



## Publications Transmittal

Transmittal Number PT 19-023	Date September 3, 2019
Publication Title / Publication Number <i>Standard Plans M 21-01</i>	
Originating Organization Design Office, Engineering and Regional Operations	

### Remarks and Instructions

The complete manual and revision packages can be accessed at  
[www.wsdot.wa.gov/design/standards/plans.htm](http://www.wsdot.wa.gov/design/standards/plans.htm).

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

### Instructions

- Replace Cover page and Foreword page with **new** pages provided.
- Remove **pages 3 ~ 12** from your current manual.
- Insert **pages 3 ~ 12**.
- Refer to the **REMOVE & INSERT INSTRUCTIONS ~ Standard Plans Revision 9-3-2019**

To get the latest information, please sign up for email updates for individual publications at  
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John Donahue

Approved By

Signature

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# REMOVE AND INSERT INSTRUCTIONS - Standard Plans Revision 9-3-2019

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# Standard Plans

**M 21-01**

September 3, 2019

**Engineering and Regional Operations**  
Development Division, Design Office

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## Foreword

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

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

Contact the Design Standards Team at:

360-705-7256 (phone)

designstandards@wsdot.wa.gov (email)

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

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

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**Steve Roark**  
State Design Engineer

## Comment Form

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To: WSDOT Headquarters  
Development Division, Design Office  
Attn: Policy, Standards, and Research Section  
PO Box 47329  
Olympia, WA 98504-7329

Subject: *Standard Plan Manual* Comment

Comment (marked copies attached):

Plan No.	Plan Title	Publication Approval Date	
<b>Section A Roadway Construction</b>			
A-10.10-00	Survey Stakes	8/7/07	2 Sheets
A-10.20-00	Survey Monument Types 1 and 2	10/5/07	
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C-70.10-01	Single-Slope Concrete Barrier (Precast)	6/17/14	3 Sheets
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C-75.20-01	Single-Slope Concrete Barrier (Precast) Vertical Back	6/11/14	
C-75.30-01	Single-Slope Concrete Barrier (Precast) Terminal	6/11/14	
C-80.10-01	Single-Slope Concrete Barrier (Cast-in-Place) Dual-Faced	6/11/14	3 Sheets
C-80.20-01	Single-Slope Concrete Barrier (Cast-in-Place) Terminal	6/11/14	
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C-40.18-03	Barrier Placement ~ Cable Barrier Shielding for Redirectional Landform	7/21/17	
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D-2.06-01	Noise Barrier Wall Type 3 (...on Offset Spread Footing)	1/6/09	2 Sheets
D-2.08-00	Noise Barrier Wall Type 4 (...on Shaft Foundation)	11/10/05	2 Sheets
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D-2.16-00	Noise Barrier Wall Type 6SS (...w/S. S. Traffic Barrier on Spread Footing)	11/10/05	
D-2.18-00	Noise Barrier Wall Type 7 (...w/Traffic Barrier on Shaft Foundation)	11/10/05	
D-2.20-00	Noise Barrier Wall Type 7SS (...w/S.S. Traffic Barrier on Shaft Foundation)	11/10/05	
D-2.32-00	Noise Barrier Wall Type 9 (Precast Wall on Spread Footing)	11/10/05	2 Sheets
D-2.34-01	Noise Barrier Wall Type 10 (...on Offset Spread Footing)	1/6/09	2 Sheets
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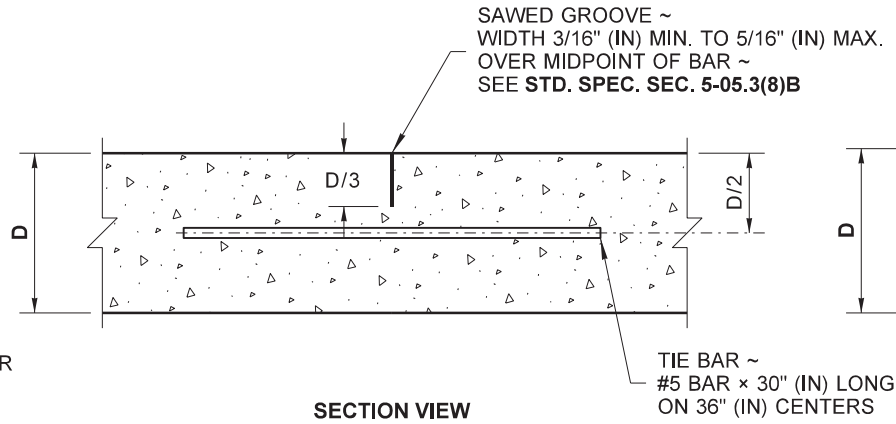
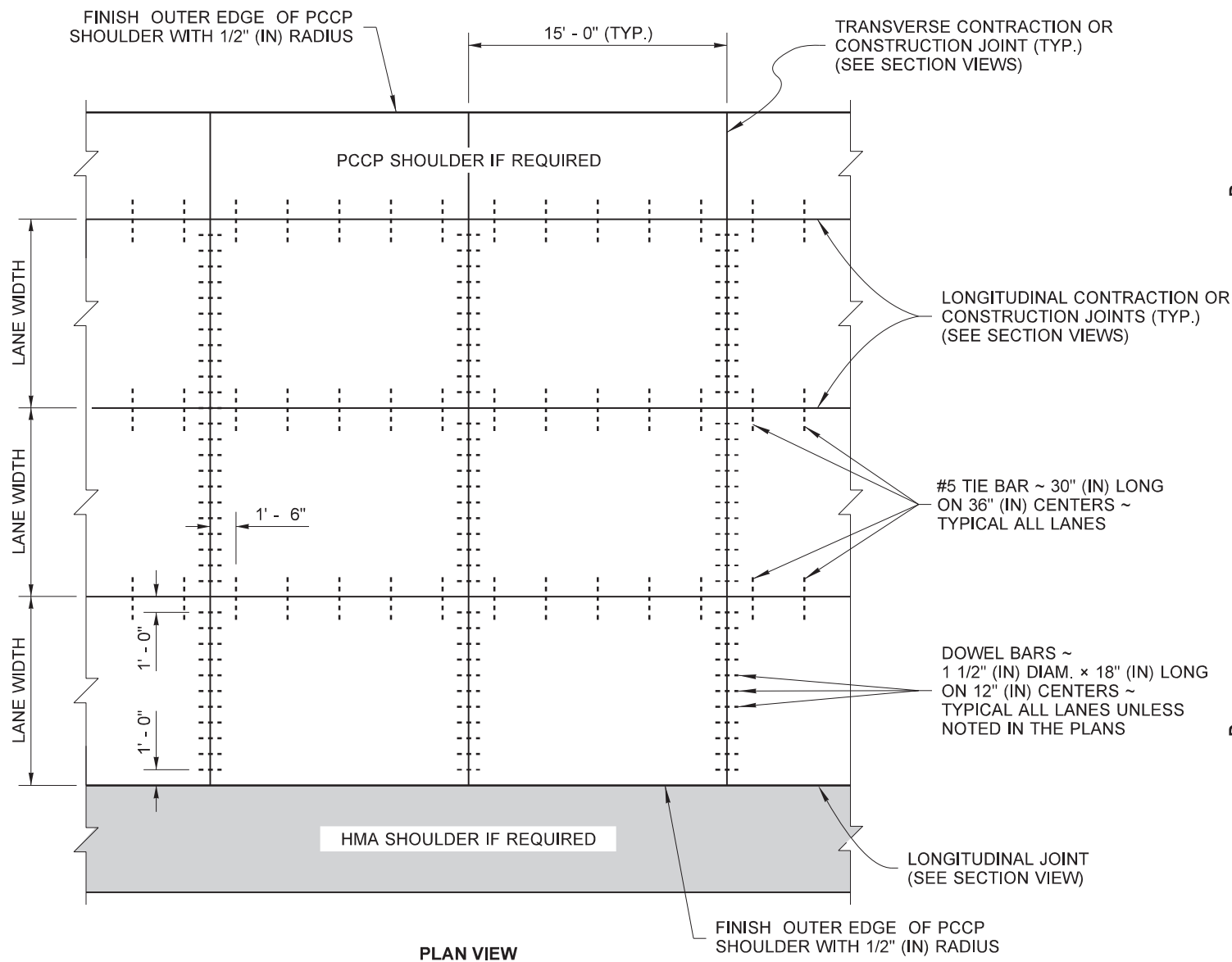
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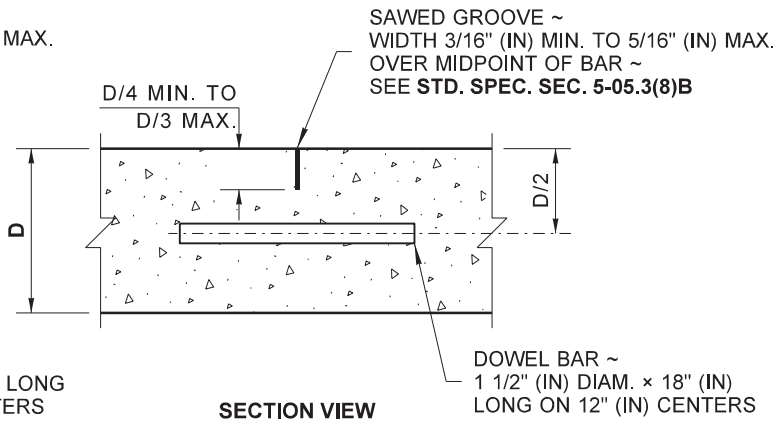
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M-80.30-00	Traffic Letters and Numerals (Low Speed Roadways)	6/10/08	

