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State Design Engineer
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DRAWN BY: ADAM COCHRAN

LUMINAIRE NUMBER (23)

/CE 1+04

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

# 23
LUM

LINE DESIGNATION
AND STATIONING
HUNDRED FOOT
INCREMENTS

76

35

SLOPE RATIO (4H:1V)

TOP FNDN

DITCH SECTION ALIGNMENT
STATIONING

1

/4:1

4:1 28
/
/

25

SIDE SLOPE RATIO
(4H:1V)

OFFSET TO CENTER
OF BASE (10 FEET)

10
F 1

4

2

2

FILL TO SUBGRADE
SHOULDER (2.25 FEET)

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

PLAN SHEET NUMBER (4)
STRUCTURE NOTE NUMBER
(15)

1+47

/

60

/2:1/F

8

SLOPE RATIO (2H:1V)

STRUCTURE NOTE REFERENCE

4-15

DITCH CUT TO
BOTTOM OF DITCH
(0.60 FEET)

KB

DC 0

F 3

FILL FROM CATCH POINT
TO BEGINNING OF SECOND
SLOPE (3.8 FEET)

7

DISTANCE FROM C
LTO CATCH
POINT (28.7 FEET)

FRONT

BACK

FRONT

BACK

STAKE FOR FOUNDATION OF LUMINAIRES,
SIGNALS OR SIGN STRUCTURES

STAKE FOR DITCH CONSTRUCTION

COMPOUND SLOPE LATH

FRONT

BACK

STAKE FOR DRAINAGE

FRONT

BACK

STAKE FOR CURB/GUTTER

A COPY MAY BE OBTAINED UPON REQUEST.
PORTATION.

SLOPE RATIO (2H:1V)

FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANS-

THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT
NOTE:

DISTANCE FROM C
L (14.3 FEET)

THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON

ON ISTER SU
AL LAND

BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY

E

RV
EYOR

RE 24787
G

G

D

BI

TE

T

HUNDRED FOOT
INCREMENTS

Y R.MU
LL OFWASHINM

MAON

25’ INCREMENTS

LINE STATIONING

I
SS
PROFE

468+50

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

LINE DESIGNATION

S
T
A

B2

DRAINAGE ALIGNMENT
STATIONING

OFFSET (3 FEET)

BKC

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

90

3

2:1
/ /

FG 14

0+32

73

FL

PLAN SHEET NUMBER (6)
STRUCTURE NOTE NUMBER (3)

3
F 0

26

/

SG F0

35

CUT TO FLOW LINE
(1.26 FEET)

STRUCTURE NOTE
REFERENCE

6-3

OFFSET (10 FEET)

KB

10
C 1

F 0

FILL TO SUBGRADE
(0.35 FEET)

SURVEY STAKES
STANDARD PLAN A-10.10-00
SHEET 2 OF 2 SHEETS

SLOPE LATH FOR
CURB SECTION

APPROVED FOR PUBLICATION

Pasco Bakotich III
STATE DESIGN ENGINEER

08-07-07
DATE

Washington State Department of Transportation


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).

The Brass Disc will be furnished by the State. 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. 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. 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. The Brass Disc shall be rotated so it can be read while the observer is facing north. When the concrete is set, cover the entire monument with moist earth and leave for three days. To replace a Public Land Survey System (PLSS) corner, consult a licensed Professional Land Surveyor (PLS).
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.

**NOTES**

**APPROXIMATE WEIGHTS**

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<th>COVER</th>
<th>TOTAL</th>
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<tbody>
<tr>
<td>WEIGHT</td>
<td>60 LBS</td>
<td>19 LBS</td>
<td>79 LBS</td>
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**SECTION**

**RISE RING**

**SECTION**

**COVER**

**SECTION**

**INSTALLATION**

**CONCRETE BASE**

**SOIL**

**GROUT**

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

**MONUMENT CASE AND COVER**

**STANDARD PLAN A-10.30-00**

**EFFECTIVE: JANUARY 7, 2008 TO AUGUST 3, 2008**

**SHEET 1 OF 1 SHEET**

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**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.

---

**SLOPE TREATMENT**

**STANDARD PLAN A-20.10-00**

**MARK W. MAURER**

**STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT**

**CERTIFICATE NO. 000598**

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---

**CUT SLOPE**

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<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>1.5 : 1</td>
<td>+2 : 1</td>
</tr>
<tr>
<td>+3 : 1</td>
<td>1.0'</td>
</tr>
<tr>
<td>+4 : 1</td>
<td>1.0'</td>
</tr>
<tr>
<td>+6 : 1</td>
<td>1.2'</td>
</tr>
<tr>
<td>Æ LEVEL</td>
<td>2.0'</td>
</tr>
<tr>
<td>-6 : 1</td>
<td>2.2'</td>
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<td>-4 : 1</td>
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</tr>
<tr>
<td>-3 : 1</td>
<td>3.0'</td>
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|2 : 1|+3 : 1|0.5'|D|
|+4 : 1|0.5'|D|
|+6 : 1|1.2'|0.5'|D|
|Æ LEVEL|1.5'|0.8'|
|-6 : 1|2.2'|1.0'|
|-4 : 1|2.0'|1.0'|
|-3 : 1|3.0'|1.5'|

|3 : 1|+6 : 1|0.5'|D|
|Æ LEVEL|1.0'|0.5'|
|-6 : 1|1.2'|0.5'|
|-4 : 1|1.5'|0.8'|
|-3 : 1|2.0'|1.0'|

|4 : 1|Æ LEVEL|0.5'|D|
|Æ LEVEL|1.0'|0.5'|
|-6 : 1|1.0'|0.5'|
|-4 : 1|1.2'|0.5'|
|-3 : 1|1.5'|0.8'|

|5 : 1|Æ LEVEL|0.5'|D|
|Æ LEVEL|1.0'|0.5'|
|-6 : 1|1.0'|0.5'|
|-4 : 1|1.2'|0.5'|
|-3 : 1|1.5'|0.8'|

SLOPE TREATMENT NOT REQUIRED
TYPICAL SECTION

- 10 GAGE 6" x 6" WIRE MESH REINFORCEMENT CENTERED IN CONCRETE
  (SEE STD. SPEC. 9-07.7)

- BOTTOM EDGE OF SLOPE PROTECTION FOLLOWS BOTTOM OF STITCH

- EDGE OF SHOULDER

- FOOTING

- Dummy joint (Typ.)

- Equal spacing
  6" centers min.
  8" centers max.

- Outer extremity of bridge

- Extend slope protection
  8" beyond outer extremity
  of bridge

- Footing

- Slope protection

- Concrete slope protection
  or cast-in-place cement concrete

- Pneumatically placed
  or cast-in-place cement concrete

- Slope protection extends
  6" beyond outer extremity
  of bridge

- Section A

- Section B

- Existing soil

- Embankment slope

- State of Washington
  Registered Landscape Architect

- Certificate No. 000880

- Sandra L. Salisbury

- Pasco Bakotich III

- 11-8-07

- Washington State Department of Transportation

- Approved for Publication 11-8-07
1. The design and shape of the semi-open concrete masonry unit shown is only one example of the products that may be used.

2. The Curb Section shall be used only when the lower roadway cross section requires a curb.
**High Tensile Steel Fasteners**

**3" Fabric Overlap**

**Overlapped Seam with Fasteners**

**3" Spacing**

**Overlapped Seam with Lacing**

**9 Gauge (Min.) Galvanized Lacing Wire or High Tensile Steel Fasteners Every Cell (≥ 3" Spacing)**

**6 x 19 IWRC Galvanized Horizontal Support Rope**

**4" Galvanized, Weldless Steel Ring with a Minimum Single Pull Working Limit of 10,000 lbs. (Typ.)**

**4" Galvanized, Weldless Steel Ring with a Minimum Single Pull Working Limit of 10,000 lbs. (Typ.)**

**9 Gauge (Min.) Galvanized Lacing Wire Woven Through Each Cell**

**U-Section of Wire Rope Clips must be applied to the Dead End of the Rope as Shown.**

**Slope Protection Anchor** ~ See Std. Plan 30.35.00.

**Length ~ As Shown in the Plans**

**Maximum Anchor Spacing (A)**

<table>
<thead>
<tr>
<th>H</th>
<th>A</th>
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<td>20'</td>
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**Maximum Length - Top Horizontal Support Rope (B)**

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<tr>
<td>300'</td>
<td>7'</td>
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</table>

**Notes**

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

2. Hexagonal mesh must meet minimum requirements of ASTM A 975 for gabions.

3. U-Section of wire rope clips must be applied to the dead end of the rope as shown.

4. 8 x 10 Type Double Twisted Hexagonal Wire Mesh Fabric. (See Note 2)

5. 9 Gauge (Min.) Galvanized Lacing Wire Woven Through Each Cell

6. Hexagonal mesh must meet minimum requirements of ASTM A 975 for gabions.

**Pasco Bakotich III 11-8-07**

**State of Washington**

**Registered Professional Engineer**

**35630**

**Expires November 8, 2007**

**NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.**
### STANDARD PLAN A-30.35-00

**SLOPE PROTECTION ANCHORS**

**NOTES**
- **SUGGESTED MINIMUM DEPTH**
  - MANTA RAY AS PER MANUFACTURER’S RECOMMENDATIONS
- **MINIMUM ALLOWABLE ANCHOR CAPACITY SHALL BE 20,000 LBS.**

#### TYPE 1
**DEADMAN**
**FOR USE IN SOIL**

- **GROUND LINE**
- **NATIVE BACKFILL**
- **WIRE ROPE CLIP (TYP.)**

#### TYPE 2
**DEADMAN**
**FOR USE IN SOIL**

- **GROUND LINE**
- **NATIVE BACKFILL**
- **WIRE ROPE CLIP (TYP.)**

#### TYPE 3
**DRILLABLE - GROUTABLE**
**FOR USE IN SOIL**

- **GROUND LINE**
- **NATIVE BACKFILL**
- **WIRE ROPE CLIP (TYP.)**

#### TYPE 4
**3/4” WIRE ROPE**
**FOR USE IN ROCK OR SOIL**

- **GROUND LINE**
- **MANTA RAY**
- **WIRE ROPE CLIP (TYP.)**

#### TYPE 5
**MECHANICAL ANCHOR**
**FOR USE IN SOIL**

- **GROUND LINE**
- **MANTA RAY**
- **WIRE ROPE CLIP (TYP.)**

#### TYPE 6
**DEFORMED STEEL THREADED BAR**
**FOR USE IN ROCK**

- **GROUND LINE**
- **MANTA RAY**
- **WIRE ROPE CLIP (TYP.)**
**CEMENT CONCRETE PAVEMENT JOINTS**

**PLAN VIEW**

- **FINISH OUTER EDGE OF PCCP**
  - SHOULDER WITH 1/2" R. EDGER
- **PCCP SHOULDER IF REQUIRED**

**SECTION VIEW**

- **LONGITUDINAL CONSTRUCTION JOINT**
  - TIE BAR ~ #5 BAR × 30" ON 36" CENTERS
- **TRANSVERSE CONTRACTION OR CONSTRUCTION JOINT (TYP.)**
  - SEE SECTION VIEWS
- **LONGITUDINAL CONSTRUCTION JOINT OR CONSTRUCTION JOINTS (TYP.)**
  - SEE SECTION VIEWS
- **TIE BARS ~ #5 BAR × 30"**
  - ON 36" CENTERS

**PARTIAL LANE WIDTH**

- **EXISTING PCCP**
- **PCCP**

**SECTION VIEW**

- **PCCP TO PCCP**
  - **LONGITUDINAL CONSTRUCTION JOINT**
  - **SAWED GROOVE**
    - WIDTH 3/16" MIN., 5/16" MAX.
    - OVER MIDPOINT OF BAR
  - **SEE STD. SPEC. 5-05.3(B)**

**LONGITUDINAL JOINT**

- **LANE WIDTH**

**PARTIAL LANE WIDTH**

- **EXISTING PCCP**
- **PCCP**

**SECTION VIEW**

- **PCCP TO HMA**
  - **LONGITUDINAL JOINT**
  - **SAWED GROOVE**
    - WIDTH 3/16" MIN., 5/16" MAX.
    - DEPTH 1" MIN.
  - **SEE STD. SPEC. 5-05.3(B)**

**CEMENT CONCRETE PAVEMENT JOINTS**

- **FINISH OUTER EDGE OF PCCP**
  - SHOULDER WITH 1/2" R. EDGER
  - IF SHOULDER SHALL BE UNPAVED

**SAWED GROOVE**

- **WIDTH 3/16" MIN., 5/16" MAX.**
- **DEPTH 1" MIN.**
- **SEE STD. SPEC. 5-05.3(B)**

**DOWEL BAR**

- **1 1/2" DIAM. × 18"**
- **ON 12" CENTERS**

**SAWED GROOVE**

- **WIDTH 3/16" MIN., 5/16" MAX.**
- **DEPTH 1" MIN.**
- **SEE STD. SPEC. 5-04.3(12)**

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

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

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

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

2. Longitudinal joints shall be placed on lane lines and shall be constructed and sealed in accordance with Standard Specification Section 5-05.3(8). Joints may be either a sawcut crack control joint or a construction joint. Sawcut joints shall terminate 1' - 0" before reaching edge of slab and must be saw cut as soon as possible after placement of concrete.

(A) Approach slabs less than 40' wide – no joint is required.

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

1/2" DIAM. × 1' - 6" DOWEL @ 1' - 0" O.C.
NOTE

PAINT THE METAL COMPONENTS OF THE APPROACH EXPANSION ANCHOR WITH ONE COAT OF FORMULA A-11-99 MEETING THE REQUIREMENTS OF STD. SPEC. SECTION 9-08.2.
2. 1/2 CONCRETE PAVEMENT DEPTH

9"

NEW CEMENT CONCRETE PAVEMENT
EXISTING CONCRETE PAVEMENT

DRILL 1 3/4" MIN. TO 2" MAX. DIAM. × 9" LONG HOLE IN EXISTING CEMENT CONCRETE FOR NEW DOWEL BAR (TYP.)

SEE STD. PLAN A-40.10 FOR TRANSVERSE JOINT DETAILS

SEE STD. PLAN A-40.10 FOR LONGITUDINAL JOINT DETAILS

CEMENT CONCRETE PAVEMENT REPAIR

NOTE:
1. Install tie bars along longitudinal joint between full panel replacement and existing cement concrete pavement. Tie bars are not installed between cement concrete pavement and hot mix asphalt shoulders.

2. Place polyethylene film (per AASHTO M 171) or building paper along the longitudinal joint between partial panel replacement and existing panel.
Dowel Bar Retrofit for Two Lanes
Divided Highway (One Way Traffic)

Existing Cement Concrete Pavement

Dowel Bar Retrofit for One Lane
Divided Highway (One Way Traffic)

Section A

Section B

Note: This plan is not a legal engineering document but an electronic duplicate. The original, signed by the engineer and approved for publication, is kept on file at the Washington State Department of Transportation. A copy may be obtained upon request.
PLAN VIEW

DOWEL BAR RETROFIT FOR EACH LANE
UNDIVIDED HIGHWAY (TWO WAY TRAFFIC)

SECTION D

EXISTING CEMENT CONCRETE PAVEMENT

DOWEL BAR (TYP.) ~ SEE PLACEMENT DETAIL, SHEET 3

SKEWED TRANSVERSE CONTRACTION JOINT
(SEE STD. PLAN A-40-10)

PLAN VIEW

DOWEL BAR RETROFIT FOR EACH LANE
UNDIVIDED HIGHWAY (TWO WAY TRAFFIC)

SECTION C

EXISTING CEMENT CONCRETE PAVEMENT

DOWEL BAR (TYP.) ~ SEE PLACEMENT DETAIL, SHEET 3

SKEWED TRANSVERSE
CONTRACTION JOINT
(SEE STD. PLAN A-40-10)
NOTES

1. A typical bridge overlay will remove 0.07 feet of Asphaltic Concrete Pavement (ACP) and place 0.15 feet of new Hot Mixed Asphalt (HMA). Depth of removal and placement will vary for each bridge. Total depth of HMA on the bridge shall not exceed 0.25 feet, unless shown otherwise in the plans.

2. If the existing depth of asphalt on the bridge deck is 0.25 feet, then the overlay will remove 0.15 feet of ACP and place 0.15 feet of new HMA. The existing bridge grade will remain unchanged.

3. FINAL GRADE TRANSITION: The maximum longitudinal taper slope to transition an increase in roadway grade to the new or existing bridge grade will be at most 1 inch rise to 40 feet run (1V:480H or flatter) (0.2% maximum). If several overlays are present, extended taper lengths shall be required to maintain the transition slope (1V:480H or flatter) (0.2% maximum).

4. If the ACP and membrane is to be removed from the bridge deck, see GSP 023106 for deck preparation before placing new membrane.

5. In accordance with Standard Specification 5-05.3(12), when pavement abuts bridges, the finished pavement parallel to centerline shall be uniform to a degree that no variations greater than 1/8-inch are present when tested with a 10-foot straightedge.
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.

Remove all concrete 3/4" minimum clearance around all exposed reinforcement bars in accordance with Standard Specification 5-09.3(6).

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

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.

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NOTES

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

2. The knockout diameter shall not be greater than 20". Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum. Provide a 1.5" minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification 9-04-3.

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

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

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

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

7. All pickup holes shall be grouted full after the basin has been placed.
FRAME AND VANED GRATE

FRAME AND VANED GRATE

ONE #3 BAR HOOP FOR 6" HEIGHT
TWO #3 BAR HOOPS FOR 12" HEIGHT

RECTANGULAR ADJUSTMENT SECTION

TWO #3 BAR HOOPS

REDUCING SECTION

#3 BAR EACH CORNER
#3 BAR EACH SIDE
#3 BAR EACH WAY

#3 BAR HOOP

#3 BAR EACH CORNER
18" MIN.

#3 BAR

CATCH BASIN TYPE 1L

PIPE ALLOWANCES

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

NOTES

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

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

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

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

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

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

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

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

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

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

4. The frame and grate may be installed with the flange 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 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" minimum to 2.5" maximum. Provide a 1.5" minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification 9-04.3.

### CATCH BASIN DIMENSIONS

<table>
<thead>
<tr>
<th>CATCH BASIN DIAMETER</th>
<th>WALL THICKNESS</th>
<th>BASE THICKNESS</th>
<th>MAXIMUM KNOCKOUT SIZE</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
<th>BASE REINFORCING STEEL</th>
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### PIPE ALLOWANCES

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<th>CATCH BASIN DIAMETER</th>
<th>CONCRETE</th>
<th>ALL METAL</th>
<th>CPSSP</th>
<th>SOLID WALL PVC</th>
<th>PROFILE WALL PVC</th>
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1. Corrugated Polyethylene Storm Sewer Pipe (Std. Spec. 9-05.20)
2. (Std. Spec. 9-05.12(1))
3. (Std. Spec. 9-05.12(2))
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". Attach the pipe supports to the manhole with 5/8" stainless steel expansion bolts or embed the supports into the manhole wall 2".

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

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

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

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

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

7. The shear gate shall be made of aluminum alloy in accordance with ASTM B 26 and ASTM B 275, designation ZG32A; or cast iron in accordance with ASTM A 48, Class 30B. The lift handle shall be made of a similar metal to the gate (to prevent galvanic corrosion), it may be of solid rod or hollow tubing, with adjustable hook as required. A neoprene rubber gasket is required between the riser mounting flange and the gate flange. Install the gate so that the level-line mark is level when the gate is closed. 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 and flange bolt pattern matches.
NOTES

1. See Contract for size and location of all pipes and orifices.
2. Baffle wall shall have #4 Bar at 12" spacing each way.
3. Precast baffle shall be keyed and grouted in place.
4. Bottom orifice plate shall be galvanized steel with a minimum thickness of 1/4". Attach orifice with 1/2" stainless steel bolts.
5. Upper flow orifice plates and elbows shall be aluminum, aluminized steel or galvanized steel. Galvanized steel shall have Treatment 1.
NOTE
Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.

MANHOLE DIMENSION TABLE

<table>
<thead>
<tr>
<th>Diam.</th>
<th>Wall Thickness</th>
<th>Base Thickness</th>
<th>Maximum Knockout Size</th>
<th>Minimum Distance Between Knockouts</th>
<th>Base Reinforcing Steel</th>
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<tbody>
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</tbody>
</table>

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Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.

### MANHOLE DIMENSION TABLE

<table>
<thead>
<tr>
<th>DIAM.</th>
<th>WALL THICKNESS</th>
<th>BASE THICKNESS</th>
<th>MAXIMUM KNOCKOUT SIZE</th>
<th>MINIMUM DISTANCE BETWEEN KNOCKOUTS</th>
<th>BASE REINFORCING STEEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>72&quot;</td>
<td>6&quot;</td>
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<td>12&quot;</td>
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<td>12&quot;</td>
<td>84&quot;</td>
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<td>0.39</td>
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**SEPARATE BASE**

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<td>8&quot;</td>
</tr>
<tr>
<td>MAXIMUM KNOCKOUT SIZE</td>
<td>60&quot;</td>
<td>72&quot;</td>
</tr>
<tr>
<td>MINIMUM DISTANCE BETWEEN KNOCKOUTS</td>
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<td>12&quot;</td>
</tr>
<tr>
<td>BASE REINFORCING STEEL</td>
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**INTEGRAL BASE**

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<tr>
<td>MAXIMUM KNOCKOUT SIZE</td>
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<td>72&quot;</td>
</tr>
<tr>
<td>MINIMUM DISTANCE BETWEEN KNOCKOUTS</td>
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<td>BASE REINFORCING STEEL</td>
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</table>
Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum.
NOTES
1. Precast cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.
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 15' use 72" x 8" Alternative Precast Footing.
NOTES
1. Precast concrete cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.
3. For depths over 15' use 72" x 8" Alternative Precast Footing.

DRAWN BY: ADAM COCHRAN

PRECAST FOOTING DETAIL
ALTERNATIVE PRECAST FOOTING DETAIL

CUTAWAY ELEVATION VIEW

PRECAST FOOTING WITH DRAIN HOLES – SEE NOTE 3

6" DIAM. DRAIN HOLE (TYP.)

SEEPAGE PORT
~ SEE NOTE 2

CIRCULAR FRAME (RING)
~ SEE STD. PLAN B-30.70

CIRCULAR GRATE ~ SEE STD. PLAN B-30.80

CONCERN SECTION

ADJUSTMENT SECTION (TYP.)

FINISHED SURFACE

VARIABLES

CRUSHED SURFACING BASE COURSE

UNDERGROUND DRAINAGE GEOTEXTILE, MODERATE SURVIVABILITY, CLASS A

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

GRAVEL BACKFILL FOR DRYWELL

4" CONCRETE SLAB ~ CLASS 3000

6" DIAM. DRAIN HOLE (TYP.)

48" I.D.

PRECAST FOOTING DETAIL

8" DIAM. DRAIN HOLE (TYP.)

#4 BARS

72"

48"
1. The asymmetry of the Combination Inlet shall be considered when calculating the offset distance for the 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 grate guard. Hood units shall mount 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" × 2" hex head bolts, nuts, and oversize washers. The washers shall have diameters adequate to assure full bearing across the slots.

4. When bolt-down grates are specified in the contract, provide two holes in the frame that are vertically aligned with the grate slots. Tap each hole to accept a 5/8" × -11 NC × 2" allen head cap screw. Location of bolt-down holes varies among different manufacturers. See BOLT-DOWN DETAIL, Standard Plan B-30.10.

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

6. This plan is intended to show the installation details of a manufactured product. It is not the intent of this plan to show the specific details necessary to fabricate the castings shown on this drawing.
NOTES

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

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

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

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

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

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

7. All pickup holes shall be grouted full after the inlet has been placed.
This frame is designed to accommodate 20" × 24" grates or covers as shown on Standard Plans B-30.20, B-30.30, B-30.40 and B-30.50.

1. When bolt-down grates or covers are specified in the Contract, provide two holes in the frame that are vertically aligned with the grate or cover slots. Tap each hole to accept a 5/8" - 11 NC × 2" allen head cap screw. Location of bolt down holes varies among different manufacturers.

2. Refer to Standard Specification 9-05 15(2) for additional requirements.

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NOTES

1. When bolt-down covers are specified in the Contract, provide two slots in the cover that are vertically aligned with the holes in the frame. Location of bolt-down slots varies among different manufacturers.

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

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

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

When bolt-down covers are specified in the Contract, provide two slots in the cover that are vertically aligned with the holes in the frame. Location of bolt-down slots varies among different manufacturers. Alternative reinforcing designs are acceptable in lieu of the rib design. Refer to Standard Specification 9-05.15(2) for additional requirements. For frame details, see Standard Plan B-30.10.
NOTES

1. When bolt-down grates are specified in the Contract, provide two slots in the grate that are vertically aligned with the holes in the frame. Location of bolt-down slots varies among different manufacturers.

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

3. For Frame details, see Standard Plan B-30.10.
1. When bolt-down grates are specified in the Contract, provide two slots in the grate that are vertically aligned with the holes in the frame. Location of bolt-down slots varies among different manufacturers.

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

3. For Frame details, see Standard Plan B-30.10.
1. When bolt-down grates are specified in the Contract, provide two slots in the grate that are vertically aligned with the holes in the frame. Location of bolt-down slots varies among different manufacturers.

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

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

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

When bolt-down grates are specified in the Contract, provide two slots in the grate that are vertically aligned with the holes in the frame. Location of bolt-down slots varies among different manufacturers. Refer to Standard Specification 9-05.15(2) for additional requirements. For Frame details, see Standard Plan B-30.10. The thickness of the grate shall not exceed 1 5/8".
NOTES

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

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

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

4. In lieu of blind pick notch for storm sewer manhole covers, drill three 1" diameter holes at 120° spacing.

5. Proprietary manhole covers without bottom ribs are acceptable.

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

CIRCULAR FRAME (RING) AND COVER

STANDARD PLAN B-30.70-01

EXPIRES JULY 1, 2009

Pasco Bakotich III 08-31-07
CIRCULAR GRATE

STANDARD PLAN B-30.80-00

NOTES
1. For use with Circular Frames (rings) detailed in Standard Plan B-30.70.
2. Slotted Manhole Covers are intended for use with Drywells only. See Standard Plans B-20.20 and B-20.60.

For use with Circular Frames (rings) detailed in Standard Plan B-30.70. Slotted Manhole Covers are intended for use with Drywells only. See Standard Plans B-20.20 and B-20.60.
For access and steps, 24" min.

84" or 96" flat slab top

72" flat slab top

48", 54", or 60" flat slab top

8" for manholes and catch basins shall meet the requirements of AASHTO M 199.

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.

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

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

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

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

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.

NOTES:

GRATE INLET TYPE 2
STANDARD PLAN B-35.40-00

SECTION C UNIT "K"

SECTION C UNIT "J"

SECTION D UNIT "H"

SECTION E UNIT "H"

BENDING DIAGRAM

(ALL DIMENSIONS ARE OUT TO OUT)

GRATE ~ SEE NOTE 9

BENDING DIAGRAM

(ALL DIMENSIONS ARE OUT TO OUT)

GRATE ~ SEE NOTE 9

Grate details and specifications for the Washington State Department of Transportation's Grate Inlet Type 2.
GRATE "A"
(APPROXIMATE WEIGHT 215 LBS)

GRATE "B"
(APPROXIMATE WEIGHT 215 LBS)
NOTES

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

2. When bolt-down grates are specified in the Contract, provide two slots in the grate that are centered with the holes in the frame. Location of bolt-down slots varies among different manufacturers.

3. Refer to Standard Specification 9-05.15(2) for additional requirements.
1. The top of the inlet shall be placed at ground level to present an unobstructed ditch or median section.

2. Bevel or round exposed concrete edges 1/2".

3. Pipes may enter through the knockouts at any reasonable angle provided the outside of the pipe can be contained within the knockout provided.

4. The grade line of the lowest inlet pipe shall enter the structure at an elevation equal to or higher than the grade line of the outlet pipe.

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

6. The steel angles shall be set so that each bearing bar of the grate shall have full seating on both ends. The finished top of concrete shall be even with the grate surface. For grates, see Standard Plan B-50-20.

7. The amount, type, and grade of reinforcing steel is the responsibility of the manufacturer.

8. The inside wall taper for form removal shall not result in any wall section thinner than 6" except in pipe knockout areas.

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

1. The top of the inlet shall be placed at ground level to present an unobstructed ditch or median section.

2. Bevel or round exposed concrete edges 1/2".

3. Pipes may enter through the knockouts at any reasonable angle provided the outside of the pipe can be contained within the knockout provided.

4. The grade line of the lowest inlet pipe shall enter the structure at an elevation equal to or higher than the grade line of the outlet pipe.

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

6. The steel angles shall be set so that each bearing bar of the grate shall have full seating on both ends. The finished top of concrete shall be even with the grate surface. For grates, see Standard Plan B-50.20.

7. The amount, type, and grade of reinforcing steel is the responsibility of the manufacturer.

8. The inside wall taper for form removal shall not result in any wall section thinner than 6" except in pipe knockout areas.

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

The top of the inlet shall be placed at ground level to present an unobstructed ditch or median section.

Bevel or round exposed concrete edges 1/2".

Pipes may enter through the knockouts at any reasonable angle provided the outside of the pipe can be contained within the knockout provided.

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.

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

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.

The amount, type, and grade of reinforcing steel is the responsibility of the manufacturer.

The inside wall taper for form removal shall not result in any wall section thinner than 6" except in pipe knockout areas.

Precast inlets shall be marked with the manufacturer’s identification on the inside of the structure in some readily accessible location.
PIPE ZONE BACKFILL (SEE NOTE 1)

CONCRETE AND DUCTILE IRON PIPE

PIPE ZONE BACKFILL (SEE NOTE 1)

GRANULATED BACKFILL FOR PIPE ZONE BEDDING (SEE NOTE 2)

FOUNDATION LEVEL

TRENCH WIDTH

(SEE NOTE 3)

85% O.D.

(SEE NOTE 4)

15% O.D.

TRENCH WIDTH

(SEE NOTE 3)

GRANULATED BACKFILL FOR PIPE ZONE BEDDING (SEE NOTE 2)

FOUNDATION LEVEL

TRENCH WIDTH

(SEE NOTE 3)

6" D. O.

50% O.D.

50% O.D.

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CONCRETE COLLAR OPTION

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

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

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

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

5. Use a flat Type K Coupling Band. Type K Coupling Bands with dimples are not allowed for the installation detail shown. The Coupling Band option shall only be used for extending existing pipes that have an inside diameter of 36” or less.
COUPLING BAND DIMENSION TABLE

<table>
<thead>
<tr>
<th>BAND TYPE</th>
<th>CORRUGATION</th>
<th>PITCH x DEPTH</th>
<th>PIPE DIAM.</th>
<th>MIN. W</th>
<th>GASKET TYPE</th>
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<td>2 2/3 x 1/2</td>
<td>3 x 1</td>
<td>12 ~ 84</td>
<td>12</td>
<td>SLEEVE</td>
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<tr>
<td>F</td>
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<td>12 ~ 84</td>
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<td>12 ~ 48</td>
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</tr>
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<td>K</td>
<td>2 2/3 x 1/2</td>
<td>* 3 x 1</td>
<td>54 ~ 84</td>
<td>24</td>
<td>SLEEVE</td>
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<tr>
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<td>2 2/3 x 1/2</td>
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<td>12 ~ 48</td>
<td>10 1/2 O-RING</td>
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<td>12 ~ 48</td>
<td>O-RING</td>
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<td>K</td>
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<td>* 3 x 1</td>
<td>54 ~ 84</td>
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* PIPE ARCH ONLY

EXISTING PIPE WITH HELICAL END

NEW PIPE EXTENSION WITH REFORMED END OR HELICAL END

COUPLING BANDS FOR CORRUGATED METAL PIPE

STANDARD PLAN B-60.40-00

Sheet 1 of 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 06-01-06

STATE DESIGN ENGINEER

Washington State Department of Transportation

EFFECTIVE: JANUARY 7, 2008 TO AUGUST 3, 2008

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

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

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).

Designed for H-20 live load and maximum allowable soil pressure of 6 Kips per square foot.
**HEADWALL ~ BOTH ENDS**

EMBANKMENT SLOPE

LENGTH IN A MULTIPLE OF 2'

**INVERT TREATMENT**

- SEE STD. SPEC. 7-03.3(4)

**SIDE VIEW ~ PLACEMENT**

---

**DIMENSIONS**

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<th>RISE</th>
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<td>AB AB AB AT AB</td>
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<td>16' - 9&quot;</td>
<td>16' - 3&quot;</td>
<td>58 40 65 17</td>
<td>89 167 38 247</td>
<td>43 4 10 4 15 4 19</td>
</tr>
<tr>
<td>17' - 3&quot;</td>
<td>16' - 3&quot;</td>
<td>57 38 65 19</td>
<td>90 174 47 215</td>
<td>55 4 10 4 14 4 18</td>
</tr>
<tr>
<td>18' - 4&quot;</td>
<td>16' - 11&quot;</td>
<td>56 42 65 18</td>
<td>99 157 47 249</td>
<td>53 4 10 4 13 4 18</td>
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<tr>
<td>19' - 2&quot;</td>
<td>17' - 2&quot;</td>
<td>54 43 65 18</td>
<td>105 156 47 254</td>
<td>53 4 10 4 13 4 18</td>
</tr>
<tr>
<td>19' - 6&quot;</td>
<td>17' - 7&quot;</td>
<td>53 46 65 16</td>
<td>107 158 47 297</td>
<td>50 4 10 4 17 4 17</td>
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<tr>
<td>20' - 4&quot;</td>
<td>17' - 10&quot;</td>
<td>53 46 65 16</td>
<td>113 156 47 314</td>
<td>52 4 10 4 18</td>
</tr>
</tbody>
</table>

**ALLOWABLE HEIGHTS OF COVER**

<table>
<thead>
<tr>
<th>CORRUGATED METAL THICKNESS</th>
<th>12 GAGE</th>
<th>10 GAGE</th>
<th>8 GAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIN</td>
<td>MAX</td>
<td>MIN</td>
<td>MAX</td>
</tr>
<tr>
<td>26'</td>
<td>25'</td>
<td>24'</td>
<td>23'</td>
</tr>
</tbody>
</table>

Span and rise dimensions are measured to the inside crests of corrugations and may vary slightly depending on manufacturer.

**INVERT TREATMENT**

- SEE STD. SPEC. 7-03.3(4)

**EQUIPMENT UNDERPASS**

STANDARD PLAN B-65.40-00

**NOTE:** THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
END SECTION LENGTH SHALL BE AT LEAST SIX TIMES THE DIAMETER OF THE PIPE (SEE STD. SPEC. 7-02.3(1))

4H:1V OR STEEPER

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

4H:1V OR STEEPER

NOTES

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

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

THERMOPLASTIC PIPE

4" MAX

CONCRETE PIPE

4" MAX

METAL PIPE

4" MAX

FOR CULVERTS 30" DIAMETER OR LESS

BEVELED END SECTIONS

STANDARD PLAN B-70.20-00

EFFECTIVE: JANUARY 7, 2008 TO AUGUST 3, 2008

Harold J. Peterfeso 06-01-06

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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### Notes:

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

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

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

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

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

### Design A

**Connection to Metal Pipe**

- **Type 1**
  - **Connection to Concrete Pipe**
    - **Inlet End Only**
      - **Design B**
        - **Connection to Concrete Pipe**
          - **Outlet End Only**

**Design B**

**Design C**

**Connection to Metal or Concrete Pipe**

**FLARED END SECTIONS**

**STANDARD PLAN B-70.60-00**

---

**Design B**

**Connection to Concrete Pipe**

**Outlet End Only**

---

**Notes**

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

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

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

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

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

---

**Notes**

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

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

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

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

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

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

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

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

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

CLASS 3000 CONCRETE

ANCHOR BOLTS - EQUALLY SPACED, 24" MAX. CENTER TO CENTER (SEE NOTE 3)

ANCHOR BOLT DETAIL

ANCHOR BOLT (TYP.) - SEE DETAIL & NOTE 3

3/4" BOLT 2 1/2"

PIPPES AND STRUCTURAL PLATE PIPES

FILL SLOPE - VARIABLE

D+D/2 OR S+S/2

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

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

3. Bevel culvert pipe to match side slope.

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

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

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

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

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

FIELD CUT PIPE BEVEL

CULVERT PIPE OR PIPE ARCH

SECTION C

3/8" × 4" × 10" STEEL PLATE

3" × 3" × 5/16" STRUCTURAL TUBING

5 3/4" × 3/4" DIAM. THREADED ROD, 4" EMBEDMENT WITH HEX HEAD NUT (TYP.)

3 1/2" × 3 1/2" BLOCKOUT (TYP.) ~ FIELD-CUT CULVERT TO MATCH BLOCKOUT IN HEADWALL

FIELD CUT PIPE BEVEL

SLOPE MATCH SIDE SLOPE; 6H:1V PREFERRED, NOT STEEPER THAN 4H:1V.
1. All pipes or pipe arches shall be attached as shown in CONNECTOR DETAIL.

2. When a Toe Plate Extension is required, it shall be the same gage as the End Section. The dimensions shall be 6" high, and 6" less than the overall width. Install centered, and lapped 2", with 3/8" × 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>A</th>
<th>H</th>
<th>W</th>
<th>OVERALL WIDTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>109</td>
<td>12</td>
<td>9</td>
<td>66</td>
</tr>
<tr>
<td>42</td>
<td>109</td>
<td>16</td>
<td>12</td>
<td>60</td>
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<tr>
<td>48</td>
<td>109</td>
<td>16</td>
<td>14</td>
<td>152</td>
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<td>54</td>
<td>109</td>
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</tr>
<tr>
<td>60</td>
<td>109</td>
<td>16</td>
<td>16</td>
<td>200</td>
</tr>
</tbody>
</table>

**Metal End Sections for Arched Pipes**

<table>
<thead>
<tr>
<th>PIPE ARCH DIMENSIONS</th>
<th>MINIMUM THICKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPAN (IN.)</td>
<td>INCHES</td>
</tr>
<tr>
<td>30</td>
<td>0.079</td>
</tr>
<tr>
<td>36</td>
<td>0.099</td>
</tr>
<tr>
<td>42</td>
<td>0.109</td>
</tr>
<tr>
<td>48</td>
<td>0.109</td>
</tr>
<tr>
<td>54</td>
<td>0.109</td>
</tr>
<tr>
<td>60</td>
<td>0.109</td>
</tr>
</tbody>
</table>

**Notes**

- SAFETY BARS (TYP.) ~ SEE NOTE 5
- SAFETY BARS END TREATMENT ~ SEE DETAIL
- CROSS DRAINAGE BAR DETAIL ~ SEE DETAIL
- PIPE ARCH RISE (IN.)

**Standard Plan B-80.20-00**

TAPERED END SECTION WITH TYPE 3 SAFETY BARS

Harold J. Peterfeso 06-08-06

Approved for Publication

Washington State Department of Transportation
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.

### METAL END SECTIONS FOR CIRCULAR PIPES

<table>
<thead>
<tr>
<th>PIPE DIAM. (INCHES)</th>
<th>MINIMUM THICKNESS</th>
<th>DIMENSIONS (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INCHES</td>
<td>GAGE</td>
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<tr>
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<td>.064</td>
<td>16</td>
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<tr>
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<td>.064</td>
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</tr>
<tr>
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<td>12</td>
</tr>
<tr>
<td>60</td>
<td>.109</td>
<td>12</td>
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</table>

### METAL END SECTIONS FOR ARCHED PIPES

<table>
<thead>
<tr>
<th>EQUIV. PIPE ARCH</th>
<th>ARCH DIMENSIONS (INCHES)</th>
<th>MINIMUM THICKNESS</th>
<th>DIMENSIONS (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SPAN (IN.)</td>
<td>RISE (IN.)</td>
<td>OVERALL WIDTH</td>
</tr>
<tr>
<td>18</td>
<td>21</td>
<td>.064</td>
<td>16</td>
</tr>
<tr>
<td>21</td>
<td>24</td>
<td>.064</td>
<td>16</td>
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<td>24</td>
<td>28</td>
<td>.064</td>
<td>16</td>
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<td>35</td>
<td>.079</td>
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<td>.109</td>
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<td>.109</td>
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</tr>
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<td>.109</td>
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</tr>
<tr>
<td>72</td>
<td>83</td>
<td>.109</td>
<td>12</td>
</tr>
</tbody>
</table>

30" AND LARGER END SECTIONS MAY BE MULTIPLE PANELS. SEAMS SHALL BE LAPED 2" AND JOINED W/ 3/8" x 3/4" BOLTS ON 6" MAX. CTRS.

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

1/2" DIAM. THREADED ROD OVER TOP OF END SECTION SIDE LUGS TO BE BOLTED TO END 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.

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

VARIES

A

CONCRETE SIDEWALK

PLANTING STRIP

ROADWAY

CONCRETE CURB

TYPE MAY VARY

MIN. SLOPE

TEMPORARY CAP AT EDGE OF RIGHT OF WAY, UNLESS OTHERWISE DIRECTED IN CONTRACT

4" DRAIN PIPE

DUMMY JOINT

WIRE MESH REINFORCEMENT

5 x 5.0 x 5.0 (4 GAGE)

4 x 4.0 x 4.0 (6 GAGE)

SEE STD. SPEC. 9-07.7

1/2" MINIMUM COVER

INVERT OF DRAIN SHALL BE AT OR ABOVE GUTTER LINE

ROADWAY

ISOMETRIC

CONCRETE CURB

TYPE MAY VARY

PLANTING STRIP

VARIES

4" DRAIN PIPE

CAPPED AT EDGE OF R/W

R/W LINE

CONCRETE SIDEWALK

WIRE MESH

4" MIN.

6" MAX.

6" (TYP.)

12" (TYP.)

SECTION A

STANDARD PLAN B-82.20-00

RESIDENTIAL STORM DRAIN, UNDER SIDEWALK

EXPIRES JULY 1, 2007

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

DRAWN BY: ADAM COCHRAN

APPROVED FOR PUBLICATION

DATE STATE DESIGN ENGINEER

Washington State Department of Transportation

SHEET 1 OF 1 SHEET

Harold J. Peterfeso 06-01-06
NOTES
1. Install sewer saddle with gasket and stainless steel clamps for connection to existing sewers. Install wye or tee sewer fitting with gaskets for new sewer installations.
2. Mark location of sewer stub in accordance with Contracting Agency requirements.

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45° BEND

4" OR 6" SEWER PIPE (SEE CONTRACT)

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

45° BEND

TEE

SEWER MAIN

FOR SANITARY SEWER USE

STANDING SIDE SEWER CONNECTION

STANDARD PLAN B-85.30-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 06-01-06

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
SECTION A
CAST IRON RING AND COVER

FOR SANITARY SEWER USE

8 INCH SEWER CLEAN-OUT
STANDARD PLAN B-85.40-00

APPROVED FOR PUBLICATION

Harold J. Peterfeso 06-08-06
DROP CONNECTIONS

STANDARD PLAN B-85.50-00

FOR SANITARY SEWER USE

DUCTILE IRON DROP CONNECTION

CONCRETE ENCASED DROP CONNECTION

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

BACKFILL WITH COMPACTED MATERIAL AS DIRECTED BY ENGINEER

CEMENT CONCRETE CLASS 3000 POURED IN PLACE

FLEXIBLE JOINT

D.I.P. 90° BEND CLEARANCE 2"

ELEVATION

Cement concrete class 3000 block poured in place

D.I.P. TEE CLEARANCE 2" TYPICAL MANHOLE

FLEXIBLE JOINT

6" MIN.

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

MORTAR DAM OR PLUG AS REQUIRED BY ENGINEER

TYPICAL MANHOLE

TYPICAL MANHOLE

TEE

2" MIN

2" MIN

20' - 0" MAX.

6" MIN.

6" MIN.

1" MAX.

6" MIN.

20' - 0" MAX.

6" MIN.

All pipe, except ductile iron pipe, shall be concrete encased.
NOTES
1. Steel tie rods to be heavily coated with asphalt after installation.
2. Restrained joints may be substituted for tie rods.
3. Surface of ground within 36" of hydrant shall be smooth.
NOTES
1. Coat the pipe threads with asphalt after assembly.
2. All piping shall be galvanized steel.
3. Valve and piping to valve shall be 2" unless otherwise noted in the Contract.
4. Locate blowoff outlet near property corner if possible.

2 INCH BLOWOFF ASSEMBLY
STANDARD PLAN B-90.20-00

DRAWN BY:  MARK SUJKA

ELEVATION

PLAN

PROPERTY LINE

METER BOX
(LOCATE IN FIELD)

BLOWOFF OUTLET

CONCRETE THRUST BLOCKING

STREET ELBOW

TWO CONCRETE BLOCKS
4" × 8" × 16" (TOP BLOCK NOT SHOWN)

TAPPED CAP OR PLUG

WATER MAIN

VALVE MARKER POST

THRUSt BLOCKING SHALL CLEAR PIPING

BLOCKING SHALL BE CLEAR OF BLOWOFF PIPING

36" MIN.

VARIeS

2" FEMALE × IP × 2 1/2" MALE NST
HOSE CONNECTION WITH CAP
(BLOWOFF OUTLET)

METER BOX
(LOCATE IN FIELD)

DRILL 1/8" HOLE

15 POUND ASPHALTIC FELT

GRAVEL POCKET

SOLID CONCRETE BEARING BLOCK ~ 4" × 8" × 16"

GATE VALVE WITH 2" SQUARE OPERATING NUT

VALVE BOX AND LID ~ CAST IRON

CONCRETE BLOCK
4" × 8" × 16"
NOTES

1. The size of the combination air release / air vacuum valve shall be specified in the Contract. The piping and valves shall be the same size as the combination air release / air vacuum valve.

