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# Standard Plans

## For Road, Bridge, and Municipal Construction

M 21-01



Washington State Department of Transportation




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# Foreword

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

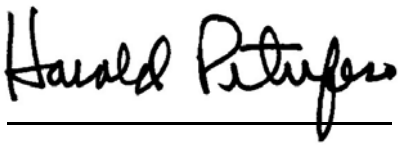
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**State Design Engineer**



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| G-8f | Steel Sign Support, Types ST-1 ~ ST-4, Installation Details | 11/9/05 | |
| G-8g | Steel Sign Support, Types SB-1 & SB-2, Installation Details | 11/9/05 | *2 Sheets* |
| G-9a | Overhead Sign Mounting Details | 6/25/02 | *4 Sheets* |




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| Plan No. | Plan Title | Publication Approval Date | |
|---|---|---|---|
| G-9b | Sign Installation on Signal and Light Standards | 6/8/06 | *2 Sheets* |
| G-9c | Barrier Mounted Sign Support | 11/23/04 | |
| G-9d | Sign Bracing | 6/8/06 | *2 Sheets* |
| **Section H** | **Delineators and Miscellaneous Construction** | | |
| H-1 | Guide Posts | 1/10/02 | |
| H-1a | Guide Post Placement Grade Intersection | 4/14/00 | |
| H-1b | Guide Post Placement for Interchanges | 6/21/06 | |
| H-1c | Guide Post Placement for Horizontal Curves | 3/4/05 | |
| H-1d | Miscellaneous Guide Post Placement | 6/21/06 | |
| H-1e | Guide Post Placement for Bridges | 6/21/06 | |
| H-2 | Type 3 Barricade | 3/4/05 | *2 Sheets* |
| H-4 | Shoulder Rumble Strip Type 1 for Divided Highways | 8/18/04 | *4 Sheets* |
| H-4a | Shoulder Rumble Strip, Types 2, 3 and 4 for Undivided Highways | 2/25/05 | *2 Sheets* |
| H-4b | Center Line Rumble Strip | 2/25/05 | *2 Sheets* |
| H-6 | Survey Monuments Type 1 and Type 2 | 10/29/03 | |
| H-7 | Monument Case and Cover | 8/10/98 | |
| H-8 | Slope Treatment | 9/18/98 | |
| H-9 | Embankment at Bridge Ends | 4/18/97 | |
| H-10 | Cement Concrete Stairway Construction Details | 5/29/98 | |
| H-12 | Mailbox Support Type 1 | 2/25/05 | *2 Sheets* |
| H-12a | Mailbox Support Type 2 | 2/25/05 | *2 Sheets* |
| H-12b | Mailbox Support Type 3 | 2/25/05 | *2 Sheets* |
| H-13 | Bollard Type 1 | 2/25/05 | |
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| H-14 | Survey Stakes | 2/9/05 | *2 Sheets* |
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| I-2 | Crest Gage | 4/23/99 | |
| I-3 | Automated Ground Water Monitoring Well | 8/20/99 | |
| I-4 | Silt Fence | 7/17/03 | |
| I-5 | Erosion Control At Culvert Ends | 7/17/03 | |
| I-6 | Temporary Silt Fence for Inlet Protection In Unpaved Areas | 7/17/03 | |
| I-7 | Storm Drain Inlet Protection | 7/17/03 | |
| I-8 | Wattle Installation On Slope | 7/17/03 | |
| I-9 | Straw Bale Barrier | 7/17/03 | |
| I-10 | Geotextile Encased Check Dam Installation | 7/17/03 | |
| I-11 | Check Dams | 9/11/03 | |
| I-12 | Erosion Control Blanket Placement On Slope | 7/17/03 | |
| I-13 | Erosion Control Blanket Placement In Channel | 7/17/03 | |
| I-14 | Miscellaneous Erosion Control Details | 7/17/03 | |
| I-15 | High Visibility Construction Fencing | 7/13/05 | |
| **Section J** | **Illumination and Signals** | | |
| J-1b | Steel Light Standard Base Details | 10/8/99 | *3 Sheets* |
| J-1c | Slip Base Adaptor for 4-Bolt Light Standard Base | 4/24/98 | |
| J-1d | Steel Light Standard, Barrier Mounted Base | 1/11/06 | |
| J-1e | Light Standard Wiring Details | 1/11/06 | |




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| J-3b | Service Cabinet Type B Modified (0 - 200 Amp Type, 120/240 Single Phase) | 3/4/05 | *2 Sheets* |
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| J-5 | Pedestrian Pushbutton Details | 8/1/97 | |
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| J-16a | Junction Box, Traffic Barrier Mounted | 3/4/05 | |
| J-16b | Conduit Installation in Retaining Wall Traffic Barrier | 9/2/05 | |
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| | | | |
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| K-2 | Road Closure With Off Site Detour | 12/20/02 | |
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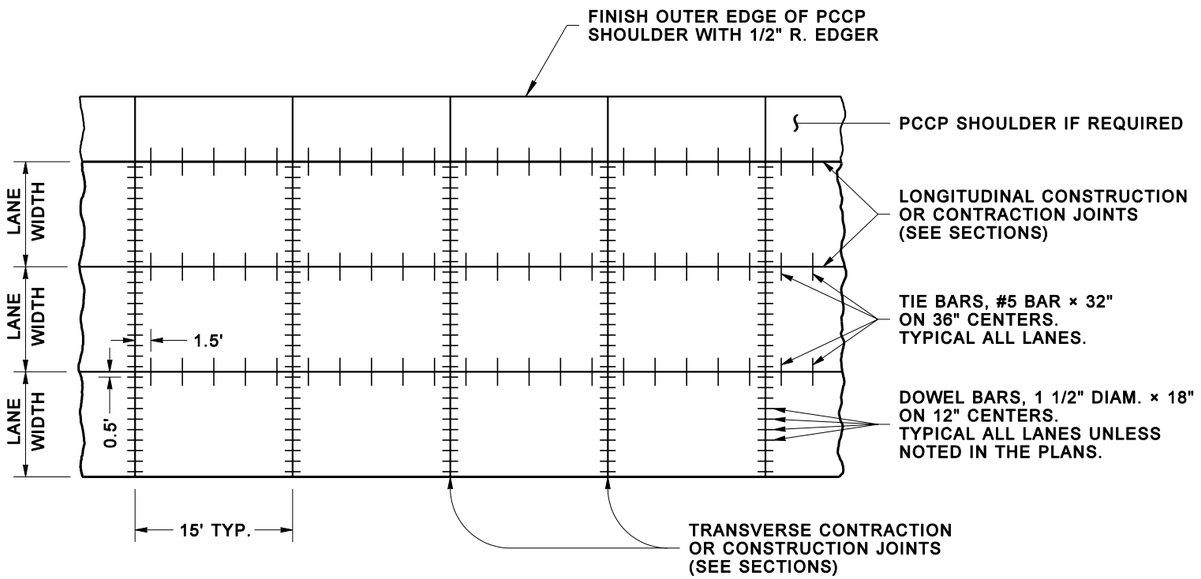
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| Plan No. | Plan Title | Publication Approval Date | |
|---|---|---|---|
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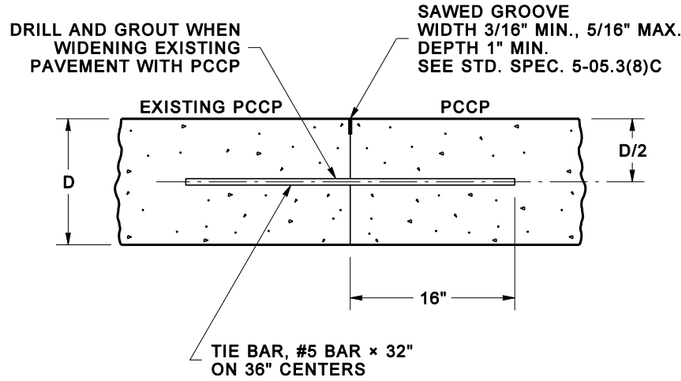



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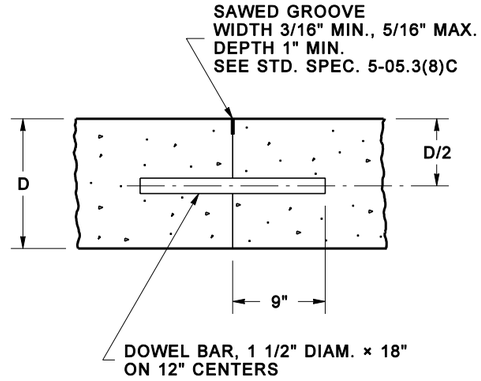
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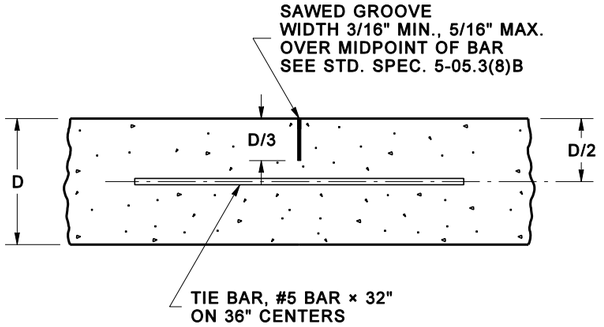

**CEMENT CONCRETE PAVEMENT JOINTS**
**PLAN VIEW**



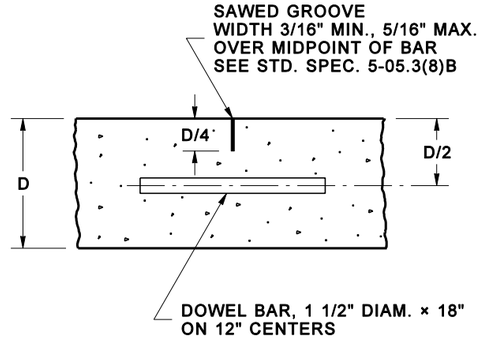

**PCCP TO PCCP**
**LONGITUDINAL CONSTRUCTION JOINT**
**SECTION VIEW**



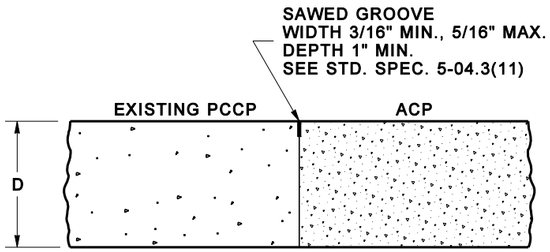

**TRANSVERSE CONSTRUCTION JOINT**
**SECTION VIEW**




**LONGITUDINAL CONTRACTION JOINT**
**SECTION VIEW**




**TRANSVERSE CONTRACTION JOINT**
**SECTION VIEW**




**PCCP TO ACP**
**LONGITUDINAL JOINT**
**SECTION VIEW**

KEVIN J. DAYTON
STATE OF WASHINGTON
24035
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 27, 2003

# CEMENT CONCRETE PAVEMENT JOINTS

# STANDARD PLAN A-1

*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.*

| DATE | REVISION | BY |
|---|---|---|
| 01/2002 | DELETED PLAIN JOINT LAYOUT PLAN; DELETED CURB/BARRIER JOINT SECTION; REVISED CONSTRUCTION JOINT GROOVE DEPTHS | MAS |

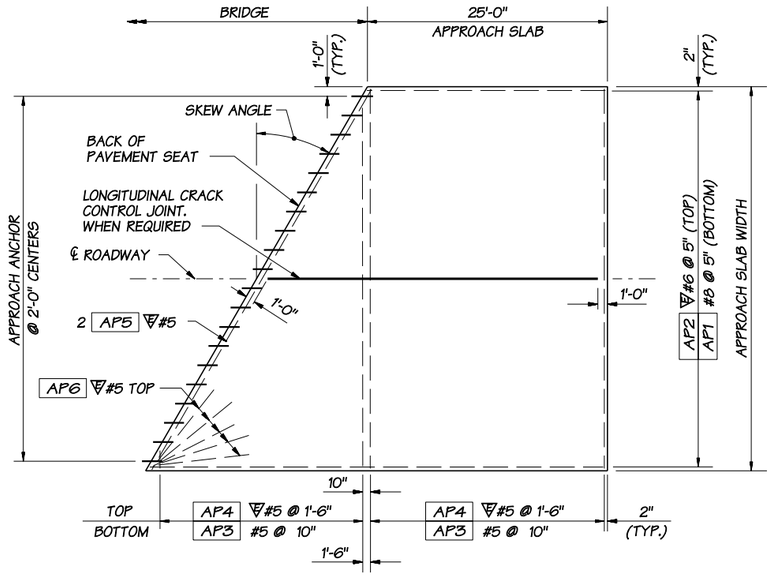
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*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-13-02* — DATE

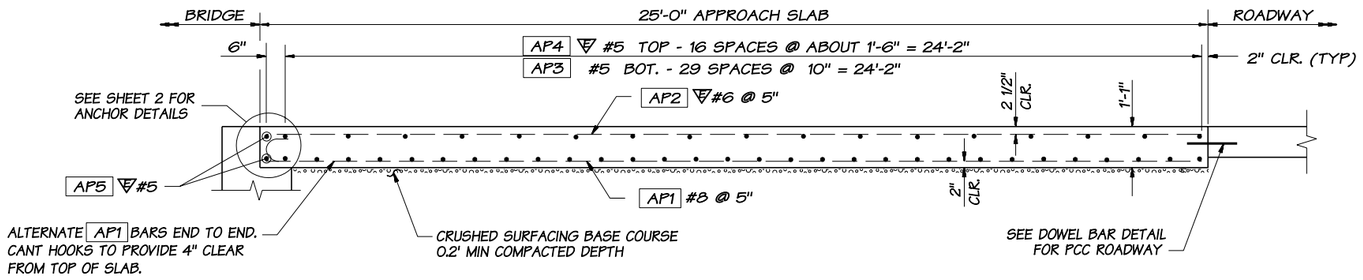
Washington State Department of Transportation

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PLAN




LONGITUDINAL SECTION

| BAR LIST FOR STANDARD 10' X 25' APP. SLAB QUANTITY MODULE | | | | |
|---|---|---|---|---|
| LOCATION | MARK # | SIZE | NO. | LENGTH |
| LONGITUDINAL BOTTOM | AP1 | 8 | 24 | 25'-7" |
| LONGITUDINAL TOP | AP2 | ∇6 | 24 | 24'-8" |
| TRANSVERSE BOTTOM | AP3 | 5 | 30 | 9'-8" |
| TRANSVERSE TOP | AP4 | ∇5 | 17 | 9'-8" |
| TRANSVERSE END BAR | AP5 | ∇5 | 2 | 9'-8" |

AP1 — 24' - 8"

BENDING DETAIL FOR QUANTITIES

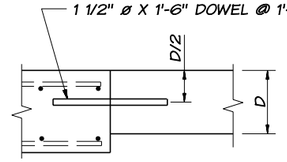
ALL REINFORCING BARS SHOWN ON THIS SHEET SHALL BE AASHTO M-31 UNLESS NOTED OTHERWISE.

∇ = EPOXY COATED REINFORCING STEEL

| APPROXIMATE QUANTITIES (PER SY) FOR SLAB (BASED ON QUANTITY MODULE) | |
|---|---|
| SLAB EPOXY COATED REINFORCING BARS (TOP MAT) | 38.52 LBS/SY |
| SLAB REINFORCING BARS (BOTTOM MAT) | 72.38 LBS/SY |
| CONCRETE (CU. YDS.) | 0.361 CY/SY |
| APPROACH ANCHORS AND PCC ROADWAY DOWELS | AS REQUIRED |
| 10 - AP6 ∇#5 (IF REQUIRED) | 105 LBS. |

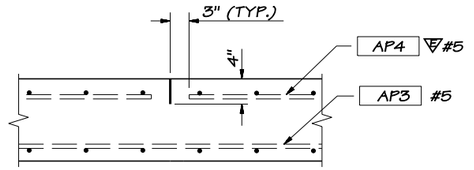
NOTES:

1. ALL EDGES OF APPROACH SLAB SHALL HAVE 1/2" RADIUS.
2. LONGITUDINAL JOINTS SHALL BE PLACED ON LANE LINES AND SHALL BE CONSTRUCTED AND SEALED IN ACCORDANCE WITH STD. SPEC. SECTION 5-05.3(8). JOINTS MAY BE EITHER A SAW CUT 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.

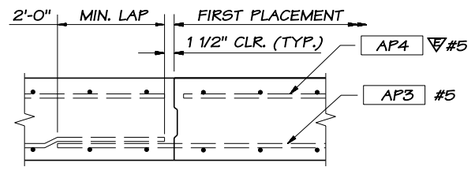



TYPICAL PCC ROADWAY DOWEL BAR DETAIL

INSERT DOWELS PARALLEL TO CENTER LINE ALONG TRANSVERSE CONSTRUCTION JOINT.




TYPICAL LONGITUDINAL CRACK CONTROL JOINT DETAIL




TYPICAL LONGITUDINAL CONSTRUCTION JOINT

EDGE FIRST POUR ONLY WITH 1/8" RADIUS.

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2002

# BRIDGE APPROACH SLAB

# STANDARD PLAN A-2

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

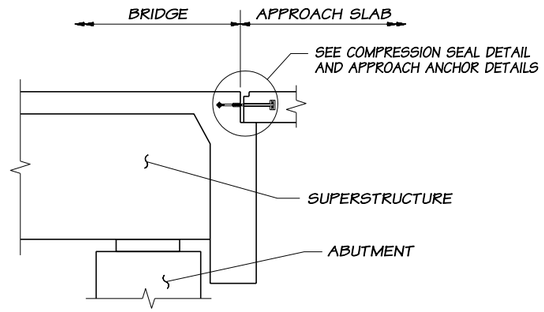
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-09-02* DATE

Washington State Department of Transportation

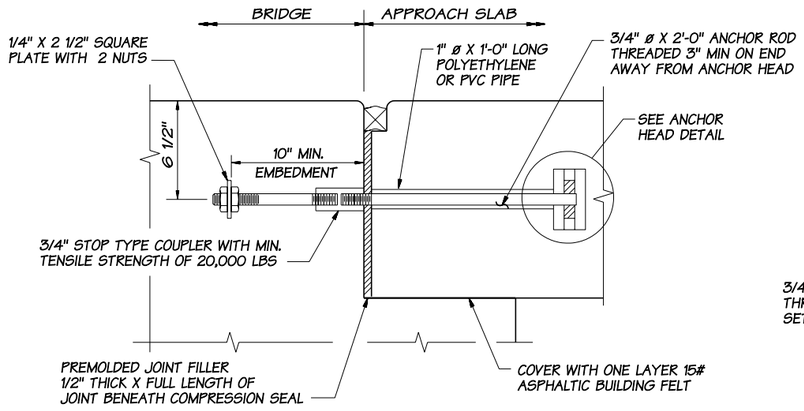
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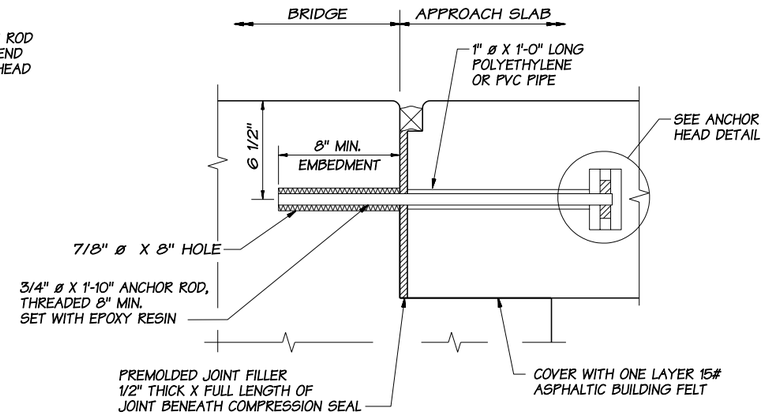



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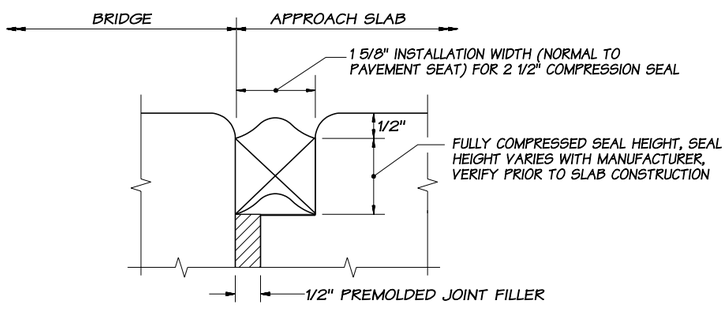

## APPROACH ANCHOR - METHOD A

SEMI-INTEGRAL TYPE ONLY

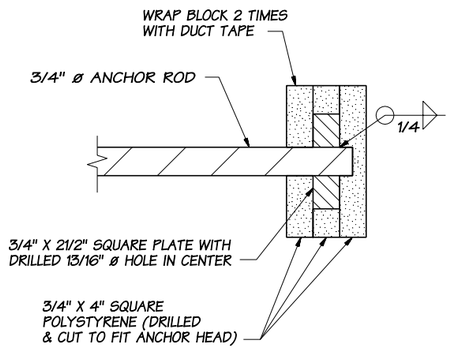



## APPROACH ANCHOR - METHOD B

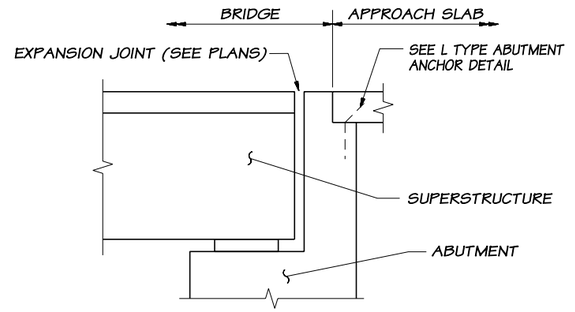
SEMI-INTEGRAL TYPE ONLY



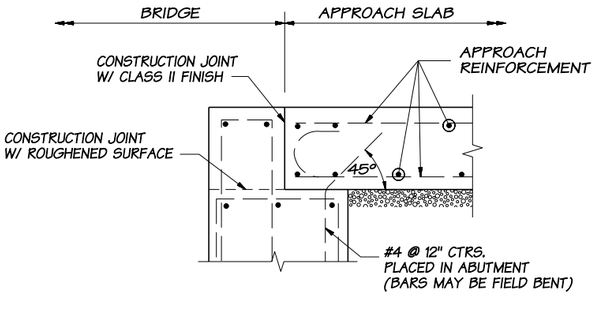

## COMPRESSION SEAL DETAIL




## ANCHOR HEAD DETAIL




## L TYPE ABUTMENT




## L TYPE ABUTMENT ANCHOR DETAIL

NOTE:

PAINT METAL COMPONENTS OF APPROACH ANCHOR WITH ONE COAT OF FORMULA A-11-99. PAINT IN ACCORDANCE WITH STD. SPEC. 9-08.2.

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2002

# BRIDGE APPROACH SLAB

# STANDARD PLAN A-2

SHEET 2 OF 2 SHEETS

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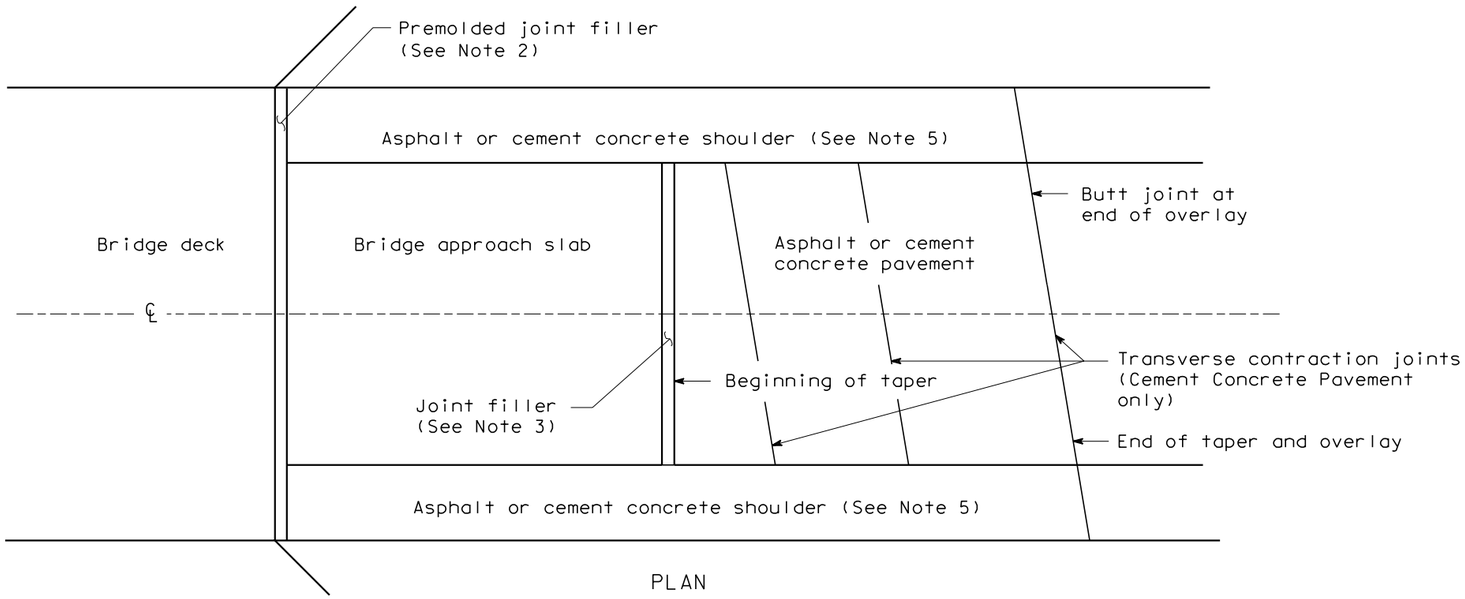
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-09-02* — DATE

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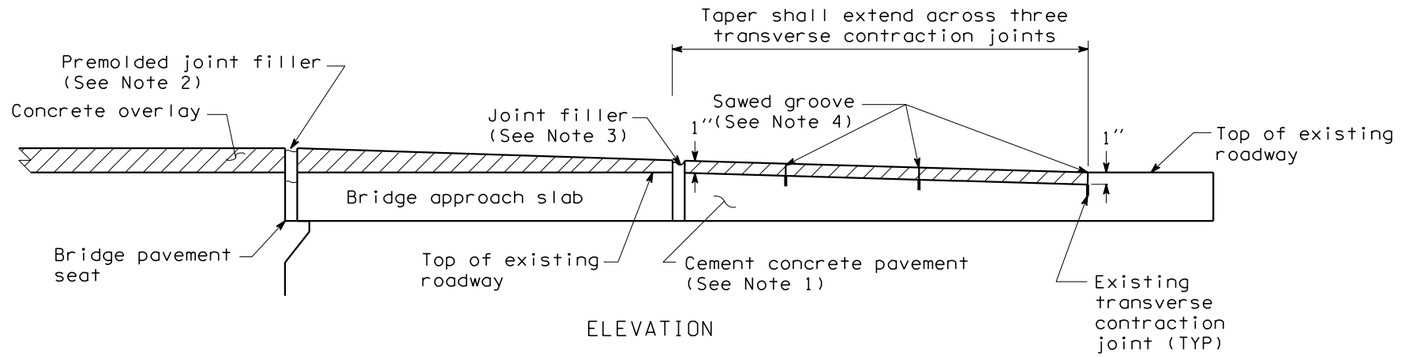
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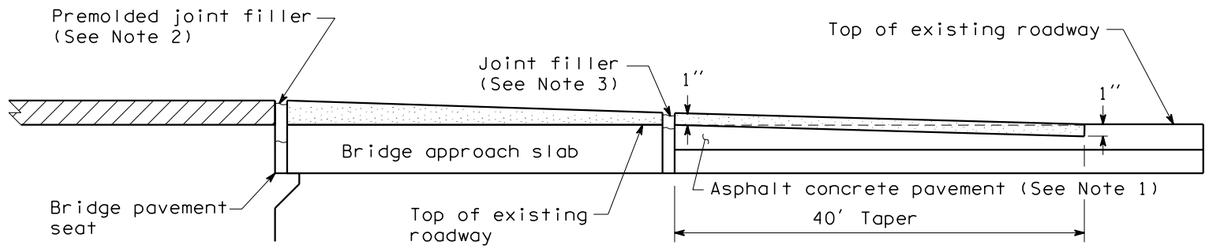

PLAN




ELEVATION

CASE 1

CEMENT CONCRETE PAVEMENT WITH ASPHALT
OR CEMENT CONCRETE SHOULDER




CASE 2

ASPHALT CONCRETE PAVEMENT
(Diaphragm cast on structure)

KEVIN J. DAYTON
STATE OF WASHINGTON
24035
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 27, 2003

# TRANSITION FROM CONCRETE OVERLAY

## STANDARD PLAN A-3

SHEET 1 OF 2 SHEETS

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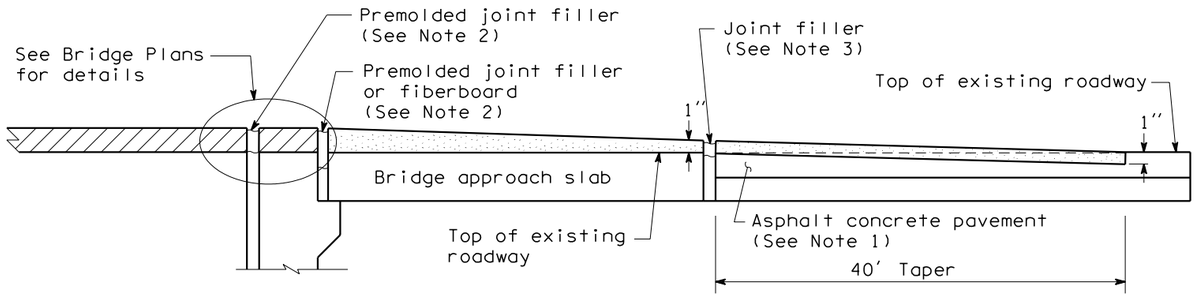
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-30-02* — DATE

Washington State Department of Transportation

| DATE | REVISION | BY |
|---|---|---|
| 05/2002 | CORRECTED TAPER LENGTH FROM 40″ TO 40′. | RG |

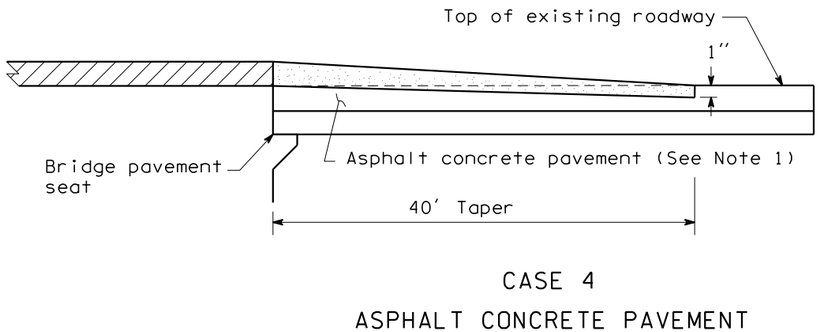
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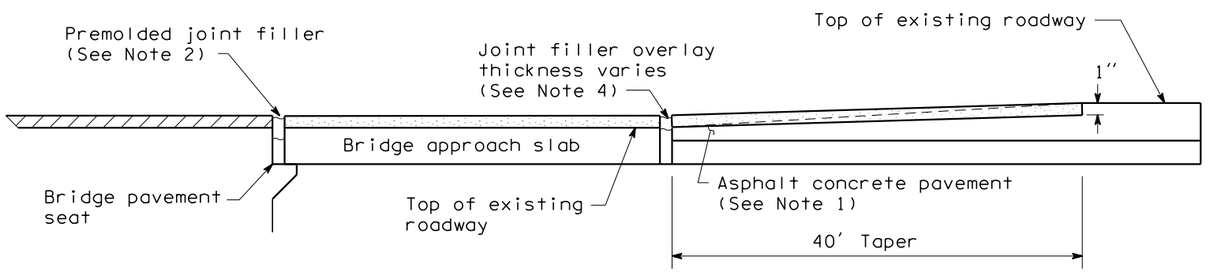

CASE 3

ASPHALT CONCRETE PAVEMENT
(L-Type Abutment)




CASE 4

ASPHALT CONCRETE PAVEMENT




CASE 5

ASPHALT CONCRETE PAVEMENT
(ACP was on bridge and/or roadway
grade slopes up from bridge)

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

NOTES

1. Plane a taper into the existing pavement and shoulders (if paved). Depth shall taper from 0'' at the beginning of pavement, to 1'' at end of taper. Does not apply when exisitng pavement has been planed.

2. Before placing overlay, remove top 2'' of existing joint filler, or 3'' if existing joint is fiberboard, and block out the joint. After overlay, install new premolded joint filler. Top of joint filler shall be between 3/16'' and 3/8'' below overlay. When a compression seal is in place, see Bridge Plans.

3. Before placing overlay, block out the joint. After overlay, install premolded joint filler or rubberized asphalt filler. Top of joint filler shall be between 3/16'' and 3/8'' below overlay.

4. Full depth sawed grooves between 1/8'' and 1/4'' wide shall be placed directly over the existing sawed grooves in the cement concrete pavement and cement concrete shoulders.

5. Cement concrete shoulders shall be overlaid with cement concrete. Asphalt concrete shoulders shall be overlaid with asphalt concrete.

LEGEND

Concrete Overlay

Asphalt Concrete Overlay

KEVIN J. DAYTON
STATE OF WASHINGTON
24035
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 27, 2003

# TRANSITION FROM CONCRETE OVERLAY

## STANDARD PLAN A-3

SHEET 2 OF 2 SHEETS

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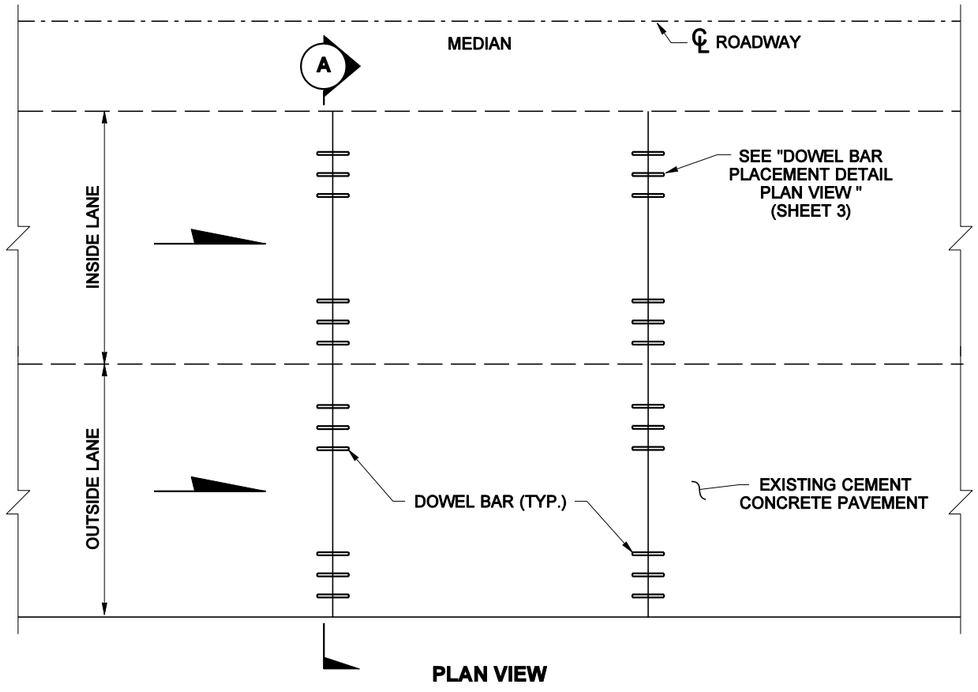
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-30-02* — DATE

Washington State Department of Transportation

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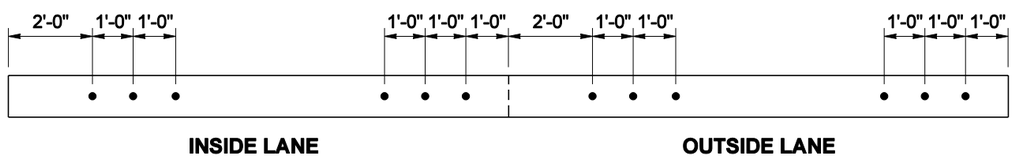
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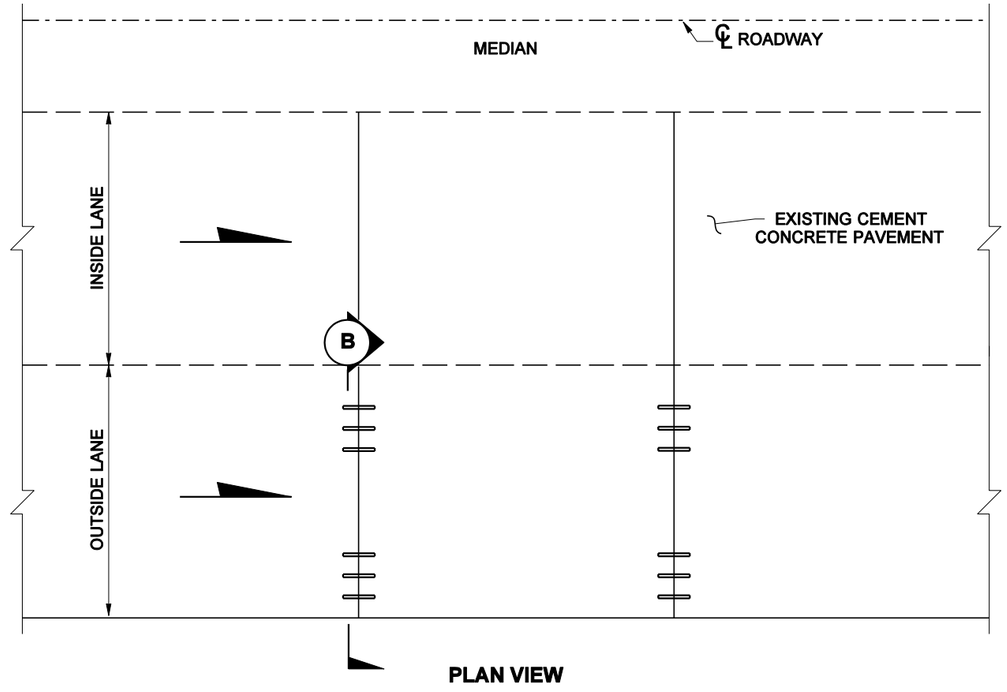



PLAN VIEW

**DIVIDED HIGHWAY (ONE WAY TRAFFIC) DOWEL BAR RETROFIT FOR TWO LANES**

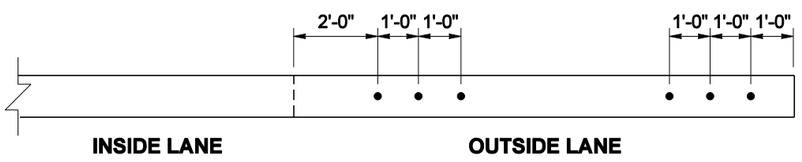



SECTION (A)




PLAN VIEW

**DIVIDED HIGHWAY (ONE WAY TRAFFIC) DOWEL BAR RETROFIT FOR ONE LANE**




SECTION (B)




EXPIRES JULY 27, 2003

# DOWEL BAR RETROFIT FOR CEMENT CONCRETE PAVEMENT

## STANDARD PLAN A-5

SHEET 1 OF 3 SHEETS

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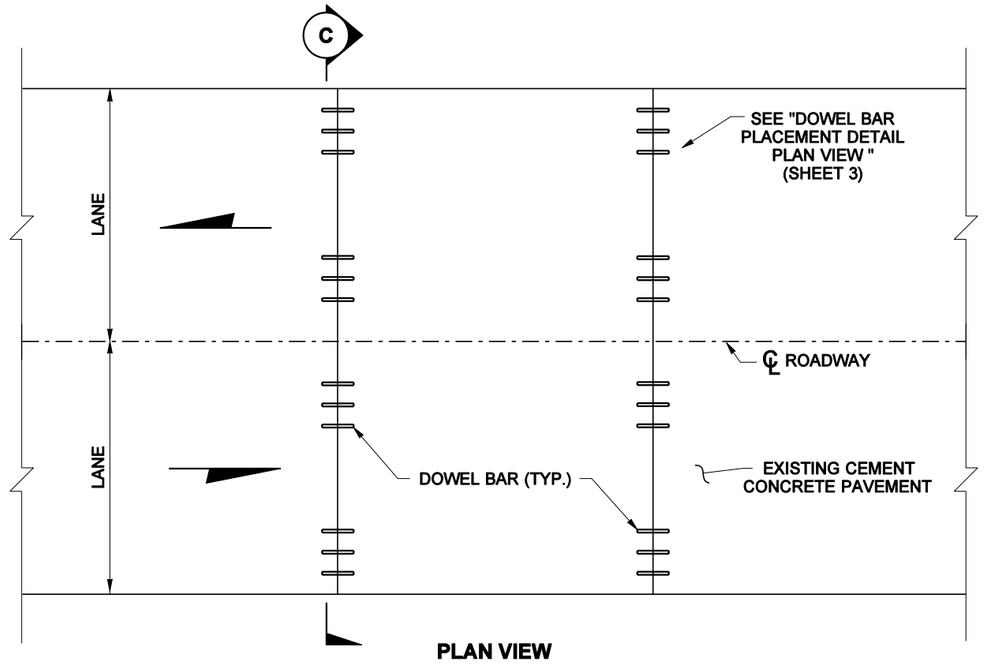
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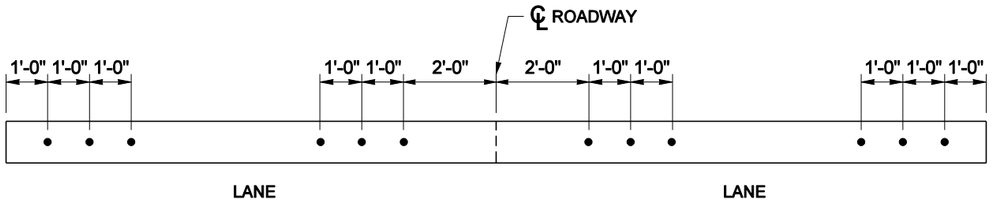
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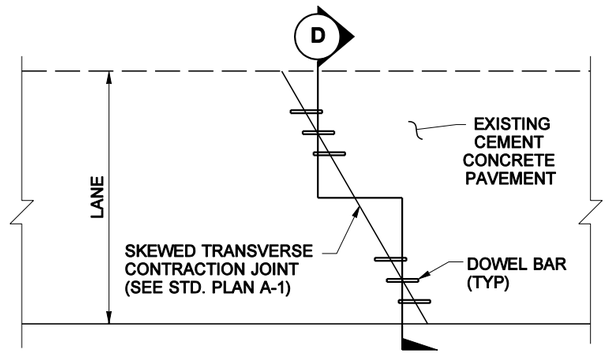



PLAN VIEW

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




SECTION C




PLAN VIEW

**SKEWED JOINT DETAIL**




SECTION D

KEVIN J. DAYTON
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24035
REGISTERED
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EXPIRES JULY 27, 2003

# DOWEL BAR RETROFIT FOR CEMENT CONCRETE PAVEMENT

## STANDARD PLAN A-5

SHEET 2 OF 3 SHEETS

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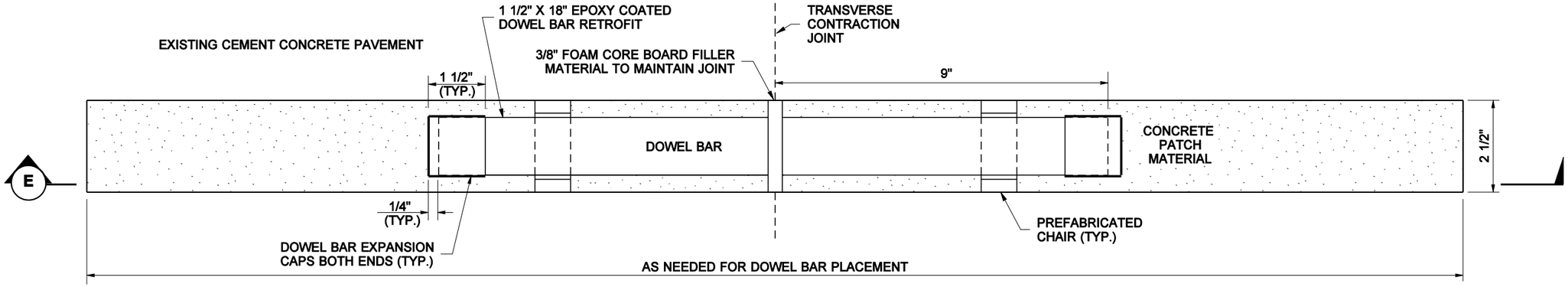
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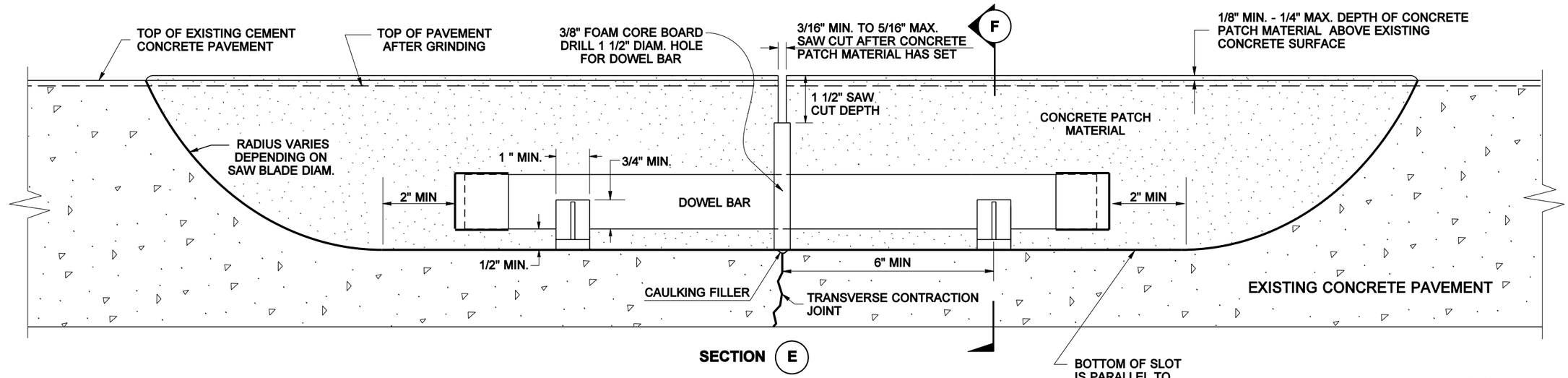
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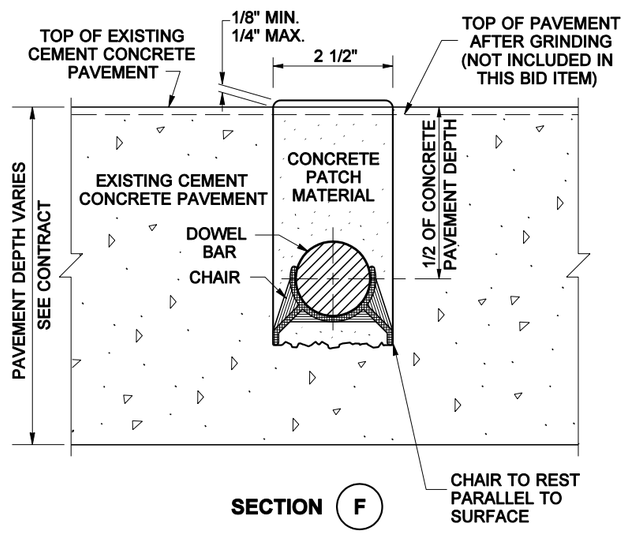



**PLAN VIEW**

## DOWEL BAR PLACEMENT DETAIL




**SECTION (E)**




**SECTION (F)**

KEVIN J. DAYTON
STATE OF WASHINGTON
24035
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 27, 2003

# DOWEL BAR RETROFIT FOR CEMENT CONCRETE PAVEMENT

## STANDARD PLAN A-5

SHEET 3 OF 3 SHEETS

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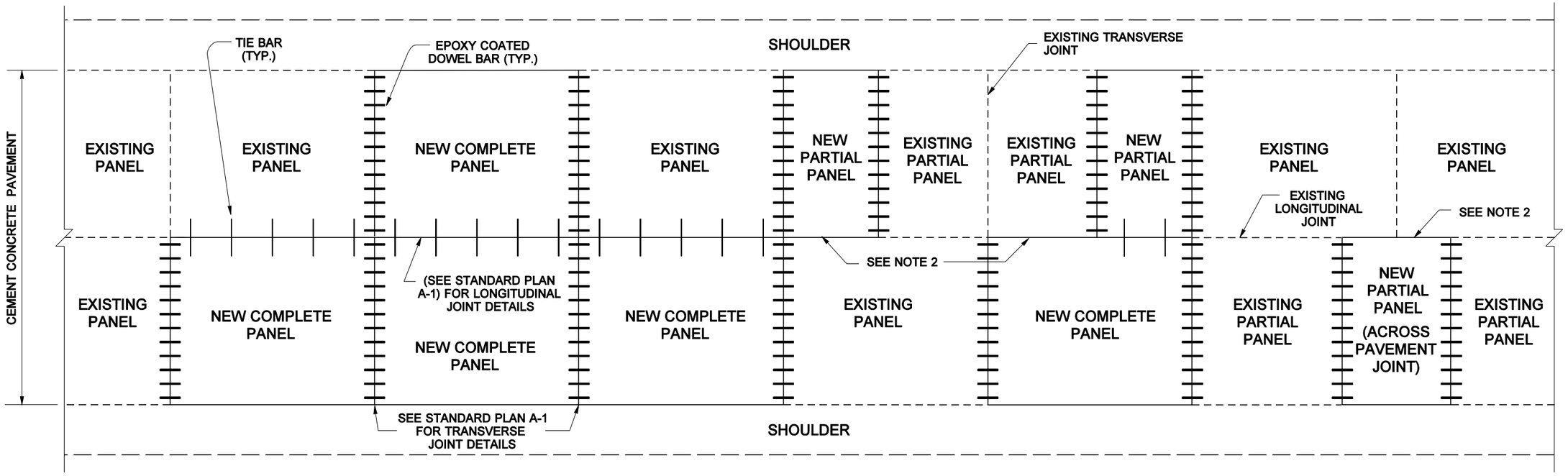
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-24-03* — DATE

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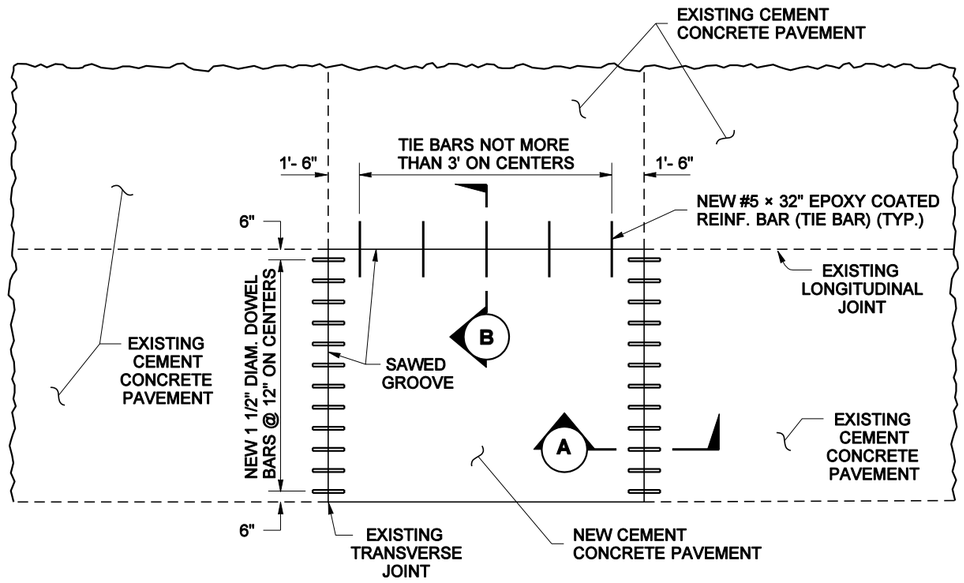
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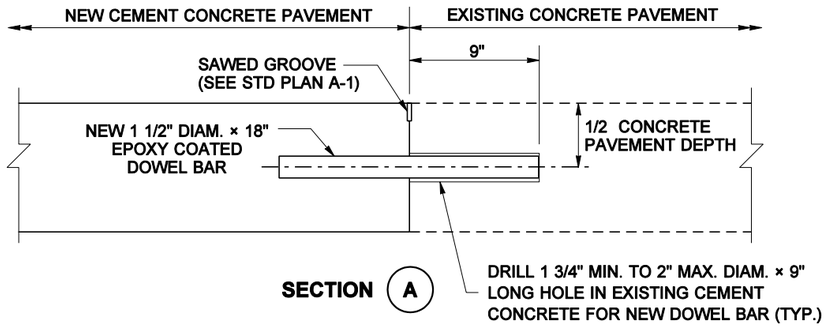

**PLAN VIEW**

## PANEL REPLACEMENT




**PLAN VIEW**

## COMPLETE PANEL REPLACEMENT




### NOTES

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 asphalt concrete shoulders.

2. Place polyethylene film (per AASHTO M 171-00) along the longitudinal joint between partial panel replacement and existing panel.

KEVIN J. DAYTON
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EXPIRES JULY 27, 2003

# CEMENT CONCRETE PAVEMENT REPAIR

# STANDARD PLAN A-6

SHEET 1 OF 2 SHEETS

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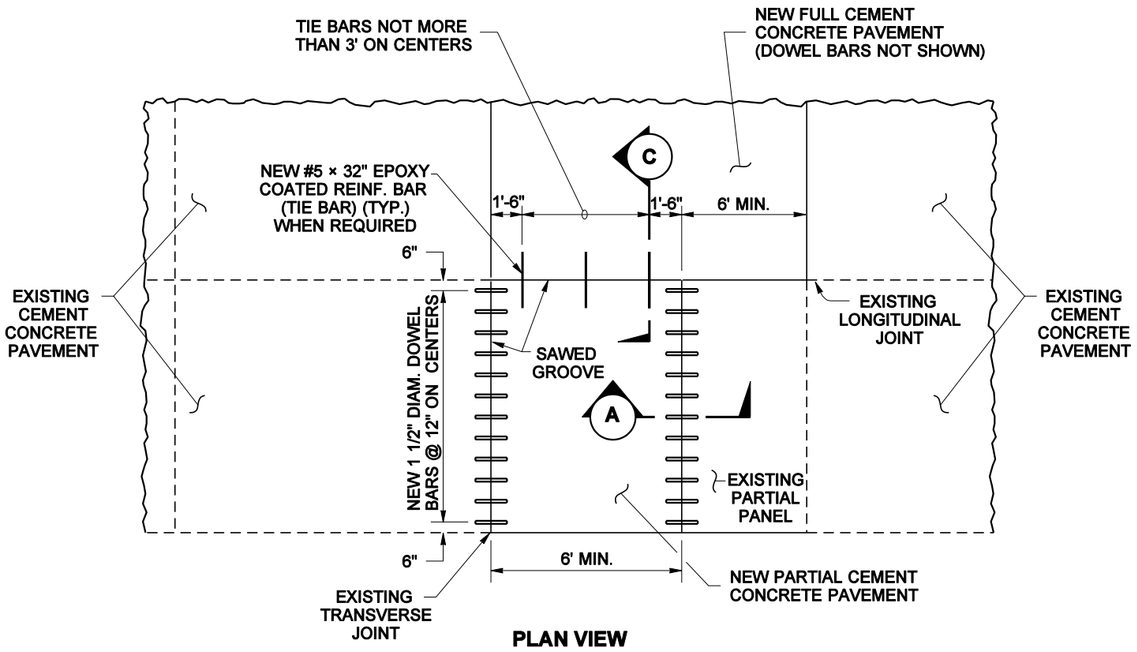
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-24-03* — DATE

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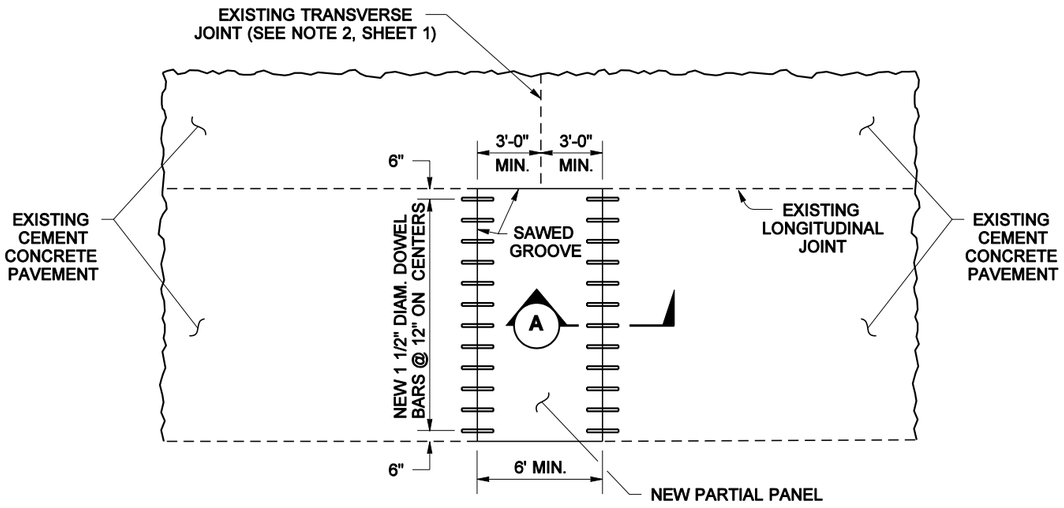
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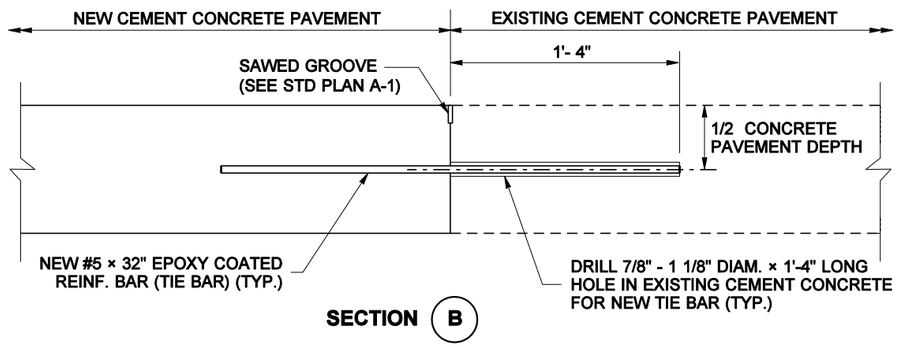

PLAN VIEW

## PARTIAL PANEL REPLACEMENT WITH TIE BARS

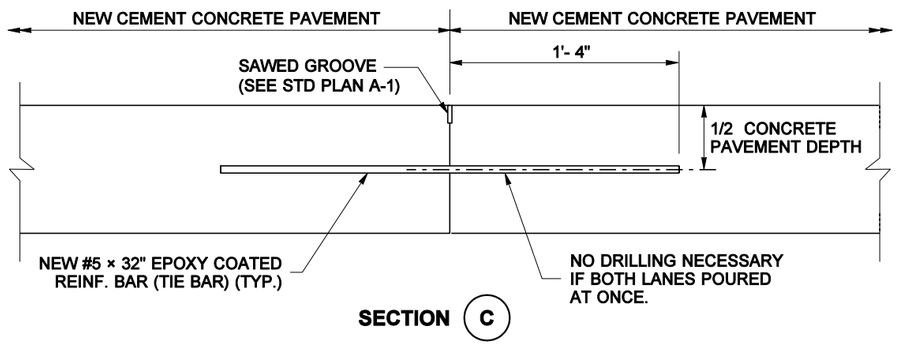



PLAN VIEW

## PARTIAL PANEL REPLACEMENT WITHOUT TIE BARS




SECTION (B)




SECTION (C)

KEVIN J. DAYTON
STATE OF WASHINGTON
24035
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 27, 2003

# CEMENT CONCRETE PAVEMENT REPAIR

## STANDARD PLAN A-6

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-24-03* — DATE

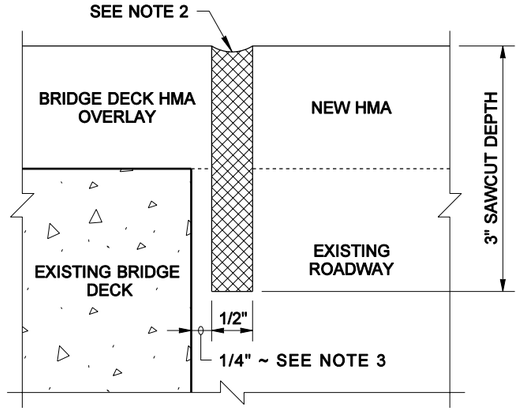
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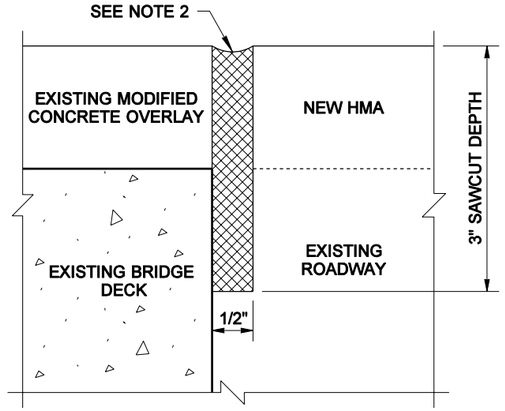
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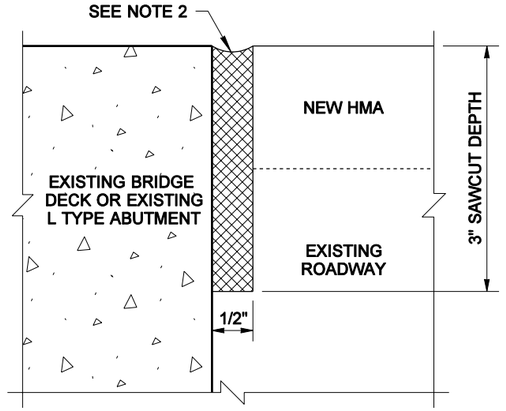
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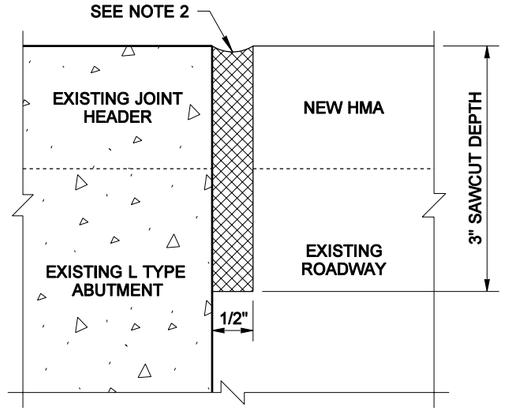

**DETAIL 1**
**1/2" JOINT SEAL**
BRIDGE DECK WITH HMA OVERLAY



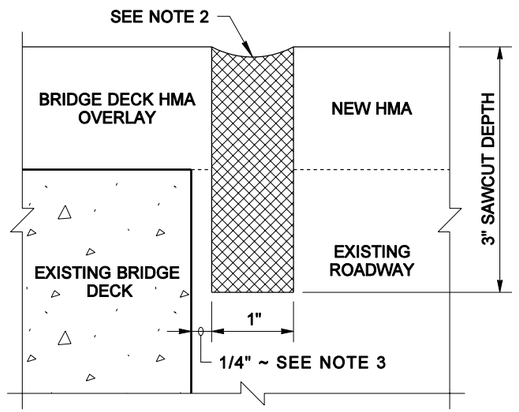

**DETAIL 2**
**1/2" JOINT SEAL**
BRIDGE DECK WITH CONCRETE OVERLAY



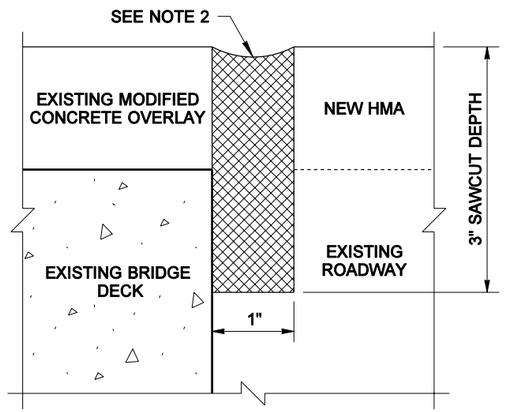

**DETAIL 3**
**1/2" JOINT SEAL**
BRIDGE DECK OR L TYPE ABUTMENT



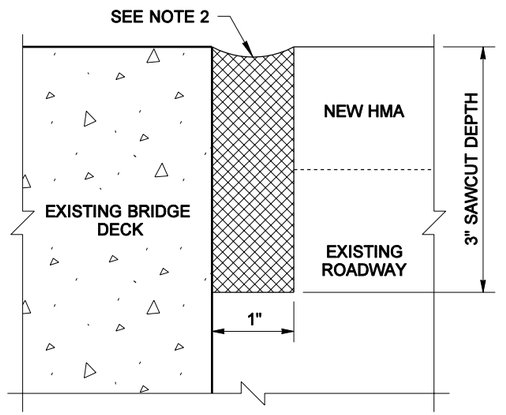

**DETAIL 4**
**1/2" JOINT SEAL**
L TYPE ABUTMENT WITH HEADER



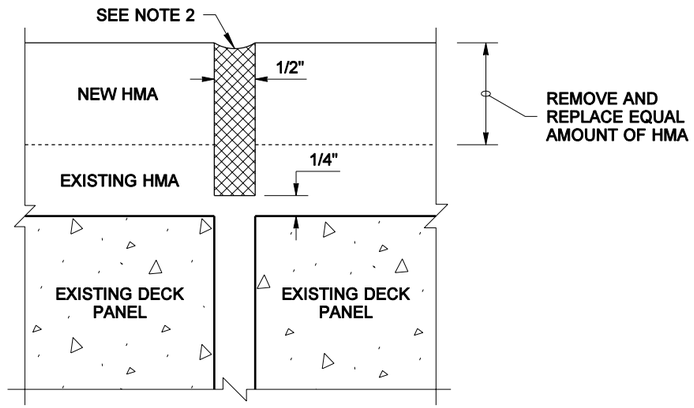

**DETAIL 5**
**1" JOINT SEAL**
BRIDGE DECK WITH HMA OVERLAY




**DETAIL 6**
**1" JOINT SEAL**
BRIDGE DECK WITH CONCRETE OVERLAY




**DETAIL 7**
**1" JOINT SEAL**
BRIDGE DECK




**DETAIL 8**
**1/2" JOINT SEAL**
BRIDGE DECK PANELS WITH HMA OVERLAY

**NOTES**

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).

JUGESH KAPUR
STATE OF WASHINGTON
25400
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 19, 2006

# BRIDGE TRANSVERSE JOINT SEAL

## STANDARD PLAN A-7

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *10-04-05* — DATE

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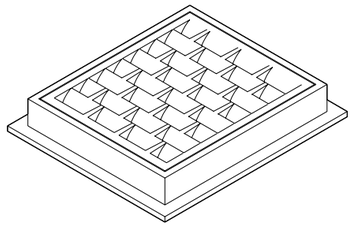
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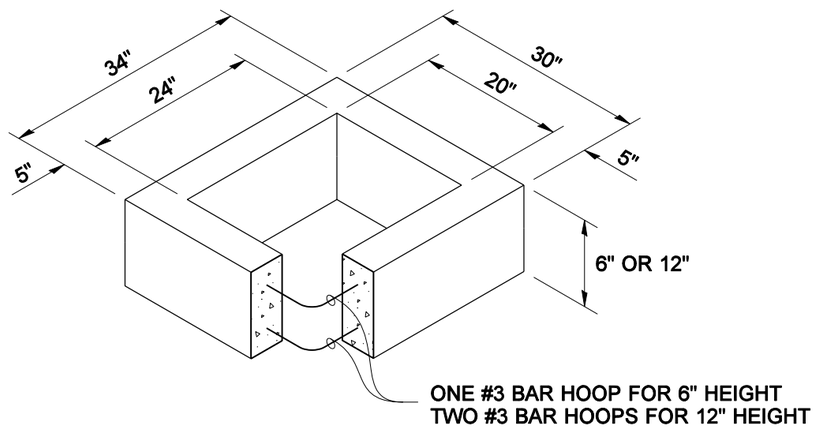
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**FRAME AND VANED GRATE**



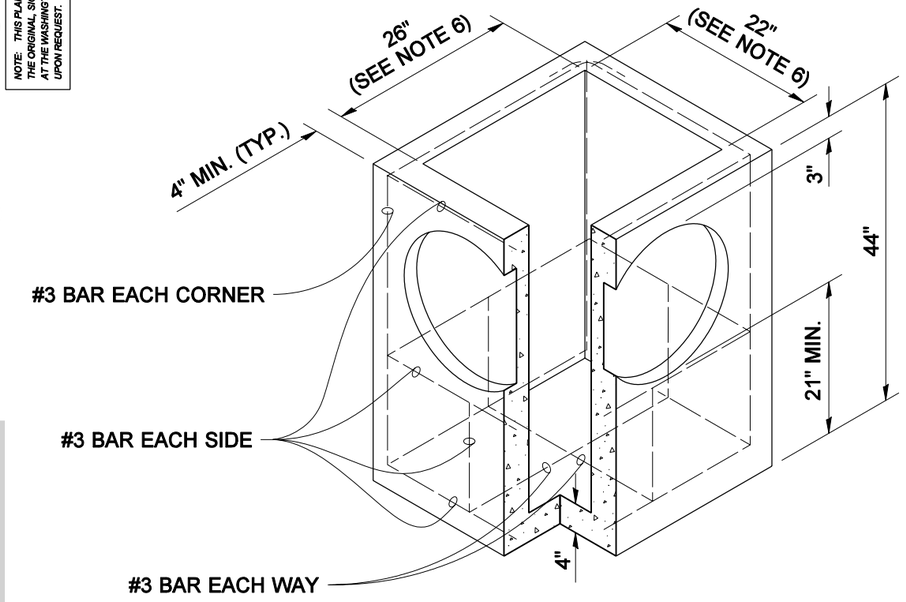

**RECTANGULAR ADJUSTMENT SECTION**

| PIPE ALLOWANCES | |
|---|---|
| **PIPE MATERIAL** | **MAXIMUM INSIDE DIAMETER** |
| REINFORCED OR PLAIN CONCRETE | 12" |
| ALL METAL PIPE | 15" |
| CPSSP * (STD. SPEC. 9-05.20) | 12" |
| SOLID WALL PVC (STD. SPEC. 9-05.12(1)) | 15" |
| PROFILE WALL PVC (STD. SPEC. 9-05.12(2)) | 15" |

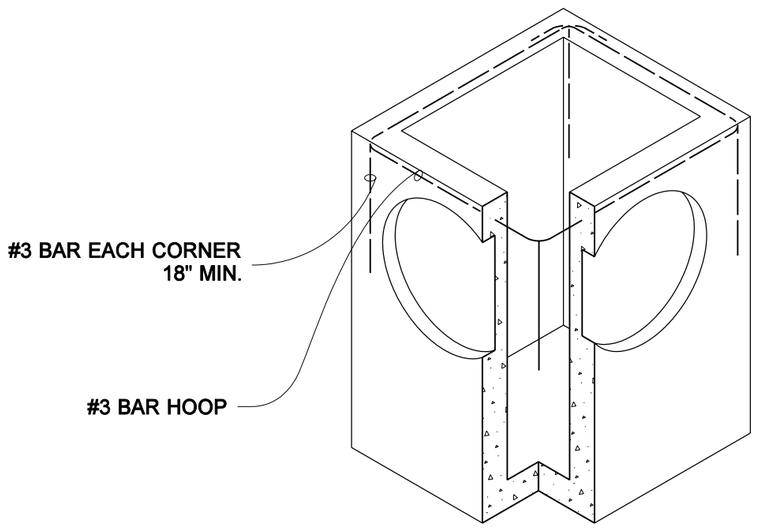
* CORRUGATED POLYETHYLENE STORM SEWER PIPE

**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 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.




**PRECAST BASE SECTION**




SEE NOTE 1

**ALTERNATIVE PRECAST BASE SECTION**

MATTHEW J. WITECKI
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EXPIRES JULY 1, 2007

# CATCH BASIN TYPE 1

## STANDARD PLAN B-5.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-01-06* — DATE

Washington State Department of Transportation

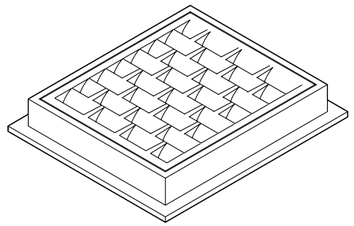
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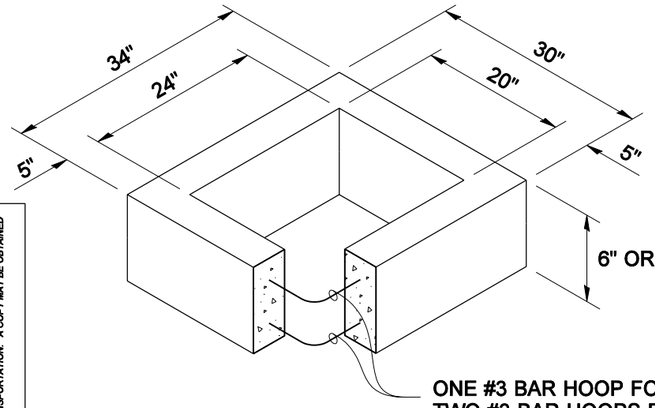
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DRAWN BY: MARK SUJKA



**FRAME AND VANED GRATE**



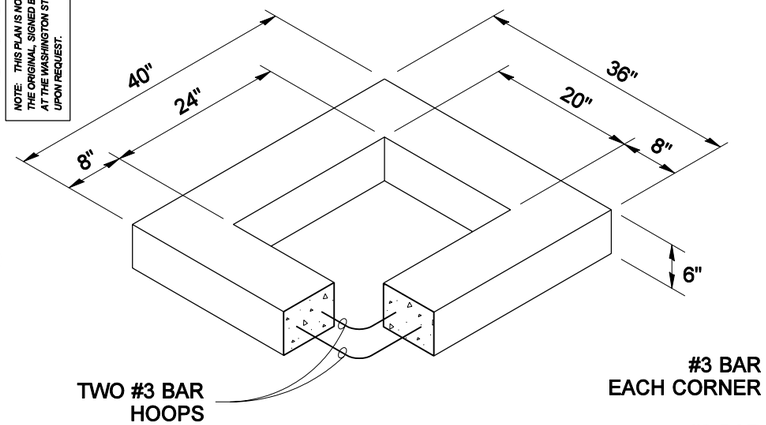

**RECTANGULAR ADJUSTMENT SECTION**

| PIPE ALLOWANCES | |
|---|---|
| **PIPE MATERIAL** | **MAXIMUM INSIDE DIAMETER** |
| REINFORCED OR PLAIN CONCRETE | 18" |
| ALL METAL PIPE | 21" |
| CPSSP * (STD. SPEC. 9-05.20) | 18" |
| SOLID WALL PVC (STD. SPEC. 9-05.12(1)) | 21" |
| PROFILE WALL PVC (STD. SPEC. 9-05.12(2)) | 21" |

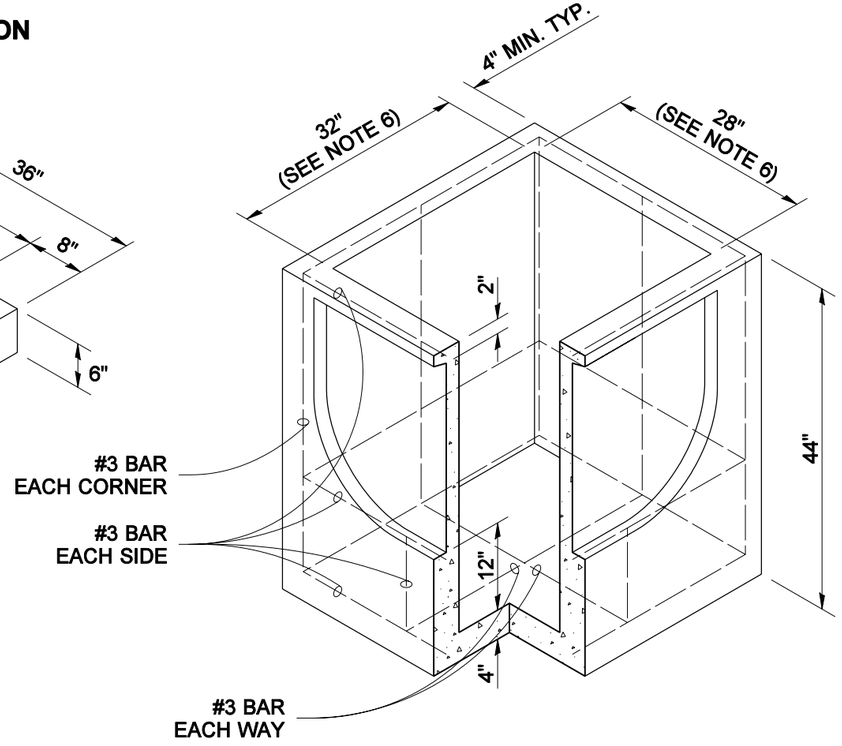
* CORRUGATED POLYETHYLENE STORM SEWER PIPE

**NOTES**

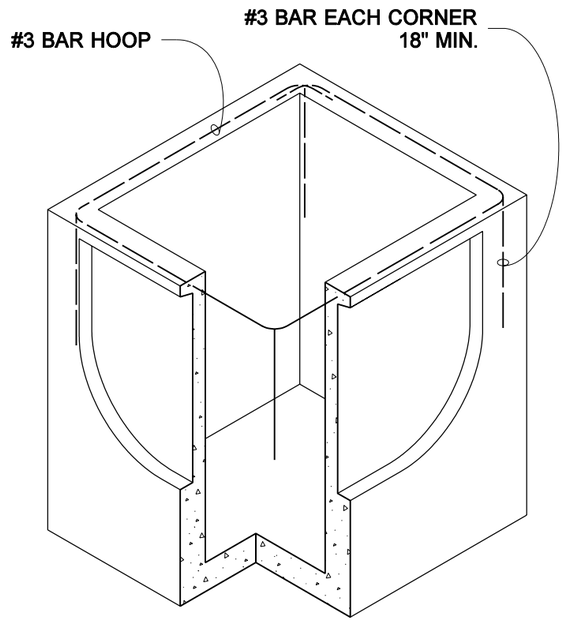
1. As acceptable alternatives to the rebar shown in the **PRECAST BASE SECTION**, fibers (placed according to the Standard Specifications), or wire mesh having a minimum area of 0.12 square inches per foot shall be used with the minimum required rebar shown in the **ALTERNATIVE PRECAST BASE SECTION**. 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.




**REDUCING SECTION**




**PRECAST BASE SECTION**




SEE NOTE 1

**ALTERNATIVE PRECAST BASE SECTION**




EXPIRES JULY 1, 2007

**CATCH BASIN TYPE 1L**

**STANDARD PLAN B-5.40-00**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-01-06* — DATE

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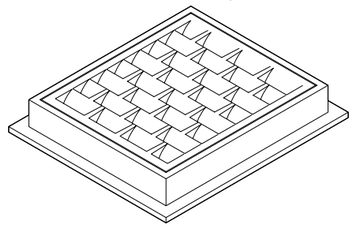
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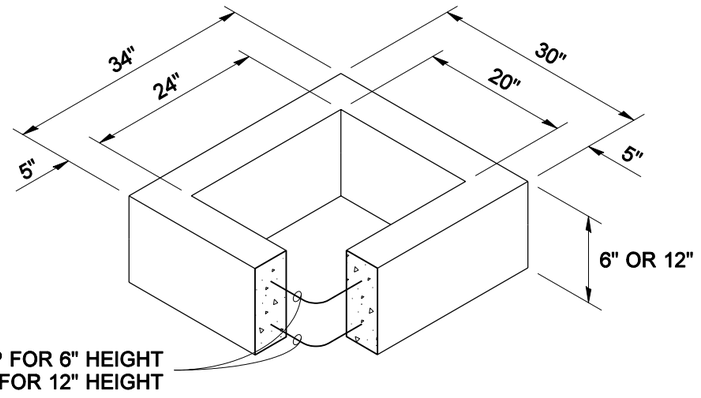
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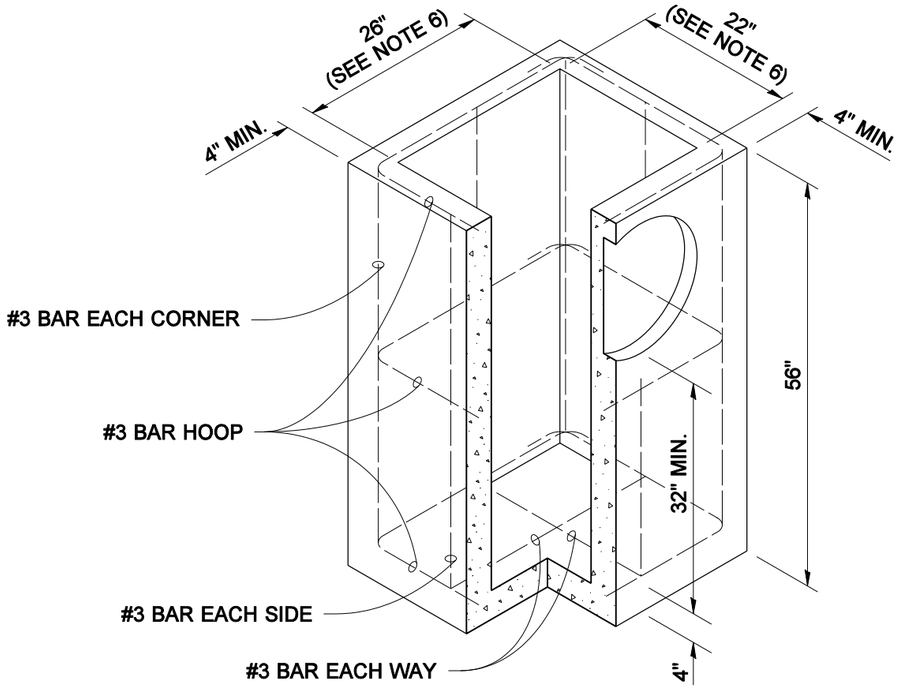
DRAWN BY: MARK SUJKA



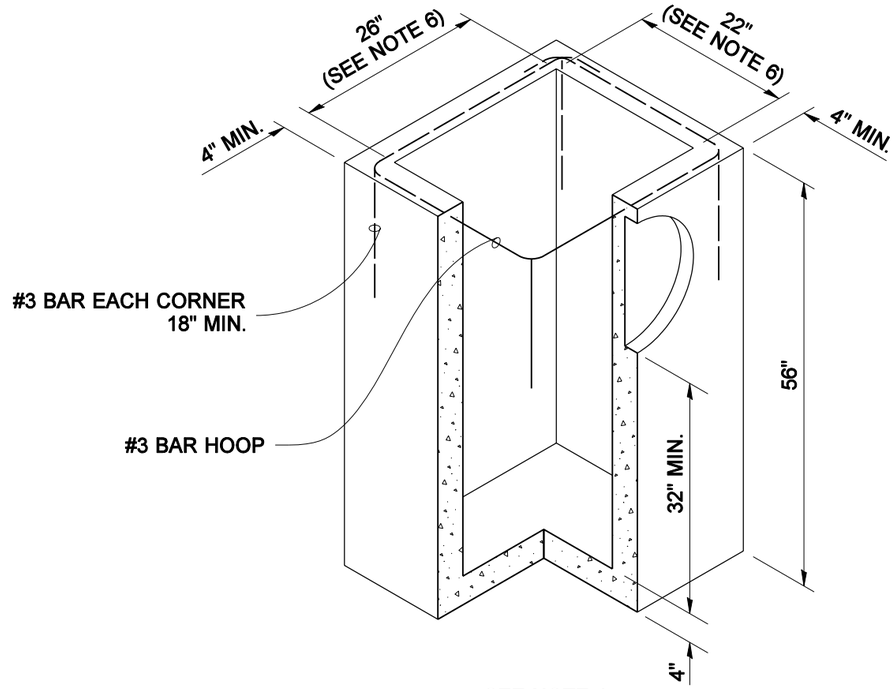
**FRAME AND VANED GRATE**




**RECTANGULAR ADJUSTMENT SECTION**




**PRECAST BASE SECTION**




SEE NOTE 1

**ALTERNATIVE PRECAST BASE SECTION**

## 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.




EXPIRES JULY 1, 2007

# CATCH BASIN TYPE 1P (FOR PARKING LOT)

## STANDARD PLAN B-5.60-00

SHEET 1 OF 1 SHEET

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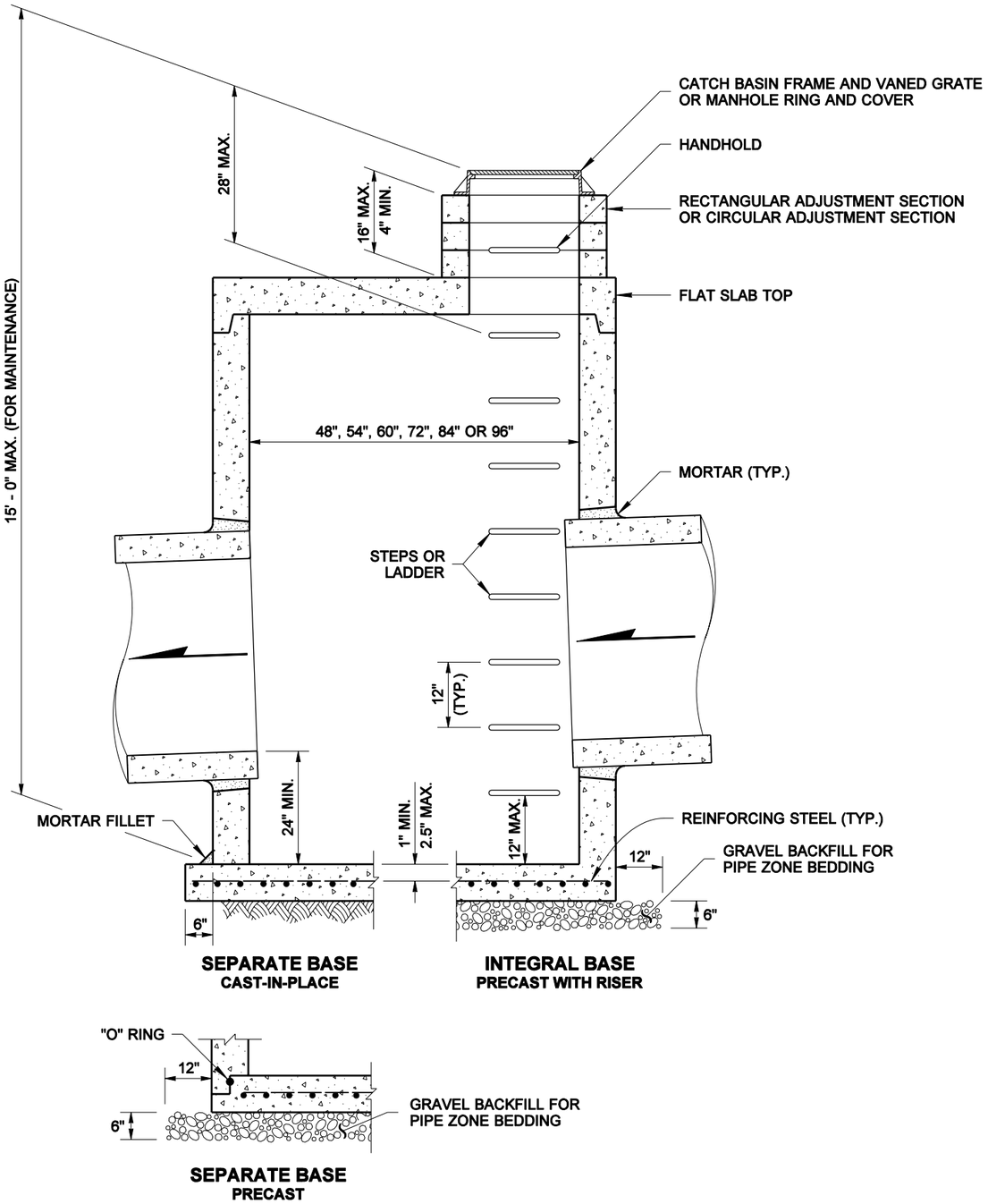
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-01-06* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN




**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**

| CATCH BASIN DIAMETER | WALL THICKNESS | BASE THICKNESS | MAXIMUM KNOCKOUT SIZE | MINIMUM DISTANCE BETWEEN KNOCKOUTS | BASE REINFORCING STEEL $in^2$/ft. IN EACH DIRECTION | |
|---|---|---|---|---|---|---|
| | | | | | SEPARATE BASE | INTEGRAL BASE |
| 48" | 4" | 6" | 36" | 8" | 0.23 | 0.15 |
| 54" | 4.5" | 8" | 42" | 8" | 0.19 | 0.19 |
| 60" | 5" | 8" | 48" | 8" | 0.25 | 0.25 |
| 72" | 6" | 8" | 60" | 12" | 0.35 | 0.24 |
| 84" | 8" | 12" | 72" | 12" | 0.39 | 0.29 |
| 96" | 8" | 12" | 84" | 12" | 0.39 | 0.29 |

**PIPE ALLOWANCES**

| CATCH BASIN DIAMETER | PIPE MATERIAL WITH MAXIMUM INSIDE DIAMETER | | | | |
|---|---|---|---|---|---|
| | CONCRETE | ALL METAL | CPSSP ① | SOLID WALL PVC ② | PROFILE WALL PVC ③ |
| 48" | 24" | 30" | 24" | 27" | 30" |
| 54" | 30" | 36" | 30" | 27" | 36" |
| 60" | 36" | 42" | 36" | 36" | 42" |
| 72" | 42" | 54" | 42" | 36" | 48" |
| 84" | 54" | 60" | 54" | 36" | 48" |
| 96" | 60" | 72" | 60" | 36" | 48" |

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))

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EXPIRES JULY 1, 2007

# CATCH BASIN TYPE 2

## STANDARD PLAN B-10.20-00

SHEET 1 OF 1 SHEET

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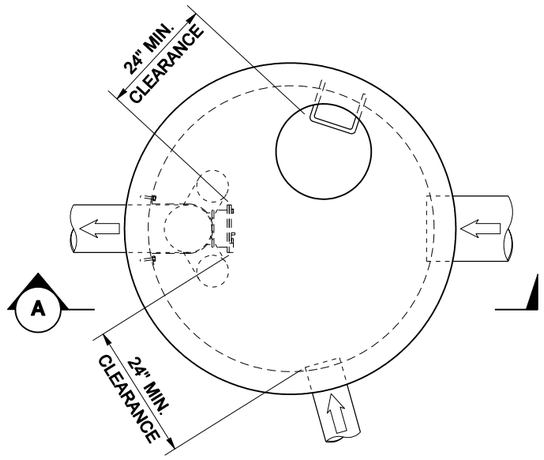
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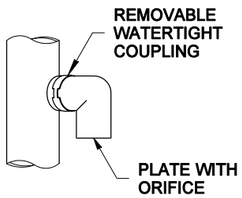
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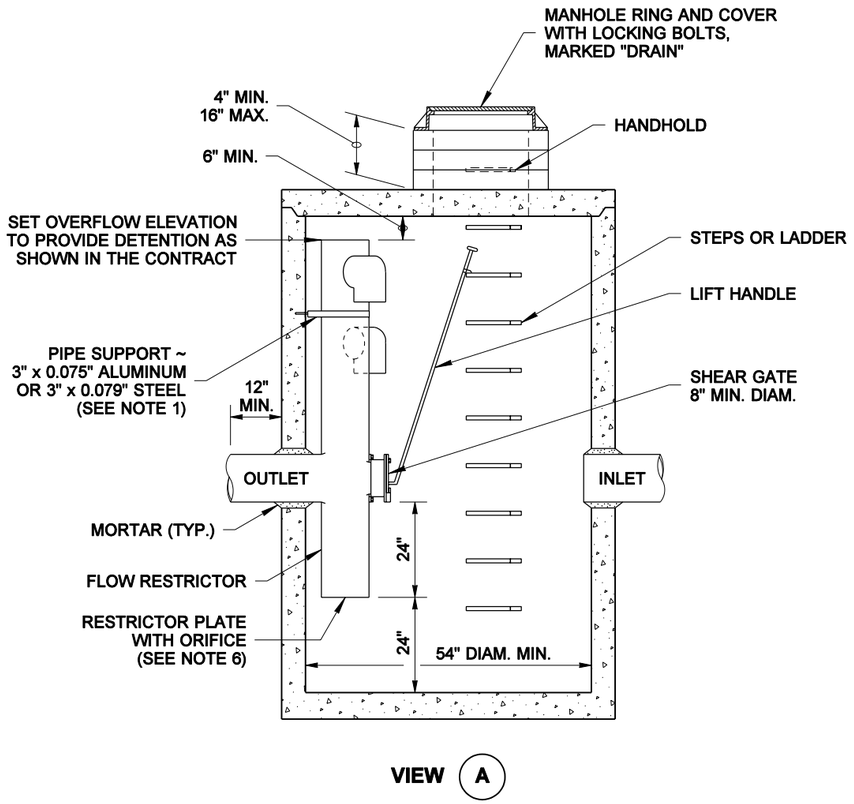
DRAWN BY: MARK SUJKA



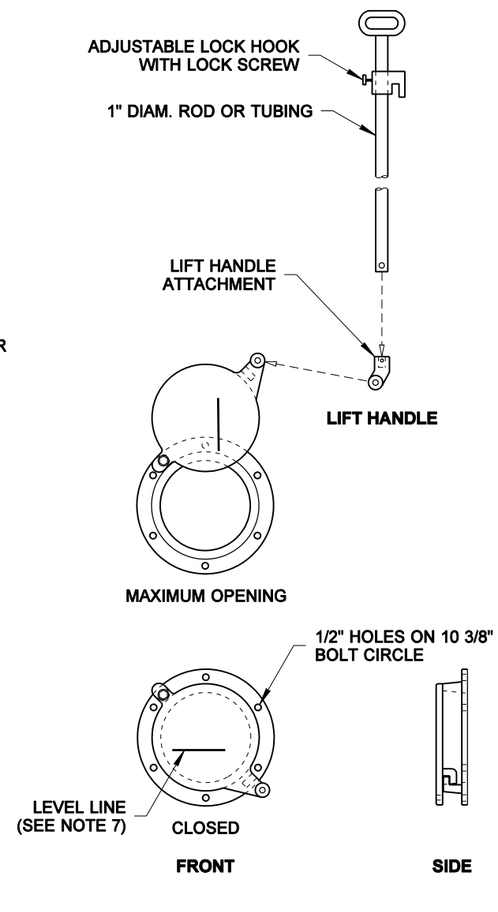

**PLAN VIEW**




**ELBOW DETAIL**




**VIEW (A)**




**SHEAR GATE DETAILS**

**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.

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

   All shear gate bolts shall be stainless steel.

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

9. Alternative shear gate designs are acceptable if material specifications are met and flange bolt pattern matches.




EXPIRES JULY 1, 2007

# CATCH BASIN TYPE 2 WITH FLOW RESTRICTOR

## STANDARD PLAN B-10.40-00

SHEET 1 OF 1 SHEET

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*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-01-06* — DATE

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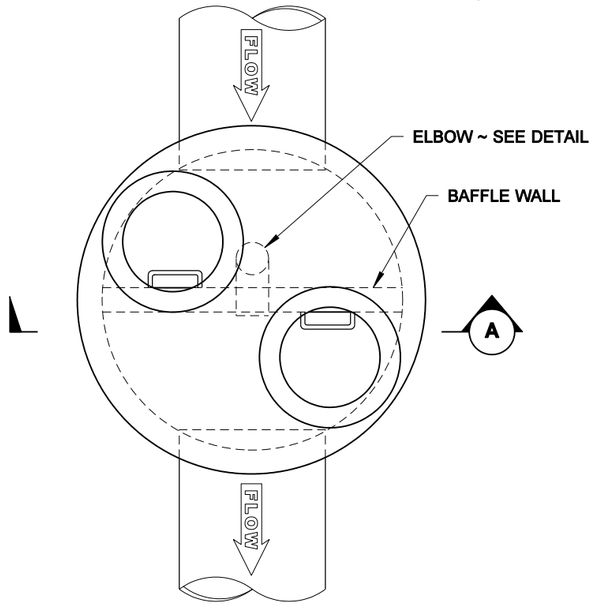
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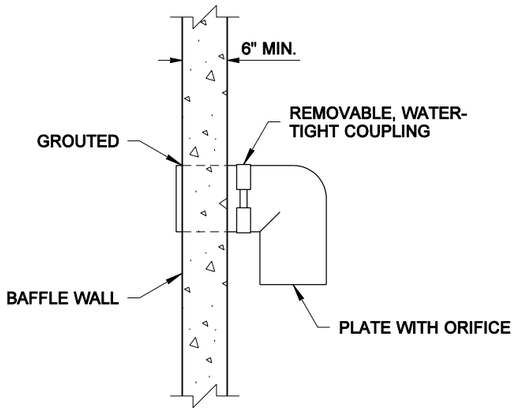
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN



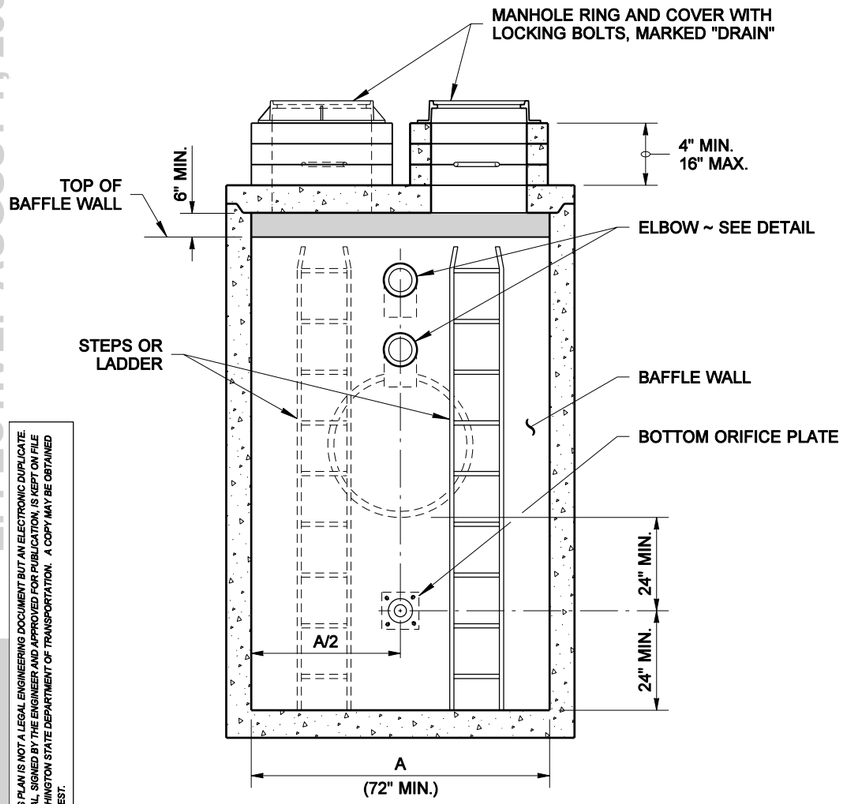

**PLAN**



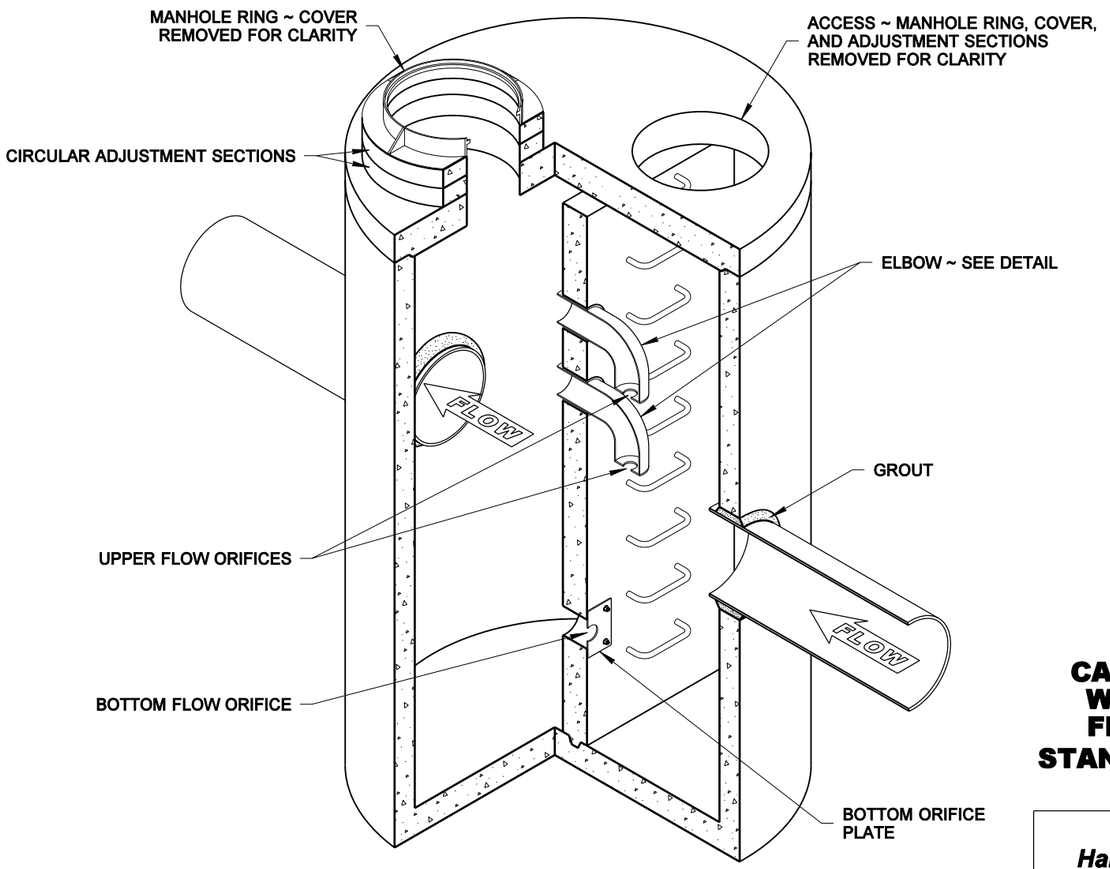

**ELBOW DETAIL**

**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.




**SECTION (A)**




**ISOMETRIC CUTAWAY**

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EXPIRES JULY 1, 2007

# CATCH BASIN TYPE 2 WITH BAFFLE TYPE FLOW RESTRICTOR STANDARD PLAN B-10.60-00

SHEET 1 OF 1 SHEET

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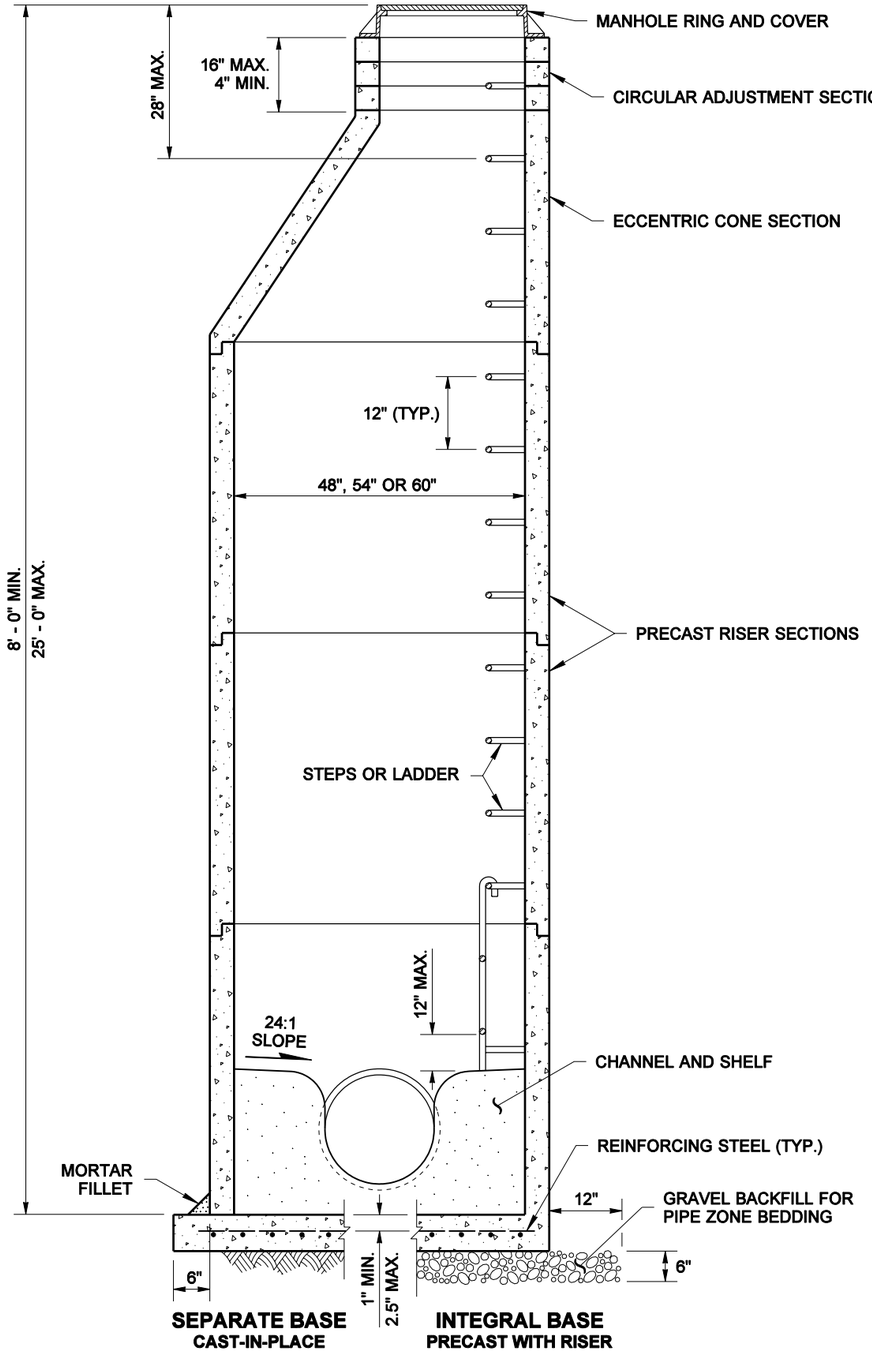
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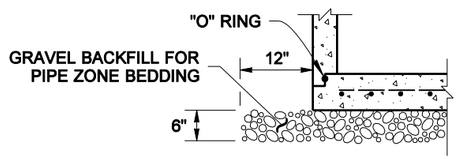
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DRAWN BY: ADAM COCHRAN




**SEPARATE BASE**
**CAST-IN-PLACE**

**INTEGRAL BASE**
**PRECAST WITH RISER**




**SEPARATE BASE**
**PRECAST**

**NOTE**

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

**MANHOLE DIMENSION TABLE**

| DIAM. | WALL THICKNESS | BASE THICKNESS | MAXIMUM KNOCKOUT SIZE | MINIMUM DISTANCE BETWEEN KNOCKOUTS | BASE REINFORCING STEEL $in^2$ /ft. IN EACH DIRECTION | |
|---|---|---|---|---|---|---|
| | | | | | SEPARATE BASE | INTEGRAL BASE |
| 48" | 4" | 6" | 36" | 8" | 0.23 | 0.15 |
| 54" | 4.5" | 8" | 42" | 8" | 0.19 | 0.19 |
| 60" | 5" | 8" | 48" | 8" | 0.25 | 0.25 |

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# MANHOLE TYPE 1

## STANDARD PLAN B-15.20-00

SHEET 1 OF 1 SHEET

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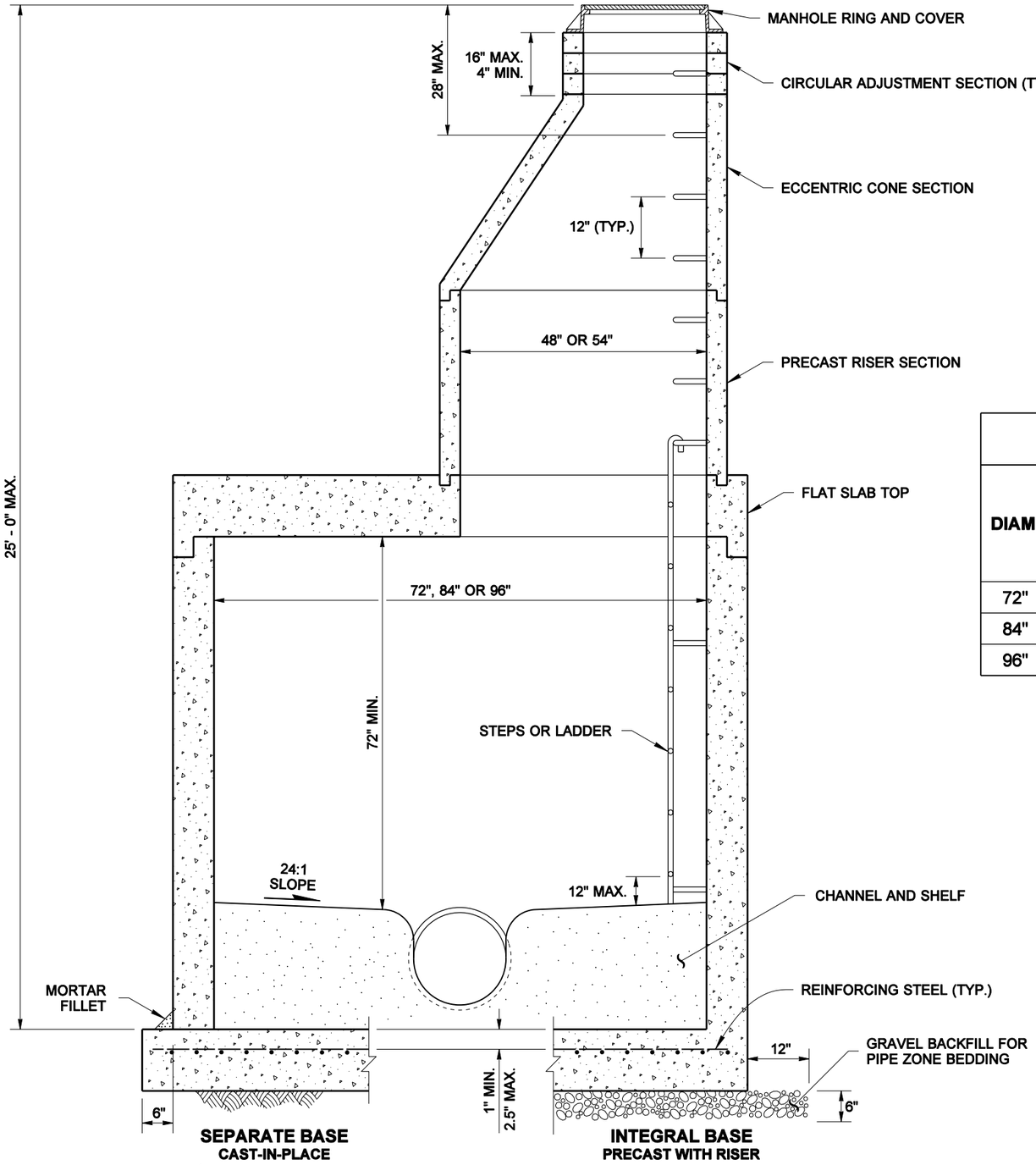
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN




**NOTE**

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

**MANHOLE DIMENSION TABLE**

| DIAM. | WALL THICKNESS | BASE THICKNESS | MAXIMUM KNOCKOUT SIZE | MINIMUM DISTANCE BETWEEN KNOCKOUTS | BASE REINFORCING STEEL $in^2$ /ft. IN EACH DIRECTION | |
|---|---|---|---|---|---|---|
| | | | | | SEPARATE BASE | INTEGRAL BASE |
| 72" | 6" | 8" | 60" | 12" | 0.35 | 0.24 |
| 84" | 8" | 12" | 72" | 12" | 0.39 | 0.29 |
| 96" | 8" | 12" | 84" | 12" | 0.39 | 0.29 |

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# MANHOLE TYPE 2

## STANDARD PLAN B-15.40-00

SHEET 1 OF 1 SHEET

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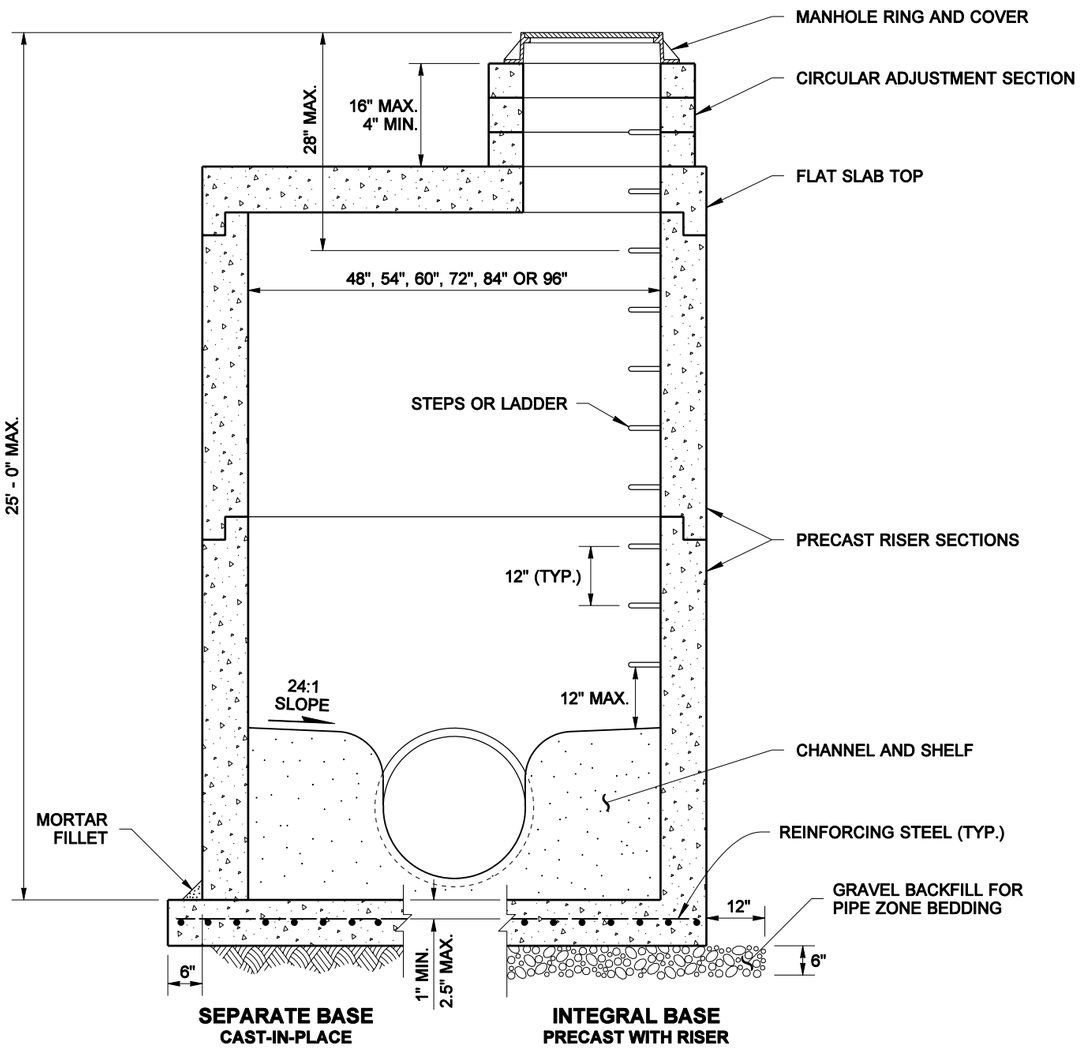
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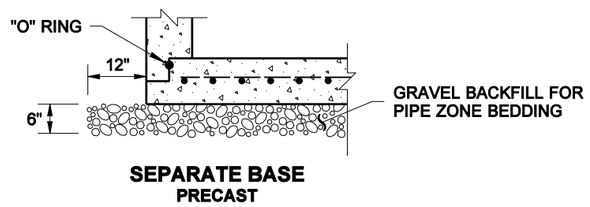
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**NOTE**

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

**MANHOLE DIMENSION TABLE**

| DIAM. | WALL THICKNESS | BASE THICKNESS | MAXIMUM KNOCKOUT SIZE | MINIMUM DISTANCE BETWEEN KNOCKOUTS | BASE REINFORCING STEEL $in^2$ /ft. IN EACH DIRECTION | |
|---|---|---|---|---|---|---|
| | | | | | SEPARATE BASE | INTEGRAL BASE |
| 48" | 4" | 6" | 36" | 8" | 0.23 | 0.15 |
| 54" | 4.5" | 8" | 42" | 8" | 0.19 | 0.19 |
| 60" | 5" | 8" | 48" | 8" | 0.25 | 0.25 |
| 72" | 6" | 8" | 60" | 12" | 0.35 | 0.24 |
| 84" | 8" | 12" | 72" | 12" | 0.39 | 0.29 |
| 96" | 8" | 12" | 84" | 12" | 0.39 | 0.29 |




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## MANHOLE TYPE 3

## STANDARD PLAN B-15.60-00

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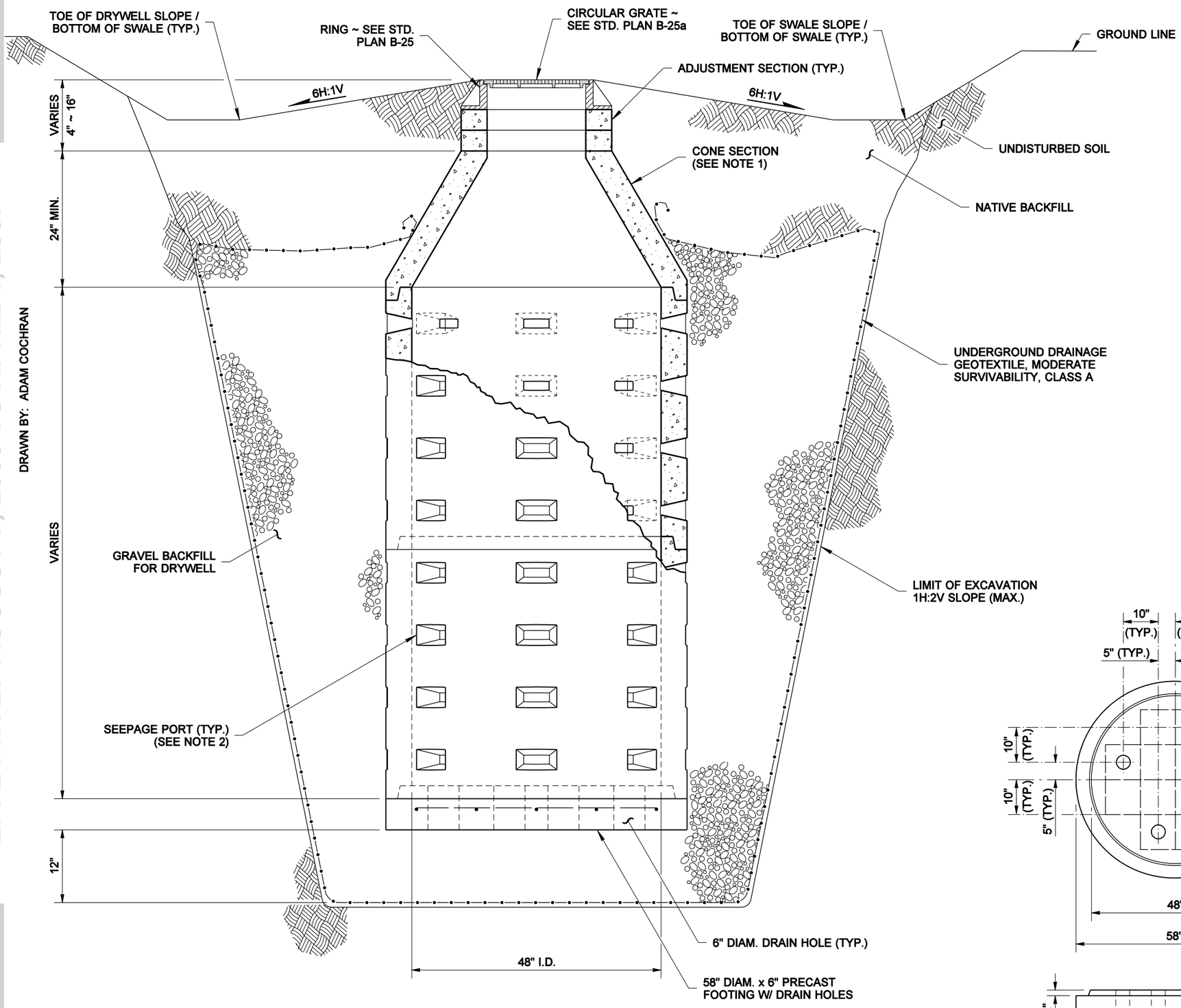
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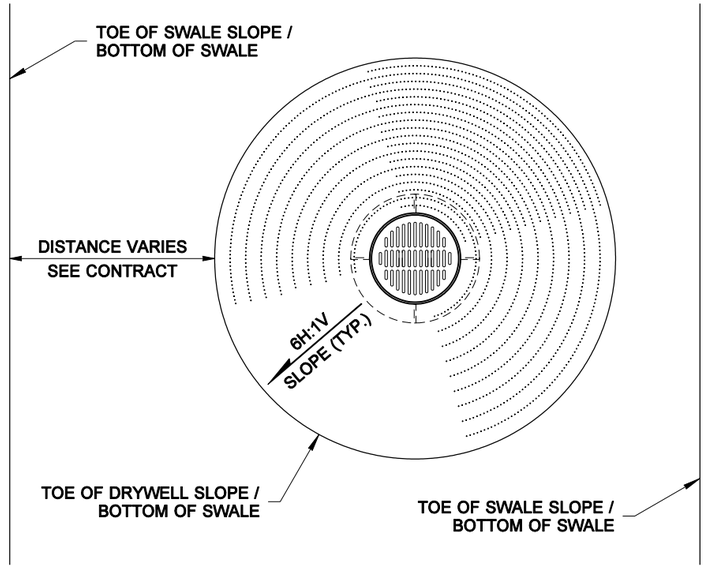



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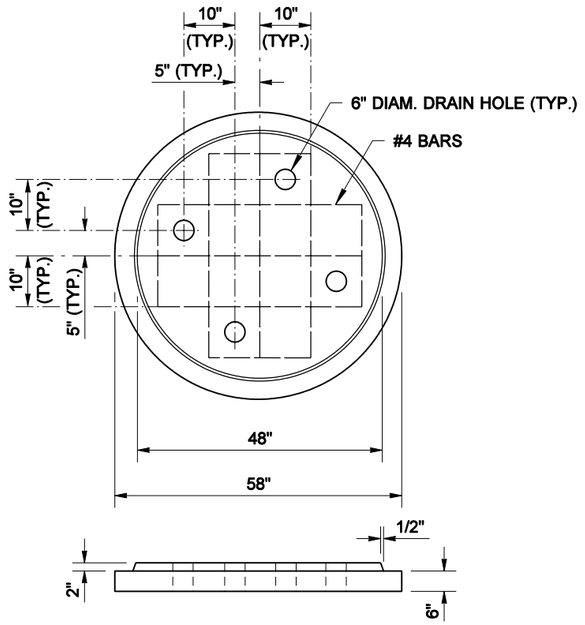
**CUTAWAY ELEVATION VIEW**

**NOTES**

1. Precast cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.




**PLAN VIEW**




**PRECAST FOOTING DETAIL**




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# DRYWELL TYPE 1 (FOR SWALE)

## STANDARD PLAN B-20.20-00

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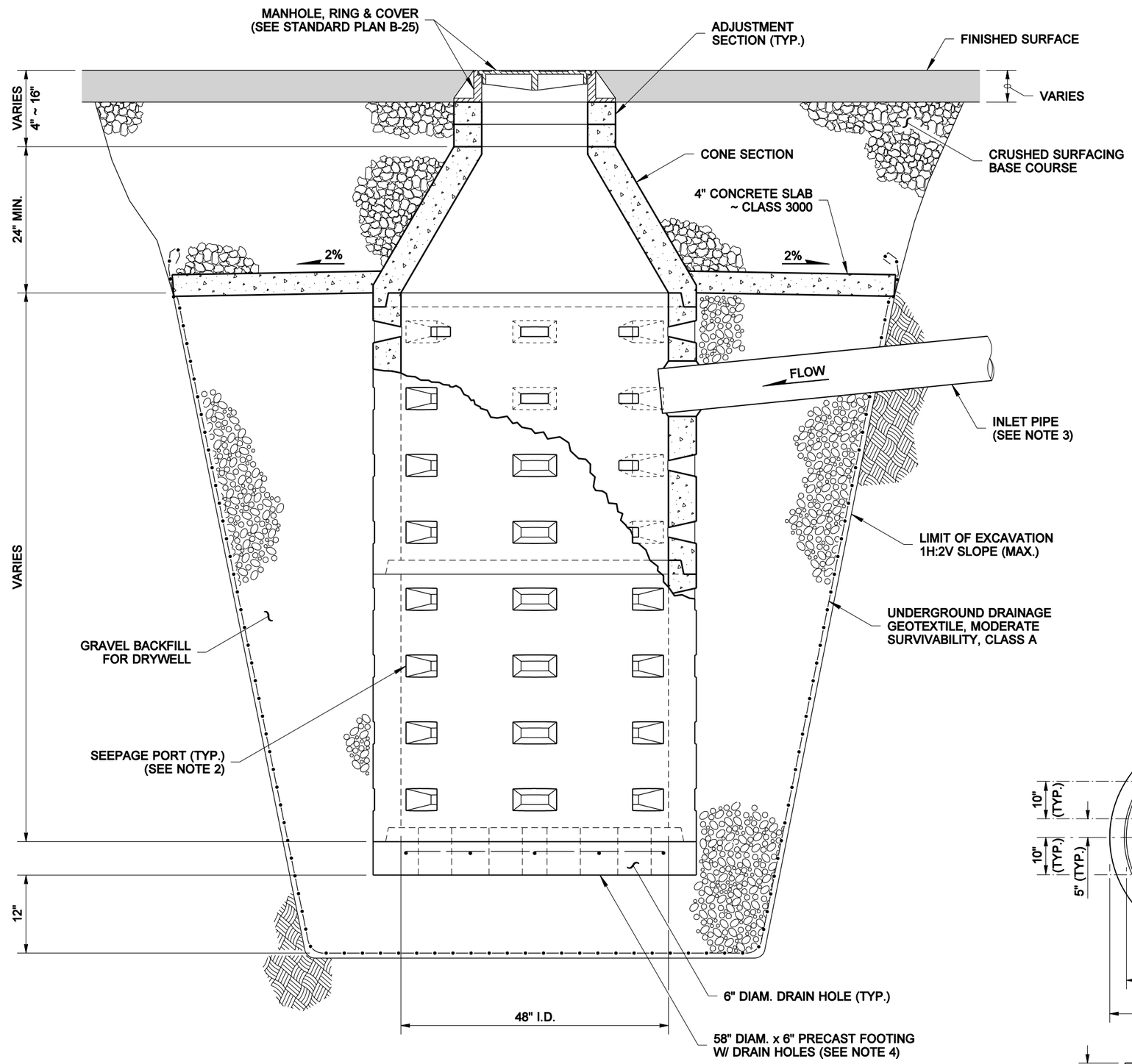
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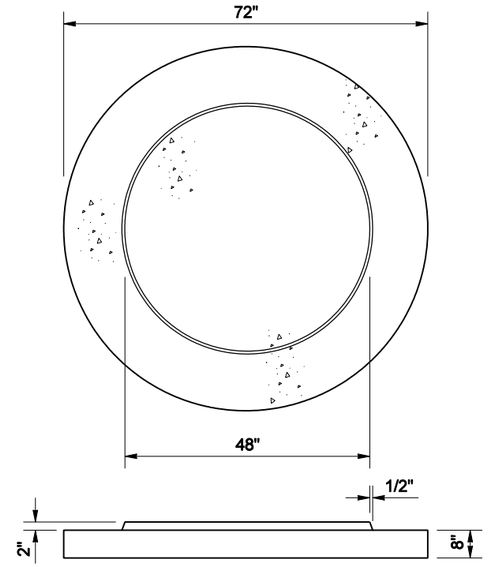
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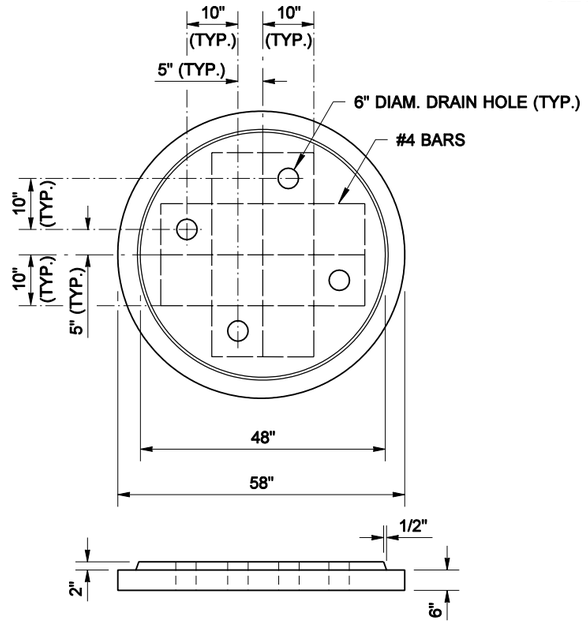

## CUTAWAY ELEVATION VIEW

**NOTES**

1. Precast concrete cone sections may be eccentric or concentric.
2. Seepage port orientation varies among manufacturers.
3. Connect inlet pipe to structure using precast hole or core drilled hole.
4. For depths over 15' use 72" x 8" Alternative Precast Footing.




## ALTERNATIVE PRECAST FOOTING DETAIL




## PRECAST FOOTING DETAIL

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# DRYWELL TYPE 2 (WITH PIPE INLET)

# STANDARD PLAN B-20.40-00

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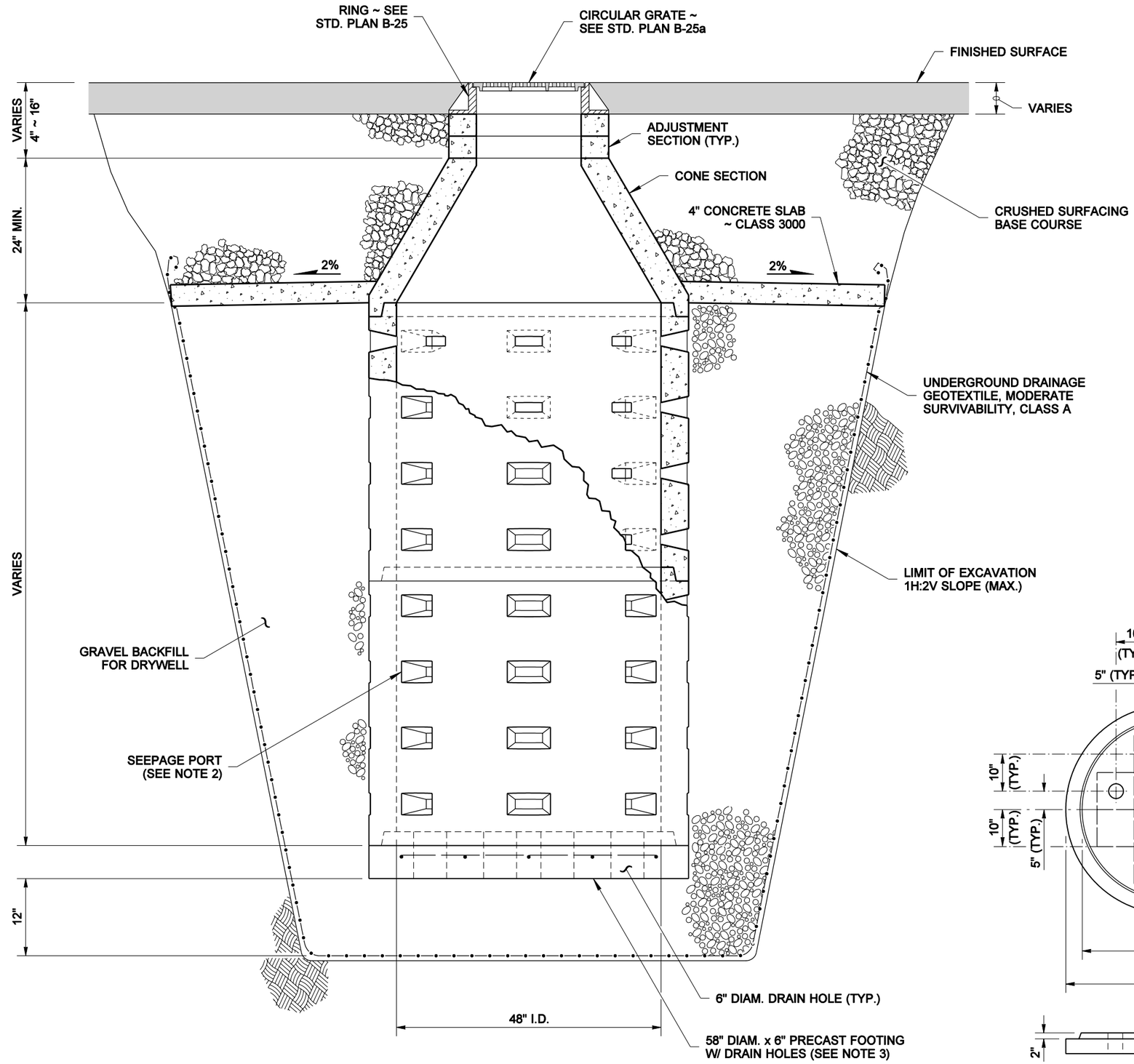
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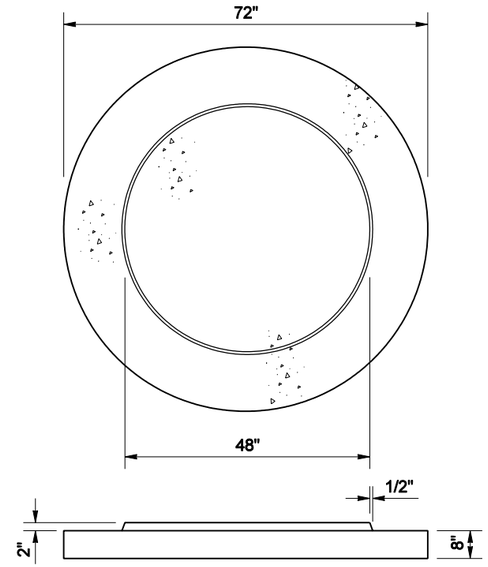



**CUTAWAY ELEVATION VIEW**

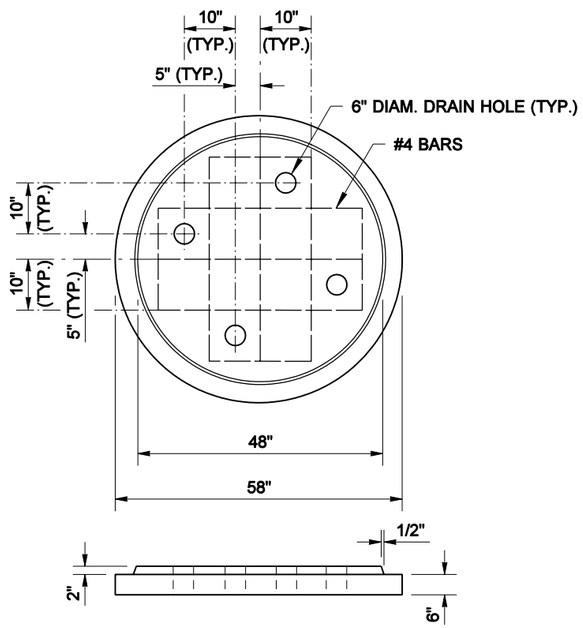
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**NOTES**

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.




**ALTERNATIVE PRECAST FOOTING DETAIL**




**PRECAST FOOTING DETAIL**

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# DRYWELL TYPE 3 (WITH AT-GRADE INLET)

# STANDARD PLAN B-20.60-00

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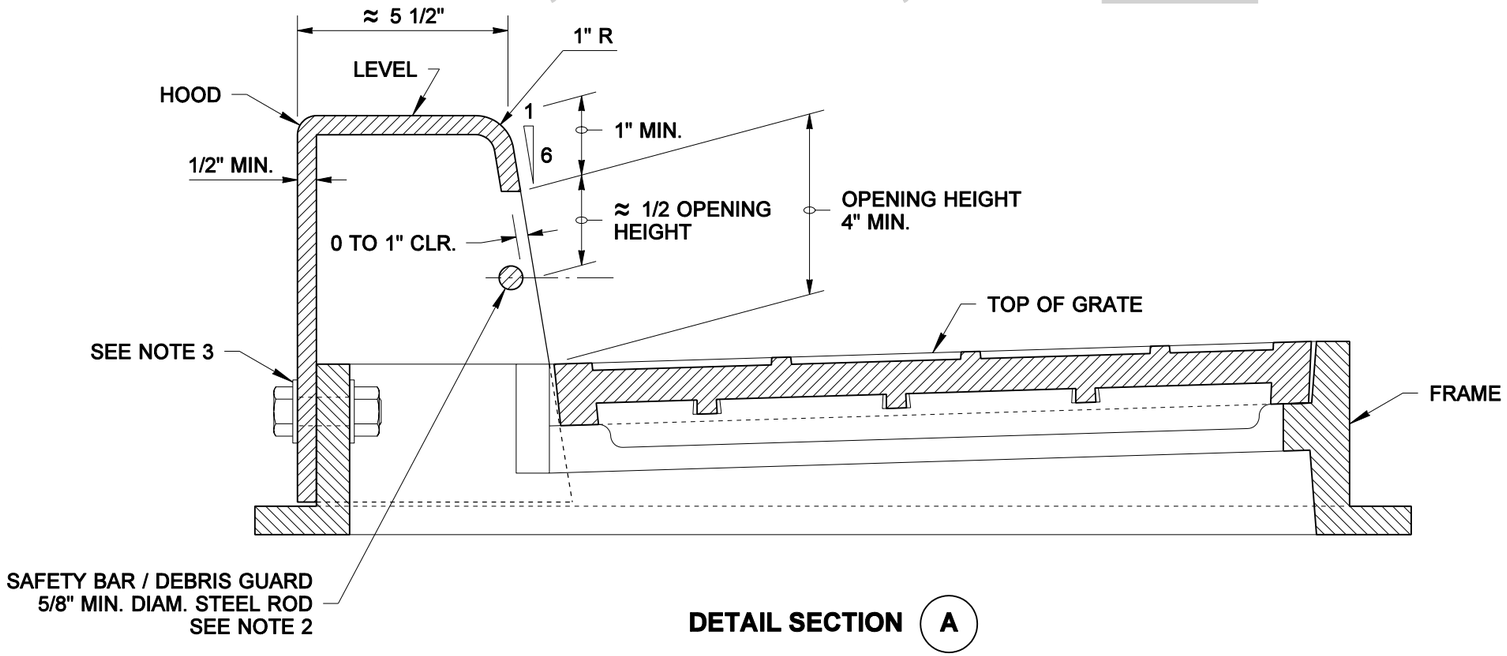
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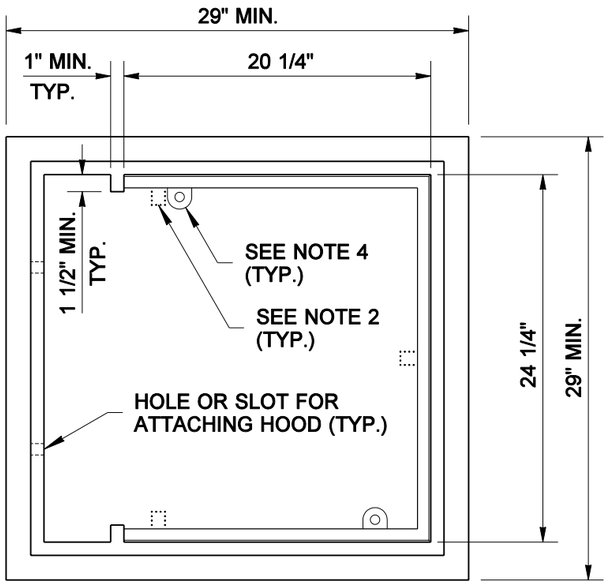
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**DETAIL SECTION (A)**

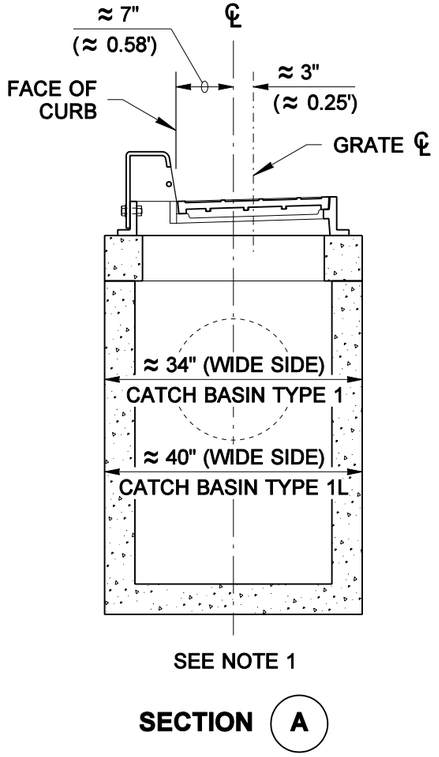
## NOTES

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.

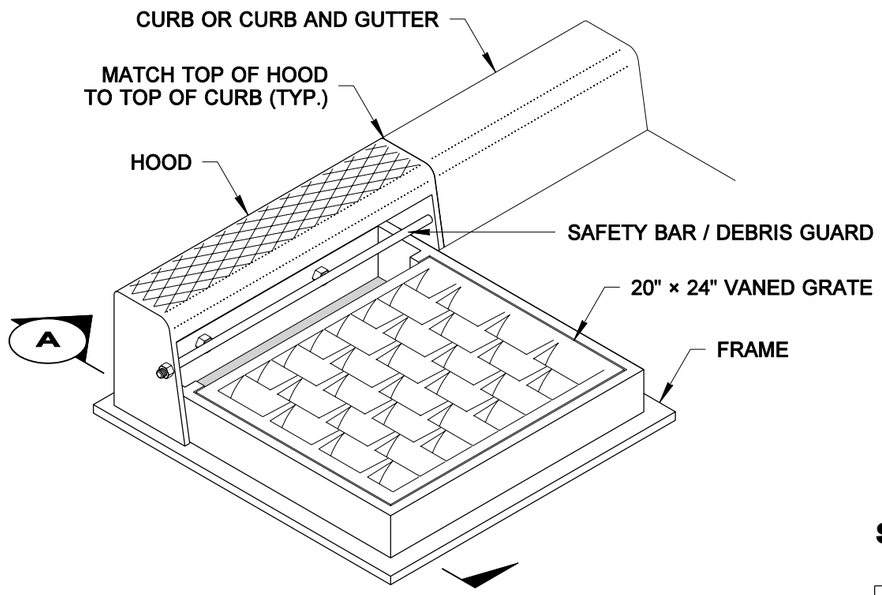



TOP VIEW

**FRAME DETAIL**




**SECTION (A)**




ISOMETRIC VIEW

**COMBINATION INLET**

FRAME, HOOD, AND VANED GRATE

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# COMBINATION INLET

# STANDARD PLAN B-25.20-00

SHEET 1 OF 1 SHEET

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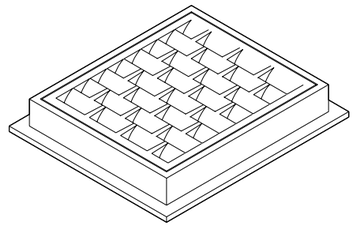
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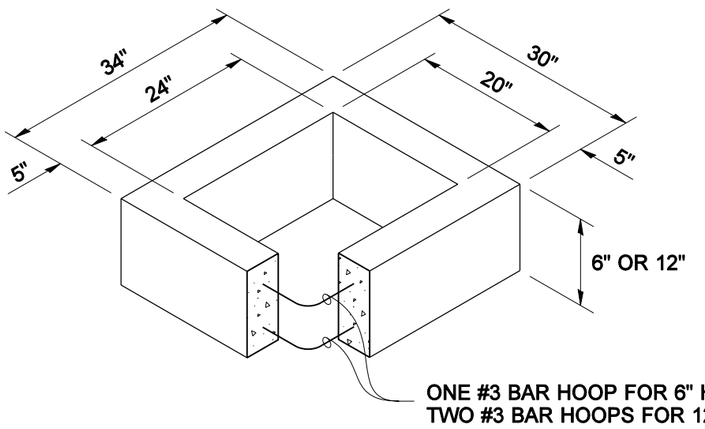
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**FRAME AND VANED GRATE**



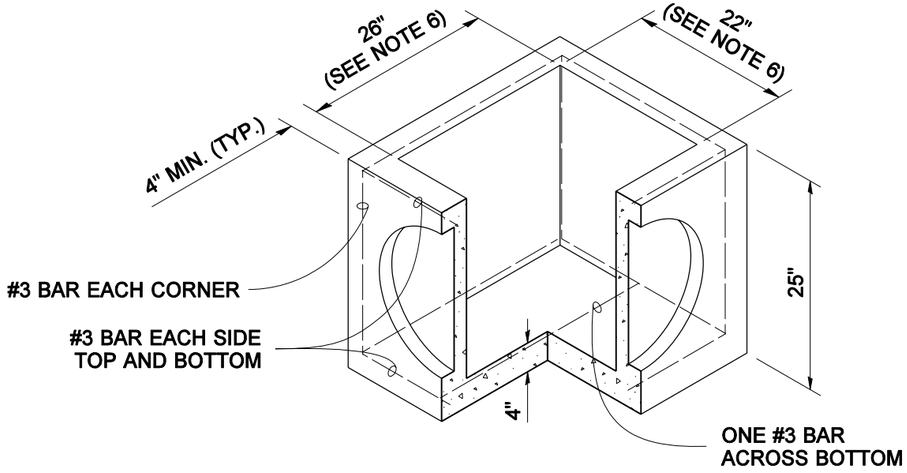

**RECTANGULAR ADJUSTMENT SECTION**

| PIPE ALLOWANCES | |
|---|---|
| **PIPE MATERIAL** | **MAXIMUM INSIDE DIAMETER** |
| REINFORCED OR PLAIN CONCRETE | 12" |
| ALL METAL PIPE | 15" |
| CPSSP * (STD. SPEC. 9-05.20) | 12" |
| SOLID WALL PVC (STD. SPEC. 9-05.12(1)) | 15" |
| PROFILE WALL PVC (STD. SPEC. 9-05.12(2)) | 15" |

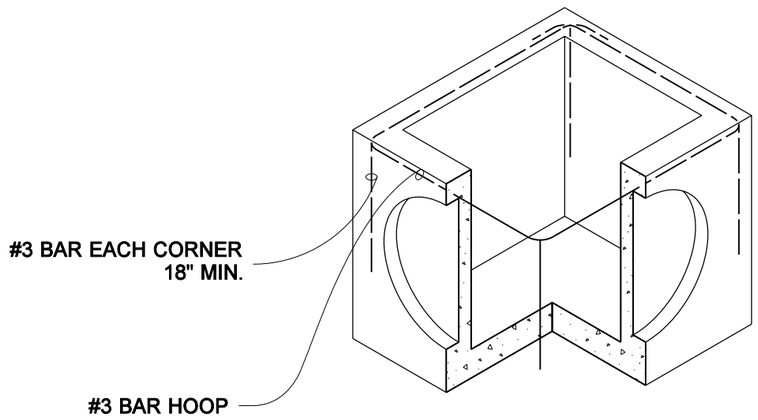
* CORRUGATED POLYETHYLENE STORM SEWER PIPE

**NOTES**

1. As acceptable alternatives to the rebar shown in the **PRECAST BASE SECTION**, fibers (placed according to the Standard Specifications), or wire mesh having a minimum area of 0.12 square inches per foot shall be used with the minimum required rebar shown in the **ALTERNATIVE PRECAST BASE SECTION**. Wire mesh shall not be placed in the knockouts.
2. The knockout diameter shall not be greater than 18". 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.




**PRECAST BASE SECTION**




SEE NOTE 1

**ALTERNATIVE PRECAST BASE SECTION**

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# CONCRETE INLET

## STANDARD PLAN B-25.60-00

SHEET 1 OF 1 SHEET

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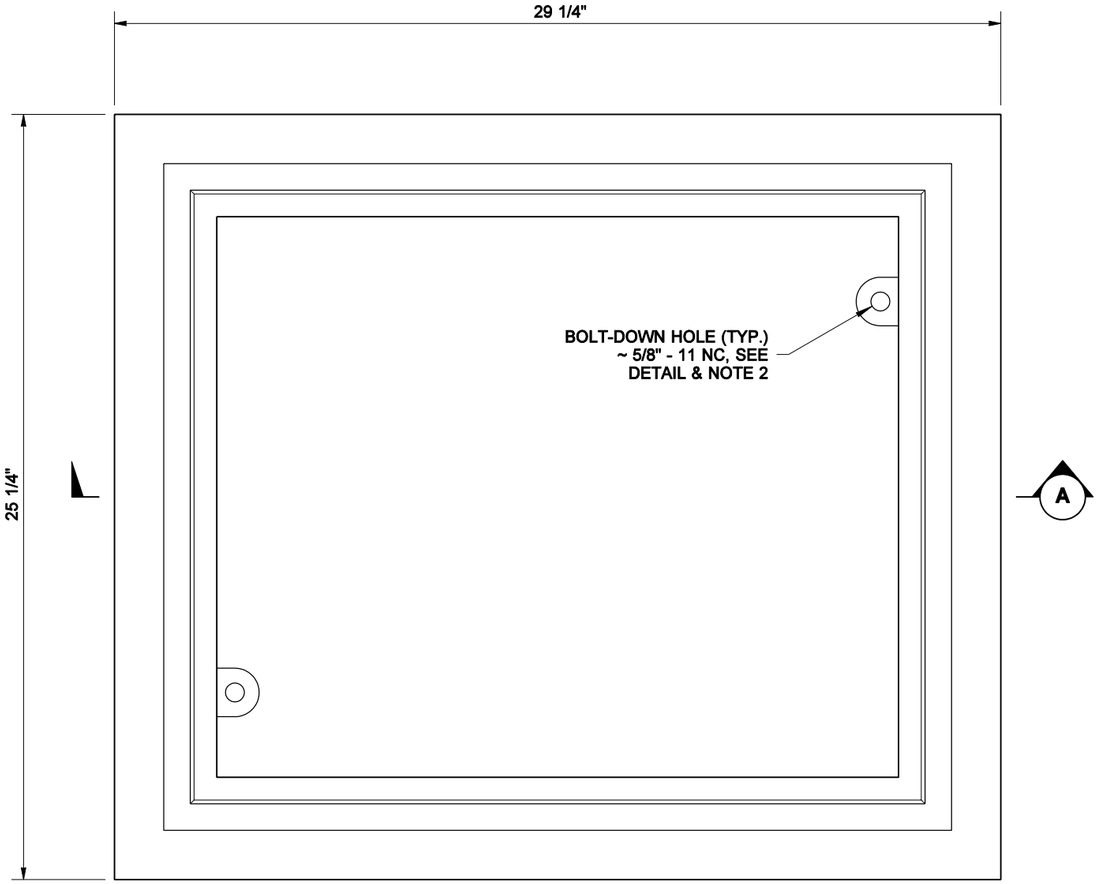
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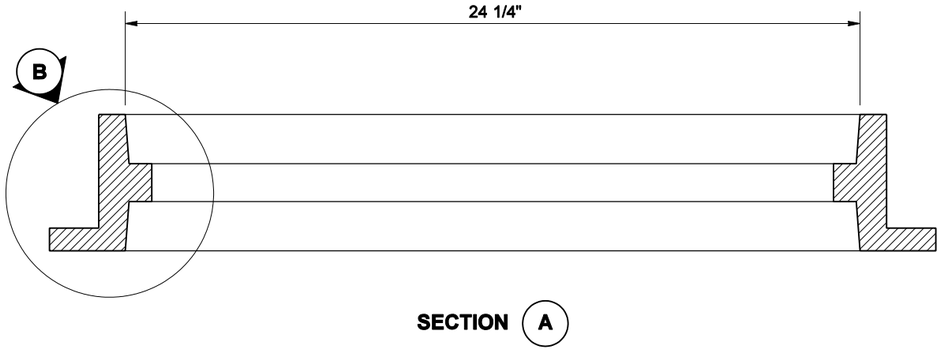
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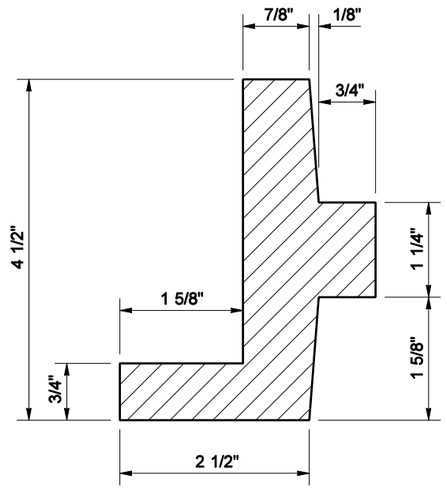

TOP



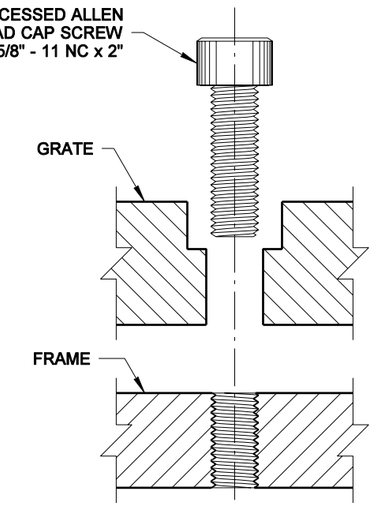

SECTION (A)

**NOTES**

1. 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.
2. 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.
3. Refer to Standard Specification 9-05.15(2) for additional requirements.

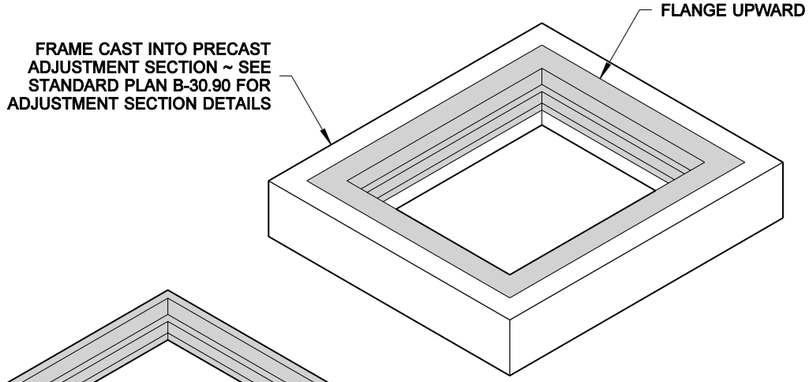


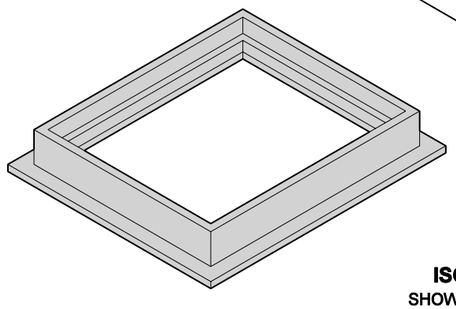

DETAIL (B)




SECTION

**BOLT-DOWN DETAIL**
SEE NOTE 2



**ISOMETRIC VIEW**
SHOWING THE VARIATIONS

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# RECTANGULAR FRAME (REVERSIBLE)

## STANDARD PLAN B-30.10-00

SHEET 1 OF 1 SHEET

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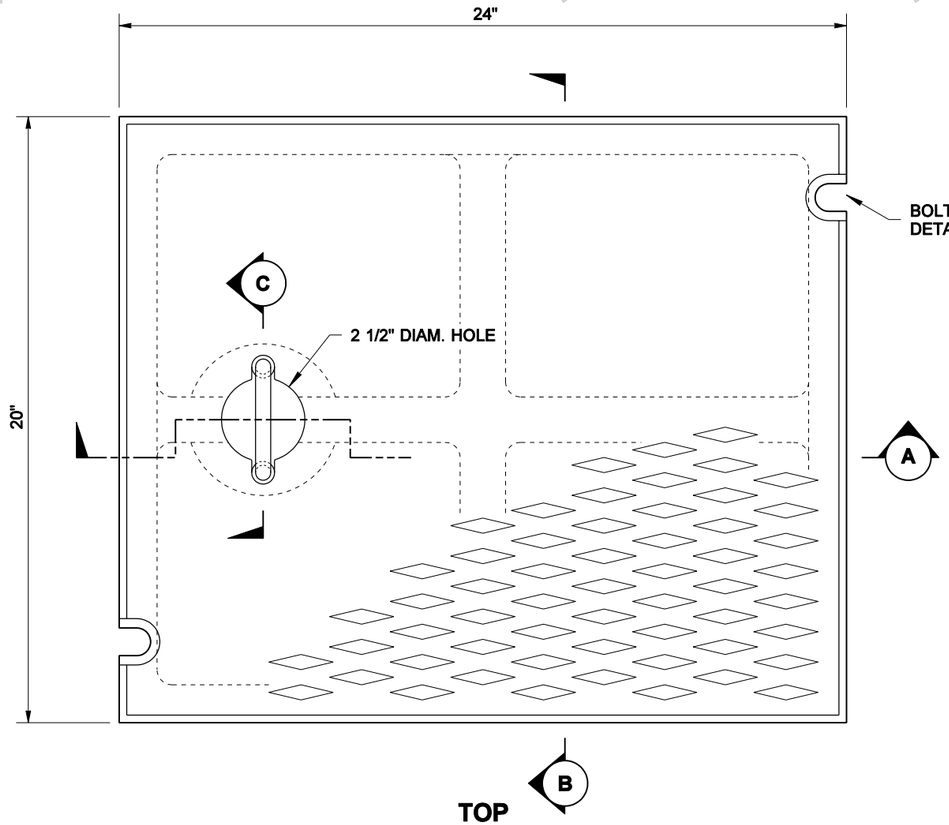
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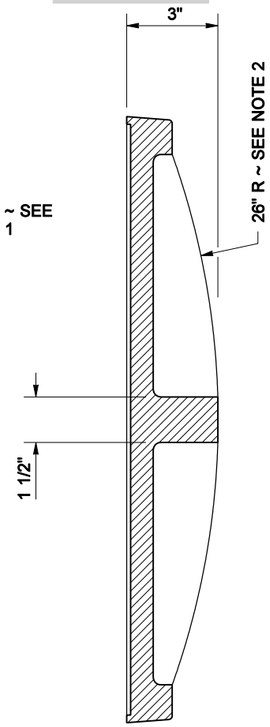
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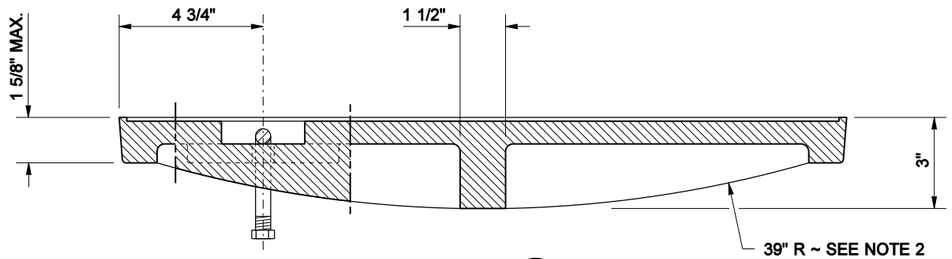
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TOP




SECTION (B)




SECTION (A)

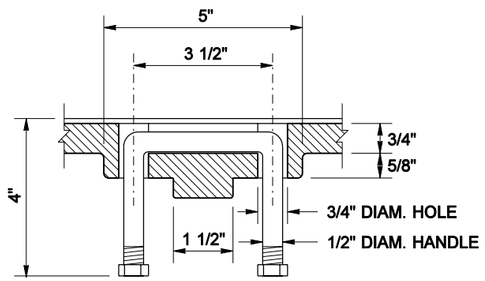
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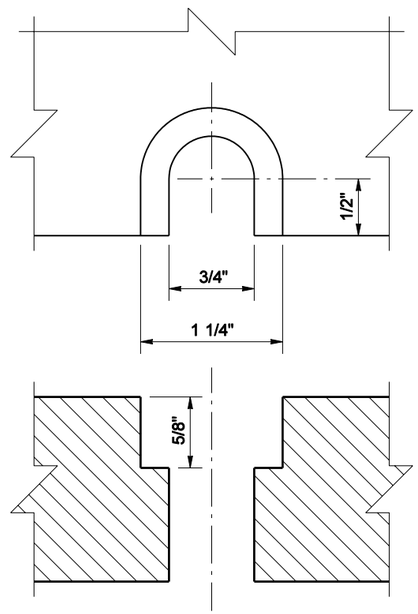
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

**NOTES**

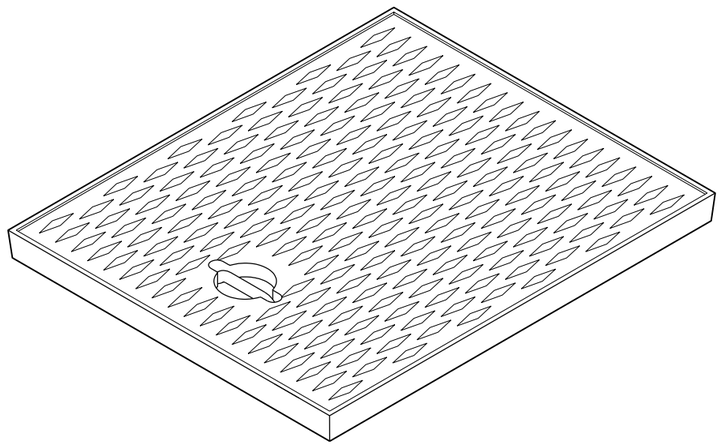
1. When bolt-down covers are specified in the Contract, provide two slots in the cover that are vertically aligned with the holes in the frame. Location of bolt-down slots varies among different manufacturers.
2. Alternative reinforcing rib designs are acceptable.
3. Refer to Standard Specification 9-05.15(2)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




SECTION (C)




**BOLT-DOWN SLOT DETAIL**
SEE NOTE 1



ISOMETRIC




EXPIRES JULY 1, 2007

# RECTANGULAR SOLID METAL COVER

## STANDARD PLAN B-30.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-08-06* — DATE

Washington State Department of Transportation

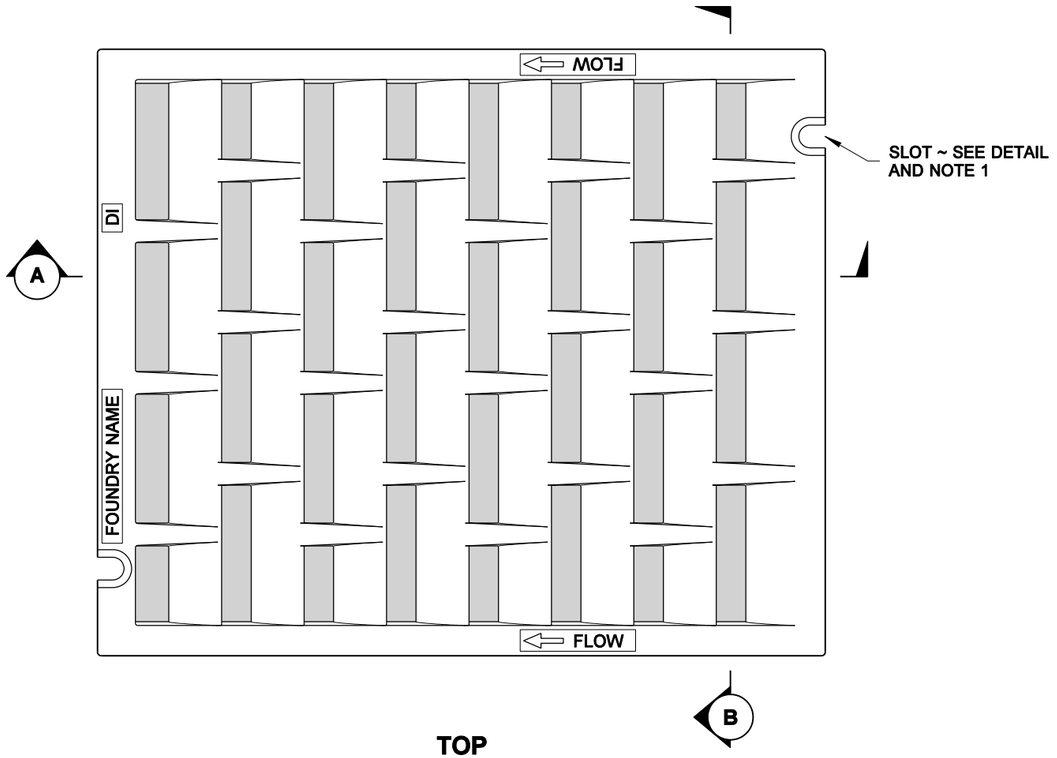
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

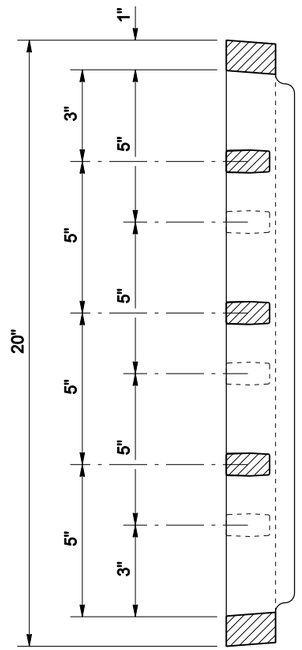
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA

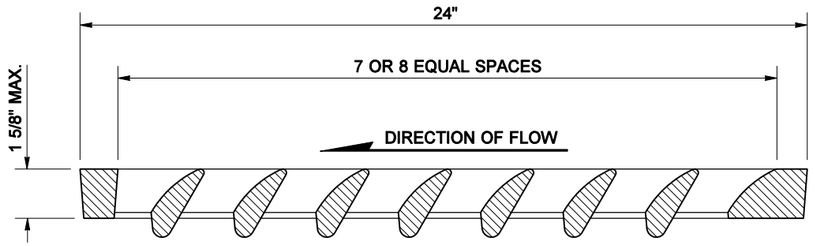
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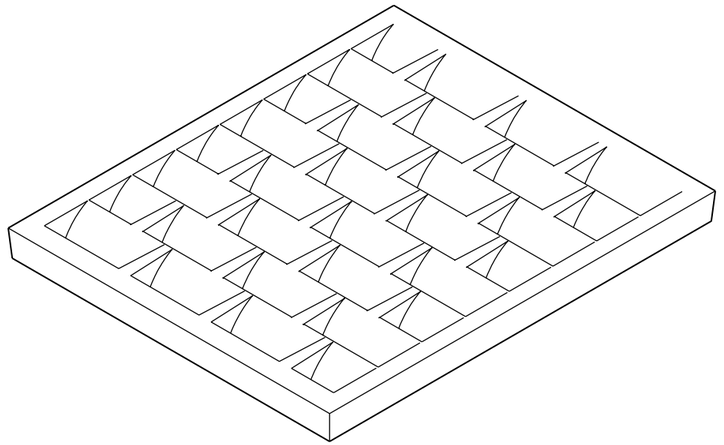

TOP




SECTION B



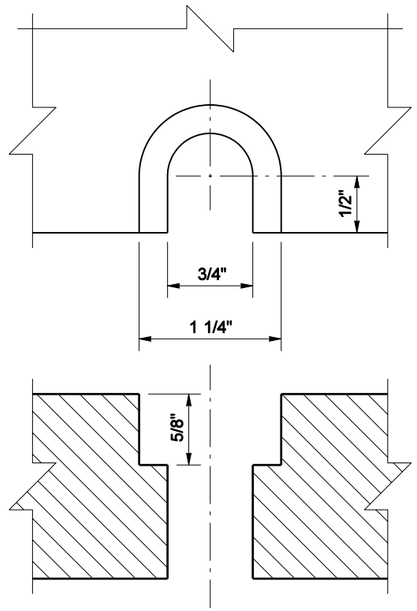

SECTION A



ISOMETRIC

**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.




**BOLT-DOWN SLOT DETAIL**
SEE NOTE 1




EXPIRES JULY 1, 2007

# RECTANGULAR VANED GRATE

## STANDARD PLAN B-30.30-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-01-06* — DATE

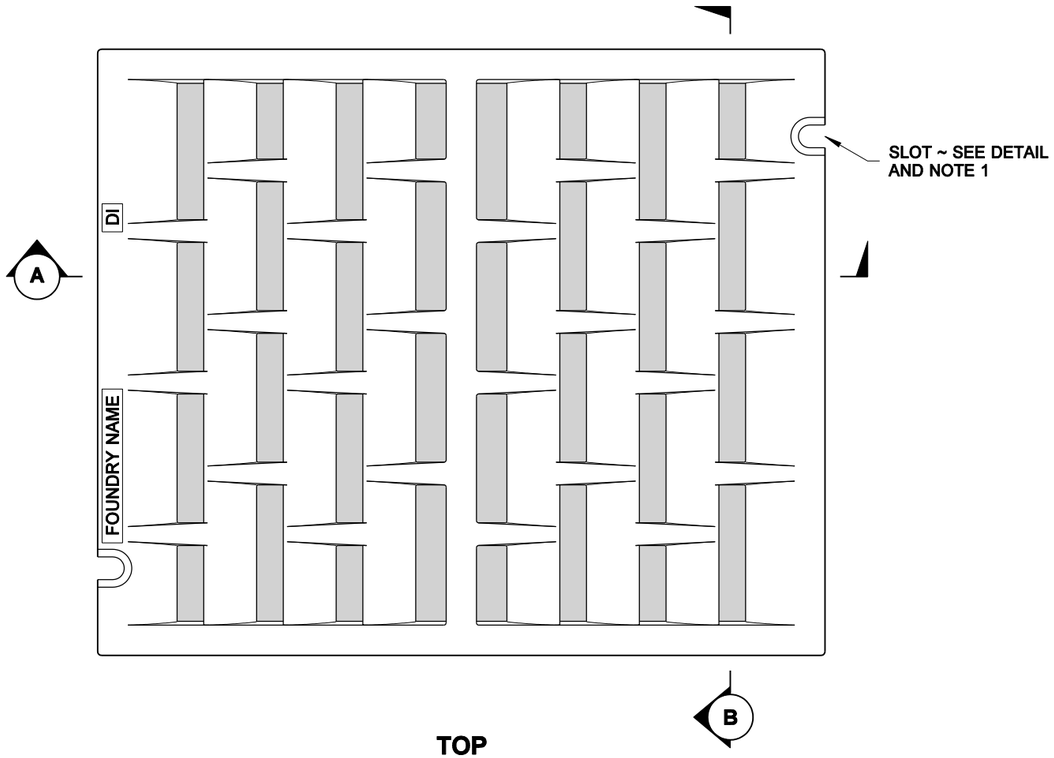
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

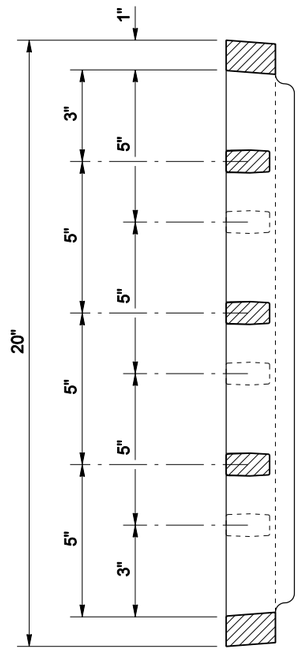
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA

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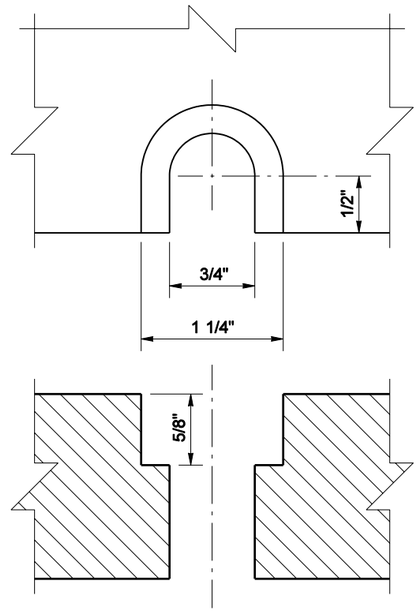

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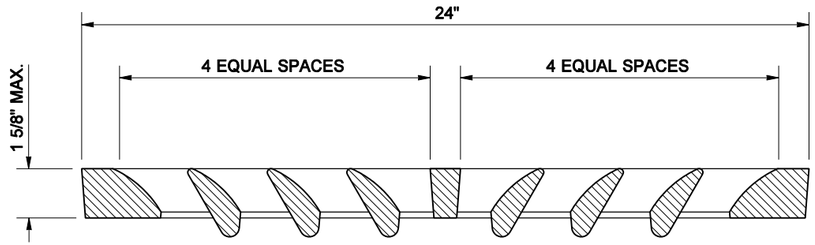

SECTION (B)

**NOTES**

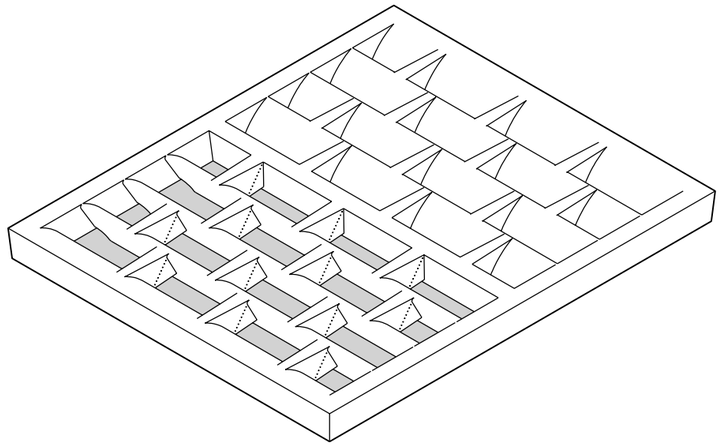
1. When bolt-down grates are specified in the Contract, provide two slots in the grate that are vertically aligned with the holes in the frame. Location of bolt-down slots varies among different manufacturers.
2. Refer to Standard Specification 9-05.15(2) for additional requirements.
3. For Frame details, see Standard Plan B-30.10.




**BOLT-DOWN SLOT DETAIL**
SEE NOTE 1




SECTION (A)



**ISOMETRIC**

MATTHEW J. WITECKI
STATE OF WASHINGTON
15588
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2007

# RECTANGULAR BI-DIRECTIONAL VANED GRATE

# STANDARD PLAN B-30.40-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

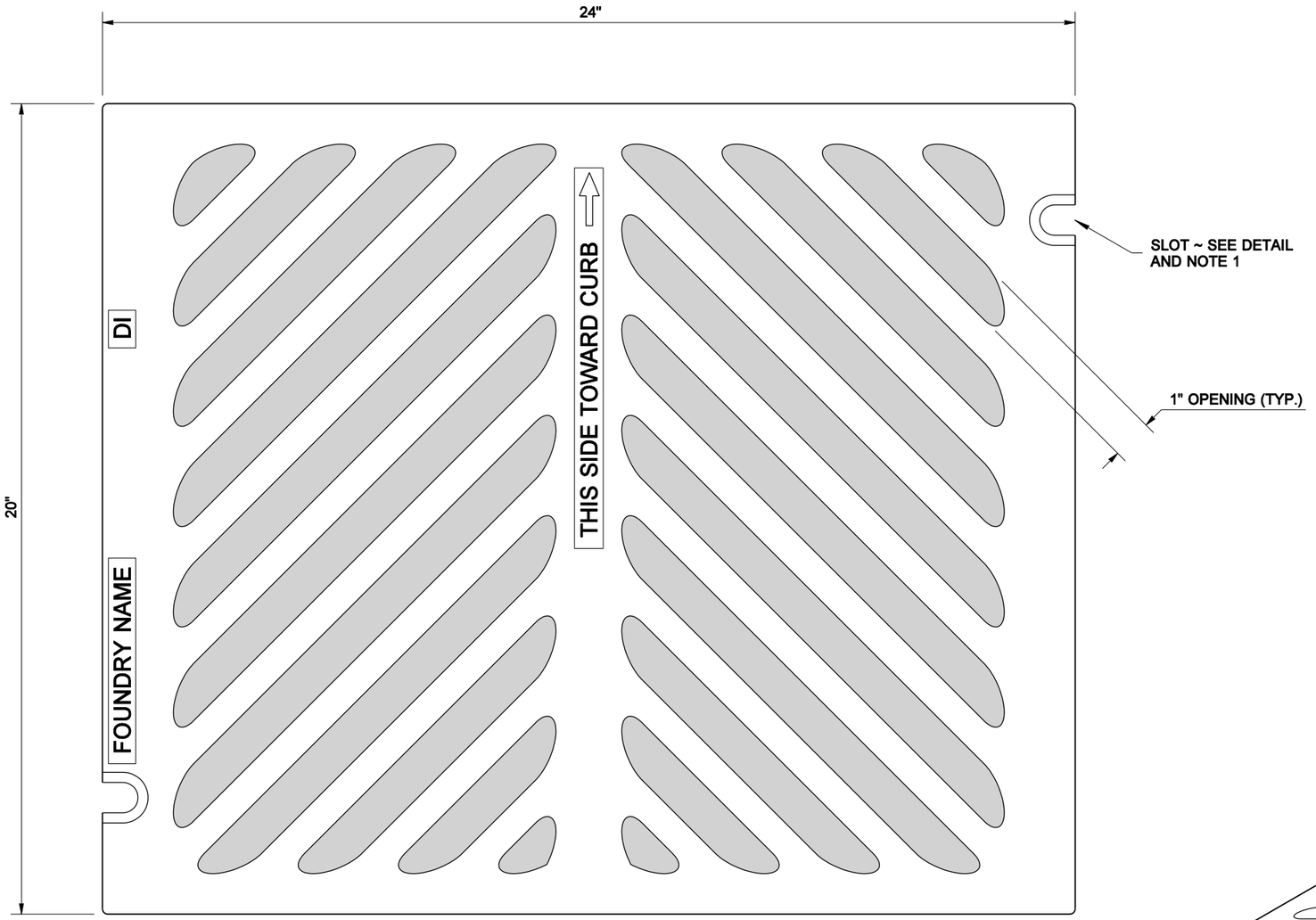
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-01-06* — DATE

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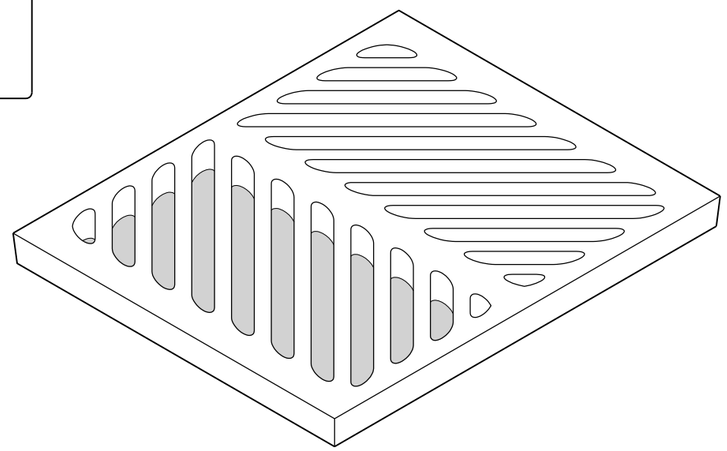
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA



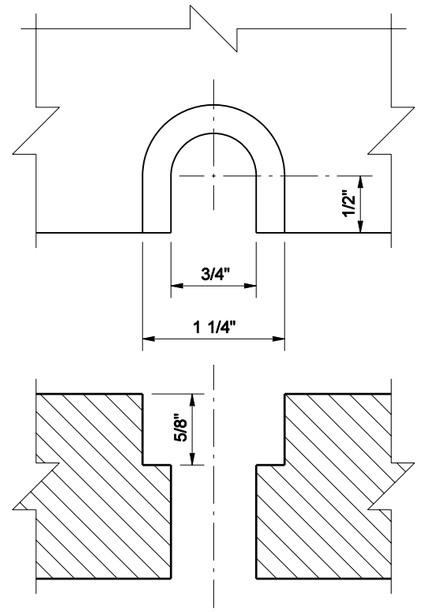

TOP



ISOMETRIC

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




**BOLT-DOWN SLOT DETAIL**
SEE NOTE 1

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MATTHEW J. WITECKI
STATE OF WASHINGTON
15588
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2007

# RECTANGULAR HERRINGBONE GRATE

## STANDARD PLAN B-30.50-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

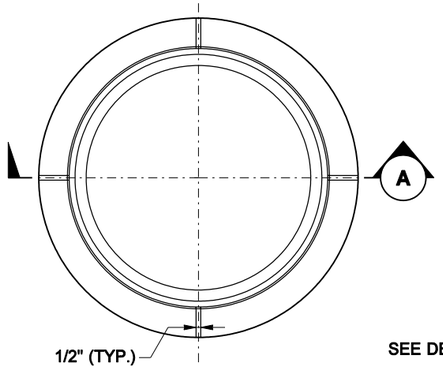
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Washington State Department of Transportation

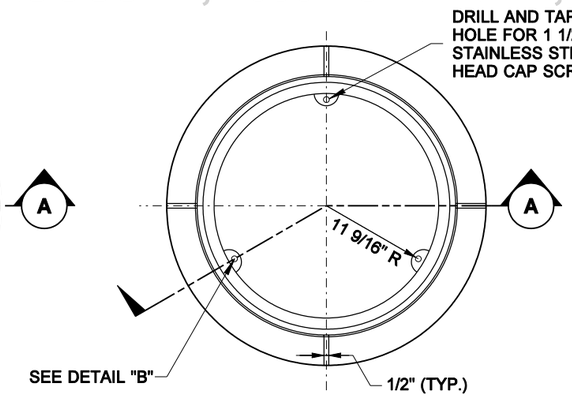
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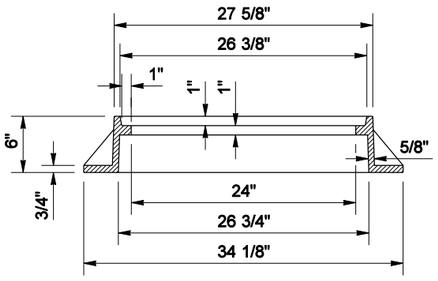
DRAWN BY: ELENA BRUNSTEIN



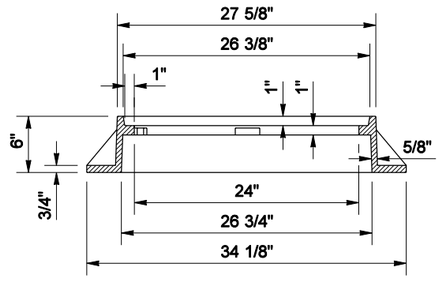

RING PLAN



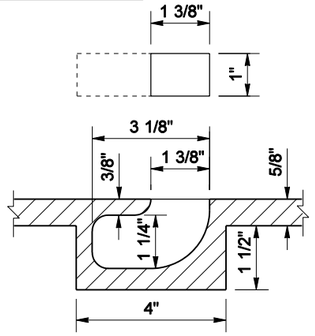

RING PLAN




RING SECTION (A)

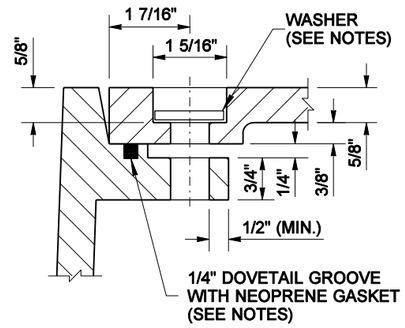



RING SECTION (A)




BLIND PICK NOTCH

DETAIL "A"

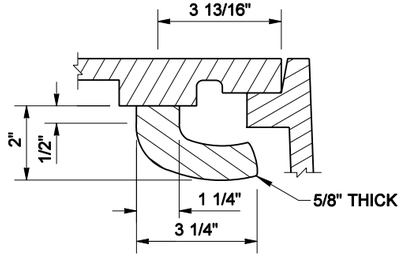



BOLT-DOWN / WATERTIGHT

DETAIL "B"

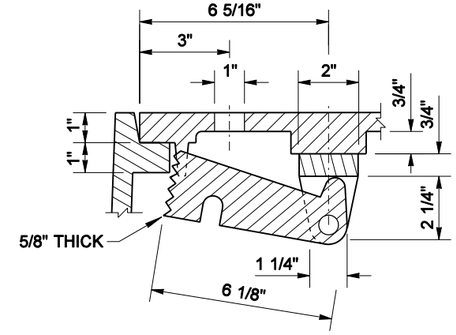
**NOTES**

1. Gasket and groove may be in the seat or underside of cover.
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).



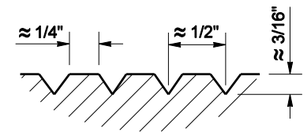

BOLT ON CAM TYPE LOCKING DEVICE

SECTION (C)

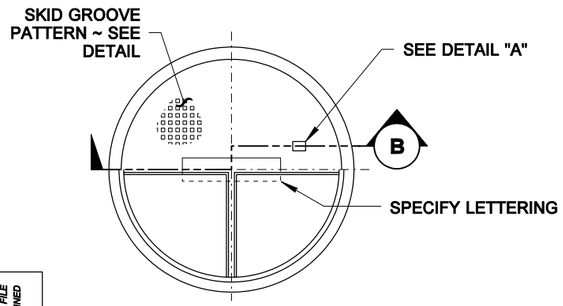



BOLT ON CAM TYPE LOCKING DEVICE

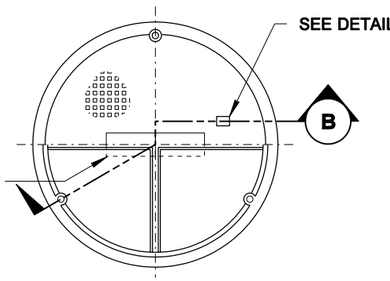
DETAIL "C"



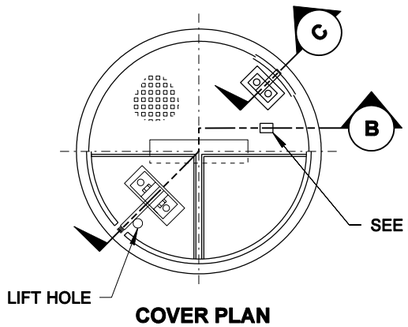

SKID GROOVE PATTERN DETAIL



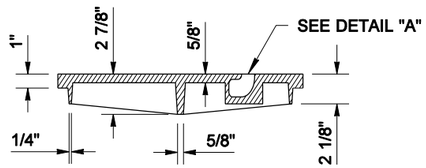

COVER PLAN




COVER PLAN




COVER PLAN

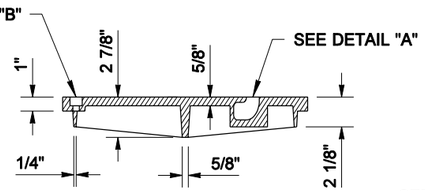



COVER SECTION (B)

(SEE NOTE 6)

STANDARD

TYPE 1

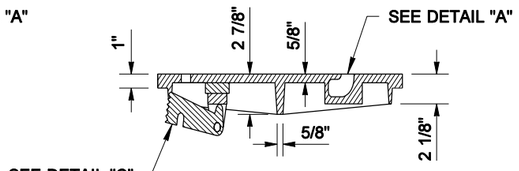



COVER SECTION (B)

(SEE NOTE 6)

BOLT-DOWN / WATERTIGHT

TYPE 2

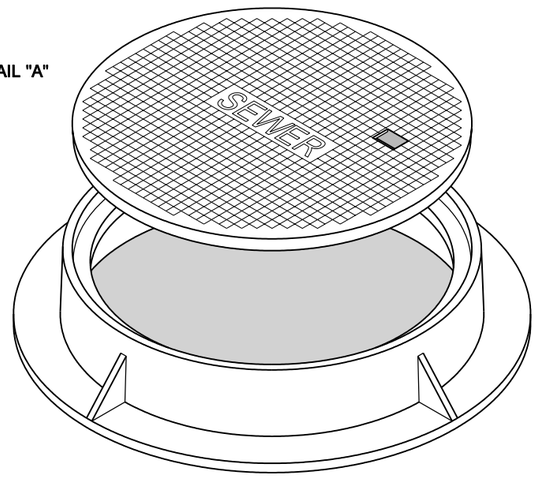



COVER SECTION (B)

(SEE NOTE 6)

CAMLOCK

TYPE 3




ISOMETRIC VIEW

MATTHEW J. WITECKI
STATE OF WASHINGTON
15588
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2007

# CIRCULAR FRAME (RING) AND COVER

# STANDARD PLAN B-30.70-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-01-06* — DATE

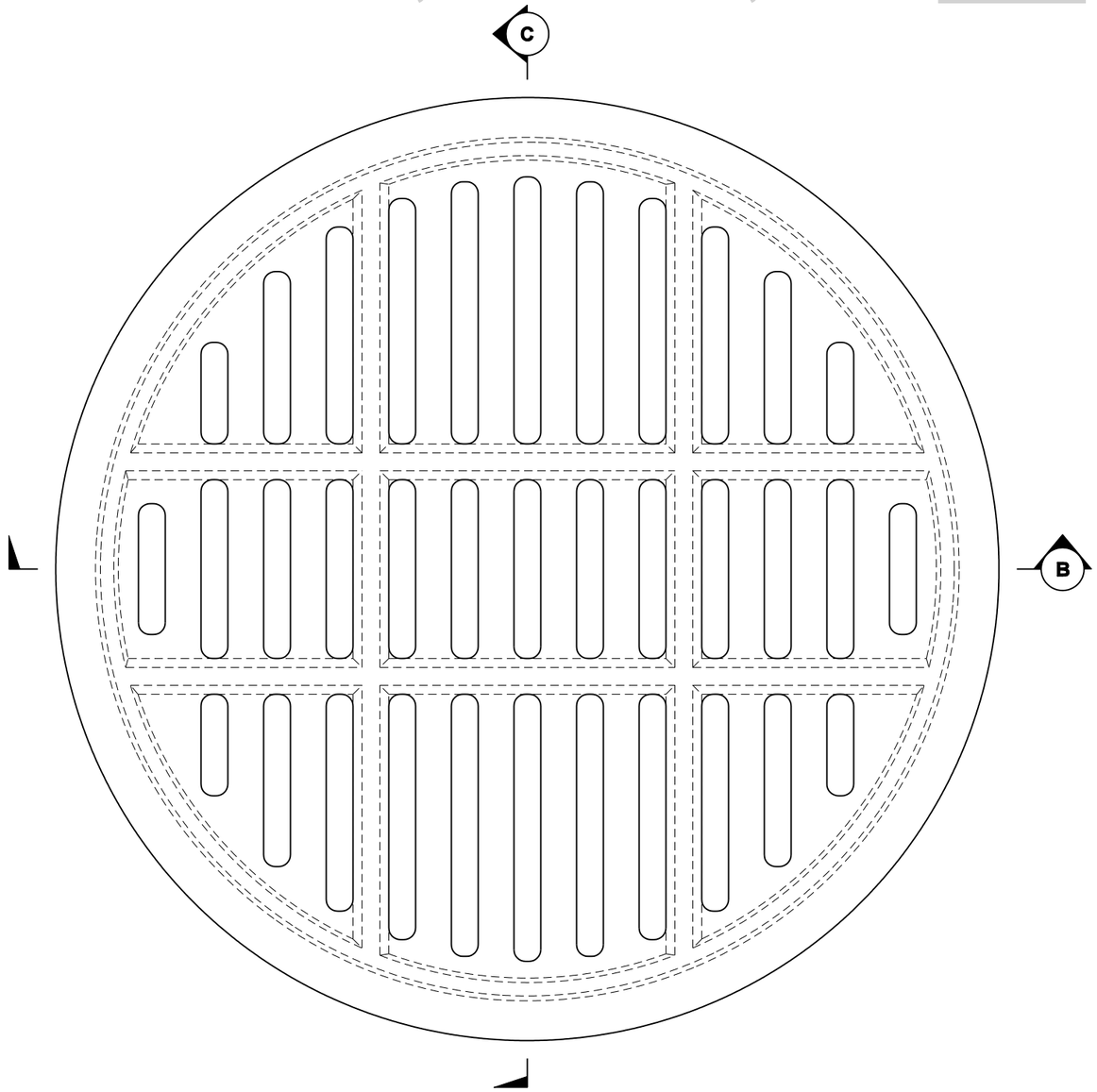
Washington State Department of Transportation

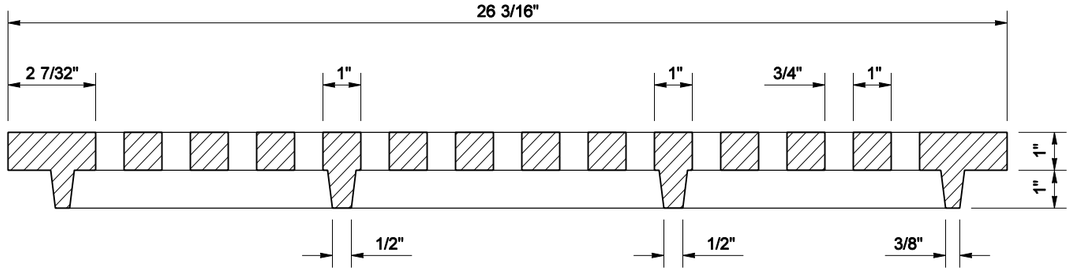
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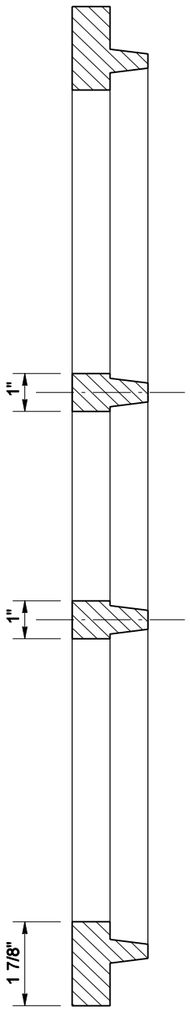
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN



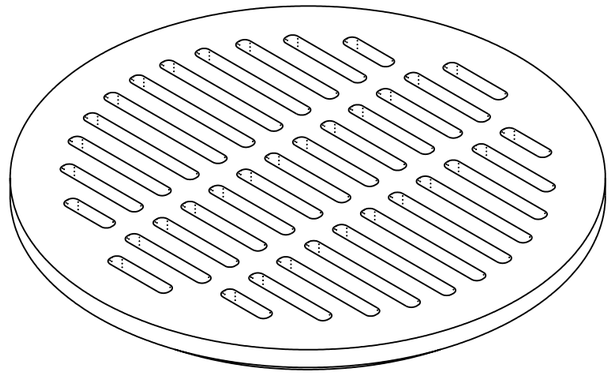

SECTION B




SECTION C

**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.



**ISOMETRIC VIEW**




EXPIRES JULY 1, 2007

# CIRCULAR GRATE

## STANDARD PLAN B-30.80-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

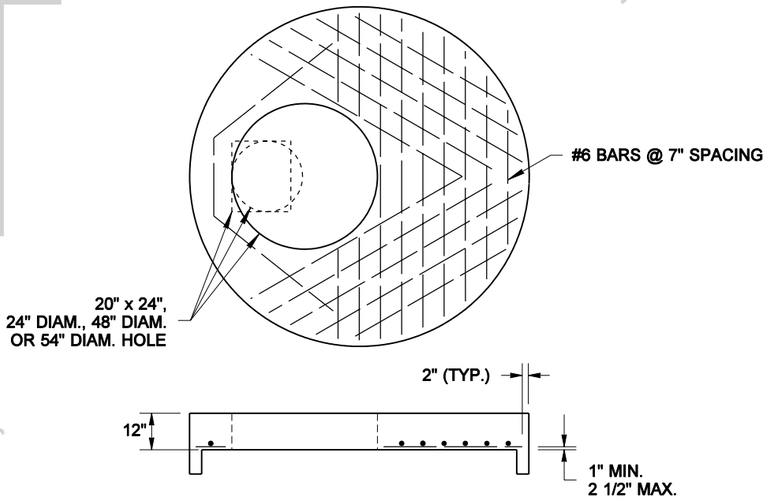
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-08-06* — DATE

Washington State Department of Transportation

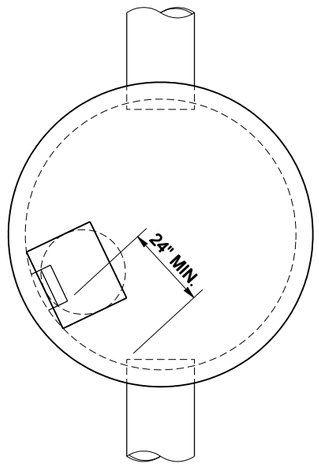
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

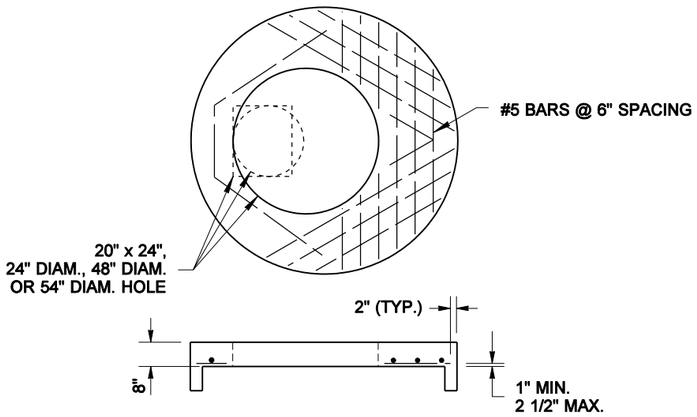
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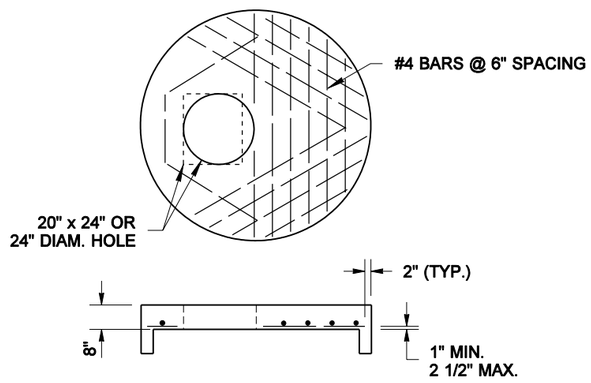

**84" or 96" FLAT SLAB TOP**



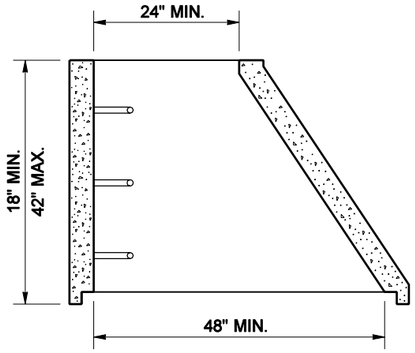

**TYPICAL ORIENTATION FOR ACCESS AND STEPS**



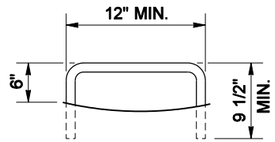

**72" FLAT SLAB TOP**



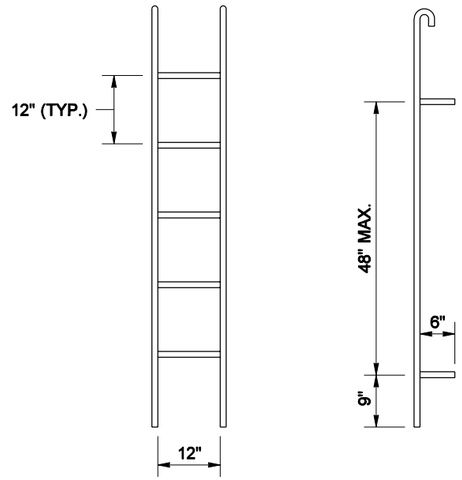

**48", 54", or 60" FLAT SLAB TOP**



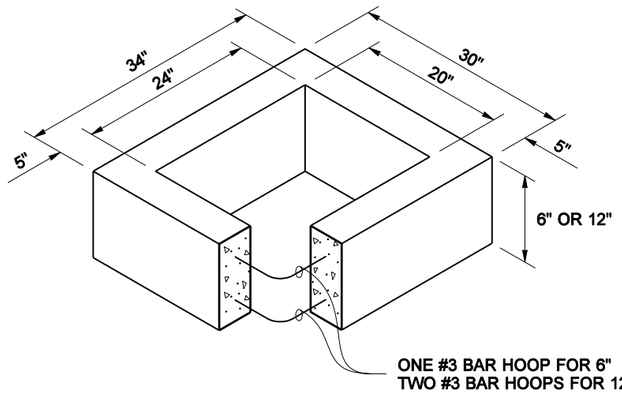

**ECCENTRIC CONE SECTION**




**STEP**

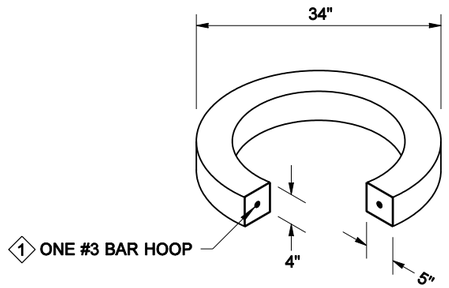



**PREFABRICATED LADDER**




**RECTANGULAR ADJUSTMENT SECTION**

1 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.




**CIRCULAR ADJUSTMENT SECTION**

MATTHEW J. WITECKI
STATE OF WASHINGTON
15588
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2007

# MISCELLANEOUS DETAILS FOR DRAINAGE STRUCTURES STANDARD PLAN B-30.90-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-08-06* — DATE

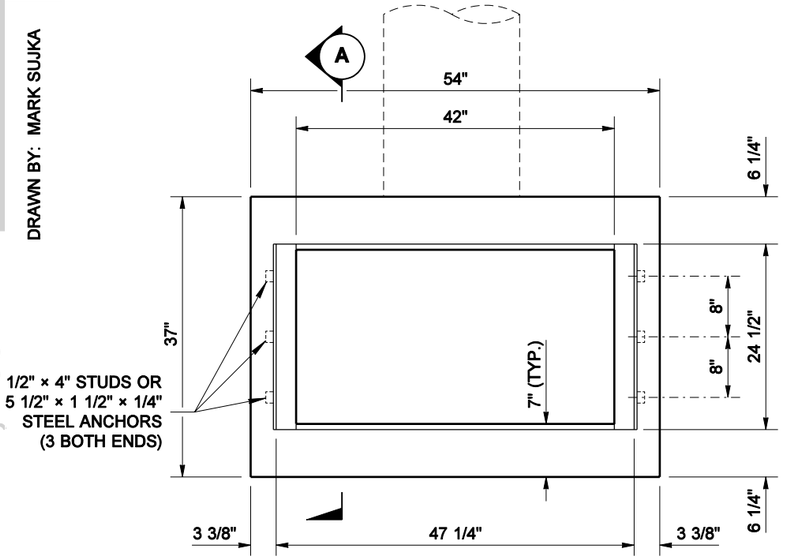
Washington State Department of Transportation

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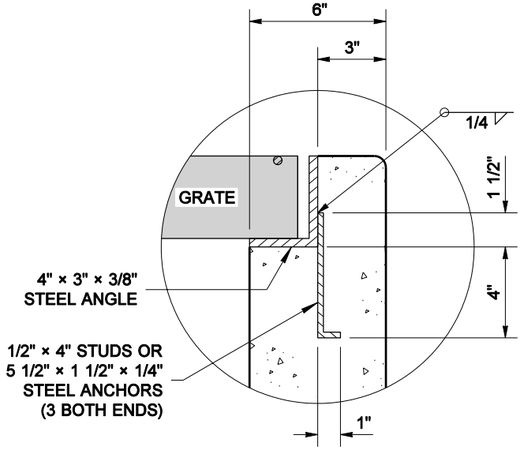
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

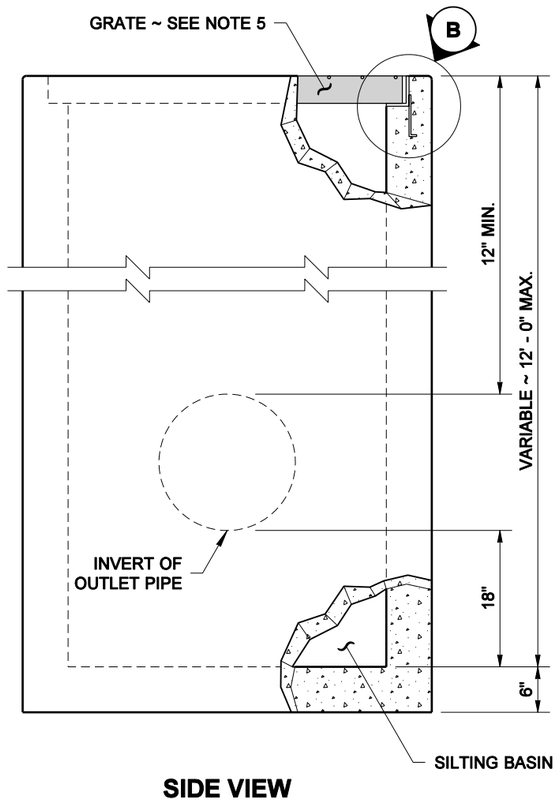
DRAWN BY: MARK SUJKA




**TOP VIEW**




**DETAIL (B)**



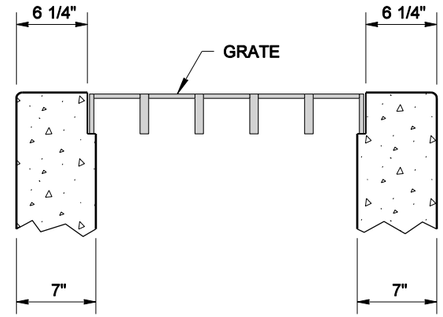

**SIDE VIEW**

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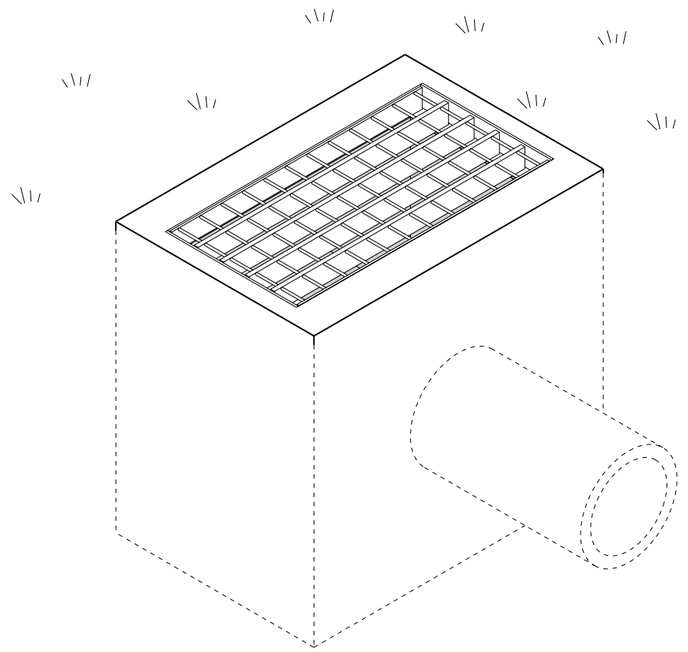
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

**NOTES**

1. The Steel Angles shall be set so that each bearing bar of prefabricated grate shall have full bearing on both ends. The finished top of concrete shall be even with the grate surface.
2. All exposed concrete shall be finished with a 1/2" radius.
3. The grade line of the top inside of any pipe shall enter no lower than the grade line of the top inside of the outlet pipe.
4. Pipes may enter through the knockouts on any side at any reasonable angle, provided the outside of the pipe can be contained between two opposite walls.
5. See contract for type of grate specified. See Standard Plan B-40.20 and B-40.40 for grate details.




**SECTION (A)**



**ISOMETRIC VIEW**

MATTHEW J. WITECKI
STATE OF WASHINGTON
15588
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2007

# GRATE INLET TYPE 1 (CAST-IN-PLACE)

## STANDARD PLAN B-35.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

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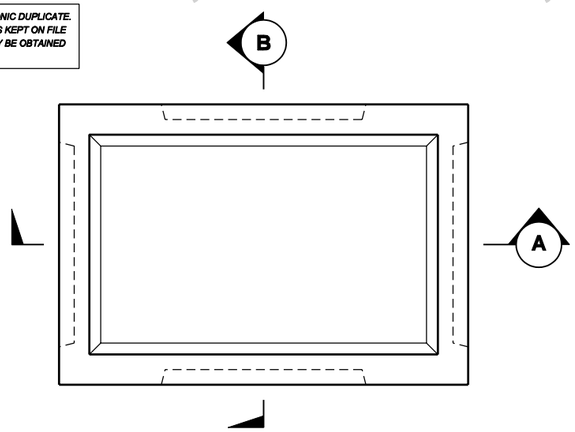
Washington State Department of Transportation

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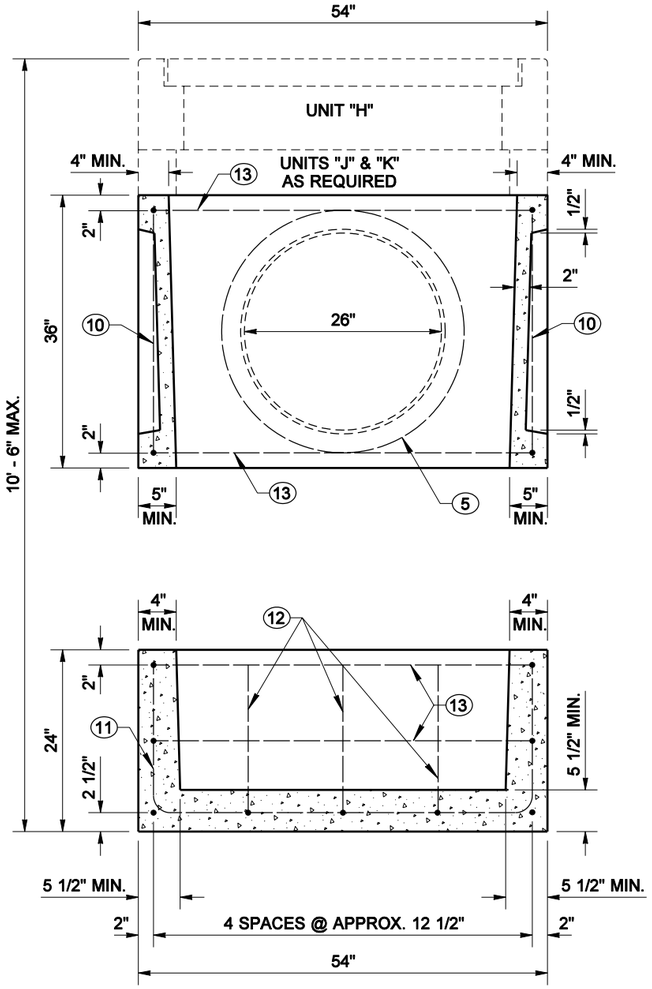
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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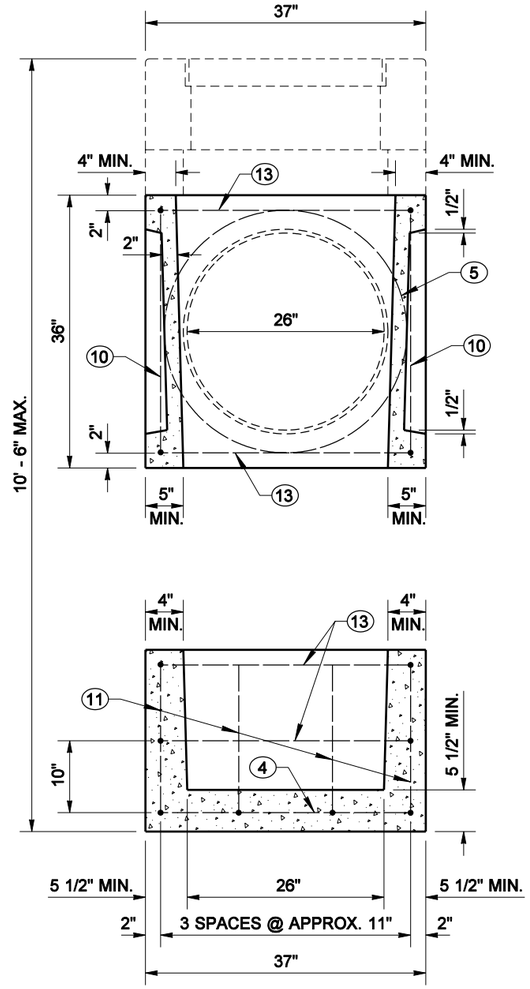
DRAWN BY: ADAM COCHRAN



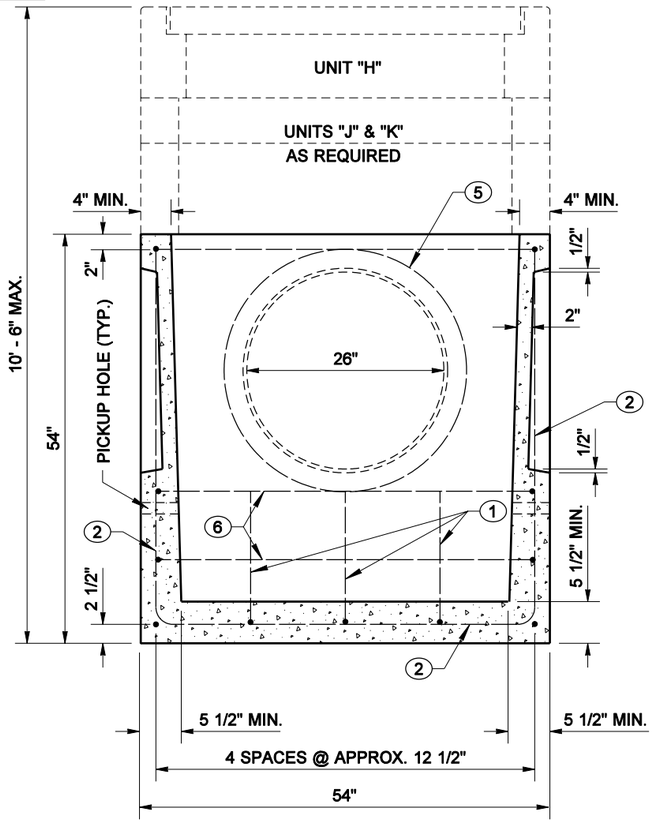

TOP VIEW



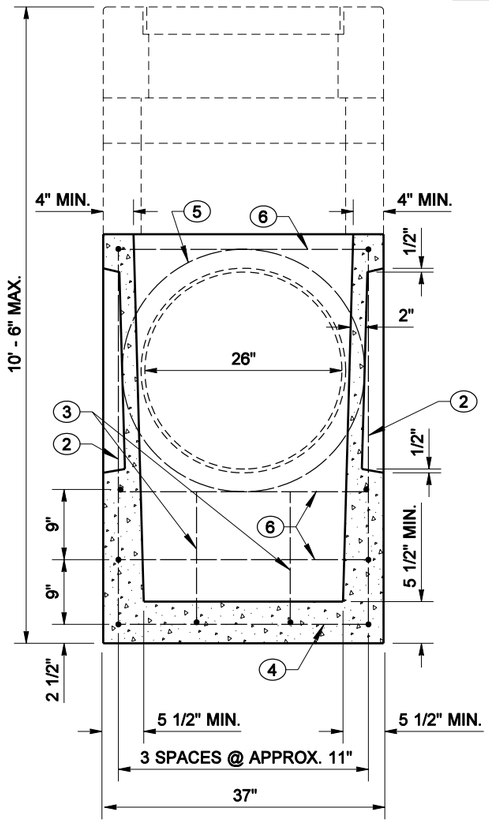

SECTION (A) TWO PIECE BASE




SECTION (B) TWO PIECE BASE




SECTION (A) ONE PIECE BASE




SECTION (B) ONE PIECE BASE

| PIPE ALLOWANCES | |
|---|---|
| **PIPE MATERIAL** | **MAXIMUM INSIDE DIAMETER** |
| REINFORCED OR PLAIN CONCRETE | 18" |
| ALL METAL PIPE | 21" |
| CPSSP * (STD. SPEC. 9-05.20) | 18" |
| SOLID WALL PVC (STD. SPEC. 9-05.12(1)) | 21" |
| PROFILE WALL PVC (STD. SPEC. 9-05.12(2)) | 21" |

* CORRUGATED POLYETHYLENE STORM SEWER PIPE




EXPIRES JULY 1, 2007

# GRATE INLET TYPE 2

## STANDARD PLAN B-35.40-00

SHEET 1 OF 2 SHEETS

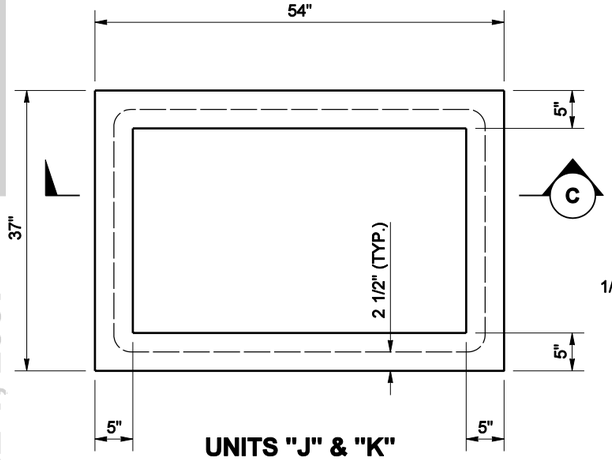
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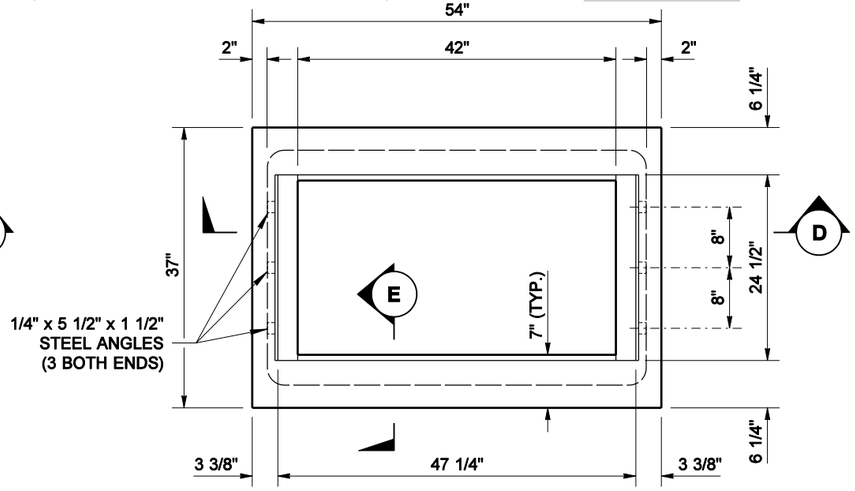
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

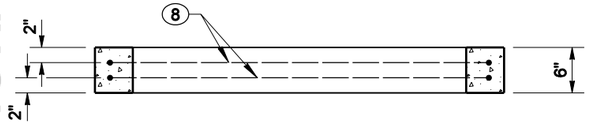
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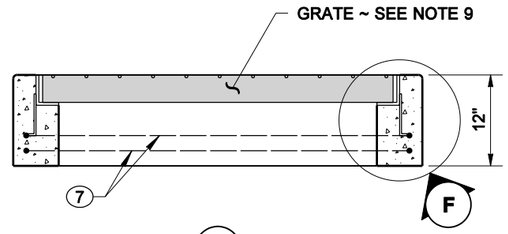

UNITS "J" & "K"



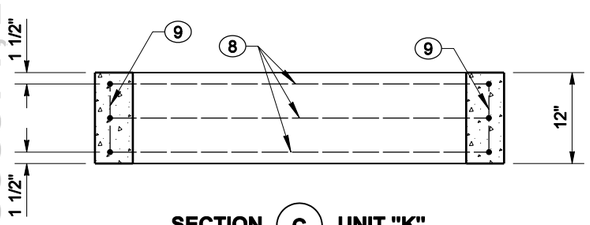

UNIT "H"



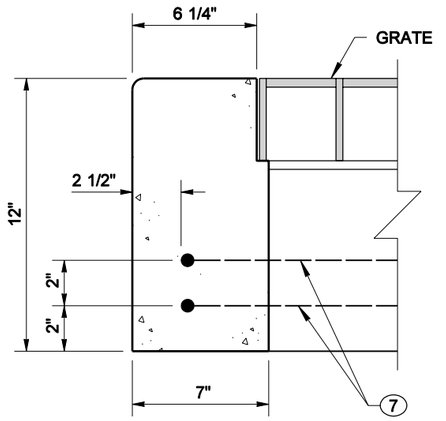

SECTION (C) UNIT "J"




SECTION (D) UNIT "H"




SECTION (C) UNIT "K"




SECTION (E) UNIT "H"

## NOTES

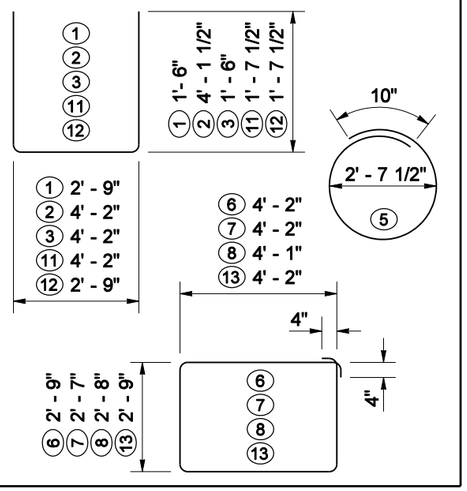
1. The Steel Angles shall be set so that each bearing bar of prefabricated grate shall have full bearing on both ends. The finished top of concrete shall be even with the grate surface.
2. Top of inlet grate shall be placed at ground level to present an unobstructed ditch or median section.
3. All exposed concrete edges shall be finished with a 1/2" radius.
4. Pipes may enter through the knockouts on any side at any reasonable angle, provided the outside of the pipe can be contained between two opposite walls.
5. The flow line of the outlet pipe shall be 18" minimum above the inside bottom of the inlet structure.
6. The grade line of the top inside of any inlet pipe shall enter no lower than the grade line of the top inside of the outlet pipe.
7. Unit "H" and optional extension units "J" and "K" shall be grouted in place to the satisfaction of the Engineer.
8. All pickup holes shall be grouted full after the basin has been placed.
9. See contract for type of grate specified. See Standard Plan B-40.20 and B-40.40 for grate details.

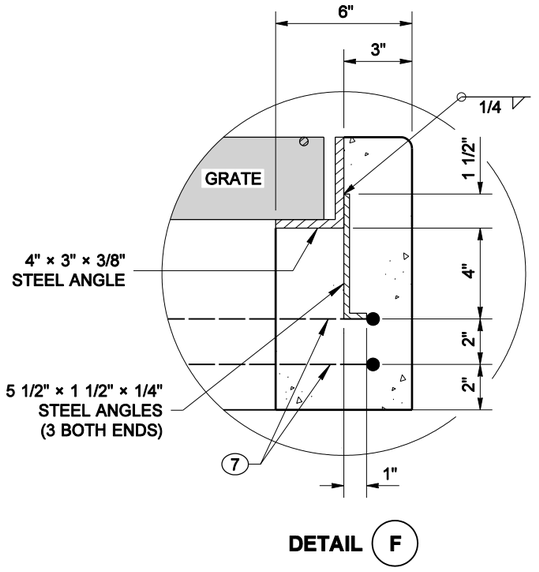
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**BAR LIST**

| MARK | LOCATION | QTY. | SIZE | LENGTH | DESCRIPTION |
|---|---|---|---|---|---|
| (1) | BOTTOM SLAB AND SIDE WALL | 3 | 3 | 5' - 9" | |
| (2) | BOTTOM SLAB AND SIDE WALL | 2 | | 12' - 5" | |
| (3) | BOTTOM SLAB AND SIDE WALL | 2 | | 7' - 2" | |
| (4) | BOTTOM SLAB AND SIDE WALL | 2 | | 2' - 9" | STRAIGHT |
| (5) | WALL | 4 | | 9' - 1" | HOOP |
| (6) | SIDE WALL | 3 | | 14' - 6" | HOOP |
| (7) | UNIT H | 2 | | 14' - 2" | HOOP |
| (8) | UNIT J | 2 | | 14' - 2" | HOOP |
| (8) | UNIT K | 3 | | 14' - 2" | HOOP |
| (9) | UNIT K | 4 | | 0' - 9" | STRAIGHT |
| (10) | SIDE WALL | 8 | | 2' - 8" | STRAIGHT |
| (11) | BOTTOM SLAB AND SIDE WALL | 4 | | 7' - 5" | |
| (12) | BOTTOM SLAB AND SIDE WALL | 3 | | 6' - 0" | |
| (13) | SIDE WALL | 4 | | 14' - 6" | HOOP |

**BENDING DIAGRAM**
(ALL DIMENSIONS ARE OUT TO OUT)




DETAIL (F)

MATTHEW J. WITECKI
STATE OF WASHINGTON
15588
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2007

# GRATE INLET TYPE 2

# STANDARD PLAN B-35.40-00

SHEET 2 OF 2 SHEETS

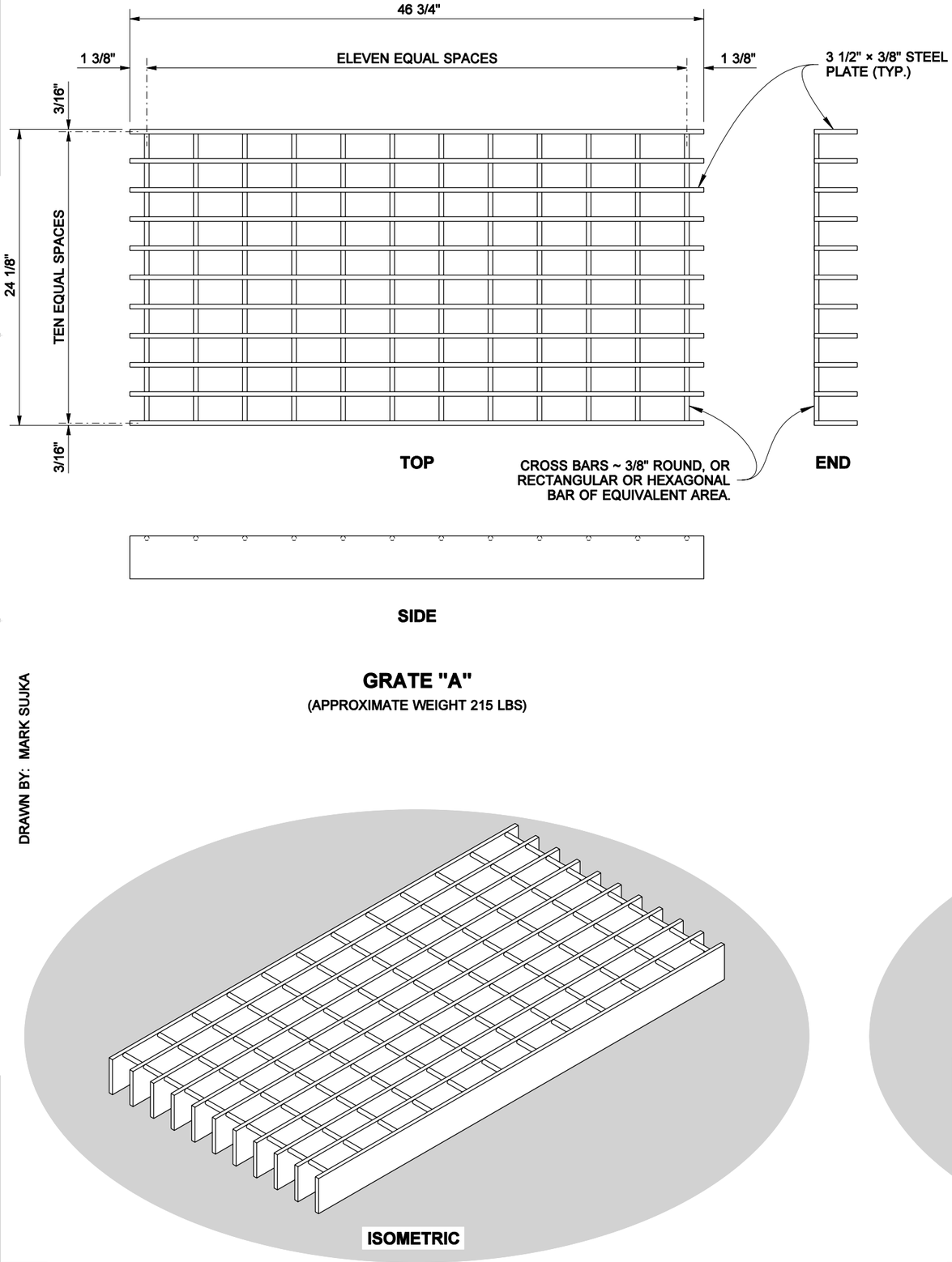
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*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-08-06* — DATE

Washington State Department of Transportation

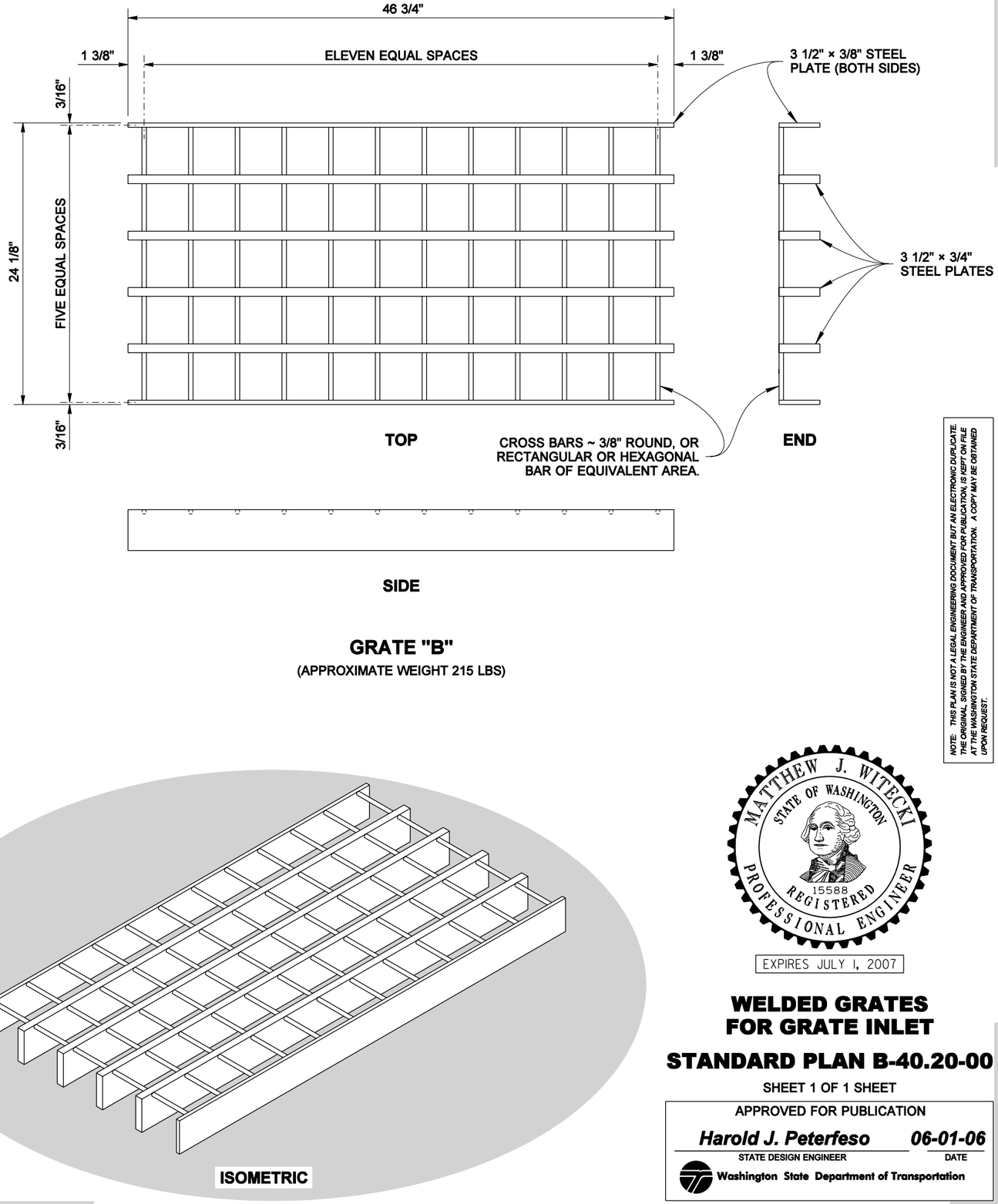
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**GRATE "A"**
(APPROXIMATE WEIGHT 215 LBS)




**GRATE "B"**
(APPROXIMATE WEIGHT 215 LBS)




DRAWN BY: MARK SUJKA

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MATTHEW J. WITECKI
STATE OF WASHINGTON
15588
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2007

# WELDED GRATES FOR GRATE INLET

## STANDARD PLAN B-40.20-00

SHEET 1 OF 1 SHEET

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*Harold J. Peterfeso* — STATE DESIGN ENGINEER
*06-01-06* — DATE

Washington State Department of Transportation

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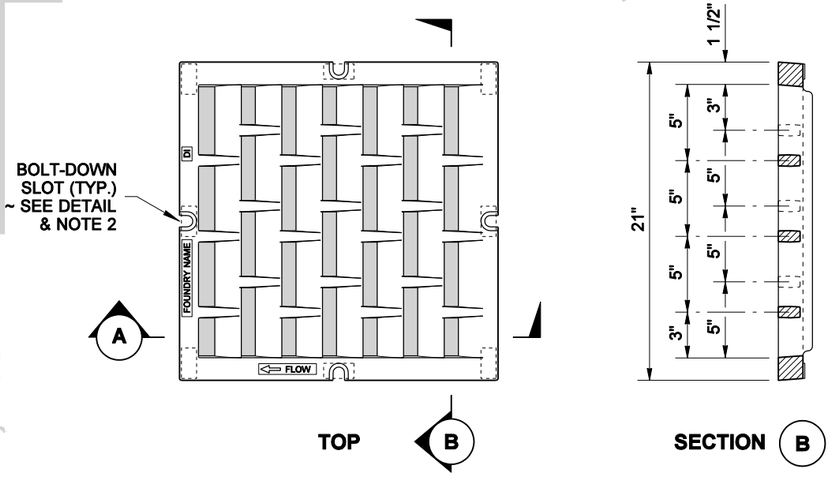
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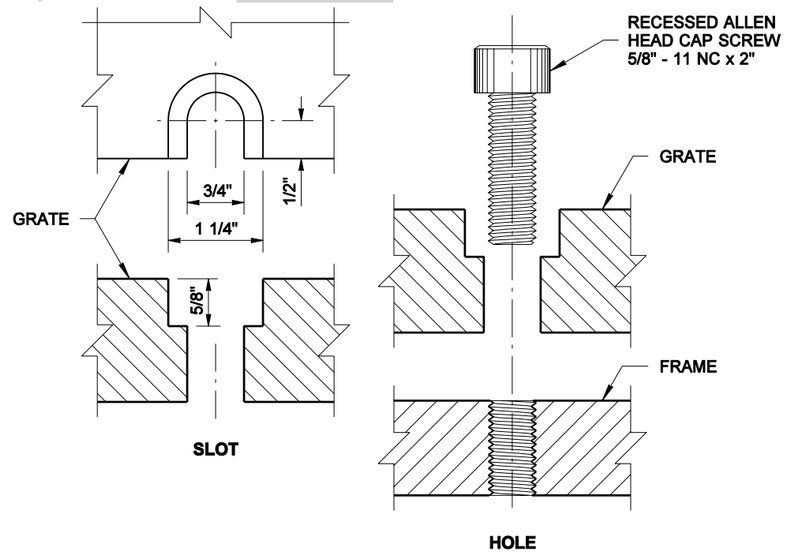
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA



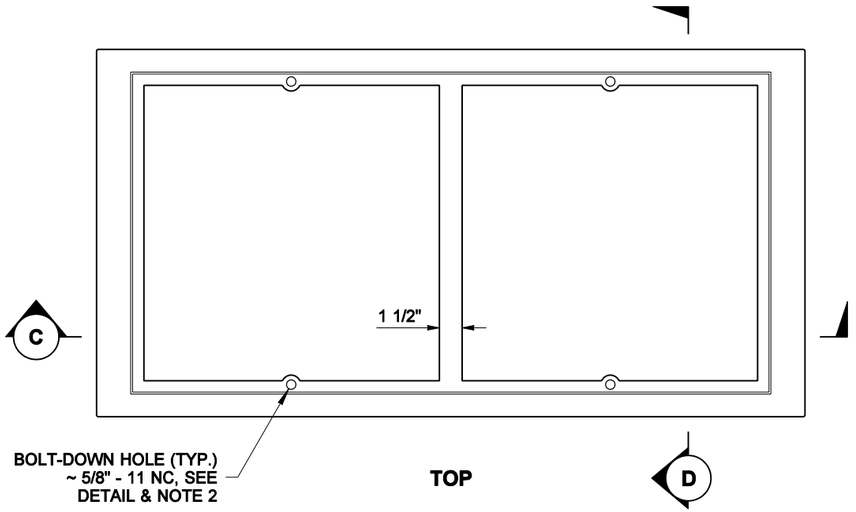

## GRATE



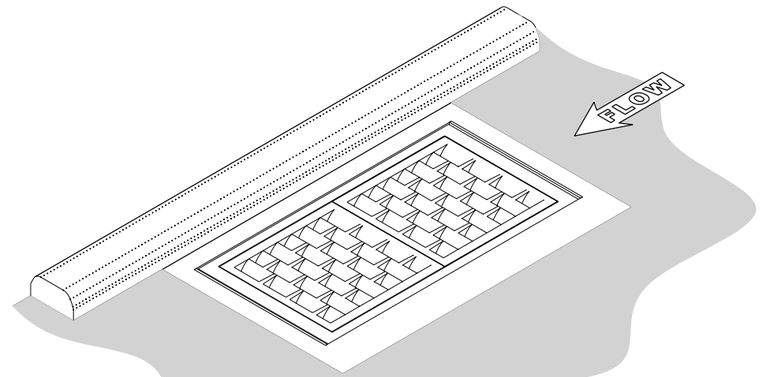

**BOLT-DOWN DETAILS**
SEE NOTE 2

**NOTES**

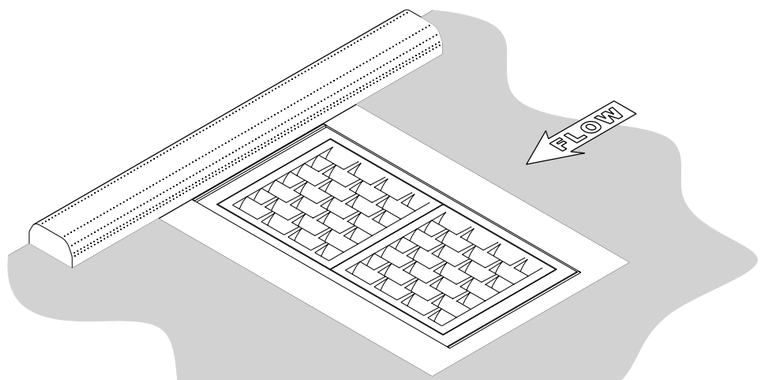
1. The Contract may specify a rotated inlet installation. Orient the Grates in the Frame so they intercept flow.
2. When bolt-down grates are specified in the Contract, provide two slots in the grate that are centered with the holes in the frame. Location of bolt-down slots varies among different manufacturers.
3. Refer to Standard Specification 9-05.15(2) for additional requirements.




## FRAME




NORMAL INSTALLATION




ROTATED INSTALLATION

**ISOMETRIC VIEWS**
SEE NOTE 1

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EXPIRES JULY 1, 2007

# FRAME AND DUAL VANED GRATES FOR GRATE INLET STANDARD PLAN B-40.40-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-01-06* DATE

Washington State Department of Transportation

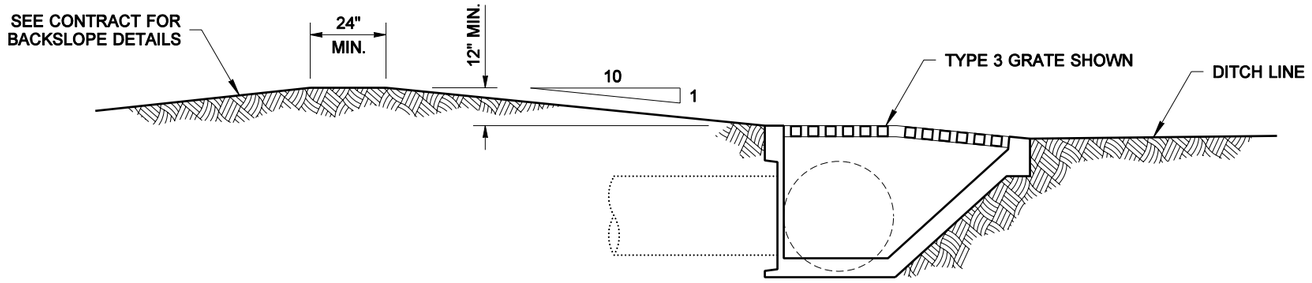
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

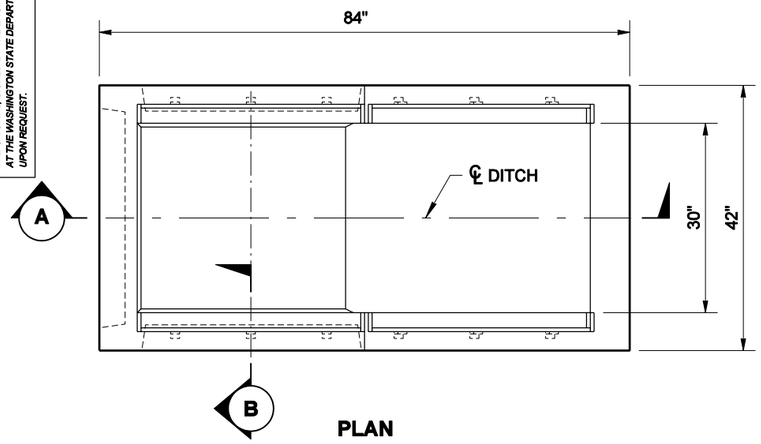
DRAWN BY: MARK SUJKA

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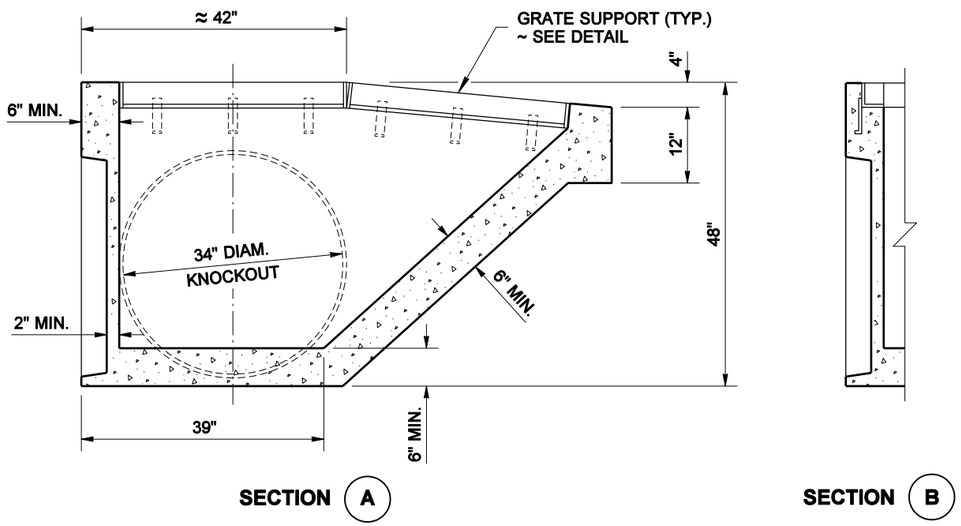



SECTION ON DITCH LINE

**DIKE INSTALLATION FOR PREFERRED SLOPE**



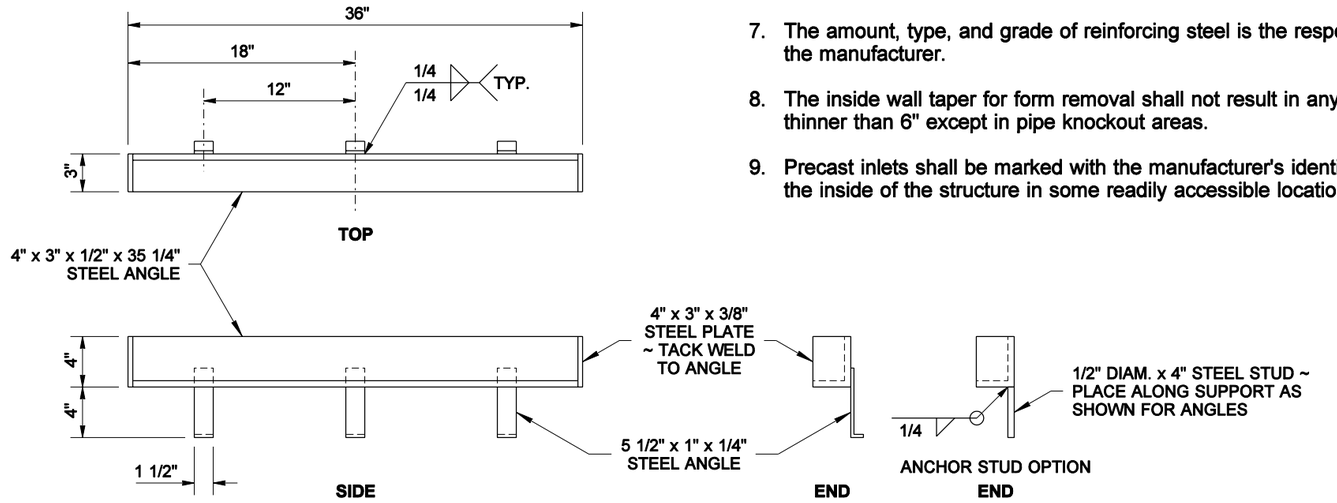

**PLAN**




**SECTION A**



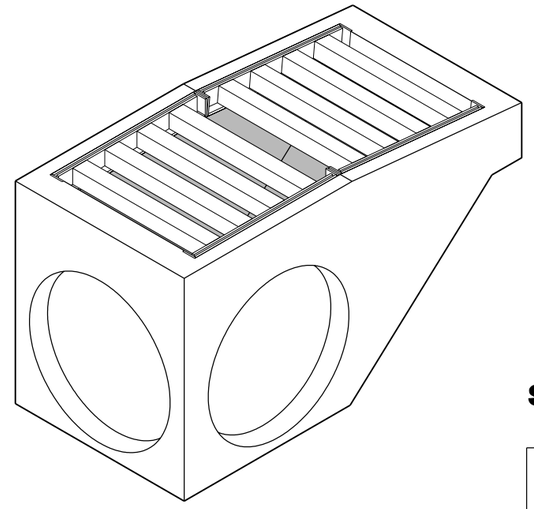
**SECTION B**




**GRATE SUPPORT DETAIL**
(FOUR SUPPORTS REQUIRED)

**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.



**ISOMETRIC**
(SHOWN WITH TYPE 1 GRATE)

MATTHEW J. WITECKI
STATE OF WASHINGTON
15588
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2007

# DROP INLET TYPE 1

## STANDARD PLAN B-45.20-00

SHEET 1 OF 1 SHEET

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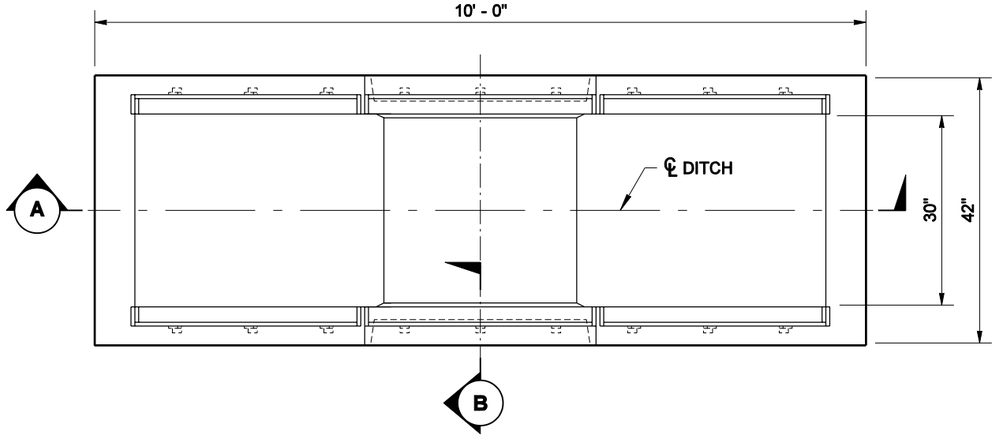
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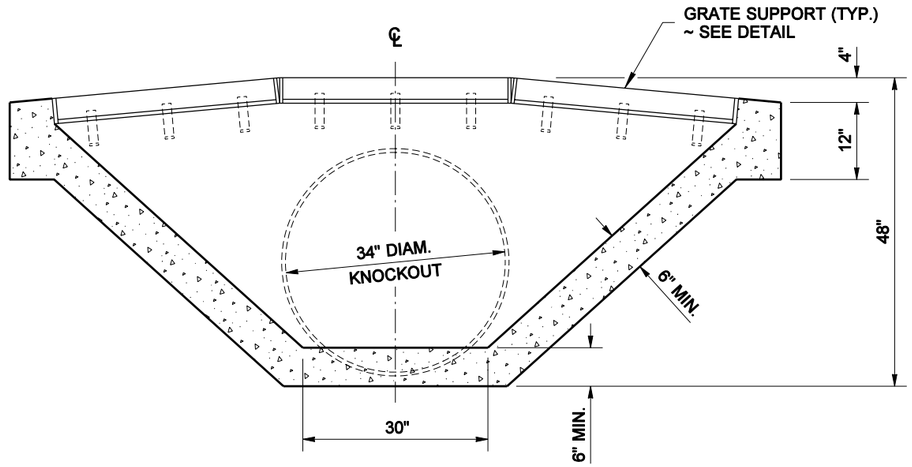
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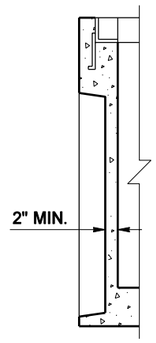
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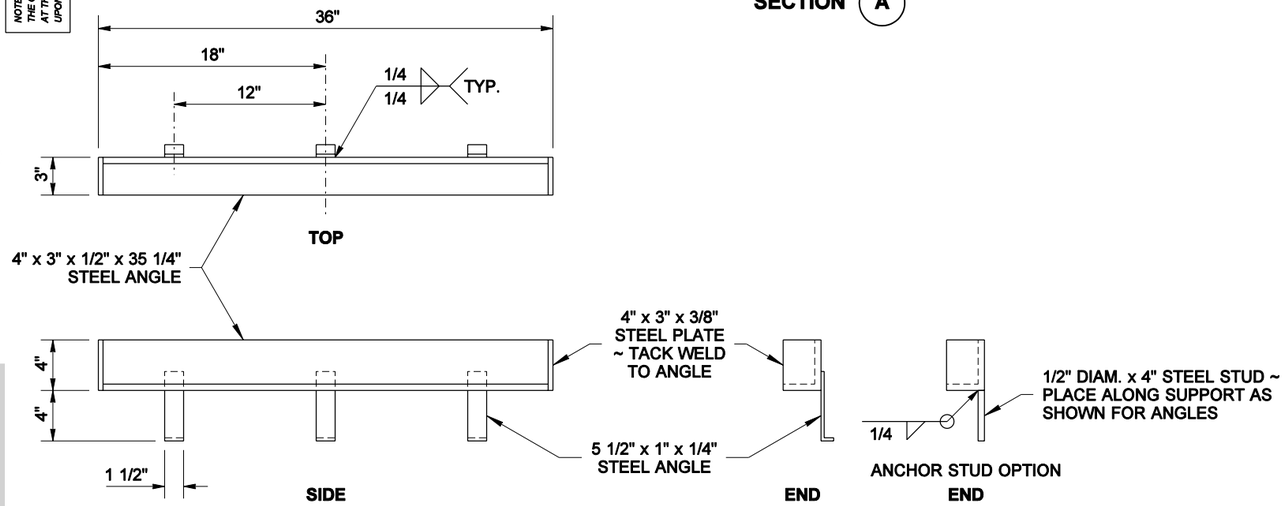

PLAN



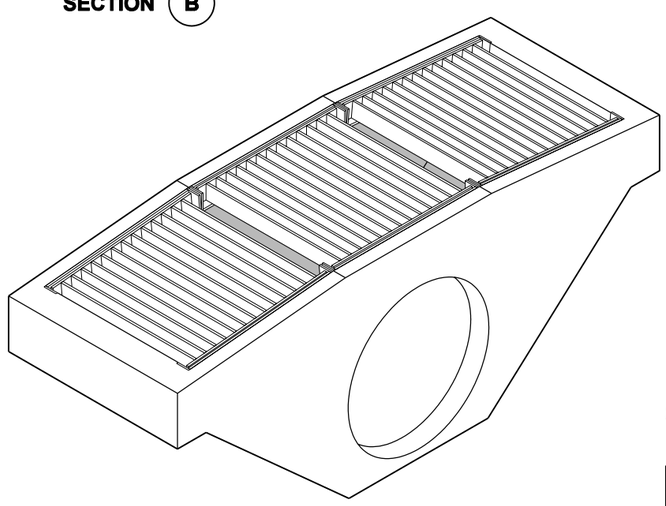

SECTION (A)




SECTION (B)




**GRATE SUPPORT DETAIL**
(SIX SUPPORTS REQUIRED)



**ISOMETRIC**
(SHOWN WITH TYPE 2 GRATE)

**NOTES**

1. The top of the inlet shall be placed at ground level to present an unobstructed ditch or median section.
2. Bevel or round exposed concrete edges 1/2".
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.

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# DROP INLET TYPE 2

## STANDARD PLAN B-45.40-00

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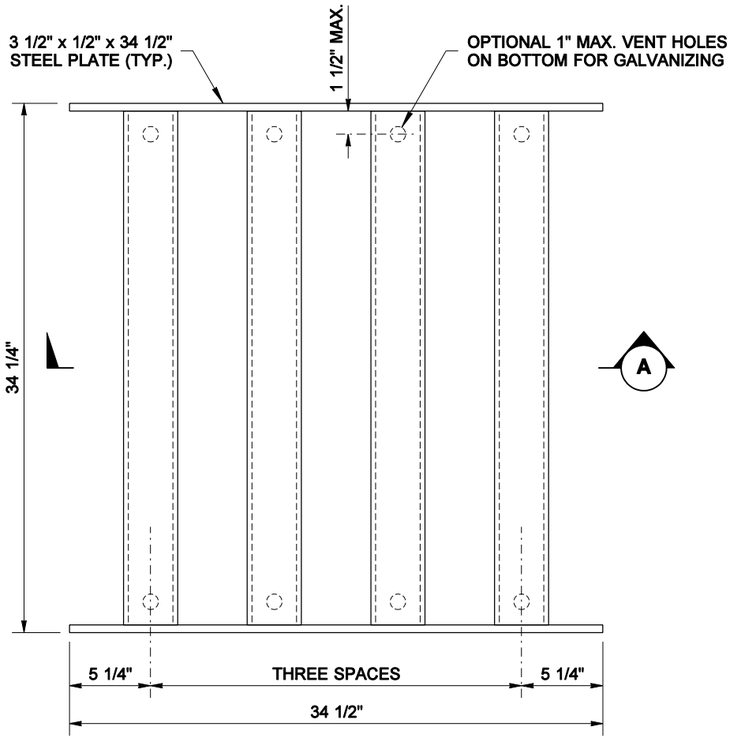
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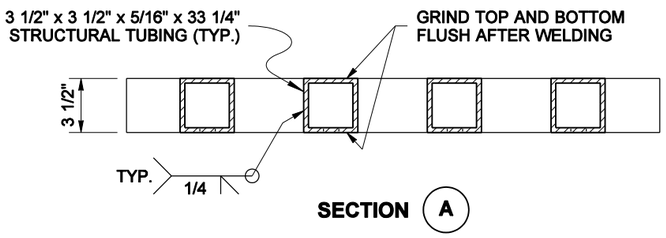
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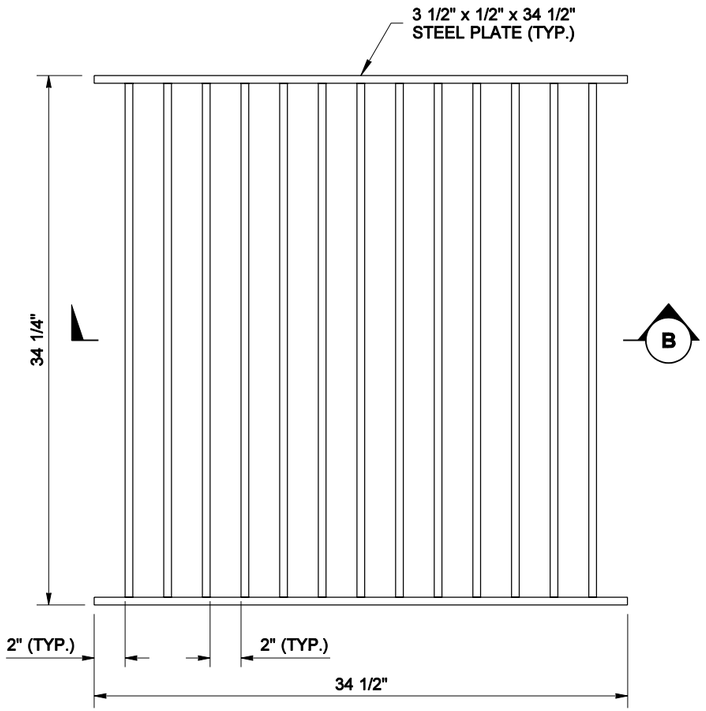
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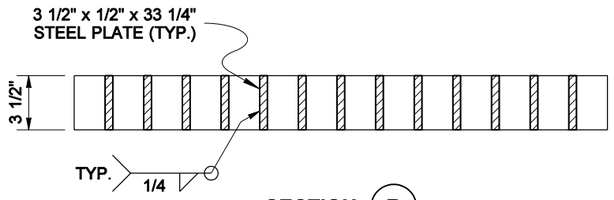

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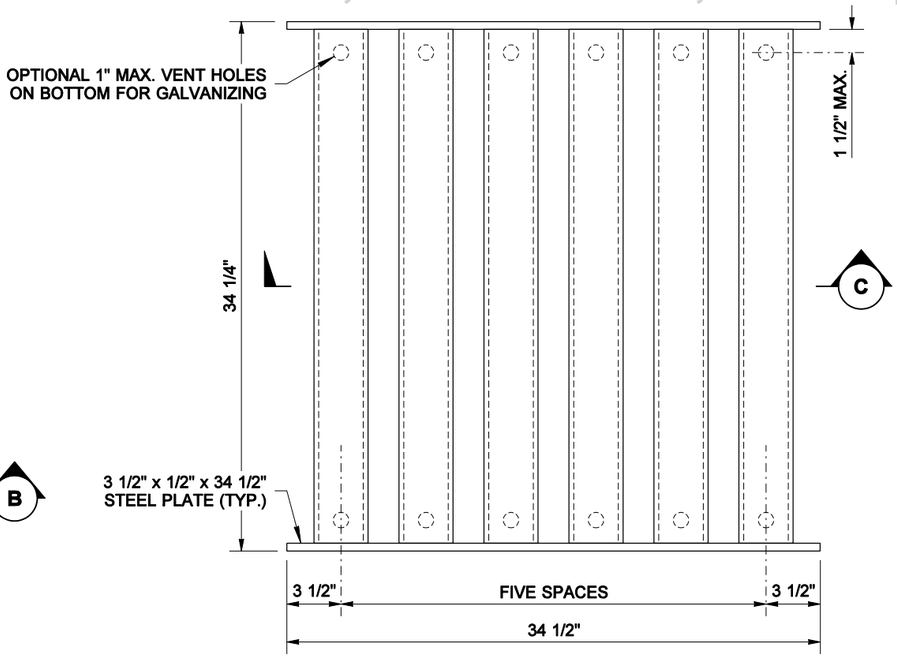

**SECTION (A)**



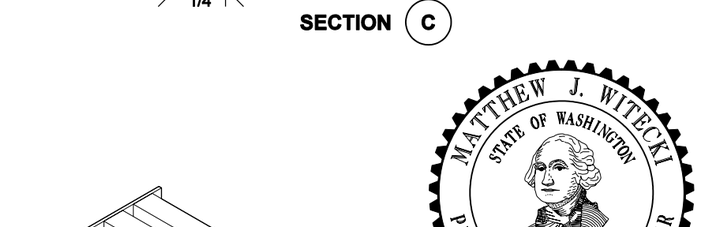

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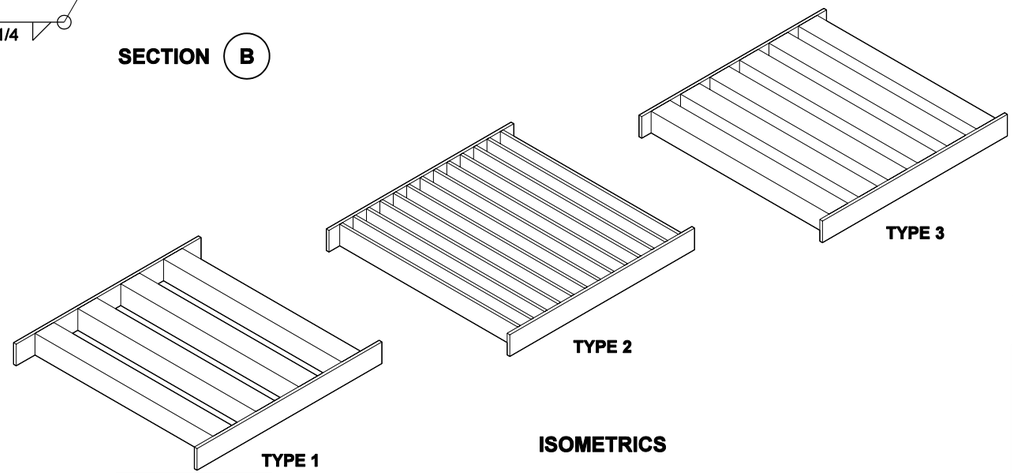

**SECTION (B)**




**TYPE 3**




**SECTION (C)**




**ISOMETRICS**

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# GRATES FOR DROP INLET

## STANDARD PLAN B-50.20-00

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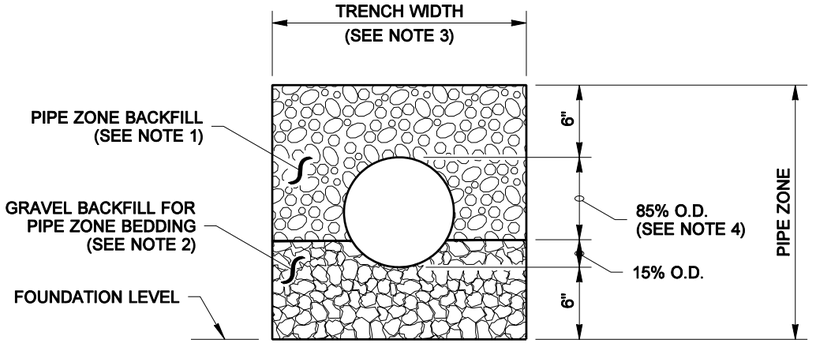
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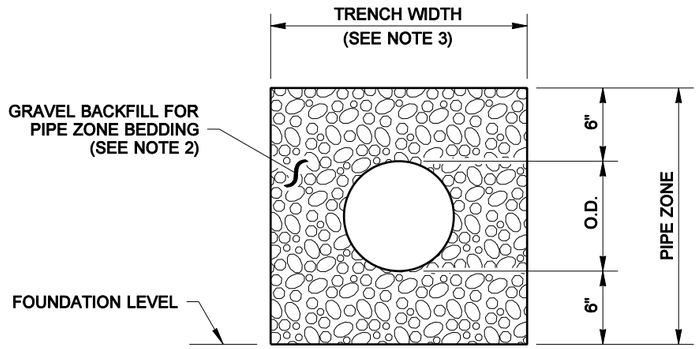
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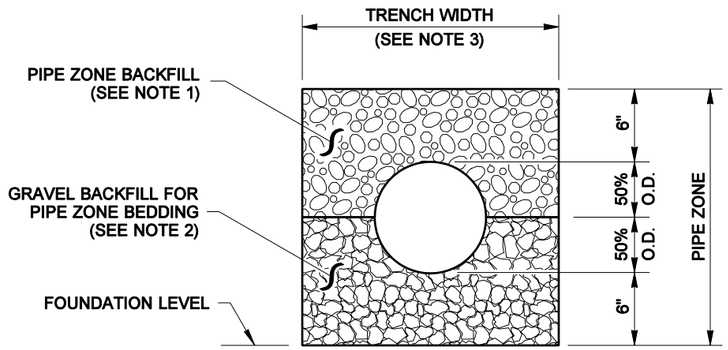
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## CONCRETE AND DUCTILE IRON PIPE



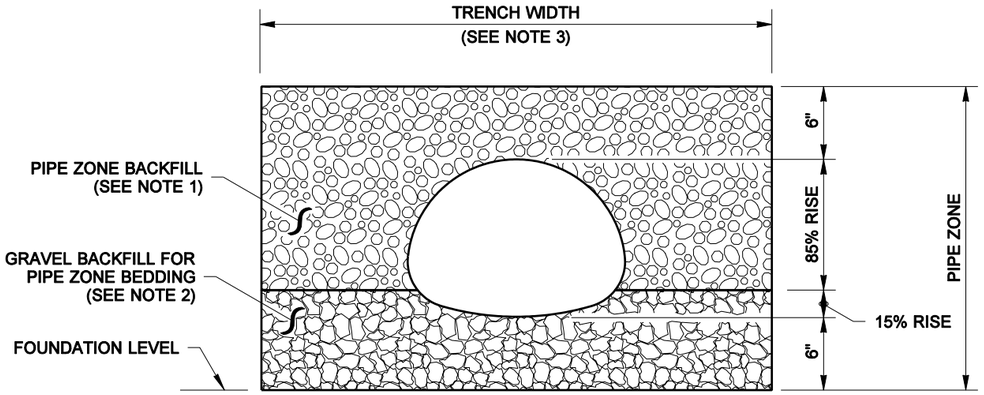

## THERMOPLASTIC PIPE




## METAL PIPE

**NOTES**

1. See Standard Specifications Section 7-08.3(3) for Pipe Zone Backfill.
2. See Standard Specifications Section 9-03.12(3) for Gravel Backfill for Pipe Zone Bedding.
3. See Standard Specifications Section 2-09.4 for Measurement of Trench Width.
4. For sanitary sewer installation, concrete pipe shall be bedded to spring line.




## PIPE ARCHES

| CLEARANCE BETWEEN PIPES FOR MULTIPLE INSTALLATIONS | | |
|---|---|---|
| **PIPE** | **SIZE** | **MINIMUM DISTANCE BETWEEN BARRELS** |
| CIRCULAR PIPE (DIAMETER) | 12" to 24" | 12" |
| | 30" to 96" | DIAM. /2 |
| | 102" to 180" | 48" |
| PIPE ARCH (SPAN) METAL ONLY | 18" to 36" | 12" |
| | 43" to 142" | SPAN /3 |
| | 148" to 200" | 48" |

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# PIPE ZONE BEDDING AND BACKFILL

# STANDARD PLAN B-55.20-00

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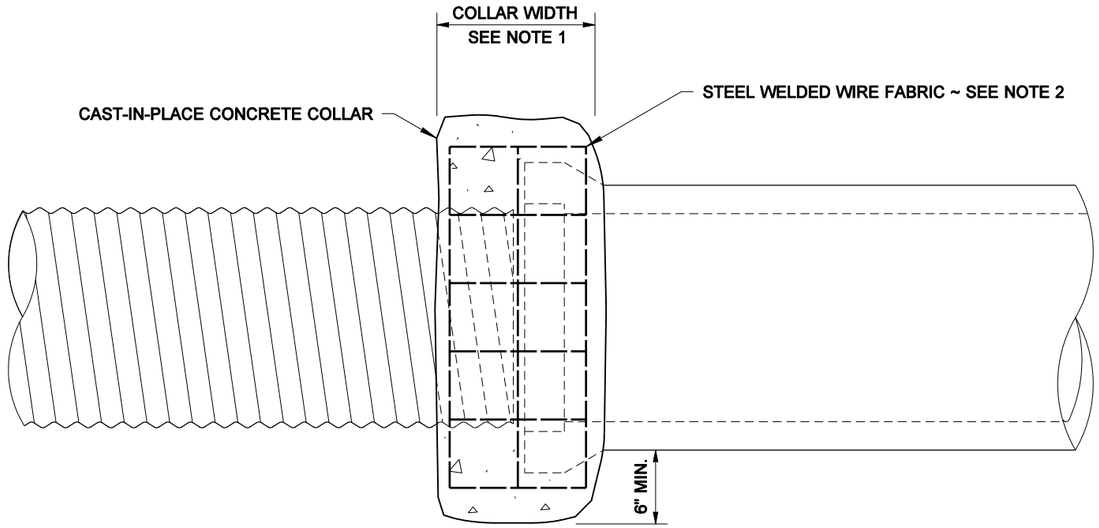
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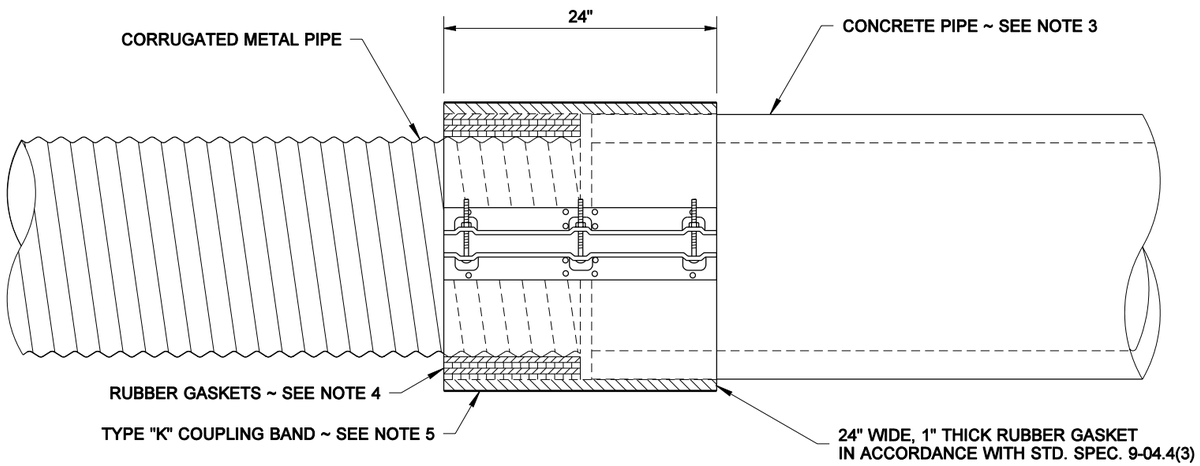
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**CONCRETE COLLAR OPTION**




**COUPLING BAND OPTION**

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**NOTES**

1. The Concrete Collar width shall be one half of the outside pipe diameter of the largest pipe. The minimum Concrete Collar width shall be 12". 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.




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# CONNECTION DETAILS FOR DISSIMILAR CULVERT PIPE

## STANDARD PLAN B-60.20-00

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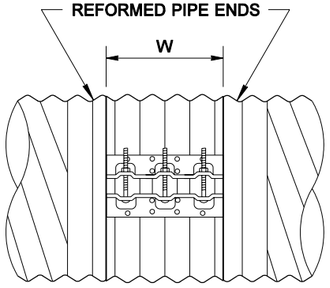
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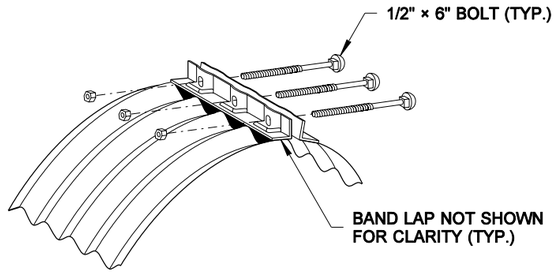
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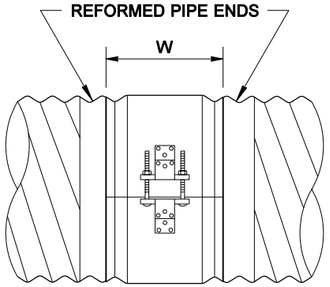
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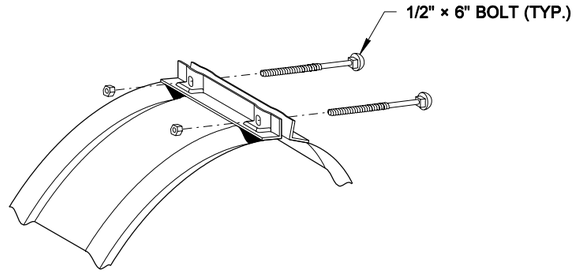

**TYPE D**
**ANNULAR CORRUGATED BAND**



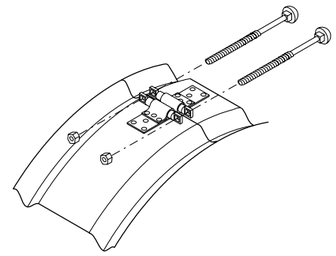

**TYPE D**
**BAND ANGLE CONNECTOR DETAIL**



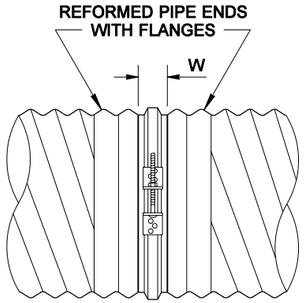

**TYPE F**
**SEMI-CORRUGATED BAND**



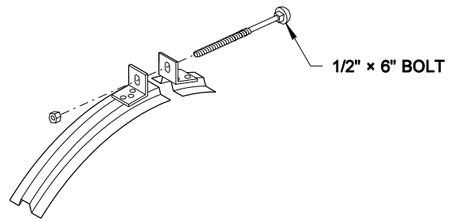

**TYPE F**
**BAND ANGLE CONNECTOR DETAIL**



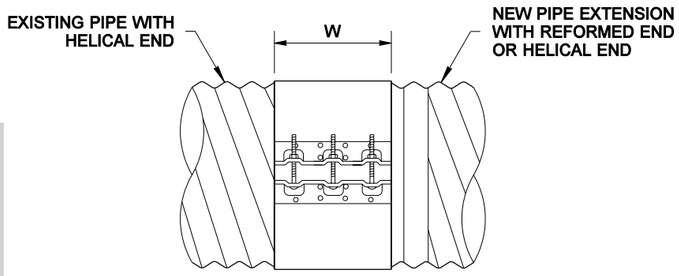
**TYPE F**
**BAR & STRAP CONNECTOR DETAIL**



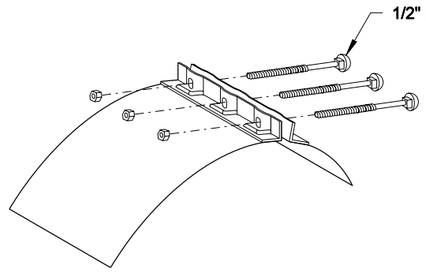

**TYPE J**
**FLANGE BAND**



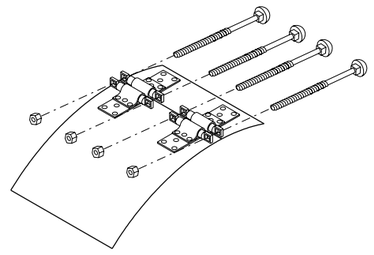

**TYPE J**
**BAND ANGLE CONNECTOR DETAIL**




**TYPE K**
**FLAT BAND OR DIMPLE BAND**




**TYPE K**
**BAND ANGLE CONNECTOR DETAIL**



**TYPE K**
**DOUBLE BAR & STRAP CONNECTOR DETAIL**

**COUPLING BAND DIMENSION TABLE**
(ALL DIMENSIONS ARE IN INCHES)

| BAND TYPE | | CORRUGATION PITCH × DEPTH | PIPE DIAM. | MIN. W | GASKET TYPE |
|---|---|---|---|---|---|
| STEEL | D | 2 2/3 × 1/2 OR 3 × 1 REFORMED TO 2 2/3 × 1/2 | 12 ~ 84 | 12 | SLEEVE |
| | | 3 × 1 REFORMED TO 2 2/3 × 1/2 | 90 ~ 144 | 24 | SLEEVE |
| | F | 2 2/3 × 1/2 OR 3 × 1 REFORMED TO 2 2/3 × 1/2 | 12 ~ 84 | 10 1/2 | O-RING |
| | J | 2 2/3 × 1/2 | 12 ~ 48 | 2 3/4 | BUTYL |
| | K | 2 2/3 × 1/2 | 12 ~ 48 | 12 | SLEEVE |
| | | | 54 ~ 84 | 24 | |
| | | * 3 × 1 | 54 ~ 144 | 24 | |
| ALUMINUM | D | 2 2/3 × 1/2 | 12 ~ 72 | 12 | SLEEVE |
| | | 3 × 1 REFORMED TO 2 2/3 × 1/2 | 36 ~ 60 | 12 | |
| | | | 66 ~ 108 | 24 | |
| | F | 2 2/3 x 1/2 | 12 ~ 48 | 10 1/2 | O-RING |
| | K | 2 2/3 x 1/2 | 12 ~ 48 | 12 | SLEEVE |
| | | | 54 ~ 84 | 24 | |
| | | * 3 × 1 | 54 ~ 96 | 24 | |

* PIPE ARCH ONLY

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# COUPLING BANDS FOR CORRUGATED METAL PIPE

## STANDARD PLAN B-60.40-00

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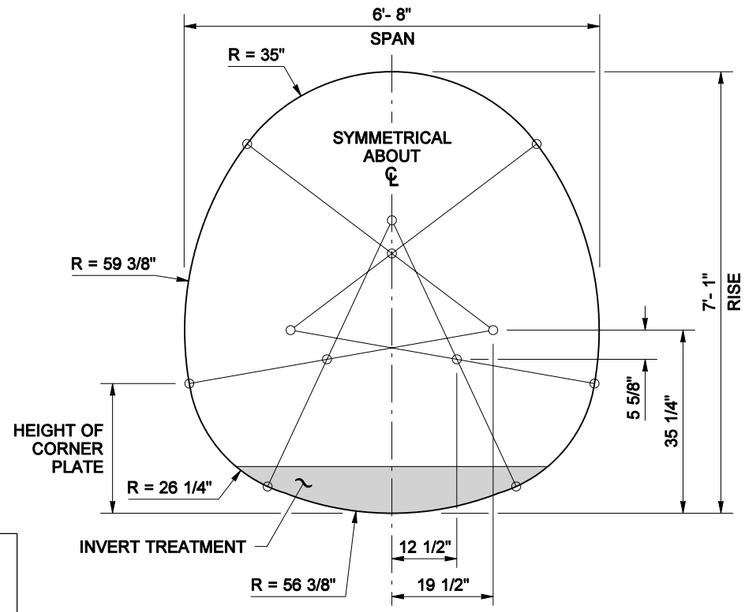
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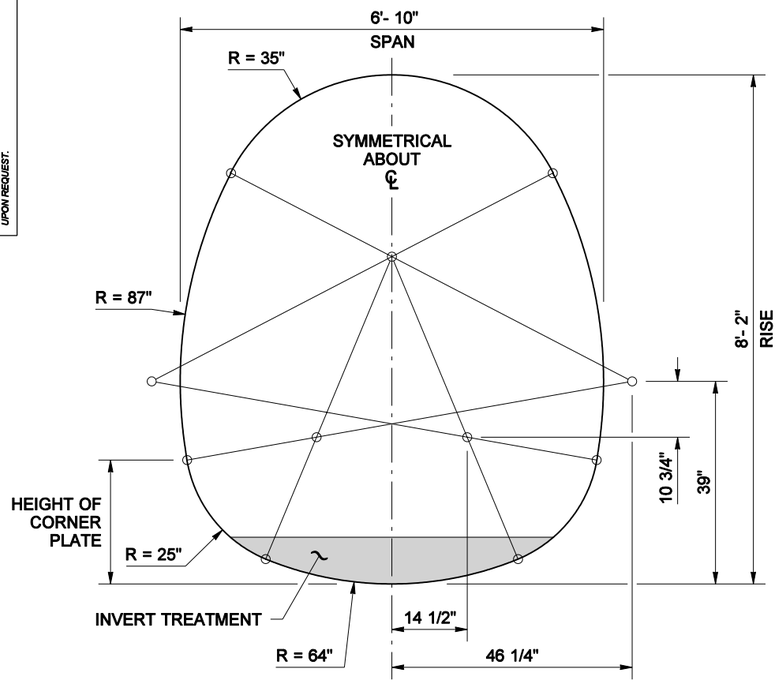
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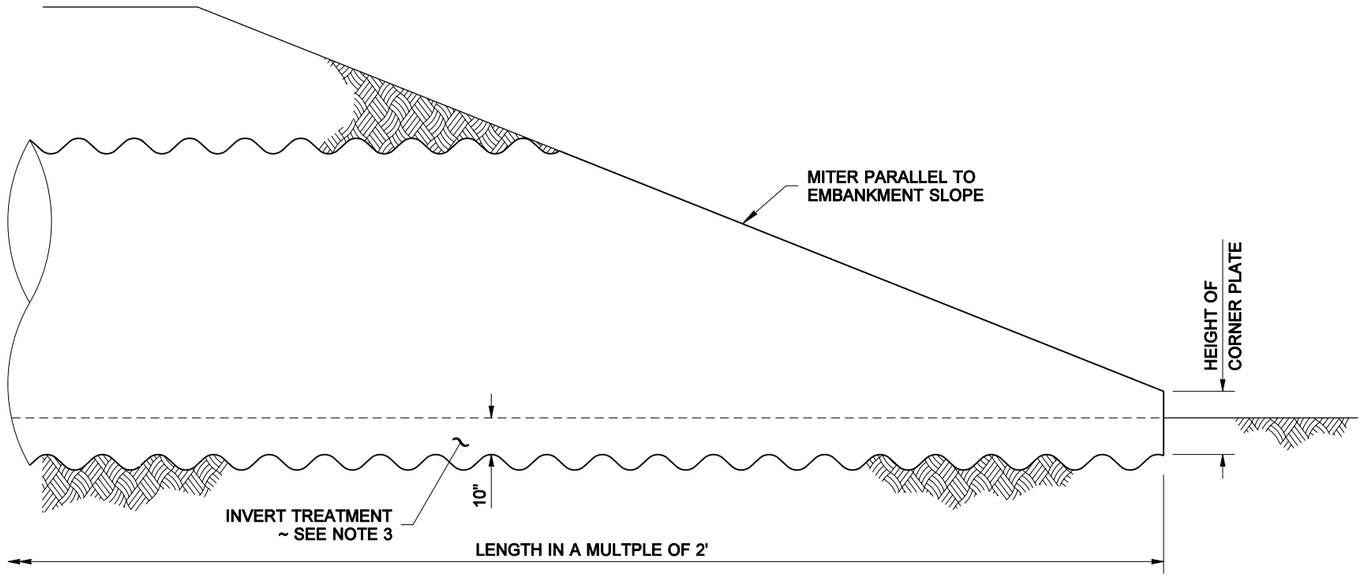
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**SECTION**

**NOTES**

1. Span and rise dimensions are nominal and are measured to the inside crests of corrugations.
2. Allowable heights of cover shall be within the limits indicated in the table included hereon. Minimums and maximums are shown.
3. Unless indicated otherwise a 10" depth (over the inside crests of corrugatons) of earth shall be placed in the invert of the Structural Plate Underpass, Design 1, for its full width and length. The earth shall consist of naturally occurring materials available in the vicinity of the structural plate underpass installation. See Standard Specification 7-03.3(4).
4. Designed for H-20 live load and maximum allowable soil pressure of 6 Kips per square foot.




**SIDE VIEW ~ PLACEMENT**

| ALLOWABLE HEIGHTS OF COVER | | | |
|---|---|---|---|
| SPAN | RISE | 12 GAGE THICK CORRUGATED METAL | |
| | | COVER | |
| | | MIN. | MAX. |
| 6' - 8" | 7' - 1" | 4' | 26' |
| 6' - 10" | 8' - 2" | 5' | 25' |

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# ANIMAL/PEDESTRIAN UNDERPASS

## STANDARD PLAN B-65.20-00

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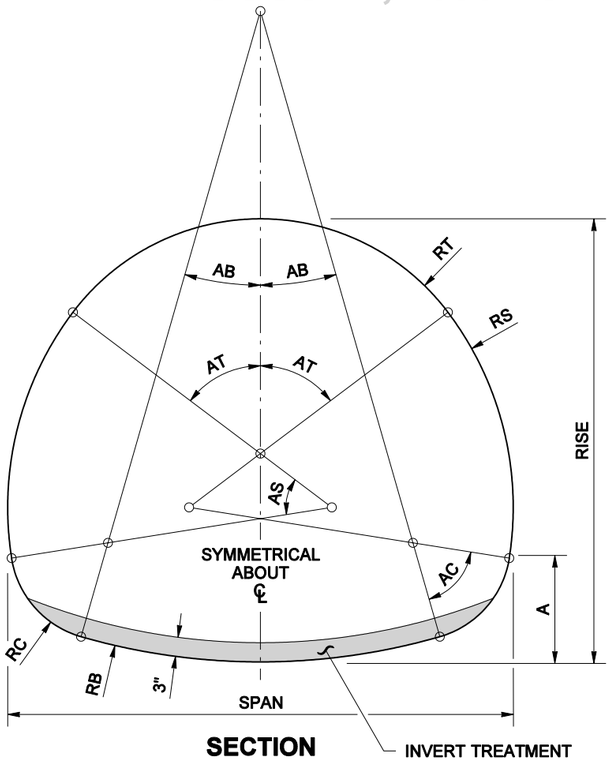
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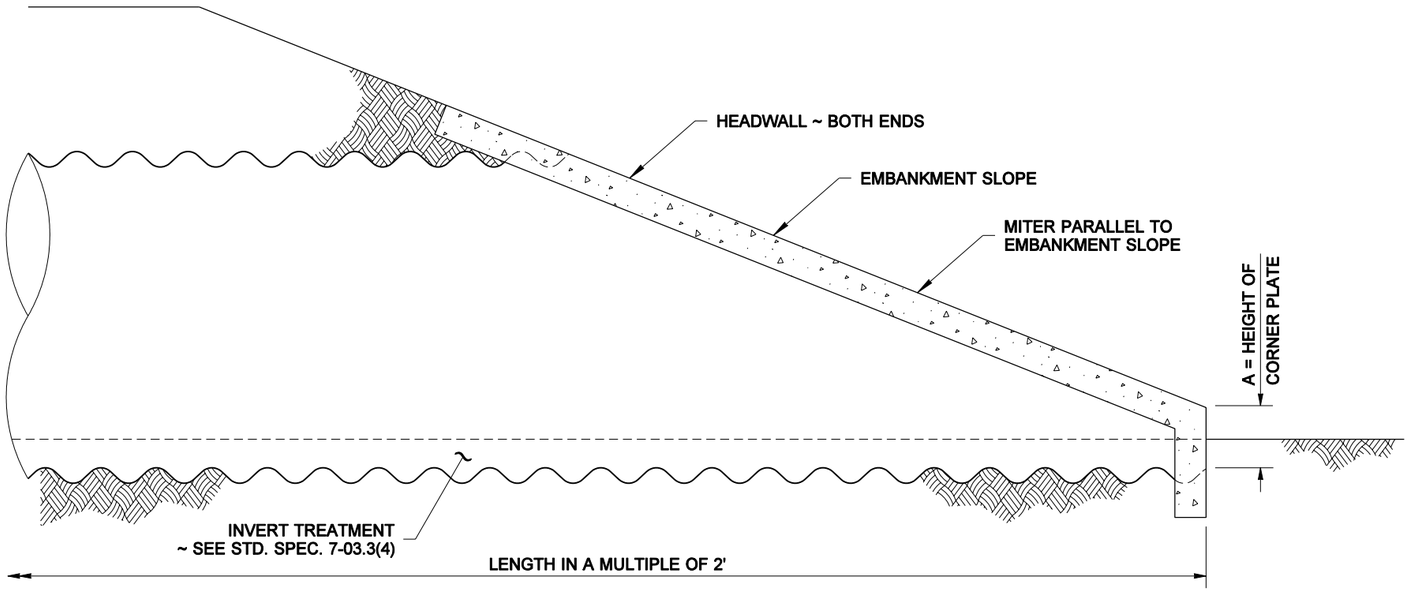
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**SECTION**

**NOTES**

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




**SIDE VIEW ~ PLACEMENT**

| DIMENSIONS | | | | | | | | | | ALLOWABLE HEIGHTS OF COVER | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | CORRUGATED METAL THICKNESS | | | | | |
| SPAN | RISE | ANGLES (DEGREES) | | | | RADII (INCHES) | | | | A (INCHES) | 12 GAGE | | 10 GAGE | | 8 GAGE | |
| | | AT | AS | AC | AB | RT | RS | RC | RB | | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. |
| 12' - 2" | 11' - 0" | 52 | 42 | 65 | 21 | 68 | 93 | 38 | 134 | 44 | 3' | 14' | 3' | 20' | 3' | 26' |
| 12' - 11" | 11' - 3" | 52 | 41 | 65 | 21 | 73 | 95 | 38 | 144 | 45 | 3' | 13' | 3' | 19' | 3' | 25' |
| 13' - 2" | 11' - 11" | 52 | 43 | 65 | 19 | 73 | 103 | 38 | 159 | 43 | 4' | 13' | 4' | 19' | 4' | 24' |
| 13' - 10" | 12' - 3" | 53 | 41 | 65 | 20 | 77 | 108 | 38 | 164 | 45 | 4' | 12' | 4' | 18' | 4' | 23' |
| 14' - 1" | 12' - 10" | 53 | 44 | 65 | 18 | 77 | 115 | 38 | 182 | 43 | 4' | 12' | 4' | 18' | 4' | 23' |
| 14' - 6" | 13' - 6" | 56 | 38 | 65 | 21 | 78 | 131 | 38 | 174 | 46 | 4' | 11' | 4' | 17' | 4' | 22' |
| 14' - 10" | 14' - 0" | 55 | 41 | 65 | 19 | 79 | 136 | 38 | 192 | 44 | 4' | 11' | 4' | 17' | 4' | 21' |
| 15' - 6" | 14' - 4" | 55 | 40 | 65 | 19 | 84 | 138 | 38 | 201 | 46 | 4' | 11' | 4' | 16' | 4' | 20' |
| 15' - 9" | 15' - 1" | 56 | 41 | 65 | 18 | 83 | 150 | 38 | 212 | 45 | --- | --- | 4' | 16' | 4' | 20' |
| 16' - 4" | 15' - 5" | 57 | 39 | 65 | 19 | 86 | 157 | 38 | 215 | 47 | --- | --- | 4' | 15' | 4' | 19' |
| 16' - 5" | 16' - 1" | 58 | 42 | 65 | 14 | 88 | 158 | 38 | 271 | 41 | --- | --- | 4' | 15' | 4' | 19' |
| 16' - 9" | 16' - 3" | 58 | 40 | 65 | 17 | 89 | 167 | 38 | 247 | 43 | --- | --- | 4' | 15' | 4' | 19' |
| 17' - 3" | 17' - 0" | 57 | 38 | 65 | 19 | 90 | 174 | 47 | 215 | 55 | --- | --- | 4' | 14' | 4' | 18' |
| 18' - 4" | 16' - 11" | 55 | 42 | 65 | 18 | 99 | 157 | 47 | 249 | 53 | --- | --- | 4' | 13' | 4' | 18' |
| 19' - 2" | 17' - 2" | 54 | 43 | 65 | 18 | 105 | 156 | 47 | 264 | 53 | --- | --- | --- | --- | 4' | 17' |
| 19' - 6" | 17' - 7" | 53 | 46 | 65 | 16 | 107 | 158 | 47 | 297 | 50 | --- | --- | --- | --- | 4' | 17' |
| 20' - 4" | 17' - 10" | 53 | 46 | 65 | 16 | 113 | 156 | 47 | 314 | 52 | --- | --- | --- | --- | 4' | 16' |




EXPIRES JULY 1, 2007

# EQUIPMENT UNDERPASS

# STANDARD PLAN B-65.40-00

SHEET 1 OF 1 SHEET

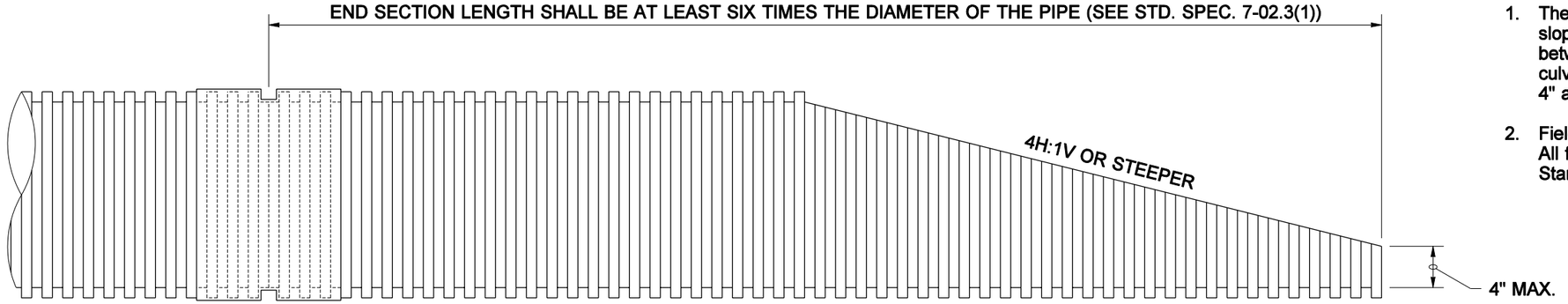
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*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-01-06* — DATE

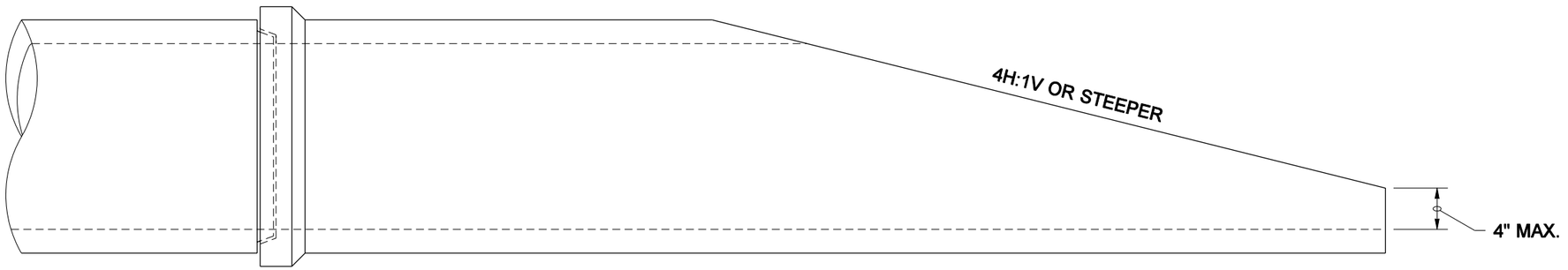
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

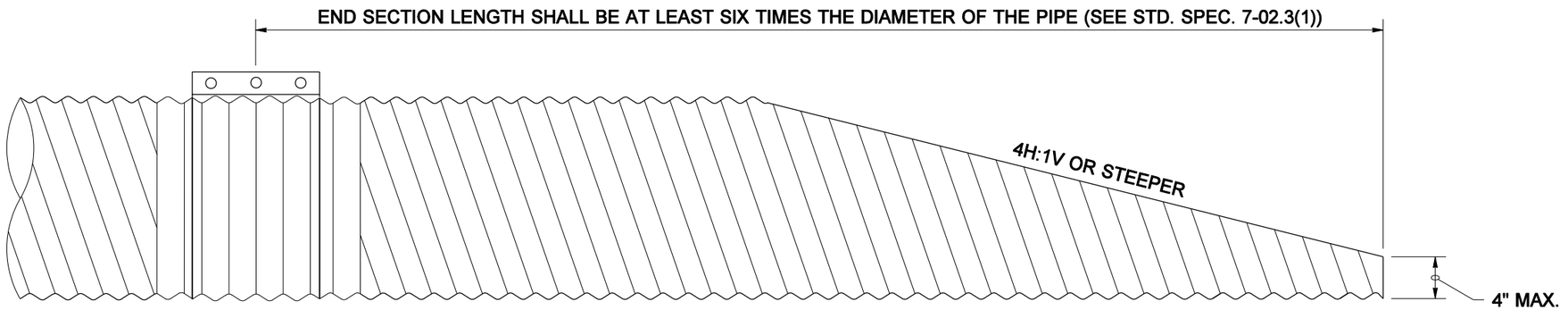
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**THERMOPLASTIC PIPE**




**CONCRETE PIPE**




**METAL PIPE**

**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 vicintiy of the culvert end to ensure that no part of the culvert protrudes more than 4" above the ground line.

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

**FOR CULVERTS 30" DIAMETER OR LESS**

MATTHEW J. WITECKI
STATE OF WASHINGTON
15588
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2007

# BEVELED END SECTIONS

## STANDARD PLAN B-70.20-00

SHEET 1 OF 1 SHEET

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*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-01-06* — DATE

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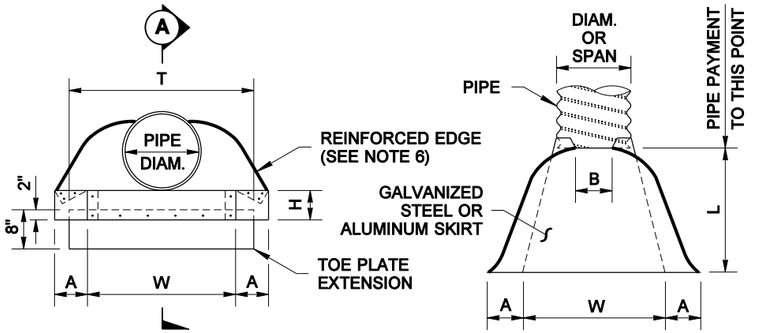
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA

| PIPE ARCH | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PIPE ARCH DIMENSION (INCHES) | | THICKNESS (INCHES) | | | DIMENSIONS (INCHES) | | | | | | SKIRT | END SECTION SLOPE (H:V) |
| | | | | | A | B | H | L | W | T | | |
| SPAN | RISE | STEEL | | ALUM. | TOL. ± 1" | MAX. | TOL. ± 1" | TOL. ± 1 1/2" | TOL. ± 2" | TOL. ± 2" | | |
| 17 | 13 | 0.064 | | 0.060 | 7 | 9 | 6 | 19 | 30 | 40 | 1 PC. | 2 1/2 : 1 |
| 21 | 15 | 0.064 | | 0.060 | 7 | 10 | 6 | 23 | 36 | 46 | 1 PC. | 2 1/2 : 1 |
| 24 | 18 | 0.064 | | 0.060 | 8 | 12 | 6 | 28 | 42 | 52 | 1 PC. | 2 1/2 : 1 |
| 28 | 20 | 0.064 | | 0.075 | 9 | 14 | 6 | 32 | 48 | 58 | 1 PC. | 2 1/2 : 1 |
| 35 | 24 | 0.079 | | 0.075 | 10 | 16 | 6 | 39 | 60 | 70 | 1 PC. | 2 1/2 : 1 |
| 42 | 29 | 0.079 | | 0.105 | 12 | 18 | 8 | 46 | 75 | 85 | 2 PC. | 2 1/2 : 1 |
| 49 | 33 | 0.109 | | 0.105 | 13 | 21 | 9 | 53 | 85 | 103 | 2 PC. | 2 1/2 : 1 |
| 57 | 38 | 0.109 | 0.138 | 0.105 | 18 | 26 | 12 | 63 | 90 | 114 | 3 PC. | 2 1/2 : 1 |
| 64 | 43 | 0.109 | 0.138 | 0.105 | 18 | 30 | 12 | 70 | 102 | 130 | 3 PC. | 2 1/2 : 1 |
| 71 | 47 | 0.109 | 0.138 | 0.135 | 18 | 33 | 12 | 77 | 114 | 146 | 3 PC. | 2 1/2 : 1 |
| 77 | 52 | 0.109 | 0.138 | —— | 18 | 36 | 12 | 77 | 126 | 152 | 3 PC. | 1 3/4 : 1 |
| 83 | 57 | 0.109 | 0.138 | —— | 18 | 39 | 12 | 77 | 138 | 158 | 3 PC. | 1 1/2 : 1 |

| PIPE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| PIPE DIAM. (INCHES) | THICKNESS (INCHES) | | DIMENSIONS (INCHES) | | | | | | SKIRT | END SECTION SLOPE (H:V) |
| | | | A | B | H | L | W | T | | |
| | STEEL | ALUM. | TOL. ± 1" | MAX. | TOL. ± 1" | TOL. ± 1 1/2" | TOL. ± 2" | TOL. ± 2" | | |
| 12 | 0.064 | 0.060 | 6 | 6 | 6 | 21 | 24 | 34 | 1 PC. | 2 1/2 : 1 |
| 15 | 0.064 | 0.060 | 7 | 8 | 6 | 26 | 30 | 40 | 1 PC. | 2 1/2 : 1 |
| 18 | 0.064 | 0.060 | 8 | 10 | 6 | 31 | 36 | 46 | 1 PC. | 2 1/2 : 1 |
| 21 | 0.064 | 0.060 | 9 | 12 | 6 | 36 | 42 | 52 | 1 PC. | 2 1/2 : 1 |
| 24 | 0.064 | 0.075 | 10 | 13 | 6 | 41 | 48 | 58 | 1 PC. | 2 1/2 : 1 |
| 30 | 0.079 | 0.075 | 12 | 16 | 8 | 51 | 60 | 70 | 2 PC. | 2 1/2 : 1 |
| 36 | 0.079 | 0.105 | 14 | 19 | 9 | 60 | 72 | 94 | 2 PC. | 2 1/2 : 1 |
| 42 | 0.109 | 0.105 | 16 | 22 | 11 | 69 | 84 | 106 | 2 PC. | 2 1/2 : 1 |
| 48 | 0.109 | 0.105 | 18 | 27 | 12 | 78 | 90 | 112 | 2 PC. | 2 1/2 : 1 |
| 54 | 0.109 | —— | 18 | 30 | 12 | 84 | 102 | 122 | 2 PC. | 2 1/2 : 1 |
| 60 | 0.109 0.138 | —— | 18 | 33 | 12 | 87 | 114 | 134 | 3 PC. | 1 3/4 : 1 |
| 66 | 0.109 0.138 | —— | 18 | 36 | 12 | 87 | 120 | 142 | 3 PC. | 1 1/2 : 1 |
| 72 | 0.109 0.138 | —— | 18 | 39 | 12 | 87 | 126 | 146 | 3 PC. | 1 1/3 : 1 |
| 78 | 0.109 0.138 | —— | 18 | 42 | 12 | 87 | 132 | 152 | 3 PC. | 1 1/4 : 1 |
| 84 | 0.109 0.138 | —— | 18 | 45 | 12 | 87 | 138 | 158 | 3 PC. | 1 1/6 : 1 |

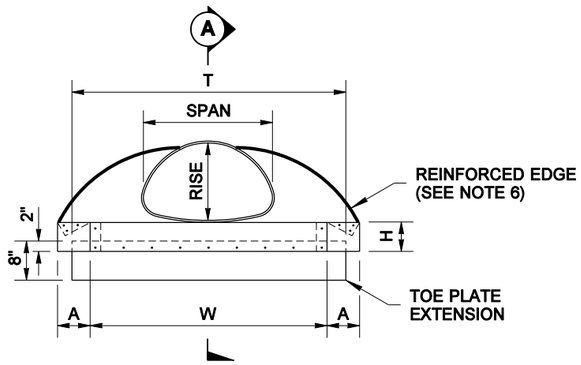
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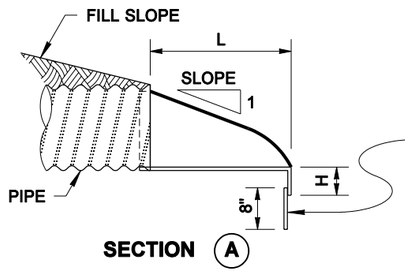

PIPE ~ ELEVATION




PIPE & PIPE ARCH ~ PLAN




PIPE ARCH ~ ELEVATION




SECTION (A)

TOE PLATE EXTENSION ~ WHEN REQUIRED; GALVANIZED STEEL OR ALUMINUM, SAME GAGE AS SKIRT, LAPPED 2", FASTENED W/ 3/8" S.S. OR AL. RIVETS OR GALVANIZED BOLTS ON 12" MAX. CENTERS.

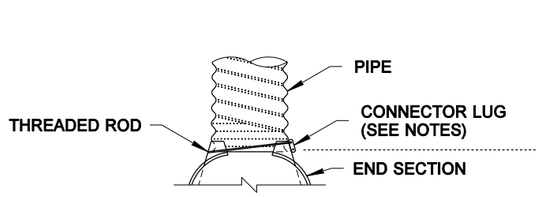
## NOTES

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

   60" thru 72" diameter pipe ..... 2" x 2" x 1/4" angle

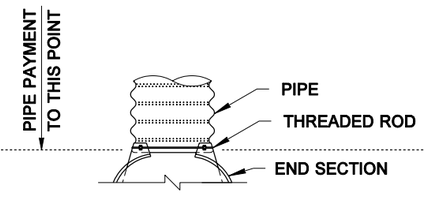
   78" and 84" diameter pipe, and
   77" x 52" & 83" x 57" pipe arch ..... 2 1/2" x 2 1/2" x 1/4" angle

   The above galvanized angles shall be attached by 3/8" galvanized nuts and bolts.
7. Galvanized steel angle reinforcement will be placed under the center panel seams on the 72" thru 84" diam. pipe and 77" x 52" & 83" x 57" pipe arch End Sections.
8. As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 16 gage galvanized steel fastened with a 1/2" diam., 6" long galvanized bolt and one squarehead nut.



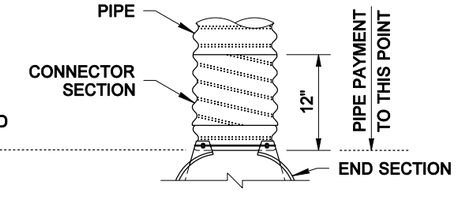

FOR 12" THRU 24" PIPE AND 17" x 13" THRU 28" x 20" PIPE ARCH WITH ANNULAR END CORRUGATIONS

**TYPE 1**




FOR 30" THRU 84" PIPE AND 35" x 24" THRU 83" x 57" PIPE ARCH WITH ANNULAR END CORRUGATIONS

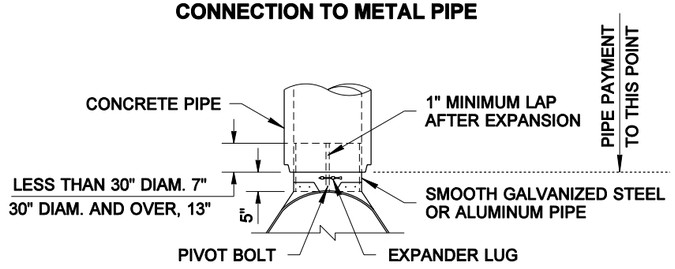
**TYPE 2**




FOR 42" THRU 84" PIPE AND 49" x 33" THRU 83" x 57" PIPE ARCH WITH ANNULAR END CORRUGATIONS, AND ALL HELICAL END CORRUGATED PIPE AND PIPE ARCH

**TYPE 3**

## DESIGN A
### CONNECTION TO METAL PIPE

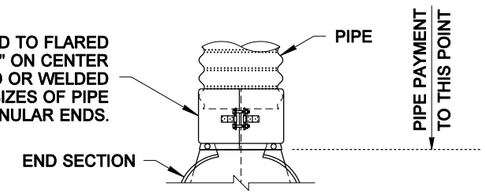



## DESIGN B
### CONNECTION TO CONCRETE PIPE INLET END ONLY




EXPIRES JULY 1, 2007

PIPE COUPLING BAND, SHOP BOLTED TO FLARED END SECTION WITH 3/8" BOLTS AT 6" ON CENTER MAXIMUM OR EQUIVALENT RIVETED OR WELDED CONNECTION. FOR USE WITH ALL SIZES OF PIPE AND PIPE ARCH WITH ANNULAR ENDS.




## DESIGN C
### CONNECTION TO METAL OR CONCRETE PIPE OUTLET ONLY

# FLARED END SECTIONS

## STANDARD PLAN B-70.60-00

SHEET 1 OF 1 SHEET

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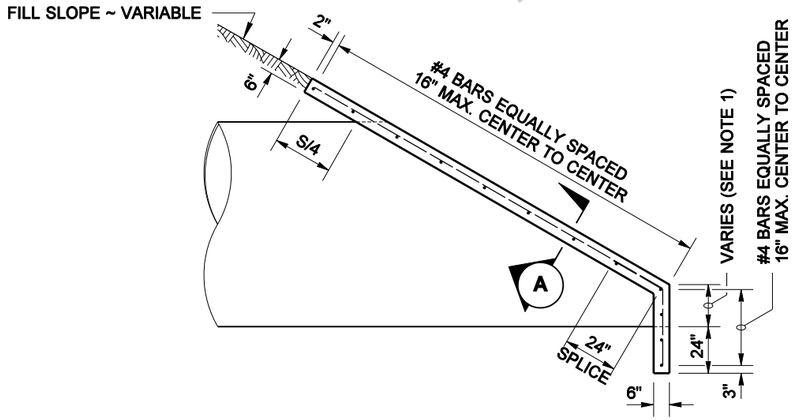
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-01-06* — DATE

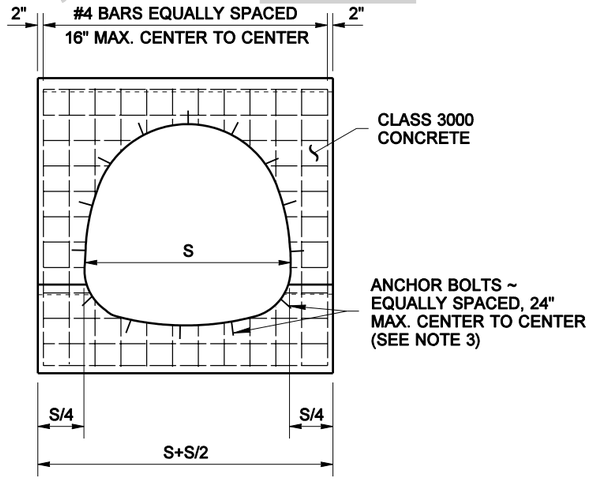
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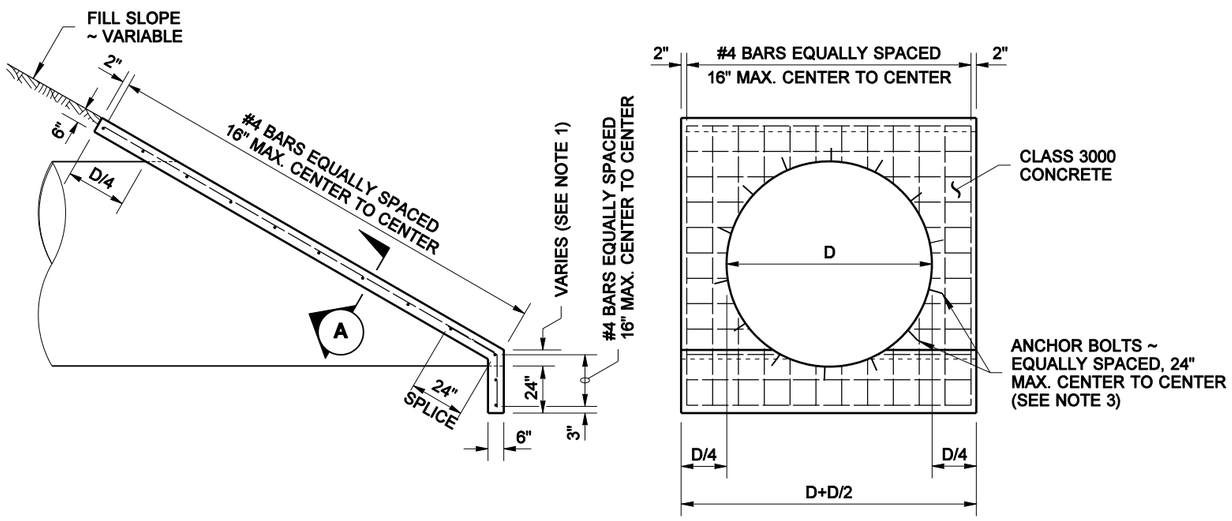


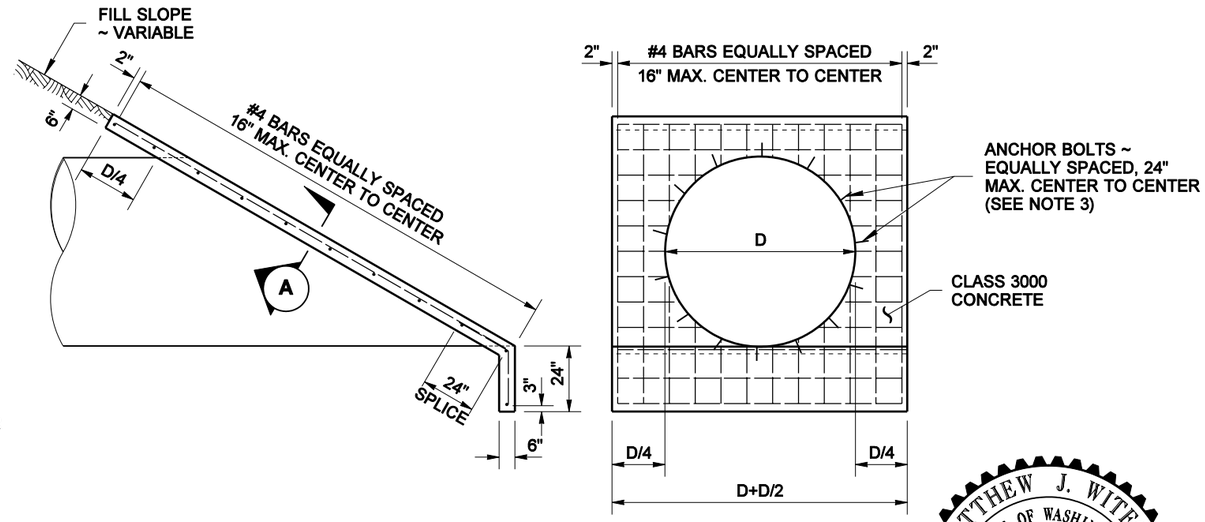

**NOTES**

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 ar used, headwall thickness shall be increased to 8".

## STRUCTURAL PLATE PIPE ARCHES AND UNDERPASSES

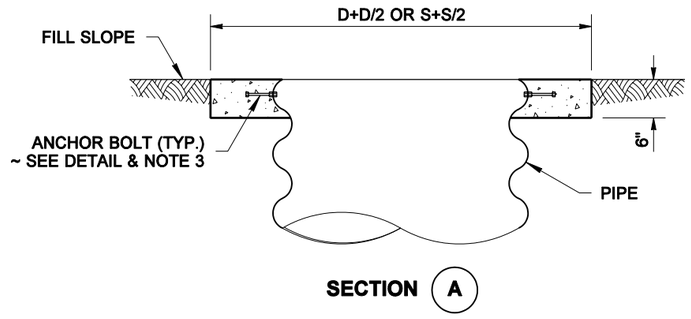



STEP MITERED PIPE

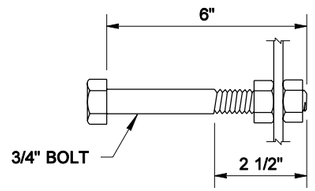



FULL MITERED PIPE

## PIPES AND STRUCTURAL PLATE PIPES




SECTION (A)




ANCHOR BOLT DETAIL




EXPIRES JULY 1, 2007

# HEADWALLS FOR CULVERT PIPE AND UNDERPASS

## STANDARD PLAN B-75.20-00

SHEET 1 OF 1 SHEET

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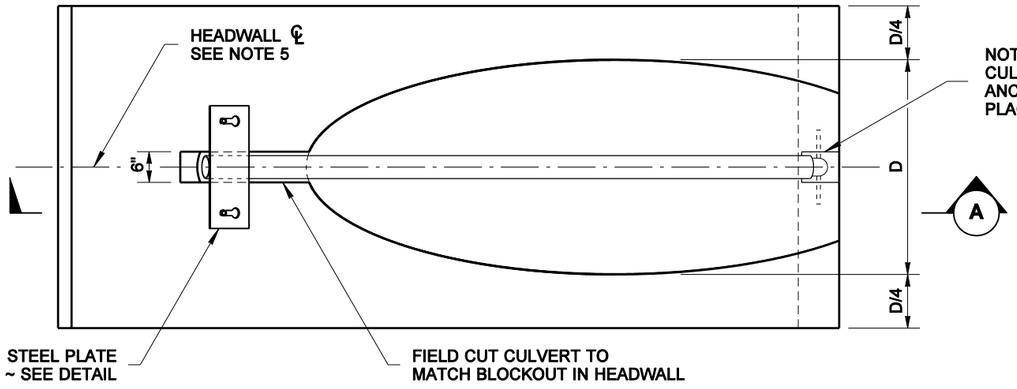
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-01-06* — DATE

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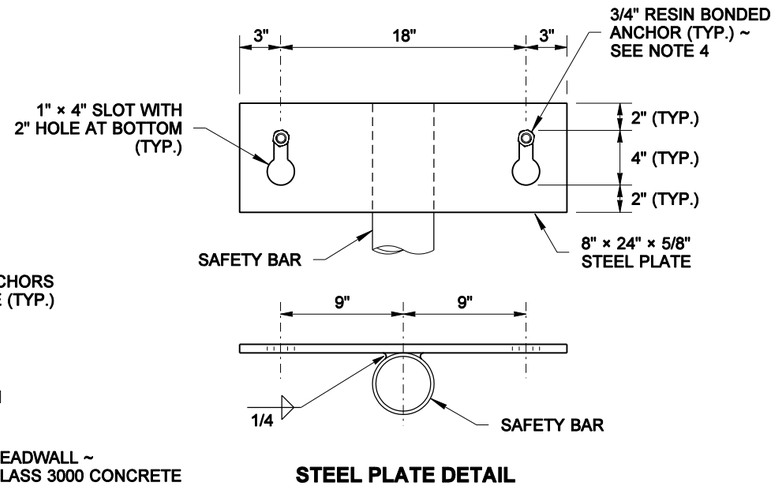

TOP VIEW

**CULVERT IS PERPENDICULAR TO ROADWAY**

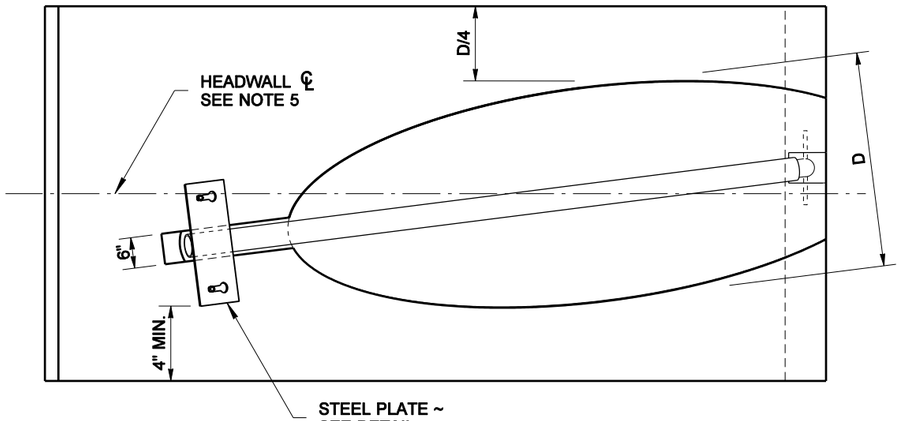
| CULVERT DIAM. | NUMBER OF BARS REQUIRED |
|---|---|
| UP TO 36" | NONE |
| 42" ~ 60" | 1 |
| 66" ~ 90" | 2 |
| 96" ~ 120" | 3 |

**NOTES**

1. Sockets shall be 3" extra strong steel pipe (3 1/2" O.D.). Sockets must be the proper angle and height so that safety bars are parallel with headwall and side slope, and are easily removable.
2. Safety Bars shall be 4" extra strong steel pipe (4 1/2" O.D.), or 4 1/2" O.D. (.250" wall thickness) steel tubing. Length (20' maximum) shall be the minimum required to achieve Resin Bonded Anchor placement in full depth concrete. When multiple bars are required (see table) place bars at equal spacing (30" max.).
3. Bevel culvert pipe to match side slope.
4. Resin bonded anchors shall be 7" in length (5" embedment).
5. Centerline of headwall shall be normal to roadway centerline.

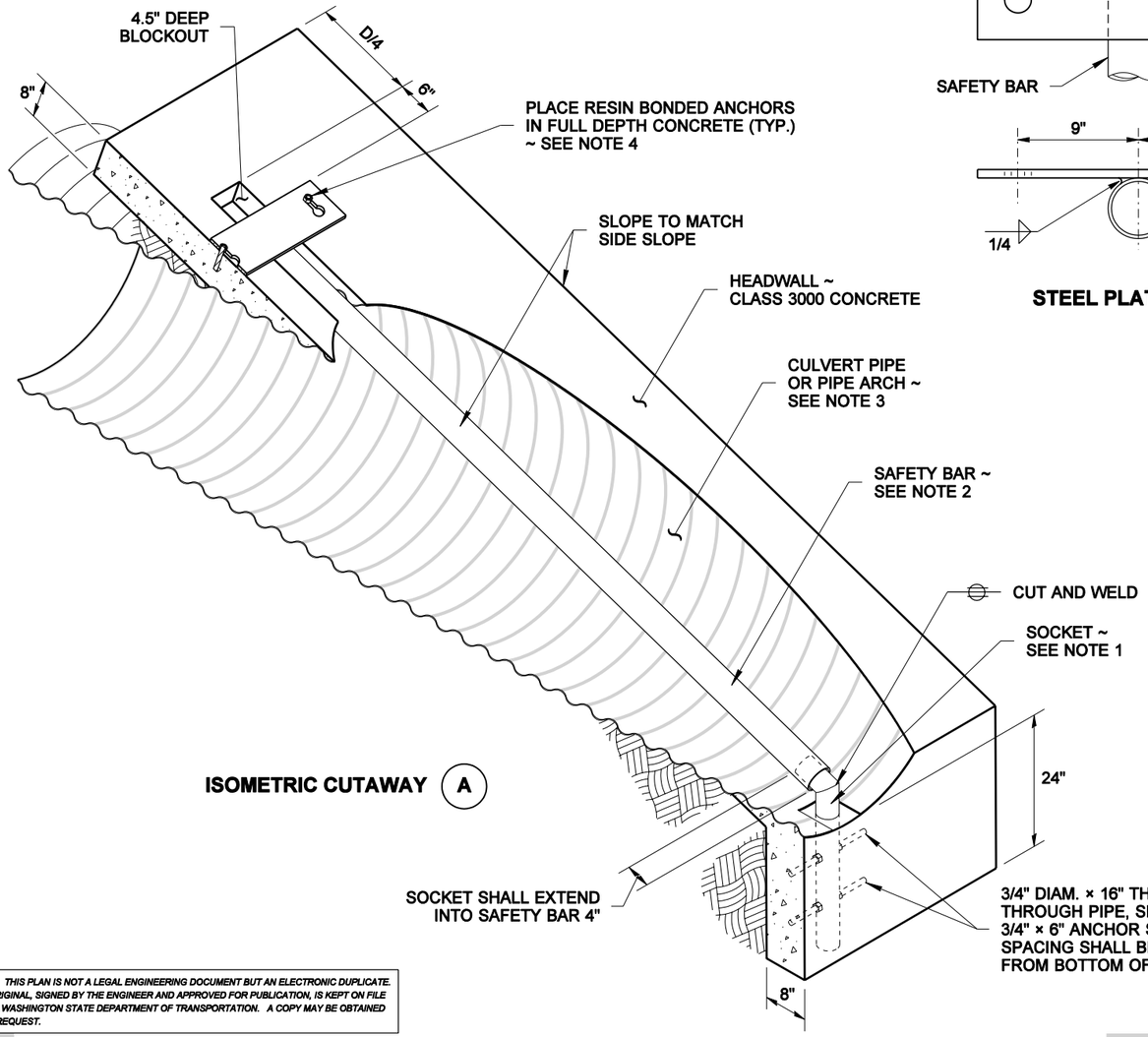



**STEEL PLATE DETAIL**

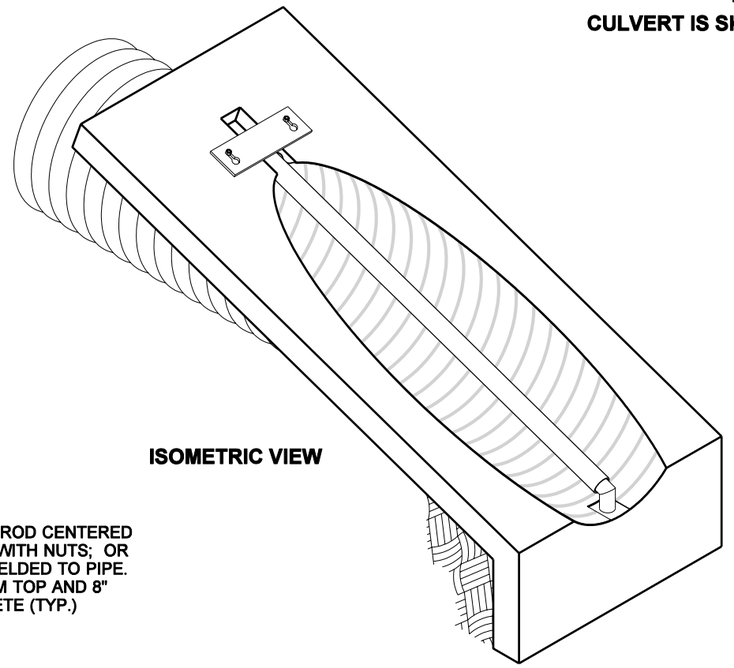



TOP VIEW

**CULVERT IS SKEWED TO ROADWAY**




**ISOMETRIC CUTAWAY (A)**



**ISOMETRIC VIEW**

DRAWN BY: ADAM COCHRAN

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MATTHEW J. WITECKI
STATE OF WASHINGTON
15588
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2007

# TYPE 1 SAFETY BARS FOR STEPPED CULVERT PIPE OR PIPE ARCH

## STANDARD PLAN B-75.50-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-08-06* — DATE

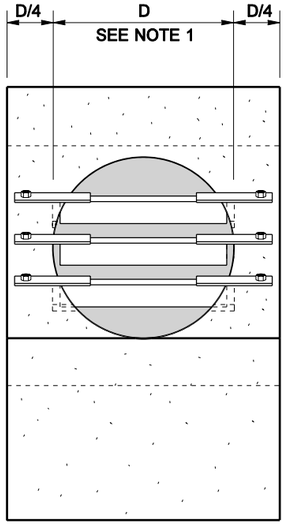
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

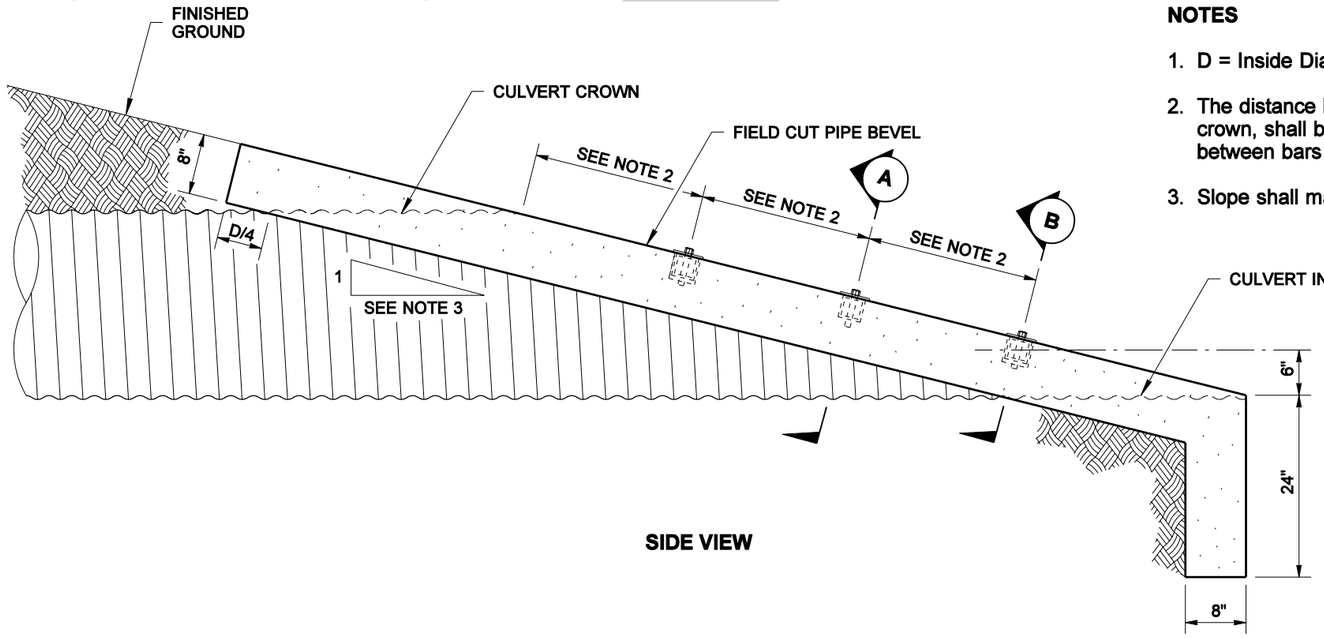
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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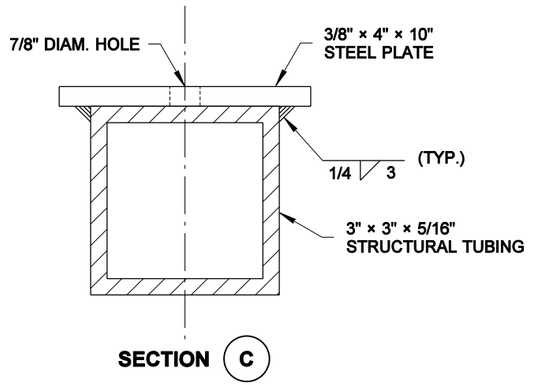

FRONT VIEW



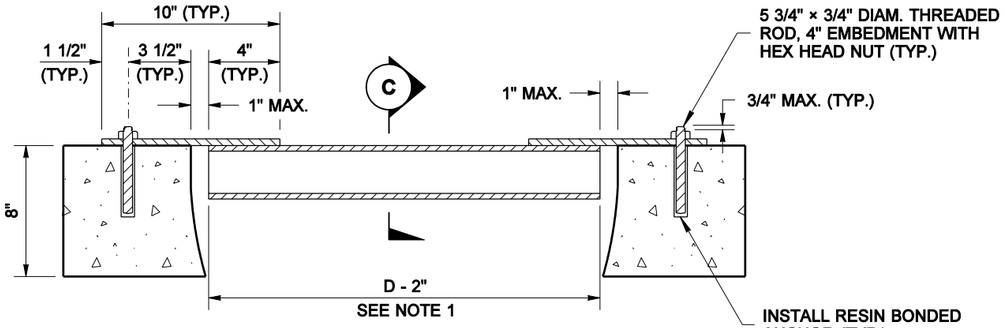

SIDE VIEW

## NOTES

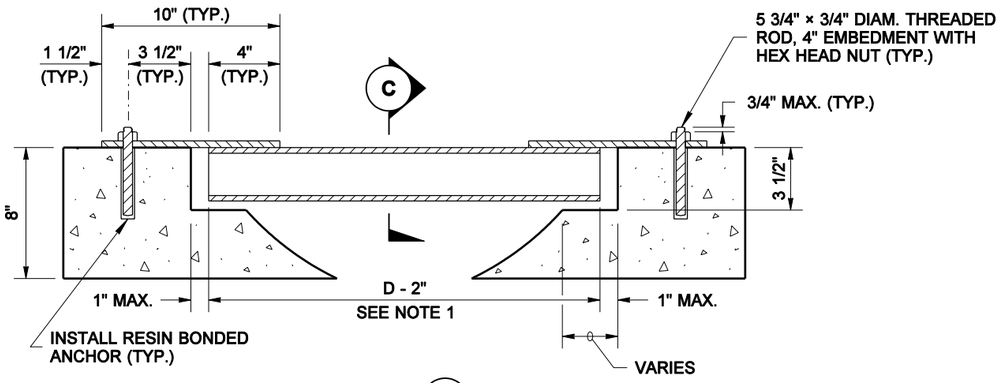
1. D = Inside Diameter of Culvert Pipe, or Pipe Arch Span Width, 36" maximum.
2. The distance between the safety bars, and between the top bar and the culvert crown, shall be equal spaces of no more than 24". The distance may vary ±1" between bars to facilitate placement.
3. Slope shall match Side Slope;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



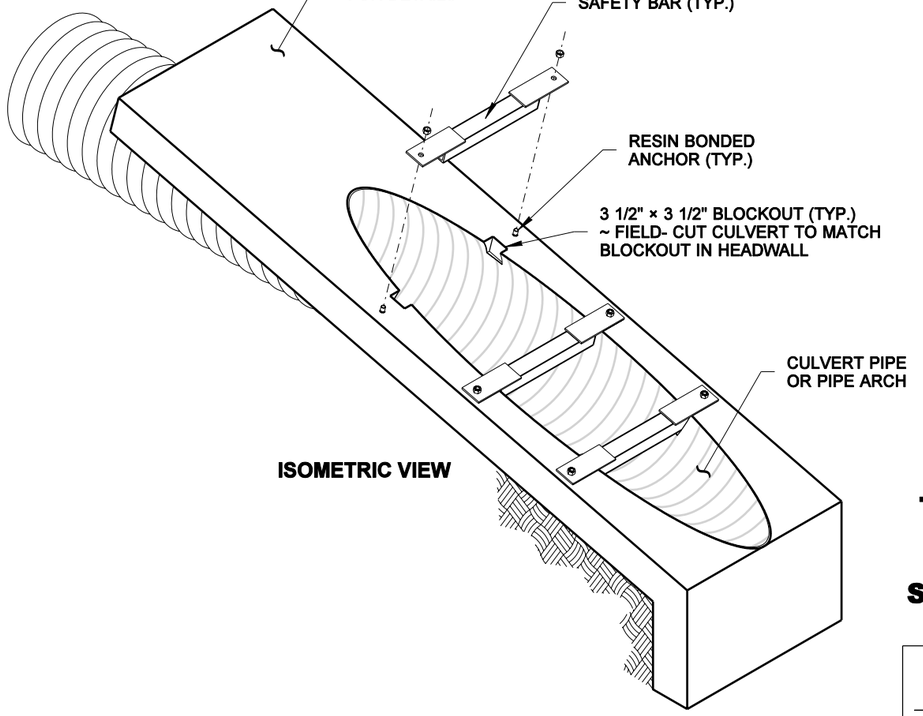

SECTION C




SECTION A




SECTION B




ISOMETRIC VIEW

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STATE OF WASHINGTON
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PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2007

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

SHEET 1 OF 1 SHEET

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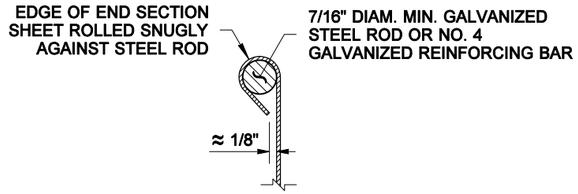
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-08-06* — DATE

Washington State Department of Transportation

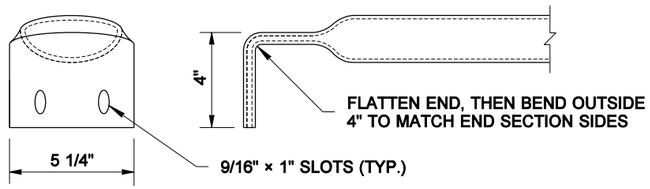
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

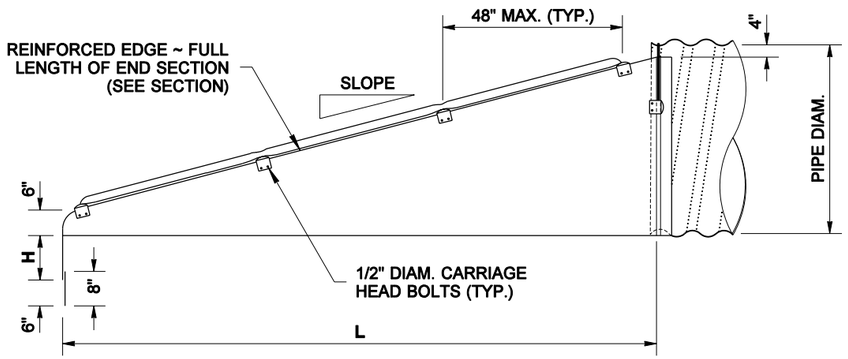
DRAWN BY: ADAM COCHRAN



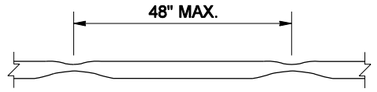

**REINFORCED EDGE SECTION**



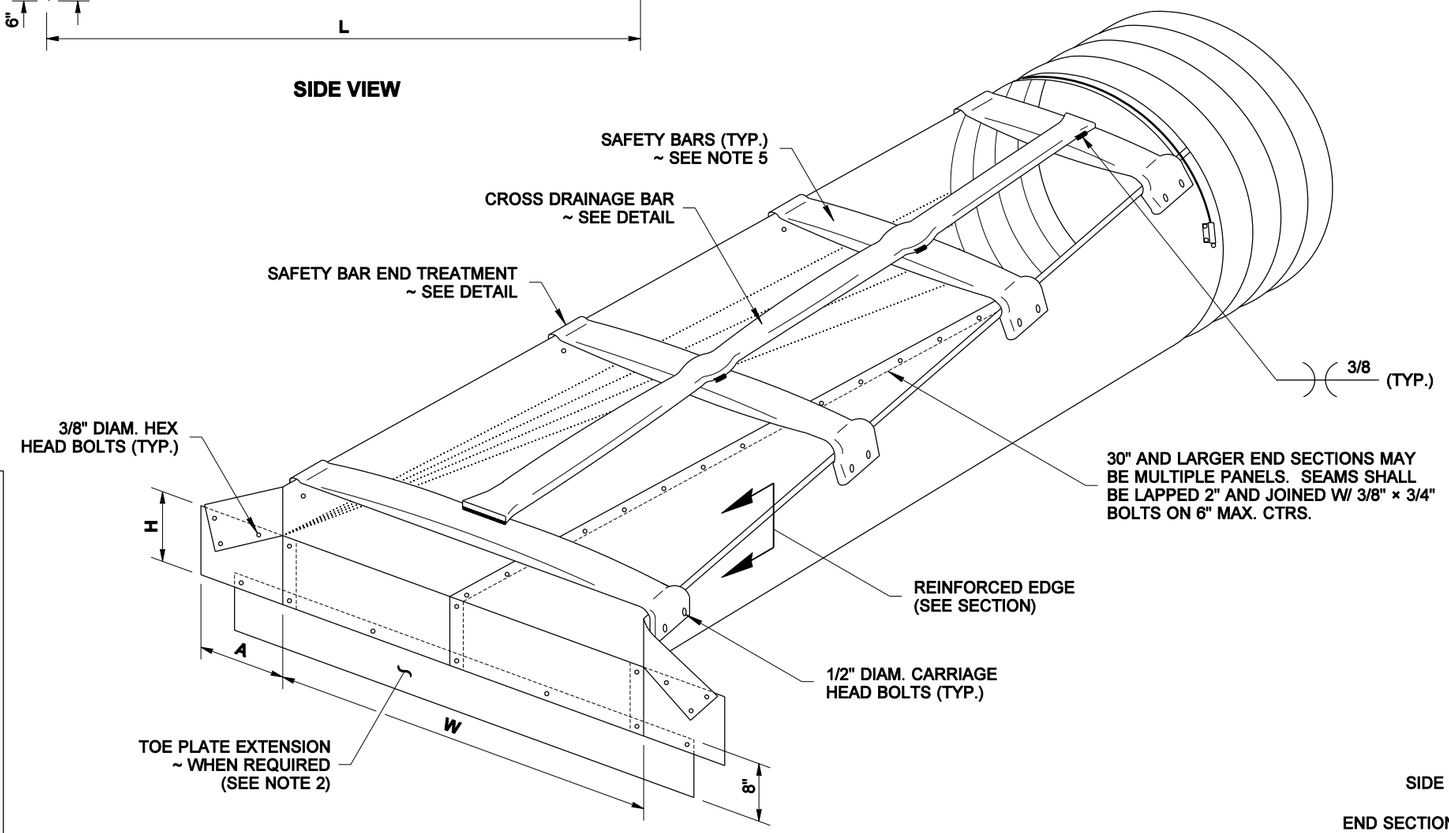

**SAFETY BAR END TREATMENT DETAIL**




**SIDE VIEW**




**CROSS DRAINAGE BAR DETAIL**




**ISOMETRIC VIEW**

**CROSS DRAINAGE STRUCTURE**

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**NOTES**

1. All pipes or pipe arches shall be attached as shown in **CONNECTOR DETAIL**.
2. When a Toe Plate Extension is required, it shall be the same gage as the End Section. The dimensions shall be 8" high, and 6" less than the overall width. Install centered, and lapped 2"; fasten with 3/8" × 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.

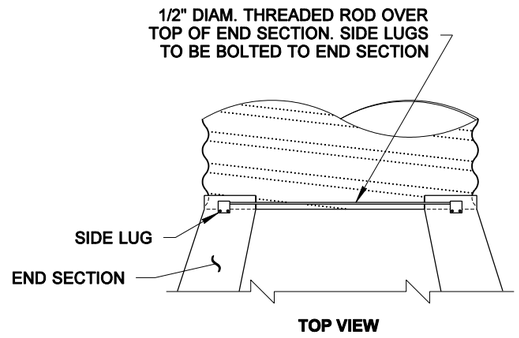
**METAL END SECTIONS FOR CIRCULAR PIPES**

| PIPE DIAM. (INCHES) | MINIMUM THICKNESS | | DIMENSIONS (INCHES) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | INCHES | GAGE | A | H | W | OVERALL WIDTH | L SLOPE 4:1 | L SLOPE 6:1 |
| 36 | 0.109 | 12 | 12 | 9 | 42 | 66 | 104 | 156 |
| 42 | 0.109 | 12 | 16 | 12 | 48 | 80 | 128 | 192 |
| 48 | 0.109 | 12 | 16 | 12 | 54 | 86 | 152 | 228 |
| 54 | 0.109 | 12 | 16 | 12 | 60 | 92 | 176 | 264 |
| 60 | 0.109 | 12 | 16 | 12 | 66 | 98 | 200 | 300 |

**METAL END SECTIONS FOR ARCHED PIPES**

| EQUIV. DIAM. (INCHES) | PIPE ARCH DIMENSIONS | | MINIMUM THICKNESS | | DIMENSIONS (INCHES) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | SPAN (IN.) | RISE (IN.) | INCHES | GAGE | A | H | W | OVERALL WIDTH | L SLOPE 4:1 | L SLOPE 6:1 |
| 30 | *35 | 24 | 0.079 | 14 | 12 | 9 | *41 | 65 | 56 | 84 |
| 36 | 42 | 29 | 0.109 | 12 | 12 | 9 | 48 | 72 | 76 | 114 |
| 42 | 49 | 33 | 0.109 | 12 | 16 | 12 | 55 | 87 | 92 | 138 |
| 48 | 57 | 38 | 0.109 | 12 | 16 | 12 | 63 | 95 | 112 | 168 |
| 54 | 64 | 43 | 0.109 | 12 | 16 | 12 | 70 | 102 | 132 | 198 |
| 60 | 71 | 47 | 0.109 | 12 | 16 | 12 | 77 | 109 | 148 | 222 |
| 72 | 83 | 57 | 0.109 | 12 | 16 | 12 | 89 | 121 | 188 | 282 |

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




**TOP VIEW**

**CONNECTOR DETAIL**




EXPIRES JULY 1, 2007

# TAPERED END SECTION WITH TYPE 3 SAFETY BARS

## STANDARD PLAN B-80.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

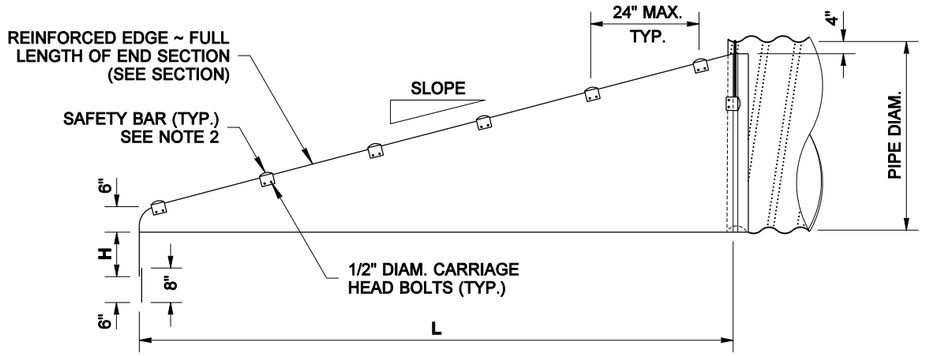
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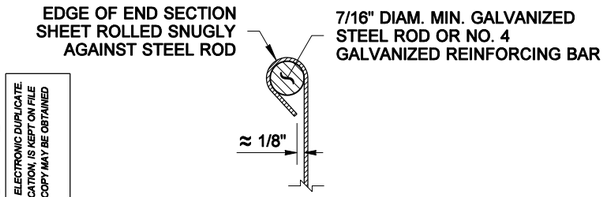
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

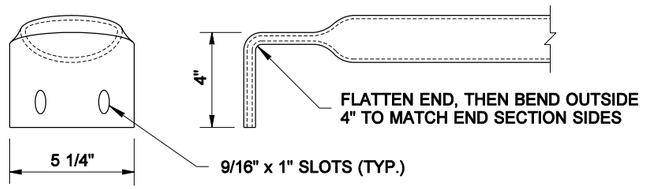
DRAWN BY: ADAM COCHRAN




**SIDE VIEW**

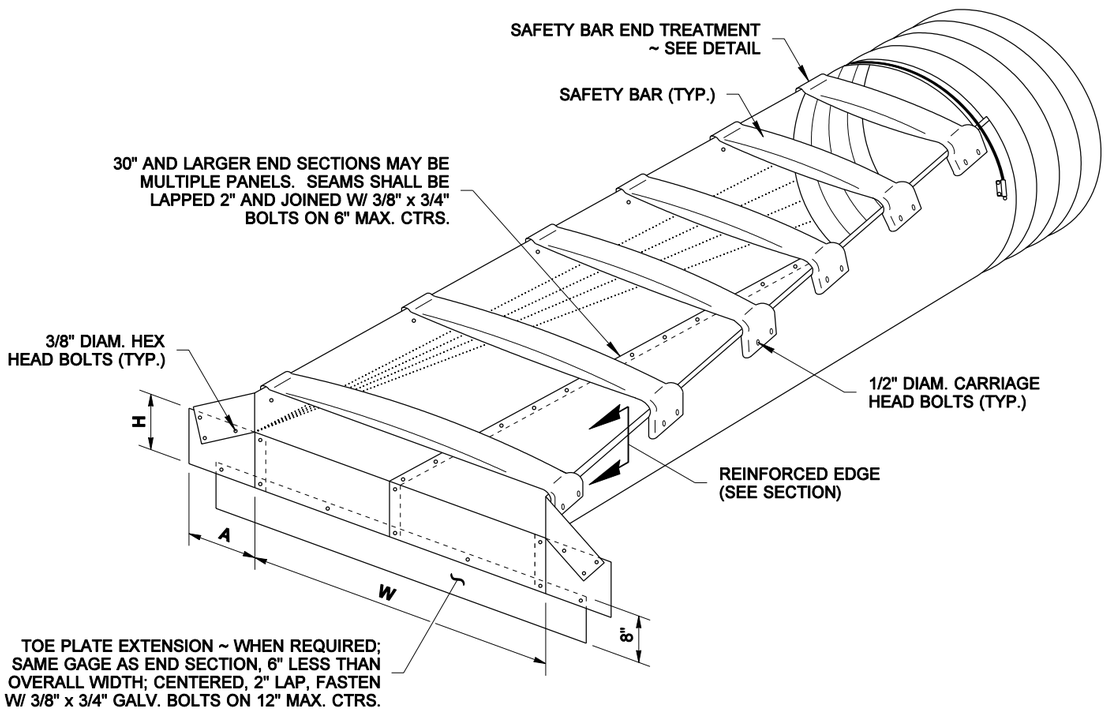



**REINFORCED EDGE SECTION**



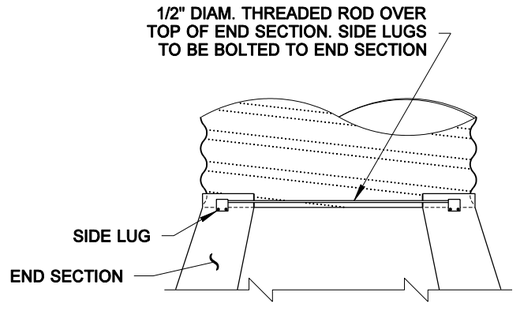

**SAFETY BAR END TREATMENT DETAIL**

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**ISOMETRIC VIEW**

## CROSS ROAD DRAINAGE STRUCTURE




**TOP VIEW**

**CONNECTOR DETAIL**

**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**

| PIPE DIAM. (INCHES) | MINIMUM THICKNESS | | DIMENSIONS (INCHES) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | INCHES | GAGE | A | H | W | OVERALL WIDTH | L SLOPE 4:1 | L SLOPE 6:1 |
| 15 | .064 | 16 | 8 | 6 | 21 | 37 | 20 | 30 |
| 18 | .064 | 16 | 8 | 6 | 24 | 40 | 32 | 48 |
| 21 | .064 | 16 | 8 | 6 | 27 | 43 | 44 | 66 |
| 24 | .064 | 16 | 8 | 6 | 30 | 46 | 56 | 84 |
| 30 | .109 | 12 | 12 | 9 | 36 | 60 | 80 | 120 |
| 36 | .109 | 12 | 12 | 9 | 42 | 66 | 104 | 156 |
| 42 | .109 | 12 | 16 | 12 | 48 | 80 | 128 | 192 |
| 48 | .109 | 12 | 16 | 12 | 54 | 86 | 152 | 228 |
| 54 | .109 | 12 | 16 | 12 | 60 | 92 | 176 | 264 |
| 60 | .109 | 12 | 16 | 12 | 66 | 98 | 200 | 300 |

**METAL END SECTIONS FOR ARCHED PIPES**

| EQUIV. DIAM. (INCHES) | PIPE ARCH DIMENSIONS | | MINIMUM THICKNESS | | DIMENSIONS (INCHES) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | SPAN (IN.) | RISE (IN.) | INCHES | GAGE | A | H | W | OVERALL WIDTH | L SLOPE 4:1 | L SLOPE 6:1 |
| 18 | 21 | 15 | .064 | 16 | 8 | 6 | 27 | 43 | 20 | 30 |
| 21 | 24 | 18 | .064 | 16 | 8 | 6 | 30 | 46 | 32 | 48 |
| 24 | 28 | 20 | .064 | 16 | 8 | 6 | 34 | 50 | 40 | 60 |
| 30 | 35 | 24 | .079 | 14 | 12 | 9 | 41 | 65 | 56 | 84 |
| 36 | 42 | 29 | .109 | 12 | 12 | 9 | 48 | 72 | 76 | 114 |
| 42 | 49 | 33 | .109 | 12 | 16 | 12 | 55 | 87 | 92 | 138 |
| 48 | 57 | 38 | .109 | 12 | 16 | 12 | 63 | 95 | 112 | 168 |
| 54 | 64 | 43 | .109 | 12 | 16 | 12 | 70 | 102 | 132 | 198 |
| 60 | 71 | 47 | .109 | 12 | 16 | 12 | 77 | 109 | 148 | 222 |
| 72 | 83 | 57 | .109 | 12 | 16 | 12 | 89 | 121 | 188 | 282 |




EXPIRES JULY 1, 2007

# TAPERED END SECTION WITH TYPE 4 SAFETY BARS (ON CROSS ROAD) STANDARD PLAN B-80.40-00

SHEET 1 OF 1 SHEET

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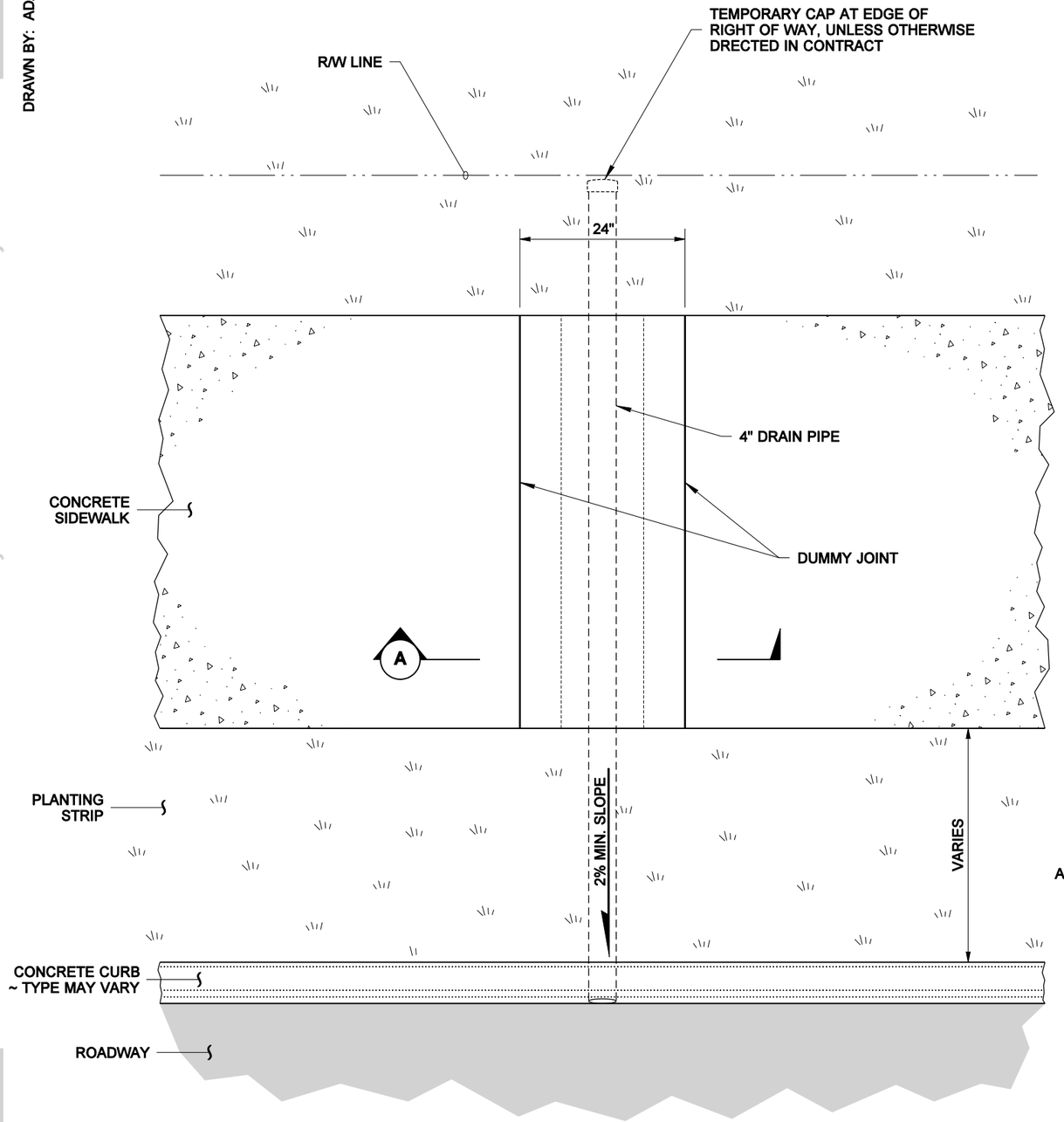
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-01-06* — DATE

Washington State Department of Transportation

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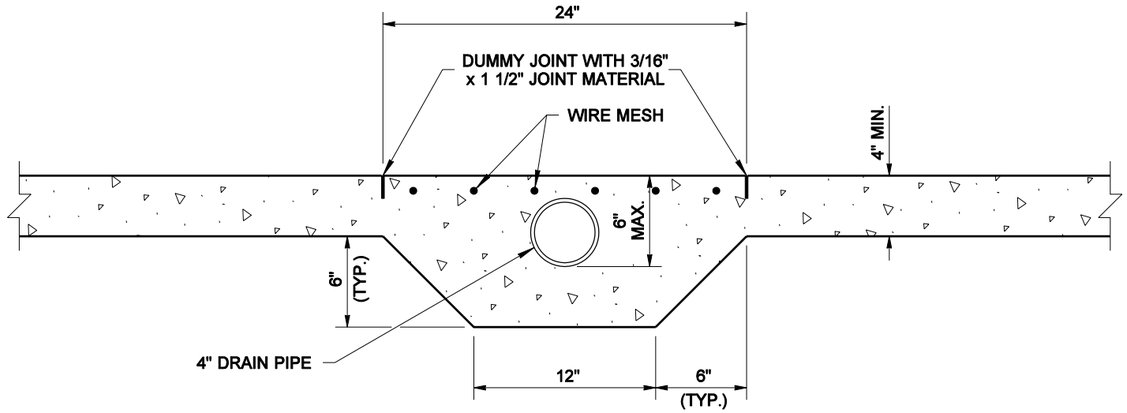
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DRAWN BY: ADAM COCHRAN

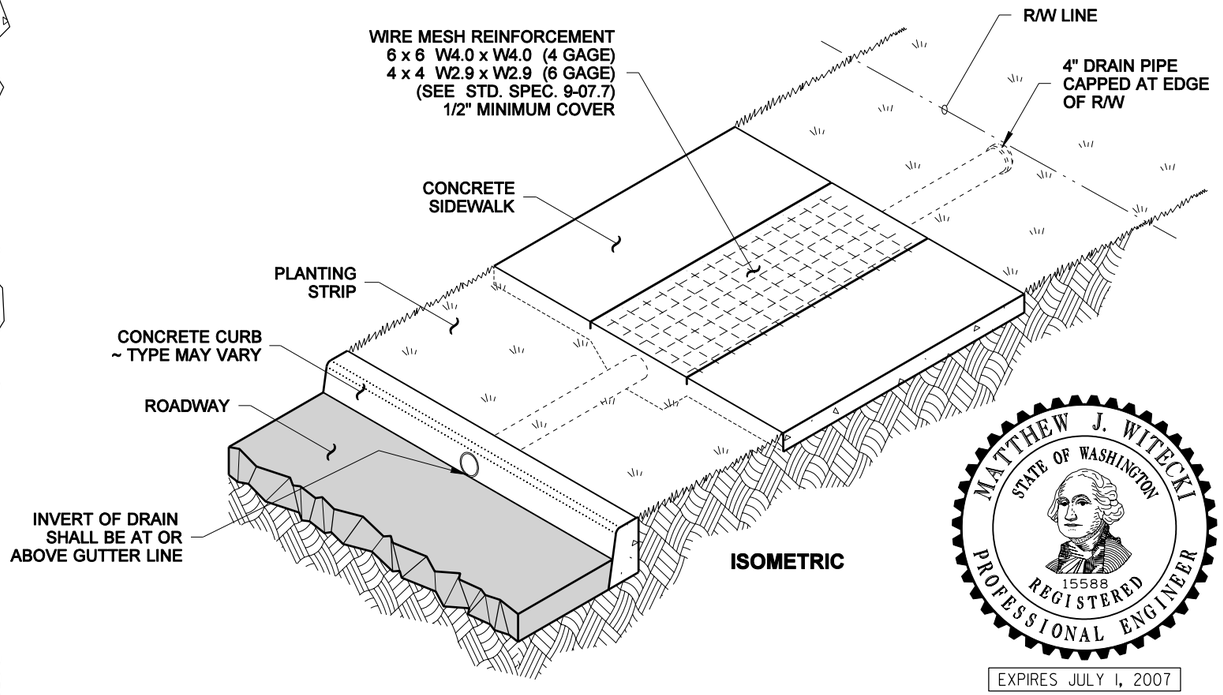



(REINFORCEMENT NOT SHOWN)

**PLAN**




**SECTION (A)**




**ISOMETRIC**

MATTHEW J. WITECKI
STATE OF WASHINGTON
15588
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2007

# RESIDENTIAL STORM DRAIN, UNDER SIDEWALK

## STANDARD PLAN B-82.20-00

SHEET 1 OF 1 SHEET

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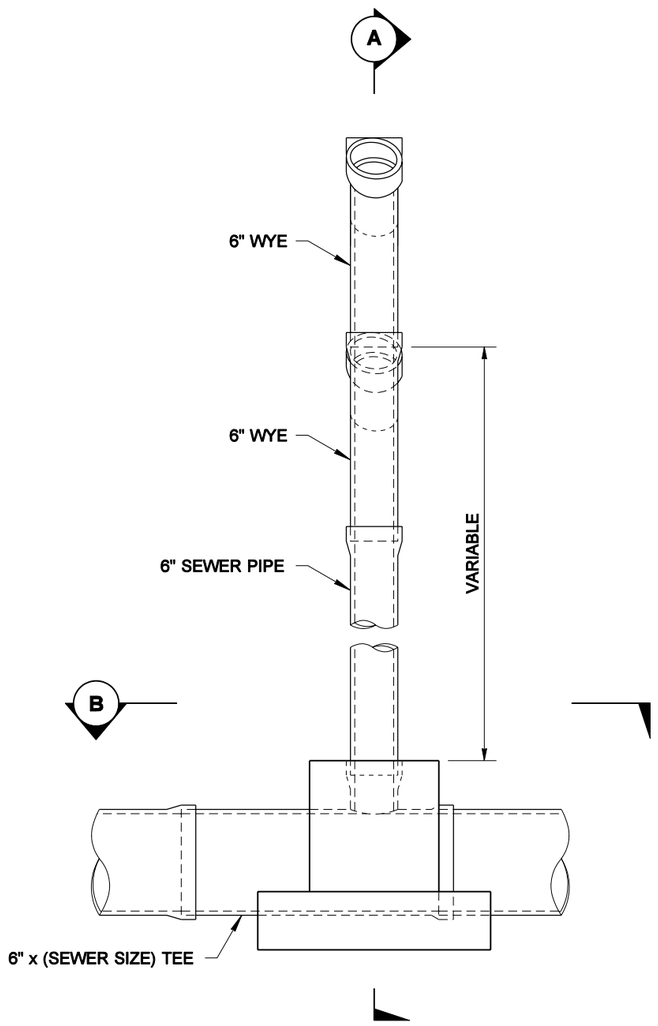
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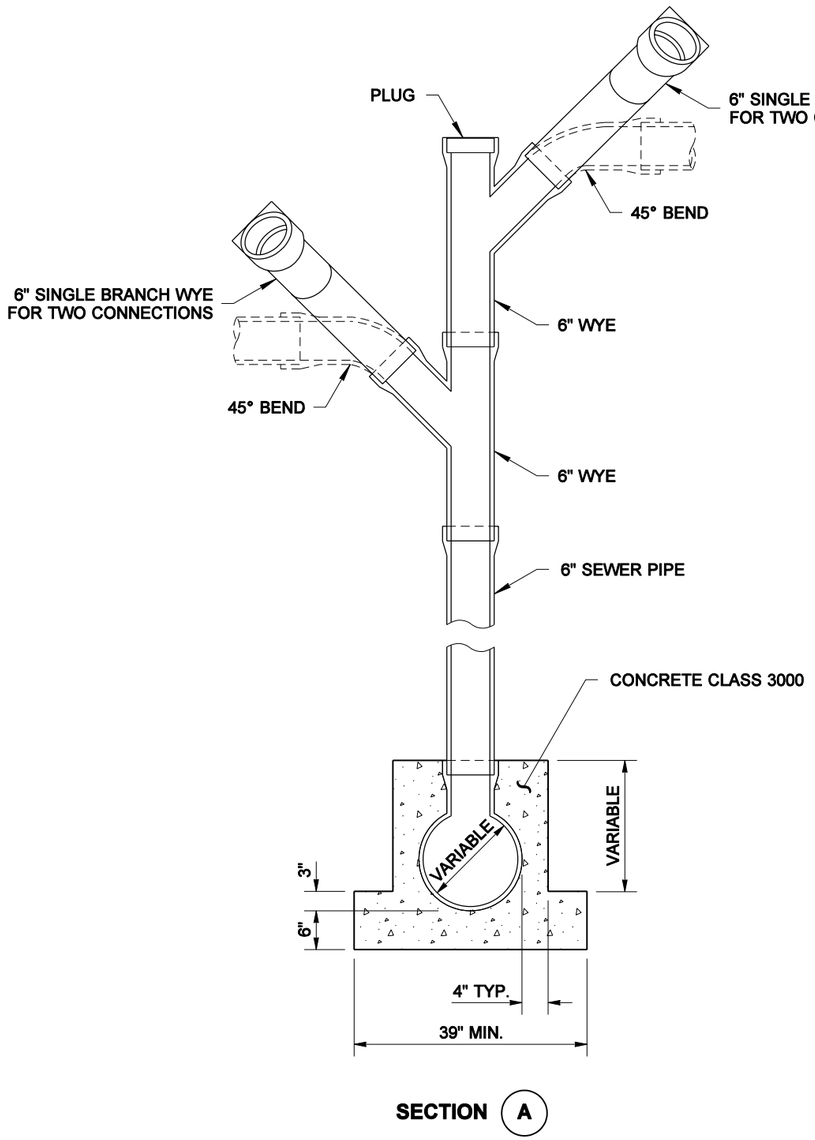
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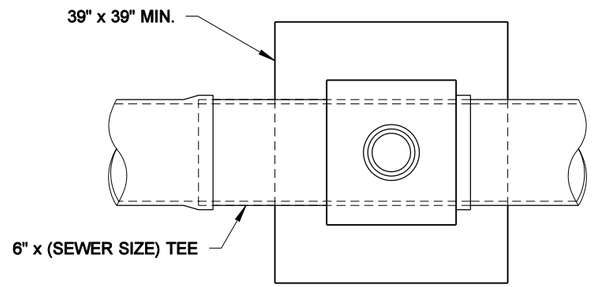
DRAWN BY: ADAM COCHRAN




ELEVATION




SECTION A




SECTION B

## FOR SANITARY SEWER USE




EXPIRES JULY 1, 2007

# VERTICAL CONNECTION

## STANDARD PLAN B-85.10-00

SHEET 1 OF 1 SHEET

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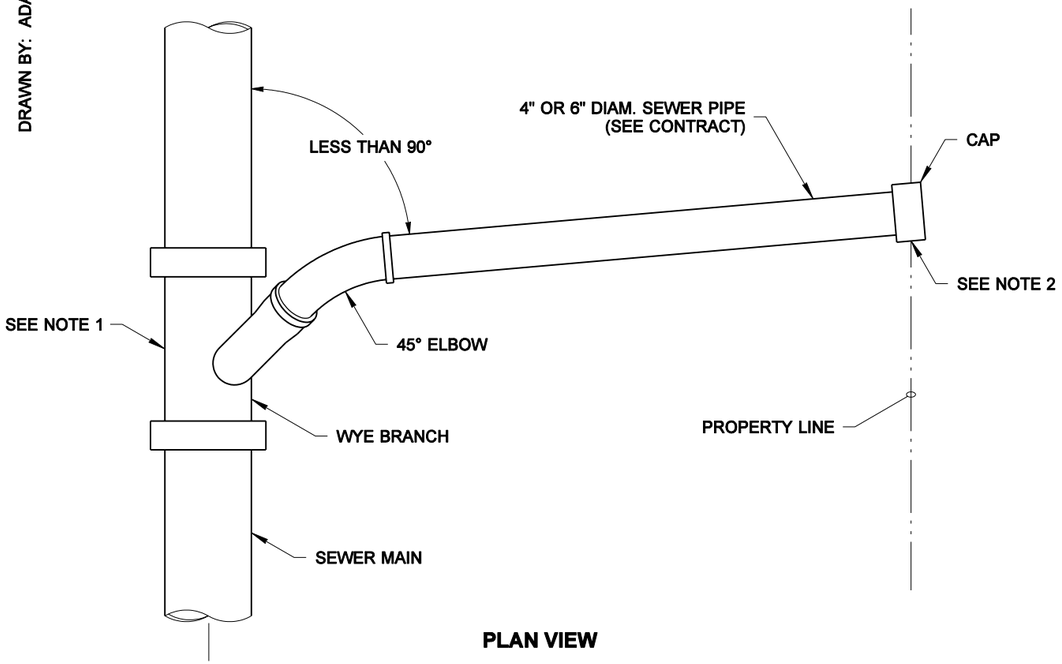
Washington State Department of Transportation

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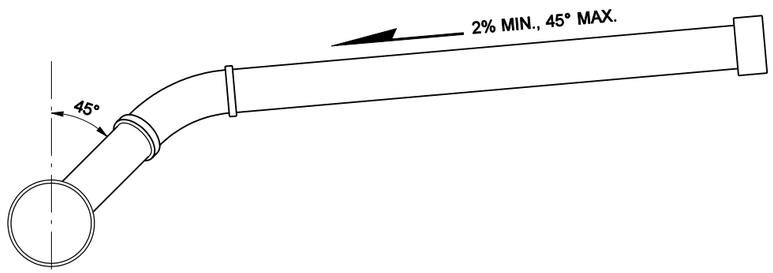
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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DRAWN BY: ADAM COCHRAN

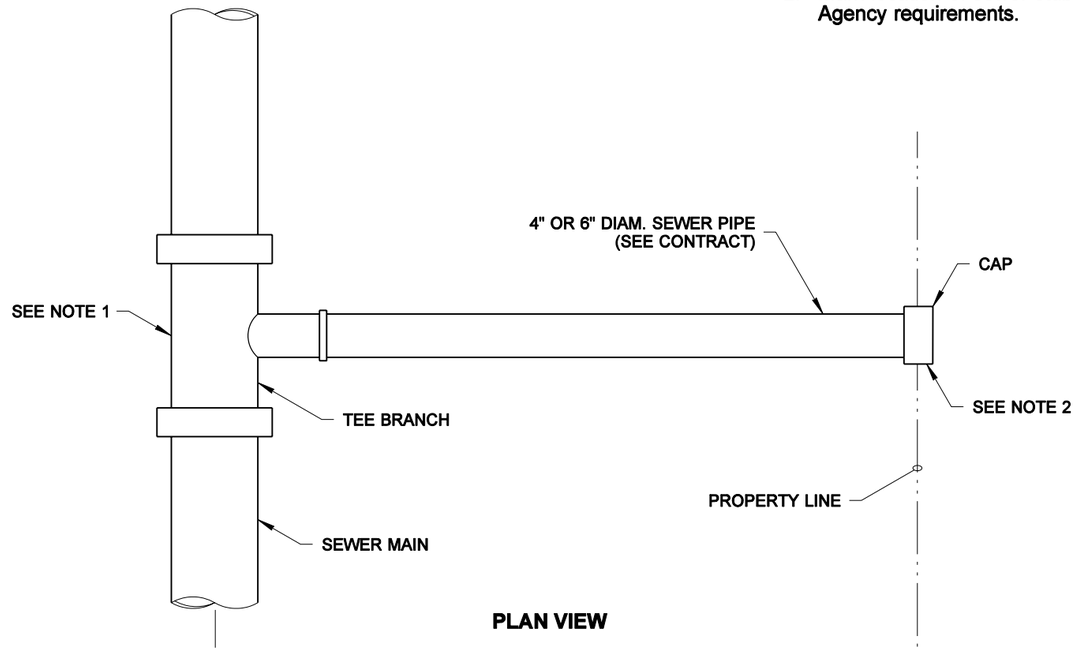



**PLAN VIEW**

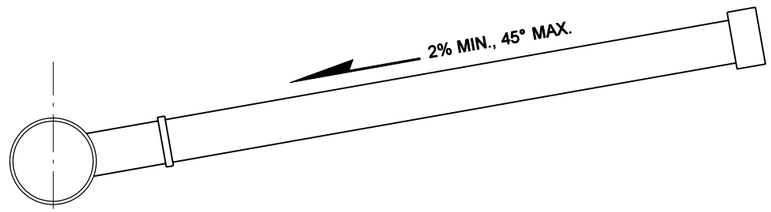



**ELEVATION VIEW**

**WYE CONNECTION**




**PLAN VIEW**




**ELEVATION VIEW**

**TEE CONNECTION**

**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.

**FOR SANITARY SEWER USE**

MATTHEW J. WITECKI
STATE OF WASHINGTON
15588
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2007

# SIDE SEWER CONNECTION

## STANDARD PLAN B-85.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-01-06* — DATE

Washington State Department of Transportation

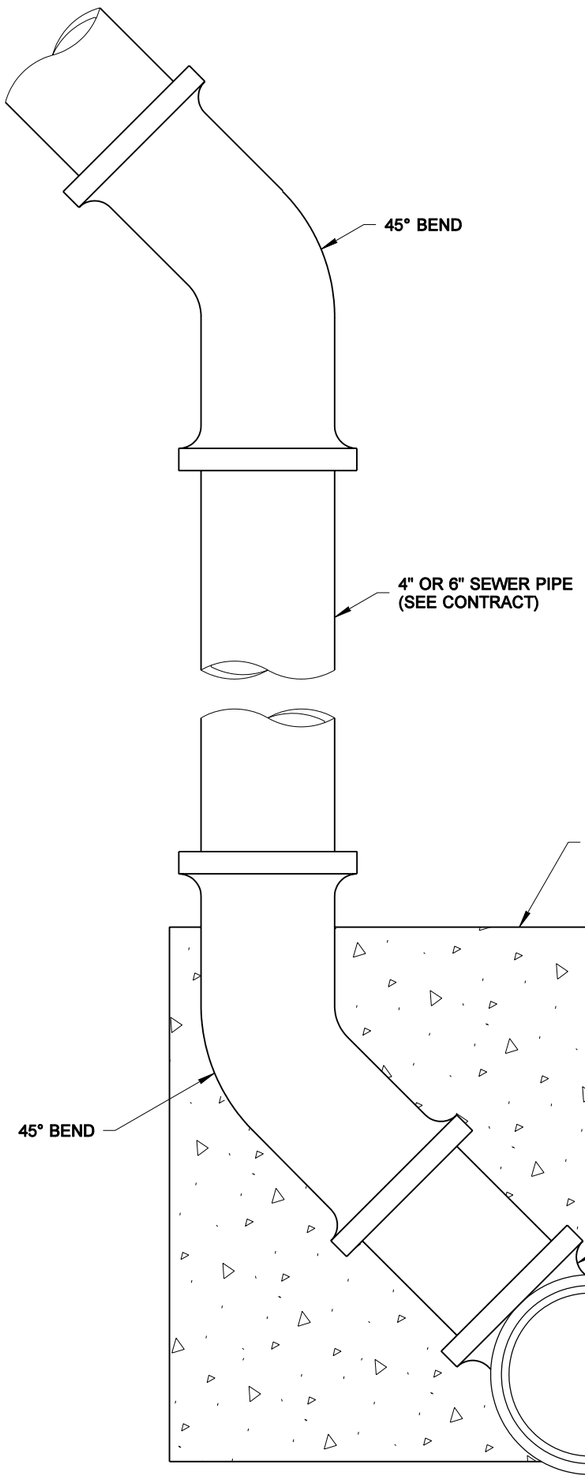
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**FOR SANITARY SEWER USE**

MATTHEW J. WITECKI
STATE OF WASHINGTON
15588
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2007

# STANDING SIDE SEWER CONNECTION

## STANDARD PLAN B-85.30-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER

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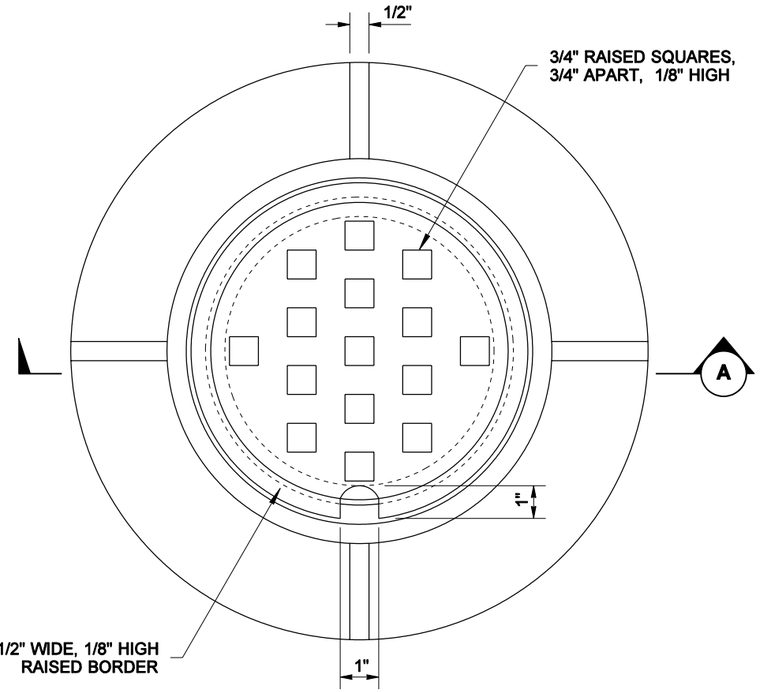
Washington State Department of Transportation

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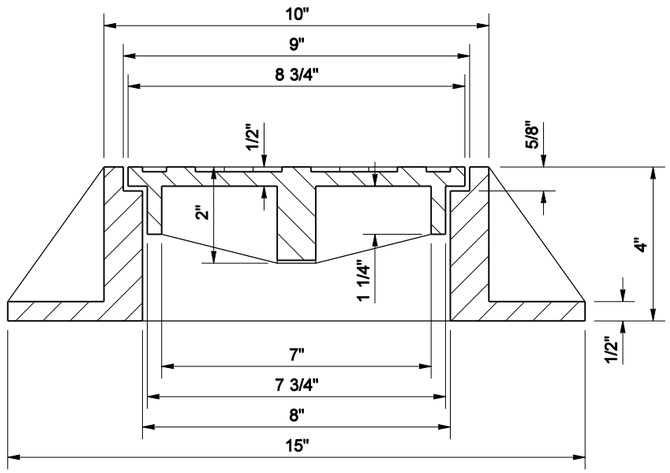
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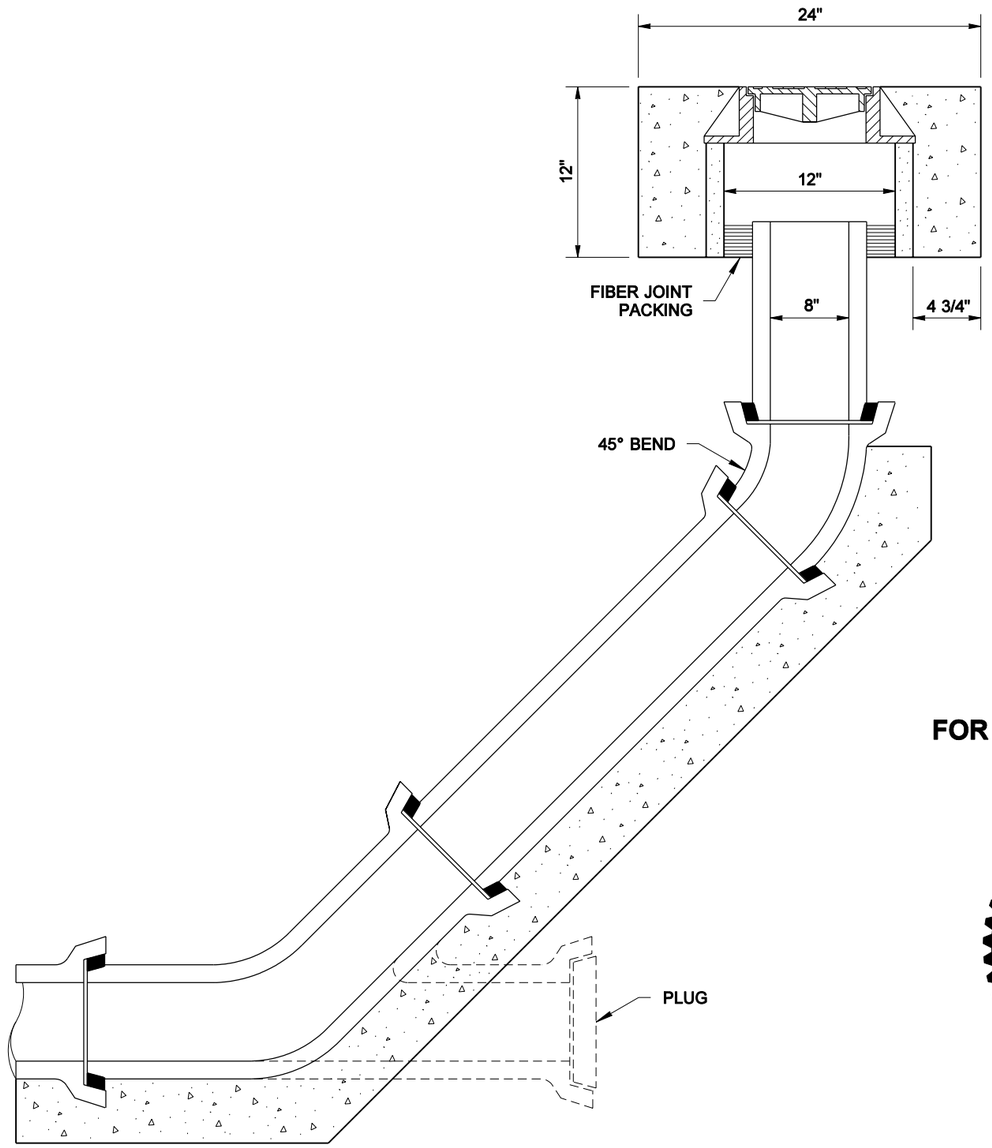



PLAN




SECTION (A)

CAST IRON RING AND COVER




FOR SANITARY SEWER USE

MATTHEW J. WITECKI
STATE OF WASHINGTON
15588
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2007

# 8 INCH SEWER CLEAN-OUT

# STANDARD PLAN B-85.40-00

SHEET 1 OF 1 SHEET

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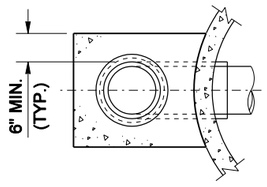
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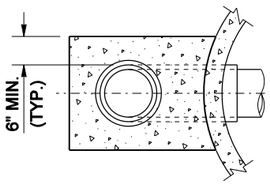
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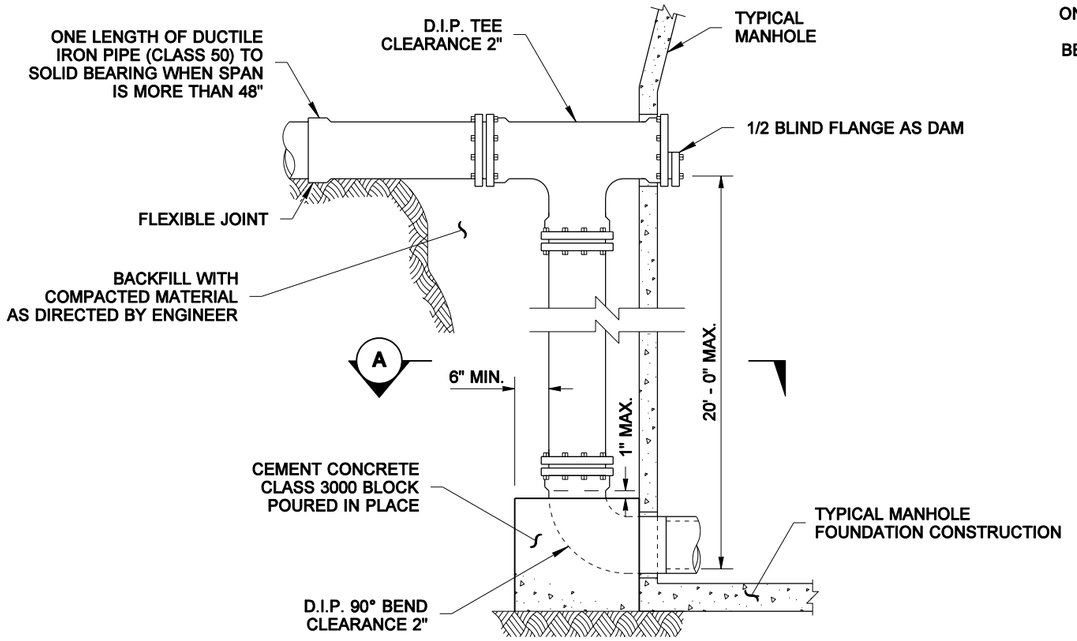
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SECTION (A)

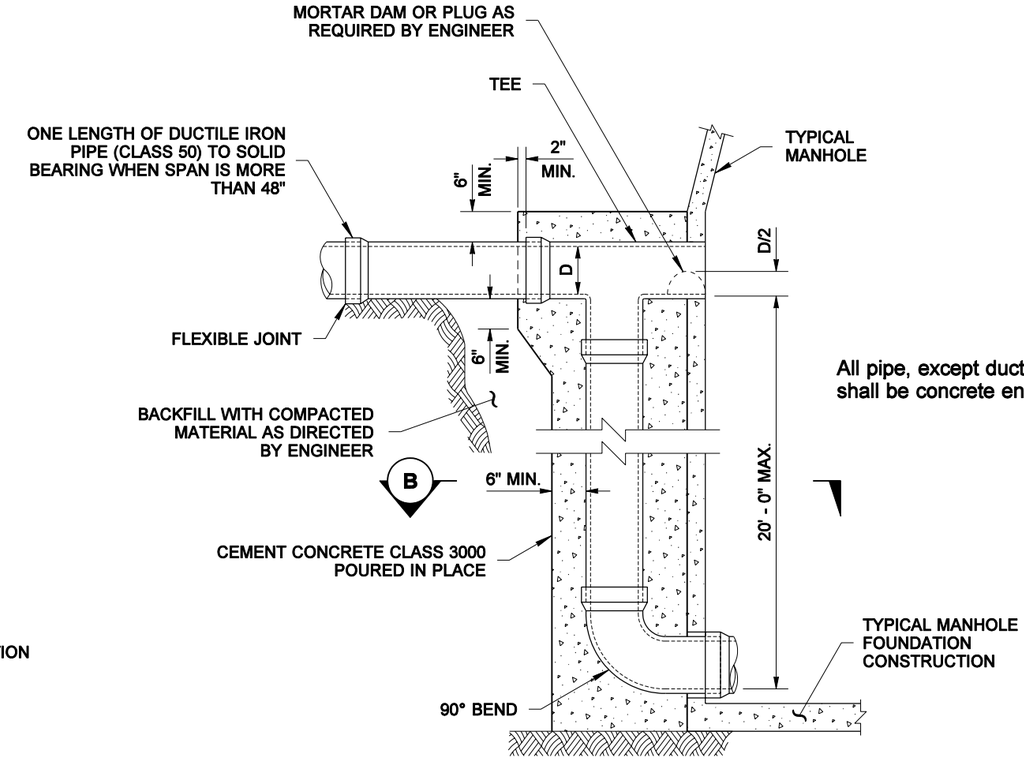



SECTION (B)




ELEVATION

**DUCTILE IRON DROP CONNECTION**




ELEVATION

**CONCRETE ENCASED DROP CONNECTION**

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

**FOR SANITARY SEWER USE**




EXPIRES JULY 1, 2007

# DROP CONNECTIONS

## STANDARD PLAN B-85.50-00

SHEET 1 OF 1 SHEET

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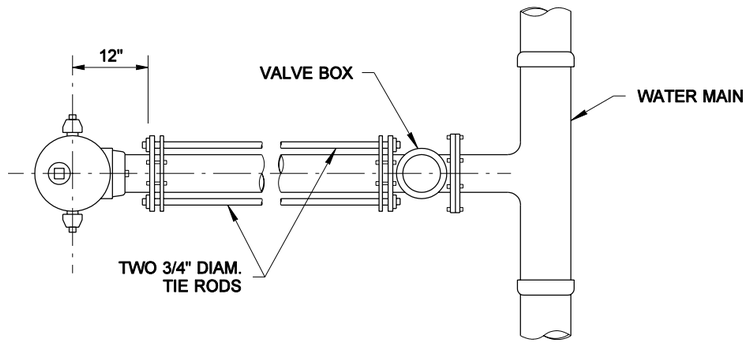
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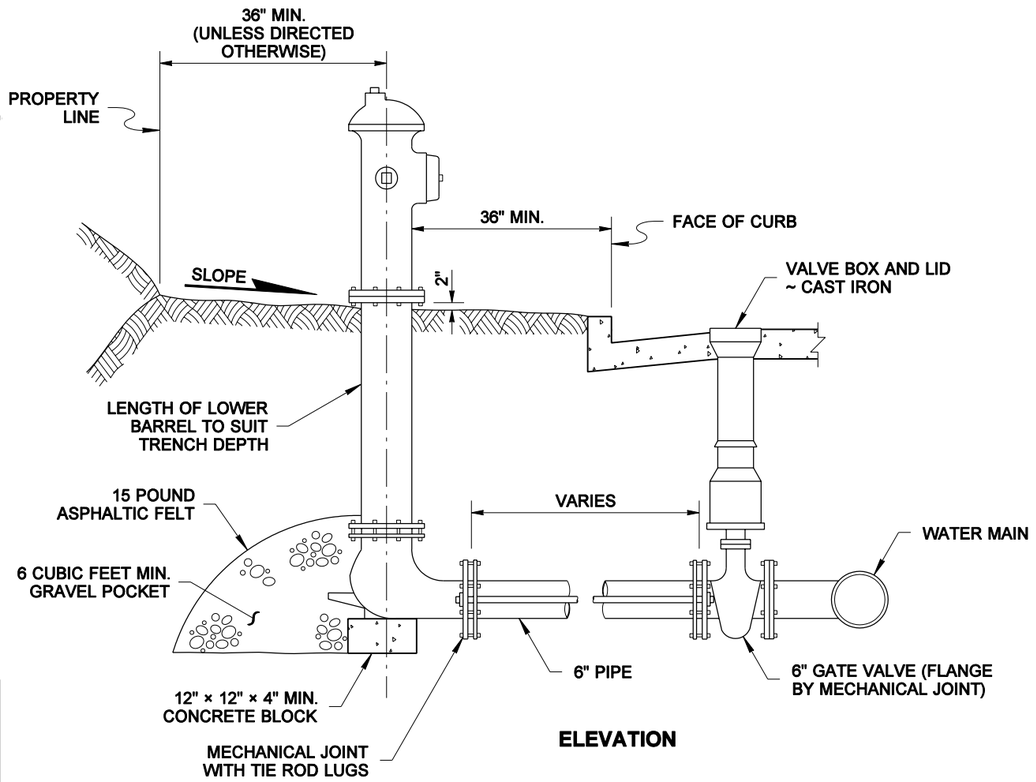
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DRAWN BY: MARK SUJKA




**PLAN**



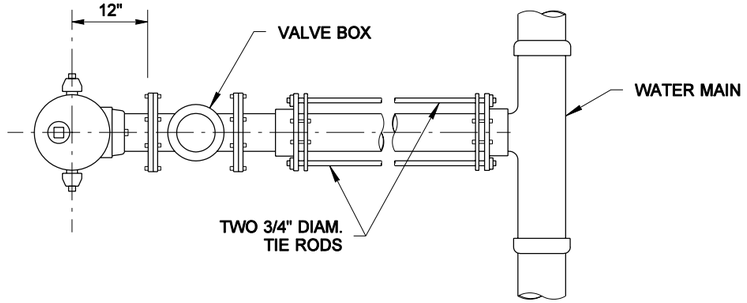

**ELEVATION**

**TYPE A**

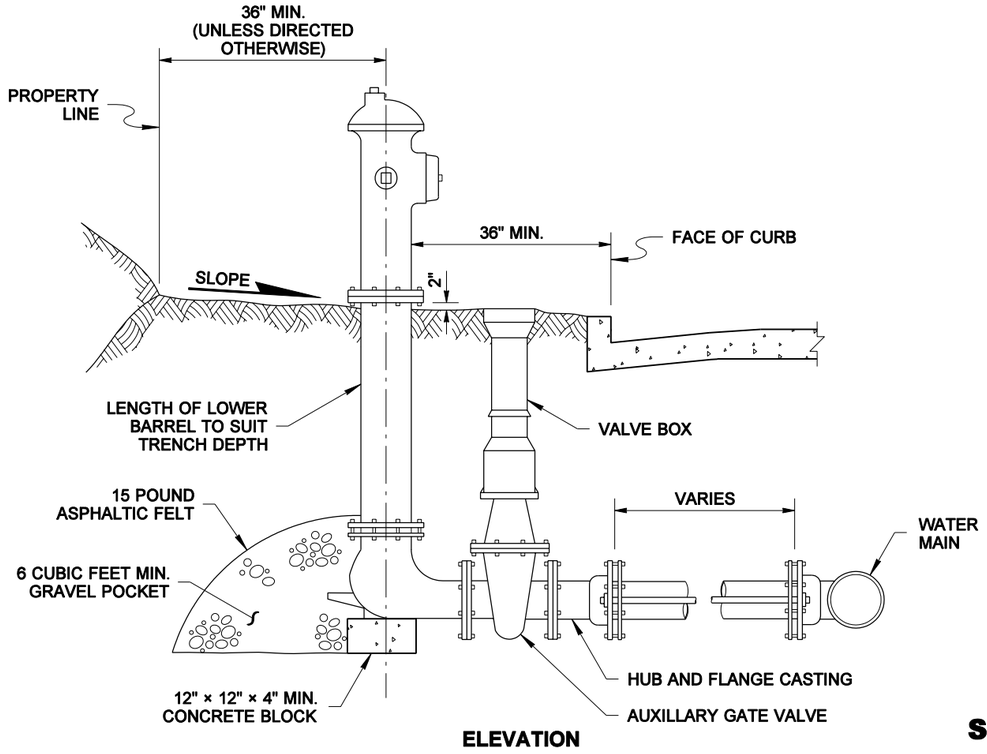
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**NOTES**

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.