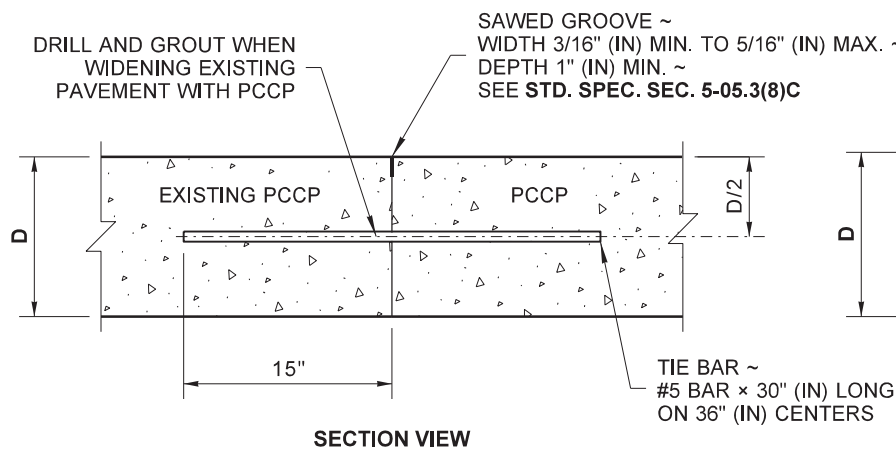
DRAWN BY: FERN LIDDELL



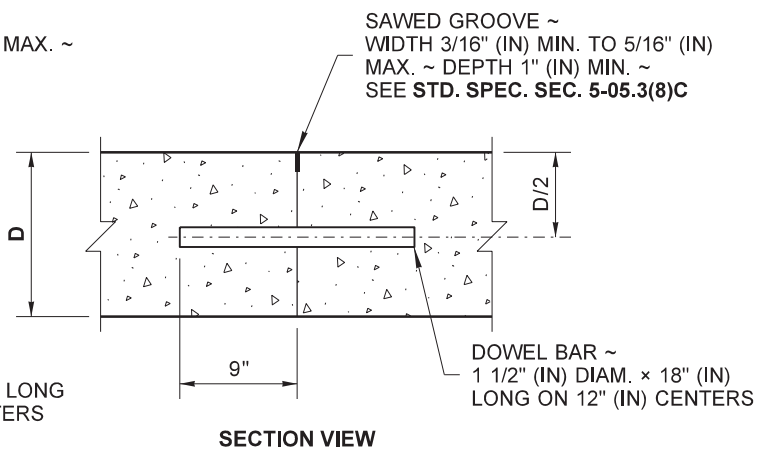
LONGITUDINAL CONTRACTION JOINT



TRANSVERSE CONTRACTION JOINT

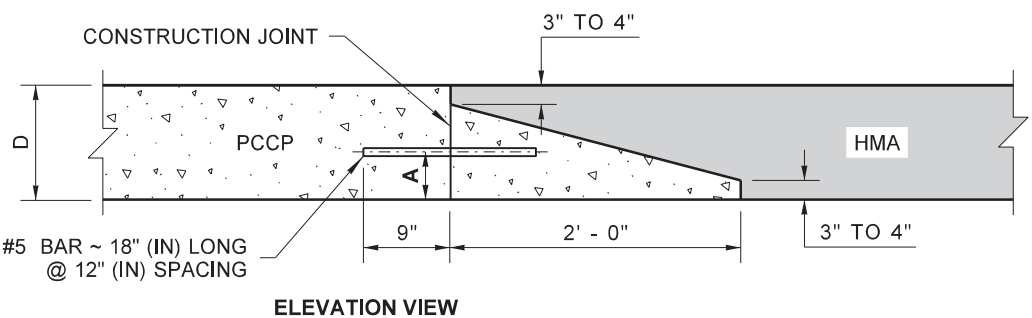


PCCP TO PCCP LONGITUDINAL CONSTRUCTION JOINT



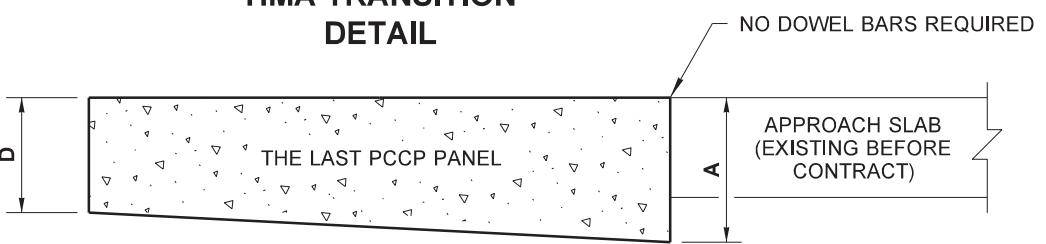
TRANSVERSE CONSTRUCTION JOINT

SLAB THICKNESS (D)	A
12"	5"
D	D/2 - 1"



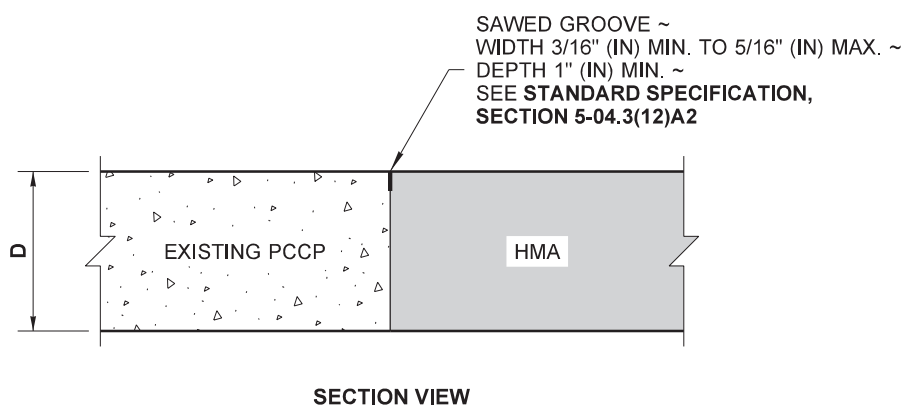
HMA TRANSITION DETAIL

DEPTH OF PCCP (D)	A
12"	15"
D	1.25 x D



EXISTING APPROACH SLAB TRANSITION DETAIL

USE ON GRANULAR BASES ONLY ~ NO TAPER REQUIRED ON ASPHALT BASES



PCCP TO HMA LONGITUDINAL JOINT



Russell, Mark A.  
Jul 19 2019 11:48 AM

**CEMENT CONCRETE PAVEMENT JOINTS**

**STANDARD PLAN A-40.10-04**

SHEET 1 OF 1 SHEET

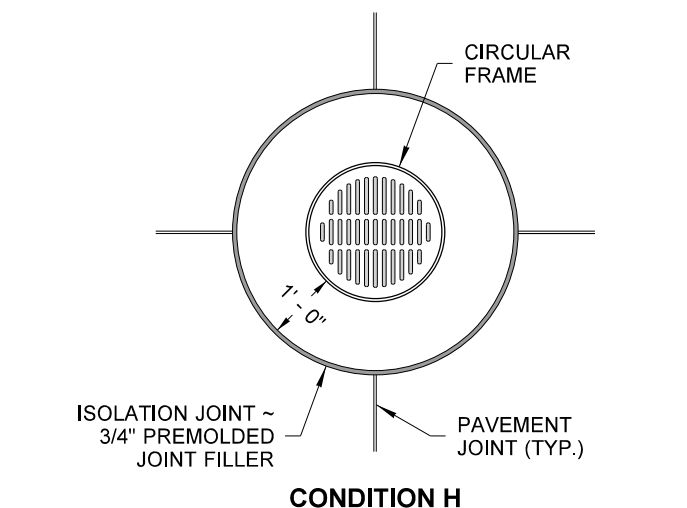
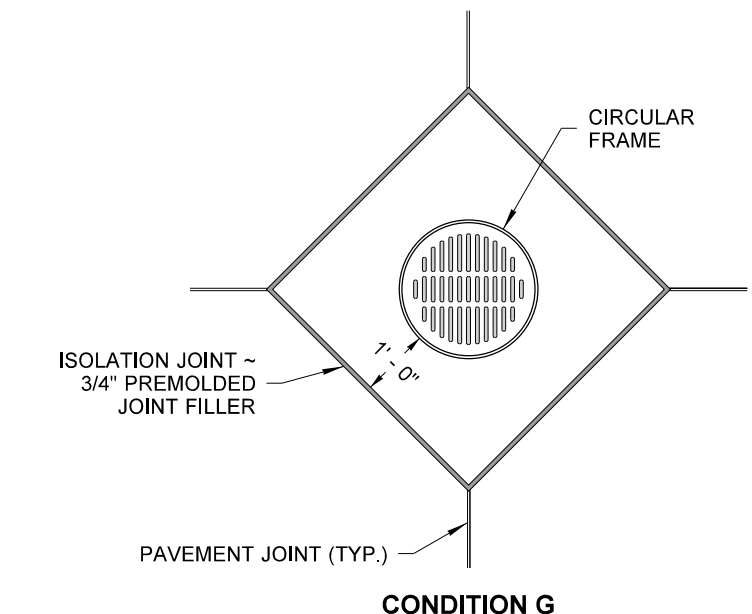
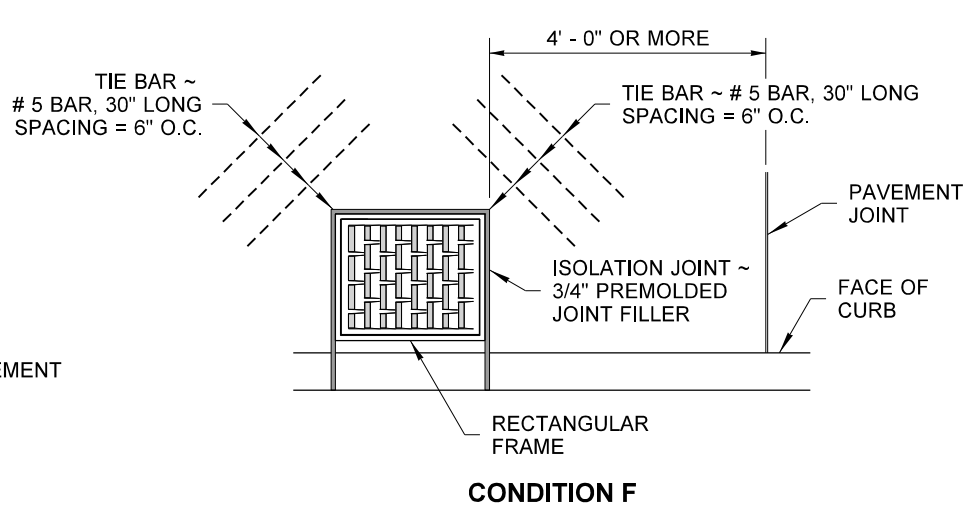
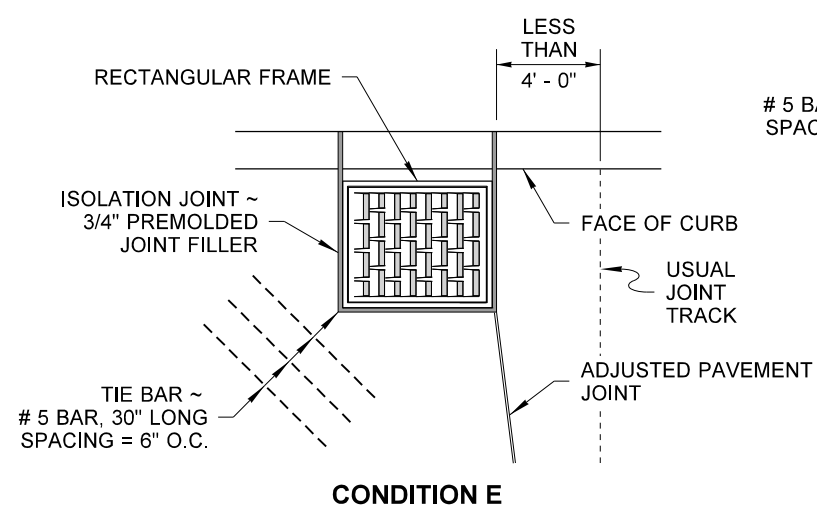
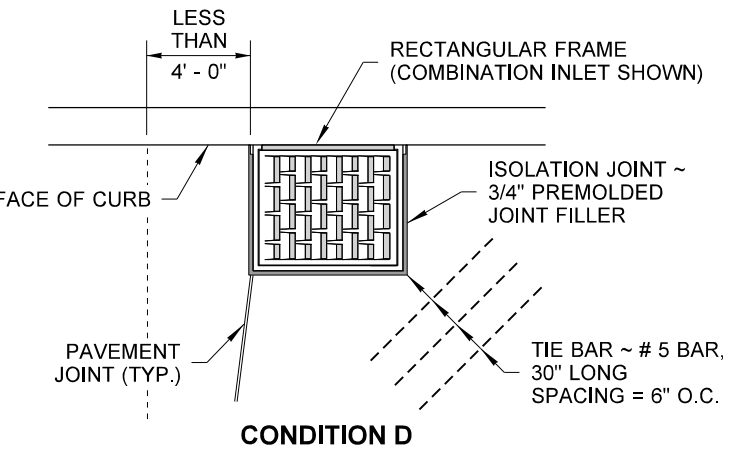
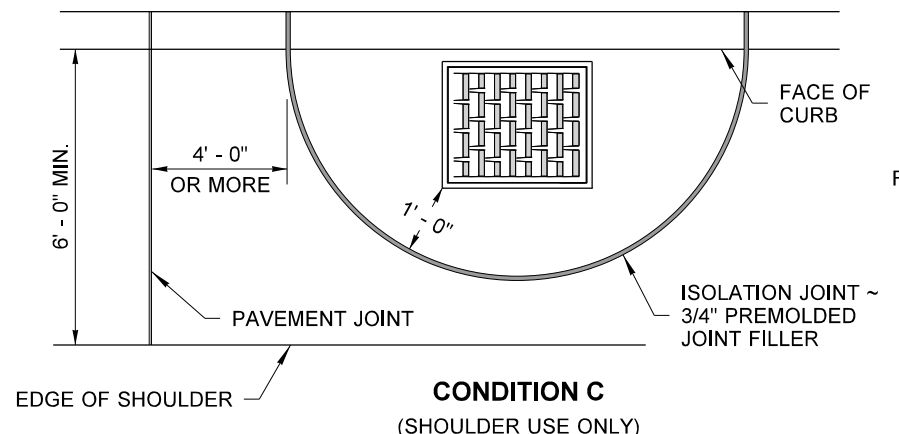
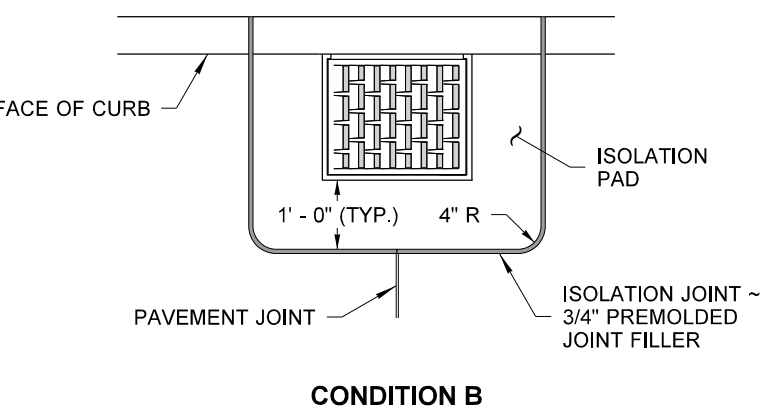
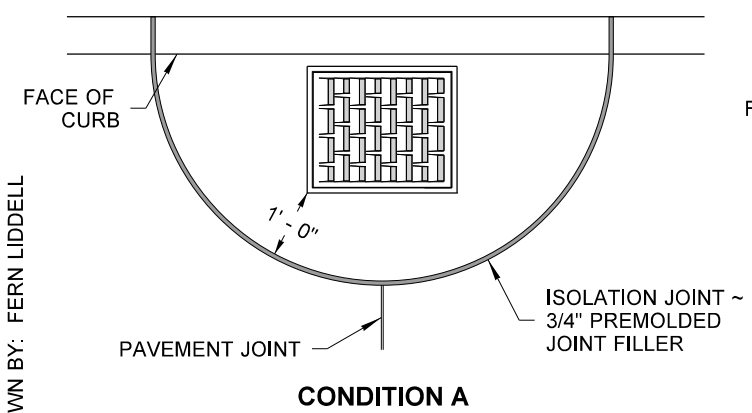
APPROVED FOR PUBLICATION