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

<table>
<thead>
<tr>
<th>SIZE</th>
<th>TEST PRESSURE (PSI)</th>
<th>THRUST AT FITTINGS IN POUNDS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>4&quot;</td>
<td>250</td>
<td>3,140</td>
</tr>
<tr>
<td>6&quot;</td>
<td>250</td>
<td>7,070</td>
</tr>
<tr>
<td>8&quot;</td>
<td>250</td>
<td>12,565</td>
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<tr>
<td>10&quot;</td>
<td>250</td>
<td>19,635</td>
</tr>
<tr>
<td>12&quot;</td>
<td>250</td>
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<td>250</td>
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<tr>
<td>16&quot;</td>
<td>250</td>
<td>50,265</td>
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</table>

<table>
<thead>
<tr>
<th>SOIL TYPE</th>
<th>SAFE BEARING LOAD (PSF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUCK, PEAT, ETC.</td>
<td>0</td>
</tr>
<tr>
<td>SOFT CLAY</td>
<td>1,000</td>
</tr>
<tr>
<td>SAND</td>
<td>2,000</td>
</tr>
<tr>
<td>SAND AND GRAVEL</td>
<td>3,000</td>
</tr>
<tr>
<td>SAND AND GRAVEL CEMENTED WITH CLAY</td>
<td>4,000</td>
</tr>
<tr>
<td>HARD SHALE</td>
<td>10,000</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>PIPE DIAM.</th>
<th>TEST PRESSURE (PSI)</th>
<th>BEND ANGLE</th>
<th>CONCRETE VOLUME (ft³)</th>
<th>CUBE SIZE (f³)</th>
<th>TIE ROD DIAM.</th>
<th>TIE ROD EMBEDMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>250</td>
<td>11.25°</td>
<td>6</td>
<td>1.8</td>
<td>5/8&quot;</td>
<td>17&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22.5°</td>
<td>12</td>
<td>2.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>45°</td>
<td>22</td>
<td>2.8</td>
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**NOTE:**
Steel tie rods to be heavily coated with asphalt after installation.
INLET PLACEMENT
AT BRIDGE END

NOTES

1. The beam guardrail type, post type, beam guardrail transition section type, connection type, and bridge traffic barrier shape may vary from that shown on this plan.

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

3. With Beam Guardrail Transition Section Types 2, 4, and 5, use Extruded Curb Types 1, 2, 4, 4a, 5, or 5a.

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

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

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

3. Beam Guardrail post spacing for Types 1 through 4 shall be 6' - 3" on centers.

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

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

6. When “Beam Guardrail Type 1 – ___ Ft. Long Post” is specified in the Contract, the post length shall be stamped with numbers, 1 1/2" min. high and 1/4" deep, at the location where the letter “H” is shown in the ASSEMBLY DETAIL. After installing a Long Post, it shall be the Contractor’s responsibility to ensure that the stamped numbers are still legible and 1/4" deep.

7. Existing posts shall not be raised. Replace posts as necessary to achieve required guardrail height.
STANDARD PLAN C-1a

BEAM GUARDRAIL

THRIE BEAM EXPANSION SECTION

6 1/4"

Ground line

2"

4 1/4"

See Note 1

THRIE BEAM RAIL ELEMENT

6' 3"

2"

4 1/4" 4 1/4" 4 1/4" 4 1/4"

29/32" x 1 1/8" splice

bolt slots (TYP)

2"

4 1/4"

5/8"x18" button head bolts with 7/32" oval grip

and recessed hex nut

(Twelve required per splice)

1 3/4" post

bolt washer

5/8"x18" button head bolts with 7/32" oval grip

and recessed hex nut

(Twelve required per splice)

WOOD POST ASSEMBLY

THRIE BEAM ASSEMBLY

NESTED THRIE BEAM (Nested for Type 11)

See Note 1

NOTES

1. Type 10 posts shall be 6x8 timber or W6x9.
   Type 11 posts shall be 10x10 timber or W6x15.
   For details, see “Standard Plan “Beam Guardrail Posts and Blocks.”

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

RAIL ASSEMBLY

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON
APPROVED FOR PUBLICATION
DEPUTY STATE DESIGN ENGINEER DATE
RBA1/99

TYPE 10

5/8" x 1 1/4" button head splice bolt with
7/32" oval grip and recessed hex nut
(Twelve required per splice)

See Note 1

WOOD POST ASSEMBLY

RAIL ASSEMBLY

5/8" x 18" button head bolts with 7/32" oval grip

and recessed hex nut

Steel post assembly

5/8" x 10" button head bolts with 7/32" oval grip

and hex nuts and cut washers

Wood block for steel post

Thrie beam guardrail
(Nested for Type 11)

See Note 1

STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
15224
EXPIRES MAY 3, 2000

CLIFFORD E. MANSFIELD

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PORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
**WOOD POST**

**STEEL POST**

**W-Beam Wood Block for Steel Post**

**THREE BEAM WOOD BLOCK for Wood Post**

**THREE BEAM WOOD BLOCK for Steel Post**

---

**POST LENGTH TABLE**

<table>
<thead>
<tr>
<th>GUARDRAIL TYPE</th>
<th>LENGTH</th>
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<tbody>
<tr>
<td>1 through 4</td>
<td>6'-0&quot;</td>
</tr>
<tr>
<td>10 or 11</td>
<td>6'-6&quot;</td>
</tr>
</tbody>
</table>

---

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NOTES
1. Wood posts for all guardrail placement plans shall be 6x8 except where noted otherwise.
2. Lower hole is for rub rail of Type 2 and Type 3 Beam Guardrail.
3. W6x9 steel posts and timber blocks are alternates for 6x8 timber posts and blocks. W6x15 steel posts and timber blocks are alternates for 10x10 timber posts and blocks.
4. Holes shall be located on approaching traffic side of web.
5. When contract requires "Beam Guardrail Type 1, __ Foot Long Post," the steel post length shall be marked with numbers to ensure permanent identification at the location where the letter "H" is shown on the detail. The marking shall be 1 1/2" MIN height.
6. Soil plate may be welded to foundation tube. If so, holes in soil plate and foundation tube may be omitted.

CONTROLLED RELEASING TERMINAL (CRT) POST

WOOD BREAKAWAY POST

THREE BEAM

SOIL PLATE

W-BEAM

FOUNDATION TUBE

G-2 POST

NOTES
- 5/8" x 1/2" bolt, nut and washer
- 5/8" x 5/8" bolts, nuts and washers (two required per post)
- welded option for steel tube and soil plate connection (see note 6)
- Soil plate may be welded to foundation tube. If so, holes in soil plate and foundation tube may be omitted.

BEAM GUARDRAIL POSTS AND BLOCKS
STANDARD PLAN C-1b
SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION
9/2003
RICHARD BASTOW

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EXPRESSES JULY 24, 2004

STATE DESIGN ENGINEER
Washington State Department of Transportation

RICHARD BA DOW
INB
EXPIRES JULY 24, 2004
34042

Harold J. Peterfeso 10-31-03

STATE OF WASHINGTON
REGISTE R PROFESSIONAL ENGINEER
EXPIRES JULY 24, 2004

Washington State Department of Transportation
NOTES:

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

G-2 Post (See Note 11)

DETAIL A

DETAIL B

1/2" DIA x 1 1/2" hex head bolt with hex nut and 1 3/4" square x .135" washer

5/8" DIA x 1 1/2" hex head bolt with hex nut. Guardrail rests on top of bolt.

Beam Guardrail

Standard Plan C-1c

Approve for Publication

Donald K. Nelson

State Design Engineer

Date

Washington State Department of Transportation

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

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

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

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

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

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

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

**Flare Rate Table**

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<th>POSTED SPEED (MPH)</th>
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<td>12 : 1</td>
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<tr>
<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>

**Guardrail Placement**

**Standard Plan C-2a**

**Drawing by:** Mark Sujka

**Date:** 05/2006

**Effective:** January 7, 2008 to August 3, 2008
1. Varying flare rates and structure widths may require a length of Beam Guardrail Type 1 or 2 between the Beam Guardrail Type 3 or 4 and the Transition on one side, and the Beam Guardrail Type 10 on the other. For Beam Guardrail Type 2 or 3, terminate the rub rail (channel rail) at the first 6×8 post of the Beam Guardrail Transition Section Type 16, and by lapping it behind the second 6×8 post on the Beam Guardrail Type 10 side, or as approved by the Engineer.

2. Use the minimum number of nested 12' - 6" thrie beam sections needed to span the structure. This run may extend past the end of the structure, and an excess of 6' - 3" maximum is acceptable. If the last 12' - 6" section extends more than 6' - 3", use a nested 6' - 3" thrie beam section in its place.

3. The Beam Guardrail Transition Section Type 16 on this end shall terminate at a 10×10 post. Place nested thrie beam with 10×10 posts at 3' - 1 1/2" maximum spacing between the end of the transition and the structure.

4. If full post depth cannot be achieved due to the structure foundation, post length shall be adjusted to the top of foundation. The Beam Guardrail Type 11 post height shall be 2' - 9".

---

**FLARE RATE TABLE**

<table>
<thead>
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<td>15 : 1</td>
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<td>14 : 1</td>
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<tr>
<td>45</td>
<td>10 : 1</td>
</tr>
<tr>
<td>40 OR LESS</td>
<td>9 : 1</td>
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</tbody>
</table>

---

**GUARDRAIL PLACEMENT**

**STANDARD PLAN C-2b**

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NOTE

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

STANDARD PLAN C-2d

NOTES
1. SRT Terminal shown, for terminal type and details, see Contract or applicable Standard Plan(s).
2. Post spacing is 6' - 3" except where noted.
3. Type 4 anchor required. See applicable Standard Plan(s).
4. The slope from the edge of the shoulder into the face of the guardrail should not exceed 10H:1V when the guardrail is within 12' - 0" from the edge of the shoulder.

CASE 10A

CASE 10B

CASE 10C
NOTES

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

2. Beam Guardrail Anchor Type 4 (W-Beam) or Type 4 (Thrie Beam) required.

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

4. If the distance from end of Beam Guardrail Type 11 to the structure exceeds 6'-3" using 12'-6" thrie beam sections, add a 6'-3" nested section of thrie beam with 10x10 posts, spaced at 3'-1 1/2" maximum, and begin transition.

5. Guardrail post spacing for Beam Guardrail Type 11 past the end of the structure shall be spaced at 6'-3" maximum with 6x8 post and standard block.

6. Attach the standard wood block to the rail using two 5/8" x 4" lag bolts.
GUARDRAIL PLACEMENT
WEAK POST INTERSECTION DESIGN (8' - 6" MAX RADIUS)

CASE 12 _D
(see Note 1)

CASE 12 _C
(see Note 2)

CASE 12 _A_
(see Note 3)

CASE 12 _B_
(see Note 7)

IDENTIFICATION PLATE
MOUNTING DETAIL
(see Note 5)

IDENTIFICATION PLATE
(see Note 5)

NOTES
1. See Contract for guardrail connection to bridge rail and concrete barrier.
2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
3. Attach to rail with 3/8" x 9" long bolt, nut and 1/2" washer on back of post.
4. For terminal type and details, see Contract and applicable Standard Plans.
5. Radius dimensions shall be etched into plate replacing the letters "HH", shown on the Identification Plate Detail. Digits shall be 1 1/2" MIN height and 3/4" MAX width. The plate shall be galvanized after etching.
6. The guardrail radius Identification Plate shall be mounted on the back side of the Rail Element using the lowest splice bolt at the P.C. of the guardrail radius.
7. First letter of case designation placement indicates end treatment on side road. Second letter indicates end treatment on main road. For instance, a Type 5 Anchor on the side road and a bridge connection on the main road would be Case 12 AC.
8. For the 8'- 6" radius, five CRT posts are required including the CRT post at point B.
9. For CRT post details, see Standard Plan "Beam Guardrail Posts and Blocks".

Needle: ICRT post with block
Beam Guardrail Anchor Type 7
X Spaces at 6'- 3" (1 space MIN)

Bean Guardrail Anchor Type 7
ICRT post with block
X Spaces at 6'- 3" (1 space MIN)

Point B
CRT Post
1/4" Hole
Steel plate

5/16" Bolt
1 1/2" Washer

1/4" Hole

2 3/4" MIN

1 1/8" MIN

5"

5/16" Bolt
1 1/2" Washer

Length = 25'

6'- 3" Post spacing (TYP)  

3/4" Hole with snug fitting insert, 3/8" ID, 7 1/2" long

Y' Hole

IDENTIFICATION PLATE
(see Note 5)

SECTION A-A

Point A

PC
CLEAR AREA

X Spaces at 6'- 3" (1 space MIN)

Type 5 Transition pay limit

Terminal pay limit (SRT shown) see Note 4

Terminal pay limit (SRT shown) see Note 4

Radius dimensions shall be etched into plate replacing the letters "HH", shown on the Identification Plate Detail. Digits shall be 1 1/2" MIN height and 3/4" MAX width. The plate shall be galvanized after etching.

First letter of case designation placement indicates end treatment on side road. Second letter indicates end treatment on main road. For instance, a Type 5 Anchor on the side road and a bridge connection on the main road would be Case 12 AC.

For the 8'- 6" radius, five CRT posts are required including the CRT post at point B.

For CRT post details, see Standard Plan "Beam Guardrail Posts and Blocks".
1. See Contract Plans for guardrail connection to bridge rail and concrete barrier.

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

3. Fewer CRT posts are required for smaller radii; include CRT Post at Point B. Attach guardrail to post with a 5/16" x 9" long bolt, a 3/8" I.D. x 7 1/2" snug fitting insert, and a 1 1/2" washer with nut on back of post.

4. For terminal type and details, see Contract and applicable Standard Plan(s).

5. Radius dimensions shall be etched into plate replacing the letters "HH", shown on the GUARDRAIL RADIUS IDENTIFICATION PLATE DETAIL. Digits shall be 1 1/2" minimum height and 3/4" maximum width. Plate shall be galvanized after etching.

6. The guardrail radius Identification Plate shall be mounted on the back side of the rail element using the lowest splice bolt nearest the PC of the guardrail radius (See View A).

7. The first letter of the Case Designation indicates the end treatment on the side road. The second letter indicates the end treatment on the main road. For example, a Type 5 Anchor on the side road with a bridge connection on the main road would be Case 13 AC, the combination shown.

8. For CRT post details, see Standard Plan C-1b.
NOTES
1. For Service Level 1, Weak Post Bridge Rail System, see Contract.
2. SRT Terminal shown. For Terminal type and details, see Contract and applicable Standard Plan(s).
3. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
4. See Standard Plan "Beam Guardrail Posts and Blocks".

CASE 14

Direction of Traffic
NOTES

1. SRT Terminal shown. For Terminal type and details, see Contract and applicable Standard Plans.

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


CASE 15

Terminal pay limit (see Note 1)
Beam Guardrail pay limit
Terminal Pay Limit (see Note 1)

Modified Beam Guardrail—(see Detail and Note 3)

Spaces of 6'-3"
0 Spaces MIN
(TYP)

See Note 2

Box culvert

Direction of Traffic

6'-3"
6'-3"
6'-3"
6'-3"

See Note 3

25’ (see Note 4)

NOTES

1. SRT Terminal shown. For Terminal type and details, see Contract and applicable Standard Plans.

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


Donald K. Nelson 3/28/97

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One Way Traffic

See Note 5

Edge of shoulder

See Table

Varies (see contract)

CASE 16

Beam Guardrail pay limit

Terminal pay limit (SRT shown) (see Note 3)

Two Way Traffic

See Table

Varies (see contract)

Two Way Traffic

CASE 17

Beam Guardrail pay limit

Terminal pay limit (SRT shown) (see Note 3)

Anchor pay limit (see Note 1)

Beam Guardrail pay limit

Curb face extension line

Edge of shoulder

See Note 5

Varies (see contract)

CASE 18

One Way Traffic

See Note 4

Bridge end

See Table

Rate     Posted Speed
MPH
15:1    70
14:1    60
12:1    55
11:1    50
10:1    45
9:1     40 or Less

NOTES

1. Type 4 anchor required. For details, see applicable Standard Plan(s).

2. For terminal type and details, see contract and applicable Standard Plan(s).

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

4. For guardrail to bridge rail connection, see applicable Standard Plan(s) or Contract.

5. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1 when the guardrail is within 12'-0" from the edge of the shoulder. Beyond 12'-0", the slope shall not be steeper than 6:1.
**CASE 20**

**GROUND LINE**

**SECTION A**

**SECTION B**

**SINGLE W-BEAM RAIL ELEMENT**

**NESTED W-BEAM RAIL ELEMENTS**

**GUARDRAIL PLACEMENT**

**18'-9" SPAN**

**STANDARD PLAN C-2n**

**审批日期**

**2001年7月30日**

**Clifford E. Mansfield**

**Washington State Department of Transportation**

**EXPIRES MAY 3, 2002**

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**NOTES**

1. See Standard Plan C-1b for additional details.

2. One-way traffic layouts are identical to the two-way layout with the exception that only the posts trailing the span need to be CRT's with double blocks.

---

**CASE 21**

**ONE-WAY TRAFFIC LAYOUT**

- CRT POSTS WITH TWO BLOCKS (SEE NOTE 2)
- OBSTRUCTION

**ELEVATION**

- TYPE 1 GUARDRAIL POSTS AND BLOCKS
- CONTROLLED RELEASING TERMINAL (CRT) POSTS WITH TWO WOOD BLOCKS
- TYPE 1 GUARDRAIL POSTS AND BLOCKS

**PLAN**

- TWO-WAY TRAFFIC
- 100' OF NESTED W-BEAM RAIL ELEMENTS
- "BEAM GUARDRAIL PLACEMENT - 25' SPAN" PAY LIMIT

---

**DRAWN BY:** MARK SUJKA

---

**APPROVED FOR PUBLICATION**

Clifford E. Mansfield  07-13-01

STATE DESIGN ENGINEER

Washington State Department of Transportation

---

**STATE OF WASHINGTON**

**REGISTERED PROFESSIONAL ENGINEER**

15224  CLIFFORD E. MANSFIELD

EXPIRES MAY 3, 2002

---

**GUARDRAIL PLACEMENT**

**25' SPAN**

**STANDARD PLAN C-2o**

---

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NOTES
1. See Contract for transition and connection type.
2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
3. Guardrail installation shall be Beam Guardrail Type 1 with standard post and block.
4. First letter of case designation indicates end treatment on side road. Second letter indicates end treatment on main road. For instance a terminal on the side road and a bridge connection on the main road would be Case 22 BC.
5. For terminal type and details, see Contract and applicable Standard Plans.
6. Radius dimensions shall be etched into plate replacing the letters "HH" shown on the Identification Plate Detail. Digits shall be 1 1/2" MIN height and 3/4" MAX width. Plate shall be galvanized after etching.
7. The guardrail Identification Plate shall be mounted at the lower splice bolt on the back side of the rail element at the PC of the guardrail radius.
CASE 23
CABLE BARRIER TO W-BEAM FLARED TERMINAL

NOTES
1. The Design Layout Line shall intercept the Cable Barrier at a point that is at least 12 feet (perpendicular) from the opposite Edge of Traveled Way.
2. A 20:1 or flatter taper shall be used when adjusting the alignment of the Cable Barrier, and is required when the W-Beam Guardrail face is less than 12 feet from the Edge of Traveled Way.
3. For Cable Barrier Type 3 Transition to W-Beam Guardrail details, see Standard Plan C-3d.

CASE 24
CABLE BARRIER TO W-BEAM BULL NOSE

NOTES
1. See Note 1
2. See Note 2
3. See Note 3
NOTES

1. The Design Layout Line shall intercept the Cable Barrier at a point that is at least 12 feet (perpendicular) from the opposite Edge of Traveled Way.

2. A 20:1 or flatter taper shall be used when adjusting the alignment of the Cable Barrier, and is required when the W-Beam Guardrail face is less than 12 feet from the Edge of Traveled Way.

LEGEND

- Design Layout Line

CASE 25

The Design Layout Line shall intercept the Cable Barrier at a point that is at least 12 feet (perpendicular) from the opposite Edge of Traveled Way.

A 20:1 or flatter taper shall be used when adjusting the alignment of the Cable Barrier, and is required when the W-Beam Guardrail face is less than 12 feet from the Edge of Traveled Way.
1. The Design Layout Line shall intercept the Cable Barrier at a point that is at least 12 feet (perpendicular) from the opposite Edge of Traveled Way.

2. A 20:1 or flatter taper shall be used when adjusting the alignment of the Cable Barrier, and is required when the W-Beam Guardrail face is less than 12 feet from the Edge of Traveled Way.

3. For Cable Barrier Type 3 Transition to W-Beam Guardrail details, see Standard Plan C-3d.
1. Extend the Cable Barrier Type 2 until the Design Layout Line clears the opposing Cable Barrier Type 2 and intercepts the Cable Barrier Type 3 at a point that is at least 12 feet (perpendicular) from the opposite Edge of Traveled Way.

2. A 20:1 or flatter taper shall be used when adjusting the alignment of the Cable Barrier. A minimum taper is required, when the Cable Barrier Type 2 is less than 12 feet from the Edge of Traveled Way, before transitioning to Cable Barrier Type 3.

LEGEND

- **Design Layout Line**

**NOTES**

- Extend the Cable Barrier Type 2 until the Design Layout Line clears the opposing Cable Barrier Type 2 and intercepts the Cable Barrier Type 3 at a point that is at least 12 feet (perpendicular) from the opposite Edge of Traveled Way.

- A 20:1 or flatter taper shall be used when adjusting the alignment of the Cable Barrier. A minimum taper is required, when the Cable Barrier Type 2 is less than 12 feet from the Edge of Traveled Way, before transitioning to Cable Barrier Type 3.
NOTE

1. Install a Type 2 Extruded Asphalt Concrete Curb (see Standard Plan F-2b) at face of guardrail.
NOTES

1. If the distance from the end of the bridge to the end of the thrie beam bridge rail section exceeds 6' - 3" using 12' - 6" thrie beam sections, add a 6' - 3" section of thrie beam bridge rail to reduce the length to less than 6' - 3".

2. When thrie beam is installed at the face of the bridge curb, install a Type 2 Extruded Asphalt Concrete Curb (see Standard Plan F-2b) at face of Guardrail. Match the height of existing bridge curb with a 20:1 transition.

3. When thrie beam is installed at the face of rigid bridge rail, an HMA ramp is required from the roadway surface to the top of the bridge curb or sidewalk. The slope of the ramp shall be 20:1 or flatter.

STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
EXPIRES JULY 24, 2006
34042
RICHARD AL

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NOTES
1. See Contract for the number of thrie beam sections for Beam Guardrail Type 11.
2. If the distance from the end of the Beam Guardrail Type 11 to the column/structure exceeds 6' - 3" using 12' - 6" thrie beam sections, add a 6' - 3" nested section of thrie beam to reduce the distance to less than 6' - 3".
3. Install a Type 2 Extruded Asphalt Concrete Curb (see Standard Plan F-2b) at face of Guardrail.
4. Attach the standard block to the rail using two 5/8" x 4" lag bolts.
STEEL USED IN THE FABRICATION OF THE BRACKET SHALL CONFORM TO ASTM A 36 AND THE BRACKET SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A 123.

3 CABLE TRANSITION TO W-BEAM BRACKET DETAIL

CABLE END ASSEMBLY ~ SEE STD. PLAN C-11b, SHEET 2

3/16" BRASS WELDING ROD. 16" MIN. ~ BEND ONE INCH AT EACH END, TO KEEP IN PLACE. MUST BE INSTALLED PRIOR TO TENSIONING THE CABLES.

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1. Posts installed on shoulder slopes steeper than 10H:1V shall be 8' long.
2. The flare rate of the guardrail may be steepened after crossing the ditch bottom to shorten the length of the terminal.
3. Determine the height of the W-Beam at the Anchor (G) by first calculating the perpendicular offset distance (D) from the edge of shoulder (S) to the Anchor (on station). Multiply that distance by 0.1, then subtract the product from the elevation of the same point (S) on the edge of shoulder used to obtain the offset distance (at the same station). Add Beam Guardrail design height (H) to that remainder for a sum that equals the elevation of the top of the W-Beam at the Anchor.

Refer to SECTION "C":

Elevation \( g = \left( Elevation_{S} - D(0.1) \right) + H \)

- \( H = 27" \) (2.25') for Beam Guardrail Type 1
- \( H = 31" \) (2.58') for Beam Guardrail Type 31

**FLARE RATE TABLE**

<table>
<thead>
<tr>
<th>RATE</th>
<th>POSTED SPEED (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 : 1</td>
<td>70</td>
</tr>
<tr>
<td>14 : 1</td>
<td>60</td>
</tr>
<tr>
<td>12 : 1</td>
<td>55</td>
</tr>
<tr>
<td>11 : 1</td>
<td>50</td>
</tr>
<tr>
<td>10 : 1</td>
<td>45</td>
</tr>
<tr>
<td>9 : 1</td>
<td>40 or less</td>
</tr>
</tbody>
</table>

**NOTES**

- Field Bend
- Bury Terminal Type 2
- Pay Limit

**PLAN**

- Beam Guardrail Type 1 or Type 31
- Buried Terminal Type 2 – Pay Limit
- (Terminal Length Varies)

**ELEVATION**

- Profile Along Rail

- Elevation of Posts & Blocks for Beam Guardrail Type 1 (Typ.)
- Elevation of Posts & Blocks for Beam Guardrail Type 31 (Typ.)
- Top of Cut
- Burial Point
- Ditch Bottom
- Location of Post (Without Block) for Both Beam Guardrail Types 1 & 31
1. Unless otherwise indicated in the contract, the SRT-350 (12.5, 8 Post) as manufactured by Trinity Industries, Inc., or a FLEAT 350 as manufactured by Road Systems Inc., shall be installed per manufacturer’s recommendations. If specified in the Contract, the FLEAT TL2 as manufactured by Road Systems, Inc. shall be installed per manufacturers recommendations.

2. Where terminal is placed on a curve, and post offsets would result in the rail encroaching onto the shoulder (e.g., the inside of a curve), the posts shall be installed so that the face of the rail is at the edge of the shoulder.

3. When snow load post washers and snow load rail washers are called for in the contract, the snow load rail washers must be omitted within the terminal limits.

4. Offset distances:
   - FLEAT 350 ............................................... 4' - 0"
   - FLEAT TL2 ............................................... 1' - 8" minimum
NOTES

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

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

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

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

5. Length for ET-PLUS (TL3) and SKT-350 is 50'. Length for ET-PLUS (TL2) and SKT-TL2 is 25'.
SLOTTED THRIE BEAM RAIL ELEMENT #1
SEE STD PLAN C-1a FOR RAIL ELEMENT DETAILS
(RAIL DIMENSIONS SHOWN ARE BEFORE BENDING TO RADIUS SHOWN IN PLAN)

SPLICE BOLT SLOT

POST BOLT SLOT

SLOT A DETAIL
(TYP)

SLOT B DETAIL
(TYP)

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

SPLICE BOLT SLOT

POST BOLT SLOT

SLOT C DETAIL
(TYP)

SLOT D DETAIL
(TYP)

SLOTTED THRIE BEAM RAIL ELEMENT #3
SEE STD PLAN C-1a FOR RAIL ELEMENT DETAILS

SPLICE BOLT SLOT

POST BOLT SLOT

SLOT D DETAIL
(TYP)
1. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter high strength bolts (Standard Specification 9-06.5(4)) with thin slab ferrule inserts or resin bonded anchors. See the Contract Plans.

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

3. This case is also applicable for vertical faces with no curbs.

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

**NOTES**

**A CONNECTION**

- W Beam and section Design F
- Face of guardrail, edge of shoulder

**B CONNECTION**

- Curb width 9" or less, or concrete barrier
- Transition pay limit

**C CONNECTION**

- Curb width greater than 9", 18" MAX
- Face of guardrail, edge of shoulder

**D CONNECTION**

- W Beam or Thrie Beam and section Design F
- Inside face of rail base

**E CONNECTION**

- W Beam or Thrie Beam and section Design F
- End Section design F
- Inside face of rail base

**F CONNECTION**

- Beam guardrail pay limit
- Inside face of rail base

**Guardrail Connection to Bridge Rail or Concrete Barrier**

**Standard Plan C-5**

SHEET 1 OF 1 SHEET

**NOTES**

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

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

3. This case is also applicable for vertical faces with no curbs.

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

**Revision History**

- REVISED NOTE 1; ADDED NOTE 4

**Acknowledgement**

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Beam Guardrail Anchor

Type 1

NOTES

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

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

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

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

5. Outside nut shall be torqued against inside nut a minimum of 100 ft-lbs.

6. Toenail bearing plate with 10d nail at corners to prevent turning.

7. Anchor pay limit does not apply when anchor is included in a Beam Guardrail Terminal.

Donald K. Nelson 05/30/97

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**BEARING PLATE**

**3"**  
**7/8"**  
**11/16"**  
**2"**  
**2"**

**ELEVATION**

**SECTION B-B**

**ANCHOR PLATE**

(See Note 1)

**ANCHOR RAIL WASHER**

**ANCHOR CABLE**

1" x 1" Stud  
Threaded full length (TYP)

**BEARING PLATE**

1/8" Hole (eight required)  
3" x 2 1/4" x 1/2" End plate

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1. Rail section and W8 x 17 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. Rail section and W8 x 17 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.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

STATE DESIGN ENGINEER
APPROVED FOR PUBLICATION

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STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
15224
EXPIRES MAY 3, 1998

CLIFFORD E. MANSFIELD

STANDARD PLAN C-6a

APPROVED FOR PUBLICATION

Donald K. Nelson 03/14/97
STATE DESIGN ENGINEER
DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

BEAM GUARDRAIL ANCHOR
TYPE 2

EFFECTIVE: JANUARY 7, 2008 TO AUGUST 3, 2008
NOTES
1. For details, see Standard Plan C-6.
2. For end section details see Standard Plan C-7 or C-7a.
3. For details, see Standard Plan C-1b.
4. Outside nut shall be torqued against inside nut a minimum of 100 ft-lbs.
5. Post and block shall match beam guardrail posts.

BEAM GUARDRAIL ANCHOR
TYPE 4

STANDARD PLAN C-6c

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

APPROVED FOR PUBLICATION
Clifford E. Mansfield
01/06/00

STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
15224

EXPIRES MAY 3, 2000
1. Attach W-beam to steel pipe with 5/8" x 1 1/4" button head bolt with no washer. No connection to the post is required.

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

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

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

5. Outside nut shall be torqued against inside nut a minimum of 100 ft/lbs.

NOTES:

1. Attach W-beam to steel pipe with 5/8" x 1 1/4" button head bolt with no washer. No connection to the post is required.

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

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

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

5. Outside nut shall be torqued against inside nut a minimum of 100 ft/lbs.

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NOTES
1. For details, see Standard Plan, “Beam Guardrail Anchor Type 1”.
2. The rail element is to be included in the “Beam Guardrail” pay item. The “Anchor” pay item includes the anchor post, anchor plate, anchor cable, bearing plate, nuts and washers.
3. For details, see Standard Plan, “Beam Guardrail Posts and Blocks”.
4. Post shall match beam guardrail posts.

Beam Guardrail pay limit (see Note 2)

Two 1” nuts and washers (see Note 1)

Anchor plate (see Note 1)

Bearing plate (see Note 1)

Standard 2” ID pipe sleeve (2 3/8” OD)

Two 1” nuts and washers (see Note 1)

Anchor Post Assembly (see Note 3)

Anchor pay limit (see Note 2)

TYPE 7 ANCHOR
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 high strength bolts (Standard Specification 9-06.5(4)) with thin slab ferrule inserts or resin bonded anchors. See the Contract Plans.

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

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

NOTES

Attach guardrail to bridge rail or concrete barrier with 7/8” diameter high strength bolts (Standard Specification 9-06.5(4)) with thin slab ferrule inserts or resin bonded anchors. See the Contract Plans.

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

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

Note: This plan is not a legal engineering document but an electronic duplicate. The original, signed by the engineer and approved for publication, is kept on file at the Washington State Department of Transportation. A copy may be obtained upon request.
NOTES

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

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

DESIGN C (THRIE BEAM)

DESIGN D (THRIE BEAM)

DESIGN F (THRIE BEAM)

DESIGN G (THRIE BEAM)

THRIE BEAM END SECTIONS

STANDARD PLAN C-7a

SHEET 1 OF 1 SHEET

Harold J. Peterfeso 10-31-03
Wire rope loops shall be 3' - 8" long, except for the top loop of the Barrier Terminal, which shall be 2' - 0" long.

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.

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.

The vertical spacing of the Wire Rope Loops in a Barrier Terminal is determined by the end of the Barrier Segment to which it is being connected. See BARRIER CONNECTION DETAIL (Sheet 2).
CONCRETE BARRIER
TYPE 2
STANDARD PLAN C-8

BARRIER SECTION
REINFORCING STEEL BENDING DIAGRAM

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

BARRIER TERMINAL
REINFORCING STEEL BENDING DIAGRAM

WIRE ROPE LOOP DETAIL

SIDE VIEW

CONNECTING PINS AND DRIFT PINS

BARRIER TERMINAL

BARRIER CONNECTION DETAIL

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CONCRETE BARRIER TYPE 4

AND TRANSITION SECTION

**INTERMEDIATE PLAN**

Face of concrete at C of barrier

**INTERMEDIATE ELEVATION**

Lifting notches

3" 3"

7 1/2 "

Bar A

Bar B

**TRANSITION PLAN**

Concrete Barrier Type 2 or cast-in-place concrete barrier, light standard section

Two #5 Bars (Bar A)

Two #5 Bars (Bar B)

1/8 "

1/8 "

**TRANSITION ELEVATION**

Concrete Barrier Type 4

Varies 2'- 0" to 3'- 0"

SECTION B-B

SECTION A-A

**TRANSITION END VIEW**

**TRANSITION SECTION**

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1. This plan shall be used for 40' and 50' Light Standards with 16' max. length double mast arms.
3. See the Contract Plans for conduit placement.
4. Concrete shall be Class 4000.

NOTES
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.

1. 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.

2. After removing the Type 3 Anchors, clean the pin holes and fill them with sealant according to Standard Specification 9-04.2.

3. TWO PINS REQUIRED PER TRAFFIC SIDE — FOUR PINS TOTAL, PER BARRIER SECTION

PRECAST CONC. BARRIER TYPE 2

PLAN VIEW

SECTION VIEWS

TYPE 3 ANCHOR PIN LOCATIONS

NOTES
The vertical locations of the Wire Rope Loops at one end compose a set that shall not vary; however, which set is applied to an end is determined by the end to which it is being connected. A set with loops 1' - 5" apart connects to a set with loops 1' - 8" apart. See Standard Plan C-8, BARRIER CONNECTION DETAIL.
BOX CULVERT GUARDRAIL STEEL POST TYPE 1
(16" to 36" ground cover)

Center line of W8x35

3/4" x 2" Bolt with hex nut and washer (TYP)
See Base Plate Detail

6" to 10"
See Post Base Plate Detail

POST ATTACHMENT DETAIL

BOX CULVERT GUARDRAIL STEEL POST TYPE 2
(0" to 6" Ground cover)

Center line of W6x9

3/4" x 2" Bolt with hex nut and washer (TYP)
See Base Plate Detail

0" to 6" (Ground cover)
See Cover Plate Detail

POST BASE ATTACHMENT DETAIL
1. Length of W8x35 and W6x9 shall be determined by measurement from top of ground to top of grout pad. This distance shall be verified by the contractor.

2. Attach guardrail post to box culvert with 3/4" high strength bolts with resin bonded anchors.

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

4. For details of post attachment to double box culvert see Standard Plan "Guardrail Placement," Case 18.

NOTES

1. Length of W8x35 and W6x9 shall be determined by measurement from top of ground to top of grout pad. This distance shall be verified by the contractor.

2. Attach guardrail post to box culvert with 3/4" high strength bolts with resin bonded anchors.

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

4. For details of post attachment to double box culvert see Standard Plan "Guardrail Placement," Case 18.
CABLE BARRIER

TYPE 1

Holes in opposite flange are required only for alternate hook bolts (see detail).

3/8" diam. hole (typ.)

See detail "A"

3/4" wire rope (typ.)

S3 x 5.7 x 5' - 3"

DETAIL "A"

CABLE BARRIER

TYPE 2

Holes in opposite flange are required only for alternate hook bolts (see detail).

3/8" diam. hole (typ.)

See detail "B"

3/4" wire rope (typ.)

S3 x 5.7 x 5' - 3"

DETAIL "B"

CABLE BARRIER

TYPE 3

Holes in opposite flange are required only for alternate hook bolts (see detail).

3/8" diam. hole (typ.)

See detail "C"

3/4" wire rope (typ.)

S3 x 5.7 x 5' - 3"

DETAIL "C"

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1. When installed in front of slopes steeper than 6:1, the distance between posts and slope break point shall be 1' - 0" minimum.

2. Where barrier is parallel to the edge of the traveled way, every sixth post shall have a reflector; see Reflector Detail. Reflectors shall be white when installed on the right side of traffic, and yellow when installed on the left side of traffic.


**Notes:**

- Post spacing table:
  - Less than 110’: use not recommended
  - 110' to 219': 6'
  - 220' to 899': 12'
  - 700' or more and tangent sections: 16'

**Plan View:**

- Cable barrier placement
  - Align face of reflector with flange edges
  - 1" spacer - galvanized steel, or aluminum
  - 1/4" bolt w/ lock nut
  - Post 2.5/8" × 5" aluminum backing with 2 5/8" × 5" reflective sheeting

**Elevation View:**

- See note 2

**Cable Barrier Placement**

- See table for post spacing

- See reflector detail

- 2000' max. (typ.)

- When installed in front of slopes steeper than 6:1, the distance between posts and slope break point shall be 1' - 0" minimum.

- Where barrier is parallel to the edge of the traveled way, every sixth post shall have a reflector; see Reflector Detail. Reflectors shall be white when installed on the right side of traffic, and yellow when installed on the left side of traffic.

- See Standard Plan C-11b for Cable Barrier Terminal details.
NOTES

1. Stagger Spring Cable End assemblies for clearance between units. Installation of cable end assemblies shall be as follows:

**LENGTH OF CABLE RUNS:**

- Up to 500' ~ Use the Spring Cable End Assembly on one end, and turnbuckle only on the other end of each cable.
- Over 500' to 2000' ~ Use the Spring Cable End Assembly on each end of each cable.

2. Distance from tangent of barrier run to notch for top cable on breakaway anchor angle shall be 4'.

3. Where the cable is connected to a cable socket with a wedge type connector, one wire of the wire rope shall be crimped over the base of the wedge to hold it firmly in place.

**TABLE**

<table>
<thead>
<tr>
<th>CABLE BARRIER</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOP</td>
<td>TOP Post to</td>
<td>SLIP Post Dimensions</td>
<td>BETWEEN</td>
</tr>
<tr>
<td>Type 1</td>
<td>Top of Highest Cable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 2</td>
<td>27°</td>
<td>S3 x 5.7 x 27 1/4&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td>Type 3</td>
<td>30°</td>
<td>S3 x 5.7 x 30 1/4&quot;</td>
<td>4 1/2&quot;</td>
</tr>
</tbody>
</table>

**KEEPER PLATE DETAIL**

- 3/8" PLATE
- 1/2" PLATE
- 3/4" PLATE

**POST SLIP BASE DETAIL**

- 1/2" PLATE
- 3/8" PLATE
- 3/8" PLATE

**PRECAST FOOTING**

- (2) #3 Bars 36" LONG (TYP.)

**COMMERCIAL CONCRETE**


**BREAKAWAY ANCHOR ANGLE**

- Cut a Slot to Make an 1/8" Thick Tab Approx. 1" Long, Bend Around Cable.
- 1/2" PLATE
- 3/8" PLATE

**CABLE BARRIER TERMINAL**

**STANDARD PLAN C-11b**
1. An Energite III System, fabricated by Energy Absorption Systems, Inc., a Pitch System as fabricated by Roadway Safety Service, Inc., or a Traffix Sand Attenuator as fabricated by Traffic Devices, Inc. shall be installed in accordance with the manufacturer's recommendations.

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

3. For Terminal Section or Concrete Barrier details see Standard Plan C-8.
NOTES

1. PERMANENT BARRIER SHALL BE PLACED INTO THE PAVEMENT A MINIMUM OF 3". NO EMBEDMENT REQUIRED FOR TEMPORARY BARRIER.

2. USE 42" BARRIER FOR GRADE SEPARATIONS UP TO 3'.

3. USE 48" BARRIER FOR GRADE SEPARATIONS UP TO 7'.

4. USE 54" BARRIER FOR GRADE SEPARATIONS UP TO 10'.

5. USE ON A HORIZONTAL CURVE WITH RADIUS LESS THAN 2000' REQUIRES A MODIFIED END DESIGN.

---

**SECTION**

**BARRIER CONNECTION DETAIL**

**REBAR GRID**

SEE BARRIER CONNECTION DETAIL

---

**SECTION**

---

**PLAN VIEW**

**ELEVATION VIEW**

**SECCTIONS**

---

**SINGLE SLOPE BARRIER**

PRE-CAST TYPE

STANDARD PLAN C-13

SHEET 1 OF 2 SHEETS

EXPIRES MAY 3, 2000

CLIFFORD E. MANSFIELD

DEPARTMENT OF TRANSPORTATION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

OLYMPIA, WASHINGTON

AUTHORIZED AS REPRINT OF ORIGINAL DRAWINGS

APPROVED FOR PUBLICATION

Clifford E. Mansfield 04-16-99

DEPUTY STATE DESIGN ENGINEER
BENDING DIAGRAM

REINFORCING STEEL FOR ONE 20' LONG SECTION

<table>
<thead>
<tr>
<th>H1</th>
<th>MARK</th>
<th>SIZE</th>
<th>LENGTH</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<td>#4</td>
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<td>413°</td>
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<td>#4</td>
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<td>10°</td>
<td>28.8°</td>
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<tr>
<td>H1</td>
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<tr>
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<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>D3</td>
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<td>8°</td>
<td>-</td>
<td>-</td>
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<td>104°</td>
<td>12°</td>
<td>33.5°</td>
<td>17°</td>
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<tr>
<td>H1</td>
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<td>-</td>
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<td>25°</td>
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<tr>
<td>D3</td>
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</tr>
<tr>
<td>1</td>
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<td>4</td>
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<td>13°</td>
<td>40°</td>
<td>20.3°</td>
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<tr>
<td>H1</td>
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<tr>
<td>H2</td>
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<tr>
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</tr>
<tr>
<td>D3</td>
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<td>-</td>
</tr>
</tbody>
</table>
NOTES

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

2. When connecting between cast-in-place and precast single slope barrier, provide a slot and rebar grid as shown in Standard Plan C-13.

DIMENSION 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>HORIZONTAL BARS (QTY.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 TO 5&quot;</td>
<td>3&quot; - 6&quot;</td>
<td>8&quot;</td>
<td>2&quot; - 0&quot;</td>
<td>3&quot;</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>UP TO 7&quot;</td>
<td>4&quot; - 0&quot;</td>
<td>9 1/8&quot;</td>
<td>2&quot; - 1 1/4&quot;</td>
<td>7&quot;</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>UP TO 10&quot;</td>
<td>4&quot; - 6&quot;</td>
<td>10 1/4&quot;</td>
<td>2&quot; - 4 1/2&quot;</td>
<td>10&quot;</td>
<td>5</td>
<td>12</td>
</tr>
</tbody>
</table>
This plan is for transitions to Pre-cast Concrete Barrier Type 2 only. See contract for transitions to other barrier shapes and bridge rails.
The Barrier Terminal is only used on the trailing end of a barrier separating two roadways with the same direction of travel.
NOTES

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

2. The Vertical Back Barrier is only used in the configurations shown in Standard Plans C-14f and C-14g.
SELECT BORROW INCL. HAUL

3/4" CHAMFER (TYP.)

SLOPE TO DRAIN

CONCRETE CAP

CEMENT CONC. CLASS 3000

TOP OF ROADWAY

SECTION A

3/8" PREMOLDED JOINT FILLER (TYP.)

STEEL WELDED WIRE FABRIC

COMPANY WITH STD. SPEC. 9-07.7

6 × 6 W02.1 × W02.1 (8 GAGE)

6 × 6 W02.6 × W02.6 (8 GAGE)

4 × 4 W02.1 × W02.1 (8 GAGE)

4 × 4 W02.6 × W02.6 (8 GAGE)

1 1/2" CLEARANCE ON ALL SURFACES

STEEL WELDED WIRE FABRIC

COMPLY WITH STD. SPEC. 9-07.7

3/8" PREMOLDED JOINT FILLER (TYP.)
1. When connecting between cast-in-place and precast Single Slope Barrier, provide a slot and rebar grid as shown on Standard Plan C-13.
2. See the Contract Plans for conduit placement.
3. Concrete shall be Class 4000.
### Notes

1. When connecting between cast-in-place and precast single slope barrier, provide a slot and rebar grid as shown in STD. PLAN C-13.
2. All concrete shall be Class 4000.

### BAR List

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

### See Dimension Table - Not Counting Splices

All dimensions are cut to cut. All bends are 2" radius.

### Table

<table>
<thead>
<tr>
<th>Grade Separation</th>
<th>BARRIER HEIGHT</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Horizontal BARS (QTY.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 TO 5&quot;</td>
<td>3'-0&quot;</td>
<td>8&quot;</td>
<td>2'-0&quot;</td>
<td>4'-10&quot;</td>
<td>3' MIN.</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>UP TO 7&quot;</td>
<td>4'-0&quot;</td>
<td>9 1/8&quot;</td>
<td>2'-2 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&quot;</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>

### Isometric View

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

1. See Standard Specification 6-21.3(9) for construction requirements.
2. Use a template to locate and secure the bolts during foundation installation.
3. When connecting between cast-in-place and precast single slope barrier, provide a slot and rebar grid as shown in Standard Plan C-13.