**PLAN**




**ELEVATION**

**TYPE B**

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# HYDRANT SETTING TYPES A AND B

## STANDARD PLAN B-90.10-00

SHEET 1 OF 1 SHEET

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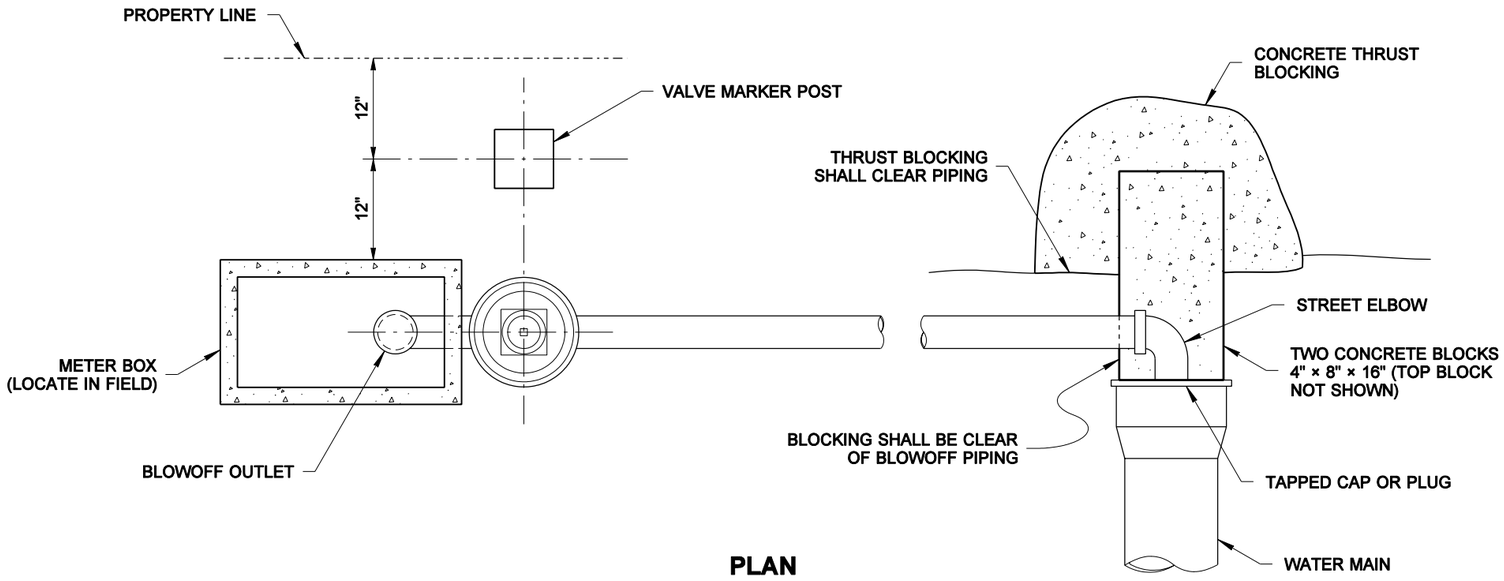
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DRAWN BY: MARK SUJKA

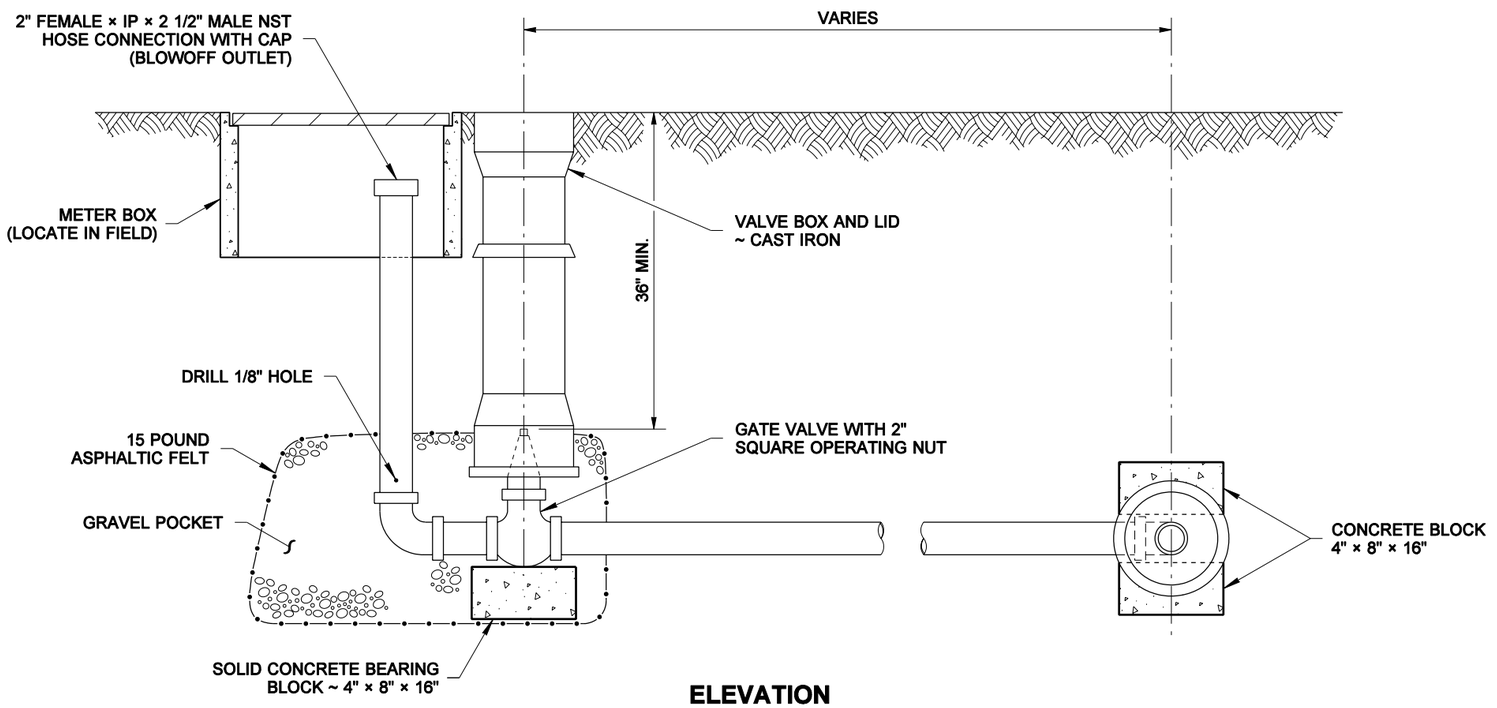



**PLAN**

**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.

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**ELEVATION**

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# 2 INCH BLOWOFF ASSEMBLY

## STANDARD PLAN B-90.20-00

SHEET 1 OF 1 SHEET

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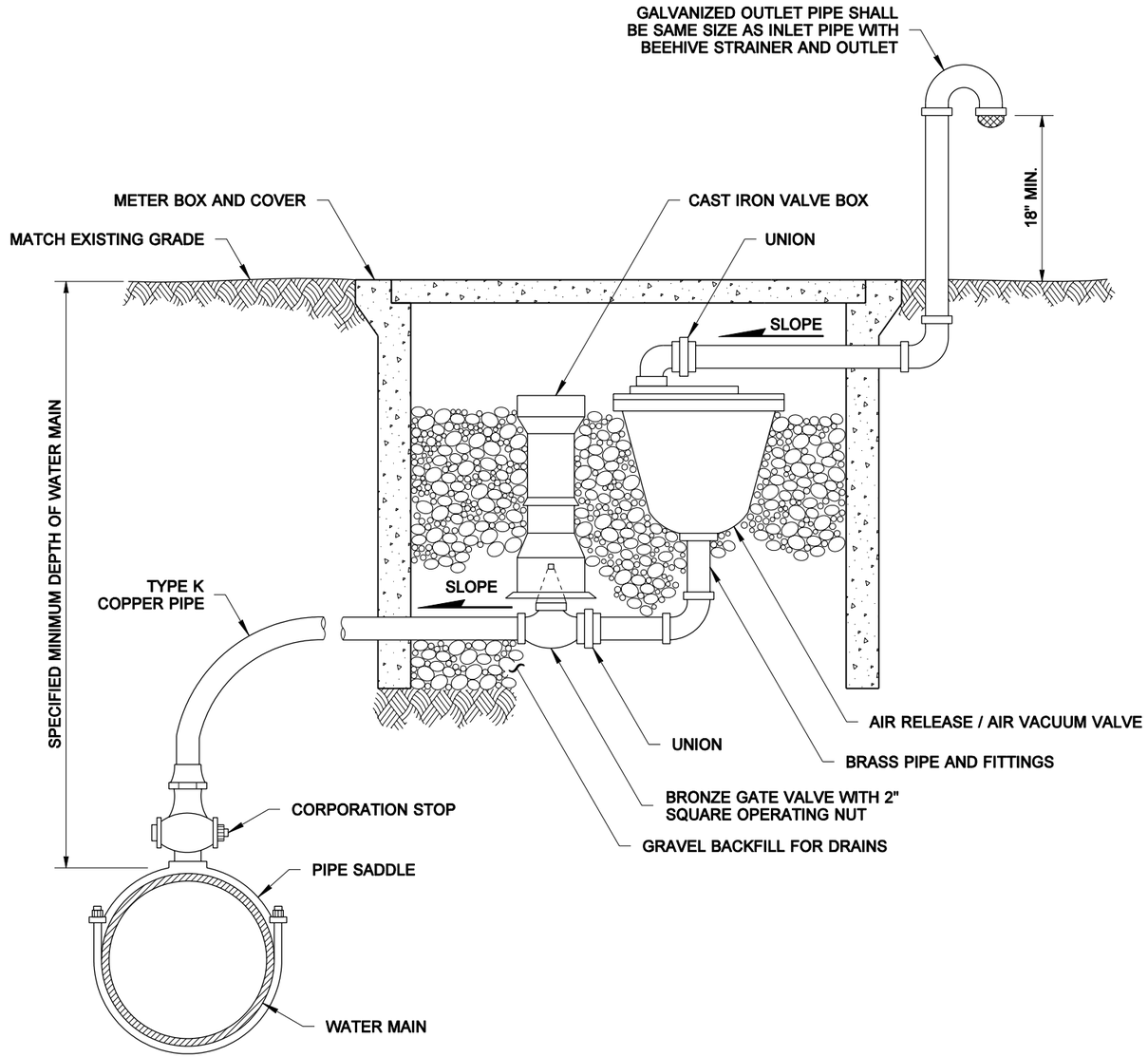
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DRAWN BY: ADAM COCHRAN




**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.

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# COMBINATION AIR RELEASE / AIR VACUUM VALVE ASSEMBLY STANDARD PLAN B-90.30-00

SHEET 1 OF 1 SHEET

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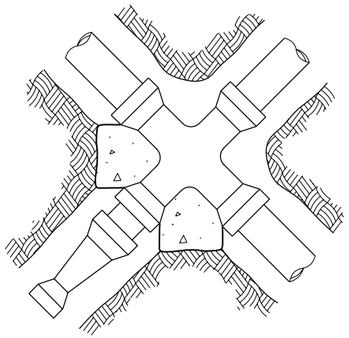
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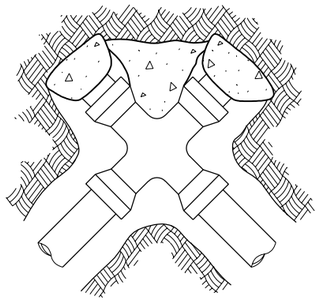
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PLAN VIEW

**UNBALANCED CROSS**

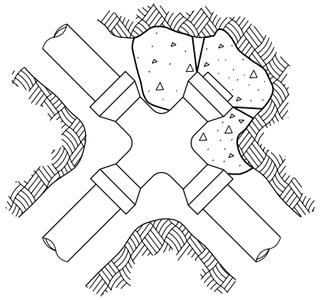
(USE COLUMN **A**)



PLAN VIEW

**PLUGGED CROSS**

(USE COLUMN **B**)



PLAN VIEW

**PLUGGED CROSS**

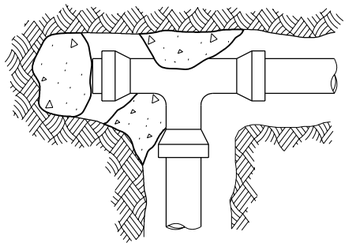
(USE COLUMN **A**)

**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.

| SIZE | TEST PRESSURE (PSI) | THRUST AT FITTINGS IN POUNDS | | | | |
|---|---|---|---|---|---|---|
| | | A | B | C | D | E |
| | | TEE AND DEAD ENDS | 90° BEND | 45° BEND | 22.5° BEND | 11.25° BEND |
| 4" | 250 | 3,140 | 4,440 | 2,405 | 1,225 | 615 |
| 6" | 250 | 7,070 | 9,995 | 5,410 | 2,760 | 1,385 |
| 8" | 250 | 12,565 | 17,770 | 9,620 | 4,905 | 2,465 |
| 10" | 250 | 19,635 | 27,770 | 15,030 | 7,660 | 3,850 |
| 12" | 250 | 28,275 | 39,985 | 21,640 | 11,030 | 5,545 |
| 14" | 250 | 38,485 | 54,425 | 29,455 | 15,015 | 7,545 |
| 16" | 250 | 50,265 | 71,085 | 38,470 | 19,615 | 9,855 |

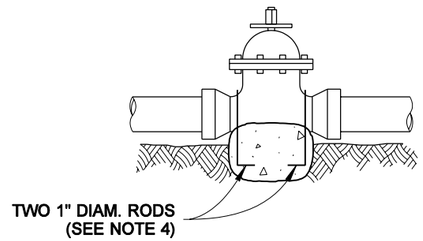
| SOIL TYPE | SAFE BEARING LOAD (PSF) |
|---|---|
| MUCK, PEAT, ETC. | 0 |
| SOFT CLAY | 1,000 |
| SAND | 2,000 |
| SAND AND GRAVEL | 3,000 |
| SAND AND GRAVEL CEMENTED WITH CLAY | 4,000 |
| HARD SHALE | 10,000 |



PLAN VIEW

**PLUGGED TEE**

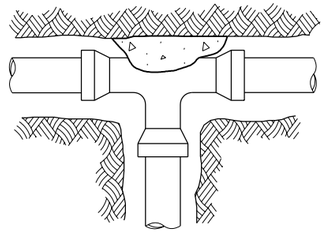
(USE COLUMN **B**)




PROFILE VIEW

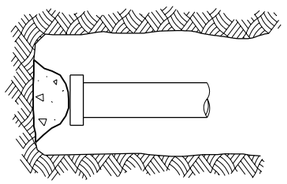
**VALVE**

(USE COLUMN **A**)



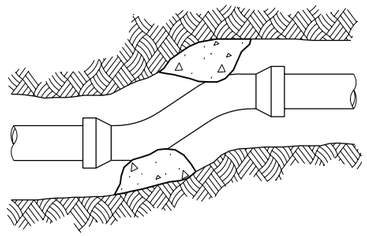
PLAN VIEW

**TEE**



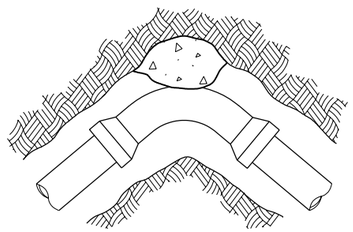
PLAN VIEW

**DEAD END**



**OFFSET**

(USE COLUMNS **B ~ E**)



**BEND**




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# CONCRETE THRUST BLOCK

## STANDARD PLAN B-90.40-00

SHEET 1 OF 1 SHEET

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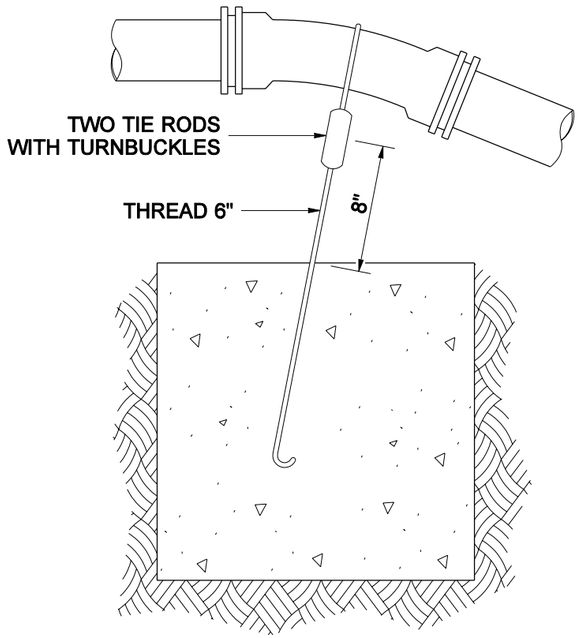
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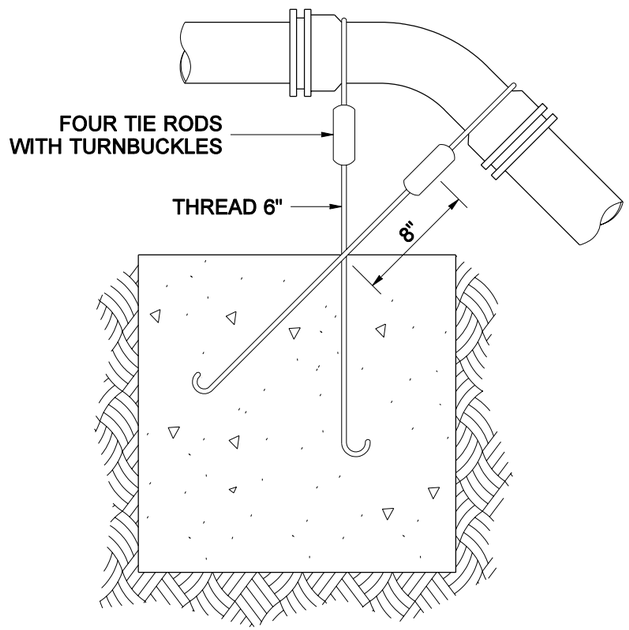
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**BLOCKING FOR 11.25° OR 22.5° VERTICAL BENDS**




**BLOCKING FOR 45° VERTICAL BENDS**

**NOTE**

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

**DIMENSION TABLE**

| PIPE DIAM. | TEST PRESSURE (PSI) | BEND ANGLE | CONCRETE VOLUME ($Ft^3$) | CUBE SIZE (Ft) | TIE ROD DIAM. | TIE ROD EMBEDMENT |
|---|---|---|---|---|---|---|
| 4" | 250 | 11.25° | 6 | 1.8 | 5/8" | 17" |
| | | 22.5° | 12 | 2.3 | | |
| | | 45° | 22 | 2.8 | | |
| 6" | 250 | 11.25° | 14 | 2.4 | 5/8" | 17" |
| | | 22.5° | 27 | 3.0 | | |
| | | 45° | 50 | 3.7 | | |
| 8" | 250 | 11.25° | 25 | 2.9 | 5/8" | 17" |
| | | 22.5° | 48 | 3.6 | | |
| | | 45° | 89 | 4.5 | | |
| 10" | 250 | 11.25° | 38 | 3.4 | 5/8" | 17" |
| | | 22.5° | 75 | 4.2 | | |
| | | 45° | 139 | 5.2 | | |
| 12" | 250 | 11.25° | 55 | 3.8 | 5/8" | 17" |
| | | 22.5° | 108 | 4.8 | | |
| | | 45° | 200 | 5.8 | 7/8" | 24" |
| 14" | 250 | 11.25° | 75 | 4.2 | 5/8" | 17" |
| | | 22.5° | 147 | 5.3 | 3/4" | 20" |
| | | 45° | 272 | 6.5 | 1" | 27" |
| 16" | 250 | 11.25° | 98 | 4.6 | 5/8" | 17" |
| | | 22.5° | 192 | 5.8 | 7/8" | 24" |
| | | 45° | 355 | 7.1 | 1 1/8" | 30" |

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

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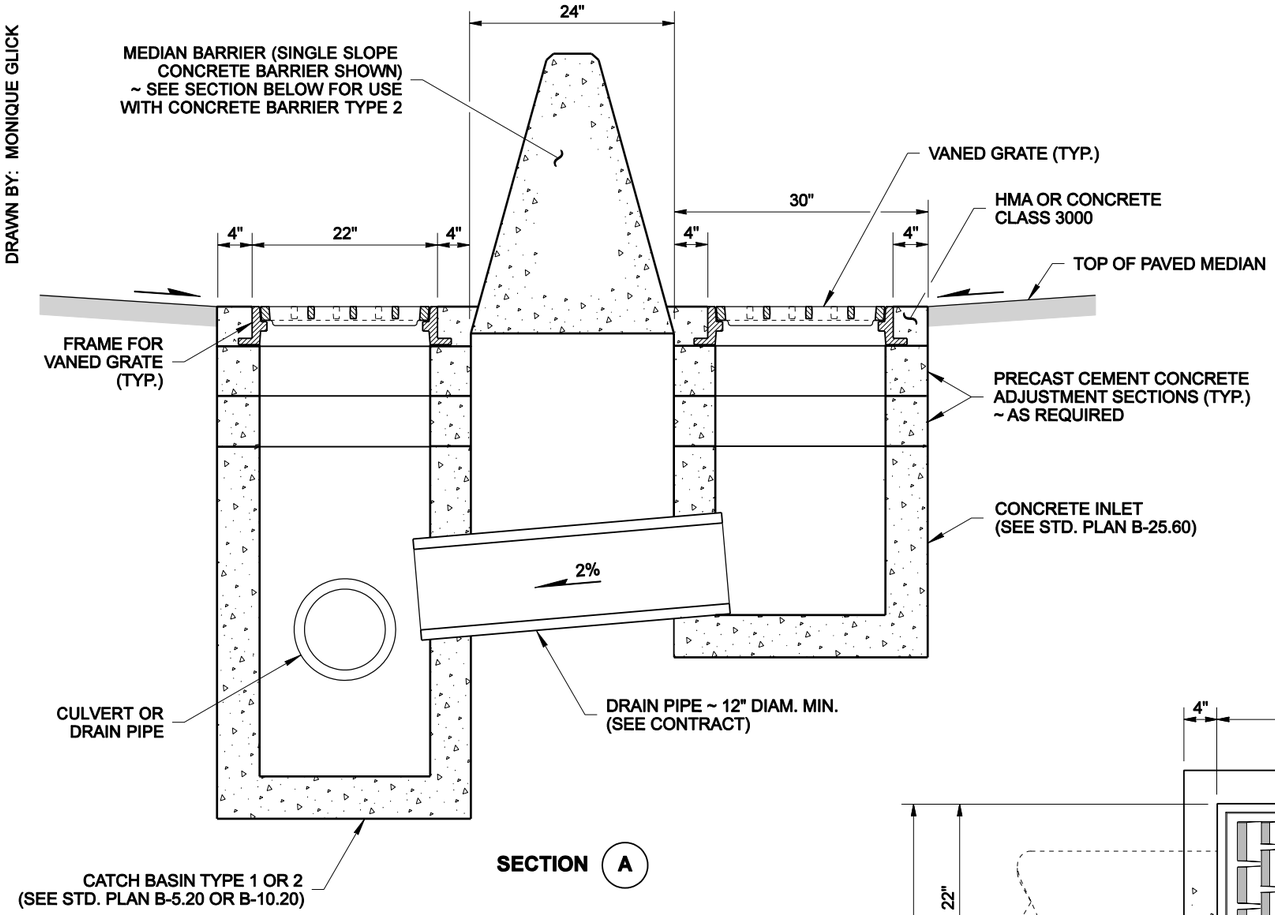
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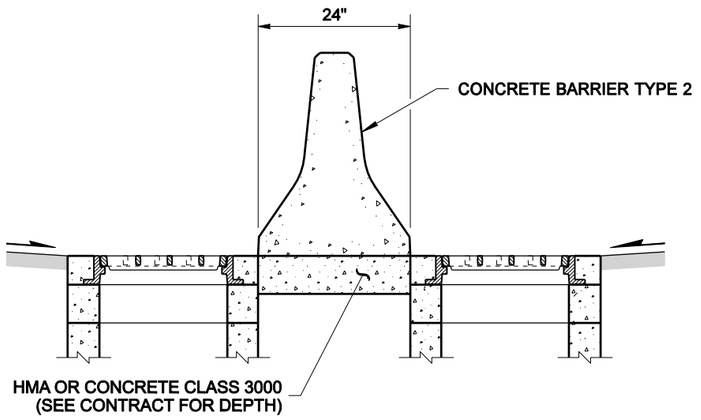
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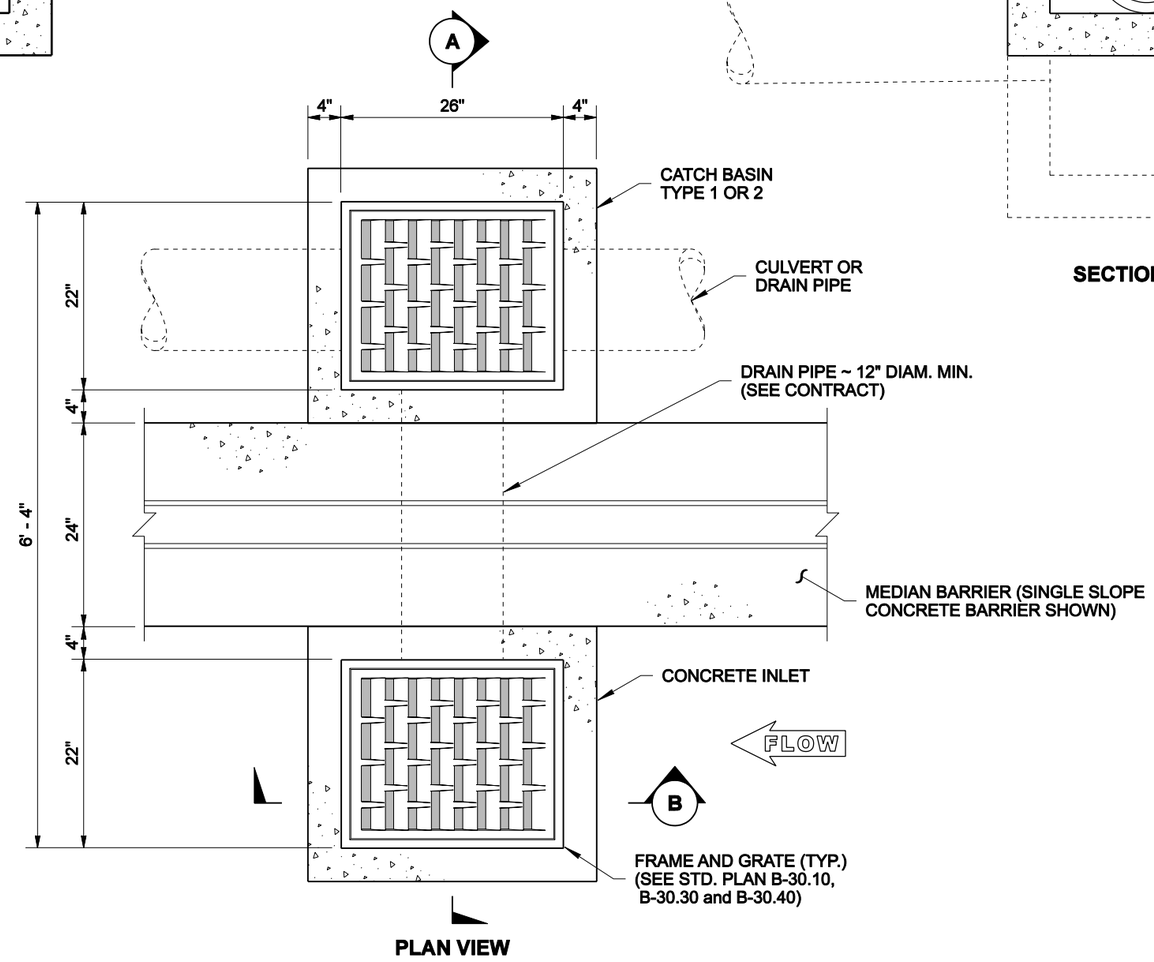



SECTION (A)

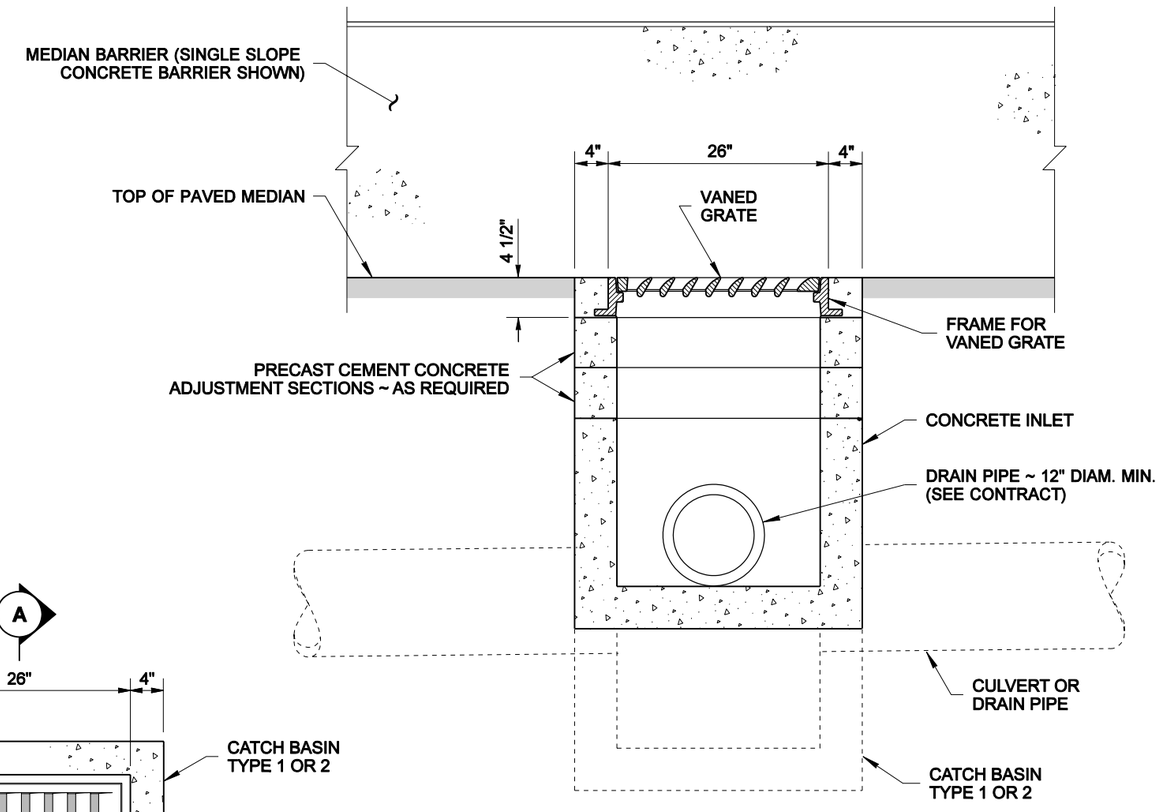



**CONCRETE BARRIER TYPE 2 SECTION**

SEE SECTION (A)




PLAN VIEW




SECTION (B)

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# MEDIAN BARRIER DRAINAGE INSTALLATION

## STANDARD PLAN B-95.20-00

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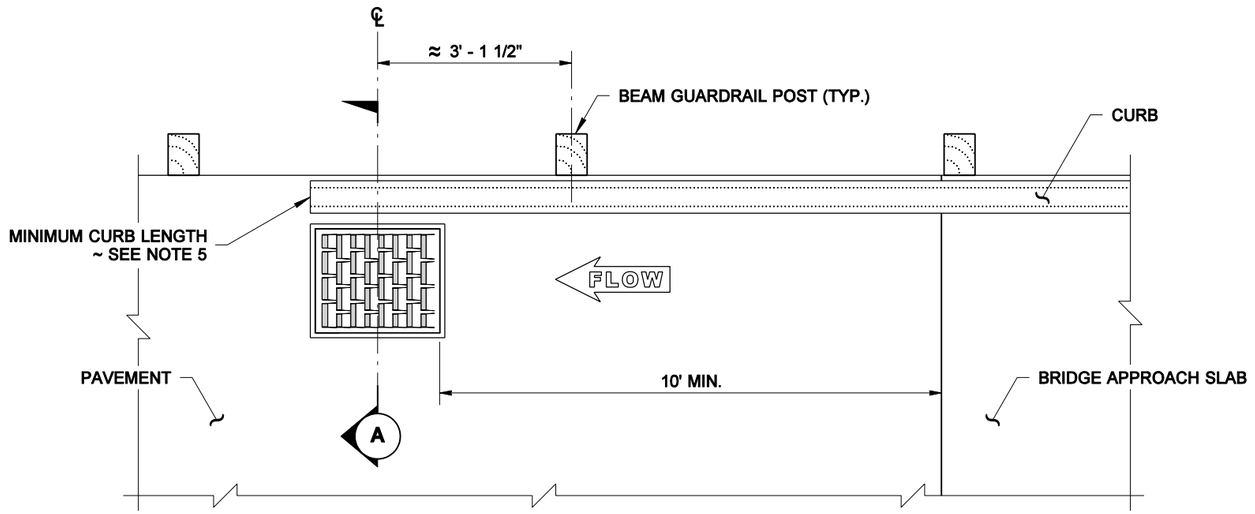
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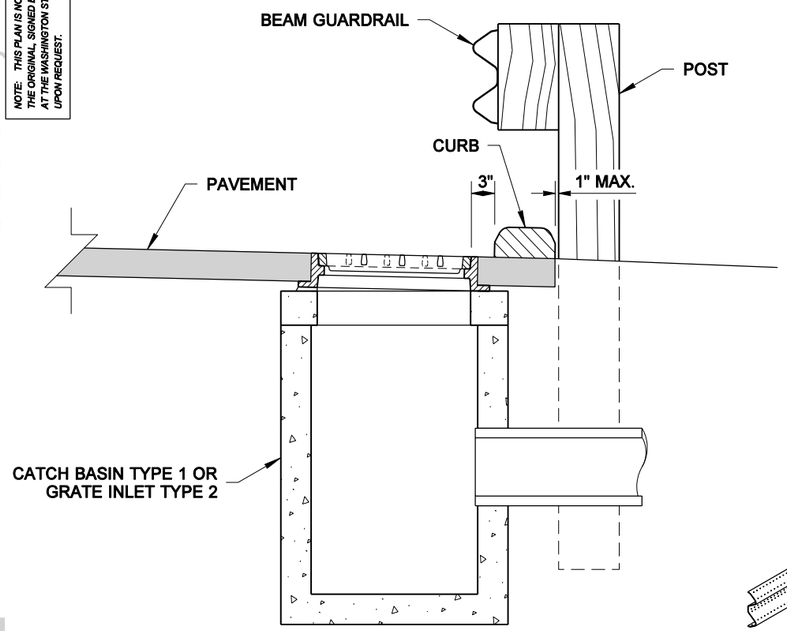
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BEAM GUARDRAIL BLOCKS AND RAIL ELEMENTS NOT SHOWN FOR CLARITY

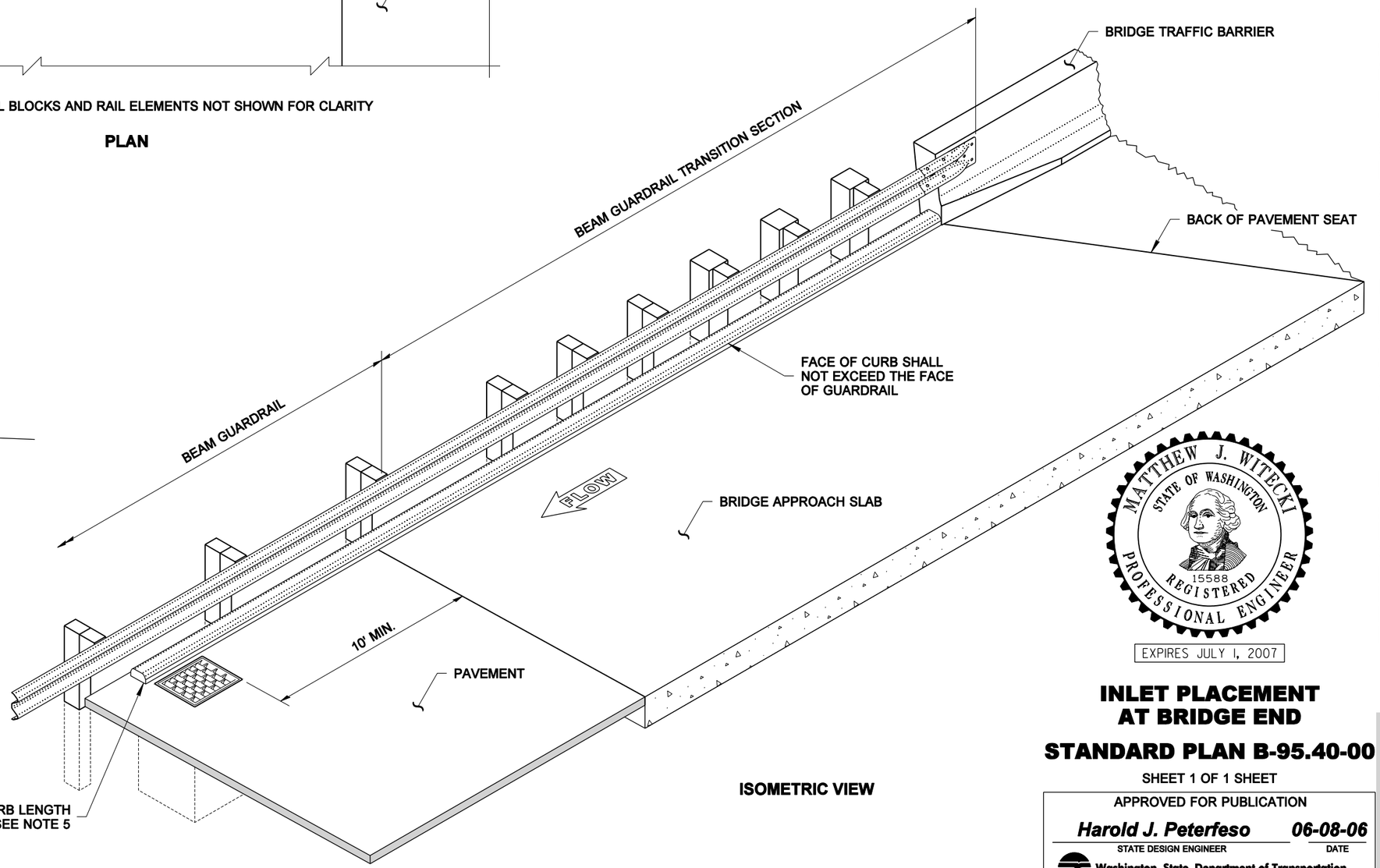
**PLAN**




**SECTION (A)**

**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.




**ISOMETRIC VIEW**

MATTHEW J. WITECKI
STATE OF WASHINGTON
15588
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2007

# INLET PLACEMENT AT BRIDGE END

## STANDARD PLAN B-95.40-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

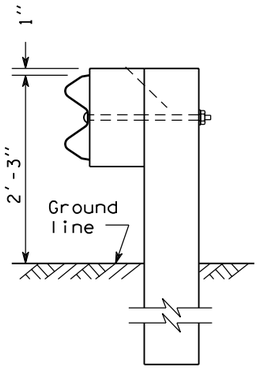
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-08-06* — DATE

Washington State Department of Transportation

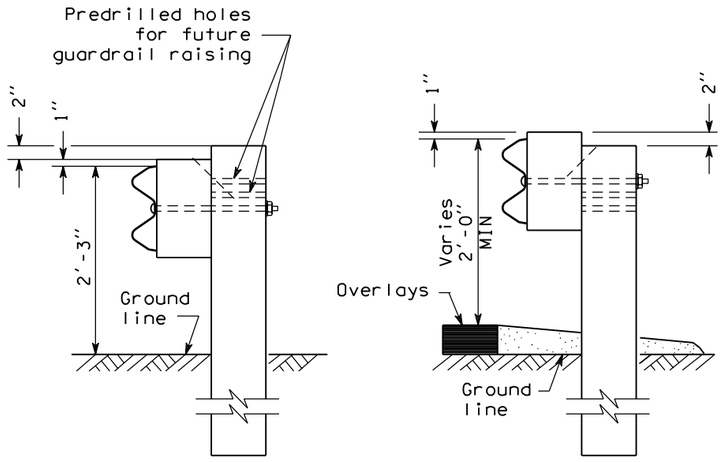
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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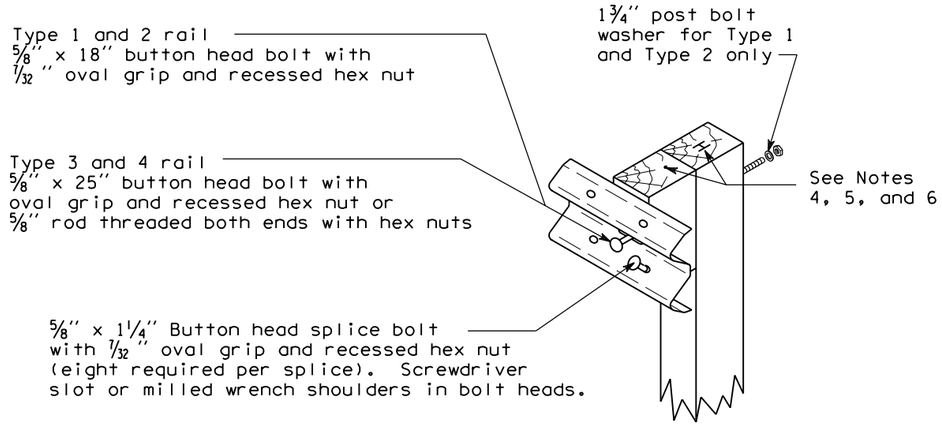

TYPE 1



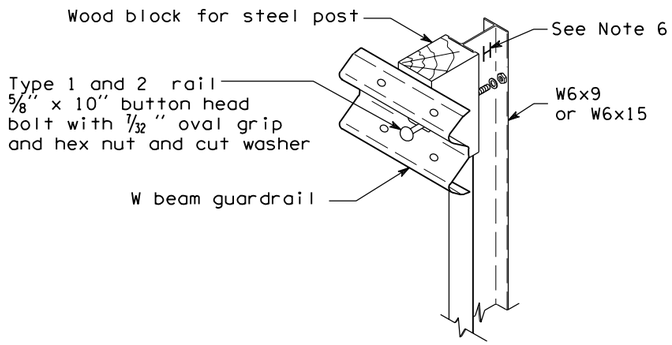

INITIAL INSTALLATION

RAIL ELEMENT RAISED

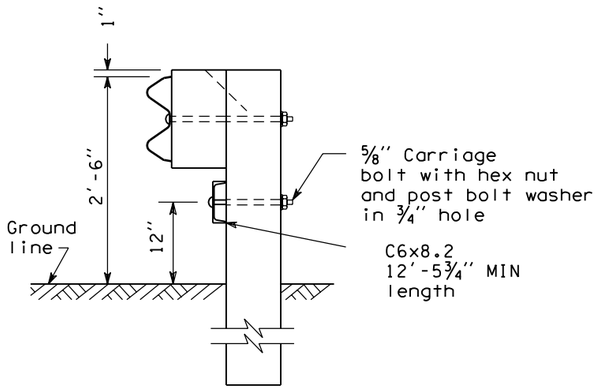
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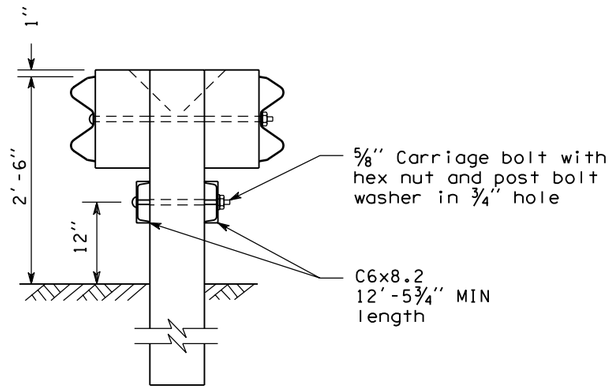

WOOD POST ASSEMBLY DETAIL



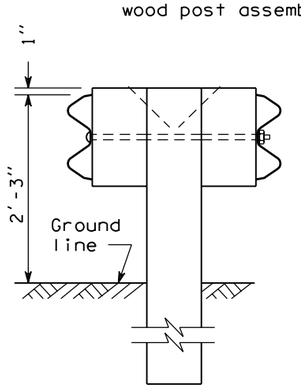

STEEL POST ASSEMBLY DETAIL
(All mounting hardware same as for wood post assembly, except as noted)




TYPE 2




TYPE 3




TYPE 4

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# BEAM GUARDRAIL (W-BEAM)

## STANDARD PLAN C-1

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *10-31-03* — DATE

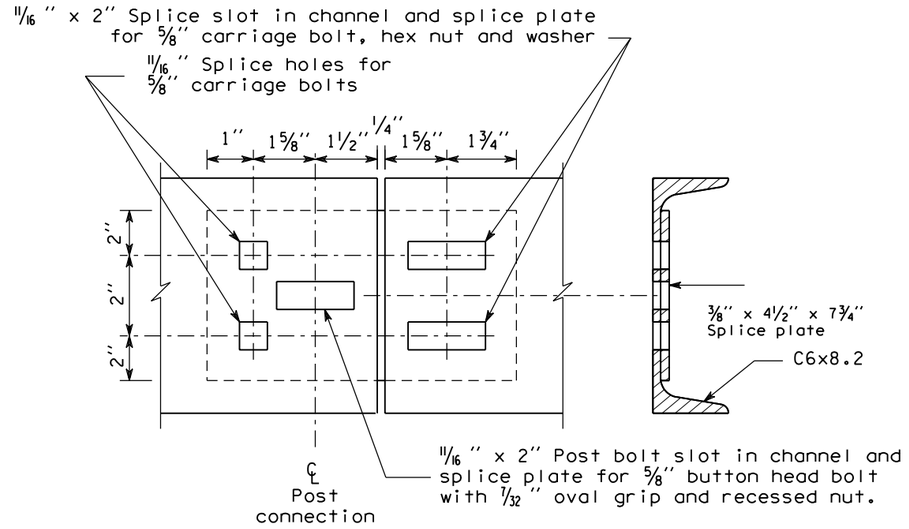
Washington State Department of Transportation

| DATE | REVISION | BY |
|---|---|---|
| 09/2003 | REV. STEEL POST ASSEMBLY DETAIL | RG |

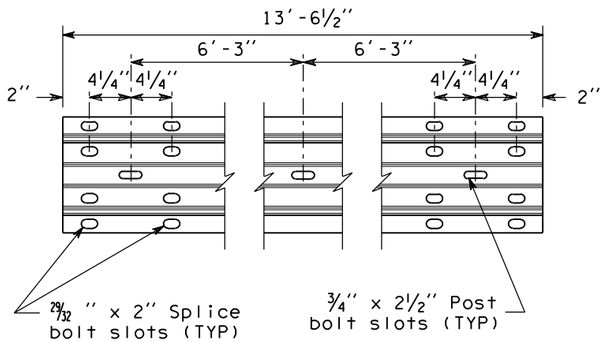
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

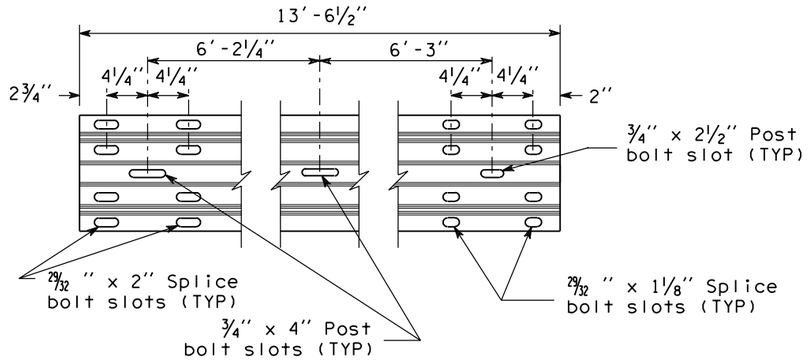
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CHANNEL RAIL SPLICE




RAIL ELEMENT




EXPANSION SECTION DETAIL

NOTES

1. When required by the contract, a Snow Load Post Washer shall be used on the backside of the post (in lieu of the 1 3/4 " post bolt washer) and a Snow Load Rail Washer shall be placed on the face side of Type 1 and Type 2 Beam Guardrail. Snow load rail washers are not to be installed on terminals.

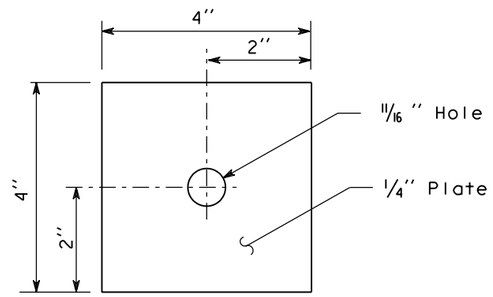
2. Rail washers, also called "snow load rail washers" are not required on new installations, except as called for in Note 1. Rail washers need not be removed on existing installations, except posts 2 through 8 of a BCT installation.

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

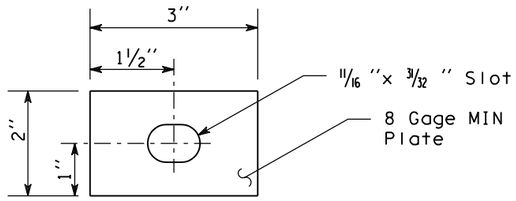
4. Timber block shall be toe-nailed to post with a 16d galvanized nail to restrict block rotation.

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

6. When Beam Guardrail Type 1, __ Foot Long Post, is specified in Contract, the post length shall be stamped with numbers 1 1/2 " MIN height and 1/4 " deep at the location where the letter "H" is shown on the detail. After installation of long post, it shall be the Contractor's responsiblity to ensure that the stamped numbers are still legible and 1/4 " deep.




SNOW LOAD
POST WASHER
(See Note 1)




SNOW LOAD
RAIL WASHER

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# BEAM GUARDRAIL (W-BEAM)

## STANDARD PLAN C-1

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* *10-31-03*

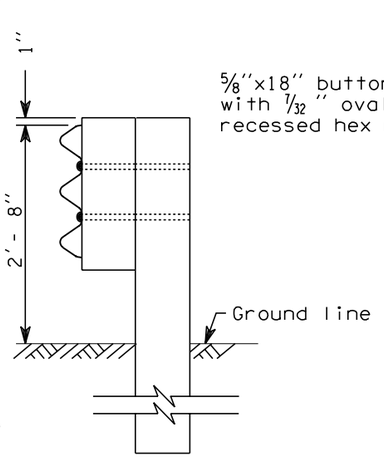
STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

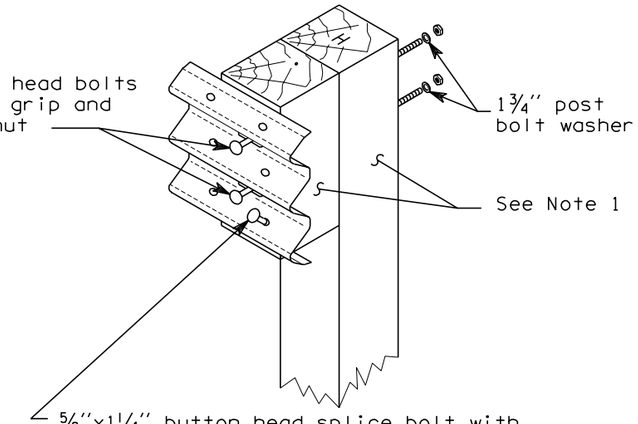
| DATE | REVISION | BY |
|---|---|---|
| 09/2003 | REV. NOTES | RG |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

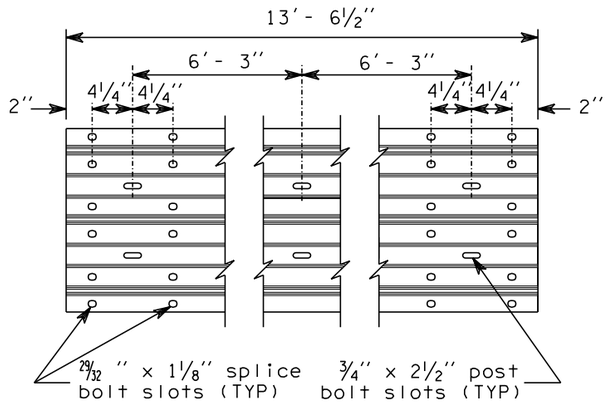



RAIL ASSEMBLY

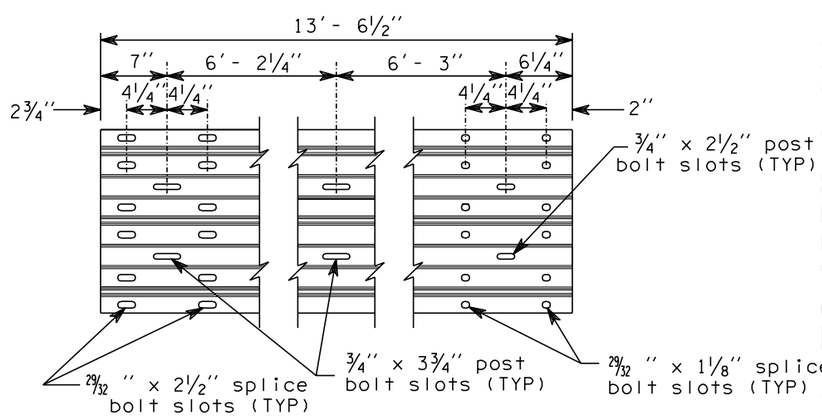



WOOD POST ASSEMBLY

**TYPE 10**



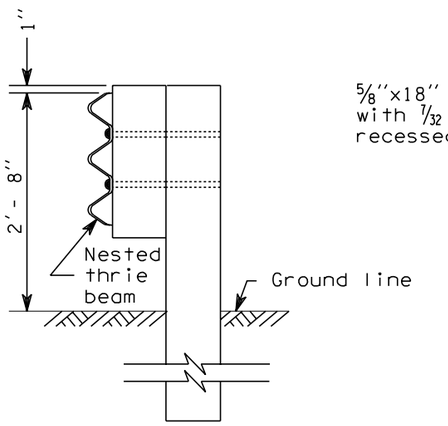

THRIE BEAM RAIL ELEMENT



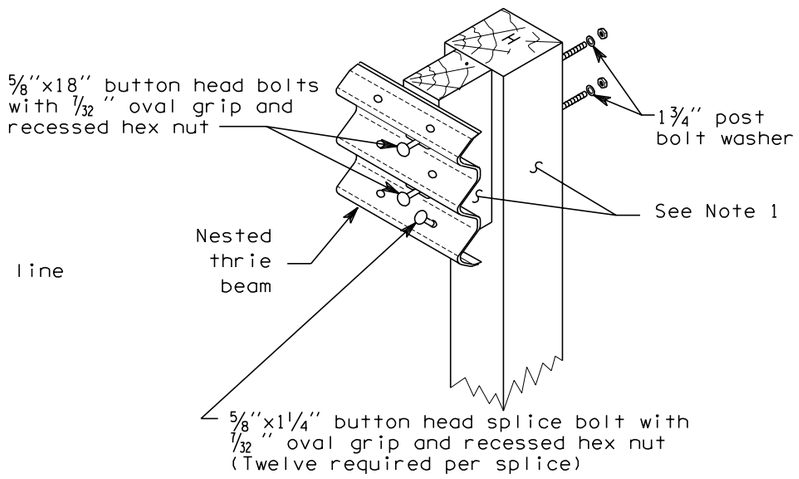

THRIE BEAM EXPANSION SECTION

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'- 1½" on center.

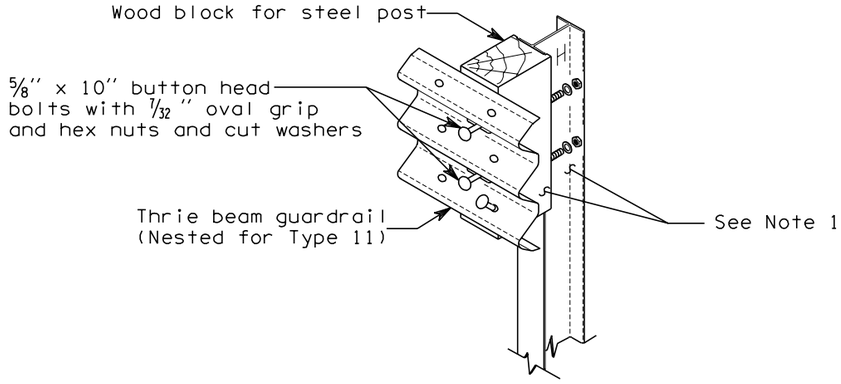



RAIL ASSEMBLY




WOOD POST ASSEMBLY

**TYPE 11**




**STEEL POST ASSEMBLY**

**TYPE 10 and 11**

CLIFFORD E. MANSFIELD STATE OF WASHINGTON 15224 REGISTERED PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2000

# BEAM GUARDRAIL (THRIE BEAM) STANDARD PLAN C-1a

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| DATE | REVISION | BY |
|---|---|---|
| 7/98 | Add steel post assembly detail | RBA |

APPROVED FOR PUBLICATION

*Clifford E. Mansfield* 7/31/98

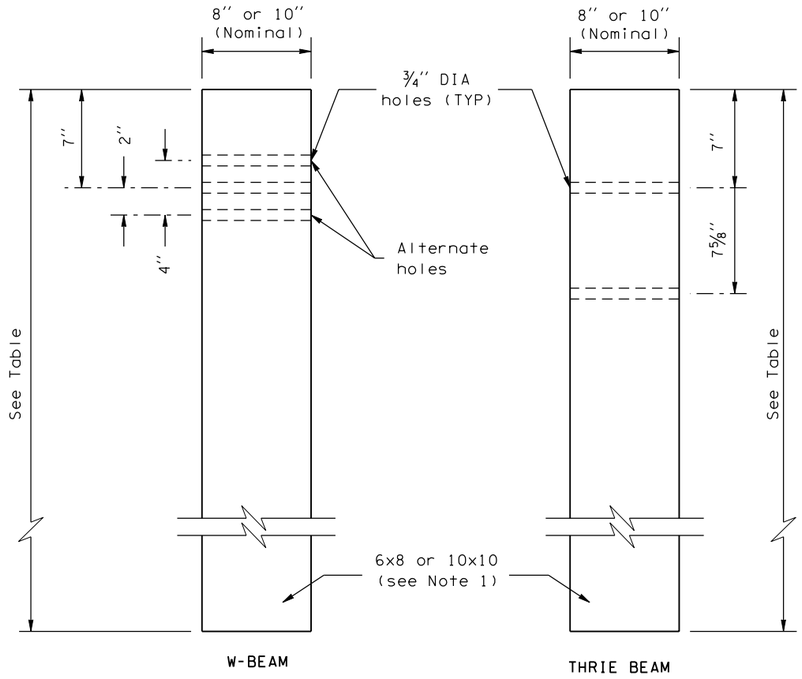
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WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

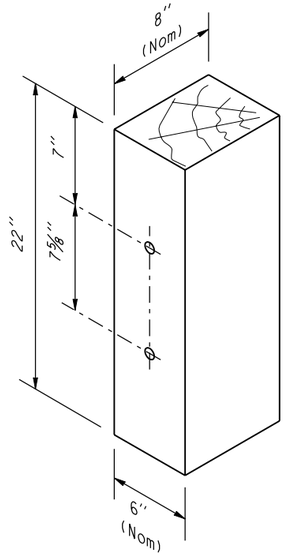
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

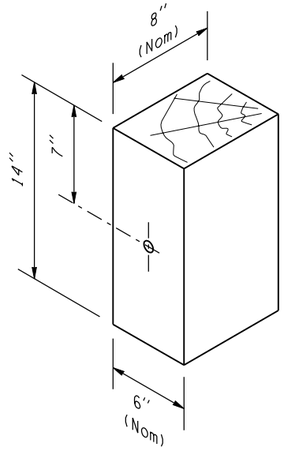
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WOOD POST

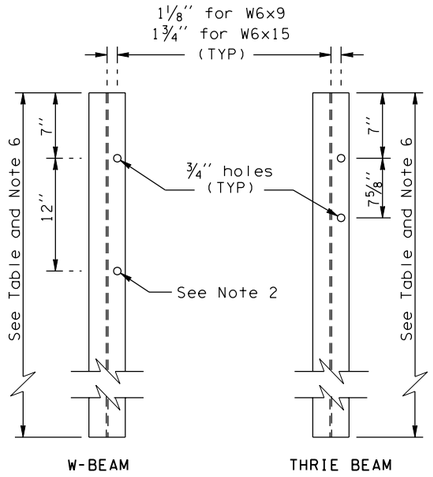



THRIE BEAM WOOD BLOCK
FOR WOOD POST

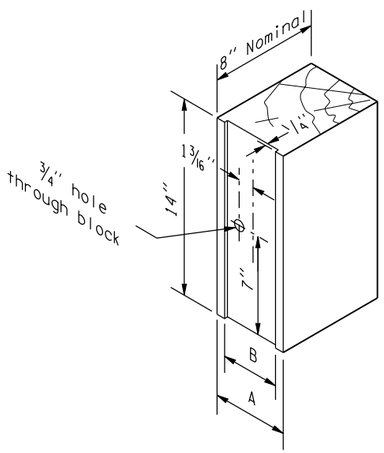



W BEAM WOOD BLOCK
FOR WOOD POSTS

| POST LENGTH TABLE | |
|---|---|
| GUARDRAIL TYPE | LENGTH |
| 1 through 4 | 6'-0'' |
| 10 or 11 | 6'-6'' |



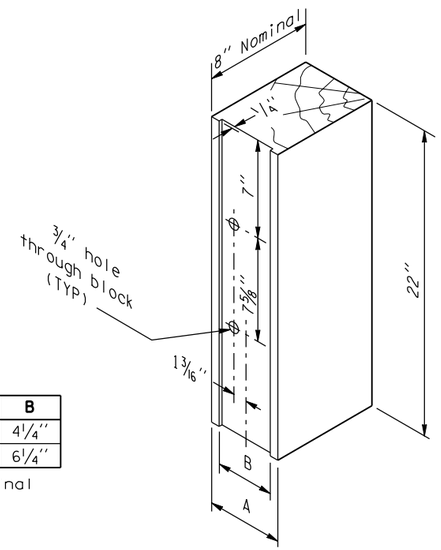

STEEL POST
See Notes 3 and 4




W BEAM WOOD BLOCK
FOR STEEL POST

| POST | A | B |
|---|---|---|
| W6X9 | 6'' * | 4¼'' |
| W6X15 | 8'' * | 6¼'' |

*Nominal




THRIE BEAM WOOD BLOCK
FOR STEEL POST

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# BEAM GUARDRAIL POSTS AND BLOCKS

## STANDARD PLAN C-1b

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *10-31-03* DATE

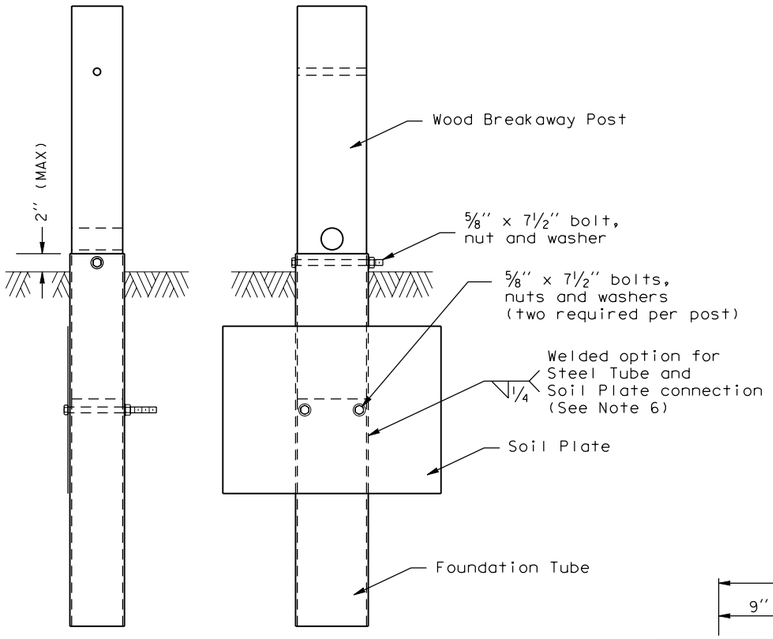
Washington State Department of Transportation

| DATE | REVISION | BY |
|---|---|---|
| 09/2003 | REV. POST LENGTH TABLE | RG |

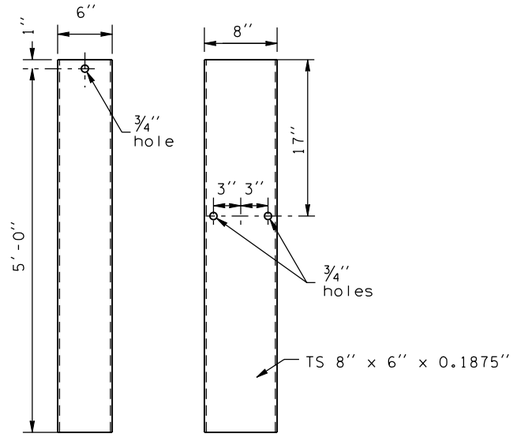
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

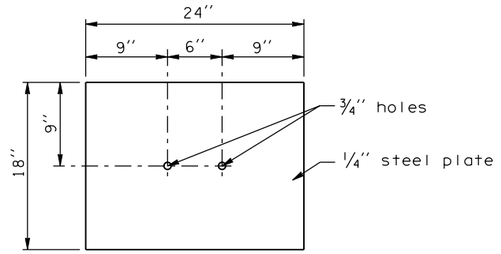
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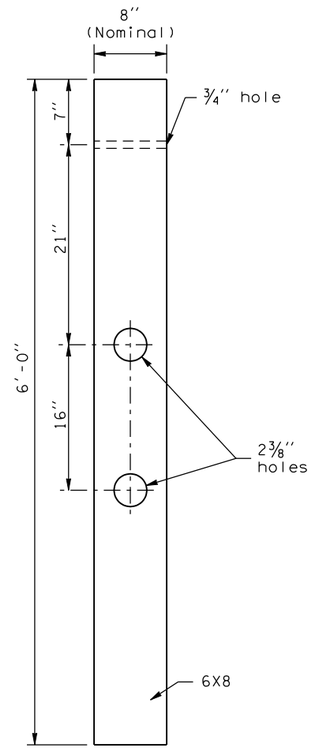

ANCHOR POST ASSEMBLY



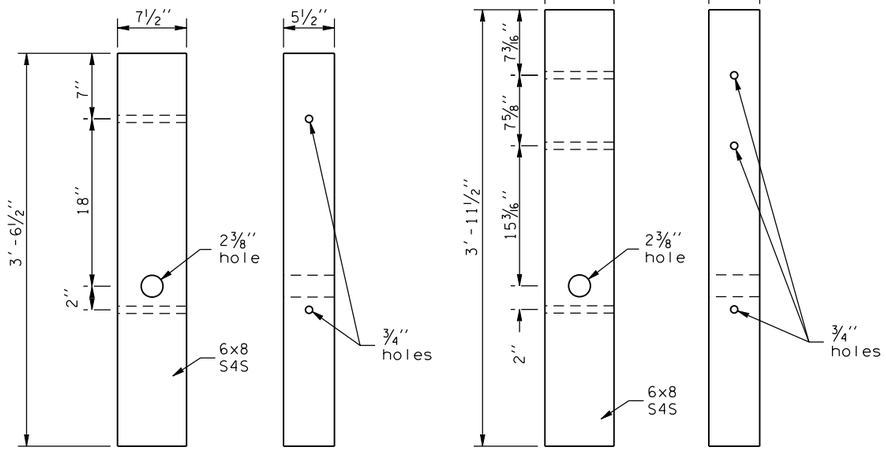

FOUNDATION TUBE




SOIL PLATE

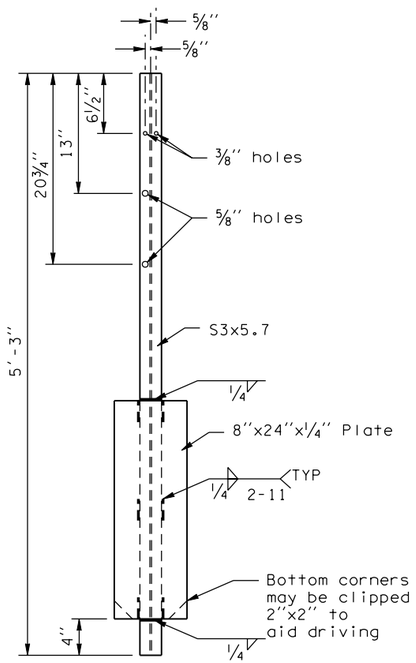



CONTROLLED RELEASING TERMINAL (CRT) POST




W-BEAM THRIE BEAM

WOOD BREAKAWAY POST




G-2 POST

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.




EXPIRES JULY 24, 2004

# BEAM GUARDRAIL POSTS AND BLOCKS

## STANDARD PLAN C-1b

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *10-31-03* DATE

Washington State Department of Transportation

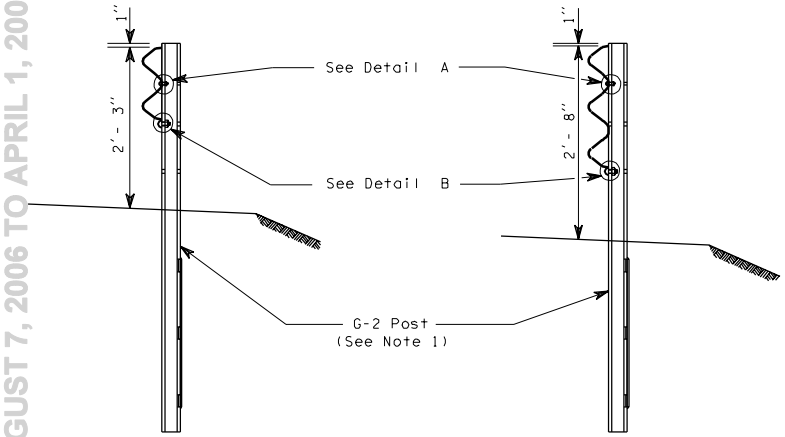
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|---|---|---|
| 09/2003 | REV. NOTES | RG |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

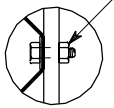
NOTES

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

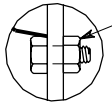



TYPE 20

TYPE 21




DETAIL A




DETAIL B

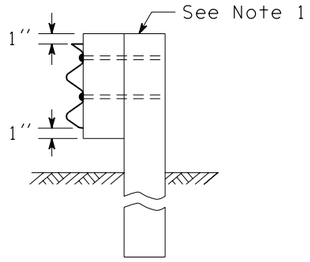
BEAM GUARDRAIL

C-1c 1 of 1

05-30-97

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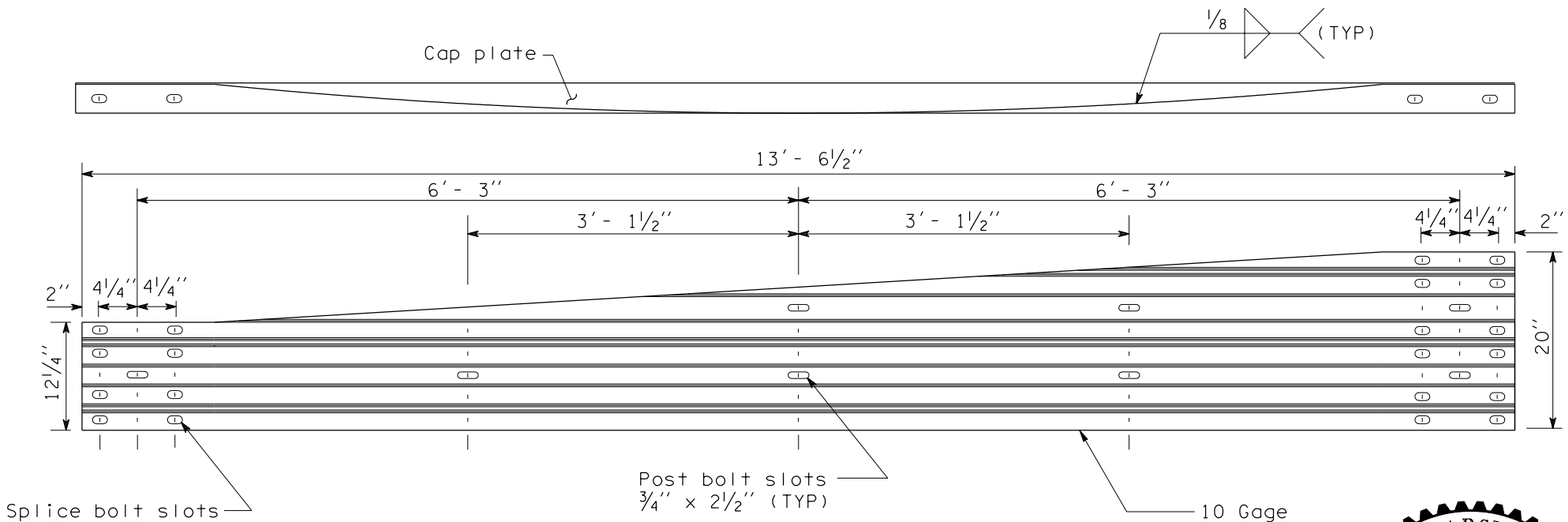



INTERMEDIATE GUARDRAIL
POST CONNECTION DETAILS

(Type A shown)

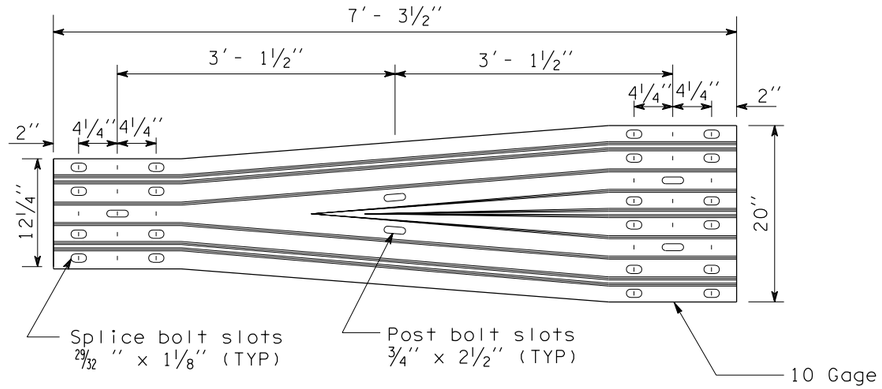
NOTES

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.




THRIE BEAM GUARDRAIL REDUCER SECTION
TYPE A

(Left section shown, right section reversed)




THRIE BEAM GUARDRAIL REDUCER SECTION
TYPE B

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# THRIE BEAM GUARDRAIL REDUCER SECTION

## STANDARD PLAN C-1d

SHEET 1 OF 1 SHEET

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| DATE | REVISION | BY |
|---|---|---|
| 09/2003 | ADDED 10 GAGE STEEL DESIGNATION; REV. NOTE 1 | RG |

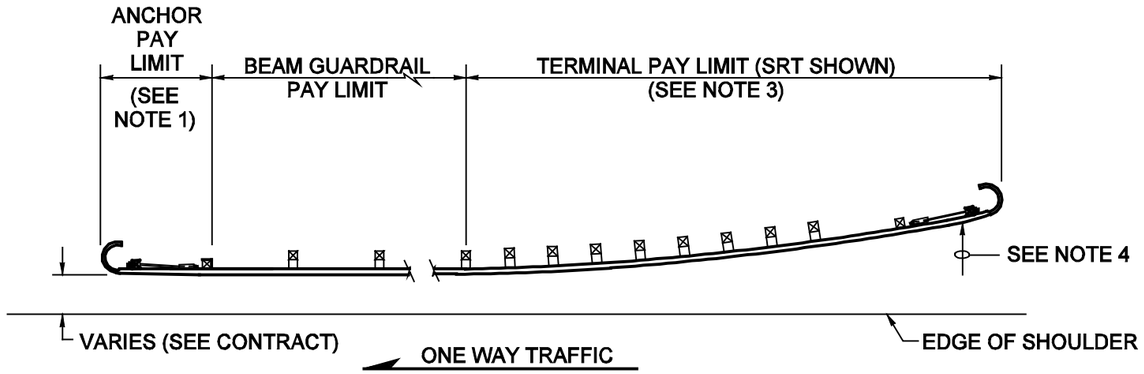
APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *10-31-03* DATE

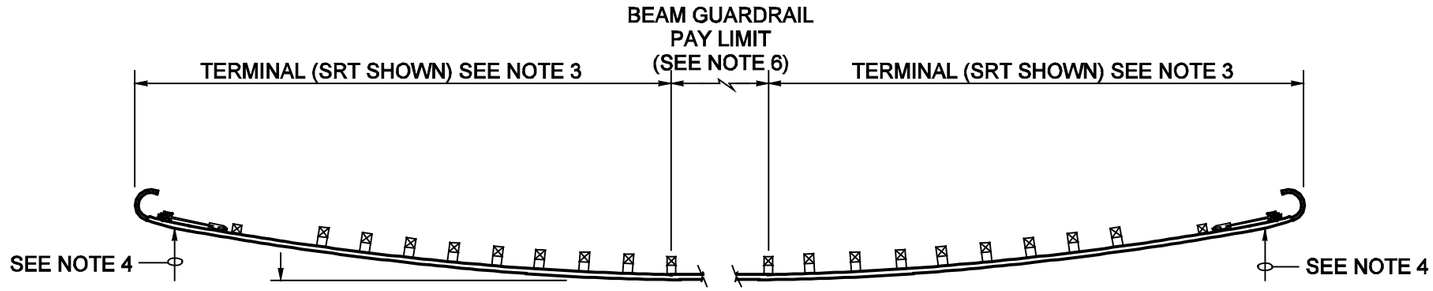
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

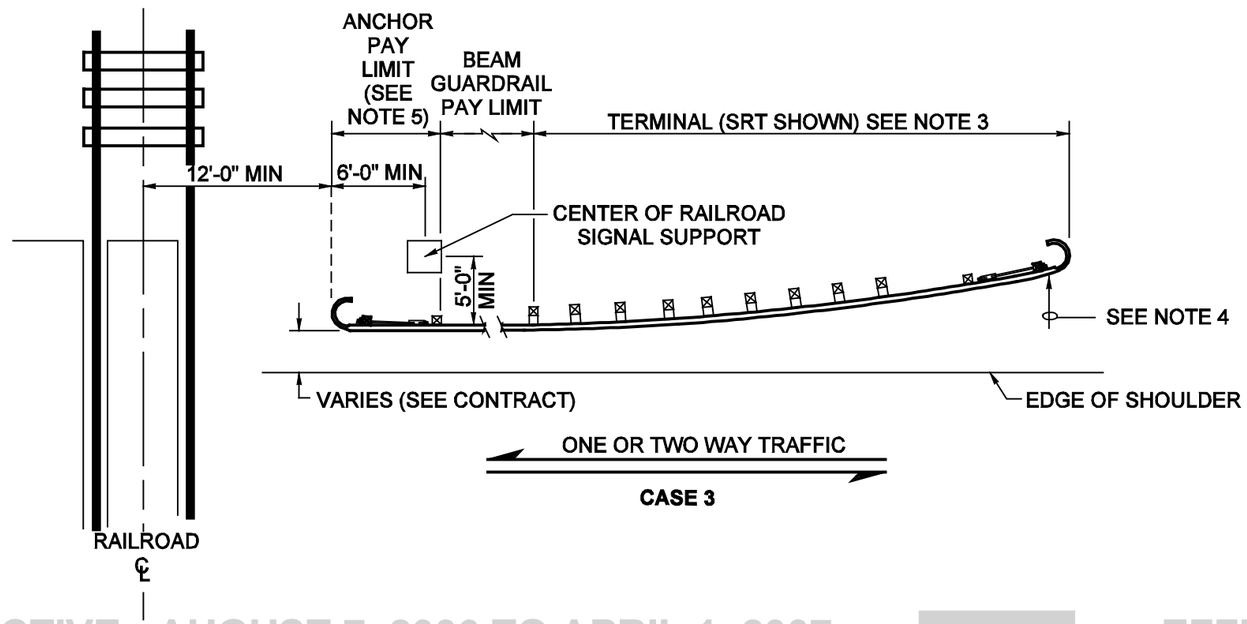
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**CASE 1**




**CASE 2**




**CASE 3**

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.

CLIFFORD E MANSFIELD
STATE OF WASHINGTON
15224
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2000

# GUARDRAIL PLACEMENT

# STANDARD PLAN C-2

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| DATE | REVISION | BY |
|---|---|---|
| 12/99 | ADDED NOTE 6. MODIFIED THE END SECTIONS TO DESIGN "C". | TWS |

APPROVED FOR PUBLICATION

*Clifford E. Mansfield* — DEPUTY STATE DESIGN ENGINEER — *01-06-00* DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

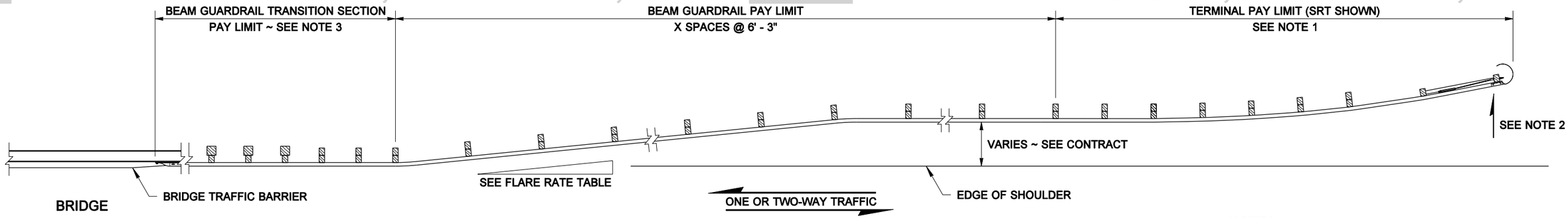
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

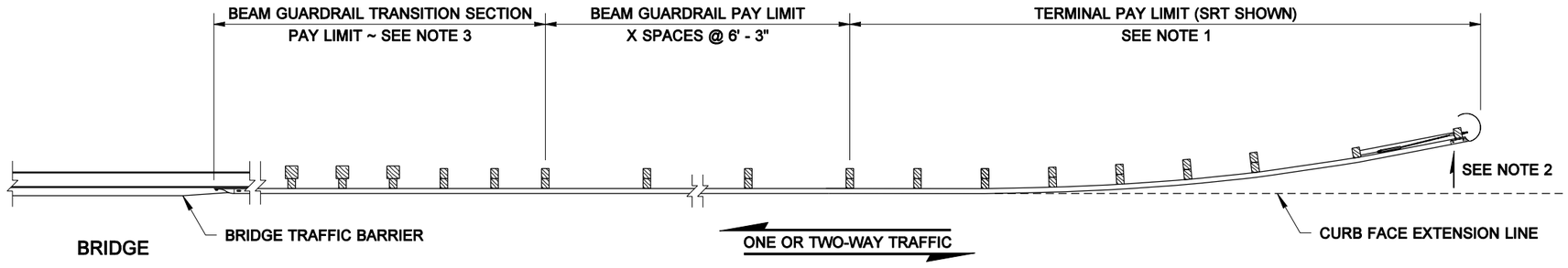
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

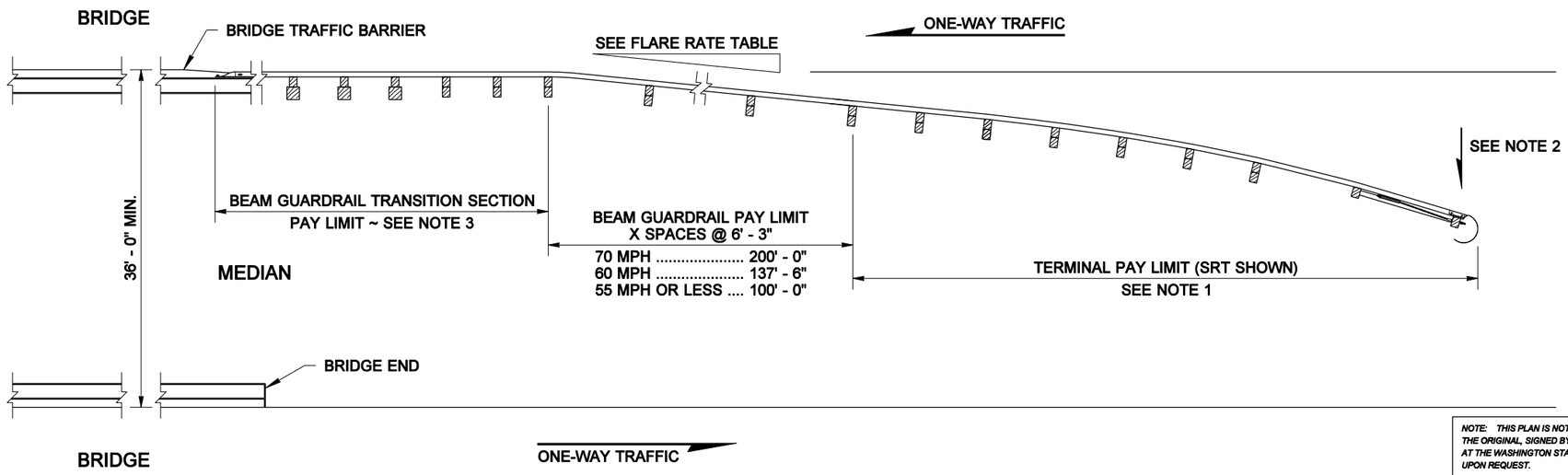
DRAWN BY: MARK SUJKA




**CASE 4**




**CASE 5**




**CASE 6**

**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 | |
|---|---|
| **POSTED SPEED (MPH)** | **RATE** |
| 70 | 15 : 1 |
| 60 | 14 : 1 |
| 55 | 12 : 1 |
| 50 | 11 : 1 |
| 45 | 10 : 1 |
| 40 OR LESS | 9 : 1 |

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# GUARDRAIL PLACEMENT

## STANDARD PLAN C-2a

SHEET 1 OF 1 SHEET

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APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-21-06* — DATE

Washington State Department of Transportation

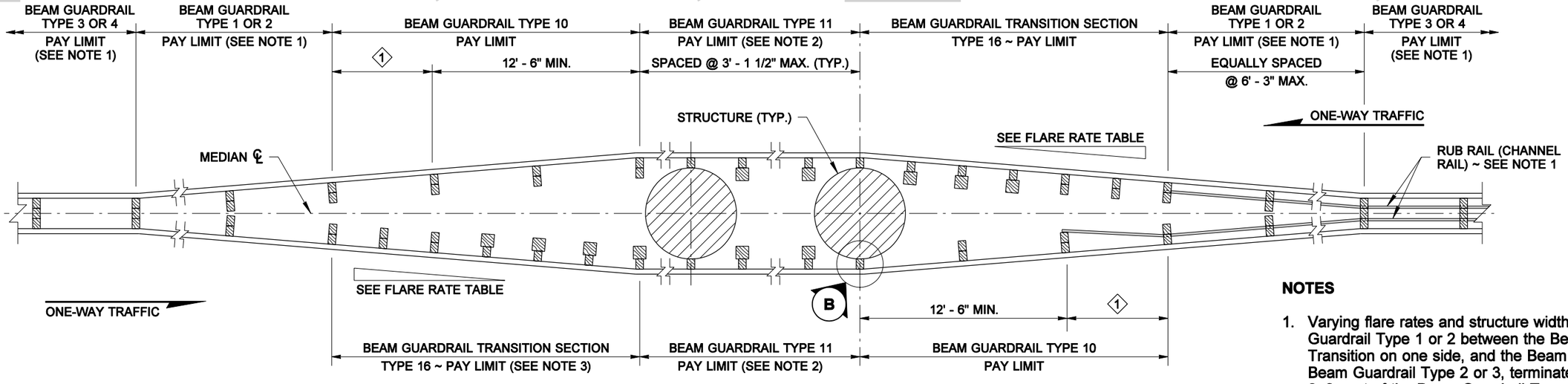
| DATE | REVISION | BY |
|---|---|---|
| 05/2006 | APPLIED CURRENT DRAFTING STANDARDS | MAS |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

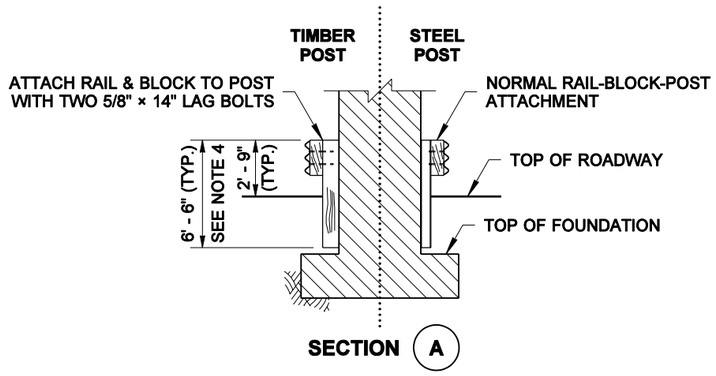



**PLAN VIEW**
(WOOD POST AND BLOCK SHOWN)

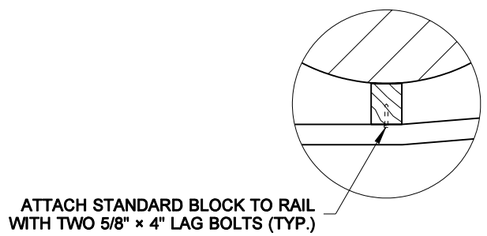
**CASE 7**

| FLARE RATE TABLE | |
|---|---|
| **POSTED SPEED (MPH)** | **RATE** |
| 70 | 15 : 1 |
| 60 | 14 : 1 |
| 55 | 12 : 1 |
| 50 | 11 : 1 |
| 45 | 10 : 1 |
| 40 OR LESS | 9 : 1 |

1 THRIE BEAM GUARDRAIL REDUCER SECTION TYPE B




SECTION (A)




DETAIL (B)

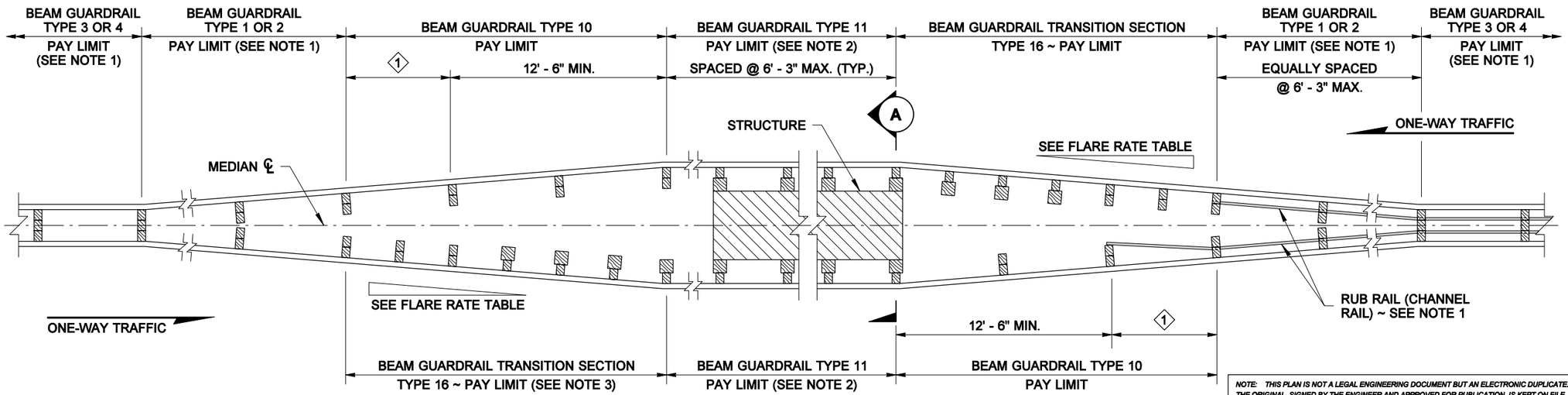
**NOTES**

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" (but less than 12' - 6"), 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".




**PLAN VIEW**
(WOOD POST AND BLOCK SHOWN)

**CASE 8**

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# GUARDRAIL PLACEMENT

## STANDARD PLAN C-2b

SHEET 1 OF 1 SHEET

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| DATE | REVISION | BY |
|---|---|---|
| 05/2006 | OMITTED ATTACHMENT TO STRUCTURE (NOTE 1) | EAB |

APPROVED FOR PUBLICATION

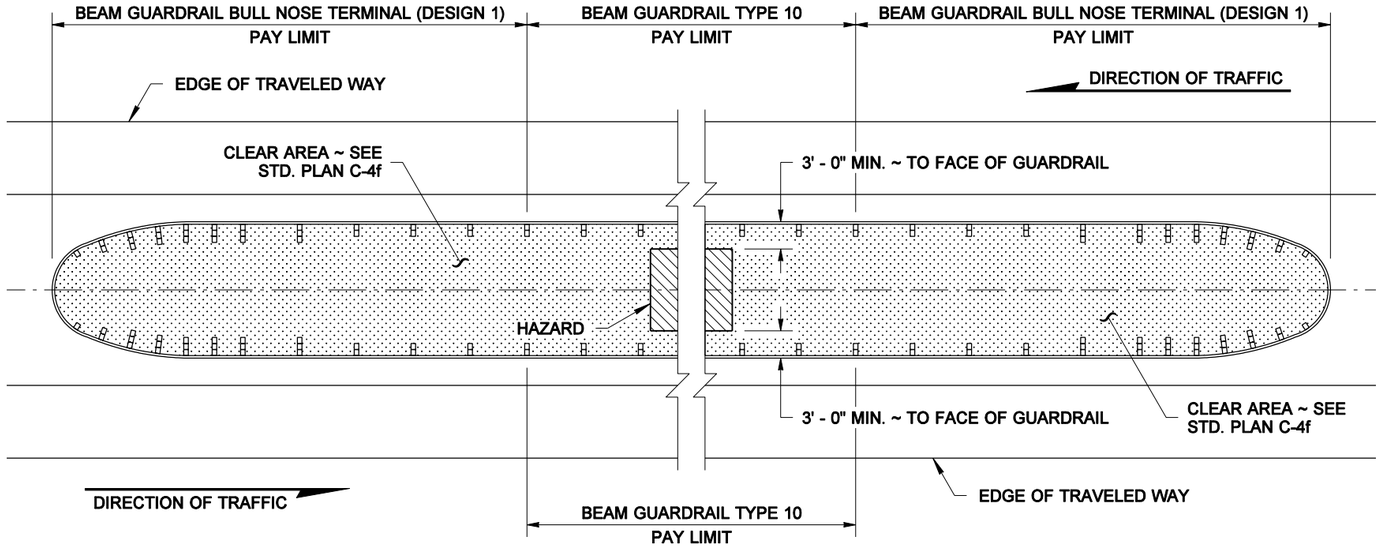
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-21-06* — DATE

Washington State Department of Transportation

DRAWN BY: ELENA BRUNSTEIN

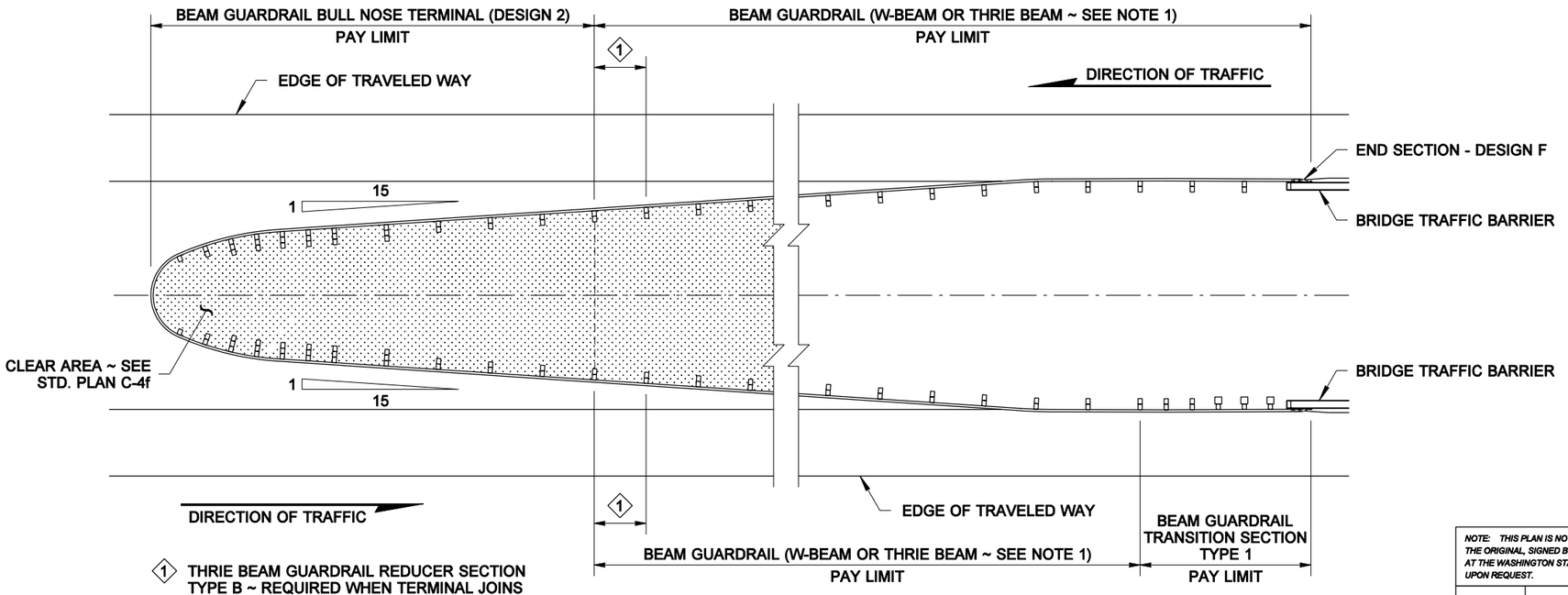
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**CASE 9A**

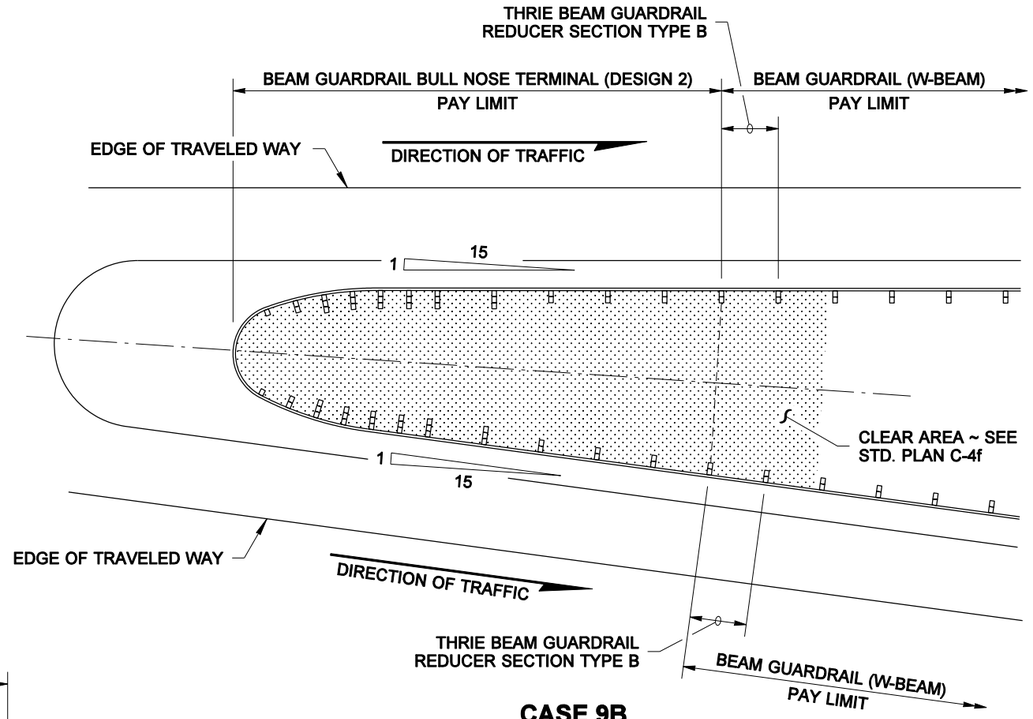
DRAWN BY: BILL BERENS




**CASE 9C**

**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.




**CASE 9B**




EXPIRES JULY 24, 2006

# GUARDRAIL PLACEMENT MEDIAN BULL NOSE

## STANDARD PLAN C-2c

SHEET 1 OF 1 SHEET

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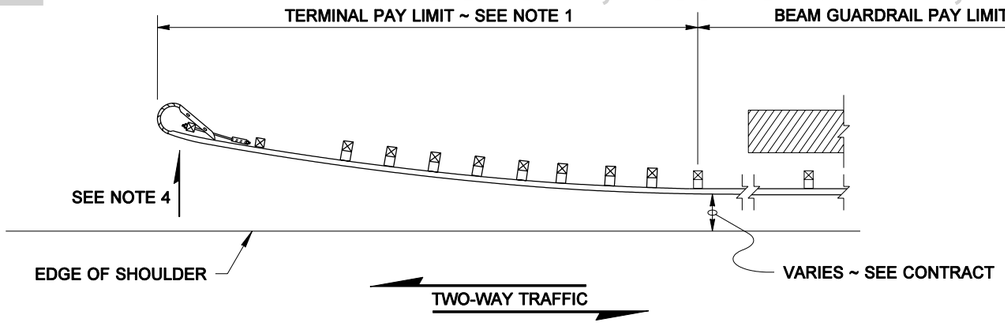
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-21-06* — DATE

Washington State Department of Transportation

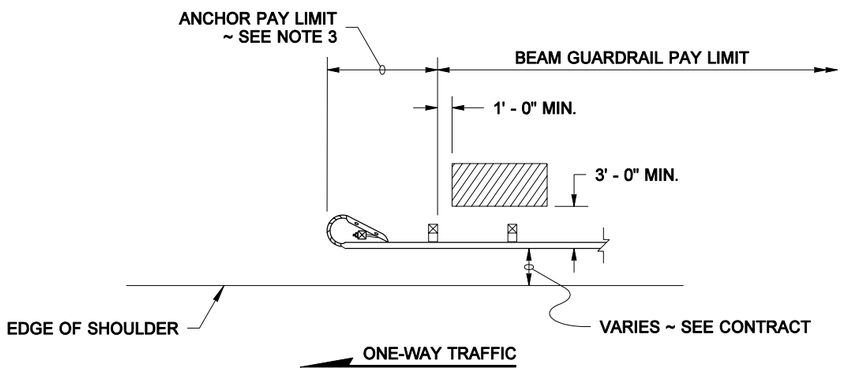
| DATE | REVISION | BY |
|---|---|---|
| 05/2006 | CLARIFIED DIMENSION OF CLEARANCE TO HAZARD IN CASE 9A | WJB |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

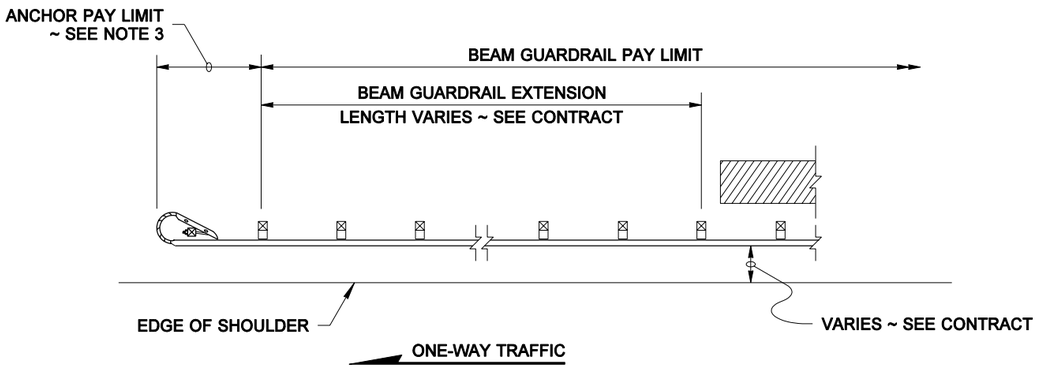
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



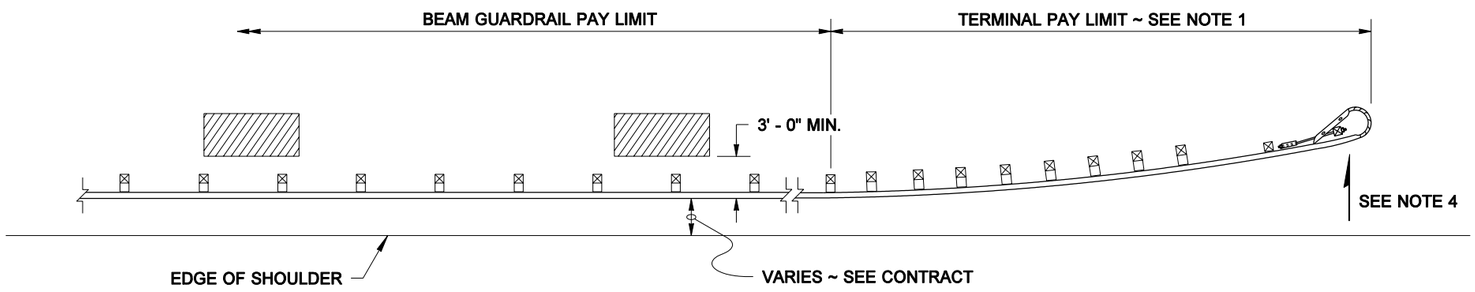

**CASE 10A**




**CASE 10B**




**CASE 10C**




ONE-WAY TRAFFIC
OR
TWO-WAY TRAFFIC

**CASE 10 A, B, or C**

**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.

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# GUARDRAIL PLACEMENT

## STANDARD PLAN C-2d

SHEET 1 OF 1 SHEET

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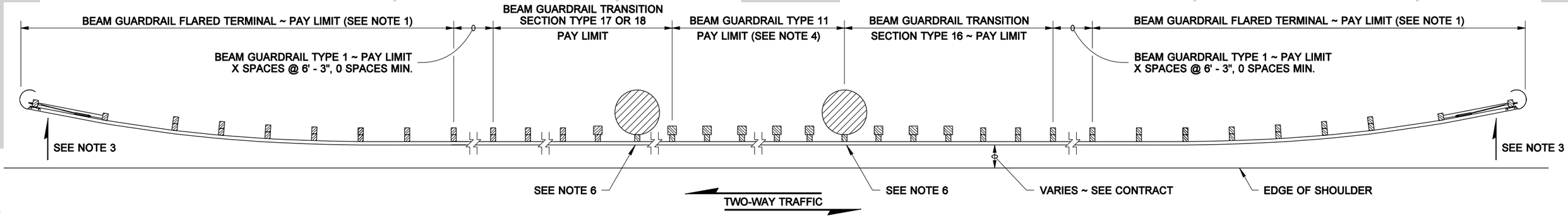
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-21-06* DATE

Washington State Department of Transportation

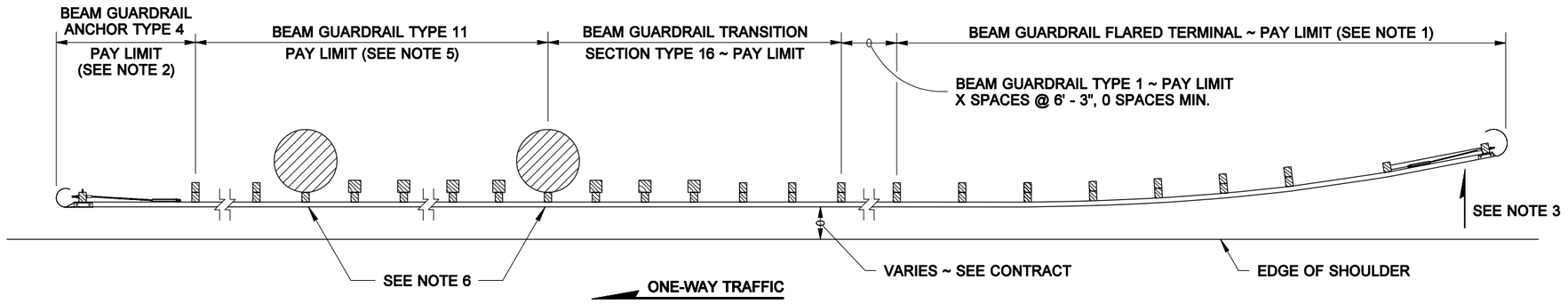
| DATE | REVISION | BY |
|---|---|---|
| 05/2006 | CLARIFIED DIMENSION OF CLEARANCE FOR HAZARD | MAS |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

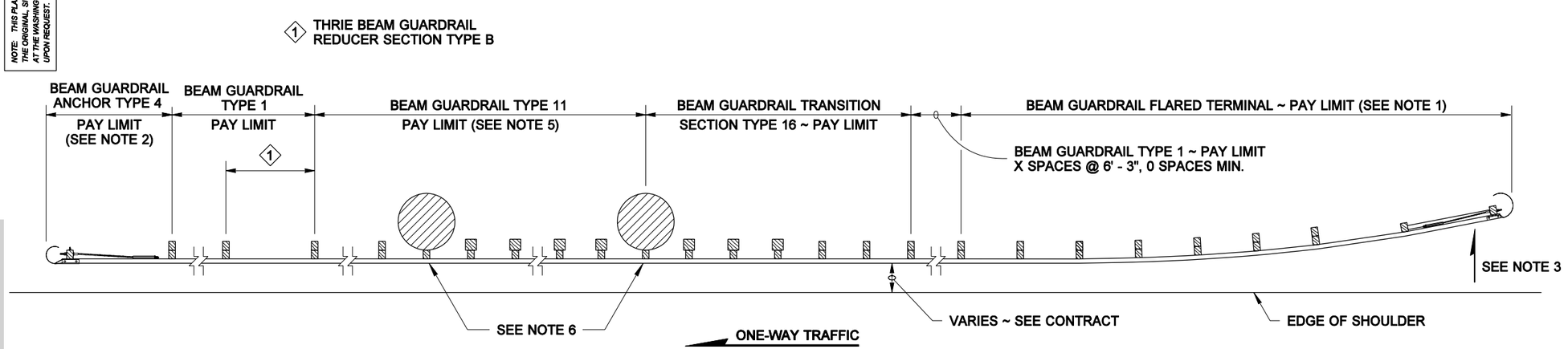
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**CASE 11A**




**CASE 11B**




**CASE 11C**

**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 10×10 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 6×8 post and standard block.
6. Attach the standard wood block to the rail using two 5/8" × 4" lag bolts.

DRAWN BY: ELENA BRUNSTEIN

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RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# GUARDRAIL PLACEMENT

## STANDARD PLAN C-2e

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* *06-21-06*

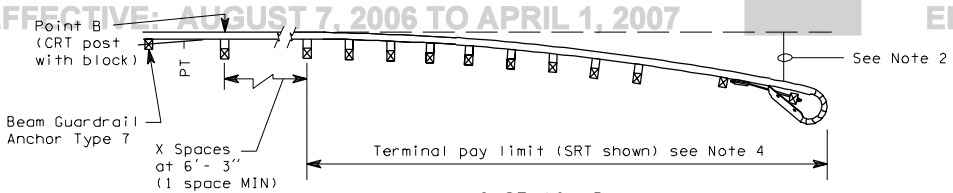
STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

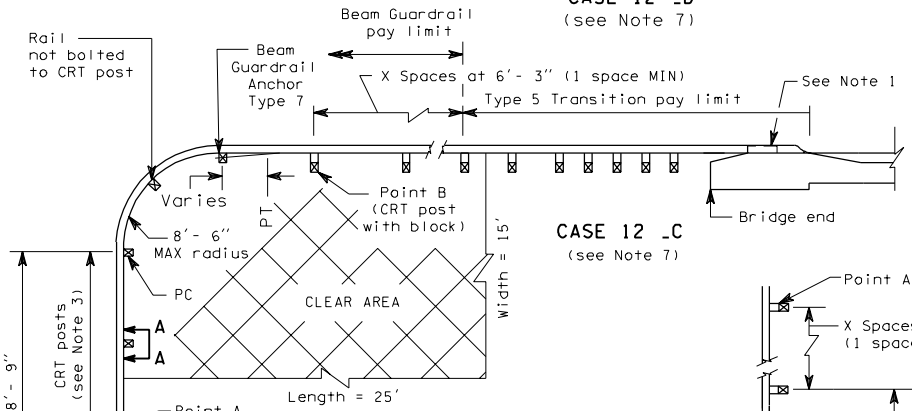
| DATE | REVISION | BY |
|---|---|---|
| 05/2006 | OMITTED ATTACHMENT TO STRUCTURE (NOTE 2) | EAB |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

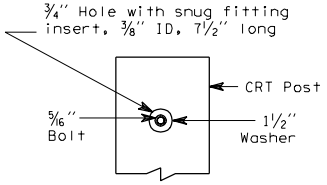



CASE 12 _D
(see Note 7)

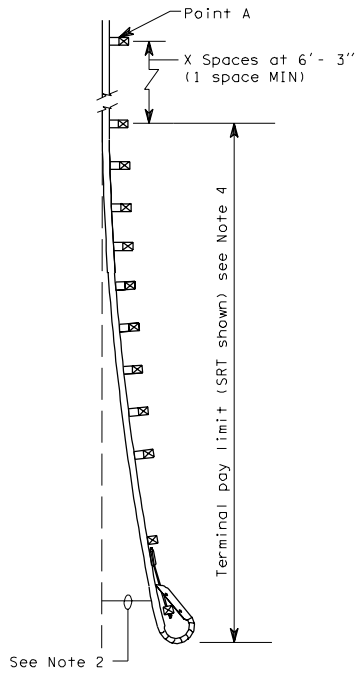



CASE 12 _C
(see Note 7)

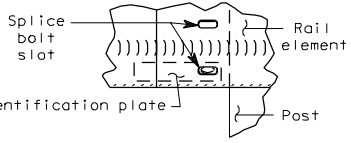
CASE 12 A_
(see Note 8)



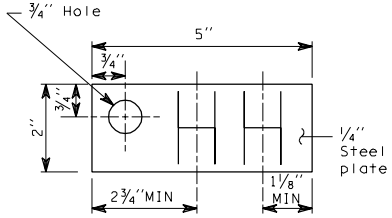

SECTION A-A




CASE 12 B_
(see Note 7)




IDENTIFICATION PLATE
MOUNTING DETAIL
(see Note 6)




IDENTIFICATION PLATE
(see Note 5)

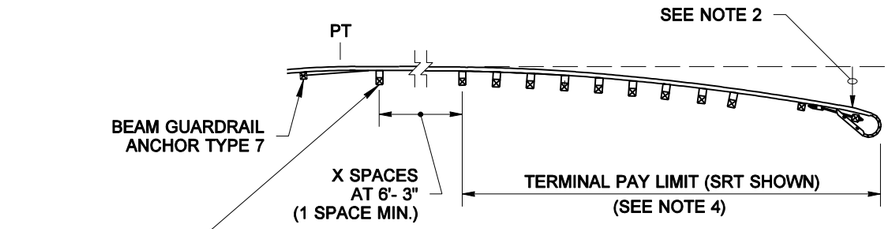
NOTES

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 ⅝" x 9" long bolt, nut and 1½" washer 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 Identification Plate Detail. Digits shall be 1½" MIN height and ¾" 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".

# GUARDRAIL PLACEMENT
## WEAK POST INTERSECTION DESIGN (8'- 6" MAX RADIUS)

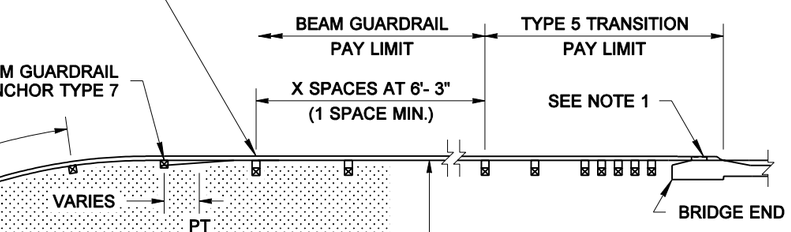
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| REQUIREMENTS | | | |
|---|---|---|---|
| RADIUS | NUMBER OF CRT POSTS (SEE NOTE 3) | CLEAR AREA | |
| | | L | W |
| 17'- 0" | 6 | 30' | 15' |
| 25'- 6" | 8 | 40' | 20' |
| 35'- 0" | 11 | 50' | 20' |



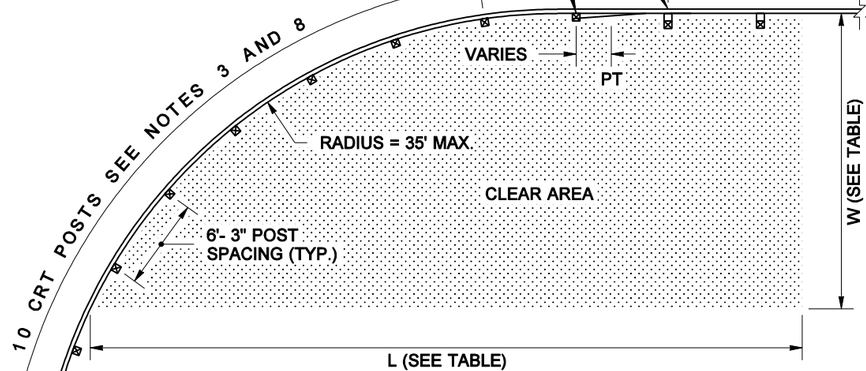

**CASE 13 _D**

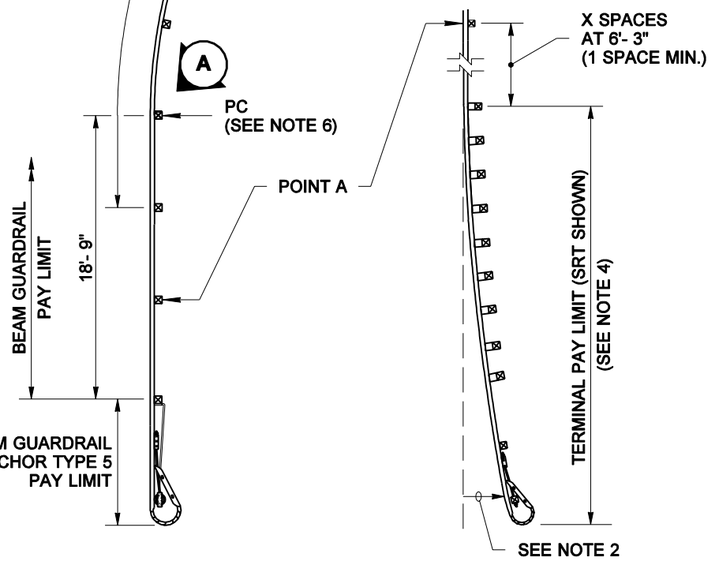
(SEE NOTE 7)




**CASE 13 _C**

(SEE NOTE 7)



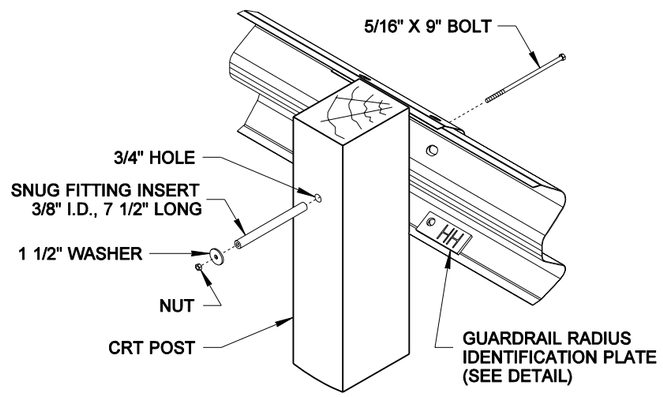




**CASE 13 A_**

(SEE NOTE 7)

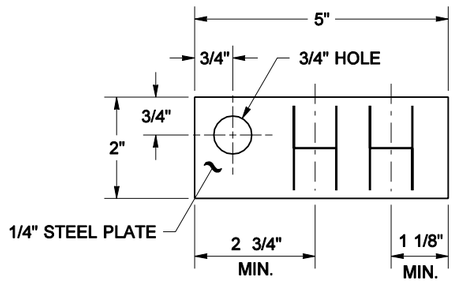
**CASE 13 B_**

(SEE NOTE 7)




(SEE NOTES 3, 6 & 8)

**VIEW (A)**




(SEE NOTE 5)

**GUARDRAIL RADIUS IDENTIFICATION PLATE DETAIL**

**NOTES**

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.




EXPIRES MAY 3, 2002

# GUARDRAIL PLACEMENT WEAK POST INTERSECTION DESIGN (35' MAX. RADIUS)

# STANDARD PLAN C-2g

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APPROVED FOR PUBLICATION

*Clifford E. Mansfield* — STATE DESIGN ENGINEER — *07-27-01* DATE

Washington State Department of Transportation

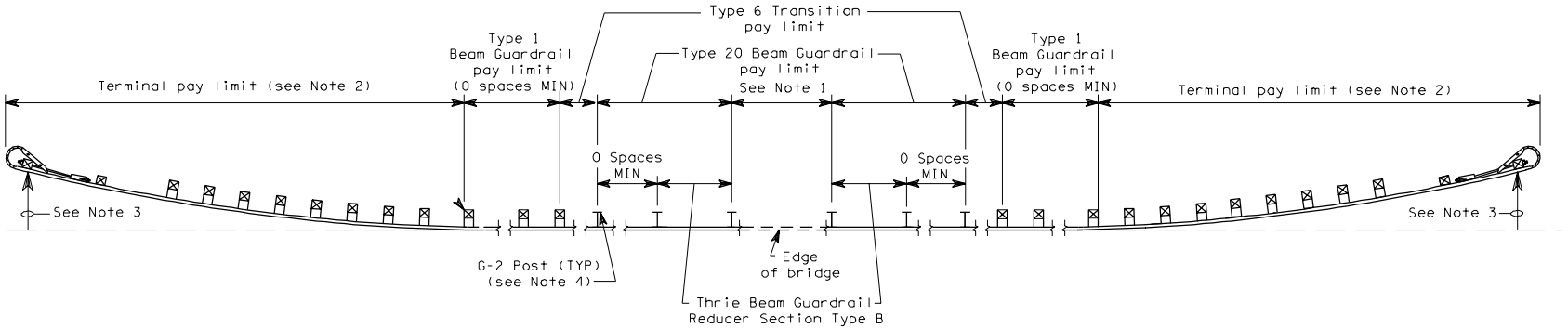
| DATE | REVISION | BY |
|---|---|---|
| 7/01 | CORRECTED NOTES; ADDED "VIEW A" | MAS |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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".




Direction of Traffic

CASE 14

GUARDRAIL PLACEMENT

C-2h 1 of 1

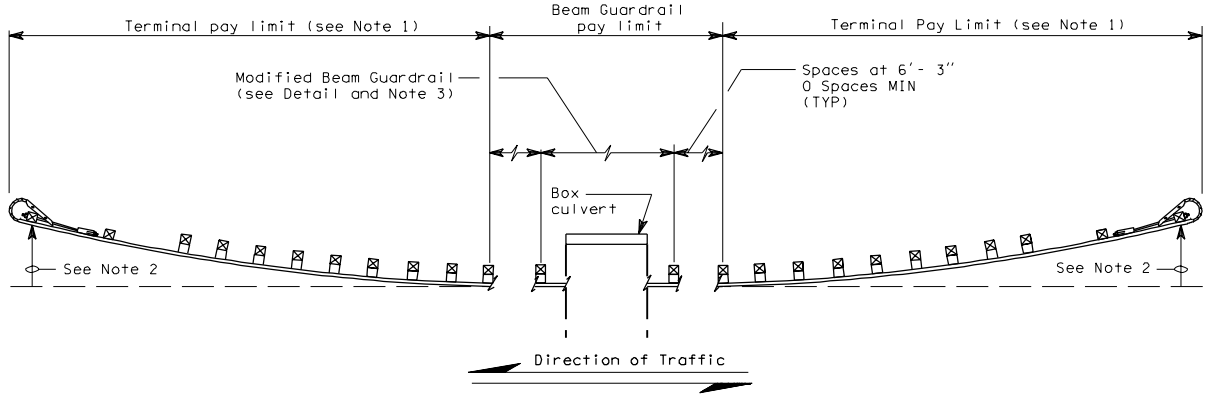
03-28-97

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

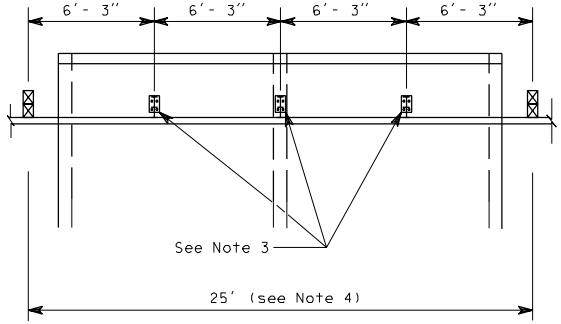
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

NOTES

1. SRT Terminal shown. 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 10:1 .
3. See Standard Plan for Box Culvert Guardrail Steel Post.
4. For spans up to 18′- 9″, see Standard Plan for Guardrail Placement Cases 19, 20, and 21.




CASE 15




DETAIL

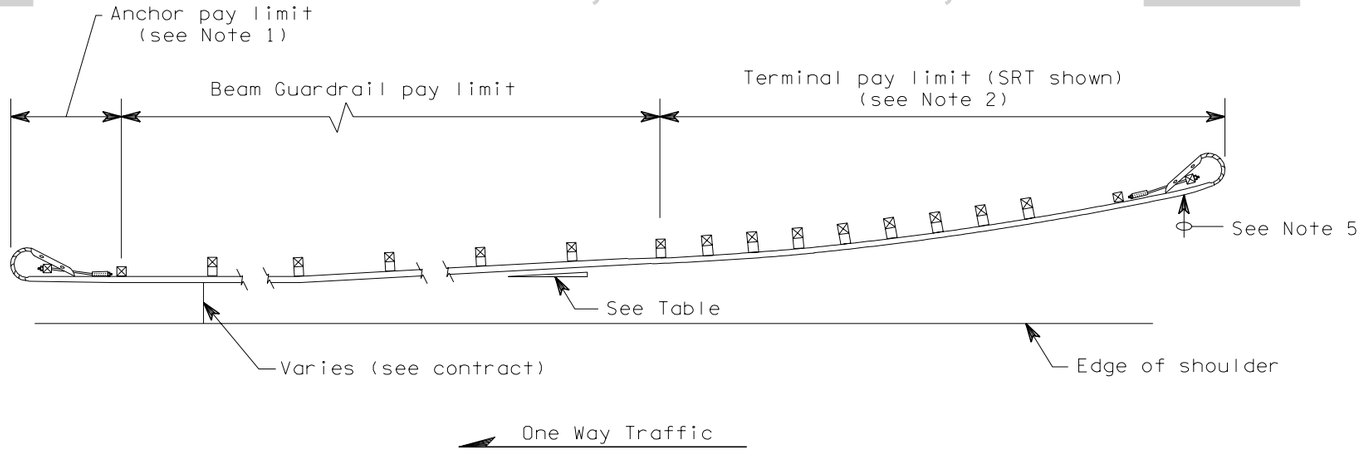
# GUARDRAIL PLACEMENT

C-2i 1 of 1

03-28-97

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

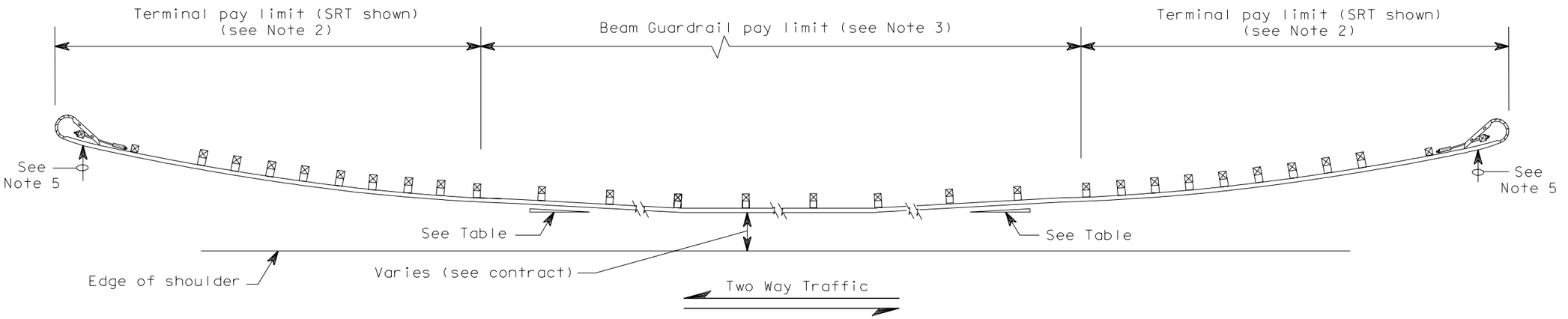
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




CASE 16

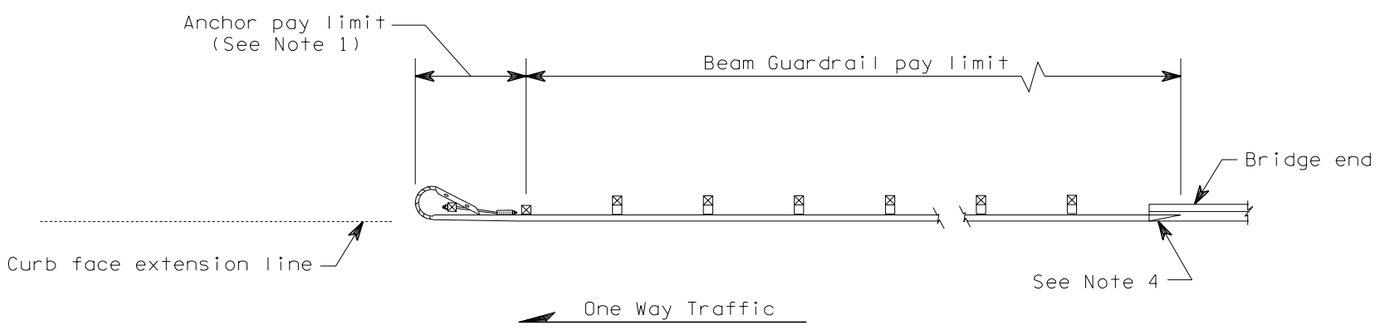
NOTES

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 17

| FLARE RATE 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 |




CASE 18

CLIFFORD E. MANSFIELD
STATE OF WASHINGTON
15224
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2000

# GUARDRAIL PLACEMENT

# STANDARD PLAN C-2j

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| DATE | REVISION | BY |
|---|---|---|
| 5/98 | Revise Flair Rate Table. | RBA |

APPROVED FOR PUBLICATION

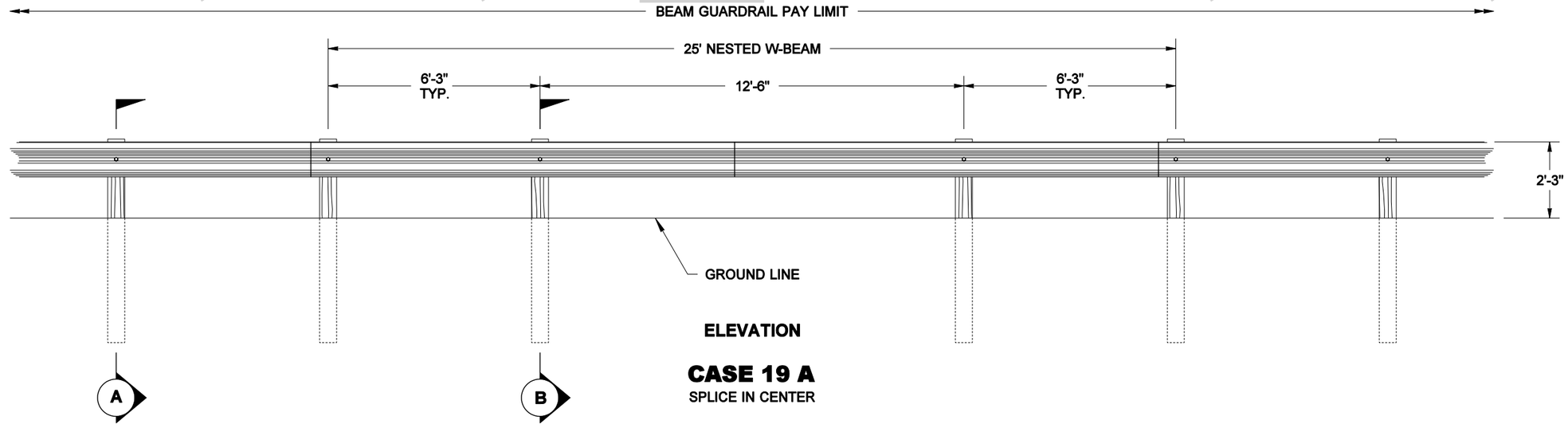
*Clifford E. Mansfield* — 6/12/98

DEPUTY STATE DESIGN ENGINEER — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

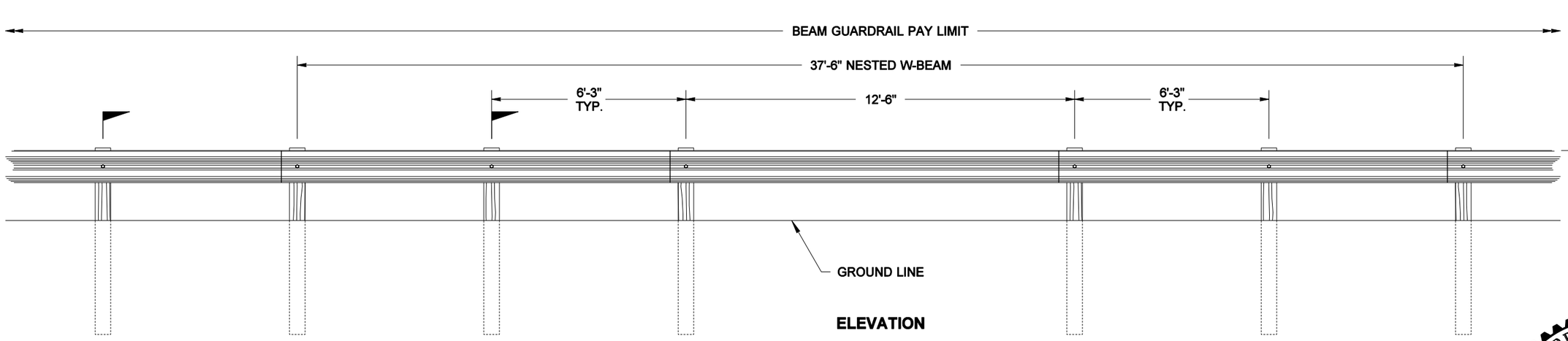
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**ELEVATION**

## CASE 19 A

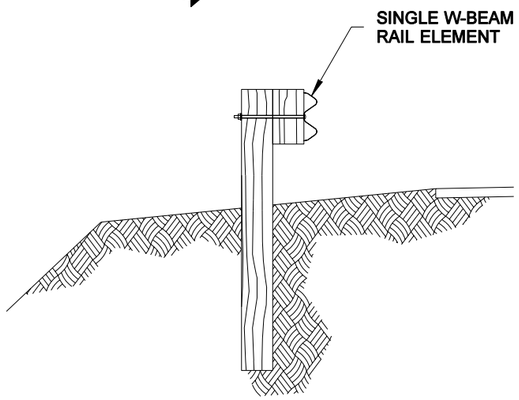
SPLICE IN CENTER



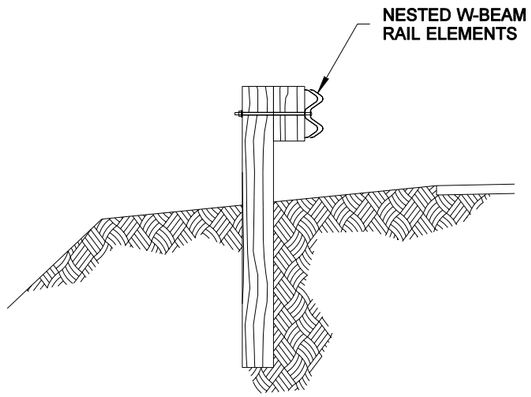

**ELEVATION**

## CASE 19 B

SPLICE AT POSTS




**SECTION (A)**




**SECTION (B)**

CLIFFORD E. MANSFIELD
STATE OF WASHINGTON
15224
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2002

# GUARDRAIL PLACEMENT
# 12'-6" SPAN
# STANDARD PLAN C-2k

APPROVED FOR PUBLICATION

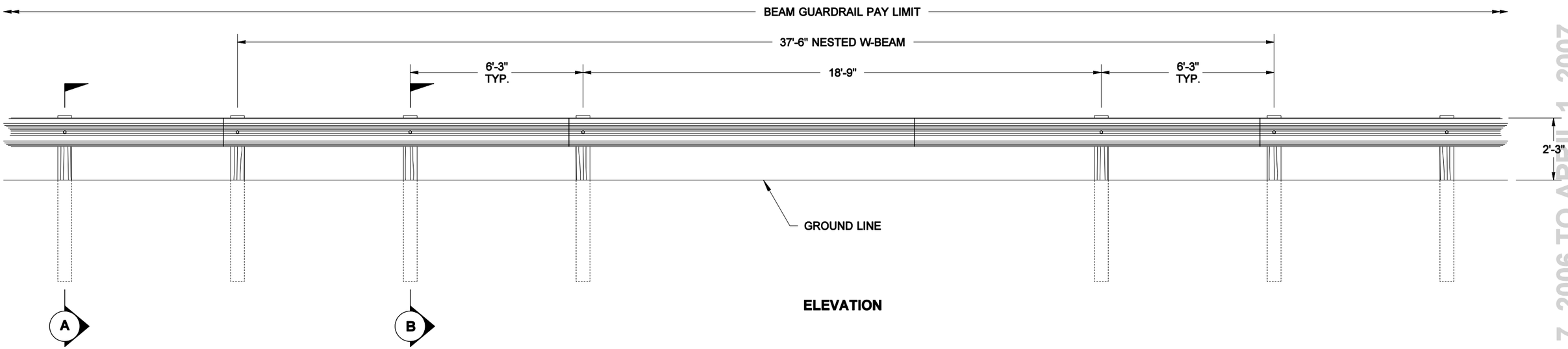
*Clifford E. Mansfield* — STATE DESIGN ENGINEER — *07-27-01* — DATE

Washington State Department of Transportation

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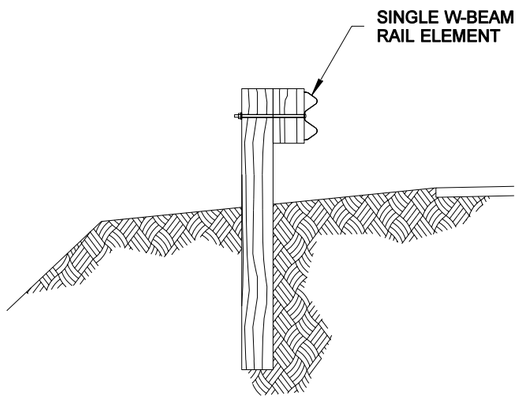
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

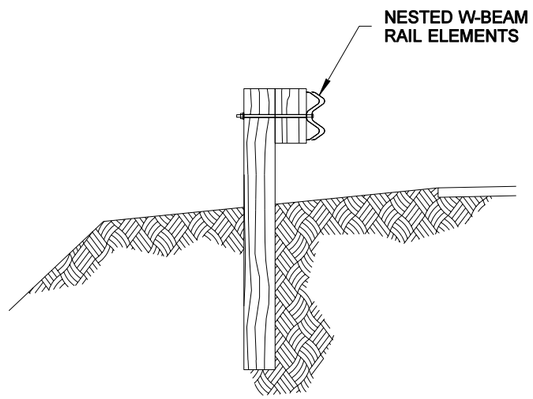



**ELEVATION**

# CASE 20




**SECTION (A)**




**SECTION (B)**

CLIFFORD E. MANSFIELD
STATE OF WASHINGTON
15224
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2002

## GUARDRAIL PLACEMENT
## 18'-9" SPAN
## STANDARD PLAN C-2n

*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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*Clifford E. Mansfield* — STATE DESIGN ENGINEER

*07-27-01* — DATE

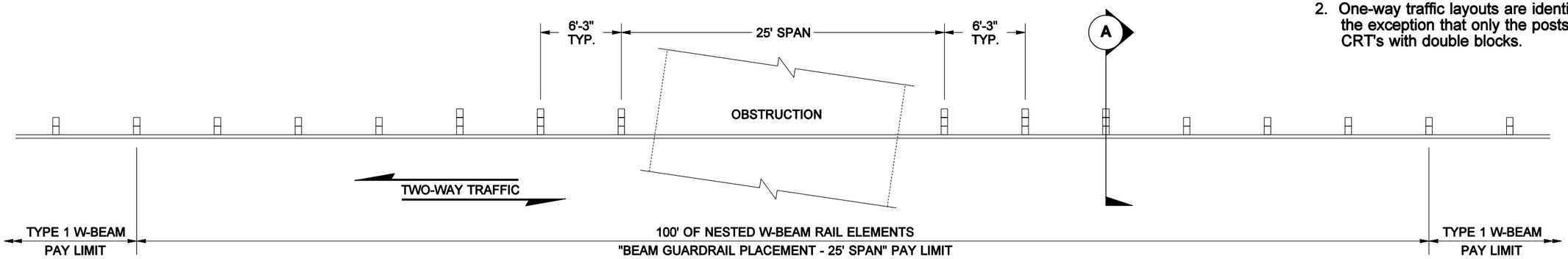
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

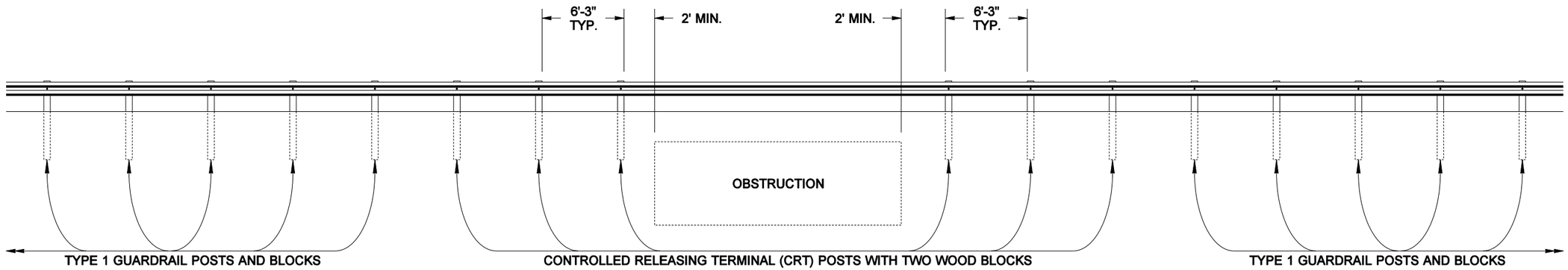
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

**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.

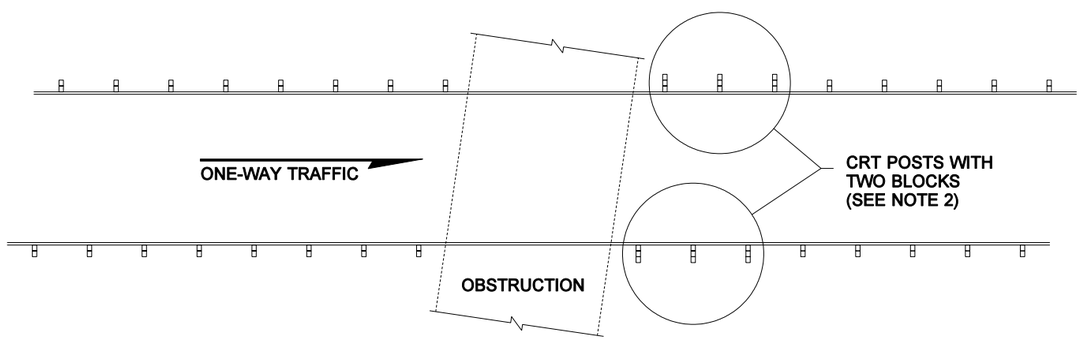



**PLAN**

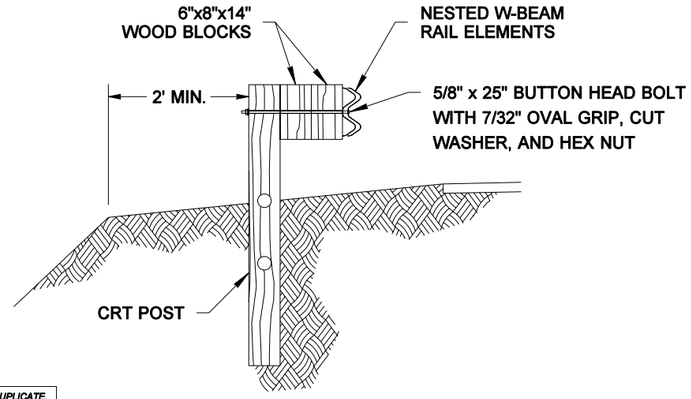



**ELEVATION**

## CASE 21




**ONE-WAY TRAFFIC LAYOUT**




**SECTION (A)**

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CLIFFORD E. MANSFIELD
STATE OF WASHINGTON
15224
REGISTERED PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2002

# GUARDRAIL PLACEMENT 25' SPAN STANDARD PLAN C-2o

APPROVED FOR PUBLICATION

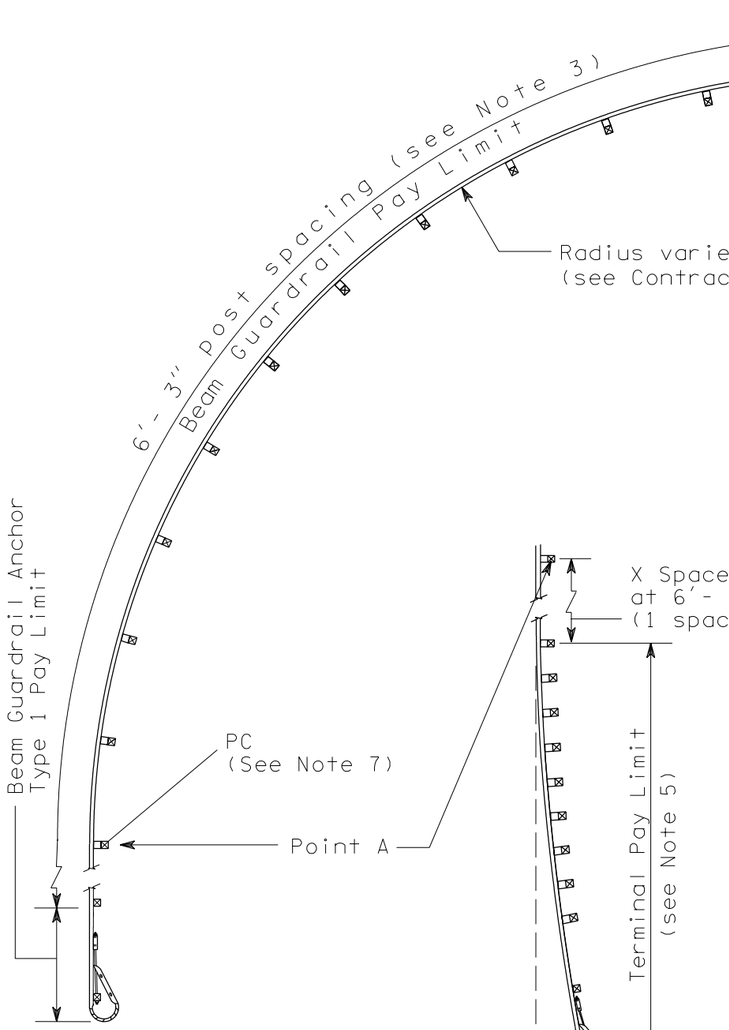
*Clifford E. Mansfield* — STATE DESIGN ENGINEER — *07-13-01* — DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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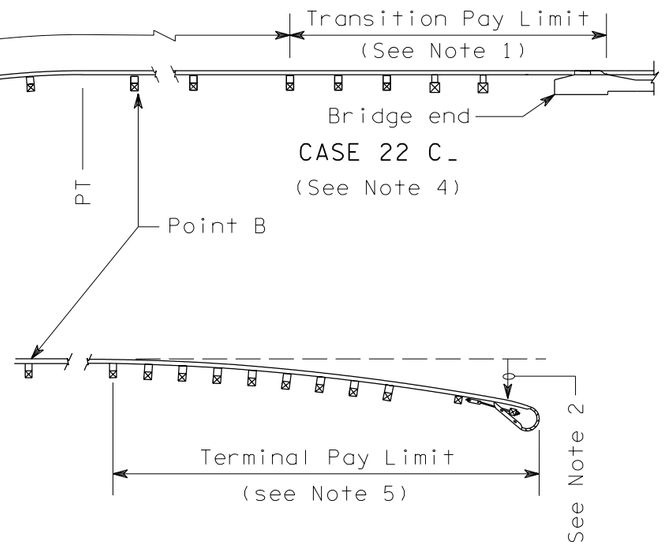

CASE 22 A_

(See Note 4)




CASE 22 B_

(See Note 4)




CASE 22 C_

(See Note 4)

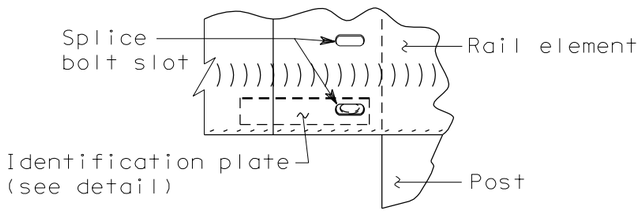



CASE 22 D_

(See Note 4)

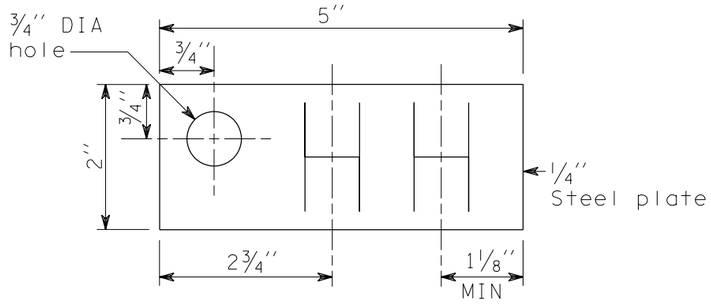
NOTES

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 Plan(s).
6. Radius dimensions shall be etched into plate replacing the letters "HH" shown on the Identification Plate Detail. Digits shall be 1½" MIN height and ¾" 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.




IDENTIFICATION PLATE MOUNTING DETAIL

(See Note 7)




IDENTIFICATION PLATE DETAIL

(See Note 6)

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# GUARDRAIL PLACEMENT STRONG POST INTERSECTION DESIGN STANDARD PLAN C-2p

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* *10-31-03*

STATE DESIGN ENGINEER — DATE

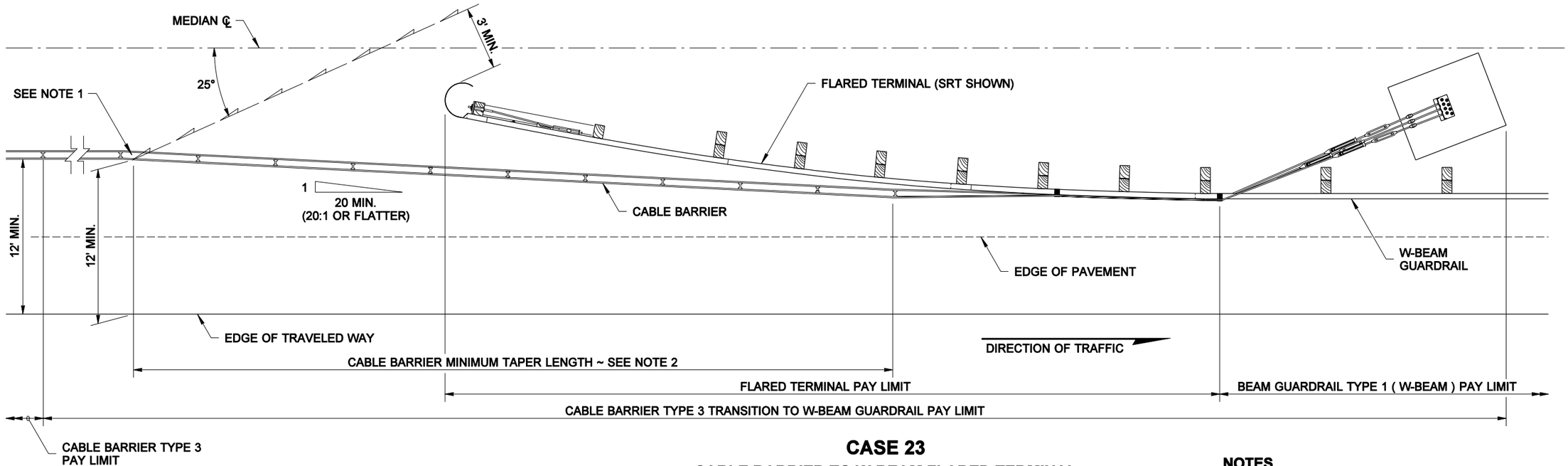
Washington State Department of Transportation

| DATE | REVISION | BY |
|---|---|---|
| 09/2003 | CORRECTED REFERENCES TO NOTES. | MHG |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN



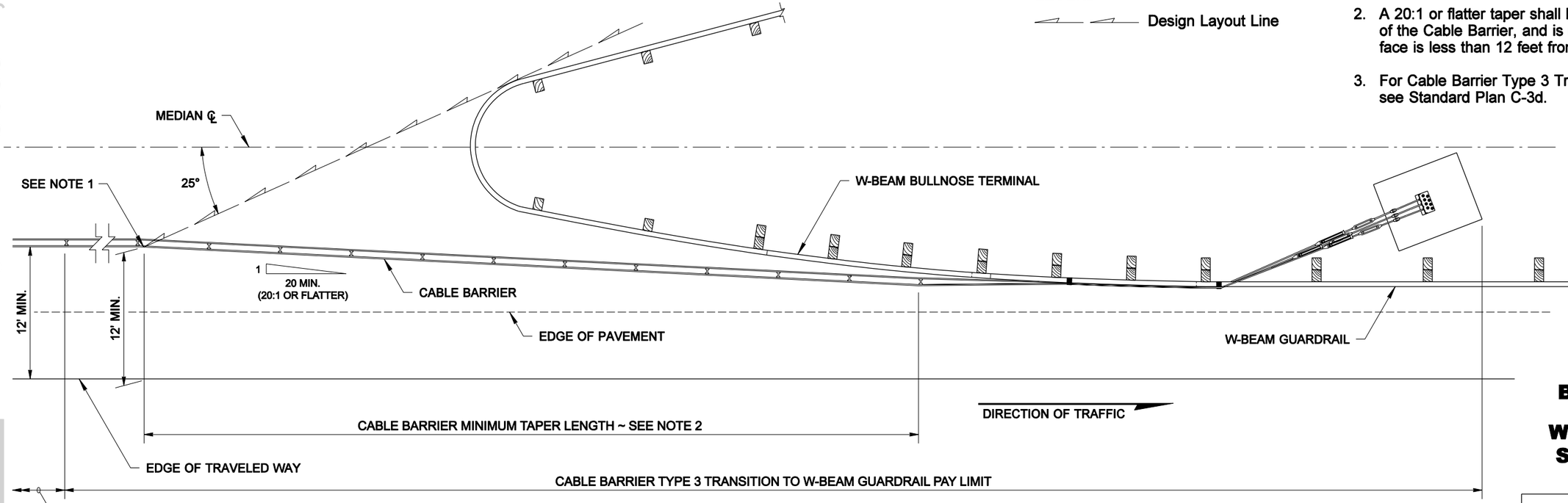

## CASE 23
### CABLE BARRIER TO W-BEAM FLARED TERMINAL

**LEGEND**

Design Layout Line

**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

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# BARRIER PLACEMENT CABLE BARRIER TO W-BEAM CONNECTIONS STANDARD PLAN C-2q

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *03-03-05* — DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

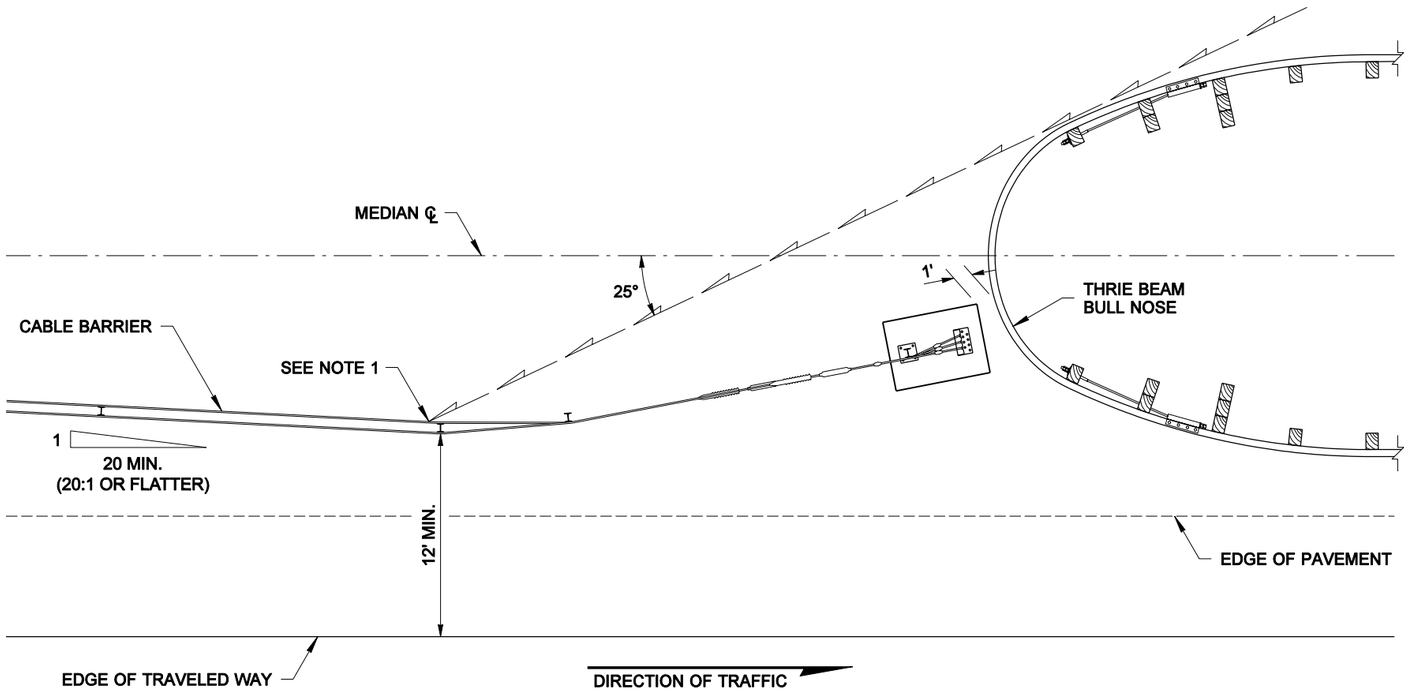
DRAWN BY: ADAM COCHRAN

**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**

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# BARRIER PLACEMENT CABLE TO THRIE BEAM BULL NOSE CONNECTION STANDARD PLAN C-2r

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *03-03-05* — DATE

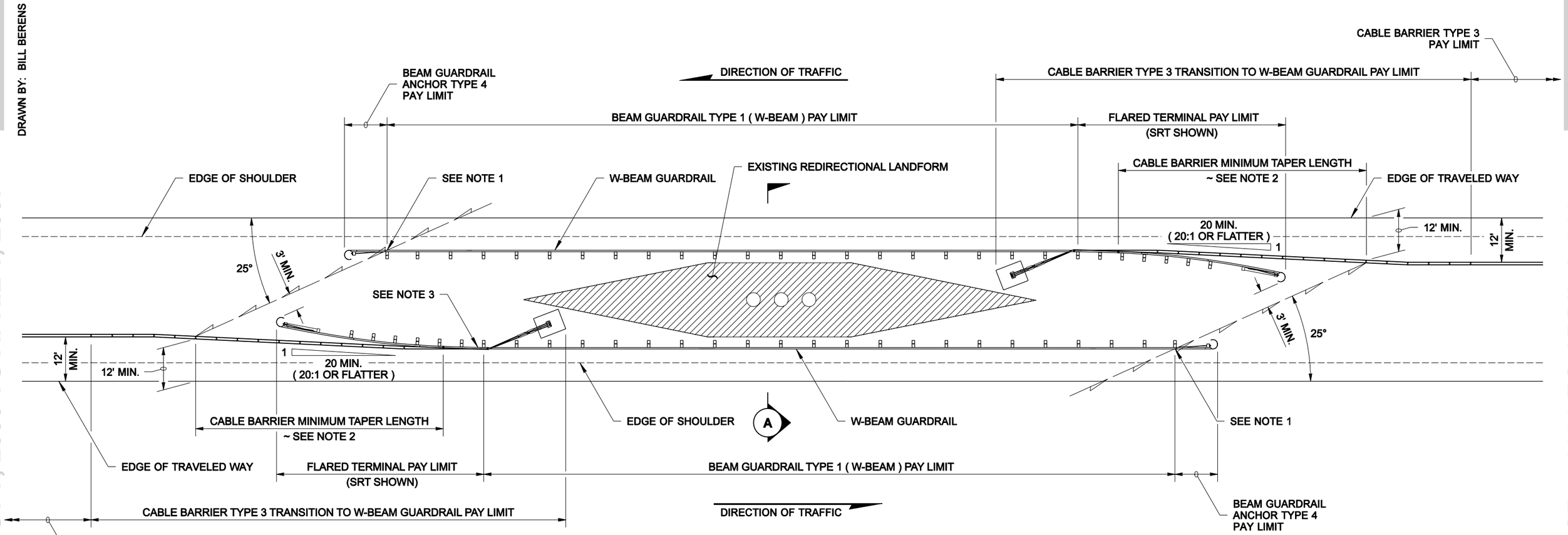
Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: BILL BERENS




**PLAN VIEW**

**CASE 26**

**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.

**LEGEND**

Design Layout Line

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# BARRIER PLACEMENT ~ CABLE TO W-BEAM SHIELDING FOR REDIRECTIONAL LANDFORM
# STANDARD PLAN C-2s

SHEET 1 OF 1 SHEET

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*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *03-03-05* — DATE

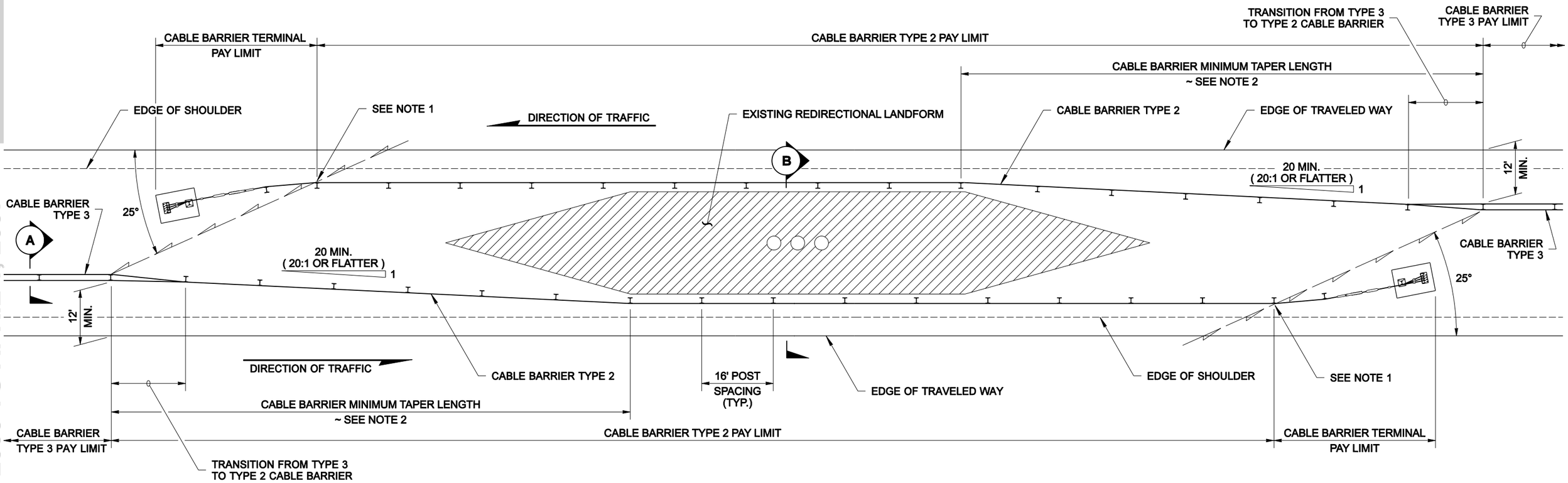
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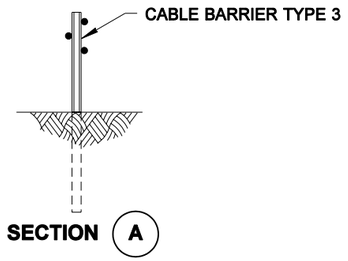
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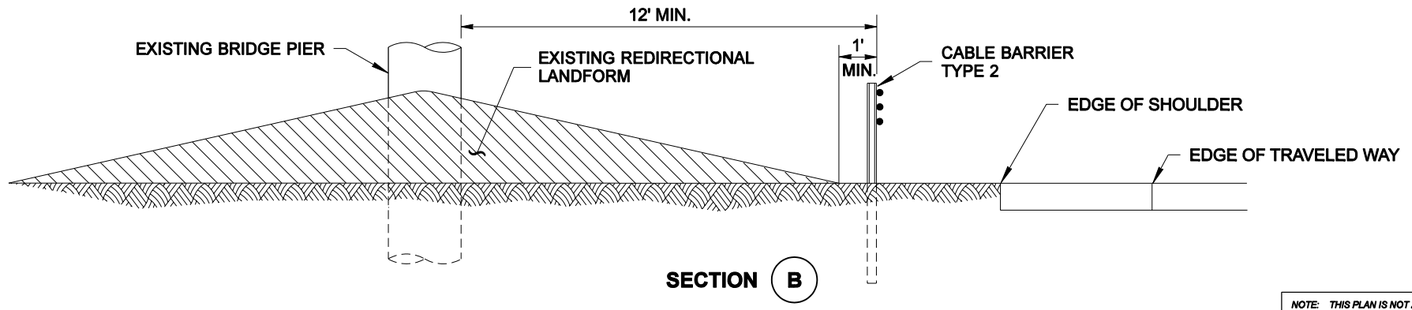
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**PLAN VIEW**

**CASE 27**




**NOTES**

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

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STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

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# BARRIER PLACEMENT ~ CABLE BARRIER SHIELDING FOR REDIRECTIONAL LANDFORM STANDARD PLAN C-2t

SHEET 1 OF 1 SHEET

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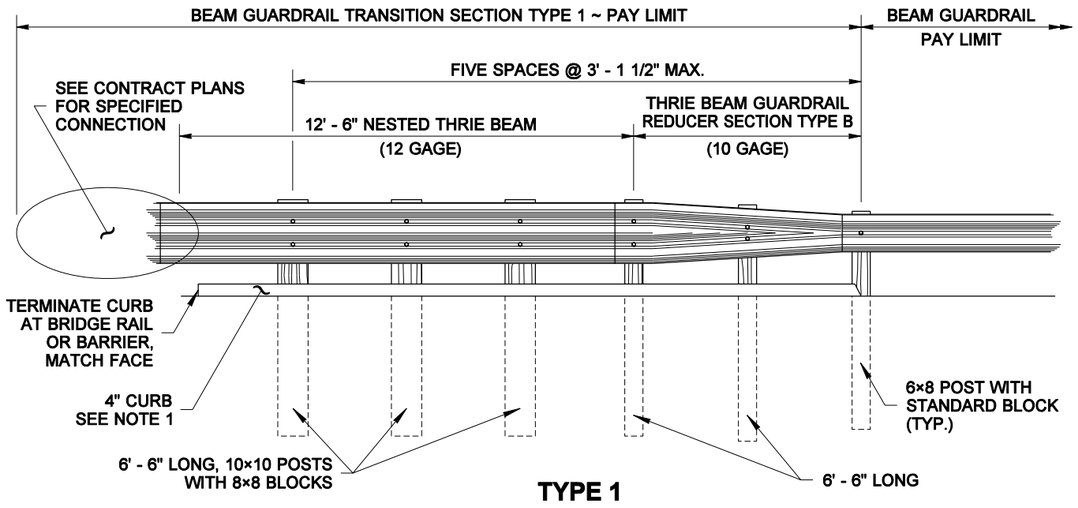
DRAWN BY: MONIQUE GLICK

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

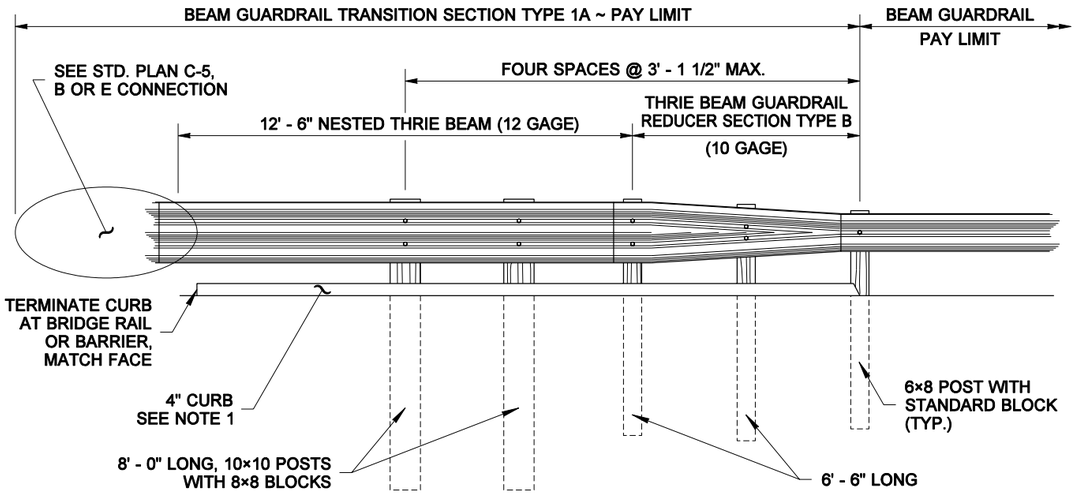
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA



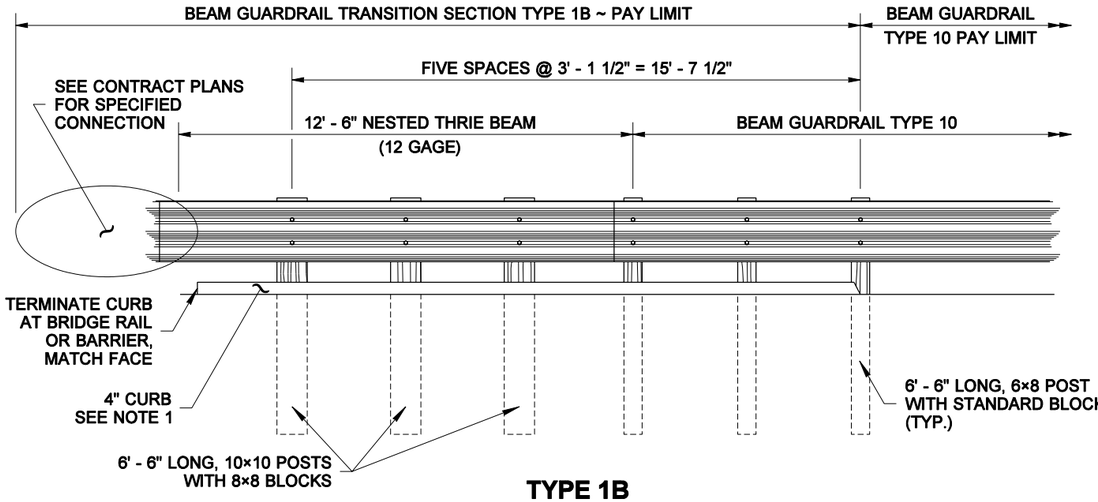

**TYPE 1**




**TYPE 1A**

**NOTE**

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




**TYPE 1B**

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# BEAM GUARDRAIL TRANSITION SECTIONS

## STANDARD PLAN C-3

SHEET 1 OF 1 SHEET

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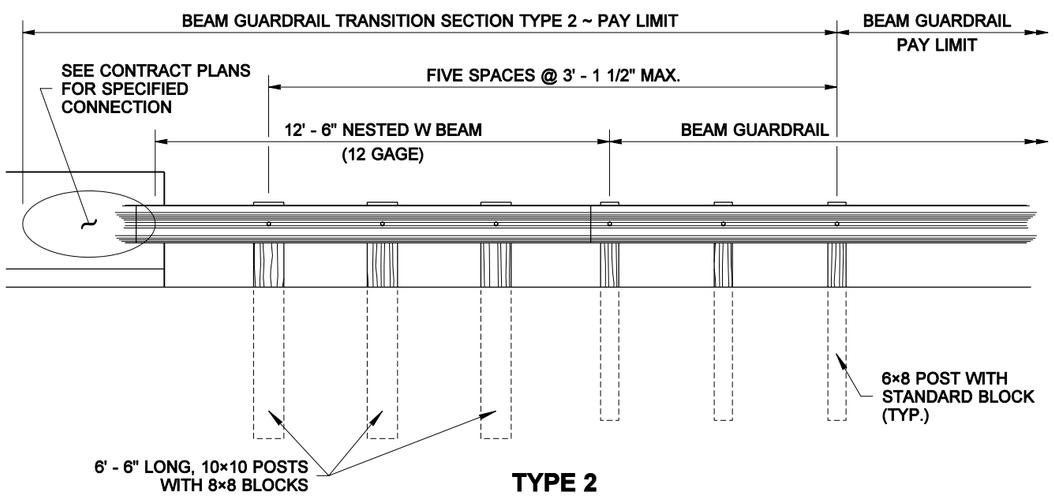
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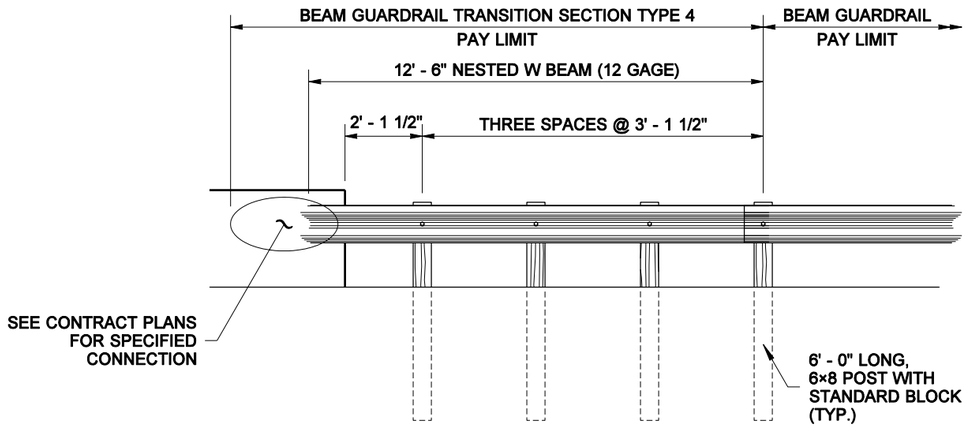
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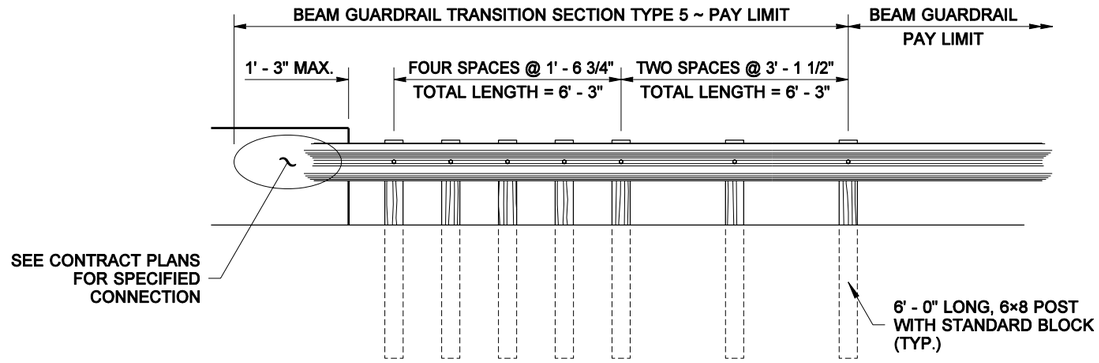
DRAWN BY: MARK SUJKA



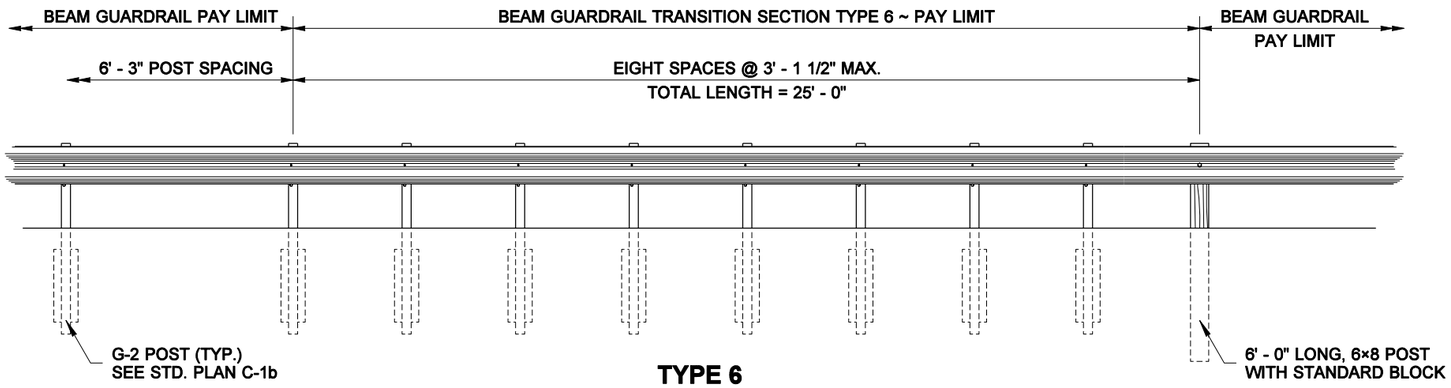

**TYPE 2**




**TYPE 4**
FOR 45 MPH AND BELOW




**TYPE 5**




**TYPE 6**

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EXPIRES JULY 24, 2006

# BEAM GUARDRAIL TRANSITION SECTIONS

## STANDARD PLAN C-3a

SHEET 1 OF 1 SHEET

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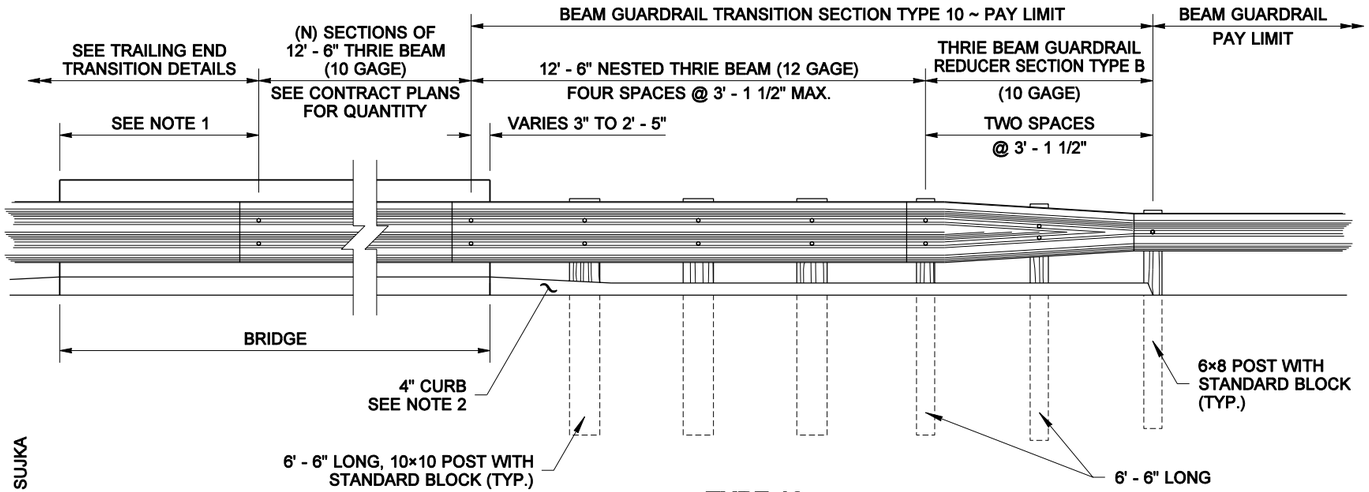
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *10-04-05* — DATE

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**TYPE 10**

**APPROACH END**

THRIE BEAM INSTALLED AT FACE OF BRIDGE CURB

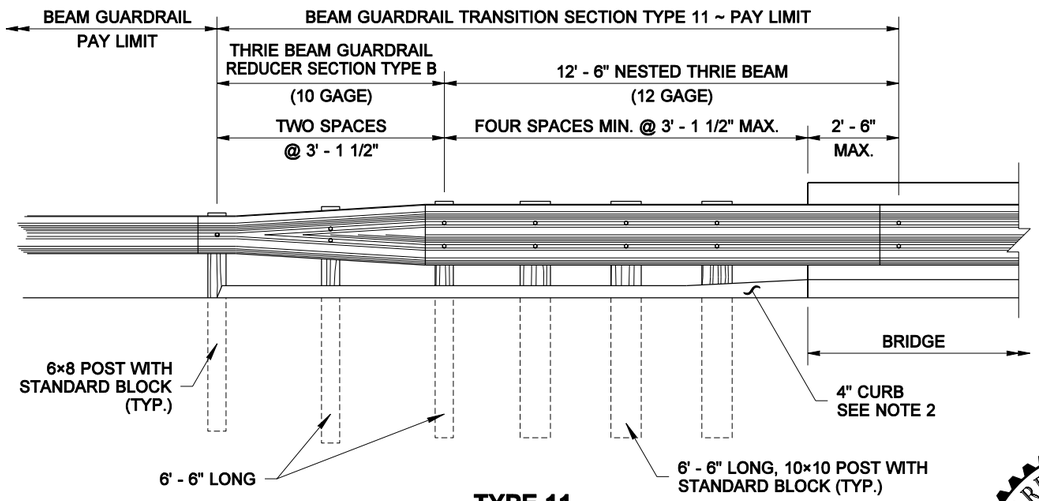
DRAWN BY: MARK SUJKA

**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.

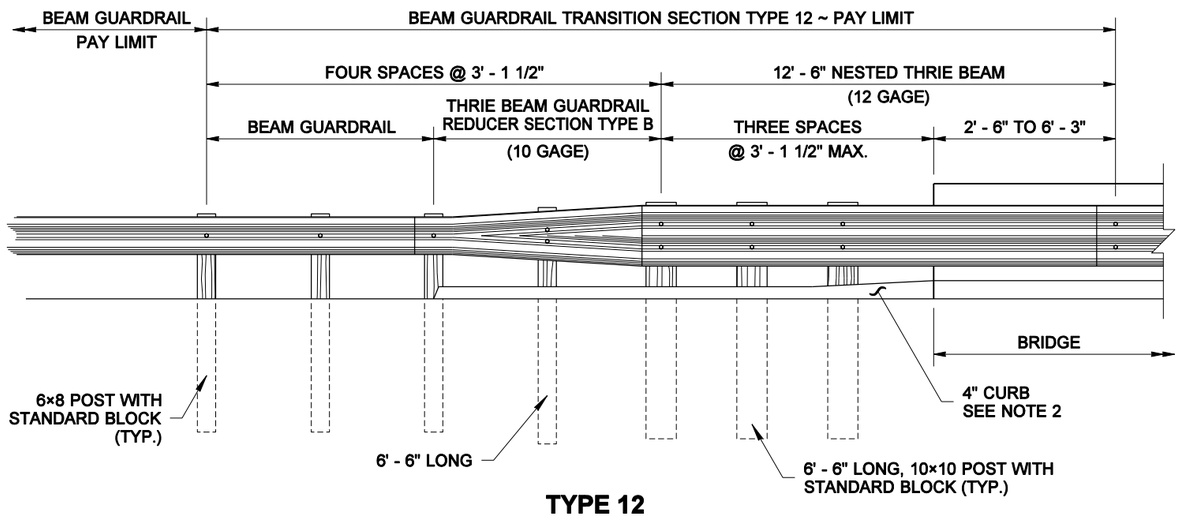
3. When thrie beam is installed at the face of rigid bridge rail, an HMA ramp is required from the roadway surface to the top of the bridge curb or sidewalk. The slope of the ramp shall be 20:1 or flatter.




**TYPE 11**

**TRAILING END**

THRIE BEAM INSTALLED AT FACE OF BRIDGE CURB




**TYPE 12**

**TRAILING END**

THRIE BEAM INSTALLED AT FACE OF BRIDGE CURB

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
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EXPIRES JULY 24, 2006

# BEAM GUARDRAIL TRANSITION SECTIONS

## STANDARD PLAN C-3b

SHEET 1 OF 2 SHEETS

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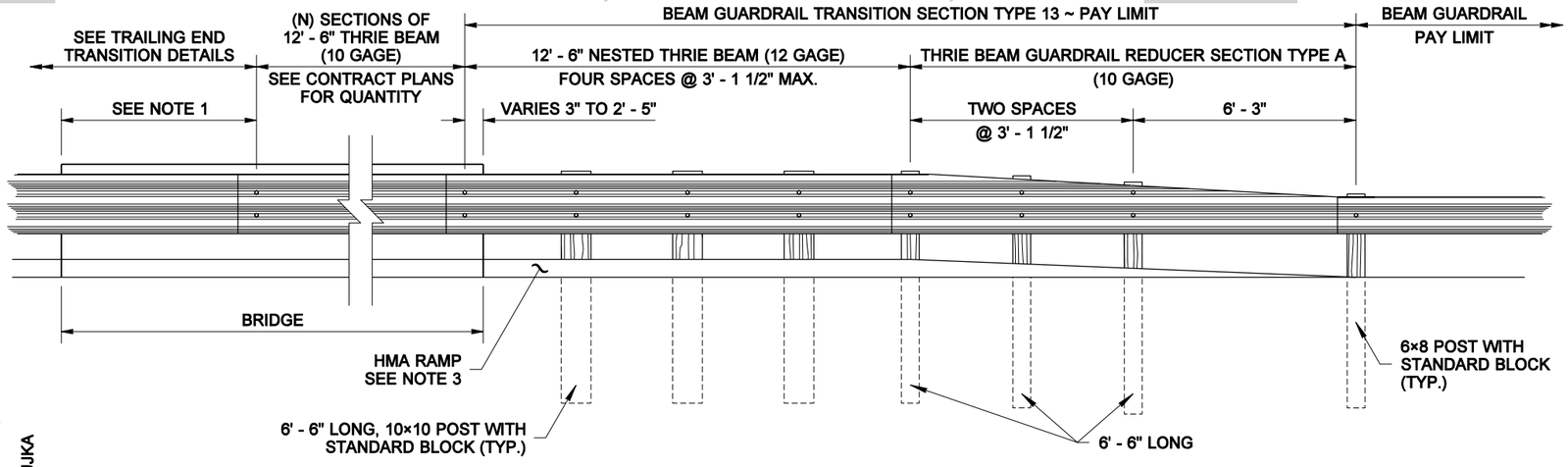
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *10-04-05* — DATE

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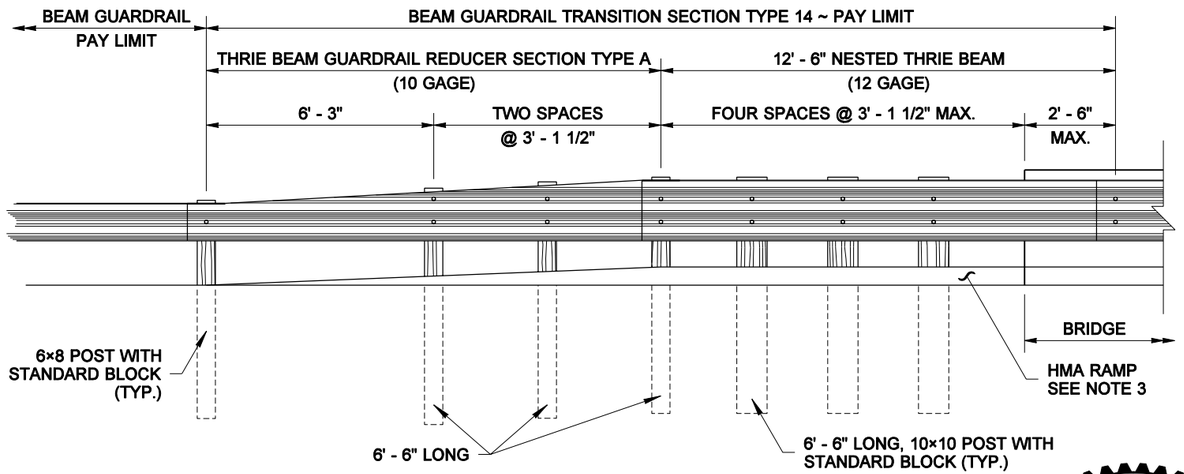
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




## TYPE 13

**APPROACH END**

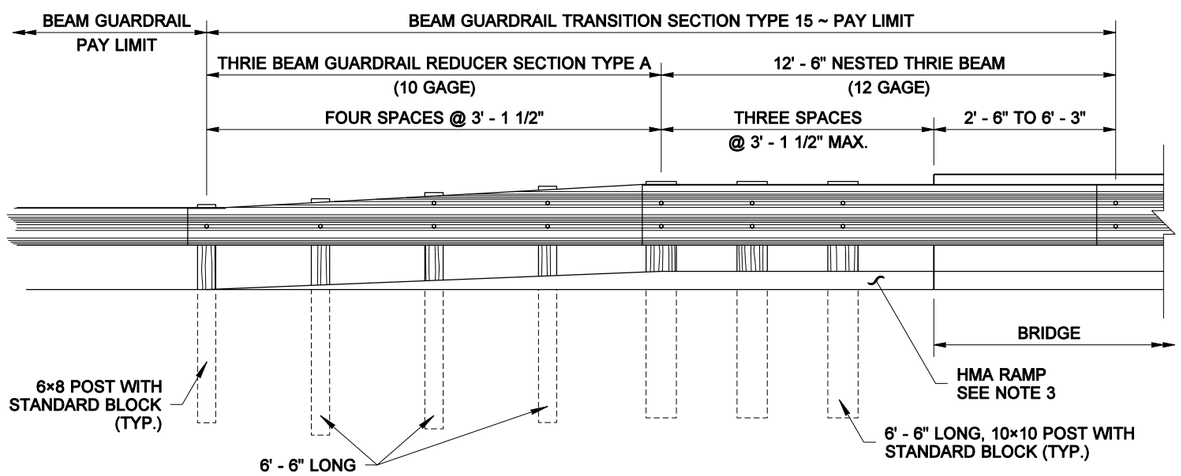
THRIE BEAM INSTALLED AT FACE OF BRIDGE RAIL




## TYPE 14

**TRAILING END**

THRIE BEAM INSTALLED AT FACE OF BRIDGE RAIL




## TYPE 15

**TRAILING END**

THRIE BEAM INSTALLED AT FACE OF BRIDGE RAIL

DRAWN BY: MARK SUJKA

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34042
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# BEAM GUARDRAIL TRANSITION SECTIONS

## STANDARD PLAN C-3b

SHEET 2 OF 2 SHEETS

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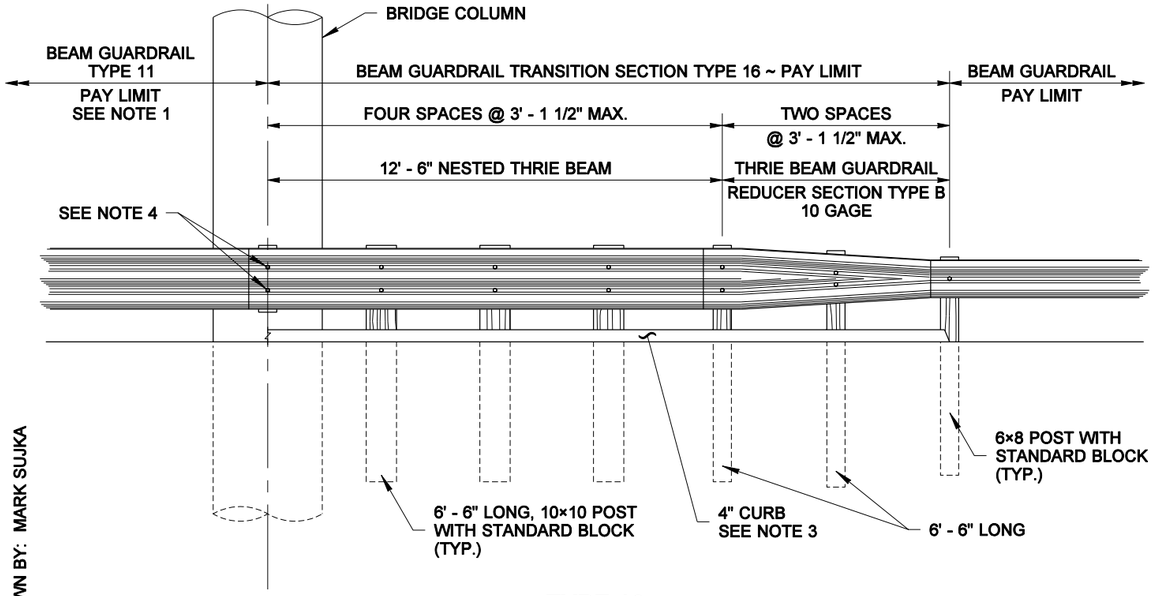
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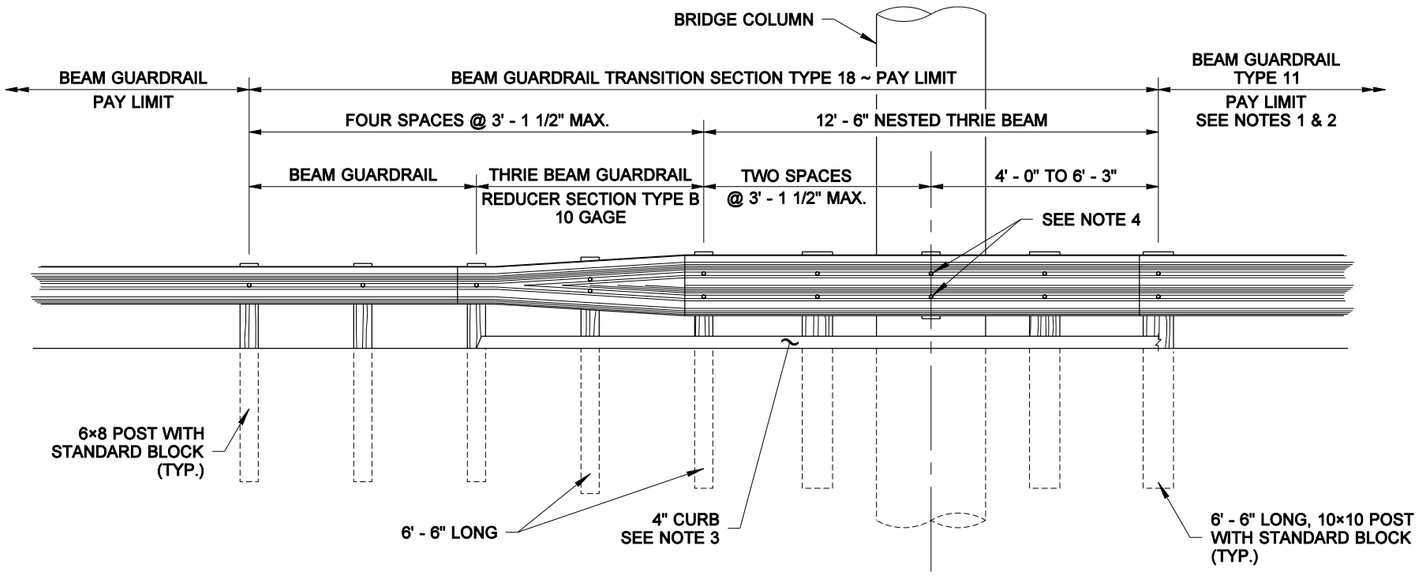
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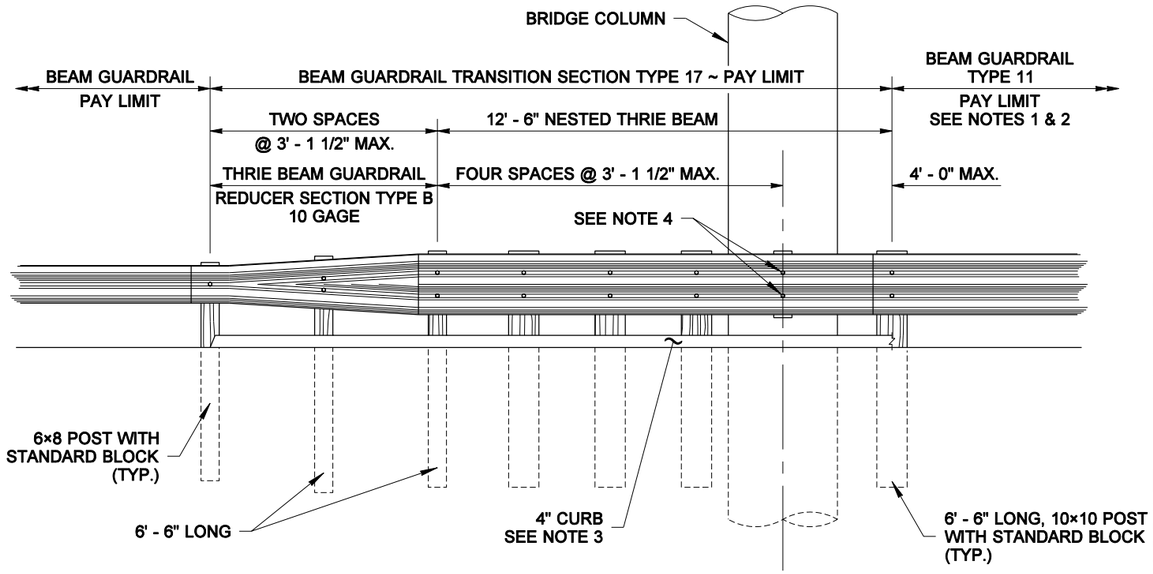

**TYPE 16**
**APPROACH END**




**TYPE 18**
**TRAILING END**

**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" × 4" lag bolts.




**TYPE 17**
**TRAILING END**

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# BEAM GUARDRAIL TRANSITION SECTIONS

## STANDARD PLAN C-3c

SHEET 1 OF 1 SHEET

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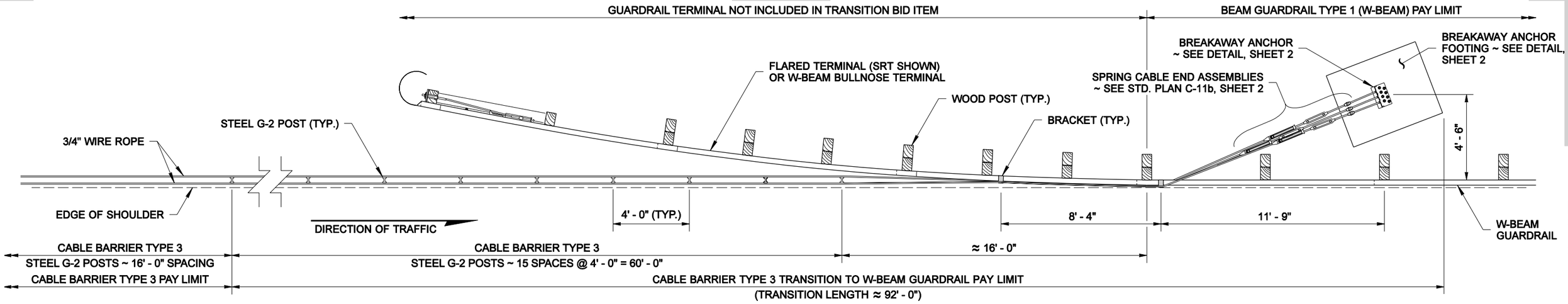
Washington State Department of Transportation

| DATE | REVISION | BY |
|---|---|---|
| 05/2006 | OMITTED ATTACHMENT TO STRUCTURE | EAB |

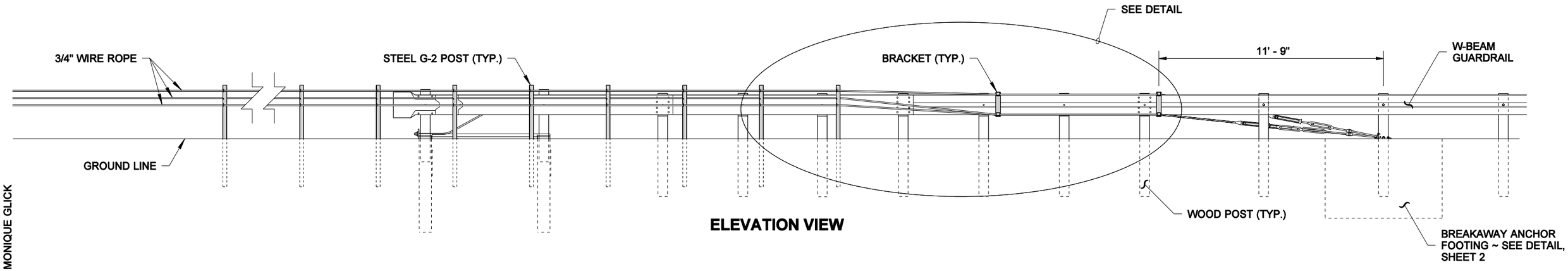
DRAWN BY: MARK SUJKA

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

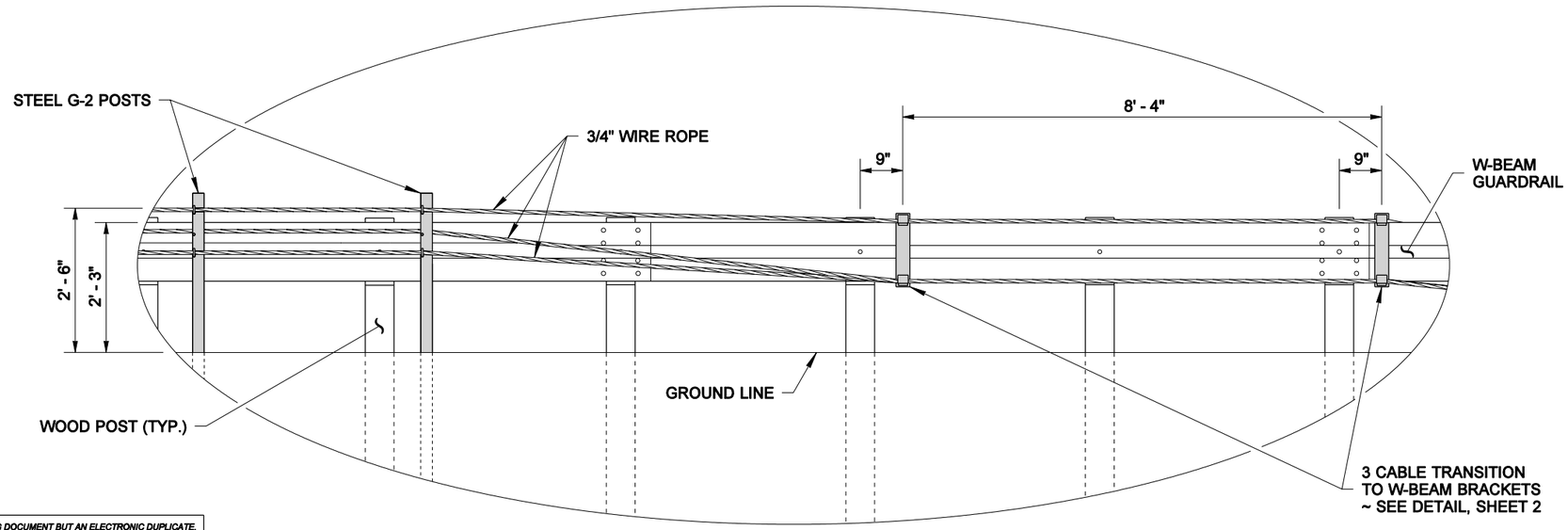
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




## PLAN VIEW




## ELEVATION VIEW




## DETAIL

DRAWN BY: MONIQUE GLICK

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STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# CABLE BARRIER TYPE 3 TRANSITION TO W-BEAM GUARDRAIL STANDARD PLAN C-3d

SHEET 1 OF 2 SHEETS

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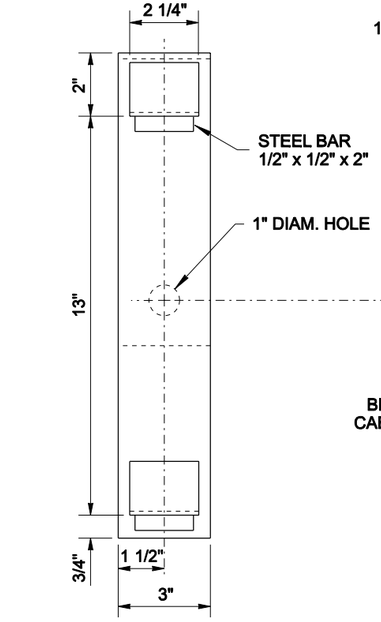
*Harold J. Peterfeso* — STATE DESIGN ENGINEER
*03-03-05* — DATE

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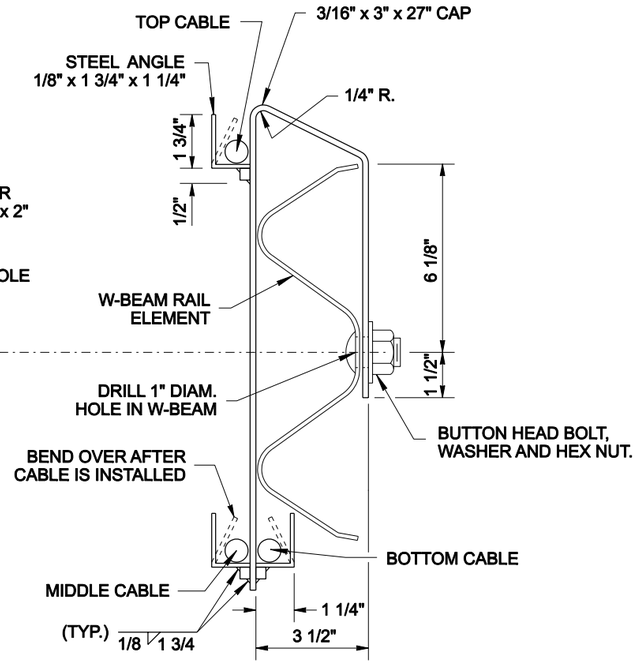
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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DRAWN BY: MONIQUE GLICK



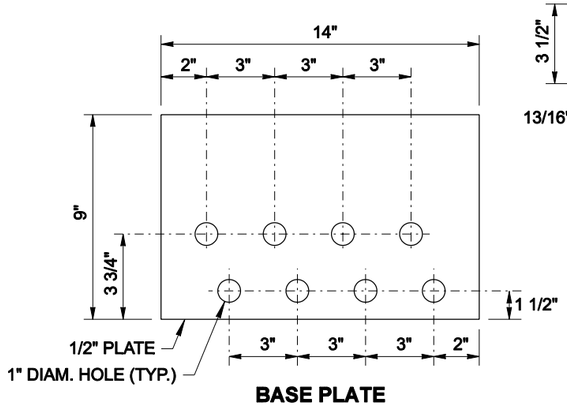

**ELEVATION VIEW**



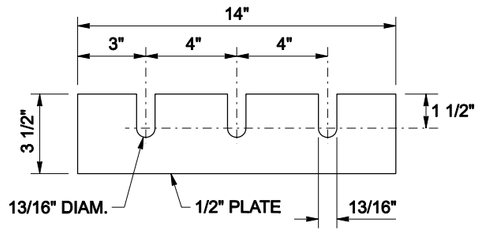

**END VIEW**

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.

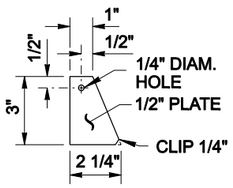
## 3 CABLE TRANSITION TO W-BEAM BRACKET DETAIL



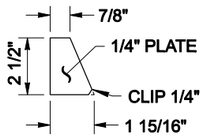

**BASE PLATE**



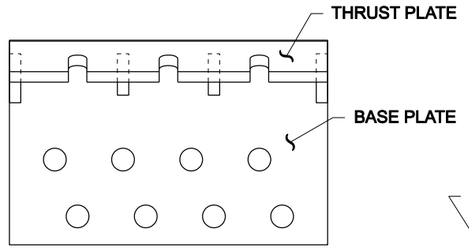

**THRUST PLATE**



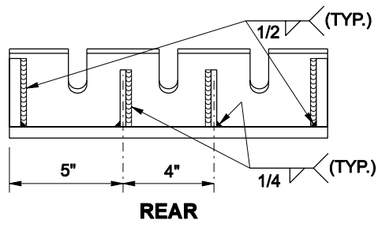

**END GUSSET**



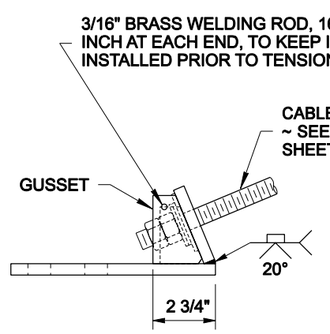

**INSIDE GUSSET**




**TOP**

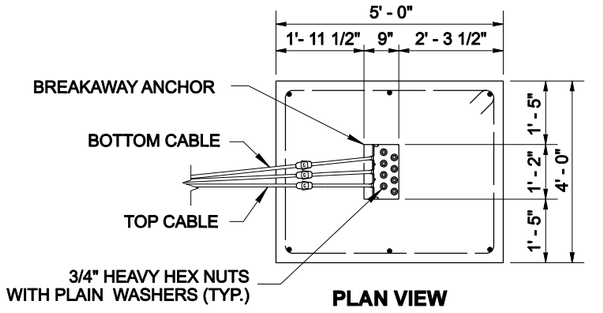



**REAR**

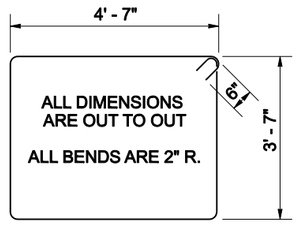



**SIDE**

## BREAKAWAY ANCHOR DETAIL

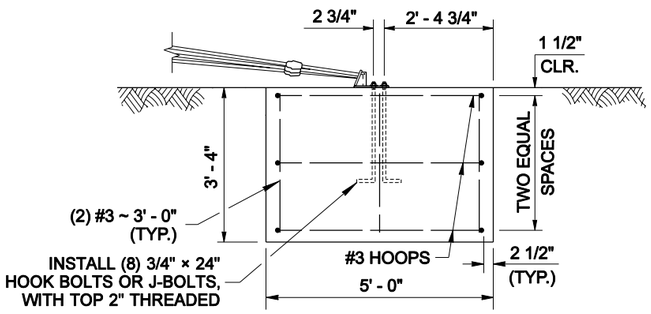



**PLAN VIEW**




**#3 HOOP**

DIRECTION OF TRAFFIC




**ELEVATION VIEW**

## BREAKAWAY ANCHOR FOOTING DETAIL

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STATE OF WASHINGTON
34042
REGISTERED
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EXPIRES JULY 24, 2006

# CABLE BARRIER TYPE 3 TRANSITION TO W-BEAM GUARDRAIL STANDARD PLAN C-3d

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

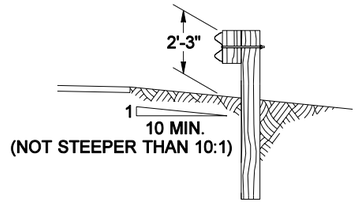
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *03-03-05* — DATE

Washington State Department of Transportation

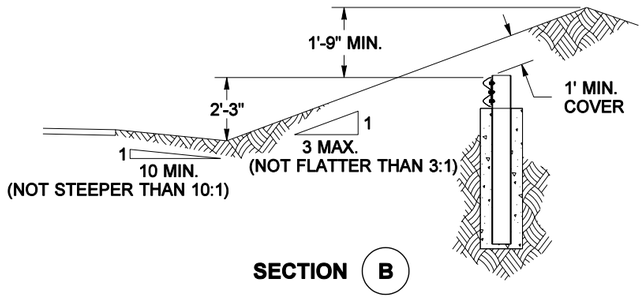
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



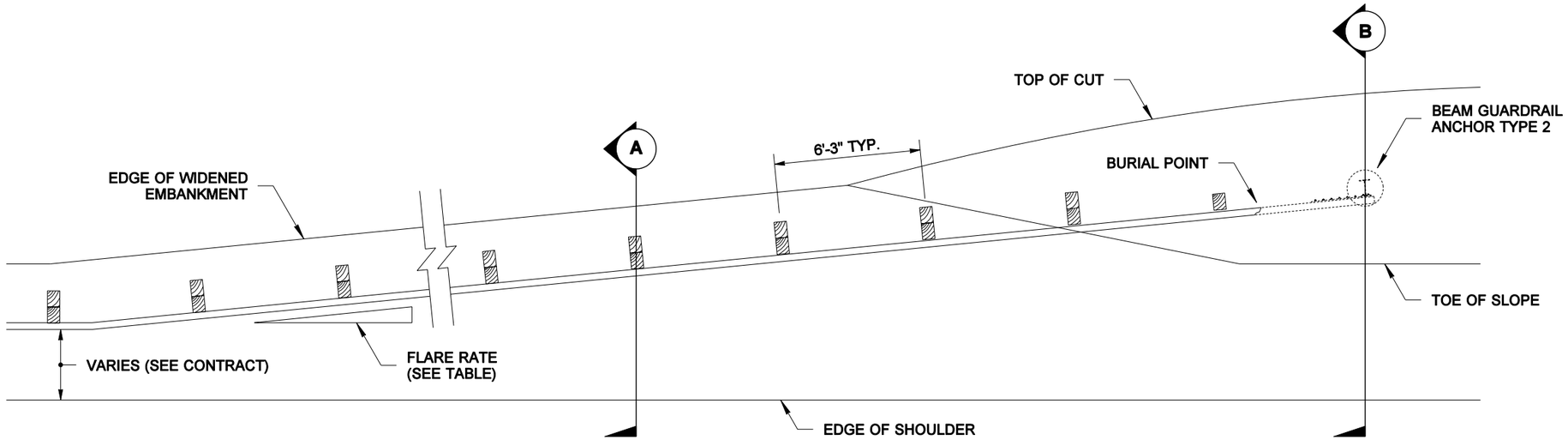

SECTION A




SECTION B

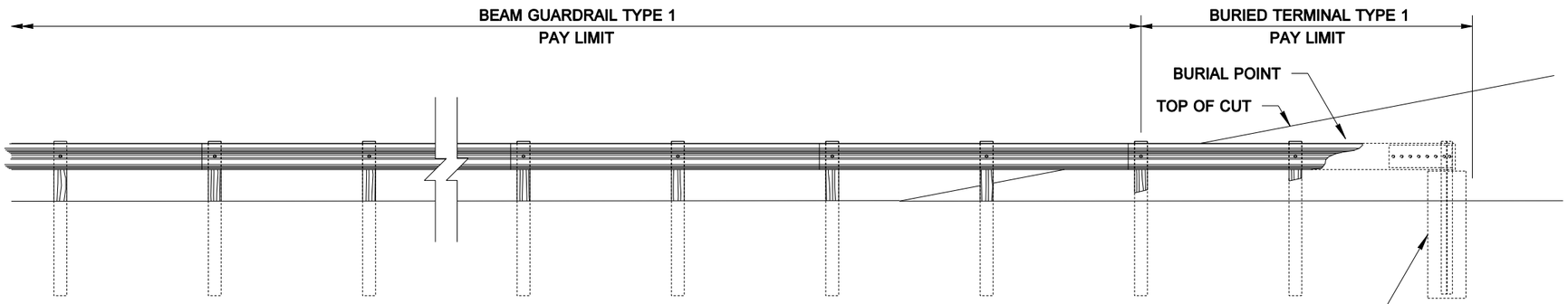


PERSPECTIVE




PLAN

| FLARE RATE 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 |




ELEVATION

CLIFFORD E. MANSFIELD
STATE OF WASHINGTON
15224
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2002

# BEAM GUARDRAIL BURIED TERMINAL TYPE 1 STANDARD PLAN C-4

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APPROVED FOR PUBLICATION

*Clifford E. Mansfield* — STATE DESIGN ENGINEER

*07-13-01* — DATE

Washington State Department of Transportation

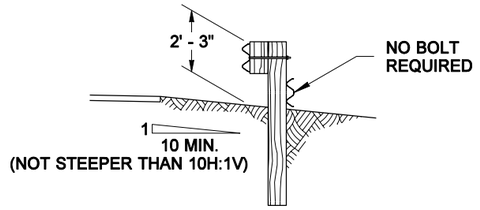
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

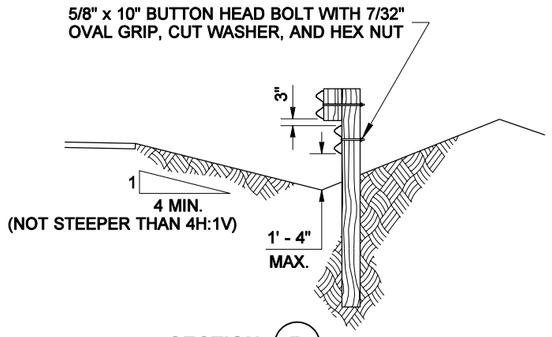
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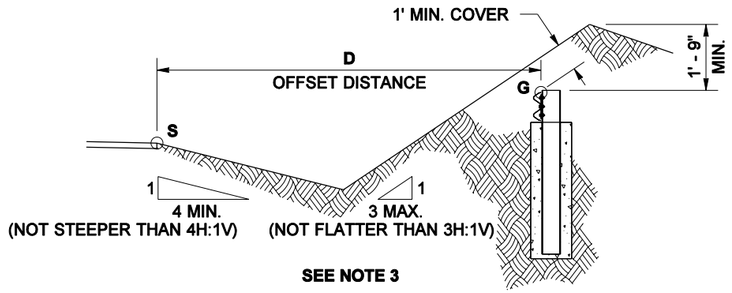
DRAWN BY: MARK SUJKA




SECTION (A)

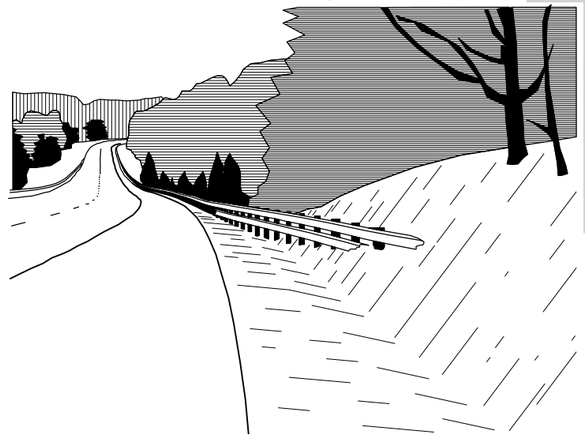



SECTION (B)

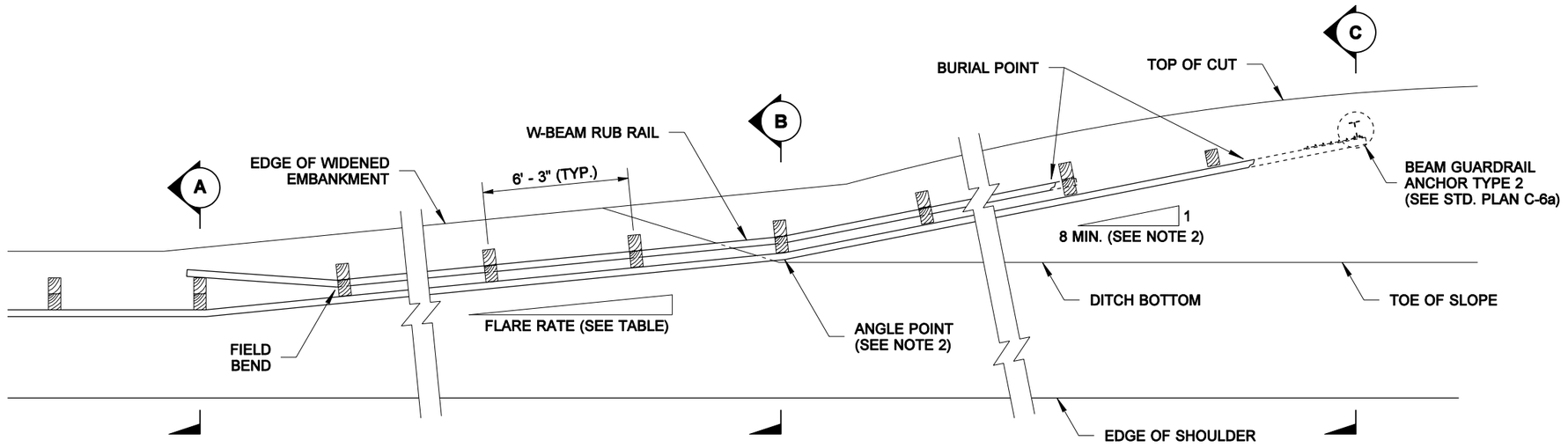



SEE NOTE 3

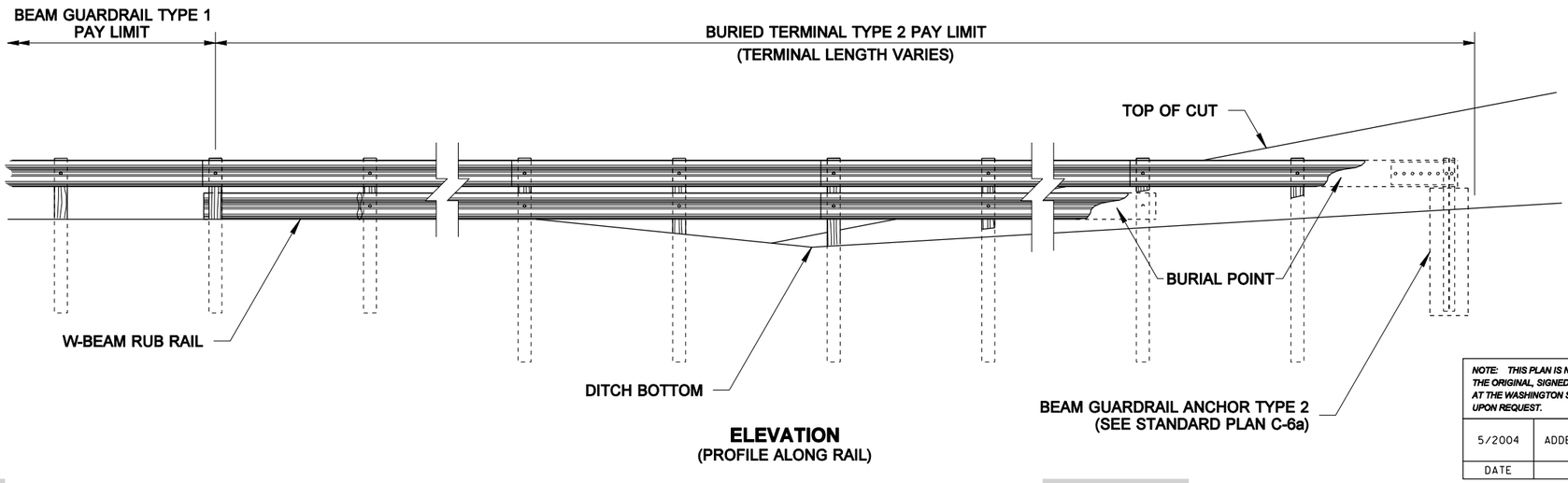
SECTION (C)



PERSPECTIVE




PLAN




ELEVATION
(PROFILE ALONG RAIL)

**NOTES**

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 27" (2.25') to that remainder for a sum that equals the elevation of the top of the W-Beam at the Anchor.

   Refer to SECTION "C":

   $$\text{Elevation}_{G} = \left(\text{Elevation}_{S} - D(0.1)\right) + 27"$$

| FLARE RATE 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 |

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# BEAM GUARDRAIL BURIED TERMINAL TYPE 2

## STANDARD PLAN C-4a

SHEET 1 OF 1 SHEET

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APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-25-05* — DATE

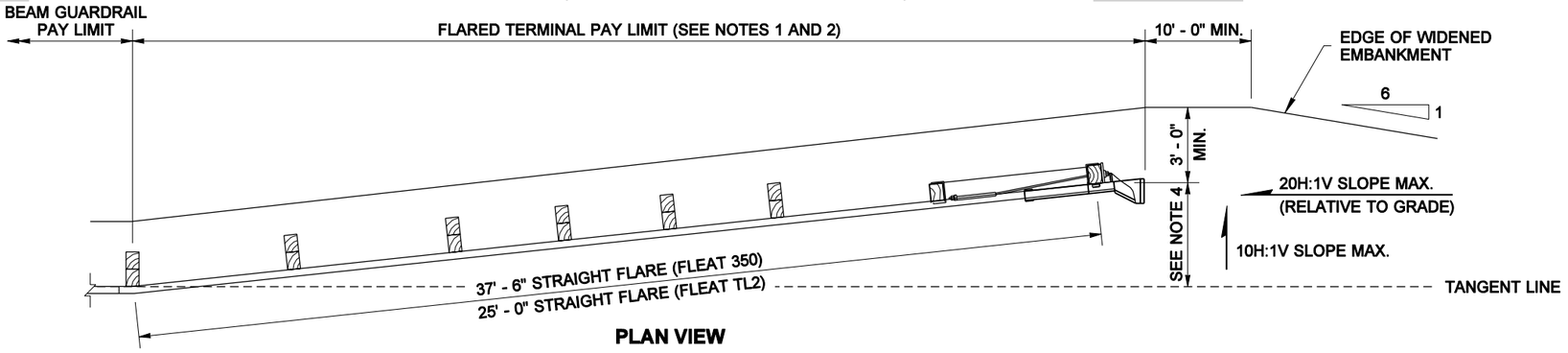
Washington State Department of Transportation

| DATE | REVISION | BY |
|---|---|---|
| 5/2004 | ADDED FORMULA FOR GUARDRAIL HEIGHT | MAS |

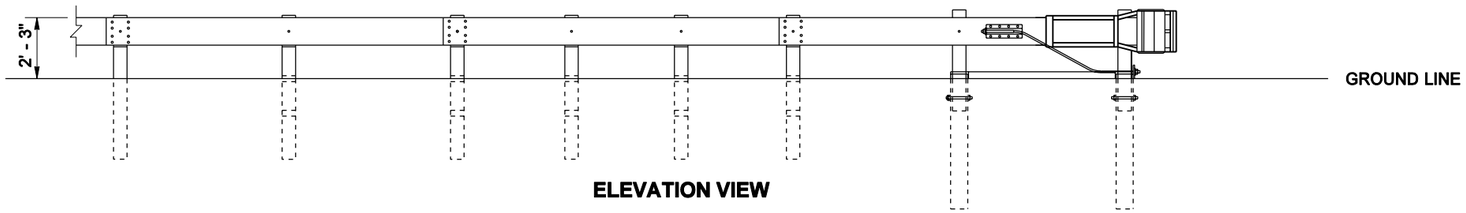
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

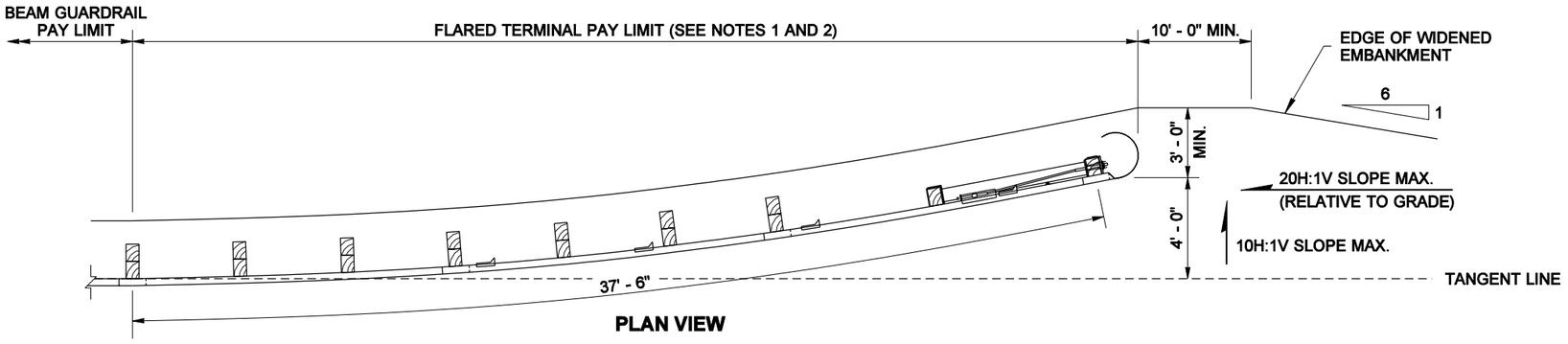



**PLAN VIEW**

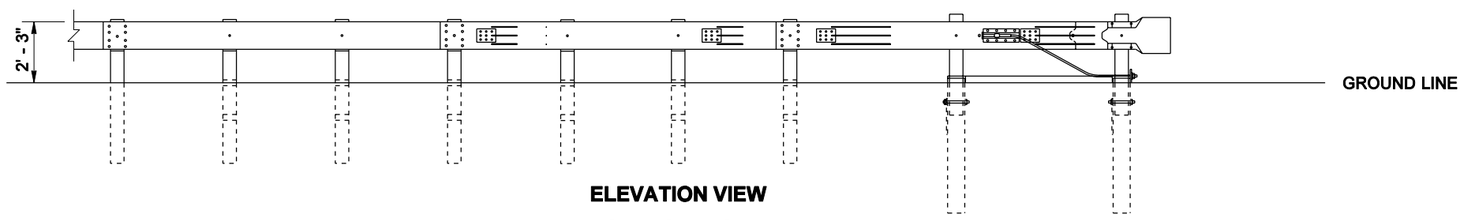



**ELEVATION VIEW**

**FLEAT OPTION**




**PLAN VIEW**




**ELEVATION VIEW**

**SRT OPTION**

**NOTES**

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 faceof 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

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# BEAM GUARDRAIL FLARED TERMINAL

## STANDARD PLAN C-4b

SHEET 1 OF 1 SHEET

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| DATE | REVISION | BY |
|---|---|---|
| 04/2006 | Revised FLEAT Flare Lengths | AMC |

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-08-06* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

NOTES

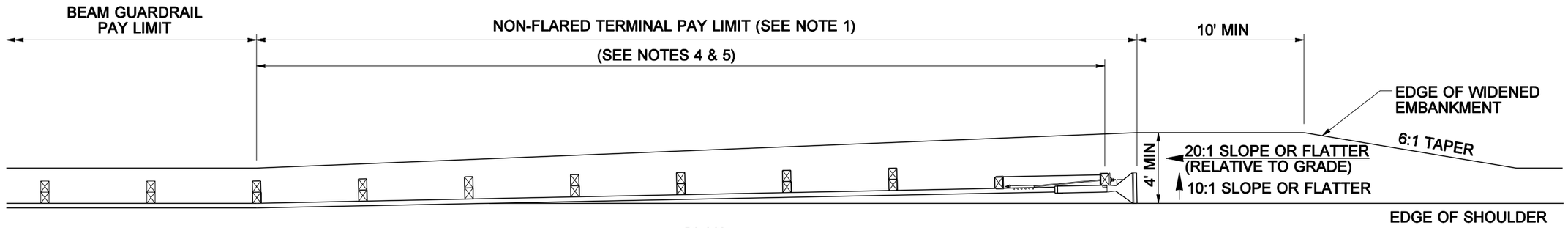
1. An ET-PLUS (TL3) as manufactured by Trinity Industries, Inc. or an SKT-350 as manufactured by Road Systems Inc. shall be installed according to manufacturer's recommendations. When a TL2 terminal is specified in the contract an ET-PLUS (TL2) as manufactured by Trinity Industries, Inc., or an SKT-TL2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

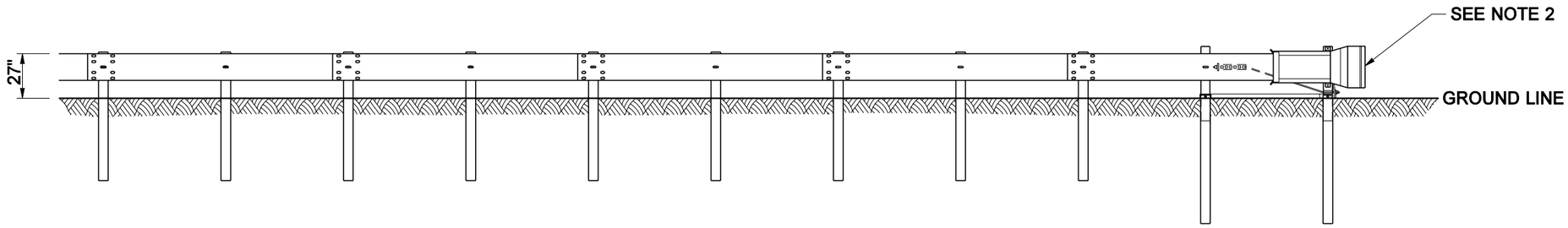
3. When snow load post washers and snow load rail washers are required by the contract, the snow load rail washers must not be installed within the terminal limits.

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'.




PLAN




ELEVATION

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# BEAM GUARDRAIL NON-FLARED TERMINAL

## STANDARD PLAN C-4e

SHEET 1 OF 1 SHEET

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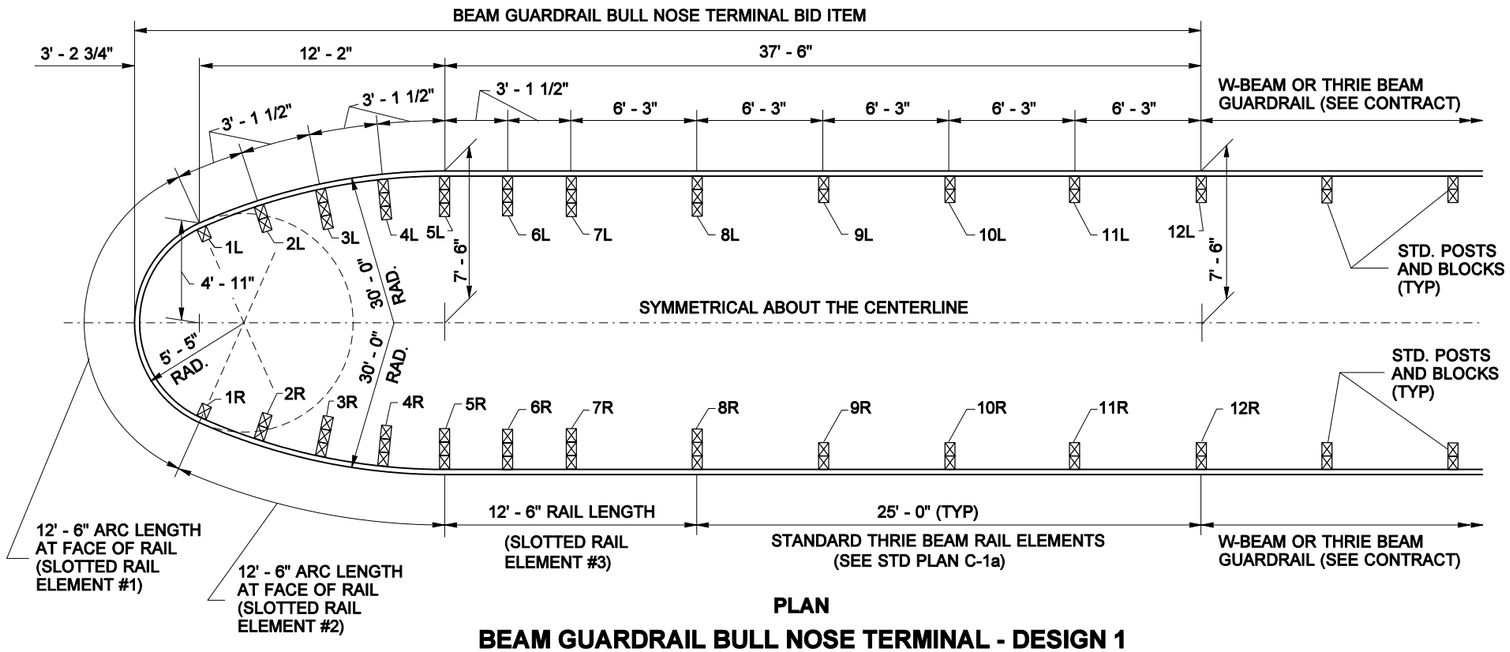
Washington State Department of Transportation

| DATE | REVISION | BY |
|---|---|---|
| 01/2003 | REVISED NOTES 1 & 5; ADDED SLOPES. | RG |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

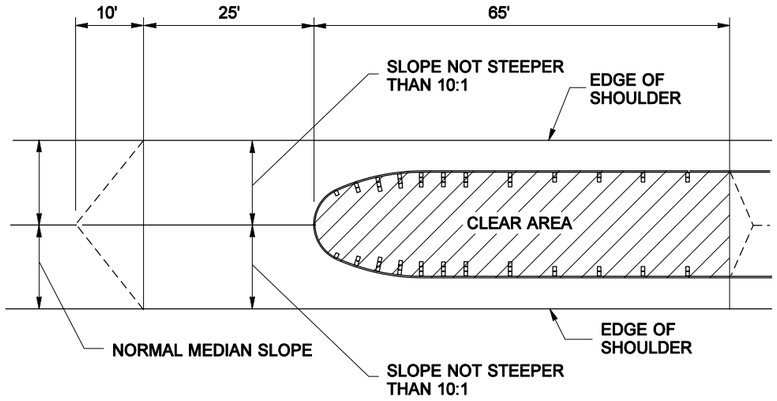
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MONIQUE GLICK



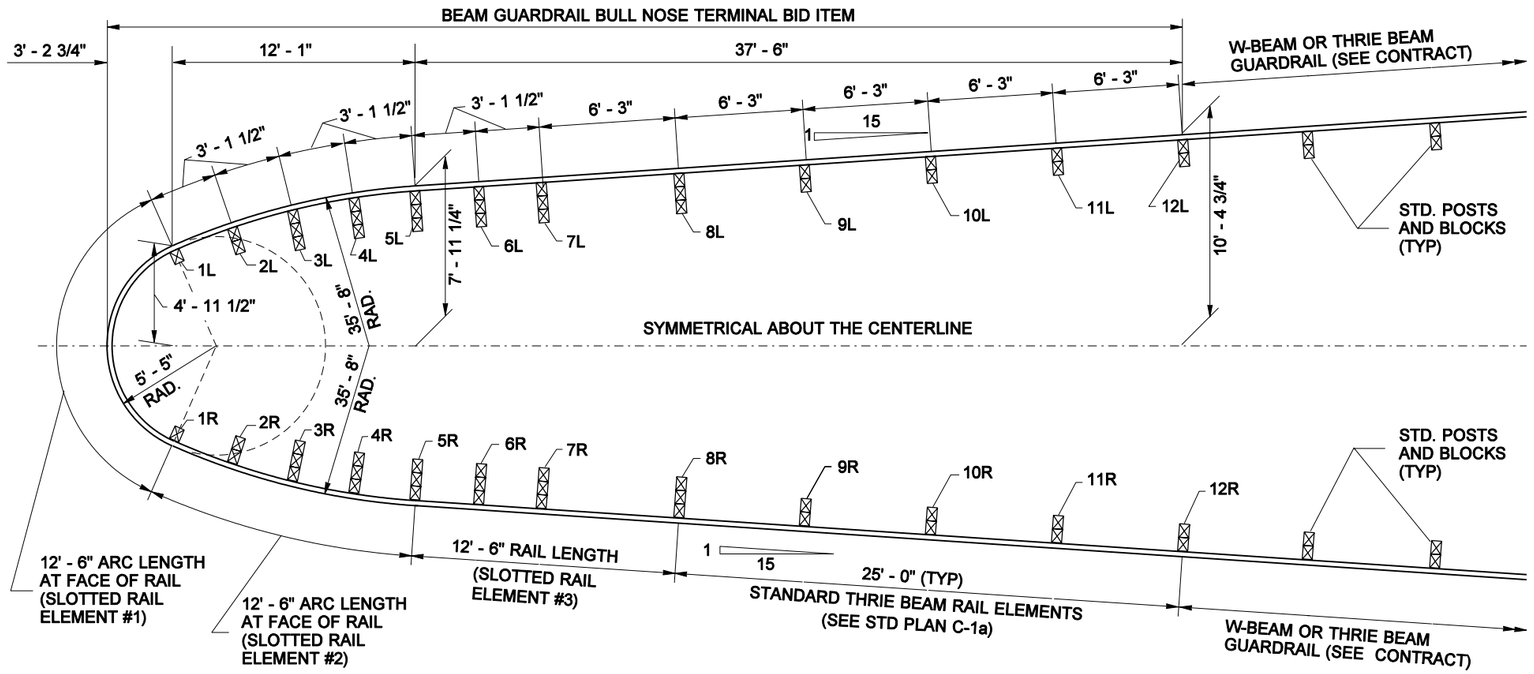

**PLAN**

## BEAM GUARDRAIL BULL NOSE TERMINAL - DESIGN 1




## BULL NOSE GRADING PLAN

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**PLAN**

## BEAM GUARDRAIL BULL NOSE TERMINAL - DESIGN 2

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# BEAM GUARDRAIL BULL NOSE TERMINAL

# STANDARD PLAN C-4f

SHEET 1 OF 4 SHEETS

| DATE | REVISION | BY |
|---|---|---|
| 05/2004 | ADDED U-BOLT CABLE CLIPS AND SECTION FOR ASSEMBLY ON SHEET 3 | MHG |

APPROVED FOR PUBLICATION

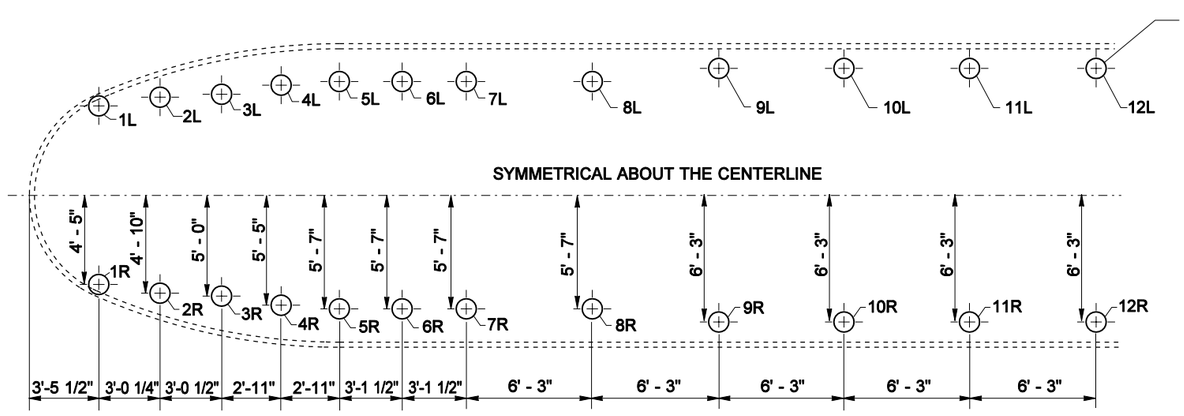
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-30-04* — DATE

Washington State Department of Transportation

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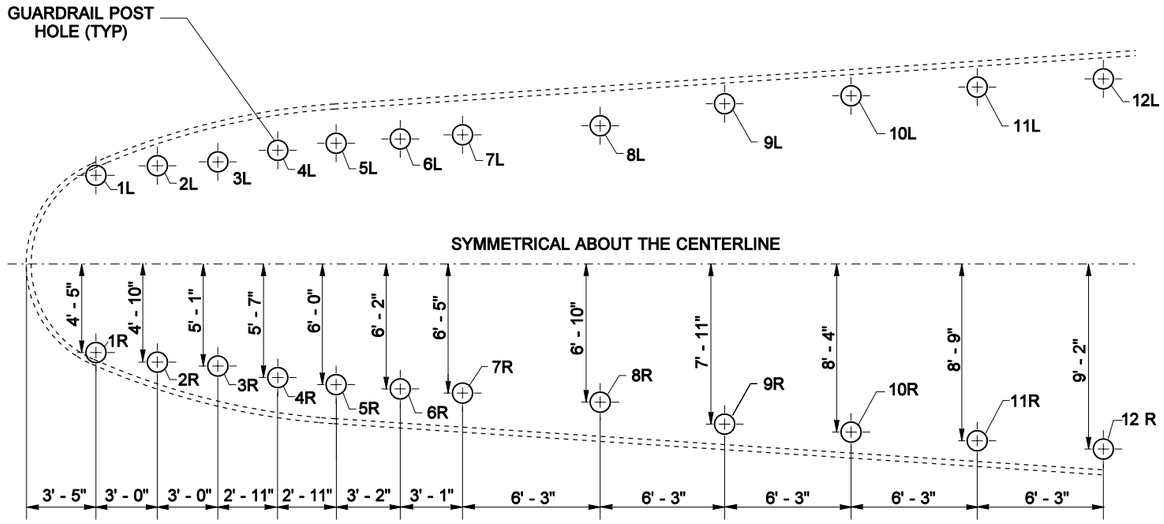
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MONIQUE GLICK



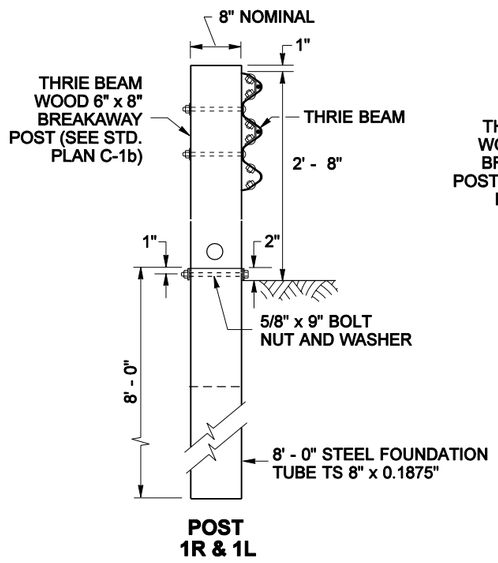

**PLAN**

## GUARDRAIL POST LAYOUT - DESIGN 1



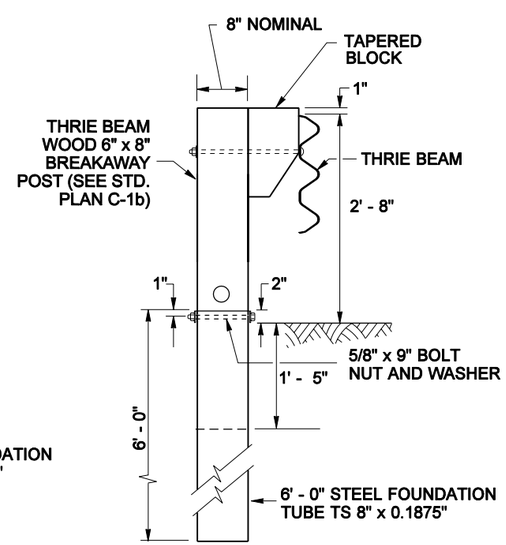

**PLAN**

## GUARDRAIL POST LAYOUT - DESIGN 2

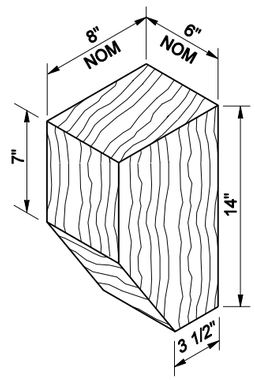



**POST 1R & 1L**

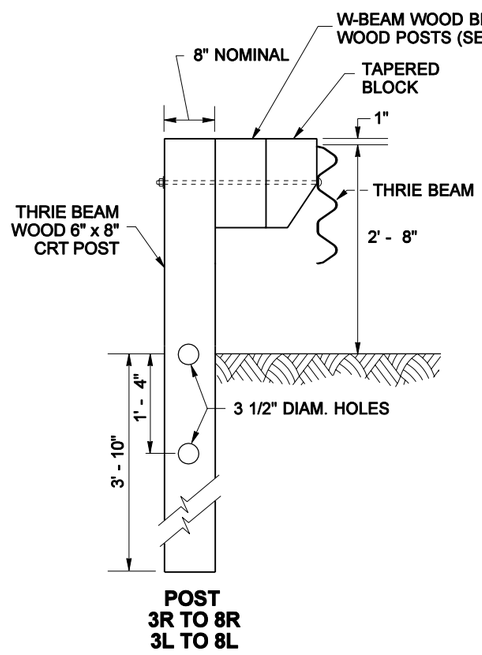
NOTE : CABLE BEARING PLATE NOT SHOWN



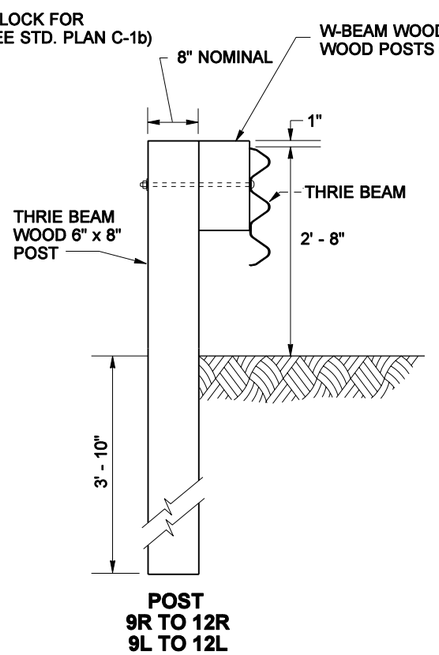

**POST 2R & 2L**




**TAPERED BLOCK**




**POST 3R TO 8R 3L TO 8L**




**POST 9R TO 12R 9L TO 12L**

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RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# BEAM GUARDRAIL BULL NOSE TERMINAL

# STANDARD PLAN C-4f



APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-30-04* — DATE

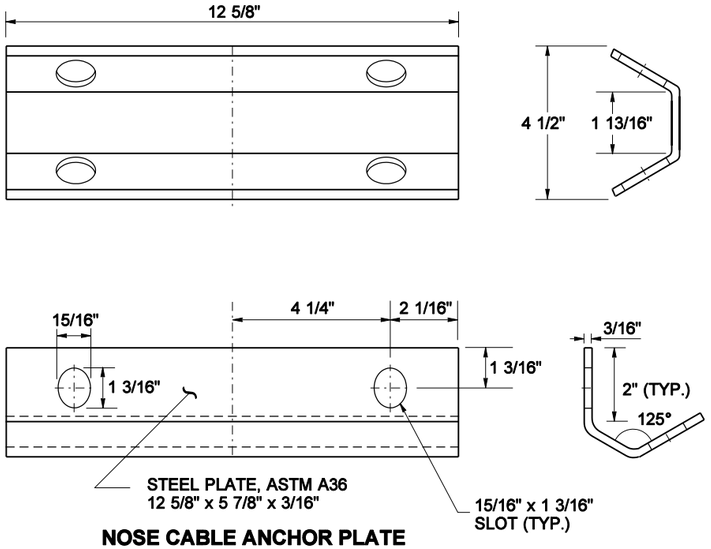
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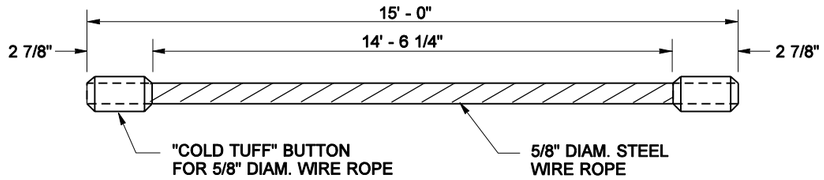
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

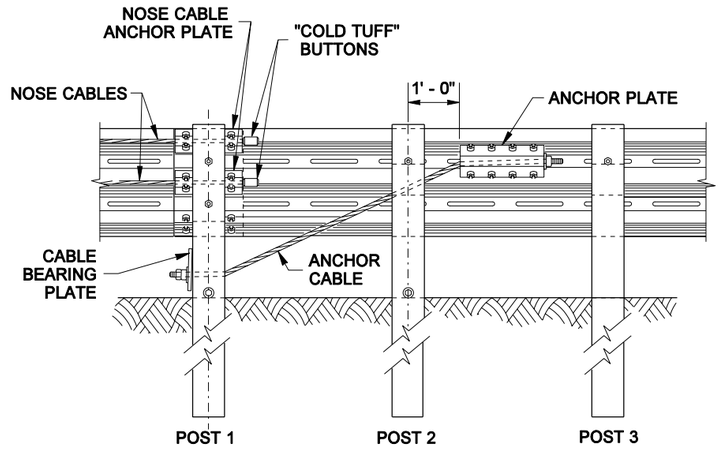
DRAWN BY: MONIQUE GLICK




**NOSE CABLE ANCHOR PLATE**

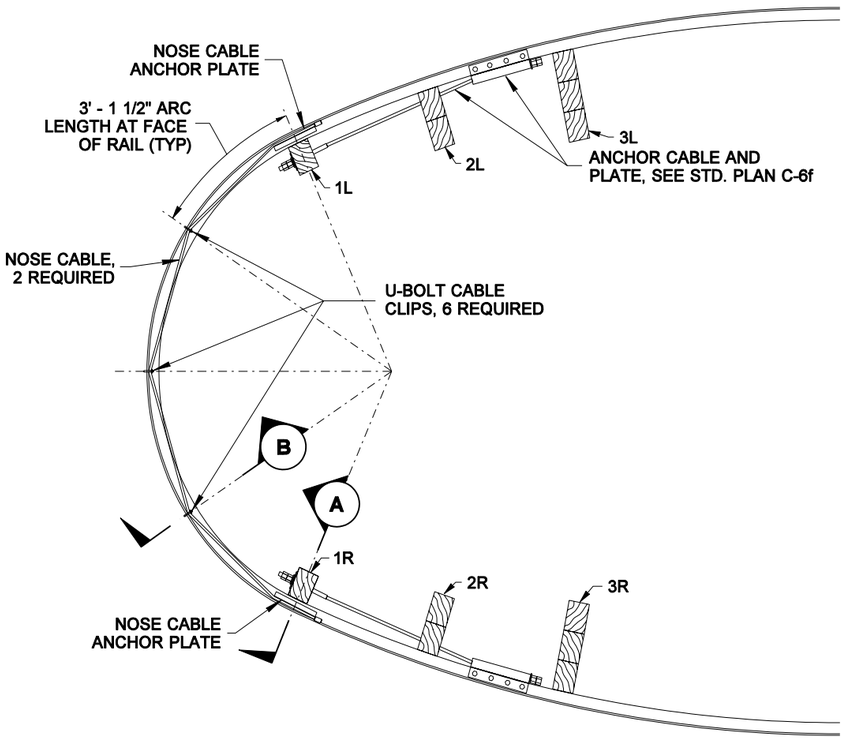



**NOSE CABLE**

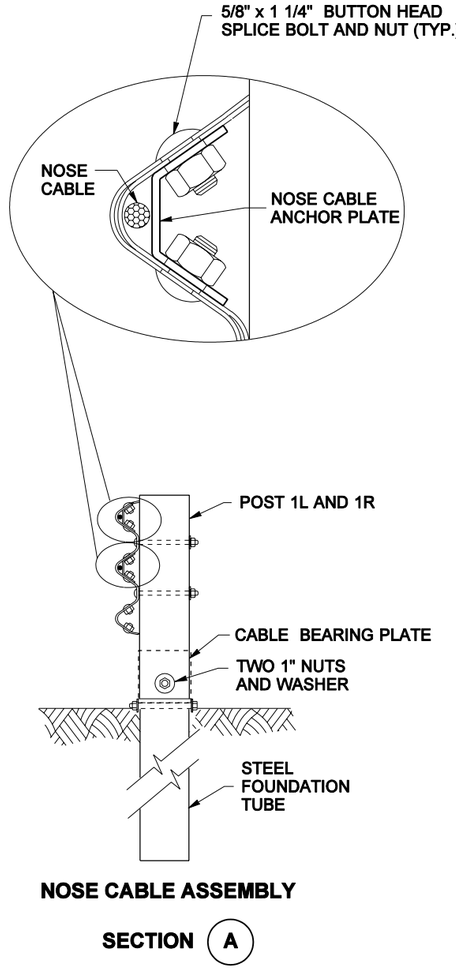



**CABLE ANCHOR & BRACKET ASSEMBLY**

FOR ANCHOR PLATE, CABLE END PLATE, AND ANCHOR CABLE (SEE STD PLAN C-6f )

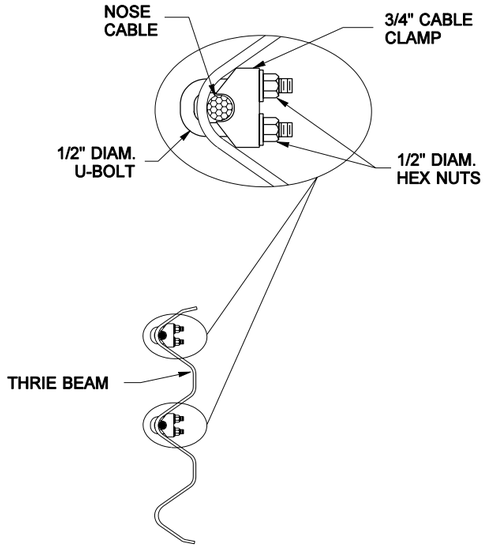



**PLAN - THRIE BEAM NOSE**




**NOSE CABLE ASSEMBLY**

**SECTION (A)**




**U-BOLT CABLE CLIP ASSEMBLY**

**SECTION (B)**

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# BEAM GUARDRAIL
# BULL NOSE TERMINAL

## STANDARD PLAN C-4f

SHEET 3 OF 4 SHEETS

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*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-30-04* — DATE

Washington State Department of Transportation

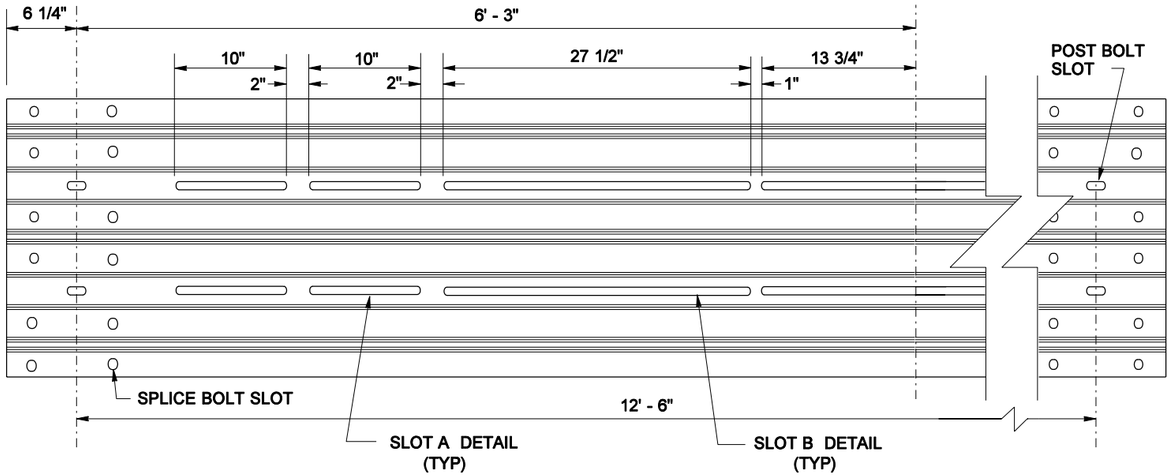
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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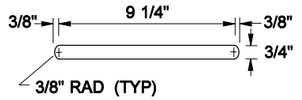
DRAWN BY: MONIQUE GLICK



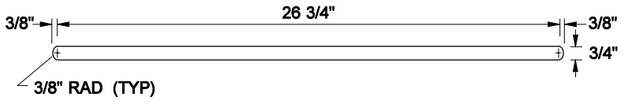

**SLOTTED THRIE BEAM RAIL ELEMENT #1**

SEE STD PLAN C-1a FOR RAIL ELEMENT DETAILS

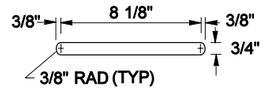
(RAIL DIMENSIONS SHOWN ARE BEFORE BENDING TO RADIUS SHOWN IN PLAN)



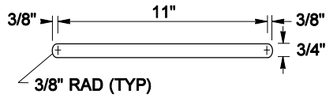

**SLOT A DETAIL**



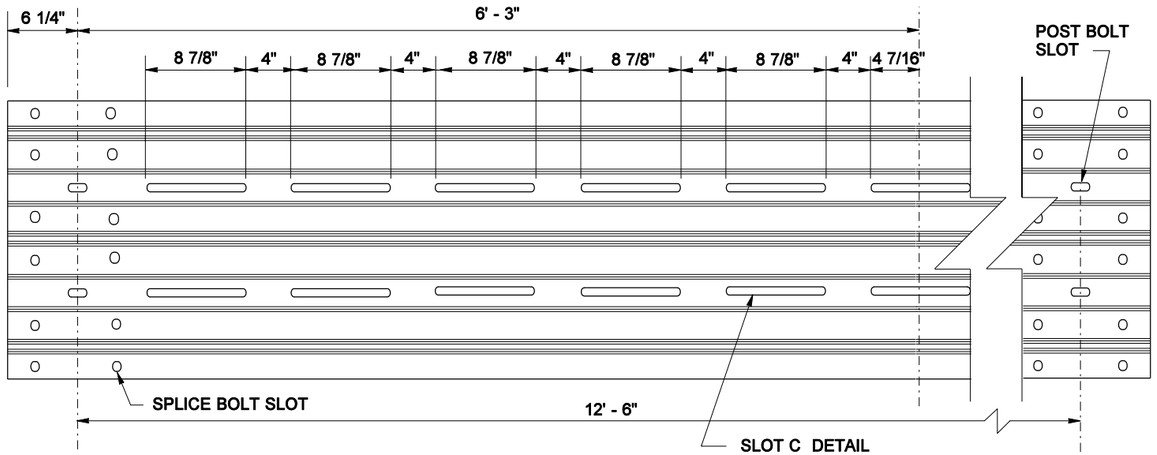

**SLOT B DETAIL**




**SLOT C DETAIL**



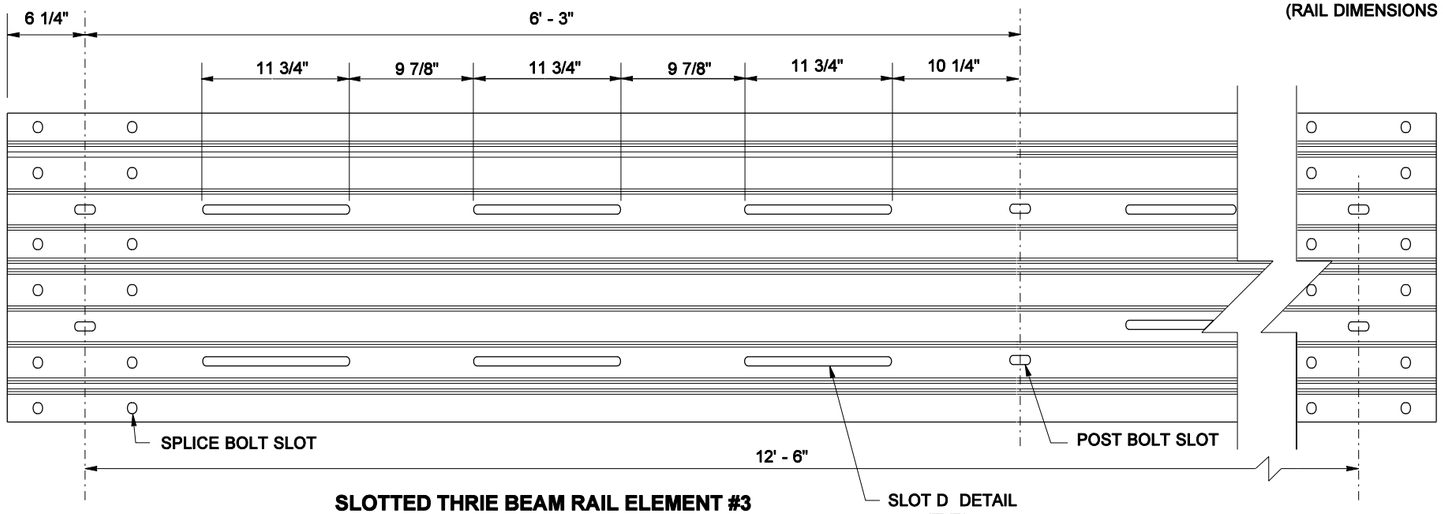

**SLOT D DETAIL**




**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)




**SLOTTED THRIE BEAM RAIL ELEMENT #3**

SEE STD PLAN C-1a FOR RAIL ELEMENT DETAILS

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RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# BEAM GUARDRAIL BULL NOSE TERMINAL

## STANDARD PLAN C-4f

SHEET 4 OF 4 SHEETS

APPROVED FOR PUBLICATION

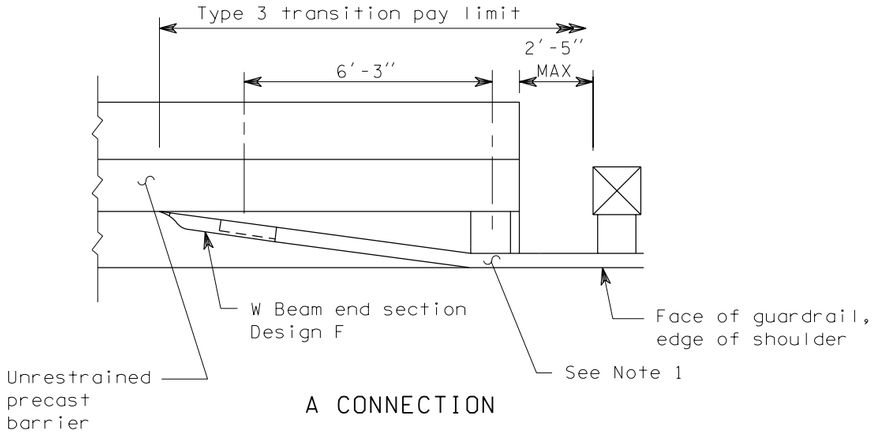
*Harold J. Peterfeso* — STATE DESIGN ENGINEER

*06-30-04* — DATE

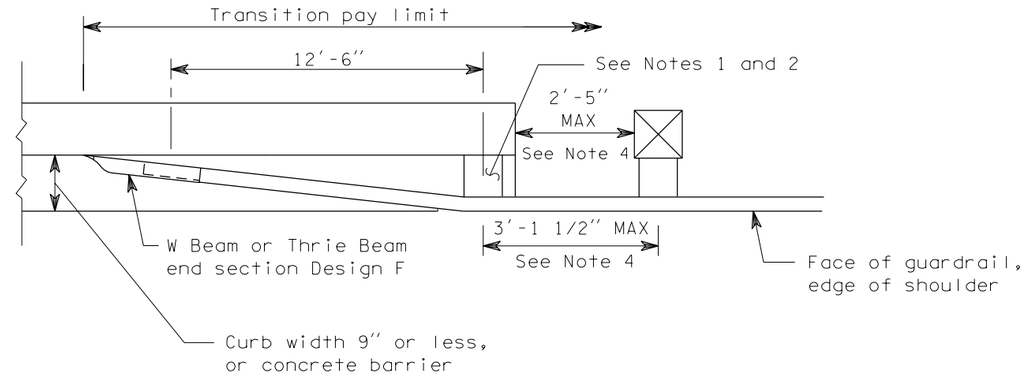
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

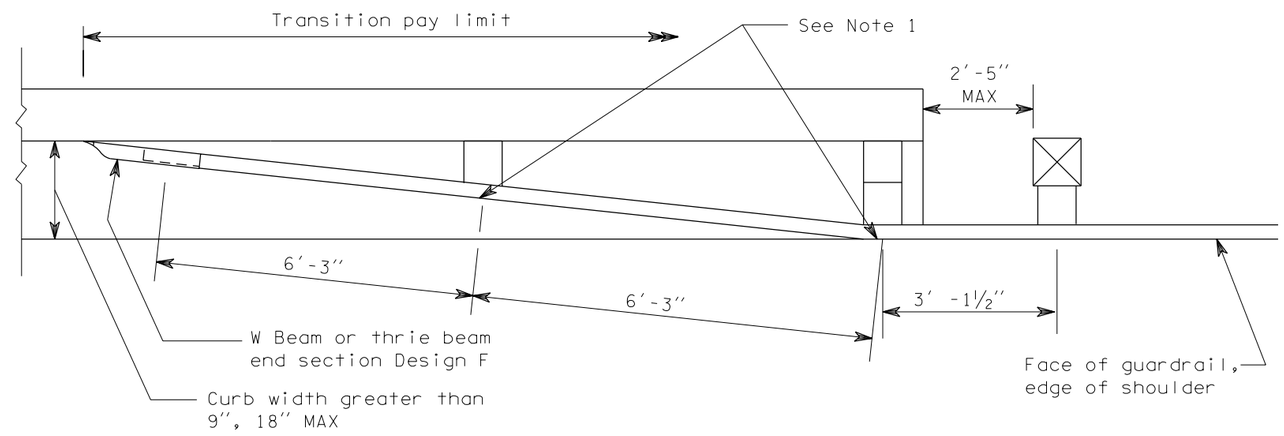
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




A CONNECTION




B CONNECTION




C CONNECTION

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

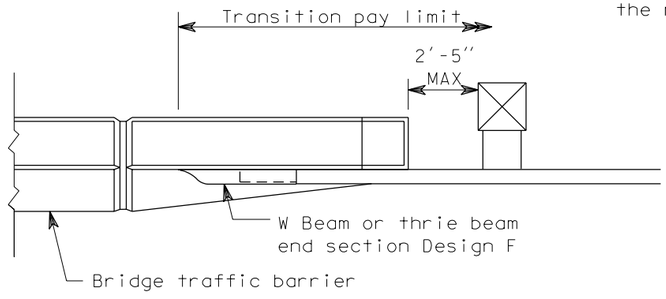
NOTES

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.

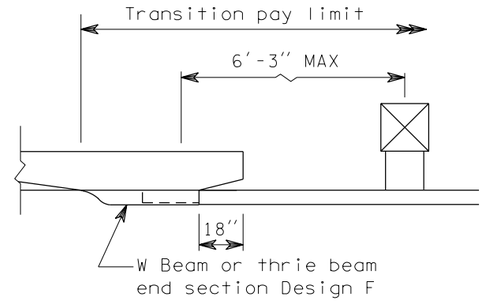
3. This case is also applicable for vertical faces with no curbs.

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

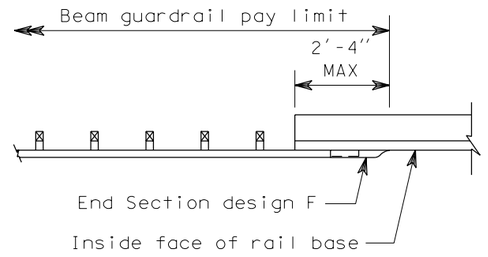



D CONNECTION

See Note 3




E CONNECTION




Direction of traffic
(one-way only)

F CONNECTION

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STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# GUARDRAIL CONNECTION TO BRIDGE RAIL OR CONCRETE BARRIER

## STANDARD PLAN C-5

SHEET 1 OF 1 SHEET

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| DATE | REVISION | BY |
|---|---|---|
| 09/2003 | REVISED NOTE 1; ADDED NOTE 4 | RG |

APPROVED FOR PUBLICATION

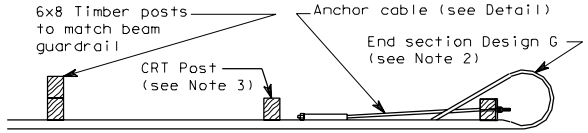
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *10-31-03* — DATE

Washington State Department of Transportation

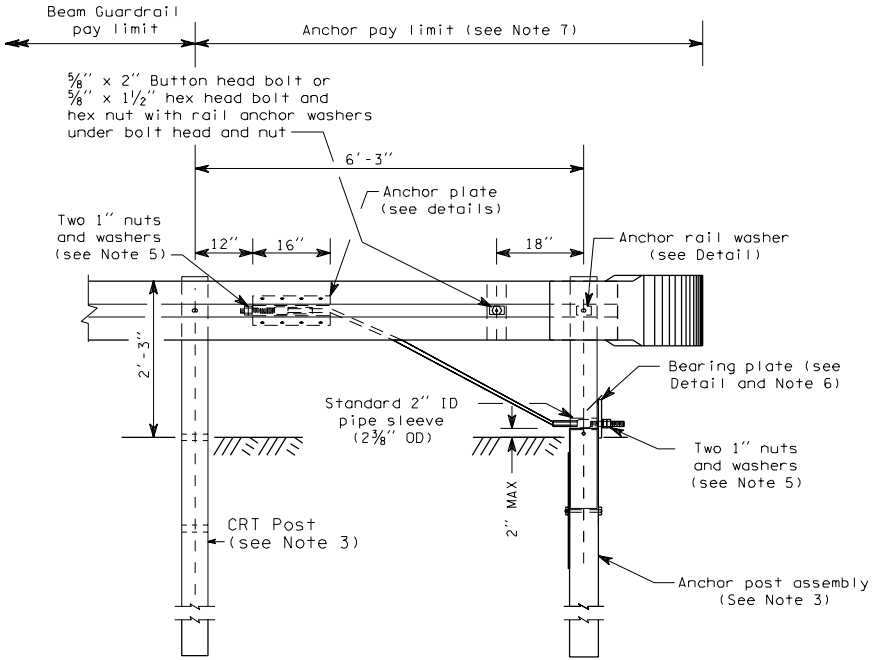
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




PLAN




TYPE 1 ANCHOR

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.

# BEAM GUARDRAIL ANCHOR TYPE 1

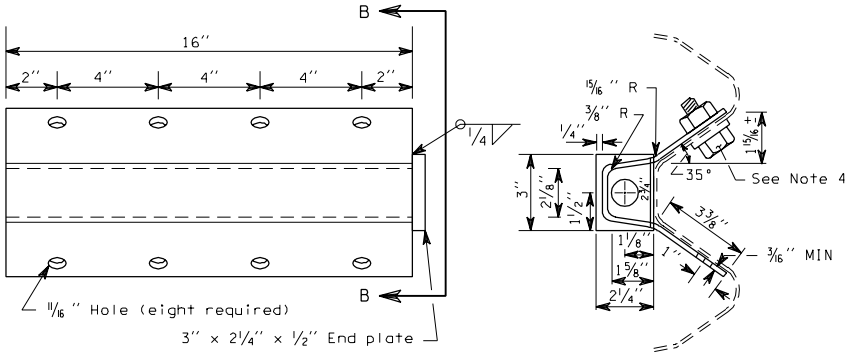
C-6

05-30-97



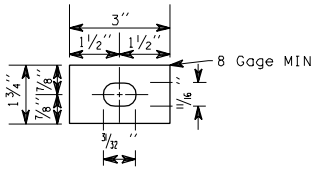
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



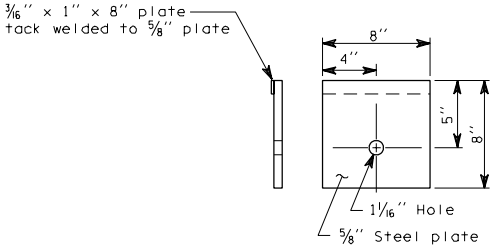

ELEVATION

SECTION B-B

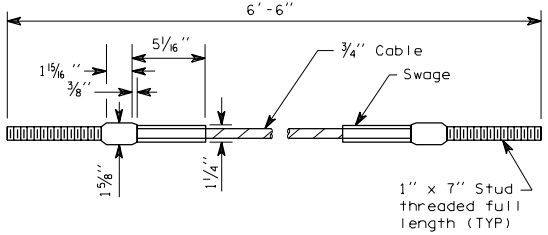



ANCHOR RAIL WASHER

ANCHOR PLATE
(See Note 1)




BEARING PLATE




ANCHOR CABLE

# BEAM GUARDRAIL ANCHOR TYPE 1

C-6

05-30-97

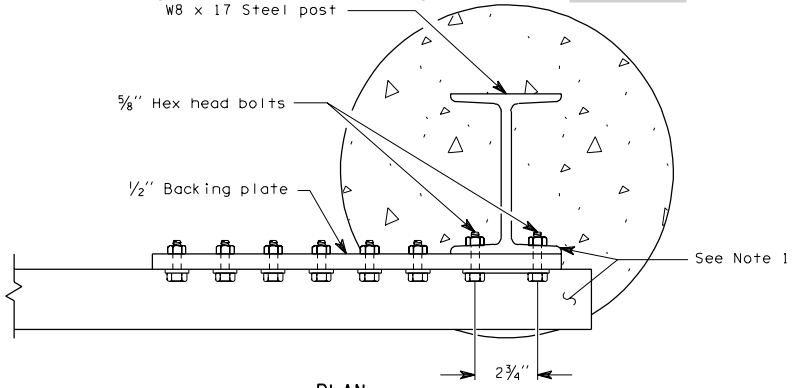


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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

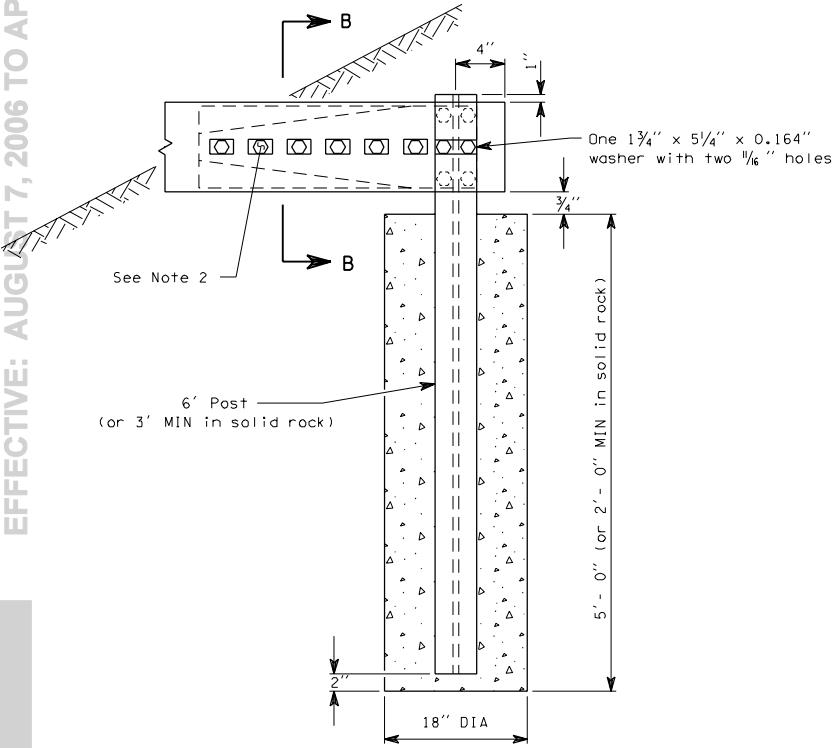
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

NOTES

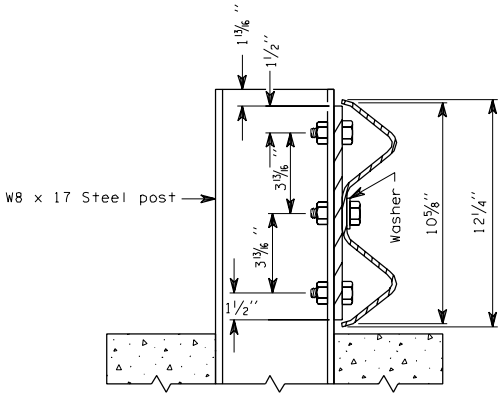
1. Rail section and W8 x 17 post shall be fabricated to receive 5/8" hex head bolts as shown.
2. All bolts shall be high strength 5/8" hex head bolts with anchor rail washers.



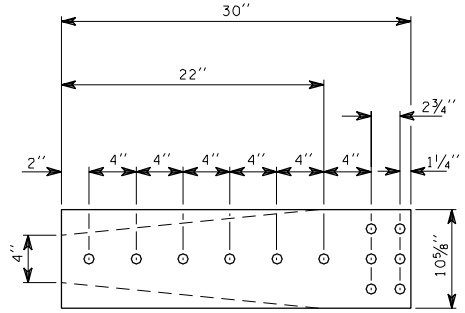

PLAN




ELEVATION




SECTION B-B



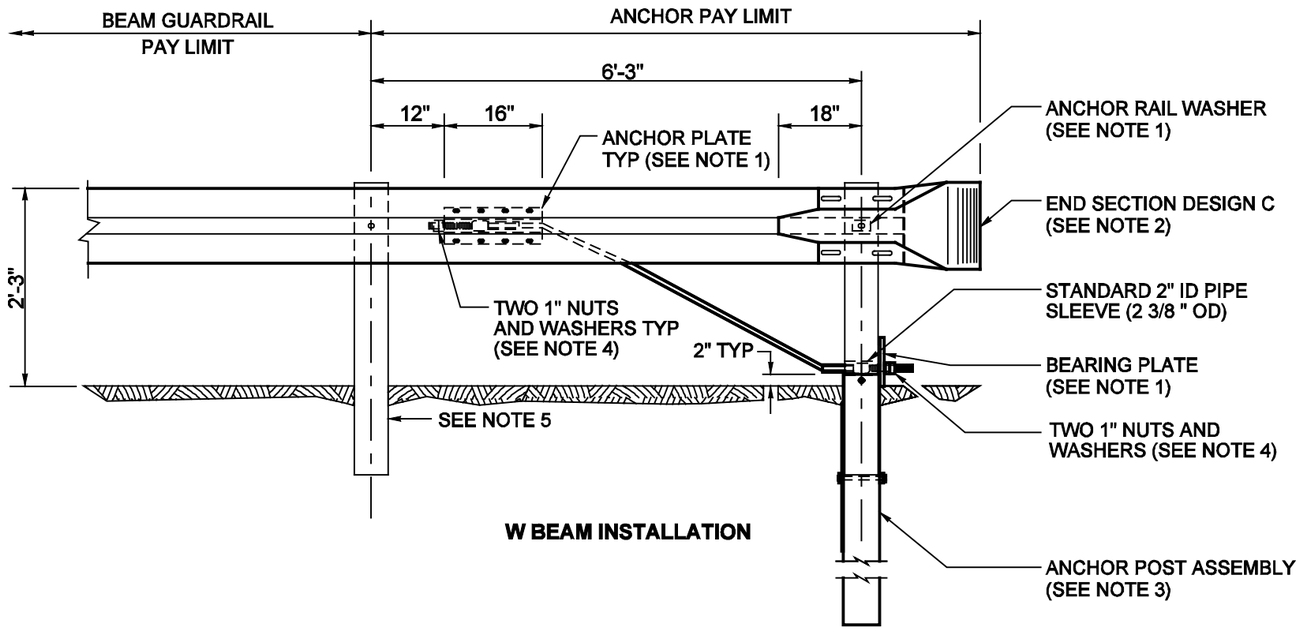

BACKING PLATE

# BEAM GUARDRAIL ANCHOR TYPE 2

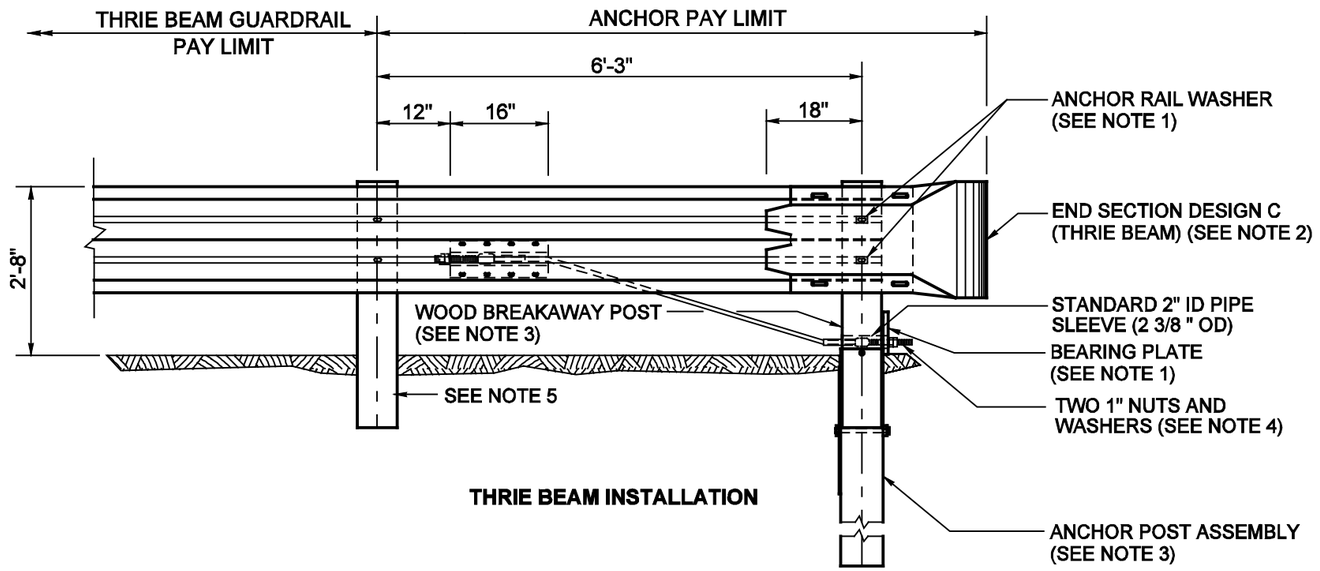
C-6a 1 of 1

03-14-97

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**W BEAM INSTALLATION**




**THRIE BEAM INSTALLATION**

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.

CLIFFORD E MANSFIELD
STATE OF WASHINGTON
15224
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2000

# BEAM GUARDRAIL ANCHOR TYPE 4

# STANDARD PLAN C-6c

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APPROVED FOR PUBLICATION

*Clifford E. Mansfield* *01-06-00*

DEPUTY STATE DESIGN ENGINEER — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

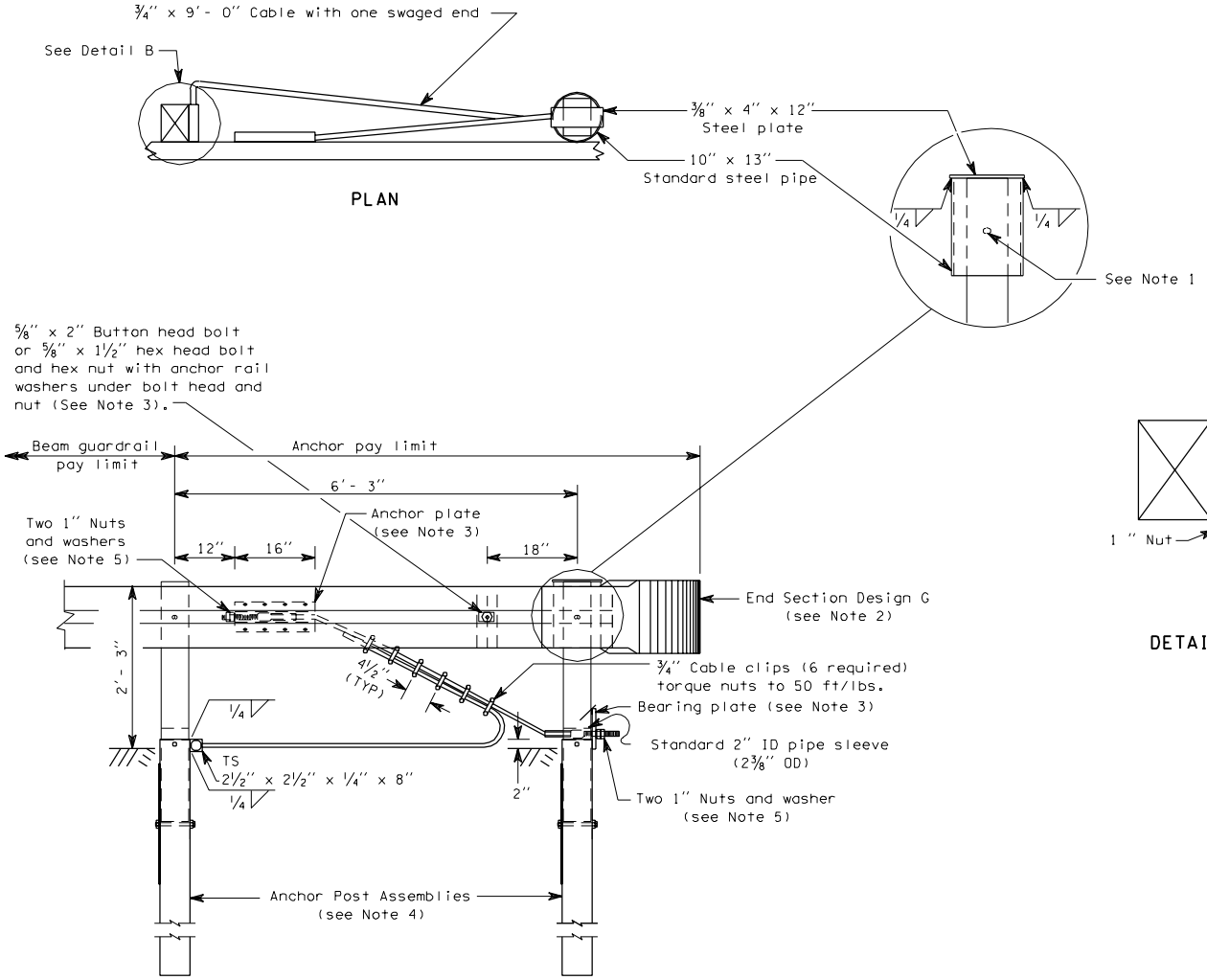
| DATE | REVISION | BY |
|---|---|---|
| 12/99 | MODIFIED "END SECTIONS" TO DESIGN "C", CHANGED NOTE 2 AND DETAIL TITLES. | TWS |

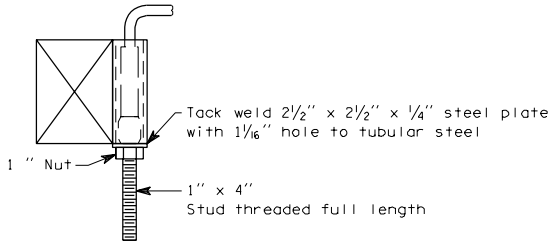
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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.



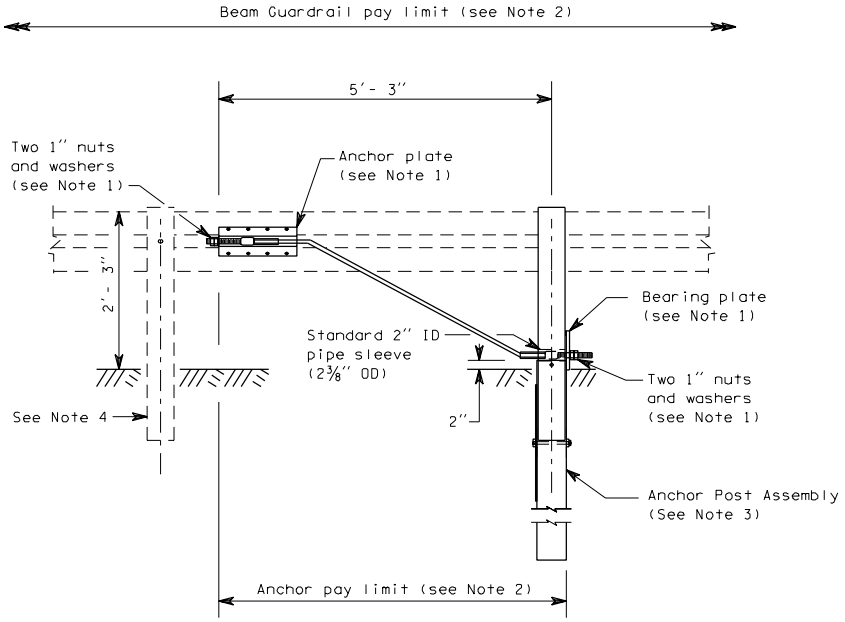




# BEAM GUARDRAIL ANCHOR TYPE 5



EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




TYPE 7 ANCHOR

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".

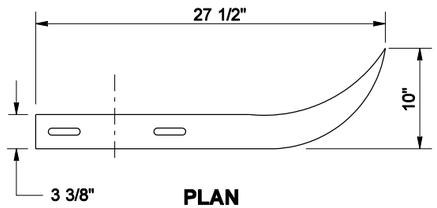
4. Post shall match beam guardrail posts.

# BEAM GUARDRAIL ANCHOR TYPE 7

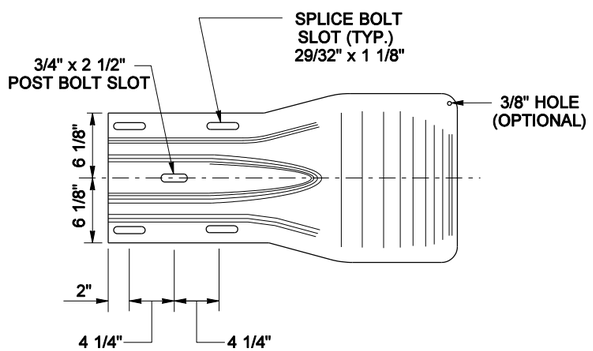


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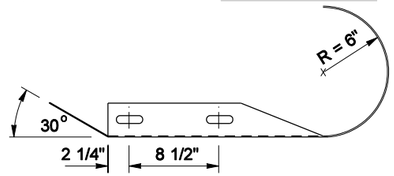



PLAN

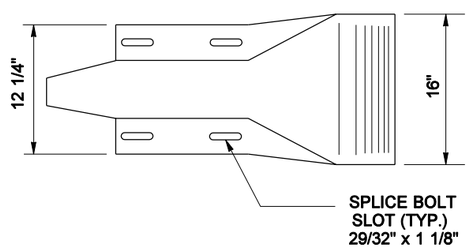



ELEVATION

**DESIGN A**




PLAN

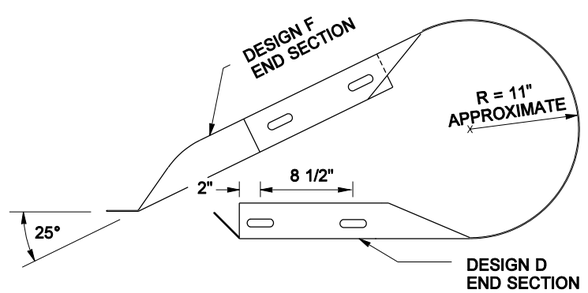



ELEVATION

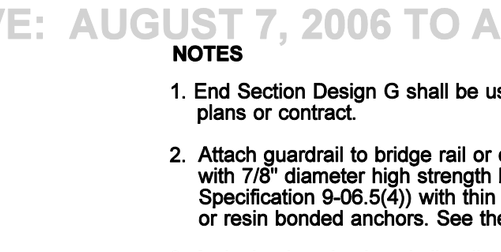
**DESIGN C**

## NOTES

1. End Section Design G shall be used except where noted on the plans or contract.
2. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter 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.



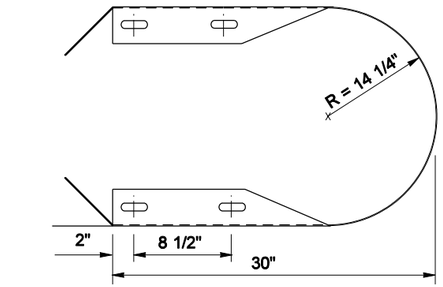

PLAN



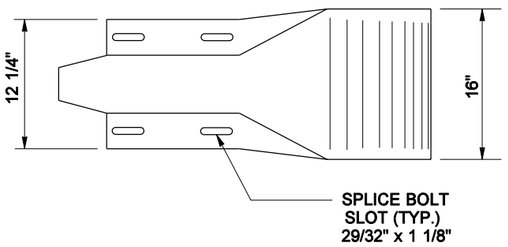

ELEVATION

**DESIGN G**

(SEE NOTE 3)

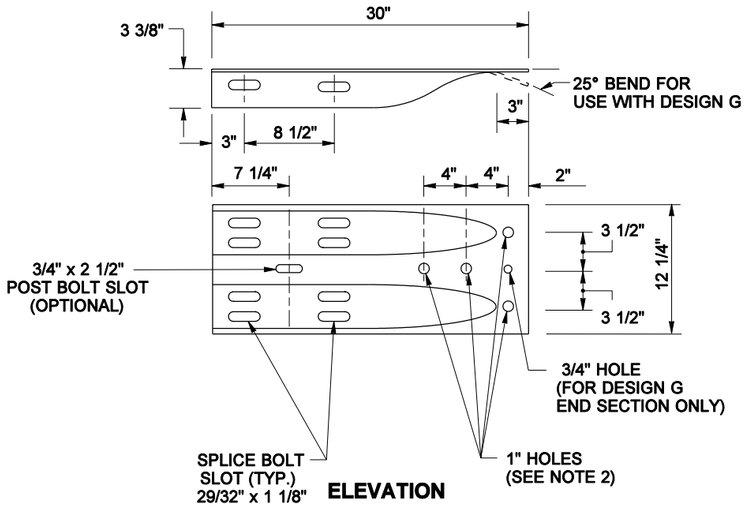



PLAN




ELEVATION

**DESIGN D**




ELEVATION

**DESIGN F**

(SEE NOTE 4)

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# BEAM GUARDRAIL END SECTIONS

## STANDARD PLAN C-7

SHEET 1 OF 1 SHEET

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APPROVED FOR PUBLICATION

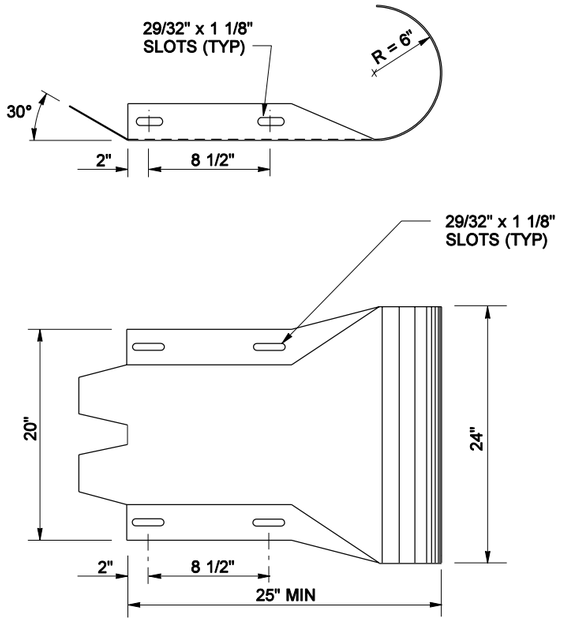
*Harold J. Peterfeso* STATE DESIGN ENGINEER — *10-31-03* DATE

Washington State Department of Transportation

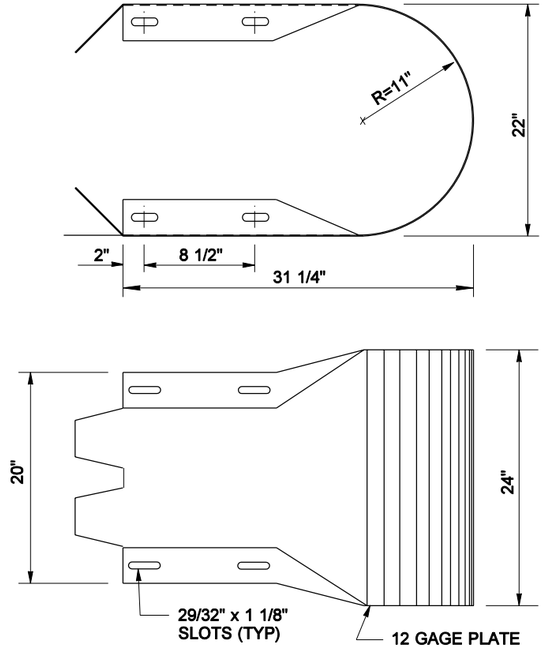
| DATE | REVISION | BY |
|---|---|---|
| 10/2003 | REV. NOTE 2. | MHG |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



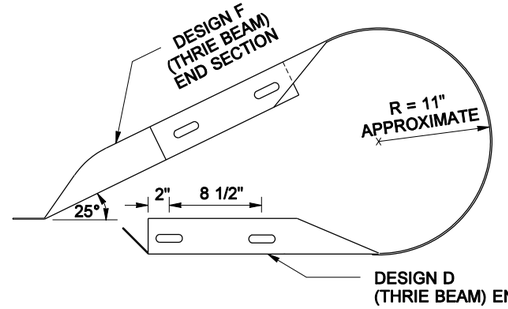

**DESIGN C (THRIE BEAM)**

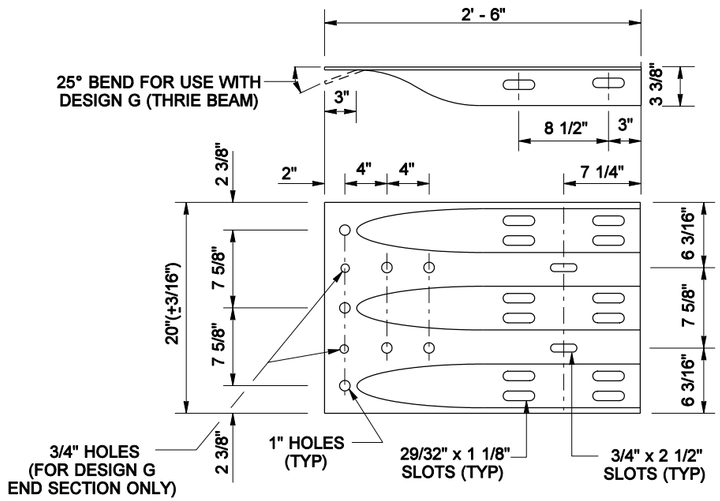



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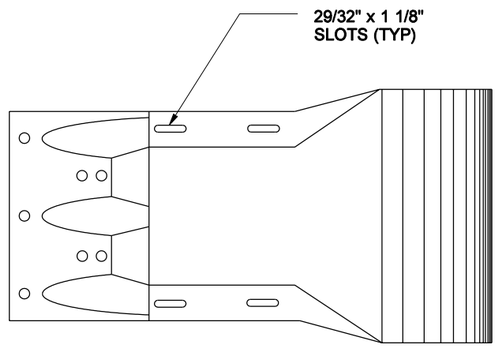
**NOTES**

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 F (THRIE BEAM)**




**DESIGN G (THRIE BEAM)**

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# THRIE BEAM END SECTIONS

## STANDARD PLAN C-7a

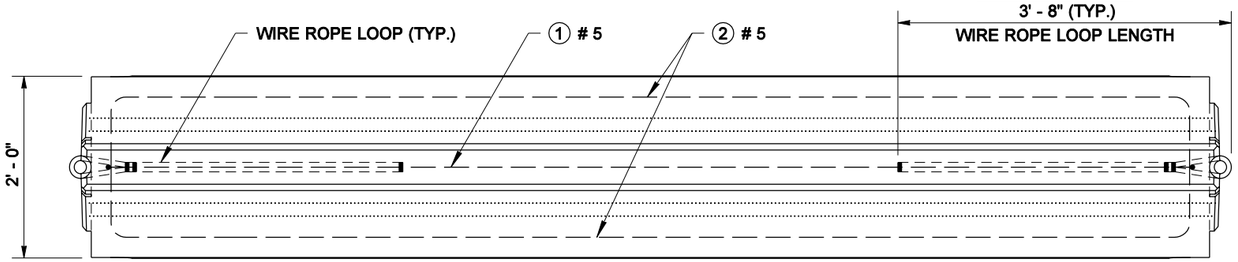
SHEET 1 OF 1 SHEET

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|---|---|---|---|
| | | | *Harold J. Peterfeso* — STATE DESIGN ENGINEER — *10-31-03* — DATE |
| 10/2003 | REV. NOTE 1. | MHG | Washington State Department of Transportation |
| DATE | REVISION | BY | |

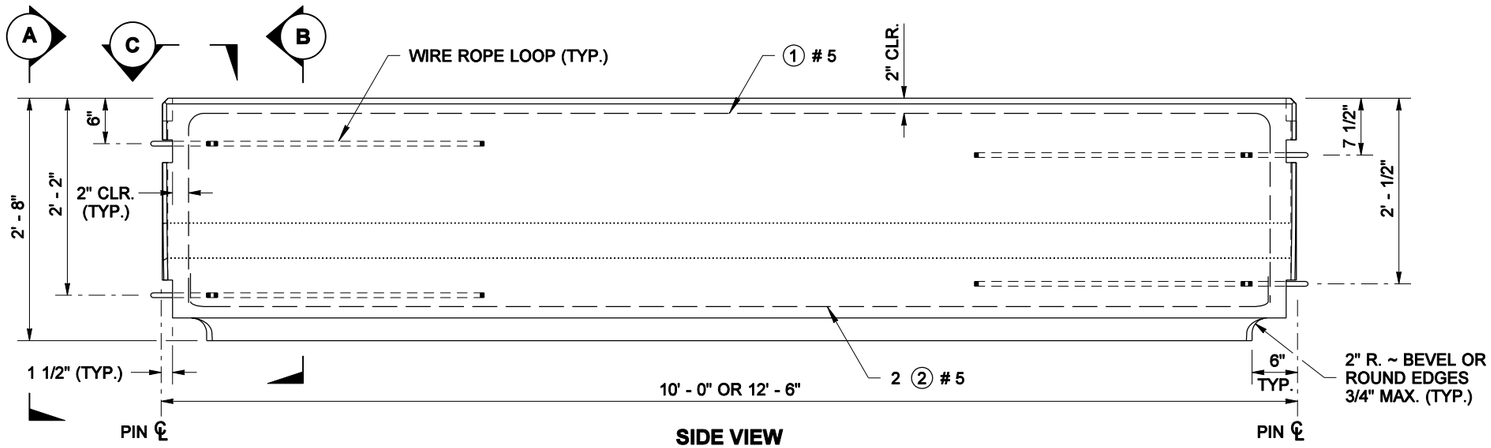
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA




**TOP VIEW**

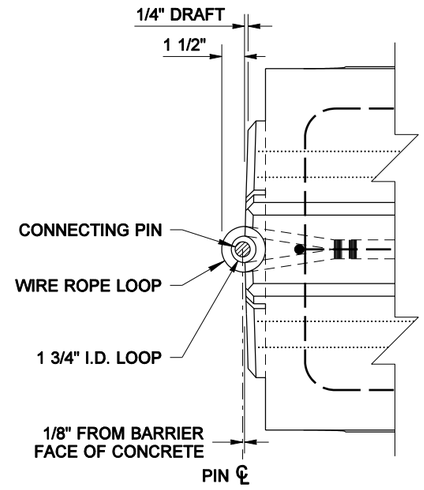



**SIDE VIEW**

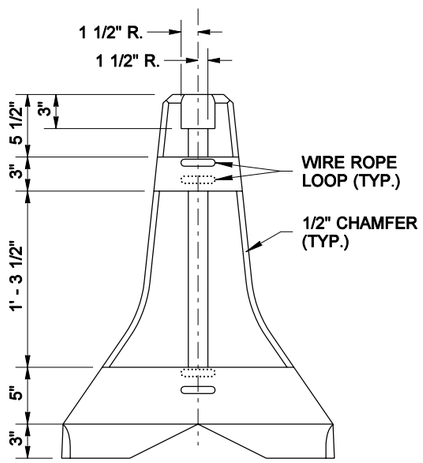
**BARRIER SECTION**

**NOTES**

1. Wire rope loops shall be 3' - 8" long, except for the top loop of the Barrier Terminal, which shall be 2' - 0" long.
2. Except for the locations of the wire rope loops, the dimensions shown in END VIEW "A" are typical for both ends of a Barrier Section or opposing ends of Barrier Terminals.
3. Connecting and Drift Pin head designs vary among different manufacturers. Pin designs that are shaped differently than those shown in the detail are acceptable, if the bearing surface is within the minimum and maximum widths specified.
4. The vertical spacing of the Wire Rope Loops in a Barrier Terminal is determined by the end of the Barrier Segment to which it is being connected. See BARRIER CONNECTION DETAIL (Sheet 2).

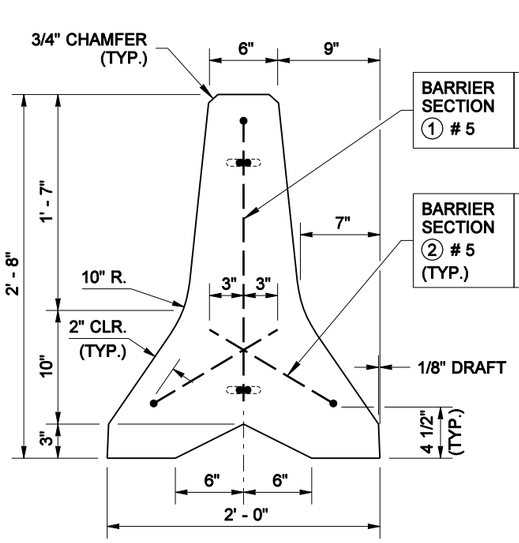



**DETAIL C**

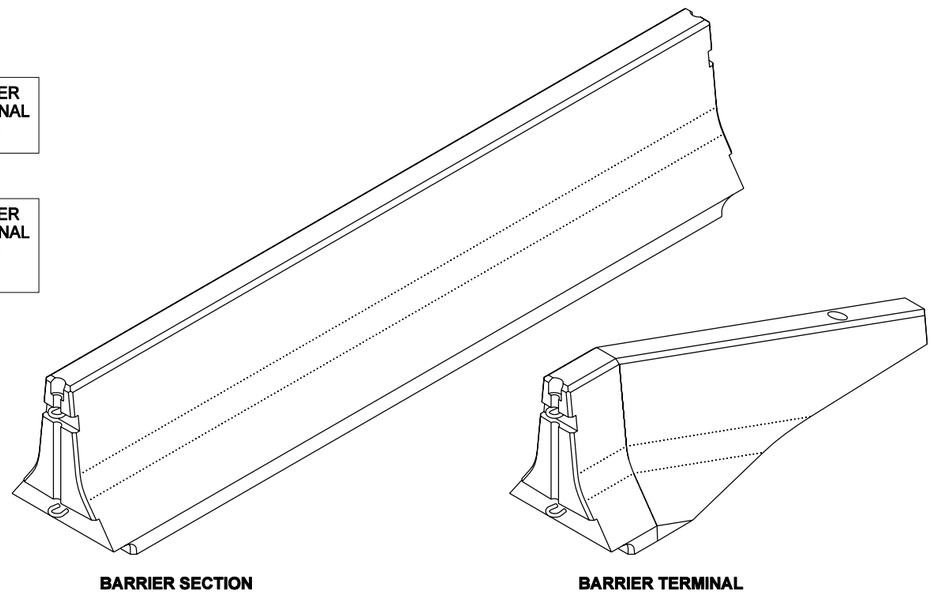



SEE NOTE 2

**END VIEW A**




**SECTION B**




**ISOMETRIC VIEWS**

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# CONCRETE BARRIER TYPE 2

## STANDARD PLAN C-8

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *04-27-04* — DATE

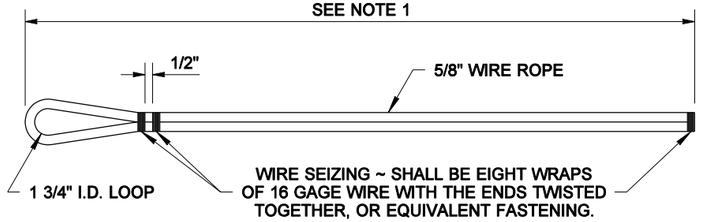
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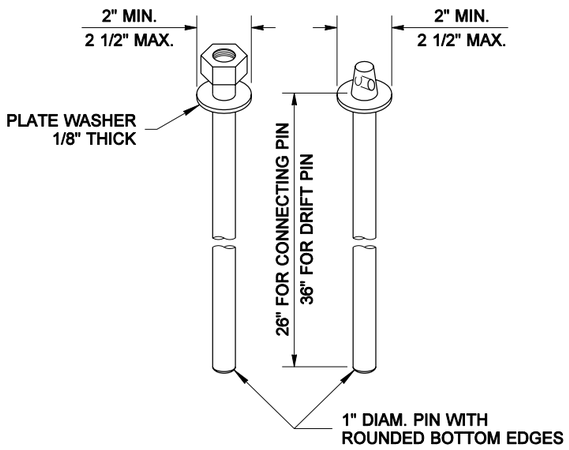
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA

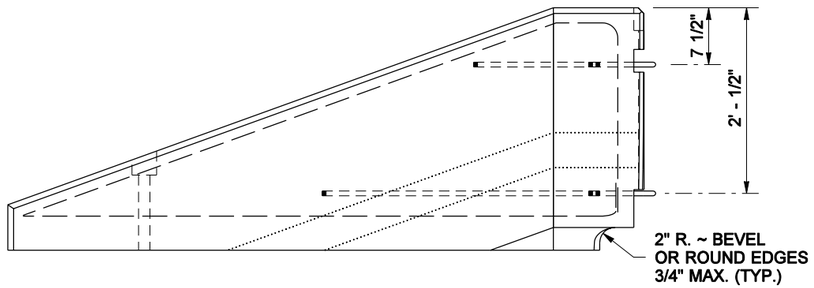



**WIRE ROPE LOOP DETAIL**

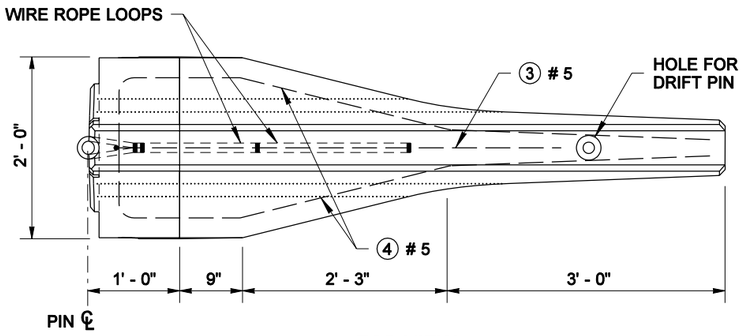



SEE NOTE 3

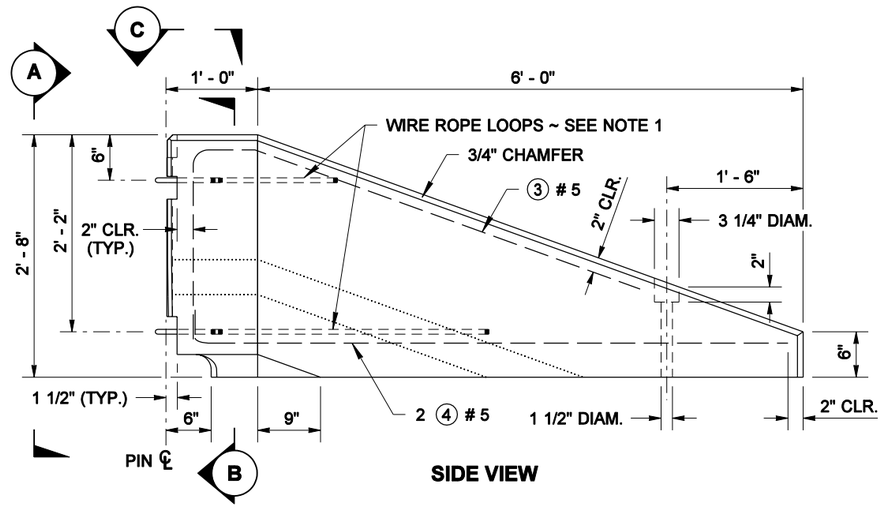
**CONNECTING PINS AND DRIFT PINS**




**SIDE VIEW**




**TOP VIEW**

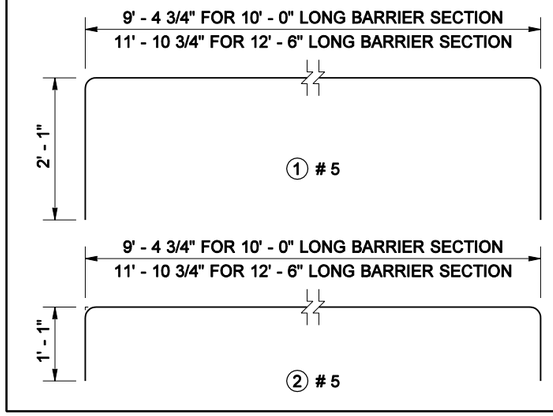



**SIDE VIEW**

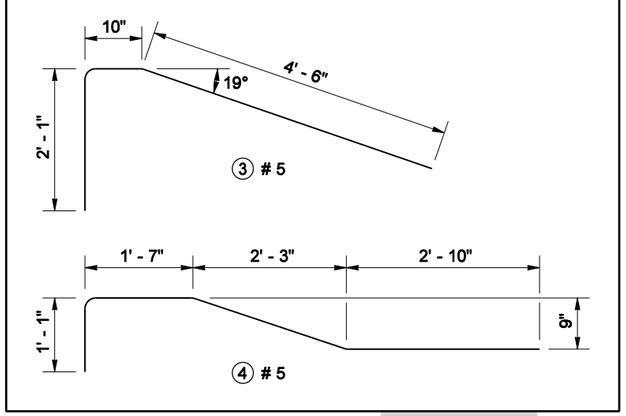
SEE NOTE 4

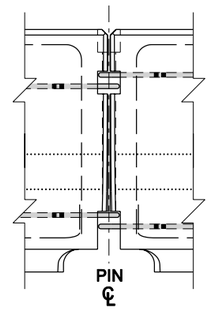
**BARRIER TERMINAL**

**BARRIER SECTION**
**REINFORCING STEEL BENDING DIAGRAM**




**BARRIER TERMINAL**
**REINFORCING STEEL BENDING DIAGRAM**




**BARRIER CONNECTION DETAIL**

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RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# CONCRETE BARRIER TYPE 2

## STANDARD PLAN C-8

SHEET 2 OF 2 SHEETS

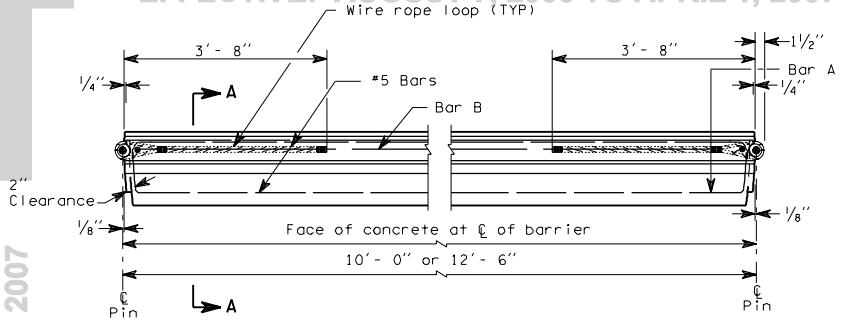
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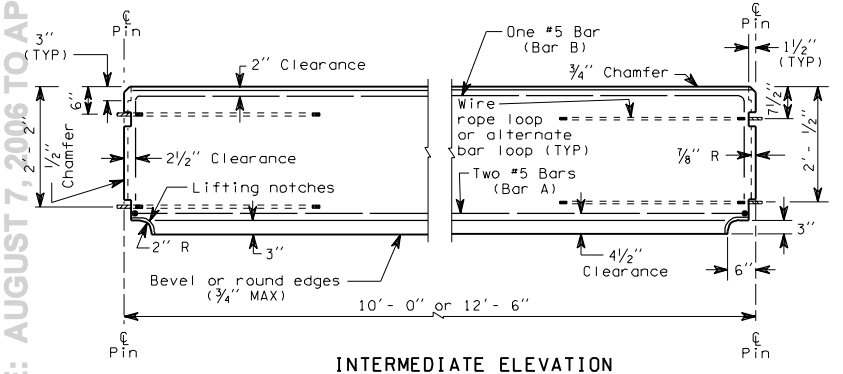
Washington State Department of Transportation

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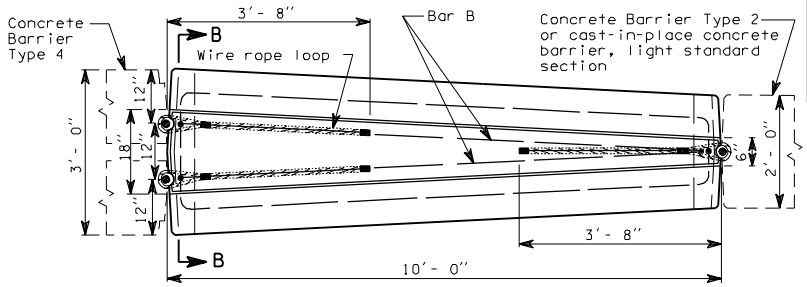

INTERMEDIATE PLAN



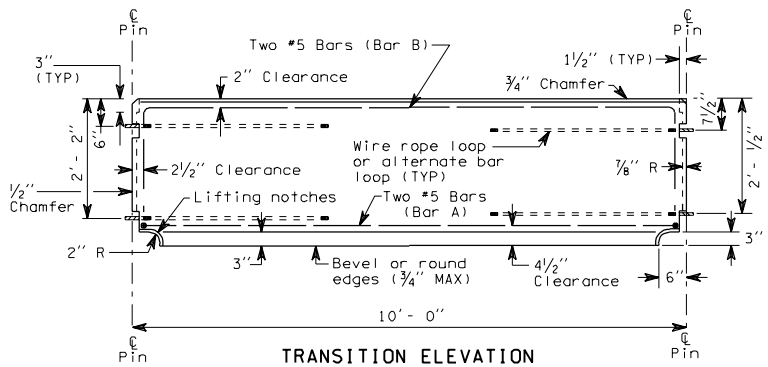

INTERMEDIATE ELEVATION

NOTE

1. For details on wire rope loop, connecting pin and end notches see Standard Plan "Concrete Barrier Type 2."

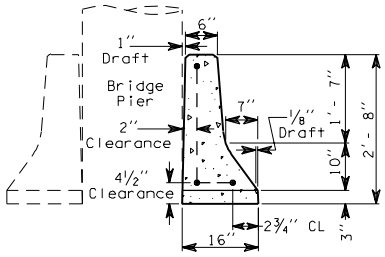



TRANSITION PLAN



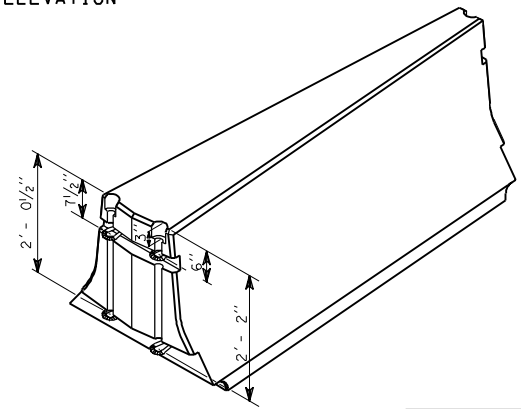

TRANSITION ELEVATION

## CONCRETE BARRIER TYPE 4 AND TRANSITION SECTION

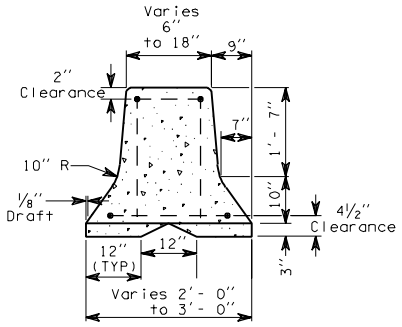



SECTION A-A

TYPE 4




TRANSITION END VIEW



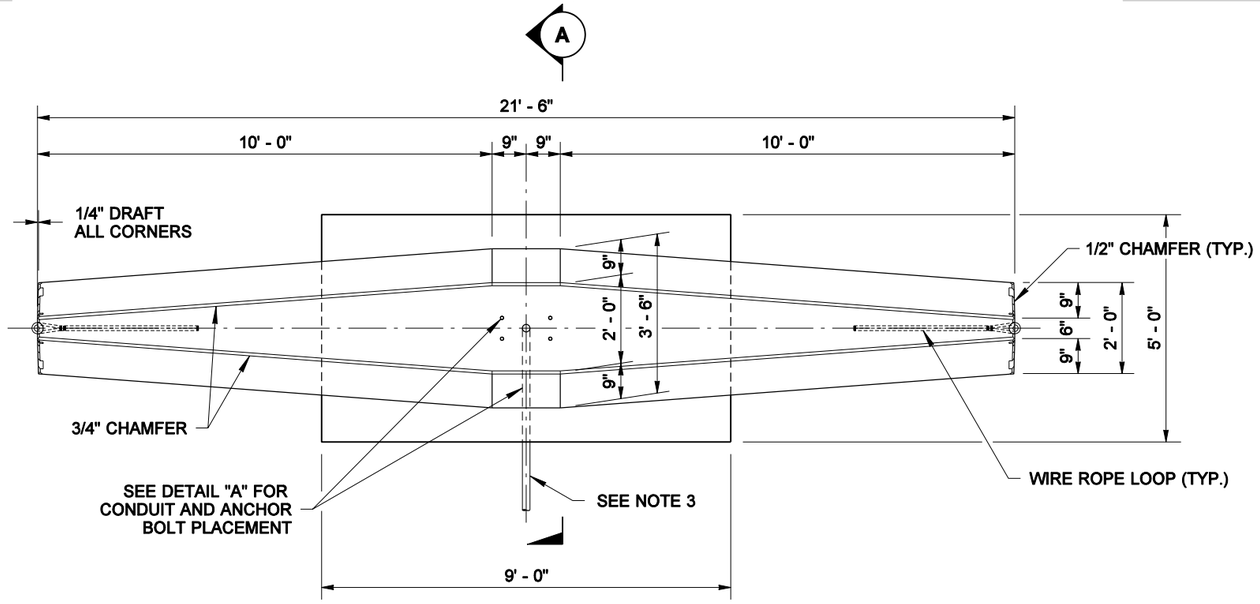

SECTION B-B

TRANSITION SECTION

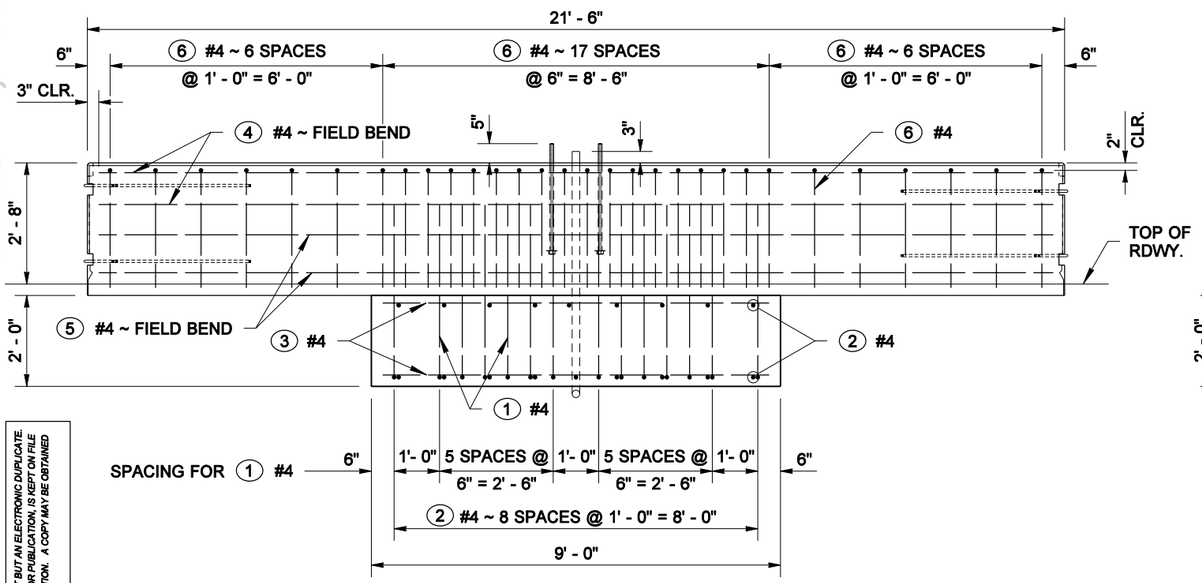
C-8a 1 of 1

07-25-97

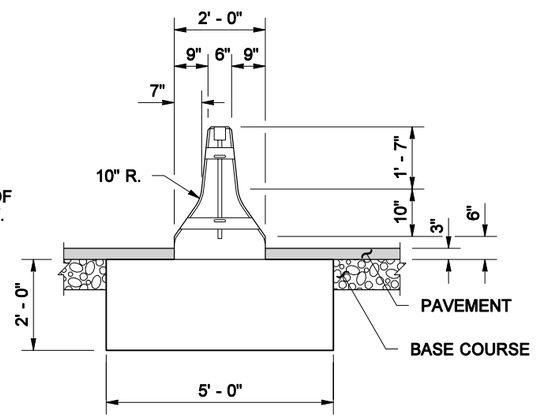
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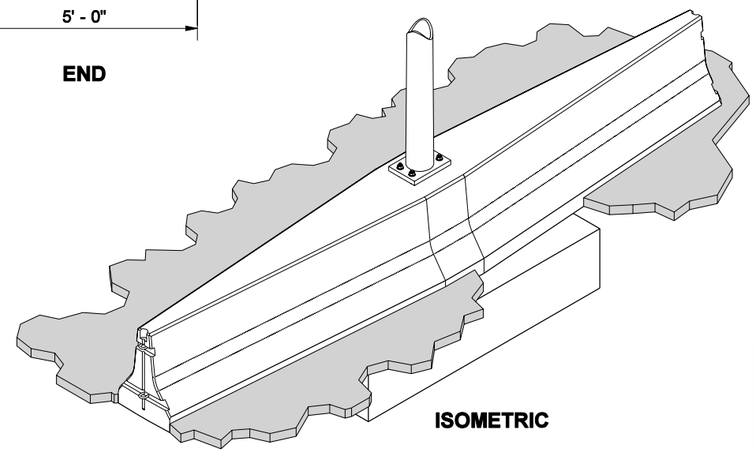

**PLAN**




**ELEVATION**



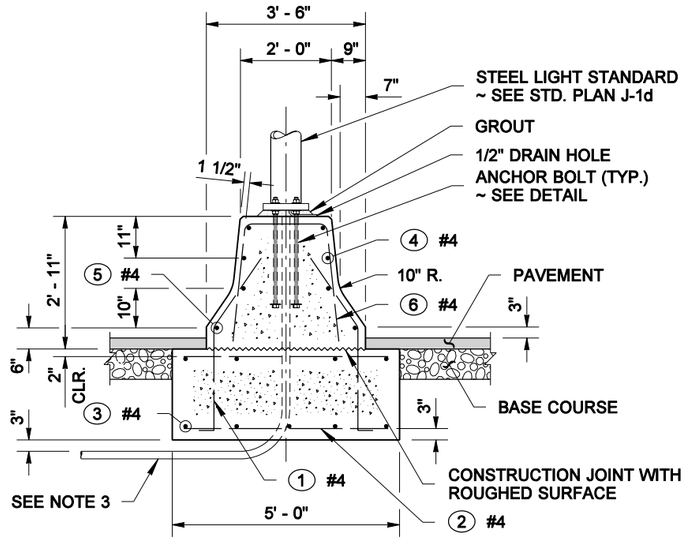

**END**



**ISOMETRIC**

**NOTES**

1. This plan shall be used for 40' and 50' Light Standards with 16' max. length double mast arms.
2. See Standard Plan C-8 for details on barrier ends, Wire Rope Loops, and Connecting Pins.
3. See the Contract Plans for conduit placement.
4. Concrete shall be Class 4000.




**SECTION (A)**

RICHARD P. ZELDENRUST
STATE OF WASHINGTON
25470
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 14, 2006

# CONCRETE BARRIER LIGHT STANDARD SECTION

## STANDARD PLAN C-8b

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *01-11-06* — DATE

Washington State Department of Transportation

DRAWN BY: BILL BERENS

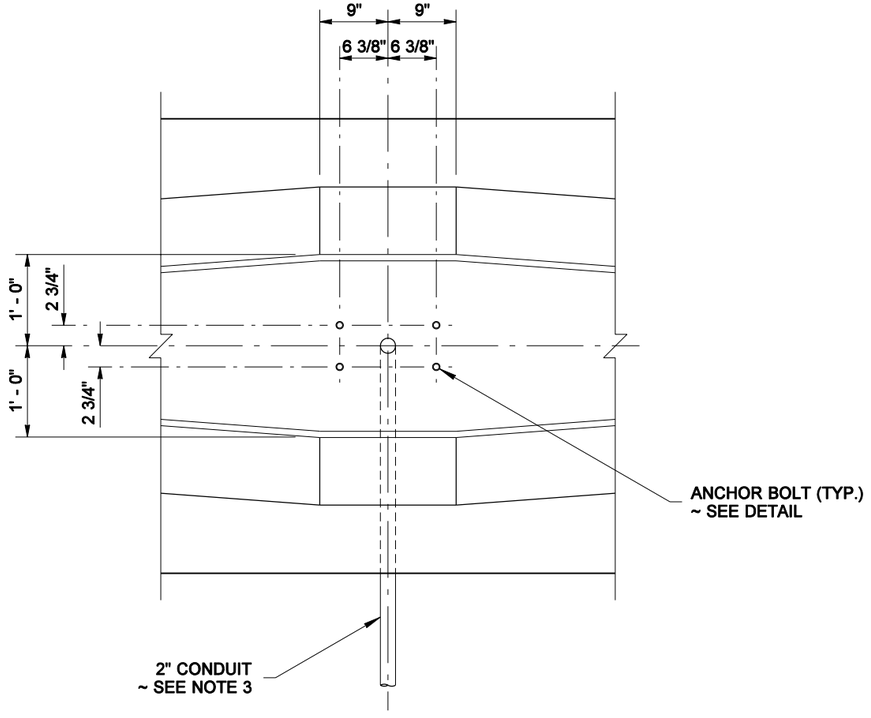
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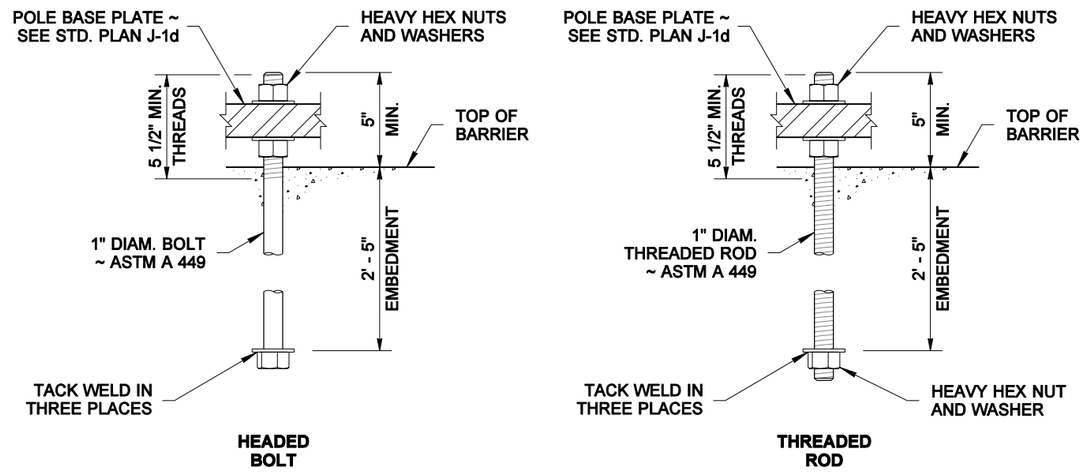
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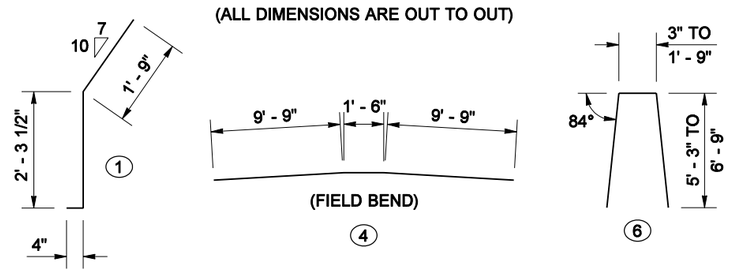

**DETAIL "A"**




**ANCHOR BOLT DETAIL**

GALVANIZE EXPOSED ANCHOR ROD END 1' - 0" MIN.

| BAR LIST | | | | | BENDING DIAGRAM |
|---|---|---|---|---|---|
| MARK | LOCATION | QTY. | SIZE | LENGTH | (ALL DIMENSIONS ARE OUT TO OUT) |
| ① | FOOTING - DOWEL | 28 | #4 | 4' - 3" | |
| ② | FOOTING | 18 | | 4' - 8" | |
| ③ | FOOTING | 9 | | 8' - 8" | |
| ④ | BARRIER | 4 | | 21' - 0" | |
| ⑤ | BARRIER | 4 | | 21' - 0" | |
| ⑥ | BARRIER | 30 | | 5' - 3" TO 6' - 9" | |







EXPIRES NOVEMBER 14, 2006

# CONCRETE BARRIER LIGHT STANDARD SECTION

## STANDARD PLAN C-8b

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

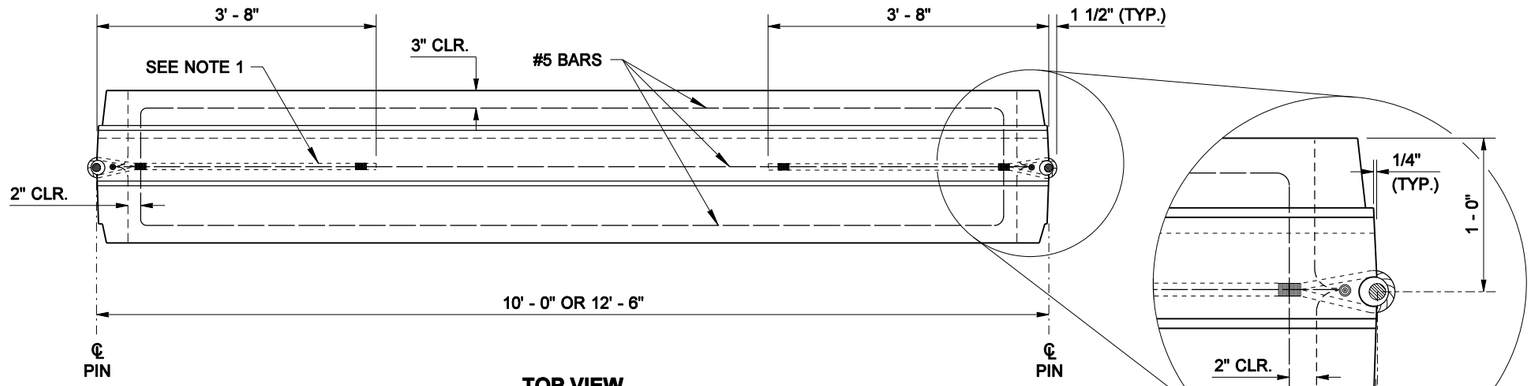
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *01-11-06* — DATE

Washington State Department of Transportation

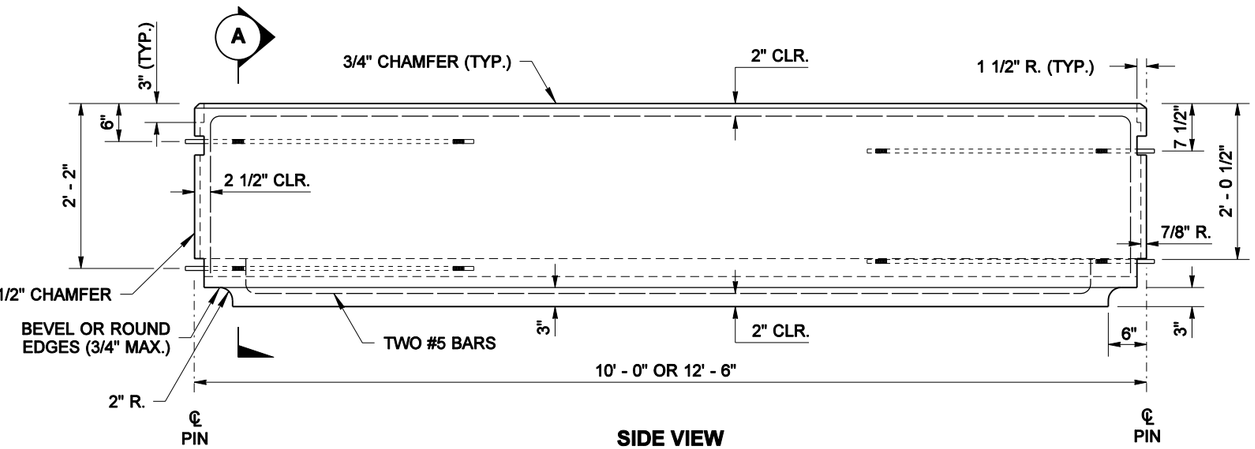
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

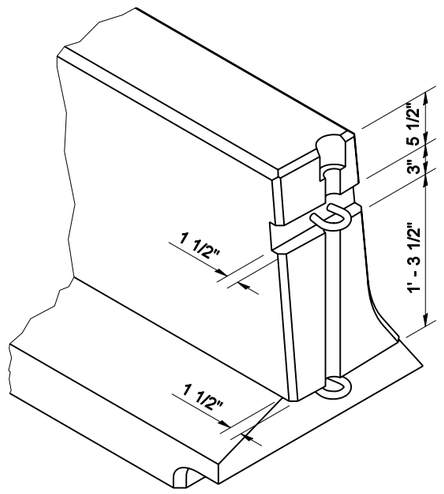
DRAWN BY: ADAM COCHRAN



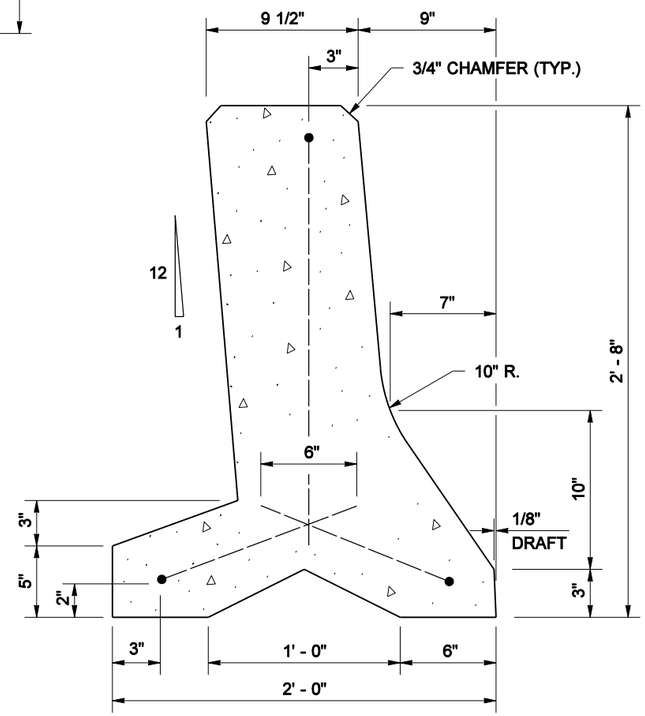

**TOP VIEW**




**SIDE VIEW**



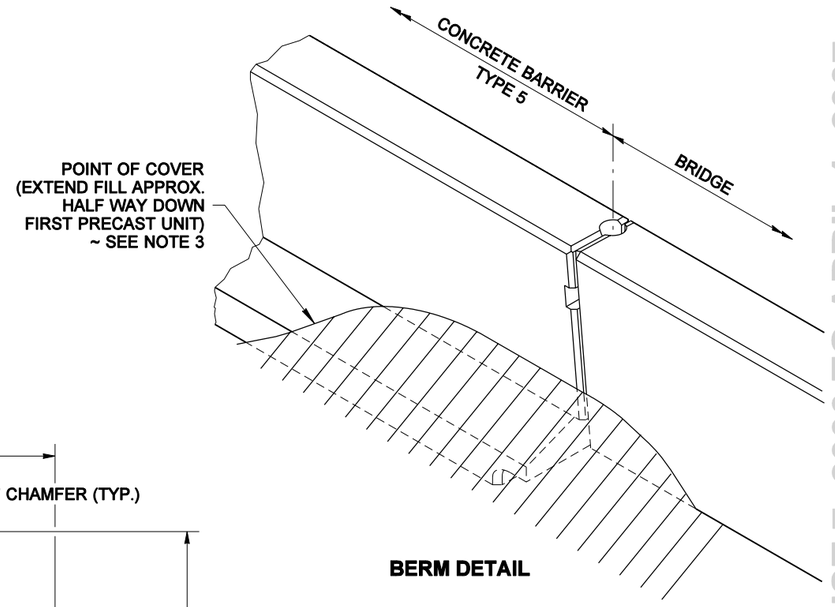

**ISOMETRIC VIEW**




**SECTION A**

**NOTES**

1. For details on loops, connecting pin, reinforcing steel, and terminal unit see Standard Plan C-8.
2. See plans for surface treatment on back face of barrier.
3. At the juncture between the Concrete Barrier Type 5 and the Bridge Barrier, cover the exposed foot of the Type 5 Barrier with an earth berm.




**BERM DETAIL**

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# PRECAST CONCRETE BARRIER TYPE 5 STANDARD PLAN C-8c

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-08-05* — DATE

Washington State Department of Transportation

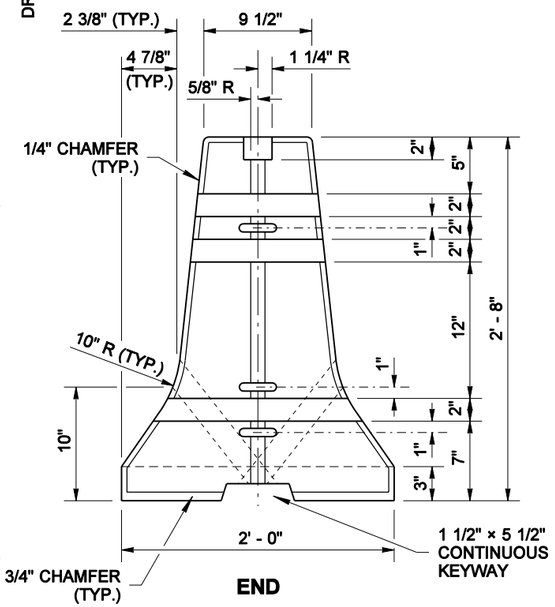
| DATE | REVISION | BY |
|---|---|---|
| 09/2005 | GENERAL REVISION FOR CLARITY | MAS |

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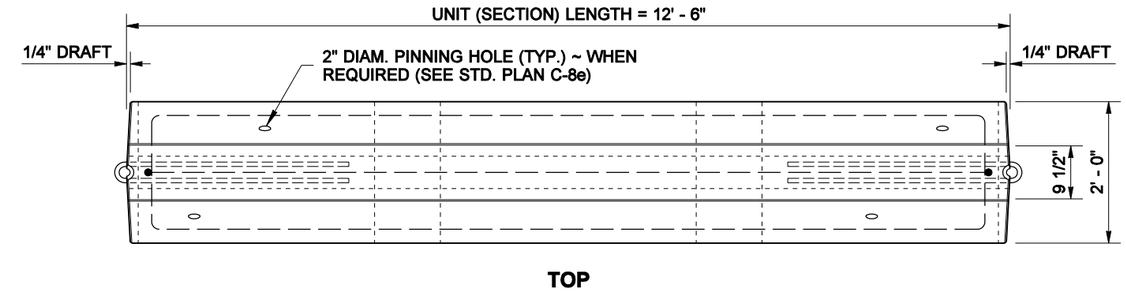
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

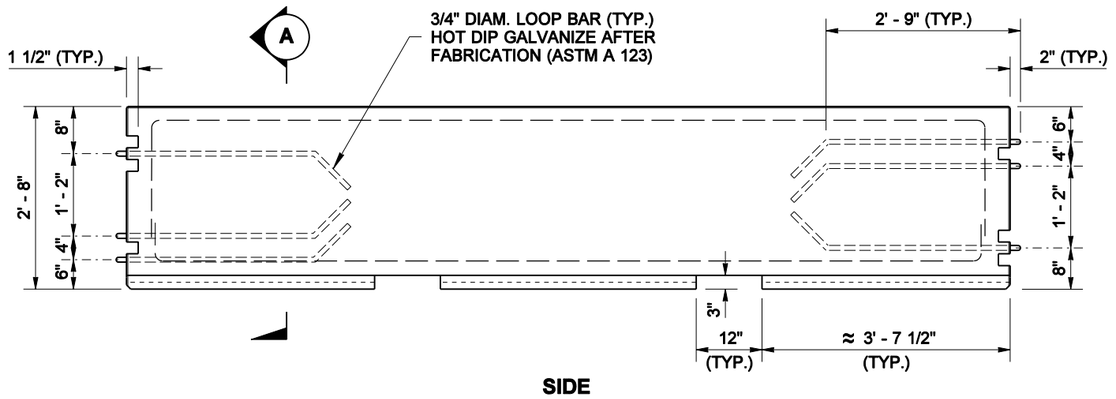
DRAWN BY: MARK SUJKA




END



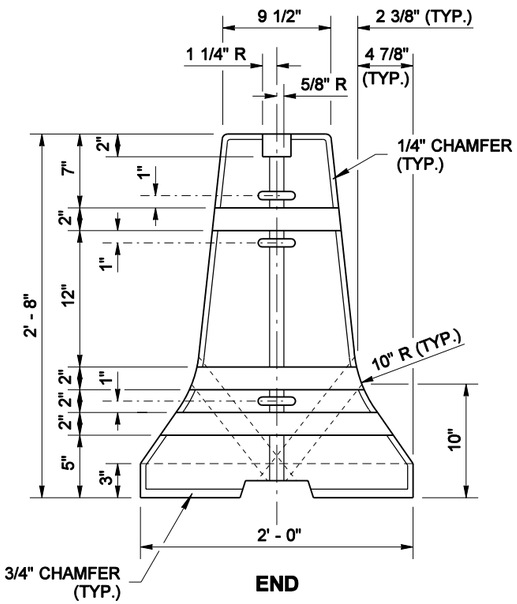

TOP



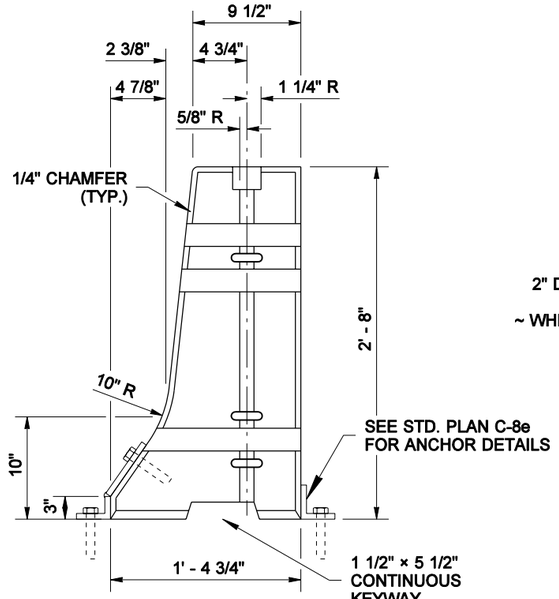

SIDE

**NOTES**

1. See Standard Plan C-8 for steel reinforcement details not shown. Barriers having steel reinforcement which exceeds the minimum requirement as shown on this plan, may be used.
2. The vertical dimensions for the slots and loop bar locations on the NARROW BASE barrier are the same as those shown on the END views of the 2' - 0" wide barrier.

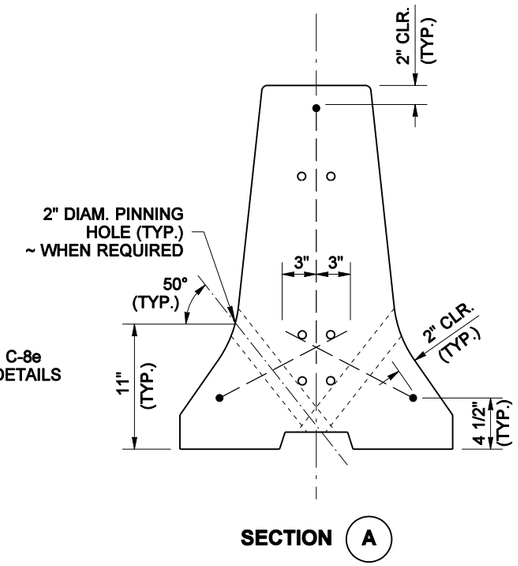



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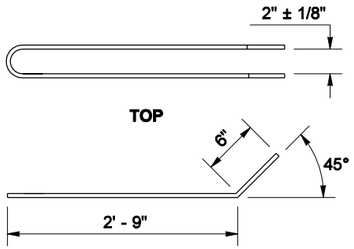



END

**NARROW BASE**

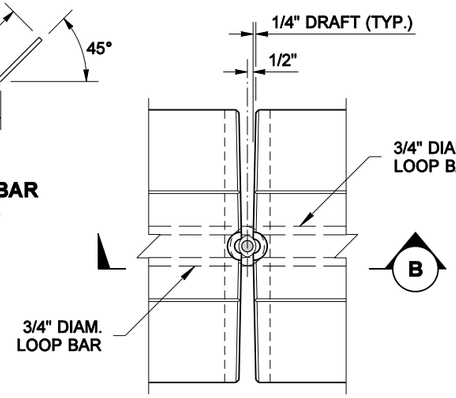



SECTION A



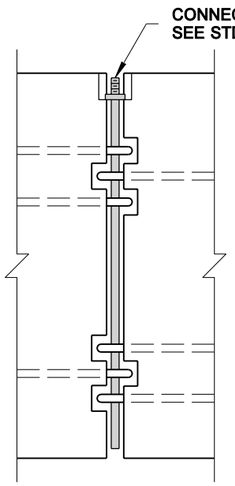

SIDE

**ALTERNATIVE LOOP BAR**
3/4" DIAM. (ASTM A 36)




TOP

**END DETAIL**
JOINING TWO BARRIER SEGMENTS




SECTION B

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# ALTERNATIVE TEMPORARY CONCRETE BARRIER (F-SHAPE)
# STANDARD PLAN C-8d

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

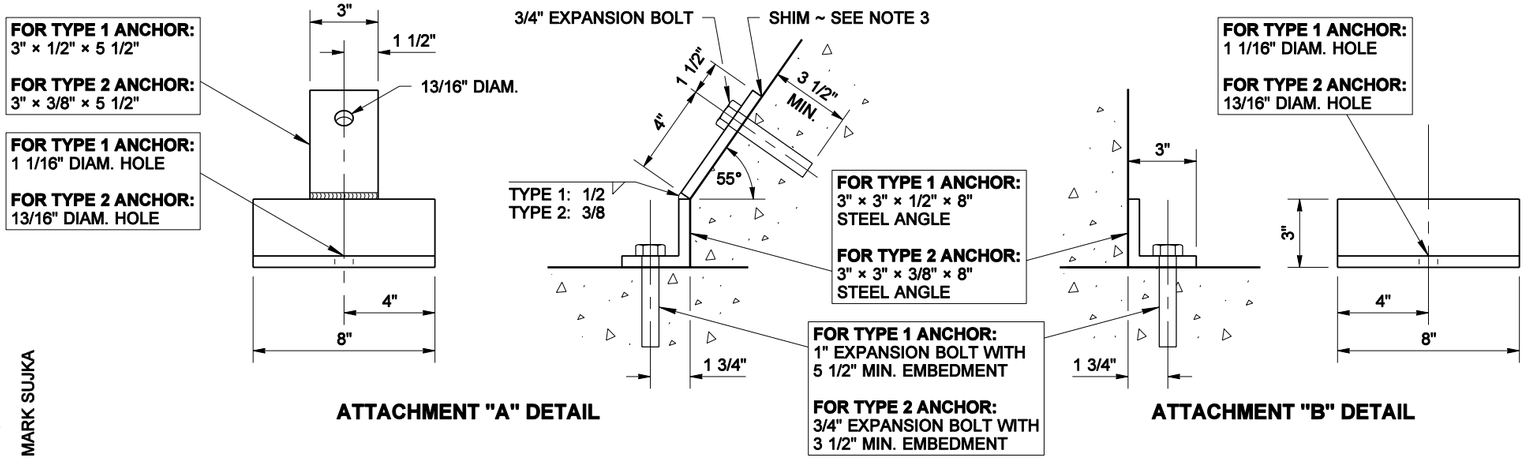
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-08-05* DATE

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. | 09/2005 | CLARIFIED MINIMUM REBAR REQUIREMENTS PROVIDED PINNING HOLE DETAILS | MAS |
|---|---|---|---|
| | DATE | REVISION | BY |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



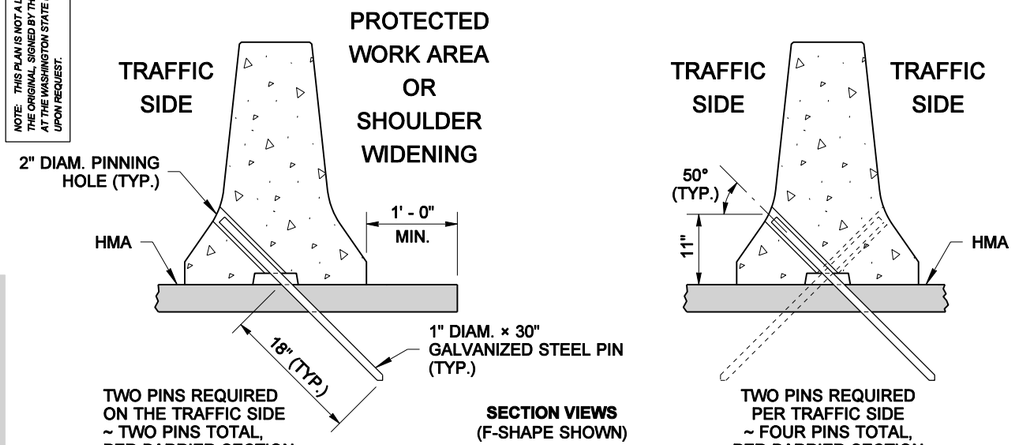

DRAWN BY: MARK SUJKA




SECTION VIEWS
(F-SHAPE SHOWN)

**TYPE 1 AND TYPE 2 ANCHORS**
**ATTACHMENT LOCATIONS**

**TYPE 1 AND TYPE 2 ANCHORS**
FOR THE TEMPORARY INSTALLATION OF
PRECAST CONC. BARRIER TYPE 2 &
TEMPORARY CONC. BARRIER (F-SHAPE)
ON CEMENT CONC. PAVEMENT

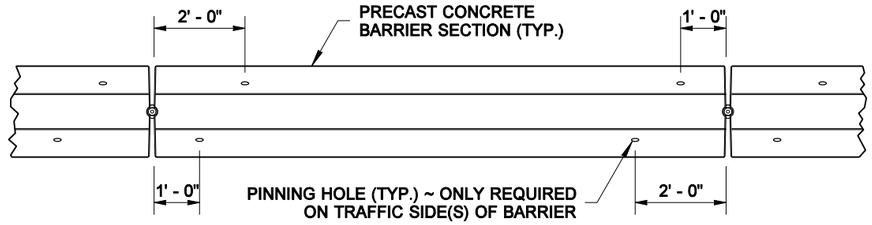



SECTION VIEWS
(F-SHAPE SHOWN)

**TYPE 3 ANCHOR**
**PIN LOCATIONS**

**TYPE 3 ANCHOR**
FOR THE TEMPORARY INSTALLATION OF
TEMPORARY CONC. BARRIER (F-SHAPE)
ON HOT MIX ASPHALT PAVEMENT

FOR THE PERMANENT INSTALLATION OF
PRECAST CONC. BARRIER TYPE 2
ON HOT MIX ASPHALT PAVEMENT

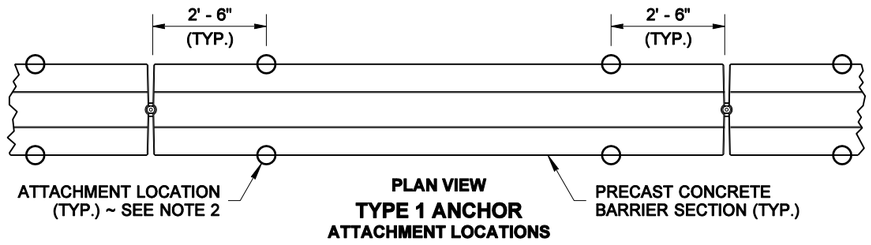



PLAN VIEW

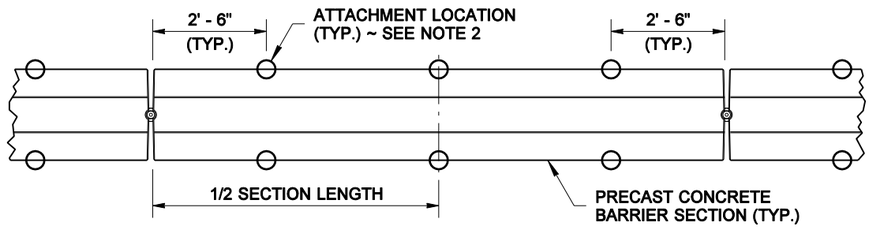
**TYPE 3 ANCHOR**
**PIN LOCATIONS**

## NOTES

1. Use Type 1 Anchors when the concrete pavement or bridge deck is 9" or thicker; use Type 2 Anchors when it is 6" or thicker.
2. Adjust the location of the Type 1 or Type 2 Anchors to avoid the main reinforcing in the deck when drilling holes.
3. Use shims to properly fit the Type 1 or Type 2 Anchors to the barrier and roadway surfaces.
4. After removing Type 1 or Type 2 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 Type 3 Anchors, clean the pin holes and fill them with sealant according to Standard Specification 9-04.2.




PLAN VIEW
**TYPE 1 ANCHOR**
**ATTACHMENT LOCATIONS**




PLAN VIEW
**TYPE 2 ANCHOR**
**ATTACHMENT LOCATIONS**

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# PRECAST CONCRETE BARRIER ANCHORS

# STANDARD PLAN C-8e

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER
*11-08-05* — DATE

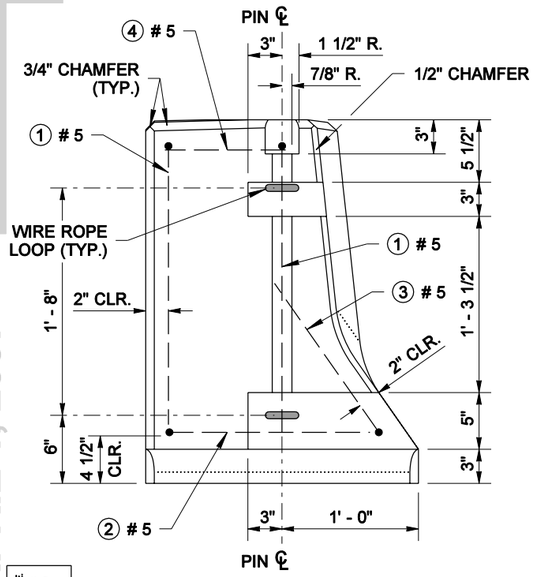
Washington State Department of Transportation

| DATE | REVISION | BY |
|---|---|---|
| 09/2005 | ADDED DISTANCE TO EDGE OF PAVEMENT<br>ADDED NOTES CLARIFYING INSTALLATION | MAS |

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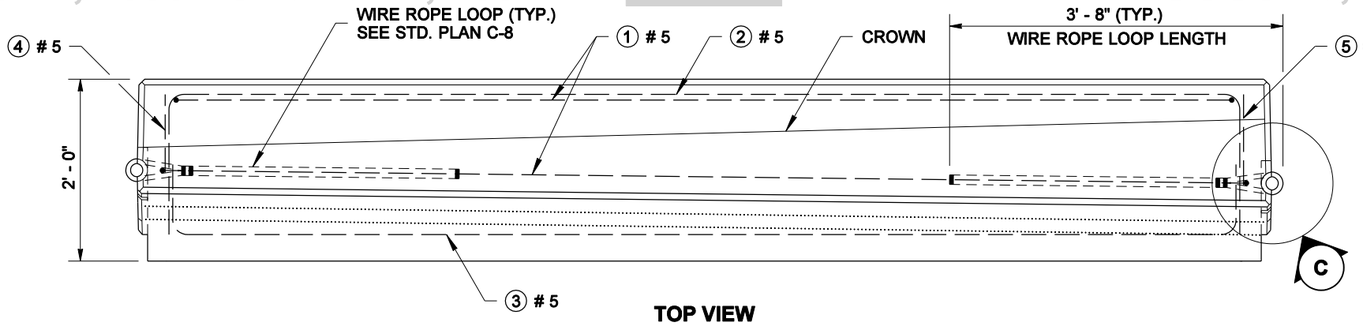
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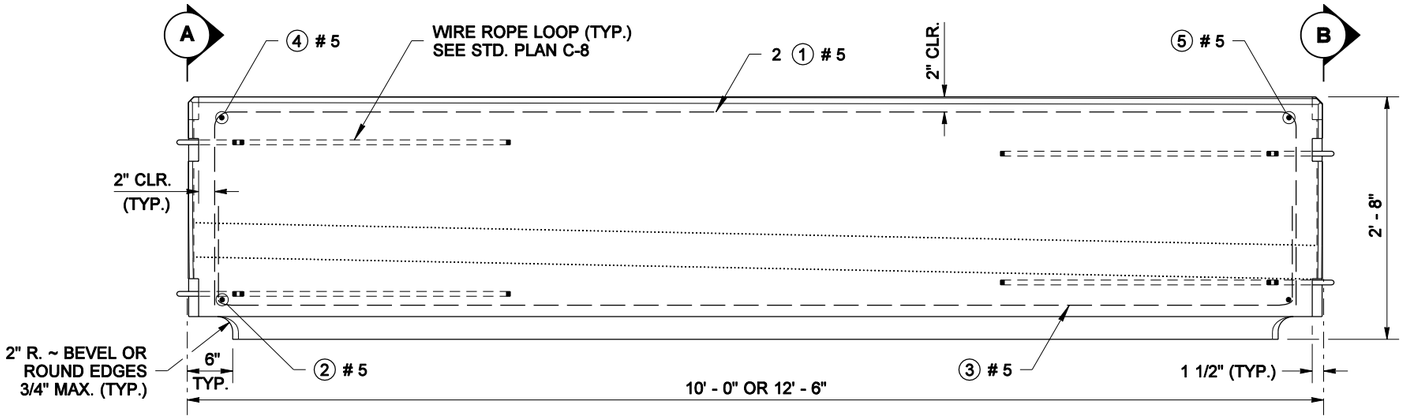



**CONCRETE BARRIER TYPE 2 (NJ-SHAPE)**

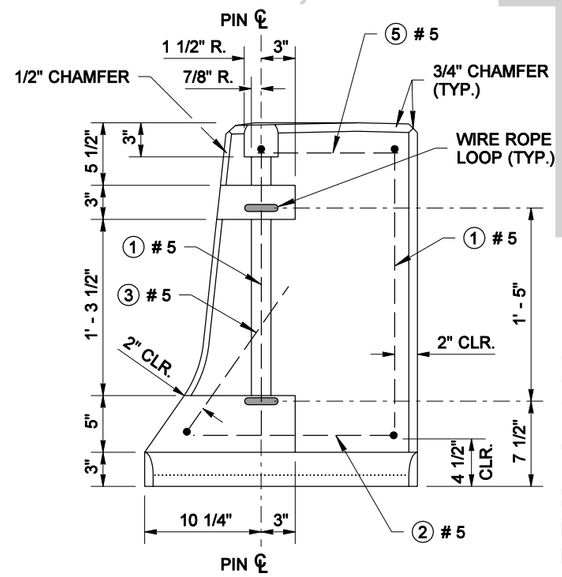
**END VIEW**




**TOP VIEW**



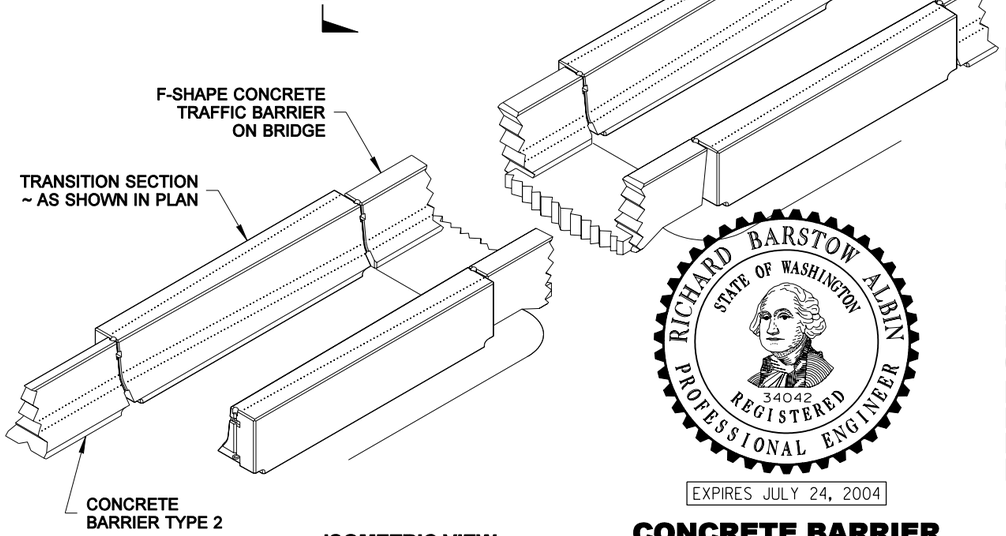

**TRAFFIC-SIDE VIEW**



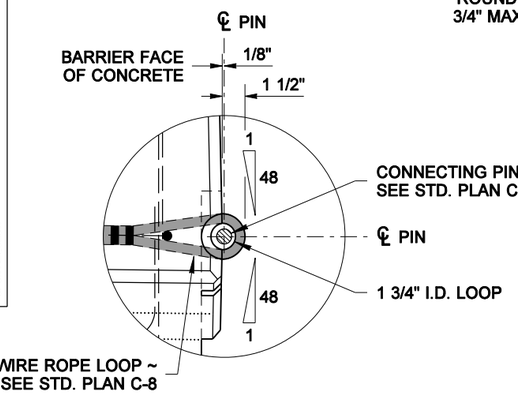

**BRIDGE F-SHAPE TRAFFIC BARRIER**

**END VIEW**

**TRANSITION SECTION**

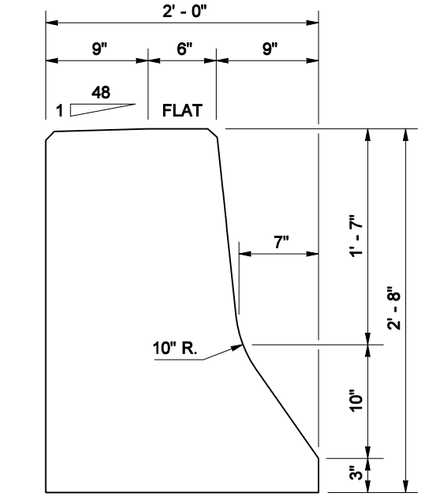



**ISOMETRIC VIEW**




**TYPICAL ~ BOTH ENDS**

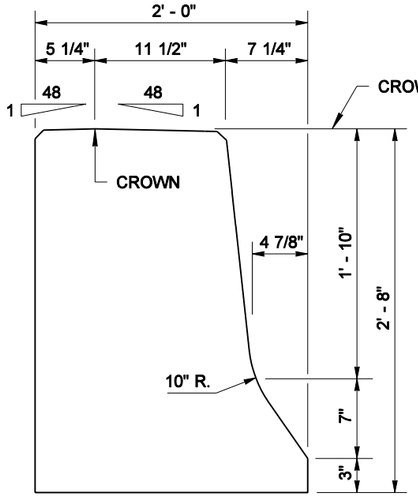
**DETAIL (C)**




**CONCRETE BARRIER TYPE 2 (NJ-SHAPE)**

**SECTION (A)**

**(SHOWN AT LIMIT OF TRANSITION)**

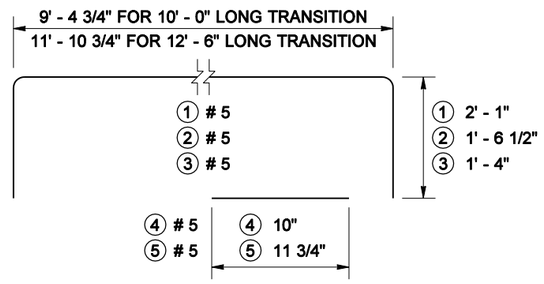



**BRIDGE F-SHAPE TRAFFIC BARRIER**

**SECTION (B)**

**(SHOWN AT LIMIT OF TRANSITION)**

**REINFORCING STEEL BENDING DIAGRAM**




**NOTE**

The vertical locations of the Wire Rope Loops at one end compose a set that shall not vary; however, which set is applied to an end is determined by the end to which it is being connected. A set with loops 1' - 5" apart connects to a set with loops 1' - 8" apart. See Standard Plan C-8, BARRIER CONNECTION DETAIL.

# CONCRETE BARRIER TRANSITION TYPE 2 TO BRIDGE F-SHAPE STANDARD PLAN C-8f

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-30-04* — DATE

Washington State Department of Transportation

RICHARD BARSTOW ALBIN — STATE OF WASHINGTON — 34042 — REGISTERED PROFESSIONAL ENGINEER

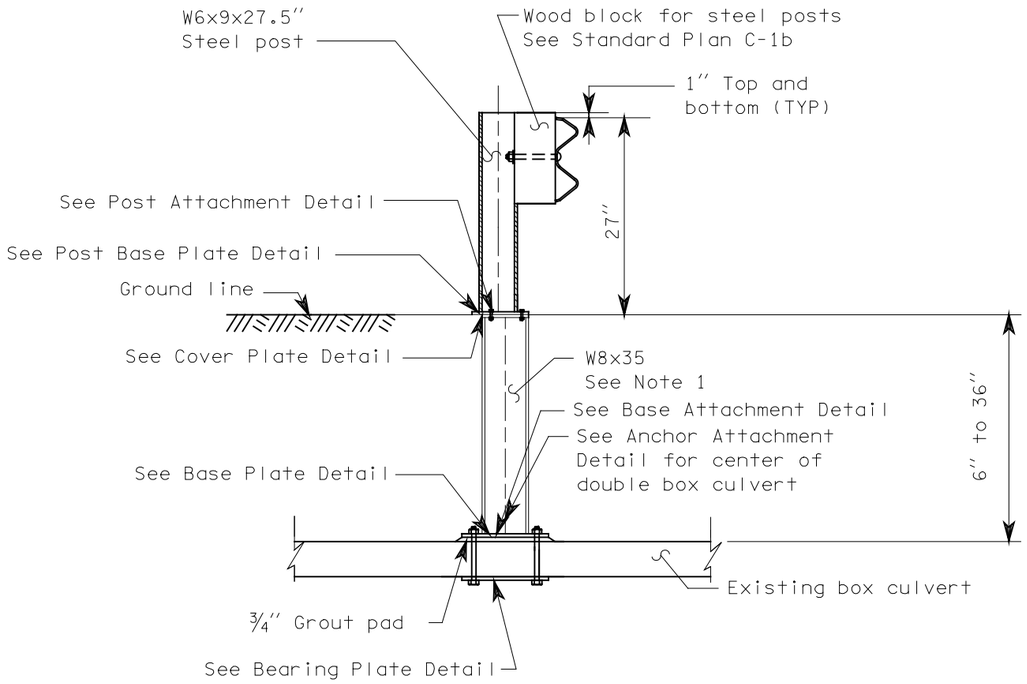
EXPIRES JULY 24, 2004

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DRAWN BY: MARK SUJKA

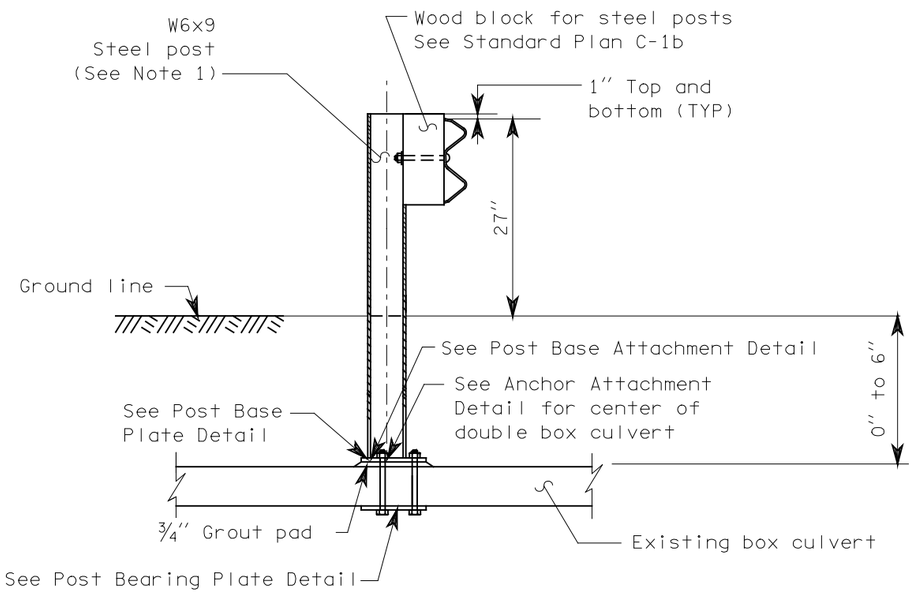
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



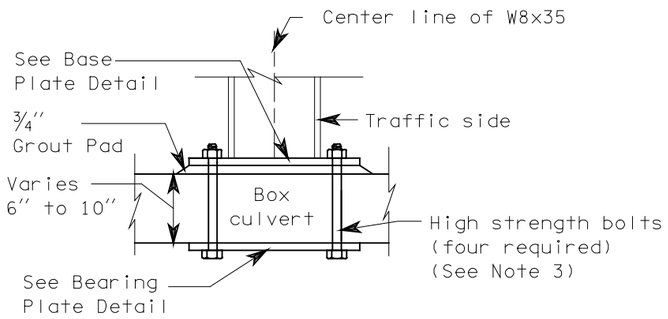

BOX CULVERT GUARDRAIL STEEL POST TYPE 1

(6″ to 36″ ground cover)

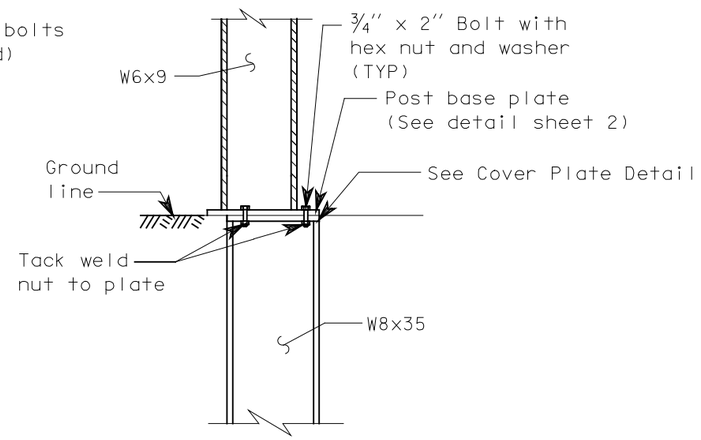



BOX CULVERT GUARDRAIL STEEL POST TYPE 2

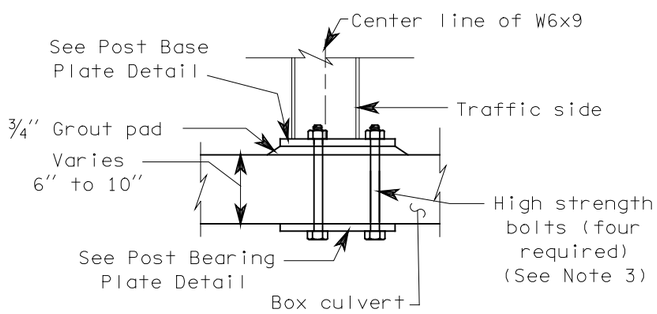
(0″ to 6″ Ground cover)




BASE ATTACHMENT DETAIL




POST ATTACHMENT DETAIL




POST BASE ATTACHMENT DETAIL

CLIFFORD E. MANSFIELD
STATE OF WASHINGTON
15224
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2000

# BOX CULVERT GUARDRAIL STEEL POST STANDARD PLAN C-10

SHEET 1 OF 2 SHEETS

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APPROVED FOR PUBLICATION

*Clifford E. Mansfield* *07/31/98*

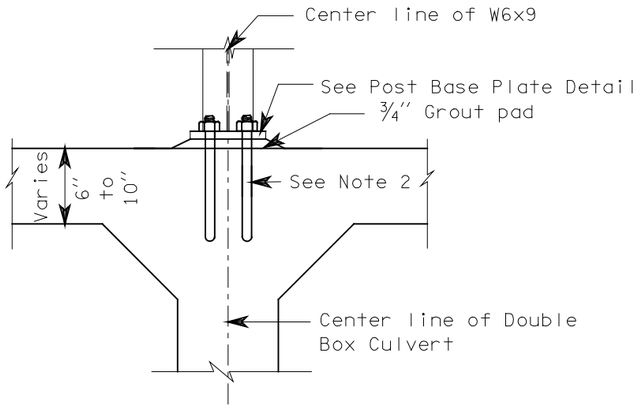
DEPUTY STATE DESIGN ENGINEER — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

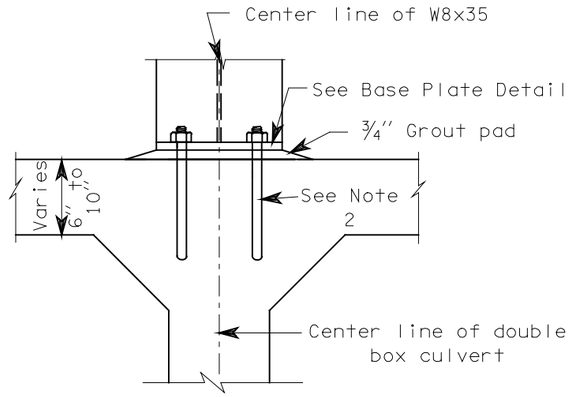
| DATE | REVISION | BY |
|---|---|---|
| 6/98 | Added wood block for steel posts. | RBA |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

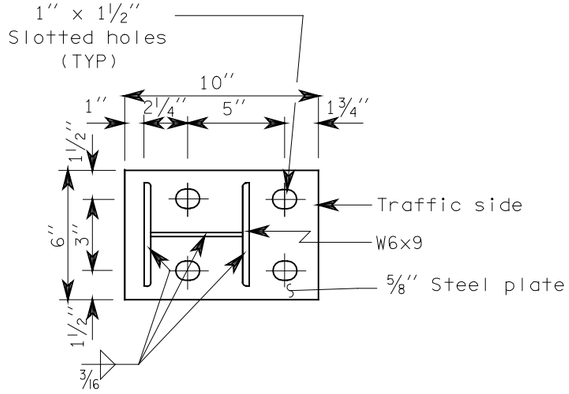
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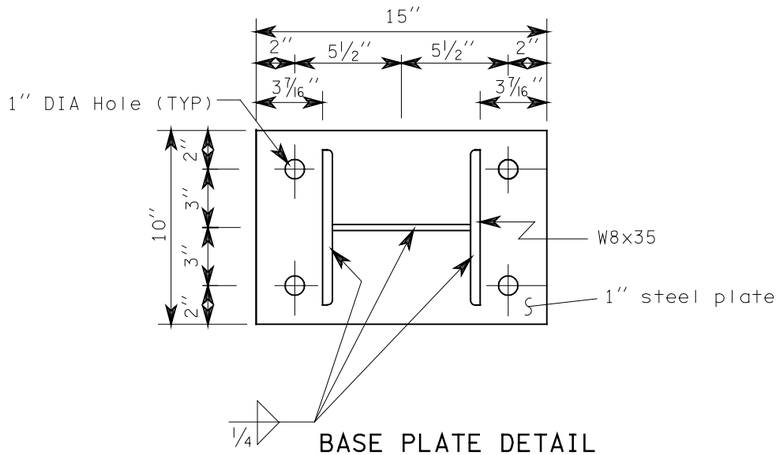

POST ANCHOR ATTACHMENT DETAIL
(See Note 4)



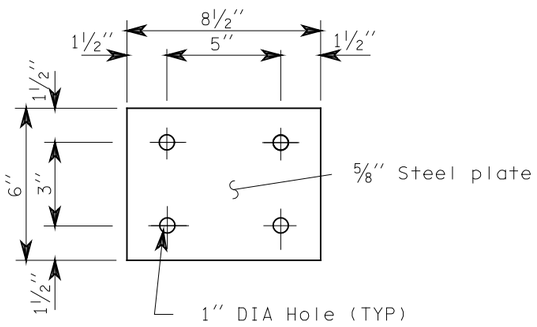

ANCHOR ATTACHMENT DETAIL
(See Note 4)



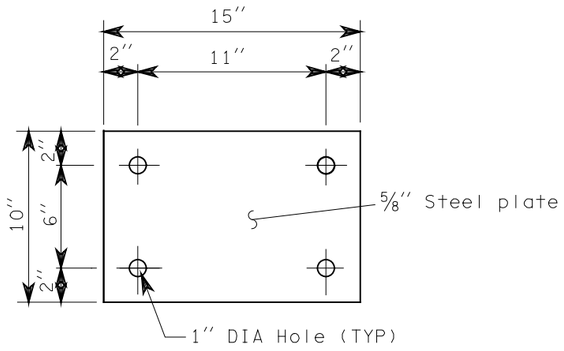

POST BASE PLATE DETAIL




BASE PLATE DETAIL




POST BEARING PLATE DETAIL




BEARING PLATE DETAIL

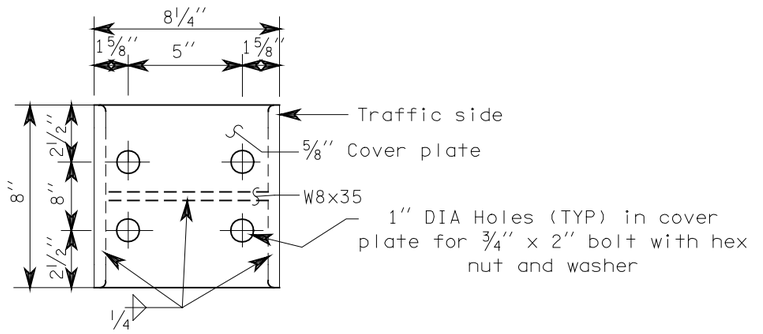
NOTES

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 ¾" high strength bolts with resin bonded anchors.

3. Drill 1¼" diameter hole in concrete slab for ⅞" 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 15.




COVER PLATE DETAIL

CLIFFORD E. MANSFIELD
STATE OF WASHINGTON
15224
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2000

# BOX CULVERT GUARDRAIL STEEL POST
# STANDARD PLAN C-10

SHEET 2 OF 2 SHEETS

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APPROVED FOR PUBLICATION

*Clifford E. Mansfield* *07/31/98*

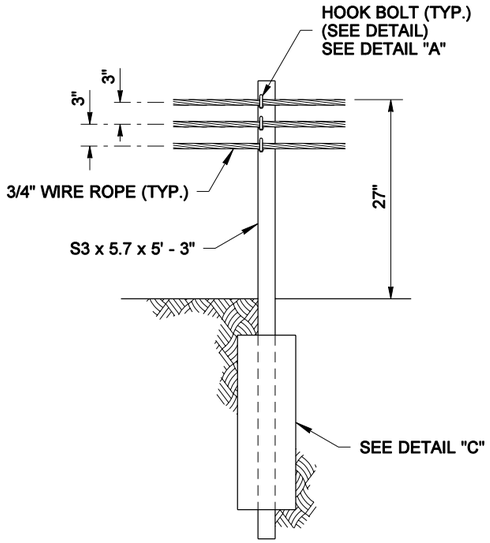
DEPUTY STATE DESIGN ENGINEER — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

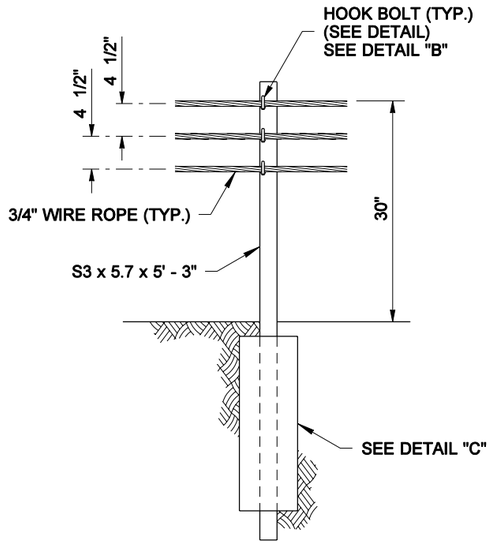
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

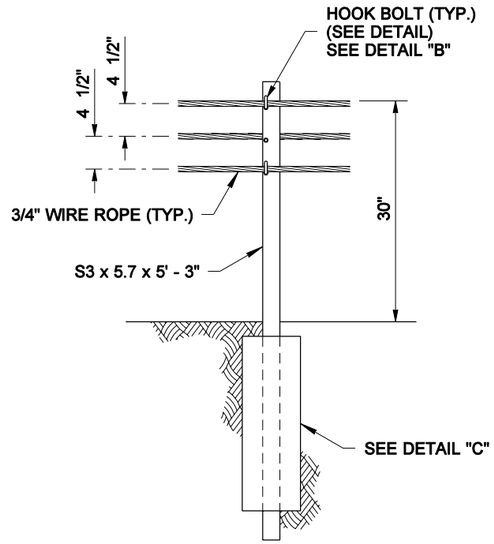
DRAWN BY: MARK SUJKA



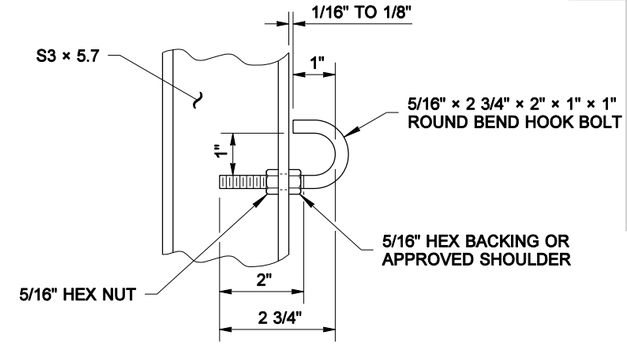

**CABLE BARRIER TYPE 1**



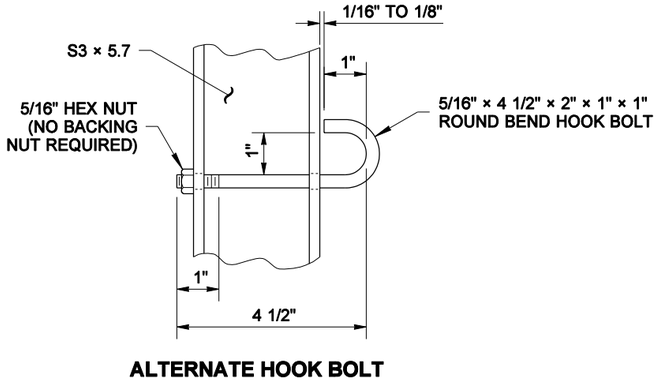

**CABLE BARRIER TYPE 2**



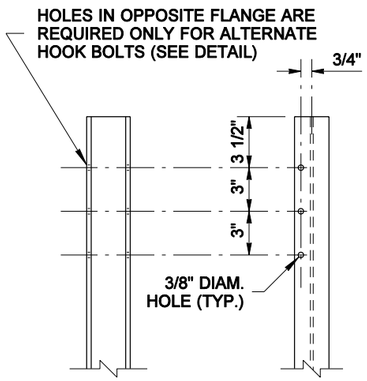

**CABLE BARRIER TYPE 3**



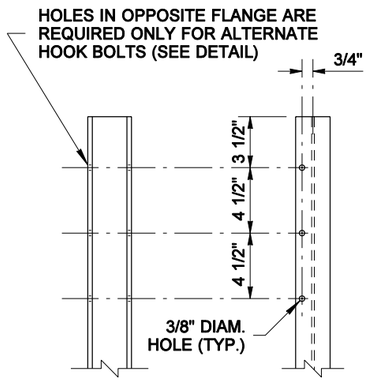

**HOOK BOLT DETAIL**



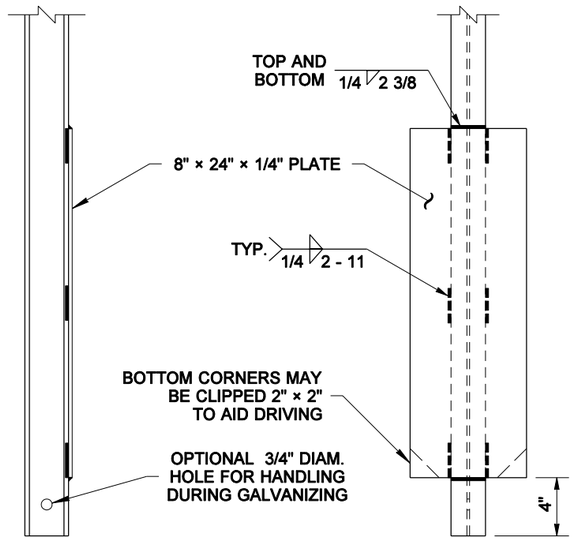

**ALTERNATE HOOK BOLT DETAIL**



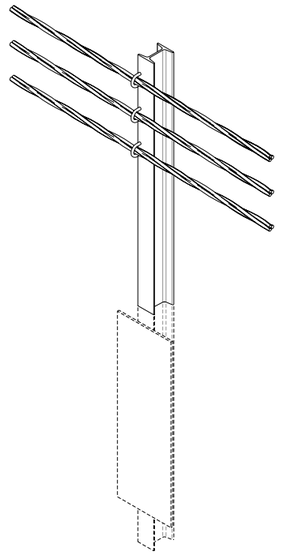

**DETAIL "A"**




**DETAIL "B"**




**DETAIL "C"**



**ISOMETRIC VIEW**

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# CABLE BARRIER

## STANDARD PLAN C-11

SHEET 1 OF 1 SHEET

| DATE | REVISION | BY |
|---|---|---|
| 12/2003 | REVISEDED DETAILS "A" & "B", REMOVED DIM. FROM GROUNDLINE TO TOP OF PLATE | MS |

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-20-04* — DATE

Washington State Department of Transportation

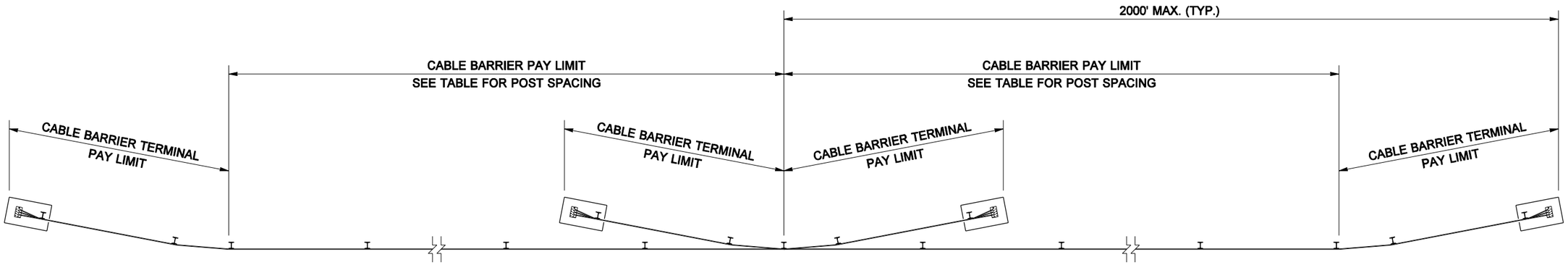
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA

| TABLE | |
|---|---|
| **CURVE RADIUS** | **POST SPACING** |
| LESS THAN 110' | USE NOT RECOMMENDED |
| 110' TO 219' | 6' |
| 220' TO 699' | 12' |
| 700' OR MORE AND TANGENT SECTIONS | 16' |



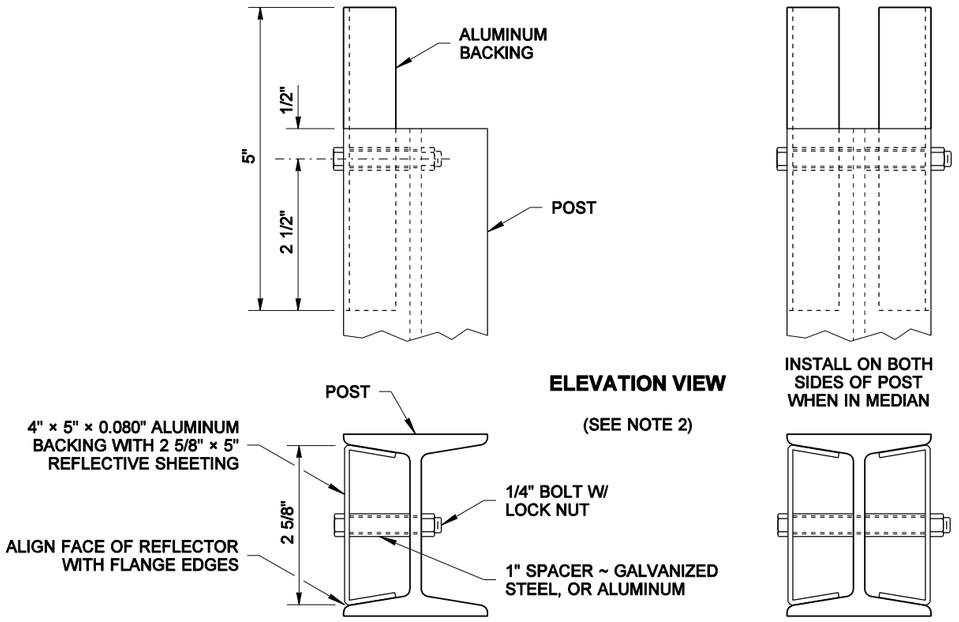

(MEASURE ALONG FACE OF CABLE BARRIER)

**PLAN VIEW**

## CABLE BARRIER PLACEMENT

**NOTES**

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




**PLAN VIEW**

## REFLECTOR DETAIL

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# CABLE BARRIER PLACEMENT

## STANDARD PLAN C-11a

SHEET 1 OF 1 SHEET

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| DATE | REVISION | BY |
|---|---|---|
| 04/2004 | REVISED TABLE, NOTE 1, & REFLECTOR DETAIL | MS |

APPROVED FOR PUBLICATION

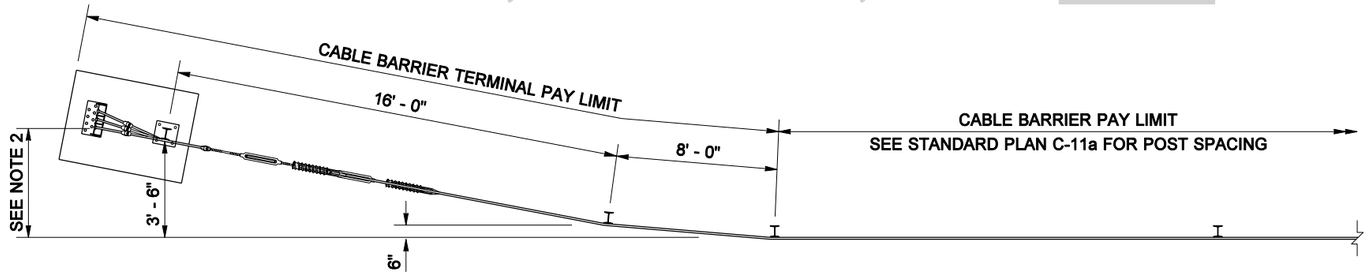
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-20-04* — DATE

Washington State Department of Transportation

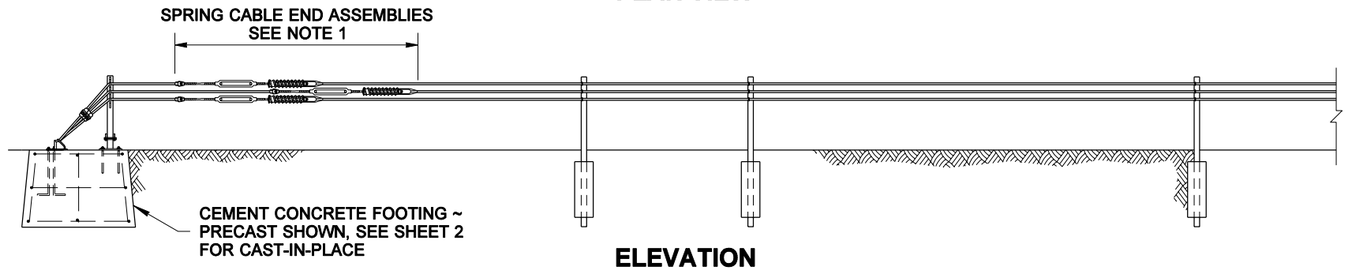
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

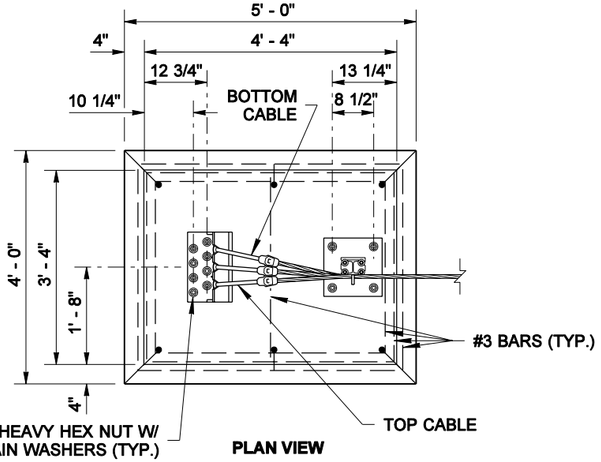
DRAWN BY: MARK SUJKA



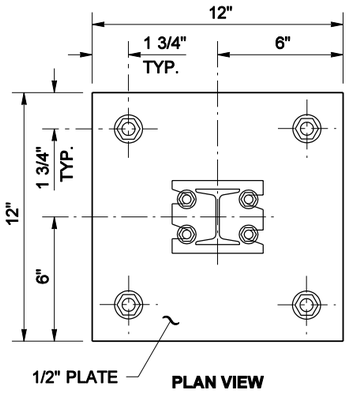

**PLAN VIEW**




**ELEVATION**

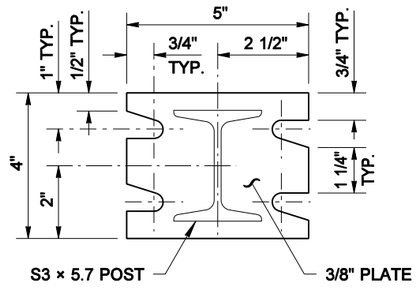



**PLAN VIEW**

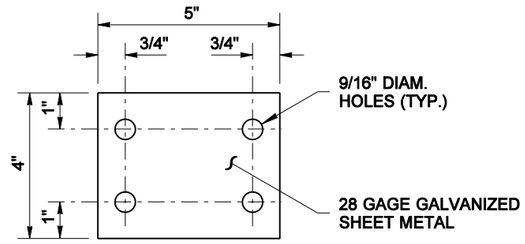



**PLAN VIEW**

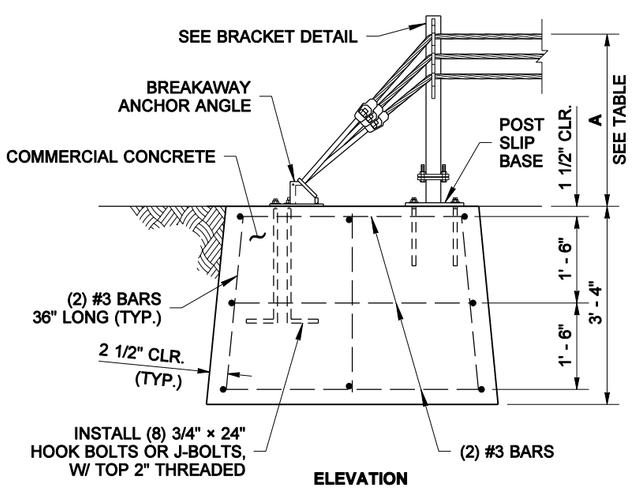
**POST SLIP BASE**




**POST SLIP BASE DETAIL**

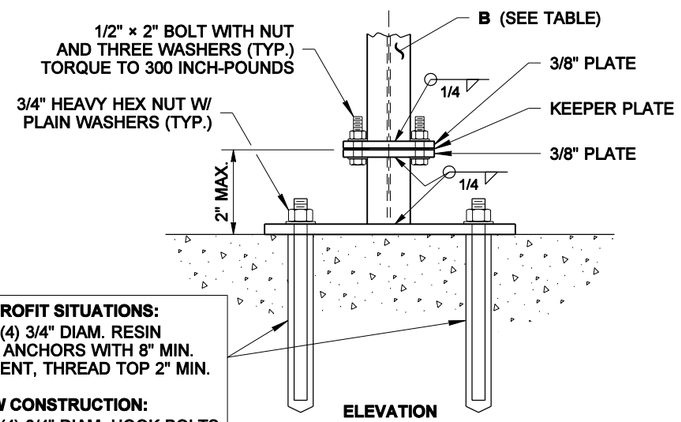



**KEEPER PLATE DETAIL**




**ELEVATION**

**PRECAST FOOTING**

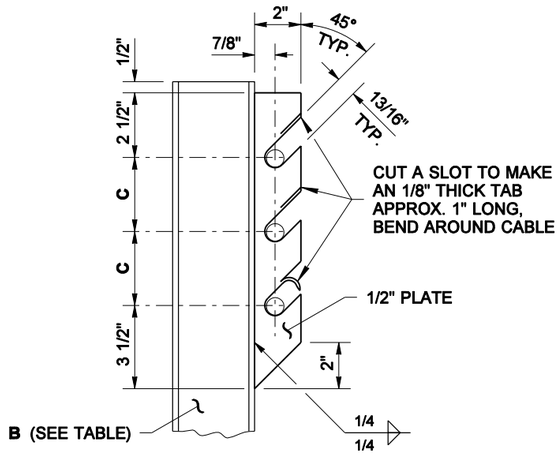



**ELEVATION**

**POST SLIP BASE**

**FOR RETROFIT SITUATIONS:**
INSTALL (4) 3/4" DIAM. RESIN BONDED ANCHORS WITH 8" MIN. EMBEDMENT, THREAD TOP 2" MIN.

**FOR NEW CONSTRUCTION:**
INSTALL (4) 3/4" DIAM. HOOK BOLTS OR J-BOLTS OR RESIN BONDED ANCHORS W/ 8" MIN. EMBEDMENT, THREAD TOP 2" MIN.