Roark, Steve  
Jul 31 2019 12:18 PM

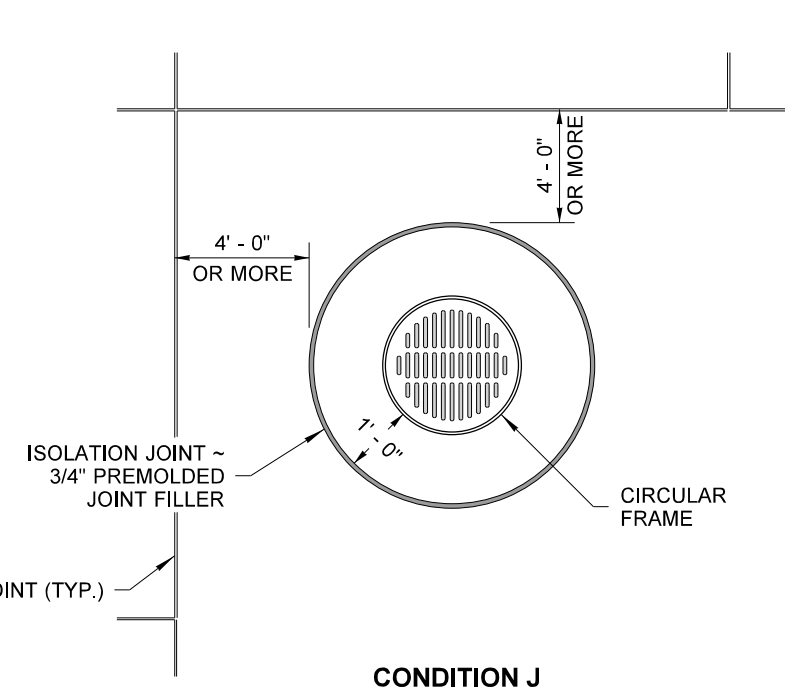
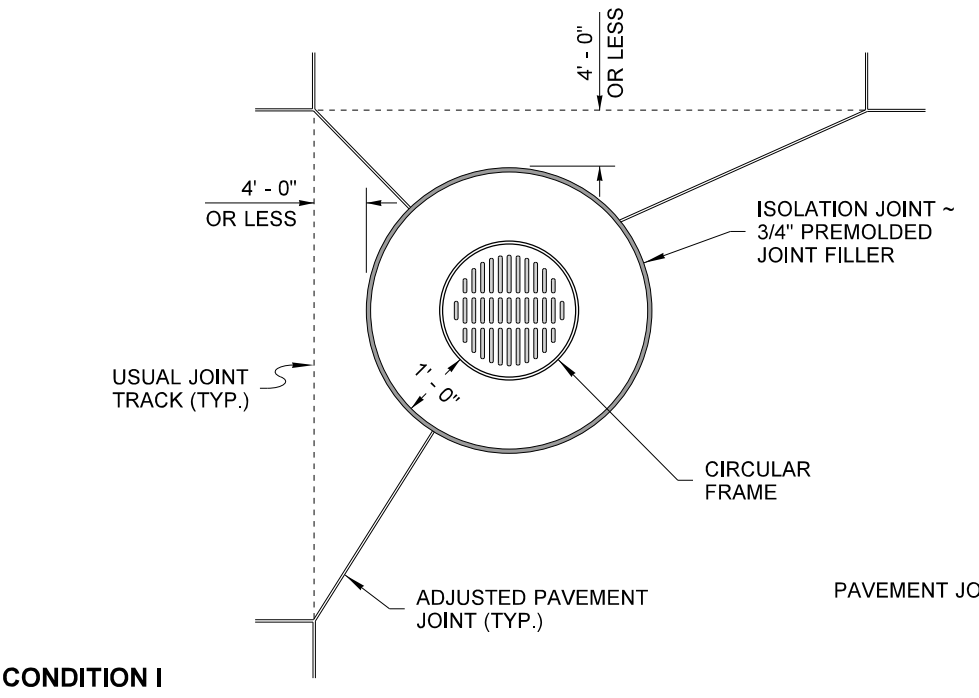
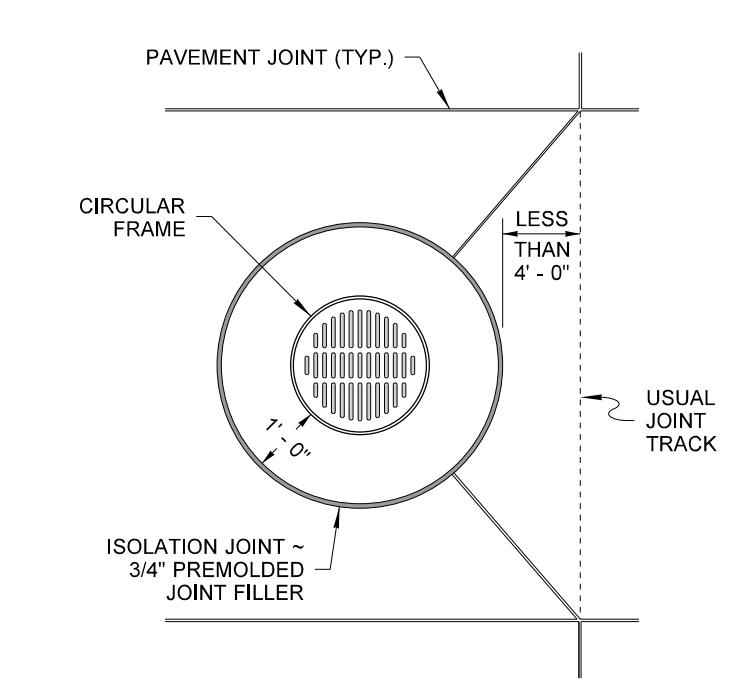
STATE DESIGN ENGINEER

Washington State Department of Transportation

DRAWN BY: FERN LIDDELL



**NOTE**  
ALL CONDITIONS ARE SHOWN IN PLAN VIEW.



NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER, MUST BE FILED WITH THE PROJECT RECORDS. THE ENGINEER'S SIGNATURE AND SEAL MUST BE OBTAINED UPON REQUEST. A COPY MAY BE OBTAINED UPON REQUEST.

**PCC PAVEMENT  
ISOLATION JOINTS  
STANDARD PLAN A-40.15-00**

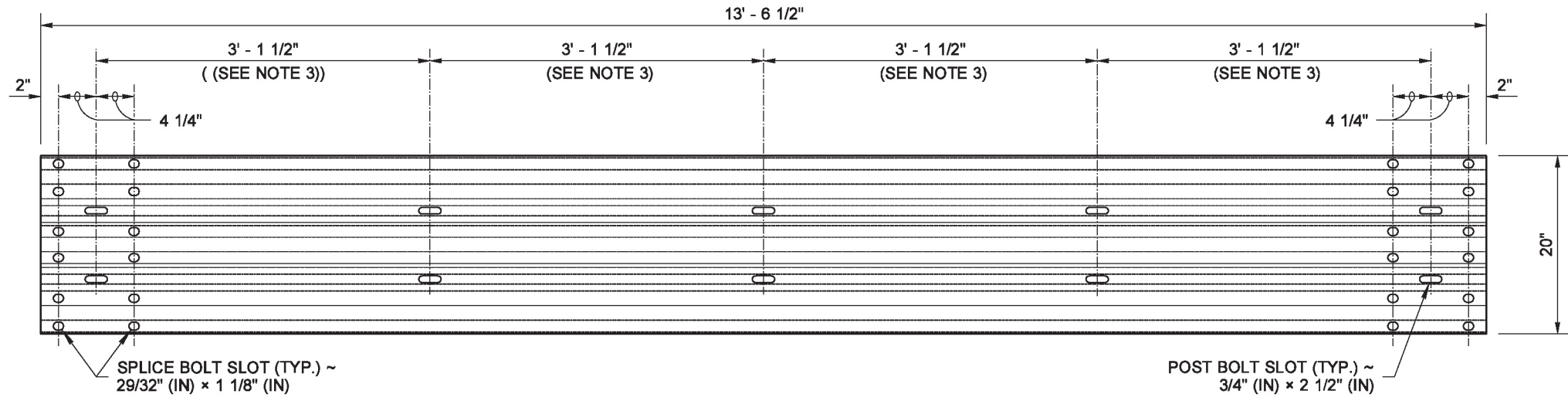
SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

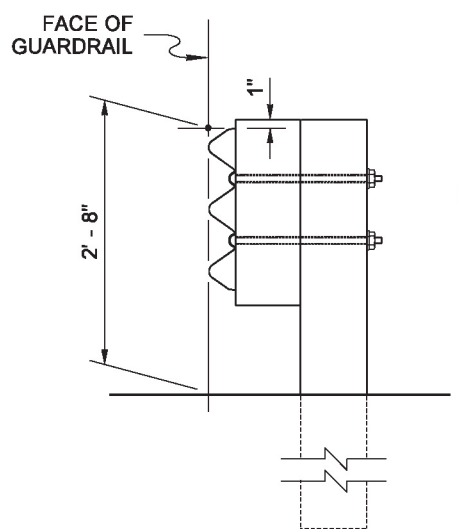
**Pasco Bakotich III** 08-11-09  
STATE DESIGN ENGINEER DATE