MATERIAL SPECIFICATIONS

- Shaft Concrete: Class 4000P
- All Other Concrete: Class 4000
- Steel Reinforcement Bar: AASHTO M 31 Grade 60
- Anchor Rods: ASTM F 1554 Grade 105
- Anchor Nuts: AASHTO M 291
- Anchor Washers: AASHTO M 293
- Anchorage Galvanizing: AASHTO M 232
- Steel Plate: ASTM A 36

SHAFT DEPTH

<table>
<thead>
<tr>
<th>Z</th>
<th>Total Sign Area (SF)</th>
<th>Allowable Lateral Bearing Pressure (PSF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13'-0&quot;</td>
<td>200 OR LESS</td>
<td>1500 AND UP</td>
</tr>
<tr>
<td>16'-0&quot;</td>
<td>200 OR LESS</td>
<td>1000 – 1499</td>
</tr>
<tr>
<td>18'-0&quot;</td>
<td>200 – 400</td>
<td>1500 AND UP</td>
</tr>
<tr>
<td>22'-0&quot;</td>
<td>200 – 400</td>
<td>1000 – 1499</td>
</tr>
</tbody>
</table>

ELEVATION

See Section "A", Sheet 2 for shaft reinforcement.

ISOMETRIC

See Note 3

Harold J. Peterfeso
01-11-06
State Design Engineer

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPRESS NOVEMBER 14, 2006.

SINGLE SLOPE CONCRETE BARRIER CANTILEVER SIGN STRUCTURE FOUNDATION

STANDARD PLAN C-14k

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
PRECAST CONC. BARRIER TYPE 2

ANCHORED PRECAST CONC. BARRIER TYPE 2

SINGLE SLOPE CONC. BARRIER CAST-IN-PLACE

SINGLE SLOPE CONC. BARRIER PRECAST

CABLE BARRIER

FACE OF BARRIER

SHOULDER

HINGE-POINT

SHOULDER

HINGE-POINT

SHOULDER

HINGE-POINT

SHOULDER

HINGE-POINT

SHOULDER

HINGE-POINT

FACE OF BARRIER

BEAM GUARDRAIL

BEAM GUARDRAIL ON STEEP SLOPES

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

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

2. The additional width for shy distance may be less than 2.0' when it, combined with the existing shoulder width, totals 8.0' or more.
NOTES
1. For component details, see Standard Plan C-23.60.
2. For terminal type and details, see Contract Plans and applicable drawings.
3. The slope from the edge of the shoulder into the face of the guardrail cannot exceed 10:1 when the face of the guardrail is less than 12'-0" from the edge of the shoulder.
4. For one-way traffic and where a crashworthy terminal is not required, use the Beam Guardrail Anchor Type 10, see Standard Plan C-23.60.
5. Where a crashworthy terminal is required use a Beam Guardrail Type 31 Non-Flared Terminal, see Standard Plan C-22.40.

For one-way traffic and where a crashworthy terminal is not required, use the Beam Guardrail Anchor Type 10, see Standard Plan C-23.60.
Where a crashworthy terminal is required use a Beam Guardrail Type 31 Non-Flared Terminal, see Standard Plan C-22.40.

For component details, see Standard Plan C-23.60.
For terminal type and details, see Contract Plans and applicable drawings.

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

For one-way traffic and where a crashworthy terminal is not required, use the Beam Guardrail Anchor Type 10, see Standard Plan C-23.60.
Where a crashworthy terminal is required use a Beam Guardrail Type 31 Non-Flared Terminal, see Standard Plan C-22.40.

For component details, see Standard Plan C-23.60.
For terminal type and details, see Contract Plans and applicable drawings.

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

For one-way traffic and where a crashworthy terminal is not required, use the Beam Guardrail Anchor Type 10, see Standard Plan C-23.60.
Where a crashworthy terminal is required use a Beam Guardrail Type 31 Non-Flared Terminal, see Standard Plan C-22.40.

For component details, see Standard Plan C-23.60.
For terminal type and details, see Contract Plans and applicable drawings.

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

For one-way traffic and where a crashworthy terminal is not required, use the Beam Guardrail Anchor Type 10, see Standard Plan C-23.60.
Where a crashworthy terminal is required use a Beam Guardrail Type 31 Non-Flared Terminal, see Standard Plan C-22.40.
1. For additional details not shown, see Standard Plan C-1b.
NOTE:

1. An ET-PLUS 31 as manufactured by Trinity Industries, Inc. or an SKT-MGS as manufactured by Road Systems Inc. shall be installed according to manufacturer's recommendations.

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

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

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

5. While these terminals do not require an offset at the end, a flare is recommended so that the end piece does not protrude into the shoulder. A maximum flare of 25:1 over the system length of the terminal is allowed for either the ET-PLUS 31 or the SKT-MGS.
NOTES
1. For use on the end of guardrail runs when a crashworthy terminal is not required.
2. For additional details not shown, see Standard Plan C-6c.
3. For End Section details, see Standard Plan C-7.
4. For Anchor Post Assembly details, see Standard Plan C-1b. Use detail on this plan for Wood Breakaway Post. (No Block on this post).
5. Fasten the Anchor Cable using two 1" nuts and washer, at both ends of cable. Outside nut shall be torqued against inside nut a minimum of 100 ft.-lbs.
6. Posts shall match those of connecting run: Timber or Steel.

BEAM GUARDRAIL TYPE 31 – PAY LIMIT
BEAM GUARDRAIL ANCHOR TYPE 10 – PAY LIMIT

ANCHOR PLATE
(SEE NOTE 2)

END SECTION DESIGN C
(SEE NOTE 3)

BEARING PLATE
(SEE NOTE 2)

GROUND LINE

ANCHOR CABLE

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

PIPE SLEEVE
(SEE NOTE 2)

SEE NOTE 5

SEE NOTE 6

voir: 1, 2, 3, 4, 5, 6

1. For use on the end of guardrail runs when a crashworthy terminal is not required.
2. For additional details not shown, see Standard Plan C-6c.
3. For End Section details, see Standard Plan C-7.
4. For Anchor Post Assembly details, see Standard Plan C-1b. Use detail on this plan for Wood Breakaway Post. (No Block on this post).
5. Fasten the Anchor Cable using two 1" nuts and washer, at both ends of cable. Outside nut shall be torqued against inside nut a minimum of 100 ft.-lbs.
6. Posts shall match those of connecting run: Timber or Steel.

BEAM GUARDRAIL (TYPE 31)
ANCHOR TYPE 10

ISOMETRIC VIEW

WOOD BREAKAWAY
POST DETAIL

ELEVATION VIEW
1. This guardrail transition is for connection to a vertical concrete shape or single slope barrier and cannot be connected directly to a concrete safety shape.

2. Do not bolt nested W-Beam or rubrail W-Beam to posts and blocks on posts 1, 2, 3 and 5. Bolt tapered blocks directly to posts.

3. The rubrail W-Beam can be shop bent to facilitate installation.

4. Posts 1, 2, 3, 4 and 6 require an additional hole to attach tapered blocks and/or rubrail.

5. Posts 1 and 2 are 10×10 timber or W8×13 steel posts ~ 7’ - 6” long. Posts 3 through 9 are 6×8 timber or W6×9 steel posts ~ 6’ - 0” long.

This guardrail transition is for connection to a vertical concrete shape or single slope barrier and cannot be connected directly to a concrete safety shape.

Do not bolt nested W-Beam or rubrail W-Beam to posts and blocks on posts 1, 2, 3 and 5. Bolt tapered blocks directly to posts.

The rubrail W-Beam can be shop bent to facilitate installation.

Posts 1, 2, 3, 4 and 6 require an additional hole to attach tapered blocks and/or rubrail.

Posts 1 and 2 are 10×10 timber or W8×13 steel posts ~ 7’ - 6” long. Posts 3 through 9 are 6×8 timber or W6×9 steel posts ~ 6’ - 0” long.
NOTE

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

EDGE OF SHOULDER

EMBANKMENT WIDENING
FOR BEAM GUARDRAIL

EMBANKMENT WIDTH W= SEE TABLE, STD. PLAN C-28.40

PLAN VIEW

BEAM GUARDRAIL TRANSITION SECTION TYPE 21 (FOR TYPE 31) - PAY LIMIT

BEAM GUARDRAIL TYPE 31

PAY LIMIT

ELEVATION VIEW

HMA CURB

W6×16 = 7'-0" LONG STEEL POST WITH 6×12 BLOCK

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

W6×9 = 6'-0" LONG TIMBER POST (OR W6×9 = 6'-0" LONG STEEL POST) WITH 6×12 BLOCK

3/4" DIAM HOLE THROUGH BLOCK (TYP.)

3/4" × 2 1/2" SLOT (TYP.)

1' - 0 1/4"

29/32" × 1 1/8" SLOT (TYP.)

SYMMETRICAL ABOUT Ø 2"

SLOT (TYP.)

SLOT (TYP.)

DETAIL A

DETAIL B

LEFT
(MIRROR OF RIGHT)

RIGHT

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NOTE


2. If the distance from the end of the bridge to the end of the Bridge Rail Thrie Beam Retrofit section (10 gage) exceeds 6' - 3" using 12' - 6" thrie beam sections, add a 6' - 3" section of 10 gage thrie beam to reduce the length to less than 6' - 3".

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

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

2. Refer to Standard Plan C-25.40 for component details for Beam Guardrail Type 31 not shown on this plan.

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

4. All posts for any standard barrier run shall be of the same type: Timber or Steel.
TYPICAL SECTION ~ WITHOUT CURB

6×8 TIMBER POST OR W6×9 STEEL POST (SEE NOTE 2)

6×8×6' LONG TIMBER POST (SEE NOTE 2)

6×12 BLOCKOUT (SEE NOTE 4)

SLOPE EMBANKMENT TABLE

<table>
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<tr>
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<th>W</th>
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<td>2H:1V OR FLATTER</td>
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<tr>
<td>STEEPER THAN 2H:1V</td>
<td>4.0 MIN.</td>
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3/4" DIAM. HOLE THROUGH BLOCK FOR STEEL POST

3/4" DIAM. HOLE THROUGH BLOCK FOR TIMBER POST

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
1. If traffic barrier is used, add 0.100 CY of concrete Class 4000 for Barrier Alternate 1. Add 0.100 CY of concrete Class 3000 for Barrier Alternate 2. 

2. For backfill requirements, see Standard Plan "B-4".

3. When wall Type 1-Sw is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1'.

4. Add 28 LBS of reinforcing steel for Barrier Alternate 1. Add 13 LBS of reinforcing steel for Barrier Alternate 2 - LF.

5. When wall Type 1-Sw is specified, concrete in the table column 'Material Quantity' shall be increased by 0.003 ft CY/LF.

6. If Bar W interferes with the retaining wall form, it shall be field bent only at the angle point. The bar shall not be twisted.

7. Top height for traffic barrier may vary 3' 6" to 6' MAX.

8. Concrete in the 24 foot wall sections shall be joined separately by beam expansion joints with a minimum 12 hour period between concrete placement.

9. Concrete cover over steel in the front face and the total wall thickness shall be increased by 1'.

10. Concrete in the 24 foot wall sections shall be joined separately by beam expansion joints with a minimum 12 hour period between concrete placement.

11. Surface treatment
12. Conc. Gutter
13. Bars L #4 at 1'-6" centers both faces
14. 1 1/2" Clearance (see Note #1)
15. Drain
16. Construction joint with reinforced surface
17. Bars M
18. 1 1/2" Clearance
19. 3" Clearance
20. Unit for H ≤ 17'
21. add one bar #4 W ≤ H ≤ 33'
22. add two bars #4 W ≤ H ≤ 30'
23. add three bars #4 W ≤ H ≤ 25'

24. 3" DIA drain at about 12" center are to provide final ground at front face of wall

25. 1/2" Pemoloid joint filler in expansion joint at 24" centers

26. Bar J only for H ≥ 21'
27. Bar K only for H ≥ 21'

28. BARS K AND M

29. WALL DESIGN WITH VERTICAL FRONT FACE AND 2' SURCHARGE OR TRAFFIC BARRIER

30. BAR E
At 1'-6" centers
### Footing Reinforcement

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### Stem Reinforcement

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### Construction Joint (TYP)
- **3'-0"**:
  - BARS J AND M

### Wall Design with Sloping Face and 2' Surcharge or Traffic Barrier

- **BARS K AND M**
- **Provide long bar curve at all angle for break points in top of wall profile**
- **Provide 24" long MN**

### BARS K AND M
- **Add 16 LB/FT of reinforcing steel for Barrier Alternate 1 or 20 LF of reinforcing steel for Barrier Alternate 2** - per LF.
- **Add 5 bars H = 35**
- **Add 4 bars 29 < H < 34**
- **Add 2 bars 17 < H < 22**
- **H > 20'**
  - For H above 20' use the table shall be increased by 1.003 x H CY/LF.
- **When Type 3 SW (isolated) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1.**
- **Height may vary if required to provide a profile pleasing to the eye.**
- **Concrete in the 24 foot wall sections shall be placed separately between expansion joints with a minimum 4-1/2 hour period between concrete placement.**

### Notes:
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- **THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE IN THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.**

### Effective:
- **JANUARY 7, 2008 TO AUGUST 3, 2008**
- **JANUARY 7, 2008 TO AUGUST 3, 2008**

### Standard Plan D-1b
- **REINFORCED CONCRETE RETAINING WALL TYPE 2 AND 2 SW STANDARD PLAN D-1b**

### Sheet:
- **1 OF 2 SHEETS**

### Approved for Publication:
- **Clifford E. Mansfield**
  - DEPUTY STATE DESIGN ENGINEER
  - WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
  - OLYMPIA, WASHINGTON

### Expires:
- **JUNE 2, 2008**
1. All concrete shall be Class 4000 except as noted.

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

3. When Wall Type 3-SW (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 3-SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by 0.003 x H CY/LF.

5. Concrete in the 24 foot wall sections shall be placed separately between expansion joints with a minimum 12 hour period between concrete placement.

SECTION - VERTICAL FACE

WALL TOP DETAIL

GUTTER DETAIL

KEY DETAIL

WALL DESIGN WITH VERTICAL FRONT FACE AND 2:1 BACKSLOPE

REINFORCED CONCRETE RETAINING WALL TYPE 3 AND 3 SW STANDARD PLAN D-1c SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION Clifford E. Mansfield 10/06/99

EXPIRES JUNE 29, 2000
NOTE 5. Concrete in the 24-foot wall sections shall be placed separately between expansion joints with a minimum 12-hour period between concrete placement.
### Footeing Reinforcement

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<th>BAR F</th>
<th>BAR K</th>
<th>BAR M</th>
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<th>BAR J</th>
<th>BAR G (size #4)</th>
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**WALL DESIGN WITH SLOPING FRONT FACE AND 2:1 BACKSLOPE**

**EXPRES JUNE 22, 2000**

**REINFORCED CONCRETE RETAINING WALL**

**TYPE 4 AND 4 SW STANDARD PLAN D-1d**

**STATE OF WASHINGTON**

**OLYMPIA, WASHINGTON**

**APPROVED FOR PUBLICATION**

Clifford E. Mansfield

DEPWTY STATE DESIGN ENGINEER

EXPIRES JUNE 29, 2000

TWS10/99 New approval date.
1. All concrete shall be Class 4000 except as noted.
2. For backfill requirements, see Standard Plan “D-4”.
3. When Wall Type 5-SW (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 5-SW (saltwater) is specified, concrete in the table column “Material Quantity” shall be increased by 0.003 x H CY/LF.
5. Concrete in the 24 foot wall sections shall be placed separately between expansion joints with a minimum 12 hour period between concrete placement.

NOTES

Special wall face treatment when specified in contract.

Sheets 1 of 2 sheets

2'-0" MIN below final ground line or roadway shoulder

1'-0" MIN below bottom of adjacent ditch

1 1/2 " Clearance

3" DIA drains

1 1/2 " MIN

3 1/2 " MAX

Construction joints in footing at 120' center MAX

Bars S #5 at 1'-0" OC

Bars Q #4 with 1'-6" lap splice and extended thru construction joints (TYP)

Bars L #4 at 1'-6" centers

Bars G #4 at 1'-6" centers

Bars E

Bars F

Bars M

BARS K AND M

Bars J (TYP) only for H > 21'

Bars K (TYP) only for H > 21'

3" Drains at about 12" centers and 6" above final grade line at front face of wall

Construction joints in footing at 120' center MAX

5/2" Chamfer (TYP)

Special wall face treatment when specified in contract.

GUTTER DETAIL

SECTION - VERTICAL FACE

WALL TOP DETAIL

WALL DESIGN WITH VERTICAL FRONT FACE AND 2:1 BACKSLOPE

REINFORCED CONCRETE RETAINING WALL TYPE 5 AND 5 SW STANDARD PLAN D-1e SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Washington State Department of Transportation

STANDARD PLAN D-1e

REINFORCED CONCRETE RETAINING WALL TYPE 5 AND 5 SW

STATE OF WASHINGTON

PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2002

JEROME A. WEIGEL

STATE ENGINEER

Harold J. Peterfeso 01-23-02

WASHINGTON State Department of Transportation

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
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**NOTE:** THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT. A COPY MAY BE OBTAINED UPON REQUEST.
1. All concrete shall be Class 4000 except as noted.

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

3. When Wall Type 6-SW (soil water) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1".

4. When all Wall Type 6-SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by 0.003 x H CY/LF.

5. Concrete in the 24 foot wall sections shall be placed separately between expansion joints with a minimum 12 hour period between concrete placement.

6. When Wall Type 6-SW (soil water) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1".

7. When all Wall Type 6-SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by 0.003 x H CY/LF.

8. Concrete in the 24 foot wall sections shall be placed separately between expansion joints with a minimum 12 hour period between concrete placement.
### Wall Design with Sloping Front Face and 2:1 Backslope

**Dimensions**

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**Concrete (CF/LF)**

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**Steel (LBS/LF)**

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**Material Quantity**

**Effective:** January 7, 2008 to August 3, 2008

**Reinforced Concrete Retaining Wall Type 6 and 6 SW Standard Plan D-1f**

**Sheet 2 of 2 Sheets**

**Approved for Publication**

**Clifford E. Mansfield**

**Deputy State Design Engineer**

**Washington State Department of Transportation**

**Olympia, Washington**

**Expire June 29, 2009**
###典型横截面

<table>
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<th>墙高</th>
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<th>第1B</th>
<th>第1C</th>
<th>第1D</th>
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- **墙厚**
  - 5"
  - 5"
  - 5"
  - 5"

- **第1A**
  - 3" CLR.
  - 3" CLR.
  - 3" CLR.
  - 3" CLR.

- **第1B**
  - 3" CLR.
  - 3" CLR.
  - 3" CLR.
  - 3" CLR.

- **第1C**
  - 3" CLR.
  - 3" CLR.
  - 3" CLR.
  - 3" CLR.

- **第1D**
  - 3" CLR.
  - 3" CLR.
  - 3" CLR.
  - 3" CLR.

###风速和风向

| 风速类型 | 风速 | 风向
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###土层类型

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###H型风障

- **墙高**
  - 22' - 0"
  - 18' - 0"
  - 14' - 0"
  - 10' - 0"

- **墙厚**
  - 5"
  - 5"
  - 5"
  - 5"

- **第1A**
  - 3" CLR.
  - 3" CLR.
  - 3" CLR.
  - 3" CLR.

- **第1B**
  - 3" CLR.
  - 3" CLR.
  - 3" CLR.
  - 3" CLR.

- **第1C**
  - 3" CLR.
  - 3" CLR.
  - 3" CLR.
  - 3" CLR.

- **第1D**
  - 3" CLR.
  - 3" CLR.
  - 3" CLR.
  - 3" CLR.

###注意事项

1. 墙将被指定为噪音屏障墙第1A、1B、1C或1D。合同规定了实际的墙高。
2. 对于中间的墙高，使用更高的H。
3. 墙板应至少在每侧有3英尺的水平地面。
4. 建筑物的接缝应在120英尺的范围内设置。
5. 合同规定了实际的基础要求D1或D2。
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING

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

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

CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING
FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

CAST-IN-PLACE CONCRETE WALL ON OFFSET SPREAD FOOTING

NOISE BARRIER WALL TYPE 3
STANDARD PLAN D-2.06-00

EFFECTIVE: JANUARY 7, 2008 TO AUGUST 3, 2008
CAST-IN-PLACE CONCRETE WALL ON SHAFT FOUNDATION

DETAIL "B"

JOINT AND CORNER DETAIL

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

DRAWN BY: ADAM COCHRAN

REINFORCED PER LISTED WALL HEIGHT REINFORCEMENT TABLE

PLACE HOOKS PARALLEL TO WALL LAYOUT LINE (TYP.)

SHADOW LENGTH FOR PAYMENT

SPACING @ 12'

THREE SPACES @ 6'

d@ STIRRUP

CONCRETE SHAFT

SHAFT REINFORCEMENT

W 3 S SPIRAL @ 8' PITCH

3" (TYP.)

1/2" NOISE SEALER (TYP.)

12" NOISE SEALER (TYP.)

3/4" CHAMFER (TYP.)

3" (TYP.)

NOISE BARRIER WALL TYPE 4

STANDARD PLAN D-2.08-00
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.
#4 @ 12" (TYP.) ~ PLACE AS SHOWN WITH BAR "D" ~ CENTERED REINFORCING STEEL

**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.
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 D1 or D2.

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

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

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WALL HT

- 6' - 0"
- 8' - 0"
- 10' - 0"
- 12' - 0"
- 14' - 0"
- 16' - 0"
- 18' - 0"
- 20' - 0"
- 22' - 0"
- 24' - 0"

SOIL TYPE

- TYPE 8A
- TYPE 8B
- TYPE 8C
- TYPE 8D

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>B1</td>
<td>60</td>
<td>80</td>
</tr>
<tr>
<td>B2</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>B3</td>
<td>80</td>
<td>120</td>
</tr>
<tr>
<td>B4</td>
<td>90</td>
<td>140</td>
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</tbody>
</table>

NOTES

1. Wall to be designated Noise Barrier Wall Type 8A, 8B, 8C or 8D. The Contract specifies actual wall designations.
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. All joints shall be in full contact and sealed.
5. The Contract specifies actual foundation requirements D1 or D2.

**ELEVATION**

**JOINT AND CORNER DETAIL**

**PRECAST CONCRETE WALL ON TRENCH FOOTING**

**STANDARD PLAN D-2.30-00**

**NOISE BARRIER WALL TYPE 8**

**APPROVED FOR PUBLICATION**

Harold J. Peterfeso 11-10-05

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES AUGUST 23, 2006

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

FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

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

TRANSVERSE BARS NOT SHOWN

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

Harold J. Peterfeso 11-10-05
FILL THE JOINT HOLE WITH GROUT USING DUCTS. DUCTS SHALL BE LOCATED ON PANEL FACE OPPOSITE TRAFFIC.

DETAIL A

FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP

PRECAST CONCRETE WALL
ON OFFSET SPREAD FOOTING

NOISE BARRIER WALL
TYPE 10
STANDARD PLAN D-2.34-00

NOTES:
- THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT
- A COPY MAY BE OBTAINED UPON REQUEST.
NOTE

The bottom 9" of Bar "B" shall be painted with one coat of formula A-6-86 zinc dust oxide primer or, one coat of formula A-11-99 primer.

### Dimension Table

<table>
<thead>
<tr>
<th>S</th>
<th>A</th>
<th>F</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>#7</td>
<td>1 1/32&quot;</td>
<td>1 1/8&quot;</td>
<td>1 1/2&quot;</td>
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<tr>
<td>#9</td>
<td>2&quot;</td>
<td>1 3/8&quot;</td>
<td>1 3/4&quot;</td>
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<tr>
<td>#11</td>
<td>2 1/32&quot;</td>
<td>2 1/4&quot;</td>
<td>2 1/4&quot;</td>
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</tbody>
</table>

### Notes

- Anchor bolts, nuts, washers, base plate, and Bar "B" shall have a protective coating of one of the following: hot-dipped galvanized AASHTO M 223 for hardware; AASHTO M 111 for washers and plates; mechanical galvanizing AASHTO M 256 CL 35, or zinc rich paint, paint threads and nuts after installation.

---

**Bar "B"**

The wedge head shall bear firmly and uniformly against the base plate. Bar "B" shall be held secure during concrete placement to prevent gaps between the wedge head and the base plate.

**Threaded Bar Option**

No taper is required on the base plate when using the threaded bar option. Use diam. F holes.

**Hole for Bar "B" (Typ.)**

(Tapered for wedge head shown)

**Slot for Anchor Bolt (Typ.)**

(Anchor bolt diam. = 1/4" + 2 1/2"

**Base Plate**

T x 10" x 1 1/2", AASHTO M 183, galvanized, 3/4" chamfer all corners (embedded with grout)

**Locations When (Six) 6 Holes Are Required (See Table)**

**NOTE**

The bottom 9" of Bar "B" shall be painted with one coat of formula A-6-86 zinc dust oxide primer or, one coat of formula A-11-99 primer.

**Bar "B" and Base Plate Details**

**Base Plate**

5" min. 2" - 0" max.

**Top of Pilaster Level (Typ.)**

**Notes**

- Anchor Bolt (Typ.) ~ ASTM F 1554-04 Grade 55 Material (See Table for Diameter)

---

**NOTE**

Anchor bolts, nuts, washers, base plate, and Bar "B" shall have a protective coating of one of the following: hot-dipped galvanized AASHTO M 223 for hardware; AASHTO M 111 for washers and plates; mechanical galvanizing AASHTO M 256 CL 35, or zinc rich paint, paint threads and nuts after installation.
NOTES

1. Wall to be designated Noise Barrier Wall Type 12A, 12B, 12C and 12D. The Contract specifies actual wall designation.

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

3. Compaction of trench height differential shall not exceed 1 foot.

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

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

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

Wind Exposure & Velocity

- B1: 80 MPH
- B2: 80 MPH
- B3: 90 MPH
- B4: 90 MPH

Type 12A

- #6 @ 12" ~ 15" spaces max. ~ Place on alternate side of bar "D" except #4 located in traffic barrier

- 1/2" Noise Sealer (Typ.)

- Panels shall be braced laterally to prevent displacement during backfill.

- Reinforcing per listed wall height reinforcement table.

- No noise sealer ~ 1/2" (Typ.)

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

- The Contract specifies actual foundation requirements D1 or D2.

Wind Exposure & Velocity

- B1: 80 MPH
- B2: 80 MPH
- B3: 90 MPH
- B4: 90 MPH

Type 12B

- #6 @ 12" ~ 15" spaces max. ~ Place on alternate side of bar "D" except #4 located in traffic barrier

- 1/2" Noise Sealer (Typ.)

- Panels shall be braced laterally to prevent displacement during backfill.

- Reinforcing per listed wall height reinforcement table.

- No noise sealer ~ 1/2" (Typ.)

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

- The Contract specifies actual foundation requirements D1 or D2.

Wind Exposure & Velocity

- B1: 80 MPH
- B2: 80 MPH
- B3: 90 MPH
- B4: 90 MPH

Type 12C

- #6 @ 12" ~ 15" spaces max. ~ Place on alternate side of bar "D" except #4 located in traffic barrier

- 1/2" Noise Sealer (Typ.)

- Panels shall be braced laterally to prevent displacement during backfill.

- Reinforcing per listed wall height reinforcement table.

- No noise sealer ~ 1/2" (Typ.)

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

- The Contract specifies actual foundation requirements D1 or D2.

Wind Exposure & Velocity

- B1: 80 MPH
- B2: 80 MPH
- B3: 90 MPH
- B4: 90 MPH

Type 12D

- #6 @ 12" ~ 15" spaces max. ~ Place on alternate side of bar "D" except #4 located in traffic barrier

- 1/2" Noise Sealer (Typ.)

- Panels shall be braced laterally to prevent displacement during backfill.

- Reinforcing per listed wall height reinforcement table.

- No noise sealer ~ 1/2" (Typ.)

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

- The Contract specifies actual foundation requirements D1 or D2.

Wind Exposure & Velocity

- B1: 80 MPH
- B2: 80 MPH
- B3: 90 MPH
- B4: 90 MPH

Noise Barrier Wall Type 12

Standard Plan D-2.38-00

Sheet 1 of 1 Sheet

Approved for Publication

Harold J. Peterfeso

EFFECTIVE: JANUARY 7, 2008 TO AUGUST 3, 2008
**NOTES**

1. Wall to be designated Noise Barrier Wall Type 12SSA, 12SSB, 12SSC and 12SSD. The Contract specifies actual wall designation.
2. For intermediate wall heights, use the next higher H.
3. Compaction of trench height differential shall not exceed 1 foot.
4. Panels shall have at least 3 feet of level ground on each side.
5. All joints shall be in full contact and sealed.
6. The Contract specifies actual foundation requirements D1 or D2.

<table>
<thead>
<tr>
<th>WALL HT</th>
<th>TYPE 12SSA</th>
<th>TYPE 12SSB</th>
<th>TYPE 12SSC</th>
<th>TYPE 12SSD</th>
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<tr>
<td>H</td>
<td>BAR &quot;B&quot;</td>
<td>BAR &quot;D&quot;</td>
<td>BAR &quot;B&quot;</td>
<td>BAR &quot;D&quot;</td>
</tr>
<tr>
<td>6' - 0&quot;</td>
<td>#6 @ 12&quot;</td>
<td>#6 @ 15&quot;</td>
<td>#6 @ 12&quot;</td>
<td>#6 @ 15&quot;</td>
</tr>
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<td>8' - 0&quot;</td>
<td>#6 @ 12&quot;</td>
<td>#6 @ 15&quot;</td>
<td>#6 @ 12&quot;</td>
<td>#6 @ 15&quot;</td>
</tr>
<tr>
<td>10' - 0&quot;</td>
<td>#6 @ 12&quot;</td>
<td>#6 @ 15&quot;</td>
<td>#6 @ 12&quot;</td>
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<tr>
<td>12' - 0&quot;</td>
<td>#6 @ 12&quot;</td>
<td>#6 @ 15&quot;</td>
<td>#6 @ 12&quot;</td>
<td>#6 @ 15&quot;</td>
</tr>
<tr>
<td>14' - 0&quot;</td>
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<td>#6 @ 15&quot;</td>
<td>#6 @ 12&quot;</td>
<td>#6 @ 15&quot;</td>
</tr>
<tr>
<td>16' - 0&quot;</td>
<td>#6 @ 12&quot;</td>
<td>#6 @ 15&quot;</td>
<td>#6 @ 12&quot;</td>
<td>#6 @ 15&quot;</td>
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<tr>
<td>18' - 0&quot;</td>
<td>#6 @ 12&quot;</td>
<td>#6 @ 15&quot;</td>
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<td>#6 @ 15&quot;</td>
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**WIND EXPOSURE & VELOCITY**

<table>
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<tr>
<th>WIND VELOCITY (MPH)</th>
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<tr>
<td>80</td>
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<tr>
<td>90</td>
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**REINFORCEMENT TABLE**

<table>
<thead>
<tr>
<th>PANEL HEIGHT (H) + D1 OR D2</th>
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<tr>
<td>12SSA</td>
</tr>
<tr>
<td>12SSB</td>
</tr>
<tr>
<td>12SSC</td>
</tr>
<tr>
<td>12SSD</td>
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</table>

**SOIL TYPE**

<table>
<thead>
<tr>
<th>SOIL TYPE</th>
<th>ANGLE OF INTERNAL FRICTION (DEGREES)</th>
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</thead>
<tbody>
<tr>
<td>D1</td>
<td>32</td>
</tr>
<tr>
<td>D2</td>
<td>36</td>
</tr>
</tbody>
</table>

**TYPICAL SECTION**

- Wall to be designated Noise Barrier Wall Type 12SSA, 12SSB, 12SSC and 12SSD. The Contract specifies actual wall designation.
- For intermediate wall heights, use the next higher H.
- Compaction of trench height differential shall not exceed 1 foot.
- Panels shall have at least 3 feet of level ground on each side.
- All joints shall be in full contact and sealed.
- The Contract specifies actual foundation requirements D1 or D2.

**WIND EXPOSURE & VELOCITY**

- 80 MPH
- 90 MPH

**REINFORCEMENT TABLE**

- Panels shall be braced laterally to prevent displacement during backfill.
- See Note 3
- Top of pavement compacted
- Top of roadway compacted
- Compaction of trench height differential shall not exceed 1 foot.
- Soil type
- Soil type
- Soil type
- Soil type

**NOTES**

1. Wall to be designated Noise Barrier Wall Type 12SSA, 12SSB, 12SSC and 12SSD. The Contract specifies actual wall designation.
2. For intermediate wall heights, use the next higher H.
3. Compaction of trench height differential shall not exceed 1 foot.
4. Panels shall have at least 3 feet of level ground on each side.
5. All joints shall be in full contact and sealed.
6. The Contract specifies actual foundation requirements D1 or D2.
<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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<tbody>
<tr>
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<td>W X</td>
<td>W X</td>
<td>W X</td>
<td>W X</td>
</tr>
<tr>
<td>WALL HT</td>
<td>BARS &quot;B&quot;,&quot;C&quot;</td>
<td>BARS &quot;E&quot;</td>
<td>BARS &quot;D&quot;</td>
<td>BARS &quot;J&quot;</td>
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<td>6' - 0&quot;</td>
<td>5' - 6&quot;</td>
<td>1&quot;</td>
<td>#4 @ 13&quot; #5 @ 13&quot;</td>
<td>#5 @ 15&quot;</td>
</tr>
<tr>
<td>8' - 0&quot;</td>
<td>5' - 3&quot;</td>
<td>1&quot;</td>
<td>#4 @ 13&quot; #5 @ 13&quot;</td>
<td>#5 @ 15&quot;</td>
</tr>
<tr>
<td>10' - 0&quot;</td>
<td>5' - 3&quot;</td>
<td>1&quot;</td>
<td>#4 @ 13&quot; #5 @ 13&quot;</td>
<td>#5 @ 15&quot;</td>
</tr>
<tr>
<td>12' - 0&quot;</td>
<td>5' - 0&quot;</td>
<td>1&quot;</td>
<td>#4 @ 13&quot; #5 @ 13&quot;</td>
<td>#5 @ 15&quot;</td>
</tr>
<tr>
<td>14' - 0&quot;</td>
<td>4' - 0&quot;</td>
<td>1&quot;</td>
<td>#4 @ 13&quot; #5 @ 13&quot;</td>
<td>#5 @ 15&quot;</td>
</tr>
<tr>
<td>16' - 0&quot;</td>
<td>5' - 0&quot;</td>
<td>10&quot;</td>
<td>#4 @ 12&quot; #5 @ 12&quot;</td>
<td>#5 @ 12&quot;</td>
</tr>
<tr>
<td>18' - 0&quot;</td>
<td>5' - 0&quot;</td>
<td>10&quot;</td>
<td>#4 @ 12&quot; #5 @ 12&quot;</td>
<td>#5 @ 12&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.
ANGLE POINT PLAN

ADJUST REINFORCEMENT AS NECESSARY TO ACCOMMODATE ANGLE POINT

LIMITS OF TRANSVERSE BARRIER REINFORCEMENT (TYP.)

BAR "B"

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

LIMITS OF TRANSVERSE BARRIER REINFORCEMENT (TYP.)

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### Typical Section

#### Shaft Support
- **Section A**
- **Wall H**
  - 6' - 0" @ 15" #4
  - 8' - 0" @ 15" #4
  - 10' - 0" @ 15" #4
  - 12' - 0" @ 15" #4
  - 14' - 0" @ 15" #4
  - 16' - 0" @ 10" #4
  - 18' - 0" @ 10" #4

- **Wall HT**
  - 6' - 0" @ 10" #4
  - 8' - 0" @ 10" #4
  - 10' - 0" @ 10" #4
  - 12' - 0" @ 10" #4
  - 14' - 0" @ 10" #4
  - 16' - 0" @ 10" #4

- **Shear Key Blockout**
- **Surface Treatment** As Required

- **Anchors**
  - #3 Spiral @ 4" pitch
  - #8 Bar "B" at 2' - 8"
  - #8 Bar "B" at 2' - 6"

- **Winds and Velocity**
  - B1: 80 MPH
  - B2: 90 MPH

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

#### Wind Exposure & Velocity

<table>
<thead>
<tr>
<th>Type</th>
<th>Wind Exposure</th>
<th>Wind Velocity</th>
</tr>
</thead>
<tbody>
<tr>
<td>14SSA</td>
<td>B1</td>
<td>80</td>
</tr>
<tr>
<td>14SSB</td>
<td>B1</td>
<td>90</td>
</tr>
<tr>
<td>14SSC</td>
<td>B2</td>
<td>80</td>
</tr>
<tr>
<td>14SSD</td>
<td>B2</td>
<td>90</td>
</tr>
</tbody>
</table>

**Noise Barrier Wall Type 14SS**

**Standard Plan D-2.48-00**

**Section at Shaft Support**

**Notes**

- **Construction Joint** With Roughened Surface
- **Height May Vary** If Required To Provide A Smooth Profile Consistent With The Roadway Profile

---

**Date**

**State Design Engineer**

**Washington State Department of Transportation**

---

**Approved for Publication**

**Sheet 1 of 2 Sheets**

**Harold J. Peterfeso**

**11-10-05**

---

**Effective:** January 7, 2008 to August 3, 2008
NOISE BARRIER WALL
TYPE 14SS
STANDARD PLAN D-2.48-00

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

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Harold J. Peterfeso 11-10-05

DRAWN BY: ADAM COCHRAN

EFFECTIVE: JANUARY 7, 2008 TO AUGUST 3, 2008
### Walls

<table>
<thead>
<tr>
<th>WALL HT</th>
<th>CMU WIDTH</th>
<th>X</th>
<th>DEPTH D1</th>
<th>DEPTH D2</th>
<th>BAR &quot;C&quot;</th>
<th>BAR &quot;D&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>8' - 0&quot;</td>
<td>8&quot;</td>
<td>3' 6&quot;</td>
<td>3' 3&quot;</td>
<td>3' 0&quot;</td>
<td>#6 @ 48&quot;</td>
<td>#7 @ 48&quot;</td>
</tr>
<tr>
<td>8' - 0&quot;</td>
<td>6&quot;</td>
<td>3' 6&quot;</td>
<td>3' 3&quot;</td>
<td>3' 0&quot;</td>
<td>#6 @ 48&quot;</td>
<td>#7 @ 48&quot;</td>
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<td>10&quot; - 0&quot;</td>
<td>6&quot;</td>
<td>3' 0&quot;</td>
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<td>2' 8&quot;</td>
<td>#6 @ 48&quot;</td>
<td>#7 @ 48&quot;</td>
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<td>3' 0&quot;</td>
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<td>2' 8&quot;</td>
<td>#6 @ 48&quot;</td>
<td>#7 @ 48&quot;</td>
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<tr>
<td>14&quot; - 0&quot;</td>
<td>6&quot;</td>
<td>3' 0&quot;</td>
<td>2' 11&quot;</td>
<td>2' 8&quot;</td>
<td>#6 @ 48&quot;</td>
<td>#7 @ 48&quot;</td>
</tr>
<tr>
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<td>6&quot;</td>
<td>3' 0&quot;</td>
<td>2' 11&quot;</td>
<td>2' 8&quot;</td>
<td>#6 @ 48&quot;</td>
<td>#7 @ 48&quot;</td>
</tr>
<tr>
<td>18&quot; - 0&quot;</td>
<td>6&quot;</td>
<td>3' 0&quot;</td>
<td>2' 11&quot;</td>
<td>2' 8&quot;</td>
<td>#6 @ 48&quot;</td>
<td>#7 @ 48&quot;</td>
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<td>3' 0&quot;</td>
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<td>2' 8&quot;</td>
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<td>#7 @ 48&quot;</td>
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<td>24&quot; - 0&quot;</td>
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<td>3' 0&quot;</td>
<td>2' 11&quot;</td>
<td>2' 8&quot;</td>
<td>#6 @ 48&quot;</td>
<td>#7 @ 48&quot;</td>
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<table>
<thead>
<tr>
<th>WALL HT</th>
<th>CMU WIDTH</th>
<th>X</th>
<th>DEPTH D1</th>
<th>DEPTH D2</th>
<th>BAR &quot;C&quot;</th>
<th>BAR &quot;D&quot;</th>
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<tbody>
<tr>
<td>8' - 0&quot;</td>
<td>8&quot;</td>
<td>3' 6&quot;</td>
<td>3' 3&quot;</td>
<td>3' 0&quot;</td>
<td>#6 @ 48&quot;</td>
<td>#7 @ 48&quot;</td>
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<tr>
<td>8' - 0&quot;</td>
<td>6&quot;</td>
<td>3' 6&quot;</td>
<td>3' 3&quot;</td>
<td>3' 0&quot;</td>
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<td>6&quot;</td>
<td>3' 0&quot;</td>
<td>2' 11&quot;</td>
<td>2' 8&quot;</td>
<td>#6 @ 48&quot;</td>
<td>#7 @ 48&quot;</td>
</tr>
<tr>
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<td>3' 0&quot;</td>
<td>2' 11&quot;</td>
<td>2' 8&quot;</td>
<td>#6 @ 48&quot;</td>
<td>#7 @ 48&quot;</td>
</tr>
<tr>
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<td>3' 0&quot;</td>
<td>2' 11&quot;</td>
<td>2' 8&quot;</td>
<td>#6 @ 48&quot;</td>
<td>#7 @ 48&quot;</td>
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<tr>
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<td>3' 0&quot;</td>
<td>2' 11&quot;</td>
<td>2' 8&quot;</td>
<td>#6 @ 48&quot;</td>
<td>#7 @ 48&quot;</td>
</tr>
<tr>
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<td>6&quot;</td>
<td>3' 0&quot;</td>
<td>2' 11&quot;</td>
<td>2' 8&quot;</td>
<td>#6 @ 48&quot;</td>
<td>#7 @ 48&quot;</td>
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<td>3' 0&quot;</td>
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<td>#7 @ 48&quot;</td>
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<tr>
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<td>#7 @ 48&quot;</td>
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<tr>
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<td>2' 8&quot;</td>
<td>#6 @ 48&quot;</td>
<td>#7 @ 48&quot;</td>
</tr>
</tbody>
</table>

### Notes

1. Wall to be designated Noise Barrier Wall Type 16A, 16B, 16C or 16D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. All masonry shall be hollow unit and installed as running bond.
4. All masonry is to be specially inspected.
5. All Concrete Masonry Unit (CMU) cells that have vertical steel reinforcing bars or bond beam units shall be filled with grout.
6. Panels shall have at least 3 feet of level ground on each side.
7. Construction joints in the trench footing shall be spaced at 120 feet maximum.
8. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layouts.
9. The Contract specifies actual foundation requirements D1 or D2.

### Masonry Wall on Trench Footing

- **Standard Plan D-2.60-00**
- **Sheet 1 of 2 Sheets**
- **Approved for Publication**

**Noise Barrier Wall Type 16**

**Effective:** January 7, 2008 to August 3, 2008

**Drawn by:** Adam Cochran

**Dimensions:** 1224.0 x 791.0

---

**Elevation**

- **Level (Typ.)**
  - 6' 0" Min. Bond Beam and Reinforced Extension at Step
  - Expansion Joints @ 24' - 0" Max. Centers. See Contract for Locations

---

**Typical Section 8" Wide CMU**

- **3" CLR**
  - #4 @ About 18" with 2' - 0" Min. Splice Continuous Thru Expansion Joint
  - 10" Bar "C"

---

**Typical Section 10" Wide CMU**

- **3" CLR**
  - #4 @ About 18" with 2' - 0" Min. Splice Continuous Thru Expansion Joint
  - 1" - 0"
TYPICAL EXPANSION JOINT

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

PLAN VIEW

EXPANSION JOINT AT WIDTH STEP

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

#5 (TYP.)

SEE DETAIL A

8" OR 10" CMU

TRAFFIC SIDE

8" CMU

10" CMU

TRAFFIC SIDE

TRAFFIC SIDE

#5 (TYP.)

PLAN VIEW

8" OR 10" CMU

BACKER ROD

POLYURETHANE SEALANT

1/2" JOINT

1/2" JOINT

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Harold J. Peterfeso 11-10-05
**FOOTING WIDTH TRANSITION DETAIL**  
FOR LOCATIONS WITHOUT FOOTING STEP  
NOTE: TRANSVERSE BARS NOT SHOWN

**BOND BEAM DETAIL**  
8" OR 10" CMU

**PLAN VIEW**  
TYPICAL EXPANSION JOINT

**PLAN VIEW**  
EXPANSION JOINT AT WIDTH STEP

**NOISE BARRIER WALL TYPE 17**  
STANDARD PLAN D-2.62-00

**STATE OF WASHINGTON**  
REGISTRATION NO. 27695
BIJAN KHALEGHI
EXPIRES AUGUST 23, 2006

**DRAWN BY:** ADAM COCHRAN

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Noise Barrier Wall
Type 18

Standard Plan D-2.64-00

Footing Width Transition Detail
(for locations without footing step)

Note: Transverse bars not shown

See Detail A

Details:
- Polyurethane Sealant
- Backer Rod

Plan View
- Typical Expansion Joint
- Expansion Joint at Width Step

Typical Both Sides of Wall

Traffic Side
- Expansion Joint Filler Placed in Sash Block Recesses.
- Cells with Vertical Reinforcing and Bond Beams Shall Be Filled with Grout

Bond Beam Detail
- Bond Beam Units
- Bond Beam Grouting Limit
- 1/2" Joint

Typical Expansion Joint

See Detail A

Typical Both Sides of Wall

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Harold J. Peterfeso
11-10-05

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Washington State Department of Transportation
BOND BEAM DETAIL

1/2" JOINT

EXPANSION JOINT FILLER PLACED IN SASH BLOCK RECESSES.