**BRACKET DETAIL**

**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 | | | |
|---|---|---|---|
| CABLE BARRIER | A<br>TOP OF FOOTING TO TOP OF HIGHEST CABLE | B<br>SLIP POST DIMENSIONS | C<br>BETWEEN CABLES |
| TYPE 1 | 27" | S3 × 5.7 × 27 1/4" | 3" |
| TYPE 2 | 30" | S3 × 5.7 × 30 1/4" | 4 1/2" |
| TYPE 3 | 30" | S3 × 5.7 × 30 1/4" | 4 1/2" |

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RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# CABLE BARRIER TERMINAL

# STANDARD PLAN C-11b

SHEET 1 OF 2 SHEETS

| DATE | REVISION | BY |
|---|---|---|
| 04/2004 | REV. FOUNDATION; REV. BOLT LENGTH FOR SLIP BASE. | MS |

APPROVED FOR PUBLICATION

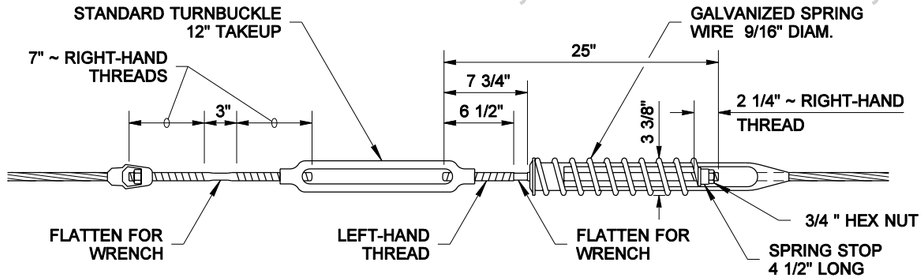
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-20-04* — DATE

Washington State Department of Transportation

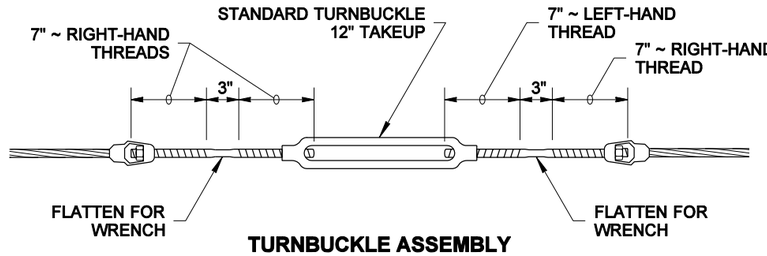
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

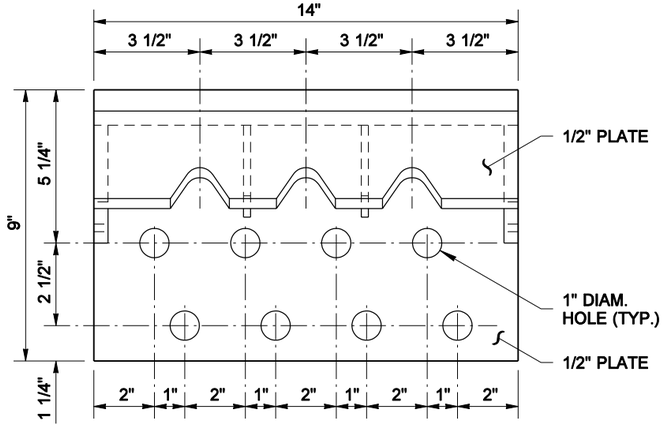
DRAWN BY: MARK SUJKA



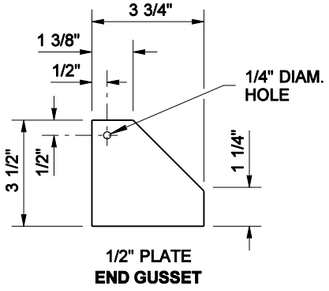

**SPRING CABLE END ASSEMBLY**



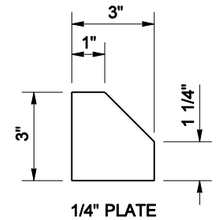

**TURNBUCKLE ASSEMBLY**



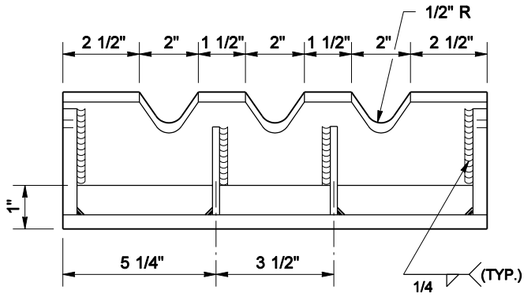

**PLAN VIEW**



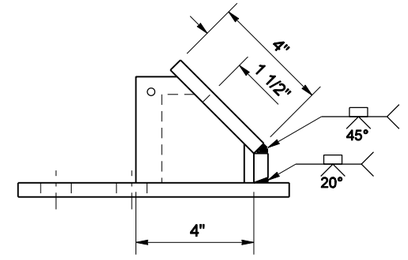

1/2" PLATE
**END GUSSET**




1/4" PLATE
**INSIDE GUSSET**

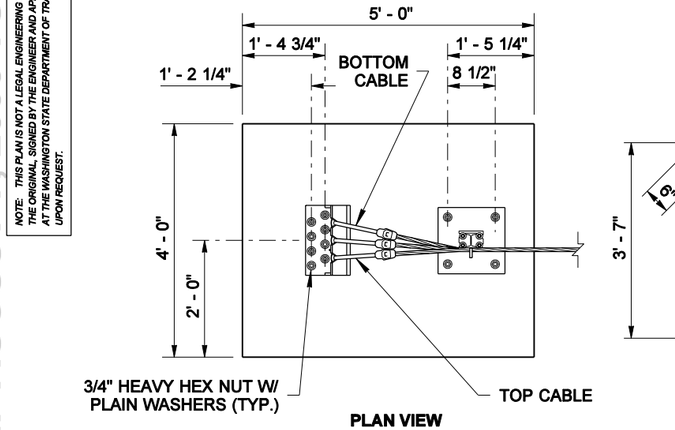



**ELEVATION**

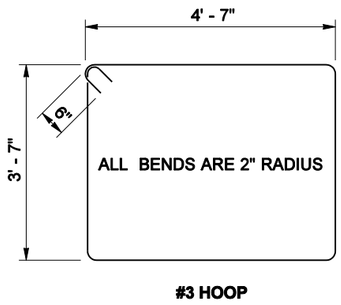



**SIDE VIEW**

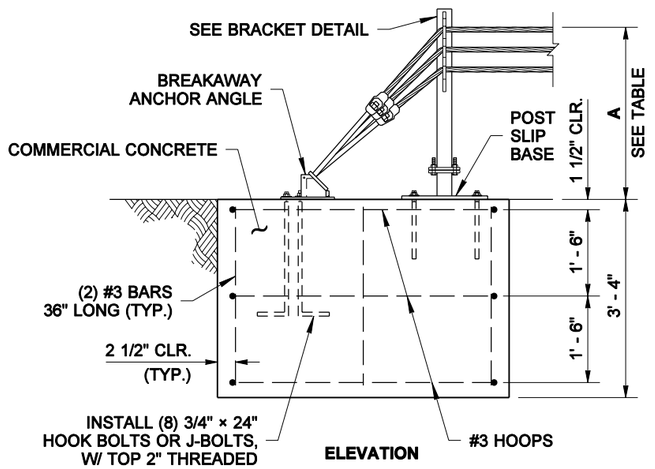
**BREAKAWAY ANCHOR ANGLE**




**PLAN VIEW**

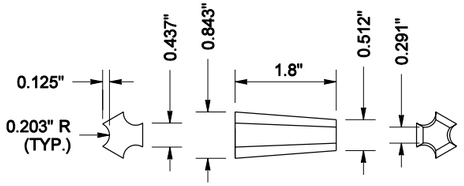



**#3 HOOP**

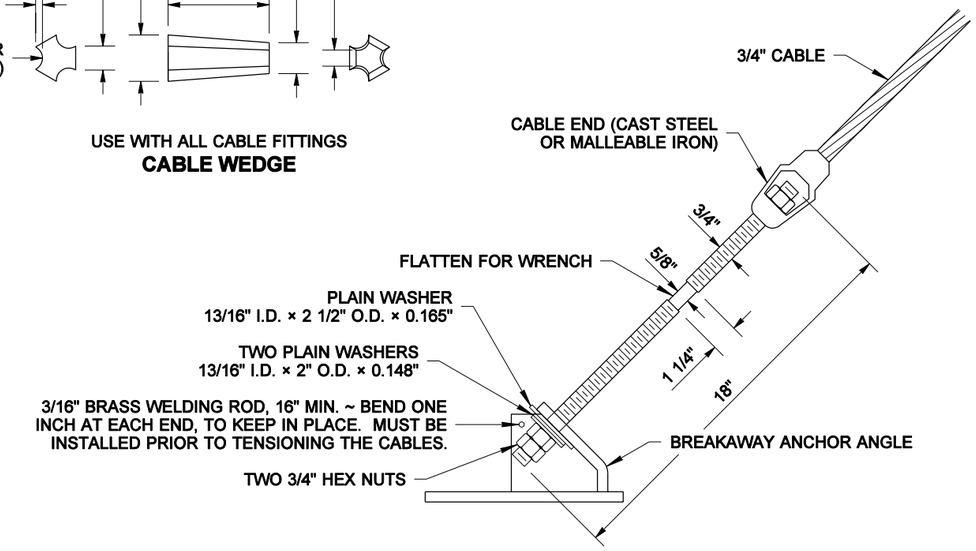



**ELEVATION**

**CAST-IN-PLACE FOOTING**




USE WITH ALL CABLE FITTINGS
**CABLE WEDGE**




**CABLE END ASSEMBLY TO**
**BREAKAWAY ANCHOR ANGLE DETAIL**

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# CABLE BARRIER TERMINAL

# STANDARD PLAN C-11b

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

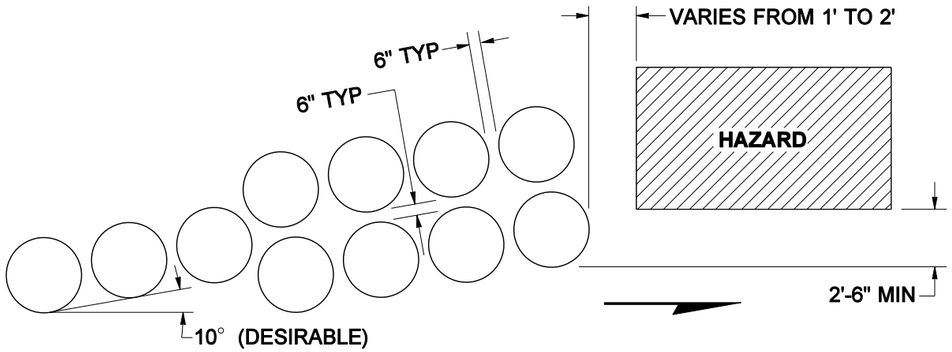
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-20-04* — DATE

Washington State Department of Transportation

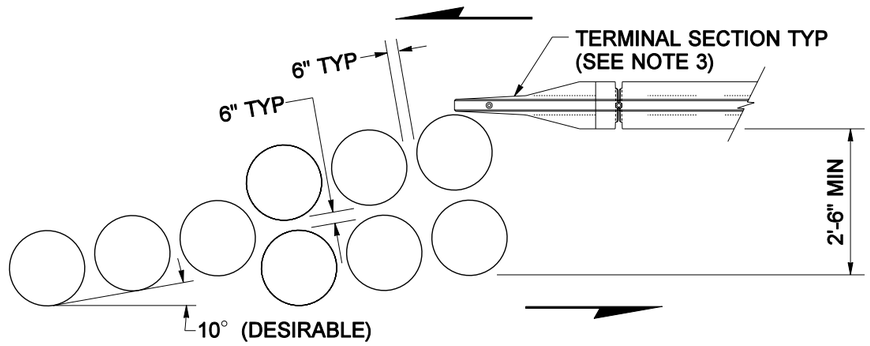
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

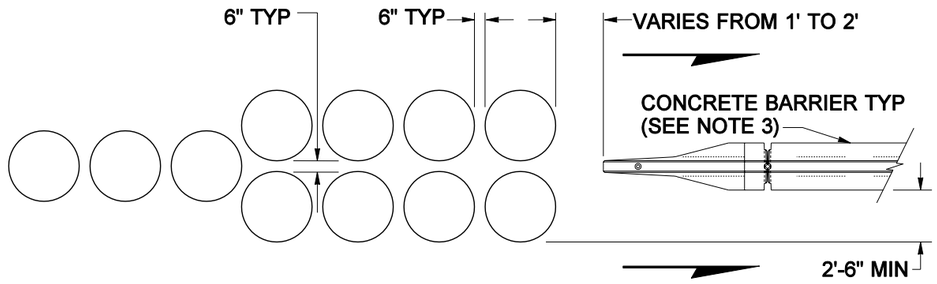
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**ROADSIDE INSTALLATION DETAIL**

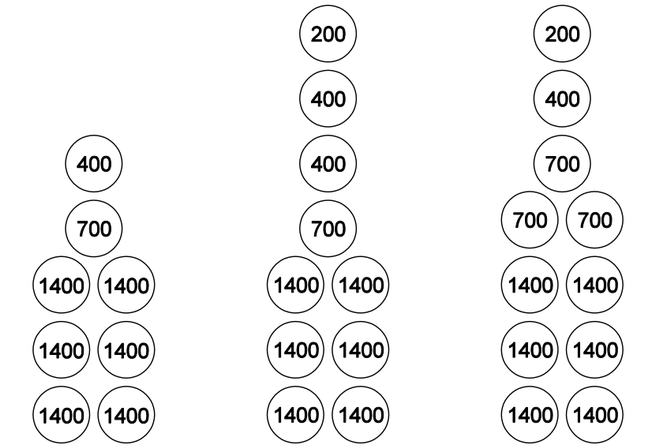



**MEDIAN INSTALLATION DETAIL**




**GORE INSTALLATION DETAIL**

## INSTALLATION DETAILS



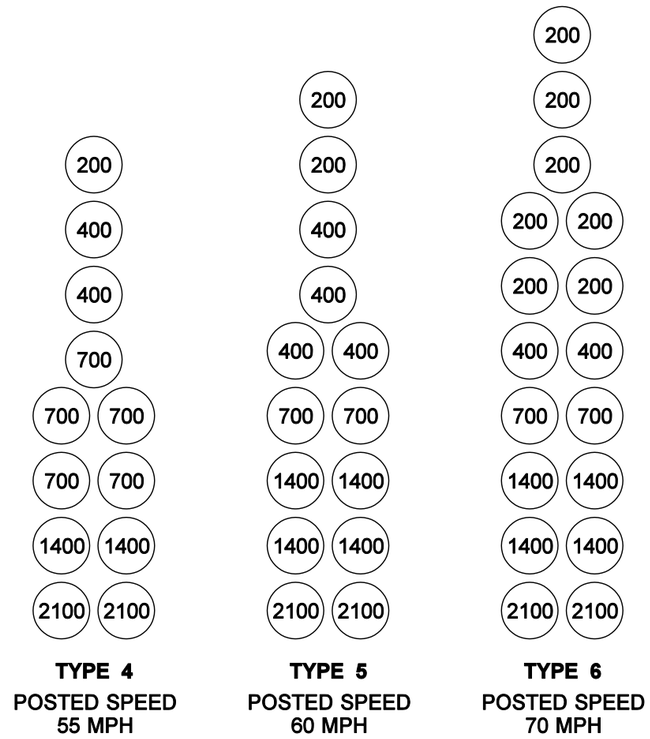

**TYPE 1**
POSTED SPEED
40 MPH OR LESS




**TYPE 2**
POSTED SPEED
45 MPH




**TYPE 3**
POSTED SPEED
50 MPH




**TYPE 4**
POSTED SPEED
55 MPH




**TYPE 5**
POSTED SPEED
60 MPH




**TYPE 6**
POSTED SPEED
70 MPH

## ATTENUATOR CONFIGURATIONS

**NOTES**

1. An Energite III System, fabricated by Energy Absorption Systems , Inc., a Fitch System as fabricated by Roadway Safety Service, Inc., or a Traffix Sand Attenuator as fabricated by Traffix 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.

CLIFFORD E. MANSFIELD
STATE OF WASHINGTON
15224
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2002

# IMPACT ATTENUATOR INERTIAL BARRIER CONFIGURATIONS
# STANDARD PLAN C-12

*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.*

| DATE | REVISION | BY |
|---|---|---|
| 7/01 | CORRECTED GORE INSTALLATION DETAIL | MAS |

APPROVED FOR PUBLICATION

*Clifford E. Mansfield* *07-27-01*
STATE DESIGN ENGINEER DATE

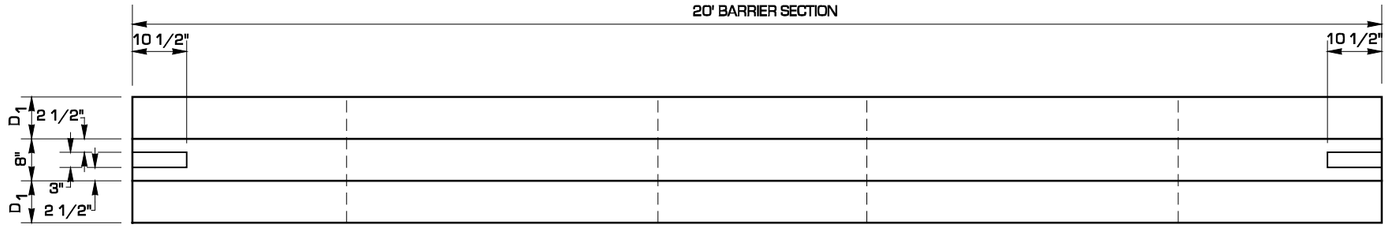
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

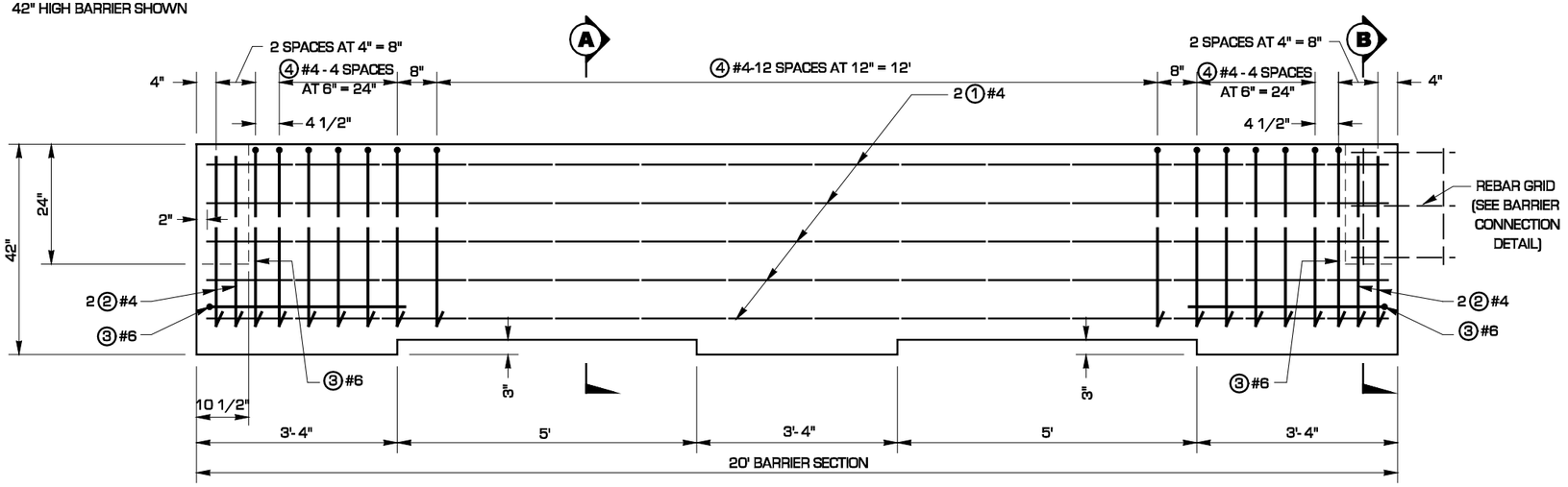
THOMAS SHEA

## PLAN VIEW




## ELEVATION VIEW

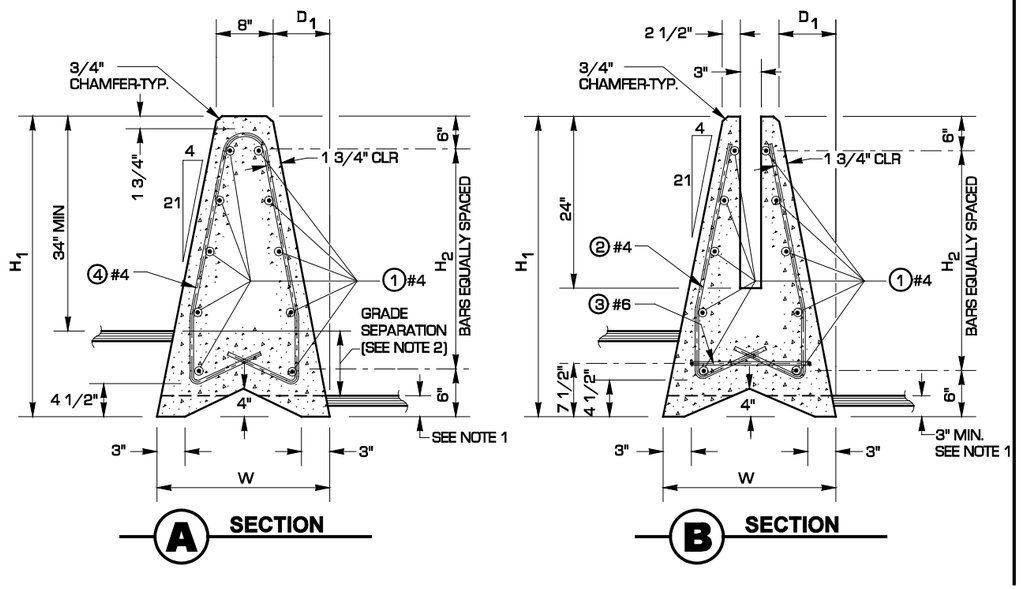
42" HIGH BARRIER SHOWN



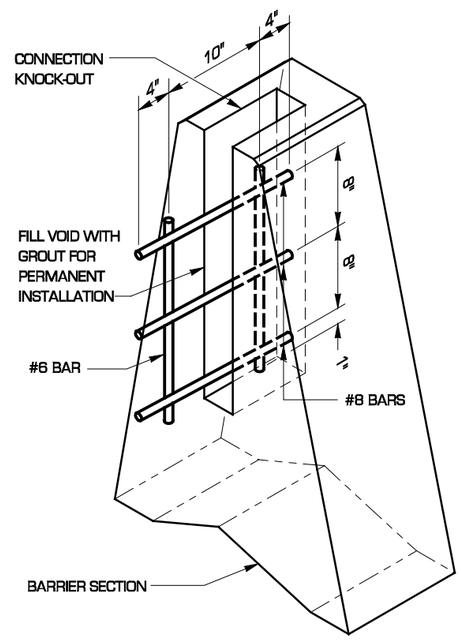

## NOTES

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 5".
   USE 48" BARRIER FOR GRADE SEPARATIONS UP TO 7".
   USE 54" BARRIER FOR GRADE SEPARATIONS UP TO 10".
3. USE ON A HORIZONTAL CURVE WITH RADII LESS THAN 2000' REQUIRES A MODIFIED END DESIGN.

## SECTIONS




## BARRIER CONNECTION DETAIL




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CLIFFORD E. MANSFIELD
STATE OF WASHINGTON
15224
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2000

# SINGLE SLOPE BARRIER PRE-CAST TYPE

# STANDARD PLAN C-13

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Clifford E. Mansfield* — *04-16-99*

DEPUTY STATE DESIGN ENGINEER — DATE

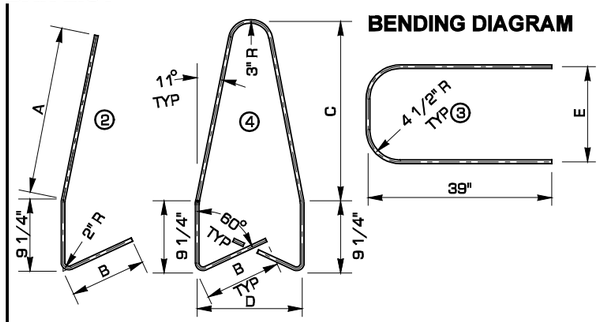
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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## BAR LIST

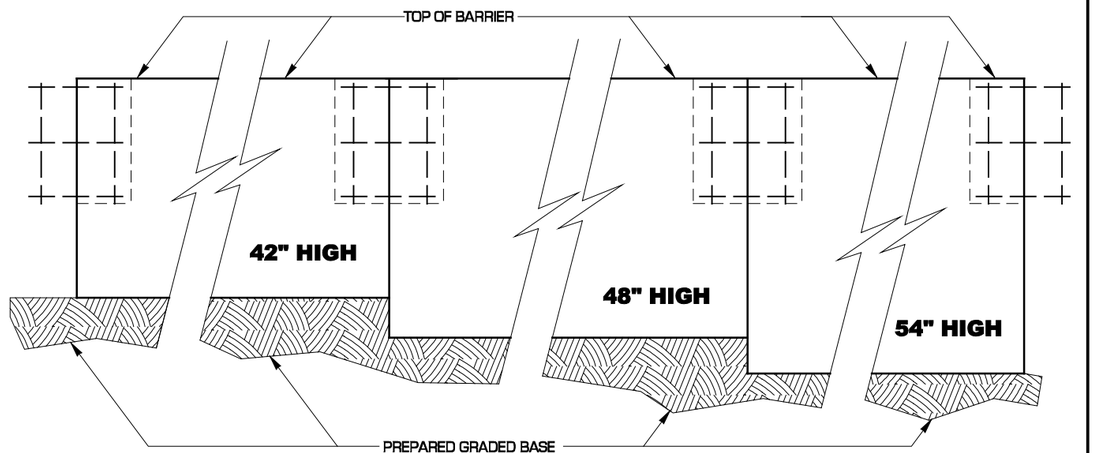
### BENDING DIAGRAM




REINFORCING STEEL FOR ONE 20' LONG SECTION

| $H_1$ | MARK | SIZE | No. | LENGTH | A | B | C | D | E |
|---|---|---|---|---|---|---|---|---|---|
| 42" | 1 | #4 | 10 | 19'- 8" | - | - | - | - | - |
| | 2 | #4 | 8 | 41.3" | 24" | 10" | - | - | - |
| | 3 | #6 | 2 | 90.1" | - | - | - | - | 16.1" |
| | 4 | #4 | 25 | 67" | - | 10" | 26.8" | 15" | - |
| | H1 | - | - | 42" | - | - | - | - | - |
| | H2 | - | - | 30" | - | - | - | - | - |
| | W | - | - | 24" | - | - | - | - | - |
| | D1 | - | - | 8" | - | - | - | - | - |
| 48" | 1 | #4 | 12 | 19'- 8" | - | - | - | - | - |
| | 2 | #4 | 8 | 50.4" | 31.1" | 12" | - | - | - |
| | 3 | #6 | 2 | 93.7" | - | - | - | - | 17.7" |
| | 4 | #4 | 25 | 104" | - | 12" | 33.5" | 17" | - |
| | H1 | - | - | 48" | - | - | - | - | - |
| | H2 | - | - | 36" | - | - | - | - | - |
| | W | - | - | 26" | - | - | - | - | - |
| | D1 | - | - | 9.1" | - | - | - | - | - |
| 54" | 1 | #4 | 14 | 19'- 8" | - | - | - | - | - |
| | 2 | #4 | 8 | 57.9" | 37.6" | 13" | - | - | - |
| | 3 | #6 | 2 | 97.3" | - | - | - | - | 21.1" |
| | 4 | #4 | 25 | 119" | - | 13" | 40" | 20.3": | - |
| | H1 | - | - | 54" | - | - | - | - | - |
| | H2 | - | - | 42" | - | - | - | - | - |
| | W | - | - | 28.6" | - | - | - | - | - |
| | D1 | - | - | 10.3" | - | - | - | - | - |

## BARRIER TRANSITION DETAIL







EXPIRES MAY 3, 2000

# SINGLE SLOPE BARRIER PRE-CAST TYPE

# STANDARD PLAN C-13

SHEET 2 OF 2 SHEETS

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*Clifford E. Mansfield* *04-16-99*

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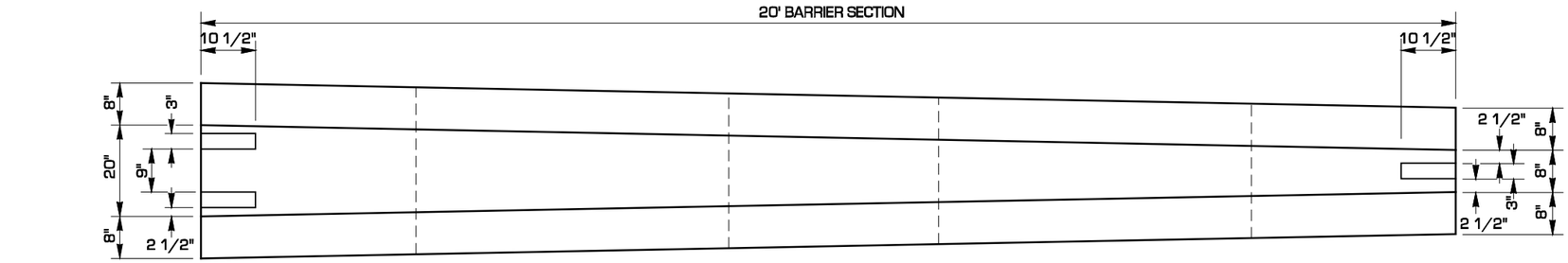
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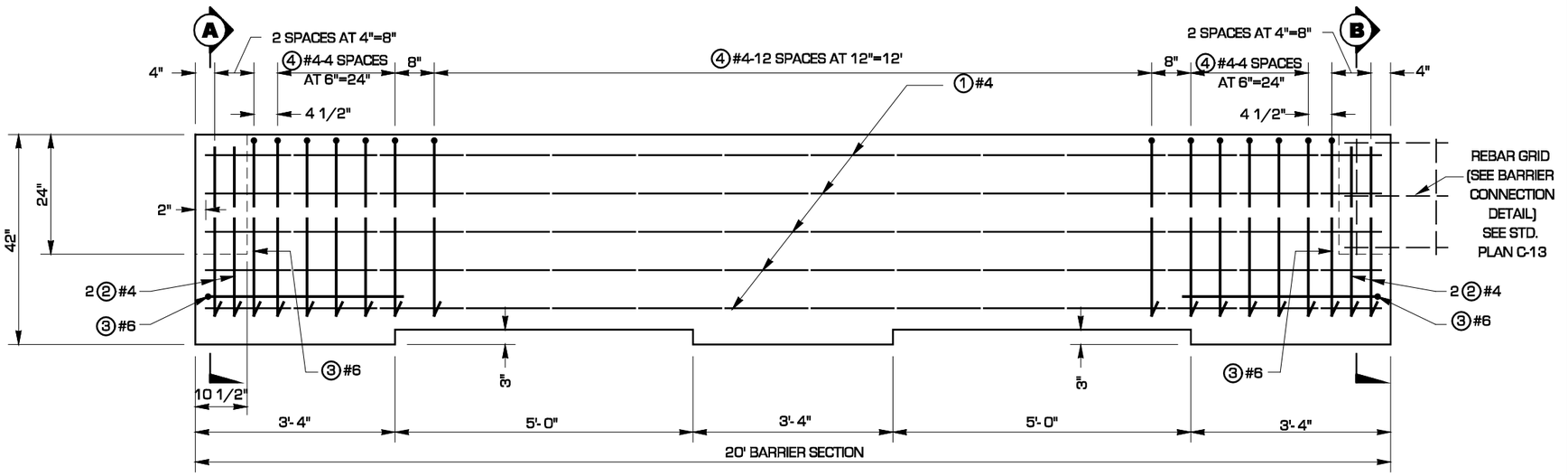
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

THOMAS SHEA

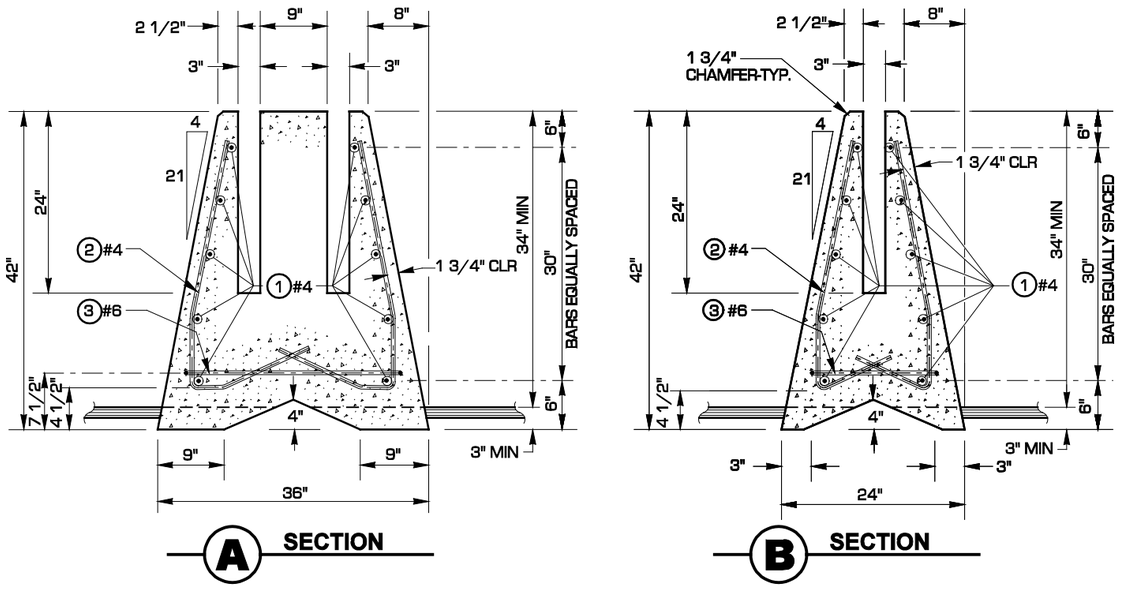
## PLAN VIEW



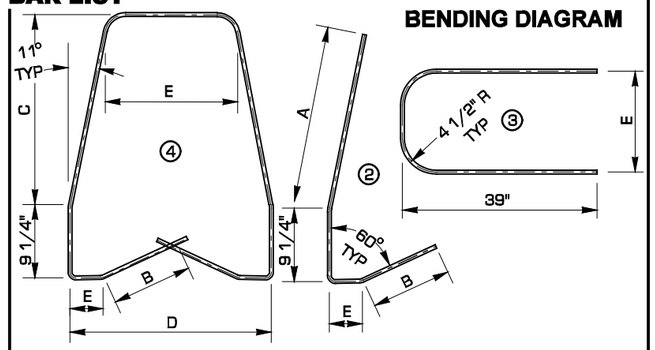

## ELEVATION VIEW




## SECTIONS




## BAR LIST




| MARK | SIZE | No. | LENGTH | A | B | C | D | E |
|---|---|---|---|---|---|---|---|---|
| 1 | #4 | 10 | 19'-8" STR. | - | - | - | - | - |
| 2 | #4 | 8 | VARIES | 24" | VARIES | - | - | VARIES |
| 3 | #6 | 2 | VARIES | - | - | - | - | VARIES |
| 4 | #4 | 25 | VARIES | - | VARIES | 26.8" | VARIES | VARIES |

CLIFFORD E. MANSFIELD
STATE OF WASHINGTON
15224
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2000

# SINGLE SLOPE BARRIER PRE-CAST TYPE TRANSITION SECTION

# STANDARD PLAN C-13a

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*Clifford E. Mansfield* — DEPUTY STATE DESIGN ENGINEER

*04-16-99* — DATE

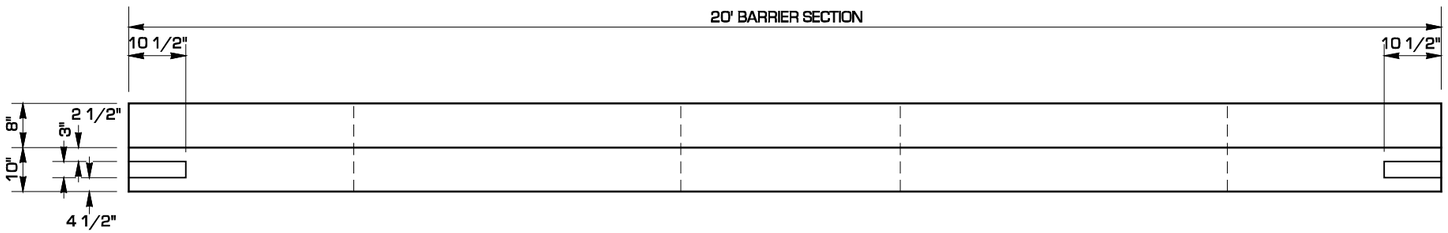
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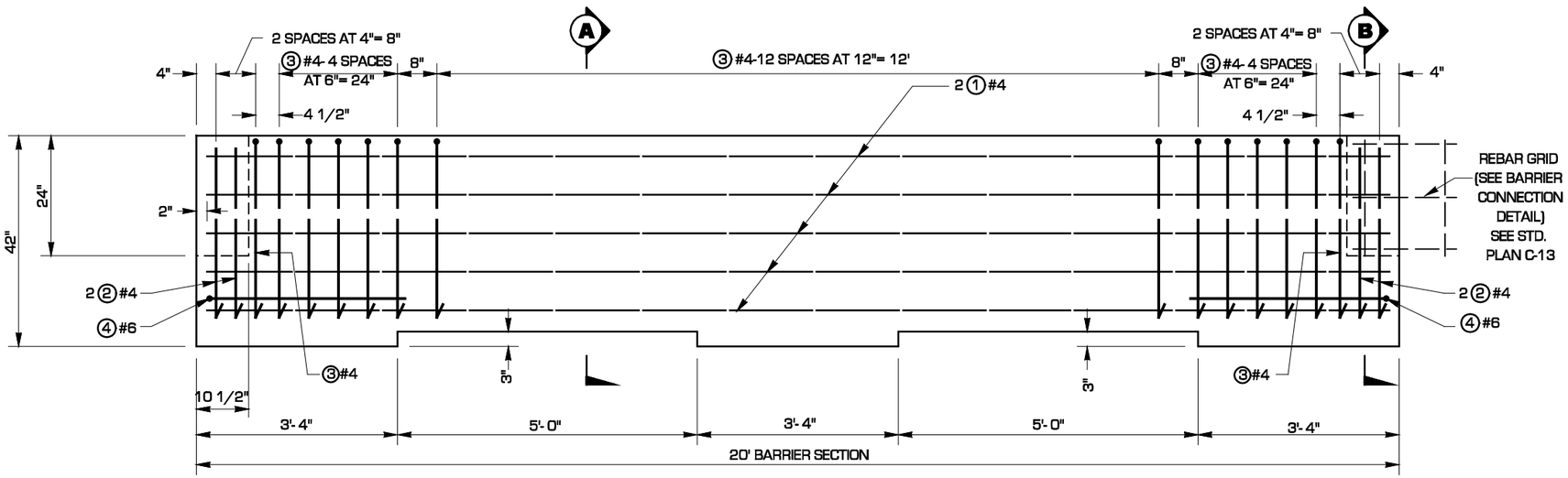
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

THOMAS SHEA

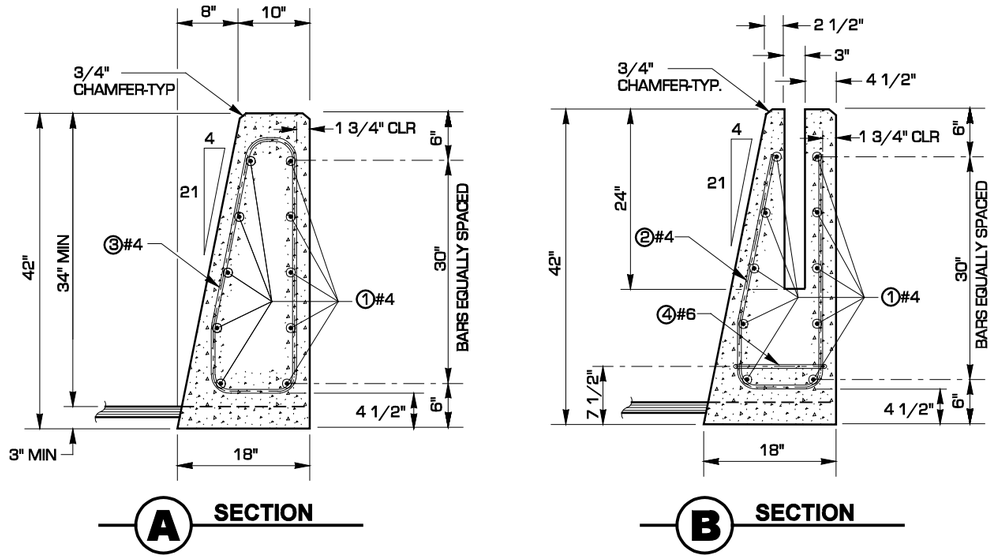
## PLAN VIEW




## ELEVATION VIEW

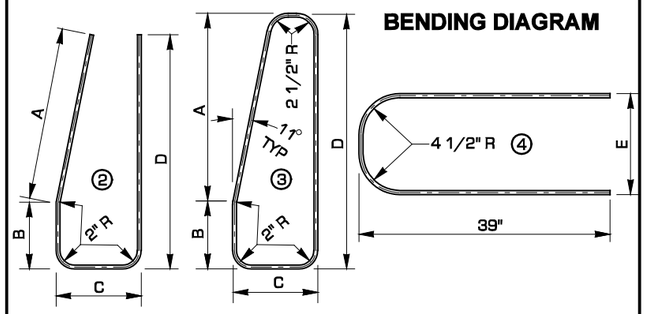



## SECTIONS




## BAR LIST

BENDING DIAGRAM




| | MARK | SIZE | No. | LENGTH | A | B | C | D | E |
|---|---|---|---|---|---|---|---|---|---|
| 42" | 1 | #4 | 10 | 19'-8" str. | - | - | - | - | - |
| | 2 | #4 | 8 | 70.5" | 22.8" | 8" | 9.5" | 30" | - |
| | 3 | #4 | 25 | 78.7 | 26.6" | 8" | 9.5" | 32" | - |
| | 4 | #6 | 2 | 84.3" | - | - | - | - | 9.5" |

CLIFFORD E. MANSFIELD — STATE OF WASHINGTON — 15224 — REGISTERED PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2000

# SINGLE SLOPE BARRIER PRE-CAST TYPE SINGLE SIDED SECTION STANDARD PLAN C-13b

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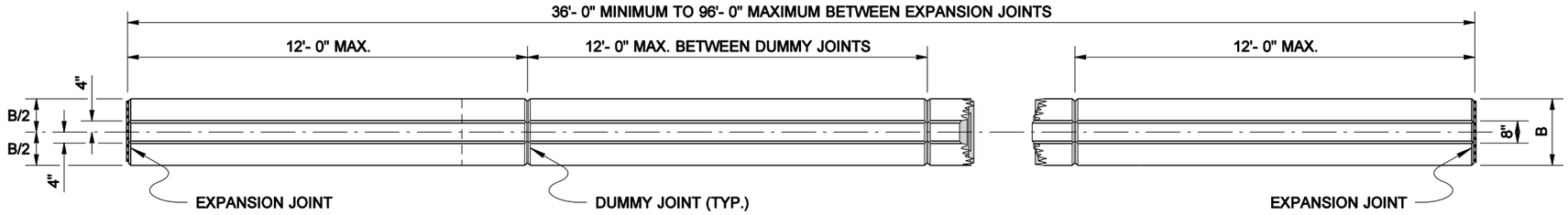
APPROVED FOR PUBLICATION

*Clifford E. Mansfield* — *04-16-99*

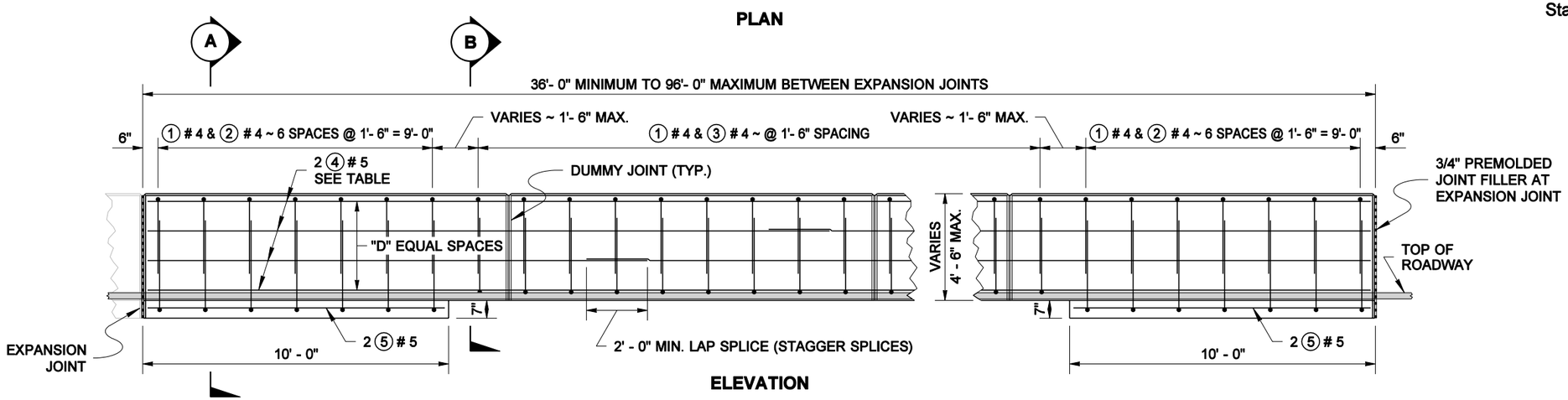
DEPUTY STATE DESIGN ENGINEER — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

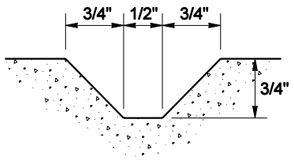
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



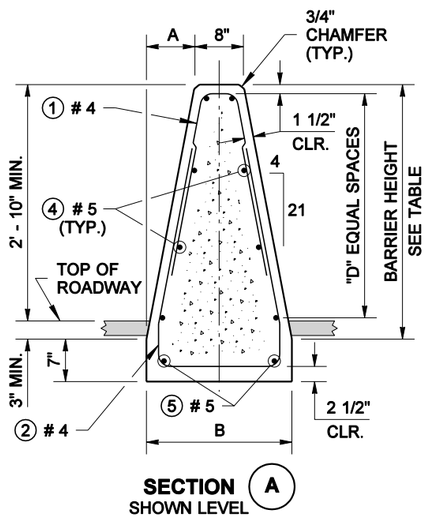

PLAN



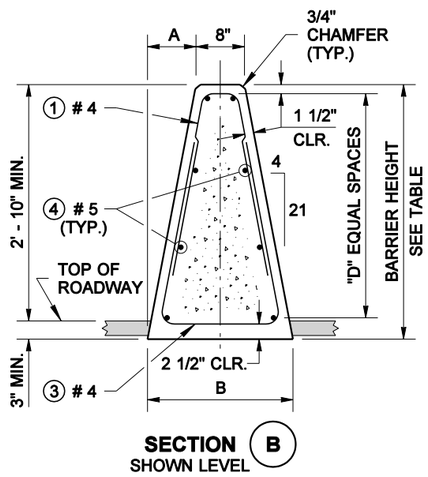

ELEVATION



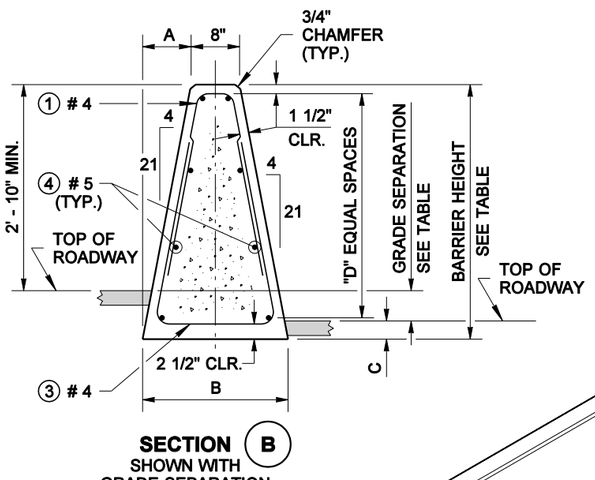

DUMMY JOINT




SECTION (A)
SHOWN LEVEL




SECTION (B)
SHOWN LEVEL




SECTION (B)
SHOWN WITH
GRADE SEPARATION

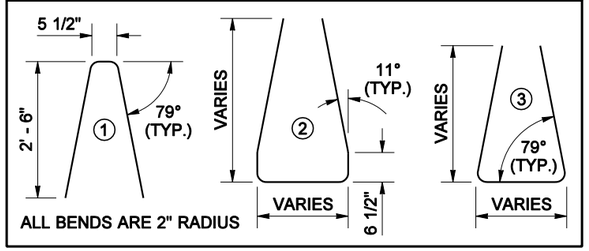



ISOMETRIC VIEW

## 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.

## REINFORCING STEEL BENDING DIAGRAM




## DIMENSION TABLE

| GRADE SEPARATION | BARRIER HEIGHT | A | B | C | D | HORIZONTAL BARS (QTY.) |
|---|---|---|---|---|---|---|
| 0 TO 5" | 3' - 6" | 8" | 2' - 0" | 3" | 3 | 8 |
| UP TO 7" | 4' - 0" | 9 1/8" | 2' - 2 1/4" | 7" | 4 | 10 |
| UP TO 10" | 4' - 6" | 10 1/4" | 2' - 4 1/2" | 10" | 5 | 12 |

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
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EXPIRES JULY 24, 2004

# SINGLE SLOPE CONCRETE BARRIER (DUAL FACE) STANDARD PLAN C-14a

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* 07-26-02

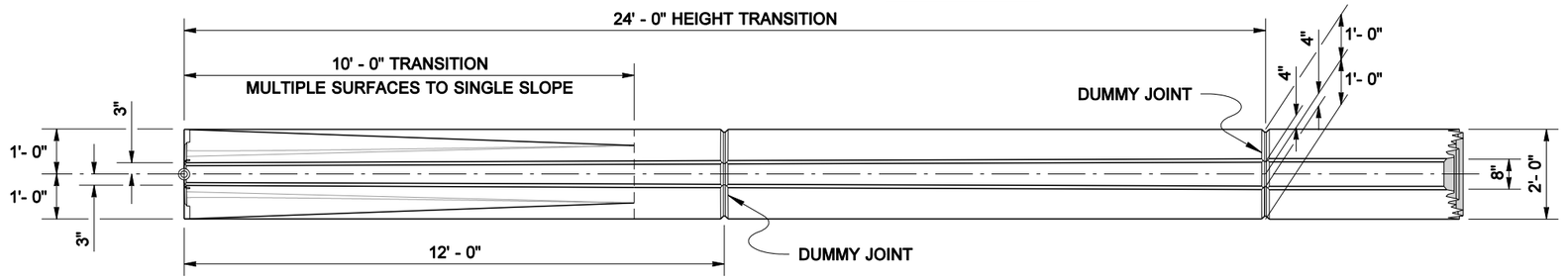
STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

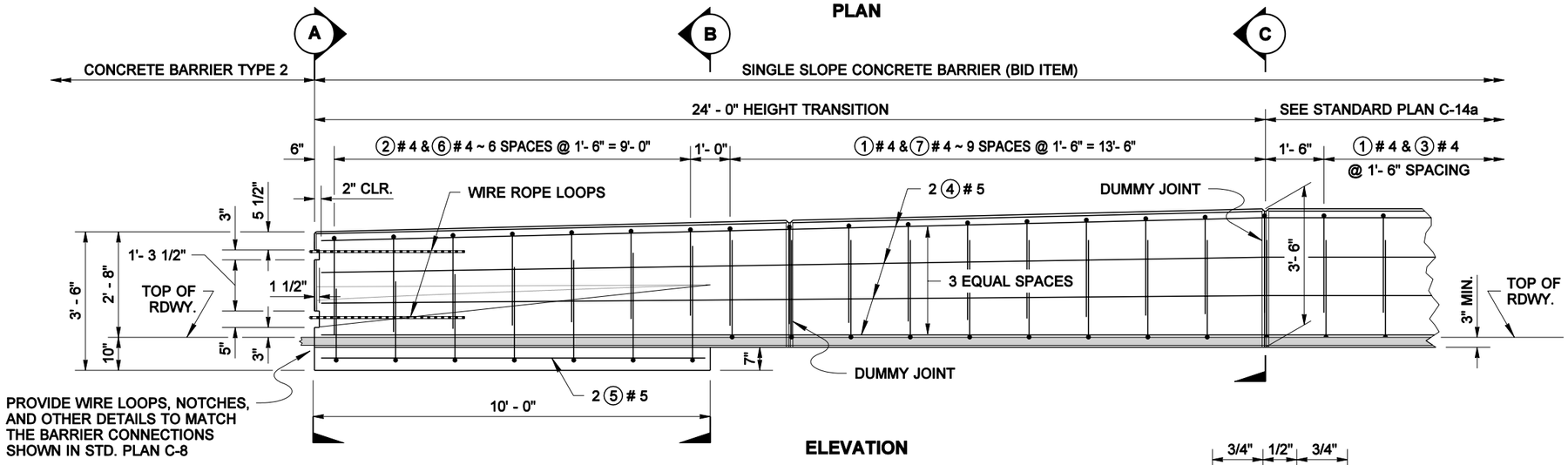
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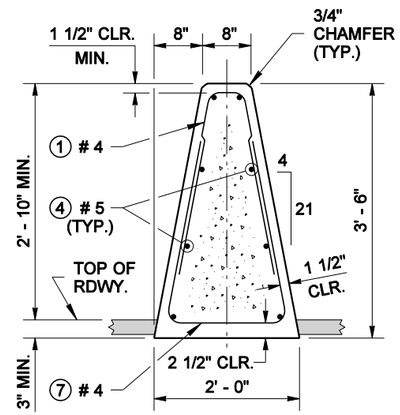

PLAN



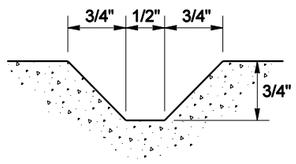

ELEVATION

**NOTE**

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




SECTION C

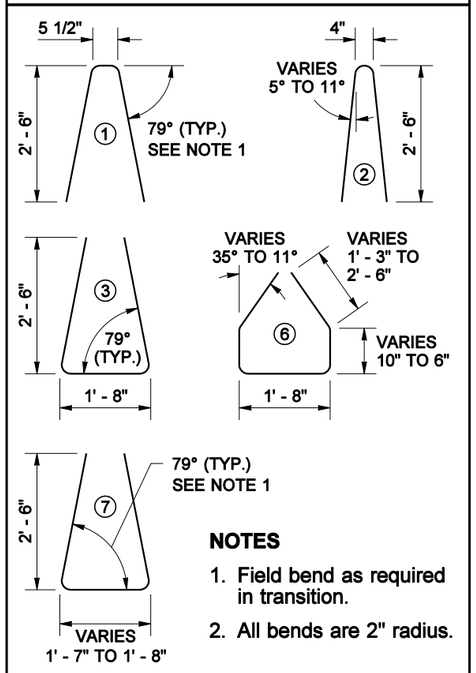



DUMMY JOINT



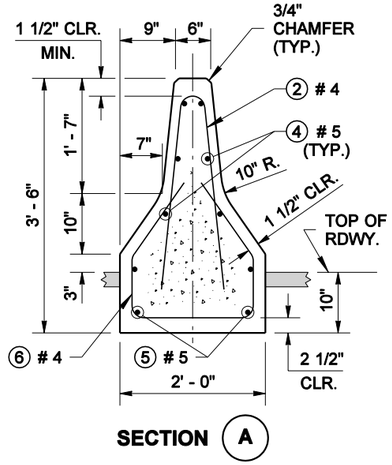
ISOMETRIC VIEW

## REINFORCING STEEL BENDING DIAGRAM

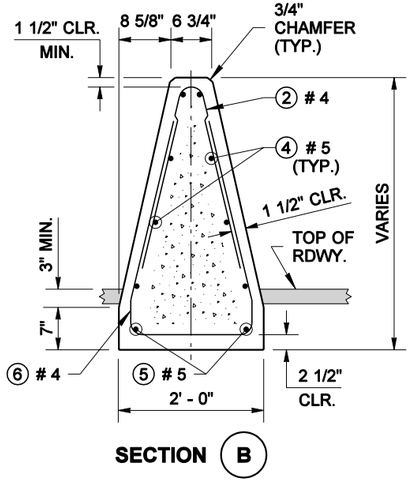



**NOTES**

1. Field bend as required in transition.
2. All bends are 2" radius.




SECTION A




SECTION B




EXPIRES JULY 24, 2004

# CONCRETE BARRIER TRANSITION TYPE 2 TO SINGLE SLOPE STANDARD PLAN C-14b

SHEET 1 OF 1 SHEET

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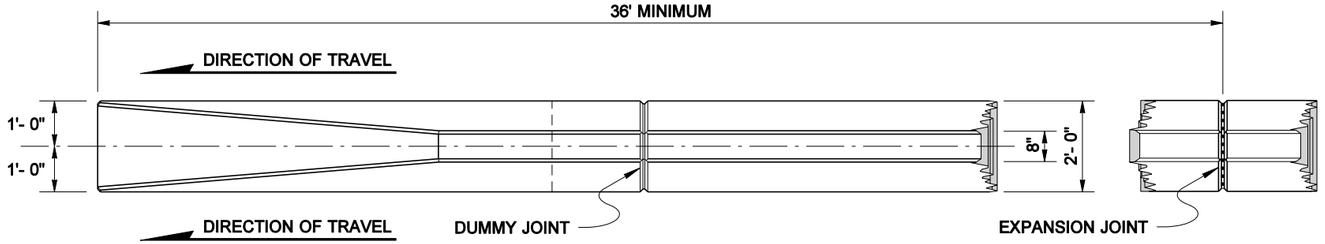
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *07-26-02* — DATE

Washington State Department of Transportation

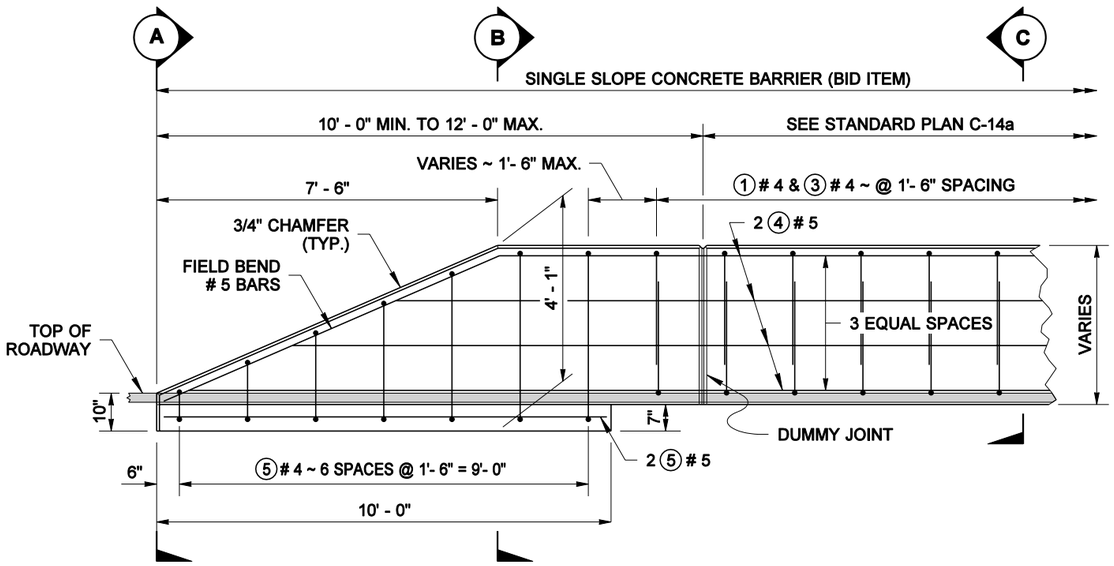
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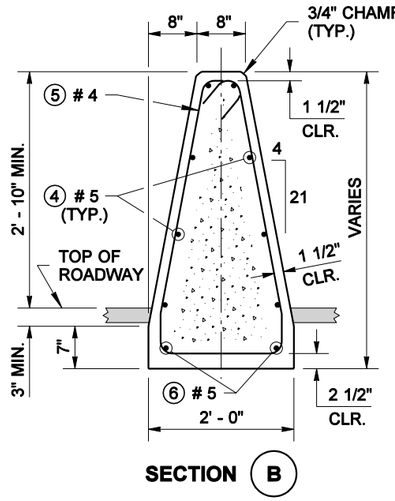

PLAN



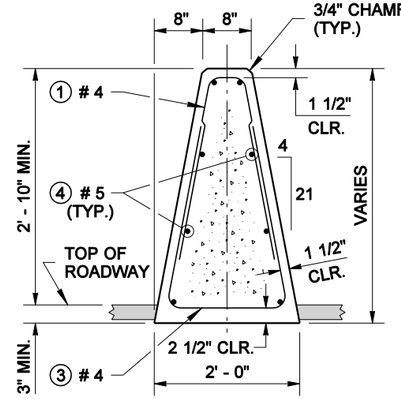

ELEVATION

**NOTE**

The Barrier Terminal is only used on the trailing end of a barrier separating two roadways with the same direction of travel.



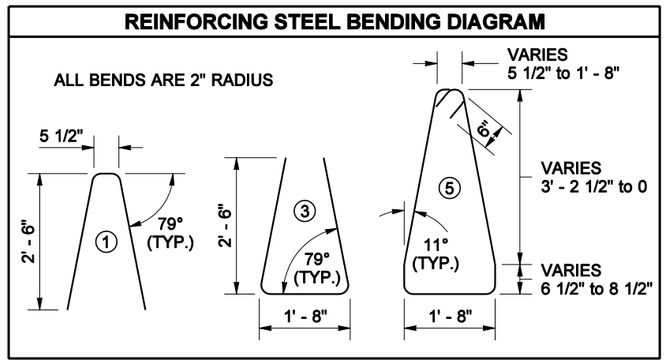

SECTION (B)

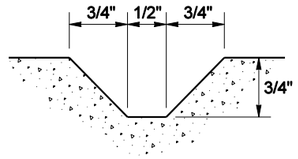



SECTION (C)




SECTION (A)




DUMMY JOINT



ISOMETRIC VIEW




EXPIRES JULY 24, 2004

# SINGLE SLOPE CONCRETE BARRIER TERMINAL

## STANDARD PLAN C-14c

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* 07-26-02

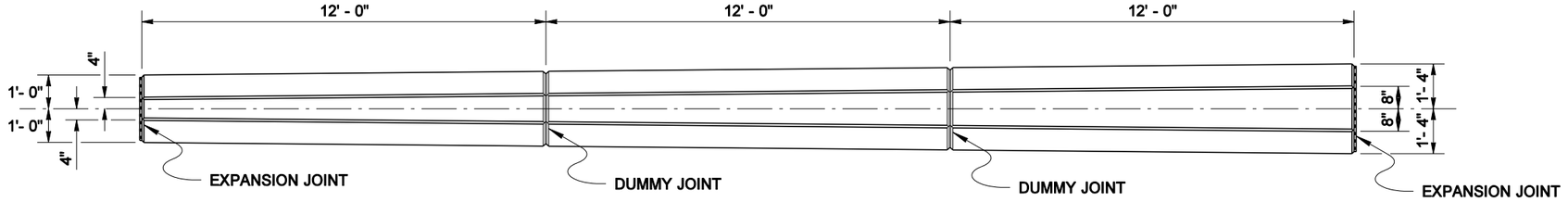
STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

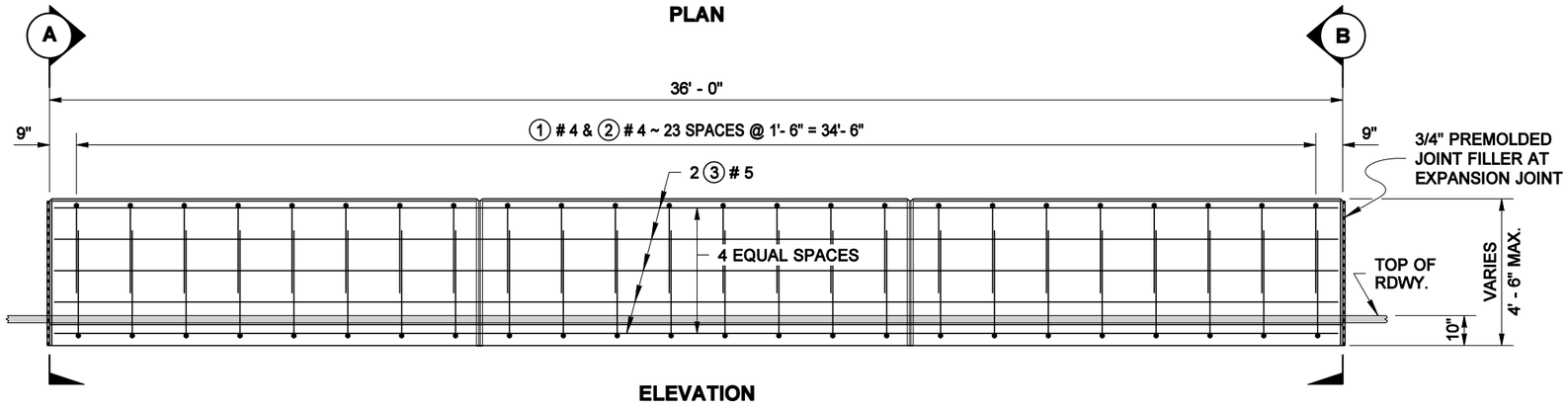
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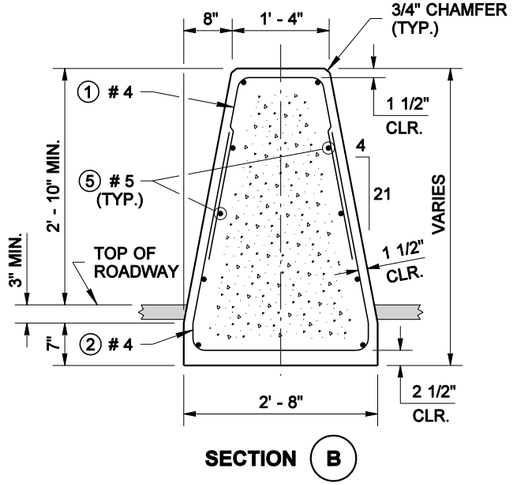
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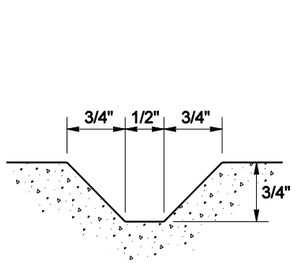

PLAN



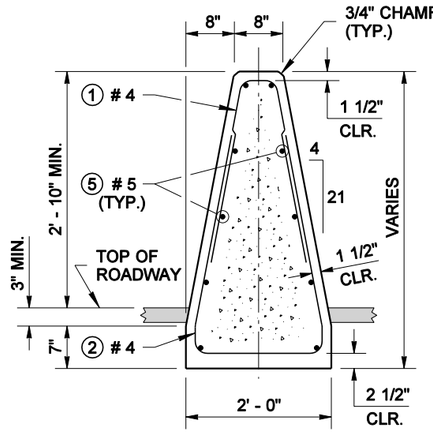

ELEVATION



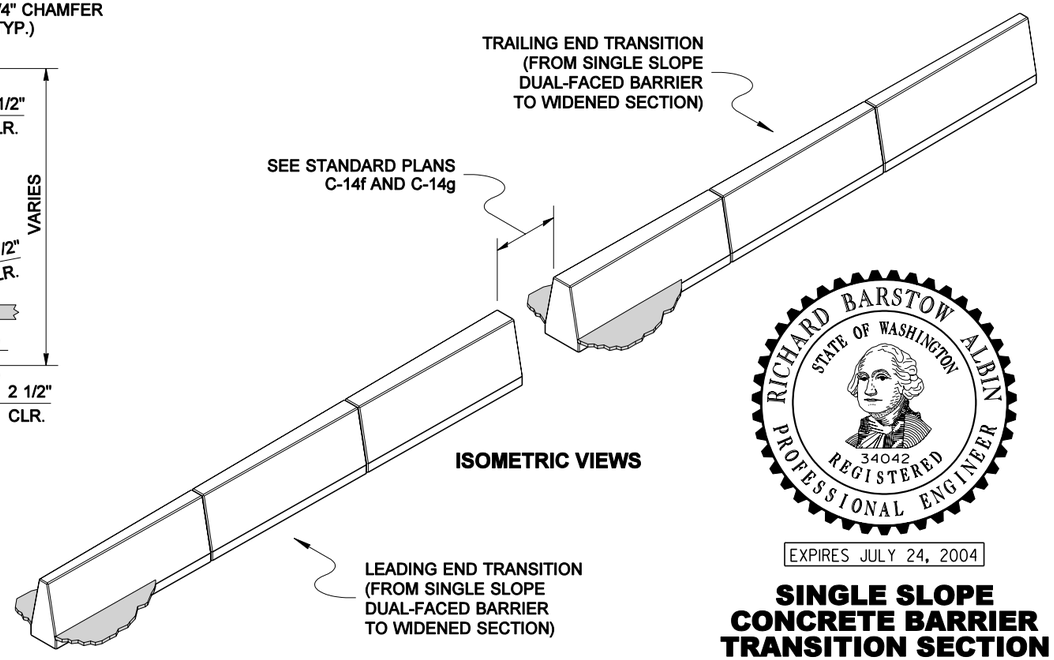

SECTION (B)




DUMMY JOINT



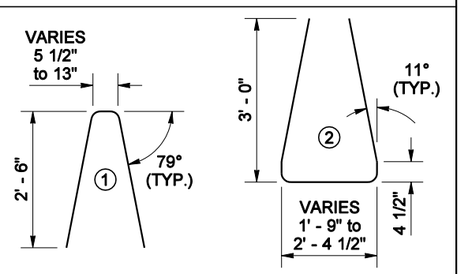

SECTION (A)




ISOMETRIC VIEWS

**BAR LIST**

| MARK | LOCATION | QTY. | SIZE | BENDING DIAGRAM |
|---|---|---|---|---|
| ① | BARRIER ~ TOP VERTICAL | 24 | 4 | |
| ② | BARRIER ~ BOTTOM VERTICAL | 24 | 4 | |
| ③ | BARRIER ~ HORIZONTAL | 10 | 5 | |




ALL BENDS ARE 2" RADIUS
ALL DIMENSIONS ARE OUT TO OUT

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2004

# SINGLE SLOPE CONCRETE BARRIER TRANSITION SECTION
# STANDARD PLAN C-14d

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

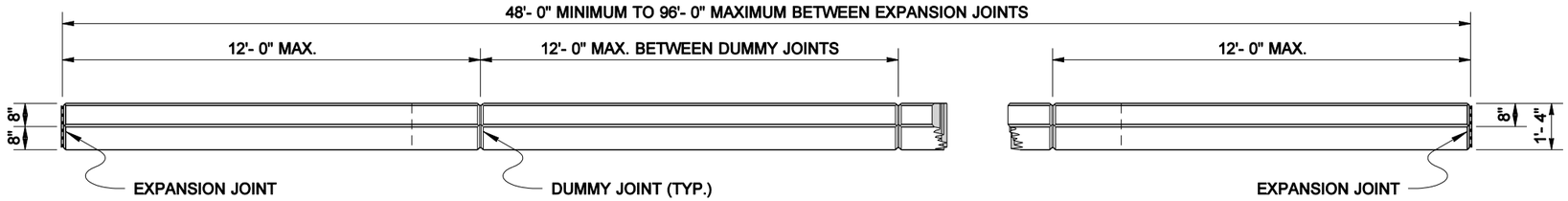
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *07-26-02* — DATE

Washington State Department of Transportation

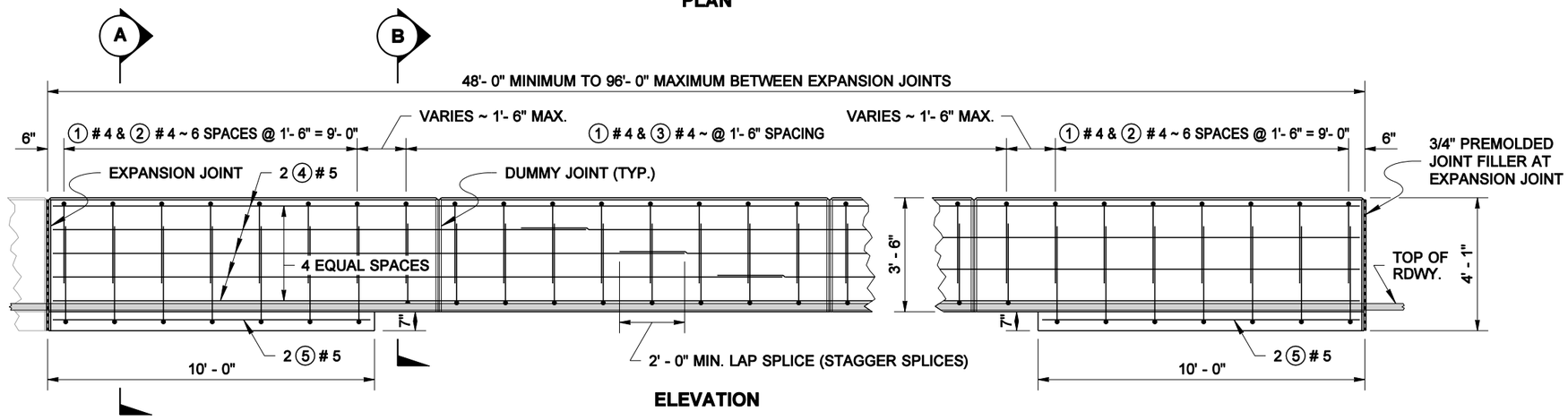
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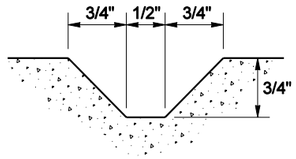
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



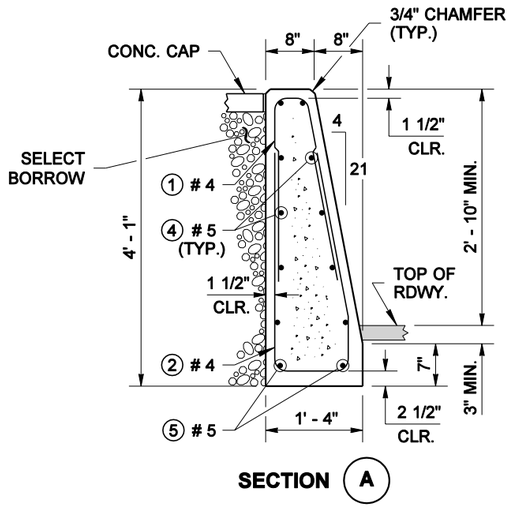

PLAN



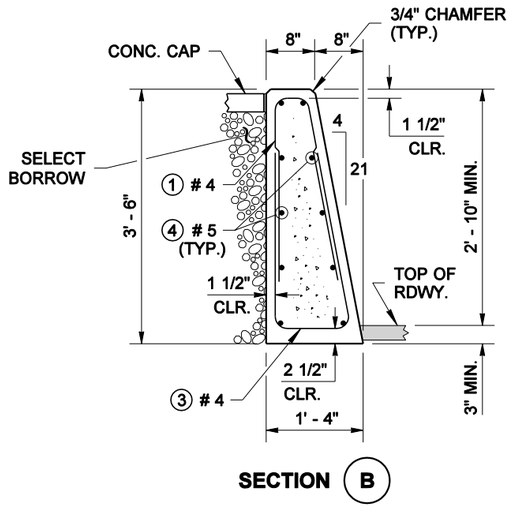

ELEVATION



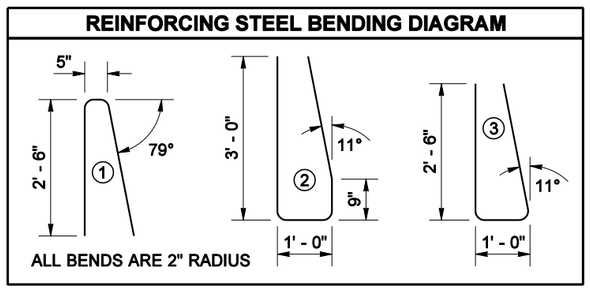

DUMMY JOINT

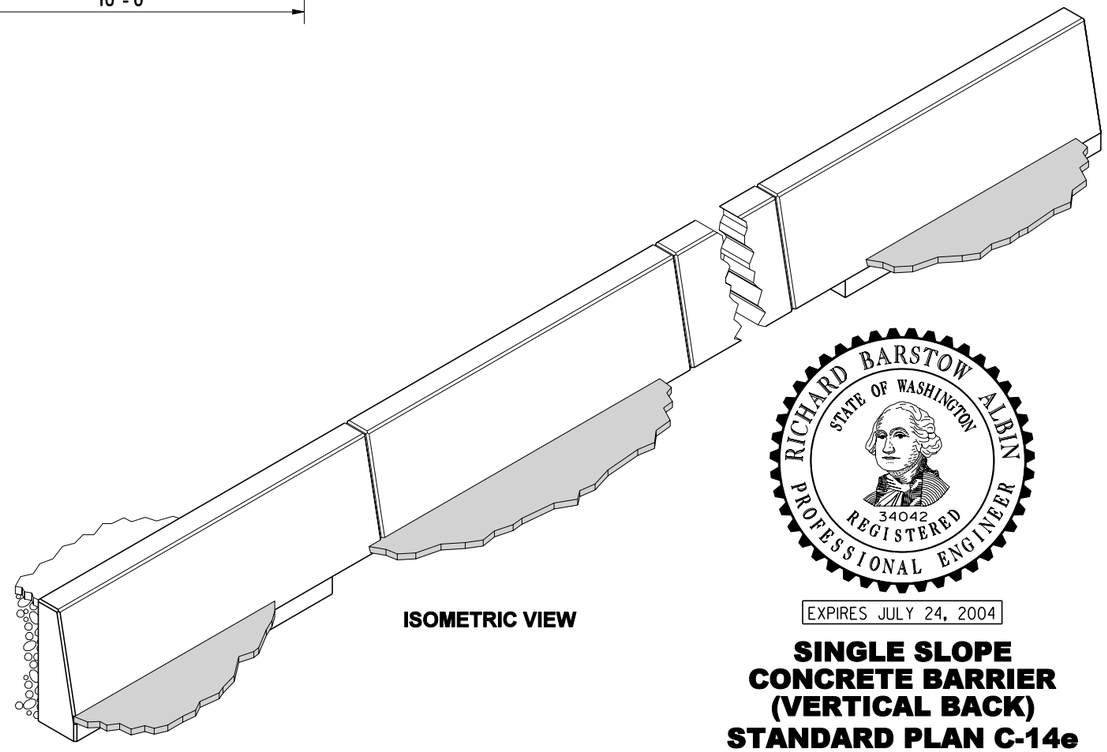



SECTION (A)




SECTION (B)



ISOMETRIC VIEW

**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.

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EXPIRES JULY 24, 2004

# SINGLE SLOPE CONCRETE BARRIER (VERTICAL BACK) STANDARD PLAN C-14e

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *07-26-02* — DATE

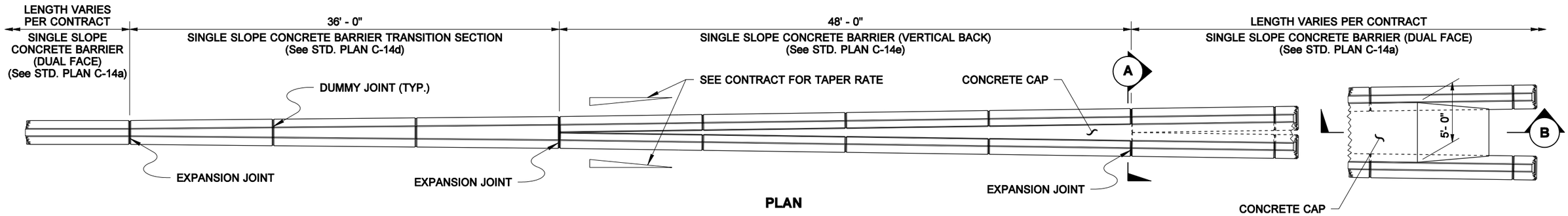
Washington State Department of Transportation

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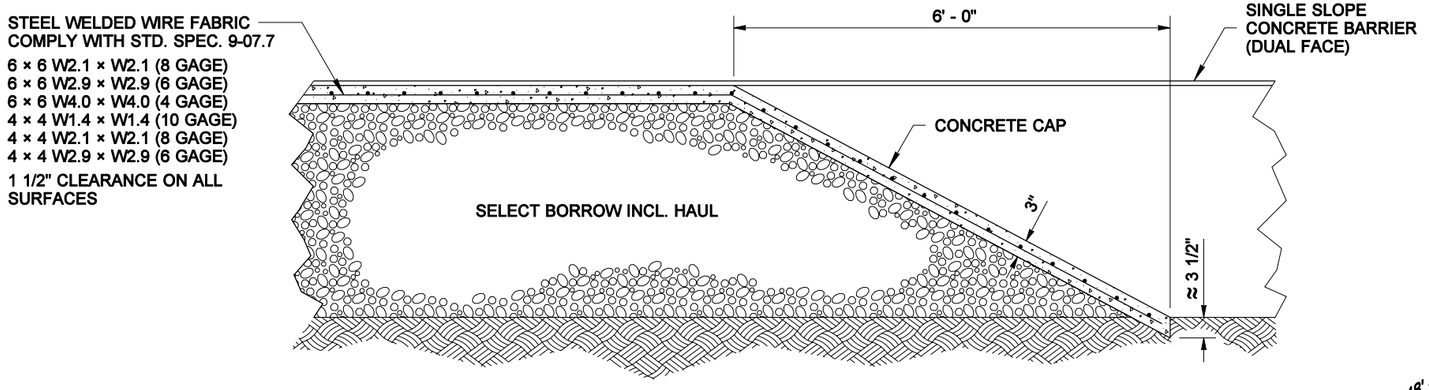
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

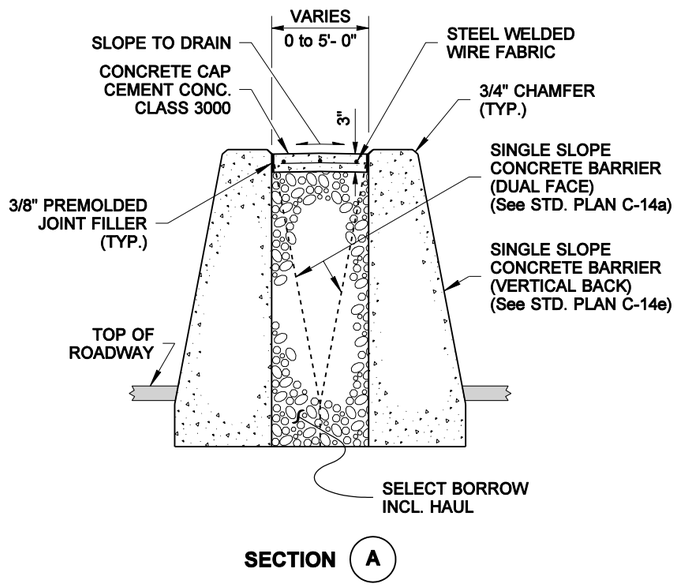
DRAWN BY: MARK SUJKA




PLAN




SECTION (B)




SECTION (A)




ISOMETRIC VIEW

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STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# SINGLE SLOPE CONCRETE BARRIER PLACEMENT
# STANDARD PLAN C-14f

SHEET 1 OF 1 SHEET

| DATE | REVISION | BY |
|---|---|---|
| 05/2005 | IN SECTION "A", REVISED REFERENCE TO STD. PLAN C-14e | MAS |

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* *09-02-05*

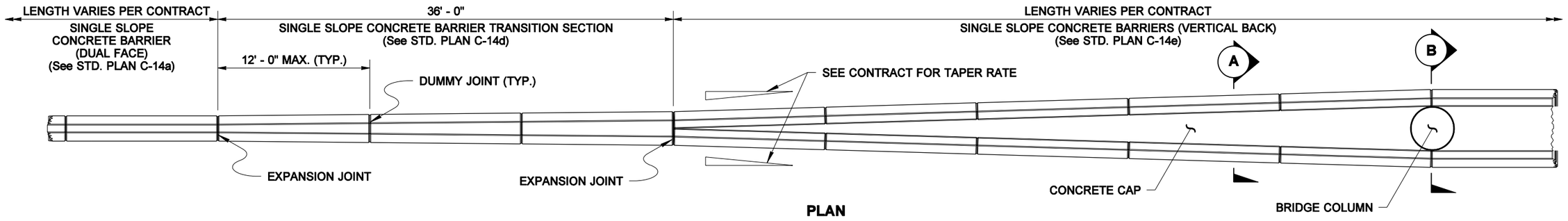
STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

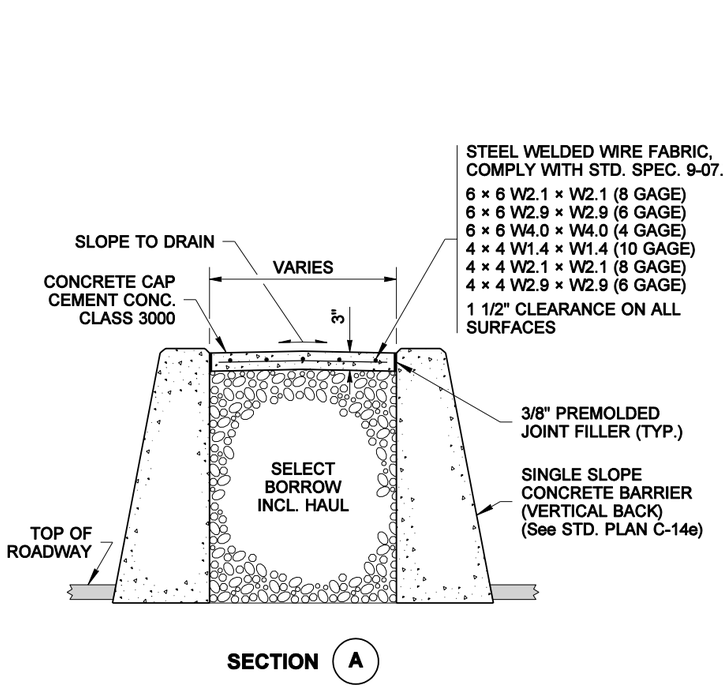
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

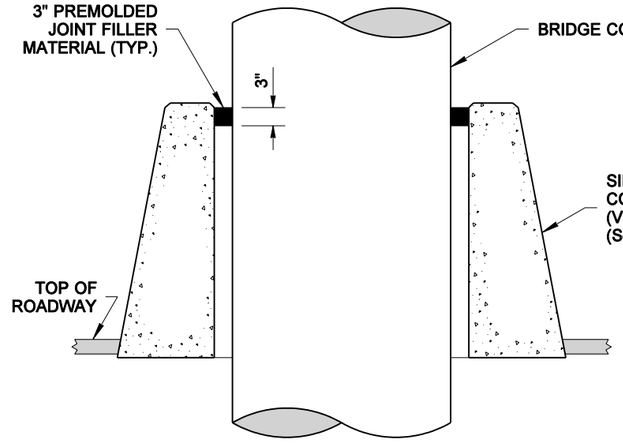
DRAWN BY: MARK SUJKA



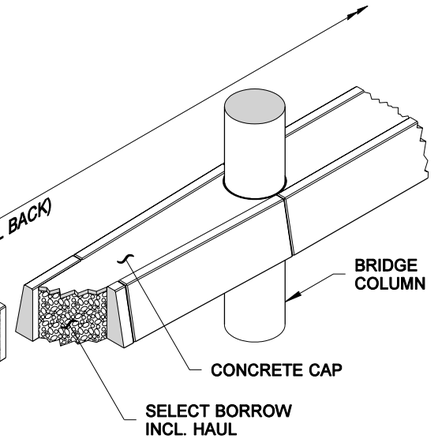

**PLAN**

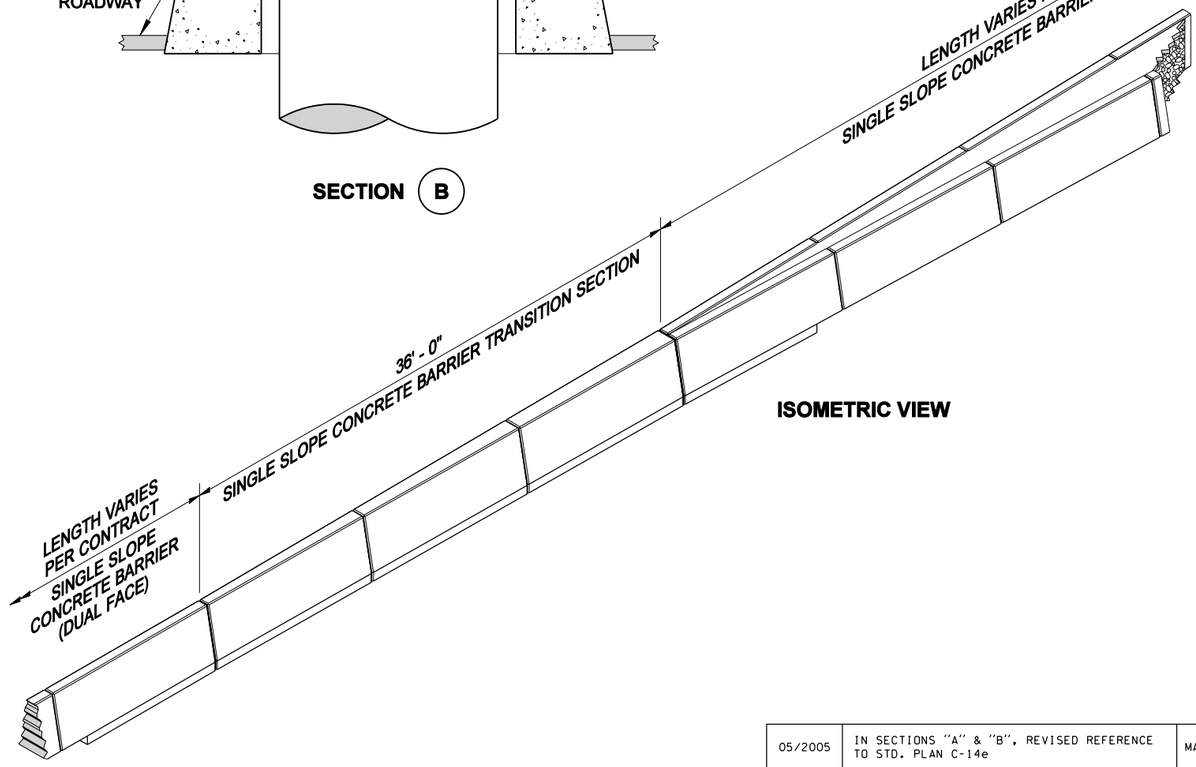



**SECTION (A)**




**SECTION (B)**




**ISOMETRIC VIEW**

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EXPIRES JULY 24, 2006

# SINGLE SLOPE CONCRETE BARRIER PLACEMENT
# STANDARD PLAN C-14g

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *09-02-05* DATE

Washington State Department of Transportation

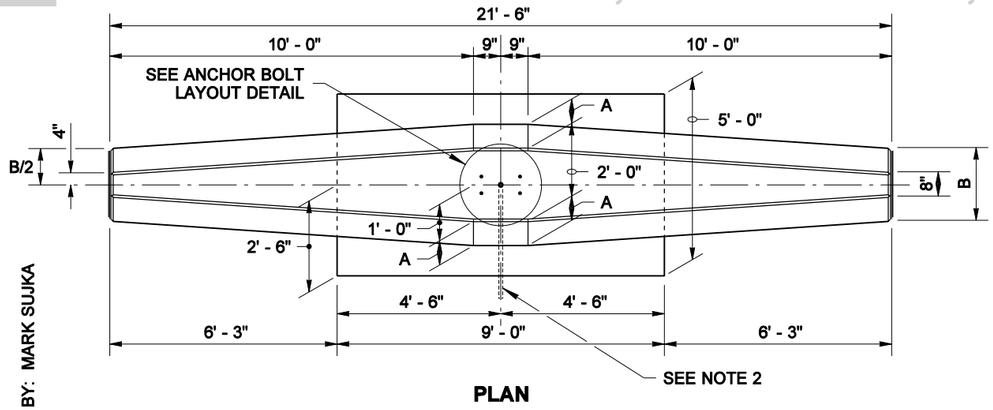
| DATE | REVISION | BY |
|---|---|---|
| 05/2005 | IN SECTIONS "A" & "B", REVISED REFERENCE TO STD. PLAN C-14e | MAS |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

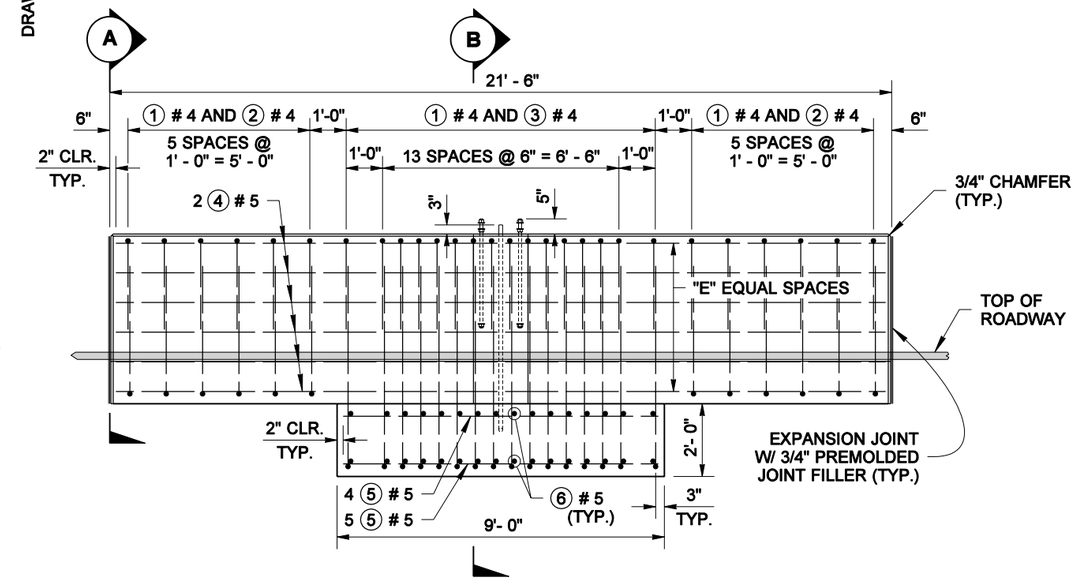
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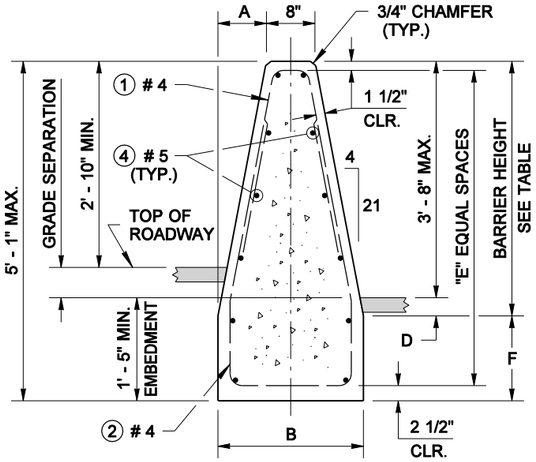
DRAWN BY: MARK SUJKA



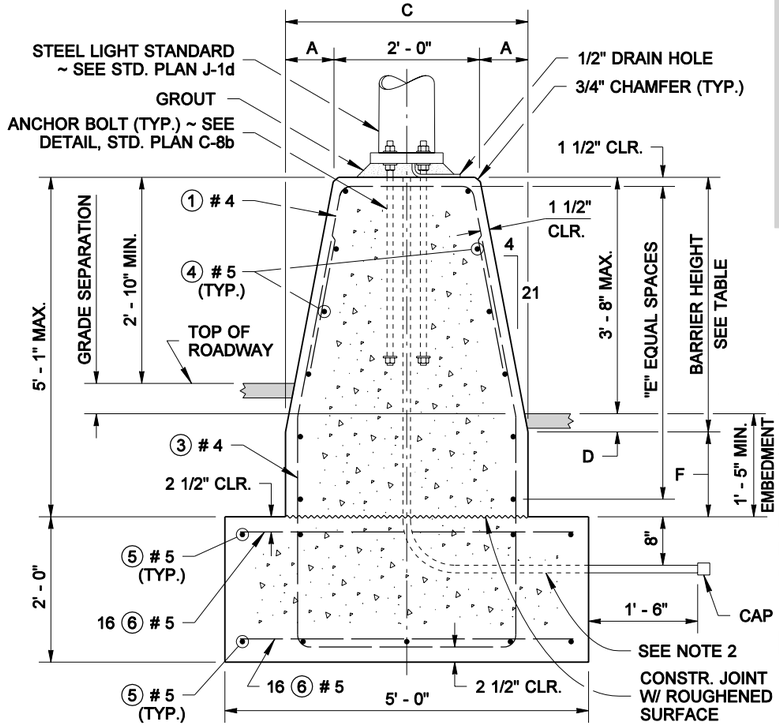

PLAN




ELEVATION




SECTION (A)




SECTION (B)

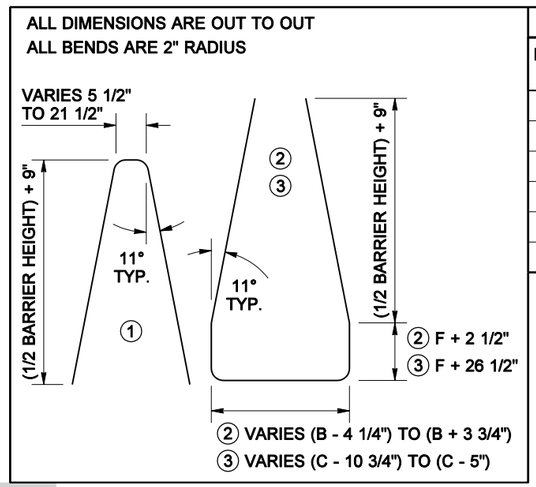



PLAN VIEW

ANCHOR BOLT LAYOUT DETAIL

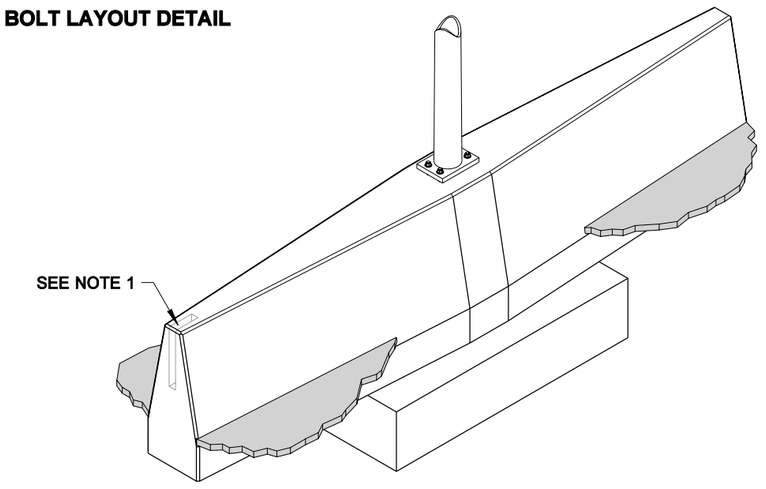
## NOTES

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.




| BAR LIST | | | |
|---|---|---|---|
| MARK NO. | LOCATION | SIZE | QUANTITY |
| ① | BARRIER ~ TOP VERTICAL | # 4 | 28 |
| ② | BARRIER ~ BOTTOM VERTICAL | # 4 | 12 |
| ③ | FND. & BARRIER ~ VERTICAL | # 4 | 16 |
| ④ | BARRIER ~ HORIZONTAL | # 5 | "Q" |
| ⑤ | FOUNDATION | # 5 | 9 |
| ⑥ | FOUNDATION | # 5 | 32 |

| TABLE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| GRADE SEPARATION | BARRIER HEIGHT | A | B | C | D | E | F | Q |
| 0 TO 5" | 3' - 6" | 8" | 2' - 0" | 3' - 4" | 3" MIN. | 5 | 1' - 2" | 12 |
| UP TO 7" | 4' - 0" | 9 1/8" | 2' - 2 1/4" | 3' - 6 1/4" | 7" MIN. | 5 | 10" | 12 |
| UP TO 10" | 4' - 6" | 10 1/4" | 2' - 4 1/2" | 3' - 8 1/2" | 10" MIN. | 6 | 7" | 14 |




ISOMETRIC VIEW




EXPIRES NOVEMBER 14, 2006

# SINGLE SLOPE CONCRETE BARRIER LIGHT STANDARD FOUNDATION STANDARD PLAN C-14h

SHEET 1 OF 1 SHEET

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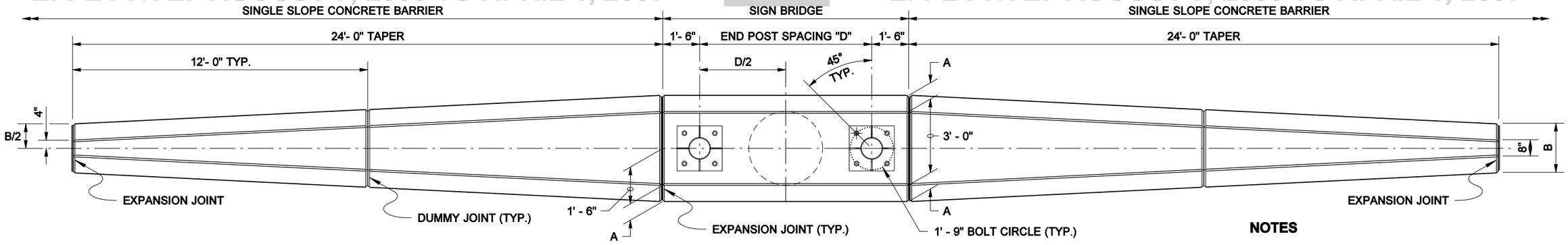
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *01-11-06* — DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

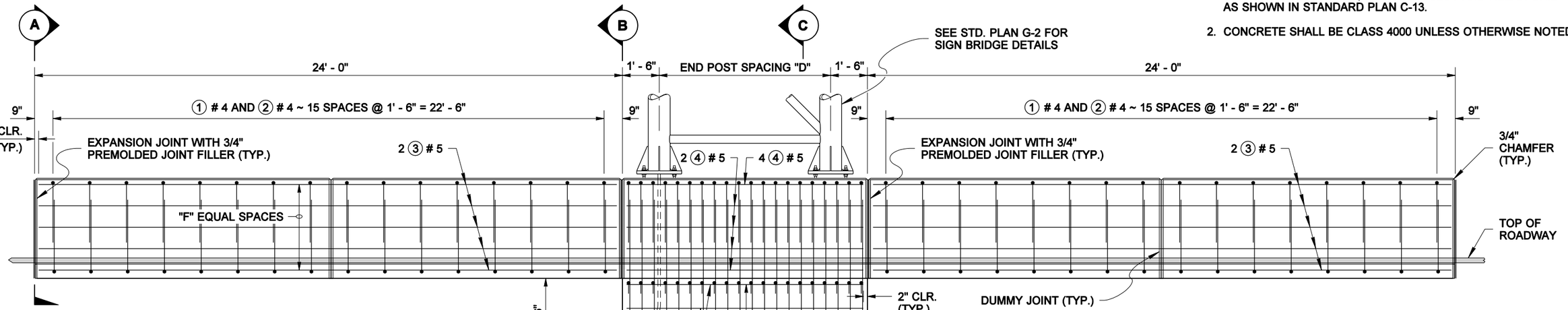
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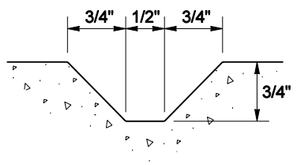

PLAN

## NOTES

1. WHEN CONNECTING BETWEEN CAST-IN-PLACE AND PRECAST SINGLE SLOPE BARRIER, PROVIDE A SLOT AND REBAR GRID AS SHOWN IN STANDARD PLAN C-13.
2. CONCRETE SHALL BE CLASS 4000 UNLESS OTHERWISE NOTED.



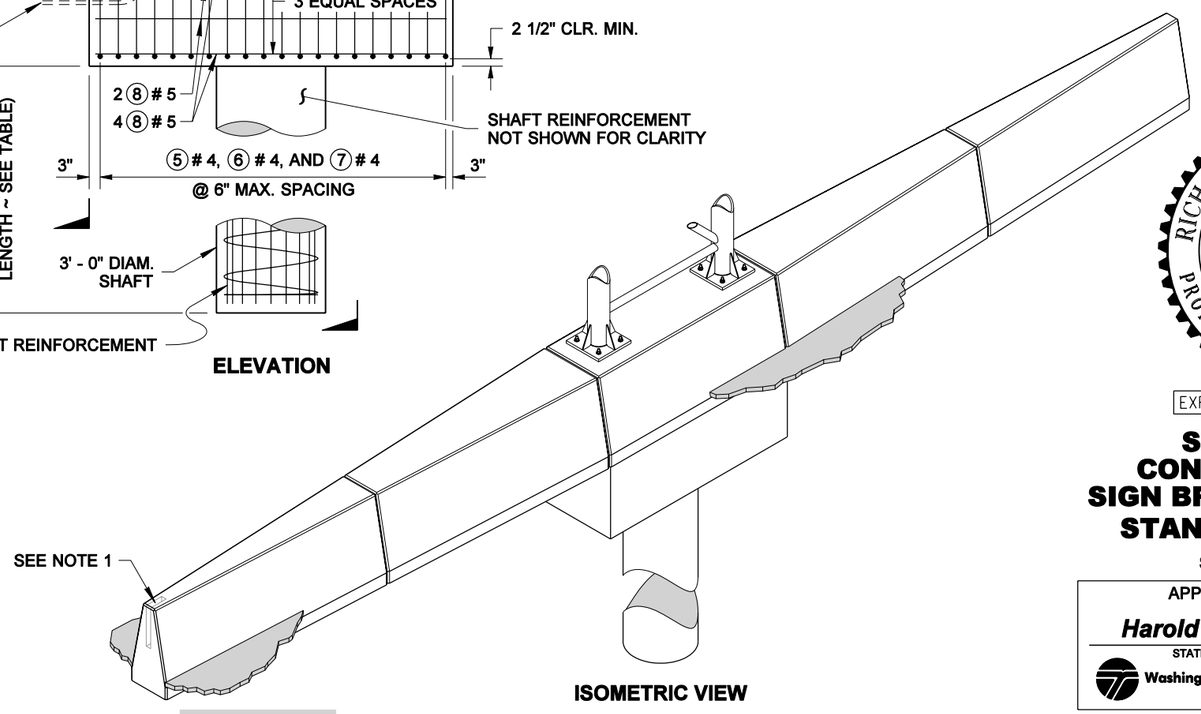

ELEVATION




DUMMY JOINT

| DIMENSIONS "D" AND "Z" | | |
|---|---|---|
| SIGN BRIDGE SPAN LENGTH | D | Z |
| 60' OR LESS | 4' - 0" | 11' - 6" |
| 61' TO 91' | 5' - 0" | 13' - 6" |
| 91' TO 120' | 6' - 0" | 15' - 0" |
| 121' TO 150' | 7' - 0" | 16' - 6" |

SHAFT DEPTH "Z" IS BASED ON ALLOWABLE LATERAL BEARING PRESSURE IN EXCESS OF 1500 PSF.




ISOMETRIC VIEW

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EXPIRES NOVEMBER 14, 2004

# SINGLE SLOPE CONCRETE BARRIER SIGN BRIDGE FOUNDATION STANDARD PLAN C-14i

SHEET 1 OF 2 SHEETS

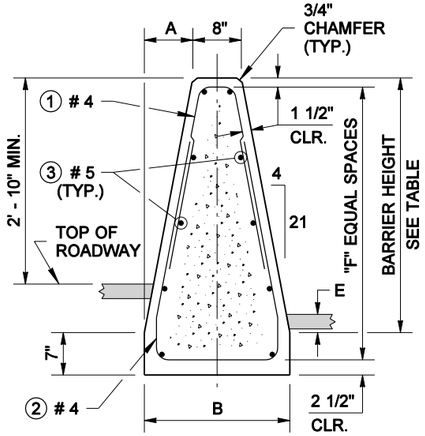
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*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-02-03* — DATE

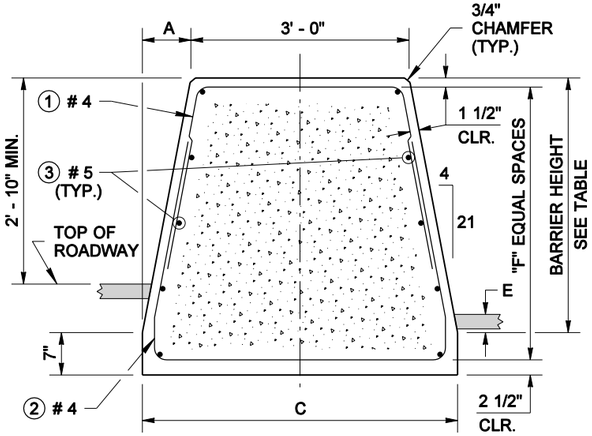
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

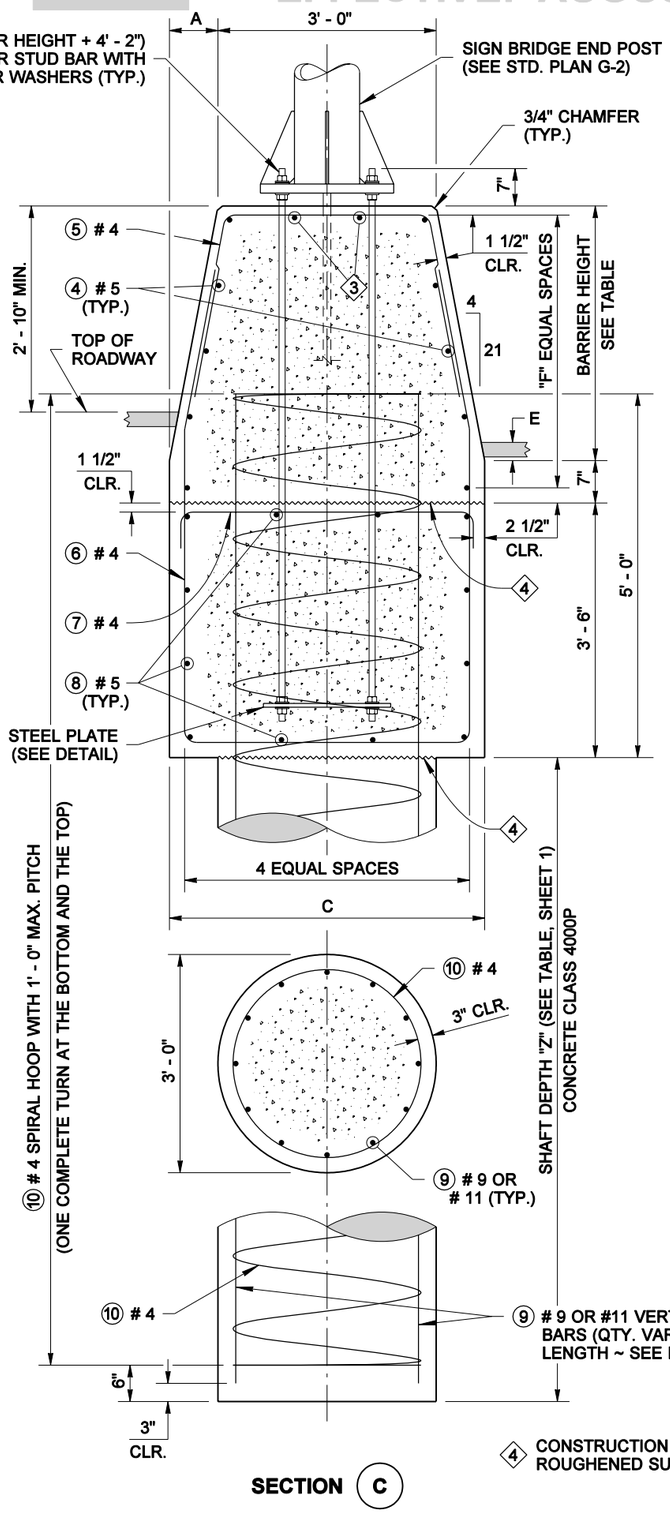
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SECTION (A)




SECTION (B)

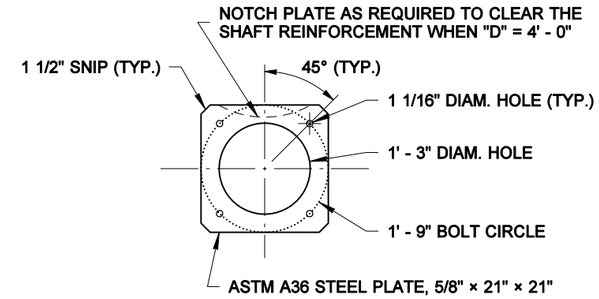



SECTION (C)

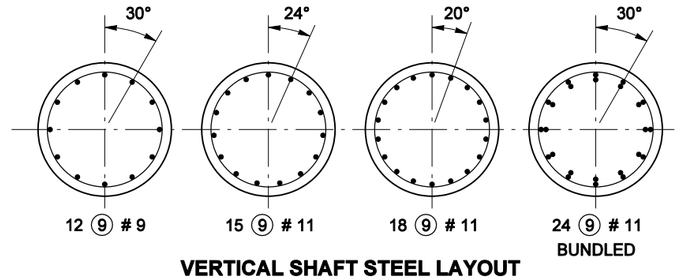
④ CONSTRUCTION JOINT WITH ROUGHENED SURFACE

| TABLE | | | | | | | |
|---|---|---|---|---|---|---|---|
| GRADE SEPARATION | BARRIER HEIGHT | A | B | C | E | F | Q |
| 0 TO 5" | 3' - 6" | 8" | 2' - 0" | 4' - 4" | 3" MIN. | 4 | 10 ◇3 |
| UP TO 7" | 4' - 0" | 9 1/8" | 2' - 2 1/4" | 4' - 6 1/4" | 7" MIN. | 5 | 12 ◇3 |
| UP TO 10" | 4' - 6" | 10 1/4" | 2' - 4 1/2" | 4' - 8 1/2" | 10" MIN. | 6 | 14 ◇3 |

◇3 ADD TWO ④ # 5 BARS, EQUALLY SPACED, AT THE TOP OF THE FOUNDATION BARRIER




STEEL PLATE DETAIL

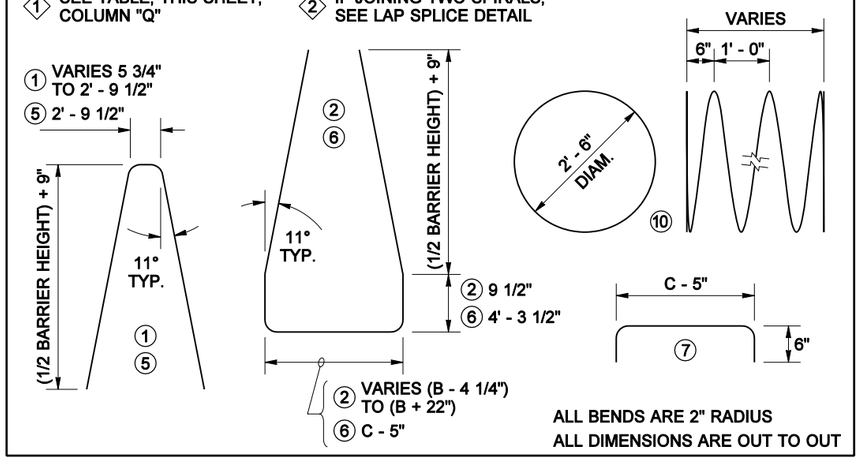



VERTICAL SHAFT STEEL LAYOUT

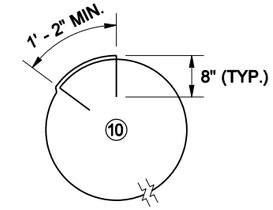
| BAR LIST | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MARK NO. | LOCATION | SPAN LENGTH | | | | | | | |
| | | 60' OR LESS | | 61' TO 91' | | 91' TO 120' | | 121' TO 150' | |
| | | SIZE | QTY. | SIZE | QTY. | SIZE | QTY. | SIZE | QTY. |
| ① | BARRIER ~ TOP VERTICAL | # 4 | 32 | # 4 | 32 | # 4 | 32 | # 4 | 32 |
| ② | BARRIER ~ BOTTOM VERTICAL | # 4 | 28 | # 4 | 28 | # 4 | 28 | # 4 | 28 |
| ③ | BARRIER ~ HORIZONTAL | # 5 | ◇1 | # 5 | ◇1 | # 5 | ◇1 | # 5 | ◇1 |
| ④ | BARRIER ~ HORIZONTAL | # 5 | ◇1 | # 5 | ◇1 | # 5 | ◇1 | # 5 | ◇1 |
| ⑤ | BARRIER ~ TOP VERTICAL | # 4 | 14 | # 4 | 16 | # 4 | 18 | # 4 | 20 |
| ⑥ | CAP & BARRIER ~ VERTICAL | # 4 | 14 | # 4 | 16 | # 4 | 18 | # 4 | 20 |
| ⑦ | CAP ~ TOP TRANSVERSE | # 4 | 14 | # 4 | 16 | # 4 | 18 | # 4 | 20 |
| ⑧ | CAP ~ HORIZONTAL | # 5 | 12 | # 5 | 12 | # 5 | 12 | # 5 | 12 |
| ⑨ | SHAFT ~ VERTICAL | # 9 | 12 | # 11 | 15 | # 11 | 18 | # 11 | 24 |
| ⑩ | SHAFT ~ SPIRAL | # 4 | 1 ◇2 | # 4 | 1 ◇2 | # 4 | 1 ◇2 | # 4 | 1 ◇2 |

◇1 SEE TABLE, THIS SHEET, COLUMN "Q"

◇2 IF JOINING TWO SPIRALS, SEE LAP SPLICE DETAIL




ALL BENDS ARE 2" RADIUS
ALL DIMENSIONS ARE OUT TO OUT




LAP SPLICE DETAIL

RICHARD P. ZELDENRUST
STATE OF WASHINGTON
25470
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 14, 2004

# SINGLE SLOPE CONCRETE BARRIER SIGN BRIDGE FOUNDATION STANDARD PLAN C-14i

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* 12-02-03

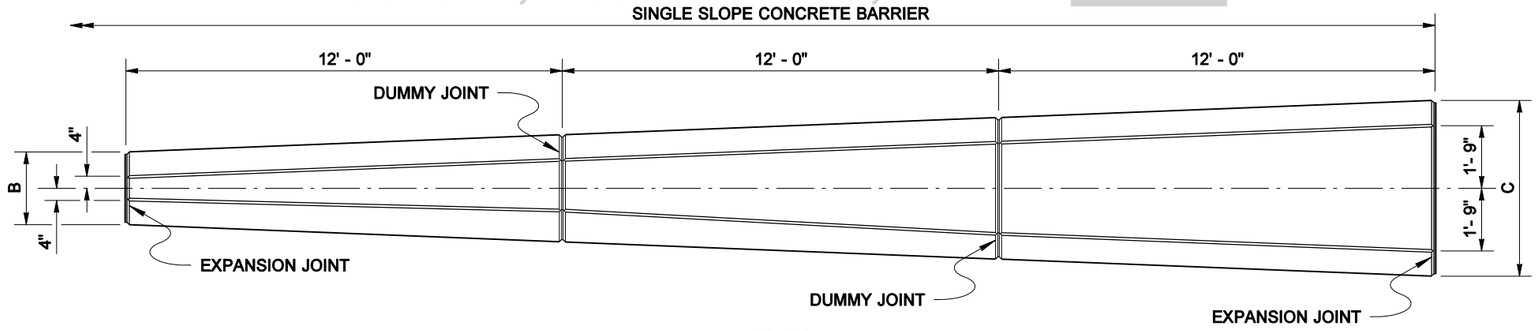
STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

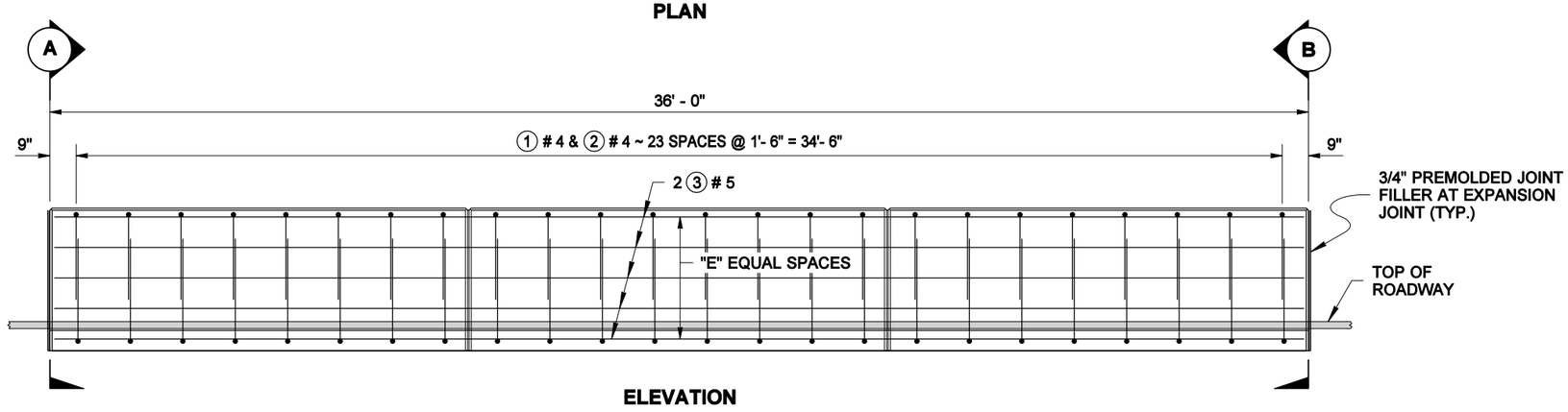
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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PLAN




ELEVATION

## NOTES

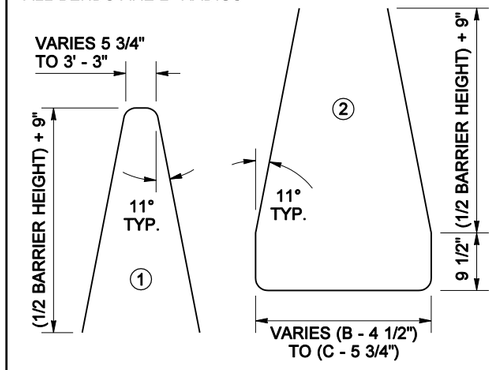
1. WHEN CONNECTING BETWEEN CAST-IN-PLACE AND PRECAST SINGLE SLOPE BARRIER, PROVIDE A SLOT AND REBAR GRID AS SHOWN IN STD. PLAN C-13.
2. ALL CONCRETE SHALL BE CLASS 4000.

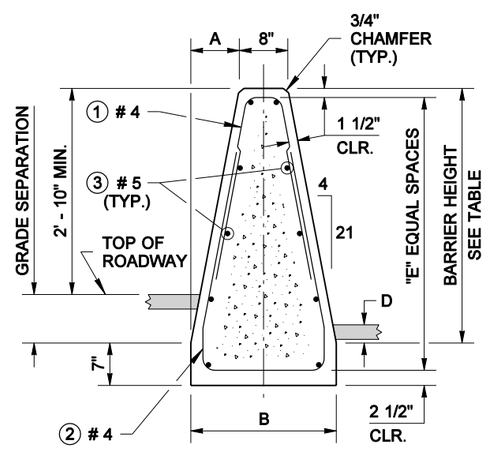
**BAR LIST**

| MARK NO. | LOCATION | SIZE | QTY. |
|---|---|---|---|
| ① | BARRIER ~ TOP VERTICAL | # 4 | 24 |
| ② | BARRIER ~ BOTTOM VERTICAL | # 4 | 24 |
| ③ | BARRIER ~ HORIZONTAL | # 5 | ◇1 |

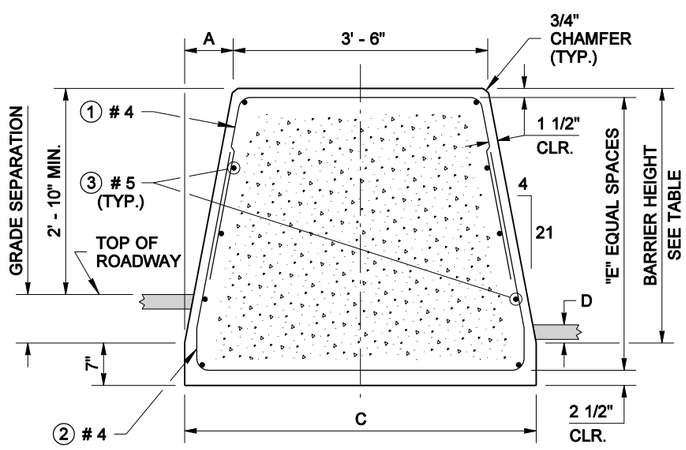
◇1 SEE DIMENSION TABLE ~ NOT COUNTING SPLICES

ALL DIMENSIONS ARE OUT TO OUT
ALL BENDS ARE 2" RADIUS



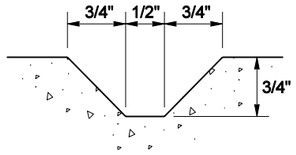




SECTION (A)




SECTION (B)

| TABLE | | | | | | | |
|---|---|---|---|---|---|---|---|
| GRADE SEPARATION | BARRIER HEIGHT | A | B | C | D | E | HORIZONTAL BARS (QTY.) |
| 0 TO 5" | 3' - 6" | 8" | 2' - 0" | 4' - 10" | 3" MIN. | 4 | 10 |
| UP TO 7" | 4' - 0" | 9 1/8" | 2' - 2 1/4" | 5' - 0 1/4" | 7" MIN. | 5 | 12 |
| UP TO 10" | 4' - 6" | 10 1/4" | 2' - 4 1/2" | 5' - 2 1/2" | 10" MIN. | 6 | 14 |




DUMMY JOINT




ISOMETRIC VIEW

RICHARD P. ZELDENRUST
STATE OF WASHINGTON
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REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 14, 2004

# SINGLE SLOPE CONCRETE BARRIER TRANSITION FOR MONOTUBE SIGN SUPPORT
# STANDARD PLAN C-14j

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-02-03* — DATE

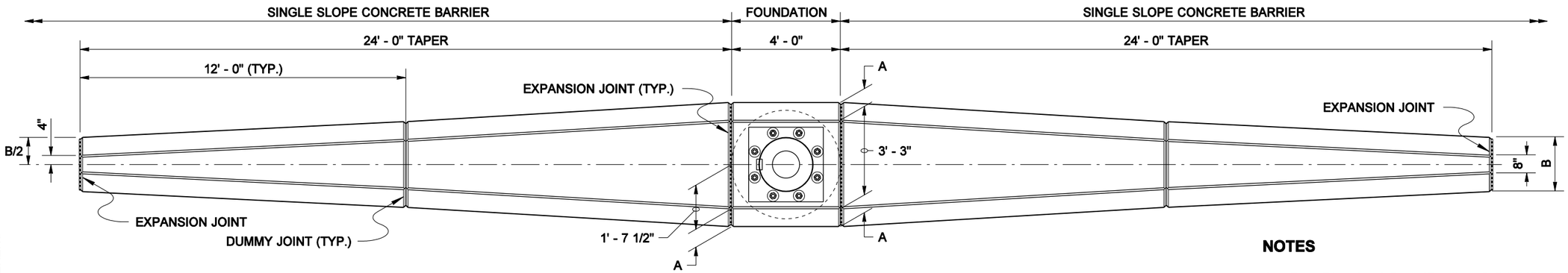
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

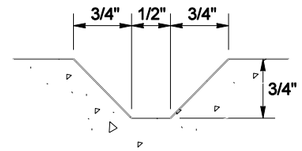
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: BILL BERENS



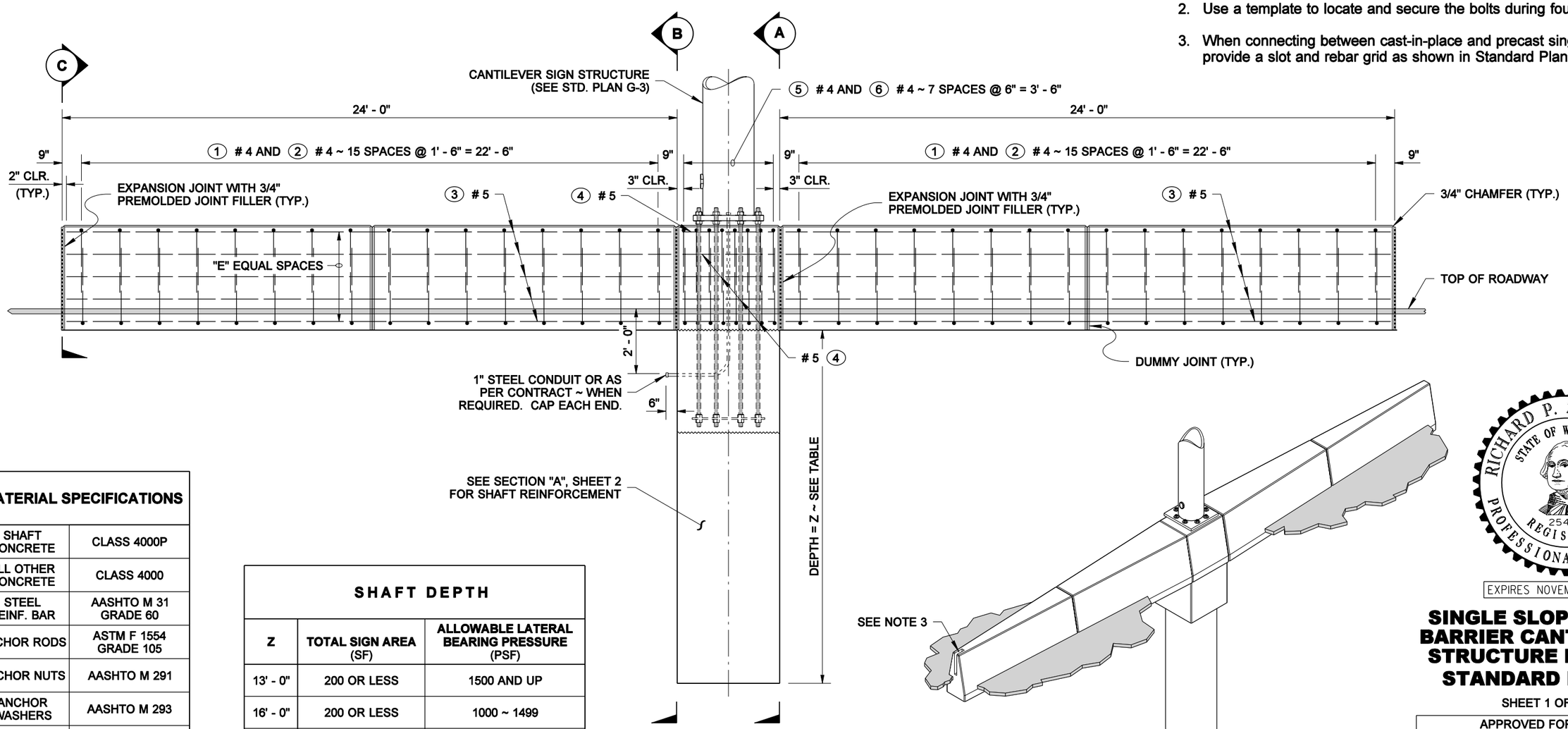

PLAN




DUMMY JOINT

## NOTES

1. See Standard Specification 8-21.3(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.




ELEVATION

| MATERIAL SPECIFICATIONS | |
|---|---|
| SHAFT CONCRETE | CLASS 4000P |
| ALL OTHER CONCRETE | CLASS 4000 |
| STEEL REINF. 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 | | |
|---|---|---|
| Z | TOTAL SIGN AREA (SF) | ALLOWABLE LATERAL BEARING PRESSURE (PSF) |
| 13' - 0" | 200 OR LESS | 1500 AND UP |
| 16' - 0" | 200 OR LESS | 1000 ~ 1499 |
| 18' - 0" | 200 ~ 400 | 1500 AND UP |
| 22' - 0" | 200 ~ 400 | 1000 ~ 1499 |




ISOMETRIC

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EXPIRES NOVEMBER 14, 2006

# SINGLE SLOPE CONCRETE BARRIER CANTILEVER SIGN STRUCTURE FOUNDATION STANDARD PLAN C-14k

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *01-11-06* — DATE

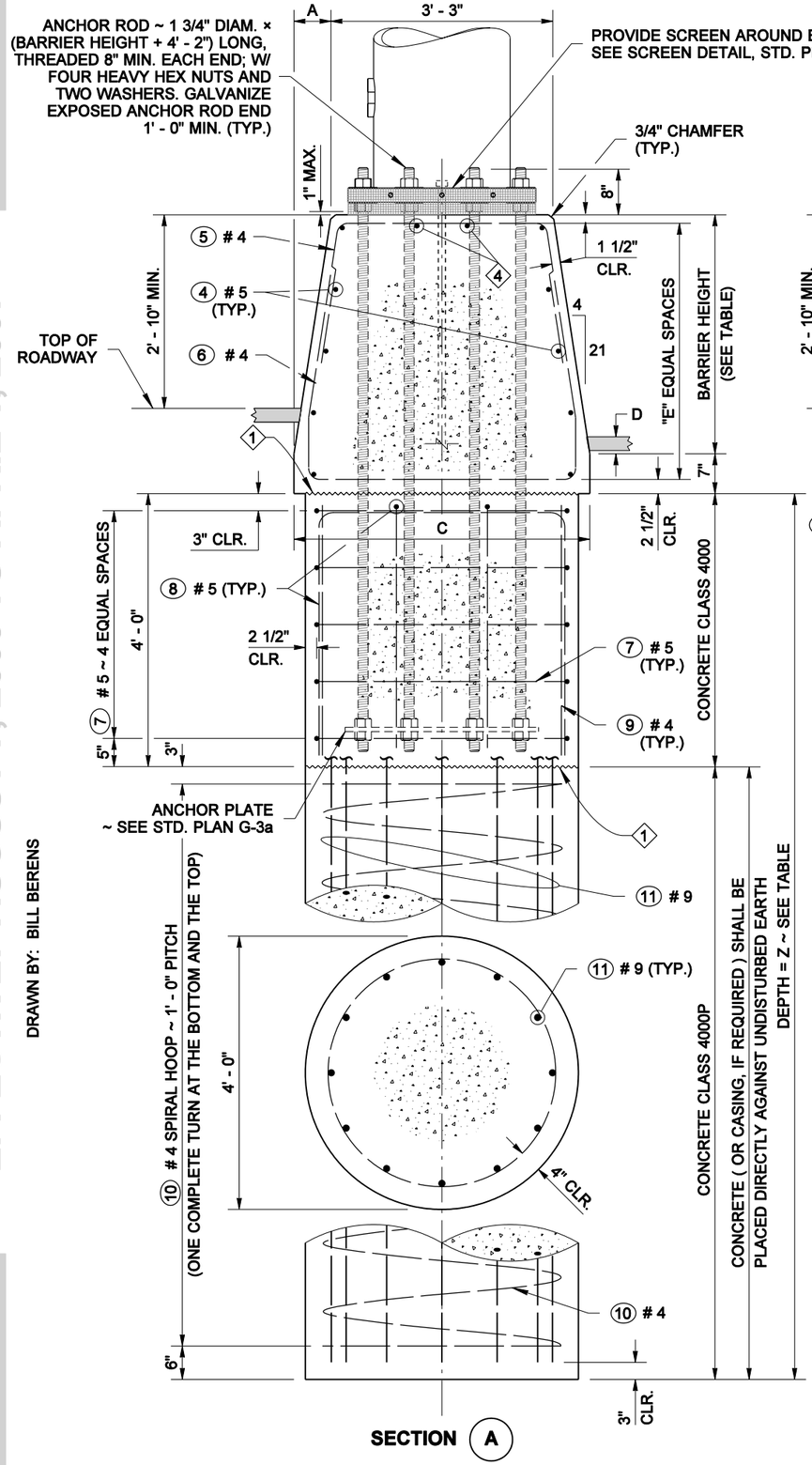
Washington State Department of Transportation

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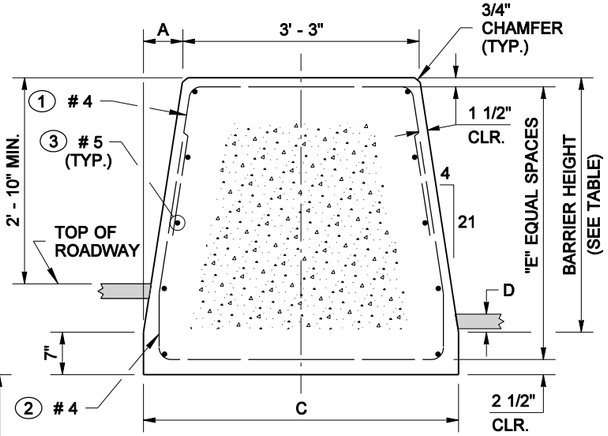
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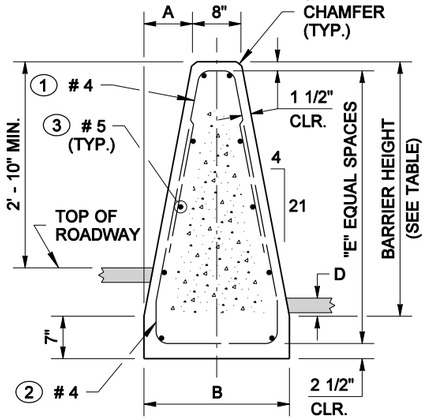
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SECTION (A)

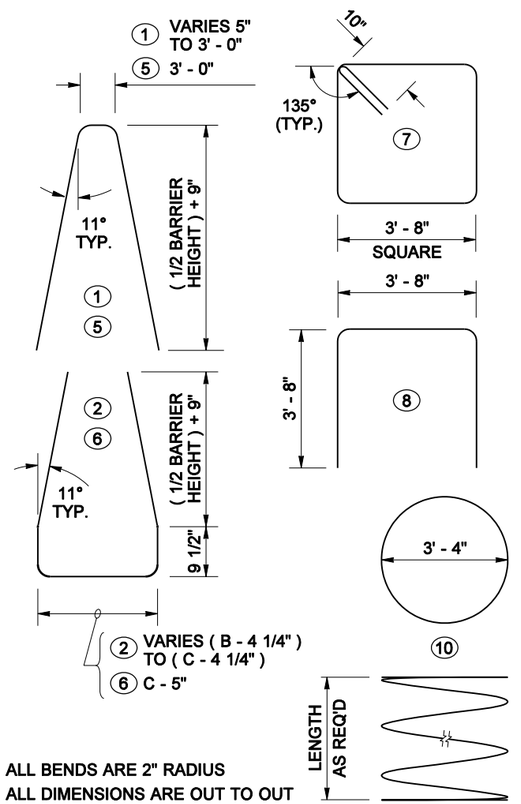



SECTION (B)




SECTION (C)

## BENDING DIAGRAM




ALL BENDS ARE 2" RADIUS
ALL DIMENSIONS ARE OUT TO OUT

## TABLE

| GRADE SEPARATION | BARRIER HEIGHT | A | B | C | D | E | Q |
|---|---|---|---|---|---|---|---|
| 0 TO 5" | 3' - 6" | 8" | 2' - 0" | 4' - 7" | 3" MIN. | 4 | 10 ◇4 |
| UP TO 7" | 4' - 0" | 9 1/8" | 2' - 2 1/4" | 4' - 9 1/4" | 7" MIN. | 5 | 12 ◇4 |
| UP TO 10" | 4' - 6" | 10 1/4" | 2' - 4 1/2" | 4' - 11 1/2" | 10" MIN. | 6 | 14 ◇4 |

## BAR LIST

| MARK NO. | LOCATION | QTY. | LENGTH | SIZE | TYPE |
|---|---|---|---|---|---|
| 1 | BARRIER ~ TOP VERTICAL | 32 | VARIES | # 4 | |
| 2 | BARRIER ~ BOTTOM VERTICAL | 32 | VARIES | # 4 | |
| 3 | BARRIER ~ HORIZONTAL | ◇2 | 23' - 8" | # 5 | STR. |
| 4 | BARRIER ~ HORIZONTAL | ◇2 | 3' - 8" | # 5 | STR. |
| 5 | BARRIER ~ TOP VERTICAL | 8 | VARIES | # 4 | |
| 6 | BARRIER ~ BOTTOM VERTICAL | 8 | VARIES | # 4 | |
| 7 | CAP ~ HOOP | 5 | 15' - 9" | # 5 | |
| 8 | CAP ~ TOP | 4 | 10' - 10" | # 5 | |
| 9 | CAP ~ VERTICAL, EACH CORNER | 4 | 3' - 4" | # 4 | STR. |
| 10 | SHAFT ~ SPIRAL | 1 ◇3 | AS REQ'D | # 4 | |
| 11 | SHAFT ~ VERTICAL | 12 | "Z" MINUS CLEARANCES | # 9 | STR. |

◇1 CONSTRUCTION JOINT WITH ROUGHENED SURFACE

◇2 SEE TABLE, THIS SHEET, COLUMN "Q"

◇3 IF JOINING TWO SPIRALS, SEE LAP SPLICE DETAIL, STD. PLAN G-3a SHEET 2

◇4 ADD TWO (4) #5 BARS, EQUALLY SPACED, AT THE TOP OF THE FOUNDATION BARRIER

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EXPIRES NOVEMBER 14, 2006

# SINGLE SLOPE CONCRETE BARRIER CANTILEVER SIGN STRUCTURE FOUNDATION STANDARD PLAN C-14k

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *01-11-06* — DATE

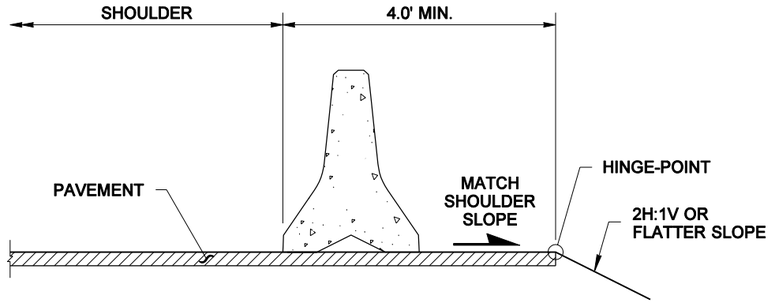
Washington State Department of Transportation

DRAWN BY: BILL BERENS

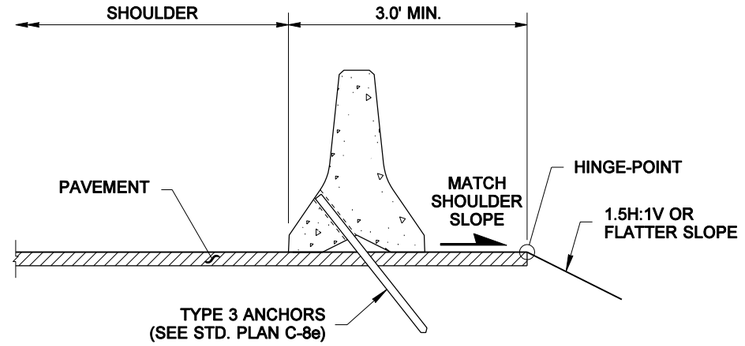
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: BILL BERENS

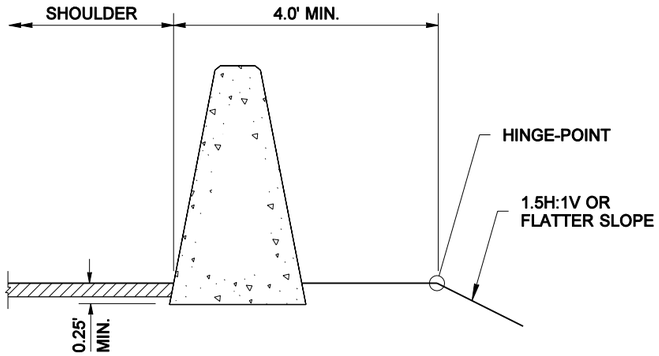



**PRECAST CONC. BARRIER TYPE 2**

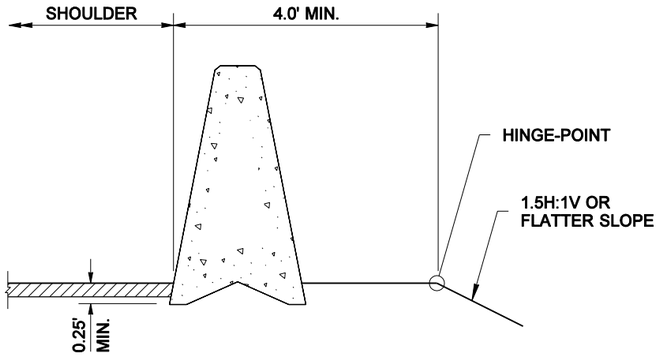



**ANCHORED PRECAST CONC. BARRIER TYPE 2**

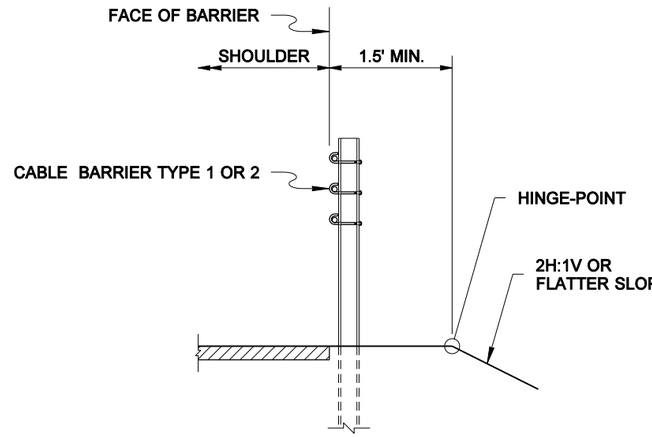
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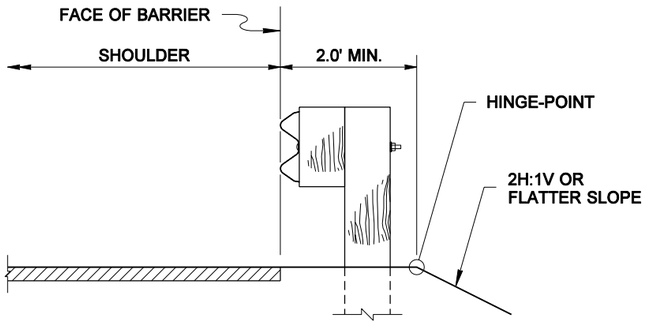

**SINGLE SLOPE CONC. BARRIER CAST-IN-PLACE**



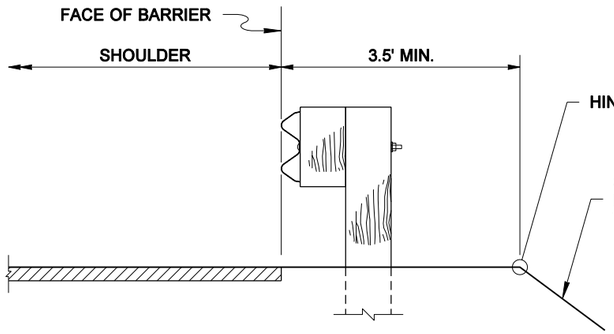

**SINGLE SLOPE CONC. BARRIER PRECAST**




**CABLE BARRIER**




**BEAM GUARDRAIL**




**BEAM GUARDRAIL ON STEEP SLOPES**

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# TRAFFIC BARRIER SHOULDER WIDENING ~ FOR SHOULDERS 8.0' AND WIDER
# STANDARD PLAN C-16a

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

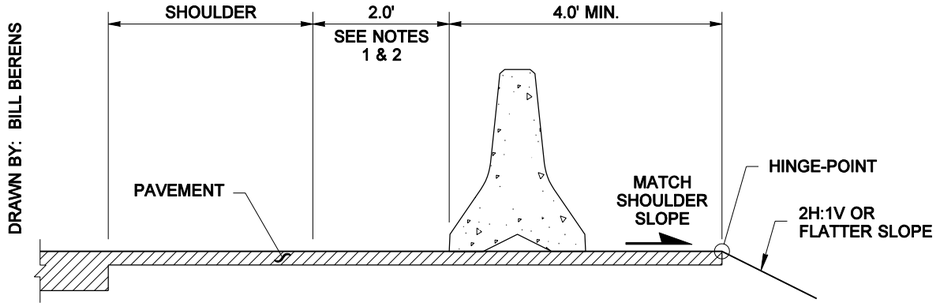
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-08-05* — DATE

Washington State Department of Transportation

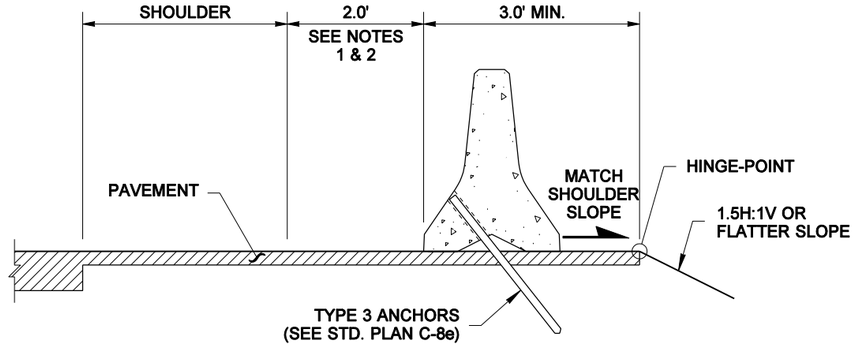
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: BILL BERENS



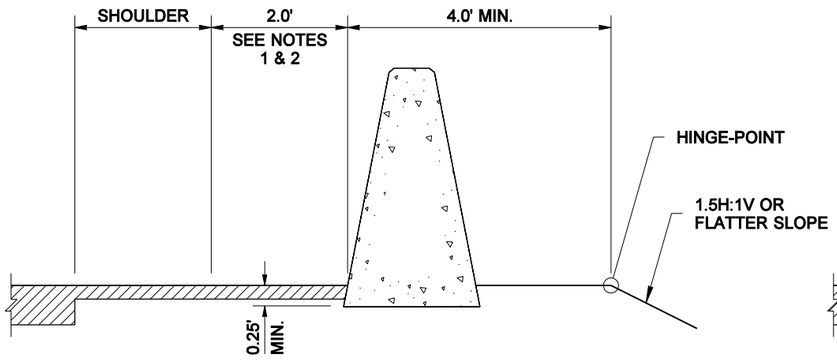

**PRECAST CONC. BARRIER TYPE 2**



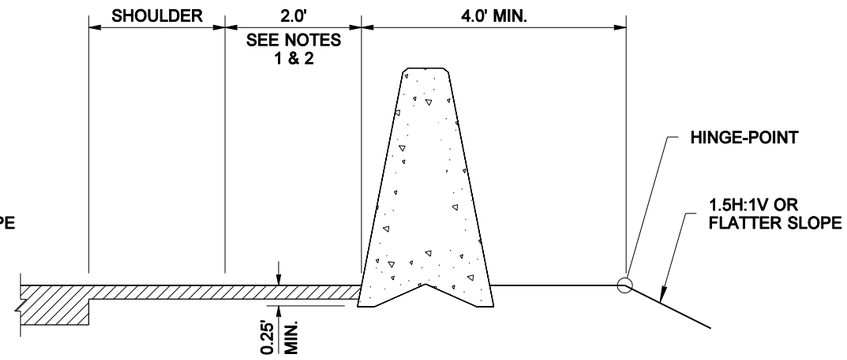

**ANCHORED PRECAST CONC. BARRIER TYPE 2**

**NOTES**

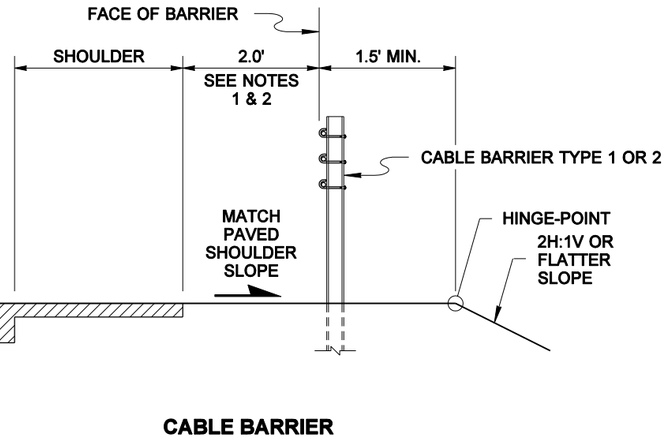
1. An additional width for shy distance is required when the existing roadway is to be widened.
2. The additional width for shy distance may be less than 2.0' when it, combined with the existing shoulder width, totals 8.0' or more.



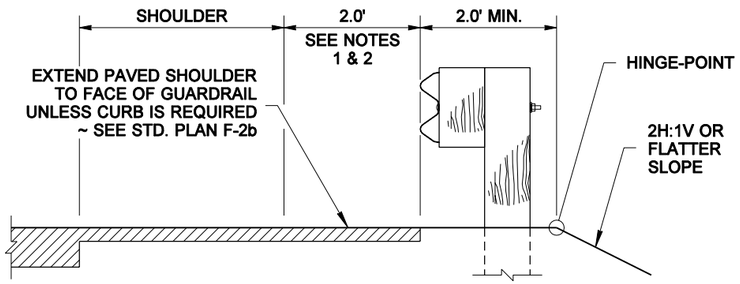

**SINGLE SLOPE CONC. BARRIER CAST-IN-PLACE**



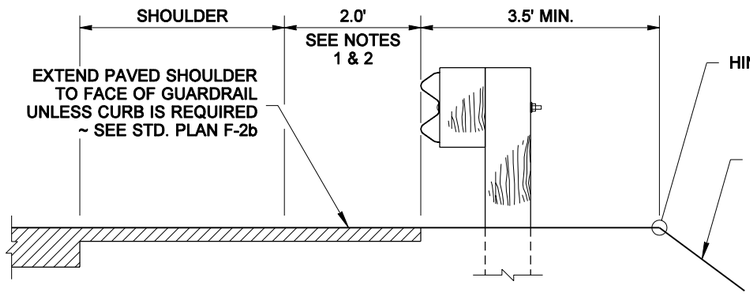

**SINGLE SLOPE CONC. BARRIER PRECAST**




**CABLE BARRIER**




**BEAM GUARDRAIL**




**BEAM GUARDRAIL ON STEEP SLOPES**

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RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# TRAFFIC BARRIER SHOULDER WIDENING ~ FOR SHOULDERS LESS THAN 8.0' WIDE STANDARD PLAN C-16b

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-08-05* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| DIMENSIONS (ft) | | | | FOOTING REINFORCEMENT | | | | | | | | | | STEM REINFORCEMENT | | MATERIAL QUANTITY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | BAR E | | BAR F | | | BAR K | | | | | BAR G (size #4) | | | | |
| H (ft) | B | $C_V$ | D | | h | SIZE | SPAC. | LENGTH | SIZE | SPAC. | LENGTH | h | b | LENGTH | | CONCRETE CY/LF | STEEL LBS/LF | H (ft) |
| 5 | 5'-6" | 2'-0" | 1'-0" | 3'-4" | 2'-9" | #4 | 9" | 3'-6" | #5 | 9" | 7'-2" | 4'-7" | 3'-0" | 3'-10" | | 0.36 | 26.3 | 5 |
| 6 | 5'-6" | 2'-0" | 1'-0" | 3'-4" | 2'-9" | #4 | 9" | 3'-5" | #5 | 9" | 8'-3" | 5'-7" | 3'-1" | 4'-10" | | 0.41 | 29.5 | 6 |
| 7 | 5'-9" | 2'-3" | 1'-0" | 3'-4" | 2'-9" | #4 | 9" | 3'-4" | #5 | 9" | 9'-7" | 6'-7" | 3'-5" | 5'-10" | | 0.47 | 31.8 | 7 |
| 8 | 5'-9" | 2'-3" | 1'-0" | 3'-4" | 2'-9" | #4 | 9" | 3'-3" | #5 | 9" | 10'-8" | 7'-7" | 3'-6" | 6'-10" | | 0.53 | 35.0 | 8 |
| 9 | 6'-0" | 2'-3" | 1'-0" | 3'-4" | 2'-9" | #4 | 9" | 3'-1" | #5 | 9" | 12'-0" | 8'-7" | 3'-8" | 7'-10" | | 0.60 | 38.5 | 9 |
| 10 | 6'-3" | 2'-3" | 1'-0" | 3'-4" | 2'-9" | #4 | 9" | 3'-6" | #5 | 9" | 12'-11" | 9'-7" | 3'-9" | 8'-10" | | 0.67 | 40.6 | 10 |
| 11 | 6'-6" | 2'-3" | 1'-0" | 3'-4" | 2'-9" | #4 | 9" | 3'-8" | #5 | 9" | 14'-0" | 10'-7" | 3'-10" | 9'-10" | | 0.75 | 44.7 | 11 |
| 12 | 7'-0" | 2'-6" | 1'-0" | 3'-4" | 2'-9" | #4 | 9" | 3'-10" | #5 | 8" | 14'-4" | 11'-7" | 4'-2" | 10'-10" | | 0.84 | 49.6 | 12 |
| 13 | 7'-6" | 2'-6" | 1'-0" | 3'-4" | 2'-9" | #5 | 10" | 4'-7" | #5 | 7" | 15'-5" | 12'-7" | 4'-3" | 11'-10" | | 0.93 | 57.5 | 13 |
| 14 | 7'-9" | 2'-6" | 1'-0" | 3'-4" | 2'-9" | #5 | 9" | 4'-8" | #5 | 7" | 17'-7" | 13'-7" | 4'-4" | 12'-10" | | 1.02 | 63.9 | 14 |
| 15 | 8'-3" | 2'-6" | 1'-0" | 3'-4" | 2'-9" | #5 | 7" | 4'-10" | #5 | 6" | 17'-9" | 14'-7" | 4'-6" | 13'-10" | | 1.12 | 73.4 | 15 |
| 16 | 8'-9" | 2'-9" | 1'-3" | 3'-8" | 3'-0" | #6 | 10" | 5'-6" | #5 | 6" | 20'-1" | 15'-7" | 4'-10" | 14'-7" | | 1.29 | 80.0 | 16 |
| 17 | 9'-3" | 3'-0" | 1'-6" | 3'-8" | 3'-0" | #6 | 10" | 5'-8" | #5 | 6" | 21'-5" | 16'-7" | 5'-2" | 15'-7" | | 1.46 | 84.8 | 17 |
| 18 | 9'-9" | 3'-3" | 1'-6" | 3'-11" | 3'-3" | #6 | 9" | 5'-10" | #6 | 7" | 22'-7" | 17'-7" | 5'-5" | 16'-4" | | 1.58 | 100.9 | 18 |
| 19 | 10'-0" | 3'-6" | 1'-9" | 3'-11" | 3'-3" | #6 | 9" | 6'-3" | #6 | 6" | 24'-0" | 18'-7" | 5'-10" | 17'-4" | | 1.77 | 118.1 | 19 |
| 20 | 10'-9" | 3'-6" | 1'-9" | 4'-2" | 3'-6" | #6 | 8" | 6'-5" | #6 | 6" | 25'-2" | 19'-7" | 6'-0" | 18'-1" | | 1.91 | 124.0 | 20 |
| 21 | 11'-3" | 3'-9" | 2'-0" | 4'-5" | 3'-9" | #6 | 8" | 6'-10" | #7 | 1'-2" | 17'-8" | 11'-11" | 6'-4" | 18'-10" | | 2.12 | 133.8 | 21 |
| 22 | 11'-9" | 4'-0" | 2'-0" | 4'-5" | 3'-9" | #6 | 7" | 7'-0" | #7 | 1'-1" | 18'-5" | 12'-4" | 6'-8" | 19'-10" | | 2.26 | 148.5 | 22 |
| 23 | 12'-3" | 4'-3" | 2'-3" | 4'-8" | 4'-0" | #6 | 7" | 7'-2" | #7 | 1'-0" | 19'-2" | 12'-10" | 7'-0" | 20'-7" | | 2.49 | 161.3 | 23 |
| 24 | 12'-9" | 4'-3" | 2'-3" | 4'-8" | 4'-0" | #6 | 6" | 7'-7" | #8 | 1'-2" | 20'-7" | 14'-2" | 7'-1" | 21'-7" | | 2.64 | 188.5 | 24 |
| 25 | 13'-3" | 4'-6" | 2'-6" | 4'-11" | 4'-3" | #6 | 6" | 7'-9" | #8 | 1'-1" | 21'-7" | 14'-9" | 7'-6" | 22'-4" | | 2.89 | 205.0 | 25 |
| 26 | 13'-9" | 4'-9" | 2'-6" | 4'-11" | 4'-3" | #6 | 6" | 7'-11" | #8 | 1'-0" | 22'-2" | 15'-1" | 7'-11" | 23'-4" | | 3.06 | 224.8 | 26 |
| 27 | 14'-3" | 5'-0" | 2'-9" | 5'-2" | 4'-6" | #6 | 6" | 8'-1" | #9 | 1'-2" | 24'-2" | 16'-9" | 8'-2" | 24'-1" | | 3.33 | 253.9 | 27 |
| 28 | 14'-9" | 5'-3" | 3'-0" | 5'-5" | 4'-9" | #6 | 6" | 8'-3" | #9 | 1'-1" | 25'-0" | 17'-3" | 8'-6" | 24'-10" | | 3.61 | 275.9 | 28 |
| 29 | 15'-3" | 5'-6" | 3'-3" | 5'-8" | 5'-0" | #6 | 6" | 8'-5" | #9 | 1'-0" | 25'-3" | 17'-9" | 8'-11" | 25'-7" | | 3.90 | 299.0 | 29 |
| 30 | 16'-0" | 5'-9" | 3'-3" | 5'-8" | 5'-0" | #7 | 7" | 9'-8" | #9 | 11" | 26'-8" | 18'-2" | 9'-3" | 26'-7" | | 4.12 | 340.3 | 30 |
| 31 | 16'-6" | 6'-0" | 3'-6" | 5'-11" | 5'-3" | #7 | 7" | 9'-10" | #9 | 11" | 27'-6" | 18'-8" | 9'-7" | 27'-4" | | 4.43 | 352.3 | 31 |
| 32 | 17'-0" | 6'-3" | 3'-9" | 6'-2" | 5'-6" | #7 | 7" | 10'-0" | #9 | 10" | 28'-5" | 19'-3" | 9'-11" | 28'-1" | | 4.76 | 390.0 | 32 |
| 33 | 17'-6" | 6'-6" | 4'-0" | 6'-4" | 5'-9" | #7 | 6" | 10'-2" | #9 | 10" | 29'-2" | 19'-9" | 10'-2" | 28'-10" | | 5.09 | 406.4 | 33 |
| 34 | 18'-0" | 6'-9" | 4'-3" | 6'-8" | 6'-0" | #7 | 6" | 10'-4" | #9 | 10" | 30'-2" | 20'-3" | 10'-8" | 29'-7" | | 5.44 | 417.8 | 34 |
| 35 | 18'-6" | 7'-0" | 4'-6" | 6'-11" | 6'-3" | #7 | 6" | 10'-6" | #10 | 11" | 32'-4" | 22'-2" | 11'-0" | 30'-3" | | 5.79 | 491.0 | 35 |

| BAR M | | | | | BAR J | | | |
|---|---|---|---|---|---|---|---|---|
| SIZE | SPAC. | LENGTH | h | b | SIZE | SPAC. | LENGTH | |
| #7 | 1'-2" | 10'-7" | 4'-10" | 6'-4" | #7 | 1'-2" | 18'-11" | 18'-10" |
| #7 | 1'-1" | 10'-11" | 4'-10" | 6'-8" | #7 | 1'-1" | 19'-11" | 19'-10" |
| #7 | 1'-0" | 11'-6" | 5'-1" | 7'-0" | #7 | 1'-0" | 20'-8" | 20'-7" |
| #8 | 1'-2" | 12'-6" | 6'-1" | 7'-1" | #8 | 1'-0" | 21'-8" | 21'-7" |
| #8 | 1'-1" | 13'-2" | 6'-4" | 7'-6" | #8 | 1'-1" | 22'-5" | 22'-4" |
| #8 | 1'-0" | 13'-6" | 6'-4" | 7'-10" | #8 | 1'-0" | 23'-5" | 23'-4" |
| #9 | 1'-2" | 15'-0" | 7'-8" | 8'-2" | #9 | 1'-2" | 24'-2" | 24'-1" |
| #9 | 1'-1" | 15'-7" | 7'-11" | 8'-6" | #9 | 1'-1" | 24'-11" | 24'-10" |
| #9 | 1'-0" | 15'-7" | 8'-2" | 8'-11" | #9 | 1'-0" | 25'-9" | 25'-7" |
| #9 | 11" | 16'-7" | 8'-2" | 9'-3" | #9 | 11" | 26'-6" | 26'-7" |
| #9 | 11" | 17'-2" | 8'-5" | 9'-7" | #9 | 11" | 27'-6" | 27'-4" |
| #9 | 10" | 17'-9" | 8'-8" | 9'-11" | #9 | 10" | 28'-3" | 28'-1" |
| #9 | 10" | 18'-3" | 8'-11" | 10'-2" | #9 | 10" | 29'-0" | 28'-10" |
| #9 | 10" | 19'-0" | 9'-2" | 10'-8" | #9 | 10" | 29'-9" | 29'-7" |
| #10 | 11" | 20'-10" | 10'-9" | 11'-0" | #10 | 11" | 30'-6" | 30'-3" |

* If traffic barrier is used, add 0.100 CY of Concrete Class 4000 for Barrier Alternate 1. Add 0.123 CY of Concrete Class 4000 for Barrier Alternate 2 - L.F.

** Add 28 LBS of reinforcing steel for Barrier Alternate 1 or 19 LBS of reinforcing steel for Barrier Alternate 2 - per LF.

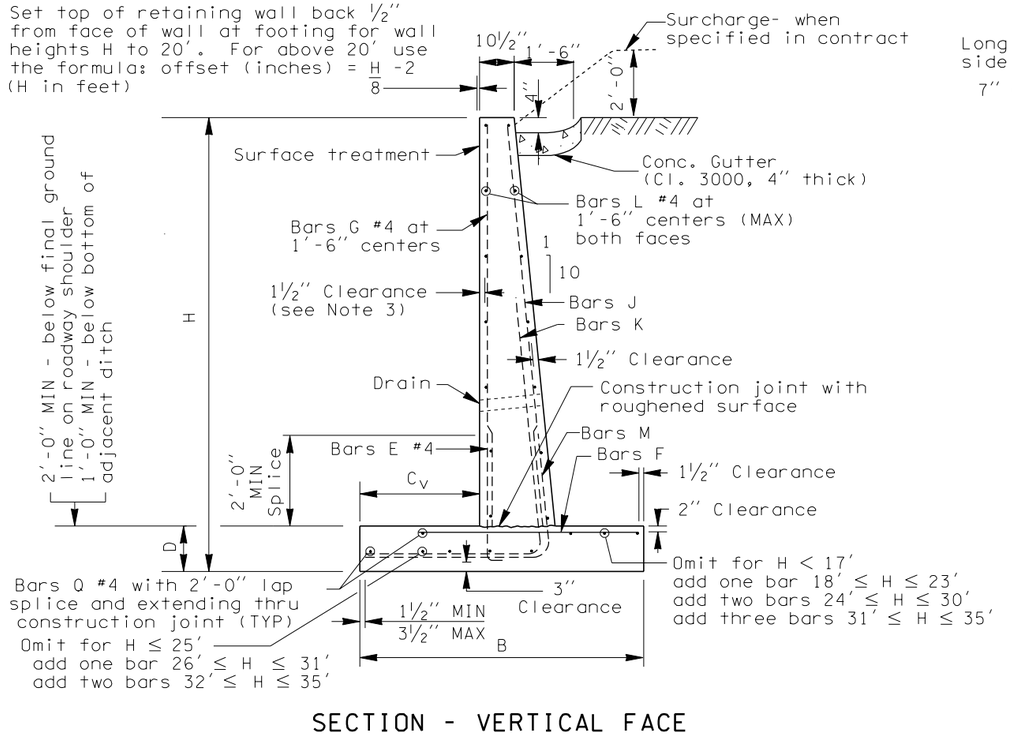
NOTES

1. All concrete including traffic barrier shall be Class 4000 except as noted.
2. For backfill requirements, see Standard Plan "D-4".
3. When Wall Type 1-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 1-SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by 0.003 x H CY/LF.
5. If Bar W1 interferes with the retaining wall form, it shall be field bent only at the angle point. The bar shall not be twisted.
6. Toe height for traffic barrier may vary, 2" MIN to 6" MAX.
7. Height of traffic barrier may vary if required to provide a profile pleasing to the eye.
8. Concrete in the 24 foot wall sections shall be placed separately between expansion joints with a minimum 12 hour period between concrete placement.

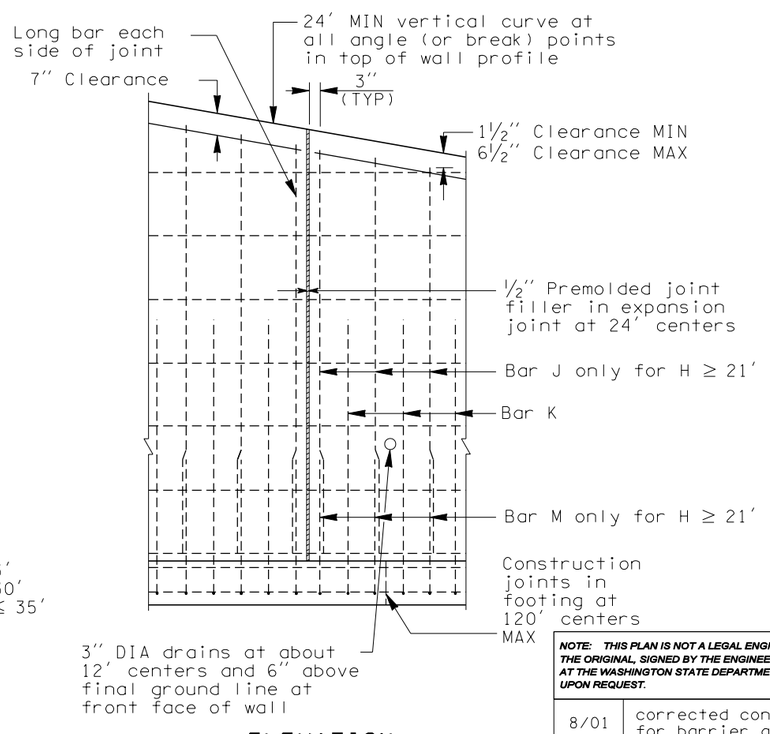
| Bar | MIN Splice |
|---|---|
| #4 | 2'-0" |
| #5 | 2'-0" |
| #6 | 2'-1" |
| #7 | 2'-11" |
| #8 | 3'-9" |
| #9 | 4'-9" |
| #10 | 6'-1" |



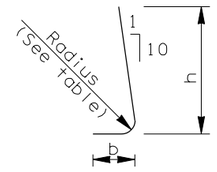

BAR E
At 1'-6" centers




SECTION - VERTICAL FACE




ELEVATION




| Bar | Radius |
|---|---|
| #5 | 9" |
| #6 | 11" |
| #7 | 1'-1" |
| #8 | 1'-3" |
| #9 | 1'-6" |
| #10 | 1'-8" |

BARS K AND M

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

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2002

# REINFORCED CONCRETE RETAINING WALL TYPE 1 AND 1 SW STANDARD PLAN D-1a

SHEET 1 OF 2 SHEETS

*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.*

| DATE | REVISION | BY |
|---|---|---|
| 8/01 | corrected concrete quantity for barrier alternate 2 | MAS |

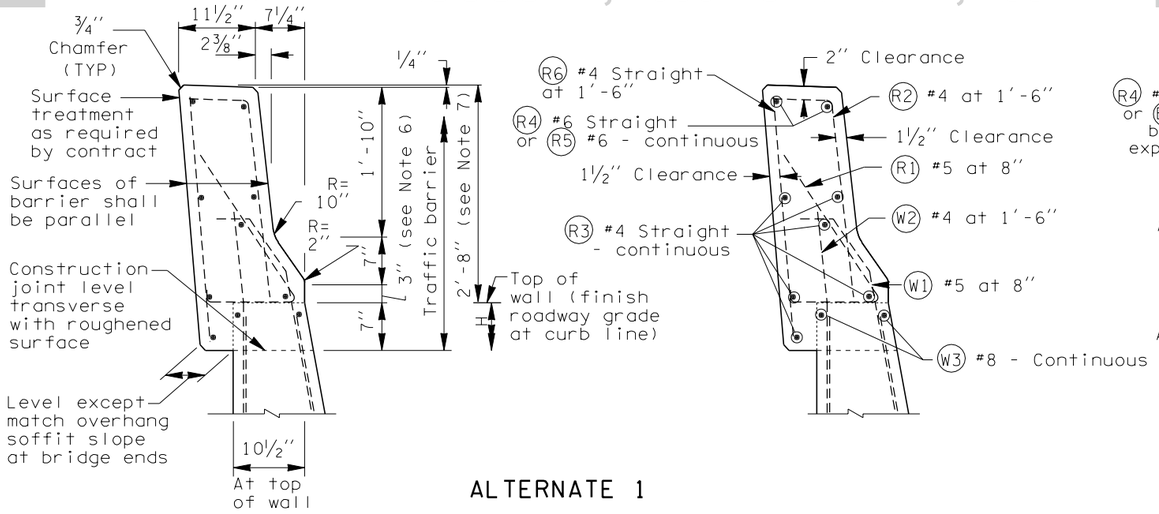
APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *01-23-02* — DATE

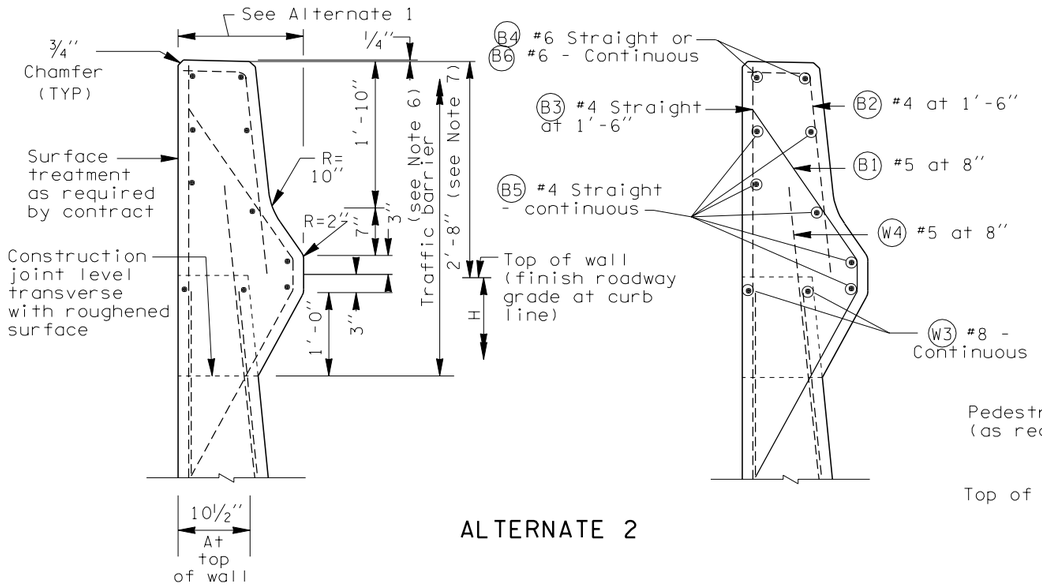
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

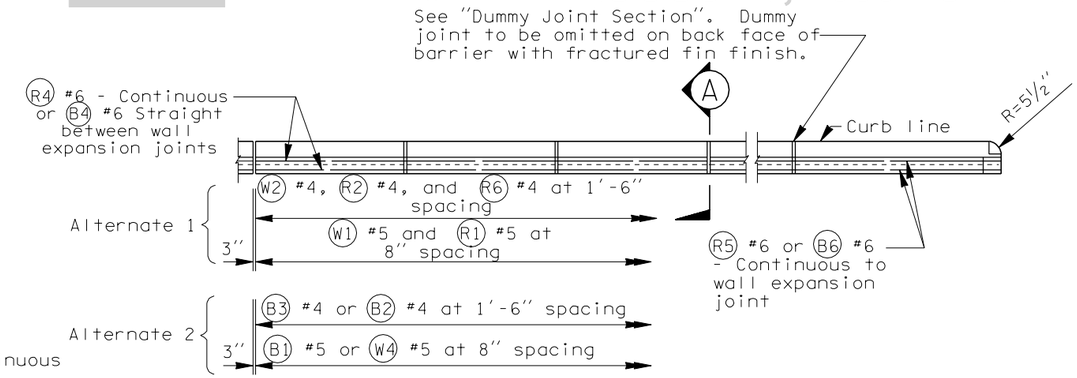
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




ALTERNATE 1

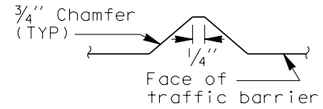



ALTERNATE 2

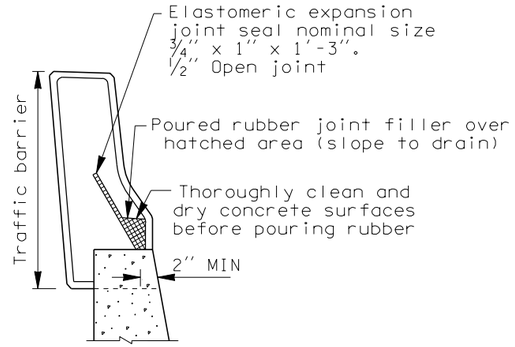



PLAN - TRAFFIC BARRIER

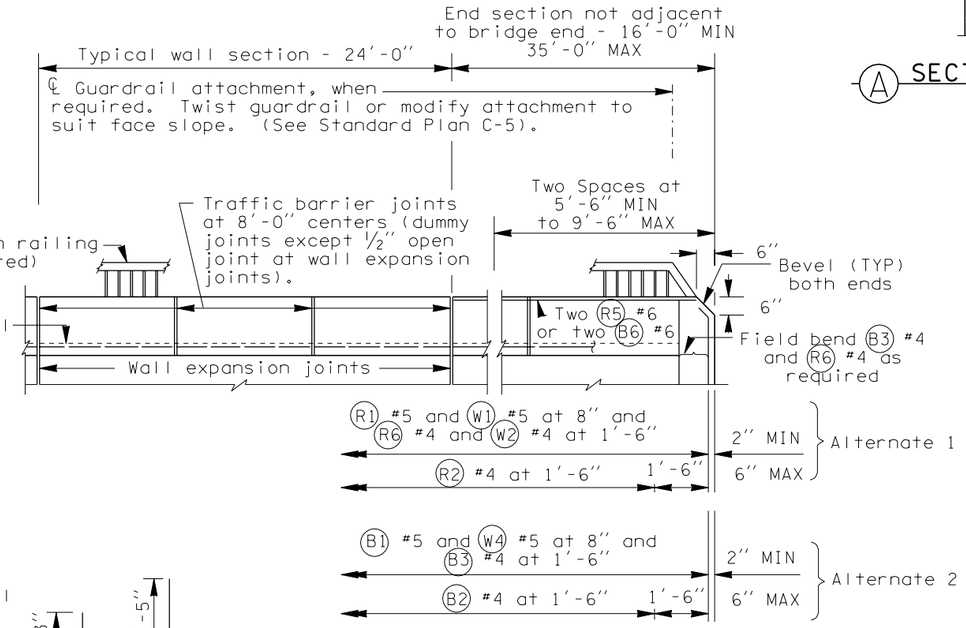
All chamfers 3/4"




DUMMY JOINT SECTION

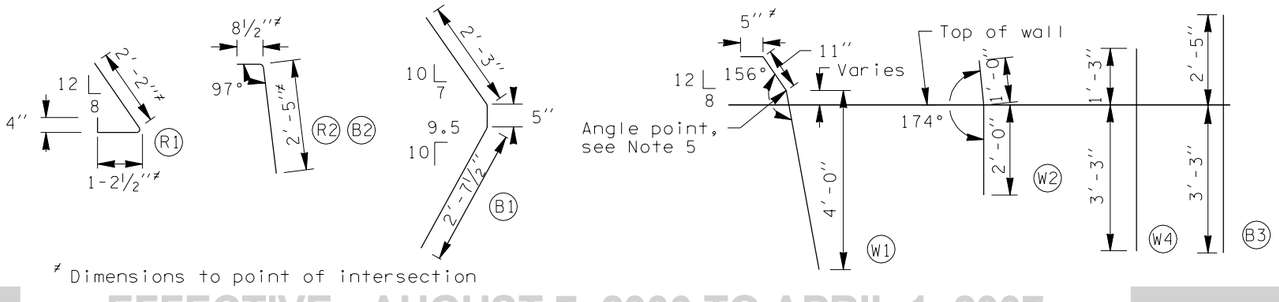



A SECTION




WALL ELEVATION

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




JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2002

# REINFORCED CONCRETE RETAINING WALL TYPE 1 AND 1 SW STANDARD PLAN D-1a

SHEET 2 OF 2 SHEETS

*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.*

| DATE | REVISION | BY |
|---|---|---|
| 8/01 | New Approval Date | MAS |

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *01-23-02* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| DIMENSIONS | | | | E BAR (size #4) | | FOOTING REINFORCEMENT | | | | | | | | STEM REINFORCEMENT | MATERIAL QUANTITY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | F BAR | | | K BAR | | | | | G BAR (size #4) | | | |
| H (ft) | B | $C_V$ | D | LENGTH | h | SIZE | SPACING | LENGTH | SIZE | SPACING | LENGTH | h | b | LENGTH | CONCRETE (CY/LF) | STEEL (LBS/LF) | H (ft) |
| 5 | 5′-6″ | 3′-0″ | 1′-0″ | 3′- 5″ | 2′- 9″ | 4 | 9″ | 3′-9″ | 5 | 9″ | 6′-10″ | 4′-7″ | 2′-7″ | 3′-10″ | 0.363 | 26.207 | 5 |
| 6 | 5′-6″ | 3′-0″ | 1′-0″ | 3′- 5″ | 2′- 9″ | 4 | 9″ | 3′-9″ | 5 | 9″ | 7′-10″ | 5′-7″ | 2′-7″ | 4′-10″ | 0.412 | 29.379 | 6 |
| 7 | 5′-9″ | 3′-3″ | 1′-0″ | 3′- 5″ | 2′- 9″ | 4 | 9″ | 3′-9″ | 5 | 9″ | 9′-1″ | 6′-7″ | 2′-10″ | 5′-10″ | 0.474 | 31.447 | 7 |
| 8 | 5′-9″ | 3′-3″ | 1′-0″ | 3′- 5″ | 2′- 9″ | 4 | 9″ | 3′-9″ | 5 | 9″ | 10′-1″ | 7′-7″ | 2′-10″ | 6′-10″ | 0.531 | 34.619 | 8 |
| 9 | 6′-0″ | 3′-6″ | 1′-0″ | 3′- 5″ | 2′- 9″ | 4 | 9″ | 3′-9″ | 5 | 9″ | 11′-4″ | 8′-7″ | 3′-1″ | 7′-11″ | 0.600 | 38.176 | 9 |
| 10 | 6′-3″ | 3′-6″ | 1′-0″ | 3′- 5″ | 2′- 9″ | 4 | 9″ | 4′-0″ | 5 | 9″ | 12′-4″ | 9′-7″ | 3′-1″ | 8′-11″ | 0.673 | 40.235 | 10 |
| 11 | 6′-6″ | 3′-6″ | 1′-0″ | 3′- 5″ | 2′- 9″ | 5 | 9″ | 4′-7″ | 5 | 9″ | 13′-4″ | 10′-7″ | 3′-1″ | 9′-11″ | 0.750 | 46.218 | 11 |
| 12 | 7′-0″ | 3′-9″ | 1′-0″ | 3′- 5″ | 2′- 9″ | 5 | 9″ | 4′-10″ | 5 | 9″ | 14′-7″ | 11′-7″ | 3′-4″ | 10′-11″ | 0.840 | 50.753 | 12 |
| 13 | 7′-6″ | 3′-9″ | 1′-0″ | 3′- 5″ | 2′- 9″ | 5 | 9″ | 5′-1″ | 5 | 9″ | 15′-10″ | 12′-7″ | 3′-4″ | 11′-11″ | 0.933 | 53.400 | 13 |
| 14 | 7′-9″ | 3′-9″ | 1′-0″ | 3′- 5″ | 2′- 9″ | 6 | 8″ | 6′-1″ | 5 | 8″ | 16′-7″ | 13′-7″ | 3′-4″ | 12′-11″ | 1.021 | 62.745 | 14 |
| 15 | 8′-0″ | 3′-9″ | 1′-0″ | 3′- 5″ | 2′- 9″ | 6 | 7″ | 6′-4″ | 5 | 7″ | 17′-7″ | 14′-7″ | 3′-4″ | 13′-11″ | 1.113 | 68.519 | 15 |
| 16 | 8′-6″ | 4′-0″ | 1′-3″ | 3′- 8″ | 3′- 0″ | 6 | 7″ | 6′-7″ | 6 | 8″ | 18′-9″ | 15′-7″ | 3′-7″ | 14′-8″ | 1.274 | 87.587 | 16 |
| 17 | 9′-0″ | 4′-3″ | 1′-3″ | 3′- 8″ | 3′- 0″ | 6 | 6″ | 6′-10″ | 6 | 8″ | 20′-0″ | 16′-7″ | 3′-10″ | 15′-8″ | 1.387 | 96.241 | 17 |
| 18 | 9′-6″ | 4′-6″ | 1′-6″ | 3′-10″ | 3′- 3″ | 6 | 6″ | 7′-1″ | 6 | 7″ | 21′-3″ | 17′-7″ | 4′-1″ | 16′-5″ | 1.567 | 107.056 | 18 |
| 19 | 10′-3″ | 5′-0″ | 1′-6″ | 3′-10″ | 3′- 3″ | 6 | 6″ | 7′-4″ | 6 | 6″ | 22′-9″ | 18′-7″ | 4′-7″ | 17′-5″ | 1.704 | 123.464 | 19 |
| 20 | 10′-6″ | 5′-0″ | 1′-9″ | 4′- 2″ | 3′- 6″ | 6 | 6″ | 7′-7″ | 6 | 6″ | 23′-9″ | 19′-7″ | 4′-7″ | 18′-2″ | 1.889 | 127.451 | 20 |
| 21 | 11′-3″ | 5′-6″ | 2′-0″ | 4′- 5″ | 3′- 9″ | 6 | 6″ | 7′-10″ | 7 | 1′-2″ | 13′-5″ | 8′-10″ | 5′-1″ | 18′-11″ | 2.118 | 131.930 | 21 |
| 22 | 11′-9″ | 5′-9″ | 2′-0″ | 4′- 5″ | 3′- 9″ | 7 | 7″ | 8′-11″ | 7 | 1′-0″ | 14′-1″ | 9′-3″ | 5′-4″ | 19′-11″ | 2.259 | 157.217 | 22 |
| 23 | 12′-3″ | 6′-0″ | 2′-3″ | 4′- 8″ | 4′- 0″ | 7 | 7″ | 9′-2″ | 7 | 1′-0″ | 14′-10″ | 9′-9″ | 5′-7″ | 20′-8″ | 2.491 | 163.792 | 23 |
| 24 | 12′-9″ | 6′-3″ | 2′-3″ | 4′- 8″ | 4′- 0″ | 7 | 6″ | 9′-5″ | 8 | 1′-2″ | 15′-5″ | 10′-2″ | 5′-10″ | 21′-8″ | 2.643 | 189.370 | 24 |
| 25 | 13′-3″ | 6′-6″ | 2′-6″ | 4′-11″ | 4′- 0″ | 7 | 6″ | 9′-8″ | 8 | 1′-1″ | 16′-2″ | 10′-8″ | 6′-1″ | 22′-5″ | 2.894 | 206.931 | 25 |
| 26 | 13′-9″ | 6′-9″ | 2′-6″ | 4′-11″ | 4′- 3″ | 7 | 6″ | 9′-11″ | 8 | 1′-0″ | 16′-10″ | 11′-1″ | 6′-4″ | 23′-5″ | 3.057 | 222.725 | 26 |
| 27 | 14′-3″ | 7′-0″ | 2′-9″ | 5′- 2″ | 4′- 6″ | 8 | 7″ | 11′-2″ | 9 | 1′-2″ | 17′-5″ | 11′-6″ | 6′-7″ | 24′-1″ | 3.326 | 254.763 | 27 |
| 28 | 14′-9″ | 7′-3″ | 3′-0″ | 5′- 5″ | 4′- 9″ | 8 | 7″ | 11′-5″ | 9 | 1′-1″ | 18′-9″ | 12′-0″ | 6′-10″ | 24′-10″ | 3.607 | 276.351 | 28 |
| 29 | 15′-3″ | 7′-6″ | 3′-3″ | 5′- 8″ | 5′- 0″ | 8 | 7″ | 11′-8″ | 9 | 1′-0″ | 19′-0″ | 12′-5″ | 7′-1″ | 25′-7″ | 3.898 | 300.338 | 29 |
| 30 | 16′-0″ | 8′-0″ | 3′-3″ | 5′- 8″ | 5′- 0″ | 8 | 6″ | 11′-11″ | 9 | 11″ | 19′-11″ | 13′-0″ | 7′-7″ | 26′-7″ | 4.118 | 340.248 | 30 |
| 31 | 16′-6″ | 8′-3″ | 3′-6″ | 5′-11″ | 5′- 3″ | 8 | 6″ | 12′-2″ | 9 | 11″ | 20′-2″ | 13′-6″ | 7′-10″ | 27′-4″ | 4.431 | 350.783 | 31 |
| 32 | 17′-0″ | 8′-6″ | 3′-9″ | 6′- 2″ | 5′- 6″ | 8 | 6″ | 12′-5″ | 9 | 10″ | 20′-11″ | 14′-0″ | 8′-1″ | 28′-1″ | 4.755 | 384.956 | 32 |
| 33 | 17′-6″ | 8′-9″ | 4′-0″ | 6′- 5″ | 5′- 9″ | 8 | 6″ | 12′-8″ | 9 | 10″ | 21′-8″ | 14′-7″ | 8′-4″ | 28′-11″ | 5.090 | 395.892 | 33 |
| 34 | 18′-0″ | 9′-0″ | 4′-3″ | 6′- 8″ | 6′- 0″ | 8 | 6″ | 12′-11″ | 9 | 10″ | 22′-6″ | 15′-1″ | 8′-7″ | 29′-7″ | 5.437 | 406.513 | 34 |
| 35 | 18′-6″ | 9′-3″ | 4′-6″ | 6′-11″ | 6′- 3″ | 8 | 6″ | 13′-2″ | 10 | 11″ | 23′-1″ | 15′-7″ | 8′-10″ | 30′-6″ | 5.794 | 467.610 | 35 |

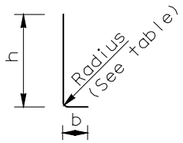
* If traffic barrier is used, add 0.110 CY of concrete Class 4000 for Barrier Alternate 1. Add 0.152 CY of concrete Class 4000 for Barrier Alternate 2 - per LF.

** Add 16 LB/FT of reinforcing steel for Barrier Alternate 1 or 23 LB/FT of reinforcing steel for Barrier Alternate 2 - per LF.

| M BAR | | | | | J BAR | | | |
|---|---|---|---|---|---|---|---|---|
| SIZE | SPACING | LENGTH | h | b | SIZE | SPACING | LENGTH | |
| 7 | 1′-2″ | 9′-4″ | 4′-9″ | 5′-1″ | 7 | 1′-2″ | 18′-10″ | |
| 7 | 1′-0″ | 9′-7″ | 4′-9″ | 5′-4″ | 7 | 1′-0″ | 19′-10″ | |
| 7 | 1′-0″ | 10′-1″ | 5′-0″ | 5′-7″ | 7 | 1′-0″ | 20′-7″ | |
| 8 | 1′-2″ | 11′-3″ | 6′-0″ | 5′-10″ | 8 | 1′-2″ | 21′-7″ | |
| 8 | 1′-1″ | 11′-9″ | 6′-3″ | 6′-1″ | 8 | 1′-1″ | 22′-4″ | |
| 8 | 1′-0″ | 12′-0″ | 6′-3″ | 6′-4″ | 8 | 1′-0″ | 23′-4″ | |
| 9 | 1′-2″ | 13′-6″ | 7′-7″ | 6′-7″ | 9 | 1′-2″ | 24′-1″ | |
| 9 | 1′-1″ | 14′-0″ | 7′-10″ | 7′-10″ | 9 | 1′-1″ | 24′-10″ | |
| 9 | 1′-0″ | 14′-6″ | 8′-1″ | 7′-1″ | 9 | 1′-0″ | 25′-7″ | |
| 9 | 11″ | 15′-0″ | 8′-1″ | 7′-7″ | 9 | 11″ | 26′-7″ | |
| 9 | 11″ | 15′-6″ | 8′-4″ | 7′-10″ | 9 | 11″ | 27′-4″ | |
| 9 | 10″ | 16′-0″ | 8′-7″ | 8″-1″ | 9 | 10″ | 28′-1″ | |
| 9 | 10″ | 16′-6″ | 8′-10″ | 8′-4″ | 9 | 10″ | 28′-11″ | |
| 9 | 10″ | 17′-0″ | 9′-1″ | 8′-7″ | 9 | 10″ | 29′-7″ | |
| 10 | 11″ | 18′-9″ | 10′-8″ | 8′-10″ | 10 | 11″ | 30′-4″ | |

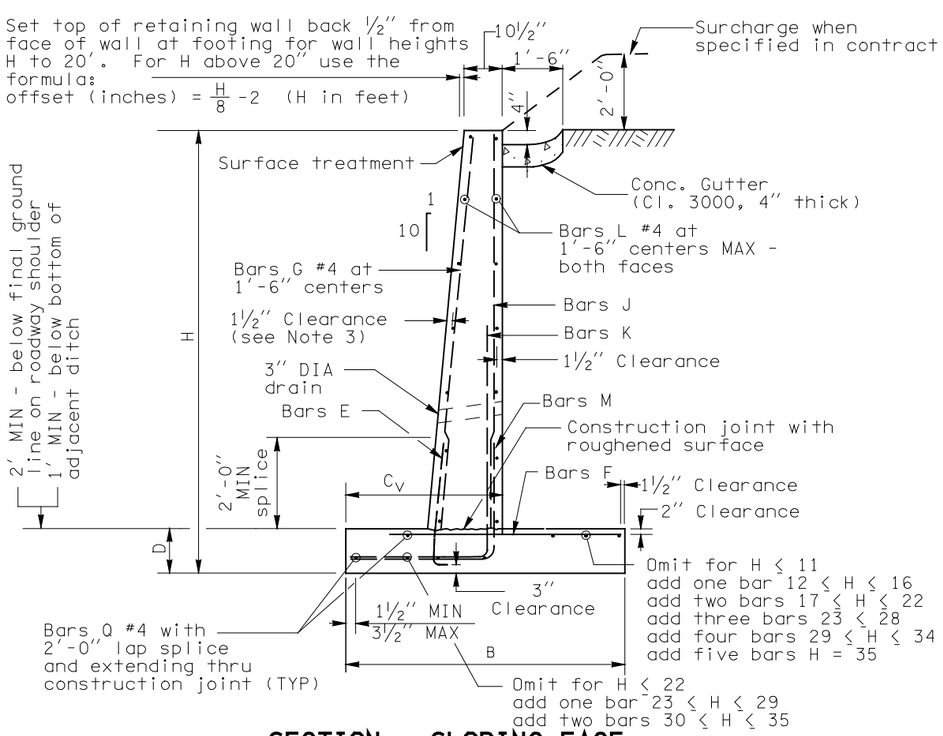
NOTES

1. All concrete including traffic barrier shall be Class 4000 except as noted.
2. For backfill requirements, see Standard Plan "D-4".
3. When Type 2-SW (saltwater) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1".
4. If concrete is "SW", the Material Quantity in the table shall be increased by 0.003 x H CY/LF.
5. If Bar W1 interferes with the retaining wall form, it shall be field bent only at the angle point. Twisting of the bar will not be permitted.
6. Toe height may vary 2" MIN to 6" MAX.
7. Height may vary if required to provide a profile pleasing to the eye.
8. Concrete in the 24 foot wall sections shall be placed separately between expansion joints with a minimum 12 hour period between concrete placement.

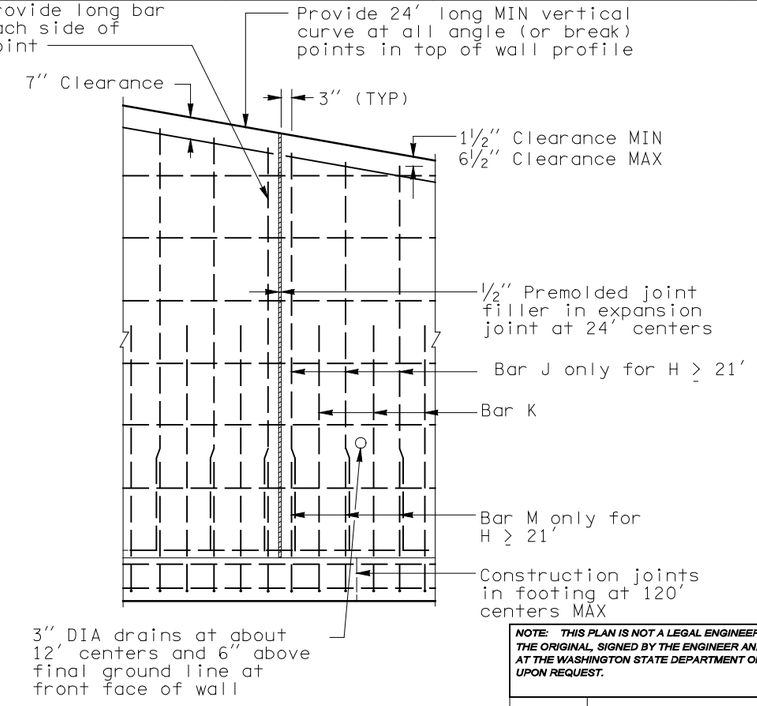



BARS K AND M

| Bar | Radius R |
|---|---|
| #5 | 9" |
| #6 | 11" |
| #7 | 1′-1" |
| #8 | 1′-3" |
| #9 | 1′-6" |
| #10 | 1′-8" |

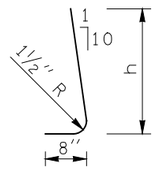



SECTION - SLOPING FACE




ELEVATION

| Bar | MIN Splice |
|---|---|
| #4 | 2′-0" |
| #5 | 2′-0" |
| #6 | 2′-1" |
| #7 | 2′-11" |
| #8 | 3′-9" |
| #9 | 4′-9" |
| #10 | 6′-1" |




BAR E
@ 1′-6" centers

WALL DESIGN WITH SLOPING FRONT FACE AND 2′ SURCHARGE OR TRAFFIC BARRIER

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2000

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

SHEET 1 OF 2 SHEETS

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.

| DATE | REVISION | BY |
|---|---|---|
| 10/99 | Added note 8. | TWS |

APPROVED FOR PUBLICATION

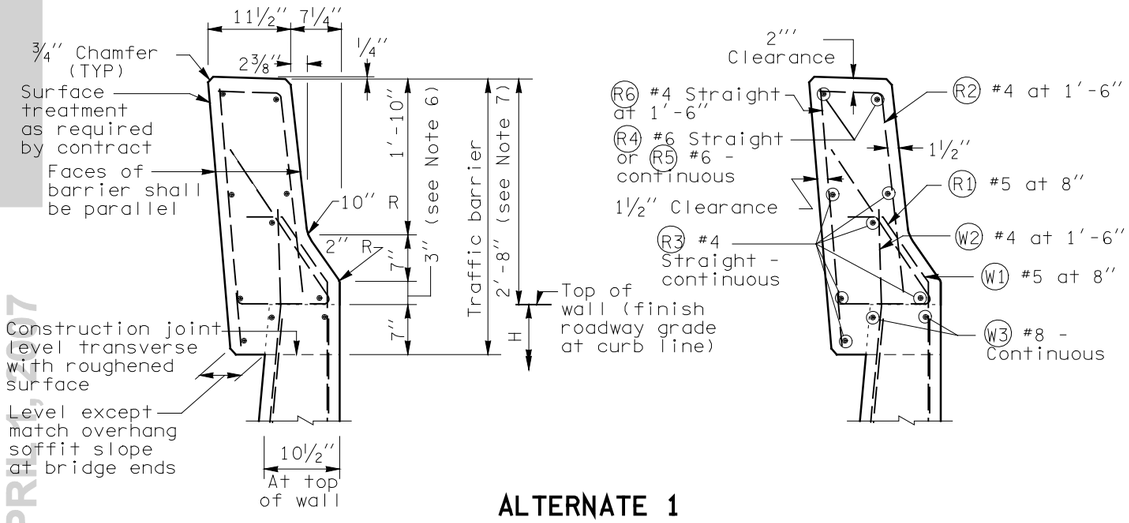
*Clifford E. Mansfield* — *10/06/99*

DEPUTY STATE DESIGN ENGINEER — DATE

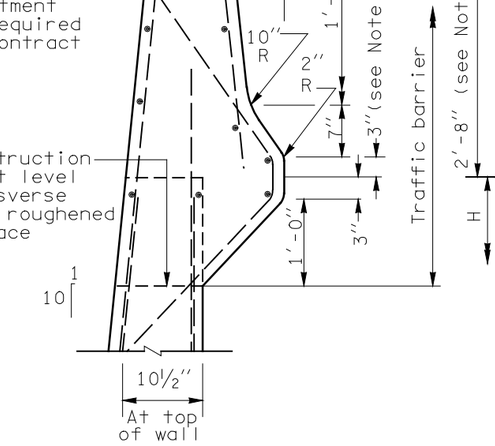
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

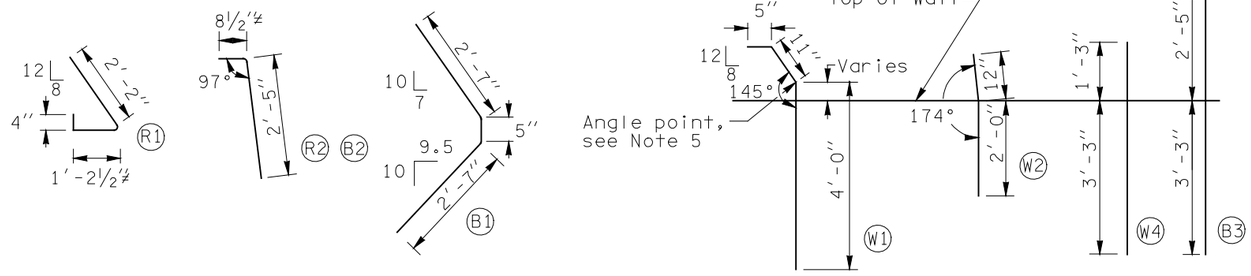
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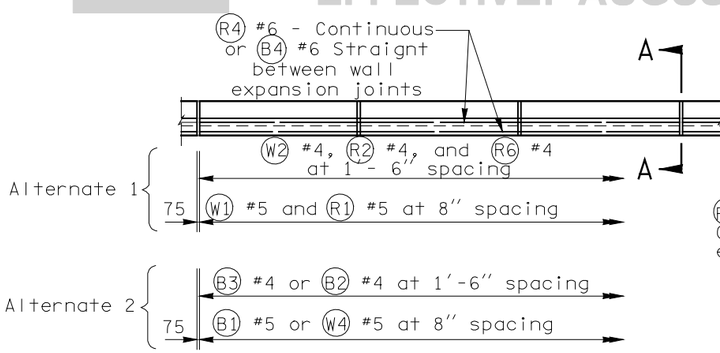

## ALTERNATE 1




## ALTERNATE 2



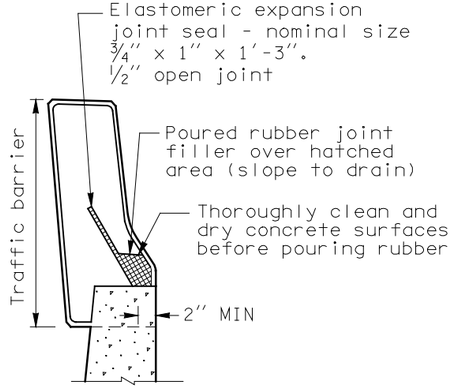

≠ Dimensions to points of intersection



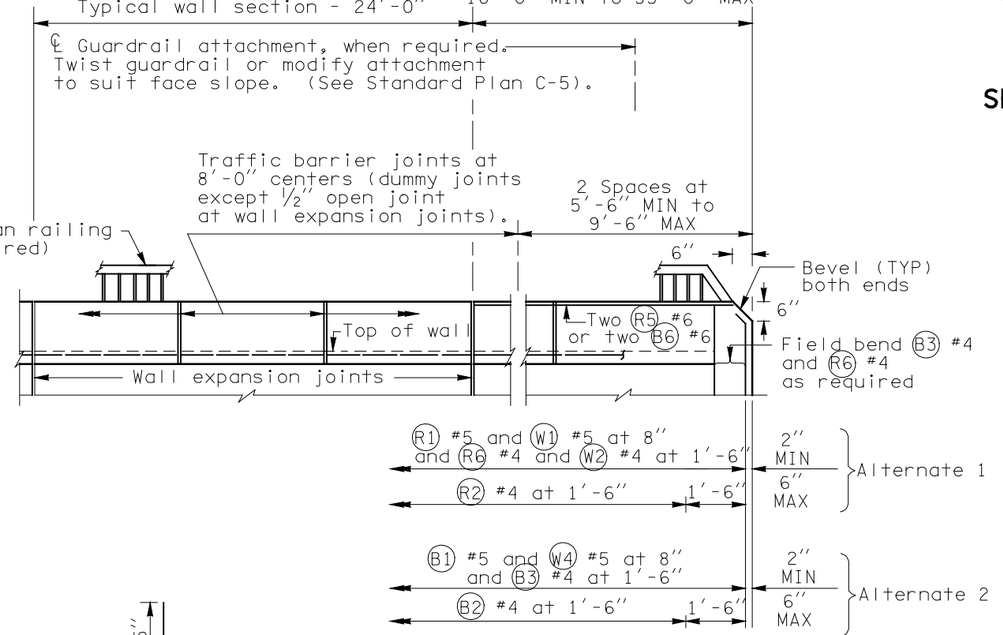

## PLAN - TRAFFIC BARRIER

All chamfers ¾"

## DUMMY JOINT SECTION




## SECTION A-A




## WALL ELEVATION

WALL DESIGN WITH SLOPING FRONT FACE AND 2' SURCHARGE OR TRAFFIC BARRIER

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2000

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

SHEET 2 OF 2 SHEETS

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| DATE | REVISION | BY |
|---|---|---|
| 10/99 | New approval date. | TWS |

APPROVED FOR PUBLICATION

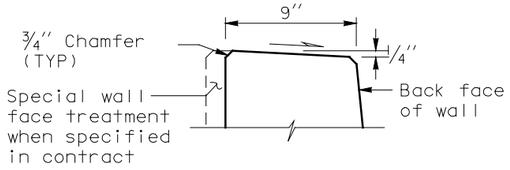
*Clifford E. Mansfield* — *10/06/99*

DEPUTY STATE DESIGN ENGINEER — DATE

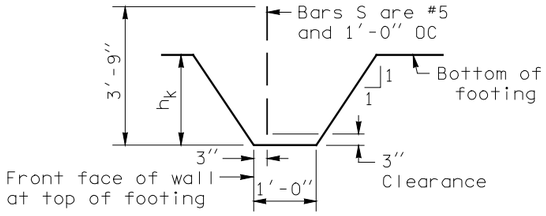
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

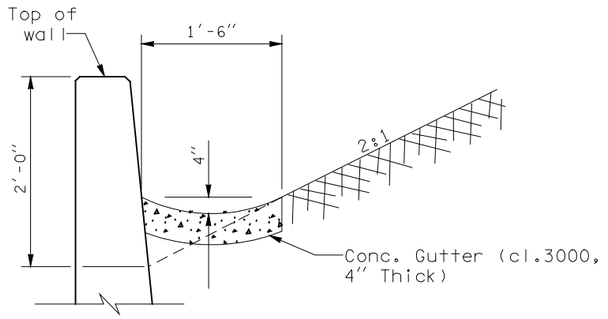



## WALL TOP DETAIL

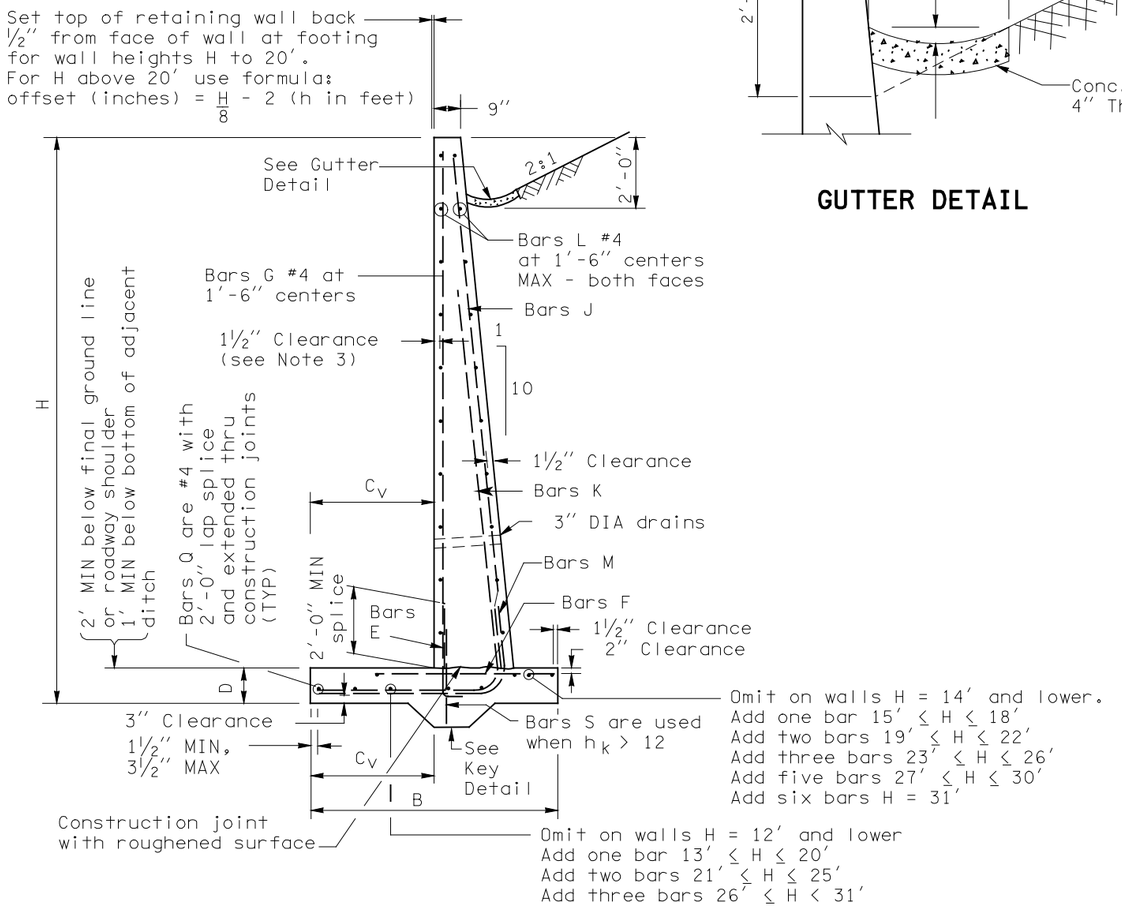



Not required on walls H = 5′ thru H = 12′

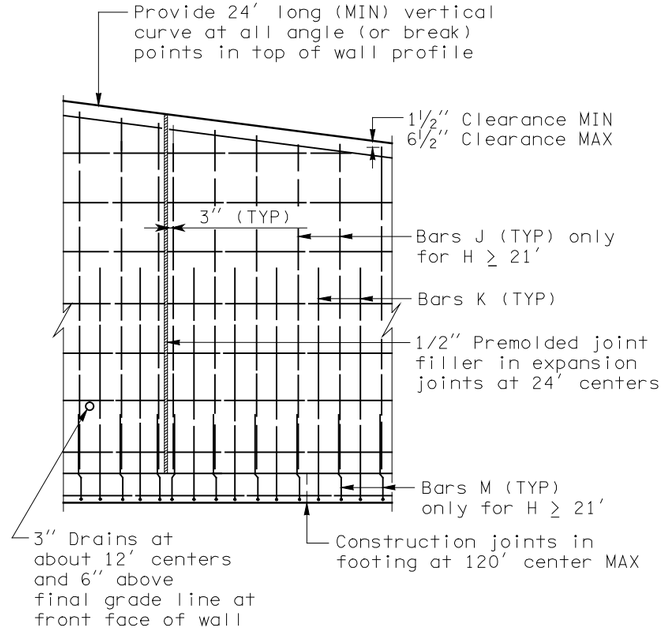
## KEY DETAIL




## GUTTER DETAIL




## SECTION - VERTICAL FACE




## ELEVATION

NOTES

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.

WALL DESIGN WITH VERTICAL FRONT FACE AND 2:1 BACKSLOPE

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2000

# REINFORCED CONCRETE RETAINING WALL TYPE 3 AND 3 SW STANDARD PLAN D-1c

SHEET 1 OF 2 SHEETS

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| DATE | REVISION | BY |
|---|---|---|
| 10/99 | Added note 5. | TWS |

APPROVED FOR PUBLICATION

*Clifford E. Mansfield* — *10/06/99*

DEPUTY STATE DESIGN ENGINEER — DATE

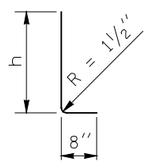
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

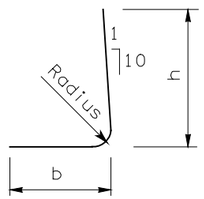
| DIMENSIONS | | | | | FOOTING REINFORCEMENT | | | | | | | | | | | | | | | STEM REINFORCEMENT | | | | MATERIAL QUANTITY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | BAR E (size #4) | | BAR F | | | BAR K | | | | | BAR M | | | | | BAR J | | | BAR G (size #4) | | | |
| H (ft) | P | $C_V$ | b | $h_k$ | LENGTH | h | SIZE | SPACING | LENGTH | SIZE | SPACING | LENGTH | h | b | SIZE | SPACING | LENGTH | h | b | SIZE | SPACING | LENGTH | LENGTH | CONCRETE (CY/LF) | STEEL (LBS/LF) | H (ft) |
| 5 | 3′-0″ | 1′-3″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-6″ | #5 | 1′-0″ | 6′-6″ | 4′-7″ | 2′-4″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3′-10″ | 0.252 | 21.698 | 5 |
| 6 | 3′-6″ | 1′-6″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-6″ | #5 | 1′-0″ | 7′-10″ | 5′-7″ | 2′-8″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 4′-10″ | 0.315 | 24.870 | 6 |
| 7 | 3′-9″ | 1′-9″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-6″ | #5 | 1′-0″ | 9′-2″ | 6′-7″ | 3′-0″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 5′-10″ | 0.372 | 26.706 | 7 |
| 8 | 4′-3″ | 1′-9″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-6″ | #5 | 1′-0″ | 10′-2″ | 7′-7″ | 3′-0″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 6′-10″ | 0.443 | 29.531 | 8 |
| 9 | 4′-9″ | 2′-0″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-6″ | #5 | 1′-0″ | 11′-6″ | 8′-7″ | 3′-4″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 7′-10″ | 0.517 | 32.703 | 9 |
| 10 | 5′-3″ | 2′-3″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-6″ | #5 | 1′-0″ | 12′-11″ | 9′-7″ | 3′-9″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 8′-10″ | 0.594 | 34.625 | 10 |
| 11 | 6′-0″ | 2′-9″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 10″ | 2′-8″ | #5 | 10″ | 14′-6″ | 10′-7″ | 4′-4″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 9′-10″ | 0.685 | 41.550 | 11 |
| 12 | 6′-6″ | 3′-0″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 8″ | 2′-10″ | #5 | 8″ | 15′-4″ | 11′-7″ | 4′-8″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 10′-10″ | 0.770 | 49.874 | 12 |
| 13 | 7′-0″ | 3′-3″ | 1′-0″ | 1′-0″ | 3′-5″ | 2′-9″ | #5 | 10″ | 3′-4″ | #5 | 7″ | 17′-2″ | 12′-7″ | 5′-0″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 11′-10″ | 0.933 | 62.676 | 13 |
| 14 | 7′-9″ | 3′-6″ | 1′-0″ | 1′-0″ | 3′-5″ | 2′-9″ | #5 | 7″ | 3′-8″ | #6 | 7″ | 18′-7″ | 13′-7″ | 5′-4″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 12′-10″ | 1.035 | 83.997 | 14 |
| 15 | 8′-6″ | 3′-9″ | 1′-0″ | 1′-0″ | 3′-6″ | 2′-9″ | #5 | 6″ | 4′-1″ | #6 | 6″ | 20′-0″ | 14′-7″ | 5′-9″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 13′-10″ | 1.141 | 100.638 | 15 |
| 16 | 9′-3″ | 4′-0″ | 1′-3″ | 1′-0″ | 3′-8″ | 2′-9″ | #6 | 6″ | 5′-0″ | #6 | 6″ | 21′-4″ | 15′-7″ | 6′-1″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 14′-10″ | 1.315 | 111.591 | 16 |
| 17 | 10′-0″ | 4′-3″ | 1′-3″ | 1′-0″ | 3′-8″ | 3′-0″ | #6 | 6″ | 5′-5″ | #6 | 5″ | 22′-8″ | 16′-7″ | 6′-5″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 15′-7″ | 1.434 | 118.632 | 17 |
| 18 | 10′-6″ | 4′-3″ | 1′-6″ | 1′-0″ | 3′-8″ | 3′-0″ | #6 | 5″ | 5′-10″ | #6 | 5″ | 23′-8″ | 17′-7″ | 6′-6″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 16′-7″ | 1.620 | 126.835 | 18 |
| 19 | 11′-3″ | 4′-6″ | 1′-6″ | 1′-6″ | 3′-11″ | 3′-3″ | #7 | 6″ | 7′-1″ | #6 | 6″ | 26′-0″ | 18′-7″ | 6′-10″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 17′-4″ | 1.817 | 168.319 | 19 |
| 20 | 12′-0″ | 4′-6″ | 1′-9″ | 1′-6″ | 4′-2″ | 3′-6″ | #7 | 5″ | 7′-9″ | #7 | 5″ | 26′-2″ | 19′-7″ | 7′-0″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 18′-1″ | 2.040 | 203.989 | 20 |
| 21 | 12′-6″ | 5′-0″ | 2′-0″ | 1′-6″ | 4′-5″ | 3′-9″ | #8 | 8″ | 8′-8″ | #7 | 11″ | 19′-11″ | 12′-11″ | 7′-7″ | #8 | 11″ | 12′-9″ | 5′-9″ | 7′-7″ | #8 | 11″ | 18′-11″ | 18′-11″ | 2.261 | 225.015 | 21 |
| 22 | 13′-6″ | 5′-3″ | 2′-3″ | 1′-6″ | 4′-8″ | 4′-0″ | #8 | 7″ | 9′-1″ | #8 | 11″ | 20′-9″ | 13′-5″ | 7′-11″ | #8 | 11″ | 13′-4″ | 6′-1″ | 7′-11″ | #8 | 11″ | 19′-8″ | 19′-7″ | 2.514 | 239.973 | 22 |
| 23 | 14′-0″ | 5′-6″ | 2′-3″ | 1′-6″ | 4′-8″ | 4′-0″ | #8 | 6″ | 9′-6″ | #8 | 10″ | 21′-6″ | 13′-10″ | 8′-3″ | #8 | 10″ | 13′-8″ | 6′-1″ | 8′-3″ | #8 | 10″ | 20′-8″ | 20′-7″ | 2.679 | 272.571 | 23 |
| 24 | 14′-9″ | 5′-9″ | 2′-6″ | 1′-6″ | 4′-11″ | 4′-3″ | #8 | 6″ | 9′-11″ | #8 | 9″ | 22′-4″ | 14′-4″ | 8′-8″ | #8 | 9″ | 14′-4″ | 6′-4″ | 8′-8″ | #8 | 9″ | 21′-5″ | 21′-4″ | 2.958 | 304.464 | 24 |
| 25 | 15′-6″ | 6′-0″ | 2′-9″ | 1′-6″ | 5′-2″ | 4′-6″ | #8 | 6″ | 10′-4″ | #8 | 10″ | 24′-4″ | 16′-0″ | 9′-0″ | #9 | 10″ | 15′-10″ | 7′-8″ | 9′-0″ | #9 | 10″ | 22′-2″ | 22′-1″ | 3.252 | 335.260 | 25 |
| 26 | 16′-3″ | 6′-3″ | 3′-0″ | 1′-6″ | 5′-5″ | 4′-9″ | #8 | 5″ | 10′-9″ | #9 | 9″ | 25′-2″ | 16′-6″ | 9′-4″ | #9 | 9″ | 16′-5″ | 7′-11″ | 9′-4″ | #9 | 9″ | 22′-11″ | 22′-10″ | 3.563 | 386.608 | 26 |
| 27 | 16′-9″ | 6′-6″ | 3′-3″ | 1′-6″ | 5′-8″ | 5′-0″ | #8 | 5″ | 10′-11″ | #9 | 8″ | 25′-11″ | 17′-0″ | 9′-8″ | #9 | 8″ | 17′-0″ | 8′-2″ | 9′-8″ | #9 | 8′ | 23′-8″ | 23′-7″ | 3.859 | 432.355 | 27 |
| 28 | 17′-6″ | 6′-9″ | 3′-6″ | 1′-6″ | 5′-11″ | 5′-3″ | #8 | 5″ | 11′-5″ | #9 | 8″ | 25′-10″ | 17′-7″ | 10′-0″ | #9 | 8″ | 17′-7″ | 8′-5″ | 10′-0″ | #9 | 8″ | 24′-6″ | 24′-4″ | 4.200 | 448.327 | 28 |
| 29 | 18′-3″ | 7′-0″ | 3′-9″ | 1′-6″ | 6′-2″ | 5′-6″ | #8 | 5″ | 11′-10″ | #9 | 9″ | 29′-0″ | 19′-5″ | 10′-4″ | #10 | 9″ | 19′-5″ | 10′-0″ | 10′-4″ | #10 | 9″ | 25′-3″ | 25′-1″ | 4.556 | 494.468 | 29 |
| 30 | 19′-0″ | 7′-3″ | 4′-0″ | 1′-6″ | 6′-5″ | 5′-9″ | #9 | 6″ | 13′-4″ | #10 | 8″ | 30′-0″ | 20′-0″ | 10′-9″ | #10 | 8″ | 20′-1″ | 10′-3″ | 10′-9″ | #10 | 8″ | 26′-0″ | 25′-10″ | 4.928 | 534.648 | 30 |
| 31 | 19′-6″ | 7′-6″ | 4′-3″ | 1′-6″ | 6′-8″ | 6′-0″ | #9 | 5″ | 13′-6″ | #10 | 8″ | 30′-10″ | 20′-6″ | 11′-1″ | #10 | 8″ | 20′-8″ | 11′-1″ | 11′-1″ | #10 | 8″ | 26′-9″ | 26′-7″ | 5.277 | 559.628 | 31 |

| Bar | MIN Splice |
|---|---|
| #4 | 2′-0″ |
| #5 | 2′-0″ |
| #6 | 2′-1″ |
| #7 | 2′-11″ |
| #8 | 3′-9″ |
| #9 | 4′-9″ |
| #10 | 6′-1″ |




**BAR E**
at 1′-6″ centers

| Bar | Radius |
|---|---|
| #5 | 9″ |
| #6 | 11″ |
| #7 | 1′-1″ |
| #8 | 1′-3″ |
| #9 | 1′-6″ |
| #10 | 1′-8″ |




**BARS K AND M**

WALL DESIGN WITH VERTICAL
FRONT FACE AND 2:1 BACKSLOPE

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2000

# REINFORCED CONCRETE RETAINING WALL TYPE 3 AND 3 SW STANDARD PLAN D-1c

SHEET 2 OF 2 SHEETS

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| DATE | REVISION | BY |
|---|---|---|
| 10/99 | New approval date. | TWS |

APPROVED FOR PUBLICATION

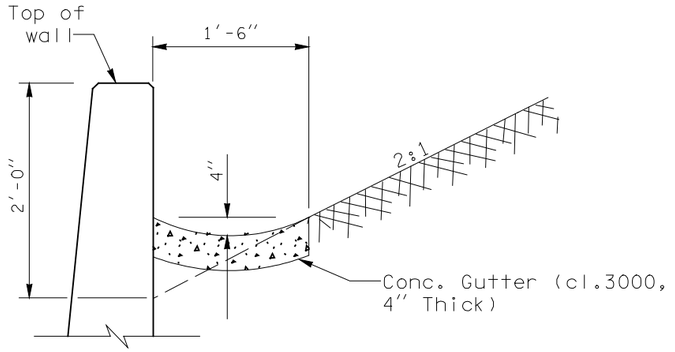
*Clifford E. Mansfield* — *10/06/99*

DEPUTY STATE DESIGN ENGINEER — DATE

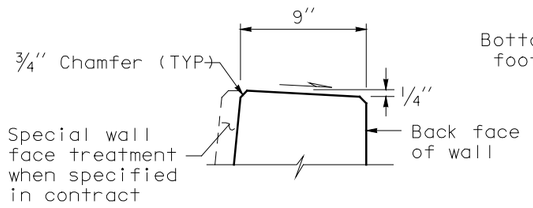
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

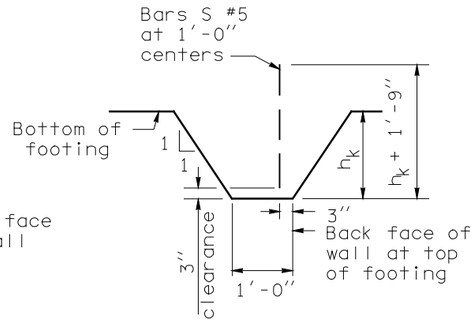
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




## GUTTER DETAIL




## WALL TOP DETAIL




Not required on walls H = 5" thru H = 14'

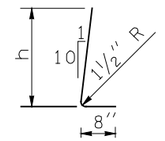
## KEY DETAIL

NOTES

1. All concrete shall be Class 4000 except as noted.
2. For backfill requirements, see Standard Plan "D-4".
3. When Wall Type 4-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 4-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.

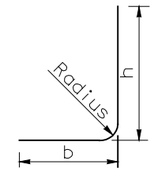
| Bar | MIN Splice |
|---|---|
| #4 | 2'-0" |
| #5 | 2'-0" |
| #6 | 2'-1" |
| #7 | 2'-11" |
| #8 | 3'-9" |
| #9 | 4'-9" |
| #10 | 6'-1" |

| Bar | Radius |
|---|---|
| #5 | 9" |
| #6 | 11" |
| #7 | 1'-1" |
| #8 | 1'-3" |
| #9 | 1'-6" |
| #10 | 1'-8" |

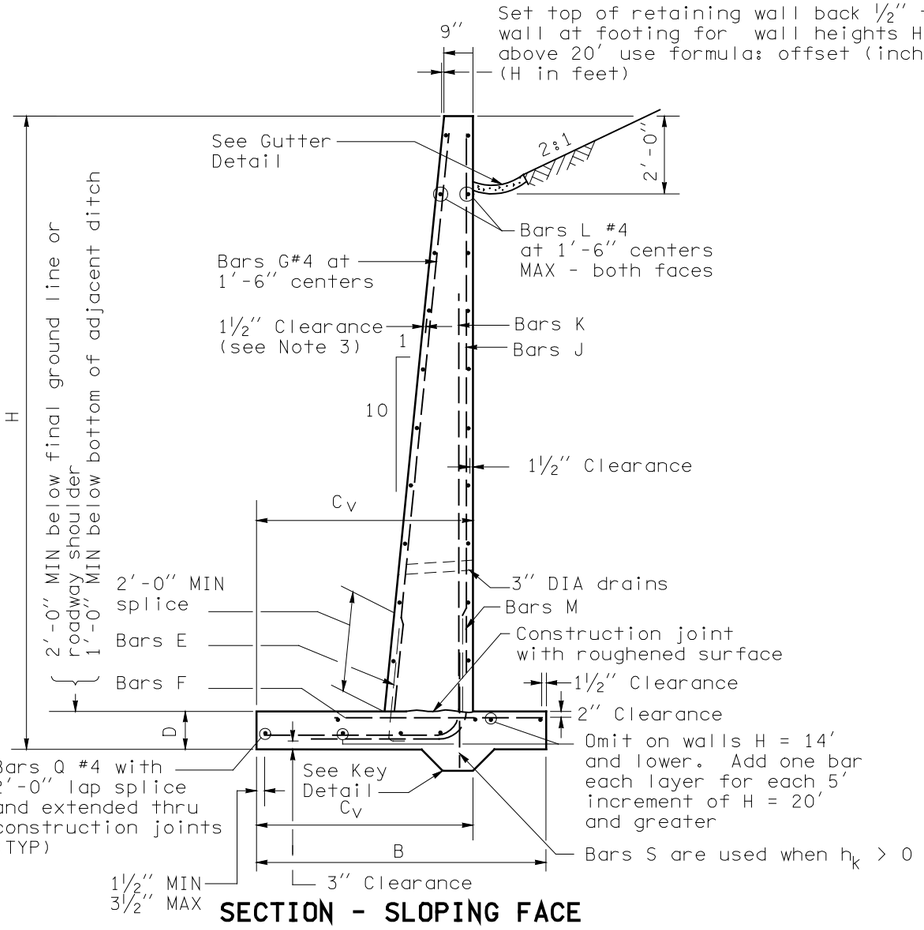



## BAR E

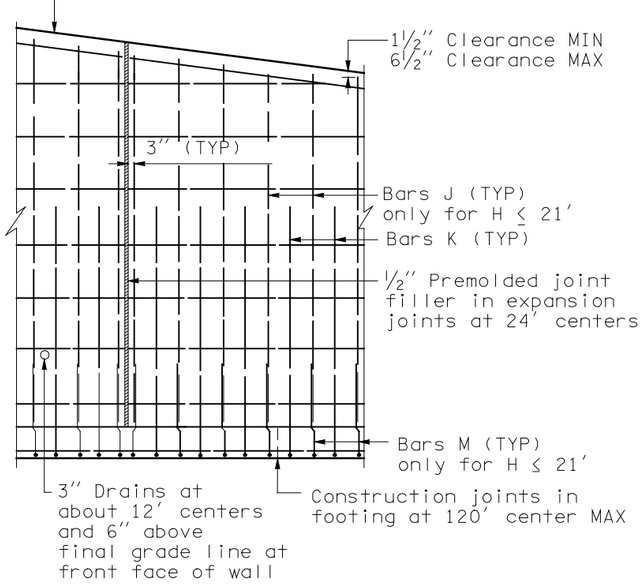
At 1'-6" centers




## BARS K AND M




## SECTION - SLOPING FACE




## ELEVATION

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

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2000

# REINFORCED CONCRETE RETAINING WALL TYPE 4 AND 4 SW STANDARD PLAN D-1d

SHEET 1 OF 2 SHEETS

*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.*

| DATE | REVISION | BY |
|---|---|---|
| 10/99 | Added note 5. | TWS |

APPROVED FOR PUBLICATION

*Clifford E. Mansfield* — DEPUTY STATE DESIGN ENGINEER — *10/06/99* DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| DIMENSIONS | | | | | FOOTING REINFORCEMENT | | | | | | | | | | | | | | | STEM REINFORCEMENT | | | | MATERIAL QUANTITY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | BAR E (size #4) | | BAR F | | | | BAR K | | | | BAR M | | | | | BAR J | | | BAR G (size #4) | | | |
| H (ft) | B | $C_V$ | D | $h_K$ | LENGTH | h | SIZE | SPACE | LENGTH | SIZE | SPACE | LENGTH | h | b | SIZE | SPACE | LENGTH | h | b | SIZE | SPACE | LENGTH | LENGTH | CONCRETE (CY/LF) | STEEL (LBS/LF) | H (ft) |
| 5 | 2′-6″ | 1′-9″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-0″ | #5 | 1′-0″ | 5′-7″ | 4′-7″ | 1′-4″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3′-10″ | 0.233 | 19.072 | 5 |
| 6 | 2′-9″ | 1′-9″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-3″ | #5 | 1′-0″ | 6′-7″ | 5′-7″ | 1′-4″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 4′-10″ | 0.287 | 22.063 | 6 |
| 7 | 3′-0″ | 2′-3″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-3″ | #5 | 1′-0″ | 8′-1″ | 6′-7″ | 1′-10″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 5′-10″ | 0.344 | 23.906 | 7 |
| 8 | 3′-6″ | 2′-6″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-3″ | #5 | 1′-0″ | 9′-4″ | 7′-7″ | 2′-1″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 6′-10″ | 0.415 | 27.158 | 8 |
| 9 | 4′-0″ | 3′-0″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-3″ | #5 | 1′-0″ | 10′-10″ | 8′-7″ | 2′-8″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 7′-10″ | 0.489 | 30.504 | 9 |
| 10 | 4′-6″ | 3′-6″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-3″ | #5 | 1′-0″ | 12′-4″ | 9′-7″ | 3′-1″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 8′-10″ | 0.567 | 33.182 | 10 |
| 11 | 5′-3″ | 3′-9″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-9″ | #5 | 1′-0″ | 13′-7″ | 10′-7″ | 3′-4″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 9′-11″ | 0.657 | 38.638 | 11 |
| 12 | 6′-0″ | 4′-0″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 3′-3″ | #5 | 10″ | 14′-10″ | 11′-7″ | 3′-8″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 10′-11″ | 0.752 | 43.820 | 12 |
| 13 | 6′-6″ | 4′-6″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 10″ | 3′-3″ | #5 | 9″ | 16′-4″ | 12′-7″ | 4′-1″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 11′-11″ | 0.841 | 48.848 | 13 |
| 14 | 7′-3″ | 4′-9″ | 1′-3″ | 0 | 3′-8″ | 3′-0″ | #4 | 9″ | 3′-9″ | #5 | 7″ | 17′-7″ | 13′-7″ | 4′-4″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 12′-8″ | 0.920 | 60.089 | 14 |
| 15 | 7′-6″ | 5′-0″ | 1′-3″ | 0 | 3′-8″ | 3′-0″ | #4 | 8″ | 3′-9″ | #6 | 8″ | 18′-10″ | 14′-7″ | 4′-8″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 13′-8″ | 1.218 | 76.409 | 15 |
| 16 | 8′-3″ | 5′-3″ | 1′-3″ | 0 | 3′-8″ | 3′-0″ | #5 | 8″ | 4′-7″ | #6 | 7″ | 20′-0″ | 15′-7″ | 4′-10″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 14′-8″ | 1.333 | 89.333 | 16 |
| 17 | 9′-0″ | 5′-6″ | 1′-3″ | 0 | 3′-8″ | 3′-0″ | #5 | 8″ | 5′-1″ | #6 | 6″ | 21′-3″ | 16′-7″ | 5′-1″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 15′-8″ | 1.452 | 104.903 | 17 |
| 18 | 9′-9″ | 5′-6″ | 1′-3″ | 0 | 3′-8″ | 3′-0″ | #6 | 6″ | 6′-4″ | #6 | 5″ | 22′-3″ | 17′-7″ | 5′-1″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 16′-8″ | 1.575 | 132.792 | 18 |
| 19 | 10′-6″ | 5′-9″ | 1′-6″ | 1′-6″ | 3′-11″ | 3′-3″ | #6 | 5″ | 6′-10″ | #7 | 6″ | 23′-5″ | 18′-7″ | 5′-4″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 17′-5″ | 1.775 | 157.038 | 19 |
| 20 | 11′-3″ | 6′-0″ | 1′-9″ | 1′-6″ | 4′-2″ | 3′-6″ | #6 | 5″ | 7′-4″ | #7 | 5″ | 24′-9″ | 19′-7″ | 5′-8″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 18′-2″ | 1.992 | 184.972 | 20 |
| 21 | 12′-0″ | 6′-3″ | 2′-0″ | 1′-6″ | 4′-4″ | 3′-9″ | #6 | 5″ | 7′-10″ | #8 | 11″ | 14′-1″ | 8′-10″ | 5′-10″ | #8 | 11″ | 11′-1″ | 5′-10″ | 5′-10″ | #8 | 11″ | 18′-10″ | 18′-11″ | 2.224 | 195.265 | 21 |
| 22 | 12′-6″ | 6′-6″ | 2′-0″ | 1′-6″ | 4′-4″ | 3′-9″ | #7 | 5″ | 8′-11″ | #8 | 10″ | 14′-9″ | 9′-3″ | 6′-2″ | #8 | 10″ | 11′-4″ | 5′-10″ | 6′-1″ | #8 | 10″ | 19′-10″ | 19′-11″ | 2.405 | 231.507 | 22 |
| 23 | 13′-0″ | 7′-0″ | 2′-0″ | 2′-0″ | 4′-4″ | 3′-9″ | #7 | 5″ | 8′-11″ | #8 | 10″ | 15′-8″ | 9′-7″ | 6′-8″ | #8 | 10″ | 11′-11″ | 5′-10″ | 6′-8″ | #8 | 10″ | 20′-10″ | 20′-11″ | 2.585 | 240.484 | 23 |
| 24 | 13′-9″ | 7′-3″ | 2′-3″ | 2′-0″ | 4′-8″ | 4′-0″ | #7 | 5″ | 9′-5″ | #8 | 9″ | 16′-4″ | 10′-1″ | 6′-10″ | #8 | 9″ | 12′-4″ | 6′-1″ | 6′-10″ | #8 | 9″ | 21′-7″ | 21′-8″ | 2.848 | 269.186 | 24 |
| 25 | 14′-3″ | 7′-6″ | 2′-3″ | 2′-6″ | 4′-8″ | 4′-0″ | #8 | 5″ | 10′-8″ | #9 | 10″ | 16′-11″ | 10′-6″ | 7′-1″ | #9 | 10″ | 13′-7″ | 7′-2″ | 7′-1″ | #9 | 10″ | 22′-7″ | 22′-8″ | 3.102 | 331.336 | 25 |
| 26 | 15′-0″ | 7′-9″ | 2′-3″ | 2′-6″ | 4′-8″ | 4′-0″ | #8 | 5″ | 11′-2″ | #9 | 9″ | 17′-6″ | 10′-10″ | 7′-4″ | #9 | 9″ | 13′-10″ | 7′-2″ | 7′-4″ | #9 | 9″ | 23′-7″ | 23′-8″ | 3.278 | 367.361 | 26 |
| 27 | 15′-6″ | 8′-3″ | 2′-6″ | 2′-6″ | 4′-11″ | 4′-3″ | #8 | 5″ | 11′-2″ | #9 | 8″ | 18′-7″ | 11′-5″ | 7′-10″ | #9 | 8″ | 14′-5″ | 7′-5″ | 7′-10″ | #9 | 8″ | 24′-4″ | 24′-5″ | 3.551 | 414.105 | 27 |
| 28 | 16′-0″ | 8′-9″ | 2′-6″ | 2′-6″ | 4′-11″ | 4′-3″ | #9 | 5″ | 11′-2″ | #9 | 8″ | 19′-5″ | 11′-9″ | 8′-4″ | #9 | 8″ | 15′-1″ | 7′-5″ | 8′-4″ | #9 | 10″ | 25′-4″ | 25′-6″ | 3.718 | 426.488 | 28 |
| 29 | 16′-9″ | 9′-0″ | 2′-9″ | 2′-6″ | 5′-2″ | 4′-6″ | #9 | 5″ | 12′-9″ | #10 | 9″ | 20′-3″ | 12′-4″ | 8′-8″ | #10 | 9″ | 16′-11″ | 9′-0″ | 8′-8″ | #10 | 9″ | 26′-1″ | 26′-3″ | 4.035 | 519.157 | 29 |
| 30 | 17′-6″ | 9′-3″ | 3′-0″ | 2′-6″ | 5′-5″ | 4′-9″ | #9 | 5″ | 13′-3″ | #10 | 8″ | 20′-11″ | 12′-10″ | 8′-10″ | #10 | 8″ | 17′-4″ | 9′-3″ | 8′-10″ | #10 | 8″ | 26′-10″ | 27′-0″ | 4.369 | 580.877 | 30 |
| 31 | 18′-0″ | 9′-6″ | 3′-0″ | 3′-0″ | 5′-5″ | 4′-9″ | #9 | 5″ | 13′-6″ | #10 | 8″ | 21′-7″ | 13′-3″ | 9′-1″ | #10 | 8″ | 17′-7″ | 9′-3″ | 9′-1″ | #10 | 8″ | 27′-10″ | 28′-0″ | 4.674 | 597.591 | 31 |
| 32 | 18′-9″ | 9′-9″ | 3′-3″ | 3′-6″ | 5′-8″ | 5′-0″ | #9 | 5″ | 14′-0″ | #10 | 8″ | 22′-2″ | 13′-9″ | 9′-4″ | #10 | 8″ | 19′-5″ | 11′-0″ | 9′-4″ | #10 | 8″ | 28′-7″ | 28′-9″ | 5.170 | 730.715 | 32 |
| 33 | 19′-3″ | 10′-0″ | 3′-6″ | 3′-6″ | 5′-11″ | 5′-3″ | #10 | 5″ | 14′-3″ | #10 | 8″ | 23′-0″ | 14′-3″ | 9′-8″ | #10 | 8″ | 20′-0″ | 11′-3″ | 9′-8″ | #10 | 8″ | 29′-4″ | 29′-6″ | 5.510 | 751.136 | 33 |

WALL DESIGN WITH SLOPING
FRONT FACE AND 2:1 BACKSLOPE

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2000

# REINFORCED CONCRETE RETAINING WALL TYPE 4 AND 4 SW STANDARD PLAN D-1d

SHEET 2 OF 2 SHEETS

*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.*

| DATE | REVISION | BY |
|---|---|---|
| 10/99 | New approval date. | TWS |

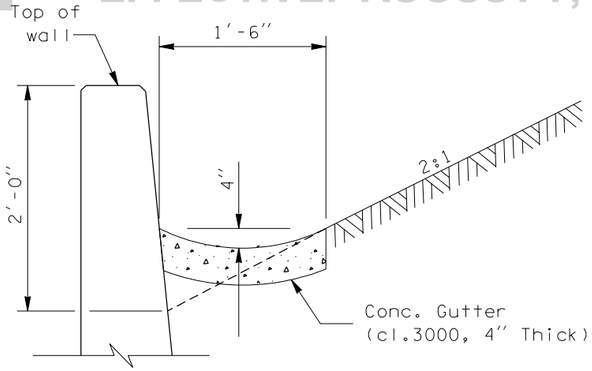
APPROVED FOR PUBLICATION

*Clifford E. Mansfield* — DEPUTY STATE DESIGN ENGINEER — *10/06/99* DATE

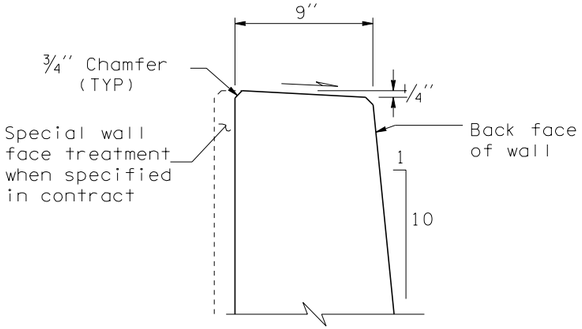
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

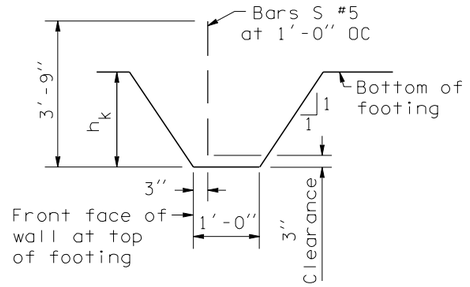
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




GUTTER DETAIL




WALL TOP DETAIL



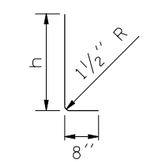

KEY DETAIL

Not required on
walls H = 5'
thru H = 25'

NOTES

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.

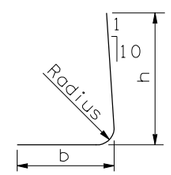
| Bar | MIN Splice |
|---|---|
| #4 | 2'-0" |
| #5 | 2'-0" |
| #6 | 2'-1" |
| #7 | 2'-11" |
| #8 | 3'-9" |
| #9 | 4'-9" |
| #10 | 6'-1" |



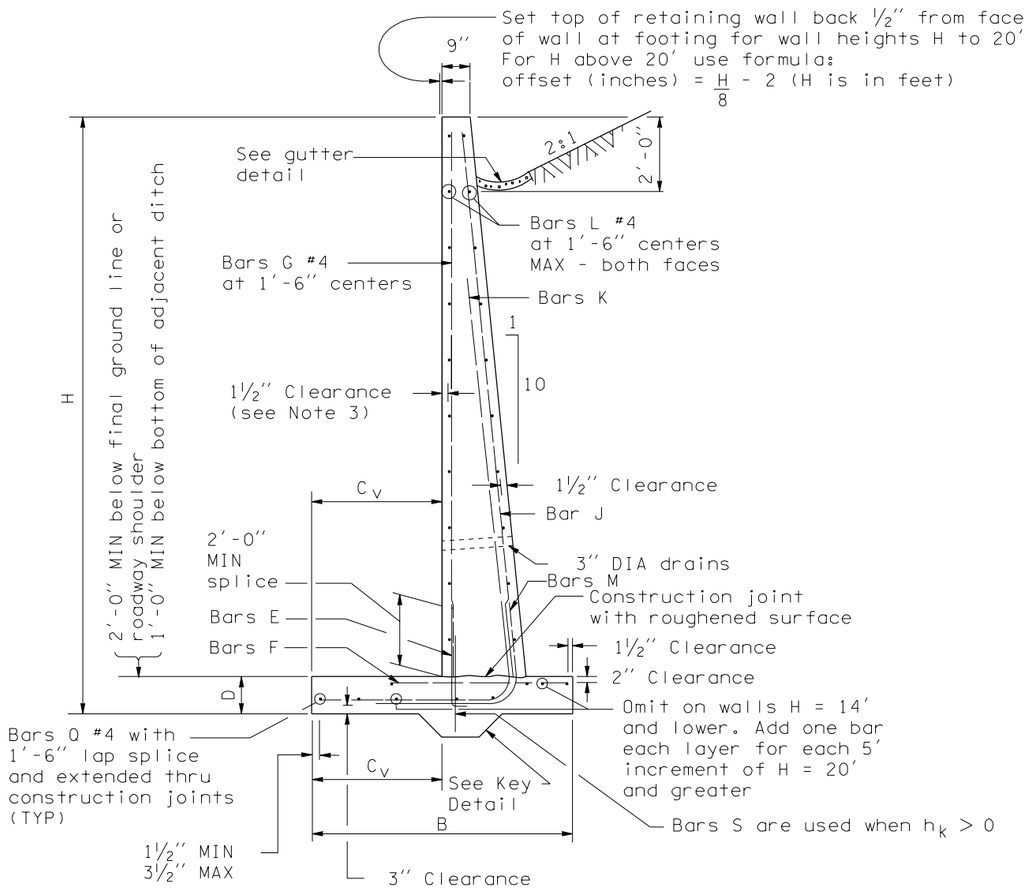

BAR E

At 1'-6" centers

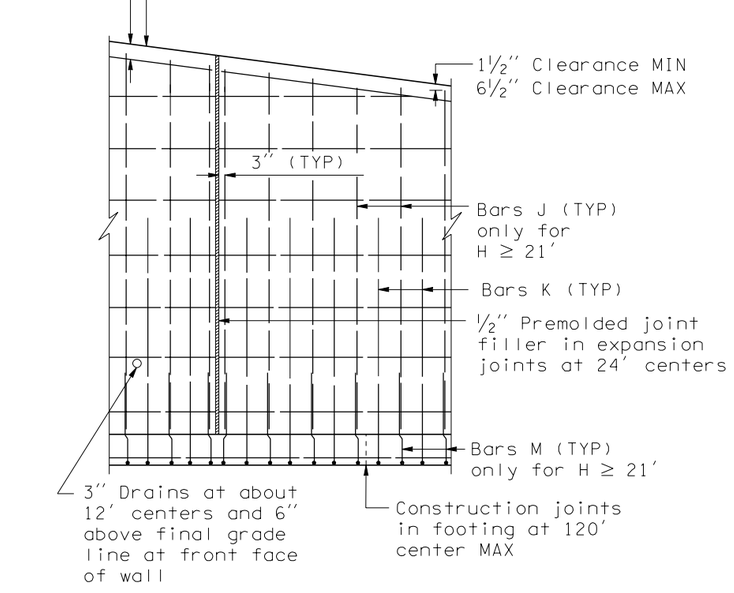
| Bar | Radius |
|---|---|
| #5 | 9" |
| #6 | 11" |
| #7 | 1'-1" |
| #8 | 1'-6" |
| #9 | 1'-8" |
| #10 | 2'-8" |




BARS K AND M




SECTION - VERTICAL FACE




ELEVATION

WALL DESIGN WITH VERTICAL
FRONT FACE AND 2:1 BACKSLOPE

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2002

# REINFORCED CONCRETE RETAINING WALL TYPE 5 AND 5 SW STANDARD PLAN D-1e

SHEET 1 OF 2 SHEETS

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APPROVED FOR PUBLICATION

*Harold J. Peterfeso* 01-23-02

STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

| DATE | REVISION | BY |
|---|---|---|
| 8/01 | New Approval Date | MAS |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| DIMENSIONS | | | | | FOOTING REINFORCEMENT | | | | | | | | | | | | | | | | | STEM REINFORCEMENT | | | | MATERIAL QUANTITY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | BAR E (size #4) | | BAR F | | | BAR K | | | | | BAR M | | | | | | | BAR J | | | BAR G (size #4) | | | |
| H (ft) | B | $C_V$ | D | $h_k$ | LENGTH | h | SIZE | SPAC. | LENGTH | SIZE | SPAC. | LENGTH | h | b | SIZE | SPAC. | LENGTH | h | b | SIZE | SPAC. | LENGTH | LENGTH | CONCRETE (CY/LF) | STEEL (lbs/LF) | H (ft) |
| 5 | 3′-0″ | 1′-0″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-0″ | #5 | 1′-0″ | 6′-3″ | 4′-7″ | 2′-0″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3′-10″ | 0.252 | 21.017 | 5 |
| 6 | 3′-0″ | 1′-0″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-0″ | #5 | 1′-0″ | 7′-3″ | 5′-7″ | 2′-1″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 4′-10″ | 0.296 | 23.928 | 6 |
| 7 | 3′-3″ | 1′-0″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-1″ | #5 | 1′-0″ | 8′-4″ | 6′-7″ | 2′-2″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 5′-10″ | 0.354 | 25.554 | 7 |
| 8 | 3′-6″ | 1′-0″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-2″ | #5 | 1′-0″ | 9′-5″ | 7′-7″ | 2′-3″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 6′-10″ | 0.415 | 28.526 | 8 |
| 9 | 4′-0″ | 1′- 3″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 1′-0″ | 2′-4″ | #5 | 1′-0″ | 10′-10″ | 8′-7″ | 2′-8″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 7′-10″ | 0.489 | 31.896 | 9 |
| 10 | 4′-6″ | 1′- 3″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #4 | 10″ | 2′-9″ | #5 | 1′-0″ | 11′-11″ | 9′-7″ | 2′-9″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 8′-10″ | 0.567 | 34.117 | 10 |
| 11 | 5′-0″ | 1′- 6″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #5 | 1′-0″ | 3′-3″ | #5 | 1′-0″ | 13′-3″ | 10′-7″ | 3′-1″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 9′-10″ | 0.648 | 38.474 | 11 |
| 12 | 5′-6″ | 1′- 6″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #5 | 9″ | 3′-8″ | #5 | 11″ | 14′-4″ | 11′-7″ | 3′-2″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 10′-10″ | 0.733 | 44.454 | 12 |
| 13 | 6′-3″ | 1′- 9″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #5 | 7″ | 4′-1″ | #5 | 9″ | 15′-8″ | 12′-7″ | 3′-6″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 11′-10″ | 0.831 | 58.247 | 13 |
| 14 | 6′-9″ | 1′- 9″ | 1′-0″ | 0 | 3′-5″ | 2′-9″ | #6 | 7″ | 4′-11″ | #5 | 7″ | 16′-10″ | 13′-7″ | 3′-8″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 12′-10″ | 0.924 | 68.698 | 14 |
| 15 | 7′-6″ | 2′-0″ | 1′-3″ | 0 | 3′-8″ | 3′-0″ | #6 | 7″ | 5′-4″ | #5 | 6″ | 18′-3″ | 14′-7″ | 4′-0″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 13′-5″ | 1.079 | 78.188 | 15 |
| 16 | 8′-3″ | 2′- 3″ | 1′-3″ | 0 | 3′-8″ | 3′-0″ | #6 | 5″ | 5′-9″ | #5 | 6″ | 19′-6″ | 15′-7″ | 4′-4″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 14′-5″ | 1.195 | 89.572 | 16 |
| 17 | 8′-9″ | 2′- 3″ | 1′-6″ | 0 | 3′-11″ | 3′-3″ | #6 | 5″ | 6′-2″ | #5 | 5″ | 20′-8″ | 16′-7″ | 4′-5″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 15′-4″ | 1.362 | 104.579 | 17 |
| 18 | 9′-3″ | 2′- 3″ | 1′-6″ | 0 | 3′-11″ | 3′-3″ | #7 | 6″ | 7′-5″ | #6 | 6″ | 21′-8″ | 17′-7″ | 4′-6″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 16′-4″ | 1.490 | 126.468 | 18 |
| 19 | 9′-6″ | 2′- 6″ | 1′-9″ | 0 | 4′-2″ | 3′-6″ | #7 | 6″ | 7′-4″ | #6 | 5″ | 23′-0″ | 18′-7″ | 4′-10″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 17′-1″ | 1.646 | 145.732 | 19 |
| 20 | 10′-0″ | 3′-0″ | 2′-0″ | 0 | 4′-5″ | 3′-9″ | #7 | 6″ | 7′-3″ | #6 | 5″ | 24′-8″ | 19′-7″ | 5′-6″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 17′-10″ | 1.841 | 151.845 | 20 |
| 21 | 10′-6″ | 3′-6″ | 2′-0″ | 0 | 4′-5″ | 3′-9″ | #7 | 6″ | 7′-2″ | #7 | 1′-0″ | 17′-5″ | 11′-11″ | 6′-1″ | #7 | 1′-0″ | 10′-3″ | 4′-10″ | 6′-1″ | #7 | 1′-0″ | 18′-11″ | 18′-10″ | 1.974 | 166.668 | 21 |
| 22 | 11′-0″ | 3′-9″ | 2′-0″ | 0 | 4′-5″ | 3′-9″ | #7 | 6″ | 7′-4″ | #7 | 11″ | 18′-2″ | 12′-4″ | 6′-5″ | #7 | 11″ | 10′-7″ | 4′-10″ | 6′-5″ | #7 | 11″ | 19′-11″ | 19′-10″ | 2.111 | 188.243 | 22 |
| 23 | 11′-6″ | 3′-9″ | 2′-3″ | 0 | 4′-8″ | 4′-0″ | #7 | 6″ | 7′-9″ | #8 | 1′-0″ | 19′-9″ | 13′-11″ | 6′-6″ | #8 | 1′-0″ | 11′-11″ | 6′-1″ | 6′-6″ | #8 | 1′-0″ | 20′-8″ | 20′-7″ | 2.332 | 209.377 | 23 |
| 24 | 12′-3″ | 4′-0″ | 2′-3″ | 0 | 4′-8″ | 4′-0″ | #8 | 7″ | 9′-2″ | #8 | 11″ | 20′-6″ | 14′-4″ | 6′-10″ | #8 | 11″ | 12′-3″ | 6′ 1″ | 6′-8″ | #8 | 11″ | 21′-8″ | 21′-7″ | 2.501 | 240.204 | 24 |
| 25 | 12′-9″ | 4′-0″ | 2′-6″ | 0 | 4′-11″ | 4′-3″ | #8 | 6″ | 9′-7″ | #8 | 10″ | 21′-2″ | 14′-10″ | 7′-0″ | #8 | 10″ | 12′-6″ | 6′-4″ | 7′-0″ | #8 | 10″ | 22′-5″ | 22′-4″ | 2.743 | 282.675 | 25 |
| 26 | 13′-0″ | 4′-6″ | 2′-6″ | 2′-0″ | 4′-11″ | 4′-3″ | #8 | 6″ | 9′-3″ | #8 | 10″ | 22′-1″ | 15′-2″ | 7′-7″ | #8 | 10″ | 13′-1″ | 6′-4″ | 7′-7″ | #8 | 10″ | 23′-5″ | 23′-4″ | 3.101 | 295.370 | 26 |
| 27 | 13′-6″ | 4′-9″ | 2′-6″ | 2′-0″ | 4′-11″ | 4′-3″ | #8 | 6″ | 9′-5″ | #9 | 11″ | 23′-10″ | 16′-8″ | 7′-11″ | #9 | 11″ | 14′-6″ | 7′-5″ | 7′-11″ | #9 | 11″ | 24′-5″ | 24′-4″ | 3.264 | 332.292 | 27 |
| 28 | 14′-0″ | 5′-0″ | 2′-9″ | 2′-0″ | 5′-2″ | 4′-6″ | #8 | 6″ | 9′-7″ | #9 | 10″ | 24′-8″ | 17′-2″ | 8′-3″ | #9 | 10″ | 15′-1″ | 7′-8″ | 8′-3″ | #9 | 10″ | 25′-2″ | 25′-1″ | 3.530 | 365.742 | 28 |
| 29 | 14′-6″ | 5′- 6″ | 2′-9″ | 2′-0″ | 5′-2″ | 4′-6″ | #8 | 6″ | 9′-5″ | #9 | 10″ | 25′-8″ | 17′-7″ | 8′-10″ | #9 | 10″ | 15′-7″ | 7′-8″ | 8′-10″ | #9 | 10″ | 26′-2″ | 26′-1″ | 3.704 | 393.720 | 29 |
| 30 | 15′-0″ | 6′- 0″ | 2′-9″ | 2′-0″ | 5′-2″ | 4′-6″ | #8 | 6″ | 9′-4″ | #9 | 9″ | 26′-8″ | 17′-11″ | 9′-6″ | #9 | 9″ | 16′-3″ | 7′-8″ | 9′-6″ | #9 | 9″ | 27′-2″ | 27′-1″ | 3.882 | 440.386 | 30 |
| 31 | 15′-6″ | 6′- 3″ | 3′-0″ | 2′-0″ | 5′-5″ | 4′-9″ | #8 | 6″ | 9′-6″ | #10 | 10″ | 28′-9″ | 19′-9″ | 9′-10″ | #10 | 10″ | 18′-2″ | 9′-3″ | 9′-10″ | #10 | 10″ | 27′-11″ | 27′-11″ | 4.174 | 491.523 | 31 |
| 32 | 16′-0″ | 6′- 6″ | 3′-0″ | 2′-0″ | 5′-5″ | 4′-9″ | #8 | 6″ | 9′-8″ | #10 | 9″ | 29′-6″ | 20′-2″ | 10′-2″ | #10 | 9″ | 18′-6″ | 9′-3″ | 10′-2″ | #10 | 9″ | 28′-11″ | 28′-11″ | 4.363 | 549.081 | 32 |
| 33 | 16′-9″ | 6′- 9″ | 3′-3″ | 2′-0″ | 5′-8″ | 5′-0″ | #9 | 7″ | 11′-2″ | #10 | 9″ | 30′-4″ | 20′-8″ | 10′-6″ | #10 | 10″ | 19′-1″ | 9′-6″ | 10′-6″ | #10 | 9″ | 29′-8″ | 29′-5″ | 4.704 | 575.423 | 33 |
| 34 | 17′-3″ | 7′-3″ | 3′-6″ | 2′-0″ | 5′-11″ | 5′-3″ | #9 | 7″ | 11′-1″ | #10 | 9″ | 31′-5″ | 21′-3″ | 11′-1″ | #10 | 9″ | 19′-11″ | 9′-9″ | 11′-1″ | #10 | 9″ | 30′-5″ | 30′-4″ | 5.028 | 592.018 | 34 |
| 35 | 17′-9″ | 7′- 6″ | 3′-6″ | 2′-0″ | 5′-11″ | 5′-3″ | #9 | 7″ | 11′-3″ | #10 | 8″ | 32′-3″ | 21′-7″ | 11′-6″ | #10 | 8″ | 20′-4″ | 9′-9″ | 11′-6″ | #10 | 8″ | 31′-5″ | 31′-4″ | 5.236 | 666.586 | 35 |

WALL DESIGN WITH VERTICAL FRONT FACE AND 2:1 BACKSLOPE

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2002

# REINFORCED CONCRETE RETAINING WALL TYPE 5 AND 5 SW STANDARD PLAN D-1e

SHEET 2 OF 2 SHEETS

*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.*

| DATE | REVISION | BY |
|---|---|---|
| 8/01 | CORRECTED TABLE | MAS |

APPROVED FOR PUBLICATION

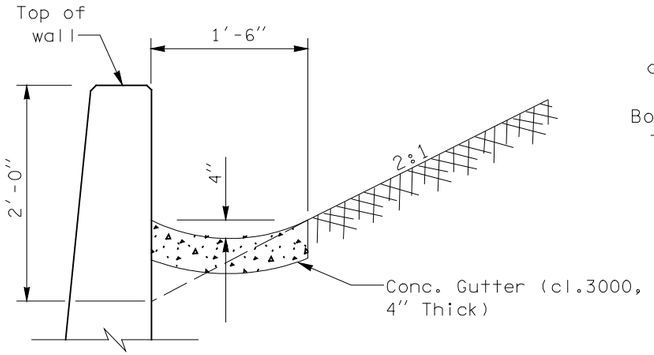
*Harold J. Peterfeso* *01-23-02*

STATE DESIGN ENGINEER — DATE

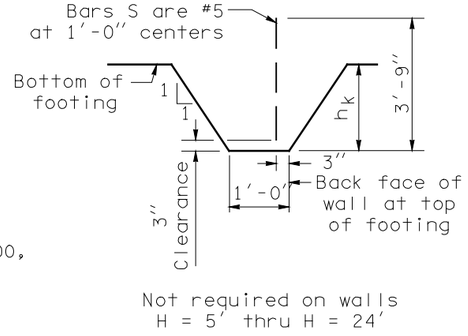
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

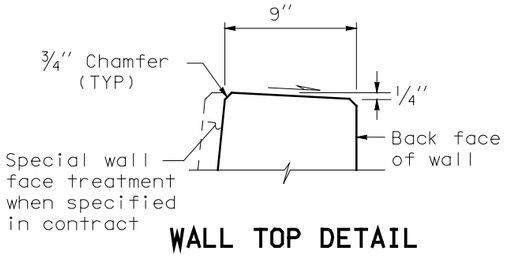



GUTTER DETAIL




Not required on walls H = 5′ thru H = 24′

KEY DETAIL



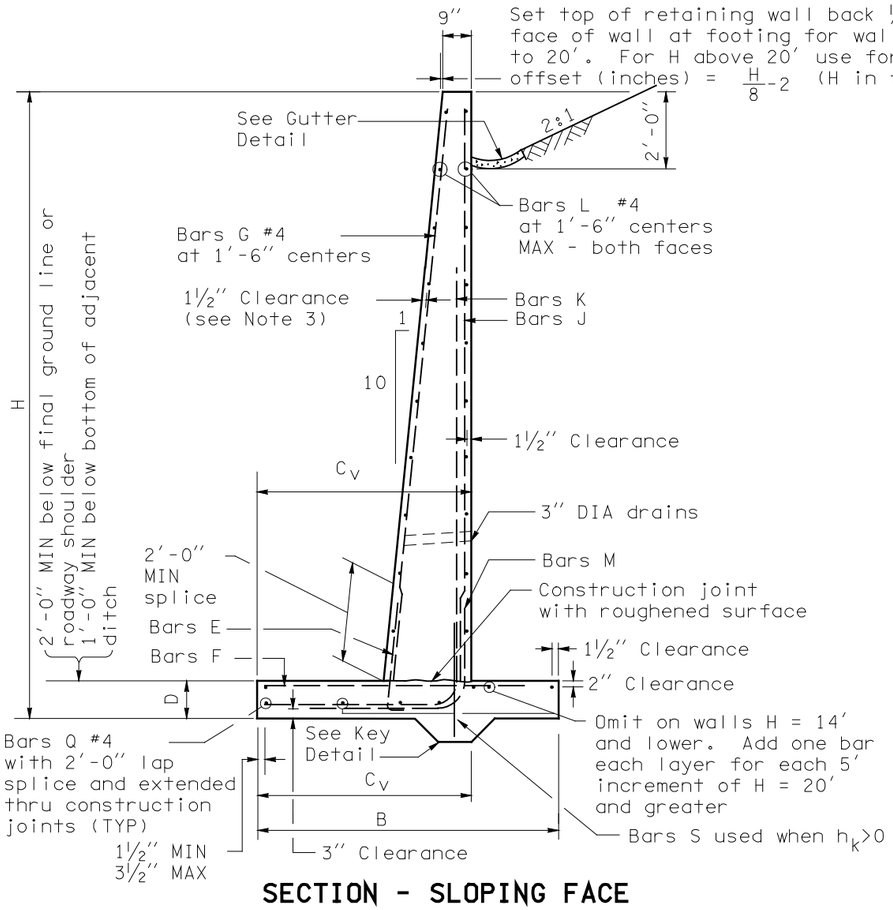

WALL TOP DETAIL

NOTES

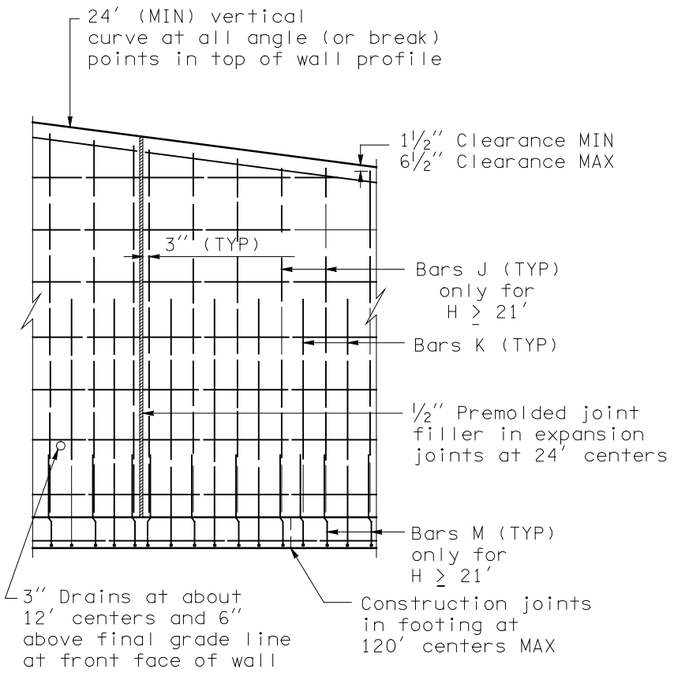
1. All concrete shall be Class 4000 except as noted.
2. For backfill requirements, see Standard Plan "D-4".
3. When Wall Type 6-SW (saltwater) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1".
4. When Wall Type 6-SW (saltwater) is specified, 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.

| Bar | MIN Splice |
|---|---|
| #4 | 2′ - 0″ |
| #5 | 2′ - 0″ |
| #6 | 2′ - 1″ |
| #7 | 2′ - 11″ |
| #8 | 3′ - 9″ |
| #9 | 4′ - 9″ |
| #10 | 6′ - 1″ |

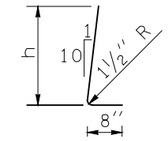
| Bar | Radius |
|---|---|
| #5 | 9″ |
| #6 | 11″ |
| #7 | 1′ - 1″ |
| #8 | 1′ - 3″ |
| #9 | 1′ - 6″ |
| #10 | 1′ - 8″ |



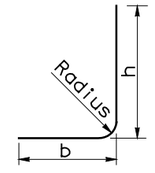

SECTION - SLOPING FACE




ELEVATION




BAR E
At 1′-6″ centers




BARS K AND M

WALL DESIGN WITH SLOPING FRONT FACE AND 2:1 BACKSLOPE

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2000

# REINFORCED CONCRETE RETAINING WALL TYPE 6 AND 6 SW STANDARD PLAN D-1f

SHEET 1 OF 2 SHEETS

*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.*

| DATE | REVISION | BY |
|---|---|---|
| 10/99 | Added note 5. | TWS |

APPROVED FOR PUBLICATION

*Clifford E. Mansfield* — DEPUTY STATE DESIGN ENGINEER — *10/06/99* DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| DIMENSIONS | | | | | FOOTING REINFORCEMENT | | | | | | | | | | | STEM REINFORCEMENT | | | | MATERIAL QUANTITY | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | BAR E (size #4) | | BAR F | | | BAR K | | | | | BAR M | | | | | BAR J | | | BAR G (size #4) | | | |
| H (ft) | B | $C_V$ | D | $h_k$ | LENGTH | h | SIZE | SPACING | LENGTH | SIZE | SPACING | LENGTH | h | b | SIZE | SPACING | LENGTH | h | b | SIZE | SPACING | LENGTH | LENGTH | CONCRETE (CY/LF) | STEEL (LBS/LF) | H (ft) |
| 5 | 2′-6″ | 2′- 0″ | 1′-0″ | 0 | 3′- 5″ | 2′- 9″ | #4 | 1′-0″ | 1′- 9″ | #5 | 1′- 0″ | 5′-11″ | 4′- 7″ | 1′- 8″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3′-10″ | 0.233 | 19.253 | 5 |
| 6 | 2′-9″ | 2′- 0″ | 1′-0″ | 0 | 3′- 5″ | 2′- 9″ | #4 | 1′-0″ | 2′- 0″ | #5 | 1′- 0″ | 6′-11″ | 5′- 7″ | 1′- 8″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 4′-10″ | 0.287 | 22.244 | 6 |
| 7 | 3′-0″ | 2′- 3″ | 1′-0″ | 0 | 3′- 5″ | 2′- 9″ | #4 | 1′-0″ | 2′- 0″ | #5 | 1′- 0″ | 8′- 1″ | 6′- 7″ | 1′-10″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 5′-10″ | 0.349 | 23.906 | 7 |
| 8 | 3′-0″ | 2′- 3″ | 1′-0″ | 0 | 3′- 5″ | 2′- 9″ | #4 | 1′-0″ | 2′- 0″ | #5 | 1′- 0″ | 9′- 1″ | 7′- 7″ | 1′-10″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 6′-10″ | 0.396 | 26.731 | 8 |
| 9 | 3′-6″ | 2′- 3″ | 1′-0″ | 0 | 3′- 5″ | 2′- 9″ | #4 | 1′-0″ | 2′- 6″ | #5 | 1′- 0″ | 10′- 1″ | 8′- 7″ | 1′-10″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 7′-10″ | 0.470 | 29.889 | 9 |
| 10 | 3″-9″ | 2′- 9″ | 1′-0″ | 0 | 3′- 5″ | 2′- 9″ | #4 | 1′-0″ | 2′- 3″ | #5 | 1′- 0″ | 11′- 6″ | 9′- 7″ | 2′- 4″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 8′-11″ | 0.539 | 31.682 | 10 |
| 11 | 4′-3″ | 3′- 0″ | 1′-0″ | 0 | 3′- 5″ | 2′- 9″ | #4 | 1′-0″ | 2′- 6″ | #5 | 1′- 0″ | 12′-11″ | 10′- 7″ | 2′- 8″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 9′-11″ | 0.620 | 35.108 | 11 |
| 12 | 5′-0″ | 3′- 3″ | 1′-0″ | 0 | 3′- 5″ | 2′- 9″ | #4 | 1′-0″ | 3′- 0″ | #5 | 1′- 0″ | 14′- 1″ | 11′- 7″ | 2′-11″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 10′-11″ | 0.715 | 39.108 | 12 |
| 13 | 5′-9″ | 3′- 6″ | 1′-0″ | 0 | 3′- 5″ | 2′- 9″ | #4 | 9″ | 3′- 6″ | #5 | 9″ | 15′- 4″ | 12′- 7″ | 3′- 1″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 11′-11″ | 0.813 | 47.301 | 13 |
| 14 | 6′-3″ | 3′- 6″ | 1′-0″ | 0 | 3′- 5″ | 2′- 9″ | #5 | 9″ | 4′- 4″ | #5 | 9″ | 16′- 4″ | 13′- 7″ | 3′- 1″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 12′-11″ | 0.906 | 53.382 | 14 |
| 15 | 7′-0″ | 3′- 9″ | 1′-0″ | 0 | 3′- 5″ | 2′- 9″ | #6 | 8″ | 5′- 4″ | #6 | 9″ | 17′- 6″ | 14′- 7″ | 3′- 4″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 13′-11″ | 1.011 | 74.154 | 15 |
| 16 | 7′-6″ | 3′- 9″ | 1′-0″ | 0 | 3′- 5″ | 2′- 9″ | #6 | 6″ | 5′-10″ | #6 | 8″ | 18′- 6″ | 15′- 7″ | 3′- 4″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 14′-11″ | 1.111 | 86.742 | 16 |
| 17 | 8′-0″ | 4′- 0″ | 1′-3″ | 0 | 3′- 8″ | 3′- 0″ | #6 | 6″ | 6′- 1″ | #6 | 7″ | 19′-10″ | 16′- 7″ | 3′- 8″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 15′- 8″ | 1.267 | 99.328 | 17 |
| 18 | 8′-9″ | 4′- 3″ | 1′-3″ | 0 | 3′- 8″ | 3′- 0″ | #6 | 5″ | 6′- 7″ | #6 | 6″ | 21′- 0″ | 17′- 7″ | 3′-10″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 16′- 8″ | 1.390 | 117.247 | 18 |
| 19 | 9′-0″ | 4′- 6″ | 1′-6″ | 0 | 3′-11″ | 3′- 3″ | #7 | 7″ | 7′- 5″ | #6 | 6″ | 22′- 3″ | 18′- 7″ | 4′- 1″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 17′- 5″ | 1.553 | 125.039 | 19 |
| 20 | 9′-3″ | 4′- 9″ | 1′-6″ | 0 | 3′-11″ | 3′- 3″ | #7 | 7″ | 7′- 5″ | #7 | 7″ | 23′- 5″ | 19′- 7″ | 4′- 4″ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 18′- 5″ | 1.662 | 142.034 | 20 |
| 21 | 9′-9″ | 5′- 0″ | 1′-6″ | 0 | 3′-11″ | 3′- 3″ | #7 | 6″ | 7′- 8″ | #7 | 1′- 0″ | 12′- 8″ | 8′- 6″ | 4′- 8″ | #7 | 1′- 0″ | 8′- 6″ | 4′- 4″ | 4′- 8″ | #7 | 1′- 0″ | 19′- 4″ | 19′- 5″ | 1.788 | 149.230 | 21 |
| 22 | 10′-3″ | 5′- 3″ | 1′-9″ | 0 | 4′- 2″ | 3′- 6″ | #7 | 6″ | 7′-11″ | #7 | 11″ | 13′- 5″ | 9′- 1″ | 4′-10″ | #7 | 11″ | 8′-11″ | 4′- 7″ | 4′-10″ | #7 | 11″ | 20′- 1″ | 20′- 2″ | 1.986 | 160.101 | 22 |
| 23 | 10′-9″ | 5′- 6″ | 1′-9″ | 0 | 4′- 2″ | 3′- 6″ | #7 | 6″ | 8′- 2″ | #7 | 10″ | 14′- 0″ | 9′- 5″ | 5′- 1″ | #7 | 1′-10″ | 9′- 2″ | 4′- 7″ | 5′- 1″ | #7 | 10″ | 21′- 1″ | 21′- 2″ | 2.123 | 171.973 | 23 |
| 24 | 11′-3″ | 5′- 9″ | 2′-0″ | 0 | 4′- 5″ | 3′- 9″ | #7 | 6″ | 8′- 5″ | #7 | 10″ | 14′-10″ | 10′- 0″ | 5′- 4″ | #7 | 1′-10″ | 9′- 8″ | 4′-10″ | 5′- 4″ | #7 | 10″ | 21′-10″ | 21′-11″ | 2.341 | 181.868 | 24 |
| 25 | 11′-6″ | 6′- 3″ | 2′-0″ | 2′-0″ | 4′- 5″ | 3′- 9″ | #7 | 6″ | 8′- 5″ | #7 | 9″ | 15′- 8″ | 10′- 4″ | 5′-10″ | #7 | 9″ | 10′- 2″ | 4′-10″ | 5′-10″ | #7 | 9″ | 22′-10″ | 22′-11″ | 2.693 | 192.607 | 25 |
| 26 | 12′-0″ | 6′- 6″ | 2′-3″ | 2′-0″ | 4′- 8″ | 4′- 0″ | #7 | 6″ | 8′- 5″ | #7 | 9″ | 16′- 5″ | 10′-10″ | 6′- 1″ | #7 | 9″ | 10′- 8″ | 5′- 1″ | 6′- 1″ | #7 | 9″ | 23′- 7″ | 23′- 8″ | 2.927 | 202.605 | 26 |
| 27 | 12′-6″ | 7′- 0″ | 2′-3″ | 2′-0″ | 4′- 8″ | 4′- 0″ | #7 | 6″ | 8′- 5″ | #7 | 8″ | 17′- 5″ | 11′- 3″ | 6′- 8″ | #7 | 8″ | 11′- 3″ | 5′- 1″ | 6′- 8″ | #7 | 8″ | 24′- 7″ | 24′- 8″ | 3.086 | 213.332 | 27 |
| 28 | 13′-0″ | 7′- 3″ | 2′-6″ | 2′-0″ | 4′-11″ | 4′- 3″ | #7 | 6″ | 8′- 8″ | #8 | 9″ | 18′- 0″ | 11′- 9″ | 6′-10″ | #8 | 9″ | 12′- 7″ | 6′- 4″ | 6′-10″ | #8 | 9″ | 25′- 4″ | 25′- 6″ | 3.338 | 255.188 | 28 |
| 29 | 13′-6″ | 7′- 6″ | 2′-6″ | 2′-0″ | 4′-11″ | 4′- 3″ | #8 | 6″ | 9′-11″ | #8 | 8″ | 18′- 8″ | 12′- 2″ | 7′- 1″ | #8 | 8″ | 12′-10″ | 6′- 4″ | 7′- 1″ | #8 | 8″ | 26′- 4″ | 26′- 6″ | 3.509 | 299.649 | 29 |
| 30 | 14′-0″ | 8′- 0″ | 2′-9″ | 2′-0″ | 5′- 2″ | 4′- 6″ | #8 | 6″ | 9′-11″ | #8 | 8″ | 19′- 9″ | 12′- 8″ | 7′- 8″ | #8 | 8″ | 13′- 8″ | 6′- 7″ | 7′- 8″ | #8 | 8″ | 27′- 1″ | 27′- 3″ | 3.780 | 317.688 | 30 |
| 31 | 14′-6″ | 8′- 3″ | 2′-9″ | 2′-0″ | 5′- 2″ | 4′- 6″ | #8 | 6″ | 10′- 2″ | #8 | 8″ | 20′- 4″ | 13′- 1″ | 7′-10″ | #8 | 8″ | 13′-10″ | 6′- 7″ | 7′-10″ | #8 | 8″ | 28′- 1″ | 28′- 3″ | 3.962 | 326.716 | 31 |
| 32 | 15′-0″ | 8′- 6″ | 3′-0″ | 2′-0″ | 5′- 5″ | 4′- 9″ | #8 | 6″ | 10′- 5″ | #9 | 9″ | 21′- 0″ | 13′- 5″ | 8′- 1″ | #9 | 9″ | 15′- 4″ | 7′-11″ | 8′- 1″ | #9 | 9″ | 28′-11″ | 29′- 0″ | 4.252 | 393.547 | 32 |
| 33 | 15′-6″ | 8′- 9″ | 3′-0″ | 2′-0″ | 5′- 5″ | 4′- 9″ | #8 | 6″ | 10′- 8″ | #9 | 8″ | 21′- 8″ | 14′- 0″ | 8′- 4″ | #9 | 8″ | 15′- 7″ | 7′-11″ | 8′- 4″ | #9 | 8″ | 29′-11″ | 30′- 0″ | 4.444 | 424.671 | 33 |
| 34 | 16′-3″ | 9′- 3″ | 3′-3″ | 2′-0″ | 5′- 8″ | 5′- 0″ | #8 | 6″ | 10′-11″ | #9 | 8″ | 22′- 8″ | 14′- 6″ | 8′-10″ | #9 | 8″ | 16′- 4″ | 8′- 2″ | 8′-10″ | #9 | 8″ | 30′- 7″ | 30′- 9″ | 4.783 | 440.218 | 34 |
| 35 | 16′-9″ | 9′- 6″ | 3′-6″ | 2′-0″ | 5′-11″ | 5′- 3″ | #8 | 5″ | 11′- 2″ | #10 | 8″ | 23′- 4″ | 15′- 0″ | 9′- 1″ | #10 | 8″ | 18′- 1″ | 9′- 9″ | 9′- 1″ | #10 | 8″ | 31′- 4″ | 31′- 6″ | 5.106 | 544.207 | 35 |

WALL DESIGN WITH SLOPING
FRONT FACE AND 2:1 BACKSLOPE

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2000

# REINFORCED CONCRETE RETAINING WALL TYPE 6 AND 6 SW STANDARD PLAN D-1f

SHEET 2 OF 2 SHEETS

*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.*

| DATE | REVISION | BY |
|---|---|---|
| 10/99 | New approval date. | TWS |

APPROVED FOR PUBLICATION

*Clifford E. Mansfield* — *10/06/99*

DEPUTY STATE DESIGN ENGINEER — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

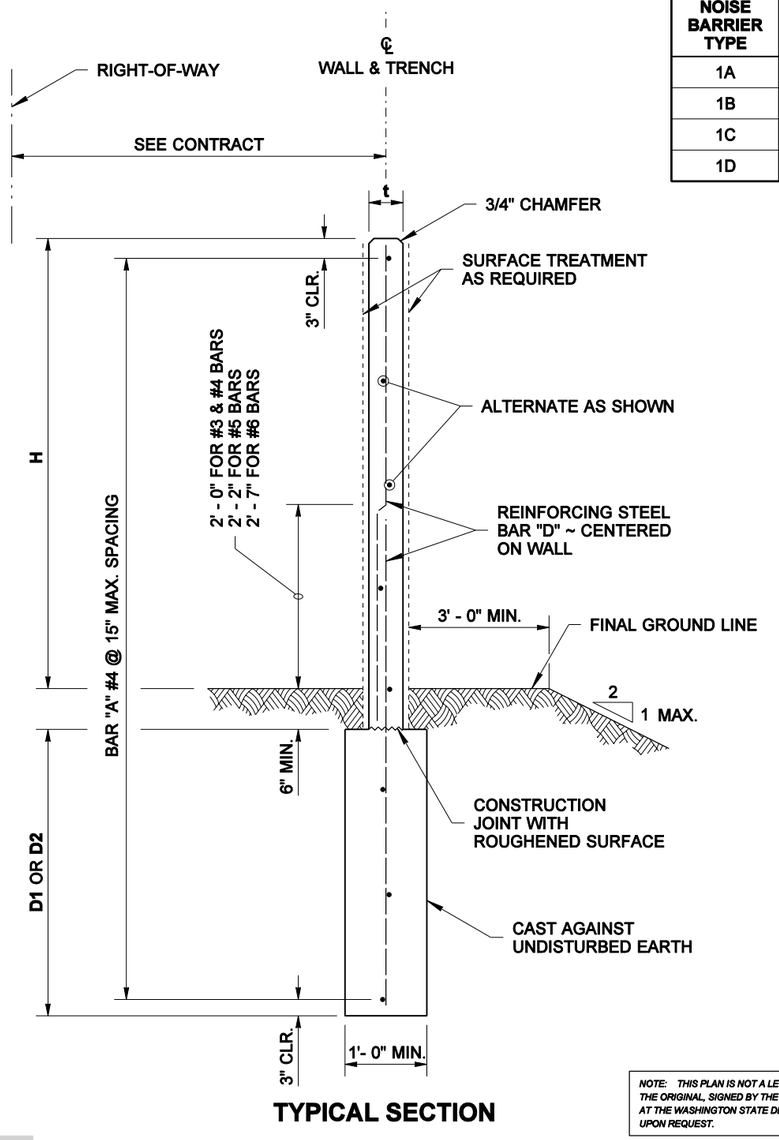
DRAWN BY: ADAM COCHRAN

| WALL HT H | TYPE 1A t | TYPE 1A DEPTH D1 | TYPE 1A DEPTH D2 | TYPE 1A BAR "D" | TYPE 1B t | TYPE 1B DEPTH D1 | TYPE 1B DEPTH D2 | TYPE 1B BAR "D" | TYPE 1C t | TYPE 1C DEPTH D1 | TYPE 1C DEPTH D2 | TYPE 1C BAR "D" | TYPE 1D t | TYPE 1D DEPTH D1 | TYPE 1D DEPTH D2 | TYPE 1D BAR "D" | WALL HT H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6' - 0" | 5" | 3' - 6" | 3' - 3" | #3 @ 15" | 5" | 3' - 9" | 3' - 6" | #3 @ 15" | 5" | 3' - 6" | 3' - 3" | #3 @ 15" | 5" | 4' - 0" | 3' - 6" | #3 @ 15" | 6' - 0" |
| 8' - 0" | 5" | 3' - 9" | 3' - 3" | #3 @ 15" | 5" | 4' - 0" | 3' - 9" | #3 @ 12" | 5" | 3' - 9" | 3' - 6" | #3 @ 15" | 5" | 4' - 3" | 3' - 9" | #3 @ 10" | 8' - 0" |
| 10' - 0" | 5" | 4' - 0" | 3' - 6" | #3 @ 13" | 5" | 4' - 6" | 4' - 0" | #4 @ 15" | 5" | 4' - 3" | 3' - 9" | #3 @ 10" | 5" | 4' - 6" | 4' - 0" | #4 @ 12" | 10' - 0" |
| 12' - 0" | 5" | 4' - 3" | 3' - 9" | #3 @ 9" | 5" | 4' - 9" | 4' - 3" | #4 @ 10" | 5" | 4' - 6" | 4' - 0" | #4 @ 12" | 5" | 5' - 0" | 4' - 6" | #4 @ 10" | 12' - 0" |
| 14' - 0" | 5" | 4' - 6" | 4' - 0" | #4 @ 12" | 5" | 5' - 0" | 4' - 6" | #4 @ 9" | 5" | 4' - 9" | 4' - 3" | #4 @ 10" | 5" | 5' - 3" | 4' - 9" | #5 @ 11" | 14' - 0" |
| 16' - 0" | 5" | 4' - 9" | 4' - 3" | #4 @ 10" | 5" | 5' - 3" | 4' - 9" | #5 @ 11" | 5" | 5' - 0" | 4' - 6" | #4 @ 9" | 5" | 5' - 9" | 5' - 0" | #5 @ 8" | 16' - 0" |
| 18' - 0" | 5" | 5' - 0" | 4' - 6" | #4 @ 9" | 5" | 5' - 6" | 5' - 0" | #5 @ 8" | 5" | 5' - 3" | 4' - 9" | #5 @ 11" | 5" | 6' - 0" | 5' - 3" | #6 @ 9" | 18' - 0" |
| 20' - 0" | 5" | 5' - 3" | 4' - 9" | #4 @ 7" | 5" | 5' - 9" | 5' - 3" | #5 @ 7" | 5" | 5' - 6" | 5' - 0" | #5 @ 7" | 6" | 6' - 3" | 5' - 6" | #6 @ 9" | 20' - 0" |
| 22' - 0" | 5" | 5' - 6" | 5' - 0" | #4 @ 6" | 6" | 6' - 0" | 5' - 6" | #5 @ 6" | 5" | 5' - 9" | 5' - 3" | #5 @ 6" | 6" | 6' - 6" | 5' - 9" | #6 @ 7" | 22' - 0" |
| 24' - 0" | 5" | 5' - 9" | 5' - 3" | #5 @ 8" | 6" | 6' - 3" | 5' - 9" | #6 @ 7" | 6" | 6' - 0" | 5' - 6" | #6 @ 7" | 7" | 6' - 9" | 6' - 0" | #6 @ 6" | 24' - 0" |

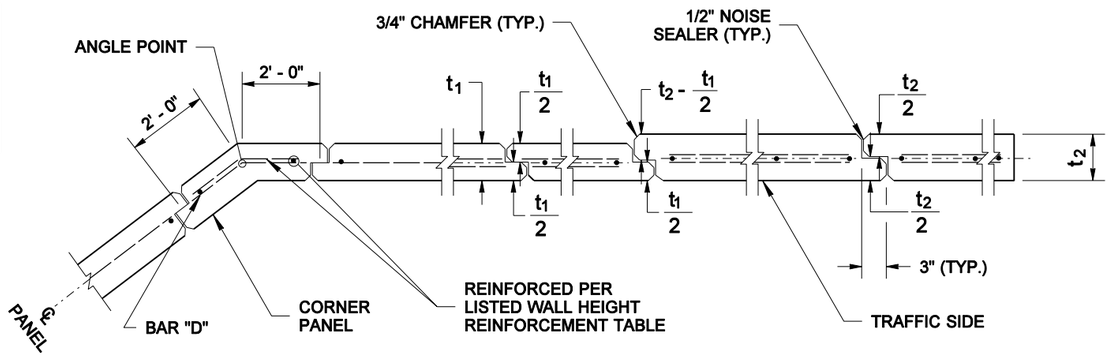
t = WALL THICKNESS

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 1A | B1 | 80 |
| 1B | B1 | 90 |
| 1C | B2 | 80 |
| 1D | B2 | 90 |

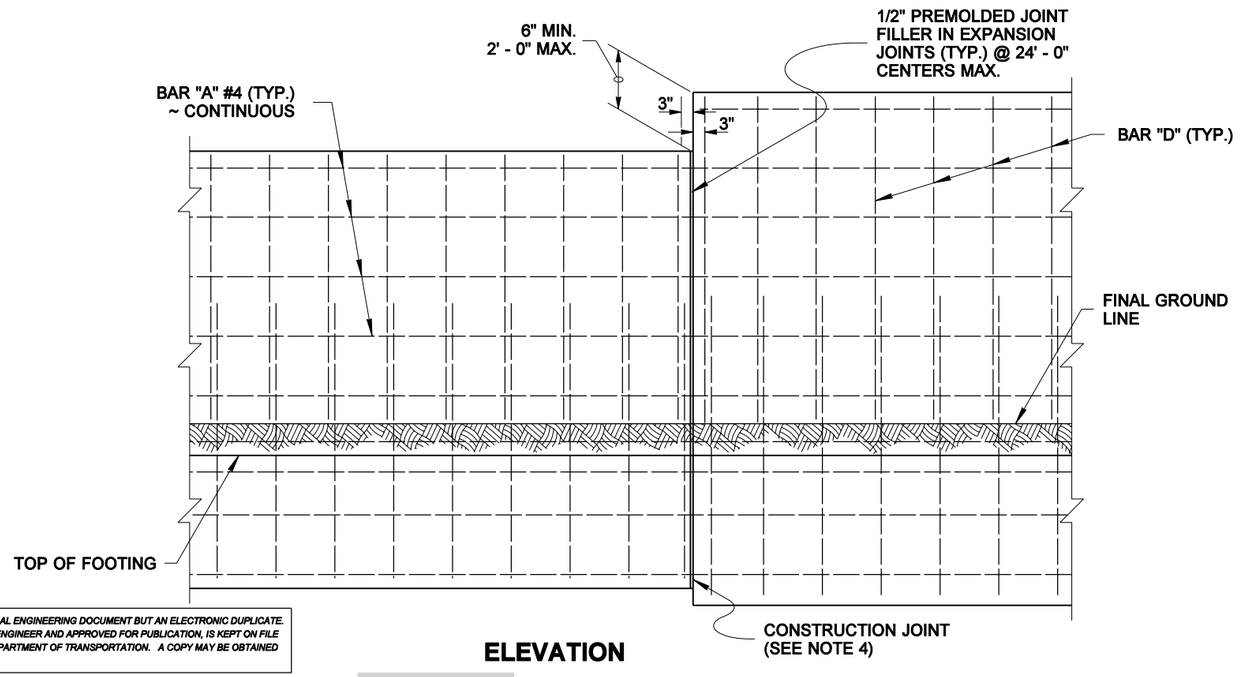
| SOIL TYPE | |
|---|---|
| SOIL TYPE | ANGLE OF INTERNAL FRICTION $\phi$ (DEGREES) |
| D1 | 32 |
| D2 | 38 |




TYPICAL SECTION




JOINT AND CORNER DETAIL




ELEVATION

NOTES

1. Wall to be designated Noise Barrier Wall Type 1A, 1B, 1C, or 1D. 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 trench footing shall be spaced at 120 feet maximum.
5. The Contract specifies actual foundation requirements D1 or D2.

*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.*

# CAST-IN-PLACE CONCRETE WALL ON TRENCH FOOTING

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 1

## STANDARD PLAN D-2.02-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

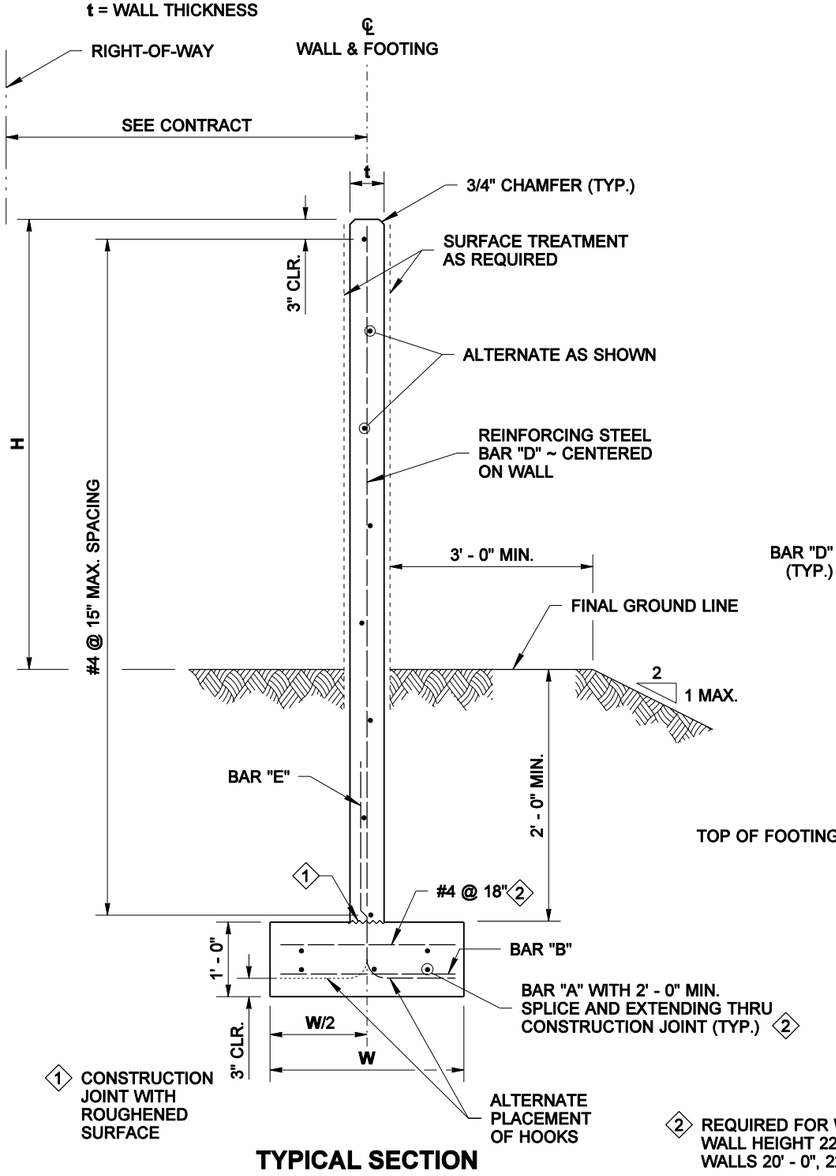
| WALL HT H | TYPE 2A W | t | BARS "A"&"F" | BAR "B" | BARS "D"&"E" | TYPE 2B W | t | BARS "A"&"F" | BAR "B" | BARS "D"&"E" | TYPE 2C W | t | BARS "A"&"F" | BAR "B" | BARS "D"&"E" | TYPE 2D W | t | BARS "A"&"F" | BAR "B" | BARS "D"&"E" | WALL HT H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6' - 0" | 2' - 0" | 5" | 3 ~ #4 | #4 @ 18" | #3 @ 15" | 2' - 3" | 5" | 3 ~ #4 | #4 @ 18" | #3 @ 12" | 2' - 0" | 5" | 3 ~ #4 | #4 @ 18" | #3 @ 15" | 2' - 6" | 5" | 3 ~ #4 | #4 @ 18" | #3 @ 11" | 6' - 0" |
| 8' - 0" | 2' - 3" | 5" | 3 ~ #4 | #4 @ 18" | #3 @ 12" | 2' - 9" | 5" | 3 ~ #4 | #4 @ 18" | #4 @ 15" | 2' - 6" | 5" | 3 ~ #4 | #4 @ 18" | #3 @ 10" | 3' - 3" | 5" | 5 ~ #4 | #4 @ 18" | #4 @ 12" | 8' - 0" |
| 10' - 0" | 2' - 6" | 5" | 3 ~ #4 | #4 @ 18" | #3 @ 9" | 3' - 3" | 5" | 5 ~ #4 | #4 @ 18" | #4 @ 10" | 2' - 9" | 5" | 3 ~ #4 | #4 @ 18" | #4 @ 12" | 3' - 6" | 5" | 5 ~ #4 | #4 @ 18" | #4 @ 10" | 10' - 0" |
| 12' - 0" | 3' - 0" | 5" | 3 ~ #4 | #4 @ 18" | #4 @ 12" | 3' - 9" | 5" | 5 ~ #4 | #4 @ 18" | #4 @ 10" | 3' - 3" | 5" | 3 ~ #4 | #4 @ 18" | #4 @ 10" | 4' - 3" | 5" | 5 ~ #4 | #4 @ 18" | #5 @ 12" | 12' - 0" |
| 14' - 0" | 3' - 3" | 5" | 3 ~ #4 | #4 @ 18" | #4 @ 10" | 4' - 3" | 5" | 5 ~ #4 | #4 @ 18" | #5 @ 11" | 3' - 9" | 5" | 3 ~ #4 | #4 @ 18" | #4 @ 9" | 4' - 9" | 5" | 5 ~ #4 | #4 @ 18" | #5 @ 8" | 14' - 0" |
| 16' - 0" | 3' - 9" | 5" | 5 ~ #4 | #4 @ 18" | #4 @ 9" | 4' - 9" | 5" | 5 ~ #4 | #4 @ 18" | #6 @ 12" | 4' - 3" | 5" | 5 ~ #4 | #4 @ 18" | #5 @ 11" | 5' - 6" | 5" | 5 ~ #4 | #4 @ 18" | #6 @ 9" | 16' - 0" |
| 18' - 0" | 4' - 0" | 5" | 5 ~ #4 | #4 @ 18" | #5 @ 11" | 5' - 3" | 5" | 5 ~ #4 | #4 @ 18" | #6 @ 9" | 4' - 6" | 5" | 5 ~ #4 | #4 @ 18" | #6 @ 12" | 6' - 0" | 6" | 5 ~ #4 | #4 @ 18" | #6 @ 9" | 18' - 0" |
| 20' - 0" | 5' - 0" | 5" | 5 ~ #4 | #4 @ 18" | #5 @ 9" | 6' - 0" | 6" | 5 ~ #4 | #4 @ 18" | #6 @ 9" | 5' - 3" | 5" | 5 ~ #4 | #4 @ 18" | #6 @ 10" | 6' - 6" | 6" | 5 ~ #4 | #4 @ 12" | #6 @ 7 1/4" | 20' - 0" |
| 22' - 0" | 5' - 6" | 5" | 5 ~ #4 | #4 @ 18" | #5 @ 7" | 6' - 3" | 6" | 5 ~ #4 | #4 @ 12" | #6 @ 8" | 5' - 9" | 6" | 5 ~ #4 | #4 @ 18" | #6 @ 9" | 7' - 0" | 7" | 5 ~ #4 | #4 @ 11" | #6 @ 7" | 22' - 0" |
| 24' - 0" | 6' - 0" | 5" | 5 ~ #4 | #4 @ 15" | #5 @ 6" | 6' - 9" | 7" | 5 ~ #4 | #4 @ 11" | #6 @ 8" | 6' - 3" | 6" | 5 ~ #4 | #4 @ 12" | #6 @ 8" | 7' - 6" | 7" | 5 ~ #4 | #4 @ 9" | #6 @ 6 1/4" | 24' - 0" |

t = WALL THICKNESS

**NOTES**

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

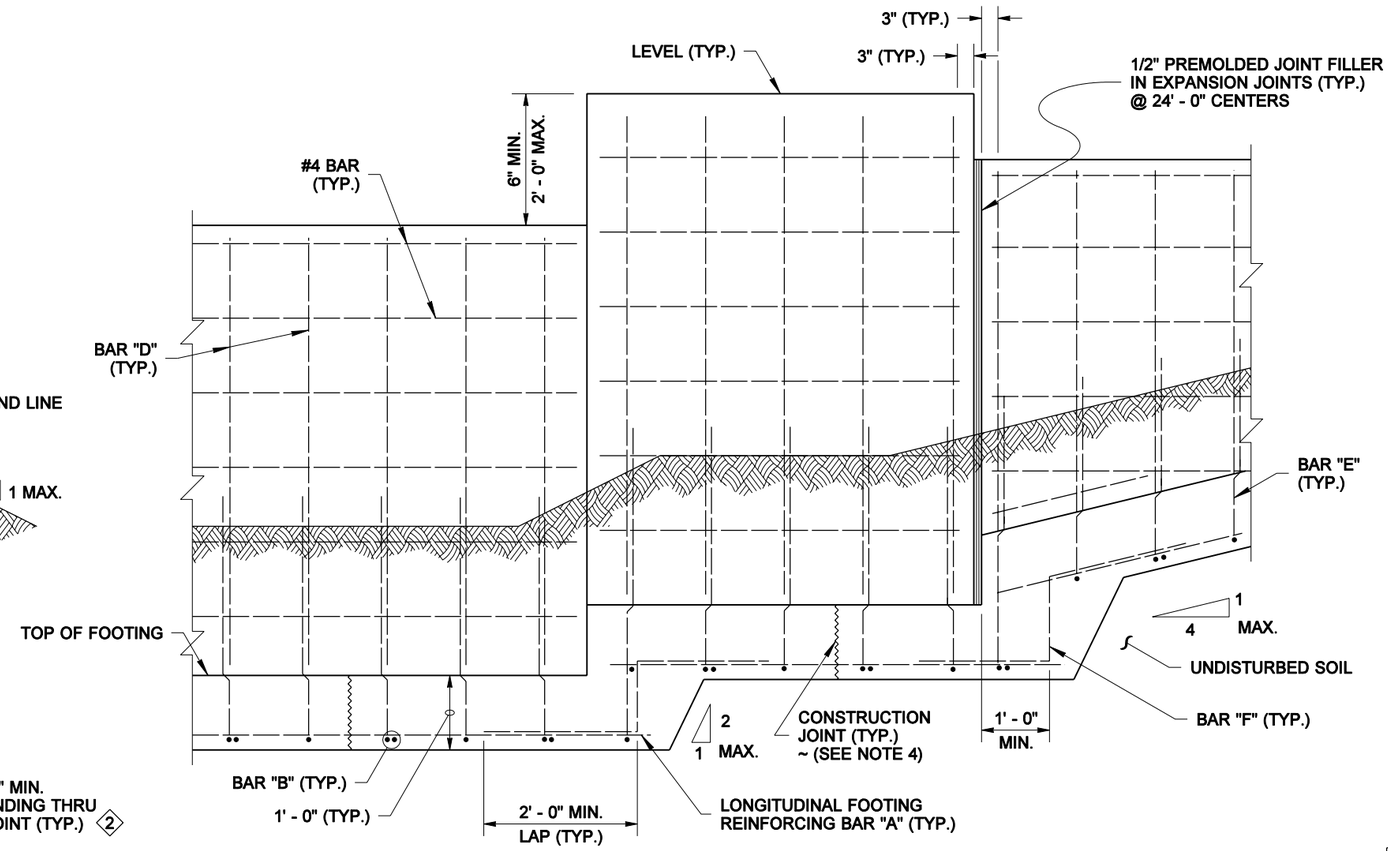
| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 2A | B1 | 80 |
| 2B | B1 | 90 |
| 2C | B2 | 80 |
| 2D | B2 | 90 |




1 CONSTRUCTION JOINT WITH ROUGHENED SURFACE

**TYPICAL SECTION**

2 REQUIRED FOR WALLS 24' - 0" ~ TYPE 2C, WALL HEIGHT 22' - 0" & 24' - 0" ~ TYPE 2B & WALLS 20' - 0", 22' - 0" & 24' - 0" ~ TYPE 2D




**ELEVATION**

# CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 2

## STANDARD PLAN D-2.04-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

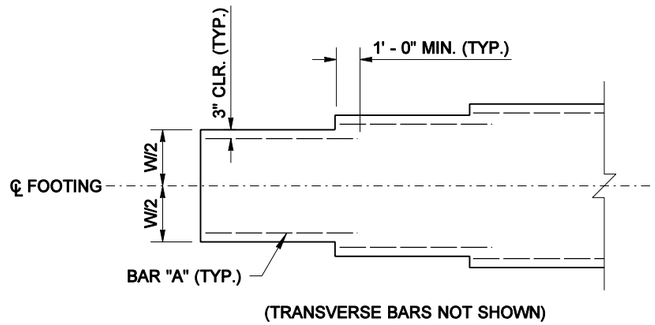
Washington State Department of Transportation

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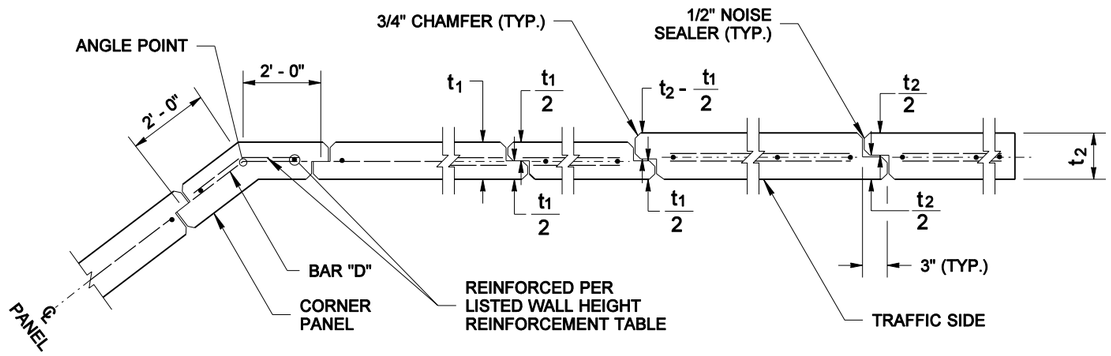
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN




(TRANSVERSE BARS NOT SHOWN)

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




**JOINT AND CORNER DETAIL**

# CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

## NOISE BARRIER WALL TYPE 2

## STANDARD PLAN D-2.04-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

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DRAWN BY: ADAM COCHRAN

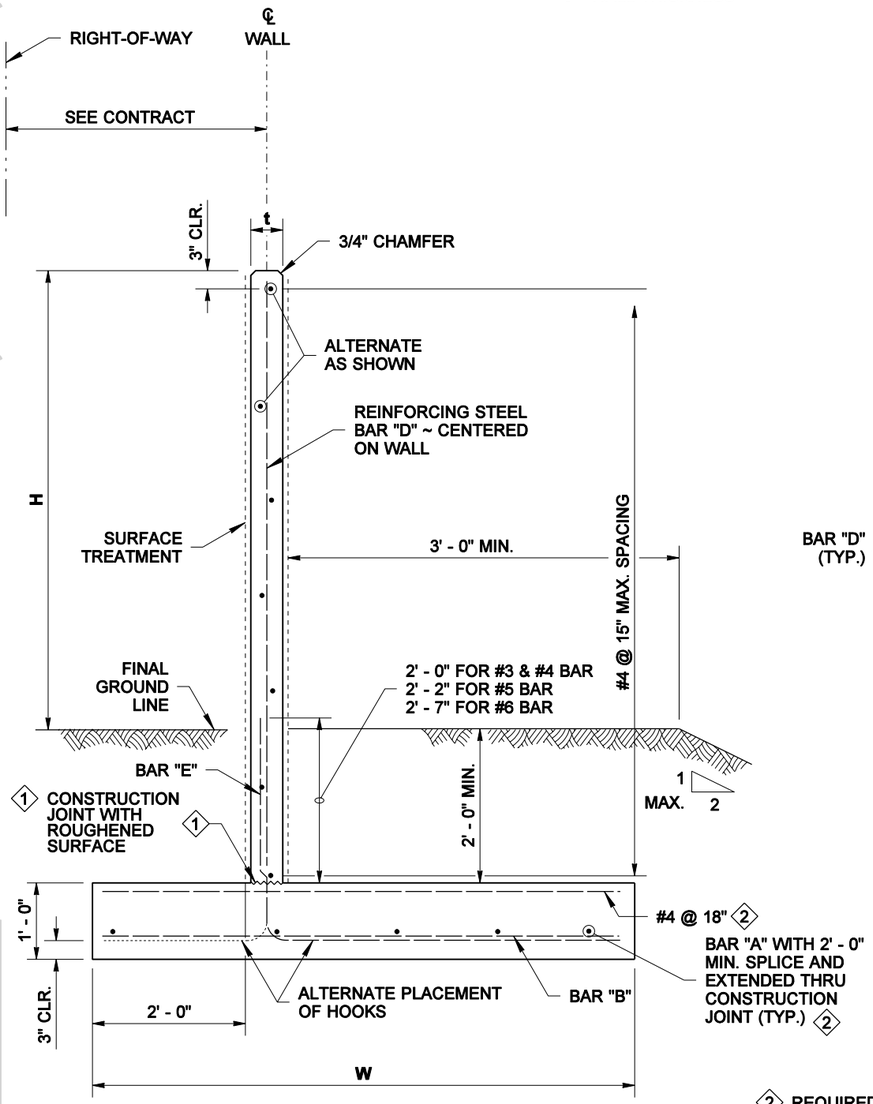
| WALL HT H | TYPE 3A | | | | | TYPE 3B | | | | | TYPE 3C | | | | | TYPE 3D | | | | | WALL HT H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | W | t | BARS "A"&"F" | BAR "B" | BARS "D"&"E" | W | t | BARS "A"&"F" | BAR "B" | BARS "D"&"E" | W | t | BARS "A"&"F" | BAR "B" | BARS "D"&"E" | W | t | BARS "A"&"F" | BAR "B" | BARS "D"&"E" | |
| 6' - 0" | 2' - 0" | 5" | 3 ~ #4 | #4 @ 18" | #3 @ 15" | 2' - 3" | 5" | 3 ~ #4 | #4 @ 18" | #3 @ 12" | 2' - 0" | 5" | 3 ~ #4 | #4 @ 18" | #3 @ 15" | 2' - 6" | 5" | 3 ~ #4 | #4 @ 18" | #3 @ 11" | 6' - 0" |
| 8' - 0" | 2' - 3" | 5" | 3 ~ #4 | #4 @ 18" | #3 @ 12" | 2' - 9" | 5" | 3 ~ #4 | #4 @ 18" | #4 @ 15" | 2' - 6" | 5" | 3 ~ #4 | #4 @ 18" | #3 @ 10" | 3' - 3" | 5" | 5 ~ #4 | #4 @ 18" | #4 @ 12" | 8' - 0" |
| 10' - 0" | 2' - 6" | 5" | 3 ~ #4 | #4 @ 18" | #3 @ 9" | 3' - 3" | 5" | 5 ~ #4 | #4 @ 18" | #4 @ 10" | 2' - 9" | 5" | 3 ~ #4 | #4 @ 18" | #4 @ 12" | 3' - 6" | 5" | 5 ~ #4 | #4 @ 18" | #4 @ 10" | 10' - 0" |
| 12' - 0" | 3' - 0" | 5" | 3 ~ #4 | #4 @ 18" | #4 @ 12" | 3' - 9" | 5" | 5 ~ #4 | #4 @ 18" | #4 @ 10" | 3' - 3" | 5" | 3 ~ #4 | #4 @ 18" | #4 @ 10" | 4' - 3" | 5" | 5 ~ #4 | #4 @ 18" | #5 @ 12" | 12' - 0" |
| 14' - 0" | 3' - 3" | 5" | 3 ~ #4 | #4 @ 18" | #4 @ 10" | 4' - 3" | 5" | 5 ~ #4 | #4 @ 18" | #5 @ 11" | 3' - 9" | 5" | 5 ~ #4 | #4 @ 18" | #4 @ 9" | 5' - 3" | 5" | 5 ~ #4 | #4 @ 18" | #5 @ 8" | 14' - 0" |
| 16' - 0" | 3' - 9" | 5" | 5 ~ #4 | #4 @ 18" | #4 @ 9" | 5' - 3" | 5" | 5 ~ #4 | #4 @ 18" | #6 @ 12" | 4' - 3" | 5" | 5 ~ #4 | #4 @ 18" | #5 @ 11" | 6' - 3" | 5" | 5 ~ #4 | #4 @ 18" | #6 @ 9" | 16' - 0" |
| 18' - 0" | 4' - 0" | 5" | 5 ~ #4 | #4 @ 18" | #5 @ 11" | 6' - 0" | 5" | 5 ~ #4 | #4 @ 18" | #6 @ 9" | 5' - 0" | 5" | 5 ~ #4 | #4 @ 18" | #6 @ 12" | 7' - 0" | 6" | 5 ~ #4 | #4 @ 18" | #6 @ 9" | 18' - 0" |
| 20' - 0" | 5' - 0" | 5" | 5 ~ #4 | #4 @ 18" | #6 @ 12" | 7' - 0" | 6" | 5 ~ #4 | #4 @ 18" | #6 @ 9" | 5' - 9" | 5" | 5 ~ #4 | #4 @ 18" | #6 @ 9" | 8' - 0" | 6" | 6 ~ #4 | #4 @ 12" | #6 @ 6" | 20' - 0" |
| 22' - 0" | 5' - 6" | 5" | 5 ~ #4 | #4 @ 18" | #6 @ 9" | 7' - 9" | 6" | 6 ~ #4 | #4 @ 12" | #6 @ 6" | 6' - 6" | 6" | 5 ~ #4 | #4 @ 18" | #6 @ 9" | 9' - 0" | 7" | 7 ~ #4 | #4 @ 12" | #6 @ 6" | 22' - 0" |
| 24' - 0" | 6' - 3" | 5" | 5 ~ #4 | #4 @ 18" | #6 @ 9" | 8' - 6" | 7" | 6 ~ #4 | #4 @ 12" | #6 @ 6" | 7' - 6" | 6" | 6 ~ #4 | #4 @ 12" | #6 @ 6" | 9' - 9" | 7" | 7 ~ #4 | #4 @ 15" | #6 @ 6" | 24' - 0" |

t = WALL THICKNESS

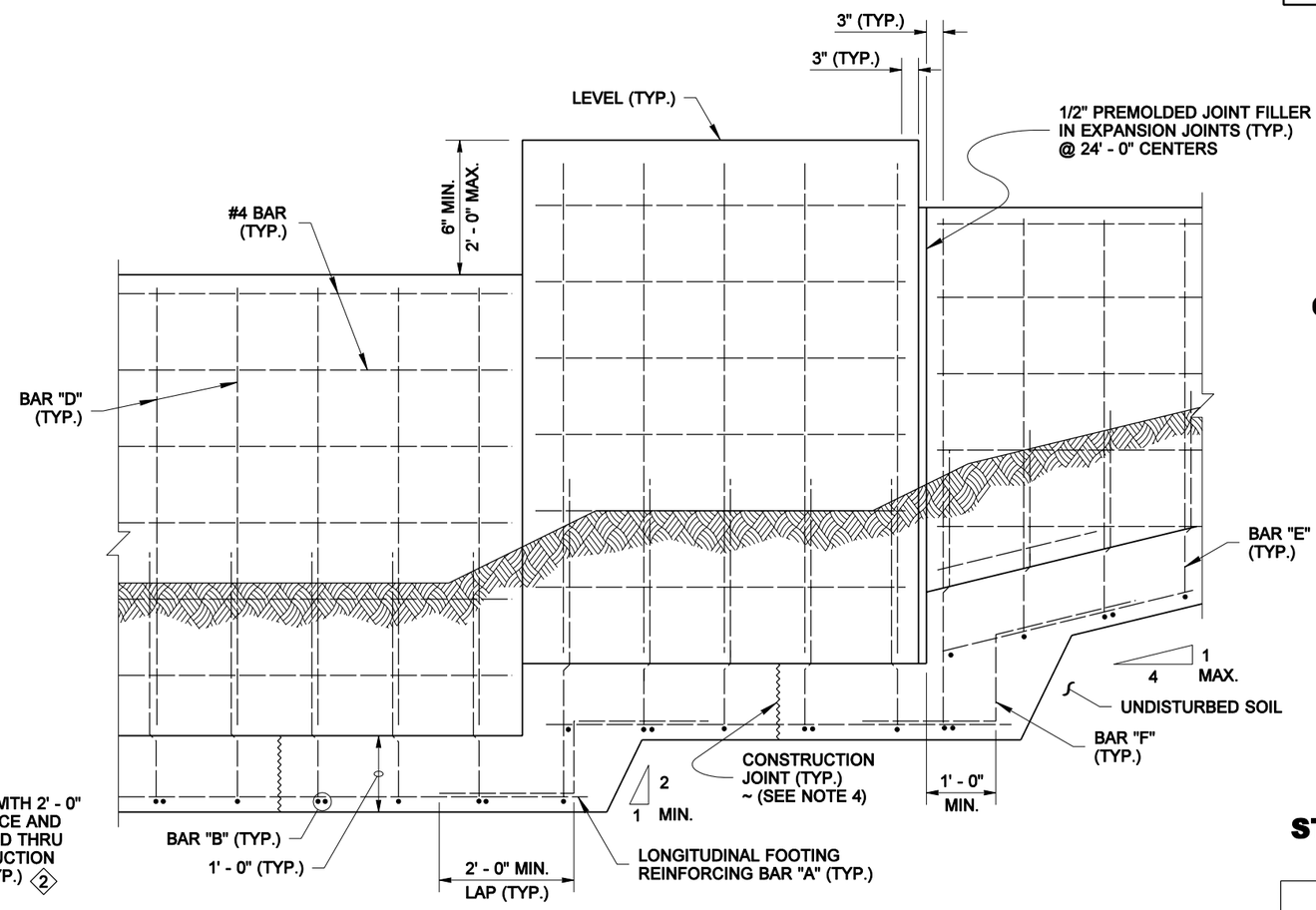
**NOTES**

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

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 3A | B1 | 80 |
| 3B | B1 | 90 |
| 3C | B2 | 80 |
| 3D | B2 | 90 |




**TYPICAL SECTION**




**ELEVATION**

2 REQUIRED FOR WALLS 24' - 0" ~ TYPE 3C, WALL HEIGHT 22' - 0" & 24' - 0" ~ TYPE 3B, & WALLS 20' - 0", 22' - 0" & 24' - 0" ~ TYPE 3D

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

BIJAN KHALEGHI — STATE OF WASHINGTON — 27695 — REGISTERED PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 3

## STANDARD PLAN D-2.06-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

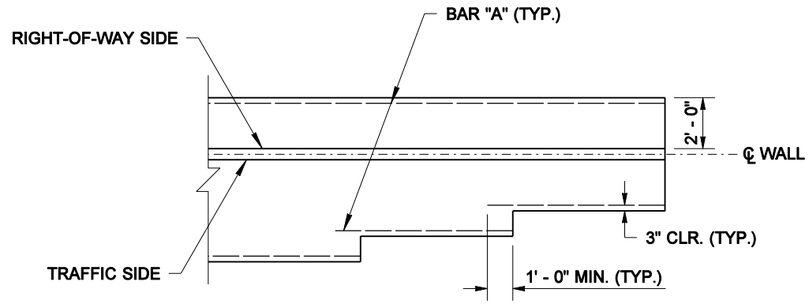
Washington State Department of Transportation

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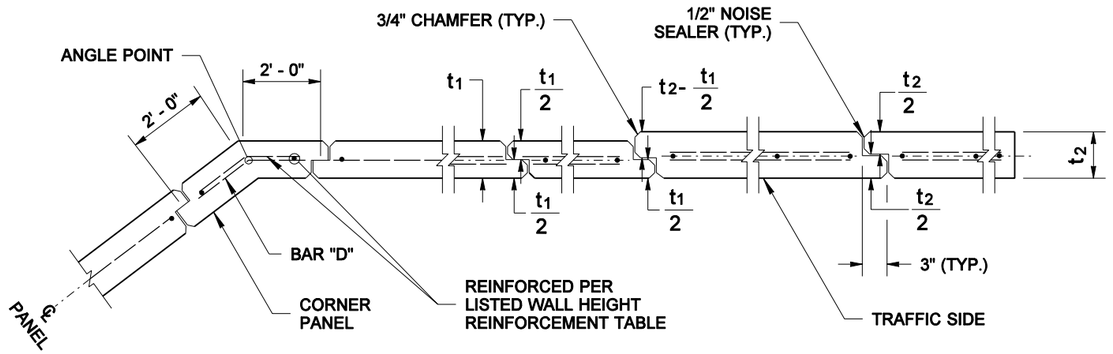
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN




(TRANSVERSE BARS NOT SHOWN)

## FOOTING WIDTH TRANSITION DETAIL
FOR LOCATIONS WITHOUT FOOTING STEP




## JOINT AND CORNER DETAIL

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

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 3

## STANDARD PLAN D-2.06-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

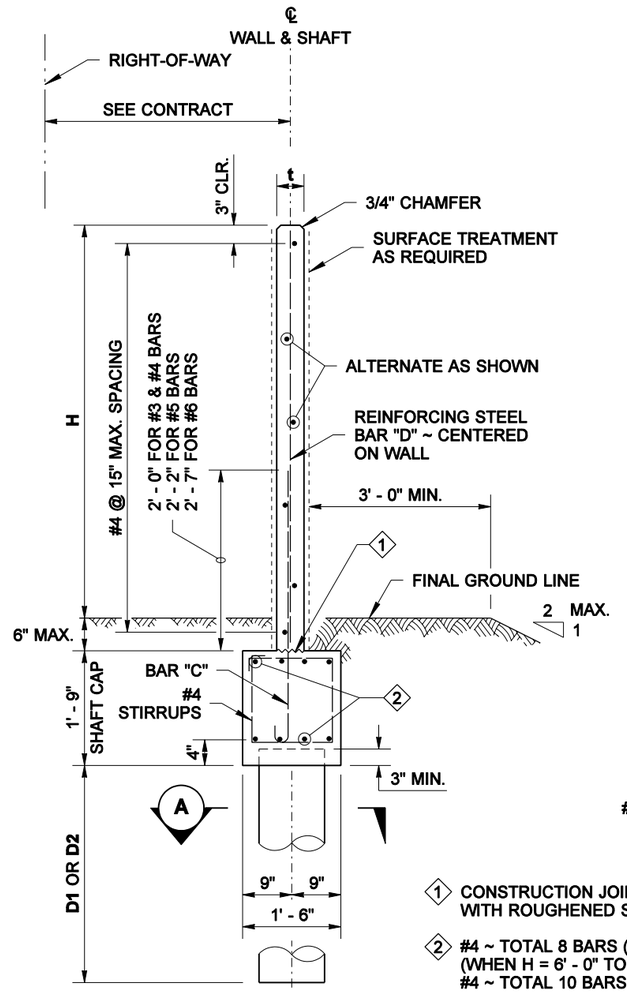
DRAWN BY: ADAM COCHRAN

| WALL HT H | TYPE 4A t | SHAFT DIAM. D | DEPTH D1 | DEPTH D2 | SHAFT REINF. BAR"P" | BARS "C"&"D" | TYPE 4B t | SHAFT DIAM. D | DEPTH D1 | DEPTH D2 | SHAFT REINF. BAR"P" | BARS "C"&"D" | TYPE 4C t | SHAFT DIAM. D | DEPTH D1 | DEPTH D2 | SHAFT REINF. BAR"P" | BARS "C"&"D" | TYPE 4D t | SHAFT DIAM. D | DEPTH D1 | DEPTH D2 | SHAFT REINF. BAR"P" | BARS "C"&"D" | WALL HT H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6' - 0" | 5" | 12" | 5' - 3" | 4' - 9" | 6 ~ #5 | #3 @ 15" | 5" | 12" | 6' - 0" | 5' - 3" | 6 ~ #5 | #3 @ 15" | 5" | 12" | 5' - 9" | 5' - 0" | 6 ~ #5 | #3 @ 15" | 5" | 12" | 6' - 6" | 5' - 9" | 6 ~ #5 | #3 @ 15" | 6' - 0" |
| 8' - 0" | 5" | 12" | 6' - 0" | 5' - 3" | 6 ~ #5 | #3 @ 15" | 5" | 12" | 7' - 0" | 6' - 0" | 6 ~ #5 | #3 @ 12" | 5" | 12" | 6' - 6" | 5' - 6" | 6 ~ #5 | #3 @ 15" | 5" | 12" | 7' - 6" | 6' - 6" | 6 ~ #6 | #3 @ 10" | 8' - 0" |
| 10' - 0" | 5" | 12" | 6' - 9" | 5' - 9" | 6 ~ #5 | #3 @ 13" | 5" | 12" | 7' - 9" | 6' - 9" | 6 ~ #6 | #4 @ 15" | 5" | 12" | 7' - 3" | 6' - 3" | 6 ~ #5 | #3 @ 10" | 5" | 12" | 8' - 3" | 7' - 0" | 6 ~ #7 | #4 @ 12" | 10' - 0" |
| 12' - 0" | 5" | 12" | 7' - 3" | 6' - 3" | 6 ~ #5 | #3 @ 9" | 5" | 12" | 8' - 6" | 7' - 3" | 6 ~ #7 | #4 @ 10" | 5" | 12" | 7' - 9" | 6' - 9" | 6 ~ #6 | #4 @ 12" | 5" | 14" | 8' - 6" | 7' - 3" | 8 ~ #7 | #4 @ 10" | 12' - 0" |
| 14' - 0" | 5" | 12" | 7' - 9" | 6' - 9" | 6 ~ #6 | #4 @ 12" | 5" | 14" | 8' - 6" | 7' - 3" | 8 ~ #7 | #4 @ 9" | 5" | 12" | 8' - 6" | 7' - 3" | 6 ~ #7 | #4 @ 10" | 5" | 14" | 9' - 3" | 8' - 0" | 8 ~ #7 | #5 @ 11" | 14' - 0" |
| 16' - 0" | 5" | 12" | 8' - 6" | 7' - 3" | 6 ~ #7 | #4 @ 10" | 5" | 16" | 9' - 3" | 8' - 0" | 8 ~ #7 | #5 @ 11" | 5" | 14" | 8' - 6" | 7' - 3" | 8 ~ #6 | #4 @ 9" | 5" | 16" | 9' - 6" | 8' - 0" | 8 ~ #8 | #5 @ 8" | 16' - 0" |
| 18' - 0" | 5" | 12" | 9' - 0" | 7' - 9" | 6 ~ #8 | #4 @ 9" | 5" | 16" | 9' - 3" | 8' - 0" | 6 ~ #8 | #5 @ 8" | 5" | 14" | 9' - 0" | 7' - 9" | 8 ~ #7 | #5 @ 11" | 5" | 16" | 10' - 0" | 8' - 6" | 8 ~ #8 | #6 @ 9" | 18' - 0" |
| 20' - 0" | 5" | 12" | 9' - 3" | 7' - 9" | 6 ~ #9 | #4 @ 7" | 5" | 16" | 10' - 0" | 8' - 6" | 8 ~ #7 | #5 @ 7" | 5" | 14" | 9' - 9" | 8' - 3" | 8 ~ #8 | #5 @ 8" | 6" | 16" | 10' - 9" | 9' - 3" | 8 ~ #9 | #6 @ 9" | 20' - 0" |
| 22' - 0" | 5" | 14" | 9' - 3" | 7' - 9" | 8 ~ #7 | #4 @ 6" | 6" | 16" | 10' - 6" | 9' - 0" | 8 ~ #8 | #5 @ 6" | 5" | 14" | 10' - 3" | 8' - 9" | 8 ~ #9 | #5 @ 8" | 6" | 16" | 11' - 6" | 9' - 9" | 8 ~ #10 | #6 @ 7" | 22' - 0" |
| 24' - 0" | 5" | 14" | 9' - 9" | 8' - 3" | 8 ~ #8 | #5 @ 8" | 6" | 16" | 11' - 3" | 9' - 6" | 8 ~ #8 | #6 @ 7" | 6" | 16" | 10' - 3" | 8' - 9" | 8 ~ #8 | #6 @ 7" | 7" | 18" | 11' - 6" | 9' - 9" | 8 ~ #10 | #6 @ 7" | 24' - 0" |

t = WALL THICKNESS

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 4A | B1 | 80 |
| 4B | B1 | 90 |
| 4C | B2 | 80 |
| 4D | B2 | 90 |

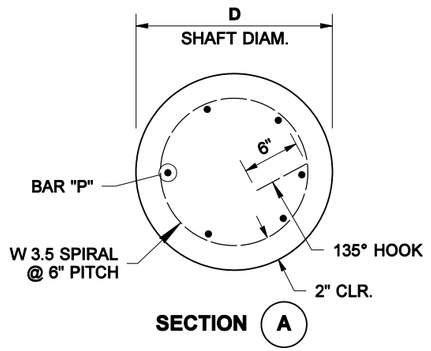
| SOIL TYPE | |
|---|---|
| SOIL TYPE | ANGLE OF INTERNAL FRICTION $\phi$ (DEGREES) |
| D1 | 32 |
| D2 | 38 |




TYPICAL SECTION

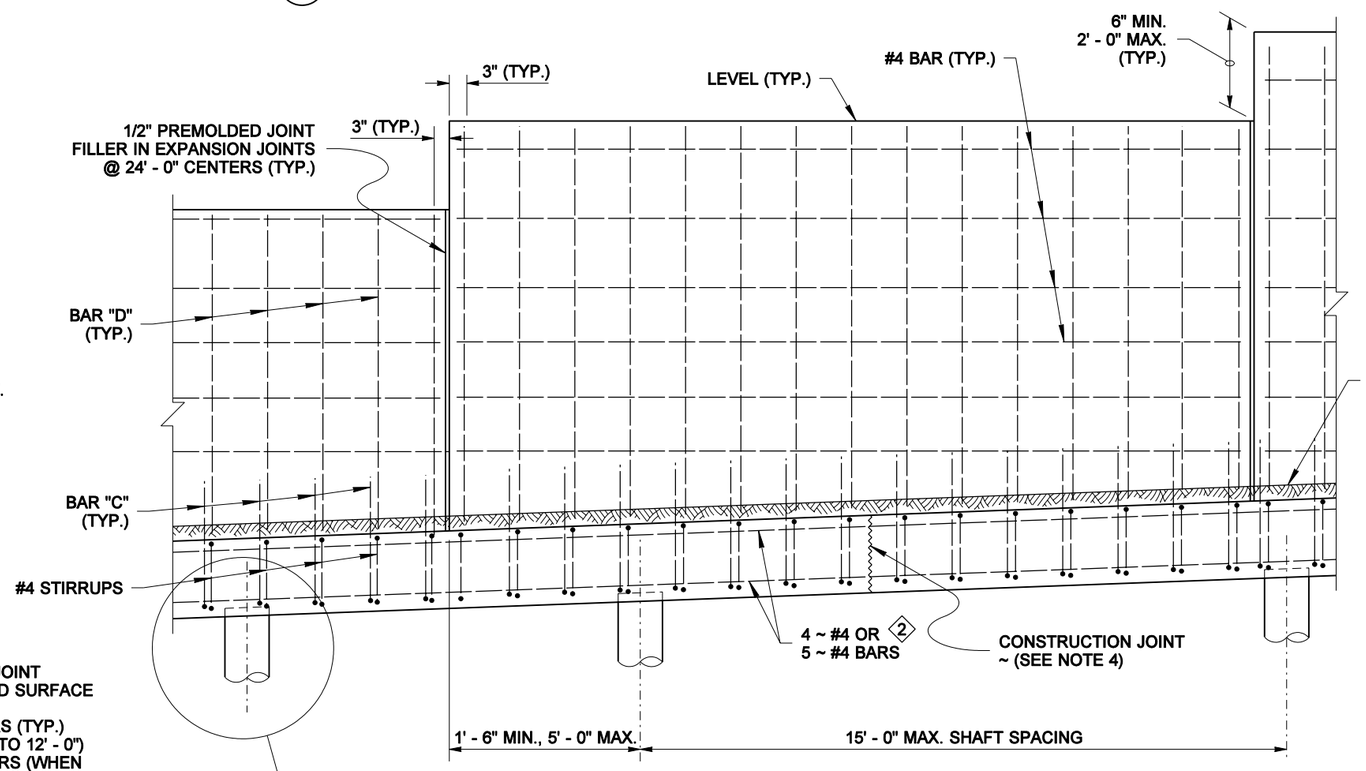
1 CONSTRUCTION JOINT WITH ROUGHENED SURFACE

2 #4 ~ TOTAL 8 BARS (TYP.) (WHEN H = 6' - 0" TO 12' - 0") #4 ~ TOTAL 10 BARS (WHEN H = 14' - 0" TO 24' - 0") WITH 2' - 0" MIN. LAP SPLICE




SECTION (A)

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ELEVATION

## NOTES

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

# CAST-IN-PLACE CONCRETE WALL ON SHAFT FOUNDATION

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 4

# STANDARD PLAN D-2.08-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

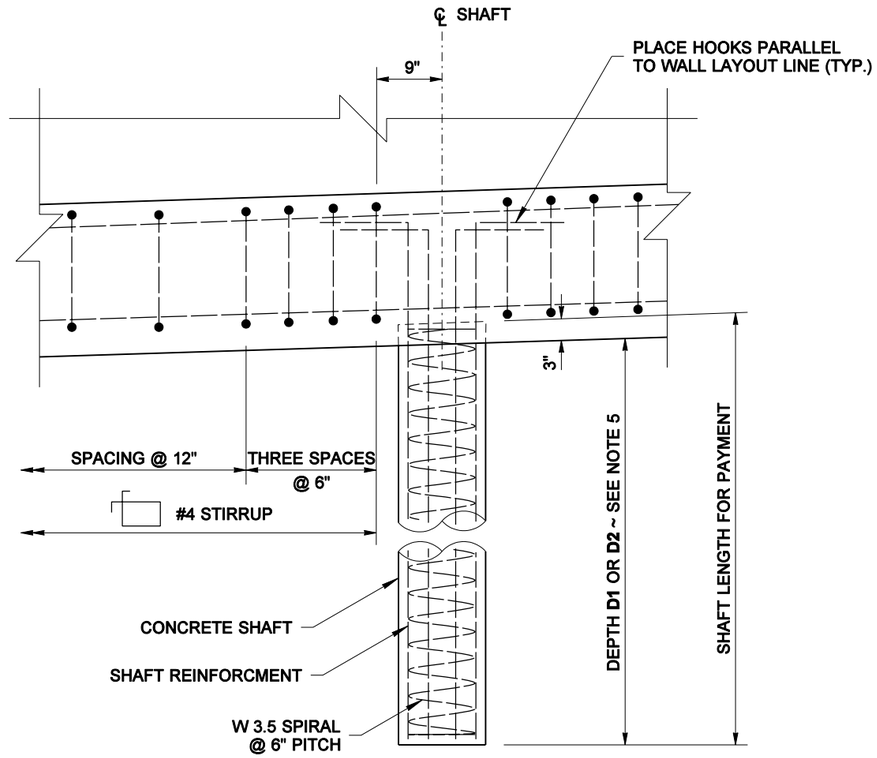
*Harold J. Peterfeso* — STATE DESIGN ENGINEER
*11-10-05* — DATE

Washington State Department of Transportation

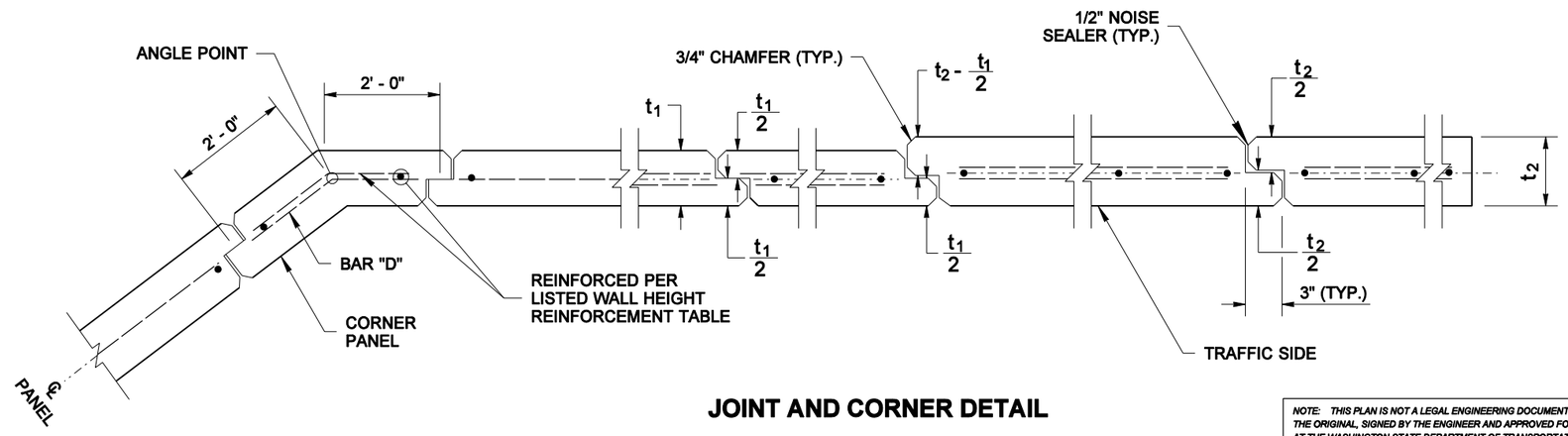
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN




## DETAIL "B"




## JOINT AND CORNER DETAIL

# CAST-IN-PLACE CONCRETE WALL ON SHAFT FOUNDATION

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

## NOISE BARRIER WALL TYPE 4

## STANDARD PLAN D-2.08-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

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DRAWN BY: ADAM COCHRAN

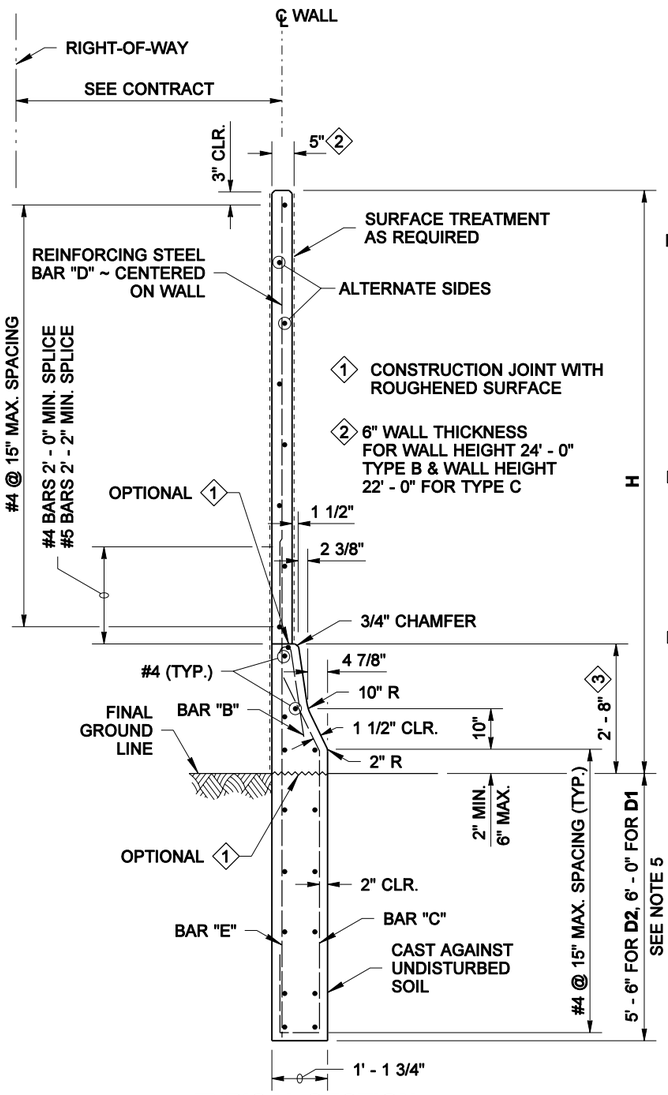
| WALL HT H | TYPE 5A BAR "B"&"C" | TYPE 5A BAR "D"&"E" | TYPE 5B BAR "B"&"C" | TYPE 5B BAR "D"&"E" | TYPE 5C BAR "B"&"C" | TYPE 5C BAR "D"&"E" | TYPE 5D BAR "B"&"C" | TYPE 5D BAR "D"&"E" | WALL HT H |
|---|---|---|---|---|---|---|---|---|---|
| 6' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 6' - 0" |
| 8' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 8' - 0" |
| 10' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 10' - 0" |
| 12' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 12" | #4 @ 15" | 12' - 0" |
| 14' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 11" | #4 @ 11" | #4 @ 11" | #4 @ 11" | #4 @ 10" | #4 @ 11" | 14' - 0" |
| 16' - 0" | #4 @ 14" | #4 @ 14" | #4 @ 10" | #4 @ 10" | #4 @ 10" | #4 @ 10" | #4 @ 12" | #4 @ 10" | 16' - 0" |
| 18' - 0" | #4 @ 10" | #4 @ 12" | #4 @ 10" | #5 @ 12" | #4 @ 10" | #4 @ 10" | #4 @ 9" | #4 @ 10" | 18' - 0" |
| 20' - 0" | #4 @ 10" | #4 @ 10" | #4 @ 9" | #5 @ 9" | #4 @ 10" | #4 @ 7 1/2" | #4 @ 9" | #4 @ 7 1/2" | 20' - 0" |
| 22' - 0" | #4 @ 10" | #4 @ 8" | #4 @ 9" | #5 @ 6 1/2" | #4 @ 10" | #4 @ 6" | #4 @ 9" | #4 @ 6" | 22' - 0" |
| 24' - 0" | #4 @ 10" | #4 @ 6" | #4 @ 9" | #5 @ 6" | #4 @ 10" | #4 @ 4" | #4 @ 9" | #4 @ 4" | 24' - 0" |

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 5A | B1 | 80 |
| 5B | B1 | 90 |
| 5C | B2 | 80 |
| 5D | B2 | 90 |

| SOIL TYPE | |
|---|---|
| SOIL TYPE | ANGLE OF INTERNAL FRICTION $\phi$ (DEGREES) |
| D1 | 32 |
| D2 | 38 |

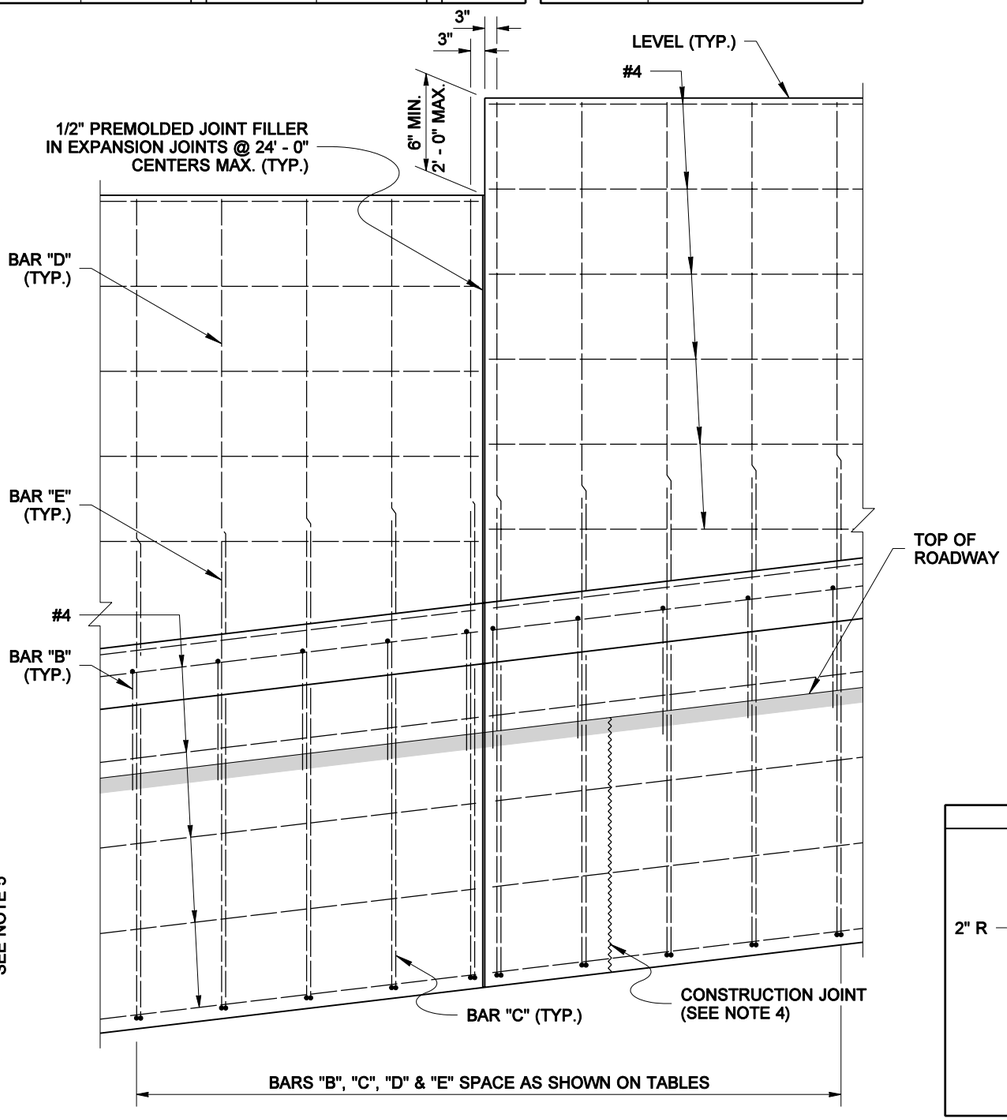
**NOTES**

1. Wall to be designated Noise Barrier Wall Type 5A, 5B, 5C or 5D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet min. of level ground on each side.
4. Construction joints in the footing shall be spaced at 120 feet max.
5. The Contract specifies actual foundation requirements D1 or D2.

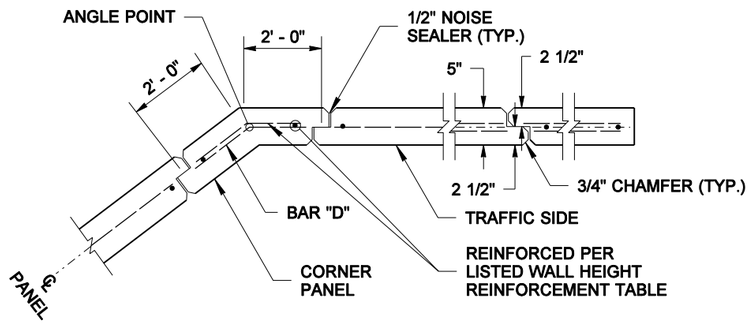



**TYPICAL SECTION**

3 HEIGHT MAY VARY IF REQUIRED TO PROVIDE A SMOOTH PROFILE CONSISTENT WITH THE ROADWAY PROFILE



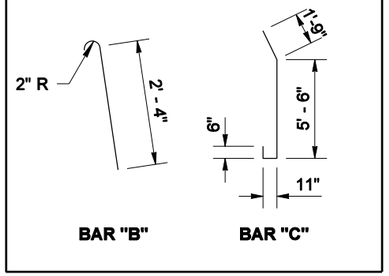

**ELEVATION**




**JOINT AND CORNER DETAIL**

**CAST-IN-PLACE W/ TRAFFIC BARRIER ON TRENCH FOOTING**

**BENDING DIAGRAM**




BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 5

## STANDARD PLAN D-2.10-00

SHEET 1 OF 1 SHEET

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*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

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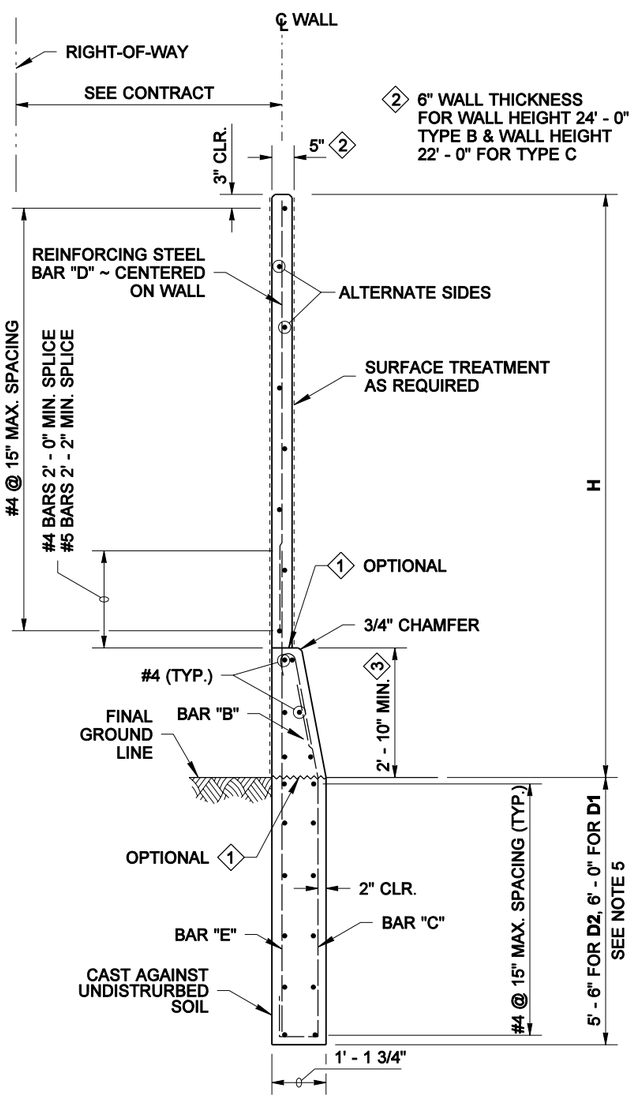
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

| WALL HT H | TYPE 5SSA BAR "B"&"C" | TYPE 5SSA BAR "D"&"E" | TYPE 5SSB BAR "B"&"C" | TYPE 5SSB BAR "D"&"E" | TYPE 5SSC BAR "B"&"C" | TYPE 5SSC BAR "D"&"E" | TYPE 5SSD BAR "B"&"C" | TYPE 5SSD BAR "D"&"E" | WALL HT H |
|---|---|---|---|---|---|---|---|---|---|
| 6' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 6' - 0" |
| 8' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 8' - 0" |
| 10' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 10' - 0" |
| 12' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 12" | #4 @ 15" | 12' - 0" |
| 14' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 11" | #4 @ 11" | #4 @ 11" | #4 @ 11" | #4 @ 10" | #4 @ 11" | 14' - 0" |
| 16' - 0" | #4 @ 14" | #4 @ 14" | #4 @ 10" | #4 @ 10" | #4 @ 10" | #4 @ 10" | #4 @ 12" | #4 @ 10" | 16' - 0" |
| 18' - 0" | #4 @ 10" | #4 @ 12" | #4 @ 10" | #5 @ 12" | #4 @ 10" | #4 @ 10" | #4 @ 9" | #4 @ 10" | 18' - 0" |
| 20' - 0" | #4 @ 10" | #4 @ 10" | #4 @ 9" | #5 @ 9" | #4 @ 10" | #4 @ 7 1/2" | #4 @ 9" | #4 @ 7 1/2" | 20' - 0" |
| 22' - 0" | #4 @ 10" | #4 @ 8" | #4 @ 9" | #5 @ 6 1/2" | #4 @ 10" | #4 @ 6" | #4 @ 9" | #4 @ 6" | 22' - 0" |
| 24' - 0" | #4 @ 10" | #4 @ 6" | #4 @ 9" | #5 @ 6" | #4 @ 10" | #4 @ 4" | #4 @ 9" | #4 @ 4" | 24' - 0" |

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 5SSA | B1 | 80 |
| 5SSB | B1 | 90 |
| 5SSC | B2 | 80 |
| 5SSD | B2 | 90 |

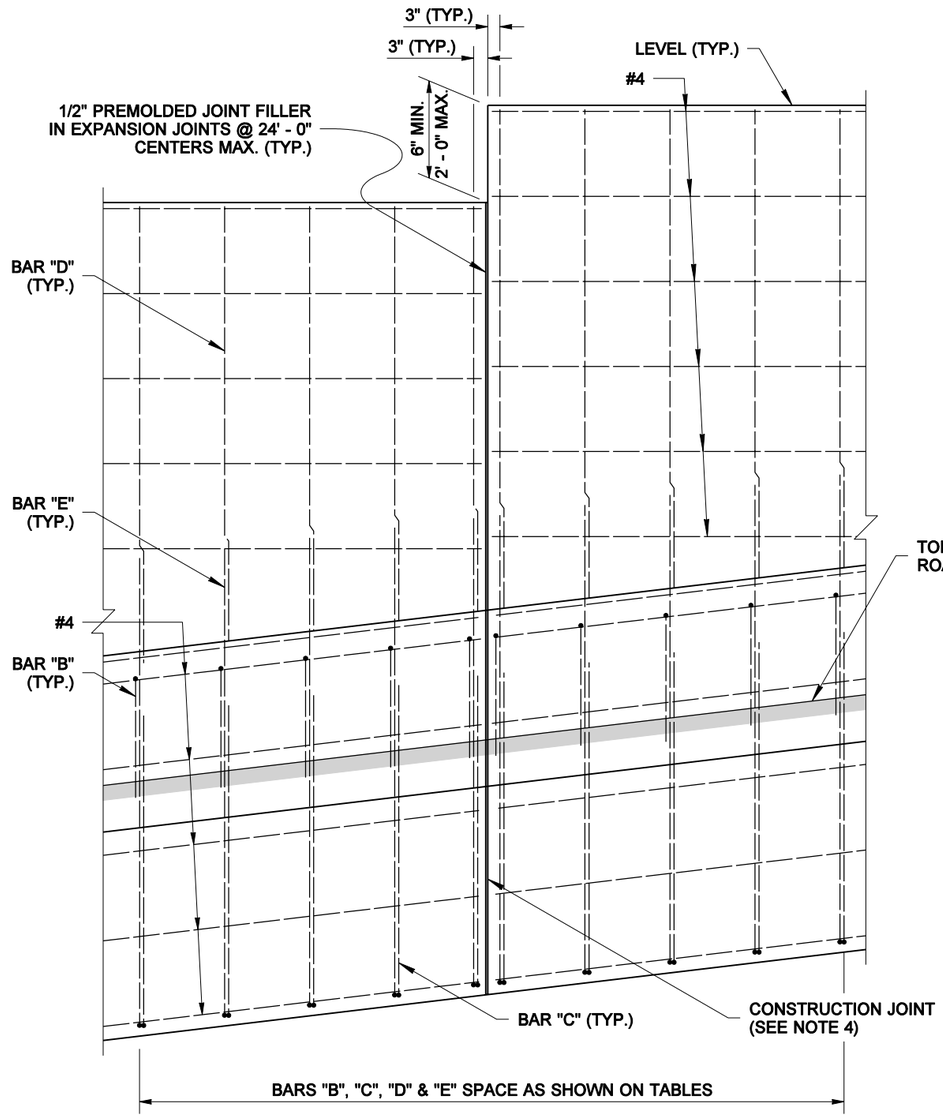
| SOIL TYPE | |
|---|---|
| SOIL TYPE | ANGLE OF INTERNAL FRICTION $\phi$ (DEGREES) |
| D1 | 32 |
| D2 | 38 |




**TYPICAL SECTION**

3 HEIGHT MAY VARY IF REQUIRED TO PROVIDE A SMOOTH PROFILE CONSISTENT WITH THE ROADWAY PROFILE

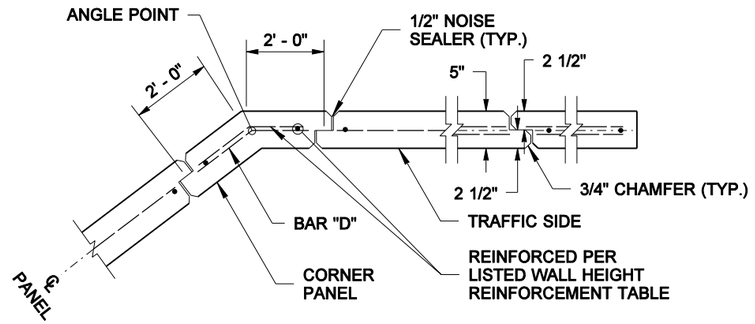
1 CONSTRUCTION JOINT WITH ROUGHENED SURFACE




**ELEVATION**

**NOTES**

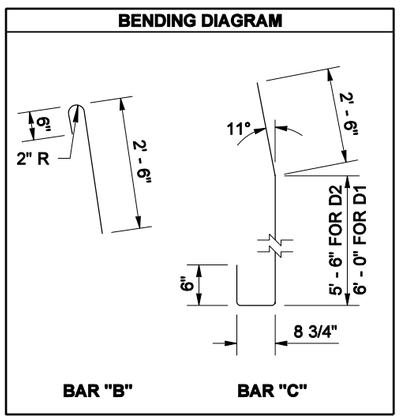
1. Wall to be designated Noise Barrier Wall Type 5SSA, 5SSB, 5SSC or 5SSD. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet min. of level ground on each side.
4. Construction joints in the footing shall be spaced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




**JOINT AND CORNER DETAIL**

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**BENDING DIAGRAM**




# CAST-IN-PLACE W/ SINGLE SLOPE TRAFFIC BARRIER ON TRENCH FOOTING

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 5SS

## STANDARD PLAN D-2.12-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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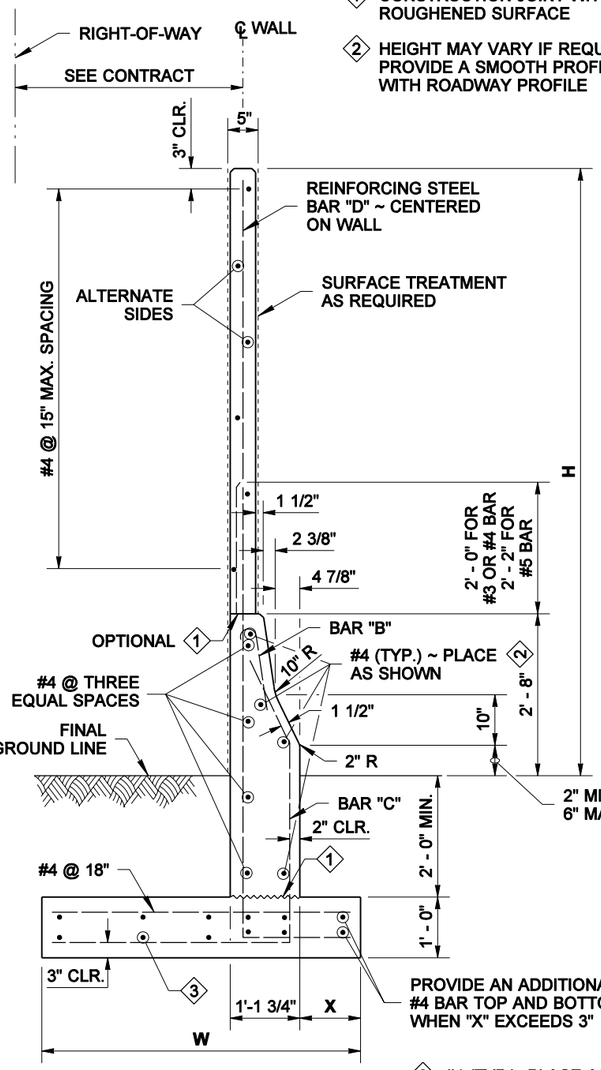
DRAWN BY: ADAM COCHRAN

| WALL HT H | TYPE 6A W | TYPE 6A X | TYPE 6A BARS "B"&"C" | TYPE 6A BARS "D"&"E" | TYPE 6B W | TYPE 6B X | TYPE 6B BARS "B"&"C" | TYPE 6B BARS "D"&"E" | TYPE 6C W | TYPE 6C X | TYPE 6C BARS "B"&"C" | TYPE 6C BARS "D"&"E" | TYPE 6D W | TYPE 6D X | TYPE 6D BARS "B"&"C" | TYPE 6D BARS "D"&"E" | WALL HT H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6' - 0" | 5' - 6" | 3" | #4 @ 12" | #4 @ 12" | 5' - 6" | 3" | #4 @ 12" | #4 @ 12" | 5' - 6" | 3" | #4 @ 12" | #4 @ 12" | 5' - 6" | 3" | #4 @ 12" | #4 @ 12" | 6' - 0" |
| 8' - 0" | 5' - 3" | 3" | #4 @ 12" | #4 @ 12" | 5' - 3" | 3" | #4 @ 12" | #4 @ 12" | 5' - 3" | 3" | #4 @ 12" | #4 @ 12" | 5' - 3" | 3" | #4 @ 12" | #4 @ 12" | 8' - 0" |
| 10' - 0" | 5' - 3" | 3" | #4 @ 12" | #4 @ 12" | 5' - 3" | 3" | #4 @ 12" | #4 @ 12" | 5' - 3" | 3" | #4 @ 12" | #4 @ 12" | 5' - 3" | 3" | #4 @ 12" | #4 @ 12" | 10' - 0" |
| 12' - 0" | 5' - 0" | 3" | #4 @ 12" | #4 @ 12" | 5' - 0" | 3" | #4 @ 12" | #4 @ 12" | 5' - 0" | 3" | #4 @ 12" | #4 @ 12" | 5' - 0" | 3" | #4 @ 12" | #4 @ 12" | 12' - 0" |
| 14' - 0" | 4' - 9" | 3" | #4 @ 12" | #4 @ 12" | 5' - 0" | 3" | #4 @ 11" | #4 @ 11" | 4' - 9" | 3" | #4 @ 12" | #4 @ 12" | 5' - 3" | 3" | #4 @ 10" | #4 @ 10" | 14' - 0" |
| 16' - 0" | 5' - 0" | 3" | #4 @ 12" | #4 @ 12" | 5' - 0" | 3" | #4 @ 10" | #4 @ 10" | 5' - 0" | 3" | #4 @ 10" | #4 @ 10" | 5' - 6" | 3" | #4 @ 12" | #5 @ 12" | 16' - 0" |
| 18' - 0" | 5' - 0" | 3" | #4 @ 10" | #4 @ 10" | 5' - 3" | 3' - 0" | #4 @ 12" | #5 @ 12" | 5' - 0" | 3' - 0" | #4 @ 10" | #4 @ 10" | 5' - 9" | 3" | #4 @ 9" | #5 @ 9" | 18' - 0" |

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 6A | B1 | 80 |
| 6B | B1 | 90 |
| 6C | B2 | 80 |
| 6D | B2 | 90 |

**NOTES**

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

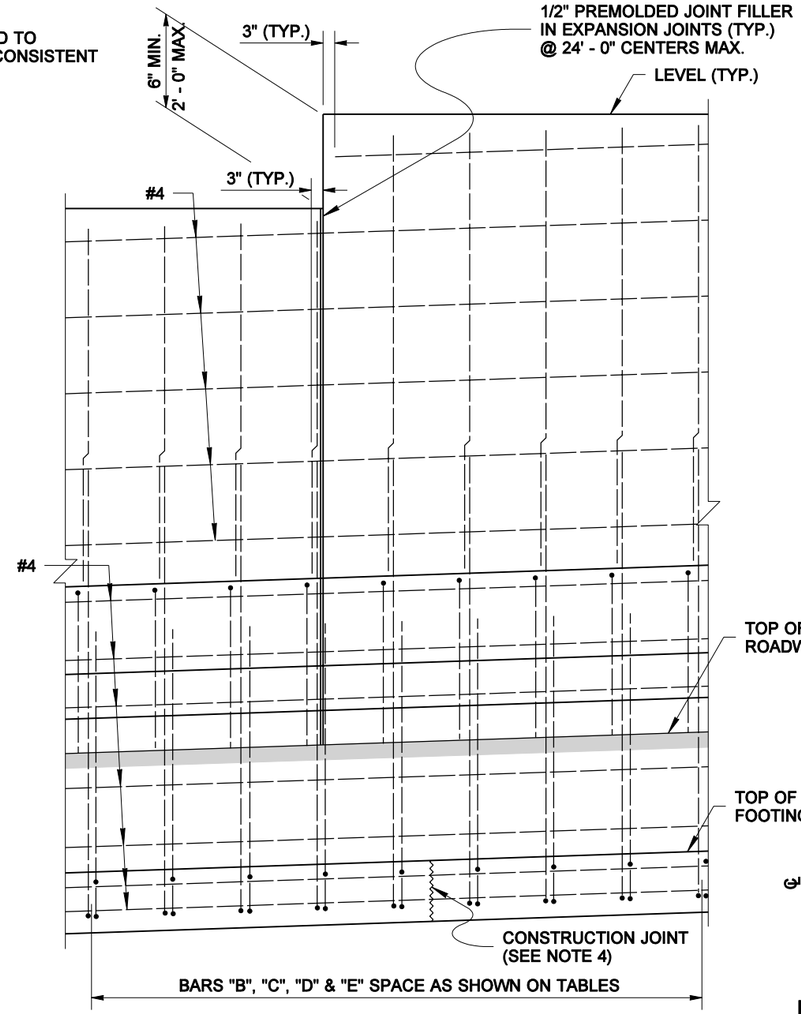



1 CONSTRUCTION JOINT WITH ROUGHENED SURFACE

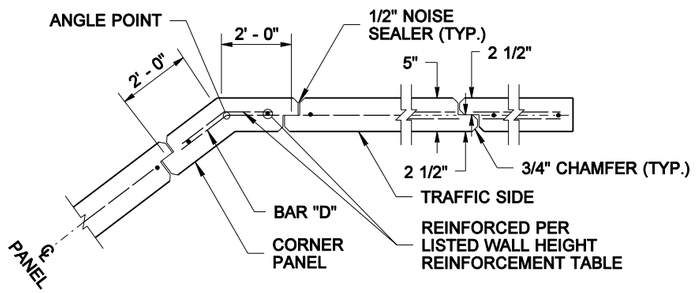
2 HEIGHT MAY VARY IF REQUIRED TO PROVIDE A SMOOTH PROFILE CONSISTENT WITH ROADWAY PROFILE

3 #4 (TYP.) PLACE AS SHOWN WITH 2' - 0" SPLICE AND EXTENDING THRU CONSTRUCTION JOINTS

**TYPICAL SECTION**

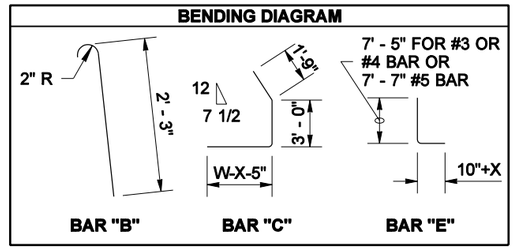


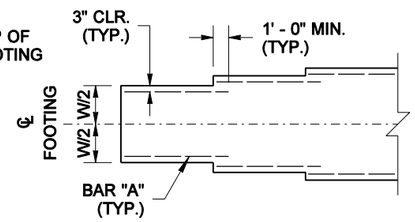

**ELEVATION**




**JOINT AND CORNER DETAIL**

**BENDING DIAGRAM**




**FOOTING WIDTH TRANSITION DETAIL**

(FOR LOCATIONS WITHOUT FOOTING STEP)

**CAST-IN-PLACE CONCRETE WALL W/ TRAFFIC BARRIER ON SPREAD FOOTING**

BIJAN KHALEGHI STATE OF WASHINGTON 27695 REGISTERED PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

**NOISE BARRIER WALL TYPE 6**

**STANDARD PLAN D-2.14-00**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

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.*

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

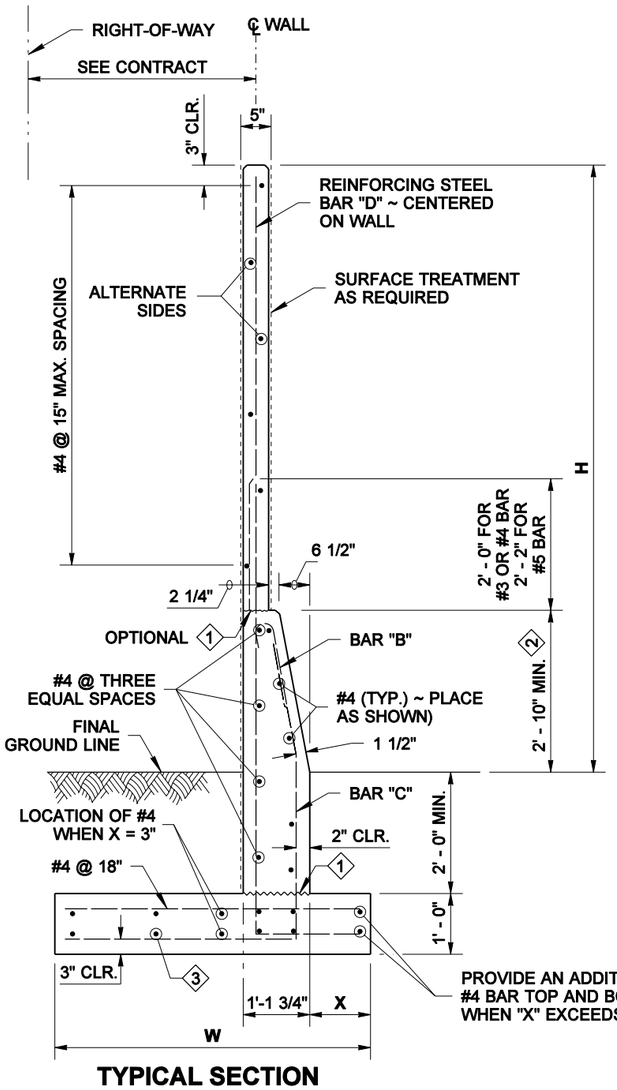
DRAWN BY: ADAM COCHRAN

| WALL HT H | TYPE 6SSA W | X | BARS "B"&"C" | BARS "D"&"E" | TYPE 6SSB W | X | BARS "B"&"C" | BARS "D"&"E" | TYPE 6SSC W | X | BARS "B"&"C" | BARS "D"&"E" | TYPE 6SSD W | X | BARS "B"&"C" | BARS "D"&"E" | WALL HT H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6' - 0" | 5' - 6" | 3" | #4 @ 12" | #4 @ 12" | 5' - 6" | 3" | #4 @ 12" | #4 @ 12" | 5' - 6" | 3" | #4 @ 12" | #4 @ 12" | 5' - 6" | 3" | #4 @ 12" | #4 @ 12" | 6' - 0" |
| 8' - 0" | 5' - 3" | 3" | #4 @ 12" | #4 @ 12" | 5' - 3" | 3" | #4 @ 12" | #4 @ 12" | 5' - 3" | 3" | #4 @ 12" | #4 @ 12" | 5' - 3" | 3" | #4 @ 12" | #4 @ 12" | 8' - 0" |
| 10' - 0" | 5' - 3" | 3" | #4 @ 12" | #4 @ 12" | 5' - 3" | 3" | #4 @ 12" | #4 @ 12" | 5' - 3" | 3" | #4 @ 12" | #4 @ 12" | 5' - 3" | 3" | #4 @ 12" | #4 @ 12" | 10' - 0" |
| 12' - 0" | 5' - 0" | 3" | #4 @ 12" | #4 @ 12" | 5' - 0" | 3" | #4 @ 12" | #4 @ 12" | 5' - 0" | 3" | #4 @ 12" | #4 @ 12" | 5' - 0" | 3" | #4 @ 12" | #4 @ 12" | 12' - 0" |
| 14' - 0" | 4' - 9" | 3" | #4 @ 12" | #4 @ 12" | 5' - 0" | 3" | #4 @ 11" | #4 @ 11" | 4' - 9" | 3" | #4 @ 12" | #4 @ 12" | 5' - 3" | 3" | #4 @ 10" | #4 @ 10" | 14' - 0" |
| 16' - 0" | 5' - 0" | 3" | #4 @ 12" | #4 @ 12" | 5' - 0" | 3" | #4 @ 10" | #4 @ 10" | 5' - 0" | 3" | #4 @ 10" | #4 @ 10" | 5' - 6" | 3" | #4 @ 12" | #5 @ 12" | 16' - 0" |
| 18' - 0" | 5' - 0" | 3" | #4 @ 10" | #4 @ 10" | 5' - 3" | 3' - 0" | #4 @ 12" | #5 @ 12" | 5' - 0" | 3' - 0" | #4 @ 10" | #4 @ 10" | 5' - 9" | 3" | #4 @ 9" | #5 @ 9" | 18' - 0" |

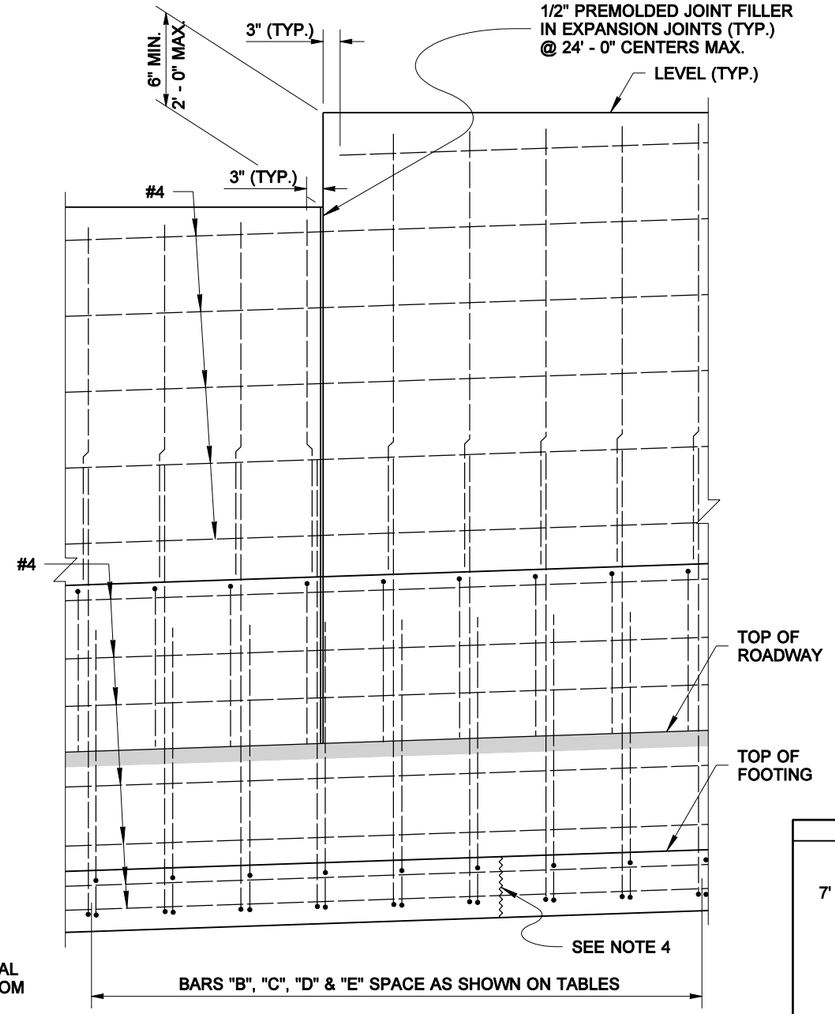
| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 6SSA | B1 | 80 |
| 6SSB | B1 | 90 |
| 6SSC | B2 | 80 |
| 6SSD | B2 | 90 |

**NOTES**

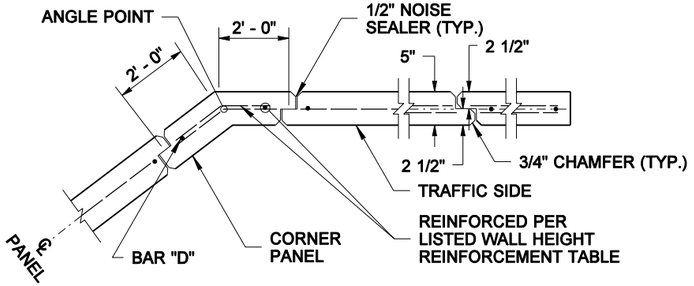
1. Wall to be designated Noise Barrier Wall Type 6SSA, 6SSB, 6SSC or 6SSD. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet of level ground on each side.
4. Construction joints in the foundation shall be spaced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



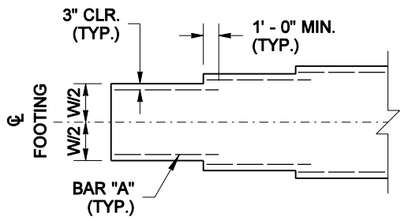

**TYPICAL SECTION**




**ELEVATION**

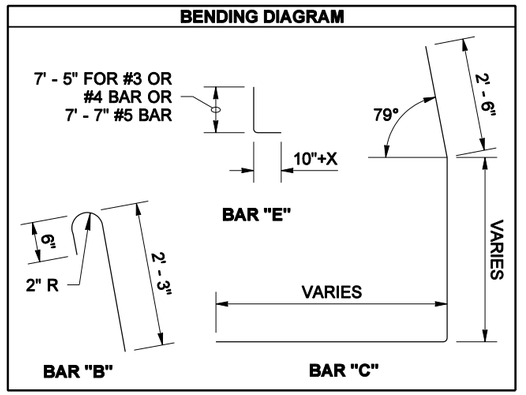



**JOINT AND CORNER DETAIL**




**FOOTING WIDTH TRANSITION DETAIL**

(FOR LOCATIONS WITHOUT FOOTING STEP)




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**CAST-IN-PLACE CONC. WALL W/ SINGLE SLOPE TRAFFIC BARRIER ON SPREAD FOOTING**

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 6SS

## STANDARD PLAN D-2.16-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

1 CONSTRUCTION JOINT WITH ROUGHENED SURFACE

2 HEIGHT MAY VARY IF REQUIRED TO PROVIDE A SMOOTH PROFILE CONSISTENT WITH ROADWAY PROFILE

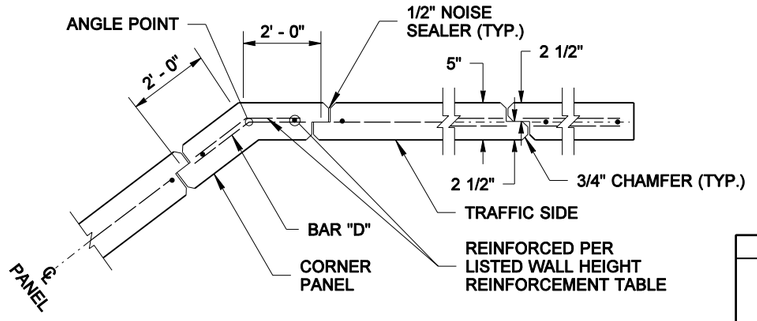
3 #4 (TYP.) PLACE AS SHOWN WITH 2' - 0" SPLICE AND EXTENDING THRU CONSTRUCTION JOINTS

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

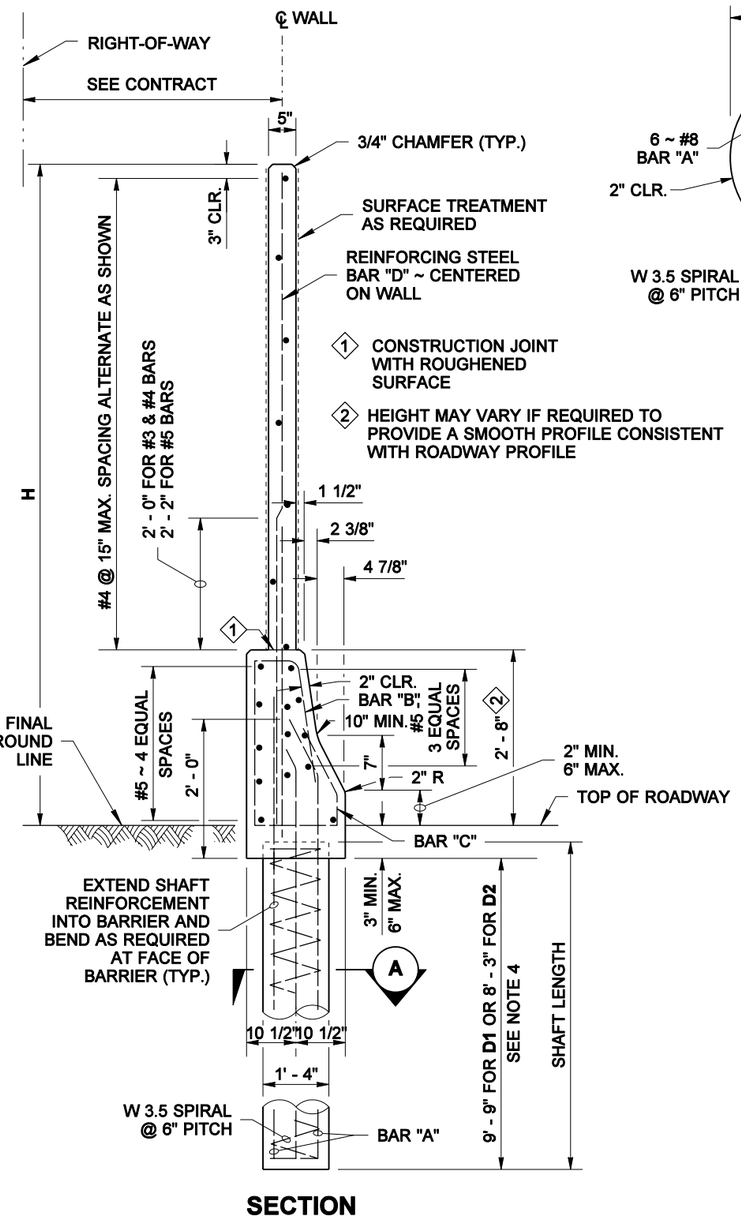
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

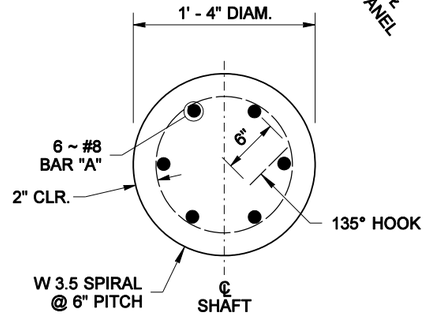
| WALL HT H | TYPE 7A BARS "B"&"C" | TYPE 7B BARS "B"&"C" | TYPE 7C BARS "B"&"C" | TYPE 7D BARS "B"&"C" | WALL HT H |
|---|---|---|---|---|---|
| 6' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 6' - 0" |
| 8' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 8' - 0" |
| 10' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 10' - 0" |
| 12' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 12" | 12' - 0" |
| 14' - 0" | #4 @ 15" | #4 @ 11" | #4 @ 14" | #4 @ 10" | 14' - 0" |
| 16' - 0" | #4 @ 14" | #4 @ 10" | #4 @ 10" | #5 @ 12" | 16' - 0" |
| 18' - 0" | #4 @ 12" | #5 @ 12" | #4 @ 10" | #5 @ 9" | 18' - 0" |




## JOINT AND CORNER DETAIL

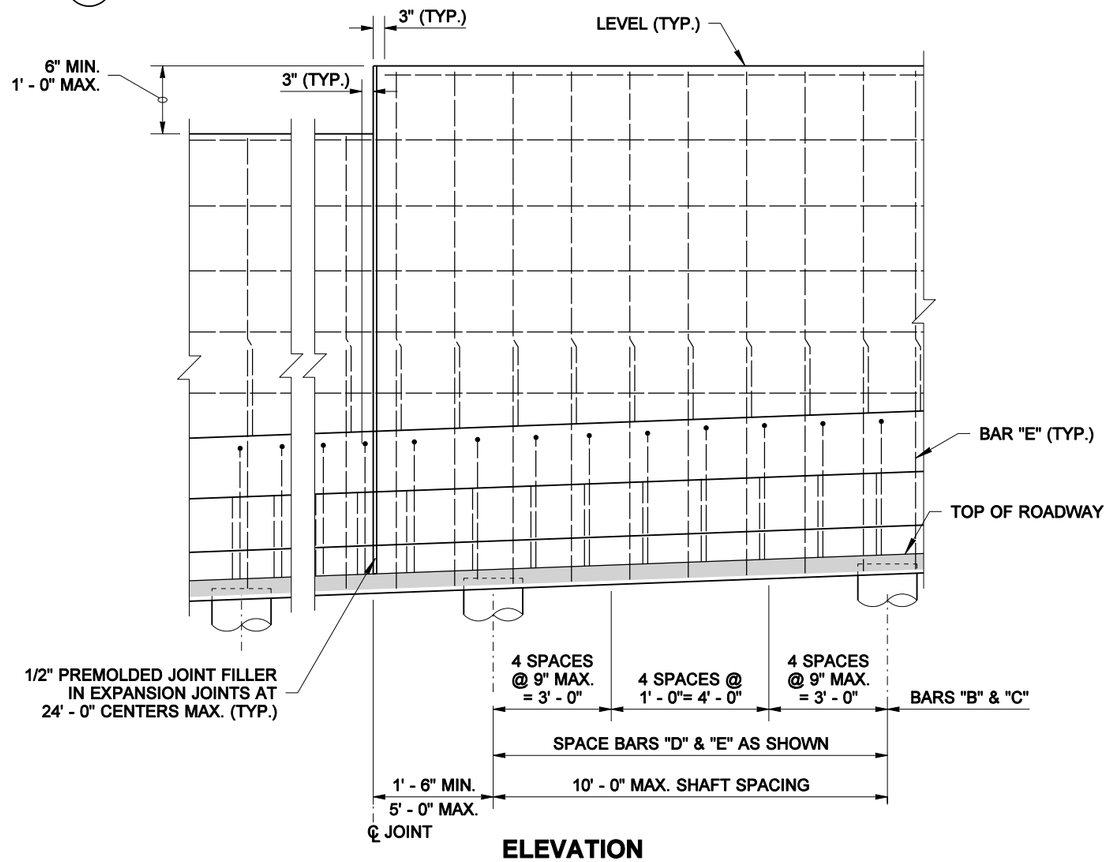



## SECTION




## SECTION (A)

1. CONSTRUCTION JOINT WITH ROUGHENED SURFACE
2. HEIGHT MAY VARY IF REQUIRED TO PROVIDE A SMOOTH PROFILE CONSISTENT WITH ROADWAY PROFILE

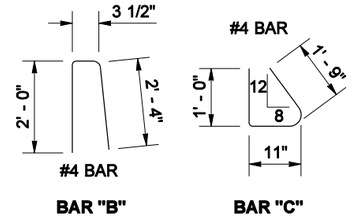



## ELEVATION

### 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.

**BENDING DIAGRAM**




| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 7A | B1 | 80 |
| 7B | B1 | 90 |
| 7C | B2 | 80 |
| 7D | B2 | 90 |

| SOIL TYPE | |
|---|---|
| SOIL TYPE | ANGLE OF INTERNAL FRICTION ϕ (DEGREES) |
| D1 | 32 |
| D2 | 38 |

*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.*

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

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 7

## STANDARD PLAN D-2.18-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

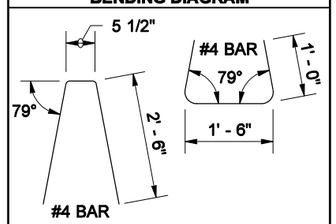
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

| WALL HT H | TYPE 7SSA BARS "B"&"C" | TYPE 7SSB BARS "B"&"C" | TYPE 7SSC BARS "B"&"C" | TYPE 7SSD BARS "B"&"C" | WALL HT H |
|---|---|---|---|---|---|
| 6' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 6' - 0" |
| 8' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 8' - 0" |
| 10' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 10' - 0" |
| 12' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 12" | 12' - 0" |
| 14' - 0" | #4 @ 15" | #4 @ 11" | #4 @ 14" | #4 @ 10" | 14' - 0" |
| 16' - 0" | #4 @ 14" | #4 @ 10" | #4 @ 10" | #5 @ 12" | 16' - 0" |
| 18' - 0" | #4 @ 12" | #5 @ 12" | #4 @ 10" | #5 @ 9" | 18' - 0" |

**BENDING DIAGRAM**

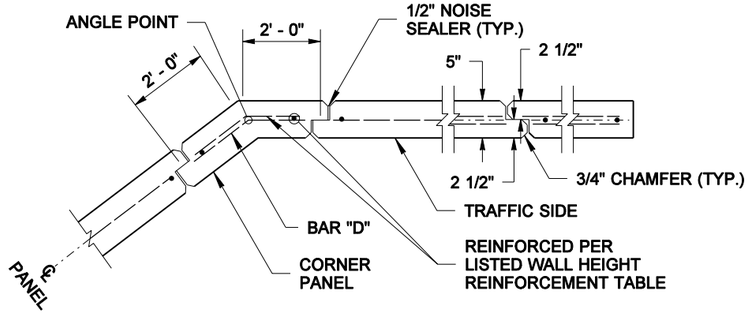



| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 7SSA | B1 | 80 |
| 7SSB | B1 | 90 |
| 7SSC | B2 | 80 |
| 7SSD | B2 | 90 |

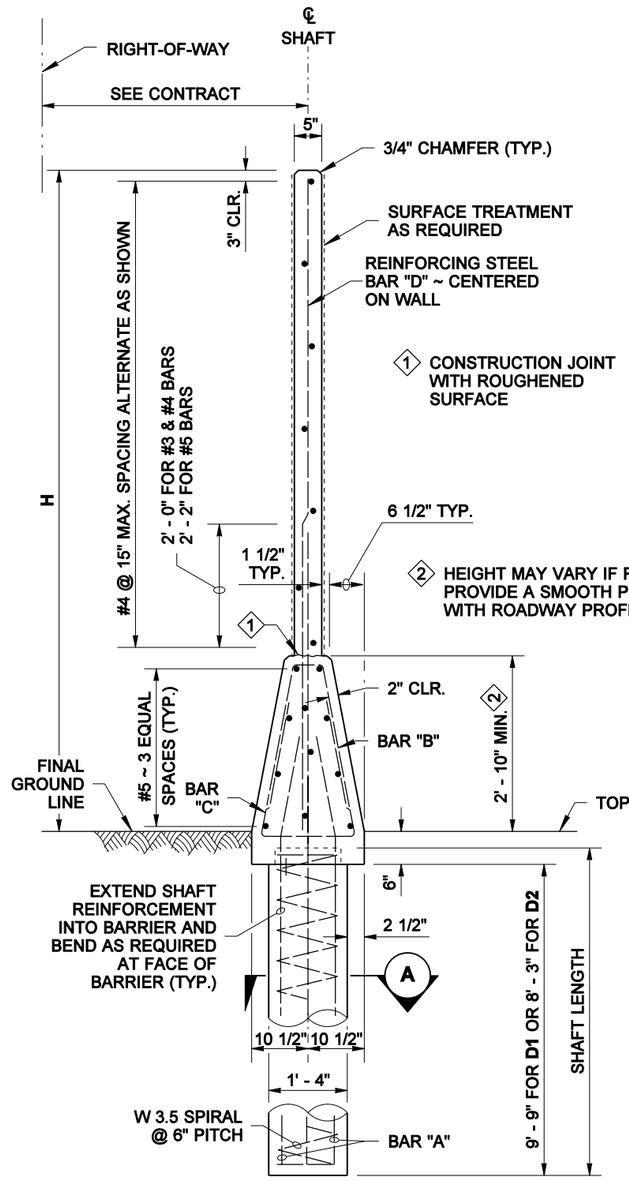
| SOIL TYPE | |
|---|---|
| SOIL TYPE | ANGLE OF INTERNAL FRICTION $\phi$ (DEGREES) |
| D1 | 32 |
| D2 | 38 |

**NOTES**

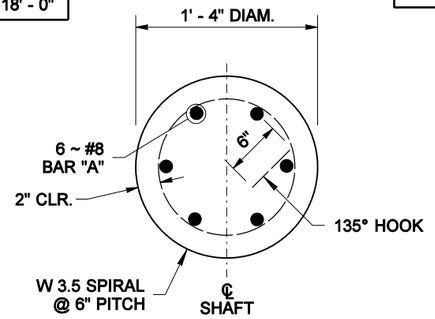
1. Wall to be designated Noise Barrier Wall Type 7SSA, 7SSB, 7SSC or 7SSD. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet of level ground on each side.
4. The Contract specifies actual foundation requirements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



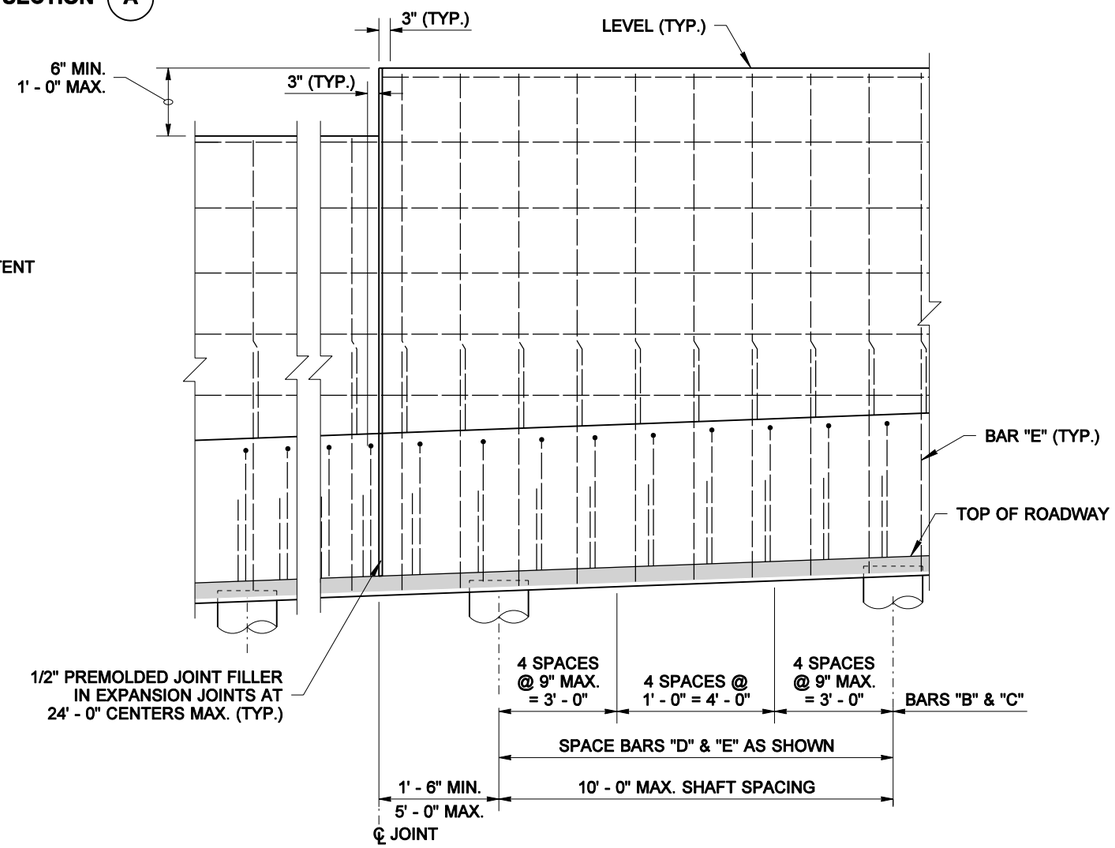

**JOINT AND CORNER DETAIL**




**SECTION**




**SECTION A**




**ELEVATION**

# CAST-IN-PLACE CONC. WALL W/ SINGLE SLOPE TRAFFIC BARRIER ON SHAFT FOUNDATION

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 7SS

## STANDARD PLAN D-2.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

| WALL HT H | TYPE 8A t | TYPE 8A DEPTH D1 | TYPE 8A DEPTH D2 | TYPE 8A BAR "D" | TYPE 8B t | TYPE 8B DEPTH D1 | TYPE 8B DEPTH D2 | TYPE 8B BAR "D" | TYPE 8C t | TYPE 8C DEPTH D1 | TYPE 8C DEPTH D2 | TYPE 8C BAR "D" | TYPE 8D t | TYPE 8D DEPTH D1 | TYPE 8D DEPTH D2 | TYPE 8D BAR "D" | WALL HT H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6' - 0" | 5" | 3' - 6" | 3' - 3" | #3 @ 15" | 5" | 3' - 9" | 3' - 6" | #3 @ 13 1/2" | 5" | 3' - 6" | 3' - 3" | #3 @ 15" | 5" | 3' - 9" | 3' - 6" | #3 @ 11" | 6' - 0" |
| 8' - 0" | 5" | 3' - 9" | 3' - 3" | #3 @ 13" | 5" | 4' - 0" | 3' - 9" | #3 @ 8 1/2" | 5" | 3' - 9" | 3' - 6" | #3 @ 11" | 5" | 4' - 3" | 3' - 9" | #4 @ 12" | 8' - 0" |
| 10' - 0" | 5" | 4' - 0" | 3' - 6" | #3 @ 8 1/2" | 5" | 4' - 3" | 4' - 0" | #4 @ 10 1/2" | 5" | 4' - 0" | 3' - 9" | #3 @ 12 1/2" | 5" | 4' - 6" | 4' - 0" | #4 @ 11" | 10' - 0" |
| 12' - 0" | 5" | 4' - 3" | 3' - 9" | #4 @ 12" | 5" | 4' - 9" | 4' - 3" | #4 @ 10" | 5" | 4' - 6" | 4' - 0" | #4 @ 10 1/2" | 5" | 5' - 0" | 4' - 6" | #5 @ 12" | 12' - 0" |
| 14' - 0" | 5" | 4' - 6" | 4' - 0" | #4 @ 10 1/2" | 5" | 5' - 0" | 4' - 6" | #5 @ 11" | 5" | 4' - 9" | 4' - 3" | #4 @ 9 1/2" | 5" | 5' - 3" | 4' - 9" | #5 @ 8 3/4" | 14' - 0" |
| 16' - 0" | 5" | 4' - 9" | 4' - 3" | #5 @ 14" | 5" | 5' - 3" | 4' - 9" | #5 @ 8 1/2" | 5" | 5' - 0" | 4' - 6" | #5 @ 11" | 5" | 5' - 9" | 5' - 0" | #6 @ 9 1/2" | 16' - 0" |
| 18' - 0" | 5" | 5' - 0" | 4' - 6" | #5 @ 11" | 5" | 5' - 6" | 5' - 0" | #6 @ 9 1/2" | 5" | 5' - 3" | 4' - 9" | #5 @ 8 1/2" | 6" | 6' - 0" | 5' - 3" | #6 @ 9" | 18' - 0" |
| 20' - 0" | 5" | 5' - 3" | 4' - 9" | #5 @ 6" | 6" | 5' - 9" | 5' - 3" | #6 @ 9 1/2" | 5" | 5' - 6" | 5' - 0" | #5 @ 6" | 6" | 6' - 3" | 5' - 6" | #6 @ 7 1/2" | 20' - 0" |
| 22' - 0" | 5" | 5' - 6" | 5' - 0" | #5 @ 7" | 6" | 6' - 0" | 5' - 6" | #6 @ 8" | 6" | 5' - 9" | 5' - 3" | #5 @ 8" | 7" | 6' - 6" | 5' - 9" | #6 @ 7" | 22' - 0" |
| 24' - 0" | 5" | 5' - 9" | 5' - 3" | #6 @ 8" | 7" | 6' - 3" | 5' - 9" | #6 @ 6 1/2" | 6" | 6' - 0" | 5' - 6" | #5 @ 6" | 7" | 6' - 9" | 6' - 0" | #6 @ 6" | 24' - 0" |

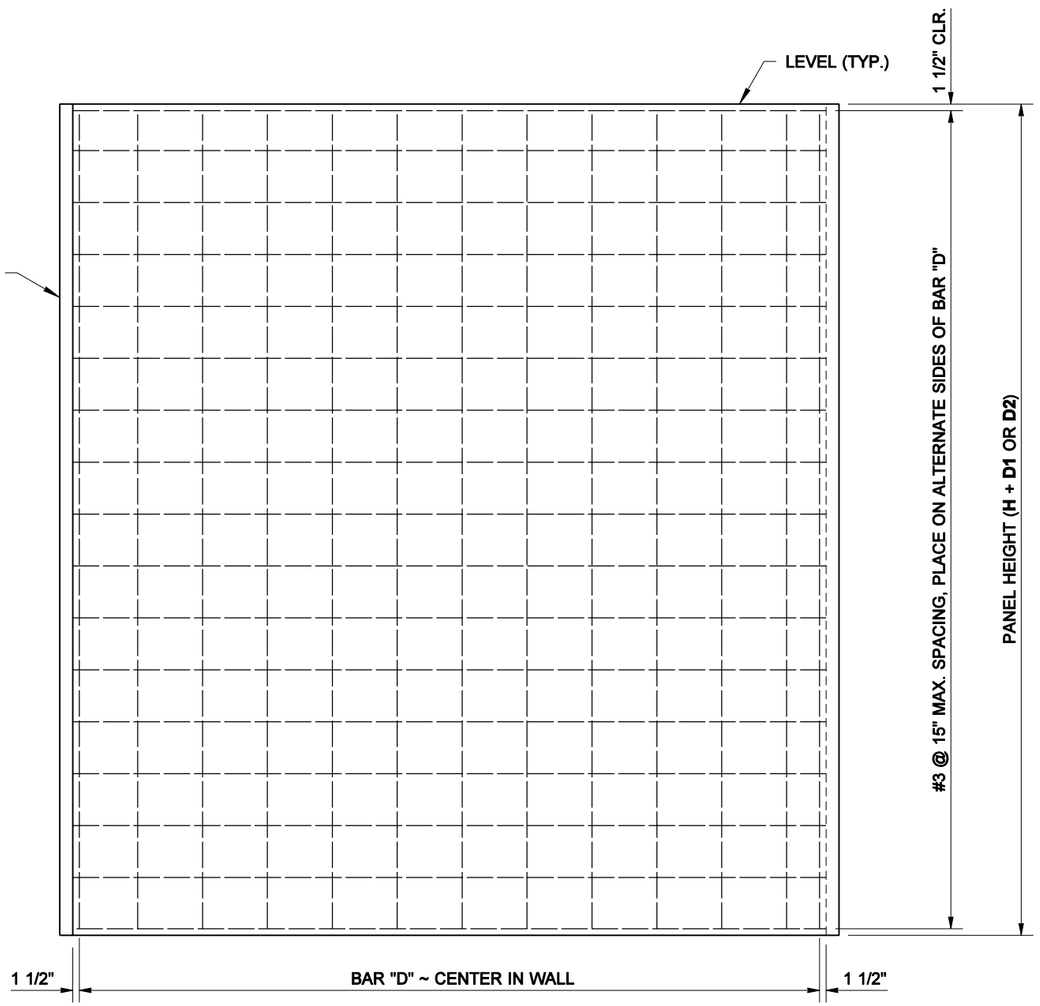
t = WALL THICKNESS

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 8A | B1 | 80 |
| 8B | B1 | 90 |
| 8C | B2 | 80 |
| 8D | B2 | 90 |

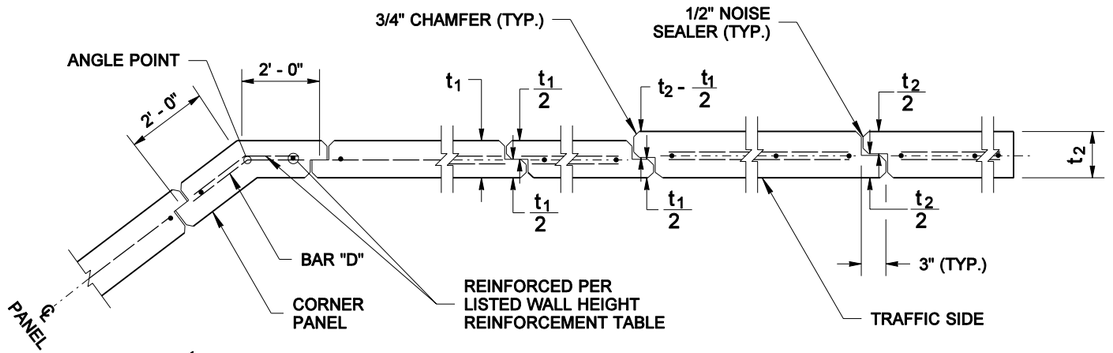
| SOIL TYPE | |
|---|---|
| SOIL TYPE | ANGLE OF INTERNAL FRICTION $\phi$ (DEGREES) |
| D1 | 32 |
| D2 | 38 |

**NOTES**

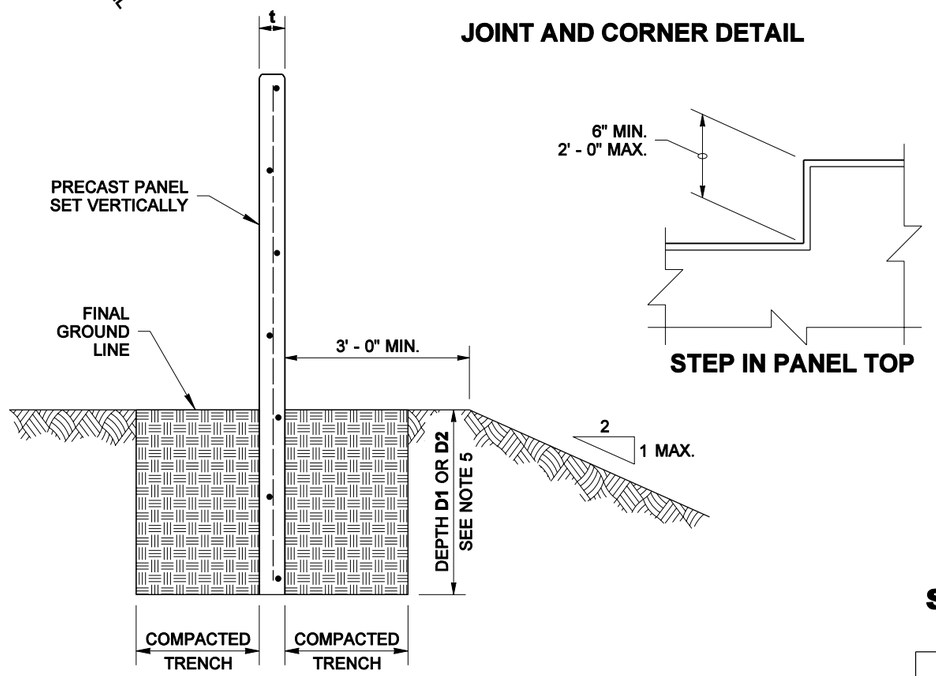
1. Wall to be designated Noise Barrier Wall Type 8A, 8B, 8C or 8D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3' - 0" of level ground on each side.
4. All joints shall be in full contact and sealed.
5. The Contract specifies actual foundation requirements D1 or D2.