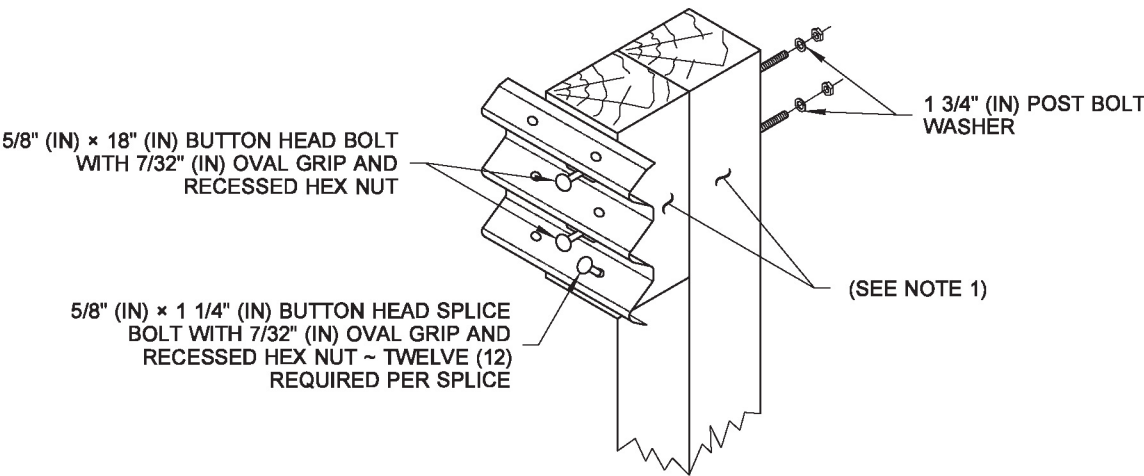
DRAWN BY: FERN LIDDELL



TYPICAL RAIL ELEMENT

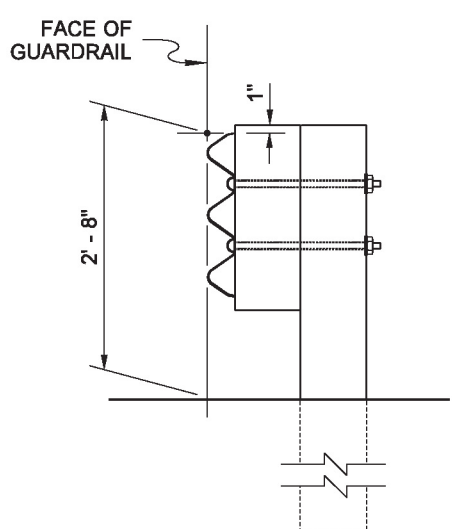


RAIL ASSEMBLY

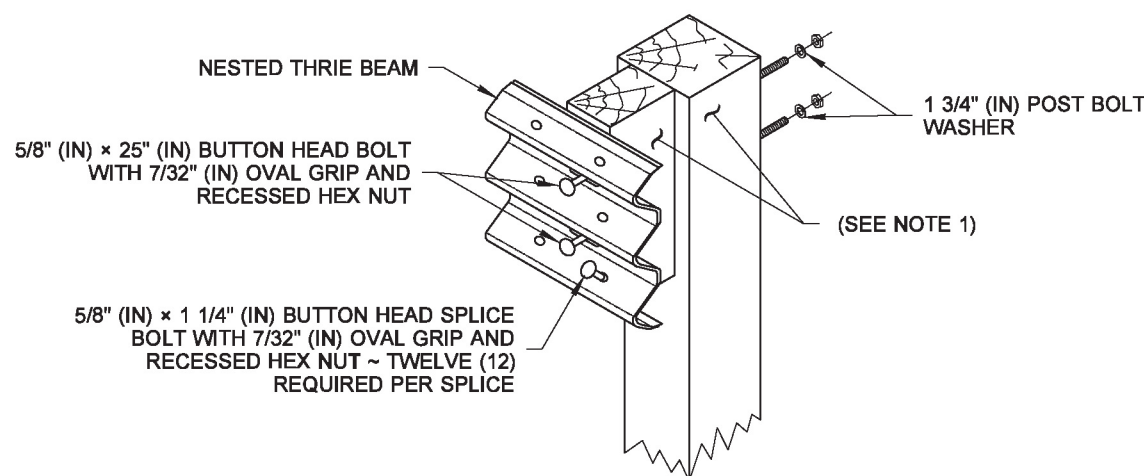


WOOD POST ASSEMBLY

TYPE 10

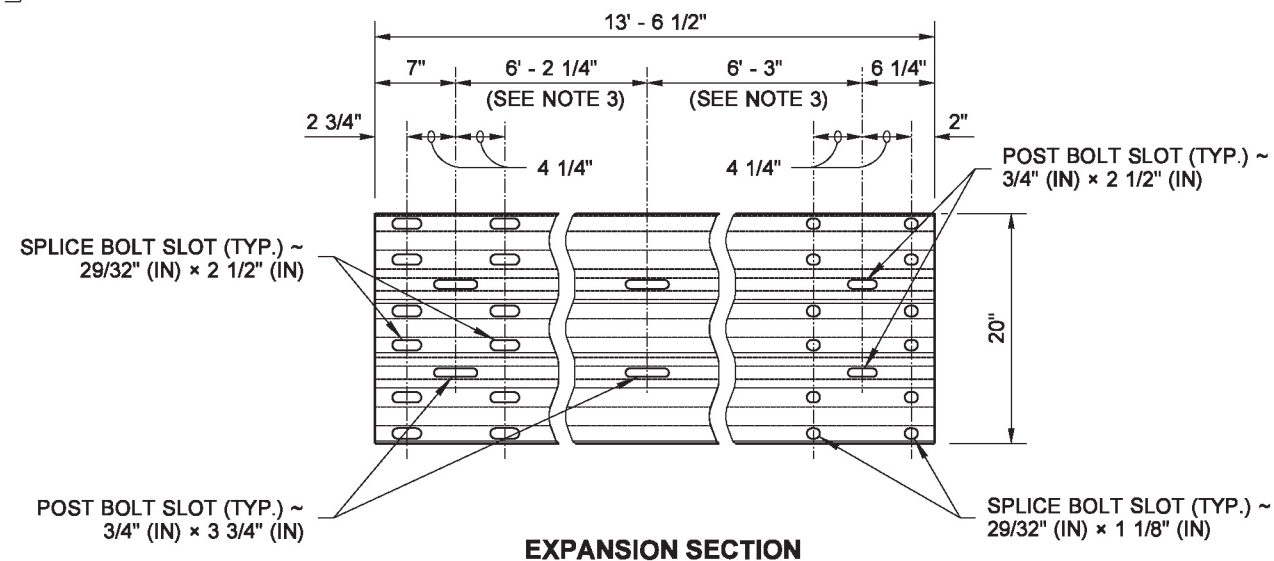


RAIL ASSEMBLY

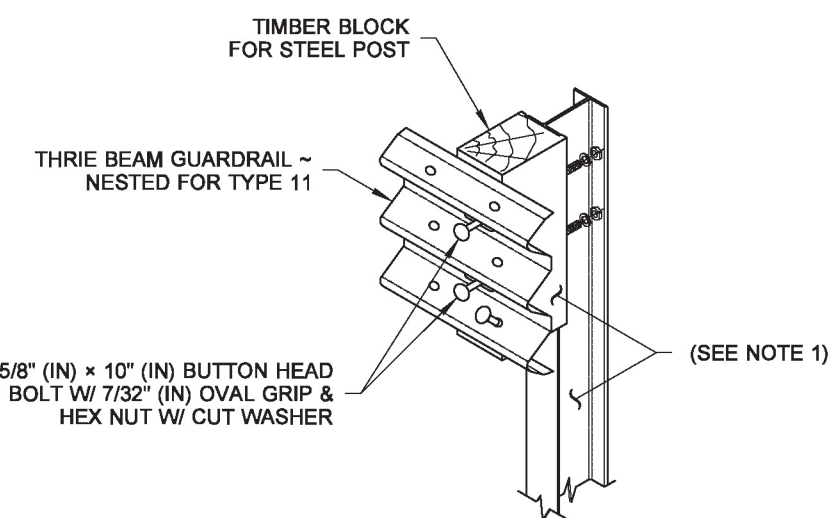


WOOD POST ASSEMBLY

TYPE 11



EXPANSION SECTION

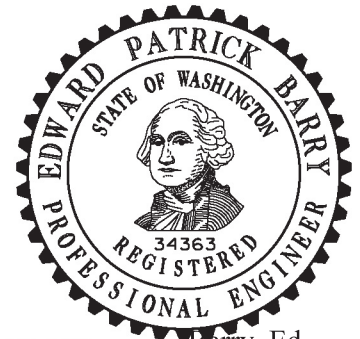


STEEL POST ASSEMBLY

TYPES 10 AND 11

NOTES

1. Type 10 post shall be 6 × 8 timber, OR either W6 × 9, or W6 × 8.5 steel. Type 11 post shall be 10 × 10 timber or W6 × 15. For additional details see **Standard Plan C-1b**.
2. Type 10 guardrail post spacing shall be 6' - 3" on center. Type 11 shall be a maximum of 3' - 1 1/2" on center.
3. Spacing may vary depending on application. See **Standard Specification Section 9-16.3(1)** for rail element requirements.



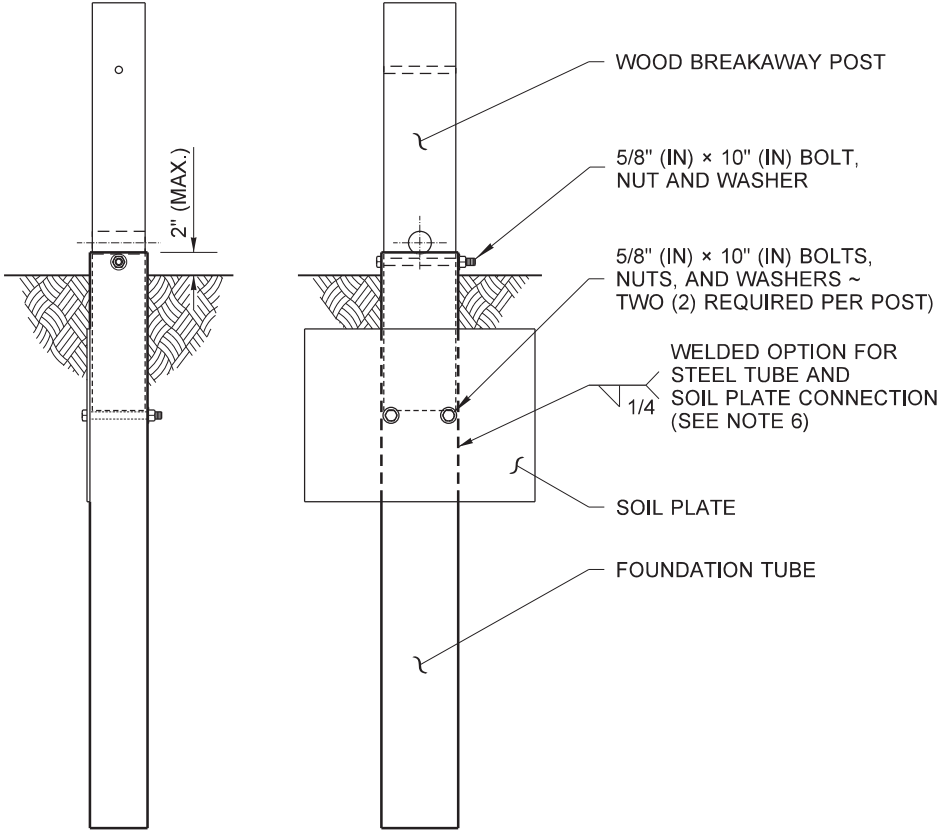
Barry, Ed  
Jul 14 2015 7:07 AM  
cosign