#4 @ 1' - 0"
#4 EVEN MULTIPLES OF 8"

#4 STIRRUP SPACING @ 12"

CONCRETE SHAFT

3 " #4 STIRRUP SPACING @ 6"
W 3.5 SPIRAL @ 6" PITCH

EXPANSION JOINT AT WIDTH STEP

1" - 5" MIN. LAP

135° HOOK (TYP.)
BAR "P" AT EQUAL SPACING
FOR TOTAL NUMBER SEE REINFORCEMENT SCHEDULE

SECTION A

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

MASONRY WALL ON SHAFT
W/ GRADE BEAM FOUNDATION

NOISE BARRIER WALL
TYPE 19

STANDARD PLAN D-2.66-00
Typical Expansion Joint:

- Expansion Joint filled with noise sealer.
- 1/2" clearance to face shell.

Section D:

- Typical Expansion Joint.

Section A:

- Flexible sealant.
- Vertical reinforcement.
- Horizontal dowel.

Section B:

- 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:

- Cap above.

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.
NOTES

1. Wall to be designated Noise Barrier Wall Type 15A, 15B, 15C or 15D. 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. Plywood and Glulam panels and all lumber shall be pressure preservative treated.

5. The Contract shall specify actual foundation requirements D1 or D2.

SHEET 1 OF 1 SHEET

NOISE BARRIER WALL

TYPE 15

STANDARD PLAN D-2.78-00

EFFECTIVE: JANUARY 7, 2008 TO AUGUST 3, 2008

NOTES

1. Wall to be designated Noise Barrier Wall Type 15A, 15B, 15C or 15D. 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. Plywood and Glulam panels and all lumber shall be pressure preservative treated.

5. The Contract shall specify actual foundation requirements D1 or D2.

SHEET 1 OF 1 SHEET

NOISE BARRIER WALL

TYPE 15

STANDARD PLAN D-2.78-00

EFFECTIVE: JANUARY 7, 2008 TO AUGUST 3, 2008
NOTES
1. All rebar shall have a minimum 1 1/2" cover.
3. See Standard Plan D-2.06 for wall reinforcement not shown.

EXPANSION JOINT
BAR "A"
4 1/2" (TYP.)
5" (TYP.)
#5 x 6'-8" (TYP.)
ANCHOR PIN WELDED TO DOOR FRAME (TYP.)
GROUNDLINE
48" DOOR OPENING
4 1/2" (TYP.)
#5 x 4'-0" (TYP.)
#6 x 11'-0" (TYP.) 2 PER SIDE OF DOOR
5' - 0"
4' - 0"
WALL
CONCRETE SLAB DETAIL
FOR CAST-IN-PLACE WALL ON OFFSET SPREAD FOOTING
CONCRETE SLAB
CONCRETE SLAB
4 1/2"
GROUND LINE
BENDING DIAGRAM
BAR "A"
2 1/2"
2 1/2"
NOTES
1. All rebar shall have a minimum 1 1/2" cover.

FOR CAST-IN-PLACE WALL
W/ TRAFFIC BARRIER

ISOMETRIC CUTAWAY VIEW

CONCRETE SLAB

TOP OF ROADWAY

TOP OF ROADWAY

FINISHED GRADE

SECTION A

SECTION B

TOP OF FOOTING

TOP OF TRAFFIC BARRIER

4'-0"

5'

8'

2'-8"

4'-8"

20'-0"

TOP VIEW

FRONT VIEW

FINISHED GRADE LINE

OBLIQUE VIEW

4" CONCRETE SLAB

1. Use spacing in wall plan per wall height.

2. #5 @ 6' - 8" (TYP.)

3. BAR "A" (TYP.)

4. BAR "A"

5. BAR "G"
EXPANSION JOINT
ANCHOR PIN WELDED TO DOOR FRAME (TYP.)

48" DOOR OPENING
ANCHOR PIN WELDED TO DOOR FRAME (TYP.)

5/8" CONCRETE SLAB

SECTION C
ANCHOR PIN (TYP.)

SECTION D

BENDING DIAGRAM
BAR "A"
BAR "B"
BAR "C"
BAR "D"
BAR "E"
BAR "F"
BAR "G"

FOR CAST-IN-PLACE WALL W/ TRAFFIC BARRIER

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

Harold J. Peterfeso 11-10-05
STATE DESIGN ENGINEER
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
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.

FOR PRECAST WALL W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

NOISE BARRIER WALL
ACCESS DOOR TYPE 4

STANDARD PLAN D-2.86-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION
Harold J. Peterfeso 11-10-05

STATE DESIGN ENGINEER
Washington State Department of Transportation

EFFECTIVE: JANUARY 7, 2008 TO AUGUST 3, 2008
NOTES

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

DRAWN BY:  ADAM COCHRAN

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PORTATION.   A COPY MAY BE OBTAINED UPON REQUEST.
Access Door and Frame for Cast-in-Place and Precast Walls

Recommended:

- 4 1/2" Stainless Steel Hinge (Typ.)
- 6" x 16" S.S. Plate W/ 10" x 1" Dia.
- S.S. Handle
- 16 Ga. Steel Door Frame
- 5" x Channel Width x 1/4" Reinforcement Plate
- 1/2" x 9" Anchor Pin
- 1/2" Tie Bar
- 11/2" Doorstop

Reinforcement Plate - 5" x Channel Width x 1/4" W/ 1/2" x 9" Anchor Pin

Anchor Reinforcement Plate (Typ.) - (Channel Width) x 1" x 1/4", Welded to Frame

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ACCESS DOOR AND FRAME FOR PRECAST WALLS ONLY

HINGE & ANCHOR PIN REINFORCEMENT PLATE (TYP.) - (CHANNEL WIDTH x 12" x 14"), WELDED TO FRAME

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

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

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

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

WELD FRAME TOGETHER INSIDE OF CHANNEL, GRIND SMOOTH EXTERIOR SURFACES BEFORE PAINTING IF NEEDED.

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GEOSYNTHETIC WALL, TYPE 1
INCLUDES SEISMIC DESIGN
GROUND ACCELERATION COEFFICIENT, A=0.16g TO 0.30g.
HORIZONTAL BACKSLOPE WITH 2 FT. TRAFFIC SURCHARGE

GEOSYNTHETIC WALL, TYPE 2 & 3
INCLUDES SEISMIC DESIGN
GROUND ACCELERATION COEFFICIENT, A=0.16g TO 0.30g.

GEOSYNTHETIC WALL, TYPE 4
STATIC DESIGN ONLY
GROUND ACCELERATION COEFFICIENT, A=0.15g OR LESS.
HORIZONTAL BACKSLOPE WITH 2 FT. TRAFFIC SURCHARGE

PERMANENT GEOSYNTHETIC WALLS
TYPICAL CROSS SECTIONS

KEY NOTES

1.  "N" Rows of 4" dowel reinforcement placed between geosynthetic layers @ 5'-0" O.C. Horizontal spacing. See table. Sheet 2. Vertical spacing between rows to be equal, as multiples of "Sv" allow. Rows may be staggered.

2.  Geotextile for underground drainage class A, low survivability (only needed if a geogrid is used for geosynthetic reinforcement).

3.  1'-0" min. geotextile overlap, top & bottom.

4.  3" I.D. PVC pipe for weep hole in wall facing – place between geosynthetic layers approx. 3' deep at 10'-0" horizontal spacing, length to extend to outer surface of specified wall facing.

NOTES
For the values of "L", "N", and "3b", see sheet 2.
For geosynthetic wall construction sequence, see sheet 3.

- EPOXY COATED

STANDARD PLAN D-3

Sheet 1 of 3 sheets

APPROVED FOR PUBLICATION

Harold J. Peterfeso 07-13-05

Washingto n State Department of Transportation
# Geosynthetic Reinforcement Length and Dowels

<table>
<thead>
<tr>
<th>Total Wall Height H (ft)</th>
<th>Fascia Footing Width B (ft)</th>
<th>Geosynthetic Reinforcement Length L (ft)</th>
<th>Rows of #4 1/2&quot; Dowel Bars Required N (No.)</th>
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<td>12' 1' - 0&quot;</td>
<td>0.60</td>
<td>0.00</td>
<td>2</td>
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<td>12' 1' - 0&quot;</td>
<td>0.60</td>
<td>0.60</td>
<td>3</td>
</tr>
<tr>
<td>12' 2' - 0&quot;</td>
<td>0.60</td>
<td>0.60</td>
<td>3</td>
</tr>
<tr>
<td>12' 2' - 0.5&quot;</td>
<td>0.60</td>
<td>0.60</td>
<td>3</td>
</tr>
<tr>
<td>12' 2' - 0&quot;</td>
<td>0.60</td>
<td>0.60</td>
<td>3</td>
</tr>
<tr>
<td>12' 2' - 0.5&quot;</td>
<td>0.60</td>
<td>0.60</td>
<td>3</td>
</tr>
<tr>
<td>12' 2' - 0&quot;</td>
<td>0.60</td>
<td>0.60</td>
<td>3</td>
</tr>
<tr>
<td>12' 2' - 0.5&quot;</td>
<td>0.60</td>
<td>0.60</td>
<td>3</td>
</tr>
</tbody>
</table>

# Geosynthetic Reinforcement Spacing and Strength

<table>
<thead>
<tr>
<th>Total Wall Height H (ft)</th>
<th>Depth Below Top of Surcharge Z (ft)</th>
<th>Geosynthetic Reinforcement Vertical Spacing S (ft)</th>
<th>Total Long-Term Geosynthetic Reinforcement Strength Required</th>
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<tbody>
<tr>
<td>5</td>
<td>0.75</td>
<td>244</td>
<td>220</td>
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<td>1.00</td>
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<td>5</td>
<td>1.25</td>
<td>408</td>
<td>367</td>
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<tr>
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<td>0.75</td>
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<td>0 to 10</td>
<td>1.00</td>
<td>557</td>
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<td>0 to 10</td>
<td>1.25</td>
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<td>0.75 to 10</td>
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<tr>
<td>0.75 to 10</td>
<td>1.00</td>
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<tr>
<td>0.75 to 10</td>
<td>1.25</td>
<td>696</td>
<td>696</td>
</tr>
</tbody>
</table>

# Notes

- The long-term geosynthetic design strength "T" shall be determined in accordance with WSDOT standard practice 268. See qualified products list for products in which "T" has been determined.
- "H", "Z", and "L" are graphically defined on Sheet 1.
- "Z" is the distance from the top of wall (as shown) to a geosynthetic layer, and is used to determine "T" for that layer.
- Column "8" is a reference for standard plan D-3.

---

Harold J. Peterfeso 07-13-05
Washington State Department of Transportation

Approved for Publication

PERMANENT GEOSYNTHETIC WALL TYPES 1 ~ 6

STANDARD PLAN D-3

SHEET 2 OF 3 SHEETS

EXPRESS JULY 3, 2007
GEOSYNTHETIC WALL CONSTRUCTION SEQUENCE

1. Place the geosynthetic "tail" over the form and lock into place with backfill.
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.

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PERMANENT GEOSYNTHETIC RETAINING WALL
WITH SHOTCRETE FACING

TYPICAL SECTION

FOR THE VALUES OF "X", SEE STD. PLAN D-3, SHEET 1.

FOR CAST-IN-PLACE FASCIA ONLY

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Dowel reinforcement (see standard plan D-3)

2" min. concrete cover = increase the cover as required to accommodate architectural features and finish.

Construction joint with roughened surface

Weep hole in wall facing (see standard plan D-3) ~ weep holes shall be kept clear of concrete.

Vertical construction joints in fascia @ 24" - 0" O.C. with 1/2" premolded joint filler (see std. plan D-1a, sheet 1, "Elevation") if the footing is stepped, provide 2" - 0" non-contact lap splices for the #4 & #6 bars at each step.

Cast-in-place concrete fascia ~ the fascia face shall be vertical or shall match the approximate final batter of the geosynthetic layers, whichever is specified in the contract. The #4 bars and interior #6 bars shall be used only if the face is vertical. The fascia face shall have a fractured fin finish (see details) unless specified otherwise in the contract.

All bars shown on this plan shall be AASHTO M31 unless otherwise specified in the contract. ~ epoxy coated

WELDED WIRE FABRIC FOR CONCRETE REINFORCEMENT 4" × 4" W2.9 OR 6" × 6" W4.0 ~ COMPLY WITH AASHTO M55

GEOSYNTHETIC LAYER (TYP.)

APPROXIMATE FINAL BATTER FOR FACE OF GEOSYNTHETIC LAYERS

FOR THE VALUES OF "X", SEE STD. PLAN D-3, SHEET 1.

FOR CAST-IN-PLACE FASCIA ONLY

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Dowel reinforcement (see standard plan D-3)

2" min. concrete cover = increase the cover as required to accommodate architectural features and finish.

Construction joint with roughened surface

Weep hole in wall facing (see standard plan D-3) ~ weep holes shall be kept clear of concrete.

Vertical construction joints in fascia @ 24" - 0" O.C. with 1/2" premolded joint filler (see std. plan D-1a, sheet 1, "Elevation") if the footing is stepped, provide 2" - 0" non-contact lap splices for the #4 & #6 bars at each step.

Cast-in-place concrete fascia ~ the fascia face shall be vertical or shall match the approximate final batter of the geosynthetic layers, whichever is specified in the contract. The #4 bars and interior #6 bars shall be used only if the face is vertical. The fascia face shall have a fractured fin finish (see details) unless specified otherwise in the contract.

All bars shown on this plan shall be AASHTO M31 unless otherwise specified in the contract. ~ epoxy coated

WELDED WIRE FABRIC FOR CONCRETE REINFORCEMENT 4" × 4" W2.9 OR 6" × 6" W4.0 ~ COMPLY WITH AASHTO M55

GEOSYNTHETIC LAYER (TYP.)

APPROXIMATE FINAL BATTER FOR FACE OF GEOSYNTHETIC LAYERS

FOR THE VALUES OF "X", SEE STD. PLAN D-3, SHEET 1.

FOR CAST-IN-PLACE FASCIA ONLY

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

Dowel reinforcement (see standard plan D-3)

2" min. concrete cover = increase the cover as required to accommodate architectural features and finish.

Construction joint with roughened surface

Weep hole in wall facing (see standard plan D-3) ~ weep holes shall be kept clear of concrete.

Vertical construction joints in fascia @ 24" - 0" O.C. with 1/2" premolded joint filler (see std. plan D-1a, sheet 1, "Elevation") if the footing is stepped, provide 2" - 0" non-contact lap splices for the #4 & #6 bars at each step.

Cast-in-place concrete fascia ~ the fascia face shall be vertical or shall match the approximate final batter of the geosynthetic layers, whichever is specified in the contract. The #4 bars and interior #6 bars shall be used only if the face is vertical. The fascia face shall have a fractured fin finish (see details) unless specified otherwise in the contract.

All bars shown on this plan shall be AASHTO M31 unless otherwise specified in the contract. ~ epoxy coated

WELDED WIRE FABRIC FOR CONCRETE REINFORCEMENT 4" × 4" W2.9 OR 6" × 6" W4.0 ~ COMPLY WITH AASHTO M55

GEOSYNTHETIC LAYER (TYP.)
1. SEE CONTRACT FOR BACKFILL LIMITS AND GEOTEXTILE CLASS.
TYPICAL GABION

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

FASTENING ADJACENT BASKETS

LACING DETAIL

Six independent wires encompassed

TWISTED FABRIC

Three vertical and two horizontal wires encompassed

WELDED FABRIC

CROSS-CONNECTING WIRE PLACEMENT, END CELLS

1/3H, 1/3H, 1/3H

CROSS-CONNECTING WIRE PLACEMENT, INTERIOR CELLS OF FRONT GABIONS

1/3H, 1/3H, 1/3H

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

STANDARD PLAN D-6

GABIONS

DEPUTY STATE DESIGN ENGINEER

APPROVED FOR PUBLICATION

Clifford E. Mansfield
6/19/98

EXPRESSES JU Ly 1, 1999

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DATE NUMERALS
~ SEE DETAILS

NUMERAL "1"

2006

TYPICAL SECTION VIEW

DATE NUMERAL DETAILS

TYPICAL DATE NUMERALS

ALIGN THE NUMERALS PARALLEL TO TOP OF TRAFFIC BARRIER

DATE LOCATION ON TWO-WAY BRIDGES

DATE LOCATION ON ONE-WAY BRIDGES

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.

DATE NUMERALS PLACEMENT ON BRIDGE TRAFFIC BARRIER

STANDARD PLAN E-1

STATE OF WASHINGTON

REGISTERED PROFESSIONAL ENGINEER

EXPIRES AUGUST 26, 2007

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02-21-07 Ken L. Smith
**NOTES**

1. Dimensions and notations for superstructure are typical for both single lane and two lane bridges.
2. All timber and lumber shall be #2 or better and untreated Douglas fir-larch.
3. All piling shall be untreated Douglas fir and shall be driven to develop a minimum load bearing capacity of 15 tons.
4. Blasting 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 S1E. On 15' spans, stringers shall be 5x16 S1E. Twin 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**

**BASE PLATE DETAIL**

**DISTRIBUTION PLATE DETAIL**

**BACKING PLATE DETAIL**

**SECTION B-B**
SQUARE

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<th>D (in.)</th>
<th>PERIMETER (in.)</th>
<th>UNIT WEIGHT (lbs./ft.)</th>
<th>AREA (in.²)</th>
<th>MOMENT OF INERTIA (in.⁴)</th>
<th>RADIUS OF OVRATON (in.)</th>
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OCTAGONAL

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<th>MOMENT OF INERTIA (in.⁴)</th>
<th>RADIUS OF OVRATON (in.)</th>
<th>NUMBER OF STRANDS</th>
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<td>477</td>
<td>9027</td>
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</table>

### Notes

1. Place lifting loops at the lifting points shown in the PILE HANDLING DIAGRAM, Standard Plan E-4a, for the case stated in the contract.
2. Spirals shall be spliced either by lapping one full turn and bending the end of the spiral to a 135° seismic hook, by welding, or by the use of a mechanical connector that develops 125% of the minimum yield strength of the spiral. Welding shall meet the requirements of Standard Specification 6-02.3(24)E.
3. All prestressing strands are 1/2" or 0.6" diameter (dₚ), Grade 270, uncoated strands, AASHTO M203, jack to 0.75 Fpu maximum.
4. Strength of concrete shall be 5.0 ksi at release and 7.0 ksi at final.
5. 2 1/2" cover if pile is exposed to salt water.
1. For pile lifting Cases 1 and 2, do not allow pile tip to bear on other piling stored in a lower layer.
2. For pile lifting Cases 3 and 4, tilt the pile in the air, do not allow the pile to touch the ground.
3. The minimum angle between the pile and the lifting strap is 60° when the pile is in the horizontal position.
4. When directed to remove a lifting loop, cut it off at the bottom of the recess and patch the recess by filling it with 1:2 mortar, finishing it to the level of the pile face. The patch shall be allowed to cure at least 24 hours prior to driving the pile.
5. The length of the formed or drilled hole shall allow for potential cut-off and full development length of the steel reinforcement. The holes must be roughened and filled with epoxy resin.
6. Expose the spiral reinforcement at the pile head and splice with new spiral in accordance with Standard Plan E-4, Note 2.
7. For handling and bunking, the Prestressed piles shall have at least the minimum number of strands shown on Std Plan E4.
8. Piles stored on the ground should be bunked on level dunnage at no more than 20' on center, with a maximum overhang of 10'.
The document appears to be a detailed set of plans for various curbs and aprons, likely for a transportation or infrastructure project. The plans include dimensions, materials, and notes for roundabout central islands, truck aprons, central island curbs, and pedestrian curbs. There are also references to standard plans and contracts for construction. The plans are drawn to scale and include notes on materials and construction methods.
1. The intent of this design is to facilitate the compaction of Hot Mix Asphalt pavement adjacent to a drainage structure.
2. The centerline of the drainage structure may differ from the centerline of the frame and grate.

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

CEMENT CONCRETE EXTRUDED CURB

# 3 BARS (TYP.)

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

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

CEMENT CONCRETE EXTRUDED CURB

# 3 BARS (TYP.)

DRAWN BY: BILL BERENS

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXTRUDED CURB
STANDARD PLAN F-10.42-00

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PORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
PRECAST CONCRETE
SLOPED MOUNTABLE CURB

TOP VIEW
INSIDE CORNER BLOCK

TOP VIEW
OUTSIDE CORNER BLOCK

TOP VIEW
18" RADIUS BLOCK

TOP VIEW
30" RADIUS BLOCK

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

TYPICAL OF ALL END VIEW

INSIDE CORNER BLOCK

18" RADIUS BLOCK

OUTSIDE CORNER BLOCK

30" RADIUS BLOCK

ISOMETRIC VIEW
TANGENT BLOCK

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CURB RADIUS TABLE

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<th>DIMENSION A</th>
<th>DIMENSION B</th>
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<tr>
<td>3'</td>
<td>12&quot;</td>
<td>2&quot;</td>
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<td>4' TO 5'</td>
<td>12&quot;</td>
<td>1 1/2&quot;</td>
<td>9&quot;</td>
</tr>
<tr>
<td>6'</td>
<td>12&quot;</td>
<td>1&quot;</td>
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</tr>
<tr>
<td>11' TO 13'</td>
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<td>3/4&quot;</td>
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</tr>
<tr>
<td>14' TO 15'</td>
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<td>16' TO 17'</td>
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<td>22 1/2&quot;</td>
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<td>22 3/4&quot;</td>
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<tr>
<td>OVER 60'</td>
<td>USE TANGENT BLOCK, SEE SHEET 1</td>
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</table>

This table lists the calculated dimensions for casting blocks suitable for constructing various curb radii. Curved blocks, or blocks with different dimensions may be acceptable with prior approval of the engineer.
NOTE
The dual faced curb may be constructed by using two precast concrete sloped mountable curbs (longitudinal halves) so long as the installation is consistent with the dimensions shown in the plan.

PRECAST CONCRETE DUAL FACED SLOPED MOUNTABLE CURB STANDARD PLAN F-10.64-01

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1. The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' x 4'.

2. Layouts 1, 2, & 3 require two (2) of this bid item: "Cement Conc. Sidewalk Ramp Type 1". The bid item does not include the adjacent Curb (or Curb & Gutter), or Sidewalk.

3. Ramp slopes shall not be steeper than 12H:1V.

4. To the maximum extent feasible, ramp cross slopes shall not exceed 2%.

5. Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.

6. Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.

**NOTES**

1. The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' × 4'.
2. The Type 2 Ramp Layout requires two (2) of this bid item: "Cement Conc. Sidewalk Ramp Type 2". The bid item does not include the adjacent Curb (or Curb & Gutter), the Sidewalk between Ramps, or the Cement Conc. Pedestrian Curb.
3. Ramp slopes shall not be steeper than 12H:1V.
4. Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.
5. Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.
1. The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' × 4'.

2. The Type 3A Ramp Layout requires two (2) of this bid item: "Cement Conc. Sidewalk Ramp Type 3A". The bid item does not include the adjacent Curb (or Curb & Gutter), the Sidewalk between Ramps, or the Cement Conc. Pedestrian Curb.

3. Ramp slopes shall not be steeper than 12H:1V.

4. Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.

5. Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.

1. The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' x 4'.

2. The Type 3B Ramp Layout requires two (2) of this bid item: "Cement Conc. Sidewalk Ramp Type 3B". The bid item does not include the adjacent Curb (or Curb & Gutter), the Sidewalk between Ramps, or the Cement Conc. Pedestrian Curb.

3. Ramp slopes shall not be steeper than 12H:1V.

4. Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.

5. Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.

This layout is used to provide access to a single crosswalk parallel to the major street. The bid item "Cement Conc. Sidewalk Ramp Type 4A" does not include the adjacent Curb (or Curb & Gutter), the Sidewalk, or the Cement Conc. Pedestrian Curb.

Ramp slopes shall not be steeper than 12H:1V.

Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.

Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.

See Std. Plan F-30.10 for sidewalk joint placement and details.

The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' x 4'.

### Notes

1. Ramp slopes shall not be steeper than 12H:1V.
2. Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.
3. Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.
5. The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' x 4'.

---

**PLAN VIEW**

**SIDEWALK RAMP TYPE 4A**

**LAYOUT**
DRAWN BY: MARK SUJKA

3/8" EXPANSION JOINT

CONCRETE SIDEWALK

CEMENT CEMENT CONC. SIDEWALK / LANDING

SIDEWALK RAMP TYPE 4B

PEDESTRIAN CURB

2% MAX. 4" CEMENT CONC. SIDEWALK / LANDING

CURB & GUTTER

DEPRESSED CURB & GUTTER

ISOMETRIC VIEW

SIDEWALK RAMP TYPE 4B

WITH LAYOUT

STANDARD PLAN F-40.18-00

EFFECTIVE: JANUARY 7, 2008 TO AUGUST 3, 2008

APPROVED FOR PUBLICATION

Ken L. Smith

STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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The ramp shown on this plan is ideal and assumes optimal roadway geometric design. It assumes a curb height of 6". Adjustments must be made for conditions in the field such as roadway grade, actual curb height, etc.

1. The maximum allowable ramp slope is 12H:1V (8.34% grade). The Federal Highway Administration (FHWA) does not accept sidewalk ramps with slopes steeper than 12H:1V. Flatter ramp slopes are permissible. Field verify the forms before pouring concrete.

2. The maximum allowable ramp slope is 12H:1V (8.34% grade). The Federal Highway Administration (FHWA) does not accept sidewalk ramps with slopes steeper than 12H:1V. Flatter ramp slopes are permissible. Field verify the forms before pouring concrete.

3. To the maximum extent feasible, the ramp cross slope shall not exceed 2%.

4. The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' × 4'.

5. Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.

6. Layout 1 is used to provide access to a single crosswalk parallel to the major street. The bid item "Cement Conc. Sidewalk Ramp Type 4C" does not include the adjacent Curb (or Curb & Gutter), the Sidewalk, or the Cement Conc. Pedestrian Curb.

7. Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.

8. See Standard Plan F-30.10 for Cement Concrete Sidewalk details, sections, etc.

The ramp shown on this plan is ideal and assumes optimal roadway geometric design. It assumes a curb height of 6". Adjustments must be made for conditions in the field such as roadway grade, actual curb height, etc.

1. The maximum allowable ramp slope is 12H:1V (8.34% grade). The Federal Highway Administration (FHWA) does not accept sidewalk ramps with slopes steeper than 12H:1V. Flatter ramp slopes are permissible. Field verify the forms before pouring concrete.

2. To the maximum extent feasible, the ramp cross slope shall not exceed 2%.

3. The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' × 4'.

4. Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.

5. Layout 1 is used to provide access to a single crosswalk parallel to the major street. The bid item "Cement Conc. Sidewalk Ramp Type 4C" does not include the adjacent Curb (or Curb & Gutter), the Sidewalk, or the Cement Conc. Pedestrian Curb.

6. Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.

7. See Standard Plan F-30.10 for Cement Concrete Sidewalk details, sections, etc.

8. The ramp shown on this plan is ideal and assumes optimal roadway geometric design. It assumes a curb height of 6". Adjustments must be made for conditions in the field such as roadway grade, actual curb height, etc.

The maximum allowable ramp slope is 12H:1V (8.34% grade). The Federal Highway Administration (FHWA) does not accept sidewalk ramps with slopes steeper than 12H:1V. Flatter ramp slopes are permissible. Field verify the forms before pouring concrete.

To the maximum extent feasible, the ramp cross slope shall not exceed 2%.

The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' × 4'.

Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.

Layout 1 is used to provide access to a single crosswalk parallel to the major street. The bid item "Cement Conc. Sidewalk Ramp Type 4C" does not include the adjacent Curb (or Curb & Gutter), the Sidewalk, or the Cement Conc. Pedestrian Curb.

Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.

See Standard Plan F-30.10 for Cement Concrete Sidewalk details, sections, etc.
1. The ramp shown on this plan is ideal and assumes optimal roadway geometric design. A given initial curb height of 6" is first reduced to 4", via the Auxiliary Ramp, staging the final descent to the roadway. Adjustments must be made for conditions in the field such as roadway grade, existing curb height, etc. The dimensions shown are the minimums unless labeled otherwise.

2. The maximum allowable ramp slope is 12H:1V (8.34% grade). The Federal Highway Administration (FHWA) does not accept sidewalk ramps with slopes steeper than 12H:1V. Flatter ramp slopes are permissible. Field verify the forms before pouring concrete.

3. To the maximum extent feasible, ramp cross slopes shall not exceed 2%.

4. The bottom of the ramp shall have a level area (not in excess of 2% in any direction), 4' × 4'.

5. Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.

6. Layouts 1, 2, & 3 require two (2) of this bid item: "Cement Conc. Sidewalk Ramp Type 5". The bid item does not include the adjacent Curb (or Curb & Gutter), or Sidewalk.

7. Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.

8. See Standard Plan F-30.10 for Cement Concrete Sidewalk details, sections, etc.
NOTES

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

2. See Std. Plan F-30.10 for sidewalk details.

3. Curb and gutter shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.

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

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

See Std. Plan F-30.10 for sidewalk details.

Curb and gutter shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.

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

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

See Std. Plan F-30.10 for sidewalk details.

Curb and gutter shown, see the Contract Plans for the curb design specified. See Standard Plan F-10.12 for curb details.

Avoid placing drainage structures, junction boxes or other obstructions in front of driveway entrances.
SIGN LIGHTING LUMINAIRE MOUNTING DETAILS FOR TRUSS STRUCTURES

NOTE: ALL NUTS, BOLTS, U-BOLTS, WASHERS AND OTHER HARDWARE SHALL BE STAINLESS STEEL, EXCEPT AS NOTED.

DETAIL "A"

SEE DETAIL "A"

SECTION E

END VIEW

LUMINAIRE MOUNTING PLATE
ITEM AVAILABLE FROM FIXTURE MANUFACTURER,
MATERIAL IS GALV. 10 GAGE STEEL PLATE

PLAN

LUMINAIRE MOUNTING PLATE

W4 X 13 STEEL

U-BOLTS
W/ 1 FLAT WASHER & LOCKNUT

POST CLIPS

SECTION A

SIGN LIGHTING LUMINAIRE MOUNTING PLATE

3/8" DIAM. X 1 1/2" BOLT
(DRILL 1/2" HOLE THROUGH TOP FLANGE OF W4 X 13 STEEL)

LUMINAIRE BRACKET - (TYP.)

VERTICAL BRACE W4 X 13 (TYP.)

U-BOLT CONNECTION

DEPTH OF TRUSS

TOP TRUSS CHORD

BOTTOM TRUSS CHORD

WINDBEAM

1'- 10 3/4" 5'-3" 3/8" DIAM. X 3/8" LOCKNUT

W4 X 13 STEEL

ELECTRICAL CONDUIT

TRUSS CORD

SIGN FACE

1'-8" 3/8" DIAM. X 1 1/2" BOLT

W4 X 13 STEEL LUMINAIRE BRACKET - (TYP.)

1'-9 1/2"

3/8" DIAM. X 3/8" LOCKNUT

LUMINAIRE MOUNTING PLATE

W4 X 13 STEEL

7/16" DIAM.

1'-1 3/4"

3/8" LOCKWASHER

SECTION

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SIGN LIGHTING LUMINAIRE MOUNTING DETAILS FOR MONOTUBE STRUCTURES

1. Refer to Contract Plans for Monotube Beam Bracket element sizes, dimensions and weld symbols.

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.
1. Refer to the Sign Specification Sheet of the Contract for the 'V' and 'W' distances.

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

1. Notch is only required with multiple post installations.

2. 6×10, 8×10, and 6×12 Timber Sign Posts cannot be made breakaway and do not have holes or notches. These posts shall not be installed within the Design Clear Zone. They may be installed behind traffic barrier.

3. Signs with a width less than 12 feet and supported on three 6×6 or 6×8 posts shall not be installed within the Design Clear Zone. They may be installed behind traffic barrier.

4. Signs with a width less than 17 feet and supported on four 6×6 or 6×8 posts shall not be installed within the Design Clear Zone. They may be installed behind traffic barrier.

5. For "X", "Y", "H1", "H2", "H3", and "H4" refer to the Sign Specification Sheet in the Contract.

6. For 6×6 posts and larger, 7 feet minimum spacing is required between posts.

### 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>4×4</td>
<td>3'-0&quot;</td>
<td>NOT REQ'D</td>
<td>NOT REQ'D</td>
</tr>
<tr>
<td>4×6</td>
<td>4'-0&quot;</td>
<td>1'-0&quot;</td>
<td>1'-0&quot;</td>
</tr>
<tr>
<td>6×6</td>
<td>4'-0&quot;</td>
<td>2&quot;</td>
<td>SEE NOTE 3 &amp; 4</td>
</tr>
<tr>
<td>6×8</td>
<td>5'-0&quot;</td>
<td>3&quot;</td>
<td>SEE NOTE 3 &amp; 4</td>
</tr>
<tr>
<td>6×10</td>
<td>6'-0&quot;</td>
<td>SEE NOTE 2</td>
<td>SEE NOTE 2</td>
</tr>
<tr>
<td>8×10</td>
<td>6'-0&quot;</td>
<td>SEE NOTE 2</td>
<td>SEE NOTE 2</td>
</tr>
<tr>
<td>6×12</td>
<td>7'-0&quot;</td>
<td>SEE NOTE 2</td>
<td>SEE NOTE 2</td>
</tr>
</tbody>
</table>

Timber Sign Post ~ See Std. Spec. 9-28

-finishing ground line

DETAIL

FINISHED GROUND LINE

COMPACTED NATIVE BACKFILL MATERIAL

EDGE OF TRAVELED WAY

FINISHED GROUND LINE

TOP OF SIGN

ELEVATION VIEW

SINGLE POST INSTALLATION

DRAWN BY: LISA CYFORD

STATE OF WASHINGTON

REGISTERED PROFESSIONAL ENGINEER
25335

THEODORE J. TRAPANEER

EXPIRES AUGUST 9, 2009

Pasco Bakotich III  11-8-07

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NARROWEST SIGN POST DIMENSION

STEEL OR ALUMINUM ANGLE (TYP.)

SIGN POST

DRILL PILOT HOLES FOR LAG BOLTS (TYP.)

GALVANIZED LAG BOLT (TYP.)

SIGN PANEL

MAJOR AND SECONDARY SIGN INSTALLATION

VARIIES 0" TO 3"

SECONDARY SIGN

EDGE OF TRAVELED WAY

MAJOR SIGN

VARIIES 0" TO 3"

SIGN POST (TYP.)

SIGN PANEL ATTACHMENT DETAIL

NOTCH LOCATION (TYP.)

TOP OF POST

TOP OF MAJOR SIGN

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

VARIIES 0" TO 3"

SECONDARY SIGN

DIRECTION OF TRAFFIC

BOTTOM OF SIGN AND TOP OF NOTCH SHALL BE ALIGNED

1/2" NOTCH IN EACH POST, WHEN REQUIRED ~ SEE POST INSTALLATION TABLE

NOTCH DEPTH ~ SEE POST INSTALLATION TABLE

FROM TOP OF POST TO BOTTOM OF SIGN

1 1/2" ALUMINUM WINDBEAM AND TWO POST CLIPS (TYP.) ~ SEE SIGN PANEL ATTACHMENT DETAIL

DRILL TWO 1/2" DIAM. HOLES THROUGH TUBE AND INSTALL "TWO 3/8" × 3" GALvanized LAG SCREWS

3/8" × 3" HEX LAG BOLT, STEEL, GALVANIZED ~ 2" - 0" MAX. O.C. ~ STAGGER OPPOSING BOLTS 1 1/2" MIN.

1/2" ALUM. RIVET (TYP.)

MAJOR AND SECONDARY SIGN INSTALLATION

MAJOR SIGN

VARIIES 0" TO 3"

ppard SIGN POST (TYP.)

SIGN PANEL ATTACHMENT DETAIL

NOTCH LOCATION (TYP.)

TOP OF POST

TOP OF MAJOR SIGN

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

VARYIES 0" TO 3"

SECONDARY SIGN

DIRECTION OF TRAFFIC

BOTTOM OF SIGN AND TOP OF NOTCH SHALL BE ALIGNED

1/2" NOTCH IN EACH POST, WHEN REQUIRED ~ SEE POST INSTALLATION TABLE

NOTCH DEPTH ~ SEE POST INSTALLATION TABLE

FROM TOP OF POST TO BOTTOM OF SIGN

1 1/2" ALUMINUM WINDBEAM AND TWO POST CLIPS (TYP.) ~ SEE SIGN PANEL ATTACHMENT DETAIL

DRILL TWO 1/2" DIAM. HOLES THROUGH TUBE AND INSTALL "TWO 3/8" × 3" GALvanized LAG SCREWS

3/8" × 3" HEX LAG BOLT, STEEL, GALVANIZED ~ 2" - 0" MAX. O.C. ~ STAGGER OPPOSING BOLTS 1 1/2" MIN.

1/2" ALUM. RIVET (TYP.)

WINDBEAM SIGN POST ~ SEE STD. SPEC. 9-28

TIMBER SIGN POST ~ SEE STD. SPEC. 9-28

TOP OF PAVEMENT

CONCRETE FOUNDATION SLEEVE DETAIL

TO BE USED WHEN PLACING TIMBER POST IN A PAVED AREA

ISOMETRIC VIEW

SIGN PANEL ATTACHMENT DETAIL

1/2"

1"

2' - 0" DIAM.

TIMBER SIGN SUPPORT

STANDARD PLAN G-22.10-00

EXPRES AUGUST 9, 2009

Pasco Bakotich III 11-8-07

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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.

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

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

Mounting brackets with steel straps shall be stainless steel or "Band-it" products that are in compliance with NCHRP 350 crash test criteria. The details are only shown on this plan to illustrate how the parts are assembled.

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 stainless steel or "Band-it" products that are in compliance with NCHRP 350 crash test criteria. The details are only shown on this plan to illustrate how the parts are assembled.
**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.

---

**ELEVATION**

- **TOP OF SIGN PANEL**
- **BOTTOM OF SIGN PANEL**
- **STEEL TUBE SIGN POST**
- **ANCHOR COUPLING**
- **ANCHOR FERRULE**
- **1" DIAM. NYLON WASHER**
- **5/16" DIAM. HEX HEAD BOLT**
- **3/8" HEX HEAD NUT**
- **1" DIAM. STEEL FLAT WASHER**
- **3" STEEL TUBE SIGN POST**
- **TOP OF SIGN POST BRACKET**
- **FINISHED GROUND LINE**

---

**DETAIL A**

- **TOP OF SIGN POST**
- **TOP OF SIGN**
- **TOP OF SIGN POST BRACKET**
- **TOP OF SIGN PANEL**

---

**DETAIL B**

- **1" DIAM. STEEL FLAT WASHER**
- **STEEL LOCK WASHER**
- **3/8" HEX HEAD NUT**
- **5/16" DIAM. HEX HEAD BOLT**
- **1" DIAM. NYLON WASHER**
- **WHEN SIGN FACE HAS TYPE 3 OR 4 SHEETING**

---

**EXPLODED VIEW**

- **BREAKAWAY SIGN BRACKET ASSEMBLY**
- **STEEL TUBE SIGN POST**
- **ANCHOR COUPLING**
- **ANCHOR FERRULE**
- **1" DIAM. NYLON WASHER**
- **5/16" DIAM. HEX HEAD BOLT**
- **3/8" HEX HEAD NUT**
- **STEEL TUBE SIGN POST BRACKET**
- **FINISHED GROUND LINE**
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.

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

For "X", "Y", "H1", and "H2", refer to the Sign Specification Sheet in the Contract.

Sign post shall be 2 1/2" nominal I.D. galvanized schedule 80 steel pipe.

Do not tighten any slip plate bolt to the recommended torque before pre-tightening the other bolts. Progressively tighten the three slip plate bolts in 10 ft-lbs increments, alternately, to a final torque of 38 ft-lbs on each bolt.
**STEEL SIGN SUPPORT**

**TYPE SB-1 & SB-2 SIGN SUPPORT**

**INSTALLATION DETAILS**

- **VIEW A**
  - Sign Panel
  - Sign Post ~ 2.5" square, 12 gauge steel tube
  - Field Drilled Z-Bar

- **VIEW B**
  - Slip Base Assembly
  - Top of Lower Slip Plate
  - Finished Ground Line
  - Sign Panel
  - 3/8" diam. Hex Head Bolt, Nut and Washers (Typ.)

- **VIEW C**
  - Slip Base Assembly (Typ.)
  - Top of Lower Slip Plate
  - Sign Panel
  - Sign Post ~ 2.5" square, 12 gauge steel tube (Typ.)

- **VIEW D**
  - Sign Panel
  - Sign Post
  - 3/16" rivets ~ 4" so staggered spacing
  - Z-Bar

- **VIEW E**
  - Sign Panel
  - Sign Post
  - 5/16" diam. ~ 3.125" long Bolt

**NOTES**

1. For "W", horizontal distance from edge of traveled way to center of nearest post, and "V", vertical distance from edge of traveled way to bottom of sign, see Standard Plan G-20.10.

2. For "X", "Y", "H1", "H2", "H3", and "H4" refer to the Sign Specification Sheet in the Contract.

**STEEL SIGN SUPPORT**

**TYPES SB-1 & SB-2**

**INSTALLATION DETAILS**

**STANDARD PLAN G-24.40-00**

**APPROVED FOR PUBLICATION**

**Pasco Bakotich III 11-8-07**

**STATE DESIGN ENGINEER**

**Washington State Department of Transportation**

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NOTES

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

2. Do not tighten any single Slip Plate Bolt to the recommended torque before pre-tightening the other bolts. Progressively tighten the three Slip Plate Bolts in 10 ft-lb increments, alternately, to a final torque of 40 ft-lbs on each.
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 "H1" refer to the Sign Specification Sheet in the Contract.
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.

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.


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ELEVATION VIEW
TYPE TP-A & TYPE TP-B FOUNDATION

<table>
<thead>
<tr>
<th>POST SIZE</th>
<th>MAX. XYZ</th>
<th>VERTICAL REBAR</th>
<th>FDN. DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>W6 x 12</td>
<td>W6 x 9</td>
<td>1570</td>
<td>5' - 0&quot;</td>
</tr>
<tr>
<td>W6 x 16</td>
<td>W6 x 12</td>
<td>2340</td>
<td>5' - 0&quot;</td>
</tr>
<tr>
<td>W8 x 21</td>
<td>W8 x 18</td>
<td>4120</td>
<td>7' - 0&quot;</td>
</tr>
<tr>
<td>W10 x 26</td>
<td>W10 x 22</td>
<td>6330</td>
<td>8' - 0&quot;</td>
</tr>
<tr>
<td>W12 x 30</td>
<td>W12 x 26</td>
<td>8720</td>
<td>9' - 0&quot;</td>
</tr>
</tbody>
</table>

ELEVATION VIEW
TYPE AS & TYPE AP FOUNDATION

<table>
<thead>
<tr>
<th>POST SIZE</th>
<th>MAX. XYZ</th>
<th>FDN. DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot; SQ.</td>
<td>250</td>
<td>4' - 0&quot;</td>
</tr>
</tbody>
</table>

ELEVATION VIEW
TYPE PL, TYPE PL-T & TYPE PL-U FOUNDATION

<table>
<thead>
<tr>
<th>MAX. XYZ</th>
<th>FDN. DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>225</td>
<td>3' - 0&quot;</td>
</tr>
<tr>
<td>265</td>
<td>4' - 0&quot;</td>
</tr>
<tr>
<td>300</td>
<td>4' - 0&quot;</td>
</tr>
<tr>
<td>600</td>
<td>4' - 0&quot;</td>
</tr>
</tbody>
</table>

NOTES
1. Per TRANSPO: 5" to 8" square posts require TP-B foundations. Foundation diameter and depth shall be verified with the Bridge office.
2. Install conduit for post-mounted Junction Box in the concrete foundation, when required. See Standard Plan J-12, Sheet 2.

KEY NOTES
- Foundation depths based on allowable lateral bearing pressure in excess of 2500 PSF.
- Two post installation.
1. Mounting brackets with steel straps shall be a stainless steel band and buckle system product or an approved equal. Mounting brackets shall be universal channel clamps; steel straps shall be 3/4" wide and 0.030" thick.

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

DIMENSIONS

A  B  C  D
3'-0"  9"
4'-0"  1'-0" 6"

MOUNTING BRACKET
AND STEEL STRAP
~ SEE NOTE 1

3/16" RIVET (TYP.)
~ 4" MAX. SPACING

1" (TYP.)

LEVEL

7'-0" MIN.

WINDBEAM

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

2. Sign braces are only installed when specified in the contract.

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

4. A nylon washer shall be placed between the sign and the steel washer when the sign face has Type 3 or 4 sheeting.

For sign attachment, see Std. Plan G-22.10.
VERTICAL CLEARANCE ~ 17’-6” MIN.
BOTTOM OF LUMINAIRE BRACKET ~ WHEN SIGN LIGHTING IS SHOWN IN THE CONTRACT

TRUSS LOWER HORIZONTAL DIAGONAL (TYP.)
TRUSS UPPER HORIZONTAL DIAGONAL (TYP.)
CHORDS

SUM OF SIGN FOR DOUBLE CANTILEVER

VERTICAL STRUTS AT SPAN END ONLY

INTERIOR DIAGONAL AT SPAN END ONLY

INTERIOR DIAGONALS AND STRUTS SHALL BE 1 1/2" PIPE (O.D. 1 1/4" WALL)

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VERTICAL STRUTS AT SPAN END ONLY

VERTICAL "FAR" TRUSS DIAGONAL (TYP.)

VERTICAL "NEAR" TRUSS DIAGONAL (TYP.)

PANEL LENGTH (4' - 3" MAX.) TO BE CONSTANT THROUGHOUT SPAN

\[ \frac{X}{2} \]

\[ \frac{Y}{2} \]

\[ Y = 5' - 0" \]

MIN.

\[ 1' - 8" \]

0 MIN. TO 1' - 6" MAX.

CAMBER EACH TRUSS 0.002 FT/FT FOR DOUBLE CANTILEVER (TYP.)