ELEVATION




JOINT AND CORNER DETAIL




SECTION

THERE SHALL NOT BE MORE THAN 1' - 0" DIFFERENTIAL BACKFILL HEIGHT




STEP IN PANEL TOP

# PRECAST CONCRETE WALL ON TRENCH FOOTING

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 8

## STANDARD PLAN D-2.30-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

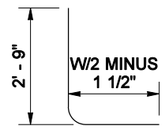
DRAWN BY: ADAM COCHRAN

| WALL HT H | TYPE 9A W | BARS "A"&"F" | t | BAR "B" | SPIRAL BAR "G" | BARS "D"&"H" | TYPE 9B W | BARS "A"&"F" | t | BAR "B" | SPIRAL BAR "G" | BARS "D"&"H" | TYPE 9C W | BARS "A"&"F" | t | BAR "B" | SPIRAL BAR "G" | BARS "D"&"H" | TYPE 9D W | BARS "A"&"F" | t | BAR "B" | SPIRAL BAR "G" | BARS D & H | WALL HT H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6' - 0" | 2' - 0" | 3 ~ #4 | 5" | #4 @ 18" | W2.0 @ 2" | #3 @ 15" | 2' - 3" | 3 ~ #4 | 5" | #4 @ 18" | W2.0 @ 2" | #3 @ 12" | 2' - 0" | 3 ~ #4 | 5" | #4 @ 18" | W2.0 @ 2" | #3 @ 15" | 2' - 6" | 3 ~ #4 | 5" | #4 @ 18" | W2.0 @ 2" | #3 @ 11" | 6' - 0" |
| 8' - 0" | 2' - 3" | 3 ~ #4 | 5" | #4 @ 18" | W2.0 @ 2" | #3 @ 12" | 2' - 9" | 3 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 15" | 2' - 6" | 3 ~ #4 | 5" | #4 @ 18" | W2.0 @ 2" | #3 @ 10" | 3' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 12" | 8' - 0" |
| 10' - 0" | 2' - 6" | 3 ~ #4 | 5" | #4 @ 18" | W2.0 @ 2" | #3 @ 9" | 3' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 10" | 2' - 9" | 3 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 12" | 3' - 6" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 10" | 10' - 0" |
| 12' - 0" | 3' - 0" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 12" | 3' - 9" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 10" | 3' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 10" | 4' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 1 3/4" | #5 @ 12" | 12' - 0" |
| 14' - 0" | 3' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 10" | 4' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 1 3/4" | #5 @ 11" | 3' - 9" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 9" | 4' - 9" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 1 3/4" | #5 @ 8" | 14' - 0" |
| 16' - 0" | 3' - 9" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 9" | 4' - 9" | 5 ~ #4 | 5" | #4 @ 18" | W4.0 @ 2" | #6 @ 12" | 4' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 1 3/4" | #5 @ 11" | 5' - 6" | 5 ~ #4 | 5" | #4 @ 18" | W4.0 @ 2" | #6 @ 9" | 16' - 0" |
| 18' - 0" | 4' - 0" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 1 3/4" | #5 @ 11" | 5' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W4.0 @ 2" | #6 @ 9" | 4' - 6" | 5 ~ #4 | 5" | #4 @ 18" | W4.0 @ 2" | #6 @ 12" | 6' - 0" | 5 ~ #4 | 6" | #4 @ 18" | W4.0 @ 2" | #6 @ 9" | 18' - 0" |
| 20' - 0" | 5' - 0" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 1 1/2" | #5 @ 9" | 6' - 0" | 5 ~ #4 | 6" | #4 @ 18" | W4.0 @ 2" | #6 @ 9" | 5' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W4.0 @ 2" | #6 @ 10" | 6' - 6" | 6 ~ #4 | 6" | #4 @ 12" | W4.0 @ 1 3/4" | #6 @ 7" | 20' - 0" |
| 22' - 0" | 5' - 6" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 1 1/2" | #5 @ 7" | 6' - 3" | 5 ~ #4 | 6" | #4 @ 12" | W4.0 @ 1 3/4" | #6 @ 8" | 5' - 9" | 5 ~ #4 | 6" | #4 @ 18" | W4.0 @ 2" | #6 @ 9" | 7' - 0" | 6 ~ #4 | 7" | #4 @ 12" | W4.0 @ 1 3/4" | #6 @ 7" | 22' - 0" |
| 24' - 0" | 6' - 0" | 5 ~ #4 | 5" | #4 @ 15" | W3.0 @ 1 1/2" | #5 @ 6" | 6' - 9" | 5 ~ #4 | 7" | #4 @ 11" | W4.0 @ 1 3/4" | #6 @ 8" | 6' - 3" | 5 ~ #4 | 6" | #4 @ 12" | W4.0 @ 1 3/4" | #6 @ 8" | 7' - 6" | 6 ~ #4 | 7" | #4 @ 15" | W4.0 @ 1 1/2" | #6 @ 6" | 24' - 0" |

t = WALL THICKNESS

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 9A | B1 | 80 |
| 9B | B1 | 90 |
| 9C | B2 | 80 |
| 9D | B2 | 90 |

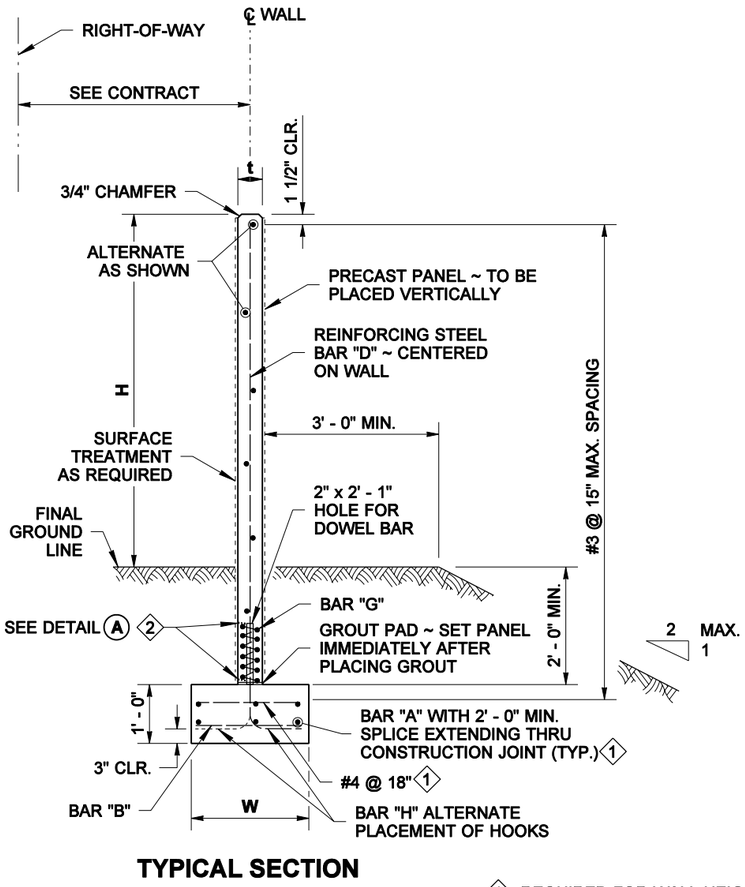
**BENDING DIAGRAM**



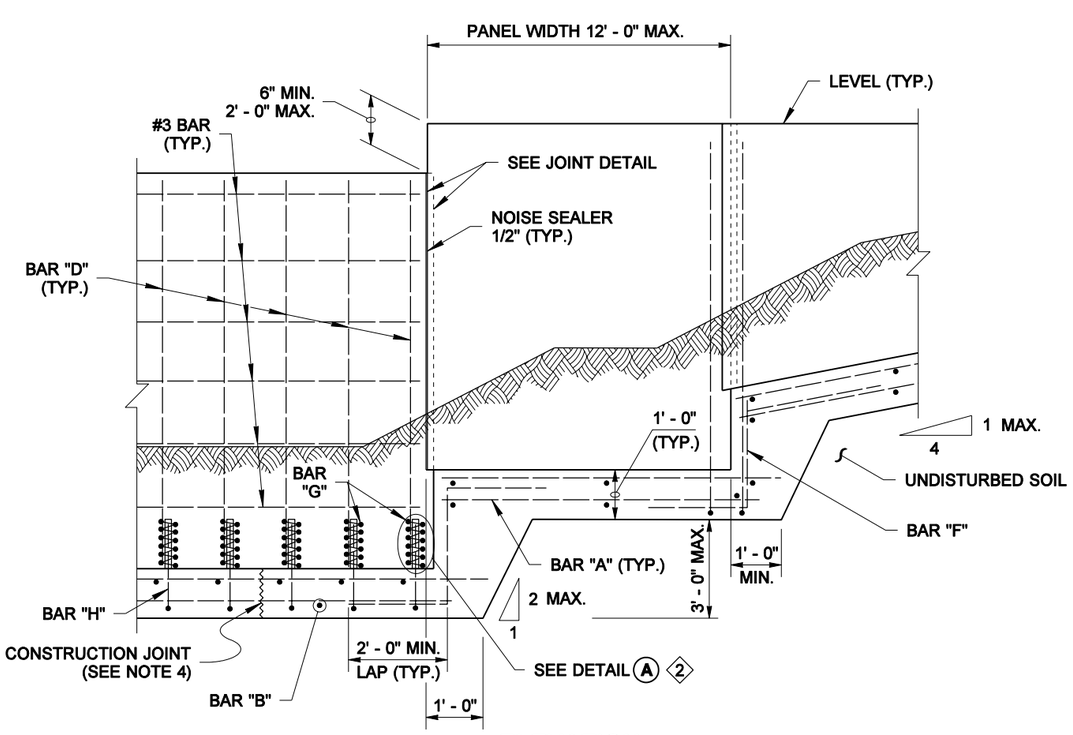

BAR "H"

## NOTES

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




**TYPICAL SECTION**




**ELEVATION**

1 REQUIRED FOR WALL HEIGHT 24' - 0" ~ TYPE 9C, WALLS 22' - 0" & 24' - 0" ~ TYPE 9B & WALLS 20' - 0", 22' - 0" & 24' - 0" ~ TYPE 9D.

# PRECAST CONCRETE WALL ON SPREAD FOOTING

BIJAN KHALEGHI — STATE OF WASHINGTON — 27695 — REGISTERED PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

## NOISE BARRIER WALL TYPE 9

## STANDARD PLAN D-2.32-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

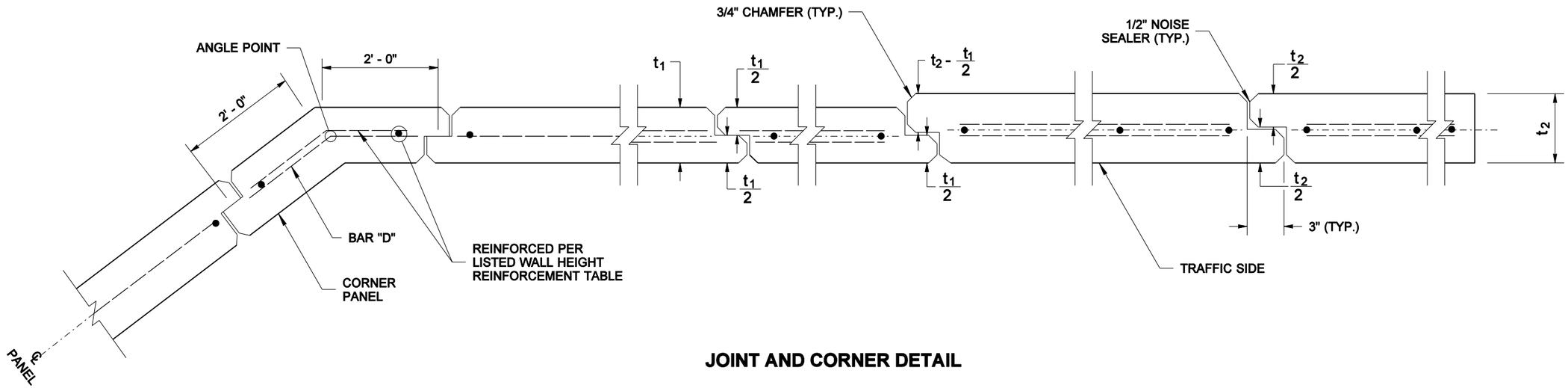
Washington State Department of Transportation

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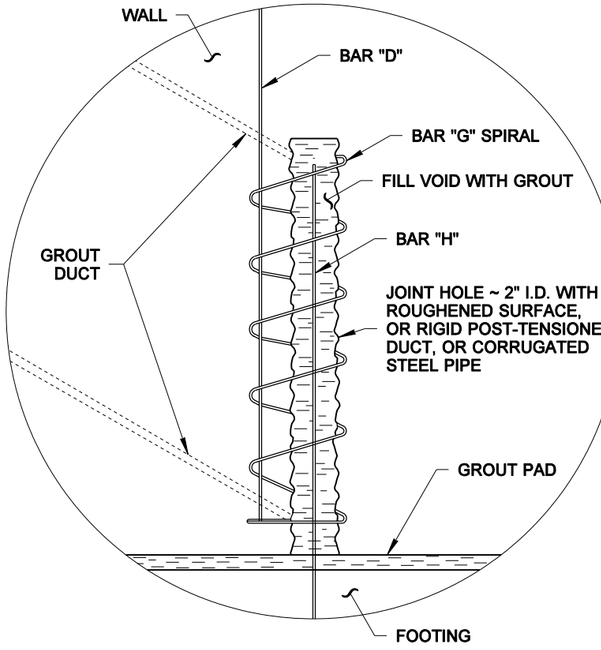
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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DRAWN BY: ADAM COCHRAN

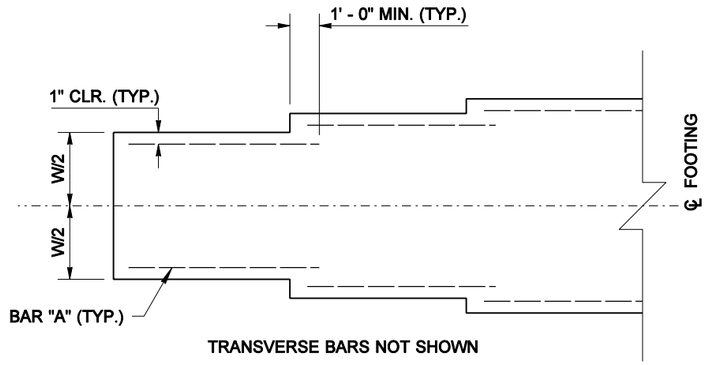



**JOINT AND CORNER DETAIL**




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

**DETAIL A**




TRANSVERSE BARS NOT SHOWN

**FOOTING WIDTH TRANSITION DETAIL**

FOR LOCATIONS WITHOUT FOOTING STEP

# PRECAST CONCRETE WALL ON SPREAD FOOTING

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

## NOISE BARRIER WALL TYPE 9

## STANDARD PLAN D-2.32-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

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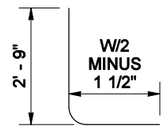
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

| WALL HT H | TYPE 10A | | | | | | TYPE 10B | | | | | | TYPE 10C | | | | | | TYPE 10D | | | | | | WALL HT H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | W | BARS "A"&"F" | t | BAR "B" | SPIRAL BAR "G" | BARS "D"&"H" | W | BARS "A"&"F" | t | BAR "B" | SPIRAL BAR "G" | BARS "D"&"H" | W | BARS "A"&"F" | t | BAR "B" | SPIRAL BAR "G" | BARS "D"&"H" | W | BARS "A"&"F" | t | BAR "B" | SPIRAL BAR "G" | BARS "D"&"H" | |
| 6' - 0" | 2' - 0" | 3 ~ #4 | 5" | #4 @ 18" | W2.0 @ 2" | #3 @ 15" | 2' - 3" | 3 ~ #4 | 5" | #4 @ 18" | W2.0 @ 2" | #3 @ 12" | 2' - 0" | 3 ~ #4 | 5" | #4 @ 18" | W2.0 @ 2" | #3 @ 15" | 2' - 6" | 3 ~ #4 | 5" | #4 @ 18" | W2.0 @ 2" | #3 @ 11" | 6' - 0" |
| 8' - 0" | 2' - 3" | 3 ~ #4 | 5" | #4 @ 18" | W2.0 @ 2" | #3 @ 12" | 2' - 9" | 3 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 15" | 2' - 6" | 3 ~ #4 | 5" | #4 @ 18" | W2.0 @ 2" | #3 @ 10" | 3' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 12" | 8' - 0" |
| 10' - 0" | 2' - 6" | 3 ~ #4 | 5" | #4 @ 18" | W2.0 @ 2" | #3 @ 9" | 3' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 10" | 2' - 9" | 3 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 12" | 3' - 6" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 10" | 10' - 0" |
| 12' - 0" | 3' - 0" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 12" | 3' - 9" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 10" | 3' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 10" | 4' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 1 3/4" | #5 @ 12" | 12' - 0" |
| 14' - 0" | 3' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 10" | 4' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 1 3/4" | #5 @ 11" | 3' - 9" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 9" | 5' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 1 3/4" | #5 @ 8" | 14' - 0" |
| 16' - 0" | 3' - 9" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 2" | #4 @ 9" | 5' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W4.0 @ 2" | #6 @ 12" | 4' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 1 3/4" | #5 @ 11" | 6' - 3" | 5 ~ #4 | 5" | #4 @ 18" | W4.0 @ 2" | #6 @ 9" | 16' - 0" |
| 18' - 0" | 4' - 0" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 1 3/4" | #5 @ 11" | 6' - 0" | 5 ~ #4 | 5" | #4 @ 18" | W4.0 @ 2" | #6 @ 9" | 5' - 0" | 5 ~ #4 | 5" | #4 @ 18" | W4.0 @ 2" | #6 @ 12" | 7' - 0" | 5 ~ #4 | 6" | #4 @ 18" | W4.0 @ 2" | #6 @ 9" | 18' - 0" |
| 20' - 0" | 5' - 0" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 1 1/2" | #5 @ 9" | 7' - 0" | 5 ~ #4 | 6" | #4 @ 18" | W4.0 @ 2" | #6 @ 9" | 5' - 9" | 5 ~ #4 | 5" | #4 @ 18" | W4.0 @ 2" | #6 @ 10" | 8' - 0" | 6 ~ #4 | 6" | #4 @ 12" | W4.0 @ 1 3/4" | #6 @ 7" | 20' - 0" |
| 22' - 0" | 5' - 6" | 5 ~ #4 | 5" | #4 @ 18" | W3.0 @ 1 1/2" | #5 @ 7" | 7' - 9" | 5 ~ #4 | 6" | #4 @ 12" | W4.0 @ 1 3/4" | #6 @ 8" | 6' - 6" | 5 ~ #4 | 6" | #4 @ 18" | W4.0 @ 2" | #6 @ 9" | 9' - 0" | 6 ~ #4 | 7" | #4 @ 12" | W4.0 @ 1 3/4" | #6 @ 7" | 22' - 0" |
| 24' - 0" | 6' - 3" | 5 ~ #4 | 5" | #4 @ 15" | W3.0 @ 1 1/2" | #5 @ 6" | 8' - 6" | 5 ~ #4 | 7" | #4 @ 11" | W4.0 @ 1 3/4" | #6 @ 8" | 7' - 6" | 5 ~ #4 | 6" | #4 @ 12" | W4.0 @ 1 3/4" | #6 @ 8" | 9' - 9" | 6 ~ #4 | 7" | #4 @ 15" | W4.0 @ 1 3/4" | #6 @ 6" | 24' - 0" |

t = WALL THICKNESS

**BENDING DIAGRAM**

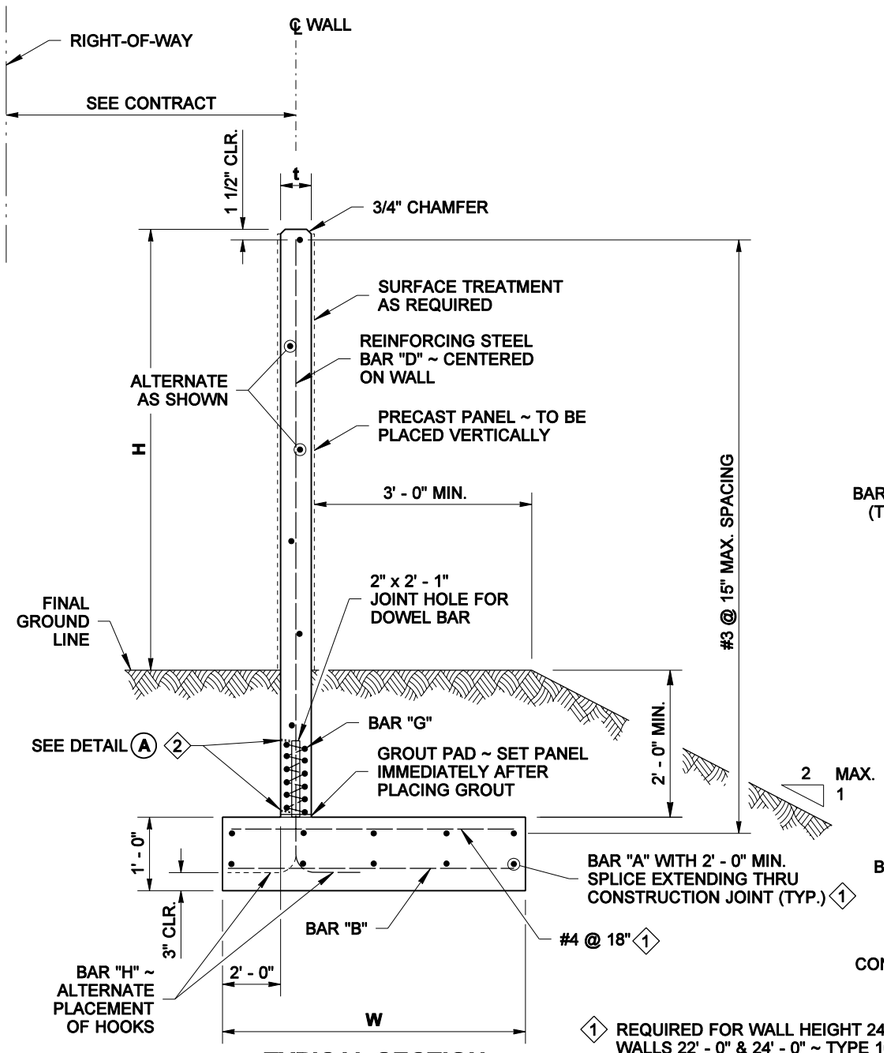



BAR "H"

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 10A | B1 | 80 |
| 10B | B1 | 90 |
| 10C | B2 | 80 |
| 10D | B2 | 90 |

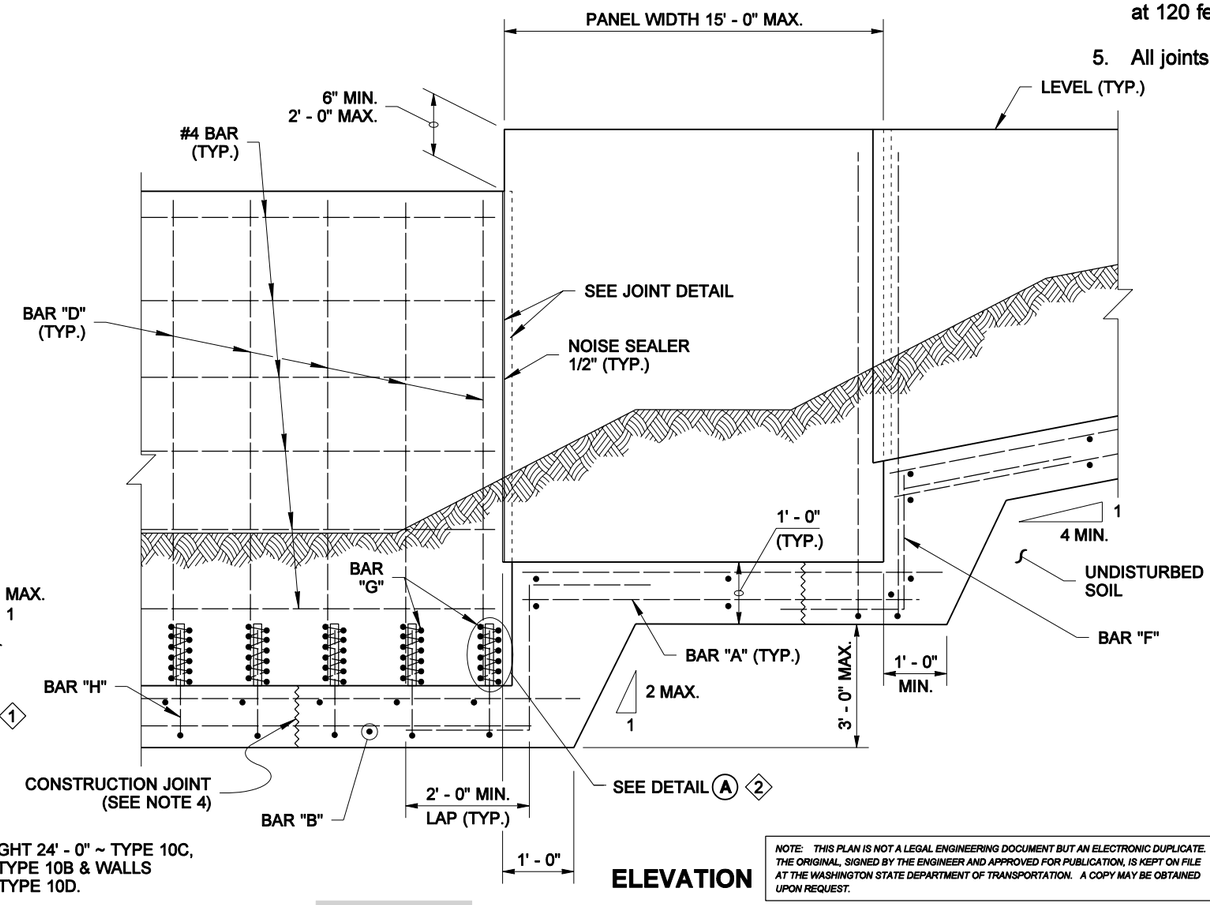
## NOTES

1. Wall to be designated Noise Barrier Wall Type 10A, 10B, 10C or 10D. The Contract specifies actual wall designation.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3' - 0" of level ground on each side.
4. Construction joints in the footing shall be spaced at 120 feet maximum.
5. All joints shall be in full contact and sealed.




**TYPICAL SECTION**

1 REQUIRED FOR WALL HEIGHT 24' - 0" ~ TYPE 10C, WALLS 22' - 0" & 24' - 0" ~ TYPE 10B & WALLS 20' - 0", 22' - 0" & 24' - 0" ~ TYPE 10D.




**ELEVATION**

# PRECAST CONCRETE WALL ON OFFSET SPREAD FOOTING

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 10

# STANDARD PLAN D-2.34-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

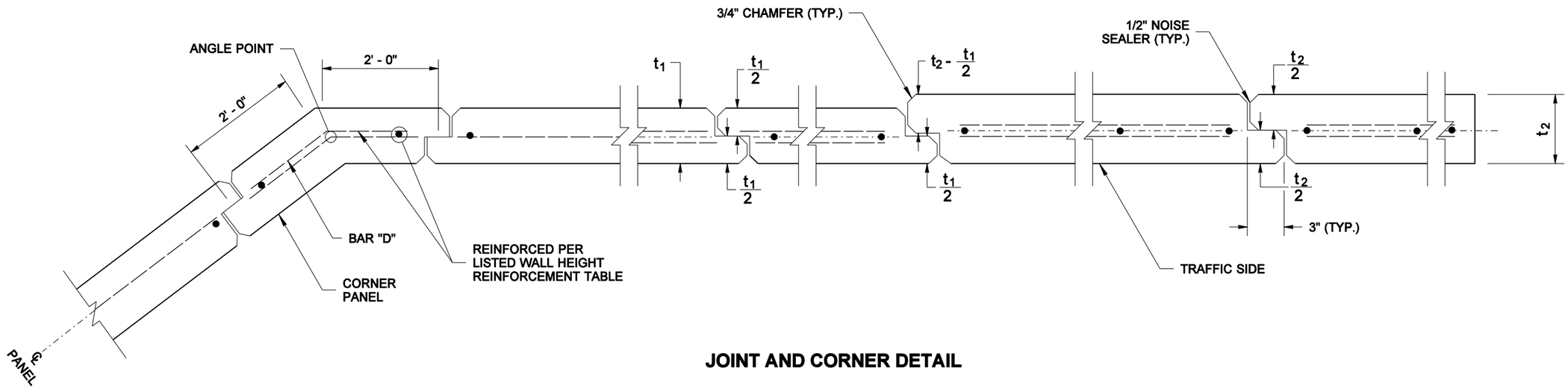
Washington State Department of Transportation

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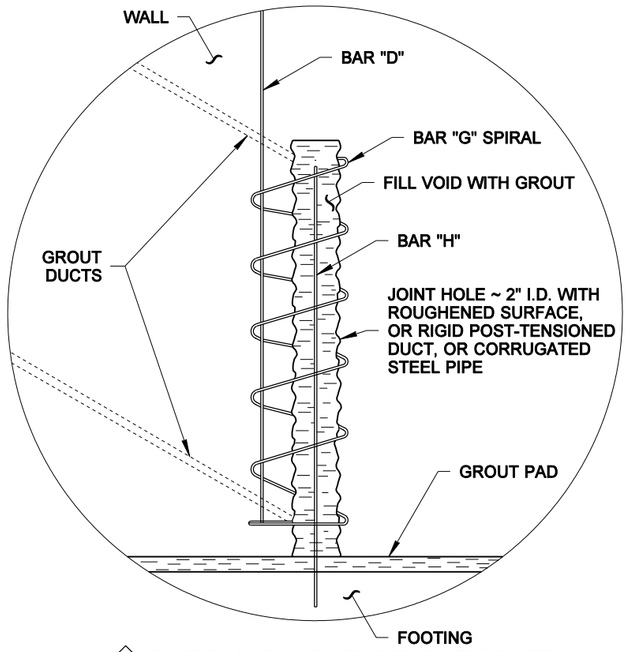
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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DRAWN BY: ADAM COCHRAN

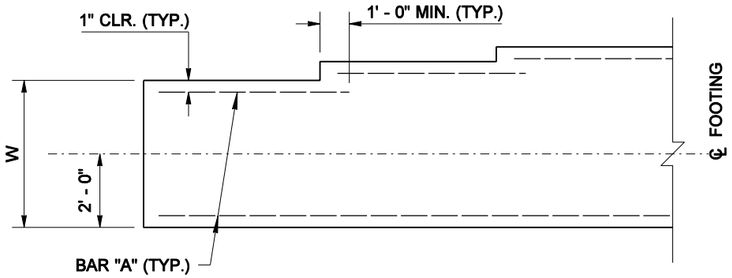



**JOINT AND CORNER DETAIL**




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

**DETAIL A**




(TRANSVERSE BARS NOT SHOWN)

**FOOTING WIDTH TRANSITION DETAIL**

FOR LOCATIONS WITHOUT FOOTING STEP

# PRECAST CONCRETE WALL ON OFFSET SPREAD FOOTING

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

## NOISE BARRIER WALL TYPE 10

## STANDARD PLAN D-2.34-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

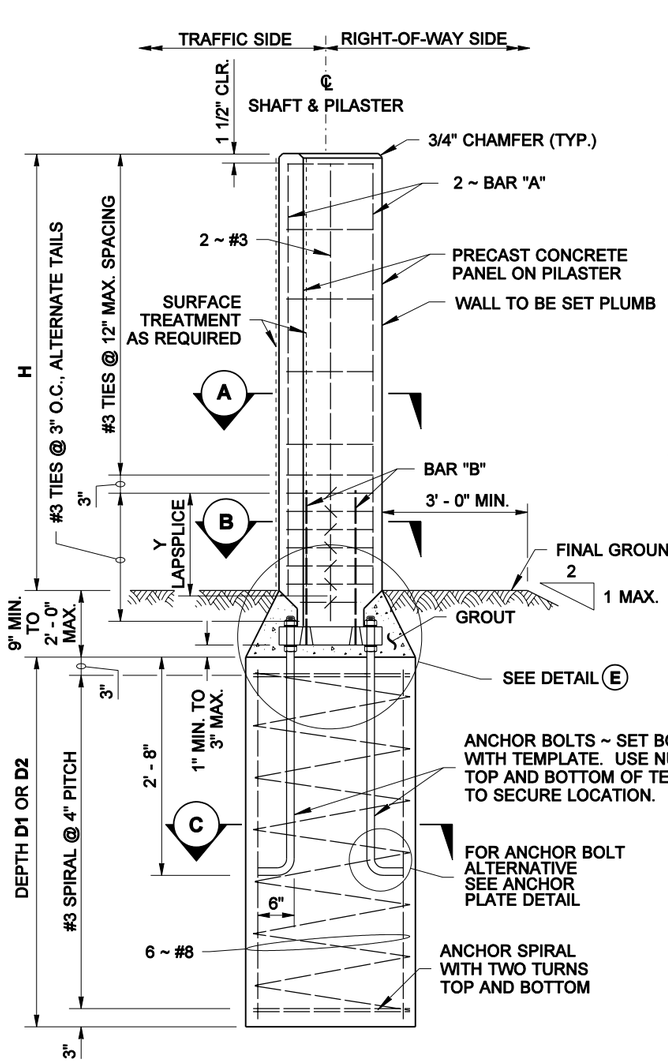
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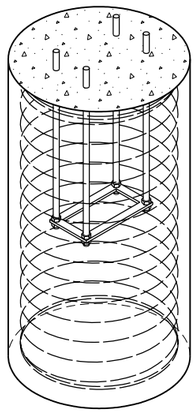
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

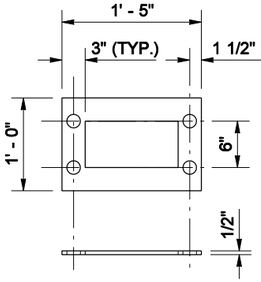
| WALL HT H | TYPE 11A | | | | | | | TYPE 11B | | | | | | | TYPE 11C | | | | | | | TYPE 11D | | | | | | | WALL HT H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DEPTH D1 | DEPTH D2 | BAR "A" | BAR "B" | Y | PLATE THICK. T | ANCHOR BOLT. DIAM. | DEPTH D1 | DEPTH D2 | BAR "A" | BAR "B" | Y | PLATE THICK. T | ANCHOR BOLT. DIAM. | DEPTH D1 | DEPTH D2 | BAR "A" | BAR "B" | Y | PLATE THICK. T | ANCHOR BOLT. DIAM. | DEPTH D1 | DEPTH D2 | BAR "A" | BAR "B" | Y | PLATE THICK. T | ANCHOR BOLT. DIAM. | |
| 6' - 0" | 5' - 0" | 4' - 6" | 4 ~ #3 | 4 ~ #7 | 2' - 0" | 1/2" | 1" | 5' - 9" | 5' - 0" | 4 ~ #3 | 4 ~ #7 | 2' - 0" | 1/2" | 1" | 5' - 3" | 4' - 9" | 4 ~ #3 | 4 ~ #7 | 2' - 0" | 1/2" | 1" | 6' - 3" | 5' - 3" | 4 ~ #3 | 4 ~ #7 | 2' - 0" | 1/2" | 1" | 6' - 0" |
| 8' - 0" | 5' - 6" | 5' - 0" | 4 ~ #3 | 4 ~ #7 | 2' - 0" | 1/2" | 1" | 6' - 6" | 5' - 9" | 4 ~ #3 | 4 ~ #7 | 2' - 0" | 5/8" | 1" | 6' - 0" | 5' - 3" | 4 ~ #3 | 4 ~ #7 | 2' - 0" | 5/8" | 1" | 7' - 0" | 6' - 0" | 4 ~ #3 | 4 ~ #7 | 2' - 0" | 3/4" | 1" | 8' - 0" |
| 10' - 0" | 6' - 3" | 5' - 3" | 4 ~ #3 | 4 ~ #7 | 2' - 0" | 5/8" | 1" | 7' - 3" | 6' - 3" | 4 ~ #4 | 4 ~ #7 | 2' - 2" | 3/4" | 1" | 6' - 9" | 5' - 9" | 4 ~ #3 | 4 ~ #7 | 2' - 0" | 3/4" | 1" | 8' - 0" | 6' - 9" | 4 ~ #4 | 4 ~ #7 | 2' - 2" | 7/8" | 1" | 10' - 0" |
| 12' - 0" | 6' - 9" | 5' - 9" | 4 ~ #3 | 4 ~ #7 | 2' - 0" | 3/4" | 1" | 8' - 0" | 6' - 9" | 4 ~ #4 | 4 ~ #7 | 2' - 7" | 1" | 1" | 7' - 6" | 6' - 3" | 4 ~ #4 | 4 ~ #7 | 2' - 2" | 1" | 1" | 8' - 9" | 7' - 3" | 4 ~ #5 | 4 ~ #7 | 2' - 7" | 1" | 1" | 12' - 0" |
| 14' - 0" | 7' - 3" | 6' - 3" | 4 ~ #4 | 4 ~ #7 | 2' - 2" | 3/4" | 1" | 8' - 9" | 7' - 6" | 4 ~ #5 | 4 ~ #7 | 2' - 7" | 1 1/8" | 1" | 8' - 0" | 6' - 9" | 4 ~ #4 | 4 ~ #7 | 2' - 7" | 1" | 1" | 9' - 6" | 8' - 0" | 4 ~ #5 | 4 ~ #7 | 3' - 3" | 1 1/4" | 1" | 14' - 0" |
| 16' - 0" | 7' - 9" | 6' - 9" | 4 ~ #4 | 4 ~ #7 | 2' - 7" | 7/8" | 1" | 9' - 6" | 8' - 0" | 4 ~ #6 | 4 ~ #7 | 3' - 3" | 1 1/4" | 1" | 8' - 9" | 7' - 3" | 4 ~ #5 | 4 ~ #7 | 2' - 7" | 1 1/8" | 1" | 10' - 3" | 8' - 6" | 4 ~ #6 | 4 ~ #8 | 4' - 3" | 1 1/4" | 1" | 16' - 0" |
| 18' - 0" | 8' - 6" | 7' - 0" | 4 ~ #5 | 4 ~ #7 | 2' - 7" | 1" | 1" | 10' - 3" | 8' - 6" | 4 ~ #6 | 4 ~ #8 | 4' - 3" | 1 3/8" | 1" | 9' - 3" | 7' - 9" | 4 ~ #6 | 4 ~ #7 | 3' - 3" | 1 1/8" | 1" | 11' - 0" | 9' - 3" | 4 ~ #7 | 4 ~ #8 | 4' - 3" | 1 3/8" | 1" | 18' - 0" |
| 20' - 0" | 9' - 0" | 7' - 6" | 4 ~ #5 | 4 ~ #7 | 3' - 3" | 1 1/4" | 1" | 10' - 9" | 9' - 0" | 4 ~ #7 | 4 ~ #8 | 4' - 3" | 1 3/8" | 1" | 10' - 0" | 8' - 3" | 4 ~ #6 | 4 ~ #8 | 4' - 3" | 1 1/4" | 1" | 11' - 9" | 9' - 9" | 4 ~ #8 | 4 ~ #9 | 5' - 5" | 1 1/2" | 1 1/8" | 20' - 0" |
| 22' - 0" | 9' - 6" | 8' - 0" | 4 ~ #6 | 4 ~ #7 | 3' - 3" | 1 3/8" | 1" | 11' - 6" | 9' - 6" | 4 ~ #8 | 4 ~ #9 | 5' - 5" | 1 1/2" | 1" | 10' - 6" | 8' - 9" | 4 ~ #7 | 4 ~ #8 | 4' - 3" | 1 3/8" | 1" | 12' - 6" | 10' - 3" | 4 ~ #8 | 4 ~ #10 | 6' - 10" | 1 5/8" | 1 1/4" | 22' - 0" |
| 24' - 0" | 10' - 0" | 8' - 3" | 4 ~ #6 | 4 ~ #8 | 4' - 3" | 1 1/2" | 1" | 12' - 0" | 10' - 0" | 4 ~ #8 | 4 ~ #10 | 6' - 10" | 1 5/8" | 1" | 11' - 3" | 9' - 3" | 4 ~ #7 | 4 ~ #9 | 5' - 5" | 1 1/2" | 1" | 13' - 3" | 11' - 0" | 4 ~ #9 | 4 ~ #11 | 8' - 5" | 1 3/4" | 1 1/4" | 24' - 0" |




TYPICAL SECTION

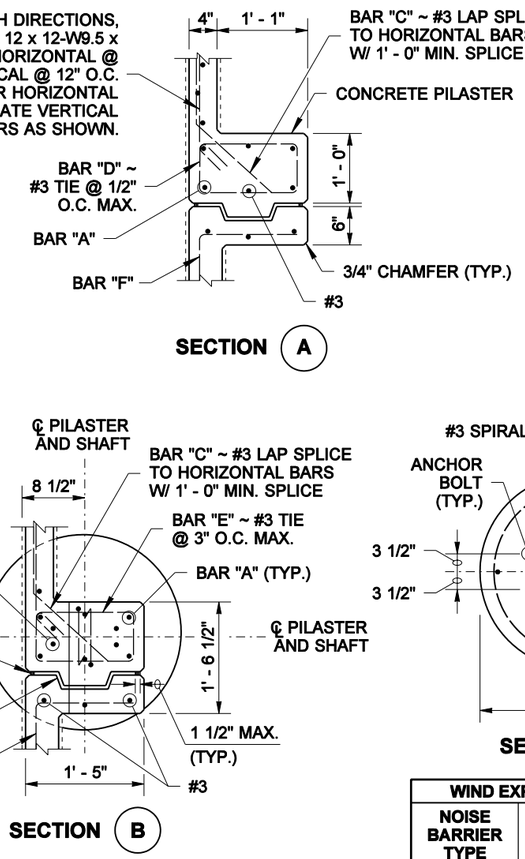


ISOMETRIC VIEW
SHOWN FOR INSTALLATION




ANCHOR PLATE DETAIL
THREADED ROD WITH NUTS TOP AND BOTTOM

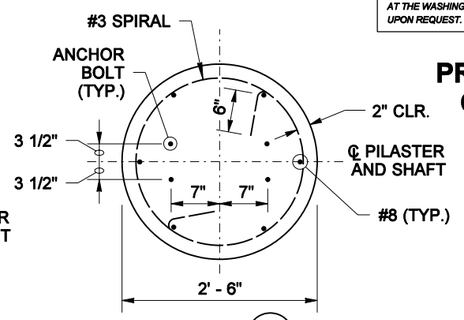
BAR "F" ~ #3 @ 12" BOTH DIRECTIONS, OR 6 x 6-W5.5 x W5.5, OR 12 x 12-W9.5 x W6.5, OR W9.5 (D10) HORIZONTAL @ 12" O.C. WITH W6 (D6) VERTICAL @ 12" O.C. OR EQUIVALENT. CENTER HORIZONTAL BAR ON WALL. ALTERNATE VERTICAL BARS AS SHOWN.



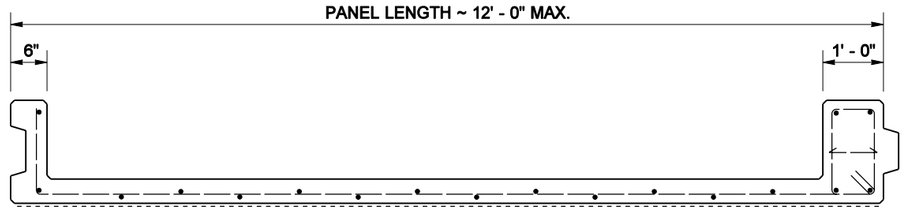

SECTION (B)




SECTION (A)




SECTION (C)




PLAN VIEW

TYPICAL PANEL

**NOTES**

1. Wall to be designated Noise Barrier Wall Type 11A, 11B, 11C or 11D. The Contract specifies actual wall dimensions.
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.
5. Maximum Panel length shall be 12 feet.

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# PRECAST CONCRETE WALL ON SHAFT FOUNDATION

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 11A | B1 | 80 |
| 11B | B1 | 90 |
| 11C | B2 | 80 |
| 11D | B2 | 90 |

| SOIL TYPE | |
|---|---|
| SOIL TYPE | ANGLE OF INTERNAL FRICTION ϕ (DEGREES) |
| D1 | 32 |
| D2 | 38 |

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EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 11

# STANDARD PLAN D-2.36-00

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER
*11-10-05* — DATE

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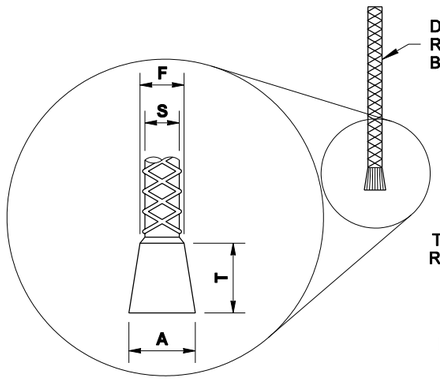
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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| S | A | T | F |
|---|---|---|---|
| #7 | 1 21/32" | 1 1/2" | 1 1/8" |
| #9 | 2" | 1 3/4" | 1 3/8" |
| #11 | 2 15/32" | 2 1/4" | 1 21/32" |

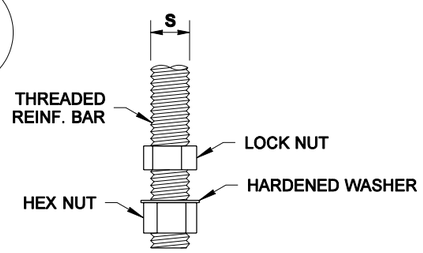
| BOLT DIAM. | DIAM. "D" | SLOT "G" |
|---|---|---|
| 1" | 1 1/8" | 1 1/8" x 2 1/2" |
| 1 1/8" | 1 1/4" | 1 1/4" x 2 7/8" |
| 1 1/4" | 1 3/8" | 1 3/8" x 3 1/8" |

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"**

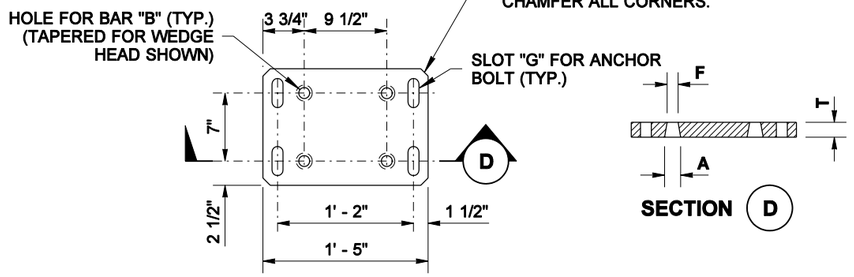
WEDGE HEAD SHALL BEAR FIRMLY AND UNIFORM AGAINST BASE PLATE. BAR "B" SHALL BE HELD SECURE DURING CONCRETE PLACEMENT TO PREVENT GAPS BETWEEN WEDGE HEAD AND BASE PLATE.



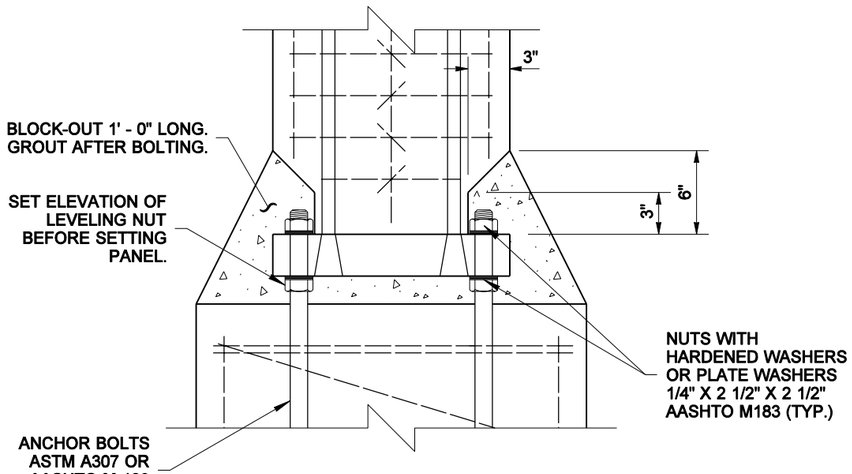

**BAR "B"**

THREADED BAR OPTION

BASE PLATE T x 1' - 0" x 1' - 5"
AASHTO M 183 GALVANIZED.
EMBEDDED WITH GROUT 3/4"
CHAMFER ALL CORNERS.

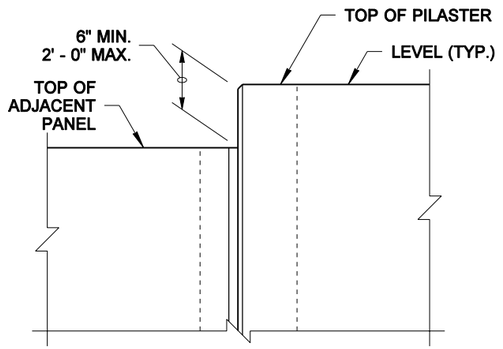



**BASE PLATE DETAIL**



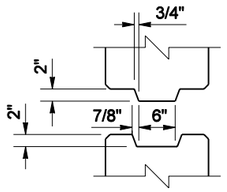

**DETAIL E**

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 GALANIZING AASHTO M 298 CL 55, OR
ZINC RICH PAINT, PAINT THREADS AND NUTS AFTER INSTALLATION.




**ELEVATION VIEW**

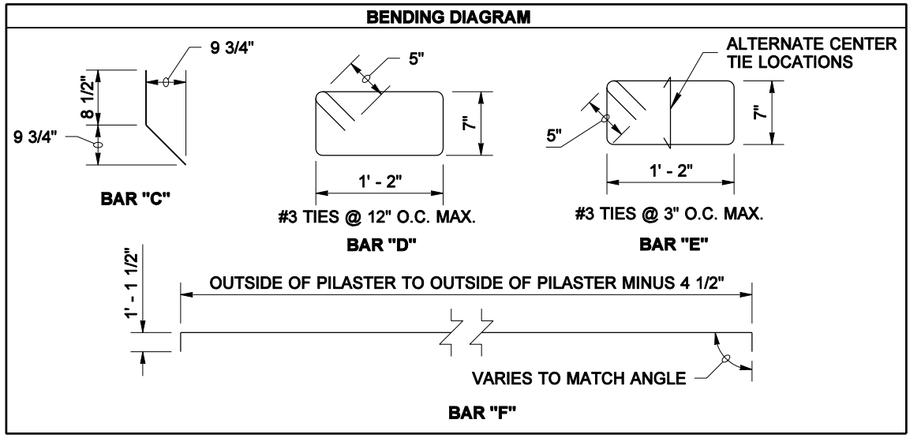
**STEP DETAIL**




**PLAN VIEW**

**SHEAR-KEY DETAIL**

**BENDING DIAGRAM**




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# PRECAST CONCRETE WALL ON SHAFT FOUNDATION

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 11

## STANDARD PLAN D-2.36-00

SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION

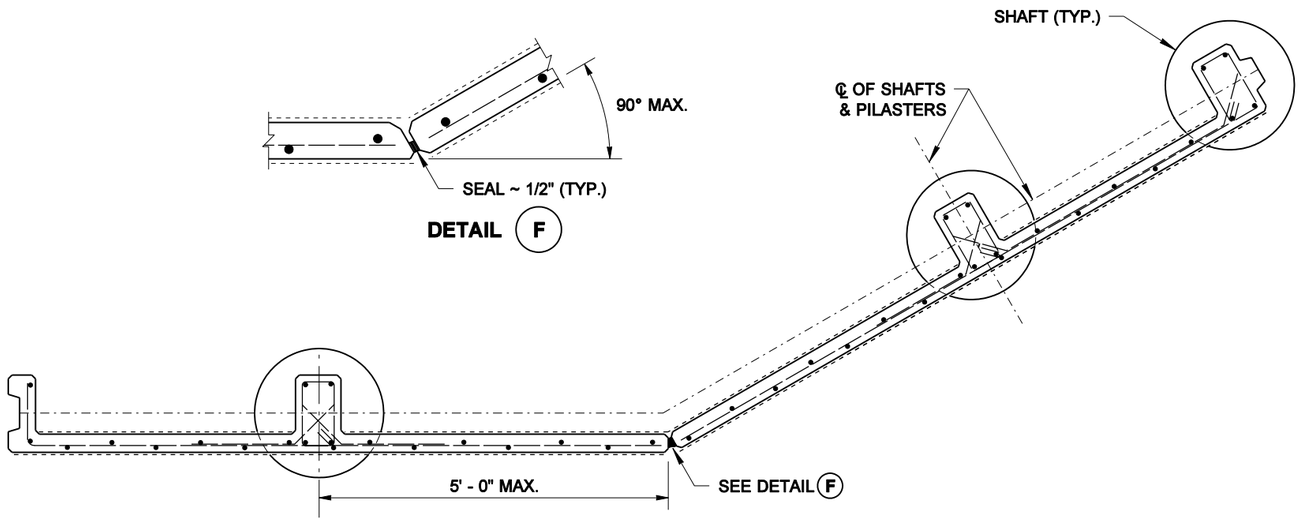
*Harold J. Peterfeso* — STATE DESIGN ENGINEER
*11-10-05* — DATE

Washington State Department of Transportation

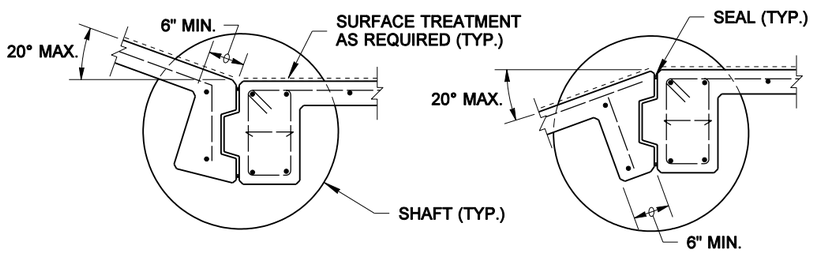
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DRAWN BY: ADAM COCHRAN

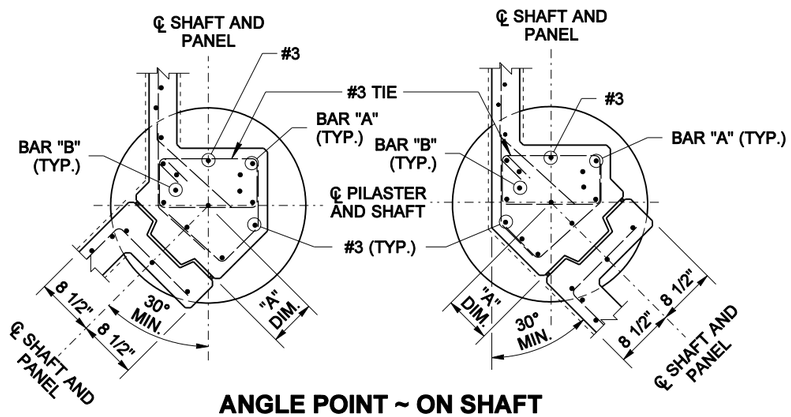



**ANGLE POINT ~ CANTILEVERED**




**ANGLE POINT ~ ON SHAFT**

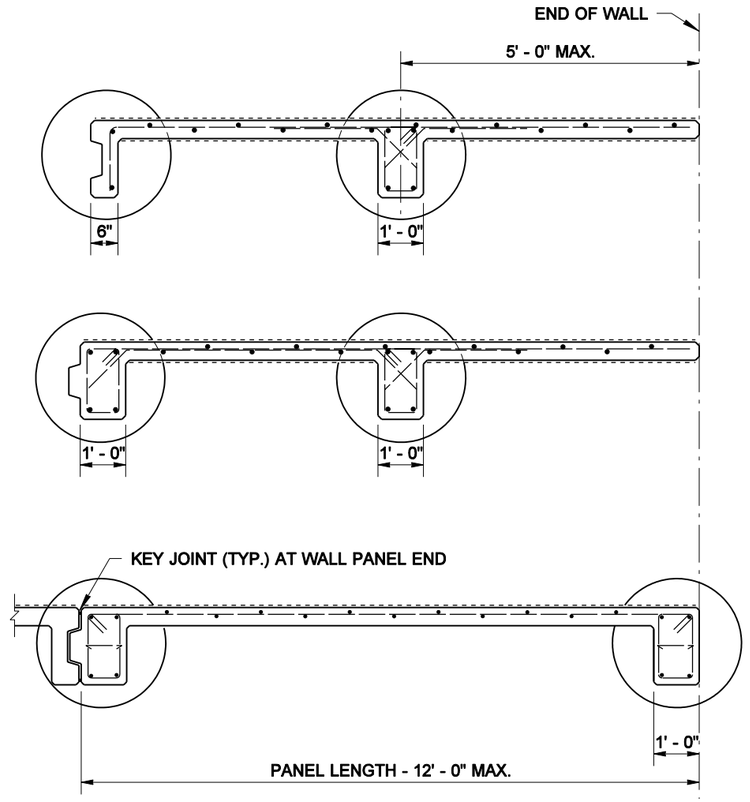
ANGLE 20° OR LESS




**ANGLE POINT ~ ON SHAFT**

ANGLE 30° TO 90°

| ANGLE (DEGREE) | "A" DIMENSION |
|---|---|
| 30 | 4 1/2" |
| 40 | 5 1/2" |
| 50 | 6 1/2" |
| 60 | 7 1/4" |
| 70 | 7 3/4" |
| 80 | 8" |
| 90 | 9 1/4" |




**END PANEL OPTIONS**

# PRECAST CONCRETE WALL ON SHAFT FOUNDATION

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EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 11

## STANDARD PLAN D-2.36-00

SHEET 3 OF 3 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

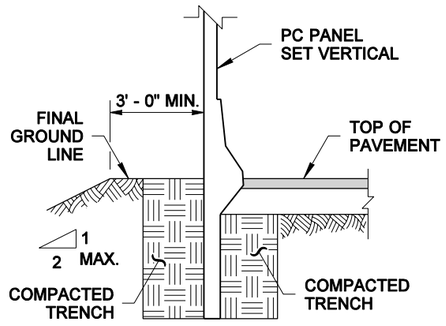
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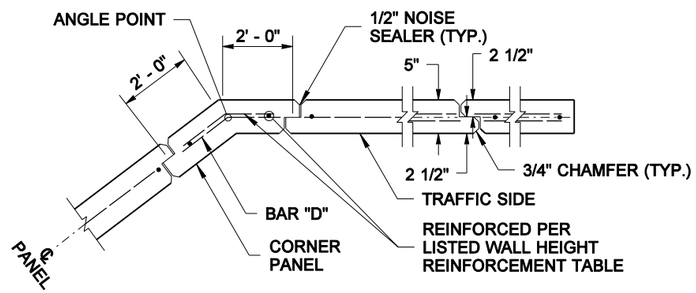

**TRENCH FOOTING**
SEE NOTE 3

| SOIL TYPE | |
|---|---|
| SOIL TYPE | ANGLE OF INTERNAL FRICTION ϕ (DEGREES) |
| D1 | 32 |
| D2 | 38 |

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 12A | B1 | 80 |
| 12B | B1 | 90 |
| 12C | B2 | 80 |
| 12D | B2 | 90 |

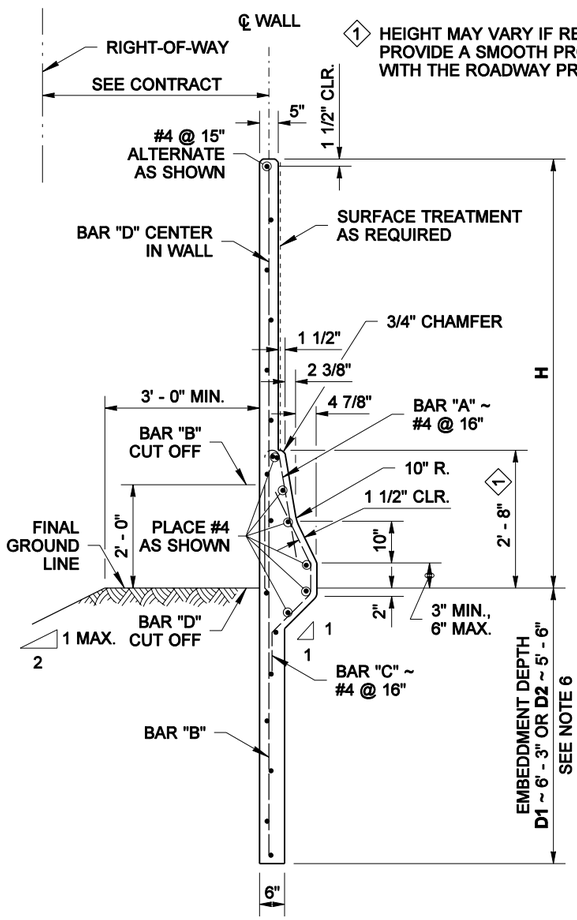
**NOTES**

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.

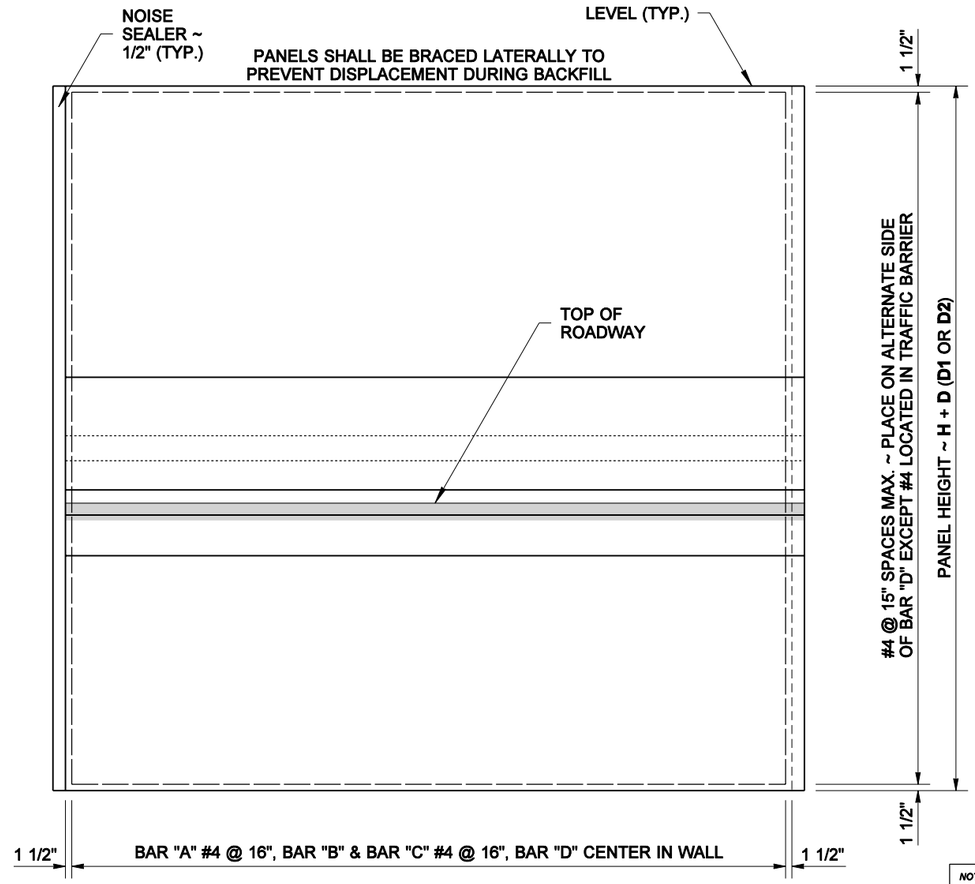



**JOINT AND CORNER DETAIL**

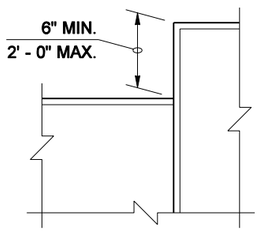
| WALL HT H | TYPE 12A | | TYPE 12B | | TYPE 12C | | TYPE 12D | | WALL HT H |
|---|---|---|---|---|---|---|---|---|---|
| | BAR "B" | BAR "D" | BAR "B" | BAR "D" | BAR "B" | BAR "D" | BAR "B" | BAR "D" | |
| 6' - 0" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | 6' - 0" |
| 8' - 0" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | 8' - 0" |
| 10' - 0" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | 10' - 0" |
| 12' - 0" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 12" | 12' - 0" |
| 14' - 0" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 11" | #6 @ 12" | #4 @ 11" | #6 @ 12" | #4 @ 15" | 14' - 0" |
| 16' - 0" | #6 @ 12" | #4 @ 10" | #6 @ 12" | #4 @ 10" | #6 @ 12" | #4 @ 10" | #6 @ 12" | #5 @ 12" | 16' - 0" |
| 18' - 0" | #6 @ 12" | #4 @ 10" | #6 @ 12" | #4 @ 10" | #6 @ 12" | #5 @ 12" | #6 @ 9" | #5 @ 9" | 18' - 0" |




**TYPICAL SECTION**

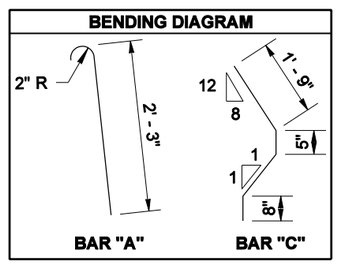



**ELEVATION**




**STEP IN PANEL TOP**

**BENDING DIAGRAM**




# PRECAST CONCRETE WALL W/ TRAFFIC BARRIER ON TRENCH FOOTING

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 12

## STANDARD PLAN D-2.38-00

SHEET 1 OF 1 SHEET

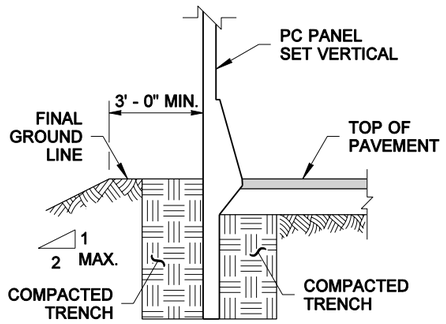
APPROVED FOR PUBLICATION
*Harold J. Peterfeso* — STATE DESIGN ENGINEER
*11-10-05* — DATE
Washington State Department of Transportation

*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.*

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN




**TRENCH FOOTING**
SEE NOTE 3

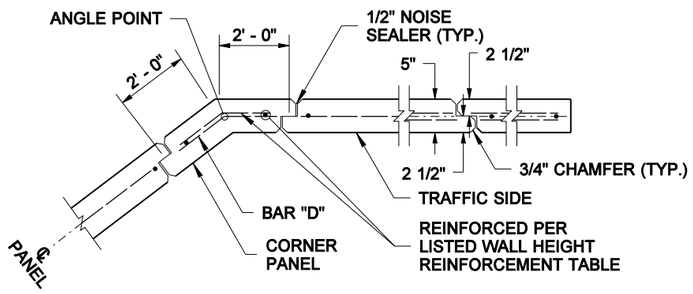
| SOIL TYPE | |
|---|---|
| SOIL TYPE | ANGLE OF INTERNAL FRICTION ϕ (DEGREES) |
| D1 | 32 |
| D2 | 38 |

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 12SSA | B1 | 80 |
| 12SSB | B1 | 90 |
| 12SSC | B2 | 80 |
| 12SSD | B2 | 90 |

**NOTES**

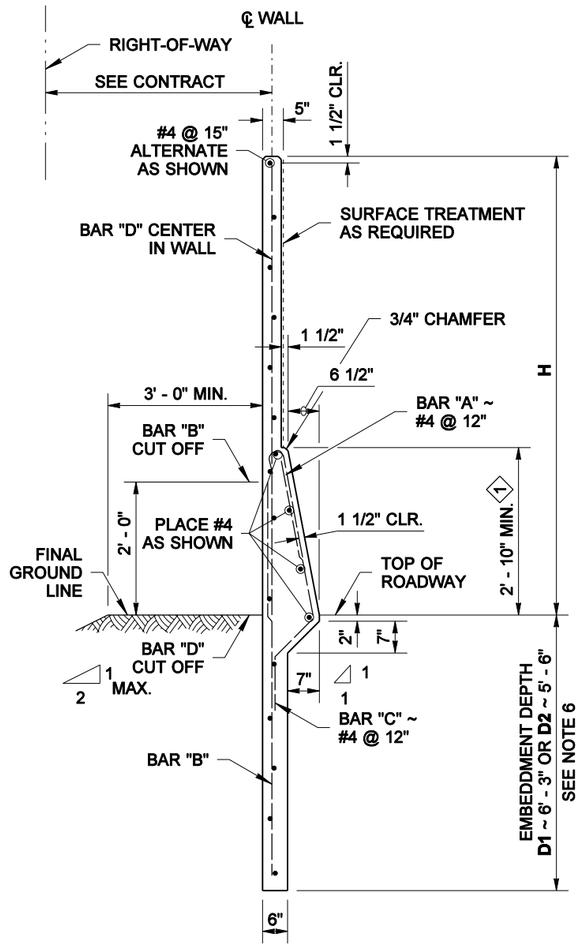
1. Wall to be designated Noise Barrier Wall Type 12SSA, 12SSB, 12SSC and 12SSD. The Contract specifies actual wall designation.
2. For intermediate wall heights, use the next higher H.
3. Compaction of trench height differential shall not exceed 1 foot.
4. Panels shall have at least 3 feet of level ground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

| WALL HT H | TYPE 12SSA | | TYPE 12SSB | | TYPE 12SSC | | TYPE 12SSD | | WALL HT H |
|---|---|---|---|---|---|---|---|---|---|
| | BAR "B" | BAR "D" | BAR "B" | BAR "D" | BAR "B" | BAR "D" | BAR "B" | BAR "D" | |
| 6' - 0" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | 6' - 0" |
| 8' - 0" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | 8' - 0" |
| 10' - 0" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | 10' - 0" |
| 12' - 0" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 12" | 12' - 0" |
| 14' - 0" | #6 @ 12" | #4 @ 15" | #6 @ 12" | #4 @ 11" | #6 @ 12" | #4 @ 11" | #6 @ 12" | #4 @ 15" | 14' - 0" |
| 16' - 0" | #6 @ 12" | #4 @ 10" | #6 @ 12" | #4 @ 10" | #6 @ 12" | #4 @ 10" | #6 @ 12" | #5 @ 12" | 16' - 0" |
| 18' - 0" | #6 @ 12" | #4 @ 10" | #6 @ 12" | #4 @ 10" | #6 @ 12" | #5 @ 12" | #6 @ 9" | #5 @ 9" | 18' - 0" |

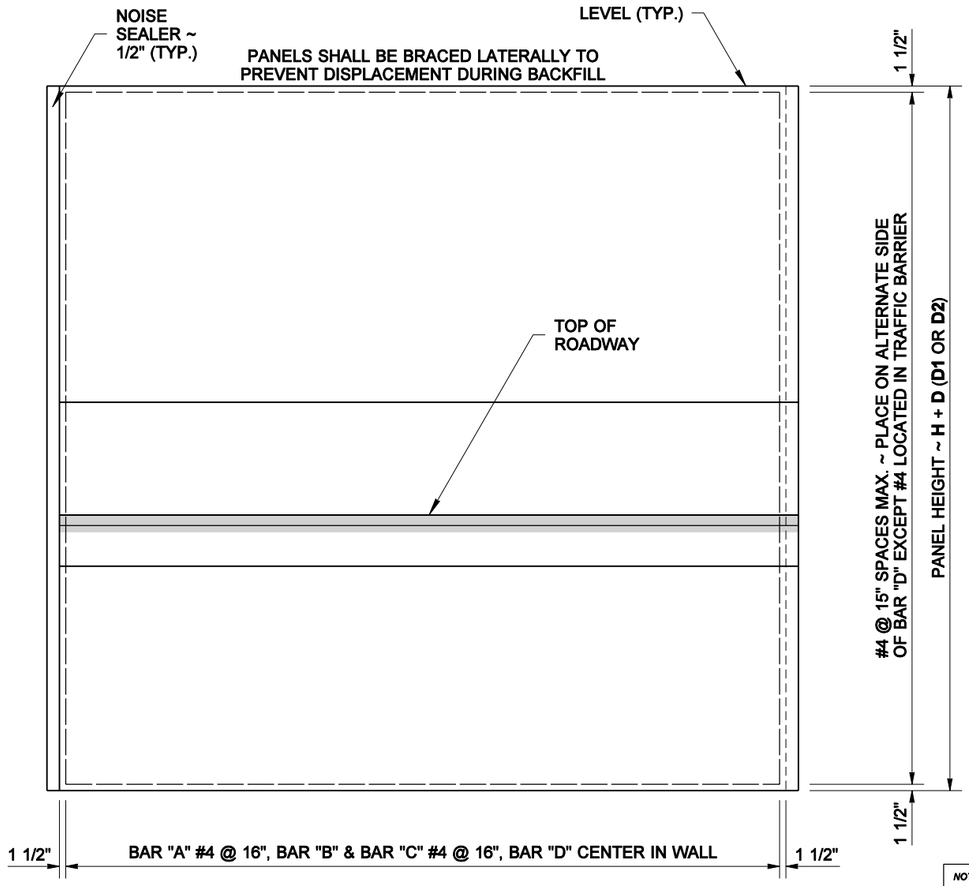



**JOINT AND CORNER DETAIL**

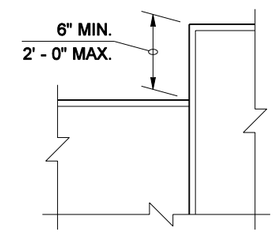
1 HEIGHT MAY VARY IF REQUIRED TO PROVIDE A SMOOTH PROFILE CONSISTENT WITH THE ROADWAY PROFILE




**TYPICAL SECTION**

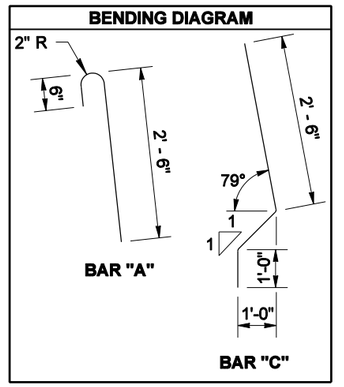



**ELEVATION**




**STEP IN PANEL TOP**

**BENDING DIAGRAM**




# PRECAST CONCRETE WALL W/ SINGLE SLOPE TRAFFIC BARRIER ON TRENCH FOOTING

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 12SS

## STANDARD PLAN D-2.40-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

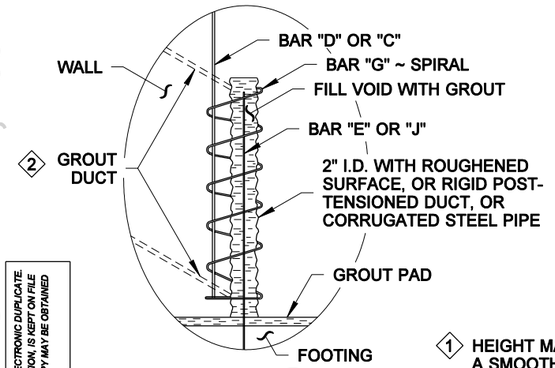
*NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.*

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

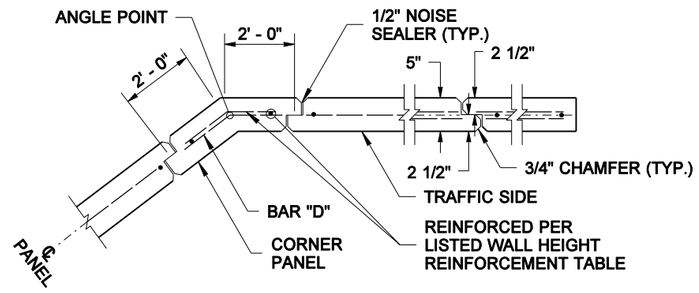
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

| WALL HT H | TYPE 13A W | X | BARS "B"&"C" | BAR "E" | BAR "D" | BAR "J" | TYPE 13B W | X | BARS "B"&"C" | BAR "E" | BAR "D" | BAR "J" | TYPE 13C W | X | BARS "B"&"C" | BAR "E" | BAR "D" | BAR "J" | TYPE 13D W | X | BARS "B"&"C" | BAR "E" | BAR "D" | BAR "J" | WALL HT H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6' - 0" | 5' - 6" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 6" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 6" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 6" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 6' - 0" |
| 8' - 0" | 5' - 3" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 3" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 3" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 3" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 8' - 0" |
| 10' - 0" | 5' - 3" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 3" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 3" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 3" | 1" | #4 @ 12" | #4 @ 12" | #3 @ 12" | #5 @ 12" | 10' - 0" |
| 12' - 0" | 5' - 0" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 0" | 1" | #4 @ 10" | #4 @ 10" | #3 @ 10" | #5 @ 10" | 5' - 0" | 1" | #4 @ 12" | #4 @ 12" | #3 @ 12" | #5 @ 15" | 5' - 0" | 1" | #4 @ 12" | #5 @ 12" | #4 @ 12" | #5 @ 12" | 12' - 0" |
| 14' - 0" | 4' - 9" | 1" | #4 @ 11" | #4 @ 11" | #3 @ 11" | #5 @ 11" | 5' - 0" | 1" | #4 @ 12" | #5 @ 12" | #4 @ 12" | #5 @ 12" | 4' - 9" | 1" | #4 @ 12" | #5 @ 12" | #4 @ 12" | #5 @ 11" | 5' - 3" | 10" | #4 @ 10" | #5 @ 10" | #4 @ 10" | #5 @ 10" | 14' - 0" |
| 16' - 0" | 5' - 0" | 10" | #4 @ 12" | #5 @ 12" | #4 @ 12" | #5 @ 12" | 5' - 0" | 10" | #4 @ 10" | #5 @ 10" | #4 @ 10" | #5 @ 10" | 5' - 0" | 10" | #4 @ 10" | #5 @ 10" | #4 @ 10" | #5 @ 12" | 5' - 6" | 1' - 6" | #4 @ 13" | #5 @ 13" | #5 @ 13" | #5 @ 13" | 16' - 0" |
| 18' - 0" | 5' - 0" | 10" | #4 @ 10" | #5 @ 10" | #4 @ 10" | #5 @ 10" | 5' - 3" | 1' - 6" | #4 @ 12" | #5 @ 12" | #5 @ 12" | #5 @ 12" | 5' - 0" | 1' - 0" | #4 @ 10" | #5 @ 10" | #4 @ 10" | #5 @ 10" | 5' - 9" | 1 - 9" | #4 @ 9" | #5 @ 9" | #5 @ 9" | #5 @ 9" | 18' - 0" |




**DETAIL (A)**



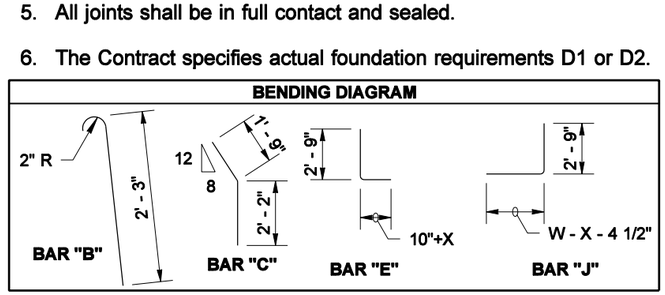

**JOINT AND CORNER DETAIL**

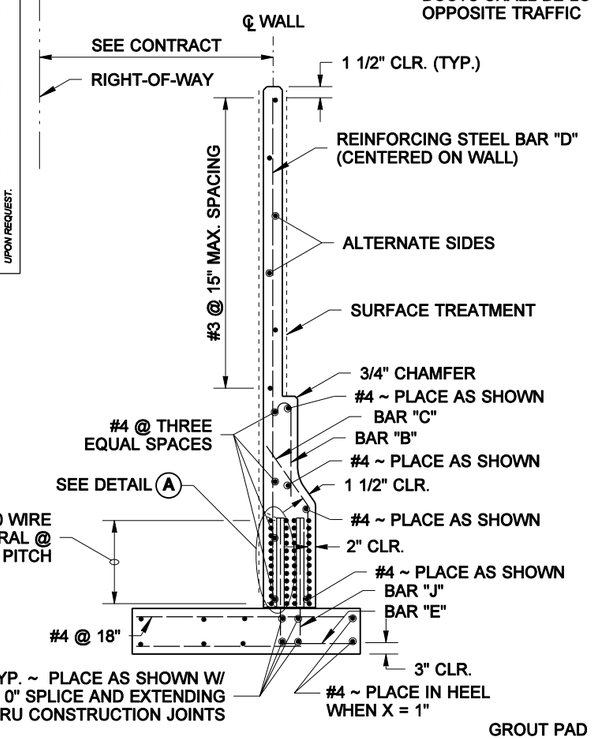
| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 13A | B1 | 80 |
| 13B | B1 | 90 |
| 13C | B2 | 80 |
| 13D | B2 | 90 |

## NOTES

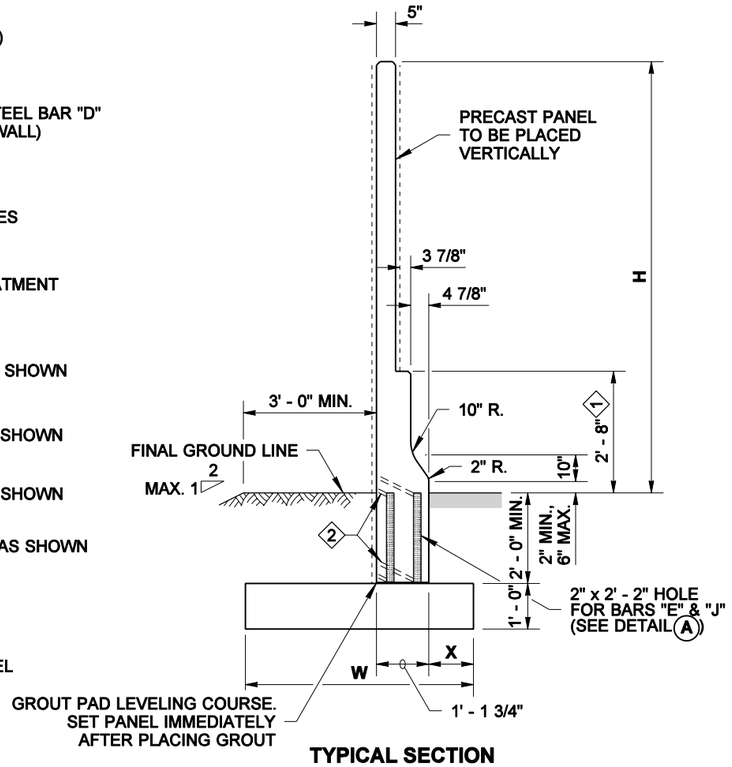
1. Wall to be designated Noise Barrier Wall Type 13A, 13B, 13C or 13D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet of level ground on each side.
4. Construction joints in the footing shall be spaced at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

1. HEIGHT MAY VARY IF REQUIRED TO PROVIDE A SMOOTH PROFILE CONSISTENT WITH THE ROADWAY PROFILE
2. FILL THE JOINT HOLE WITH GROUT USING DUCTS. DUCTS SHALL BE LOCATED ON PANEL FACE OPPOSITE TRAFFIC

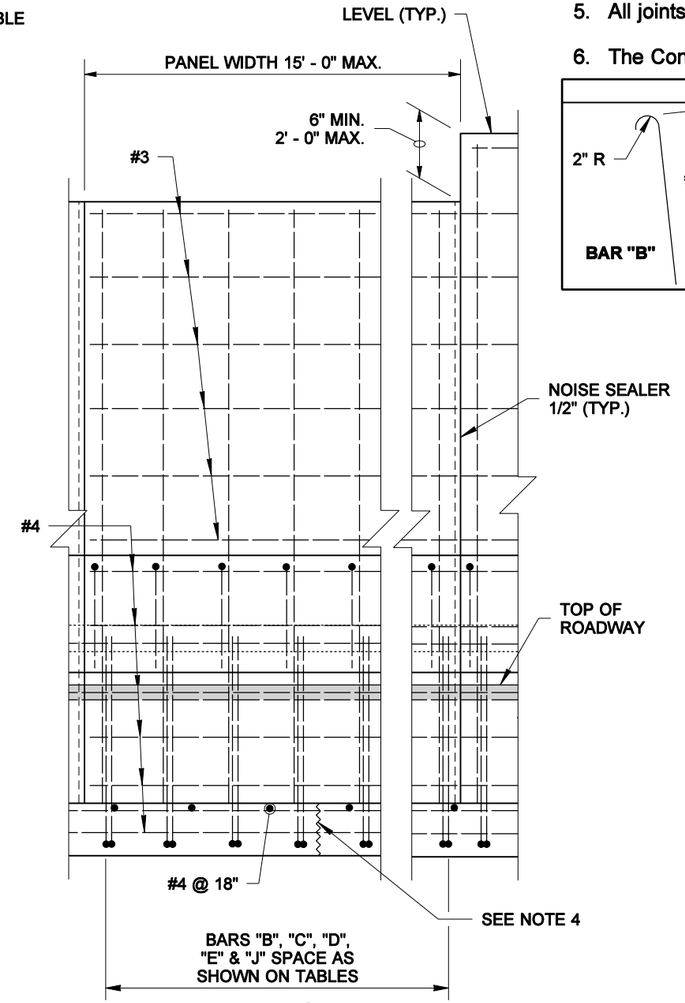



**REINFORCEMENT SECTION**




**TYPICAL SECTION**




**ELEVATION**

# PRECAST CONCRETE WALL W/ TRAFFIC BARRIER ON SPREAD FOOTING

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 13

## STANDARD PLAN D-2.42-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

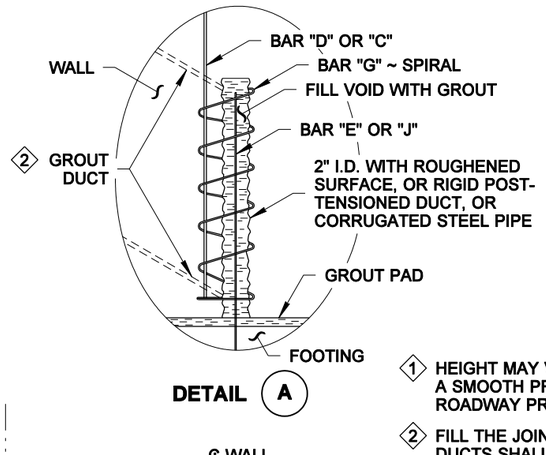
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

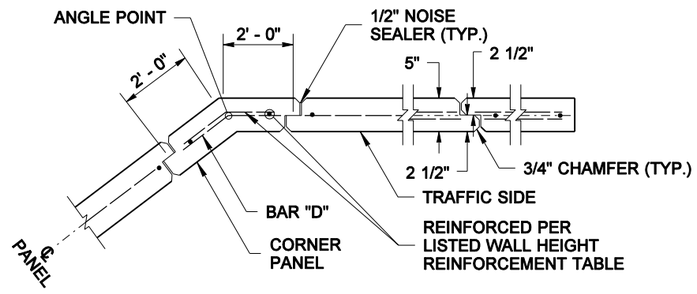
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

| WALL HT H | TYPE 13SSA W | X | BARS "B"&"C" | BAR "E" | BAR "D" | BAR "J" | TYPE 13SSB W | X | BARS "B"&"C" | BAR "E" | BAR "D" | BAR "J" | TYPE 13SSC W | X | BARS "B"&"C" | BAR "E" | BAR "D" | BAR "J" | TYPE 13SSD W | X | BARS "B"&"C" | BAR "E" | BAR "D" | BAR "J" | WALL HT H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6' - 0" | 5' - 6" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 6" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 6" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 6" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 6' - 0" |
| 8' - 0" | 5' - 3" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 3" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 3" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 3" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 8' - 0" |
| 10' - 0" | 5' - 3" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 3" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 3" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 3" | 1" | #4 @ 12" | #4 @ 12" | #3 @ 12" | #5 @ 12" | 10' - 0" |
| 12' - 0" | 5' - 0" | 1" | #4 @ 15" | #4 @ 15" | #3 @ 15" | #5 @ 15" | 5' - 0" | 1" | #4 @ 10" | #4 @ 10" | #3 @ 10" | #5 @ 10" | 5' - 0" | 1" | #4 @ 12" | #4 @ 12" | #3 @ 12" | #5 @ 15" | 5' - 0" | 1" | #4 @ 12" | #5 @ 12" | #4 @ 12" | #5 @ 12" | 12' - 0" |
| 14' - 0" | 4' - 9" | 1" | #4 @ 11" | #4 @ 11" | #3 @ 11" | #5 @ 11" | 5' - 0" | 1" | #4 @ 12" | #5 @ 12" | #4 @ 12" | #5 @ 12" | 4' - 9" | 1" | #4 @ 12" | #5 @ 12" | #4 @ 12" | #5 @ 11" | 5' - 3" | 10" | #4 @ 10" | #5 @ 10" | #4 @ 10" | #5 @ 10" | 14' - 0" |
| 16' - 0" | 5' - 0" | 10" | #4 @ 12" | #5 @ 12" | #4 @ 12" | #5 @ 12" | 5' - 0" | 10" | #4 @ 10" | #5 @ 10" | #4 @ 10" | #5 @ 10" | 5' - 0" | 10" | #4 @ 10" | #5 @ 10" | #4 @ 10" | #5 @ 12" | 5' - 6" | 1' - 6" | #4 @ 13" | #5 @ 13" | #5 @ 13" | #5 @ 13" | 16' - 0" |
| 18' - 0" | 5' - 0" | 10" | #4 @ 10" | #5 @ 10" | #4 @ 10" | #5 @ 10" | 5' - 3" | 1' - 6" | #4 @ 12" | #5 @ 12" | #5 @ 12" | #5 @ 12" | 5' - 0" | 1' - 0" | #4 @ 10" | #5 @ 10" | #4 @ 10" | #5 @ 10" | 5' - 9" | 1 - 9" | #4 @ 9" | #5 @ 9" | #5 @ 9" | #5 @ 9" | 18' - 0" |




**DETAIL (A)**



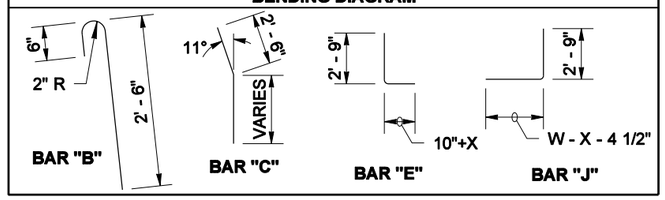

**JOINT AND CORNER DETAIL**

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 13SSA | B1 | 80 |
| 13SSB | B1 | 90 |
| 13SSC | B2 | 80 |
| 13SSD | B2 | 90 |

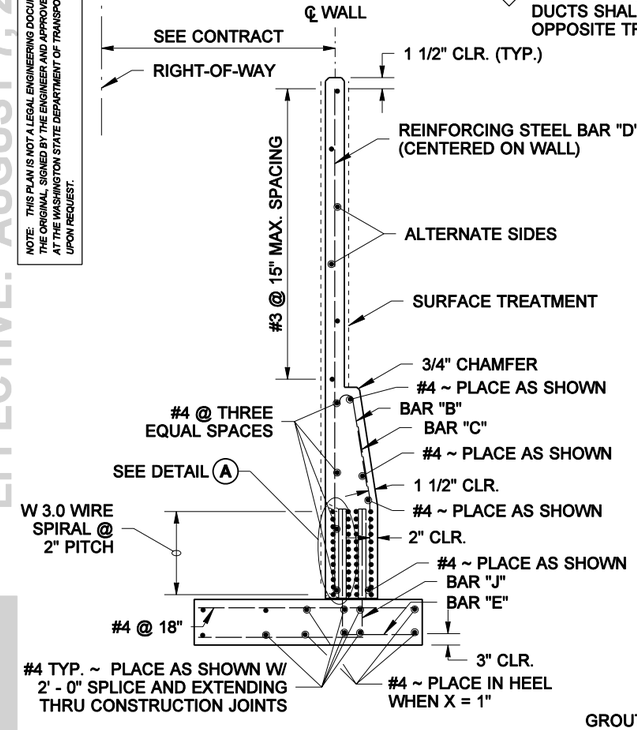
## NOTES

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

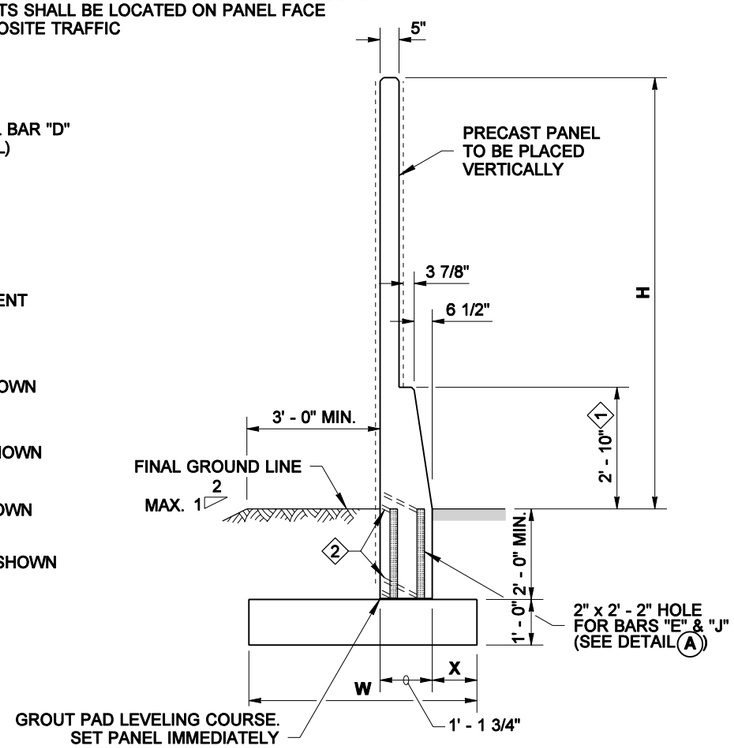
**BENDING DIAGRAM**



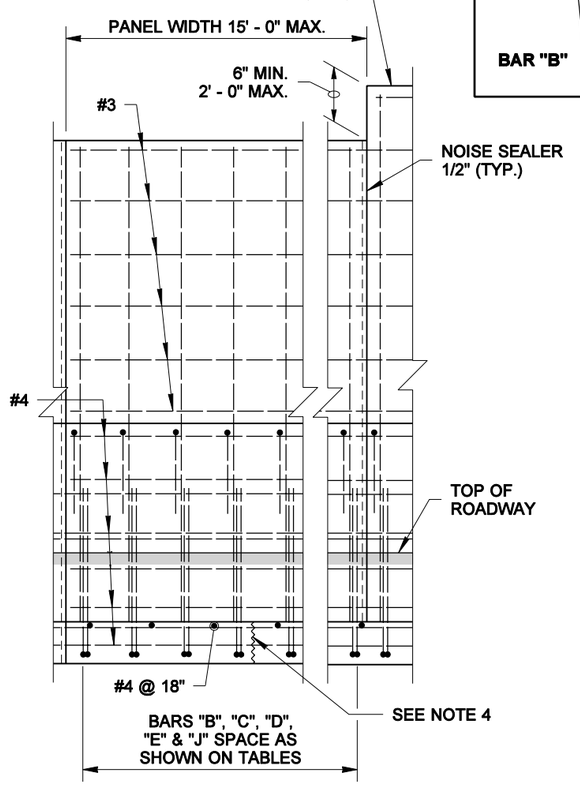

1. HEIGHT MAY VARY IF REQUIRED TO PROVIDE A SMOOTH PROFILE CONSISTENT WITH THE ROADWAY PROFILE
2. FILL THE JOINT HOLE WITH GROUT USING DUCTS. DUCTS SHALL BE LOCATED ON PANEL FACE OPPOSITE TRAFFIC




**REINFORCEMENT SECTION**




**TYPICAL SECTION**




**ELEVATION**

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

BIJAN KHALEGHI — STATE OF WASHINGTON — 27695 — REGISTERED PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 13SS

## STANDARD PLAN D-2.44-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

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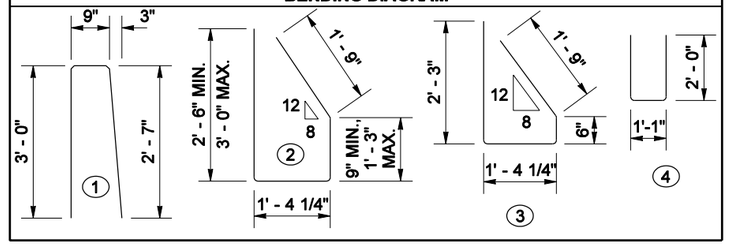
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

| WALL HT H | TYPE 14A BAR "A" | TYPE 14B BAR "A" | TYPE 14C BAR "A" | TYPE 14D BAR "A" | WALL HT H |
|---|---|---|---|---|---|
| 6' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 6' - 0" |
| 8' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 8' - 0" |
| 10' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 10' - 0" |
| 12' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 12' - 0" |
| 14' - 0" | #4 @ 15" | #4 @ 11" | #4 @ 15" | #4 @ 10" | 14' - 0" |
| 16' - 0" | #4 @ 10" | #4 @ 10" | #4 @ 10" | #5 @ 12" | 16' - 0" |
| 18' - 0" | #4 @ 10" | #5 @ 12" | #4 @ 10" | #5 @ 12" | 18' - 0" |

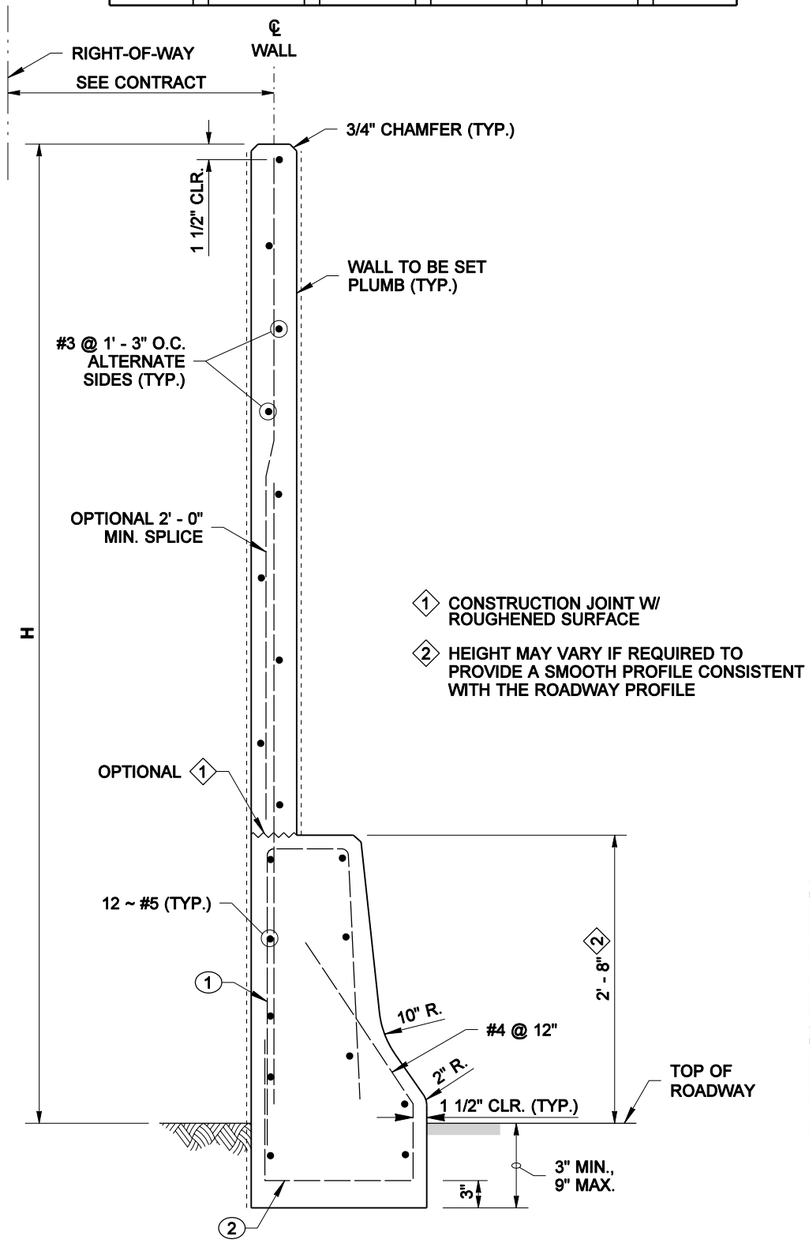
**BENDING DIAGRAM**



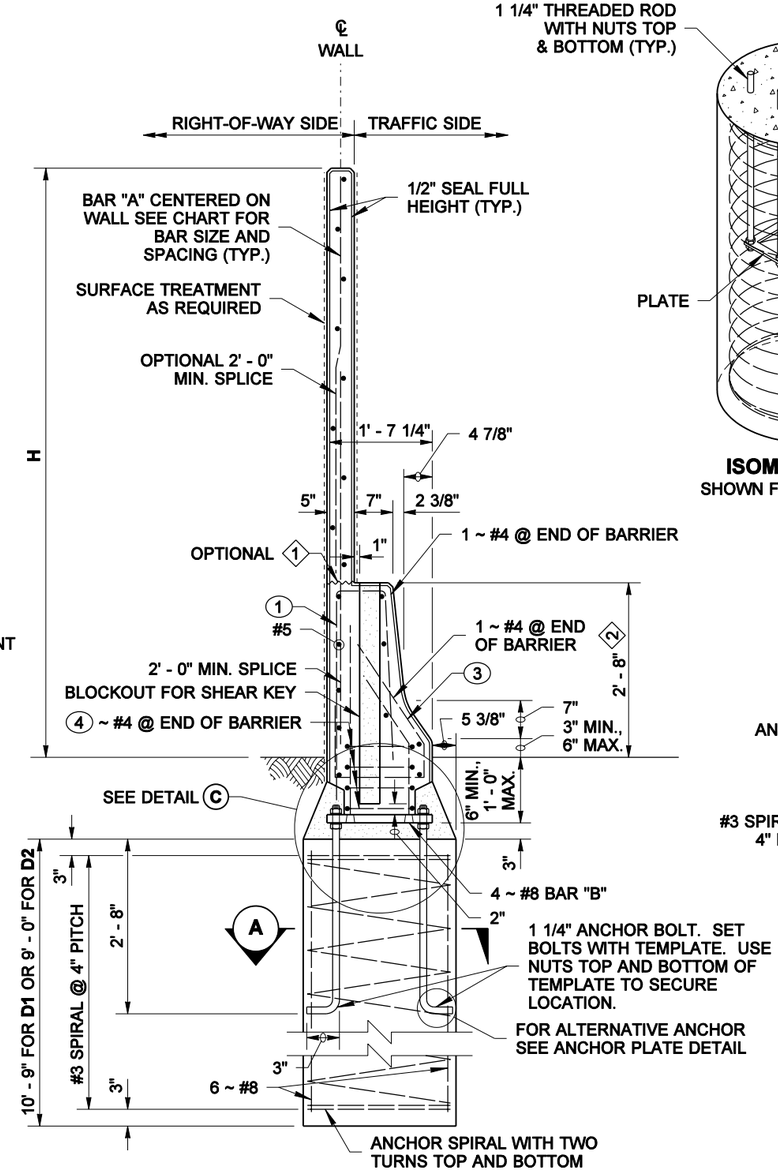

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 14A | B1 | 80 |
| 14B | B1 | 90 |
| 14C | B2 | 80 |
| 14D | B2 | 90 |

**NOTES**

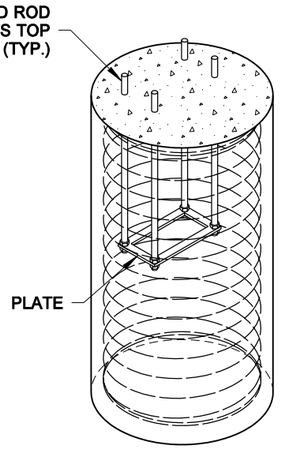
1. Wall to be designated Noise Barrier Wall Type 14A, 14B, 14C or 14D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet level ground on each side.
4. All joints shall be in full contact and sealed.
5. Anchor 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.



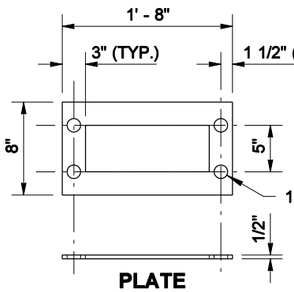

**TYPICAL SECTION**




**SECTION AT SHAFT SUPPORT**

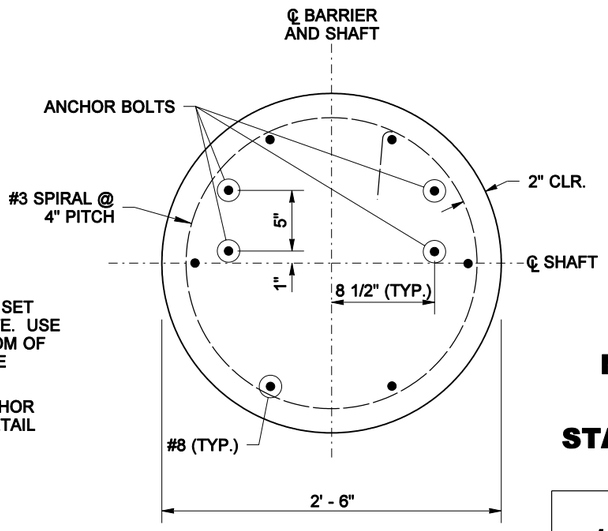



**ISOMETRIC VIEW**
SHOWN FOR INSTALLATION




**PLATE**

**ANCHOR PLATE DETAIL**




**SECTION A**

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# PRECAST CONCRETE WALL W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 14

## STANDARD PLAN D-2.46-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

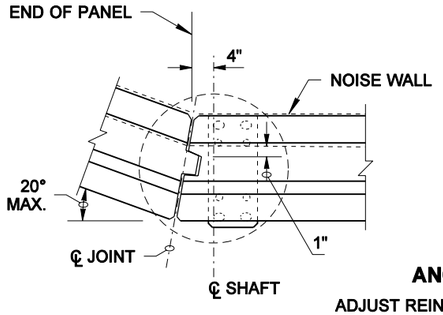
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

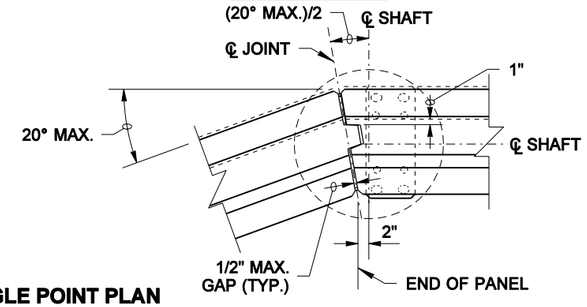
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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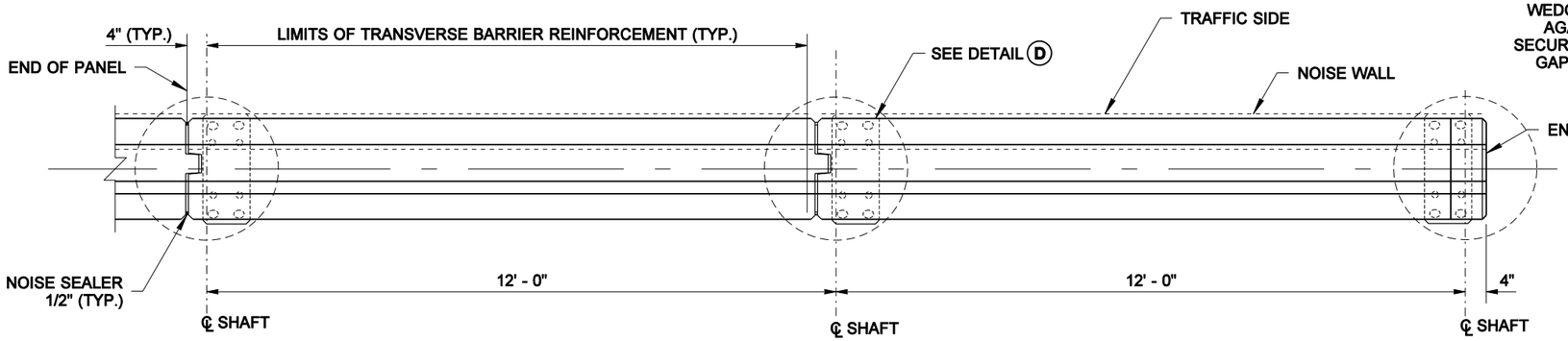
DRAWN BY: ADAM COCHRAN



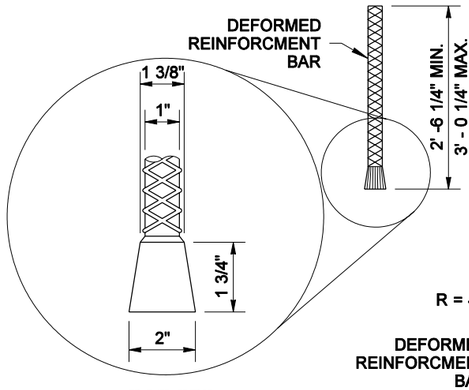




**ANGLE POINT PLAN**

ADJUST REINFORCEMENT AS NECESSARY
TO ACCOMODATE ANGLE POINT

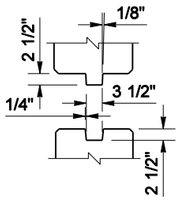


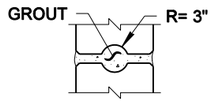

**TYPICAL INTERMEDIATE AND END PANEL**




**BAR "B"**

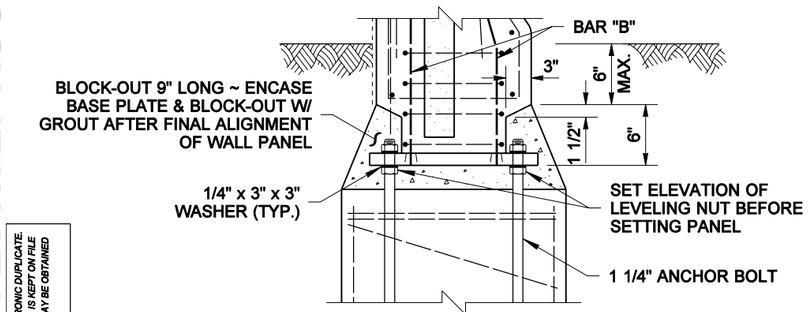
WEDGE HEAD SHALL BEAR FIRMLY AND UNIFORMLY AGAINST BASE PLATE. BAR "B" SHALL BE HELD SECURE DURING CONCRETE PLACEMENT TO PREVENT GAPS BETWEEN WEDGE HEAD AND BASE PLATE.



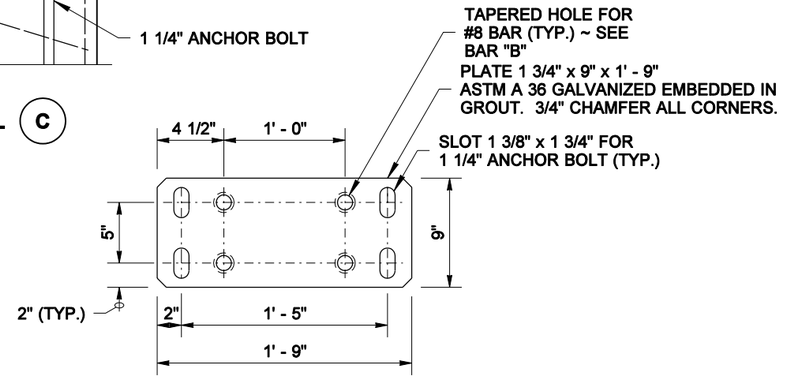




OPTIONAL

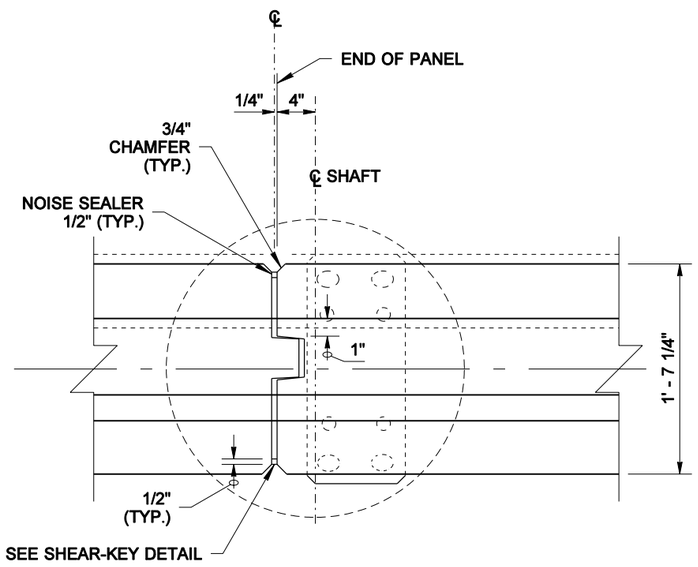
**SHEAR-KEY DETAIL**




**DETAIL C**




**BASE PLATE DETAIL**




**DETAIL D**

# PRECAST CONCRETE WALL W/ TRAFFIC BARRIER ON SHAFT FOUNDATION

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 14

## STANDARD PLAN D-2.46-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

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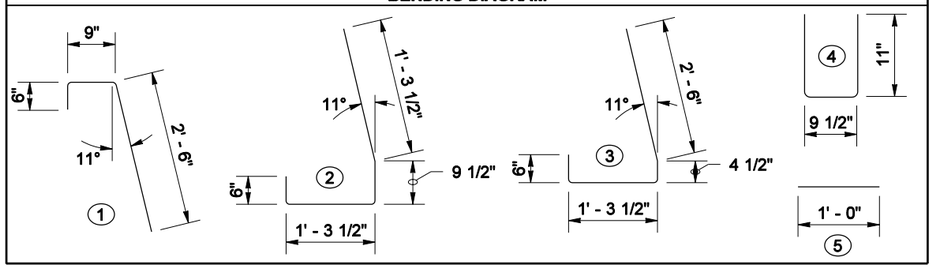
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

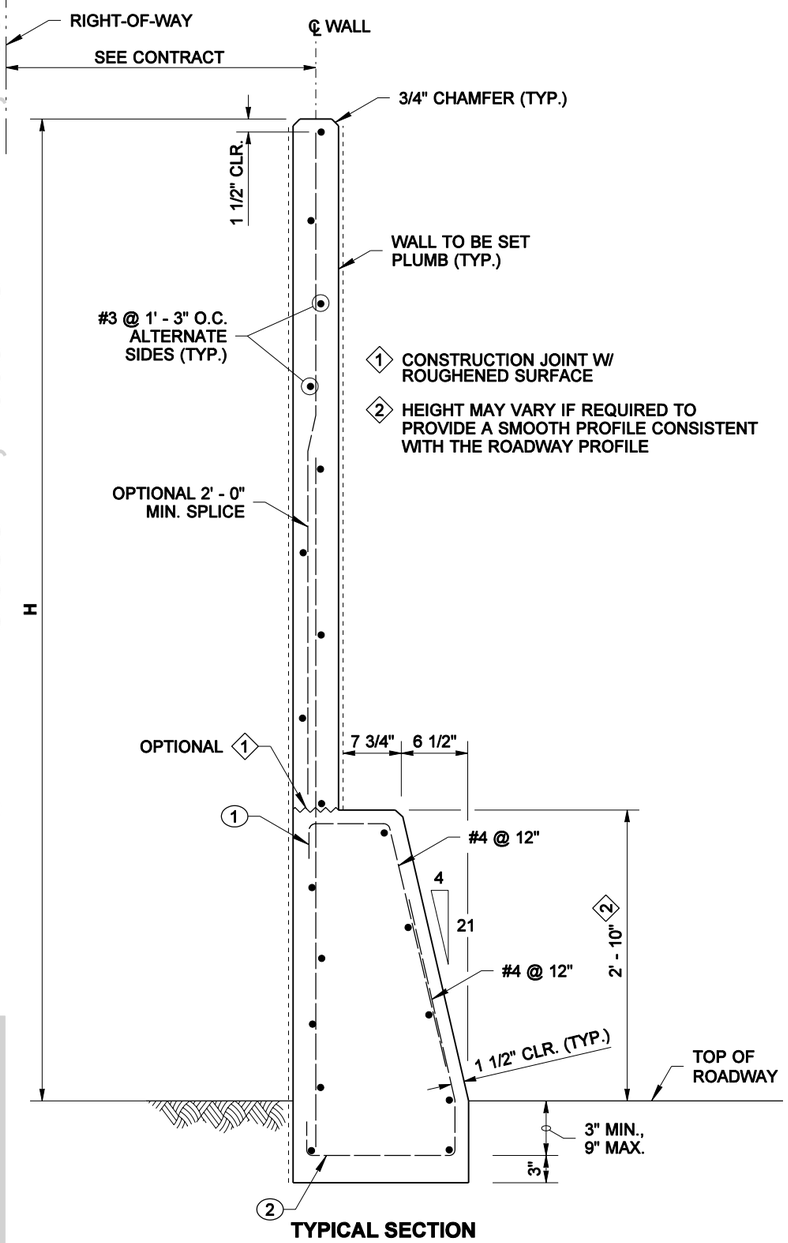
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

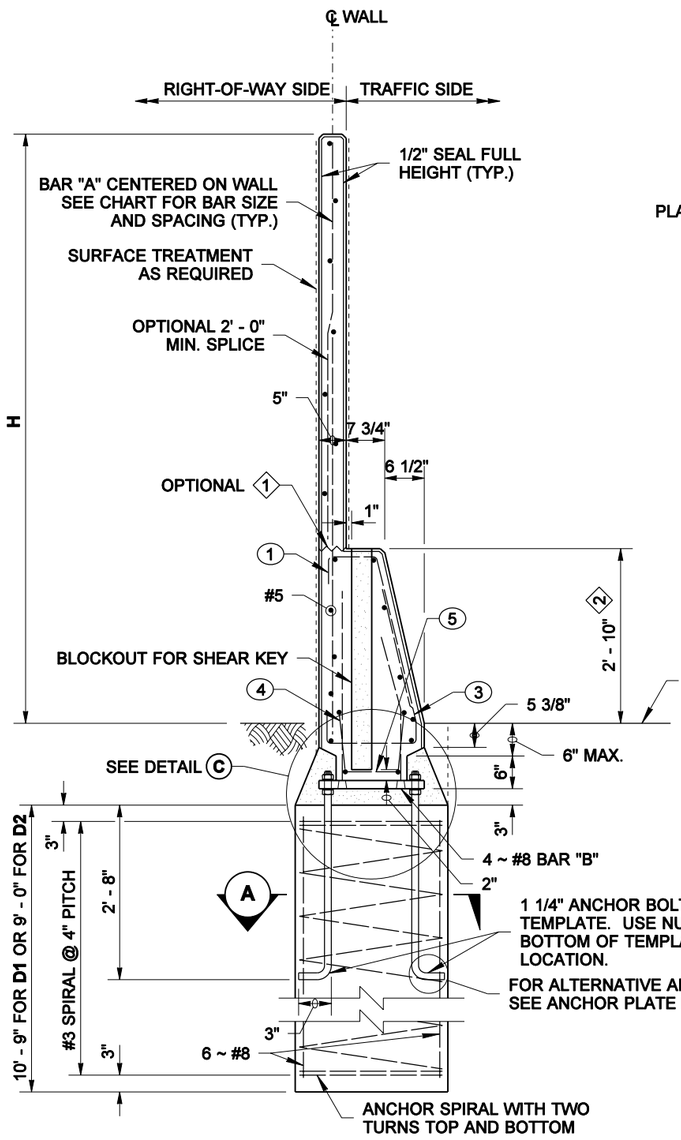
| WALL HT H | TYPE 14SSA BAR "A" | TYPE 14SSB BAR "A" | TYPE 14SSC BAR "A" | TYPE 14SSD BAR "A" | WALL HT H |
|---|---|---|---|---|---|
| 6' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 6' - 0" |
| 8' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 8' - 0" |
| 10' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 10' - 0" |
| 12' - 0" | #4 @ 15" | #4 @ 15" | #4 @ 15" | #4 @ 15" | 12' - 0" |
| 14' - 0" | #4 @ 15" | #4 @ 11" | #4 @ 15" | #4 @ 10" | 14' - 0" |
| 16' - 0" | #4 @ 10" | #4 @ 10" | #4 @ 10" | #5 @ 12" | 16' - 0" |
| 18' - 0" | #4 @ 10" | #5 @ 12" | #4 @ 10" | #5 @ 12" | 18' - 0" |

**BENDING DIAGRAM**

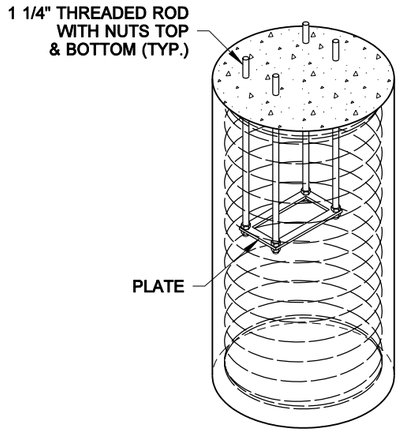


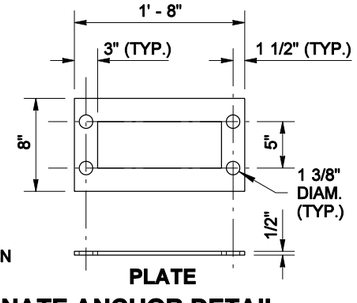

**TYPICAL SECTION**




**SECTION AT SHAFT SUPPORT**




**ISOMETRIC VIEW**
SHOWN FOR INSTALLATION



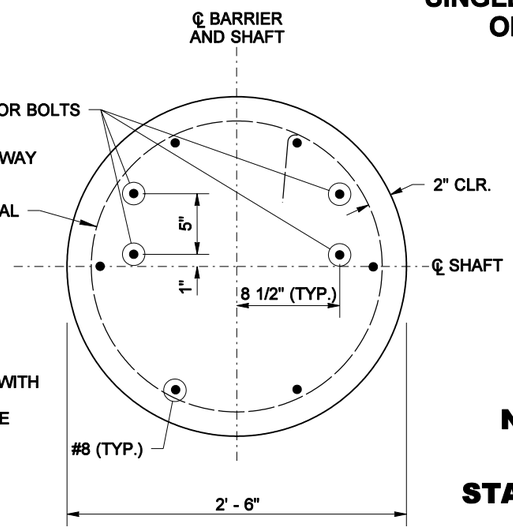

**PLATE**

**ALTERNATE ANCHOR DETAIL**
THREADED ROD WITH NUTS TOP AND BOTTOM

**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 | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 14SSA | B1 | 80 |
| 14SSB | B1 | 90 |
| 14SSC | B2 | 80 |
| 14SSD | B2 | 90 |




**SECTION A**

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

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED PROFESSIONAL ENGINEER
EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 14SS

## STANDARD PLAN D-2.48-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

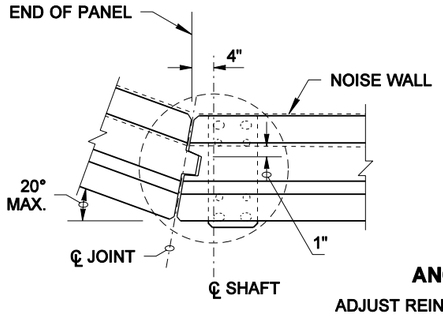
Washington State Department of Transportation

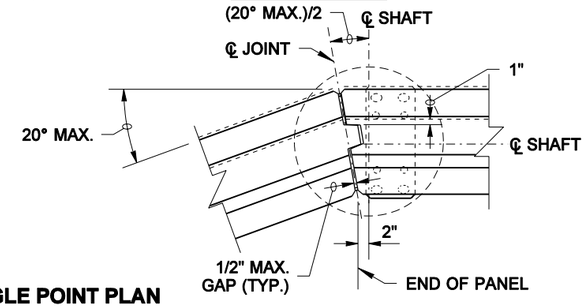
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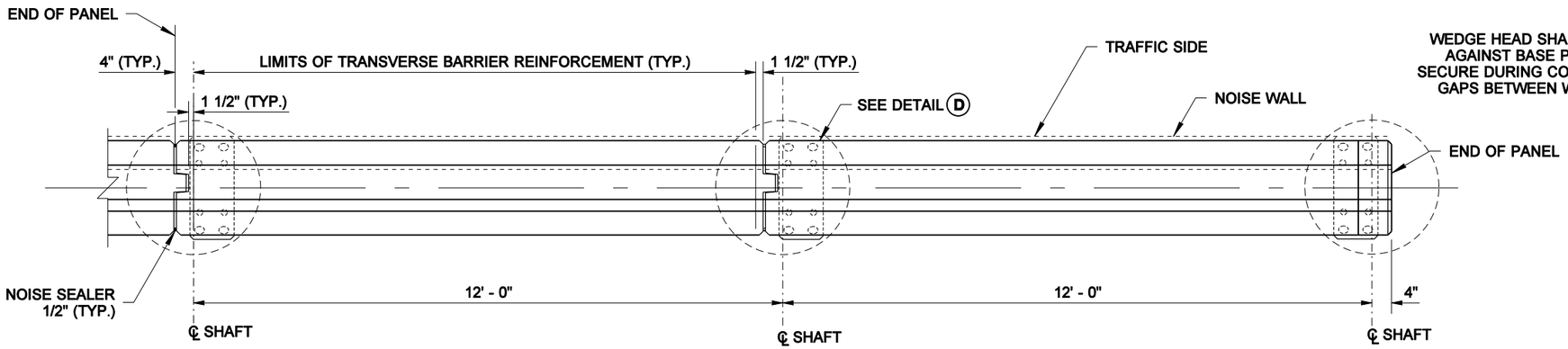
DRAWN BY: ADAM COCHRAN



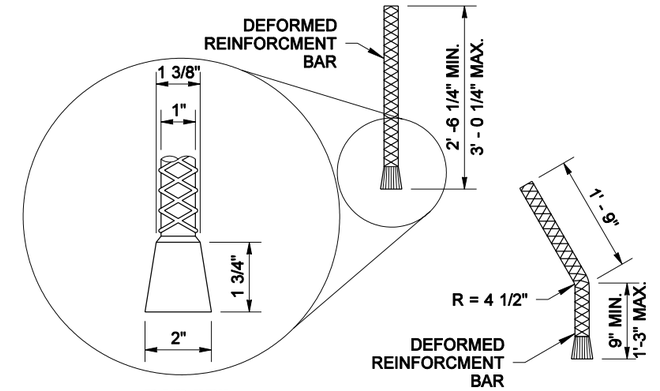




**ANGLE POINT PLAN**

ADJUST REINFORCEMENT AS NECESSARY TO ACCOMODATE ANGLE POINT

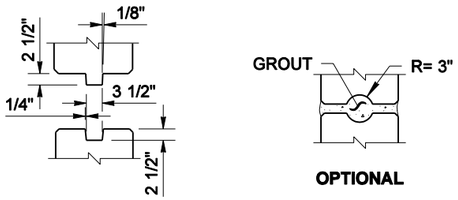



**TYPICAL INTERMEDIATE AND END PANEL**

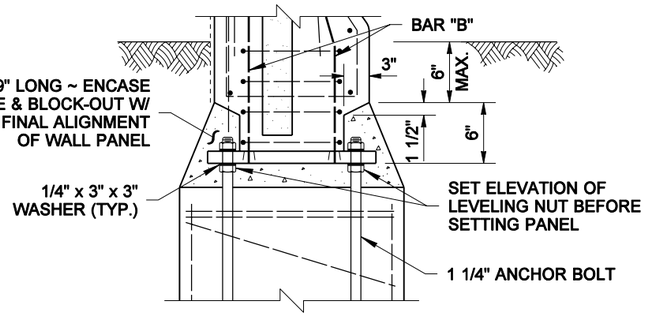



**BAR "B"**

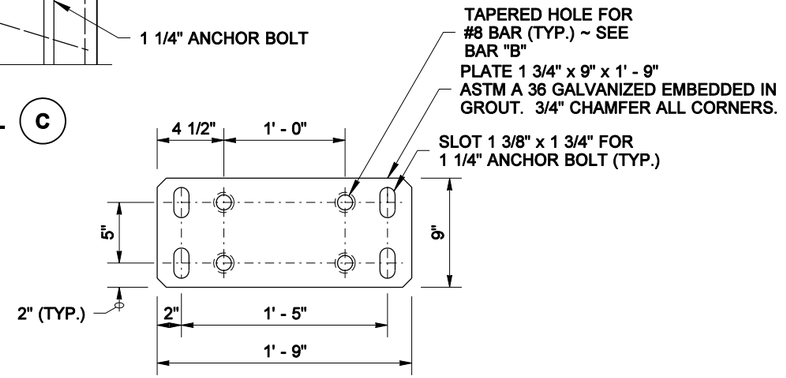
WEDGE HEAD SHALL BEAR FIRMLY AND UNIFORMLY AGAINST BASE PLATE. BAR "B" SHALL BE HELD SECURE DURING CONCRETE PLACEMENT TO PREVENT GAPS BETWEEN WEDGE HEAD AND BASE PLATE.



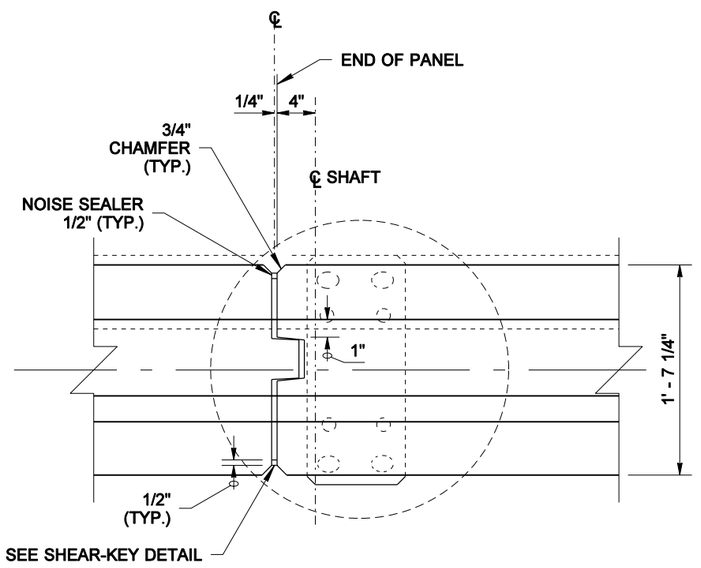

**SHEAR-KEY DETAIL**




**DETAIL C**




**BASE PLATE DETAIL**




**DETAIL D**

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

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 14SS

## STANDARD PLAN D-2.48-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 16A | B1 | 80 |
| 16B | B1 | 90 |
| 16C | B2 | 80 |
| 16D | B2 | 90 |

| SOIL TYPE | |
|---|---|
| SOIL TYPE | ANGLE OF INTERNAL FRICTION ϕ (DEGREES) |
| D1 | 32 |
| D2 | 38 |

CMU = CONCRETE MASONRY UNIT

| WALL HT H | TYPE 16A | | | | | |
|---|---|---|---|---|---|---|
| | CMU WIDTH | X | DEPTH D1 | DEPTH D2 | BAR "C" | BAR "D" |
| 6' - 0" | 8" | — | 3' - 3" | 3' - 0" | — | #6 @ 48" |
| 8' - 0" | 8" | — | 3' - 6" | 3' - 4" | — | #6 @ 48" |
| 10' - 0" | 8" | — | 3' - 10" | 3' - 6" | — | #6 @ 48" |
| 12' - 0" | 8" | — | 4' - 7" | 3' - 8" | — | #6 @ 48" |
| 14' - 0" | 8" | — | 4' - 4" | 3' - 10" | — | #6 @ 32" |
| 16' - 0" | 8" | — | 4' - 7" | 4' - 1" | — | #6 @ 24" |
| 18' - 0" | 10" | 5' - 4" | 4' - 10" | 4' - 3" | #6 @ 48" | #6 @ 48" |
| 20' - 0" | 10" | 6' - 0" | 5' - 3" | 4' - 9" | #6 @ 32" | #6 @ 32" |
| 22' - 0" | 10" | 6' - 8" | 5' - 6" | 5' - 0" | #6 @ 24" | #6 @ 24" |
| 24' - 0" | 10" | 7' - 4" | 5' - 9" | 5' - 3" | #6 @ 18" | #6 @ 18" |

| WALL HT H | TYPE 16C | | | | | |
|---|---|---|---|---|---|---|
| | CMU WIDTH | X | DEPTH D1 | DEPTH D2 | BAR "C" | BAR "D" |
| 6' - 0" | 8" | — | 3' - 6" | 3' - 3" | — | #6 @ 48" |
| 8' - 0" | 8" | — | 3' - 9" | 3' - 5" | — | #6 @ 48" |
| 10' - 0" | 8" | — | 4' - 7" | 3' - 8" | — | #6 @ 48" |
| 12' - 0" | 8" | — | 4' - 4" | 3' - 11" | — | #6 @ 32" |
| 14' - 0" | 8" | — | 4' - 8" | 4' - 2" | — | #6 @ 24" |
| 16' - 0" | 10" | 4' - 0" | 4' - 11" | 4' - 5" | #6 @ 40" | #6 @ 40" |
| 18' - 0" | 10" | 4' - 8" | 5' - 3" | 4' - 8" | #6 @ 32" | #6 @ 32" |
| 20' - 0" | 10" | 5' - 4" | 5' - 6" | 5' - 0" | #6 @ 24" | #6 @ 24" |
| 22' - 0" | 10" | 6' - 0" | 5' - 9" | 5' - 3" | #6 @ 16" | #6 @ 16" |
| 24' - 0" | 10" | 7' - 8" | 6' - 0" | 5' - 6" | #7 @ 16" | #7 @ 16" |

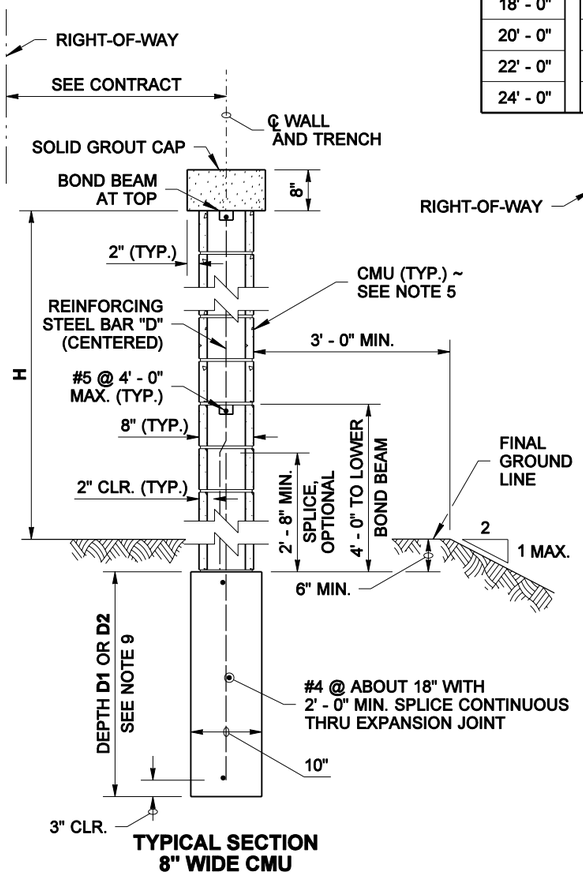
| WALL HT H | TYPE 16B | | | | | |
|---|---|---|---|---|---|---|
| | CMU WIDTH | X | DEPTH D1 | DEPTH D2 | BAR "C" | BAR "D" |
| 6' - 0" | 8" | — | 3' - 8" | 3' - 4" | — | #6 @ 48" |
| 8' - 0" | 8" | — | 4' - 0" | 3' - 8" | — | #6 @ 48" |
| 10' - 0" | 8" | — | 4' - 4" | 3' - 10" | — | #6 @ 48" |
| 12' - 0" | 8" | — | 4' - 8" | 4' - 2" | — | #6 @ 40" |
| 14' - 0" | 10" | 4' - 0" | 4' - 11" | 4' - 5" | #6 @ 40" | #6 @ 40" |
| 16' - 0" | 10" | 4' - 8" | 5' - 3" | 4' - 8" | #6 @ 32" | #6 @ 32" |
| 18' - 0" | 10" | 5' - 4" | 5' - 6" | 5' - 0" | #6 @ 24" | #6 @ 24" |
| 20' - 0" | 10" | 6' - 0" | 4' - 9" | 5' - 3" | #7 @ 24" | #7 @ 24" |
| 22' - 0" | 10" | 8' - 0" | 6' - 0" | 5' - 6" | #7 @ 16" | #7 @ 16" |
| 24' - 0" | 10" | 10' - 0" | 6' - 3" | 5' - 9" | #8 @ 16" | #8 @ 16" |

| WALL HT H | TYPE 16D | | | | | |
|---|---|---|---|---|---|---|
| | CMU WIDTH | X | DEPTH D1 | DEPTH D2 | BAR "C" | BAR "D" |
| 6' - 0" | 8" | — | 3' - 10" | 3' - 5" | — | #6 @ 48" |
| 8' - 0" | 8" | — | 4' - 2" | 3' - 9" | — | #6 @ 48" |
| 10' - 0" | 8" | — | 4' - 5" | 4' - 0" | — | #6 @ 32" |
| 12' - 0" | 10" | 4' - 0" | 4' - 10" | 4' - 4" | #6 @ 48" | #6 @ 48" |
| 14' - 0" | 10" | 4' - 0" | 5' - 3" | 4' - 7" | #6 @ 32" | #6 @ 32" |
| 16' - 0" | 10" | 4' - 8" | 5' - 7" | 4' - 11" | #6 @ 24" | #6 @ 24" |
| 18' - 0" | 10" | 5' - 4" | 5' - 10" | 5' - 1" | #6 @ 18" | #6 @ 18" |
| 20' - 0" | 10" | 7' - 4" | 6' - 0" | 5' - 6" | #7 @ 18" | #7 @ 18" |
| 22' - 0" | 10" | 9' - 8" | 6' - 6" | 5' - 9" | #8 @ 18" | #8 @ 18" |
| 24' - 0" | 10" | 12' - 0" | 6' - 9" | 6' - 0" | #9 @ 18" | #9 @ 18" |

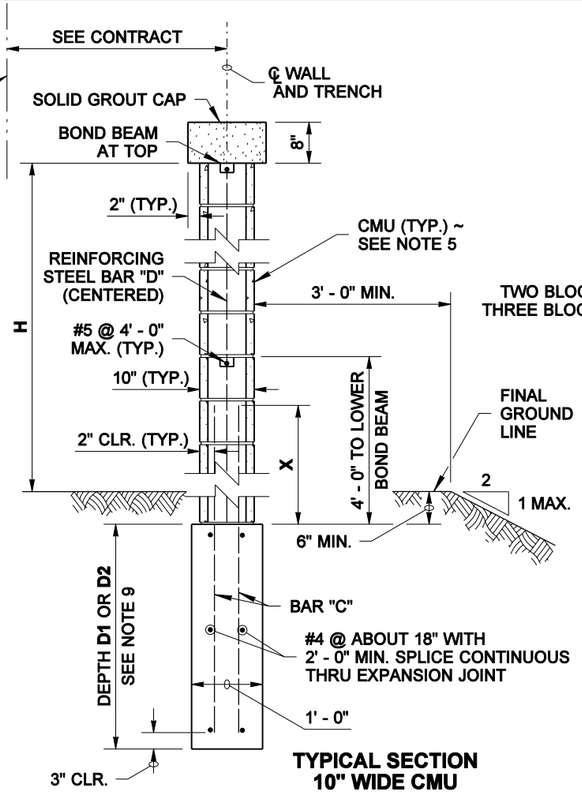
## NOTES

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.

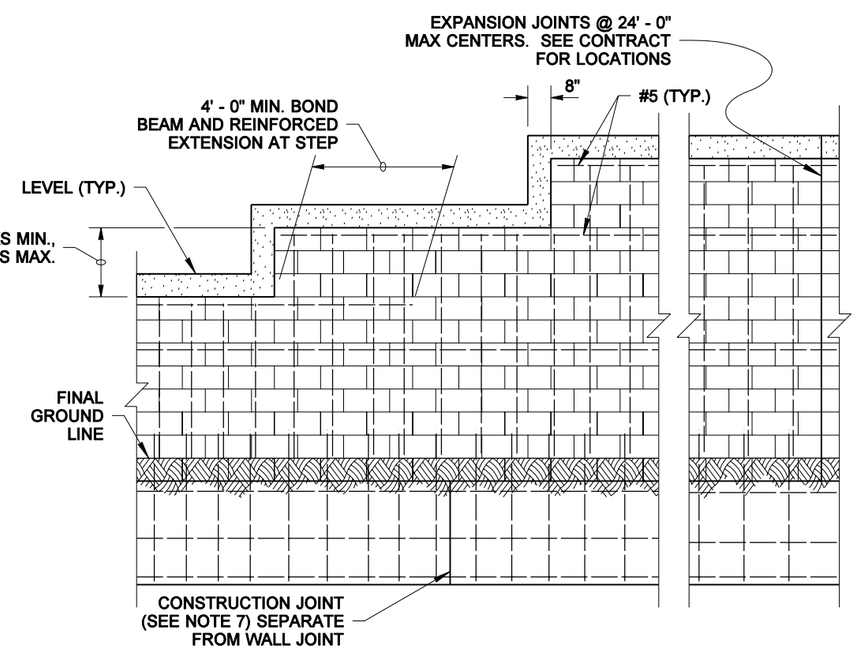
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TYPICAL SECTION
8" WIDE CMU




TYPICAL SECTION
10" WIDE CMU




ELEVATION

# MASONRY WALL ON TRENCH FOOTING

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 16

## STANDARD PLAN D-2.60-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

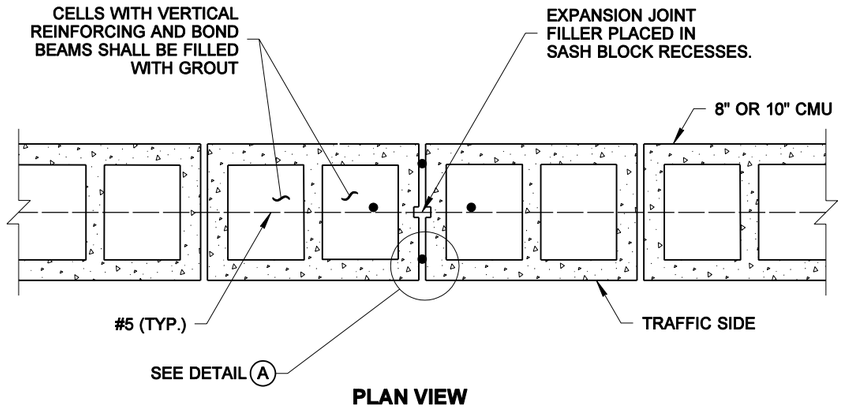
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

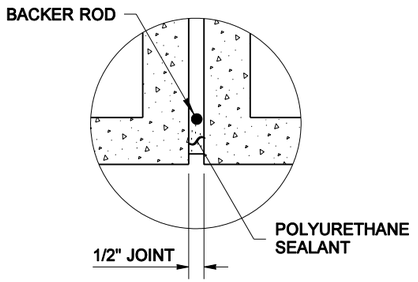
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN




**PLAN VIEW**

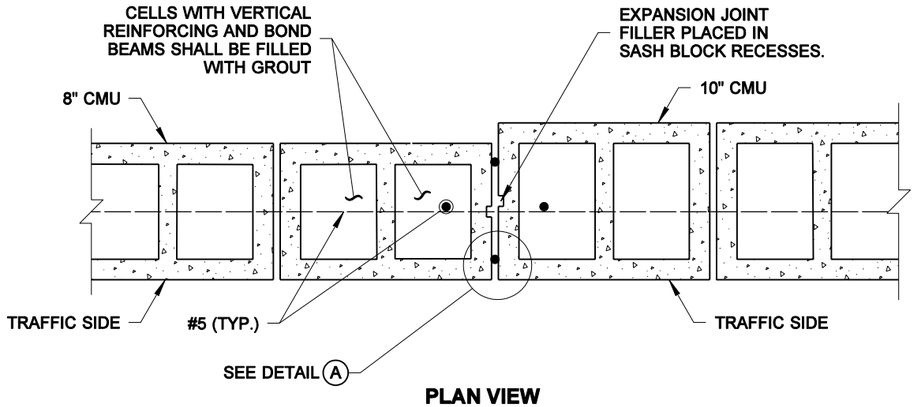
## TYPICAL EXPANSION JOINT




**DETAIL A**

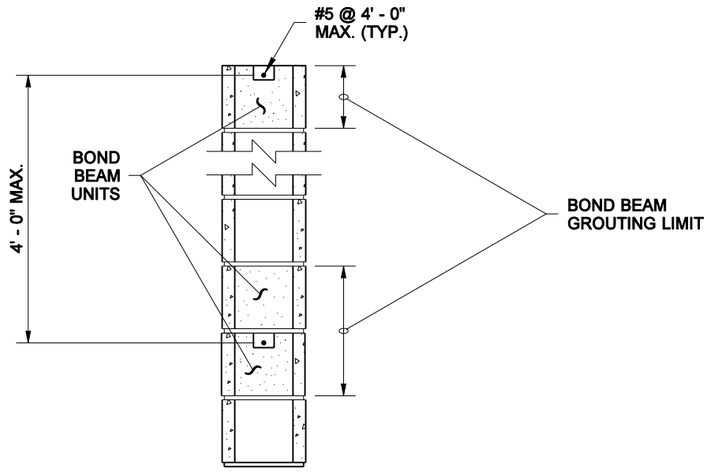
TYPICAL BOTH SIDES OF WALL

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**PLAN VIEW**

## EXPANSION JOINT AT WIDTH STEP




## BOND BEAM DETAIL

# MASONRY WALL ON TRENCH FOOTING

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 16

## STANDARD PLAN D-2.60-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 17A | B1 | 80 |
| 17B | B1 | 90 |
| 17C | B2 | 80 |
| 17D | B2 | 90 |

CMU = CONCRETE MASONRY UNIT

| WALL HT H | TYPE 17A | | | | | | |
|---|---|---|---|---|---|---|---|
| | CMU WIDTH | X | W | BAR "A" | BAR "C" | BAR "D" | BAR "E" |
| 6' - 0" | 8" | — | 2' - 0" | 3 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 8' - 0" | 8" | — | 2' - 3" | 3 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 10' - 0" | 8" | — | 2' - 6" | 3 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 12' - 0" | 8" | — | 3' - 0" | 4 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 14' - 0" | 8" | — | 3' - 3" | 4 ~ #4 | — | #6 @ 32" | #4 @ 18" |
| 16' - 0" | 10" | 5' - 4" | 3' - 9" | 5 ~ #4 | — | #6 @ 32" | #4 @ 18" |
| 18' - 0" | 10" | 6' - 0" | 4' - 0" | 5 ~ #4 | #6 @ 48" | #6 @ 48" | #4 @ 18" |
| 20' - 0" | 10" | 6' - 8" | 5' - 0" | 5 ~ #4 | #6 @ 32" | #6 @ 32" | #4 @ 18" |
| 22' - 0" | 10" | 7' - 4" | 5' - 6" | 5 ~ #4 | #6 @ 24" | #6 @ 24" | #4 @ 18" |
| 24' - 0" | 10" | 8' - 0" | 6' - 0" | 5 ~ #4 | #6 @ 24" | #6 @ 24" | #4 @ 18" |

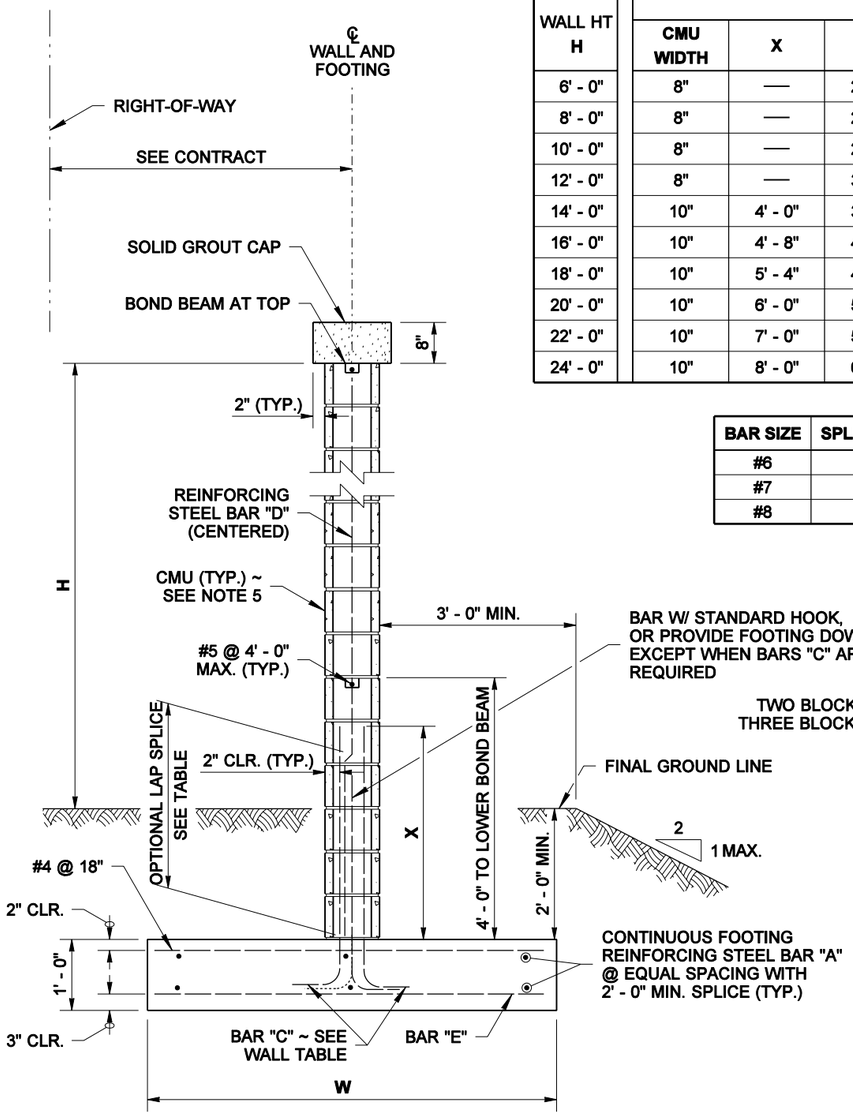
| WALL HT H | TYPE 17C | | | | | | |
|---|---|---|---|---|---|---|---|
| | CMU WIDTH | X | W | BAR "A" | BAR "C" | BAR "D" | BAR "E" |
| 6' - 0" | 8" | — | 2' - 0" | 3 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 8' - 0" | 8" | — | 2' - 6" | 3 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 10' - 0" | 8" | — | 2' - 9" | 3 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 12' - 0" | 8" | — | 3' - 3" | 3 ~ #4 | — | #6 @ 40" | #4 @ 18" |
| 14' - 0" | 10" | 4' - 0" | 3' - 9" | 5 ~ #4 | — | #6 @ 16" | #4 @ 18" |
| 16' - 0" | 10" | 4' - 8" | 4' - 3" | 5 ~ #4 | #6 @ 40" | #6 @ 40" | #4 @ 18" |
| 18' - 0" | 10" | 5' - 4" | 4' - 6" | 5 ~ #4 | #6 @ 32" | #6 @ 32" | #4 @ 18" |
| 20' - 0" | 10" | 6' - 0" | 5' - 3" | 5 ~ #4 | #6 @ 24" | #6 @ 16" | #4 @ 18" |
| 22' - 0" | 10" | 7' - 0" | 5' - 9" | 5 ~ #4 | #6 @ 16" | #6 @ 16" | #4 @ 18" |
| 24' - 0" | 10" | 8' - 0" | 6' - 3" | 5 ~ #4 | #7 @ 16" | #7 @ 16" | #4 @ 12" |

| WALL HT H | TYPE 17B | | | | | | |
|---|---|---|---|---|---|---|---|
| | CMU WIDTH | X | W | BAR "A" | BAR "C" | BAR "D" | BAR "E" |
| 6' - 0" | 8" | — | 12' - 3" | 3 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 8' - 0" | 8" | — | 2' - 9" | 4 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 10' - 0" | 8" | — | 3' - 3" | 4 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 12' - 0" | 10" | 4' - 0" | 3' - 9" | 4 ~ #4 | — | #6 @ 40" | #4 @ 18" |
| 14' - 0" | 10" | 4' - 8" | 4' - 3" | 5 ~ #4 | #6 @ 40" | #6 @ 40" | #4 @ 18" |
| 16' - 0" | 10" | 5' - 4" | 4' - 9" | 5 ~ #4 | #6 @ 32" | #6 @ 32" | #4 @ 18" |
| 18' - 0" | 10" | 6' - 0" | 5' - 3" | 6 ~ #4 | #6 @ 24" | #6 @ 24" | #4 @ 18" |
| 20' - 0" | 10" | 8' - 0" | 6' - 0" | 5 ~ #4 | #7 @ 24" | #7 @ 24" | #4 @ 18" |
| 22' - 0" | 10" | 10' - 0" | 6' - 3" | 5 ~ #4 | #7 @ 16" | #7 @ 16" | #4 @ 12" |
| 24' - 0" | 10" | 12' - 0" | 6' - 9" | 5 ~ #4 | #8 @ 16" | #8 @ 16" | #4 @ 12" |

| WALL HT H | TYPE 17D | | | | | | |
|---|---|---|---|---|---|---|---|
| | CMU WIDTH | X | W | BAR "A" | BAR "C" | BAR "D" | BAR "E" |
| 6' - 0" | 8" | — | 2' - 6" | 3 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 8' - 0" | 8" | — | 3' - 3" | 5 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 10' - 0" | 10" | 4' - 0" | 3' - 6" | 5 ~ #4 | — | #6 @ 24" | #4 @ 18" |
| 12' - 0" | 10" | 4' - 0" | 4' - 3" | 5 ~ #4 | #6 @ 32" | #6 @ 32" | #4 @ 18" |
| 14' - 0" | 10" | 4' - 8" | 4' - 9" | 5 ~ #4 | #6 @ 24" | #6 @ 24" | #4 @ 18" |
| 16' - 0" | 10" | 5' - 4" | 5' - 6" | 5 ~ #4 | #6 @ 16" | #7 @ 16" | #4 @ 18" |
| 18' - 0" | 10" | 7' - 4" | 6' - 0" | 5 ~ #4 | #7 @ 24" | #7 @ 16" | #4 @ 18" |
| 20' - 0" | 10" | 9' - 8" | 6' - 6" | 5 ~ #4 | #7 @ 16" | #8 @ 16" | #4 @ 12" |
| 22' - 0" | 10" | 12' - 0" | 7' - 0" | 5 ~ #4 | #7 @ 16" | #8 @ 16" | #4 @ 12" |
| 24' - 0" | 10" | 15' - 0" | 7' - 6" | 6 ~ #4 | #7 @ 16" | #8 @ 16" | #4 @ 12" |

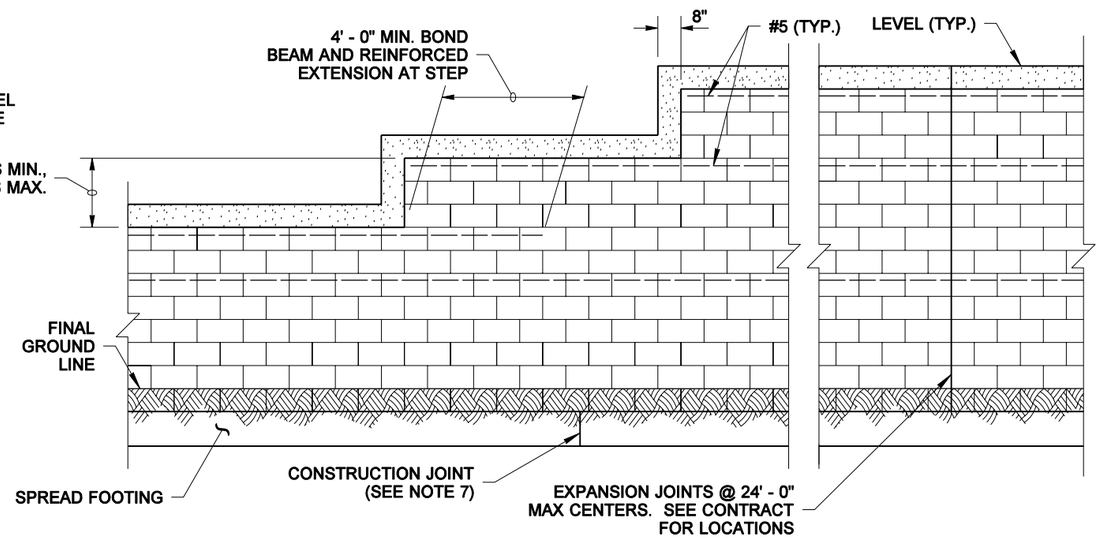
## NOTES

1. Wall to be designated Noise Barrier Wall Type 17A, 17B, 17C or 17D. 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 footing shall be spaced at 120 feet maximum.
8. See "Masonry Wall Finishes and Details" sheets for masonry block finishes, special shapes, sizes and layout.




TYPICAL SECTION

| BAR SIZE | SPLICE LENGTH |
|---|---|
| #6 | 2' - 8" |
| #7 | 3' - 8" |
| #8 | 4' - 10" |




ELEVATION

# MASONRY WALL ON SPREAD FOOTING

BIJAN KHALEGHI — STATE OF WASHINGTON — 27695 — REGISTERED PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 17

## STANDARD PLAN D-2.62-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

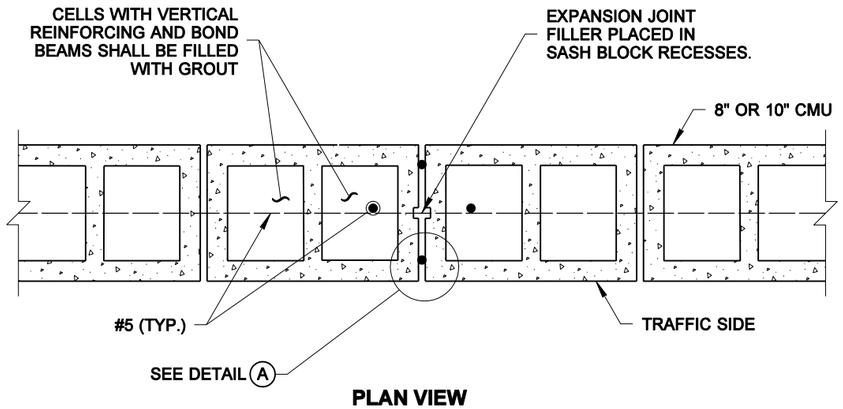
Washington State Department of Transportation

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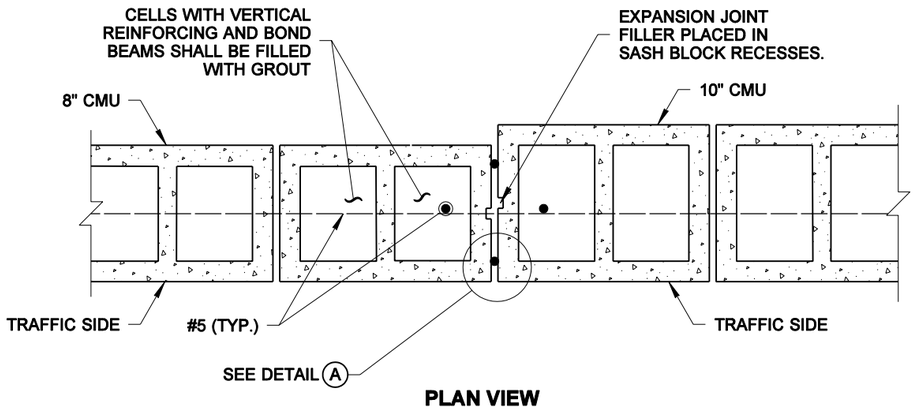
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN



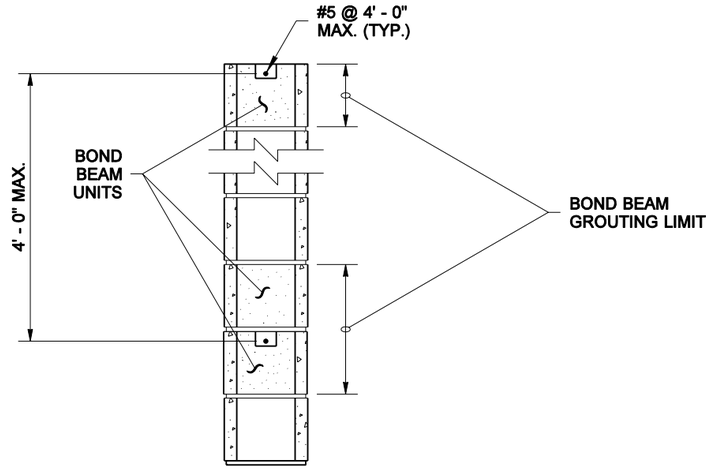

**PLAN VIEW**

## TYPICAL EXPANSION JOINT

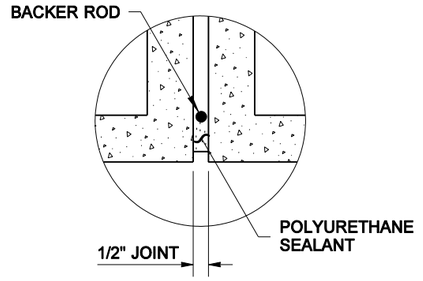



**PLAN VIEW**

## EXPANSION JOINT AT WIDTH STEP

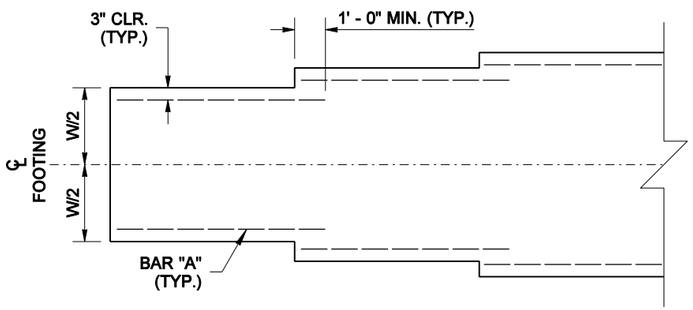



## BOND BEAM DETAIL




**DETAIL (A)**

TYPICAL BOTH SIDES OF WALL




## FOOTING WIDTH TRANSITION DETAIL

(FOR LOCATIONS WITHOUT FOOTING STEP)
NOTE: TRANSVERSE BARS NOT SHOWN

# MASONRY WALL ON SPREAD FOOTING

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 17

# STANDARD PLAN D-2.62-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

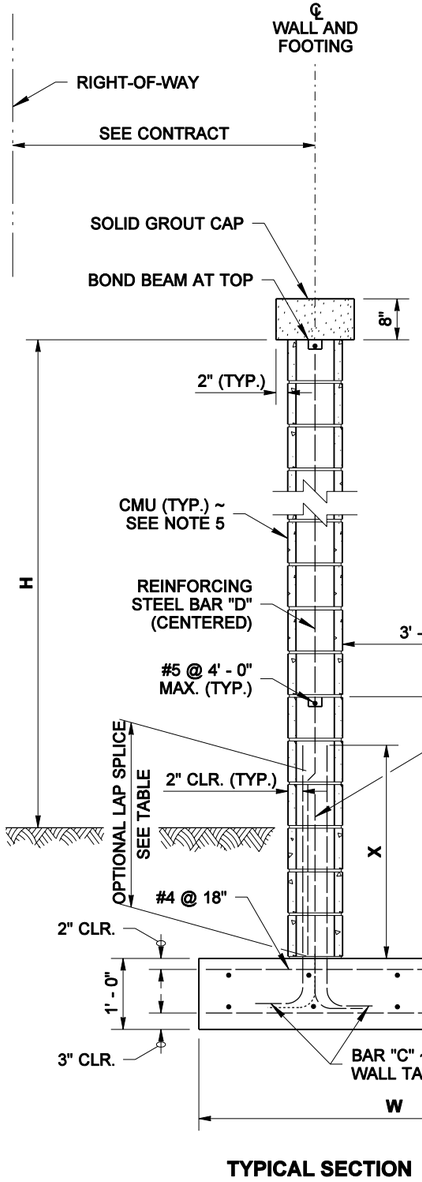
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 18A | B1 | 80 |
| 18B | B1 | 90 |
| 18C | B2 | 80 |
| 18D | B2 | 90 |




TYPICAL SECTION

| WALL HT H | TYPE 18A | | | | | | |
|---|---|---|---|---|---|---|---|
| | CMU WIDTH | X | W | BAR "A" | BAR "C" | BAR "D" | BAR "E" |
| 6' - 0" | 8" | — | 2' - 0" | 3 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 8' - 0" | 8" | — | 2' - 3" | 3 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 10' - 0" | 8" | — | 2' - 6" | 3 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 12' - 0" | 8" | — | 3' - 0" | 4 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 14' - 0" | 8" | — | 3' - 3" | 4 ~ #4 | — | #6 @ 36" | #4 @ 18" |
| 16' - 0" | 10" | 5' - 4" | 3' - 9" | 5 ~ #4 | — | #6 @ 16" | #4 @ 18" |
| 18' - 0" | 10" | 6' - 0" | 4' - 0" | 5 ~ #4 | #6 @ 48" | #6 @ 48" | #4 @ 18" |
| 20' - 0" | 10" | 6' - 8" | 5' - 0" | 5 ~ #4 | #6 @ 32" | #6 @ 32" | #4 @ 18" |
| 22' - 0" | 10" | 7' - 4" | 5' - 6" | 5 ~ #4 | #6 @ 24" | #6 @ 24" | #4 @ 18" |
| 24' - 0" | 10" | 8' - 0" | 6' - 3" | 5 ~ #4 | #6 @ 16" | #6 @ 16" | #4 @ 18" |

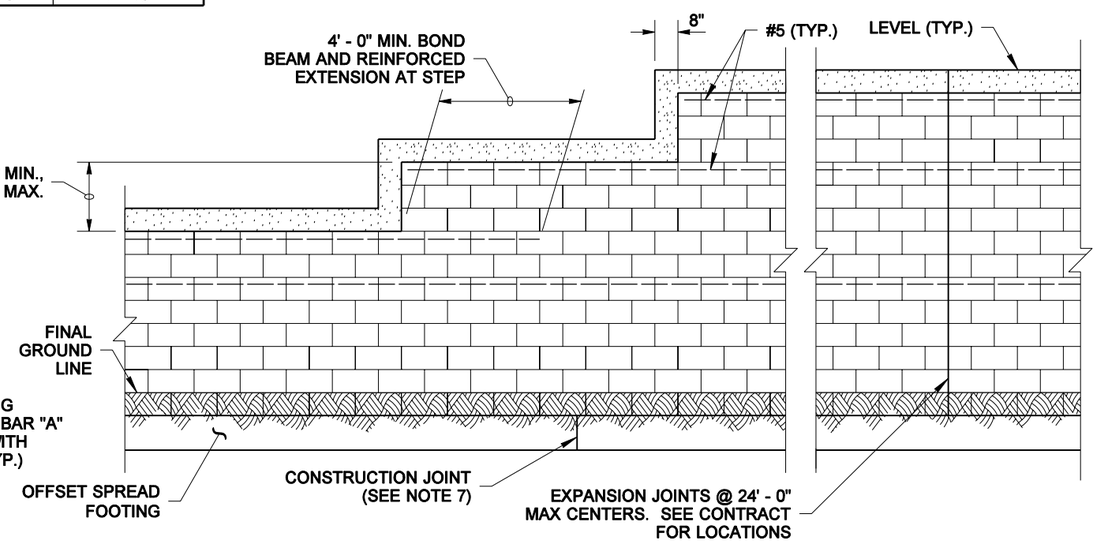
| WALL HT H | TYPE 18B | | | | | | |
|---|---|---|---|---|---|---|---|
| | CMU WIDTH | X | W | BAR "A" | BAR "C" | BAR "D" | BAR "E" |
| 6' - 0" | 8" | — | 2' - 3" | 3 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 8' - 0" | 8" | — | 2' - 9" | 4 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 10' - 0" | 8" | — | 3' - 3" | 4 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 12' - 0" | 10" | 4' - 0" | 3' - 9" | 4 ~ #4 | — | #6 @ 40" | #4 @ 18" |
| 14' - 0" | 10" | 4' - 8" | 4' - 3" | 5 ~ #4 | #6 @ 40" | #6 @ 40" | #4 @ 18" |
| 16' - 0" | 10" | 5' - 4" | 5' - 3" | 5 ~ #4 | #6 @ 32" | #6 @ 32" | #4 @ 18" |
| 18' - 0" | 10" | 6' - 0" | 6' - 0" | 6 ~ #4 | #6 @ 24" | #6 @ 24" | #4 @ 18" |
| 20' - 0" | 10" | 8' - 0" | 7' - 0" | 5 ~ #4 | #7 @ 24" | #7 @ 24" | #4 @ 18" |
| 22' - 0" | 10" | 10' - 0" | 7' - 9" | 5 ~ #4 | #7 @ 16" | #7 @ 16" | #4 @ 12" |
| 24' - 0" | 10" | 12' - 0" | 8' - 6" | 5 ~ #4 | #8 @ 16" | #8 @ 16" | #4 @ 12" |

| WALL HT H | TYPE 18C | | | | | | |
|---|---|---|---|---|---|---|---|
| | CMU WIDTH | X | W | BAR "A" | BAR "C" | BAR "D" | BAR "E" |
| 6' - 0" | 8" | — | 2' - 0" | 3 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 8' - 0" | 8" | — | 2' - 6" | 3 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 10' - 0" | 8" | — | 2' - 9" | 3 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 12' - 0" | 8" | — | 3' - 3" | 3 ~ #4 | — | #6 @ 40" | #4 @ 18" |
| 14' - 0" | 10" | 4' - 0" | 3' - 9" | 5 ~ #4 | — | #6 @ 16" | #4 @ 18" |
| 16' - 0" | 10" | 4' - 8" | 4' - 3" | 5 ~ #4 | #6 @ 40" | #6 @ 40" | #4 @ 18" |
| 18' - 0" | 10" | 5' - 4" | 5' - 0" | 5 ~ #4 | #6 @ 32" | #6 @ 32" | #4 @ 18" |
| 20' - 0" | 10" | 6' - 0" | 5' - 9" | 5 ~ #4 | #6 @ 24" | #6 @ 24" | #4 @ 18" |
| 22' - 0" | 10" | 7' - 0" | 6' - 6" | 5 ~ #4 | #6 @ 16" | #6 @ 16" | #4 @ 18" |
| 24' - 0" | 10" | 8' - 0" | 7' - 6" | 5 ~ #4 | #7 @ 16" | #7 @ 16" | #4 @ 12" |

| WALL HT H | TYPE 18D | | | | | | |
|---|---|---|---|---|---|---|---|
| | CMU WIDTH | X | W | BAR "A" | BAR "C" | BAR "D" | BAR "E" |
| 6' - 0" | 8" | — | 2' - 6" | 3 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 8' - 0" | 8" | — | 3' - 3" | 5 ~ #4 | — | #6 @ 48" | #4 @ 18" |
| 10' - 0" | 10" | 4' - 0" | 3' - 6" | 5 ~ #4 | — | #6 @ 24" | #4 @ 18" |
| 12' - 0" | 10" | 4' - 0" | 4' - 3" | 5 ~ #4 | #6 @ 48" | #6 @ 32" | #4 @ 18" |
| 14' - 0" | 10" | 4' - 8" | 5' - 3" | 5 ~ #4 | #6 @ 32" | #6 @ 24" | #4 @ 18" |
| 16' - 0" | 10" | 5' - 4" | 6' - 3" | 5 ~ #4 | #6 @ 24" | #7 @ 16" | #4 @ 18" |
| 18' - 0" | 10" | 7' - 4" | 7' - 0" | 5 ~ #4 | #6 @ 16" | #7 @ 16" | #4 @ 18" |
| 20' - 0" | 10" | 9' - 8" | 8' - 0" | 5 ~ #4 | #7 @ 16" | #8 @ 16" | #4 @ 12" |
| 22' - 0" | 10" | 12' - 0" | 9' - 0" | 5 ~ #4 | #8 @ 16" | #8 @ 16" | #4 @ 12" |
| 24' - 0" | 10" | 15' - 0" | 9' - 9" | 6 ~ #4 | #9 @ 16" | #8 @ 16" | #4 @ 12" |

CMU = CONCRETE MASONRY UNIT

| BAR SIZE | SPLICE LENGTH |
|---|---|
| #6 | 2' - 8" |
| #7 | 3' - 8" |
| #8 | 4' - 10" |




ELEVATION

**NOTES**

1. Wall to be designated Noise Barrier Wall Type 18A, 18B, 18C or 18D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. All masonry shall be hollow unit and installed as running bond.
4. All masonry is to be specially inspected.
5. All Concrete Masonry Unit (CMU) cells that have vertical steel reinforcing bars or bond beam units shall be filled with grout.
6. Panels shall have at least 3 feet of level ground on each side.
7. Construction joints in the footing shall be spaced at 120 feet maximum.
8. See "Masonry Wall Finishes and Details" sheets for masonry block finishes, special shapes, sizes and layout.

# MASONRY WALL ON OFFSET SPREAD FOOTING

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 18

## STANDARD PLAN D-2.64-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER
*11-10-05* — DATE

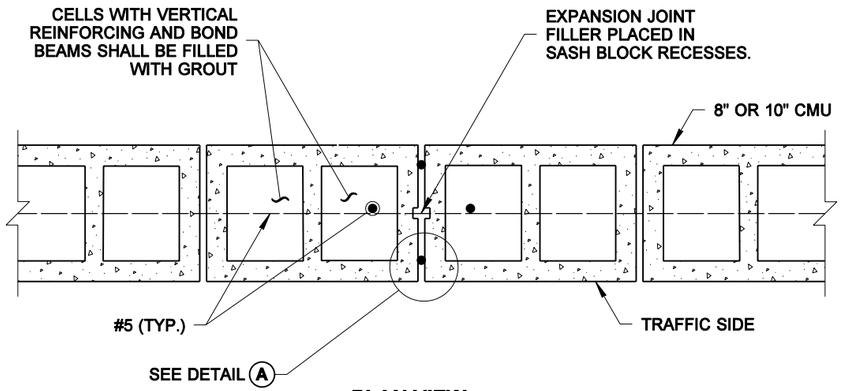
Washington State Department of Transportation

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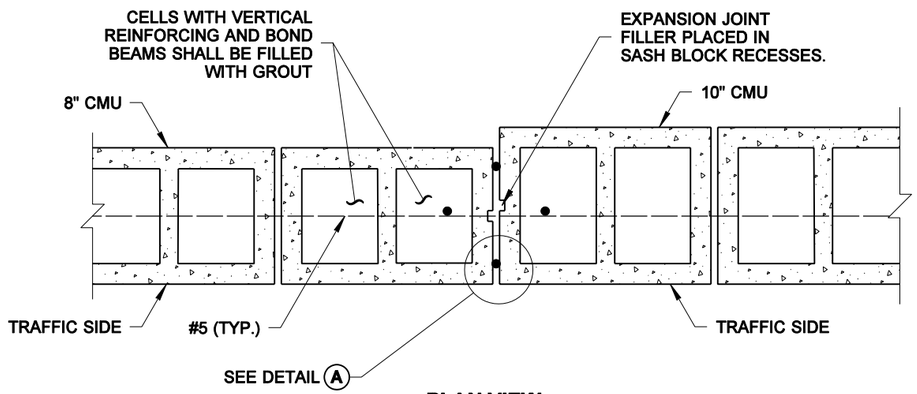
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN



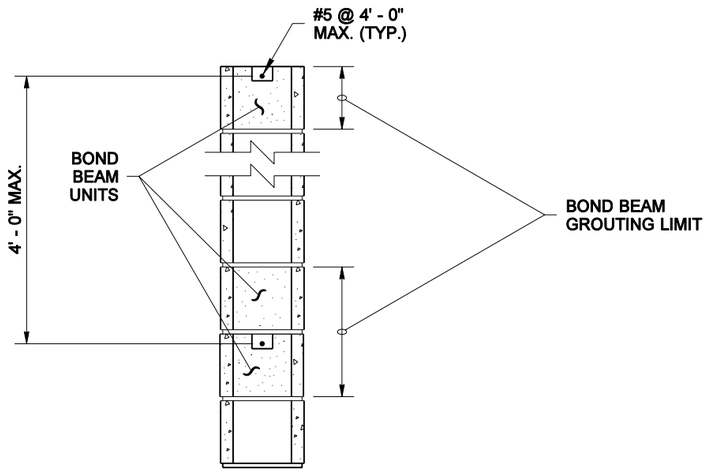

**PLAN VIEW**

## TYPICAL EXPANSION JOINT

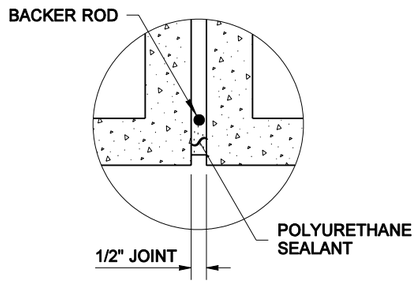



**PLAN VIEW**

## EXPANSION JOINT AT WIDTH STEP

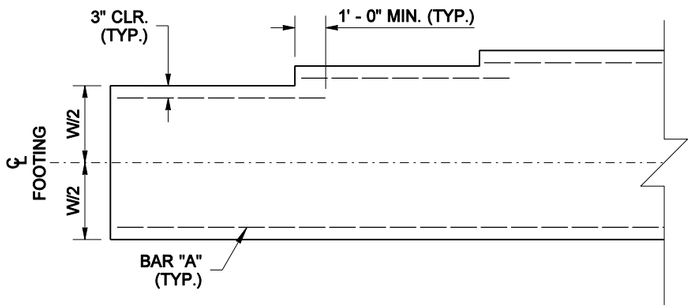



## BOND BEAM DETAIL




## DETAIL A

TYPICAL BOTH SIDES OF WALL




## FOOTING WIDTH TRANSITION DETAIL

(FOR LOCATIONS WITHOUT FOOTING STEP)
NOTE: TRANSVERSE BARS NOT SHOWN

# MASONRY WALL ON OFFSET SPREAD FOOTING

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 18

# STANDARD PLAN D-2.64-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

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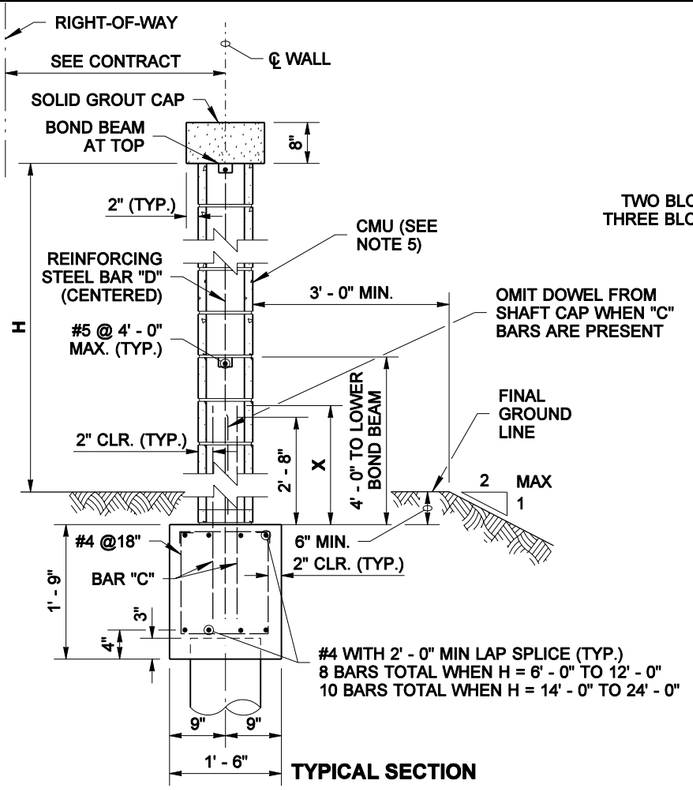
DRAWN BY: ADAM COCHRAN

| WALL HT H | TYPE 19A | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | CMU WIDTH | X | BAR "D" | BAR "C" | DIAM. | BAR "P" | DEPTH D1 | DEPTH D2 |
| 6' - 0" | 8" | — | #6 @ 48" | — | 12" | 6 ~ #5 | 5' - 3" | 4' - 9" |
| 8' - 0" | 8" | — | #6 @ 48" | — | 12" | 6 ~ #5 | 6' - 0" | 5' - 3" |
| 10' - 0" | 8" | — | #6 @ 48" | — | 12" | 6 ~ #5 | 6' - 9" | 5' - 9" |
| 12' - 0" | 8" | — | #6 @ 48" | — | 12" | 6 ~ #5 | 7' - 3" | 6' - 3" |
| 14' - 0" | 8" | — | #6 @ 32" | — | 12" | 6 ~ #6 | 7' - 9" | 6' - 9" |
| 16' - 0" | 10" | 5' - 4" | #6 @ 32" | — | 12" | 6 ~ #7 | 8' - 3" | 7' - 0" |
| 18' - 0" | 10" | 6' - 0" | #6 @ 48" | #6 @ 48" | 12" | 6 ~ #8 | 8' - 9" | 7' - 6" |
| 20' - 0" | 10" | 6' - 8" | #6 @ 32" | #6 @ 32" | 12" | 6 ~ #9 | 9' - 3" | 7' - 9" |
| 22' - 0" | 10" | 7' - 4" | #6 @ 24" | #6 @ 24" | 14" | 8 ~ #7 | 9' - 3" | 7' - 9" |
| 24' - 0" | 10" | 8' - 0" | #6 @ 24" | #6 @ 24" | 14" | 8 ~ #8 | 9' - 9" | 8' - 3" |

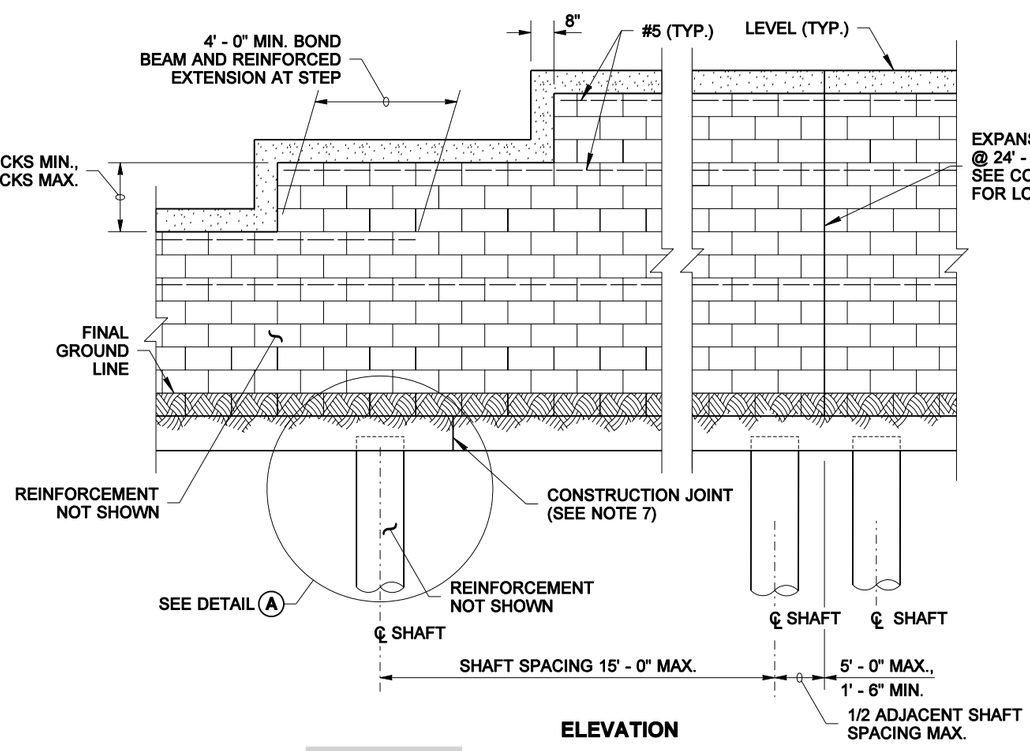
| WALL HT H | TYPE 19B | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | CMU WIDTH | X | BAR "D" | BAR "C" | DIAM. | BAR "P" | DEPTH D1 | DEPTH D2 |
| 6' - 0" | 8" | — | #6 @ 48" | — | 12" | 6 ~ #5 | 6' - 0" | 5' - 3" |
| 8' - 0" | 8" | — | #6 @ 48" | — | 12" | 6 ~ #5 | 7' - 0" | 6' - 0" |
| 10' - 0" | 8" | — | #6 @ 48" | — | 12" | 6 ~ #6 | 7' - 9" | 6' - 9" |
| 12' - 0" | 10" | 4' - 0" | #6 @ 40" | — | 12" | 6 ~ #7 | 8' - 6" | 7' - 3" |
| 14' - 0" | 10" | 4' - 8" | #6 @ 32" | #6 @ 32" | 14" | 8 ~ #7 | 8' - 6" | 7' - 3" |
| 16' - 0" | 10" | 5' - 4" | #6 @ 24" | #6 @ 24" | 14" | 8 ~ #7 | 9' - 3" | 8' - 0" |
| 18' - 0" | 10" | 6' - 0" | #6 @ 16" | #6 @ 16" | 16" | 6 ~ #8 | 9' - 3" | 8' - 0" |
| 20' - 0" | 10" | 8' - 0" | #7 @ 16" | #7 @ 32" | 16" | 8 ~ #7 | 10' - 0" | 8' - 6" |
| 22' - 0" | 10" | 10' - 0" | #7 @ 16" | #7 @ 24" | 16" | 8 ~ #8 | 10' - 6" | 9' - 0" |
| 24' - 0" | 10" | 12' - 0" | #8 @ 16" | #7 @ 16" | 16" | 8 ~ #8 | 11' - 3" | 9' - 6" |

| WALL HT H | TYPE 19C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | CMU WIDTH | X | BAR "D" | BAR "C" | DIAM. | BAR "P" | DEPTH D1 | DEPTH D2 |
| 6' - 0" | 8" | — | #6 @ 48" | — | 12" | 6 ~ #5 | 5' - 9" | 5' - 0" |
| 8' - 0" | 8" | — | #6 @ 48" | — | 12" | 6 ~ #5 | 6' - 6" | 5' - 6" |
| 10' - 0" | 8" | — | #6 @ 48" | — | 12" | 6 ~ #5 | 7' - 3" | 6' - 3" |
| 12' - 0" | 8" | — | #6 @ 40" | — | 12" | 6 ~ #6 | 7' - 9" | 6' - 9" |
| 14' - 0" | 8" | 5' - 4" | #6 @ 40" | — | 12" | 6 ~ #7 | 8' - 6" | 7' - 3" |
| 16' - 0" | 10" | 5' - 4" | #6 @ 32" | #6 @ 32" | 14" | 8 ~ #6 | 8' - 6" | 7' - 3" |
| 18' - 0" | 10" | 6' - 0" | #6 @ 24" | #6 @ 24" | 14" | 8 ~ #7 | 9' - 0" | 7' - 9" |
| 20' - 0" | 10" | 6' - 8" | #6 @ 24" | #6 @ 16" | 14" | 8 ~ #8 | 9' - 9" | 8' - 3" |
| 22' - 0" | 10" | 7' - 4" | #6 @ 16" | #6 @ 16" | 14" | 8 ~ #9 | 10' - 3" | 8' - 9" |
| 24' - 0" | 10" | 8' - 0" | #6 @ 16" | #6 @ 16" | 16" | 8 ~ #8 | 10' - 3" | 8' - 9" |

| WALL HT H | TYPE 19D | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | CMU WIDTH | X | BAR "D" | BAR "C" | DIAM. | BAR "P" | DEPTH D1 | DEPTH D2 |
| 6' - 0" | 8" | — | #6 @ 48" | — | 12" | 6 ~ #5 | 6' - 6" | 5' - 9" |
| 8' - 0" | 8" | — | #6 @ 48" | — | 12" | 6 ~ #6 | 7' - 6" | 6' - 6" |
| 10' - 0" | 10" | 4' - 0" | #6 @ 24" | — | 12" | 6 ~ #7 | 8' - 3" | 7' - 0" |
| 12' - 0" | 10" | 4' - 8" | #6 @ 32" | #6 @ 32" | 14" | 8 ~ #7 | 8' - 6" | 7' - 3" |
| 14' - 0" | 10" | 4' - 8" | #6 @ 24" | #6 @ 24" | 14" | 8 ~ #7 | 9' - 3" | 8' - 0" |
| 16' - 0" | 10" | 5' - 4" | #6 @ 16" | #6 @ 16" | 16" | 6 ~ #8 | 9' - 6" | 8' - 0" |
| 18' - 0" | 10" | 7' - 4" | #7 @ 16" | #7 @ 24" | 16" | 8 ~ #8 | 10' - 0" | 8' - 6" |
| 20' - 0" | 10" | 9' - 8" | #8 @ 16" | #7 @ 16" | 16" | 8 ~ #9 | 10' - 9" | 9' - 3" |
| 22' - 0" | 10" | 12' - 0" | #8 @ 16" | #7 @ 16" | 16" | 8 ~ #10 | 11' - 6" | 9' - 9" |
| 24' - 0" | 10" | 15' - 0" | #8 @ 16" | #7 @ 16" | 18" | 8 ~ #10 | 11' - 6" | 9' - 9" |




TYPICAL SECTION




ELEVATION

**NOTES**

1. Wall to be designated Noise Barrier Wall Type 19A, 19B, 19C, or 19D. 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 the 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 shaft cap shall be spaced 120 feet maximum.
8. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layouts.
9. The Contract specifies actual foundation requirements D1 or D2.

| SOIL TYPE | |
|---|---|
| SOIL TYPE | ANGLE OF INTERNAL FRICTION ◊ (DEGREES) |
| D1 | 32 |
| D2 | 38 |

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 19A | B1 | 80 |
| 19B | B1 | 90 |
| 19C | B2 | 80 |
| 19D | B2 | 90 |

# MASONRY WALL ON SHAFT W/ GRADE BEAM FOUNDATION

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 19

## STANDARD PLAN D-2.66-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

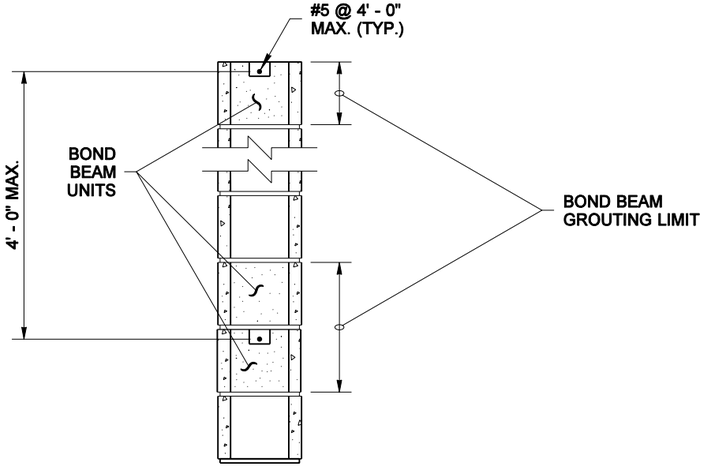
Washington State Department of Transportation

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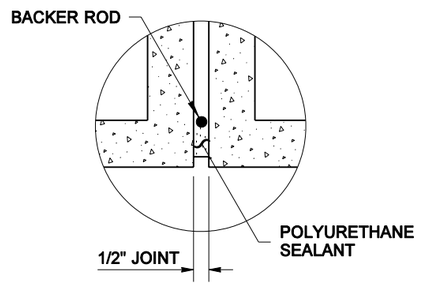
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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DRAWN BY: ADAM COCHRAN

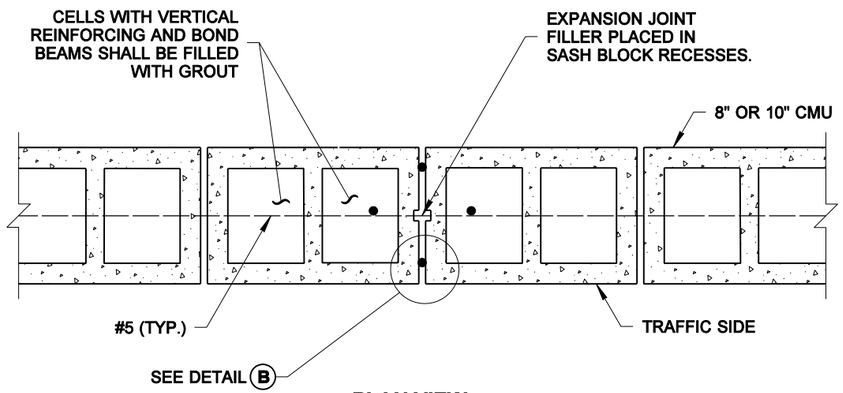



**BOND BEAM DETAIL**



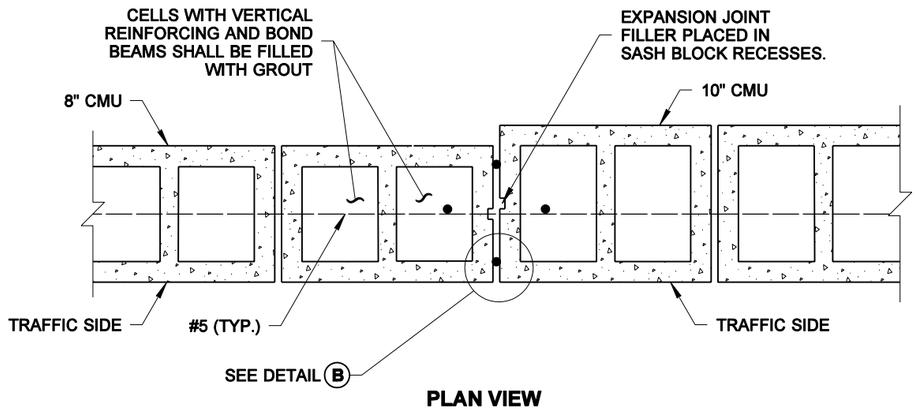

**DETAIL (B)**

TYPICAL BOTH SIDES OF WALL



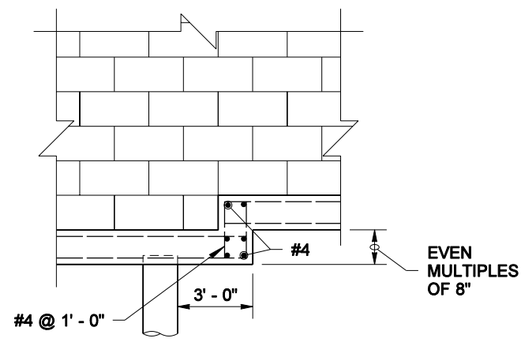

**PLAN VIEW**

**TYPICAL EXPANSION JOINT**



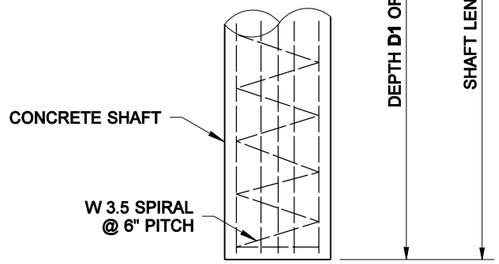

**PLAN VIEW**

**EXPANSION JOINT AT WIDTH STEP**

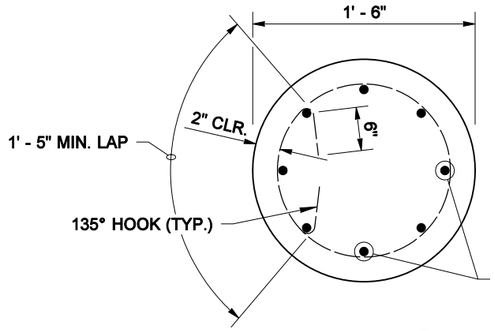



**STEP DETAIL**




**DETAIL (A)**




**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

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 19

## STANDARD PLAN D-2.66-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 20A | B1 | 80 |
| 20B | B1 | 90 |
| 20C | B2 | 80 |
| 20D | B2 | 90 |

| SOIL TYPE | |
|---|---|
| SOIL TYPE | ANGLE OF INTERNAL FRICTION ϕ (DEGREES) |
| D1 | 32 |
| D2 | 38 |

| TIE SPACING | |
|---|---|
| BAR "A" SIZE | SPACING |
| #4 | 6" O.C. |
| #5 | 6" O.C. |
| #6 | 5" O.C. |
| #7, #8, #9, #10 | 4" O.C. |

| TYPE 20A | | | | | | |
|---|---|---|---|---|---|---|
| WALL HT H | DEPTH D1 | DEPTH D2 | BAR "A" | BAR "B" | BAR "C" | PILASTER SPACING L |
| 6' - 0" | 5' - 6" | 5' - 0" | 6 ~ #6 | 4 ~ #4 | #5 @ 32" | 16' - 0" |
| 8' - 0" | 6' - 6" | 5' - 6" | 6 ~ #6 | 4 ~ #4 | #5 @ 32" | 16' - 0" |
| 10' - 0" | 7' - 0" | 6' - 0" | 6 ~ #6 | 4 ~ #4 | #5 @ 32" | 16' - 0" |
| 12' - 0" | 7' - 9" | 6' - 6" | 6 ~ #6 | 4 ~ #5 | #5 @ 32" | 16' - 0" |
| 14' - 0" | 8' - 3" | 7' - 0" | 6 ~ #6 | 4 ~ #5 | #5 @ 32" | 16' - 0" |
| 16' - 0" | 9' - 0" | 7' - 6" | 6 ~ #6 | 4 ~ #6 | #5 @ 32" | 16' - 0" |
| 18' - 0" | 9' - 6" | 8' - 0" | 6 ~ #6 | 4 ~ #7 | #5 @ 32" | 16' - 0" |
| 20' - 0" | 10' - 3" | 8' - 6" | 6 ~ #6 | 6 ~ #7 | #5 @ 32" | 16' - 0" |
| 22' - 0" | 10' - 9" | 9' - 0" | 6 ~ #6 | 6 ~ #8 | #5 @ 32" | 16' - 0" |
| 24' - 0" | 11' - 3" | 9' - 6" | 6 ~ #6 | 6 ~ #9 | #5 @ 32" | 16' - 0" |

| TYPE 20B | | | | | | |
|---|---|---|---|---|---|---|
| WALL HT H | DEPTH D1 | DEPTH D2 | BAR "A" | BAR "B" | BAR "C" | PILASTER SPACING L |
| 6' - 0" | 6' - 6" | 5' - 9" | 6 ~ #6 | 4 ~ #4 | #5 @ 32" | 16' - 0" |
| 8' - 0" | 7' - 6" | 6' - 6" | 6 ~ #6 | 4 ~ #4 | #5 @ 32" | 16' - 0" |
| 10' - 0" | 8' - 6" | 7' - 0" | 6 ~ #6 | 4 ~ #5 | #5 @ 32" | 16' - 0" |
| 12' - 0" | 9' - 3" | 7' - 9" | 6 ~ #6 | 4 ~ #6 | #5 @ 32" | 16' - 0" |
| 14' - 0" | 10' - 0" | 8' - 6" | 6 ~ #6 | 4 ~ #7 | #5 @ 32" | 16' - 0" |
| 16' - 0" | 11' - 0" | 9' - 0" | 6 ~ #6 | 6 ~ #8 | #5 @ 32" | 16' - 0" |
| 18' - 0" | 11' - 9" | 9' - 9" | 6 ~ #6 | 6 ~ #9 | #5 @ 32" | 16' - 0" |
| 20' - 0" | 12' - 6" | 10' - 3" | 6 ~ #7 | 6 ~ #10 | #5 @ 32" | 16' - 0" |
| 22' - 0" | 12' - 6" | 10' - 3" | 6 ~ #7 | 6 ~ #10 | #5 @ 32" | 16' - 0" |
| 24' - 0" | 12' - 6" | 10' - 3" | 6 ~ #7 | 6 ~ #10 | #5 @ 32" | 12' - 0" |

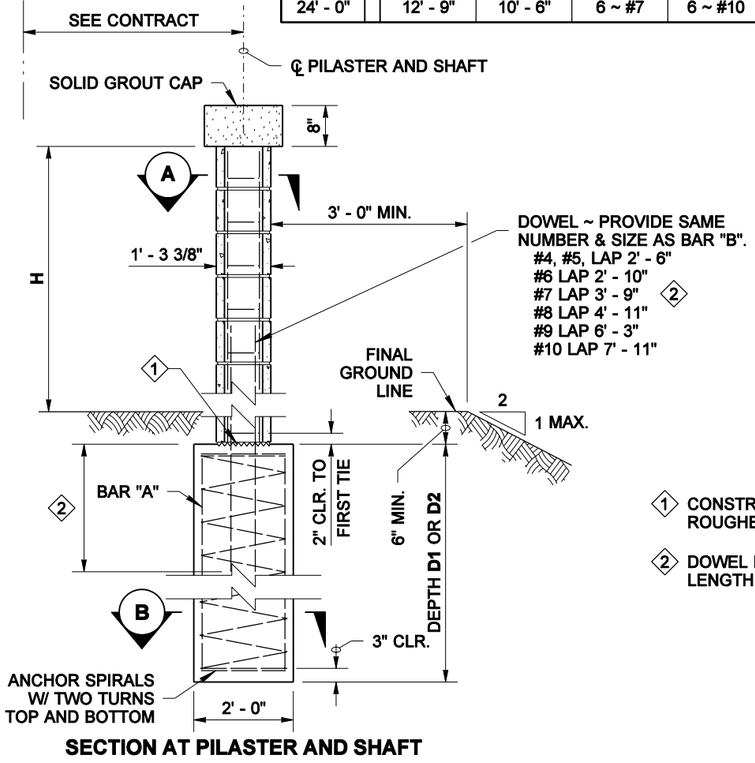
| TYPE 20C | | | | | | |
|---|---|---|---|---|---|---|
| WALL HT H | DEPTH D1 | DEPTH D2 | BAR "A" | BAR "B" | BAR "C" | PILASTER SPACING L |
| 6' - 0" | 6' - 3" | 5' - 3" | 6 ~ #6 | 4 ~ #4 | #6 @ 32" | 16' - 0" |
| 8' - 0" | 7' - 0" | 6' - 0" | 6 ~ #6 | 4 ~ #4 | #6 @ 32" | 16' - 0" |
| 10' - 0" | 7' - 9" | 6' - 6" | 6 ~ #6 | 4 ~ #5 | #6 @ 32" | 16' - 0" |
| 12' - 0" | 8' - 6" | 7' - 3" | 6 ~ #6 | 4 ~ #5 | #6 @ 32" | 16' - 0" |
| 14' - 0" | 9' - 3" | 7' - 9" | 6 ~ #6 | 4 ~ #6 | #6 @ 32" | 16' - 0" |
| 16' - 0" | 10' - 0" | 8' - 3" | 6 ~ #6 | 4 ~ #7 | #6 @ 32" | 16' - 0" |
| 18' - 0" | 10' - 9" | 9' - 0" | 6 ~ #6 | 6 ~ #7 | #6 @ 32" | 16' - 0" |
| 20' - 0" | 11' - 3" | 9' - 6" | 6 ~ #6 | 6 ~ #8 | #6 @ 32" | 16' - 0" |
| 22' - 0" | 12' - 0" | 10' - 0" | 6 ~ #7 | 6 ~ #9 | #6 @ 32" | 16' - 0" |
| 24' - 0" | 12' - 9" | 10' - 6" | 6 ~ #7 | 6 ~ #10 | #6 @ 32" | 16' - 0" |

| TYPE 20D | | | | | | |
|---|---|---|---|---|---|---|
| WALL HT H | DEPTH D1 | DEPTH D2 | BAR "A" | BAR "B" | BAR "C" | PILASTER SPACING L |
| 6' - 0" | 7' - 0" | 6' - 0" | 6 ~ #6 | 4 ~ #4 | #6 @ 32" | 16' - 0" |
| 8' - 0" | 8' - 3" | 7' - 0" | 6 ~ #6 | 4 ~ #5 | #6 @ 32" | 16' - 0" |
| 10' - 0" | 9' - 3" | 7' - 9" | 6 ~ #6 | 4 ~ #6 | #6 @ 32" | 16' - 0" |
| 12' - 0" | 10' - 3" | 8' - 6" | 6 ~ #6 | 4 ~ #7 | #6 @ 32" | 16' - 0" |
| 14' - 0" | 11' - 0" | 9' - 3" | 6 ~ #6 | 6 ~ #8 | #6 @ 32" | 16' - 0" |
| 16' - 0" | 12' - 0" | 9' - 9" | 6 ~ #6 | 6 ~ #9 | #6 @ 32" | 16' - 0" |
| 18' - 0" | 12' - 9" | 10' - 6" | 6 ~ #7 | 6 ~ #10 | #6 @ 32" | 16' - 0" |
| 20' - 0" | 13' - 0" | 10' - 6" | 6 ~ #7 | 6 ~ #10 | #6 @ 32" | 14' - 0" |
| 22' - 0" | 13' - 0" | 10' - 6" | 6 ~ #8 | 6 ~ #10 | #6 @ 32" | 12' - 0" |
| 24' - 0" | 13' - 6" | 11' - 3" | 6 ~ #8 | 6 ~ #10 | #6 @ 32" | 12' - 0" |

CMU = CONCRETE MASONRY UNIT

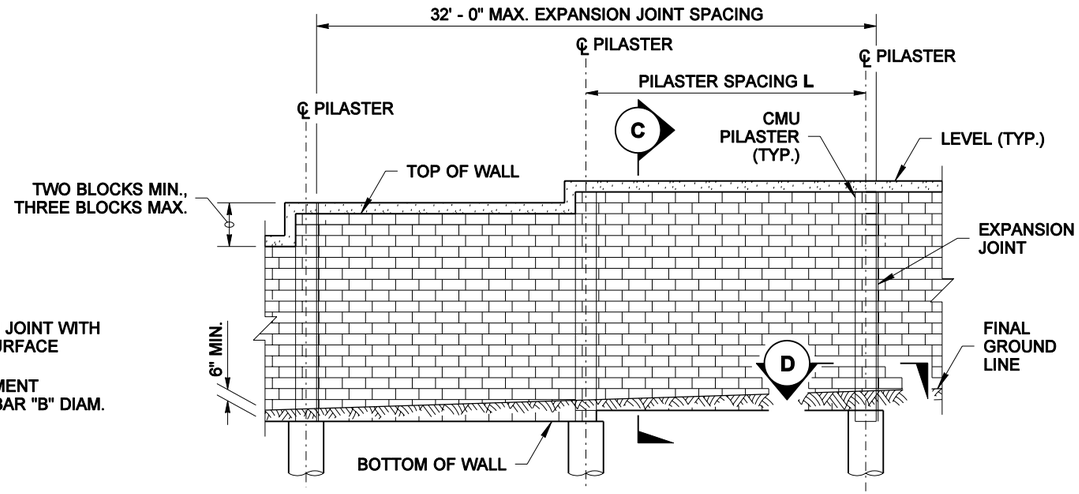
## NOTES

1. Wall to be designated Noise Barrier Wall Type 20A, 20B, 20C, or 20D. 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. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layouts.
8. The Contract specifies actual foundation requirements D1 or D2.




SECTION AT PILASTER AND SHAFT

1. CONSTRUCTION JOINT WITH ROUGHENED SURFACE
2. DOWEL EMBEDMENT LENGTH = 40 x BAR "B" DIAM.




ELEVATION

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# MASONRY WALL ON SHAFT FOUNDATION

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 20

## STANDARD PLAN D-2.68-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

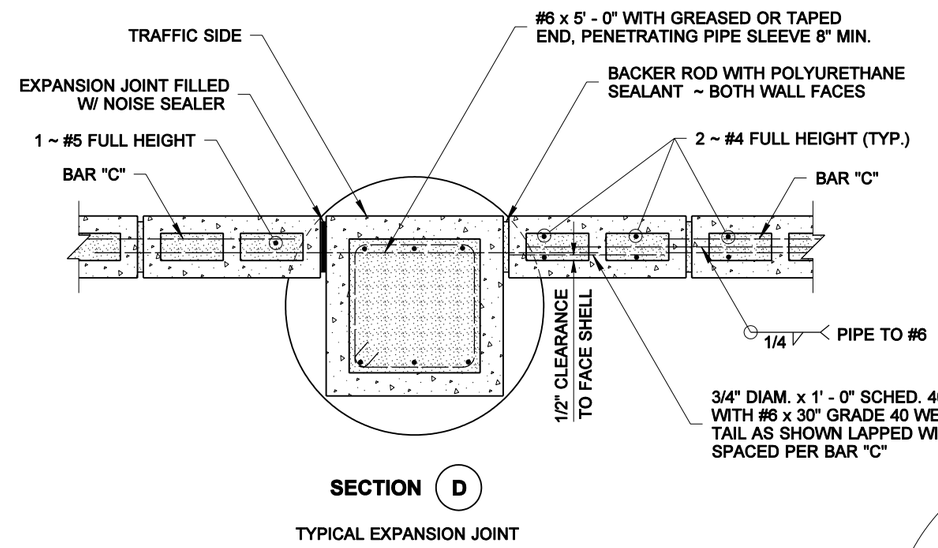
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

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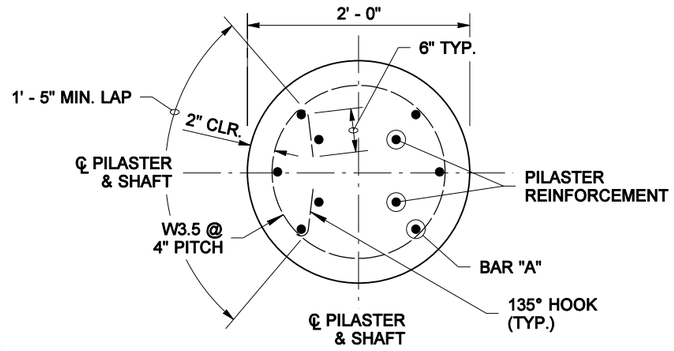
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN



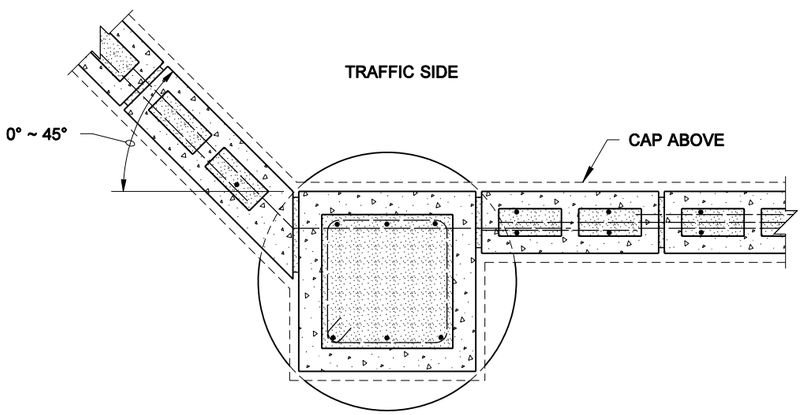

**SECTION (D)**

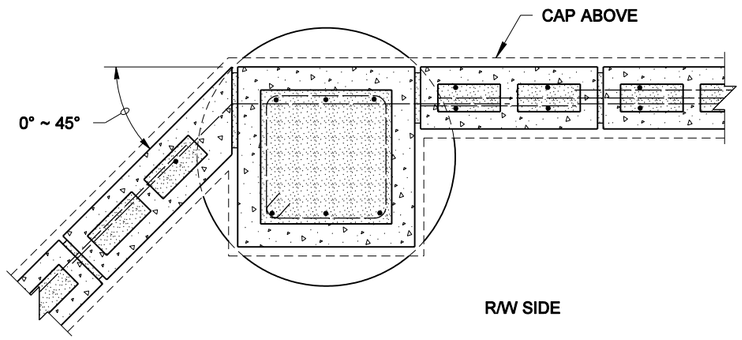
TYPICAL EXPANSION JOINT



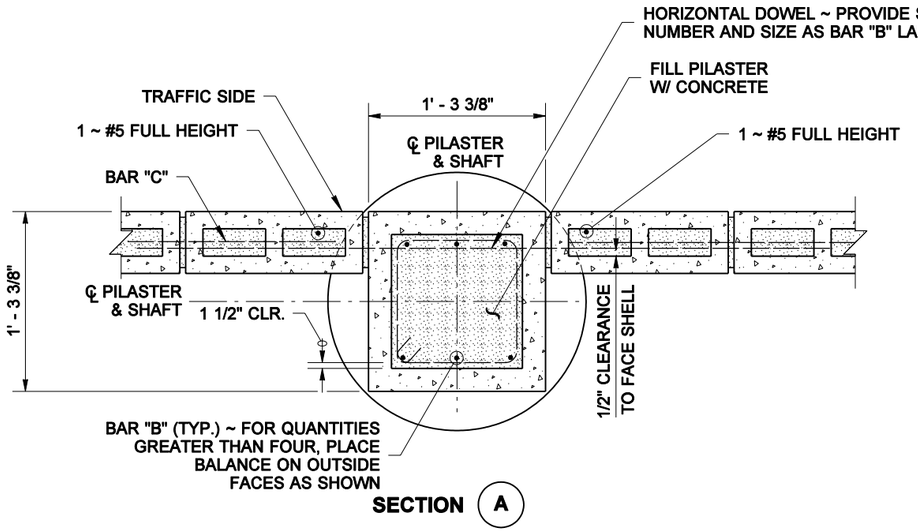

**SECTION (B)**

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

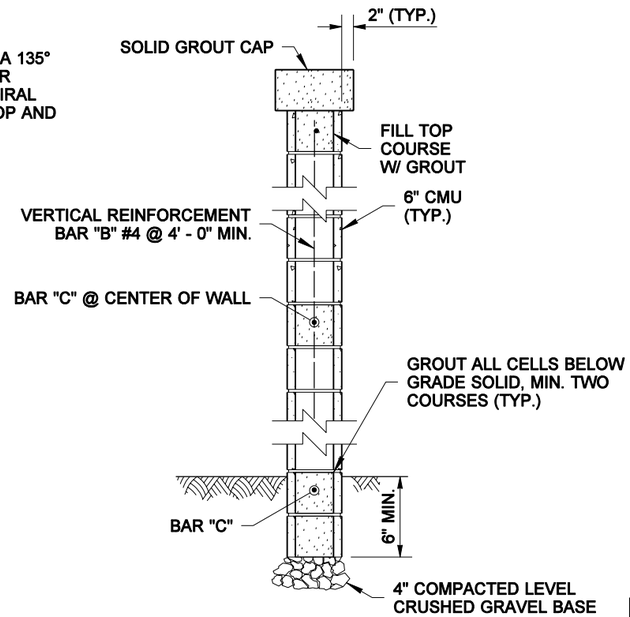



**ANGLE POINT PLAN**




**SECTION (A)**




**SECTION (C)**

# MASONRY WALL ON SHAFT FOUNDATION

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 20

## STANDARD PLAN D-2.68-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

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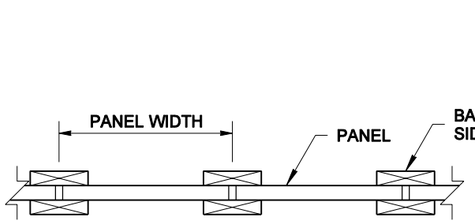
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

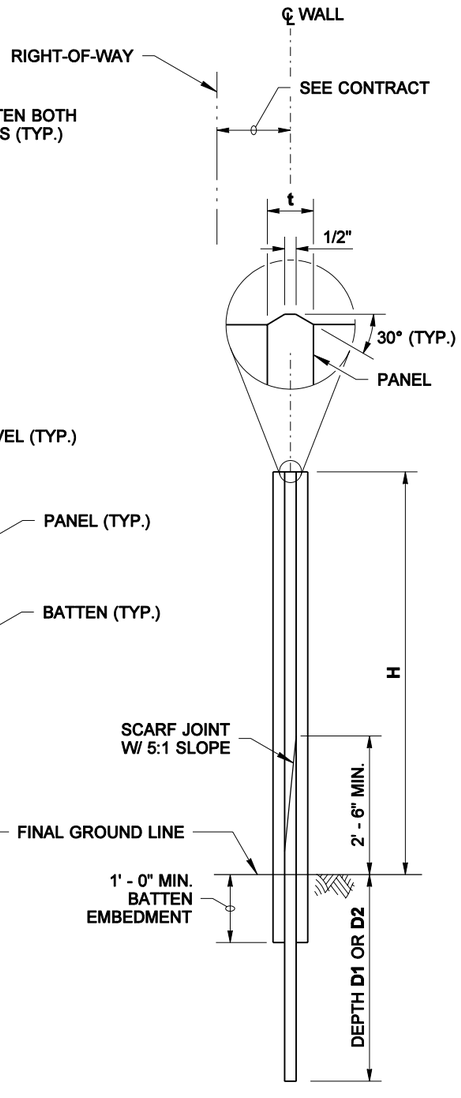
| WALL HT H | TYPE 15A | | | | TYPE 15B | | | | TYPE 15C | | | | TYPE 15D | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DEPTH D1 | DEPTH D2 | GLULAM t | PLYWOOD t | DEPTH D1 | DEPTH D2 | GLULAM t | PLYWOOD t | DEPTH D1 | DEPTH D2 | GLULAM t | PLYWOOD t | DEPTH D1 | DEPTH D2 | GLULAM t | PLYWOOD t |
| 6' - 0" | 3' - 3" | 3' - 0" | 1" | 1 1/4" | 3' - 9" | 3' - 6" | 1 1/4" | 1 1/2" | 3' - 6" | 3' - 3" | 1 1/8" | 1 3/8" | 4' - 0" | 3' - 6" | 1 1/2" | 1 5/8" |
| 8' - 0" | 3' - 6" | 3' - 3" | 1 1/4" | 1 3/8" | 4' - 0" | 3' - 9" | 1 5/8" | 1 7/8" | 3' - 9" | 3' - 6" | 1 3/8" | 1 5/8" | 4' - 3" | 3' - 9" | 1 7/8" | 2 1/8" |
| 10' - 0" | 4' - 0" | 3' - 6" | 1 1/2" | 1 5/8" | 4' - 6" | 4' - 0" | 1 7/8" | 2 1/4" | 4' - 0" | 3' - 9" | 1 5/8" | 2" | 4' - 6" | 4' - 0" | 2 1/4" | 2 1/2" |
| 12' - 0" | 4' - 3" | 3' - 9" | 1 5/8" | 2" | 4' - 9" | 4' - 3" | 2 1/4" | 2 5/8" | 4' - 6" | 4' - 0" | 2" | 2 1/4" | 4' - 9" | 4' - 3" | 2 1/2" | 3" |
| 14' - 0" | 4' - 6" | 4' - 0" | 2" | 2 1/4" | 5' - 0" | 4' - 6" | 2 1/2" | 3" | 4' - 9" | 4' - 3" | 2 1/4" | 2 5/8" | 5' - 3" | 4' - 9" | 2 7/8" | 3 3/8" |
| 16' - 0" | 4' - 9" | 4' - 0" | 2 1/4" | 2 1/2" | 5' - 3" | 4' - 9" | 2 7/8" | 3 1/4" | 5' - 0" | 4' - 6" | 2 1/2" | 3" | 5' - 6" | 5' - 0" | 3 1/4" | 3 3/4" |
| 18' - 0" | 5' - 0" | 4' - 3" | 2 1/2" | 2 7/8" | 5' - 6" | 5' - 0" | 3 1/4" | 3 5/8" | 5' - 3" | 4' - 9" | 2 7/8" | 3 1/4" | 6' - 0" | 5' - 3" | 3 5/8" | 4 1/4" |

**NOTES**

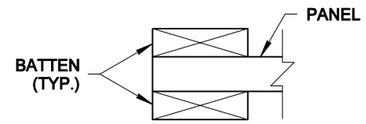
1. Wall to be designated Noise Barrier Wall Type 15A, 15B, 15C or 15D. The Contract specifies actual wall designations.
2. For intermediate wall heights not listed use the next higher H.
3. Panels shall have at least 3 feet of level ground on each side.
4. Plywood and Glulam panels and all lumber shall be pressure preservative treated.
5. The Contract shall specify actual foundation requirements D1 or D2.



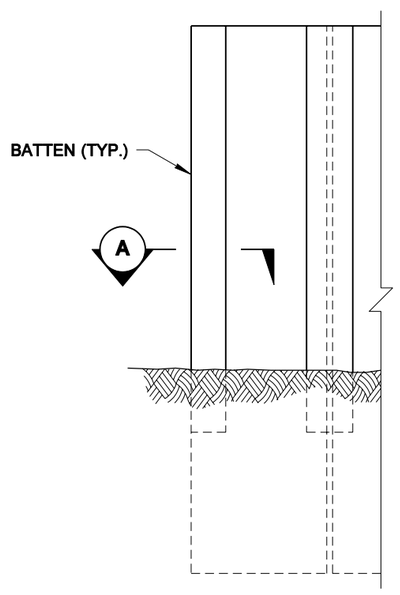

**PLAN**




**ELEVATION** **TYPICAL SECTION**



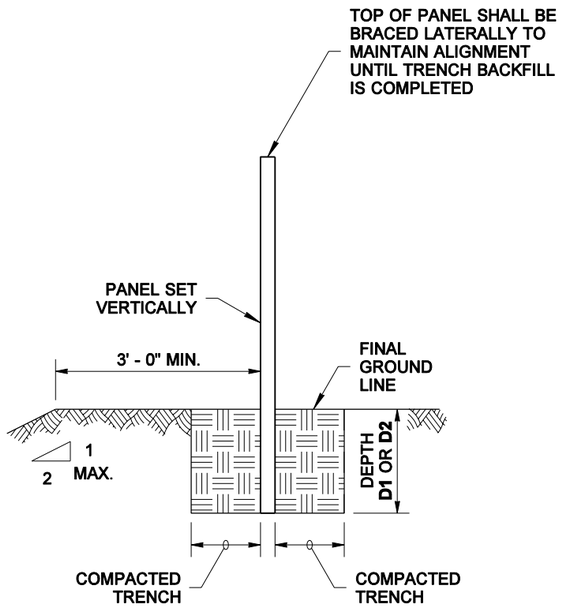

**SECTION (A)**




**ELEVATION END DETAIL**

| WIND EXPOSURE & VELOCITY | | |
|---|---|---|
| NOISE BARRIER TYPE | WIND EXPOSURE | WIND VELOCITY (MPH) |
| 15A | B1 | 80 |
| 15B | B1 | 90 |
| 15C | B2 | 80 |
| 15D | B2 | 90 |

| SOIL TYPE | |
|---|---|
| SOIL TYPE | ANGLE OF INTERNAL FRICTION ϕ (DEGREES) |
| D1 | 32 |
| D2 | 38 |




**TRENCH FOOTING**

# TIMBER PANEL WALL ON TRENCH FOOTING

BIJAN KHALEGHI STATE OF WASHINGTON 27695 REGISTERED PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL TYPE 15

## STANDARD PLAN D-2.78-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

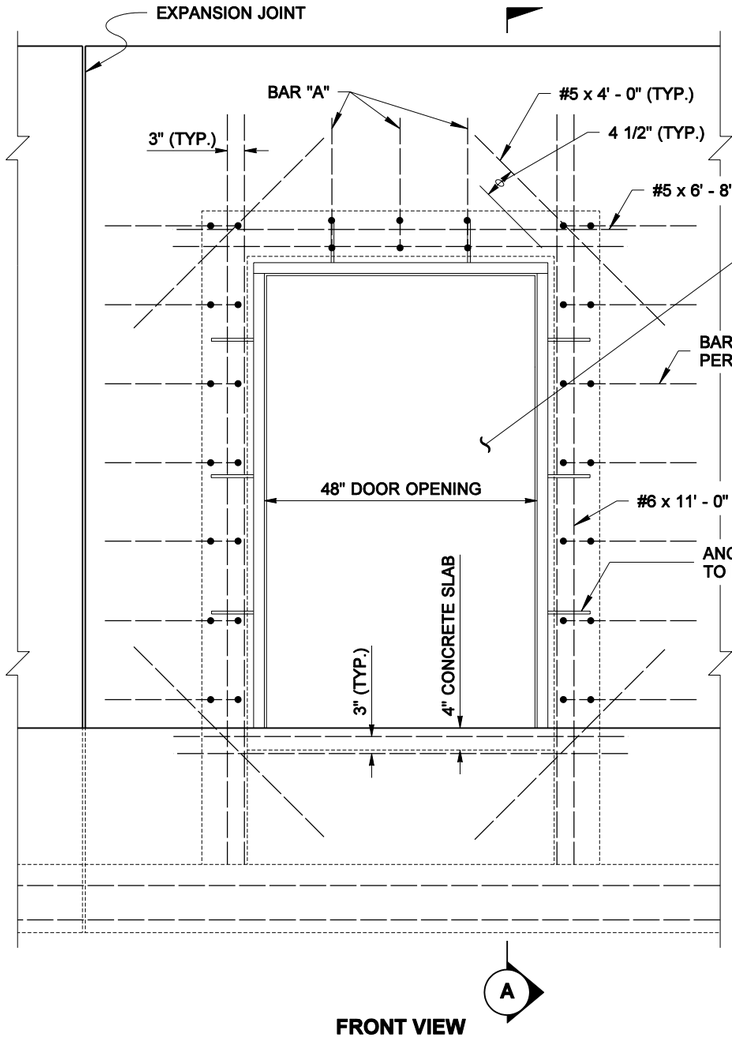
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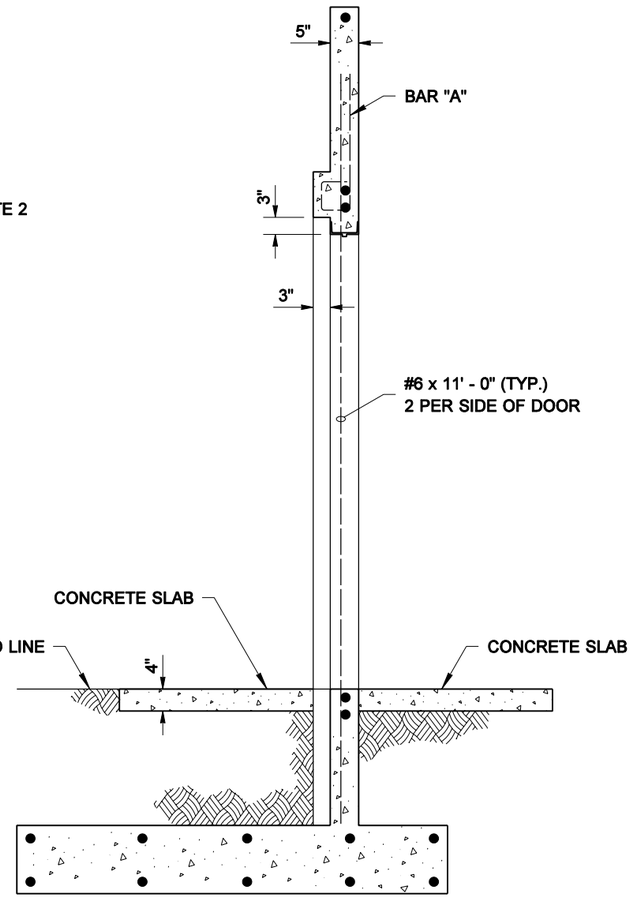
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

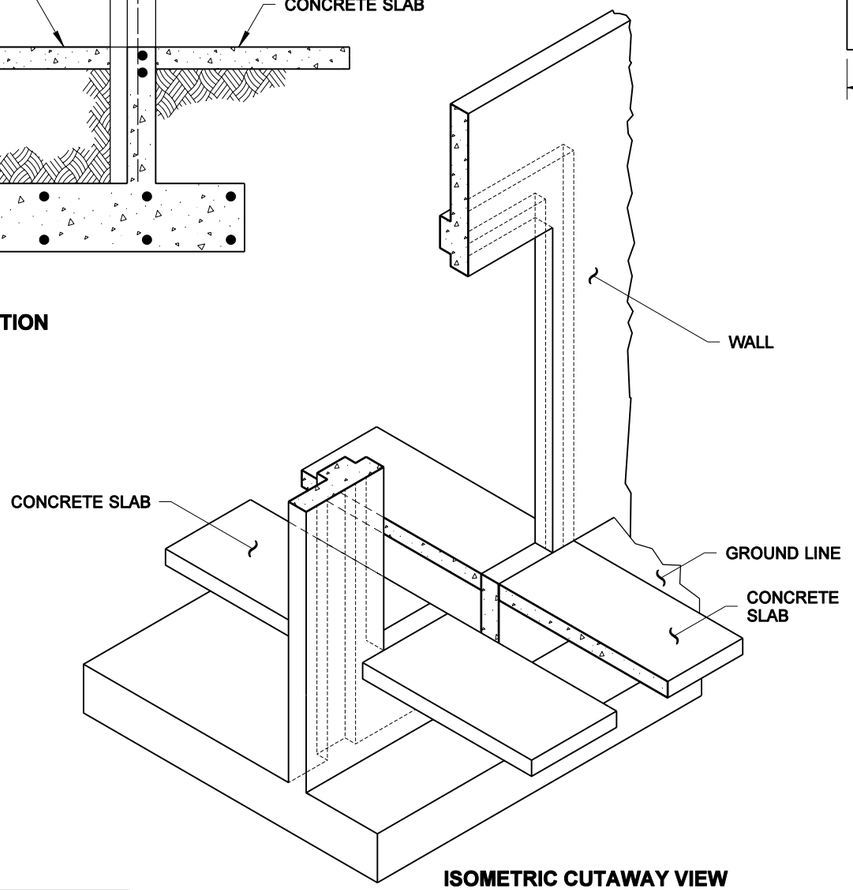
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FRONT VIEW



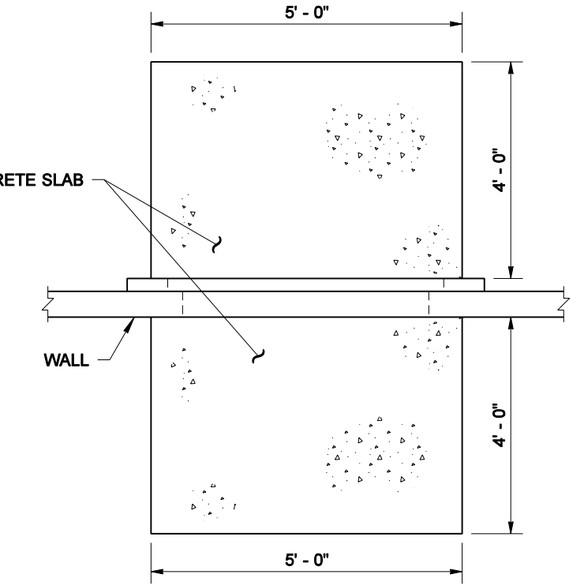

A SECTION




ISOMETRIC CUTAWAY VIEW

**NOTES**

1. All rebar shall have a minimum 1 1/2" cover.
2. See Standard Plan D-2.92 for door and frame details.
3. See Standard Plan D-2.06 for wall reinforcement not shown.

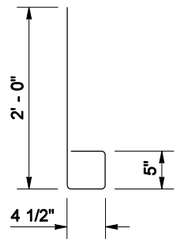



PLAN VIEW

**CONCRETE SLAB DETAIL**

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

**BENDING DIAGRAM**




BAR "A"

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL ACCESS DOOR TYPE 1

## STANDARD PLAN D-2.80-00

SHEET 1 OF 1 SHEET

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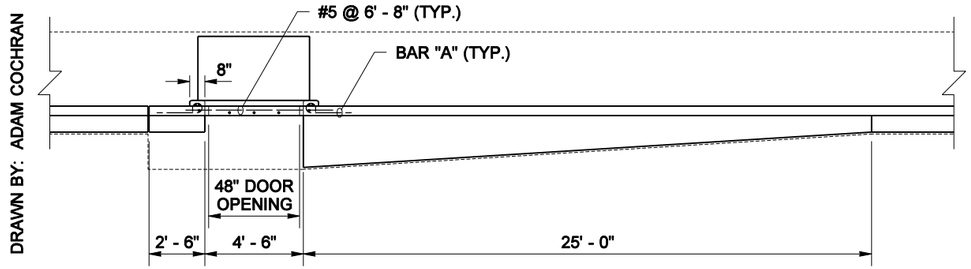
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

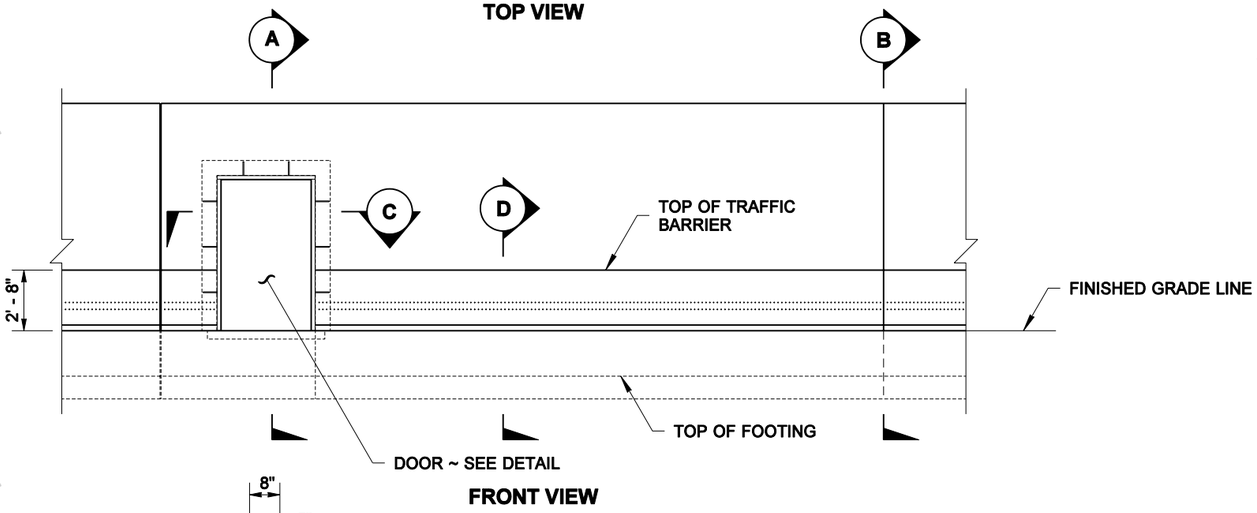
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

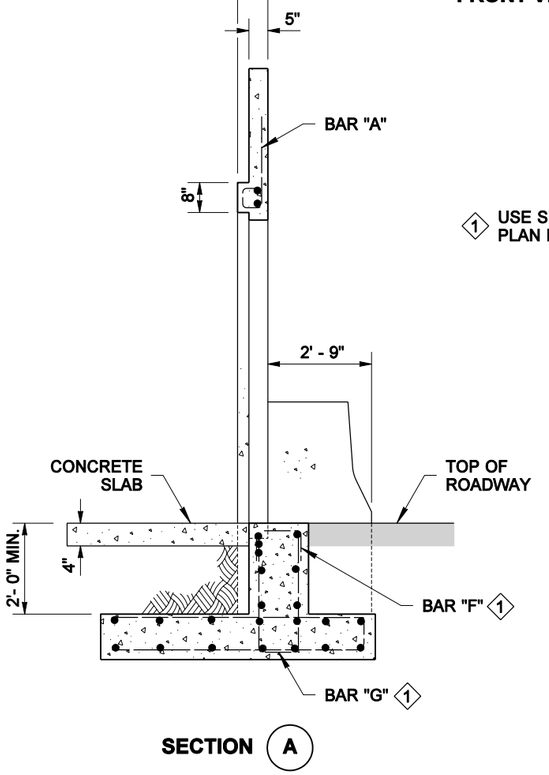
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**TOP VIEW**

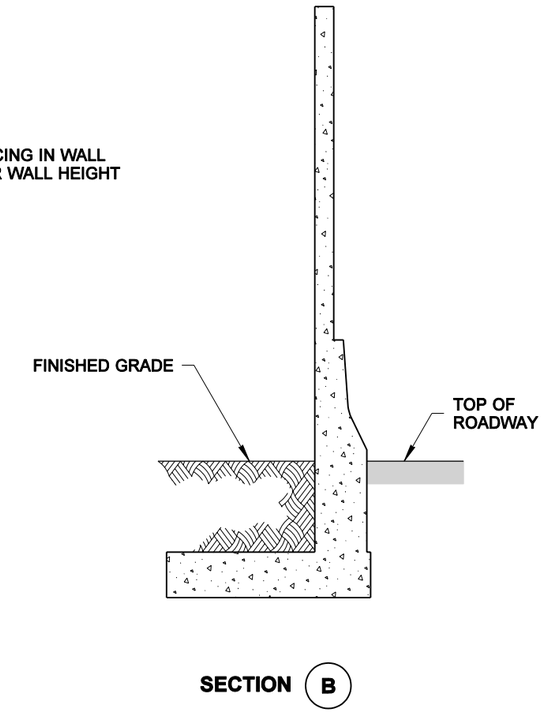



**FRONT VIEW**




1 USE SPACING IN WALL PLAN PER WALL HEIGHT

**SECTION A**



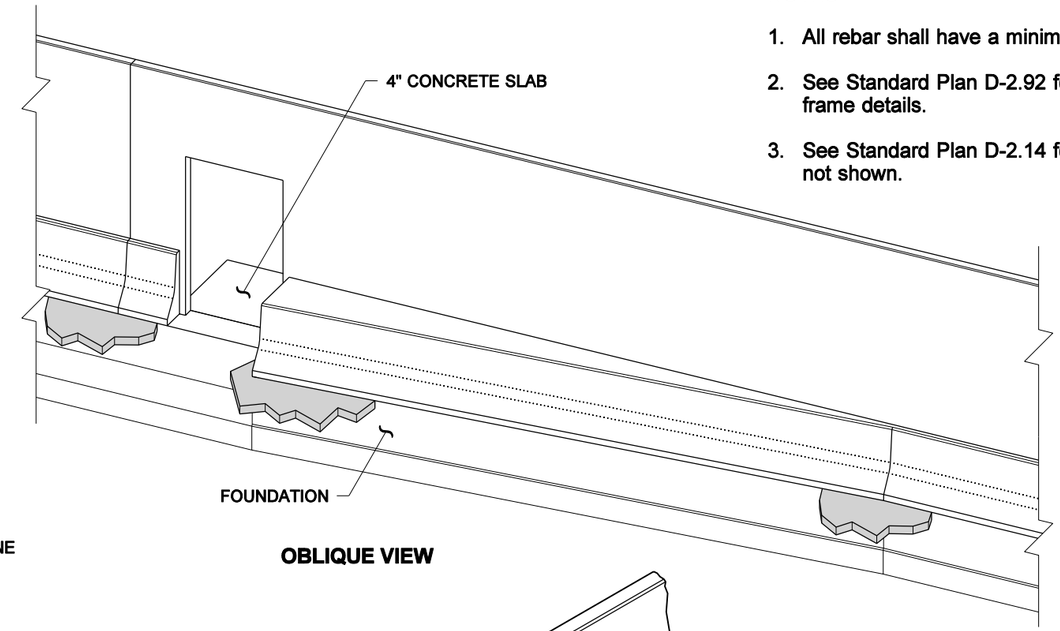

**SECTION B**

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

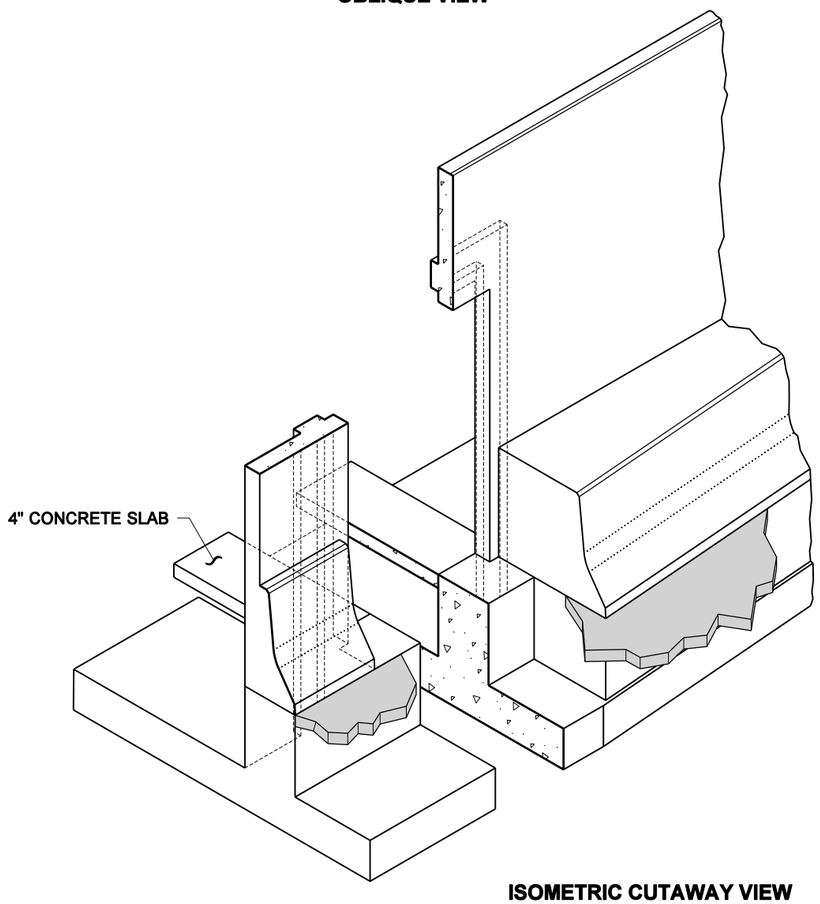
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

**NOTES**

1. All rebar shall have a minimum 1 1/2" cover.
2. See Standard Plan D-2.92 for door and frame details.
3. See Standard Plan D-2.14 for wall reinforcement not shown.




**OBLIQUE VIEW**




**ISOMETRIC CUTAWAY VIEW**

# FOR CAST-IN-PLACE WALL W/ TRAFFIC BARRIER

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL ACCESS DOOR TYPE 2

## STANDARD PLAN D-2.82-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

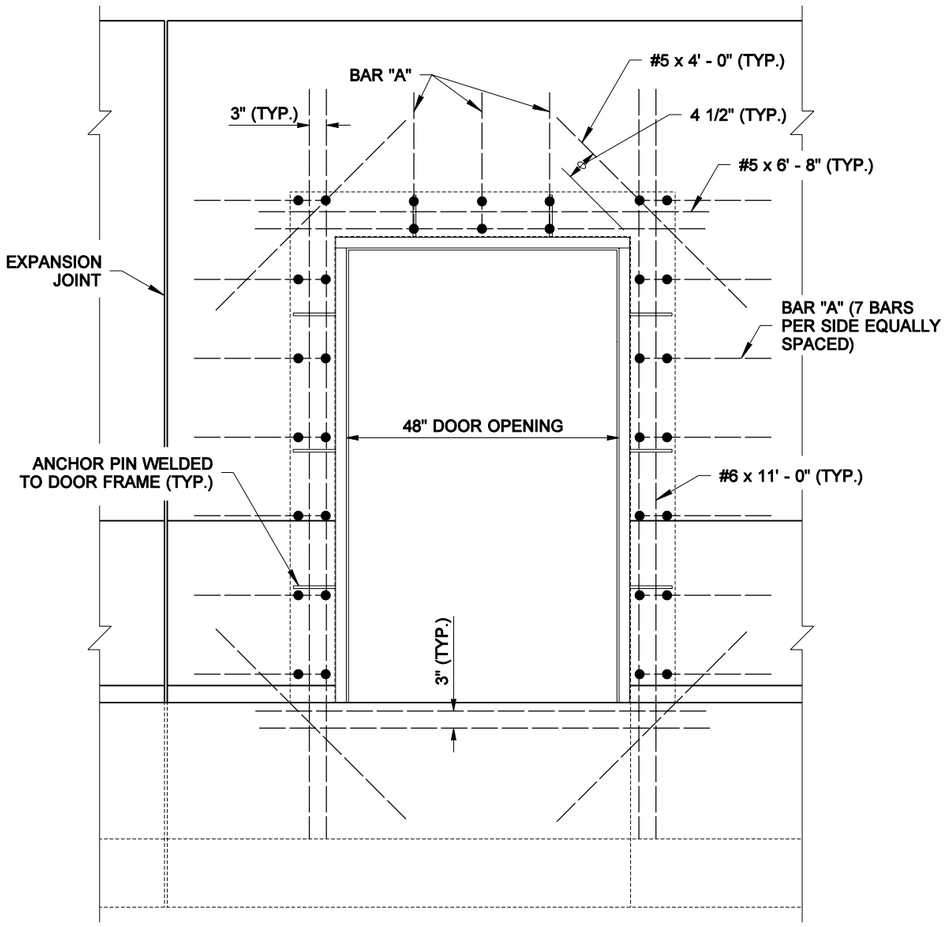
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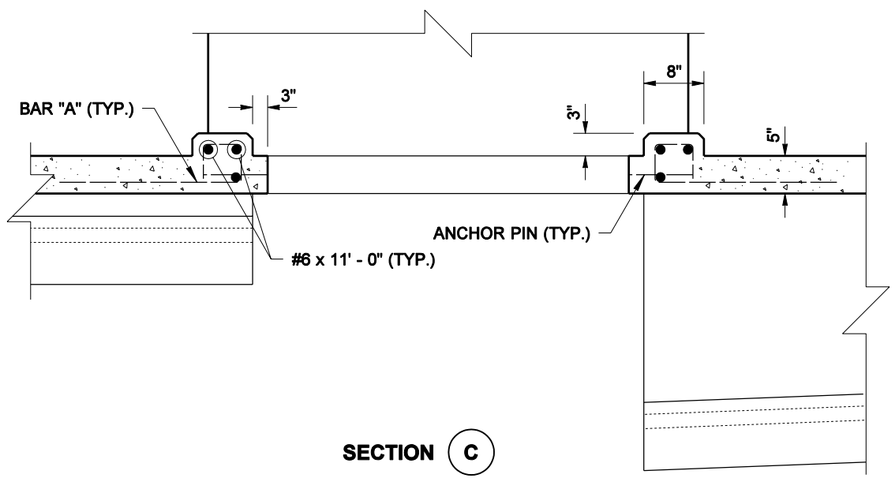
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

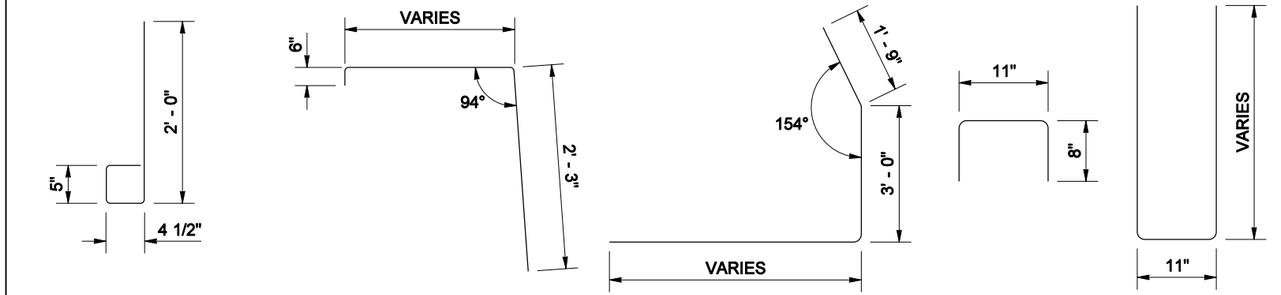


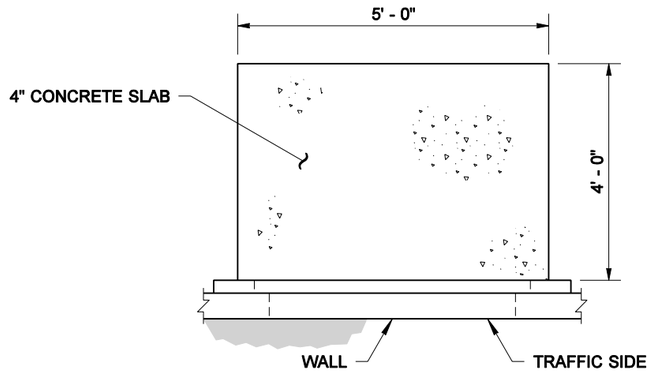

**DOOR DETAIL**
(SEE NOTE 2)



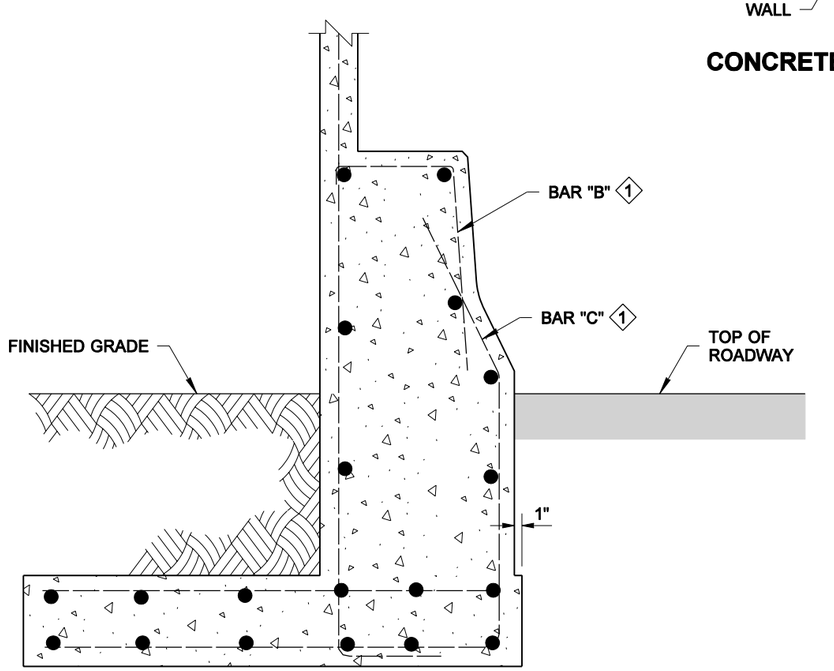

SECTION (C)

**BENDING DIAGRAM**




**CONCRETE SLAB DETAIL**




SECTION (D)

**FOR CAST-IN-PLACE WALL W/ TRAFFIC BARRIER**

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL ACCESS DOOR TYPE 2

## STANDARD PLAN D-2.82-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

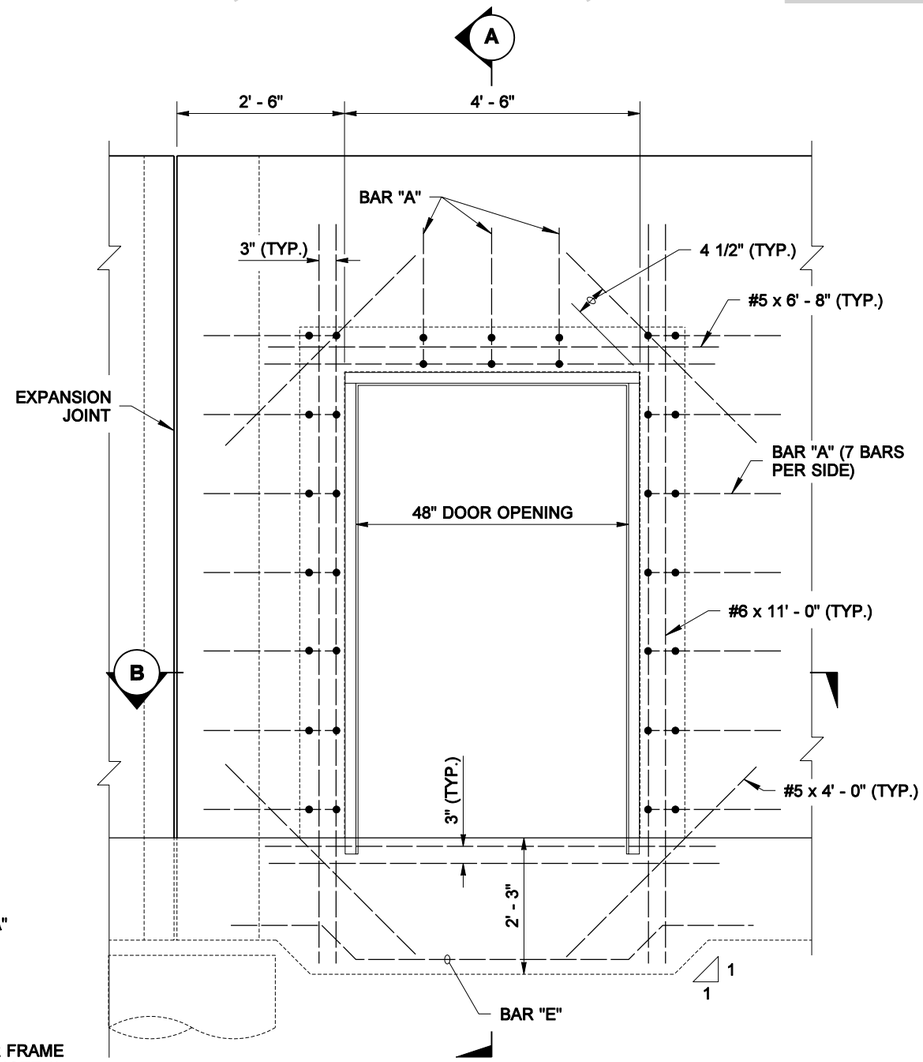
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

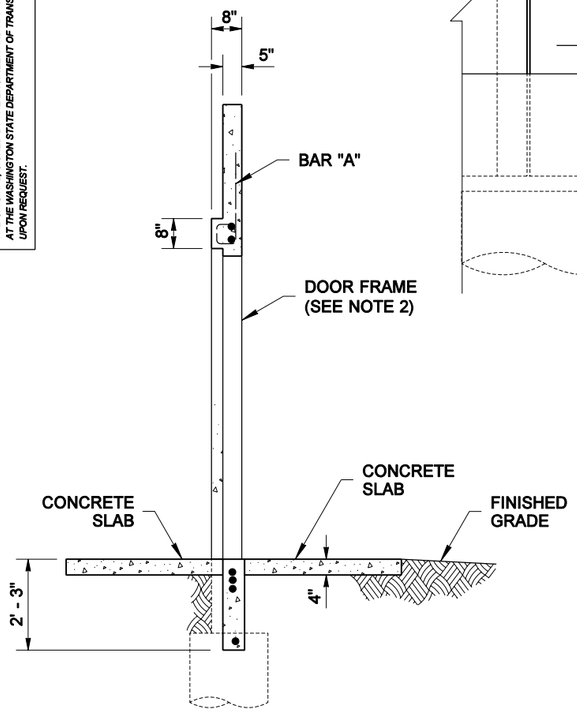
DRAWN BY: ADAM COCHRAN

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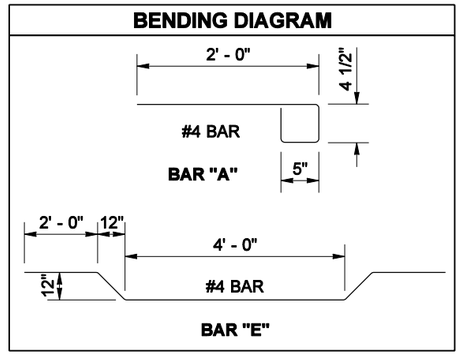


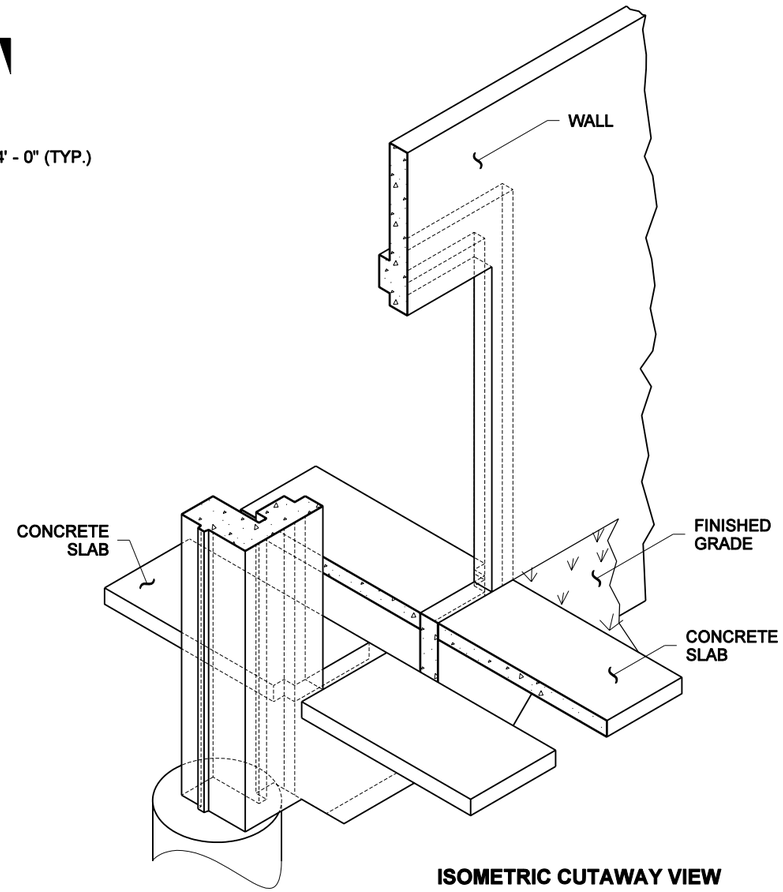

CONCRETE SLAB NOT SHOWN

## DOOR DETAIL
(SEE NOTE 2)




SECTION (A)

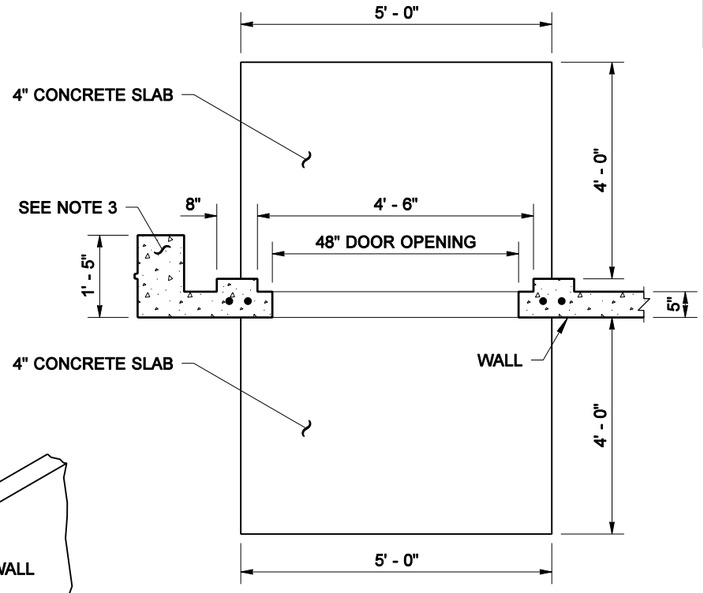



ISOMETRIC CUTAWAY VIEW

**NOTES**

1. All rebar shall have a minimum 1 1/2" cover.
2. See Standard Plan D-2.92 for door and frame details.
3. See Standard Plan D-2.36 for wall reinforcement not shown.




SECTION (B)

## FOR PRECAST WALL ON SHAFT FOUNDATION

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL ACCESS DOOR TYPE 3

## STANDARD PLAN D-2.84-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

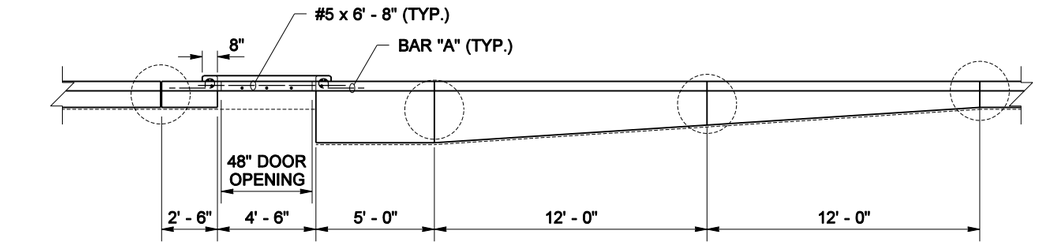
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

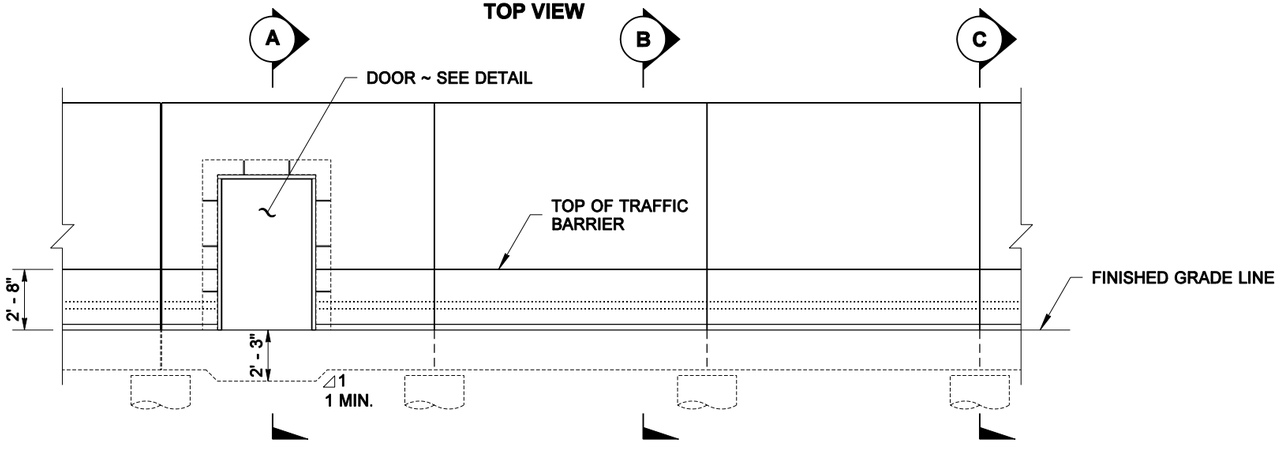
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

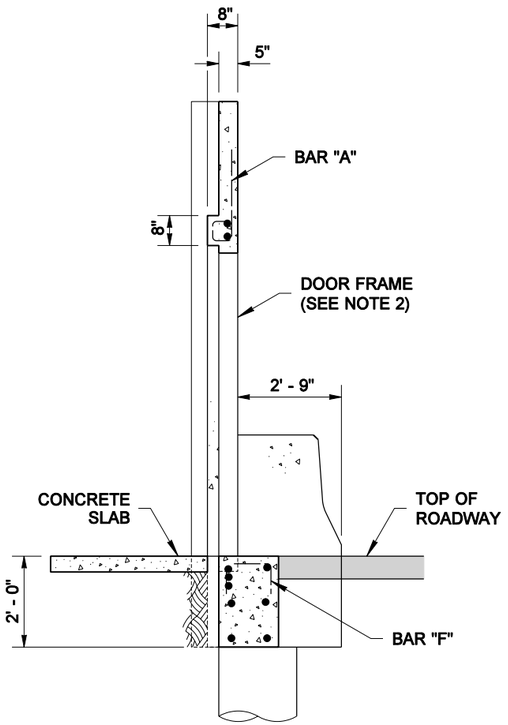
DRAWN BY: ADAM COCHRAN



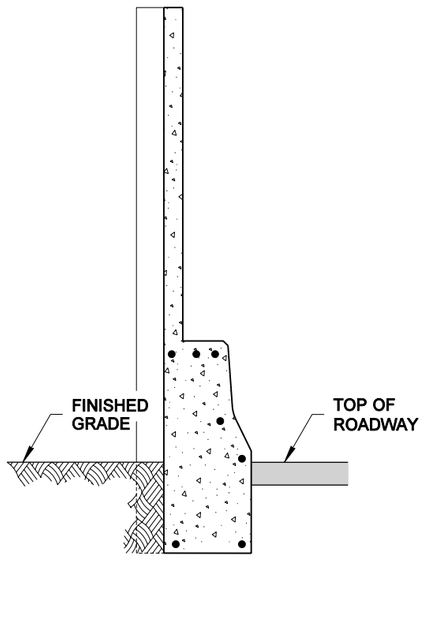

TOP VIEW



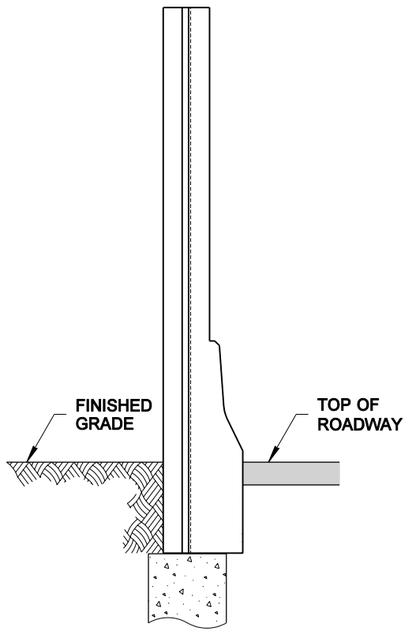

FRONT VIEW




SECTION A



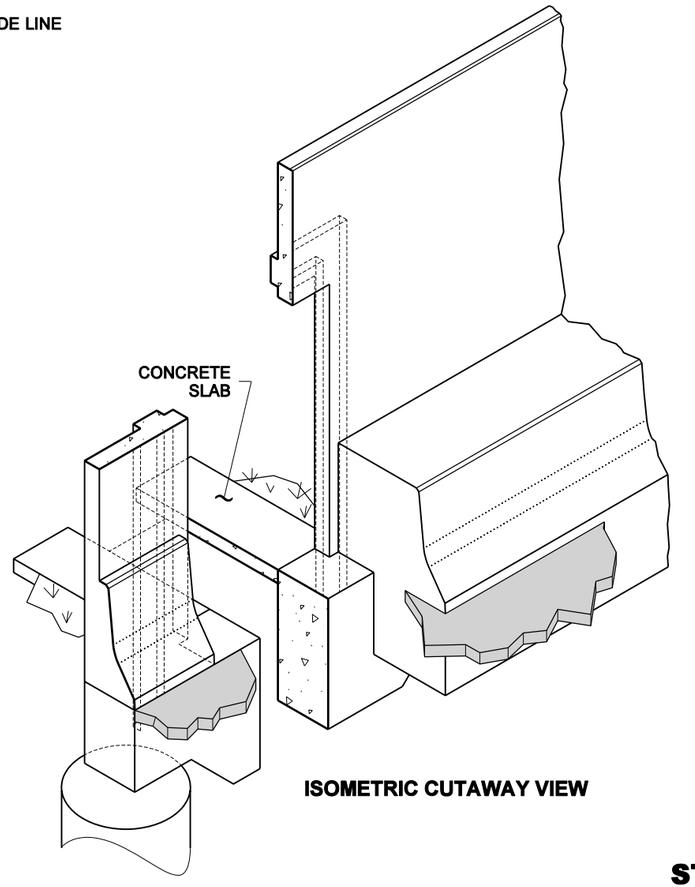

SECTION B




SECTION C

**NOTES**

1. All rebar shall have a minimum 1 1/2" cover.
2. See Standard Plan D-2.92 for door and frame details.
3. See Standard Plan D-2.44 for wall reinforcement not shown.




ISOMETRIC CUTAWAY VIEW

**FOR PRECAST WALL W/ TRAFFIC BARRIER ON SHAFT FOUNDATION**

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL ACCESS DOOR TYPE 4

## STANDARD PLAN D-2.86-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

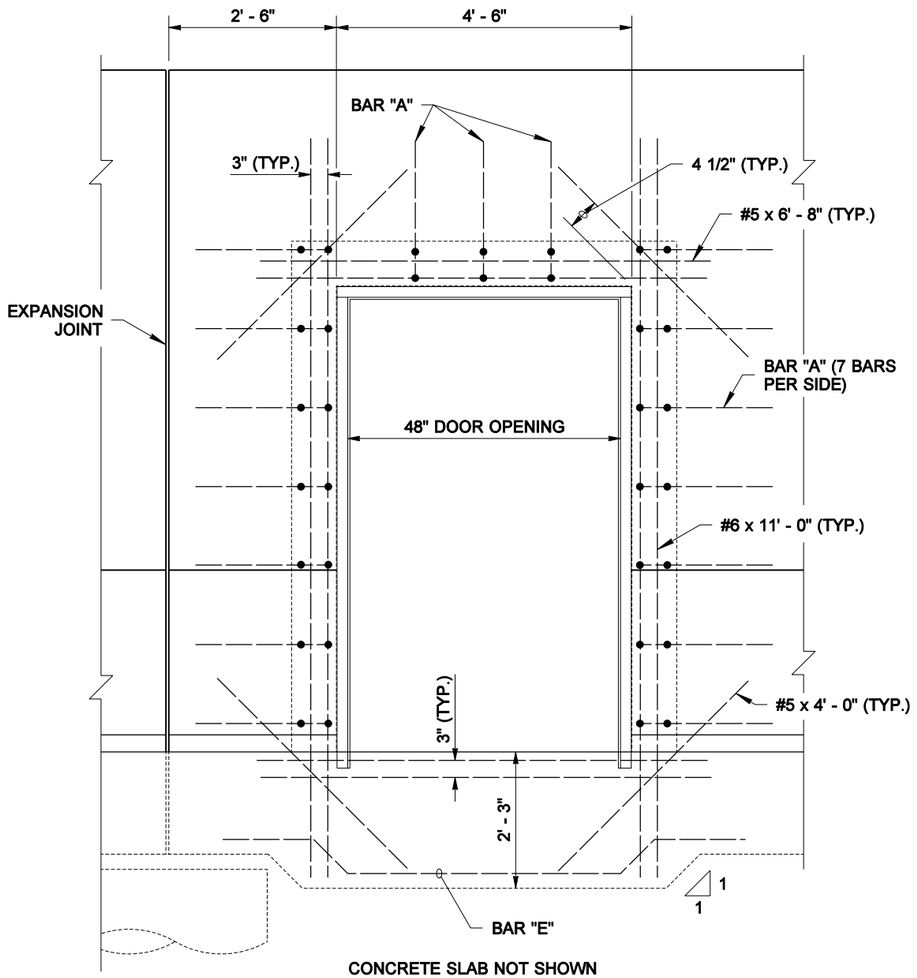
Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN

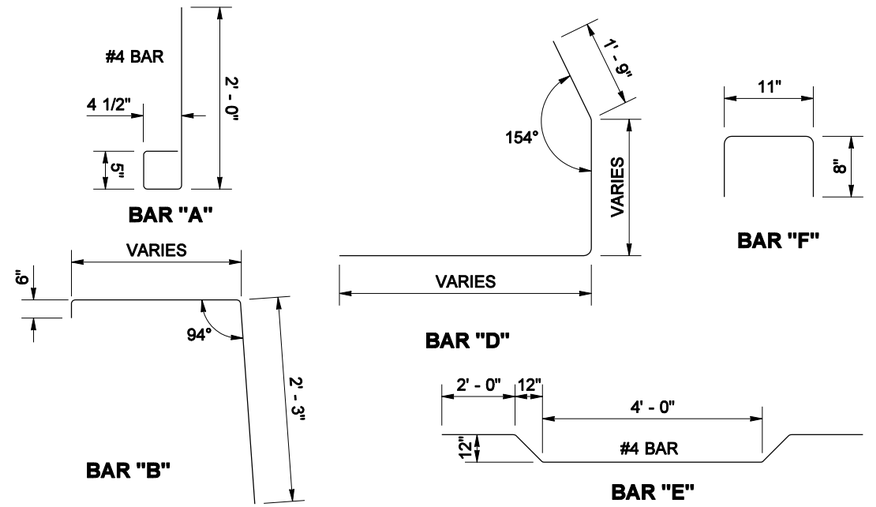


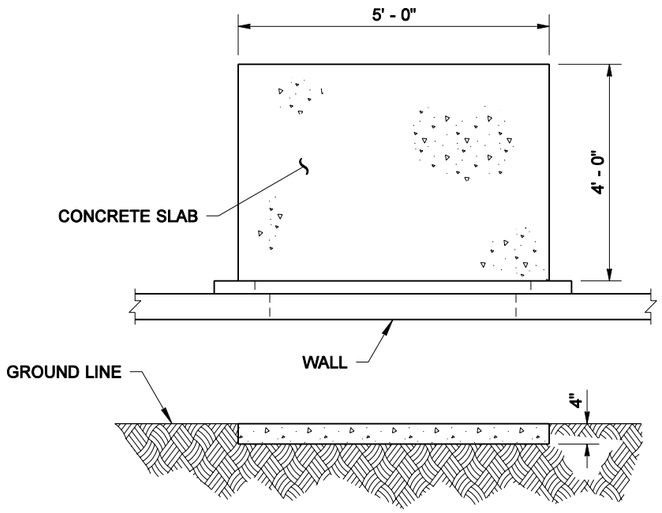

CONCRETE SLAB NOT SHOWN

**DOOR DETAIL**

(SEE NOTE 2)

**BENDING DIAGRAM**




**CONCRETE SLAB DETAIL**

**FOR PRECAST WALL W/ TRAFFIC BARRIER ON SHAFT FOUNDATION**

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL ACCESS DOOR TYPE 4

## STANDARD PLAN D-2.86-00

SHEET 2 OF 2 SHEETS

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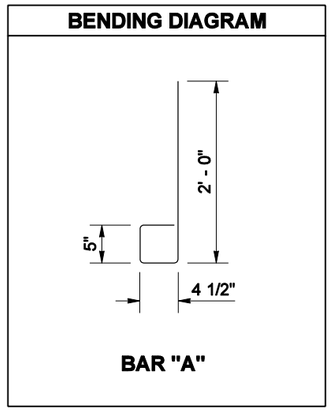
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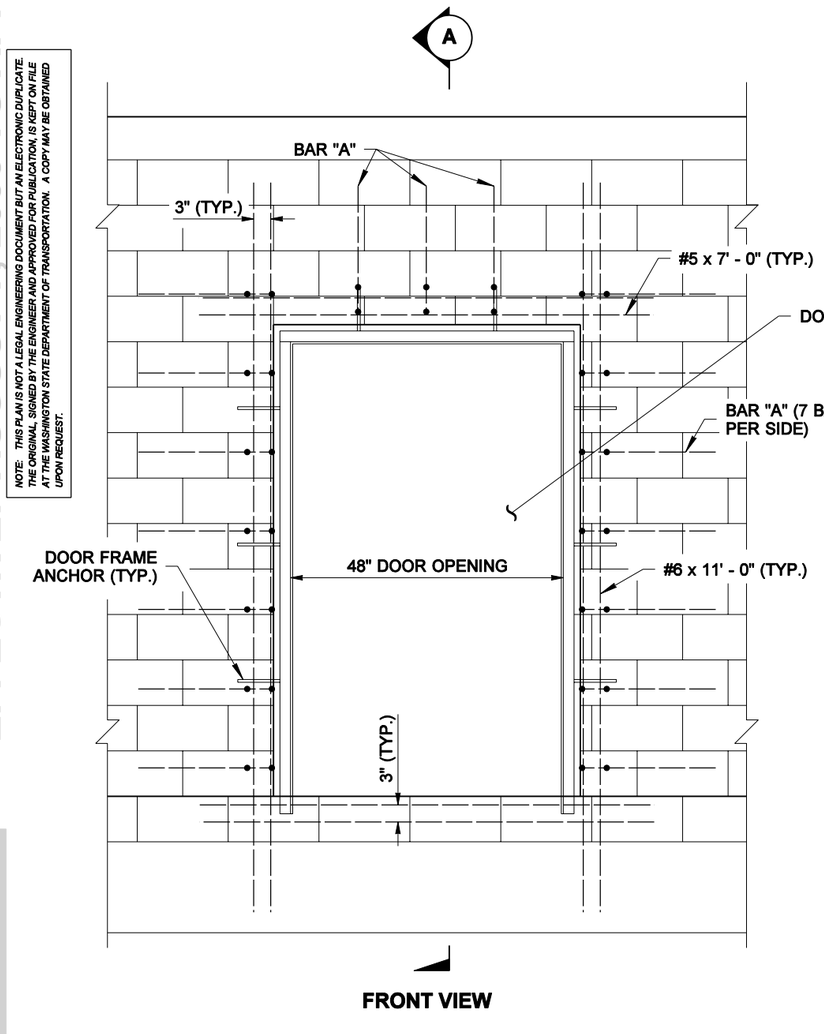
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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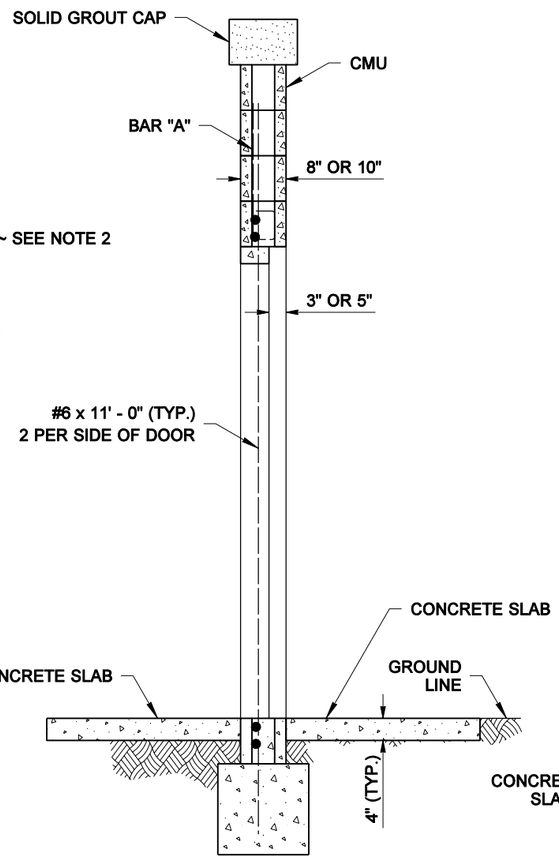
DRAWN BY: ADAM COCHRAN

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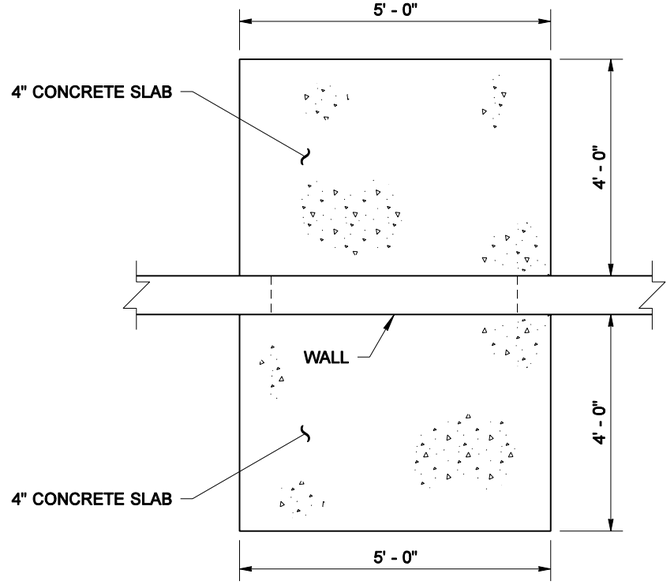



FRONT VIEW



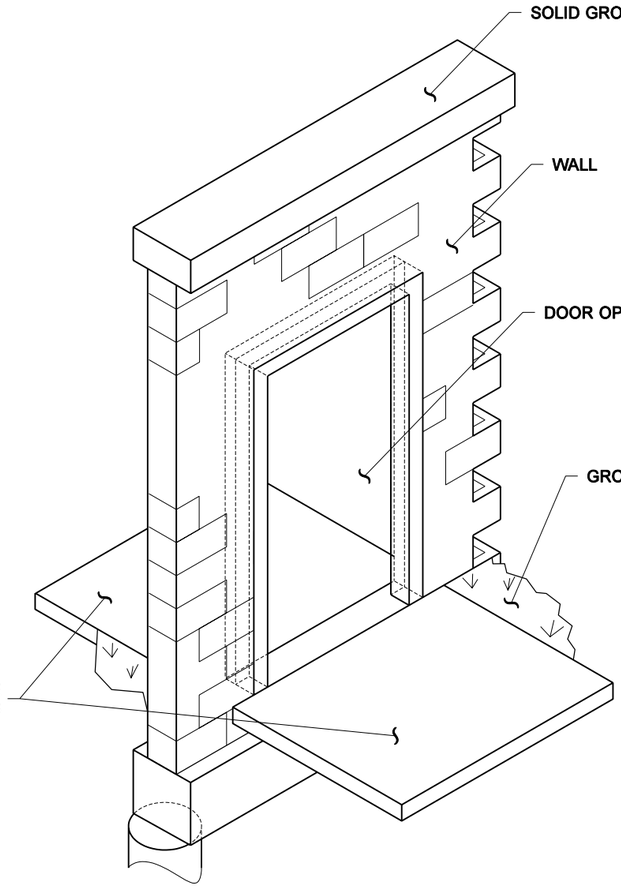

SECTION (A)




CONCRETE SLAB DETAIL

**NOTES**

1. All rebar shall have a minimum 1 1/2" cover.
2. See Standard Plan D-2.92 for door and frame details.
3. See Standard Plan D-2.68 for wall reinforcement not shown.




**FOR MASONRY WALL (SHAFT FOUNDATION SHOWN)**

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL ACCESS DOOR TYPE 5

## STANDARD PLAN D-2.88-00

SHEET 1 OF 1 SHEET

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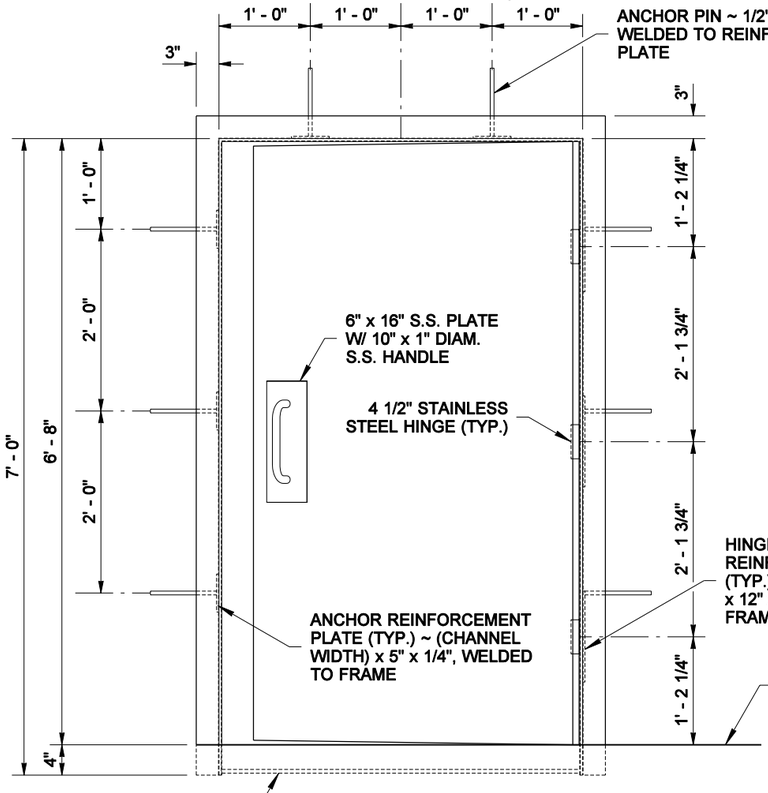
Washington State Department of Transportation

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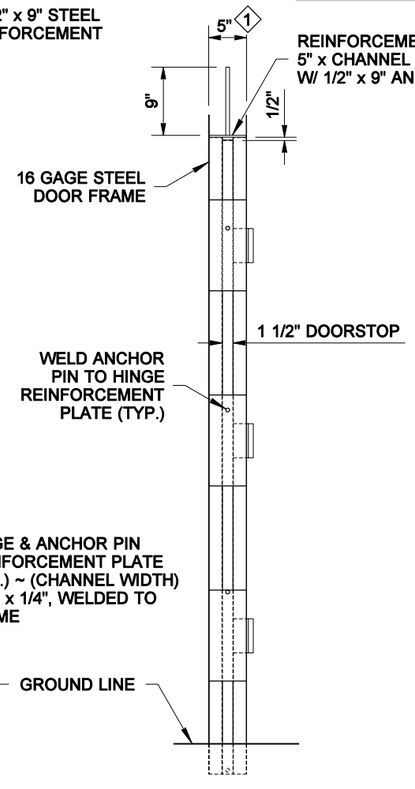
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DRAWN BY: ADAM COCHRAN

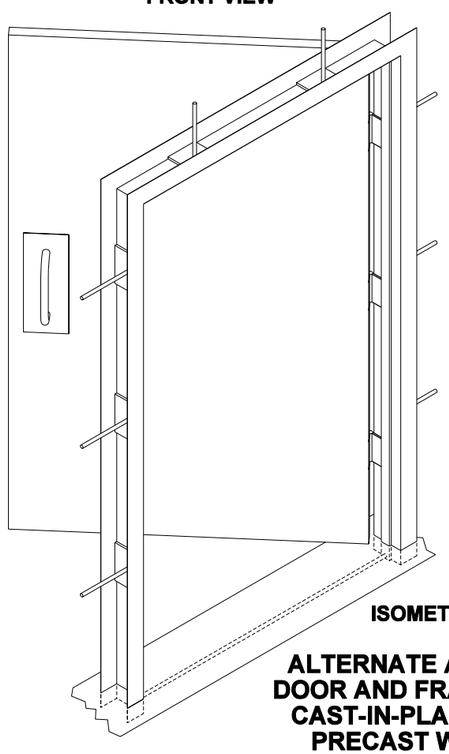
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FRONT VIEW

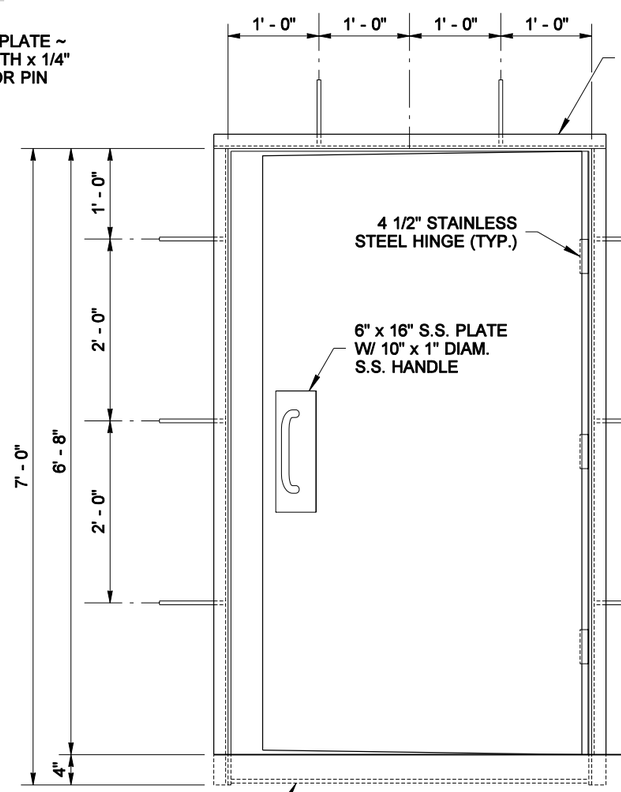



SIDE VIEW

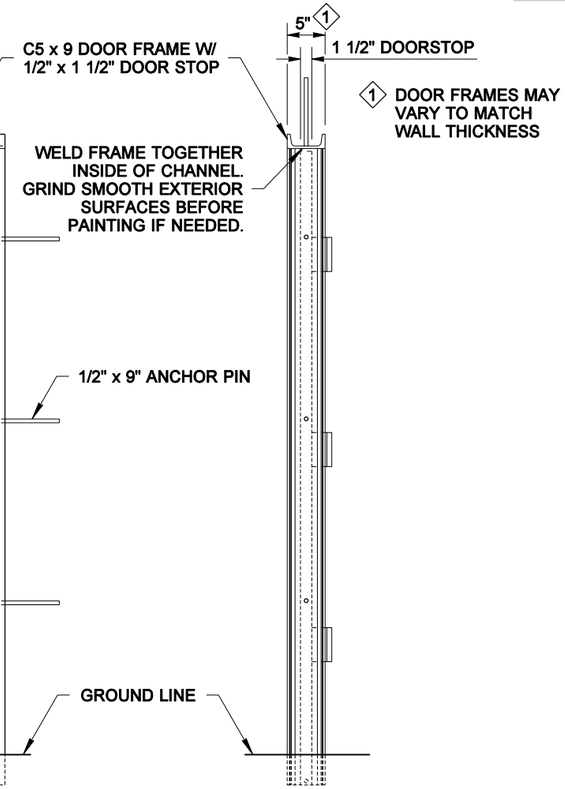


ISOMETRIC VIEW

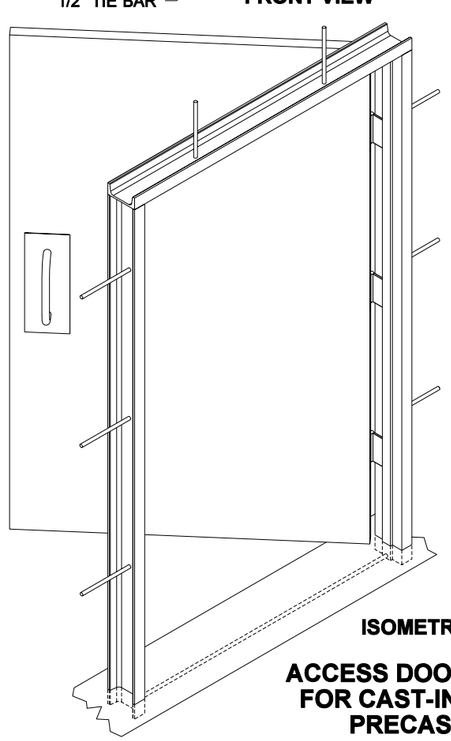
**ALTERNATE ACCESS DOOR AND FRAME FOR CAST-IN-PLACE AND PRECAST WALLS**




FRONT VIEW




SIDE VIEW



ISOMETRIC VIEW

**ACCESS DOOR AND FRAME FOR CAST-IN-PLACE AND PRECAST WALLS**

**NOTE**

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

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL ACCESS DOOR & FRAME

## STANDARD PLAN D-2.92-00

SHEET 1 OF 2 SHEETS

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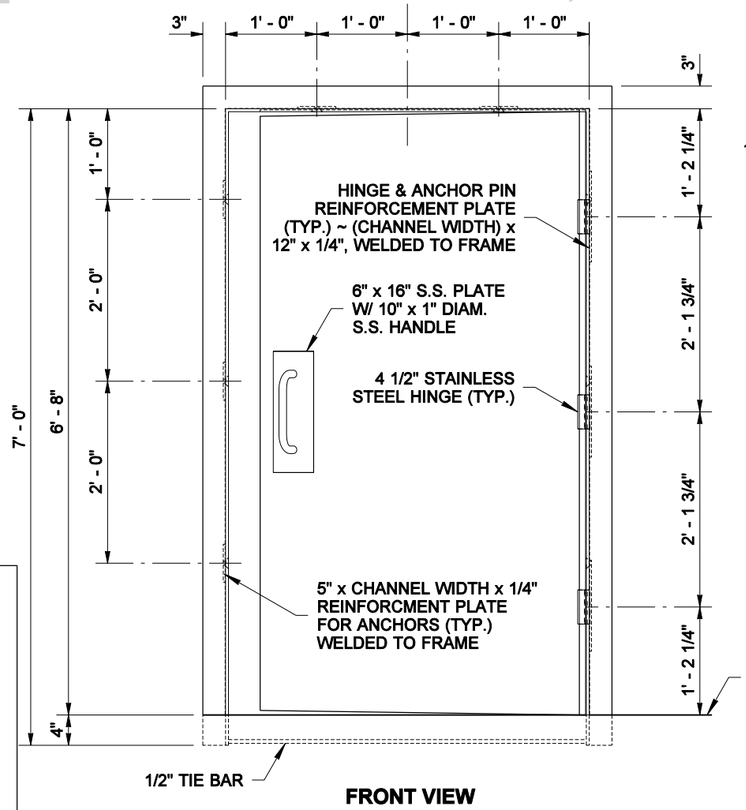
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

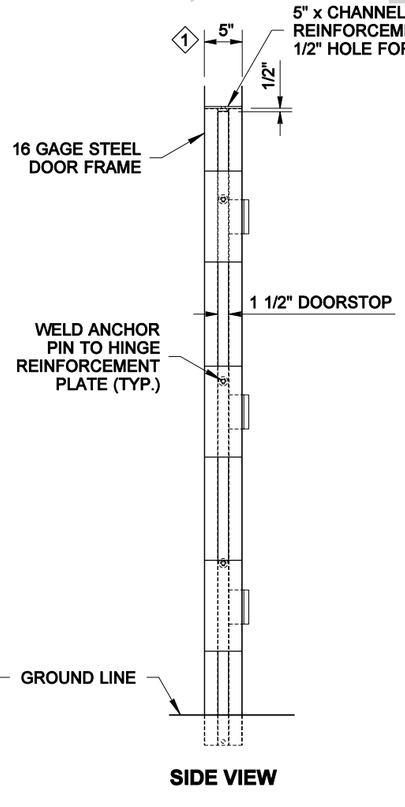
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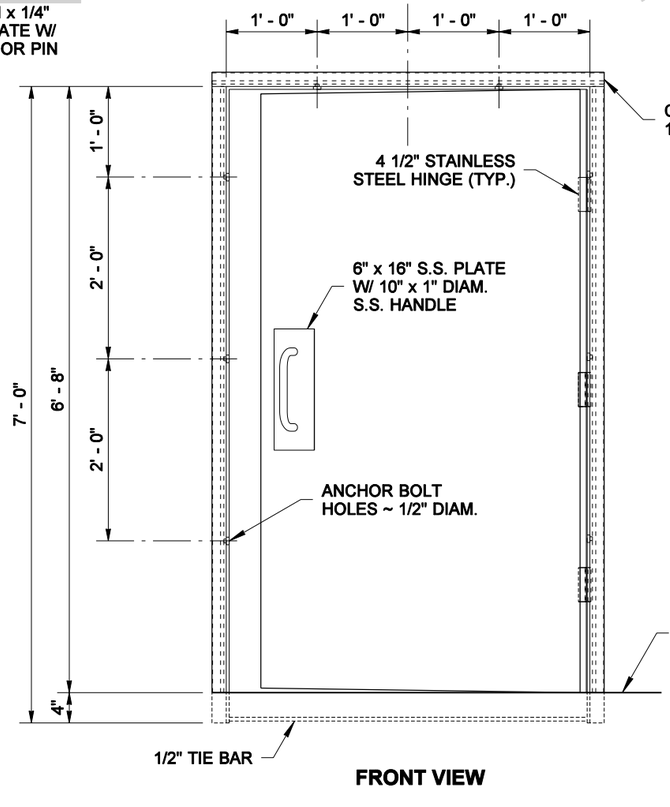
DRAWN BY: ADAM COCHRAN



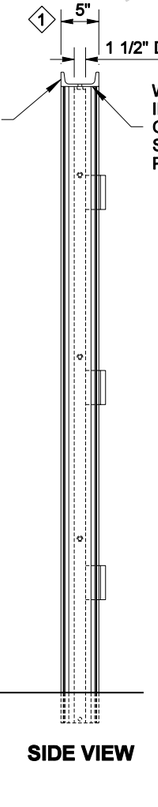

FRONT VIEW




SIDE VIEW

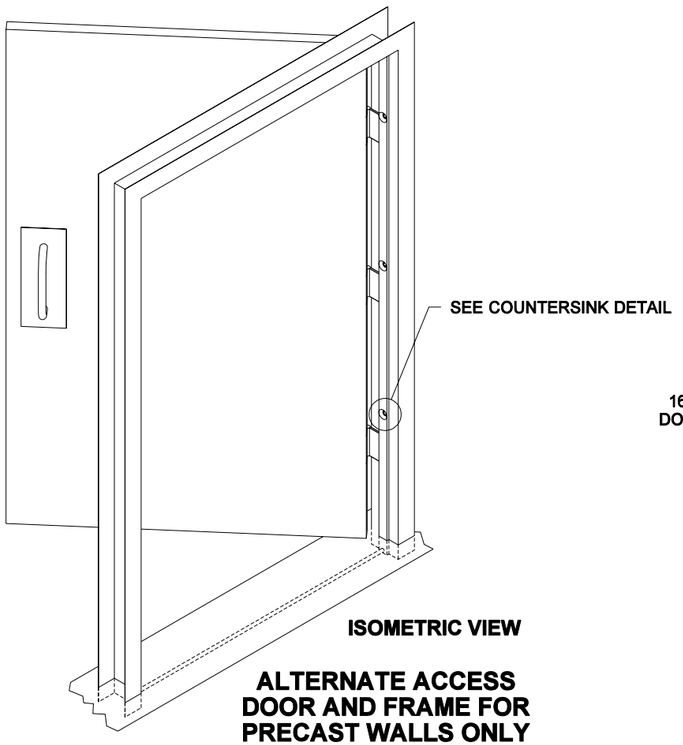



FRONT VIEW



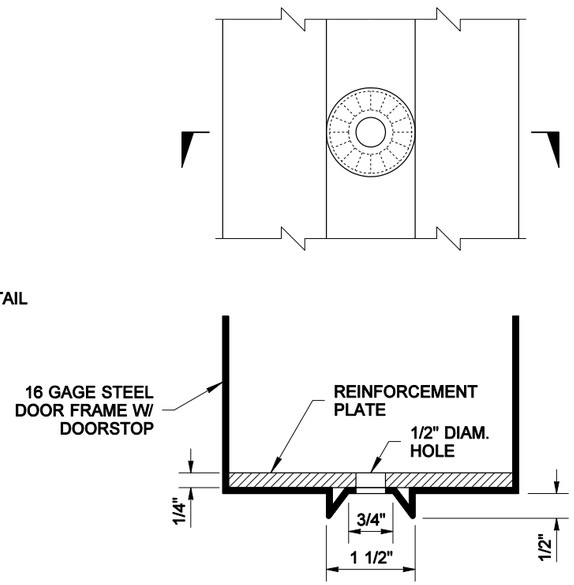

SIDE VIEW

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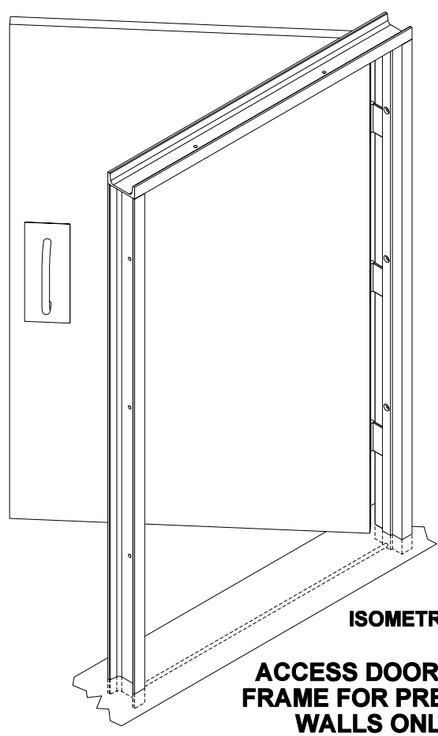



ISOMETRIC VIEW

**ALTERNATE ACCESS DOOR AND FRAME FOR PRECAST WALLS ONLY**




**COUNTERSINK DETAIL**



ISOMETRIC VIEW

**ACCESS DOOR AND FRAME FOR PRECAST WALLS ONLY**

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2006

# NOISE BARRIER WALL ACCESS DOOR & FRAME

## STANDARD PLAN D-2.92-00

SHEET 2 OF 2 SHEETS

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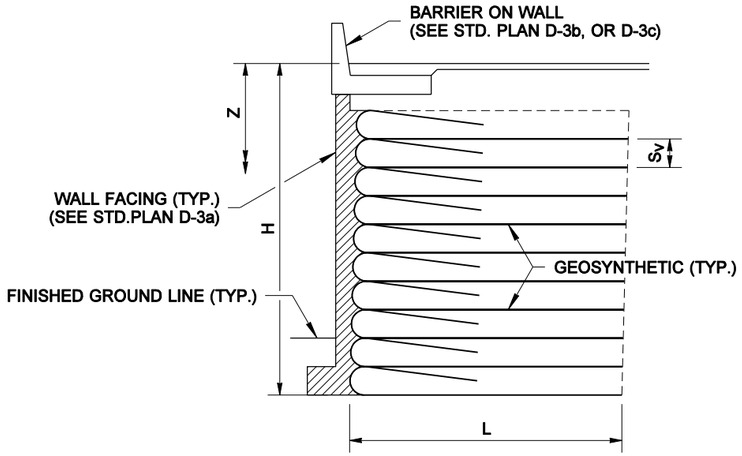
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-10-05* — DATE

Washington State Department of Transportation

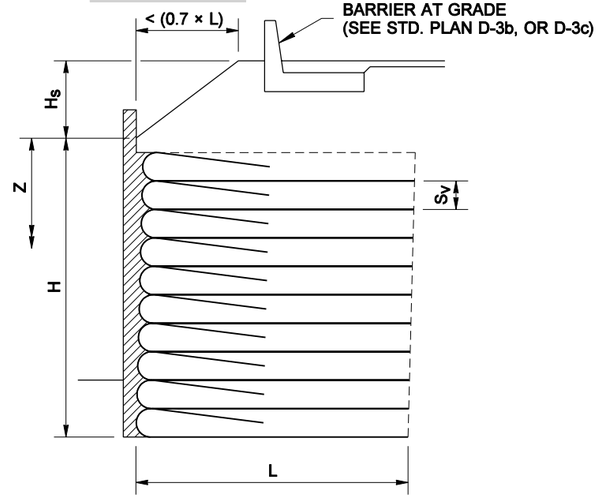
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

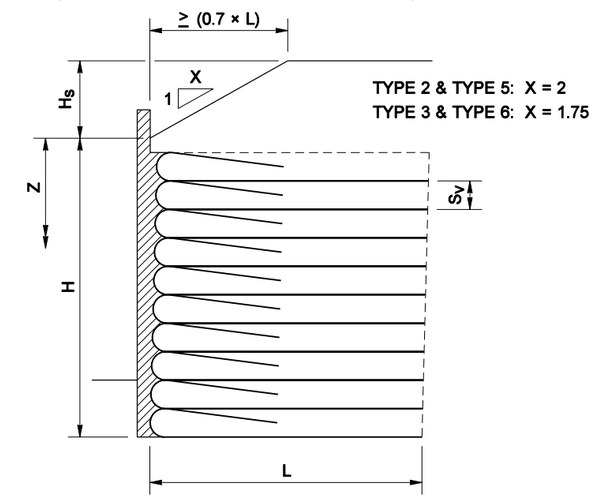
DRAWN BY: MARK SUJKA




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



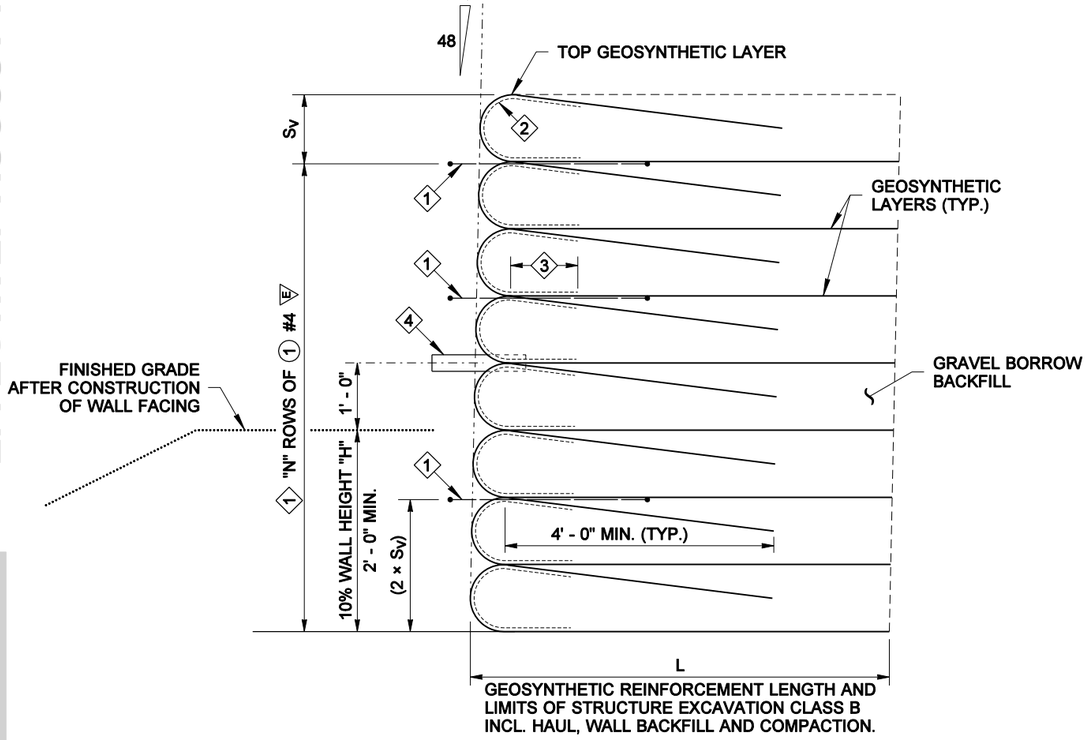

**GEOSYNTHETIC WALL, TYPE 4**
**STATIC DESIGN ONLY**
GROUND ACCELERATION COEFFICIENT, A=0.15g OR LESS.
HORIZONTAL BACKSLOPE WITH 2 FT. TRAFFIC SURCHARGE




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

# PERMANENT GEOSYNTHETIC WALLS
## TYPICAL CROSS SECTIONS

**GEOSYNTHETIC WALL, TYPES 5 & 6**
**STATIC DESIGN ONLY**
GROUND ACCELERATION COEFFICIENT, A=0.15g OR LESS.




**SECTION DETAIL**

## NOTES

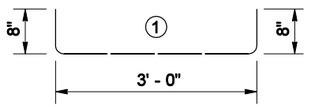
FOR THE VALUES OF "L", "N", AND "$S_V$", SEE SHEET 2.

FOR GEOSYNTHETIC WALL CONSTRUCTION SEQUENCE, SEE SHEET 3.

E = EPOXY COATED

## KEY NOTES

① "N" ROWS OF ① #4 E 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 GEO-SYNTHETIC LAYERS APPROX. 9" DEEP AT 10' - 0" HORIZONTAL SPACING, LENGTH TO EXTEND TO OUTER SURFACE OF SPECIFIED WALL FACING.

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EXPIRES JULY 1, 2007

# PERMANENT GEOSYNTHETIC WALL TYPES 1 ~ 6
# STANDARD PLAN D-3

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *07-13-05* — DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA

## GEOSYNTHETIC REINFORCEMENT LENGTH AND DOWELS

| TOTAL WALL HEIGHT $H+H_S$ (ft) | FASCIA FOOTING WIDTH B (ft - in) | GEOSYNTHETIC REINFORCEMENT LENGTH L (ft) | | | | | | ROWS OF #4 (E) DOWEL BARS REQUIRED N (No.) |
|---|---|---|---|---|---|---|---|---|
| | | TYPE 1 | TYPE 2 | TYPE 3 | TYPE 4 | TYPE 5 | TYPE 6 | |
| ≤ 5' | 1' - 0" | 6.0 | 6.0 | 6.5 | 6.0 | 6.0 | 6.0 | 2 |
| 6' | 1' - 0" | 6.0 | 6.0 | 7.9 | 6.0 | 6.0 | 6.0 | 3 |
| 7' | 1' - 0" | 6.4 | 6.9 | 9.3 | 6.4 | 6.4 | 6.4 | 3 |
| 8' | 1' - 0" | 6.9 | 7.9 | 10.7 | 6.9 | 6.9 | 7.1 | 3 |
| 9' | 1' - 0" | 7.4 | 8.9 | 12.1 | 7.4 | 7.4 | 8.1 | 3 |
| 10' | 1' - 0" | 7.9 | 10.0 | 13.5 | 7.9 | 7.9 | 9.0 | 4 |
| 11' | 1' - 0 1/2" | 8.4 | 11.0 | 14.7 | 8.4 | 8.4 | 10.0 | 4 |
| 12' | 1' - 0 1/2" | 8.8 | 12.0 | 16.1 | 8.8 | 8.8 | 10.9 | 4 |
| 13' | 1' - 1" | 9.3 | 13.0 | 17.5 | 9.3 | 9.3 | 11.9 | 4 |
| 14' | 1' - 1" | 9.8 | 13.9 | 18.9 | 9.8 | 9.8 | 12.8 | 4 |
| 15' | 1' - 2" | 10.5 | 14.9 | 20.3 | 10.5 | 10.5 | 13.7 | 6 |
| 16' | 1' - 2" | 11.2 | 16.0 | 21.7 | 11.2 | 11.2 | 14.7 | 6 |
| 17' | 1' - 2 1/2" | 11.9 | 17.0 | 22.9 | 11.9 | 11.9 | 15.6 | 8 |
| 18' | 1' - 2 1/2" | 12.6 | 18.0 | 24.3 | 12.6 | 12.6 | 16.6 | 8 |
| 19' | 1' - 3" | 13.3 | 19.0 | 25.7 | 13.3 | 13.4 | 17.5 | 8 |
| 20' | 1' - 3" | 14.0 | 20.1 | 27.1 | 14.0 | 14.1 | 18.5 | 10 |
| 21' | 1' - 3 1/2" | 14.7 | 21.1 | 28.5 | 14.7 | 14.8 | 19.4 | 10 |
| 22' | 1' - 3 1/2" | 15.4 | 22.2 | 29.9 | 15.4 | 15.5 | 20.4 | 10 |
| 23' | 1' - 4" | 16.1 | 23.2 | 31.1 | 16.1 | 16.2 | 21.3 | 10 |
| 24' | 1' - 4" | 16.8 | 24.2 | 32.5 | 16.8 | 16.9 | 22.3 | 10 |
| 25' | 1' - 5" | 17.5 | 25.2 | 33.9 | 17.5 | 17.7 | 23.2 | 10 |
| 26' | 1' - 5" | 18.2 | 26.3 | 35.3 | 18.2 | 18.4 | 24.2 | 10 |
| 27' | 1' - 5 1/2" | 18.9 | 27.3 | 36.7 | 18.9 | 19.1 | 25.1 | 10 |
| 28' | 1' - 5 1/2" | 19.6 | 28.2 | 38.1 | 19.6 | 19.9 | 26.1 | 10 |
| 29' | 1' - 6" | 20.3 | 29.2 | 39.5 | 20.3 | 20.6 | 27.0 | 10 |
| 30' | 1' - 6" | 21.0 | 30.3 | 40.7 | 21.0 | 21.3 | 28.0 | 10 |
| 31' | 1' - 6 1/2" | 21.7 | 31.4 | 42.1 | 21.7 | 22.0 | 28.9 | 10 |
| 32' | 1' - 6 1/2" | 22.4 | 32.3 | 43.5 | 22.4 | 22.8 | 29.9 | 10 |
| 33' | 1' - 7" | 23.1 | 33.3 | 44.9 | 23.1 | 23.4 | 30.8 | 10 |
| 34' | 1' - 7" | 23.8 | 34.3 | 46.3 | 23.8 | 24.2 | 31.8 | 10 |
| 35' | 1' - 8" | 24.5 | 35.4 | 47.7 | 24.5 | 24.9 | 32.7 | 10 |

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## GEOSYNTHETIC REINFORCEMENT SPACING AND STRENGTH

| TOTAL WALL HEIGHT $H+H_S$ (ft) | DEPTH BELOW TOP OF SURCHARGE $Z+H_S$ (ft) | GEOSYNTHETIC REINFORCEMENT VERTICAL SPACING $S_V$ (ft) | LONG-TERM GEOSYNTHETIC REINFORCEMENT STRENGTH REQUIRED $T_{al}$ (lb/ft) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | TYPE 1 | TYPE 2 | TYPE 3 | TYPE 4 | TYPE 5 | TYPE 6 |
| UP TO 5 | 5 | 0.75 | 244 | 220 | 228 | 244 | 220 | 228 |
| | 5 | 1.00 | 325 | 294 | 305 | 325 | 294 | 305 |
| | 5 | 1.25 | 406 | 367 | 380 | 406 | 367 | 380 |
| $5 < H+H_S \leq 10$ | 0 to 10 | 0.75 | 418 | 415 | 438 | 418 | 415 | 438 |
| | 0 to 10 | 1.00 | 557 | 553 | 584 | 557 | 553 | 584 |
| | 0 to 10 | 1.25 | 696 | 691 | 731 | 696 | 691 | 731 |
| $10 < H+H_S \leq 20$ | 0 to 10 | 0.75 | 418 | 498 | 580 | 418 | 467 | 534 |
| | 10.1 to 20 | 0.75 | 766 | 815 | 882 | 766 | 815 | 882 |
| | 0 to 10 | 1.00 | 557 | 665 | 774 | 557 | 623 | 712 |
| | 10.1 to 20 | 1.00 | 1020 | 1087 | 1176 | 1020 | 1087 | 1176 |
| | 0 to 10 | 1.25 | 696 | 830 | 967 | 696 | 779 | 889 |
| | 10.1 to 20 | 1.25 | 1272 | 1356 | 1464 | 1272 | 1356 | 1464 |
| $20 < H+H_S \leq 30$ | 0 to 10 | 0.75 | 442 | 620 | 744 | 418 | 528 | 629 |
| | 10.1 to 20 | 0.75 | 766 | 876 | 1000 | 766 | 876 | 977 |
| | 20.1 to 30 | 0.75 | 1114 | 1224 | 1320 | 1114 | 1224 | 1320 |
| | 0 to 10 | 1.00 | 589 | 828 | 991 | 557 | 704 | 839 |
| | 10.1 to 20 | 1.00 | 1020 | 1169 | 1332 | 1020 | 1168 | 1308 |
| | 20.1 to 30 | 1.00 | 1488 | 1632 | 1764 | 1488 | 1632 | 1764 |
| | 0 to 10 | 1.25 | 736 | 1034 | 1236 | 696 | 881 | 1048 |
| | 10.1 to 20 | 1.25 | 1272 | 1464 | 1668 | 1272 | 1464 | 1632 |
| | 20.1 to 30 | 1.25 | 1860 | 2040 | 2208 | 1860 | 2040 | 2208 |
| $30 < H+H_S \leq 35$ | 0 to 10 | 0.75 | 464 | 683 | 826 | 418 | 559 | 677 |
| | 10.1 to 20 | 0.75 | 766 | 937 | 1081 | 766 | 907 | 1025 |
| | 20.1 to 30 | 0.75 | 1114 | 1254 | 1368 | 1114 | 1254 | 1368 |
| | 30.1 to 35 | 0.75 | 1284 | 1428 | 1548 | 1284 | 1428 | 1548 |
| | 0 to 10 | 1.00 | 619 | 910 | 1102 | 557 | 745 | 902 |
| | 10.1 to 20 | 1.00 | 1020 | 1248 | 1440 | 1020 | 1212 | 1368 |
| | 20.1 to 30 | 1.00 | 1488 | 1668 | 1824 | 1488 | 1668 | 1824 |
| | 30.1 to 35 | 1.00 | 1716 | 1908 | 2064 | 1716 | 1908 | 2064 |
| | 0 to 10 | 1.25 | 773 | 1138 | 1380 | 696 | 931 | 1127 |
| | 10.1 to 20 | 1.25 | 1272 | 1560 | 1800 | 1272 | 1512 | 1704 |
| | 20.1 to 30 | 1.25 | 1860 | 2088 | 2292 | 1860 | 2088 | 2292 |
| | 30.1 to 35 | 1.25 | 2148 | 2376 | 2580 | 2148 | 2376 | 2580 |

### NOTES

THE LONG-TERM GEOSYNTHETIC DESIGN STRENGTH "$T_{al}$" SHALL BE DETERMINED IN ACCORDANCE WITH WSDOT STANDARD PRACTICE T925. SEE QUALIFIED PRODUCTS LIST FOR PRODUCTS IN WHICH "$T_{al}$" HAS BEEN DETERMINED.

"H", "$H_S$", "L", AND "Z" 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 "$T_{al}$" FOR THAT LAYER.

COLUMN "B" IS A REFERENCE FOR STANDARD PLAN D-3a.

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# PERMANENT GEOSYNTHETIC WALL TYPES 1 ~ 6 STANDARD PLAN D-3

SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION

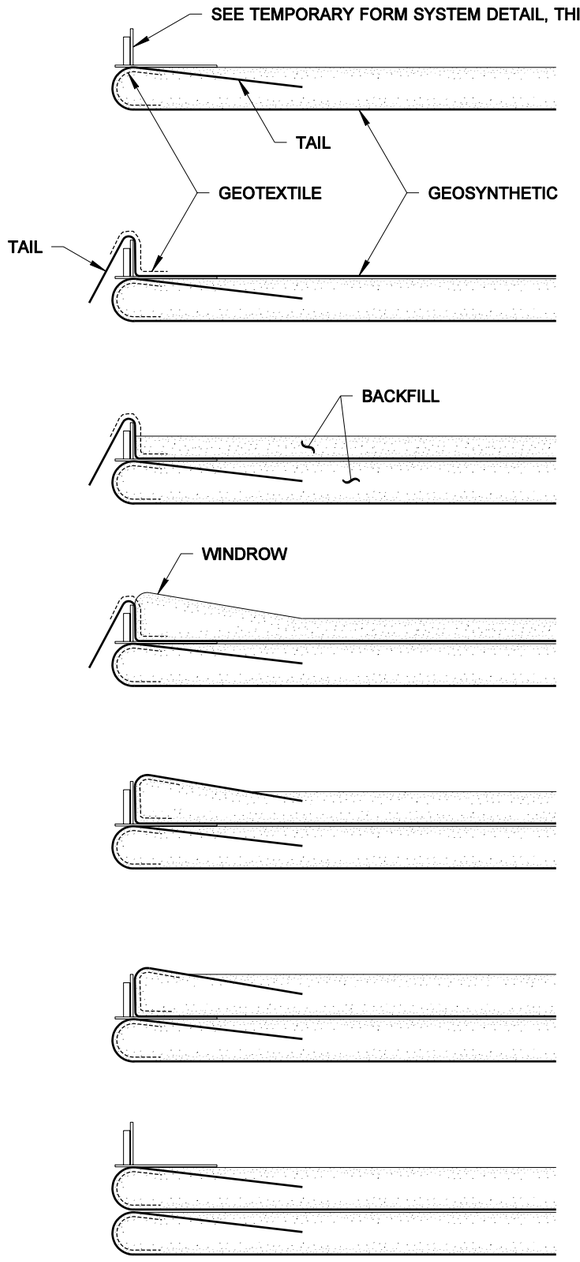
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *07-13-05* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA




1. SET FORM ON COMPLETED LIFT.
2. UNROLL GEOSYNTHETIC AND POSITION IT SO THAT A 4' - 0" WIDE "TAIL" DRAPES OVER THE FORM. IF A GEOGRID IS USED FOR THE GEOSYNTHETIC REINFORCEMENT, POSITION GEOTEXTILE TO PREVENT BACKFILL FROM SPILLING THROUGH GEOGRID OPENINGS.
3. PLACE THE BACKFILL UNTIL THE BACKFILL IS UP TO HALF OF THE REQUIRED VERTICAL GEOSYNTHETIC LAYER SPACING.
4. PLACE A WINDROW TO SLIGHTLY GREATER THAN FULL LIFT HEIGHT AGAINST THE FORM.
5. PLACE THE GEOSYNTHETIC "TAIL" OVER THE WINDROW AND LOCK INTO PLACE WITH BACKFILL.
6. COMPLETE BACKFILLING UNTIL THE COMPACTED BACKFILL LAYER THICKNESS IS EQUAL TO THE REQUIRED VERTICAL GEOSYNTHETIC LAYER SPACING.
7. THE FORM MAY BE LEFT IN PLACE WHILE CONSTRUCTING THE NEXT LAYER (SEE NOTE 2), OTHERWISE, RESET THE FORM AND REPEAT THE SEQUENCE.

## GEOSYNTHETIC WALL CONSTRUCTION SEQUENCE

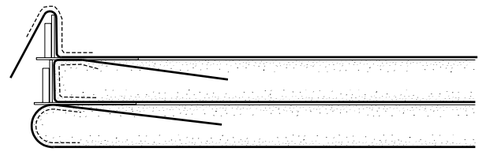
(SECTION VIEW)

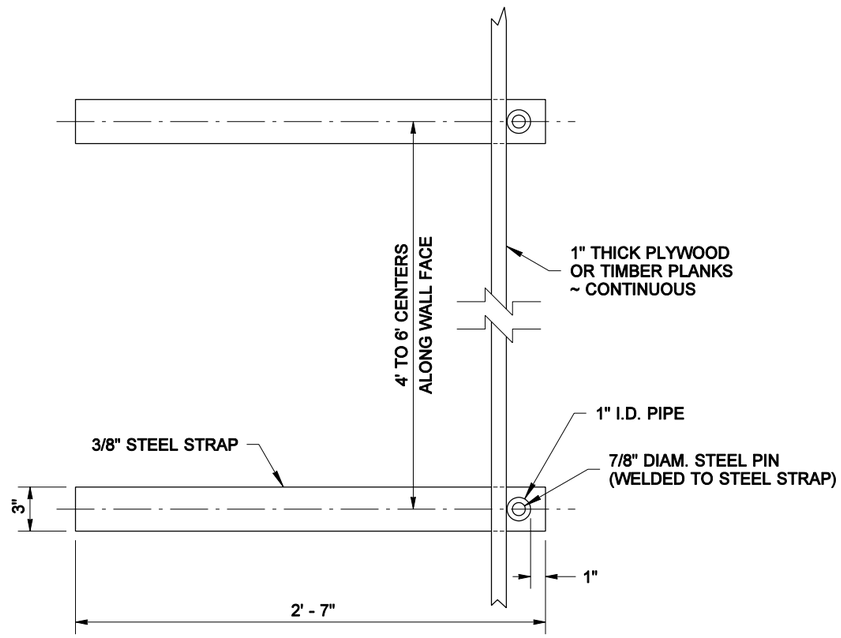
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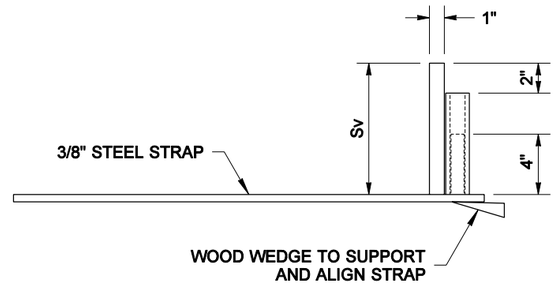
### NOTES

1. USE OF THE TEMPORARY FORM SYSTEM, AS DETAILED IN THIS PLAN, IS OPTIONAL.
2. TO HELP MAINTAIN THE WALL FACE BATTER, LEAVE THE FORM SYSTEM FOR THE PRECEDING LAYER IN PLACE WHILE CONSTRUCTING THE NEXT LAYER. WHEN THE UPPER LAYER IS COMPLETE, REMOVE THE FORM SYSTEM FROM THE LOWER LAYER AND RESET IT FOR THE NEXT LAYER. SEE BELOW.






PLAN




ELEVATION

## TEMPORARY FORM SYSTEM DETAIL




EXPIRES JULY 1, 2007

# PERMANENT GEOSYNTHETIC WALL TYPES 1 ~ 6 STANDARD PLAN D-3

SHEET 3 OF 3 SHEETS

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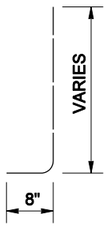
Washington State Department of Transportation

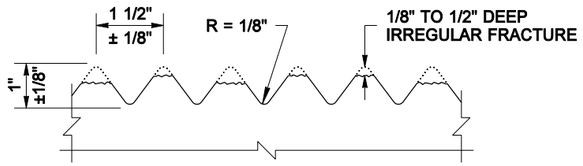
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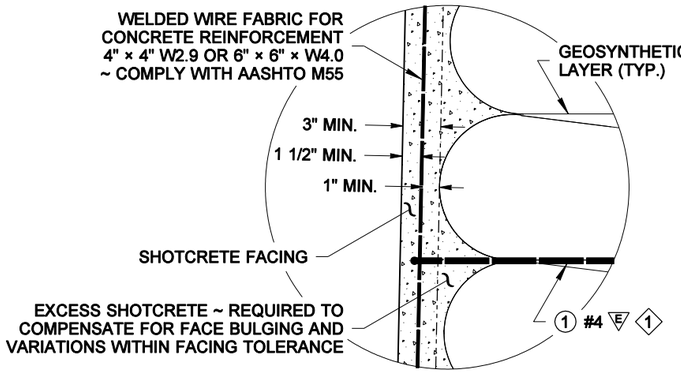


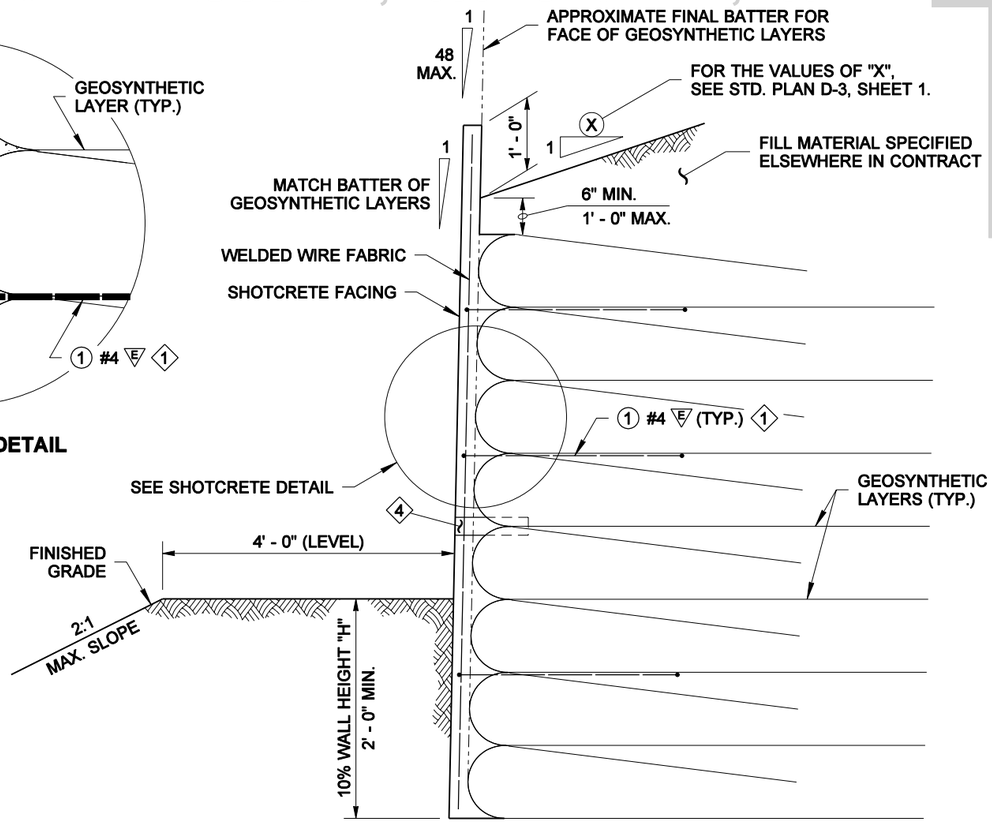

PLAN VIEW

**FRACTURED FIN FINISH DETAIL**

FOR CAST-IN-PLACE FASCIA ONLY

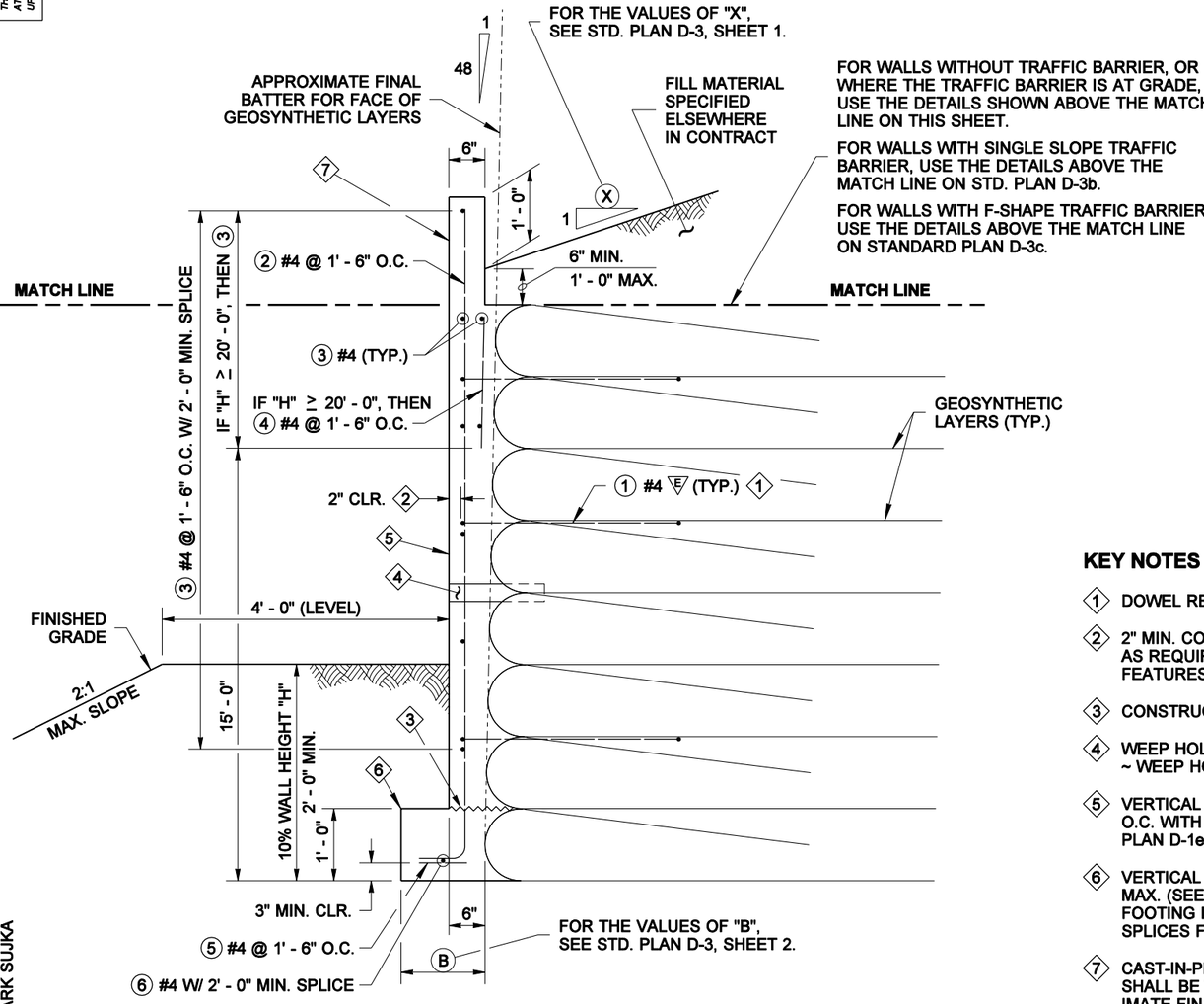



**SHOTCRETE DETAIL**




TYPICAL SECTION

**PERMANENT GEOSYNTHETIC RETAINING WALL WITH SHOTCRETE FACING**




TYPICAL SECTION

**PERMANENT GEOSYNTHETIC RETAINING WALL WITH CAST-IN-PLACE CONCRETE FASCIA**

**KEY NOTES**

◇1 DOWEL REINFORCEMENT (SEE STANDARD PLAN D-3)

◇2 2" MIN. CONCRETE COVER ~ INCREASE THE COVER AS REQUIRED TO ACCOMMODATE ARCHITECTURAL FEATURES AND FINISH.

◇3 CONSTRUCTION JOINT WITH ROUGHENED SURFACE

◇4 WEEP HOLE IN WALL FACING (SEE STANDARD PLAN D-3) ~ WEEP HOLES SHALL BE KEPT CLEAR OF CONCRETE.

◇5 VERTICAL CONSTRUCTION JOINTS IN FASCIA @ 24' - 0" O.C. WITH 1/2" PREMOLDED JOINT FILLER (SEE STD. PLAN D-1e, SHEET 1, "ELEVATION")

◇6 VERTICAL CONSTRUCTION JOINTS IN FOOTING @ 120' O.C. MAX. (SEE STD. PLAN D-1e, SHEET 1, "ELEVATION"). IF THE FOOTING IS STEPPED, PROVIDE 2' - 0" NON-CONTACT LAP SPLICES FOR THE ⑥ #4 BARS AT EACH STEP.

◇7 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 ③ BARS SHALL BE USED ONLY IF THE FACE IS VERTICAL. THE FASCIA FACE SHALL HAVE A FRACTURED FIN FINISH (SEE DETAIL) UNLESS SPECIFIED OTHERWISE IN THE CONTRACT.

**NOTES**

ALL BARS SHOWN ON THIS PLAN SHALL BE AASHTO M-31 UNLESS OTHERWISE SPECIFIED IN THE CONTRACT.

E = EPOXY COATED

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EXPIRES MAY 19, 2006

# PERMANENT GEOSYNTHETIC WALL FASCIA AND FACING STANDARD PLAN D-3a

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-30-04* — DATE

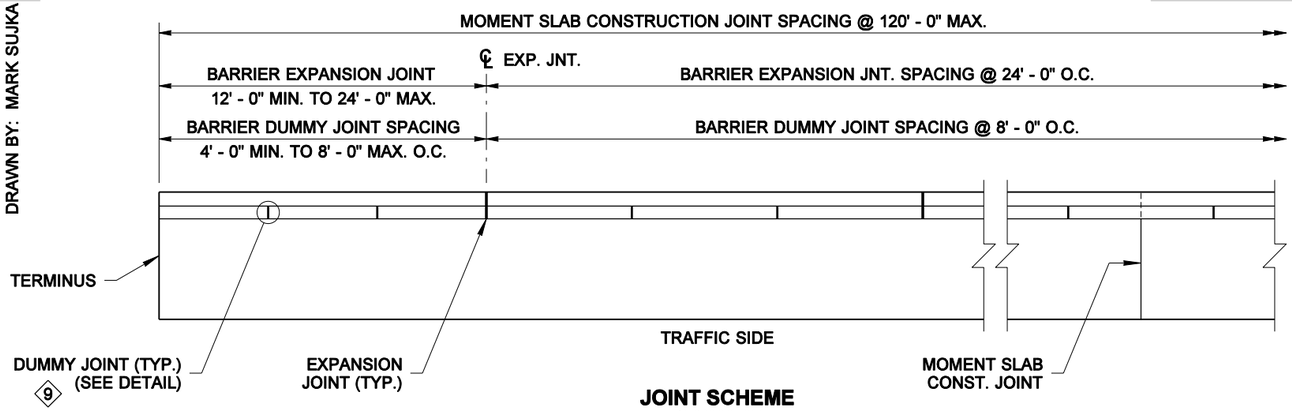
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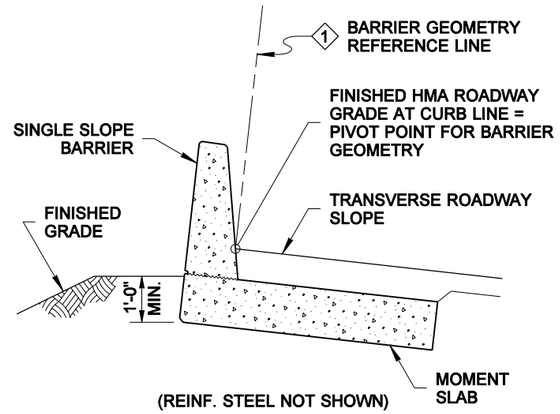
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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**JOINT SCHEME**
PLAN VIEW



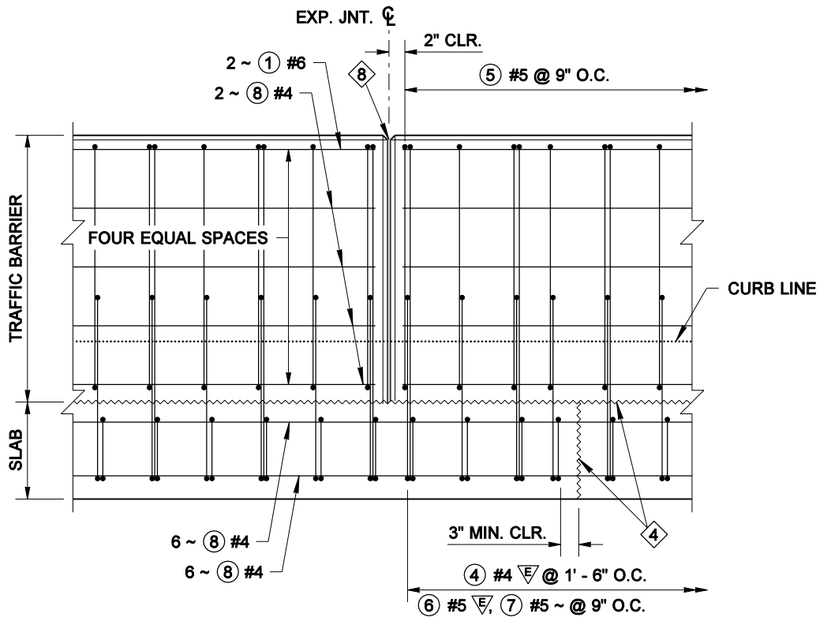

(REINF. STEEL NOT SHOWN)

**TYPICAL SECTION**
SHOWN AT GRADE

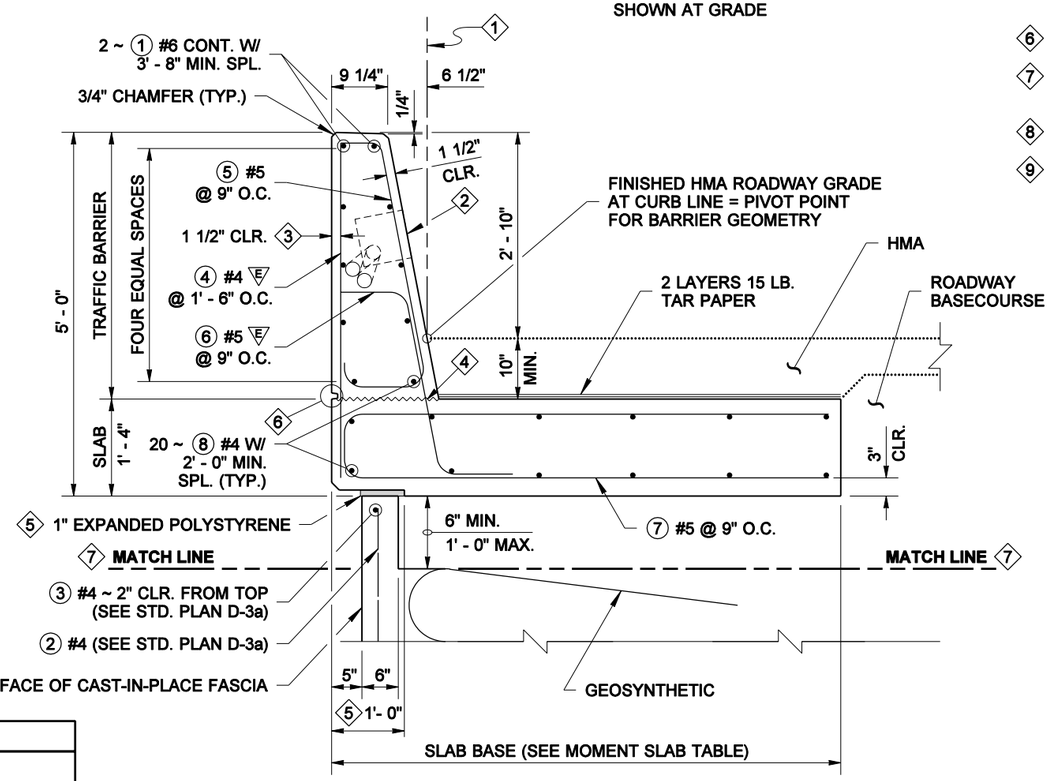
## KEY NOTES

1. THE BARRIER GEOMETRY REFERENCE LINE (B.G.R.L.) IS PERPENDICULAR TO THE TRANSVERSE ROADWAY SLOPE (T.R.S.). FOR SUPERELEVATED TRANSVERSE ROADWAY SLOPES, THE B.G.R.L. ON THE LOW SIDE OF THE ROADWAY SHALL BE PERPENDICULAR TO THE T.R.S. UP TO A MAXIMUM OF 8% SUPERELEVATION; THE B.G.R.L. ON THE HIGH SIDE SHALL ALWAYS BE PERPENDICULAR TO THE T.R.S.
2. JUNCTION BOX & PULL BOX ~ 8" × 8" × 1' - 6" NEMA 4 X S.S. (TYP.). JUNCTION BOX CAN BE RECESSED 1/2" MAX. SEE SPECIAL PROVISIONS. SIZE CONDUIT PER WIRING SCHEDULE, SEE ELECTRICAL PLANS.
3. 1 1/2" MIN. CONCRETE COVER ~ INCREASE THE COVER AS REQUIRED TO ACCOMMODATE ARCHITECTURAL FEATURES AND FINISH.
4. CONSTRUCTION JOINT WITH ROUGHENED SURFACE
5. THE NOTCH, DETAILED BY THESE DIMENSIONS AND SPECIFICATIONS, IS REQUIRED ONLY IF THE BARRIER IS ON WALL FACING.
6. RUSTICATION ~ SEE RUSTICATION DETAIL
7. FOR STRUCTURAL DETAILS BELOW THE MATCH LINE, SEE STANDARD PLANS D-3 AND D-3a.
8. 1/2" EXPANSION JOINT WITH PREMOLDED JOINT FILLER
9. INSTALL BARRIER DUMMY JOINTS ON TRAFFIC SIDE ONLY WHEN ARCHITECTURAL FEATURES ARE SPECIFIED.

| MOMENT SLAB TABLE | | |
|---|---|---|
| SLAB LENGTH | SLAB BASE | |
| | ON WALL | AT GRADE |
| GREATER THAN 80' - 0" | 7' - 0" | 5' - 0" |
| BETWEEN 60' - 0" & 80' - 0" | 8' - 0" | 6' - 0" |
| BETWEEN 40' - 0" & 60' - 0" | 9' - 0" | 7' - 0" |
| LESS THAN 40' - 0" | CONTACT BRIDGE OFFICE | |




**ELEVATION**



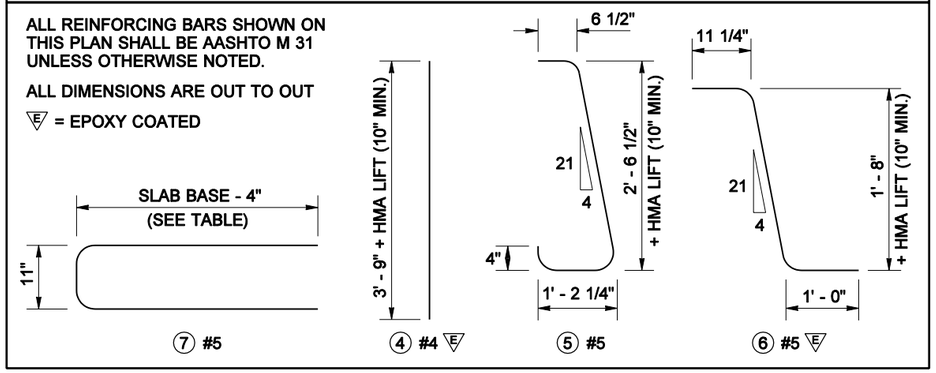

**TYPICAL SECTION**
SHOWN ON WALL

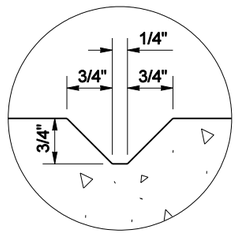
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ALL REINFORCING BARS SHOWN ON THIS PLAN SHALL BE AASHTO M 31 UNLESS OTHERWISE NOTED.

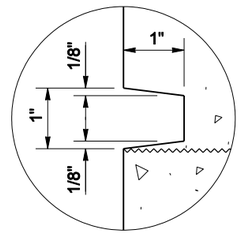
ALL DIMENSIONS ARE OUT TO OUT

E = EPOXY COATED




**DUMMY JOINT DETAIL**




**RUSTICATION DETAIL**




EXPIRES MAY 19, 2006

# PERMANENT GEOSYNTHETIC WALL SINGLE SLOPE BARRIER STANDARD PLAN D-3b

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-30-04* — DATE

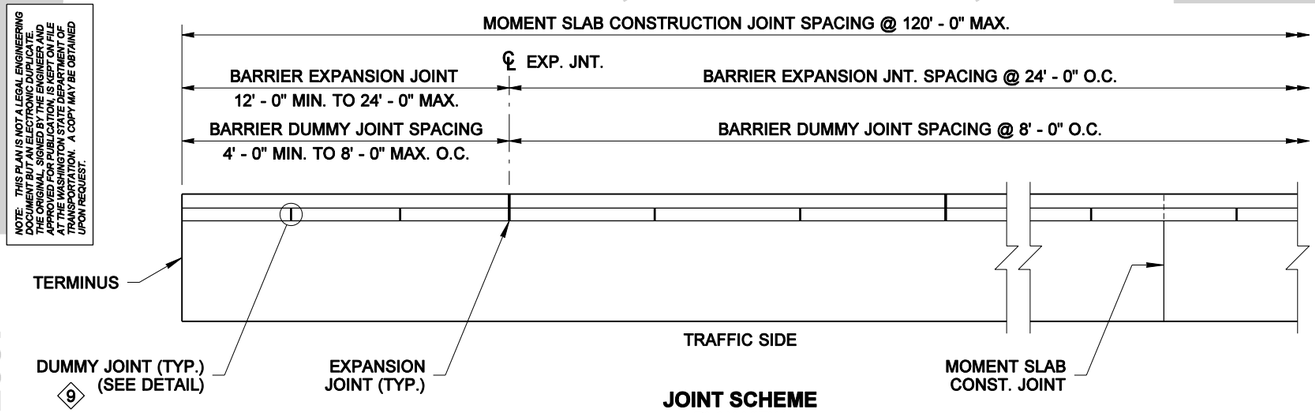
Washington State Department of Transportation

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.

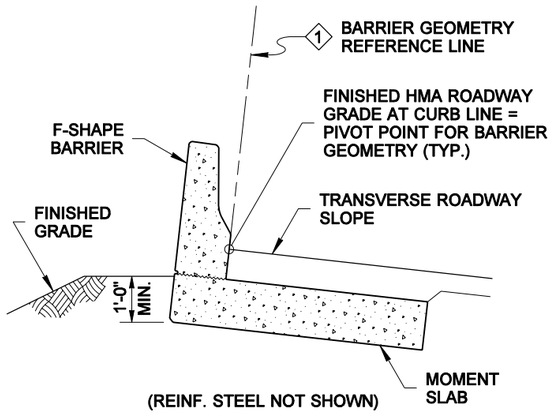
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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**JOINT SCHEME**
PLAN VIEW



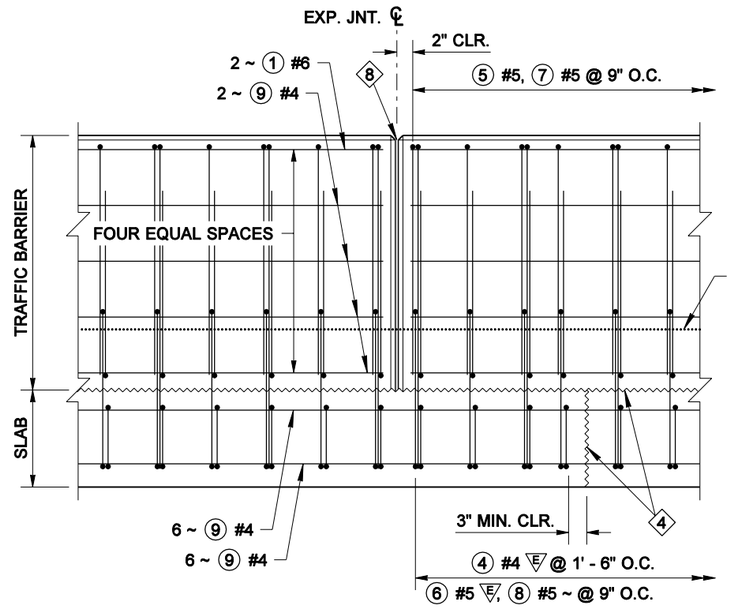

(REINF. STEEL NOT SHOWN)

**TYPICAL SECTION**
SHOWN AT GRADE

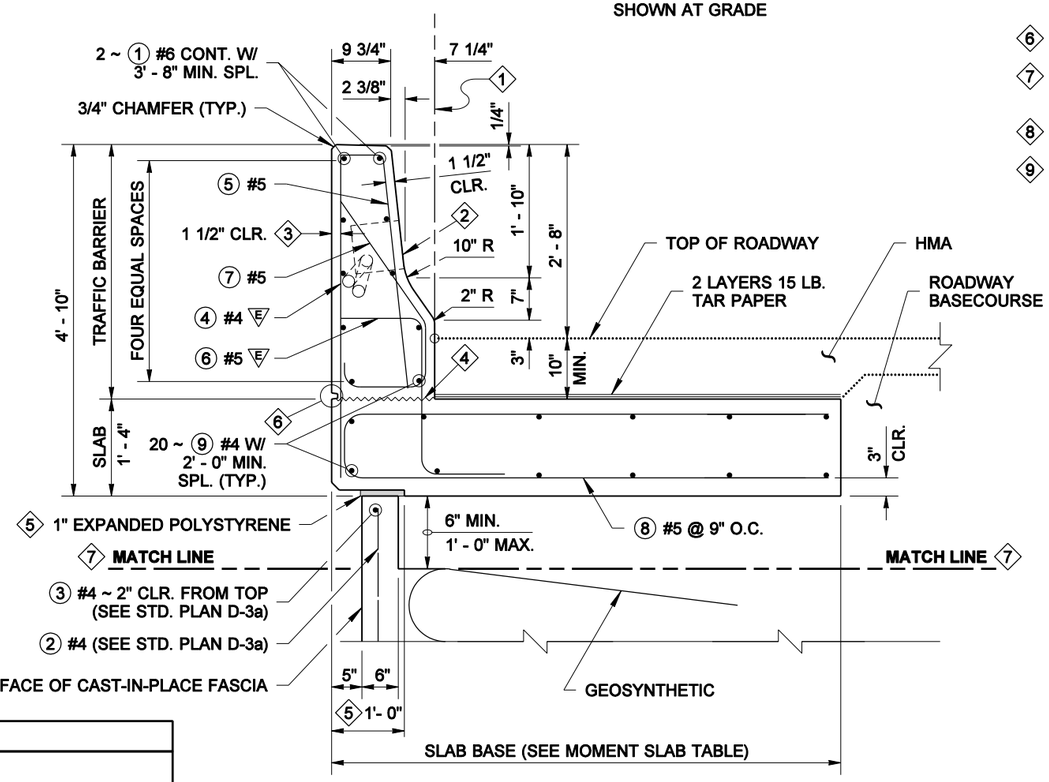
## KEY NOTES

1. THE BARRIER GEOMETRY REFERENCE LINE (B.G.R.L.) IS PERPENDICULAR TO THE TRANSVERSE ROADWAY SLOPE (T.R.S.). FOR SUPERELEVATED TRANSVERSE ROADWAY SLOPES, THE B.G.R.L. ON THE LOW SIDE OF THE ROADWAY SHALL BE PERPENDICULAR TO THE T.R.S. UP TO A MAXIMUM OF 8% SUPERELEVATION; THE B.G.R.L. ON THE HIGH SIDE SHALL ALWAYS BE PERPENDICULAR TO THE T.R.S.
2. JUNCTION BOX & PULL BOX ~ 8" × 8" × 1' - 6" NEMA 4 X S.S. (TYP.). JUNCTION BOX CAN BE RECESSED 1/2" MAX. SEE SPECIAL PROVISIONS. SIZE CONDUIT PER WIRING SCHEDULE, SEE ELECTRICAL PLANS.
3. 1 1/2" MIN. CONCRETE COVER ~ INCREASE THE COVER AS REQUIRED TO ACCOMMODATE ARCHITECTURAL FEATURES AND FINISH.
4. CONSTRUCTION JOINT WITH ROUGHENED SURFACE
5. THE NOTCH, DETAILED BY THESE DIMENSIONS AND SPECIFICATIONS, IS REQUIRED ONLY IF THE BARRIER IS ON WALL FACING.
6. RUSTICATION ~ SEE RUSTICATION DETAIL
7. FOR STRUCTURAL DETAILS BELOW THE MATCH LINE, SEE STANDARD PLANS D-3 AND D-3a.
8. 1/2" EXPANSION JOINT WITH PREMOLDED JOINT FILLER
9. INSTALL BARRIER DUMMY JOINTS ON TRAFFIC SIDE ONLY WHEN ARCHITECTURAL FEATURES ARE SPECIFIED.

| MOMENT SLAB TABLE | | |
|---|---|---|
| SLAB LENGTH | SLAB BASE | |
| | ON WALL | AT GRADE |
| GREATER THAN 80' - 0" | 7' - 0" | 5' - 0" |
| BETWEEN 60' - 0" & 80' - 0" | 8' - 0" | 6' - 0" |
| BETWEEN 40' - 0" & 60' - 0" | 9' - 0" | 7' - 0" |
| LESS THAN 40' - 0" | CONTACT BRIDGE OFFICE | |




**ELEVATION**




**TYPICAL SECTION**
SHOWN ON WALL

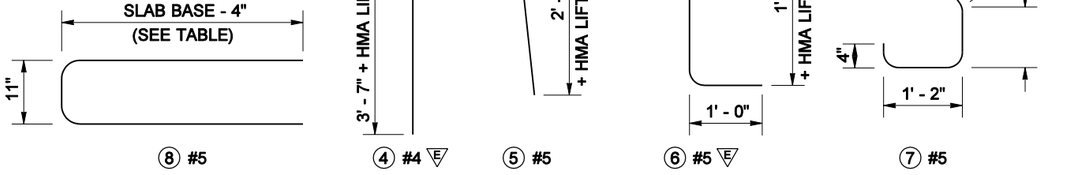
DRAWN BY: MARK SUJKA

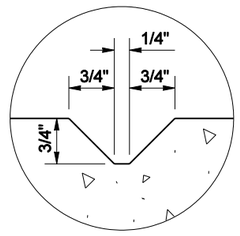
### REINFORCING STEEL BENDING DIAGRAM

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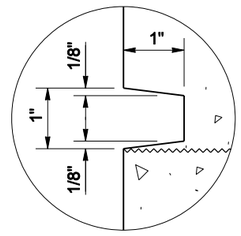
ALL DIMENSIONS ARE OUT TO OUT

Ⓔ = EPOXY COATED




**DUMMY JOINT DETAIL**




**RUSTICATION DETAIL**

JUGESH KAPUR
STATE OF WASHINGTON
25400
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 19, 2006

# PERMANENT GEOSYNTHETIC WALL F - SHAPE BARRIER STANDARD PLAN D-3c

SHEET 1 OF 1 SHEET

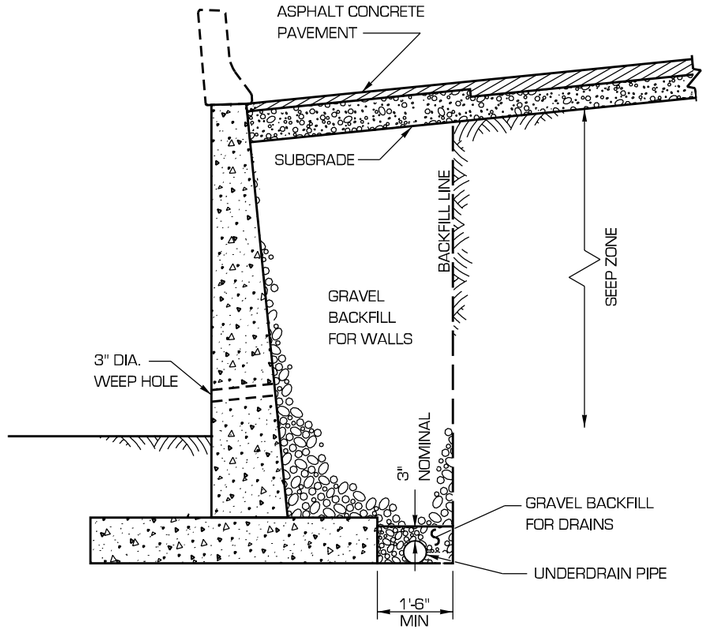
APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-30-04* — DATE

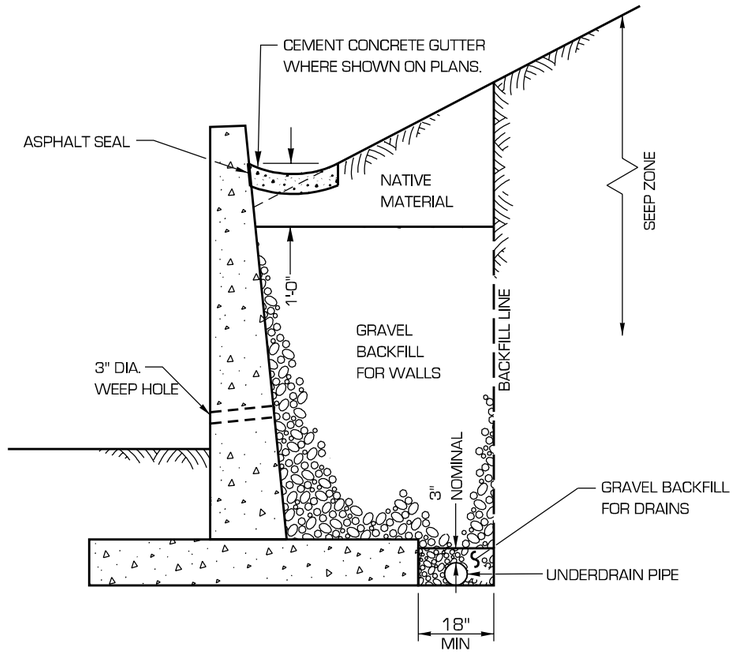
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

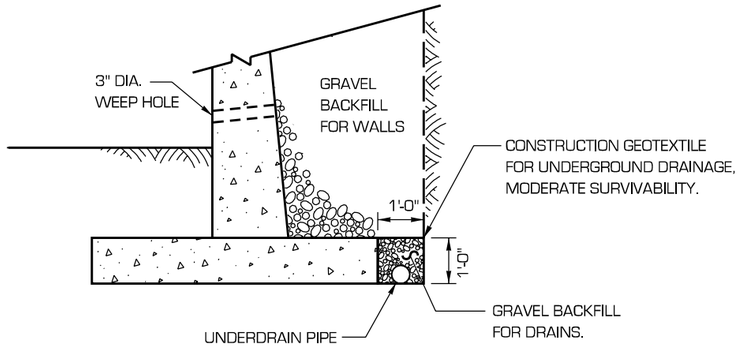
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**CONDITION A**



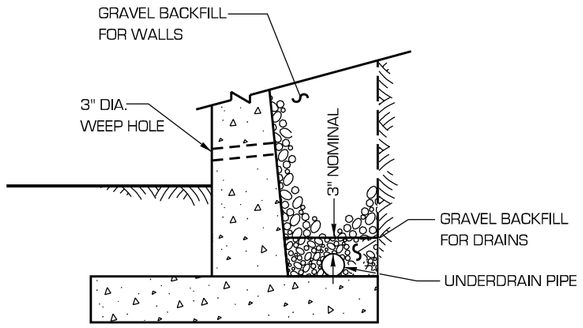

**CONDITION B**




**CONDITION A OR CONDITION B WITH GEOTEXTILE**

NOTES

1. SEE CONTRACT FOR BACKFILL LIMITS AND GEOTEXTILE CLASS.




**ALTERNATE DETAIL**

TYPICAL FOR CONSTRUCTION WITH SHORING.

M. MYINT LWIN
STATE OF WASHINGTON
10536
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JANUARY 17, 1999

# BACKFILL AND DRAINAGE FOR RETAINING WALLS

# STANDARD PLAN D-4

*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.*

| DATE | REVISION | BY |
|---|---|---|
| 10/98 | REMOVED GURADRAIL, CURB & METAL CRIB WALLS. | MT |

APPROVED FOR PUBLICATION

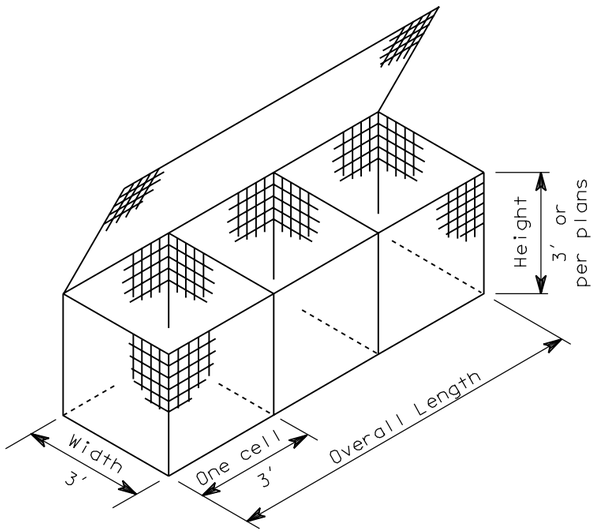
*Clifford E. Mansfield* — *12/11/98*

DEPUTY STATE DESIGN ENGINEER — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

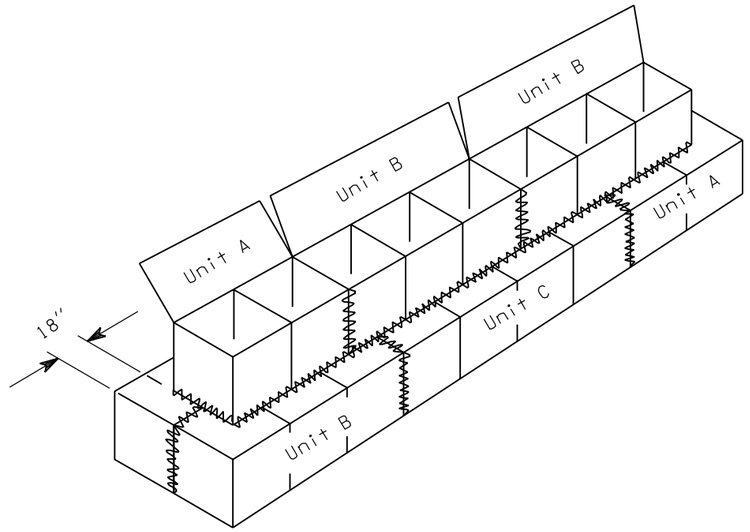
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

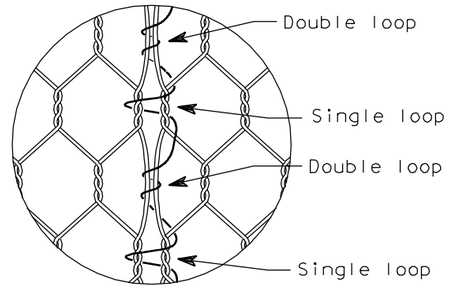



Unit A - 2 cell gabion = 6′
Unit B - 3 cell gabion = 9′
Unit C - 4 cell gabion = 12′

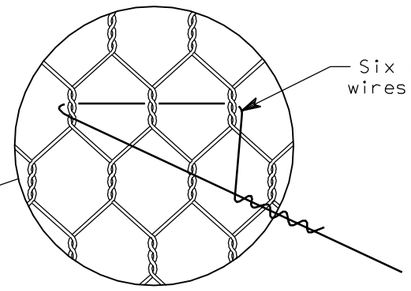
TYPICAL GABION



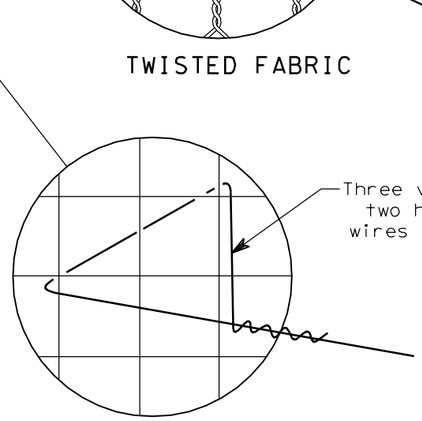

FASTENING ADJACENT BASKETS



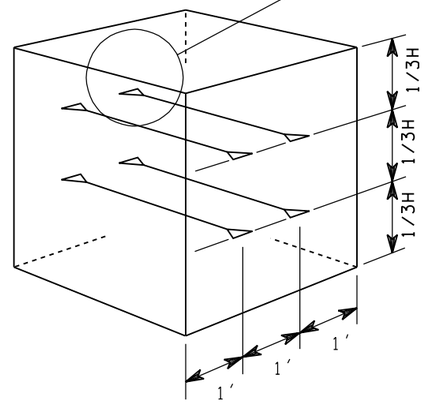

LACING DETAIL



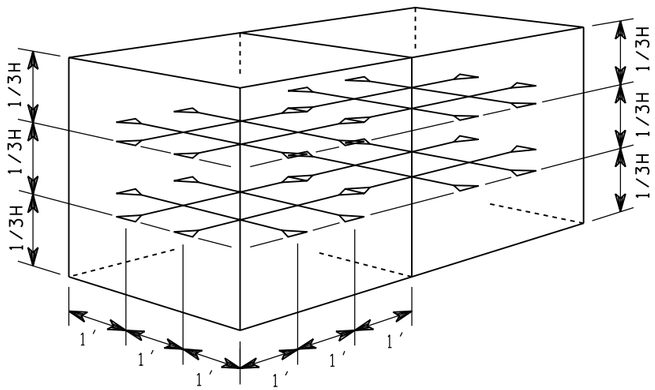

TWISTED FABRIC




WELDED FABRIC




CROSS CONNECTING WIRE
PLACMENT, INTERIOR CELLS
OF FRONT GABIONS




CROSS-CONNECTING WIRE
PLACEMENT, END CELLS

TONY M. ALLEN
STATE OF WASHINGTON
25339
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 1999

# GABIONS
# STANDARD PLAN D-6

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APPROVED FOR PUBLICATION

*Clifford E. Mansfield* — *6/19/98*

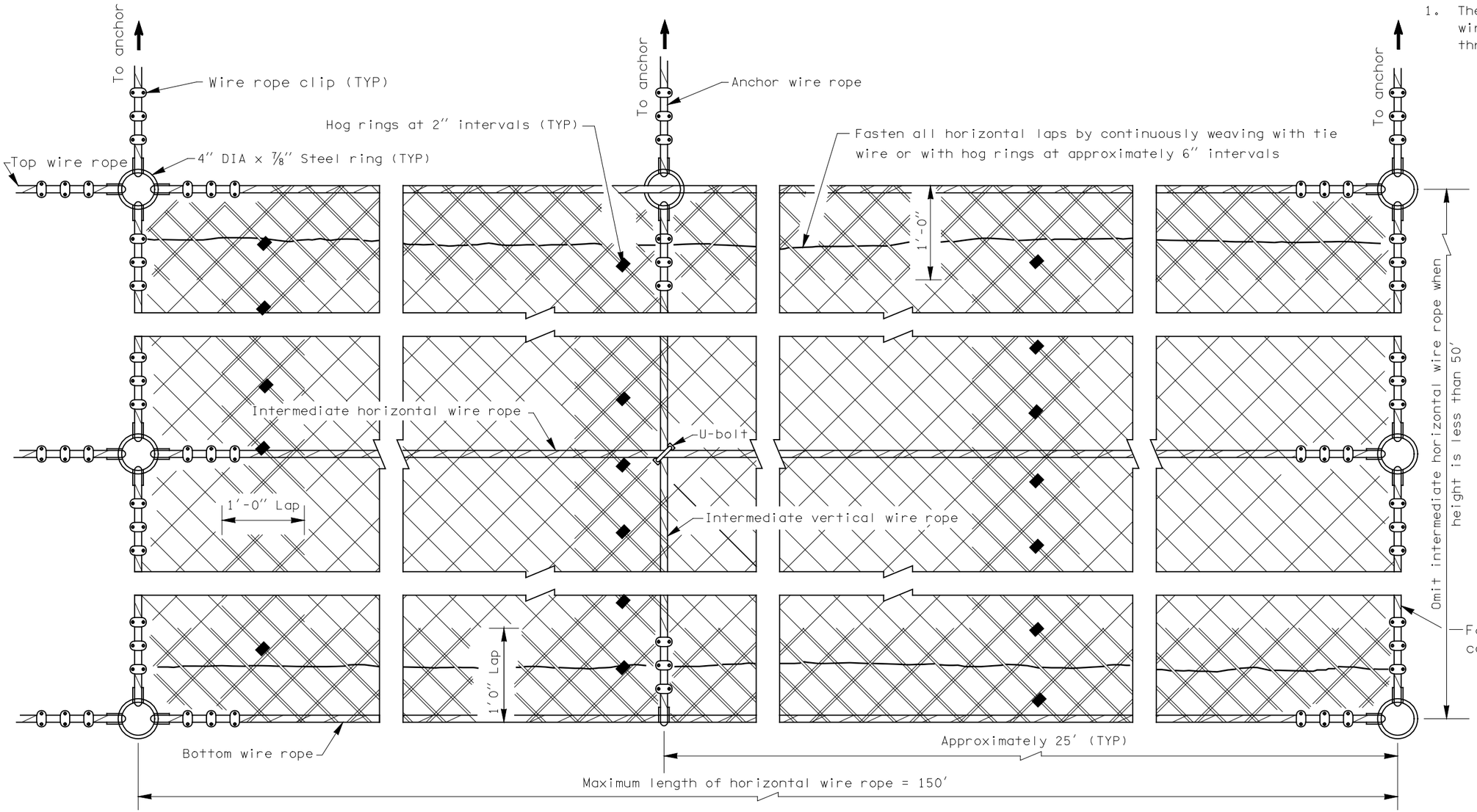
DEPUTY STATE DESIGN ENGINEER — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

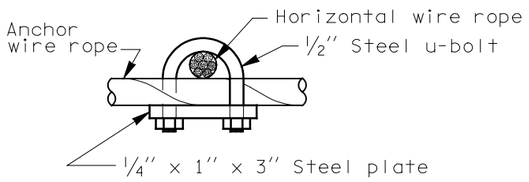
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

NOTE:
1. The Contractor may provide two twin base wire rope clips at 3″ O.C. in lieu of three u-bolt type wire rope clips as shown.

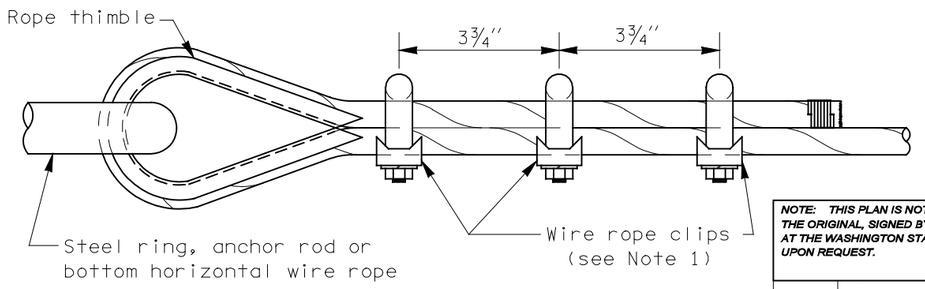



ASSEMBLY DETAILS

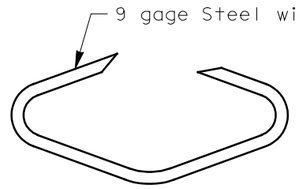



U-BOLT

Use to clamp intermediate horizontal wire ropes to vertical wire ropes




WIRE ROPE CONNECTION




HOG RING

Use for lap connections of netting

TONY M. ALLEN
STATE OF WASHINGTON
25339
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2001

# WIRE MESH SLOPE PROTECTION

# STANDARD PLAN D-7

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| DATE | REVISION | BY |
|---|---|---|
| 9/99 | Title changed; cable references changed to wire rope. | JR |

APPROVED FOR PUBLICATION

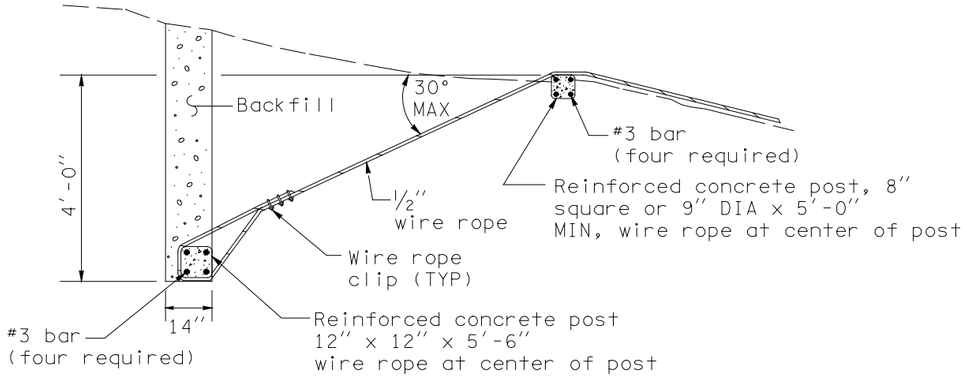
*Clifford E. Mansfield* *10/06/99*

DEPUTY STATE DESIGN ENGINEER — DATE

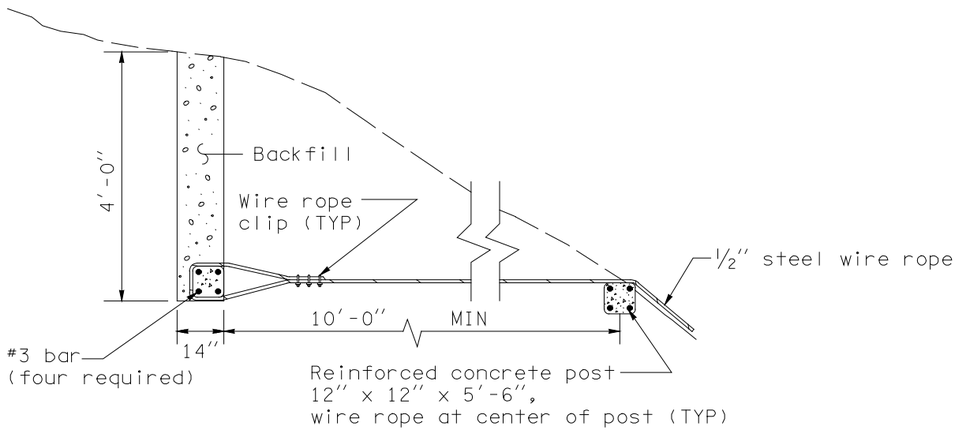
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

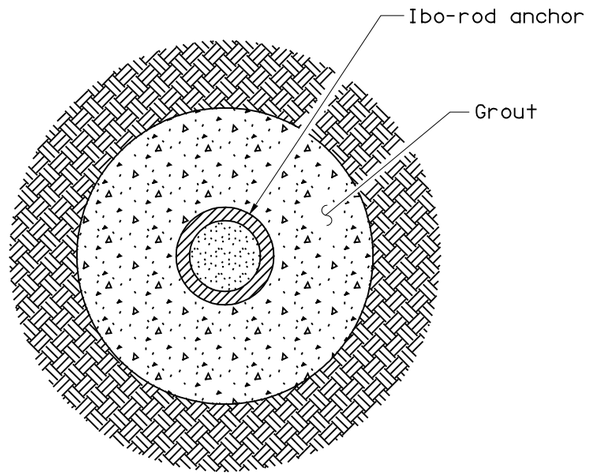
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




TYPE 1 ANCHOR
(FOR USE IN EARTH)



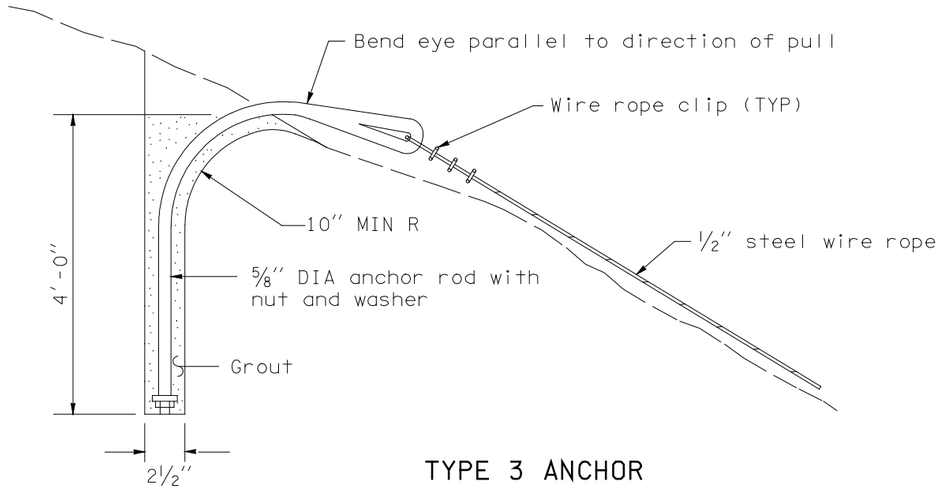

TYPE 2 ANCHOR
(FOR USE IN COMBINED EARTH AND ROCK)



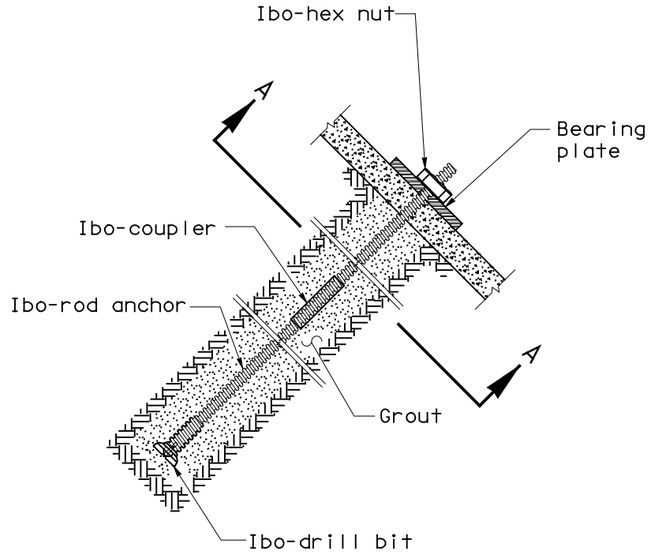

SECTION A-A

NOTE:

1. Two twin base wire rope clips at 3″ centers may be substituted for three u-bolted wire rope clips shown.




TYPE 3 ANCHOR
(FOR USE IN SOLID ROCK)




TYPE 4 ANCHOR
(FOR USE IN SOLID ROCK)

TONY M. ALLEN
STATE OF WASHINGTON
25339
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 1, 2001

# WIRE MESH SLOPE PROTECTION

## STANDARD PLAN D-7a

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| DATE | REVISION | BY |
|---|---|---|
| 9/99 | Title changed; cable references changed to wire rope. | JR |

APPROVED FOR PUBLICATION

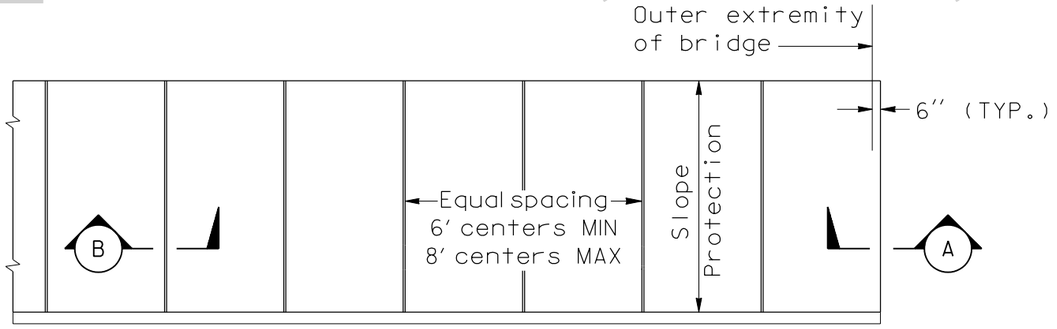
*Clifford E. Mansfield* *10/06/99*

DEPUTY STATE DESIGN ENGINEER — DATE

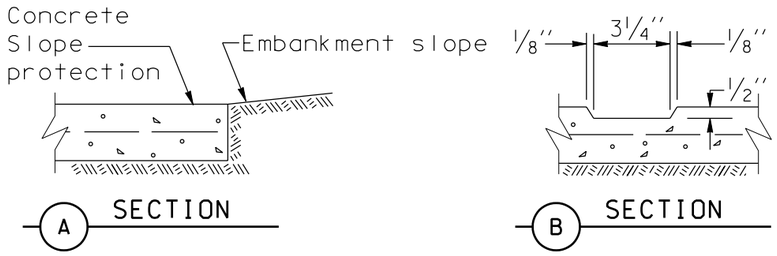
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

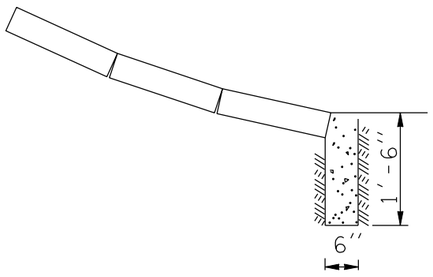



ELEVATION
CONCRETE SLOPE PROTECTION
(Pneumatically placed or poured in place cement concrete shown)

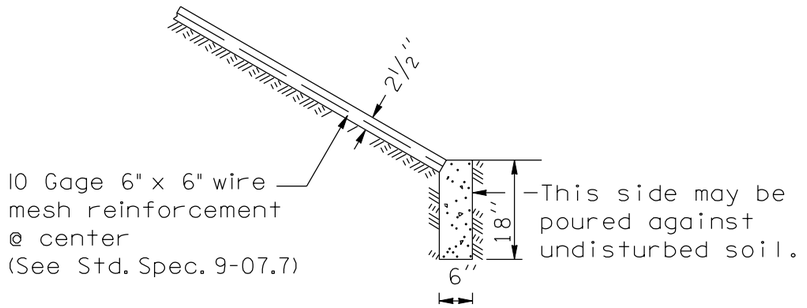








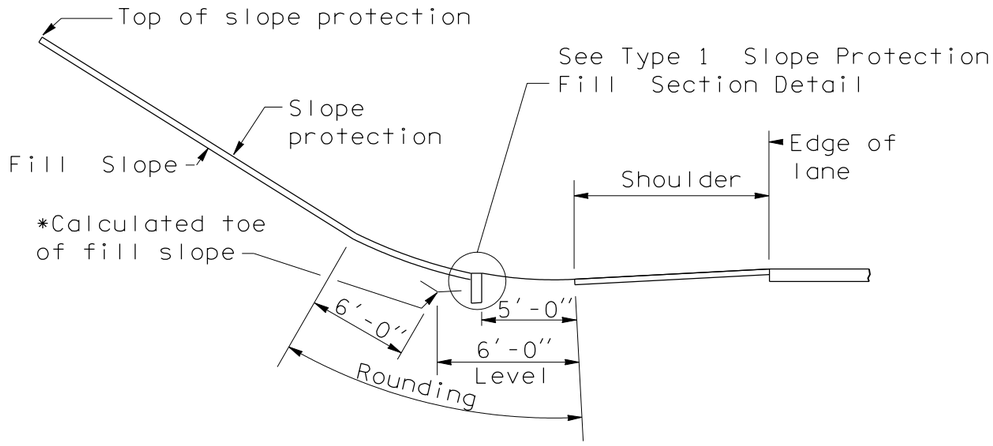

TYPE 1 SLOPE PROTECTION FILL SECTION DETAIL
(Semi-open concrete masonry units shown)




TYPE 2 SLOPE PROTECTION CUT SECTION DETAIL
(Pneumatically placed or poured in place cement concrete shown)

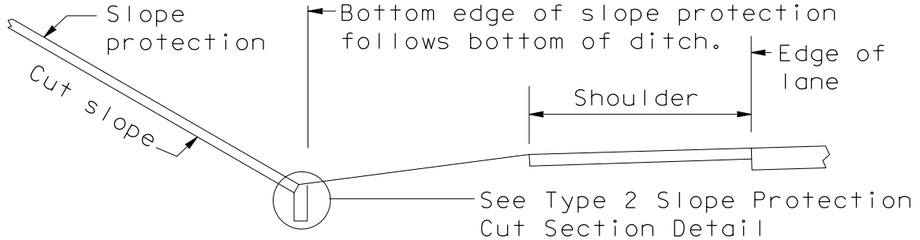
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




SIDE ELEVATION
(For fill section on lower roadway)

*Fill slope shall be rounded to allow placement of concrete slope protection.




SIDE ELEVATION
(For cut section on lower roadway)

4029
REGISTERED ARCHITECT
ALEXANDER YOUNG
STATE OF WASHINGTON

Principal Architect

# CONCRETE SLOPE PROTECTION STANDARD PLAN D-9

SHEET 1 OF 2 SHEETS

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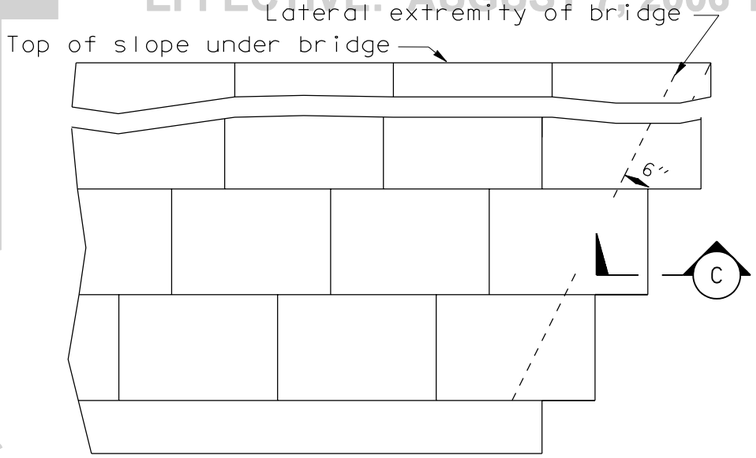
*Clifford E. Mansfield* — DEPUTY STATE DESIGN ENGINEER — 12/11/98 DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

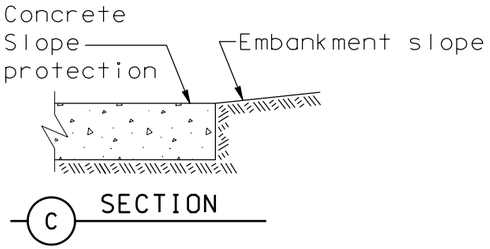
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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SKEWED BRIDGE PLAN

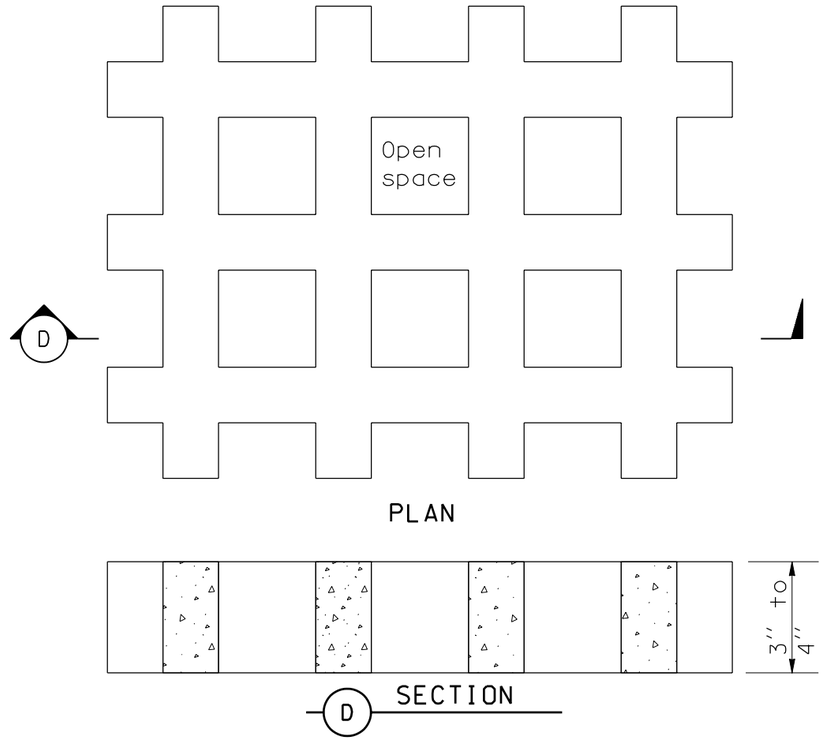
(Semi-open concrete masonry units shown)




NOTES

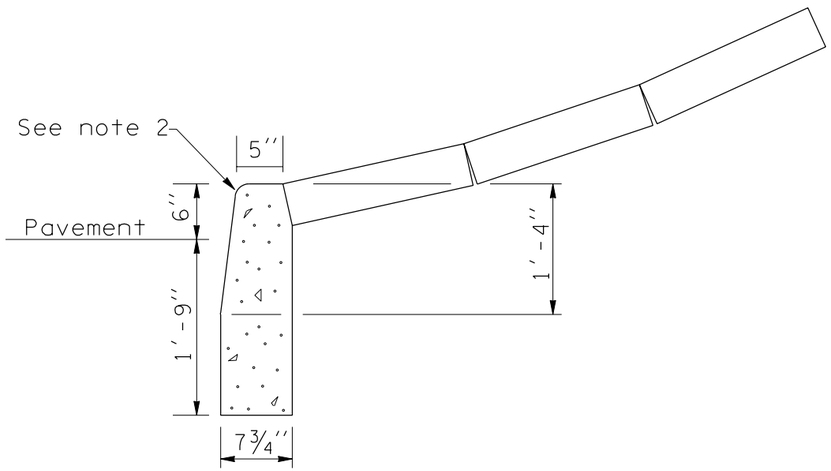
1. The design and shape of the semi-open concrete masonry unit shown is only one example of the products that may be used.