**BEAM GUARDRAIL  
(THRIE BEAM)**

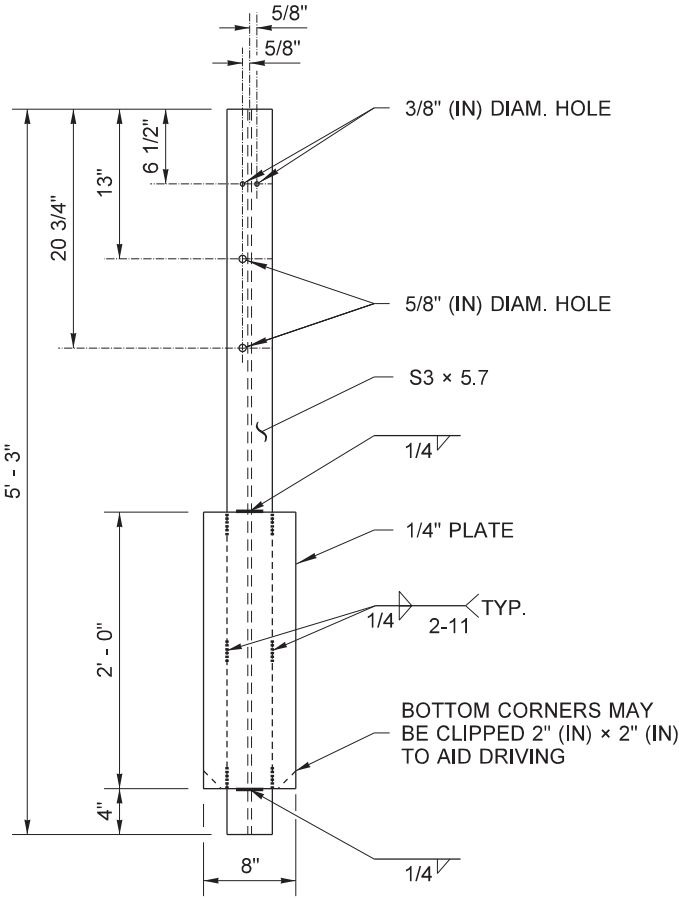
**STANDARD PLAN C-1a**

SHEET 1 OF 1 SHEET

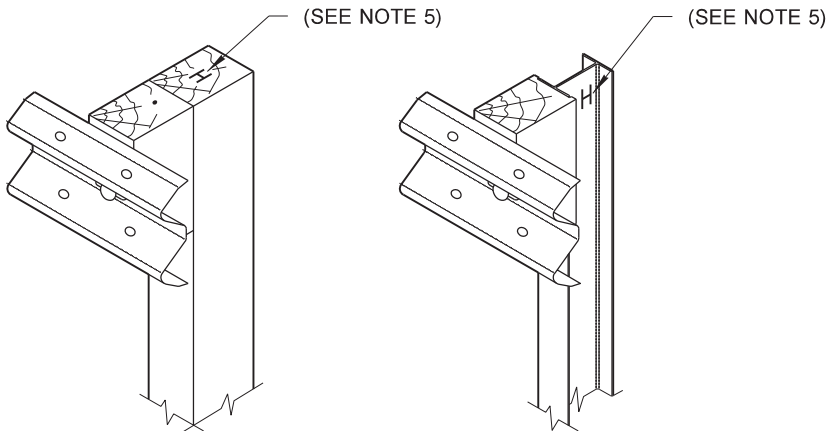
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Carpenter, Jeff  
Jul 14 2015 11:30 AM  
STATE DESIGN ENGINEER  
Washington State Department of Transportation



ANCHOR POST ASSEMBLY



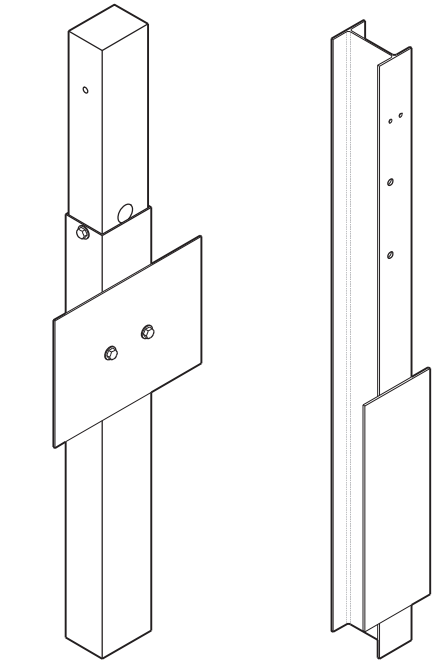
G-2 POST



TIMBER POST

STEEL POST

PARTIAL ASSEMBLY DETAIL



ANCHOR POST

G-2 POST

ISOMETRIC

NOTES

1. Wood posts for all guardrail placement plans shall be 6 × 8 except where noted otherwise.
2. Lower hole is for Rub Rail of Type 2 and Type 3 Beam Guardrail.
3. W6×8.5 or W6×9 steel posts and timber blocks are alternates for 6×8 timber posts and blocks. W6×15 steel posts and timber blocks are alternates for 10×10 timber posts and blocks.
4. Attach blockouts to steel posts using bolt holes on approaching traffic side of post web.
5. When "Beam Guardrail Type - \_\_ Ft. Long Post" is specified in the Contract, the post length shall be stamped with numbers, 1 1/2" (in) min. high and 3/4" (in) wide at the location where the letter "H" is shown in the ASSEMBLY DETAIL. For wood post applications, the letter shall be stamped to a minimum depth of 1/4" (in). For steel post applications, the letter shall be legible after the post is galvanized. After post installation, it shall be the Contractor's responsibility to ensure the stamped numbers remain visible.
6. Soil plate may be welded to foundation tube. If so, holes in soil plate and foundation tube may be omitted.



Donahue, John  
Aug 10 2019 1:28 PM

**BEAM GUARDRAIL  
POSTS AND BLOCKS**

**STANDARD PLAN C-1b**

SHEET 1 OF 2 SHEETS

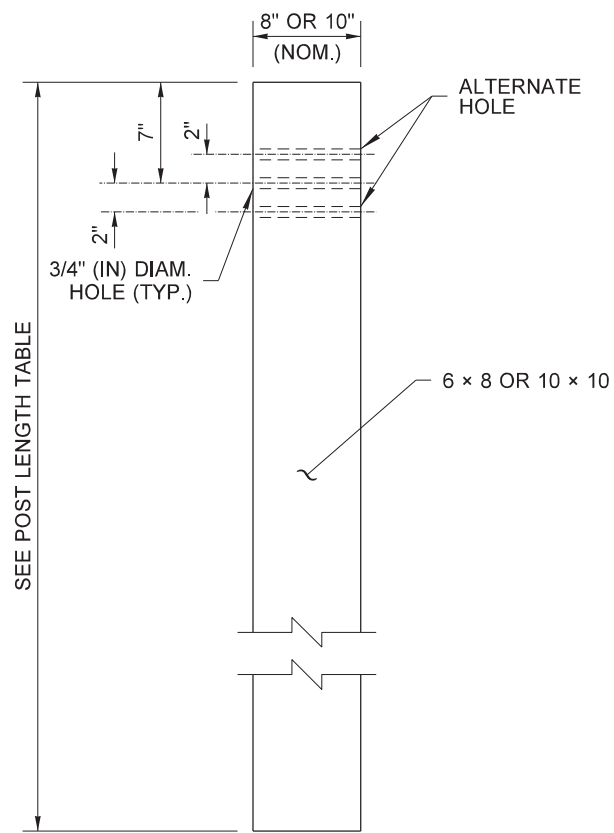
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Roark, Steve  
Aug 12 2019 9:54 AM

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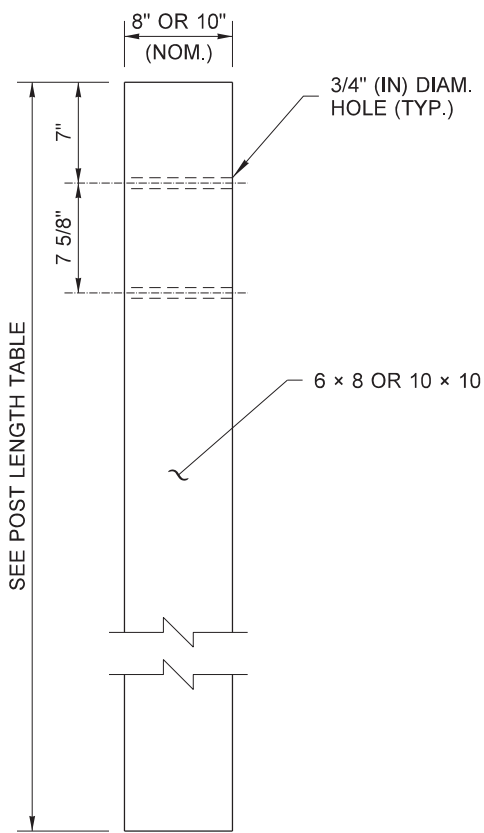
Washington State Department of Transportation

DRAWN BY: FERN LIDDELL



W-BEAM

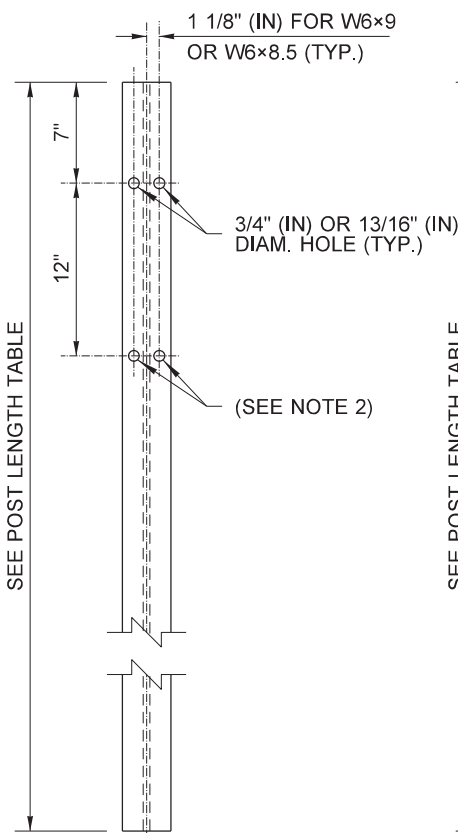
WOOD POST



THRIE BEAM

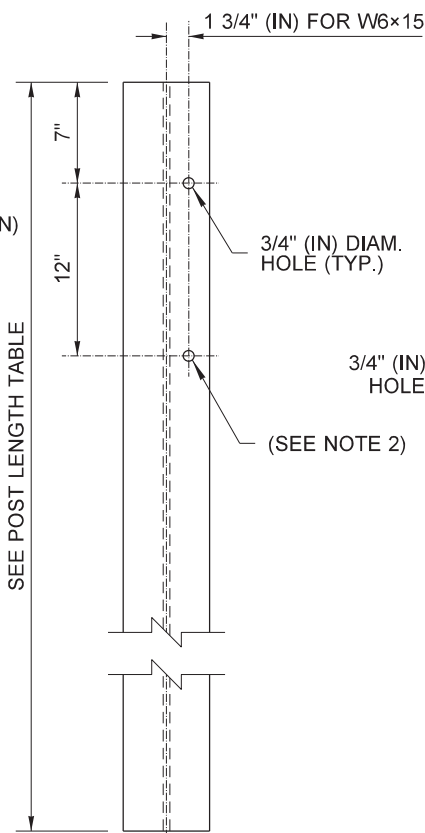
POST LENGTH TABLE	
GUARDRAIL TYPE	LENGTH
1 through 4 & 31	6' - 0" *
10 or 11	6' - 6"

\* SEE CONTRACT FOR "BEAM GUARDRAIL TYPE - \_\_ FT. LONG POST" LENGTHS. (SEE NOTE 5)

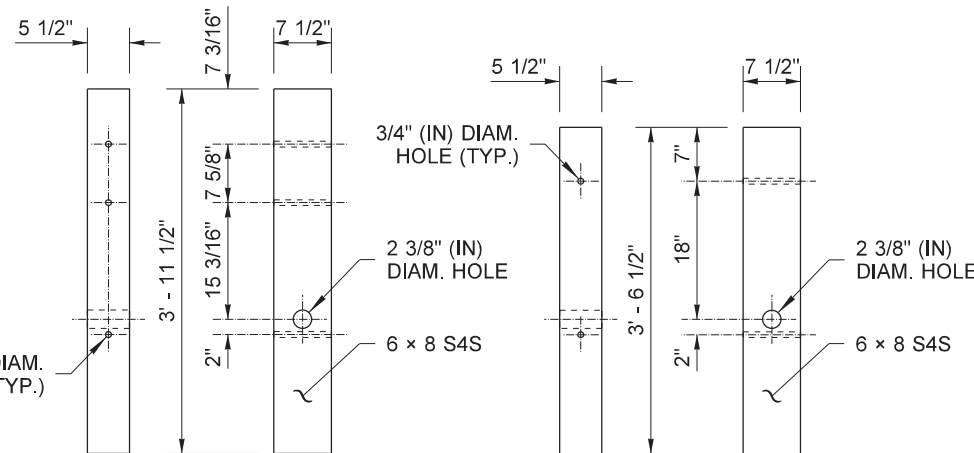


W-BEAM

STEEL POST  
(SEE NOTES 3 AND 4)