CAMBER EACH TRUSS 0.002 FT/FT FOR DOUBLE CANTILEVER (TYP.)

\[ \frac{1}{4}" CAPPED NIPPLE \]

\[ 1' - 0" \]

MIN.

\[ 2' - 0" \]

\[ 7" \]

\[ H \]

\[ \text{POST} \]

\[ \text{CHORD (TYP.)} \]

\[ \text{CHORD (TYP.)} \]

\[ \text{BOTTOM OF LUMINAIRE BRACKET, WHEN SIGN LIGHTING IS SHOWN IN THE CONTRACT} \]

\[ \text{SIGN CENTERLINE MAY VARY FROM TRUSS CENTERLINE TO PROVIDE MINIMUM VERTICAL CLEARANCE.} \]

ELEVATION

DOUBLE CANTILEVER SIGN STRUCTURE

PERSPECTIVE

CANTILEVER SIGN STRUCTURE (TRUSS-TYPE)

STANDARD PLAN G-60.10-00

Sheet 2 of 4 Sheets

Approved for Publication

Pasco Bakotich III 08-31-07

EFFECTIVE: JANUARY 7, 2008 TO AUGUST 3, 2008

No. 25470

Richard P. Zeldenrust

Expires November 14, 2008

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HEMISPHERICAL POST FINIAL, 1/8" MIN. THICKNESS. INSTALL AFTER GALVANIZING.

3/8" ALLEN HOLLOW SET SCREW WITH DOG POINT (TYP.) (CORROSION RESISTANT METAL OR COATING) AT 90° INTERVALS

CUT HOLE IN POST FOR WIDE FLANGE, 1/8" MAX. CLEARANCE ALL AROUND

15/16" DIAM. HOLE (TYP.) CENTERED IN OPPOSITE FLANGES FOR SINGLE CANTILEVER

1/2" DIAM. DRAIN HOLES (TYP.) TO FacilitATE GALVANIZING

7/8" DIAM. BOLTS X 2 1/2" LONG (STO SPEC 8.06.5 (2)), HEAVY DUTY NUT AND 2 WASHERS (TYP.) - INSTALL BOLTS WITH HEAD TOWARD CHORD

ELEVATION

SECTION THROUGH FINIAL AND POST

FINIAL BRACKET

DIAGONAL CONNECTION DETAIL TYPICAL OF ALL DIAGONALS

BASE ~ SIDE

ELEVATION

1/4" PLATE 10" x 10" PIPE O.D.

BACK-UP RING

1/2" DIAM. HOLES AS CLOSE TO WELD AS POSSIBLE TO FACILITATE GALVANIZING

1/2" DIAM. BOLTS x 2 1/2" LONG (STD. SPEC. 9-05.6 (3)), HEAVY DUTY NUT AND 2 WASHERS (TYP.) - INSTALL BOLTS WITH HEAD TOWARD CHORD

CHORD TO POST CONNECTION DETAIL

DETAIL "D"

BASE ~ TOP

TYPICAL TRUSS DETAILS ENDS OF DIAGONALS SHALL BE CUT TO FIT NEATLY AGAINST CHORDS

TOP

ISOMETRIC

BASE

CHORD

DIAGONALS

FINIAL BRACKET

BASE ~ SIDE

BASE ~ END

ENDS OF DIAGONALS SHALL BE CUT TO FIT NEATLY AGAINST CHORDS

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**POST BASE DETAILS**

- **Removable Rain Tight Hand Hole Cover with Gasket** - Fasten with two stainless steel (ASTM F 593) screws.
- **Hand Hole Frame**
- **Hole in Post Base** (Hole Dia. = Post I.D. - 2")
- **2" Diameter Holes for Anchor Bolts**
- **2-6" Diameter Bolt Circle**
- **1/2" Diameter Steel Bolt**
  - 1/2" long, with washer and nut for ground
- **Inside Edges Shall Be Round and Smooth All Around**

**SECTION B**

- **1/4" Back-up Bar**
- **Seal Weld**

**DETAIL "G"**

- **Pipe O.D.**
- **Pipe Wall**
- **Back-up Ring**
- **100% UT**

**VIEW C**

- **Screen Detail**
- **Drill and Tap For 1/4" Diam. Cap Screw, ASTM F 593, W. S.S. Washer, Spacing in 5" O.C.**
- **Welded Galv. Cloth 1/16" x 7/16" Sq. Wrap Around Base Plate With 3" Min. Lap**

**BASE WELD DETAIL**

- **24" O.D. Pipe (t = 0.099) Splice With**
- **24" O.D. Upper Post (See Post Selection Table)**
- **18" O.D. Pipe (t = 0.750) Splice With**
- **18" O.D. Upper Post (See Post Selection Table)**

**CANTILEVER SIGN STRUCTURE (TRUSS-TYPE)**

**STANDARD PLAN G-60.10-00**

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**Pasco Bakotich III**

**08-31-07**

**State Design Engineer**

**Washington State Department of Transportation**

**EXPIRES NOVEMBER 14, 2008**
VALUES OF Z

<table>
<thead>
<tr>
<th>FOUNDATION TYPE</th>
<th>TOTAL SIGN AREA</th>
<th>ALLOWABLE LATERAL BEARING PRESSURE (PSF)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>200 SF OR LESS</td>
<td>200 SF - 400 SF</td>
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<tr>
<td>Z</td>
<td>Z</td>
<td>1500 AND UP</td>
</tr>
<tr>
<td>1</td>
<td>13&quot; - 0&quot;</td>
<td>18&quot; - 0&quot;</td>
</tr>
<tr>
<td></td>
<td>16&quot; - 0&quot;</td>
<td>22&quot; - 0&quot;</td>
</tr>
</tbody>
</table>

1. See Standard Specification Section 8-21.3(b) for construction requirements.
2. Use a template to locate and secure bolts in place during foundation installation.
2" - 6" BOLT CIRCLE

3/4" PLATE (ASTM A 36)
(NO GALVANIZING REQUIRED)

2" DIAM HOLE FOR ANCHOR BOLT (TYP.)

ANCHOR PLATE DETAIL

MAY BE FIELD BENT (TYP.)

Spiral bar

SHOP WELD OR FIELD WELD

FIELD WELD OR

SEE TABLE FOR WELD DIMENSIONS

SPIRAL WELDED LAP SPLICE DETAIL

SPIRAL LAP SPLICE DETAIL

WELDING SHALL MEET THE REQUIREMENTS OF STD. SPEC. 5-02.3(24)E
FOR WELD DIMENSIONS, SEE TABLE BELOW

COLUMN AND SHAFT SPIRAL OPTIONS

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

BAR LIST

<table>
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<tr>
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<th>QTY.</th>
<th>LENGTH</th>
<th>SIZE</th>
<th>TYPE</th>
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<tbody>
<tr>
<td>1</td>
<td>CAP VERTICAL</td>
<td>4</td>
<td>3' - 10&quot;</td>
<td>#4</td>
<td>STR.</td>
</tr>
<tr>
<td>2</td>
<td>CAP HOOPS</td>
<td>5</td>
<td>15' - 9&quot;</td>
<td>#5</td>
<td></td>
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<tr>
<td>3</td>
<td>SHAFT VERTICAL</td>
<td>12</td>
<td>2&quot; MINUS CLEARANCES</td>
<td>#0</td>
<td>STR.</td>
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<tr>
<td>4</td>
<td>SHAFT SPIRAL</td>
<td>1</td>
<td>AS REQUIRED</td>
<td>#4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>CAP TOP</td>
<td>4</td>
<td>10' - 10&quot;</td>
<td>#5</td>
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BENDING DIAGRAM
(ALL DIMENSIONS ARE OUT TO OUT)

MATERIAL SPECIFICATIONS

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

CANTILEVER SIGN
STRUCTURE (TRUSS-TYPE)
FOUNDATION TYPE 1
STANDARD PLAN G-60.20-00

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
CONCRETE SHALL BE PLACED DIRECTLY AGAINST UNDISTURBED EARTH OR ALTERNATIVELY, BACKFILL PLACED AROUND FOUNDATION SHALL BE COMPACTED IN CONFORMANCE WITH STD. SPEC. 2-09.3 (1) E, METHOD 1 OR 4.

ALL FORMWORK SHALL BE REMOVED.

ANCHOR PLATE ~ SEE DETAIL, STD. PLAN G-60.20 SHEET 2

ANCHOR PLATE ~ SEE DETAIL, STD. PLAN G-60.10 SHEET 4

PROVIDE SCREEN AROUND BASE, ~ SEE SCREEN DETAIL, STD. PLAN G-60.10 SHEET 4

1. See Standard Specification Section 8-21.3(9) for construction requirements.
### Values of Z

<table>
<thead>
<tr>
<th>Foundation Type</th>
<th>Total Sign Area</th>
<th>Allowable Lateral Bearing Pressure (PSF)</th>
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<tbody>
<tr>
<td></td>
<td>200 SF OR LESS</td>
<td>200 SF ~ 400 SF</td>
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<tr>
<td>TYPE 2</td>
<td>Z</td>
<td>Z</td>
</tr>
<tr>
<td></td>
<td>9'-0&quot;</td>
<td>11'-0&quot;</td>
</tr>
<tr>
<td></td>
<td>Z</td>
<td>Z</td>
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<tr>
<td></td>
<td>TYPE 3</td>
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<tr>
<td></td>
<td>11'-0&quot;</td>
<td>13'-6&quot;</td>
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<tr>
<td></td>
<td>NOT LESS THAN 1500</td>
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### Material Specifications

- **Concrete**: Class 4000
- **Steel Reinforcement Bar**: AASHTO M 31 Grade 60
- **Anchor Rods**: ASTM F 1554 Grade 105
- **Anchor Nuts**: AASHTO M 291
- **Anchor Washers**: AASHTO M 293
- **Anchorage Galvanizing**: AASHTO M 232
- **Anchor Plate**: ASTM A 36

---

**Foundation Wall Ties**: #5

**Foundation Verticals**: 
- 6 ft 6 in.
- 14 #5

**Pedestal Verticals**: 
- 16 ft 10 in.
- 14 #5

**Foundation Wall Horizontals**: 
- 2 ft 6 in.
- 14 #5

**Foundation Wall Horizontals at Slope**: 
- 2 ft 6 in.
- 10 #5

**Foundation Wall Hoop**: 
- 3 ft 2 in.
- 5 #4

**Foundation Wall Horizontals**

### Bending Diagram

- **Anchor Rods**: ASTM F 1554 Grade 105
- **Anchor Nuts**: AASHTO M 291
- **Anchor Washers**: AASHTO M 293
- **Anchorage Galvanizing**: AASHTO M 232
- **Anchor Plate**: ASTM A 36

---

**Cantilever Sign Structure (Truss-Type)**

<table>
<thead>
<tr>
<th>Foundation Types 2 &amp; 3</th>
<th>Standard Plan G-60.30-00</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sheet 2 of 2 Sheets</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Pasco Bakotich III**

**08-31-07**

**State Design Engineer**

**State of Washington**

**Registered Professional Engineer**

25470

**Expires November 14, 2008**

**State of Washington Department of Transportation**

**Approve for Publication**

**Pasco Bakotich III**

**08-31-07**

**State Design Engineer**

**State of Washington**

**Registered Professional Engineer**

25470

**Expires November 14, 2008**

**State of Washington Department of Transportation**

**Approve for Publication**
1. Horizontal and vertical clearance requirements shall be as shown in Contract Plans.

2. Horizontal diagonals must join chords where vertical diagonals connect (panel points).

3. Interior diagonals shall be placed at panel points, 40' maximum spacing. Locate symmetrically about centerline of span if possible. An interior diagonal is not required at span ends.

4. No post splices permitted in lower third of height, nor closer than 3' - 0" to bottom of chord. No chord shop splices permitted in middle third of span. Maximum of one splice in each end post.

**ELEVATION**

**STRUCTURE DIMENSIONS**

<table>
<thead>
<tr>
<th>SPAN LENGTH</th>
<th>DIMENSION</th>
<th>TOP AND BOTTOM CHORDS</th>
<th>DIAGONALS</th>
<th>END TRUSS POSTS</th>
<th>END TRUSS STRUTS AND DIAGONALS</th>
<th>TOTAL SIGN AREA (MAX.) (SQ. FT.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60' OR LESS</td>
<td>4' - 0&quot;</td>
<td>3&quot; x .216&quot;</td>
<td>1 1/4&quot; x .140&quot;</td>
<td>10&quot; x .279&quot;</td>
<td>2 1/2&quot; x .203&quot;</td>
<td>384</td>
</tr>
<tr>
<td>61' to 90'</td>
<td>5' - 0&quot;</td>
<td>4&quot; x .237&quot;</td>
<td>2&quot; x .154&quot;</td>
<td>10&quot; x .279&quot;</td>
<td>2 1/2&quot; x .203&quot;</td>
<td>624</td>
</tr>
<tr>
<td>91' to 120'</td>
<td>6&quot; - 0&quot;</td>
<td>5&quot; x .259&quot;</td>
<td>3&quot; x .176&quot;</td>
<td>10&quot; x .307&quot;</td>
<td>3 1/2&quot; x .216&quot;</td>
<td>894</td>
</tr>
<tr>
<td>121' to 150'</td>
<td>7' - 0&quot;</td>
<td>6&quot; x .380&quot;</td>
<td>2 1/2&quot; x .303&quot;</td>
<td>10&quot; x .369&quot;</td>
<td>3 1/2&quot; x .236&quot;</td>
<td>1104</td>
</tr>
</tbody>
</table>

5. Panel points (TYP.) - see Notes 2 and 3

6. Panel length p to be constant throughout span and not to exceed D + 2'.

7. Sign bridge foundation - see Std. Plan G-70.30

8. Vertical clearance requirement shall be as shown in Contract Plans.

9. Base elevation (TYP.) = Height of shallowest sign on structure, + 1' - 0" min.

10. Equal elevations = Height of any sign with height greater than Y1.

**NOTE:** This plan is not a legal engineering document but an electronic duplicate. The original, signed by the engineer and approved for publication, is kept on file at the Washington State Department of Transportation. A copy may be obtained upon request.
BASE PLATE HOLE = 8" DIAM.
1 1/2" DIAM. HOLE FOR ANCHOR BOLT (TYP.)

POST BASE DETAILS

SECTION B

HANDHOLE

1/8" BACK-UP BAR

SEAL WELD

BASE WELD DETAIL

VIEW C

T-30

3/16" WELD

ANCHOR ROD (TYP.)

TOP OF FOUNDATION

WELDED GALV. CLOTH 1/16" x 7/16" SQ. WRAP AROUND BASE PLATE WITH 3" MIN. LAP

SCREEN DETAIL

DRILL AND TAP FOR 1/4" DIAM. CAP SCREW, ASTM F 593, W. S. S. WASHER, SPACING 8" O.C.

TOP OF FOUNDATION

TOP OF BASE

POST ANCHOR BOLT

HANDHOLE

1/16" SEAL WELD

1/4"

1/8"

B

TOP

C

POST BASE DETAILS

BASE PLATE HOLE = 8" DIAM.

45°

1" - 9" BOLT CIRCLE

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CASE THE EXCAVATION AND PLACE USING TREMIE METHOD WHEN WATER IS PRESENT.

**TABLE**

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>SPAN LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>60' TO 90'</td>
<td>91' TO 120'</td>
</tr>
<tr>
<td>DIMENSION = D</td>
<td>4&quot; - 0&quot;</td>
</tr>
<tr>
<td>BAR SPACES = N</td>
<td>2</td>
</tr>
<tr>
<td>SHAFT DEPTH = Z</td>
<td>11&quot; - 0&quot;</td>
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</tbody>
</table>

**BAR LIST**

<table>
<thead>
<tr>
<th>MARK</th>
<th>LOCATION</th>
<th>SPAN LENGTH</th>
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<tbody>
<tr>
<td>07</td>
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<td>QTY.</td>
<td>SIZE</td>
<td>QTY.</td>
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<tr>
<td>11</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>08</td>
<td>SHAFT - SPIRAL</td>
<td>1</td>
</tr>
<tr>
<td>09</td>
<td>CAP - TOP AND BOTTOM</td>
<td>1</td>
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<tr>
<td>10</td>
<td>CAP - SIDES</td>
<td>6</td>
</tr>
<tr>
<td>11</td>
<td>CAP - HOOPS</td>
<td>6</td>
</tr>
</tbody>
</table>

**BENDING DIAGRAM**

**ELEVATION**

**FOUNDATION TYPE 1**

**ISOMETRIC**

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**MATERIAL SPECIFICATIONS**

- **CONCRETE**: CLASS 4000
- **STEEL, REINFORCING**: AASHTO M 31, GRADE 60
- **ANCHOR RODS**: ASTM F 1564, GRADE 105
- **ANCHOR NUTS**: AASHTO M 291
- **ANCHOR WASHERS**: AASHTO M 263
- **ANCHORAGE GALVANIZING**: AASHTO M 232
- **ANCHOR PLATE**: ASTM A 36

**TABLE**

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>SPAN LENGTH</th>
<th>60' OR LESS</th>
<th>61' TO 90'</th>
<th>91' TO 120'</th>
<th>120' TO 150'</th>
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<tbody>
<tr>
<td>D</td>
<td>4' - 0&quot;</td>
<td>5' - 0&quot;</td>
<td>6' - 0&quot;</td>
<td>7' - 0&quot;</td>
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</tr>
<tr>
<td>N</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>10</td>
<td></td>
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<tr>
<td>Z</td>
<td>TYPE</td>
<td>2</td>
<td>3</td>
<td>10</td>
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<table>
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<tr>
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<th>10' - 0&quot;</th>
<th>11' - 0&quot;</th>
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<tbody>
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<td>6&quot;</td>
<td>6&quot;</td>
<td>10&quot;</td>
<td>11&quot;</td>
</tr>
<tr>
<td>3</td>
<td>7&quot;</td>
<td>8&quot;</td>
<td>10&quot;</td>
<td>11&quot;</td>
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**BAR LIST**

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<th>MARK</th>
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<th>SPAN LENGTH</th>
<th>QTY</th>
<th>SIZE</th>
<th>QTY</th>
<th>SIZE</th>
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<tbody>
<tr>
<td></td>
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<td>CAP - TOP</td>
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<td>6</td>
<td>4</td>
<td>7</td>
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<tr>
<td></td>
<td>2</td>
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<td>61' TO 90'</td>
<td>14</td>
<td>4</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>3</td>
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<td>4</td>
<td>4</td>
<td>22</td>
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<tr>
<td></td>
<td>4</td>
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<td>6</td>
<td>7</td>
<td>10</td>
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<td>5</td>
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<td>5</td>
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<td>7</td>
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<td>5</td>
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<td>5</td>
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<tr>
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<td>8</td>
<td>FND. WALL - HORIZONTAL</td>
<td>61' TO 90'</td>
<td>10</td>
<td>5</td>
<td>12</td>
<td>5</td>
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</tbody>
</table>

**FOUNDATION TYPES 2 & 3**

- **CONCRETE BELOW FINISHED GROUNDLINE SHALL BE PLACED DIRECTLY AGAINST UNDISTURBED EARTH OR ALTERNATELY, BACKFILL PLACED AROUND FOUNDATION. SHALL BE COMPACTED IN CONFORMANCE WITH STD. SPEC. SECTION 2-09.3 (1) E, METHOD 1 OR 4. ALL FORMWORK SHALL BE REMOVED.**

**ANCHOR PLATE DETAIL**

- **ANCHOR ROD = 1" DIAM x 2' - 9" THREADED & MIN. EACH END, W/ 3 WASHERS AND 4 HEAVY HEX NUTS**

**ISOMETRIC**

- **ANCHOR PLATE DETAIL**
  - **ANCHOR PLATE**: 5/8" x 21" x 21"
  - **1' - 6" DIAM. BOLT CIRCLE (TYP.)**
  - **1' - 0" MIN. GALVANIZING (TYP.)**
  - **TOP**
  - **SYM. ART E**
  - **SYMMETRICAL ABOUT**

**BAR SPACES ~ N**

- **EQUAL SPACES**
- **2" CLR.**
- **3' - 0" 5/8" x 21" x 21"**

**FINISH GROUND LINE**

- **3' - 0" LEVEL**

**END**

- **FINISH GROUND LINE**
  - **3' - 0"**
  - **2' - 6" 10" MAX. BENDING**

**SIDE**

- **FINISH GROUND LINE**
  - **3' - 0"**
  - **2' - 6" 10" MAX. BENDING**

**ANCHOR PLATE DETAIL**

- **ANCHOR PLATE**: 5/8" x 21" x 21"
- **1' - 6" DIAM. BOLT CIRCLE (TYP.)**
- **1' - 0" MIN. GALVANIZING (TYP.)**
- **TOP**
- **SYM. ART E**
- **SYMMETRICAL ABOUT**

**CONCRETE BELOW FINISHED GROUNDLINE SHALL BE PLACED DIRECTLY AGAINST UNDISTURBED EARTH OR ALTERNATELY, BACKFILL PLACED AROUND FOUNDATION. SHALL BE COMPACTED IN CONFORMANCE WITH STD. SPEC. SECTION 2-09.3 (1) E, METHOD 1 OR 4. ALL FORMWORK SHALL BE REMOVED.**
NOTES
1. NOT INTENDED FOR USE IN FRONT OF STATIC SIGNS
2. FOR MOUNTING THE MAINTENANCE WALKWAY TO A MONOTUBE SIGN BRIDGE, SEE STANDARD PLAN G-95.20.
3. FOR MOUNTING THE MAINTENANCE WALKWAY TO A TRUSS-TYPE SIGN BRIDGE, SEE STANDARD PLAN G-95.30.
4. LOCATION OF RAILING SPUCES TO BE DETERMINED BY FABRICATOR SEE "RAILING SPICE DETAIL".

PIPE
ASTM A 36 OR ASTM A 53 GRADE B, TYPE E OR R OR ASTM A 650 GRADE B

PLATES AND SHAPES
ASTM A 36

STRUCTURAL TUBING
ASTM A 650 GRADE B

GALVANIZING FOR PIPE PLATES AND SHAPES
AASHTO M 111

HIGH STRENGTH BOLTS, NUTS & WASHERS, INCL. MOUNTING BEAM BOLTS
STD SPEC. 9-06.5(3)

ALL OTHER BOLTS
STD SPEC. 9-06.5(1)

FASTENER GALVANIZING
AASHTO M 232

STEEL GRATING
ASTM A 36

MAINTENANCE WALKWAY

FOR SIGN BRIDGES
STANDARD PLAN G-95.10-00

ELEVATION
MAINTENANCE WALKWAY

PROVIDE A 3/4" DIAM. HOLE IN PIPES, AT PIPE CROSSINGS, FOR GALVANIZING

SEE DETAIL "A"

END VIEW
MAINTENANCE WALKWAY GATE

SEE DETAIL "B"

END VIEW
B

MAINTENANCE WALKWAY

FOR MOUNTING THE MAINTENANCE WALKWAY TO A MONOTUBE SIGN BRIDGE, SEE STANDARD PLAN G-95.20.

FOR MOUNTING THE MAINTENANCE WALKWAY TO A TRUSS-TYPE SIGN BRIDGE, SEE STANDARD PLAN G-95.30.

LOCATION OF RAILING SPUCES TO BE DETERMINED BY FABRICATOR SEE "RAILING SPICE DETAIL".

NOTES
1. NOT INTENDED FOR USE IN FRONT OF STATIC SIGNS
2. FOR MOUNTING THE MAINTENANCE WALKWAY TO A MONOTUBE SIGN BRIDGE, SEE STANDARD PLAN G-95.20.
3. FOR MOUNTING THE MAINTENANCE WALKWAY TO A TRUSS-TYPE SIGN BRIDGE, SEE STANDARD PLAN G-95.30.
4. LOCATION OF RAILING SPUCES TO BE DETERMINED BY FABRICATOR SEE "RAILING SPICE DETAIL".

PIPE
ASTM A 36 OR ASTM A 53 GRADE B, TYPE E OR R OR ASTM A 650 GRADE B

PLATES AND SHAPES
ASTM A 36

STRUCTURAL TUBING
ASTM A 650 GRADE B

GALVANIZING FOR PIPE PLATES AND SHAPES
AASHTO M 111

HIGH STRENGTH BOLTS, NUTS & WASHERS, INCL. MOUNTING BEAM BOLTS
STD SPEC. 9-06.5(3)

ALL OTHER BOLTS
STD SPEC. 9-06.5(1)

FASTENER GALVANIZING
AASHTO M 232

STEEL GRATING
ASTM A 36

MAINTENANCE WALKWAY

FOR SIGN BRIDGES
STANDARD PLAN G-95.10-00

ELEVATION
MAINTENANCE WALKWAY

PROVIDE A 3/4" DIAM. HOLE IN PIPES, AT PIPE CROSSINGS, FOR GALVANIZING

SEE DETAIL "A"

END VIEW
MAINTENANCE WALKWAY GATE

SEE DETAIL "B"
**Maintenance Walkway for Sign Bridges**

**Standard Plan G-95.10-00**

**Sheet 2 of 3 Sheets**

**Effective: January 7, 2008 to August 3, 2008**

**Drawn by:** Mark Sujka

**State of Washington**

**Registered Professional Engineer**

**Expiration:** November 14, 2008

**Pasco Bakotich III 11-8-07**

**Note:** This plan is not a legal engineering document but an electronic duplicate. The original, signed by the engineer and approved for publication, is kept on file at the Washington State Department of Transportation. A copy may be obtained upon request.

**Details:**

- **Section C:** Connection Plate Detail
  - Connection Plate (See Detail)
  - **Holes:** 3/8" Plate
  - **Drive Pin Holes:** 3/8" Plate
  - **W4 x 13, Plate & Post**

- **Section D:** Connection Plate Detail
  - **W4 x 13, Plate & Post**
  - **Connection Plate (See Detail)**
  - **Holes:** 3/8" Plate
  - **Drive Pin Holes:** 3/8" Plate
  - **W4 x 13, Plate & Post**

- **Detail "A"**
  - **2" Diam. Std. Pipe Wall**
  - **Connection Plate (See Detail)**
  - **Drive Pin Detail**

- **Detail "B"**
  - **2" Diam. Std. Pipe Wall**
  - **Connection Plate (See Detail)**
  - **Drive Pin Detail**

- **Elevation**
  - **2" Diam. Std. Pipe Wall**
  - **Connection Plate (See Detail)**
  - **Drive Pin Detail**

- **RAILING SPlice DETAIL**
  - **2" Std. Pipe (Railing)**

**Construction:**

- **2" Diam. Std. Pipe Wall**
- **Connection Plate (See Detail)**
- **Drive Pin Detail**

**Details:**

- **Drive Pin Holes:** 3/8" Plate
- **W4 x 13, Plate & Post**
- **Equal Spacing 3/8" Holes**
- **3/8" Plate**

**Bolts and Nuts:**

- **1/4" Plate (Typ.)**
- **3/8" Chamfer (Typ.)**
- **3/8" Plate**

**Stiffeners:**

- **1/4" x 1 1/2" Both Sides**
- **5/8" Diam. ASTM A325 H.S. Bolt W/ Heavy Hex Nut and Washer, Galv. (Typ.), Tighten Per Std Spec. 6-03.3(33).**

**Miscellaneous:**

- **SLOTTED TYPE SPRING PIN** (ANSI B18.8.2, TYPE 304 STAINLESS STEEL)
- **3/8" PLATE**
- **1/4" PLATE**

**Significance:**

- **MaintenancE WALKWAY**

**Approval:**

- **Approved for Publication**

**State Design Engineer**

**Washington State Department of Transportation**
STEEL GRATING DETAIL

SECTION F

1/4" TOE PLATE

EVERY FOURTH BEARING BAR AND NEAR ALL TOE PLATE CORNERS

GRATING FASTENER SEE DETAIL

CROSS BAR (TYP.)

3/16" MIN.
0" MAX.
3/4" MAX.

W4 x 13 (TYP.)

BEARING BAR

1/4" TOE PLATE

SECTION G

1/4" TOE PLATE

GRATING FASTENER SEE DETAIL

CROSS BAR

3/16" MIN.
0" MAX.
3/4" MAX.

W4 x 13

BEARING BARS

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

WALK-IN CABINET TYPE VMS

3'-0" MAX. ATTACHMENT BRACKET SPACING

2'-6"

5'-0"

WALKWAY IS OPTIONAL IN THIS ZONE

SEE CONTRACT FOR VMS DIMENSIONS

SEE CONTRACT FOR MAINTENANCE WALKWAY LAYOUT

WALKWAY IS OPTIONAL IN THIS ZONE

SEE SHEET 2 FOR BRACKET DETAILS

FALL RESTRAINT BRACKET (TYP.) (SEE DETAIL "A"

HOLE DIAM. = BOLT DIAM. + 1/16"

DETAIL "A"

3/4" x 3" SLOTTED HOLE

DETAIL "B"

3/4" x 4" x 8" PLATE

"8'-0" MIN. SPACING (TYP.)

6'-0" MIN. FROM TOP OF GRATE

FALL RESTRAINT BRACKET (TYP.) (SEE DETAIL)

ELEVATION

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

PLAN

SAFETY CABLE AND INTERMEDIATE SUPPORT ARE OPTIONAL IN THIS ZONE

INTERMEDIATE SUPPORT FOR WIRE ROPE (TYP.) (SEE NOTE 3)

8'-0" MAX. SPACING (TYP.)

6'-0" MIN. FROM TOP OF GRATE

FALL RESTRAINT BRACKET (TYP.) (SEE DETAIL)

NOTES

1. NOT INTENDED FOR USE IN FRONT OF STATIC SIGNS.
2. FOR MAINTENANCE WALKWAY, RAILING, GRATING, AND TOE PLATE DETAILS, SEE STANDARD PLAN G-95.10.
3. USE TWO LANYARDS THROUGH INTERMEDIATE WIRE ROPE SUPPORT.
4. 3/8" DIA. WIRE ROPE WITH 14 KIPS MIN. BREAKING STRENGTH. THE WIRE ROPE SHALL BE INSTALLED WITH 450 LBS. OF TENSION, AND WITH 6" OF TAKE UP ADJUSTMENT AVAILABLE IN THE TURNBUCKLE.
FALL RESTRAINT BRACKET INSTALLATION ON NEW MONOTUBE SIGN BRIDGE

- **Provide a 3/4" Drain Hole for Galvanizing, Top & Bottom (Typ.)**
- **Structural Lugs (Size to Fit Rope Speleter Socket) (Typ.) See Detail "A"**
- **Field Locate 1 1/8" Diam. Holes @ Front and Back of Monotube (Typ.)**
- **3/4" x 13" x 1' - 8" Plate**
- **Existing Monotube Beam and Bracket Plate**
- **Monotube Beam**
- **Monotube**

**SECTION A**

- **3/4" H.S. Bolt w/ Nut & 2 Washers, Galv. (Typ.)**
- **Structural Lug (Intermediate Support) See Detail "A"**
- **1/4" Cover Plate Top & Bottom**

**SECTION B**

- **3" Thread Each End (Typ.)**
- **1" Diam. Rod w/ 2 Lock-Nuts & Washers, Galv. (ASTM A 449) (Typ.) ~ 4 Sets Required Per Bracket**
- **Existing Monotube**
- **TS6 x 4 x 5/16**
- **L4 x 4 x 3/8**
- **L4 x 4 x 3/8**

**SECTION C**

- **1/4" Cover Plate Top & Bottom**
- **3/4" H.S. Bolt w/ Nut & 2 Washers, Galv. (Typ.)**
- **Structural Lug (Intermediate Support) See Detail "A"**
- **3/4" Dia. Rod w/ 2 Lock-Nuts & Washers, Galv. (ASTM A 449) (Typ.) ~ 4 Sets Required Per Bracket**
- **Existing Monotube**
- **TS6 x 4 x 5/16**
- **L4 x 4 x 3/8**
- **L4 x 4 x 3/8**

**ELEVATION VIEW**

- **Provide a 3/4" Drain Hole for Galvanizing, Top & Bottom (Typ.)**
- **Structural Lugs (Size to Fit Rope Speleter Socket) (Typ.) See Detail "A"**
- **Fall Restraint**
- **Fall Restraint Bracket Installation on Existing Monotube Sign Bridge**

**NOTE:**
- This plan is not a legal engineering document but an electronic duplicate. The original, signed by the engineer and approved for publication, is kept on file at the Washington State Department of Transportation. A copy may be obtained upon request.
**Maintenance Walkway Partial Plan**

- **Steel Grating:** W4 x 13
- **Top of Toe Plate (All-Around):**
- **Walkway Entrance (Inside Opening Swinging Gate):**
- **Top of Grating:**
- **1" Min. (Typ.):**
- **3 1/2" Min. CLR:**
- **W4 x 13 MOUNTING BEAM:**
- **3/8" × 4" × 3" Plate (Typ.):**
- **1/2" Min. CLR:**
- **C5 x 9:**
- **1/2" Dia. H.S. MOUNTING BEAM BOLT (Typ.):**
- **9/16" × 3/4" Slot Hole (Vert.) for 1/2" Dia. H.S. MOUNTING BEAM BOLT (Typ.):**
- **1/4" (Typ.):**
- **3/8" × 4" × 3" Plate (Typ.):**
- **1 1/4" (Typ.):**
- **MOUNTING BEAM:**
- **1 1/4":**
- **W4 x 13:**
- **1 1/4":**
- **W4 x 13 AND POST:**
- **7/8" × 1" Slotted Hole:**
- **In Channel (Typ.):**
- **MONOTUBE SIGN BRIDGE:**
- **Face of VMS:**
- **VIEW:**
- **ATTACHMENT BRACKET DETAIL:**

**Bracket Notes:**

- Paint entire attachment bracket to match existing structure except for mounting beam.
- Sign, light, beam lengths, size and spacing shall be determined from the contract plans or WSDOT standard plans.

**Attachment Bracket Detail:**

- **D: MONOTUBE SIGN BRIDGE**
- **E: BEAM**
- **F: ALL PARTS**
- **G: MOUNTING BEAM**
- **H: LOCKING HEX NUT W/ NYLON INSERT (Typ.):**
- **I: WASHER (Typ.):**
- **J: HEX NUT:**
- **K: 3/4" Dia. Rod:**
- **L: 3/8" × 4" × 3" Plate (Typ.):**
- **M: 1/2" Min. CLR:**
- **N: C5 x 9:**
- **O: 1/4" (Typ.):**
- **P: 3/8" × 4" × 3" Plate (Typ.):**
- **Q: 1 1/4":**
- **R: 1/2" Min. CLR:**
- **S: C5 x 9:**
- **T: 1 1/4":**
- **U: 3/8" × 4" × 3" Plate (Typ.):**
- **V: 1/2" Min. CLR:**
- **W: C5 x 9:**
- **X: 1 1/4":**
- **Y: 3/8" × 4" × 3" Plate (Typ.):**
- **Z: 1/2" Min. CLR:**

**Section D**

- **Attach Bracket Details**
- **1 1/4" (Typ.):**
- **W4 x 13:**
- **4' - 0" Max. (Typ.):**
- **W4 x 13 AND POST:**
- **1 1/4":**
- **W4 x 13 AND POST:**
- **7/8" × 1" Slotted Hole (Vert.) for 1/2" Dia. H.S. MOUNTING BEAM BOLT (Typ.):**
- **1/4" (Typ.):**
- **3/8" × 4" × 3" Plate (Typ.):**
- **1 1/4":**
- **W4 x 13 AND POST:**
- **1 1/4":**
- **W4 x 13 AND POST:**

**Section E**

- **Attach Bracket Details**
- **1 1/4":**
- **W4 x 13:**
- **4' - 0" Max. (Typ.):**
- **W4 x 13 AND POST:**
- **1 1/4":**
- **W4 x 13 AND POST:**
- **7/8" × 1" Slotted Hole (Vert.) for 1/2" Dia. H.S. MOUNTING BEAM BOLT (Typ.):**
- **1/4" (Typ.):**
- **3/8" × 4" × 3" Plate (Typ.):**
- **1 1/4":**
- **W4 x 13 AND POST:**
- **1 1/4":**
- **W4 x 13 AND POST:**

**Section F**

- **Attach Bracket Details**
- **1 1/4":**
- **W4 x 13:**
- **4' - 0" Max. (Typ.):**
- **W4 x 13 AND POST:**
- **1 1/4":**
- **W4 x 13 AND POST:**
- **7/8" × 1" Slotted Hole (Vert.) for 1/2" Dia. H.S. MOUNTING BEAM BOLT (Typ.):**
- **1/4" (Typ.):**
- **3/8" × 4" × 3" Plate (Typ.):**
- **1 1/4":**
- **W4 x 13 AND POST:**
- **1 1/4":**
- **W4 x 13 AND POST:**
MAINTENANCE WALKWAY INSTALLED ON TRUSS-TYPE SIGN BRIDGE

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

ELEVATION

1. NOT INTENDED FOR USE IN FRONT OF STATIC SIGNS.
2. FOR MAINTENANCE WALKWAY, RAILING, GRATING, AND TOE PLATE DETAILS, SEE STANDARD PLAN G-95.10.
3. USE TWO LANYARDS THROUGH INTERMEDIATE WIRE ROPE SUPPORT.
4. 3/8" DIAM. WIRE ROPE WITH 14 KIPS MIN. BREAKING STRENGTH. THE WIRE ROPE SHALL BE INSTALLED WITH 450 LBS. OF TENSION, AND WITH 6" OF TAKE UP ADJUSTMENT AVAILABLE IN THE TURNBUCKLE.

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

MATERIAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>PIPE</th>
<th>ASTM A 36 OR ASTM A 53 GRADE B, TYPE E OR S, OR ASTM A 500 GRADE B</th>
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<tr>
<td>PLATES AND SHAPES</td>
<td>ASTM A 36</td>
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<tr>
<td>STRUCTURAL TUBING</td>
<td>ASTM A 500 GRADE B</td>
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<tr>
<td>GALVANIZING FOR PIPE PLATES AND SHAPES</td>
<td>AASHTO M 111</td>
</tr>
<tr>
<td>HIGH STRENGTH BOLTS, NUTS, &amp; WASHERS, INCL. MOUNTING BEAM BOLTS</td>
<td>STD SPEC. 9-06.5(2)</td>
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<tr>
<td>ALL OTHER BOLTS</td>
<td>STD SPEC. 9-06.5(1)</td>
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<tr>
<td>FASTENER GALVANIZING</td>
<td>AASHTO M 232</td>
</tr>
<tr>
<td>STEEL GRATING</td>
<td>ASTM A 36</td>
</tr>
<tr>
<td>WIRE ROPE</td>
<td>ASTM A 603 W CLASS A WEIGHT ZINC COATED WIRES THROUGHOUT</td>
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<tr>
<td>U-BOLTS, NUTS, AND WASHERS</td>
<td>ASTM F 593 AND ASTM F 594, TYPE 304</td>
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</tbody>
</table>

NOTE 1:

1. 3/8" PLATE (TYP.)
2. 3/4" PLATE W/ 13/16" DIAM. HOLES FOR U-BOLTS
3. 3/4" PLATE W/ 1/4" (TYP.)
4. 3/4" PLATE W/ 13/16" DIAM. HOLES FOR U-BOLTS

NOTE 2:

1. 1/4" 3/4" PLATE W/ 13/16" DIAM. HOLES FOR U-BOLTS
2. 3/4" PLATE W/ 1/4" (TYP.)
3. 3/4" PLATE W/ 13/16" DIAM. HOLES FOR U-BOLTS

NOTE 3:

1. 1/4" 3/4" PLATE W/ 13/16" DIAM. HOLES FOR U-BOLTS
2. 3/4" PLATE W/ 1/4" (TYP.)
3. 3/4" PLATE W/ 13/16" DIAM. HOLES FOR U-BOLTS

NOTE 4:

1. 1/4" 3/4" PLATE W/ 13/16" DIAM. HOLES FOR U-BOLTS
2. 3/4" PLATE W/ 1/4" (TYP.)
3. 3/4" PLATE W/ 13/16" DIAM. HOLES FOR U-BOLTS

NOTES

1. 3/8" DIAM. WIRE ROPE WITH 14 KIPS MIN. BREAKING STRENGTH. THE WIRE ROPE SHALL BE INSTALLED WITH 450 LBS. OF TENSION, AND WITH 6" OF TAKE UP ADJUSTMENT AVAILABLE IN THE TURNBUCKLE.

EXPIRES NOVEMBER 14, 2008

MAINTENANCE WALKWAY MOUNTING FOR TRUSS-TYPE SIGN BRIDGE

STANDARD PLAN G-95.30-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III 11-8-07

Washington State Department of Transportation

EFFECTIVE: JANUARY 7, 2008 TO AUGUST 3, 2008
**MAINTENANCE WALKWAY**

**PARTIAL PLAN**

- **VMS HOUSING**
- **STEEL GRATING (TYP.)**
- **1" MAX. CLR. (TYP.)**
- **W4 x 13 MOUNTING BEAM (TYP.)**
- **WALKWAY ENTRANCE (INSIDE OPENING SWING GATE)**
- **TOE PLATE (ALL-AROUND)**
- **TRUSS CHORD**
- **3/8" DIA. U-BOLTS W/ HEX LOCK NUTS & FLAT WASHERS**
- **3/4" x 3" SLOTTED HOLE**
- **5/8" PLATE**
- **HOLE DIAM. = BOLT DIAM. + 1/16"**
- **5" WHEN AN INTERMEDIATE SUPPORT IS USED**
- **TRUSS-TYPE SIGN BRIDGE**

**SECTION B**

- **FACE OF VMS**
- **ENTRY PANEL**
- **TOP OF TOE PLATE**
- **TOP OF GRATING**
- **W4 x 13 MOUNTING BEAM**
- **3 1/2"**
- **1" MIN. (TYP.)**
- **6"**
- **2" R**
- **3/4" x 3" PLATE**
- **TRUSS CHORD**
- **W4 x 13 MOUNTING BEAM**
- **5 1/8" 5 1/8"**

**SECTION C**

- **3/8" DIA. U-BOLTS W/ HEX LOCK NUTS & FLAT WASHERS**
- **3/4" x 4" x 8" PLATE**
- **5"**
- **2" R**
- **3/4" x 3" SLOTTED HOLE**
- **5/8" PLATE**

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

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

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

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

5. Water level may vary, depending on season.

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

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

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.

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.

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

Water level may vary, depending on season.

Pour in approximately 1 tablespoon of cork dust at installation, and after each reading.
WEATHER RESISTANT BATTERY COMPARTMENT

MOISTURE-PROOF (POTTED) INTERNAL DATA LOGGER

REMOVABLE ADJUSTER CAP

"0" CALIBRATION POINT MARKER

"0" CALIBRATION POINT (FINISHED GRADE)

WELL SCREEN SLOTS BEGIN (ALL SLOTS 0.07")

WELL SCREEN

NO. 1 SAND OR PEA GRAVEL

BENTONITE PELLETS

END OF PROBE

WELL SCREEN SLOTS END

END OF ANNULUS AROUND WELL SCREEN

WEIGHTED 0.1 CALIBRATION POINT MARKER

BENTONITE PELLETS

WEIGHTED 0.1 CALIBRATION POINT MARKER

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT. IT IS PROVIDED AS AN ELECTRONIC DUPLICATE FOR CONVENIENCE ONLY. THIS DOCUMENT MAY NOT BE USED IN COURT OR OTHER LEGAL PROCEEDINGS WITHOUT THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION.
**NOTE**

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.
### NOTES

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

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

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

4. Attach a newspaper box to a steel post with two 1 7/8" Muffler Clamps spaced 4" apart. Field drill 7/16" holes in the newspaper box to fit. Use 2 1/2" × 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.

---

### Wood Post Fasteners

<table>
<thead>
<tr>
<th>Size / Type</th>
<th>Quantity</th>
<th>Washers</th>
<th>Locknuts</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; diam. × 4 3/4&quot; bolt</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3/8&quot; diam. × 3 1/4&quot; bolt</td>
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<td>8</td>
<td>4</td>
</tr>
<tr>
<td>3/16&quot; diam. × 1&quot; screw</td>
<td>4</td>
<td>8</td>
<td>4</td>
</tr>
</tbody>
</table>

### Steel Post Fasteners

<table>
<thead>
<tr>
<th>Size / Type</th>
<th>Quantity</th>
<th>Washers</th>
<th>Locknuts</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; diam. × 2 3/4&quot; bolt</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3/8&quot; diam. × 3 1/4&quot; bolt</td>
<td>4</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>3/16&quot; diam. × 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>

---

### Additional Washers

Add additional washers as required to fill gap (Typ.)

---

### Steel Post Assembly Detail

**Bracket (Typ.)**

- See detail, sheet 2

**Anti-Twist Plate (Typ.)**

- See detail, sheet 2

**1 7/8" Muffler Clamp (1 7/8" M-CLAMP)**

- See detail, sheet 2

---

### Mailbox Support Type 1

**Platform (Typ.)**

- See detail, sheet 2

---

**Mailbox ~ Size 1, 1A, or 2 (Size 1A shown)**

(See Table, Sheet 2, for Dimensions)
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 5 mailboxes may be installed on a Type 2 Support.