2. The Type 3 Slope Protection Curb Detail shall be used only when the lower roadway cross section requires a curb.




SEMI-OPEN CONCRETE MASONRY UNITS

(See note 1 & 2)




TYPE 3 SLOPE PROTECTION
CURB DETAIL (Elevation)

(Semi-open concrete masonry units shown)

4029
REGISTERED
ARCHITECT
ALEXANDER YOUNG
STATE OF WASHINGTON

Principal Architect

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*Clifford E. Mansfield* — DEPUTY STATE DESIGN ENGINEER

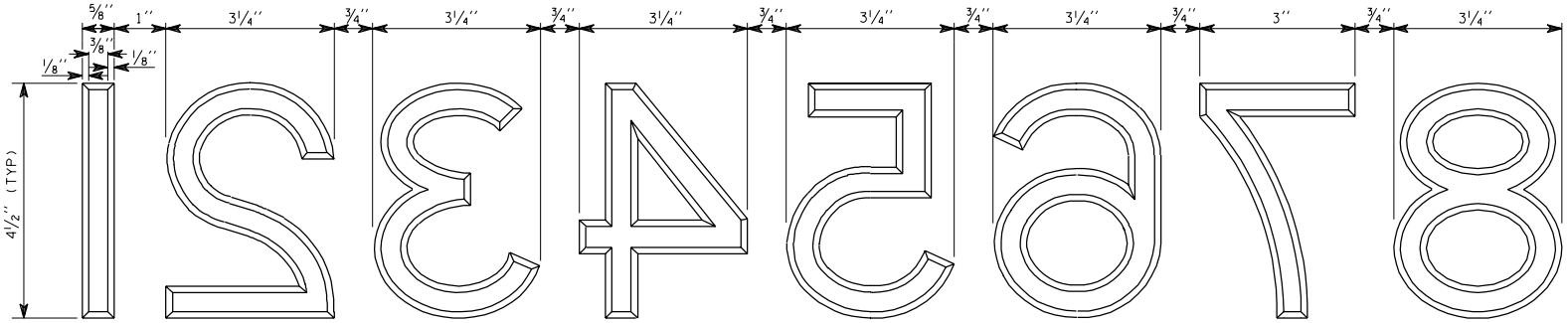
*12/11/98* — DATE

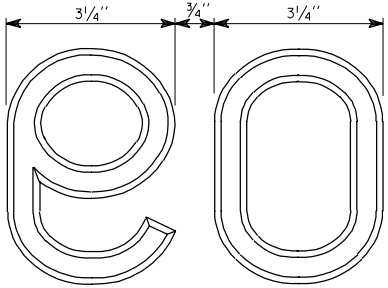
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OLYMPIA, WASHINGTON

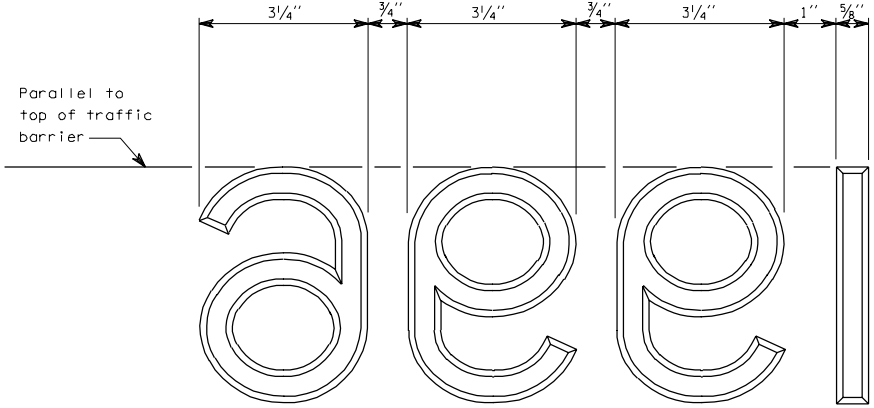
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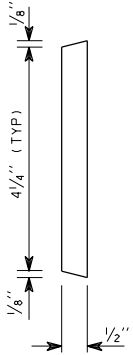
NOTE
Spacing between the numeral "1" and any other numeral is 1". Spacing between all other numerals is ¾".




TYPICAL DATE



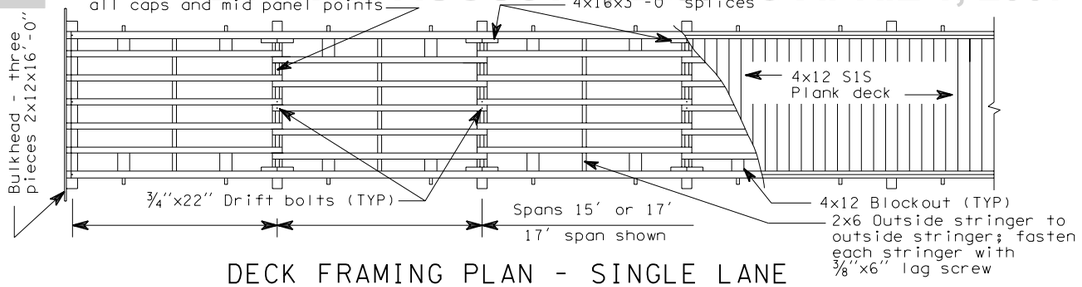

END VIEW

DATE NUMERALS

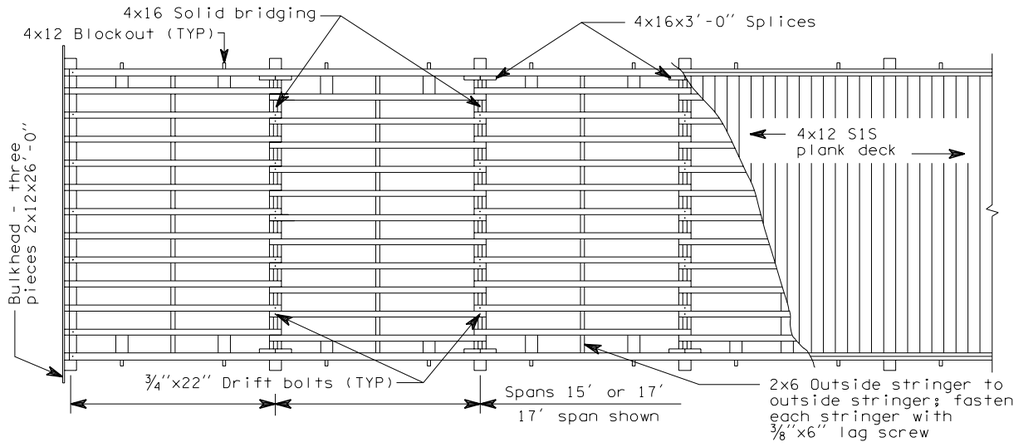
E-1 1 of 1
07-25-97

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

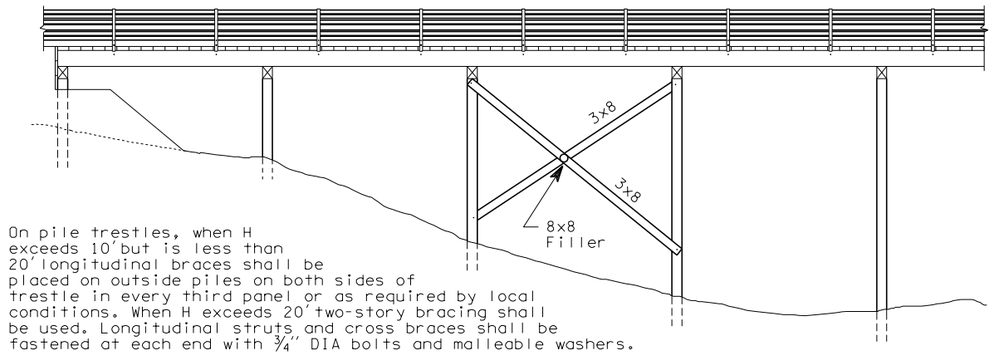
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




DECK FRAMING PLAN - SINGLE LANE

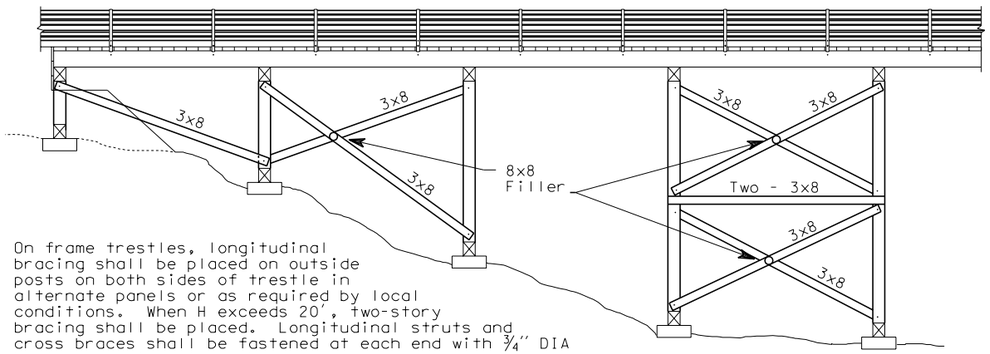



DECK FRAMING PLAN - TWO LANE




On pile trestles, when H exceeds 10' but is less than 20' longitudinal braces shall be placed on outside piles on both sides of trestle in every third panel or as required by local conditions. When H exceeds 20' two-story bracing shall be used. Longitudinal struts and cross braces shall be fastened at each end with 3/4" DIA bolts and malleable washers.

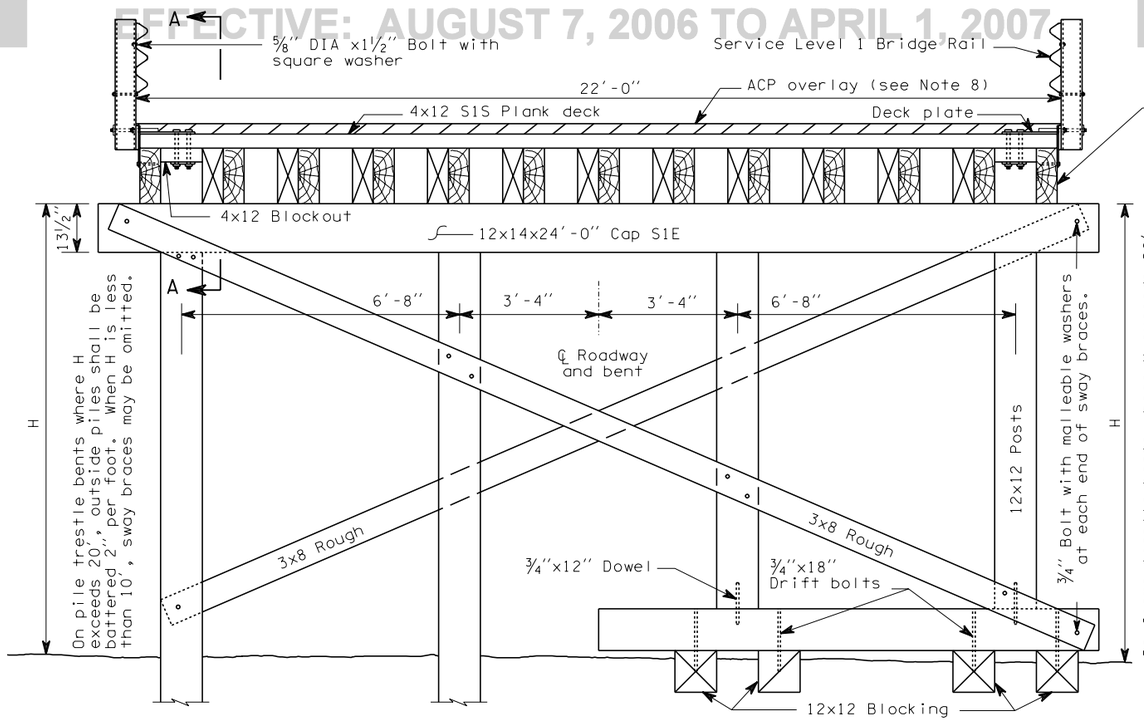
ELEVATION - PILE TRESTLE




On frame trestles, longitudinal bracing shall be placed on outside posts on both sides of trestle in alternate panels or as required by local conditions. When H exceeds 20', two-story bracing shall be placed. Longitudinal struts and cross braces shall be fastened at each end with 3/4" DIA bolts and malleable washers.

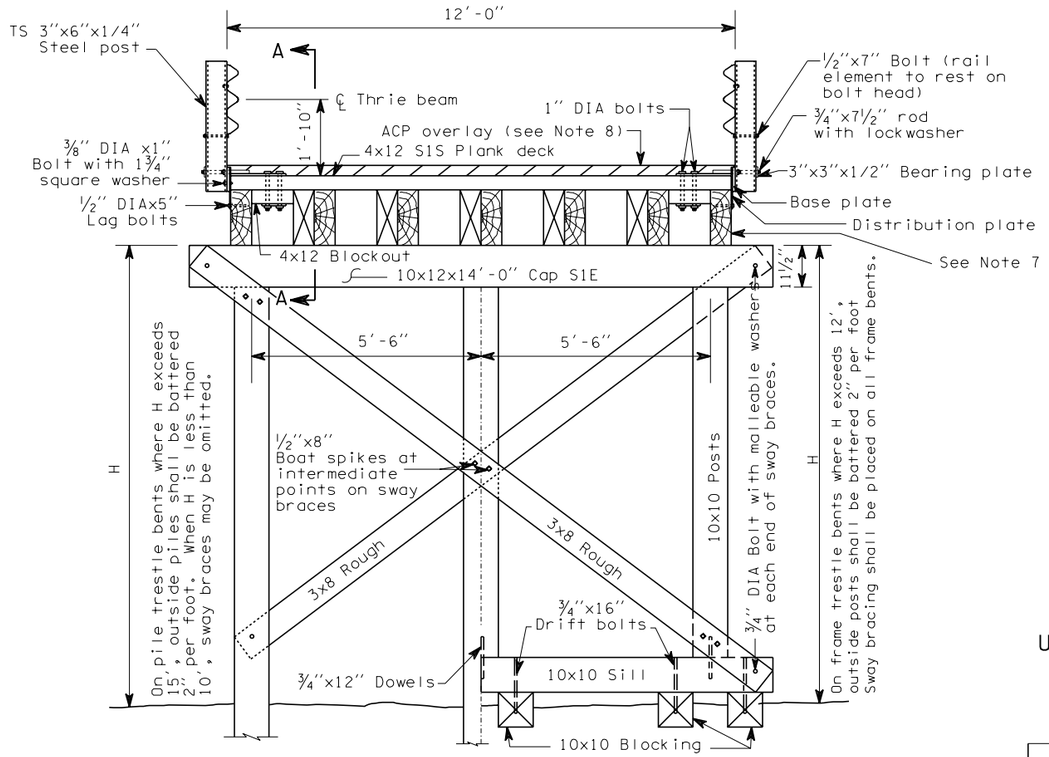
ELEVATION - FRAME TRESTLE

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




HALF SECTION-PILE BENT HALF SECTION-FRAME BENT

TYPICAL SECTION-TWO LANE BRIDGE




HALF SECTION-PILE BENT HALF SECTION-FRAME BENT

TYPICAL SECTION SINGLE LANE BRIDGE

M. MYINT LWIN
STATE OF WASHINGTON
10536
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JANUARY 17, 1999

# PILE OR FRAME DETOUR BRIDGE WITH ASPHALT OVERLAY

USE ONLY FOR TEMPORARY BRIDGES

## STANDARD PLAN E-2

SHEET 1 OF 2 SHEETS

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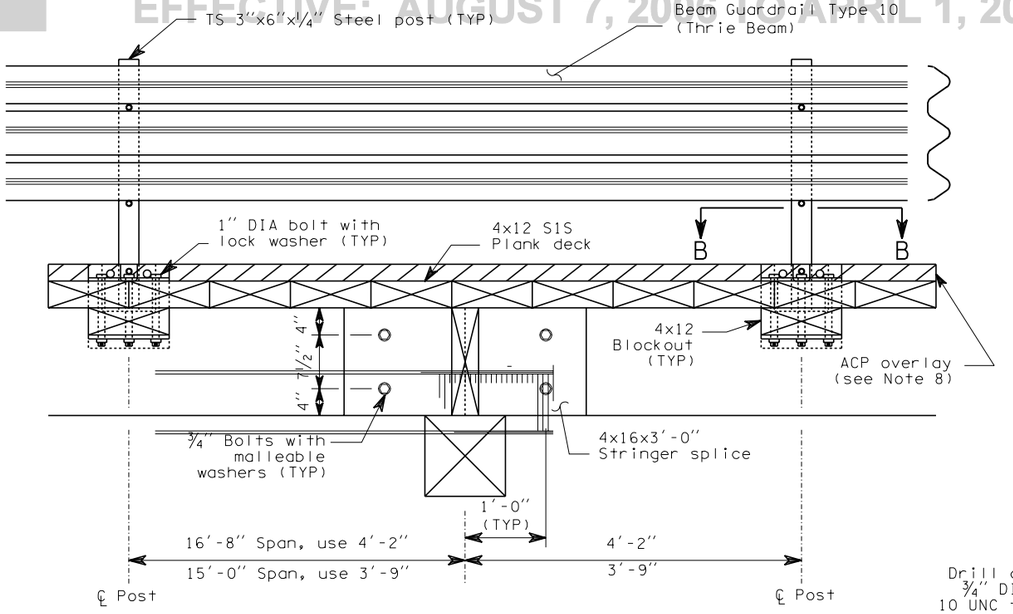
*Brian Ziegler* — STATE DESIGN ENGINEER — *5/29/98* — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

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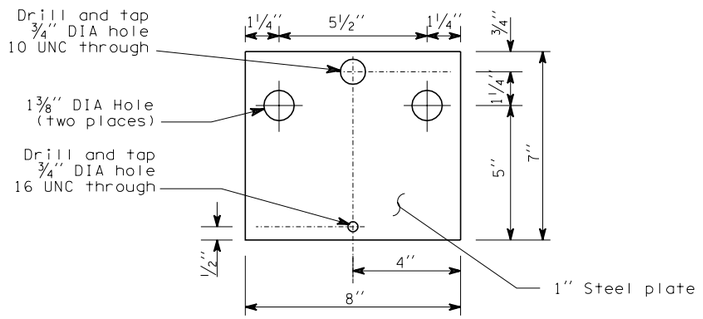
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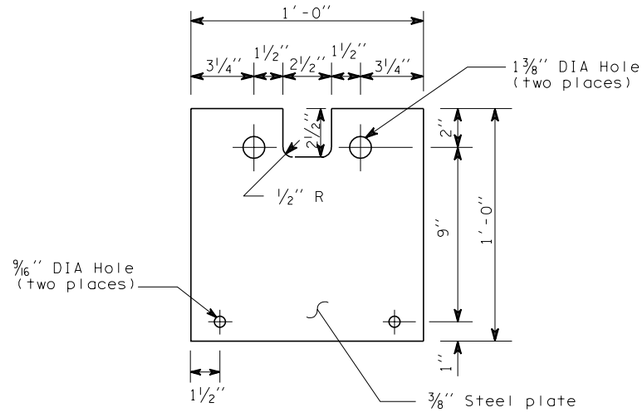

SECTION A-A

NOTES

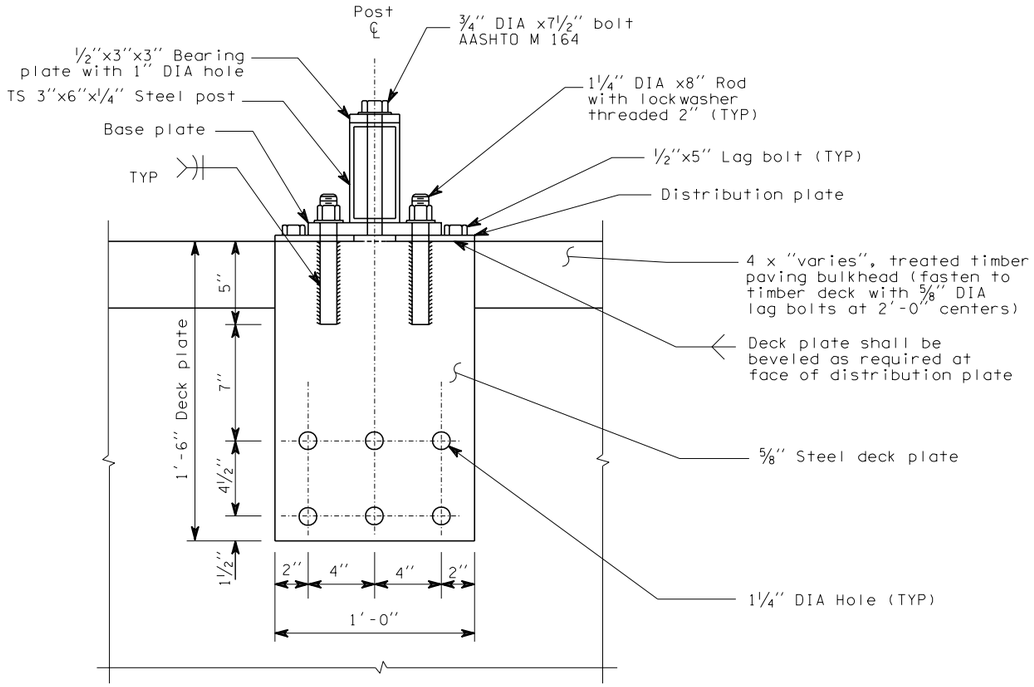
1. Dimensions and notations for superstructure are typical for both single lane and two lane bridges.
2. All timber and lumber shall be #2 or better and untreated Douglas fir-larch.
3. All piling shall be untreated Douglas fir and shall be driven to develop a minimum load bearing capacity of 15 tons.
4. Blocking for frame bents shall be proportioned to carry a minimum load of 15 tons per post.
5. All hardware shall be black, ungalvanized.
6. Each deck plank shall be nailed to each stringer with two 7" spikes, number 1 or larger.
7. On 17'spans, stringers shall be 6x16 S1E. On 15' spans, stringers shall be 5x16 S1E. Two-lane bridges shall use thirteen lines of stringers, one-lane bridges shall use seven lines of stringers.
8. Overlay thickness must be sufficient to cover bolts.



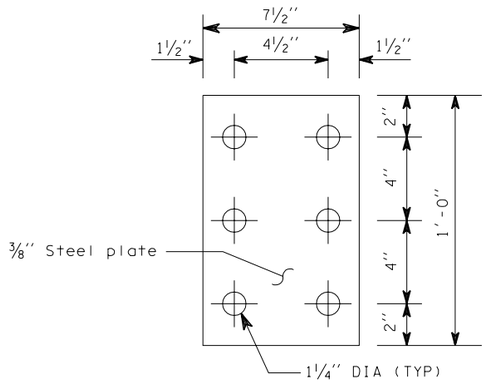

BASE PLATE DETAIL




DISTRIBUTION PLATE DETAIL




SECTION B-B




BACKING PLATE DETAIL

M. MYINT LWIN
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10536
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EXPIRES JANUARY 17, 1999

# PILE OR FRAME DETOUR BRIDGE WITH ASPHALT OVERLAY

USE ONLY FOR TEMPORARY BRIDGES

## STANDARD PLAN E-2

SHEET 2 OF 2 SHEETS

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*Brian Ziegler* — STATE DESIGN ENGINEER

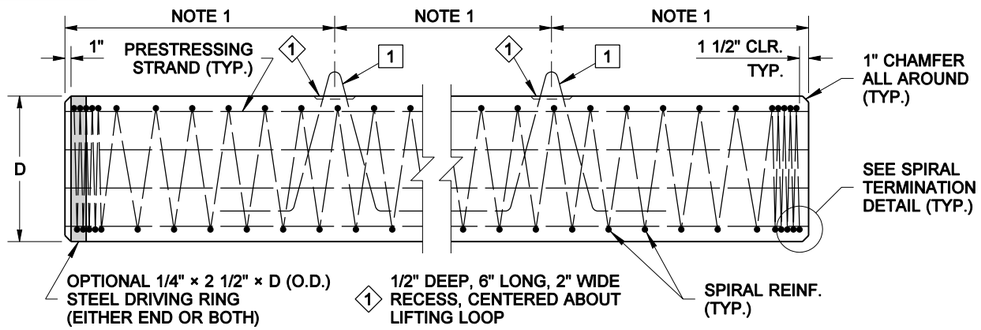
*5/29/98* — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

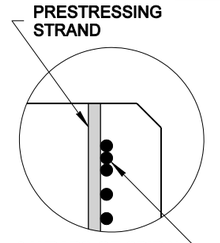
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| PILE TYPE | D (in.) | PERIMETER (in.) | UNIT WEIGHT (lbs./ft.) | AREA (in.²) | MOMENT OF INERTIA (in.⁴) | RADIUS OF GYRATION (in.) | NUMBER OF STRANDS | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | MINIMUM | MAXIMUM |
| SQUARE | 12 | 48.0 | 158 | 144 | 1728 | 3.5 | 4 | 7 |
| | 14 | 56.0 | 215 | 196 | 3201 | 4.0 | 6 | 10 |
| | 16 | 64.0 | 281 | 256 | 5461 | 4.6 | 7 | 13 |
| OCTAGONAL | 14 | 46.4 | 178 | 162 | 2103 | 3.6 | 5 | 8 |
| | 16 1/2 | 54.7 | 247 | 226 | 4057 | 4.2 | 7 | 11 |
| | 18 | 59.6 | 295 | 268 | 5746 | 4.6 | 8 | 13 |
| | 20 | 66.3 | 364 | 331 | 8758 | 5.1 | 9 | 16 |
| | 24 | 79.5 | 524 | 477 | 18161 | 6.2 | 13 | 22 |

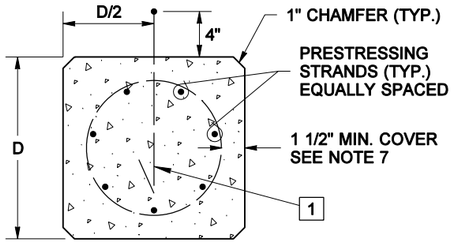



**ELEVATION**

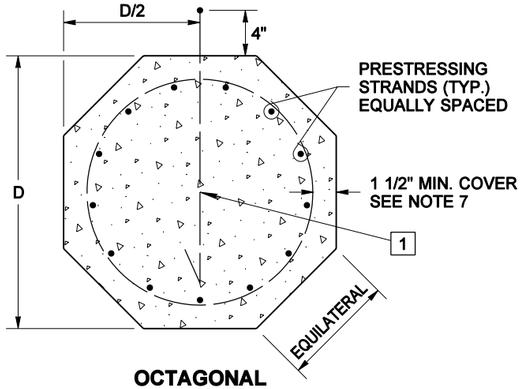



**SPIRAL TERMINATION DETAIL**

## PILE DETAILS

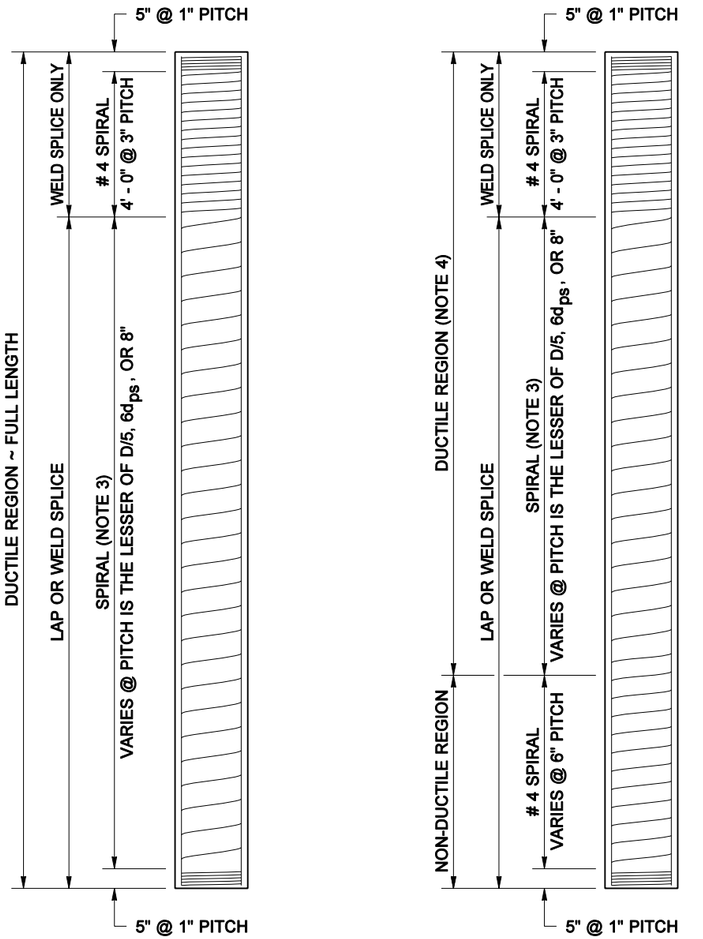



**SQUARE**




**OCTAGONAL**

**TYPICAL SECTIONS**



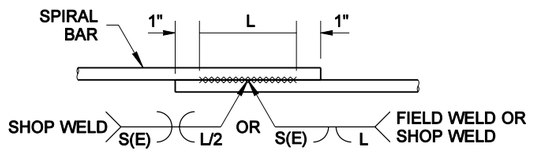

**PILES LESS THAN 35' LONG**




**PILES MORE THAN 35' LONG**

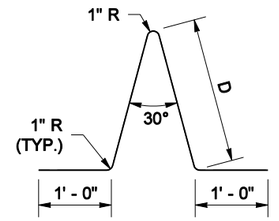
**SPIRAL REINFORCEMENT**

| DEFORMED BAR AASHTO M 31 GR. 60 | PLAIN STEEL BAR AASHTO M 31 GR. 60 | COLD DRAWN WIRE AASHTO M 32 | DEFORMED WIRE AASHTO M225 | WELD DIMENSIONS | | |
|---|---|---|---|---|---|---|
| | | | | S | E | LENGTH (L) |
| # 4 | 1/2" DIAM. | W 20 | D 20 | 6 | 3 | 4" |
| # 5 | 5/8" DIAM. | W 31 | D 31 | 8 | 5 | 6" |

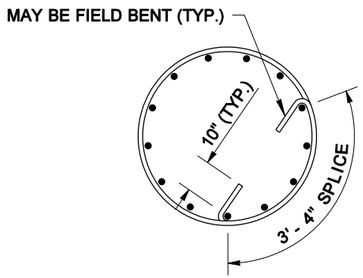



SEE TABLE FOR WELD DIMENSIONS

**SPIRAL WELDED LAP SPLICE DETAIL**




**BENDING DIAMOND**




**SPIRAL LAP SPLICE DETAIL**

## 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 strenth 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 ($d_{ps}$), 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.




EXPIRES AUGUST 23, 2004

# PRECAST PRESTRESSED CONCRETE PILES

## STANDARD PLAN E-4

SHEET 1 OF 1 SHEET

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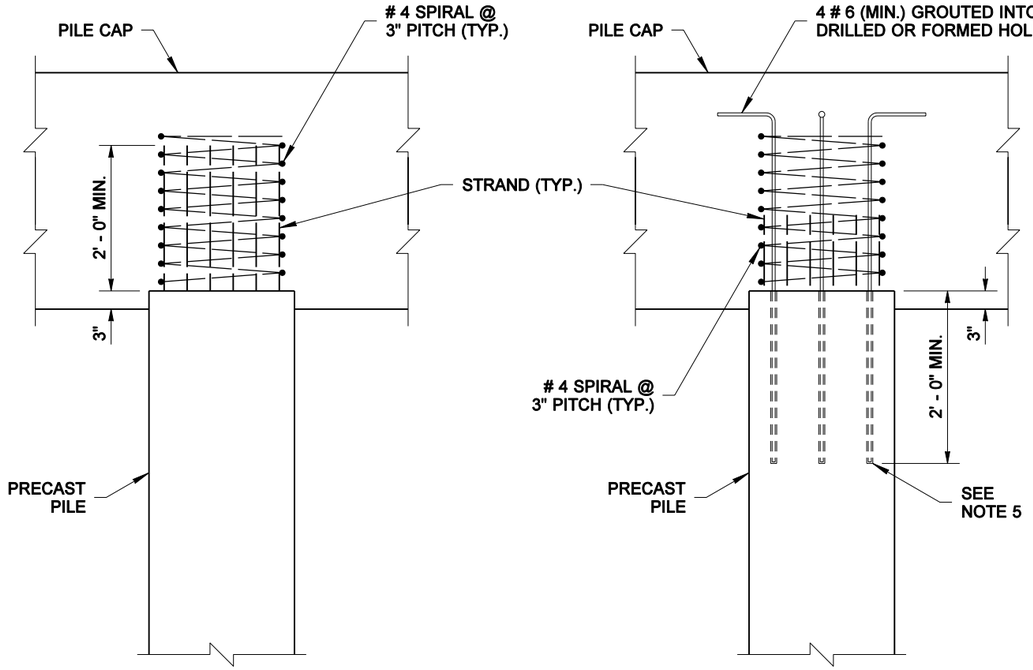
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *08-27-03* — DATE

Washington State Department of Transportation

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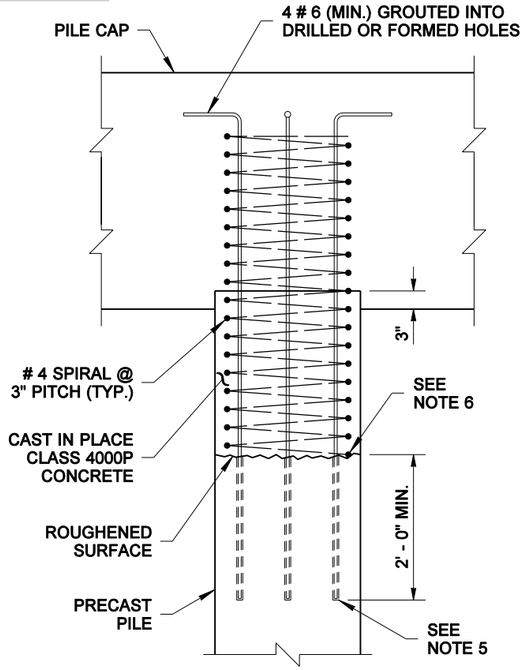
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**PILE CUTOFF WITH STRANDS EXTENDING 2' - 0" MINIMUM**

**PILE CUTOFF WITH STRANDS EXTENDING LESS THAN 2' - 0"**

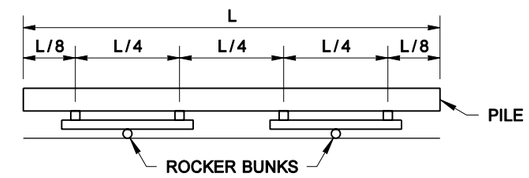



**BUILD-UP ON PILE DRIVEN BELOW CUTOFF**

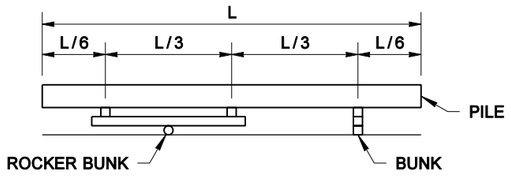
## PILE TO PILE-CAP CONNECTIONS

### PRECAST PILES, HANDLING NOTES

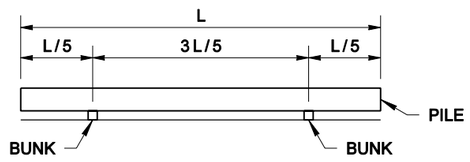
1. For pile lifting Cases 1 and 2, do not allow pile tip to bear on other piling stored in a lower layer.
2. For pile lifting Cases 3 and 4, tilt the pile in the air, do not allow the pile to touch the ground.
3. The minimum angle between the pile and the lifting strap is 60° when the pile is in the horizontal position.
4. When directed to remove a lifting loop, cut it off at the bottom of the recess and patch the recess by filling it with 1:2 mortar, finishing it to the level of the pile face. The patch shall be allowed to cure at least 24 hours prior to driving the pile.
5. The length of the formed or drilled hole shall allow for potential cut-off and full development length of the steel reinforcement. The holes must be roughened and filled with epoxy resin.
6. Expose the spiral reinforcement at the pile head and splice with new spiral in accordance with Standard Plan E-4, Note 2.
7. For handling and bunking, the Prestressed piles shall have at least the minimum number of strands shown on Std Plan E4.
8. Piles stored on the ground should be bunked on level dunnage at no more than 20' on center, with a maximum overhang of 10'.




**"L" IS MORE THAN 90'**

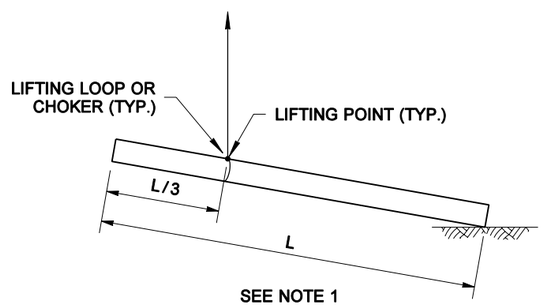



**"L" IS MORE THAN 70' BUT NOT MORE THAN 90'**

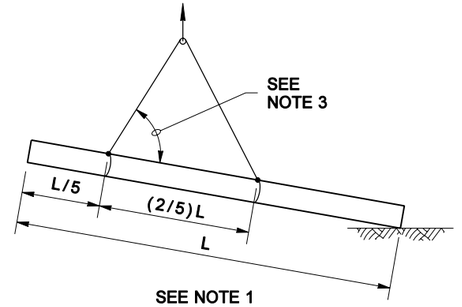



**"L" IS 70' OR LESS**

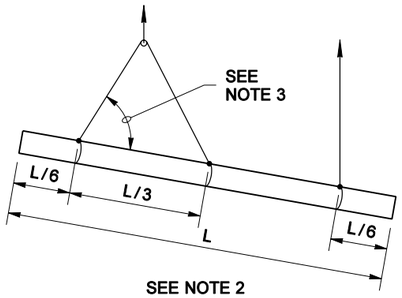
## PILE BUNKING AND SHIPPING SUPPORT DIAGRAMS



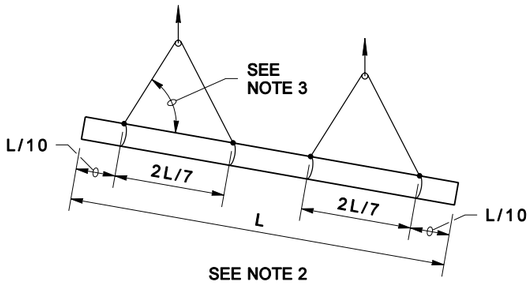

**WHEN "L" IS 50' OR LESS**
**CASE 1**




**WHEN "L" IS MORE THAN 50' BUT NOT MORE THAN 70'**
**CASE 2**




**WHEN "L" IS MORE THAN 70' BUT NOT MORE THAN 90'**
**CASE 3**




**WHEN "L" IS MORE THAN 90'**
**CASE 4**

## PILE HANDLING DIAGRAMS

BIJAN KHALEGHI
STATE OF WASHINGTON
27695
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 23, 2004

# PRECAST PRESTRESSED CONCRETE PILES HANDLING AND CAPPING

# STANDARD PLAN E-4a

SHEET 1 OF 1 SHEET

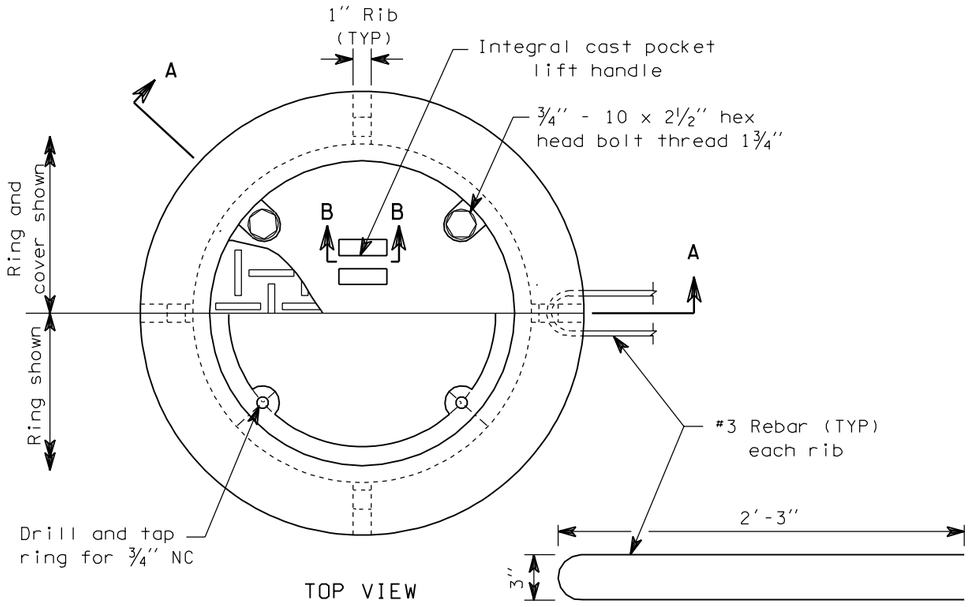
APPROVED FOR PUBLICATION

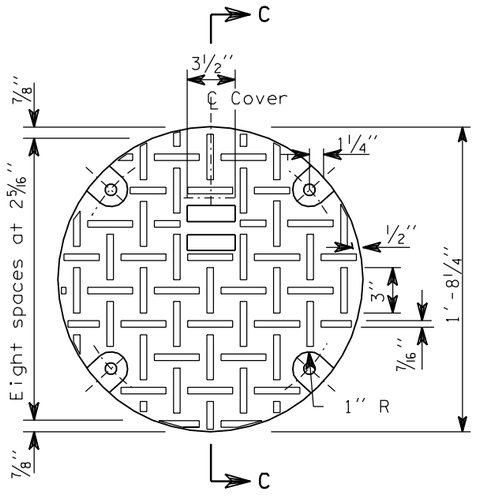
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *08-27-03* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

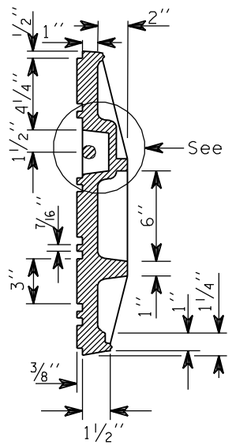
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

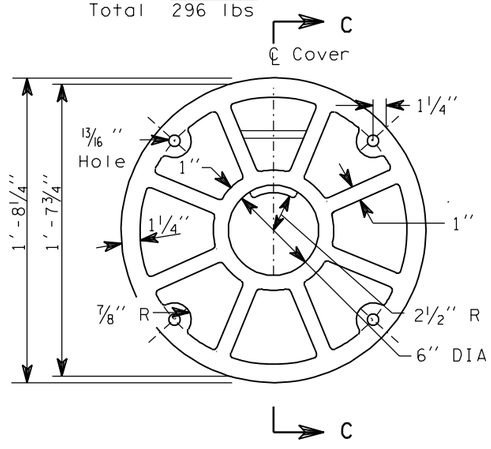


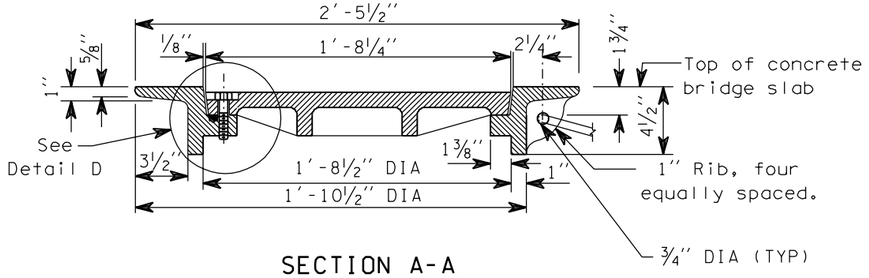

RING AND COVER

NOTE
Approximate weights: Ring 173 lbs
Cover 123 lbs
Total 296 lbs

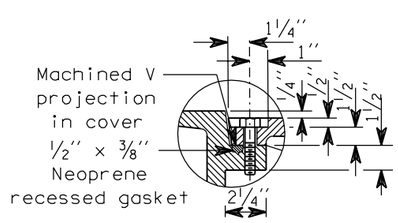


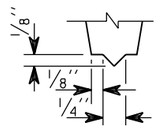

MANHOLE COVER



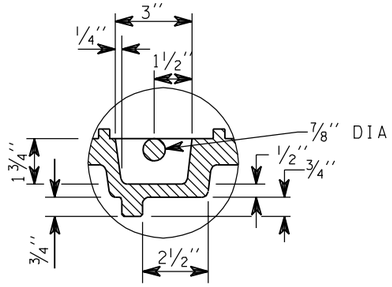

SECTION A-A
(Raised traffic pattern not shown)



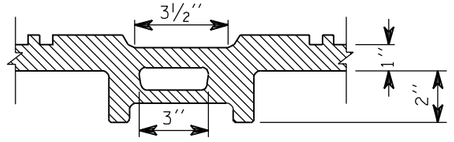

DETAIL D




V PROJECTION
DETAIL




DETAIL E
(Turned 90°)




SECTION B-B

M. MYINT LWIN
STATE OF WASHINGTON
10536
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JANUARY 17, 1999

# MANHOLE RING AND COVER FOR BRIDGES
# STANDARD PLAN E-5

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.

APPROVED FOR PUBLICATION

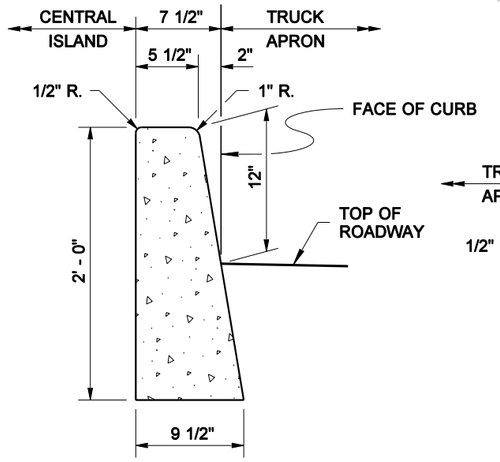
*Brian Ziegler* — STATE DESIGN ENGINEER

*5/29/98* — DATE

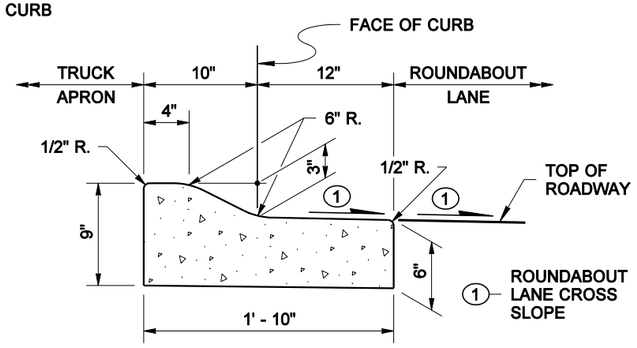
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



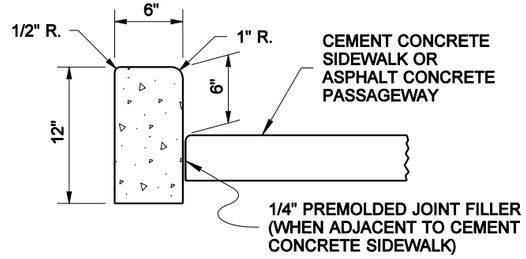

**ROUNDABOUT TRUCK APRON INNER CEMENT CONCRETE CURB**



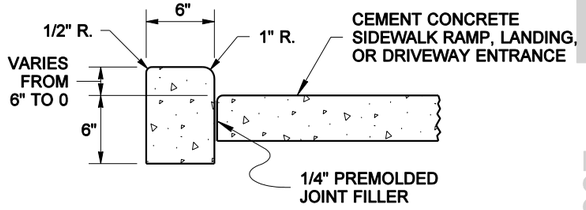

**ROUNDABOUT TRUCK APRON OUTER CEMENT CONCRETE CURB AND GUTTER**

**GENERAL NOTE**

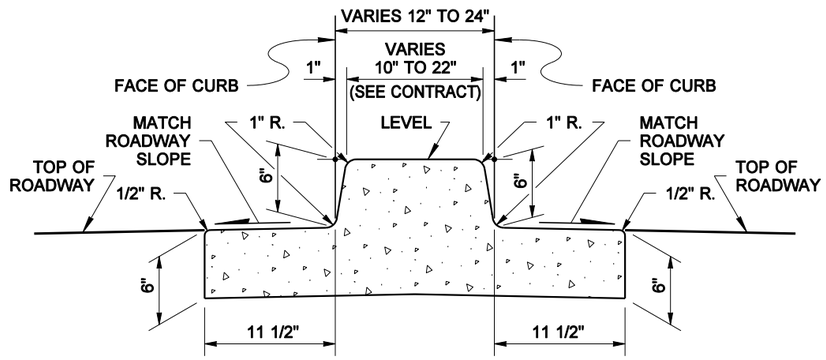
See Standard Plan F-3 for Curb Expansion and Contraction Joint spacing.



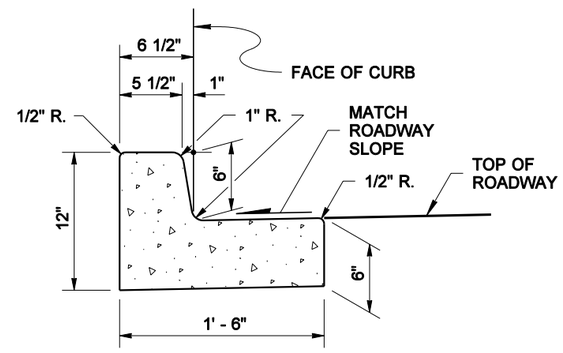

**CEMENT CONCRETE PEDESTRIAN CURB**



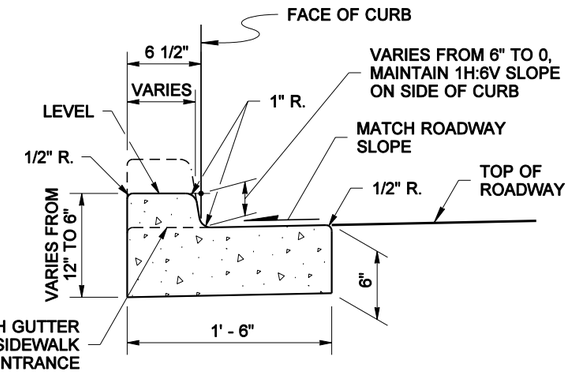

**CEMENT CONCRETE PEDESTRIAN CURB**
**AT SIDEWALK RAMPS & LANDINGS, AND DRIVEWAY ENTRANCES**



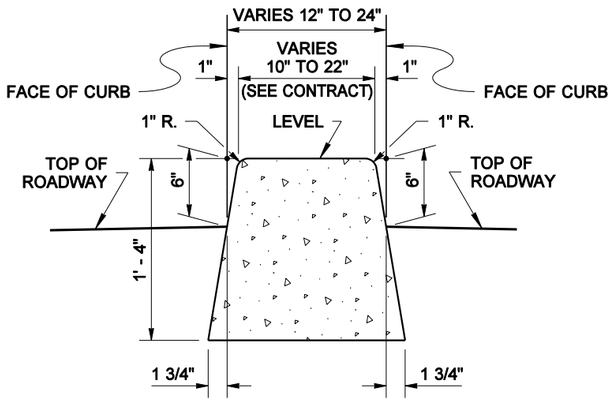

**DUAL-FACED CEMENT CONCRETE TRAFFIC CURB AND GUTTER**



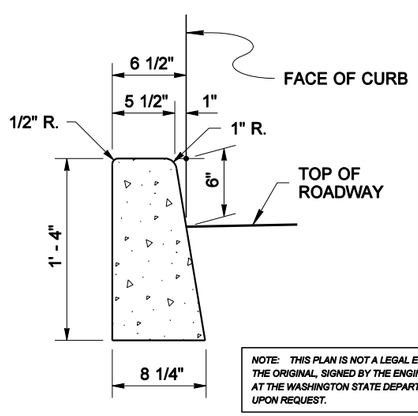

**CEMENT CONCRETE TRAFFIC CURB AND GUTTER**



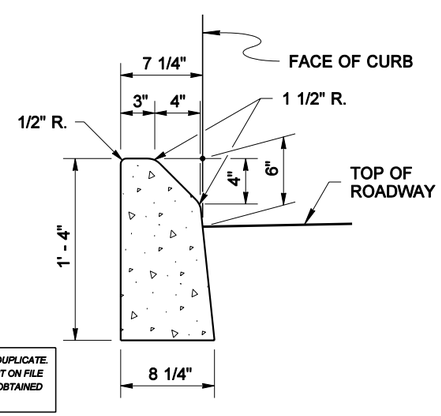

**DEPRESSED CURB SECTION**
**AT SIDEWALK RAMPS AND DRIVEWAY ENTRANCES**




**DUAL-FACED CEMENT CONCRETE TRAFFIC CURB**




**CEMENT CONCRETE TRAFFIC CURB**




**MOUNTABLE CEMENT CONCRETE TRAFFIC CURB**

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HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2003

# CEMENT CONCRETE CURBS

## STANDARD PLAN F-1

SHEET 1 OF 1 SHEET

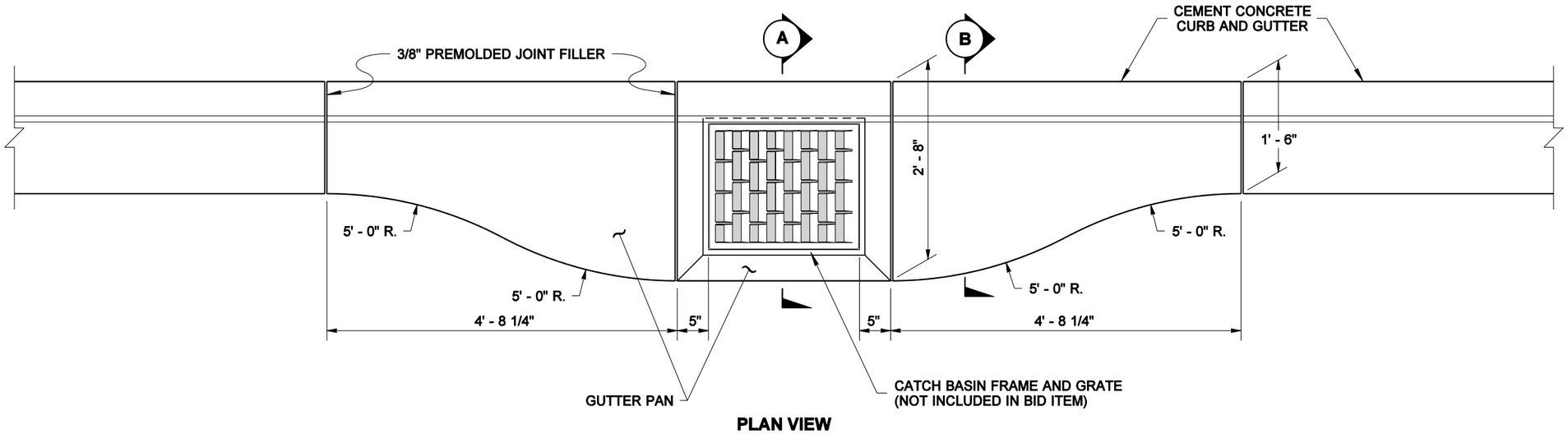
APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-17-02* — DATE

Washington State Department of Transportation

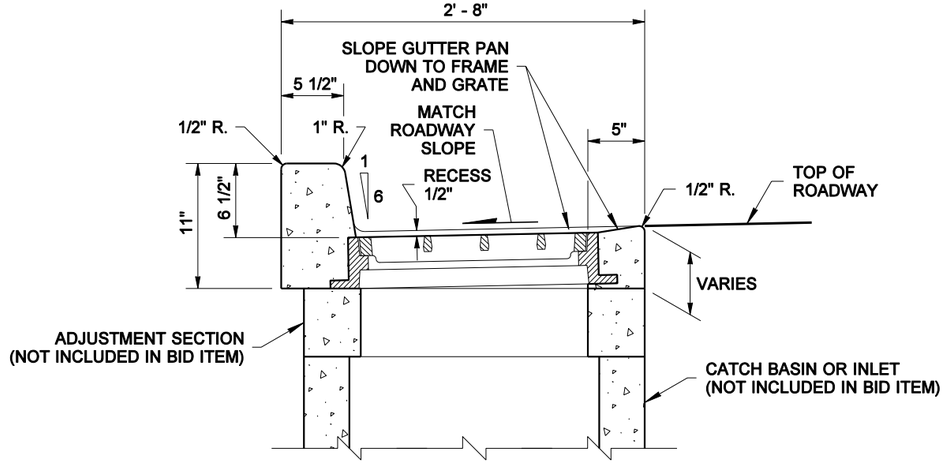
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

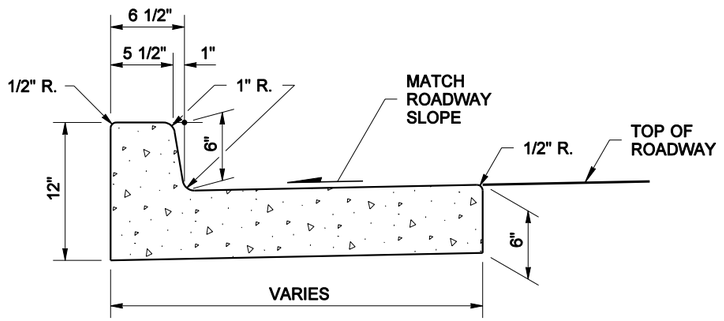



**PLAN VIEW**

## CATCH BASIN GUTTER PAN




**SECTION (A)**




**SECTION (B)**

HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2003

# CEMENT CONCRETE CURB AND GUTTER PAN

## STANDARD PLAN F-1a

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-17-02* — DATE

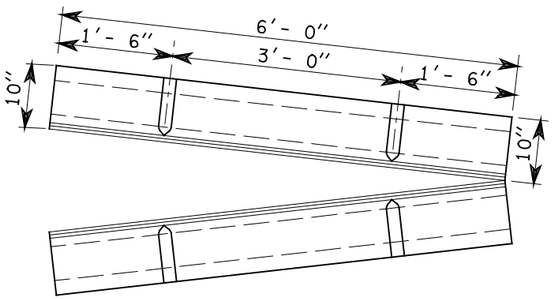
Washington State Department of Transportation

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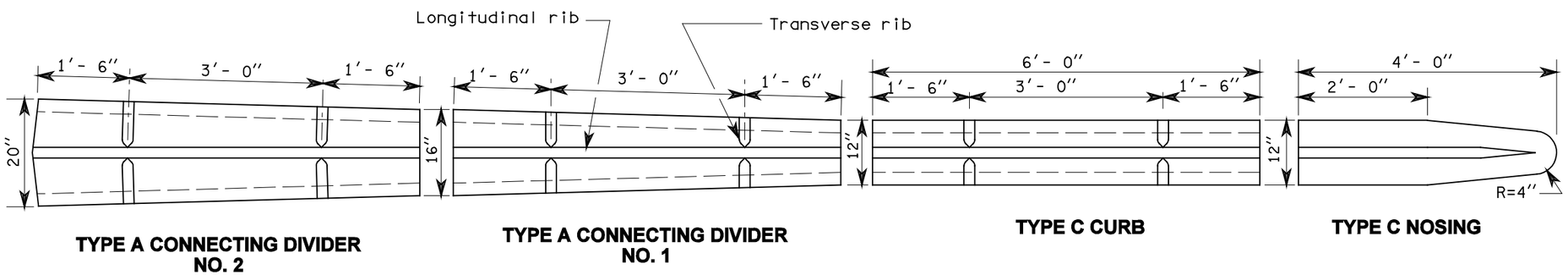
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

Note: Scuppers to be provided at intervals as required by the Engineer.




**TYPE A CURB STRAIGHT SECTION**



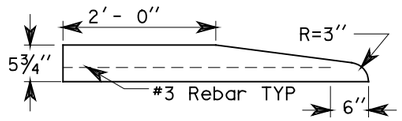

**TYPE A CONNECTING DIVIDER NO. 2**

**TYPE A CONNECTING DIVIDER NO. 1**

**TYPE C CURB**

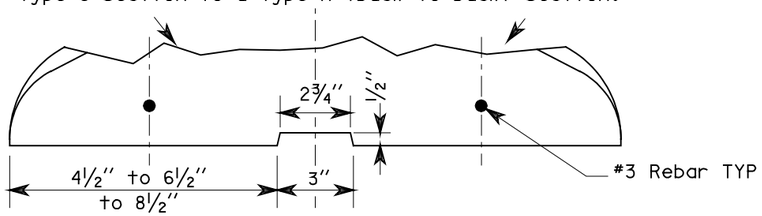
**TYPE C NOSING**

**PLAN VIEW**

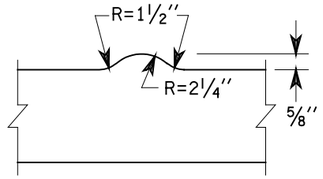



**TYPE A AND C NOSING ELEVATION**

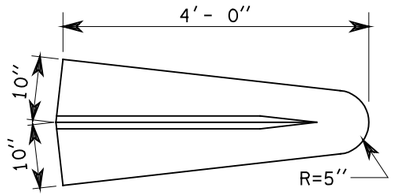
The main body of the curb and the longitudinal rib shall form a uniform transition from a Type C section to a Type A (back to back) section.



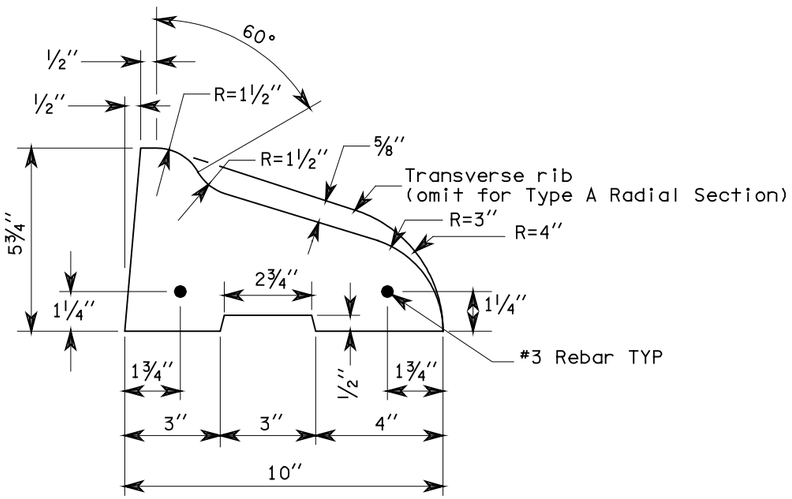

**TYPE A CONNECTING DIVIDER SECTION**



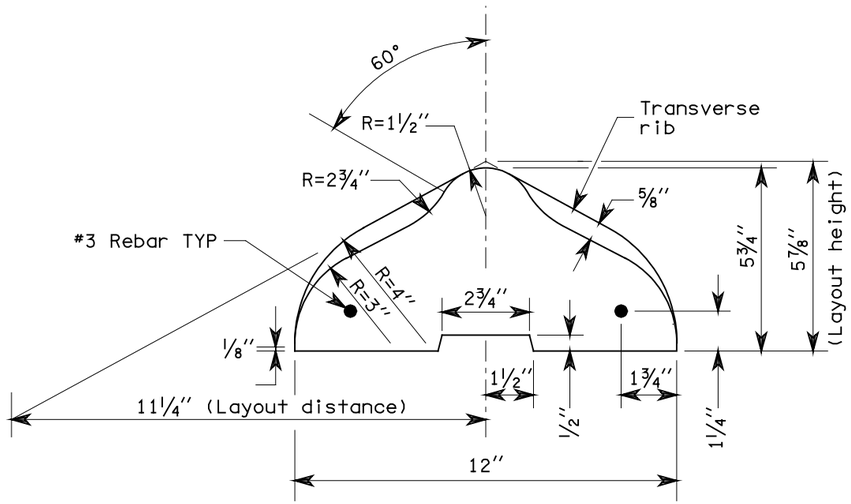

**LONGITUDINAL SECTION THROUGH TRANSVERSE RIB**




**TYPE A NOSING**




**TYPE A CURB SECTION**




**TYPE C CURB SECTION**

CLIFFORD E. MANSFIELD
STATE OF WASHINGTON
15224
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2000

# PRECAST TRAFFIC CURB
# STANDARD PLAN F-2

*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.*

| DATE | REVISION | BY |
|---|---|---|
| 8-99 | Deleted table & radial section identified rebar | TWS |

APPROVED FOR PUBLICATION

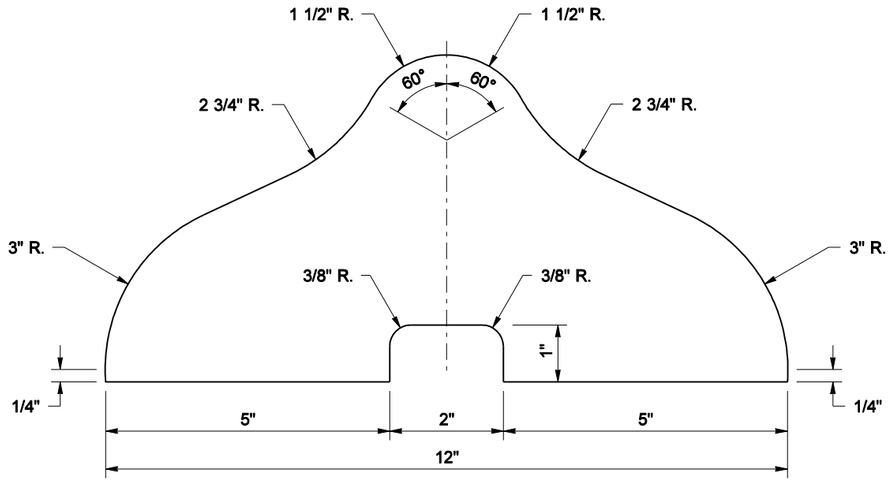
*Clifford E. Mansfield* — DEPUTY STATE DESIGN ENGINEER — *08/27/99* DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

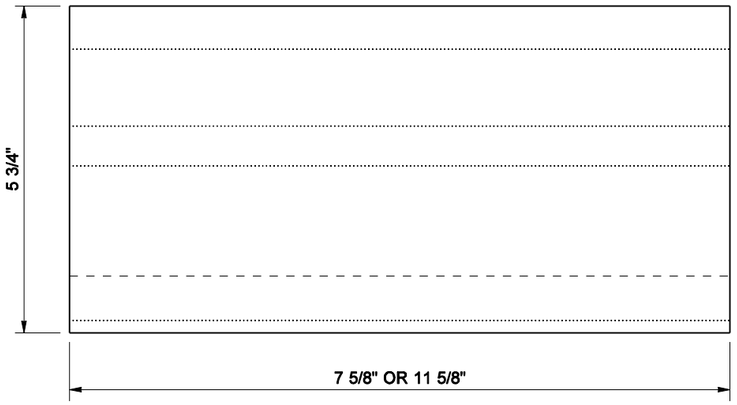
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: BILL BERENS

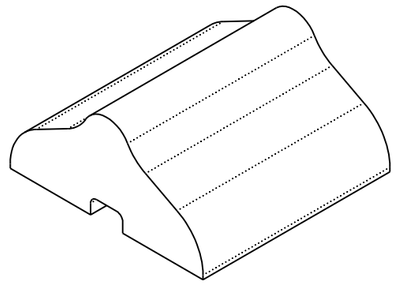



SECTION

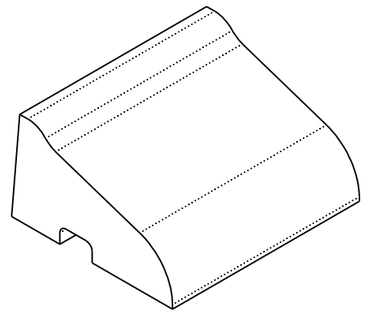



ELEVATION

## TYPE C BLOCK

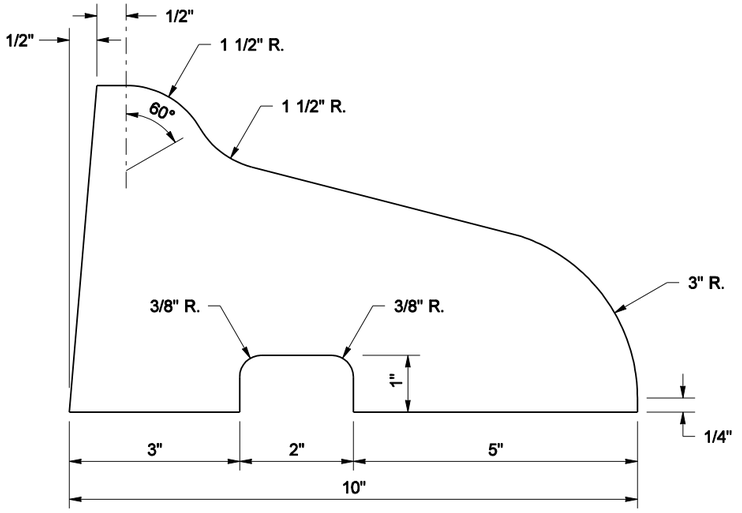


TYPE C BLOCK

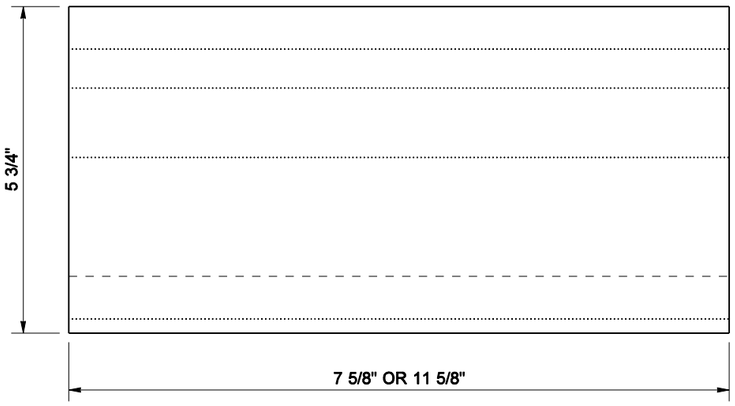


TYPE A BLOCK

ISOMETRIC VIEWS




SECTION




ELEVATION

## TYPE A BLOCK

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HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2005

# BLOCK TRAFFIC CURB

# STANDARD PLAN F-2a

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* *06-23-04*

STATE DESIGN ENGINEER — DATE

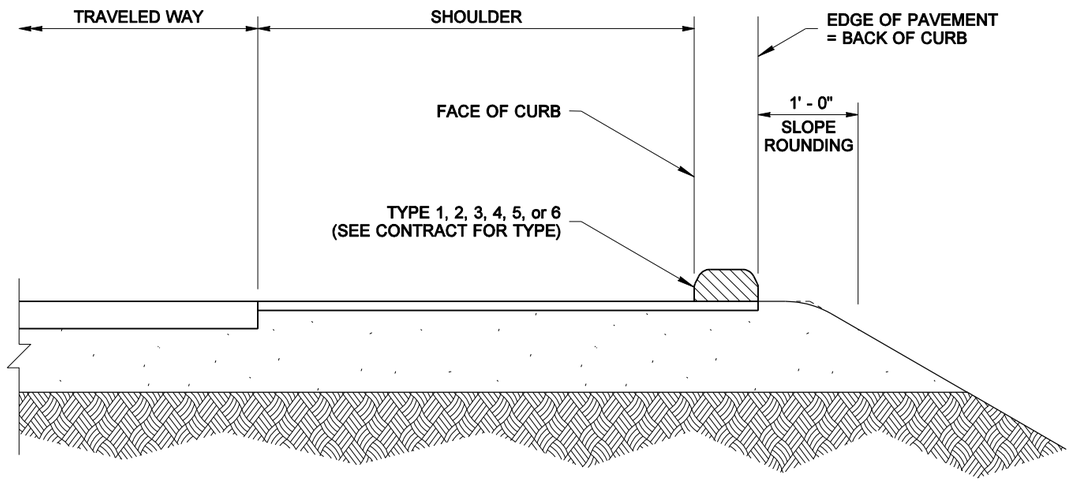
Washington State Department of Transportation

| DATE | REVISION | BY |
|---|---|---|
| 04/2004 | CORRECTED DIMENSIONAL ERROR ON BLOCK WIDTHS | BB |

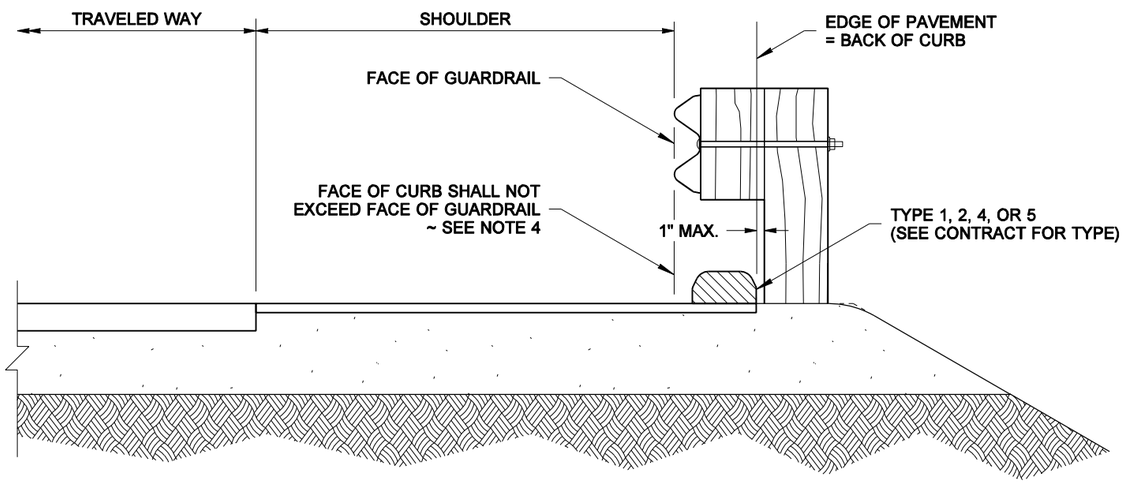
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: BILL BERENS



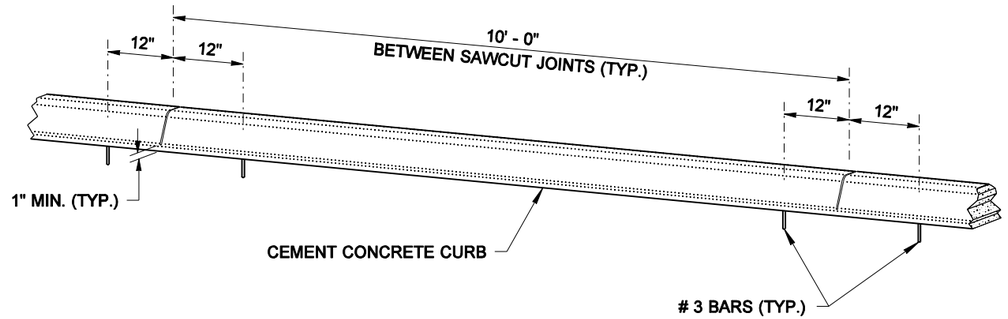

**EXTRUDED CURB**




**EXTRUDED CURB AT GUARDRAIL**

**NOTES**

1. See Standard Specifications for anchoring methods.
2. Type 4a and Type 5a curbs do not require steel tie bars for anchoring.
3. The installation of curb in areas with existing Guardrail could require the removal and resetting of the Guardrail or its components.
4. Curb shall be placed at the face of Guardrail for transitions to concrete barriers.




**SPACING OF ANCHOR BARS**

HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2005

# EXTRUDED CURB

## STANDARD PLAN F-2b

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-09-05* — DATE

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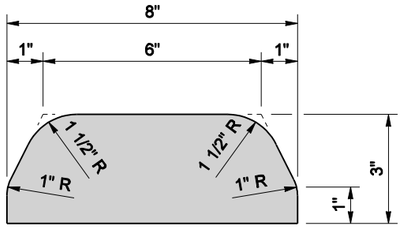
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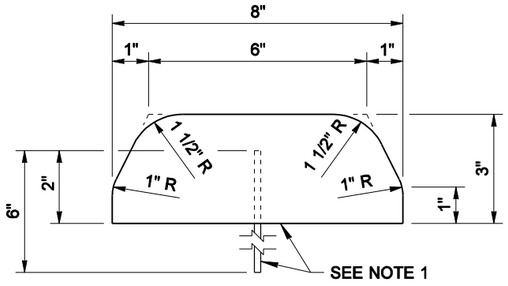
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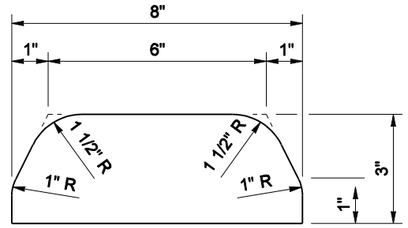
DRAWN BY: BILL BERENS



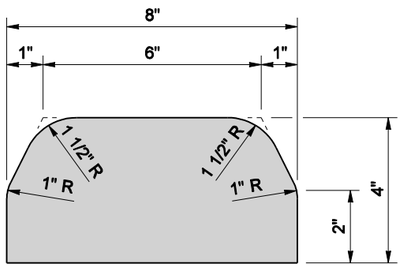

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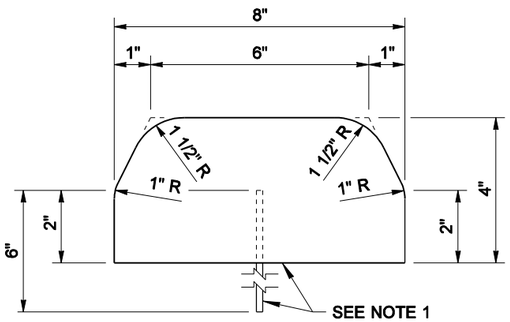

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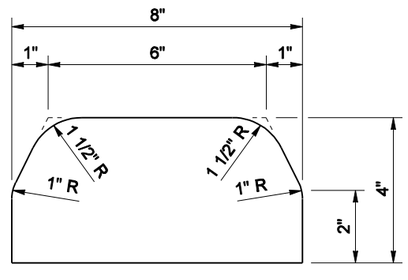

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SEE NOTE 2



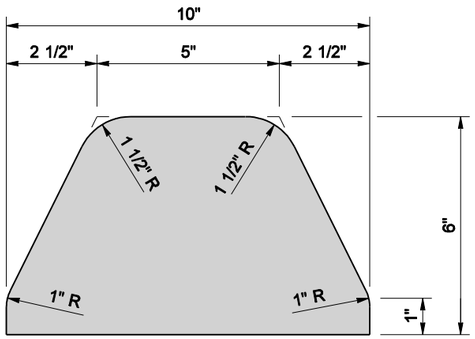

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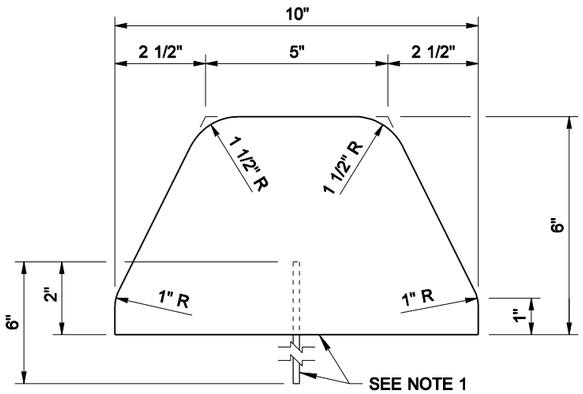

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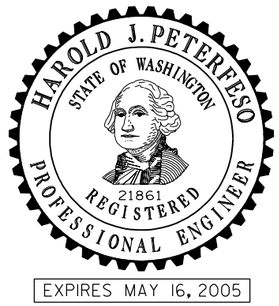

**TYPE 5a**
(CEMENT CONCRETE)
SEE NOTE 2




**TYPE 3**
(ASPHALT)




**TYPE 6**
(CEMENT CONCRETE)




EXPIRES MAY 16, 2005

# EXTRUDED CURB

# STANDARD PLAN F-2b

SHEET 2 OF 2 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-09-05* — DATE

Washington State Department of Transportation

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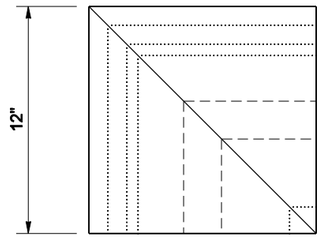
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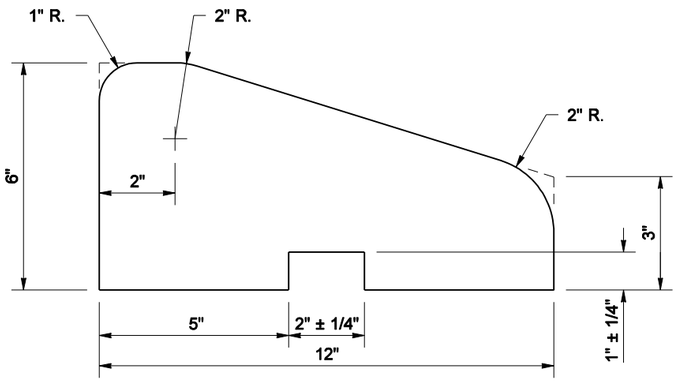
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DRAWN BY: BILL BERENS



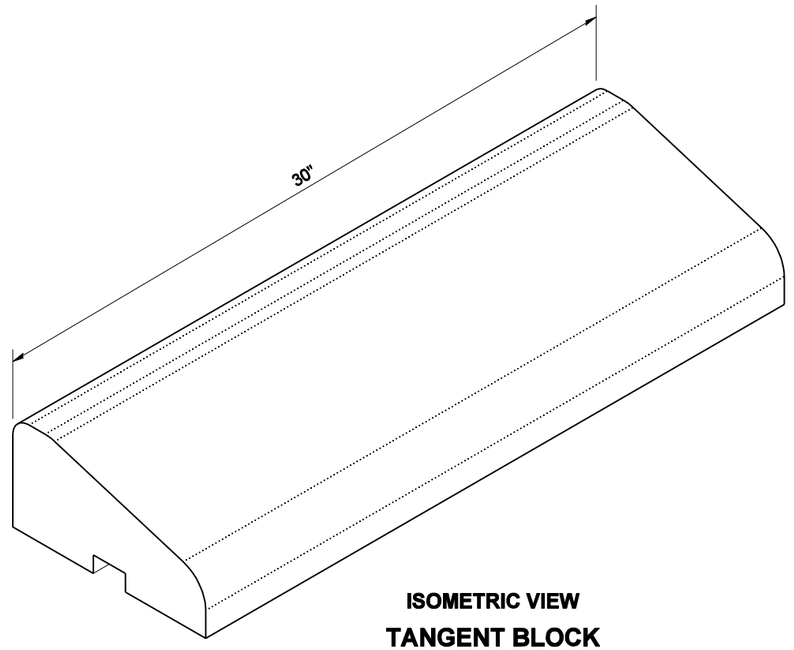

TOP VIEW

**INSIDE CORNER BLOCK**



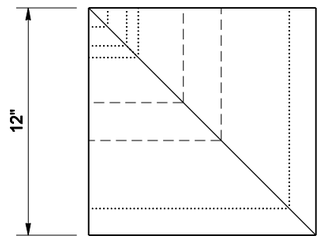

TYPICAL OF ALL

**END VIEW**




**ISOMETRIC VIEW**

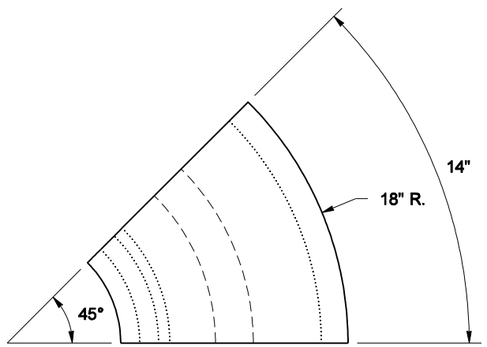
**TANGENT BLOCK**




TOP VIEW

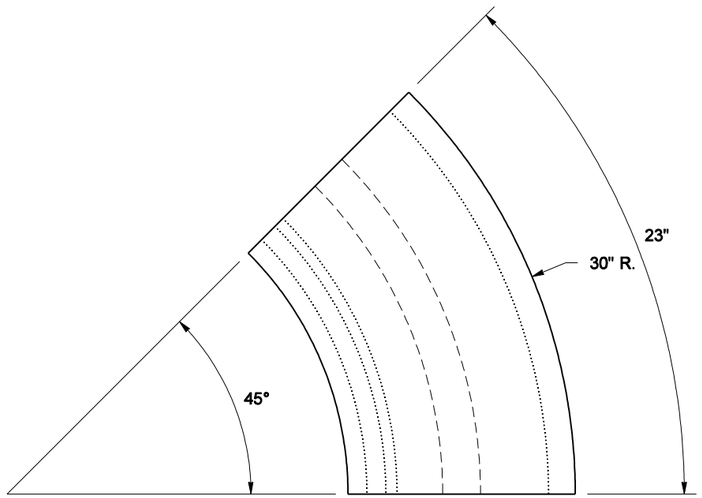
**OUTSIDE CORNER BLOCK**

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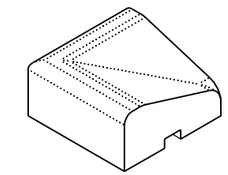

TOP VIEW

**18" RADIUS BLOCK**

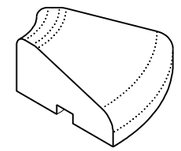



TOP VIEW

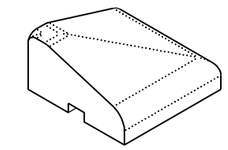
**30" RADIUS BLOCK**



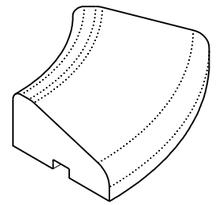
**INSIDE CORNER BLOCK**



**18" RADIUS BLOCK**



**OUTSIDE CORNER BLOCK**



**30" RADIUS BLOCK**

**ISOMETRIC VIEWS**




EXPIRES MAY 16, 2005

# PRECAST CONCRETE SLOPED MOUNTABLE CURB

## STANDARD PLAN F-2c

SHEET 1 OF 2 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER

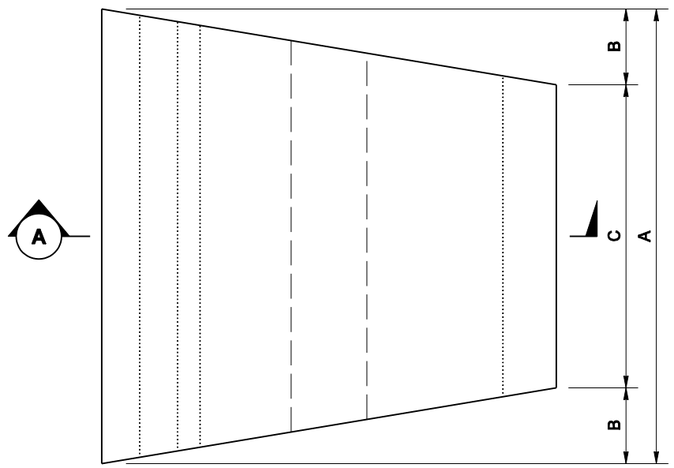
*06-23-04* — DATE

Washington State Department of Transportation

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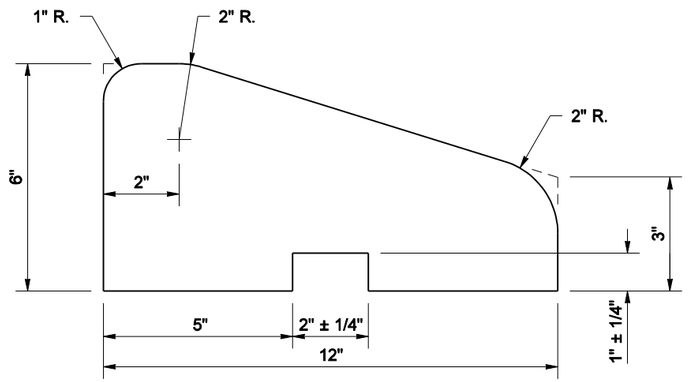
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DRAWN BY: BILL BERENS

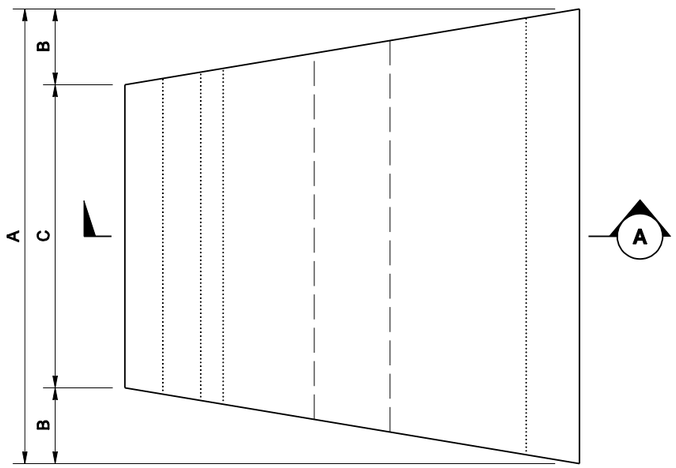



TOP VIEW

**INSIDE RADIUS BLOCK**




SECTION (A)



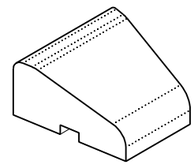

TOP VIEW

**OUTSIDE RADIUS BLOCK**

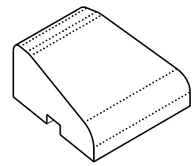
## CURB RADIUS TABLE

| CURB RADIUS | DIMENSION A | DIMENSION B | DIMENSION C |
|---|---|---|---|
| 3' | 12" | 2" | 8" |
| 4' TO 5' | 12" | 1 1/2" | 9" |
| 6' | 12" | 1" | 10" |
| 7' | 12" | 7/8" | 10 1/4" |
| 8' | 18" | 1 1/8" | 15 3/4" |
| 9' | 18" | 1" | 16" |
| 10' | 18" | 7/8" | 16 1/4" |
| 11' TO 13' | 18" | 3/4" | 16 1/2" |
| 14' TO 15' | 18" | 5/8" | 16 3/4" |
| 16' TO 17' | 24" | 3/4" | 22 1/2" |
| 18' TO 22' | 24" | 5/8" | 22 3/4" |
| 23' TO 29' | 24" | 1/2" | 23" |
| 30' TO 34' | 30" | 1/2" | 29" |
| 35' TO 48' | 30" | 3/8" | 29 1/4" |
| 49' TO 60' | 30" | 1/4" | 29 1/2" |
| OVER 60' | USE TANGENT BLOCK, SEE SHEET 1 | | |

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.



**INSIDE RADIUS BLOCK**



**OUTSIDE RADIUS BLOCK**

**ISOMETRIC VIEWS**

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EXPIRES MAY 16, 2005

# PRECAST CONCRETE SLOPED MOUNTABLE CURB

## STANDARD PLAN F-2c

SHEET 2 OF 2 SHEETS

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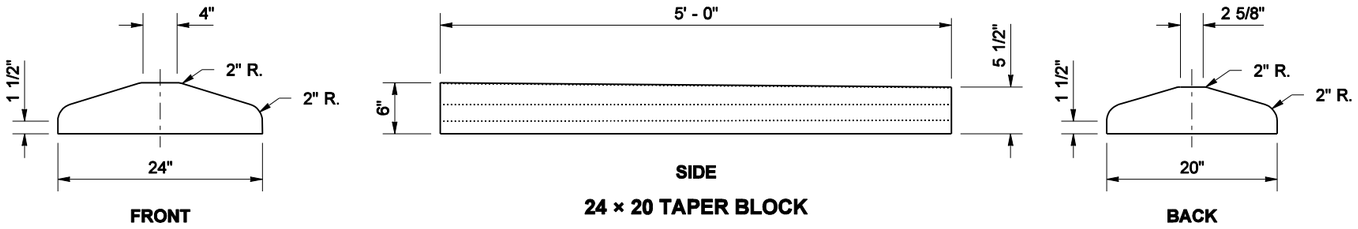
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-23-04* — DATE

Washington State Department of Transportation

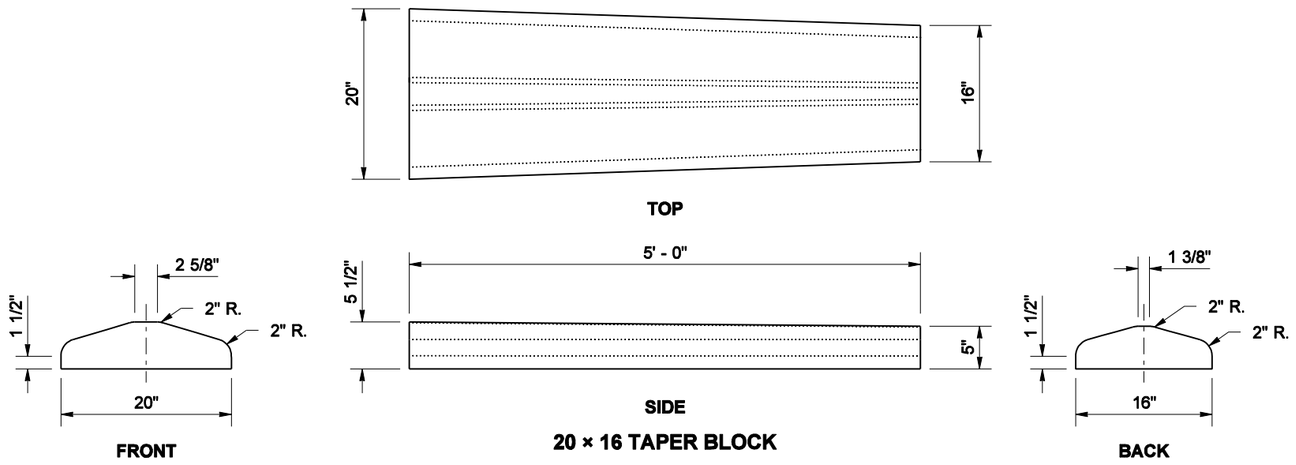
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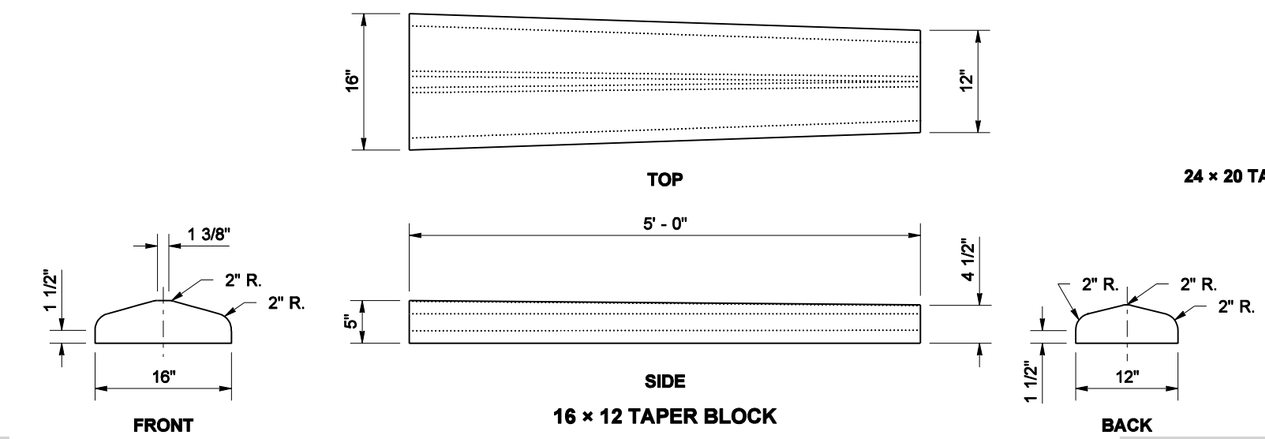
DRAWN BY: BILL BERENS




**24 × 20 TAPER BLOCK**



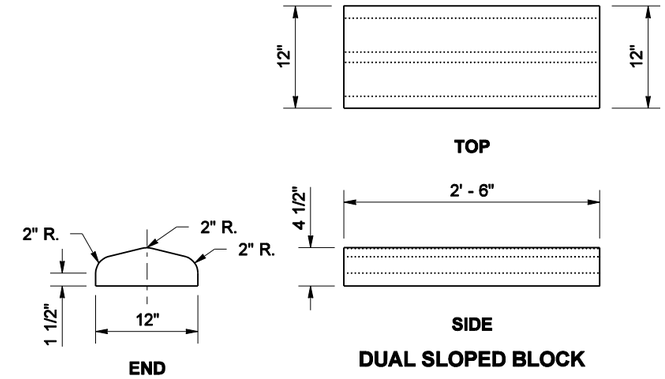

**20 × 16 TAPER BLOCK**




**16 × 12 TAPER BLOCK**

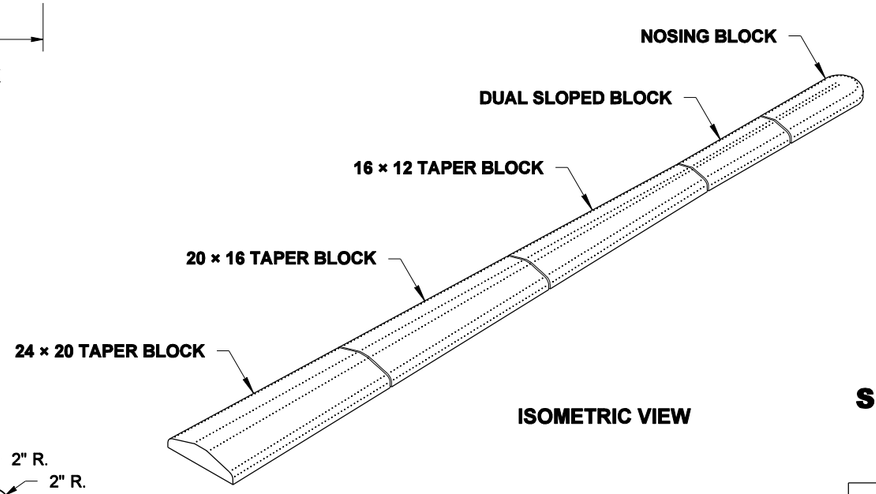
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**DUAL SLOPED BLOCK**

**NOSING BLOCK**




**ISOMETRIC VIEW**

HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2005

# PRECAST CONCRETE DUAL FACED SLOPED MOUNTABLE CURB STANDARD PLAN F-2d

SHEET 1 OF 1 SHEET

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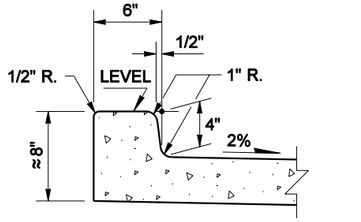
Washington State Department of Transportation

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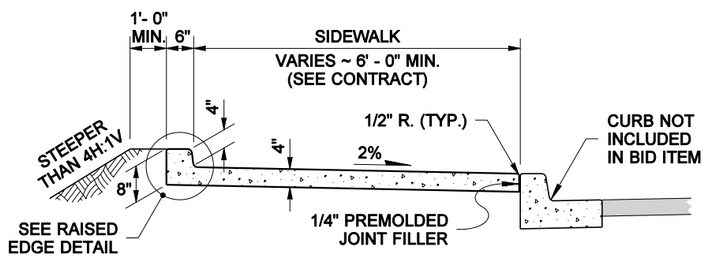
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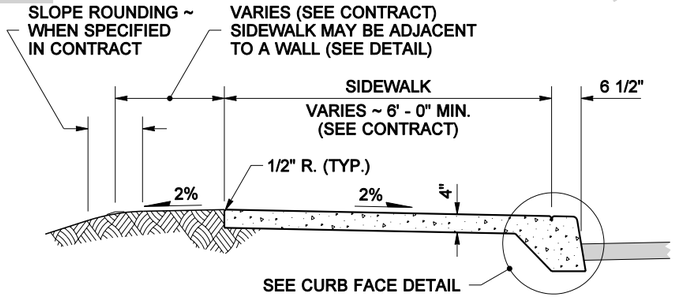



**NOTE:** EXTEND SIDEWALK TRANSVERSE JOINTS TO INCLUDE RAISED EDGE

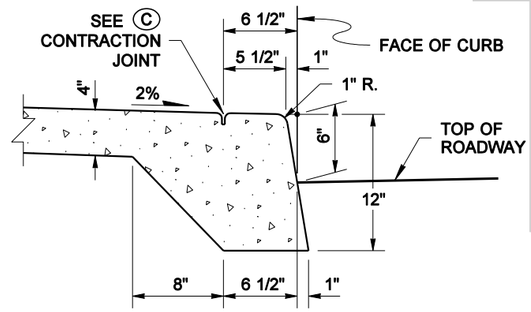
**RAISED EDGE DETAIL**




**CEMENT CONCRETE SIDEWALK WITH RAISED EDGE**

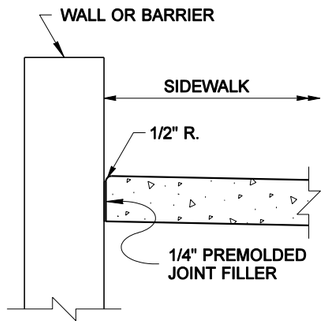



**MONOLITHIC CEMENT CONCRETE CURB AND SIDEWALK**

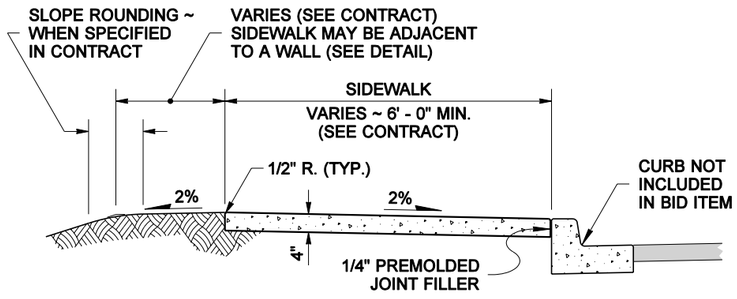



**NOTE:** EXTEND SIDEWALK TRANSVERSE EXPANSION JOINTS TO INCLUDE CURB (FULL DEPTH)

**CURB FACE DETAIL**



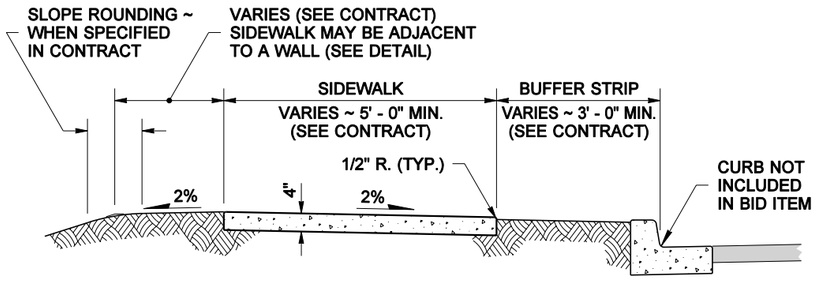

**SIDEWALK ADJACENT TO WALL DETAIL**



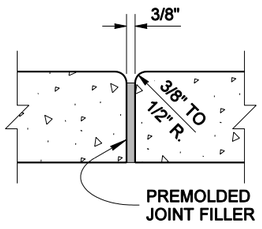

**CEMENT CONCRETE SIDEWALK**
**ADJACENT TO CURB**



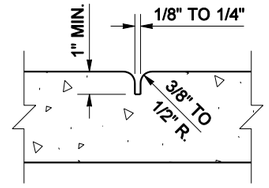

**JOINT AND FINISH DETAIL**




**CEMENT CONCRETE SIDEWALK**
**ADJACENT TO BUFFER STRIP**




**(E) EXPANSION JOINT**




**(C) CONTRACTION JOINT**




EXPIRES MAY 16, 2003

**CEMENT CONCRETE SIDEWALK**

**STANDARD PLAN F-3**

SHEET 1 OF 1 SHEET

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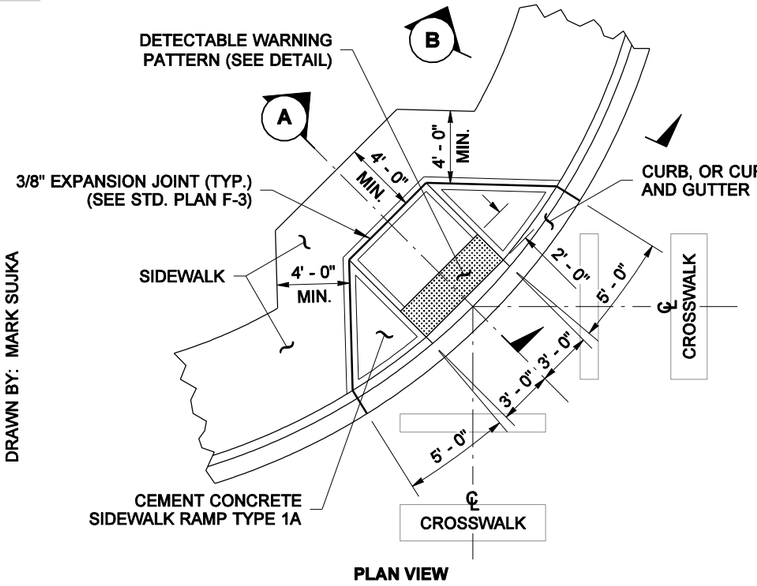
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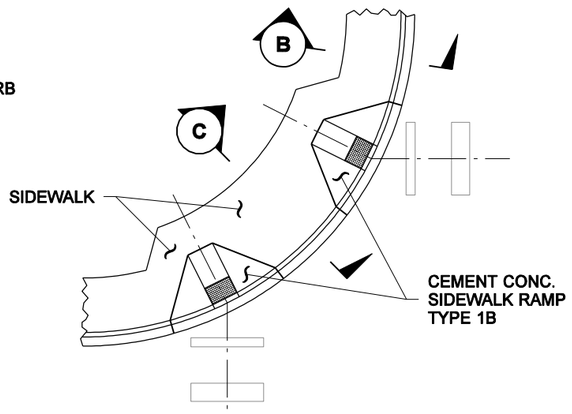
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA



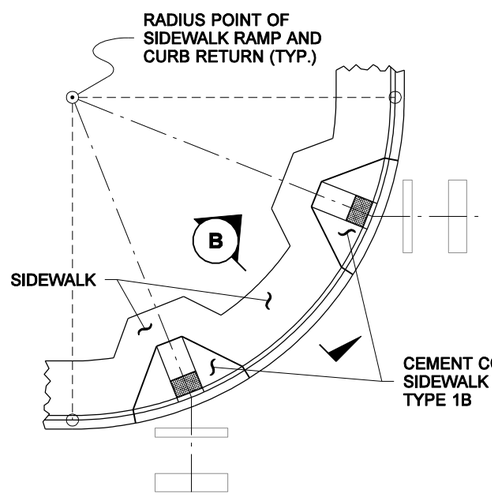

PLAN VIEW

## SIDEWALK RAMP TYPE 1A
LAYOUT
SEE NOTE 1



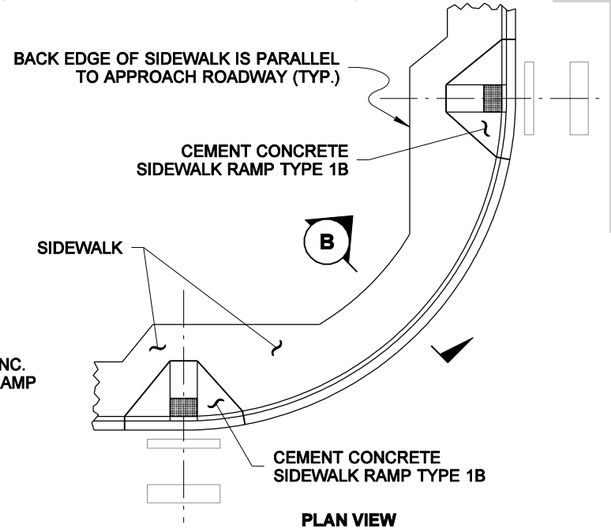

PLAN VIEW

**LAYOUT 1**
SEE NOTE 2



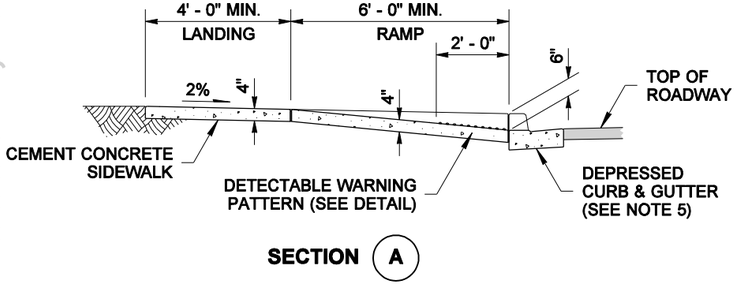

PLAN VIEW

**LAYOUT 2**
SEE NOTE 2

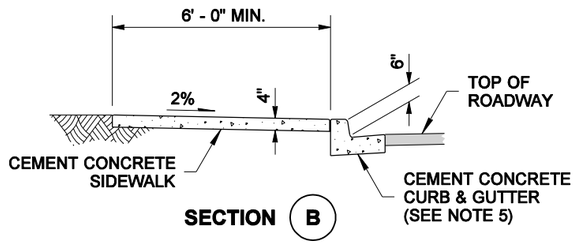



PLAN VIEW

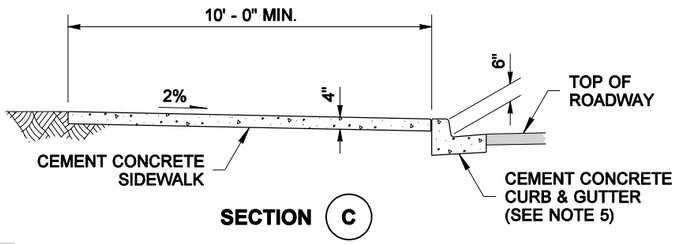
**LAYOUT 3**
SEE NOTE 2



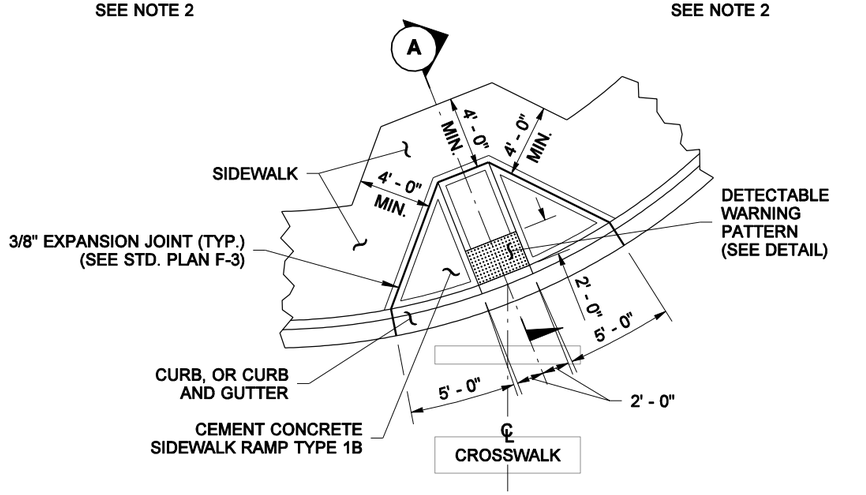

SECTION (A)




SECTION (B)

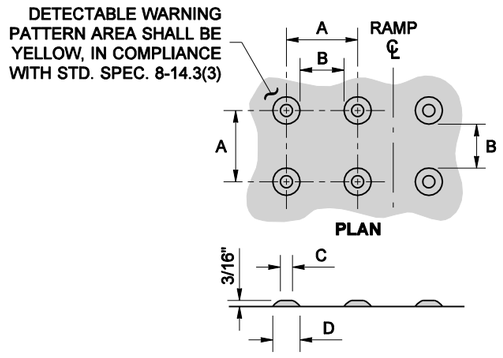



SECTION (C)




PLAN VIEW

## SIDEWALK RAMP TYPE 1B
FOR LAYOUTS 1, 2, & 3



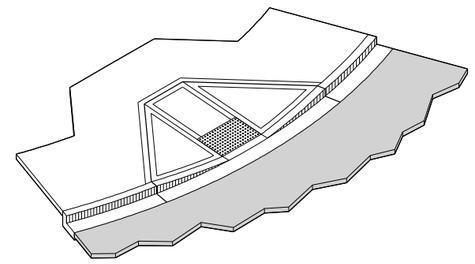

| | MIN. | MAX. |
|---|---|---|
| A | 1 5/8" | 2 3/8" |
| B | 5/8" | 1 1/2" |
| C | 7/16" | 3/4" |
| D | 7/8" | 1 7/16" |

TRUNCATED DOMES (SEE NOTE 7)

## DETECTABLE WARNING PATTERN DETAIL

### NOTES

1. The Type 1A Ramp is used to provide access to two crosswalks only when it is infeasible to provide a separate ramp for each crosswalk.
2. Layouts 1, 2, & 3 require two (2) of this bid item: "Cement Conc. Sidewalk Ramp Type 1B". 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. 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-1 for curb details.
6. See Standard Plan F-3 for sidewalk joint placement and details.
7. Detectable warning patterns may be created by any method that will achieve the truncated dome dimensions and spacing shown.



ISOMETRIC VIEW

HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2005

# SIDEWALK RAMP TYPES 1A & 1B WITH LAYOUTS STANDARD PLAN F-3a

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-09-05* — DATE

Washington State Department of Transportation

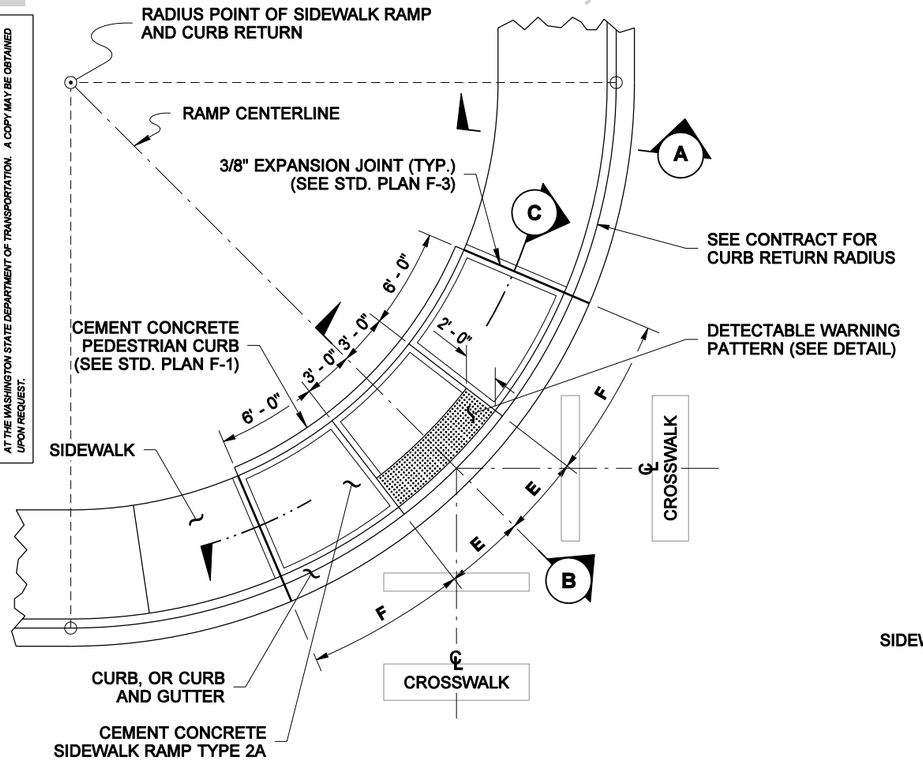
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

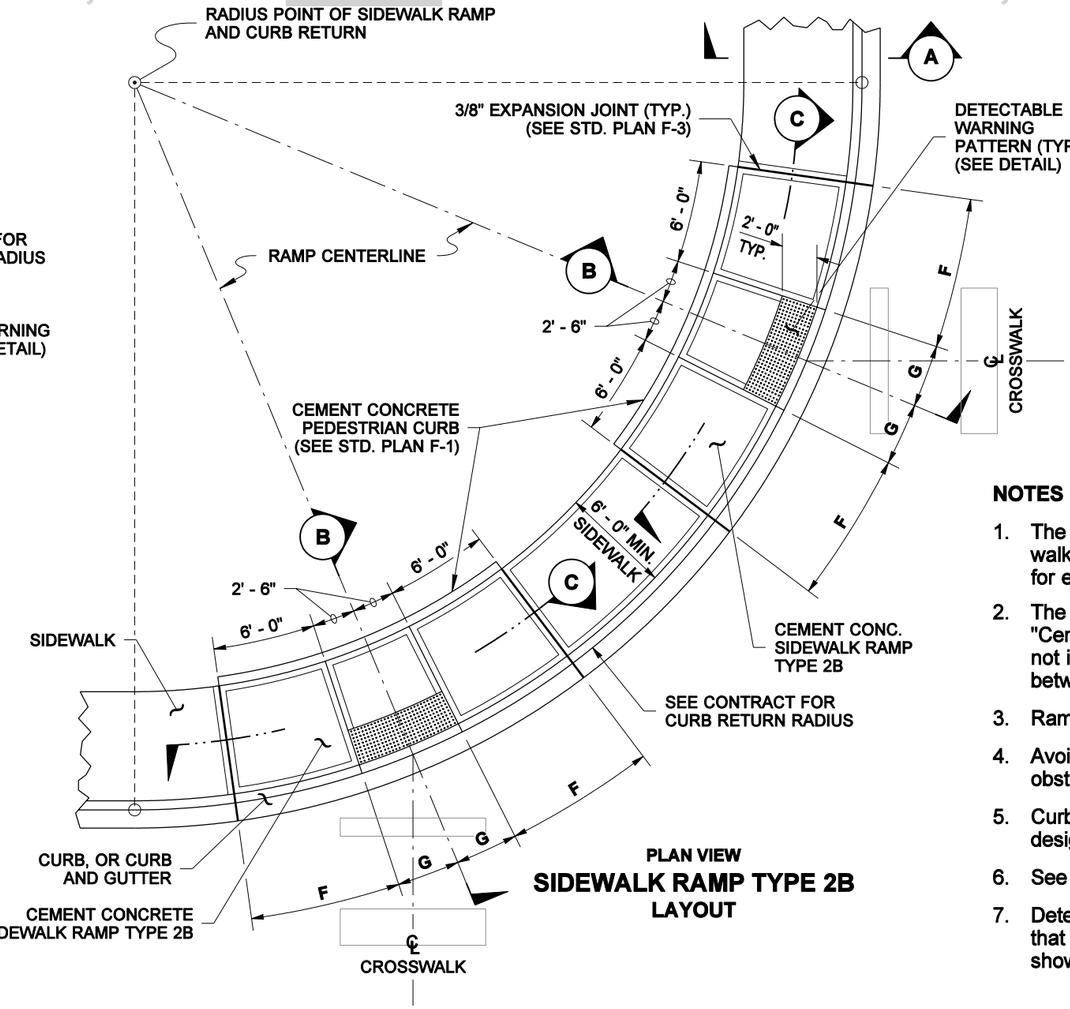
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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PLAN VIEW

## SIDEWALK RAMP TYPE 2A LAYOUT




PLAN VIEW

## SIDEWALK RAMP TYPE 2B LAYOUT

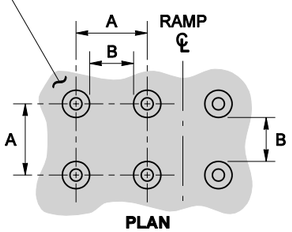
| RADIUS (AT CURB FACE) | E | F | G |
|---|---|---|---|
| 20 FEET | 4' - 5 1/4" | 8' - 10 1/2" | 3' - 8 1/2" |
| 30 FEET | 3' - 10" | 7' - 8" | 3' - 2 1/4" |
| 40 FEET | 3' - 7" | 7' - 2" | 3' - 0" |
| 50 FEET | 3' - 5 1/2" | 6' - 10 3/4" | 2' - 10 1/2" |
| 60 FEET | 3' - 4 1/2" | 6' - 8 3/4" | 2' - 9 1/2" |
| 70 FEET | 3' - 3 3/4" | 6' - 7 1/2" | 2' - 9" |
| 80 FEET | 3' - 3 1/4" | 6' - 6 1/2" | 2' - 8 1/2" |
| 90 FEET | 3' - 2 3/4" | 6' - 5 1/2" | 2' - 8 1/4" |
| 100 FEET | 3' - 2 1/2" | 6' - 5" | 2' - 8" |

INTERMEDIATE RADII CAN BE INTERPOLATED

### NOTES

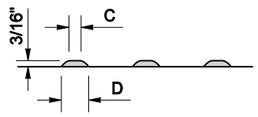
1. The Type 2A Ramp is used to provide access to two cross-walks only when it is infeasible to provide a separate ramp for each crosswalk.
2. The Type 2B Ramp Layout requires two (2) of this bid item: "Cement Conc. Sidewalk Ramp Type 2B". The bid item does not include the adjacent Curb (or Curb & Gutter), 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-1 for curb details.
6. See Std. Plan F-3 for sidewalk joint placement and details.
7. Detectable warning patterns may be created by any method that will achieve the truncated dome dimensions and spacing shown.

DETECTABLE WARNING PATTERN AREA SHALL BE YELLOW, IN COMPLIANCE WITH STD. SPEC. 8-14.3(3)




PLAN

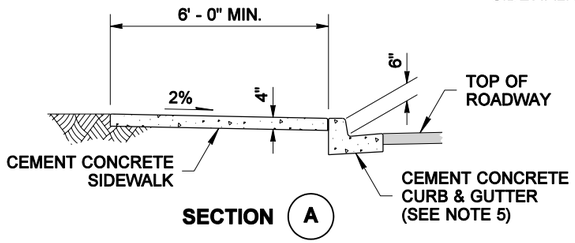
| | MIN. | MAX. |
|---|---|---|
| A | 1 5/8" | 2 3/8" |
| B | 5/8" | 1 1/2" |
| C | 7/16" | 3/4" |
| D | 7/8" | 1 7/16" |



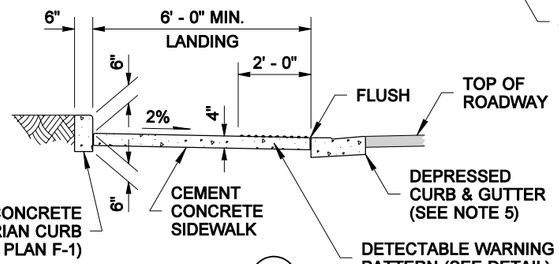

ELEVATION

TRUNCATED DOMES (SEE NOTE 7)

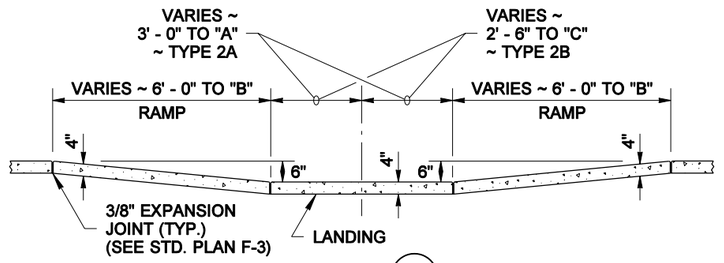
## DETECTABLE WARNING PATTERN DETAIL



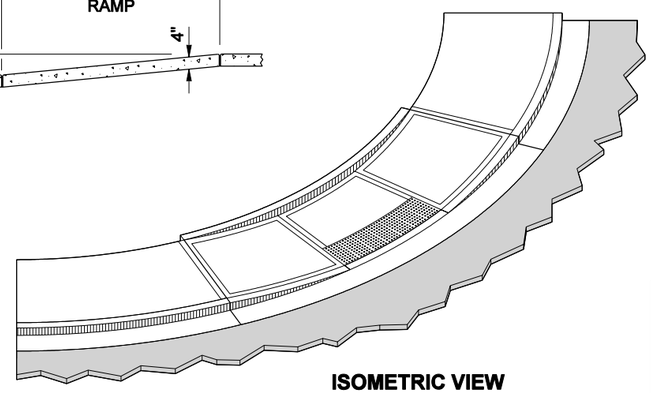

SECTION (A)




SECTION (B)




SECTION (C)



ISOMETRIC VIEW

HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2007

# SIDEWALK RAMP TYPES 2A & 2B WITH LAYOUTS STANDARD PLAN F-3b

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

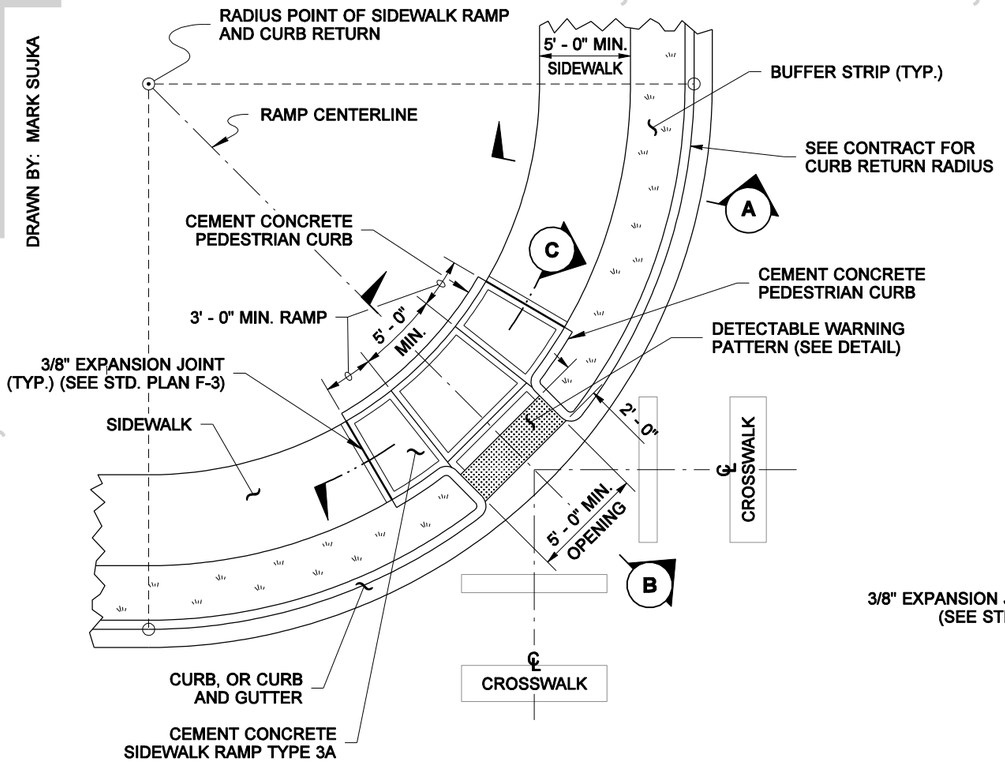
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *09-02-05* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

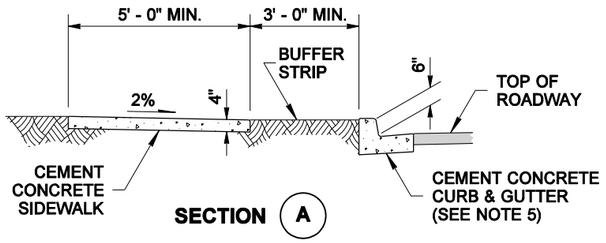
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA

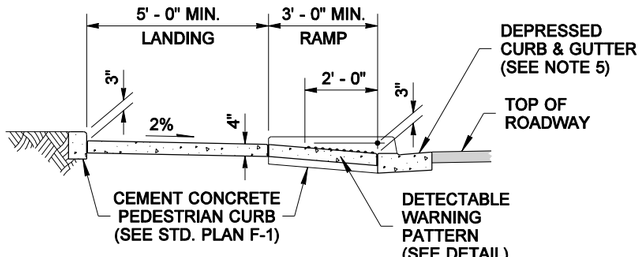



PLAN VIEW

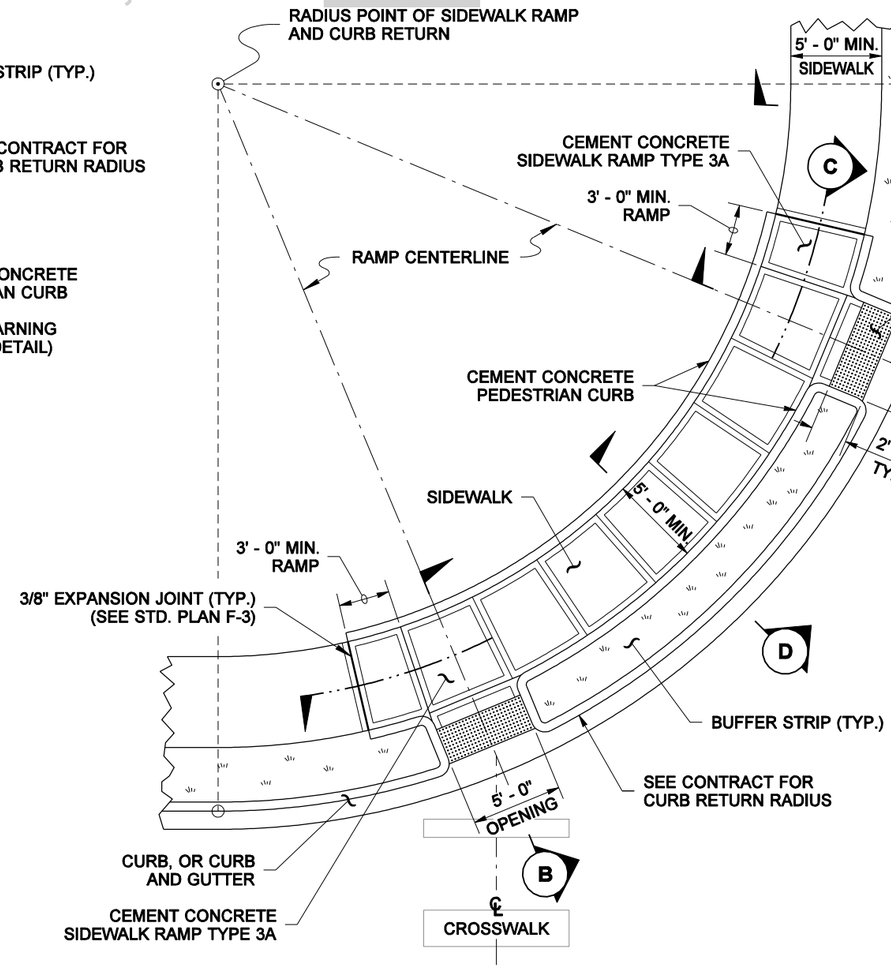
## SIDEWALK RAMP TYPE 3A
### LAYOUT 1




SECTION (A)

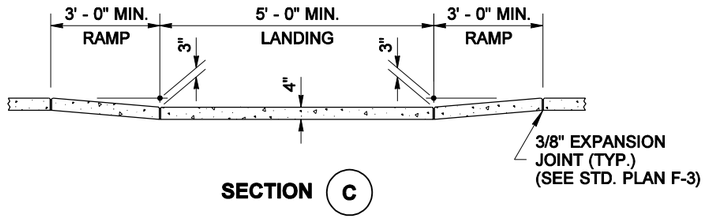



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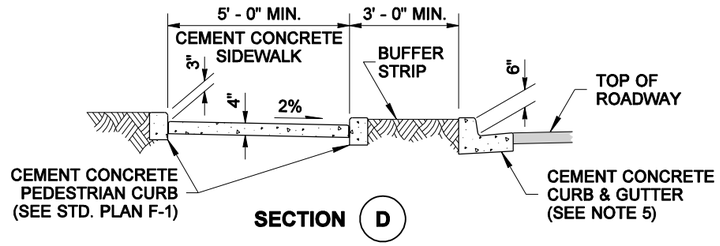



PLAN VIEW

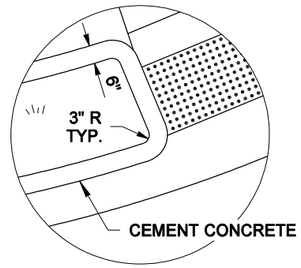
## SIDEWALK RAMP TYPE 3A
### LAYOUT 2




SECTION (C)




SECTION (D)

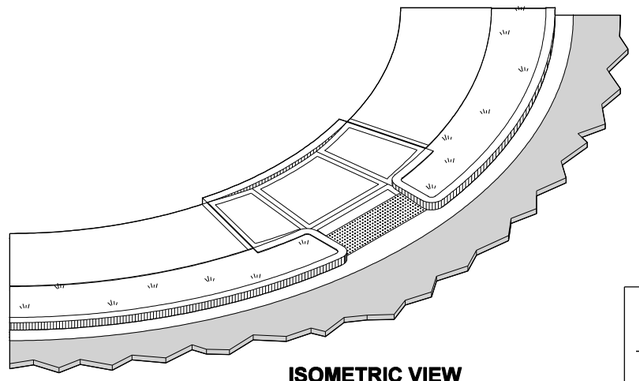



**CURB RADIUS DETAIL**

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**NOTES**

1. Layouts 1 and 3 are used to provide access to two crosswalks only when it is infeasible to provide a separate ramp for each crosswalk.
2. Layout 2 requires two (2) of this bid item: "Cement Conc. Sidewalk Ramp Type 3A". Layout 4 requires two (2) of this bid item: "Cement Conc. Sidewalk Ramp Type 3B". These bid items do 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-1 for curb details.
6. See Std. Plan F-3 for sidewalk joint placement and details.
7. Detectable warning patterns may be created by any method that will achieve the truncated dome dimensions and spacing shown.



ISOMETRIC VIEW

HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2005

## SIDEWALK RAMP TYPES 3A & 3B WITH LAYOUTS STANDARD PLAN F-3c

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

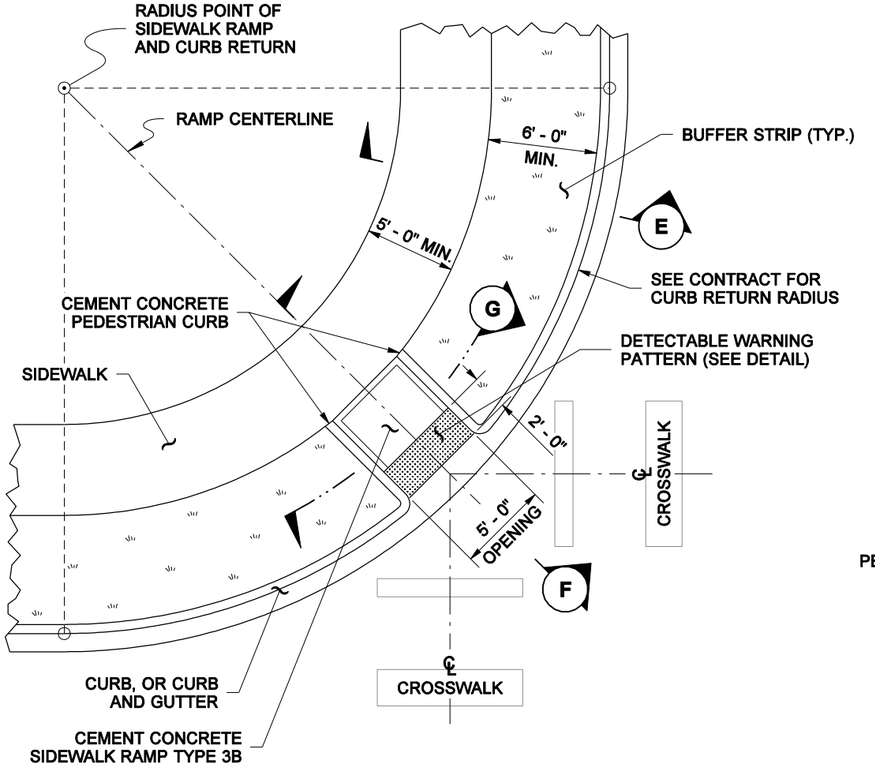
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-09-05* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

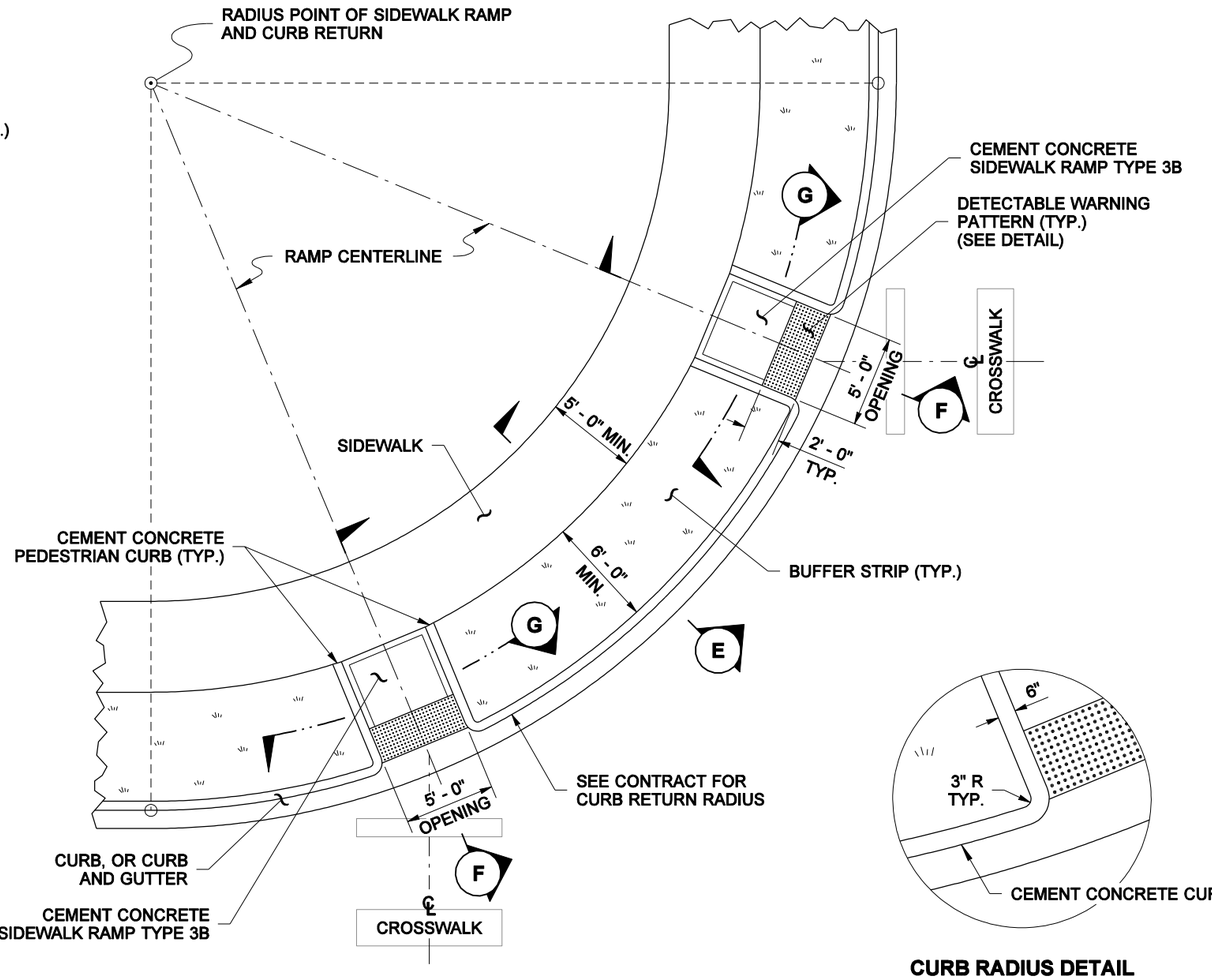
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA




PLAN VIEW

**SIDEWALK RAMP TYPE 3B**
**LAYOUT 3**

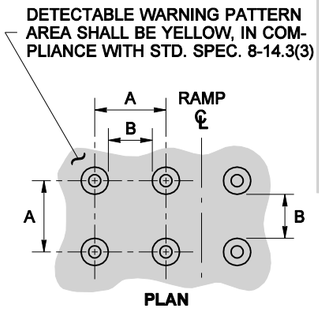



PLAN VIEW

**SIDEWALK RAMP TYPE 3B**
**LAYOUT 4**

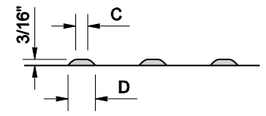



**CURB RADIUS DETAIL**




PLAN

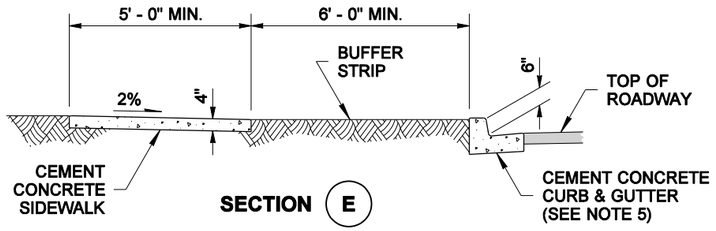
| | MIN. | MAX. |
|---|---|---|
| A | 1 5/8" | 2 3/8" |
| B | 5/8" | 1 1/2" |
| C | 7/16" | 3/4" |
| D | 7/8" | 1 7/16" |



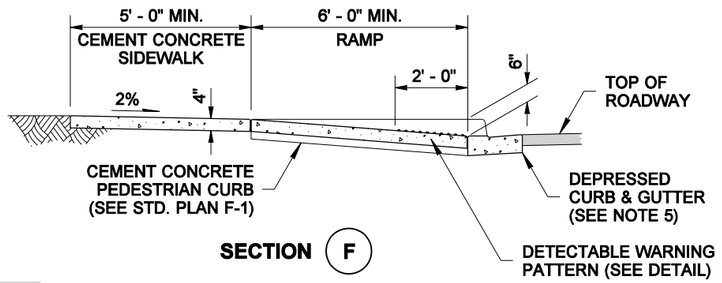

ELEVATION

TRUNCATED DOMES (SEE NOTE 7)

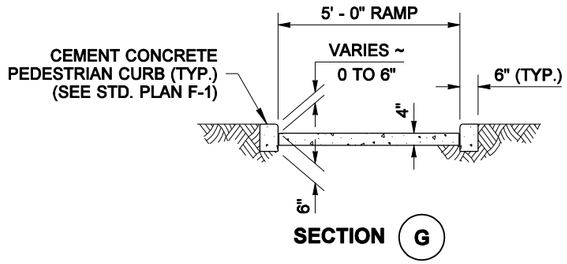
**DETECTABLE WARNING PATTERN DETAIL**




SECTION (E)

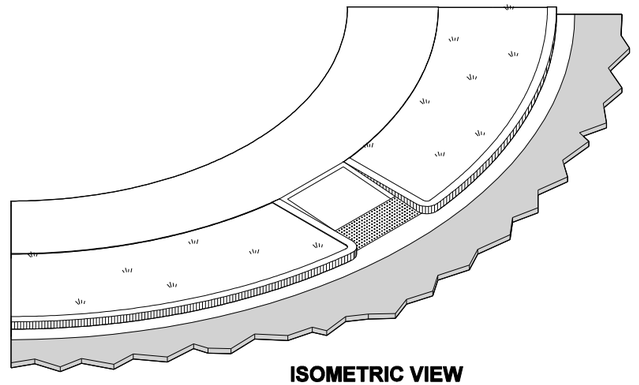



SECTION (F)




SECTION (G)

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ISOMETRIC VIEW

HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2005

**SIDEWALK RAMP TYPES 3A & 3B WITH LAYOUTS STANDARD PLAN F-3c**

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

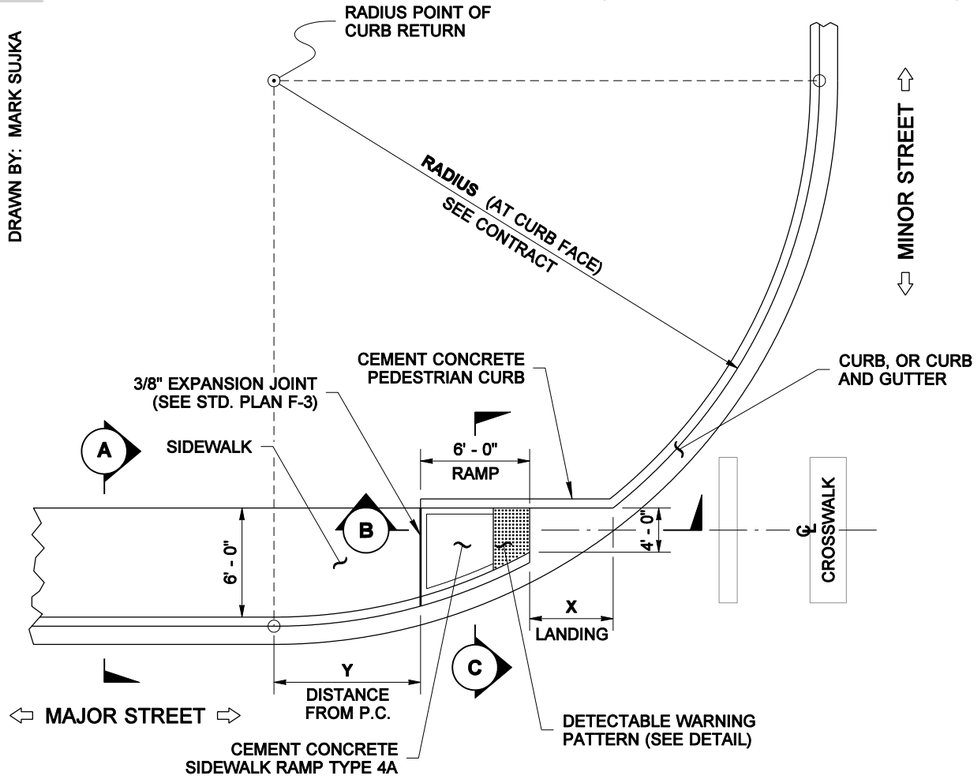
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-09-05* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA




PLAN VIEW

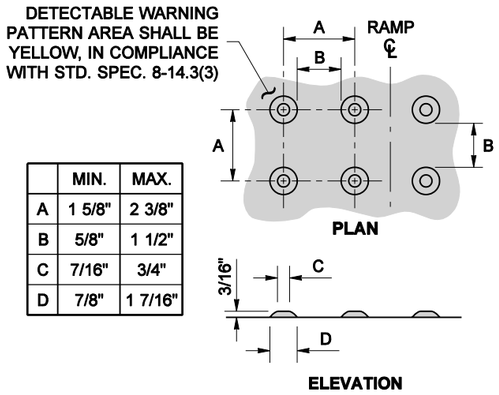
## SIDEWALK RAMP TYPE 4A LAYOUT

| RADIUS (AT CURB FACE) | X | Y |
|---|---|---|
| 20 FEET | 6' - 1 3/4" | 2' - 7 1/4" |
| 30 FEET | 7' - 11 3/4" | 4' - 8 1/4" |
| 40 FEET | 9' - 5 1/4" | 6' - 5" |
| 50 FEET | 10' - 8 3/4" | 7' - 11 1/4" |
| 60 FEET | 11' - 10 1/4" | 9' - 3 1/2" |
| 70 FEET | 12' - 10 3/4" | 10' - 6 3/4" |
| 80 FEET | 13' - 10 1/2" | 11' - 8 3/4" |
| 90 FEET | 14' - 9 1/4" | 12' - 9 3/4" |
| 100 FEET | 15' - 7 1/2" | 13' - 10 1/4" |

INTERMEDIATE RADII CAN BE INTERPOLATED

**NOTES**

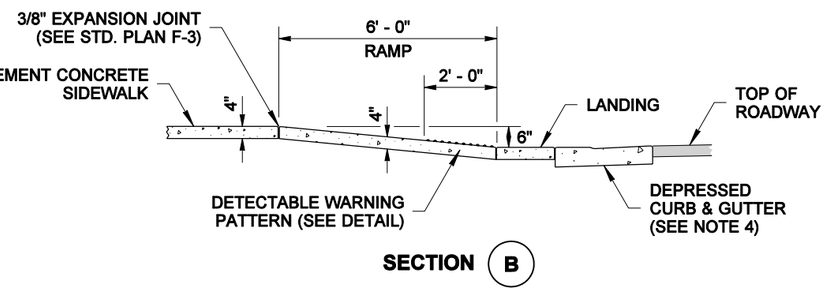
1. This layout is used to provide access to a single crosswalk parallel to the major street. The bid item "Cement Conc. Sidewalk Ramp Type 4A" does not include the adjacent Curb (or Curb & Gutter), the Sidewalk, or the Cement Conc. Pedestrian Curb.
2. Ramp slopes shall not be steeper than 12H:1V.
3. Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.
4. Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-1 for curb details.
5. See Std. Plan F-3 for sidewalk joint placement and details.
6. Detectable warning patterns may be created by any method that will achieve the truncated dome dimensions and spacing shown.



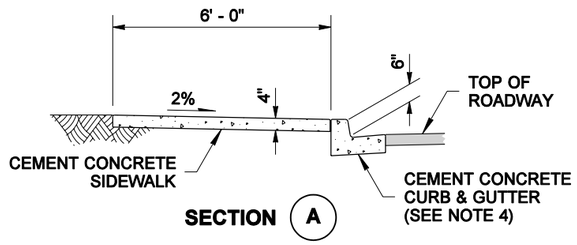

| | MIN. | MAX. |
|---|---|---|
| A | 1 5/8" | 2 3/8" |
| B | 5/8" | 1 1/2" |
| C | 7/16" | 3/4" |
| D | 7/8" | 1 7/16" |

TRUNCATED DOMES (SEE NOTE 6)

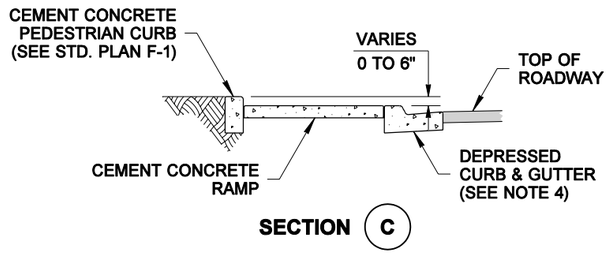
**DETECTABLE WARNING PATTERN DETAIL**



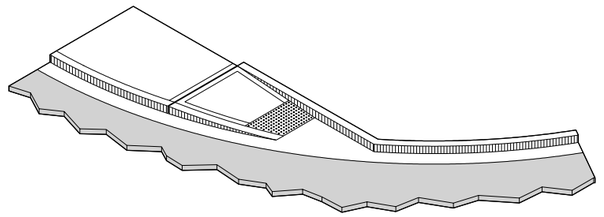

SECTION B




SECTION A




SECTION C



ISOMETRIC VIEW

HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2005

# SIDEWALK RAMP TYPE 4A WITH LAYOUT

# STANDARD PLAN F-3d

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-09-05* — DATE

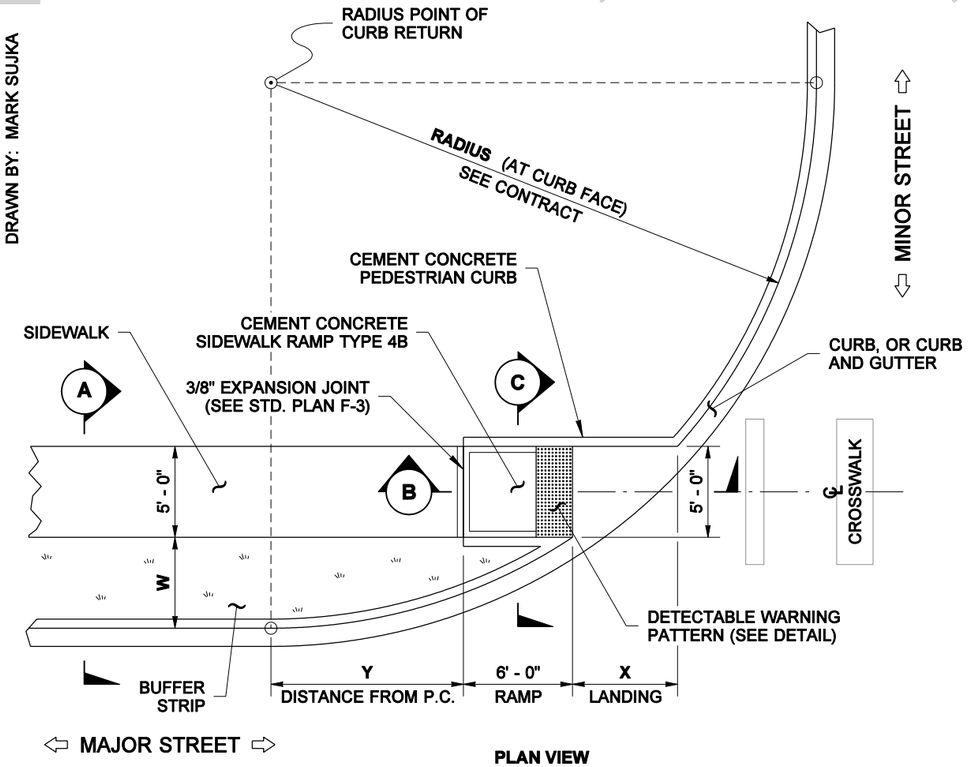
Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA

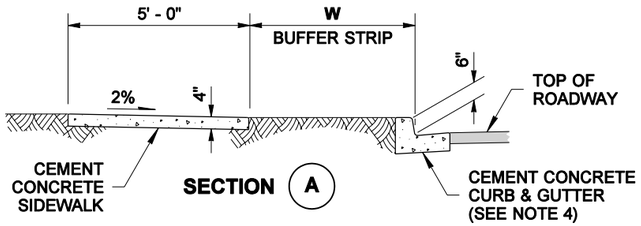


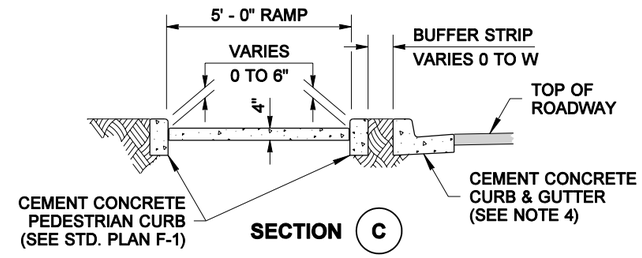

PLAN VIEW

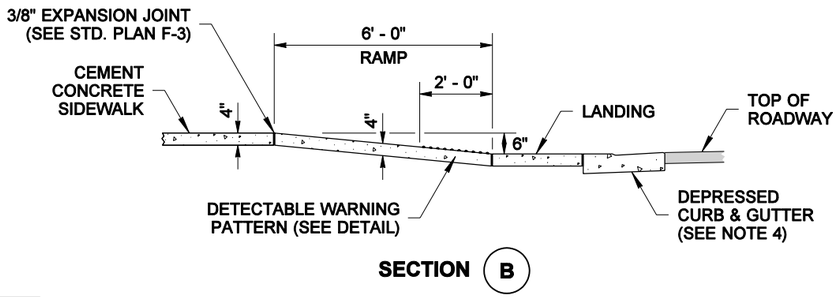
## SIDEWALK RAMP TYPE 4B
### PLAN

| RADIUS (AT CURB FACE) | W = 3' - 0" | | W = 4' - 0" | | W = 5' - 0" | | W = 6' - 0" | | W = 7' - 0" | |
|---|---|---|---|---|---|---|---|---|---|---|
| | X | Y | X | Y | X | Y | X | Y | X | Y |
| 20 FEET | 5' - 5 1/2" | 4' - 6 1/2" | 4' - 8 1/2" | 6' - 0" | 4' - 1" | 7' - 2 3/4" | 3' - 7" | 8' - 3 1/2" | 3' - 1 1/2" | 9' - 2 1/2" |
| 30 FEET | 7' - 3 3/4" | 7' - 1" | 6' - 5 1/2" | 8' - 11 1/2" | 5' - 9 1/4" | 10' - 7" | 5' - 2 1/2" | 12' - 0" | 4' - 8 3/4" | 13' - 3 1/4" |
| 40 FEET | 8' - 9 1/2" | 9' - 2 1/2" | 7' - 10" | 11' - 5 1/4" | 7' - 1" | 13' - 4 1/2" | 6' - 5 3/4" | 15' - 3/4" | 5' - 11 1/2" | 16' - 7 1/4" |
| 50 FEET | 10' - 3/4" | 11' - 3/4" | 9' - 1/4" | 13' - 7 1/4" | 8' - 2 1/2" | 15' - 9 1/2" | 7' - 6 1/2" | 17' - 9" | 6' - 11 3/4" | 19' - 6 1/4" |
| 60 FEET | 11' - 2 1/2" | 12' - 8 3/4" | 10' - 3/4" | 15' - 6 1/2" | 9' - 2 1/4" | 17' - 11 3/4" | 8' - 5 3/4" | 20' - 1 3/4" | 7' - 10 1/2" | 22' - 1 1/2" |
| 70 FEET | 12' - 2 3/4" | 14' - 3 1/4" | 11' - 1/4" | 17' - 4" | 10' - 1" | 19' - 11 3/4" | 9' - 3 3/4" | 22' - 4 1/4" | 8' - 8 1/4" | 24' - 6 1/4" |
| 80 FEET | 13' - 2" | 15' - 8 1/2" | 11' - 10 1/2" | 18' - 11 3/4" | 10' - 10 3/4" | 21' - 10" | 10' - 1" | 24' - 4 3/4" | 9' - 5" | 26' - 8 3/4" |
| 90 FEET | 14' - 1/2" | 17' - 1/2" | 12' - 8 1/4" | 20' - 6 1/2" | 11' - 7 3/4" | 23' - 7" | 10' - 9 3/4" | 26' - 3 3/4" | 10' - 1 1/4" | 28' - 9 1/2" |
| 100 FEET | 14' - 10 1/2" | 18' - 3 3/4" | 13' - 5 1/2" | 22' - 0" | 12' - 4 1/4" | 25' - 2 3/4" | 11' - 5 3/4" | 28' - 1 1/2" | 10' - 9" | 30' - 9" |

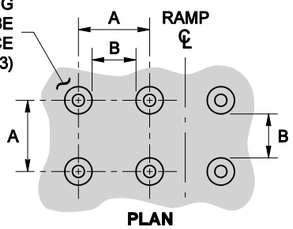
INTERMEDIATE RADII CAN BE INTERPOLATED



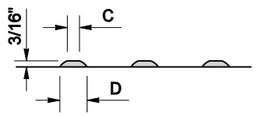




DETECTABLE WARNING PATTERN AREA SHALL BE YELLOW, IN COMPLIANCE WITH STD. SPEC. 8-14.3(3)




| | MIN. | MAX. |
|---|---|---|
| A | 1 5/8" | 2 3/8" |
| B | 5/8" | 1 1/2" |
| C | 7/16" | 3/4" |
| D | 7/8" | 1 7/16" |



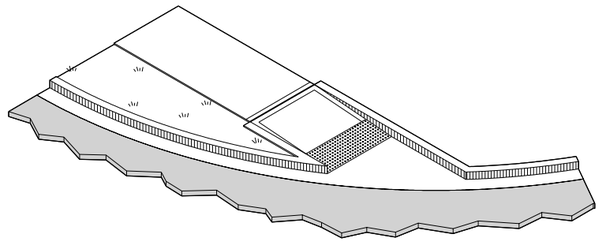

ELEVATION

TRUNCATED DOMES (SEE NOTE 6)

### DETECTABLE WARNING PATTERN DETAIL

**NOTES**

1. This layout is used to provide access to a single crosswalk parallel to the major street. The bid item "Cement Conc. Sidewalk Ramp Type 4B" does not include the adjacent Curb (or Curb & Gutter), the Sidewalk, or the Cement Conc. Pedestrian Curb.
2. Ramp slopes shall not be steeper than 12H:1V.
3. Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.
4. Curb & Gutter is shown, see the Contract Plans for the curb design specified. See Standard Plan F-1 for curb details.
5. See Std. Plan F-3 for sidewalk joint placement and details.
6. Detectable warning patterns may be created by any method that will achieve the truncated dome dimensions and spacing shown.



ISOMETRIC VIEW




EXPIRES MAY 16, 2005

## SIDEWALK RAMP TYPE 4B WITH LAYOUT

## STANDARD PLAN F-3e

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

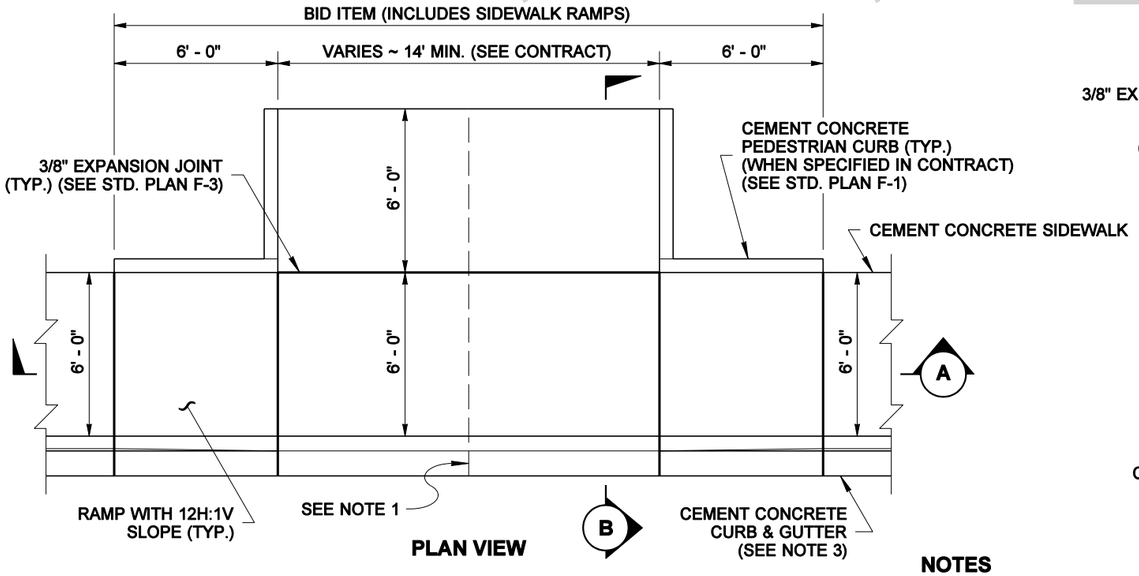
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-09-05* — DATE

Washington State Department of Transportation

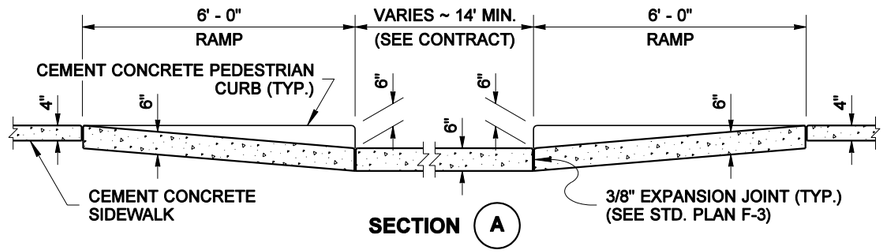
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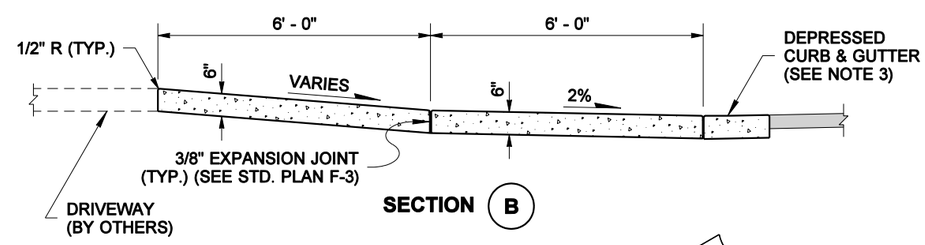
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

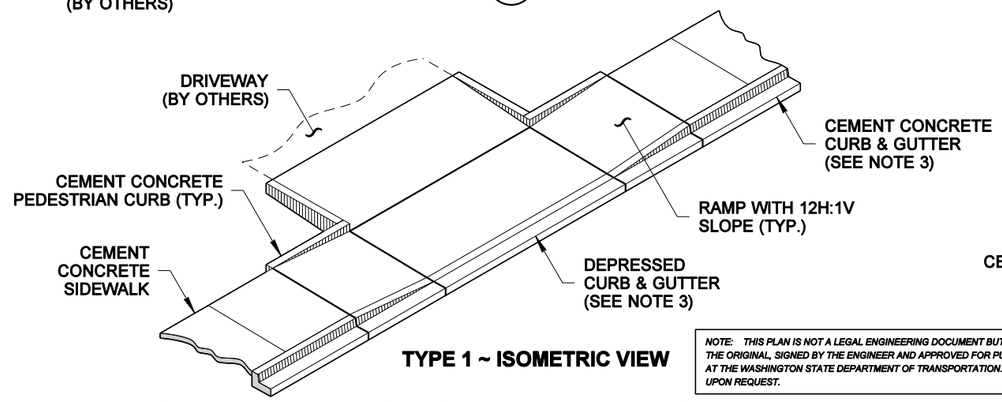
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



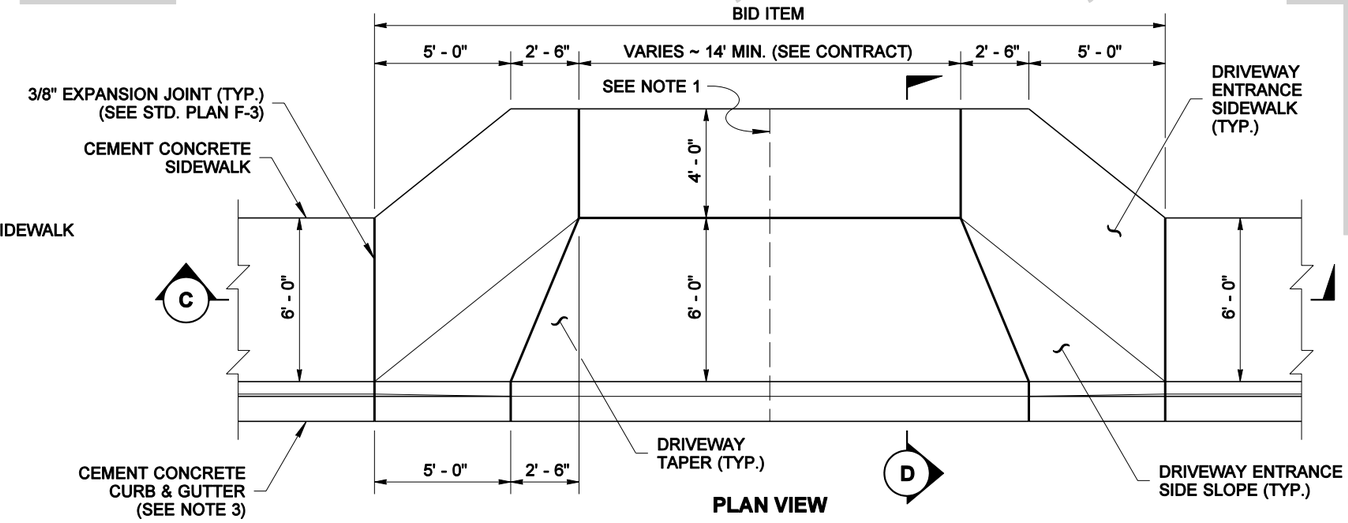

## CEMENT CONCRETE DRIVEWAY ENTRANCE TYPE 1



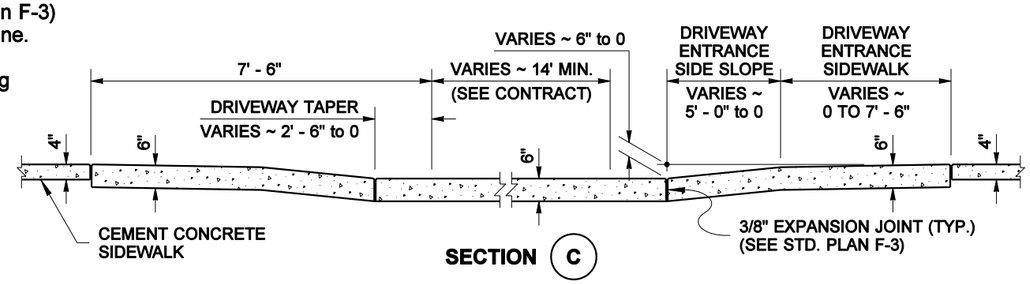

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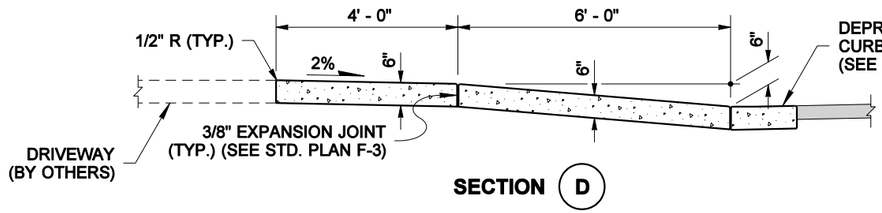


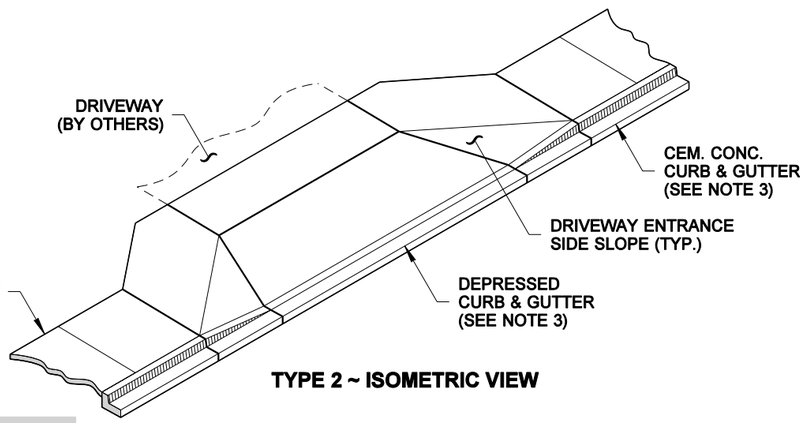

## CEMENT CONCRETE DRIVEWAY ENTRANCE TYPE 2

### NOTES

1. When the driveway width exceeds 15 feet, construct a full depth expansion joint (see Standard Plan F-3) 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-3 for sidewalk details.
3. Curb and gutter shown, see the Contract Plans for the curb design specified. See Std. Plan F-1 for curb details.
4. Avoid placing drainage structures, junction boxes or other obstructions in front of driveway entrances.




HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2003

# CEMENT CONCRETE DRIVEWAY ENTRANCE TYPES 1, 2, 3 & 4

# STANDARD PLAN F-4

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

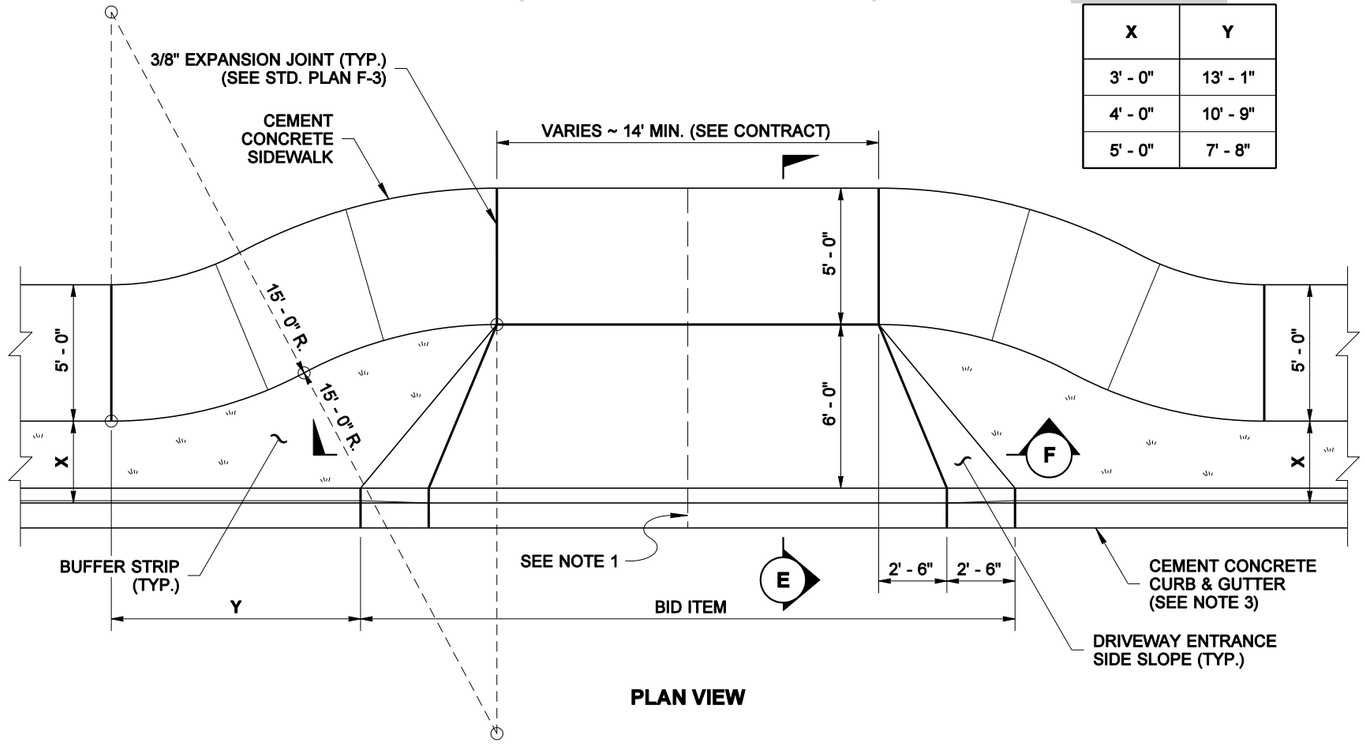
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *01-13-03* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

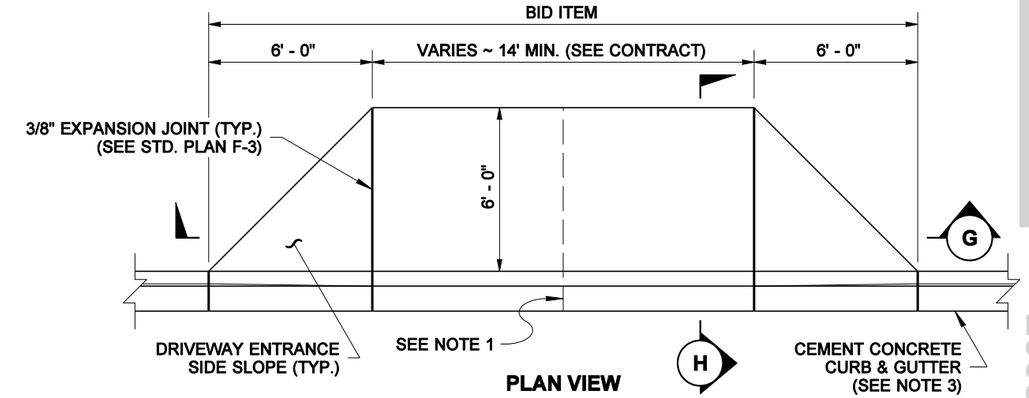
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| X | Y |
|---|---|
| 3' - 0" | 13' - 1" |
| 4' - 0" | 10' - 9" |
| 5' - 0" | 7' - 8" |



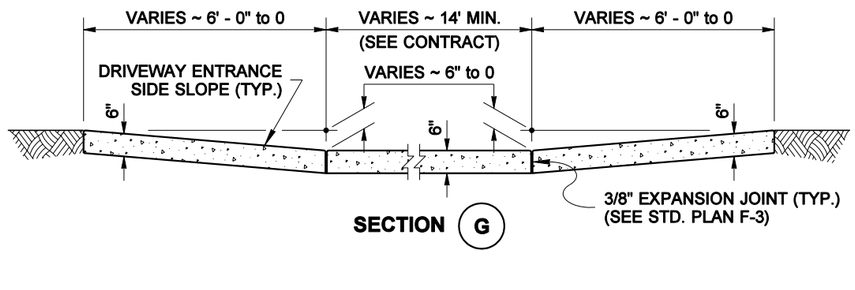

PLAN VIEW

## CEMENT CONCRETE DRIVEWAY ENTRANCE TYPE 3

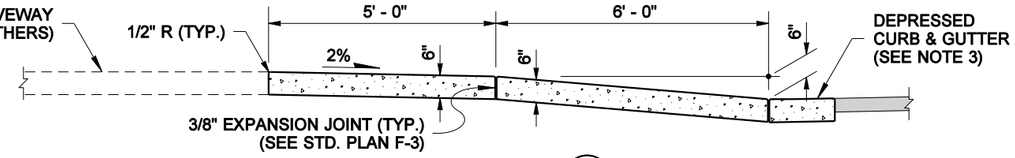



PLAN VIEW

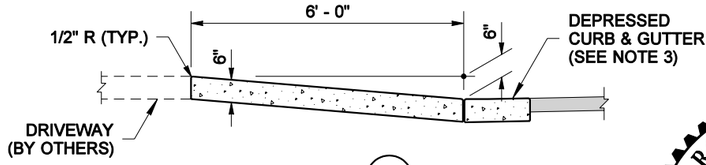
## CEMENT CONCRETE DRIVEWAY ENTRANCE TYPE 4



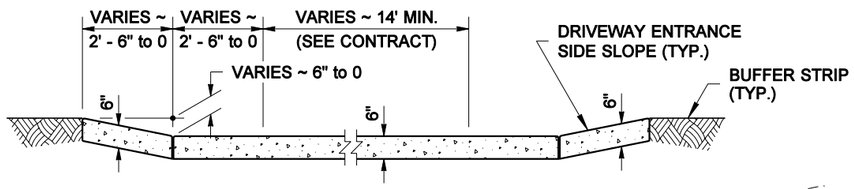

SECTION G



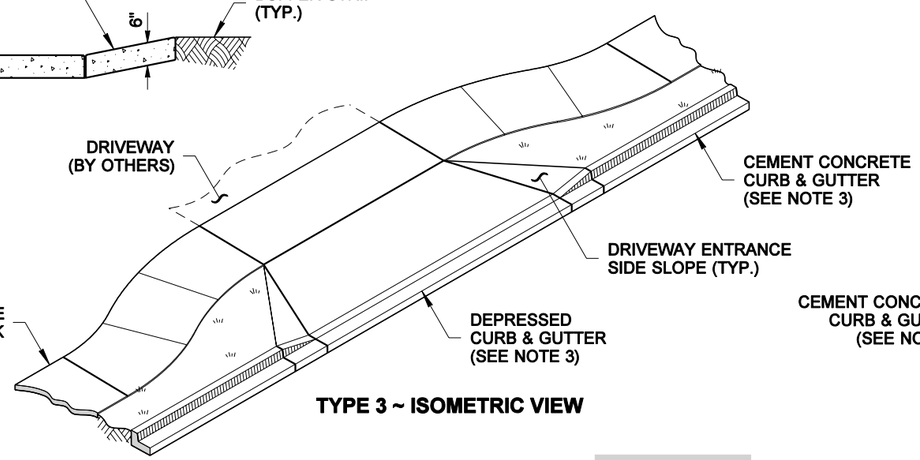

SECTION E



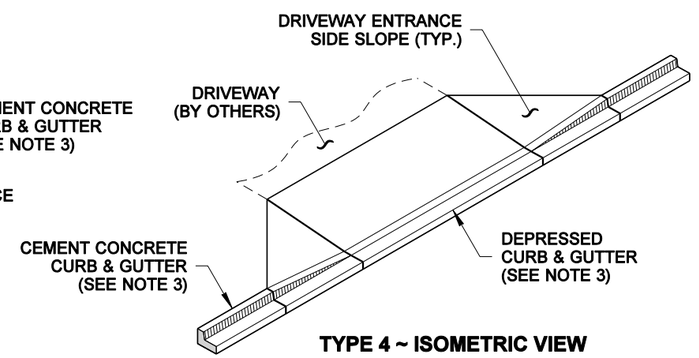

SECTION H




SECTION F




TYPE 3 ~ ISOMETRIC VIEW




TYPE 4 ~ ISOMETRIC VIEW

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HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2003

# CEMENT CONCRETE DRIVEWAY ENTRANCE TYPES 1, 2, 3 & 4 STANDARD PLAN F-4

SHEET 2 OF 2 SHEETS

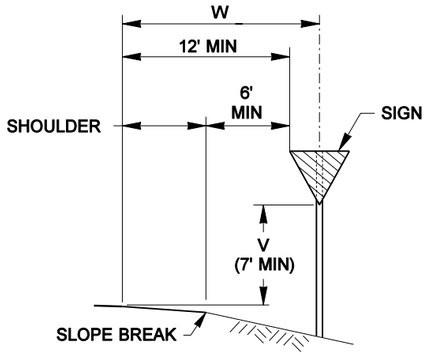
APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *01-13-03* — DATE

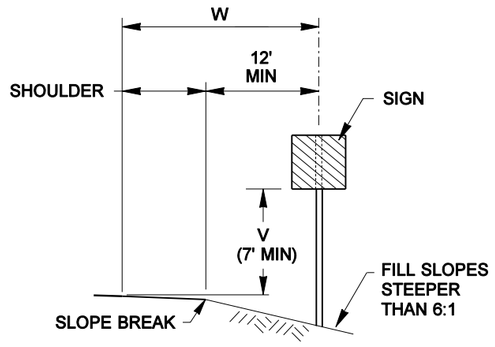
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

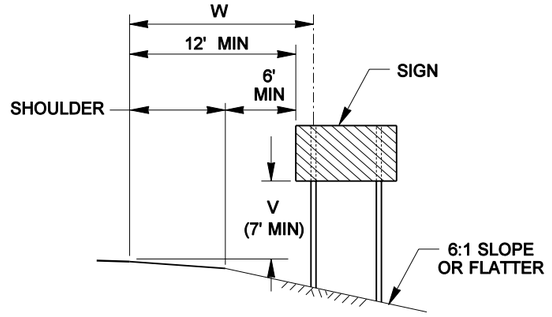
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**SIGN INSTALLATION IN FILL SECTION**



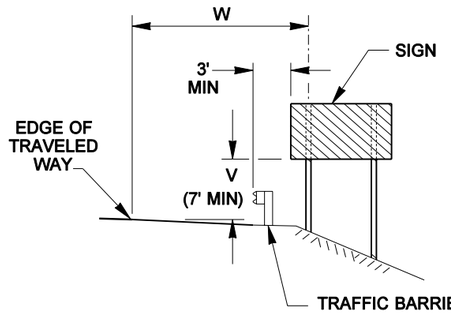

**SIGN INSTALLATION ON STEEP FILL SLOPES**



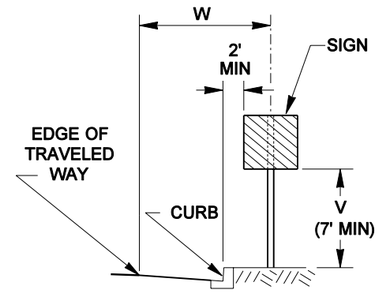

**MULTIPLE SIGN POST INSTALLATION IN FILL SECTION**

**NOTES**

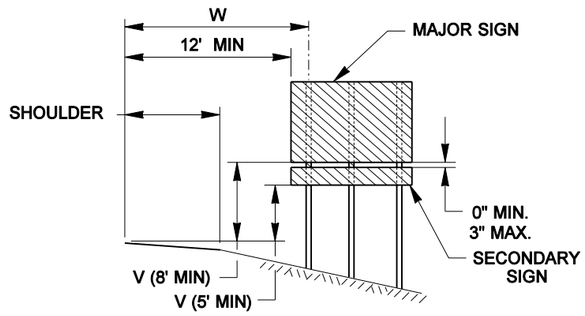
1. Refer to the Sign Specification Sheet of the contract for the 'V' and 'W' distances



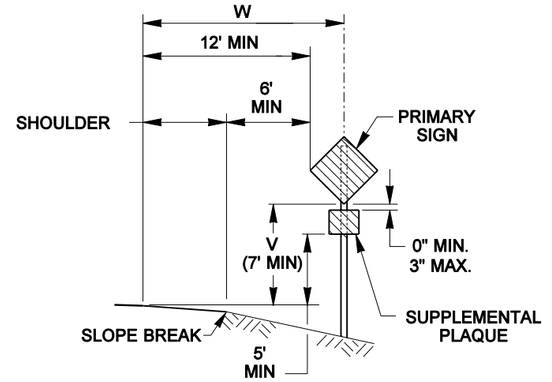

**SIGN INSTALLATION BEHIND TRAFFIC BARRIER**



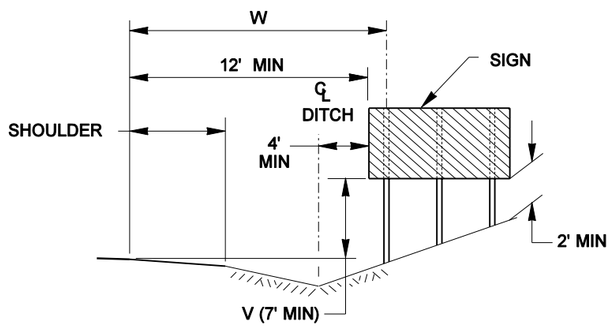

**SIGN INSTALLATION IN CURB SECTION**



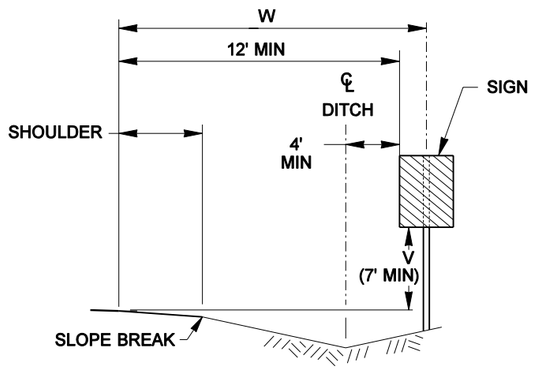

**GUIDE OR DIRECTIONAL SIGN WITH SECONDARY SIGN INSTALLATION ON EXPRESSWAYS AND FREEWAYS**




**SIGN WITH SUPPLEMENTAL PLAQUE INSTALLATION IN FILL SECTION**




**MULTIPLE SIGN POST INSTALLATION IN DITCH SECTION**




**SIGN INSTALLATION IN DITCH SECTION**




EXPIRES OCTOBER 26, 2002

# GROUND MOUNTED SIGN PLACEMENT

# STANDARD PLAN G-1

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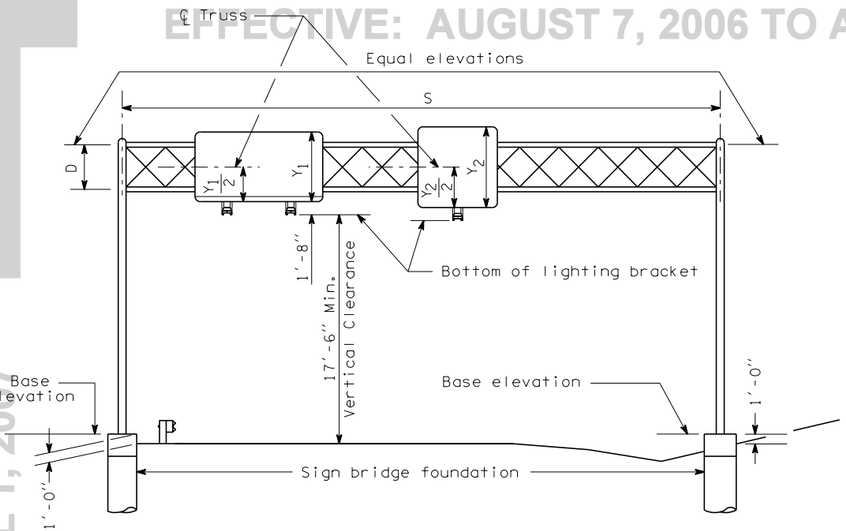
*Harold J. Peterfeso* — STATE DESIGN ENGINEER

*09-12-01* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

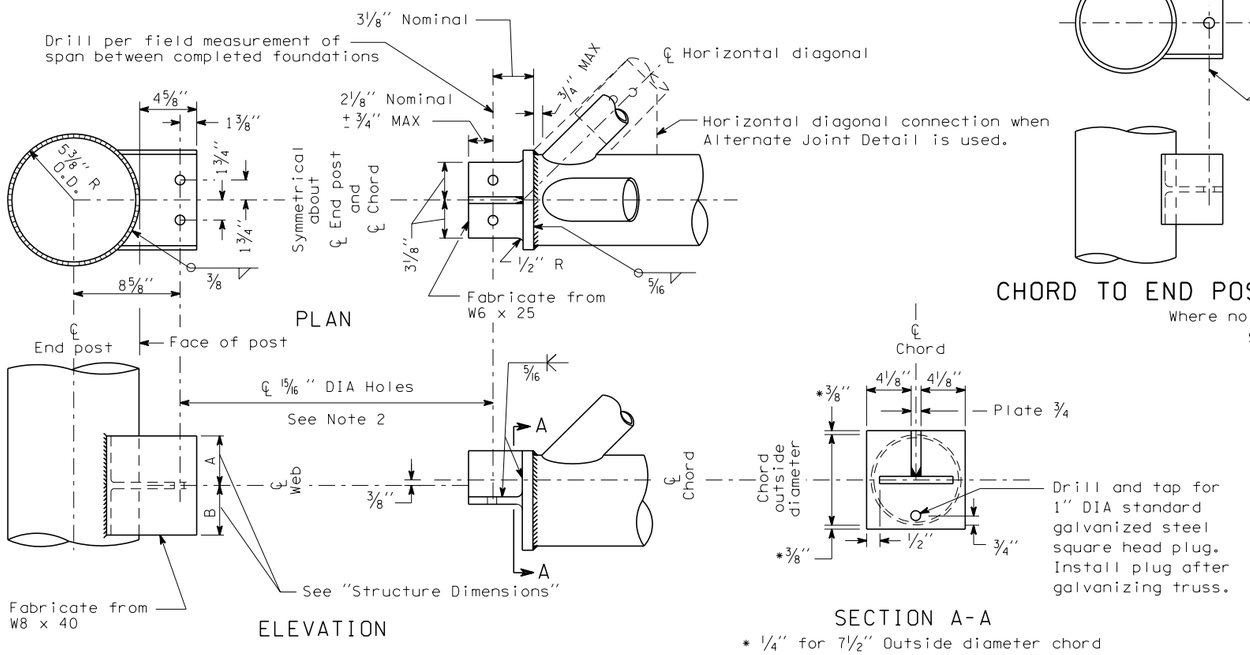
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




$Y_1$ = Height of shallowest sign on structure, D + 1' MIN

$Y_2$ = Height of any sign with height greater than $Y_1$

## SIGN BRIDGE LAYOUT



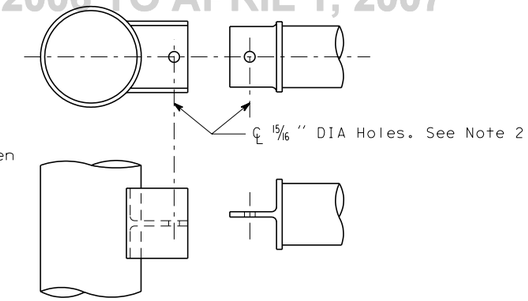

## CHORD TO END POST CONNECTION TYPE R

Where diagonals connect

| SPAN LENGTH S | DIMENSION D | TOP AND BOT CHORDS | DIAGONALS | END TRUSS POSTS | END TRUSS STRUTS AND DIAGONALS | TOTAL SIGN AREA (MAX) | A | B |
|---|---|---|---|---|---|---|---|---|
| 60' or less | 4'-0" | 3" x .216" | 1¼" x .140" | 10" x .250" | 2½" x .203" | 384 sq ft | 2⅜" | 1⅝" |
| 61' to 90' | 5'-0" | 4" x .237" | 2" x .154" | 10" x .250" | 2½" x .203" | 624 sq ft | 2⅞" | 2⅛" |
| 91' to 120' | 6'-0" | 5" x .258" | 2" x .154" | 10" x .307" | 3" x .216" | 864 sq ft | 3⅜" | 2⅝" |
| 121' to 150' | 7'-0" | 6" x .280" | 2½" x .203" | 10" x .365" | 3½" x .226 | 1104 sq ft | 4 1/16" | 3¼" |

All members are pipe. Values shown are nominal pipe size and wall thickness.

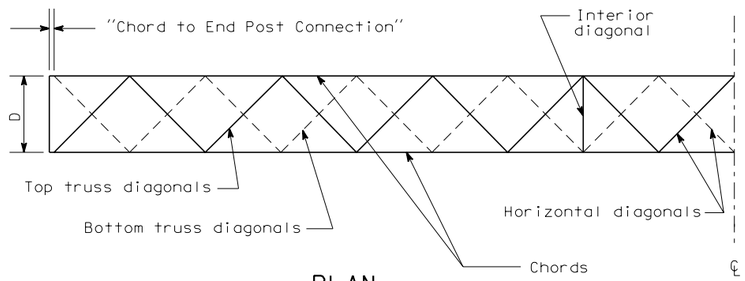
## STRUCTURE DIMENSIONS




## CHORD TO END POST CONNECTION TYPE Q

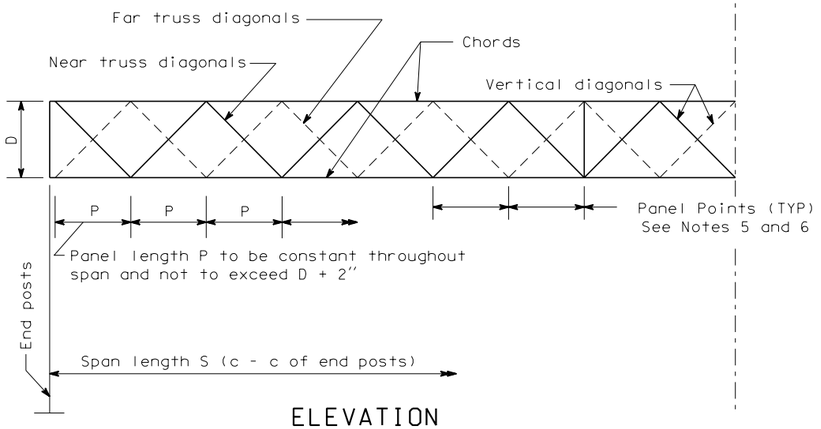
Where no diagonals connect
See Note 3

| MATERIAL SPECIFICATIONS | |
|---|---|
| PIPE (Chords, Diagonals, Struts and Posts) | ASTM A 36 or ASTM A 53 Grade B, Type E or S, or A 500 Grade B |
| PLATES & SHAPES | ASTM A 36 |
| BOLTS, NUTS, AND WASHERS | STD. SPEC. 9-06.5(3) |
| PIPE, PLATE & SHAPE GALVANIZING | AASHTO M 111 |
| FASTENER GALVANIZING | AASHTO M 232 |

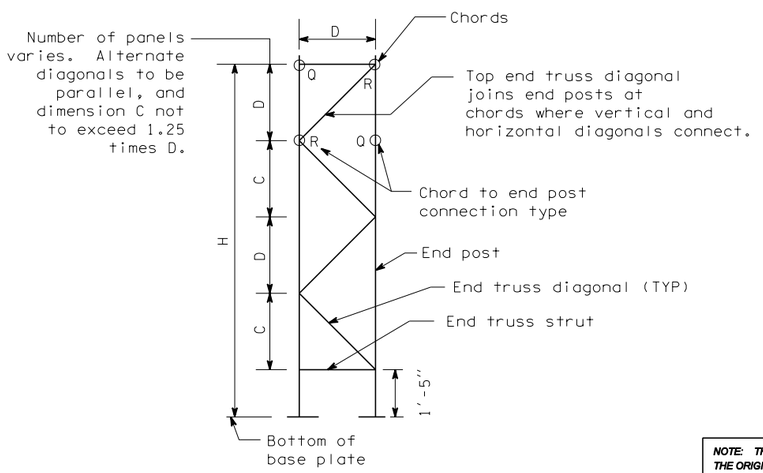



PLAN

℄ Symmetrical about ℄ span (except framing with odd number of panels).




ELEVATION




END VIEW




EXPIRES JUNE 29, 2004

# SIGN BRIDGE STANDARD PLAN G-2

SHEET 1 OF 3 SHEETS

*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.*

APPROVED FOR PUBLICATION

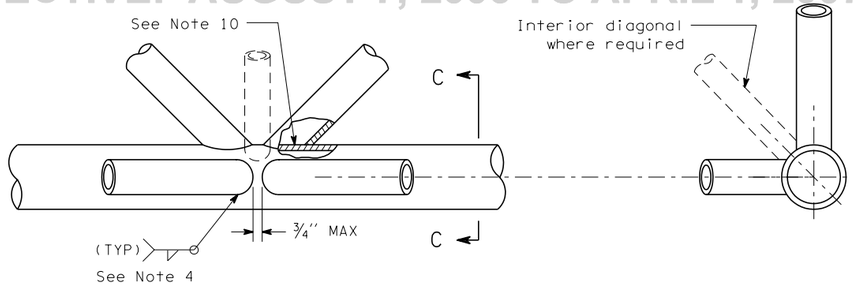
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-04-02* DATE

Washington State Department of Transportation

| DATE | REVISION | BY |
|---|---|---|
| 03/2002 | ADDED MATERIALS SPECIFICATIONS | MAS |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

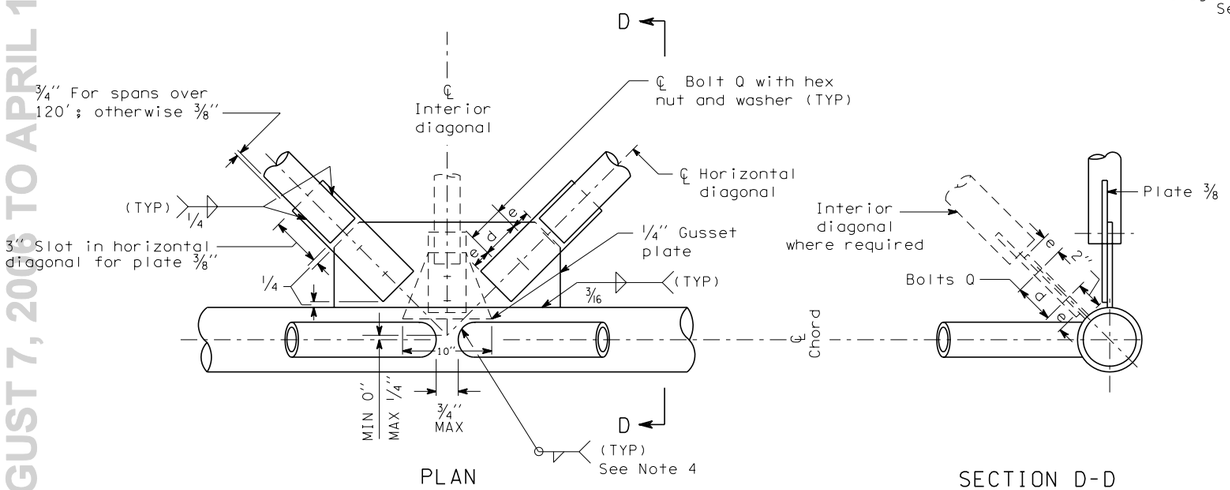



PLAN

SECTION C-C

## TYPICAL JOINT DETAIL

Chord shown - End Post Similar



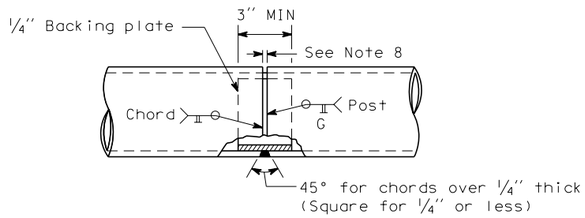

PLAN




SECTION D-D

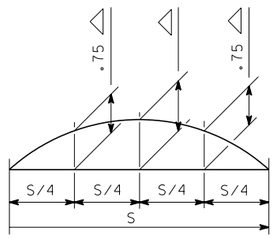
## ALTERNATE JOINT DETAIL

Not for connections between vertical diagonals and chords.




## END POST OR CHORD SHOP SPLICE

See Note 9




For span lengths not listed, interpolate values of △.

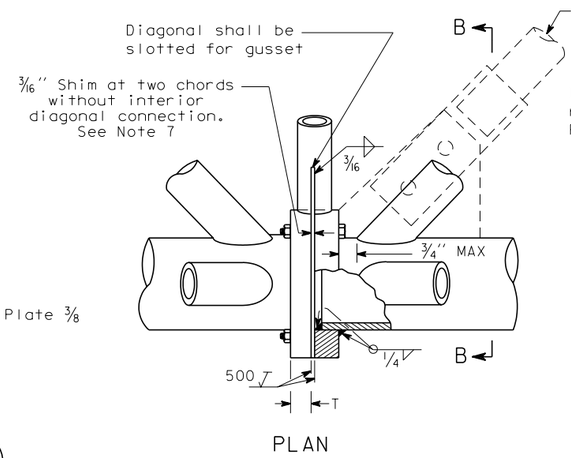
Fabricate truss with chords curved to provide camber. Do not camber by using shims between chord at splices.

## DEAD LOAD CAMBER

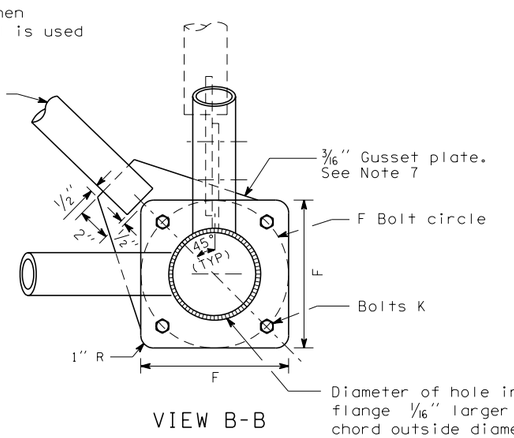
| SPAN LENGTH S(ft) | △ - (in) |
|---|---|
| 40′ | 1/2 |
| 50′ | 3/4 |
| 60′ | 7/8 |
| 61′ | 7/8 |
| 70′ | 1 |
| 80′ | 1 1/4 |
| 90′ | 1 1/2 |
| 91′ | 1 3/8 |
| 100′ | 1 5/8 |
| 110′ | 2 |
| 120′ | 2 3/8 |
| 121′ | 2 1/8 |
| 130′ | 2 1/2 |
| 140′ | 2 7/8 |
| 150′ | 3 3/8 |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| SPAN LENGTH | F | T | K |
|---|---|---|---|
| 60′ or less | 6″ | 3/4″ | 1/2″ |
| 61′ to 90′ | 7″ | 7/8″ | 5/8″ |
| 91′ to 120′ | 8 1/2″ | 1″ | 3/4″ |
| 121′ to 150′ | 9 1/2″ | 1 1/4″ | 7/8″ |




PLAN




VIEW B-B

## CHORD FIELD SPLICE

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

| SPAN LENGTH | ALTERNATE JOINT DETAIL DATA | | |
|---|---|---|---|
| | e | d | BOLT Q DIAMETER |
| 60′ or less | 1 1/4″ | 2 1/2″ | 3/4″ |
| 61′ to 90′ | 1 1/2″ | 3″ | 7/8″ |
| 91′ to 120′ | 1 1/2″ | 3″ | 7/8″ |
| 121′ to 150′ | 1 3/4″ | 3 1/2″ | 1″ |

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2004

# SIGN BRIDGE STANDARD PLAN G-2

SHEET 2 OF 3 SHEETS

*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.*

APPROVED FOR PUBLICATION

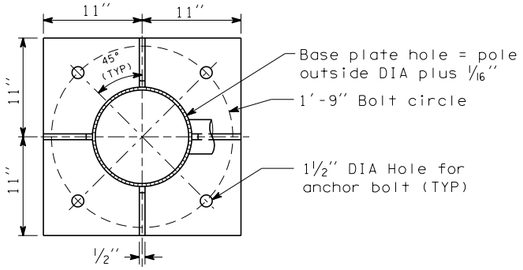
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-04-02* DATE

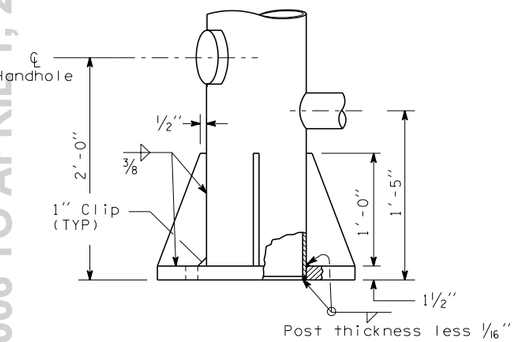
Washington State Department of Transportation

| DATE | REVISION | BY |
|---|---|---|
| 03/2002 | CORRECTED WELDING SYMBOL | MAS |

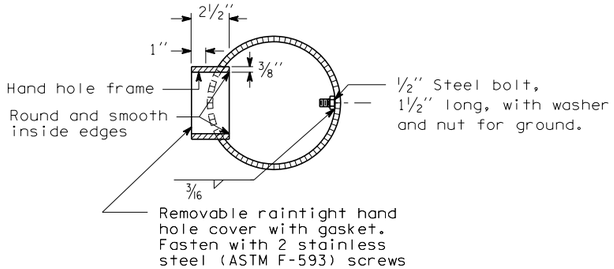
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

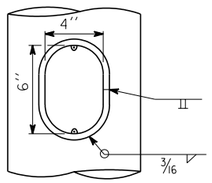
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



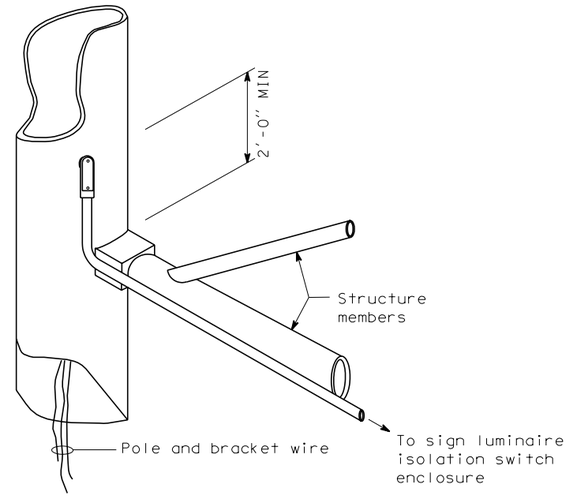




END POST BASE WITH HANDHOLE LOCATION



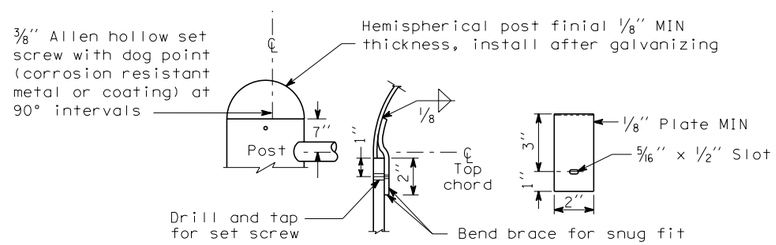

HANDHOLE DETAIL




CONDUIT PLACEMENT

NOTES

1. Horizontal and vertical clearance requirements shall be as shown in Contract Plans.
2. Assemble with 7/8'' Diameter bolts. Install bolts with head upward. Exclude bolt threading from grip.
3. Details not shown are same as Chord to End Post Connection Type R, omitting the 3/4'' plate stiffener on the tee member.
4. Ends of diagonals shall be cut to fit neatly against chord or post. Fillet weld size to be diagonal tube or pipe thickness plus 1/16''.
5. Horizontal diagonals must join chords where vertical diagonals connect (panel points).
6. 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.
7. Omit gussets or shims where interior diagonals are not required at chord field splice.
8. Dimension shall equal chord thickness or 1/4'', whichever is less.
9. 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.
10. Drill hole in chord at each diagonal and strut. Diameter shall be 1'' for spans over 60'. For spans 60' or less, diameter shall be 3/4''.




FINIAL DETAIL

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2004

# SIGN BRIDGE
# STANDARD PLAN G-2

SHEET 3 OF 3 SHEETS

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APPROVED FOR PUBLICATION

*Harold J. Peterfeso* *06-04-02*

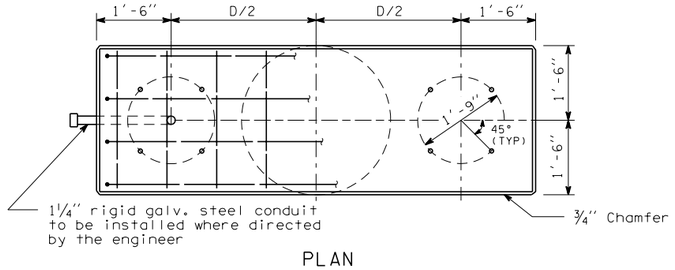
STATE DESIGN ENGINEER — DATE

| DATE | REVISION | BY |
|---|---|---|
| 03/2002 | DELETED BALLAST BOX AND ATTACHMENT DETAILS | MAS |

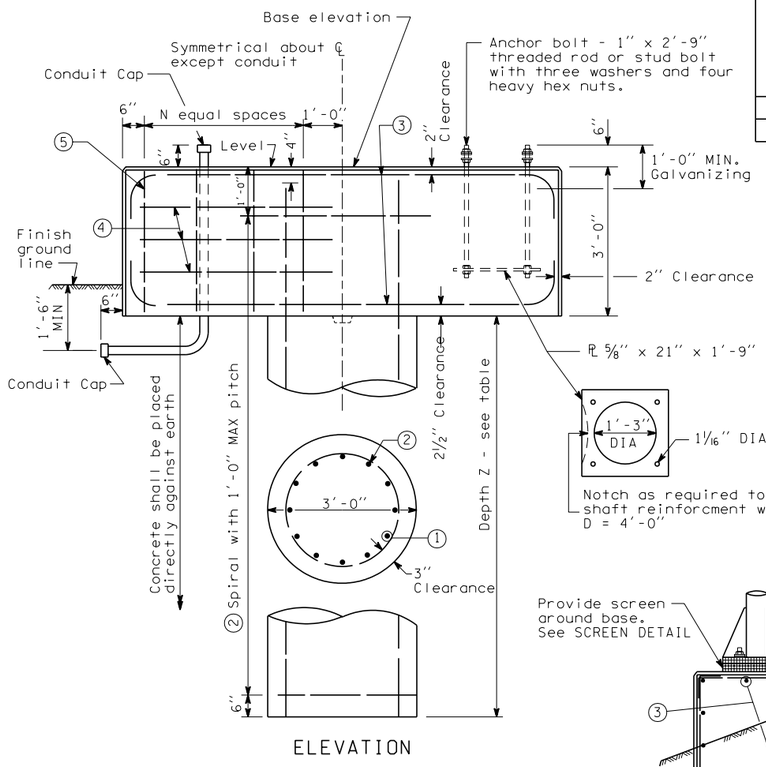
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

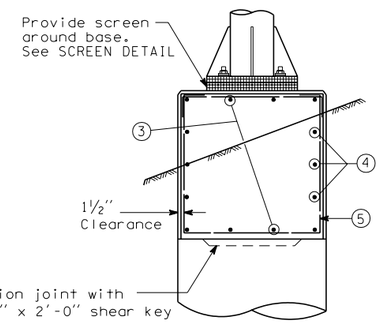
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

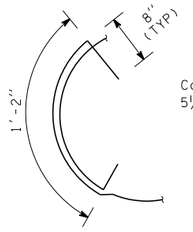



PLAN




ELEVATION




BAR ② #4 LAP SPLICE DETAIL

Note:

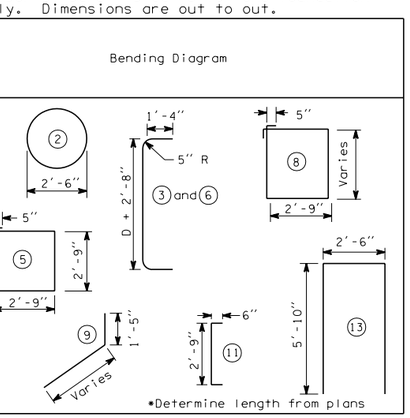
End posts shall be erected on a true vertical. Plumbing shall be accomplished by adjustment of the nuts located in the base. After plumbing, tighten upper nut on anchor bolt ¼ turn min. to 1/3 turn max. past snug tight.

FOUNDATION - TYPE 1

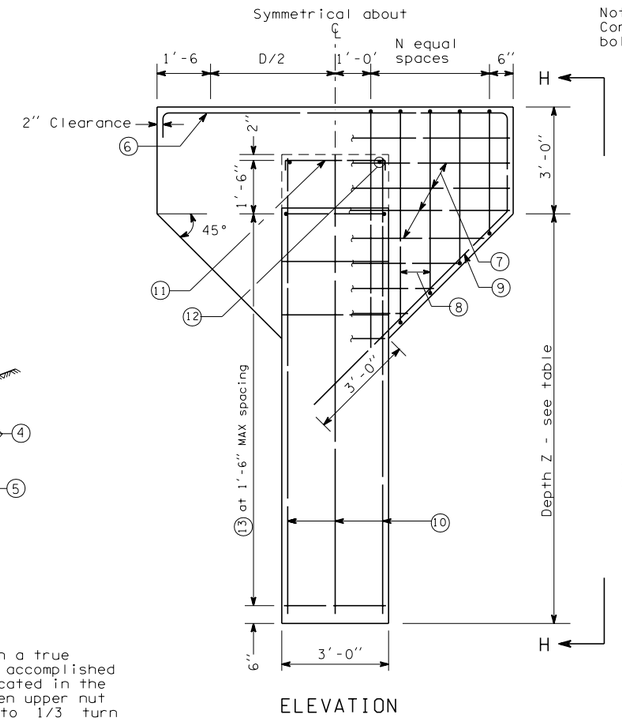
## BAR LIST

Number of bars listed is for one foundation only. Dimensions are out to out.

| Foundation Type | Mark | Location | Span Length 60' or less No | Size | 61' to 90' No | Size | 91' to 120' No | Size | 120' to 150' No | Size | Bending Diagram |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | Shaft - vertical | 11 | 9 | 14 | 11 | 18 | 11 | 23 | 11 | Str |
| | 2 | Shaft - spiral | * | 4 | * | 4 | * | 4 | * | 4 | |
| | 3 | Cap-Top and bottom | 8 | 6 | 8 | 7 | 10 | 8 | 12 | 8 | |
| | 4 | Cap - sides | 6 | 4 | 6 | 4 | 6 | 4 | 6 | 4 | Str |
| | 5 | Cap - hoops | 6 | 4 | 8 | 4 | 14 | 4 | 22 | 4 | |
| 2 and 3 | 6 | Cap - top | 4 | 6 | 4 | 7 | 5 | 8 | 6 | 8 | |
| | 7 | Cap - sides | 14 | 4 | 16 | 4 | 18 | 4 | 18 | 4 | Str |
| | 8 | Cap - hoops | 6 | 4 | 8 | 4 | 14 | 4 | 22 | 4 | |
| | 9 | Cap - bottom | 8 | 6 | 8 | 7 | 10 | 8 | 12 | 8 | |
| | 10 | Fnd wall vertical | 30 | 6 | 42 | 6 | 42 | 7 | 50 | 7 | Str |
| | 11 | Fnd wall ties | 8 | 5 | 8 | 5 | 8 | 5 | 8 | 5 | |
| | 12 | Fnd wall horizontal | 4 | 5 | 4 | 5 | 4 | 5 | 4 | 5 | Str |
| 2 | 13 | Fnd wall horizontal | 8 | 5 | 8 | 5 | 10 | 5 | 12 | 5 | |
| 3 | 13 | Fnd wall horizontal | 10 | 5 | 12 | 5 | 14 | 5 | 16 | 5 | |

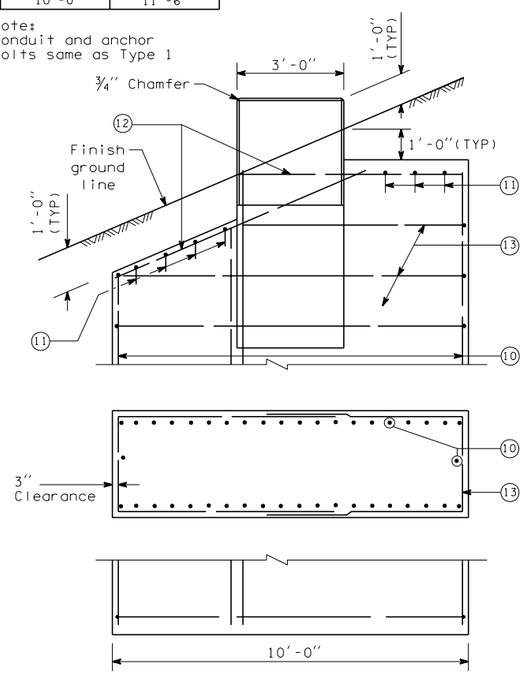



| Foundation Type | Span Length | 60' or less | 61' to 90' | 91' to 120' | 121' to 150' |
|---|---|---|---|---|---|
| All | D | 4'-0" | 5'-0" | 6'-0" | 7'-0" |
| | N | 2 | 3 | 6 | 10 |
| 1 | Z | 11'-6" | 13'-6" | 15'-0" | 16'-6" |
| 2 | Z | 5'-6" | 6'-6" | 7'-6" | 8'-6" |
| 3 | Z | 7'-0" | 8'-6" | 10'-0" | 11'-6" |




ELEVATION

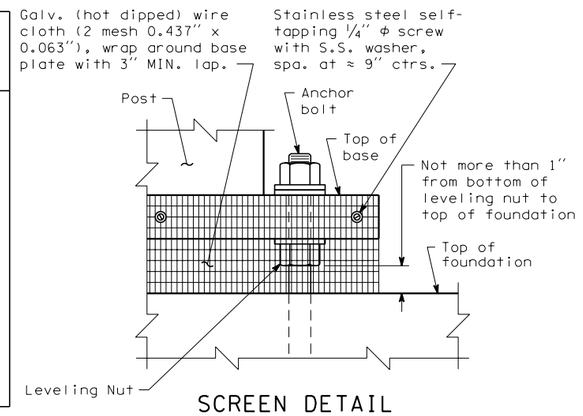
Note:
Conduit and anchor bolts same as Type 1




VIEW H-H

FOUNDATION - TYPES 2 AND 3

NOTE: See contract plans for type of foundation to be used.




SCREEN DETAIL

| MATERIAL SPECIFICATIONS | |
|---|---|
| SHAFT CONCRETE | Class 4000P or Class 4000W |
| ALL OTHER CONCRETE | CLASS 4000 |
| STEEL REINF. BAR | AASHTO M 31 |
| ANCHOR RODS | ASTM F 1554 GRADE 105 |
| ANCHOR NUTS | AASHTO M 291 |
| ANCHOR WASHERS | AASHTO M 291 |
| ANCHOR BOLTS, NUTS, AND WASHERS | STD. SPEC. 9-06.5(4) |
| ANCHORAGE GALVANIZING | AASHTO M 232 |
| STEEL TEMPLATE | ASTM A 36 |




EXPIRES JUNE 29, 2004

**SIGN BRIDGE FOUNDATIONS**

**STANDARD PLAN G-2a**

SHEET 1 OF 1 SHEET

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| DATE | REVISION | BY |
|---|---|---|
| 03/2002 | ADDED MATERIALS SPECIFICATIONS AND SCREEN DETAIL | MAS |

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* *06-04-02*

STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

SIGN BRIDGE FOUNDATIONS

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

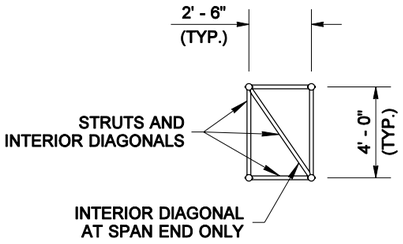
DRAWN BY: BILL BERENS

| POST SELECTION | | |
|---|---|---|
| TOTAL SIGN AREA ◇1 Σ (X TIMES Y) ($FT^2$) | POST SIZE | |
| | O.D. | WALL |
| 50 OR LESS | 18" | 0.438" |
| 50+ to 100 | 18" | 0.438" |
| 100+ to 150 | 24" | 0.375" |
| 150+ to 200 | 24" | 0.375" |
| 200+ to 250 | 24" | 0.375" |
| 250+ to 300 | 24" | 0.375" |
| 300+ to 350 | 24" | 0.438" |
| 350+ to 400 | 24" | 0.500" |

SINGLE OR DOUBLE CANTILEVER

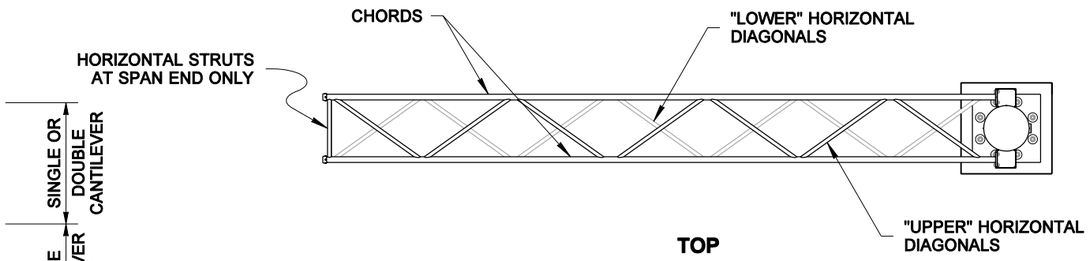
DOUBLE CANTILEVER ONLY

◇1 SUM OF SIGN FOR DOUBLE CANTILEVER

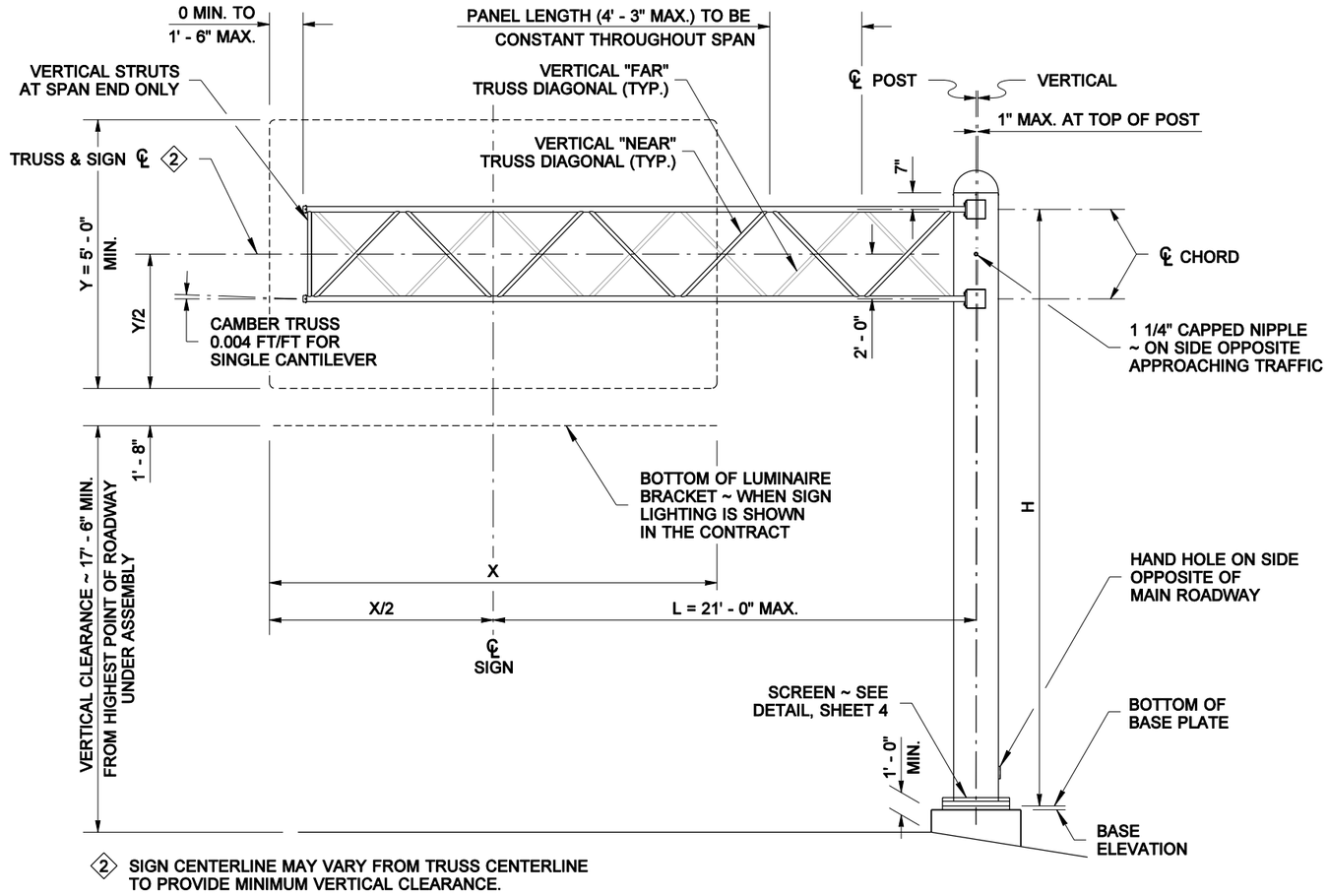



**END**

ALL TRUSS DIAGONALS AND STRUTS SHALL BE 1 1/2" PIPE (0.145" WALL)




**TOP**




◇2 SIGN CENTERLINE MAY VARY FROM TRUSS CENTERLINE TO PROVIDE MINIMUM VERTICAL CLEARANCE.

**ELEVATION**

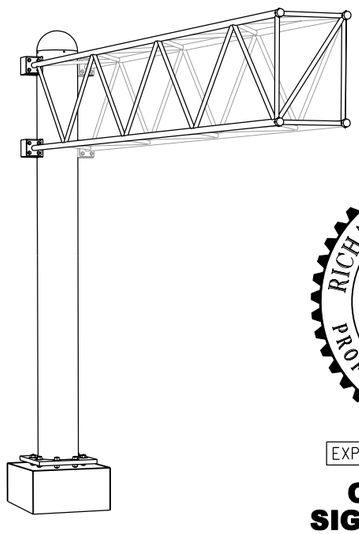
## SINGLE CANTILEVER SIGN STRUCTURE

**NOTES**

1. Vertical and horizontal clearance requirements shall be as shown on the contract plans.
2. No post splices permitted in lower third of height, nor closer than 3' - 0" to bottom chord, except as otherwise noted. No chord shop splices permitted in first two-thirds of the span, except as otherwise noted. A maximum of two splices are permitted in the post. For post or chord shop splice details, see Standard Plan G-2.
3. The back-up plates or rings for all full penetration welds shall be welded continuously to the joined pieces. This can be done by either a continuous fillet weld on the back side of the piece, or by a continuous weld in the root of the full penetration weld.
4. All bolt holes shall be drilled, and the diameter shall be 1/16" larger than the nominal bolt diameter, except as noted.
5. The design and analysis of the structures has been done in accordance with AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires and Traffic Signals Dated 2001, using 90 MPH wind velocity and fatigue category - I.
6. Adjust post alignment in plane normal to roadway center line by means of leveling nuts located below base plate to maintain upward slope in cantilever arm(s). Tighten anchor nuts above base plate in accordance with Standard Specification 6-03.3(33).
7. Variable Message Signs (VMS) exceeding 700 lbs. and/or 200 sq. ft. shall not be installed on cantilever structure.

| MATERIAL SPECIFICATIONS | |
|---|---|
| PIPE (CHORDS, DIAGONALS, STRUTS AND POSTS) | ASTM A 36 OR ASTM A 53 GRADE B, TYPE E OR S, OR A 500 GRADE B |
| PLATES | ASTM A 36 |
| SHAPES | ASTM A 36<br>ASTM A 992 |
| BOLTS, NUTS, & WASHERS | STD. SPEC. 9-06.5(3) |
| PIPE, PLATE & SHAPE GALVANIZING | AASHTO M 111 |
| FASTENER GALVANIZING | AASHTO M 232 |

| CHORD SELECTION | | |
|---|---|---|
| SIGN AREA (X TIMES Y) ($FT^2$) | CHORD SIZE | |
| | NOM. DIAM. | WALL |
| 50 OR LESS | 2" | 0.154" |
| 50+ TO 100 | 2" | 0.218" |
| 100+ TO 150 | 2 1/2" | 0.203" |
| 150+ TO 200 | 3" | 0.216" |



**PERSPECTIVE**

RICHARD P. ZELDENRUST
STATE OF WASHINGTON
25470
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 14, 2006

# CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) STANDARD PLAN G-3

SHEET 1 OF 4 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-09-05* — DATE

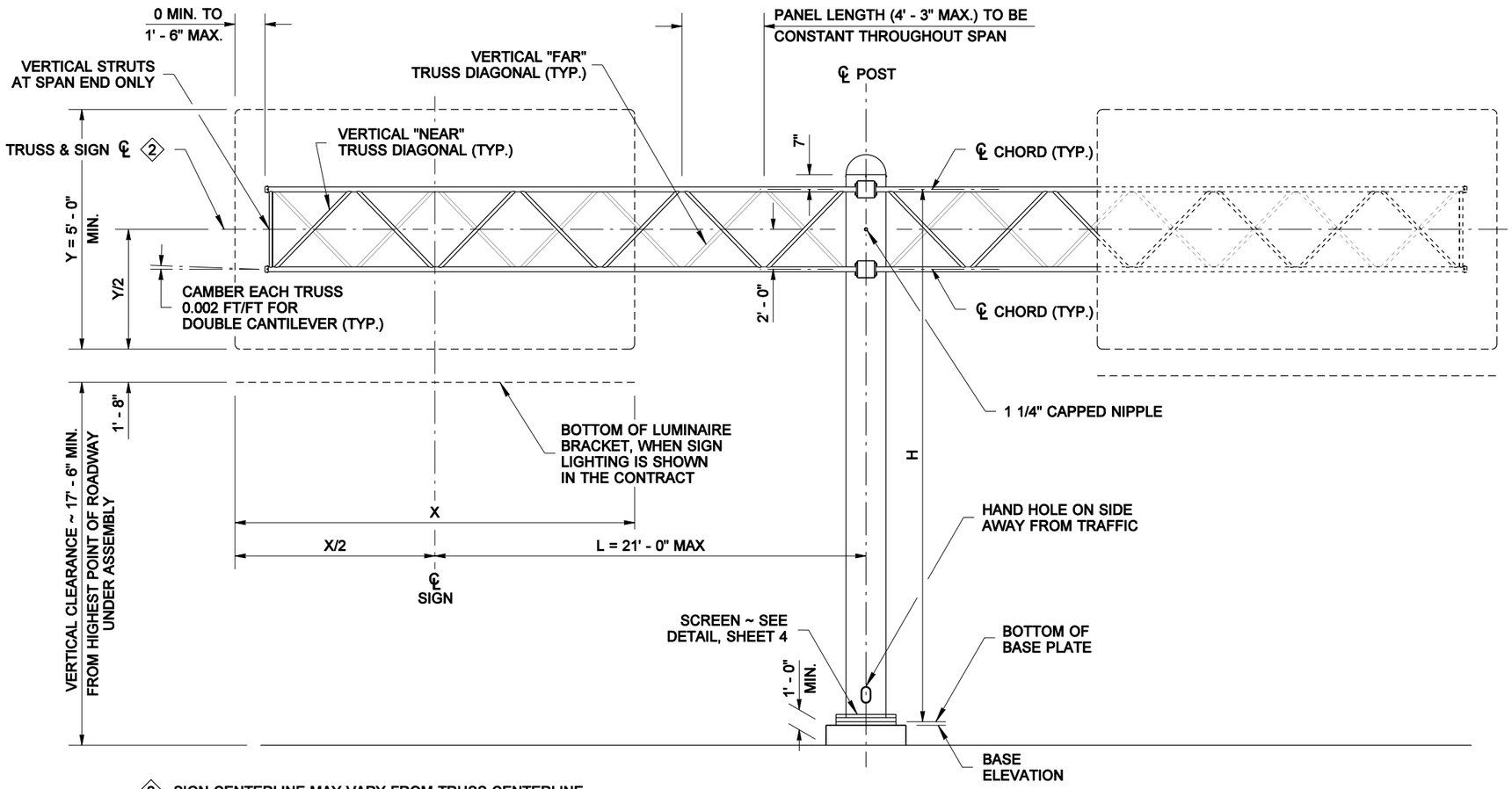
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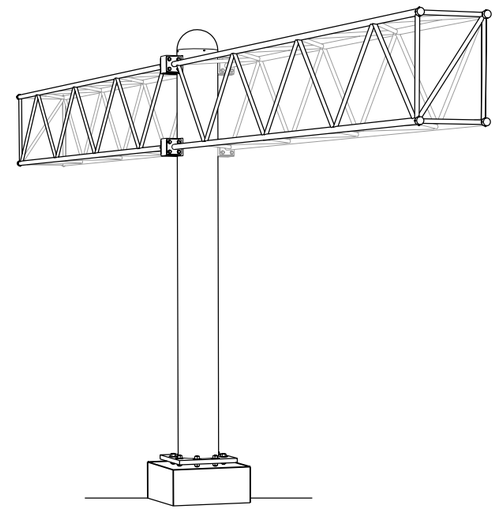
DRAWN BY: BILL BERENS




2 SIGN CENTERLINE MAY VARY FROM TRUSS CENTERLINE TO PROVIDE MINIMUM VERTICAL CLEARANCE.

**ELEVATION**

**DOUBLE CANTILEVER SIGN STRUCTURE**



**PERSPECTIVE**




EXPIRES NOVEMBER 14, 2006

# CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) STANDARD PLAN G-3

SHEET 2 OF 4 SHEETS

APPROVED FOR PUBLICATION

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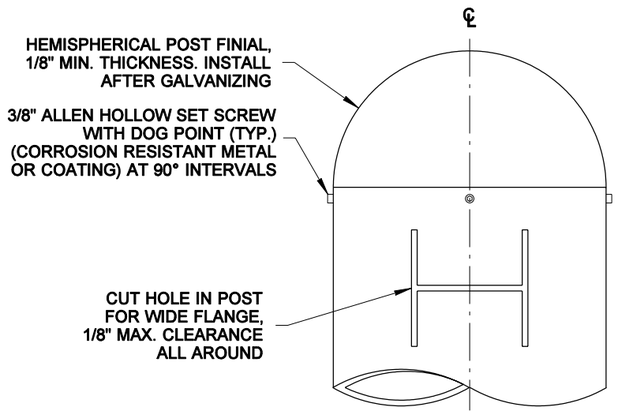
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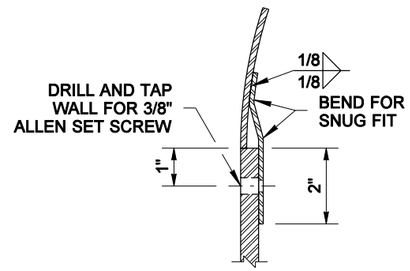
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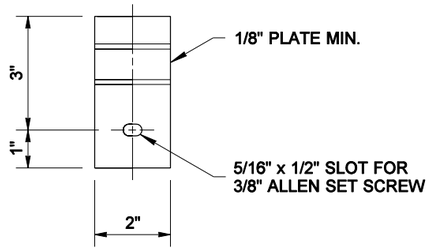
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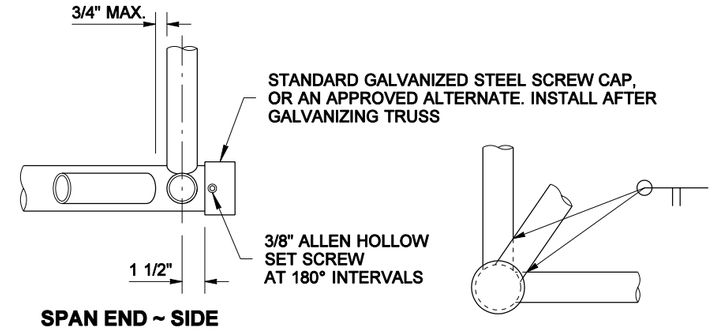

**ELEVATION**
ROTATED 90° TO SHOW CUTOUT




**SECTION THROUGH FINIAL AND POST**



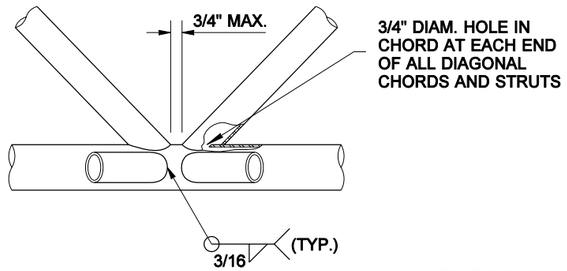

**FINIAL BRACKET**



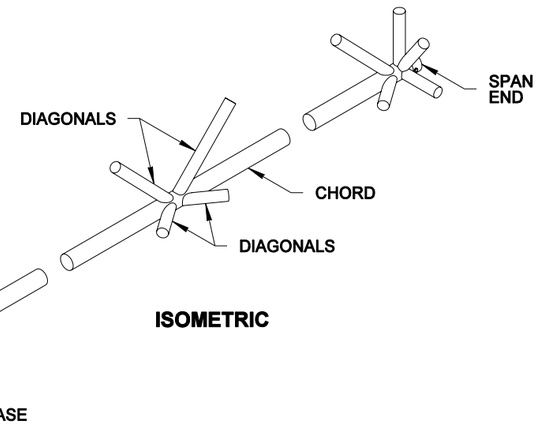

**SPAN END ~ SIDE**



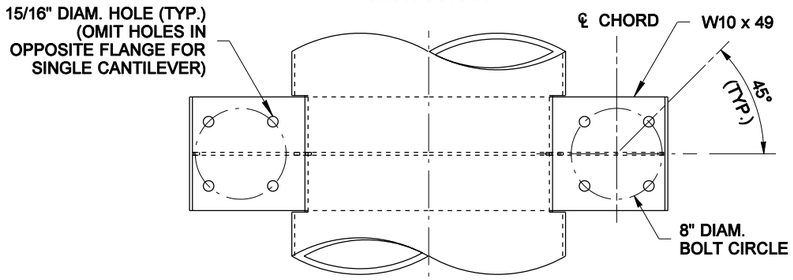
**SPAN END ~ END**
OPPOSITE HAND SHOWN FOR CLARITY



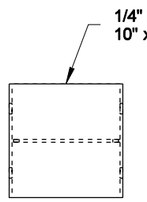

**DIAGONAL CONNECTION DETAIL**
TYPICAL OF ALL DIAGONALS



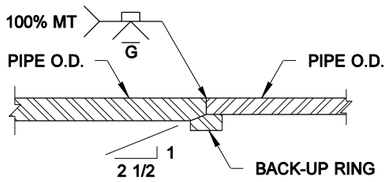

**ISOMETRIC**



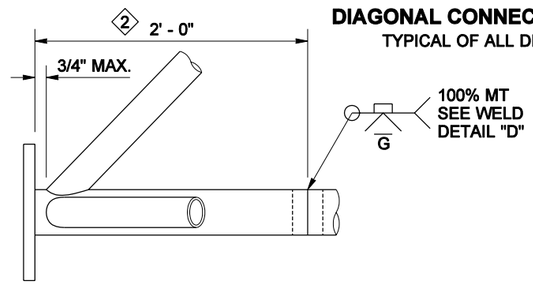

**ELEVATION**




**END OF CHORD**

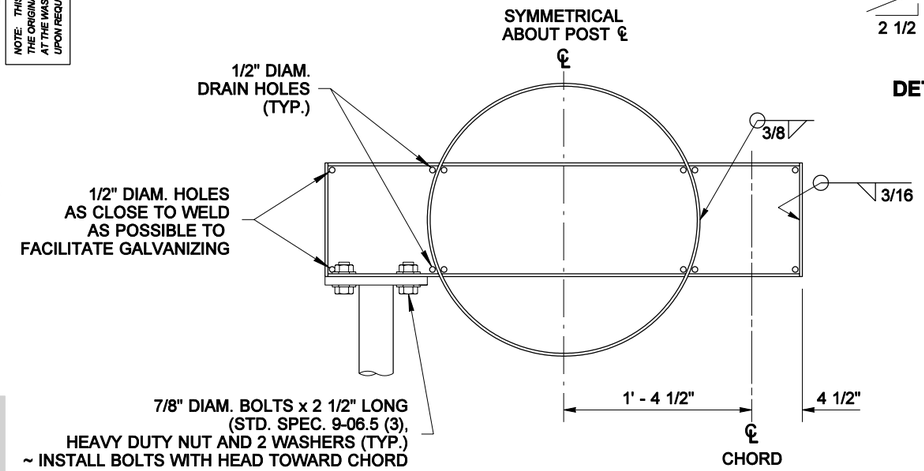



**DETAIL "D"**



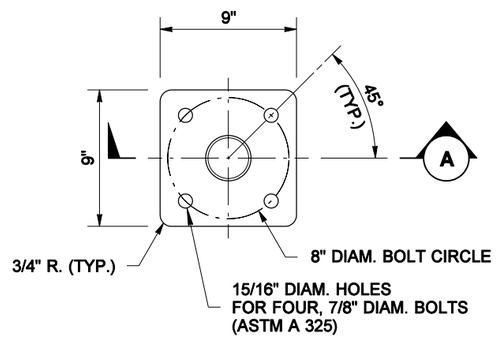

**BASE ~ SIDE**

2 3" DIAM. PIPE (t = 0.300) SPLICE WITH 3" DIAM. PIPE (t = 0.216) (SEE CHORD SELECTION TABLE)
2 1/2" DIAM. PIPE (t = 0.276) SPLICE WITH 2 1/2" DIAM. PIPE (t = 0.203) (SEE CHORD SELECTION TABLE)

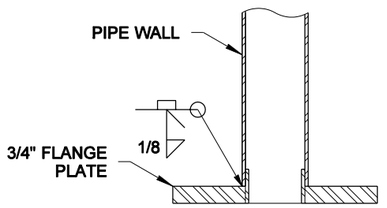



**TOP**

**CHORD TO POST CONNECTION DETAIL**




**BASE ~ TOP**




**SECTION (A)**

**TYPICAL TRUSS DETAILS**
ENDS OF DIAGONALS SHALL BE CUT TO FIT NEATLY AGAINST CHORDS

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EXPIRES NOVEMBER 14, 2006

# CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) STANDARD PLAN G-3

SHEET 3 OF 4 SHEETS

APPROVED FOR PUBLICATION

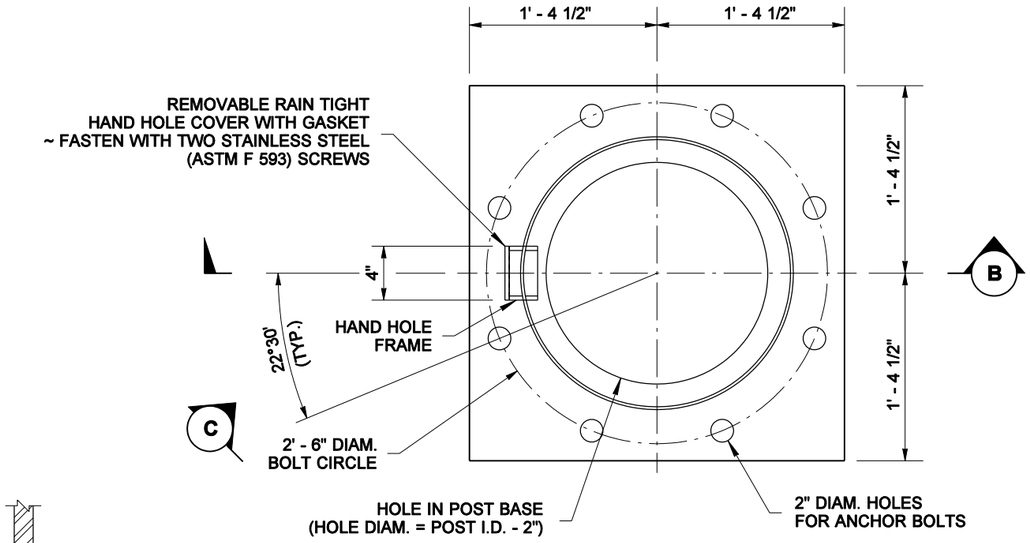
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-09-05* — DATE

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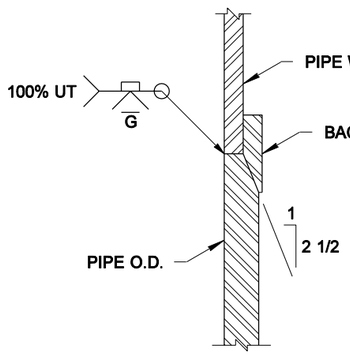
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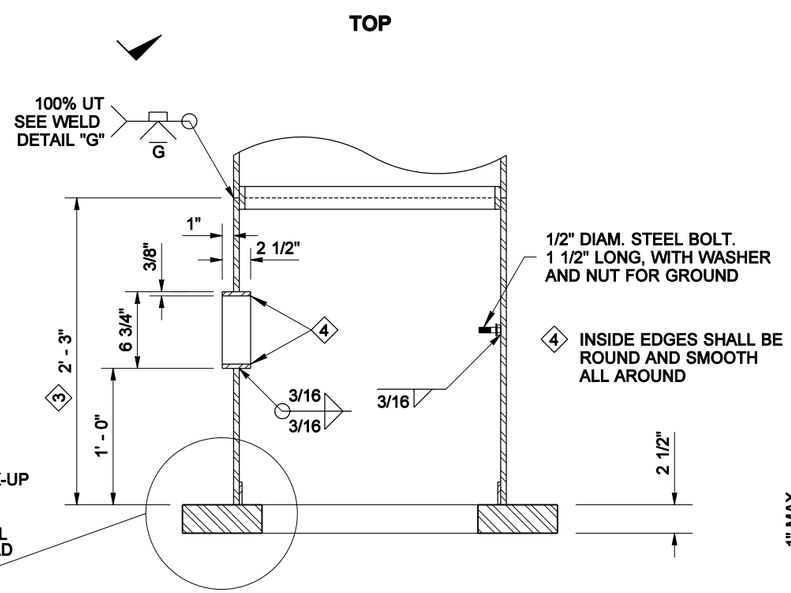
DRAWN BY: BILL BERENS

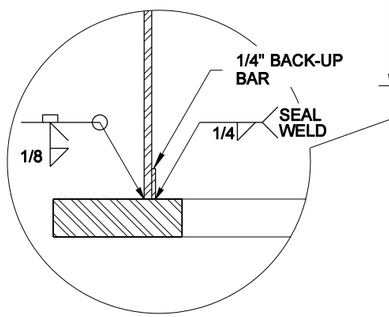



TOP




DETAIL "G"



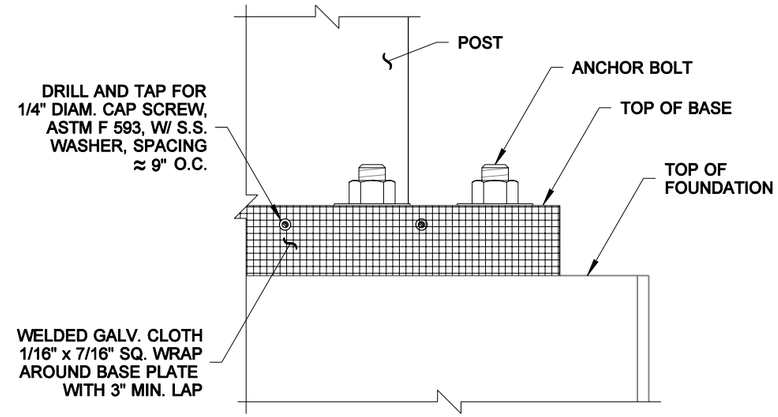




BASE WELD DETAIL

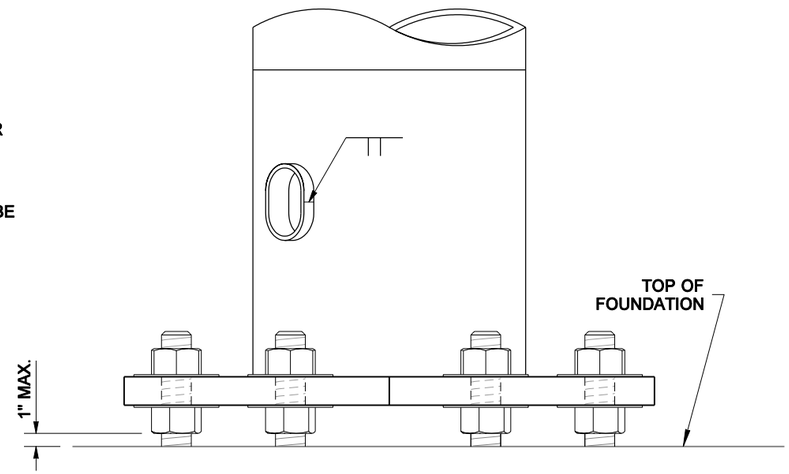
SECTION (B)

3 24" O.D. PIPE (t = 0.969) 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)

**POST BASE DETAILS**




**SCREEN DETAIL**




VIEW (C)

RICHARD P. ZELDENRUST
STATE OF WASHINGTON
25470
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 14, 2006

# CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) STANDARD PLAN G-3

SHEET 4 OF 4 SHEETS

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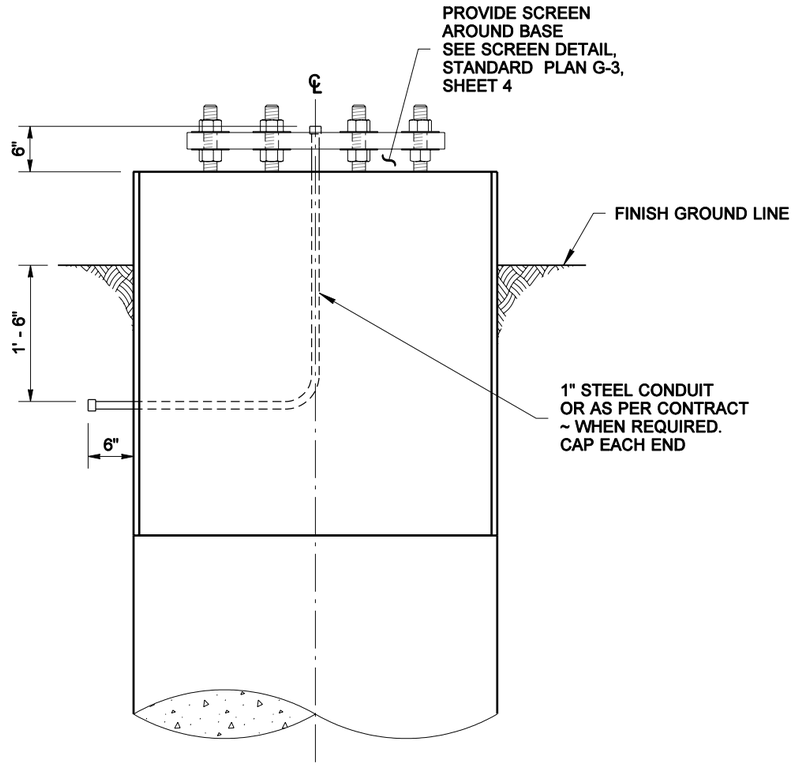
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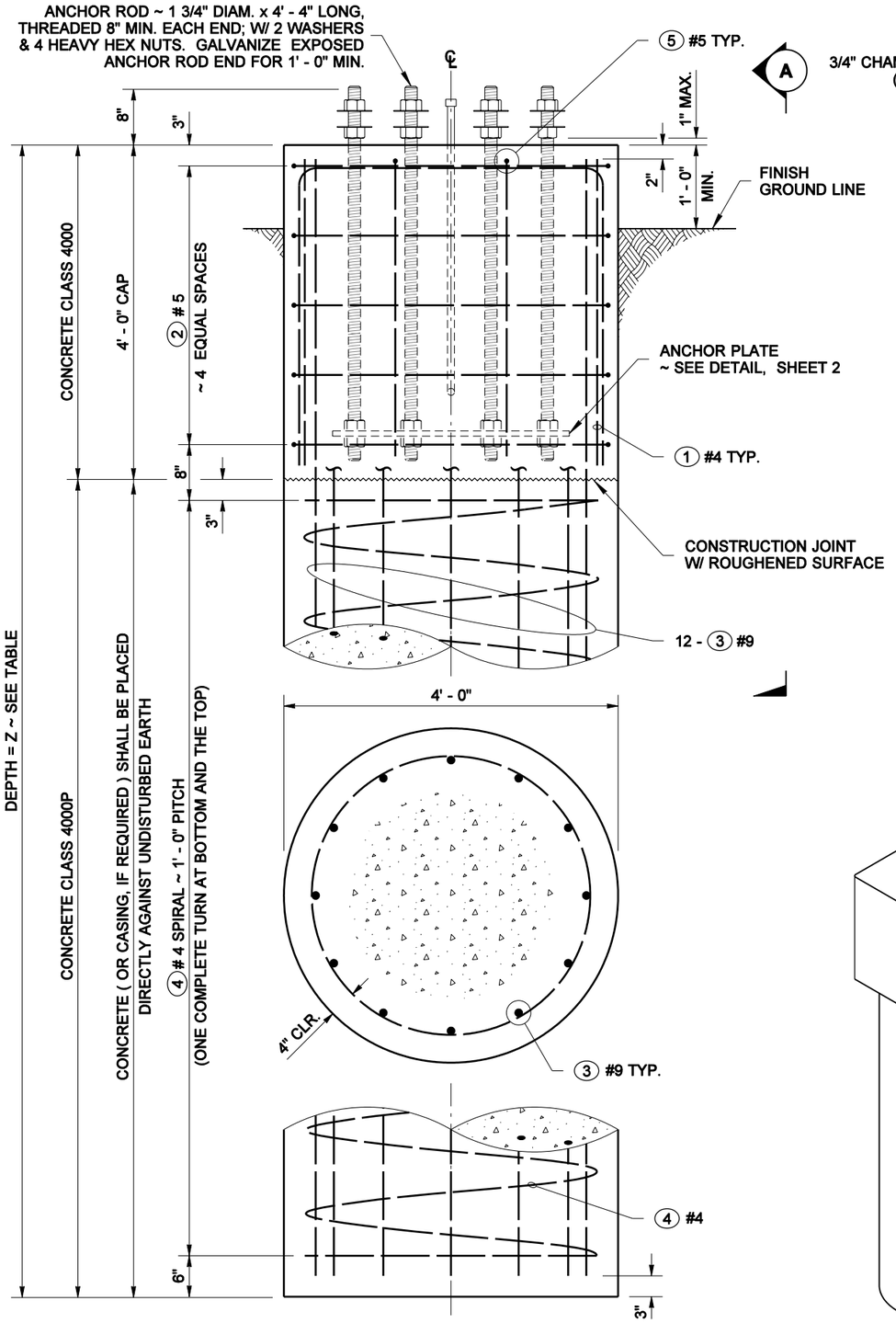
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



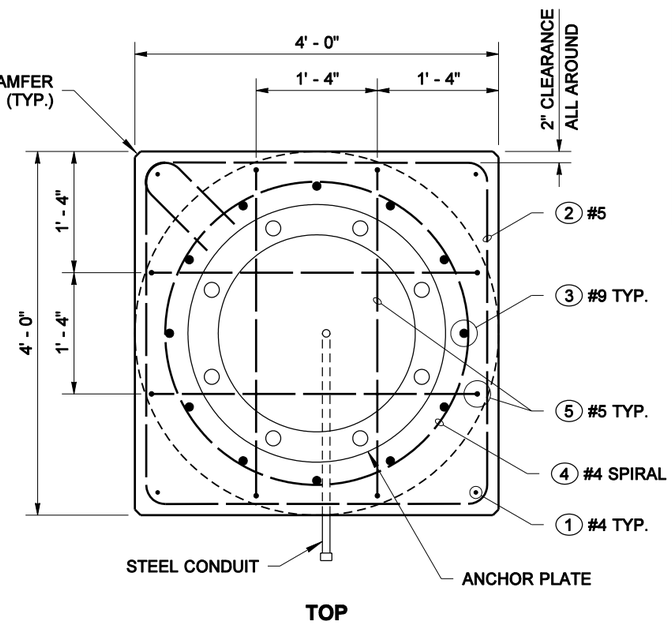

VIEW (A)

DRAWN BY: BILL BERENS

| VALUES OF Z | | | |
|---|---|---|---|
| FOUNDATION TYPE | TOTAL SIGN AREA | | ALLOWABLE LATERAL BEARING PRESSURE (PSF) |
| | 200 SF OR LESS | 200 SF ~ 400 SF | |
| | Z | Z | |
| 1 | 13' - 0" | 18' - 0" | 1500 AND UP |
| | 16' - 0" | 22' - 0" | 1000 ~ 1499 |



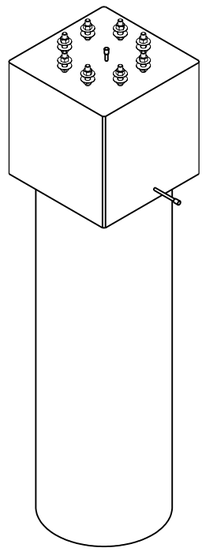

SIDE




TOP

**NOTES**

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



ISOMETRIC

RICHARD P. ZELDENRUST
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EXPIRES NOVEMBER 14, 2006

# CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) FOUNDATION TYPE 1 STANDARD PLAN G-3a

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

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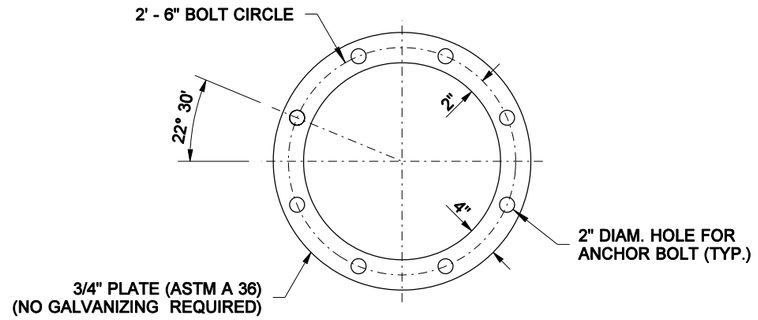
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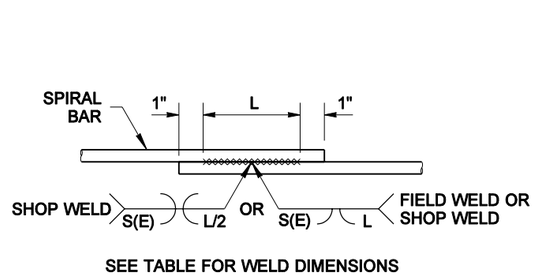
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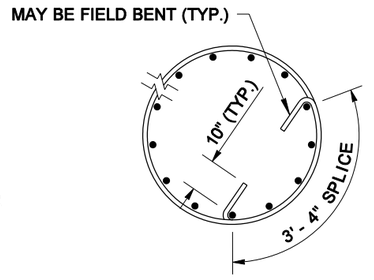



**ANCHOR PLATE DETAIL**




SEE TABLE FOR WELD DIMENSIONS

**SPIRAL WELDED LAP SPLICE DETAIL**




**SPIRAL LAP SPLICE DETAIL**

WELDING SHALL MEET THE REQUIREMENTS OF STD. SPEC. 6-02.3(24)E
FOR WELD DIMENSIONS, SEE TABLE BELOW

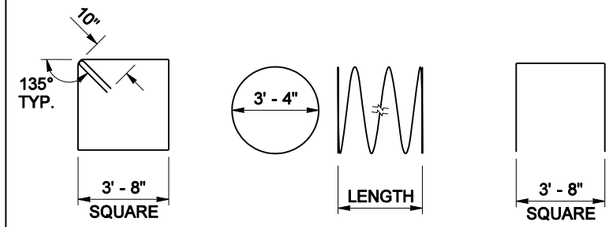
**COLUMN AND SHAFT SPIRAL OPTIONS**

| DEFORMED BAR AASHTO M 31 GRADE 60 | PLAIN STEEL BAR AASHTO M 31 GRADE 60 | COLD DRAWN WIRE AASHTO M 32 | DEFORMED WIRE AASHTO M 225 | WELD DIMENSIONS (INCHES) | | |
|---|---|---|---|---|---|---|
| | | | | S | E | L |
| # 4 | 1/2" DIAM. | W20 | D20 | 1/4 | 1/8 | 4 |
| # 5 | 5/8" DIAM. | W31 | D31 | 5/16 | 3/16 | 6 |
| # 6 | 3/4" DIAM. | W44 | D44 | 3/8 | 3/16 | 6 |

**BAR LIST**

| MARK | LOCATION | QTY. | LENGTH | SIZE | TYPE |
|---|---|---|---|---|---|
| (1) | CAP VERTICAL | 4 | 3' - 10" | #4 | STR. |
| (2) | CAP HOOPS | 5 | 15' - 9" | #5 | |
| (3) | SHAFT VERTICAL | 12 | "Z" MINUS CLEARANCES | #9 | STR. |
| (4) | SHAFT SPIRAL | 1 | AS REQUIRED | #4 | |
| (5) | CAP TOP | 4 | 10' - 10" | #5 | |

**BENDING DIAGRAM**
(ALL DIMENSIONS ARE OUT TO OUT)




**MATERIAL SPECIFICATIONS**

| | |
|---|---|
| SHAFT CONCRETE | CLASS 4000P |
| ALL OTHER CONCRETE | CLASS 4000 |
| STEEL REINF. 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 |




EXPIRES NOVEMBER 14, 2006

# CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) FOUNDATION TYPE 1 STANDARD PLAN G-3a

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

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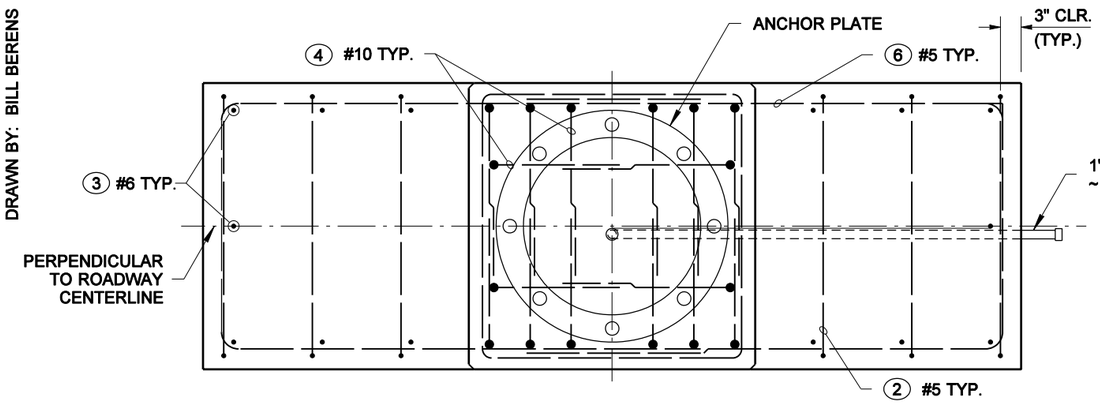
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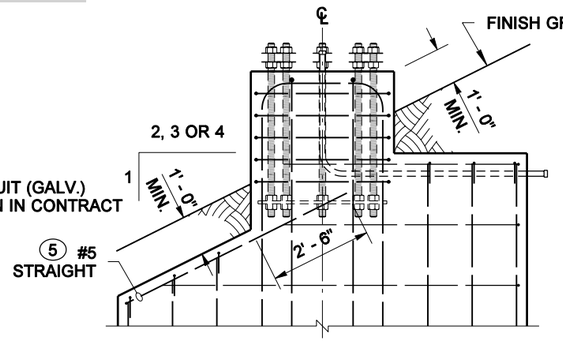
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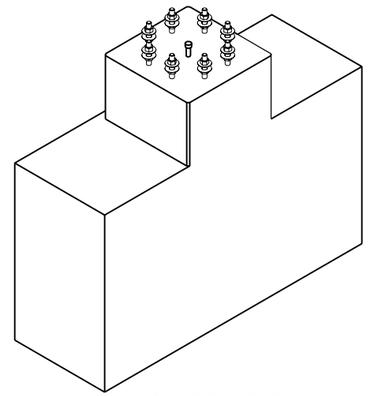
DRAWN BY: BILL BERENS



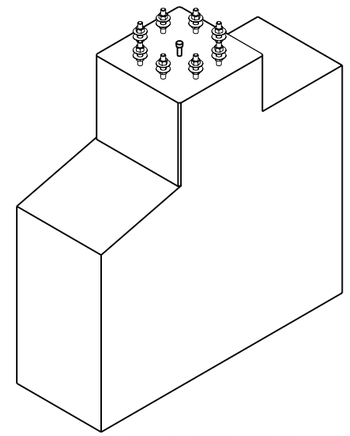




**NOTE**

1. See Standard Specification Section 8-21.3(9) for construction requirements.



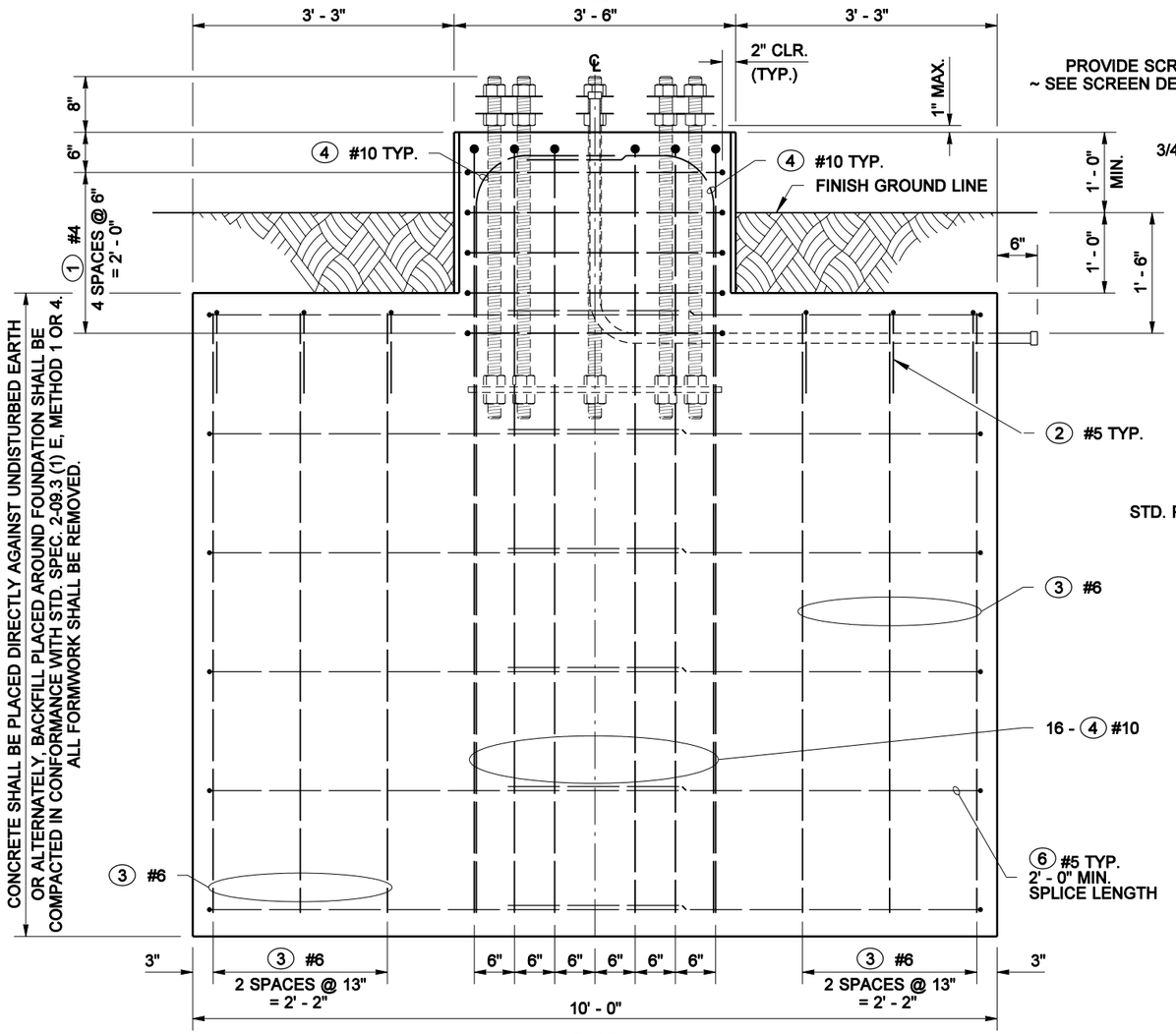
**FOR LEVEL GRADE**



**FOR SLOPED GRADE**

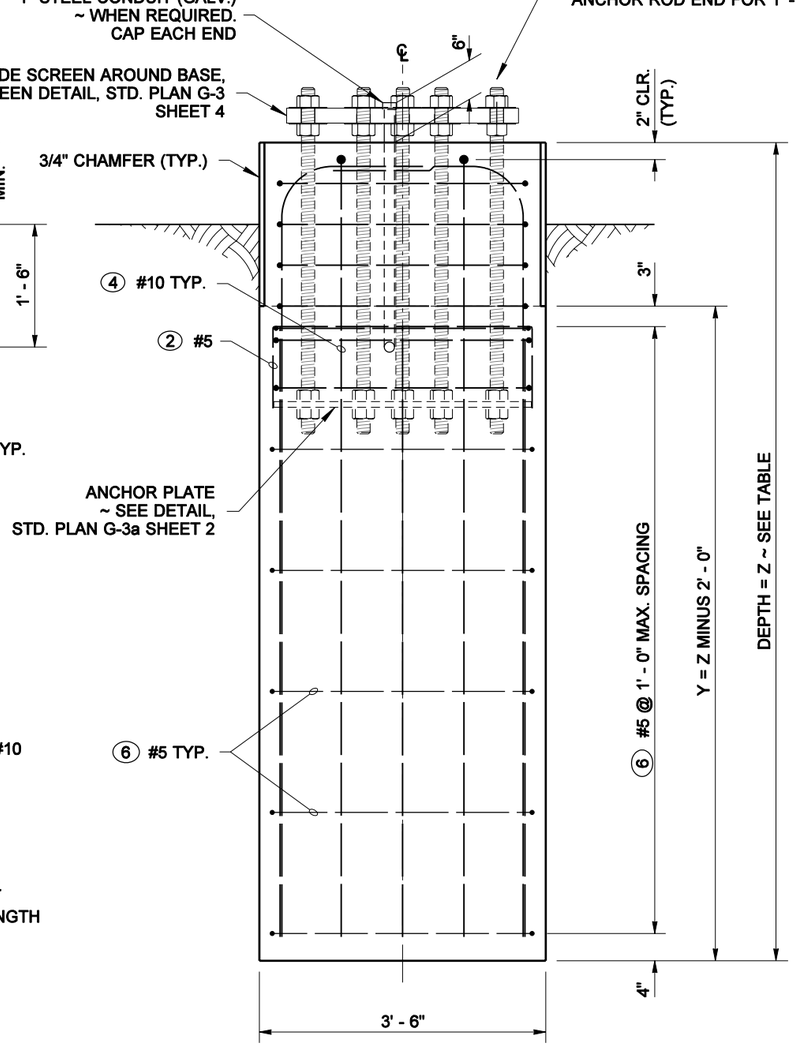
**ISOMETRIC**

**TOP**




**SIDE**

**SIDE**
ON SLOPED GRADE
(SHOWN AT REDUCED SCALE)




**END**

RICHARD P. ZELDENRUST
STATE OF WASHINGTON
25470
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 14, 2006

# CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) FOUNDATION TYPE 2 & 3 STANDARD PLAN G-3b

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-09-05* — DATE

Washington State Department of Transportation

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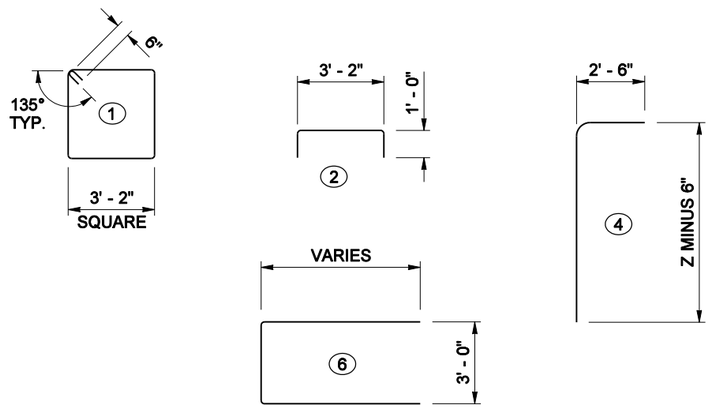
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: BILL BERENS

## BAR LIST ~ TYPES 2 AND 3

| MARK | LOCATION | TOTAL SIGN AREA | | | |
|---|---|---|---|---|---|
| | | 200 SF OR LESS | | +200 SF -400 SF | |
| | | QTY. | SIZE | QTY. | SIZE |
| ① | PEDESTAL HOOP | 5 | #4 | 5 | #4 |
| ② | FOUNDATION WALL TIES | 6 | #5 | 6 | #5 |
| ③ | FOUNDATION VERTICALS | 14 | #6 | 14 | #6 |
| ④ | PEDESTAL VERTICALS | 16 | #10 | 16 | #10 |
| ⑤ | FOUNDATION WALL HORIZONTALS AT SLOPE | 2 | #5 | 2 | #5 |
| ⑥ | FOUNDATION WALL HORIZONTALS | VARIES SEE PLANS | #5 | VARIES SEE PLANS | #5 |

## BENDING DIAGRAM




## VALUES OF Z

| FOUNDATION TYPE | TOTAL SIGN AREA | | ALLOWABLE LATERAL BEARING PRESSURE (PSF) |
|---|---|---|---|
| | 200 SF OR LESS | 200 SF ~ 400 SF | |
| | Z | Z | |
| TYPE 2 | 9' - 0" | 11' - 0" | 2500 OR GREATER |
| TYPE 3 | 11' - 0" | 13' - 6" | NOT LESS THAN 1500 |

## MATERIAL SPECIFICATIONS

| | |
|---|---|
| CONCRETE | CLASS 4000 |
| STEEL REINF. 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 |




EXPIRES NOVEMBER 14, 2006

# CANTILEVER SIGN STRUCTURE (TRUSS-TYPE) FOUNDATION TYPE 2 & 3 STANDARD PLAN G-3b

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-09-05* — DATE

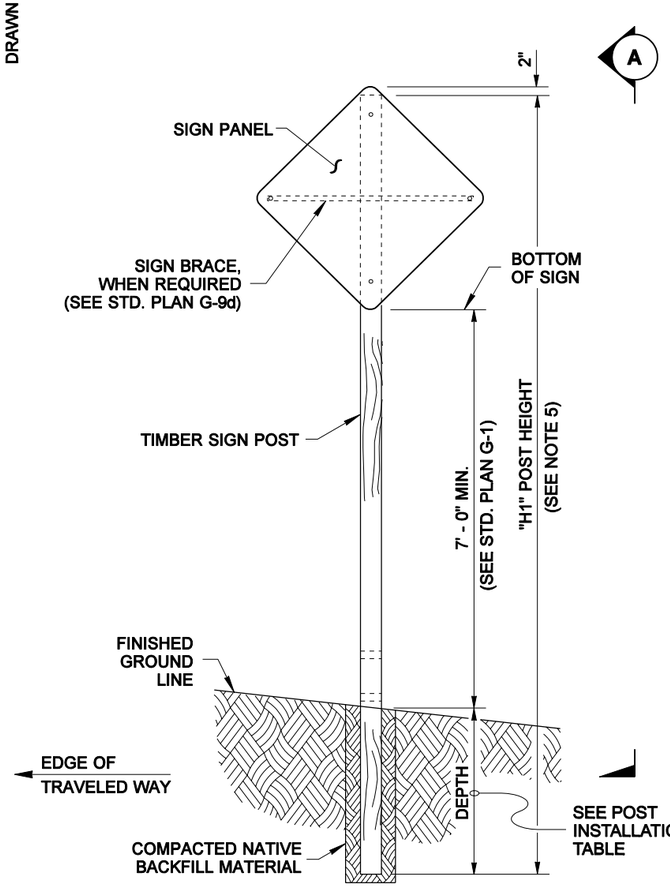
Washington State Department of Transportation

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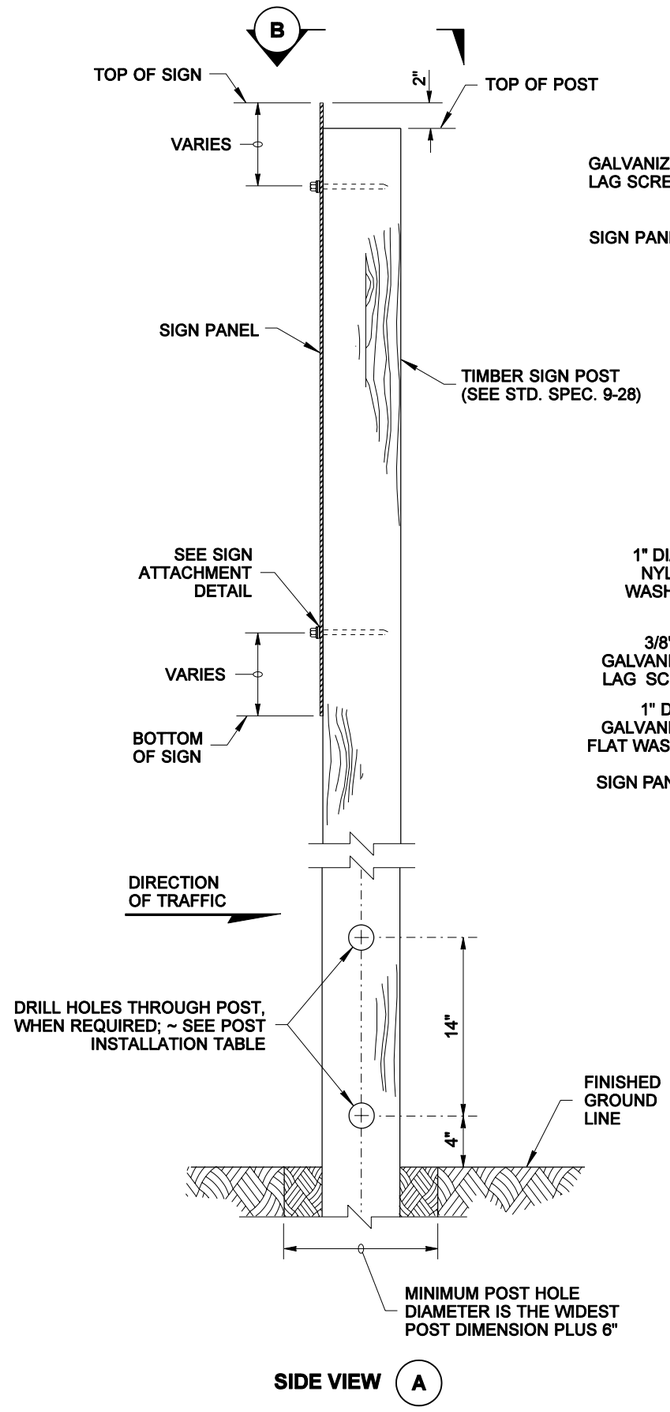
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MONIQUE GLICK

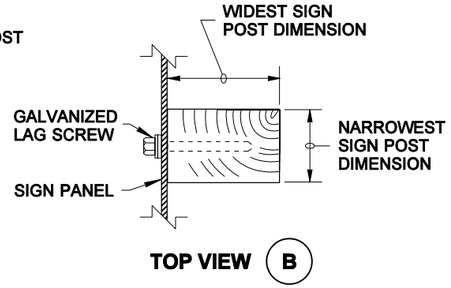



ELEVATION VIEW

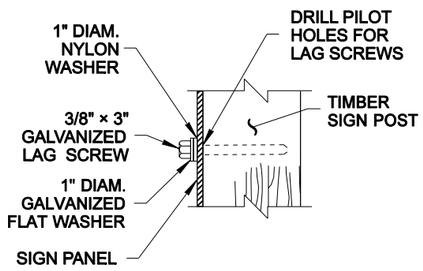
## SINGLE POST INSTALLATION




SIDE VIEW (A)




TOP VIEW (B)




## SIGN ATTACHMENT DETAIL

**NOTES**

1. Notch is only required with multiple post installations.
2. 6 x 10, 8 x 10, and 8 x 12 Timber Sign Posts can not 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 x 6 or 6 x 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 x 6 or 6 x 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.

**POST INSTALLATION TABLE**

| POST SIZE | DEPTH | HOLE DIAMETER | NOTCH DEPTH See Note 1 |
|---|---|---|---|
| 4 x 4 | 3' - 0" | NOT REQ'D | NOT REQ'D |
| 4 x 6 | 4' - 0" | 1 1/2" | 1 1/2" |
| 6 x 6 | 4' - 0" | 2" See Note 3 & 4 | 2" See Note 3 & 4 |
| 6 x 8 | 4' - 0" | 3" See Note 3 & 4 | 3" See Note 3 & 4 |
| 6 x 10 | 5' - 0" | See Note 2 | See Note 2 |
| 8 x 10 | 5' - 0" | See Note 2 | See Note 2 |
| 8 x 10 | 5' - 0" | See Note 2 | See Note 2 |




EXPIRES MAY 5, 2007

# TIMBER SIGN SUPPORTS

## STANDARD PLAN G-4a

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-09-05* — DATE

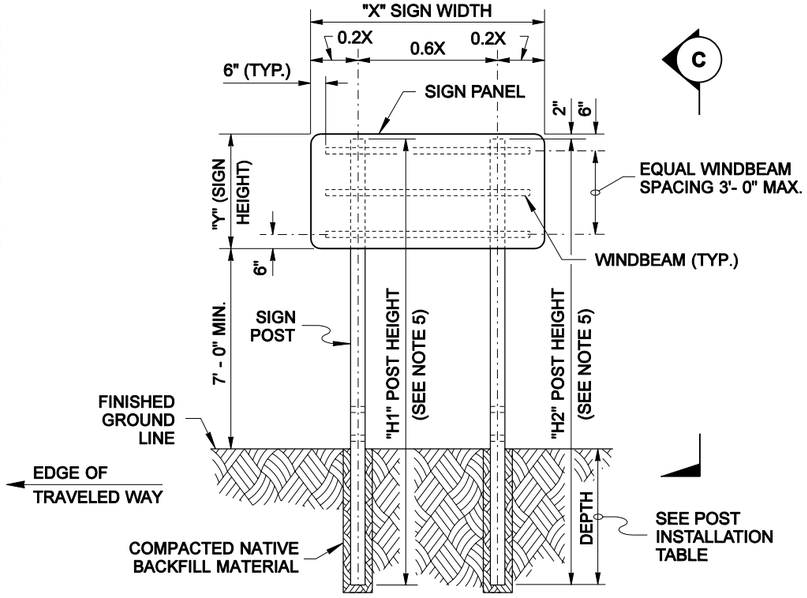
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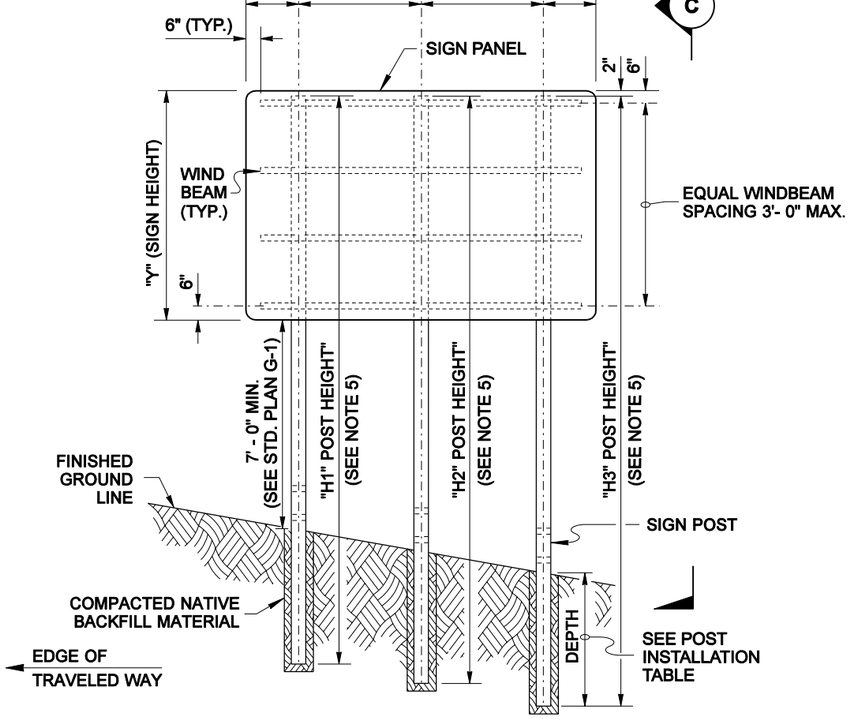
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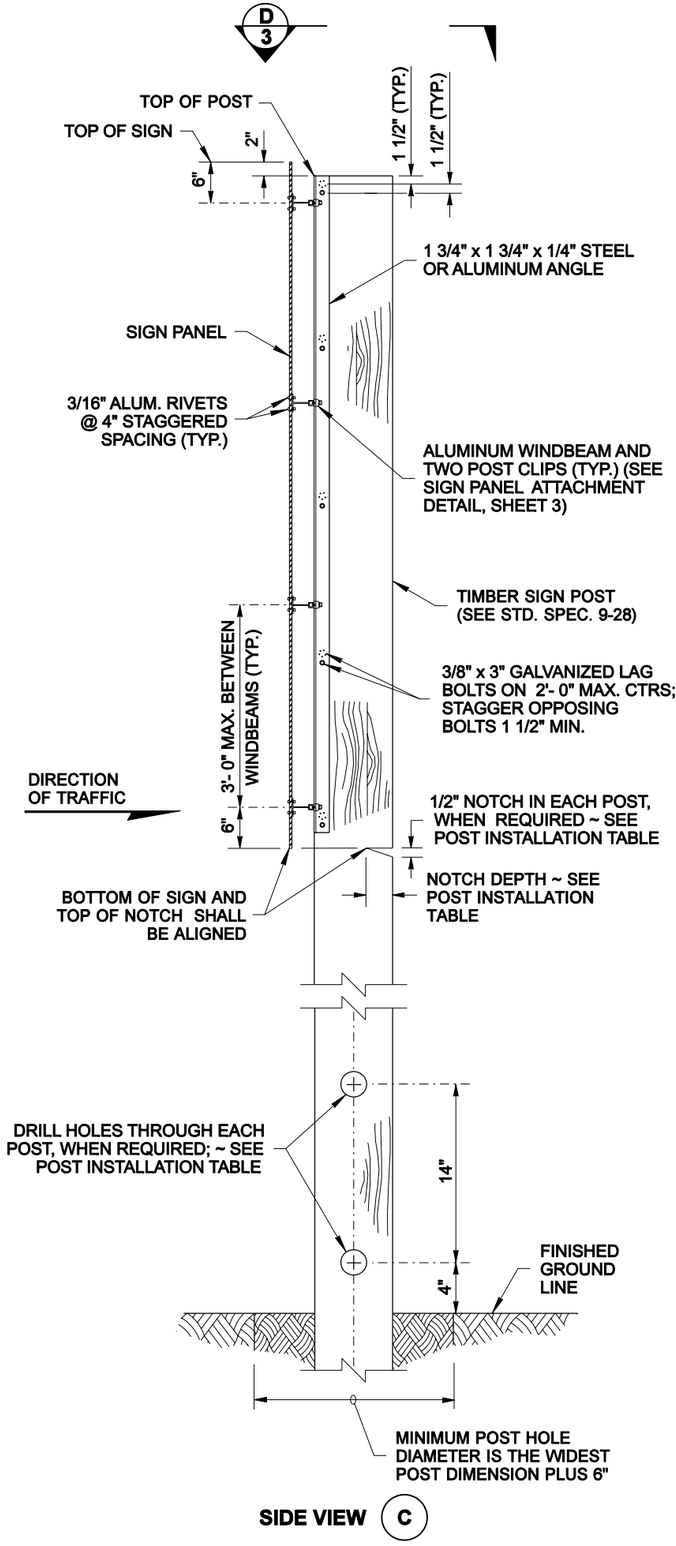
DRAWN BY: MONIQUE GLICK



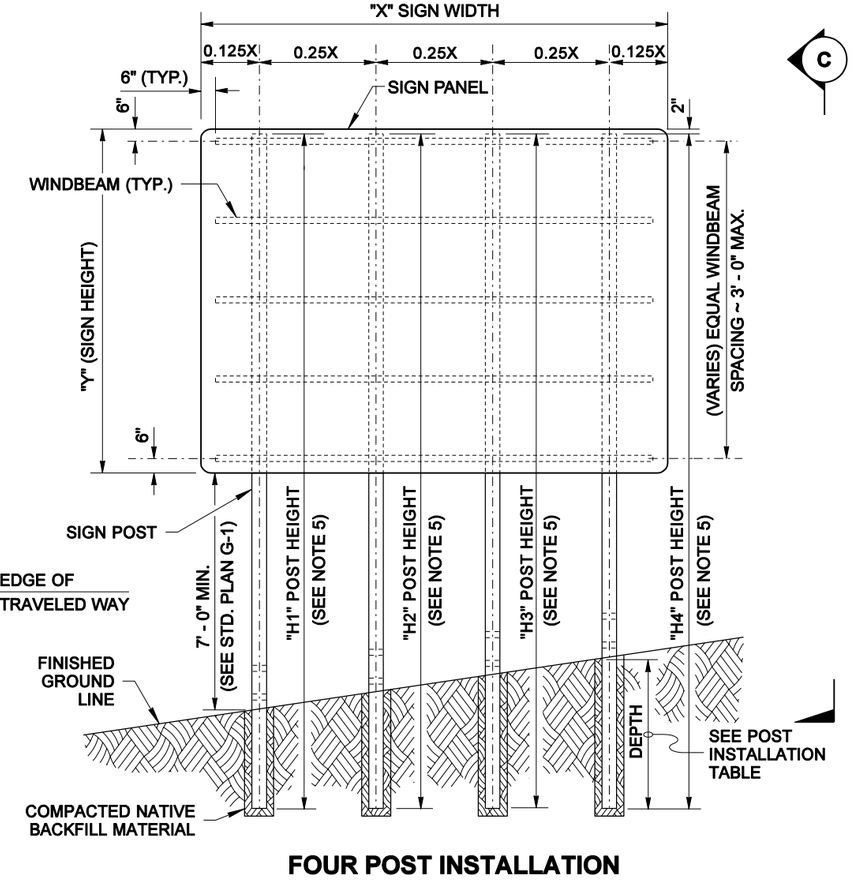

**TWO POST INSTALLATION**




**THREE POST INSTALLATION**




**SIDE VIEW** (C)




**FOUR POST INSTALLATION**

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2007

# TIMBER SIGN SUPPORTS

## STANDARD PLAN G-4a

SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-09-05* — DATE

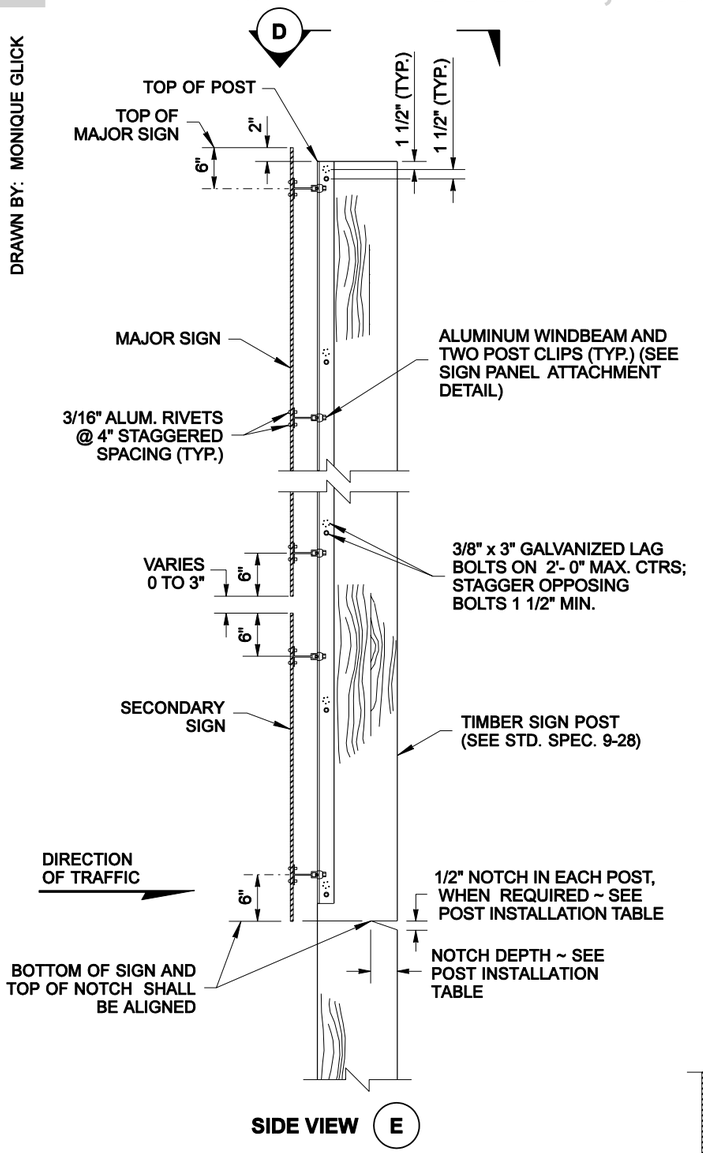
Washington State Department of Transportation

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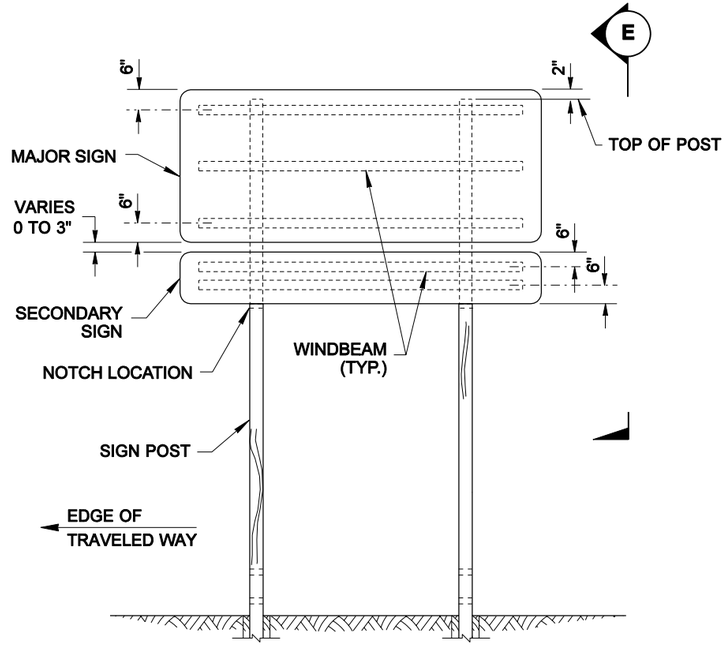
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

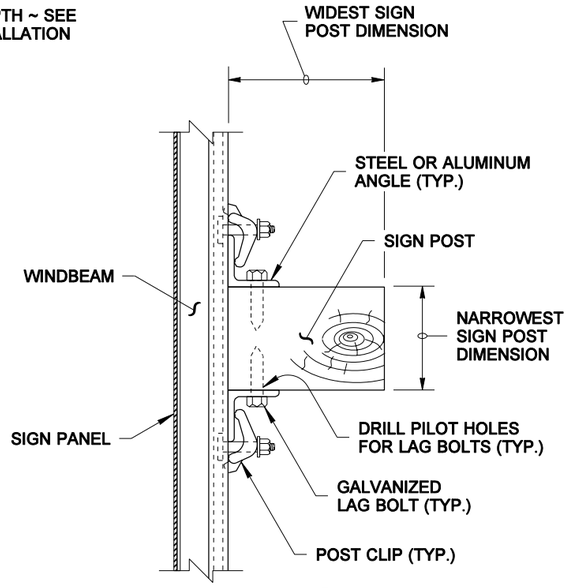
DRAWN BY: MONIQUE GLICK



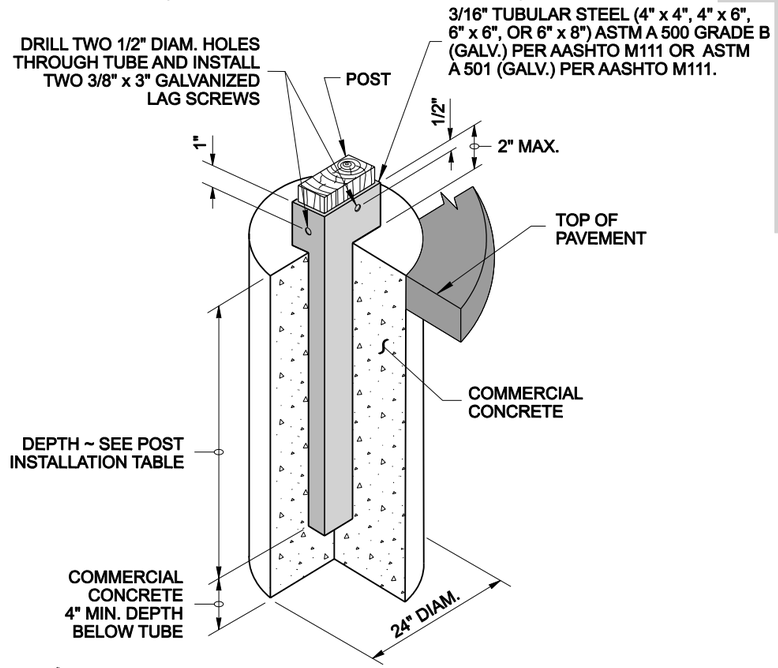

**SIDE VIEW** (E)




**MAJOR AND SECONDARY SIGN INSTALLATION**



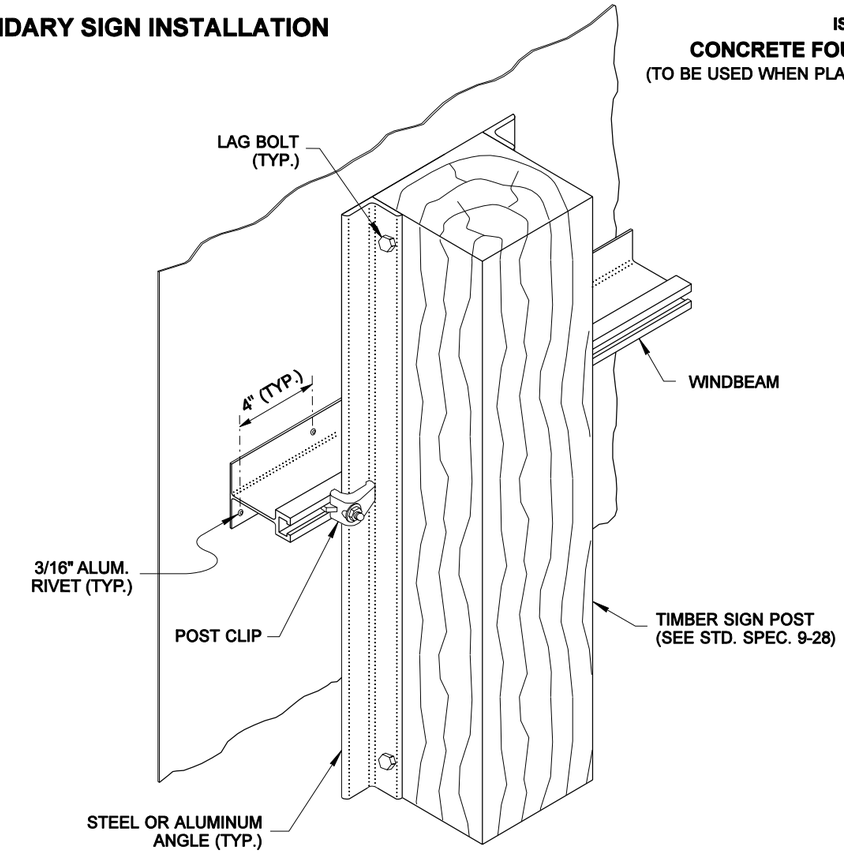

**TOP VIEW** (D)




**ISOMETRIC VIEW**

**CONCRETE FOUNDATION SLEEVE DETAIL**

(TO BE USED WHEN PLACING TIMBER POST IN A PAVED AREA)




**ISOMETRIC VIEW**

**SIGN PANEL ATTACHMENT DETAIL**

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2007

# TIMBER SIGN SUPPORTS

## STANDARD PLAN G-4a

SHEET 3 OF 3 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER

*11-09-05* — DATE

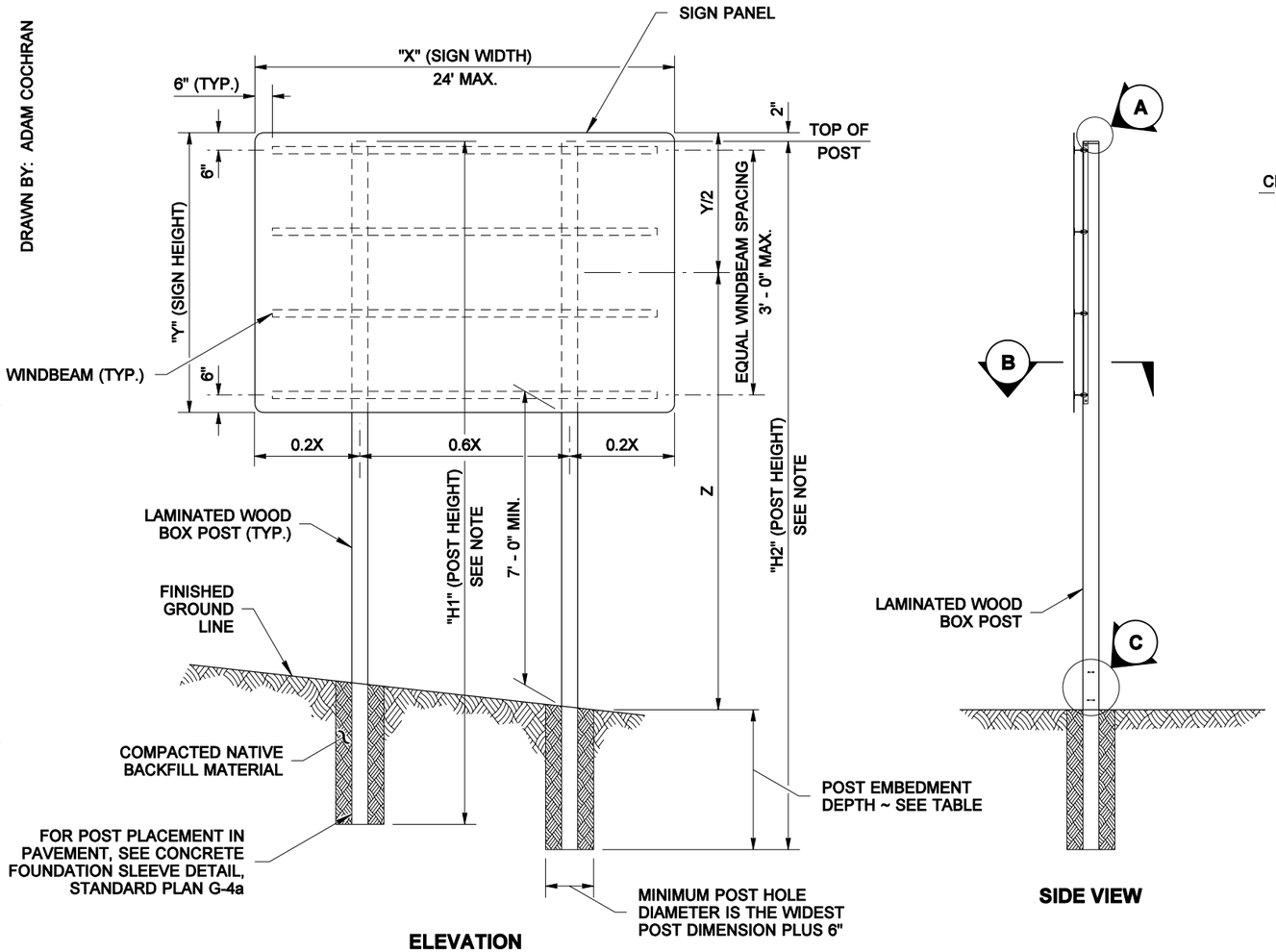
Washington State Department of Transportation

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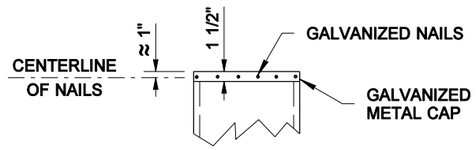
DRAWN BY: ADAM COCHRAN



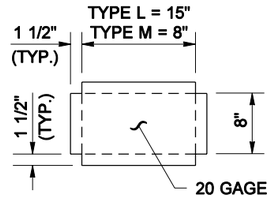

ELEVATION




SIDE VIEW



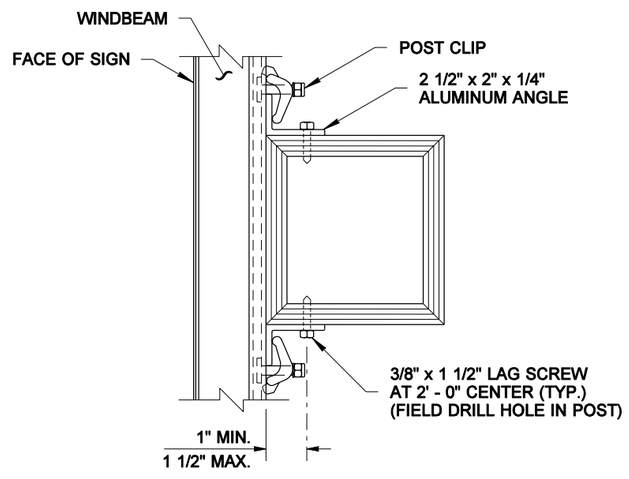

DETAIL (A)




GALVANIZED METAL CAP

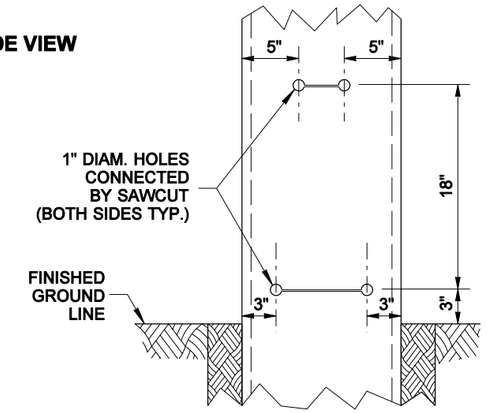
**NOTE**

See "Construction Sign Specification Sheet" of the contract for "H1", "H2", "H3", "H4", "X" & "Y" values and definitions.

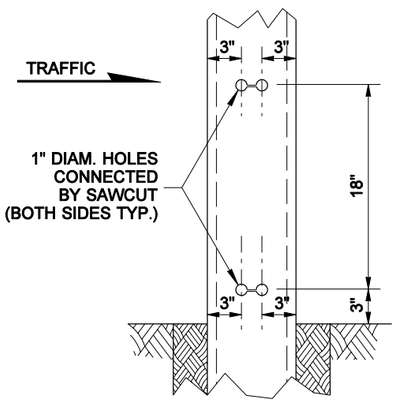



SECTION (B)

| POST EMBEDMENT DEPTH<br>DEPTH IN FEET | | | | | | |
|---|---|---|---|---|---|---|
| Z HEIGHT (FT) | TOTAL SIGN AREA (SQUARE FEET) | | | | | |
| | UP TO 50 | 51 TO 100 | 101 TO 150 | 151 TO 200 | 201 TO 250 | 251 TO 290 |
| 9 TO 12 | 6 | 6 | 7 | 8 | 9 | 10 |
| 13 TO 15 | 6 | 6 | 7.5 | 9 | 10 | |
| 16 TO 18 | 7 | 7.5 | 9 | NOT PERMITTED | | |
| 19 TO 22 | 7 | 8 | 10 | | | |
| 23 TO 26 | 7.5 | 8.5 | | | | |



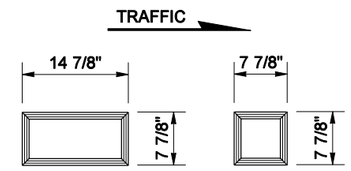

TYPE L POST




TYPE M POST

BREAKAWAY FEATURE

DETAIL (C)




TYPE L POST TYPE M POST

TYPICAL SECTIONS

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# ROADSIDE SIGNS ON LAMINATED WOOD BOX POSTS STANDARD PLAN G-4b

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-30-04* — DATE

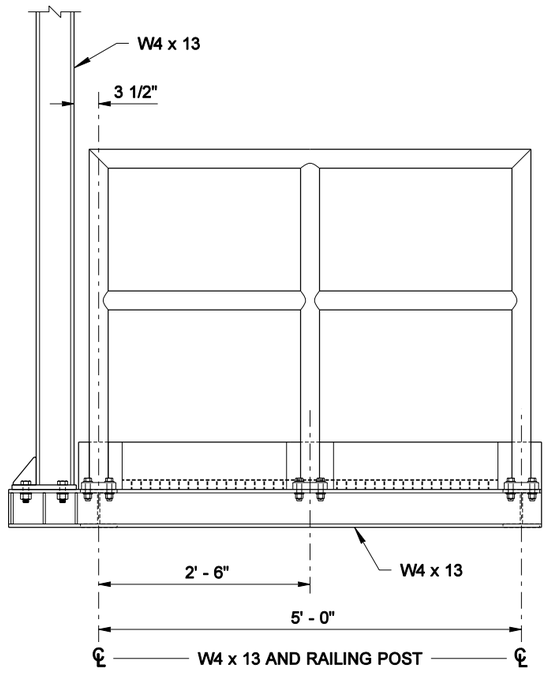
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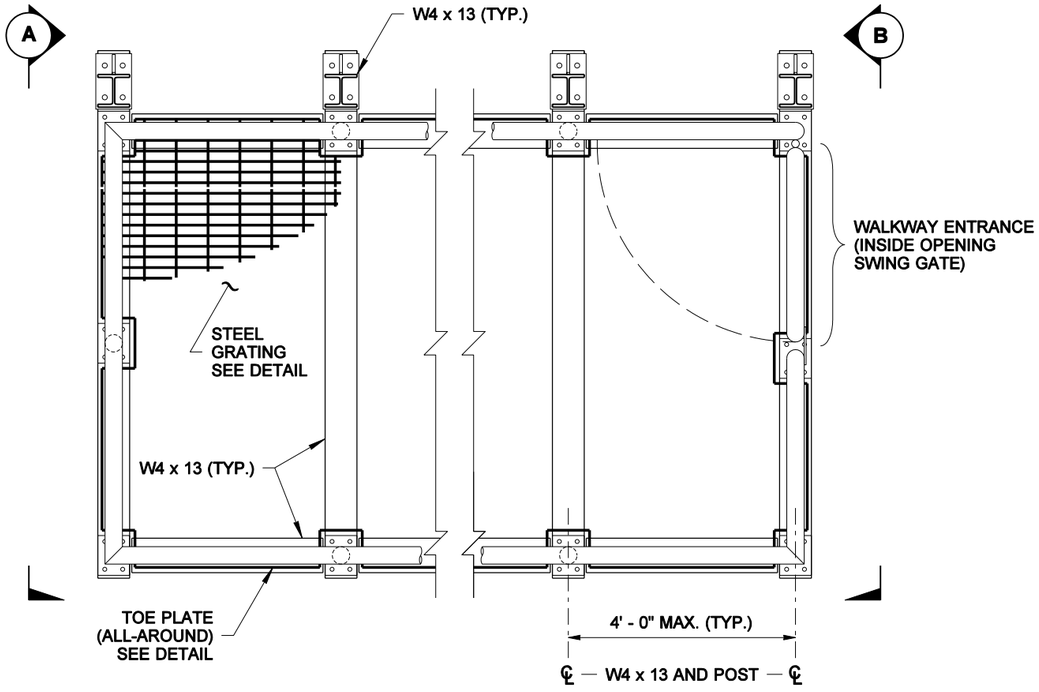
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END VIEW (A)

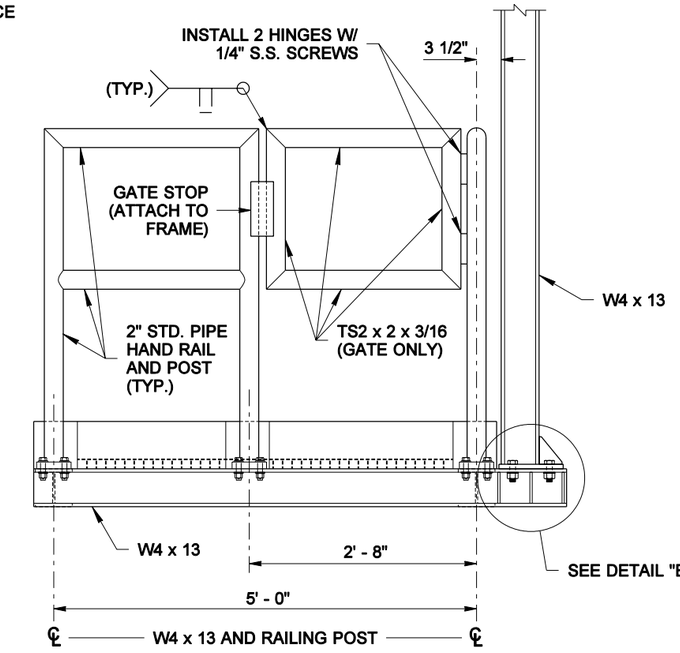



PLAN

## MAINTENANCE WALKWAY

### NOTES

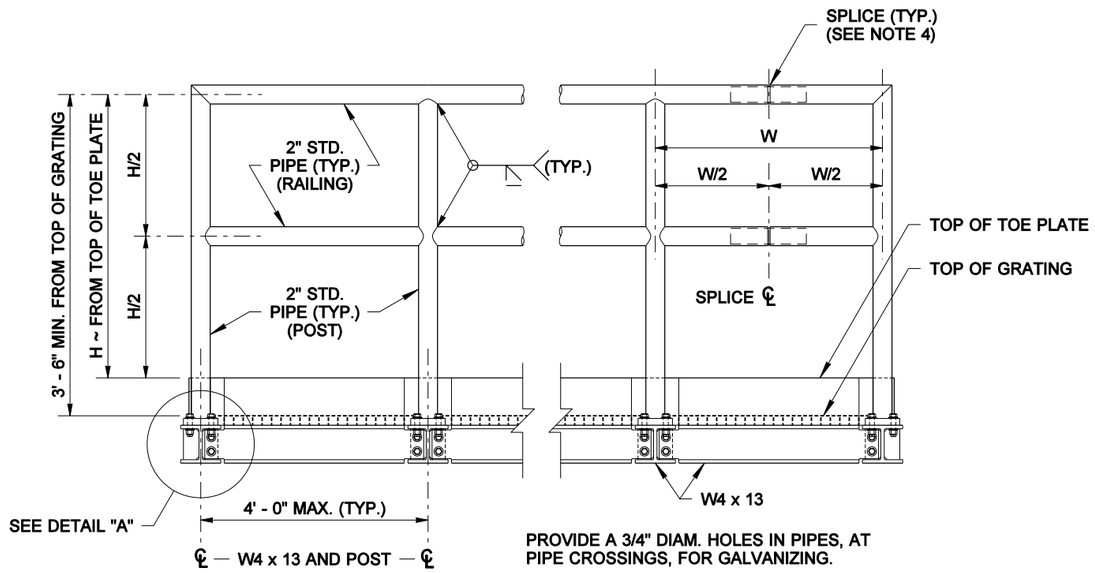
1. NOT INTENDED FOR USE IN FRONT OF STATIC SIGNS.
2. FOR MOUNTING THE MAINTENANCE WALKWAY TO A MONOTUBE OVERHEAD SIGN STRUCTURE, SEE STANDARD PLAN G-6a.
3. FOR MOUNTING THE MAINTENANCE WALKWAY TO A TRUSS-TYPE OVERHEAD SIGN STRUCTURE, SEE STANDARD PLAN G-6b.
4. LOCATION OF RAILING SPLICES TO BE DETERMINED BY FABRICATOR. SEE "RAILING SPLICE DETAIL".




MAINTENANCE WALKWAY GATE

END VIEW (B)

| MATERIAL SPECIFICATIONS | |
|---|---|
| PIPE | ASTM A 36 OR ASTM A 53 GRADE B, TYPE E OR S, OR ASTM A 500 GRADE B |
| PLATES AND SHAPES | ASTM A 36 |
| STRUCTURAL TUBING | ASTM A 500 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 |




PROVIDE A 3/4" DIAM. HOLES IN PIPES, AT PIPE CROSSINGS, FOR GALVANIZING.

ELEVATION

## MAINTENANCE WALKWAY

RICHARD P. ZELDENRUST
STATE OF WASHINGTON
25470
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 14, 2004

# MAINTENANCE WALKWAY FOR OVERHEAD SIGN STRUCTURES

# STANDARD PLAN G-6

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

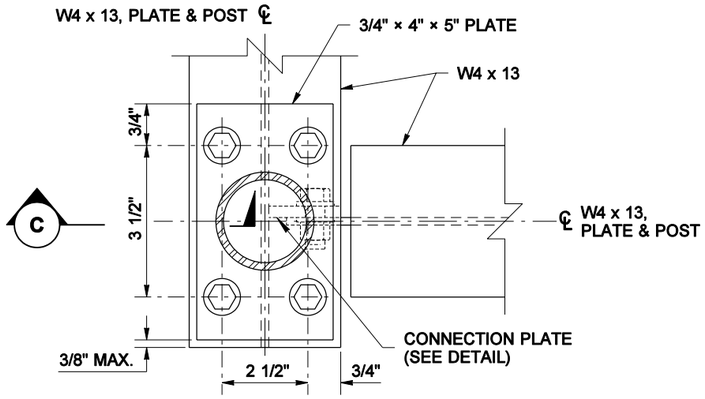
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *08-27-03* — DATE

Washington State Department of Transportation

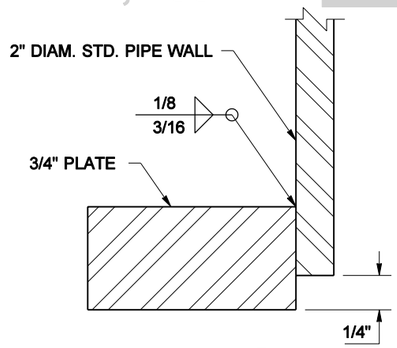
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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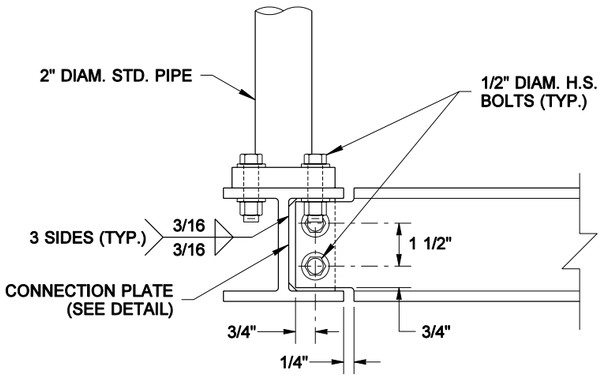
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PLAN

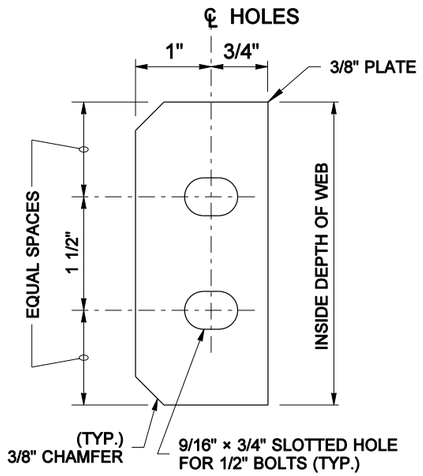



SECTION C

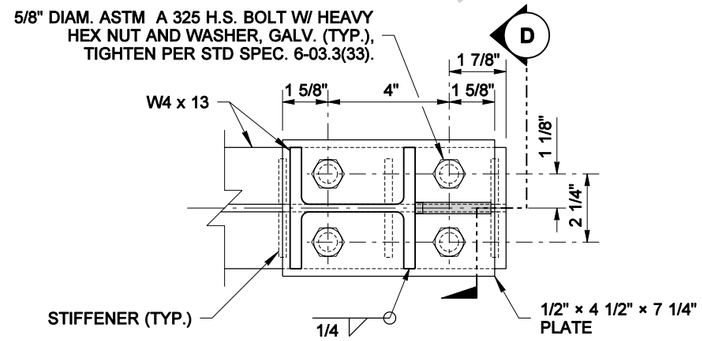



ELEVATION

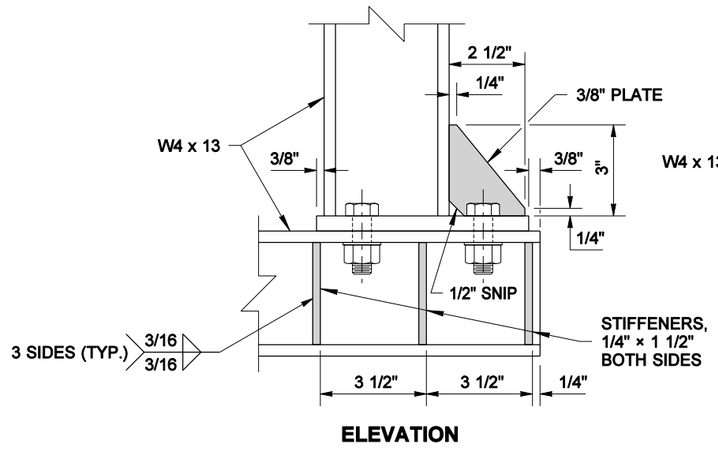
DETAIL "A"



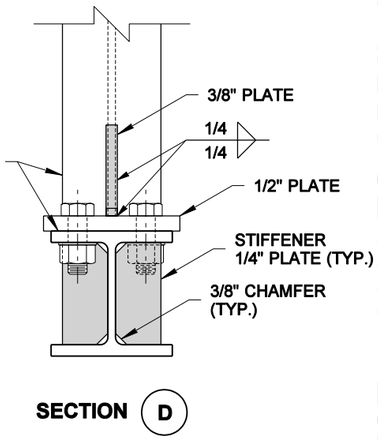

CONNECTION PLATE DETAIL




PLAN

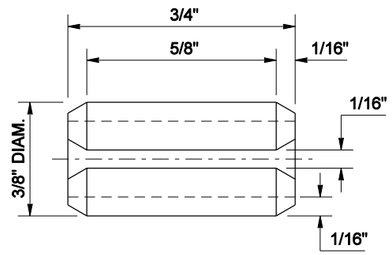



ELEVATION



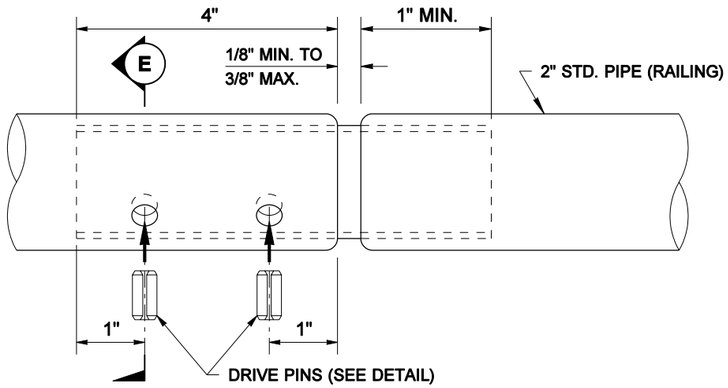

SECTION D

DETAIL "B"



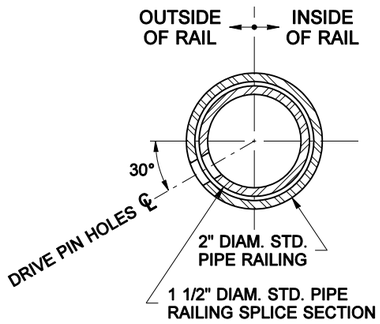

SLOTTED TYPE SPRING PIN
(ANSI B18.8.2, TYPE 304 STAINLESS STEEL)

DRIVE PIN DETAIL




ELEVATION

RAILING SPLICE DETAIL




SECTION E




EXPIRES NOVEMBER 14, 2004

# MAINTENANCE WALKWAY FOR OVERHEAD SIGN STRUCTURES

## STANDARD PLAN G-6

SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION

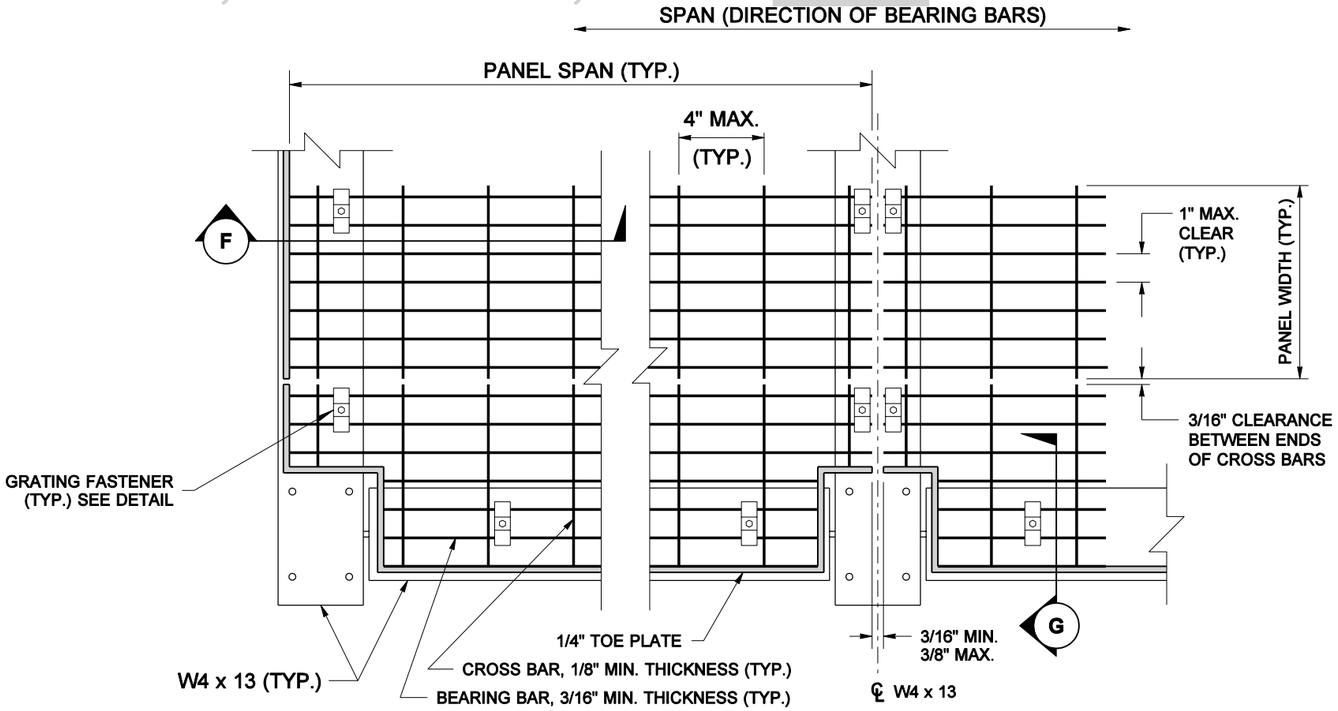
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *08-27-03* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

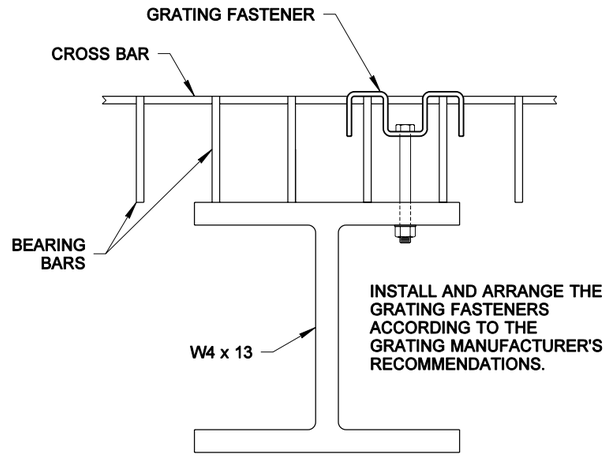
NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.



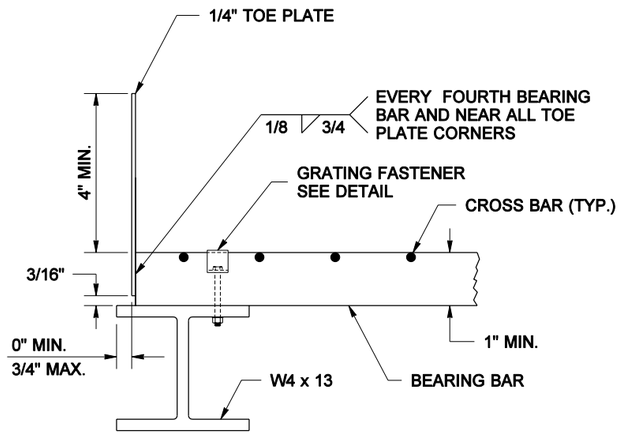

PLAN

## STEEL GRATING DETAIL

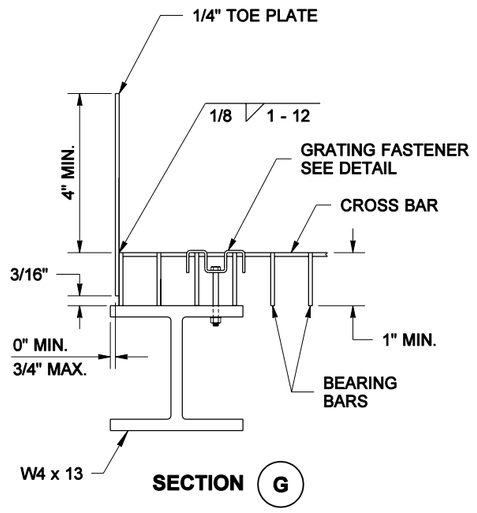
(RAILING NOT SHOWN FOR CLARITY)




## GRATING FASTENER DETAIL




SECTION (F)




SECTION (G)

RICHARD P. ZELDENRUST
STATE OF WASHINGTON
25470
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 14, 2004

# MAINTENANCE WALKWAY FOR OVERHEAD SIGN STRUCTURES

# STANDARD PLAN G-6

SHEET 3 OF 3 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER

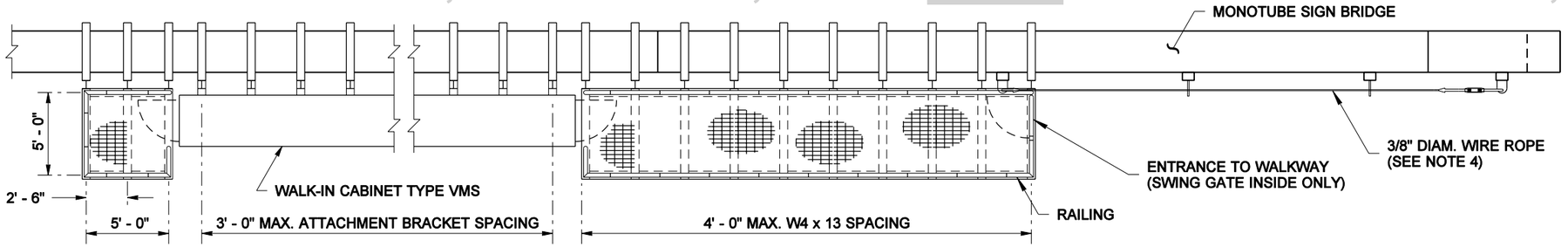
*08-27-03* — DATE

Washington State Department of Transportation

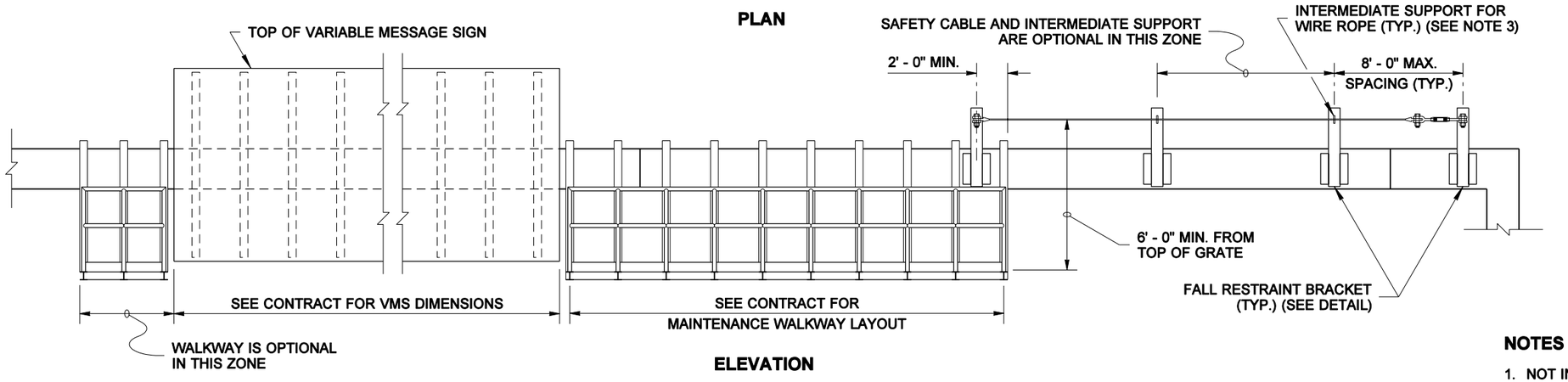
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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PLAN




ELEVATION

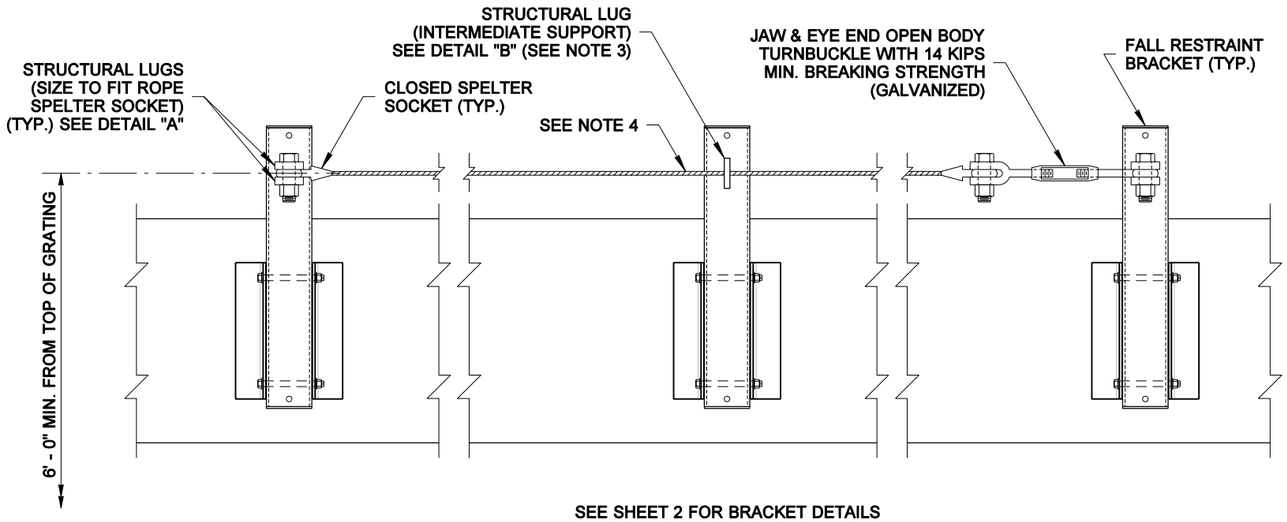
| MATERIAL SPECIFICATIONS | |
|---|---|
| PIPE | ASTM A 36 OR ASTM A 53 GRADE B, TYPE E OR S, OR ASTM A 500 GRADE B |
| PLATES AND SHAPES | ASTM A 36 |
| STRUCTURAL TUBING | ASTM A 500 GRADE B |
| GALVANIZING FOR PIPE PLATES AND SHAPES | AASHTO M 111 |
| HIGH STRENGTH BOLTS, NUTS, & WASHERS; INCL. MOUNTING 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 |
| WIRE ROPE | ASTM A 603 W/ CLASS A WEIGHT ZINC COATED WIRES THROUGHOUT |

## MAINTENANCE WALKWAY INSTALLED ON MONOTUBE OVERHEAD SIGN STRUCTURE

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

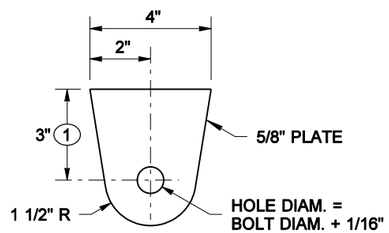
### NOTES

1. NOT INTENDED FOR USE IN FRONT OF STATIC SIGNS.
2. FOR MAINTENANCE WALKWAY, RAILING, GRATING, AND TOE PLATE DETAILS, SEE STANDARD PLAN G-6.
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.



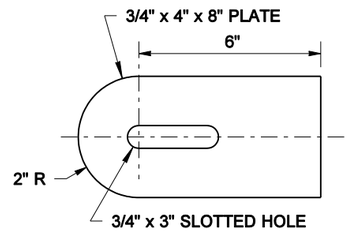

SEE SHEET 2 FOR BRACKET DETAILS

**FALL RESTRAINT**




1 5" WHEN AN INTERMEDIATE SUPPORT IS USED

**DETAIL "A"**




**DETAIL "B"**

RICHARD P. ZELDENRUST
STATE OF WASHINGTON
25470
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 14, 2004

# MAINTENANCE WALKWAY MOUNTING FOR MONOTUBE OVERHEAD SIGN STRUCTURE

## STANDARD PLAN G-6a

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

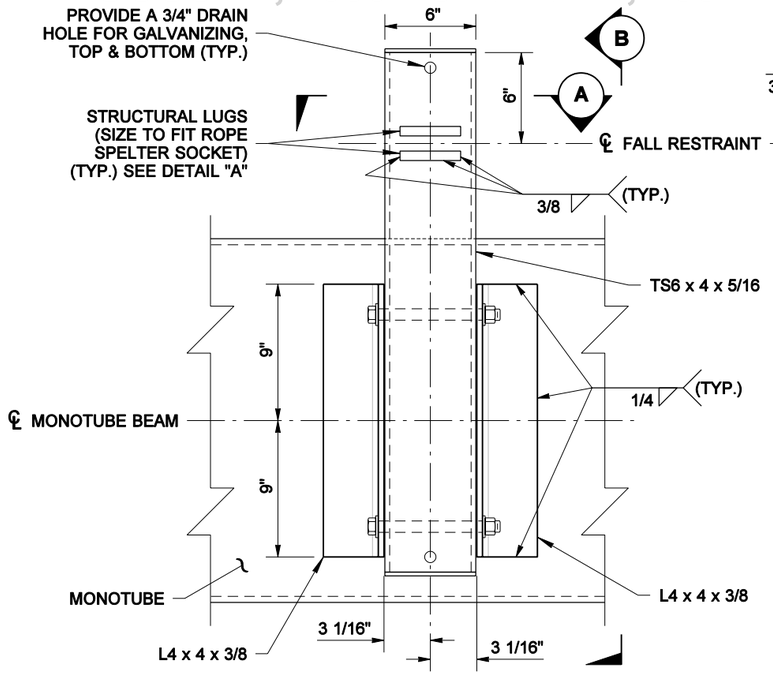
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *08-27-03* — DATE

Washington State Department of Transportation

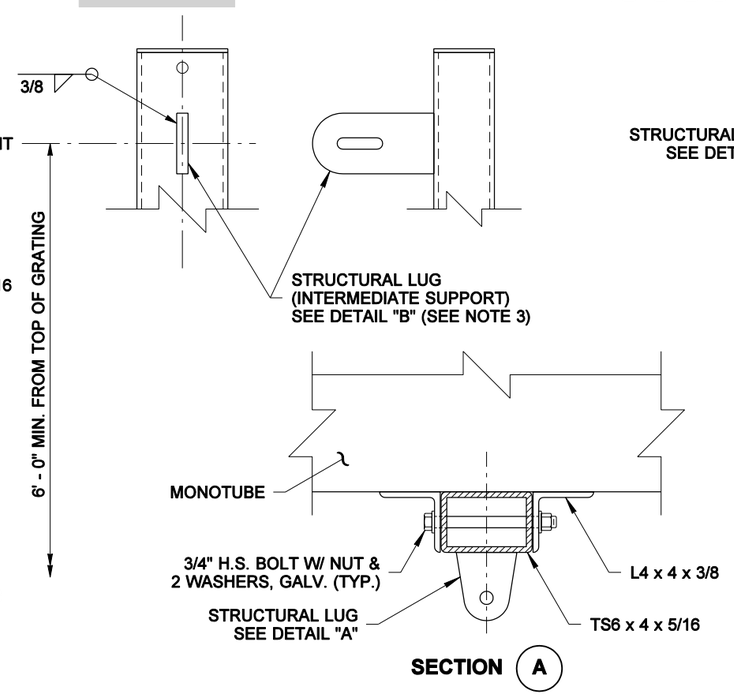
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

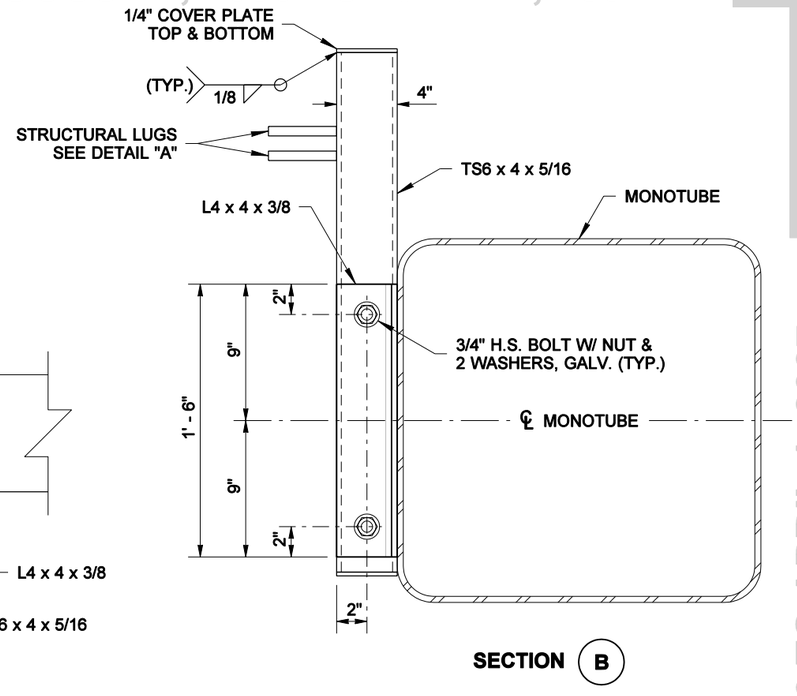
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ELEVATION VIEW

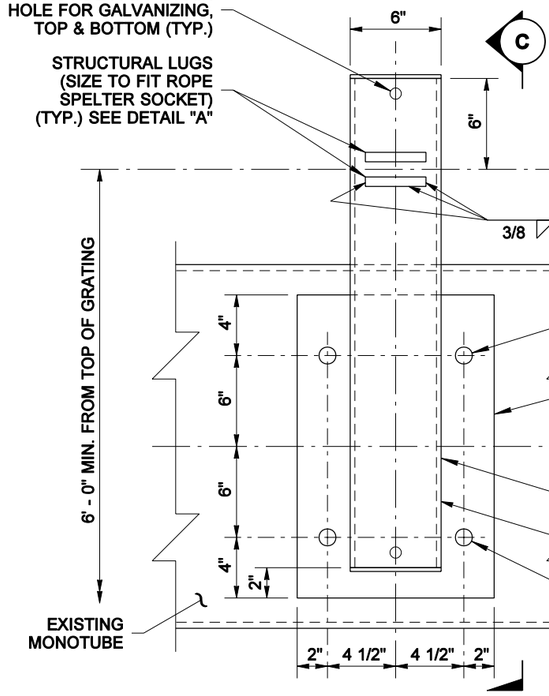



SECTION (A)

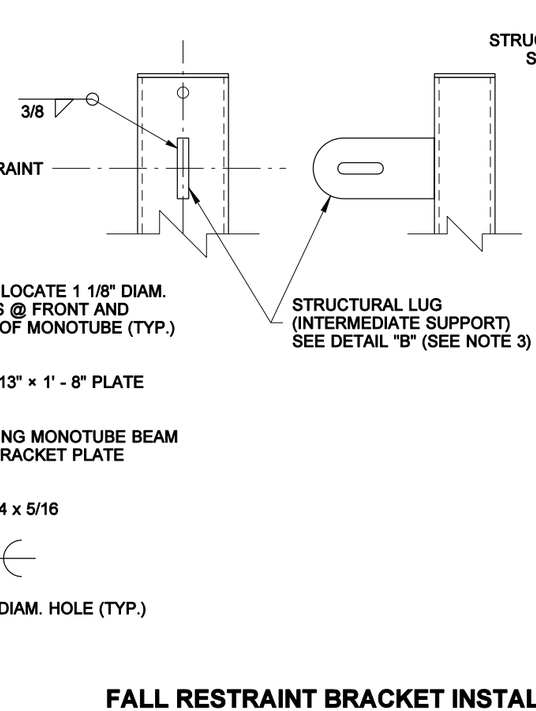



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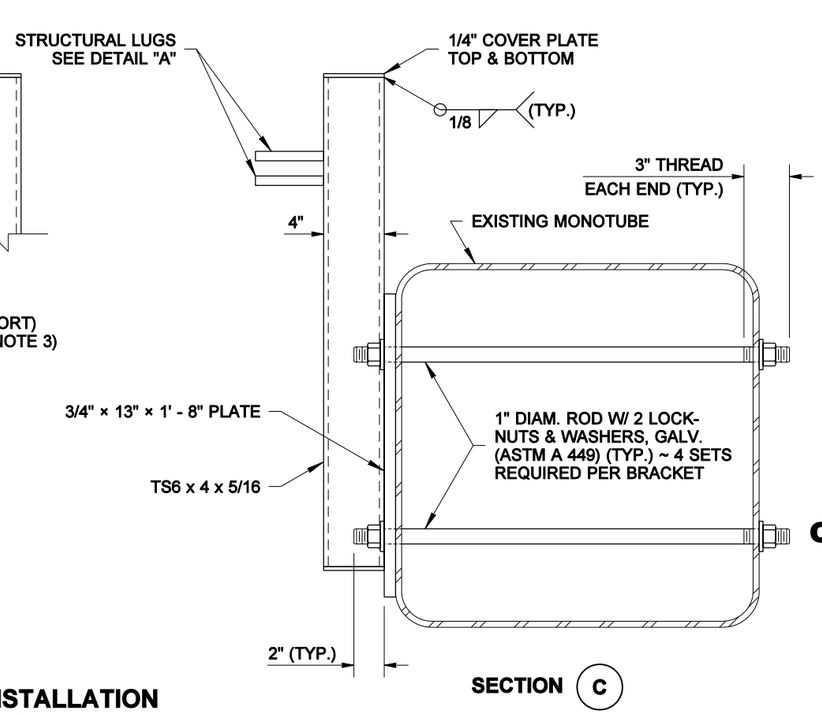
## FALL RESTRAINT BRACKET INSTALLATION ON NEW MONOTUBE SIGN STRUCTURE




ELEVATION VIEW




## FALL RESTRAINT BRACKET INSTALLATION ON EXISTING MONOTUBE SIGN STRUCTURE




SECTION (C)

RICHARD P. ZELDENRUST
STATE OF WASHINGTON
25470
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 14, 2004

# MAINTENANCE WALKWAY MOUNTING FOR MONOTUBE OVERHEAD SIGN STRUCTURE

## STANDARD PLAN G-6a

SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION

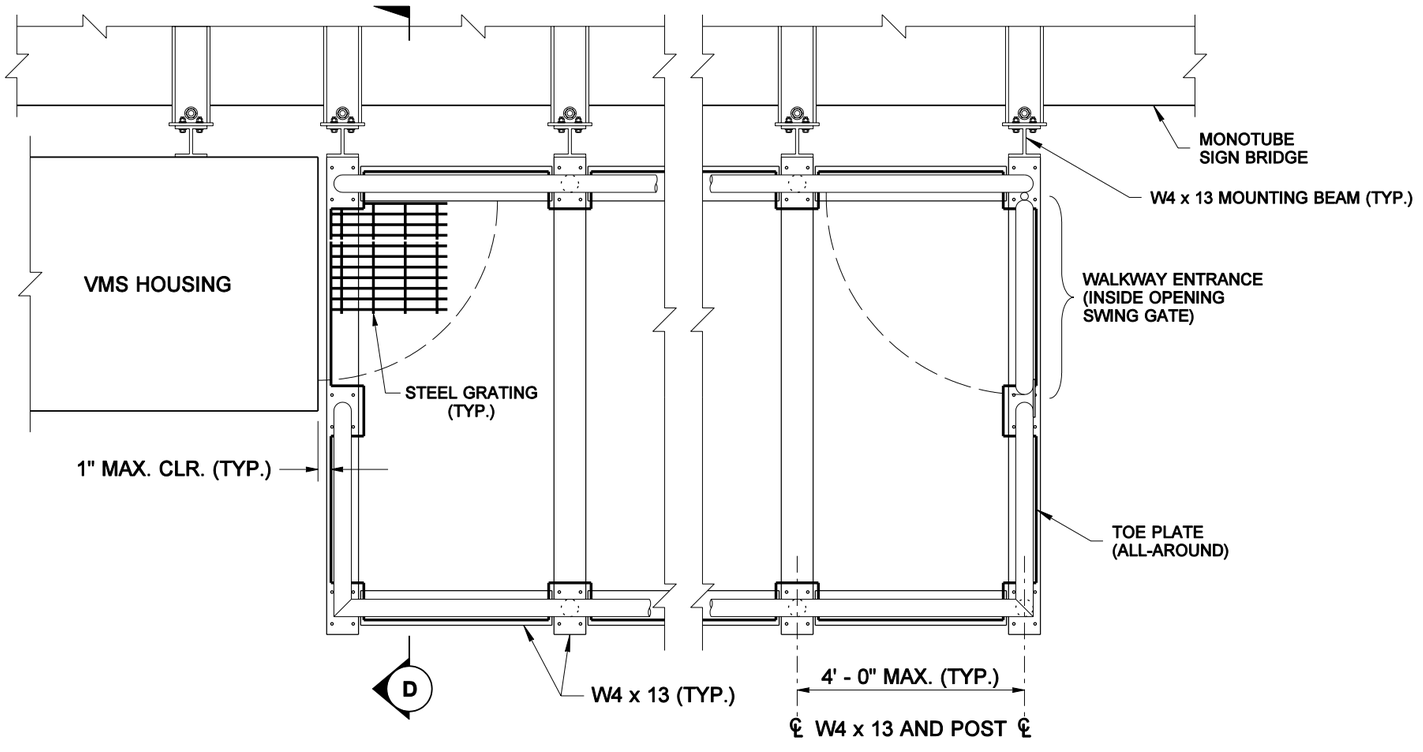
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *08-27-03* — DATE

Washington State Department of Transportation

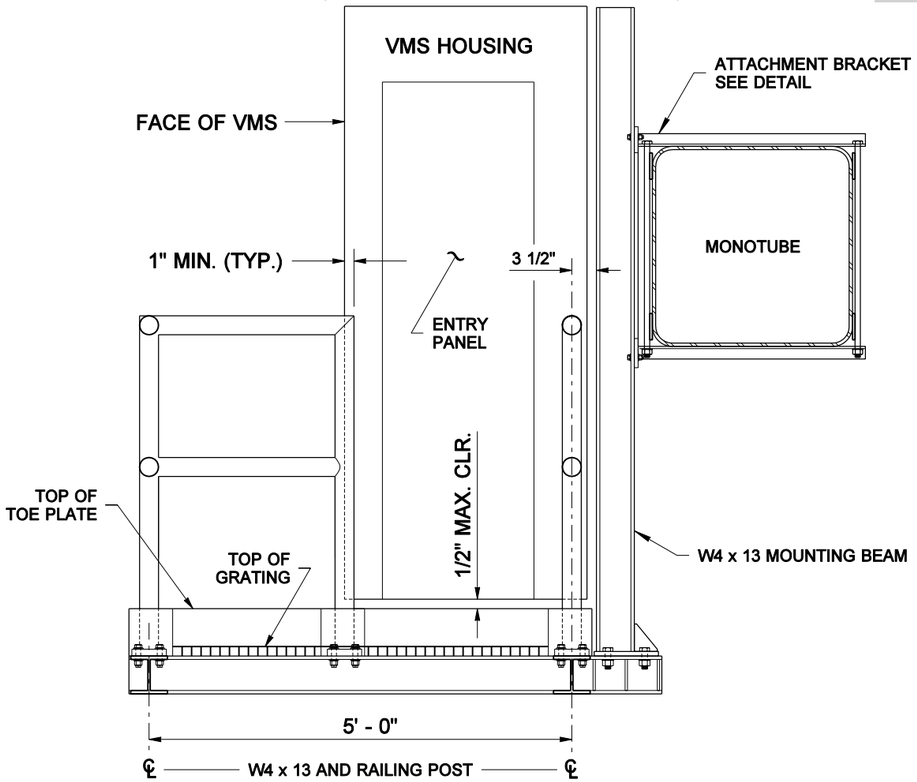
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

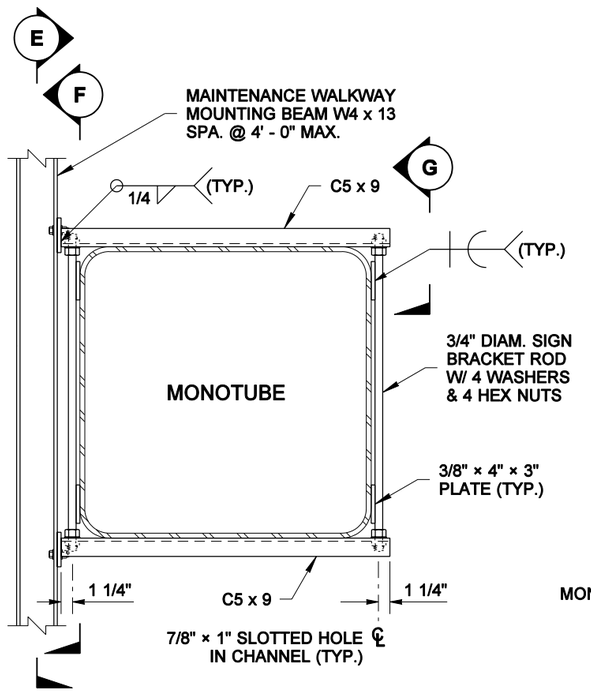
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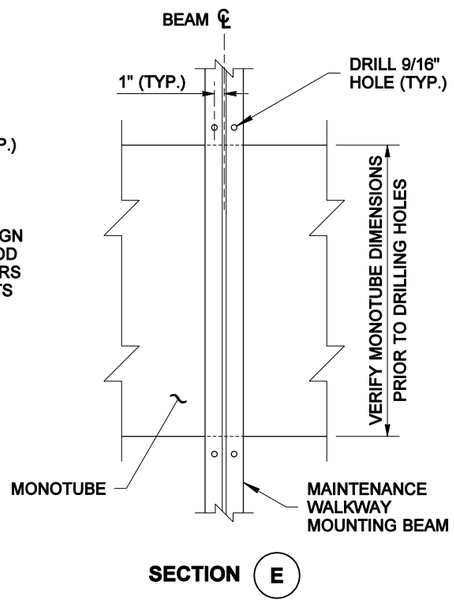

## MAINTENANCE WALKWAY
### PARTIAL PLAN



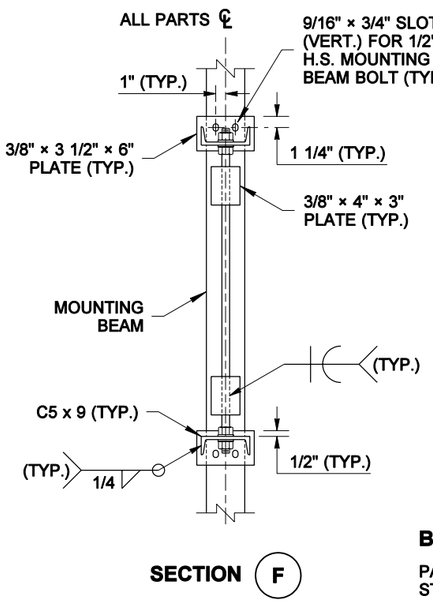

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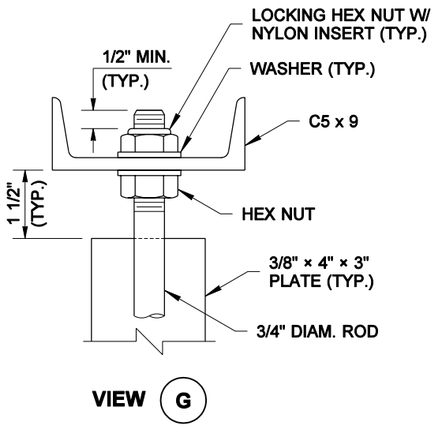

### ATTACHMENT BRACKET DETAIL




### SECTION (E)




### SECTION (F)




### VIEW (G)

### 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.




EXPIRES NOVEMBER 14, 2004

# MAINTENANCE WALKWAY MOUNTING FOR MONOTUBE OVERHEAD SIGN STRUCTURE

## STANDARD PLAN G-6a

SHEET 3 OF 3 SHEETS

APPROVED FOR PUBLICATION

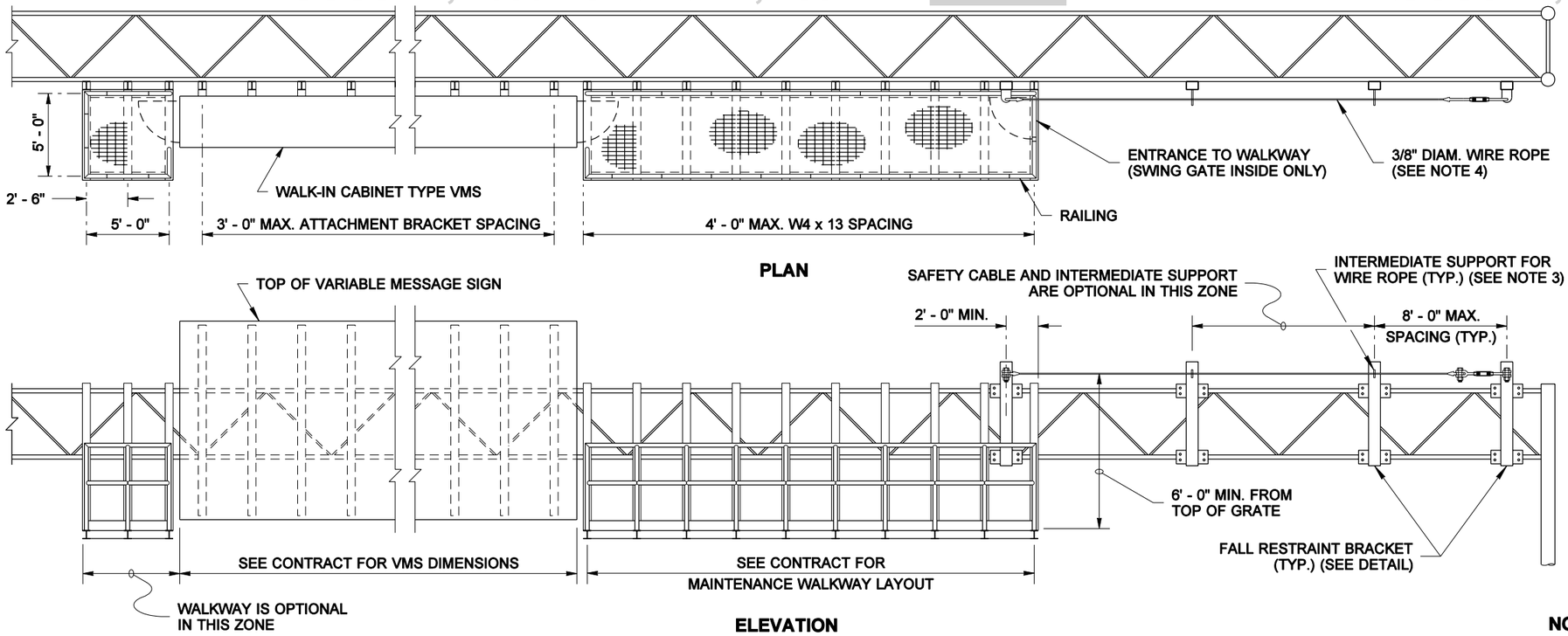
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *08-27-03* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

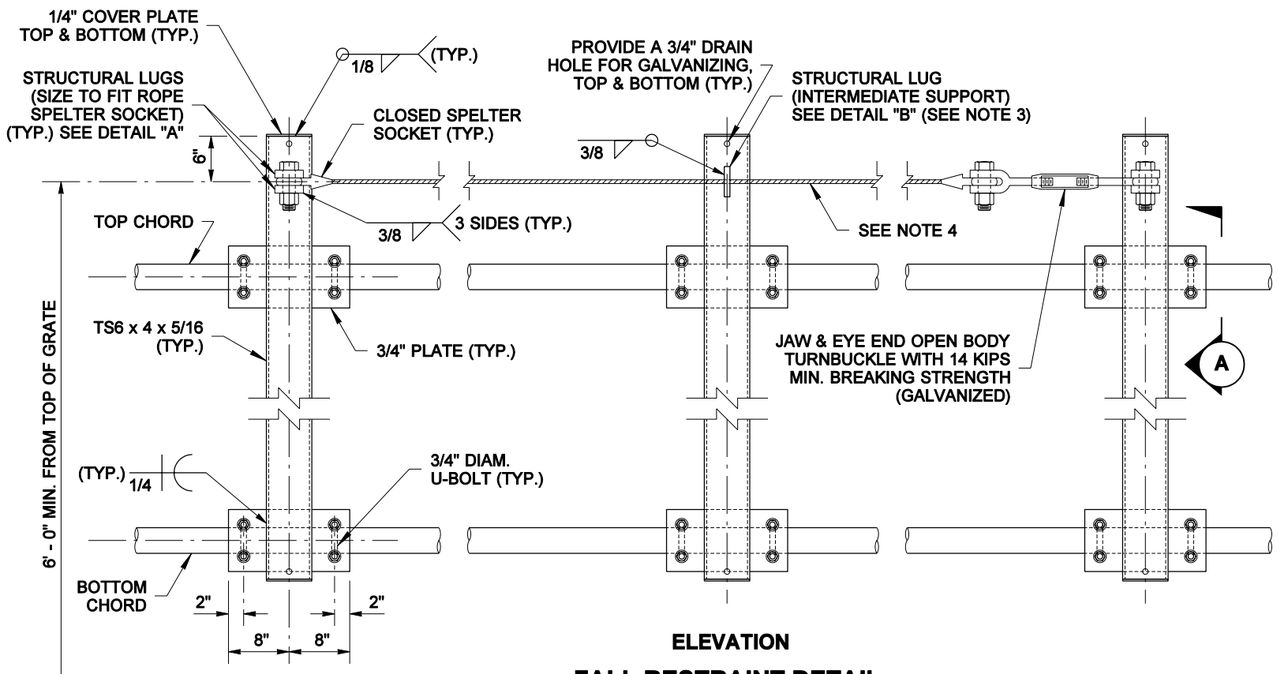
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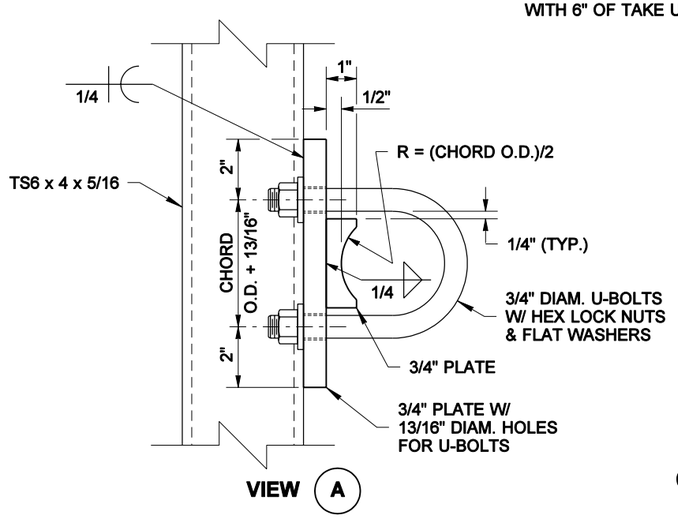



## MAINTENANCE WALKWAY INSTALLED ON TRUSS-TYPE OVERHEAD SIGN STRUCTURE

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




## FALL RESTRAINT DETAIL




| MATERIAL SPECIFICATIONS | |
|---|---|
| PIPE | ASTM A 36 OR ASTM A 53 GRADE B, TYPE E OR S, OR ASTM A 500 GRADE B |
| PLATES AND SHAPES | ASTM A 36 |
| STRUCTURAL TUBING | ASTM A 500 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 |
| WIRE ROPE | ASTM A 603 W/ CLASS A WEIGHT ZINC COATED WIRES THROUGHOUT |
| U-BOLTS, NUTS, AND WASHERS | ASTM F 593 AND ASTM F 594, TYPE 304 |

### 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-6.
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.




EXPIRES NOVEMBER 14, 2004

# MAINTENANCE WALKWAY MOUNTING FOR TRUSS-TYPE OVERHEAD SIGN STRUCTURE

## STANDARD PLAN G-6b

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

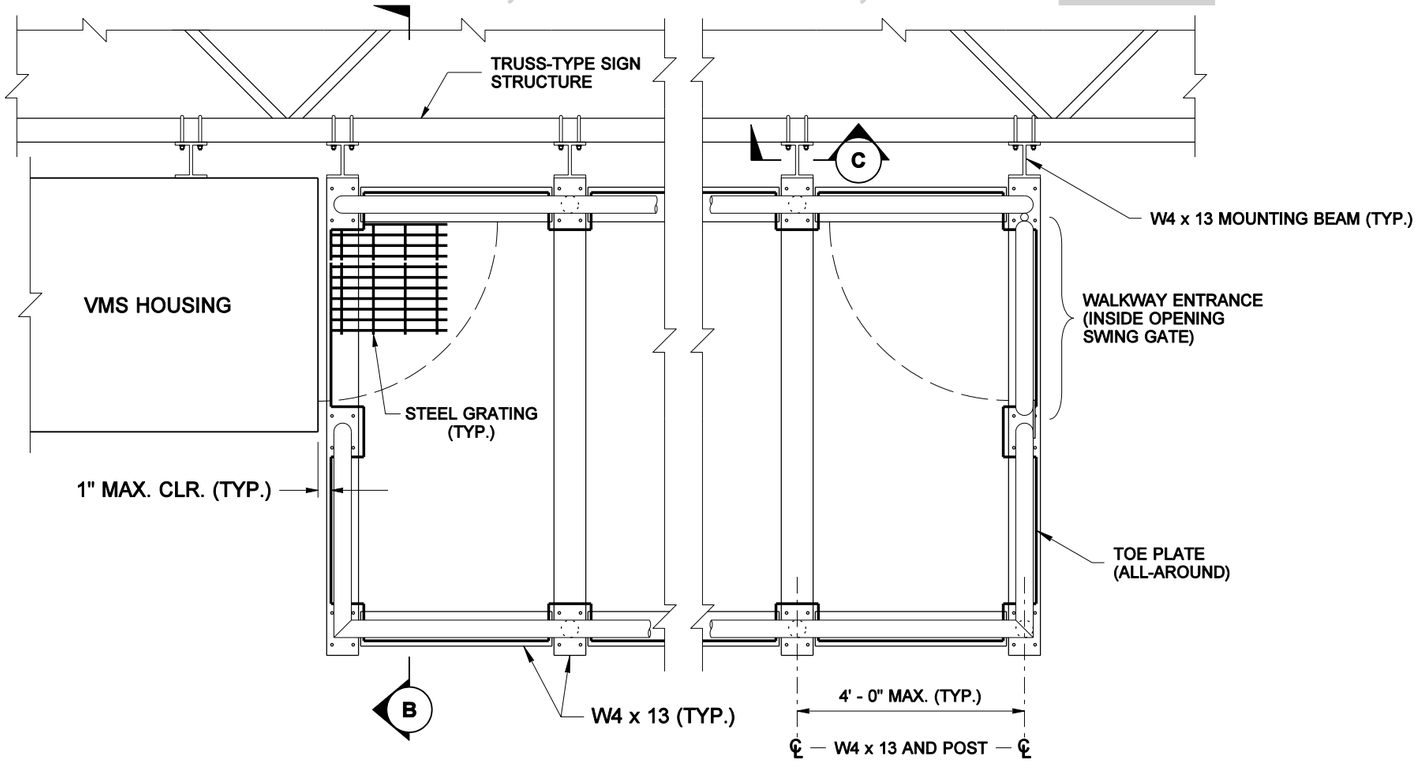
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *08-27-03* — DATE

Washington State Department of Transportation

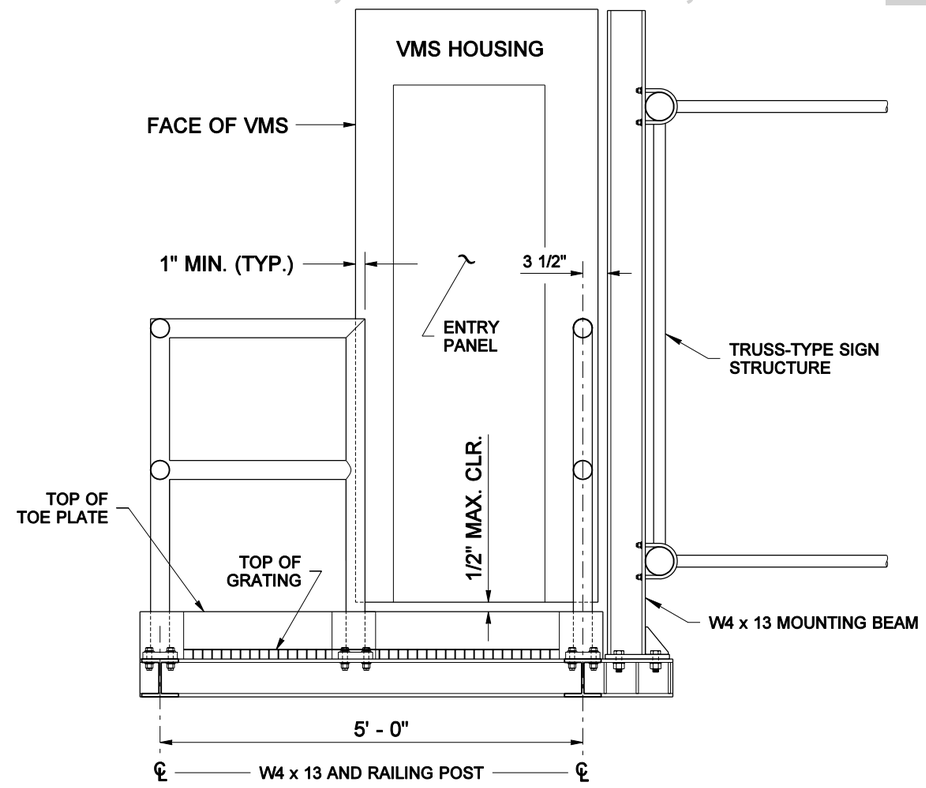
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

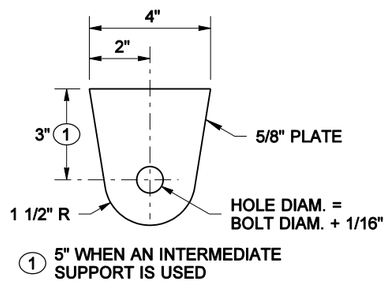
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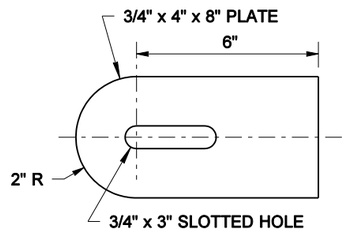

**MAINTENANCE WALKWAY**
**PARTIAL PLAN**



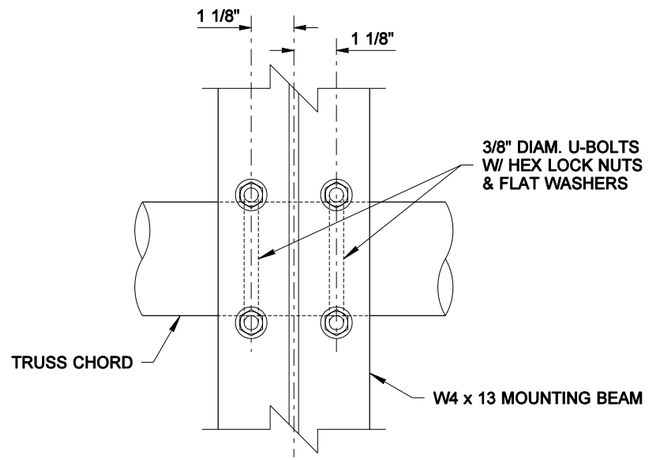

**SECTION (B)**




**DETAIL "A"**




**DETAIL "B"**




**SECTION (C)**

RICHARD P. ZELDENRUST
STATE OF WASHINGTON
25470
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 14, 2004

# MAINTENANCE WALKWAY MOUNTING FOR TRUSS-TYPE OVERHEAD SIGN STRUCTURE

## STANDARD PLAN G-6b

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

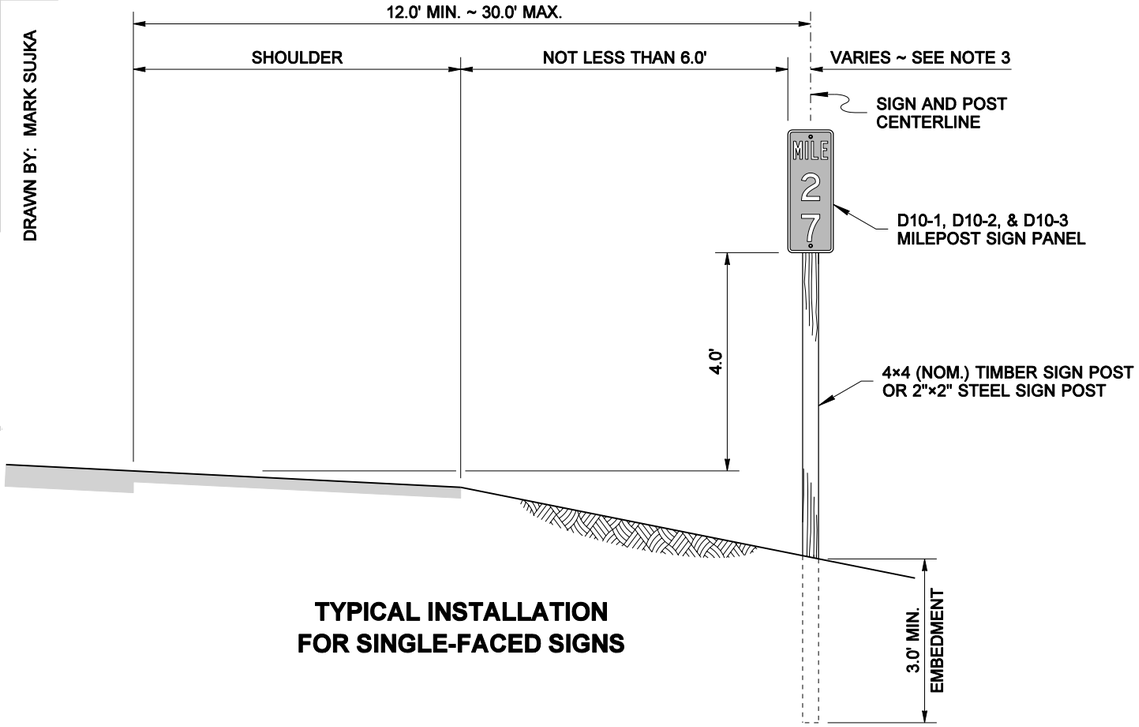
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *08-27-03* — DATE

Washington State Department of Transportation

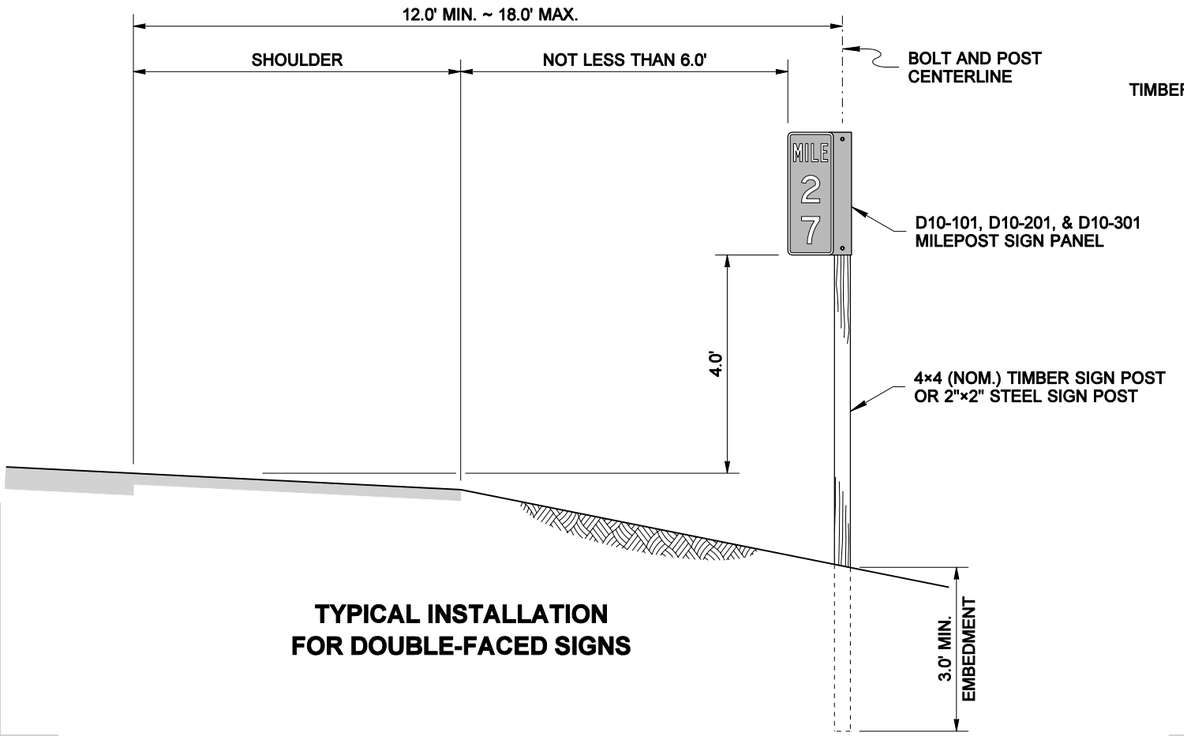
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA



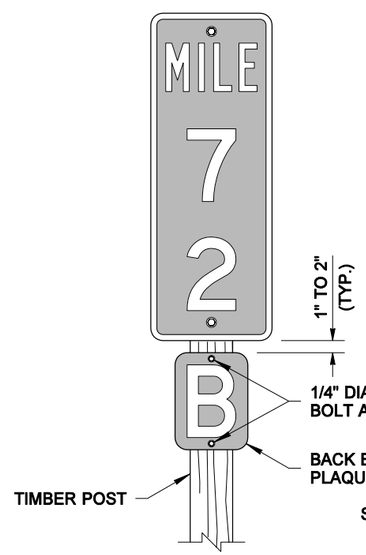

**TYPICAL INSTALLATION FOR SINGLE-FACED SIGNS**



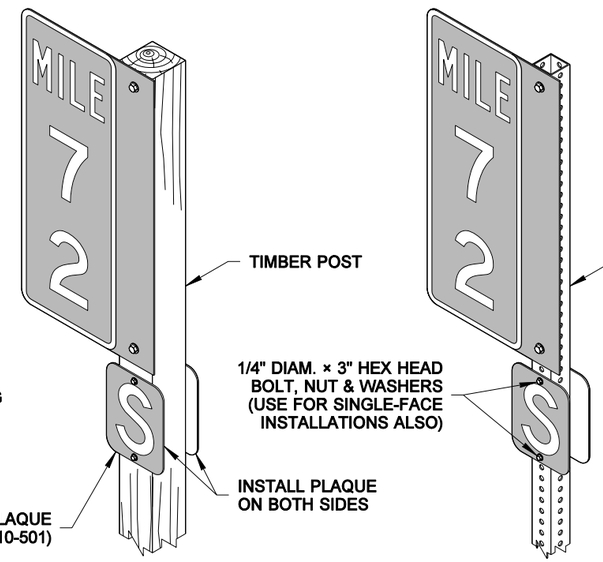

**TYPICAL INSTALLATION FOR DOUBLE-FACED SIGNS**

**NOTES**

1. Attach the Milepost Sign Panel to a timber sign post using two 3/8" diameter lag bolts, with washers; see Standard Plan G-4a. For post and attachment details on steel sign posts, see Standard Plan G-8f, Type ST-1.
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-1.
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.




**SINGLE-FACED SIGN**




**DOUBLE-FACED SIGN**

**SUPPLEMENTAL PLAQUE ~ MOUNTING DETAIL**

SEE NOTE 2

THEODORE J. TREPANIER
STATE OF WASHINGTON
25335
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 9, 2007

# MILEPOST

## STANDARD PLAN G-7

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* *06-08-06*

STATE DESIGN ENGINEER — DATE

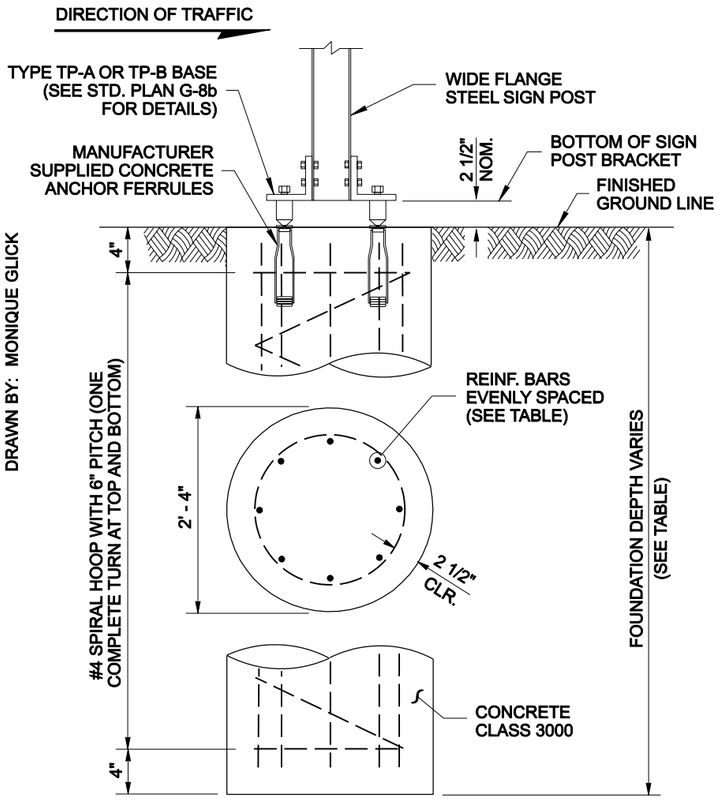
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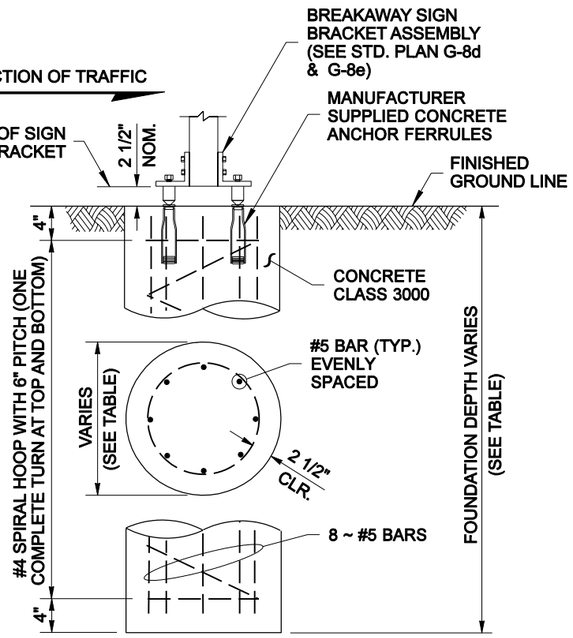
DRAWN BY: MONIQUE GLICK




**ELEVATION VIEW**

## TYPE TP-A & TYPE TP-B FOUNDATION

| TYPE TP-A & TYPE TP-B FOUNDATION TABLE | | | | | |
|---|---|---|---|---|---|
| POST SIZE | | MAX. XYZ | | VERTICAL REBAR | FND. DEPTH ① |
| ASTM A 36 | ASTM A 992 | 2 POST | 3 POST | | |
| W6 x 12 | W6 x 9 | 1570 | 2355 | 8 ~ # 5 | 4' - 0" |
| W6 x 16 | W6 x 12 | 2340 | 3510 | 8 ~ # 5 | 5' - 0" |
| W8 x 21 | W8 x 18 | 4120 | 6180 | 8 ~ # 6 | 7' - 0" |
| W10 x 26 | W10 x 22 | 6320 | 9480 | 8 ~ # 7 | 8' - 0" |
| W12 x 30 | W12 x 26 | 8700 | — | 8 ~ # 7 | 9' - 0" |

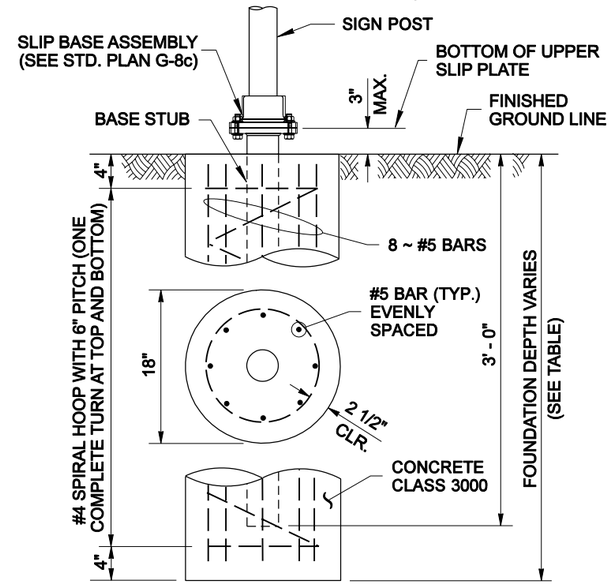



**ELEVATION VIEW**

## TYPE AS & TYPE AP FOUNDATION

| TYPE AS FOUNDATION TABLE | | | |
|---|---|---|---|
| POST SIZE | MAX. XYZ | FND. DIAM. | FND. DEPTH ① |
| 4" SQ. | 250 | 18" | 4' - 0" |
| 5" SQ. | 300 | 24" | 4' - 0" |
| 6" SQ. | 350 | 24" | 4' - 0" |
| 7" SQ. | 400 | 28" | 5' - 0" |
| 8" SQ. | 450 | 28" | 5' - 0" |

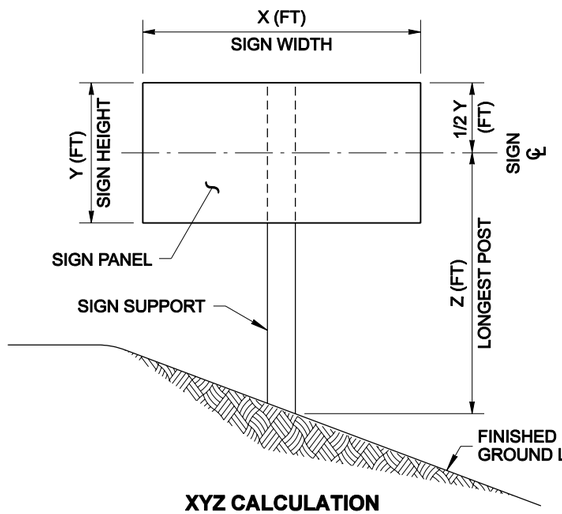
| TYPE AP FOUNDATION TABLE | | | |
|---|---|---|---|
| POST SIZE | MAX. XYZ | FND. DIAM. | FND. DEPTH ① |
| 2 1/2" DIAM. | 225 | 18" | 3' - 6" |
| 3" DIAM. | 250 | 18" | 4' - 0" |
| 3 1/2" DIAM. | 275 | 24" | 4' - 0" |
| 4" DIAM. | 300 | 24" | 4' - 0" |




**ELEVATION VIEW**

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

| TYPE PL, TYPE PL-T & TYPE PL-U FOUNDATION TABLE | |
|---|---|
| MAX. XYZ | FND. DEPTH ① |
| 225 | 3' - 6" |
| 265 | 4' - 0" |
| 300 | 4' - 6" |
| 600 ② | 4' - 6" |

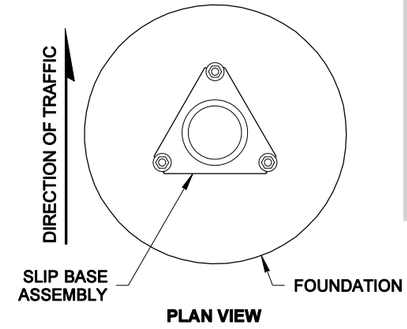



**XYZ CALCULATION**

$XYZ\ (FT^3) = X \times Y \times Z$

USED TO DETERMINE POST SIZE

~ SEE FOUNDATION TABLES




**PLAN VIEW**

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

**NOTE**

Install conduit for Post-mounted Junction Box in the concrete foundation, when required. (See Standard Plan J-12, Sheet 2.)

**KEY NOTES**

① Foundation depths based on allowable lateral bearing pressure in excess of 2500 PSF.

② Two post installation

RICHARD P. ZELDENRUST — STATE OF WASHINGTON — 25470 — REGISTERED PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 14, 2006

# STEEL SIGN SUPPORT FOUNDATION DETAILS

# STANDARD PLAN G-8a

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-15-04* — DATE

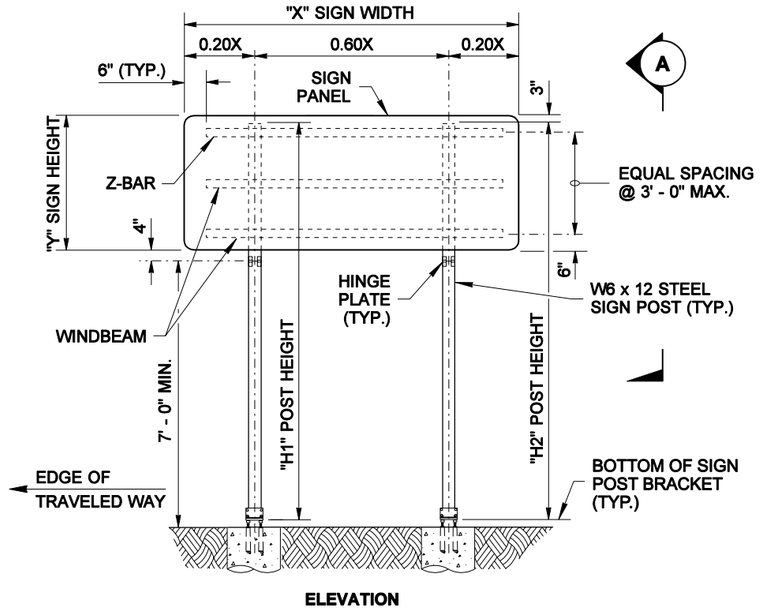
Washington State Department of Transportation

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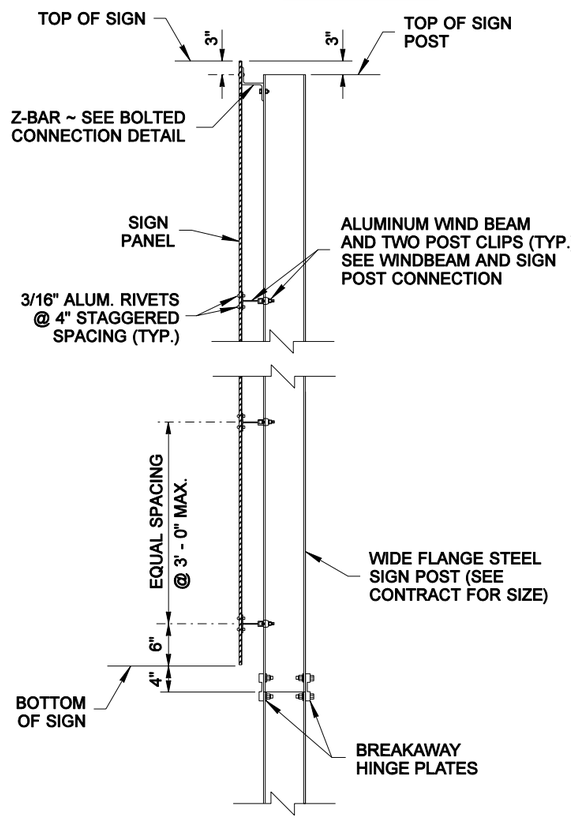
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DRAWN BY: MONIQUE GLICK

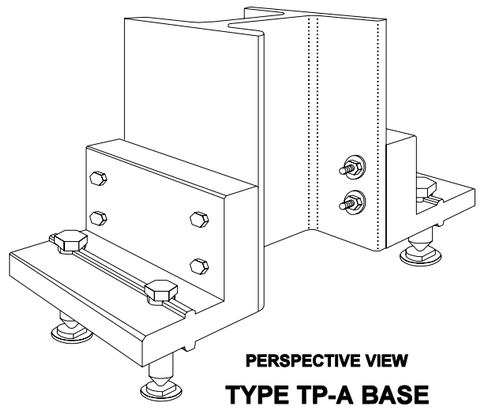



ELEVATION

## TYPE TP-A OR TP-B SIGN SUPPORT

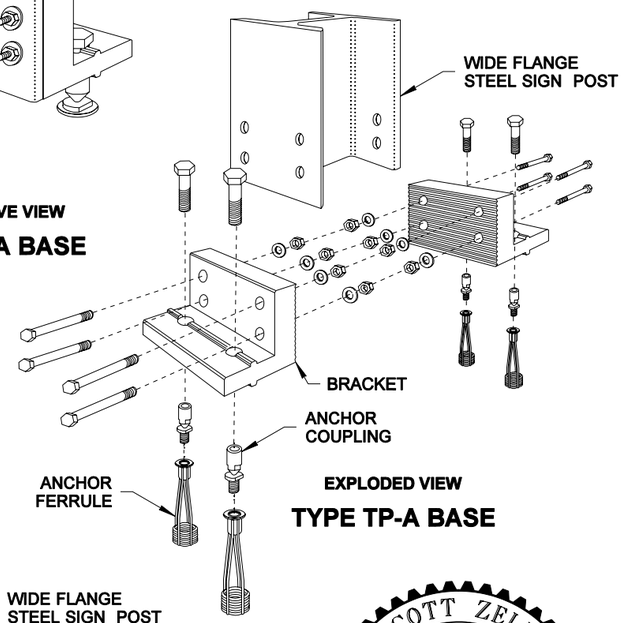



DETAIL (A)



PERSPECTIVE VIEW

## TYPE TP-A BASE

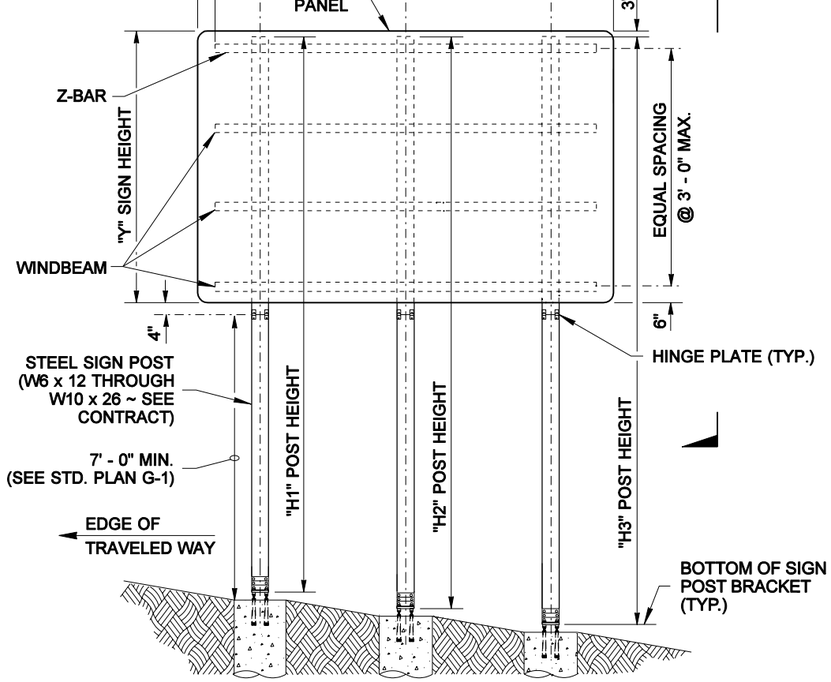



EXPLODED VIEW

## TYPE TP-A BASE

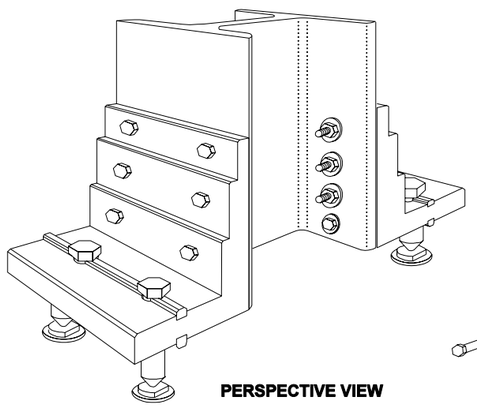
### NOTES

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-8a.
3. For "X", "Y", "H1", "H2", and "H3", refer to the Sign Specification Sheet in the Contract.