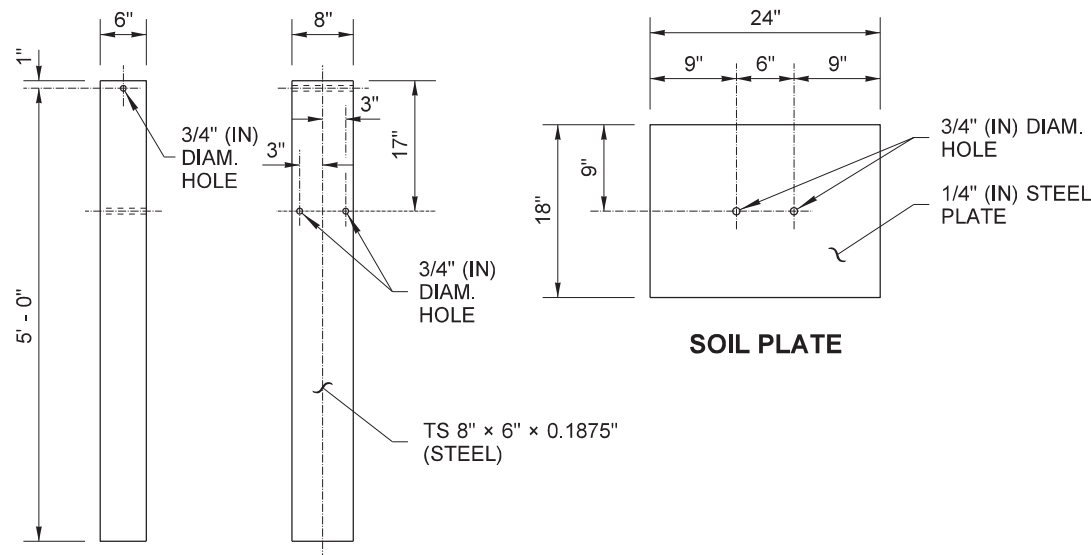
THRIE BEAM



THRIE BEAM

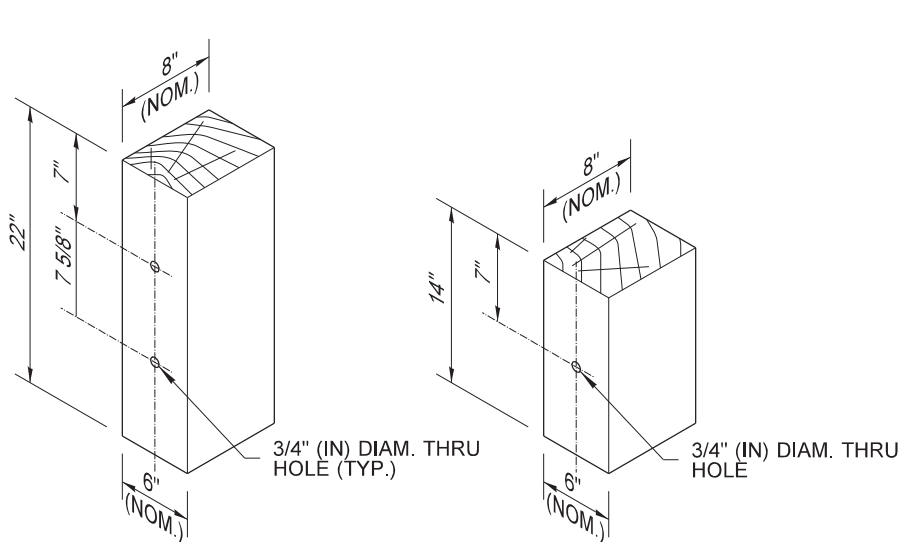
W-BEAM

WOOD BREAKAWAY POST

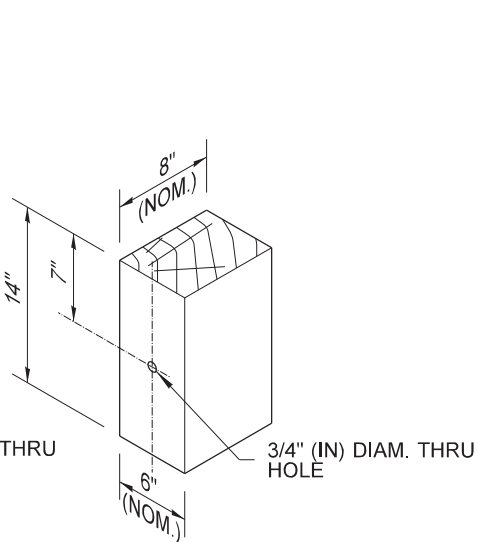


FOUNDATION TUBE

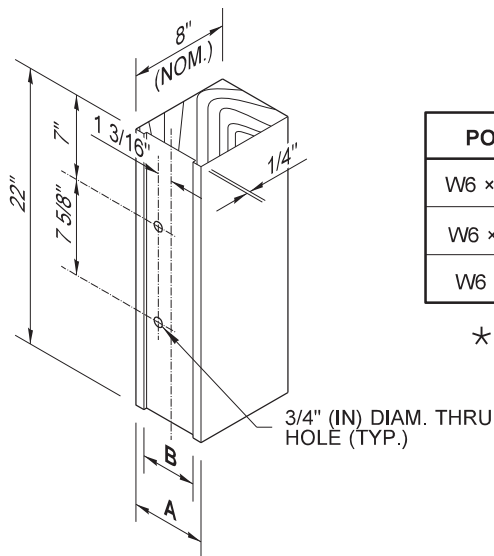
SOIL PLATE



THRIE BEAM WOOD BLOCK  
FOR WOOD POST



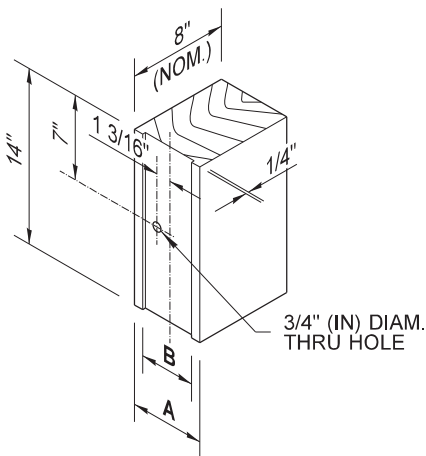
W-BEAM WOOD BLOCK  
FOR WOOD POST



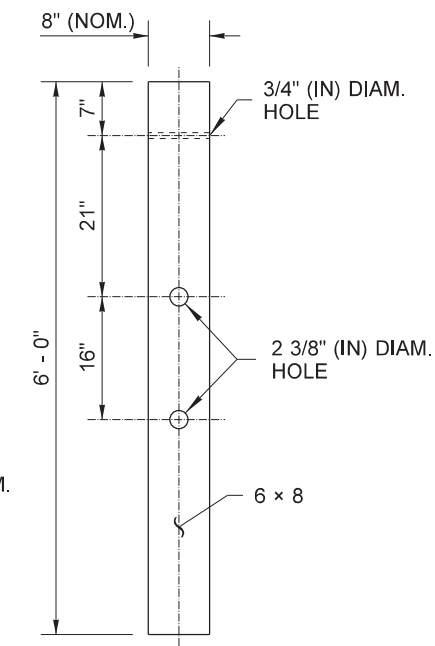
THRIE BEAM WOOD BLOCK  
FOR STEEL POST

POST	A	B
W6 x 8.5	8" ✕ ✕	6 1/4"
W6 x 15	8" ✕ ✕	6 1/4"
W6 x 9	6" ✕ ✕	4 1/4"

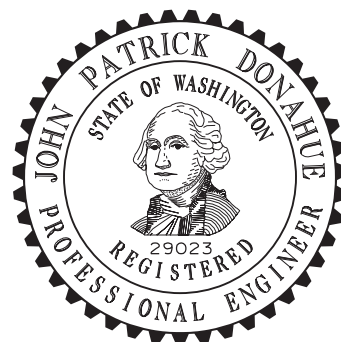
✕ ✕ NOMINAL (NOM.)



W-BEAM WOOD BLOCK  
FOR STEEL POST



CONTROLLED RELEASING  
TERMINAL (CRT) POST



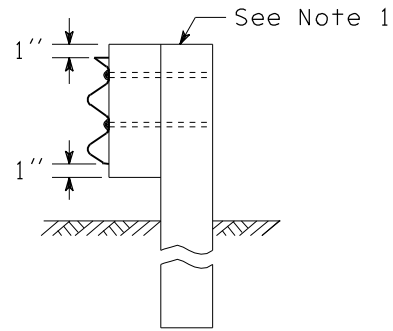
Donahue, John  
Aug 10 2019 1:28 PM  
cosign

## BEAM GUARDRAIL POSTS AND BLOCKS

### STANDARD PLAN C-1b

SHEET 2 OF 2 SHEETS

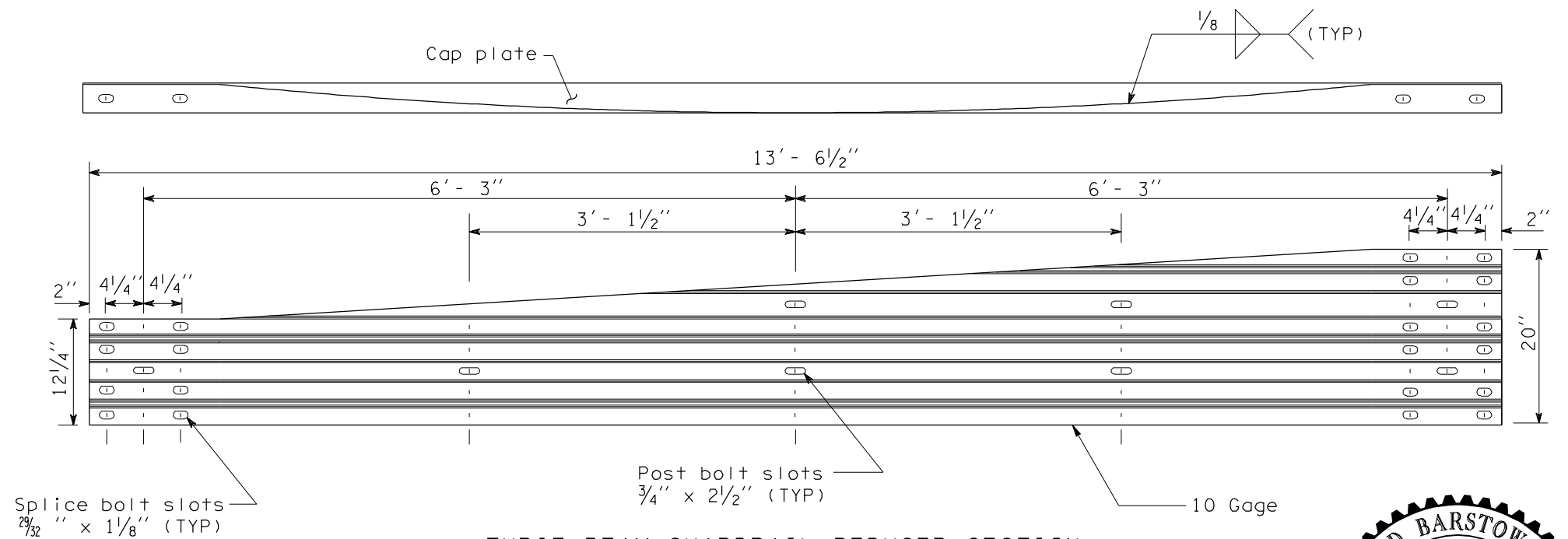




INTERMEDIATE GUARDRAIL  
POST CONNECTION DETAILS  
(Type A shown)