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

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

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

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

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

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

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

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

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

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

MAILBOX SUPPORT

TYPE 3

STANDARD PLAN H-70.30-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III

09-05-07

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

STATE DESIGN ENGINEER

DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES JUNE 19, 2008

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

- **Material**: Black Polyethylene fabric with open mesh, weather and UV resistant, orange color
- **Typical Section**
  - 2x2 wood or steel T-bar posts
  - Staple top tie self-locking tie - 50# min. tensile strength, UV stabilized
  - 1x4 high visibility fence

**Environmental Sensitive Area**
- 2x2 wood or steel T-bar post
- Staple top tie self-locking tie - 50# min. tensile strength, UV stabilized
- High density polyethylene fabric with open mesh, UV resistant, orange color

**Protected Area**
- 2x2 wood or steel T-bar post
- Staple top tie self-locking tie - 50# min. tensile strength, UV stabilized

**Elevation**
- Fence on slope
- 6'-0" max.

**Diagram Details**
- Work Area
- Environmentally sensitive area boundary
- Protected area
- Vertical post
- Isometric view

**Plan Information**
- Standard Plan I-10.10-00
- State of Washington Registered Landscape Architect
- Certificate No. 000598
- Mark W. Maurer

**Approval**
- Approved for publication
- Pasco Bakotich III, 08-31-07
- Washington State Department of Transportation
NOTES

1. Maximize detention of stormwater by placing fence as far away from toe of slope as possible without encroaching on sensitive areas or outside of the clearing boundaries.

2. Install silt fencing along contours whenever possible.

3. Install the ends of the silt fence to point slightly up-slope to prevent sediment from flowing around the ends of the fence.

4. Perform maintenance in accordance with Standard Specifications 8.01.3(9)A and 8.01.3(15).

SILT FENCE

STANDARD PLAN I-30.10-00

Sheet 1 of 1 sheet

Maximize detention of stormwater by placing fence as far away from toe of slope as possible without encroaching on sensitive areas or outside of the clearing boundaries.

Install silt fencing along contours whenever possible.

Install the ends of the silt fence to point slightly up-slope to prevent sediment from flowing around the ends of the fence.

Perform maintenance in accordance with Standard Specifications 8.01.3(9)A and 8.01.3(15).
Perform maintenance in accordance with Standard Specification 8-01.3(9)A and 8-01.3(15).

**NOTE:**

**SILT FENCE DESIGN**

- Place sand bags as required around culvert to provide support for silt fence.
- Compost berm design - see std. plan I-80.10
- Culvert, box culvert, or pipe arch - end treatment varies

**COMPOST BERM DESIGN**

- Compost berm design - see std. plan I-80.10
- Culvert, box culvert, or pipe arch - end treatment varies

**SECTION A**

- Geotextile 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**

- Flow protected area

**NOTE**

- Disturbed area
- Protected area

- Erosion control at culvert ends
- Standard plan I-30.20-00
- Compost berm ~ see std. plan I-80.10
- Culvert, box culvert, or pipe arch - end treatment varies

**DATE:**

- State of Washington

**REGISTERED LANDSCAPE ARCHITECT**

- Certificate No. 000598

**MARK W. MAURER**

- Certificate No. 000598

**STATE OF WASHINGTON**

- Registered Landscape Architect

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

**APPROVED FOR PUBLICATION:**

- Pasco Bakotich III 09-20-07
- State Design Engineer

**WASHINGTON STATE DEPARTMENT OF TRANSPORTATION**
Wattles shall be in accordance with Standard Specification 9-14.5(5). Install Wattles along contours. Installation shall be in accordance with Standard Specification 8-01.3(10).

Securely knot each end of Wattle. Abut adjacent Wattles tightly, end to end, without overlapping the ends.

Pilot holes may be driven through the Wattles and into the soil when soil conditions require.

Live stakes may be used for permanent installation and shall be in accordance with Standard Specification 9-14.5(6).

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

Perform maintenance in accordance with Standard Specification 8-01.3(15).
NOTES

1. Compost Sock shall be in accordance with Standard Specification 9-14.5(6). Compost Sock shall be a minimum of 8" in diameter or sized to suit conditions as specified by the Engineer or Contractor.

2. Compost material to be dispersed on site, as determined by the Engineer.


4. Always install Compost Sock perpendicular to slope and along contour lines.

5. Remove sediment from the upper slope side of the Compost Sock when accumulation has reached 1/2 of the effective height of the Compost Sock.

6. Live stakes can be used in addition to wooden stakes and shall be in accordance with Standard Specification 9-14.6(1). See plans for species selection and spacing.
1. See Standard Specification 8-01.3(9)c for additional information.

2. Perform maintenance in accordance with Standard Specification 8-01.3(15).
Prefabricated units may be used in lieu of the design shown on this plan upon approval of the Engineer.

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

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

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

1. Fasten cross braces together with screws, nails, nylon ties or wire.
2. Attach wood or metal cross braces to stabilize wood.
3. Compacted native soil 2' - 0" MIN.
4. Grate
5. Silt fence = See Std. Plan I-30.10
6. Inlet
7. Section A
8. Inlet
9. Compacted native soil
10. Grate
11. Flow
NOTES
1. Size the Below Inlet Grate Device (BIGD) for the storm water structure it will service.
2. The BIGD shall have a built-in high-flow relief system (overflow bypass).
3. The retrieval system must allow removal of the BIGD without spilling the collected material.
4. Perform maintenance in accordance with Standard Specification 8-01.3(15).
NOTES

1. Geotextile encased Check Dams shall meet the requirements of Standard Specifications 8-01.3(6)A and 9-14.5(4).

2. Install the sloped ends of the Check Dam a minimum of 3" higher than the top of the check dam in the channel to ensure that water flows over the dam and not around it.

3. Flat bottom ditch design shown, Check Dam installation details are similar for "V" bottom ditches.

4. Perform maintenance in accordance with Standard Specifications 8-01.3(15).

CHECK DAM

ORIENT THE SEWN EDGE OF THE CHECK DAM TOWARD THE UPSTREAM SIDE
DIG TRENCH APPROXIMATELY 6" WIDE AND DEEP, STAPLE END OF GEOTEXTILE AND BACKFILL WITH NATIVE MATERIAL
STAPLES (TYP.) 8" MIN. LENGTH
FLOW
STAPLES (TYP.) 8" MIN. LENGTH

CHECK DAM

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT
CERTIFICATE NO. 000598
MARK W. MAURER
Pasco Bakotich III 09-20-07

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NOTE
ROCK CHECK DAMS SHALL BE PLACED OUTSIDE OF THE CLEAR ZONE, OR BEHIND TRAFFIC BARRIER.

SPACE CHECK DAMS THE DISTANCE APART WHERE POINTS "A" AND "B" ARE THE SAME ELEVATION

SACKS SHALL BE #10 BURLAP OR APPROVED ALTERNATE FILLED WITH 48 TO 55 LBS. OF GRAVEL BACKFILL FOR DRAINS.

PLACE SACKS FIRMLY AGAINST GROUND LINE AND ADJACENT SACKS.

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

NOTE
WATTLE OR COMPOST SOCK (TYP.)

CHECK DAMS
STANDARD PLAN I-50.20-00

APPROVED FOR PUBLICATION
08-31-07

Pasco Bakotich III
08-31-07

STATE DESIGN ENGINEER
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
EROSION CONTROL BLANKET PLACEMENT ON SLOPE

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).

ANCHOR TRENCH - SECTION A

SHINGLE SPLICE - SECTION B

DRAWN BY: MARK SUJKA

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT
CERTIFICATE NO. 000598

MARK W. MAURER
CERTIFICATE NO. 000998

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APPROVED FOR PUBLICATION
08-31-07

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
EROSION CONTROL BLANKET PLACEMENT

IN CHANNEL

STATE STANDARD PLAN I-60.20-00

NOTES
1. More than the minimum of one fastener per square yard may be required due to conditions such as blanket composition, soil type, surface uniformity, and flow velocity.
2. Provide Check Slots per manufacturer’s recommendations.
3. Roll ends may be spliced in a check slot.

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.

Provide Check Slots per manufacturer’s recommendations.

Roll ends may be spliced in a check slot.

See Standard Specification 8-01.3(3).
**MISCELLANEOUS EROSION CONTROL DETAILS**

**STANDARD PLAN I-80.10-00**

**SECTION A**

**TEMPORARY SEDIMENT TRAP**

- OUTFLOW CHANNEL IS CONSTRUCTED BY EXCAVATION
- **2' - 0" SETTLING DEPTH**
- **1' - 6" SEDIMENT STORAGE**
- **COMPACTED NATIVE MATERIAL CONSTRUCTED BY EXCAVATION OR EMBANKMENT**
- **1' - 0" DEPTH OF 3/4" - 1 1/2" WASHED GRAVEL BACKFILL**

**GROUND LINE**

- **GROUND LINE**
- **25' - 0" R MIN. (TYP.)**
- **1' - 0" MIN.**
- **PROVIDE FULL WIDTH OF INGRESS / EGRESS AREA**
- **15' - 0" MIN.**

**EXISTING ROAD**

- **EXISTING ROAD**
- **25' - 0" R MIN. (TYP.)**
- **4" ~ 8" QUARRY SPALLS**
- **AS REQUIRED ~ 100' MIN., EXCEPT MAY BE REDUCED TO 50' MIN. FOR SITES WITH LESS THAN ONE ACRE OF EXPOSED SOIL.**

**ISOMETRIC VIEW**

- **STABILIZED CONSTRUCTION ENTRANCE**
- **PLACE CONSTRUCTION GEOTEXTILE FOR SOIL STABILIZATION AND A MINIMUM OF 6.16" CRUSHED ROCK UNDER THE SPALLS, FROM THE EDGE OF THE EXISTING ROADWAY TO THE RADIUS RETURNS, OR AS DIRECTED BY THE ENGINEER.**
- **25' - 0" R MIN. (TYP.)**
- **4" ~ 8" QUARRY SPALLS**
- **AS REQUIRED ~ 100' MIN., EXCEPT MAY BE REDUCED TO 50' MIN. FOR SITES WITH LESS THAN ONE ACRE OF EXPOSED SOIL.**

**COARSE COMPOST**

- **COARSE COMPOST**
- **TYPICAL SECTION**
- **COMPOST BERM DETAIL**

- **NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.**
1. Galvanized steel mast arm - configuration varies with manufacturer.
2. Luminaire - see Contract for type and number.
3. Mounting height - roadway to luminaire elevation difference ± 2%, see Contract.
4. Mast arm length - see Contract.
5. 3/8" galvanized thimble eyebolt (single or double) with washers and nuts or eyenut.
7. Pole and bracket cable.
9. From ground line to 10' above ground, enclose equipment grounding conductor in galvanized steel conduit, code sized. Above 10' from ground, staple equipment grounding conductor to pole. Connect to supplemental ground per Standard Plan J-9a.
10. Service wedge clamp.
11. ACSR triplex or fourplex conductors - see Contract.
12. Copper split bolt connector.
15. Fused quick disconnect - use 30 amp fuses for high mast supports.
16. Weatherhead - size as required.
17. Steel conduit.
18. 8" x 8" x 4" NEMA 3R Junction box with raintight hubs and removable cover.
20. 12 pole terminal block.
21. Direct burial conductors or galvanized steel conduits with conductors - see Contract.
22. Grounding bushing.
24. Class 5 timber pole - length sufficient for mounting height and burial depth.
25. Class 2 timber pole - length sufficient for mounting height and burial depth.
26. 3/8" x 9" step bolt.
27. 3/4" x 10" plate collar bent to fit pole diameter (8" - 10"").
28. 3/4" x 4" machine bolts (four required) with washers and nuts.
29. 5/8" lag bolts (six required) - drill 3/8" hole in plate.
30. 2" pipe.
31. 3/4" wire hole 2" from gusset plate, smooth hole edges.
32. 1" nonmetallic conduit with 3/4" straps at code spacing.
33. Distance varies, 35' MIN, 50' MAX, depending on line clearance requirements.

NOTES:
1. Timber luminaire supports are allowed only for temporary installations where breakaway or slip bases are not required.
2. When down guys are required, See Standard Plan J-7a.

NOTES:
1. Timber luminaire supports are allowed only for temporary installations where breakaway or slip bases are not required.
2. When down guys are required, See Standard Plan J-7a.
TYPE A SERVICE, 120 VOLT

- Timer pole
- Photoelectric control oriented to north sky
- Two 5/8" x 3" galvanized lag screws
- Two 3/4" x 6" brass bolts; drill bracket to fit meter base

PHOTOELECTRIC CONTROL DETAILS

Bend conduit to pole and strap within 1' above meter

TYPE B SERVICE, 120/240 VOLT

- Timer pole
- Photoelectric control oriented to north sky
- Two 5/8" x 3" galvanized lag screws
- Two 3/4" x 6" brass bolts; drill bracket to fit meter base

Bend conduit to pole and strap within 1' above meter

TYPE C SERVICE, 480 VOLT

- Timer pole
- Photoelectric control oriented to north sky
- Two 5/8" x 3" galvanized lag screws
- Two 3/4" x 6" brass bolts; drill bracket to fit meter base

Bend conduit to pole and strap within 1' above meter

Liquid tight flexible conduit, length 2' MIN, 3' MAX - strap to pole
Conduit and conductors, size to utility requirements
1" conduit, three #12
30' Class V treated timber pole
Bend conduit to pole and strap within 1' above meter
3" - 6" nipple or warp fitting
Hub and gasket (TYP)

Bend conduit to pole and strap within 1' above meter

Liquid tight flexible conduit, length 2' MIN, 3' MAX - strap to pole
Conduit and conductors, size to utility requirements
1" conduit, three #12
30' Class V treated timber pole
Bend conduit to pole and strap within 1' above meter
3" - 6" nipple or warp fitting
Hub and gasket (TYP)

Bend conduit to pole and strap within 1' above meter

Liquid tight flexible conduit, length 2' MIN, 3' MAX - strap to pole
Conduit and conductors, size to utility requirements
1" conduit, three #12
30' Class V treated timber pole
Bend conduit to pole and strap within 1' above meter
3" - 6" nipple or warp fitting
Hub and gasket (TYP)

Bend conduit to pole and strap within 1' above meter

Liquid tight flexible conduit, length 2' MIN, 3' MAX - strap to pole
Conduit and conductors, size to utility requirements
1" conduit, three #12
30' Class V treated timber pole
Bend conduit to pole and strap within 1' above meter
3" - 6" nipple or warp fitting
Hub and gasket (TYP)

Bend conduit to pole and strap within 1' above meter

Liquid tight flexible conduit, length 2' MIN, 3' MAX - strap to pole
Conduit and conductors, size to utility requirements
1" conduit, three #12
30' Class V treated timber pole
Bend conduit to pole and strap within 1' above meter
3" - 6" nipple or warp fitting
Hub and gasket (TYP)

Bend conduit to pole and strap within 1' above meter
1. Metering arrangements may vary with different serving utilities. The contractor shall verify the requirements of the utility prior to installing the service equipment.

2. All service pole conduit shall be secured to the pole with conduit strap at 5' centers.

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

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

5. Bend and attach pole within 1' of enclosure. See Standard Plan “Typical Grounding Details.”

6. For Type B service wiring diagram, use Standard Plan “Modified Type B Service.” For Type C service wiring diagram, use Standard Plan, “Type E Service.”

7. See breaker schedule in contract for breaker and contactor sizes.

NOTES:

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7. See breaker schedule in contract for breaker and contactor sizes.

8. Where required by the serving utility, service breakers shall be installed above the meter socket in a separate raintight enclosure.
10. VERIFY THE SERVICE UTILITY STAND-OFF DIMENSION.

11. WHEN USING ALTERNATE DOOR HINGE: REMOVE ...

12. INSTALL CONDUIT COUPLINGS ON ALL CONDUITS. PLACE COUPLINGS FLUSH WITH TOP OF CONCRETE FOUNDATION.

13. WHEN USING ALTERNATE DOOR HINGE: REMOVE ...

14. VERIFY THE SERVICE UTILITY STAND-OFF DIMENSION.
GENERAL NOTES

1. SEE ST. SPECIFICATION 9-20.24, SERVICE CABINETS.

2. CABINETS SHALL BE RATED SOUTHERN 3R AND SHALL INCLUDE TWO RAIN TIGHT VENTS.

3. METERING EQUIPMENT DO OR SHALL BE PAD LOCKABLE. EACH DOOR SHALL BE GASKETED. INSTALL BEST CX CONSTRUCTION CORE ON BOTTOM DOOR. SEE DOOR HINGE DETAIL, STANDARD PLAN J-1b. CONCEALED HEAVY DUTY STAINLESS STEEL LIFT OFF HINGES ARE ALLOWED AS AN ALTERNATIVE TO DOOR HINGE DETAIL SHOWN ON STANDARD PLAN J-3b. UPPER DOOR SHALL HAVE 2 HINGES AND LOWER DOOR SHALL HAVE 3 HINGES. THE LOWER DOOR SHALL HAVE A TWO POSITION DOOR STOP ASSEMBLY.

5. THE FOLLOWING EQUIPMENT WITHIN THE ENCLOSURE MOUNTED ON TOP OF CONCRETE FOUNDATION.


2. INSTALLATION OF CABINET AS IDENTIFIED FOR CONSTRUCTION IN CONTRACT PLANS.

3. INSTALLATION OF SERVICE GROUND PER ST. PLAN J-8b "TYPICAL GROUNDING DETAIL".

4. SERVICE CABINET TYPE D (0 - 200 AMP TYPE 120/240 SINGLE PHASE)

5. STANDARD PLAN J-3c

6. SERVICE CABINET - ENCLOSURE TO BE FABRICATED IN STAINLESS STEEL. ENCLOSURE MOUNTING DETAILS STANDARD PLAN J-3b. ENCLOSURE TO BE FABRICATED IN STAINLESS STEEL. ENCLOSURE TO BE FABRICATED IN STAINLESS STEEL.

7. SERVICE CABINET ENCLOSURE - ENCLOSURE TO BE FABRICATED IN STAINLESS STEEL.

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77. SERVICE CABINET ENCLOSURE - ENCLOSURE TO BE FABRICATED IN STAINLESS STEEL.
1. Where pad or pedestal mounts are located in a sidewalk, construct mount top flush with sidewalk grade, omitting chamfer where top and sidewalk abut.

2. Pad mount design is typical.

3. Place a silicone seal between the cabinet foundation and the cabinet for the pad mount design.

Notes:
- Install one spare others as required.
- Locate conduits centrally in foundation.
- Anchor bolts and data for spacing to be supplied by cabinet manufacturer.
- Shim to plumb See Note 3
- 4" x 9" pipe flange
- 7 1/2 DIA bolt circle for at least 4 bolt holes 3/4 DIA each
- 4" steel pipe
- 3" X 5" handhole with cover
- 5/8 X 2'-0" X 4" steel anchor bolts
- 2" conduit and cap; others as required.
- #4 bar each corner
- #4 hoops
- 3/8 diameter plastic drain
- #4 hoops
- PEDESTAL MOUNT
- PEDESTAL BASE DETAILS
- CABINET FOUNDATION DETAILS
- STANDARD PLAN J-6c

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON
APPROVED FOR PUBLICATION
DEPUTY STATE DESIGN ENGINEER DATE
CLIFFORD E. MANSFIELD 04-24-98
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1. See contract for head type, mounting height and orientation.
2. All nipples, fittings and center pipes shall be 1 1/2" dia nominal trade size (NEC).
3. Install neoprene gasket outside head when flanged elbows are supplied.
NOTES:
1. Type M mounting shall have "O" ring groove and seal top and bottom at signal attachment.
2. Type M mounting for conventional heads shall have a 2" diameter opening at the signal attachment.
3. Type M mounting for optically programmed heads shall have a 3 1/2" DIA opening at the signal attachment.
4. Type N mounting with optically programmed heads shall be installed with 14" nominal arms.
5. See Standard Plan J-6h for tether wire, and backplate requirements.
**Type PPB, PS, & I Standard Details**

**Signal Standard Type Designations**

**Anchor Bolt, Nut, & Washer Sizes**

<table>
<thead>
<tr>
<th>Type</th>
<th>Standard</th>
<th>Dimensions</th>
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<tbody>
<tr>
<td>PPB</td>
<td>4 1/4&quot; DIA x 12&quot; x 2&quot;</td>
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<tr>
<td>PS</td>
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</table>

**Type PPB, PS, I, RM & FB Standard Details**

**Foundation Details**

**Type PPB, PS, I, RM & FB Standard Dimension Chart**

<table>
<thead>
<tr>
<th>Item</th>
<th>Type PPB</th>
<th>Type PS</th>
<th>Type I</th>
<th>Type RM</th>
<th>Type FB</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4&quot;-6&quot;</td>
<td>8&quot;-0&quot;</td>
<td>10&quot;-0&quot;</td>
<td>SEE SHEET</td>
<td>SEE SHEET</td>
</tr>
<tr>
<td>B</td>
<td>2 1/2&quot;</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>C</td>
<td>7/8</td>
<td>7/8</td>
<td>7/8</td>
<td>SEE SHEET</td>
<td>SEE SHEET</td>
</tr>
<tr>
<td>D</td>
<td>9/16</td>
<td>9/16</td>
<td>9/16</td>
<td>SEE SHEET</td>
<td>SEE SHEET</td>
</tr>
<tr>
<td>E</td>
<td>9/32</td>
<td>9/32</td>
<td>9/32</td>
<td>SEE SHEET</td>
<td>SEE SHEET</td>
</tr>
<tr>
<td>F</td>
<td>1/2&quot;</td>
<td>1/2&quot;</td>
<td>1/2&quot;</td>
<td>SEE SHEET</td>
<td>SEE SHEET</td>
</tr>
<tr>
<td>G</td>
<td>5/32</td>
<td>5/32</td>
<td>5/32</td>
<td>SEE SHEET</td>
<td>SEE SHEET</td>
</tr>
<tr>
<td>H</td>
<td>5/32</td>
<td>5/32</td>
<td>5/32</td>
<td>SEE SHEET</td>
<td>SEE SHEET</td>
</tr>
<tr>
<td>I</td>
<td>1/2&quot;</td>
<td>1/2&quot;</td>
<td>1/2&quot;</td>
<td>SEE SHEET</td>
<td>SEE SHEET</td>
</tr>
<tr>
<td>K</td>
<td>1&quot;</td>
<td>1&quot;</td>
<td>1&quot;</td>
<td>1&quot;</td>
<td>1&quot;</td>
</tr>
<tr>
<td>S</td>
<td>3/8&quot;</td>
<td>3/8&quot;</td>
<td>3/8&quot;</td>
<td>3/8&quot;</td>
<td>3/8&quot;</td>
</tr>
</tbody>
</table>

**Type PPB, PS I, RM, & FB Details**

**Foundation Details**

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

Flashing Warning Beacon
18" amber lens
Type D standard signal head mounting.
Standard Plan J-6f
( drill slipfitter to seat set screws)

RAMP METERED AHEAD WHEN FLASHING

Stop here on RED

FLASHING BEACON DETAIL
Shaft, slipfitter, walls and handhole are the same as shown for Type I Standards, except shaft length is 14'.

See "FOUNDATION DETAIL"
**STRAIN POLE DIMENSION CHART**

<table>
<thead>
<tr>
<th>KEY</th>
<th>ITEM</th>
<th>POLE CLASS (Resultant Horizontal Tension)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>200</td>
</tr>
<tr>
<td>A</td>
<td>Base plate width</td>
<td>15&quot;</td>
</tr>
<tr>
<td>B</td>
<td>Anchor bolt circle diameter</td>
<td>16&quot;</td>
</tr>
<tr>
<td>C</td>
<td>Pole base diameter</td>
<td>10&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 size</td>
<td>3/8&quot;</td>
</tr>
<tr>
<td>F</td>
<td>Anchor plate size</td>
<td>1&quot;x3&quot;x3&quot;</td>
</tr>
<tr>
<td>G</td>
<td>Vertical steel number and size</td>
<td>1&quot;x3&quot;x3&quot;</td>
</tr>
</tbody>
</table>

**CONE SECTION DETAIL**

- Handhole frame: Round and smooth inside edges.
- removable raintight handhole cover with gasket. Fasten with 2 stainless steel (ASTM F-593) screws.

**HANDHOLE DETAIL**

- Handhole frame: Round and smooth inside edges.
- removable raintight handhole cover with gasket. Fasten with 2 stainless steel (ASTM F-593) screws.

**FOUNDATION DETAIL**

- 2" Clearance
- 1/8" Chamfer

**NOTES**

1. 2 1/2" diameter weatherhead may be substituted for the elbow and nipple assembly.
2. Pole shaft shall have 0.14"/ft taper.
4. Handholes may be 6" x 4" oval or rectangle.

---

**STRAIN POLE STANDARDS TYPE IV AND V**

**STANDARD PLAN J-7c**

- Steel clamps
- Schedule 80 pipe sleeve
- 1" DIA x 1" Cable connect bolt
- 1/4" for 3 Gauge
- 3/8" for 1/0 Gauge
- 3/8" Thick (A36) steel clamps

**APPROVED FOR PUBLICATION**

Clifford E. Mansfield 06-19-98

STATE ENGINEER

Olympia, Washington

**EXPIRES JANUARY 17, 1999**

---

**WASHINGTON DEPARTMENT OF TRANSPORTATION**

Olympia, Washington
ANCHOR ASSEMBLY

ALTERNATE DOWN GUY DETAIL

POWER INSTALLED HELICAL SCREW ANCHOR (SEE NOTES)

TAMPED PIT RUN ROCK 6" TO 12"

10'-0" MIN, 15'-0" MAX

40' CLASS 2 TIMBER POLE UNLESS NOTED OTHERWISE IN THE CONTRACT

TOP OF ALL SIGNAL HEADS IN水平 LEVEL

SAG = 5% OF SPAN TAG LENGTH TIL

3 TURN COIL DRIP LOOP

WEATHERHEAD ENTRANCE ELBOW

AERIAL TERMINAL COMPARTMENT ASSEMBLY ON SPANS NOTED

STRAIN CLAMP (SEE NOTE 3)

3. SEE "STRAIN CLAMP DETAIL" ON STANDARD PLAN.
   "STRAIN POLE STANDARDS: TYPE IV AND TYPE V".

2. IF ANCHOR HOLE DIAMETER IS GREATER THAN NOMINAL DIAMETER OF FOLDED ANCHORS, A 5' COVER OF 6" TO 12" SIZE ROCK SHALL BE TAMPED IN TO REPLACE THE DISTURBED SOIL IMMEDIATELY ABOVE THE ANCHOR.

1. AN EIGHT-WAY EXPANDING ANCHOR MAY BE USED AS AN ACCEPTABLE ALTERNATE TO POWER INSTALLED HELICAL SCREW ANCHOR.

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EXPRESS JUNE 4, 1999

WASHINGTON DEPARTMENT OF TRANSPORTATION

OLYMPIA, WASHINGTON

STANDARD PLAN J-7d

APPROVED FOR PUBLICATION

DEPUTY STATE DESIGN ENGINEER DATE

REVISION APPR'DBYDATE

DISTANCE depth of pole:

Russell E. Mansfield 04-24-98

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

OLYMPIA, WASHINGTON

EXPIRES JUNE 4, 1999

2. 3700# 4800#

4. 4600#, 5400# 7200# 9000#

5. 3700# 4800# 5400# 7200# 9000#

6. 3700# 4800# 5400# 7200# 9000#

7. 3700# 4800# 5400# 7200# 9000#
TYPE 1 INDUCTION LOOP

STANDARD PLAN J-8a

NOTE

1. For Sections A and B, see Standard Plan J-8d.

CONDUIT

DETAIL "A"
(SEE STD. PLAN J-8d)

SEE ENTRANCE SAWCUT DETAIL

SEE ENTRANCE SAWCUT DETAIL

CONDUIT

DETAIL "A"
(SEE STD. PLAN J-8d)

NOTE

CONDUIT

B

STOP LINE

JUNCTION BOX

LEAD-IN SAWCUTS (TYP.)

S = START
F = FINISH

S1

STOP LINE

TYPES 1 STOP LINE LOOPS
(40' LONG OR AS SHOWN IN THE CONTRACT)

SPLICE

TWO CONDUCTOR SHIELDED CABLE

JUNCTION BOX

ENTRANCE SAWCUT DETAIL

CORNER SAWCUT DETAIL

CENTER OF LOOP AND VEHICLE LANE

LEAD-IN SAWCUT

LOOP SAWCUT

VARIIES

LOOP SAWCUT

REMOVE PAVEMENT TO SAWCUT DEPTH AND FILL WITH SEALANT

MANDGE

STOP LINE

TRAFFIC FLOW

TYPE 1 STOP LINE LOOP WIRING DIAGRAM

ENTRANCE SAWCUT DETAIL

CORNER SAWCUT DETAIL

NOTE

1. For Sections A and B, see Standard Plan J-8d.
1. For Sections A and B, see Standard Plan J-8d.
1. All of the loop lead-in wires shall return to the Junction Box.

2. For Splice Detail, see Standard Plan J-8d.

NOTES

**TYPE 2 STOP LINE LOOP WIRING DIAGRAM**
(SERIES SPLICE SHOWN)

**TYPE 2 ADVANCE LOOP WIRING DIAGRAM**

**TYPE 2 INDUCTION LOOP**

**TYPE 2 SAMPLING LOOP WIRING DIAGRAM**
(SERIES SPLICE SHOWN)

DRAWN BY: MONIQUE GLICK

TRAFFIC FLOW

SEE CORNER SAWCUT DETAIL (SHEET 1)

SEE ENTRANCE SAWCUT DETAIL

CONDUIT

LEAD-IN SAW CUTS (TYP.)

SHOULDER

VEHICLE LANE

VEHICLE LANE

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
NOTE
1. For Sections A and B, see Standard Plan J-8d.

TYPE 3 INDUCTION LOOP
STANDARD PLAN J-8c

TYPE 3 SAMPLING LOOPS

ENTRANCE SAWCUT DETAIL

8'-0" DIAM. (TYP.)

LEAD-IN SAWCUT

CENTERS OF LOOP AND VEHICLE LANE

SEE ENTRANCE SAWCUT DETAIL

SEE ENTRANCE SAWCUT DETAIL

6'-0" DIAM. (TYP.)

9'-0" DIAM. (TYP.)

1'-0"

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
1. All of the loop lead-in wires shall return to the Junction Box.

2. For Splice Detail, see Standard Plan J-8d.
1. Fill the conduit trench to the top of the existing or new surfacing with CSTC, sand or controlled density fill. See "Standard Specifications" Section 2-09.3(1)E.

2. Minor Regional variation is allowed in the soft pocket closure. Consult with the Engineer or see the Contract for additional requirements.

3. Conductors shall be snug to the bottom of the sawcut. High temperature backer rod shall be snug to the conductors.

**CONDUIT SIZING TABLE**

<table>
<thead>
<tr>
<th>LOOP LEAD PAIRS</th>
<th>1-2</th>
<th>3</th>
<th>4-5</th>
<th>6-8</th>
<th>9-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONDUIT SIZE (MIN)</td>
<td>1&quot;</td>
<td>1 1/4&quot;</td>
<td>1 1/2&quot;</td>
<td>2&quot;</td>
<td>3&quot;</td>
</tr>
</tbody>
</table>

**INDUCTION LOOP DETAILS**

**STANDARD PLAN J-8d**

**DRAWN BY:** MONIQUE GLICK

**FOR CONDUIT SIZE TO CONTROLLER CABINET, SEE CONTRACT**

**SEE CONDUIT SIZING TABLE**

**NOTES**

- For conduit size to controller cabinet, see contract.
- See conduit sizing table.
1. Install the Junction Box and the lead-in conduit.
2. Sawcut the loop slots and the lead-in slots.
3. Lay out the loop wire starting at the Junction Box, allowing 5' minimum slack.
4. Install the wire in the loop slot as shown.
5. 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, and the loop series number.
6. Twist each pair of the lead wires two times per foot from the loop to the Junction Box. Reverse the direction of the twist for each successive pair installed.
7. Construct a supplemental splice containing any series loop connections required in the plans. Supplemental splices are subject to the same requirements shown for the loop lead and the shielded cable splice.
8. Splice the loop leads of supplemental splice leads to the shielded cable as noted in the Contract.
9. Complete installation and test loop circuits or combination loop circuits. See Standard Specifications 8-20.3(14).D.
10. Conduit for the loop stubout shall be as required in the Contract.
1. If parallel circuits of different sizes are contained in one conduit, the size of the grounding conductor shall be determined on the basis of the largest conductor. Only one grounding conductor is required for each conduit regardless of the number of circuits contained.

2. Service ground per serving utility requirement. If the utility uses aluminum service conductors, an approved Al-Cu pressure type ground connector shall be used to secure the service neutral to the copper neutral bar in the service enclosure. Except for the above, all grounding conductors shall be copper.

3. Equipment grounding conductors and grounding electrode conductors shall be sized in accordance with the National Electric Code (No. 8 minimum).

4. Required to supplement equipment grounding for luminaire standards with direct burial, aerial feeds, or where required in plans.

5. Required at all services and separately derived systems.

KEY

1. Service Neutral
2. Service Ground
3. Grounding Electrode Conductor
4. Bonding Jumper
5. Grounding Bushing (typ. all conduit terminations)
6. Service Neutral Bus (Copper)
7. Service Enclosure
8. Equipment Grounding Conductor
9. Junction Box
10. Electrical Load Support (luminaire pole)
11. Copper Split Bolt Clamp
12. Galvanized Steel Conduit (GSC)
13. Non-metallic Conduit (NMC)
14. Option A - 10' GSC with Field Bend
   - Approved Adapter Fitting
   - Grounding Bushing
   Option B - 10' GSC
   - GS Factory Elbows
   - Approved Adapter Fitting
   - GS Coupling
   - Grounding Bushing
15. Ground Rod
16. Edge of Foundation, Pole or Service Support
17. Clamp
18. Junction Box or 8" Drain Tile with Approved Cover
19. Code Sized GSC
20. To Service Neutral Bus
21. To Grounding Terminal or Connection to Equipment Grounding System

GALVANIZED STEEL CONDUIT (GSC) APPLICATION

GROUNDING DETAILS

SUPPLEMENTAL GROUND

SERVICE GROUND

GROUND ROD DETAILS

NOTES

1. If parallel circuits of different sizes are contained in one conduit, the size of the grounding conductor shall be determined on the basis of the largest conductor. Only one grounding conductor is required for each conduit regardless of the number of circuits contained.

2. Service ground per serving utility requirement. If the utility uses aluminum service conductors, an approved Al-Cu pressure type ground connector shall be used to secure the service neutral to the copper neutral bar in the service enclosure. Except for the above, all grounding conductors shall be copper.

3. Equipment grounding conductors and grounding electrode conductors shall be sized in accordance with the National Electric Code (No. 8 minimum).

4. Required to supplement equipment grounding for luminaire standards with direct burial, aerial feeds, or where required in plans.

5. Required at all services and separately derived systems.

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

STANDARD PLAN J-9a
APPROVED FOR PUBLICATION
DEPUTY STATE DESIGN ENGINEER DATE
TYPICAL GROUNDING DETAILS

EXPIRES JUNE 4, 1999
ABN
Plan:

- J-box
- Conduit reserve area
- Face of guardrail
- Back of curb
- Edge of shoulder
- Conduit
- Conduit reserve area

Section A-A:

- J-box
- Conduit reserve area
- Not steeper than 2:1

Electrical Conduit Placement

Approved for publication:

Clifford E. Mansfield 07-18-97
State Design Engineer
State of Washington Department of Transportation
Olympia, Washington
NOTES

1. All box dimensions are approximate. Exact configurations vary among manufacturers.

2. The lid thicknesses are minimum. The diamond pattern shall be 28% minimum of overall thickness.

3. Lid support members shall be 3/16" minimum thick steel C, L, or T shape, welded to the frame.

4. A 1/4"-20NC × 3/4" S.S. ground stud shall be welded to the bottom of the lid; include S.S. nut and flat washer.

5. Bolts and nuts shall be liberally coated with anti-seize compound.

6. Connect a bonding jumper to steel conduit bushing for GRS conduit; connect to equipment grounding conductor for PVC conduit. Bonding Jumper shall be #8 min. × 4' of tinned braided copper.

7. The System Identification letters shall be 1/8" line thickness formed by engraving, stamping, or with a S.S. weld bead. Grind off diamond pattern before forming letters. See System Identification Detail.

8. When required in the Contract, Type 2 boxes shall be provided with a 10" x 27 1/2", 10 gage divider plate complete with fasteners.

9. The Junction Box Type 2 shall be provided with a 12" deep extension when specified in the Contract.

10. See the Standard Specifications for alternative reinforcement and class of concrete.

JUNCTION BOX DIMENSION TABLE

<table>
<thead>
<tr>
<th>ITEM</th>
<th>TYPE 1</th>
<th>TYPE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>OUTSIDE LENGTH OF JUNCTION BOX 22&quot;</td>
<td>33&quot;</td>
</tr>
<tr>
<td>B</td>
<td>OUTSIDE WIDTH OF JUNCTION BOX 17&quot;</td>
<td>22 1/2&quot;</td>
</tr>
<tr>
<td>C</td>
<td>INSIDE LENGTH OF JUNCTION BOX 18&quot;</td>
<td>29 3/4&quot;</td>
</tr>
<tr>
<td>D</td>
<td>INSIDE WIDTH OF JUNCTION BOX 13&quot;</td>
<td>18 1/2&quot;</td>
</tr>
<tr>
<td>E</td>
<td>LID LENGTH 17 5/8&quot;</td>
<td>28 5/8&quot;</td>
</tr>
<tr>
<td>F</td>
<td>LID WIDTH 12 5/8&quot;</td>
<td>18 1/8&quot;</td>
</tr>
<tr>
<td></td>
<td>CAPACITY – CONDUIT DIAMETER 6&quot;</td>
<td>12&quot;</td>
</tr>
</tbody>
</table>

SYSTEM IDENTIFICATION DETAIL

ITS INTELLIGENT TRANSPORTATION SYSTEM
COMMUNICATION SYSTEM
LT LIGHTING SYSTEM
TS TRAFFIC SIGNAL SYSTEM
TEL TELEPHONE SYSTEM

STANDARD JUNCTION BOX TYPES 1 & 2

STANDARD PLAN J-11a SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION Pasco Bakotich III 10-12-07
Washington State Department of Transportation
STATE DESIGN ENGINEER
EXPIRES AUGUST 9, 2009
### Notes

1. All box dimensions are approximate. Exact configurations vary among manufacturers.

2. All lid thicknesses are minimum. The diamond pattern shall be 3/32" minimum thick.

3. Lid stiffener plates shall bear on frame. Mill to bearing seat and perimeter bar for full even contact after fabrication of frame and lid. Lid and frame units with uneven bearing will be rejected.

4. The installed lid and frame shall fit with full even contact around the perimeter of a junction box after installation. Care shall be taken to prevent debris accumulation on the contact surfaces.

5. A 1/4-20NC × 3/4" S.S. ground stud shall be welded to the bottom of each lid; include S.S. nut and flat washer.

6. The hinges shall allow the lids to open 180°.

7. Bolts and nuts shall be liberally coated with anti-seize compound.

8. Connect a bonding jumper to steel conduit bushing for GRS conduit, connect to equipment grounding conductor for PVC conduit. As an alternative, the bonding jumper shall be attached to the front face of the hinge pocket with a 5/16-20NC × 3/4" bolt, S.S. nut, and flat washer. Bonding Jumper shall be #8 min. × 4' of tinned braided copper.

9. The System Identification letters shall be 1/8" line thickness formed by engraving, stamping, or with a S.S. weld bead. Grind off diamond pattern before forming letters. See System Identification Detail.

10. A 1% tolerance is allowed for all dimensions.

11. See the Standard Specifications for class of concrete.

### Junction Box Dimension Table

<table>
<thead>
<tr>
<th>Mark</th>
<th>Item</th>
<th>Type 4</th>
<th>Type 5</th>
<th>Type 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>BOX INSIDE LENGTH</td>
<td>19&quot;</td>
<td>28&quot;</td>
<td>36&quot;</td>
</tr>
<tr>
<td>B</td>
<td>BOX INSIDE WIDTH</td>
<td>14&quot;</td>
<td>17&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td>C</td>
<td>LID LENGTH</td>
<td>19&quot;</td>
<td>22&quot;</td>
<td>29&quot;</td>
</tr>
</tbody>
</table>
| D    | LID WIDTH          | 11 15/16"| 16 7/16"| 20 7/16"
| W    | STIFFENER SPACING  | 4"     | 5 1/2" | 6 3/4" |
| X    | STIFFENER LENGTH   | 3 1/16"| 4 9/16"| 5 43/48"|
| Y    | STIFFENER SPACING  | 6"     | 7"     | 9 1/2" |
| Z    | STIFFENER LENGTH   | 18 1/4"| 21 1/4"| 28 1/4"|
|      | CAPACITY - CONDUIT DIAM. | 8"   | 12"    | 24"    |

### Section A

- **Frame Stud**: 3/8" diam., 8" long
- **Lid stiffener**: 1" thick, 9 1/4" long
- **Lid**: 3/16" thick, 20" wide
- **Gris Conduit**: 3" diam., 6" long
- **PVC Conduit**: 2 7/8" diam., 6" long
- **Roadway Surface**: 13" wide
- **Lift Hole**: 1" ~ 2" diam.
- **Welded Wire Reinforcement (WWR)**: 4x4-W5xW5
- **Bonding Jumper**
  - See Note 8
- **Diamond Pattern:** See Note 2
- **Hinge**
  - See Detail "D", Note 6
- **Bolts and nuts**: Liberally coated with anti-seize compound
- **Gravel Pad**: 6" wide, 7" long
- **Gris Conduit**: 3" diam., 8" long
- **Bonding Jumper**: See Note 8
- **Locking Bolt**
  - See Note 8
- **Connecting Stud**: 3/8" diam., 8" long
- **Bolts and nuts**: Liberally coated with anti-seize compound
- **Bonding Jumper**: See Note 8
- **Lid stiffener plates**: Bear on frame
- **System Identification**: 1/8" line thickness formed by engraving, stamping, or with a S.S. weld bead
- **Bolts and nuts**: Liberally coated with anti-seize compound
- **Gravel Pad**: 6" wide, 7" long
- **Gris Conduit**: 3" diam., 8" long
- **Bonding Jumper**: See Note 8
- **Locking Bolt**: See Note 8
- **Connecting Stud**: 3/8" diam., 8" long
- **Bolts and nuts**: Liberally coated with anti-seize compound
- **Bonding Jumper**: See Note 8
- **Lid stiffener plates**: Bear on frame

### Diagrams

- **Top View**
- **Isometric View**
- **Section A**

---

**Drawn by Elena Brunstein**

**Approved for Publication**

**State of Washington Department of Transportation**

**Standard Plan J-11b**

**Sheet 1 of 2 Sheets**

---

**Heavy Duty Junction Box Types 4, 5, & 6**

**Steffen's Engineering**

**EXPIRES MAY 5, 2007**

---

**Harold J. Peterfeso**

**09-02-05**

**State of Washington Department of Transportation**

**APPROVED FOR PUBLICATION**
NOTES

1. Junction boxes type 7 and type 8 are identical except for the addition of locking bolts on the type 8.

2. All box dimensions are approximate. Exact configurations vary among manufacturers.

3. All lid thicknesses are minimum. The diamond pattern shall be 3/32” minimum thick.

4. Lid support members shall be 3/16” min. thick steel C, L, or T shape, welded to the frame. Exact configurations vary among manufacturers.

5. A 1/4-20NC x 3/4” S.S. ground stud shall be welded to the bottom of each lid; include S.S. nut and flat washer.

6. The hinges shall allow the lids to open 180°.

7. Bolts and nuts shall be liberally coated with anti-seize compound.

8. Connect an equipment bonding jumper to steel conduit bushing for GRS conduit; connect to equipment grounding conductor for PVC conduit. As an alternative to the ground stud connection, the equipment bonding jumper shall be attached to the front face of the hinge pocket with a 5/16-20NC x 3/4” S.S. bolt, nut, and flat washer. Equipment Bonding Jumper shall be #18 min. x 4’ of tinned braided copper.

9. The System Identification letters shall be 1/8” line thickness formed by engraving, stamping, or with a S.S. weld bead. Grind off diamond pattern before forming letters. See System Identification Detail.

10. See the Standard Specifications for alternative reinforcement and class of concrete.

11. Capacity ~ conduit diameter = 24”
DETAIL "A"

FRAME - L 1 3/4" × 1/2" × 3/16"

FRAME STUD - 3/8" DIAM. × 3"

GROUND STUD WITH NUT (TYP.) - SEE NOTE 5

HEX COUPLING NUT - S.S. 5/16-NC × 7/8" WITH S.S. 5/16-NC × 3/4" BOLT (TYP.)

LID SUPPORT - 3/16" MIN. THICK

S.S. PIN W/ SNAP RING GROOVE

SNAP RING

VIEW B

DETAIL "D"

HINGE

BOLT PLATE - 2" × 2" × 3/16"

HEX HEAD BOLT - S.S. 1/2" × 1 1/2"

HEX COUPLING NUT - S.S. 5/16-NC × 7/8"

WITH S.S. 5/16-NC × 3/4" BOLT (TYP.)

WWR - TIED IN 2 PLACES TO FRAME STUD (TYP.)

LID SUPPORT - 3/16" MIN. THICK

FRAME - L 1 3/4" × 1/2" × 3/16"

HANDLE STOP - 6" × 3" × 1/4"

HANDLE - BENT 1/2" STEEL ROD, LEVEL WITH LID

FRAME ~ L 1 3/4" × 1/2" × 3/16"

LID SUPPORT ~ SEE NOTE 4

LID SUPPORT ~ 3/16" MIN. THICK

LID SUPPORT - 3/16" MIN. THICK

DETAIL "B"

LOCKING BOLT

OMIT FOR TYPE 7

DETAIL "C"

HANDLE - BENT 1/2" STEEL ROD, LEVEL WITH LID

FRAME ~ L 1 3/4" × 1/2" × 3/16"

LID SUPPORT ~ SEE NOTE 4

LID SUPPORT - 3/16" MIN. THICK

NUT - S.S. 1/2" DIAM. WELDED TO THE PLATE OR GALVANIZED NUT WITH KEEPER SPRING 1/2" DIAM. WITHOUT WELD. BOLT DOWN ATTACHMENT CONFIGURATIONS VARY AMONG MANUFACTURERS

WASHER - S.S. 1 7/16" O.D. × 1/2" I.D. × 1/8"

DRAWN BY: ELENA BRUNSTEIN

STANDARD DUTY JUNCTION BOX TYPES 7 & 8

STANDARD PLAN J-11c

SYSTEM IDENTIFICATION

DETAIL

ITS

INTELLIGENT TRANSPORTATION SYSTEM

COMM

COMMUNICATION SYSTEM

LT

LIGHTING SYSTEM

TS

TRAFFIC SIGNAL SYSTEM

TEL

TELEPHONE SYSTEM

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1. Install the Junction Box on the Timber Sign Post, or the Steel Sign Support, that is farthest from the roadway.