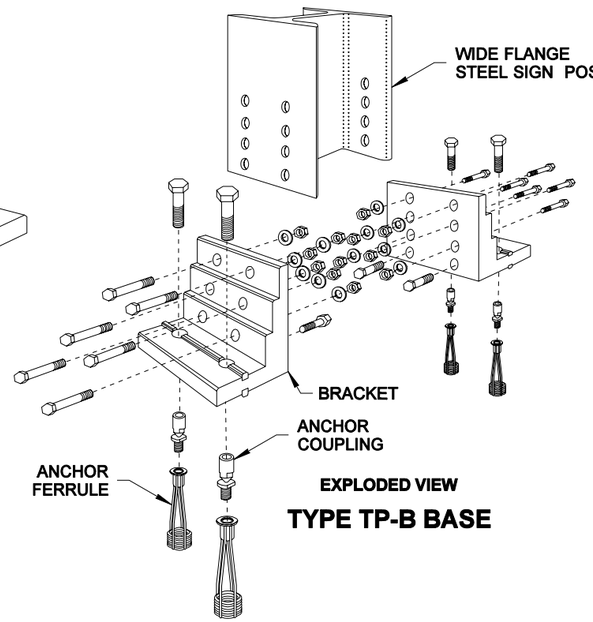

ELEVATION

## TYPE TP-B SIGN SUPPORT



PERSPECTIVE VIEW

## TYPE TP-B BASE




EXPLODED VIEW

## TYPE TP-B BASE

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28680
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PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2007

# STEEL SIGN SUPPORT TYPES TP-A AND TP-B INSTALLATION DETAILS STANDARD PLAN G-8b

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-09-05* — DATE

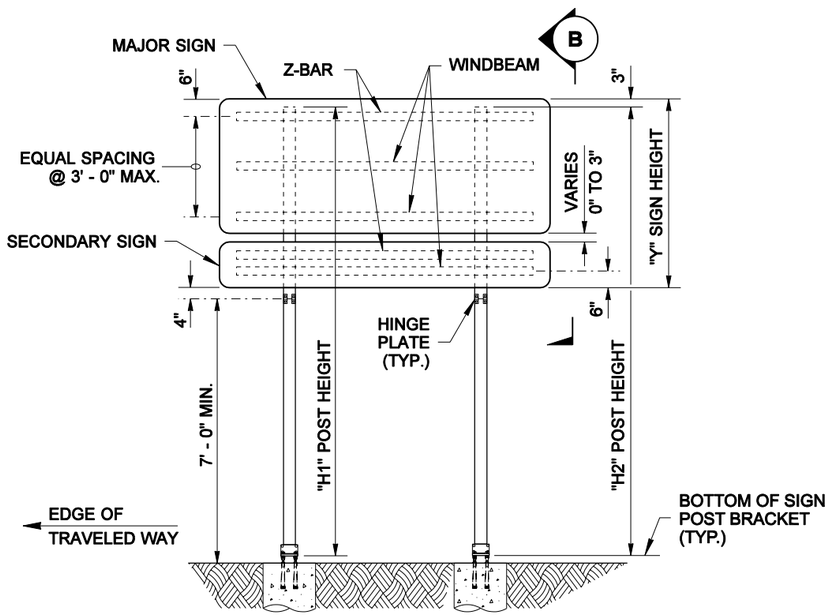
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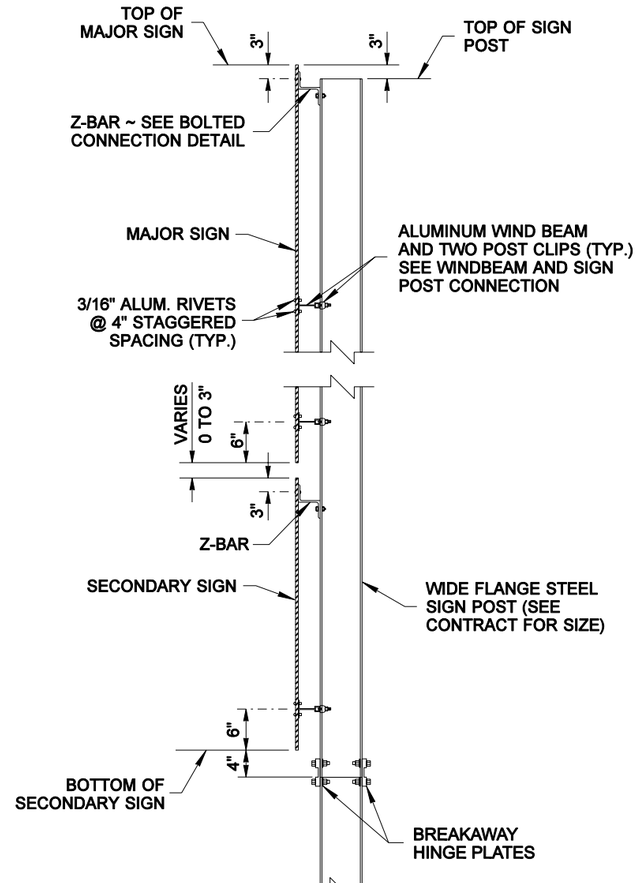
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MONIQUE GLICK

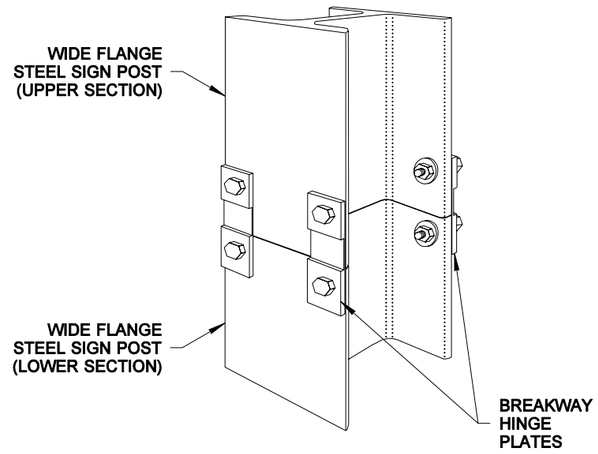



ELEVATION

## MAJOR AND SECONDARY SIGN SUPPORT INSTALLATION

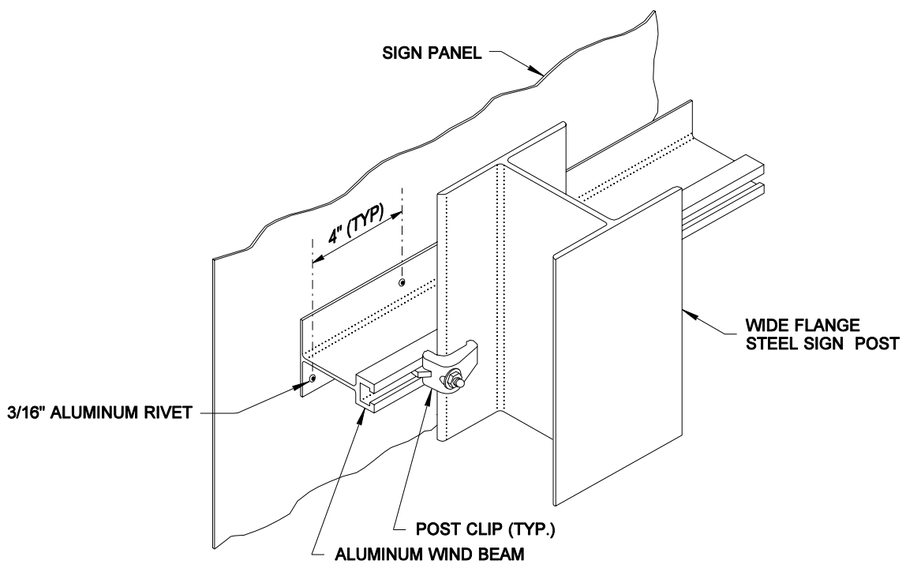



DETAIL (B)




PERSPECTIVE VIEW

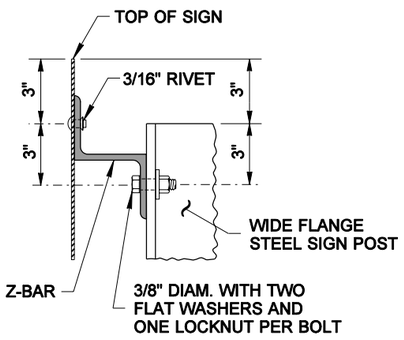
## BREAKAWAY HINGE PLATE CONNECTION




ISOMETRIC VIEW

## WINDBEAM AND SIGN POST CONNECTION

ATTACH POST CLIPS ON BOTH SIDES OF WIDE FLANGE STEEL SIGN POST




## Z-BAR BOLTED CONNECTION DETAIL

BOLT ON ONE SIDE OF EACH WIDE FLANGE STEEL SIGN POST

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PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2007

# STEEL SIGN SUPPORT TYPES TP-A AND TP-B INSTALLATION DETAILS STANDARD PLAN G-8b

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

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Washington State Department of Transportation

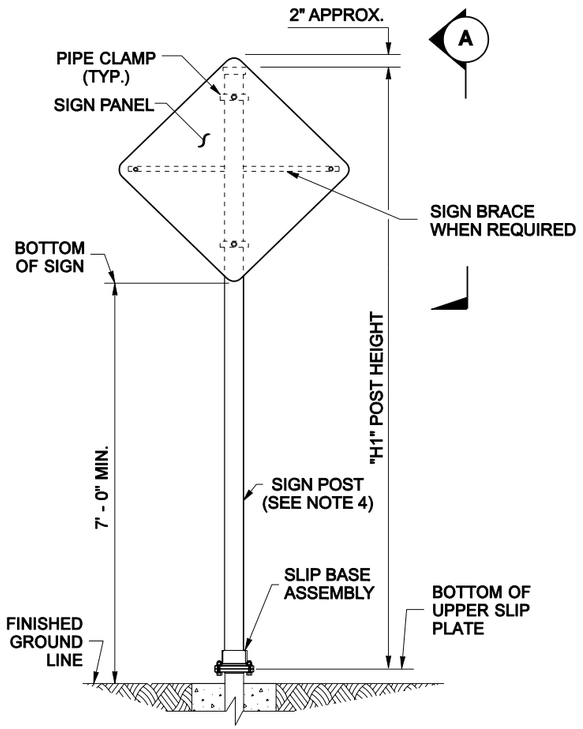
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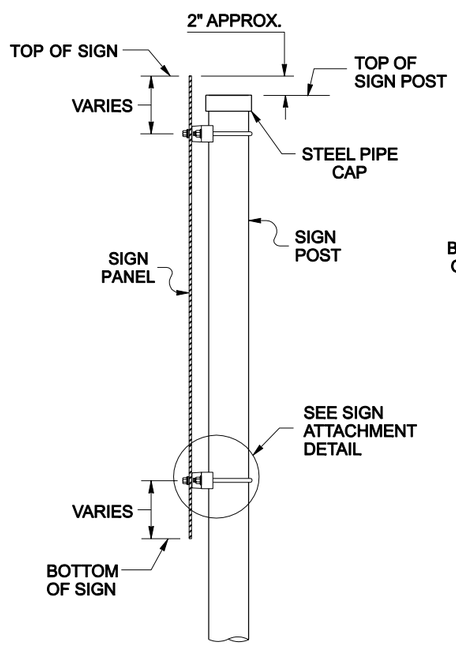
DRAWN BY: MONIQUE GLICK

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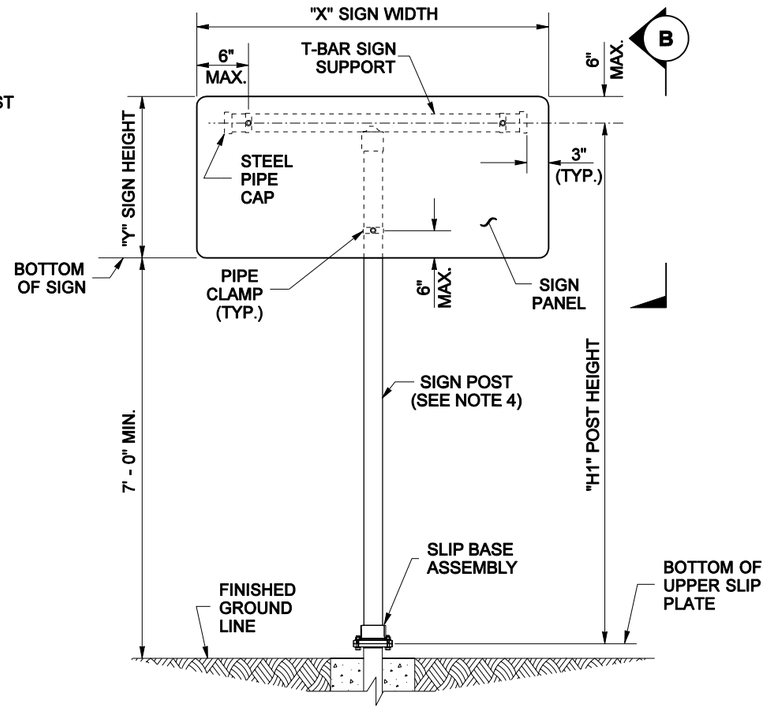



**ELEVATION**

## TYPE PL SIGN SUPPORT



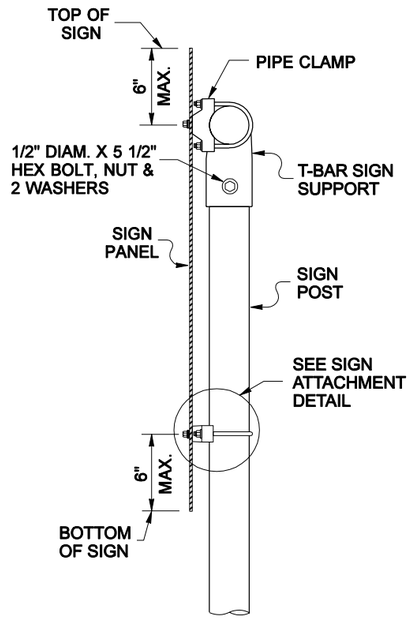

**DETAIL (A)**



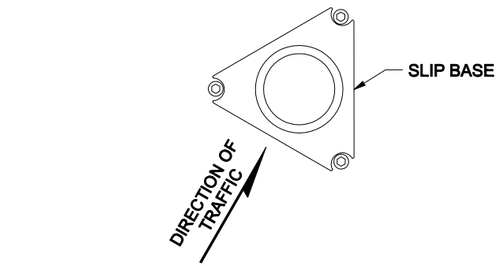

**ELEVATION**

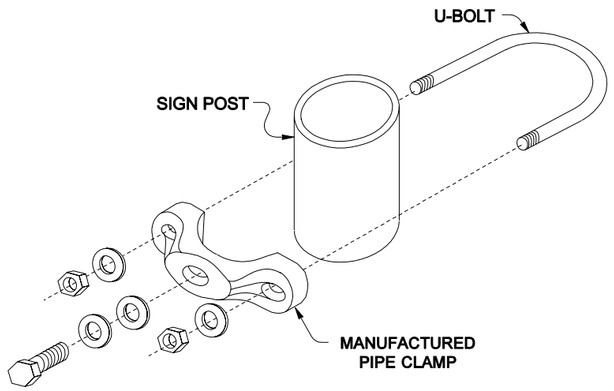
## TYPE PL-T SIGN SUPPORT

FOR NOTES, SEE SHEET 2



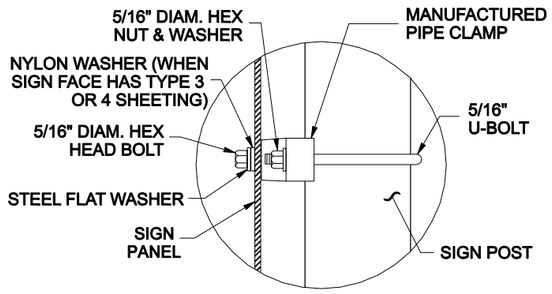

**DETAIL (B)**



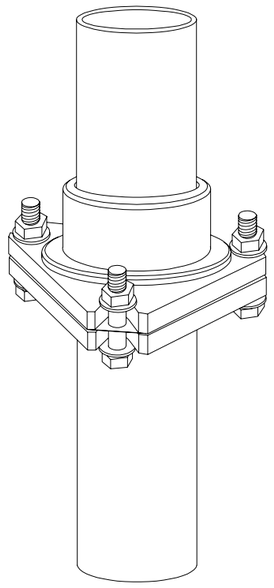




**EXPLODED VIEW**

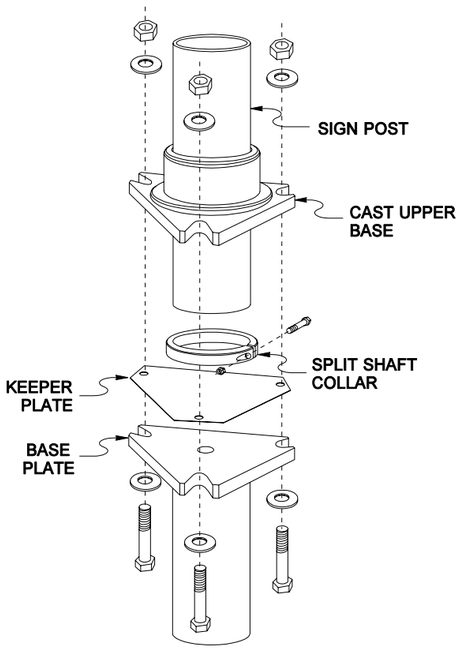
## PIPE CLAMP AND U-BOLT




## SIGN ATTACHMENT DETAIL



**ISOMETRIC VIEW**




**EXPLODED VIEW**

## SLIP BASE ASSEMBLY

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# STEEL SIGN SUPPORT TYPES PL, PL-T, & PL-U INSTALLATION DETAILS STANDARD PLAN G-8c

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *08-18-04* — DATE

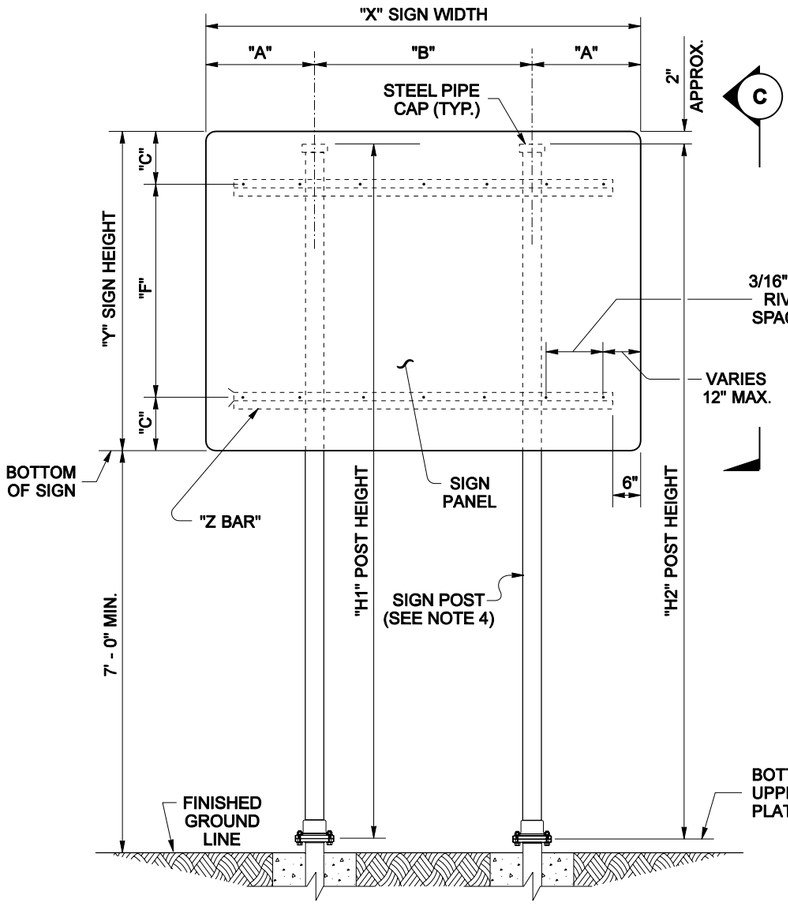
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MONIQUE GLICK

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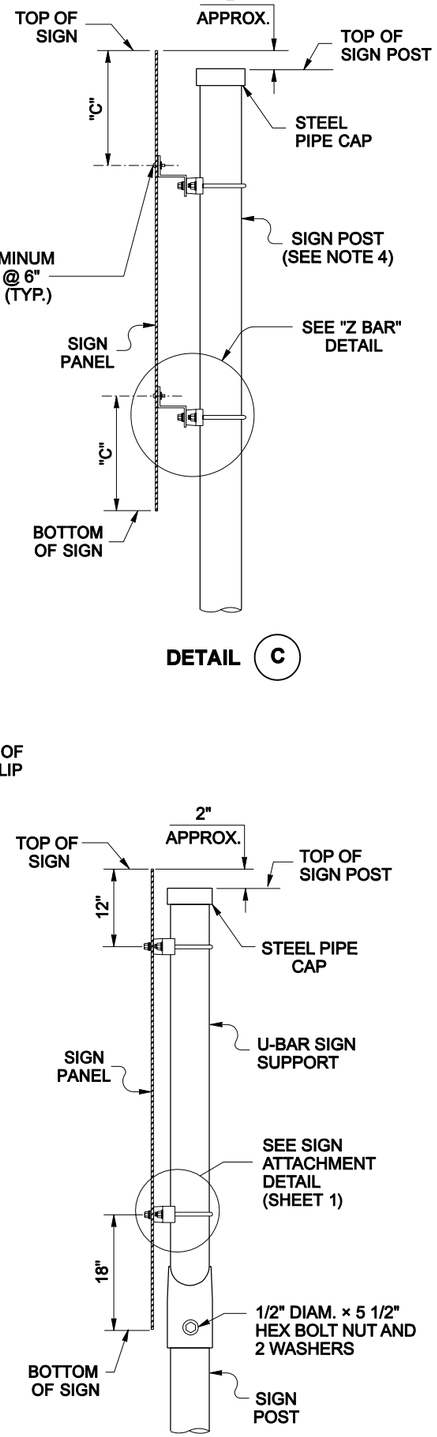

ELEVATION

## TYPE PL SIGN SUPPORT (DUAL POST INSTALLATION)

| | "X" SIGN WIDTH | | |
|---|---|---|---|
| | 6' - 0" | 8' - 0" | 10' - 0" |
| "A" | 1' - 6" | 2' - 0" | 3' - 0" |
| "B" | 3' - 0" | 4' - 0" | 4' - 0" |

| | "Y" SIGN HEIGHT | | |
|---|---|---|---|
| | 6' - 0" | 8' - 0" | 10' - 0" |
| "C" | 1' - 0" | 2' - 0" | 3' - 0" |
| "F" | 4' - 0" | 4' - 0" | 4' - 0" |

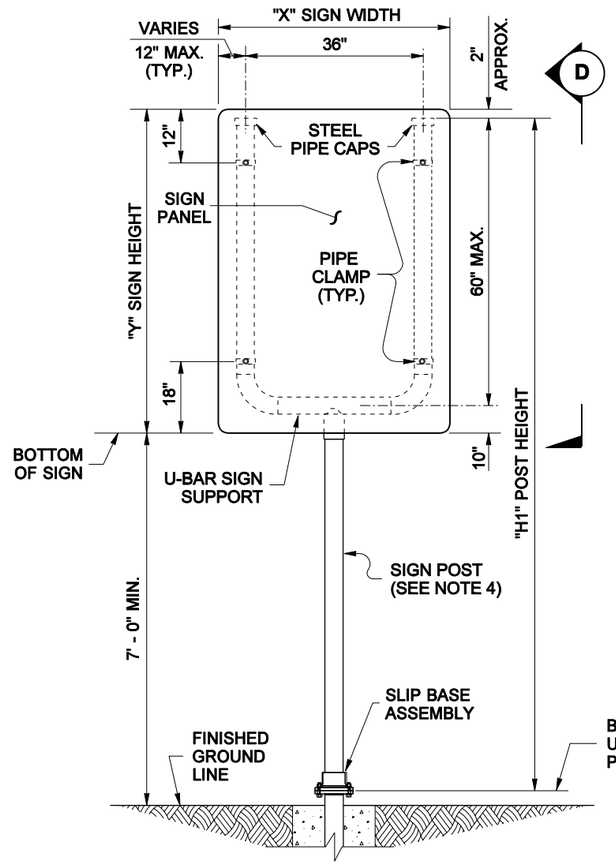
"A", "B", "C", & "F" MAY BE INTERPOLATED FOR INTERMEDIATE SIGN SIZES




DETAIL C

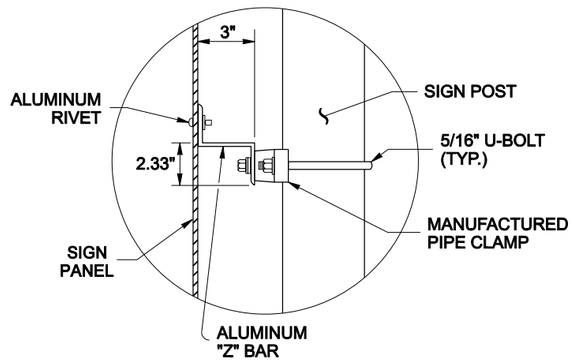



DETAIL D




ELEVATION

## TYPE PL-U SIGN SUPPORT




"Z" BAR DETAIL

**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-8a.
3. For "X", "Y", "H1", and "H2", refer to the Sign Specification Sheet in the Contract.
4. Sign post shall be 2 1/2" diam. galvanized schedule 80 steel pipe.

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# STEEL SIGN SUPPORT TYPES PL, PL-T, & PL-U INSTALLATION DETAILS STANDARD PLAN G-8c

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

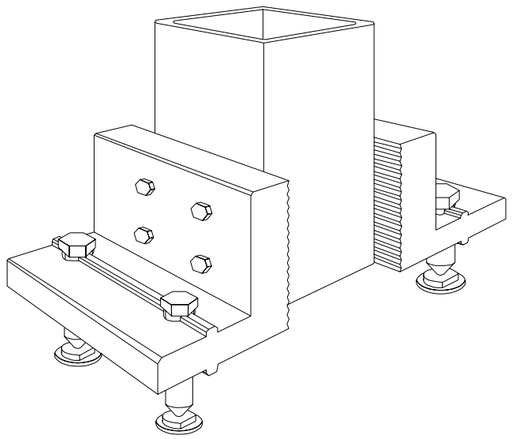
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *08-18-04* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

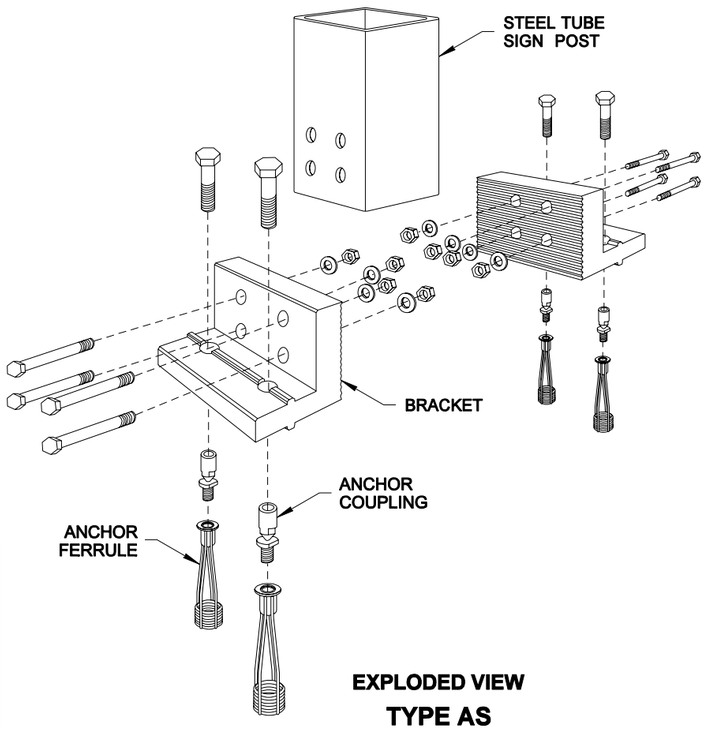
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MONIQUE GLICK



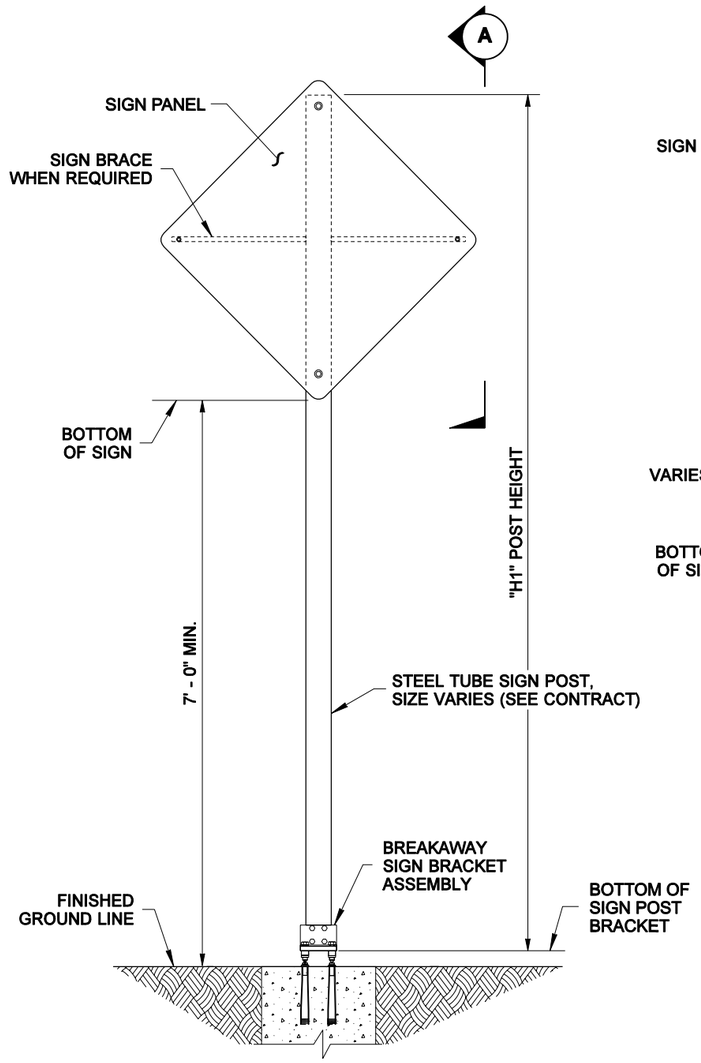
**PERSPECTIVE VIEW**

## TYPE AS
## BREAKAWAY SIGN BRACKET ASSEMBLY



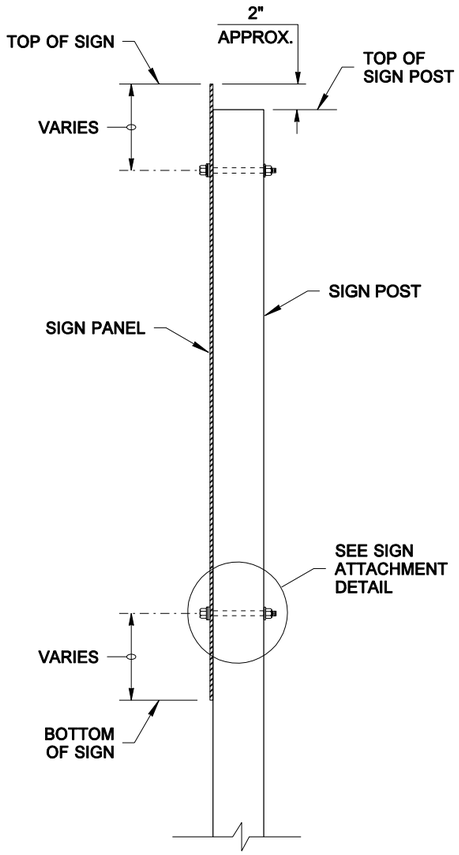

**EXPLODED VIEW**

## TYPE AS
## BREAKAWAY SIGN BRACKET ASSEMBLY




**ELEVATION**

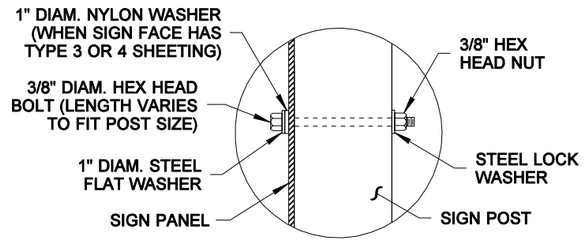
## TYPE AS
## SIGN SUPPORT




**DETAIL (A)**

**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-8a.
3. For "H1" refer to the Sign Specification Sheet in the Contract.




**SIGN ATTACHMENT DETAIL**

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# STEEL SIGN SUPPORT
# TYPE AS
# INSTALLATION DETAILS
# STANDARD PLAN G-8d

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-15-04* — DATE

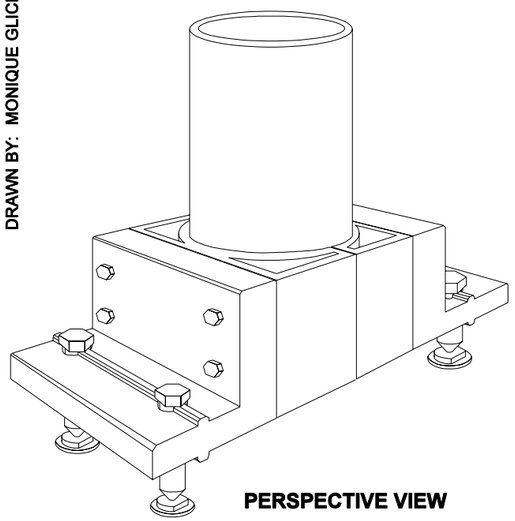
Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

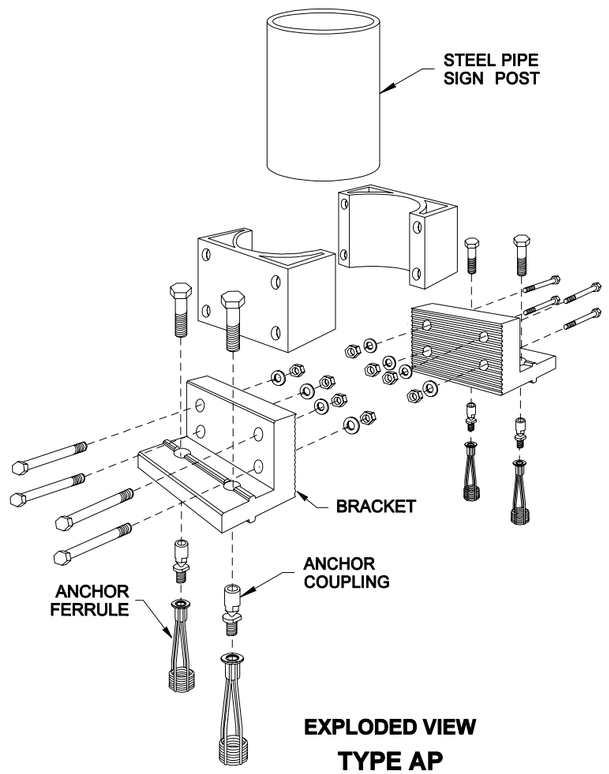
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MONIQUE GLICK



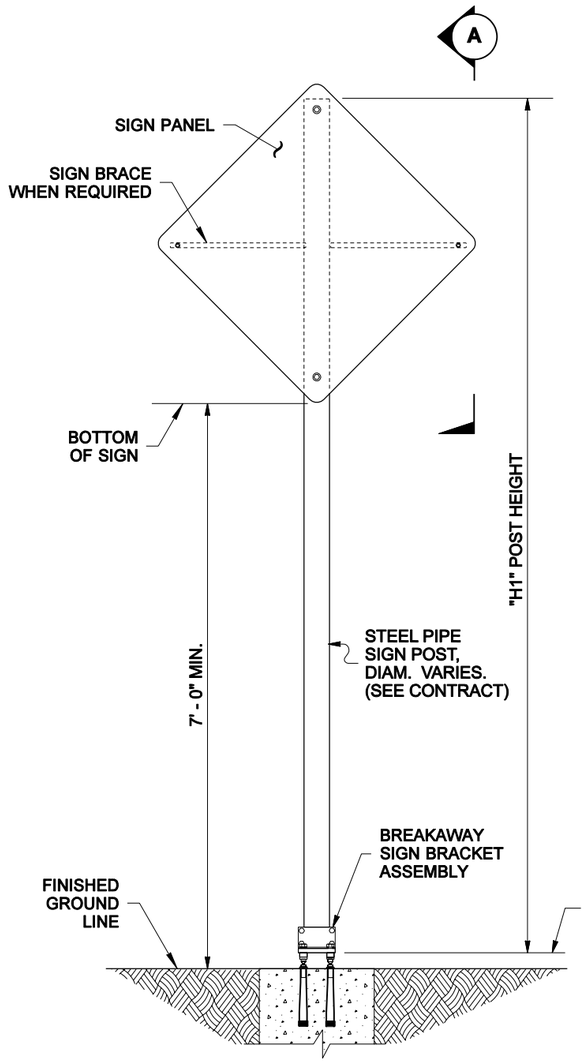
PERSPECTIVE VIEW

## TYPE AP
## BREAKAWAY SIGN BRACKET ASSEMBLY



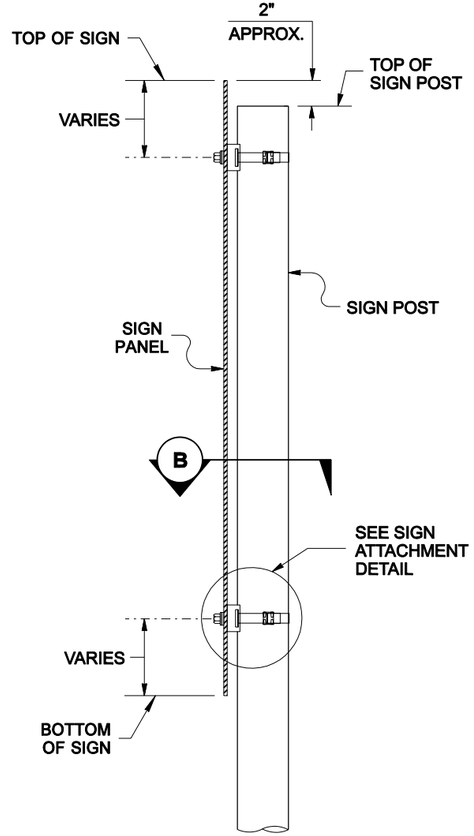

EXPLODED VIEW

## TYPE AP
## BREAKAWAY SIGN BRACKET ASSEMBLY

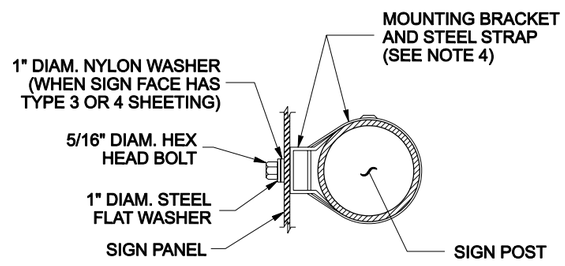



ELEVATION

## TYPE AP
## SIGN SUPPORT



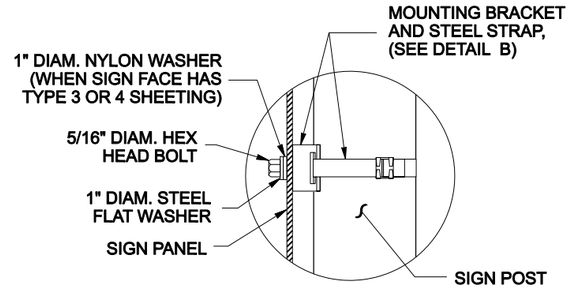

DETAIL (A)




DETAIL (B)

**NOTES**

1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are only shown on this plan to illustrate how the parts are assembled.
2. For Steel Sign Support Foundation, see Standard Plan G-8a.
3. For "H1" refer to the Sign Specification Sheet in the Contract.
4. Mounting brackets with steel straps shall be the stainless steel one bolt, flared leg bracket and 3/4" wide, 0.030" thick strap "Band-it" products or an approved equal.




SIGN ATTACHMENT DETAIL

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# STEEL SIGN SUPPORT
# TYPE AP
# INSTALLATION DETAILS
# STANDARD PLAN G-8e

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — *08-18-04*

STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

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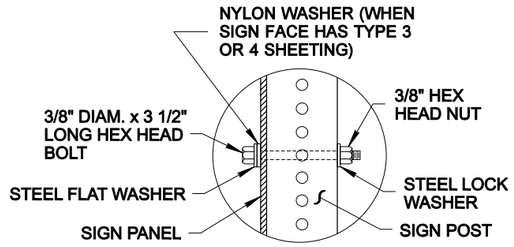
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

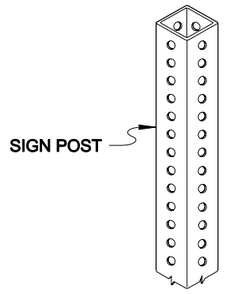
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

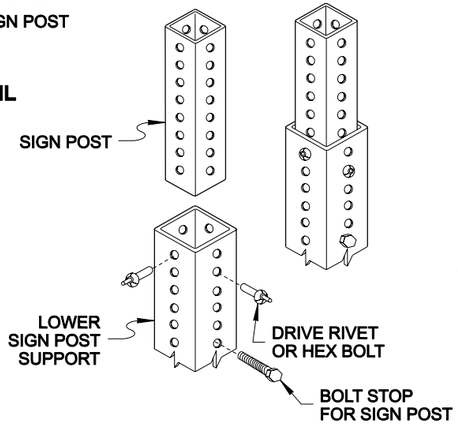
DRAWN BY: MONIQUE GLICK



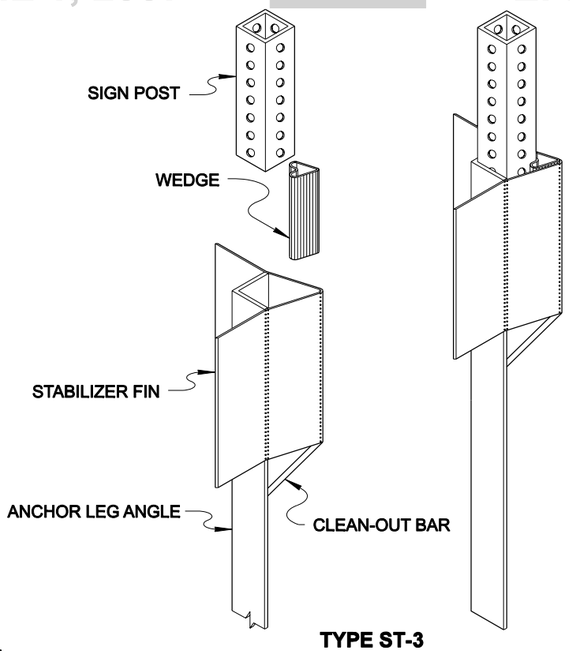

**SIGN ATTACHMENT DETAIL**



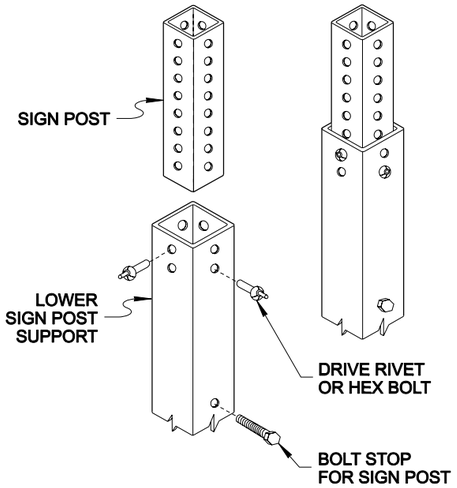

**TYPE ST-1**




**TYPE ST-2**



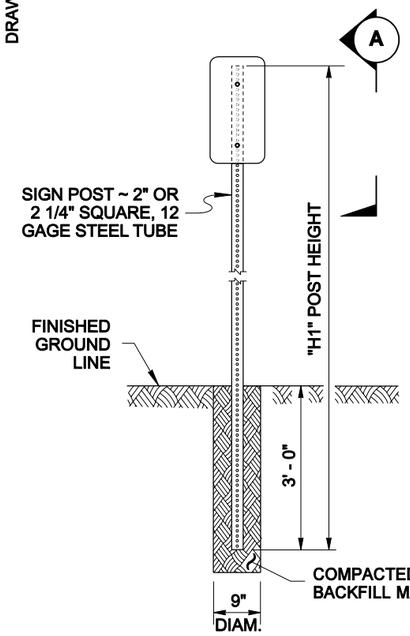

**TYPE ST-3**




**TYPE ST-4**

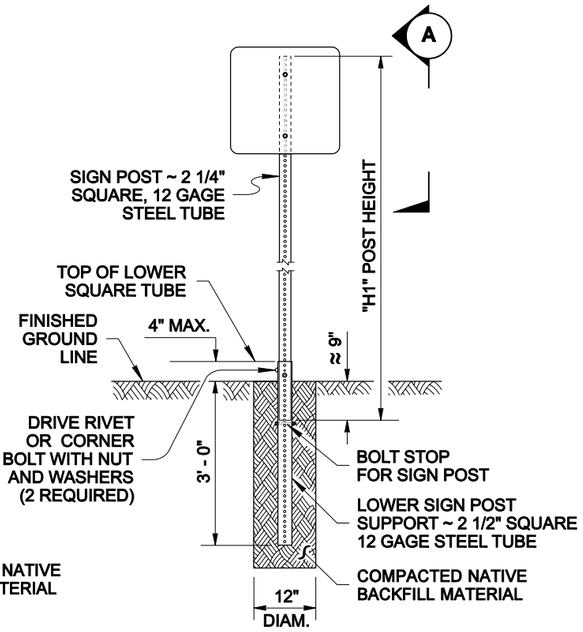
**ISOMETRIC AND EXPLODED VIEWS**

## SQUARE TUBE SIGN BASE ASSEMBLIES



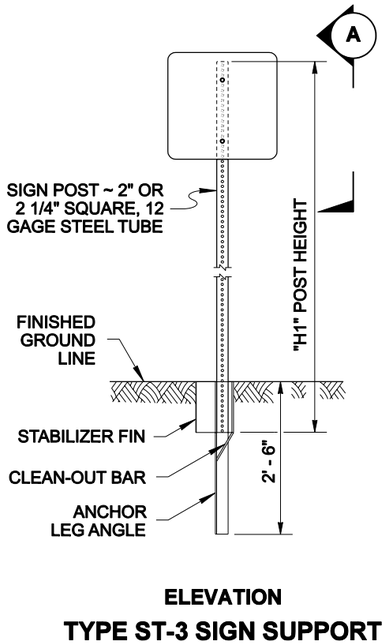

**ELEVATION**

**TYPE ST-1 SIGN SUPPORT**




**ELEVATION**

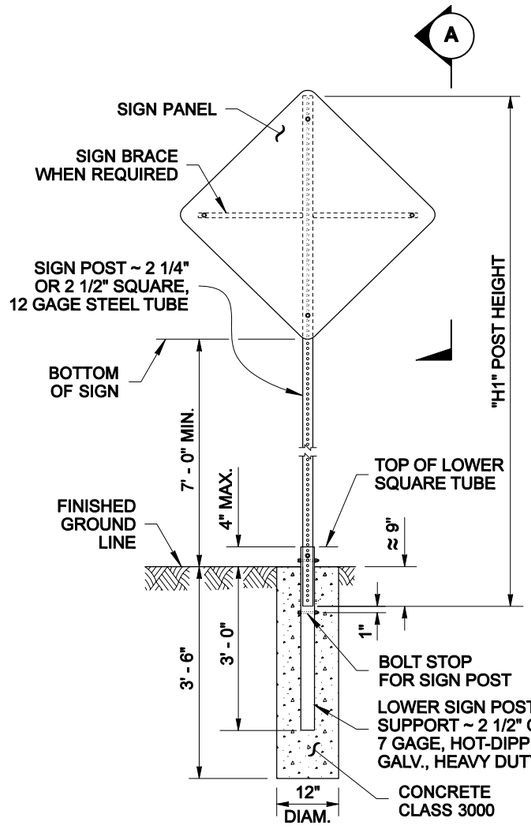
**TYPE ST-2 SIGN SUPPORT**




**ELEVATION**

**TYPE ST-3 SIGN SUPPORT**

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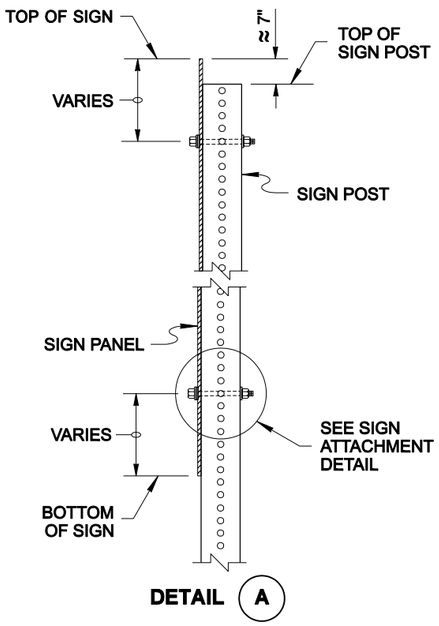

**ELEVATION**

**TYPE ST-4 SIGN SUPPORT**

**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 "H1" refer to the Sign Specification Sheet in the Contract.




**DETAIL A**

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2007

# STEEL SIGN SUPPORT TYPES ST-1 ~ ST-4 INSTALLATION DETAILS STANDARD PLAN G-8f

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-09-05* — DATE

Washington State Department of Transportation

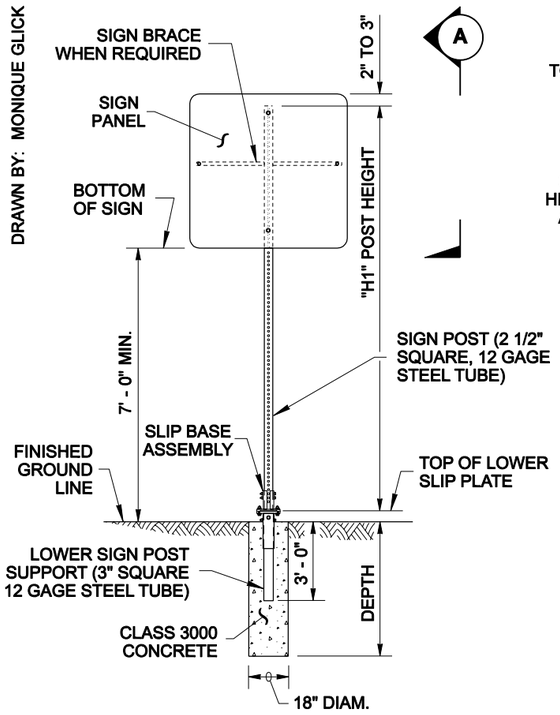
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

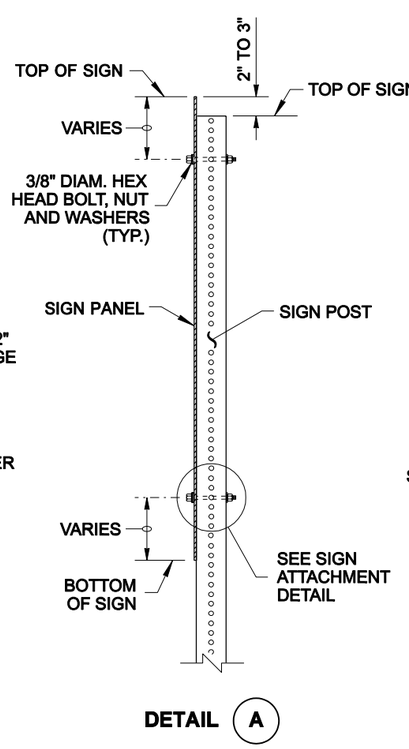
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MONIQUE GLICK

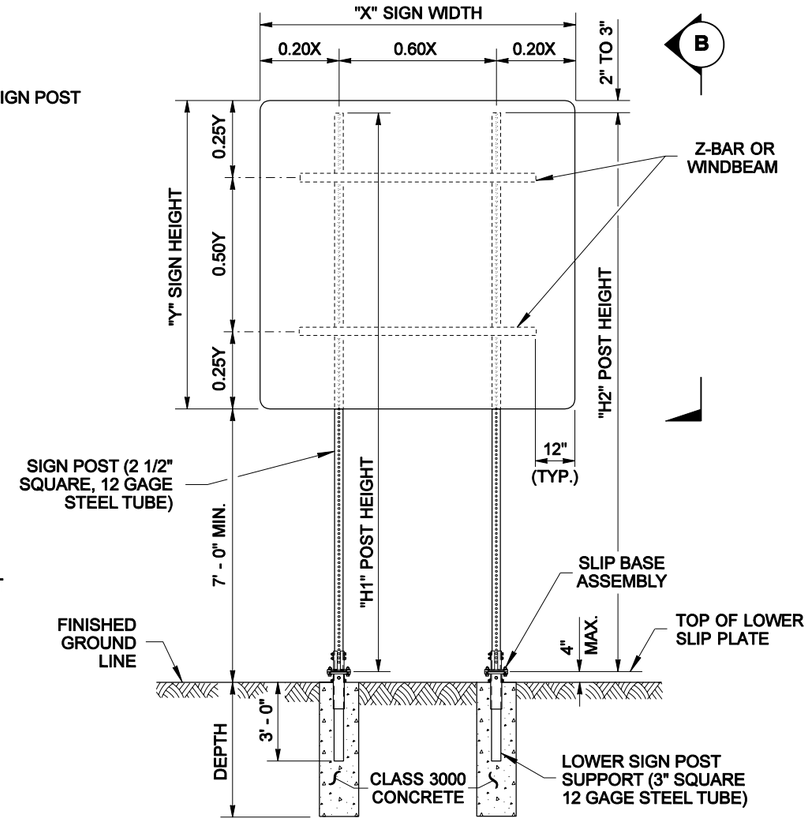



**ELEVATION**




**DETAIL (A)**

## TYPE SB-1 & SB-2 SIGN SUPPORT

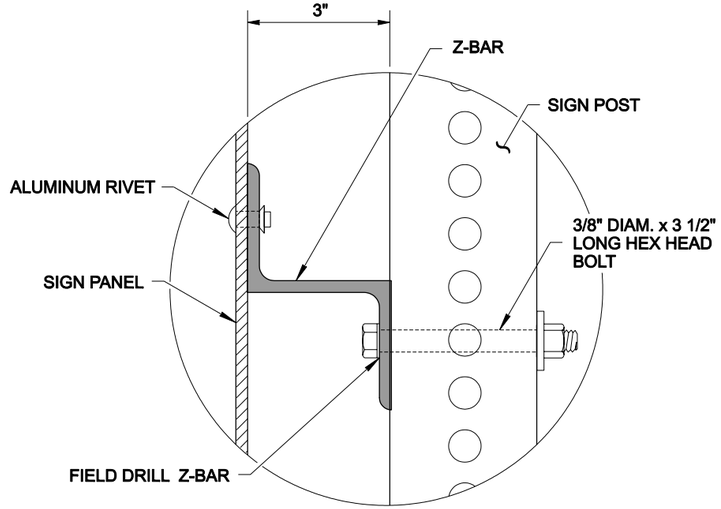



**ELEVATION**

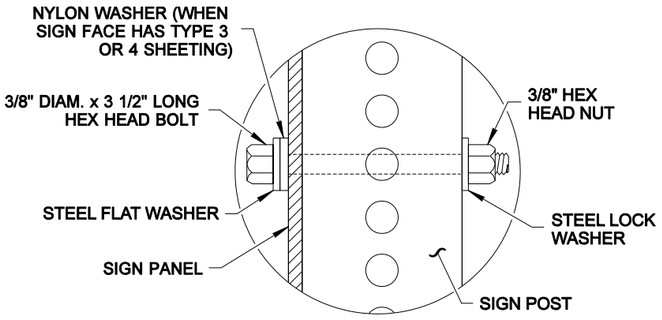
## TYPE SB-1 & SB-2 SIGN SUPPORT (DUAL POST INSTALLATION)

**NOTES**

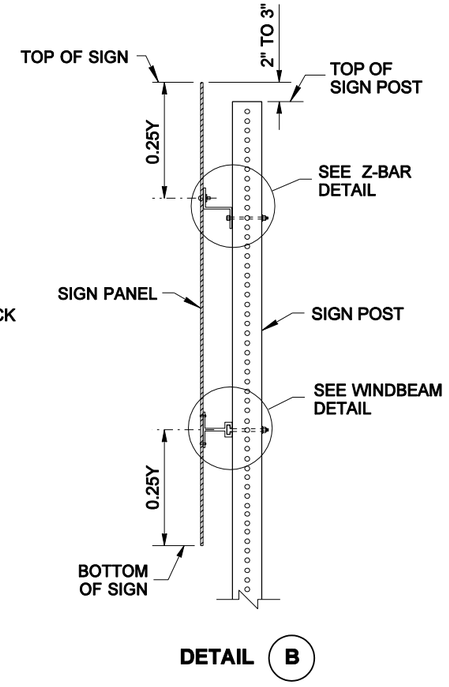
1. For "W", Horizontal distance from edge of traveled way to center of nearest post, and "V", Vertical distance from edge of traveled way to bottom of sign, see Standard Plan G-1.
2. For "X", "Y", "H1", "H2", "H3", and "H4" refer to the Sign Specification Sheet in the Contract.



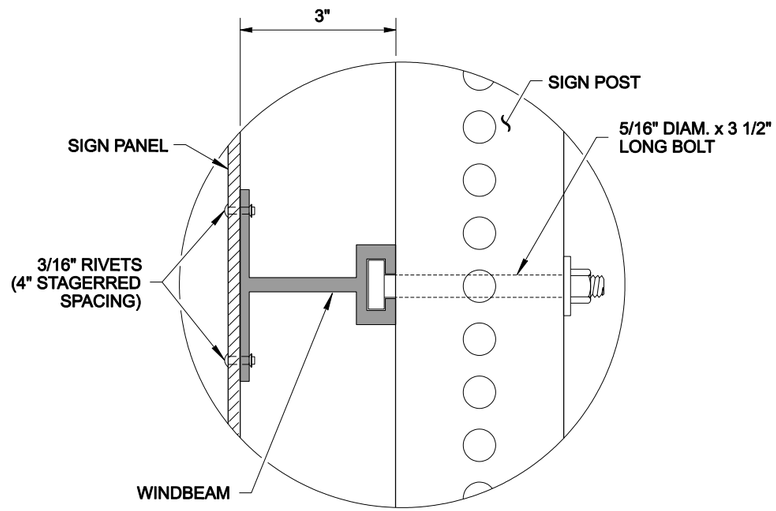

**Z-BAR DETAIL**




**SIGN ATTACHMENT DETAIL**




**DETAIL (B)**




**WINDBEAM DETAIL**

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2007

# STEEL SIGN SUPPORT TYPES SB-1 & SB-2 INSTALLATION DETAILS STANDARD PLAN G-8g

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER

*11-09-05* — DATE

Washington State Department of Transportation

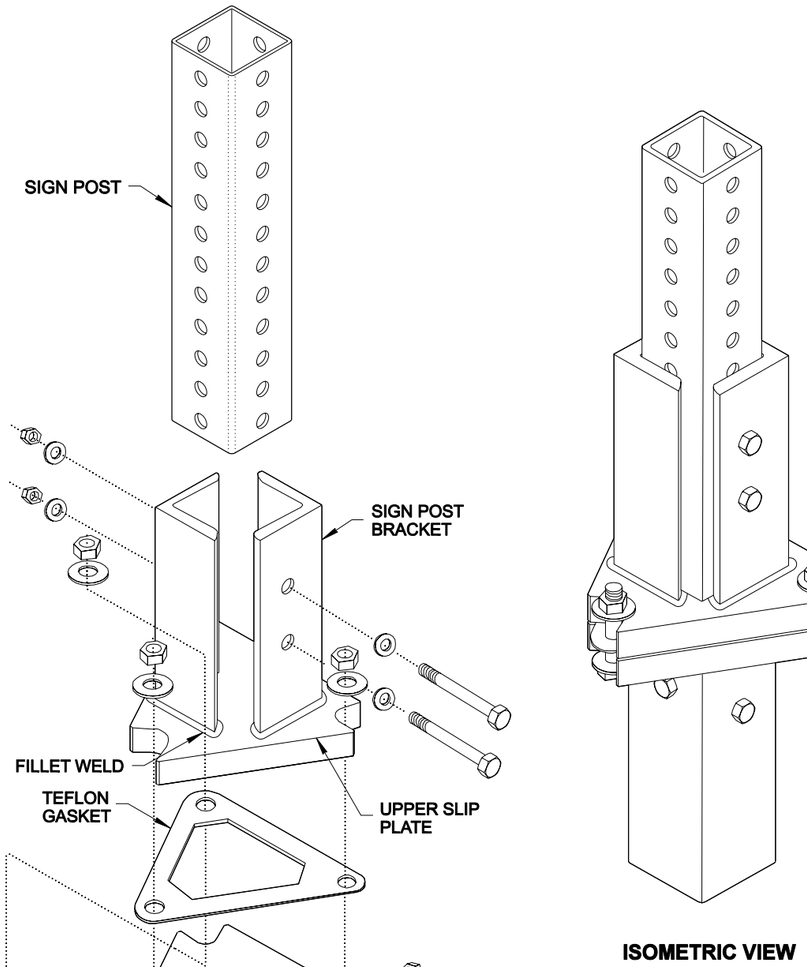
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MONIQUE GLICK

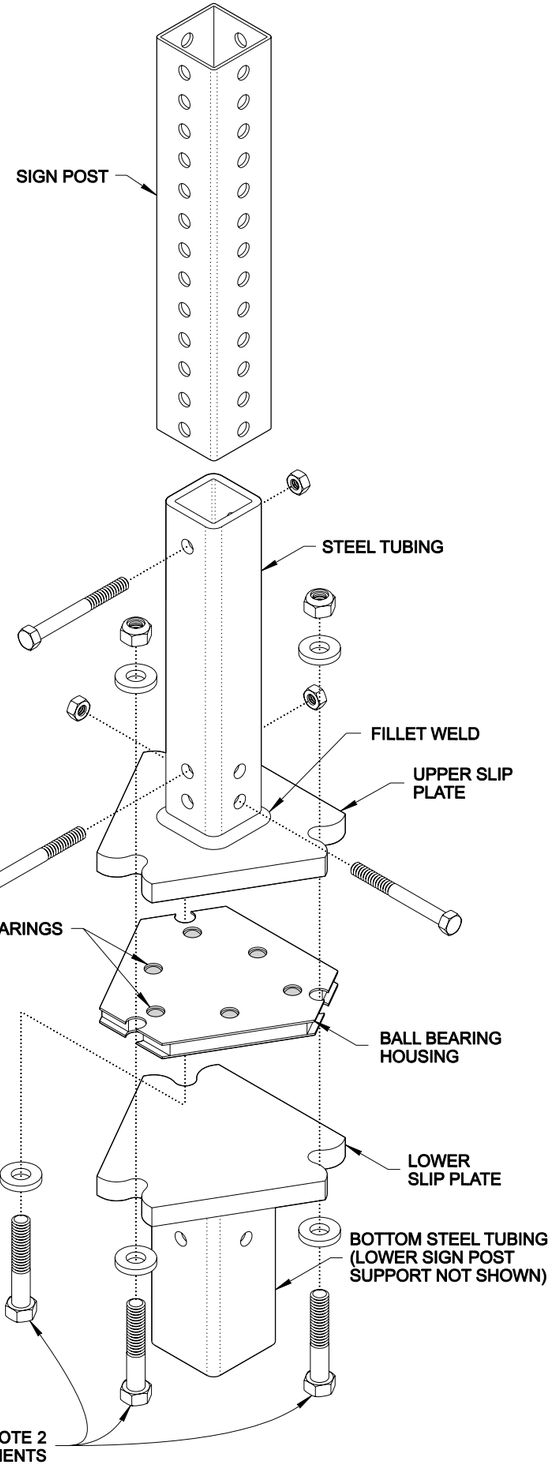



EXPLODED VIEW

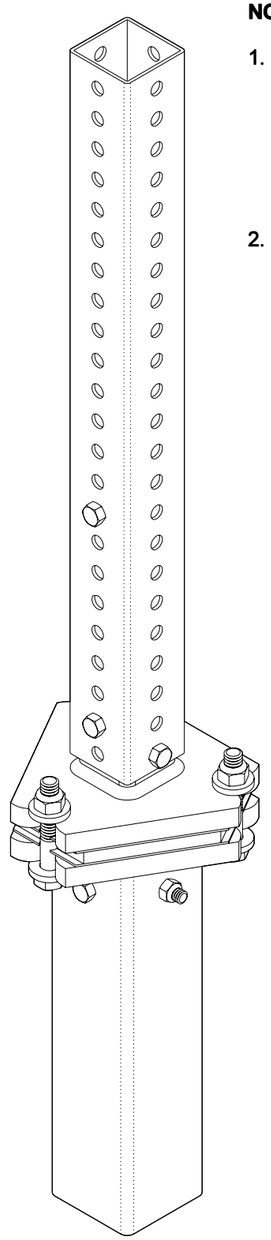


ISOMETRIC VIEW

**TYPE SB-1**
**SLIP BASE ASSEMBLY**




EXPLODED VIEW



ISOMETRIC VIEW

**TYPE SB-2**
**SLIP BASE ASSEMBLY**

**NOTES**

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

2. 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.




EXPIRES MAY 5, 2007

# STEEL SIGN SUPPORT TYPES SB-1 & SB-2 INSTALLATION DETAILS STANDARD PLAN G-8g

SHEET 2 OF 2 SHEETS

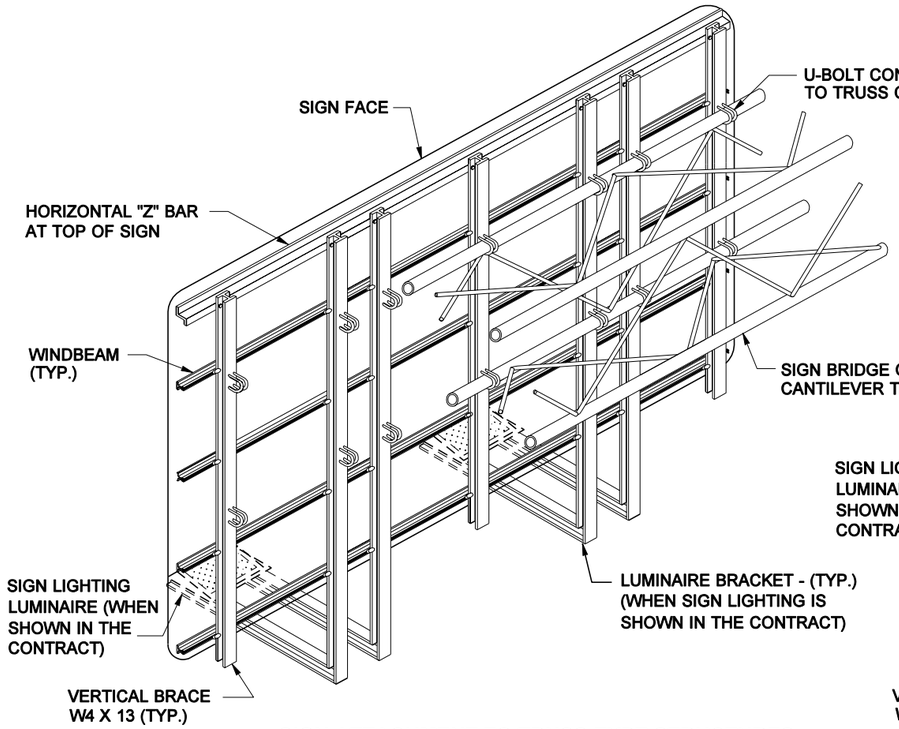
APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-09-05* — DATE

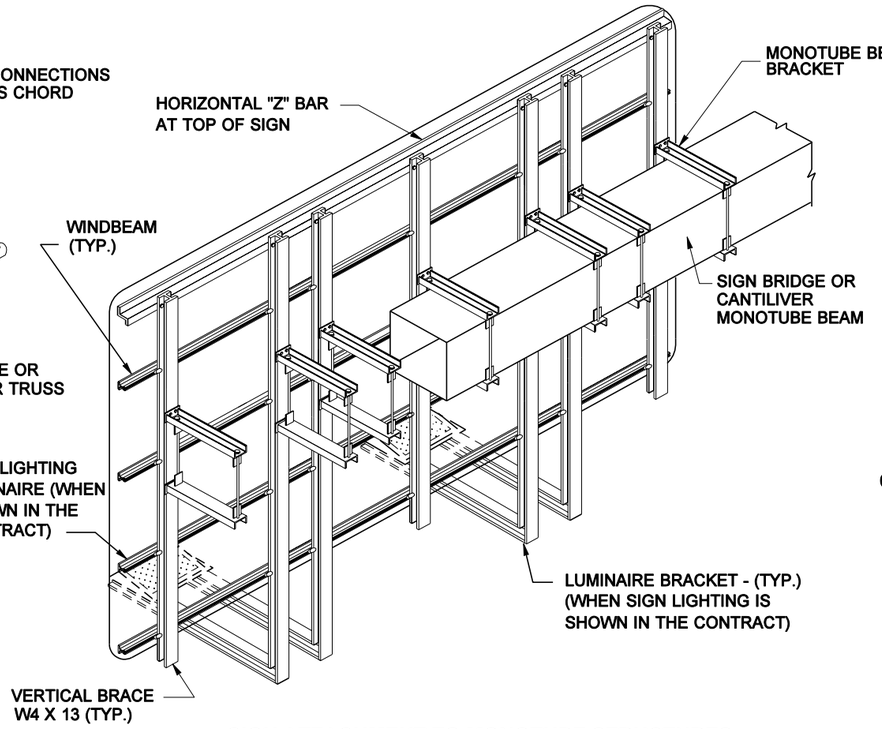
Washington State Department of Transportation

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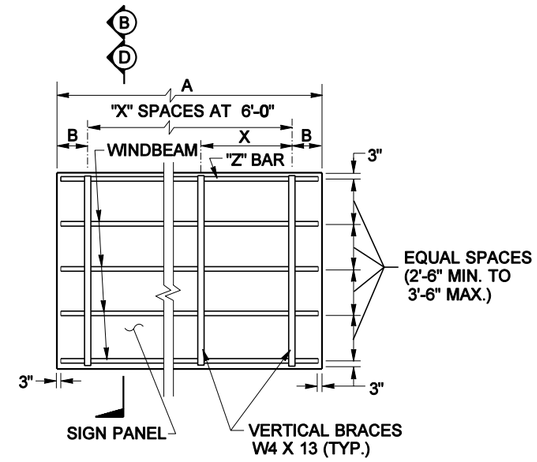
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**SIGN ATTACHMENT TO TRUSS-TYPE STRUCTURES**



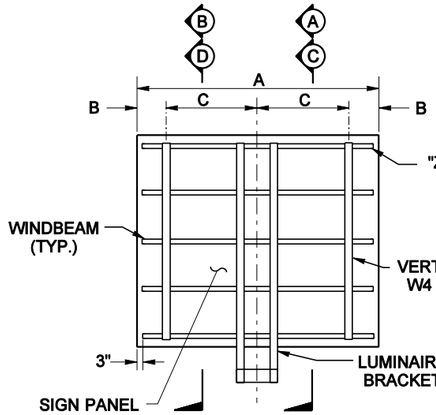

**SIGN ATTACHMENT TO MONOTUBE STRUCTURES**




**OVERHEAD SIGNS WITHOUT SIGN LIGHTING LUMINAIRES**

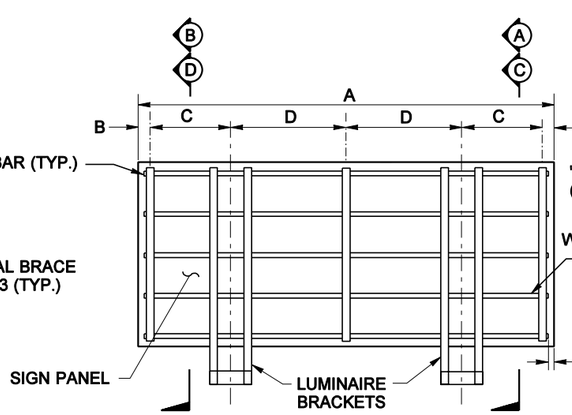
| A | B | X |
|---|---|---|
| 8'-0" | 1'-0" | 1 |
| 10'-0" | 2'-0" | 1 |
| 12'-0" | 3'-0" | 1 |
| 14'-0" | 1'-0" | 2 |
| 16'-0" | 2'-0" | 2 |
| 18'-0" | 3'-0" | 2 |
| 20'-0" | 1'-0" | 3 |
| 22'-0" | 2'-0" | 3 |

| A | B | X |
|---|---|---|
| 24'-0" | 3'-0" | 3 |
| 26'-0" | 1'-0" | 4 |
| 28'-0" | 2'-0" | 4 |
| 30'-0" | 3'-0" | 4 |
| 32'-0" | 1'-0" | 5 |
| 34'-0" | 2'-0" | 5 |
| 36'-0" | 3'-0" | 5 |




**SIGN WITH ONE SIGN LIGHTING LUMINAIRE**

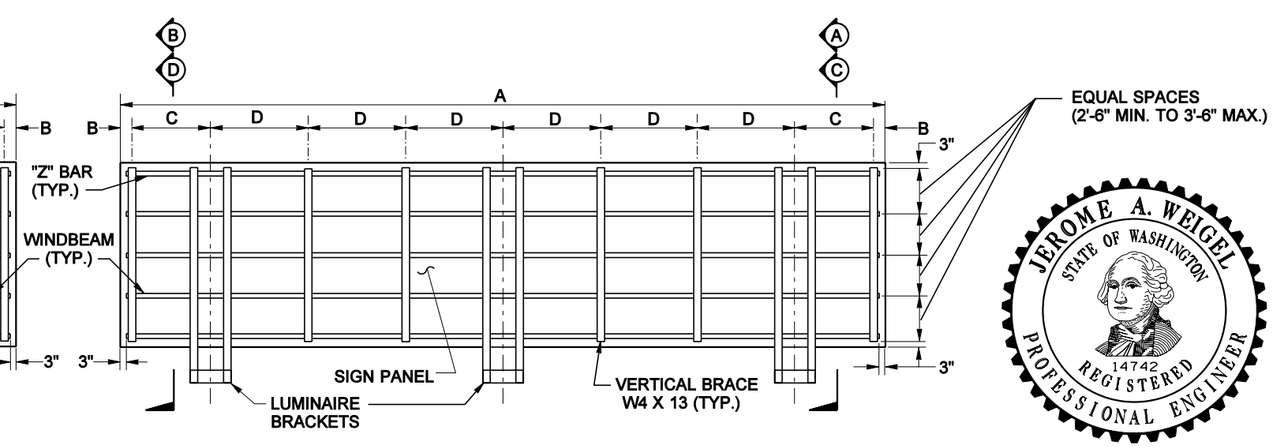
| A | B | C |
|---|---|---|
| 8'-0" | 6" | 3'-6" |
| 10'-0" | 6" | 4'-6" |
| 12'-0" | 6" | 5'-6" |
| 14'-0" | 1'-0" | 6'-0" |
| 16'-0" | 2'-0" | 6'-0" |




**SIGN WITH TWO SIGN LIGHTING LUMINAIRES**

| A | B | C | D |
|---|---|---|---|
| 18'-0" | 6" | 3'-6" | 5'-0" |
| 20'-0" | 6" | 3'-6" | 6'-0" |
| 22'-0" | 6" | 3'-6" | 4'-8" |
| 24'-0" | 6" | 3'-6" | 5'-4" |

| A | B | C | D |
|---|---|---|---|
| 26'-0" | 6" | 4'-6" | 5'-4" |
| 28'-0" | 6" | 5'-6" | 5'-4" |
| 30'-0" | 1'-0" | 6'-0" | 5'-4" |
| 32'-0" | 2'-0" | 6'-0" | 5'-4" |




**SIGN WITH THREE SIGN LIGHTING LUMINAIRES**

| A | B | C | D |
|---|---|---|---|
| 34'-0" | 6" | 3'-6" | 4'-4" |
| 36'-0" | 6" | 3'-6" | 4'-8" |

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2004

# OVERHEAD SIGN MOUNTING DETAILS STANDARD PLAN G-9a

SHEET 1 OF 4 SHEETS

*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.*

APPROVED FOR PUBLICATION

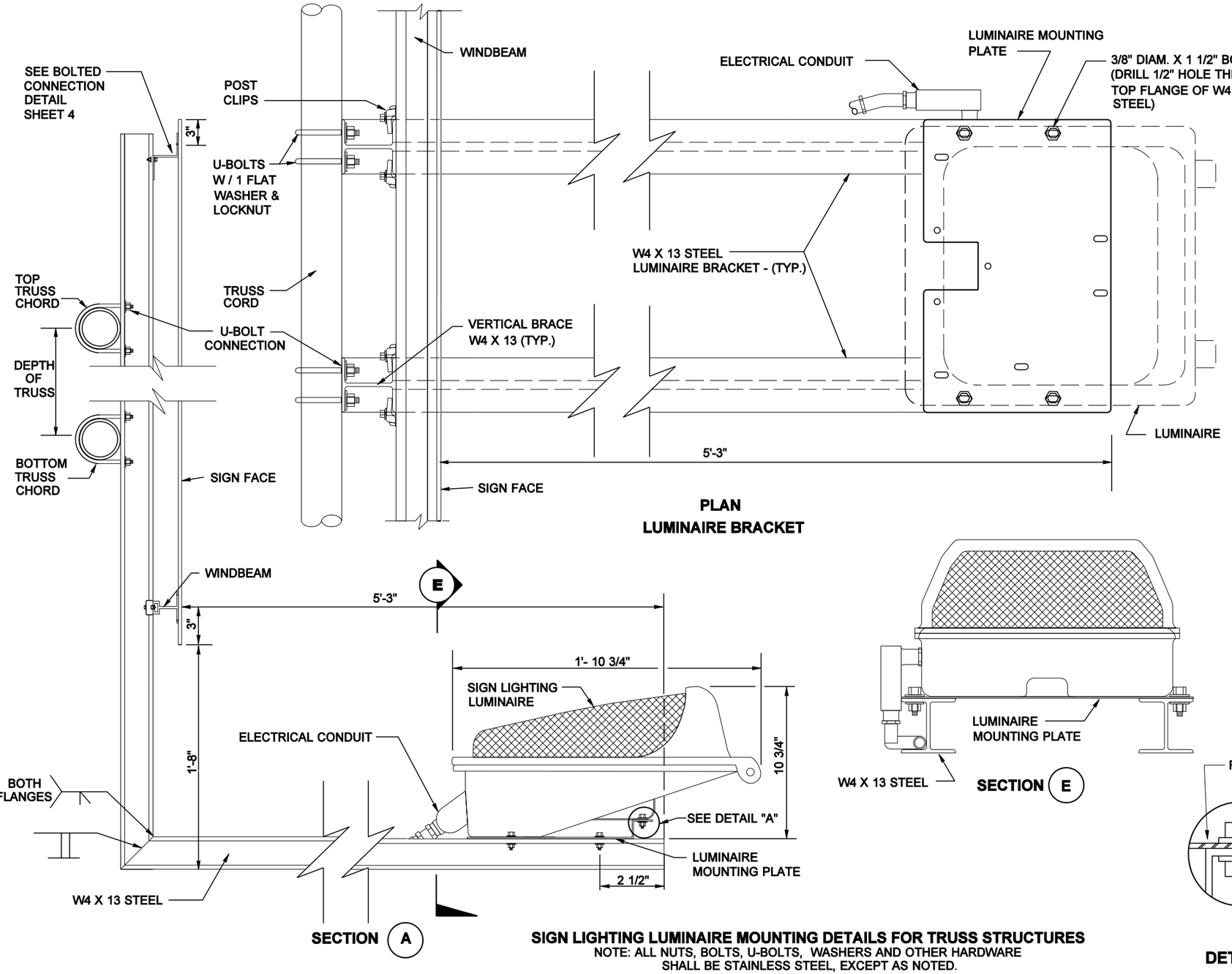
*Harold J. Peterfeso* — STATE DESIGN ENGINEER

*06-25-02* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**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.

**LUMINAIRE MOUNTING PLATE**

ITEM AVAILABLE FROM FIXTURE MANUFACTURER, MATERIAL IS GALV. 10 GAGE STEEL PLATE

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2004

# OVERHEAD SIGN MOUNTING DETAILS STANDARD PLAN G-9a

SHEET 2 OF 4 SHEETS

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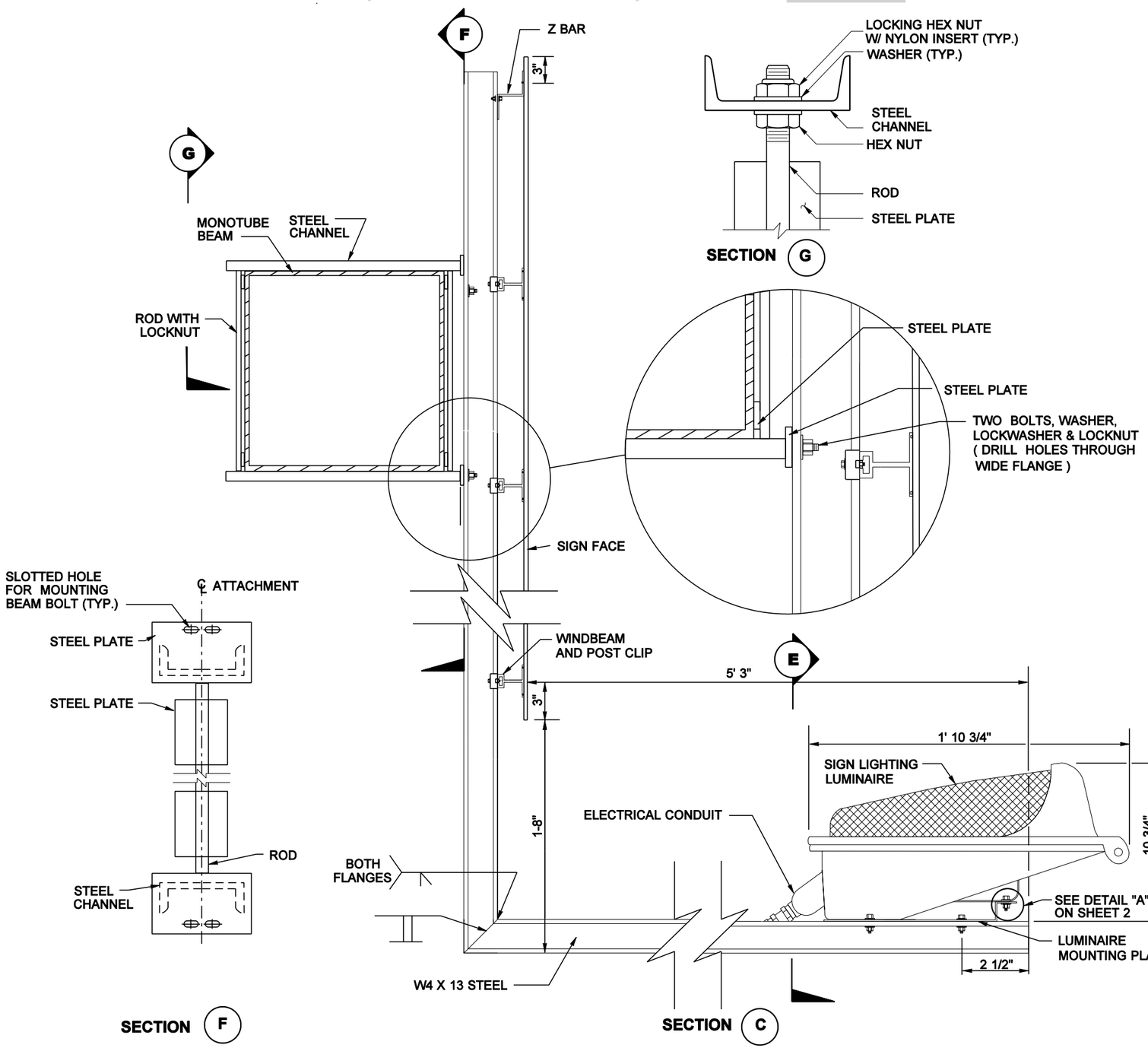
APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-25-02* — DATE

Washington State Department of Transportation

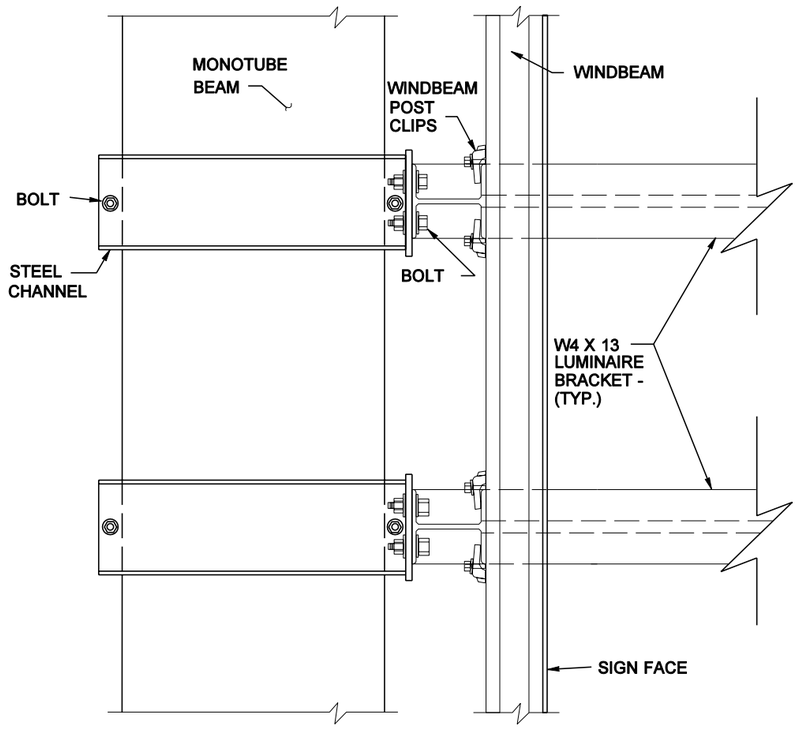
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




NOTES

1. Refer to Contract Plans for Monotube Beam Bracket element sizes, dimensions and weld symbols.




PLAN

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2004

# OVERHEAD SIGN MOUNTING DETAILS STANDARD PLAN G-9a

SHEET 3 OF 4 SHEETS

## SIGN LIGHTING LUMINAIRE MOUNTING DETAILS FOR MONOTUBE STRUCTURES

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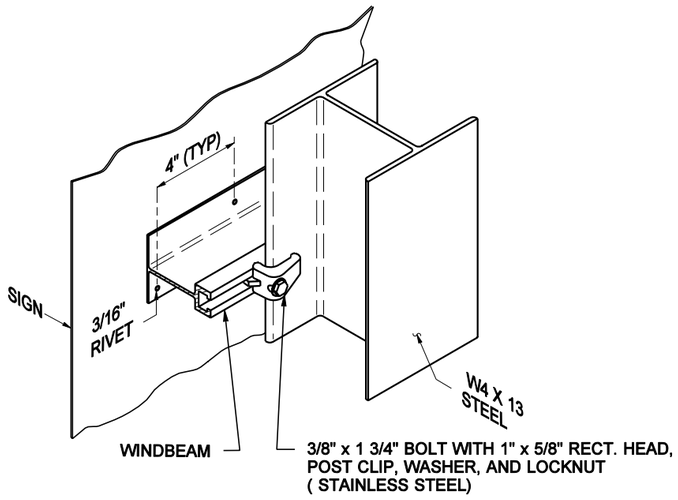
APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-25-02* — DATE

Washington State Department of Transportation

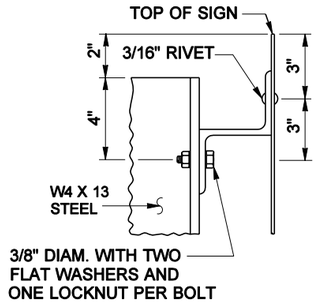
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



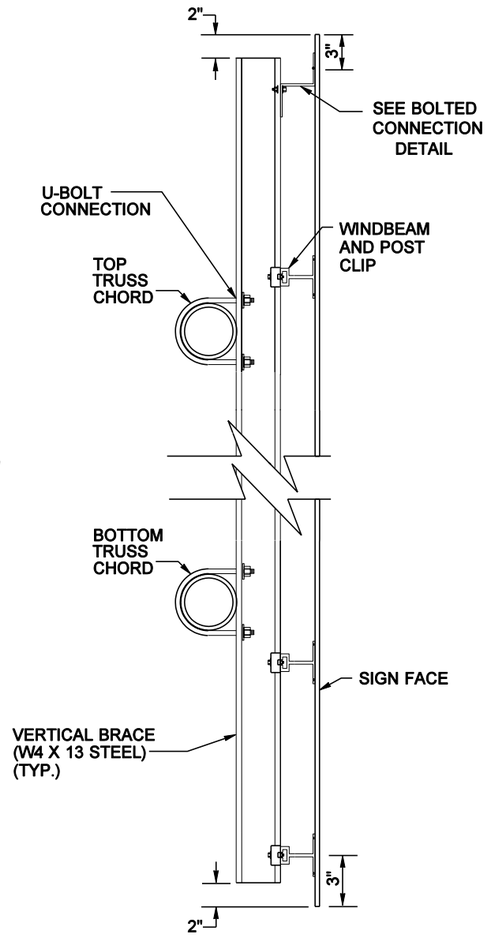

**WINDBEAM CONNECTION DETAIL**

(ON BOTH SIDES OF WIDE FLANGE)

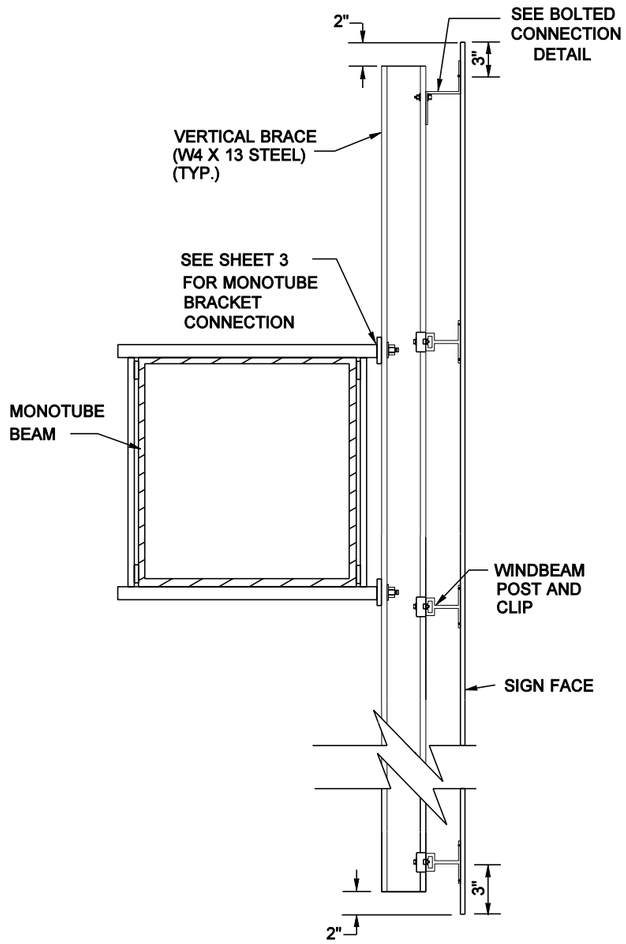



**BOLTED CONNECTION DETAIL**

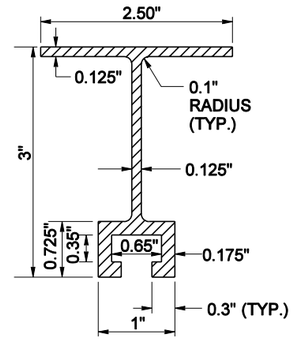
(ON BOTH SIDES OF WIDE FLANGE)



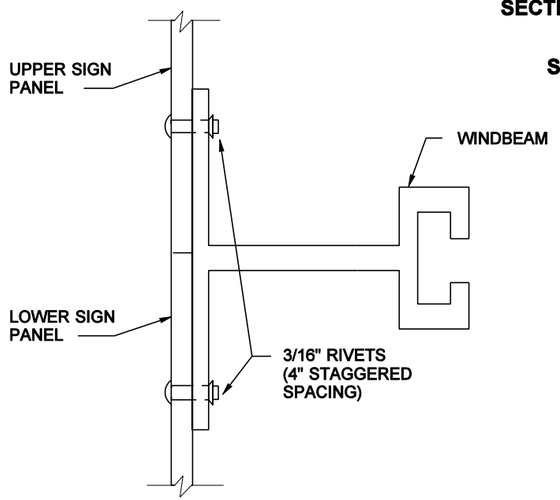

**SECTION B**




**SECTION D**




**ALUMINUM WINDBEAM DETAIL**




**HORIZONTAL SIGN PANEL SPLICE**

**SIGN ATTACHMENT DETAILS FOR TRUSS-TYPE AND MONOTUBE STRUCTURES**

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
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EXPIRES JUNE 29, 2004

# OVERHEAD SIGN MOUNTING DETAILS STANDARD PLAN G-9a

SHEET 4 OF 4 SHEETS

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APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER

*06-25-02* — DATE

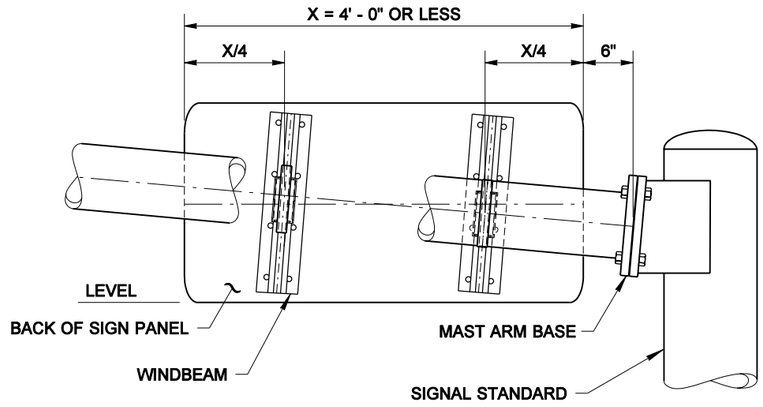
Washington State Department of Transportation

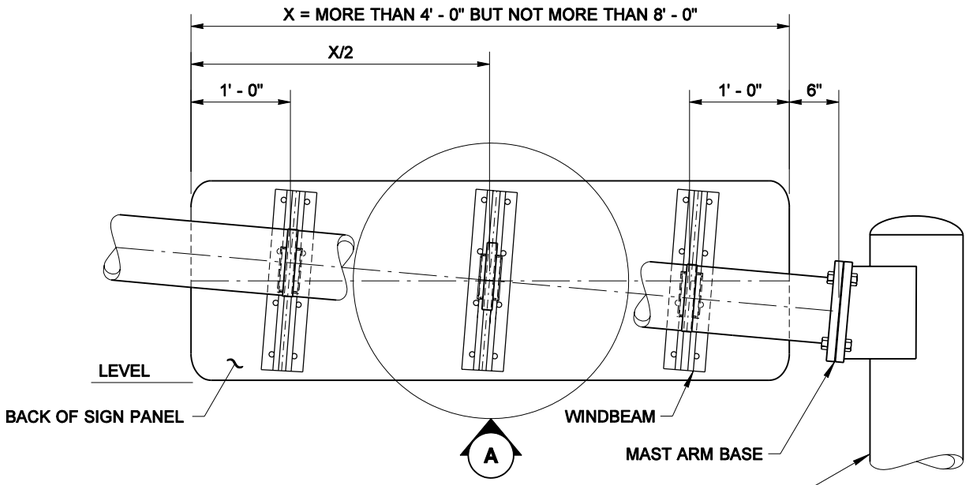
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

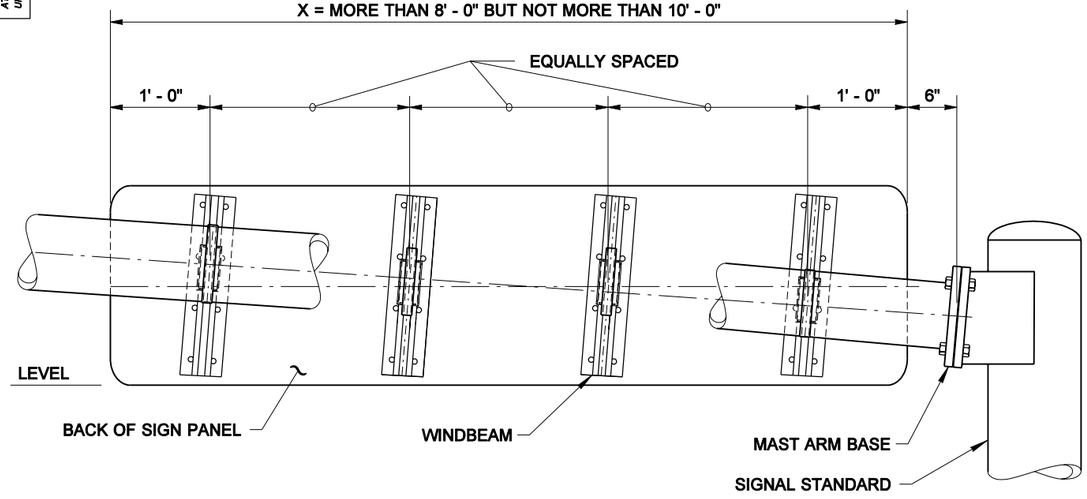
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ELENA BRUNSTEIN

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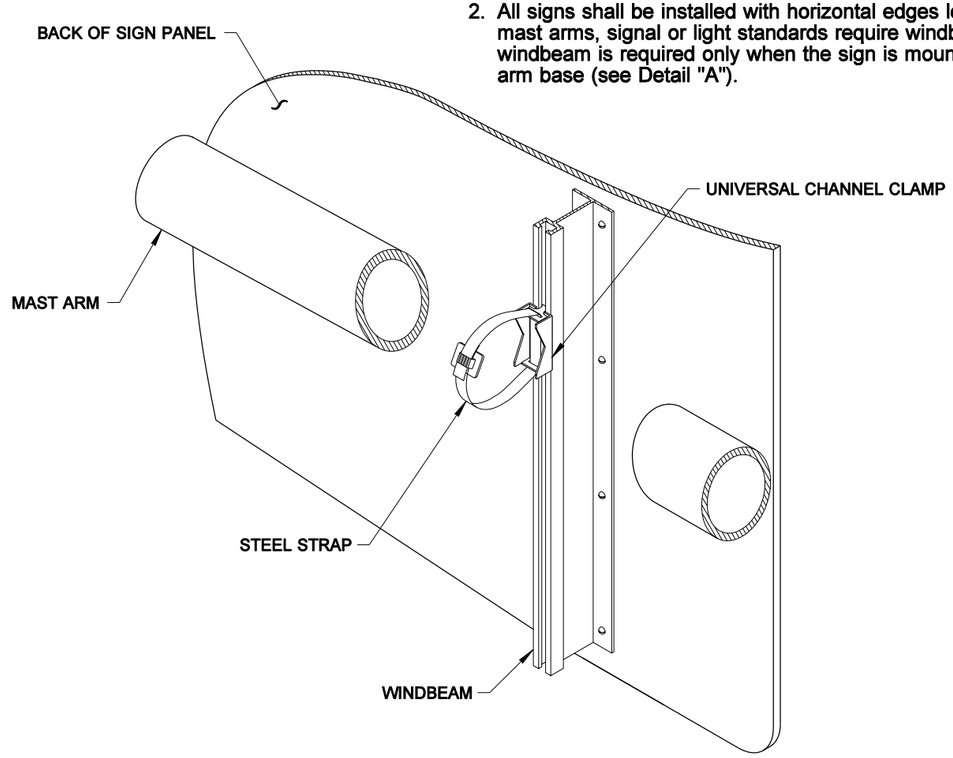



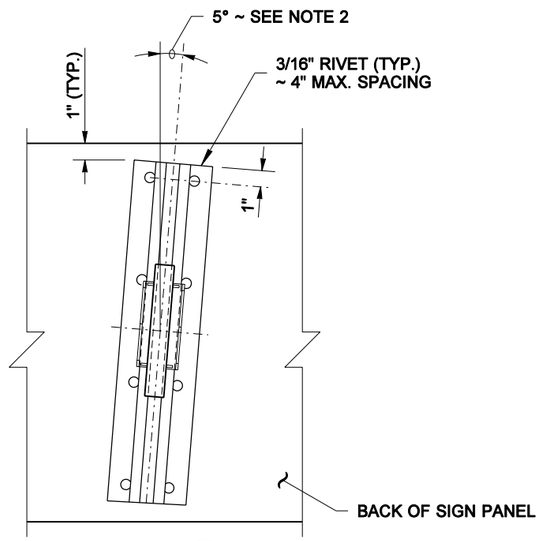

**MAST ARM MOUNTED STREET NAME SIGNS**

**NOTES**

1. Mounting brackets with steel straps shall be a stainless steel band and buckle system product or an approved equal. Mounting brackets shall be universal channel clamps; steel straps shall be 3/4" wide and 0.030" thick.
2. All signs shall be installed with horizontal edges level. All signs installed on mast arms, signal or light standards require windbeams. A skewed windbeam is required only when the sign is mounted within 12" of the mast arm base (see Detail "A").




**TYPICAL MAST ARM INSTALLATION**




**DETAIL (A)**

TYPICAL FOR EACH CONNECTION

THEODORE J. TREPANIER
STATE OF WASHINGTON
25335
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 9, 2007

# SIGN INSTALLATION ON SIGNAL AND LIGHT STANDARDS STANDARD PLAN G-9b

SHEET 1 OF 2 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-08-06* — DATE

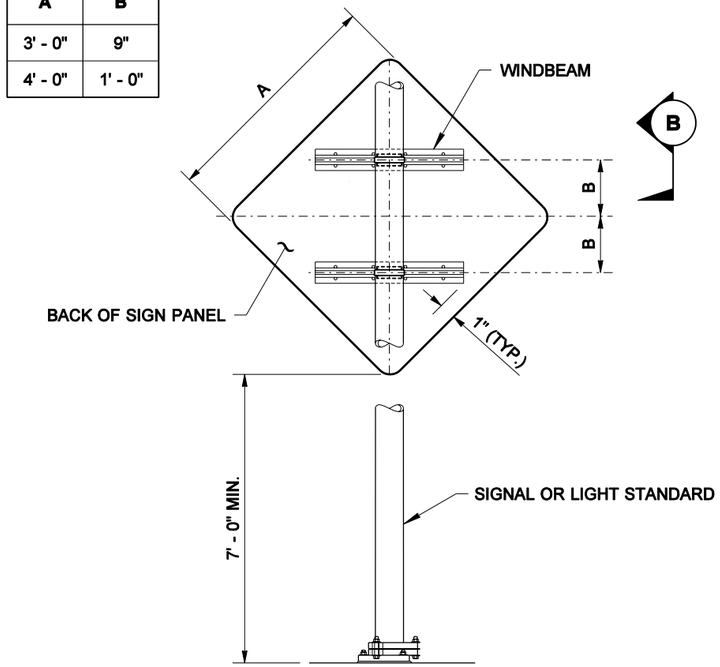
Washington State Department of Transportation

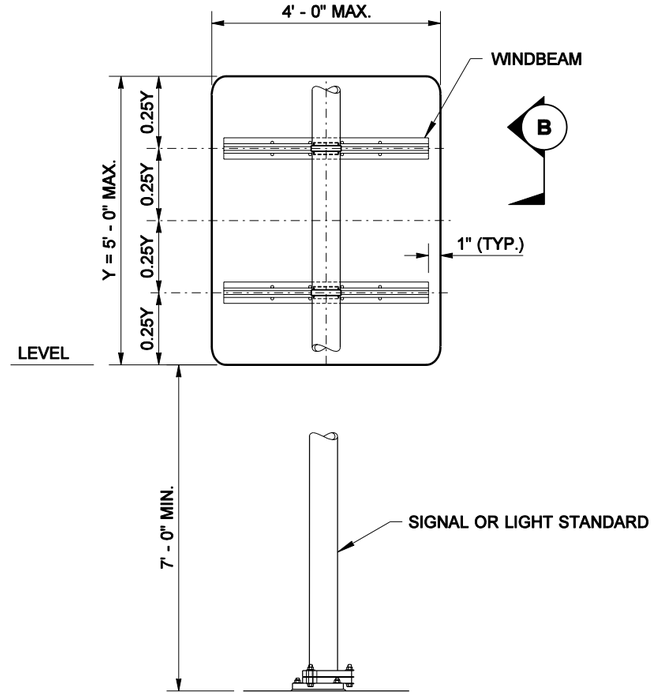
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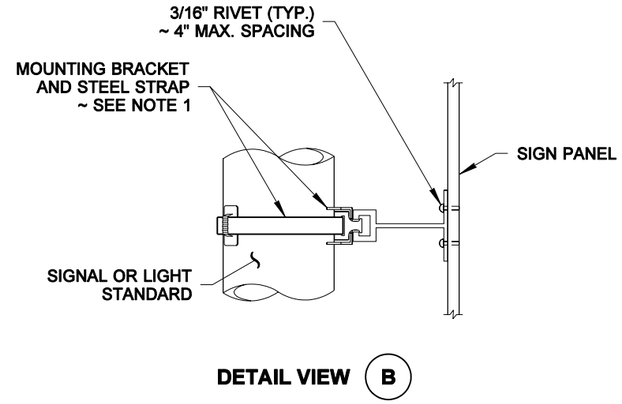
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ELENA BRUNSTEIN

| DIMENSIONS | |
|---|---|
| A | B |
| 3' - 0" | 9" |
| 4' - 0" | 1' - 0" |

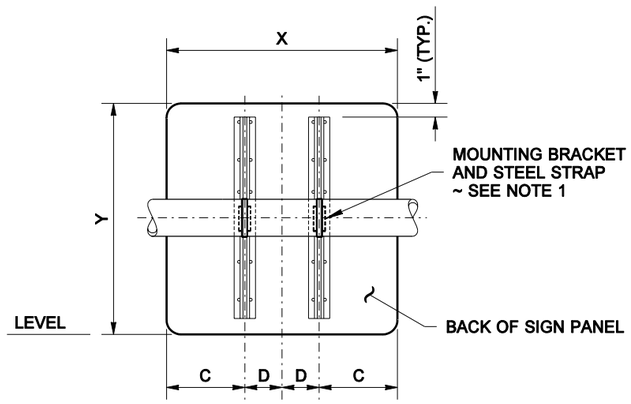



**DETAIL VIEW** (B)

## SIGN INSTALLATION ON LIGHT STANDARD




| DIMENSIONS | | | |
|---|---|---|---|
| X | Y | C | D |
| 3' - 0" | 2' - 6" | 1' - 0" | 6" |
| 3' - 0" | 3' - 0" | 1' - 0" | 6" |
| 4' - 0" | 2' - 6" | 1' - 3" | 9" |

## MAST ARM MOUNTED LANE USE SIGNS

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THEODORE J. TREPANIER
STATE OF WASHINGTON
25335
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 9, 2007

# SIGN INSTALLATION ON SIGNAL AND LIGHT STANDARDS STANDARD PLAN G-9b

SHEET 2 OF 2 SHEET

APPROVED FOR PUBLICATION

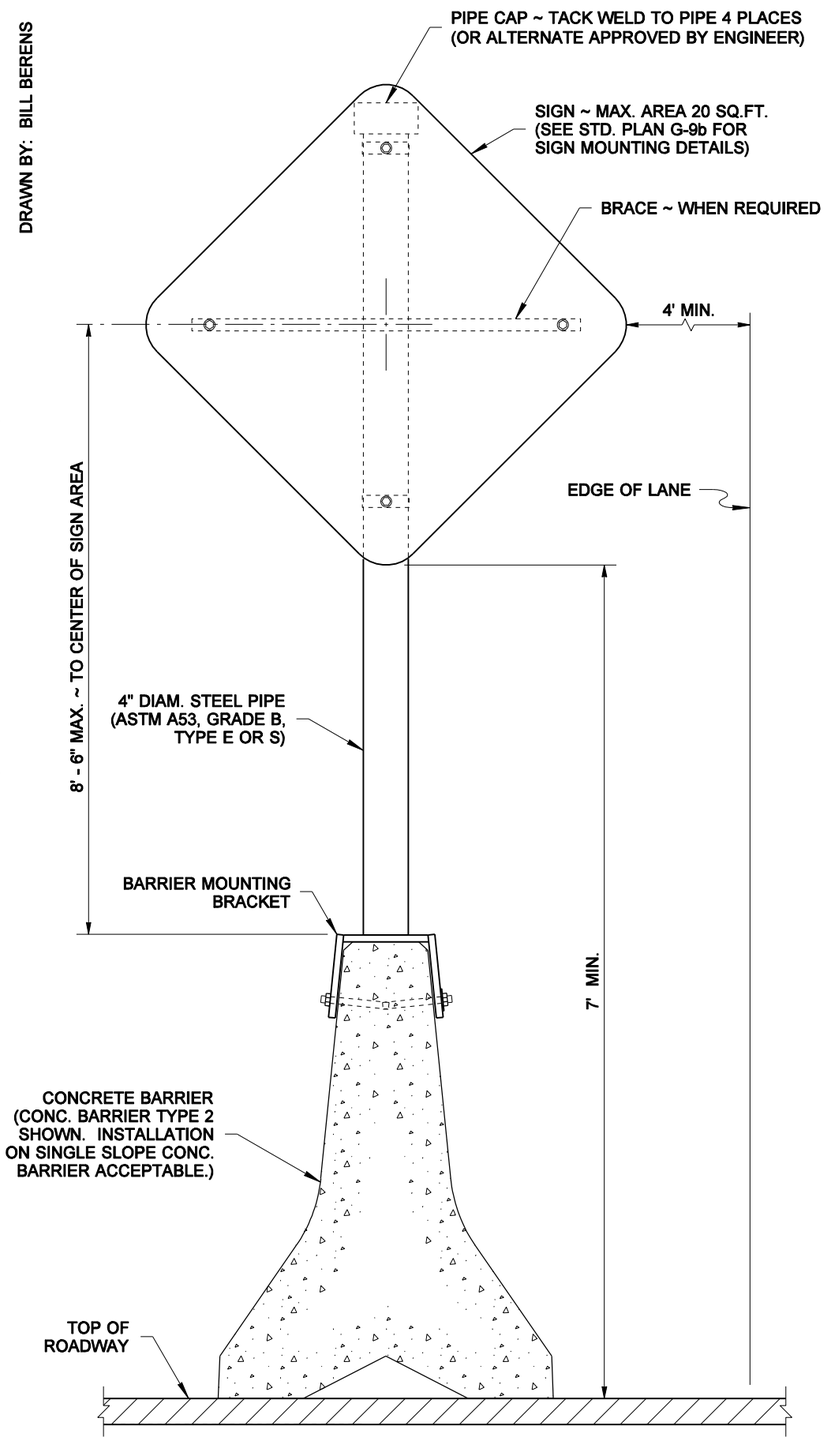
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-08-06* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

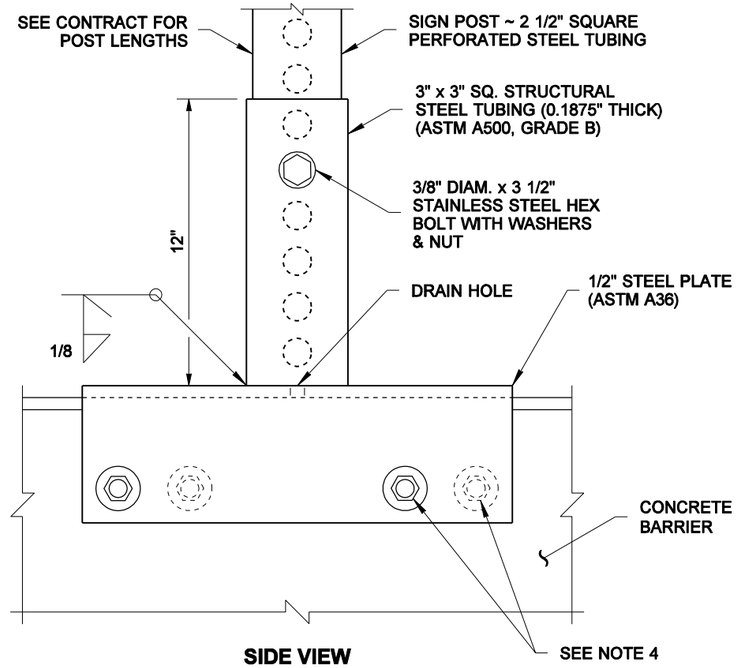
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: BILL BERENS




**TYPICAL SECTION**

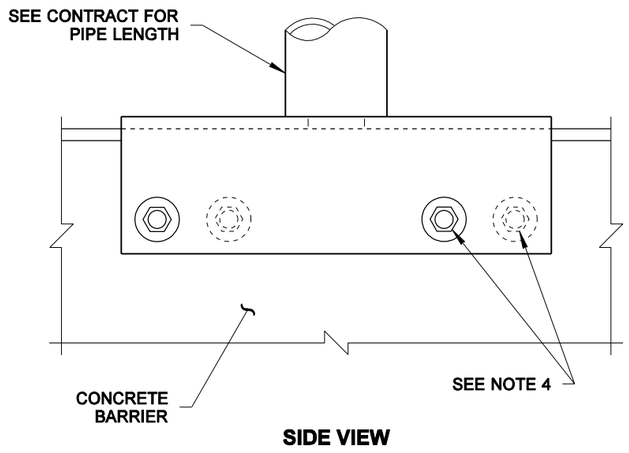
## BARRIER MOUNTED SIGN SUPPORT




**SIDE VIEW**

(FOR SQUARE TUBING SIGN POSTS SUPPORTING SIGNS WITH A MAXIMUM AREA OF 9 SQ.FT.)

## OPTIONAL "MANUFACTURED" BARRIER MOUNTING BRACKET



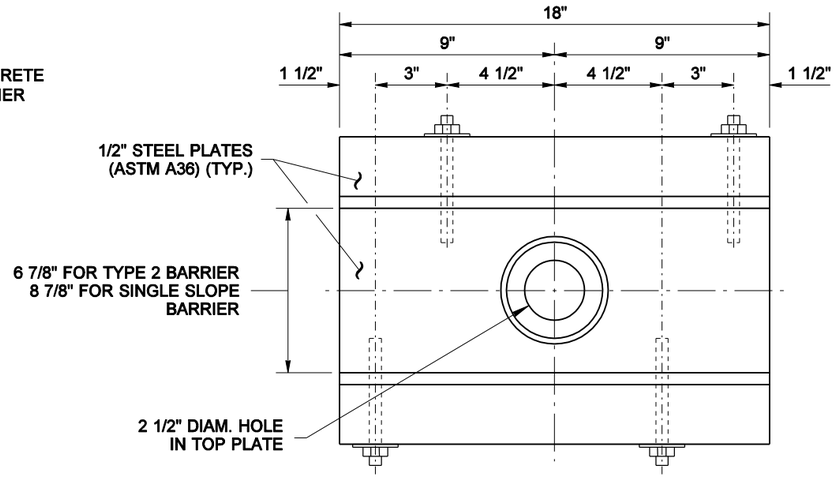

**SIDE VIEW**

## BARRIER MOUNTING BRACKET

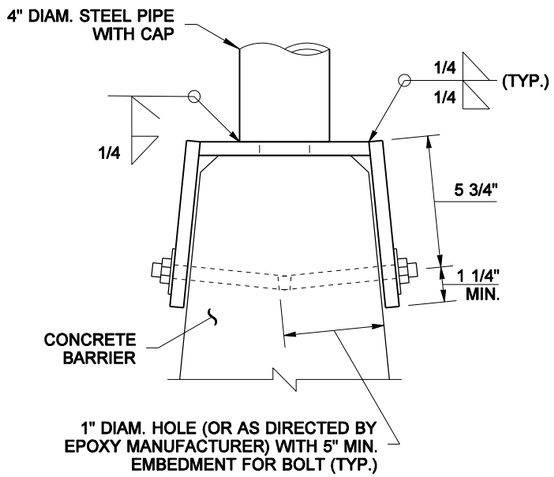
(SEE NOTE 3)

**NOTES**

1. Attach sign to Z-Bar or windbeam with 3/16" rivets at 4" staggered spacing.
2. A nylon washer shall be placed between the sign face and any other washer required on signs constructed of Type III or IV sheeting.
3. A bent plate may be used in lieu of the welded plates shown. Both shall be galvanized after fabrication.
4. The bracket to barrier fasteners shall be 5/8" diam. resin bonded anchors (all thread) ASTM A193 Grade B7 or ASTM A449 (galvanized) with matching nut and washer. Epoxy resin shall conform to Standard Specification 9-26.1




**TOP VIEW**




**END VIEW**

RICHARD P. ZELDENRUST
STATE OF WASHINGTON
25470
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 14, 2004

# BARRIER MOUNTED SIGN SUPPORT

# STANDARD PLAN G-9c

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-23-04* DATE

Washington State Department of Transportation

| DATE | REVISION | BY |
|---|---|---|
| 05/2004 | ADDED HOLE IN TOP PLATE; REV. FASTENERS | BB |

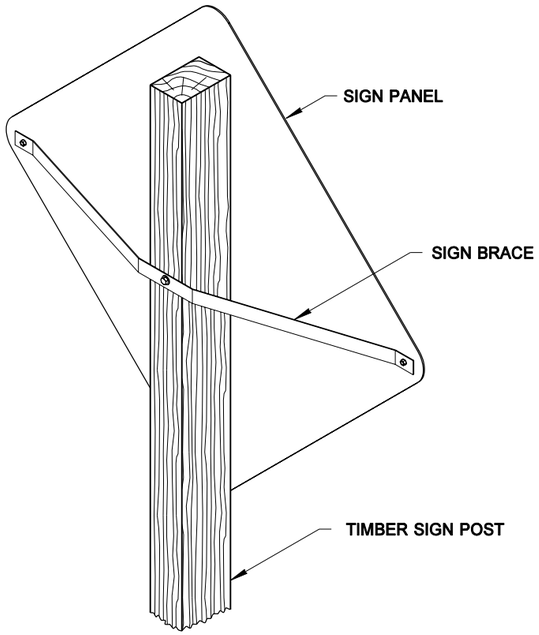
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

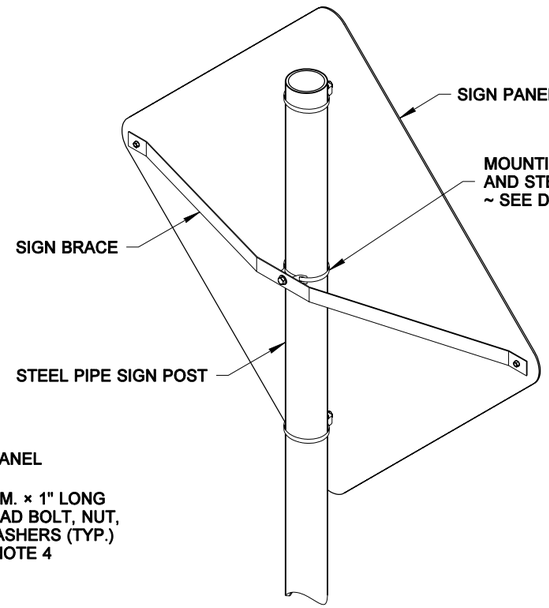
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

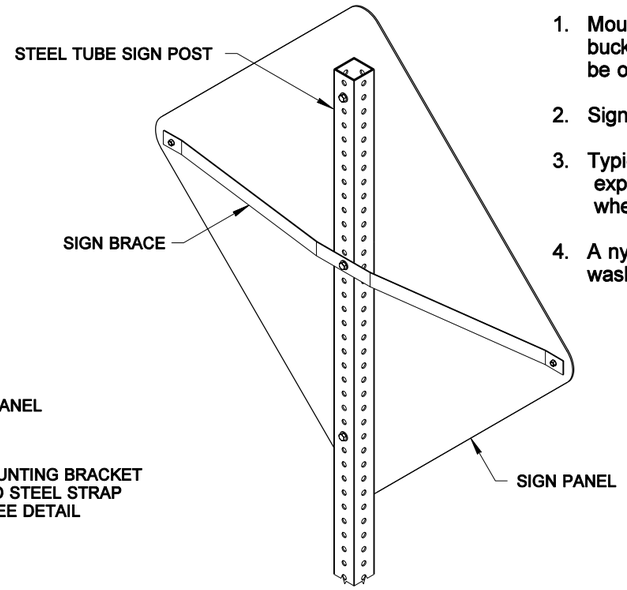
DRAWN BY: ELENA BRUNSTEIN




**SIGN BRACE ON TIMBER POST**



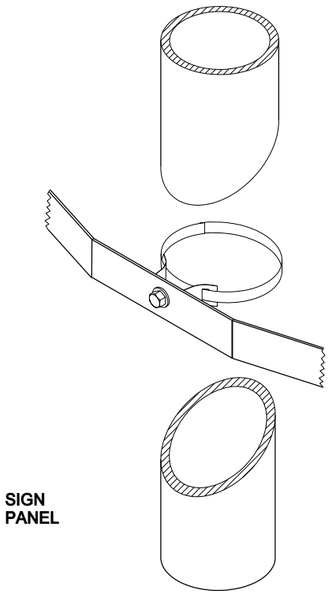

**SIGN BRACE ON STEEL PIPE**



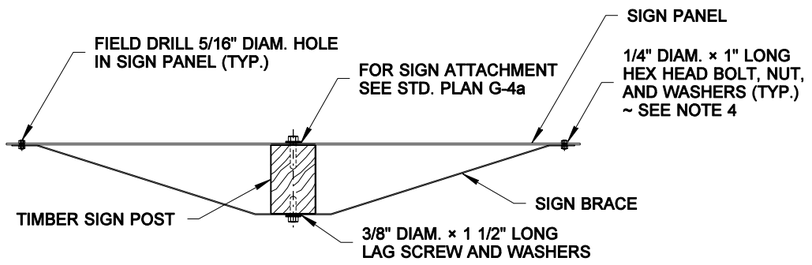

**SIGN BRACE ON STEEL TUBE**

**NOTES**

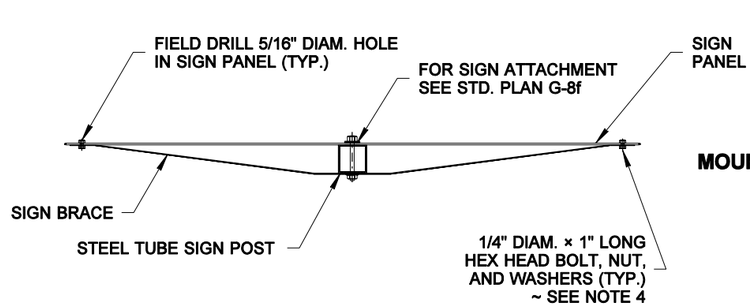
1. Mounting brackets with steel straps shall be a stainless steel band and buckle system product or an approved equal. Mounting brackets shall be one bolt, flared leg; steel straps shall be 3/4" wide and 0.030" thick.
2. Sign braces are only installed when specified in the contract.
3. Typically braces are 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.



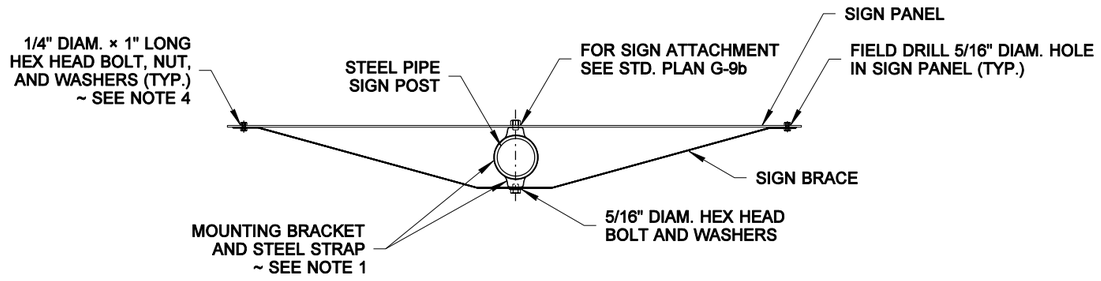
**MOUNTING BRACKET AND STEEL STRAP DETAIL**




**PLAN**




**PLAN**




**PLAN**

THEODORE J. TREPANIER
STATE OF WASHINGTON
25335
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 9, 2007

# SIGN BRACING

# STANDARD PLAN G-9d

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-08-06* — DATE

Washington State Department of Transportation

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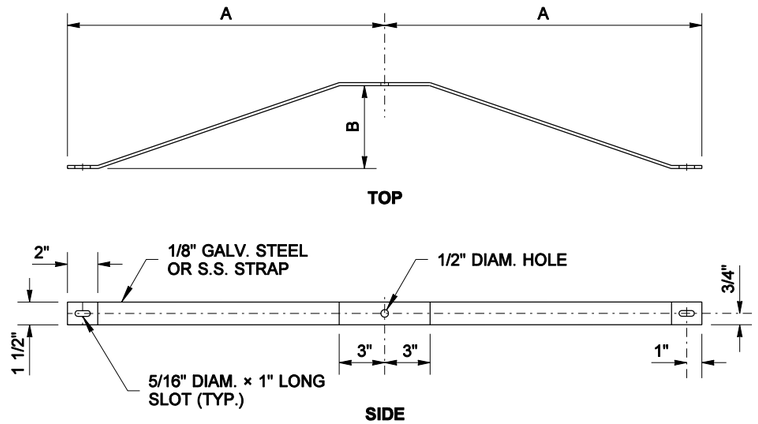
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

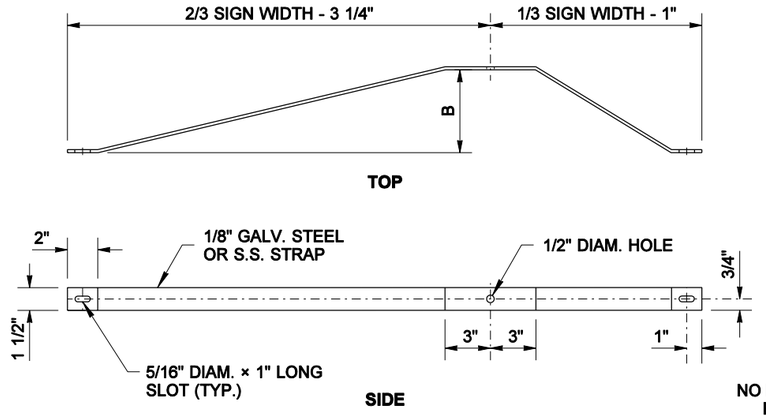
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ELENA BRUNSTEIN

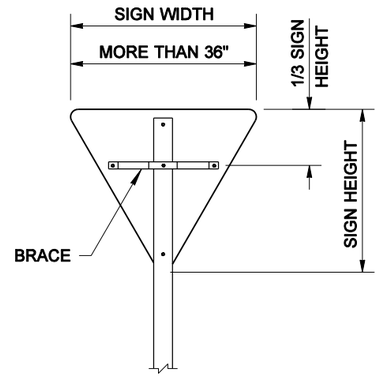
| SIGN BRACE DIMENSIONS | | | | |
|---|---|---|---|---|
| | SIGN TYPE | | | |
| | YIELD | DIAMOND-SHAPED | OTHERS | |
| A | 1/3 SIGN WIDTH - 1 3/4" | 1/2 SIGN WIDTH - 2 1/4" | 1/2 SIGN WIDTH - 1" | |
| | SIGN POST TYPE | | | |
| | 4×6 OR 6×6 TIMBER POST | 6×8 TIMBER POST | 3" DIAM. STEEL PIPE | 2 1/2" SQUARE TUBE |
| B | 5 1/2" | 7 1/2" | 4 3/4" | 2 1/2" |



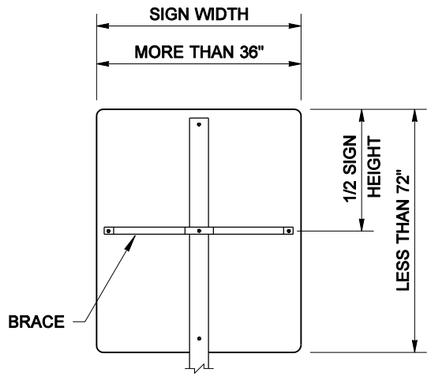

**SIGN BRACE DETAIL**



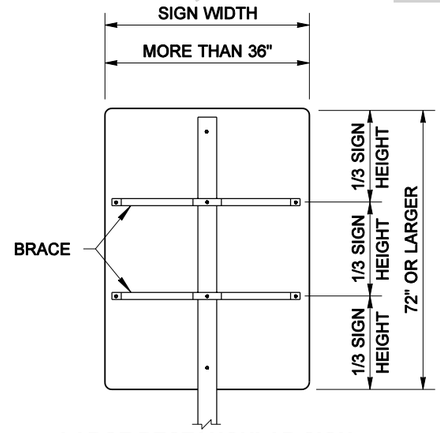

**NO PASSING ZONE SIGN BRACE DETAIL**



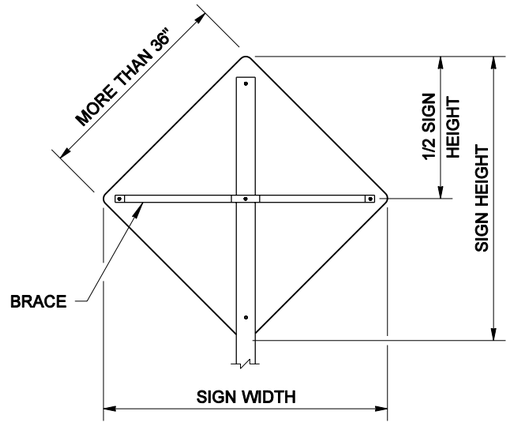

**YIELD SIGN**



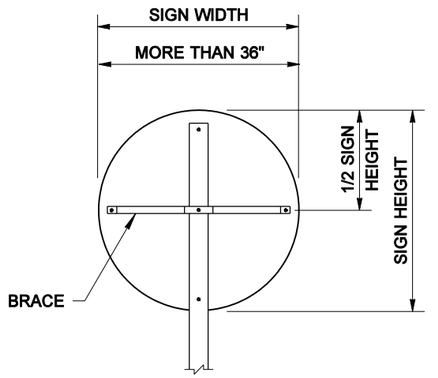

**SMALL RECTANGULAR SIGN**



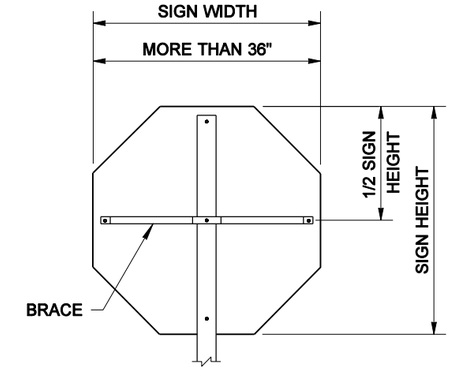

**LARGE RECTANGULAR SIGN**



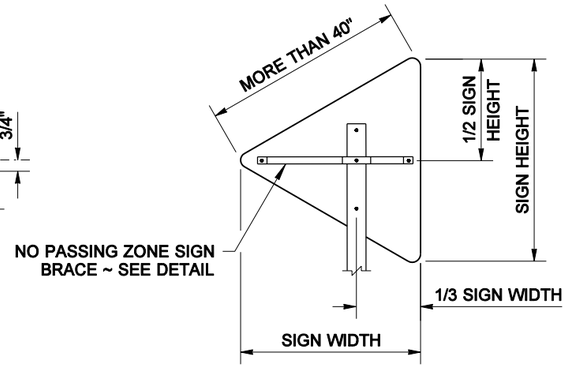

**DIAMOND-SHAPED SIGN**



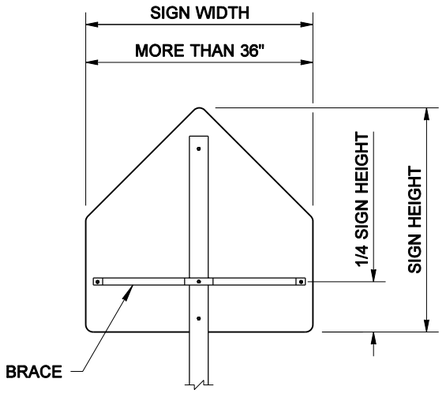

**RAILROAD WARNING SIGN**




**STOP SIGN**




**NO PASSING ZONE SIGN**




**SCHOOL ZONE SIGN**

**SIGN BRACE PLACEMENT**

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THEODORE J. TREPANIER
STATE OF WASHINGTON
25335
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 9, 2007

# SIGN BRACING

# STANDARD PLAN G-9d

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-08-06* — DATE

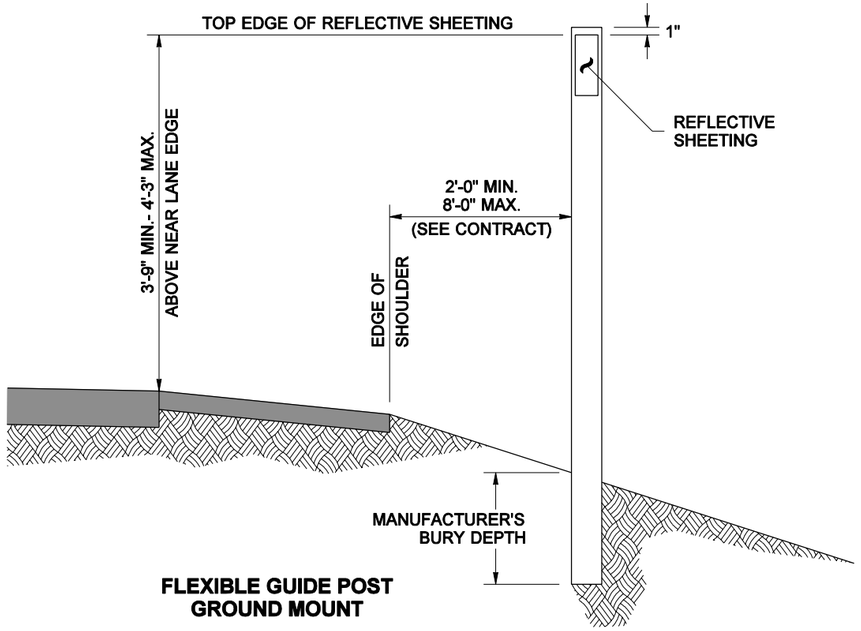
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

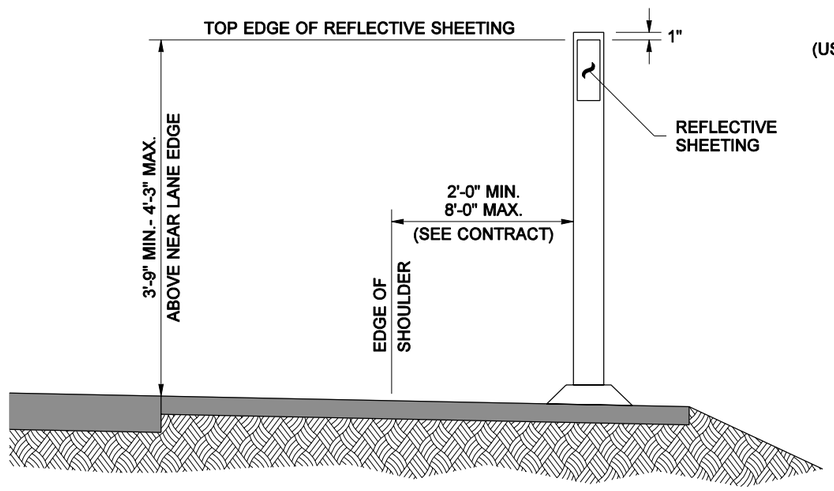
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

## GUIDE POST REFLECTIVE SHEETING APPLICATIONS

| TYPE W | TYPE WW | TYPE Y | TYPE YY | TYPE G1 (STD. PLAN H-1d) | TYPE G2 (STD. PLAN H-1d) |
|---|---|---|---|---|---|
| ○ | ◫ | ● | ⊕ | ◫ G1 | ◫ G2 |
| FACING TRAFFIC: 3" × 8" WHITE | FACING TRAFFIC: 3" × 8" WHITE; BACK SIDE: 3" × 4" WHITE, 4", 3" × 4" WHITE | FACING TRAFFIC: 3" × 8" YELLOW | FACING TRAFFIC: 3" × 8" YELLOW; BACK SIDE: 3" × 8" YELLOW | FACING TRAFFIC: 3" × 8" WHITE, 4", 8" GREEN; BACK SIDE: 3" × 4" WHITE, 4", 4" WHITE | FACING TRAFFIC: 3" × 8" WHITE; BACK SIDE: 3" × 4" WHITE, 4", 4" WHITE, 4", 8" GREEN |



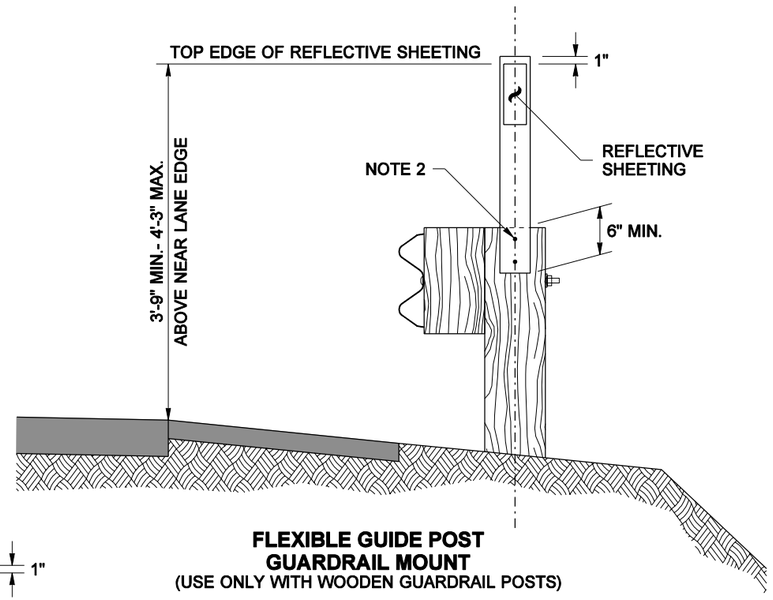

**FLEXIBLE GUIDE POST GROUND MOUNT**




**FLEXIBLE GUIDE POST SURFACE MOUNT**

**NOTES**

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" x 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.




**FLEXIBLE GUIDE POST GUARDRAIL MOUNT**
(USE ONLY WITH WOODEN GUARDRAIL POSTS)

TOBY D. RICKMAN
STATE OF WASHINGTON
24655
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES OCTOBER 26, 2002

# GUIDE POSTS

# STANDARD PLAN H-1

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

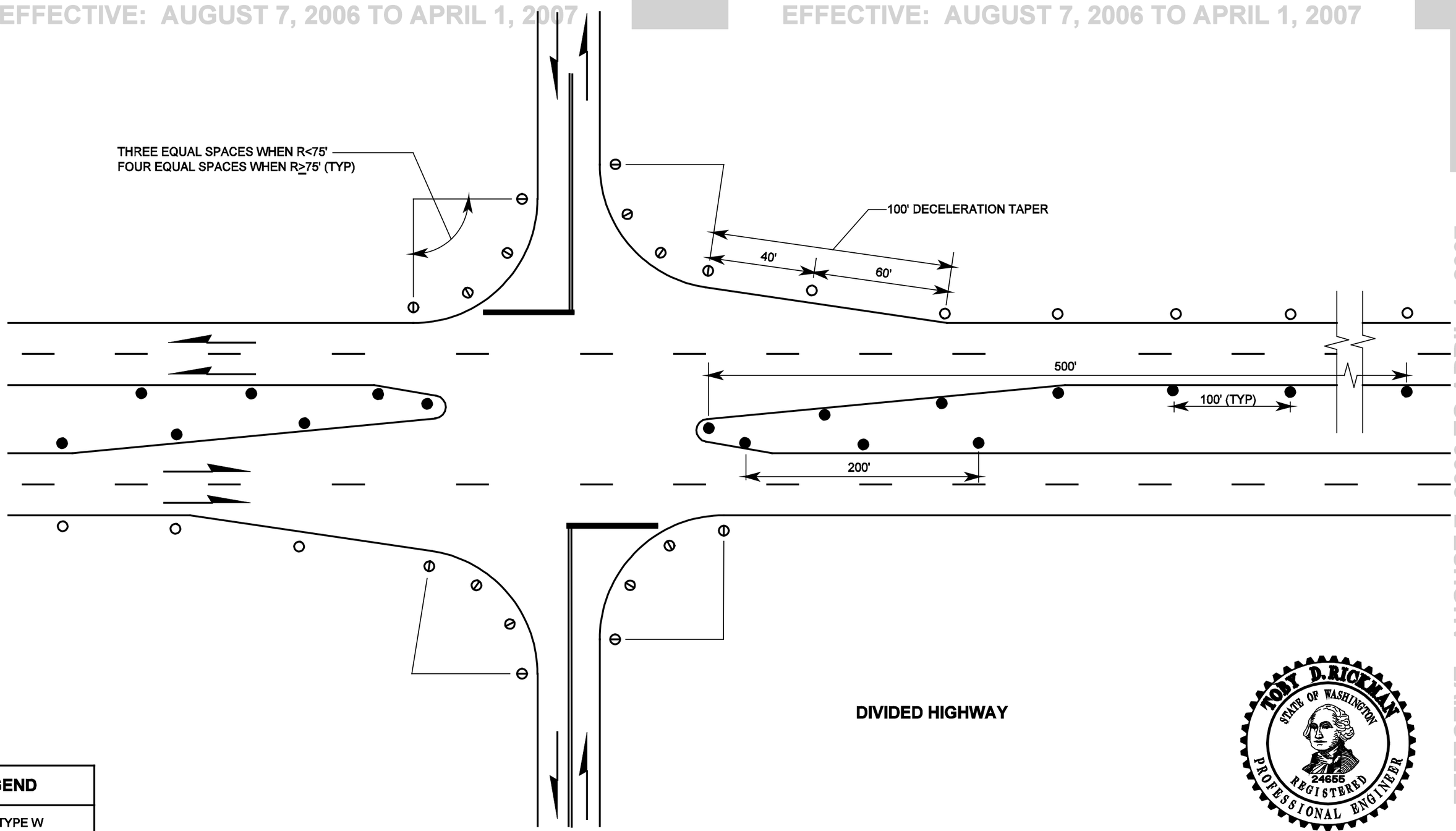
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *01-10-02* — DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**DIVIDED HIGHWAY**

| LEGEND | |
|---|---|
| ○ | TYPE W |
| ● | TYPE Y |
| ⦶ | TYPE WW |

SEE TABLE IN STANDARD PLAN H-1 FOR DEFINITION OF GUIDE POST TYPES

TOBY D. RICKMAN
STATE OF WASHINGTON
24655
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES OCTOBER 26, 2000

# GUIDE POST PLACEMENT GRADE INTERSECTION STANDARD PLAN H-1a

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APPROVED FOR PUBLICATION

*Clifford E. Mansfield* *4/14/00*

DEPUTY STATE DESIGN ENGINEER — DATE

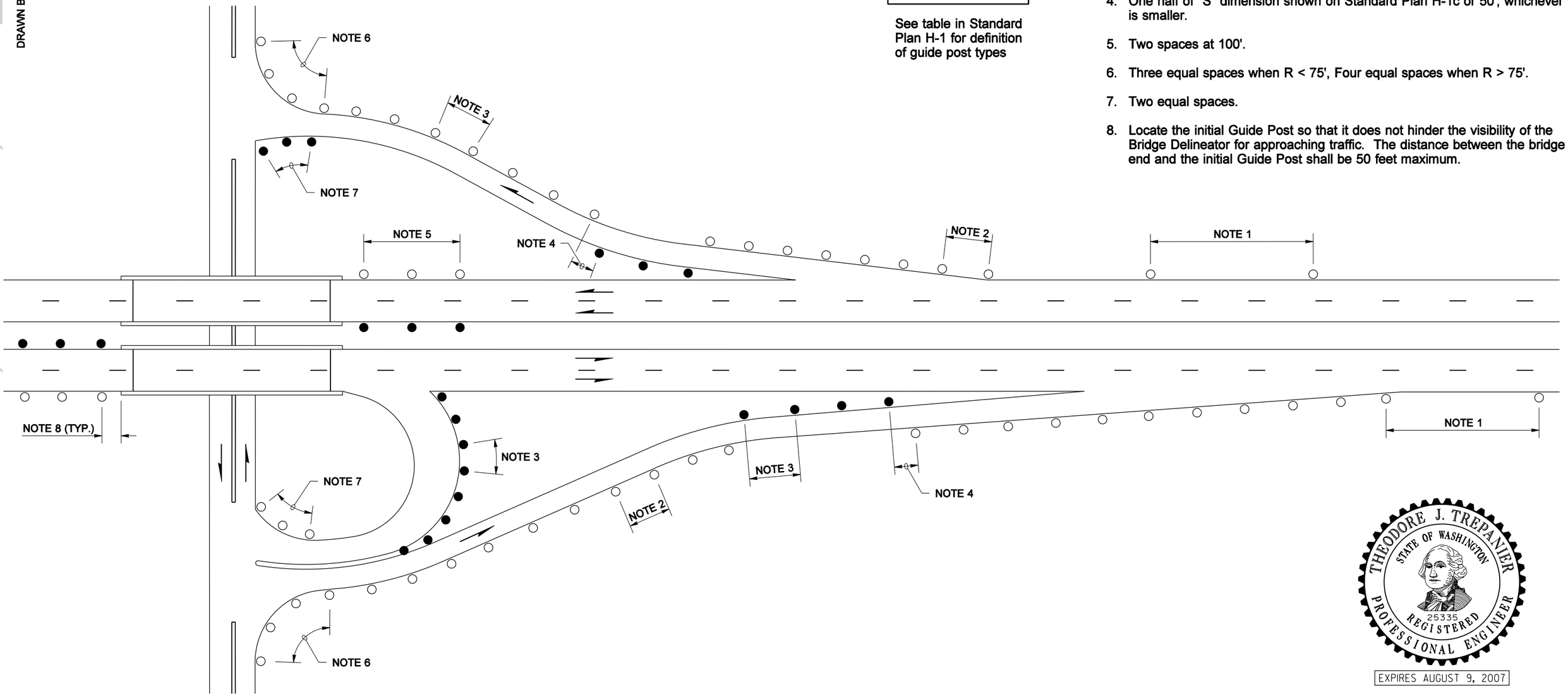
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

| DATE | REVISION | BY |
|---|---|---|
| 3/00 | DELETED "RED REFLECTIVE SHEETING". | TWS |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN




| LEGEND | |
|---|---|
| ○ | TYPE W |
| ● | TYPE Y |

See table in Standard Plan H-1 for definition of guide post types

**NOTES**

1. See plans for guide post requirements between interchanges.
2. Guide posts shall be placed at 100' on ramp tangents and tapers.
3. "S" dimension shown on Standard Plan H-1c or 100', whichever is smaller.
4. One half of "S" dimension shown on Standard Plan H-1c or 50', whichever is smaller.
5. Two spaces at 100'.
6. Three equal spaces when R < 75', Four equal spaces when R > 75'.
7. Two equal spaces.
8. Locate the initial Guide Post so that it does not hinder the visibility of the Bridge Delineator for approaching traffic. The distance between the bridge end and the initial Guide Post shall be 50 feet maximum.

THEODORE J. TREPANIER
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25335
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 9, 2007

# GUIDE POST PLACEMENT FOR INTERCHANGES

## STANDARD PLAN H-1b

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-21-06* — DATE

Washington State Department of Transportation

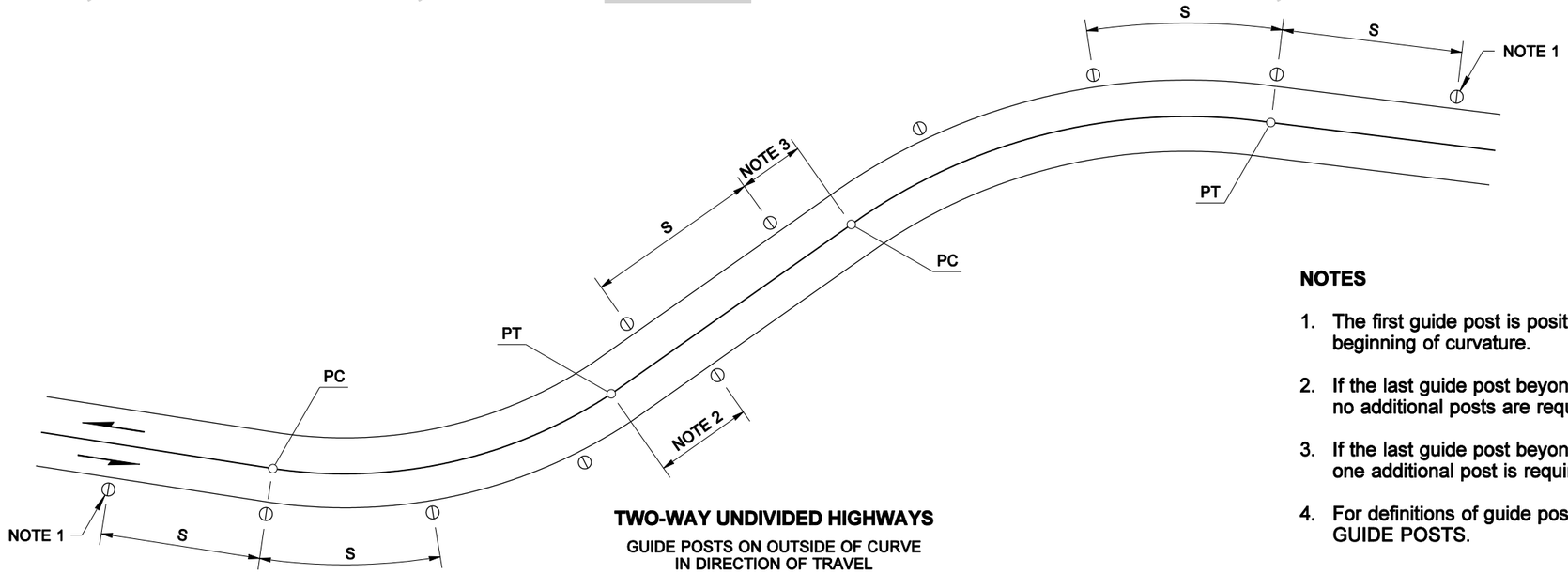
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| GUIDE POST SPACING (FEET) | |
|---|---|
| RADIUS | S |
| 50 | 20 |
| 115 | 25 |
| 150 | 30 |
| 200 | 35 |
| 250 | 40 |
| 300 | 50 |
| 400 | 55 |
| 500 | 65 |
| 600 | 70 |
| 700 | 75 |
| 800 | 80 |
| 900 | 85 |
| 1,000 | 90 |
| 1,200 | 100 |
| 1,700 | 120 |
| 2,300 | 140 |
| 2,900 | 160 |
| 3,700 | 180 |
| 4,500 | 200 |
| 5,500 | 220 |
| 6,500 | 240 |
| 7,600 | 260 |
| 8,800 | 280 |
| 10,000 | 300 |
| R>10,000 | 300 |

INTERPOLATE FROM THE TABLE FOR RADII NOT SHOWN



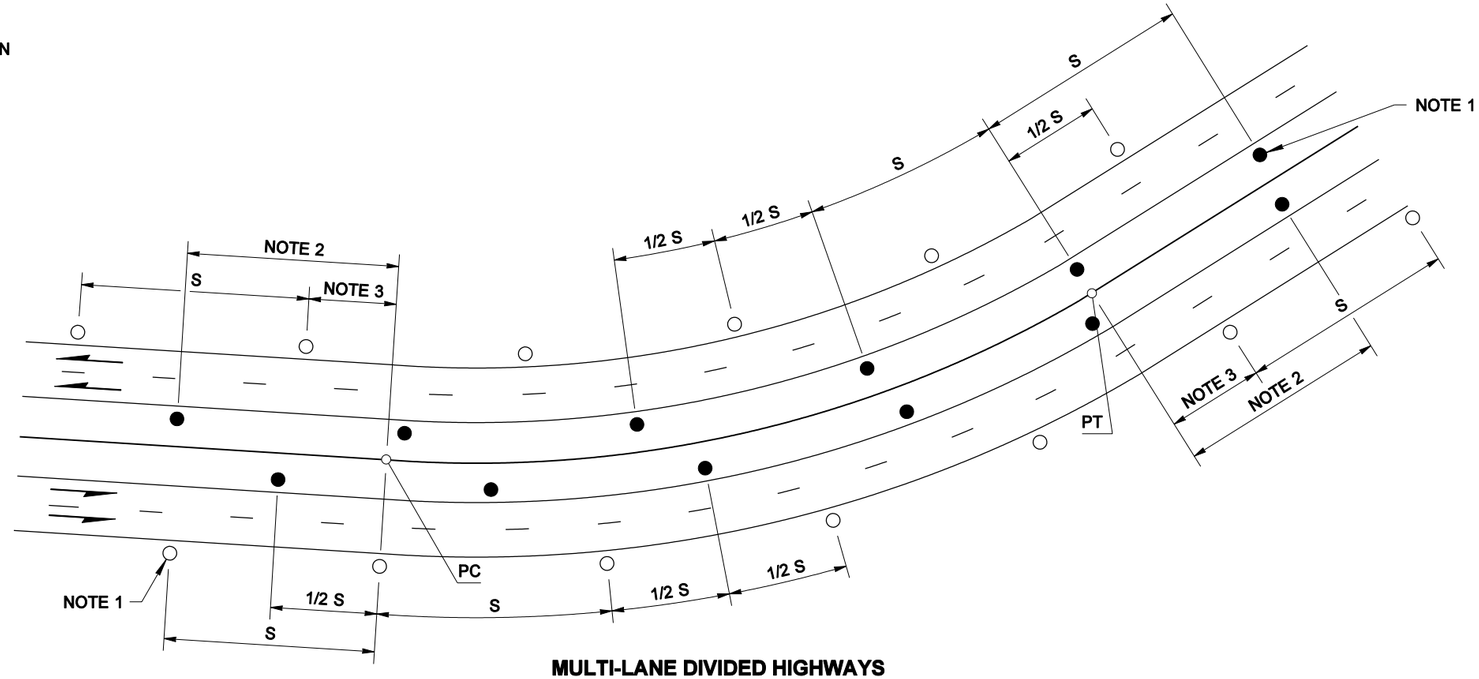

**TWO-WAY UNDIVIDED HIGHWAYS**

GUIDE POSTS ON OUTSIDE OF CURVE IN DIRECTION OF TRAVEL

**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.
4. For definitions of guide post types, see Standard Plan H-1, GUIDE POSTS.

| LEGEND |
|---|
| ○ TYPE W |
| ⦶ TYPE WW |
| ● TYPE Y |




**MULTI-LANE DIVIDED HIGHWAYS**

GUIDE POSTS ON INSIDE AND OUTSIDE OF CURVE FOR EACH DIRECTION OF TRAVEL

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# GUIDE POST PLACEMENT FOR HORIZONTAL CURVES

## STANDARD PLAN H-1c

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

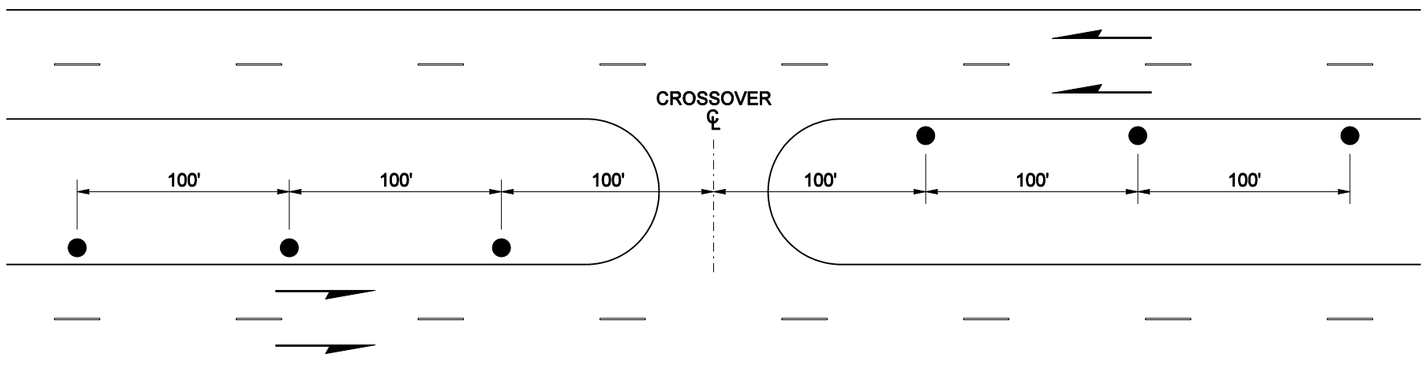
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *03-04-05* — DATE

Washington State Department of Transportation

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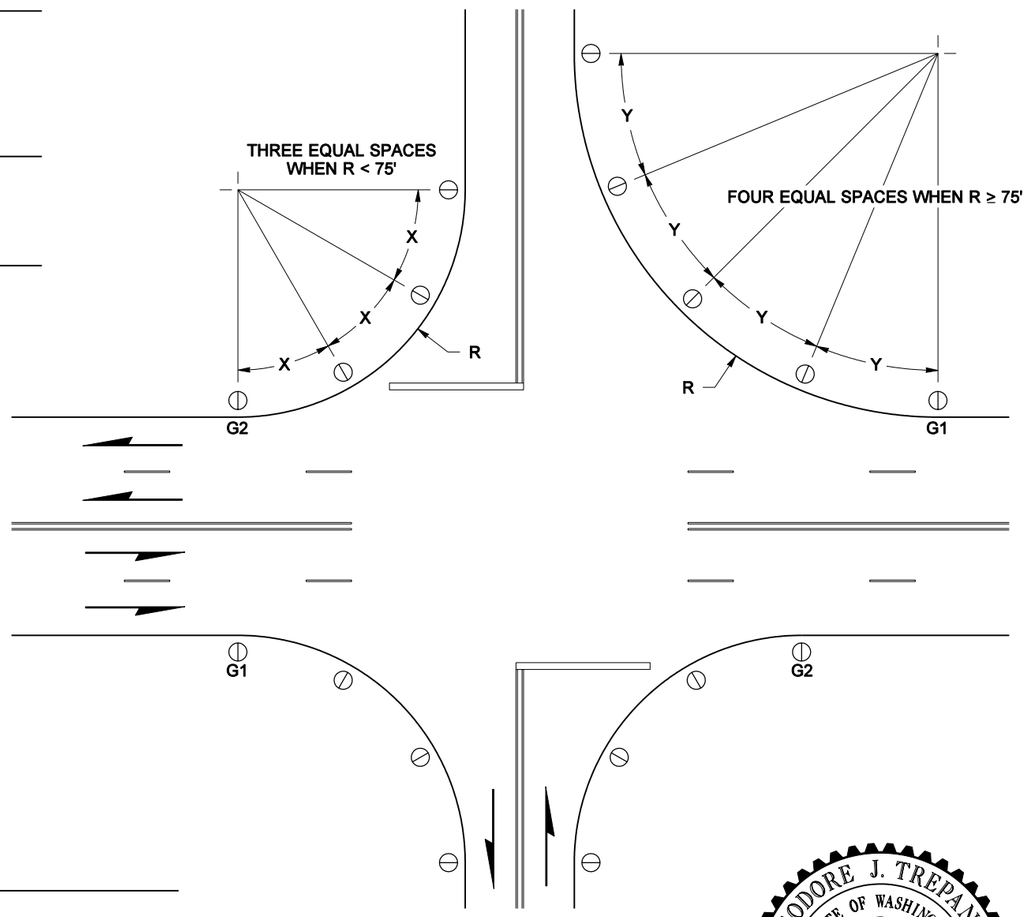
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**MEDIAN CROSSOVERS**




**LANE REDUCTIONS**




**UNDIVIDED HIGHWAY**
WITHOUT ILLUMINATION

**LEGEND**

- TYPE W
- TYPE WW
- TYPE Y
- G1 TYPE G1
- G2 TYPE G2

FOR DEFINITION OF GUIDE POST TYPES,
SEE STANDARD PLAN H-1, GUIDE POSTS

THEODORE J. TREPANIER
STATE OF WASHINGTON
25335
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 9, 2007

# MISCELLANEOUS GUIDE POST PLACEMENT

## STANDARD PLAN H-1d

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER
*06-21-06* — DATE

Washington State Department of Transportation

DRAWN BY: MARK SUJKA

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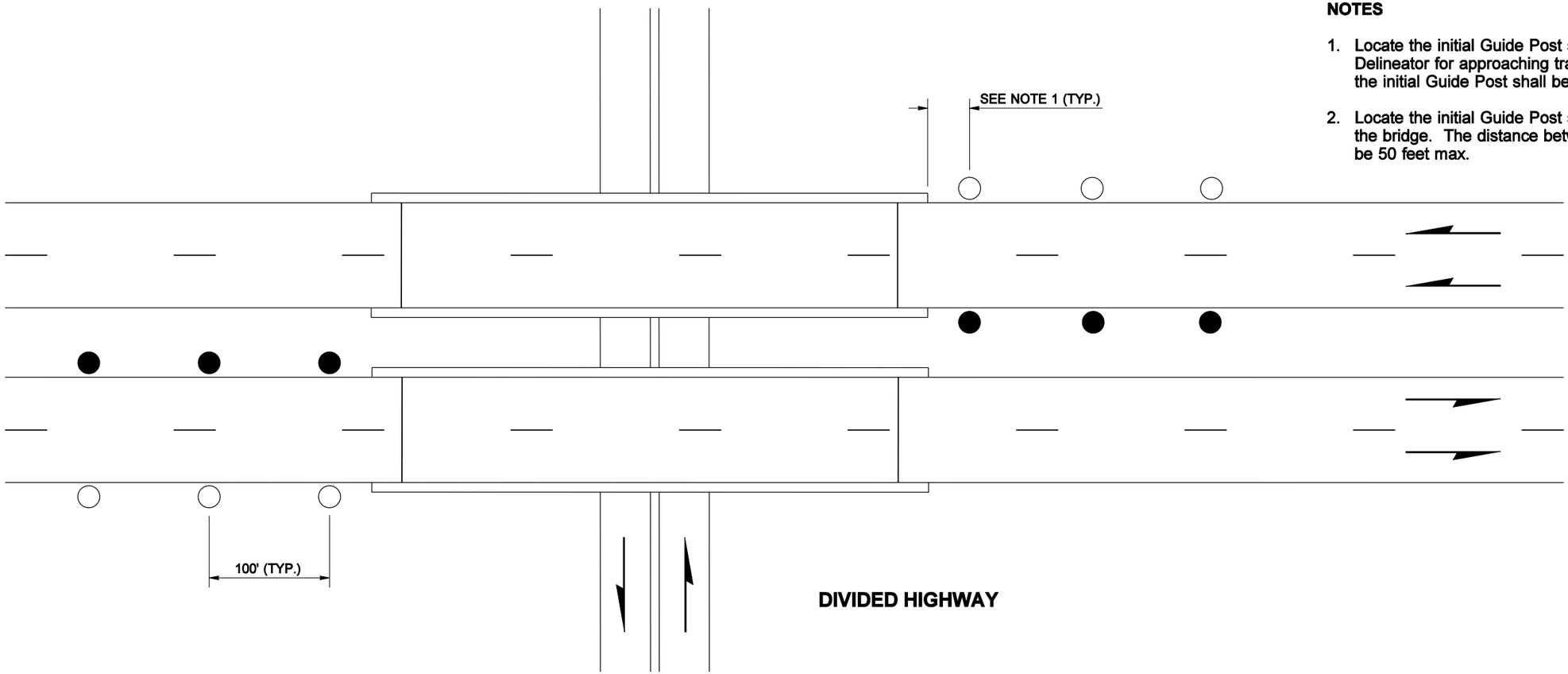
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

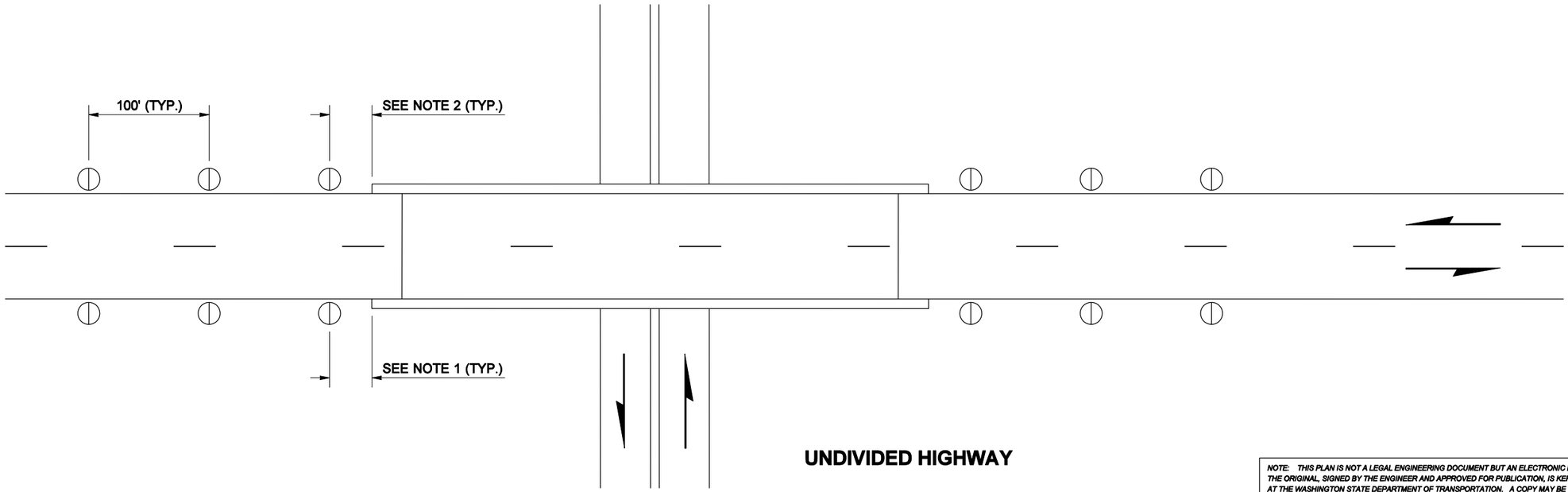
**NOTES**

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.




**DIVIDED HIGHWAY**




**UNDIVIDED HIGHWAY**

| LEGEND | |
|---|---|
| ○ | TYPE W |
| ● | TYPE Y |
| ⊖ | TYPE WW |

See table in Standard Plan H-1 for definition of guide post types

THEODORE J. TREPANIER
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25335
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EXPIRES AUGUST 9, 2007

# GUIDE POST PLACEMENT FOR BRIDGES

## STANDARD PLAN H-1e

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* *06-21-06*

STATE DESIGN ENGINEER — DATE

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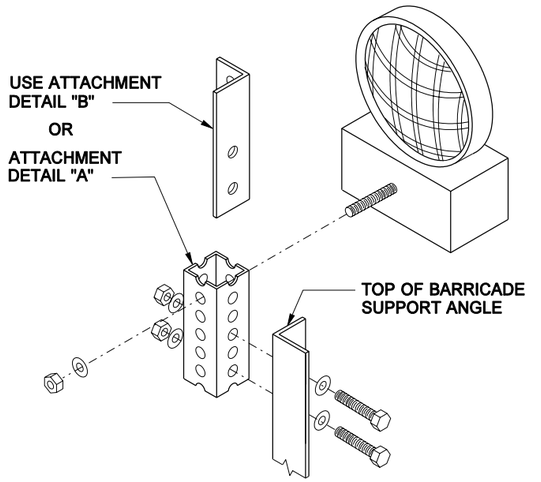
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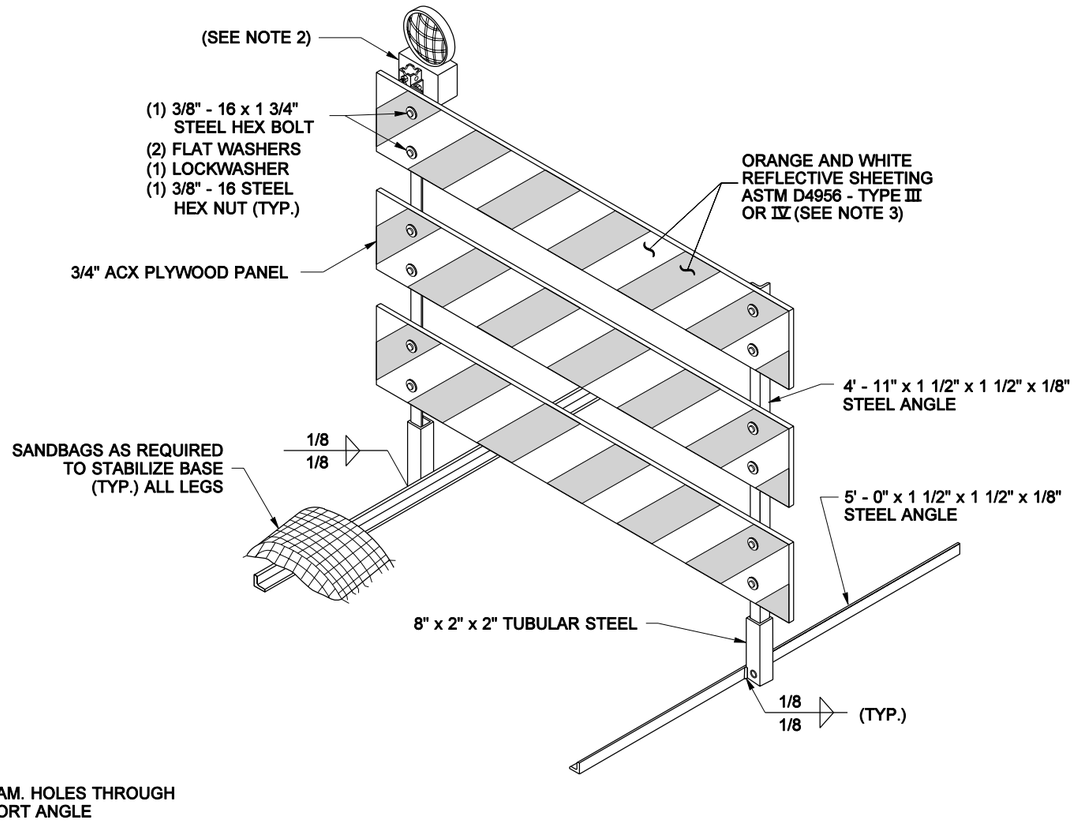
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

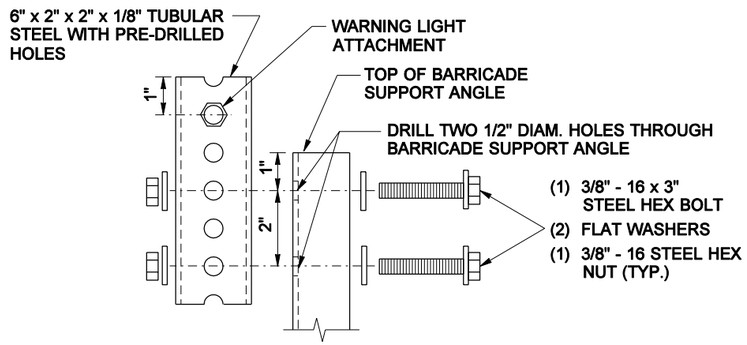



**WARNING LIGHT ATTACHMENT DETAIL**

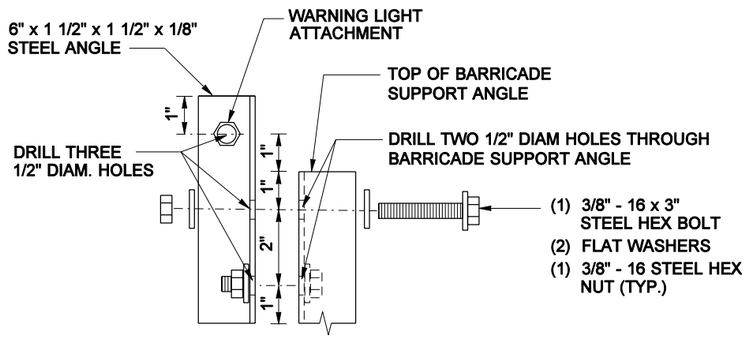



**NOTES**

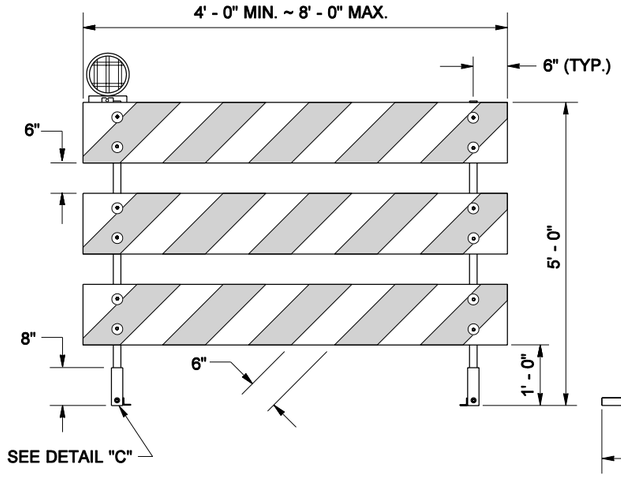
1. All fasteners may be zinc plated, galvanized or stainless steel. All steel angle and tubular steel shall be hot-rolled, high carbon steel, painted or galvanized.
2. Install one lightweight Type A Low-Intensity flashing warning light on the traffic side of the barricade. Install two Type A Low-Intensity flashing warning lights per barricade when the barricades are used to close a roadway. Attach the light to the barricade according to the light manufacturer's recommendations or use the details shown on this plan.
3. Stripes on barricade rails shall be alternating orange and white retroreflective stripes (sloping downward at an angle of 45 degrees in the direction traffic is to pass).
4. The Type 3 barricade design shown on this plan meets the crash test requirements of NCHRP 350. Alternate designs may be approved if they conform to the NCHRP 350 crash test criteria.
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.



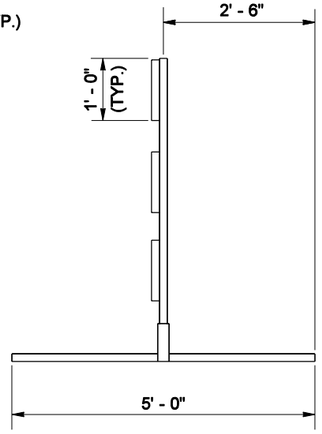

**ATTACHMENT DETAIL "A"**



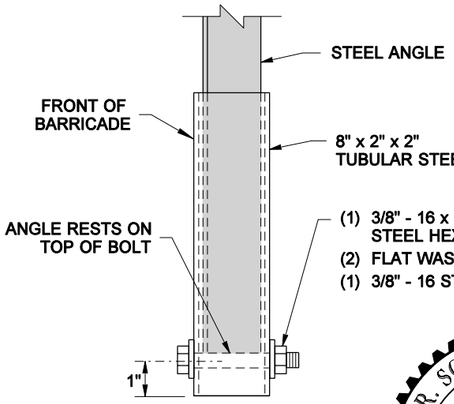

**ATTACHMENT DETAIL "B"**




**ELEVATION**




**SIDE**




**DETAIL "C"**




EXPIRES MAY 5, 2005

**TYPE 3 BARRICADE**

# STANDARD PLAN H-2

SHEET 1 OF 2 SHEETS

**TYPE 3 BARRICADE**

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *03-04-05* — DATE

Washington State Department of Transportation

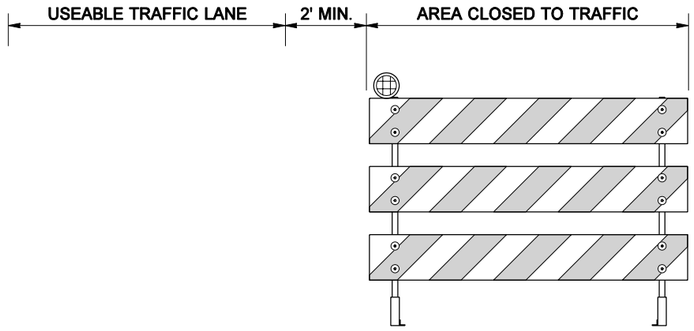
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DRAWN BY: MONIQUE GLICK

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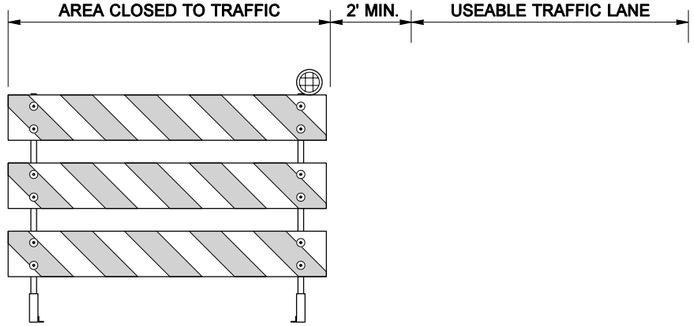
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




TYPE 3 L BARRICADE

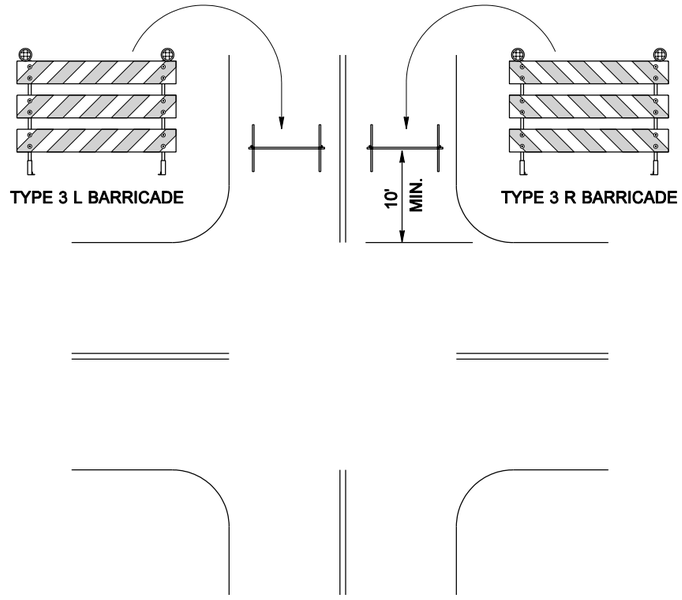
**STRIPES ON THE BARRICADES SHALL SLOPE DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS**



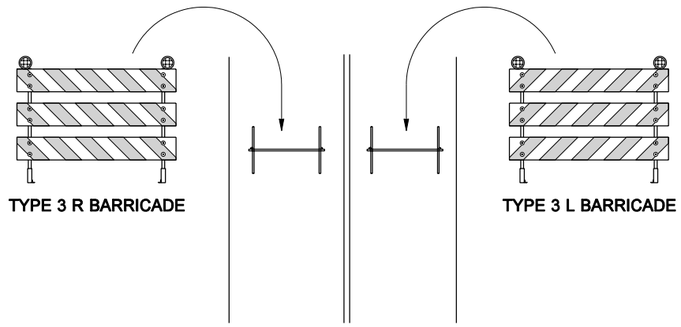

TYPE 3 R BARRICADE

**STRIPES ON THE BARRICADES SHALL SLOPE DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS**

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**ROAD CLOSURE AT INTERSECTION**




**ROAD CLOSURE AT OTHER LOCATIONS**




EXPIRES MAY 5, 2005

# TYPE 3 BARRICADE

## STANDARD PLAN H-2

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *03-04-05* — DATE

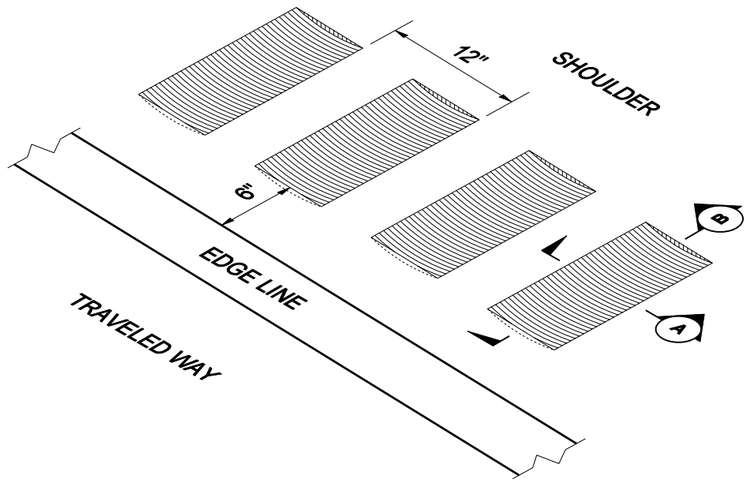
Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

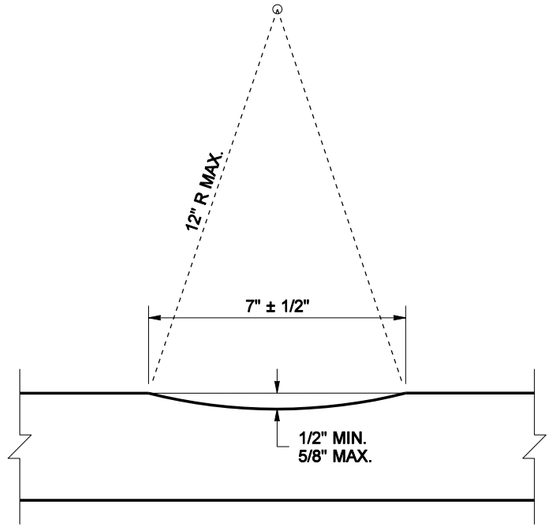
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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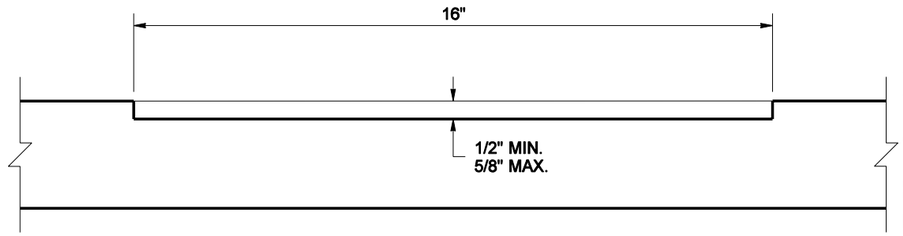



ISOMETRIC VIEW

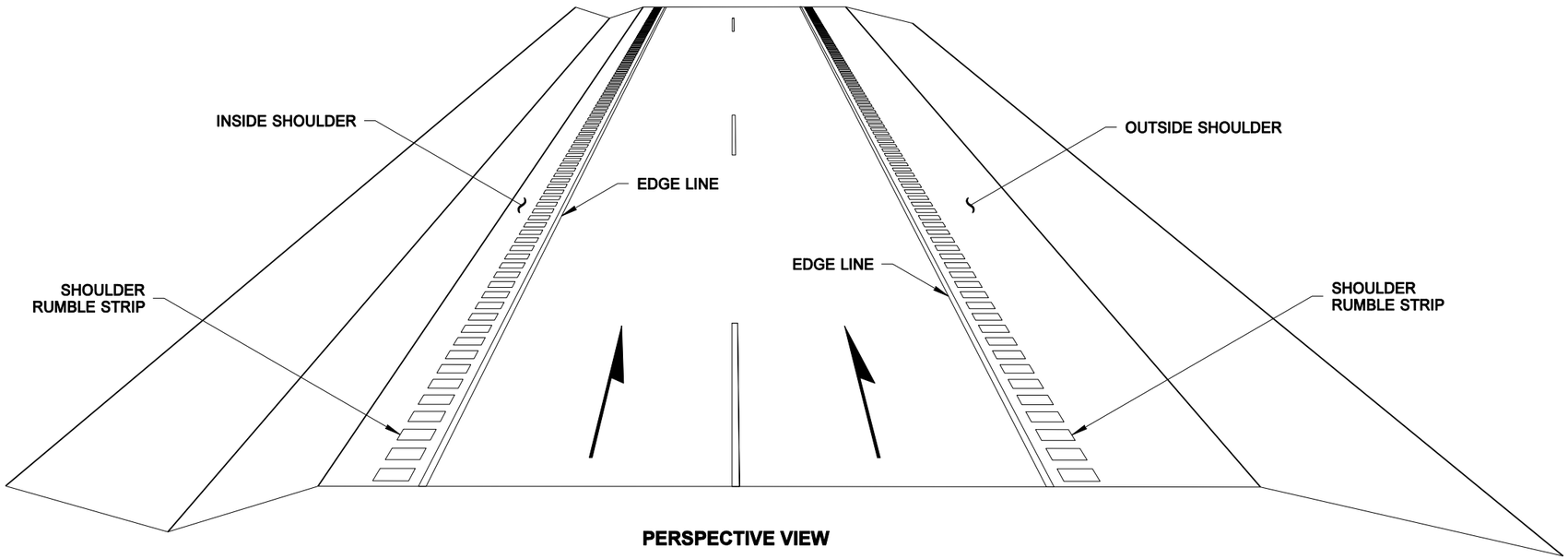
**TYPICAL SHOULDER INSTALLATION**




SECTION (A)




SECTION (B)




PERSPECTIVE VIEW

**MULTI-LANE DIVIDED HIGHWAY**

HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2005

# SHOULDER RUMBLE STRIP TYPE 1 FOR DIVIDED HIGHWAYS STANDARD PLAN H-4

SHEET 1 OF 4 SHEETS

APPROVED FOR PUBLICATION

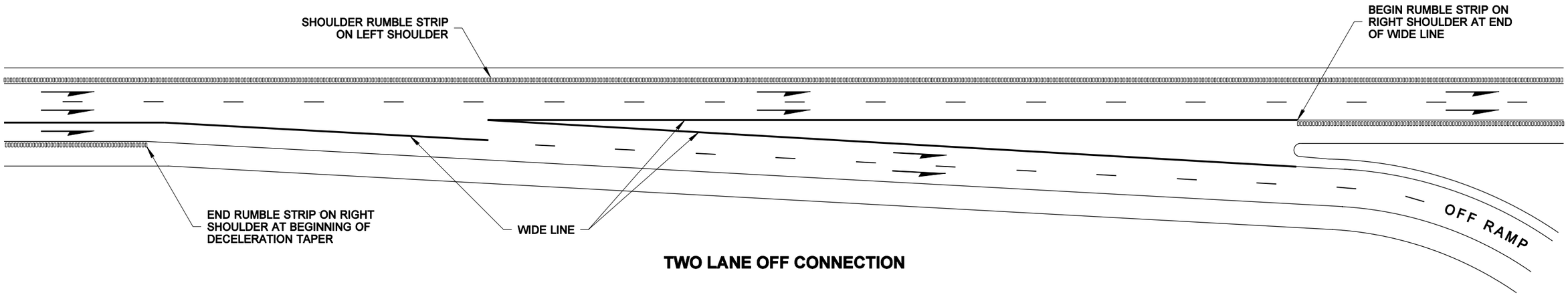
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *08-18-04* DATE

Washington State Department of Transportation

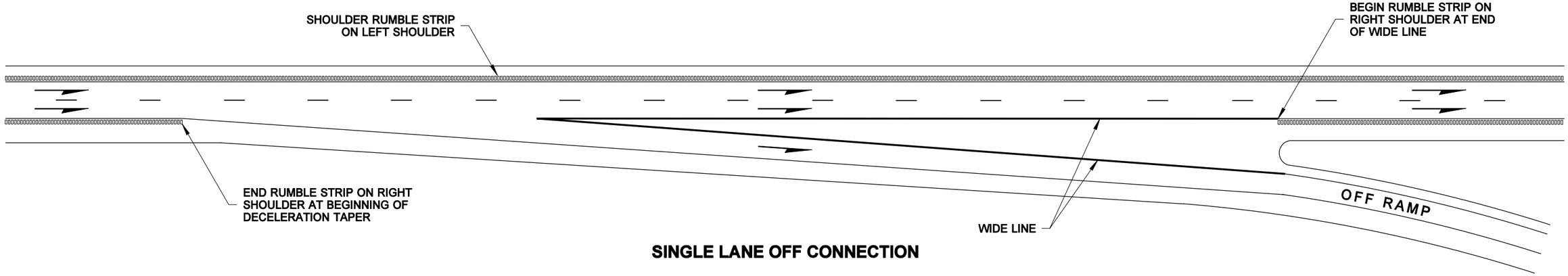
| DATE | REVISION | BY |
|---|---|---|
| 05/2004 | ADDED SHEET 4, RUMBLE STRIP PLACEMENT AT INTERSECTIONS DETAIL | AMC |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

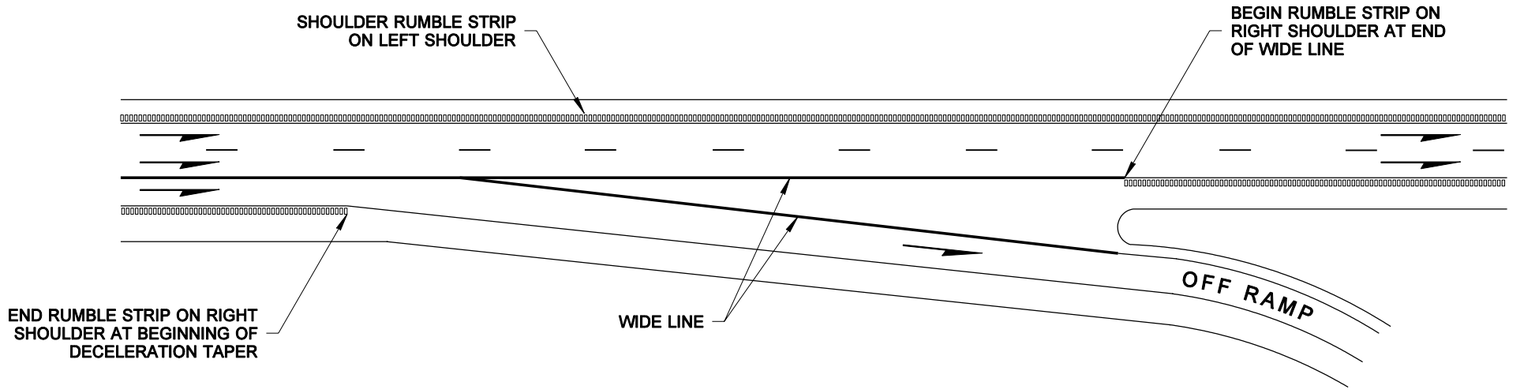
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**TWO LANE OFF CONNECTION**




**SINGLE LANE OFF CONNECTION**




**SINGLE LANE OFF CONNECTION**
**FOR ONE LANE REDUCTION**

HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2005

# SHOULDER RUMBLE STRIP TYPE 1 FOR DIVIDED HIGHWAYS STANDARD PLAN H-4

SHEET 2 OF 4 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* *08-18-04*

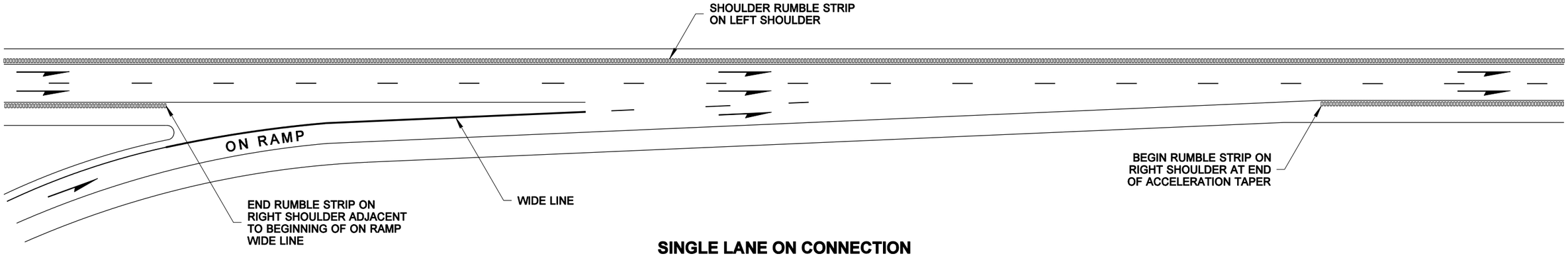
STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

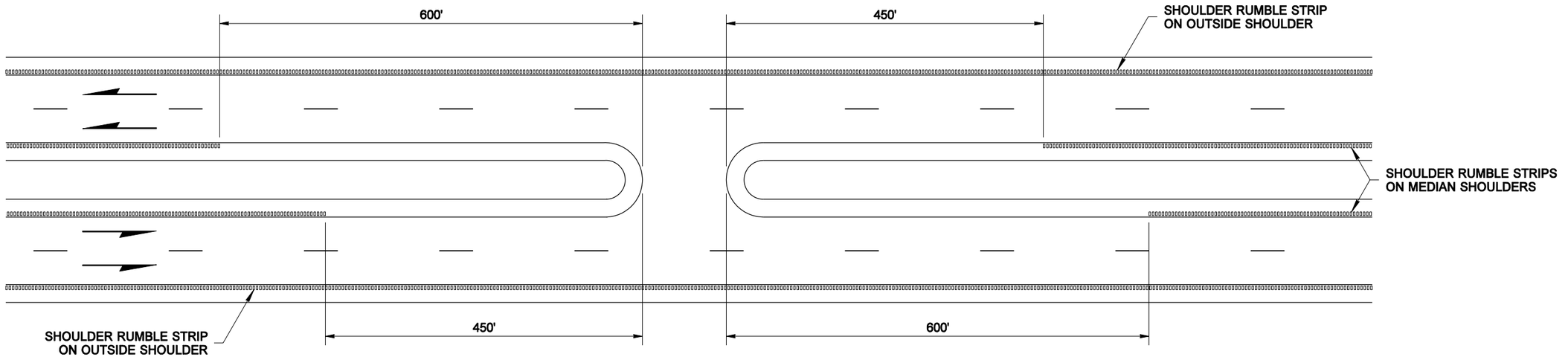
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

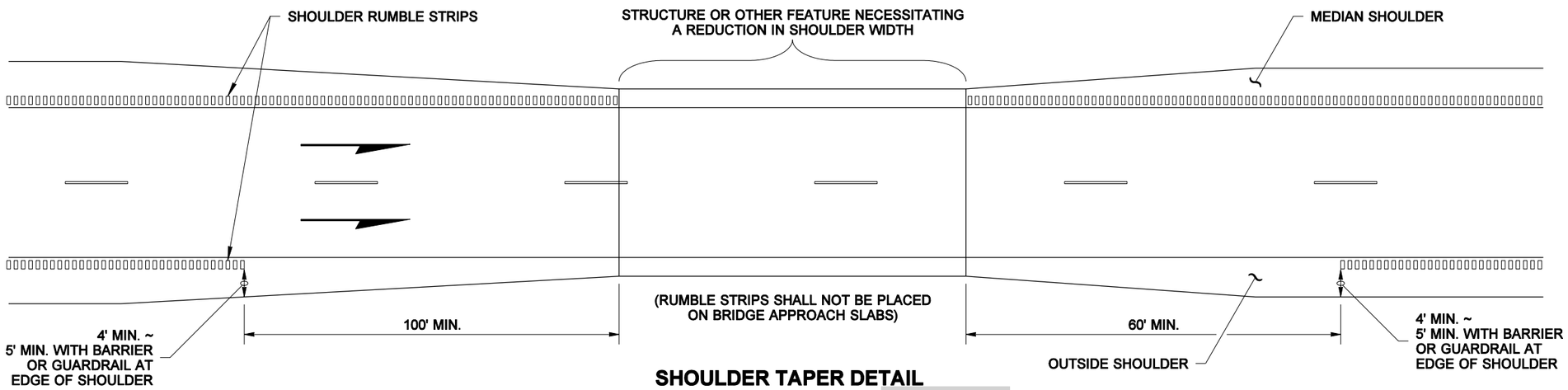
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




## SINGLE LANE ON CONNECTION




## MEDIAN CROSSOVER




## SHOULDER TAPER DETAIL

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HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2005

# SHOULDER RUMBLE STRIP TYPE 1 FOR DIVIDED HIGHWAYS STANDARD PLAN H-4

SHEET 3 OF 4 SHEETS

APPROVED FOR PUBLICATION

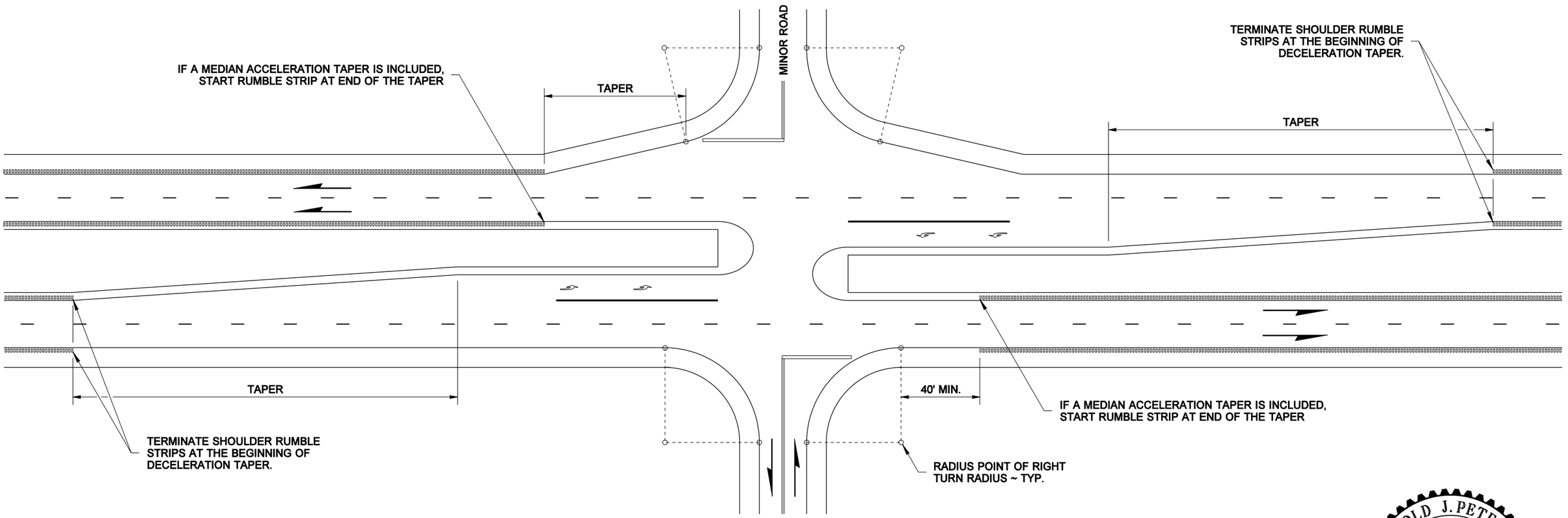
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *08-18-04* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN




## RUMBLE STRIP PLACEMENT AT INTERSECTIONS

HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2005

# SHOULDER RUMBLE STRIP TYPE 1 FOR DIVIDED HIGHWAYS STANDARD PLAN H-4

SHEET 4 OF 4 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *08-18-04* — DATE

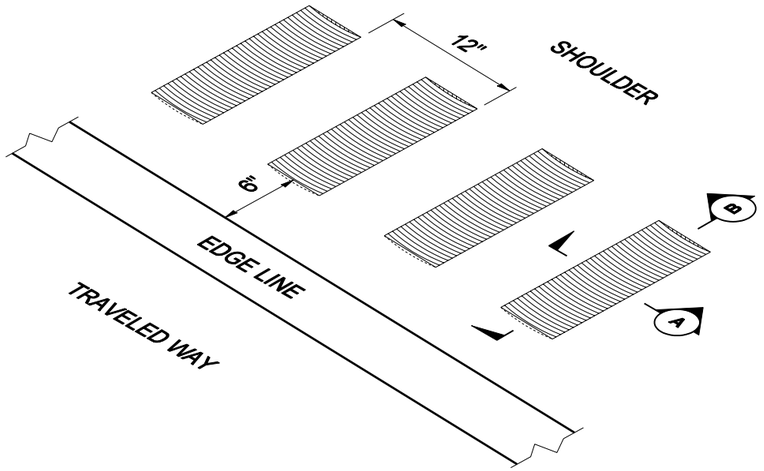
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

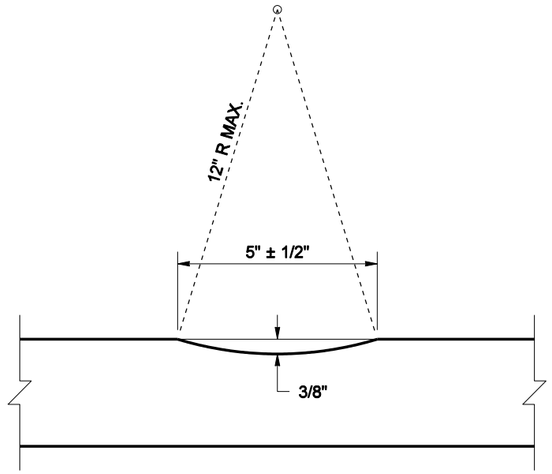
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA




ISOMETRIC VIEW

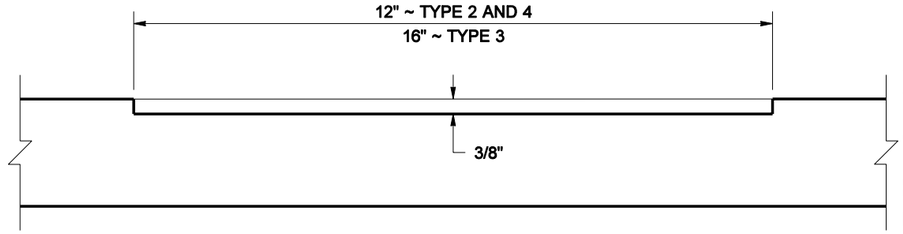
**TYPICAL SHOULDER INSTALLATION**



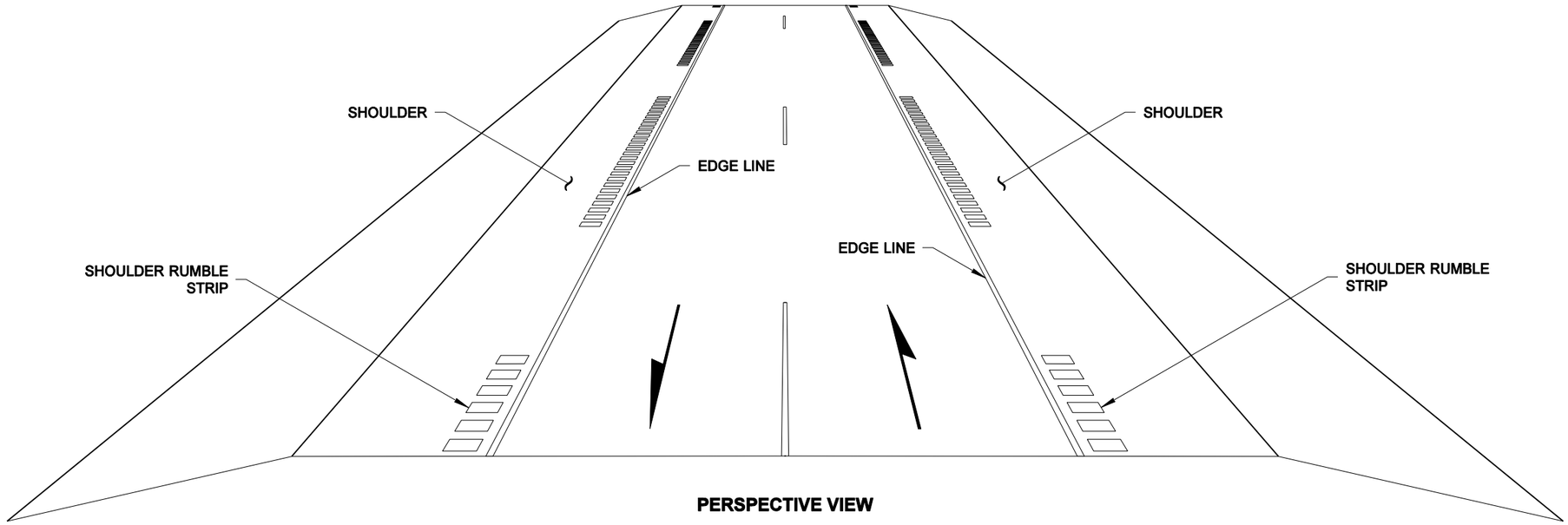

SECTION (A)

**NOTE**

Rumble strips are not installed in certain reduced-width shoulder locations. See the SHOULDER TAPER DETAIL on Standard Plan H-4.




SECTION (B)




PERSPECTIVE VIEW

**UNDIVIDED HIGHWAY**
(TYPE 4 PATTERN SHOWN)

HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2005

# SHOULDER RUMBLE STRIP TYPES 2, 3, & 4 FOR UNDIVIDED HIGHWAYS STANDARD PLAN H-4a

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-25-05* — DATE

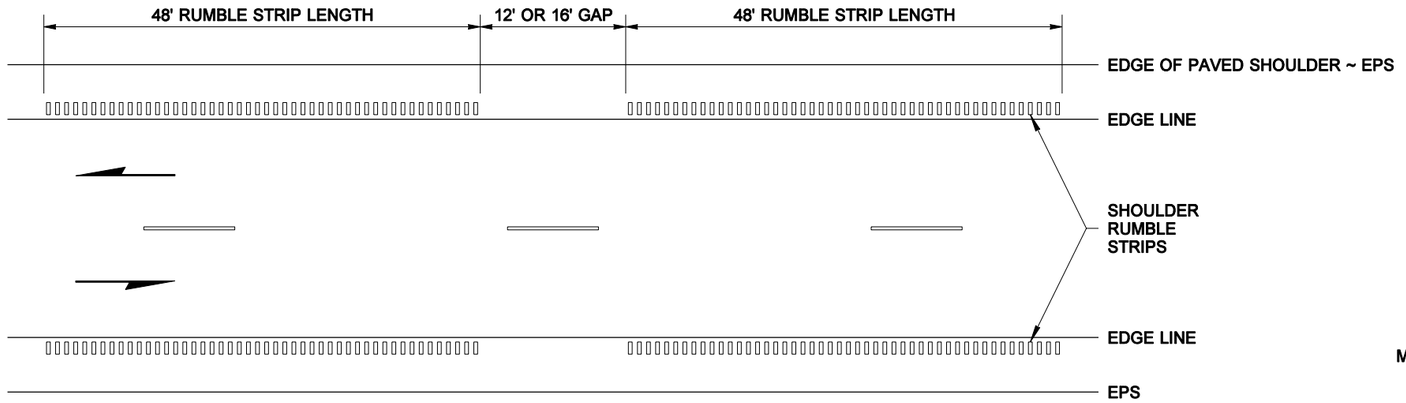
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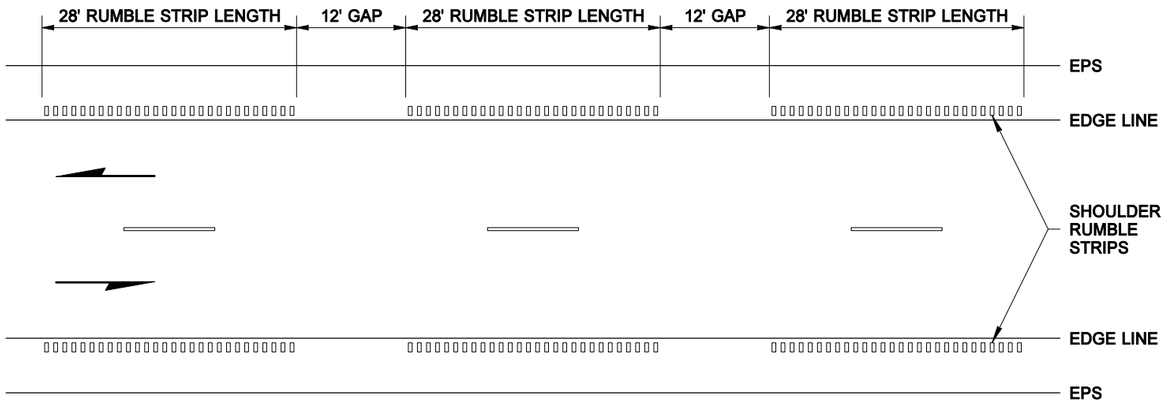
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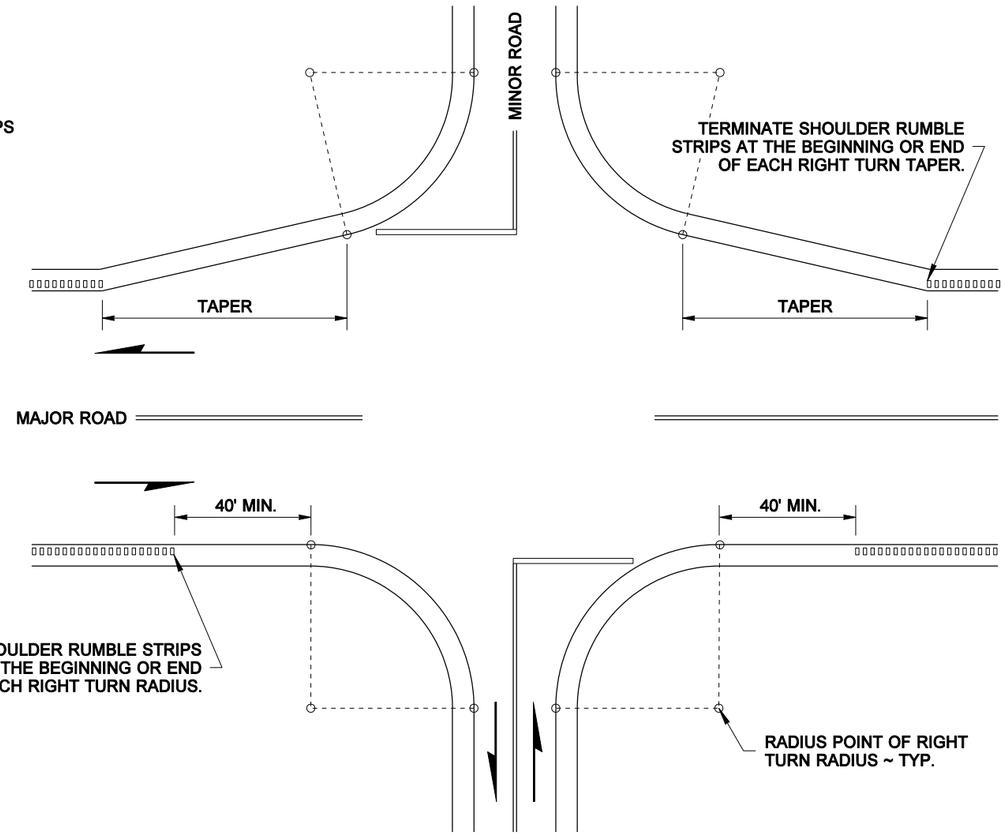
DRAWN BY: MARK SUJKA




**TYPE 2** ~ 12' GAP AND 12" WIDE STRIP
**TYPE 3** ~ 16' GAP AND 16" WIDE STRIP




**TYPE 4** ~ 12" WIDE STRIP




**RUMBLE STRIP PLACEMENT AT INTERSECTIONS**

HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2005

# SHOULDER RUMBLE STRIP TYPES 2, 3, & 4 FOR UNDIVIDED HIGHWAYS STANDARD PLAN H-4a

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

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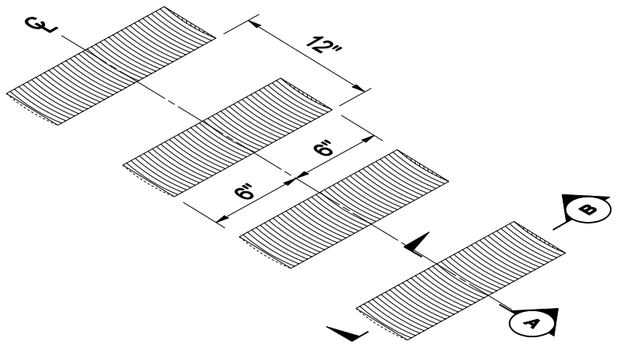
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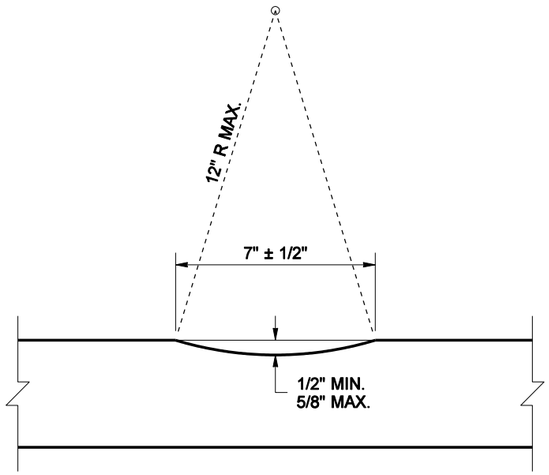
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DRAWN BY: BILL BERENS

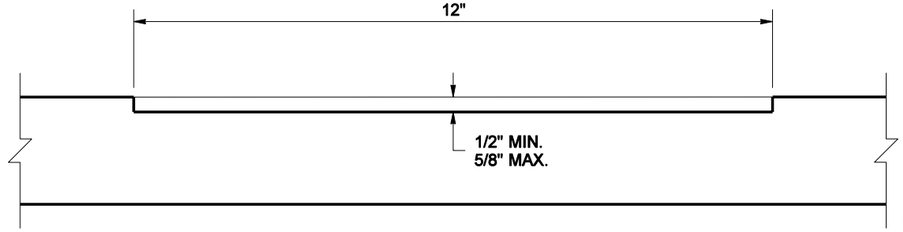



**ISOMETRIC VIEW**

**TYPICAL INSTALLATION**



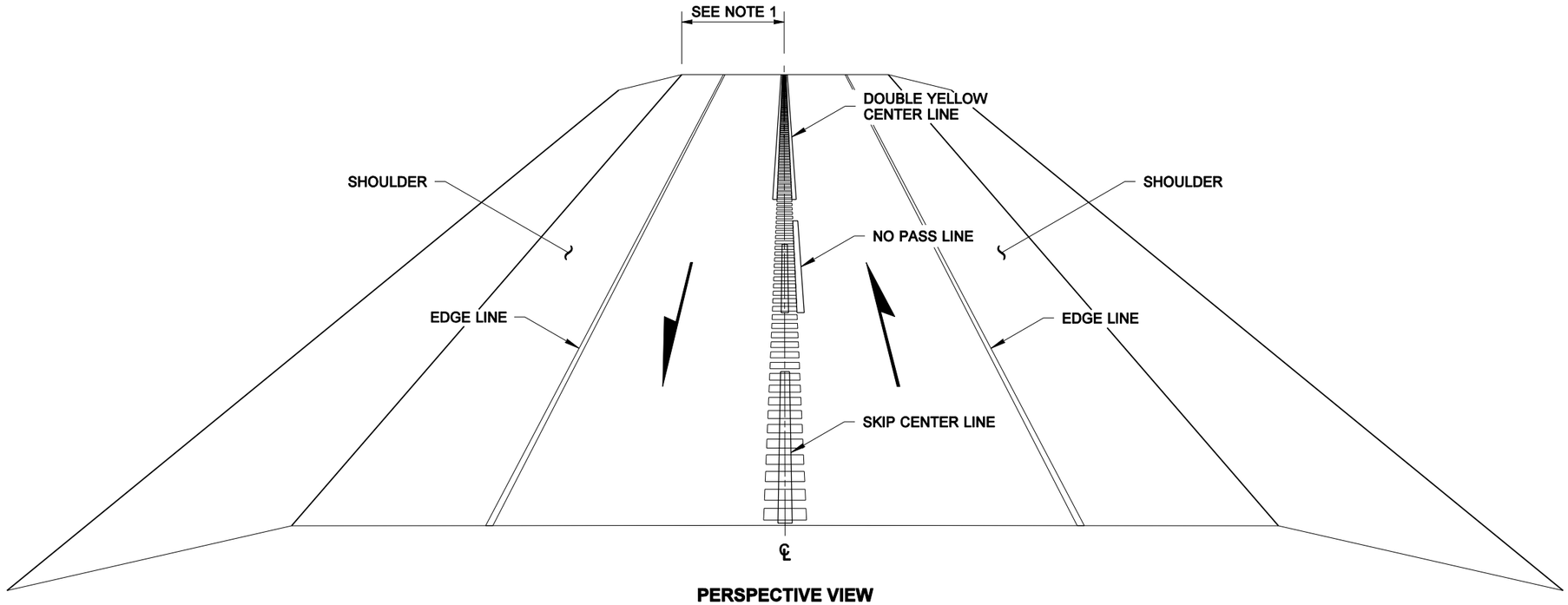

**SECTION (A)**




**SECTION (B)**

**NOTES**

1. Center Line Rumble Strip installation requires a minimum distance of 12 feet from roadway center line to edge of paved shoulder.
2. When directed by the Engineer, Rumble Strips may be omitted along the turn pocket taper where noise may adversely affect adjacent residents.




**PERSPECTIVE VIEW**

**UNDIVIDED HIGHWAY**

HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2005

# CENTER LINE RUMBLE STRIP

## STANDARD PLAN H-4b

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-25-05* — DATE

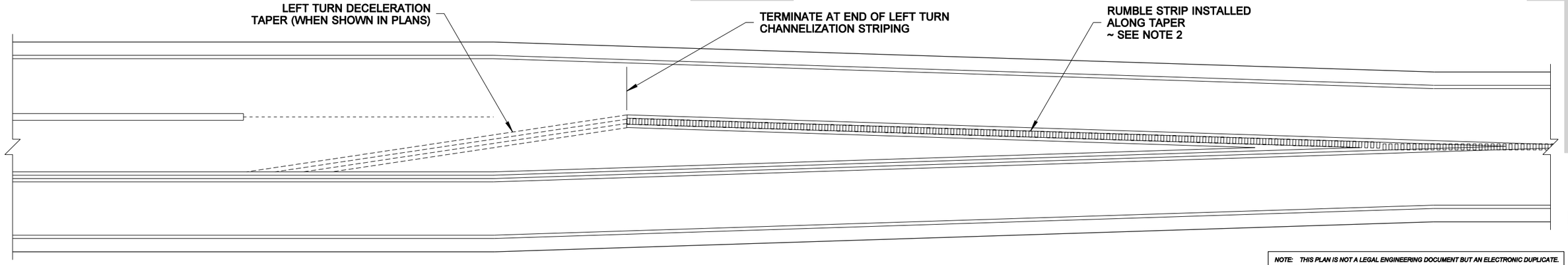
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

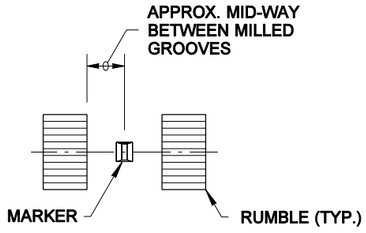
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DRAWN BY: BILL BERENS

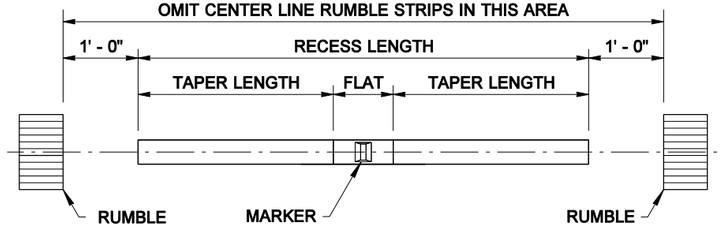



## INTERSECTION WITH LEFT TURN CHANNELIZATION

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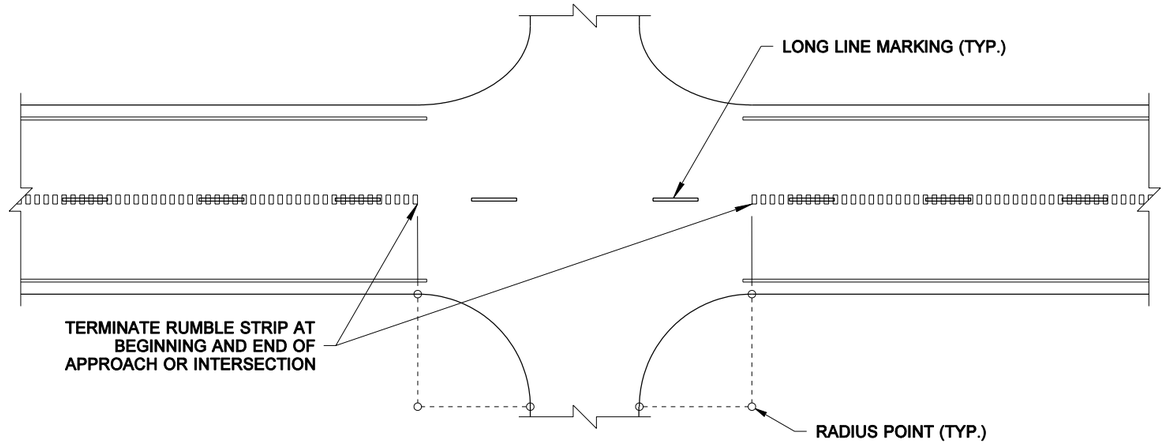



**RAISED PAVEMENT MARKER**
WHEN SPECIFIED IN CONTRACT

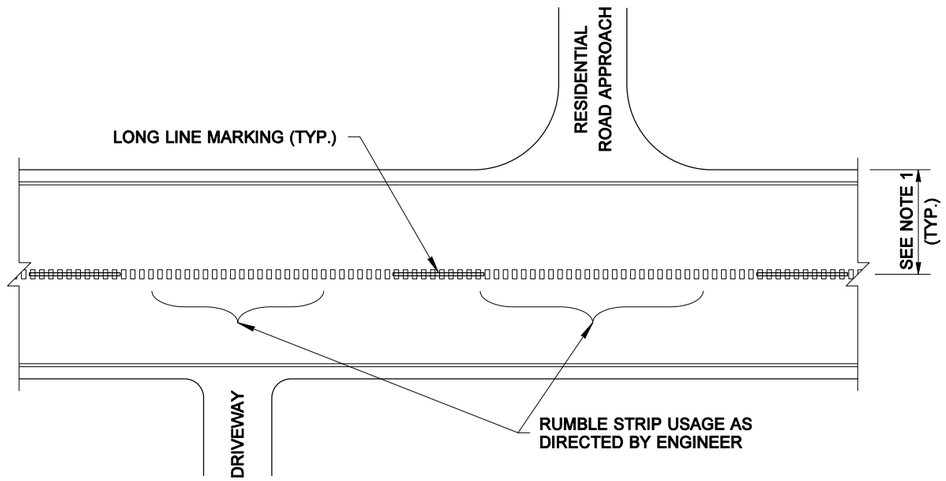



REFER TO STANDARD PLAN M-20.30 FOR
RECESSED PAVEMENT MARKER DETAIL

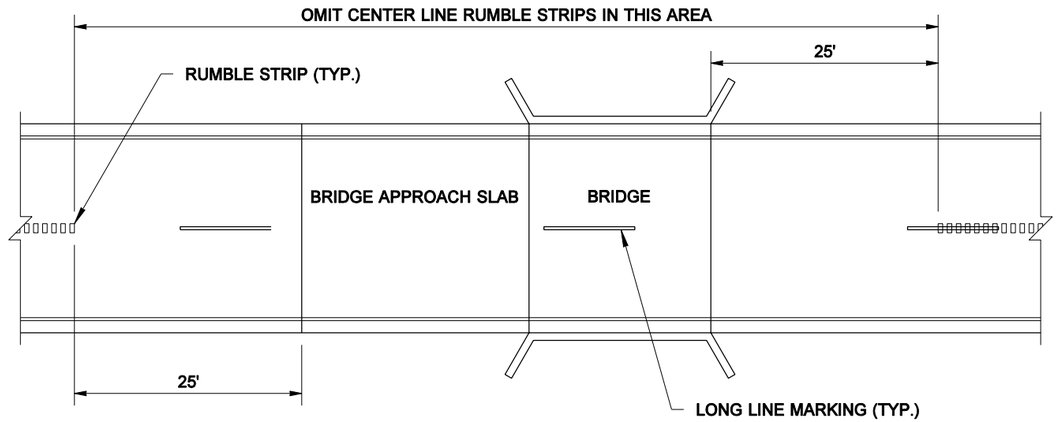
**RECESSED PAVEMENT MARKER**
WHEN SPECIFIED IN CONTRACT




**UNCHANNELIZED INTERSECTIONS**
**AND COMMERCIAL ROAD APPROACHES**




**NON-COMMERCIAL ROAD APPROACHES AND DRIVEWAYS**




**BRIDGE**

HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2005

# CENTER LINE RUMBLE STRIP

## STANDARD PLAN H-4b

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

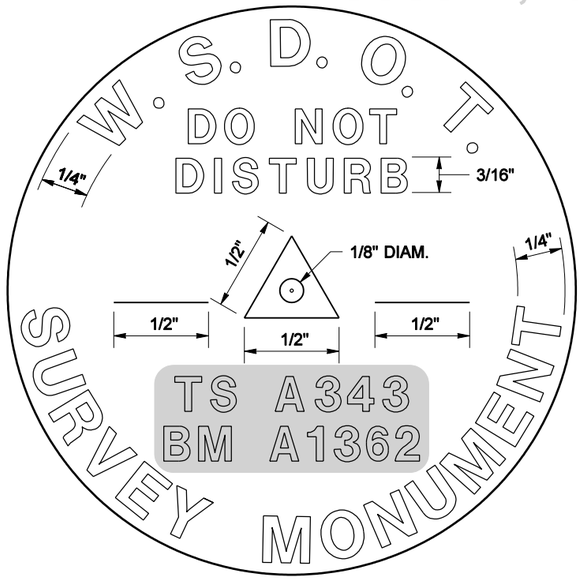
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-25-05* — DATE

Washington State Department of Transportation

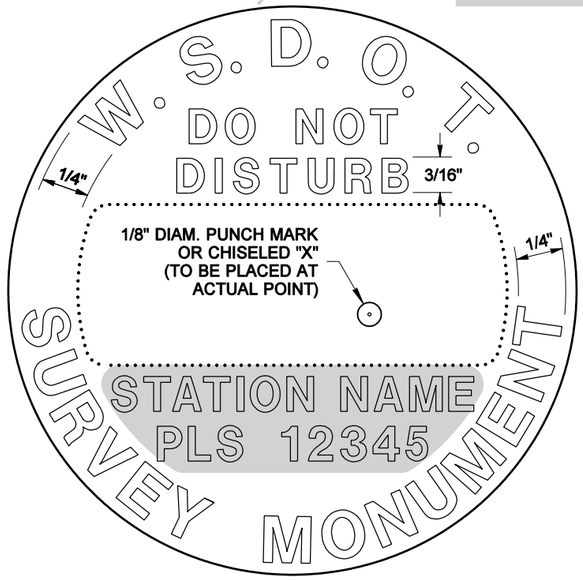
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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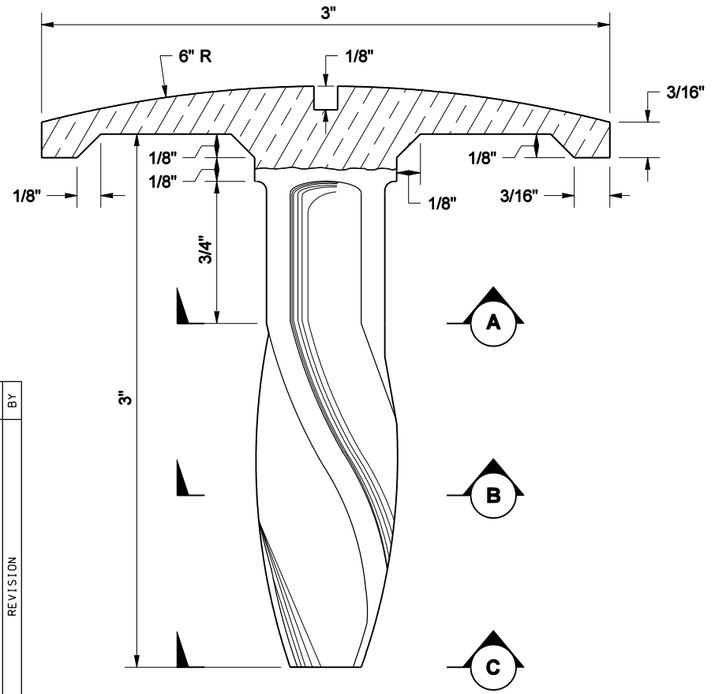

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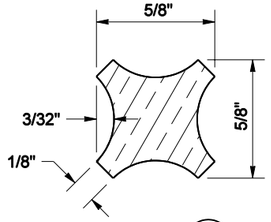

**TYPE 2**

**TOP VIEW**

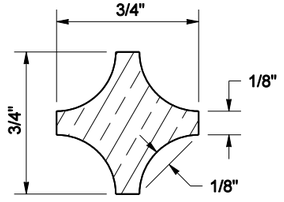
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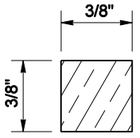

**SIDE VIEW**




**SECTION (A)**



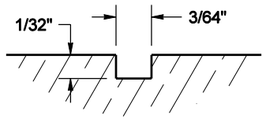

**SECTION (B)**



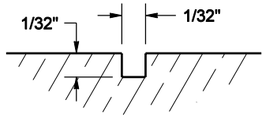

**SECTION (C)**

| BY | DATE | REVISION |
|---|---|---|
| MAS | 10/2003 | ADDED TYPE 2 MONUMENT |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



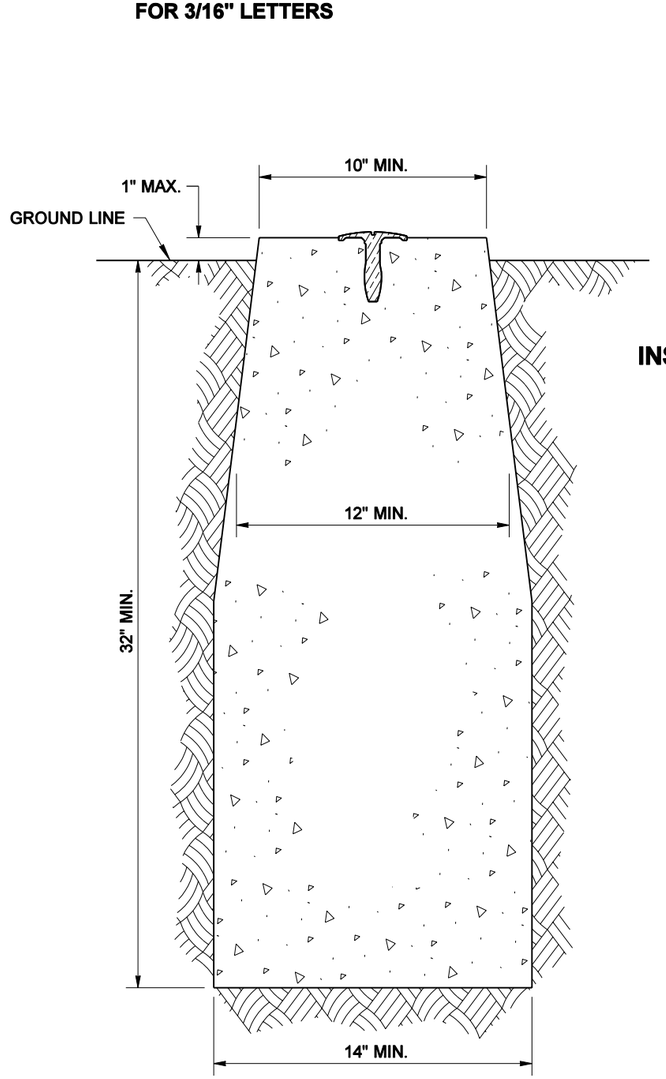

**SECTION OF GROOVE FOR 1/4" LETTERS**




**SECTION OF GROOVE FOR 3/16" LETTERS**

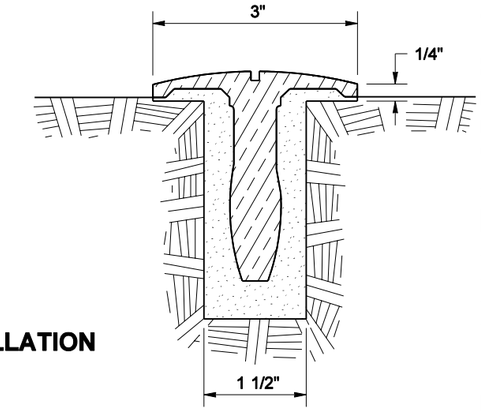
## NOTES

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. WHEN THE CONCRETE IS SET, COVER THE ENTIRE MONUMENT WITH MOIST EARTH AND LEAVE FOR THREE DAYS.
5. THE TOP OF THE MONUMENT MAY BE RECESSED OR PROTRUDING, DEPENDING ON CONDITIONS.
6. TO REPLACE A GENERAL LAND OFFICE (GLO) CORNER, CONSULT A LICENSED PROFESSIONAL LAND SURVEYOR (PLS).




**SECTION VIEW OF GENERAL INSTALLATION**

**INSTALLATION**




**SECTION VIEW OF LEDGE ROCK, CONCRETE OR ASPHALT INSTALLATION**




EXPIRES MAY 16, 2005

# SURVEY MONUMENTS TYPE 1 AND TYPE 2

# STANDARD PLAN H-6

SHEET 1 OF 1 SHEET

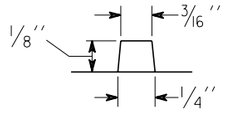
APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *10-29-03* — DATE

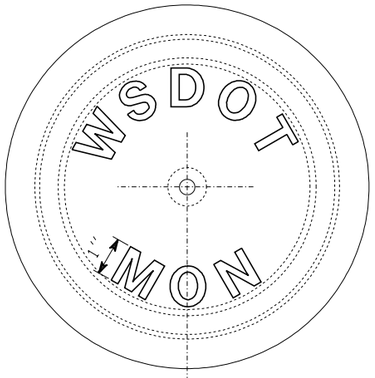
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

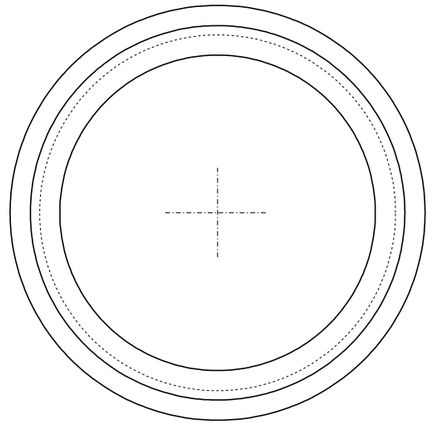



SECTION OF LETTER




MONUMENT COVER

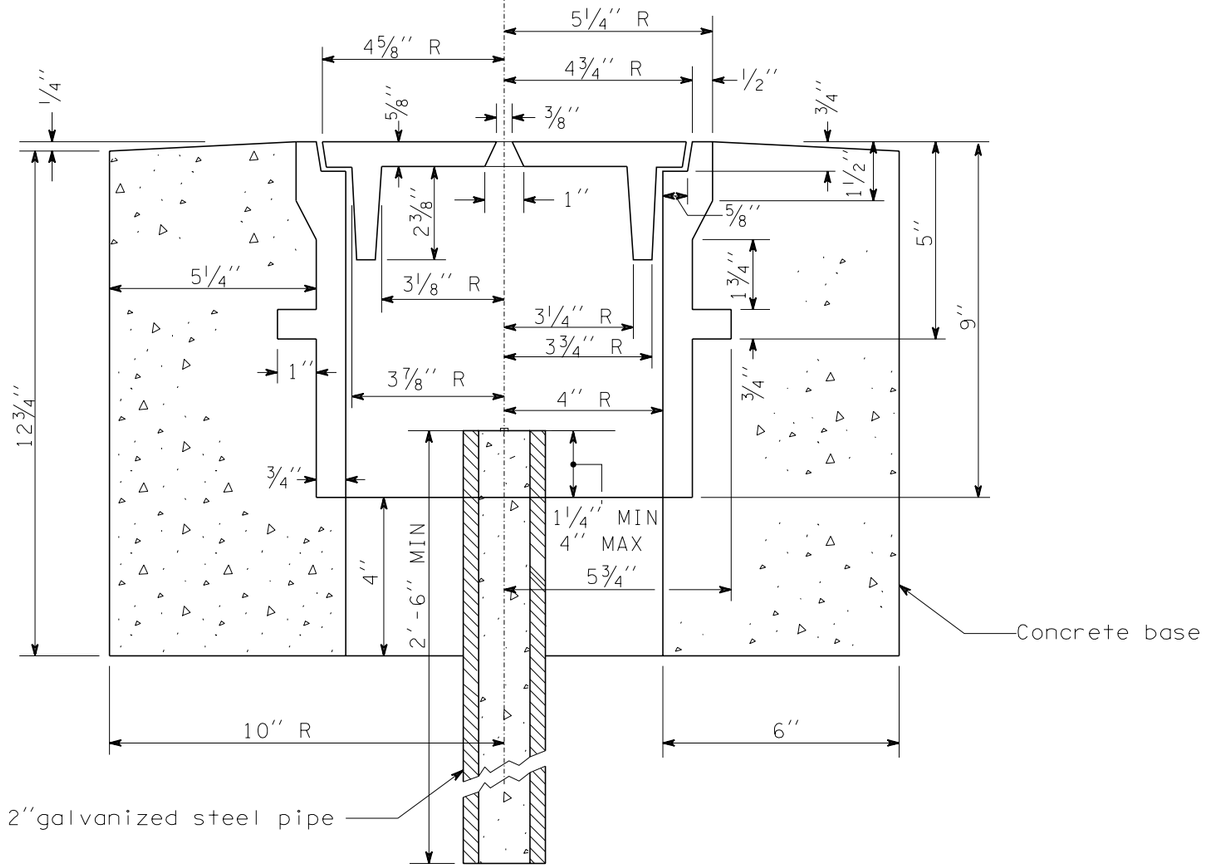
| APPROXIMATE WEIGHTS | |
|---|---|
| Case | 60 lbs |
| Cover | 19 lbs |
| Total | 79 lbs |



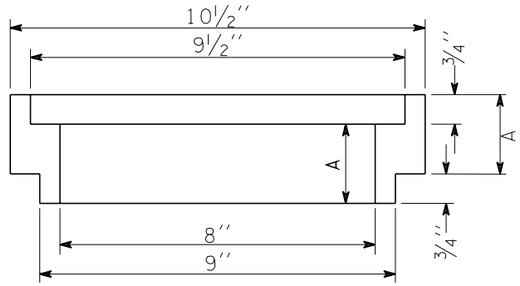
PLAN

RISER RING

| RISER RING DIMENSIONS | | | |
|---|---|---|---|
| A (SIZE) | 1 1/2'' | 2'' | 3'' |




ASSEMBLY SECTION




SECTION

RISER RING

CLIFFORD E. MANSFIELD
STATE OF WASHINGTON
15224
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2000

# MONUMENT CASE AND COVER

# STANDARD PLAN H-7

*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.*

APPROVED FOR PUBLICATION

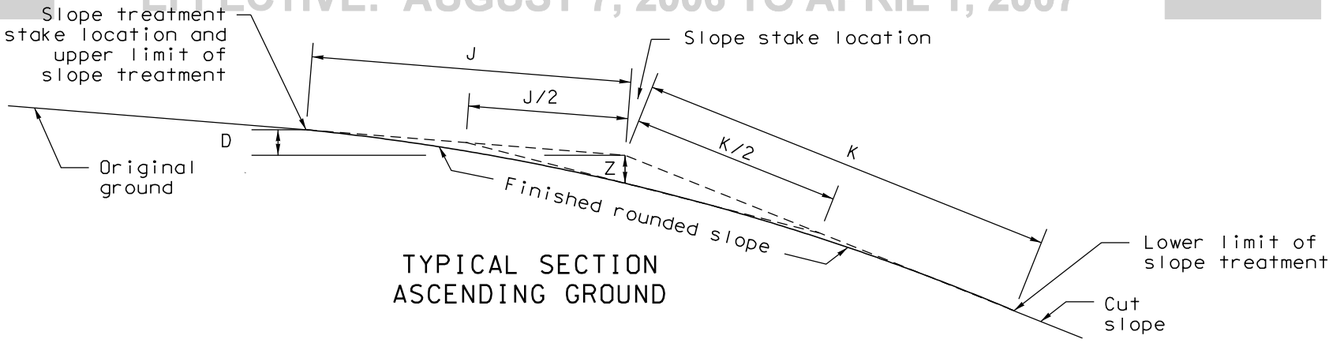
*Clifford E. Mansfield* — *8/10/98*

DEPUTY STATE DESIGN ENGINEER — DATE

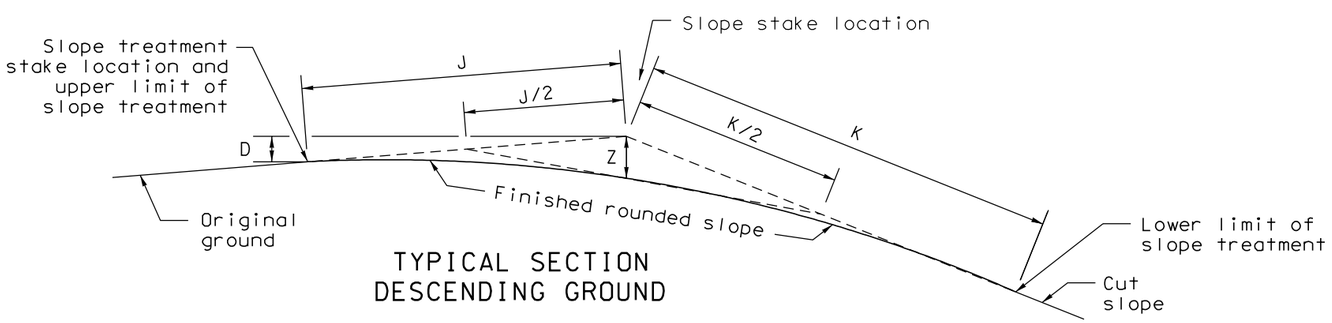
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

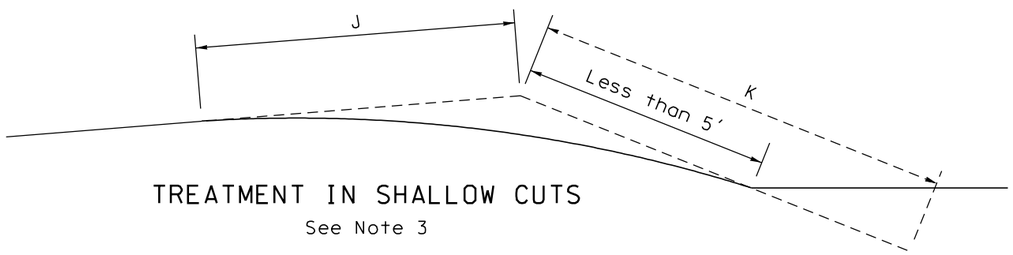
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




TYPICAL SECTION
ASCENDING GROUND

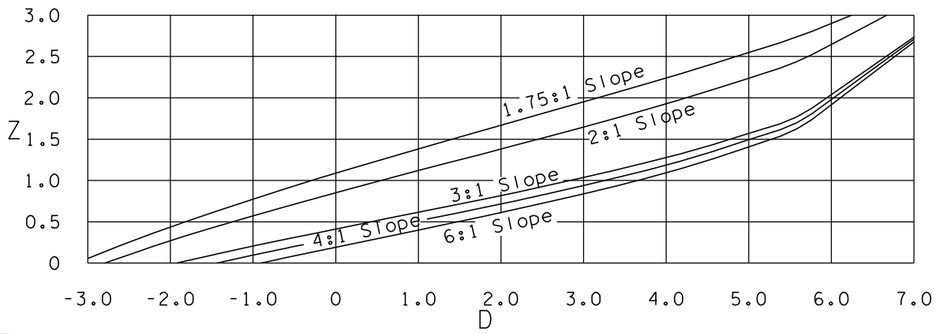



TYPICAL SECTION
DESCENDING GROUND




TREATMENT IN SHALLOW CUTS
See Note 3

VALUES OF Z (feet)
For Class A Slope Treatment




$$Z = \frac{\frac{K}{2}\sqrt{\left(\frac{J}{2}\right)^2 - \left(\frac{D}{2}\right)^2} \pm \left(\frac{DKS}{4}\right)}{\frac{KS}{2} + \left(\sqrt{1+S^2}\right)\left(\sqrt{\left(\frac{J}{2}\right)^2 - \left(\frac{D}{2}\right)^2}\right)}$$

In this equation the term ±DKS/4 is positive when the slope treatment stake is lower than the slope stake (descending ground); and negative when the slope treatment stake is higher than the slope stake (ascending ground).

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

NOTES

1. Slope treatment shall be constructed simultaneously with the roadway excavation. Ordinarily hand trimming will not be required if satisfactory results are obtained with mechanical equipment.
2. It is essential that the construction of cut and fill slopes and the application of slope treatment fit as naturally as possible into the existing landscape to provide an aesthetically and geometrically satisfactory completed roadway.
3. When the distance K is greater than the distance from the top of cut to the bottom of ditch, slope treatment shall begin at bottom of ditch.

LEGEND:

J Distance from slope stake to slope treatment stake, measured on natural ground slope.

K Distance from slope stake to lower limit of slope treatment, measured down face of cut slope.

H Difference in elevation between finished shoulder grade and slope stake.

D Difference in elevation between slope stake and slope treatment stake.

Z Depth of slope treatment at slope stake as determined by a straight line between the midpoints of J and K.

S Horizontal distance per foot cut for the slope under consideration. (For a 3:1 slope, S=3)

| CUT SLOPE | Class A | | Class B |
|---|---|---|---|
| | J | K | J and K |
| 4:1 | 7′ | 5′ | 5′ |
| 3:1 | 7′ | 5′ | 5′ |
| 2:1 | 7′ | 9′ | 5′ |
| 1.75:1 | 7′ | 12′ | 5′ |

DENNIS C. JACKSON
STATE OF WASHINGTON
14061
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 8, 1998

# SLOPE TREATMENT

# STANDARD PLAN H-8

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.

APPROVED FOR PUBLICATION

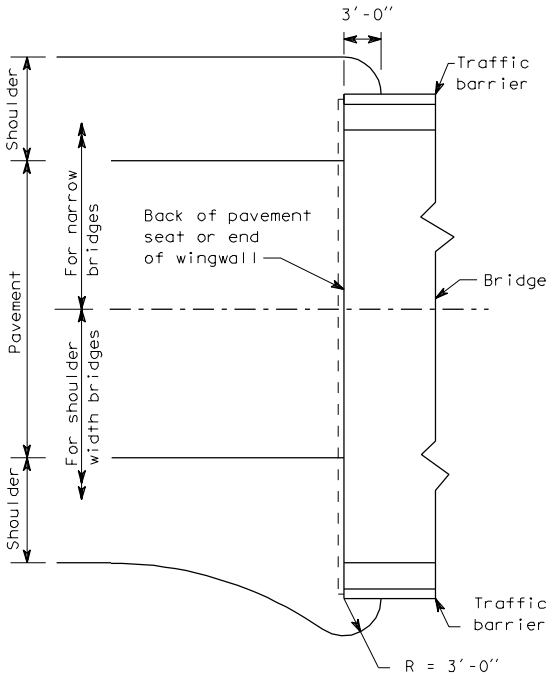
*Clifford E. Mansfield* — ***09/18/98***

DEPUTY STATE DESIGN ENGINEER — DATE

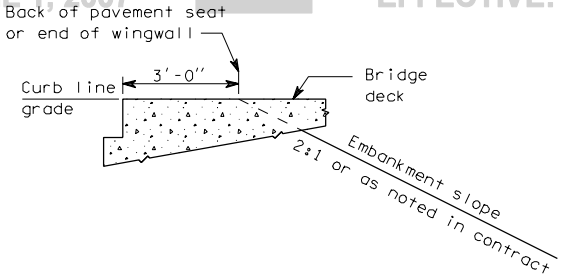
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

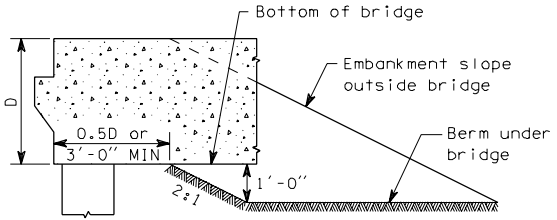
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



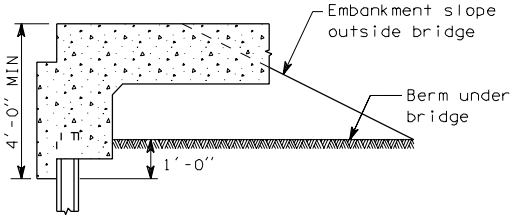

PLAN AT BRIDGE END



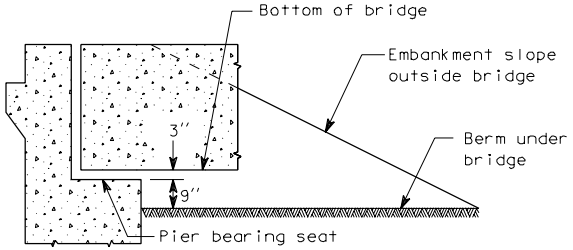

GENERAL SECTION AT BRIDGE END



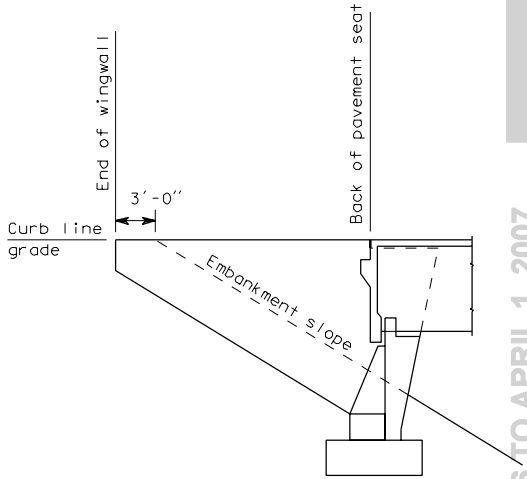

BRIDGE ON COLUMNS OR PILES




FLAT SLAB BRIDGE




BRIDGE ON BEARINGS



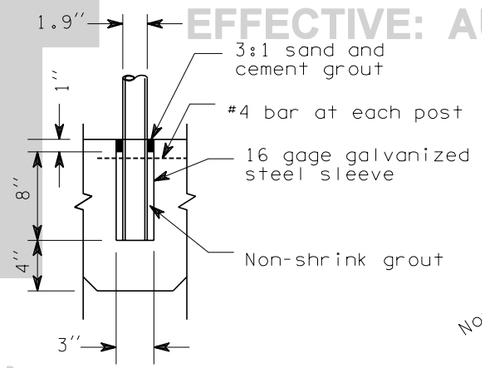

BRIDGE WITH WING WALLS

## EMBANKMENT AT BRIDGE ENDS

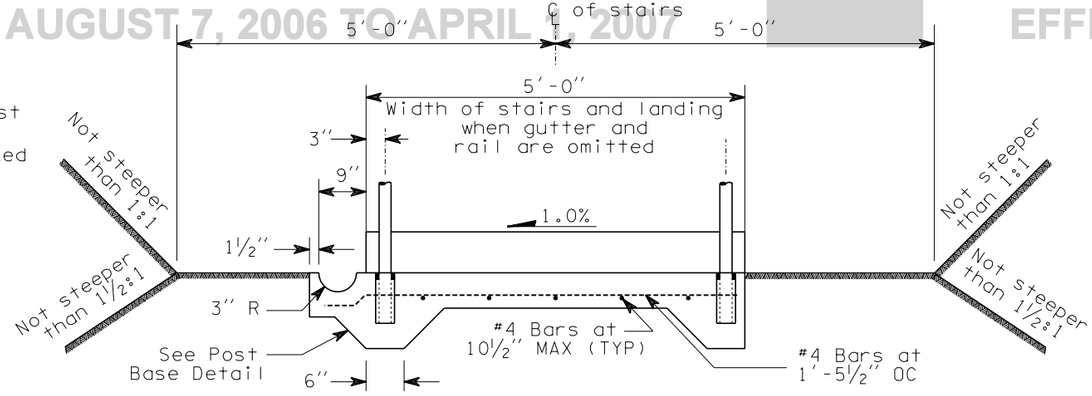


EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

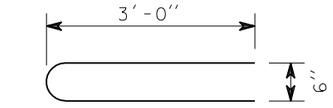
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




POST BASE DETAIL



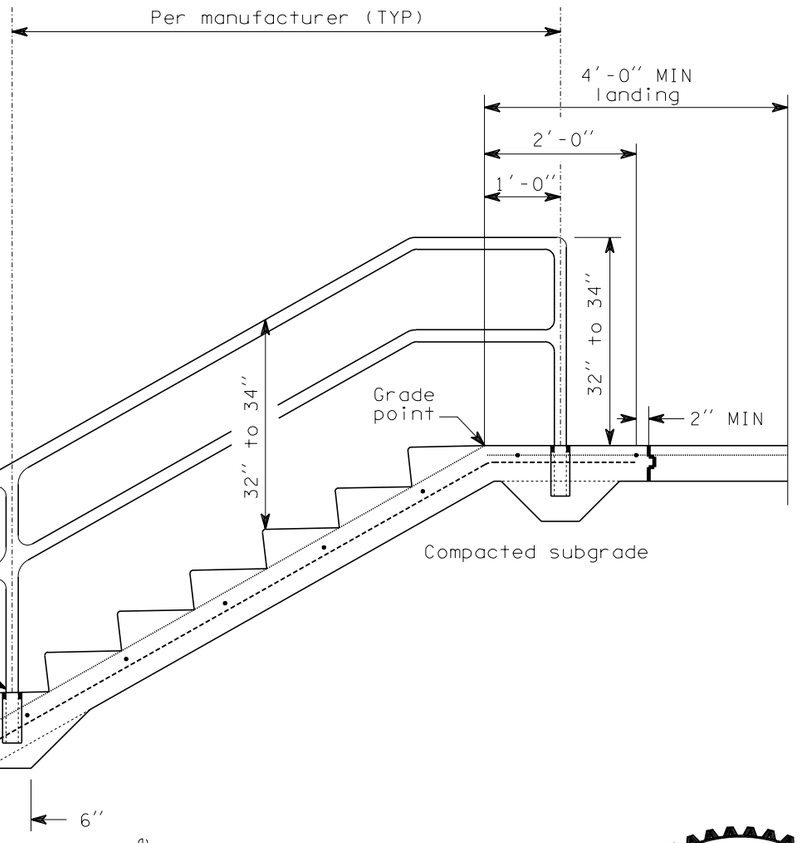

SLAB AND GRADING SECTION

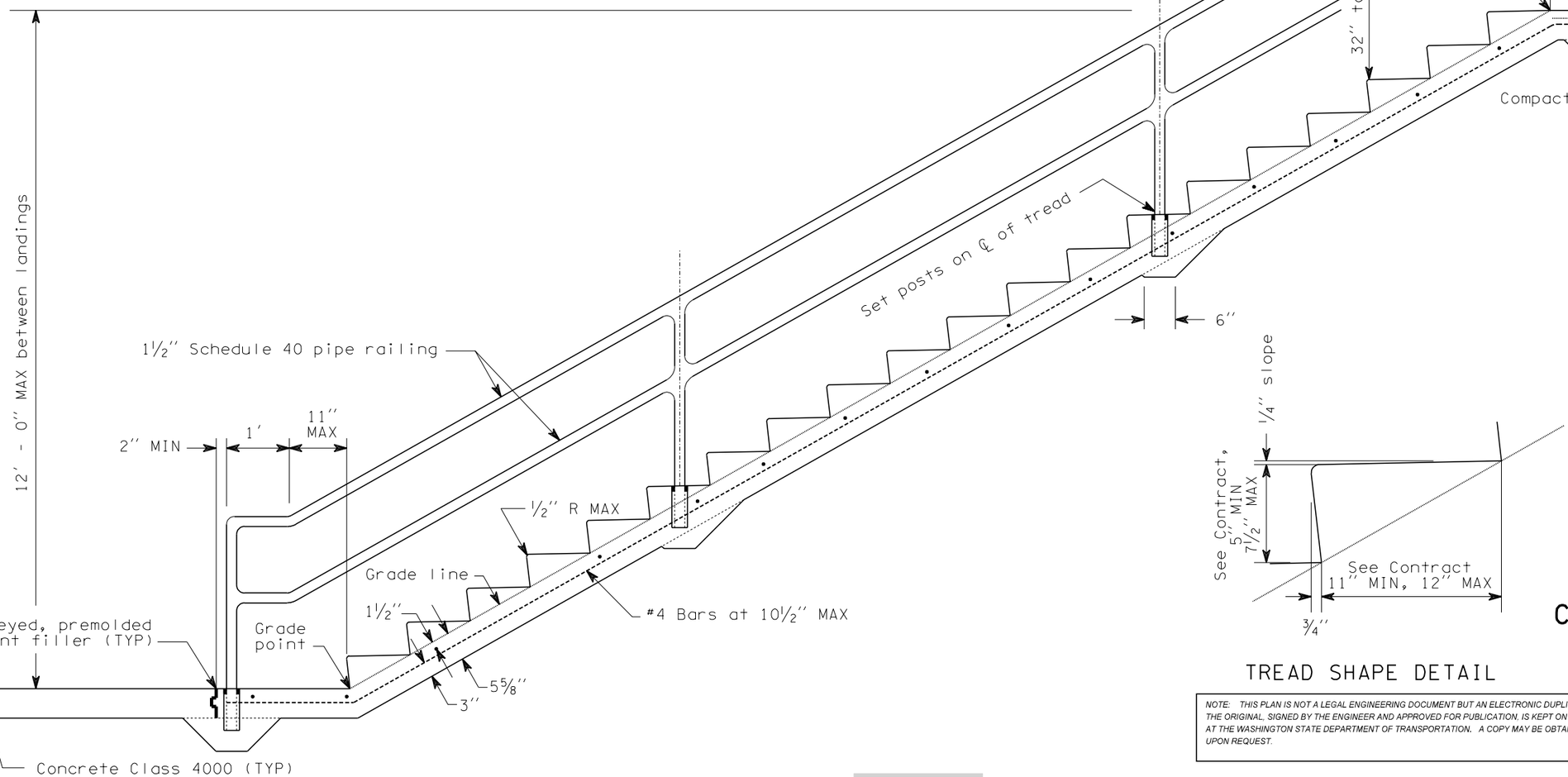



#4 BAR AT EACH POST

NOTES

1. Manufacturer shall submit shop drawings of pipe railing for review Design shall be in accordance with AASHTO specifications.
2. Aluminum pipe railing shall have no external surface welds.







TREAD SHAPE DETAIL

M. MYINT LWIN
STATE OF WASHINGTON
10536
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JANUARY 17, 1999

# CEMENT CONCRETE STAIRWAY CONSTRUCTION DETAILS STANDARD PLAN H-10

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.

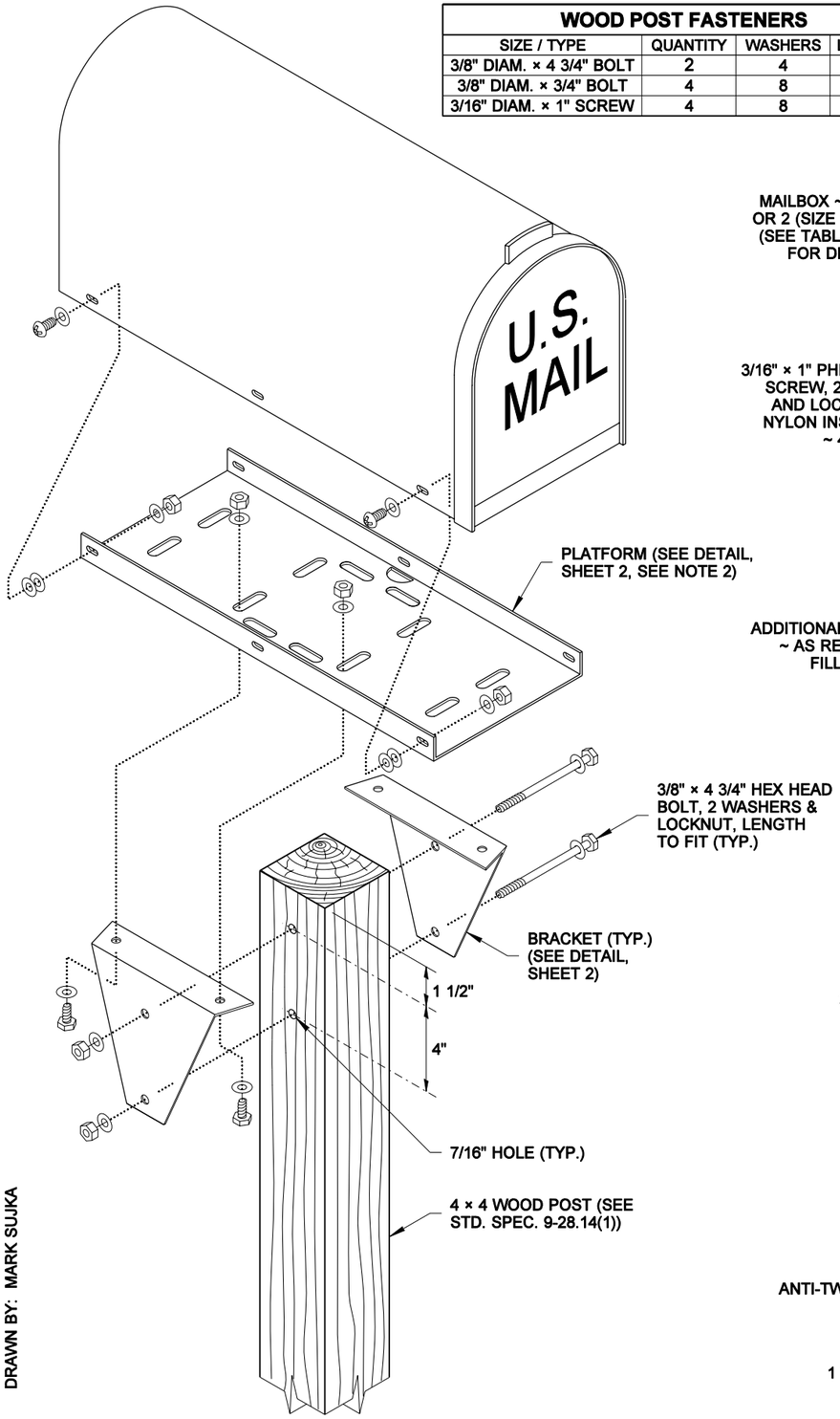
APPROVED FOR PUBLICATION

*Brian Ziegler* — STATE DESIGN ENGINEER — *5/29/98* — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

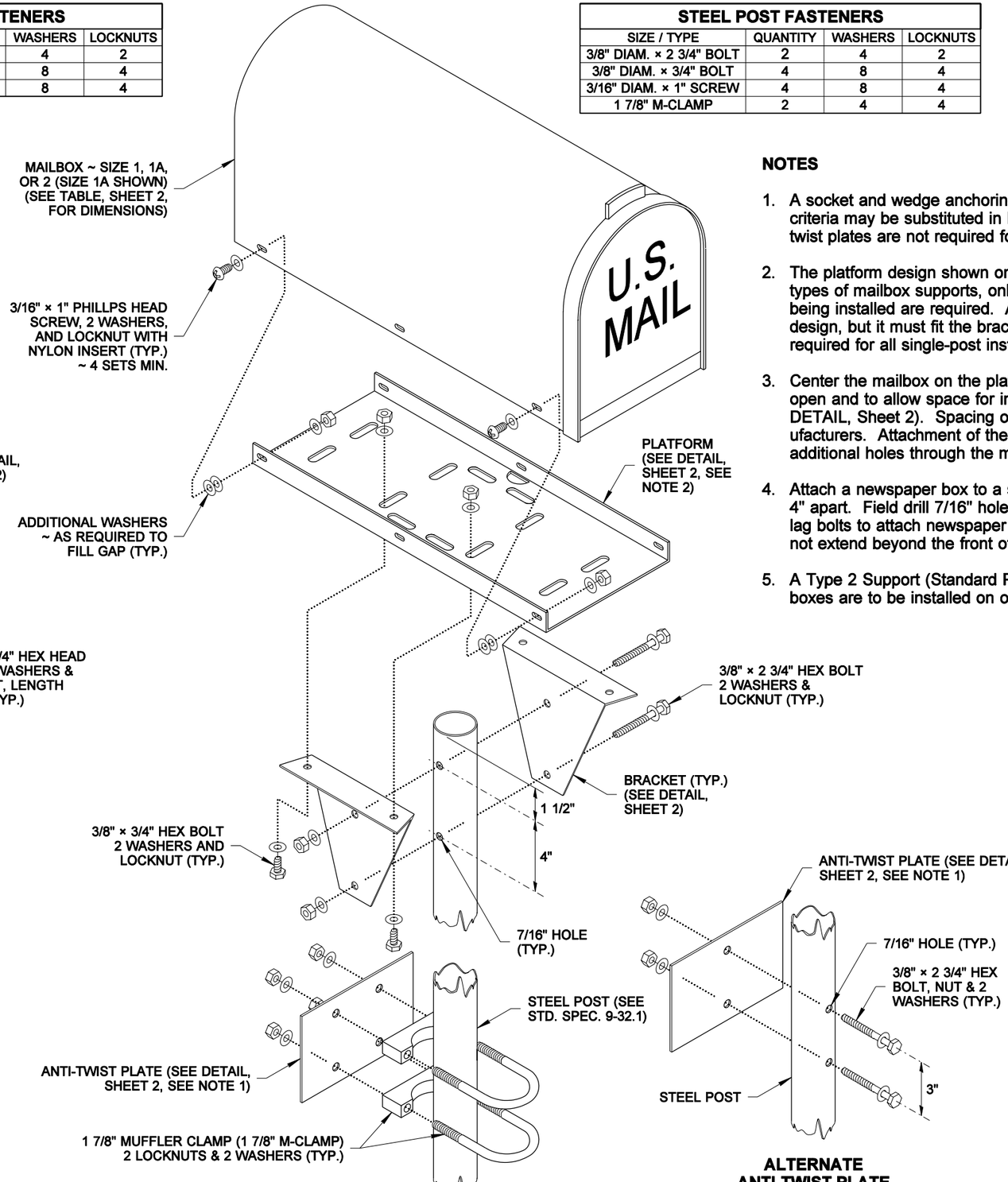
| WOOD POST FASTENERS | | | |
|---|---|---|---|
| SIZE / TYPE | QUANTITY | WASHERS | LOCKNUTS |
| 3/8" DIAM. × 4 3/4" BOLT | 2 | 4 | 2 |
| 3/8" DIAM. × 3/4" BOLT | 4 | 8 | 4 |
| 3/16" DIAM. × 1" SCREW | 4 | 8 | 4 |




**WOOD POST ASSEMBLY DETAIL**

(SEE **STEEL POST ASSEMBLY DETAIL** FOR SPECIFICATIONS NOT SHOWN)

| STEEL POST FASTENERS | | | |
|---|---|---|---|
| SIZE / TYPE | QUANTITY | WASHERS | LOCKNUTS |
| 3/8" DIAM. × 2 3/4" BOLT | 2 | 4 | 2 |
| 3/8" DIAM. × 3/4" BOLT | 4 | 8 | 4 |
| 3/16" DIAM. × 1" SCREW | 4 | 8 | 4 |
| 1 7/8" M-CLAMP | 2 | 4 | 4 |




**STEEL POST ASSEMBLY DETAIL**




**ALTERNATE ANTI-TWIST PLATE DESIGN**

**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 accomodate 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-12a) is required when 2 or more mailboxes are to be installed on one support.

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EXPIRES JULY 24, 2006

# MAILBOX SUPPORT TYPE 1

## STANDARD PLAN H-12

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER

*02-25-05* — DATE

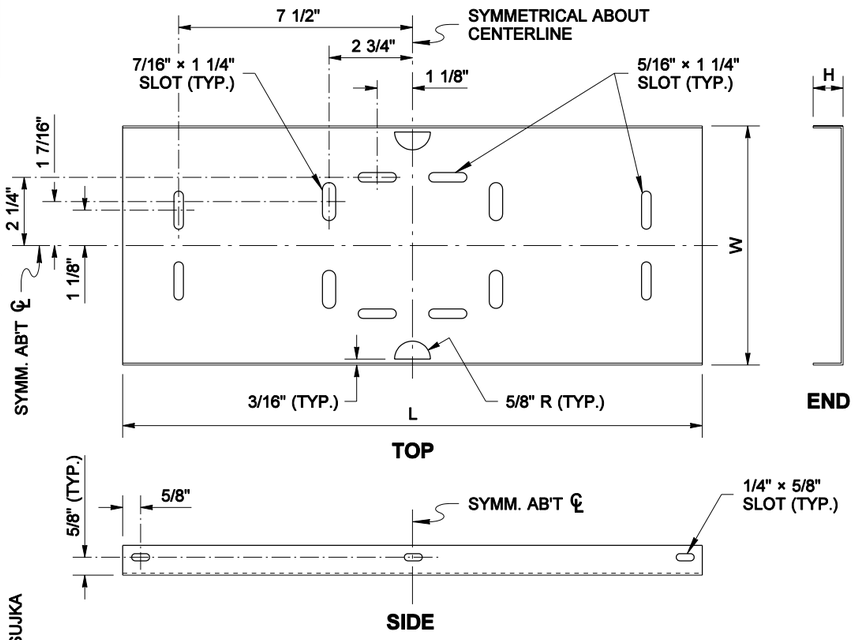
Washington State Department of Transportation

DRAWN BY: MARK SUJKA

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

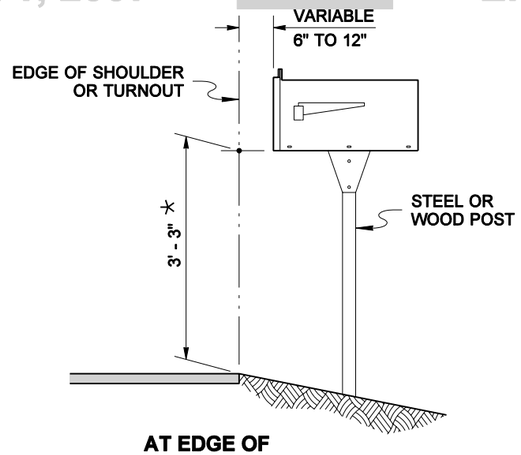
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| MAILBOX & PLATFORM DIMENSIONS | | | | | | |
|---|---|---|---|---|---|---|
| SIZE | MAILBOX DIMENSIONS | | | PLATFORM DIMENSIONS | | |
| | L | W | H | L | W | H |
| 1 | 19" | 6 1/2" | 8 1/2" | 17" | 6" | 1" |
| 1A | 21" | 8" | 10 1/2" | 19" | 7 1/2" | 1" |
| 2 | 24" | 11 1/2" | 13 1/2" | 21" | 11" | 1" |

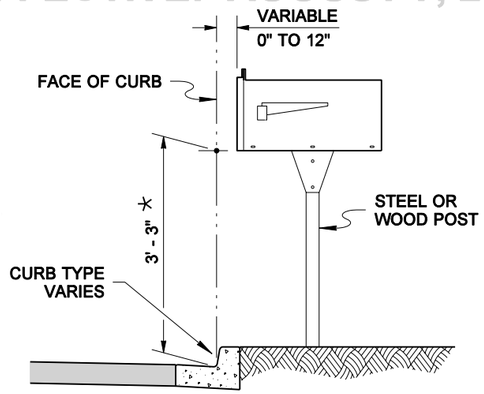



**PLATFORM DETAIL**

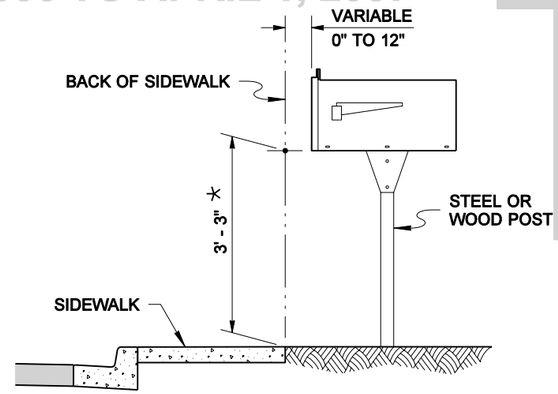
DRAWN BY: MARK SUJKA




**AT EDGE OF SHOULDER**



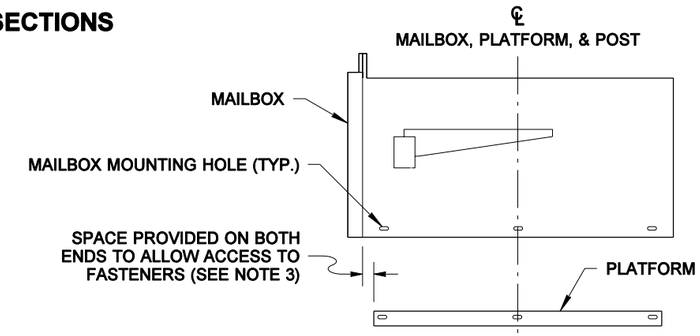

**BEHIND CURB**



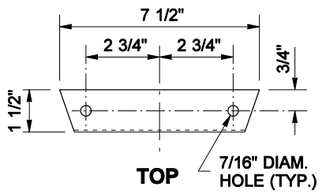

**BEHIND SIDEWALK**

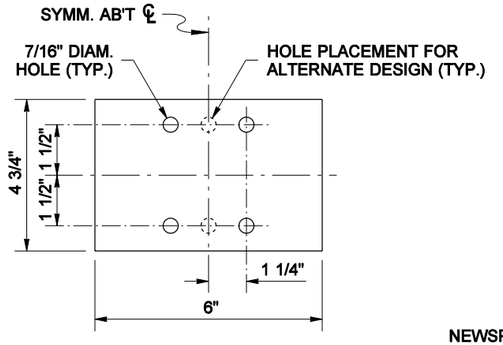
✶ UNLESS OTHERWISE SHOWN IN THE PLANS

**MAILBOX PLACEMENT SECTIONS**

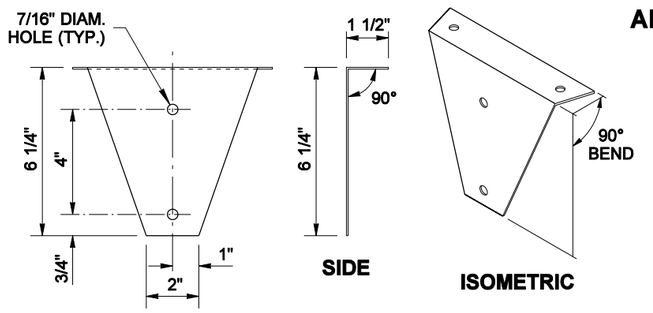



**ALIGNMENT DETAIL**

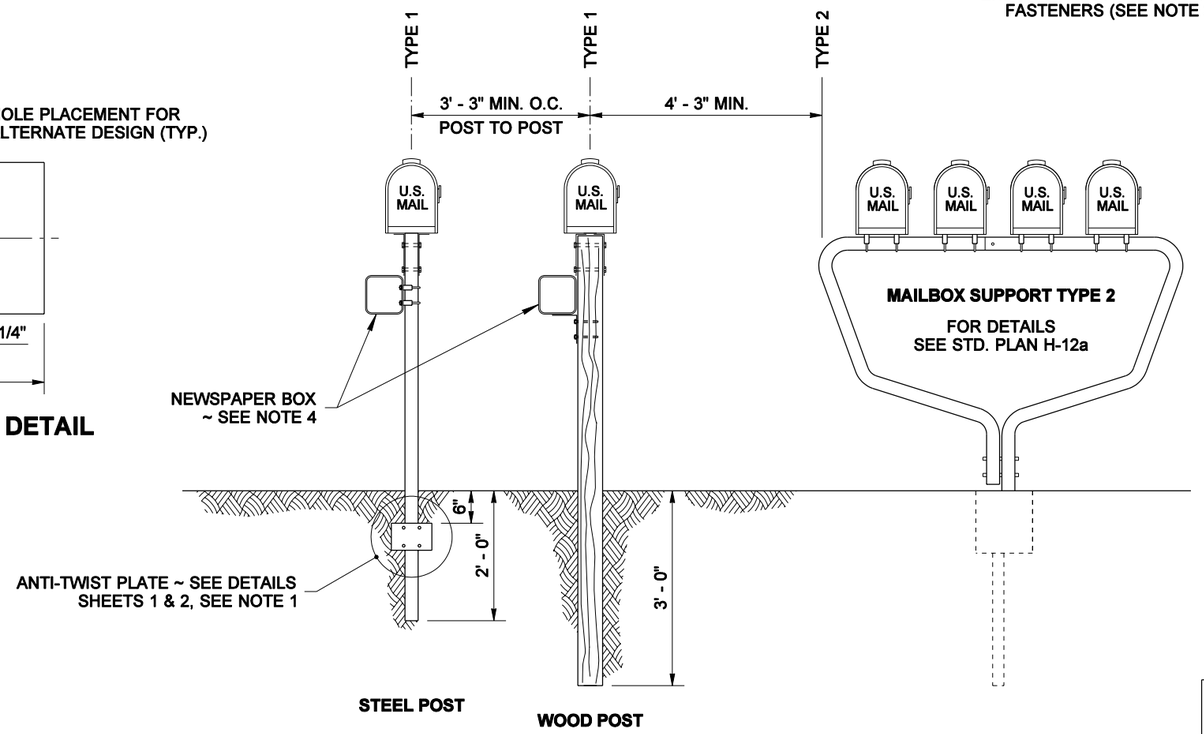



**ANTI-TWIST PLATE DETAIL**




**BRACKET DETAIL**




**POST PLACEMENT DETAIL**

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RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# MAILBOX SUPPORT TYPE 1

## STANDARD PLAN H-12

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

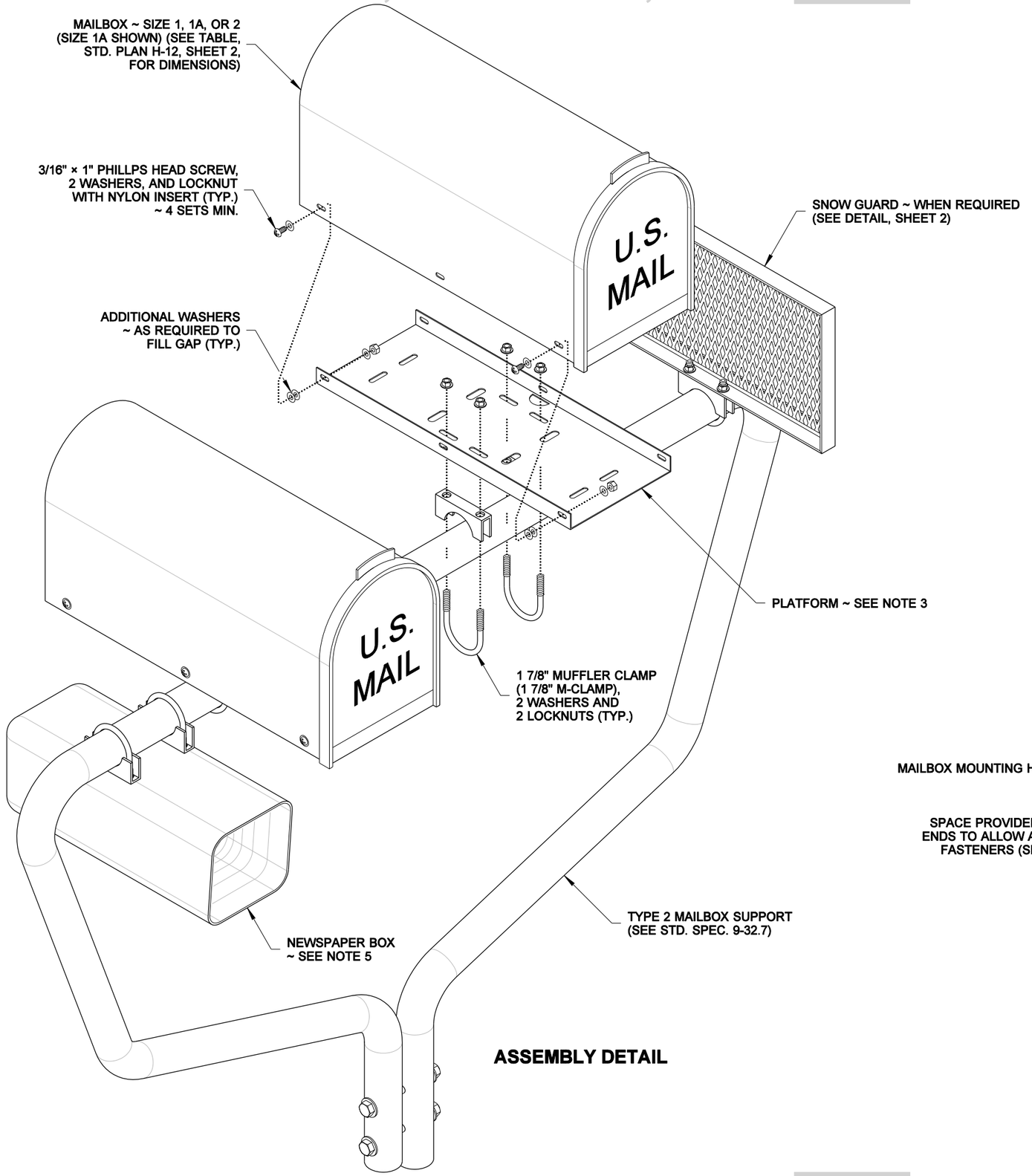
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-25-05* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA




**ASSEMBLY DETAIL**

**NOTES**

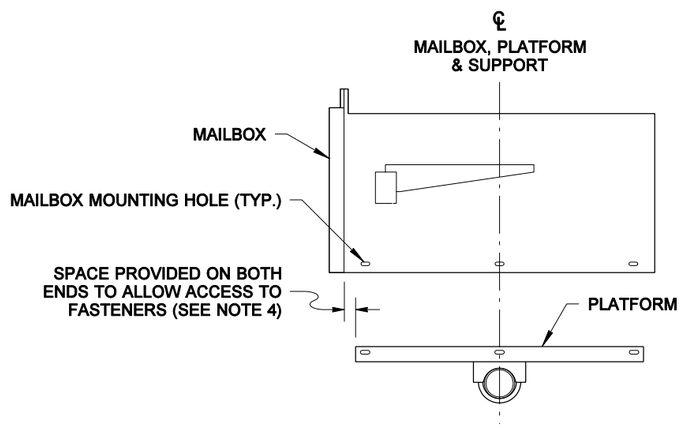
1. The anchoring system shall meet NCHRP 350 crash test criteria. Use a socket and wedge system, or the anchoring system supplied by or recommended by the Type 2 Support manufacturer.

2. A maximum of 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-12, Sheet 2. This design features slots that accomodate 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.




**ALIGNMENT DETAIL**

SEE NOTE 4

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# MAILBOX SUPPORT TYPE 2

## STANDARD PLAN H-12a

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER

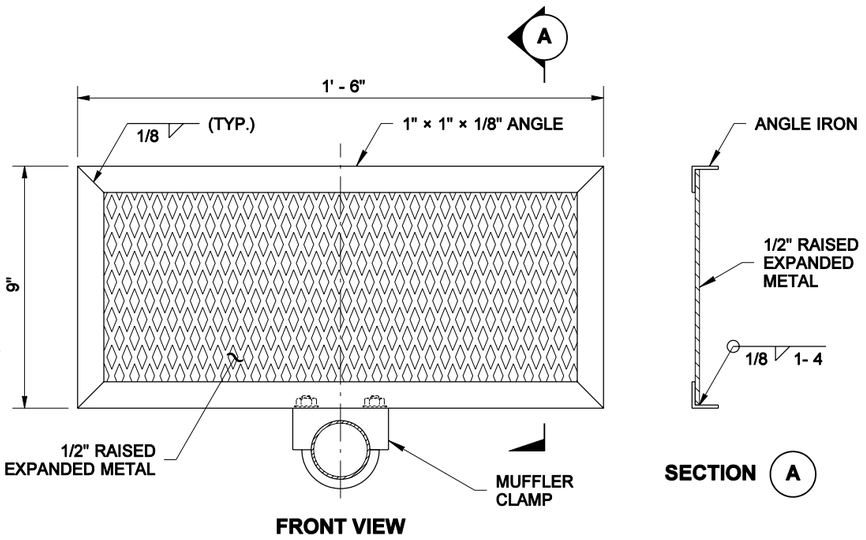
*02-25-05* — DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

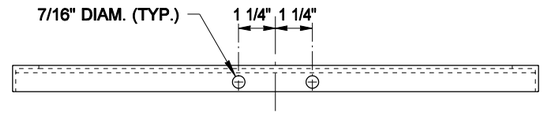
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




FRONT VIEW

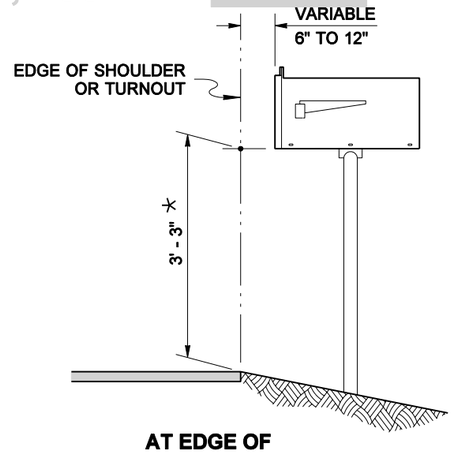



SECTION (A)

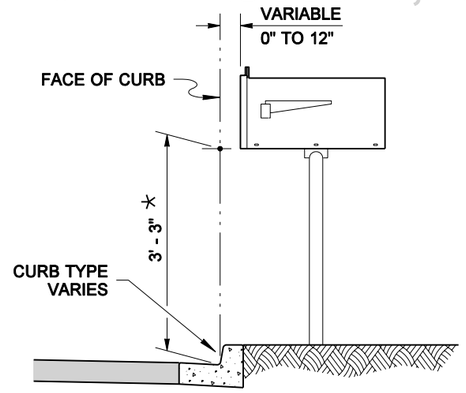



BOTTOM VIEW

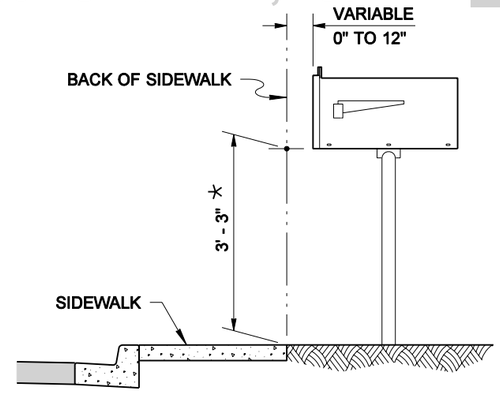
**SNOW GUARD DETAIL**




**AT EDGE OF SHOULDER**



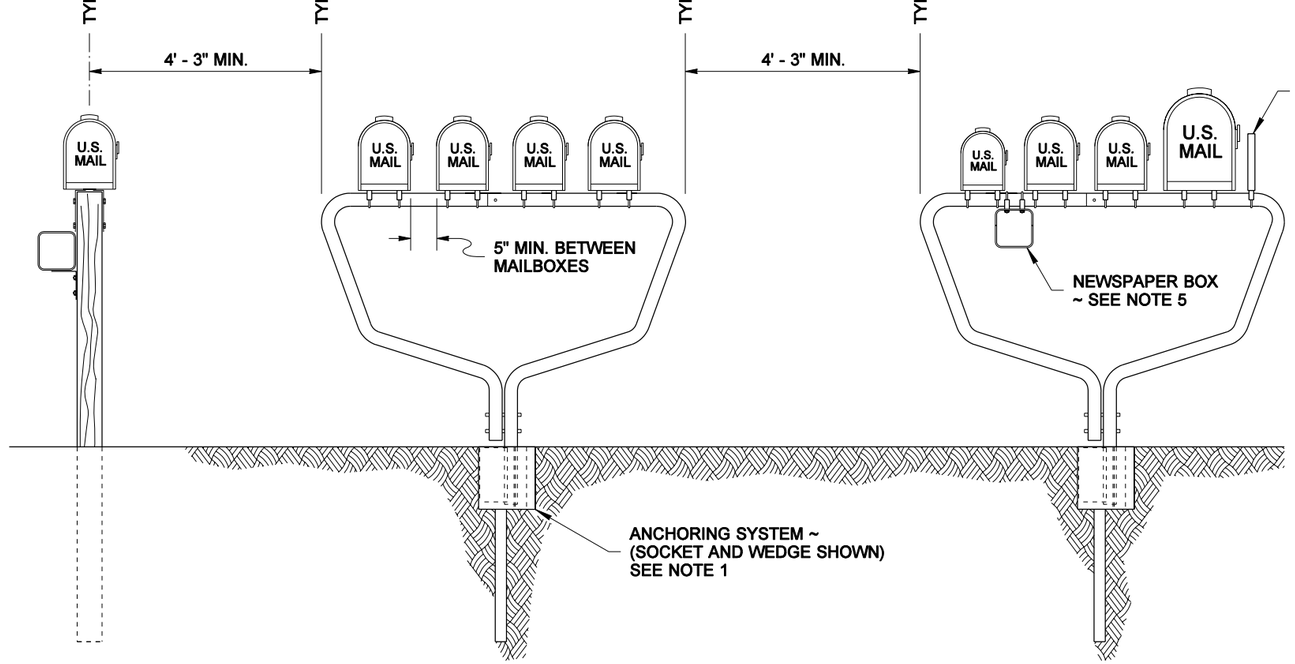

**BEHIND CURB**




**BEHIND SIDEWALK**

✶ UNLESS OTHERWISE SHOWN IN THE PLANS

**MAILBOX PLACEMENT SECTIONS**




**MAILBOX SUPPORT TYPE 1**
(WOOD POST SHOWN)

FOR DETAILS
SEE STD. PLAN H-12

**MAILBOX SUPPORTS TYPE 2**

**SPACING DETAIL**

DRAWN BY: MARK SUJKA

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# MAILBOX SUPPORT TYPE 2

## STANDARD PLAN H-12a

SHEET 2 OF 2 SHEETS

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*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-25-05* — DATE

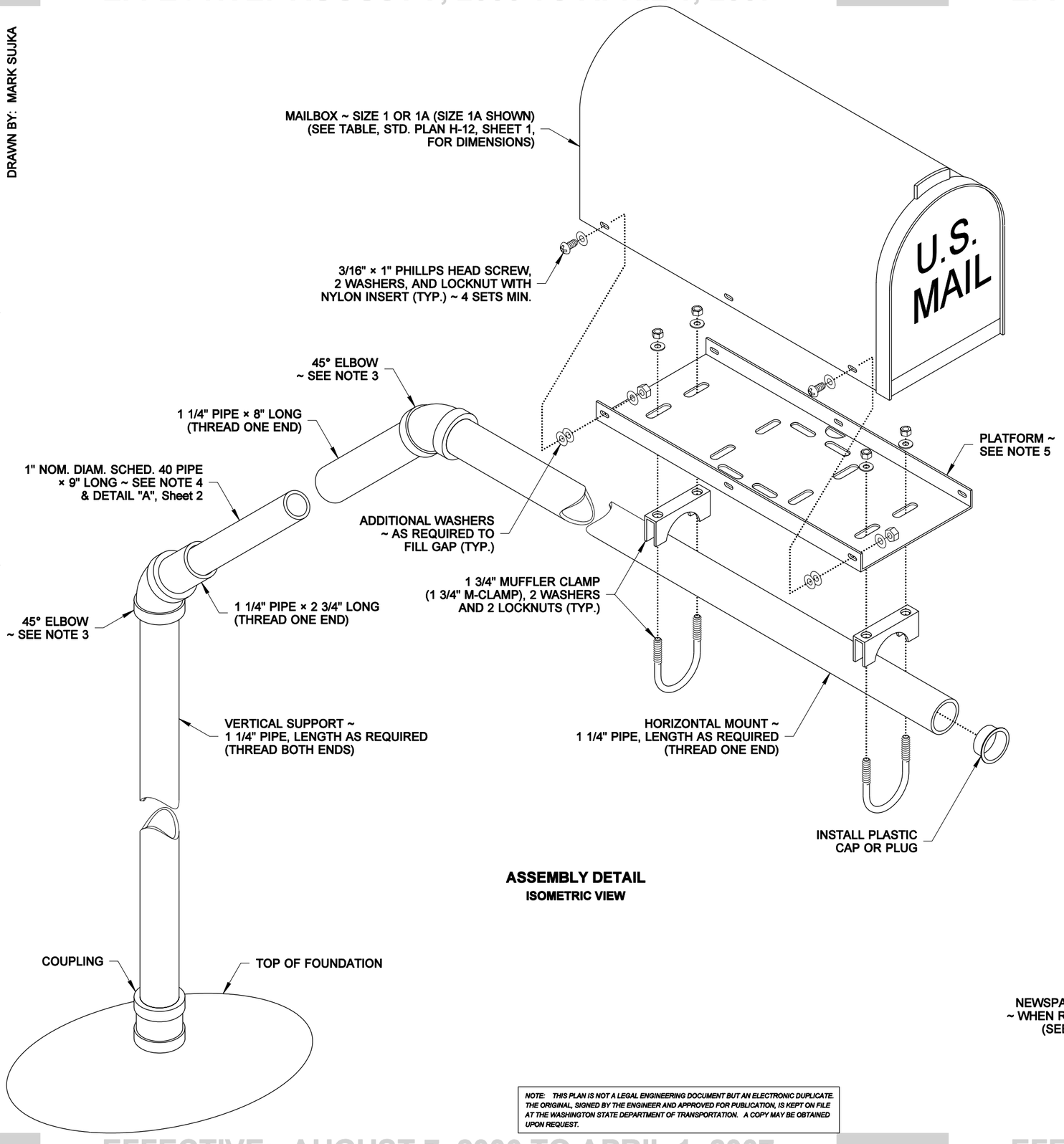
Washington State Department of Transportation

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DRAWN BY: MARK SUJKA




**ASSEMBLY DETAIL**
**ISOMETRIC VIEW**

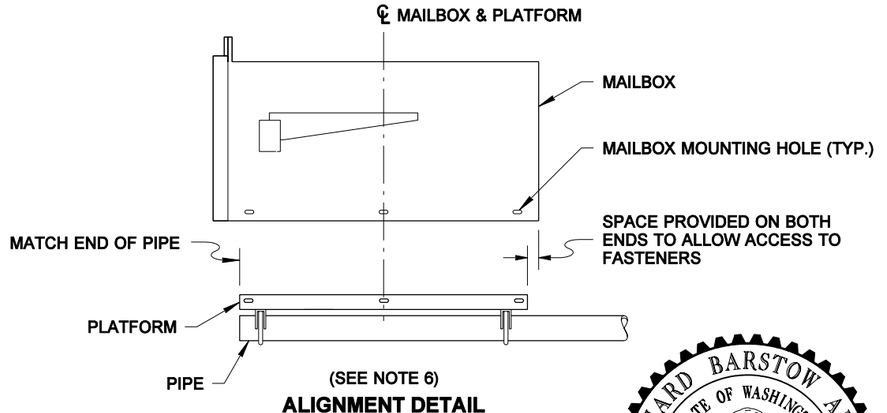
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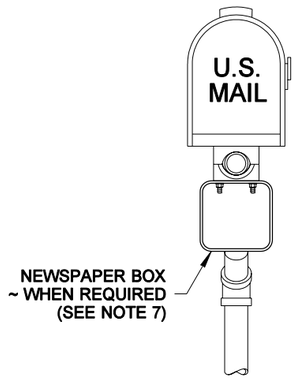
**NOTES**

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-12, Sheet 2. This design features slots that accomodate 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.




(SEE NOTE 6)

**ALIGNMENT DETAIL**
**SIDE VIEW**




**NEWSPAPER BOX ATTACHMENT DETAIL**
**ELEVATION VIEW**

RICHARD BARSTOW ALBIN
STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# MAILBOX SUPPORT TYPE 3

## STANDARD PLAN H-12b

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

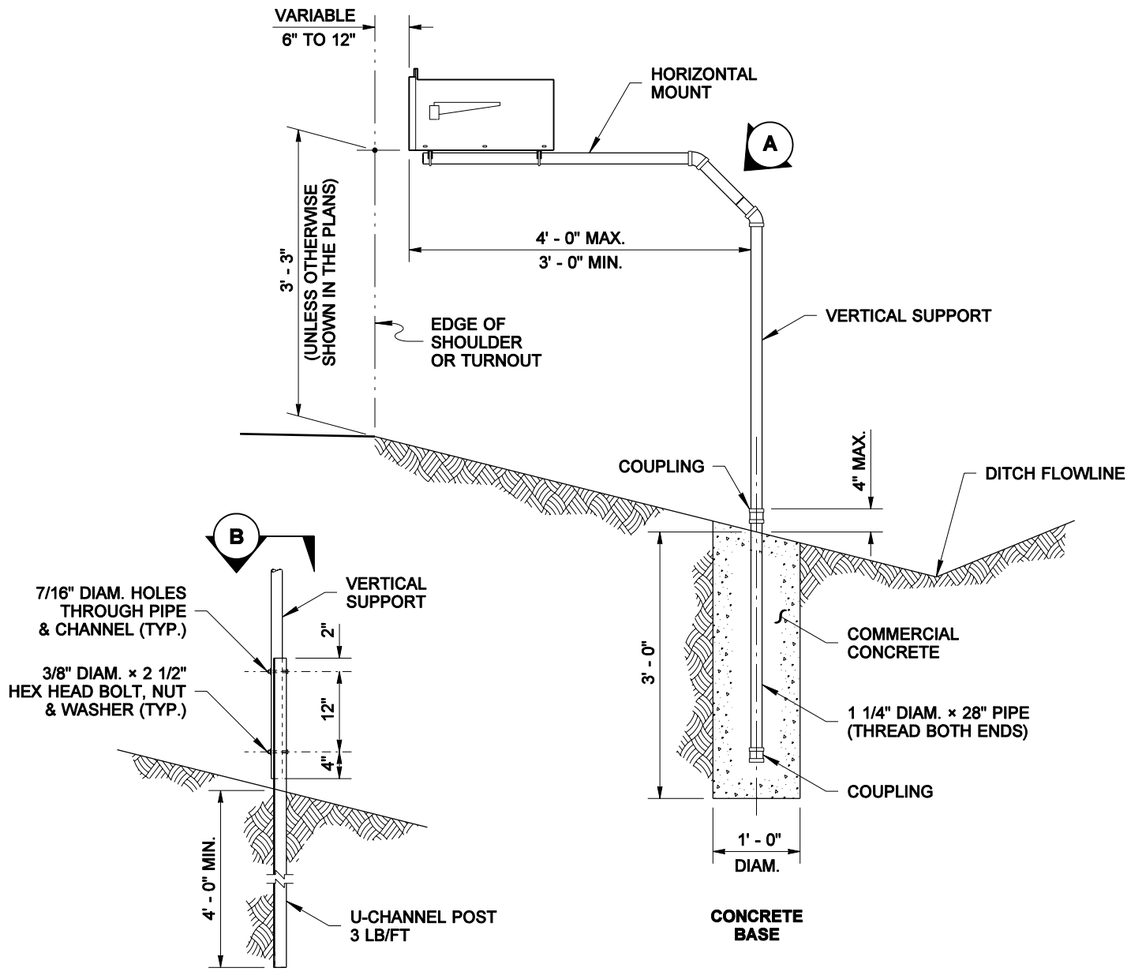
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-25-05* — DATE

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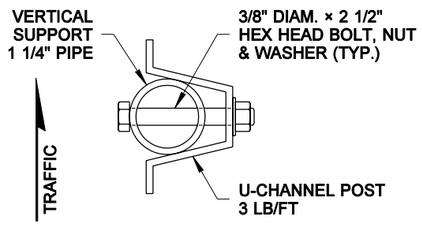
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

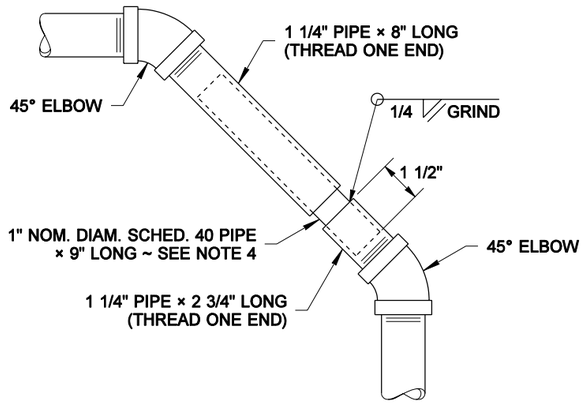
DRAWN BY: MARK SUJKA



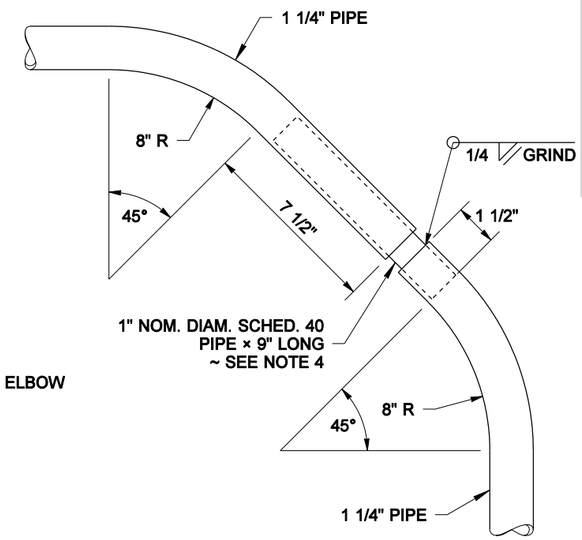

**PLACEMENT DETAIL**
**SECTION VIEW**




**SECTION (B)**

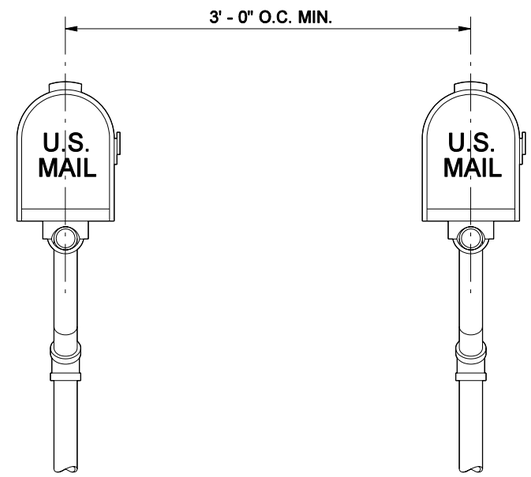



**PIPE FITTING ANGLES**




**PIPE BENDING ANGLES**

**DETAIL (A)**




**SPACING DETAIL**
**ELEVATION VIEW**

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STATE OF WASHINGTON
34042
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 24, 2006

# MAILBOX SUPPORT TYPE 3

## STANDARD PLAN H-12b

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

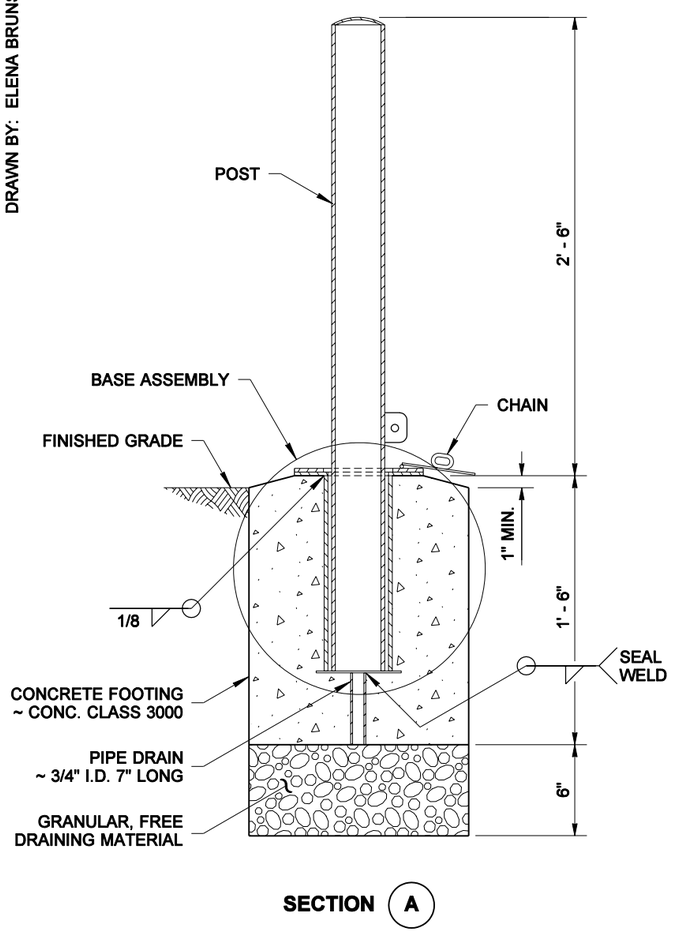
*Harold J. Peterfeso* — STATE DESIGN ENGINEER
*02-25-05* — DATE

Washington State Department of Transportation

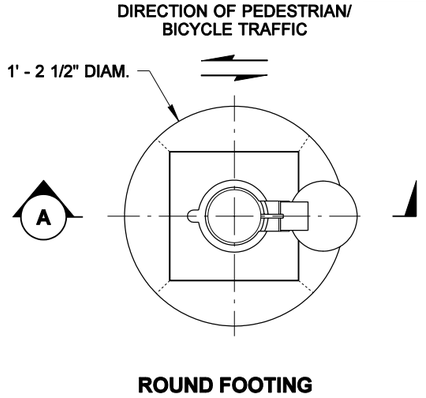
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

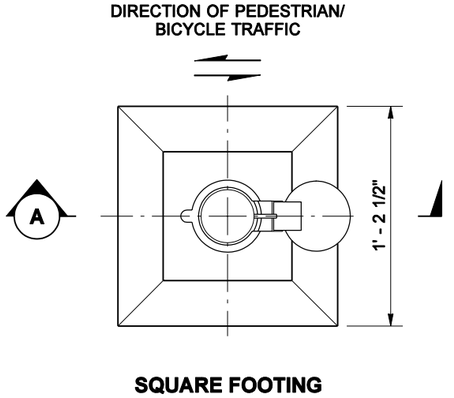
DRAWN BY: ELENA BRUNSTEIN




**SECTION (A)**

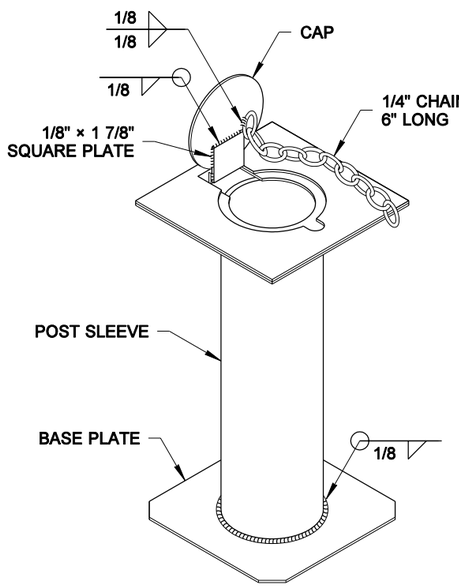


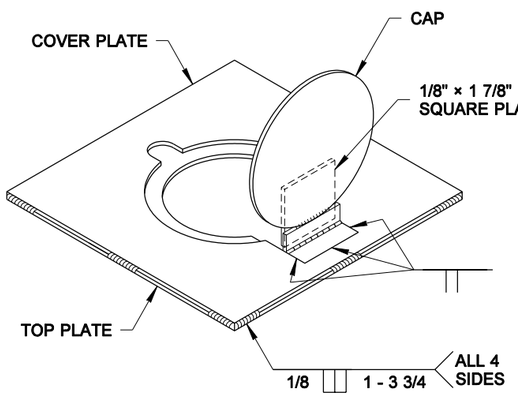

**ROUND FOOTING**



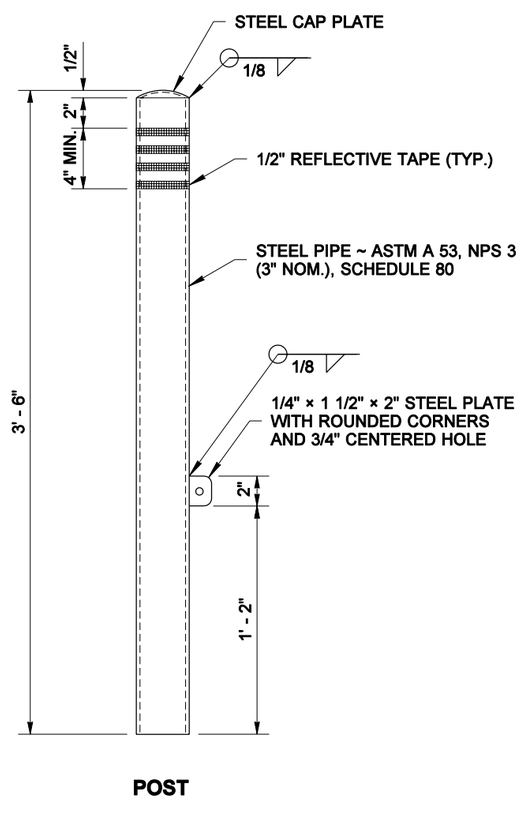

**SQUARE FOOTING**

**PLAN VIEW**



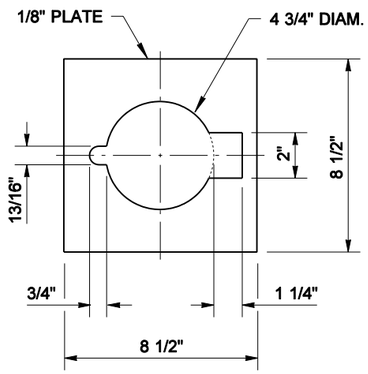

**BASE ASSEMBLY**



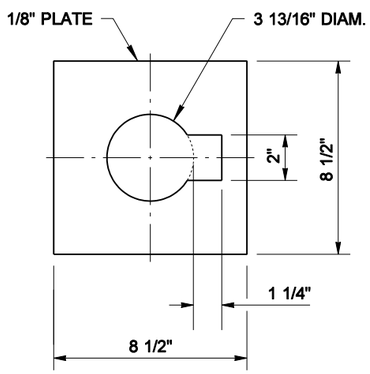

**POST**

**NOTE**

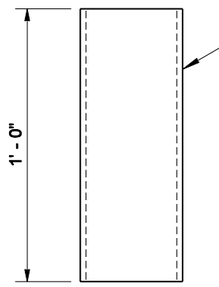
This bollard does not have an effective breakaway design feature and cannot be installed within the Design Clear Zone.



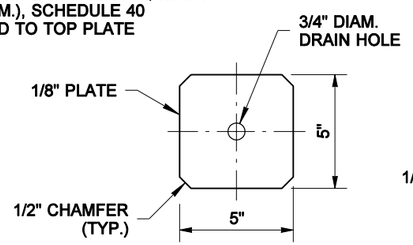

**COVER PLATE**



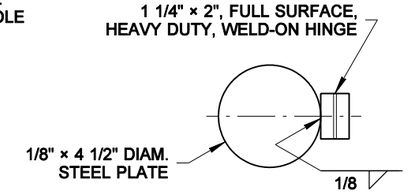

**TOP PLATE**




**POST SLEEVE**




**BASE PLATE**




**CAP AND HINGE**

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EXPIRES MAY 16, 2005

# BOLLARD TYPE 1

## STANDARD PLAN H-13

SHEET 1 OF 1 SHEET

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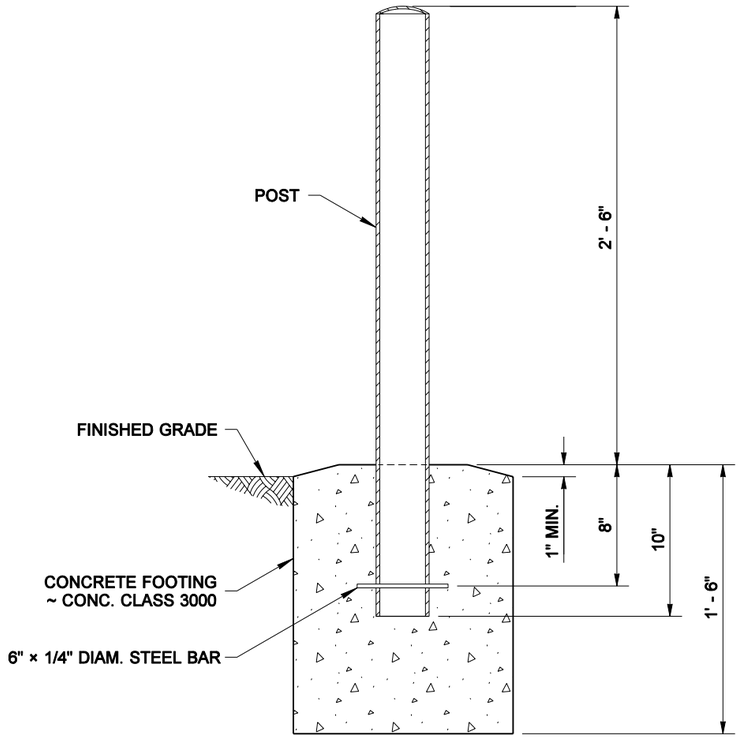
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-25-05* — DATE

Washington State Department of Transportation

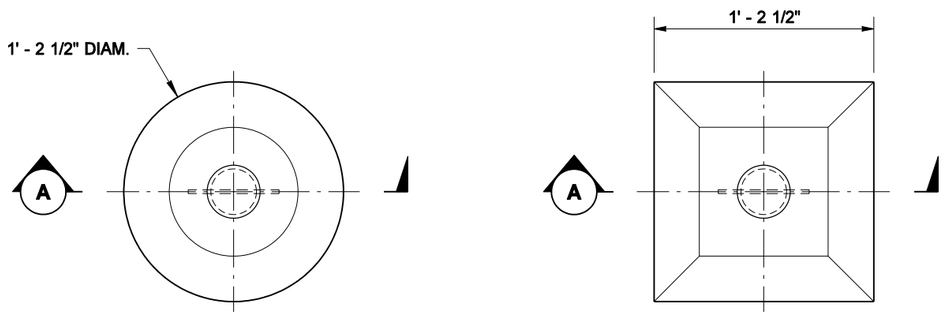
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ELENA BRUNSTEIN



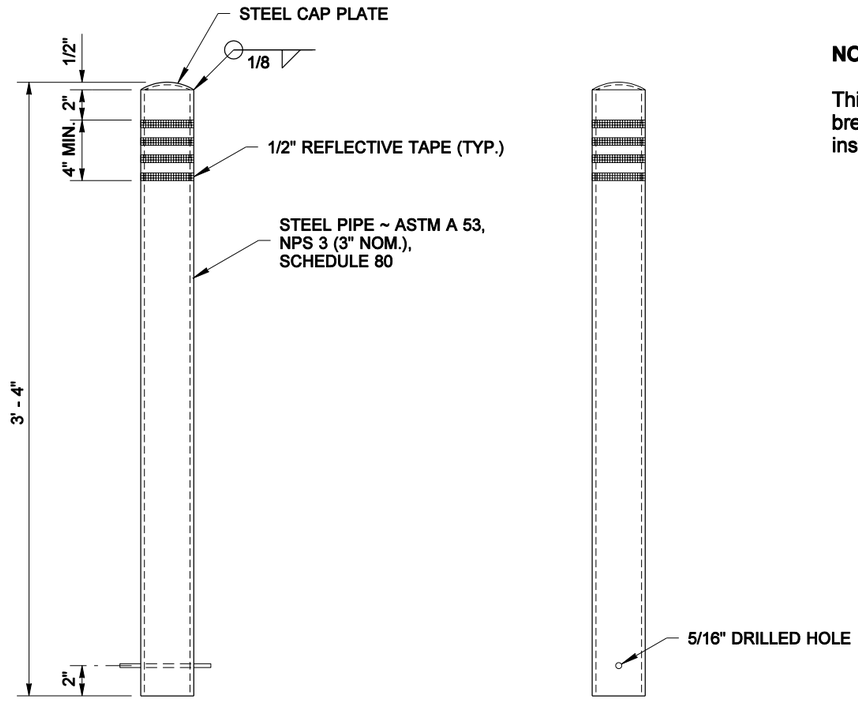

SECTION (A)




ROUND FOOTING

SQUARE FOOTING

PLAN VIEW




FRONT VIEW

SIDE VIEW

POST

**NOTE**

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

HAROLD J. PETERFESO
STATE OF WASHINGTON
21861
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 16, 2005

# BOLLARD TYPE 2

## STANDARD PLAN H-13a

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* *02-25-05*

STATE DESIGN ENGINEER — DATE

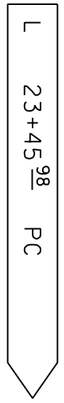
Washington State Department of Transportation

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DRAWN BY: ADAM COCHRAN




LINE DESIGNATION

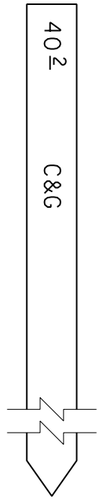
LINE STATIONING

HUNDRED FOOT INCREMENTS

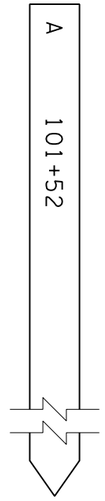
CONTROL POINT

**ALIGNMENT STAKE**

STAKE EVERY 100 FEET ON TANGENTS,
EVERY 25 FEET ON CURVES




DISTANCE FROM ℄ (40.2 FEET)




LINE DESIGNATION

LINE STATIONING

HUNDRED FOOT INCREMENTS

FRONT BACK

**CLEARING/GRUBBING (C&G) LATH**

STAKE AT EACH FULL STATION,
100 FEET ON TANGENTS,
EVERY 25 FEET ON CURVES.
NO HUB NECESSARY.




CUT TO BACK OF DITCH (2.2 FEET)

DISTANCE FROM ℄ TO CATCH (BACK OF DITCH) (25.7 FEET)

SIDE SLOPE RATIO (4H:1V)

BACK OF DITCH




LINE DESIGNATION

LINE STATIONING

HUNDRED FOOT INCREMENTS

FRONT BACK

**SLOPE STAKE**




OFFSET FROM SLOPE STAKE CATCH (10 FEET)

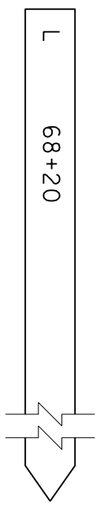
FILL AT RP STAKE (1.2 FEET)

CUT AT CATCH POINT (BACK OF DITCH)

DISTANCE FROM ℄ TO CATCH POINT

SIDE SLOPE RATIO (4H:1V)

BACK OF DITCH



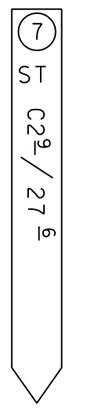

LINE DESIGNATION

LINE STATIONING

HUNDRED FOOT INCREMENTS

FRONT BACK

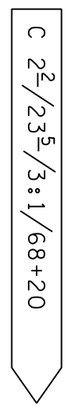
**LATH FOR SLOPE REFERENCES**




OFFSET FROM SLOPE STAKE CATCH (7 FEET)

CUT AT ST STAKE (2.9 FEET)

DISTANCE FROM ℄ (27.6 FEET)




CUT AT CATCH POINT (2.2 FEET)

DISTANCE FROM ℄ TO CATCH (BACK OF DITCH) (23.5 FEET)

SIDE SLOPE RATIO (3H:1V)

LINE STATIONING

HUNDRED FOOT INCREMENTS

FRONT BACK

**SLOPE TREATMENT (ST) STAKE FOR CUT SECTIONS**




DAYLIGHT CATCH (CUT 0.0 FEET)

FILL (0.1 FEET)

SIDE SLOPE TO A 2% ROADWAY SLOPE (50H:1V)

DISTANCE FROM ℄ (16.2 FEET)

**DAYLIGHT (D/L) STAKE**

BILLY R. MUMMA
STATE OF WASHINGTON
24787
REGISTERED
PROFESSIONAL LAND SURVEYOR
EXPIRES 11/29/2005

# SURVEY STAKES

## STANDARD PLAN H-14

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* *02-09-05*

STATE DESIGN ENGINEER DATE

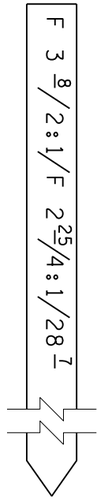
Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN




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

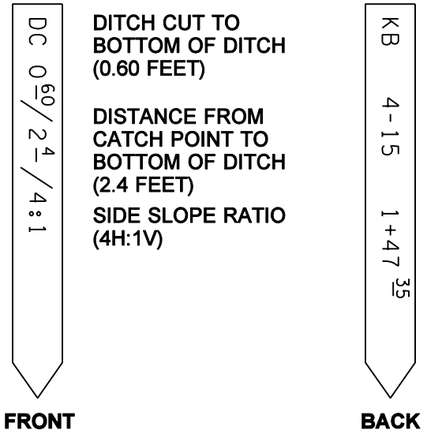
SLOPE RATIO (2H:1V)

FILL TO SUBGRADE SHOULDER (2.25 FEET)

SLOPE RATIO (4H:1V)

DISTANCE FROM ℄ TO CATCH POINT (28.7 FEET)

**COMPOUND SLOPE LATH**




DITCH CUT TO BOTTOM OF DITCH (0.60 FEET)

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

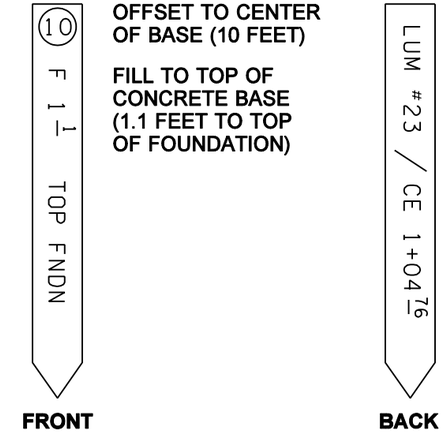
SIDE SLOPE RATIO (4H:1V)

STRUCTURE NOTE REFERENCE

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

DITCH SECTION ALIGNMENT STATIONING

**STAKE FOR DITCH CONSTRUCTION**




OFFSET TO CENTER OF BASE (10 FEET)

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

LUMINAIRE NUMBER (23)

LINE DESIGNATION AND STATIONING

HUNDRED FOOT INCREMENTS

**STAKE FOR FOUNDATION OF LUMINAIRES, SIGNALS OR SIGN STRUCTURES**



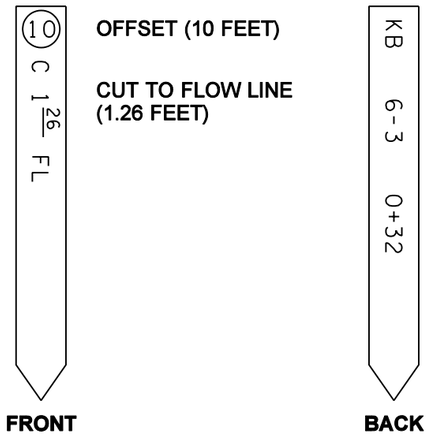

FILL TO SUBGRADE (0.35 FEET)

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

DISTANCE FROM ℄ (14.3 FEET)

SLOPE RATIO (2H:1V)

**SLOPE LATH FOR CURB SECTION**




OFFSET (10 FEET)

CUT TO FLOW LINE (1.26 FEET)

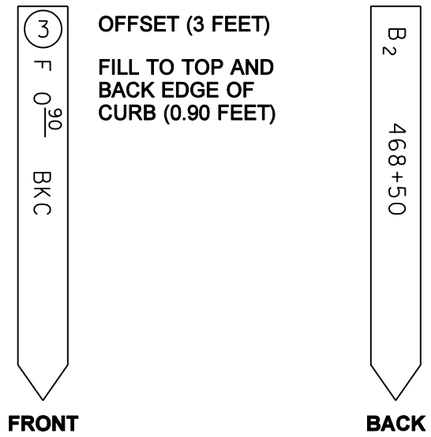
STRUCTURE NOTE REFERENCE

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

DRAINAGE ALIGNMENT STATIONING

25' INCREMENTS

**STAKE FOR DRAINAGE**




OFFSET (3 FEET)

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

LINE DESIGNATION

LINE STATIONING

HUNDRED FOOT INCREMENTS

**STAKE FOR CURB/GUTTER**




# SURVEY STAKES

## STANDARD PLAN H-14

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-09-05* — DATE

Washington State Department of Transportation

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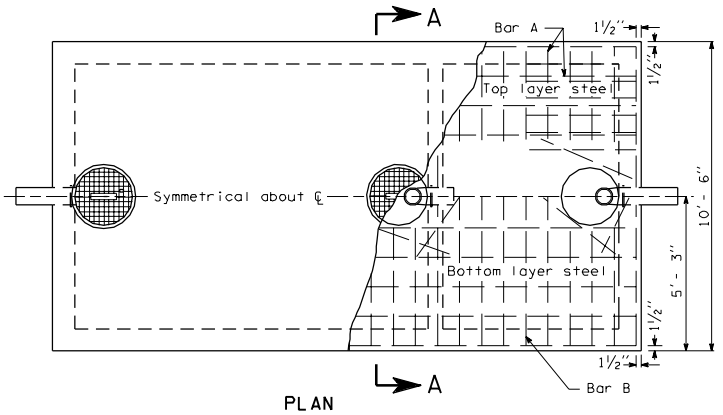
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

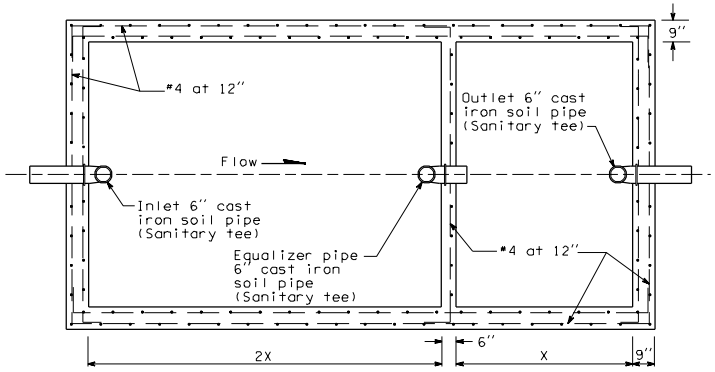
| APPROXIMATE QUANTITIES | | | | |
|---|---|---|---|---|
| Tank Capacity | Length (X) | Concrete | Steel Reinf. Bars | Cast Iron Soil Pipe & Fitting |
| Gal. | Ft. | C.Y. | Lbs. | Lbs. |
| 6000 | 6 | 23 | 3800 | 471 |
| 8000 | 8 | 28 | 4600 | 471 |
| 10000 | 10 | 32 | 5400 | 471 |
| 12000 | 12 | 37 | 6300 | 471 |
| 14000 | 14 | 42 | 7100 | 471 |

NOTES:

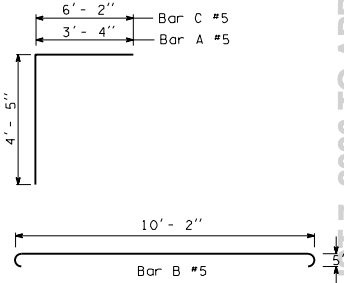
1. Approval of local health department is required before work is started.
2. Excavated material shall be disposed of as directed by the Engineer.
3. All work shall be left open until inspected and approved by the Health Officer and the Engineer.
4. All grades shall be checked and approved by the Engineer.
5. Water tight manhole covers shall be approved by the Engineer prior to installation.
6. Precast septic tanks are acceptable, subject to the approval of the Engineer. Materials shall meet or exceed those shown.
7. Plan dimensions may vary as site conditions and system design permit.
8. All concrete shall be Class 4000.
9. Reinforcing steel shall be Grade 300 or Grade 400.




PLAN

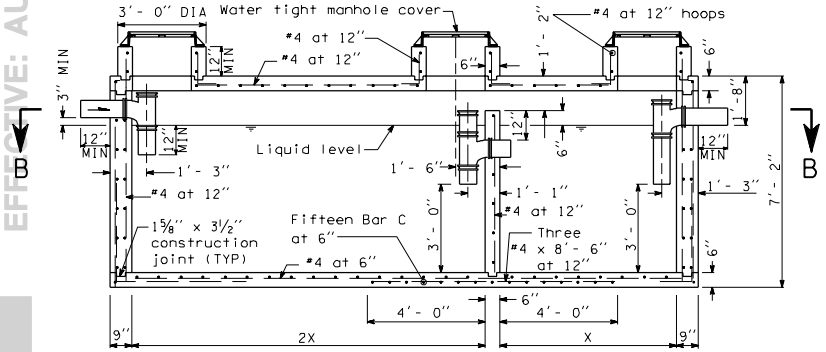



SECTION B-B

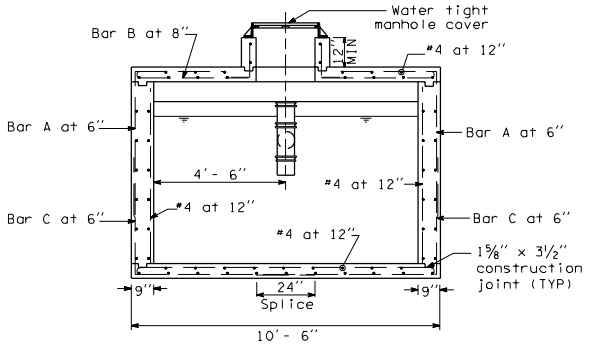



BAR DETAILS

# REST AREA SEPTIC TANK




LONGITUDINAL SECTION

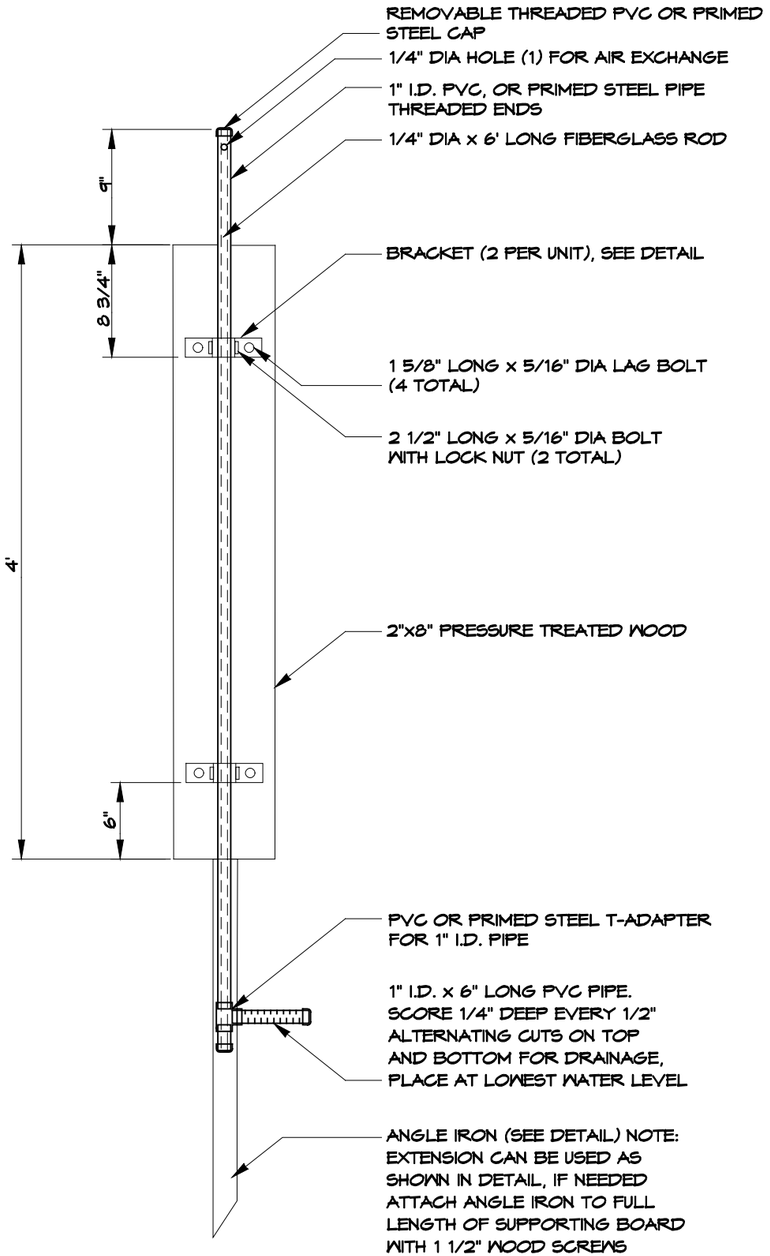



SECTION A-A

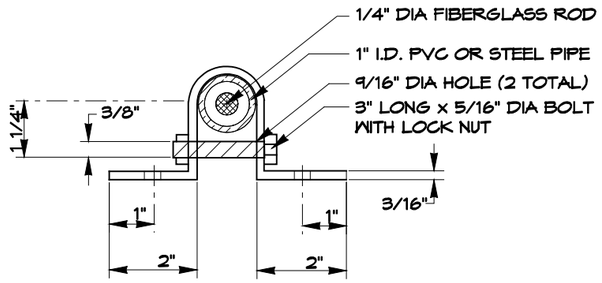


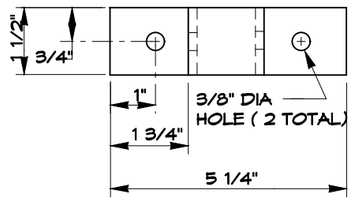
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

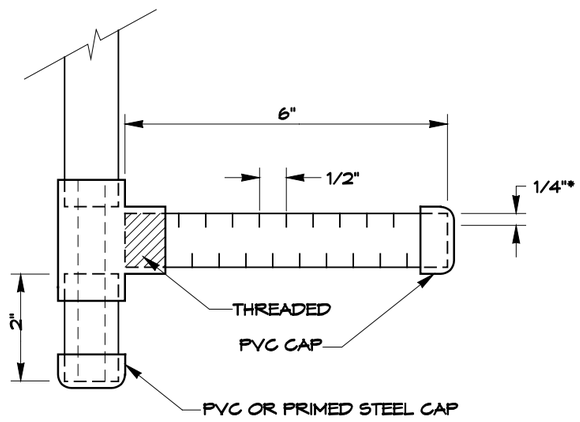



## CREST GAGE
NOT TO SCALE



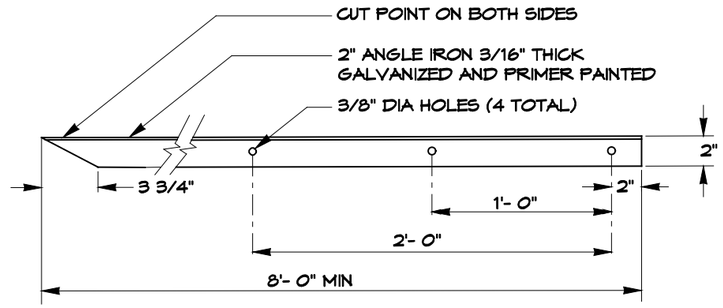




## BRACKET (2 PER UNIT)
NOT TO SCALE

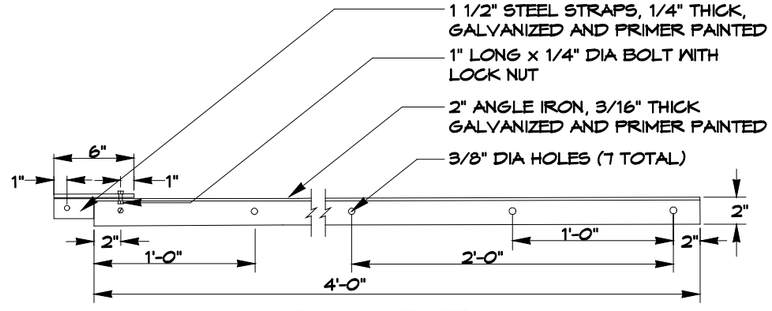



* REFERS TO DRAINAGE CUTS ON TOP AND BOTTOM OF PIPE

## WATER INTAKE & CLEAN-OUT ASSEMBLY
NOT TO SCALE




## ANGLE IRON
NOT TO SCALE




## ANGLE IRON EXTENSION
NOT TO SCALE

NOTE: POUR IN APPROXIMATELY 1 TABLESPOON OF CORK DUST AT INSTALLATION AND AFTER EACH READING

NOTE: GAGE ASSEMBLY BACKING BOARD, PIPE, ROD, AND ANGLE IRON CAN BE EXTENDED AS NEEDED TO FIT SITE REQUIREMENTS.

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

# CREST GAGE

# STANDARD PLAN I-2

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APPROVED FOR PUBLICATION

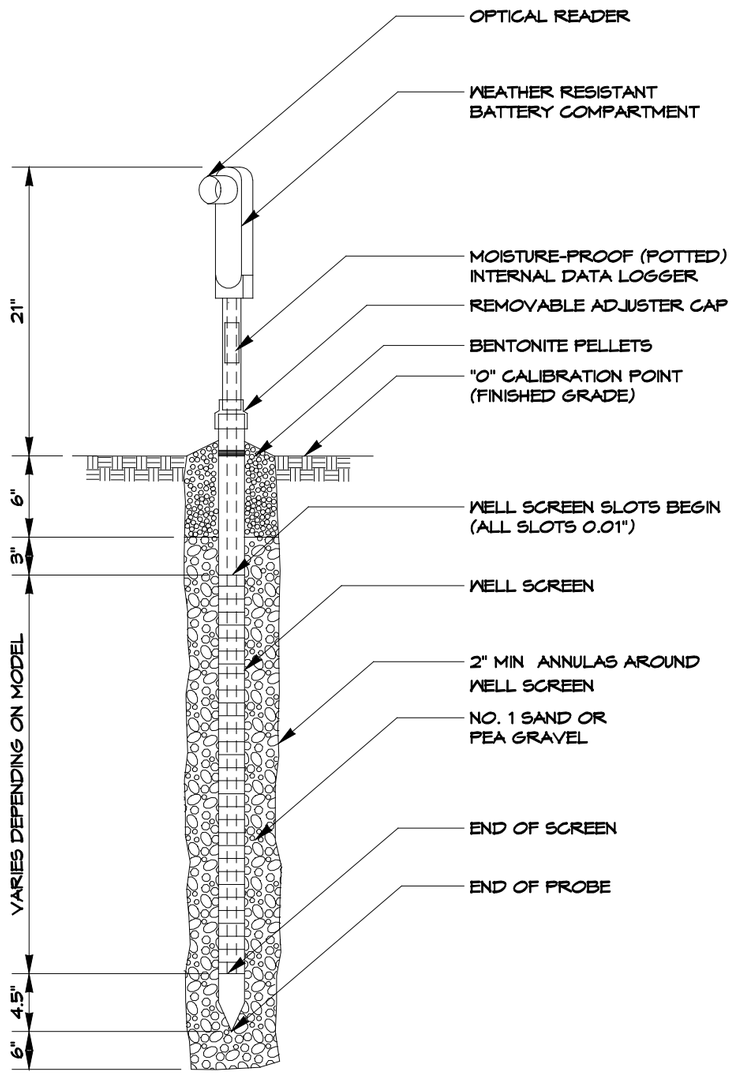
*Clifford E. Mansfield* — *04-23-99*

DEPUTY STATE DESIGN ENGINEER — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




AUTOMATED GROUND WATER MONITORING WELL

NOT TO SCALE

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

# AUTOMATED GROUND WATER MONITORING WELL

## STANDARD PLAN I-3

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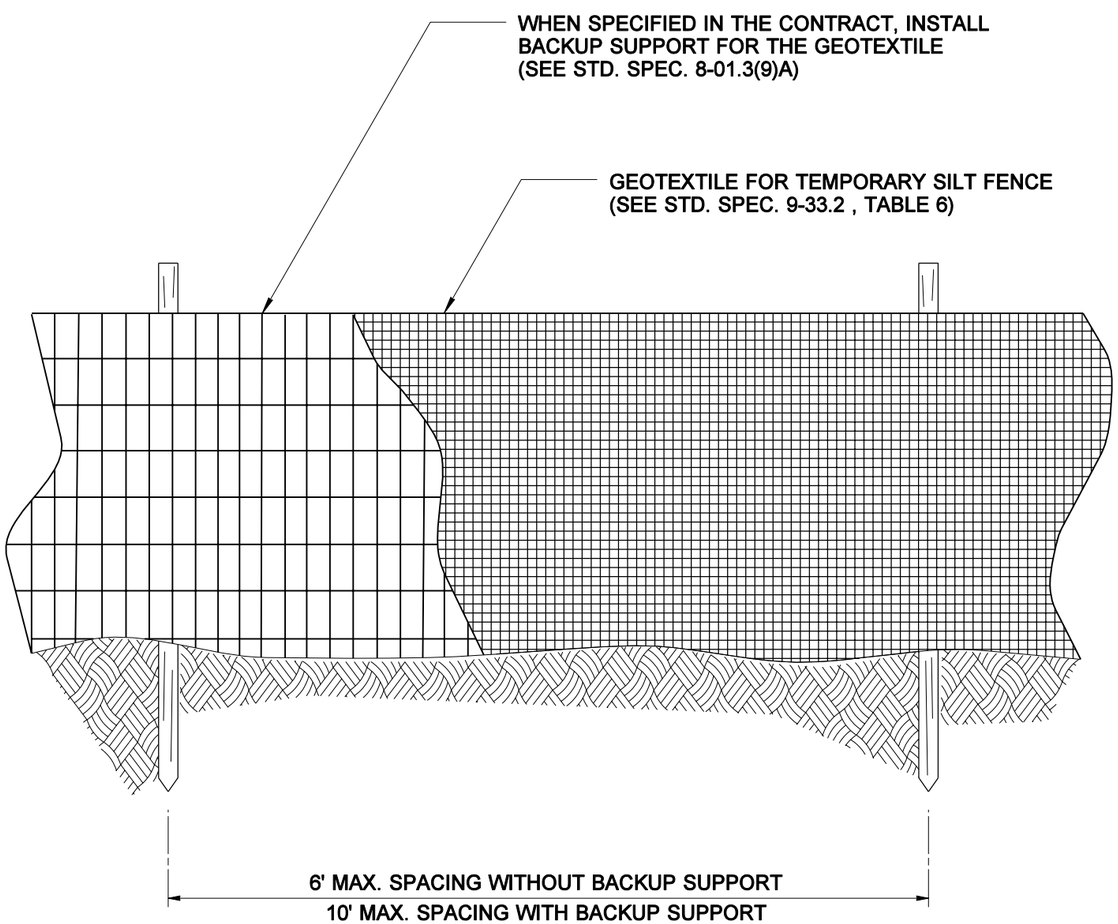
*Clifford E. Mansfield* — *08-20-99*

DEPUTY STATE DESIGN ENGINEER — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

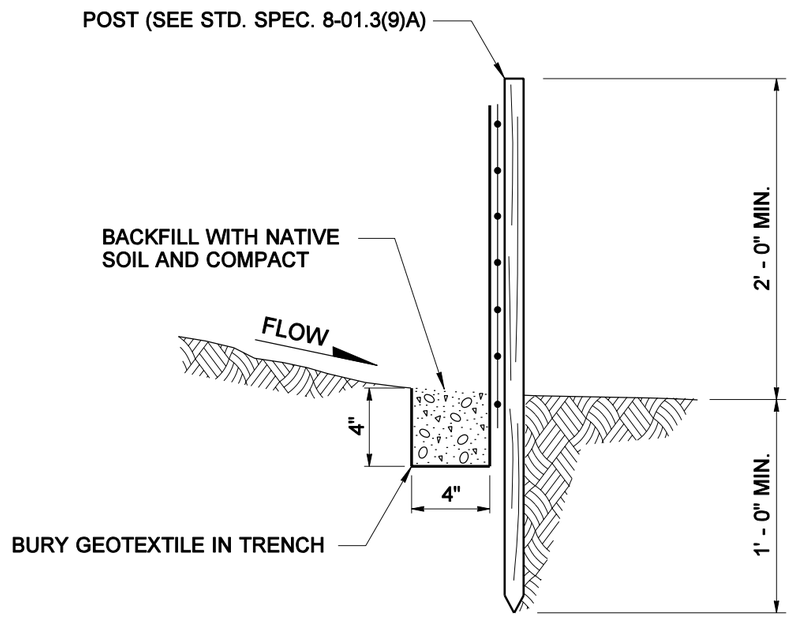
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**ELEVATION VIEW**

**NOTES**

1. MAXIMIZE DETENTION OF STORMWATER BY PLACING FENCE AS FAR AWAY FROM THE 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).




**SIDE VIEW**

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

# SILT FENCE

## STANDARD PLAN I-4

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* *07-17-03*

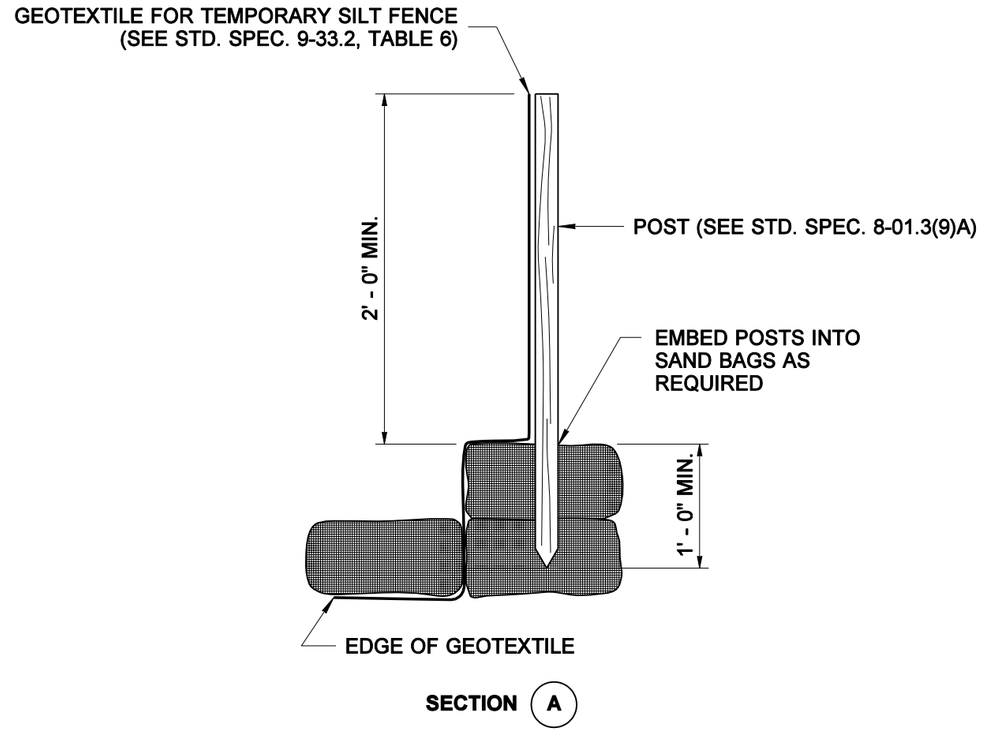
STATE DESIGN ENGINEER — DATE

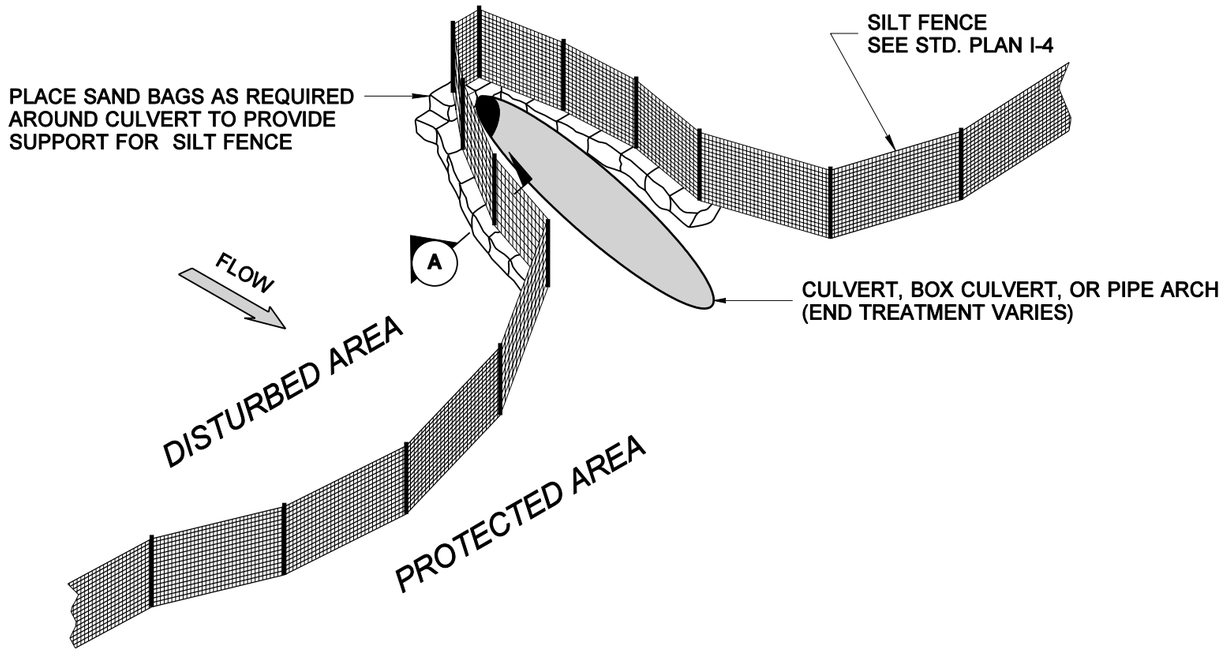
Washington State Department of Transportation

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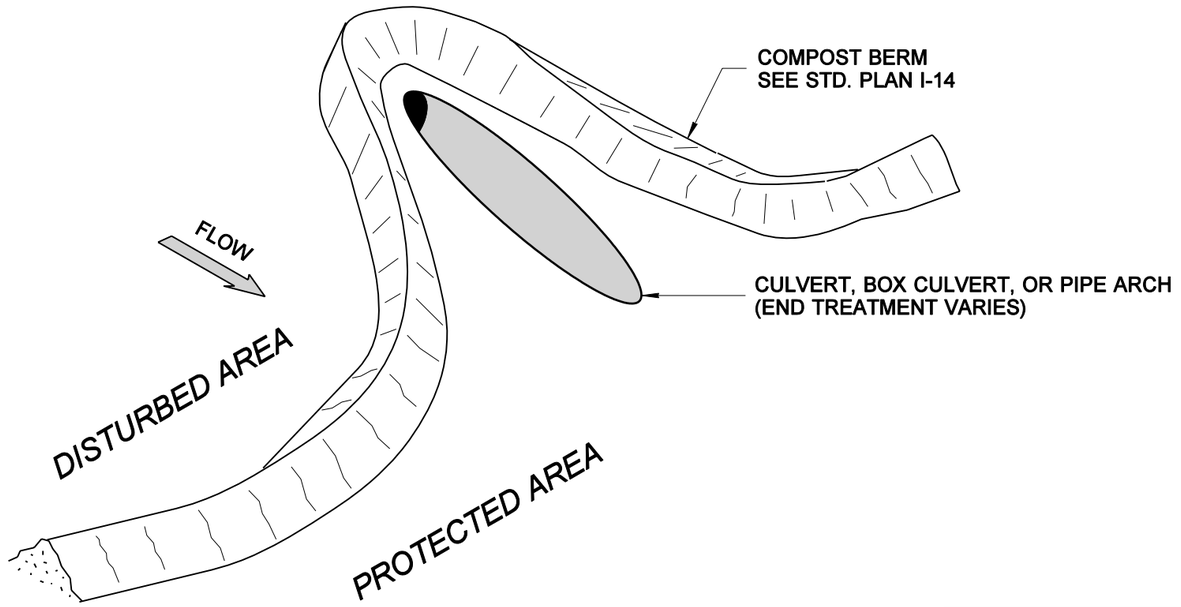



**SILT FENCE DESIGN**

**NOTE**

PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATIONS 8-01.3(9)A AND 8-01.3(15).




**COMPOST BERM DESIGN**

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

# EROSION CONTROL AT CULVERT ENDS

## STANDARD PLAN I-5

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

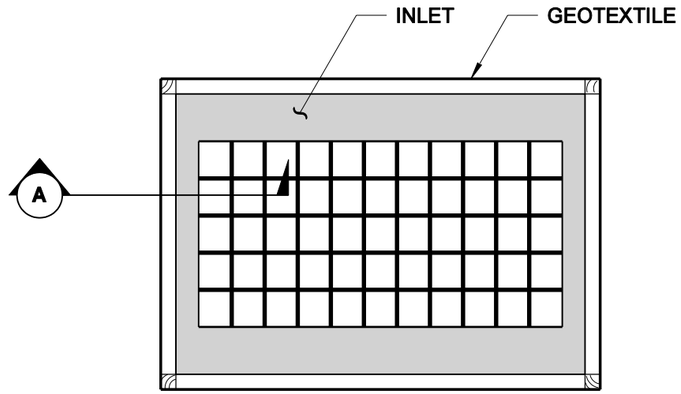
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *07-17-03* — DATE

Washington State Department of Transportation

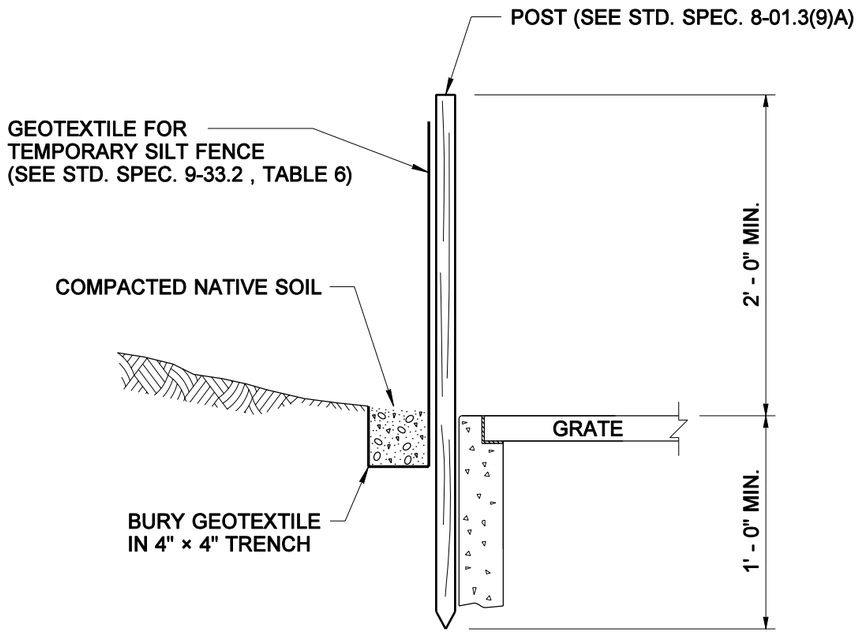
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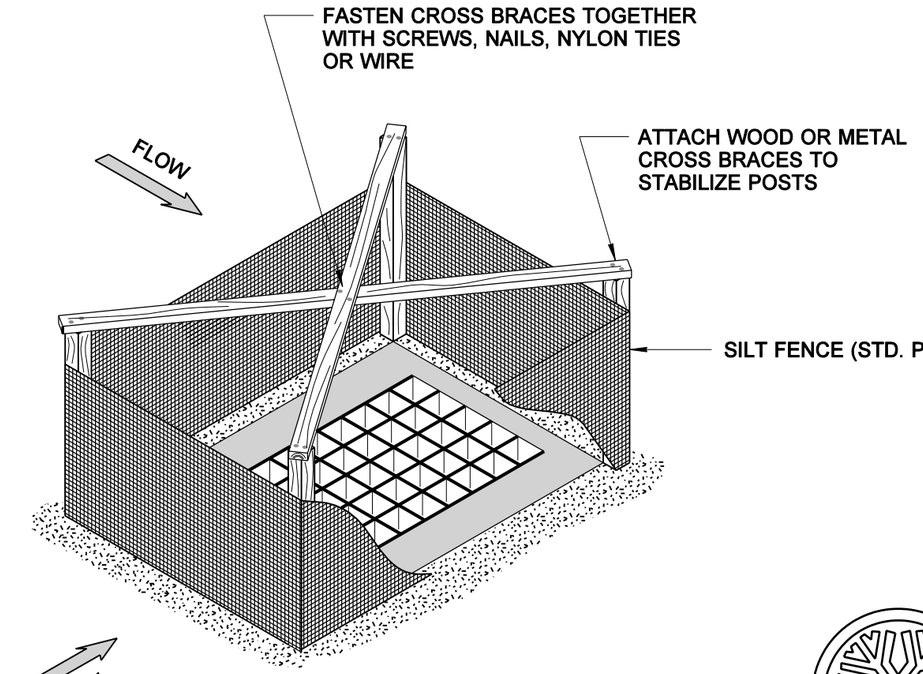

**PLAN VIEW**
(CROSS BRACES NOT SHOWN)




**SECTION A**

**NOTES**

1. PREFABRICATED UNITS MAY BE USED IN LIEU OF THE DESIGN SHOWN ON THIS PLAN UPON APPROVAL OF THE ENGINEER.
2. STRUCTURE SHALL BE CONSTRUCTED SUCH THAT GEOTEXTILE MATERIAL SHALL BE FASTENED TO POSTS CREATING A SEAMLESS JOINT.
3. ENSURE THAT PONDING HEIGHT OF WATER DOES NOT CAUSE FLOODING ON ADJACENT ROADWAYS OR PRIVATE PROPERTY.
4. PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATION 8-01.3(15).




**ISOMETRIC VIEW**
(ENTIRE FENCE NOT SHOWN
FOR ILLUSTRATIVE PURPOSES)

STATE OF
WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

# TEMPORARY SILT FENCE FOR INLET PROTECTION IN UNPAVED AREAS
# STANDARD PLAN I-6

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

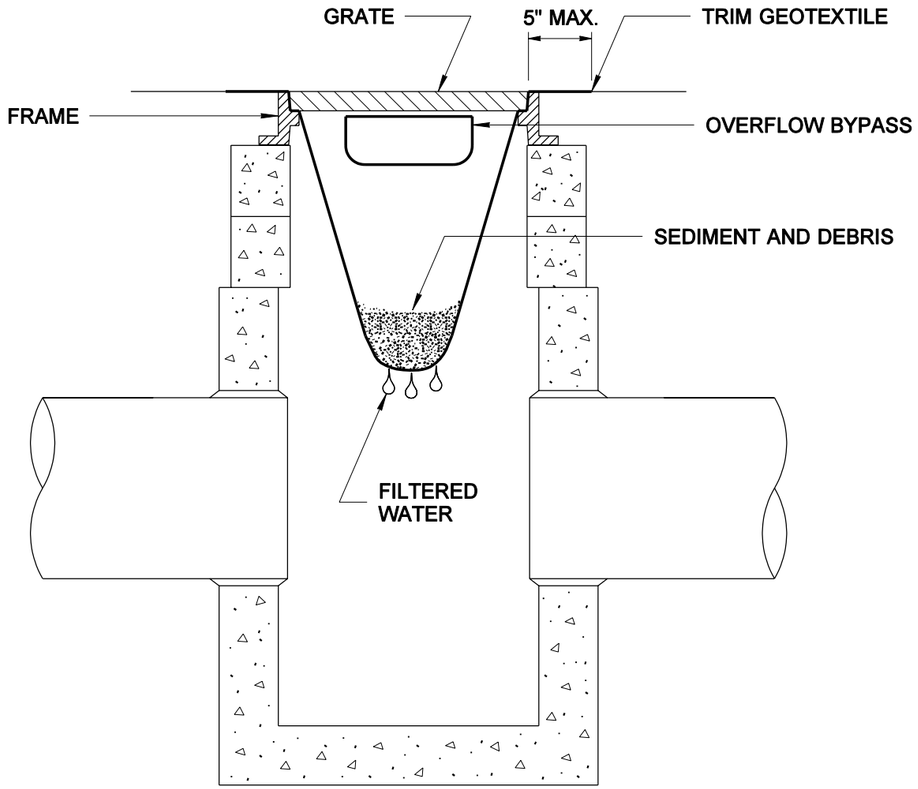
*Harold J. Peterfeso* *07-17-03*
STATE DESIGN ENGINEER DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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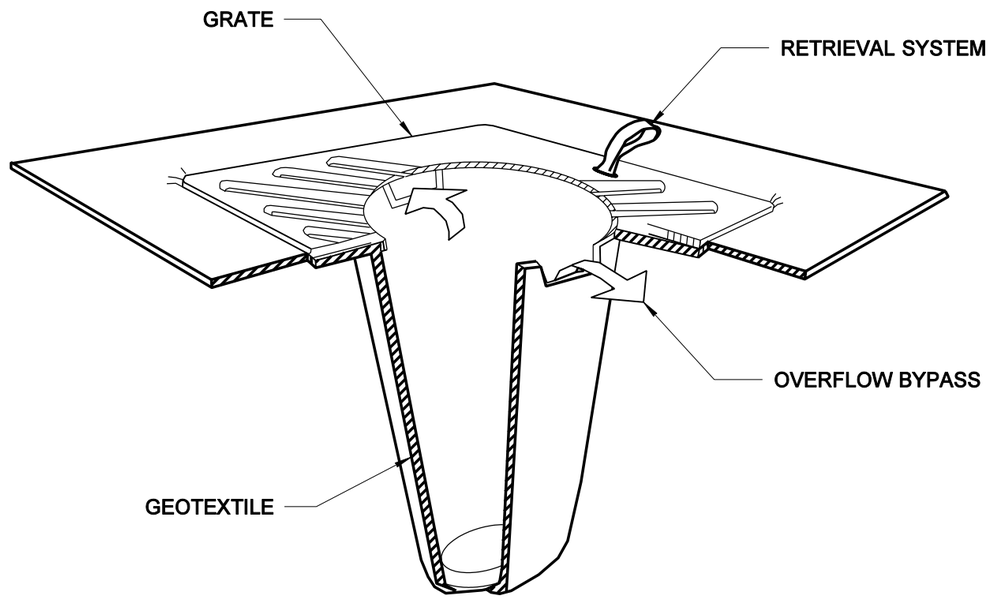



**CROSS SECTION**

NOT TO SCALE

**NOTES**

1. PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATION 8-01.3(15).
2. SIZE THE BELOW GRATE INLET DEVICE (BGID) FOR THE STORM WATER STRUCTURE IT WILL SERVICE.
3. THE BGID SHALL HAVE A BUILT-IN HIGH-FLOW RELIEF SYSTEM (OVERFLOW BYPASS).
4. THE RETRIEVAL SYSTEM MUST ALLOW REMOVAL OF THE BGID WITHOUT SPILLING THE COLLECTED MATERIAL.




**ISOMETRIC VIEW**

NOT TO SCALE

STATE OF
WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

# PREFABRICATED BELOW GRATE INLET DEVICE DETAILS

**STORM DRAIN**
**INLET PROTECTION**

**STANDARD PLAN I-7**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* *07-17-03*

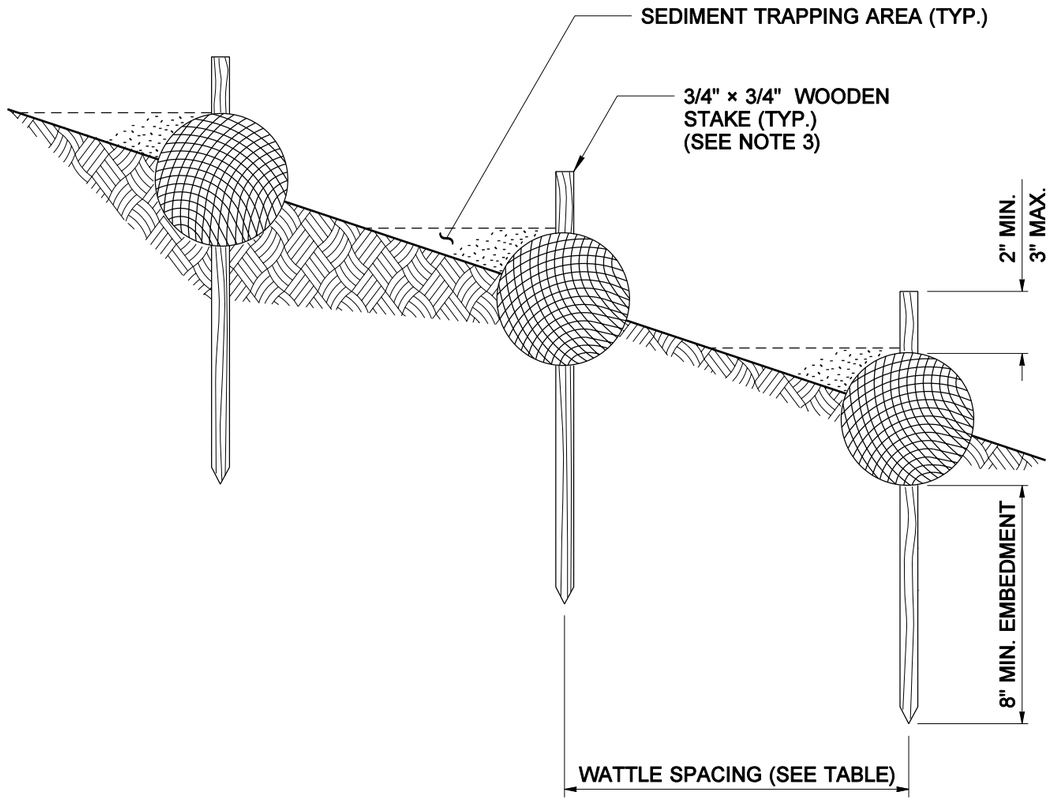
STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

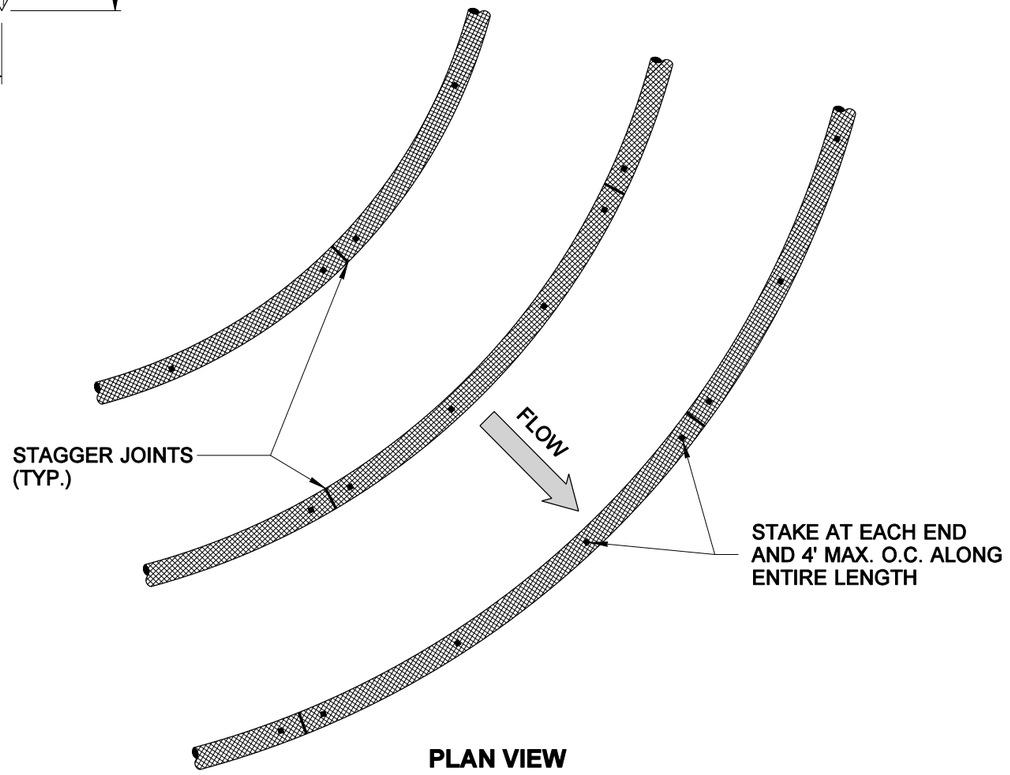
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**ELEVATION VIEW**




**PLAN VIEW**

## NOTES

1. INSTALL WATTLES ALONG CONTOURS (SEE STANDARD SPECIFICATION 8-01.3(10)).
2. WATTLES SHALL BE INSPECTED REGULARLY, AND IMMEDIATELY AFTER A RUNOFF PRODUCING RAINFALL, TO ENSURE THEY REMAIN THOROUGHLY ENTRENCHED AND IN CONTACT WITH THE SOIL.
3. LIVE STAKES MAY BE USED FOR PERMANENT INSTALLATIONS.
4. PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATION 8-01.3(15).
5. INSTALL WATTLES SNUGLY INTO THE TRENCH. ABUT ADJACENT WATTLES TIGHTLY, END TO END, WITHOUT OVERLAPPING THE ENDS.
6. PILOT HOLES MAY BE DRIVEN THROUGH THE WATTLE AND INTO THE SOIL, WHEN SOIL CONDITIONS REQUIRE.

| WATTLE SPACING TABLE | |
|---|---|
| SLOPE | MAXIMUM SPACING |
| 1:1 | 10 FEET |
| 2:1 | 20 FEET |
| 3:1 | 30 FEET |
| 4:1 | 40 FEET |

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STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

# WATTLE INSTALLATION ON SLOPE

## STANDARD PLAN I-8

SHEET 1 OF 1 SHEET

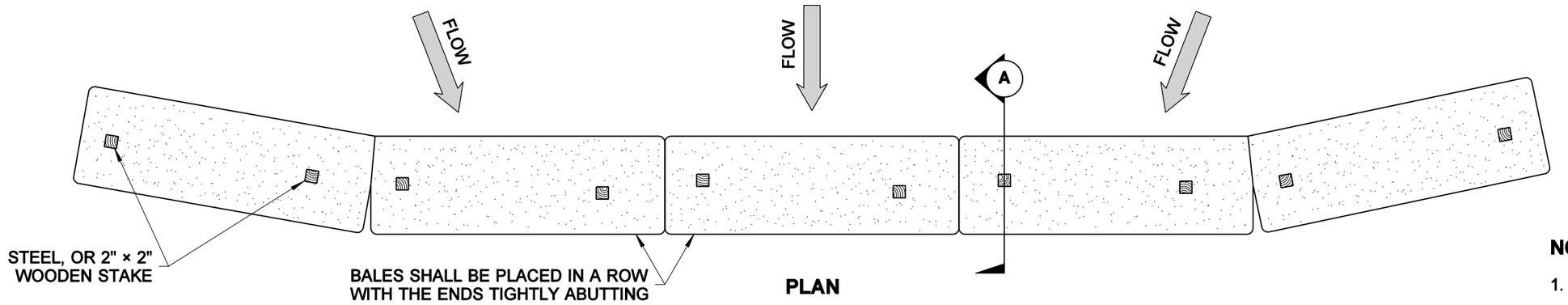
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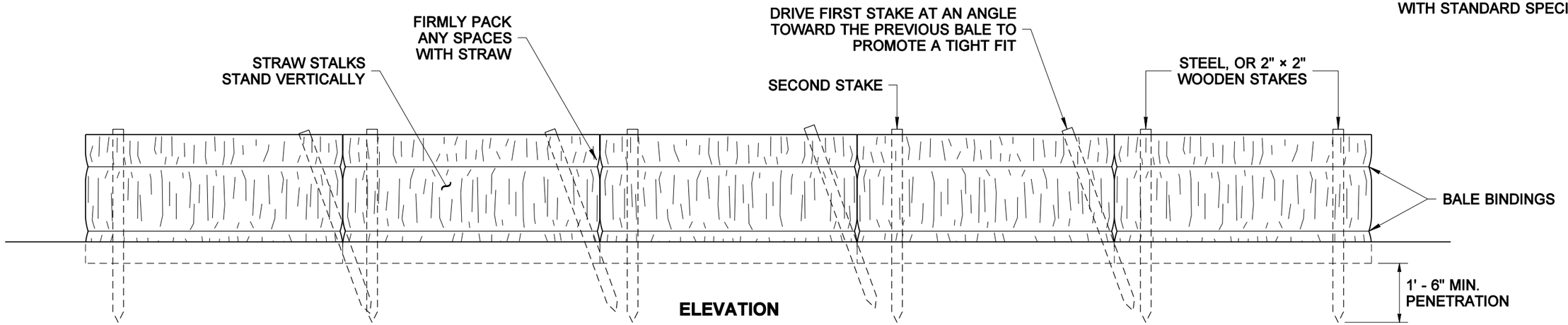
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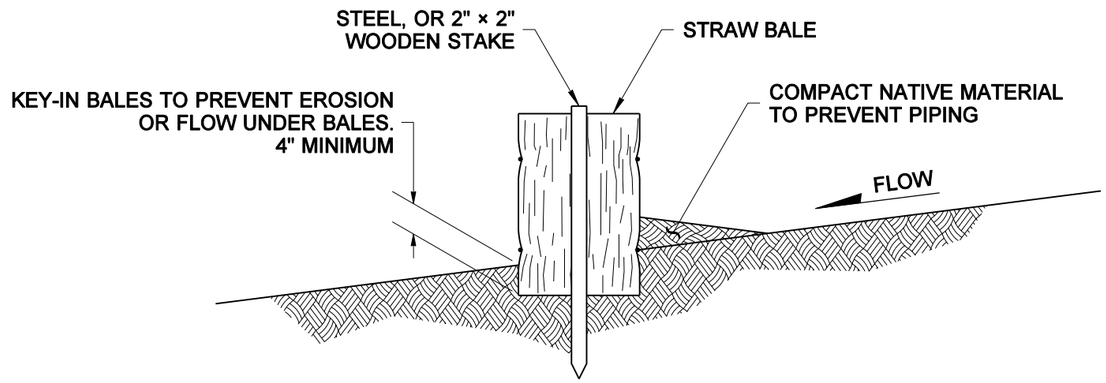

PLAN

## NOTES

1. SEE STANDARD SPECIFICATION 8-01.3(9)D, FOR ADDITIONAL INFORMATION.
2. PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATION 8-01.3(15).




ELEVATION




SECTION (A)

STATE OF
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CERTIFICATE NO. 000598

# STRAW BALE BARRIER

## STANDARD PLAN I-9

SHEET 1 OF 1 SHEET

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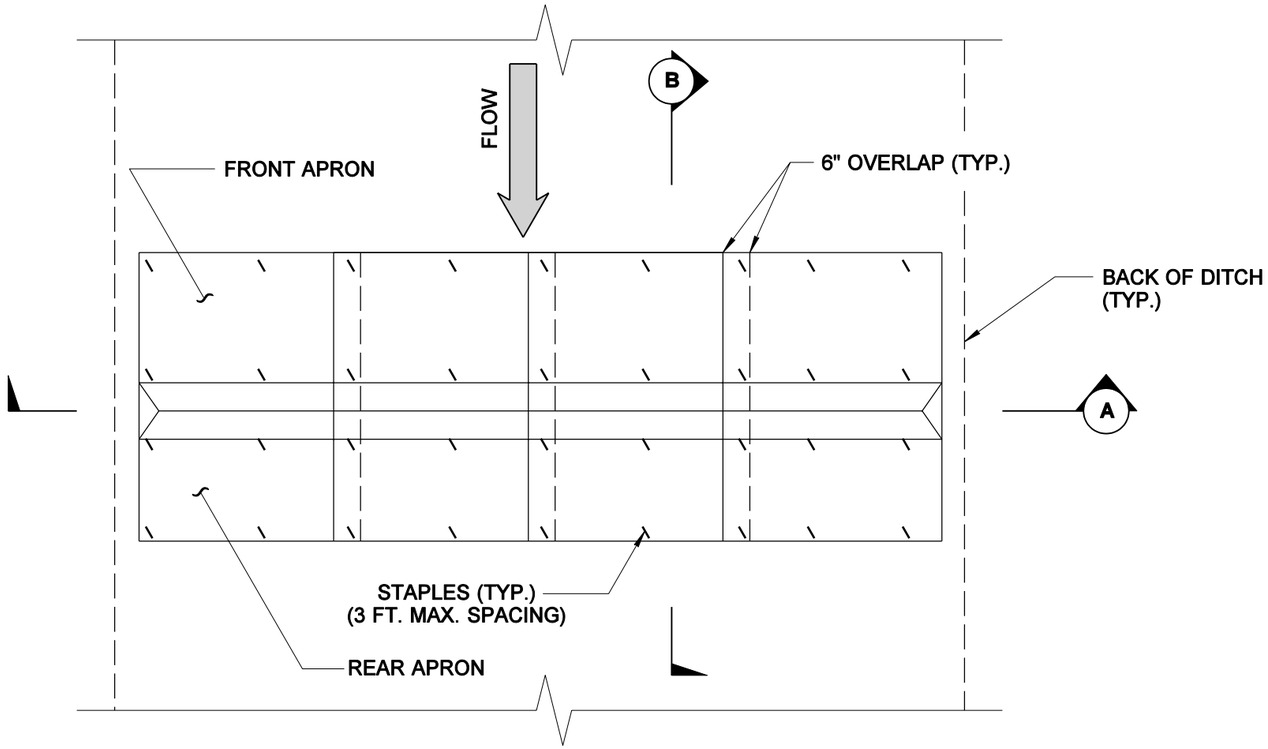
Washington State Department of Transportation

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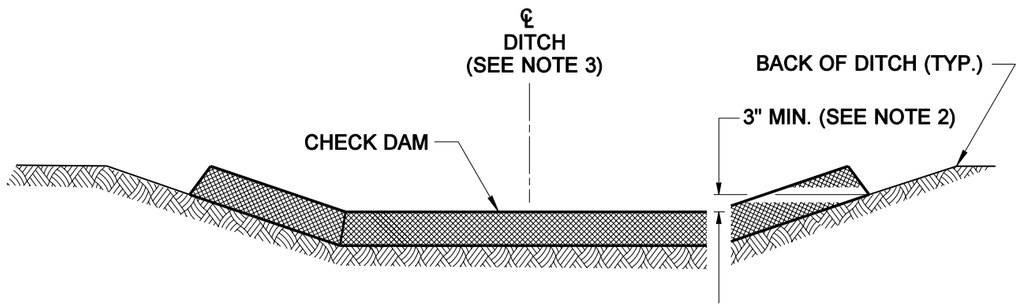
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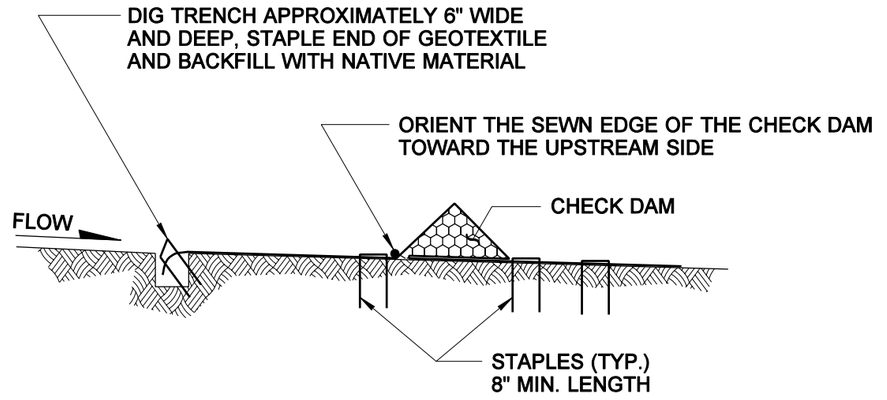

**PLAN VIEW**



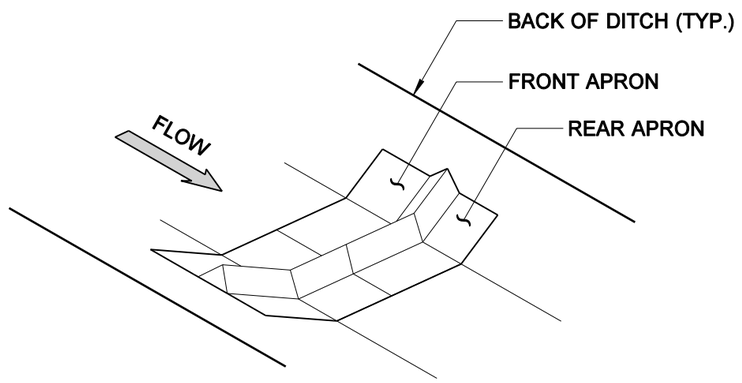

**SECTION A**

## NOTES

1. GEOTEXTILE ENCASED CHECK DAMS SHALL MEET THE REQUIREMENTS OF STANDARD SPECIFICATIONS 8-01.3(5)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 SPECIFICATION 8-01.3(15).




**SECTION B**




**ISOMETRIC VIEW**

STATE OF
WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

# GEOTEXTILE ENCASED CHECK DAM INSTALLATION

## STANDARD PLAN I-10

SHEET 1 OF 1 SHEET

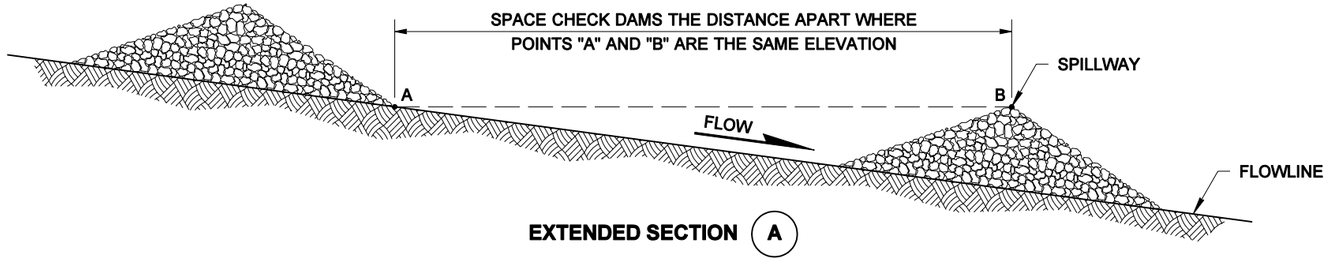
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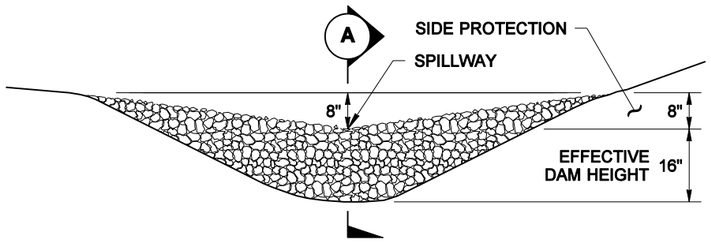
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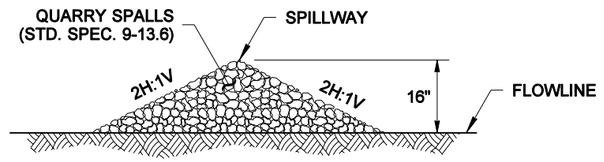
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**EXTENDED SECTION (A)**




**ELEVATION**

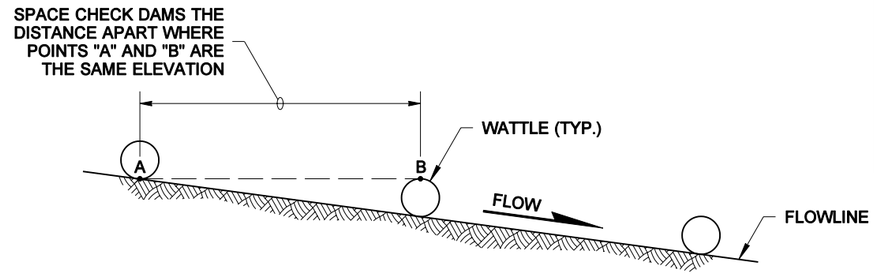



**SECTION (A)**

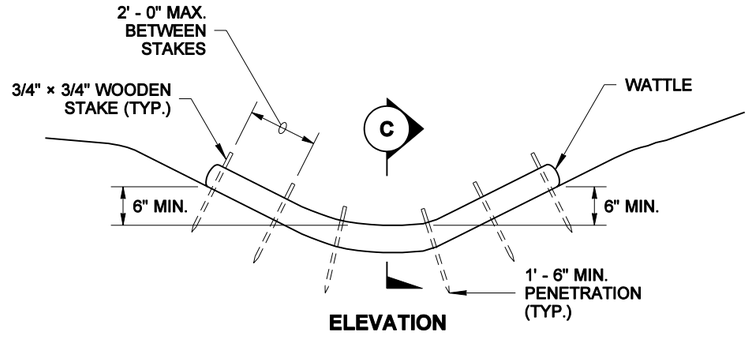
**NOTE**

ROCK CHECK DAMS SHALL BE PLACED OUTSIDE OF THE CLEAR ZONE, OR BEHIND TRAFFIC BARRIER.

## ROCK CHECK DAM

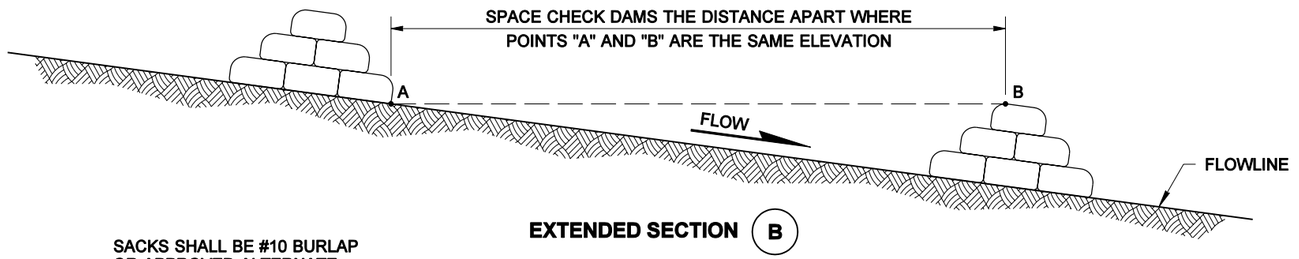



**EXTENDED SECTION (C)**

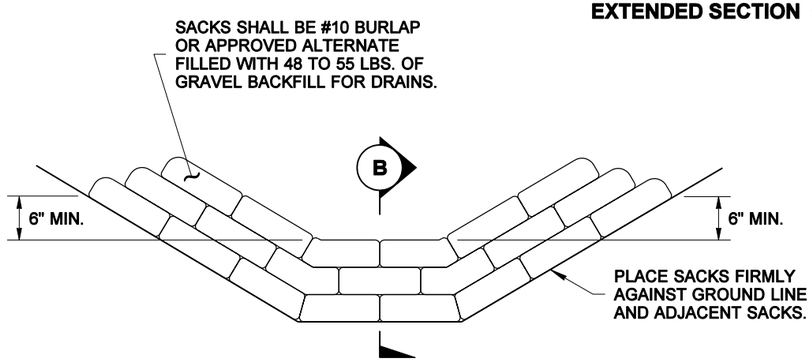



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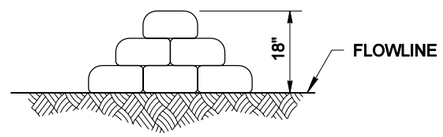
## WATTLE CHECK DAM




**EXTENDED SECTION (B)**




**ELEVATION**




**SECTION (B)**

## SANDBAG CHECK DAM

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LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

# CHECK DAMS

# STANDARD PLAN I-11

SHEET 1 OF 1 SHEET

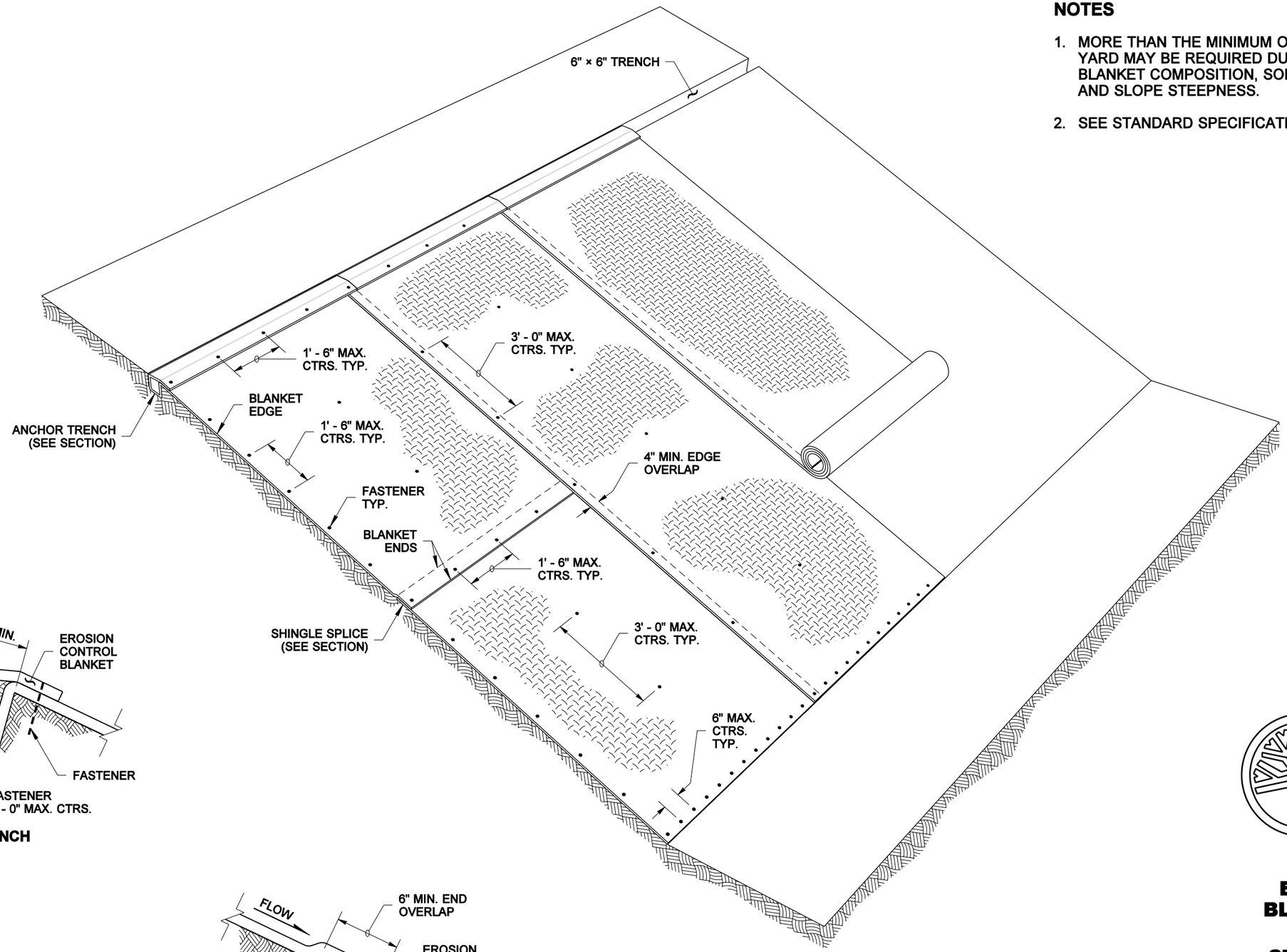
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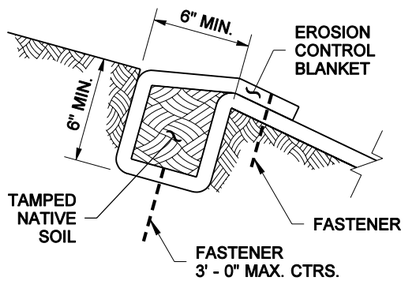
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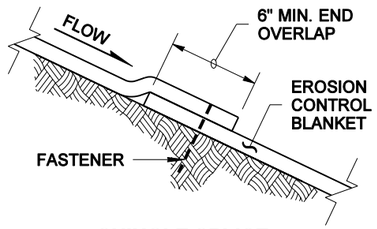

PERSPECTIVE VIEW

## NOTES

1. MORE THAN THE MINIMUM OF ONE FASTENER PER SQUARE YARD MAY BE REQUIRED DUE TO CONDITIONS SUCH AS BLANKET COMPOSITION, SOIL TYPE, SURFACE UNIFORMITY, AND SLOPE STEEPNESS.
2. SEE STANDARD SPECIFICATION 8-01.3(3).




**ANCHOR TRENCH**
**SECTION**




**SHINGLE SPLICE**
**SECTION**

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

# EROSION CONTROL BLANKET PLACEMENT ON SLOPE

## STANDARD PLAN I-12

SHEET 1 OF 1 SHEET

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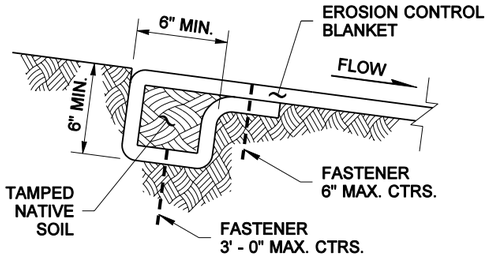
Washington State Department of Transportation

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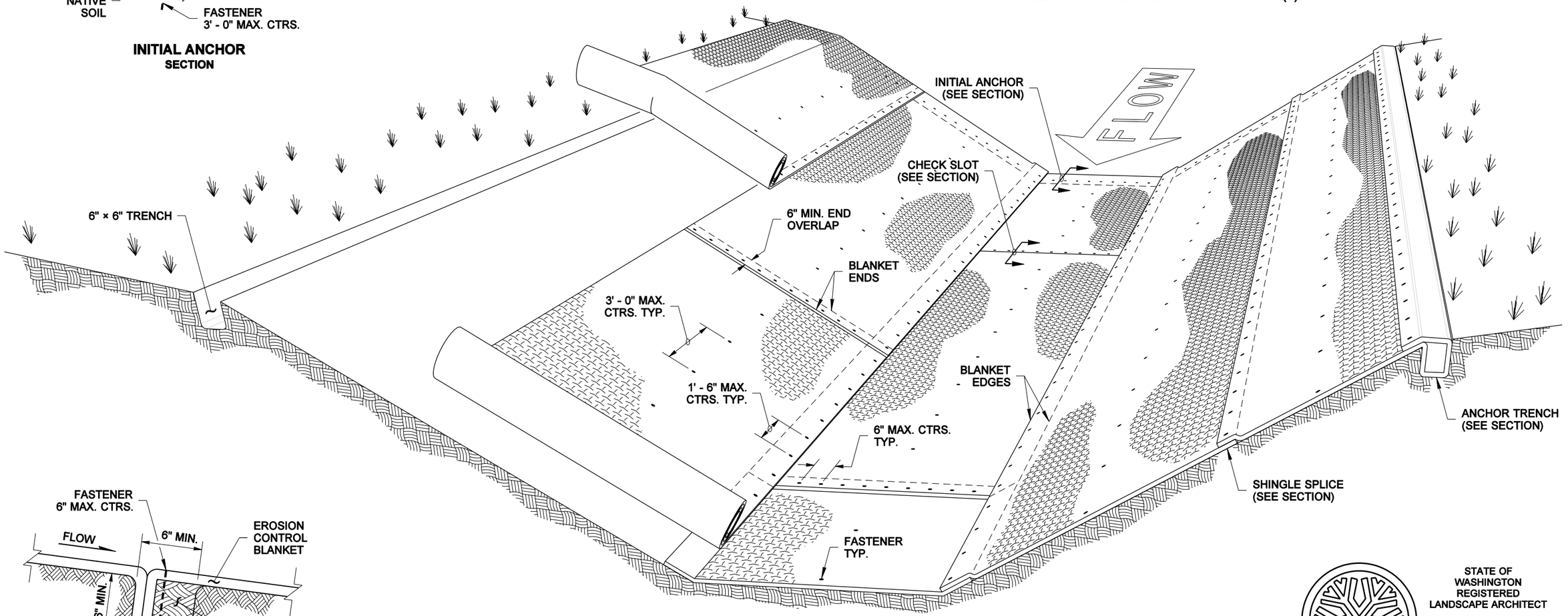
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**INITIAL ANCHOR**
**SECTION**

## NOTES

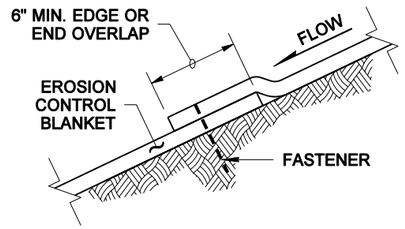
1. MORE THAN THE MINIMUM OF ONE FASTENER PER SQUARE YARD MAY BE REQUIRED DUE TO CONDITIONS SUCH AS BLANKET COMPOSITION, SOIL TYPE, SURFACE UNIFORMITY, AND FLOW VELOCITY.
2. ROLL ENDS MAY BE SPLICED IN A CHECK SLOT.
3. SEE STANDARD SPECIFICATION 8-01.3(3).



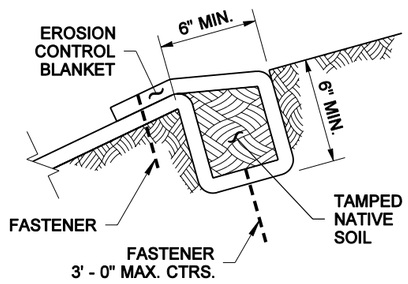

**PERSPECTIVE VIEW**




**CHECK SLOT**
**SECTION**




**SHINGLE SPLICE**
**SECTION**




**ANCHOR TRENCH**
**SECTION**

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

# EROSION CONTROL BLANKET PLACEMENT IN CHANNEL

## STANDARD PLAN I-13

SHEET 1 OF 1 SHEET

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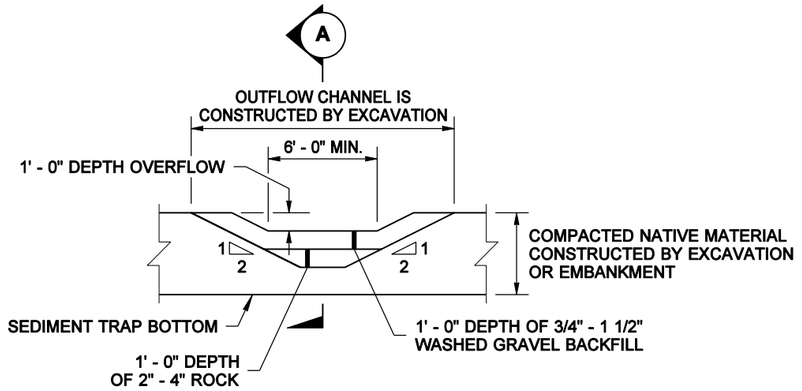
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *07-17-03* — DATE

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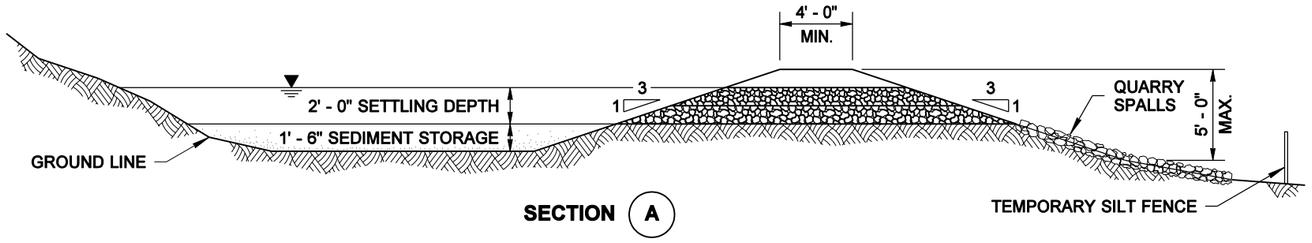
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

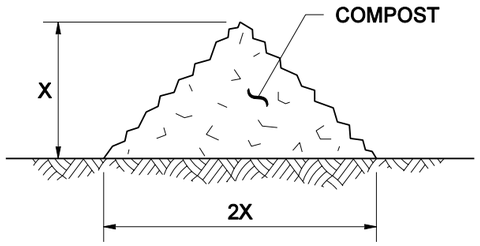
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**ELEVATION**



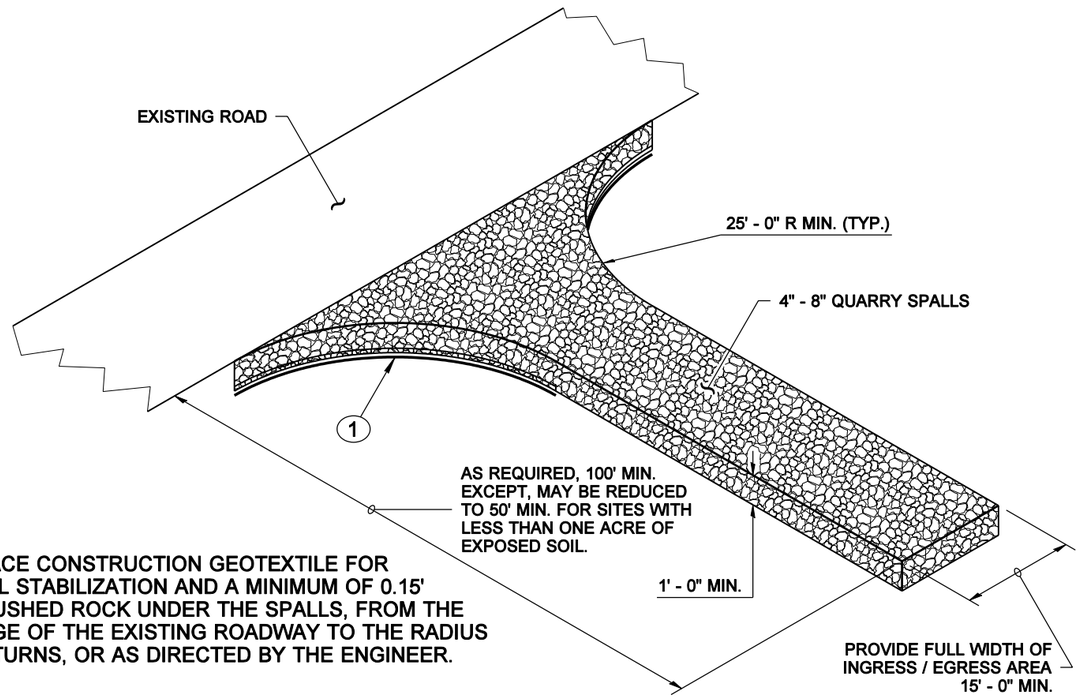

## TEMPORARY SEDIMENT TRAP




X = 1' - 0" FOR SLOPES 4H:1V OR FLATTER
X = 1' - 6" FOR SLOPES STEEPER THAN 4H:1V

**SECTION VIEW**

## COMPOST BERM DETAIL




(1) PLACE CONSTRUCTION GEOTEXTILE FOR SOIL STABILIZATION AND A MINIMUM OF 0.15' CRUSHED ROCK UNDER THE SPALLS, FROM THE EDGE OF THE EXISTING ROADWAY TO THE RADIUS RETURNS, OR AS DIRECTED BY THE ENGINEER.