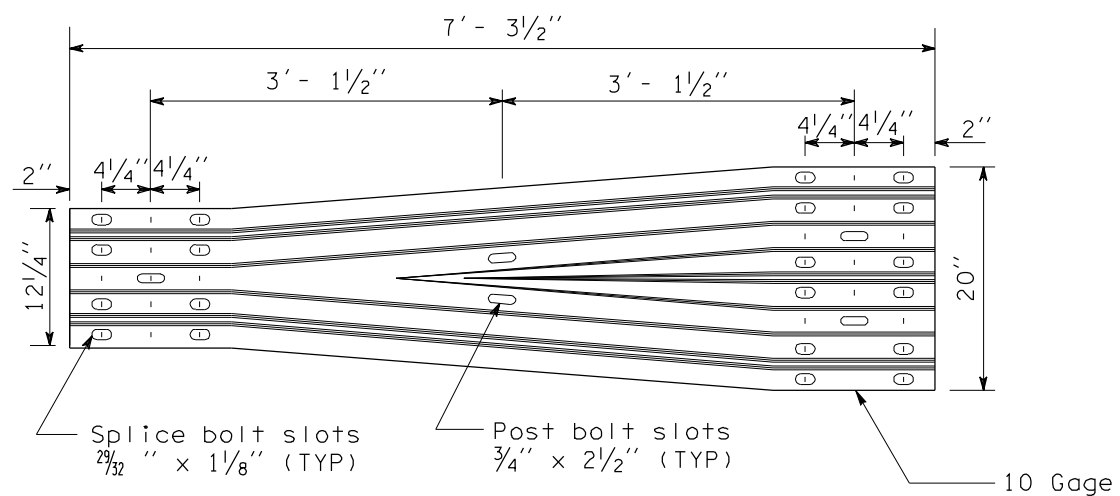
NOTES

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



EXPIRES JULY 24, 2004

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**THRIE BEAM GUARDRAIL  
REDUCER SECTION**

**STANDARD PLAN C-1d**

SHEET 1 OF 1 SHEET

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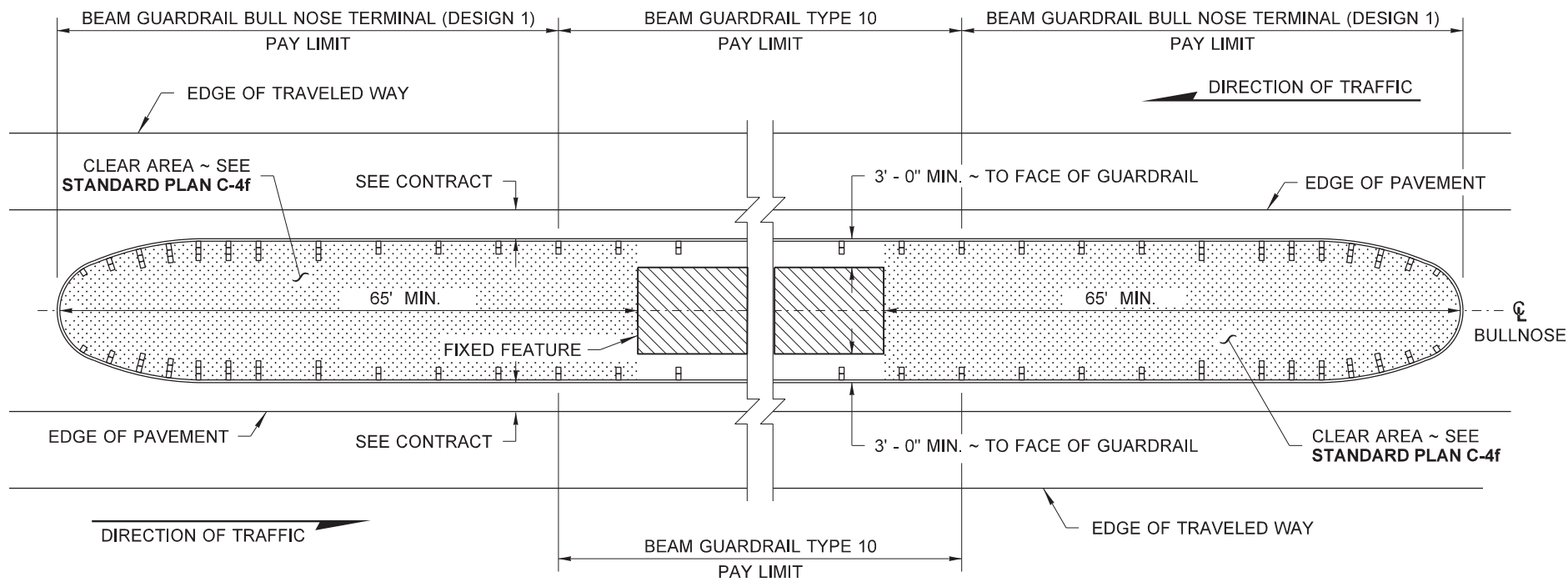
**Harold J. Peterfeso** **10-31-03**  
STATE DESIGN ENGINEER DATE



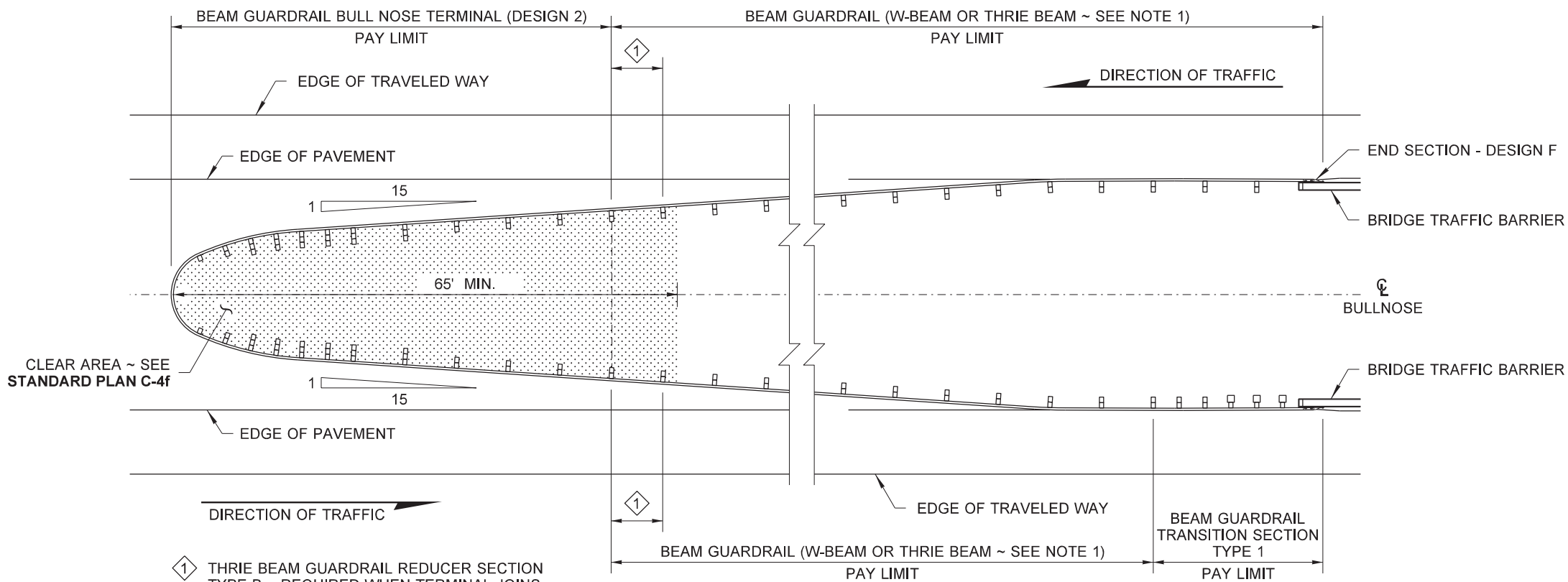
Washington State Department of Transportation