- Secure the Sign Lighting Conductors to the Conduit with a Cable Tie (see STD. PLAN J-1e, DETAIL "A")
- Connect the Equipment Grounding Conductor to the Grounding System in the Type 1 Junction Box

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NOTES

1. The Heavy Duty Lid shall be used when a Pull Box is placed in the paved shoulder. Use a 5" thick lid for new pull box installation, otherwise see Contract Plans for overlay depth to match the lid thickness.

2. The diamond pattern shall be 3/32" minimum thick.

3. A 1/4-20NC x 3/4" S.S. ground stud with S.S. nut and flat washer shall be attached to the lid and coated with anti-seize compound.

4. Connect a bonding jumper to steel conduit bushings for GRS conduit; connect to equipment grounding conductor and also to the ground rod for PVC conduit. The Bonding Jumper shall be #8 min. × 4' of tinned braided copper.

5. The System Identification letters shall be 1/8" line thickness formed by engraving, casting, stamping, or with a weld bead. See SYSTEM IDENTIFICATION DETAIL, Standard Plan J-11a.

6. Concrete shall be Class 4000.

7. Plastic plugs shall be put into lid inserts after fabrication and after lid installation.

PULL BOX

STANDARD PLAN J-15a

Sheets 1 of 2 Sheets
SPLIT PULL BOX
(Shown with Heavy Duty Lid)
See Pull Box, Sheet 1, for Dimensions Not Shown

HEAVY DUTY LID
~ See Note 1

GROUND STUD ~ Thread into predrilled hole, see Note 3

KNOCKOUT (Typ.)

LOCATION WIRE ~ Provide 1' - 0' Diam.
Loop above channel section

6" PIPE HANGER ~ See Detail

TIE WRAP

CHANNEL NUT WITH SPRING

HEX HEAD BOLT 1/2-13NC × 15/16"

HEX BOLT 3/8-16NC × 12"

FIELD VERIFY

PIECE HANGER ~ S.S., 1 1/4" Diam., 1 - 0" Long, Split

FIELD VERIFY

CABLE BUFFER ~ Corrugated
PVC pipe, 6" diam., 1' - 0" long, split

KNOCKOUT (Typ.)

LOCATION WIRE ~ Provide 1' - 0' Diam.
Loop above channel section

6" PIPE HANGER ~ See Detail

CABLE BUFFER

TIE WRAP

INTERNAL PERSPECTIVE VIEW
CABLE RACKING SCHEME
Coil the cable by using a "figure 8" folded in the middle to make a loop

END VIEW

ISOMETRIC CUTAWAY VIEW

PULL BOX
STANDARD PLAN J-15a
SHEET 2 OF 2 SHEETS

EXPRES: MAY 5, 2007

APPROVED FOR PUBLICATION
Harold J. Peterfeso 10-04-05
STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

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THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON
FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANS-
PORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
NOTES

1. The Heavy Duty Lid shall be used when a Cable Vault is placed in the paved shoulder. Use a 5” thick lid for the new cable vault installation, otherwise see Contract Plans for overlay depth to match the lid thickness.

2. The diamond pattern shall be 3/32” minimum thick.

3. A 1/4-20NC x 3/4” S.S. ground stud with S.S. nut and flat washer shall be attached to the lid and coated with anti-seize compound.

4. Connect a bonding jumper to steel conduit bushings for GRS conduit; connect to equipment grounding conductor and also to the ground rod for PVC conduit. The Bonding Jumper shall be #8 min. x 4’ of tinned braided copper.

5. The System Identification letters shall be 1/8” line thickness formed by engraving, casting, stamping, or with a weld bead. See SYSTEM IDENTIFICATION DETAIL, Standard Plan J-11a.

6. Concrete shall be Class 4000.

7. Plastic plugs shall be put into lid inserts after fabrication and after lid installation.

Concrete shall be Class 4000.
The diamond pattern shall be 3/32” minimum thick.

A 1/4-20NC x 3/4” S.S. ground stud with S.S. nut and flat washer shall be attached to the lid and coated with anti-seize compound.

Connect a bonding jumper to steel conduit bushings for GRS conduit; connect to equipment grounding conductor and also to the ground rod for PVC conduit. The Bonding Jumper shall be #8 min. x 4’ of tinned braided copper.

The System Identification letters shall be 1/8” line thickness formed by engraving, casting, stamping, or with a weld bead. See SYSTEM IDENTIFICATION DETAIL, Standard Plan J-11a.

Concrete shall be Class 4000.

Plastic plugs shall be put into lid inserts after fabrication and after lid installation.
SPLIT CABLE VAULT

(IS Shown with HEAVY DUTY LID)

SEE CABLE VAULT, SHEET 1, FOR DIMENSIONS NOT SHOWN

HEAVY DUTY LID
~ SEE NOTE 1

GROUND STUD ~ THREAD INTO PREDRIILED HO1E, SEE NOTE 3

5" DIAM. KNOCKOUT (TYP.) ~ MINIMUM 8 KNOCKOUTS EACH WALL

LIFT HOLE ~ 1" TO 2" DIAM.

FIELD VERIFY

8" PIPE HANGER DETAIL
FABRICATE IF NOT AVAILABLE COMMERCIIALLY

PIPE HANGER

SPLIT CABLE VAULT

(Shown with HEAVY DUTY LID)

SEE CABLE VAULT, SHEET 1, FOR DIMENSIONS NOT SHOWN

HEAVY DUTY LID
~ SEE NOTE 1

GROUND STUD ~ THREAD INTO PREDRIILED HO1E, SEE NOTE 3

5" DIAM. KNOCKOUT (TYP.) ~ MINIMUM 8 KNOCKOUTS EACH WALL

LIFT HOLE ~ 1" TO 2" DIAM.

FIELD VERIFY

8" PIPE HANGER DETAIL
FABRICATE IF NOT AVAILABLE COMMERCIIALLY

PIPE HANGER

CABLE VAULT

STANDARD PLAN J-15b

SHEET 2 OF 2 SHEETS

EFFECTIVE: JANUARY 7, 2008 TO AUGUST 3, 2008

APPROVED FOR PUBLICATION

Harold J. Peterfeso 10-04-05
STATE DESIGN ENGINEER DATE

Washington State Department of Transportation

EXPRES MAY 5, 2007

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1. The Junction Box shall be of type 304 stainless steel, welded seam construction: #12 gage backbox with #28 finish, #12 gage cover with #4 finish, and #12 gage mounting tabs.

2. All conduit connections to the Junction Box shall be concrete-tight (wet concrete shall not infiltrate during pour). Field drill or punch the holes in the center of the box end, unless adding additional conduit. (See SECTION "B")

3. Use concrete-tight fittings on the outside of the junction box conduit connection. Use an insulated, grounded end bushing on the inside for GRS conduit. Use an end bell bushing on the inside for PVC conduit.

4. The System identification letters shall be 1/16" line thickness formed by engraving, stamping, or with a S.S. weld bead. See Detail.

5. Liberally coat the threads of the cover fasteners with anti-seize compound during construction & before final closure.

6. Details shown for box installation in stationary forms.
1. Conduit pipes placed in retaining wall traffic barriers shall be fitted with Conduit Deflection (CD) Fittings spaced at 120' maximum. The CD Fittings shall be placed at the traffic barrier open joints that coincide with the retaining wall stem expansion joints nearest to the transverse construction joints in the wall footing.

2. Install Galvanized Rigid Steel (GRS) conduit between the Junction Box(es) Type 1 and the CD Fitting(s) “A”. GRS conduit shall also be used from the CD Fitting(s) “A” to the PVC adaptor in the barrier.

PVC Conduit may be used only in stationary-form barriers. Connect to GRS using a PVC adaptor.

GRS Conduit may be used in stationary-form barriers, but it shall be used in slipform barriers.

KEY NOTES

- Junction Box ~ 8" × 8" × 18" NEMA 4X in stationary-form barrier, adjustable NEMA 3R in slipform barrier (junction box can be recessed up to 1/8"). See Standard Plan J-16a.
- Conduit Fitting with Internal Bonding Jumper ~ Type DX for deflection of 30° & 3/4" movement.
- Where conduit exits from a structure, wrap the conduit pipe for 1' – 0" on each side from the exiting point. Pipe-wrap tape shall be 2" wide, 20 mil thick, & installed w/ 1" minimum overlap.
- 1’ – 0" long, 3/4" thick expanded closed cell foam sleeve around conduit and conduit fitting. After placing wire ties, duct tape seams and ends to seal and prevent concrete from bonding with fitting and conduit.
- Where conduit in a structure is routed across a joint, wrap the conduit pipe for 1’ – 0" on each side of joint. Pipe-wrap tape shall be 2" wide, 20 mil thick, & installed w/ 1" minimum overlap.
- 10’ long section of GRS Conduit

Conduit Deflection Fitting "A" Detail

- 3/4" DIAM. POLYETHYLENE DRAIN TUBE
- BUNDLE REBARS ADJACENT TO EACH END OF JUNCTION BOX ~ SEE NOTE 2

Conduit Deflection Fitting "B" Detail

- 3/8" MIN., 8" MAX. ~ CONDUIT AND THREADS CAST OUTSIDE STRUCTURE
- PLACE @ EXIT FROM STRUCTURE

CONDUIT INSTALLATION IN TRAFFIC BARRIER ON RETAINING WALL

STANDARD PLAN J-16b

Sheet 1 of 1 Sheet

APPROVED FOR PUBLICATION

Pasco Bakotich III 09-20-07

Washington State Department of Transportation

STATE DESIGN ENGINEER

Washington State Department of Transportation

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NOTES

1. Install a Conduit Deflection (CD) Fitting “A” at the exit from the barrier. Install a Conduit Deflection Fitting “B” to connect conduit ends at each concrete barrier expansion joint. See Standard Plan J-16b for Conduit Deflection Fitting details.

2. Install Galvanized Rigid Steel (GRS) conduit between the Junction Box(es) Type 1 and the CD Fitting(s) “A”. GRS conduit shall also be used from the CD Fitting(s) “A” to the PVC adaptor in the barrier.

PVC Conduit may be used only in stationary-form barriers. Connect to GRS using a PVC adaptor.

GRS Conduit may be used in stationary-form barriers, but it shall be used in slipform barriers.

3. See Standard Plan C-14a for additional information on Single Slope Concrete Barrier.

KEY NOTES

◊ Junction Box = 6" x 6" x 18" NEMA 4X in stationary-form barrier, adjustable NEMA 3R in slipform barrier (junction box can be recessed up to 1/8”). See Standard Plan J-16a.

◊ Where conduit in a structure is routed across a cold joint with continuous reinforcing steel, install premolded joint filler and wrap the conduit pipe for 1'-0" on each side of joint. Pipe-wrap tape shall be 2" wide, 20 mil thick, & installed w/ 1" min. overlap.

◊ 10' long section of GRS Conduit.

INSTALLATION IN SINGLE SLOPE CONCRETE BARRIER (DUAL FACE)

STANDARD PLAN J-16c

1/200 SCALE

DRAWN BY: ELENA BRUNSTEIN

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

DATE: STATE DESIGN ENGINEER

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DRAWN BY: ELENA BRUNSTEIN
NOTES

1. The Traffic Data Collection Loop spacing shall be 16'-0" from leading edge to leading edge. The loops shall be centered inside lanes without an adjacent shoulder; the loops in lanes adjacent to shoulders, including the median shoulder, shall be located 1'-8" from the edge of lane, see Detail "A".

2. Type 2 Advanced Induction Loops may also be used, see Standard Plan J-8b.

3. The loops and axle sensors shall be cut in the final lift of asphalt.

4. For concrete pavement lanes with asphalt shoulders, install all of the Piezo sensor and splice in the concrete lane. Also for concrete pavement lanes install the loops 4" to 6" away from the expansion joints.

5. The shoulder notch length along the roadway shall be 4" or the conduit size plus 2", whichever is larger. The shoulder notch width perpendicular to the roadway shall be the conduit size plus 1/4".

6. After all the wire leads are installed, seal the end of the conduit with Conduit Sealant. See the Special Provisions in the contract for the material used to fill the notch in the shoulder, or use an asphalt cold-patch.

7. Use Schedule 40 PVC conduit from the junction box to the cabinet. When there are four or more total lanes, use one conduit for each direction of travel. For conduit installation, see Standard Specification 8-20.

8. Use Schedule 80 PVC, HDPE, or Steel Conduit under the roadway. For conduit installation, see Standard Specification 8-20.

9. An inspector from the Traffic Data Office (TDO) shall be on site during all phases of the Traffic Recorder installation. The Contractor shall alert the Engineer 10 days prior to the beginning of any installation activity.

PLAN VIEW
INDUCTION LOOP / PIEZO AXLE SENSOR
NUMBER IDENTIFICATION

Lane 1 - (drive lane) ~ Loop L1, Piezo P1, Loop L2
Lane 2 - (drive lane) ~ Loop L3, Piezo P2, Loop L4
Lane 3 - (drive lane) ~ Loop L5, Piezo P3, Loop L6
Lane 4 - (pass lane) ~ Loop L7, Piezo P4, Loop L8
Lane 5 - (drive lane) ~ Loop L1, Piezo P1, Loop L2
Lane 6 - (drive lane) ~ Loop L3, Piezo P2, Loop L4
Lane 7 - (pass lane) ~ Loop L5, Piezo P3, Loop L6

TYPICAL 7 LANE FREEWAY WITH MEDIAN

TYPICAL 2 WAY ROADWAY

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NOTES
1. The Traffic Data Collection Loops shall be centered inside lanes without an adjacent shoulder; the loops in lanes adjacent to shoulders, including the median shoulder, shall be located 12" from the edge of lane, see Detail "A".
2. Type 3 Advanced Induction Loops may also be used, see Standard Plan J-8b.
3. The loops and axle sensors shall be cut in the final lift of asphalt.
4. For concrete pavement lanes with asphalt shoulders, install all of the Piezo sensor and splice in the concrete lane. Also for concrete pavement lanes install the loops 4" to 6" away from the expansion joints.
5. The shoulder notch length along the roadway shall be 4" or the conduit size plus 2", whichever is larger. The shoulder notch width perpendicular to the roadway shall be the conduit size plus 1/4".
6. After all the wire leads are installed, seal the end of the conduit with Conduit Sealant. See the Special Provisions in the contract for the material used to fill the notch in the shoulder, or use an asphalt cold-patch.
7. Use Schedule 40 PVC conduit from the junction box to the cabinet. When there are four or more total lanes, use one conduit for each direction of travel. See Standard Specification 8-20 for conduit installation.
8. Use Schedule 80 PVC, HDPE, or steel conduit under the roadway. See Standard Specification 8-20 for conduit installation.
9. An inspector from the Traffic Data Office (TDO) shall be on site during all phases of the Traffic Recorder installation. The Contractor shall alert the Engineer 10 days prior to the beginning of any installation activity.

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
Lane 3 - (drive lane) ~ Loop L1, Piezo P1, Piezo P2, Loop L2
Lane 4 - (drive lane) ~ Loop L3, Piezo P3, Piezo P4, Loop L4
Lane 5 - (pass lane) ~ Loop L5, Piezo P5, Piezo P6, Loop L6

TYPICAL 5 LANE FREEWAY WITH MEDIAN
Using pavement crayons, paint, tape measure and cord, 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 passive cable length is enough to reach the cabinet. DO NOT SPLICE CABLE. Leave a 4' minimum cable length inside of the cabinet.

2. Using a wet-cutting pavement saw with a 3/4" diamond blade, wet-cut the slot for the sensor. The slot must be 3/4" wide, +/-1/16", by 1" minimum deep. Cut the slot 8" longer than the sensor length, (including the lead attachment).

3. Cut home run slots for Piezo sensors. Center the home run slot on the sensor slot. Cut the home run slots 2" minimum to 2 1/2" maximum deep and 1/4" minimum wide. Cut the slots wider if installing conduit.

4. Using a power washer with water, remove and collect all the slurry and loose material from the slots. Sweep the slots with a stiff wire bristled brush. Dry all of the slots with a large capacity air compressor (150 CFM minimum). All of the slots and the pavement 1' on either side must be completely dry.
**Sensor Installation Instructions**

**Section D**

1. Place 2" duct tape along length of both sides of the sensor slot. Tape 1/16" away from the slot.

2. Visually inspect sensor to ensure it is straight without any twists or curls. Check passive cable for bare wire. Check lead attachment for cracks or gaps. Check distance to ensure the correct sensor is being installed: Class 1 Piezo Axle sensor for Weigh-in-Motion, and Class 2 Piezo Axle sensor for Permanent Traffic Recorder.

3. Place the sensor on the tape next to the slot. Handle the sensor with clean latex (or equivalent) gloves.

4. Clean the sensor with the grit of a steel wool or emery pad. Wipe it down with isopropyl alcohol and a clean, lint-free cloth.

5. Place the installation brackets on the sensor every 6" for the length of the sensor. Use the 3/4" brackets.

6. Place the sensor in the slot. The end of the sensor should be 2" from the end of the slot, and should not touch the bottom of the slot. The lead attachment end should also not touch the bottom or sides of the slot.

7. If any of the 3/4" brackets do not fit snugly against the sides of the slot or are loose, replace them with a 1" bracket.

8. Starting at the lead attachment end, position the sensor so that it is parallel to the surface of the road, approximately 3/8" below the surface of the road. At this depth, the installation brackets are 1/8" below the surface of the road.

9. Visually inspect sensor to ensure it is straight without any twists or curls. Place the sensor in the slot in the road. The end of the sensor should be at least 2" from the end of the slot, and should not touch the bottom of the slot. The lead attachment end should also not touch the bottom or sides of the slot.

10. If any of the 3/4" brackets do not fit snugly against the sides of the slot or are loose, replace them with a 1" bracket.

11. If any of the 3/4" brackets do not fit snugly against the sides of the slot or are loose, replace them with a 1" bracket.

12. Starting at the lead attachment end, position the sensor so that it is parallel to the surface of the road, approximately 3/8" below the surface of the road. At this depth, the installation brackets are 1/8" below the surface of the road.

13. Visually inspect the length of the sensor to ensure that it is at a uniform depth along its length and that it is level (not twisted, cantiled or bent).

14. Run the passive wire the length of the home run slot. Place the polypropylene rope under and over the passive cable (inside the slot). This will keep the grout from running out into the deeper home run slot.

15. Place all of the induction loops to the site specifications.


17. Using a low speed mixing drill (450 rpm) and a mixing paddle, premix the grout for 2 minutes or until smooth. Add hardener to the grout and mix according to the manufacturer’s instructions.

18. Pour the grout into the slot using a small bead. Make sure that the grout flows under the sensor slowly, eliminating air pockets. Start at the end and pour towards the lead attachment. Repeat until the slot is completely full of grout, at least in 2 passes, (approximately 1/2" thick each).

19. Using a putty knife or a trowel lightly spread the grout smooth along the surface. As it will shrink while curing, use a belt sander to sand the top of the grout flush with the surface.

20. Remove the tape as soon as the final grout pour is complete.

21. Once the grout for the Weigh in Motion Piezo Sensors is cured, (approximately 35 minutes, depending on grout type and ambient temperature), use a belt sander to sand the top of the grout flush with the surface.

22. Allow the loop sealant and the grout for both sensor installations to fully cure (45-60 minutes) before opening to traffic.
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-6c for details.


---

**Notes:**

**Material Information:**

- Service Cabinet (Typ.)
- To Junction Box
- Ground Rod
- To Utility
- 8 Circuit Loop Terminal Strip with Closed Back panel
- Transformer (Typ.)
- 4 Plug Outlet
- Single Pair Wire in Cable
- Soldered Compression Connection
- Loop Wires
- Secondary Terminal Strip if Needed

**Color Code Identification:**

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</table>

**Splice Detail:**

- Color Coded Labels on All Wires
- Single Pair Wires
- JUNCTION BOX WIRING (shown prior to splicing)
- LOOP WIRES
- PIEZO PASSIVE WIRE
- CABLE
- CONDUIT (Typ.)
- Ground Rod

**Permanent Traffic Recorder and Weigh-In-Motion Details:**

- Harold J. Peterfeso 09-02-05
- State Design Engineer
- Office of Traffic Operations
- Washington State Department of Transportation
1. This plan depicts the Steel Light Standard types and terms commonly referred to in the contract. All Steel Light Standards are fabricated in accordance with the Standard Specifications and the Contract Provisions.

2. The Luminaire Pole height shall not exceed 50' (H1).

3. Slip Bases shall not be installed on 50' (H1) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.

4. The optimal location of the Luminaire head is over the edge of the traveled way. Based on the placement of the Steel Light Standard foundation, the position of the Luminaire head may vary. See Standard Plan J-28.22.

5. Light Standard mast arm orientation is typically perpendicular to roadway centerline.

POLE

MAST ARM LENGTH
(12' MAX. FOR SINGLE ARM
8' MAX. FOR DOUBLE ARM)

MOUNTING HEIGHT

EDGE OF TRAVELED WAY

OFFSET DISTANCE

SHOULDER

BOTTOM OF POLE BASE

STEEL LIGHT STANDARD MOUNTED BASE
SEE STD. PLAN J-28.60, C-8b, AND C-14h

BRIDGE MOUNTED
(TYPE 1 MAST ARM SHOWN)

LUMINAIRE POLE

MAST ARM LENGTH

LUMINAIRE HEAD

LUMINAIRE POLE

LUMINAIRE POLE

TOP OF BRIDGE DECK

HAND HOLE

BOTTOM OF POLE BASE

STEREO LIGHT STANDARD

BOLT CONNECTION

H1

H1

H1

HAND HOLE

STEEL LIGHT STANDARD

BOLT CONNECTION

H2

H2

H2

HAND HOLE

MEDIAN BARRIER MOUNTED
(TYPE 1 MAST ARM SHOWN)

POST TOP MOUNTED LUMINAIRE
(SLIP BASE SHOWN)

SHOULDER

VARIES WITH OFFSET DISTANCE

TOP OF BRIDGE DECK

HAND HOLE

BOTTOM OF POLE BASE

BRIDGE MOUNTED MEDIAN BARRIER MOUNTED POST TOP MOUNTED LUMINAIRE

VARIES WITH OFFSET DISTANCE

TOP OF BRIDGE DECK

HAND HOLE

BOTTOM OF POLE BASE

STANDARD PLAN J-28.45

TYPE 1 MAST ARM SHOWN

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Pasco Bakotich III 08-07-07

STATE OF WASHINGTON

REGISTERED PROFESSIONAL ENGINEER

EXPIRES AUGUST 9, 2007

THEODORE J. TRAPANI

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION

DRAWN BY: BILL BERENS
**NOTES**

1. The Steel Light Standard Placement depicted on this plan is only intended for installations where roadside conditions allow its usage. Roadside conditions may require a special design by the Bridge Office, as determined by the Project Engineer.


**TAPER NOTE**

End Taper (on approach from opposing traffic):

- 20' (longitudinal) = use on one-way roadways or where the Light Standard is not in the Design Clear Zone of the opposing traffic.
- 6H:1V min. taper = use when the Light Standard is in the Design Clear Zone of the opposing traffic.

**BASED ON FIELD CONDITIONS, STEEL LIGHT STANDARD PLACEMENT CAN BE ADJUSTED ± 4.0', WHEN APPROVED BY THE PROJECT ENGINEER.**

**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.
CASE A
SLOPES 3H:1V THRU 2H:1V (MAX.)

CASE B
SLOPES FLATTER THAN 3H:1V

CASE C
FORE SLOPES 4H:1V OR FLATTER

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

DITCH SECTIONS
SLOPES 2H:1V OR FLATTER
BEHIND TRAFFIC BARRIER

SLOPES STEEPER THAN 2H:1V
BEHIND TRAFFIC BARRIER
(SPECIAL DESIGN FOUNDATION)

PROVIDE 2.0’ MIN. LEVEL GRADE TO
PREVENT BUILD-UP OF DEBRIS
AROUND BASE

MAXIMUM EXPOSED CONCRETE EQUALS THE RATIO
OF THE GRADE OF THE EXISTING SLOPE TIMES
THE DIAMETER OF THE FOUNDATION

NOT STEEPER THAN 2H:1V

3.0’ MIN. FOR BEAM GUARDRAIL
4.0’ MIN. FOR CONC. BARRIER TYPE 2

EDGE OF SHOULDER/FACE OF GUARDRAIL

TRAFFIC BARRIER
(BEAM GUARDRAIL SHOWN)

CASE E

STEEL LIGHT STANDARD FOUNDATION

EDGE OF SHOULDER/FACE OF CURB

CEMENT CONCRETE TRAFFIC CURB

CASE F

CASE G
ROADSIDE DITCH WITH
FORE SLOPE STEEPER THAN 4H:1V (2H:1V MAX.)

CASE H
CUT SECTION WITH
BACK SLOPE STEEPER THAN 3H:1V (2H:1V MAX.)

EMBANKMENTS

4.0’ MIN.

OUTSIDE OF DESIGN CLEAR ZONE

STEEL LIGHT STANDARD FOUNDATION

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

**METHOD 1**

**NO SUBSURFACE FORM**

This option is only used when the existing soil in the hole will remain standing and the cement concrete can be placed without causing the soil to collapse. Concrete shall be cast directly against undisturbed soil.

Auger the hole for the foundation. Use paper or cardboard form to achieve a smooth finish on the final exposed cement concrete. Support the form as necessary to remain plumb.


Place the concrete foundation.

After concrete has cured, remove the paper or cardboard form portion.

Construct the embankment widening (if required).

**METHOD 2**

**METAL (SUBSURFACE) FORM REQUIRED**

When the existing soil will not retain a vertical face, over-excavate the foundation area and install a 36" diameter, corrugated metal (pipe) form. The corrugated metal form shall not extend more than 6" below any portion of the foundation that will remain exposed upon final grading. Continue forming to full height using paper or cardboard form to achieve a smooth finish on final exposed cement concrete. Support the form as necessary to remain plumb.


Place the concrete foundation.

After concrete has cured, remove the paper or cardboard form portion.

Backfill with controlled-density fill or compacted borrow in accordance with Standard Specification 8-20.3(2).

Construct the embankment widening (if required).
1. 50' (H1) poles with double mast arms or poles weighing in excess of 1000 LBS shall not be installed on a slip base.
2. Galvanizing shall be in accordance with AASHTO M 111.
3. See Standard Plans C-8b, C-14h, and J-28.60 for foundation and base plate requirements when light standards are mounted on cement concrete traffic barrier.
4. See Standard Specification Section 6.03.3 (33) and 8.20.3 (4) for the torque requirements for all of the Anchor Bolt installations. Install 1-inch diameter Clamping Bolts in all Slip Bases to a torque of 95 Foot-Pounds - See Standard Specification Section 6.03.3 (33).
50' (H1) poles with double mast arms or poles weighing in excess of 1000 lbs. shall not be installed on a Slip Base.

The Slip and Anchor Plates shall be manufactured from ASTM A572 GR.50 or ASTM A588. All Slip Plate notched surfaces shall be finished smooth.

The Clamping Bolts shall be high strength steel, manufactured from AASHTO M164, with heavy hex nut and hardened washer. Galvanize the Clamping Bolts according to AASHTO M232.

Round and smooth all edges along wire-way to protect the conductors. See Standard Plan J-28.70 for wiring details.

Galvanize the Anchor/Slip Plate after fabrication according to AASHTO M 111.

Clamping Bolt diameters may vary on existing installations. Replace them with the same size as the originals when repairing or reusing a luminaire pole.
STEEL LIGHT STANDARD ELBOW DETAIL

FOR LUMINAIRE POLES WITH SINGLE MAST ARM 12' OR LESS, AND DOUBLE MAST ARMS 8' OR LESS, MOUNTED ON BRIDGE OR RETAINING WALLS.

NOTES
1. Galvanize the Elbow Assembly after fabrication according to AASHTO M 111.

EXPLODED ISOMETRIC VIEW

TYPICAL SECTIONS

PASSCO BAKOTICH III 08-07-07

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

APPROVED FOR PUBLICATION
1. Pole Base Plate for a Slip Base design shall be 1 1/4" steel manufactured from ASTM A572 GR. 50 or ASTM A588. Pole Base Plate for a Fixed Base design shall be either 1 1/4" steel manufactured from ASTM A572 GR. 50, ASTM A588, or 1 1/2" manufactured from ASTM A36. All Pole Base Plate notched surfaces shall be finished smooth.


3. Galvanizing shall be in accordance with AASHTO M 111.

4. See Standard Plan C-8b, C-14h and J-28.60 for foundation and base plate requirements when steel light standards are mounted on concrete traffic barriers.


**NOTES**

- THE CONDUCTOR ATTACHMENT CONFIGURATIONS VARY AMONG DIFFERENT MANUFACTURERS. CONDUCTOR ATTACHMENTS ARE REQUIRED ON ALL POLES, FIXED OR SLIP BASE.

- T = RIM PLATE THICKNESS BY LUMINAIRE POLE FABRICATOR

- ROUND AND SMOOTH INSIDE EDGES

- CONFIGURATION AND LOCATION OF THE HAND HOLE VARIES AMONG MANUFACTURERS. MINIMUM SIZE OPENING SHOWN.

- THE CONDUCTOR ATTACHMENT BRACKET = 1/4" THICK STEEL × 2" WIDE × 4" LONG

- CLAMP = 1/8" THICK STEEL × 2" WIDE × 3" LONG

- BACK-UP STRIP = 1/4" THICK, OR NO THINNER THAN POLE WALL THICKNESS. TACK WELD OR SEAL WELD TO BASE PLATE.

- 1" (TYP.) DIAM. HOLES

- ROUND AND SMOOTH ALL EDGES ALONG WIRE-WAY TO PROTECT CONDUCTORS.

- SEE STANDARD PLAN J-28.70 FOR WIRING DETAILS.

- GALVANIZING SHALL BE IN ACCORDANCE WITH AASHTO M 111.

- SEE STANDARD PLAN C-8b, C-14h AND J-28.60 FOR FOUNDATION AND BASE PLATE REQUIREMENTS WHEN STEEL LIGHT STANDARDS ARE MOUNTED ON CONCRETE TRAFFIC BARRIERS.

- SEE STANDARD PLAN J-28.52 FOR DETAILS WHEN SLIP BASE IS REQUIRED.

**ELEVATION VIEW**

**SECTION D**

**VIEW B**

**VIEW C**

**VIEW A**

**ISOMETRIC VIEW**

**TOP VIEW**

**POLE BASE PLATE DETAIL**
NOTES
1. See Standard Plans C-8b and C-14h for foundation and anchor bolt details.
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.

See Standard Plans C-8b and C-14h for foundation and anchor bolt details. Round and smooth all edges around hand hole and along the wire-way to protect the conductors. See Standard Plan J-28.70 for wiring details. Install grout after plumbing the pole.
NOTES
1. Sign sequence is the same for both directions of travel. Adjust for the direction of roadway curves.
2. Flashing Warning Lights (Type B per MUTCD) and/or flags may be used to call attention to the advance Warning Signs.
3. Existing conflicting pavement markings and signs that are no longer applicable shall be removed or obliterated. Temporary pavement markings shall be used to delineate bypass detour.
4. Raised pavement markers and/or temporary guideposts may be used on bypass as directed by the Engineer.
5. Steady Burning Warning Light (Type C per MUTCD) shall be used to mark Channelizing Devices at night.
6. Where advisory speed is 30 mph or less, reverse turn signs should be used. Other curve or turn Warning Signs may be substituted to depict roadway alignment.
7. Temporary barriers and end treatments shall be crashworthy.
8. To improve visibility, consider use of temporary illumination at closure points.
10. Consider using a PCMS for additional advance warning.

CHANNELIZING DEVICE SPACING

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>IN TAPER (FEET)</th>
<th>IN TANGENT (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 / 70</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>35 / 45</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>25 / 30</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

Stream or Other Obstruction
optional

Temporary Double Yellow Centerline
optional

Temporary White Edge Line
optional

Road Work Ahead
optional

End Road Work
### SIGN SPACING = X (1)

<table>
<thead>
<tr>
<th>Category</th>
<th>Speed</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Roads</td>
<td>45 / 55 MPH</td>
<td>500' ± 0</td>
</tr>
<tr>
<td>Rural Roads &amp; Urban Arterials,</td>
<td>35 / 40 MPH</td>
<td>350' ± 0</td>
</tr>
<tr>
<td>Residential &amp; Business Districts</td>
<td>25 / 30 MPH</td>
<td>200' ± 0</td>
</tr>
<tr>
<td>Urban Streets</td>
<td>25 MPH OR LESS</td>
<td>100' ± 0</td>
</tr>
</tbody>
</table>

(1) All sign spacing may be adjusted to accommodate at-grade intersections and driveways.

(2) This sign spacing may be reduced in urban areas to fit roadway conditions.

---

**NOTES**

1. Modify Regulatory Traffic Control Devices, as needed, for the duration of the detour.
2. Two Flashing Warning Lights (Type A per MUTCD) may be used to mark each barricade at night.
3. Trail Blazers shall be installed throughout the detour, as appropriate.
4. Signing shown for the one direction only.
5. Coordinate with emergency services.
6. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
SIGN SPACING = X

ALL SIGN SPACING MAY BE ADJUSTED TO ACCOMMODATE AT-GRADE INTERSECTIONS AND DRIVEWAYS.

LONGITUDINAL BUFFER SPACE = B

POSTED SPEED (MPH) | 25 | 30 | 35 | 40 | 45
LENGTH B (FEET)    | 55 | 85 | 120| 170| 270

SIGN LOCATION

ROAD WORK AHEAD

CHANNELIZING DEVICES

SIGN SPACING

POSTED SPEED (MPH) | 25 / 30 | 20 | 40
LENGTH B (FEET)    | 120 | 170| 270

LEGEND

SIGN LOCATION

CHANNELIZING DEVICES

BARRIACLE ~ TYPE 3 L

FLASHING WARNING LIGHT

NOTES

1. This plan is intended for use on roadways when traffic volumes create sufficient gaps for motor vehicles to yield.

2. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark Channelizing Devices at night.

3. Adequate sight distance shall be provided for drivers to see opposing traffic, otherwise use flaggers and/or Temporary Signal.

4. Extend Channelizing Device taper across shoulder ~ recommended.

5. Post mount signs when in place for 3 days or longer.

6. For speed limit 35 mph or higher replace W1-3R with W1-4R.

7. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

8. Consider using a PCMS for additional advance warning.

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES
1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. Night work requires additional roadway lighting at flagging stations. See WSDOT Standard Specifications for additional details.

3. Extend Channelizing Device taper across shoulder ~ recommended.

4. Sign sequence is the same for both directions of travel on the roadway.

5. Channelizing Device spacing for the downstream taper option shall be 20' O.C.

6. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

(1) ALL SIGN SPACING MAY BE ADJUSTED TO ACCOMMODATE INTERCHANGE RAMPS, AT-GRADE INTERSECTIONS, AND DRIVEWAYS.

(2) THIS SIGN SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.
Channelizing Devices are recommended along centerline to separate traffic from work operation. Devices are required at tapers to shift traffic movement between lanes and to protect all flagging stations.

Night work requires additional roadway lighting at flagging stations. See WSDOT Standard Specifications for additional details.

For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

NOTES

1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead Stopping Distance.

2. Extend device taper (L/3) across shoulder ~ recommended.

3. Portable Changeable Message Sign (PCMS) ~ recommended.

4. Traffic Safety Drums for all tapers on high speed roadway ~ recommended.

5. Transverse Devices in closed lane every 1000' ~ recommended.

6. Channelizing Device spacing for the downstream taper option shall be 20' O.C.

7. Use advanced notice for any overwidth loads prior to lane closure for alternative routes if applicable ~ recommended.

8. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

SINGLE LANE CLOSURE WITH ENCROACHMENT

STANDARD PLAN K-24.20-00

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES

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LEGEND

- SIGN LOCATION
- CHANNELIZING DEVICES
- PROTECTIVE VEHICLE ~ RECOMMENDED
- PORTABLE CHANGEABLE MESSAGE SIGN
- ARROW PANEL
- EXISTING EDGE STRIPE
- EXISTING LANE STRIPE
- TEMPORARY TRAFFIC CONTROL DEVICE

---

LONGITUDINAL BUFFER SPACE = B
POSTED SPEED (MPH)  25  30  35  40  45  50  55  60
LENGTH B (FEET)    155 200 250 305 360 425 495 570

MINIMUM TAPER LENGTH = L (FEET)
LANE WIDTH (FEET)  25  30  35  40  45  50  55  60  65  70
POSTED SPEED (MPH)  10  155 160 205 210 450 500 550  -  -
11  115 165 225 294 495 550 605 690  -  -
12  125 180 240 320 540 590 660 720 780 840

MINIMUM WEIGHT 15,000 LBS. (MAXIMUM WEIGHT SHALL BE IN ACCORDANCE WITH MANUFACTURER RECOMMENDATION)

ROLL AHEAD STopping DISTANCE = 30 FEET MIN. (DRY PAVEMENT ASSUMED)

BUFFER DATA

TYPICAL PROTECTIVE VEHICLE WITH TMA (SEE NOTE 1)

VEHICLE TYPE
4 YARD DUMP TRUCK, SERVICE TRUCK, FLAT BED, ETC.

LOADED WEIGHT
MINIMUM WEIGHT 15,000 LBS.

SIGN SPACING = X (1)

(1) ALL SIGN SPACING MAY BE ADJUSTED TO ACCOMMODATE AT-GRADE INTERSECTIONS, AND DRIVEWAYS.

(2) THIS SIGN SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.

CHANNELIZING DEVICE SPACING

POSTED SPEED (MPH)  50 / 70  35 / 45  25 / 30
IN TAPER (FEET)  40  30  20
IN TANGENT (FEET)  80  60  40

RURAL HIGHWAYS
60 / 65 MPH  80/7 a
RURAL ROADS
45 / 55 MPH  50/7 a
RURAL ROADS & URBAN ARTERIALS
35 / 40 MPH  30/7 a
RURAL ROADS, URBAN ARTERIALS,
RESIDENTIAL & BUSINESS DISTRICTS
25 / 30 MPH  20/7 a (2)
URBAN STREETS
25 MPH OR LESS  100/7 a (2)

ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE.

END ROAD WORK
G20-2A OR DOWNSTREAM TAPER TO SHOW END OF WORK AREA ~ SEE NOTE 6

SEE NOTE 2

SEE NOTE 5

SEE NOTE 6

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

*Standard Plan K-24.40-01*

### Buffer Data

**Typical Protective Vehicle with TMA**

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Loaded Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Yard Dump Truck, Service Truck, Flat Bed, etc.</td>
<td>Minimum Weight 15,000 lbs. (Maximum weight shall be in accordance with manufacturer recommendation)</td>
</tr>
</tbody>
</table>

**Roll Ahead Stopping Distance** = 30 feet min. (Dry pavement assumed)

### Minimum Taper Length = L (feet)

<table>
<thead>
<tr>
<th>LANE WIDTH (FEET)</th>
<th>POSTED SPEED (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>25 30 35 40 45 50 55 60</td>
</tr>
<tr>
<td>11</td>
<td>25 30 35 40 45 50 55 60</td>
</tr>
<tr>
<td>12</td>
<td>25 30 35 40 45 50 55 60</td>
</tr>
</tbody>
</table>

### Sign Spacing = X (1)

- Rural Highways: 60 / 65 MPH, 80’ ±
- Rural Roads: 45 / 55 MPH, 50’ ±
- Rural Roads & Urban Arterials: 35 / 40 MPH, 35’ ±
- Rural Roads, Urban Arterials, Residential & Business Districts: 25 / 30 MPH, 200’ ± (2)
- Urban Streets: 25 MPH or less, 100’ ± (2)

All signs are black on orange unless designated otherwise.

1. All sign spacing may be adjusted to accommodate interchange ramps, at-grade intersections, and driveways.
2. This sign spacing may be reduced in urban areas to fit roadway conditions.

### Channelizing Device Spacing

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
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<td>80</td>
</tr>
<tr>
<td>40 / 45</td>
<td>30</td>
<td>60</td>
</tr>
</tbody>
</table>

### Legend

- **|** Sign Location
- **= = =** Channelizing Devices
- **= = =** Protective Vehicle - Recommended
- **PCMS** Portable Changeable Message Sign
- **ARROW PANEL**

**NOTE:** This plan is not a legal engineering document but an electronic duplicate. The original, signed by the engineer and approved for publication, is kept on file at the Washington State Department of Transportation. A copy may be obtained upon request.

**For Local Agency Use Only NOT FOR USE ON STATE ROUTES**

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**Date:** January 7, 2008 to August 3, 2008

**Effective:** January 7, 2008 to August 3, 2008

---

**APPROVED FOR PUBLICATION**

Pasco Bakotich III 10-12-07

Washington State Department of Transportation
1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. Devices shall not encroach into adjacent lanes.

3. Extend device taper (L/3) across shoulder ~ recommended.

4. Portable Changeable Message Sign (PCMS) ~ recommended.

5. Use Transverse Devices in closed lane every 1000' 35/64 ~ recommended.

6. Traffic Safety Drums for all tapers on high speed roadway ~ recommended.

7. Channelizing Device spacing for the downstream taper option shall be 20' O.C.

8. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
LONGITUDINAL BUFFER SPACE = B

POSTED SPEED (MPH)
25 30 35 40 45 50 55 60 65 70

LENGTH B (FEET)
155 200 250 300 350 425 495 570 645 730

SIGN SPACING = X (1)

RURAL HIGHWAYS
60 / 65 MPH 807 ±

RURAL ROADS
45 / 55 MPH 500 ±

RURAL ROADS & URBAN ARTERIALS
50 / 40 MPH 350 ±

RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL & BUSINESS DISTRICTS
25 / 30 MPH 200 ± (2)

ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE.

(1) ALL SIGN SPACING MAY BE ADJUSTED TO ACCOMMODATE INTERCHANGE RAMPS, AT-GRADE INTERSECTIONS, AND DRIVEWAYS.

(2) THIS SIGN SPACING MAY BE REDUCED IN URBAN AREAS TO FIT ROADWAY CONDITIONS.

MINIMUM TAPER LENGTH = L (FEET)

LANE WIDTH (FEET)
25 30 35 40 45 50 55 60 65 70

POSTED SPEED (MPH)
10 105 150 205 270 450 500 550 - -

11 115 155 225 284 465 550 600 660 - -

12 125 182 245 330 540 600 660 720 780 840

LONGITUDINAL BARRIER FLARE RATES

POSTED SPEED (MPH)
60 65 70

ANCHORED BARRIER
18 : 1 16 : 1

UNANCHORED BARRIER
- - 40 OR BELOW 10 : 1

SINGLE LANE CLOSURE WITH TEMPORARY CONCRETE BARRIER
STANDARD PLAN K-24.80-01

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES

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NOTES

1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance. Extend device taper (L/3) across shoulder ~ recommended.

2. Portable Changeable Message Sign (PCMS) ~ recommended.

3. If the lane shift is short and has minimal radius curve (30mph or less) use sign W1-3 in lieu of sign W1-4.

4. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
NOTES

1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. Portable Changeable Message Sign (PCMS) ~ recommended.

3. Prohibit turns as necessary for traffic conditions.

4. For signs size refer to Manual on Uniform Traffic Control Device (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
NOTES

1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. If an existing signal is present, the signal shall be set to "red flash mode" or turned off during flagging operations.

3. Extend device taper (L/3) across shoulder ~ recommended.

4. Law enforcement officer may be used in lieu of flaggers to control intersection traffic.

5. For speed limit of 30 mph or less use sign W1-3 in lieu of sign W1-4.

6. Maintain at least one access point for each business within the Work Area limits.

7. Portable Changeable Message Sign (PCMS) ~ recommended.

8. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
NOTES
1. If the work space extends across a crosswalk, the crosswalk should be closed (see Standard Plan K-34.20).
2. The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection. However, when this results in the closure of a right lane having significant right turning movements, then the right lane may be restricted to right turn only, as shown. This procedure increases the through capacity by eliminating right turns from the open through lane.
3. Prohibit turns as necessary for traffic conditions.
4. Flashing Warning Lights (Type A per MUTCD) should be used, as needed, to mark barricades at night.
5. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark channelizing devices at night.
6. For long term projects, conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary.
7. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

SIGN SPACING = X

| RURAL ROADS | 45 / 55 MPH | 500' L |
| RURAL ROADS & URBAN ARTERIALS | 35 / 40 MPH | 350' L |
| RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL & BUSINESS DISTRICTS | 25 / 30 MPH | 200' L |
| URBAN STREETS | 25 MPH OR LESS | 100' L |

ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE

CHANNELIZING DEVICE SPACING

<table>
<thead>
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</tr>
<tr>
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<td>40</td>
</tr>
</tbody>
</table>

MINIMUM TAPER LENGTH = L (FEET)

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</tr>
<tr>
<td>11</td>
<td>110 160 210 260 310 360 410 460 510 560</td>
</tr>
<tr>
<td>12</td>
<td>120 180 230 280 330 380 430 480 530 580</td>
</tr>
</tbody>
</table>

LEGEND

- SIGN LOCATION
- CHANNELIZING DEVICES
- BARRICADE ~ TYPE 3 L
- ARROW PANEL
NOTES

1. If the work space extends across a crosswalk, the crosswalk should be closed (see Standard Plan K-34.20).

2. The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection. However, when this results in the closure of a left lane having significant left-turning movements, then the left lane may be reopened as a turn bay for left turns only, as shown.