**ISOMETRIC VIEW**

## STABILIZED CONSTRUCTION ENTRANCE

STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

# MISCELLANEOUS EROSION CONTROL DETAILS

## STANDARD PLAN I-14

SHEET 1 OF 1 SHEET

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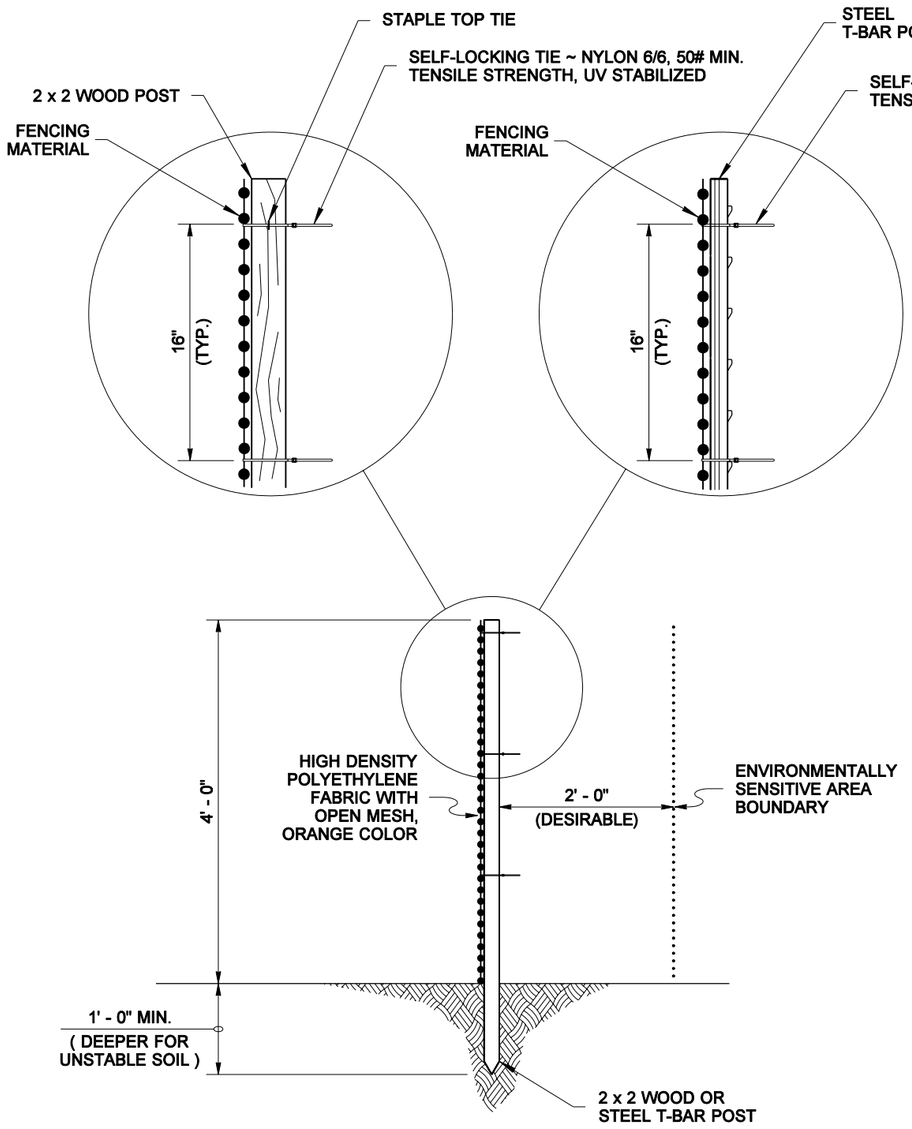
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

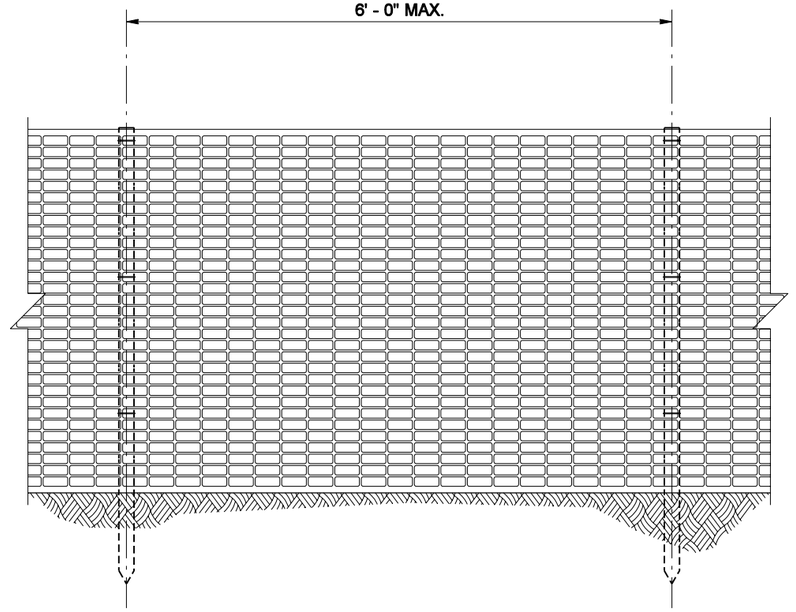
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: BILL BERENS

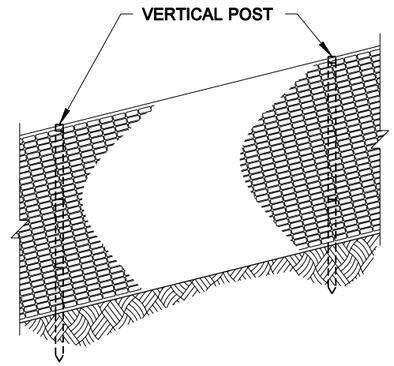
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**TYPICAL SECTION**

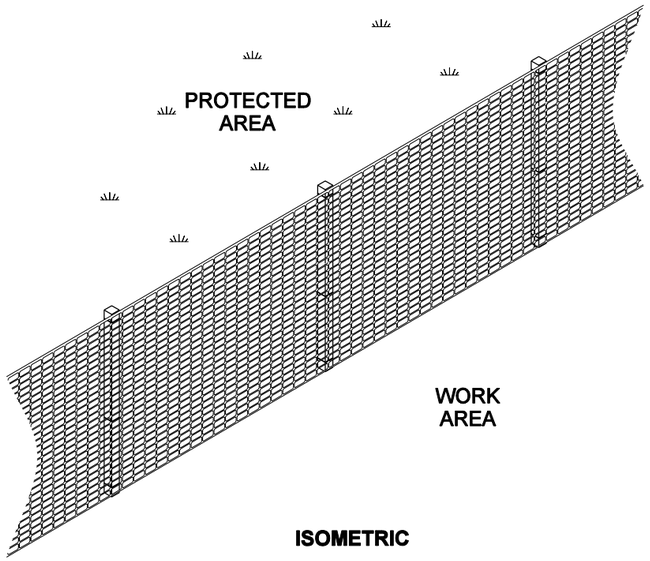



**ELEVATION**




**ELEVATION**

**FENCE ON SLOPE**




**ISOMETRIC**

KEVIN J. DAYTON
STATE OF WASHINGTON
24035
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JULY 27, 2005

# HIGH VISIBILITY CONSTRUCTION FENCING

## STANDARD PLAN I-15

SHEET 1 OF 1 SHEET

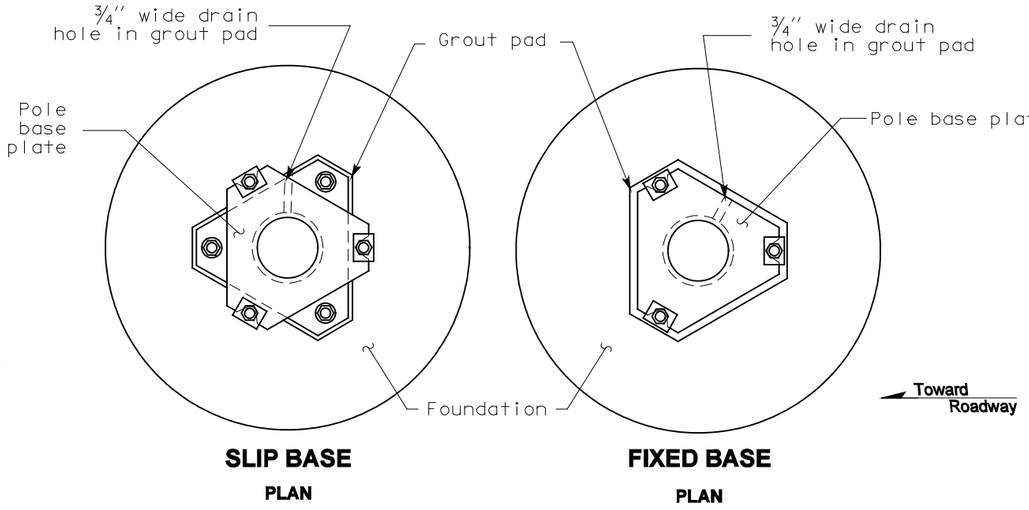
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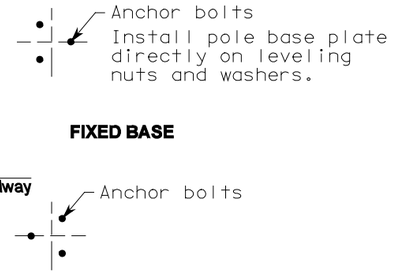
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

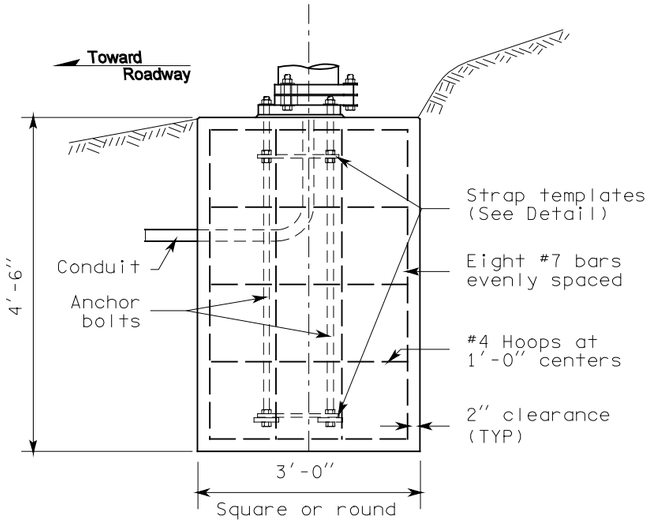



**SLIP BASE**
**PLAN**

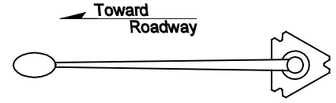
**FIXED BASE**
**PLAN**



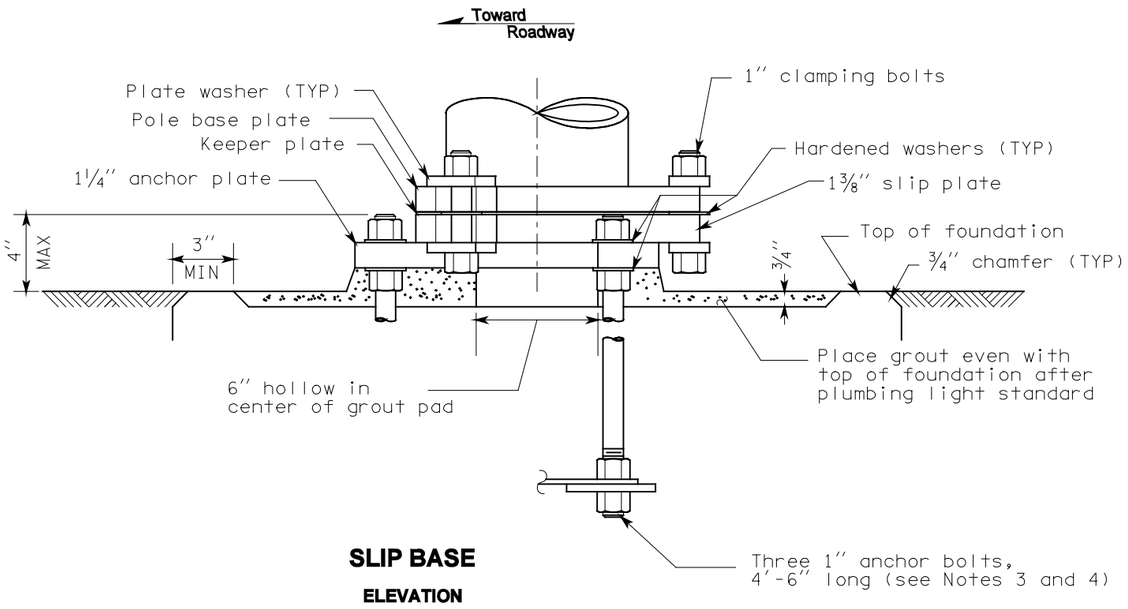

**ANCHOR BOLT LAYOUT**



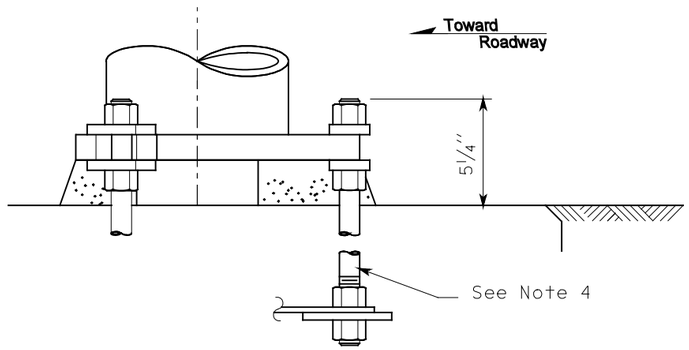

**FOUNDATION DETAIL**
(See Note 1)




**LIGHT STANDARD ORIENTATION**




**SLIP BASE**
**ELEVATION**




**FIXED BASE**
**ELEVATION**

Details similar to slip base except where noted

JEROME A. WEIGEL
STATE OF WASHINGTON
14742
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 29, 2000

# STEEL LIGHT STANDARD BASE DETAILS

# STANDARD PLAN J-1b

SHEET 1 OF 3 SHEETS

*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.*

| DATE | REVISION | BY |
|---|---|---|
| 10-99 | | TWS |

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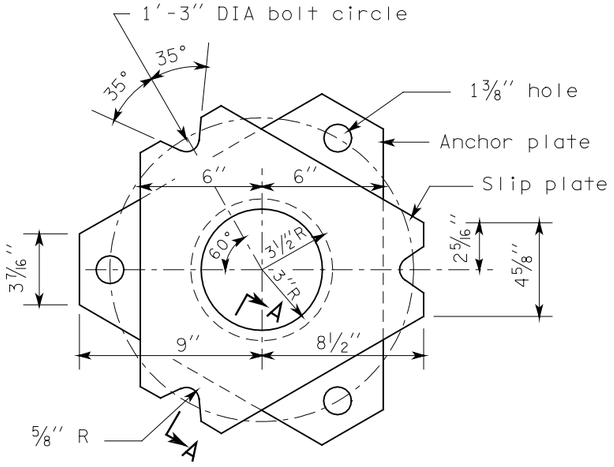
*Clifford E. Mansfield* *10/08/99*

DEPUTY STATE DESIGN ENGINEER — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

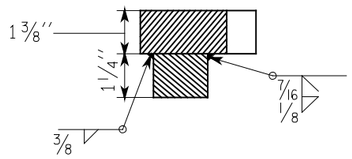
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

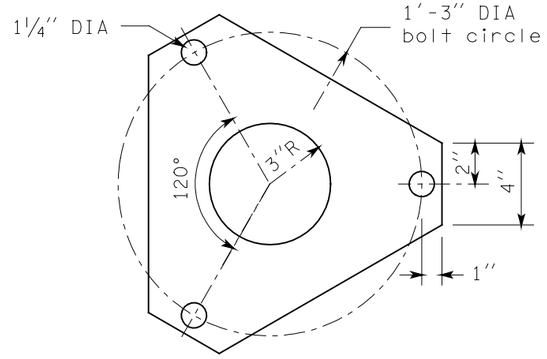



**SLIP/ANCHOR PLATES DETAIL**

Smooth finish top, bottom, and notched surfaces

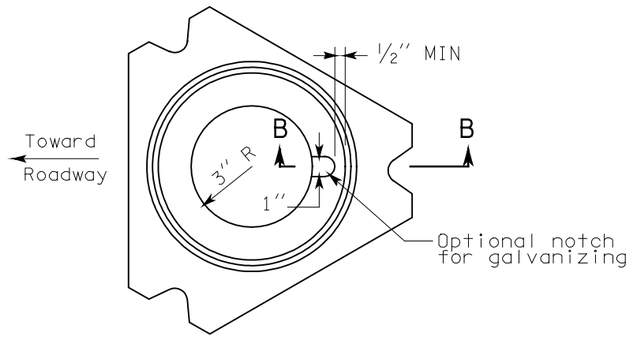



**SECTION A-A**



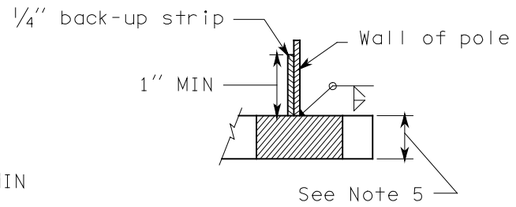

**KEEPER PLATE**

Place between pole base plate and slip plate on top of middle washers.




**POLE BASE PLATE**

Smooth finish top, bottom, and notched surfaces




**SECTION B-B**

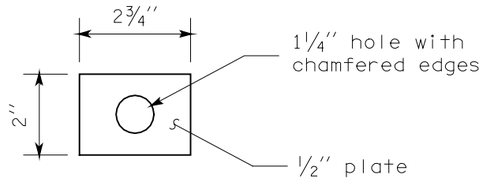
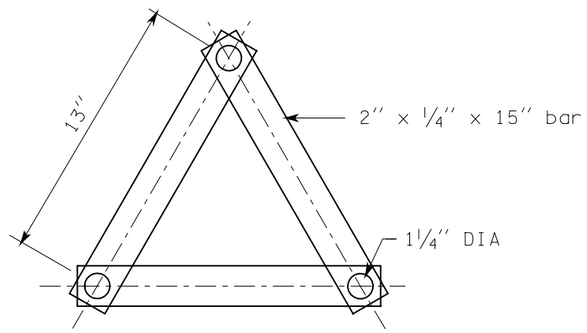



**PLATE WASHER**




**STRAP TEMPLATE ASSEMBLY DETAIL**

Place over anchor bolts
(See Note 4)




EXPIRES JUNE 29, 2000

# STEEL LIGHT STANDARD BASE DETAILS

## STANDARD PLAN J-1b



*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.*

| DATE | REVISION | BY |
|---|---|---|
| 10-99 | REVISED SECTION B-B. | TWS |

APPROVED FOR PUBLICATION

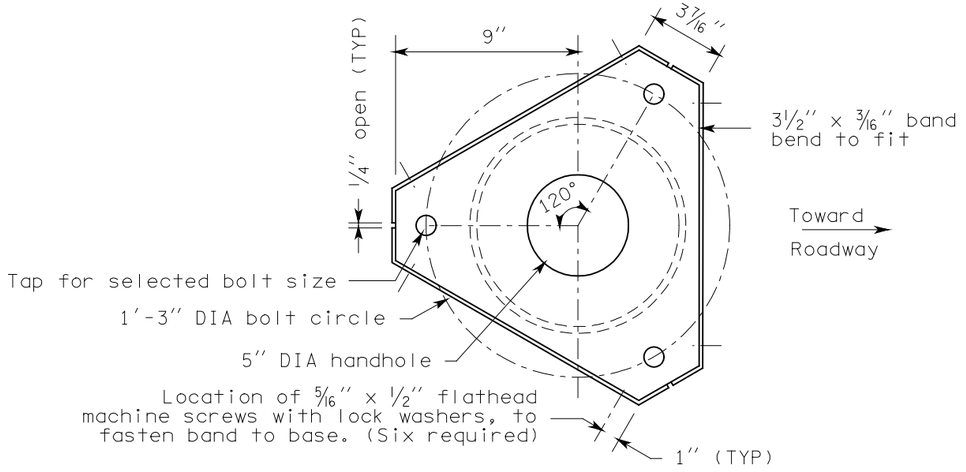
*Clifford E. Mansfield* *10/08/99*

DEPUTY STATE DESIGN ENGINEER — DATE

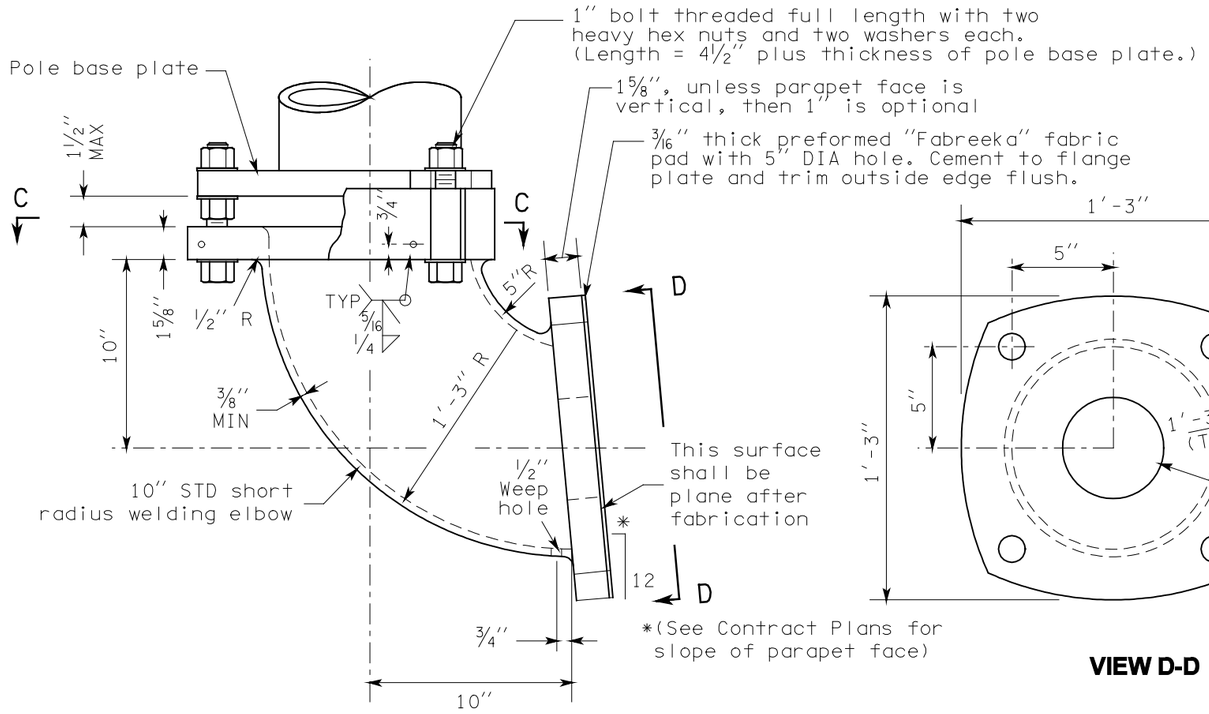
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**SECTION C-C**




**ELEVATION**




**VIEW D-D**

## LIGHTING BRACKET DETAIL

For light standards with single arm 12′ or less and double arms 8′ or less mounted on bridges or retaining walls.

NOTES

1. See Standard Plan C-8b for base plate and foundation requirements when light standards are mounted on concrete barrier.
2. Round and smooth all edges along wire-way to protect conductors. See Standard Plan J-1e for wiring details.
3. The top of the anchor rod shall be both threaded and galvanized a minimum of 12″. The bottom of the anchor rod shall be threaded a minimum of 3″. Galvanizing shall be in accordance with AASHTO M111 after threading. Hooked anchor bolts are not allowed.
4. Strap templates shall be held in place by nuts 6″ from the top of the foundation, and at bottom of anchor bolts resting on 4″ x 3/8″ square washers.
5. Pole base plate for a slip base design shall be 1 1/4″ AASHTO M223 Gr. 345. Pole base plate for a fixed base design may be either 1 1/4″ AASHTO M223 Gr. 345 or 1 1/2″ AASHTO M183.
6. Installation of a 50′ pole with double mast arms on a slip base is not allowed.

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14742
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EXPIRES JUNE 29, 2000

# STEEL LIGHT STANDARD BASE DETAILS

# STANDARD PLAN J-1b



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|---|---|---|
| 10-99 | REVISED NOTES 1, 2 & 5; ADDED NOTE 6. | TWS |

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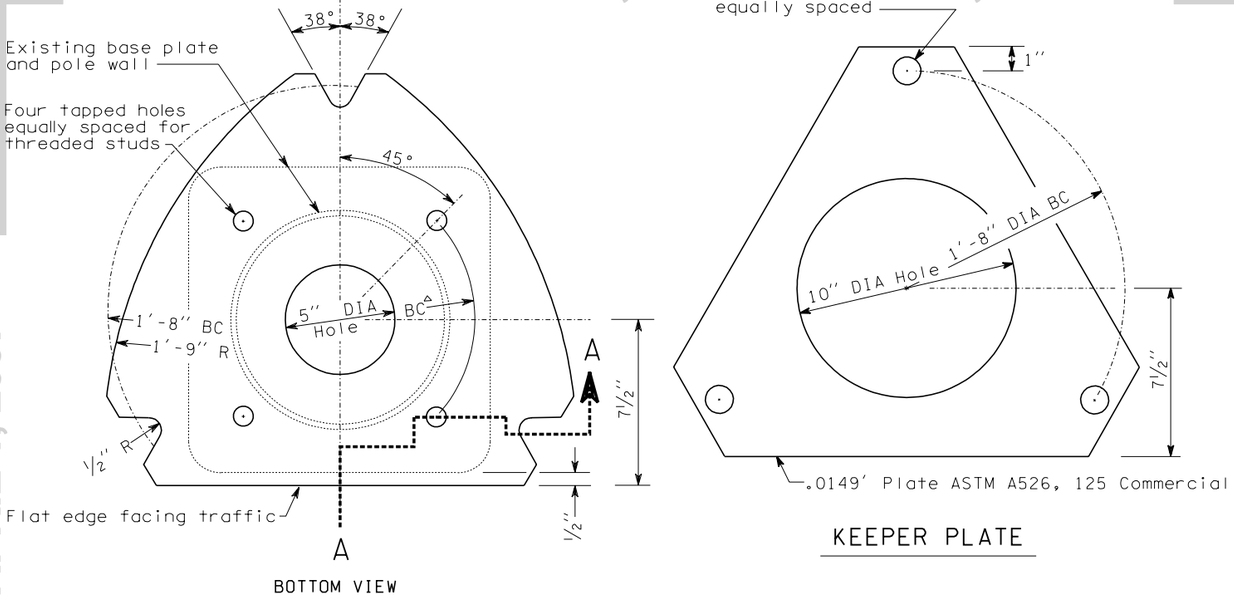
*Clifford E. Mansfield* *10/08/99*

DEPUTY STATE DESIGN ENGINEER — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

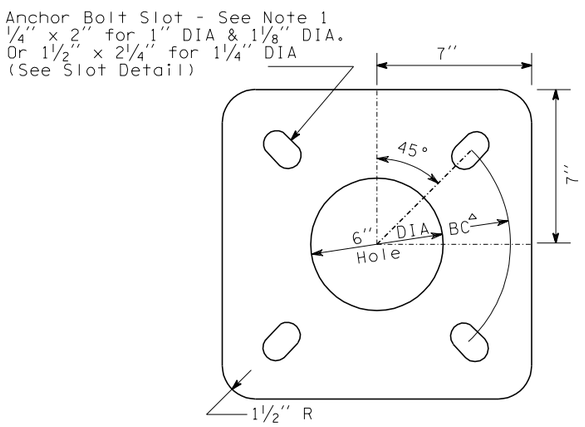



BOTTOM VIEW

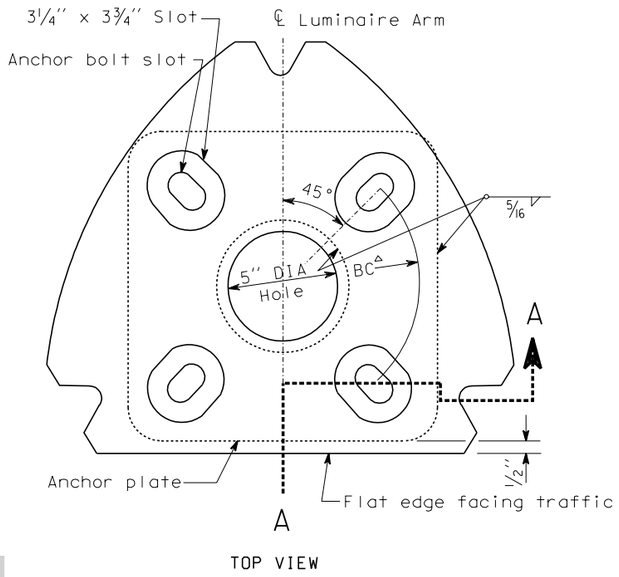
PLAN - TOP SLIP PLATE




KEEPER PLATE

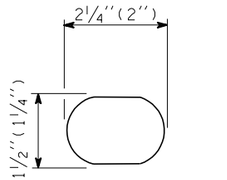



ANCHOR PLATE




TOP VIEW

PLAN - BOTTOM SLIP PLATE

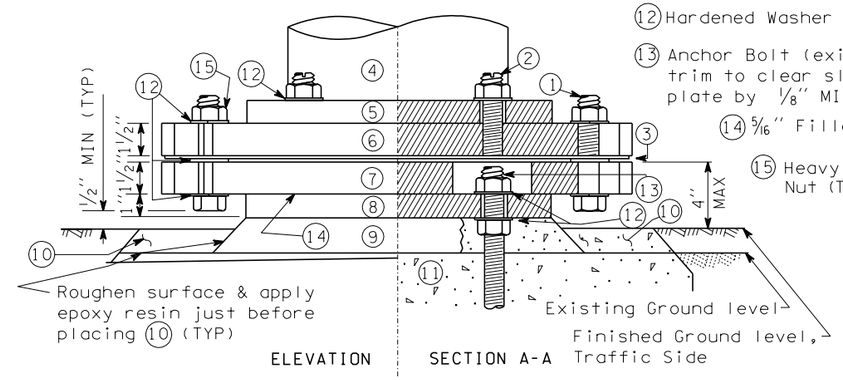



SLOT DETAIL

NOTE:
Plate shall conform to AASHTO M183 M (ASTM A36) except as noted.
Flat washer shall conform to AASHTO M164 M (ASTM A325).

## KEY

1. Clamping Bolts, ⅞" DIA hex head bolt & nut, three plate washers, 50 ft.-lbs. torque. (Three per slip base)
2. Threaded Slotted Stud, see SCHEDULE for DIA, hardened washer and heavy hex nut (four per base plate). Insert stud and center punch at bottom periphery to lock tapped stud in place prior to galvanizing.
3. Keeper Plate
4. Pole Wall (existing)
5. Base Plate (existing)
6. Top Slip Plate
7. Bottom Slip Plate
8. Anchor Plate
9. Grout (exist. w/drain)
10. New Grout Pad
11. Foundation (existing)
12. Hardened Washer
13. Anchor Bolt (existing), trim to clear slip plate by ⅛" MIN.
14. 5/16" Fillet Weld
15. Heavy Hex Nut (TYP)




ELEVATION SECTION A-A

## ASSEMBLY DETAILS

After bolting bottom slip plate assembly to foundation, fill slotted bolt holes with mastic.

Grade around foundation to ensure stub height does not exceed 4".

Removal of the frangible base from the existing base plate is required.

Misaligned anchor bolts must be removed and replaced.

| SCHEDULE | | | | |
|---|---|---|---|---|
| Adapter Type | Anchor Bolt* | BC^a (Bolt Circle)+ | Existing Base Type | Luminaire Height ± |
| A-1 | 1" | 11" | Welded Plate | 30' |
| A-2 | 1" | 1'-0¼" | Cast Aluminum | 30' |
| A-3 | 1" | 1'-0¾" | Steel Transformer | 30' |
| A-4 | 1⅛" | 1'-2⅛" | 2-Pc. Alum. Clamp | 40' |
| A-5 | 1¼" | 1'-2⅛" | 2-Pc. Alum. Clamp | 40' |

* Use matching diameter for threaded studs

\+ Contractor shall verify BC in field before ordering. If BC or anchor bolt sizes differ from those listed, contact Bridge and Structures Office.

± Plus or minus 2'-6"

M. MYINT LWIN
STATE OF WASHINGTON
10536
REGISTERED
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EXPIRES JANUARY 17, 1999

# SLIP BASE ADAPTOR FOR 4-BOLT LIGHT STANDARD BASE STANDARD PLAN J-1c

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.

APPROVED FOR PUBLICATION

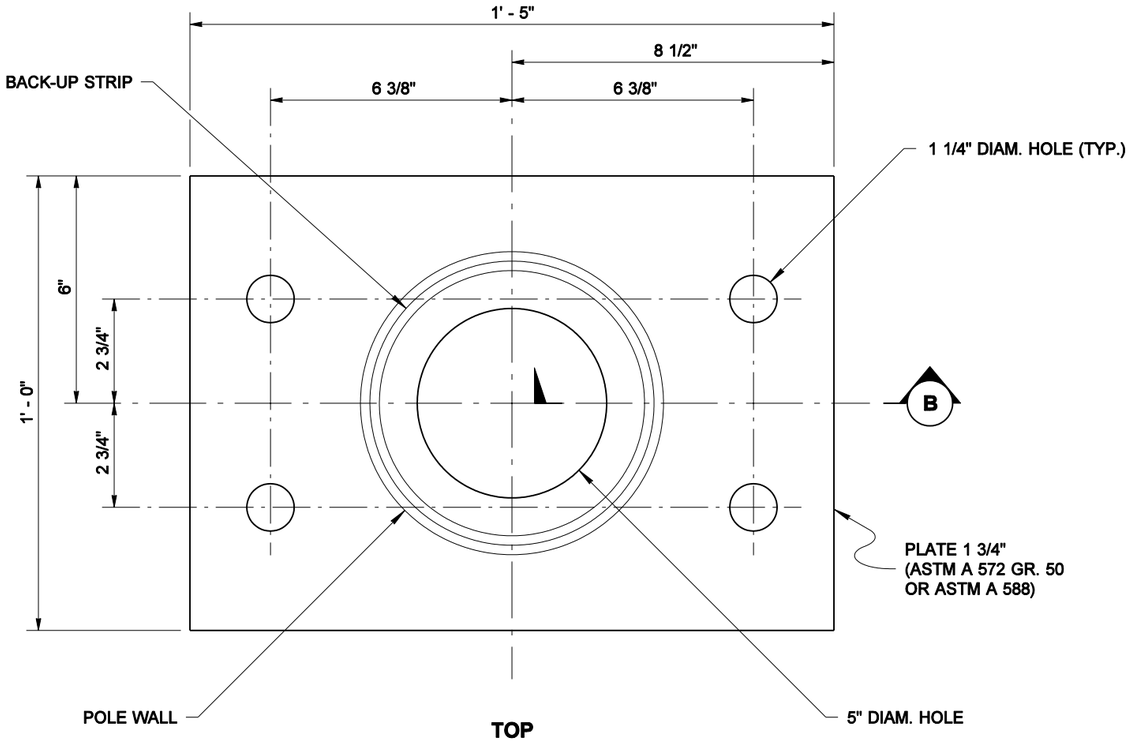
*Clifford E. Mansfield* — DEPUTY STATE DESIGN ENGINEER — 4/24/98 DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA

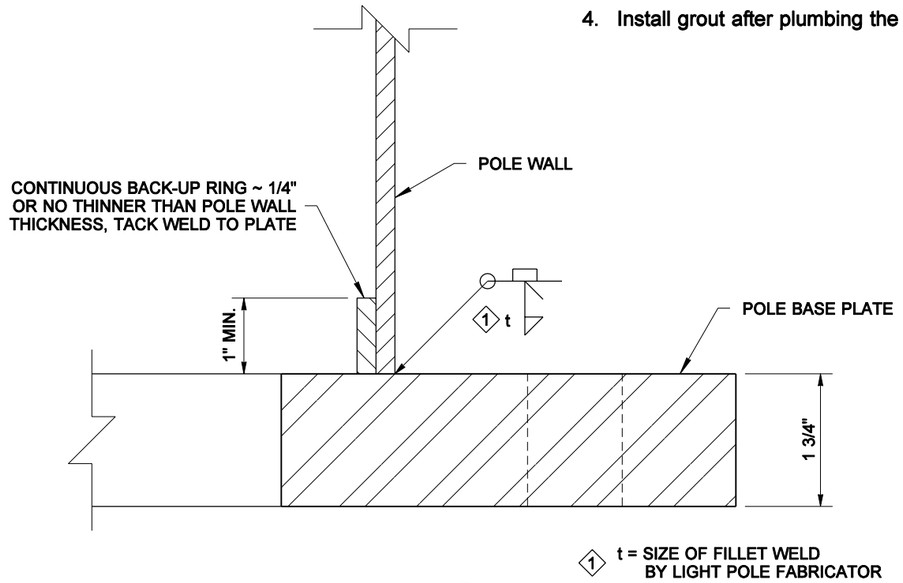
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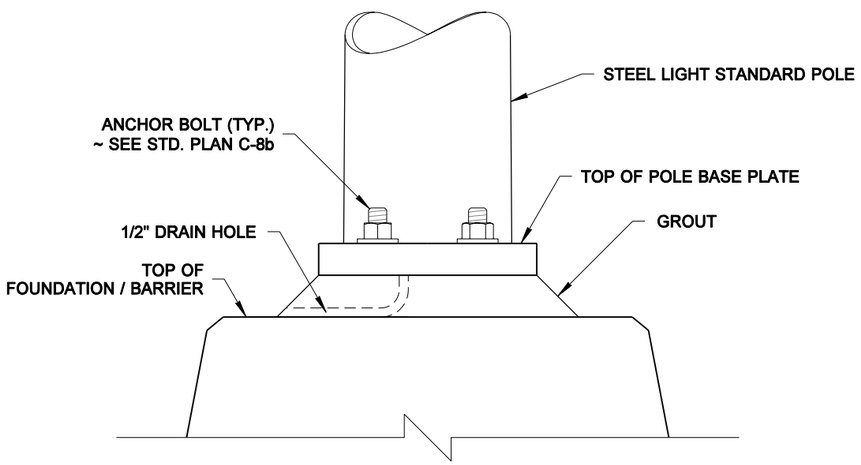

**POLE BASE PLATE**

**NOTES**

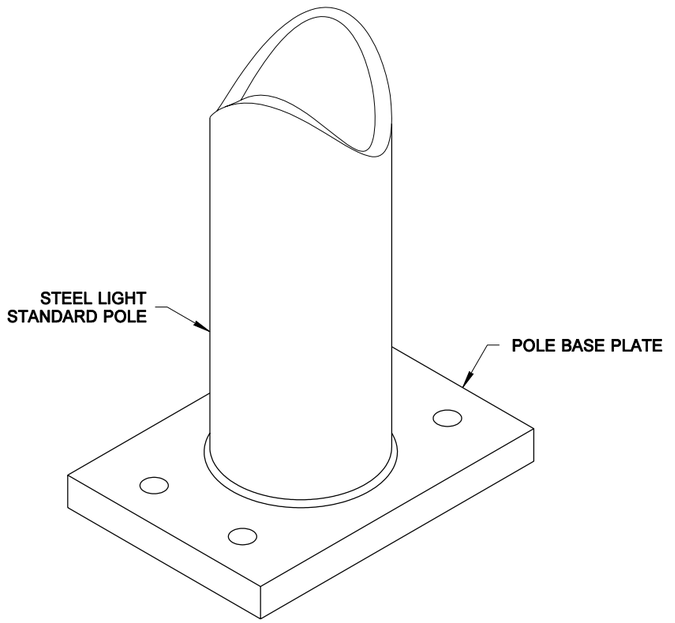
1. See Standard Plans C-8b and C-14h for foundation details.
2. Round and smooth all edges along the wire-way to protect the conductors.
3. See Standard Plan J-1e for wiring details.
4. Install grout after plumbing the pole.




**SECTION B**




**PLACEMENT DETAIL**




**ISOMETRIC**

RICHARD P. ZELDENRUST
STATE OF WASHINGTON
25470
REGISTERED
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EXPIRES NOVEMBER 14, 2006

# STEEL LIGHT STANDARD BARRIER MOUNTED BASE

## STANDARD PLAN J-1d

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *01-11-06* — DATE

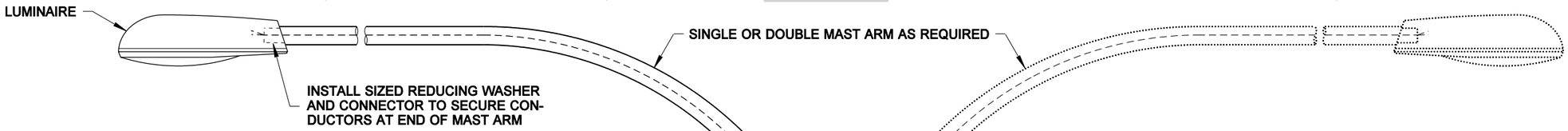
Washington State Department of Transportation

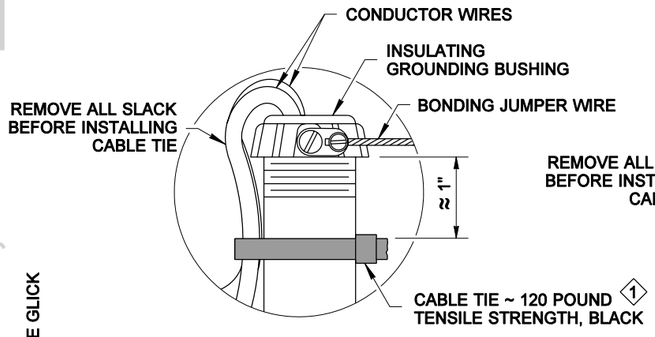
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

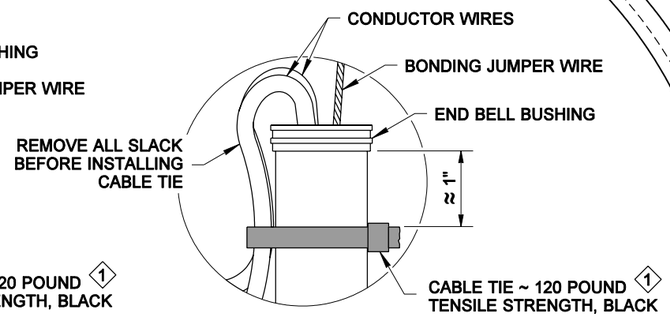
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MONIQUE GLICK



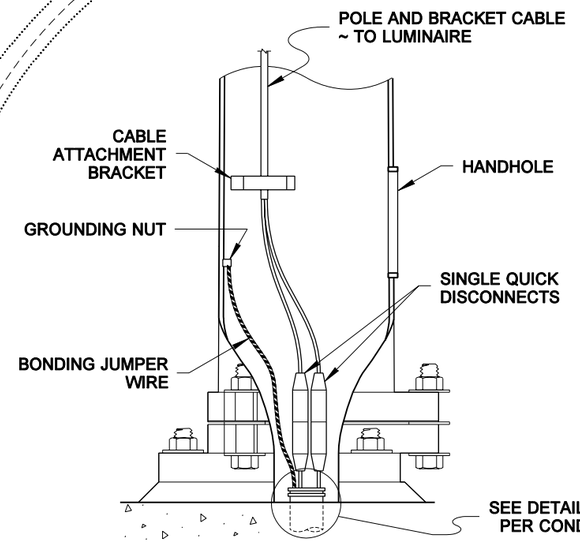




**DETAIL "A"**
**RIGID STEEL CONDUIT**

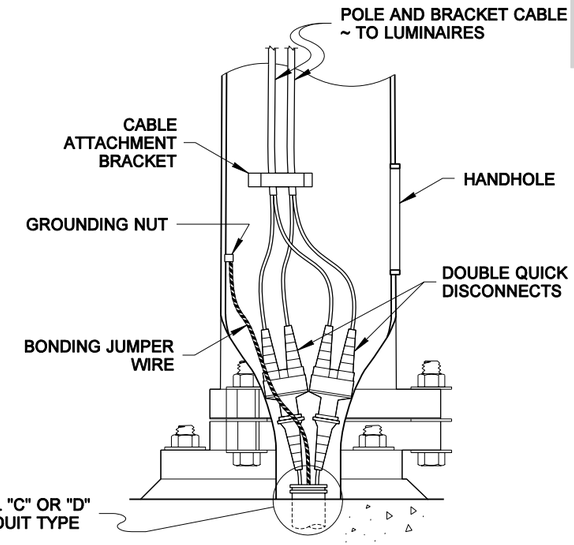



**DETAIL "B"**
**PVC CONDUIT**

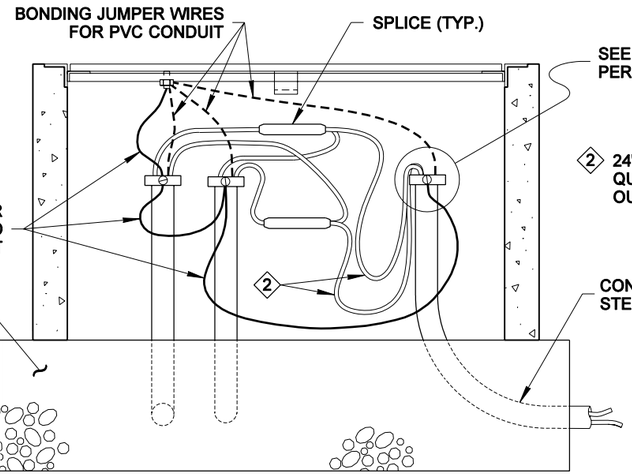
1 APPLICATION FOR FIXED BASE SIMILAR EXCEPT NO CABLE TIE IS REQUIRED AT JUNCTION BOX.




**BASE WIRING DETAIL**
**FOR SINGLE MAST ARM**
(SLIP BASE SHOWN)

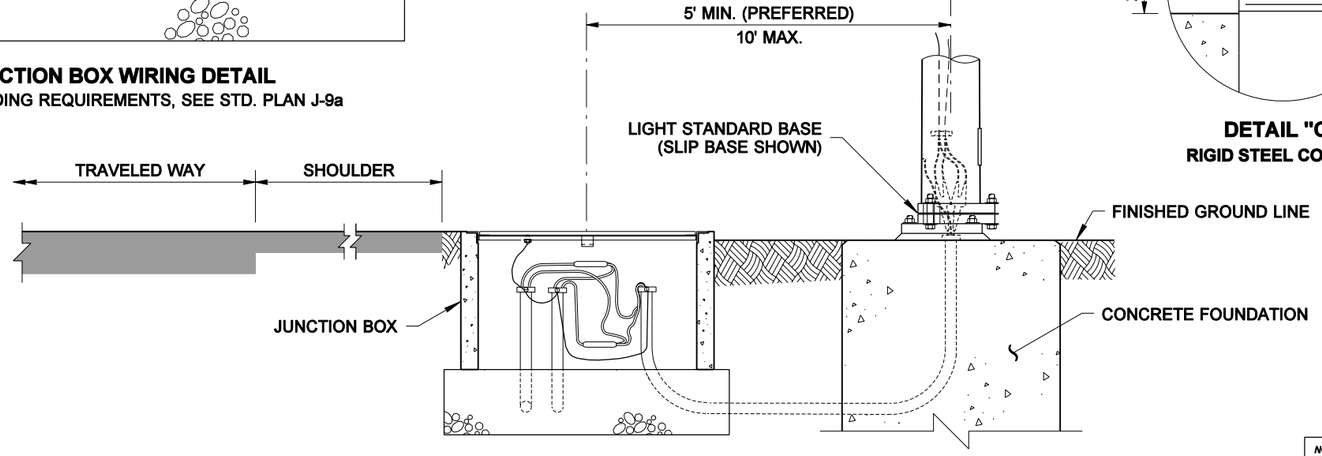



**BASE WIRING DETAIL**
**FOR DOUBLE MAST ARMS**
(SLIP BASE SHOWN)

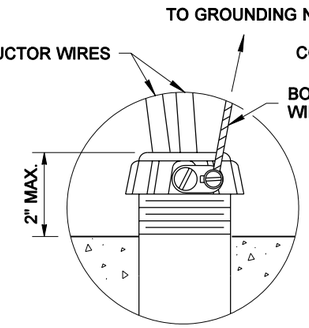



2 24" SLACK REQUIRED TO ALLOW QUICK DISCONNECTS TO BE PULLED OUTSIDE HANDHOLE 6" MIN.

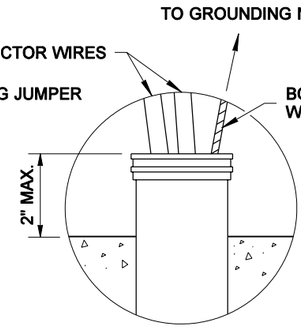
**JUNCTION BOX WIRING DETAIL**
FOR GROUNDING REQUIREMENTS, SEE STD. PLAN J-9a




**TYPICAL LOCATION OF JUNCTION BOX AND FOUNDATION**




**DETAIL "C"**
**RIGID STEEL CONDUIT**




**DETAIL "D"**
**PVC CONDUIT**

**NOTE**

See Standard Specification 8-20.

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STATE OF WASHINGTON
28680
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EXPIRES MAY 5, 2007

# LIGHT STANDARD WIRING DETAILS

## STANDARD PLAN J-1e

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *01-11-06* — DATE

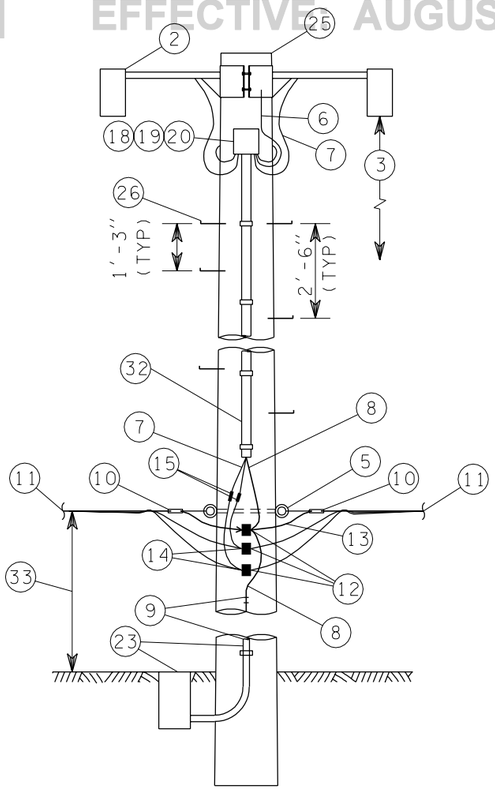
Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




HIGH MAST TIMBER
LUMINAIRE SUPPORT

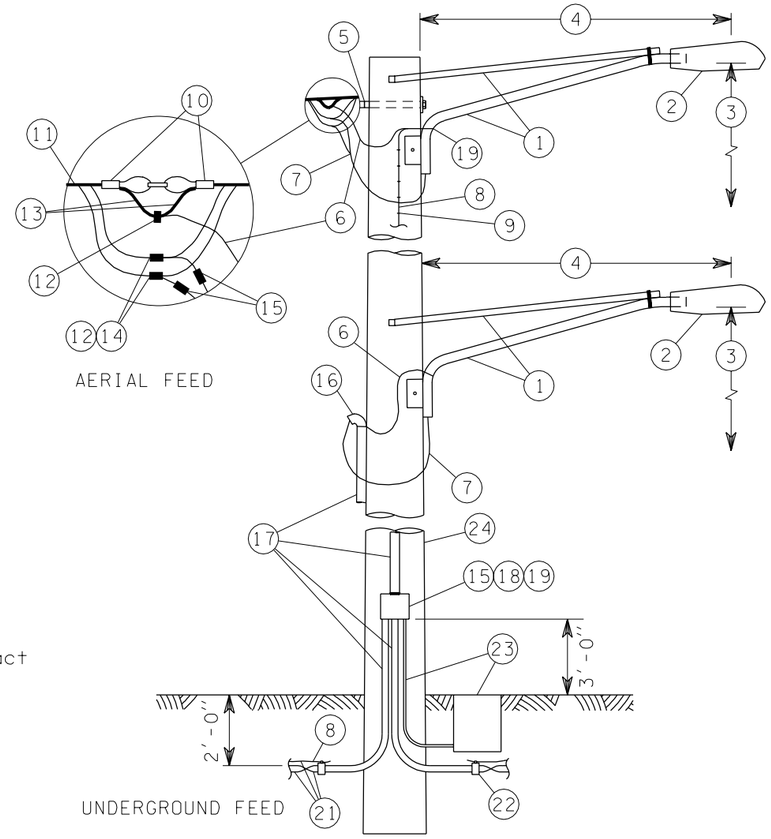
Shown for 480 VAC power feed.
Increase conductor and fuse size
as required for 240 VAC power feed.

KEY

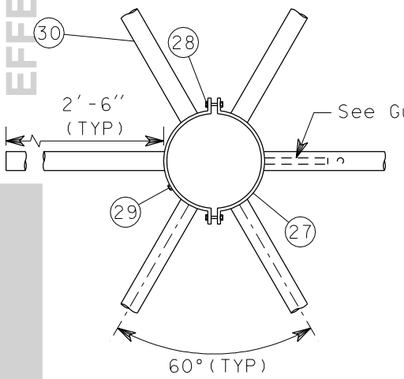
1. Galvanized steel mast arm - configuration varies with manufacturer
2. Luminaire - see Contract for type and number
3. Mounting height - roadway to luminaire elevation difference ± 2%, see Contract
4. Mast arm length - see Contract
5. 5/8" galvanized thimble eyebolt (single or double) with washers and nuts or eyenut
6. Bonding jumper
7. Pole and bracket cable
8. Equipment grounding conductor see Standard Plan J-9a.
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
13. Messenger cable
14. Insulating tape for waterproof connection
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
19. Grounding lug
20. 12 pole terminal block
21. Direct burial conductors or galvanized steel conduits with conductors - see Contract
22. Grounding bushing
23. Supplemental ground - see Standard Plan J-9a.
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. 5/8" x 9" step bolt
27. 1/4" x 10" plate collar bent to fit pole diameter (8" - 10")
28. 3/8" x 4" machine bolts (four required) with washers and nuts
29. 1/2" lag bolts (six required) - drill 9/16" 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:

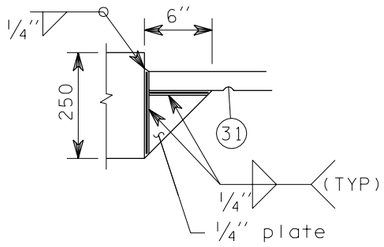
1. Timber luminaire supports are allowed only for temporary installations where breakaway or slip bases are not required.
2. When down guys are required, See Standard Plan J-7d.




TIMBER LUMINAIRE SUPPORT



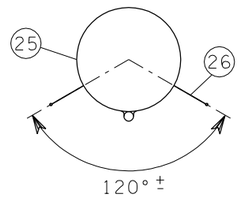

PLAN VIEW
LUMINAIRE SUPPORT BRACKET
GALVANIZE AFTER FABRICATION




GUSSET DETAIL




PLAN VIEW
TYPICAL LUMINAIRE MOUNTING
CONFIGURATIONS




STEP BOLT PLACEMENT




EXPIRES OCTOBER 26, 2000

# TIMBER LIGHT STANDARDS
# STANDARD PLAN J-1f

*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.*

APPROVED FOR PUBLICATION

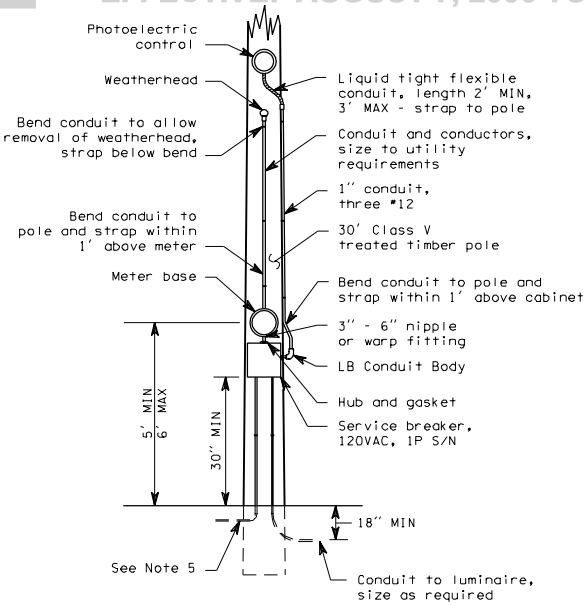
*Clifford E. Mansfield* 6/23/00

DEPUTY STATE DESIGN ENGINEER — DATE

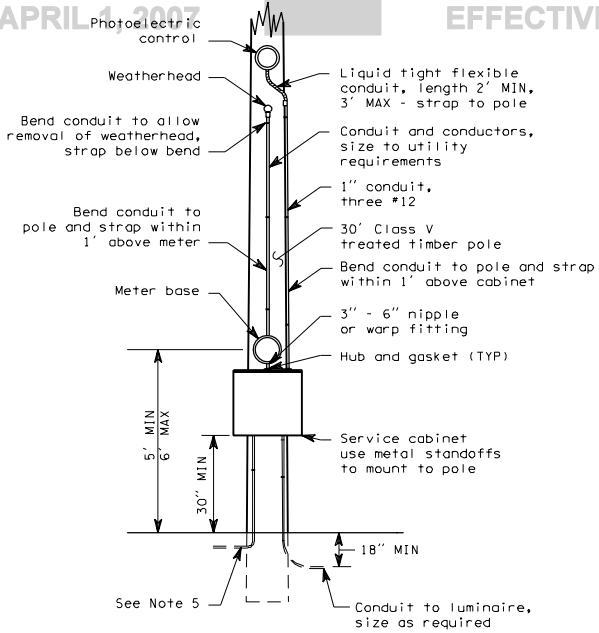
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

| DATE | REVISION | BY |
|---|---|---|
| 5/00 | REPLACED PLAN TITLE REFERENCES WITH PLAN NUMBERS. CORRECTED KEY NOTE 5. | TWS |

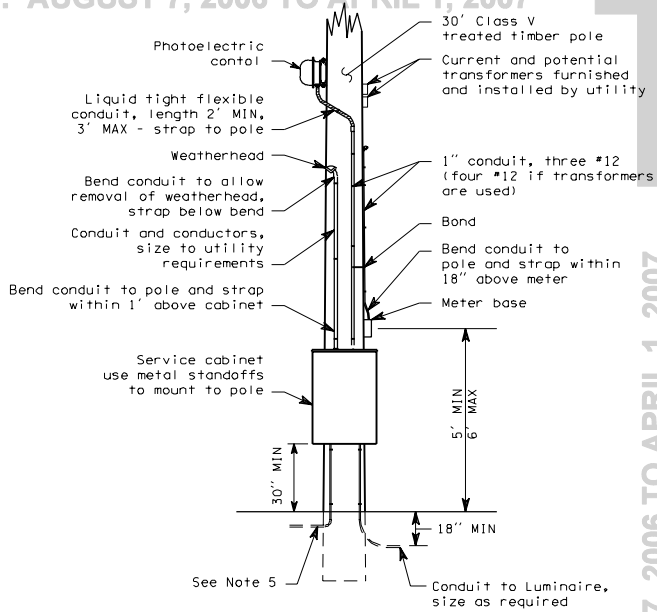
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TYPE A SERVICE, 120 VOLT

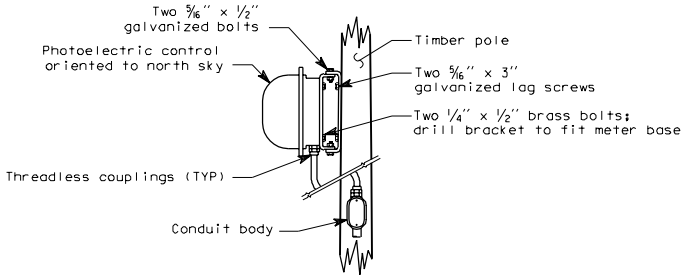



TYPE B SERVICE, 120/240 VOLT




TYPE C SERVICE, 480 VOLT

TYPE A, B AND C SERVICE LIGHTING DETAILS




PHOTOELECTRIC CONTROL DETAILS

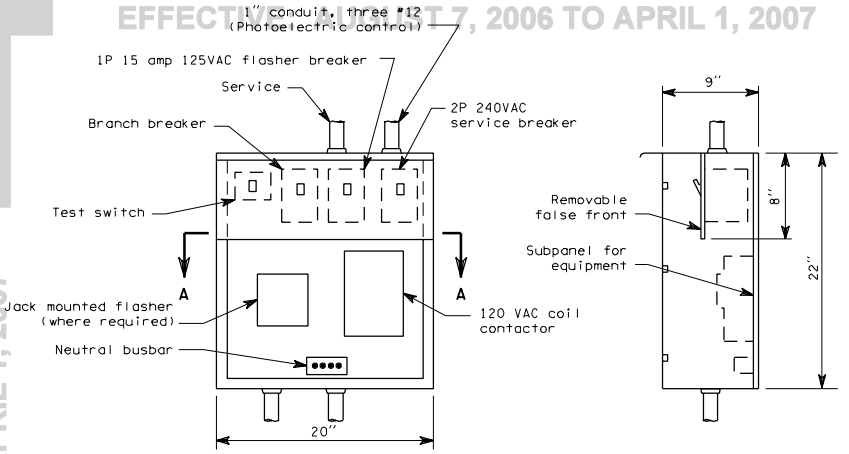
J-3

08-01-97

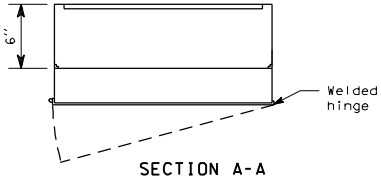


EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

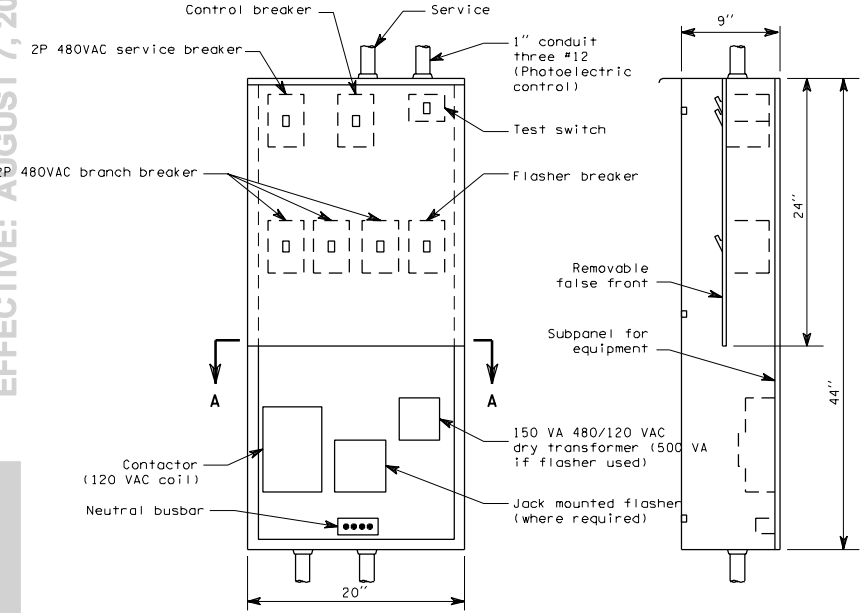
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




TYPE B SERVICE CABINET



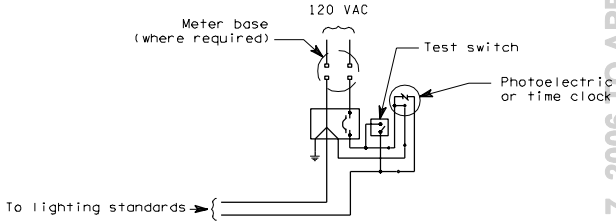

SECTION A-A




TYPE C SERVICE CABINET

NOTES:

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




TYPE A WIRING DIAGRAM
120 VOLT

# TYPE A, B AND C SERVICE LIGHTING DETAILS

J-3

08-01-97



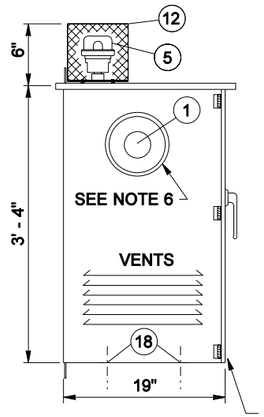
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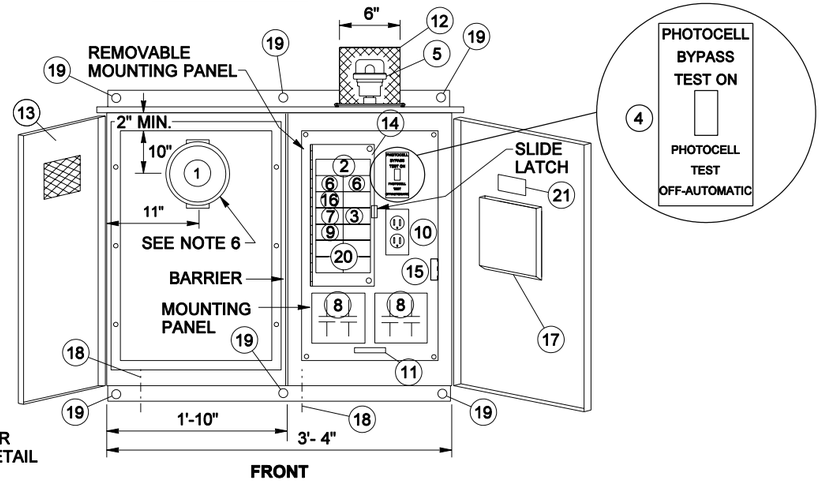
## GENERAL NOTES

### 200 AMP TYPE 120/240 1ø SERVICE CABINET

1. SEE STANDARD SPECIFICATION 9-29.24, SERVICE CABINETS.
2. HINGES SHALL HAVE STAINLESS STEEL OR BRASS PINS.
3. CABINETS SHALL BE RATED NEMA 3R AND SHALL INCLUDE TWO RAIN TIGHT VENTS.
4. METERING EQUIPMENT DOOR SHALL BE PAD LOCKABLE. EACH DOOR SHALL BE GASKETED. INSTALL BEST CX CONSTRUCTION CORE ON RIGHT DOOR. SEE DOOR HINGE DETAIL, SHEET 1 OF 2.
5. THE FOLLOWING EQUIPMENT WITHIN THE SERVICE ENCLOSURE SHALL HAVE AN APPROPRIATELY ENGRAVED PHENOLIC NAME PLATE ATTACHED WITH SCREWS OR RIVETS: KEY NUMBERS 2, 3, 4, 6, 7, 8, 9 AND 16. KEY NUMBER 4 NAME PLATE SHALL READ: "PHOTOCELL BYPASS TEST ON" AND "PHOTOCELL TEST OFF- AUTOMATIC". SEE SERVICE CABINET DETAIL.
6. METERING ARRANGEMENTS VARY WITH DIFFERENT SERVING UTILITIES. THE UTILITY MAY REQUIRE METER BASE MOUNTING IN THE ENCLOSURE, ON THE SIDE OR ON THE BACK OF THE ENCLOSURE. THE UTILITY MAY REQUIRE THE DIMENSION BETWEEN THE DOOR AND THE FRONT OF THE SAFETY SOCKET BOX TO BE LESS THAN THE 11 INCHES SHOWN IN THE LEFT SIDE- SAFETY SOCKET BOX MOUNTING DETAIL. THE CONTRACTOR SHALL VERIFY THE SERVING UTILITY'S REQUIREMENTS PRIOR TO FABRICATION OF AND INSTALLING THE SERVICE EQUIPMENT.
7. DIMENSIONS SHOWN ARE MINIMUM AND SHALL BE ADJUSTED TO ACCOMMODATE THE VARIOUS SIZES OF EQUIPMENT INSTALLED.
8. ALL BUSSWORK SHALL BE HIGH GRADE COPPER AND SHALL EQUAL OR EXCEED THE MAIN BREAKER RATING. ALL BREAKERS SHALL BOLT ONTO THE BUSSWORK. JUMPERING OF BREAKERS SHALL NOT BE ALLOWED. BUSSWORK SHALL ACCOMMODATE ALL FUTURE EQUIPMENT AS SHOWN IN THE BREAKER SCHEDULE.
9. THE PHOTOCELL UNIT SHALL BE CENTERED IN THE PHOTOCELL ENCLOSURE TO PERMIT 360 DEGREE ROTATION OF THE PHOTOCELL WITHOUT REMOVAL OF THE PHOTOCELL UNIT OR THE PHOTOCELL ENCLOSURE.
10. ALL INTERNAL WIRE RUNS SHALL BE IDENTIFIED WITH "TO - FROM" CODED TAGS LABELED WITH THE CODE LETTERS AND/OR NUMBERS SHOWN ON THE SCHEDULES. APPROVED PVC OR POLYOLEFIN WIRE MARKING SLEEVES SHALL BE USED.
11. ALL NUTS, BOLTS AND WASHERS USED FOR MOUNTING THE PHOTOCELL ENCLOSURE SHALL BE STAINLESS STEEL.
12. A 1% TOLERANCE IS ALLOWED FOR ALL DIMENSIONS.
13. UNISTRUT TYPE CHANNEL AND MOUNTING HARDWARE COMPONENTS SHALL BE STAINLESS STEEL. CONDUIT CLAMPS SHALL BE HOT DIPPED, GALVANIZED STEEL OR STAINLESS STEEL.
14. INSTALL CONDUIT COUPLINGS ON ALL CONDUITS. PLACE COUPLINGS FLUSH WITH TOP OF CONCRETE FOUNDATION.
15. NOTE 15 HAS BEEN DELETED.
16. THE METER BASE PORTION OF THIS SERVICE WAS DESIGNED TO MEET METERING PORTION OF EUSERC DRAWING 309 REQUIREMENTS.
17. WHEN USING ALTERNATE DOOR HINGE: REMOVE HINGE PIN PRIOR TO WELDING HINGE TO CABINET AND PRIOR TO HOT DIP GALVANIZING CABINET. AFTER GALVANIZING, REPLACE PIN WITH BRASS PIN AND SOLDER IN PLACE.
18. VERIFY THE SERVICE UTILITY STAND-OFF DIMENSION. ADJUST THE REMOVABLE PANEL TO THE MEASUREMENT PROVIDED BY THE UTILITY COMPANY. AFTER ADJUSTMENT, CUT OFF ALL-THREAD BOLTS SO THAT NO LESS THAN 2 AND NO MORE THAN 3 FULL THREADS EXTEND PAST THE FACE OF THE NUTS

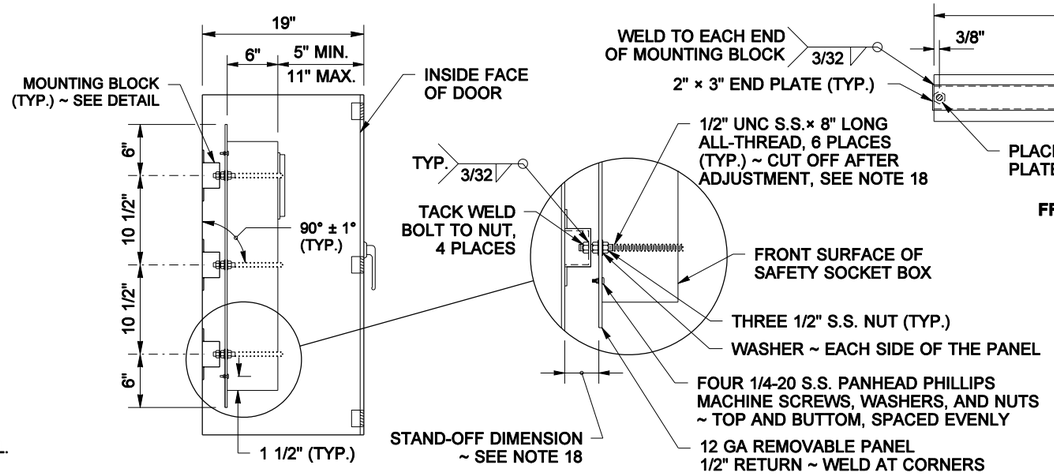



LEFT SIDE




FRONT

## SERVICE CABINET DETAIL



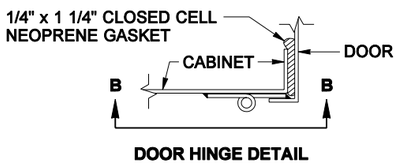

LEFT SIDE- SAFETY SOCKET BOX MOUNTING DETAIL




FRONT VIEW SIDE VIEW

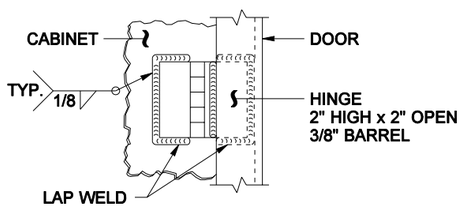
### MOUNTING BLOCK DETAIL

12 GA. ~ MATERIAL TO BE THE SAME AS CABINET MATERIAL

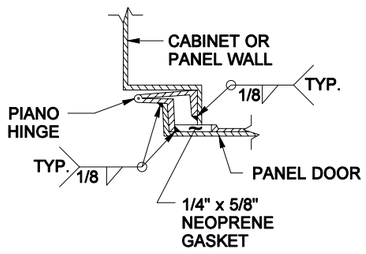



DOOR HINGE DETAIL

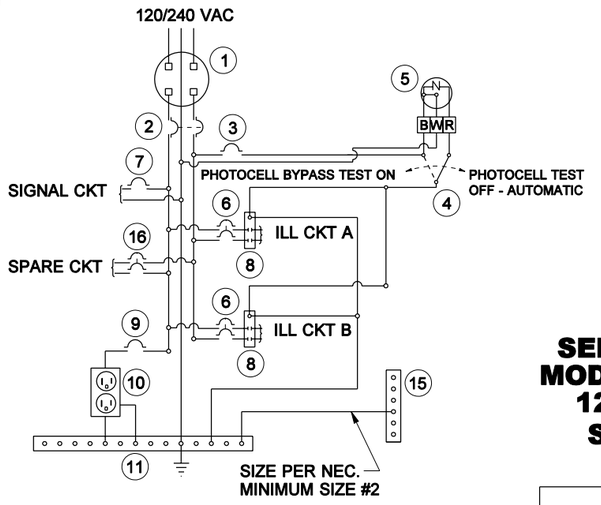
ALTERNATE FOR TYPE B MODIFIED CABINET SEE NOTE 17




VIEW B-B




DOOR HINGE DETAIL




WIRING SCHEMATIC

## KEY

1. METER BASE PER SERVING UTILITY REQUIREMENTS. AS A MINIMUM, THE METER BASE SHALL BE SAFETY SOCKET BOX WITH FACTORY INSTALLED TEST BYPASS FACILITY THAT MEETS THE REQUIREMENTS OF EUSERC DRAWING 305.
2. MAIN BREAKER (SEE BREAKER SCHEDULE)
3. PHOTOCELL BREAKER (SPST 15 AMP - 120/240 VOLT)
4. TEST SWITCH (SPDT SNAP ACTION, POSITIVE CLOSE 15 AMP - 120/277 VOLT - "T" RATED)
5. PHOTOELECTRIC CONTROL, STD. SPEC. 9 - 29.11(2)
6. BRANCH BREAKER (SEE BREAKER SCHEDULE)
7. SIGNAL BREAKER (SEE BREAKER SCHEDULE)
8. CONTACTOR (SEE BREAKER SCHEDULE)
9. RECEPTACLE BREAKER (SPST 20 AMP - 120/240 VOLT)
10. RECEPTACLE, GROUNDED (GFCI 20 AMP - 125 VOLT)
11. NEUTRAL BUSS, 14 LUG COPPER
12. PHOTOCELL ENCLOSURE - ENCLOSURE TO BE FABRICATED FROM 5/8" EXPANDED STEEL MESH WITH WELDED SEAMS AND MOUNTING FLANGES. HOT DIP GALVANIZED AFTER FABRICATION. TYPE 5052 - H32 ALUMINUM WITH 5/8" x 5/8" OPENINGS EQUIVALENT TO 5/8" EXPANDED STEEL MESH MAY BE USED AS ALTERNATIVE MATERIAL. SEE PHOTOCELL ENCLOSURE MOUNTING DETAIL, SHEET 2 OF 2.
13. HINGED FRONT FACING DOOR WITH 4" x 4" MIN. POLISHED WIRE GLASS WINDOW.
14. HINGED DEAD FRONT WITH 1/4 TURN FASTENERS OR SLIDE LATCH.
15. CABINET MAIN BONDING JUMPER. BUSS SHALL BE 4 LUG TINNED COPPER. SEE CABINET MAIN BONDING JUMPER DETAIL ON SHEET 2 OF 2.
16. SPARE BRANCH BREAKER (DPST 20AMP- 120/240 VOLT)
17. METAL WIRING DIAGRAM HOLDER
18. 1/4" DIAMETER DRAIN HOLE. DRILL BEFORE GALVANIZING.
19. MOUNTING HOLE. SEE SERVICE CABINET MOUNTING DETAILS.
20. 18 CIRCUIT PANEL BOARD - MINIMUM SIZE WITH SEPARATE MAIN BREAKER.
21. LABEL CABINET WITH BUSSWORK RATING.

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# SERVICE CABINET TYPE B MODIFIED (0 - 200 AMP TYPE 120/240 SINGLE PHASE) STANDARD PLAN J-3b

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *03-04-05* — DATE

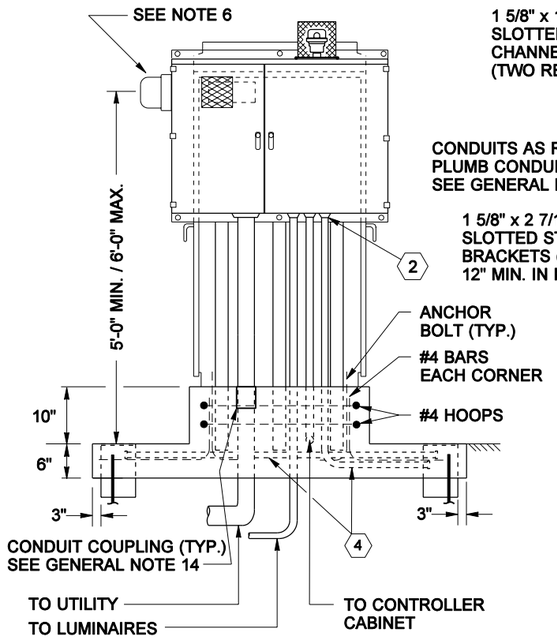
Washington State Department of Transportation

| DATE | REVISION | BY |
|---|---|---|
| 01/2005 | REVISED SAFETY SOCKET BOX MOUNTING DETAIL | EB |

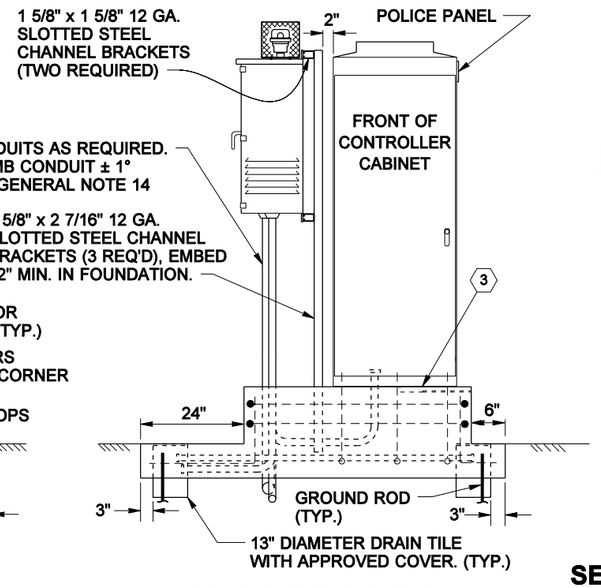
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

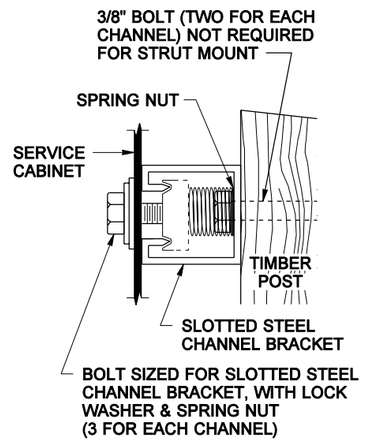
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**FRONT OF SERVICE CABINET**

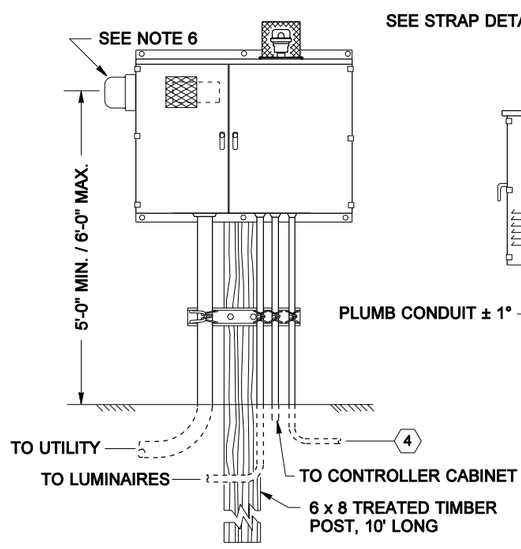



**RIGHT SIDE OF SERVICE CABINET**

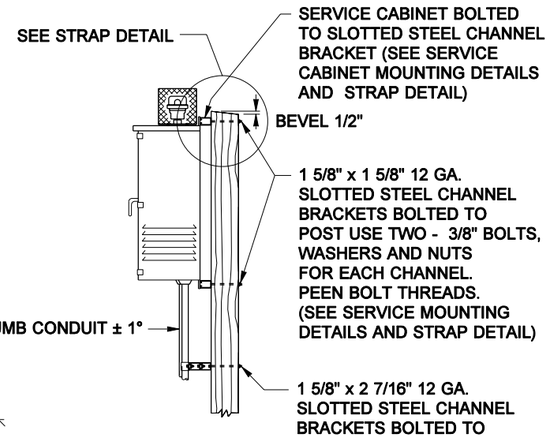



**CABINET BRACKET MOUNTING DETAIL**

# SERVICE CABINET MOUNTING DETAILS

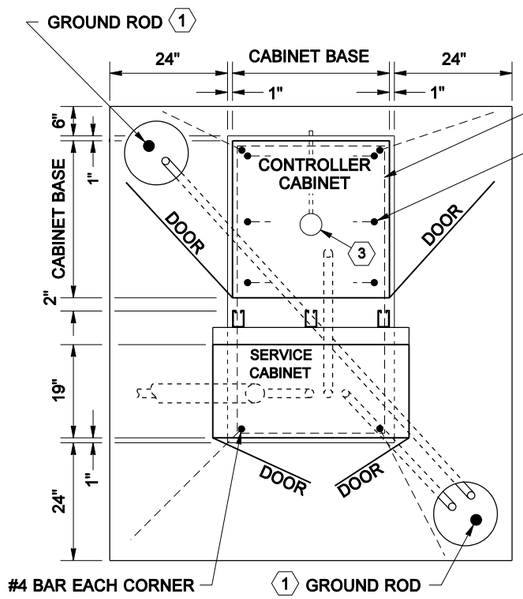



**FRONT OF SERVICE CABINET**




**RIGHT SIDE OF SERVICE CABINET**

## STRUT MOUNT

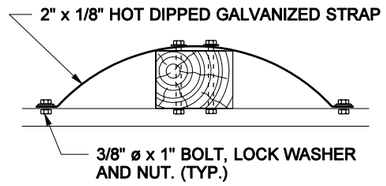



**PLAN VIEW OF SERVICE CABINET**

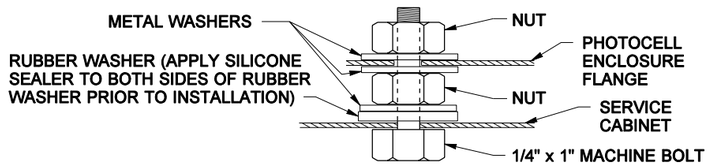
SEE STANDARD PLAN J-6c "CABINET FOUNDATION DETAILS", FOR DETAILS NOT SHOWN.

1. DRIVE GROUND RODS BEFORE PLACING CONCRETE. MOVE ROD(S) AND DRAIN TILE(S) WITH COVER(S) AS REQUIRED TO ACHIEVE FULL GROUND PENETRATION. MAINTAIN A 6' MINIMUM CLEARANCE BETWEEN GROUND RODS AS DETAILED ON STD. PLAN J-9a "TYPICAL GROUNDING DETAILS".
2. ALL CONDUITS PENETRATING CABINET SHALL BE TERMINATED WITH GROUNDING END BUSHING AND BONDED TO THE CABINET GROUNDING BUS.
3. 4" DIAM. x 1/2" DEEP SUMP. SLOPE FOUNDATION TOWARDS SUMP. 3/8" DIAM. POLYETHYLENE OR COPPER DRAIN PIPE. SLOPE TO DRAIN OUTSIDE FOUNDATION.
4. TO SERVICE GROUND - PER STD. PLAN J-9a "TYPICAL GROUNDING DETAILS"

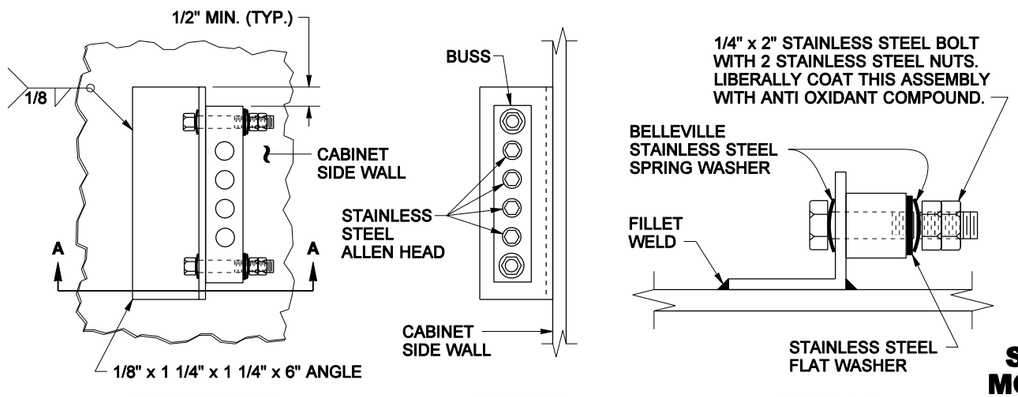
## POST MOUNT




**POST MOUNT STRAP DETAIL**




## PHOTOCELL ENCLOSURE MOUNTING DETAIL




**ELEVATION VIEW** **SIDE VIEW** **DETAIL A-A**

## CABINET MAIN BONDING JUMPER DETAIL

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STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# SERVICE CABINET TYPE B MODIFIED (0 - 200 AMP TYPE 120/240 SINGLE PHASE)
# STANDARD PLAN J-3b

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

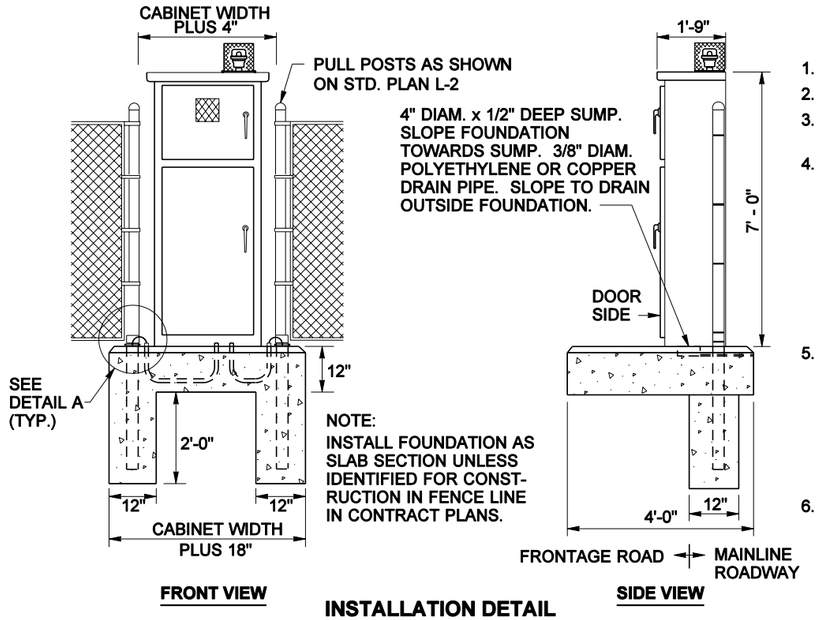
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *03-04-05* — DATE

Washington State Department of Transportation

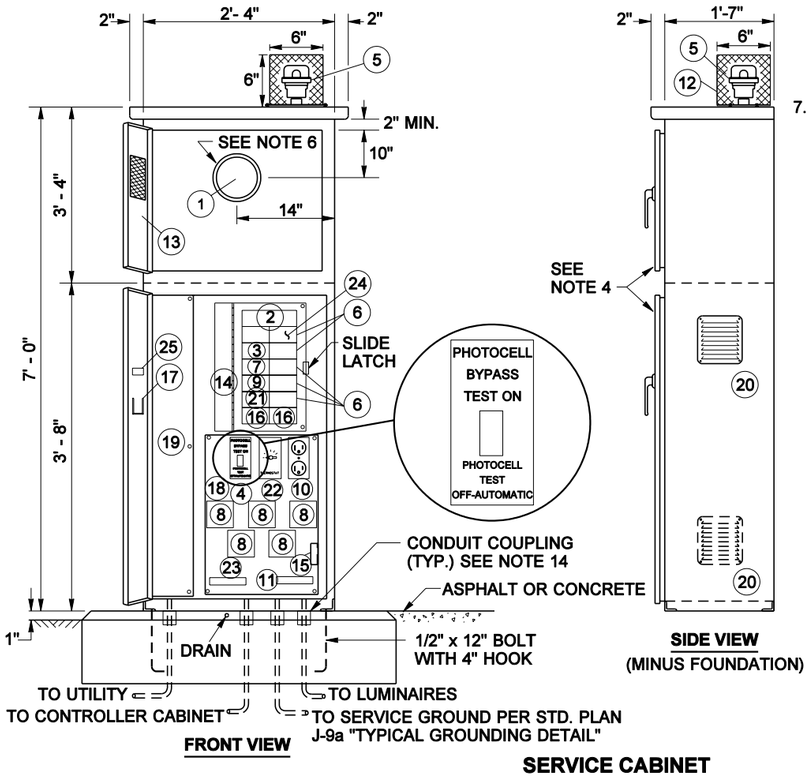
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

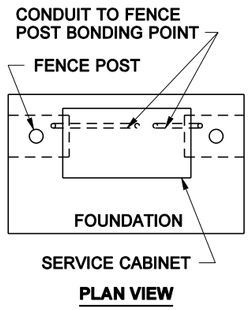
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




## INSTALLATION DETAIL




## SERVICE CABINET

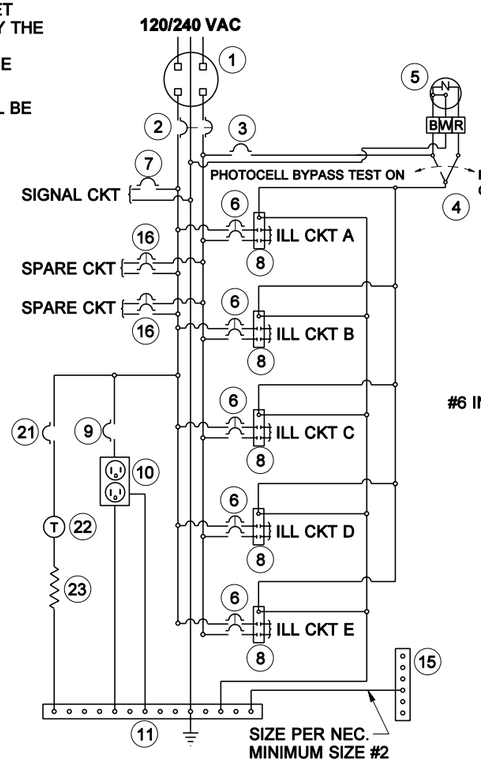



**PLAN VIEW**

## GENERAL NOTES

**200 AMP TYPE 120/240 1ø SERVICE CABINET**

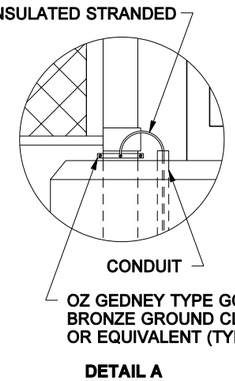
1. SEE STD. SPECIFICATION 9-29.24, SERVICE CABINETS.
2. HINGES SHALL HAVE STAINLESS STEEL OR BRASS PINS.
3. CABINETS SHALL BE RATED NEMA 3R AND SHALL INCLUDE TWO RAIN TIGHT VENTS.
4. METERING EQUIPMENT DOOR SHALL BE PAD LOCKABLE. EACH DOOR SHALL BE GASKETED. INSTALL BEST CX CONSTRUCTION CORE ON BOTTOM DOOR. SEE DOOR HINGE DETAIL, STANDARD PLAN J-3b. 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 SERVICE ENCLOSURE SHALL HAVE AN APPROPRIATELY ENGRAVED PHENOLIC NAME PLATE ATTACHED WITH SCREWS OR RIVETS:
   KEY NUMBERS 2, 3, 4, 6, 7, 8, 9, 16 AND 21.
   KEY NUMBER 4 NAME PLATE SHALL READ:
   "PHOTOCELL BYPASS TEST ON" AND "PHOTOCELL TEST OFF- AUTOMATIC". SEE SERVICE CABINET DETAIL.
6. METERING ARRANGEMENTS VARY WITH DIFFERENT SERVING UTILITIES. THE UTILITY MAY REQUIRE METER BASE MOUNTING IN THE ENCLOSURE, ON THE SIDE OR ON THE BACK OF THE ENCLOSURE. THE UTILITY MAY REQUIRE THE DIMENSION BETWEEN THE DOOR AND THE FRONT OF THE SAFETY SOCKET BOX TO BE LESS THAN THE 11 INCHES SHOWN IN THE LEFT SIDE- SAFETY SOCKET BOX MOUNTING DETAIL. SEE STANDARD PLAN J-3b FOR SAFETY SOCKET BOX DETAIL. THE CONTRACTOR SHALL VERIFY THE SERVING UTILITY'S REQUIREMENTS PRIOR TO FABRICATION OF AND INSTALLING THE SERVICE EQUIPMENT.
7. DIMENSIONS SHOWN ARE MINIMUM AND SHALL BE ADJUSTED TO ACCOMMODATE THE VARIOUS SIZES OF EQUIPMENT INSTALLED.
8. ALL BUSSWORK SHALL BE HIGH GRADE COPPER AND SHALL EQUAL OR EXCEED THE MAIN BREAKER RATING. ALL BREAKERS SHALL BOLT ONTO THE BUSSWORK. JUMPERING OF BREAKERS SHALL NOT BE ALLOWED. BUSSWORK SHALL ACCOMMODATE ALL FUTURE EQUIPMENT AS SHOWN IN THE BREAKER SCHEDULE.
9. THE PHOTOCELL UNIT SHALL BE CENTERED IN THE PHOTOCELL ENCLOSURE TO PERMIT 360 DEGREE ROTATION OF THE PHOTOCELL WITHOUT REMOVAL OF THE PHOTOCELL UNIT OR PHOTOCELL ENCLOSURE.
10. ALL INTERNAL WIRE RUNS SHALL BE IDENTIFIED WITH "TO - FROM" CODED TAGS LABELED WITH THE CODE LETTERS AND/OR NUMBERS SHOWN ON THE SCHEDULES. APPROVED PVC OR POLYOLEFIN WIRE MARKING SLEEVES SHALL BE USED.
11. ALL NUTS, BOLTS AND WASHERS USED FOR MOUNTING THE PHOTOCELL ENCLOSURE SHALL BE STAINLESS STEEL.
12. A 1% TOLERANCE IS ALLOWED FOR ALL DIMENSIONS.
13. THE PHOTOCELL CIRCUIT SHALL BE INSTALLED IN FLEX CONDUIT WITHIN THE METER COMPARTMENT.
14. INSTALL CONDUIT COUPLINGS ON ALL CONDUITS. PLACE COUPLINGS FLUSH WITH TOP OF CONCRETE FOUNDATION.
15. SEE PLANS FOR BREAKER SCHEDULE.
16. SEAL CABINET TO FOUNDATION WITH A 1/2" BEAD OF SILICONE. APPLY SILICONE TO DRY SURFACE ONLY.
17. THE METER BASE PORTION OF THIS SERVICE WAS DESIGNED TO MEET METERING PORTION OF EUSERC DRAWING 309 REQUIREMENTS.




## WIRING SCHEMATIC

**KEY**

1. METER BASE PER SERVING UTILITY REQUIREMENTS. AS A MINIMUM, THE METER BASE SHALL BE SAFETY SOCKET BOX WITH FACTORY INSTALLED TEST BYPASS FACILITY THAT MEETS THE REQUIREMENTS OF EUSERC DRAWING 305.
2. MAIN BREAKER (SEE BREAKER SCHEDULE)
3. PHOTOCELL BREAKER (SPST 15 AMP - 120/240 VOLT)
4. TEST SWITCH (SPDT SNAP ACTION, POSITIVE CLOSE, 15 AMP - 120/277 VOLT "T" RATED)
5. PHOTOELECTRIC CONTROL, STD. SPEC. 9 - 29.11(2)
6. BRANCH BREAKER (SEE BREAKER SCHEDULE)
7. SIGNAL BREAKER (SEE BREAKER SCHEDULE)
8. CONTACTOR (SEE BREAKER SCHEDULE)
9. RECEPTACLE BREAKER (SPST 20 AMP - 120/240 VOLT)
10. RECEPTACLE, GROUNDED (GFCI 20 AMP - 125 VOLT)
11. NEUTRAL BUSS, 14 LUG COPPER
12. PHOTOCELL ENCLOSURE - ENCLOSURE TO BE FABRICATED FROM 5/8" EXPANDED STEEL MESH WITH WELDED SEAMS AND MOUNTING FLANGES. HOT DIP GALVANIZED AFTER FABRICATION. TYPE 5052 - H32 ALUMINUM WITH 5/8" x 5/8" OPENINGS EQUIVALENT TO 5/8" EXPANDED STEEL MESH MAY BE USED AS ALTERNATIVE MATERIAL. SEE PHOTOCELL ENCLOSURE MOUNTING DETAILS, STANDARD PLAN J-3b.
13. HINGED FRONT FACING DOOR WITH 4" x 4" MIN. POLISHED WIRE GLASS WINDOW.
14. HINGED DEAD FRONT WITH 1/4 TURN FASTENERS OR SLIDE LATCH.
15. CABINET MAIN BONDING JUMPER. BUSS SHALL BE 4 LUG TINNED COPPER. SEE CABINET MAIN BONDING JUMPER DETAIL, STANDARD PLAN J-3b.
16. SPARE BRANCH BREAKER (DPST 20AMP- 120/240 VOLT)
17. METAL WIRING DIAGRAM HOLDER
18. REMOVABLE EQUIPMENT MOUNTING PAN
19. 6" x 6" MIN. UNDERGROUND FEED - SERVICE WIREWAY (LEFT REAR CORNER)
20. SCREENED VENTS, 2 REQUIRED, 1 EACH SIDE, LOUVERED PLATES.
21. HEATER BREAKER (SPST 15 AMP - 120/240 VOLT)
22. THERMOSTAT, 40°F CLOSURE - 3 DIFFERENTIAL
23. STRIP HEATER (100 WATT NOMINAL) , WITH TERMINAL STRIP COVER.
24. 24 CIRCUIT PANEL BOARD - MINIMUM SIZE WITH SEPARATE MAIN BREAKER.
25. LABEL CABINET WITH BUSSWORK RATING.




**DETAIL A**

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2003

# SERVICE CABINET TYPE D (0 - 200 AMP TYPE 120/240 SINGLE PHASE) STANDARD PLAN J-3c

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

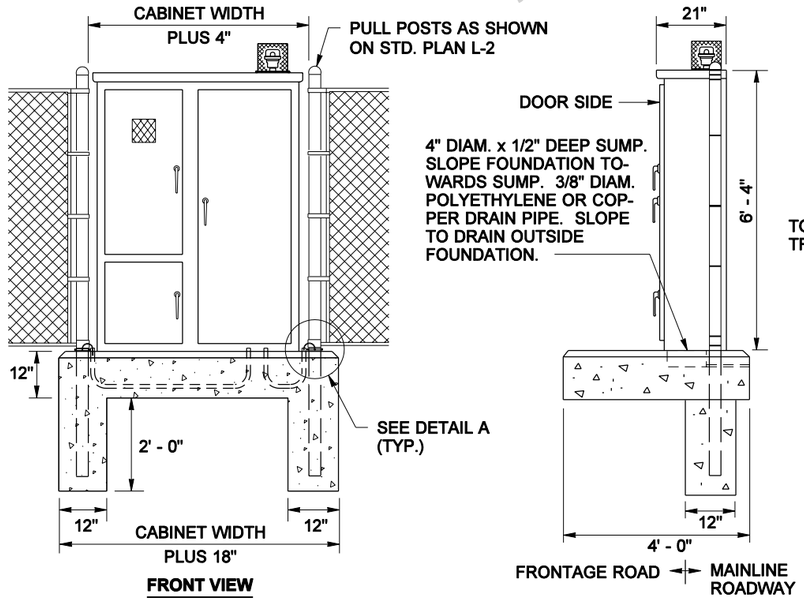
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *06-24-02* — DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

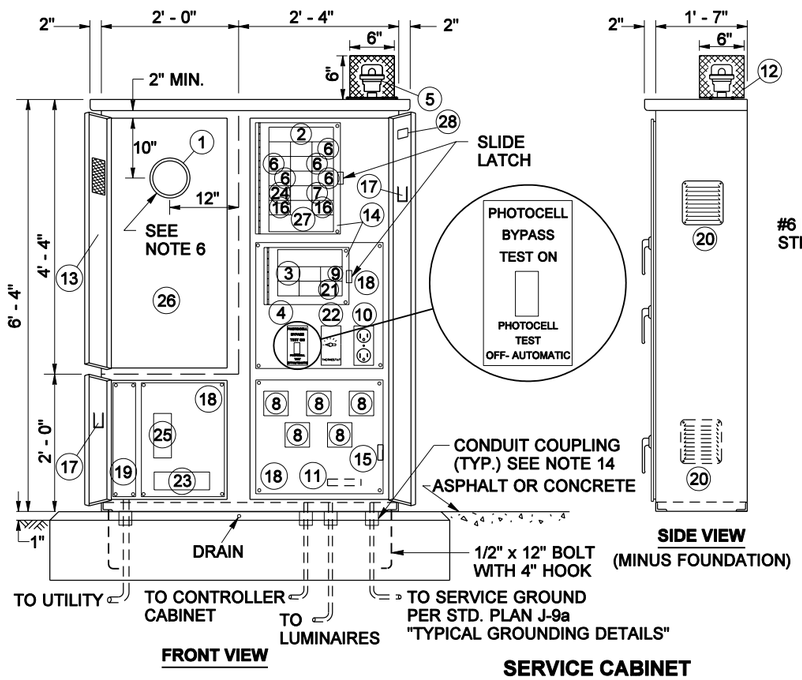






NOTE: INSTALL FOUNDATION AS SLAB SECTION UNLESS IDENTIFIED FOR CONSTRUCTION IN FENCE LINE IN CONTRACT PLANS.

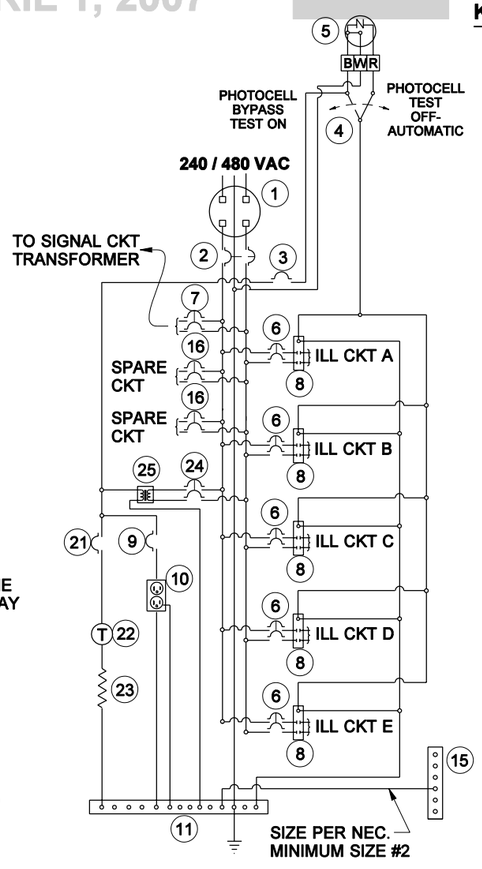
## INSTALLATION DETAIL



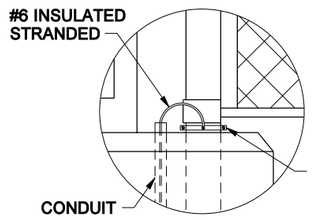




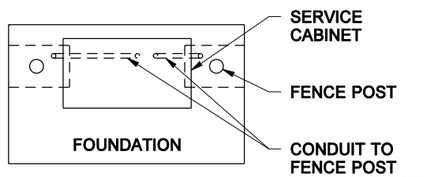
## SERVICE CABINET




## WIRING SCHEMATIC




## DETAIL A




## PLAN VIEW

**KEY**

1. METER BASE PER SERVING UTILITY REQUIREMENTS. AS A MINIMUM, THE METER BASE SHALL BE SAFETY SOCKET BOX WITH FACTORY INSTALLED TEST BYPASS FACILITY THAT MEETS THE REQUIREMENTS OF EUSERC DRAWING 305.
2. MAIN BREAKER (SEE BREAKER SCHEDULE)
3. PHOTOCELL BREAKER (SPST 15 AMP - 120/240 VOLT)
4. TEST SWITCH ( SPDT SNAP ACTION, POSITIVE CLOSE 15 AMP - 120/277 VOLT "T" RATED)
5. PHOTOELECTRIC CONTROL, STD. SPEC. 9 - 29.11(2)
6. BRANCH BREAKER (SEE BREAKER SCHEDULE)
7. SIGNAL TRANSFORMER BREAKER (SEE BREAKER SCHEDULE)
8. CONTACTOR (SEE BREAKER SCHEDULE)
9. RECEPTACLE BREAKER (SPST 20 AMP - 120/240 VOLT)
10. RECEPTACLE, GROUNDED (GFCI 20 AMP - 125 VOLT)
11. NEUTRAL BUSS, 14 LUG COPPER
12. PHOTOCELL ENCLOSURE - ENCLOSURE TO BE FABRICATED FROM 5/8" EXPANDED STEEL MESH WITH WELDED SEAMS AND MOUNTING FLANGES. HOT DIP GALVANIZED AFTER FABRICATION. TYPE 5052 - H32 ALUMINUM WITH 5/8" x 5/8" OPENINGS EQUIVALENT TO 5/8" EXPANDED STEEL MESH MAY BE USED AS ALTERNATIVE MATERIAL. SEE PHOTOCELL ENCLOSURE MOUNTING DETAILS, STANDARD PLAN J-3b.
13. HINGED FRONT FACING DOOR WITH 4" x 4" MIN. POLISHED WIRE GLASS WINDOW.
14. HINGED DEAD FRONT WITH 1/4 TURN FASTENERS OR SLIDE LATCH
15. CABINET MAIN BONDING JUMPER. BUSS SHALL BE 4 LUG TINNED COPPER. SEE CABINET MAIN BONDING JUMPER DETAIL, STANDARD PLAN J-3b.
16. SPARE BRANCH BREAKER (DPST 20AMP- 240/480 VOLT)
17. METAL WIRING DIAGRAM HOLDER
18. REMOVABLE EQUIPMENT MOUNTING PAN
19. 6" x 6" MIN. UNDERGROUND FEED - SERVICE WIREWAY (LEFT REAR CORNER)
20. SCREENED VENTS, 2 REQUIRED, 1 EACH SIDE, LOUVERED PLATES
21. HEATER BREAKER (SPST 15 AMP - 120/240 VOLT)
22. THERMOSTAT, 40°F CLOSURE - 3 DIFFERENTIAL
23. STRIP HEATER (100 WATT NOMINAL), WITH TERMINAL STRIP COVER
24. TRANSFORMER BREAKER (DPST 15 AMP - 480 VOLT)
25. DRY TRANSFORMER (480/120 VOLT) 3 KVA COPPER BUSSED AND COPPER WOUND
26. RESERVED FOR METER, CURRENT TRANSFORMER AND/OR DISCONNECT SWITCH AS REQUIRED BY THE UTILITY
27. 24 CIRCUIT PANEL BOARD - MINIMUM SIZE WITH SEPARATE MAIN BREAKER.
28. LABEL CABINET WITH BUSSWORK RATING

## GENERAL NOTES

**200 AMP TYPE 240/480 1ø SERVICE CABINET**

1. SEE STD. SPECIFICATION 9-29.24, SERVICE CABINETS.
2. HINGES SHALL HAVE STAINLESS STEEL OR BRASS PINS.
3. CABINETS SHALL BE RATED NEMA 3R AND SHALL INCLUDE TWO RAIN TIGHT VENTS.
4. METERING EQUIPMENT DOORS SHALL BE PAD LOCKABLE. EACH DOOR SHALL BE GASKETED. INSTALL BEST CX CONSTRUCTION CORE ON BOTTOM LEFT AND RIGHT DOORS. SEE DOOR HINGE DETAIL, STD. PLAN J-3b; CONCEALED HEAVY DUTY STAINLESS STEEL LIFT OFF HINGES ARE ALLOWED AS AN ALTERNATIVE. UPPER LEFT DOOR SHALL HAVE 3 HINGES, LOWER LEFT DOOR SHALL HAVE 2 HINGES, AND RIGHT DOOR SHALL HAVE 3 HINGES. LOWER DOOR SHALL HAVE A TWO POSITION DOOR STOP ASSEMBLY.
5. THE FOLLOWING EQUIPMENT WITHIN THE SERVICE ENCLOSURE SHALL HAVE AN APPROPRIATELY ENGRAVED PHENOLIC NAME PLATE ATTACHED WITH SCREWS OR RIVETS: KEY NUMBERS 2, 3, 4, 6, 7, 8, 9, 16, 21 AND 25. KEY NUMBER 4 NAME PLATE SHALL READ: "PHOTOCELL BYPASS TEST ON" AND "PHOTOCELL TEST OFF- AUTOMATIC". SEE SERVICE CABINET DETAIL.
6. METERING ARRANGEMENTS VARY WITH DIFFERENT SERVING UTILITIES. THE UTILITY MAY REQUIRE METER BASE MOUNTING IN THE ENCLOSURE, ON THE SIDE, OR ON THE BACK OF THE ENCLOSURE. THE UTILITY MAY REQUIRE THE DIMENSION BETWEEN THE DOOR AND THE FRONT OF THE SAFETY SOCKET BOX TO BE LESS THAN THE 11 INCHES SHOWN IN THE LEFT SIDE- SAFETY SOCKET BOX MOUNTING DETAIL, SEE STD. PLAN J-3b. THE CONTRACTOR SHALL VERIFY THE SERVING UTILITY'S REQUIREMENTS PRIOR TO FABRICATION OF AND INSTALLING THE SERVICE EQUIPMENT.
7. THE DIMENSIONS SHOWN ARE MINIMUM AND SHALL BE ADJUSTED TO ACCOMMODATE THE VARIOUS SIZES OF EQUIPMENT INSTALLED.
8. ALL BUSSWORK SHALL BE HIGH GRADE COPPER AND SHALL EQUAL OR EXCEED THE MAIN BREAKER RATING. ALL BREAKERS SHALL BOLT ONTO THE BUSSWORK. JUMPERING OF BREAKERS SHALL NOT BE ALLOWED. BUSSWORK SHALL ACCOMMODATE ALL FUTURE EQUIPMENT AS SHOWN IN THE BREAKER SCHEDULE.
9. THE PHOTOCELL UNIT SHALL BE CENTERED IN THE PHOTOCELL ENCLOSURE TO PERMIT 360 DEGREE ROTATION OF THE PHOTOCELL WITHOUT REMOVAL OF THE PHOTOCELL UNIT OR THE PHOTOCELL ENCLOSURE.
10. ALL INTERNAL WIRE RUNS SHALL BE IDENTIFIED WITH "TO - FROM" CODED TAGS LABELED WITH THE CODE LETTERS AND/OR NUMBERS SHOWN ON THE SCHEDULES. APPROVED PVC OR POLYOLEFIN WIRE MARKING SLEEVES SHALL BE USED.
11. ALL NUTS, BOLTS, AND WASHERS USED FOR MOUNTING PHOTOCELL ENCLOSURE SHALL BE STAINLESS STEEL.
12. A 1% TOLERANCE IS ALLOWED FOR ALL DIMENSIONS.
13. SEE PLANS FOR BREAKER SCHEDULE.
14. INSTALL CONDUIT COUPLINGS ON ALL CONDUITS. PLACE COUPLINGS FLUSH WITH TOP OF CONCRETE FOUNDATION.
15. SEAL CABINET TO FOUNDATION WITH A 1/2" BEAD OF SILICONE. APPLY SILICONE TO DRY SURFACE ONLY.
16. THE METER BASE PORTION OF THIS SERVICE WAS DESIGNED TO MEET METERING PORTION OF EUSERC DRAWING 309 REQUIREMENTS.

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# SERVICE CABINET TYPE E (0 - 200 AMP TYPE 240/480 SINGLE PHASE)
# STANDARD PLAN J-3d

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *11-05-03* — DATE

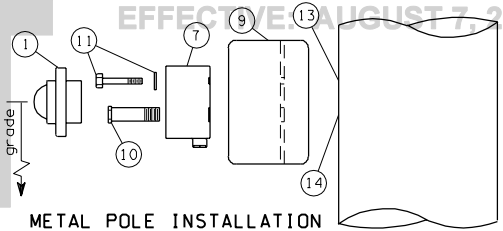
Washington State Department of Transportation

| DATE | REVISION | BY |
|---|---|---|
| 09/2003 | REVISED KEY NOTE 16 | MHG |

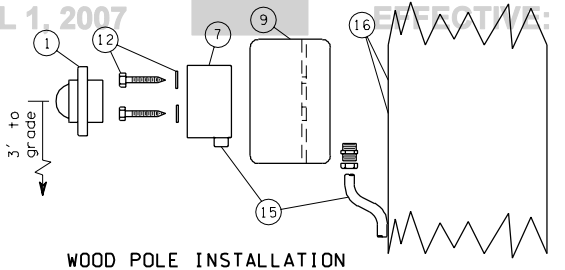
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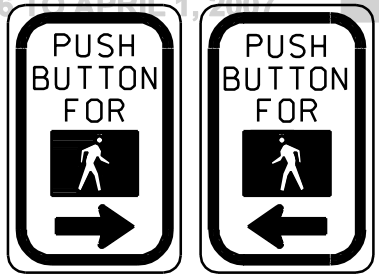
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




METAL POLE INSTALLATION
PPB-M
(Pedestrian PushButton - Metal Pole)

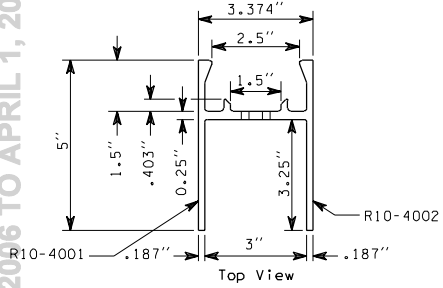



WOOD POLE INSTALLATION
PPB-W
(Pedestrian PushButton - Wood Pole)
(Bottom feed shown)

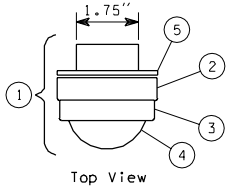



R10-4001 R10-4002

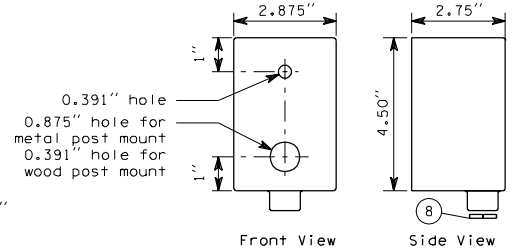
NOTE:
When "PPB-MR" or "PPB-WR" are specified in the contract, the arrow shall be installed in the opposite direction than as shown for "PPB-M" or "PPB-W"




Top View

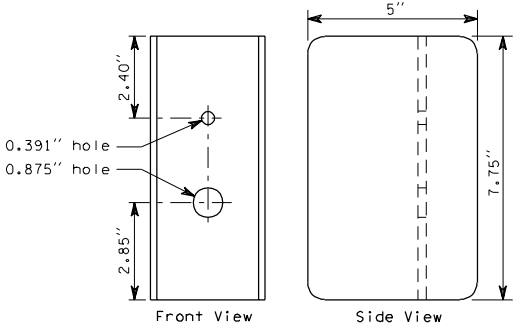



Top View



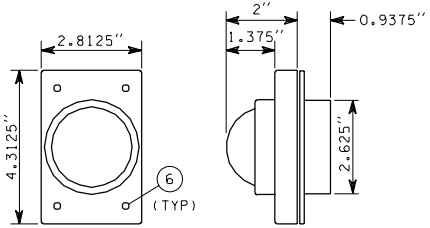

Front View Side View

CAST ALUMINUM CONDULET




Front View Side View

ALUMINUM 'H' EXTRUSION




Front View Side View

PUSHBUTTON SWITCH ASSEMBLY

# PEDESTRIAN PUSHBUTTON DETAILS

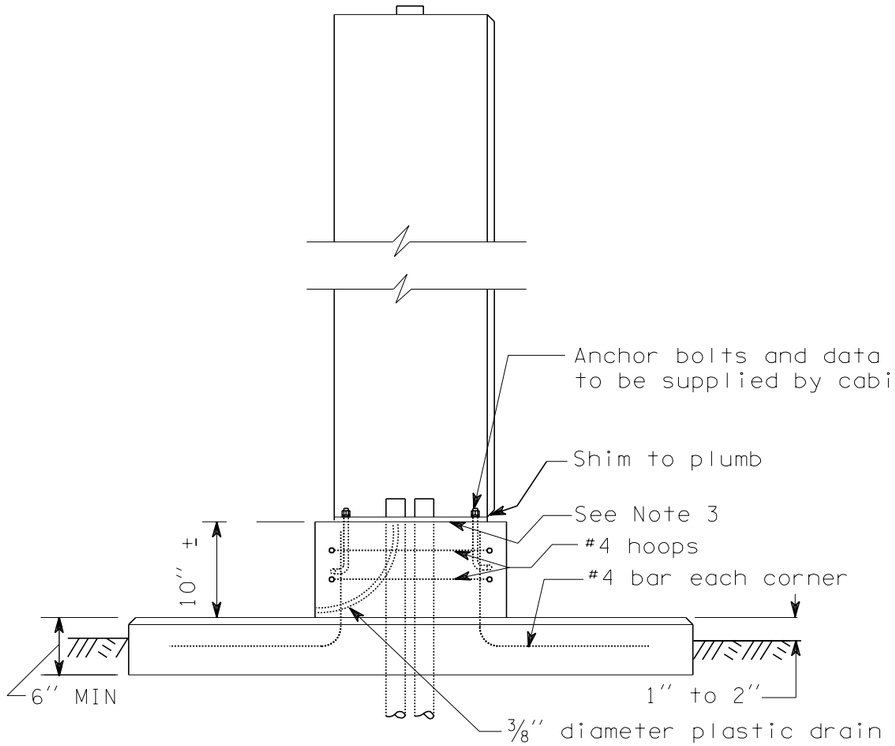
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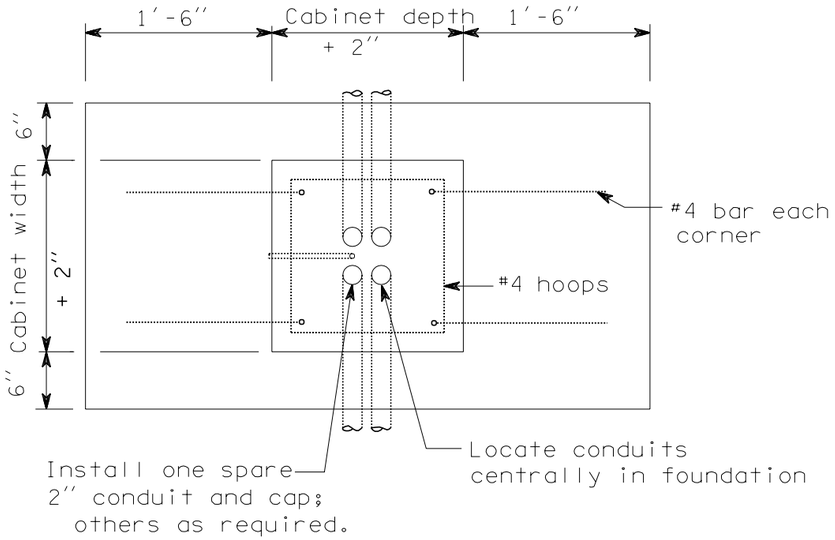
1. Pushbutton switch assembly
2. Cast metal housing
3. Protective collar
4. Pushbutton switch
5. Gasket
6. Stainless steel fastener
7. Cast aluminum condulet
8. Aluminum plug with 1/8" drilled weep hole. On timber pole installation, remove plug for wire entrance and drill weep hole in condulet.
9. Aluminum 'H' extrusion
10. Chase nipple - 7/8" hex head x 1/2" pipe thread x 2 1/2" long
11. 3/8" - 16 X 2 1/2" stainless steel bolt with washer
12. 5/8" X 4" lag bolt with washer
13. Drill and tap shaft for 3/8" bolt
14. Drill and tap shaft for 1/2" nipple
15. Conduit and fittings as required for timber pole installation; reverse condulet and conduit for top feed
16. Drill pilot hole for 3/8" lag bolt



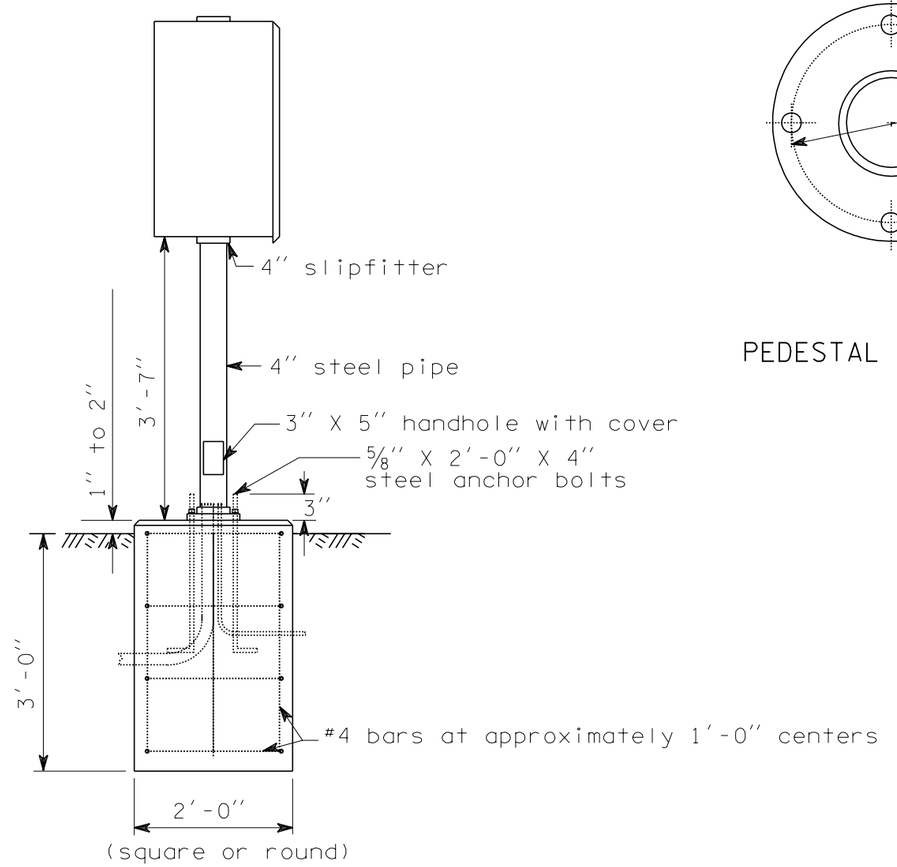
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



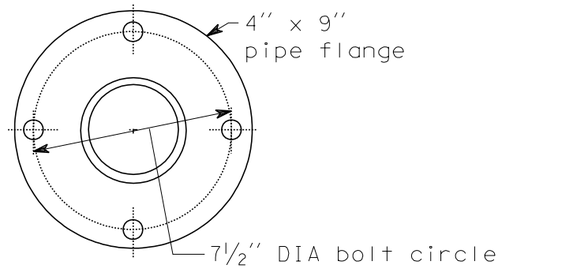

PAD MOUNT




PEDESTAL MOUNT

NOTES

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.




PEDESTAL BASE DETAILS




EXPIRES JUNE 4, 1999

# CABINET FOUNDATION DETAILS

## STANDARD PLAN J-6c

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APPROVED FOR PUBLICATION

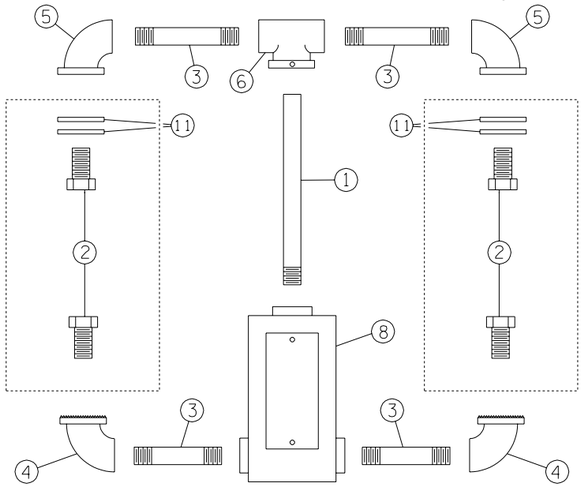
*Clifford E. Mansfield* — 4/24/98

DEPUTY STATE DESIGN ENGINEER — DATE

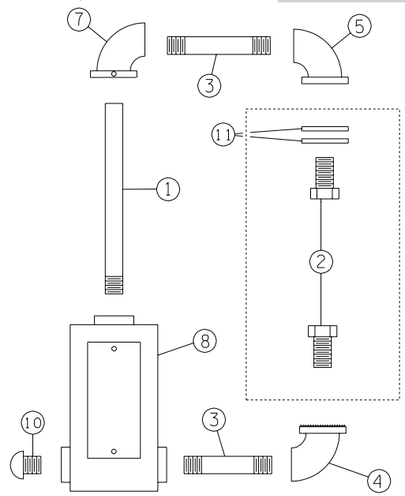
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

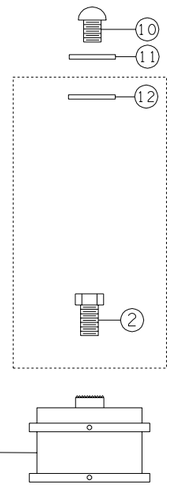
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



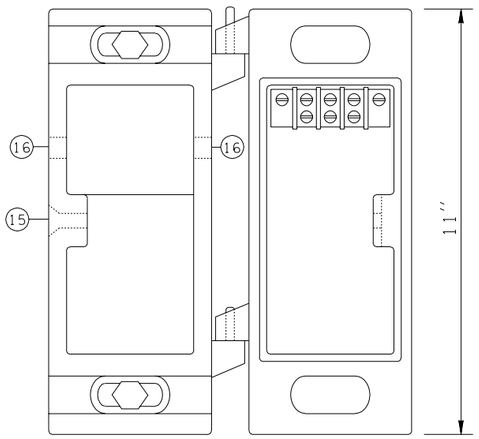
SIDE MOUNT
TYPE A - PED.
TYPE H - VEHICLE

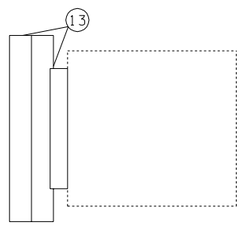


SIDE MOUNT
TYPE B - PED.
TYPE K - VEHICLE



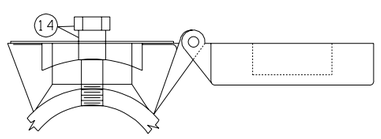
TOP MOUNT
TYPE D - PED.
OR VEHICLE



SIDE MOUNT
TYPE E

(NEON GRID OR SIMILAR SIZE
INCANDESCENT PEDESTRIAN HEAD)



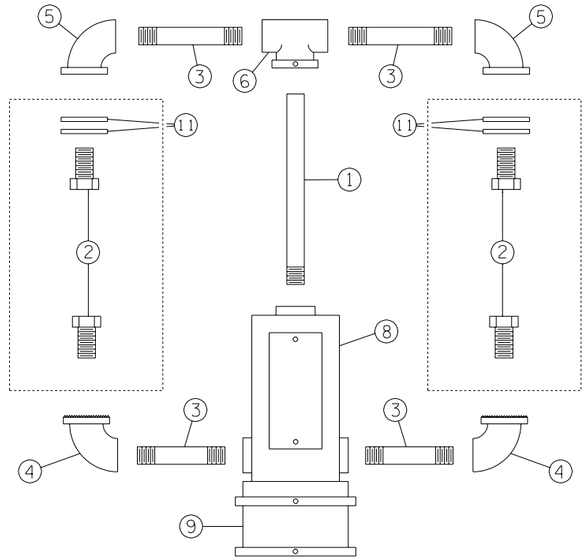
TYPE E MOUNTING DETAILS

KEY

1. CENTER PIPE
2. LOCKNIPPLE
3. NIPPLE
4. SERRATED ELBOW
5. SERRATED OR FLANGED ELBOW
6. REAMED TEE WITH SET SCREW
7. REAMED ELBOW WITH SET SCREW
8. BRONZE TERMINAL COMPARTMENT WITH:
   - GASKETED COVER
   - FASTENERS
   - WIRE LEADS
   - MOUNTING SADDLE FOR SIDE MOUNTS
   - ¼" DIA DRAIN HOLE
   - 12 POSITION TERMINAL STRIP
   - WIREWAY FOR SIDE MOUNTS
9. BRONZE COLLAR, 4¼" I.D. WITH SET SCREWS
10. ORNAMENT CAP
11. GASKET AND WASHER
12. CONDUIT LOCKNUT
13. TYPE E HINGE MOUNTING
14. FASTENER WITH SPACER
    -½" LAG SCREWS ON WOOD POLE
    -½" BOLTS TAPPED TO METAL POLE
15. FLATHEAD SOCKET BOLT
16. ½" INSERT HOLE FOR EXTERNAL WIRE ENTRANCE
    REQUIRED ON TIMBER POLE MOUNTINGS ONLY.

NOTES:

1. SEE CONTRACT FOR HEAD TYPE, MOUNTING HEIGHT AND ORIENTATION.
2. ALL NIPPLES, FITTINGS AND CENTER PIPES SHALL BE 1½" DIA NOMINAL TRADE SIZE (NEC).
3. INSTALL NEOPRENE GASKET OUTSIDE HEAD WHEN FLANGED ELBOWS ARE SUPPLIED.



TOP MOUNT
TYPE C - PED.
TYPE F - VEHICLE

DAVID K. PEACH
STATE OF WASHINGTON
00110089
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 4, 1999

# SIGNAL HEAD MOUNTING DETAILS POLE & POST TOP MOUNTINGS

## STANDARD PLAN J-6f

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.

APPROVED FOR PUBLICATION

*Clifford E. Mansfield* — *4/24/98*

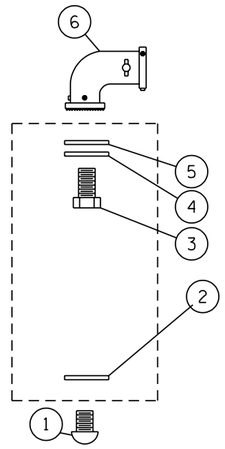
DEPUTY STATE DESIGN ENGINEER — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

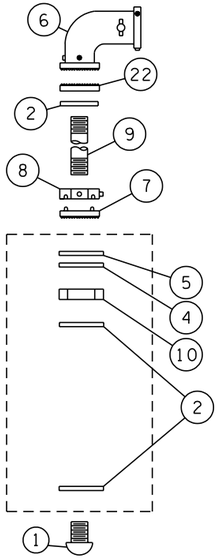
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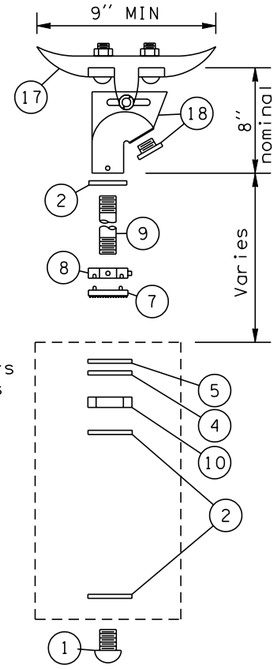
1. End cap
2. Conduit locknut, 1½" DIA
3. Locknipple, 1½" DIA
4. Steel washer
5. Neoprene gasket
6. Bronze serrated ell fitting with:
   - 3/8 " stainless steel through bolt and nuts
   - Three set screws at slipfitter connection
   - Three allen head stainless steel set screws at conduit nipple connection
7. Serrated ring with pins
8. Hex locknut with:
   - Two allen head stainless steel set screws
   - Pin receptacles
9. Conduit nipple, 1 1/2 " DIA
10. Hex locknut, 1½" DIA
11. Mounting assembly
12. Bronze elevator plumbizer with ⅜" stainless steel through bolt, washers, and two nuts
13. Aluminum arm with set screw
14. Slotted tube with closure strip
15. Tube clamp, 2½" ID, MIN
16. Internally threaded clamp assembly with:
    - Two set screws
    - 1/2 " x 0.045" stainless steel bands
    - Screw buckles, 7/16 " with swivels, nuts, and washers
    - Band clips with allen head stainless steel set screws
17. Bronze messenger hanger with:
    - ½" DIA J bolts
    - Cable lock bar
    - Rivet
    - Cotter key
18. Bronze internally threaded wire entrance with:
    - Bushing insert
    - Allen head stainless steel set screw
19. Bronze balance adjuster
20. Multi-head mounting assembly
21. Spider assembly
22. Serrated ring with no pins



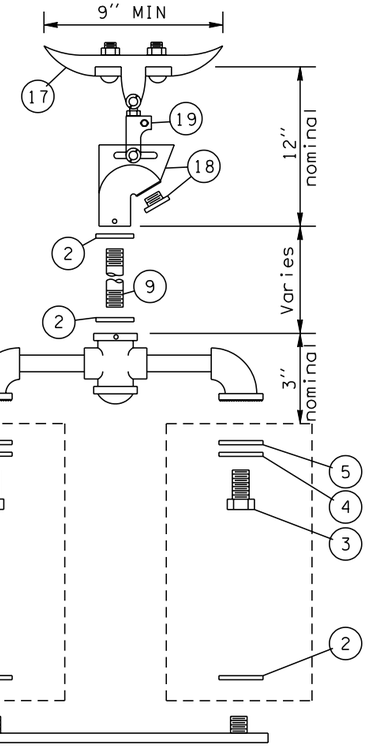

ARM MOUNT
TYPE L



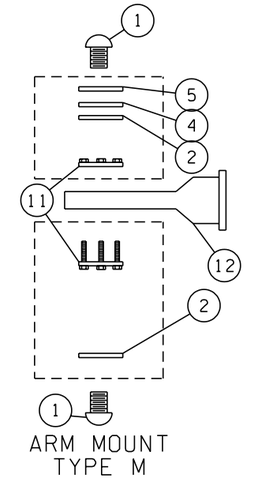

ARM MOUNT
TYPE LE
(TYPE L WITH
EXTENSION FITTINGS)



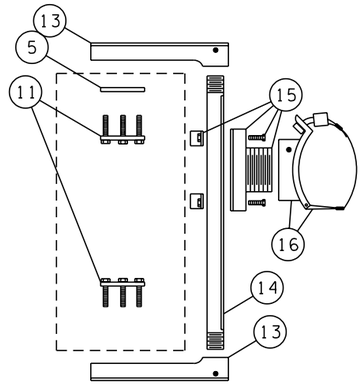

SPAN WIRE
TYPE P (1 HEAD)




SPAN WIRE
TYPE Q (2 HEADS)
TYPE R (3 HEADS)
TYPE S (4 HEADS)




ARM MOUNT
TYPE M




ARM MOUNT
TYPE N

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 3½" 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.

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2003

# SIGNAL HEAD MOUNTING DETAILS MAST ARM & SPAN WIRE MOUNTINGS

## STANDARD PLAN J-6g

SHEET 1 OF 1 SHEET

*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.*

APPROVED FOR PUBLICATION

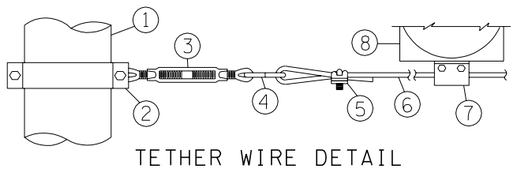
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-12-02* — DATE

Washington State Department of Transportation

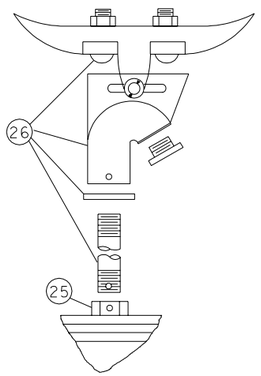
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|---|---|---|
| 11/2002 | REV. KEY NOTES 6, 9, 16 & 18; REV. NOTE 5; REV. SPAN WIRE TYPE P DETAIL | RG |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

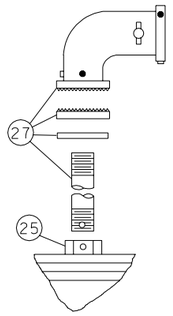
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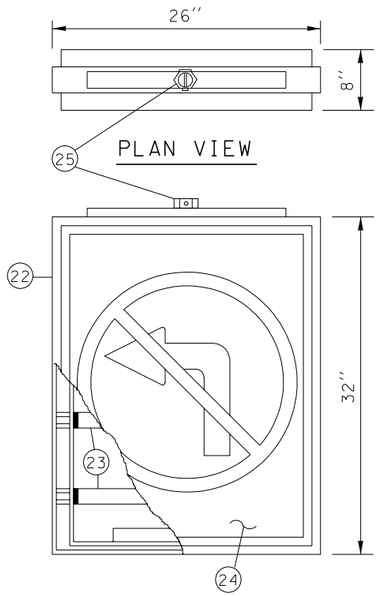

TETHER WIRE DETAIL



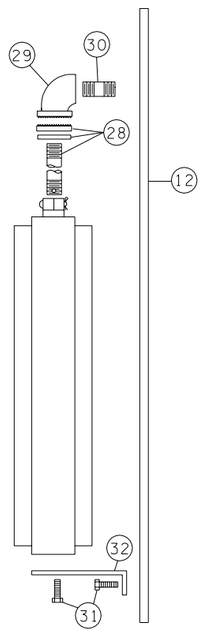

SPAN WIRE MOUNT




MAST ARM MOUNT

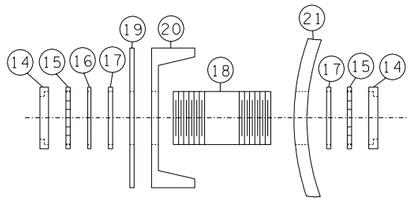



ELEVATION

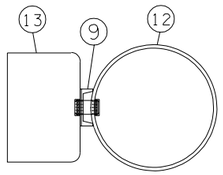



SIDE POLE MOUNT

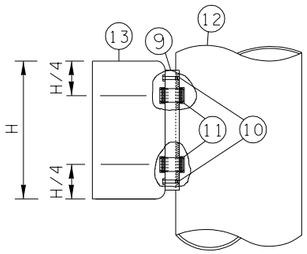
INTERNALLY ILLUMINATED SIGN DETAILS




WIREWAY DETAIL

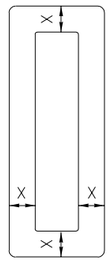



PLAN VIEW




ELEVATION

CABINET MOUNTING DETAIL




8" OR 12" SECTIONS

8" SECTION X = 8" ± ½"

12" SECTION X = 5½" ± ½"

BACKPLATE DETAIL

KEY:

① METAL OR TIMBER POLE
② 2" x 3/16" S.S. BAND WITH 2 EACH, 3/8-16NC x 3/4" STAINLESS STEEL HEX HEAD BOLT, LOCK WASHERS AND NUTS
③ 5/16", EYE AND EYE, TURNBUCKLE
④ S HOOK, 3/8" MILD STEEL
⑤ 1/8" WIRE ROPE CLAMP (U BOLT TYPE)
⑥ 1/8" STAINLESS STEEL TETHER WIRE
⑦ WIRE CLAMP WITH LEAD WIRE WRAP
⑧ SIGNAL HEAD
⑨ 6 X 8.2 LB/FT CHANNEL
⑩ 2 EACH, 1/2-20 NF X 2½" HEX HEAD BOLT, LOCK WASHER (DRILL AND TAP POLE TO ACCEPT)
⑪ WIREWAY (SEE DETAIL THIS SHEET)
⑫ METAL POLE
⑬ CABINET
⑭ END BUSHING
⑮ CONDUIT LOCKNUT
⑯ STEEL WASHER
⑰ WEATHERPROOF SEAL
⑱ 2" DIA x 4" NIPPLE UNLESS OTHERWISE NOTED
⑲ CABINET WALL DRILLED 1/8" OVERSIZE OF NIPPLE
⑳ CHANNEL DRILLED 1/8" OVERSIZE OF NIPPLE
㉑ POLE DRILLED 1/8" OVERSIZE OF NIPPLE
㉒ 6063 EXTRUDED ALUMINUM FRAME
㉓ 4 EACH, F24T12/CW FLOURESCENT TUBES
㉔ TRANSLUCENT PLEXIGLASS SIGN FACE
㉕ 1½" CAST IRON HUB WITH 5/16" PIN AND COTTER KEY
㉖ SEE KEY 2,9,17, AND 18, STANDARD PLAN "SIGNAL HEAD MOUNTING DETAILS MAST ARM AND SPAN WIRE MOUNTINGS" .
㉗ SEE KEY 2,6,9 AND 22, STANDARD PLAN "SIGNAL HEAD MOUNTING DETAILS MAST ARM AND SPAN WIRE MOUNTINGS" .
㉘ SEE KEY 2,9 AND 22, STANDARD PLAN "SIGNAL HEAD MOUNTING DETAILS MAST ARM AND SPAN WIRE MOUNTINGS" .
㉙ SERRATED 1½" ELBOW
㉚ 1½" DIA NIPPLE (DRILL AND TAP POLE TO ACCEPT)
㉛ 2 EACH, 1/2-20NF x 3/4" STAINLESS STEEL HEX HEAD BOLT AND LOCK WASHERS (DRILL AND TAP POLE TO ACCEPT
㉜ MOUNTING BRACKET

NOTES:

1. BACKPLATES SHALL BE INSTALLED WITH 6 STAINLESS STEEL SCREWS AND WASHERS.

DAVID K. PEACH
STATE OF WASHINGTON
00110089
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 4, 1999

# MISCELLANEOUS SIGNAL DETAILS

# STANDARD PLAN J-6h

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APPROVED FOR PUBLICATION

*Clifford E. Mansfield* — *4/24/98*

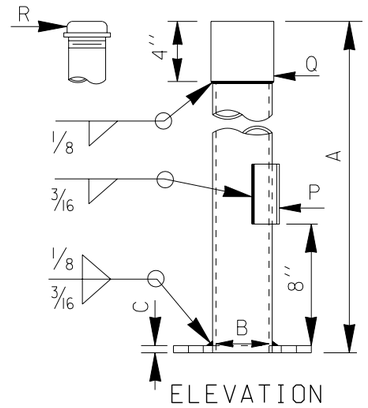
DEPUTY STATE DESIGN ENGINEER — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

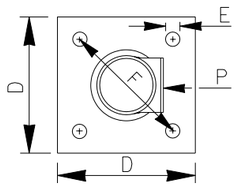
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## TYPE PPB, PS, & I STANDARD DETAILS



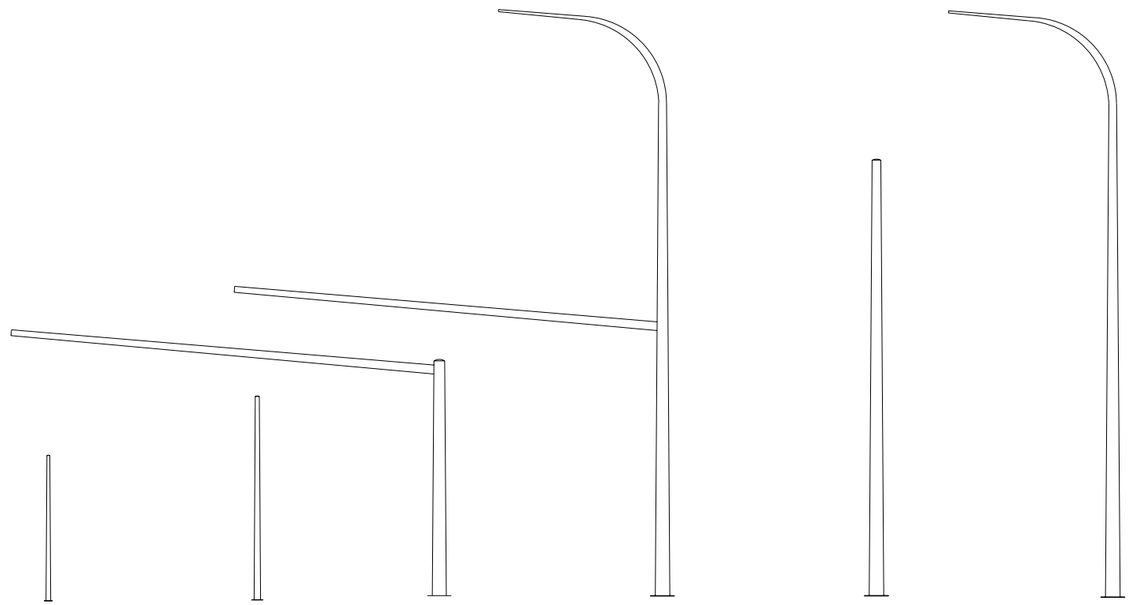

ELEVATION




PLAN

| ANCHOR BOLT, NUT, & WASHER SIZES | | |
|---|---|---|
| MARK | STANDARD | DIMENSIONS |
| S | TYPE PPB | 4 - ½'' DIA x 12'' x 2'' |
| S | TYPE PS & I | 4 - ¾'' DIA x 30'' x 4'' |
| S | TYPE FB & RM | 3 - ¾'' DIA x 30'' x 4'' |

## SIGNAL STANDARD TYPE DESIGNATIONS



TYPE PPB PED. PUSH BUTTON POST STANDARD

TYPE PS PED. HEAD STANDARD

TYPE I & RM VEHICLE HEAD AND RAMP METER STANDARD

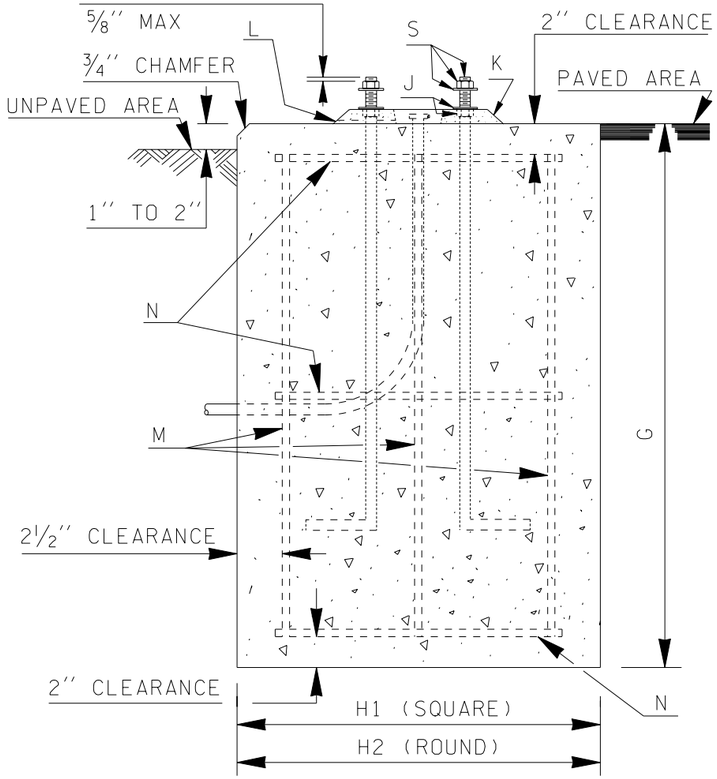
TYPE FB FLASHING BEACON STANDARD

TYPE II MAST ARM STANDARD

TYPE III LIGHTING AND MAST ARM STANDARD

TYPE IV STRAIN POLE STANDARD

TYPE V LIGHTING AND STRAIN POLE STANDARD




FOUNDATION DETAILS

TWO THREADS MIN

| TYPE PPB, PS, I, RM & FB STANDARD DIMENSION CHART | | | | | | |
|---|---|---|---|---|---|---|
| MARK | ITEM | TYPE PPB | TYPE PS | TYPE I | TYPE RM | TYPE FB |
| A | HEIGHT | 4''-6'' | 8'-0'' | 10'-0'' | SEE SHEET 2 | SEE SHEET 2 |
| B | POLE BASE DIA | 2½'' | * | * | * | * |
| C | PLATE THICKNESS | ½'' | ½'' | ½'' | SEE SHEET 2 | SEE SHEET 2 |
| D | PLATE WIDTH | 5'' | 9'' | 9'' | SEE SHEET 2 | SEE SHEET 2 |
| E | HOLE DIA | ⅝'' | 1'' | 1'' | SEE SHEET 2 | SEE SHEET 2 |
| F | BOLT CIRCLE | 4½'' | 8½'' | 8½'' | SEE SHEET 2 | SEE SHEET 2 |
| G | FOUNDATION DEPTH | 1'-6'' | 3'-0'' | 3'-0'' | 3'-0'' | 3'-0'' |
| H1 | FOUNDATION WIDTH | 1'-6'' | 2'-0'' | 2'-0'' | 2'-0'' | 2'-0'' |
| H2 | FOUNDATION DIA | 2'-0'' | 2'-3'' | 2'-3'' | 2'-3'' | 2'-3'' |
| J | NUT & WASHER | Four ½'' | ¾'' | ¾'' | ¾'' | ¾'' |
| K | GROUT PAD THICKNESS | NONE | ** | ** | SEE SHEET 2 | SEE SHEET 2 |
| L | PLASTIC DRAIN TUBE DIA | NONE | ⅜'' | ⅜'' | ⅜'' | ⅜'' |
| M | VERTICAL RE-BAR | NONE | Eight #4 | Eight #4 | Eight #4 | Eight #4 |
| N | HORIZ. RE-BAR HOOP | NONE | Three #4 | Three #4 | Three #4 | Three #4 |
| P | HANDHOLE SIZE | NONE | 3½'' x 4'' | 3½'' x 4'' | 3½'' x 4'' | 3½'' x 4'' |
| Q | SLIPFITTER DIA (I.D.) | NONE | 4'' | 4'' | 4'' | 4'' |
| R | CAP DIA | 2½'' | NONE | NONE | NONE | NONE |

* TAPERED ROUND OR OCTAGONAL SHAFT, 11 GAGE, 4'' OD AT SLIPFITTER WELD. TAPER = 0.14 INCHES/FT.

** LEVELING NUT HEIGHT 1'' MAXIMUM.
LEVELING NUTS NOT REQUIRED FOR TYPE PPB STANDARD

TOBY D. RICKMAN
STATE OF WASHINGTON
24655
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES OCTOBER 26, 2002

# SIGNAL STANDARD TYPE DESIGNATIONS AND TYPE PPB, PS, I, RM, & FB DETAILS

## STANDARD PLAN J-7a

SHEET 1 OF 2 SHEETS

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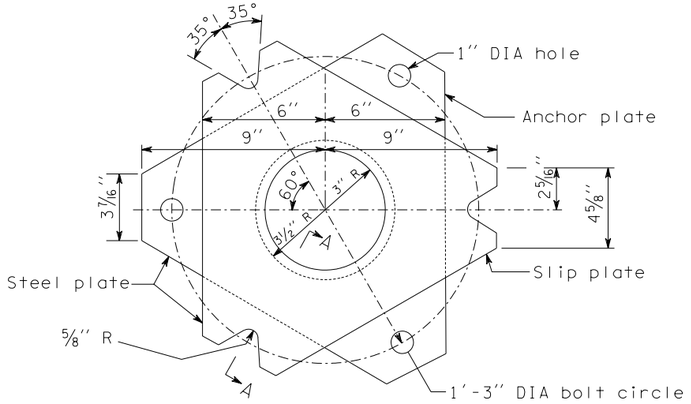
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — 09-12-01 DATE

Washington State Department of Transportation

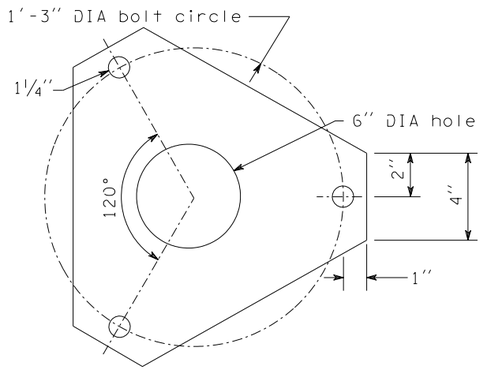
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|---|---|---|
| 7/01 | WELDING SYMBOL SIZES | MHG |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

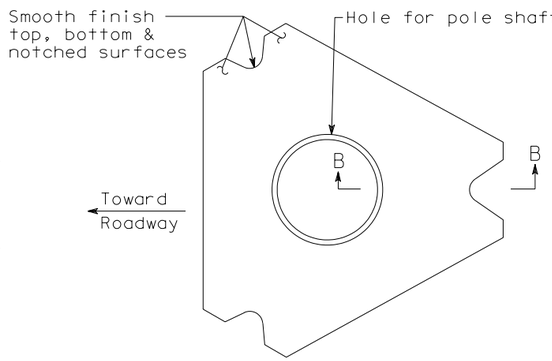



SLIP/ANCHOR PLATES DETAIL



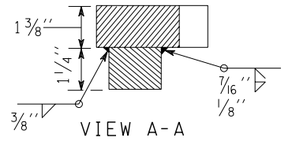

KEEPER PLATE

Place between pole base plate and slip plate on top of middle washers.

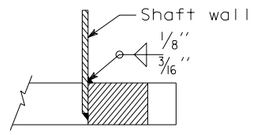



BASE PLATE

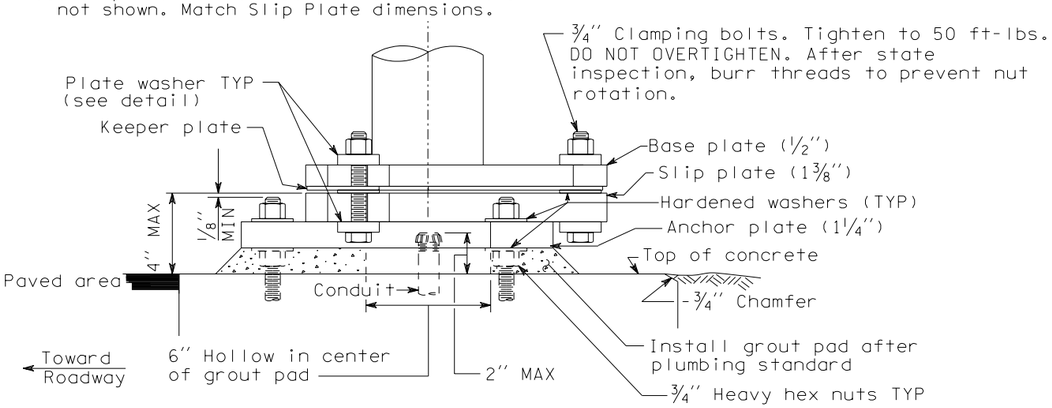
See Slip Anchor Plate Detail for dimensions not shown. Match Slip Plate dimensions.




VIEW A-A

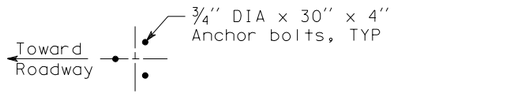



VIEW B-B




FLASHING BEACON AND RAMP METER BASE ELEVATION

See "FOUNDATION DETAIL" for other requirements.




ANCHOR BOLT LAYOUT

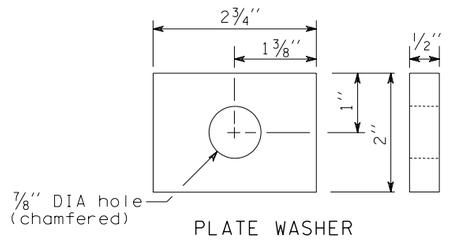
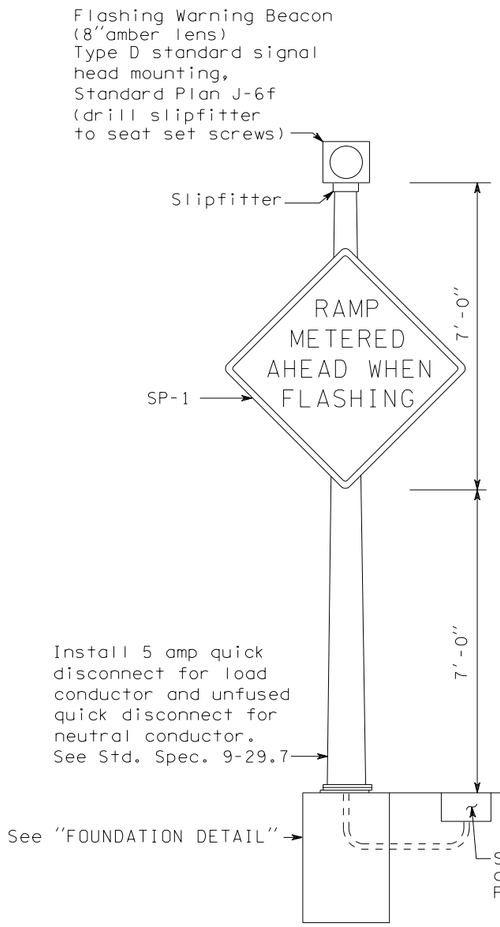
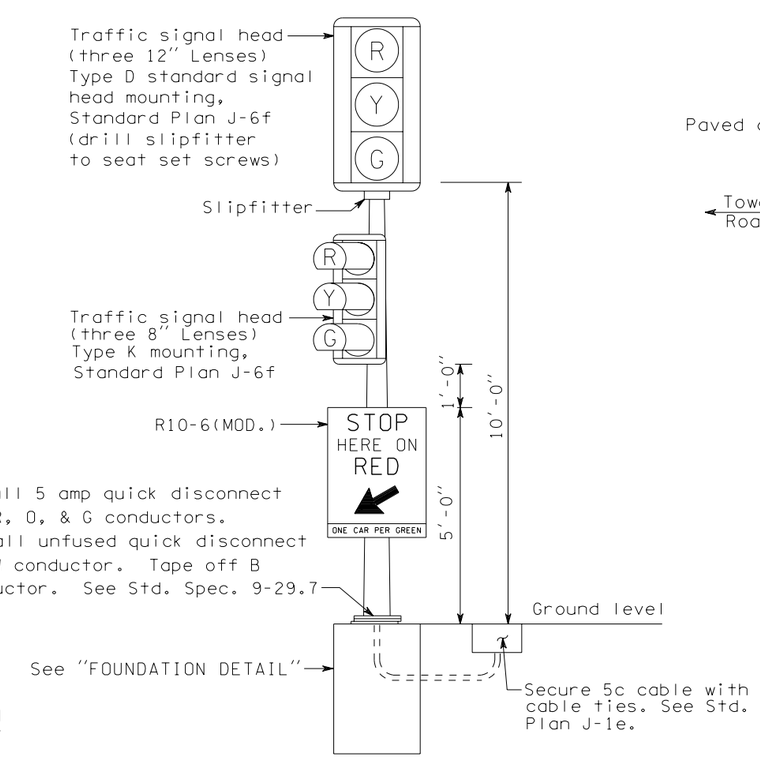



PLATE WASHER




FLASHING BEACON DETAIL

Shaft, slipfitter, welds and handhole are the same as shown for Type 1 Standards, except shaft length is 14'.




RAMP METER DETAIL

Shaft, slipfitter, welds and handhole are the same as shown for Type 1 Standards.

TOBY D. RICKMAN
STATE OF WASHINGTON
24655
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES OCTOBER 26, 2002

# SIGNAL STANDARD TYPE DESIGNATIONS AND TYPE PPB, PS, I, RM, & FB DETAILS

## STANDARD PLAN J-7a

SHEET 2 OF 2 SHEETS

*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.*

APPROVED FOR PUBLICATION

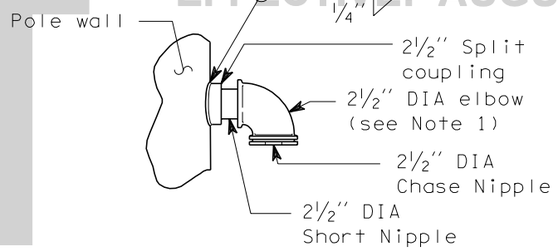
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *09-12-01* DATE

Washington State Department of Transportation

| DATE | REVISION | BY |
|---|---|---|
| 7/01 | CORRECTED - FLASHING BEACON DETAIL | MHG |

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



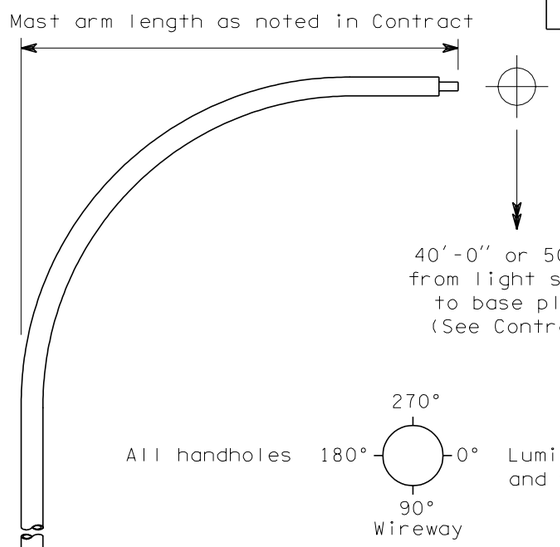

WIREWAY DETAIL

## STRAIN POLE DIMENSION CHART

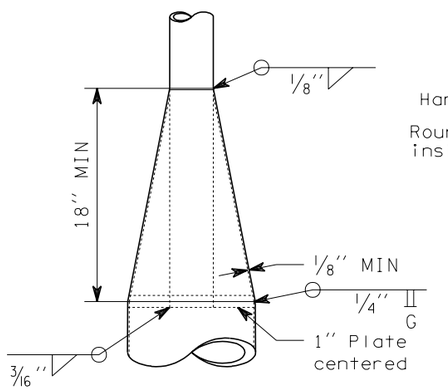
| KEY | ITEM | POLE CLASS (Resultant Horizontal Tension) 1900 LB | 2700 LB | 3700 LB | 4800 LB | 5600 LB | 6300 LB | 7200 LB |
|---|---|---|---|---|---|---|---|---|
| | Pole gauge | 3 | 3 | 3 | 1/0 | 1/0 | 1/0 | 1/0 |
| A | Base plate width | 15" | 15" | 17" | 18" | 18" | 20" | 20" |
| B | Anchor bolt circle diameter | 16" | 16" | 19" | 20" | 20" | 22" | 22" |
| C | Pole base diameter | 10" | 12" | 14" | 14" | 15" | 16" | 17" |
| D | Base plate thickness | 1¾" | 1¾" | 1¾" | 2" | 2" | 2" | 2" |
| E | Anchor bolt size | 1"x36" | 1¼"x60" | 1⅜"x60" | 1½"x60" | 1½"x60" | 1¾"x66" | 1¾"x66" |
| F | Anchor plate size | 1"x3"x3" | 1"x4"x4" | 1"x4"x4" | 1"x5"x5" | 1"x5"x5" | 1"x6"x6" | 1"x6"x6" |
| G | Vertical steel number and size | Eight #5 | Eight #6 | Eight #7 | Eight #7 | Eight #8 | Eight #8 | Eight #9 |

NOTES

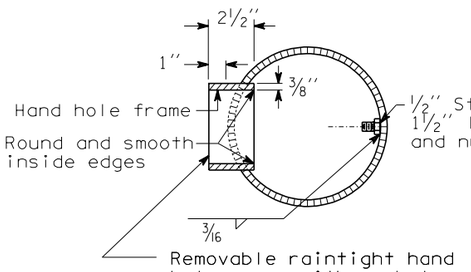
1. 2½" diameter weatherhead may be substituted for the elbow and nipple assembly.
2. Pole shaft shall have 0.14"/ft taper.
3. See Standard Plan J-7d for details.
4. Handholes may be 6" x 4" oval or rectangle.

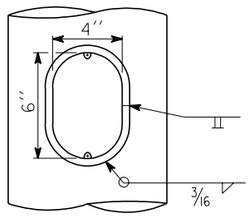



ATTACHMENT POINT ANGLES

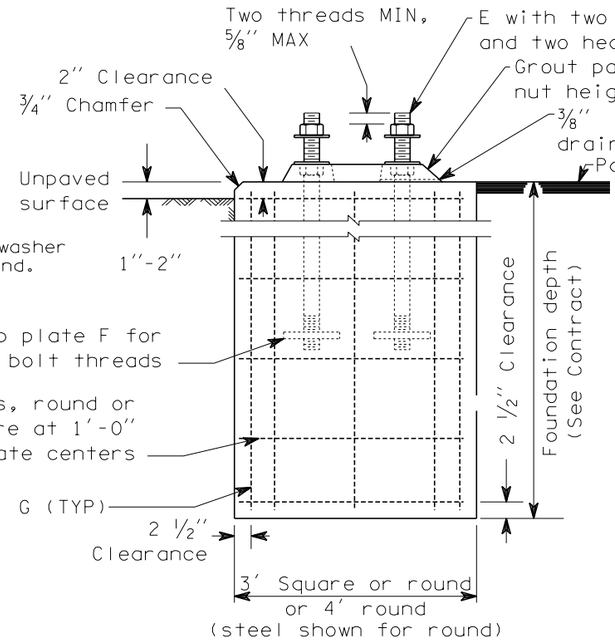



CONE SECTION DETAIL

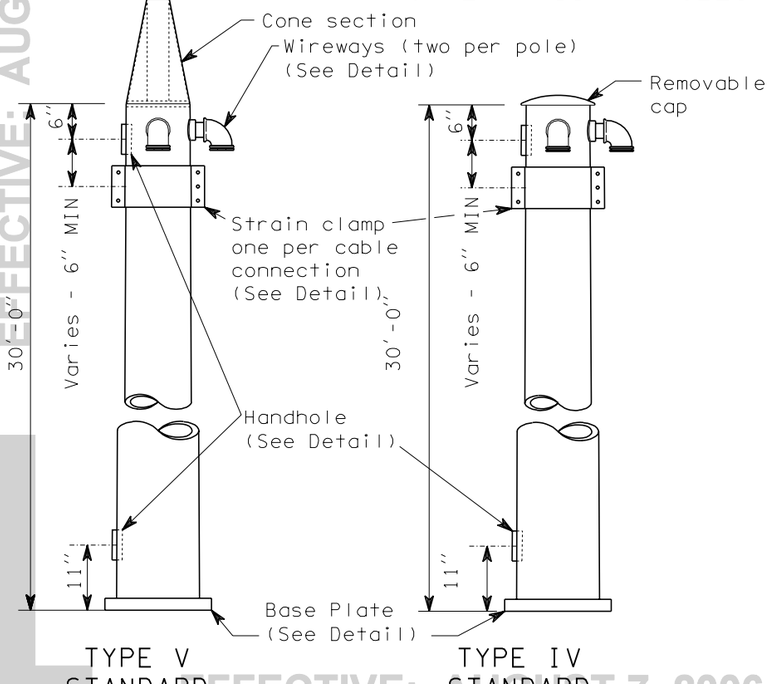



HANDHOLE DETAIL
See Note 4

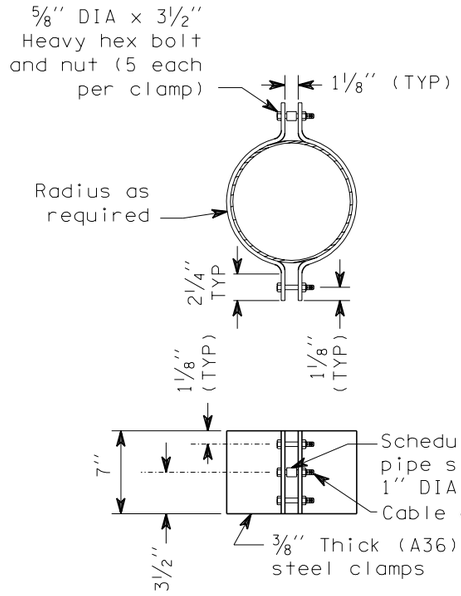



FOUNDATION DETAIL

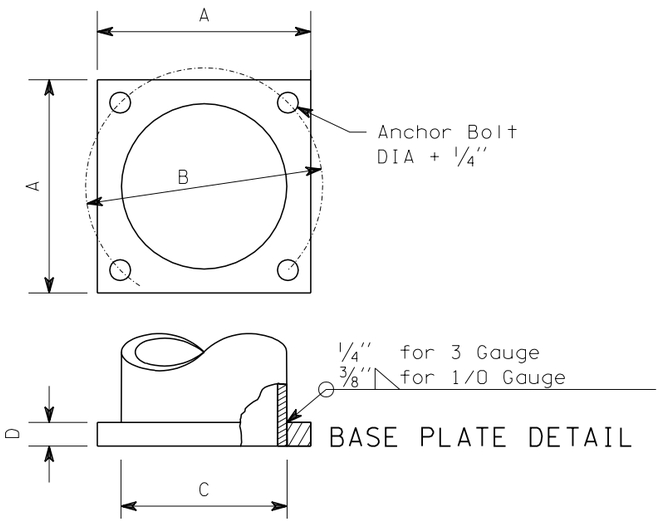



TYPE V STANDARD

TYPE IV STANDARD




STRAIN CLAMP DETAIL




BASE PLATE DETAIL

M. MYINT LWIN
STATE OF WASHINGTON
10536
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JANUARY 17, 1999

# STRAIN POLE STANDARDS TYPE IV AND V

# STANDARD PLAN J-7c

APPROVED FOR PUBLICATION

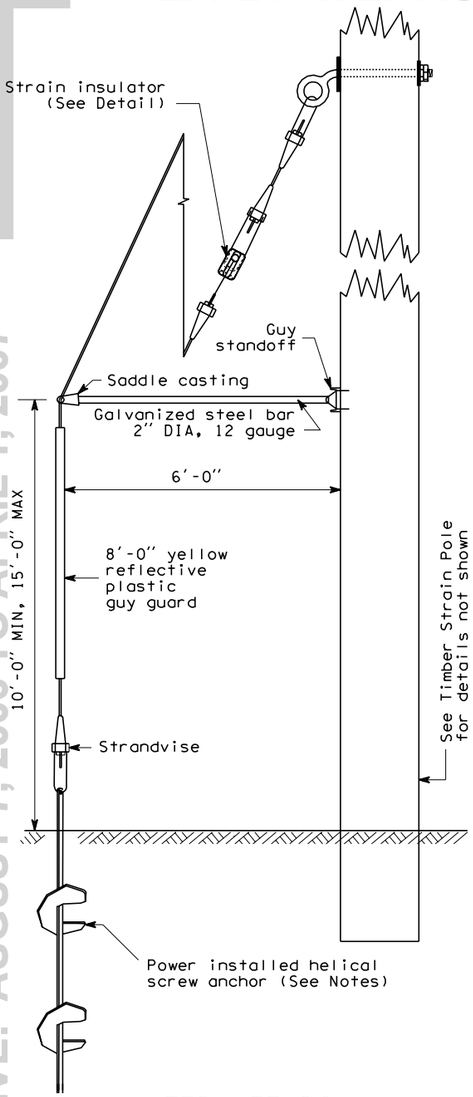
*Clifford E. Mansfield* — 6/19/98

for STATE DESIGN ENGINEER — DATE

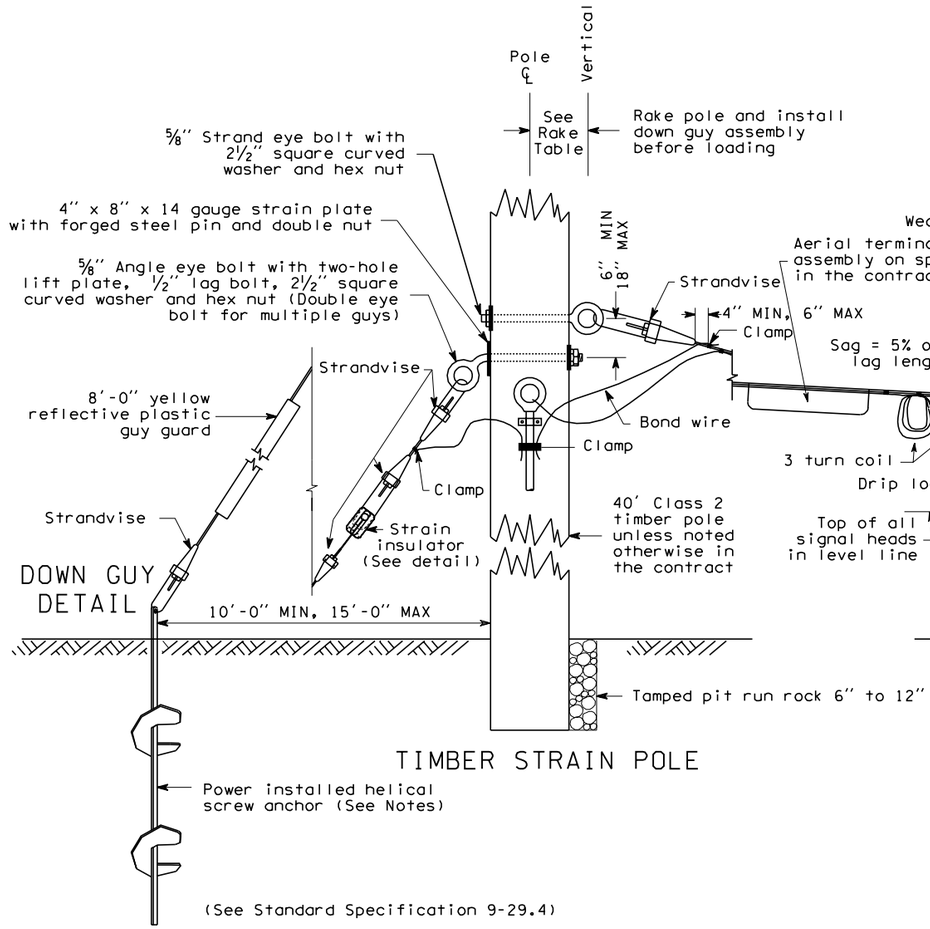
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

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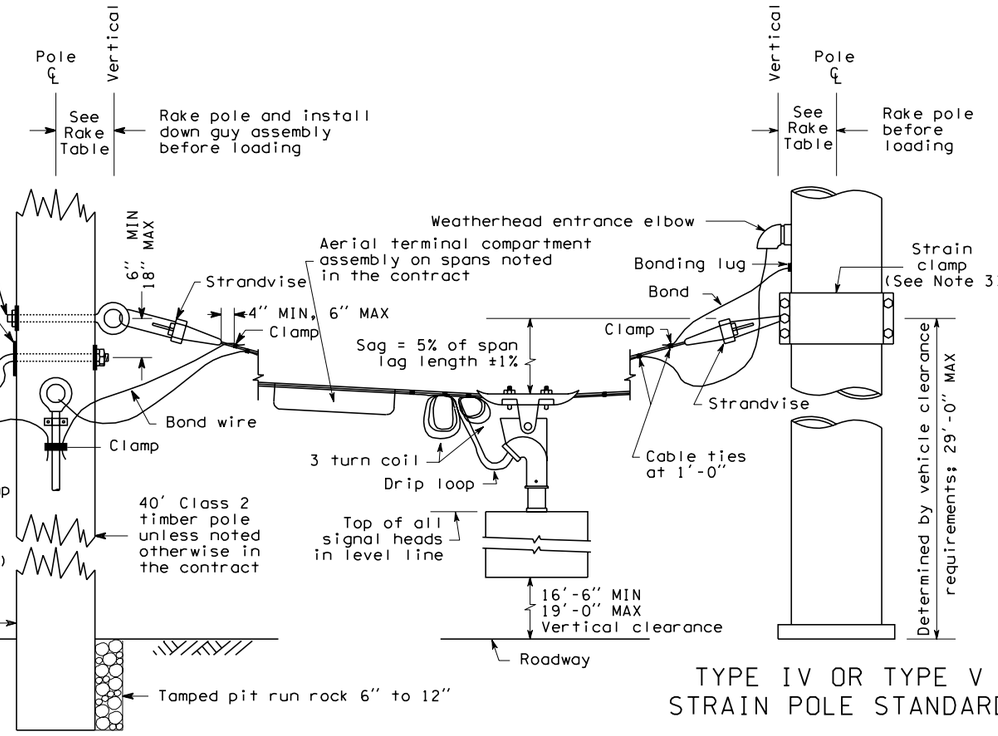
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




ALTERNATE DOWN GUY DETAIL




ANCHOR ASSEMBLY




TIMBER STRAIN POLE





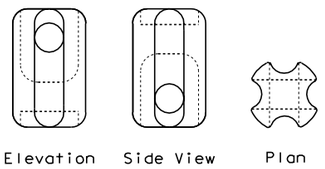


TYPE IV OR TYPE V
STRAIN POLE STANDARD

NOTES

1. An eight-way expanding anchor may be used as an acceptable alternate to power installed helical screw anchor.
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.
3. See "Strain Clamp Detail" on Standard Plan "Strain Pole Standards: Type IV and Type V".

| RAKE TABLE | |
|---|---|
| POLE CLASS | RAKE |
| 1900# | 7" |
| 2700# | 6" |
| 3700# | 5" |
| 4800# | 5" |
| 5400# | 4" |
| 4300# | 4" |
| 7200# | 4" |
| TIMBER | 6" |




STRAIN INSULATOR DETAIL

DAVID K. PEACH
STATE OF WASHINGTON
00110089
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 4, 1999

# SPAN WIRE INSTALLATION

# STANDARD PLAN J-7d

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| DATE | REVISION | BY | APPR'D |
|---|---|---|---|
| 4/98 | Delete bury depth of pole. | ABN | WDB |

APPROVED FOR PUBLICATION

*Clifford E. Mansfield* — *4/24/98*

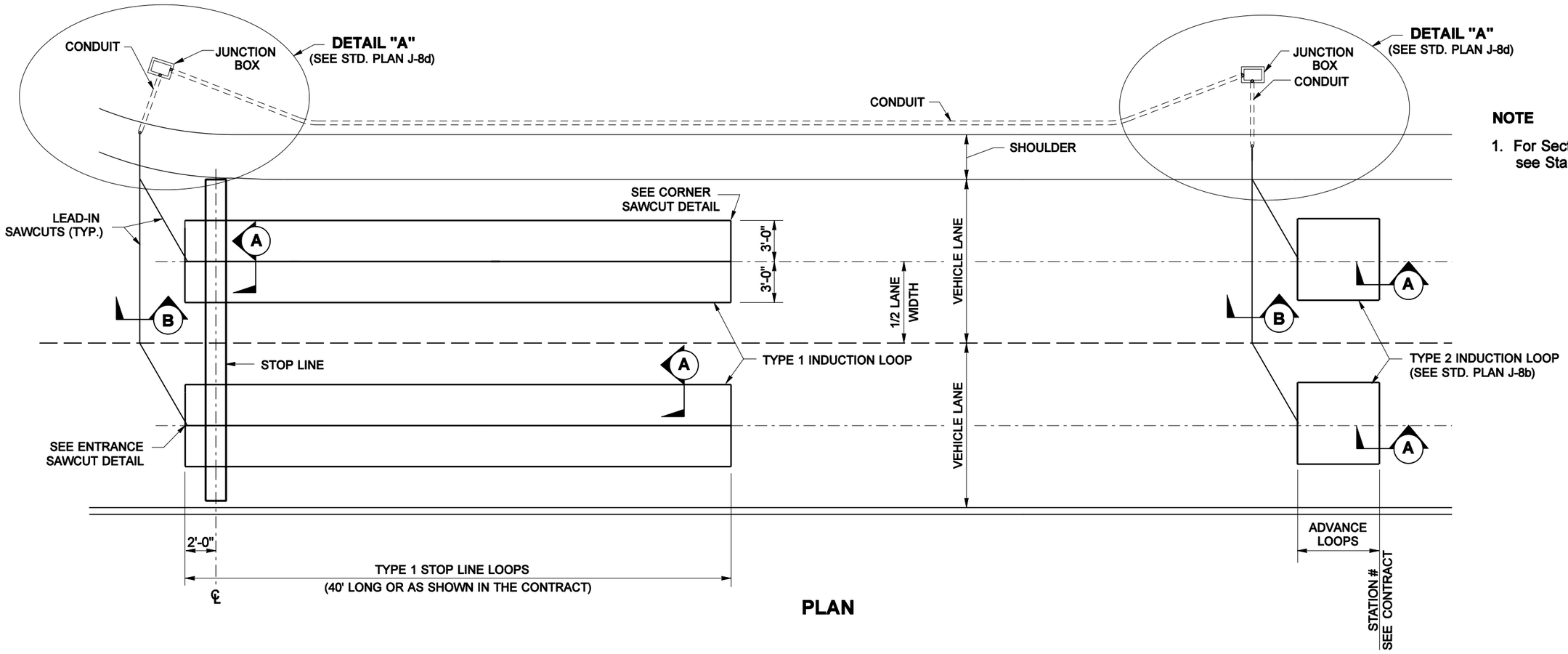
DEPUTY STATE DESIGN ENGINEER — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

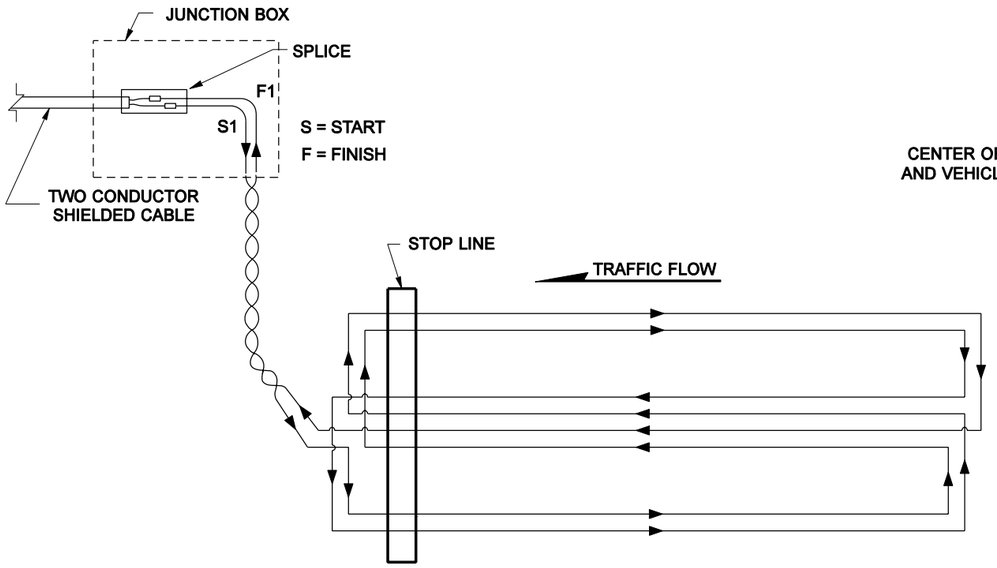
DRAWN BY: MONIQUE GLICK



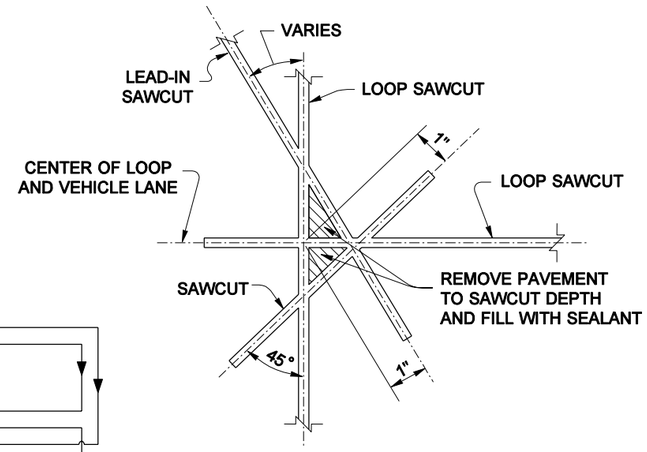

**PLAN**

**NOTE**

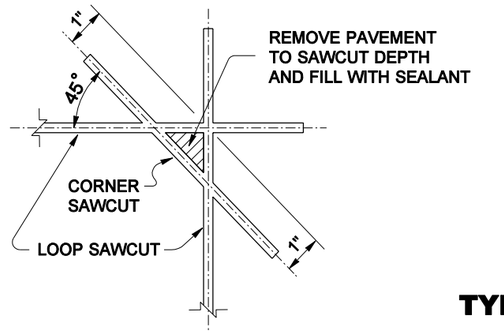
1. For Sections A and B, see Standard Plan J-8d.




**TYPE 1 STOP LINE LOOP WIRING DIAGRAM**




**ENTRANCE SAWCUT DETAIL**




**CORNER SAWCUT DETAIL**

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# TYPE 1 INDUCTION LOOP

## STANDARD PLAN J-8a

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-20-04* — DATE

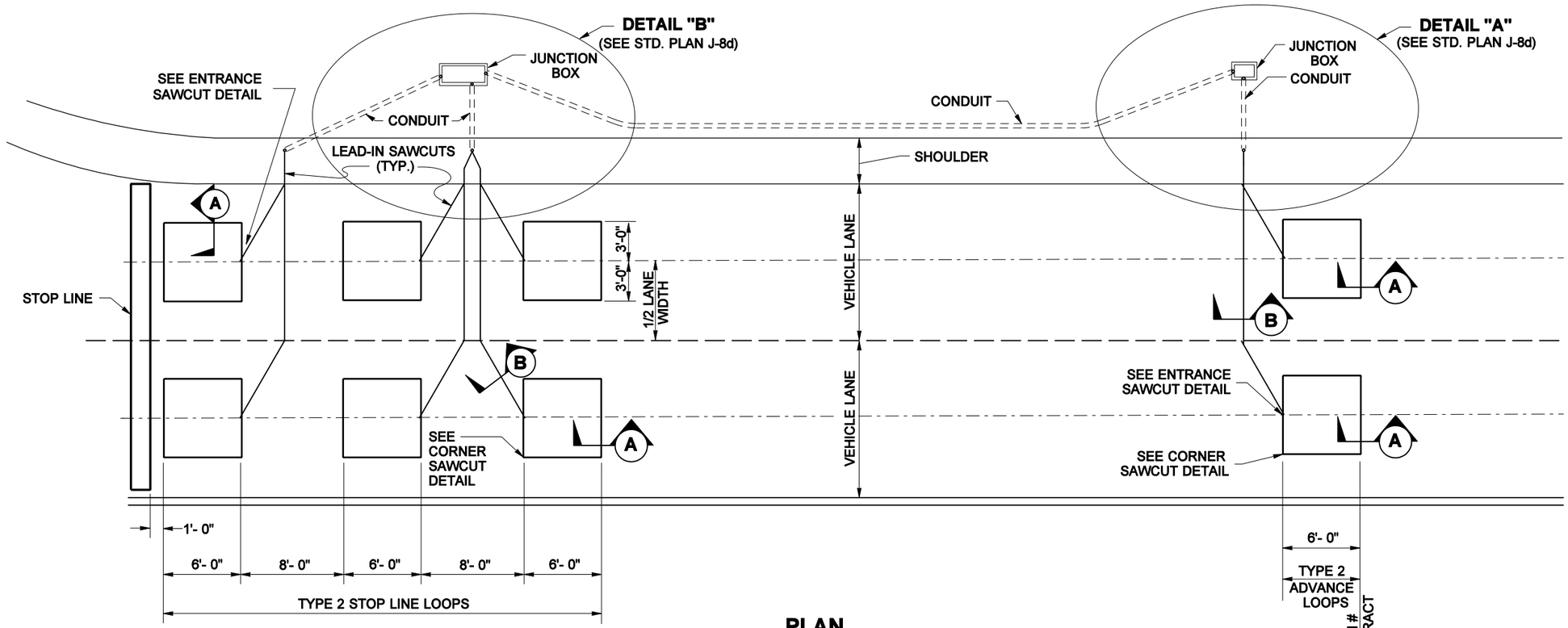
Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

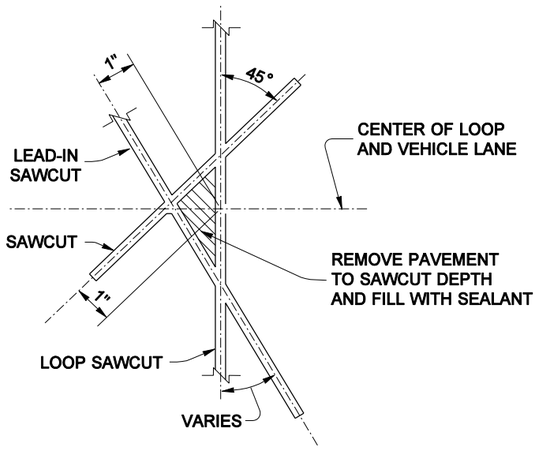
DRAWN BY: MONIQUE GLICK



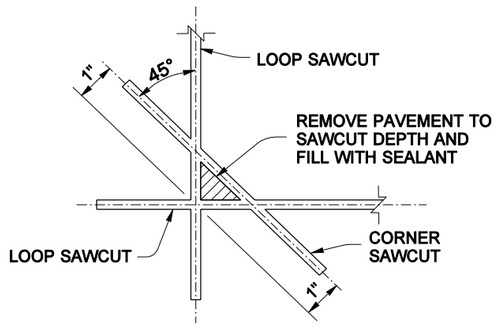

PLAN

**NOTE**

1. For Sections A and B, see Standard Plan J-8d.




ENTRANCE SAWCUT DETAIL




CORNER SAWCUT DETAIL

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# TYPE 2 INDUCTION LOOP

## STANDARD PLAN J-8b

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

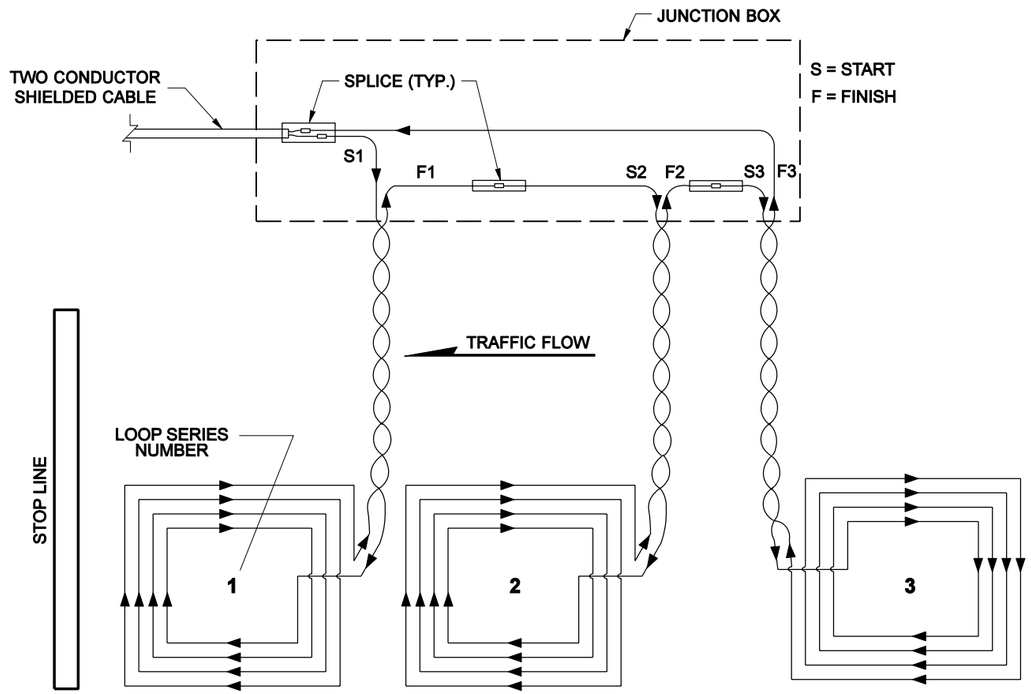
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-20-04* — DATE

Washington State Department of Transportation

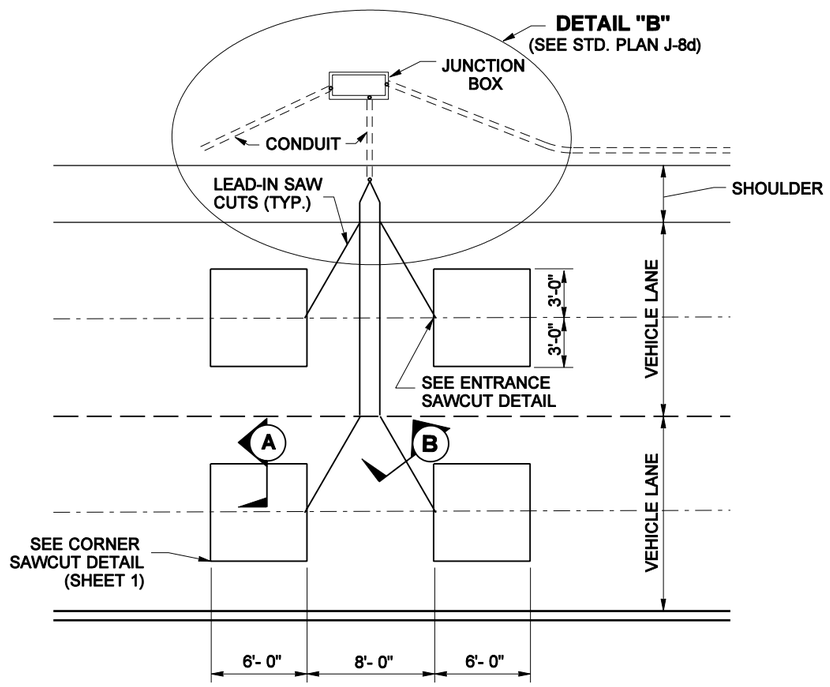
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MONIQUE GLICK



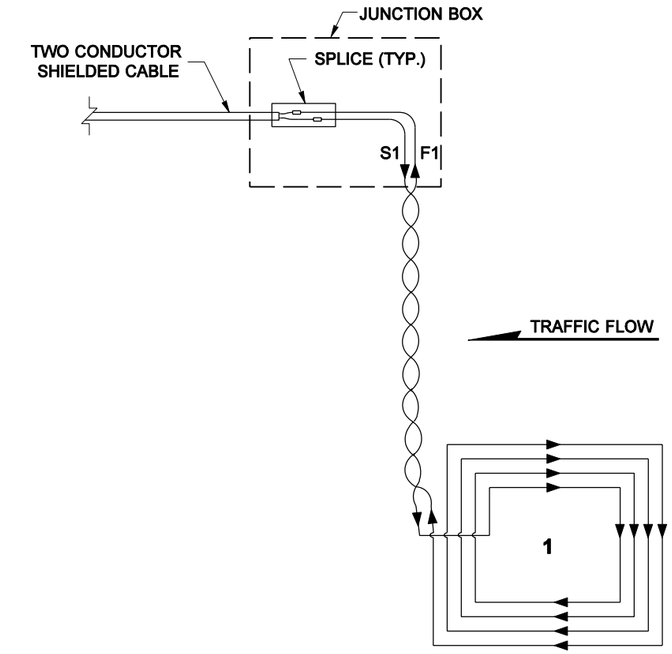

**TYPE 2 STOP LINE LOOP WIRING DIAGRAM**
**(SERIES SPLICE SHOWN)**




**TYPE 2 SAMPLING LOOPS**

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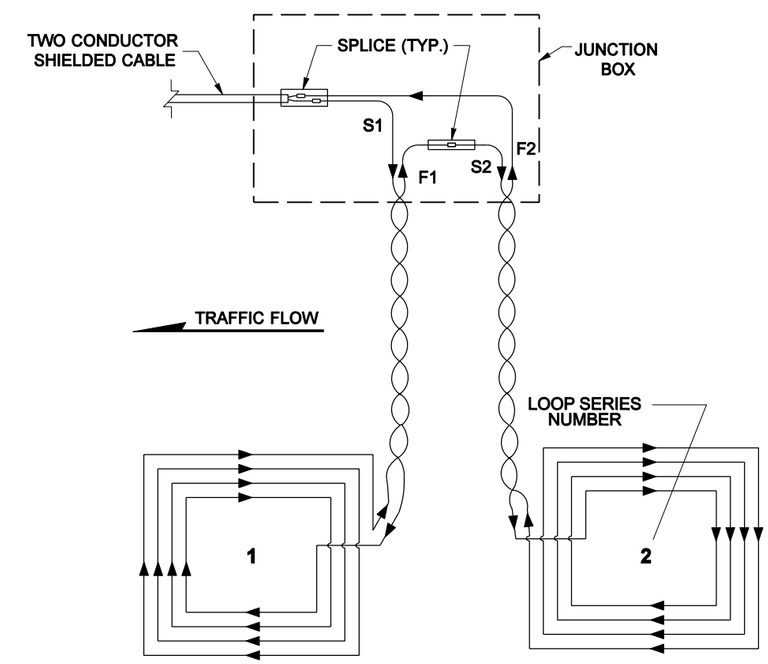
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**TYPE 2 ADVANCE LOOP WIRING DIAGRAM**

**NOTES**

1. All of the loop lead-in wires shall return to the Junction Box.
2. For Splice Detail, see Standard Plan J-8d.




**TYPE 2 SAMPLING LOOP WIRING DIAGRAM**
**(SERIES SPLICE SHOWN)**

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# TYPE 2 INDUCTION LOOP

## STANDARD PLAN J-8b

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

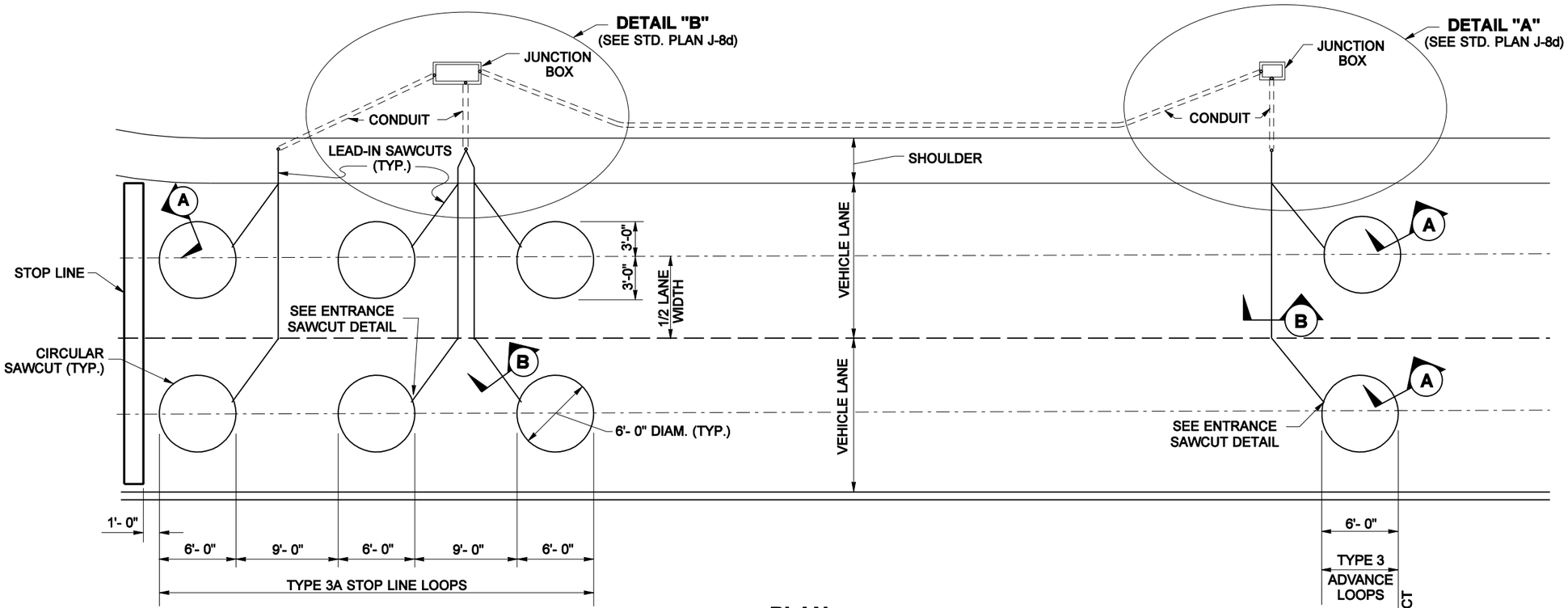
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-20-04* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

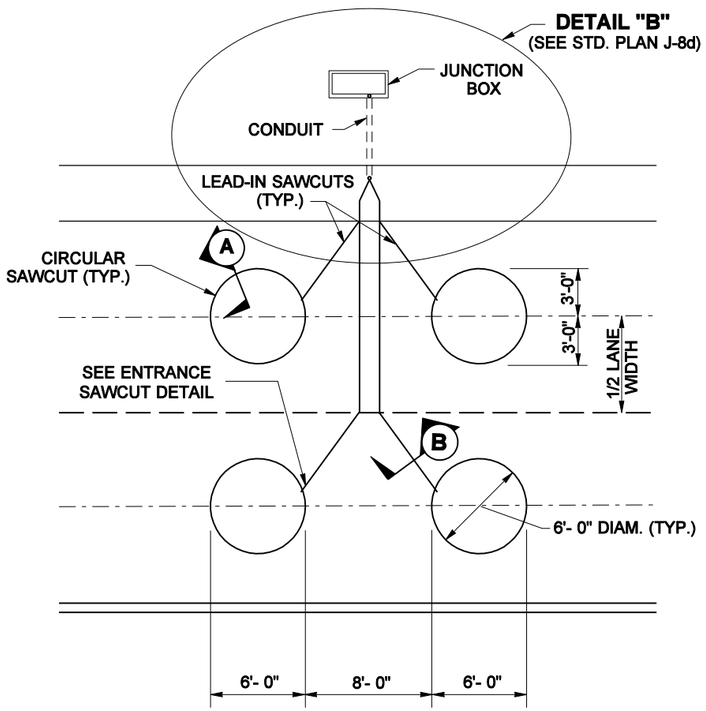
DRAWN BY: MONIQUE GLICK



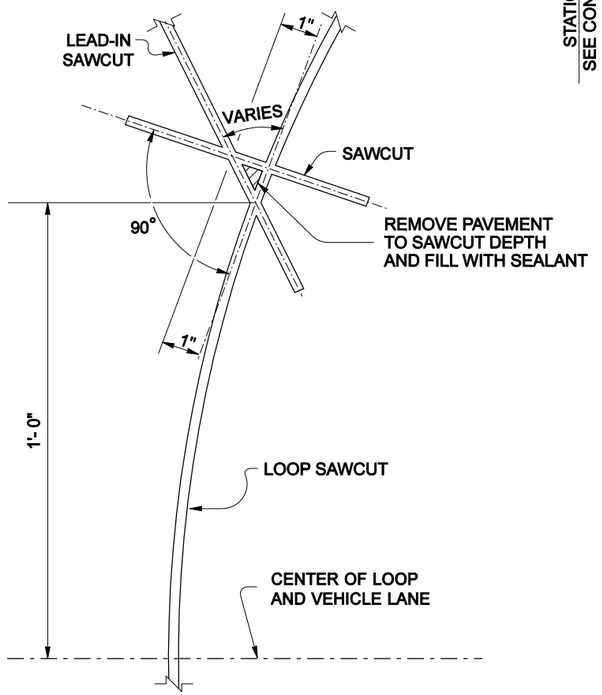

PLAN

**NOTE**

1. For Sections A and B, see Standard Plan J-8d.




TYPE 3 SAMPLING LOOPS




ENTRANCE SAWCUT DETAIL

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R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# TYPE 3 INDUCTION LOOP

## STANDARD PLAN J-8c

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER

*05-20-04* — DATE

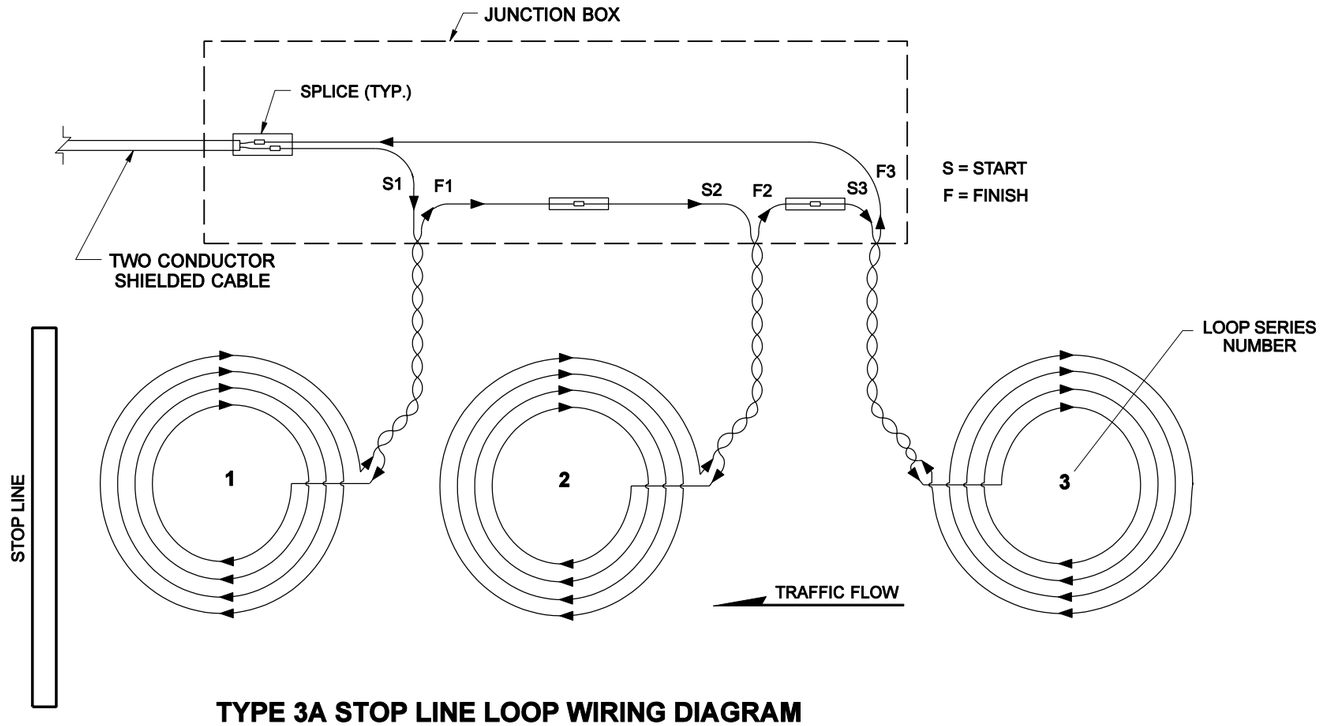
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

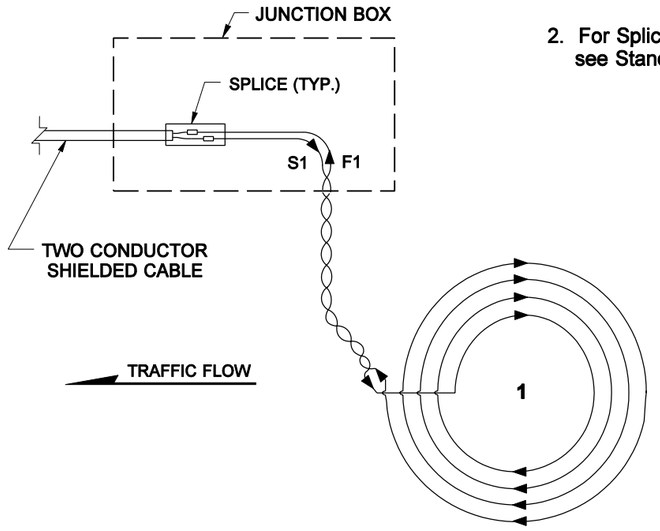
DRAWN BY: MONIQUE GLICK



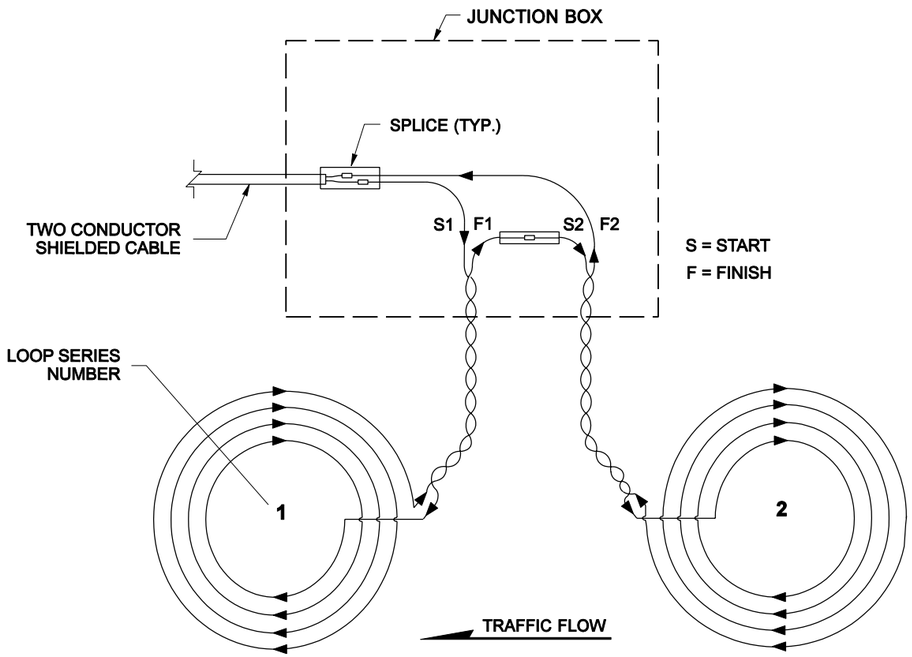

**TYPE 3A STOP LINE LOOP WIRING DIAGRAM**
**(SERIES SPLICE SHOWN)**

**NOTES**

1. All of the loop lead-in wires shall return to the Junction Box.
2. For Splice Detail, see Standard Plan J-8d.




**TYPE 3 ADVANCE**
**LOOP WIRING DIAGRAM**




**TYPE 3 SAMPLING LOOP WIRING DIAGRAM**
**(SERIES SPLICE SHOWN)**

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R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

**TYPE 3 INDUCTION LOOP**

**STANDARD PLAN J-8c**

SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-20-04* — DATE

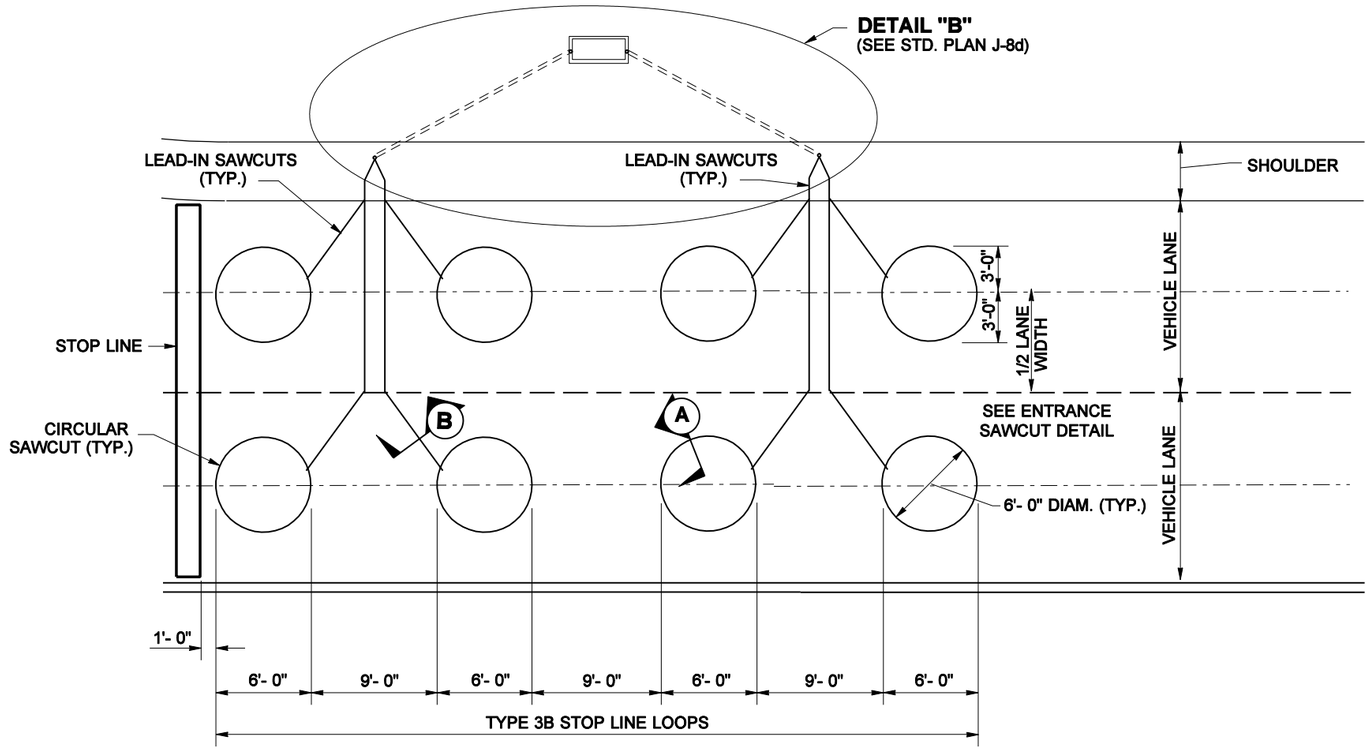
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

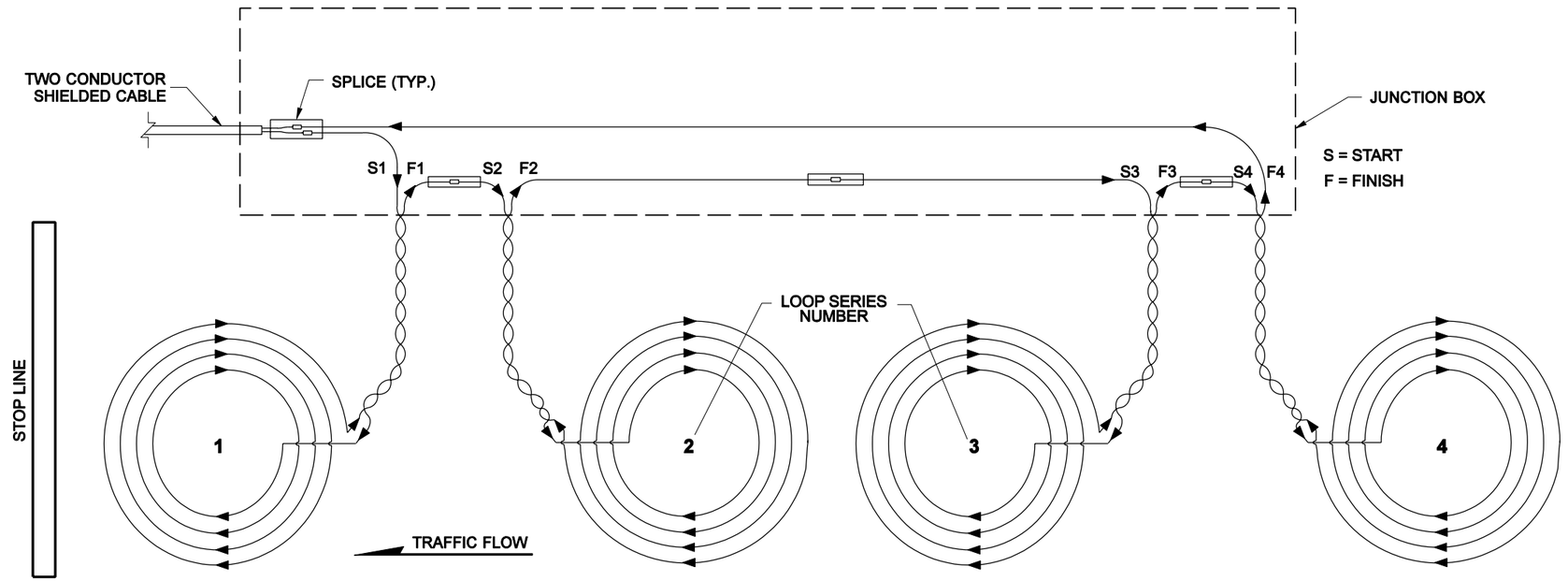
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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**PLAN**




**TYPE 3B STOP LINE LOOP WIRING DIAGRAM**

**(SERIES SPLICE SHOWN)**

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28680
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EXPIRES MAY 5, 2005

# TYPE 3 INDUCTION LOOP

## STANDARD PLAN J-8c

SHEET 3 OF 3 SHEETS

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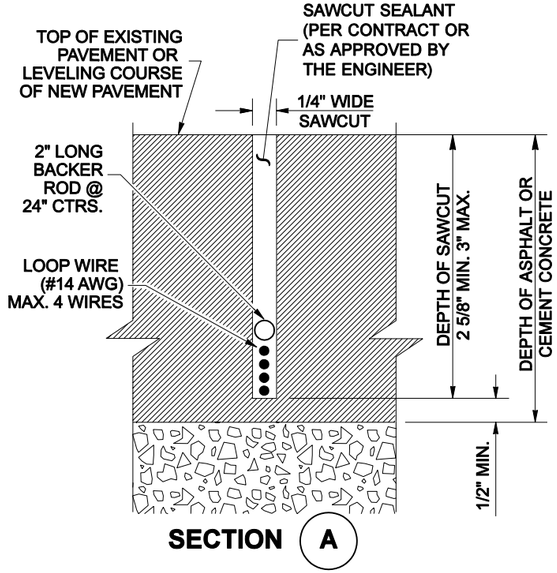
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-20-04* — DATE

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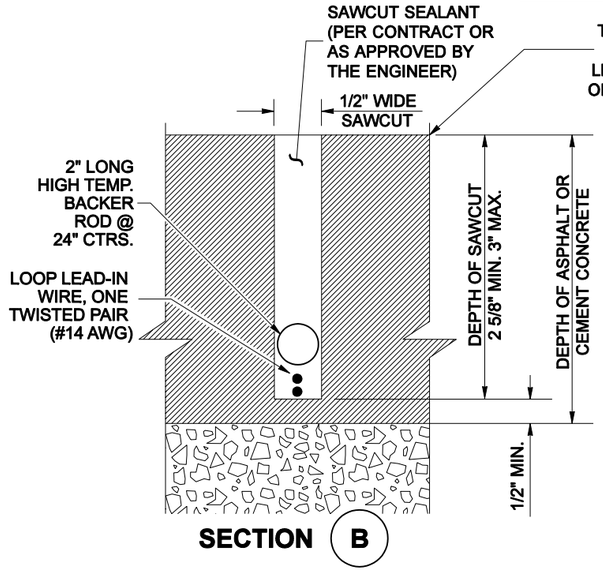
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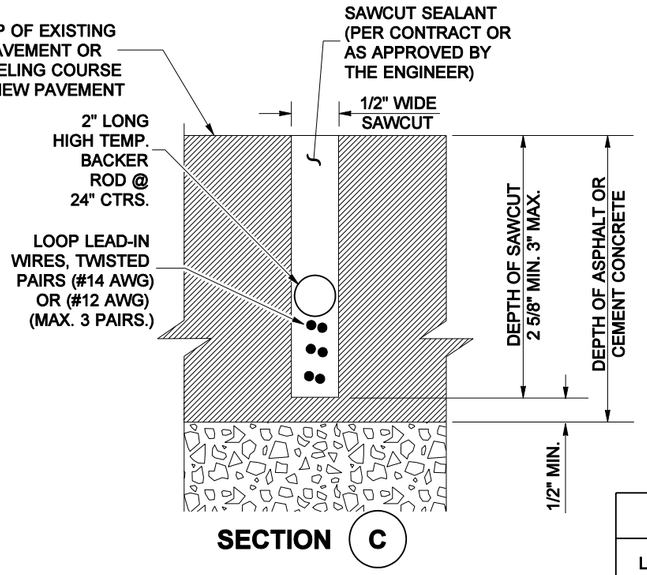
DRAWN BY: MONIQUE GLICK




SECTION (A)




SECTION (B)



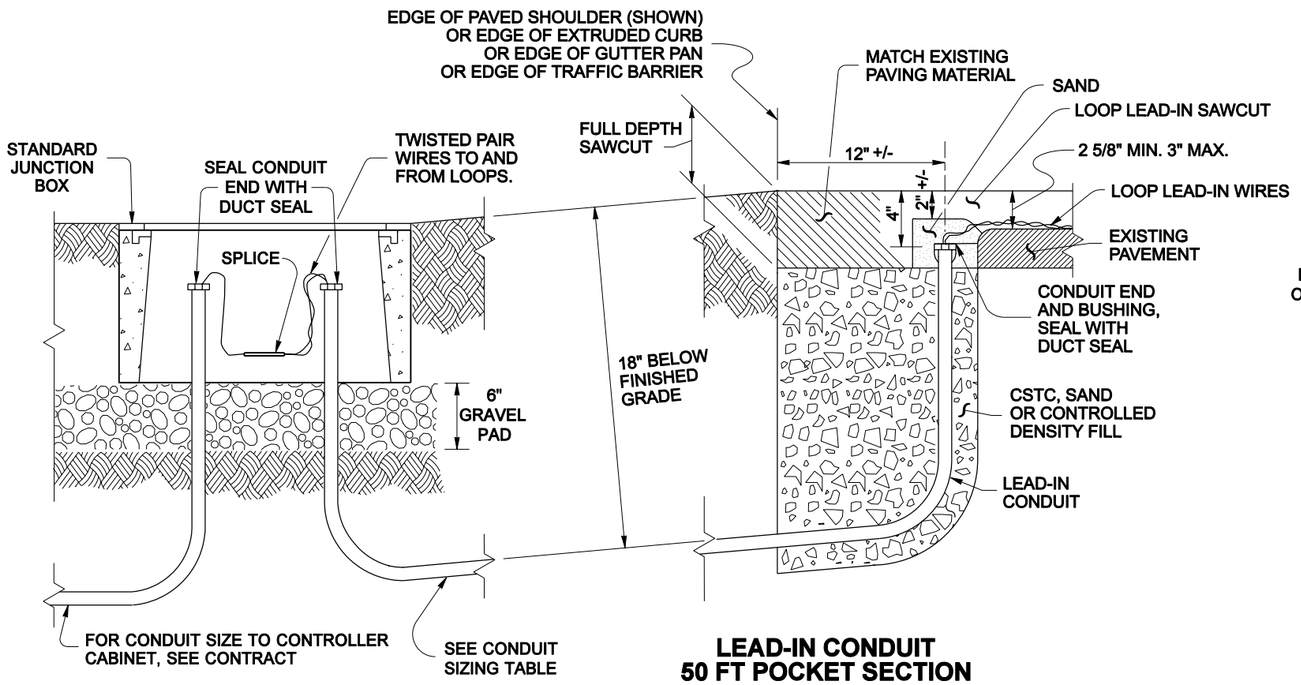

SECTION (C)

**NOTES**

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**

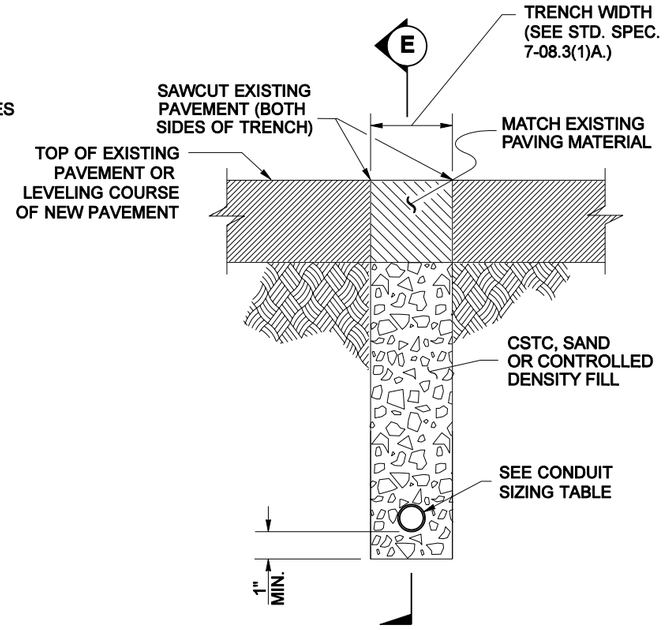
| LOOP LEAD PAIRS | 1-2 | 3 | 4-5 | 6-8 | 9-12 |
|---|---|---|---|---|---|
| CONDUIT SIZE (MIN) | 1" | 1 1/4" | 1 1/2" | 2" | 3" |




**JUNCTION BOX PLACEMENT**

**LEAD-IN CONDUIT 50 FT POCKET SECTION**

SECTION (E)




SECTION (D)

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STATE OF WASHINGTON
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EXPIRES MAY 5, 2005

# INDUCTION LOOP DETAILS

## STANDARD PLAN J-8d

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-20-04* — DATE

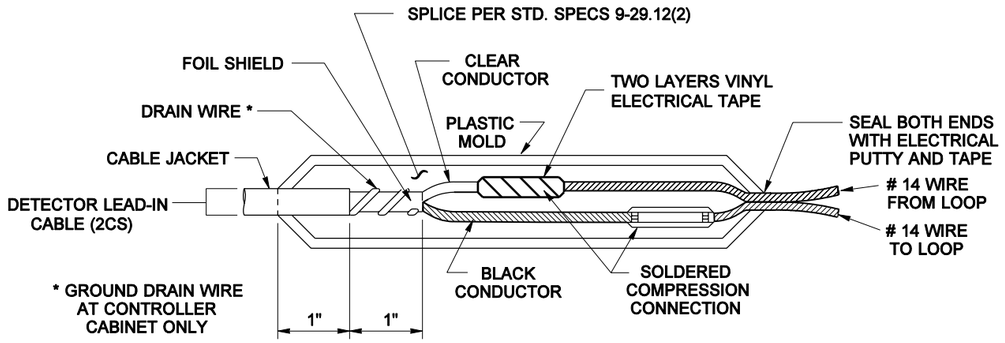
Washington State Department of Transportation

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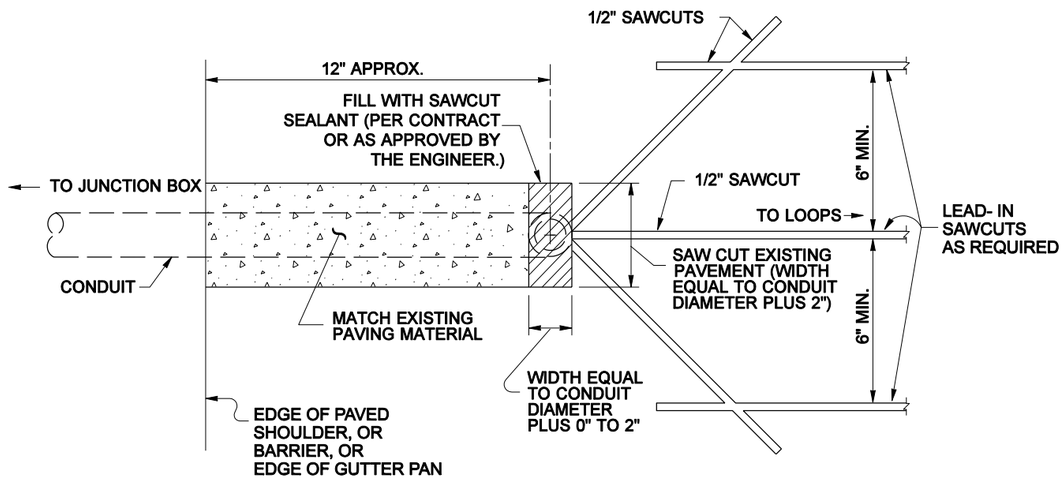
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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DRAWN BY: MONIQUE GLICK




## SPLICE DETAIL

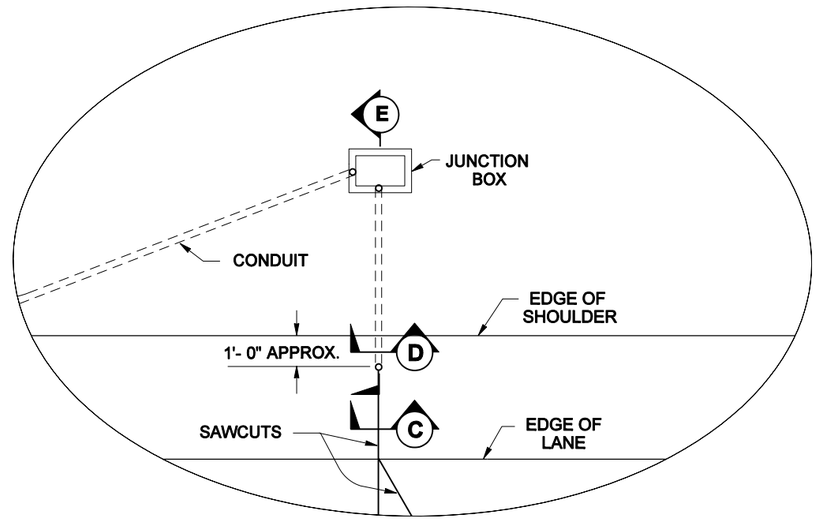



## SAWCUT AND CONDUIT CONNECTION PLAN

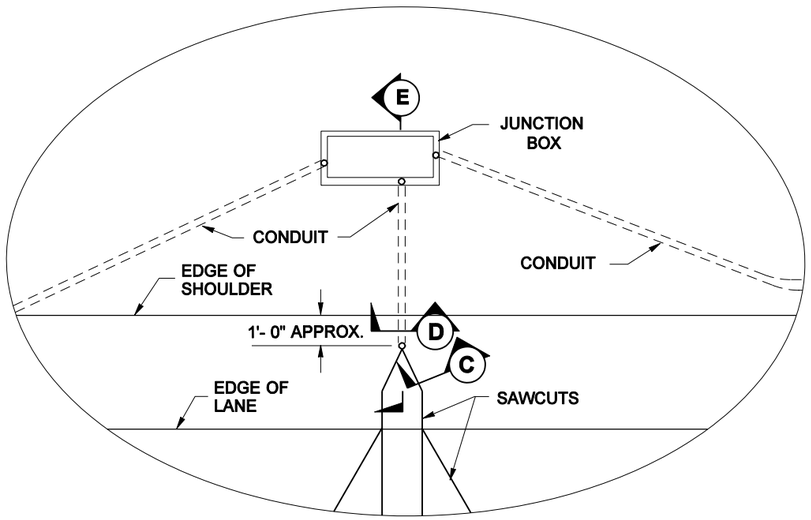
### LOOP LEAD-IN WIRING LABEL

L x x x - x x

LOOP NUMBER — DASH — "S" OR "F" — LOOP SERIES NUMBER




## DETAIL "A"




## DETAIL "B"

### LOOP INSTALLATION NOTES

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 the 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.

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PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# INDUCTION LOOP DETAILS

## STANDARD PLAN J-8d

SHEET 2 OF 2 SHEETS

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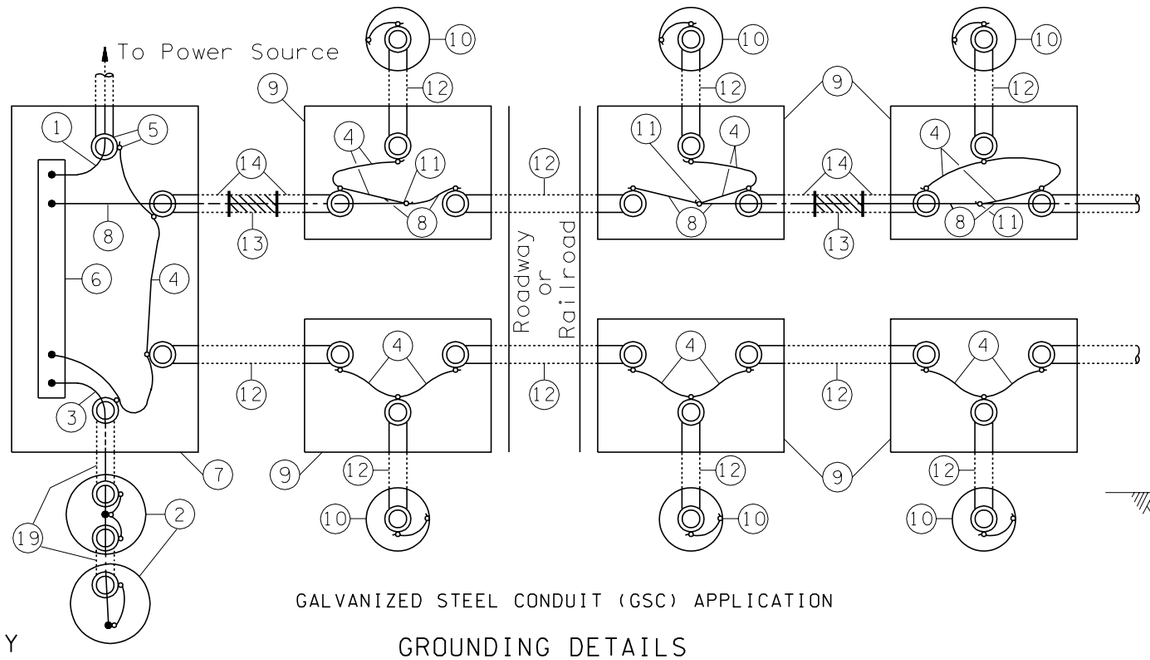
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COMBINATION GALVANIZED STEEL CONDUIT (GSC) AND NON-METALLIC CONDUIT (NMC) APPLICATION




GALVANIZED STEEL CONDUIT (GSC) APPLICATION

## GROUNDING DETAILS

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

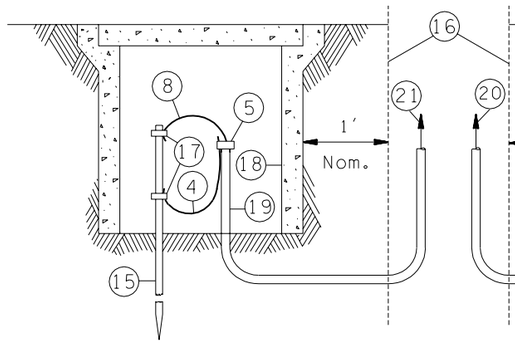
NOTES:

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.

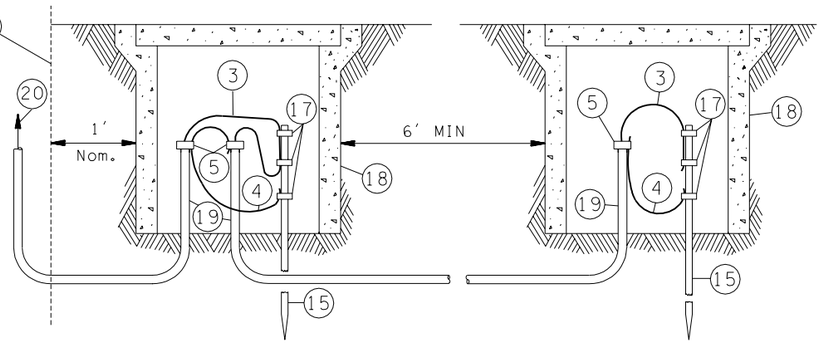
3. Equipment grounding conductors and grounding electrode conductors shall be sized in accordance with the National Electric Code (No. 8 minimum) .

SUPPLEMENTAL GROUND




Required to supplement equipment grounding for luminaire standards with direct burial, aerial feeds, or where required in plans.

SERVICE GROUND




Required at all services and separately derived systems.

## GROUND ROD DETAILS

DAVID K. PEACH
STATE OF WASHINGTON
00011089
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JUNE 4, 1999

# TYPICAL GROUNDING DETAILS

# STANDARD PLAN J-9a

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| DATE | REVISION | BY | APPR'D |
|---|---|---|---|
| | Note 3, change "connectors" to "conductors". | ABN | |

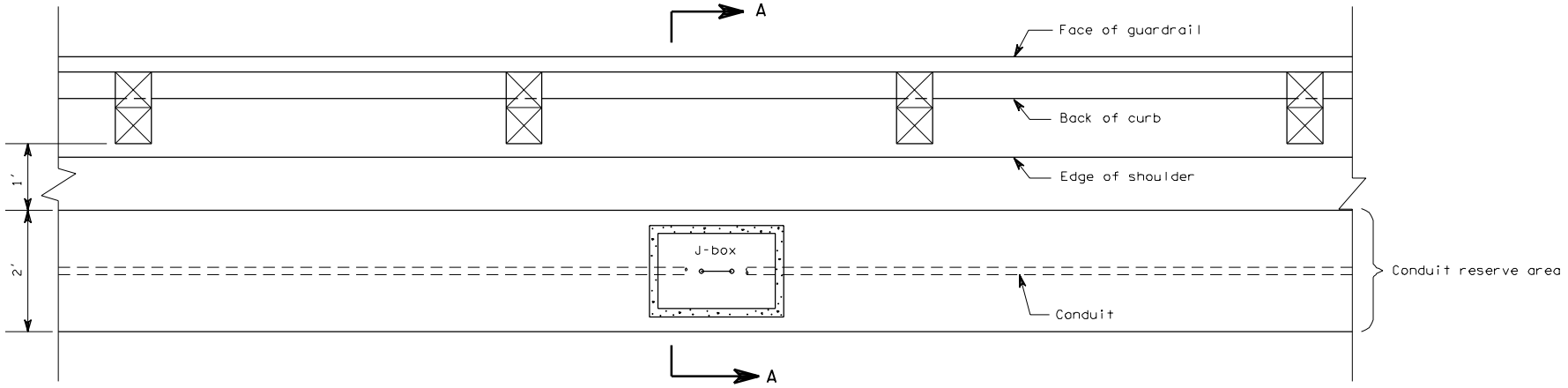
APPROVED FOR PUBLICATION

*Clifford E. Mansfield* — *4/24/98*

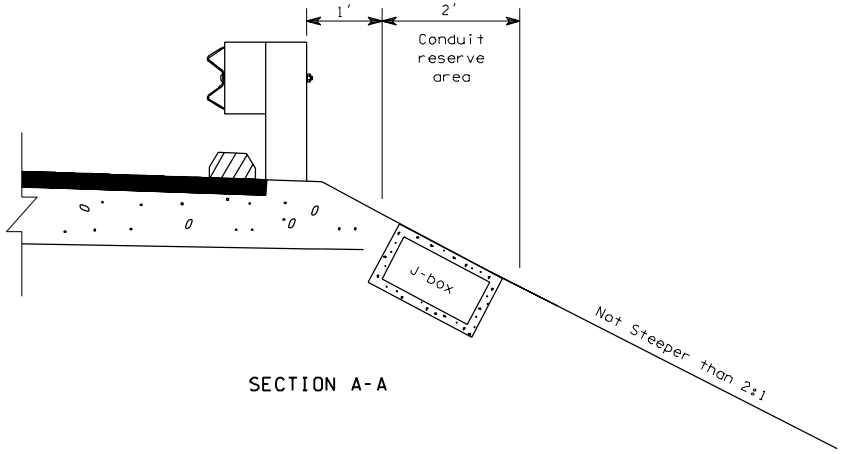
DEPUTY STATE DESIGN ENGINEER — DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




PLAN




SECTION A-A

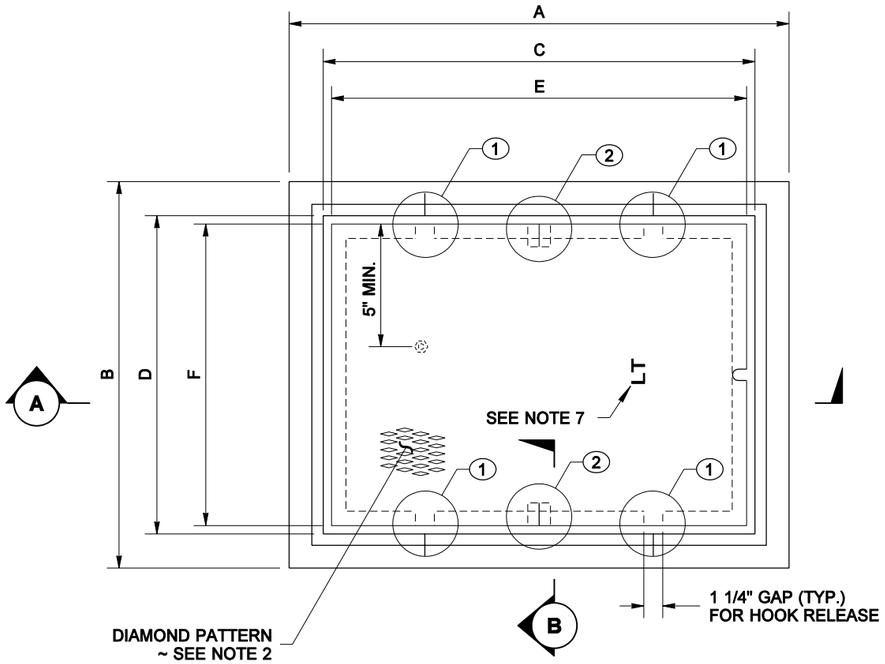
# ELECTRICAL CONDUIT PLACEMENT



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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ELENA BRUNSTEIN

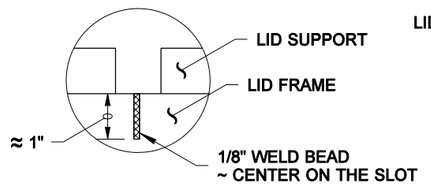



**TOP VIEW**

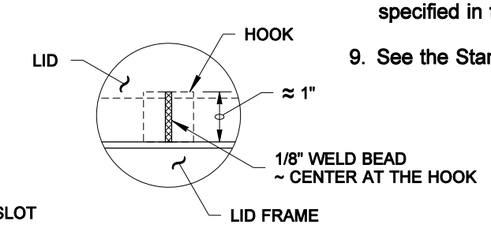
| JUNCTION BOX DIMENSION TABLE | | | |
|---|---|---|---|
| MARK | ITEM | BOX TYPE | |
| | | TYPE 1 | TYPE 2 |
| A | OUTSIDE LENGTH OF JUNCTION BOX | 22" | 33" |
| B | OUTSIDE WIDTH OF JUNCTION BOX | 17" | 22 1/2" |
| C | INSIDE LENGTH OF JUNCTION BOX | 18" ~ 19" | 29" ~ 30" |
| D | INSIDE WIDTH OF JUNCTION BOX | 13" ~ 14" | 18 1/2" ~ 19 1/2" |
| E | LID LENGTH | 17 5/8" | 28 5/8" |
| F | LID WIDTH | 12 5/8" | 18 1/8" |
| CAPACITY ~ CONDUIT DIAMETER | | 6" | 12" |

**NOTES**

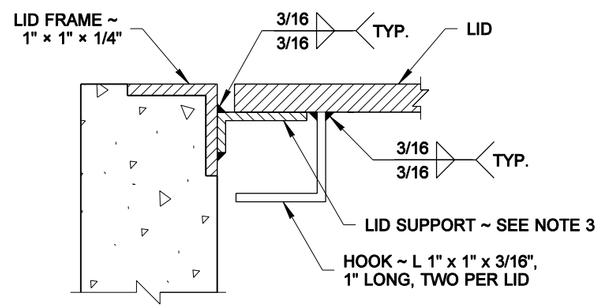
1. All box dimensions are approximate. Exact configurations vary among manufacturers.
2. The lid thicknesses are minimum. The diamond pattern shall be 28% minimum of overall thickness.
3. Lid support members shall be 3/16" minimum thick steel C, L, or T shape, welded to the frame.
4. A 1/4-20NC × 3/4" 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. The Junction Box Type 2 shall be provided with a 12" deep extension when specified in the Contract.
9. See the Standard Specifications for alternative reinforcement and class of concrete.



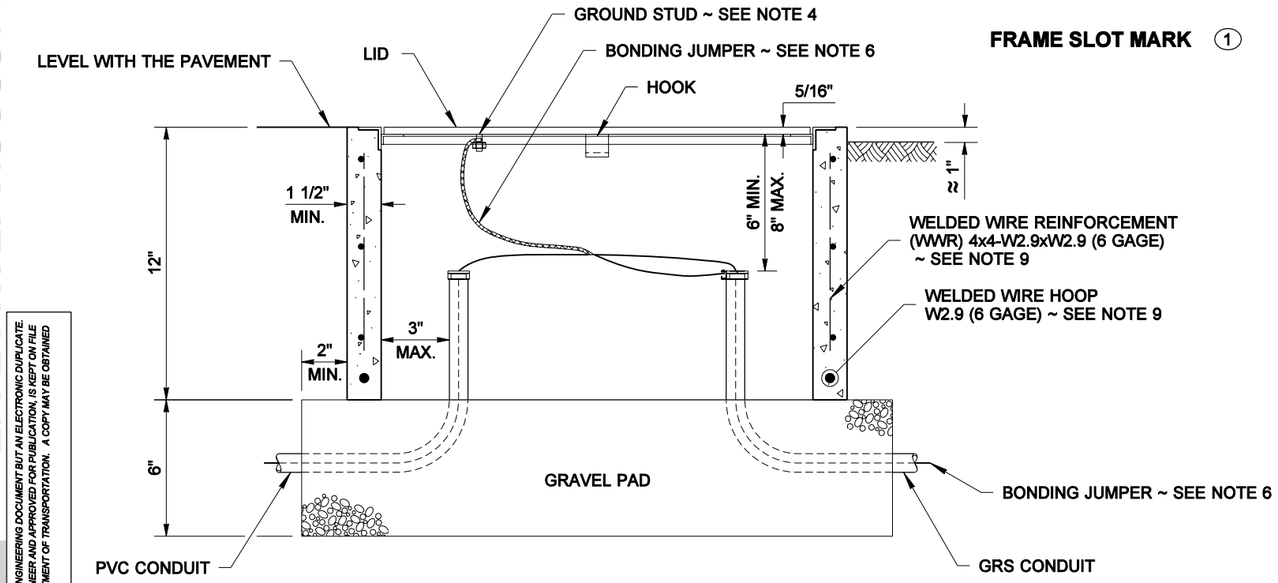

**FRAME SLOT MARK** (1)




**LID HOOK MARK** (2)




**SECTION** (B)




**SECTION** (A)

| SYSTEM IDENTIFICATION DETAIL |
|---|
| ≈ 1" (TYP.) ITS ≈ 1" (TYP.) |
| INTELLIGENT TRANSPORTATION SYSTEM |
| COMM |
| COMMUNICATION SYSTEM |
| LT |
| LIGHTING SYSTEM |
| TS |
| TRAFFIC SIGNAL SYSTEM |
| TEL |
| TELEPHONE SYSTEM |

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EXPIRES MAY 5, 2007

# STANDARD JUNCTION BOX TYPES 1 & 2

## STANDARD PLAN J-11a

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER
*09-02-05* — DATE

Washington State Department of Transportation

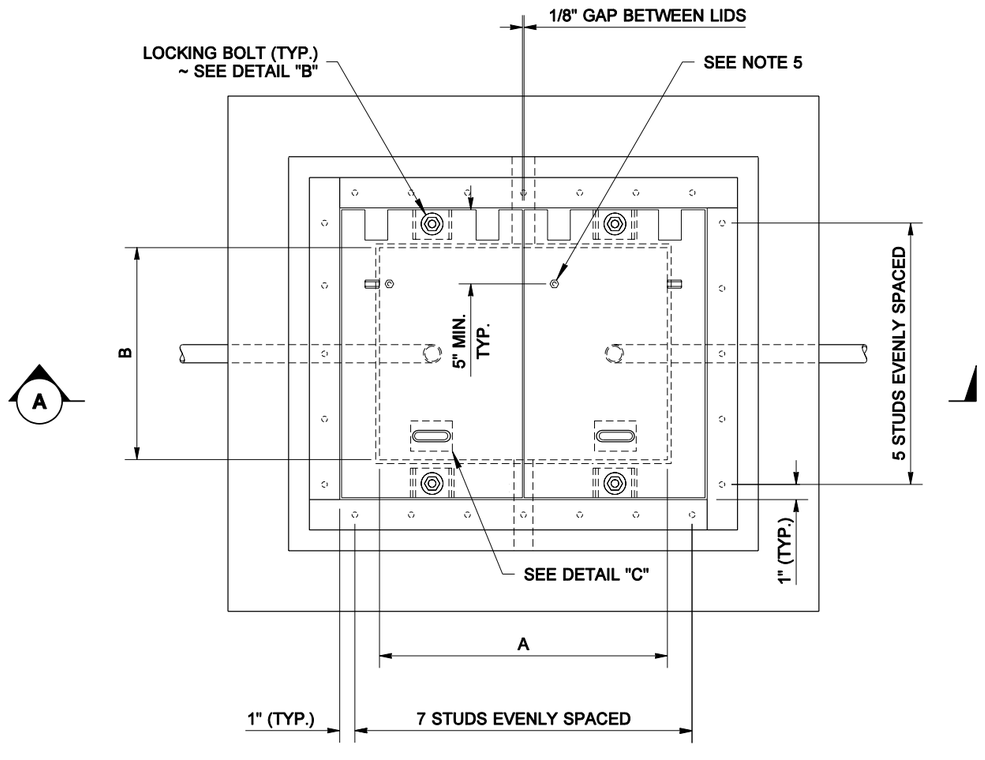
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DRAWN BY: ELENA BRUNSTEIN

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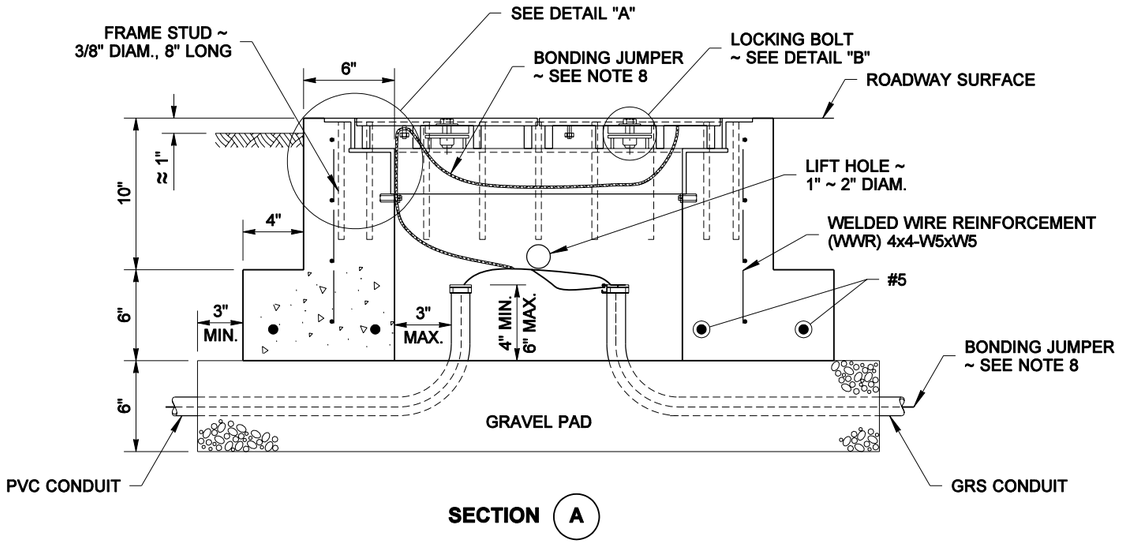

TOP VIEW

| MARK | ITEM | BOX TYPE | | |
|---|---|---|---|---|
| | | TYPE 4 | TYPE 5 | TYPE 6 |
| A | BOX INSIDE LENGTH | 19" | 28" | 36" |
| B | BOX INSIDE WIDTH | 14" | 17" | 24" |
| C | LID LENGTH | 19" | 22" | 29" |
| 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. | | 6" | 12" | 24" |

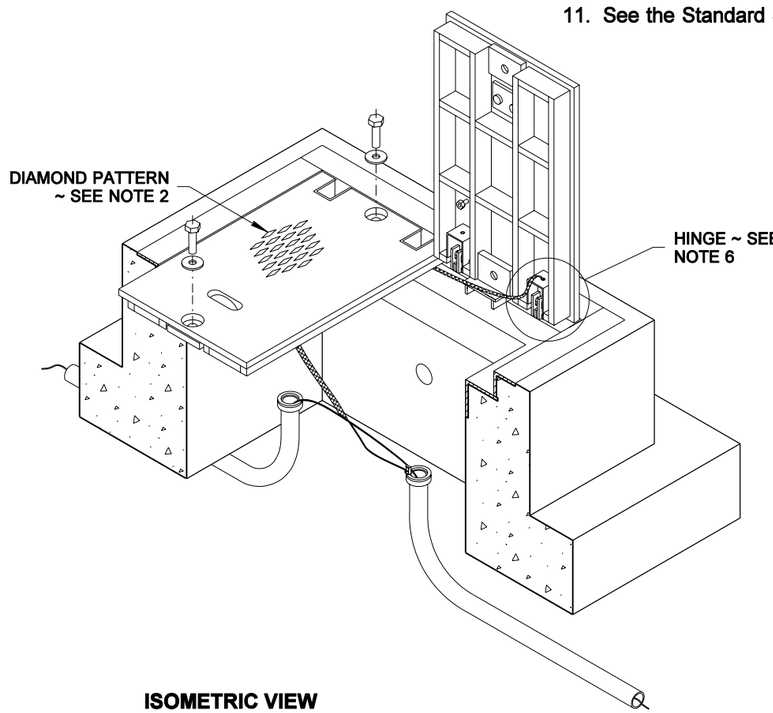
**JUNCTION BOX DIMENSION TABLE**

**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.




SECTION (A)




ISOMETRIC VIEW

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REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2007

# HEAVY DUTY JUNCTION BOX TYPES 4, 5, & 6

## STANDARD PLAN J-11b

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *09-02-05* — DATE

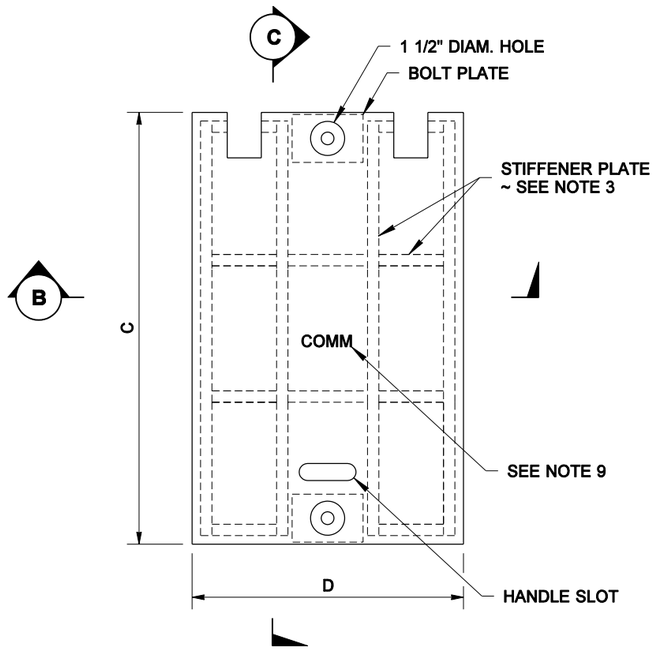
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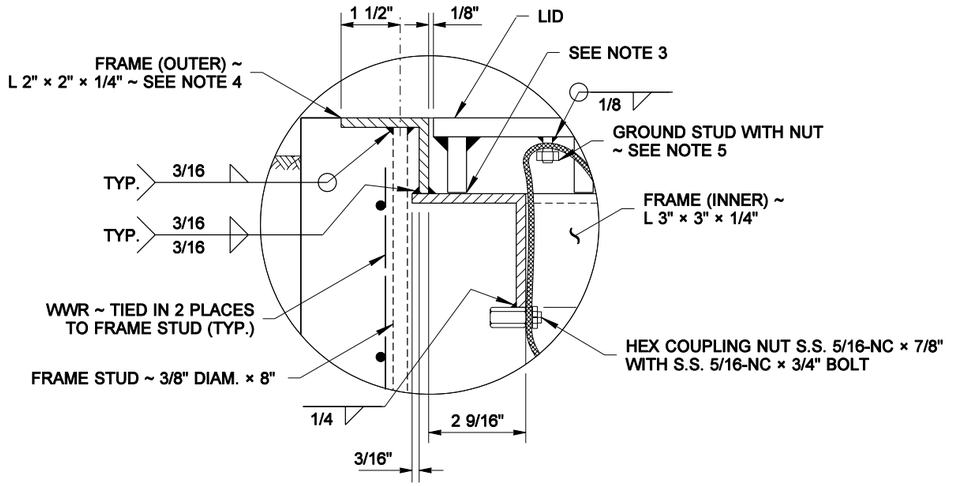
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ELENA BRUNSTEIN

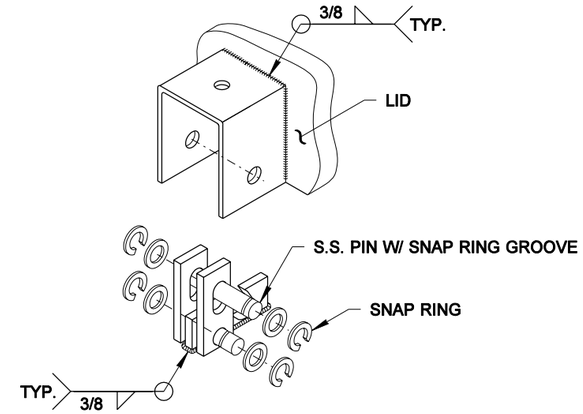
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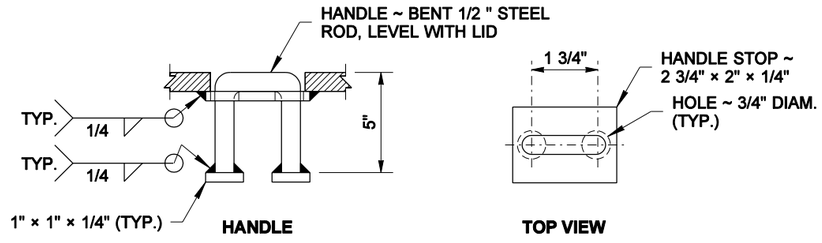

**PLAN VIEW**



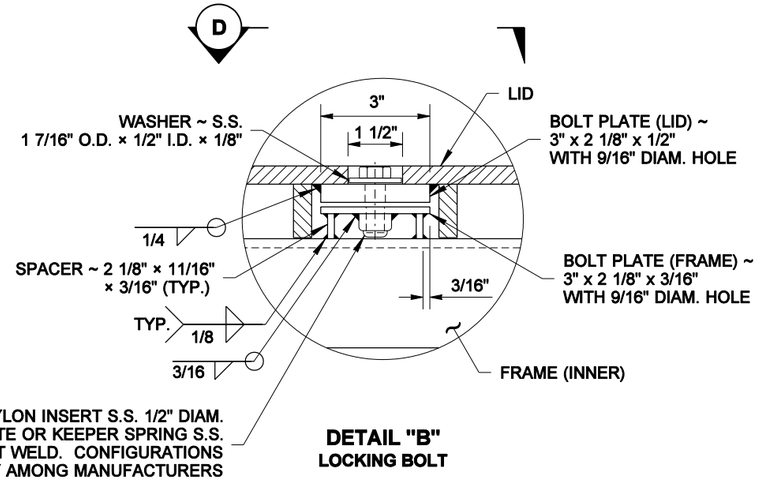

**DETAIL "A"**



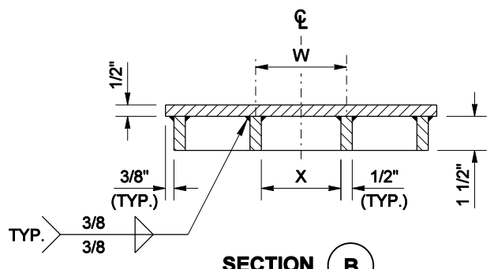

**DETAIL "D"**
**HINGE**



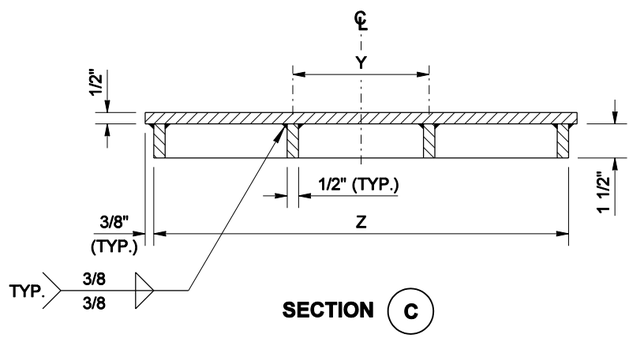

**DETAIL "C"**



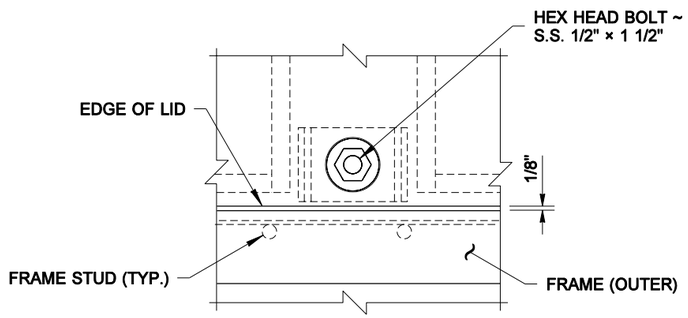

**DETAIL "B"**
**LOCKING BOLT**




**SECTION (B)**




**SECTION (C)**




**VIEW (D)**

**SYSTEM IDENTIFICATION DETAIL**

≈ 1" (TYP.) ≈ 1" (TYP.)

ITS
INTELLIGENT TRANSPORTATION SYSTEM

COMM
COMMUNICATION SYSTEM

LT
LIGHTING SYSTEM

TS
TRAFFIC SIGNAL SYSTEM

TEL
TELEPHONE SYSTEM

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2007

# HEAVY DUTY JUNCTION BOX TYPES 4, 5, & 6

## STANDARD PLAN J-11b

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

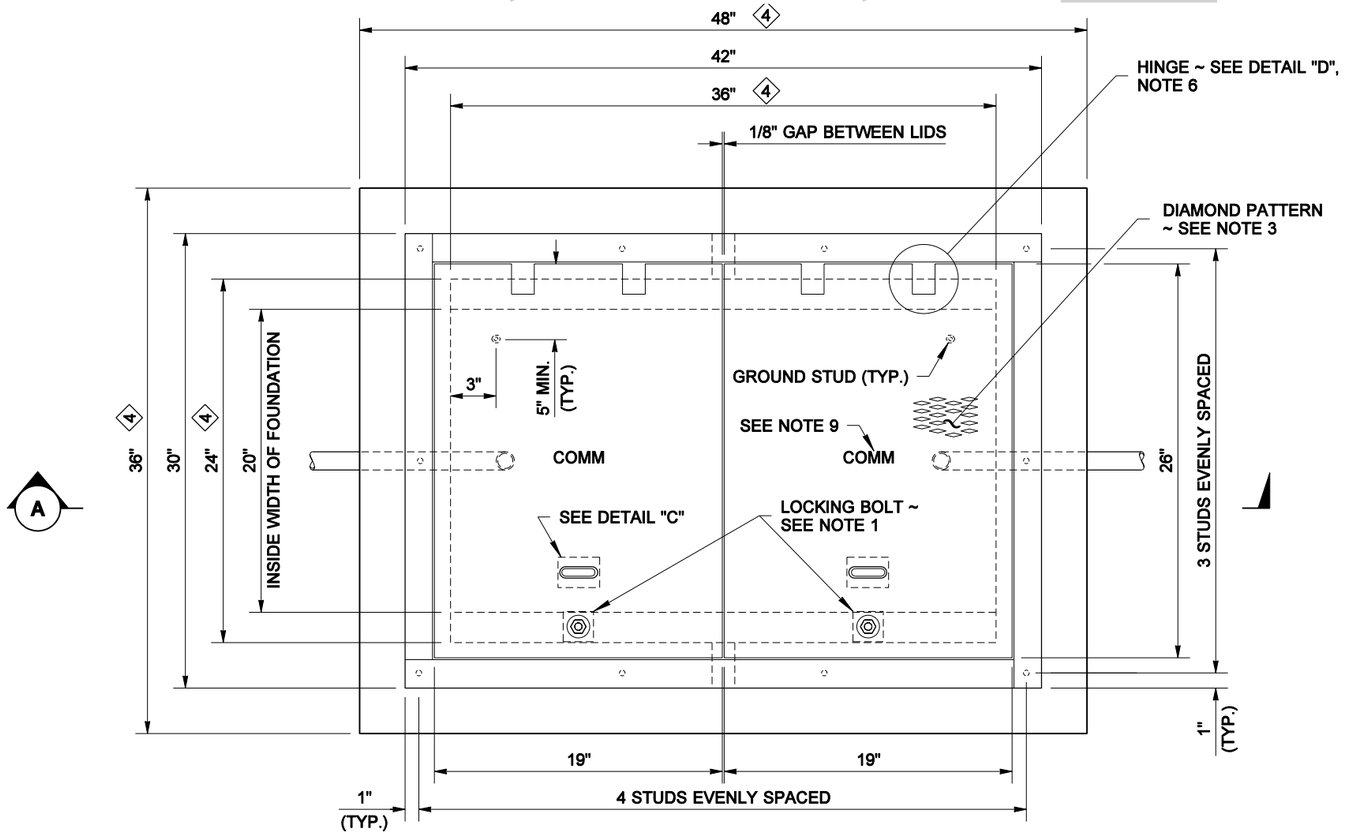
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *09-02-05* — DATE

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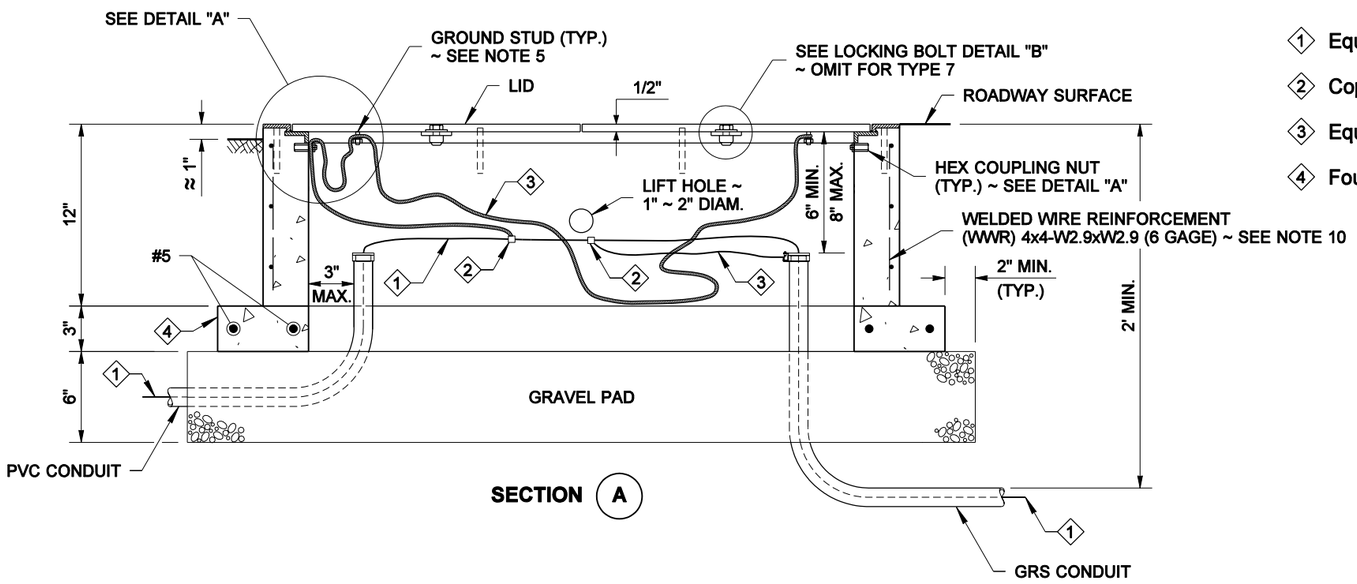
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ELENA BRUNSTEIN




**TOP VIEW**
USE LOCKING BOLTS ONLY FOR TYPE 8




**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 × 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 × 3/4" S.S. bolt, nut, and flat washer. Equipment 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. See the Standard Specifications for alternative reinforcement and class of concrete.
11. Capacity ~ conduit diameter = 24"

① Equipment grounding conductor
② Copper split bolt clamp
③ Equipment bonding jumper ~ see note 8
④ Foundation

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EXPIRES AUGUST 9, 2007

# STANDARD DUTY JUNCTION BOX TYPES 7 & 8

## STANDARD PLAN J-11c

SHEET 1 OF 2 SHEET

APPROVED FOR PUBLICATION

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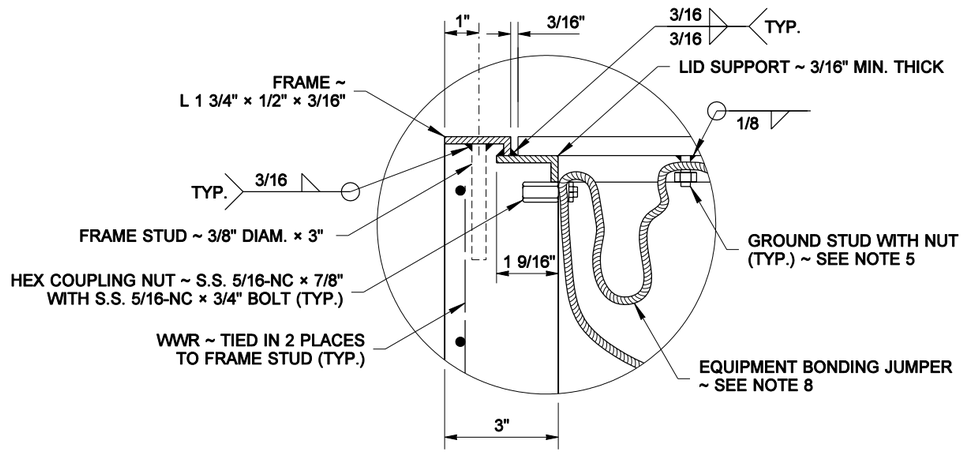
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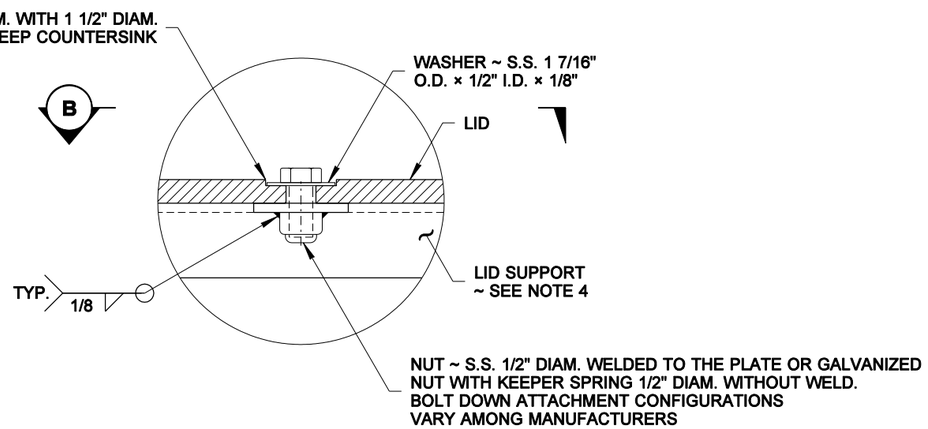
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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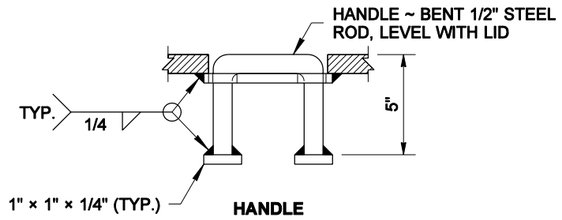
DRAWN BY: ELENA BRUNSTEIN




**DETAIL "A"**

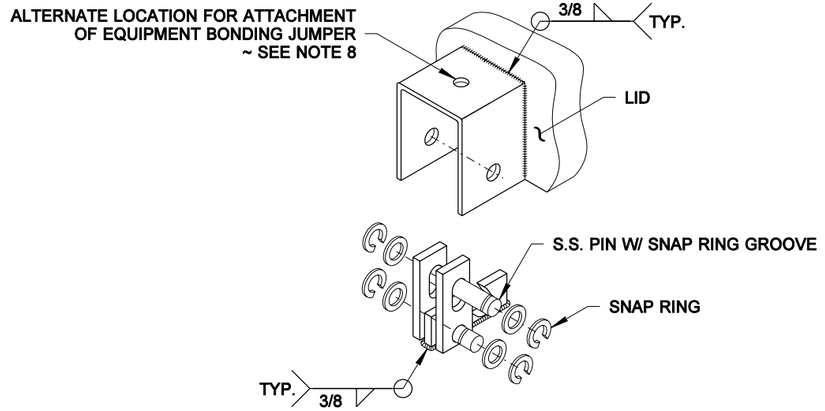



**DETAIL "B"**
**LOCKING BOLT**
OMIT FOR TYPE 7




**HANDLE**

**DETAIL "C"**




**DETAIL "D"**
**HINGE**

**SYSTEM IDENTIFICATION DETAIL**

≈ 1" (TYP.) ≈ 1" (TYP.)

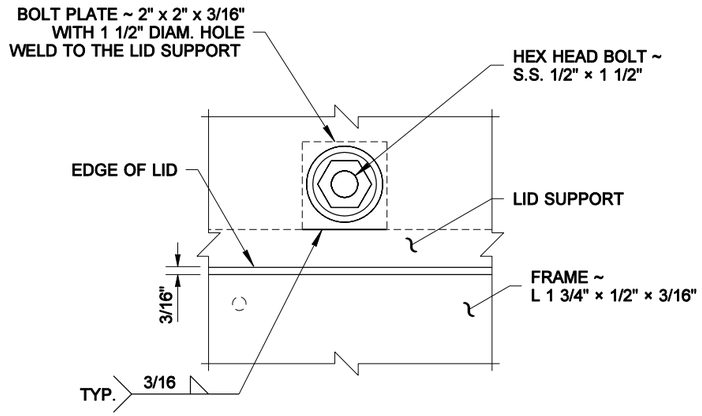
**ITS**
INTELLIGENT TRANSPORTATION SYSTEM

**COMM**
COMMUNICATION SYSTEM

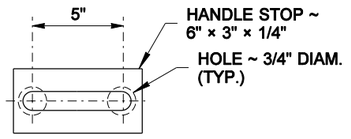
**LT**
LIGHTING SYSTEM

**TS**
TRAFFIC SIGNAL SYSTEM

**TEL**
TELEPHONE SYSTEM




**VIEW B**




**TOP VIEW**

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STATE OF WASHINGTON
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REGISTERED
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EXPIRES AUGUST 9, 2007

# STANDARD DUTY JUNCTION BOX TYPES 7 & 8

## STANDARD PLAN J-11c

SHEET 2 OF 2 SHEETS

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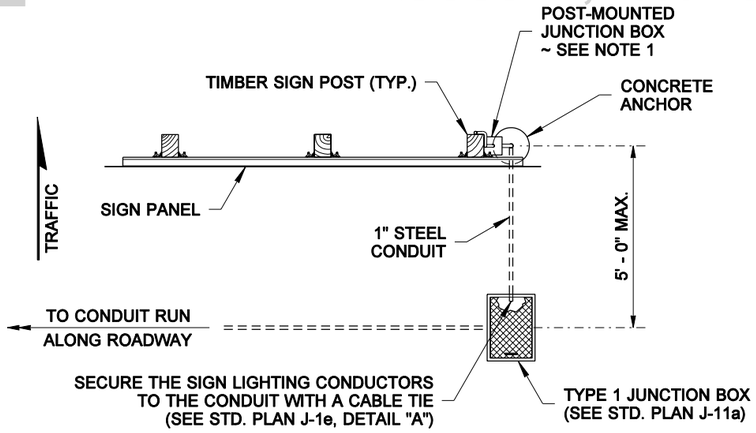
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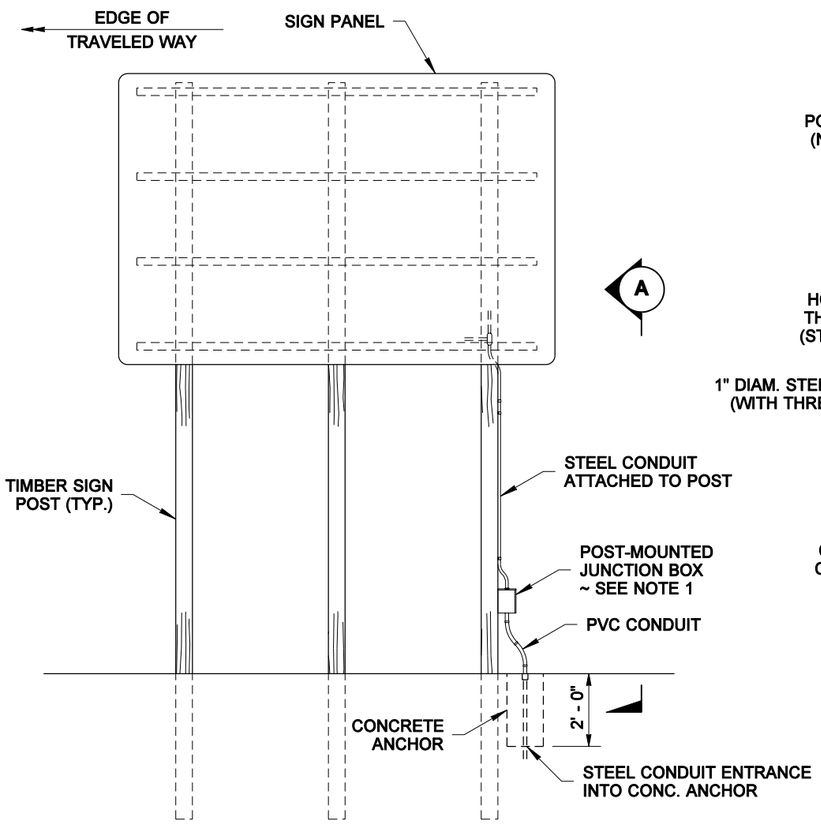
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DRAWN BY: MARK SUJKA

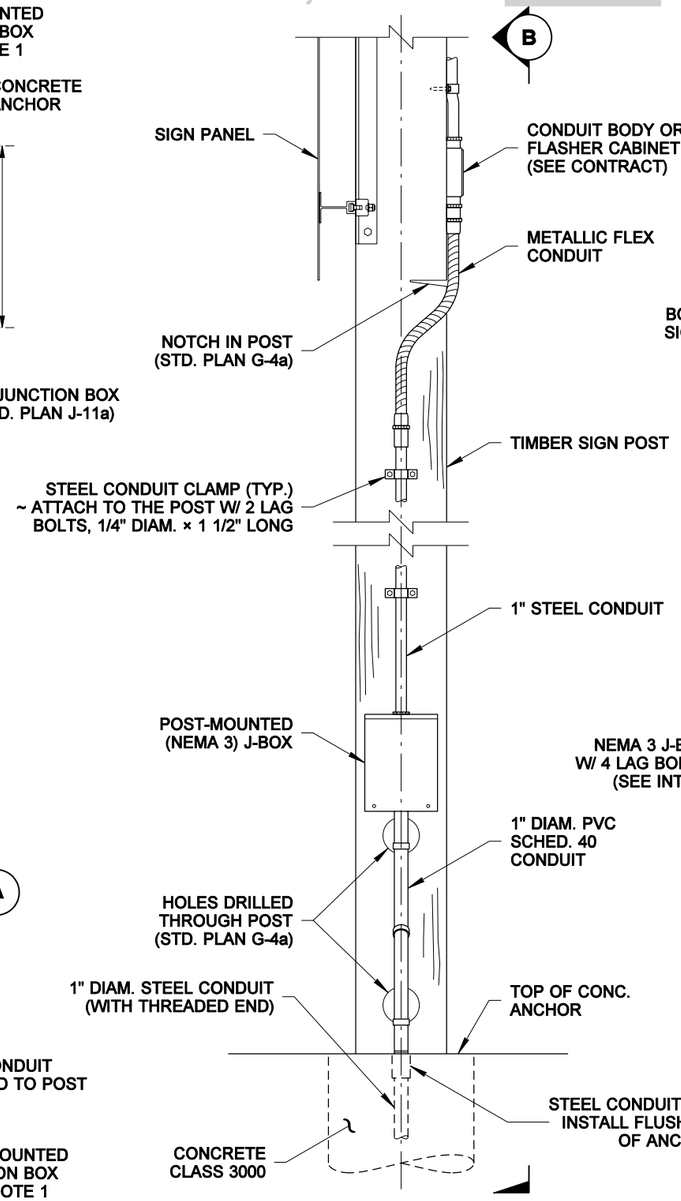



**PLAN**

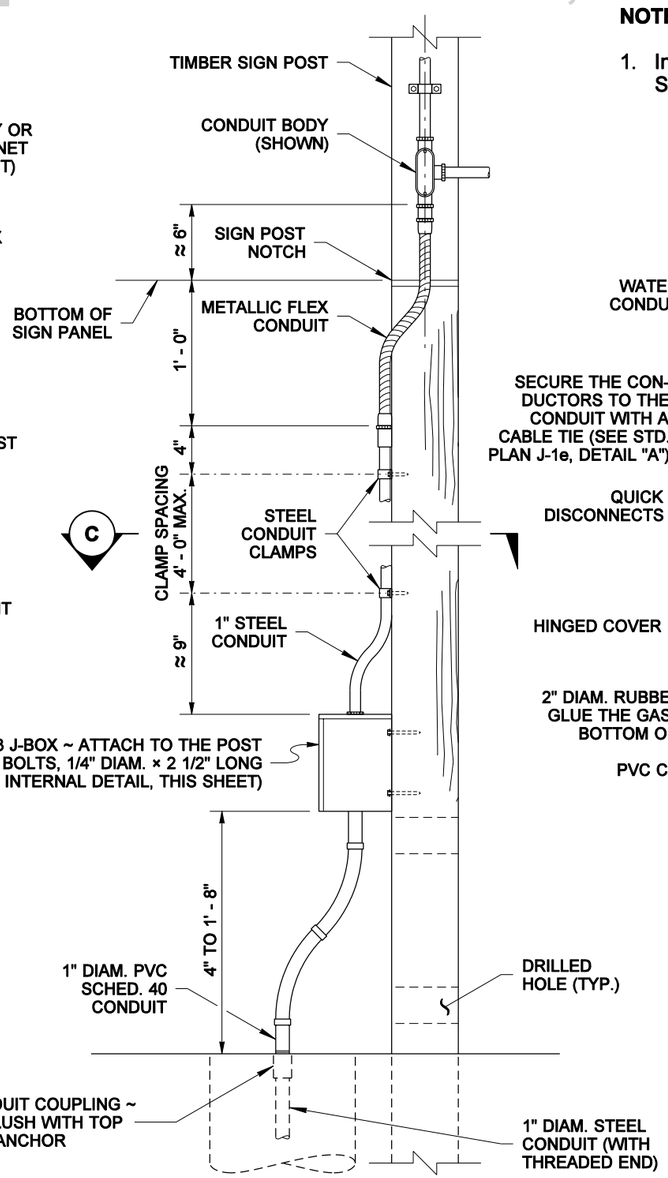



**ELEVATION**

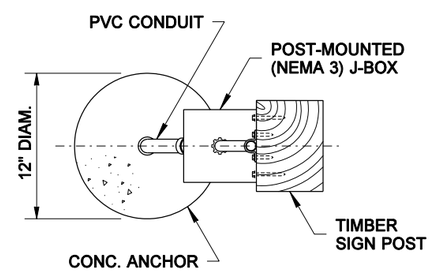
**JUNCTION BOX ATTACHMENT TO TIMBER SIGN SUPPORT**




**DETAIL VIEW (A)**



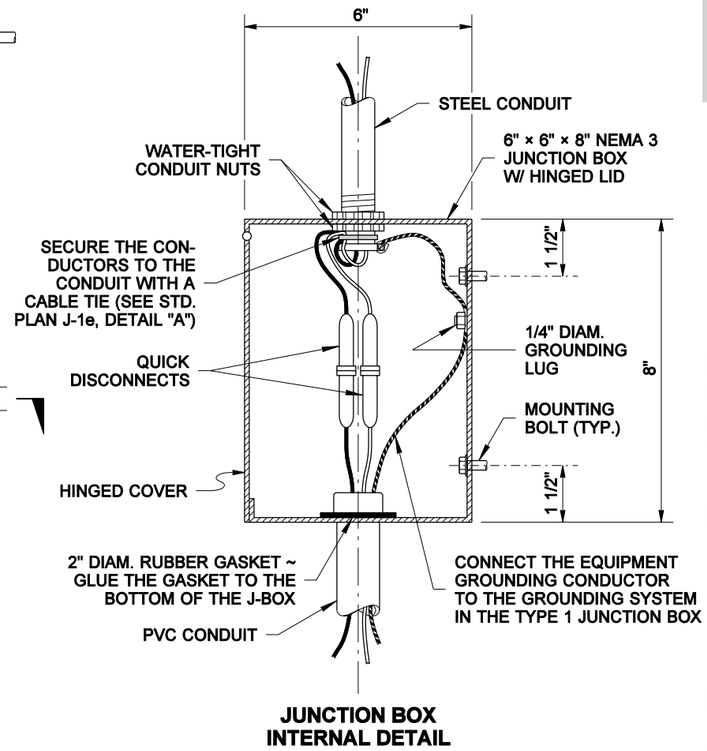

**DETAIL VIEW (B)**




**SECTION (C)**

**NOTE**

1. Install the Junction Box on the Timber Sign Post, or the Steel Sign Support, that is farthest from the roadway.




**JUNCTION BOX INTERNAL DETAIL**

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STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2007

# SIGN POST-MOUNTED JUNCTION BOX

# STANDARD PLAN J-12

SHEET 1 OF 2 SHEETS

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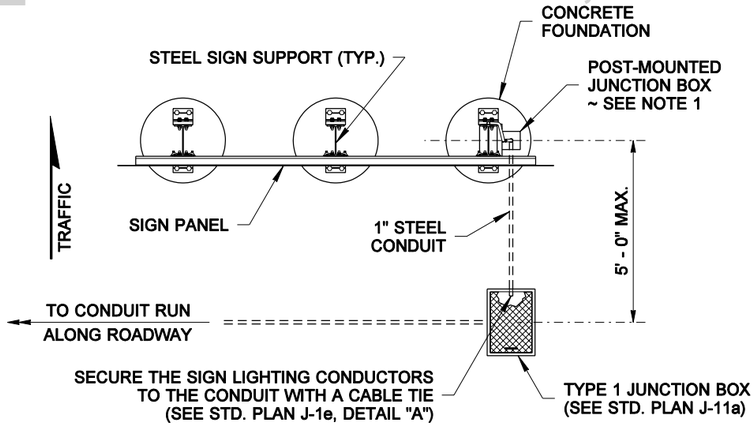
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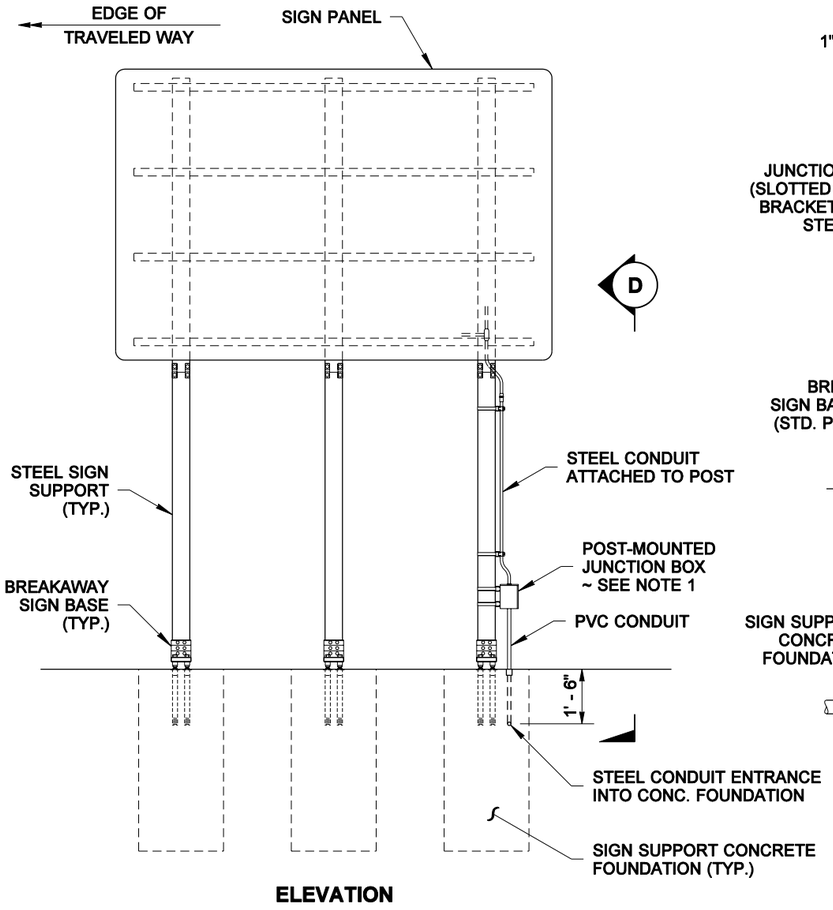
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DRAWN BY: MARK SUJKA

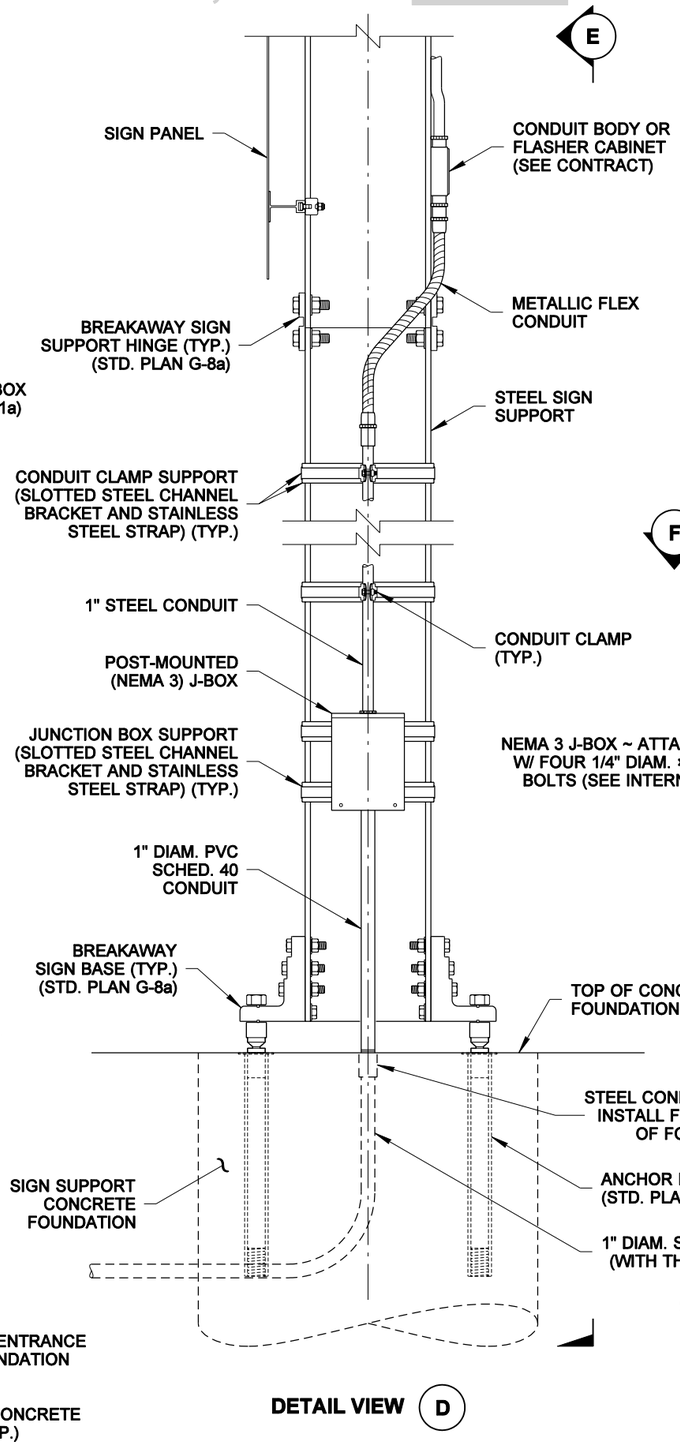



**PLAN**

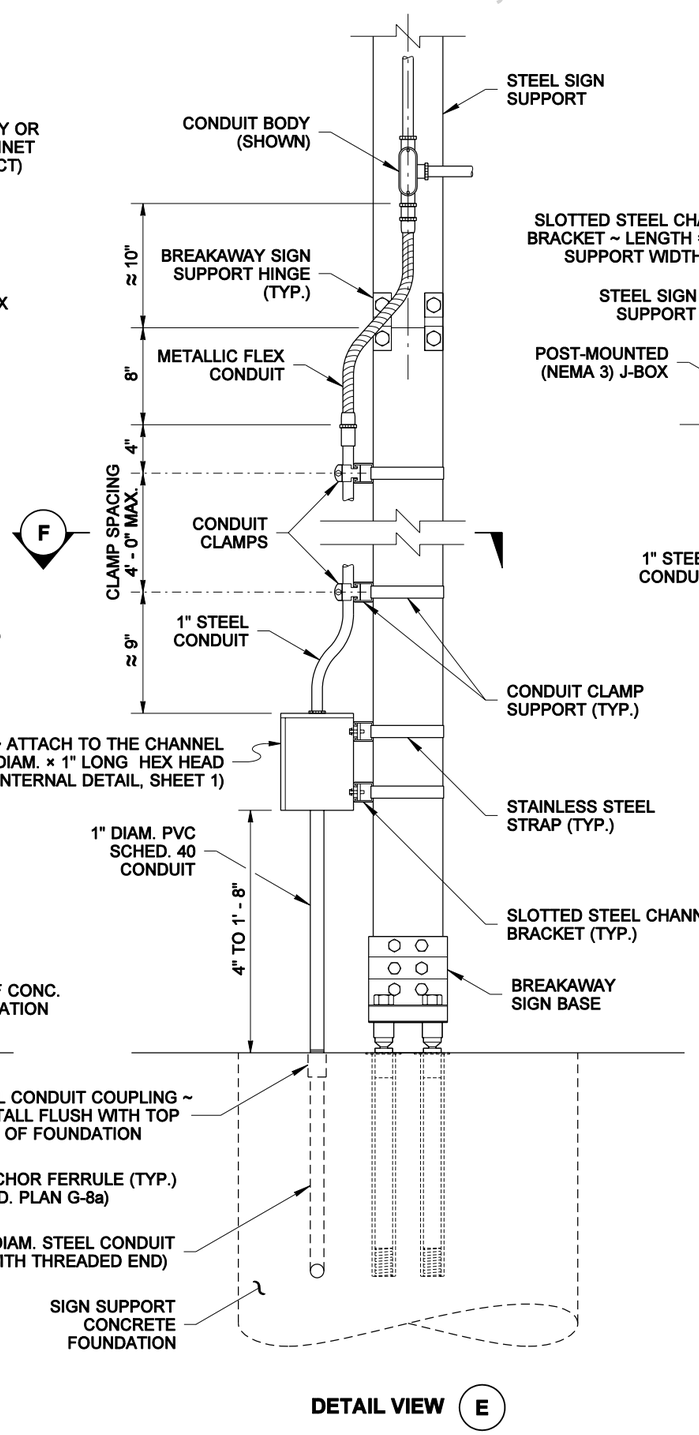



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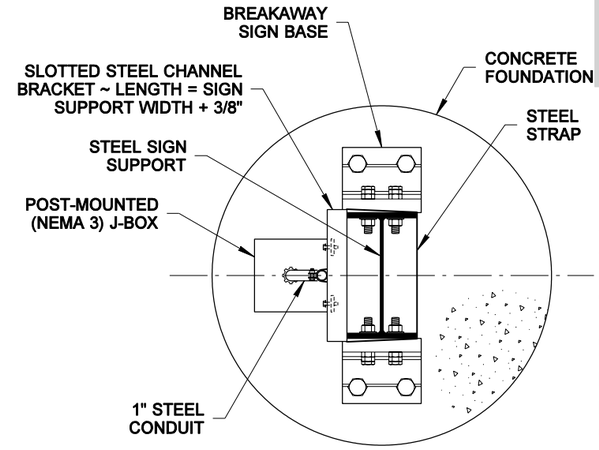
## JUNCTION BOX ATTACHMENT TO STEEL SIGN SUPPORT




**DETAIL VIEW (D)**




**DETAIL VIEW (E)**




**SECTION (F)**

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2007

# SIGN POST-MOUNTED JUNCTION BOX

# STANDARD PLAN J-12

SHEET 2 OF 2 SHEETS

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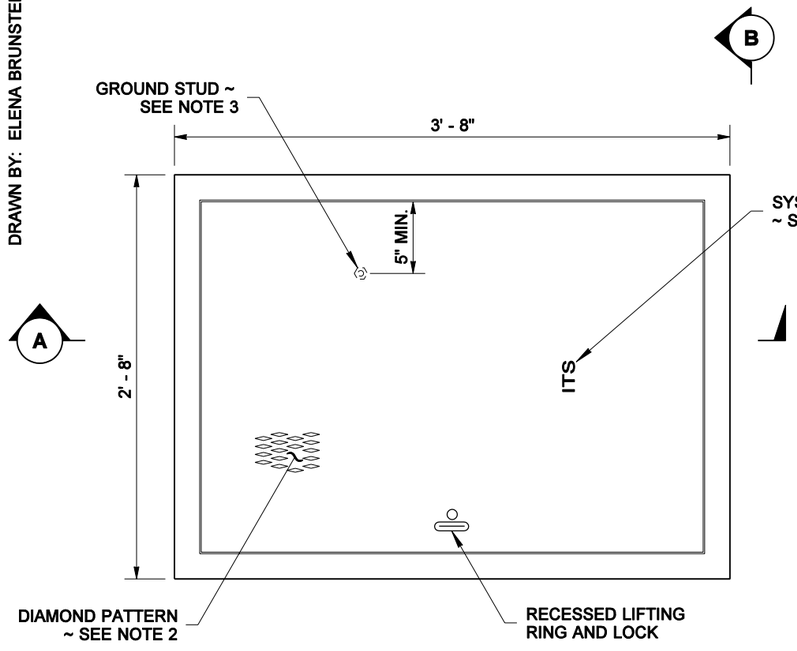
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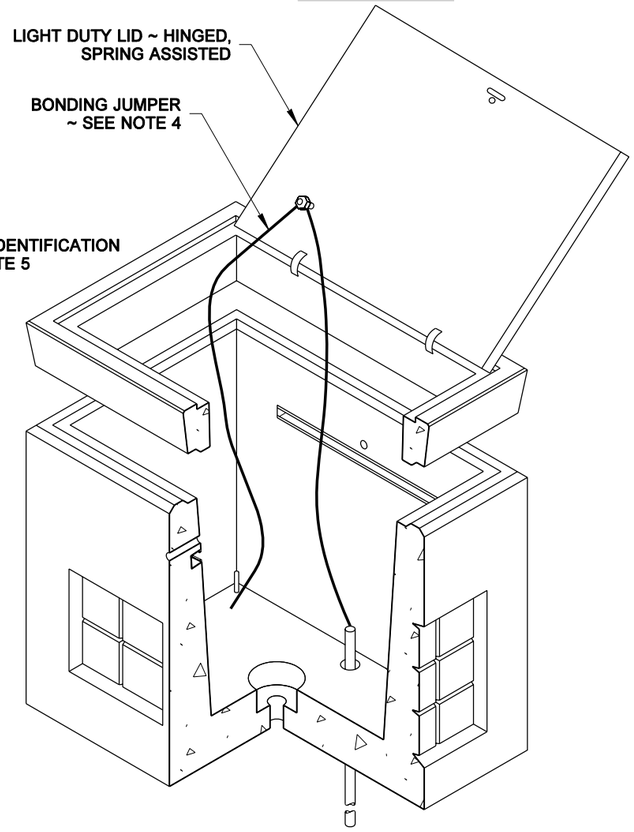
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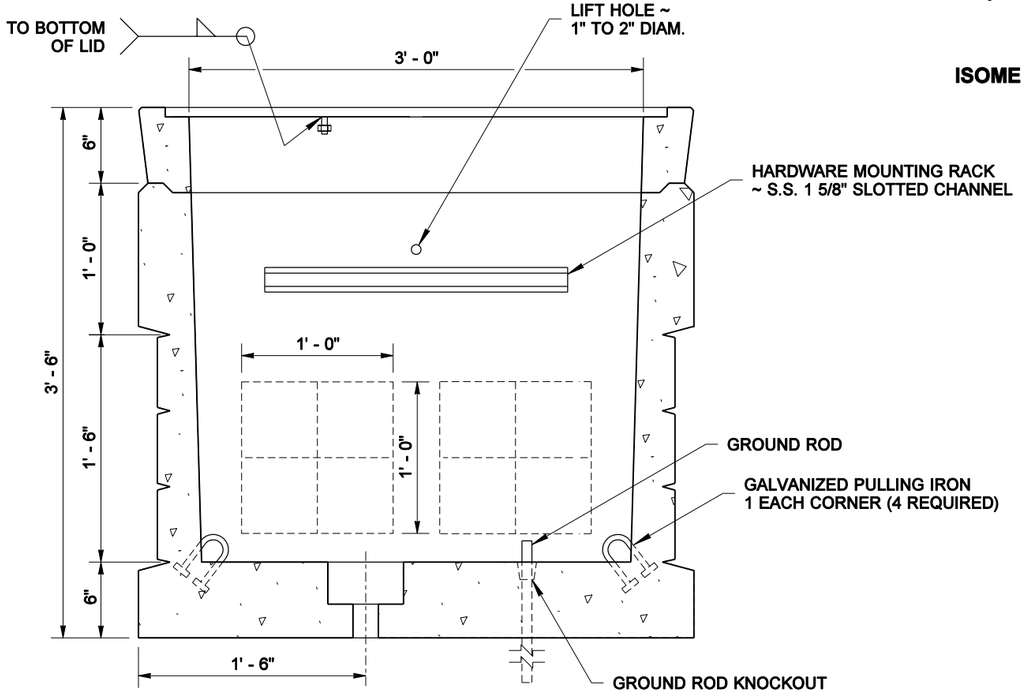
DRAWN BY: ELENA BRUNSTEIN




**TOP VIEW**

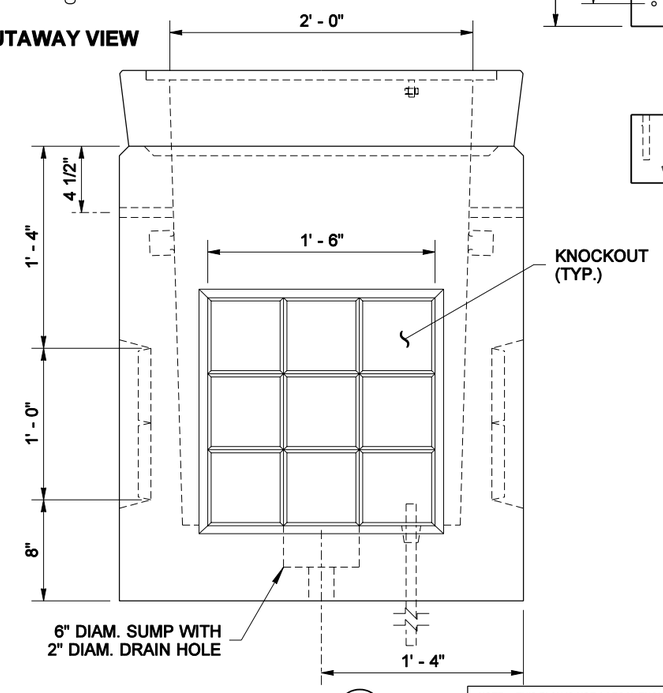



**ISOMETRIC CUTAWAY VIEW**




**SECTION (A)**

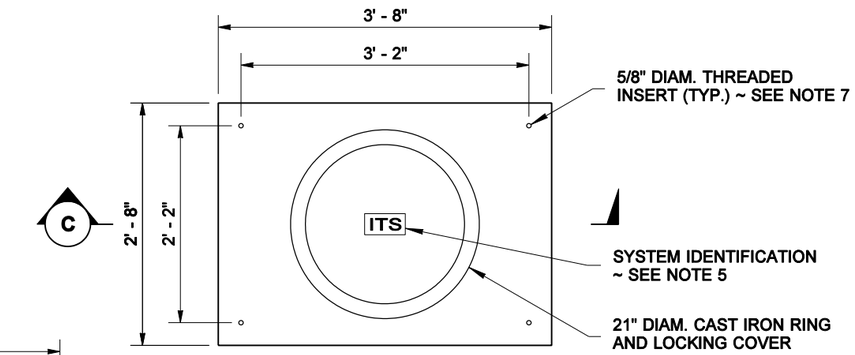
**PULL BOX**
(SHOWN WITH LIGHT DUTY LID)



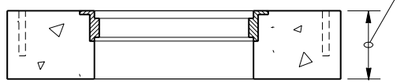

**VIEW (B)**

**NOTES**

1. The Heavy Duty Lid shall be used when a Pull Box is placed in the paved shoulder. Use a 9" 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 × 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.




**HEAVY DUTY LID**
SEE NOTE 1




**SECTION (C)**

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2007

# PULL BOX

## STANDARD PLAN J-15a

SHEET 1 OF 2 SHEETS

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*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *10-04-05* — DATE

Washington State Department of Transportation

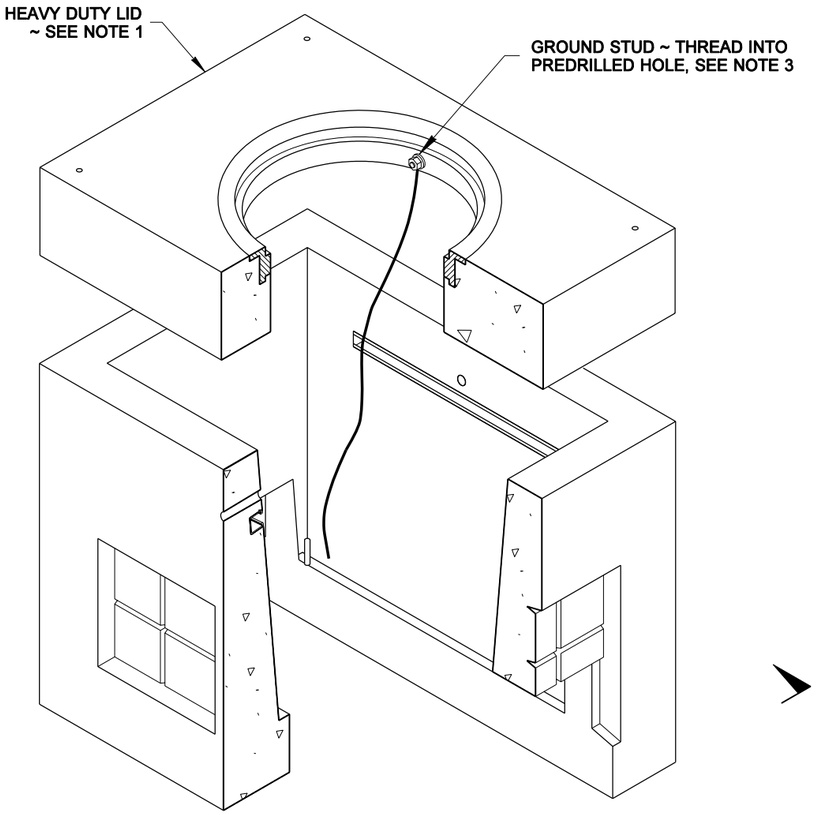
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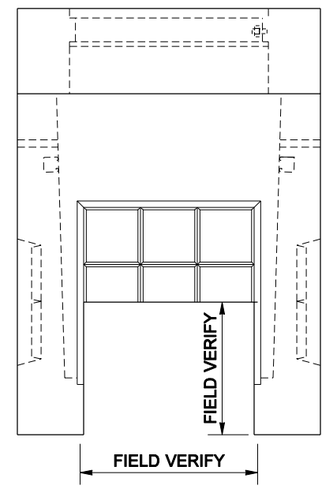
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DRAWN BY: ELENA BRUNSTEIN

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ISOMETRIC CUTAWAY VIEW

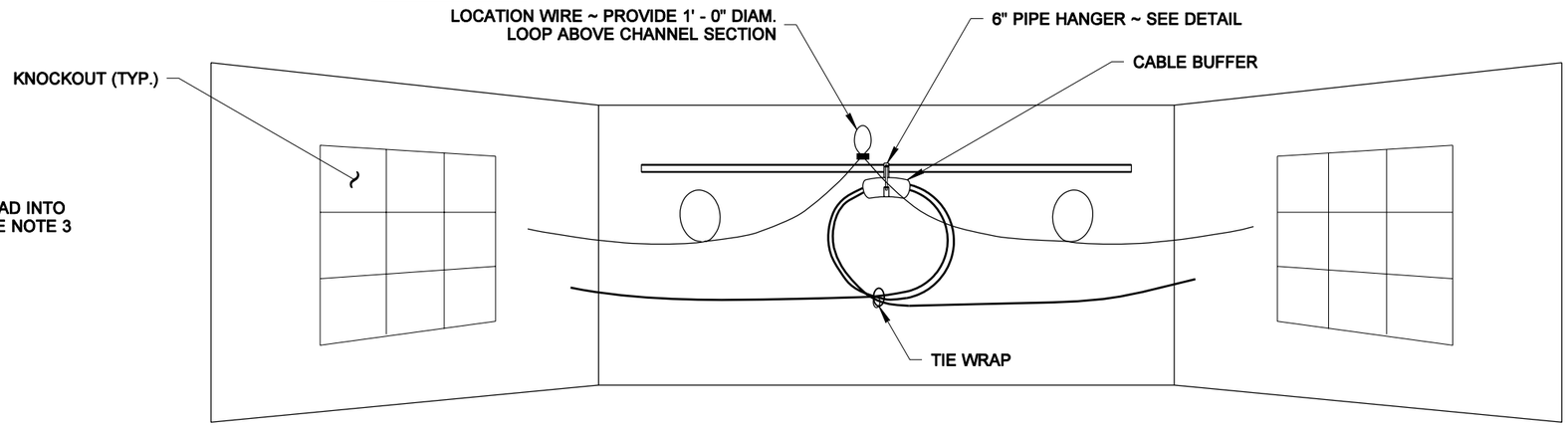



END VIEW (D)

## SPLIT PULL BOX

(SHOWN WITH HEAVY DUTY LID)

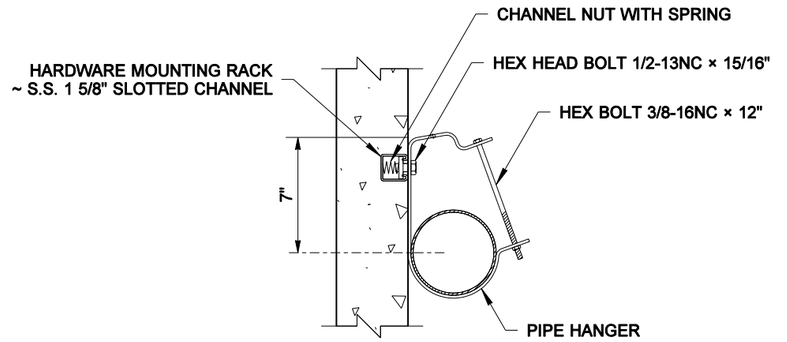
SEE **PULL BOX**, SHEET 1, FOR DIMENSIONS NOT SHOWN



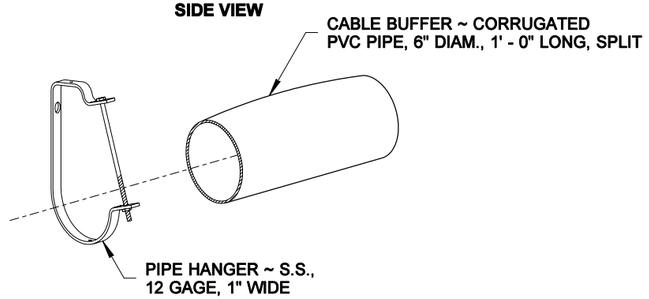

INTERNAL PERSPECTIVE VIEW

## CABLE RACKING SCHEME

COIL THE CABLE BY USING A "FIGURE 8" FOLDED IN THE MIDDLE TO MAKE A LOOP




SIDE VIEW




ISOMETRIC VIEW

## 6" PIPE HANGER DETAIL

FABRICATE IF NOT AVAILABLE COMMERCIALLY

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2007

## PULL BOX

## STANDARD PLAN J-15a

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER

*10-04-05* — DATE

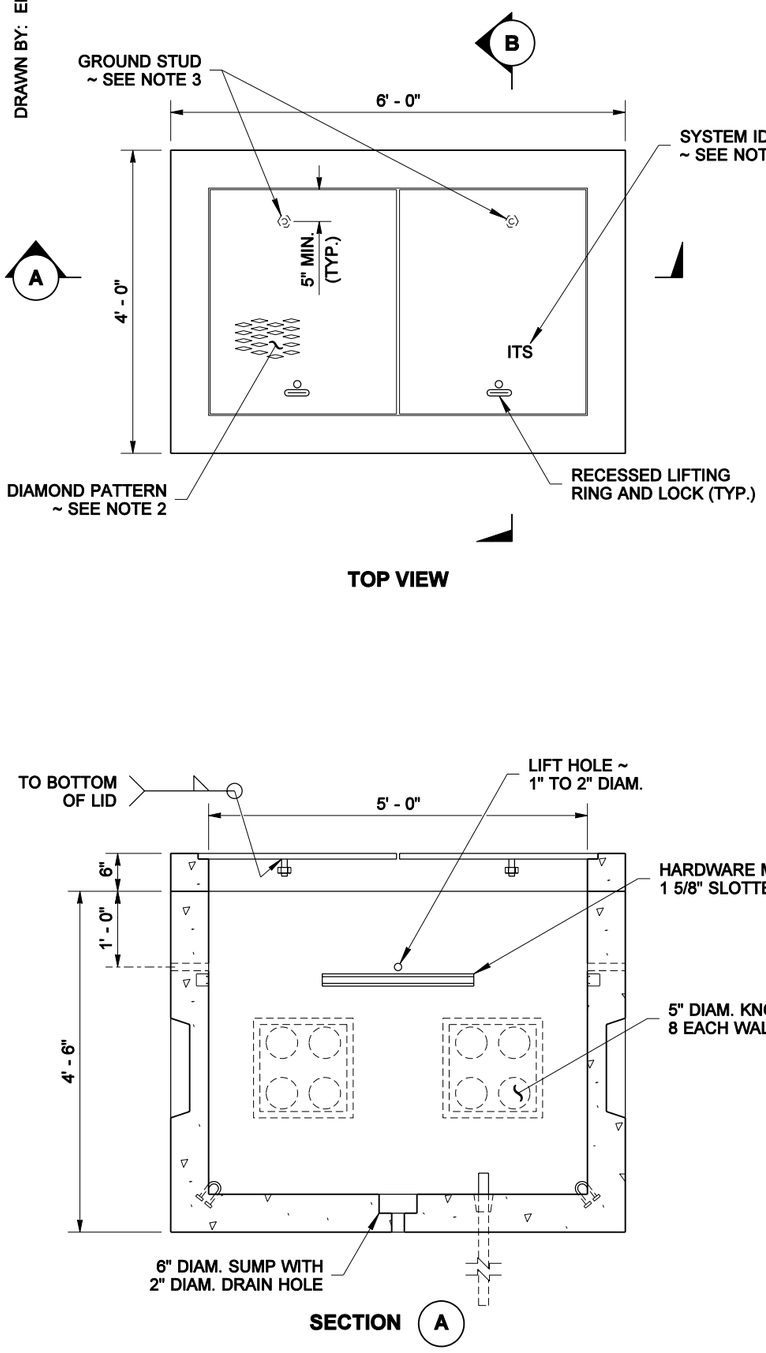
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

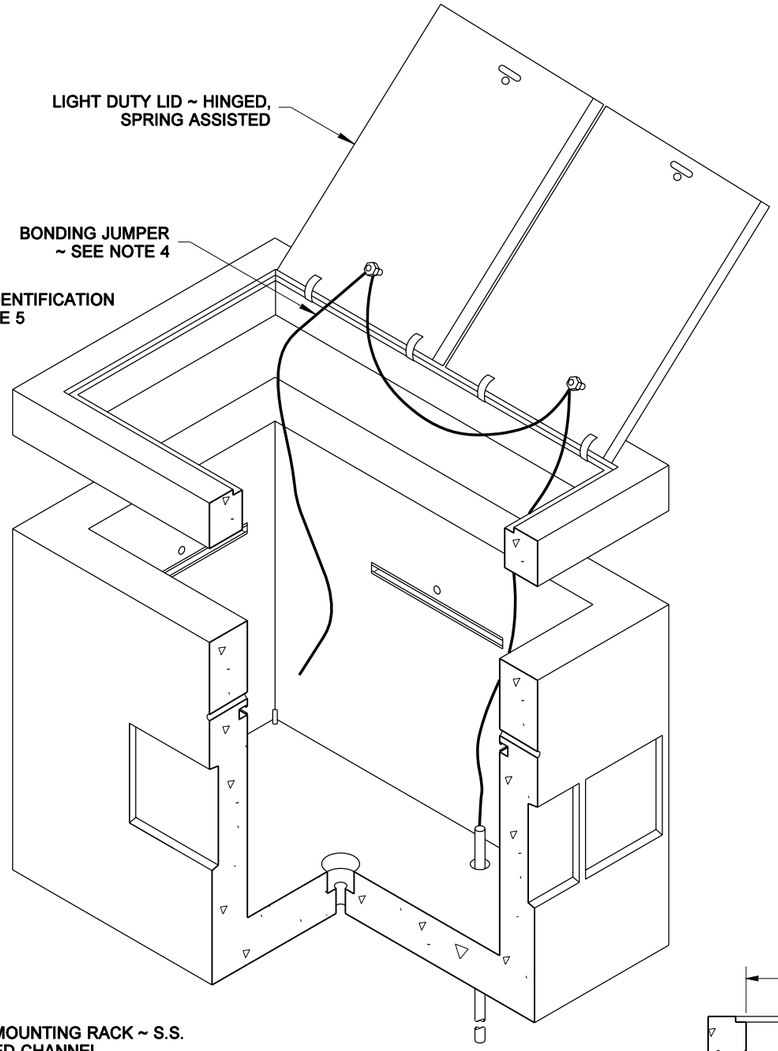
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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DRAWN BY: ELENA BRUNSTEIN



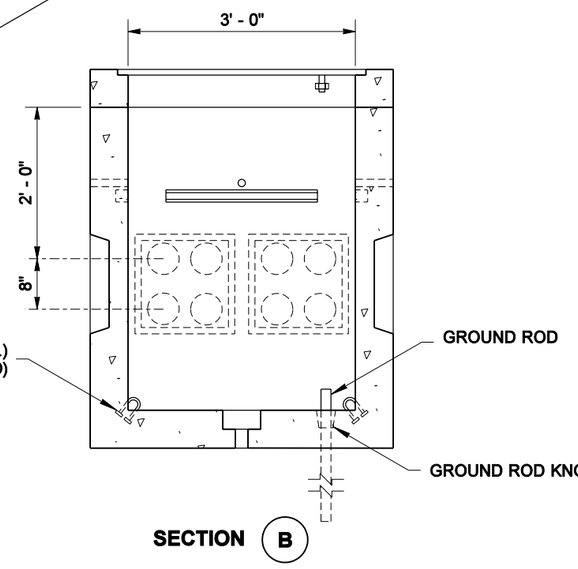

**TOP VIEW**




**ISOMETRIC CUTAWAY VIEW**




**SECTION (A)**

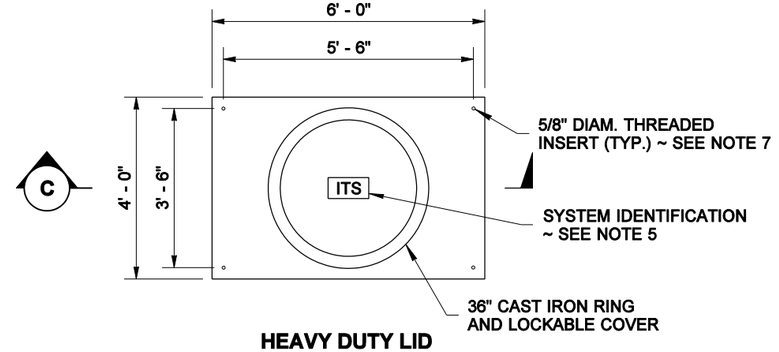



**SECTION (B)**

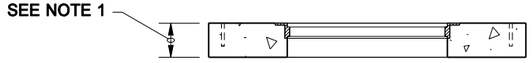
## CABLE VAULT
(SHOWN WITH LIGHT DUTY LID)

**NOTES**

1. The Heavy Duty Lid shall be used when a Cable Vault is placed in the paved shoulder. Use a 9" 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 × 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.




**HEAVY DUTY LID**
SEE NOTE 1




**SECTION (C)**

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EXPIRES MAY 5, 2007

# CABLE VAULT

## STANDARD PLAN J-15b

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

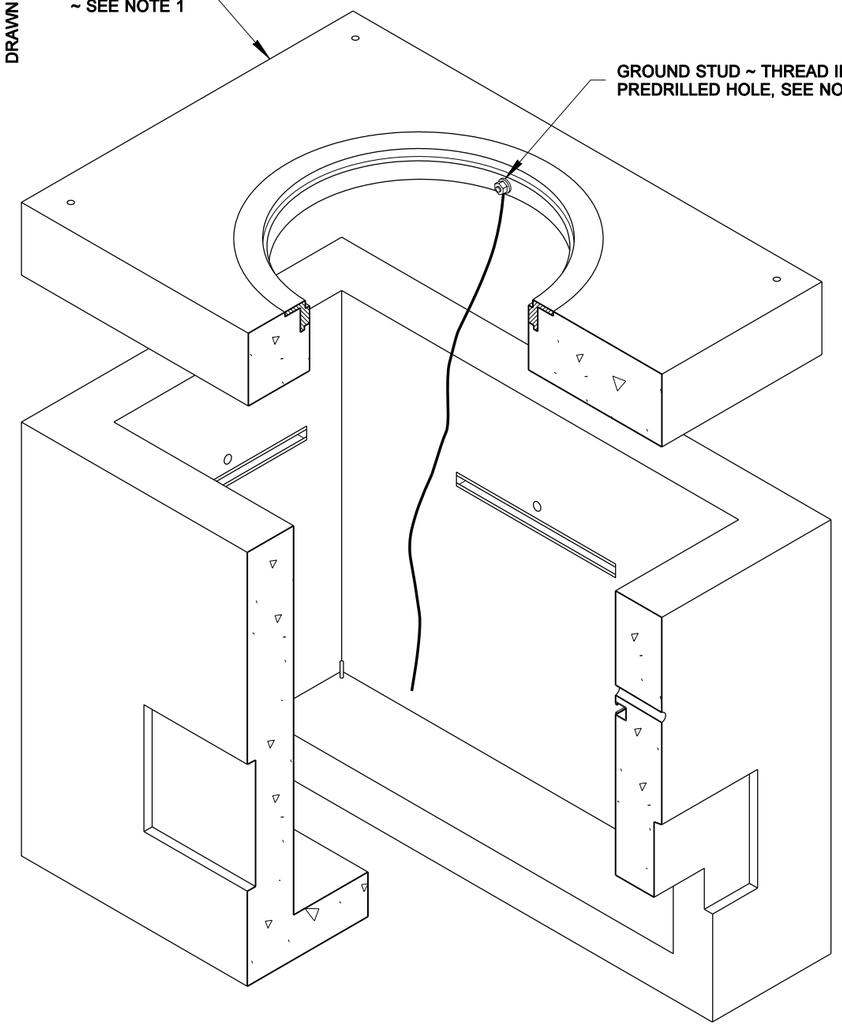
*Harold J. Peterfeso* — STATE DESIGN ENGINEER
*10-04-05* — DATE

Washington State Department of Transportation

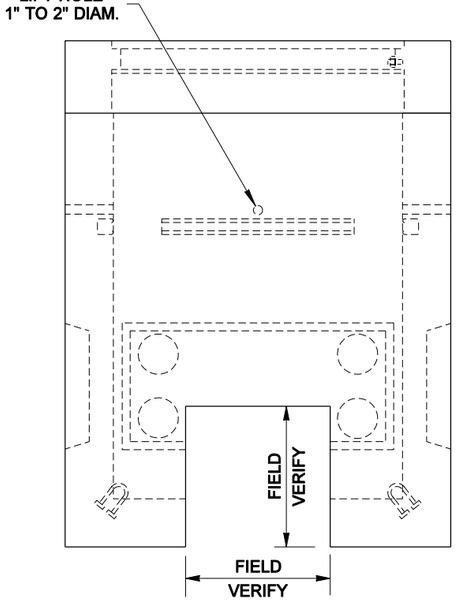
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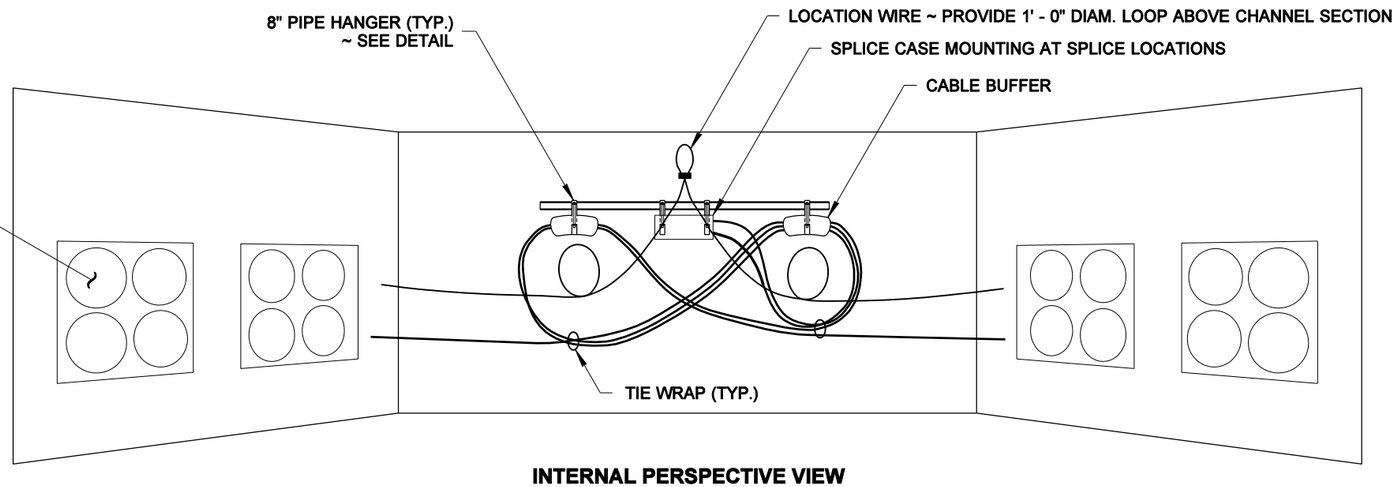
DRAWN BY: ELENA BRUNSTEIN




ISOMETRIC CUTAWAY VIEW



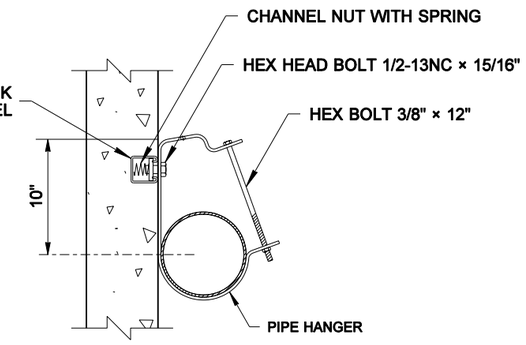

END VIEW (D)



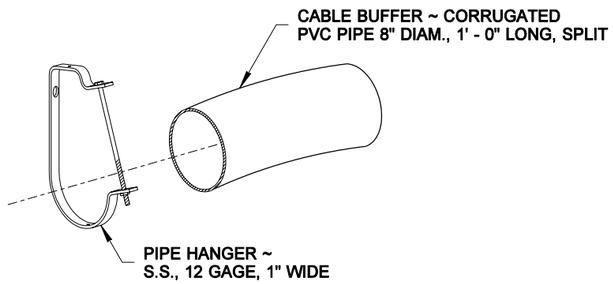

INTERNAL PERSPECTIVE VIEW

## CABLE RACKING SCHEME

COIL THE CABLE BY USING A "FIGURE 8"




SIDE VIEW




ISOMETRIC VIEW

R. SCOTT ZELLER
STATE OF WASHINGTON
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REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2007

## CABLE VAULT

## STANDARD PLAN J-15b

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *10-04-05* — DATE

Washington State Department of Transportation

**SPLIT CABLE VAULT**
(SHOWN WITH HEAVY DUTY LID)
SEE **CABLE VAULT**, SHEET 1, FOR DIMENSIONS NOT SHOWN

**8" PIPE HANGER DETAIL**
FABRICATE IF NOT AVAILABLE COMMERCIALLY

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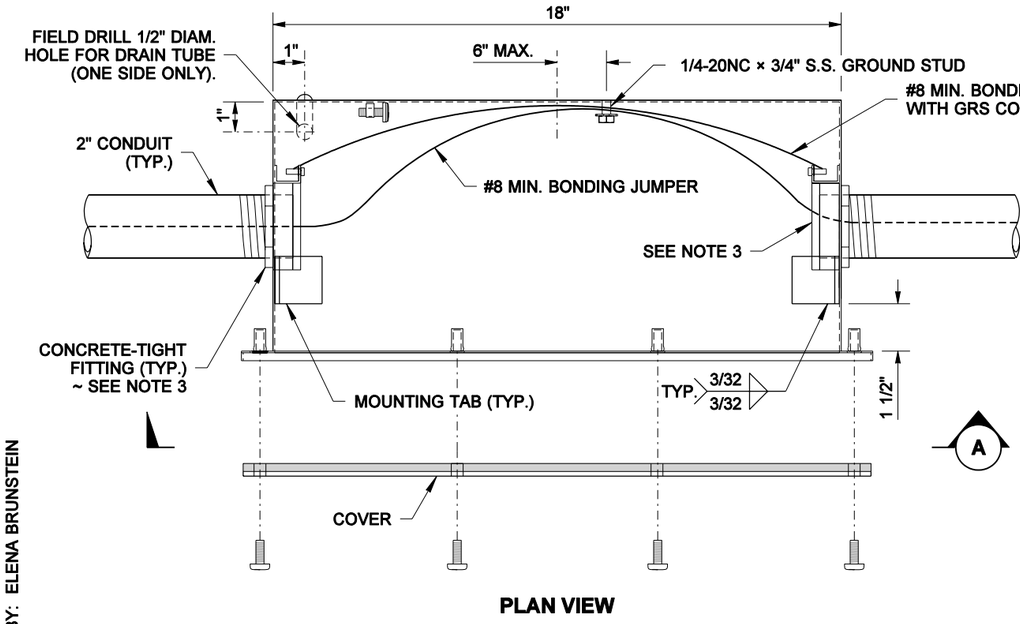
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

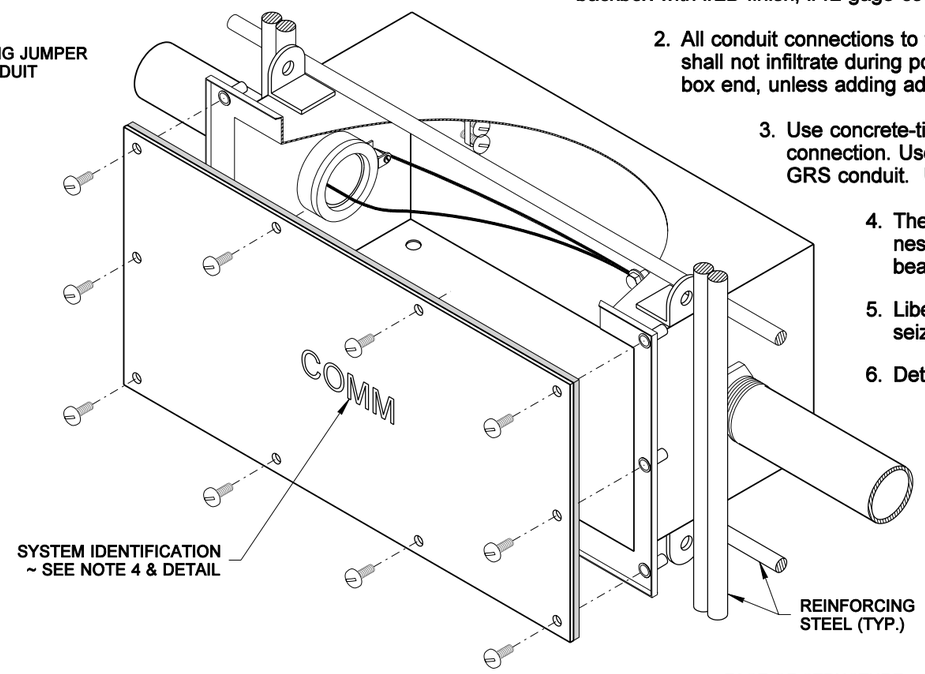
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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DRAWN BY: ELENA BRUNSTEIN




**PLAN VIEW**

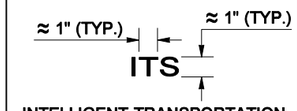



**ISOMETRIC VIEW**
SHOWN MOUNTED IN REINFORCING STEEL

**NOTES**

1. The Junction Box shall be of type 304 stainless steel, welded seam construction: #12 gage backbox with #2B 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.

**SYSTEM IDENTIFICATION DETAIL**

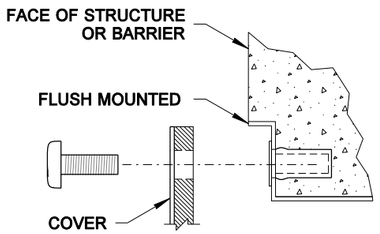



INTELLIGENT TRANSPORTATION SYSTEM

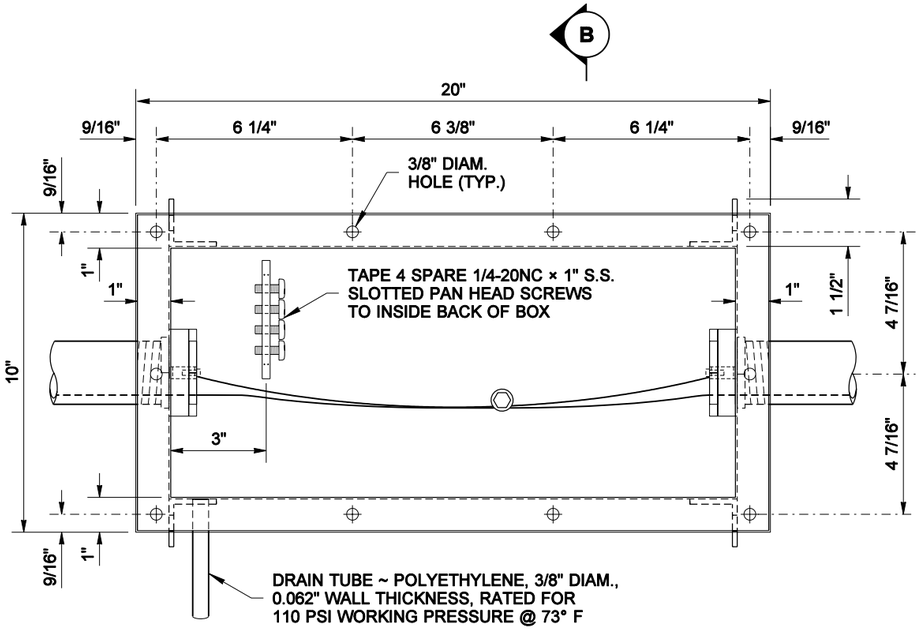
COMM
COMMUNICATION SYSTEM

LT
LIGHTING SYSTEM

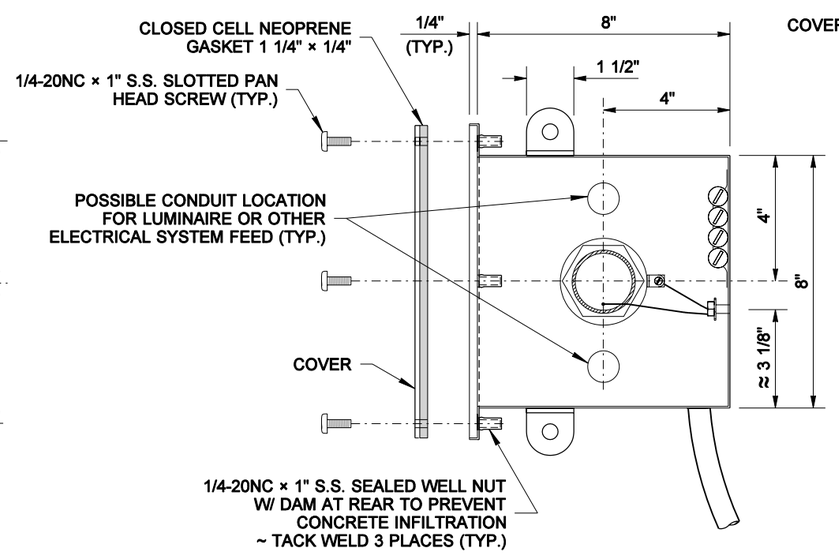
TS
TRAFFIC SIGNAL SYSTEM




**MOUNTING DETAIL**
SECTION VIEW




**VIEW (A)**




**SECTION (B)**

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EXPIRES MAY 5, 2005

# JUNCTION BOX TRAFFIC BARRIER MOUNTED

## STANDARD PLAN J-16a

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *03-04-05* — DATE

Washington State Department of Transportation

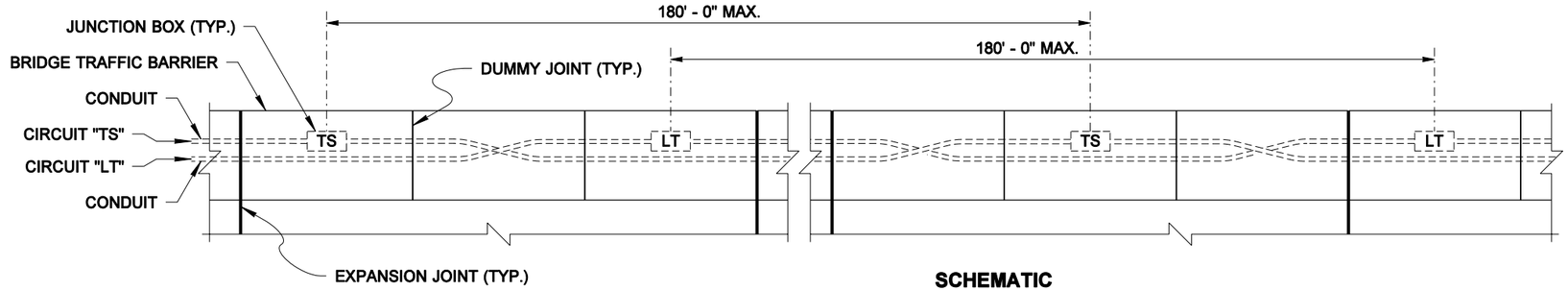
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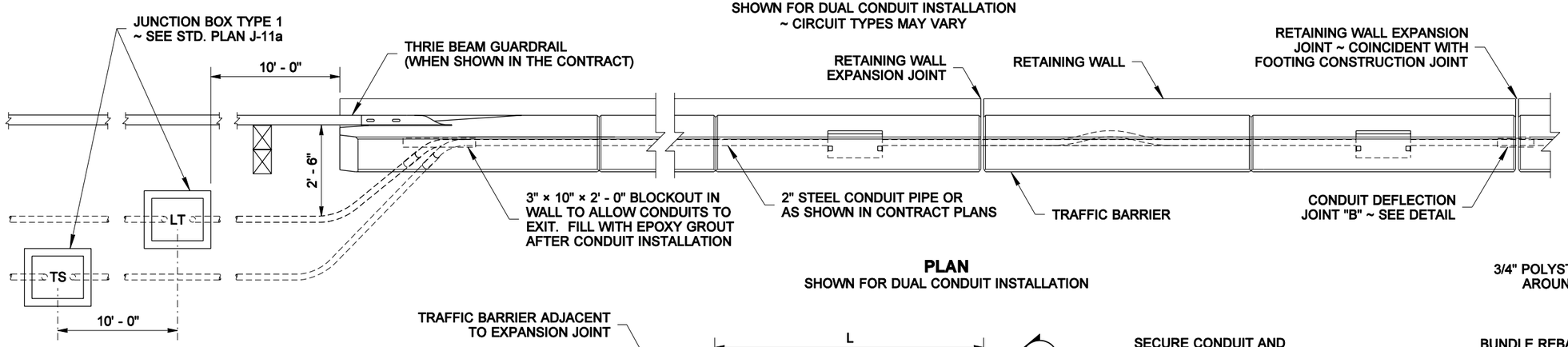
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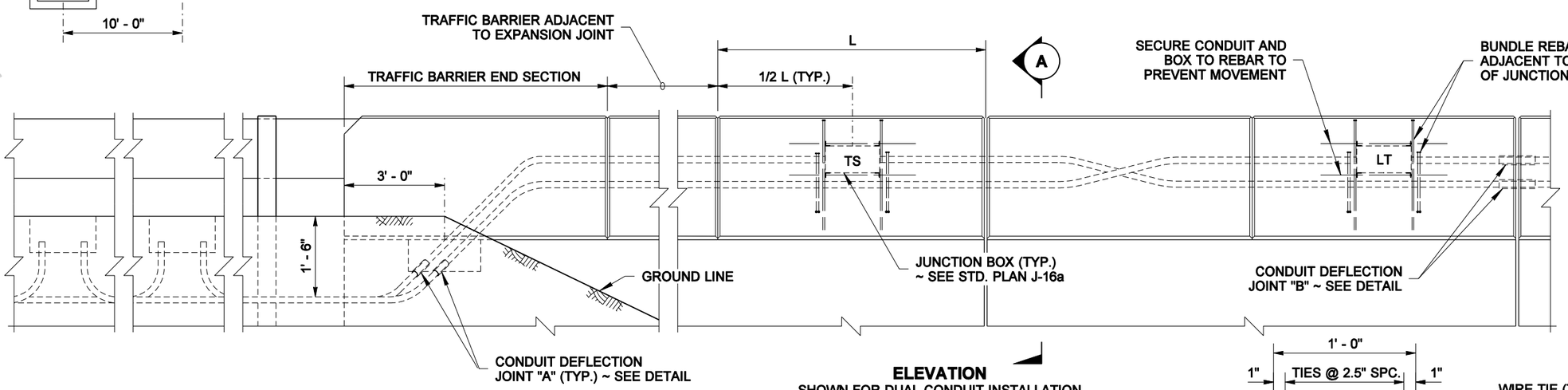
DRAWN BY: ELENA BRUNSTEIN



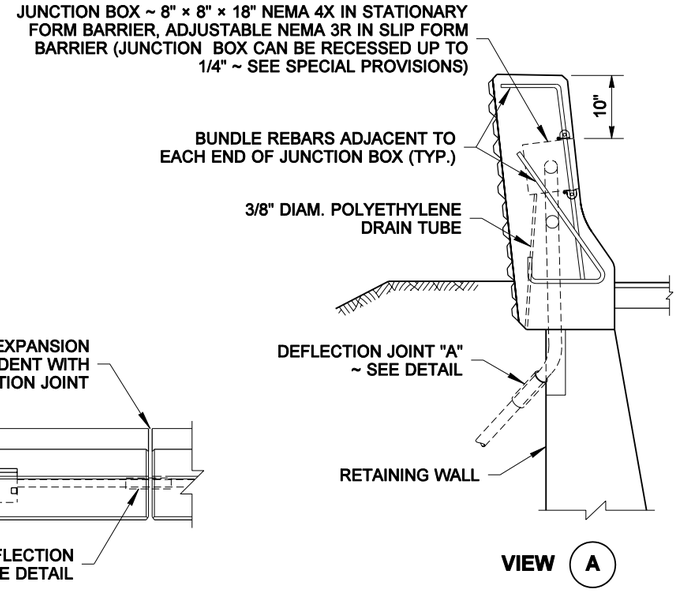

**SCHEMATIC**
SHOWN FOR DUAL CONDUIT INSTALLATION
~ CIRCUIT TYPES MAY VARY



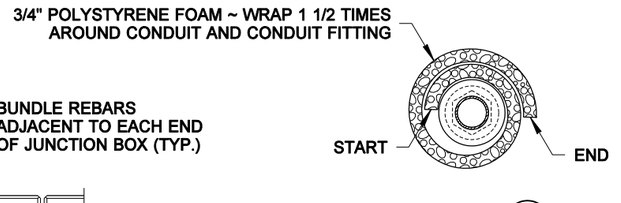

**PLAN**
SHOWN FOR DUAL CONDUIT INSTALLATION




**ELEVATION**
SHOWN FOR DUAL CONDUIT INSTALLATION




**VIEW (A)**

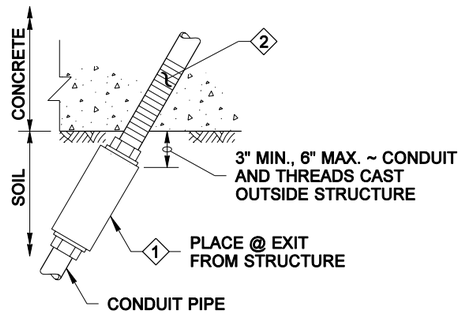



**SECTION (B)**

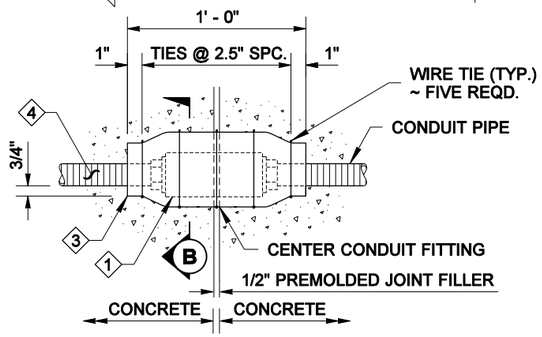
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## KEY NOTES

1. Conduit fitting with internal bonding jumper ~ Type DX for deflection of 30° and 3/4" movement.
2. Where steel conduit exits from a structure wrap conduit pipe for 1' - 0" on each side from the exiting point. Pipe-wrap tape shall be 2" wide, 20 mil thick, and installed with a minimum of 1" overlap.
3. 1' - 0" long, 3/4" thick expanded polystyrene 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.
4. Where conduit in a structure is routed across a joint, wrap steel conduit pipe for 1' - 0" on each side of joint. Pipe-wrap tape shall be 2" wide, 20 mil thick, and installed with a minimum of 1" overlap.




**CONDUIT DEFLECTION JOINT "A" DETAIL**




**CONDUIT DEFLECTION JOINT "B" DETAIL**
CONDUIT PIPES PLACED IN RETAINING WALL TRAFFIC BARRIERS SHALL BE FITTED WITH DEFLECTION FITTINGS SPACED AT 120' MAXIMUM. THE DEFLECTION 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

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EXPIRES MAY 5, 2007

# CONDUIT INSTALLATION IN RETAINING WALL TRAFFIC BARRIER
# STANDARD PLAN J-16b

SHEET 1 OF 1 SHEETS

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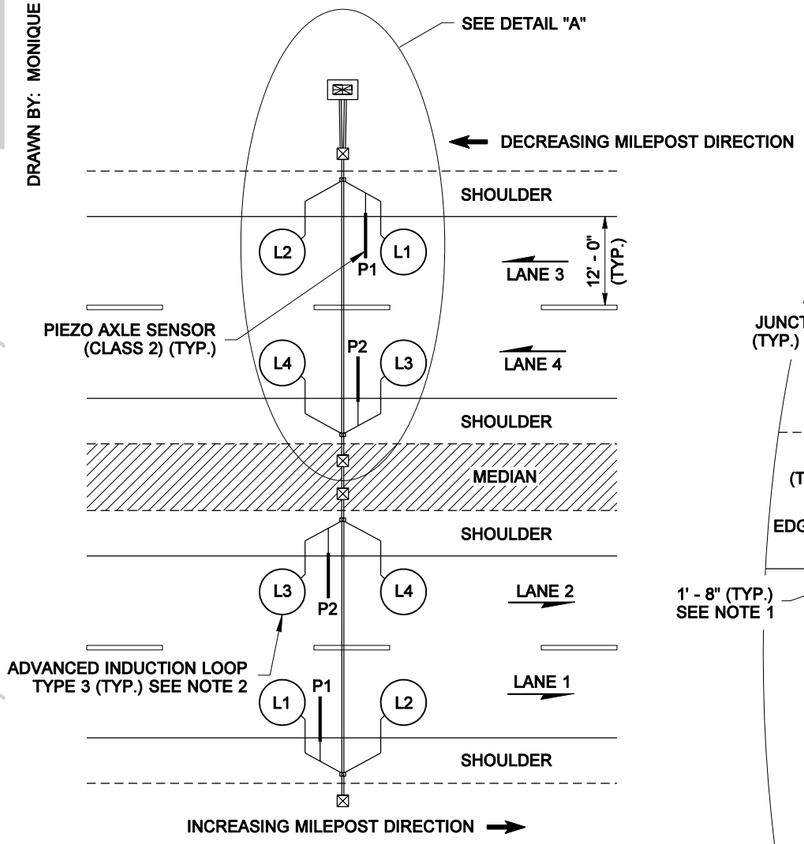
*Harold J. Peterfeso* — STATE DESIGN ENGINEER
*09-02-05* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MONIQUE GLICK




**PLAN VIEW**

**INDUCTION LOOP / PIEZO AXLE SENSOR NUMBER IDENTIFICATION**

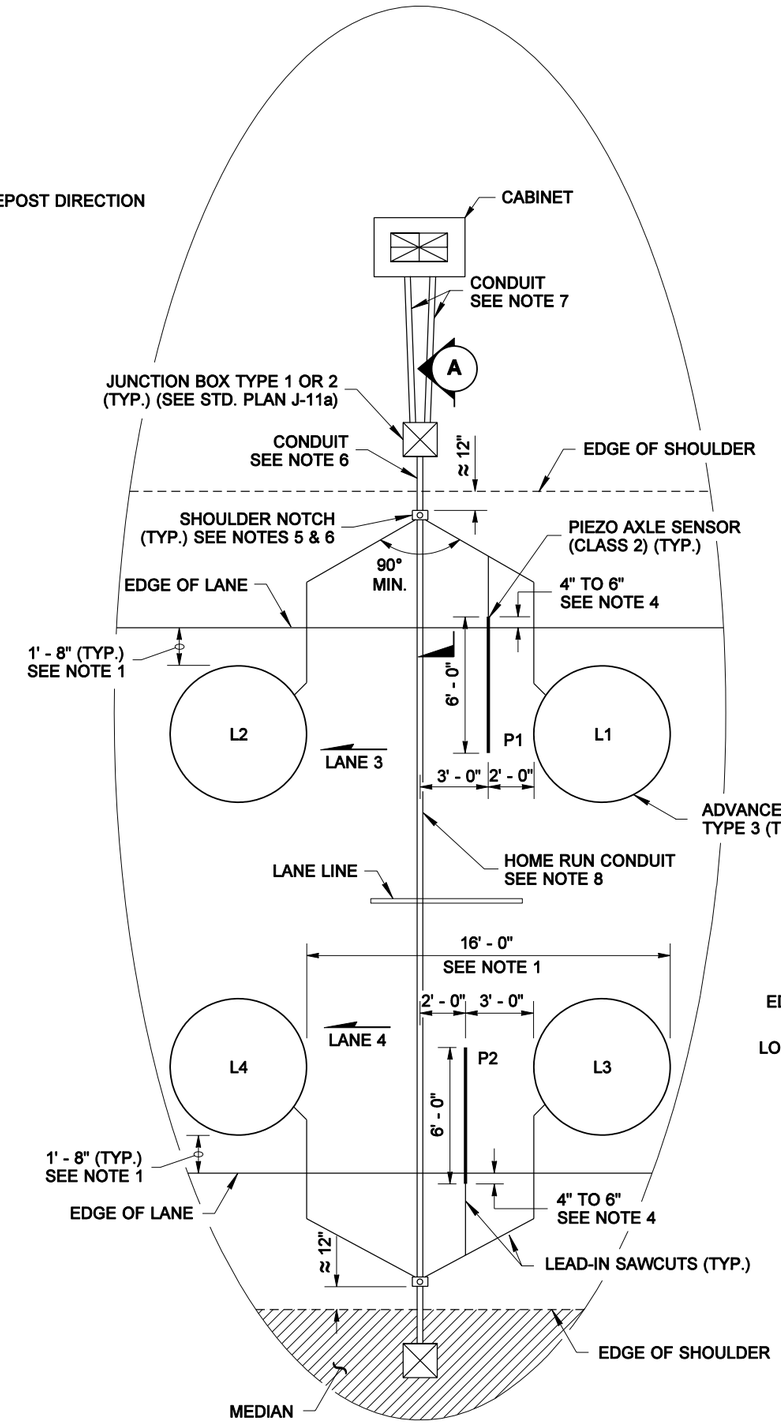
Lane 1 - (drive lane) ~ Loop L1, Piezo P1, Loop L2

Lane 2 - (pass lane) ~ Loop L3, Piezo P2, Loop L4

Lane 3 - (drive lane) ~ Loop L1, Piezo P1, Loop L2

Lane 4 - (pass lane) ~ Loop L3, Piezo P2, Loop L4

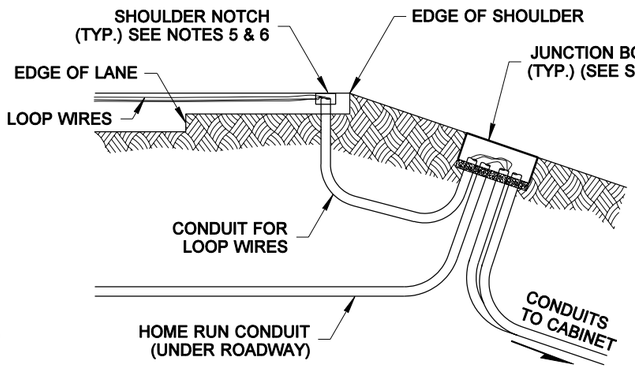
**TYPICAL 4 LANE FREEWAY WITH MEDIAN**




**DETAIL "A"**

**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.
10. See Standard Plan J-20 for Piezo Axle Sensor General Installation Instructions.




**SECTION (A)**

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PROFESSIONAL ENGINEER

EXPIRES JANUARY 26, 2007

# PERMANENT TRAFFIC RECORDER SITE INSTALLATIONS
# STANDARD PLAN J-18

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *09-02-05* — DATE

Washington State Department of Transportation

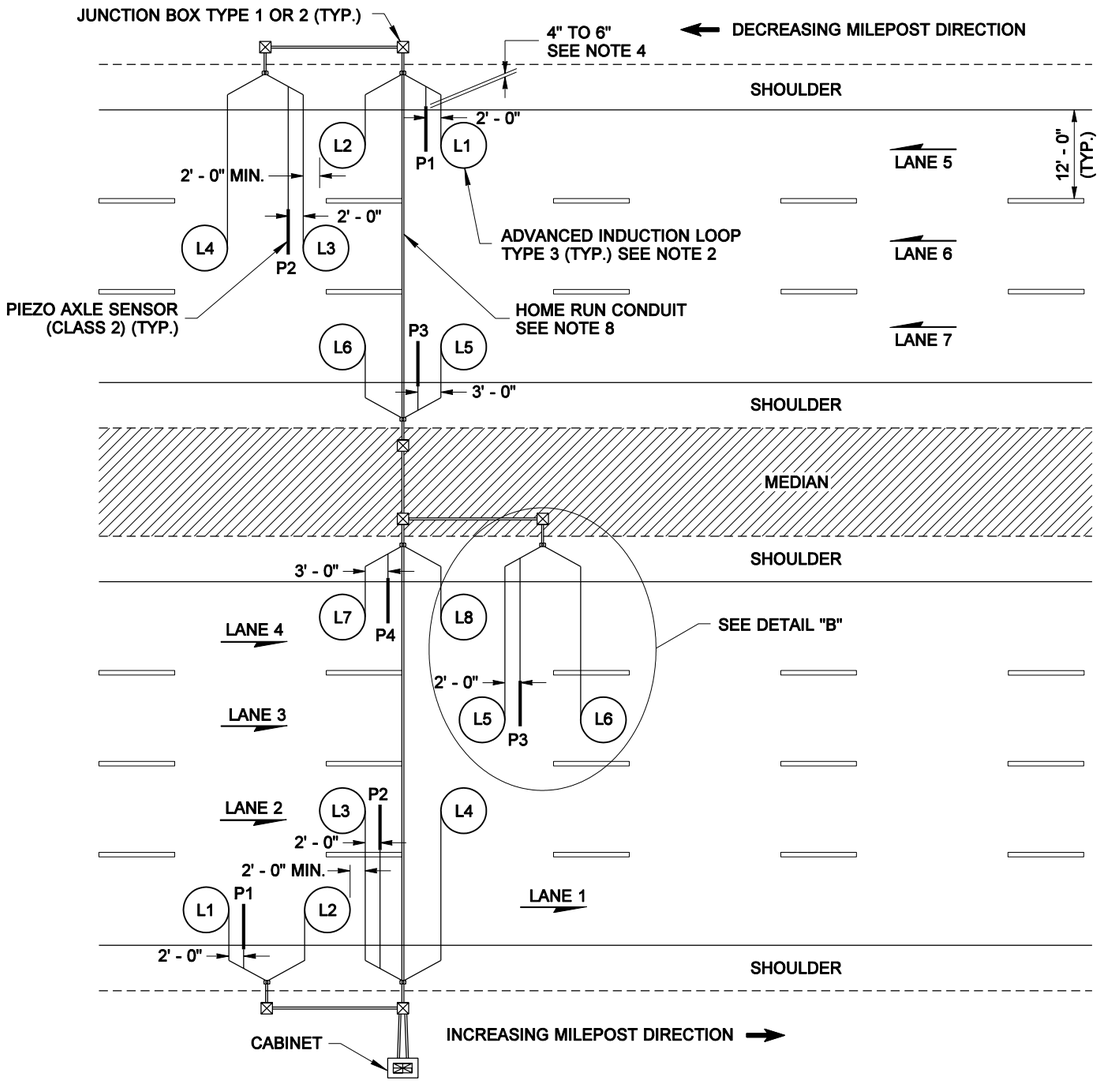
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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DRAWN BY: MONIQUE GLICK

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**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

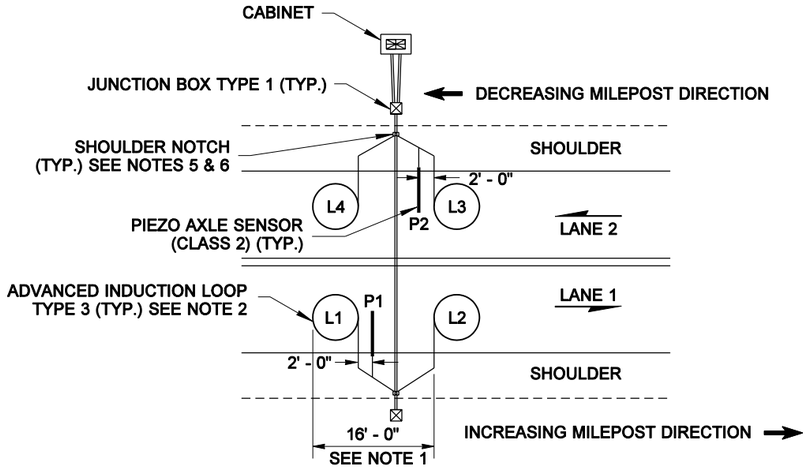
Lane 4 - (pass lane) ~ Loop L7, Piezo P4, Loop L8

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**



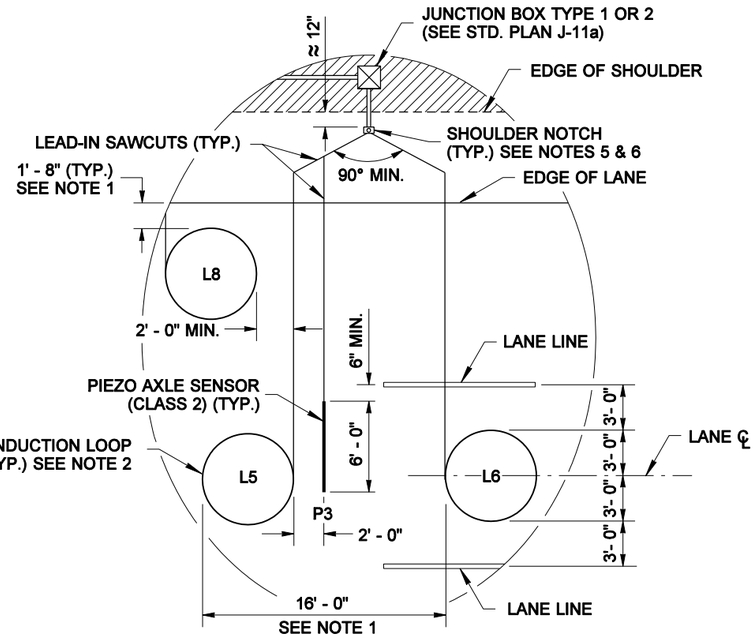

**PLAN VIEW**

**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

**TYPICAL 2 WAY ROADWAY**




**DETAIL "B"**

ROGER E. HORTON
STATE OF WASHINGTON
19894
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JANUARY 26, 2007

# PERMANENT TRAFFIC RECORDER SITE INSTALLATIONS STANDARD PLAN J-18

SHEET 2 OF 2 SHEETS

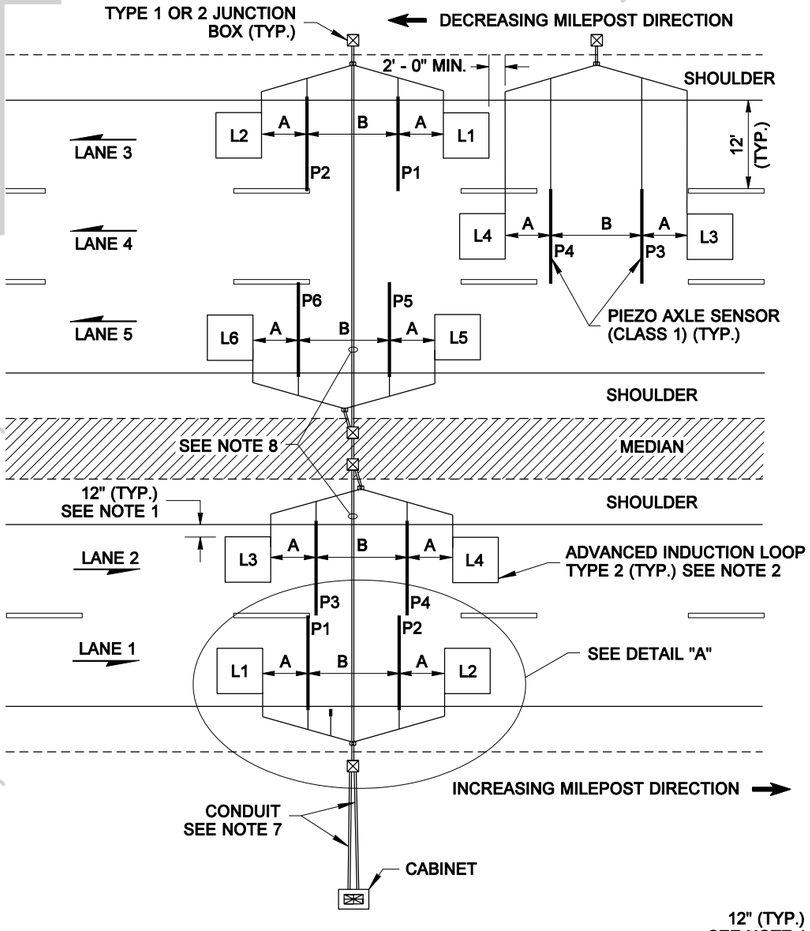
APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *09-02-05* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**PLAN VIEW**

**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

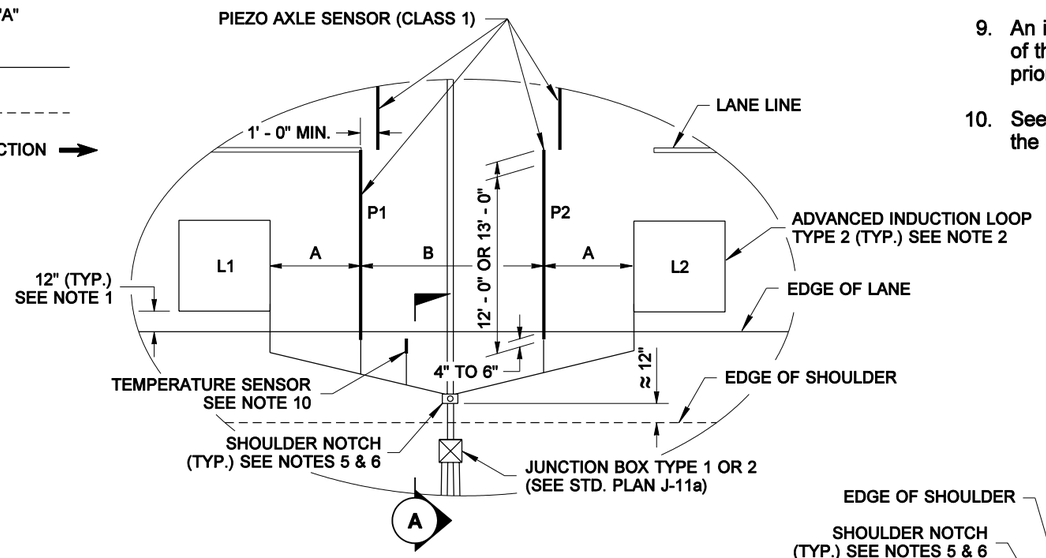
Lane 3 - (drive lane) ~ Loop L1, Piezo P1, Piezo P2, Loop L2

Lane 4 - (drive lane) ~ Loop L3, Piezo P3, Piezo P4, Loop L4

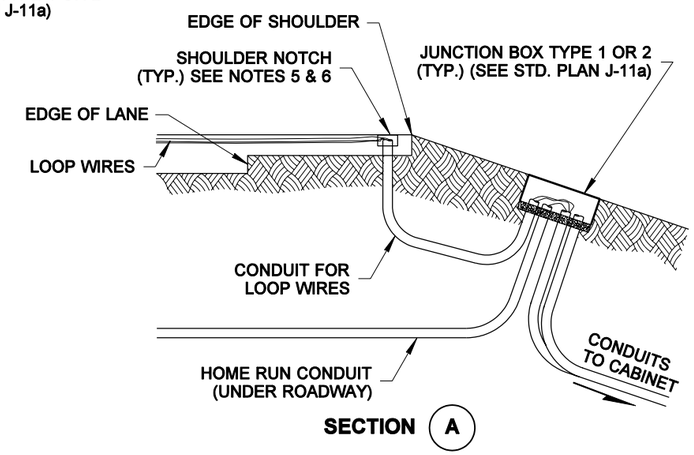
Lane 5 - (pass lane) ~ Loop L5, Piezo P5, Piezo P6, Loop L6

**TYPICAL 5 LANE FREEWAY WITH MEDIAN**

| INDUCTION LOOP TO PIEZO AXLE SPACING | | |
|---|---|---|
| | A | B |
| RURAL | 6' | 12' |
| URBAN | 2' | 10' |




**DETAIL "A"**




**SECTION A**

**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.
10. See Standard Plan J-20 for Piezo Axle Sensor General installation instructions. See the Special Provisions in the contract for Temperature Sensor installation instructions.




EXPIRES JANUARY 26, 2007

# WEIGH-IN-MOTION SITE INSTALLATION

## STANDARD PLAN J-19

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *09-02-05* — DATE

Washington State Department of Transportation

DRAWN BY: MONIQUE GLICK

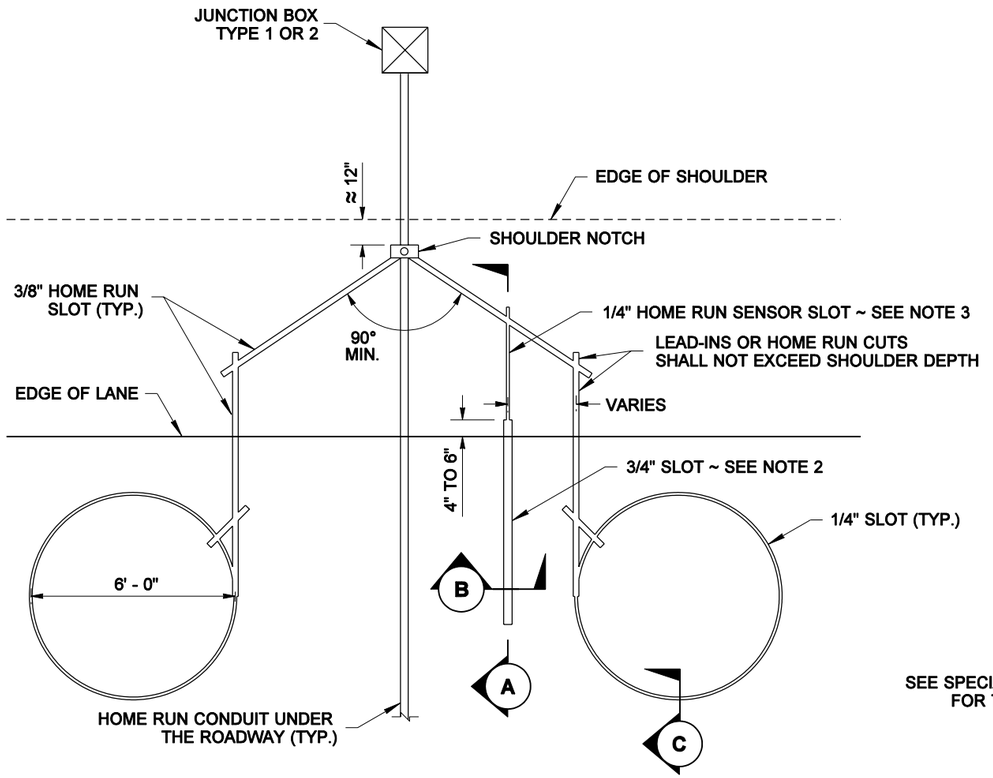
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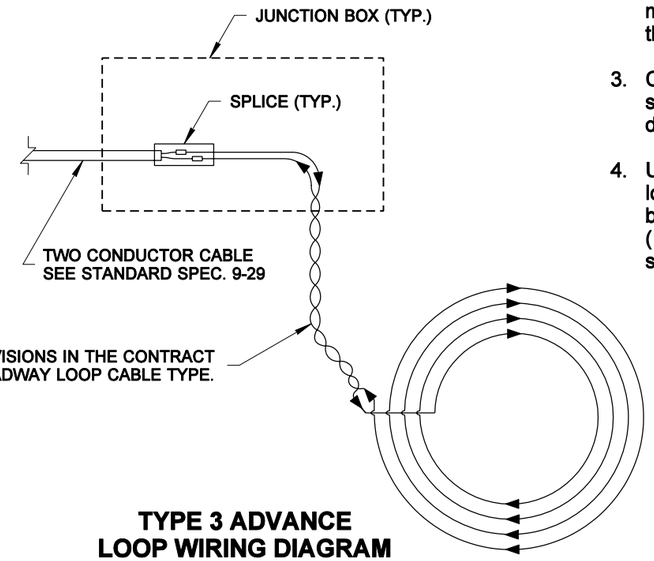
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DRAWN BY: MONIQUE GLICK

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**SAWCUT LAYOUT**




**TYPE 3 ADVANCE LOOP WIRING DIAGRAM**

**THESE ARE GENERAL INSTALLATION INSTRUCTIONS**

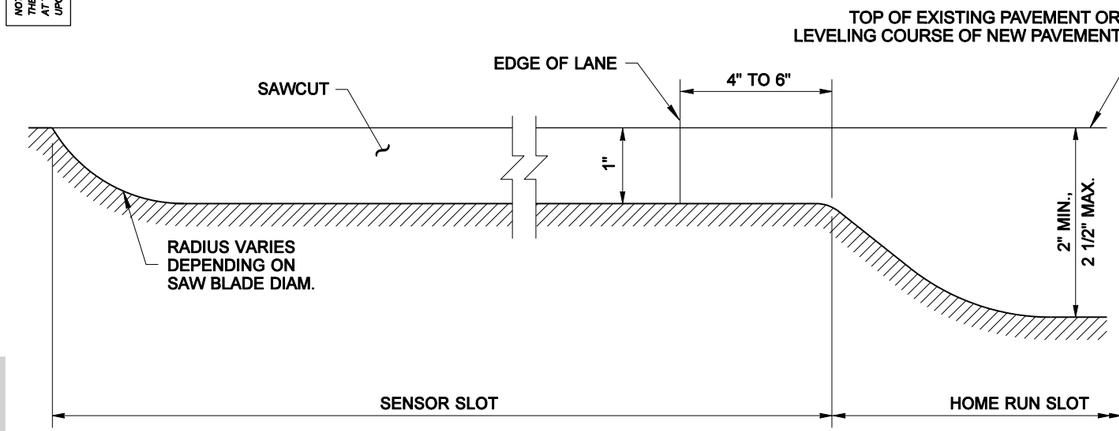
**SEE SPECIFIC MANUFACTURER'S INSTALLATION INSTRUCTIONS IN THE SPECIAL PROVISIONS OF THE CONTRACT**

1. 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).

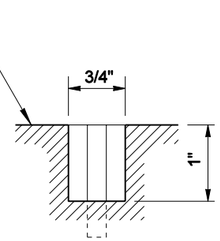
3. Cut home run slots for Piezo sensors. Center the home run slot on the sensor slot. Cut the home run slots 2" minimum to 2 1/2" maximum deep and 1/4" minimum wide. Cut the slots wider if installing conduit.

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.

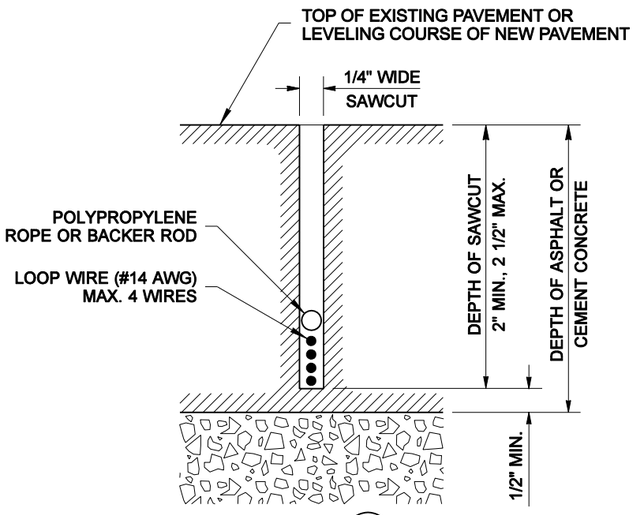



**SECTION (A)**

**(BEFORE SENSOR INSTALLATION)**




**SECTION (B)**




**SECTION (C)**

ROGER E. HORTON
STATE OF WASHINGTON
19894
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JANUARY 26, 2007

# PERMANENT TRAFFIC RECORDER AND WEIGH-IN-MOTION DETAILS STANDARD PLAN J-20

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

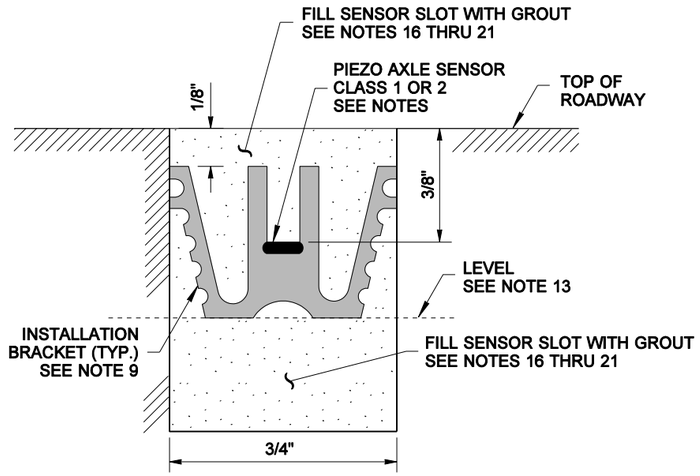
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *09-02-05* — DATE

Washington State Department of Transportation

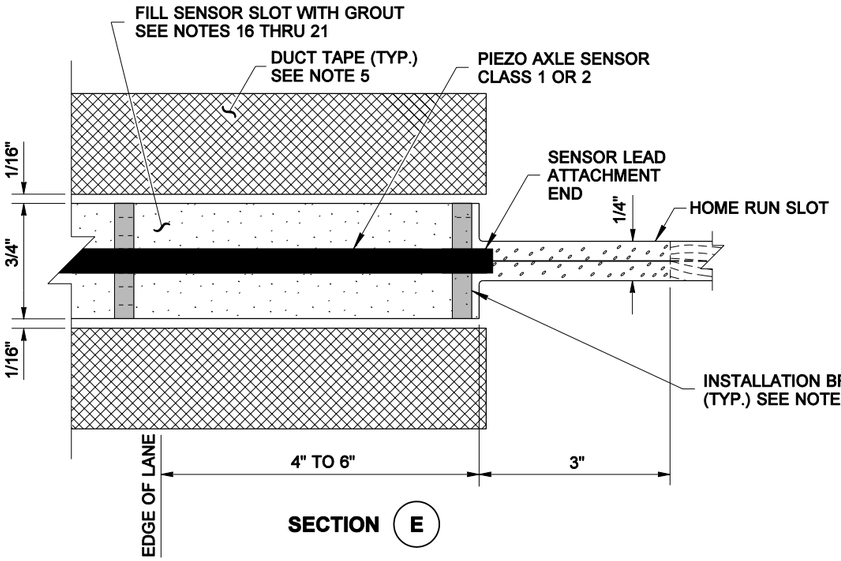
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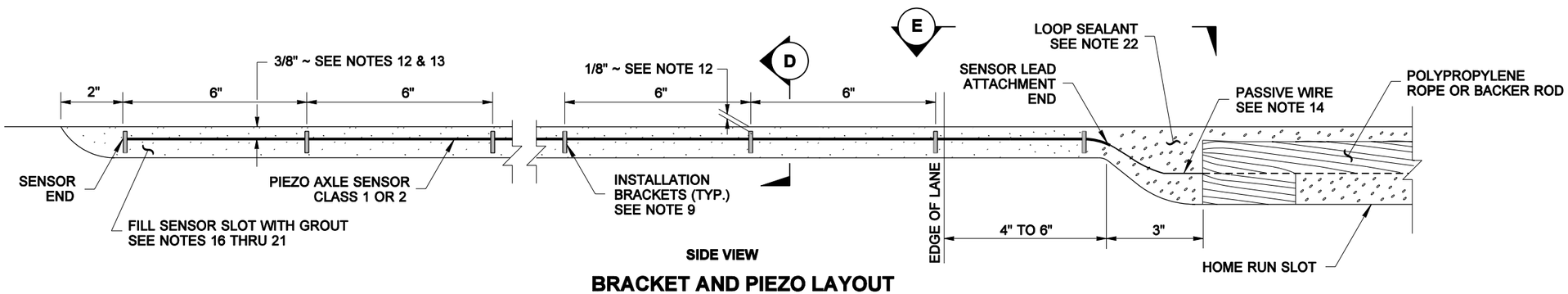
DRAWN BY: MONIQUE GLICK




SECTION (D)




SECTION (E)




## BRACKET AND PIEZO LAYOUT

**THESE ARE GENERAL INSTALLATION INSTRUCTIONS**

**SEE SPECIFIC MANUFACTURER'S INSTALLATION INSTRUCTIONS IN THE SPECIAL PROVISIONS OF THE CONTRACT**

5. Place 2" duct tape along length of both sides of the sensor slot. Tape 1/16" away from the slot.
6. 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 the data sheet 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.
7. Place the sensor on the tape next to the slot. Handle the sensor with clean latex (or equivalent) gloves.
8. 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.
9. Place the installation brackets on the sensor every 6" for the length of the sensor. Use the 3/4" brackets.
10. 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 the sides of the slot.
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, canted or bent).
14. Run the passive wire the length of the home run slot. Place the poly-propylene 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.
16. See the Special Provisions in the contract for the grout type used for Weigh-in-Motion Peizo Sensors and Permanent Traffic recorder Peizo sensors.
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 length of the slot. The resin should be slightly higher (1/16") than the tape as it will shrink while curing.
20. Remove the tape as soon as the final grout pour is complete.
21. Once the grout for the Weigh in Motion Peizo 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.

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ROGER E. HORTON
STATE OF WASHINGTON
19894
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JANUARY 26, 2007

# PERMANENT TRAFFIC RECORDER AND WEIGH-IN-MOTION DETAILS STANDARD PLAN J-20

SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* 09-02-05

STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

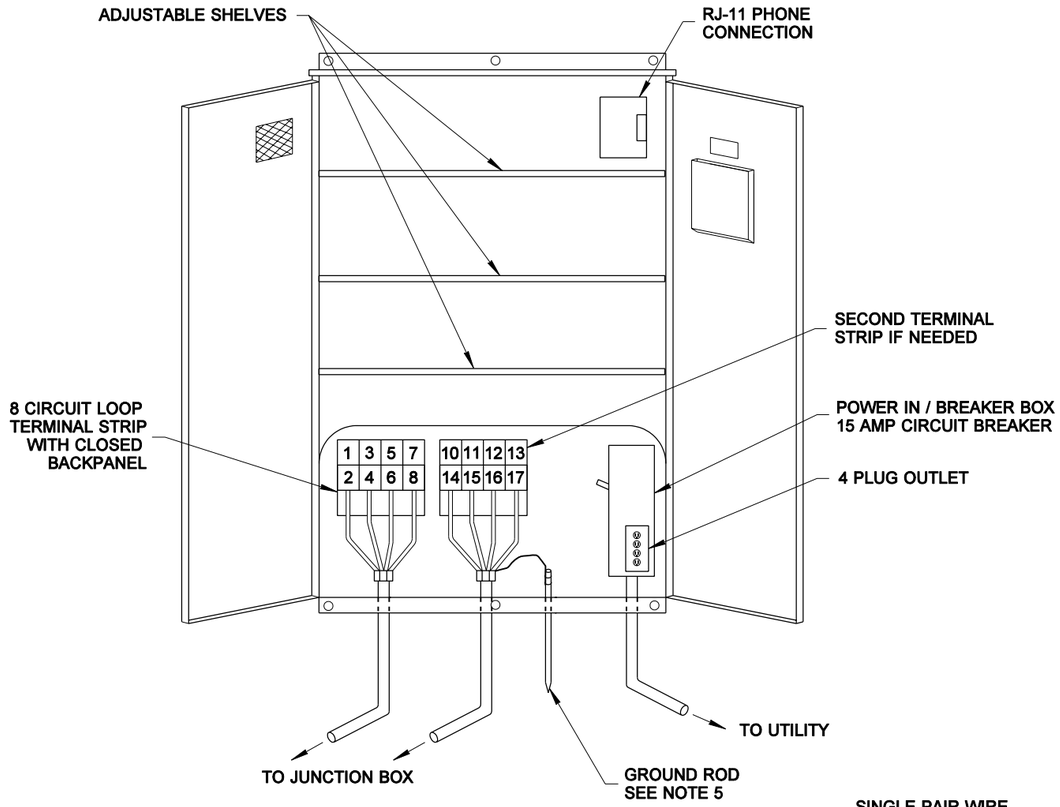
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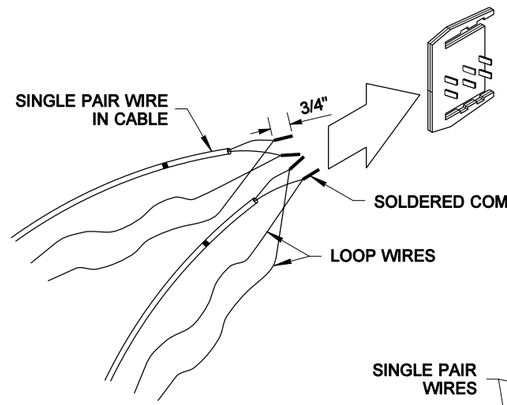

**SERVICE CABINET (TYP.)**

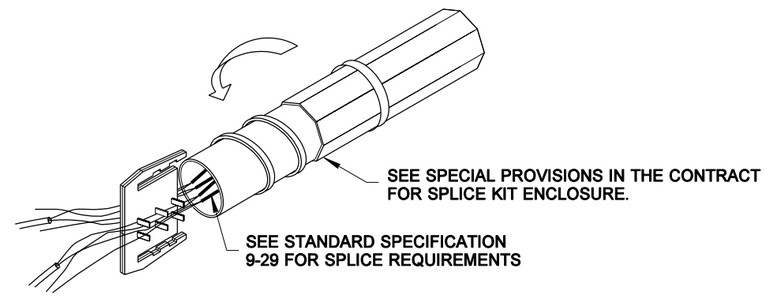
SEE NOTES 2 THRU 5

| COLOR CODE IDENTIFICATION | |
|---|---|
| COLOR | CIRCUIT NO. |
| BLACK | 0 |
| BROWN | 1 |
| RED | 2 |
| ORANGE | 3 |
| YELLOW | 4 |
| GREEN | 5 |
| BLUE | 6 |
| VIOLET | 7 |
| GRAY | 8 |
| BROWN & BLACK | 10 |
| BROWN & BROWN | 11 |
| BROWN & RED | 12 |
| BROWN & ORANGE | 13 |
| BROWN & YELLOW | 14 |
| BROWN & GREEN | 15 |
| BROWN & BLUE | 16 |
| BROWN & VIOLET | 17 |
| WHITE IS FOR INCREASING MILEPOSTS | |

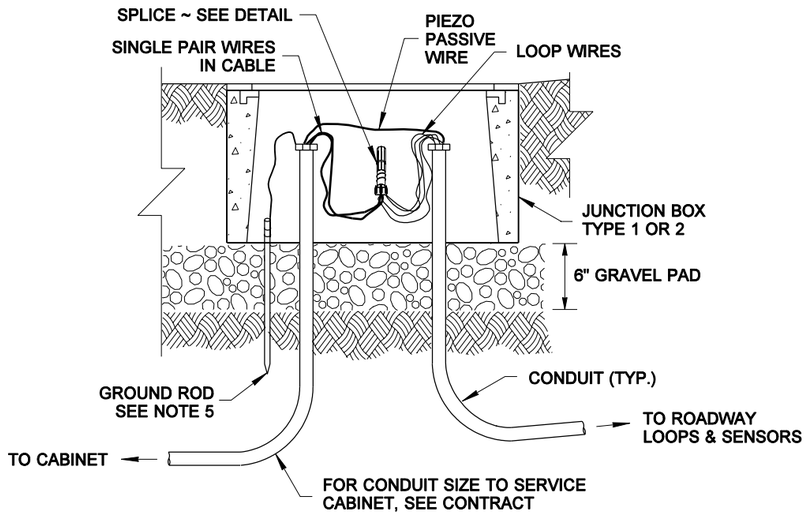
**NOTES**

1. The Loop and Piezo leads in all Junction Boxes and Cabinets are to be color-coded. Use colored tape on each specific wire, see table. Wrap the tape on the wires approximately 6" beyond conduit in all Junction Boxes.
2. The maximum load in the Cabinet is 5 Amps.
3. The Cabinet may be pedestal or pad mount, see Standard Plan J-6c for details.
4. See Special Provisions in the contract for the Cabinet dimensions. See Standard Specification 9-29 for other requirements.
5. For Grounding Details, See Standard Plan J-9a. See Standard Specification 8-20 for other requirements.

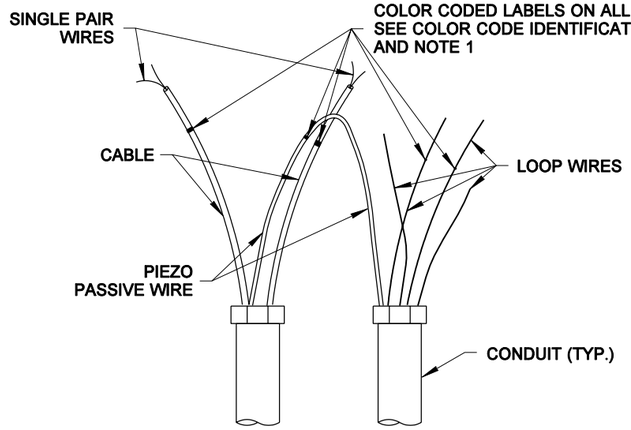



**SPLICE DETAIL**




**JUNCTION BOX**




**JUNCTION BOX WIRING**

**(SHOWN PRIOR TO SPLICING)**

ROGER E. HORTON
STATE OF WASHINGTON
19894
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES JANUARY 26, 2007

# PERMANENT TRAFFIC RECORDER AND WEIGH-IN-MOTION DETAILS STANDARD PLAN J-20

SHEET 3 OF 3 SHEETS

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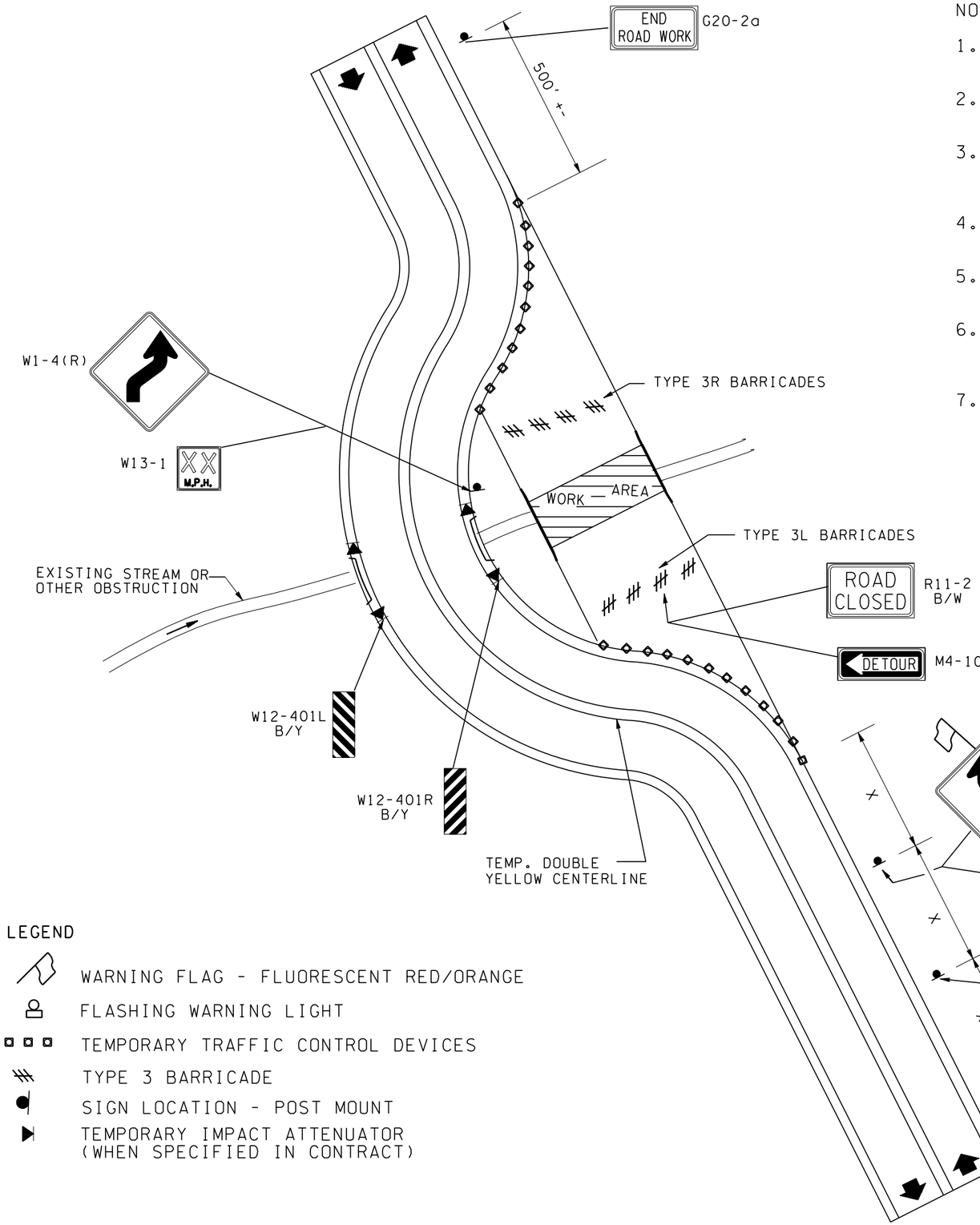
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *09-02-05* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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LEGEND

- WARNING FLAG - FLUORESCENT RED/ORANGE
- FLASHING WARNING LIGHT
- TEMPORARY TRAFFIC CONTROL DEVICES
- TYPE 3 BARRICADE
- SIGN LOCATION - POST MOUNT
- TEMPORARY IMPACT ATTENUATOR (WHEN SPECIFIED IN CONTRACT)

NOTES

1. SIGN SEQUENCE IS THE SAME FOR BOTH DIRECTIONS OF TRAVEL, ADJUSTED FOR THE DIRECTION OF ROADWAY CURVES.
2. FLASHING WARNING LIGHTS (TYPE B, MUTCD) AND/OR FLAGS SHALL BE USED TO CALL ATTENTION TO THE ADVANCE WARNING SIGNS.
3. EXISTING CONFLICTING PAVEMENT MARKINGS AND SIGNS NO LONGER APPLICABLE SHALL BE REMOVED. 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 LIGHTS (TYPE C, MUTCD) SHALL BE USED TO MARK TRAFFIC CONTROL DEVICES AT NIGHT.
6. WHERE ADVISORY SPEEDS ARE 30 MPH OR LESS, REVERSE TURN SIGNS SHOULD BE USED. OTHER CURVE OR TURN WARNING SIGNS MAY BE SUBSTITUTED TO DEPICT ROADWAY ALIGNMENT AS APPROPRIATE.
7. ROADSIDE BARRIERS AND END TREATMENTS SHALL BE CRASHWORTHY.

| SIGN SPACING = X (FEET) | | |
|---|---|---|
| Rural Roads | 45/55 MPH | 500'+- |
| Urban Arterials & Rural Roads | 35/40 MPH | 350'+- |
| Rural Roads Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |

| CHANNELIZING DEVICE SPACING (FEET) | | |
|---|---|---|
| MPH | TAPER | TANGENT |
| 50/70 | 40 | 80 |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |

ALAN O. KING
STATE OF WASHINGTON
15213
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 23, 2003

# ROAD CLOSURE WITH DIVERSION

## STANDARD PLAN K-1

SHEET 1 OF 1 SHEET

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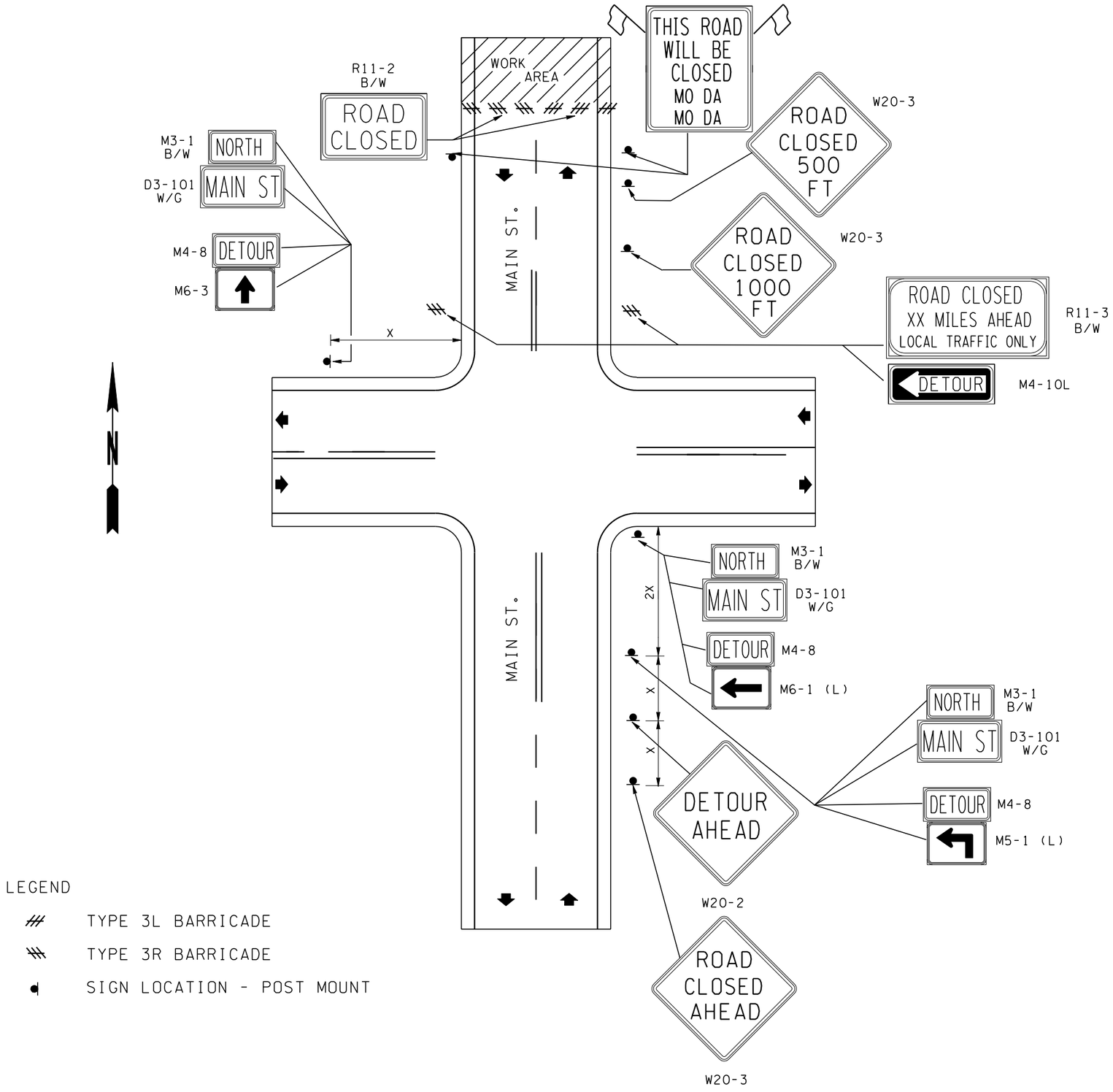
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LEGEND

- TYPE 3L BARRICADE
- TYPE 3R BARRICADE
- SIGN LOCATION - POST MOUNT

NOTES

1. MODIFY REGULATORY TRAFFIC CONTROL DEVICES FOR THE DURATION OF THE DETOUR.
2. TWO FLASHING WARNING LIGHTS (TYPE A, MUTCD) SHALL BE USED TO MARK EACH BARRICADE AT NIGHT.
3. DETOUR TRAILBLAZERS SHALL BE INSTALLED THROUGHOUT THE DETOUR.
4. SIGNING SHOWN FOR ONE DIRECTION ONLY.
5. COORDINATE WITH EMERGENCY SERVICES.

| SIGN SPACING = X (FEET) | | |
|---|---|---|
| Rural Roads | 45/55 MPH | 500'+- |
| Urban Arterials & Rural Roads | 35/40 MPH | 350'+- |
| Rural Roads Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |

ALAN O. KING
STATE OF WASHINGTON
15213
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 23, 2003

# ROAD CLOSURE WITH OFF-SITE DETOUR

## STANDARD PLAN K-2

SHEET 1 OF 1 SHEET

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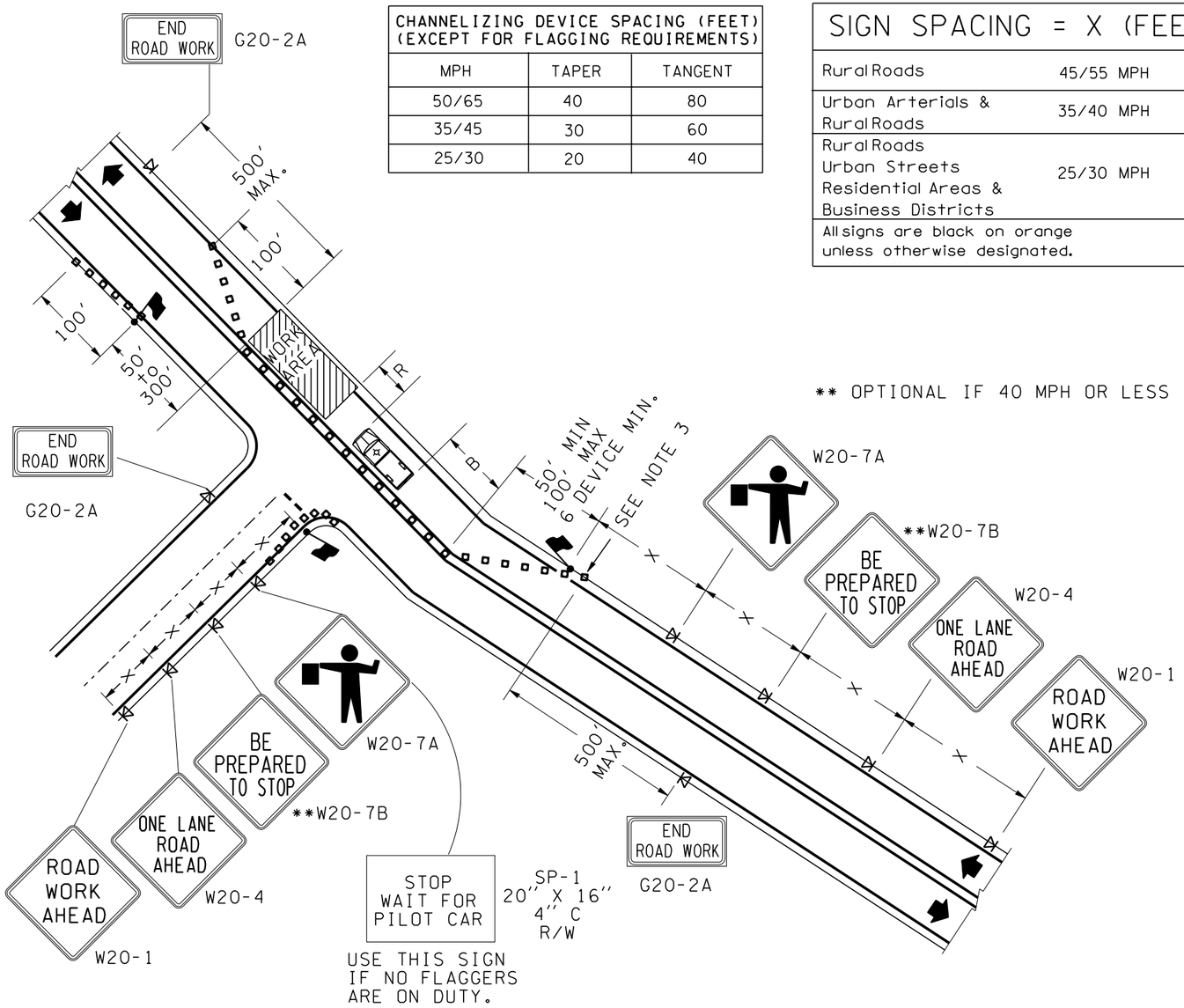
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-20-02* — DATE

Washington State Department of Transportation

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| CHANNELIZING DEVICE SPACING (FEET) (EXCEPT FOR FLAGGING REQUIREMENTS) | | |
|---|---|---|
| MPH | TAPER | TANGENT |
| 50/65 | 40 | 80 |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |

| SIGN SPACING = X (FEET) | | |
|---|---|---|
| Rural Roads | 45/55 MPH | 500'+- |
| Urban Arterials & Rural Roads | 35/40 MPH | 350'+- |
| Rural Roads Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |

NOTES

1. FLAGGER STATIONS SHALL BE ILLUMINATED DURING HOURS OF DARKNESS.
2. EXTEND DEVICES TAPER ACROSS SHOULDER.
3. SIGN SEQUENCE IS THE SAME FOR BOTH DIRECTIONS OF TRAVEL ON THE HIGHWAY.
4. RADIO COMMUNICATION RECOMMENDED BETWEEN FLAGGERS. REQUIRED IF FLAGGERS DO NOT HAVE CLEAR VISION OF EACH OTHER.

| BUFFER DATA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| BUFFER SPACE = B | | | | | | | | | |
| SPEED (MPH) | 25 | 30 | 35 | 40 | 45 | 50 | 55 | | |
| LENGTH (feet) | 55 | 85 | 120 | 170 | 220 | 280 | 335 | | |

| PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R | | | |
|---|---|---|---|
| VEHICLE TYPE | TYPICAL VEHICLE LOADED WEIGHT (LBS) | POSTED SPEED (mph) | STATIONARY OPERATION (feet) |
| 4 YARD DUMP TRUCK | 24,000 | 50-55 | 75 |
| | | 45 | 50 |
| 2 TON CARGO TRUCK | 15,000 | 50-55 | 100 |
| | | 45 | 75 |
| 1 TON CARGO TRUCK | 10,000 | 50-55 | 150 |
| | | 45 | 100 |
| ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT. | | | |

LEGEND

- SIGN LOCATION - TRIPOD MOUNT
- TEMPORARY TRAFFIC CONTROL DEVICES
- FLAGGING STATION
- PROTECTIVE VEHICLE (WHEN SPECIFIED IN CONTRACT)
- ---- EXISTING STOP BAR

FOR PILOT CAR OPERATIONS THE FOLLOWING SIGNS SHALL BE REQUIRED TO SUPPLEMENT THE SIGNS SHOWN ON THIS PLAN.

G20-4
36'' X 18''
PILOT CAR FOLLOW ME
(ON PILOT CAR)

SP-1
20'' X 16''
4'' C
R/W
STOP WAIT FOR PILOT CAR
(FOR ROAD APPROACHES AS NEEDED)

ALAN O. KING
STATE OF WASHINGTON
15213
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 23, 2003

# ALTERNATING ONE-WAY TRAFFIC FLAGGER CONTROLLED OR PILOT CAR CONTROLLED STANDARD PLAN K-3

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* 12-20-02

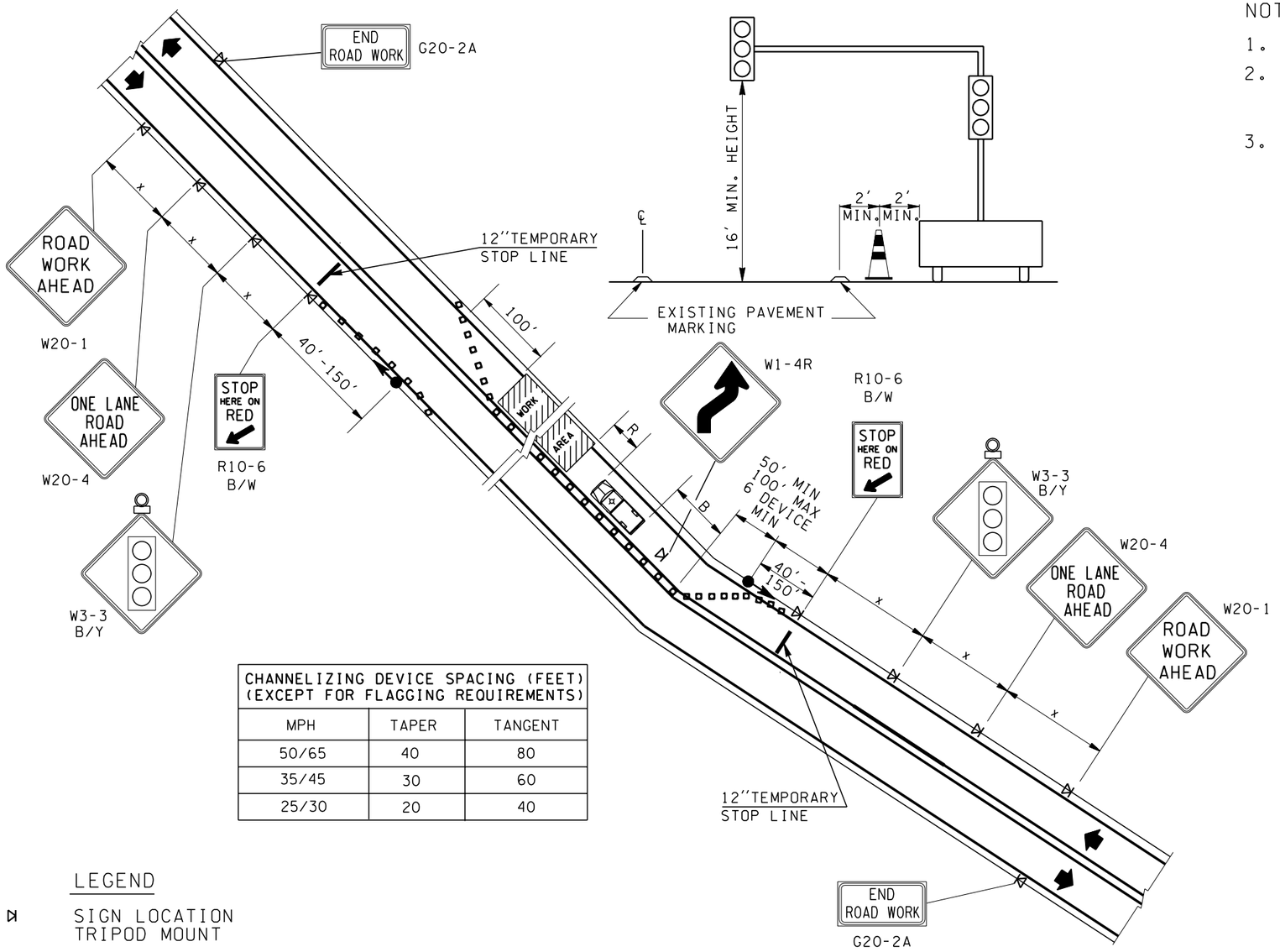
STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




| CHANNELIZING DEVICE SPACING (FEET) (EXCEPT FOR FLAGGING REQUIREMENTS) | | |
|---|---|---|
| MPH | TAPER | TANGENT |
| 50/65 | 40 | 80 |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |

LEGEND

- SIGN LOCATION TRIPOD MOUNT
- TEMPORARY TRAFFIC CONTROL DEVICES
- FLAGGING STATION
- PROTECTIVE VEHICLE (WHEN SPECIFIED IN CONTRACT)
- PORTABLE SIGNAL
- FLASHING BEACON

NOTES

1. EXTEND TAPER ACROSS SHOULDER.
2. THE MAXIMUM LENGTH OF WORK AREA CONTROLLED BY ONE-WAY TRAFFIC SIGNAL IS 400 FT. SIGNAL TIMING SHALL BE ESTABLISHED BY QUALIFIED PERSONNEL.
3. SIGNS SHALL BE POST MOUNTED IF SIGNAL REMAINS IN PLACE MORE THAN 3 DAYS.

| BUFFER DATA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| BUFFER SPACE = B | | | | | | | | | |
| SPEED (MPH) | 25 | 30 | 35 | 40 | 45 | 50 | 55 | | |
| LENGTH (feet) | 55 | 85 | 120 | 170 | 220 | 280 | 335 | | |
| PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R | | | | | | | | | |

| VEHICLE TYPE | TYPICAL VEHICLE LOADED WEIGHT (LBS) | POSTED SPEED (mph) | STATIONARY OPERATION (feet) |
|---|---|---|---|
| 4 YARD DUMP TRUCK | 24,000 | 50-55 | 75 |
| | | 45 | 50 |
| 2 TON CARGO TRUCK | 15,000 | 50-55 | 100 |
| | | 45 | 75 |
| 1 TON CARGO TRUCK | 10,000 | 50-55 | 150 |
| | | 45 | 100 |

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT.

| SIGN SPACING = X (feet) | | |
|---|---|---|
| Rural Roads | 45/55 MPH | 500'+- |
| Urban Arterials | 35/40 MPH | 350'+- |
| Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |

ALAN O. KING
STATE OF WASHINGTON
15213
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 23, 2003

# ALTERNATING ONE-WAY TRAFFIC TEMPORARY SIGNAL CONTROLLED

# STANDARD PLAN K-4

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* 12-20-02

STATE DESIGN ENGINEER DATE

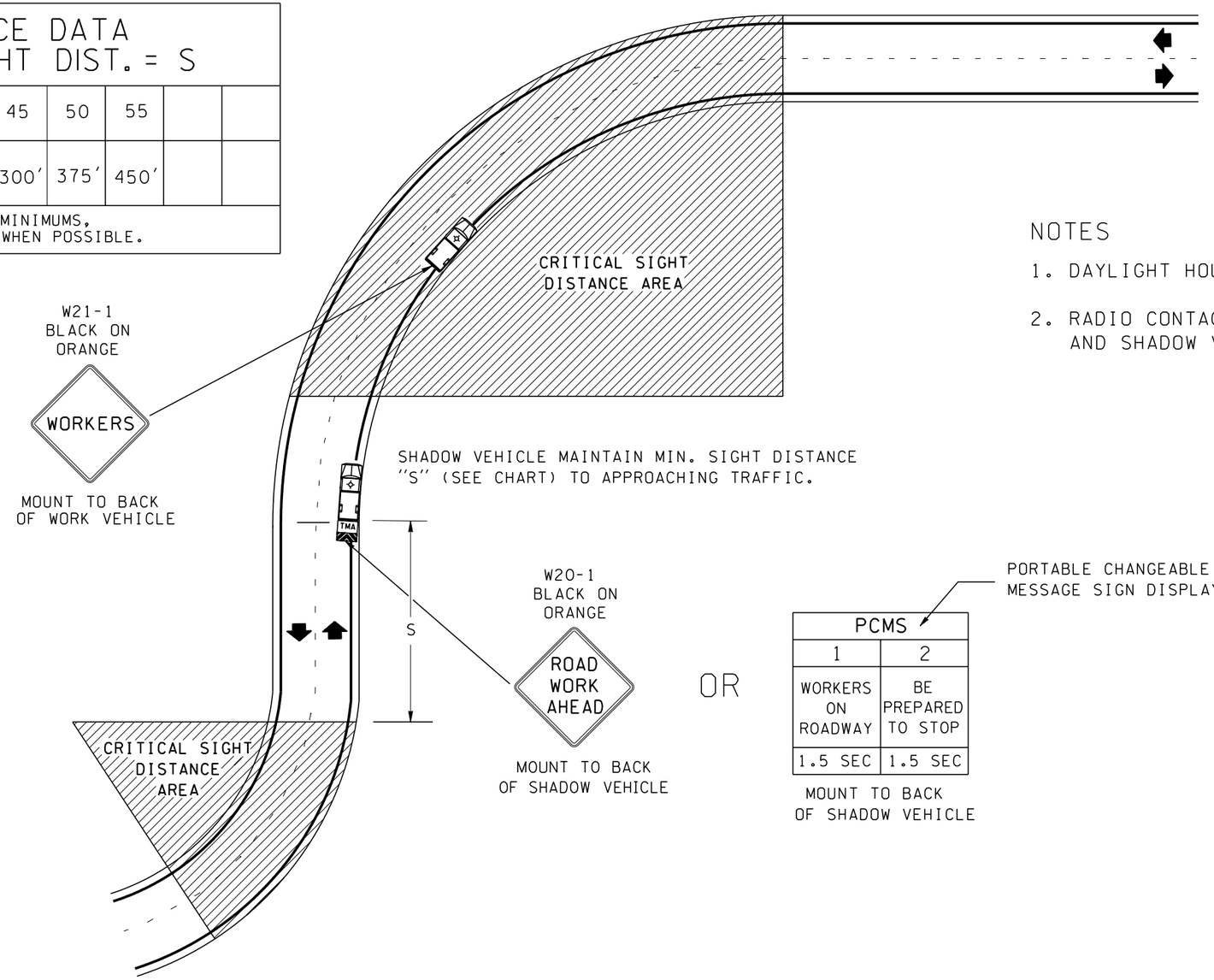
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| SIGHT DISTANCE DATA<br>MIN. STOPPING SIGHT DIST. = S | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SPEED LIMIT MPH | 25 | 30 | 35 | 40 | 45 | 50 | 55 | | |
| DISTANCE FEET | 75′ | 100′ | 150′ | 225′ | 300′ | 375′ | 450′ | | |
| DISTANCES SHOWN ARE MINIMUMS,<br>USE ADDITIONAL DISTANCE WHEN POSSIBLE. | | | | | | | | | |




OR

PORTABLE CHANGEABLE MESSAGE SIGN DISPLAYS

| PCMS | |
|---|---|
| 1 | 2 |
| WORKERS ON ROADWAY | BE PREPARED TO STOP |
| 1.5 SEC | 1.5 SEC |

MOUNT TO BACK
OF SHADOW VEHICLE

NOTES

1. DAYLIGHT HOURS ONLY.
2. RADIO CONTACT BETWEEN WORK CREW AND SHADOW VEHICLE RECOMMENDED.

LEGEND

WORK VEHICLE WITH FLASHING AMBER WARNING BEACON

SHADOW VEHICLE WITH FLASHING AMBER WARNING BEACON
(WITH TRUCK MOUNTED ATTENUATOR WHEN SPECIFIED IN CONTRACT)




EXPIRES NOVEMBER 23, 2003

# MOBILE SHOULDER OPERATION WITH LANE ENCROACHMENT STANDARD PLAN K-5

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-20-02* — DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

## BUFFER DATA

**BUFFER SPACE = B**

| SPEED (MPH) | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | — |
|---|---|---|---|---|---|---|---|---|---|---|
| LENGTH (feet) | 55 | 85 | 120 | 170 | 220 | 280 | 335 | 415 | 485 | — |

**PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R**

| VEHICLE TYPE | TYPICAL VEHICLE LOADED WEIGHT (LBS) | POSTED SPEED (mph) | STATIONARY OPERATION (feet) |
|---|---|---|---|
| 4 YARD DUMP TRUCK | 24,000 | 60-65 | 100 |
| | | 50-55 | 75 |
| | | 45 | 50 |
| 2 TON CARGO TRUCK | 15,000 | 60-65 | 150 |
| | | 50-55 | 100 |
| | | 45 | 75 |
| 1 TON CARGO TRUCK | 10,000 | 60-65 | 200 |
| | | 50-55 | 150 |
| | | 45 | 100 |

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT.

## CHANNELIZING DEVICE SPACING (FEET)

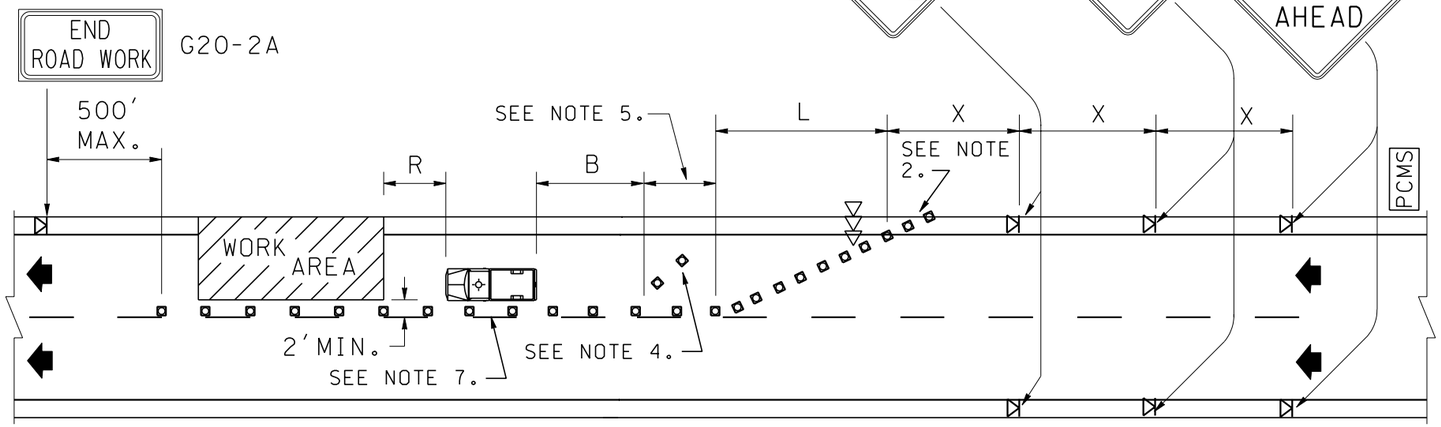
| MPH | TAPER | TANGENT |
|---|---|---|
| 50/65 | 40 | 80 |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |

## MINIMUM TAPER LENGTH = L (FEET)

| LANE WIDTH (feet) | Posted Speed (mph) 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 |
|---|---|---|---|---|---|---|---|---|---|
| 10 | 105 | 150 | 205 | 270 | 450 | 500 | 550 | - | - |
| 11 | 115 | 165 | 225 | 295 | 495 | 550 | 605 | 660 | - |
| 12 | 125 | 180 | 245 | 320 | 540 | 600 | 660 | 720 | 780 |

NOTES

1. EXTEND DEVICE TAPER ACROSS SHOULDER.
2. DEVICES SHOULD NOT ENCROACH INTO ADJACENT LANES.
3. INSTALL PORTABLE CHANGEABLE MESSAGE SIGN (WHEN SPECIFIED) APPROXIMATELY 1 MILE IN ADVANCE OF LANE CLOSURE.
4. USE TRANSVERSE DEVICES IN CLOSED LANE EVERY 1000′ +-
5. TRAFFIC SAFETY DRUMS RECOMMENDED FOR HIGH SPEED ROADWAYS AND IN TAPER SECTIONS. USE (IN LIEU OF CONES).
6. ANALYZE THE TRAFFIC VOLUMES TO DETERMINE WORK HOURS TO MININIZE TRAFFIC IMPACTS.
7. A TEMPORARY RIGHT EDGE LINE IS REQUIRED FOR A LONG TERM CLOSURE.




PORTABLE CHANGEABLE MESSAGE SIGN DISPLAYS

| PCMS | |
|---|---|
| 1 | 2 |
| RIGHT LANE CLOSED | 1 MILE AHEAD |
| 1.5 SEC | 1.5 SEC |

## SIGN SPACING = X (FEET)

| | | |
|---|---|---|
| Rural Roads | 45/65 MPH | 500′+- |
| Urban Arterials & Rural Roads | 35/40 MPH | 350′+- |
| Rural Roads Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200′+- |

All signs are black on orange unless otherwise designated.

## LEGEND

- SIGN LOCATION-TRIPOD MOUNTED
- SEQUENTIAL ARROW SIGN
- TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE (WHEN SPECIFIED IN CONTRACT)
- TMA — PROTECTIVE VEHICLE WITH TRUCK MOUNTED ATTENUATOR (WHEN SPECIFIED IN CONTRACT FOR HIGH SPEED ROADWAYS)
- PCMS — PORTABLE CHANGEABLE MESSAGE SIGN (WHEN SPECIFIED IN CONTRACT)

ALAN O. KING — STATE OF WASHINGTON — 15213 — REGISTERED PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 23, 2003

# RIGHT LANE CLOSURE FOR DIVIDED HIGHWAY

## STANDARD PLAN K-6

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

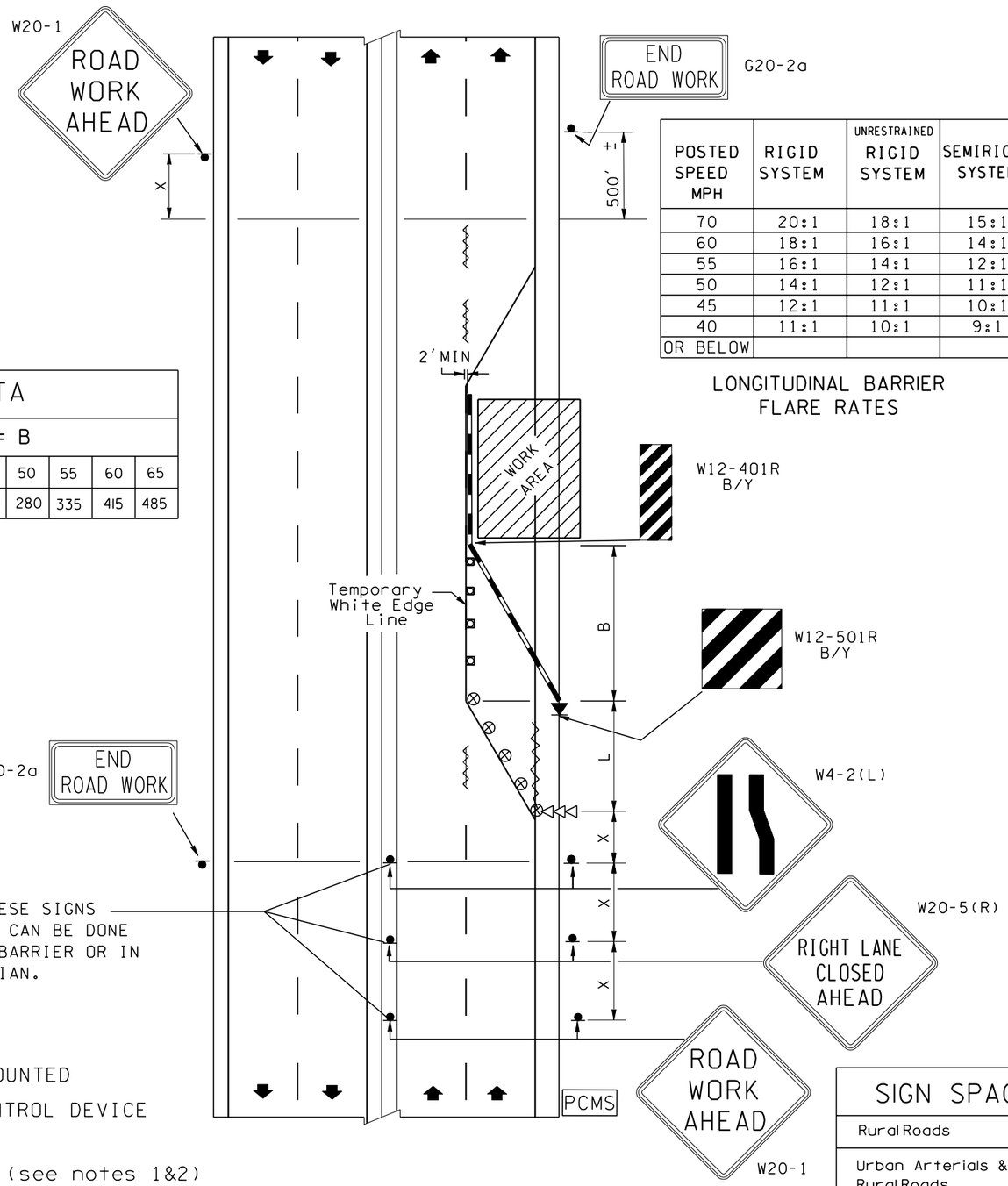
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-20-02* — DATE

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




| POSTED SPEED MPH | RIGID SYSTEM | UNRESTRAINED RIGID SYSTEM | SEMIRIGID SYSTEM |
|---|---|---|---|
| 70 | 20:1 | 18:1 | 15:1 |
| 60 | 18:1 | 16:1 | 14:1 |
| 55 | 16:1 | 14:1 | 12:1 |
| 50 | 14:1 | 12:1 | 11:1 |
| 45 | 12:1 | 11:1 | 10:1 |
| 40 | 11:1 | 10:1 | 9:1 |
| OR BELOW | | | |

LONGITUDINAL BARRIER FLARE RATES

NOTES

1. EXISTING CONFLICTING PAVEMENT MARKINGS NO LONGER APPLICABLE SHALL BE REMOVED OR OBLITERATED.
2. TEMPORARY MARKINGS SHALL BE USED AS NECESSARY.
3. EXPOSED ENDS OF CONCRETE BARRIERS SHALL BE MAINTAINED OUTSIDE THE CLEAR ZONE AND ADEQUATELY FLARED OR FITTED WITH IMPACT ATTENUATORS.
4. STEADY BURNING WARNING LIGHTS (TYPE C, MUTCD) SHALL BE USED TO MARK CHANNELIZING DEVICES AT NIGHT AS NEEDED.
5. ROADSIDE BARRIERS AND END TREATMENT SHALL BE CRASHWORTHY.
6. INSTALL PORTABLE CHANGEABLE MESSAGE SIGN (WHEN SPECIFIED) APPROXIMATELY 1 MILE IN ADVANCE OF LANE CLOSURE.

| BUFFER DATA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| BUFFER SPACE = B | | | | | | | | | |
| SPEED (MPH) | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 |
| LENGTH (feet) | 55 | 85 | 120 | 170 | 220 | 280 | 335 | 415 | 485 |

| MINIMUM TAPER LENGTH = L (FEET) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| LANE WIDTH (feet) | Posted Speed (mph) 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 |
| 10 | 105 | 150 | 205 | 270 | 450 | 500 | 550 | - | - |
| 11 | 115 | 165 | 225 | 295 | 495 | 550 | 605 | 660 | - |
| 12 | 125 | 180 | 245 | 320 | 540 | 600 | 660 | 720 | 780 |

PORTABLE CHANGEABLE MESSAGE SIGN DISPLAYS

| PCMS | |
|---|---|
| 1 | 2 |
| RIGHT LANE CLOSED | ONE MILE AHEAD |
| 1.5 SEC | 1.5 SEC |

| CHANNELIZING DEVICE SPACING (FEET) | | |
|---|---|---|
| MPH | TAPER | TANGENT |
| 50/65 | 40 | 80 |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |

LEGEND

- SIGN LOCATION-POST MOUNTED
- TEMPORARY TRAFFIC CONTROL DEVICE
- TRAFFIC SAFETY DRUMS
- OBLITERATED MARKINGS (see notes 1&2)
- TEMPORARY CONCRETE BARRIER W/REFLECTORS
- SEQUENTIAL ARROW SIGN
- TEMPORARY IMPACT ATTENUATORS (WHEN SPECIFIED IN CONTRACT).
- PCMS PORTABLE CHANGEABLE MESSAGE SIGN (WHEN SPECIFIED IN CONTRACT)

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| SIGN SPACING = X (FEET) | | |
|---|---|---|
| Rural Roads | 45/65 MPH | 500'+- |
| Urban Arterials & Rural Roads | 35/40 MPH | 350'+- |
| Rural Roads Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |




EXPIRES NOVEMBER 23, 2003

# LANE CLOSURE WITH TEMPORARY CONCRETE BARRIER

## STANDARD PLAN K-7

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

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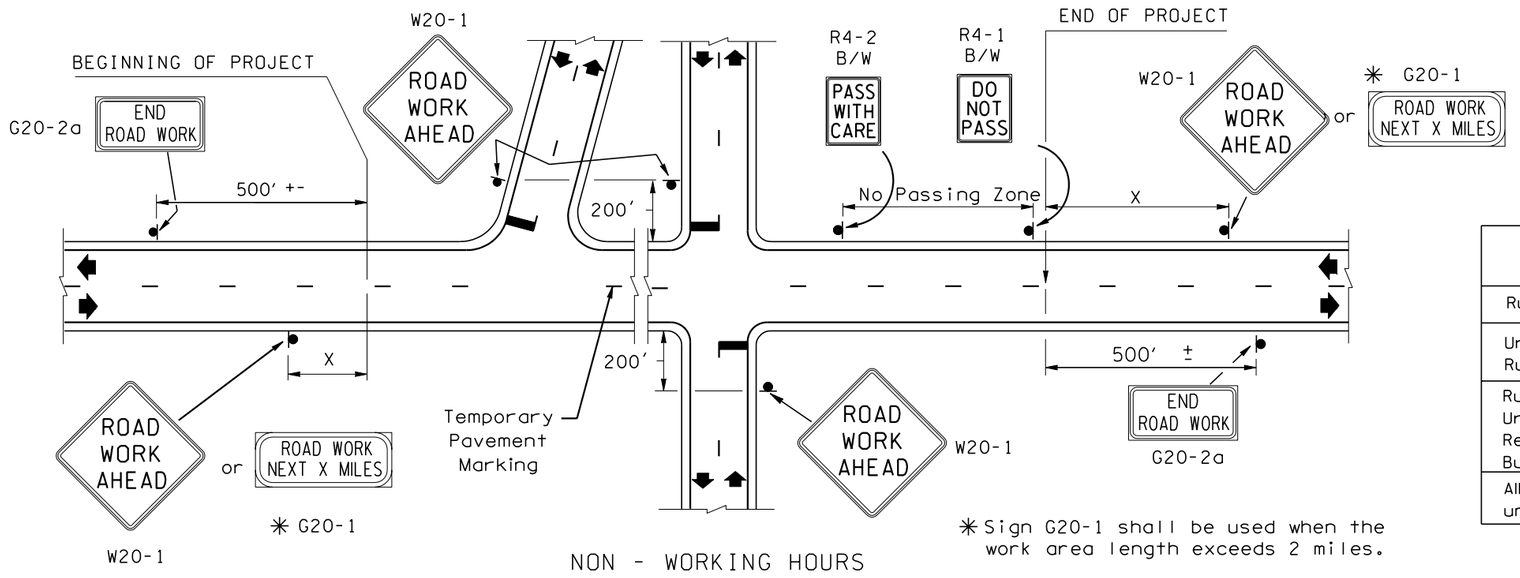
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

NOTES

1. OTHER WARNING SIGNS, SUCH AS LOOSE GRAVEL, TRUCK CROSSING, BUMP, ABRUPT LANE EDGE, ETC. SHALL BE USED AS NECESSARY ALONG WITH ADVISORY SPEED SIGNS.
2. ADVISORY SPEED SIGNS ARE DETERMINED BY THE ENGINEER.
3. FLOODLIGHTS SHALL BE PROVIDED TO MARK FLAGGER STATIONS AT NIGHT.




NON - WORKING HOURS

✳ Sign G20-1 shall be used when the work area length exceeds 2 miles.

| SIGN SPACING = X (FEET) | | |
|---|---|---|
| Rural Roads | 45/65 MPH | 500'+- |
| Urban Arterials & Rural Roads | 35/40 MPH | 350'+- |
| Rural Roads Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |

LEGEND

SIGN LOCATION-POST MOUNTED

ALAN O. KING
STATE OF WASHINGTON
15213
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 23, 2003

# PAVING OPERATIONS NON-WORKING HOURS STANDARD PLAN K-8

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-20-02* — DATE

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

## BUFFER DATA

**BUFFER SPACE = B**

| SPEED (MPH) | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | — |
|---|---|---|---|---|---|---|---|---|---|---|
| LENGTH (feet) | | | | 170 | 220 | 280 | 335 | 415 | 485 | — |

**PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R**

| VEHICLE TYPE | TYPICAL VEHICLE LOADED WEIGHT (LBS) | POSTED SPEED (mph) | STATIONARY OPERATION (feet) |
|---|---|---|---|
| 4 YARD DUMP TRUCK | 24,000 | 60-65 | 100 |
| | | 50-55 | 75 |
| | | 45 | 50 |
| 2 TON CARGO TRUCK | 15,000 | 60-65 | 150 |
| | | 50-55 | 100 |
| | | 45 | 75 |
| 1 TON CARGO TRUCK | 10,000 | 60-65 | 200 |
| | | 50-55 | 150 |
| | | 45 | 100 |

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT.

## SIGN SPACING = X (FEET)

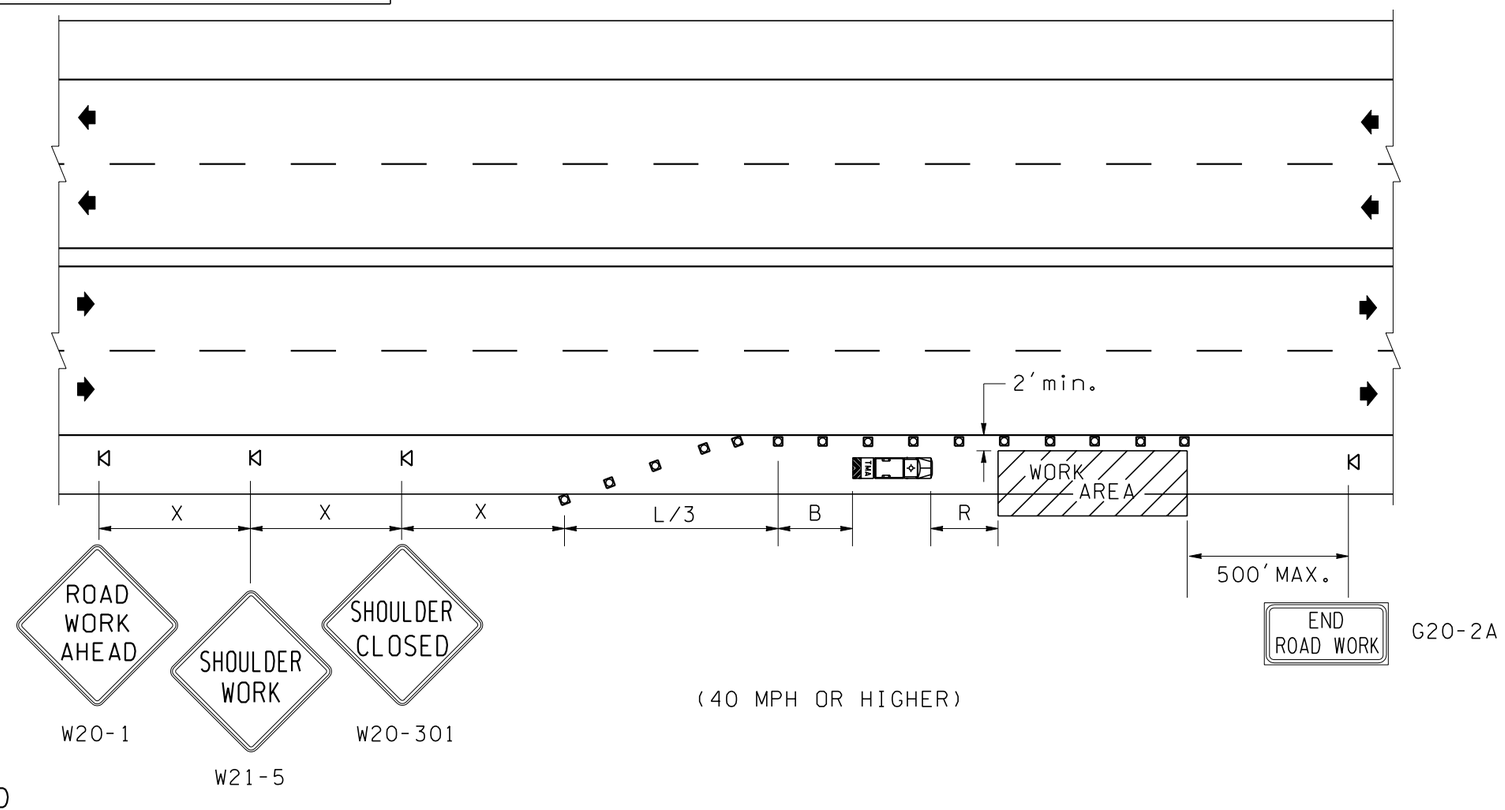
| | | |
|---|---|---|
| Rural Roads | 45/65 MPH | 500'+- |
| Urban Arterials | 40 MPH | 350'+- |

All signs are black on orange unless otherwise designated.

**CHANNELIZING DEVICE SPACING (FEET)**

| MPH | TAPER | TANGENT |
|---|---|---|
| 50/70 | 40 | 80 |
| 40/45 | 30 | 60 |

1. NO ENCROACHMENT ON TRAVELLED LANE IF ENCROACHMENT IS NECESSARY, LANE SHALL BE CLOSED.
2. FOR OPERATIONS OF 15 MINUTES OR LESS, ALL SIGNS AND CHANNELIZATION DEVICES MAY BE ELIMINATED.




(40 MPH OR HIGHER)

LEGEND

- SIGN LOCATION-TRIPOD MOUNTED
- TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE WITH TRUCK MOUNTED ATTENUATOR (WHEN SPECIFIED IN CONTRACT)

**MINIMUM TAPER LENGTH (L) IN FEET**

| Lane Width (feet) | Posted Speed (mph) 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 |
|---|---|---|---|---|---|---|---|---|---|
| 10 | - | - | - | 265 | 450 | 500 | 550 | - | - |
| 11 | - | - | - | 295 | 495 | 550 | 605 | 660 | - |
| 12 | - | - | - | 320 | 540 | 600 | 660 | 720 | 780 |

ALAN O. KING — STATE OF WASHINGTON — 15213 — REGISTERED PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 23, 2003

# SHOULDER CLOSURE HIGH SPEED

## STANDARD PLAN K-9

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-20-02* — DATE

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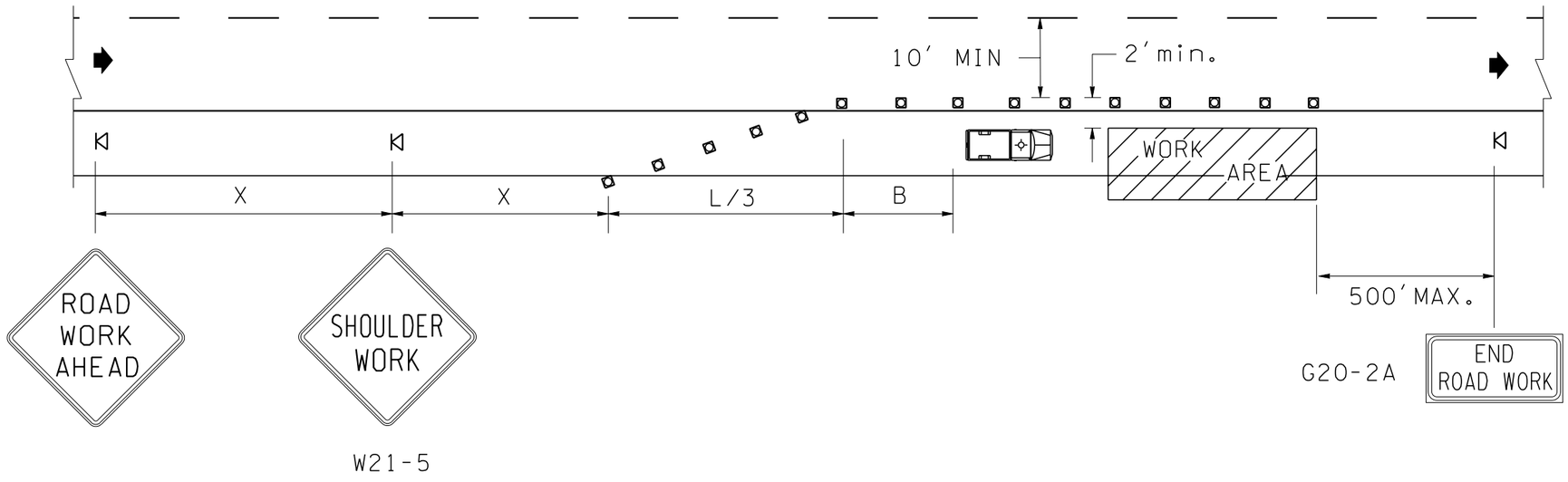
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| BUFFER DATA | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BUFFER SPACE = B | | | | | | | | |
| SPEED (MPH) | 25 | 30 | 35 | 40 | 45 | | | |
| LENGTH (feet) | 55 | 85 | 120 | — | — | | | |

| CHANNELIZING DEVICE SPACING (FEET) | | |
|---|---|---|
| MPH | TAPER | TANGENT |
| 35 | 30 | 60 |
| 25/30 | 20 | 40 |

| SIGN SPACING = X (FEET) | | |
|---|---|---|
| Urban Arterials | 35 MPH | 350'+- |
| Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |

| MINIMUM TAPER LENGTH (L) IN FEET | | | | | |
|---|---|---|---|---|---|
| Lane Width (feet) | Posted Speed (mph) 25 | 30 | 35 | 40 | |
| 10 | 105 | 150 | 205 | - | |
| 11 | 115 | 165 | 225 | - | |
| 12 | 125 | 180 | 245 | - | |




LEGEND

- SIGN LOCATION-TRIPOD MOUNTED
- TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE (WHEN SPECIFIED IN CONTRACT)

(35 MPH OR LESS)

ALAN O. KING
STATE OF WASHINGTON
15213
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 23, 2003

# SHOULDER CLOSURE LOW SPEED

## STANDARD PLAN K-10

SHEET 1 OF 1 SHEET

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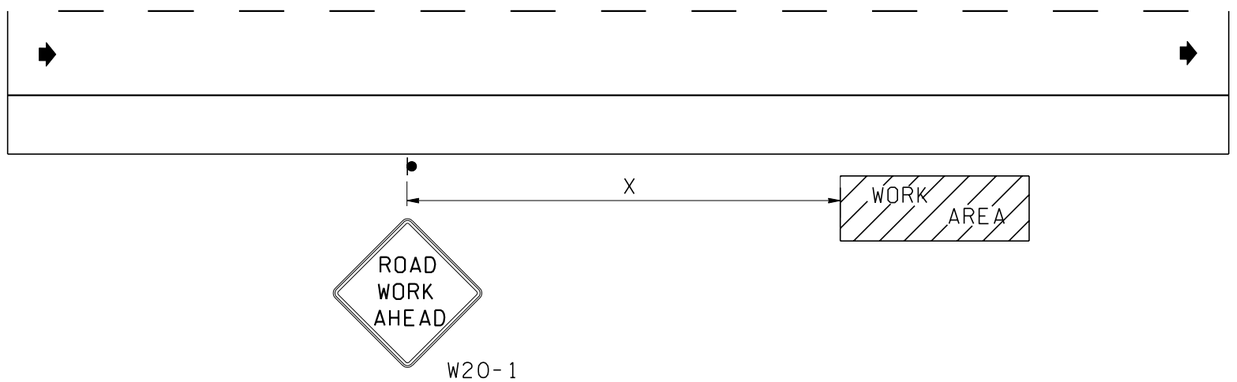
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-20-02* DATE

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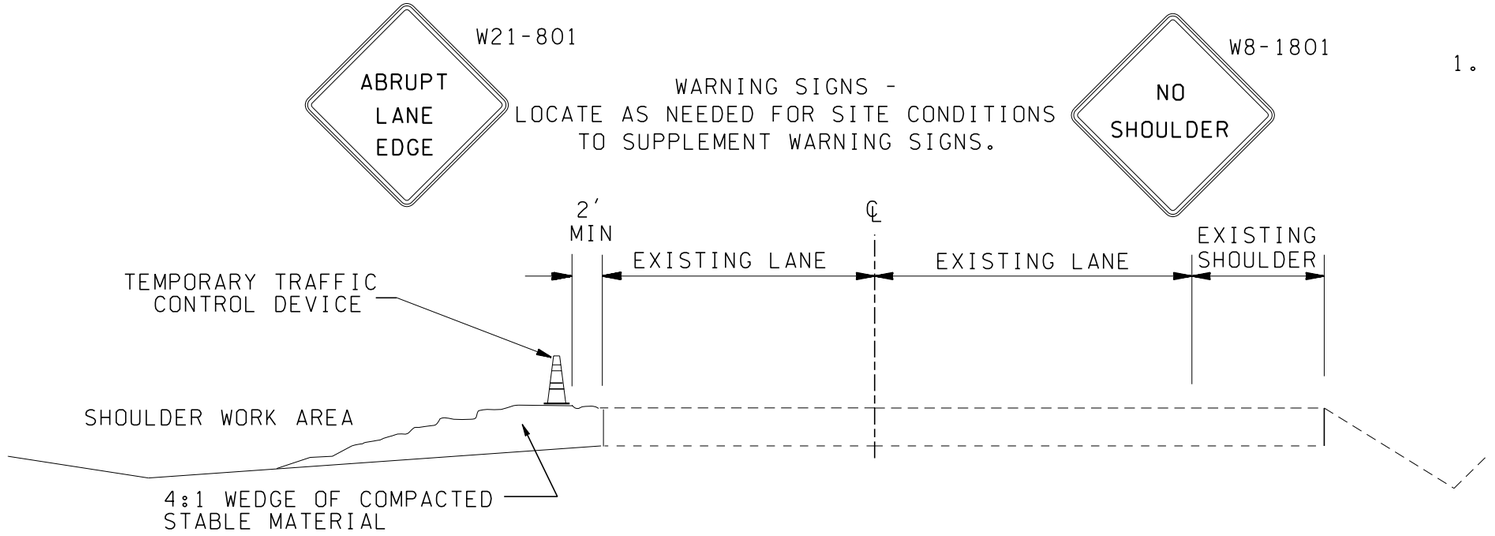



WORK BEYOND THE SHOULDER

NOTES

1. THE SIGN SHOWN IS NOT REQUIRED IF THE WORK SPACE IS BEHIND A BARRIER, MORE THAN 2' BEHIND THE CURB, OR 15' OR MORE FROM THE EDGE OF ANY ROADWAY.

| SIGN SPACING = X (feet) | | |
|---|---|---|
| Rural Roads | 45/55 MPH | 500'+- |
| Urban Arterials | 35/40 MPH | 350'+- |
| Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |




SHOULDER WORK AREA PROTECTION
NON-WORKING HOURS

1. SHOULDER EXCAVATION SHALL BE LIMITED TO ONE SIDE AT A TIME.




EXPIRES NOVEMBER 23, 2003

# SHOULDER WORK AREAS

## STANDARD PLAN K-11

SHEET 1 OF 1 SHEET

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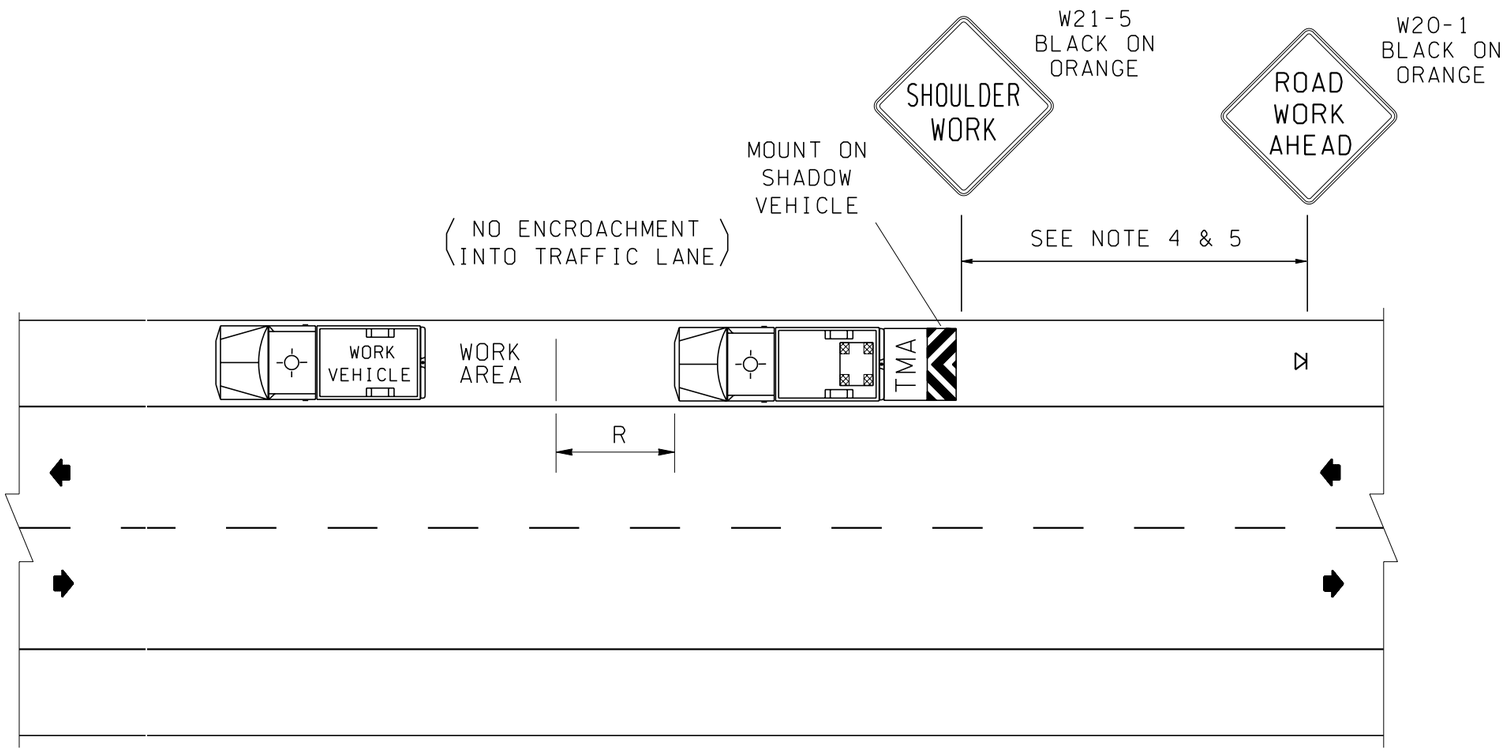
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R' | | | |
|---|---|---|---|
| VEHICLE TYPE | VEHICLE WEIGHT (LBS) | STATIONARY | MOBILE |
| 4 YARD DUMP TRUCK | 24,000 | 100' | 175' |
| ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT | | | |

NOTES

1. WORK VEHICLE AND SHADOW/PROTECTIVE VEHICLE SHALL USE WARNING BEACONS.
2. SHADOW/PROTECTIVE VEHICLE RECOMMENDED- SHALL MAINTAIN 500'-1000' OF SIGHT DISTANCE TO APPROACHING TRAFFIC.
3. THIS PLAN MAY BE IMPLEMENTED ON MULTI-LANE HIGHWAYS WITH LESS THAN 10,000 ADT.
4. 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 SHOULD NOT EXCEED 2 MILES.
5. IN THOSE SITUATIONS WHERE THE DISTANCE BETWEEN THE ADVANCE WARNING SIGNS AND THE WORK IS 1 TO 2 MILES, A SUPPLEMENTAL DISTANCE PLAQUE SHALL BE USED WITH THE ROAD WORK AHEAD SIGN.




LEGEND

SEQUENTIAL ARROW PANEL - TYPE "B" (CAUTION MODE)

TMA — TRUCK MOUNTED ATTENUATOR

WARNING BEACON

ALAN O. KING
STATE OF WASHINGTON
15213
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 23, 2003

# SHORT TERM DURATION OR MOBILE OPERATION SHOULDER CLOSURE
# STANDARD PLAN K-12

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-20-02* DATE

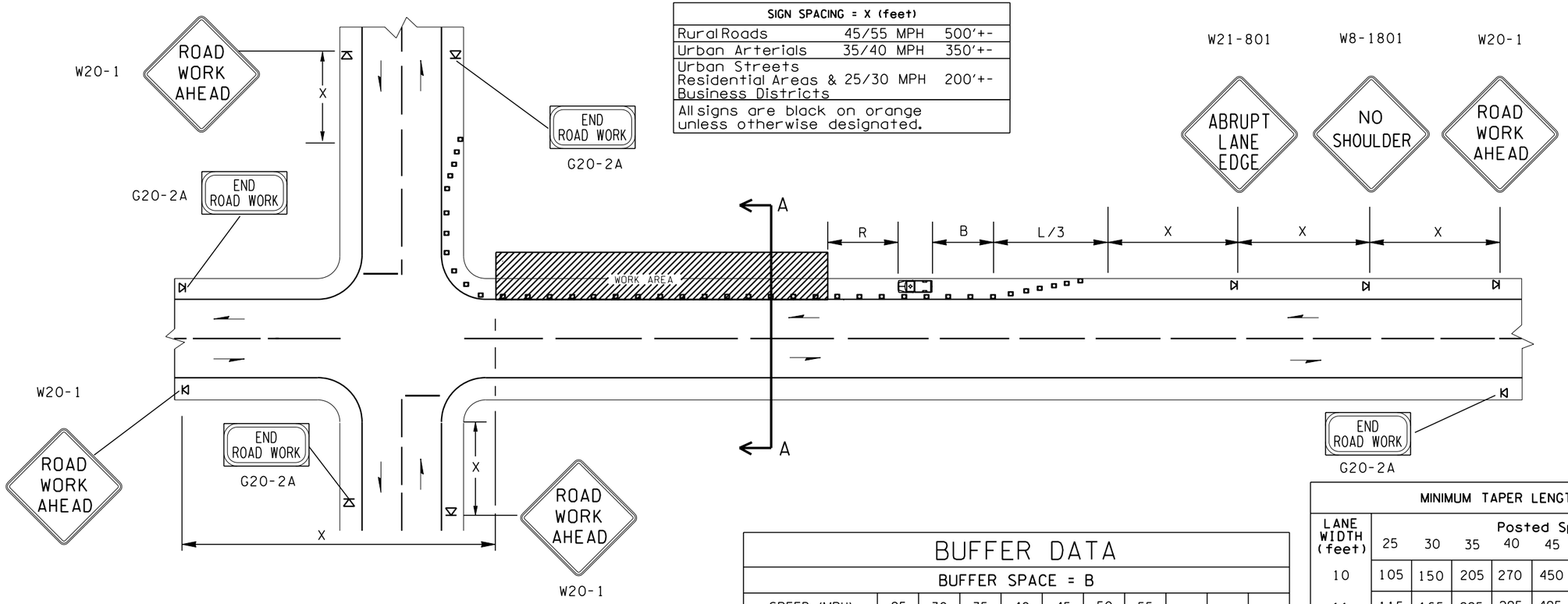
Washington State Department of Transportation

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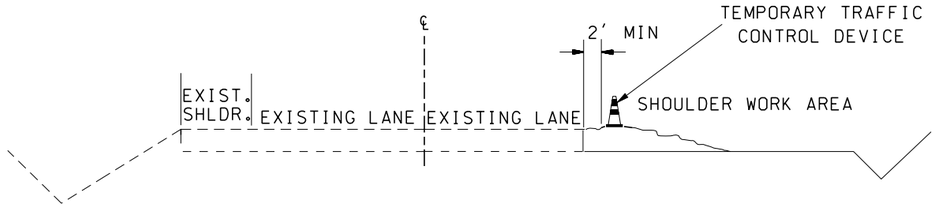
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| SIGN SPACING = X (feet) | | |
|---|---|---|
| Rural Roads | 45/55 MPH | 500'+- |
| Urban Arterials | 35/40 MPH | 350'+- |
| Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |




TYPICAL ROADWAY SECTION A-A




## BUFFER DATA

BUFFER SPACE = B

| SPEED (MPH) | 25 | 30 | 35 | 40 | 45 | 50 | 55 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| LENGTH (feet) | 55 | 85 | 120 | 170 | 220 | 280 | 335 | | | |

BUFFER VEHICLE ROLL AHEAD DISTANCE = R

| VEHICLE TYPE | TYPICAL VEHICLE LOADED WEIGHT (lbs) | POSTED SPEED (mph) | STATIONARY OPERATION (feet) | MOVING OPERATION (feet) |
|---|---|---|---|---|
| 4 YARD DUMP TRUCK | 24,000 | | | |
| | | 50-55 | 75 | |
| | | 45 | 50 | |
| 2 TON CARGO TRUCK | 15,000 | | | |
| | | 50-55 | 100 | |
| | | 45 | 75 | |

ROLL AHEAD STOPPING SIGHT DISTANCE ASSUMES DRY PAVEMENT

| MINIMUM TAPER LENGTH = L (feet) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| LANE WIDTH (feet) | Posted Speed (mph) 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 |
| 10 | 105 | 150 | 205 | 270 | 450 | 500 | 550 | - | - | - |
| 11 | 115 | 165 | 225 | 295 | 495 | 550 | 605 | - | - | - |
| 12 | 125 | 180 | 245 | 320 | 540 | 600 | 660 | - | - | - |

LEGEND

- SIGN LOCATION - TRIPOD MOUNT
- TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE (WHEN SPECIFIED IN CONTRACT)
- PROTECTIVE VEHICLE WITH TRUCK MOUNTED ATTENUATOR (WHEN SPECIFIED IN CONTRACT FOR HIGH SPEED ROADWAYS)

NOTES

1. FOR LONG-TERM PROJECTS, CONFLICTING PAVEMENT MARKINGS NO LONGER APPLICABLE SHALL BE REMOVED. TEMPORARY MARKINGS SHALL BE USED AS NECESSARY AND SIGNS SHALL BE POST MOUNTED.

| CHANNELIZING DEVICE SPACING (feet) | | |
|---|---|---|
| MPH | TAPER | TANGENT |
| 50/70 | 40 | 80 |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |

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ALAN O. KING
STATE OF WASHINGTON
15213
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 23, 2003

# INTERSECTION SHOULDER WORK
# 4 WAY INTERSECTION
# STANDARD PLAN K-13

SHEET 1 OF 1 SHEET

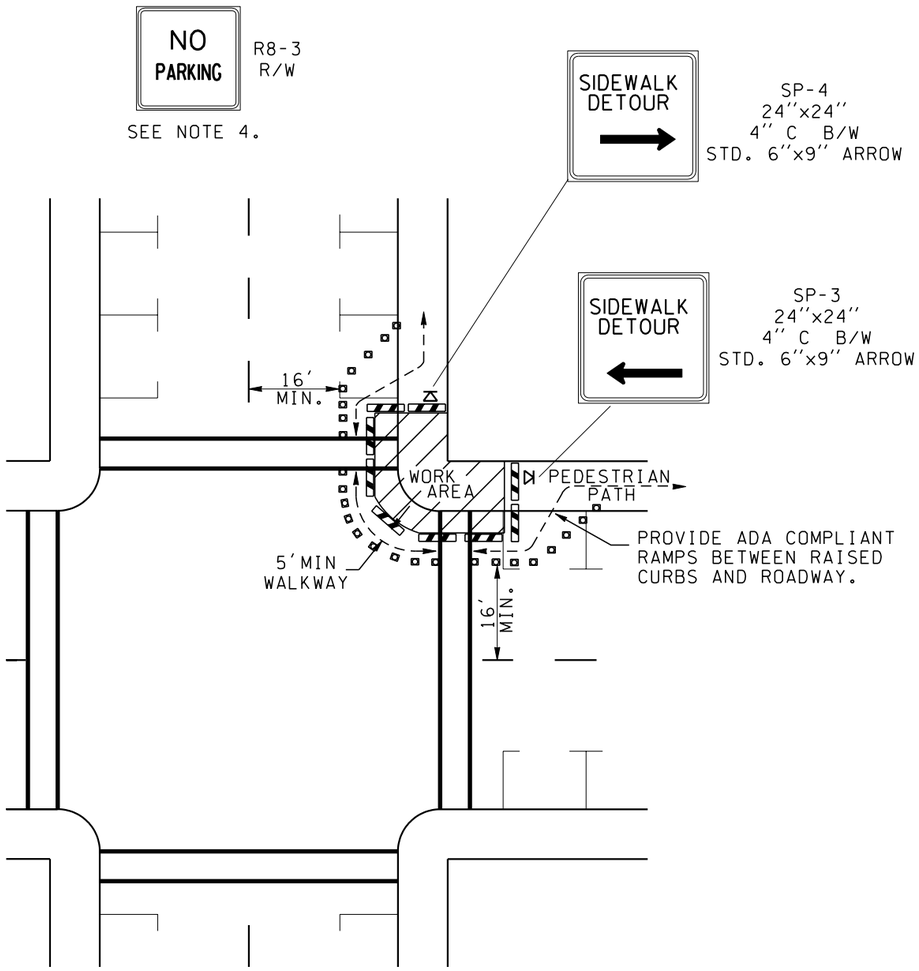
APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-20-02* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



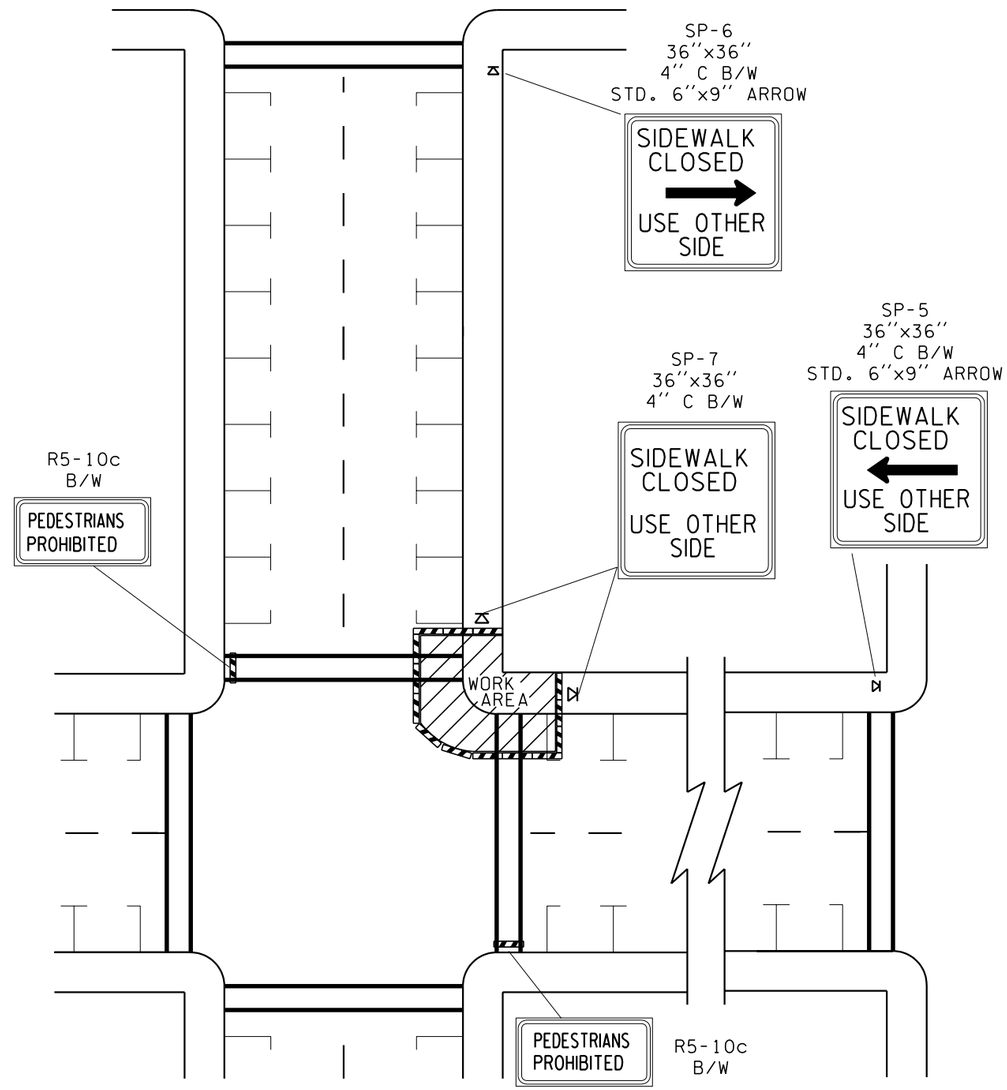

PEDESTRIAN DETOUR
(NONWORKING HOURS)

LEGEND

- SIGN LOCATION-TRIPOD MOUNTED
- TEMPORARY TRAFFIC CONTROL DEVICES
- TYPE 2 BARRICADE

NOTES

1. CONTROLS SHOWN ARE FOR PEDESTRIAN TRAFFIC ONLY.
2. USE WARNING LIGHTS ON BARRICADES.
3. TEMPORARY PEDESTRIAN ROUTES SHALL BE COMPLIANT WITH ADA REQUIREMENTS.
4. CURB PARKING SHALL BE PROHIBITED FOR AT LEAST 50' IN ADVANCE OF A MID-BLOCK CROSSWALK.




PEDESTRIAN DETOUR
(WORKING HOURS)

ALAN O. KING
STATE OF WASHINGTON
15213
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 23, 2003

# PEDESTRIAN TRAFFIC CONTROL AT INTERSECTIONS
# STANDARD PLAN K-14

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-20-02* — DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

## BUFFER DATA

BUFFER SPACE = B

| SPEED (MPH) | 25 | 30 | 35 | 40 | 45 | 50 | 55 | | |
|---|---|---|---|---|---|---|---|---|---|
| LENGTH (feet) | 55 | 85 | 120 | 170 | 220 | 280 | 335 | | |

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R

| TYPICAL LOADED PROTECTIVE VEHICLE | TYPICAL VEHICLE LOADED WEIGHT (LBS) | POSTED SPEED (mph) | STATIONARY OPERATION (feet) |
|---|---|---|---|
| 4 YARD DUMP TRUCK | 24,000 | 60-65 | 100 |
| | | 50-55 | 75 |
| | | 45 | 50 |
| 2 TON CARGO TRUCK | 15,000 | 60-65 | 150 |
| | | 50-55 | 100 |
| | | 45 | 75 |
| 1 TON CARGO TRUCK | 10,000 | 60-65 | 200 |
| | | 50-55 | 150 |
| | | 45 | 100 |

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT

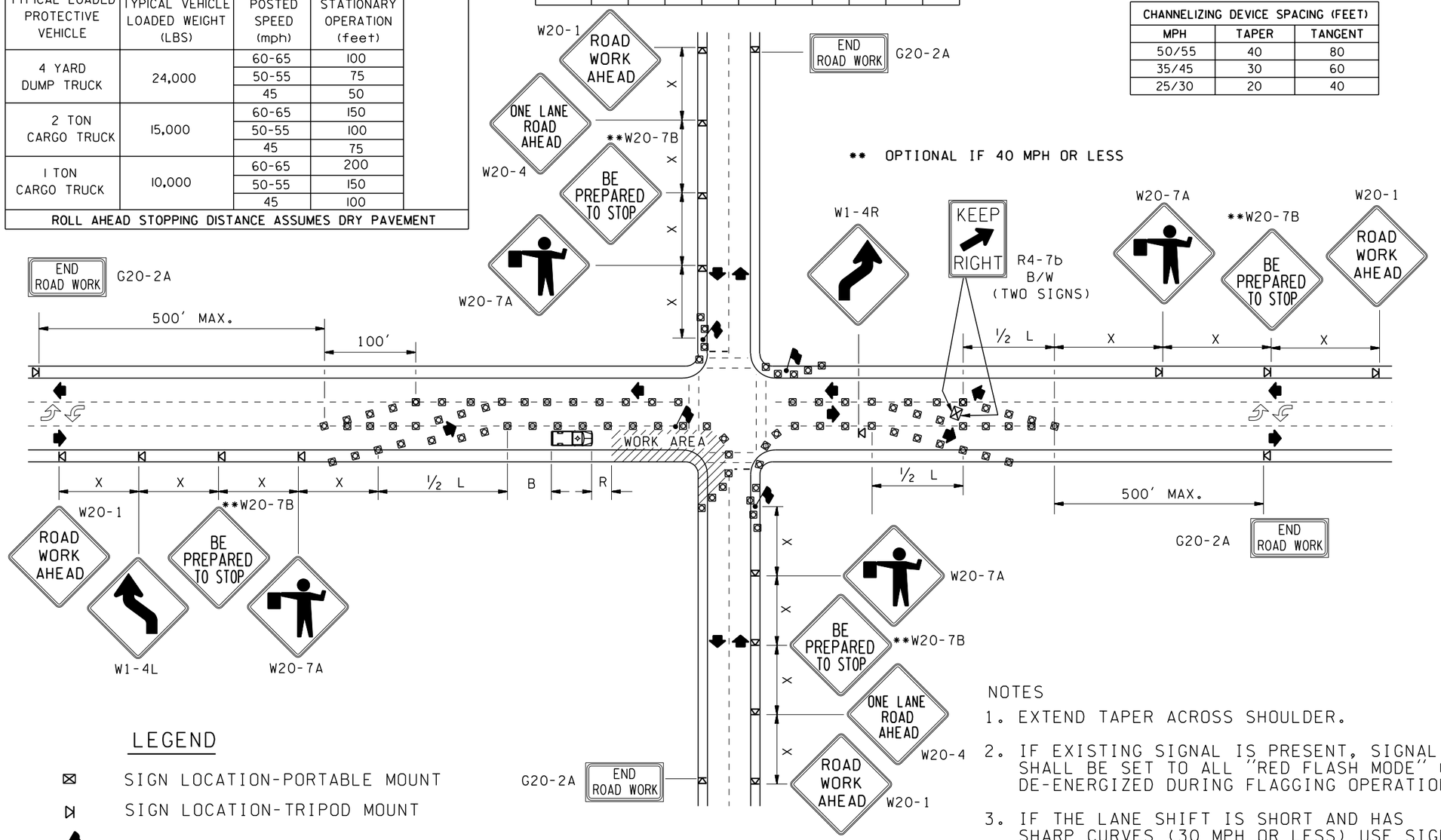
## MINIMUM TAPER LENGTH = L (FEET)

| LANE WIDTH (feet) | Posted Speed (mph) 25 | 30 | 35 | 40 | 45 | 50 | 55 |
|---|---|---|---|---|---|---|---|
| 10 | 105 | 150 | 205 | 270 | 450 | 500 | 550 |
| 11 | 115 | 165 | 225 | 295 | 495 | 550 | 605 |
| 12 | 125 | 180 | 245 | 320 | 540 | 600 | 660 |

## SIGN SPACING = X (FEET)

| | | |
|---|---|---|
| Rural Roads | 45/55 MPH | 500'+- |
| Urban Arterials | 35/40 MPH | 350'+- |
| Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |

| CHANNELIZING DEVICE SPACING (FEET) | | |
|---|---|---|
| MPH | TAPER | TANGENT |
| 50/55 | 40 | 80 |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |




### LEGEND

- SIGN LOCATION-PORTABLE MOUNT
- SIGN LOCATION-TRIPOD MOUNT
- FLAGGING STATION
- TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE (WHEN SPECIFIED IN CONTRACT)
- PROTECTIVE VEHICLE WITH TRUCK MOUNTED ATTENUATOR (WHEN SPECIFIED IN CONTRACT FOR HIGH SPEED ROADWAYS)

### NOTES

1. EXTEND TAPER ACROSS SHOULDER.
2. IF EXISTING SIGNAL IS PRESENT, SIGNAL SHALL BE SET TO ALL "RED FLASH MODE" OR DE-ENERGIZED DURING FLAGGING OPERATIONS.
3. IF THE LANE SHIFT IS SHORT AND HAS SHARP CURVES (30 MPH OR LESS) USE SIGN W1-3 IN LIEU OF SIGN W1-4.

ALAN O. KING
STATE OF WASHINGTON
15213
REGISTERED PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 23, 2003

# INTERSECTION LANE CLOSURE THREE LANE ROADWAY STANDARD PLAN K-15

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* 12-20-02

STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

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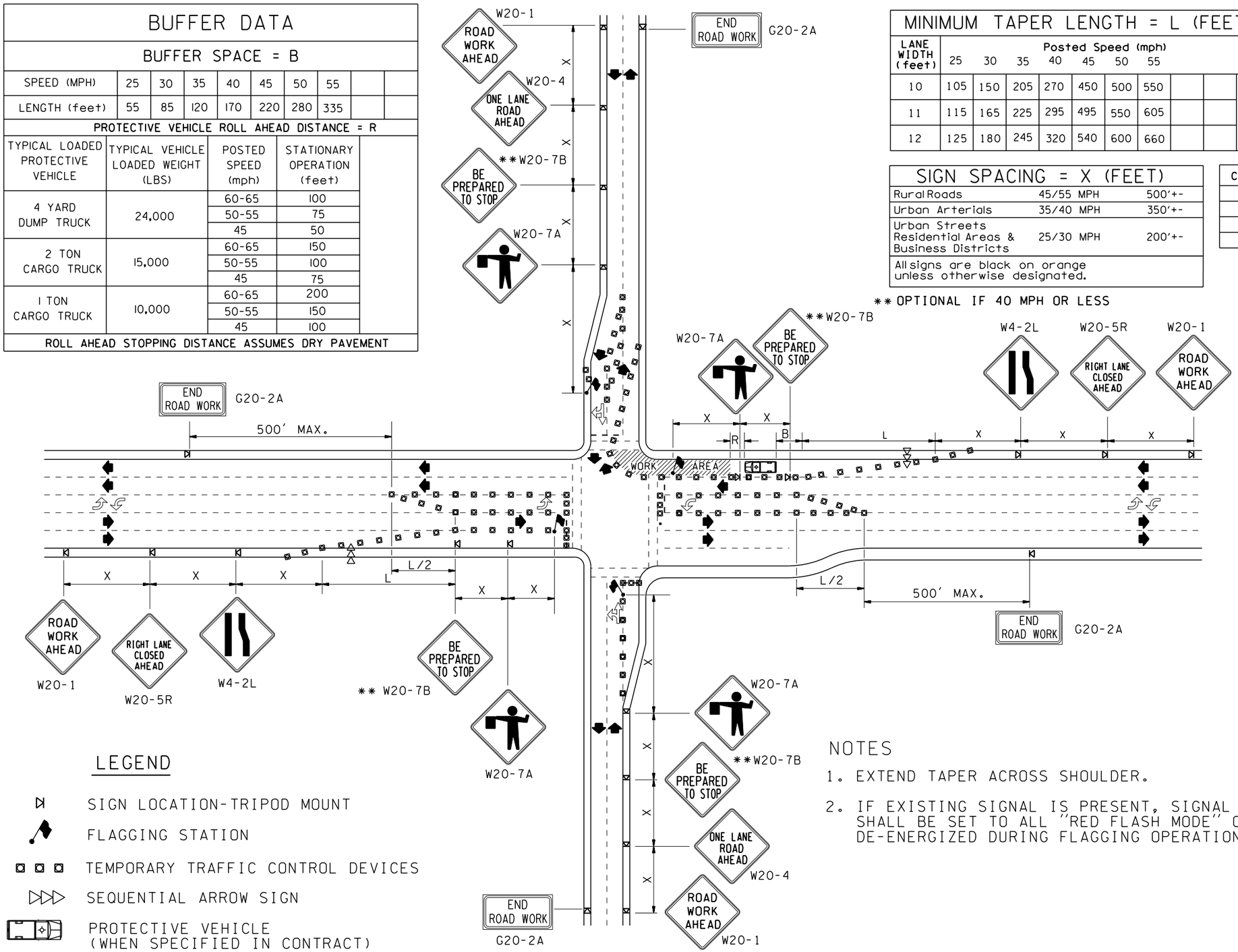
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| BUFFER DATA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| BUFFER SPACE = B | | | | | | | | | |
| SPEED (MPH) | 25 | 30 | 35 | 40 | 45 | 50 | 55 | | |
| LENGTH (feet) | 55 | 85 | 120 | 170 | 220 | 280 | 335 | | |

| PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R | | | |
|---|---|---|---|
| TYPICAL LOADED PROTECTIVE VEHICLE | TYPICAL VEHICLE LOADED WEIGHT (LBS) | POSTED SPEED (mph) | STATIONARY OPERATION (feet) |
| 4 YARD DUMP TRUCK | 24,000 | 60-65 | 100 |
| | | 50-55 | 75 |
| | | 45 | 50 |
| 2 TON CARGO TRUCK | 15,000 | 60-65 | 150 |
| | | 50-55 | 100 |
| | | 45 | 75 |
| 1 TON CARGO TRUCK | 10,000 | 60-65 | 200 |
| | | 50-55 | 150 |
| | | 45 | 100 |

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT




| MINIMUM TAPER LENGTH = L (FEET) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| LANE WIDTH (feet) | Posted Speed (mph) 25 | 30 | 35 | 40 | 45 | 50 | 55 | | | |
| 10 | 105 | 150 | 205 | 270 | 450 | 500 | 550 | | | |
| 11 | 115 | 165 | 225 | 295 | 495 | 550 | 605 | | | |
| 12 | 125 | 180 | 245 | 320 | 540 | 600 | 660 | | | |

| SIGN SPACING = X (FEET) | | |
|---|---|---|
| Rural Roads | 45/55 MPH | 500'+- |
| Urban Arterials | 35/40 MPH | 350'+- |
| Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |

| CHANNELIZING DEVICE SPACING (FEET) | | |
|---|---|---|
| MPH | TAPER | TANGENT |
| 50/55 | 40 | 80 |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |

** OPTIONAL IF 40 MPH OR LESS

## LEGEND

- SIGN LOCATION-TRIPOD MOUNT
- FLAGGING STATION
- TEMPORARY TRAFFIC CONTROL DEVICES
- SEQUENTIAL ARROW SIGN
- PROTECTIVE VEHICLE (WHEN SPECIFIED IN CONTRACT)
- PROTECTIVE VEHICLE WITH TRUCK MOUNTED ATTENUATOR (WHEN SPECIFIED IN CONTRACT FOR HIGH SPEED ROADWAYS)

## NOTES

1. EXTEND TAPER ACROSS SHOULDER.
2. IF EXISTING SIGNAL IS PRESENT, SIGNAL SHALL BE SET TO ALL "RED FLASH MODE" OR DE-ENERGIZED DURING FLAGGING OPERATIONS.

ALAN O. KING
STATE OF WASHINGTON
15213
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 23, 2003

# INTERSECTION LANE CLOSURE FIVE LANE ROADWAY STANDARD PLAN K-16

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* 12-20-02

STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

## BUFFER DATA

BUFFER SPACE = B

| SPEED (MPH) | 25 | 30 | 35 | 40 | 45 | 50 | 55 |
|---|---|---|---|---|---|---|---|
| LENGTH (feet) | 55 | 85 | 120 | 170 | 220 | 280 | 335 |

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R

| VEHICLE TYPE | TYPICAL VEHICLE LOADED WEIGHT (LBS) | POSTED SPEED (mph) | STATIONARY OPERATION (feet) |
|---|---|---|---|
| 4 YARD DUMP TRUCK | 24,000 | 50-55 | 75 |
| | | 45 | 50 |
| 2 TON CARGO TRUCK | 15,000 | 50-55 | 100 |
| | | 45 | 75 |
| 1 TON CARGO TRUCK | 10,000 | 50-55 | 150 |
| | | 45 | 100 |

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT

## SIGN SPACING = X (FEET)

| | | |
|---|---|---|
| Rural Roads | 45/55 MPH | 500'+- |
| Urban Arterials | 35/40 MPH | 350'+- |
| Rural Roads<br>Urban Streets<br>Residential Areas &<br>Business Districts | 25/30 MPH | 200'+- |

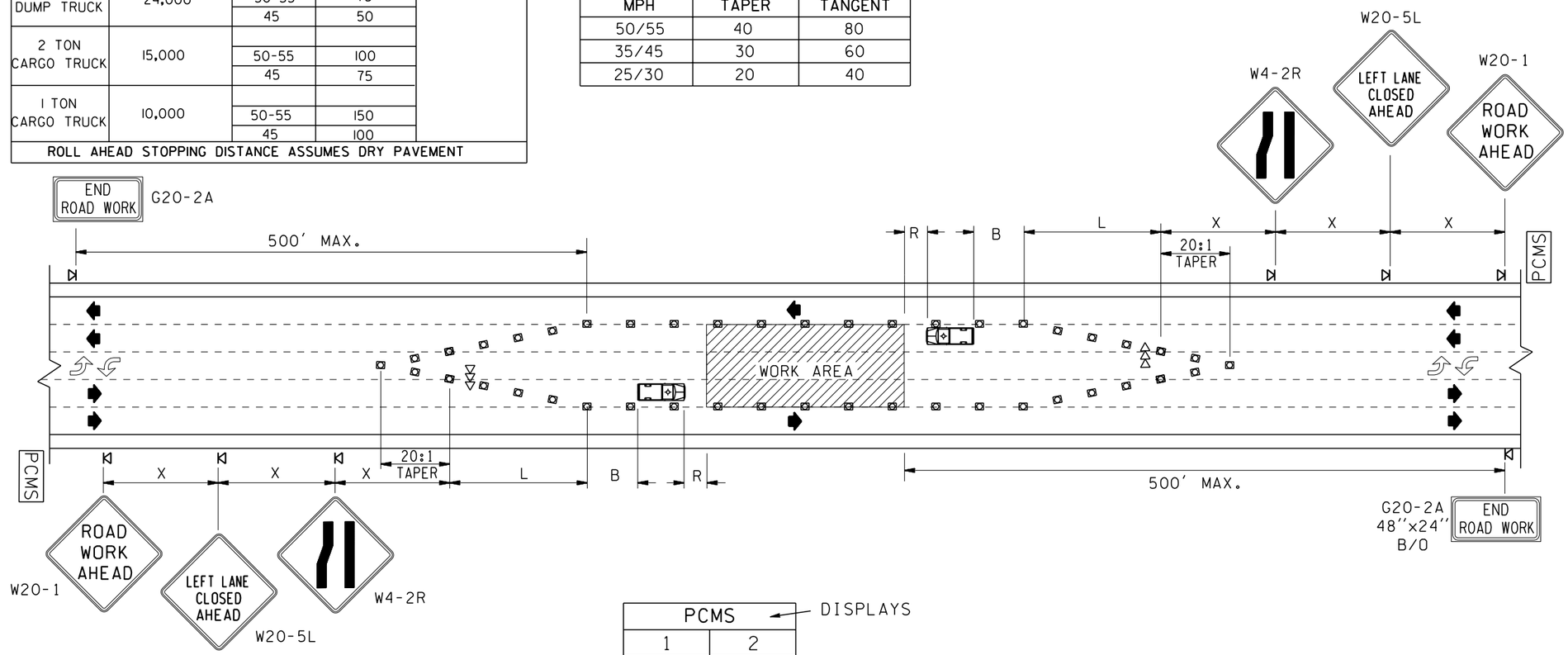
All signs are black on orange unless otherwise designated.

## MINIMUM TAPER LENGTH = L (FEET)

| LANE WIDTH (feet) | Posted Speed (mph) 25 | 30 | 35 | 40 | 45 | 50 | 55 |
|---|---|---|---|---|---|---|---|
| 10 | 105 | 150 | 205 | 270 | 450 | 500 | 550 |
| 11 | 115 | 165 | 225 | 295 | 495 | 550 | 605 |
| 12 | 125 | 180 | 245 | 320 | 540 | 600 | 660 |

## CHANNELIZING DEVICE SPACING (FEET)

| MPH | TAPER | TANGENT |
|---|---|---|
| 50/55 | 40 | 80 |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |




## LEGEND

- SIGN LOCATION-TRIPOD MOUNT
- SEQUENTIAL ARROW SIGN
- TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE (WHEN SPECIFIED IN CONTRACT)
- TMA — PROTECTIVE VEHICLE WITH TRUCK MOUNTED ATTENUATOR (WHEN SPECIFIED IN CONTRACT FOR HIGH SPEED ROADWAYS)
- PCMS — PORTABLE CHANGEABLE MESSAGE SIGN (WHEN SPECIFIED IN CONTRACT)

| PCMS | DISPLAYS |
|---|---|
| 1 | 2 |
| CENTER LANE CLOSED | LIMITED TURNING |
| 1.5 SEC | 1.5 SEC |

Field locate 1 mile +- in advance of lane closure.

## NOTES

1. MAINTAIN A MINIMUM OF ONE ACCESS POINT FOR EACH BUSINESS WITHIN WORK AREA LIMITS.

ALAN O. KING
STATE OF WASHINGTON
15213
REGISTERED PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 23, 2003

# LEFT LANE AND CENTER TURN LANE CLOSURE FIVE LANE ROADWAY
# STANDARD PLAN K-17

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* 12-20-02

STATE DESIGN ENGINEER — DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

## BUFFER DATA

BUFFER SPACE = B

| SPEED (MPH) | 25 | 30 | 35 | 40 | 45 | 50 | 55 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| LENGTH (feet) | — | — | — | 170 | 220 | 280 | 335 | | | |

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R

| VEHICLE TYPE | TYPICAL VEHICLE LOADED WEIGHT (LBS) | POSTED SPEED (mph) | STATIONARY OPERATION (feet) |
|---|---|---|---|
| 4 YARD DUMP TRUCK | 24,000 | | 100 |
| | | 50-55 | 75 |
| | | 45 | 50 |
| 2 TON CARGO TRUCK | 15,000 | | 150 |
| | | 50-55 | 100 |
| | | 45 | 75 |
| 1 TON CARGO TRUCK | 10,000 | | 200 |
| | | 50-55 | 150 |
| | | 45 | 100 |

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT

## MINIMUM TAPER LENGTH = L (FEET)

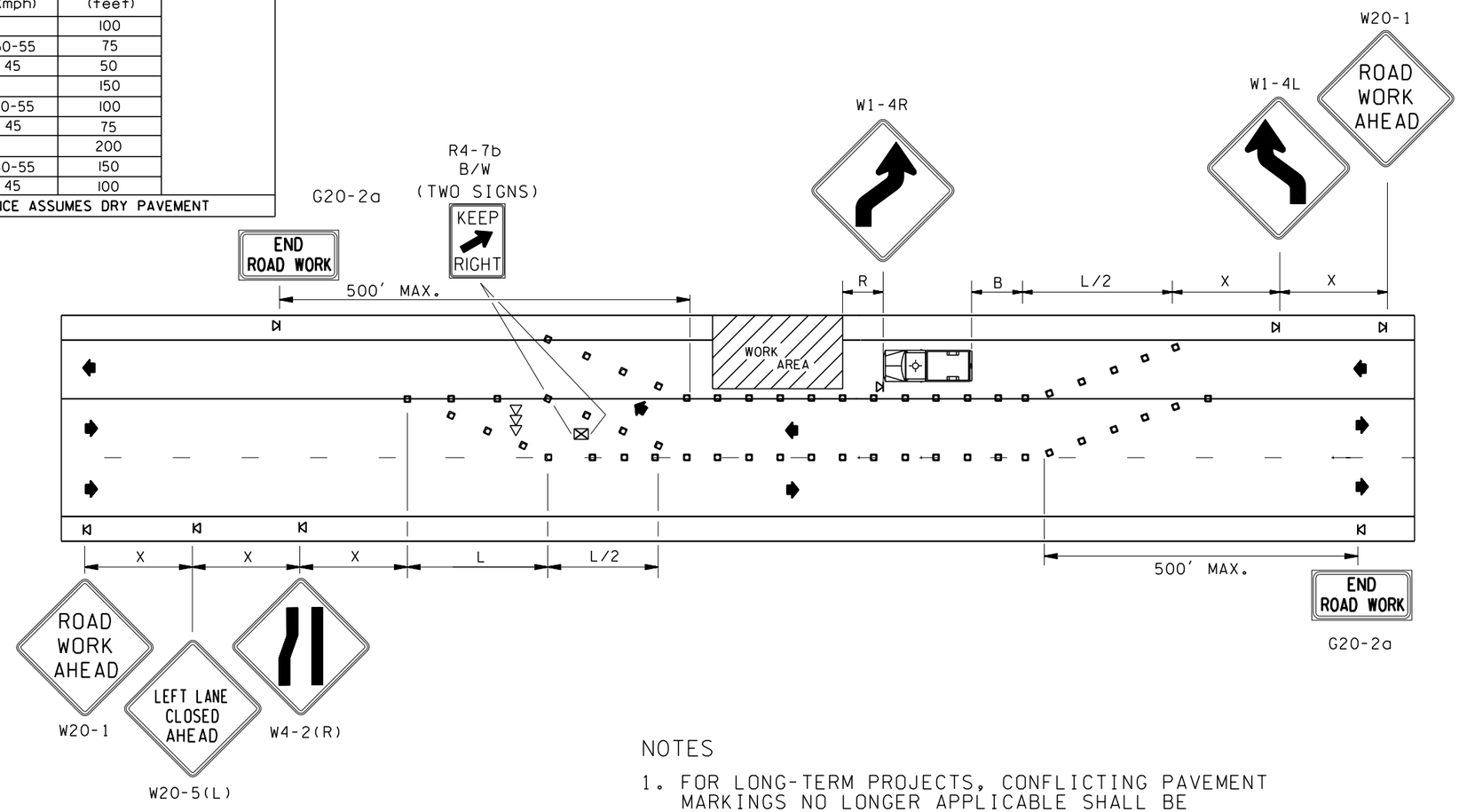
| LANE WIDTH (feet) | Posted Speed (mph) 25 | 30 | 35 | 40 | 45 | 50 | 55 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 105 | 150 | 205 | 270 | 450 | 500 | 550 | | | |
| 11 | 115 | 165 | 225 | 295 | 495 | 550 | 605 | | | |
| 12 | 125 | 180 | 245 | 320 | 540 | 600 | 660 | | | |

## SIGN SPACING = X (FEET)

| | | |
|---|---|---|
| Rural Roads | 45/55 MPH | 500'+- |
| Urban Arterials | 35/40 MPH | 350'+- |
| Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |

All signs are black on orange unless otherwise designated.

| CHANNELIZING DEVICE SPACING (FEET) | | |
|---|---|---|
| MPH | TAPER | TANGENT |
| 50/60 | 40 | 80 |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |




## LEGEND

- SIGN LOCATION-PORTABLE MOUNT
- SIGN LOCATION-TRIPOD MOUNT
- SEQUENTIAL ARROW SIGN
- TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE (WHEN SPECIFIED IN CONTRACT)
- PROTECTIVE VEHICLE WITH TRUCK MOUNTED ATTENUATOR (WHEN SPECIFIED IN CONTRACT FOR HIGH SPEED ROADWAYS)

## NOTES

1. FOR LONG-TERM PROJECTS, CONFLICTING PAVEMENT MARKINGS NO LONGER APPLICABLE SHALL BE REMOVED OR OBLITERATED AS SOON AS PRACTICABLE. TEMPORARY MARKINGS SHALL BE USED AS NECESSARY AND SIGNS SHALL BE POST MOUNTED.
2. STEADY BURNING WARNING LIGHTS (TYPE C, MUTCD) SHALL BE USED TO MARK CHANNELIZING DEVICES AT NIGHT AS NEEDED.
3. IF THE LANE SHIFT IS SHORT AND HAS SHARP CURVES (30 MPH OR LESS) USE SIGN W1-3 IN LIEU OF SIGN W1-4.

ALAN O. KING
STATE OF WASHINGTON
15213
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 23, 2003

# LANE SHIFT THREE LANE ROADWAY

## STANDARD PLAN K-18

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-20-02* — DATE

Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

## BUFFER DATA

BUFFER SPACE = B

| SPEED (MPH) | 25 | 30 | 35 | 40 | 45 | 50 | 55 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| LENGTH (feet) | 55 | 85 | 120 | 170 | 220 | 280 | 335 | | | |

PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R

| VEHICLE TYPE | TYPICAL VEHICLE LOADED WEIGHT (LBS) | POSTED SPEED (mph) | STATIONARY OPERATION (feet) |
|---|---|---|---|
| 4 YARD DUMP TRUCK | 24,000 | 50 | 75 |
| | | 45 | 50 |
| 2 TON CARGO TRUCK | 15,000 | 50 | 100 |
| | | 45 | 75 |
| 1 TON CARGO TRUCK | 10,000 | 50 | 150 |
| | | 45 | 100 |

ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT

## SIGN SPACING = X (FEET)

| | | |
|---|---|---|
| Rural Roads | 45/55 MPH | 500'+- |
| Urban Arterials | 35/40 MPH | 350'+- |
| Rural Roads<br>Urban Streets<br>Residential Areas &<br>Business Districts | 25/30 MPH | 200'+- |

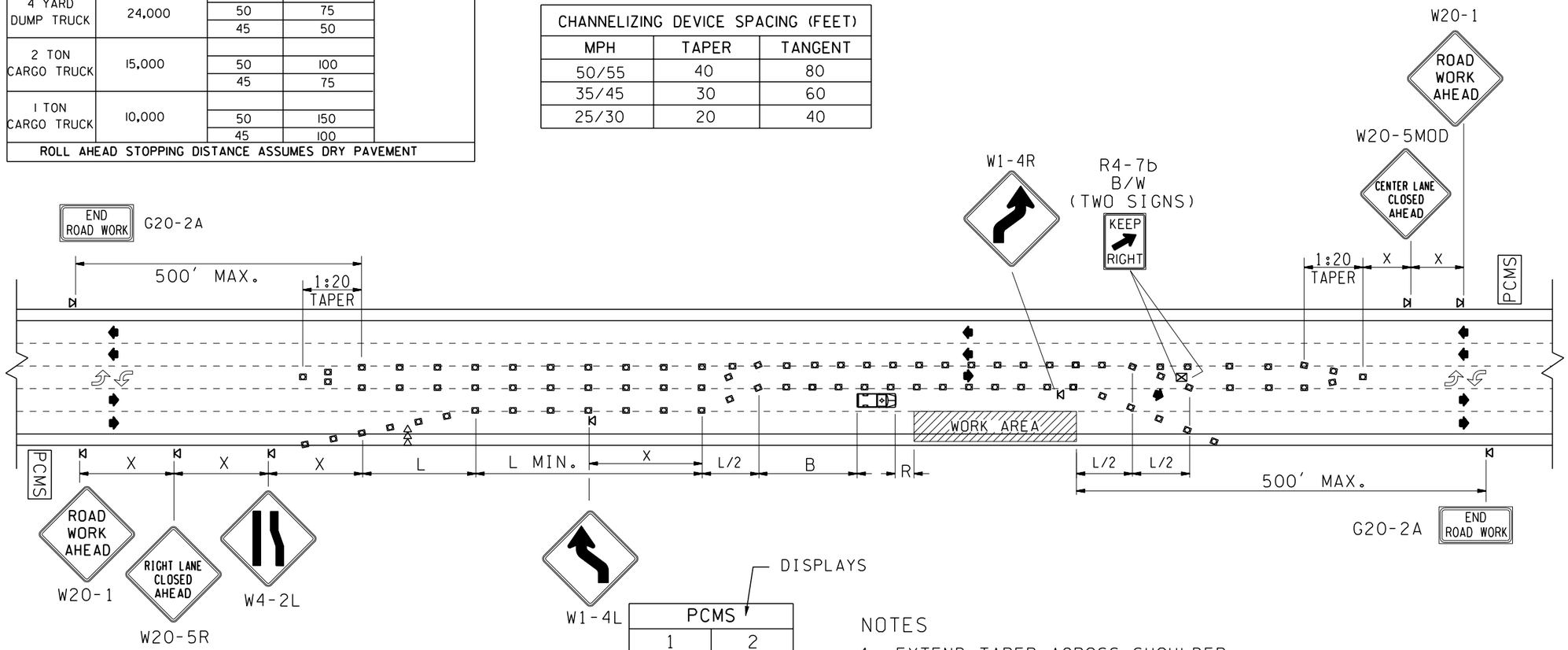
All signs are black on orange unless otherwise designated.

## MINIMUM TAPER LENGTH = L (FEET)

| LANE WIDTH (feet) | Posted Speed (mph) 25 | 30 | 35 | 40 | 45 | 50 | 55 |
|---|---|---|---|---|---|---|---|
| 10 | 105 | 150 | 205 | 270 | 450 | 500 | 550 |
| 11 | 115 | 165 | 225 | 295 | 495 | 550 | 605 |
| 12 | 125 | 180 | 245 | 320 | 540 | 600 | 660 |

## CHANNELIZING DEVICE SPACING (FEET)

| MPH | TAPER | TANGENT |
|---|---|---|
| 50/55 | 40 | 80 |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |




| PCMS DISPLAYS | |
|---|---|
| 1 | 2 |
| CENTER LANE CLOSED | LIMITED TURNING |
| 1.5 SEC | 1.5 SEC |

Field locate after last intersection in advance of lane closure.

### LEGEND

- SIGN LOCATION-PORTABLE MOUNT
- SIGN LOCATION-TRIPOD MOUNT
- SEQUENTIAL ARROW SIGN
- TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE WITH TRUCK MOUNTED ATTENUATOR (WHEN SPECIFIED IN CONTRACT)
- PCMS — PORTABLE CHANGEABLE MESSAGE SIGN (WHEN SPECIFIED IN CONTRACT)

### NOTES

1. EXTEND TAPER ACROSS SHOULDER.
2. MAINTAIN A MINIMUM OF ONE ACCESS POINT FOR EACH BUSINESS WITHIN WORK AREA LIMITS.
3. IF THE LANE SHIFT IS SHORT AND HAS SHARP CURVES (30 MPH OR LESS) USE SIGN W1-3 IN LIEU OF SIGN W1-4.

ALAN O. KING — STATE OF WASHINGTON — 15213 — REGISTERED PROFESSIONAL ENGINEER

EXPIRES NOVEMBER 23, 2003

# RIGHT LANE CLOSURE WITH LANE SHIFT FIVE LANE ROADWAY

# STANDARD PLAN K-19

SHEET 1 OF 1 SHEET

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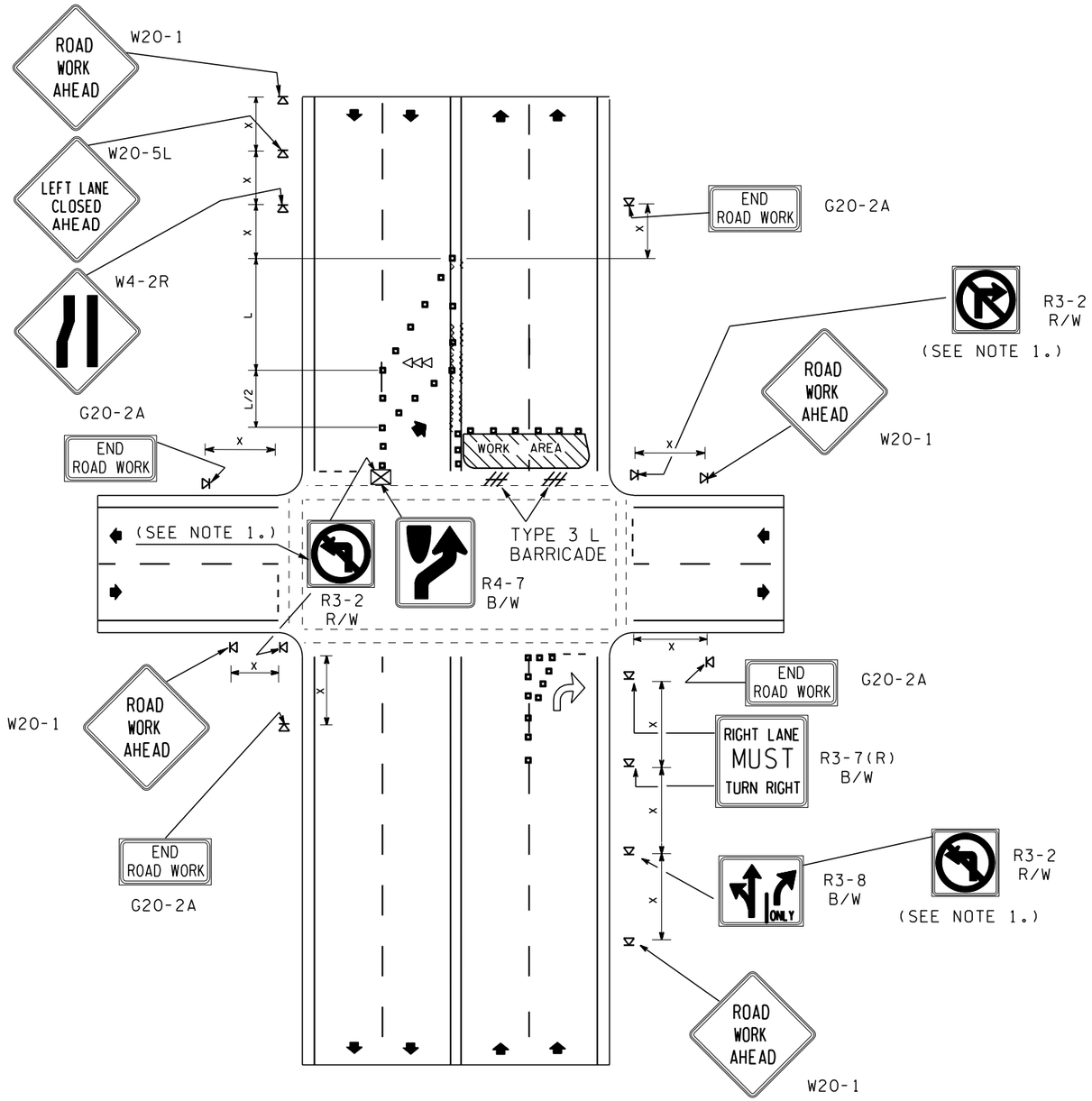
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Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




LEGEND

- SIGN LOCATION-TRIPOD MOUNT
- SIGN LOCATION-PORTABLE MOUNT
- TEMPORARY TRAFFIC CONTROL DEVICES
- TYPE 3L BARRICADE
- SEQUENTIAL ARROW SIGN
- OBLITERATED MARKINGS (SEE NOTE 4)
- PAINTED TRAFFIC ARROW (OPTIONAL)

NOTES

1. NO LEFT TURN SIGNS ARE TO BE USED IF TRAFFIC VOLUMES ARE TOO HIGH OR THERE IS A SIGNAL OPERATING. CLOSE LEFT TURN POCKET IF THERE IS ONE ON THE SIDE STREET.
2. FLASHING WARNING LIGHTS (TYPE A, MUTCD) SHOULD BE USED TO MARK BARRICADES AT NIGHT.
3. STEADY BURNING WARNING LIGHTS (TYPE C, MUTCD) SHALL BE USED TO MARK CHANNELIZING DEVICES AT NIGHT.
4. FOR LONG-TERM PROJECTS, CONFLICTING PAVEMENT MARKINGS NO LONGER APPLICABLE SHALL BE REMOVED OR OBLITERATED. TEMPORARY MARKINGS SHALL BE USED.

| MINIMUM TAPER LENGTH = L (feet) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| LANE WIDTH (feet) | Posted Speed (mph) 25 | 30 | 35 | 40 | 45 | 50 | 55 | | | |
| 10 | 105 | 150 | 205 | 270 | 450 | 500 | 550 | | | |
| 11 | 115 | 165 | 225 | 295 | 495 | 550 | 605 | | | |
| 12 | 125 | 180 | 245 | 320 | 540 | 600 | 660 | | | |

| SIGN SPACING = X (feet) | | |
|---|---|---|
| Rural Roads | 45/55 MPH | 500'+- |
| Urban Arterials | 35/40 MPH | 350'+- |
| Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |

| CHANNELIZING DEVICE SPACING (feet) | | |
|---|---|---|
| MPH | TAPER | TANGENT |
| 50/70 | 40 | 80 |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |

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# HALF ROAD CLOSURE

## STANDARD PLAN K-20

SHEET 1 OF 1 SHEET

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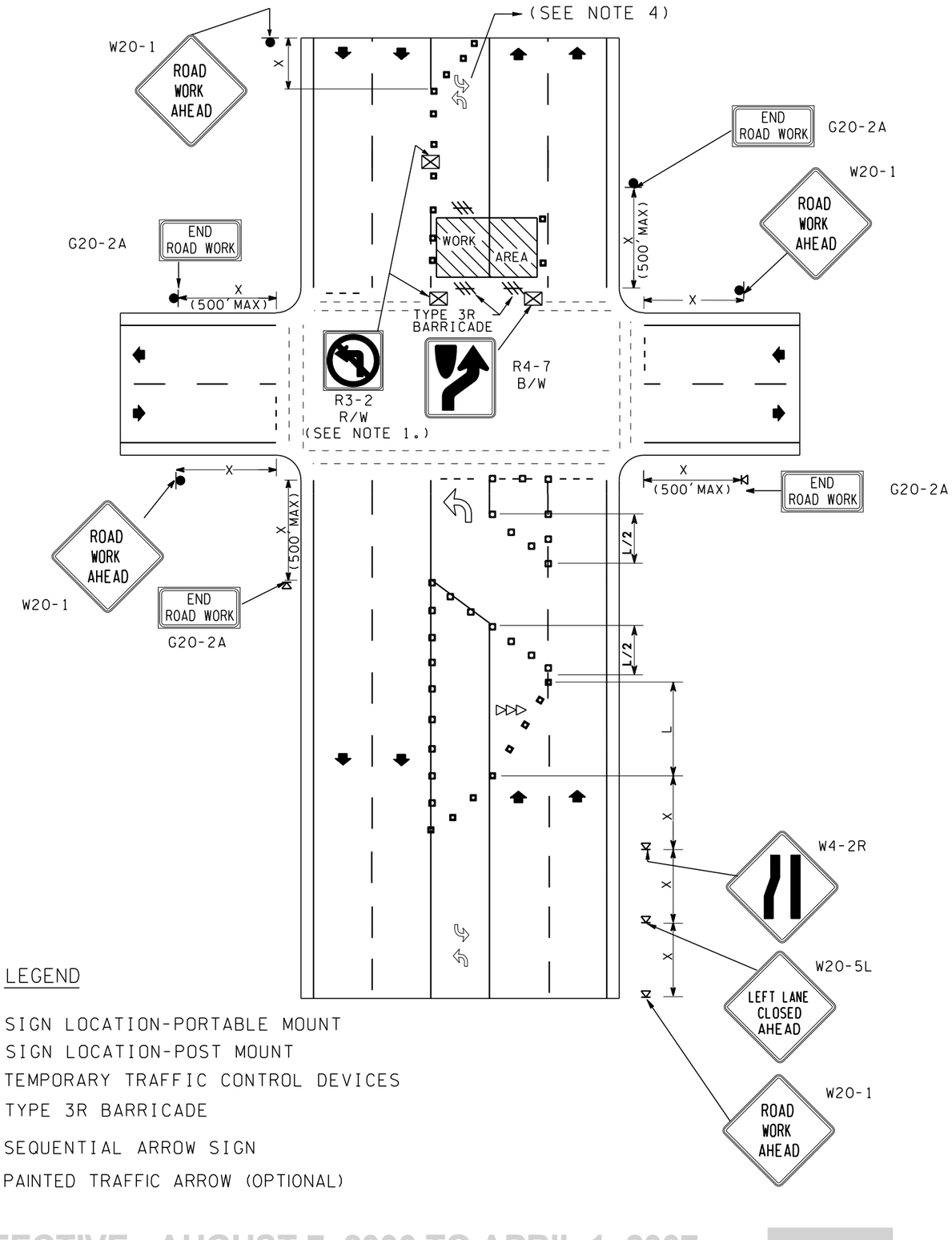
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LEGEND

- SIGN LOCATION-PORTABLE MOUNT
- SIGN LOCATION-POST MOUNT
- TEMPORARY TRAFFIC CONTROL DEVICES
- TYPE 3R BARRICADE
- SEQUENTIAL ARROW SIGN
- PAINTED TRAFFIC ARROW (OPTIONAL)

NOTES

1. PROHIBIT TURNS AS NECESSARY FOR TRAFFIC CONDITIONS. CLOSE LEFT TURN POCKET IF THERE IS ONE ON SIDE STREET.
2. FLASHING WARNING LIGHTS (TYPE A, MUTCD) SHOULD BE USED TO MARK BARRICADES AT NIGHT.
3. STEADY BURNING WARNING LIGHTS (TYPE C, MUTCD) SHALL BE USED TO MARK CHANNELIZING DEVICES AT NIGHT.
4. FOR LONG-TERM PROJECTS, CONFLICTING PAVEMENT MARKINGS NO LONGER APPLICABLE SHALL BE REMOVED OR OBLITERATED. TEMPORARY MARKINGS SHALL BE USED.

| MINIMUM TAPER LENGTH = L (feet) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| LANE WIDTH (feet) | Posted Speed (mph) 25 | 30 | 35 | 40 | 45 | 50 | 55 | | | |
| 10 | 105 | 150 | 205 | 270 | 450 | 500 | 550 | | | |
| 11 | 115 | 165 | 225 | 295 | 495 | 550 | 605 | | | |
| 12 | 125 | 180 | 245 | 320 | 540 | 600 | 660 | | | |

| SIGN SPACING = X (feet) | | |
|---|---|---|
| Rural Roads | 45/55 MPH | 500'+- |
| Urban Arterials | 35/40 MPH | 350'+- |
| Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |

| CHANNELIZING DEVICE SPACING (feet) | | |
|---|---|---|
| MPH | TAPER | TANGENT |
| 50/70 | 40 | 80 |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |

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# MULTIPLE LANE CLOSURES AT INTERSECTION STANDARD PLAN K-21

SHEET 1 OF 1 SHEET

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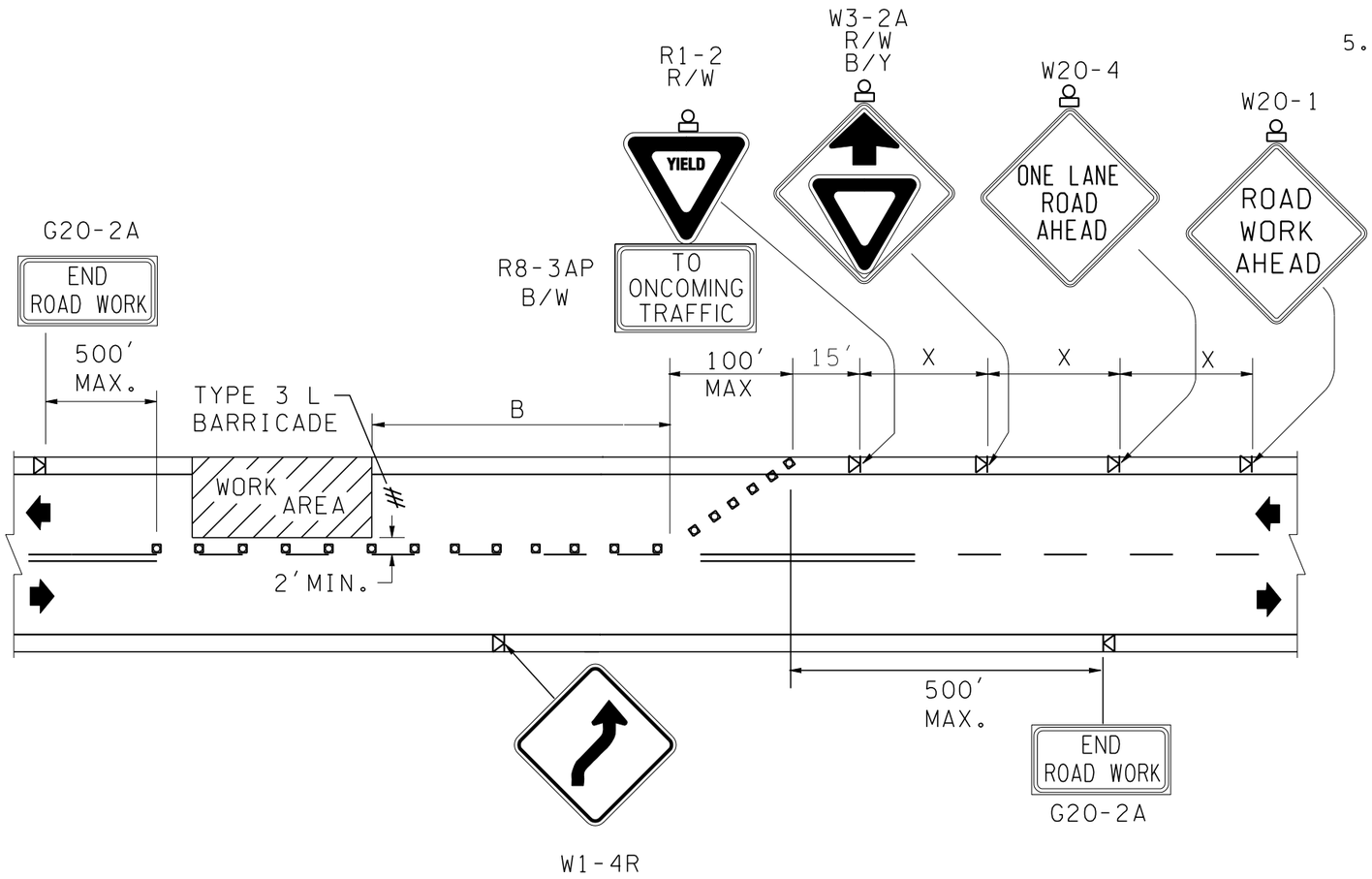
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| SIGN SPACING = X (FEET) | | |
|---|---|---|
| Rural Roads | 45 MPH | 500'+- |
| Urban Arterials | 35/40 MPH | 350'+- |
| Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |

| CHANNELIZING DEVICE SPACING (FEET) | | |
|---|---|---|
| MPH | TAPER | TANGENT |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |




NOTES

1. EXTEND DEVICES TAPER ACROSS SHOULDER.
2. SIGN SEQUENCE IS THE SAME FOR BOTH DIRECTIONS OF TRAVEL ON THE HIGHWAY.
3. STEADY BURNING WARNING LIGHTS (TYPE C, MUTCD) SHALL BE USED TO MARK TRAFFIC CONTROL DEVICES AT NIGHT.
4. FOR USE WHEN TRAFFIC VOLUMES ARE SUCH THAT SUFFICIENT GAPS EXIST FOR MOTOR VEHICLES THAT MUST YIELD.
5. DRIVERS MUST HAVE ADEQUATE SIGHT DISTANCE TO SEE OPPOSING TRAFFIC AS THEY APPROACH, OTHERWISE FLAGGERS AND/OR TEMPORARY SIGNAL IS REQUIRED.

| BUFFER DATA | | | | | | |
|---|---|---|---|---|---|---|
| BUFFER SPACE = B | | | | | | |
| SPEED (MPH) | 25 | 30 | 35 | 40 | 45 | |
| LENGTH (feet) | 55 | 85 | 120 | 170 | 220 | |

LEGEND

- SIGN LOCATION - TRIPOD MOUNT
- TEMPORARY TRAFFIC CONTROL DEVICES
- FLASHING WARNING LIGHT
- TYPE 3L BARRICADE

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# LANE CLOSURE ON LOW-VOLUME TWO-LANE ROAD WITHOUT FLAGGERS STANDARD PLAN K-22

SHEET 1 OF 1 SHEET

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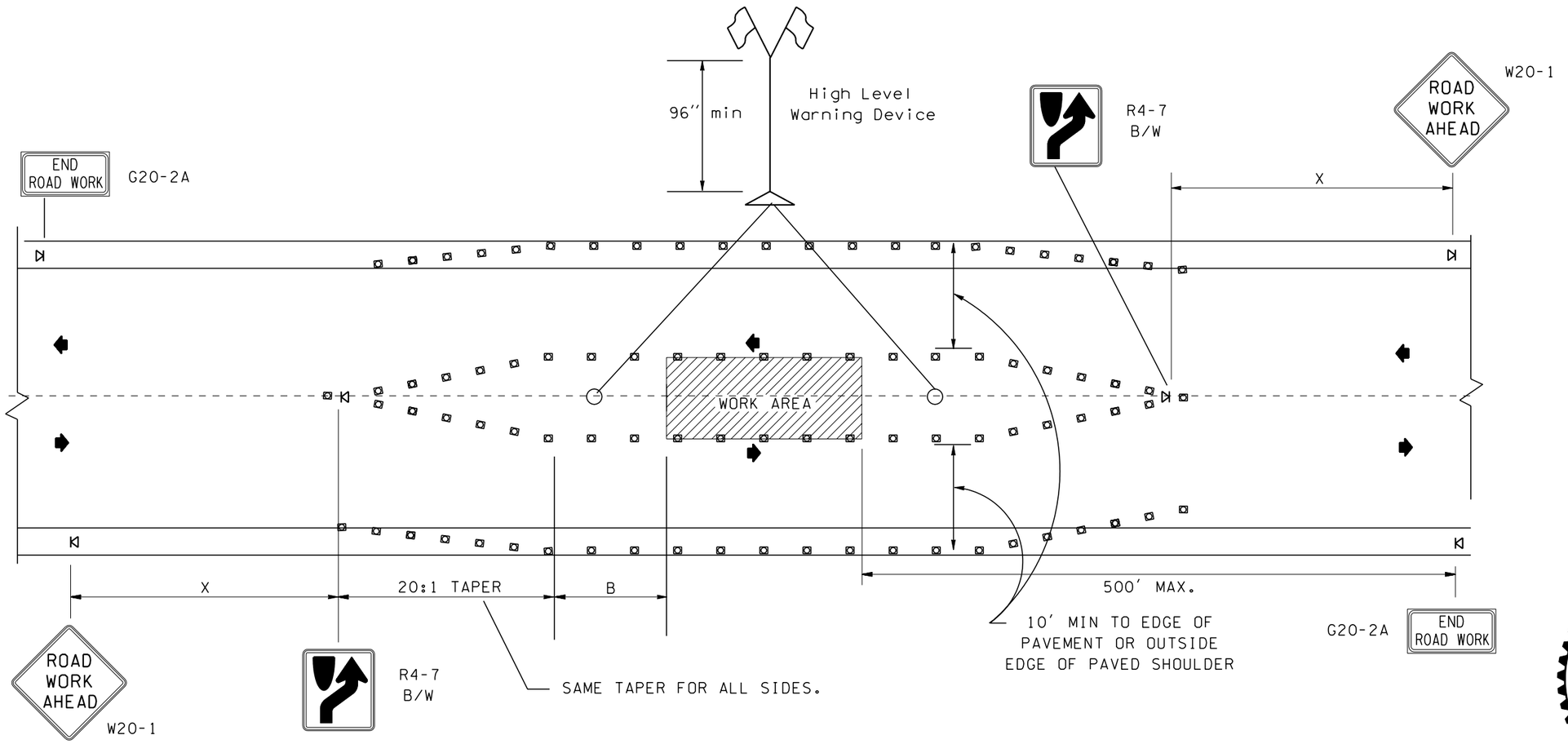
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| SIGN SPACING = X (FEET) | | |
|---|---|---|
| Rural Roads | 45 MPH | 500'+- |
| Urban Arterials | 35/40 MPH | 350'+- |
| Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |

| CHANNELIZING DEVICE SPACING (FEET) | | |
|---|---|---|
| MPH | TAPER | TANGENT |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |

| BUFFER DATA | | | | | | |
|---|---|---|---|---|---|---|
| BUFFER SPACE = B | | | | | | |
| SPEED (MPH) | 25 | 30 | 35 | 40 | 45 | |
| LENGTH (feet) | 55 | 85 | 120 | 170 | 220 | |




LEGEND

SIGN LOCATION-TRIPOD MOUNT

TEMPORARY TRAFFIC CONTROL DEVICES

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# WORK IN CENTER OF LOW-VOLUME ROAD

## STANDARD PLAN K-23

SHEET 1 OF 1 SHEET

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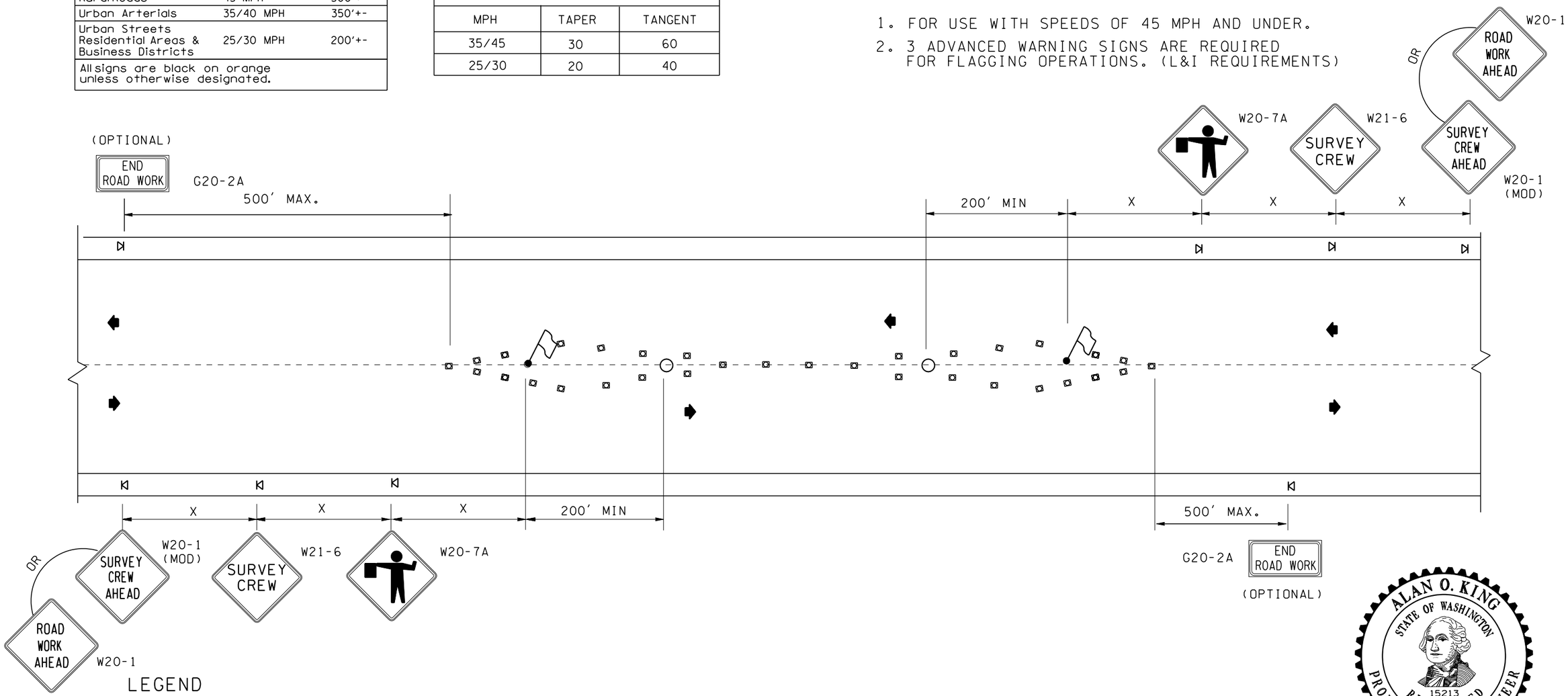
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| SIGN SPACING = X (FEET) | | |
|---|---|---|
| Rural Roads | 45 MPH | 500'+- |
| Urban Arterials | 35/40 MPH | 350'+- |
| Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |

| CHANNELIZING DEVICE SPACING (FEET) | | |
|---|---|---|
| MPH | TAPER | TANGENT |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |

NOTES

1. FOR USE WITH SPEEDS OF 45 MPH AND UNDER.
2. 3 ADVANCED WARNING SIGNS ARE REQUIRED FOR FLAGGING OPERATIONS. (L&I REQUIREMENTS)




LEGEND

- SIGN LOCATION - TRIPOD MOUNT
- TEMPORARY TRAFFIC CONTROL DEVICES
- FLAGGING STATION
- SURVEYOR

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# SURVEYING ALONG CENTERLINE OF LOW-VOLUME ROAD STANDARD PLAN K-24

SHEET 1 OF 1 SHEET

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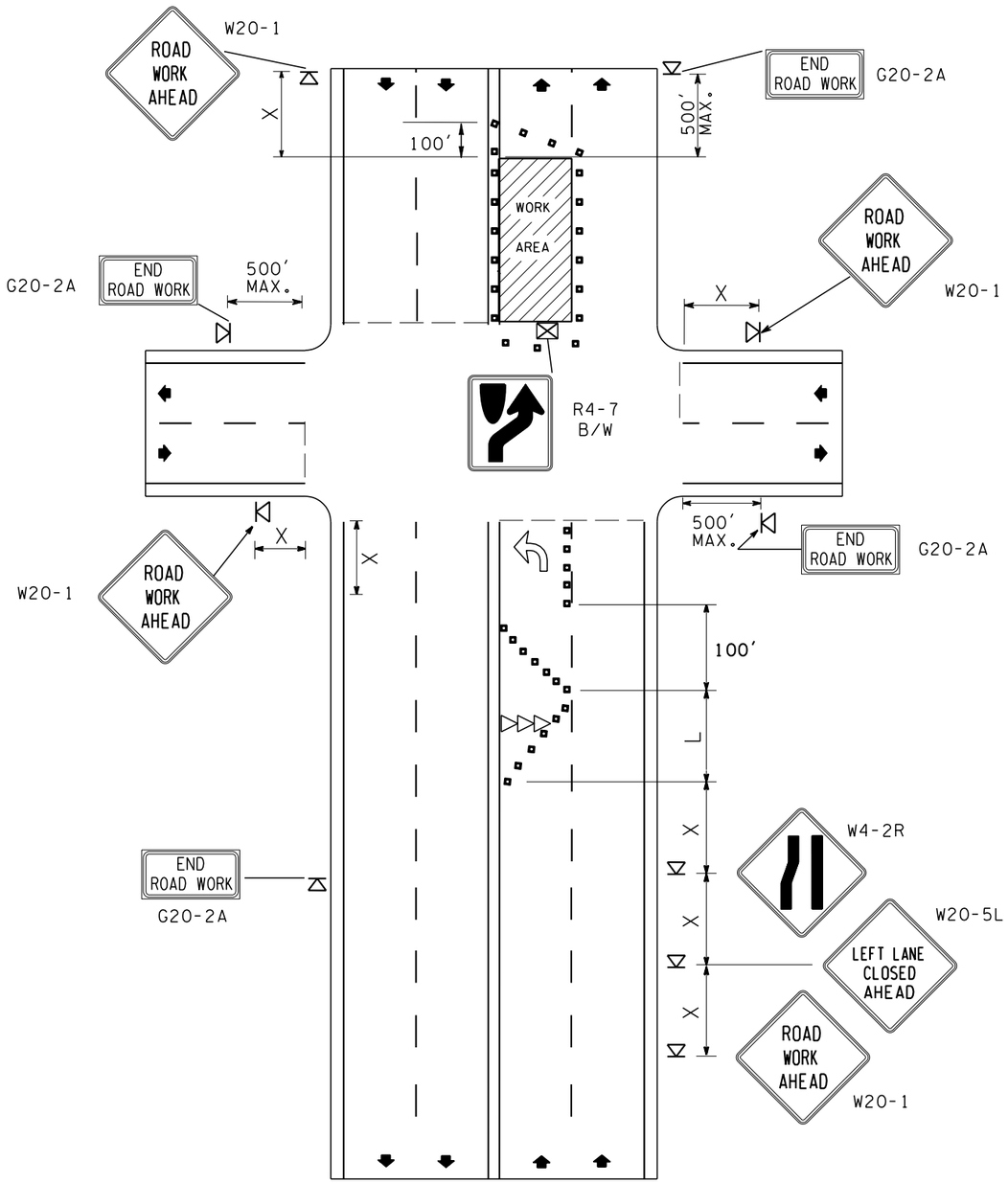
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




## LEGEND

- ⊠ SIGN LOCATION-PORTABLE MOUNT
- ⋈ SIGN MOUNT - TRIPOD MOUNT
- ▫ ▫ ▫ TEMPORARY TRAFFIC CONTROL DEVICES
- ▷▷▷ SEQUENTIAL ARROW SIGN
- PAINTED TRAFFIC ARROW (OPTIONAL)

NOTES

1. PROHIBIT TURNS AS NECESSARY FOR TRAFFIC CONDITIONS. CLOSE LEFT TURN POCKET IF THERE IS ONE ON SIDE STREET.
2. FLASHING WARNING LIGHTS (TYPE A, MUTCD) SHOULD BE USED TO MARK BARRICADES AT NIGHT, AS NEEDED.
3. STEADY BURNING WARNING LIGHTS (TYPE C, MUTCD) SHOULD BE USED TO MARK CHANNELIZING DEVICES AT NIGHT AS NEEDED.
4. FOR LONG-TERM PROJECTS, CONFLICTING PAVEMENT MARKINGS NO LONGER APPLICABLE SHALL BE REMOVED OR OBLITERATED AS SOON AS PRACTICABLE. TEMPORARY MARKINGS SHALL BE USED AS NECESSARY.

| MINIMUM TAPER LENGTH = L (feet) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| LANE WIDTH (feet) | Posted Speed (mph) 25 | 30 | 35 | 40 | 45 | 50 | 55 | | | |
| 10 | 105 | 150 | 205 | 270 | 450 | 500 | 550 | | | |
| 11 | 115 | 165 | 225 | 295 | 495 | 550 | 605 | | | |
| 12 | 125 | 180 | 245 | 320 | 540 | 600 | 660 | | | |

| SIGN SPACING = X (feet) | | |
|---|---|---|
| Rural Roads | 45/55 MPH | 500'+- |
| Urban Arterials | 35/40 MPH | 350'+- |
| Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |

| CHANNELIZING DEVICE SPACING (feet) | | |
|---|---|---|
| MPH | TAPER | TANGENT |
| 50/70 | 40 | 80 |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |

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# LEFT LANE CLOSURE ON FAR SIDE OF INTERSECTION STANDARD PLAN K-25

SHEET 1 OF 1 SHEET

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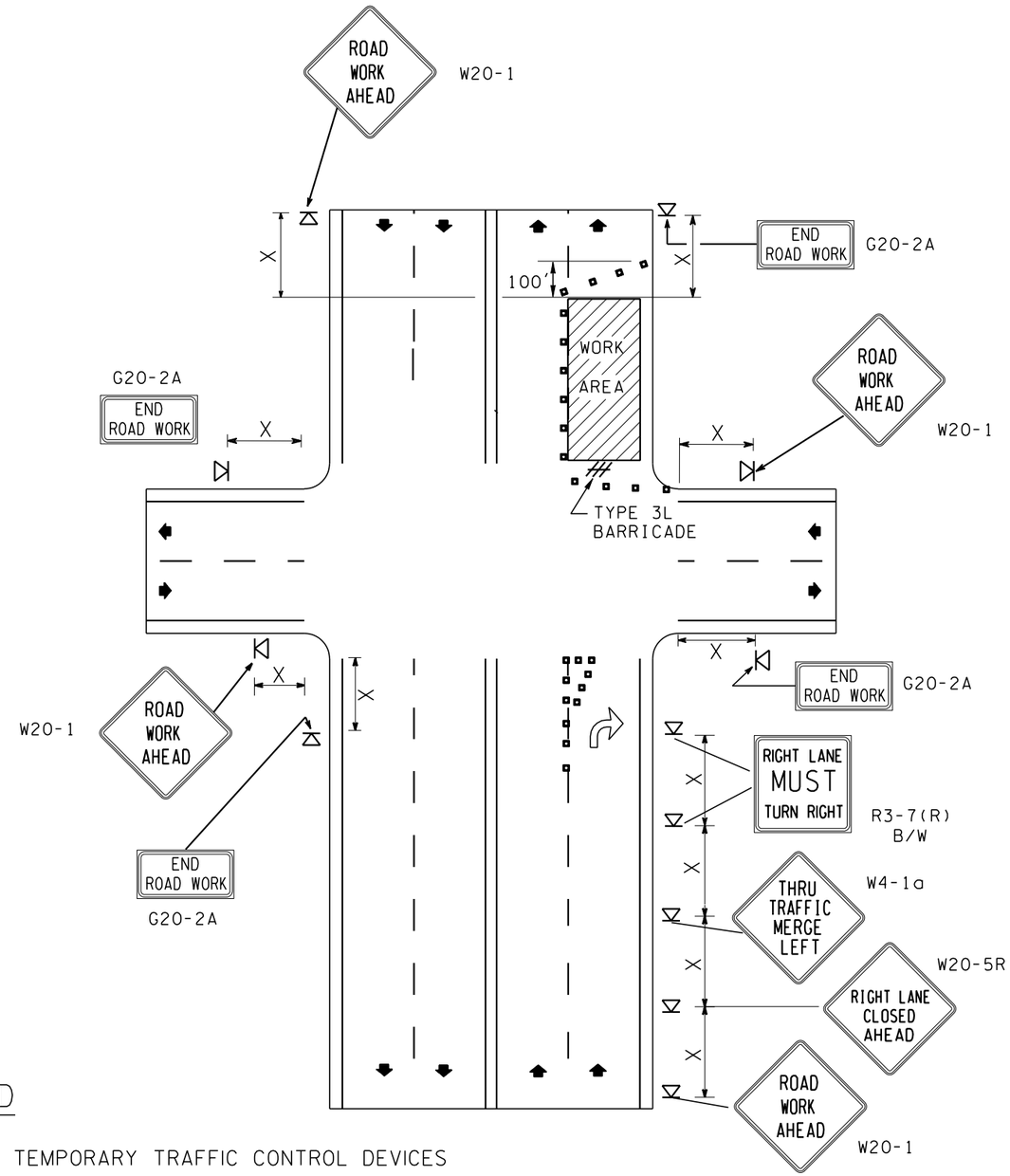
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




## LEGEND

- TEMPORARY TRAFFIC CONTROL DEVICES
- TYPE 3L BARRICADE
- SIGN MOUNT - TRIPOD MOUNT
- PAINTED TRAFFIC ARROW (OPTIONAL)

NOTES

1. PROHIBIT TURNS AS NECESSARY FOR TRAFFIC CONDITIONS. CLOSE LEFT TURN POCKET IF THERE IS ONE ON SIDE STREET.
2. FLASHING WARNING LIGHTS (TYPE A, MUTCD) SHOULD BE USED TO MARK BARRICADES AT NIGHT, AS NEEDED.
3. STEADY BURNING WARNING LIGHTS (TYPE C, MUTCD) SHOULD BE USED TO MARK CHANNELIZING DEVICES AT NIGHT AS NEEDED.
4. FOR LONG-TERM PROJECTS, CONFLICTING PAVEMENT MARKINGS NO LONGER APPLICABLE SHALL BE REMOVED OR OBLITERATED AS SOON AS PRACTICABLE. TEMPORARY MARKINGS SHALL BE USED AS NECESSARY.

| SIGN SPACING = X (feet) | | |
|---|---|---|
| Rural Roads | 45/55 MPH | 500'+- |
| Urban Arterials | 35/40 MPH | 350'+- |
| Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |

| CHANNELIZING DEVICE SPACING (feet) | | |
|---|---|---|
| MPH | TAPER | TANGENT |
| 50/70 | 40 | 80 |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |

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# RIGHT LANE CLOSURE ON FAR SIDE OF INTERSECTION STANDARD PLAN K-26

SHEET 1 OF 1 SHEET

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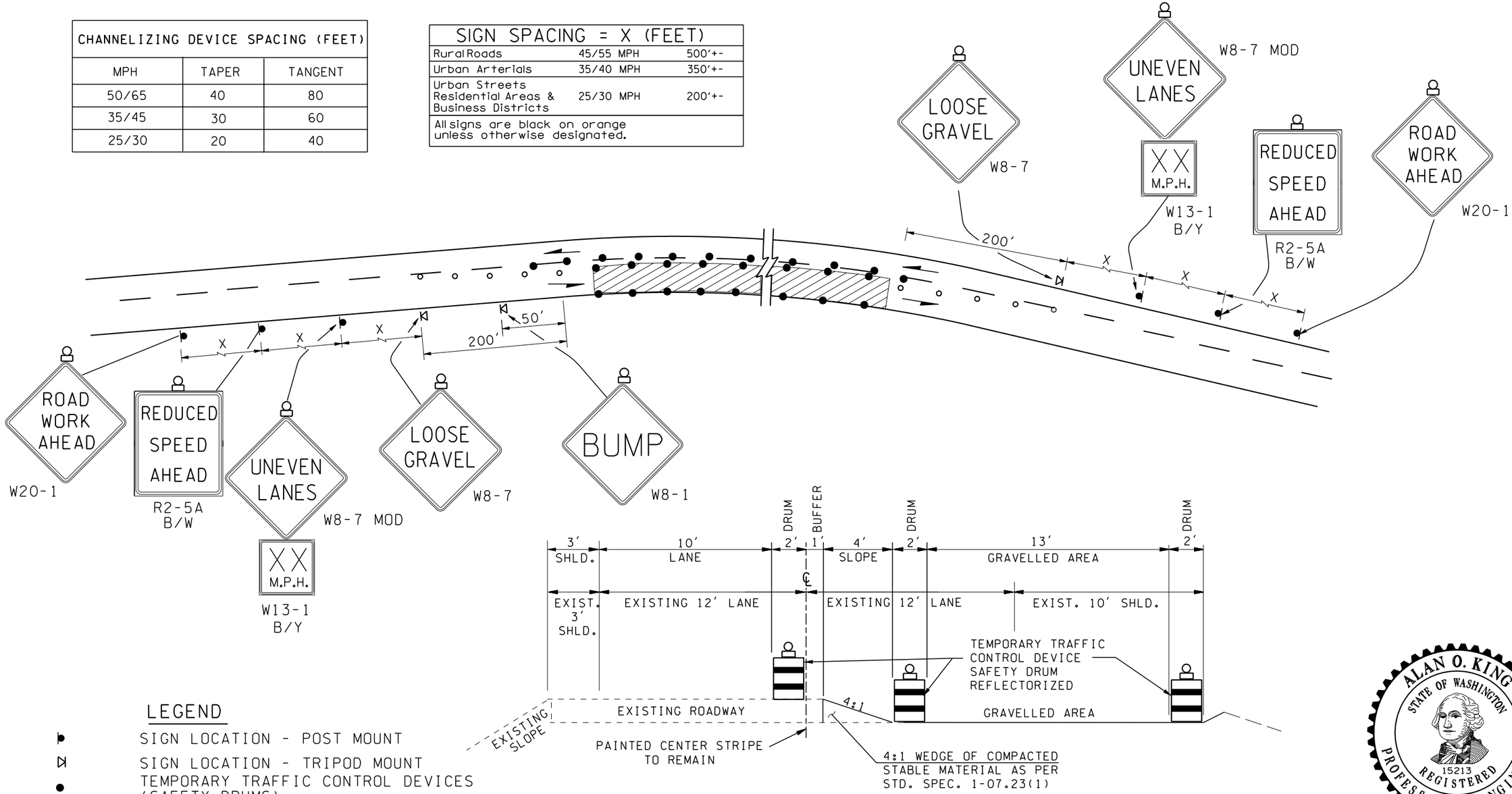
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| CHANNELIZING DEVICE SPACING (FEET) | | |
|---|---|---|
| MPH | TAPER | TANGENT |
| 50/65 | 40 | 80 |
| 35/45 | 30 | 60 |
| 25/30 | 20 | 40 |

| SIGN SPACING = X (FEET) | | |
|---|---|---|
| Rural Roads | 45/55 MPH | 500'+- |
| Urban Arterials | 35/40 MPH | 350'+- |
| Urban Streets Residential Areas & Business Districts | 25/30 MPH | 200'+- |
| All signs are black on orange unless otherwise designated. | | |




## LEGEND

- SIGN LOCATION - POST MOUNT
- SIGN LOCATION - TRIPOD MOUNT
- TEMPORARY TRAFFIC CONTROL DEVICES (SAFETY DRUMS)
- TYPE "A" FLASHING WARNING LIGHT
- TUBULAR MARKERS
- GRAVELLED AREA

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EXPIRES NOVEMBER 23, 2003

# ONE LANE REPAIR DURING NON-WORKING HOURS STANDARD PLAN K-27

SHEET 1 OF 1 SHEET

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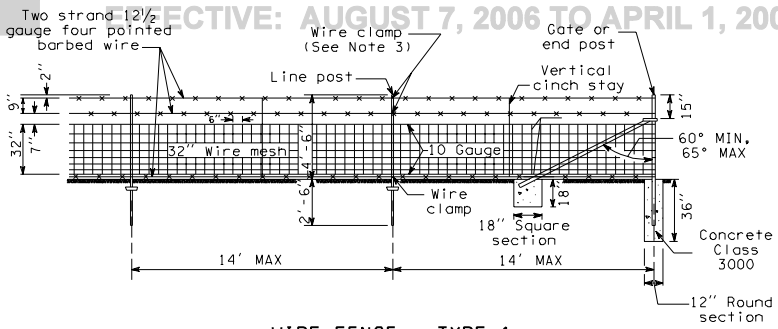
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-20-02* DATE

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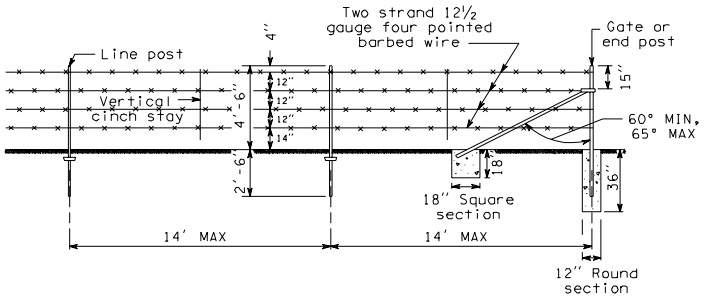
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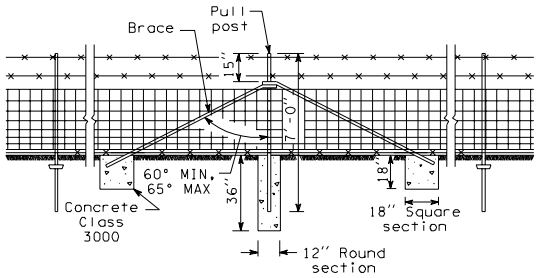
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



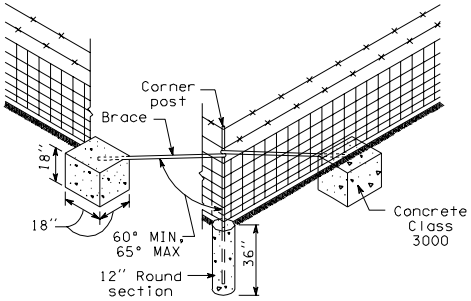

WIRE FENCE - TYPE 1



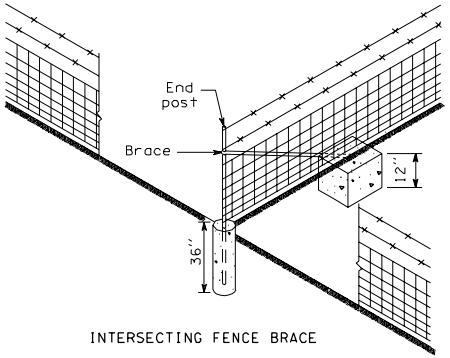

WIRE FENCE - TYPE 2




LINE BRACE
(Maximum spacing 1000 feet)

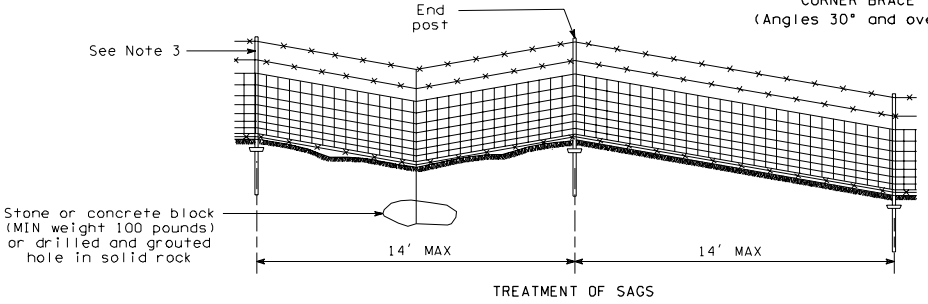



CORNER BRACE
(Angles 30° and over)




INTERSECTING FENCE BRACE

WIRE FENCE




TREATMENT OF SAGS

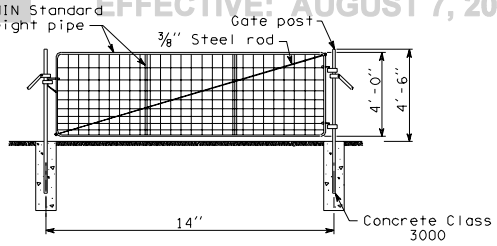
## STEEL POST DETAILS

Details for Type 2 Fence identical as shown for Type 1 Fence

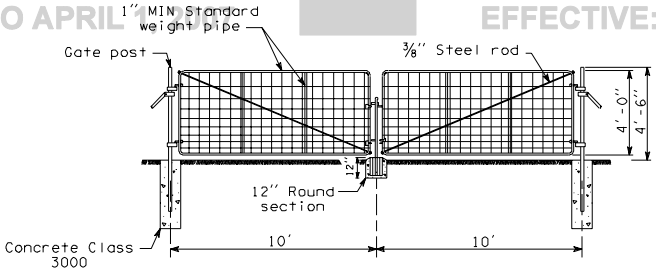
L-1

07-18-97

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



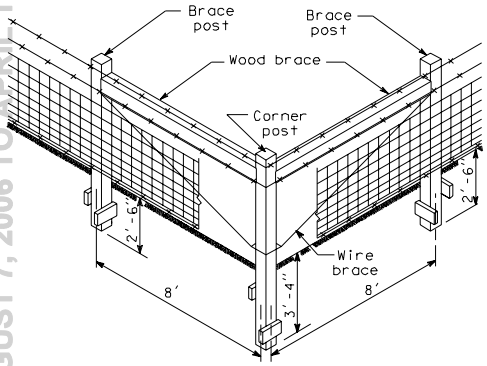

SINGLE WIRE GATE, 14' WIDE



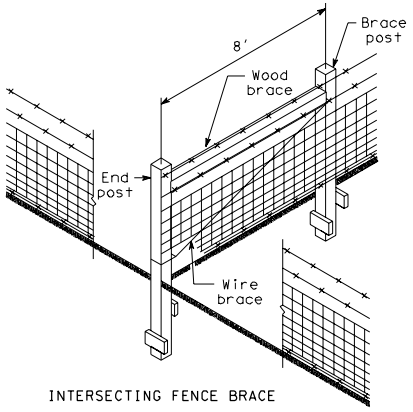

DOUBLE WIRE GATE, 20' WIDE

NOTES:

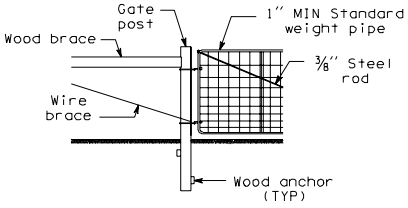
1. Details for Type 2 Fence, sme as Type 1.
2. Wood anchors shall be 2x4 lumber, 12" long MIN, fastened with three 16d galvanized nails.
3. Four wire clamps per post required for mesh wire. Three additional clamps per post required in sag section.



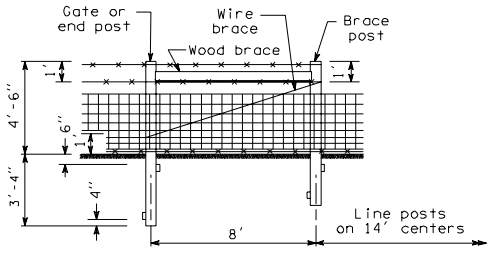

CORNER BRACE
(Angles 30° and over)



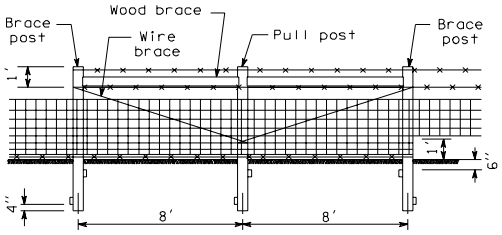

INTERSECTING FENCE BRACE




GATE POST




END BRACE




LINE BRACE
(Maximum spacing 1000 feet)

WIRE FENCE

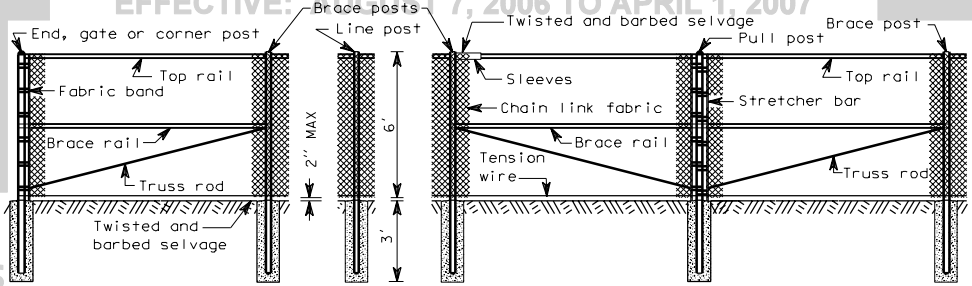
WOOD POST DETAILS

L-1
07-18-97

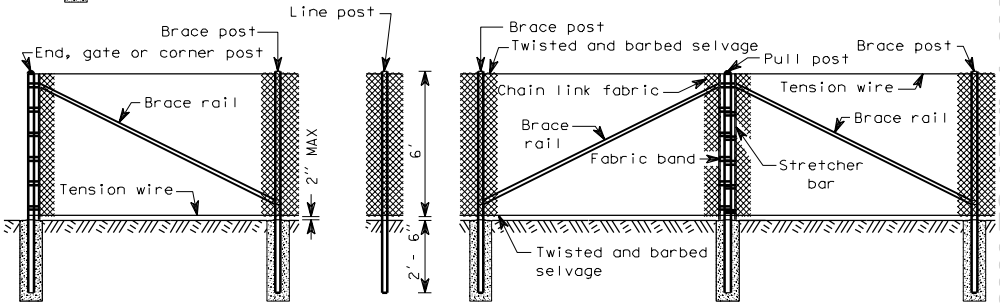


EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

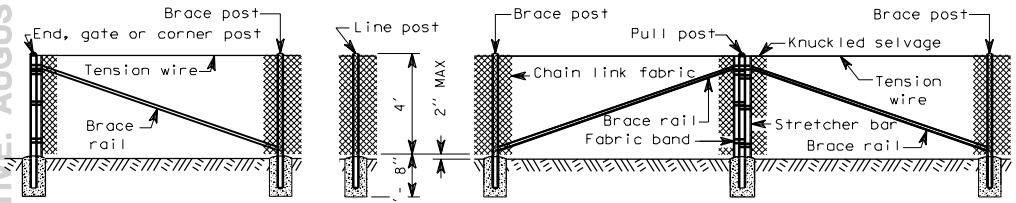
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



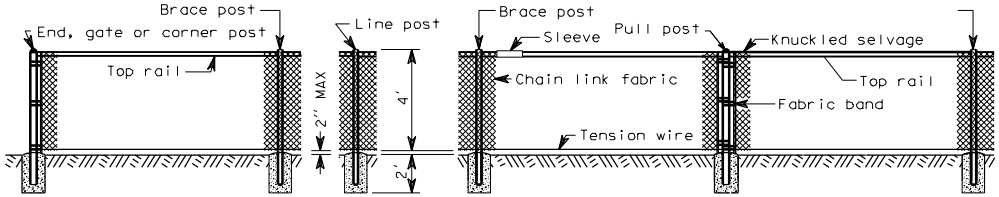

CHAIN LINK FENCE TYPE 1




CHAIN LINK FENCE TYPE 3




CHAIN LINK FENCE TYPE 4




CHAIN LINK FENCE TYPE 6

CHAIN LINK FENCE

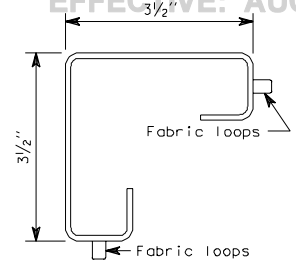
L-2

07-18-97

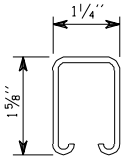


EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

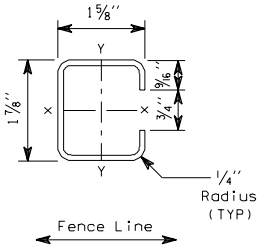
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




END, CORNER AND PULL POST




RAIL AND BRACE




LINE POST

ROLL FORMED SECTIONS

NOTES:

All concrete post bases shall be 10" minimum diameter.

All posts shall be spaced at 10' maximum intervals unless otherwise directed by the Engineer.

Top or bottom tension wires shall be placed within the limits of the first full fabric weave.

Details are illustrative and shall not limit hardware design or post selection of any particular fence type.

| TYPE | MEMBER | | | | | | | | | | | | | | | | | | ALL POSTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BRACE RAIL & TOP RAIL | | | | | | LINE & BRACE POST | | | | | | END, CORNER, & PULL POST | | | | GATE POST | | |
| | ROUND | | H-COLUMN | | ROLL FORMED | | ROUND | | H-COLUMN | | ROLL FORMED | | ROUND | | ROLL FORMED | | ROUND | | |
| | I.D. Pipe (Inches) | Weight Per Foot (Pounds) | Size (Inches) | Weight Per Foot (Pounds) | Size (Inches) | Weight Per Foot (Pounds) | I.D. Pipe (Inches) | Weight Per Foot (Pounds) | Size (Inches) | Weight Per Foot (Pounds) | Size (Inches) | Weight Per Foot (Pounds) | I.D. Pipe (Inches) | Weight Per Foot (Pounds) | Size (Inches) | Weight Per Foot (Pounds) | I.D. Pipe (Inches) | Weight Per Foot (Pounds) | LENGTH |
| 1 | 1¼ | 2.27 | 1¼ x 1⅝ | 1.35 | 1⅝ x 1¼ | 1.35 | 2 | 3.65 | 2¼ | 4.0 | 1⅝ x 1⅞ | 2.34 | 2½ | 5.79 | 3½ x 3½ | 5.14 | 3½ | 9.1 | 8'-8" |
| | | | | | | | | | | | | | | | | | | | |
| 3 | 1¼ | 2.27 | 1¼ x 1⅝ | 1.35 | 1⅝ x 1¼ | 1.35 | 1½ | 2.72 | 1⅞ | 2.72 | 1⅝ x 1⅞ | 1.85 | 2 | 3.65 | 3½ x 3½ | 5.14 | 3½ | 9.1 | 8'-8" |
| 4 | 1¼ | 2.27 | 1¼ x 1⅝ | 1.35 | 1⅝ x 1¼ | 1.35 | 1½ | 2.72 | 1⅞ | 2.72 | 1⅝ x 1⅞ | 1.85 | 2 | 3.65 | 3½ x 3½ | 5.14 | 3½ | 9.1 | 5'-6" |
| | | | | | | | | | | | | | | | | | | | |
| 6 | 1¼ | 2.27 | 1¼ x 1⅝ | 1.35 | 1⅝ x 1¼ | 1.35 | 2 | 3.65 | 2¼ | 4.0 | 1⅝ x 1⅞ | 2.34 | 2½ | 5.79 | 3½ x 3½ | 5.14 | 3½ | 9.1 | 5'-6" |
| | | | | | | | | | | | | | | | | | | | |

CHAIN LINK FENCE

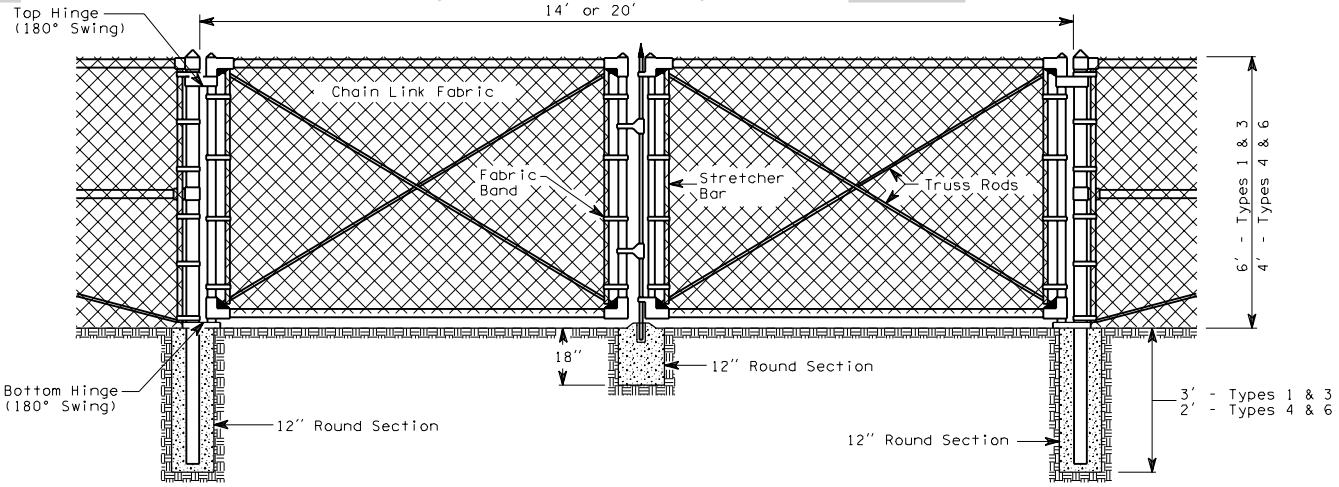
L-2

07-18-97



EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

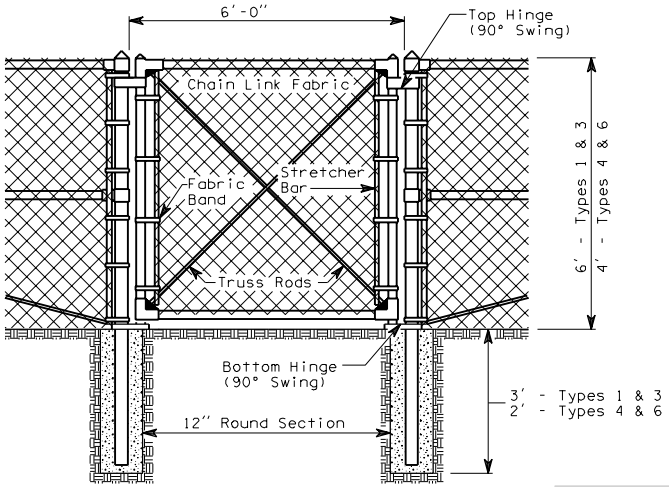
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




NOTES:

1. Fence fabric shall be secured to gate frames with knuckled selvage along top edge for Types 4 & 6 chain link fence installations.

2. Minimum post length:
   Types 1 & 3 8′- 8″
   Types 4 & 6 5′- 6″

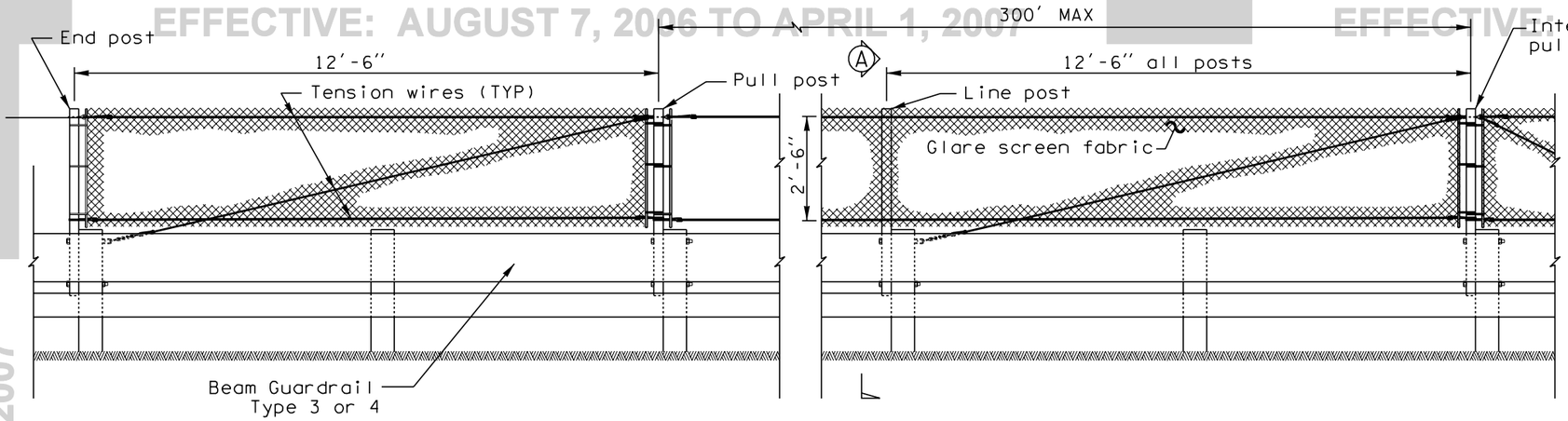



## CHAIN LINK GATES

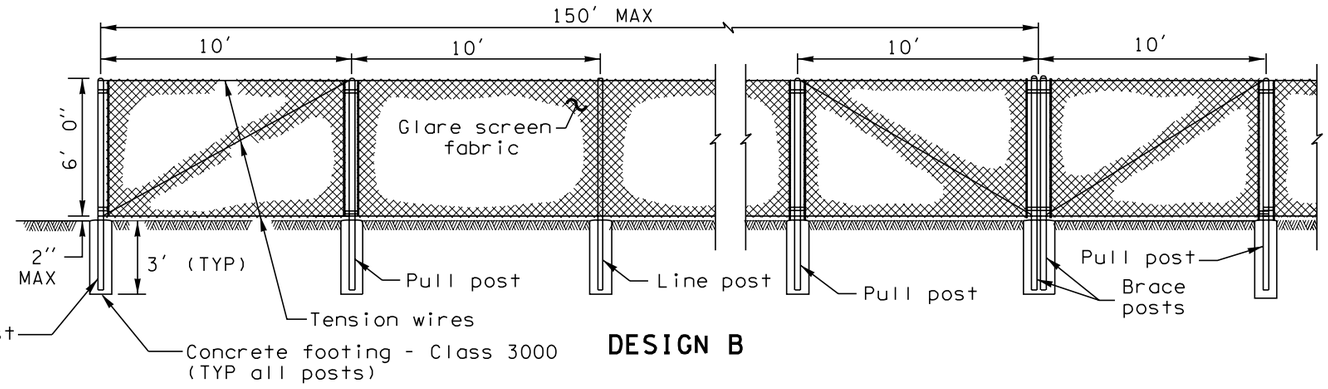


EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
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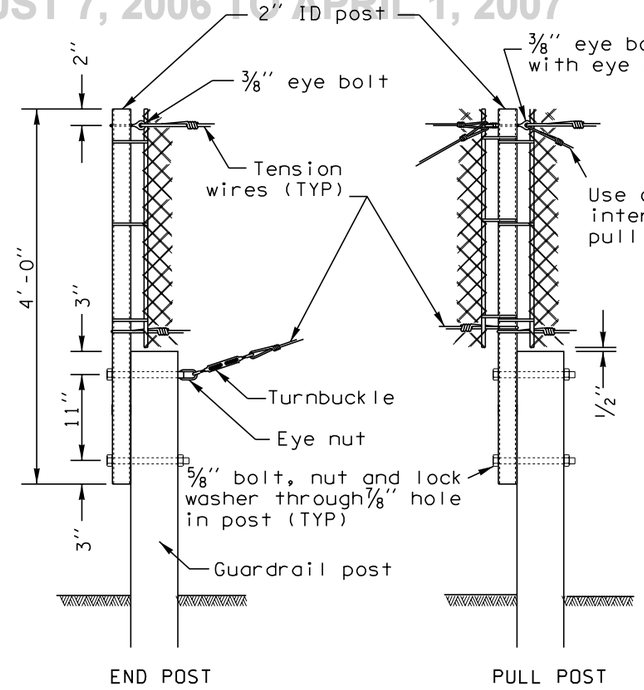
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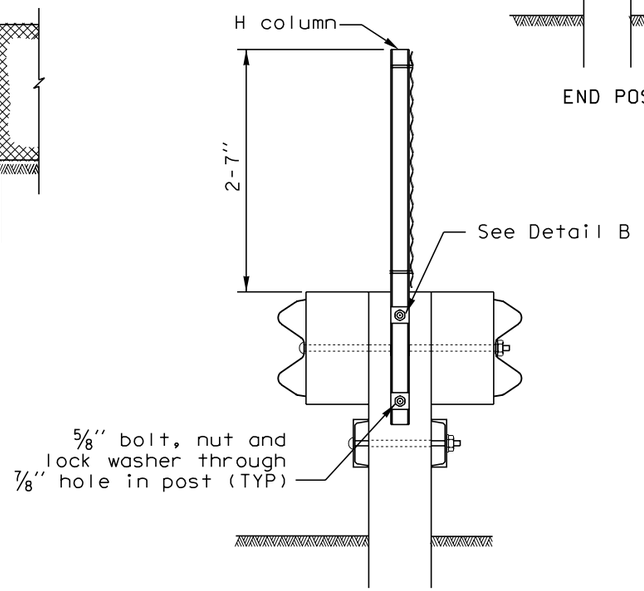

DESIGN A



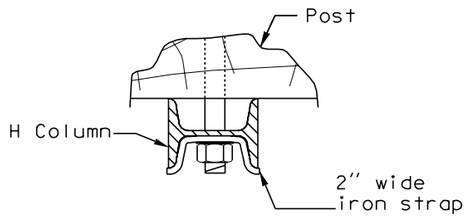

DESIGN B



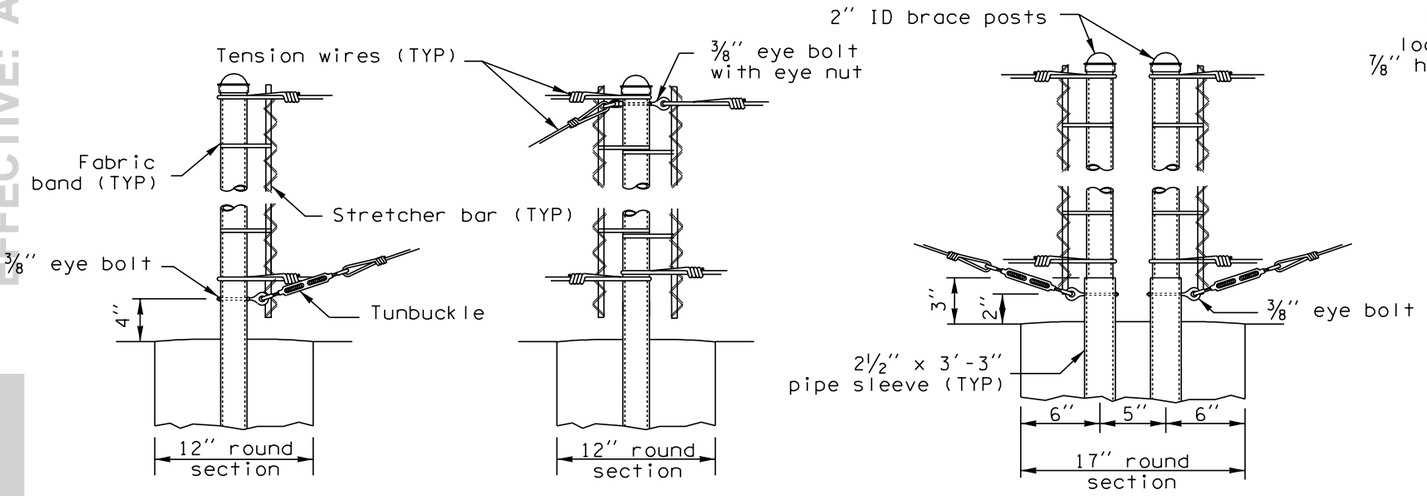

DESIGN A DETAILS




SECTION A




DETAIL B




END POST PULL POST BRACE POST DETAILS

DESIGN B DETAILS

CLIFFORD E. MANSFIELD
STATE OF WASHINGTON
15224
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2000

# GLARE SCREEN TYPE 1
# STANDARD PLAN L-5

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.

APPROVED FOR PUBLICATION

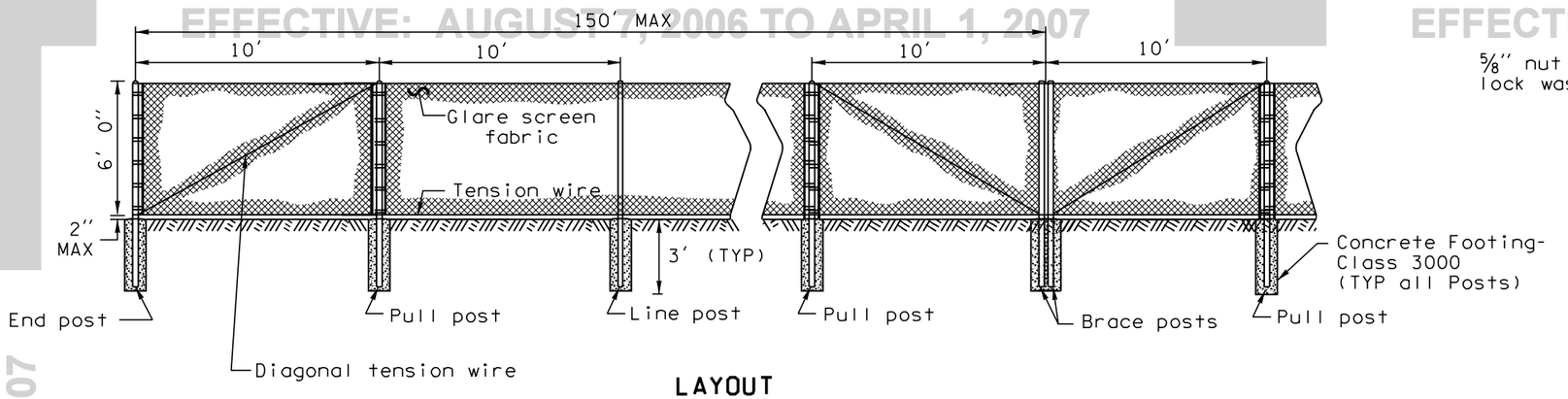
*Clifford E. Mansfield* — 7/31/98

DEPUTY STATE DESIGN ENGINEER — DATE

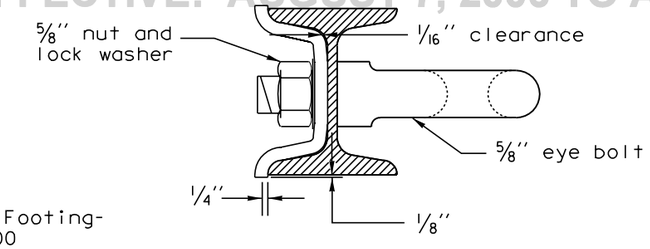
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

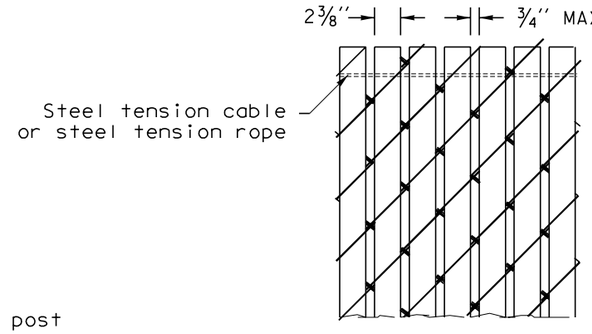
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



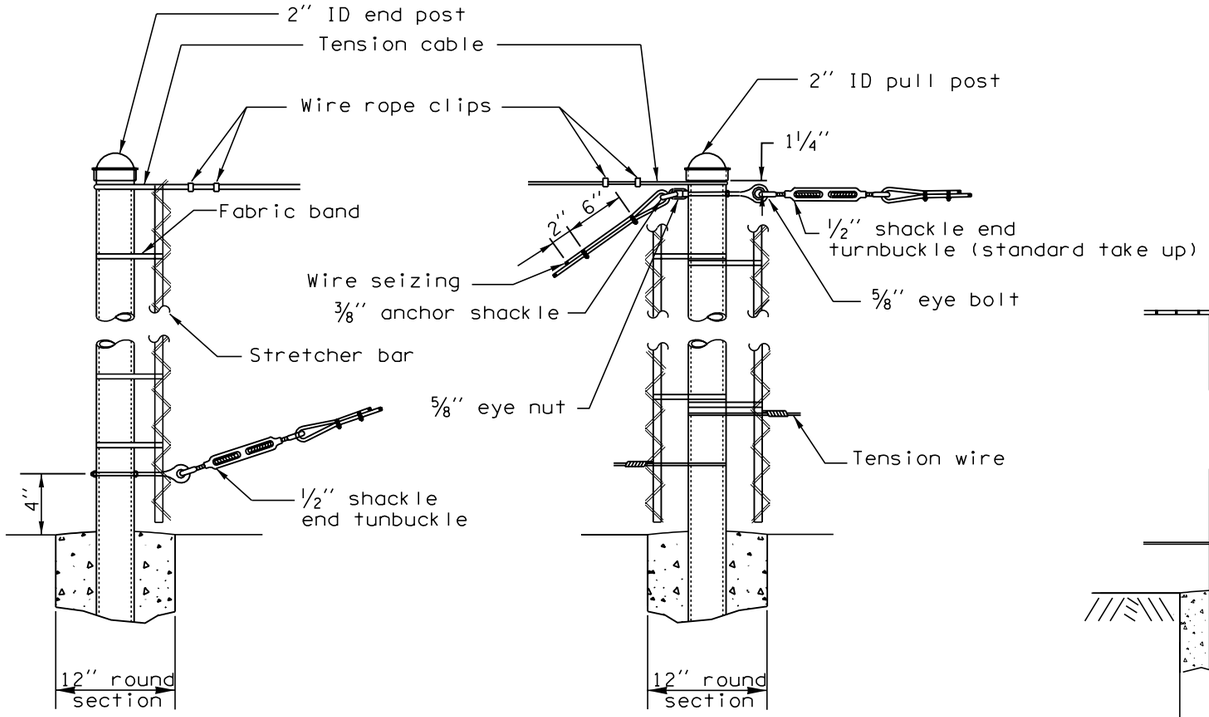

LAYOUT




EYE BOLT ATTACHMENT
TO H COLUMN POST



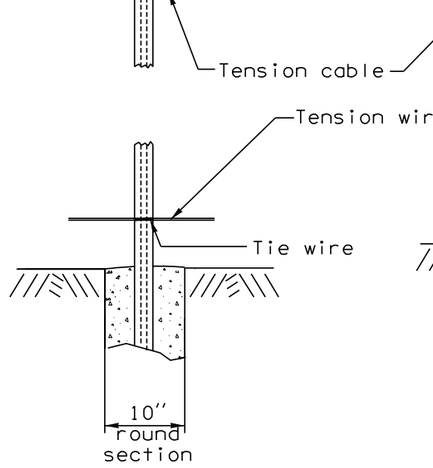

SLATS DETAIL



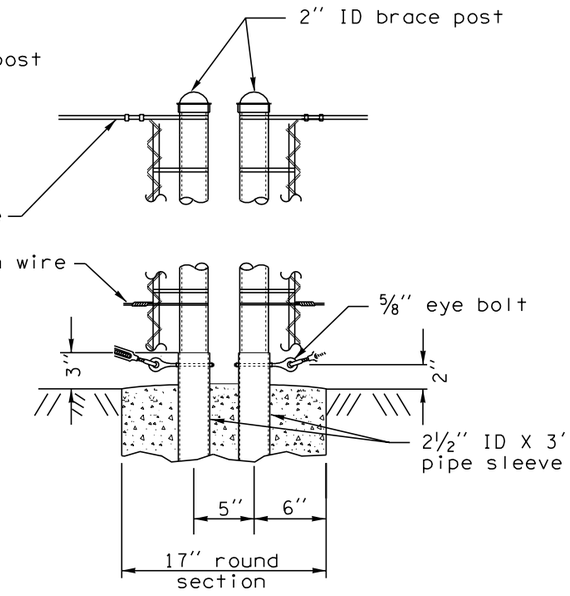

END POST




PULL POST




LINE POST




BRACE POST DETAILS

CLIFFORD E. MANSFIELD
STATE OF WASHINGTON
15224
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 3, 2000

# GLARE SCREEN TYPE 2

# STANDARD PLAN L-5a

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APPROVED FOR PUBLICATION

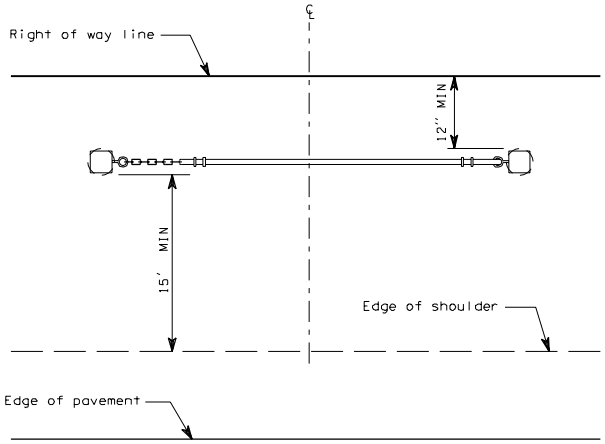
*Clifford E. Mansfield* — *7/31/98*

DEPUTY STATE DESIGN ENGINEER — DATE

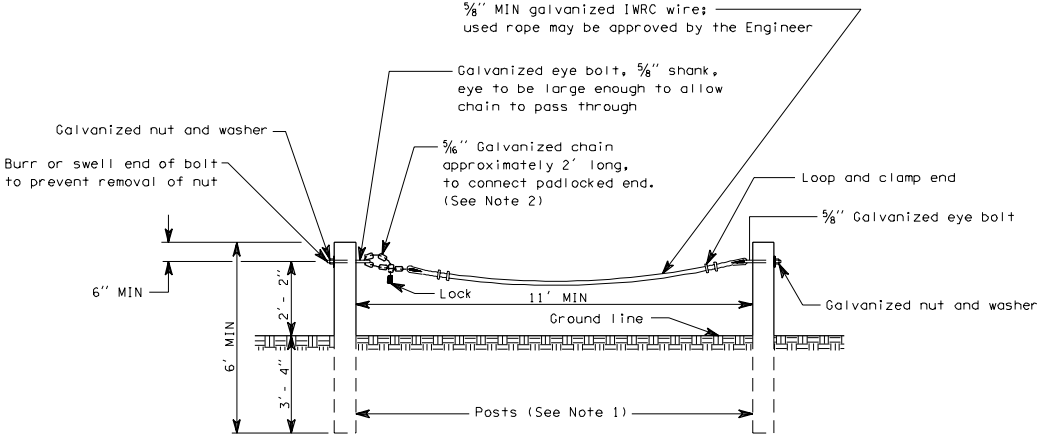
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




PLAN




ELEVATION

NOTES

1. Posts shall be 6 x 8 wood or W6 x 9 steel. See Standard Plan "Beam Guardrail Posts and Blocks".

2. Padlocked end shall be determined by the Project Engineer. Lock shall not be provided.

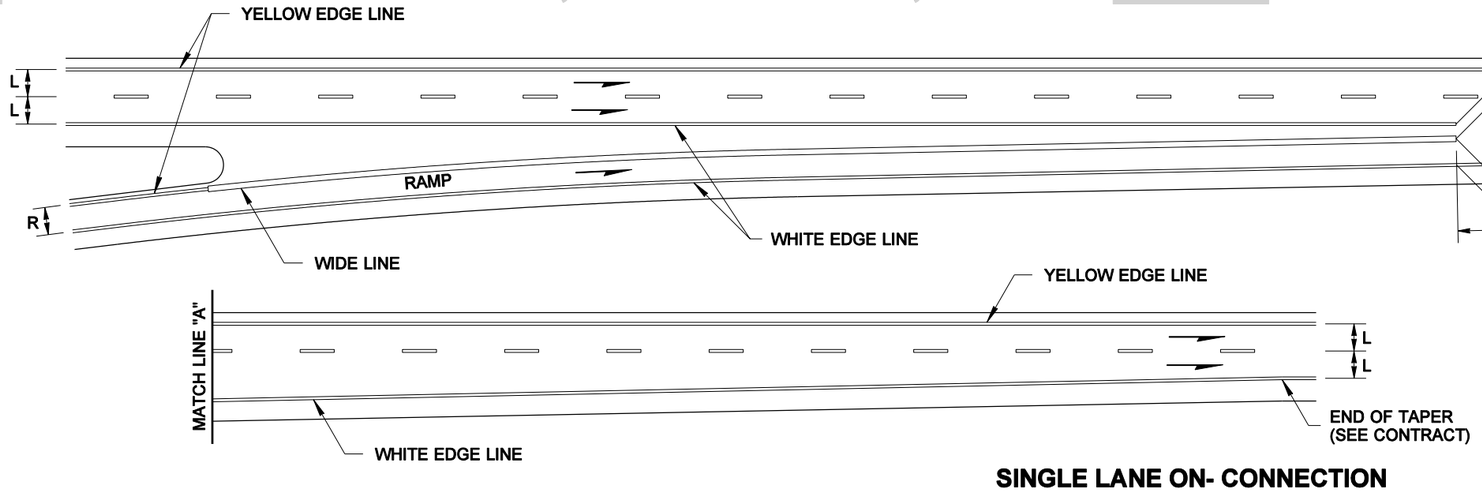
# ACCESS CONTROL GATE



EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: ADAM COCHRAN



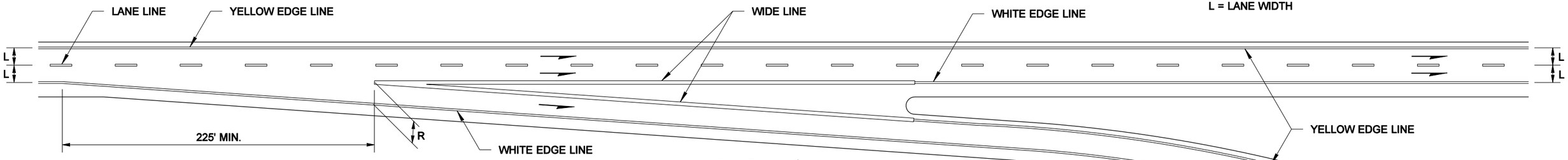

## SINGLE LANE ON- CONNECTION

**NOTES**

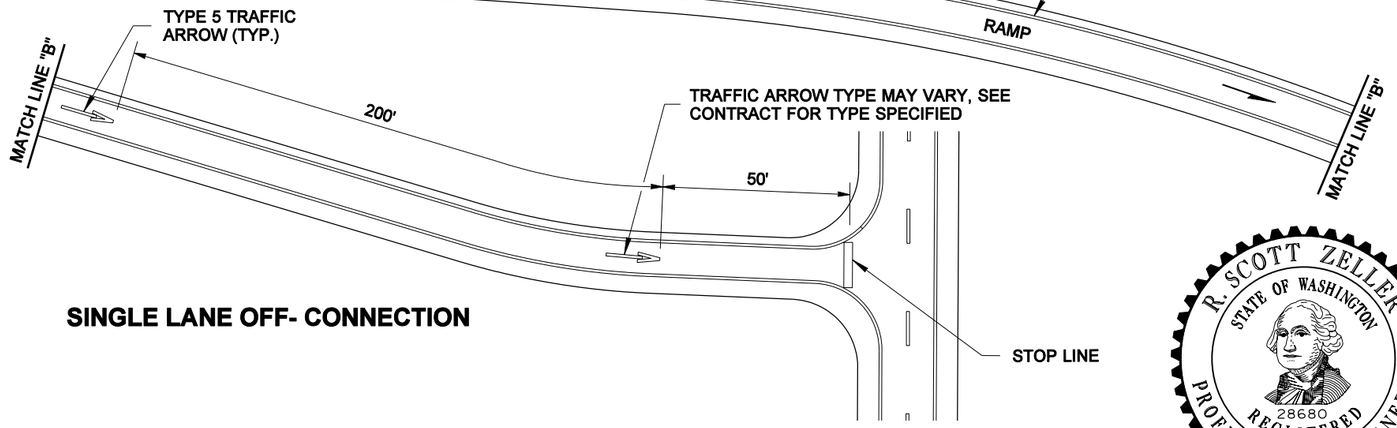
1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used for supplementing or substituting the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.
2. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

**LEGEND**

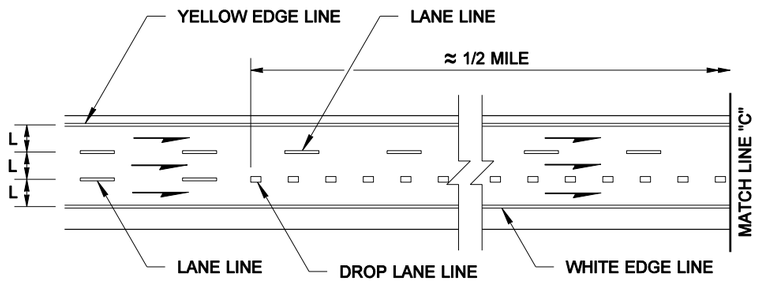
R = RAMP LANE WIDTH
L = LANE WIDTH

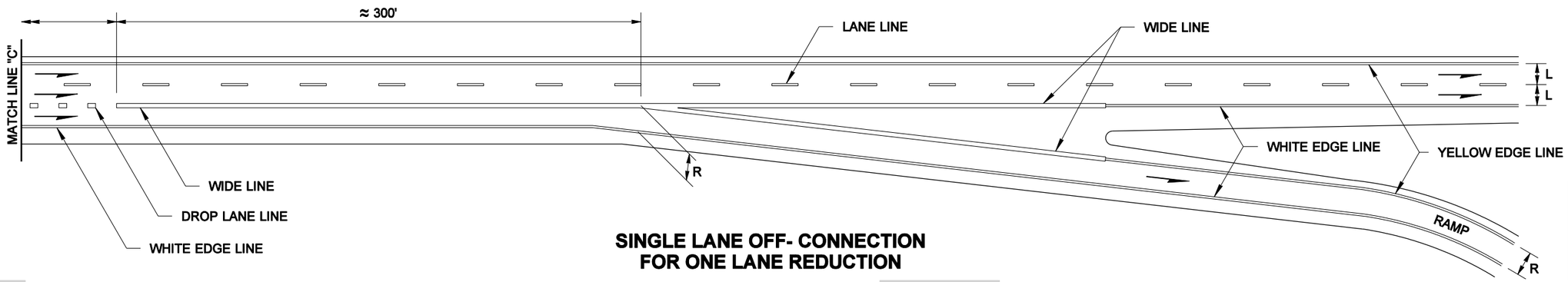



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## SINGLE LANE OFF- CONNECTION




## SINGLE LANE OFF- CONNECTION FOR ONE LANE REDUCTION

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# RAMP CHANNELIZATION SINGLE LANE

# STANDARD PLAN M-1.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-25-05* — DATE

Washington State Department of Transportation

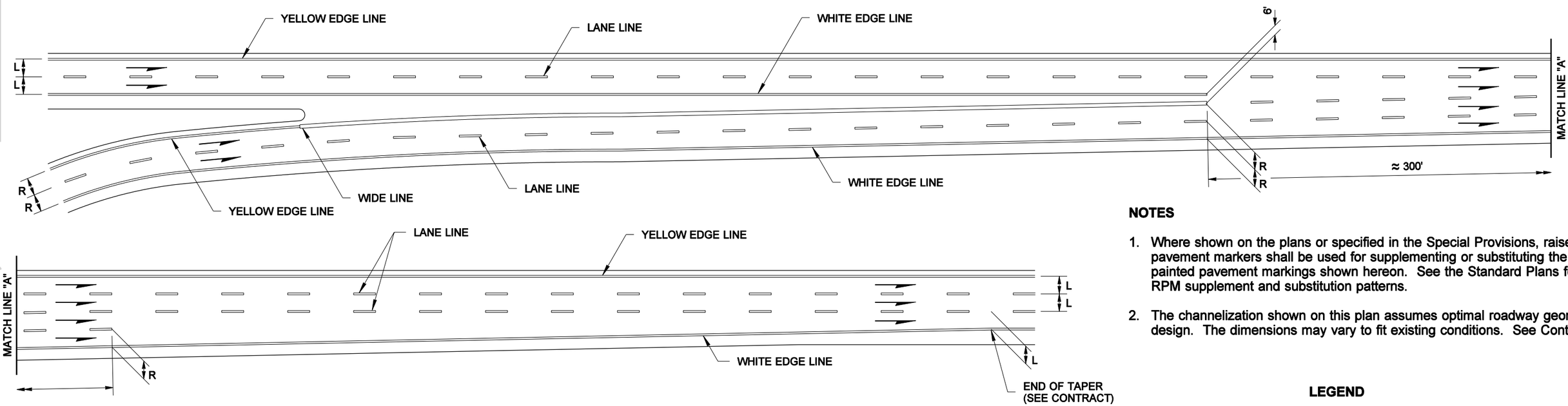
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




**TWO LANE ON- CONNECTION**

**NOTES**

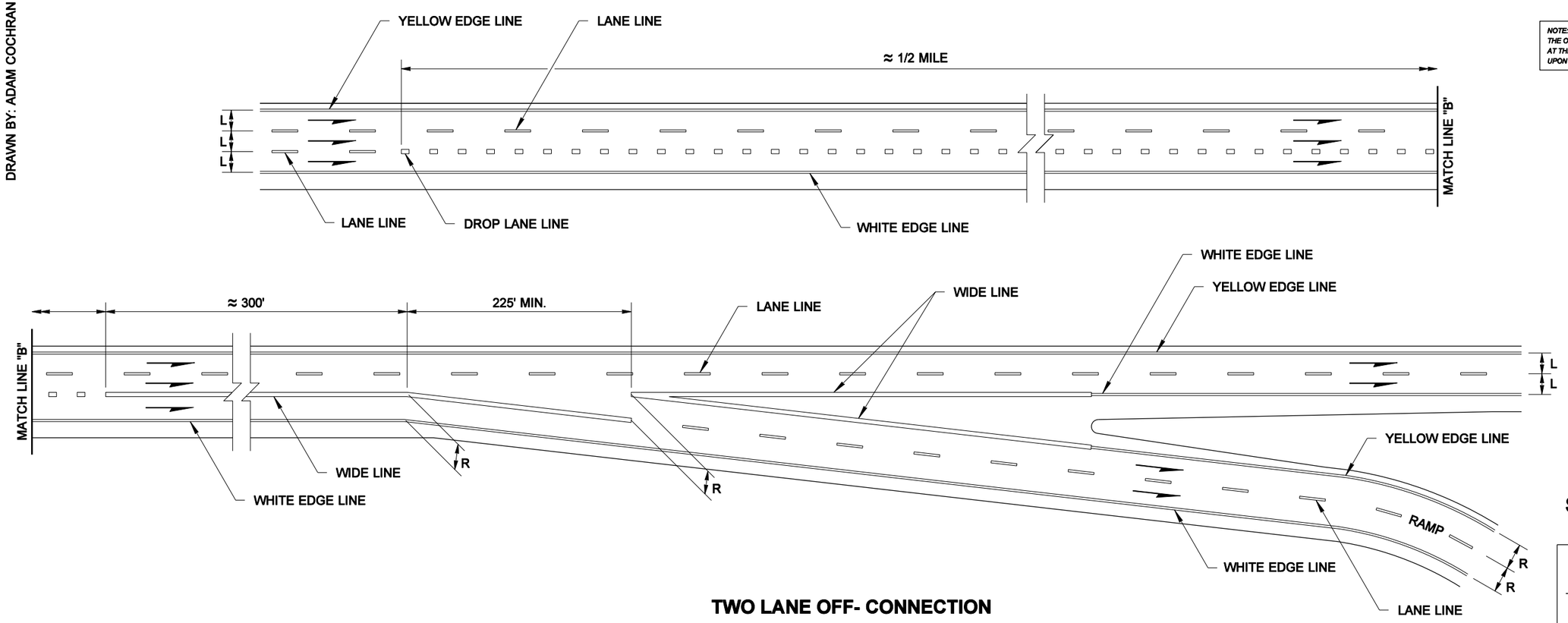
1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used for supplementing or substituting the painted pavement markings shown hereon. See the Standard Plans for RPM supplement and substitution patterns.
2. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

**LEGEND**

R = RAMP LANE WIDTH

L = LANE WIDTH

DRAWN BY: ADAM COCHRAN




**TWO LANE OFF- CONNECTION**

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R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# RAMP CHANNELIZATION TWO LANE

## STANDARD PLAN M-1.40-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

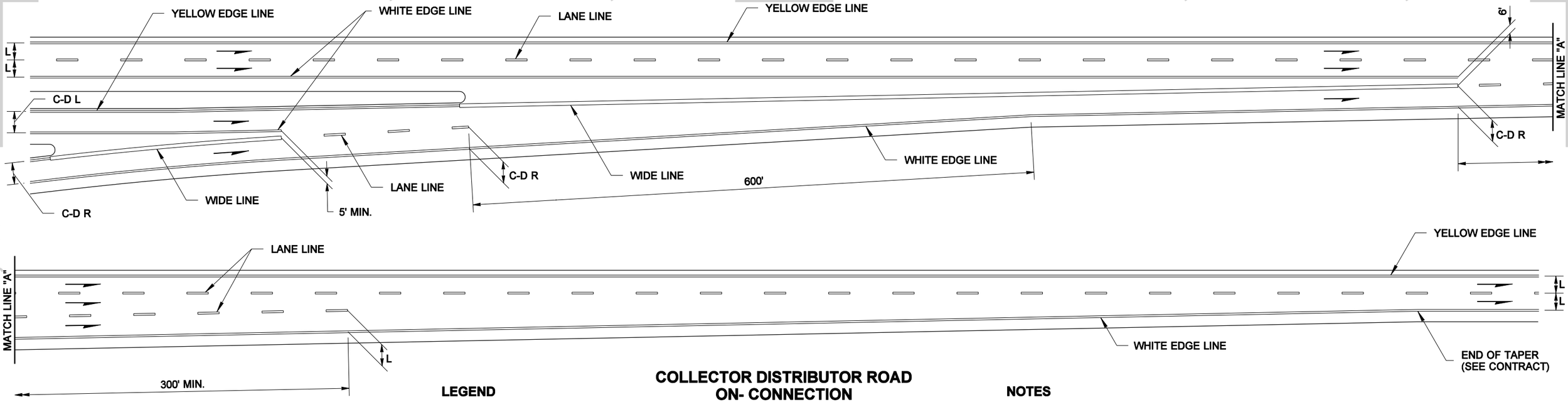
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-25-05* — DATE

Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007




## COLLECTOR DISTRIBUTOR ROAD ON- CONNECTION

**LEGEND**

C-D R = COLLECTOR DISTRIBUTOR RAMP LANE WIDTH

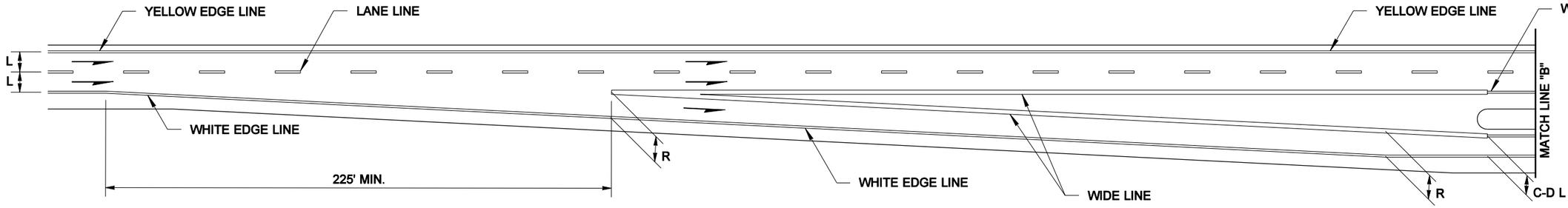
C-D L = COLLECTOR DISTRIBUTOR LANE WIDTH

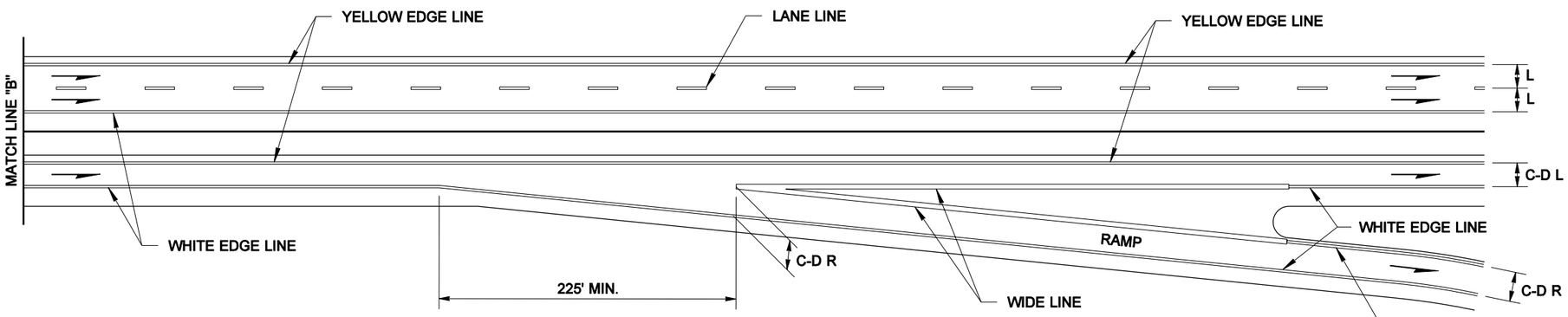
R = RAMP LANE WIDTH

L = LANE WIDTH

**NOTES**

1. Where shown on the plans or specified in the Special Provisions, raised pavement markers shall be used 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.




## COLLECTOR DISTRIBUTOR ROAD OFF- CONNECTION

DRAWN BY: ADAM COCHRAN

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# RAMP CHANNELIZATION COLLECTOR DISTRIBUTOR ROAD

# STANDARD PLAN M-1.60-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-25-05* — DATE

Washington State Department of Transportation

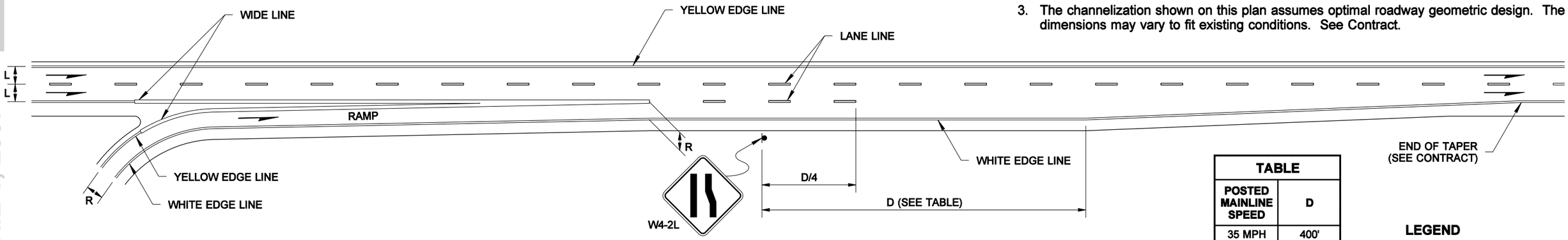
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

**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.

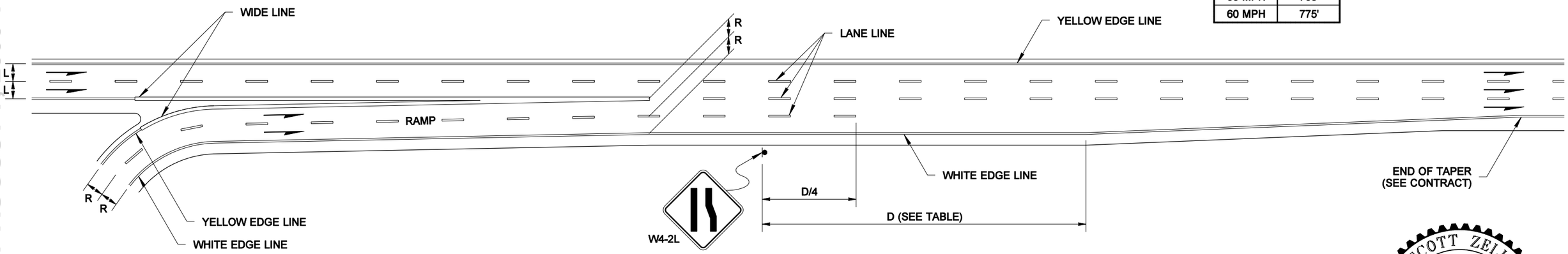



**SINGLE LANE, PARALLEL TYPE ON- CONNECTION**

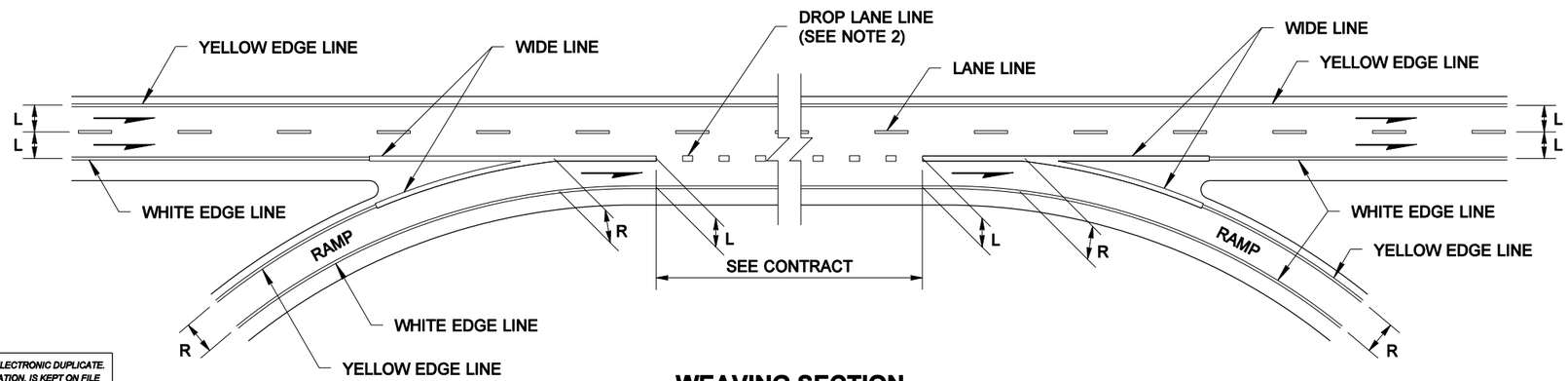
| TABLE | |
|---|---|
| POSTED MAINLINE SPEED | D |
| 35 MPH | 400' |
| 40 MPH | 475' |
| 45 MPH | 550' |
| 50 MPH | 625' |
| 55 MPH | 700' |
| 60 MPH | 775' |

**LEGEND**

L = LANE WIDTH
R = RAMP LANE WIDTH




**DOUBLE LANE, PARALLEL TYPE ON- CONNECTION**




**WEAVING SECTION**

DRAWN BY: ADAM COCHRAN

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# RAMP CHANNELIZATION PARALLEL ON & WEAVING SECTION STANDARD PLAN M-1.80-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *02-25-05* — DATE

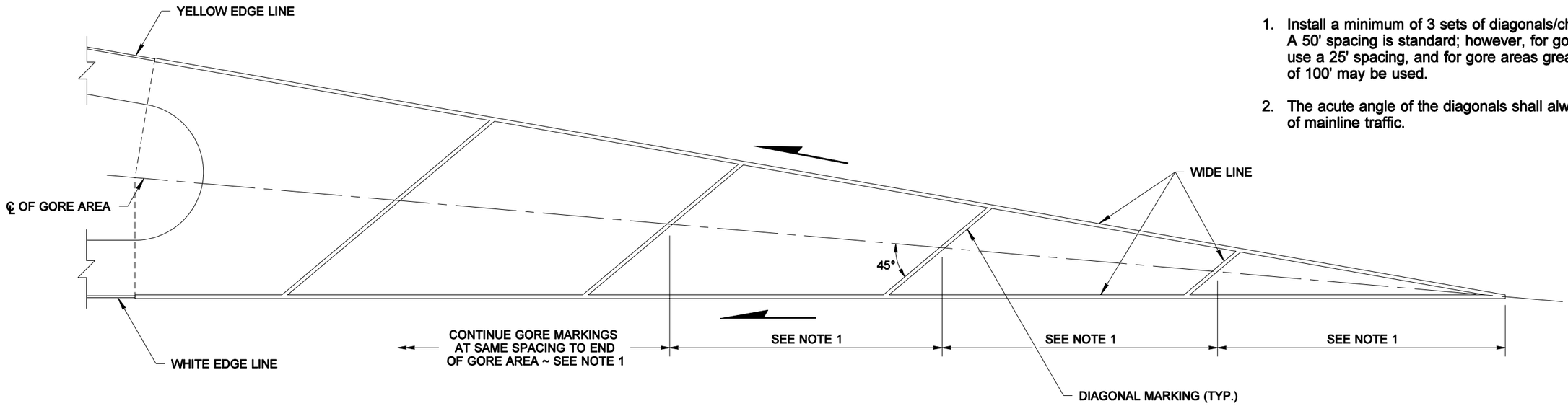
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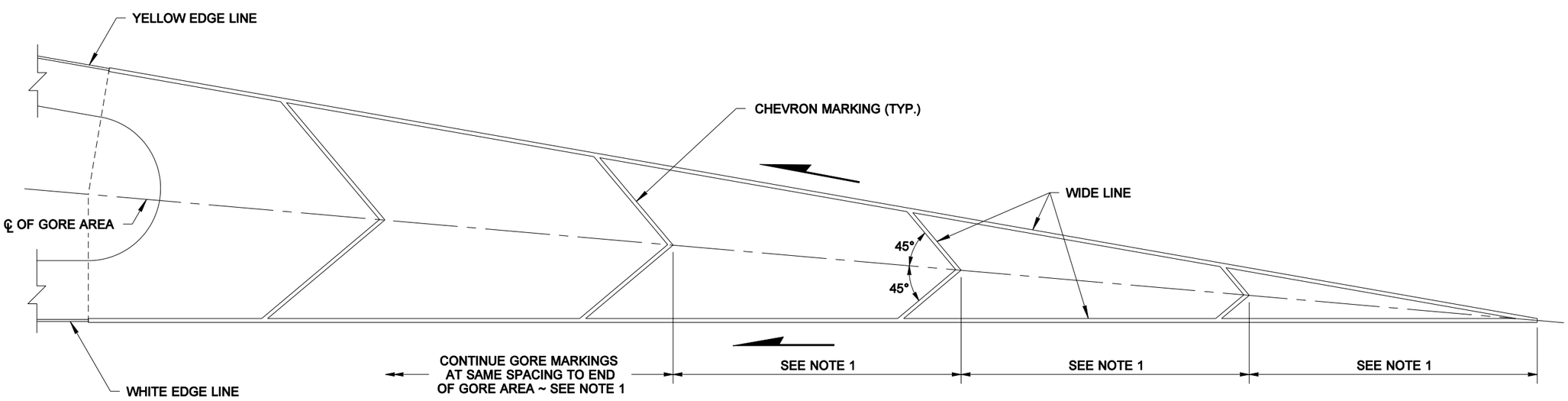
DRAWN BY: ADAM COCHRAN




**GORE AREA MARKING LAYOUT WITH DIAGONALS**

**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.




**GORE AREA MARKING LAYOUT WITH CHEVRONS**

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# GORE AREA MARKING LAYOUTS

## STANDARD PLAN M-2.20-00

SHEET 1 OF 1 SHEET

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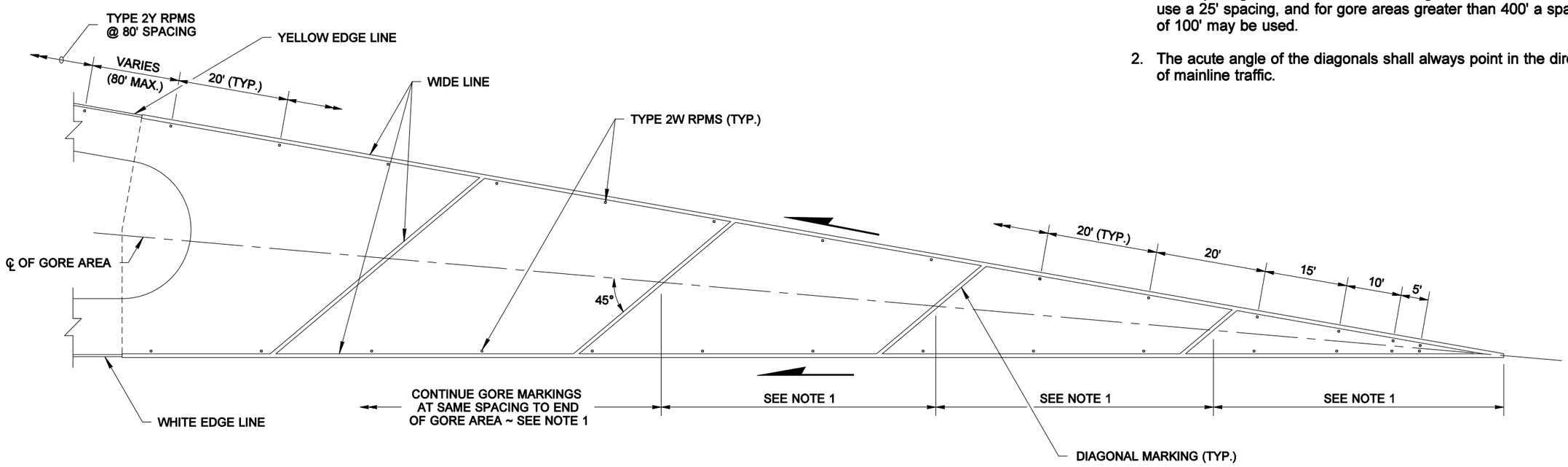
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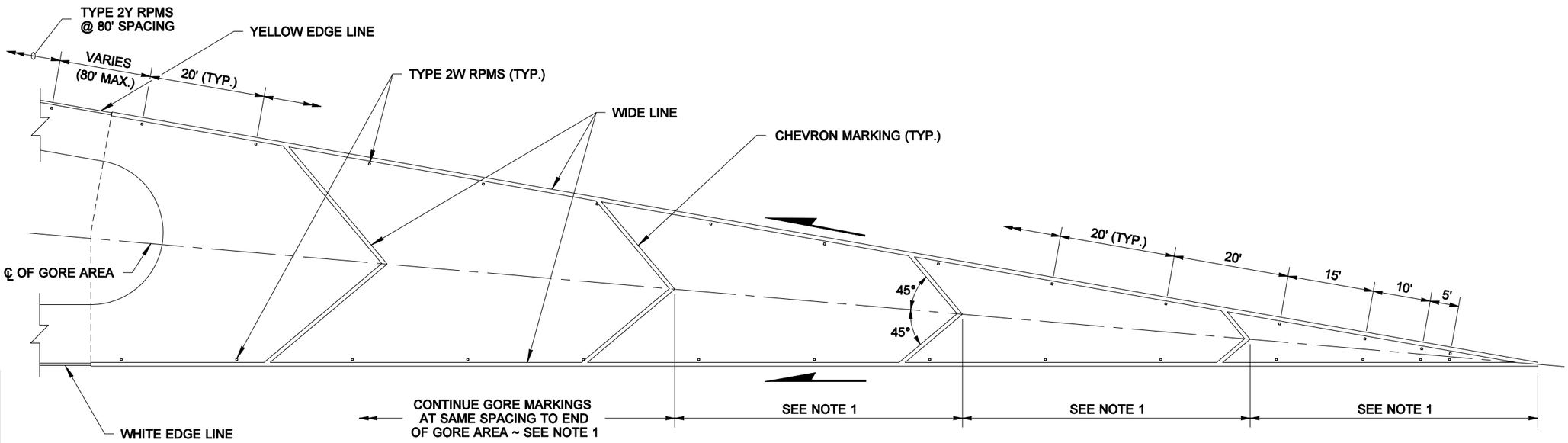
DRAWN BY: ADAM COCHRAN

**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.




**GORE AREA MARKING LAYOUT WITH DIAGONALS**




**GORE AREA MARKING LAYOUT WITH CHEVRONS**

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STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# GORE AREA SUPPLEMENT WITH TYPE 2 RAISED PAVEMENT MARKERS
# STANDARD PLAN M-2.40-00

SHEET 1 OF 1 SHEET

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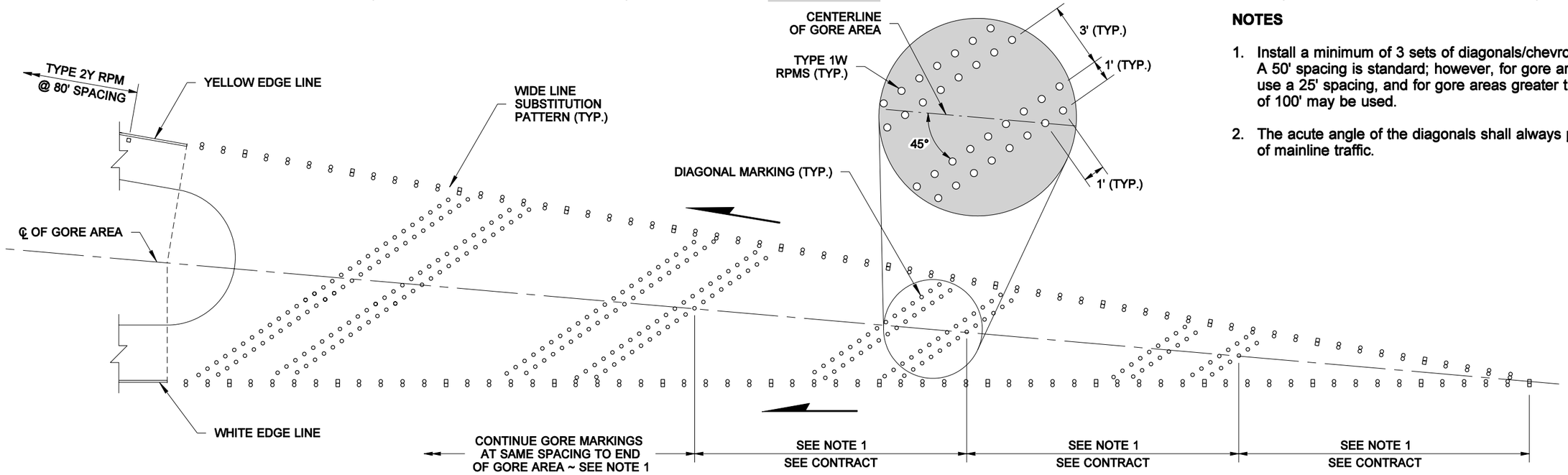
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DRAWN BY: ADAM COCHRAN

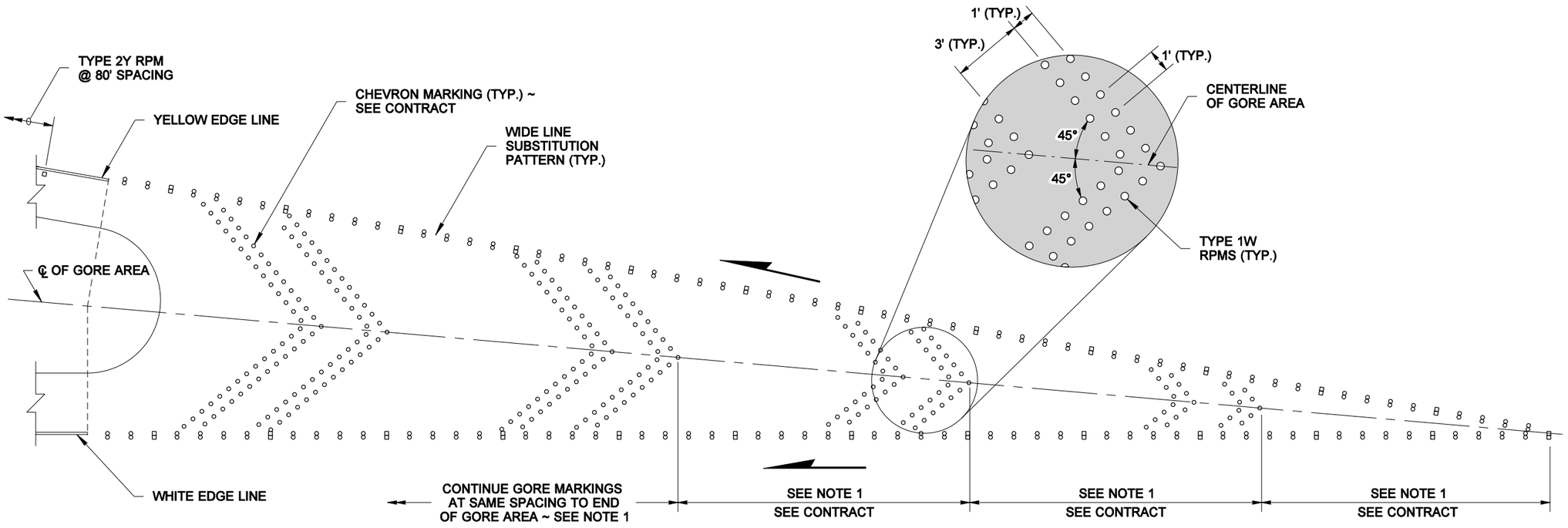



**GORE AREA MARKINGS WITH DIAGONALS**

**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.




**GORE AREA MARKINGS WITH CHEVRONS**

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# GORE AREA SUBSTITUTION WITH TYPES 1 & 2 RAISED PAVEMENT MARKERS
# STANDARD PLAN M-2.60-00

SHEET 1 OF 1 SHEET

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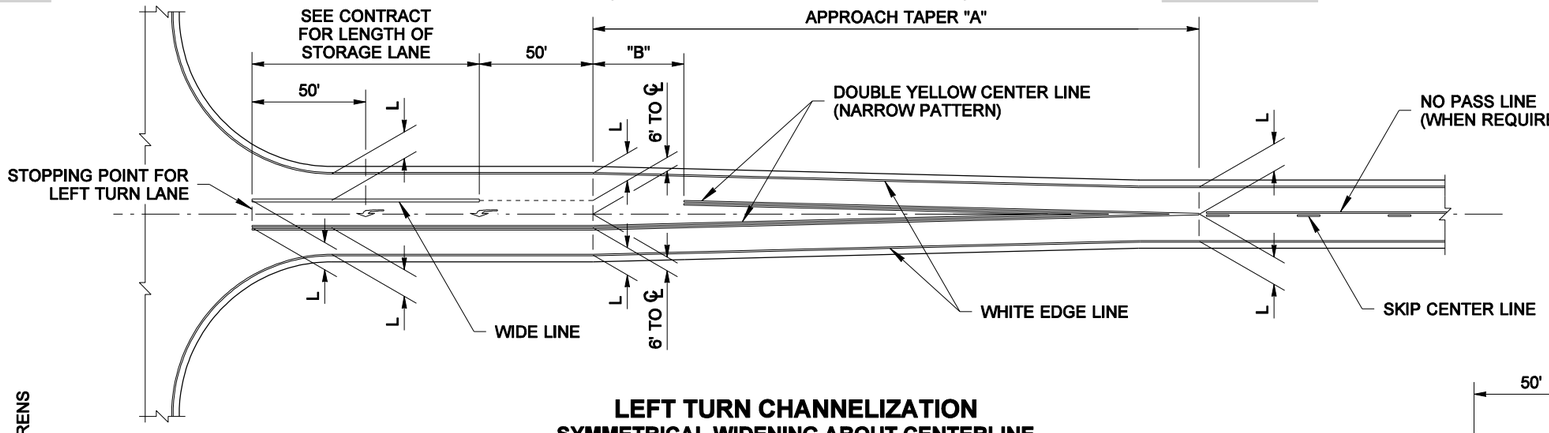
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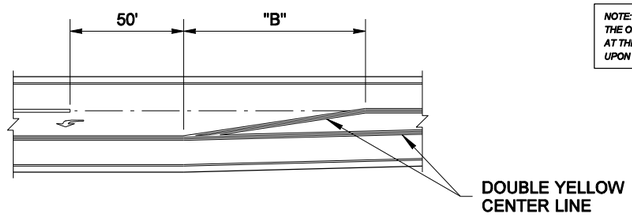
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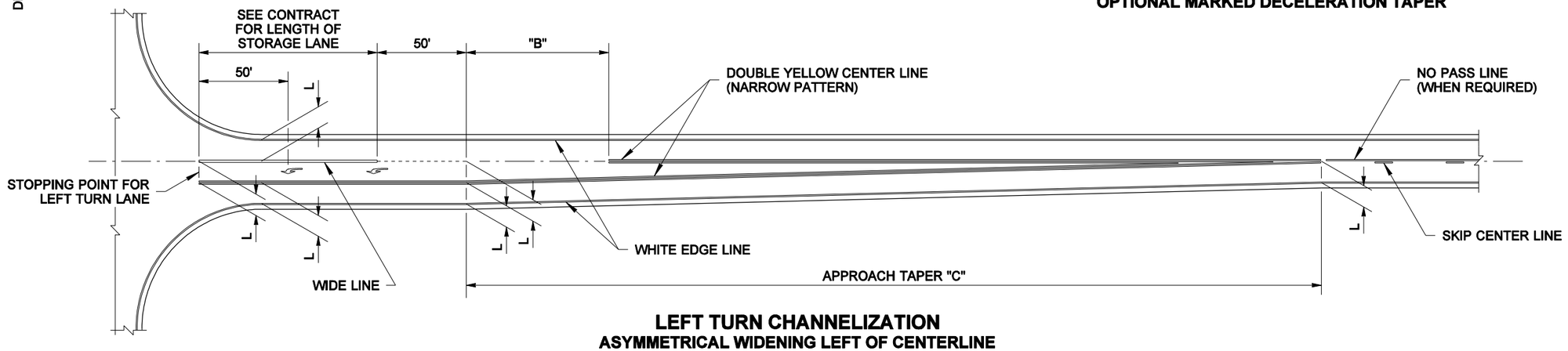
DRAWN BY: BILL BERENS



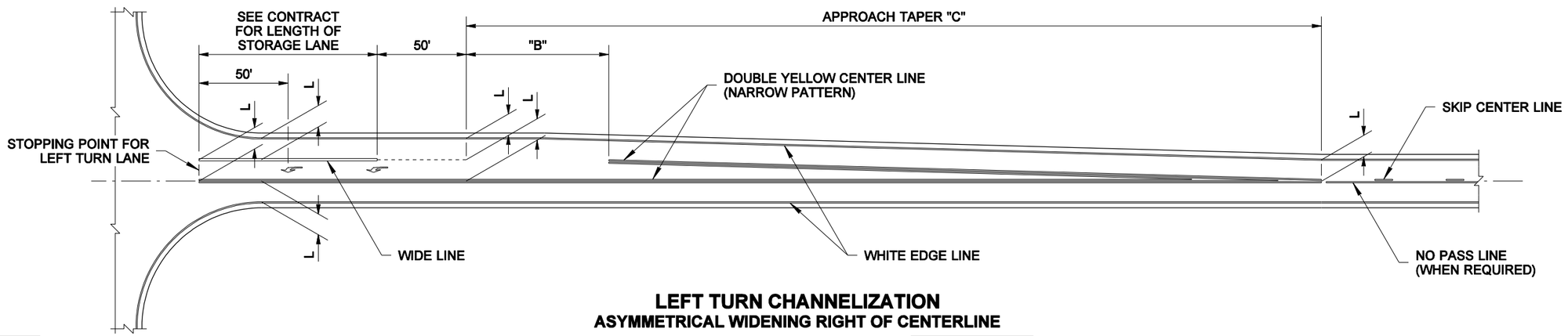

## LEFT TURN CHANNELIZATION
### SYMMETRICAL WIDENING ABOUT CENTERLINE




## OPTIONAL MARKED DECELERATION TAPER




## 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

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| POSTED SPEED | APPROACH TAPER "A" | DIMENSION "B" | APPROACH TAPER "C" |
|---|---|---|---|
| 60 MPH | 360' | 120' | 720' |
| 55 MPH | 330' | 110' | 660' |
| 50 MPH | 300' | 100' | 600' |
| 45 MPH | 270' | 90' | 540' |
| 40 MPH | 240' | 80' | 480' |
| 35 MPH | 210' | 70' | 420' |
| 30 MPH | 180' | 60' | 360' |
| 25 MPH | 150' | 50' | 300' |
| 20 MPH | 120' | 40' | 240' |




EXPIRES MAY 5, 2005

# LEFT TURN CHANNELIZATION

## STANDARD PLAN M-3.10-00

SHEET 1 OF 1 SHEET

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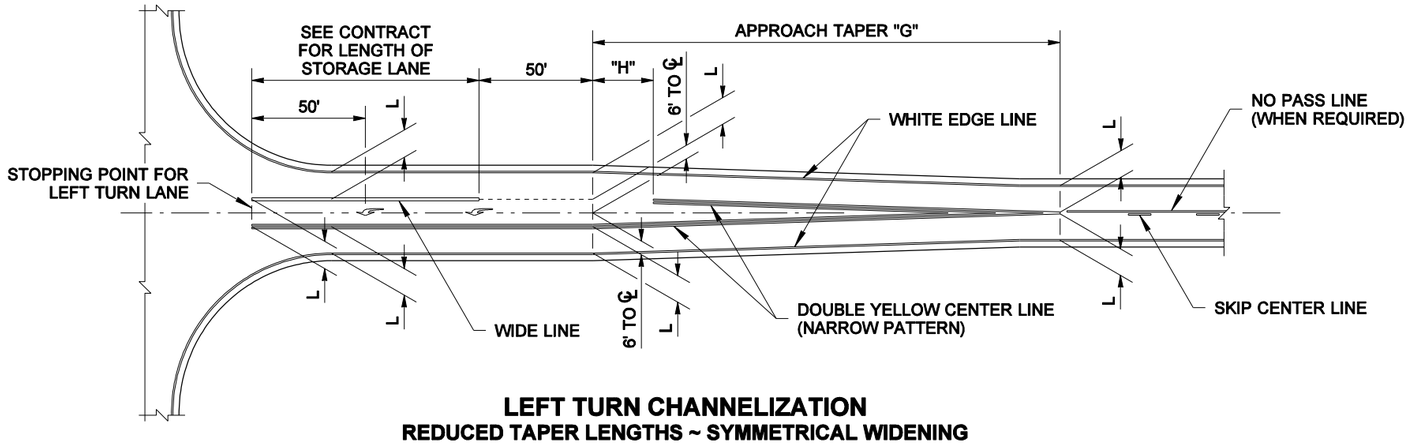
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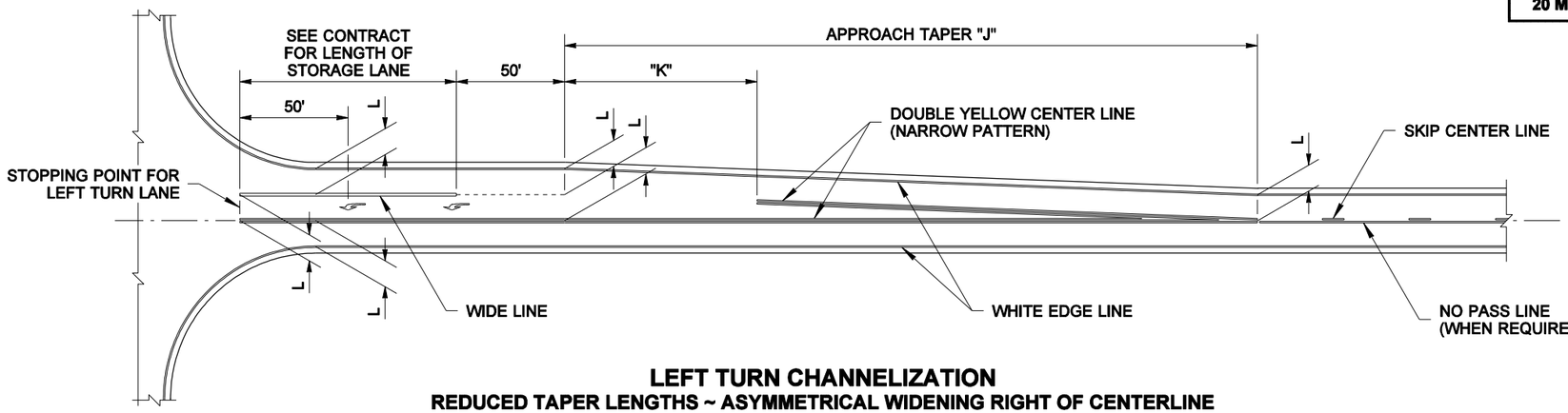
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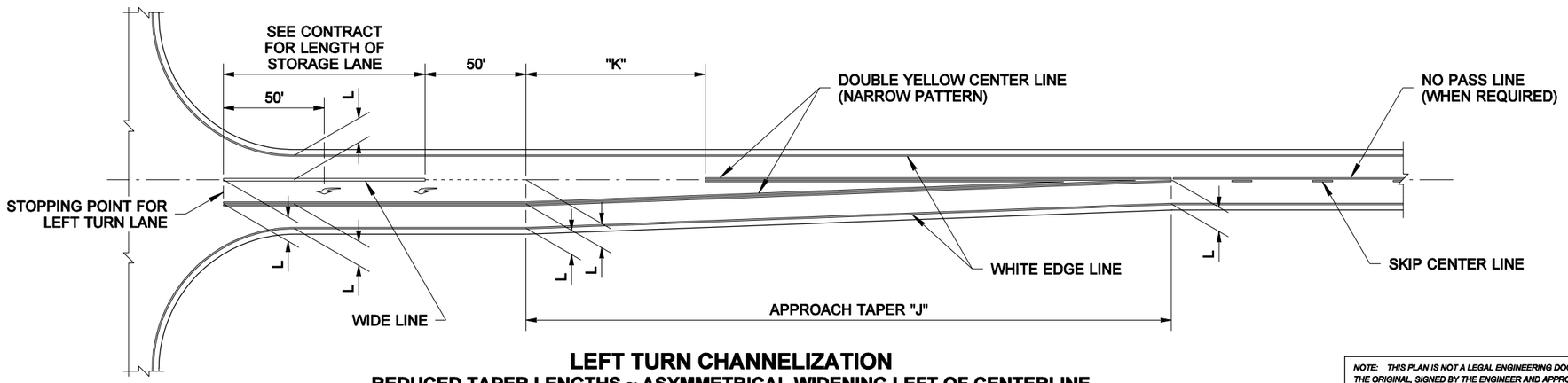
DRAWN BY: BILL BERENS



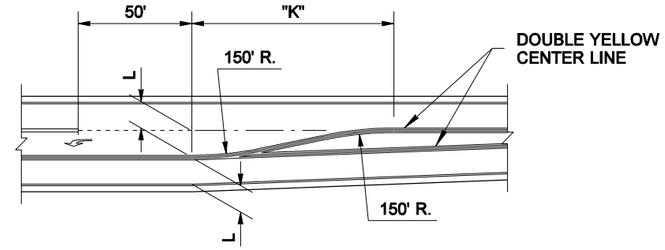

## LEFT TURN CHANNELIZATION
### REDUCED TAPER LENGTHS ~ SYMMETRICAL WIDENING
**(FOR LIMITED USE IN URBAN AREAS WITH POSTED SPEEDS OF 40 MPH OR LESS)**




## 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)**




## OPTIONAL MARKED DECELERATION TAPER
**(FOR LIMITED USE IN URBAN AREAS)**

| POSTED SPEED | APPROACH TAPER "G" | DIMENSION "H" | APPROACH TAPER "J" | DIMENSION "K" |
|---|---|---|---|---|
| 40 MPH | 160' | 27' | 320' | 53' |
| 35 MPH | 123' | 20' | 245' | 41' |
| 30 MPH | 90' | 15' | 180' | 30' |
| 25 MPH | 63' | 10' | 125' | 21' |
| 20 MPH | 40' | 7' | 80' | 13' |

### 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

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# LEFT TURN CHANNELIZATION REDUCED TAPERS
# STANDARD PLAN M-3.20-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-15-04* — DATE

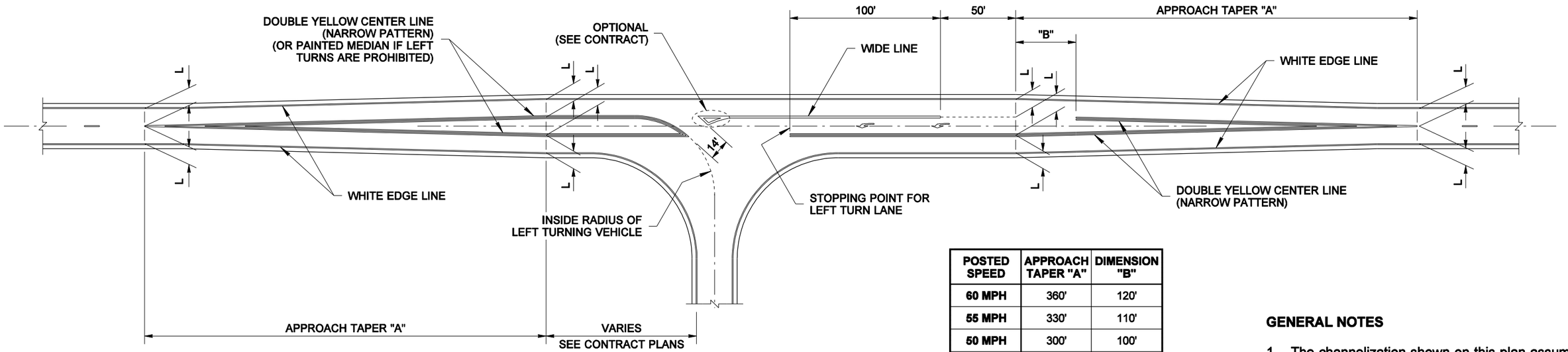
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DRAWN BY: BILL BERENS




## LEFT TURN CHANNELIZATION
### TEE INTERSECTION

| POSTED SPEED | APPROACH TAPER "A" | DIMENSION "B" |
|---|---|---|
| 60 MPH | 360' | 120' |
| 55 MPH | 330' | 110' |
| 50 MPH | 300' | 100' |
| 45 MPH | 270' | 90' |
| 40 MPH | 240' | 80' |
| 35 MPH | 210' | 70' |
| 30 MPH | 180' | 60' |
| 25 MPH | 150' | 50' |
| 20 MPH | 120' | 40' |

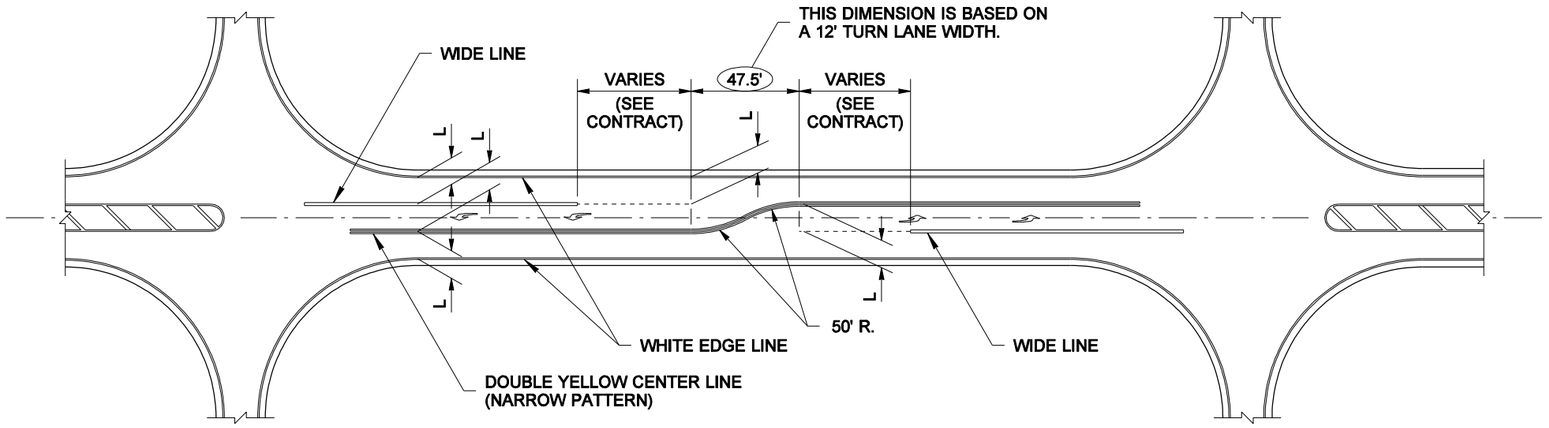
**GENERAL NOTES**

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




## LEFT TURN CHANNELIZATION
### BACK TO BACK LEFT TURN LANES

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STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# LEFT TURN CHANNELIZATION TEE INTERSECTION AND BACK-TO-BACK TURN LANES STANDARD PLAN M-3.30-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-15-04* — DATE

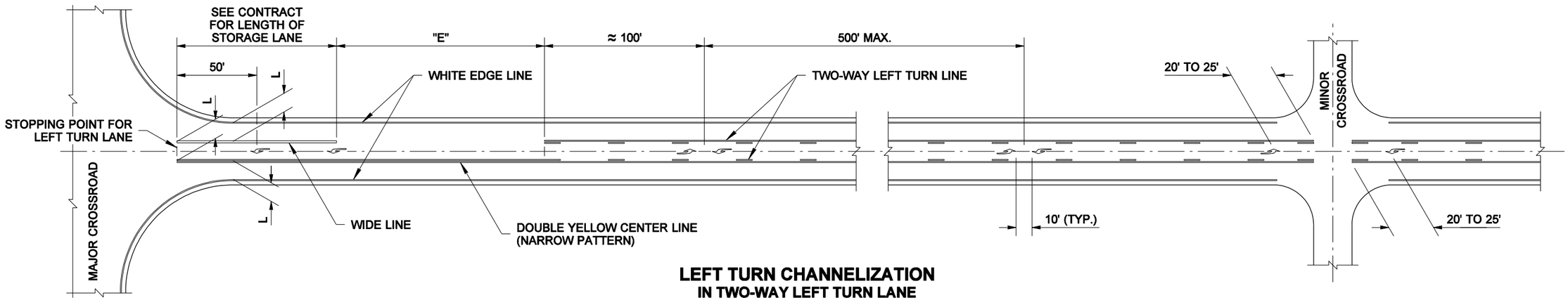
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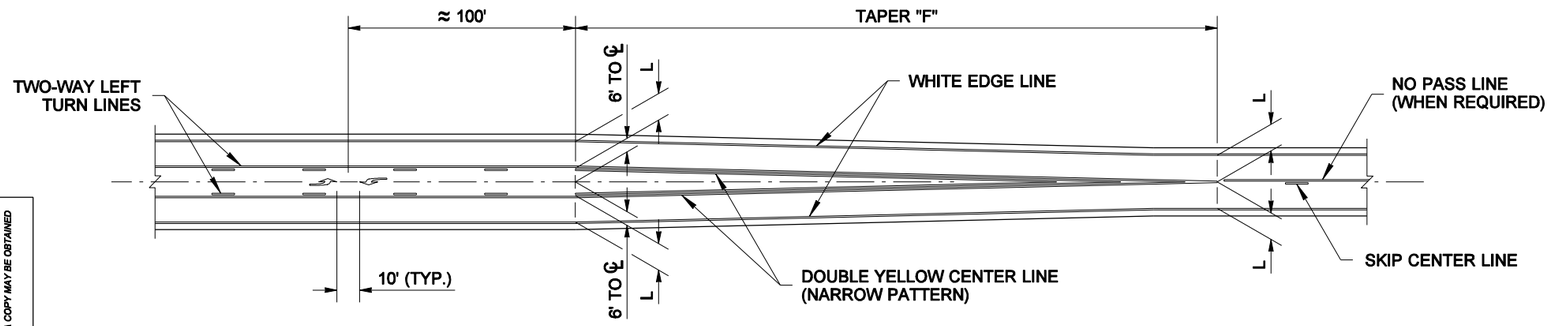
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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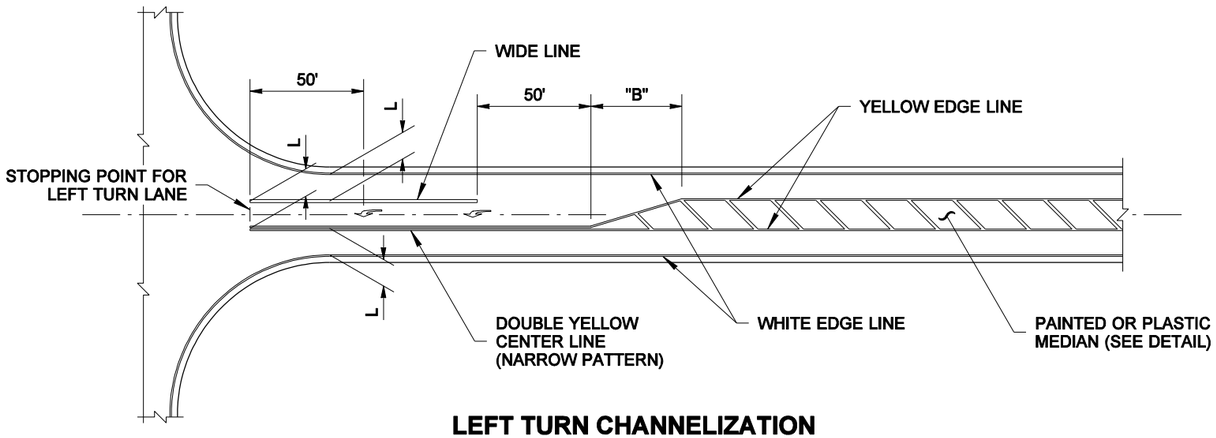
DRAWN BY: BILL BERENS




## LEFT TURN CHANNELIZATION
### IN TWO-WAY LEFT TURN LANE




## TWO-WAY LEFT TURN LANE TRANSITION




## LEFT TURN CHANNELIZATION
### IN PAINTED MEDIAN

### GENERAL NOTES

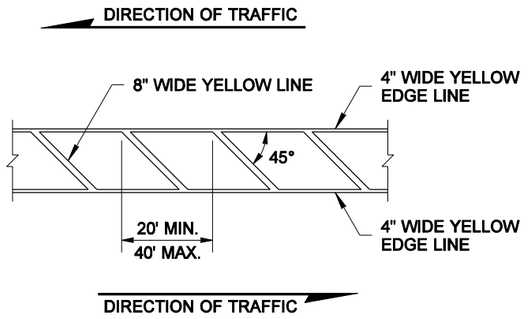
1. The channelization shown on this plan assumes optimal roadway geometric design. The dimensions may vary to fit existing conditions. See Contract.

L = 12' Typical Lane Width. See Contract for specified lane widths.

| POSTED SPEED | "B" | "E" | TAPER "F" |
|---|---|---|---|
| 60 MPH | 120' | 170' | 360' |
| 55 MPH | 110' | 160' | 330' |
| 50 MPH | 100' | 150' | 300' |
| 45 MPH | 90' | 140' | 270' |
| 40 MPH | 80' | 130' | 240' |
| 35 MPH | 70' | 120' | 210' |
| 30 MPH | 60' | 110' | 180' |
| 25 MPH | 50' | 100' | 150' |
| 20 MPH | 40' | 90' | 120' |

### LEGEND

Type 2L Traffic Arrow




## PAINTED OR PLASTIC MEDIAN DETAIL

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# TWO-WAY LEFT TURN AND MEDIAN CHANNELIZATION
# STANDARD PLAN M-3.40-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

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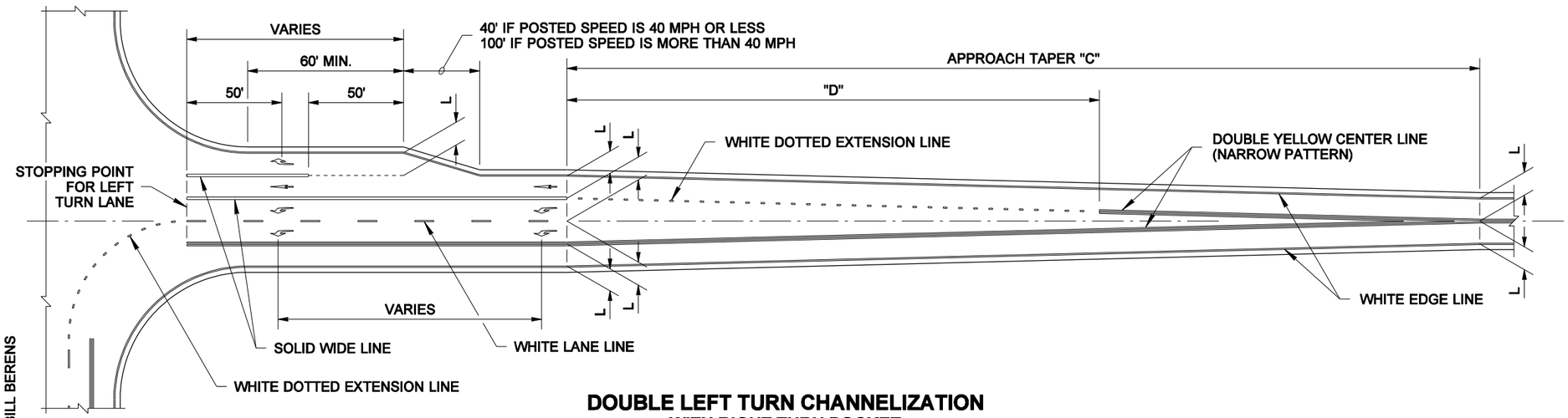
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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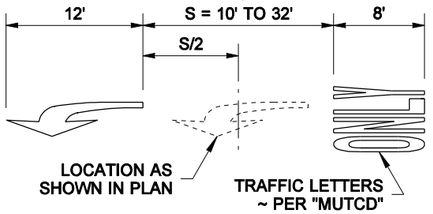
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: BILL BERENS



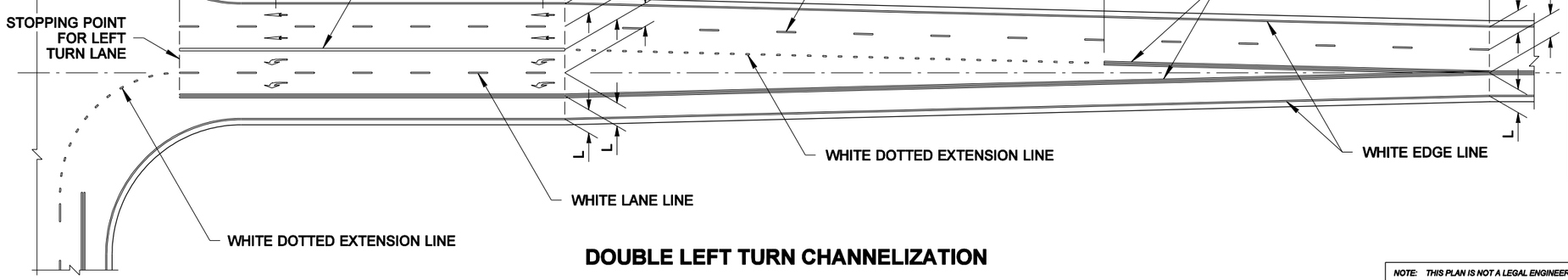

## DOUBLE LEFT TURN CHANNELIZATION
### WITH RIGHT TURN POCKET




**LANE MESSAGE DETAIL**
OPTIONAL ~ SEE GENERAL NOTE 2

### 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.



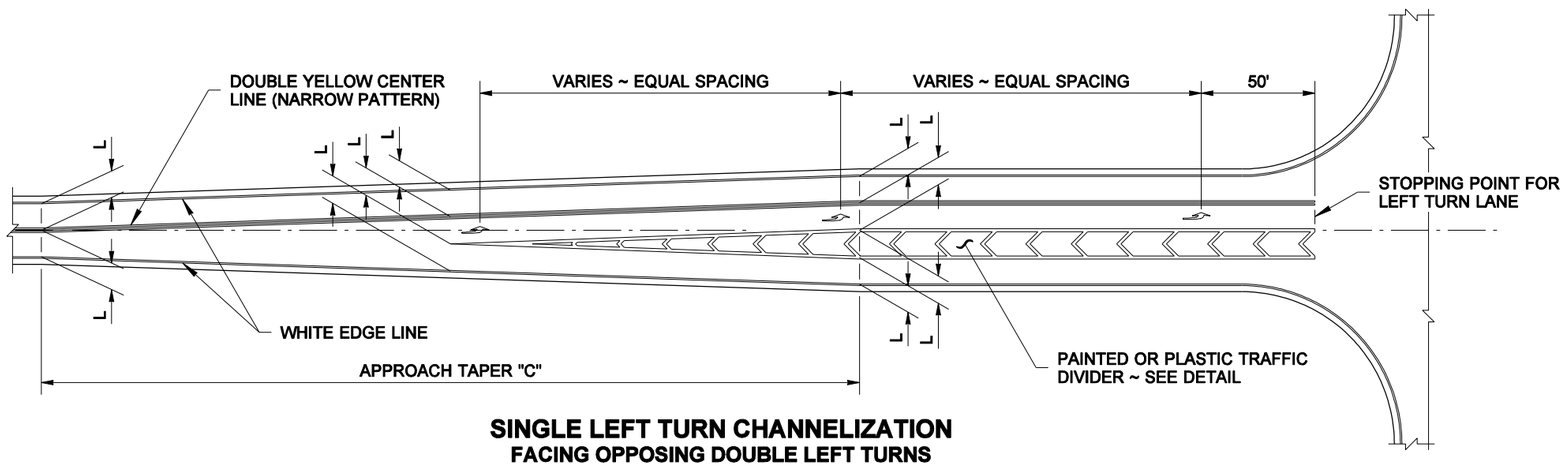

## DOUBLE LEFT TURN CHANNELIZATION

| POSTED SPEED | APPROACH TAPER "C" | "D" |
|---|---|---|
| 60 MPH | 720' | 420' |
| 55 MPH | 660' | 385' |
| 50 MPH | 600' | 350' |
| 45 MPH | 540' | 315' |
| 40 MPH | 480' | 280' |
| 35 MPH | 420' | 245' |
| 30 MPH | 360' | 210' |
| 25 MPH | 300' | 175' |
| 20 MPH | 240' | 140' |

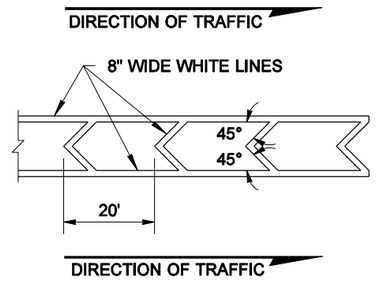
L = 12' Typical Lane Width.
See Contract for specified lane widths.

### LEGEND

- Type 2L Traffic Arrow
- Type 2R Traffic Arrow
- Type 1 Traffic Arrow (Optional)




## SINGLE LEFT TURN CHANNELIZATION
### FACING OPPOSING DOUBLE LEFT TURNS




**PAINTED OR PLASTIC TRAFFIC DIVIDER**

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EXPIRES MAY 5, 2005

## DOUBLE LEFT TURN CHANNELIZATION
## STANDARD PLAN M-3.50-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *12-15-04* — DATE

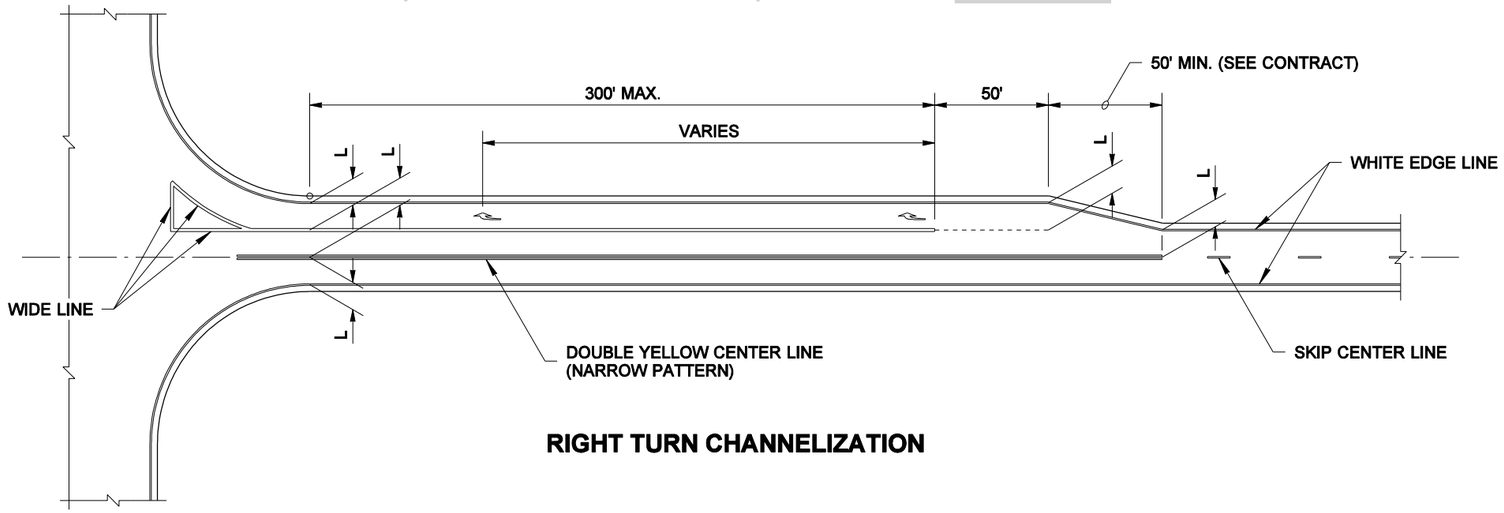
Washington State Department of Transportation

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

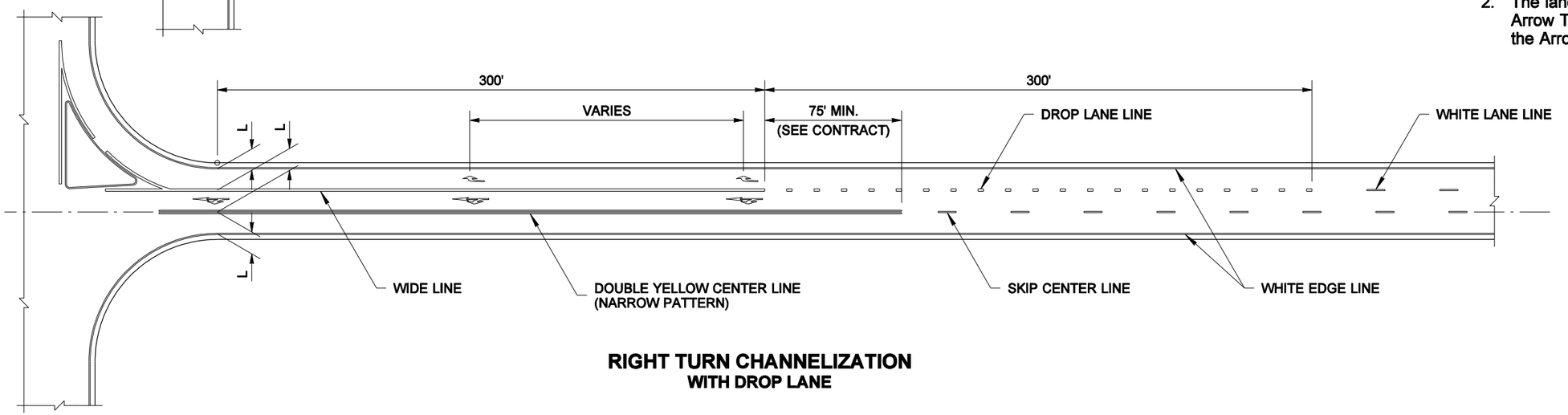
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

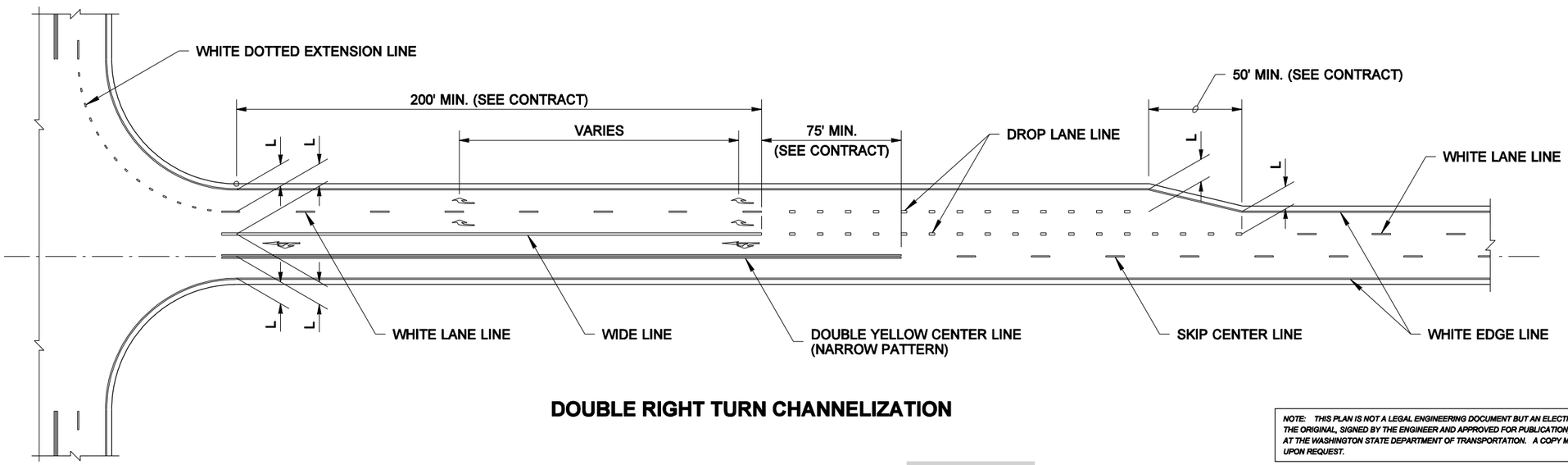
DRAWN BY: BILL BERENS



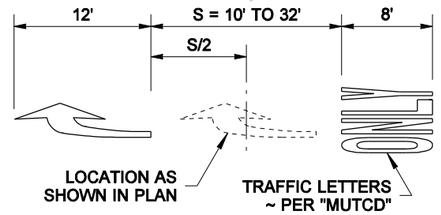

**RIGHT TURN CHANNELIZATION**




**RIGHT TURN CHANNELIZATION**
**WITH DROP LANE**




**DOUBLE RIGHT TURN CHANNELIZATION**




**LANE MESSAGE DETAIL**
OPTIONAL ~ SEE GENERAL NOTE 2

**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 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

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# RIGHT TURN CHANNELIZATION

## STANDARD PLAN M-5.10-00

SHEET 1 OF 1 SHEET

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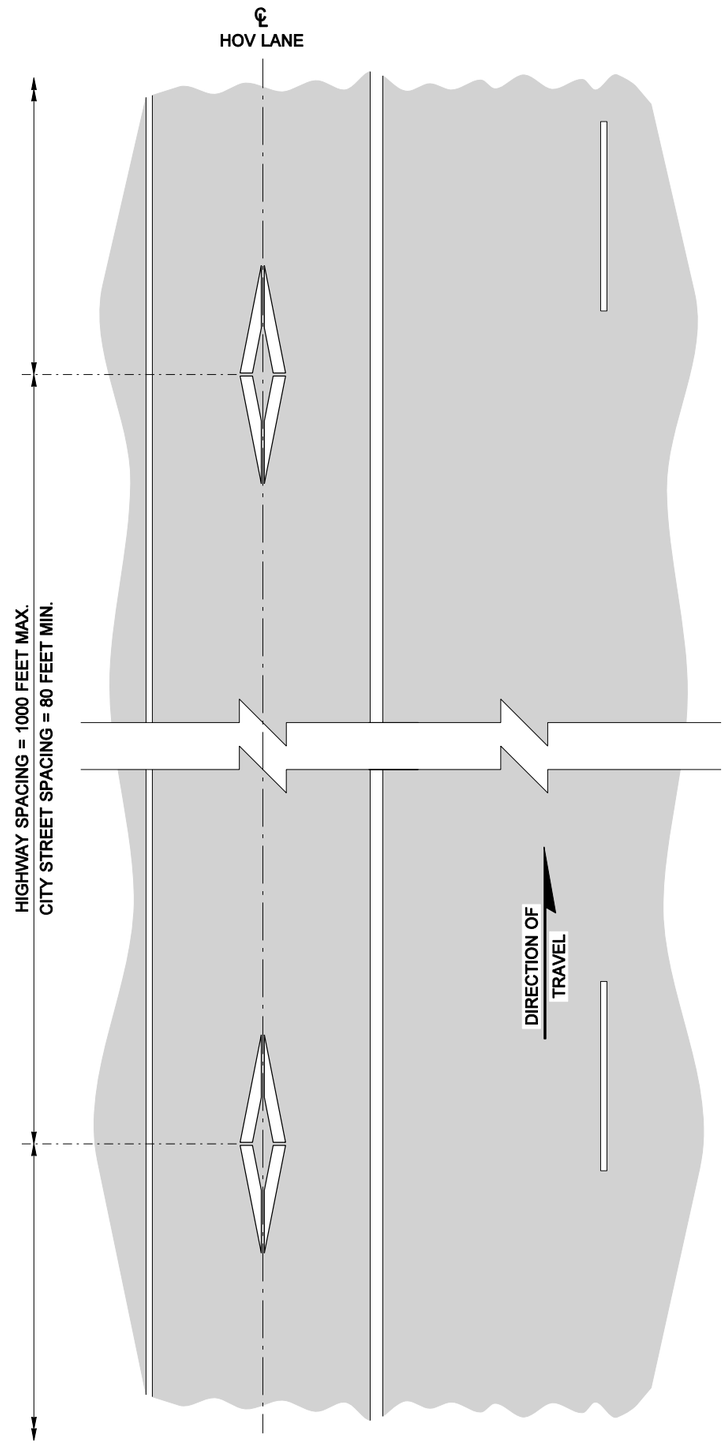
Washington State Department of Transportation

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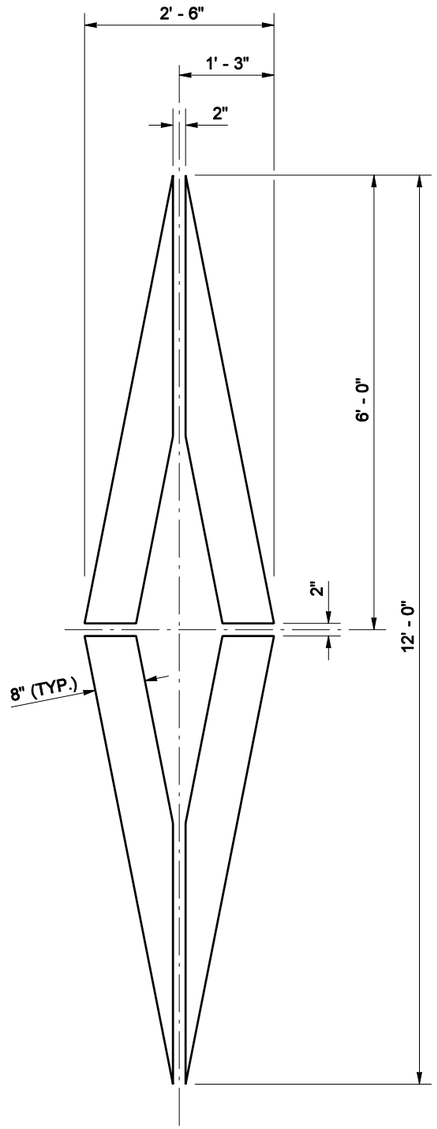
DRAWN BY: MARK SUJKA




**LAYOUT**

**NOTE**

When Specified in the Contract Plans, the HOV Symbol Marking shall be installed with an offset of 1 foot max. from the lane centerline.




**HOV LANE SYMBOL**

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PROFESSIONAL ENGINEER

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# HIGH OCCUPANCY VEHICLE (HOV) LANE SYMBOL LAYOUT
# STANDARD PLAN M-7.50-00

SHEET 1 OF 1 SHEET

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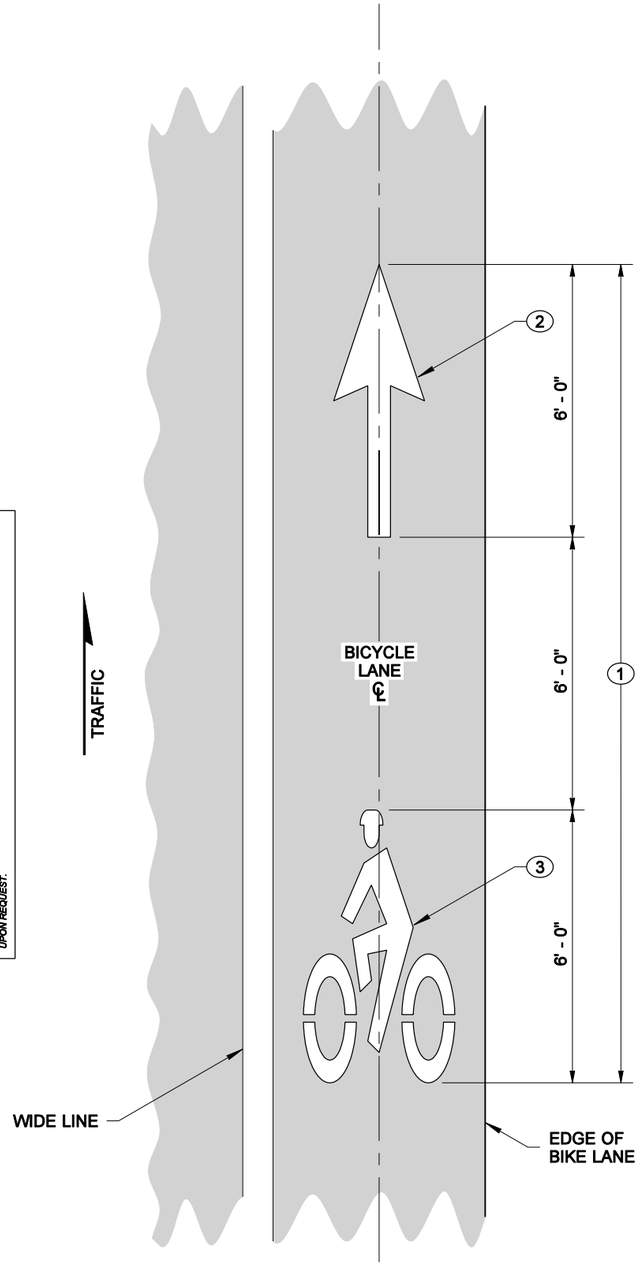
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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

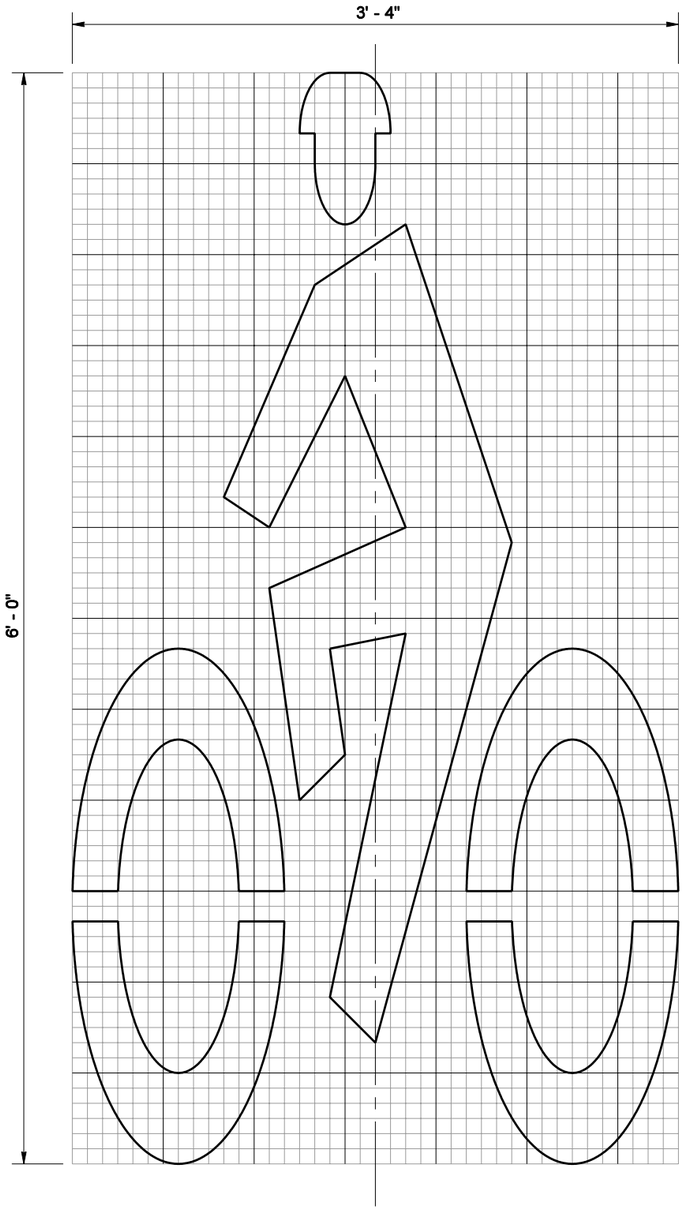
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA

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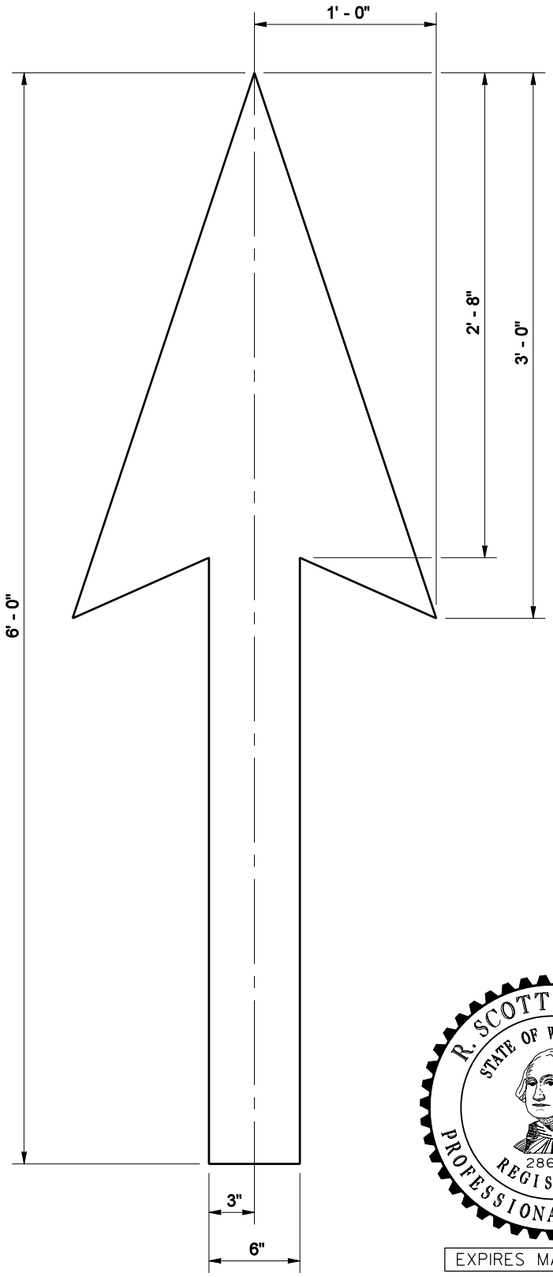



**BICYCLE LANE SYMBOL LAYOUT**




GRID IS 1" SQUARE

**BIKE RIDER SYMBOL DETAIL**




**BIKE LANE ARROW DETAIL**

**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

**GENERAL NOTE**

See contract for location and material requirements.

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REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# BICYCLE LANE SYMBOL LAYOUT

## STANDARD PLAN M-9.50-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

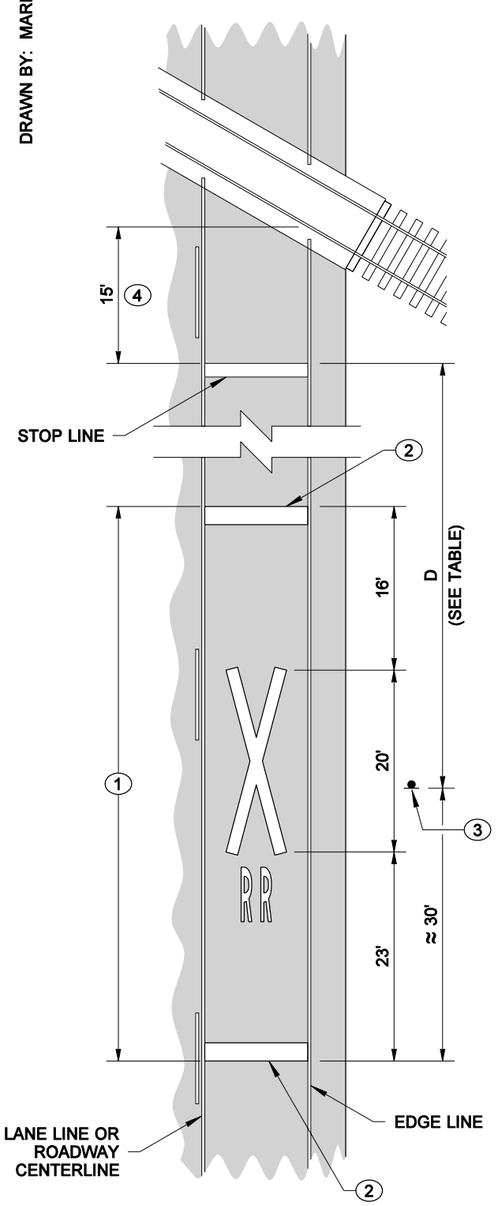
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *03-04-05* — DATE

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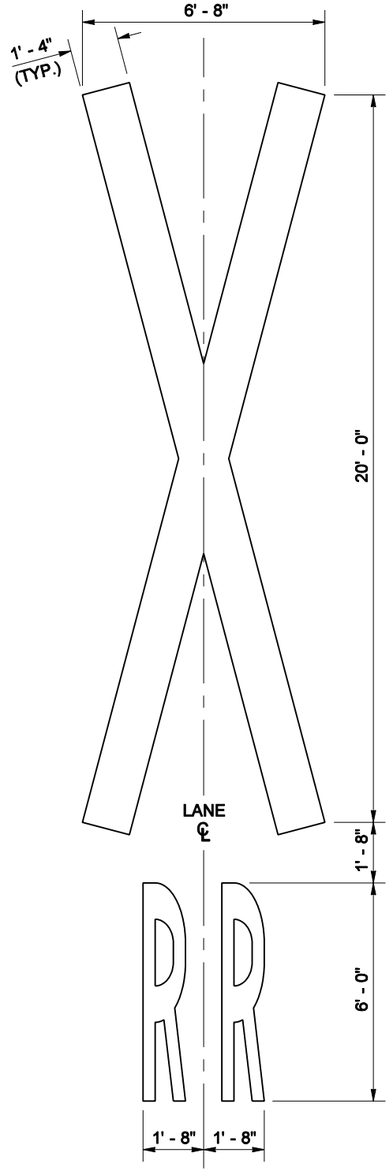
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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DRAWN BY: MARK SUJKA



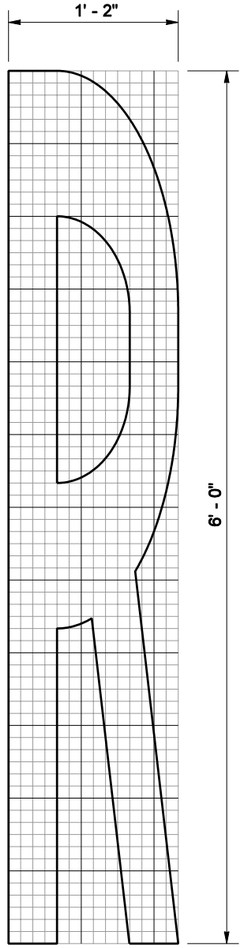

LAYOUT




SYMBOL DETAIL

**GENERAL NOTE**

See contract for location and material requirements.




GRID IS 1" SQUARE

**"R" DETAIL**

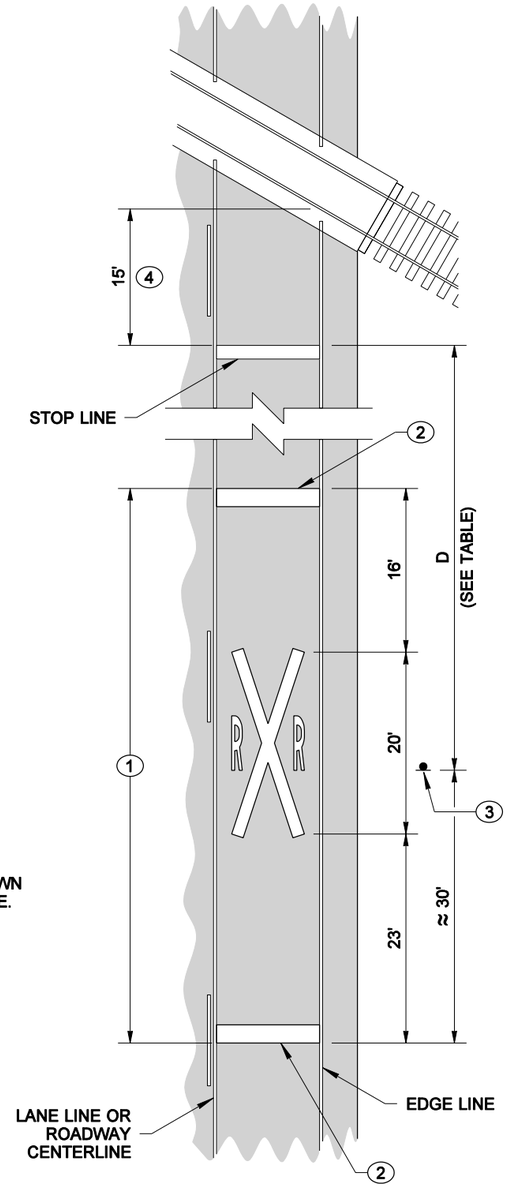
| MPH | D* |
|---|---|
| 25 | 50 Ft. |
| 30 | 100 Ft. |
| 35 | 150 Ft. |
| 40 | 225 Ft. |
| 45 | 300 Ft. |
| 50 | 375 Ft. |
| 55 | 450 Ft. |
| 60 | 550 Ft. |
| 65 | 650 Ft. |

* DIMENSIONS SHOWN ARE APPROXIMATE. SEE CONTRACT.

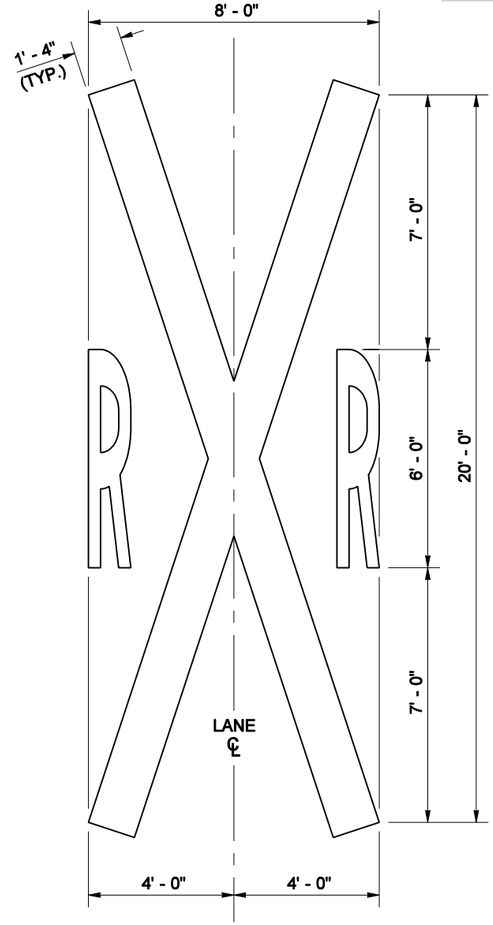
**KEY NOTES**

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.

**STANDARD SYMBOL**




LAYOUT




SYMBOL DETAIL




EXPIRES MAY 5, 2005

**ALTERNATIVE SYMBOL**

# RAILROAD CROSSING LAYOUT

## STANDARD PLAN M-11.10-00

SHEET 1 OF 1 SHEET

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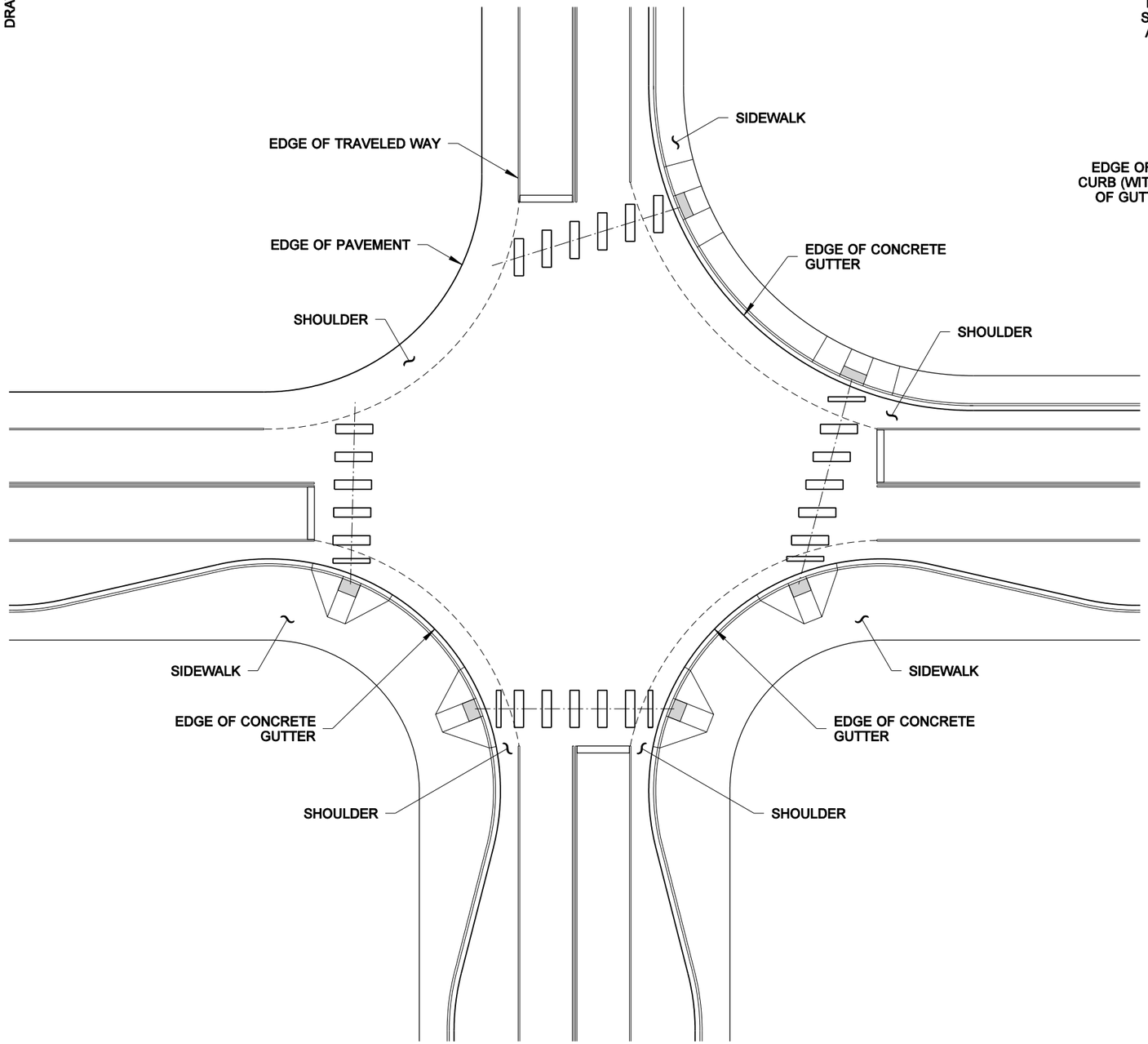
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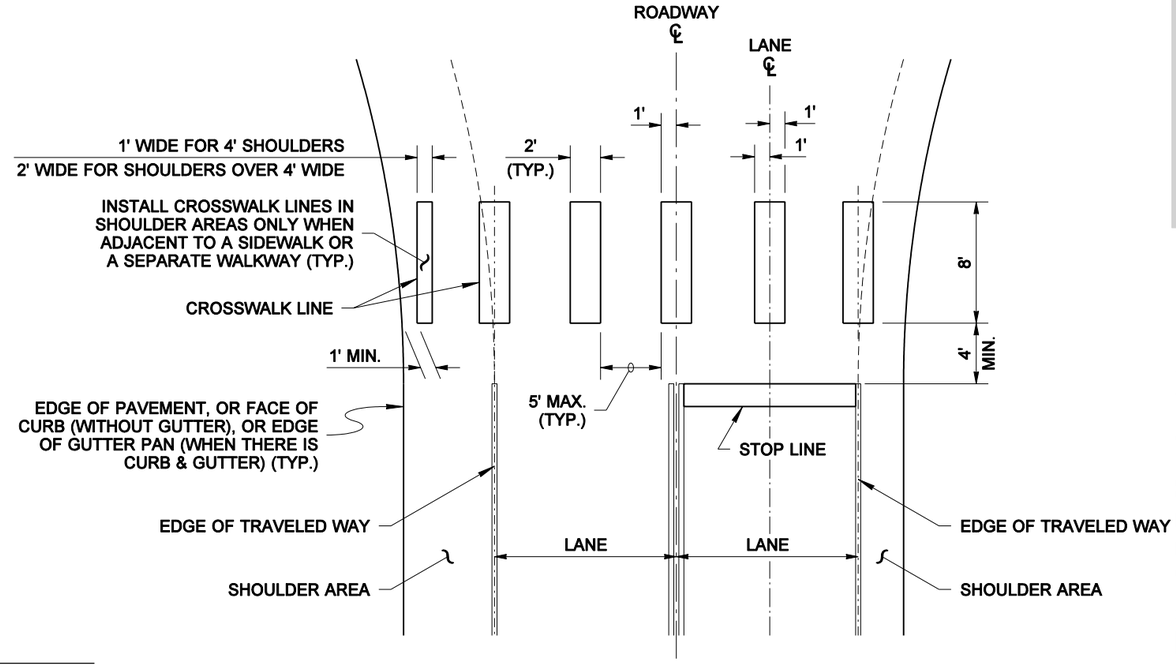
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DRAWN BY: BILL BERENS




**TYPICAL APPLICATIONS**




**DETAIL**

**NOTE**

See the Contract Plans for the locations of Crosswalk centerlines.

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STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# CROSSWALK LAYOUT

## STANDARD PLAN M-15.10-00

SHEET 1 OF 1 SHEET

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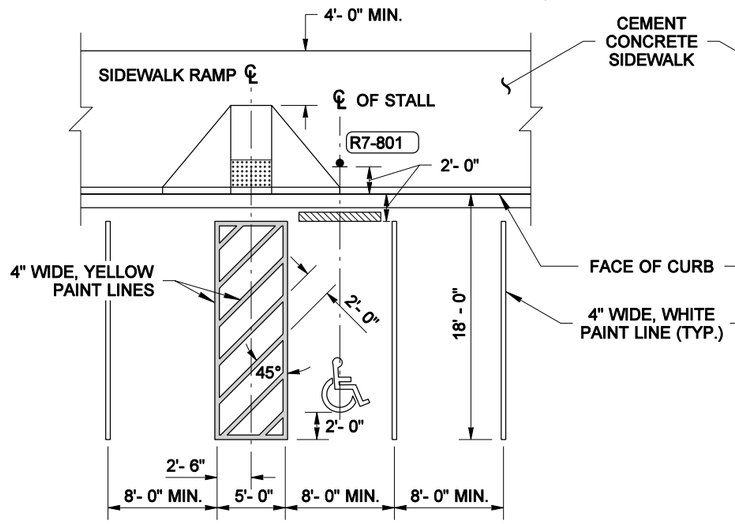
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DRAWN BY: MARK SUJKA

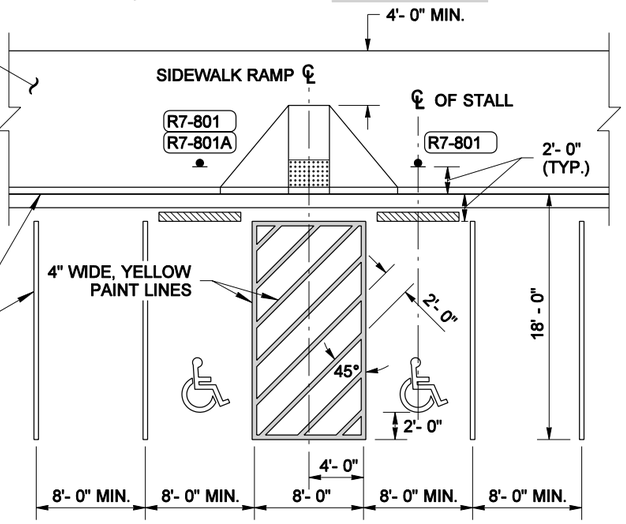
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PLAN

## ONE ACCESSIBLE STALL

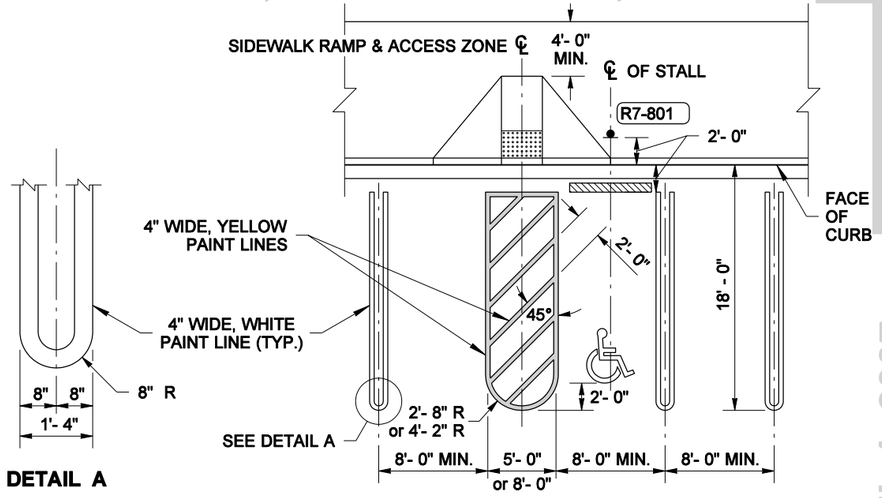
**90° PARKING STALL ARRANGEMENT**




PLAN

## TWO ACCESSIBLE STALLS

**90° PARKING STALL ARRANGEMENT**




DETAIL A

PLAN

## ALTERNATE PARKING STALL MARKINGS

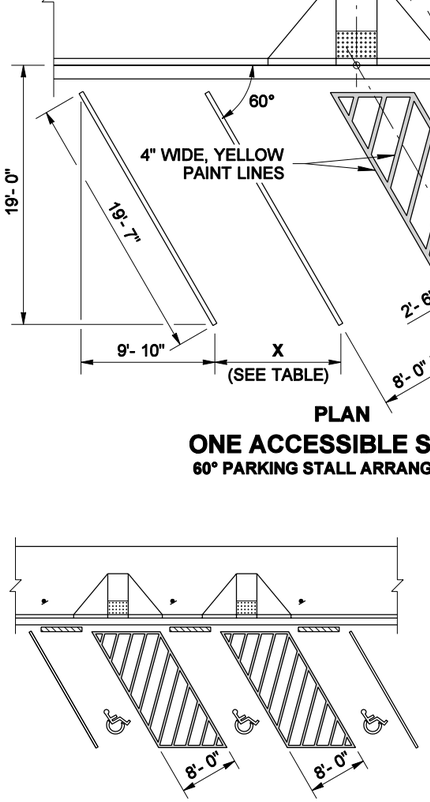
USE ONLY WHEN SPECIFIED IN THE CONTRACT

**NOTES**

1. Three, four and five accessible stall arrangements may be either 60° angle or 90° perpendicular parking arrangements. See contract.
2. Signs indicating a parking space or stall for a physically disabled person shall be installed between 36" and 84" above the sidewalk surface.
3. 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.
4. Wheel stops, when specified in the contract, shall be approximately 6" high and a minimum of 6' long.
5. Refer to the Standard Plans for sidewalk ramp, detectable warning pattern, and curb details.

**LEGEND**

- R7-801 — Reserved Parking Sign and post with R7-801A Plaque, if indicated (See Sign Fabrication Manual)
- Access Parking Space Symbol
- Manufactured wheel stop
- Detectable Warning Pattern

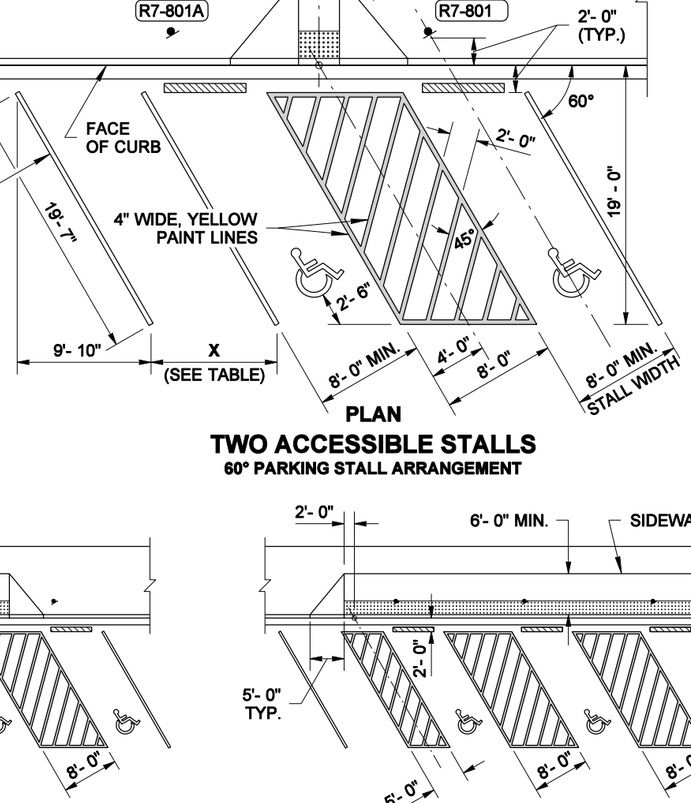



PLAN

## ONE ACCESSIBLE STALL

**60° PARKING STALL ARRANGEMENT**

| STALL WIDTH | X |
|---|---|
| 8'- 0" | 9'- 3" |
| 9'- 0" | 10'- 5" |
| 10'- 0" | 11'- 7" |
| 11'- 0" | 12'- 8" |
| 12'- 0" | 13'- 10" |



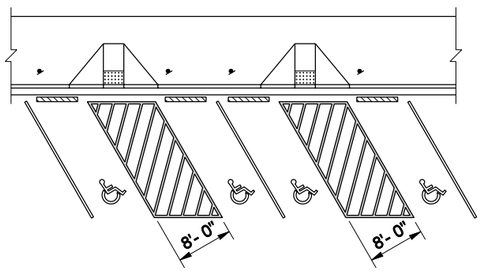

PLAN

## TWO ACCESSIBLE STALLS

**60° PARKING STALL ARRANGEMENT**




## THREE ACCESSIBLE STALLS




## FOUR ACCESSIBLE STALLS




## FIVE ACCESSIBLE STALLS

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# PARKING SPACE LAYOUTS

## STANDARD PLAN M-17.10-00

SHEET 1 OF 1 SHEET

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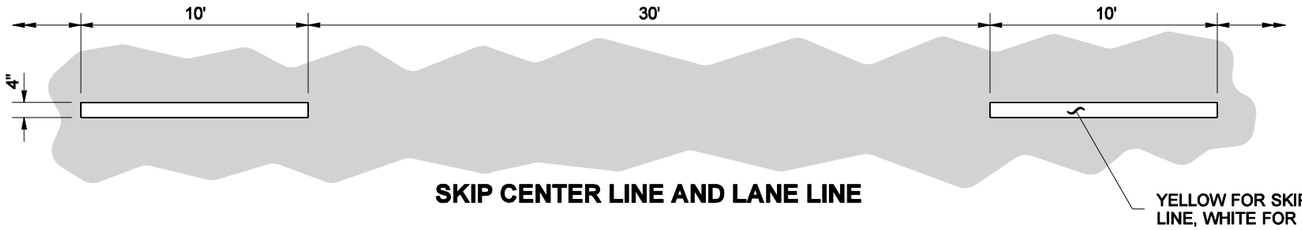
*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *03-04-05* — DATE

Washington State Department of Transportation

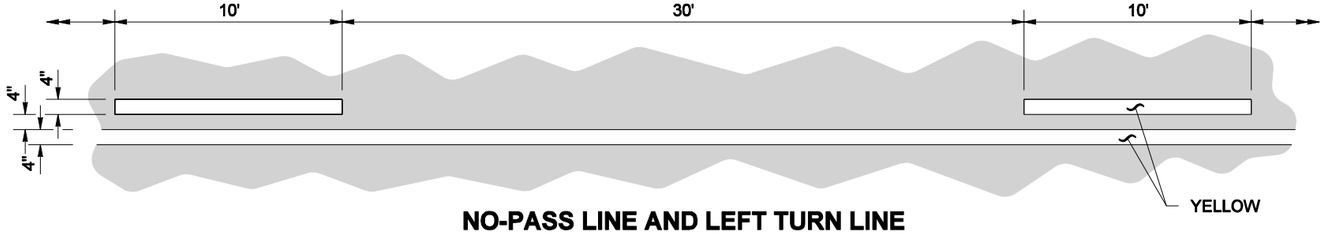
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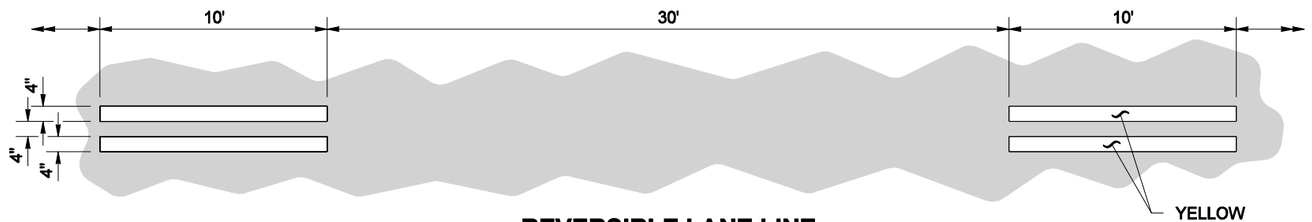
DRAWN BY: MONIQUE GLICK



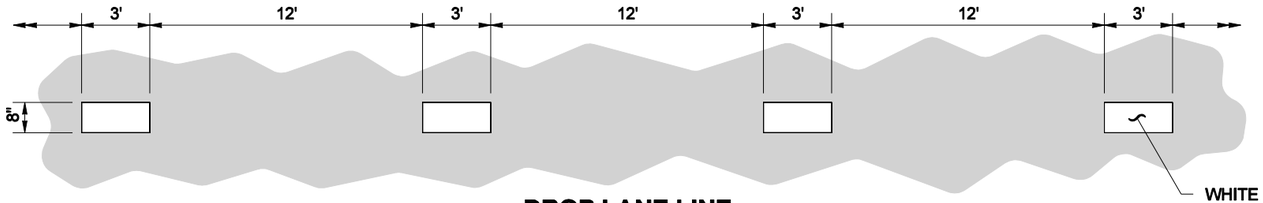

**SKIP CENTER LINE AND LANE LINE**



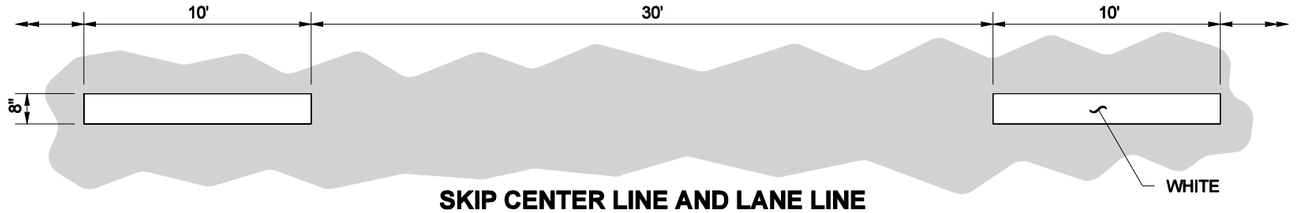

**NO-PASS LINE AND LEFT TURN LINE**



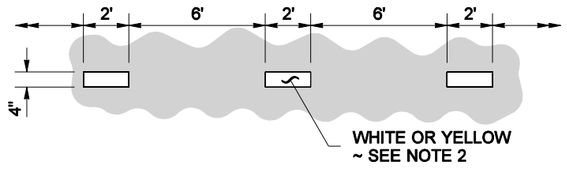

**REVERSIBLE LANE LINE**



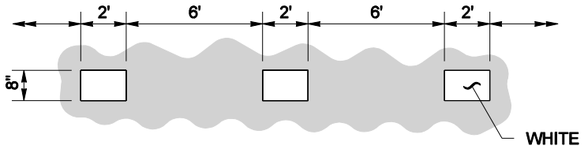

**DROP LANE LINE**




**SKIP CENTER LINE AND LANE LINE**



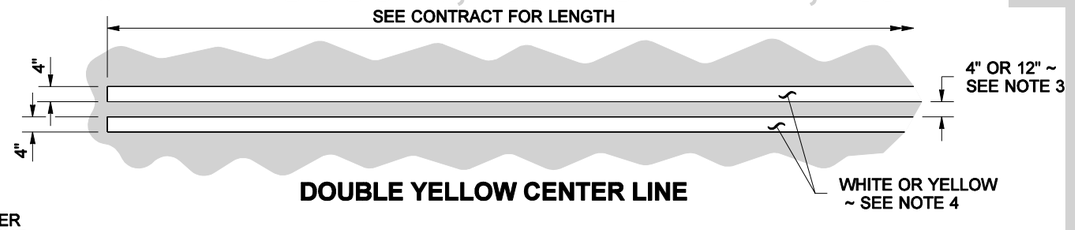

**DOTTED EXTENSION LINE**



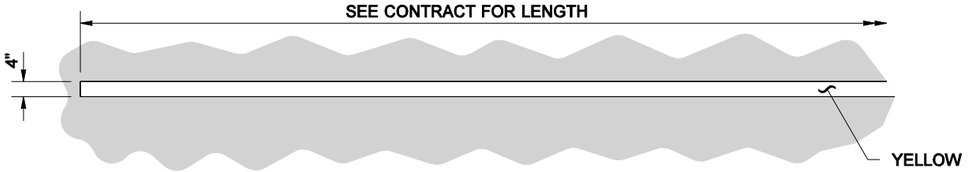

**DOTTED WIDE LINE**

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

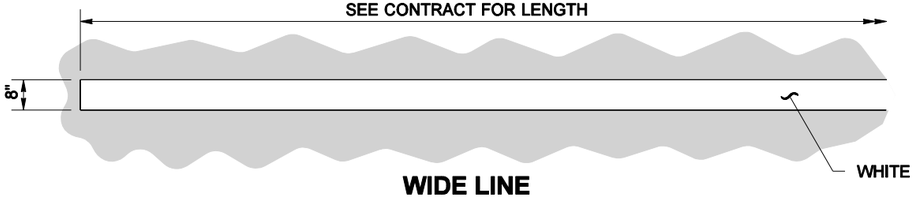
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007



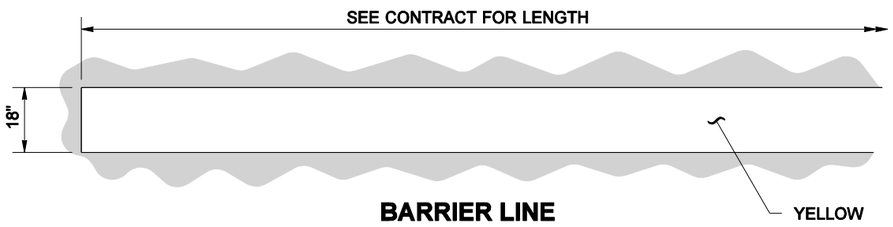

**DOUBLE YELLOW CENTER LINE**




**EDGE LINE**




**WIDE LINE**




**BARRIER LINE**

**NOTES**

1. See the Standard Plans for Pavement Marking Details.
2. Dotted Extension Line shall be the same color as the line it is extending.
3. Double Yellow Center Line shall be 12" between lines for everything, except 4" for left turn channelization and narrow roadways with 10' lane widths or less.
4. Edge Line shall be white on right edge of traveled way, and yellow on left edge of traveled way on one way roadways.

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EXPIRES MAY 5, 2005

# LONG LINE MARKING PATTERNS

## STANDARD PLAN M-20.10-00

SHEET 1 OF 1 SHEET

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*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *03-04-05* — DATE

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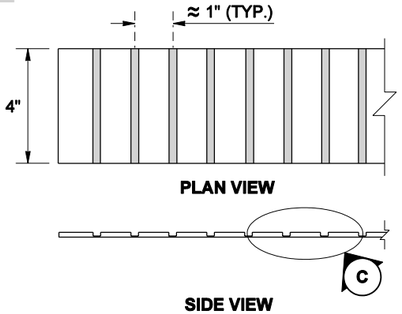
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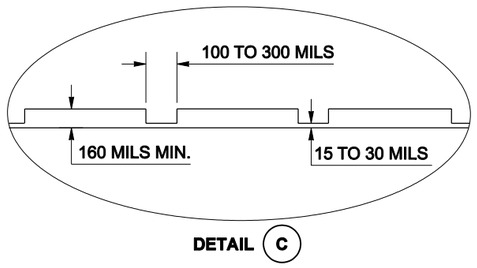
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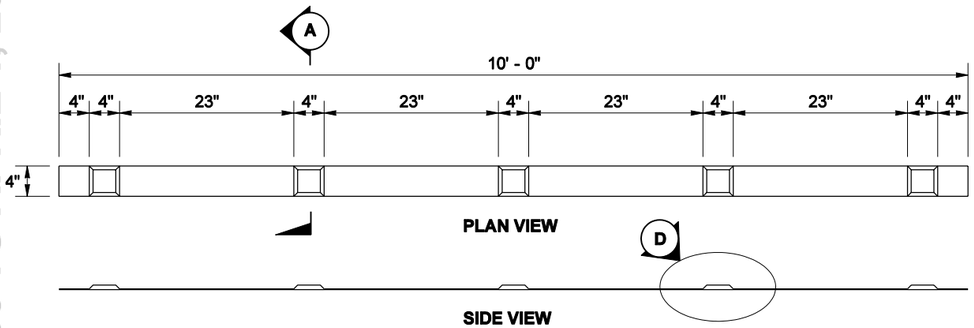
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DRAWN BY: MONIQUE GLICK



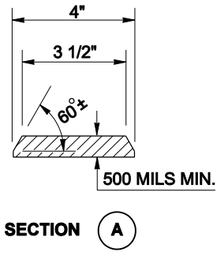



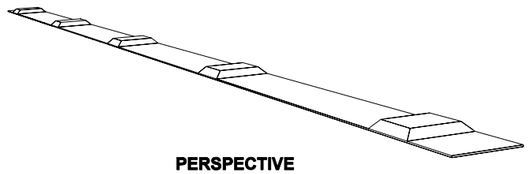

**EMBOSSED PLASTIC LINE**

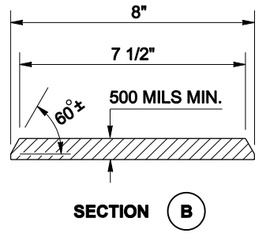


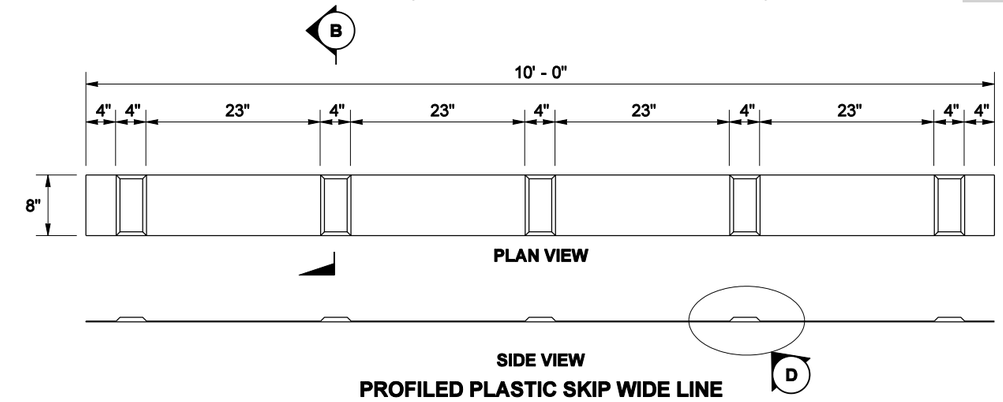

**PROFILED PLASTIC LINE**

SEE NOTE

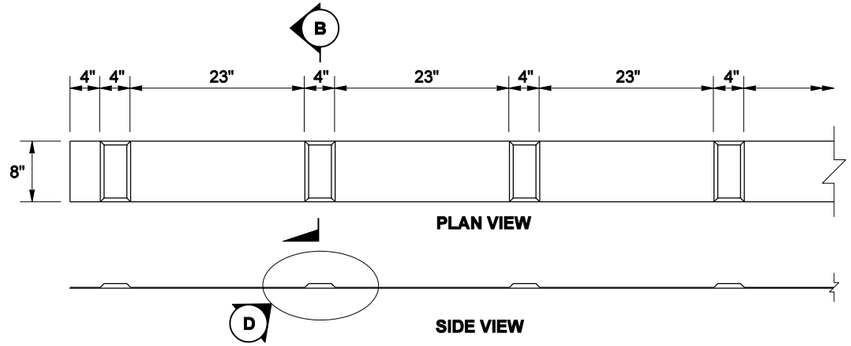


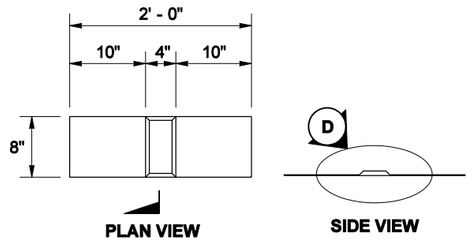



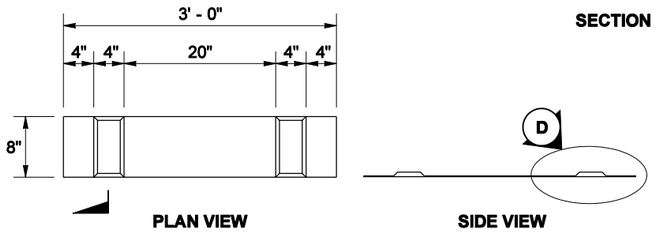

**PROFILED PLASTIC SKIP WIDE LINE**



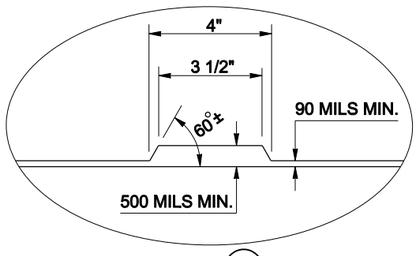

**PROFILED PLASTIC WIDE LINE**




**PROFILED PLASTIC DOTTED WIDE LINE**

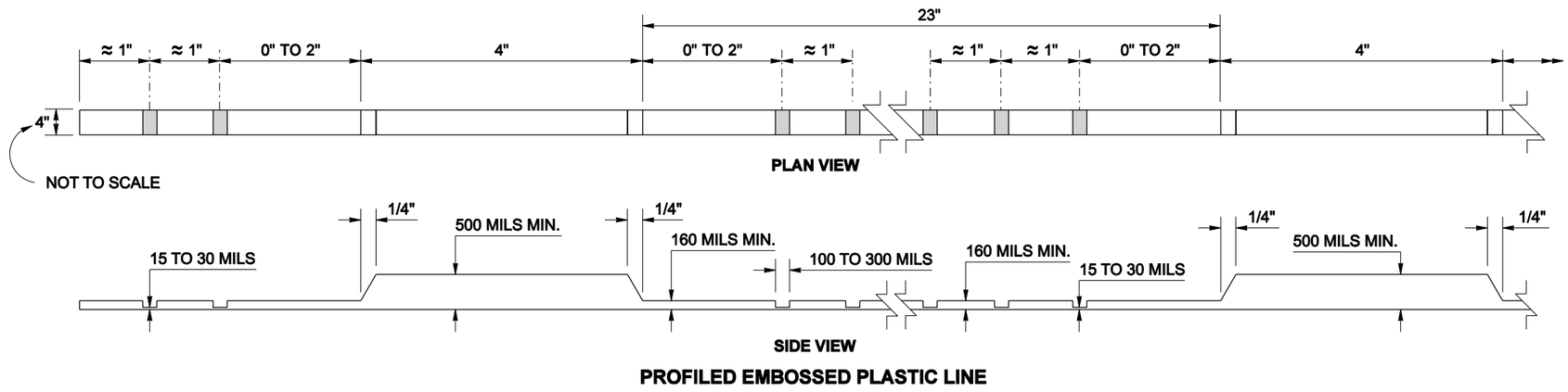



**PROFILED PLASTIC DROP LANE LINE**




**NOTE**

For Longitudinal Lines use the PROFILED PLASTIC LINE in a continuous pattern.




**PROFILED EMBOSSED PLASTIC LINE**

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# PROFILED PLASTIC LINES

## STANDARD PLAN M-20.20-00

SHEET 1 OF 1 SHEET

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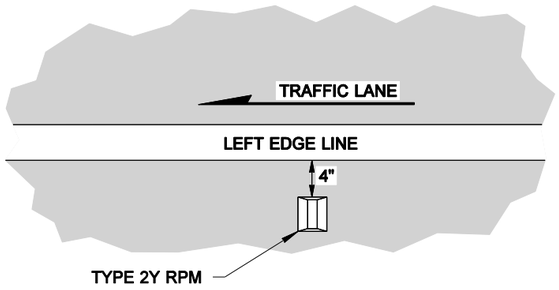
Washington State Department of Transportation

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

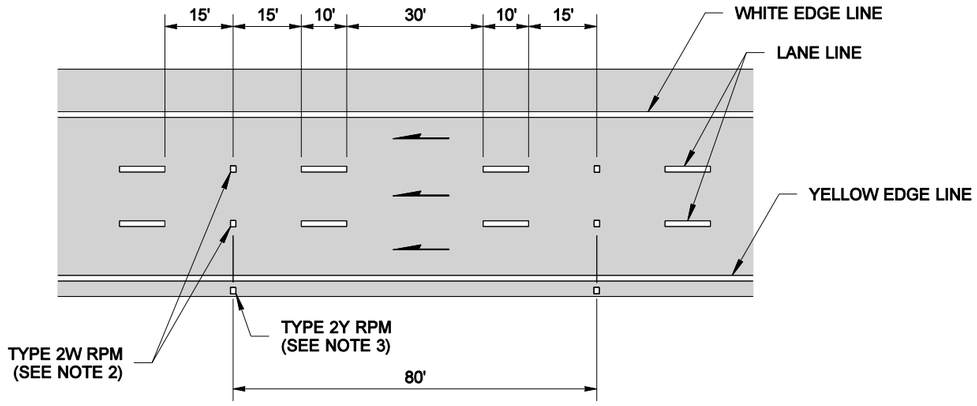
DRAWN BY: ADAM COCHRAN

| TYPE 2 RPM RAISED FACE COLORS | |
|---|---|
| TYPE 2YY | YELLOW AND YELLOW |
| TYPE 2W | WHITE ~ ONE SIDE ONLY |
| TYPE 2Y | YELLOW ~ ONE SIDE ONLY |




**LEFT EDGE OF LANE PLACEMENT DETAIL**

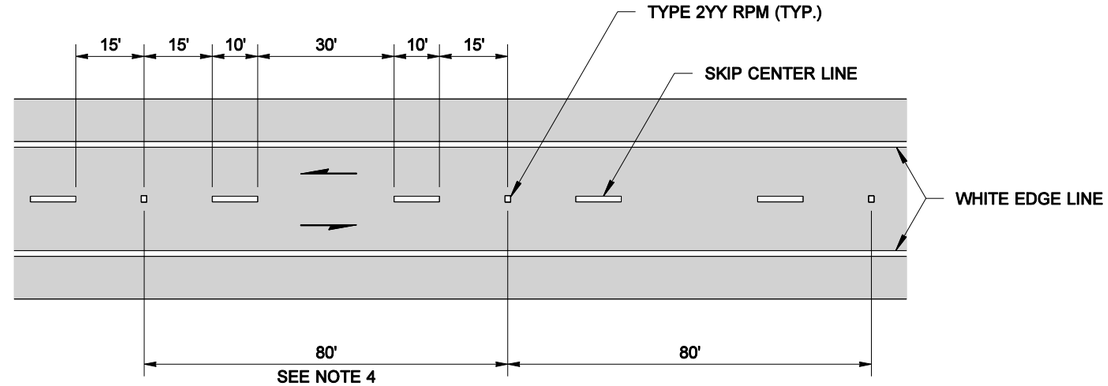
**SEE NOTE 3**



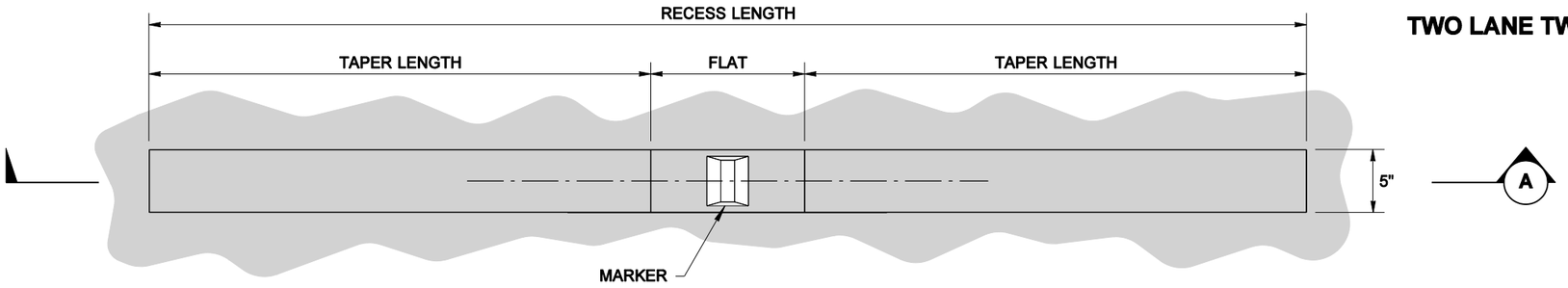

**MULTILANE ONE-WAY TRAFFIC**

**NOTES**

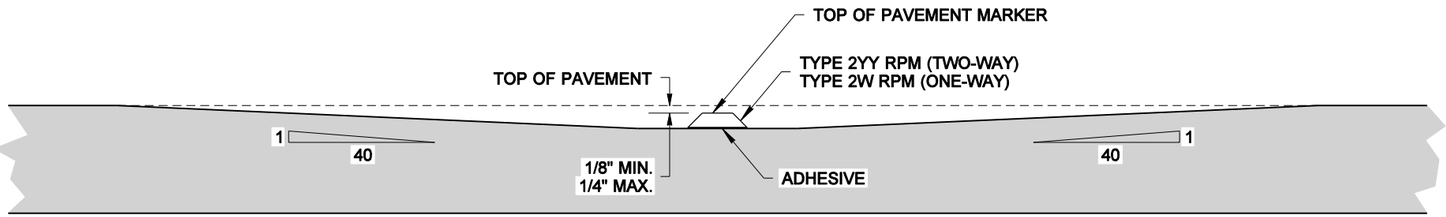
1. Recessed pavement markers, when specified, shall be installed at the locations shown for Type 2W RPM's on multilane one-way roadways, and type 2YY RPM's on two lane two-way roadways.
2. For lane lines, Type 2W RPM's shall be spaced at 80' intervals on tangents and horizontal curves with a radius of 5000' or more, and 40' intervals on horizontal curves having radii of less than 5000'.
3. Type 2Y RPM's, when specified, shall be placed outside the Left Edge Line. See "LEFT EDGE OF LANE PLACEMENT DETAIL".
4. For center lines, Type 2YY RPM's shall be spaced at 80' intervals on tangents and horizontal curves with a radius of 5000' or more, and 40' intervals on horizontal curves having radii less than 5000' Type 2YY RPM's are to be centered between skip lines.




**TWO LANE TWO-WAY TRAFFIC**




**PLAN VIEW**




**SECTION (A)**

**RECESSED PAVEMENT MARKER DETAILS**

FOR USE WHERE SPECIFIED IN CONTRACT

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EXPIRES MAY 5, 2005

# LONG LINE SUPPLEMENT WITH RAISED PAVEMENT MARKERS ~ GENERAL

# STANDARD PLAN M-20.30-00

SHEET 1 OF 1 SHEET

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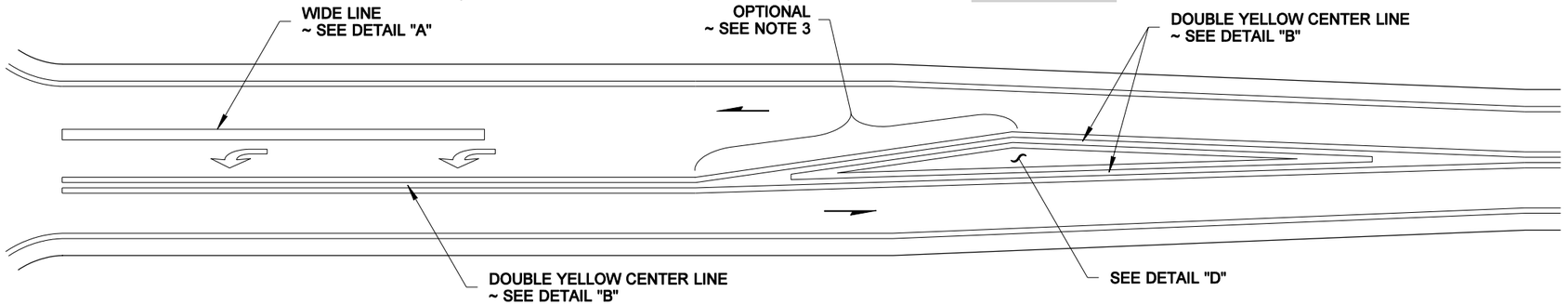
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DRAWN BY: ADAM COCHRAN

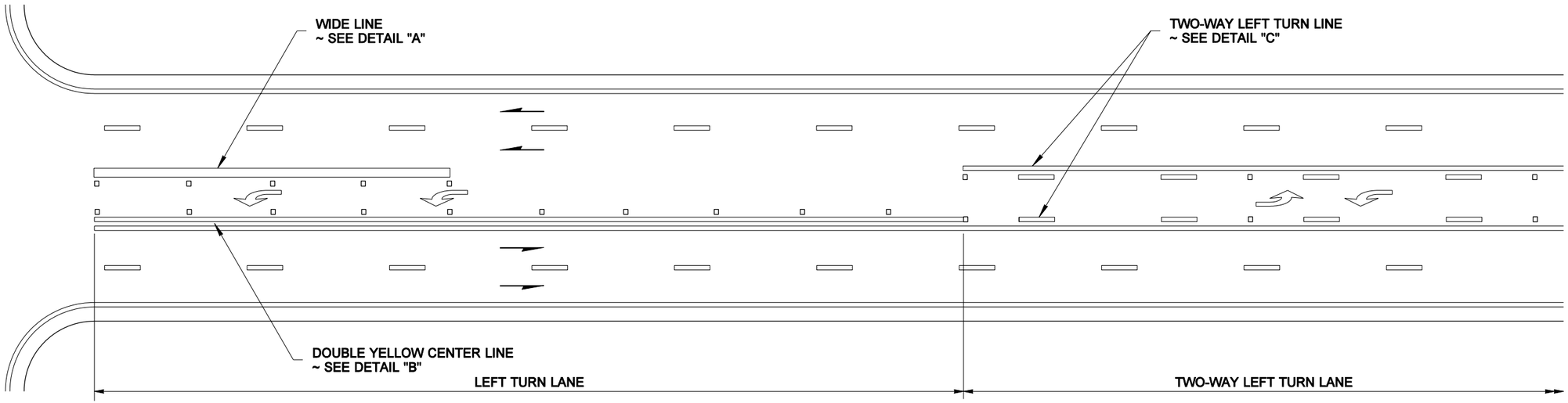



**LEFT TURN LANE**

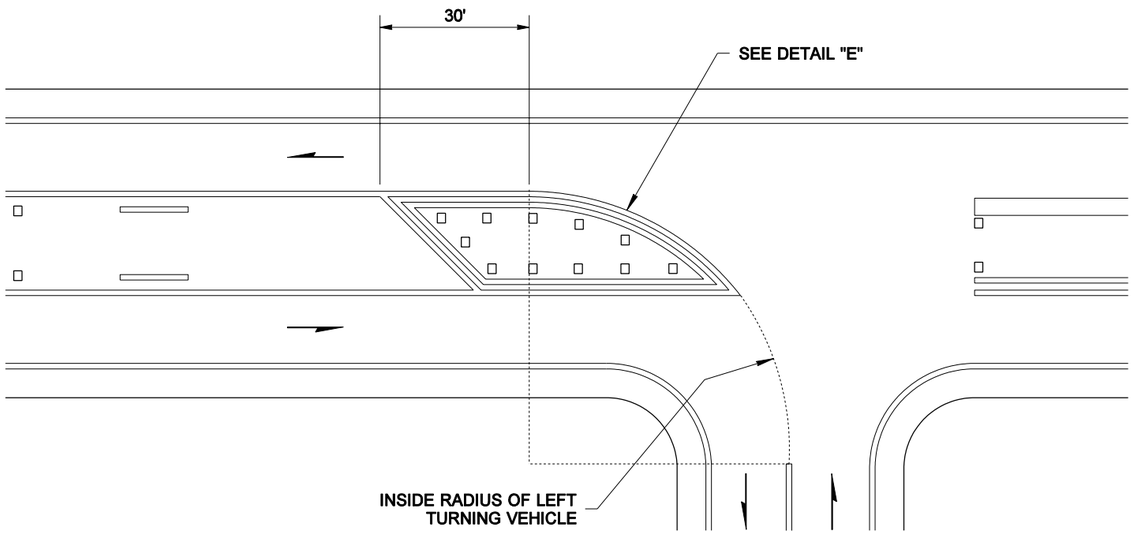
(SEE NOTE 3)

**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.




**TWO-WAY LEFT TURN LANE**




**END TWO-WAY LEFT TURN LANE**

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EXPIRES MAY 5, 2005

# LONG LINE SUPPLEMENT WITH RAISED PAVEMENT MARKERS ~ TURN LANES
# STANDARD PLAN M-20.40-00

SHEET 1 OF 2 SHEETS

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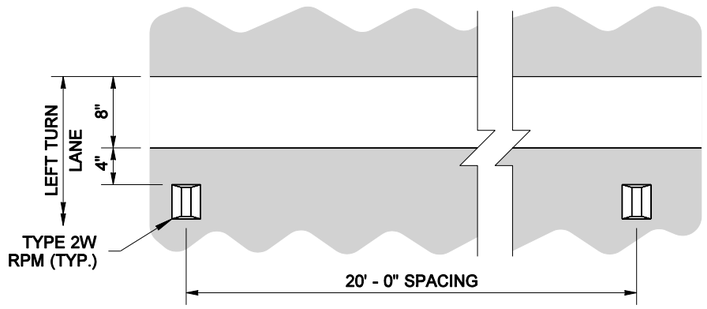
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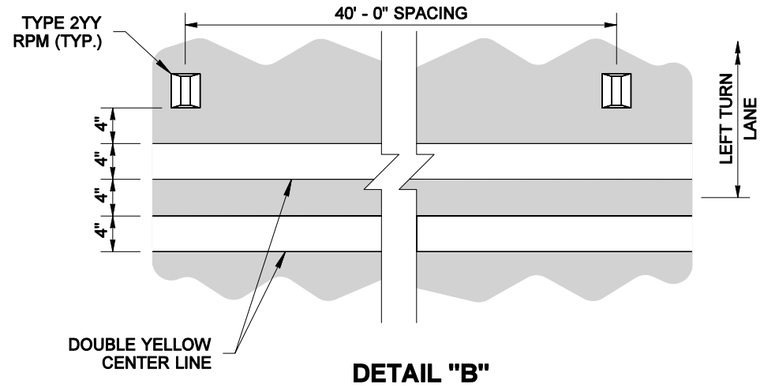
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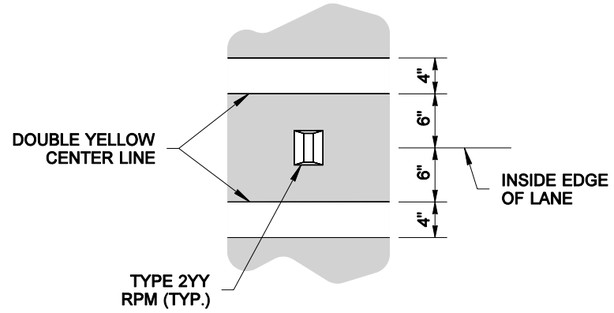
DRAWN BY: ADAM COCHRAN



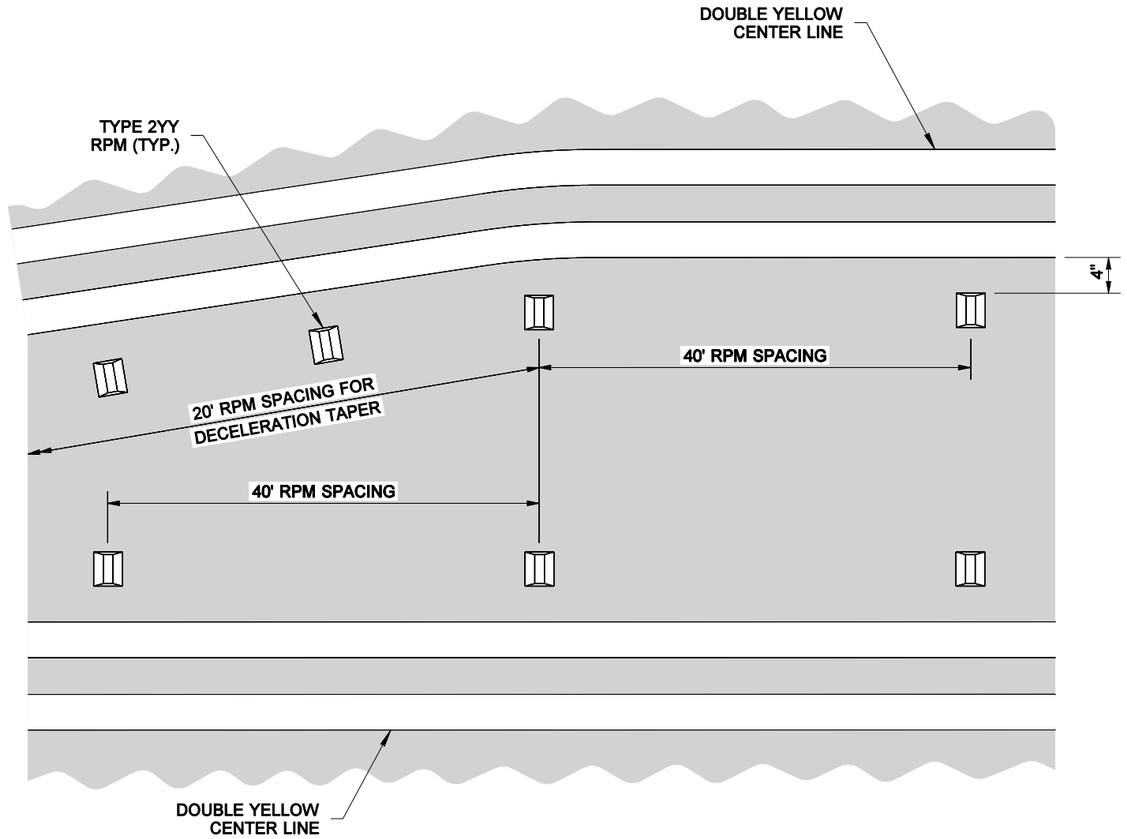

**DETAIL "A"**



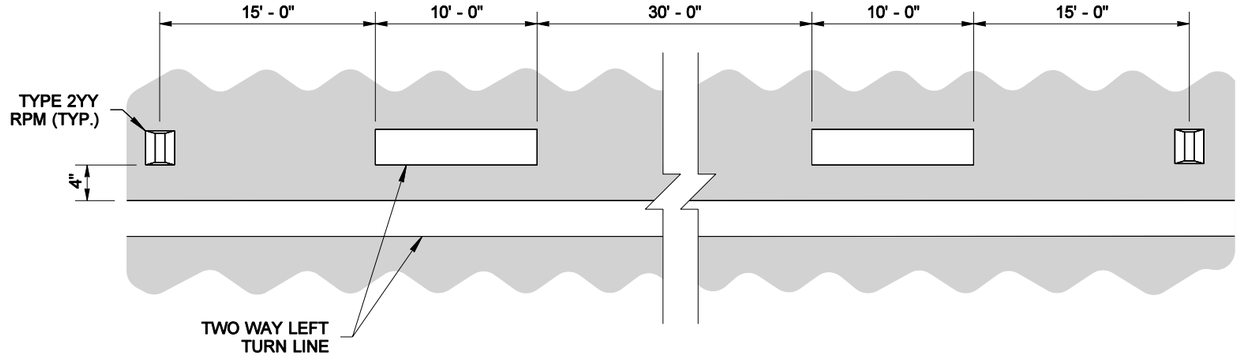

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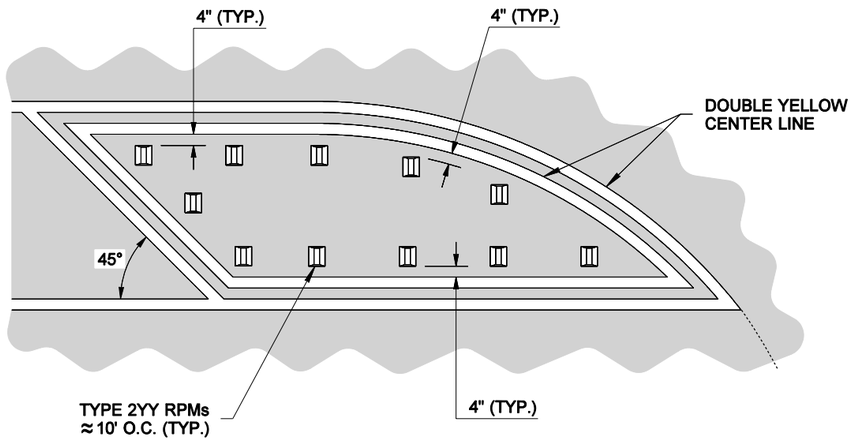

**ALTERNATE LINE DETAIL**




**DETAIL "D"**




**DETAIL "C"**




**DETAIL "E"**

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R. SCOTT ZELLER
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PROFESSIONAL ENGINEER

EXPIRES MAY 5, 2005

# LONG LINE SUPPLEMENT WITH RAISED PAVEMENT MARKERS ~ TURN LANES

# STANDARD PLAN M-20.40-00

SHEET 2 OF 2 SHEETS

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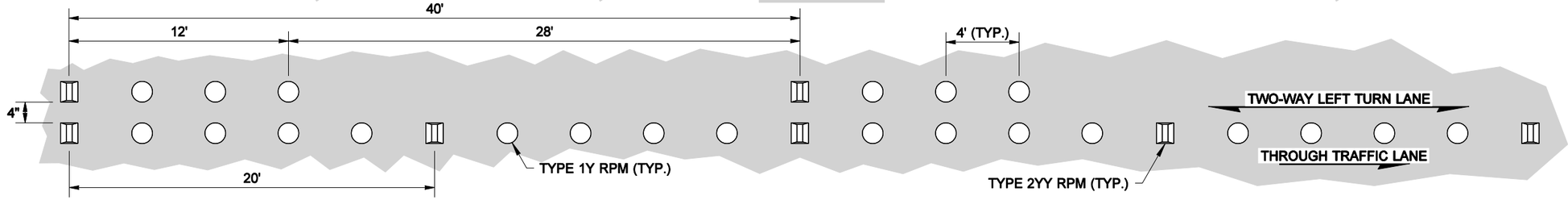
*03-04-05* — DATE

Washington State Department of Transportation

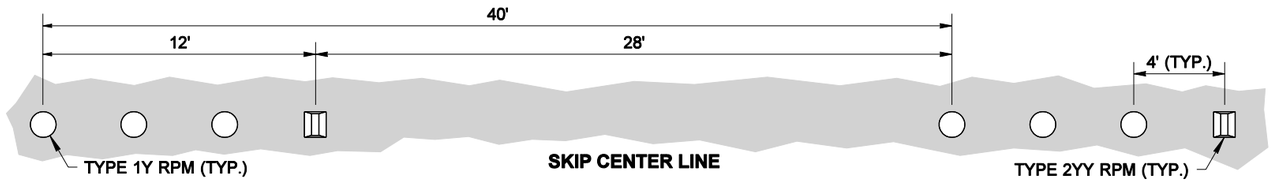
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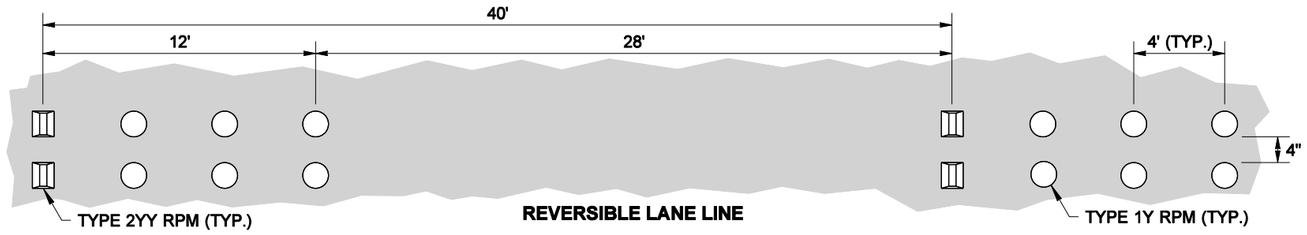
DRAWN BY: ADAM COCHRAN



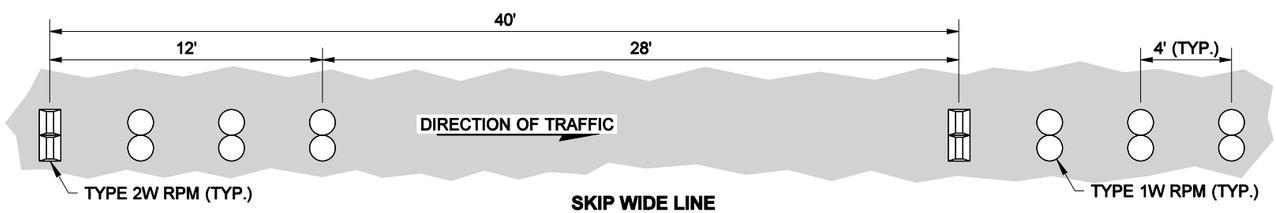

**TWO-WAY LEFT TURN LINE**



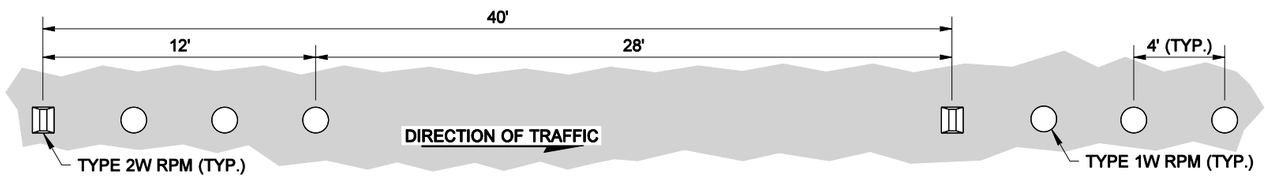

**SKIP CENTER LINE**



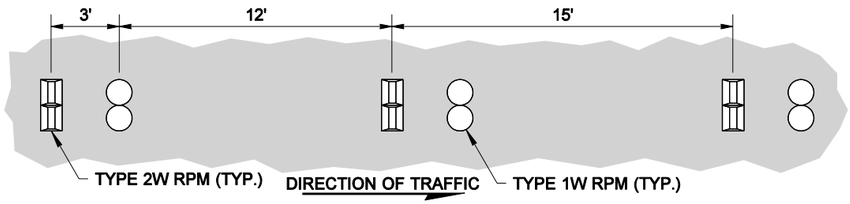

**REVERSIBLE LANE LINE**




**SKIP WIDE LINE**



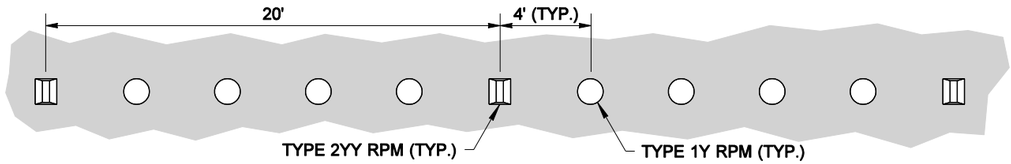

**LANE LINE**



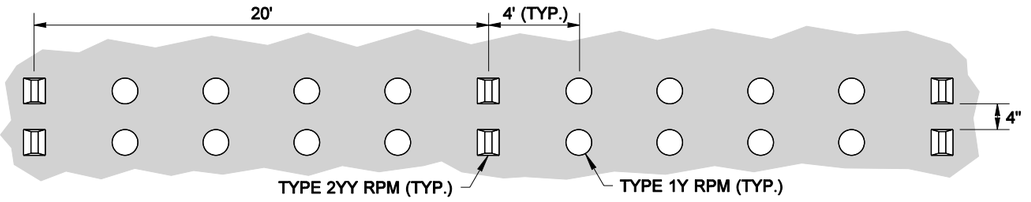

**DROP LANE LINE**

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

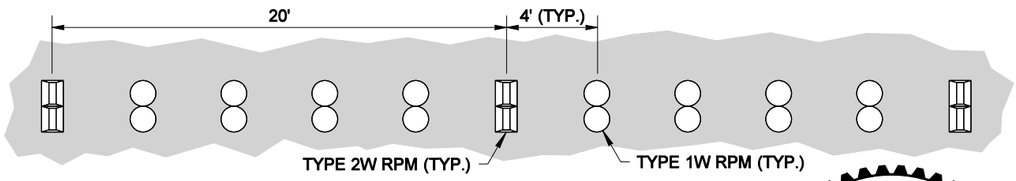
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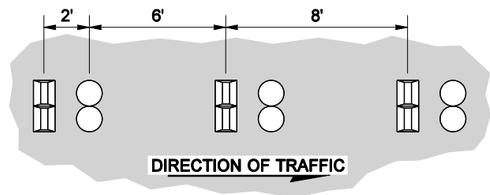

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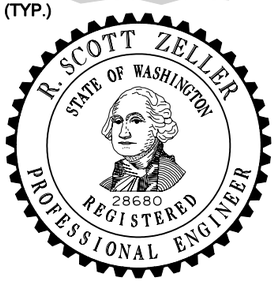

**DOUBLE YELLOW CENTER LINE**




**WIDE LINE**




**WIDE DOTTED LINE**




EXPIRES MAY 5, 2005

# LONG LINE SUBSTITUTION WITH RAISED PAVEMENT MARKERS STANDARD PLAN M-20.50-00

SHEET 1 OF 1 SHEET

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*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *03-04-05* — DATE

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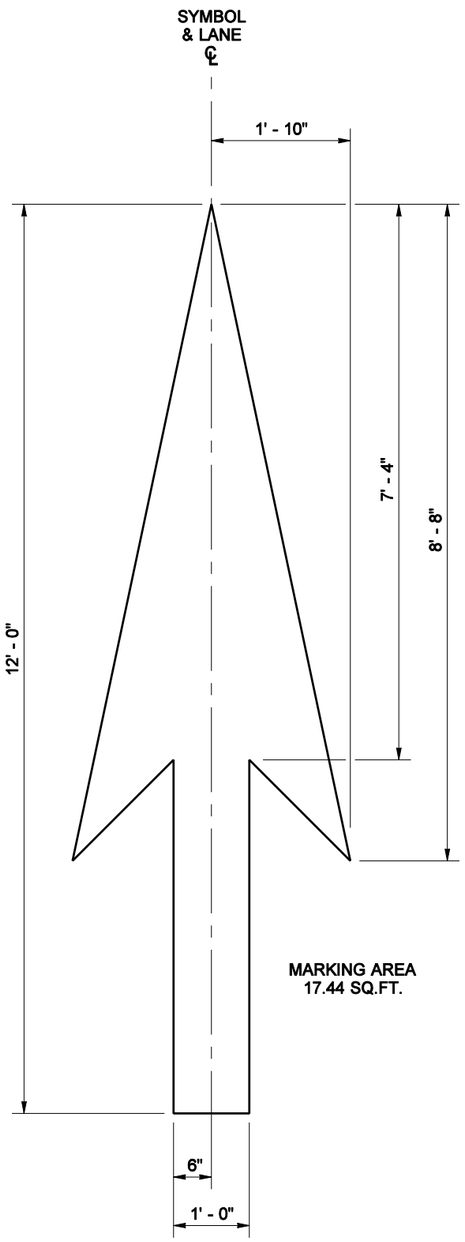
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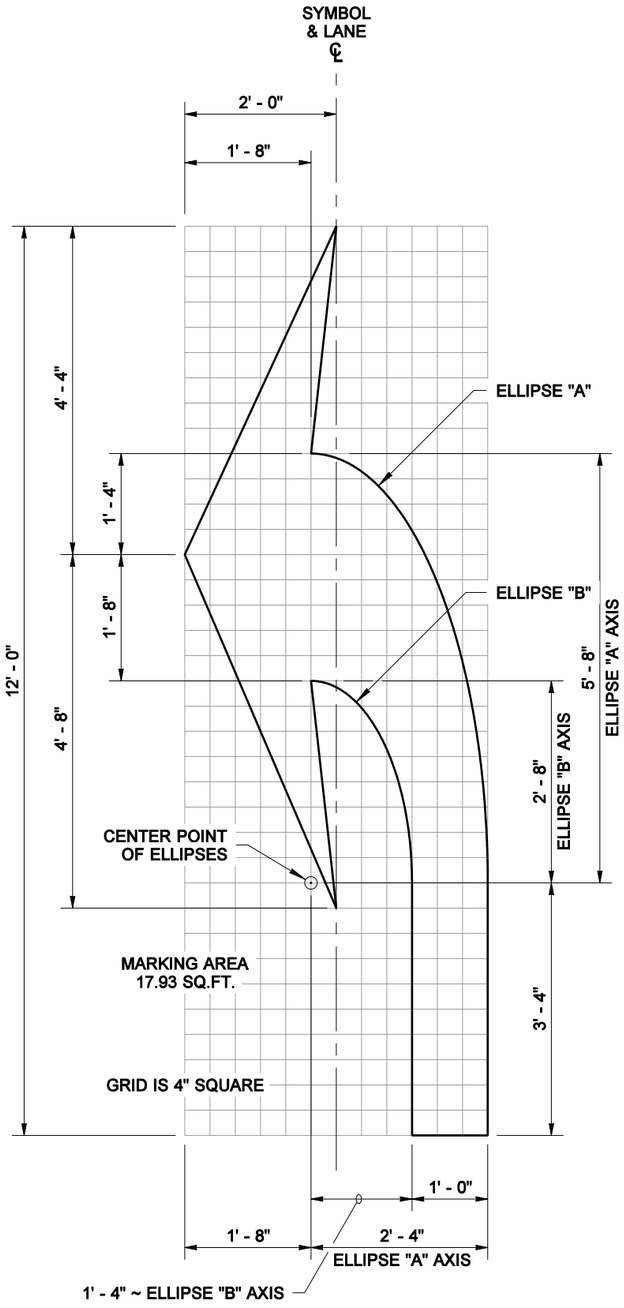
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA



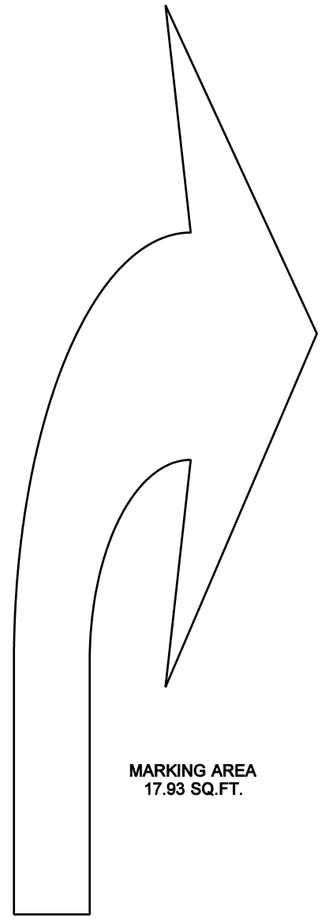

**TYPE 1 TRAFFIC ARROW**




**TYPE 2L (LEFT)**
**TRAFFIC ARROW**

**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.




**TYPE 2R (RIGHT)**
**TRAFFIC ARROW**

MIRROR IMAGE OF
TYPE 2L TRAFFIC ARROW




EXPIRES AUGUST 9, 2007

# SYMBOL MARKINGS TRAFFIC ARROWS FOR HIGH SPEED ROADWAYS STANDARD PLAN M-24.20-01

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-31-06* — DATE

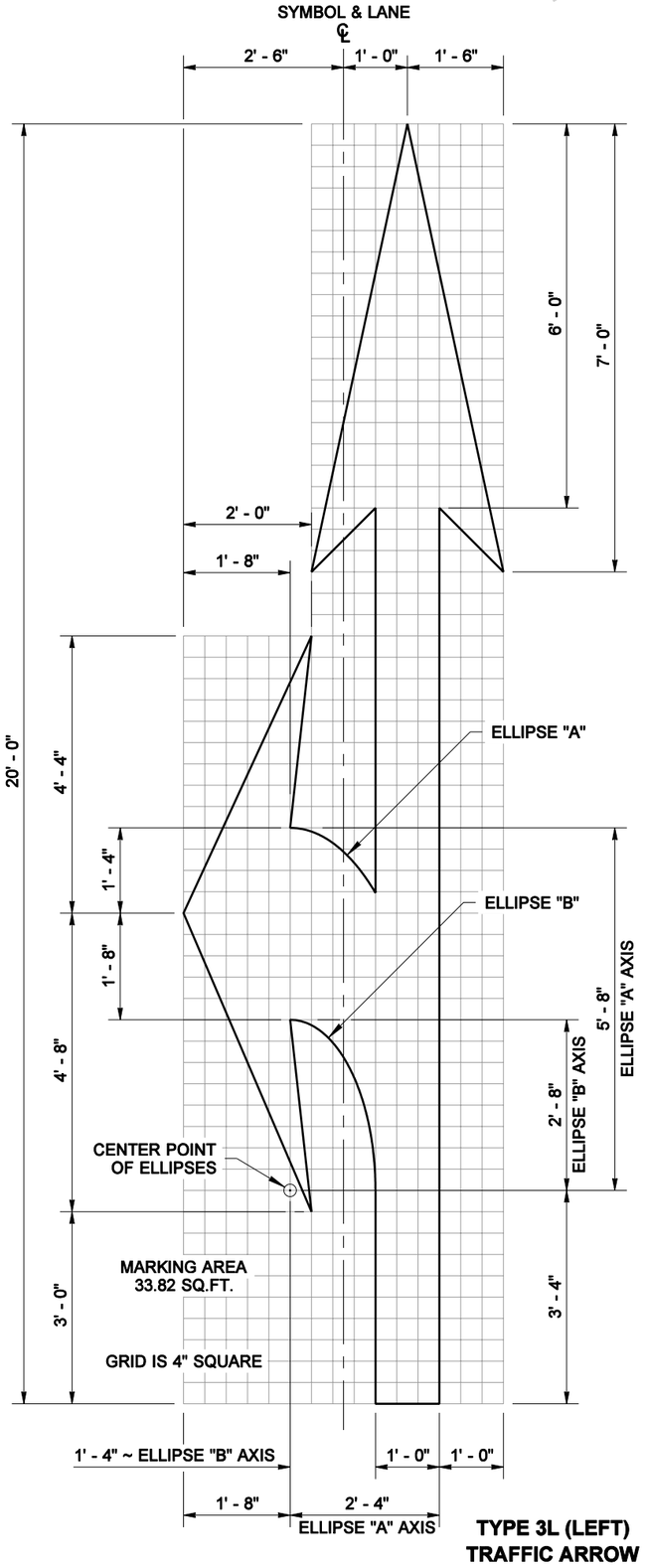
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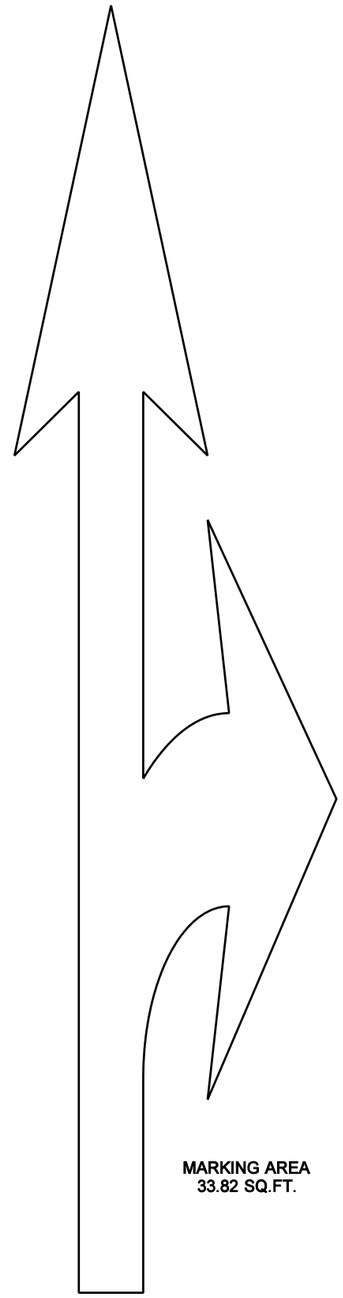
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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DRAWN BY: MARK SUJKA

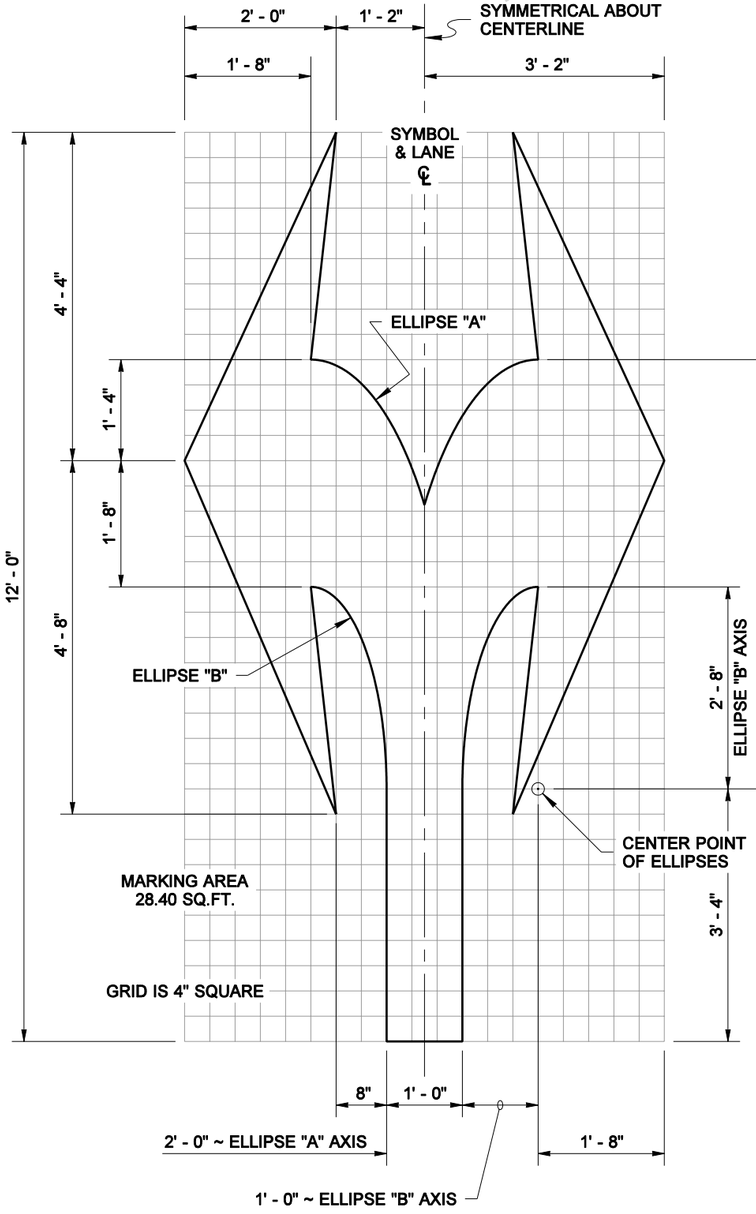



**TYPE 3L (LEFT) TRAFFIC ARROW**




**TYPE 3R (RIGHT) TRAFFIC ARROW**

MIRROR IMAGE OF TYPE 3L TRAFFIC ARROW




**TYPE 4 TRAFFIC ARROW**

THEODORE J. TREPANIER
STATE OF WASHINGTON
25335
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 9, 2007

# SYMBOL MARKINGS TRAFFIC ARROWS FOR HIGH SPEED ROADWAYS STANDARD PLAN M-24.20-01

SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-31-06* — DATE

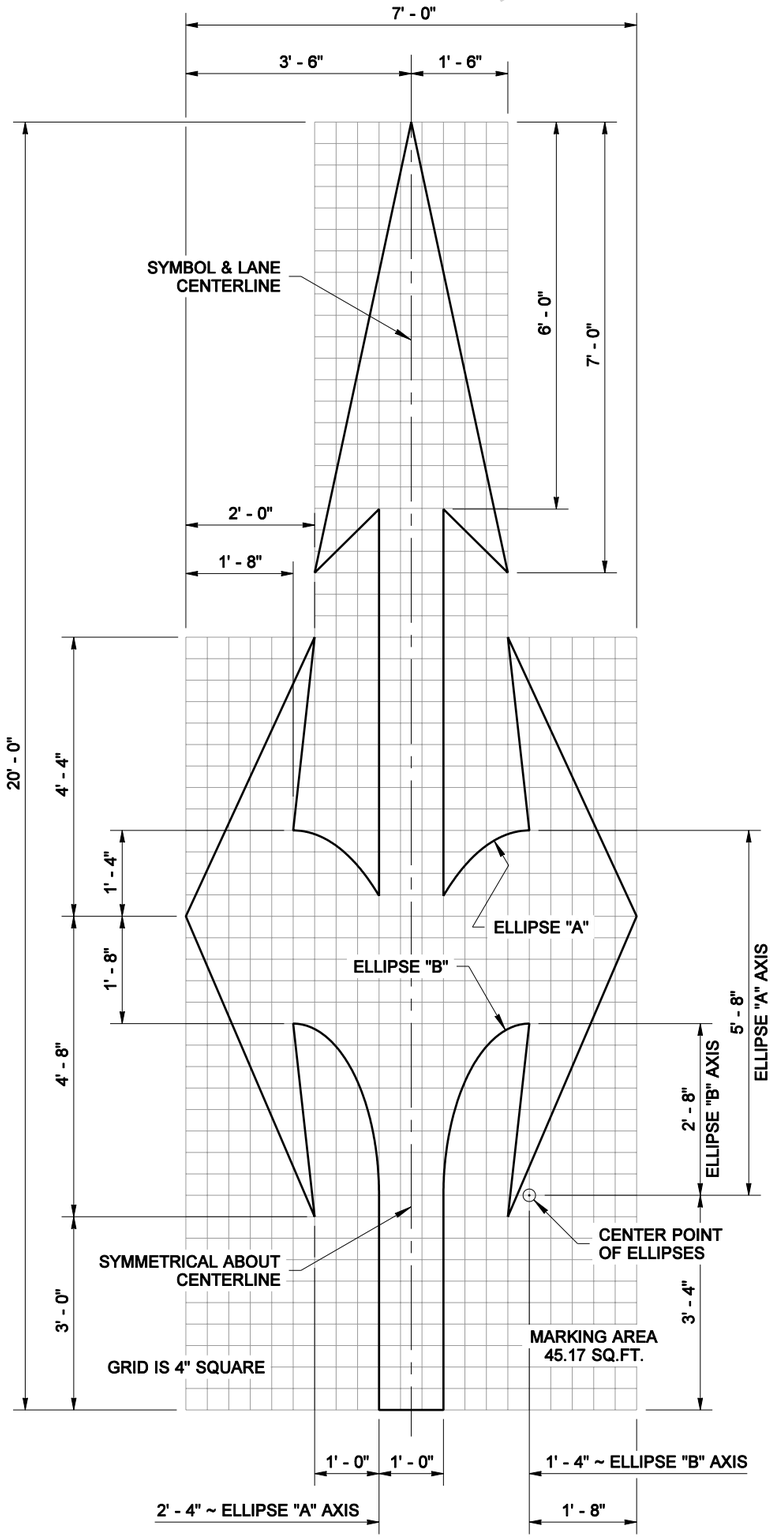
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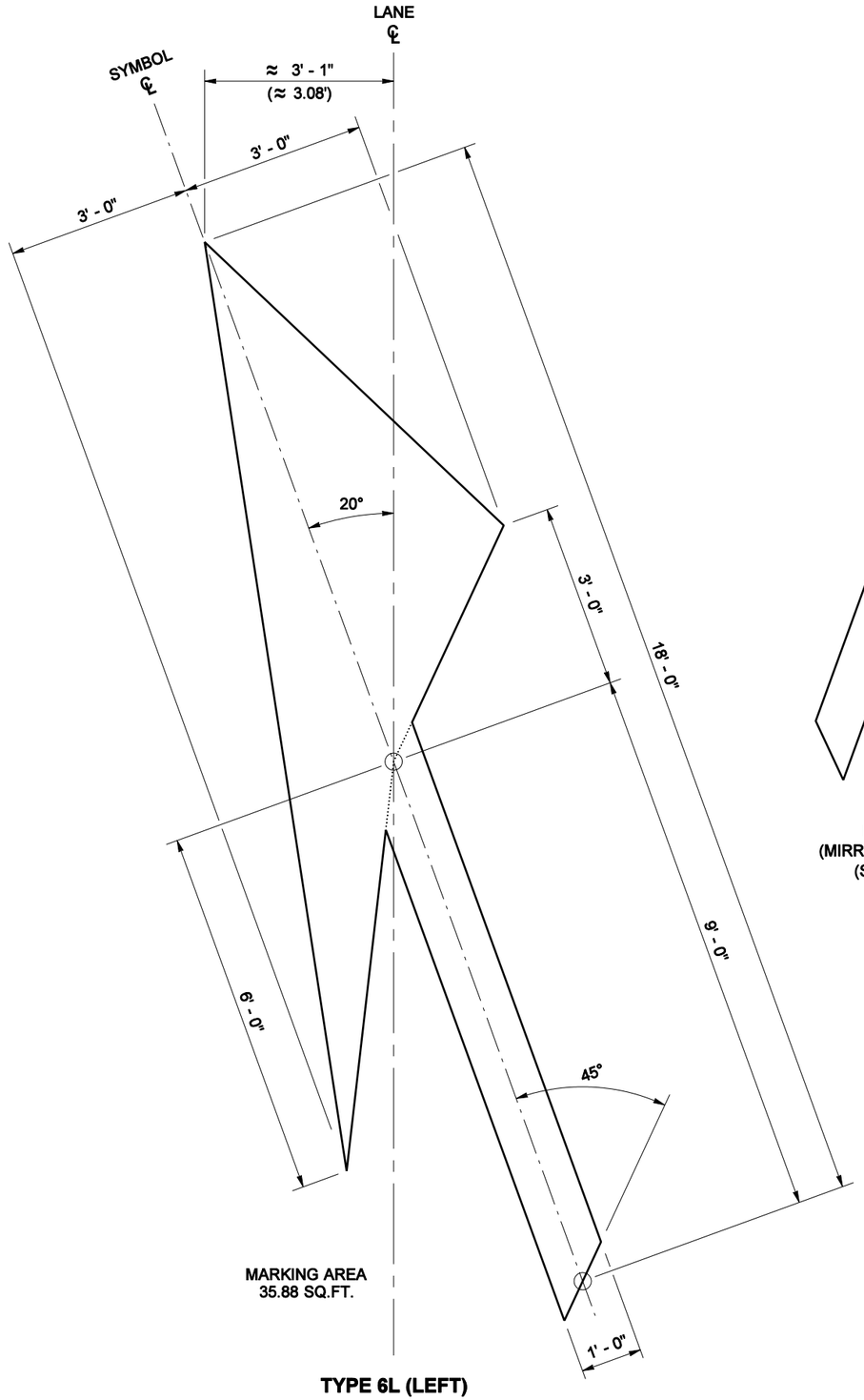
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

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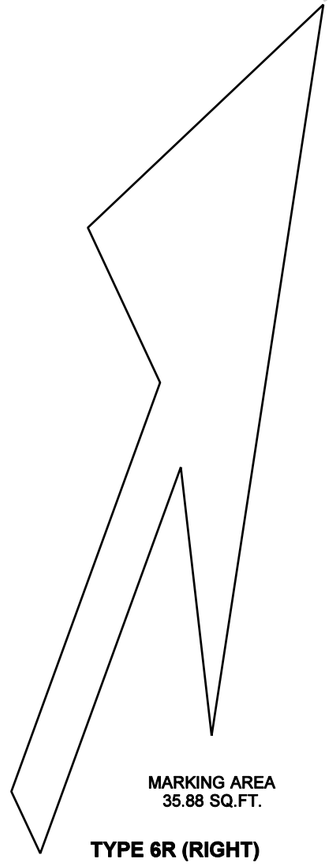
DRAWN BY: MARK SUJKA




**TYPE 7 TRAFFIC ARROW**




**TYPE 6L (LEFT) TRAFFIC ARROW**




**TYPE 6R (RIGHT) TRAFFIC ARROW**

MIRROR IMAGE OF TYPE 6L
(MIRRORED ABOUT LANE CENTERLINE)
(SHOWN AT REDUCED SCALE)

THEODORE J. TREPANIER
STATE OF WASHINGTON
25335
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 9, 2007

# SYMBOL MARKINGS TRAFFIC ARROWS FOR HIGH SPEED ROADWAYS STANDARD PLAN M-24.20-01

SHEET 3 OF 3 SHEETS

APPROVED FOR PUBLICATION

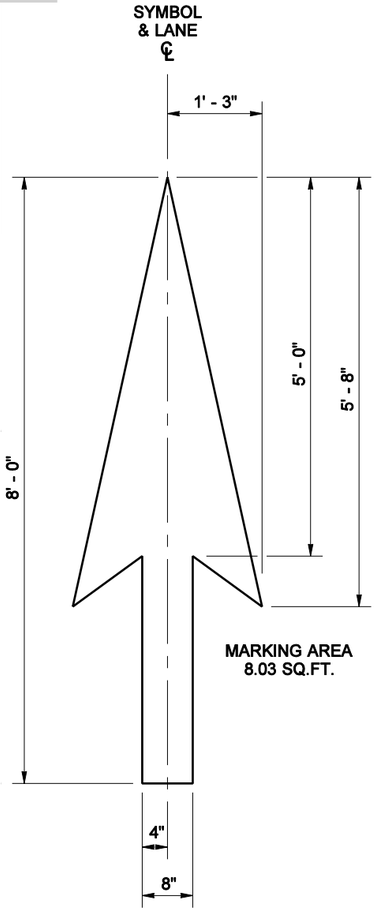
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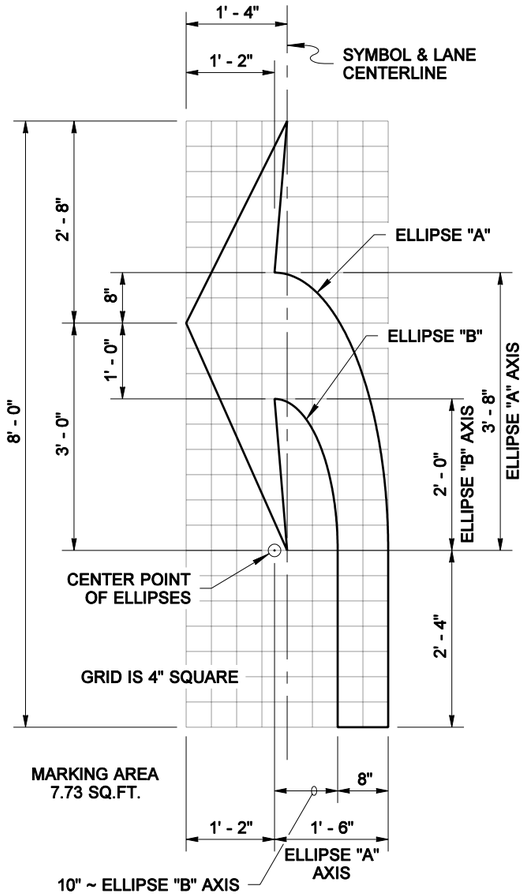



**TYPE 1S TRAFFIC ARROW**




**TYPE 2SR (RIGHT) TRAFFIC ARROW**

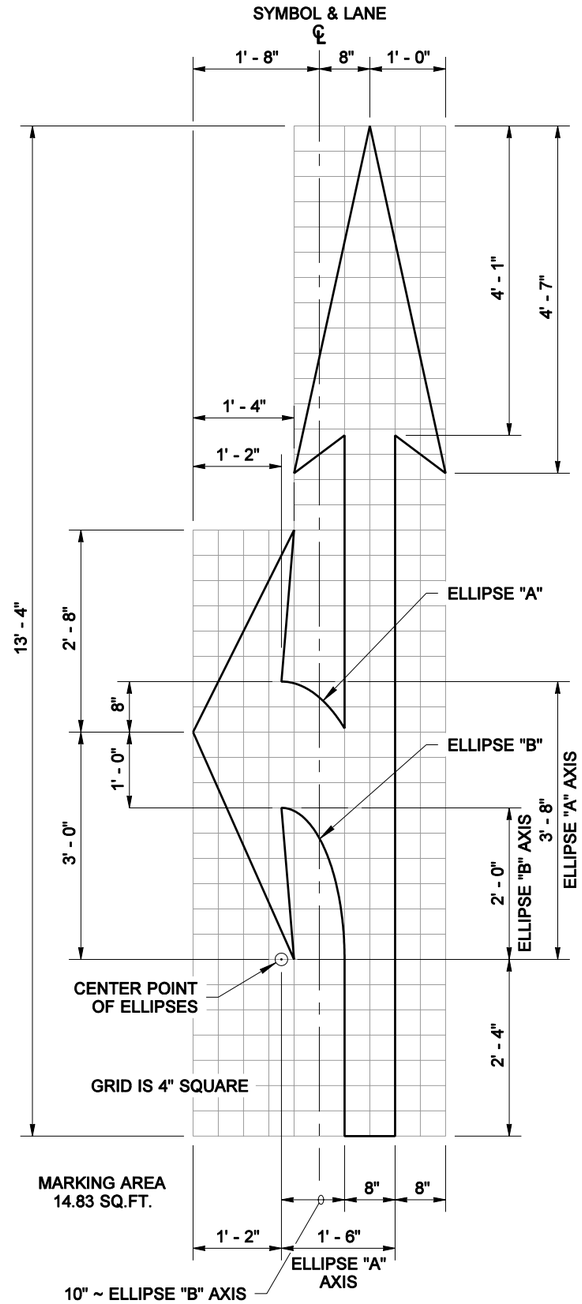
MIRROR IMAGE OF
TYPE 2SL TRAFFIC ARROW
(SHOWN AT REDUCED SCALE)



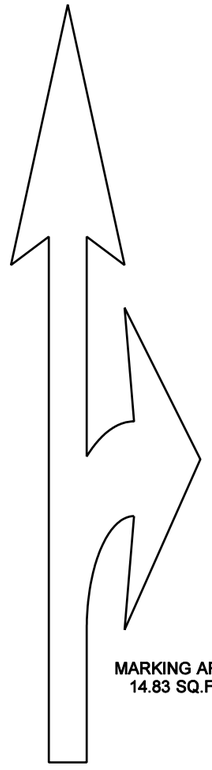

**TYPE 2SL (LEFT) TRAFFIC ARROW**

**NOTE**

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.

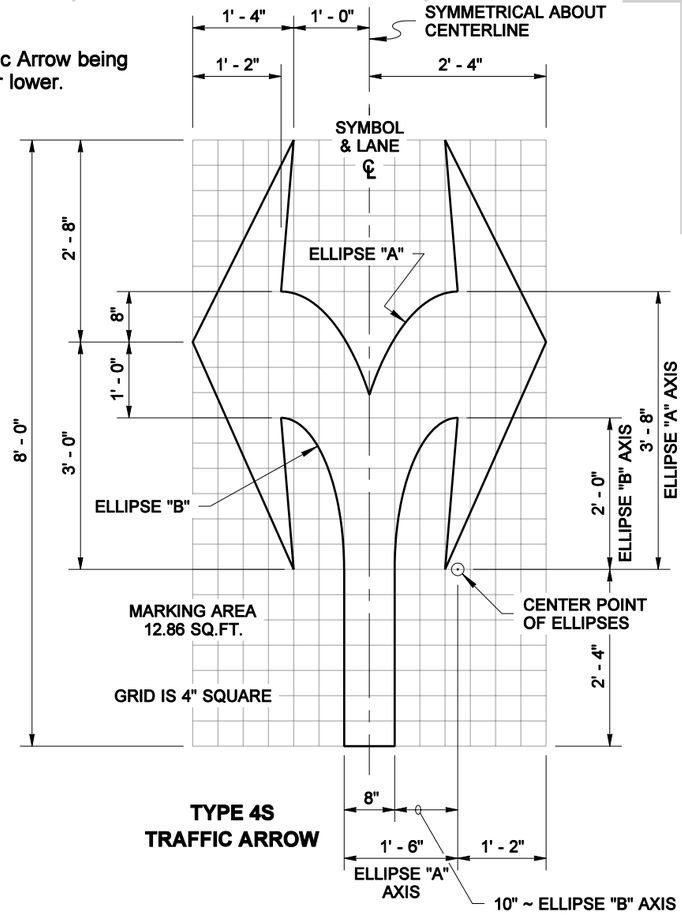



**TYPE 3SL (LEFT) TRAFFIC ARROW**




**TYPE 3SR (RIGHT) TRAFFIC ARROW**

MIRROR IMAGE OF
TYPE 3SL TRAFFIC ARROW
(SHOWN AT REDUCED SCALE)




**TYPE 4S TRAFFIC ARROW**

THEODORE J. TREPANIER
STATE OF WASHINGTON
25335
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES AUGUST 9, 2007

# SYMBOL MARKINGS TRAFFIC ARROWS FOR LOW SPEED ROADWAYS STANDARD PLAN M-24.40-01

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-31-06* — DATE

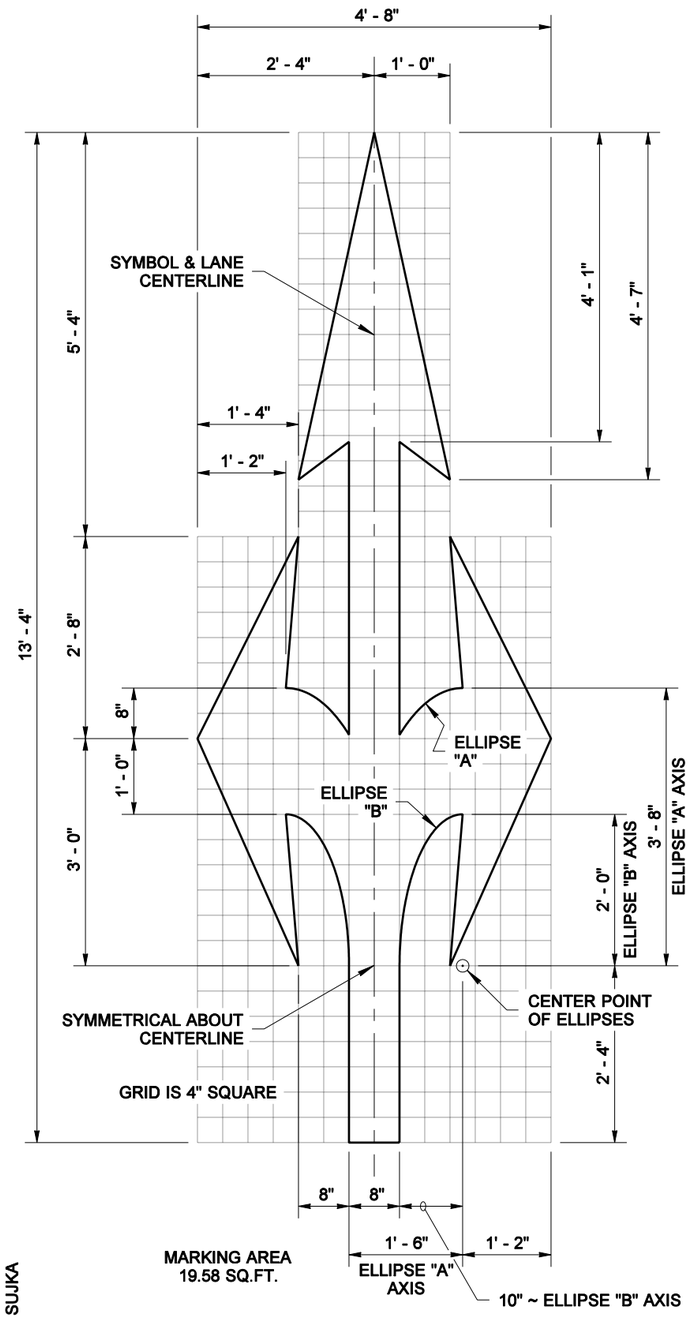
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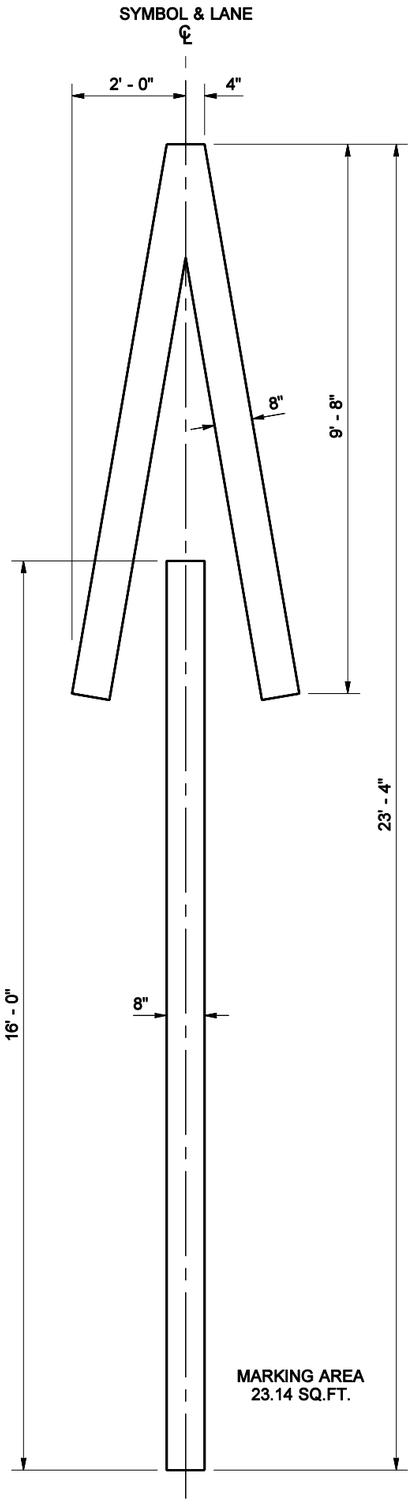
DRAWN BY: MARK SUJKA

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

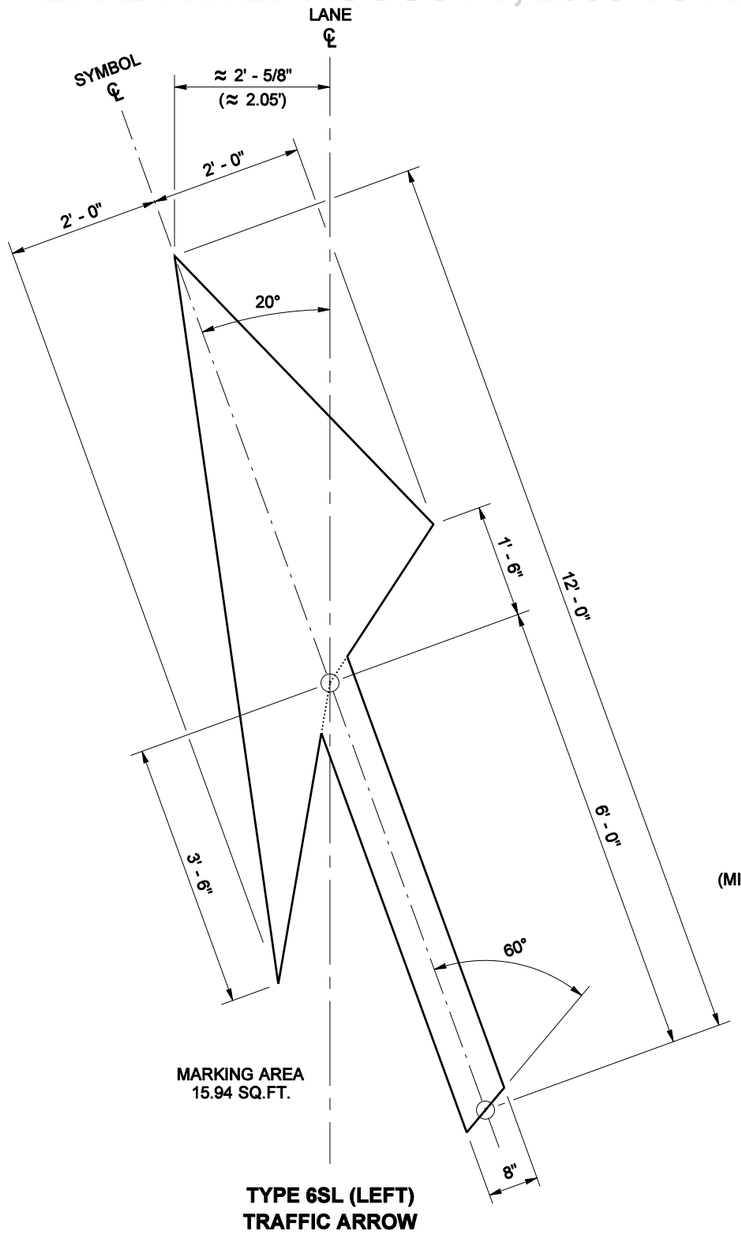
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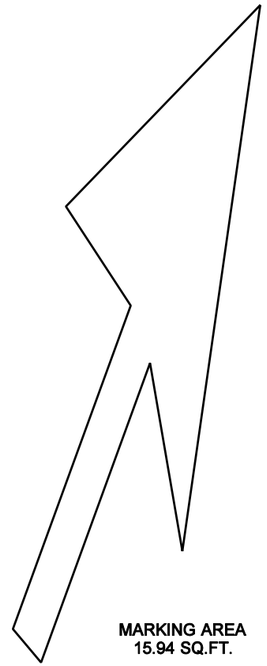

**TYPE 7S TRAFFIC ARROW**




**TYPE 5 TRAFFIC ARROW**




**TYPE 6SL (LEFT) TRAFFIC ARROW**



MARKING AREA
15.94 SQ.FT.

**TYPE 6SR (RIGHT) TRAFFIC ARROW**

MIRROR IMAGE OF TYPE 6SL
(MIRRORED ABOUT LANE CENTERLINE)
(SHOWN AT REDUCED SCALE)




EXPIRES AUGUST 9, 2007

# SYMBOL MARKINGS TRAFFIC ARROWS FOR LOW SPEED ROADWAYS STANDARD PLAN M-24.40-01

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* — STATE DESIGN ENGINEER — *05-31-06* — DATE

Washington State Department of Transportation

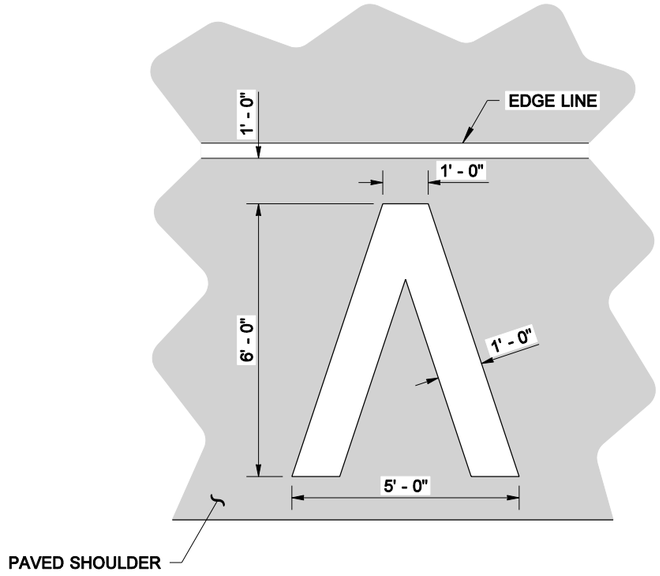
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DRAWN BY: MARK SUJKA

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EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

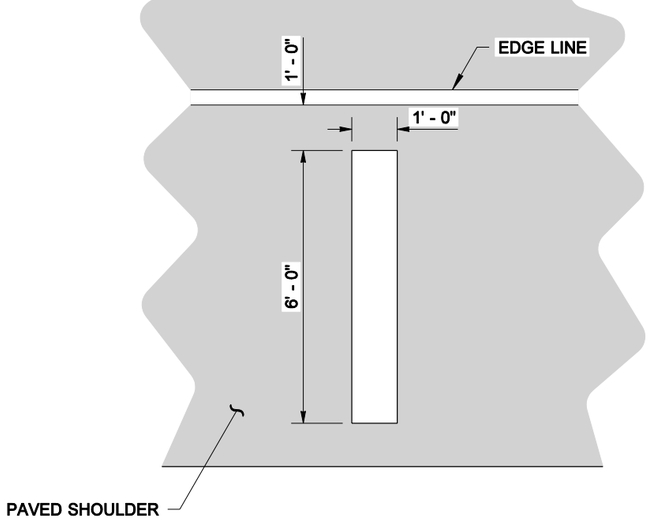
DRAWN BY: MARK SUJKA




MARKING AREA = 11.73 SQ.FT.

**HALF MARKER**

**(1/2 MILE INTERVAL)**

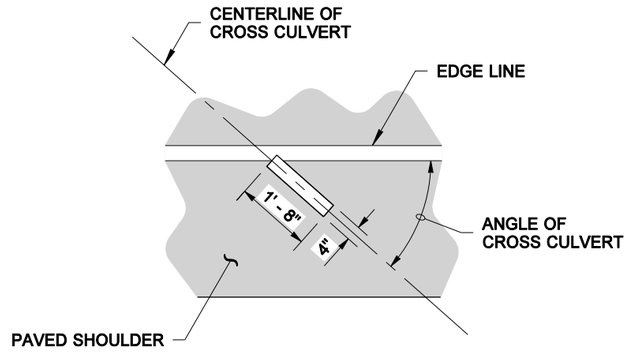



MARKING AREA = 6.00 SQ.FT.

**FULL MARKER**

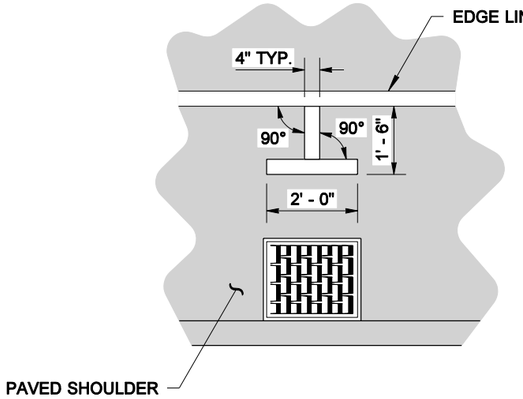
**(1 MILE INTERVAL)**

## AERIAL SURVEILLANCE MARKERS




MARKING AREA = 0.56 SQ.FT.

**CROSS CULVERT**




MARKING AREA = 1.06 SQ.FT.

**DRAINAGE STRUCTURE INLET**

## DRAINAGE MARKING




EXPIRES AUGUST 9, 2007

# SYMBOL MARKINGS MISCELLANEOUS

## STANDARD PLAN M-24.60-01

SHEET 1 OF 2 SHEETS

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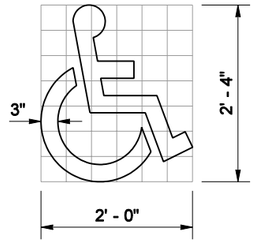
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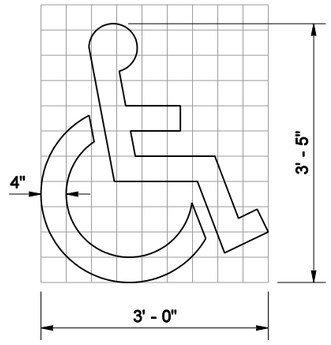
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

DRAWN BY: MARK SUJKA



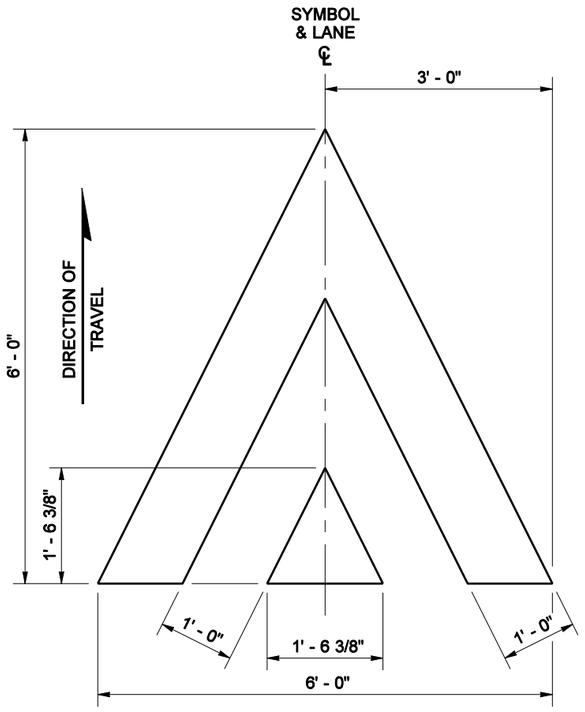

GRID IS 4" SQUARE MARKING AREA = 1.41 SQ.FT.

**ACCESS PARKING SPACE SYMBOL (MINIMUM)**



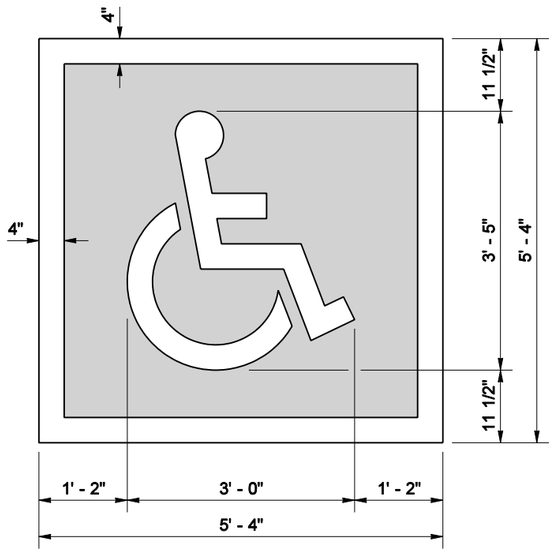

GRID IS 4" SQUARE MARKING AREA = 3.09 SQ.FT.

**ACCESS PARKING SPACE SYMBOL (STANDARD)**



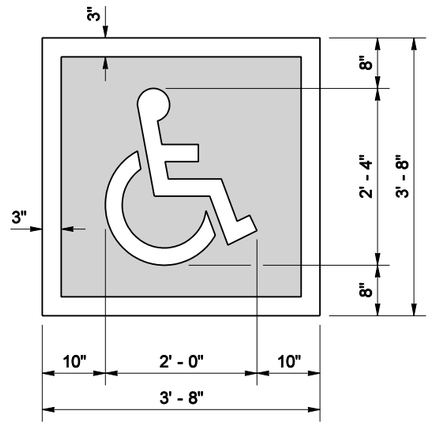

MARKING AREA = 12.08 SQ.FT.

**SPEED BUMP SYMBOL**




TOTAL MARKING AREA = 28.44 SQ.FT.
WHITE = 9.76 SQ.FT. BLUE = 18.69 SQ.FT.

**ACCESS PARKING SPACE SYMBOL (STANDARD)**
**WITH BLUE BACKGROUND AND WHITE BORDER**
(REQUIRED FOR CEMENT CONCRETE SURFACES)



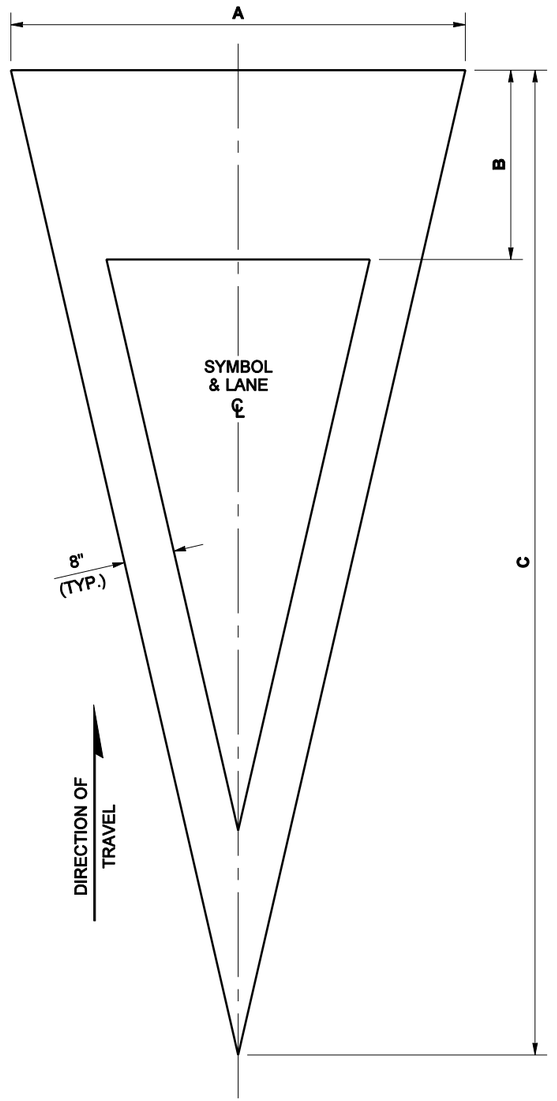

TOTAL MARKING AREA = 13.44 SQ.FT.
WHITE = 4.82 SQ.FT. BLUE = 8.62 SQ.FT.

**ACCESS PARKING SPACE SYMBOL (MINIMUM)**
**WITH BLUE BACKGROUND AND WHITE BORDER**
(REQUIRED FOR CEMENT CONCRETE SURFACES)

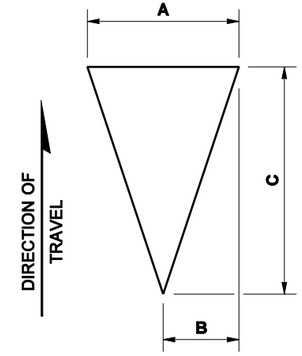
EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

EFFECTIVE: AUGUST 7, 2006 TO APRIL 1, 2007

| SYMBOL MARKING | | A | B | C | USE | MARKING AREA |
|---|---|---|---|---|---|---|
| YIELD AHEAD SYMBOL | TYPE 1 | 6' - 0" | 2' - 6" | 13' - 0" | LESS THAN 45 MPH | 25.90 SQ.FT. |
| | TYPE 2 | 6' - 0" | 3' - 0" | 20' - 0" | 45 MPH OR GREATER | 36.54 SQ.FT. |
| YIELD LINE SYMBOL | TYPE 1 | 1' - 0" | 6" | 1' - 6" | LESS THAN 45 MPH | 0.75 SQ.FT. |
| | TYPE 2 | 2' - 0" | 1' - 0" | 3' - 0" | 45 MPH OR GREATER | 3.00 SQ.FT. |




**YIELD AHEAD SYMBOL**




**YIELD LINE SYMBOL**
(MULTIPLE SYMBOLS REQUIRED FOR TRANSVERSE YIELD LINE ~ SEE CONTRACT)

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REGISTERED
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EXPIRES AUGUST 9, 2007

# SYMBOL MARKINGS MISCELLANEOUS

## STANDARD PLAN M-24.60-01

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

*Harold J. Peterfeso* *05-31-06*

STATE DESIGN ENGINEER DATE

Washington State Department of Transportation

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