3. Prohibit turns as necessary for traffic conditions.

4. Flashing Warning Lights (Type A per MUTCD) should be used, as needed, to mark barricades at night.

5. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark channelizing devices at night.

6. For long term projects, conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary.

7. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
NOTES

1. Prohibit turns as necessary for traffic conditions.
2. Flashing Warning Lights (Type A per MUTCD) should be used, as needed, to mark barricades at night.
3. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark channelizing devices at night.
4. For long term projects, conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary.
5. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M56-05.
NOTES
1. NO LEFT TURN signs are to be used if traffic volumes are too high or there is an operating signal. Close the left turn pocket if there is one on the side street.
2. When turn prohibitions are implemented, two turn prohibition signs should be used, one on the near side and, space permitting, one on the far side of the intersection.
3. If the work space extends a crosswalk, the crosswalk should be closed (see Standard Plan K-34.20).
4. Flashing Warning Lights (Type A per MUTCD) should be used, as needed, to mark channelizing devices at night.
5. Steady Burning Warning Lights (Type C per MUTCD) shall be used to mark channelizing devices at night.
6. For long term projects conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used.
7. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

SIGN SPACING = X

<table>
<thead>
<tr>
<th>RURAL ROADS</th>
<th>45 / 55 MPH</th>
<th>500' X</th>
</tr>
</thead>
<tbody>
<tr>
<td>RURAL ROADS &amp; URBAN ARTERIALS</td>
<td>35 / 40 MPH</td>
<td>350' X</td>
</tr>
<tr>
<td>URBAN ROADS, URBAN ARTERIALS, RESIDENTIAL &amp; BUSINESS DISTRICTS</td>
<td>25 / 30 MPH</td>
<td>200' X</td>
</tr>
<tr>
<td>URBAN STREETS</td>
<td>25 MPH OR LESS</td>
<td>100' X</td>
</tr>
</tbody>
</table>

ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE

MINIMUM TAPER LENGTH = L (FEET)

<table>
<thead>
<tr>
<th>LANE WIDTH (FEET)</th>
<th>POSTED SPEED (MPH)</th>
<th>MINIMUM TAPER LENGTH (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>25 / 30 / 35 / 40 / 45</td>
<td>50</td>
</tr>
<tr>
<td>11</td>
<td>105 / 150 / 205 / 270 / 340 / 410 / 480 / 550 / 620</td>
<td></td>
</tr>
</tbody>
</table>

ALL SIGN SPACING MAY BE ADJUSTED TO ACCOMMODATE AT-GRADE INTERSECTIONS AND DRIVEWAYS.

CHANNELIZING DEVICE SPACING

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>IN TAPER (FEET)</th>
<th>IN TANGENT (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 / 70</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>35 / 45</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>25 / 30</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

LEGEND

- - - - - SIGN LOCATION

- - - - - CHANNELIZING DEVICES

- - - - - ARROW PANEL

- - - - - BARRICADE ~ TYPE 3 L

- - - - - OBSCURED MARKING

LONGITUDINAL BUFFER SPACE = B

POSTED SPEED (MPH) | LENGTH (FEET)
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>25 / 30 / 35 / 40 / 45</td>
<td>50 / 85 / 120 / 170 / 270</td>
</tr>
</tbody>
</table>

SIGN SPACING = X

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1. When crosswalks or other pedestrian facilities are closed or re-located, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

2. Controls shown are for pedestrian traffic only.

3. Use Warning Lights on barricades.

4. Maintain a minimum width of 3 feet for pedestrian path.

5. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

Install on Type 2 Barricades throughout the work area 24 hours prior to implementing traffic control. Prior notification of Local Law Enforcement required.
1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. For long term projects conflicting pavement markings that are no longer applicable shall be removed. Temporary markings shall be used as necessary and signs shall be post mounted.

3. The sign MOTORCYCLES USE EXTREME CAUTION may be used.

4. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
### CHANNELIZING DEVICES

**PROTECTIVE VEHICLE ~ RECOMMENDED**

<table>
<thead>
<tr>
<th>LEGEND</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
</tr>
</tbody>
</table>

#### LONGITUDINAL BUFFER SPACE = B

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
<th>65</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td>LENGTH B (FEET)</td>
<td>360</td>
<td>425</td>
<td>495</td>
<td>570</td>
<td>545</td>
<td>730</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### BUFFER DATA

**TYPICAL PROTECTIVE VEHICLE WITH TMA** (SEE NOTE 1)

<table>
<thead>
<tr>
<th>VEHICLE TYPE</th>
<th>LOADED WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 YARD DUMP TRUCK</td>
<td>MINIMUM WEIGHT 15,000 LBS. (MAXIMUM WEIGHT SHALL BE IN ACCORDANCE WITH MANUFACTURER RECOMMENDATION)</td>
</tr>
<tr>
<td>SERVICE TRUCK, FLAT BED, ETC.</td>
<td></td>
</tr>
</tbody>
</table>

**ROLL AHEAD STOPPING DISTANCE = 30 FEET MIN.**

(DRY PAVEMENT ASSUMED)

#### MINIMUM TAPER LENGTH = L (FEET)

<table>
<thead>
<tr>
<th>SHOULDER WIDTH (FEET)</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
<th>65</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSTED SPEED (MPH)</td>
<td>SEE STD. PLAN</td>
<td>270</td>
<td>300</td>
<td>330</td>
<td>360</td>
<td>390</td>
<td>420</td>
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<td></td>
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</table>

### CHANNELIZING DEVICE SPACING

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>IN TAPER (FEET)</th>
<th>IN TANGENT (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 / 70</td>
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<td>80</td>
</tr>
<tr>
<td>45 / 50</td>
<td>30</td>
<td>60</td>
</tr>
</tbody>
</table>

#### SIGN SPACING = X

**RURAL HIGHWAYS**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>60 / 65 MPH</th>
<th>500'</th>
<th>35/64</th>
</tr>
</thead>
</table>

**RURAL ROADS**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>45 / 55 MPH</th>
<th>500'</th>
<th>35/64</th>
</tr>
</thead>
</table>

ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE.

NOTES

1. A Protective Vehicle is recommended regardless if a TMA is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. Channelizing Device spacing for the downstream taper option shall be 20' O.C.

3. No Encroachment on the traveled lane is permitted. If Encroachment is necessary, the lane shall be closed (see Standard Plan K-24.20).

4. Signs to be post mounted for long term projects.

5. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-55.
**LONGITUDINAL BUFFER SPACE = B**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
<th>65</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td>LENGTH B (FEET)</td>
<td>155</td>
<td>200</td>
<td>250</td>
<td>305</td>
<td>305</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

**MINIMUM TAPER LENGTH = L (FEET)**

<table>
<thead>
<tr>
<th>SHOULDER WIDTH (FEET)</th>
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<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSTED SPEED (MPH)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35 / 40</td>
<td>83</td>
<td>90</td>
<td>123</td>
</tr>
<tr>
<td>25 / 30</td>
<td>84</td>
<td>120</td>
<td>164</td>
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<tr>
<td>LESS THAN 6</td>
<td>105</td>
<td>150</td>
<td>204</td>
</tr>
</tbody>
</table>

**BUFFER DATA**

**TYPICAL PROTECTIVE VEHICLE WITH TMA (SEE NOTE 1)**

**VEHICLE TYPE**

| 4 YARD DUMP TRUCK, SERVICE TRUCK, FLAT BED, ETC. | MINIMUM WEIGHT: 15,000 LBS. (MAXIMUM WEIGHT SHALL BE IN ACCORDANCE WITH MANUFACTURER RECOMMENDATION) |

**ROLL AHEAD STOPPING DISTANCE = 30 FEET MIN.**

(DRY PAVEMENT ASSUMED)

**LEGEND**

- **SIGN LOCATION**
- **CHANNELIZING DEVICES**
- **PROTECTIVE VEHICLE - RECOMMENDED**

**NOTE:**

1. A Protective Vehicle is recommended regardless if a Truck Mounted Attenuator (TMA) is available; a work vehicle may be used. When no TMA is used, the Protective Vehicle shall be strategically located to shield workers, with no specific Roll-Ahead distance.

2. Channelizing Device spacing for the downstream taper option shall be 20’ O.C.

3. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M65-05.
**NOTES**

1. In those situations where multiple work locations within a limited distance make it practical to place stationary signs, the distance between the advance warning sign and the work area should not exceed 5 miles.

2. In those situations where the distance between the advance signs and the work area is 2 to 5 miles, a supplemental distance plaque should be used with the road work ahead sign.

3. No encroachment into traffic lane is permitted with this plan.

4. Work vehicle and shadow vehicle shall use warning beacons.

5. Shadow vehicle shall maintain 600' to 1000' of sight distance to approaching traffic.

6. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M50-00.

---

**LEGEND**

- **DI**  
  - Sign location
  - Protective vehicle
  - Truck mounted attenuator – recommended
  - Sequential arrow panel type “B” – caution mode
  - Warning beacon – required

<table>
<thead>
<tr>
<th>PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPICAL PROTECTIVE VEHICLE WITH TMA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VEHICLE TYPE</th>
<th>LOADED WEIGHT</th>
<th>STATIONARY OPERATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 YARD DUMP TRUCK, SERVICE TRUCK, FLAT BED, ETC.</td>
<td>MINIMUM WEIGHT 15,000 LBS. (MAXIMUM WEIGHT SHALL BE IN ACCORDANCE WITH MANUFACTURER RECOMMENDATION)</td>
<td>30 FEET</td>
</tr>
</tbody>
</table>

**ROLL AHEAD DISTANCES VARY AND SHALL BE DETERMINED IN FIELD BASED ON WORK OPERATION AND SITE SPECIFIC CONDITIONS**

**SHOULDER CLOSURE ~ SHORT DURATION**

**STANDARD PLAN K-40.60-00**

**FOR LOCAL AGENCY USE ONLY NOT FOR USE ON STATE ROUTES**

**APPROVED FOR PUBLICATION**

Ken L. Smith 02-15-07

STATE DESIGN ENGINEER

Washington State Department of Transportation
NOTES

1. The sign shown is not required in the following cases: the work space is behind a barrier, or more than 2' behind the curb, or more than 15' from the edge of a roadway.

2. For sign size, refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

(1) All sign spacing may be adjusted to accommodate at-grade intersections and driveways.

(2) This sign spacing may be reduced in urban areas to fit roadway conditions.

FOR LOCAL AGENCY USE ONLY
NOT FOR USE ON STATE ROUTES

WORK BEYOND THE SHOULDER

STANDARD PLAN K-40.80-00

DRAWN BY: ELENA BRUNSTEIN

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

EXPIRES AUGUST 9, 2007

THEODORE J. TREPANIEN

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NOTES

1. Implement this plan when the initial roadway assessment is complete and determined to be passable with caution.

2. Portable Changeable Message Sign (PCMS) ~ recommended. For one-lane two-way traffic situations (see Standard Plan K-20.40) for additional details.

3. Spot hazards shall be marked with barricades or channelizing devices to alert motorists.

4. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.
1. Install additional Warning Signs based on site conditions and traffic characteristics. See an appropriate Standard Plan for guidance.

2. Regulatory Speed Limit signs are not a substitute for Work Zone Warning signs. Speed Limit signs shall remain in place as long as the reduced speed condition applies.

3. Motorcycle Warning Signs are required as per Washington Administrative Code (WAC) 468-95-305.

4. Closing a road and restricting traffic shall conform to Revised Code of Washington (RCW) 47.48.

5. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

LEGEND

PCMS PORTABLE CHANGEABLE MESSAGE SIGN

SP-2 36" x 48" B/W

LOOSE GRAVEL 35

W2-1701 OR OTHER APPROPRIATE WARNING SIGN DEPENDING ON SITE CONDITIONS

MOTORCYCLES USE EXTREME CAUTION

CHIP SEAL PROJECT

NEXT X MILES

FROM AUG XX TO AUG XX

CHIP SEAL PROJECT

CHIP SEAL AREA

FIELD LOCATE IN ADVANCE OF SIGNING

FOR LOCAL AGENCY USE ONLY

NOT FOR USE ON STATE ROUTES

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**CHALLENGING DEVICE SPACING**

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>IN TAPER (FEET)</th>
<th>IN TANGENT (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 / 70</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>35 / 45</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>25 / 30</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

1. **SIGN SPACING = X (1)**
   - RURAL HIGHWAYS: 60 / 65 MPH 800' ±
   - RURAL ROADS: 45 / 55 MPH 500' ±
   - RURAL ROADS & URBAN ARTERIALS: 35 / 40 MPH 350' ±
   - RURAL ROADS, URBAN ARTERIALS, RESIDENTIAL & BUSINESS DISTRICTS: 25 / 30 MPH 200' ± (2)
   - URBAN STREETS: 25 MPH OR LESS 100' ± (2)
   - ALL SIGNS ARE BLACK ON ORANGE UNLESS DESIGNATED OTHERWISE

2. **NOTES**
   2. **MOTORCYCLES USE EXTREME CAUTION** signs shall be installed when the following roadway conditions exist:
      - grooved pavement
      - abrupt lane edge
      - steel plates
      - loose gravel of earth
   Specific signs for each of the conditions noted shall be installed along with **MOTORCYCLES USE EXTREME CAUTION** signs.
   3. For signs size refer to Manual on Uniform Traffic Control Devices (MUTCD) and WSDOT Sign Fabrication Manual M55-05.

---

**FOR LOCAL AGENCY USE ONLY**

**NOT FOR USE ON STATE ROUTES**

---

**MOTORCYCLE SUPPLEMENTAL SIGNING**

**STANDARD PLAN K-60.40-00**

---

**APPROVED FOR PUBLICATION**

Ken L. Smith 02-15-07

STATE DESIGN ENGINEER

Washington State Department of Transportation

---

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NOTES

1. For long term projects conflicting pavement markings that are no longer applicable shall be removed or obliterated. Temporary markings shall be used as necessary.

2. For Hot Mixed Asphalt Pavement, a temporary striping tape shall be installed in conjunction with DO NOT PASS and "PASS WITH CARE" sign locations.

3. Temporary roadside delineation with Channelization Devices is optional. The appropriate taper length shall be L/2. See Standard Plan K-24.20 for minimum taper length (L).

4. For long term projects a channelization/pavement marking plan should be implemented.

5. Temporary Raised Pavement Marker (TRPM) may be used on a pattern spacing 5' O.C. to simulate a solid line.
For sign installation details, see Std. Plan G - series.

1. For sign installation details, see Std. Plan G - series.
2. In rural areas, the "V" Height can be a minimum of 7 feet for primary signs and 6 feet for the supplemental plaques for greater visibility, as directed by the engineer.
3. The "V" height for signs, with an area of more than 50 square feet and two or more sign supports, is 7 feet in both rural and urban areas.
**ELEVATION**

**WARNING LIGHT ATTACHMENT DETAIL**

1. Drill two 1/2" diam. holes through barricade support angle.

**TOP OF BARRICADE SUPPORT ANGLE**

2. Support angle 45° min. ~ 8° - 0° max.

3. 6" (TYP.)

4. 2 - 6"

5. 5' - 0"

6. Top of barricade

**TYPE 3 BARRICADE**

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.
AREA CLOSED TO TRAFFIC USEABLE TRAFFIC LANE

ROAD CLOSURE AT INTERSECTION

2' MIN.

WORK AREA

TYPE 3L BARRICADE

STRIPES ON THE BARRICADES SHALL SLOPE DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS

TYPE 3R BARRICADE

ROAD CLOSURE AT OTHER LOCATIONS

WORK AREA

TYPE 3L BARRICADE

TYPE 3R BARRICADE

BARRICADE PLACEMENT

USEABLE TRAFFIC LANE 

AREA CLOSED TO TRAFFIC 2' MIN.
The reinforcing steel details for the NARROW BASE barrier are the same as those shown for the 2’ wide barrier except that the bars along the vertical face run vertically with a 1 1/2" clearance.

The vertical dimensions for the slots and loop bar locations on the NARROW BASE barrier are the same as those shown on the END views of the 2’ wide barrier.
**NOTES**

1. Use Type 1 Anchors when the concrete pavement or bridge deck is 6" or thicker with 2' wide concrete barrier only. Use Type 2 Anchors (Standard Plan K-80.37) with narrow base barrier.

2. Adjust the location of the Type 1 Anchors to avoid the main reinforcing in the deck when drilling holes.

3. Use shims to properly fit the Type 1 Anchors to the barrier and roadway surfaces.

4. Upon removal of the Type 1 Anchors, clean the bolt holes and fill them with grout according to Standard Specification 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.

**ATTACHMENT "A" DETAIL**

- **TRAFFIC SIDE**
  - Protected work area or edge of deck
  - Attachment "A" - See detail

**ATTACHMENT "B" DETAIL**

- **TRAFFIC SIDE**
  - Protected work area or edge of deck
  - Attachment "B" - See detail

**TYPE 1 ANCHOR**

Temporary installation of precast concrete barrier type 2 (STD. PLAN C-8) and temporary concrete barrier (F-shape) (STD. PLAN K-80.30) on cement conc. pavement or bridge deck.

- **ATTACHMENT LOCATIONS**
  - 2' segment length (typ.)
  - 1/2 segment length (typ.)

**TYPE 3 ANCHOR**

Temporary installation of precast concrete barrier type 2 (STD. PLAN C-8) and temporary concrete barrier (F-shape) (STD. PLAN K-80.30) on hot mix asphalt pavement.

- **PIN LOCATIONS**
  - 2' - 0" pinning hole (typ.) - only required on traffic side(s) of barrier
  - 5' - 0" pinning hole (typ.)

---

**Ken L. Smith 02-21-07**

**Washington State Department of Transportation**

**DATE STATE DESIGN ENGINEER**

**Sheet 1 of 1 Sheet**

**APPROVED FOR PUBLICATION**

**STATE OF WASHINGTON**

**REGISTERED PROFESSIONAL ENGINEER**

**EXPIRES JULY 24, 2008**

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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.

1. Use Class 1 when the concrete pavement or bridge deck is 9" or thicker; use Class 2 when it is 6" or thicker.
2. Adjust the location of the anchors to avoid the main reinforcing in the deck when drilling holes.
3. Use shims to properly fit the anchors to the barrier and roadway surfaces.
4. Upon removal of the anchors, clean the bolt holes and fill them with grout according to Standard Specification 6.02.3(20).
NOTES

1. The bracing and pull post details for Wire Fence Type 2 are the same as for Type 1.

2. Attach the wire mesh to the posts using four fasteners. Three additional fasteners per post are required within and at the limits of sag conditions. Use additional fasteners on posts which mark the angle point of any sudden change in topography.

3. Wood anchors (for wood posts) shall be 2x4 lumber, 12" long minimum, and fastened with three 16d galvanized nails.

The bracing and pull post details for Wire Fence Type 2 are the same as for Type 1. 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 which mark the angle point of any sudden change in topography. Wood anchors (for wood posts) shall be 2x4 lumber, 12" long minimum, and fastened with three 16d galvanized nails.
1. All concrete post bases shall be 10' minimum diameter.
2. Along the top and bottom, using Hog Rings, fasten the Chain Link Fence Fabric to the Tension Wire and Tension Cable within the limits of the first full fabric weave.
3. Details are illustrative and shall not limit hardware design or post selection of any particular fence type.
DOUBLE GATE

SINGLE GATE
1. All glare screen posts shall be 1 5/8" × 2 1/4" Galvanized Steel H-Columns.

2. Post Bolts shall be:
   - On Timber Posts: Hex head bolt 5/8-16 UNC × 8" with lock washer.
   - On Steel Posts: Hex head bolt 5/8-16 UNC × 2 1/2" with lock washer.
   - Either with hex nut and washer, or eye nut and washer where shown in the plan.
NOTE
Hardware shall be stainless steel or galvanized in accordance with AASHTO M232.
NOTES

1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used for supplementing or substituting the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

2. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

LEGEND

- R = RAMP LANE WIDTH
- L = LANE WIDTH

SINGLE LANE ON- CONNECTION

RAMP CHANNELIZATION
SINGLE LANE

STANDARD PLAN M-1.20-01

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NOTES

1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used for supplementing or substituting the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

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LEGEND

R = RAMP LANE WIDTH
L = LANE WIDTH

Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used for supplementing or substituting the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.

The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.
MATCH LINE "A"

MATCH LINE "B"

WHERE SHOWN ON THE PLANS OR SPECIFIED IN THE SPECIAL PROVISIONS, RAISED PAVEMENT MARKERS SHALL BE USED FOR SUPPLEMENTING OR SUBSTITUTING THE PAINTED PAVEMENT MARKINGS SHOWN HEREON. SEE THE STANDARD PLANS FOR RPM SUPPLEMENT AND SUBSTITUTION PATTERNS.

THE CHANNELIZATION SHOWN ON THIS PLAN ASSUMES OPTIMAL GEOMETRIC DESIGN. THE DIMENSIONS MAY VARY TO FIT EXISTING CONDITIONS. SEE CONTRACT.

1. WHERE SHOWN ON THE PLANS OR SPECIFIED IN THE SPECIAL PROVISIONS, RAISED PAVEMENT MARKERS SHALL BE USED FOR SUPPLEMENTING OR SUBSTITUTING THE PAINTED PAVEMENT MARKINGS SHOWN HEREON. SEE THE STANDARD PLANS FOR RPM SUPPLEMENT AND SUBSTITUTION PATTERNS.

2. THE CHANNELIZATION SHOWN ON THIS PLAN ASSUMES OPTIMAL GEOMETRIC DESIGN. THE DIMENSIONS MAY VARY TO FIT EXISTING CONDITIONS. SEE CONTRACT.

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 for supplementing or substituting 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>
<thead>
<tr>
<th>POSTED MAINLINE SPEED</th>
<th>D</th>
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<tbody>
<tr>
<td>35 MPH</td>
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</tr>
<tr>
<td>40 MPH</td>
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<td>65 MPH</td>
<td>1200'</td>
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<td>1250'</td>
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</table>

RAMP CHANNELIZATION PARALLEL ON & WEAVING SECTION
STANDARD PLAN M-1.80-02

SEE TABLE
NOTES

1. Install a minimum of 3 sets of diagonals/chevrons in the gore area. A 50’ spacing is standard; however, for gore areas shorter than 150’ use a 25’ spacing, and for gore areas greater than 400’ a spacing of 100’ may be used.

2. The acute angle of the diagonals shall always point in the direction of mainline traffic.
NOTES

1. Install a minimum of 3 sets of diagonals/chevrons in the gore area. A 50’ spacing is standard; however, for gore areas shorter than 150’ use a 25’ spacing, and for gore areas greater than 400’ a spacing of 100’ may be used.

2. The acute angle of the diagonals shall always point in the direction of mainline traffic.
1. Install a minimum of 3 sets of diagonals/chevrons in the gore area. A 50' spacing is standard; however, for gore areas shorter than 150' use a 25' spacing, and for gore areas greater than 400' a spacing of 100' may be used.

2. The acute angle of the diagonals shall always point in the direction of mainline traffic.
LEFT TURN CHANNELIZATION

SYMMETRICAL WIDENING ABOUT CENTERLINE

OPTIONAL MARKED DECELERATION TAPER

DOUBLE CENTER LINE (YELLOW)
NARROW PATTERN

WIDE LANE LINE

LEFT TURN CHANNELIZATION

ASYMMETRICAL WIDENING LEFT OF CENTERLINE

LEFT TURN CHANNELIZATION

ASYMMETRICAL WIDENING RIGHT OF CENTERLINE

GENERAL NOTES

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

L = 12' Typical Lane Width. See Contract for specified lane widths.

LEGEND

Type 2L Traffic Arrow

POSTED SPEED | APPROACH TAPER A | DIMENSION B | APPROACH TAPER C | DIMENSION D
---|---|---|---|---
60 MPH | 360' | 60' | 720' | 120'
55 MPH | 330' | 55' | 660' | 110'
50 MPH | 300' | 50' | 600' | 100'
45 MPH | 270' | 45' | 540' | 90'
40 MPH | 240' | 40' | 480' | 80'
35 MPH | 210' | 35' | 420' | 70'
30 MPH | 180' | 30' | 360' | 60'
25 MPH | 150' | 25' | 300' | 50'
20 MPH | 120' | 20' | 240' | 40'

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**LEFT TURN CHANNELIZATION**

REDUCED TAPER LENGTHS—SYMMETRICAL WIDENING

*(FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)*

**LEFT TURN CHANNELIZATION**

REDUCED TAPER LENGTHS—ASYMMETRICAL WIDENING RIGHT OF CENTERLINE

*(FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)*

**LEFT TURN CHANNELIZATION**

REDUCED TAPER LENGTHS—ASYMMETRICAL WIDENING LEFT OF CENTERLINE

*(FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)*

**GENERAL NOTES**

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

L = 12' Typical Lane Width. See Contract for specified lane widths.

**LEGEND**

Type 2L Traffic Arrow

**POSTED SPEED**

<table>
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<tr>
<th>POSTED SPEED</th>
<th>APPROACH TAPER G</th>
<th>DIMENSION H</th>
<th>APPROACH TAPER J</th>
<th>DIMENSION K</th>
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<td>10'</td>
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<td>40'</td>
<td>7'</td>
<td>80'</td>
<td>13'</td>
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</tbody>
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**NOTE:**

This plan is not a legal engineering document but an electronic duplicate. The original, signed by the engineer and approved for publication, is kept on file at the Washington State Department of Transportation. A copy may be obtained upon request.

**STATE OF WASHINGTON**

**REGISTERED PROFESSIONAL ENGINEER**

25335 THEODORE J. TREPANIER

EXPIRES AUGUST 9, 2007

01-30-07 Ken L. Smith

APPROVED FOR PUBLICATION
### General Notes

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

L = 12' Typical Lane Width. See Contract for specified lane widths.

### Legend

- **Type 2L Traffic Arrow**

### Table

<table>
<thead>
<tr>
<th>Posted Speed</th>
<th>Approach Taper A</th>
<th>Dimension B</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 MPH</td>
<td>360'</td>
<td>120'</td>
</tr>
<tr>
<td>55 MPH</td>
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<tr>
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<td>50'</td>
</tr>
<tr>
<td>20 MPH</td>
<td>120'</td>
<td>40'</td>
</tr>
</tbody>
</table>

### Left Turn Channelization

**Tee Intersection**

- **Inside Radius of Left Turning Vehicle**
- **Stopping Point for Left Turn Lane**
- **Approach Taper "A"**
- **Approach Taper A**
- **Varies**
- **See Contract Plans**

### Dimensions

- Varies
- See Contract Plans

### Notes

- This dimension is based on a 12' turn lane width.

### Specs

- **White Edge Line**
- **Double Center Line (Yellow) (Narrow Pattern)**
- **Optional (See Contract)**
- **INSIDE RADIUS OF LEFT TURNING VEHICLE**
- **Approach Taper "A"**

---

**Approach Taper A**

- **Wide Lane Line**
- **Left Turn Channelization**
- **Back to Back Left Turn Lanes**
TWO-WAY LEFT TURN LANE TRANSITION

LEFT TURN CHANNELIZATION IN PAINTED MEDIAN

POSTED SPEED | DIMENSION E | TAPER F | DIMENSION B
-------------|-------------|---------|-------------
60 MPH       | 170'        | 360'    | 120'        
55 MPH       | 160'        | 330'    | 110'        
50 MPH       | 150'        | 300'    | 100'        
45 MPH       | 140'        | 270'    | 90'         
40 MPH       | 130'        | 240'    | 80'         
35 MPH       | 120'        | 210'    | 70'         
30 MPH       | 110'        | 180'    | 60'         
25 MPH       | 100'        | 150'    | 50'         
20 MPH       | 90'         | 120'    | 40'         

GENERAL NOTES

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

L = 12' Typical Lane Width.
See Contract for specified lane widths.

LEGEND

Type 2L Traffic Arrow

PAINTED OR PLASTIC MEDIAN
COMPOSED OF LONGITUDINAL MARKINGS

LEFT TURN CHANNELIZATION IN PAINTED MEDIAN

STOPPING POINT FOR LEFT TURN LANE

DOUBLE CENTER LINE (YELLOW) (NARROW PATTERN)

WHITE EDGE LINE

YELLOW WIDE LINE

YELLOW EDGE LINE

PAINTED OR PLASTIC MEDIAN – SEE DETAIL

DIRECTION OF TRAFFIC

45°

20' MIN.
40' MAX.

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DOUBLE LEFT TURN CHANNELIZATION
WITH RIGHT TURN POCKET

GENERAL 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 lane message "ONLY" may be added to the Traffic Arrow Type 2L locations shown, in which case, substitute the Arrow as per the LANE MESSAGE DETAIL.

<table>
<thead>
<tr>
<th>POSTED SPEED</th>
<th>APPROACH TAPER C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 MPH</td>
<td>720'</td>
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<td>55 MPH</td>
<td>660'</td>
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<td>60 MPH</td>
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<tr>
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<td>360'</td>
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<td>175'</td>
</tr>
<tr>
<td>20 MPH</td>
<td>240'</td>
<td>140'</td>
</tr>
</tbody>
</table>

LEGEND
- Type 2L Traffic Arrow
- Type 2R Traffic Arrow
- Type 1 Traffic Arrow

WHITE WIDE LINES
PAINTED OR PLASTIC TRAFFIC DIVIDER
COMPOSED OF LONGITUDINAL MARKINGS

WHITE DOTTED EXTENSION LINE
WHITE DOTTED EXTENSION LINE
WHITE EDGE LINE
DOUBLE CENTER LINE (YELLOW)
DOUBLE CENTER LINE (YELLOW)
DIRECTION OF TRAFFIC
WIDE LANE LINE
STOPPING POINT FOR LEFT TURN LANE
APPROACH TAPER C
APPROACH TAPER C
50'
RIGHT TURN CHANNELIZATION

1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

2. The lane message "ONLY" may be added to the Traffic Arrow Type 2R locations shown, in which case, substitute the Arrow as per the LANE MESSAGE DETAIL.

L = 12' Typical Lane Width. See Contract for specified lane widths.

LEGEND
- Type 2R Traffic Arrow
- Type 3L Traffic Arrow

GENERAL NOTES

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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' x 6' White Bike Lane Arrow
3. Bike Rider Symbol

GRID IS 1" SQUARE

TOTAL MARKING AREA 10.27 SQ.FT.
MARKING AREA 6.02 SQ.FT.
MARKING AREA 4.25 SQ.FT.

MARKING AREA 6.02 SQ.FT.
MARKING AREA 4.25 SQ.FT.
MARKING AREA 6.02 SQ.FT.

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GENERAL NOTE

See contract for location and material requirements.

KEY NOTES

1. Bid Item "Railroad Crossing Symbol" includes "X" symbol, letters, and two 24" white transverse lines.
2. 24" white transverse line
3. W10-1 Advance Warning Sign (not included in RR Crossing Symbol Bid Item)
4. Place Stop Line 15' from the nearest rail or approximately 8 feet from RR gate, if present.
1. See the Contract Plans for locations of crosswalk centerlines.
2. To the maximum extent possible, curb ramp centerline should be perpendicular to the crosswalk centerline.
3. To the maximum extent possible, crosswalks should be perpendicular to the centerline of the traveled way.
NOTES

1. Three, four and five accessible stall arrangements may be either 60° (angled) or 90° (perpendicular) parking arrangements. See Contract.

2. An Access Parking Space Symbol is required for each accessible parking stall. A blue background and white border are required when the symbol is installed on a cement concrete surface.

3. All accessible stalls shall have wheel stops. Place wheel stops in other stalls when specified in the contract. Wheel stops shall be approximately 6" high and a minimum of 6' long.

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 Center Line shall be 12" everywhere, except 4" for left turn channelization and narrow roadways with lane widths of 10 feet or less. Local Agencies (on non-State Routes) may specify a 4" distance for all locations.

4. The distance between the lines of the Double Lane Line shall be 4".

5. Wide Lane Line shall be white.

6. Wide Line shall be yellow or white as specified in the Plans.

7. Dotted Extension Line shall be the same color as the line it is extending.

8. 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.

9. The distance between the lines of the Double Center Line shall be 12" everywhere, except 4" for left turn channelization and narrow roadways with lane widths of 10 feet or less. Local Agencies (on non-State Routes) may specify a 4" distance for all locations.

10. The distance between the lines of the Double Lane Line shall be 4".

11. Wide Lane Line shall be white.

12. Wide Line shall be yellow or white as specified in the Plans.
GENERAL NOTE
See Standard Plan M-20.10 for pattern and color requirements.

PROFILED PLASTIC
(BROKEN LINE)
FOR:
CENTER LINE & LANE LINE – W = 4"
NO-PASS LINE & TWO-WAY LEFT-TURN CENTER LINE – W = 4"
REVERSIBLE LANE LINE – W = 4"
WIDE BROKEN LANE LINE – W = 8"

EMBOSSED PLASTIC
(SOLID OR BROKEN LINE)
FOR:
CENTER LINE & LANE LINE
NO-PASS LINE & TWO-WAY LEFT-TURN CENTER LINE
DOUBLE CENTER LINE & DOUBLE LANE LINE
EDGE LINE & SOLID LANE LINE

PROFILED PLASTIC
(SOLID LINE)
FOR:
NO-PASS LINE – W = 4"
TWO-WAY LEFT-TURN CENTER LINE – W = 4"
DOUBLE CENTER LINE & DOUBLE LANE LINE – W = 4"
EDGE LINE & SOLID LANE LINE – W = 4"
WIDE LANE LINE & WIDE LINE – W = 8"
DOUBLE WIDE LANE LINE – W = 8"
BARRIER CENTER LINE – W = 20"

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NOTES

1. Raised Pavement Markers Types 2YY and 2W shall be spaced at 80' intervals on tangents and on horizontal curves with a radius of 5000' or more, and at 40' intervals on horizontal curves having radii of less than 5000'. Center the RPM's in the gaps between the pavement marking lines.

2. Type 2Y RPM's, when specified, shall be placed outside the left edge line at 80' intervals. See "LEFT EDGE OF LANE PLACEMENT DETAIL".

3. Recessed pavement markers, when specified, shall be installed at the locations shown for Type 2W RPM's on multilane one-way roadways, and Type 2YY RPM's on two lane two-way roadways.

4. The Type 2W RPM's placed on multilane one-way roadways and all RPM's set in recesses shall have an abrasion resistant coating.

LONGITUDINAL MARKING
SUPPLEMENT WITH RAISED PAVEMENT MARKERS

STANDARD PLAN M-20.30-01

SECTION A

RECESSED PAVEMENT MARKER DETAILS
FOR USE WHERE SPECIFIED IN CONTRACT
NOTES

1. Raised pavement markers shall be installed only when specified in the Contract Plans.

2. See the Standard Plans for marker designation.

3. The portion labeled "OPTIONAL" is only used when the Optional Marked Deceleration Taper (see Standard Plans M-3.10 and M-3.20) is specified in the contract plans.

Raised pavement markers shall be installed only when specified in the Contract Plans. See the Standard Plans for marker designation. The portion labeled "OPTIONAL" is only used when the Optional Marked Deceleration Taper (see Standard Plans M-3.10 and M-3.20) is specified in the contract plans.
1. The NO PASS LINE (when required) is applied parallel to the CENTER LINE, 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 Traffic Arrow being placed on roadways with a posted speed limit of 45 mph or higher.
Use the dimensions shown on this plan for each type Traffic Arrow being placed on roadways with a posted speed limit of 40 mph or lower.
AERIAL SURVEILLANCE MARKERS

HALF MARKER
(1/2 MILE INTERVAL)

FULL MARKER
(1 MILE INTERVAL)

MARKING AREA = 0.98 SQ.FT.
CROSS CULVERT

MARKING AREA = 1.06 SQ.FT.
DRAINAGE STRUCTURE INLET

MARKING AREA = 6.00 SQ.FT.
PAVED SHOULDER

MARKING AREA = 11.73 SQ.FT.
PAVED SHOULDER

STOP LINE

1' - 0" - UNLESS NOTED:
1' - 0" - UNLESS NOTED
OTHERWISE IN CONTRACT

LENGTH VARIES - SEE CONTRACT

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1. When guardrail runs concurrent, the contractor shall either:
   A. Drive the flexible guide post in line with the guardrail posts, or
   B. Mount the shorter flexible guide post onto the guardrail post.

2. Guide posts shall be fastened to the guardrail posts using two 2" × 3/8" lag screws with washers, along centerline of post. Also acceptable is any approved method submitted by the guide post manufacturer.

3. When concrete barrier runs concurrent, the contractor shall mount barrier delineators where guideposts are required.

BARRIER DELINEATOR NOTES

1. Spacing of Barrier Delineators shall be as shown in the plans.

2. 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.

3. 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.

4. The reflective surface shall be rectangular or trapezoidal.

5. Reflective Sheeting: 12 square inches minimum surface area; Type III, IV, V, or VI, selected from approved materials listed in the Qualified Products List.

6. 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:

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<th>Entrance Angle</th>
<th>Specific Intensity (cd/ft-c)</th>
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<td>128</td>
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<tr>
<td>0.1°</td>
<td>20°</td>
<td>50</td>
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   Yellow

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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 $R \geq 75'$.

7. Two equal spaces.

8. Locate the initial Guide Post so that it does not hinder the visibility of the Bridge Delineator for approaching traffic. The distance between the bridge end and the initial Guide Post shall be 50 feet maximum.

NOTE

THREE EQUAL SPACES
WHEN R < 75'

FOUR EQUAL SPACES WHEN R ≥ 75'

100' DECELERATION TAPER

100' (TYP.)

DIVIDED HIGHWAY

REFLECTIVE SHEETING APPLICATIONS

<table>
<thead>
<tr>
<th>TYPE</th>
<th>facing traffic</th>
<th>back side</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>3' 3'</td>
<td>3' 3'</td>
</tr>
<tr>
<td>G2</td>
<td>4' 4'</td>
<td>4' 4'</td>
</tr>
</tbody>
</table>

LEGEND

- TYPE W
- TYPE WW
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10
GUIDE POST SPACING
(Feet)

<table>
<thead>
<tr>
<th>RADIUS</th>
<th>S</th>
</tr>
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<tbody>
<tr>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>115</td>
<td>25</td>
</tr>
<tr>
<td>150</td>
<td>30</td>
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<tr>
<td>200</td>
<td>36</td>
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<tr>
<td>250</td>
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<td>300</td>
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<td>400</td>
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<tr>
<td>500</td>
<td>70</td>
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<td>75</td>
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<tr>
<td>700</td>
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<td>800</td>
<td>85</td>
</tr>
<tr>
<td>900</td>
<td>90</td>
</tr>
<tr>
<td>1,000</td>
<td>100</td>
</tr>
<tr>
<td>1,200</td>
<td>100</td>
</tr>
<tr>
<td>1,700</td>
<td>120</td>
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<tr>
<td>2,300</td>
<td>140</td>
</tr>
<tr>
<td>2,900</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>R&gt;10,000</td>
<td>300</td>
</tr>
</tbody>
</table>

Interpolate from the table for radii not shown.

TWO-WAY UNDIVIDED HIGHWAYS
GUIDE POSTS ON OUTSIDE OF CURVE IN DIRECTION OF TRAVEL

NOTE 1
NOTE 2
NOTE 3

GUIDE POST PLACEMENT
HORIZONTAL CURVES
STANDARD PLAN M-40.40-00

NOTE 1
NOTE 2
NOTE 3

MULTI-LANE DIVIDED HIGHWAYS
GUIDE POSTS ON INSIDE AND OUTSIDE OF CURVE FOR EACH DIRECTION OF TRAVEL

NOTE 1
NOTE 2
NOTE 3

LEGEND

- TYPE W
- TYPE WW
- TYPE Y

SEE TYPE DEFINITIONS, STD. PLAN M-40.10

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.

SEE TYPE DEFINITIONS, STD. PLAN M-40.10
NOTES

1. Locate the initial Guide Post so that it does not hinder the visibility of the Bridge Delineator for approaching traffic. The distance between the bridge end and the initial Guide Post shall be 50 feet max.

2. Locate the initial Guide Post so that its visibility is unhindered for traffic departing the bridge. The distance between the bridge end and the initial Guide Post shall be 50 feet max.

SHOULDER RUMBLE STRIP
TYPE 1
FOR DIVIDED HIGHWAYS
STANDARD PLAN M-60.10-00

TYPICAL SHOULDER INSTALLATION

ISOMETRIC VIEW

SECTION A

SECTION B

PERSPECTIVE VIEW

MULTI-LANE DIVIDED HIGHWAY
SHOULDER RUMBLE STRIP
ON LEFT SHOULDER

WIDE LANE LINE

END RUMBLE STRIP ON RIGHT
SHOULDER AT BEGINNING OF
DECELERATION TAPER

BEGIN RUMBLE STRIP ON
RIGHT SHOULDER AT END
OF WIDE LANE LINE

TWO LANE OFF- CONNECTION

SHOULDER RUMBLE STRIP
ON LEFT SHOULDER

WIDE LANE LINE

END RUMBLE STRIP ON RIGHT
SHOULDER AT BEGINNING OF
DECELERATION TAPER

BEGIN RUMBLE STRIP ON
RIGHT SHOULDER AT END
OF WIDE LANE LINE

SINGLE LANE OFF- CONNECTION

SHOULDER RUMBLE STRIP
ON LEFT SHOULDER

WIDE LANE LINE

END RUMBLE STRIP ON RIGHT
SHOULDER AT BEGINNING OF
DECELERATION TAPER

BEGIN RUMBLE STRIP ON
RIGHT SHOULDER AT END
OF WIDE LANE LINE

SINGLE LANE OFF- CONNECTION
FOR ONE LANE REDUCTION

OFF RAMP
SHOULDER RUMBLE STRIP
ON LEFT SHOULDER

BEGIN RUMBLE STRIP ON
RIGHT SHOULDER AT END
OF ACCELERATION TAPER

END RUMBLE STRIP ON
RIGHT SHOULDER ADJACENT
TO BEGINNING OF ON RAMP
WIDE LANE LINE

SINGLE LANE ON- CONNECTION

4' MIN. ~
5' MIN. WITH BARRIER
OR GUARDRAIL AT
EDGE OF SHOULDER

450'

600'

450'

600'

450'

600'

BEGIN RUMBLE STRIP ON
OUTSIDE SHOULDER

SHOULDER RUMBLE STRIPS
ON MEDIAN SHOULDERS

STRUCTURE OR OTHER FEATURE NECESSITATING
A REDUCTION IN SHOULDER WIDTH

MEDIAN CROSSOVER

SHOULDER RUMBLE STRIP
ON OUTSIDE SHOULDER

SHOULDER RUMBLE STRIP
ON LEFT SHOULDER

SHOULDER RUMBLE STRIP
ON OUTSIDE SHOULDER

SHOULDER RUMBLE STRIP
ON MEDIAN SHOULDERS

SHOULDER TAPER DETAIL

(RUMBLE STRIPS SHALL NOT BE PLACED
ON BRIDGE APPROACH SLABS)

4' MIN. ~
5' MIN. WITH BARRIER
OR GUARDRAIL AT
EDGE OF SHOULDER

100' MIN.

60' MIN.

OUTSIDE SHOULDER

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PORTATION. A COPY MAY BE OBTAINED UPON REQUEST.
RUMBLE STRIP PLACEMENT AT INTERSECTIONS

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 ACCELERATION TAPER.

40' MIN.

RADIUS POINT OF RIGHT TURN RADIUS (TYP.)

TERMINATE THE SHOULDER RUMBLE STRIPS AT THE BEGINNING OF THE DECELERATION TAPER.
NOTE
Rumble strips are not installed in certain reduced-width shoulder locations. See the SHOULDER TAPER DETAIL on Standard Plan M-60.10.
SHOULDER RUMBLE STRIP TYPES 2, 3, & 4
FOR UNDIVIDED HIGHWAYS
STANDARD PLAN M-60.20-00

EDGE OF PAVED SHOULDER - EPS
EDGE LINE
SHOULDER RUMBLE STRIPS
EDGE LINE
EPS

TYPE 2 - 12" GAP AND 12" WIDE STRIP
TYPE 3 - 16" GAP AND 16" WIDE STRIP

48' RUMBLE STRIP LENGTH
12 OR 16' GAP
48' RUMBLE STRIP LENGTH

RUMBLE STRIP PLACEMENT AT INTERSECTIONS

TERMINATE SHOULDER RUMBLE STRIPS AT THE BEGINNING OR END OF EACH RIGHT TURN TAPER.

RADIUS POINT OF RIGHT TURN RADIUS (TYP.)
40' MIN.

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NOTES

1. Center Line Rumble Strip installation requires a minimum distance of 12 feet from Center Line to edge of paved shoulder.

2. When directed by the Engineer, Rumble Strips may be installed along the turn pocket taper where there is a history of rear-end collisions in the turn pocket.
INTERSECTION WITH LEFT TURN CHANNELIZATION

- Terminate at end of left turn channelization striping.
- Install rumble strip.
- Rumble strip optional — see Note 2.

- Recessed pavement marker when specified in contract.
- Longitudinal marking (Typ.)
  - Omit center line rumble strips in this area.

- Rumble strip (Typ.)
- Refer to standard plan M-20.30 for recessed pavement marker detail.
- Markers when specified in contract.

- Bridge approach slab.
- Bridge.
- Longitudinal marking (Typ.)

- Non-commercial road approaches and driveways.
- Unchannelized intersections and commercial road approaches.

- Rumble strip usage as directed by engineer.
- Terminating rumble strip at beginning and end of approach or intersection.
- Radius point (Typ.).

- Washington State Department of Transportation.