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

DRAWN BY: BILL BERENS



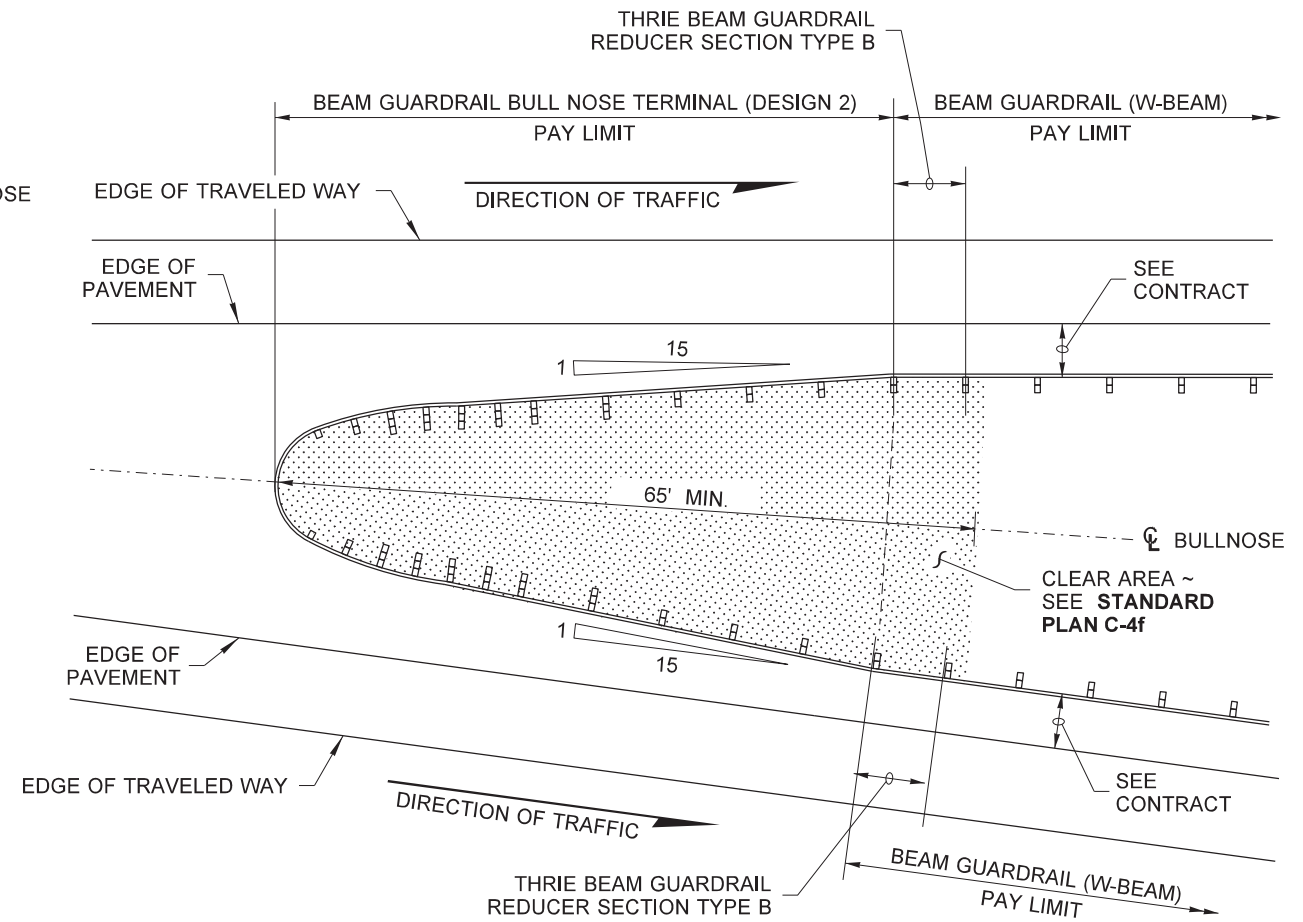
CASE 9A



CASE 9C

NOTE

- 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



Donahue, John  
Aug 10 2019 1:35 PM

**GUARDRAIL PLACEMENT  
MEDIAN BULL NOSE**

**STANDARD PLAN C-2c**

SHEET 1 OF 1 SHEET

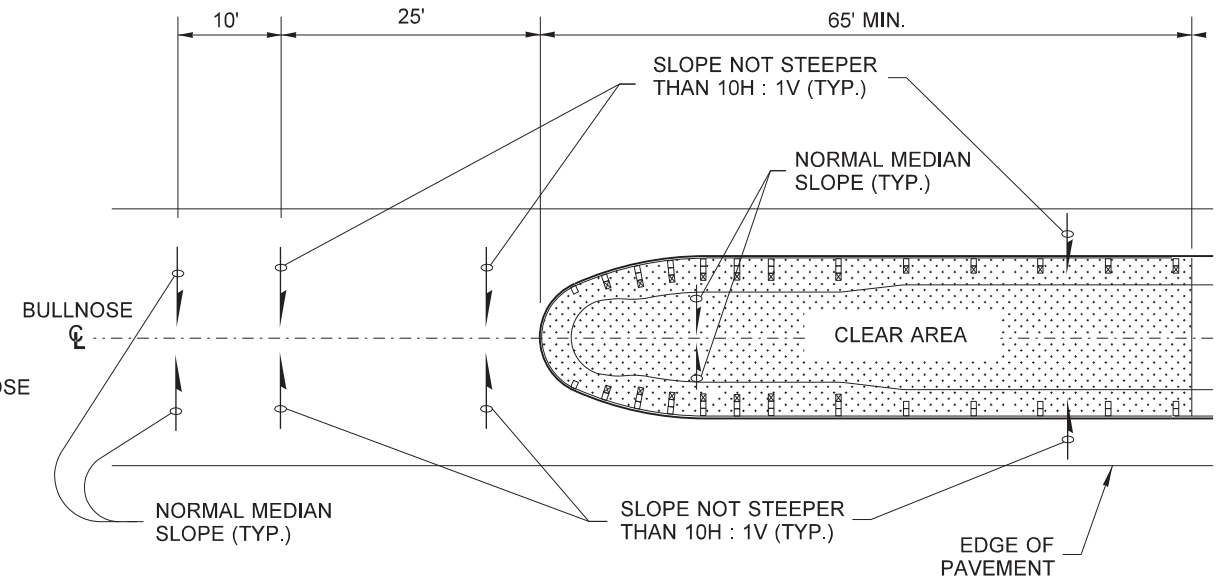
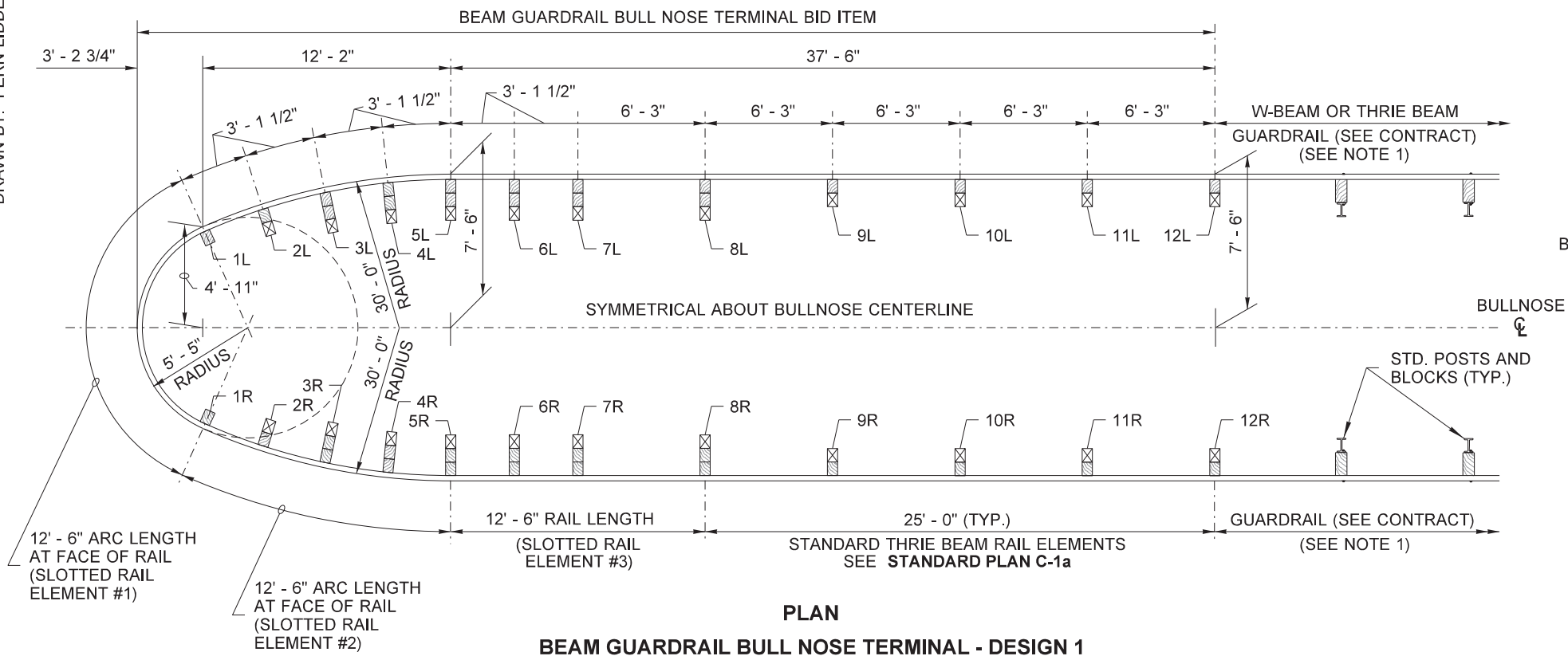
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Aug 12 2019 9:55 AM

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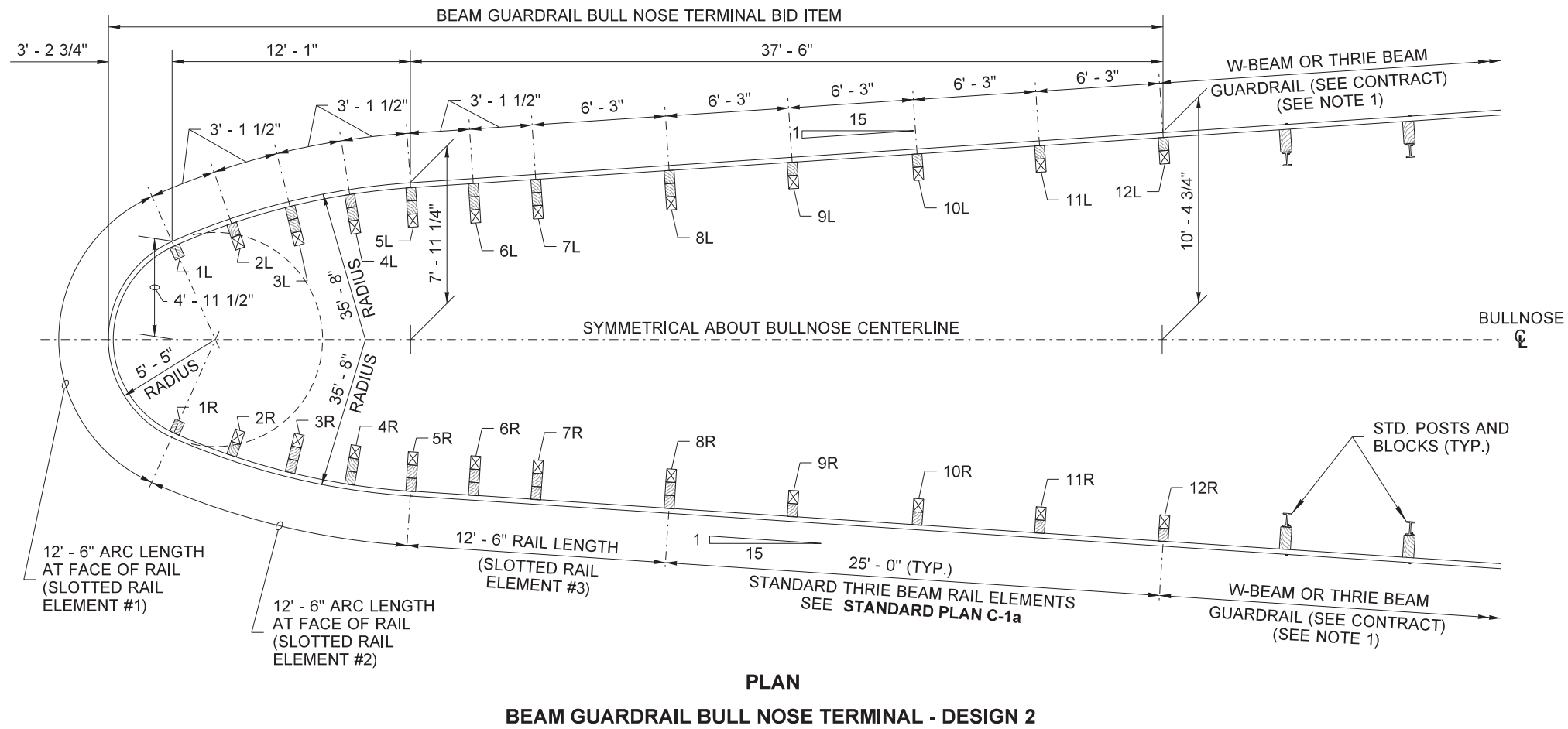
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BULL NOSE GRADING PLAN

NOTE

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



Donahue, John  
Aug 10 2019 1:41 PM

BEAM GUARDRAIL  
BULL NOSE TERMINAL

STANDARD PLAN C-4f

SHEET 1 OF 4 SHEETS

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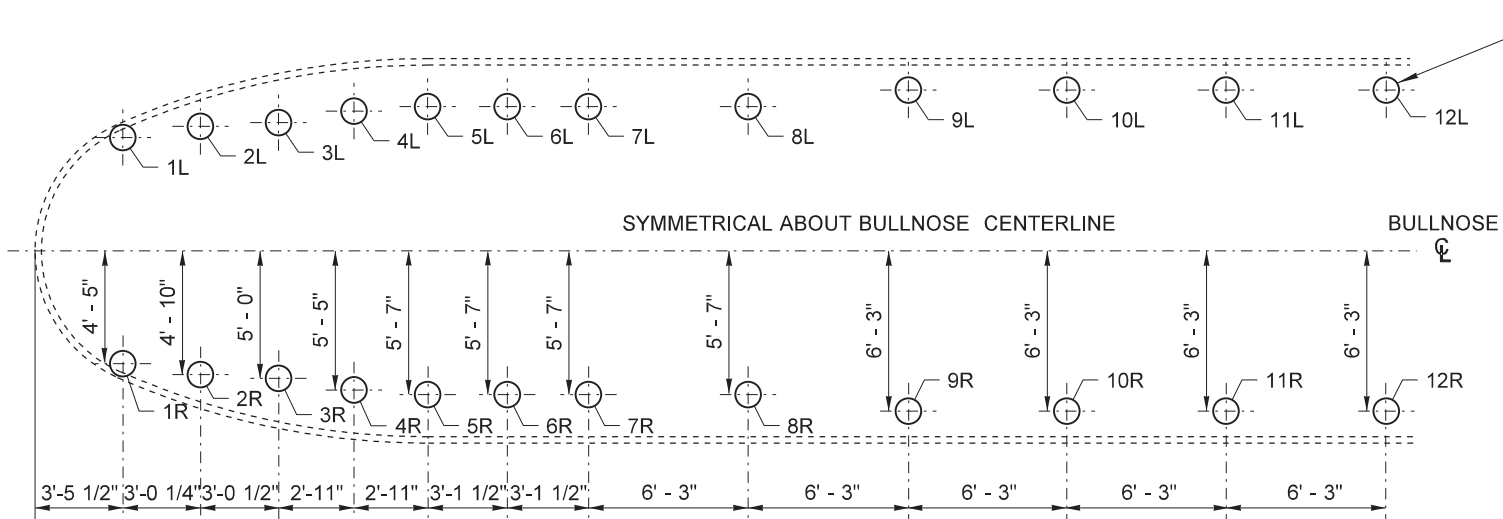
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Aug 12 2019 9:56 AM

STATE DESIGN ENGINEER

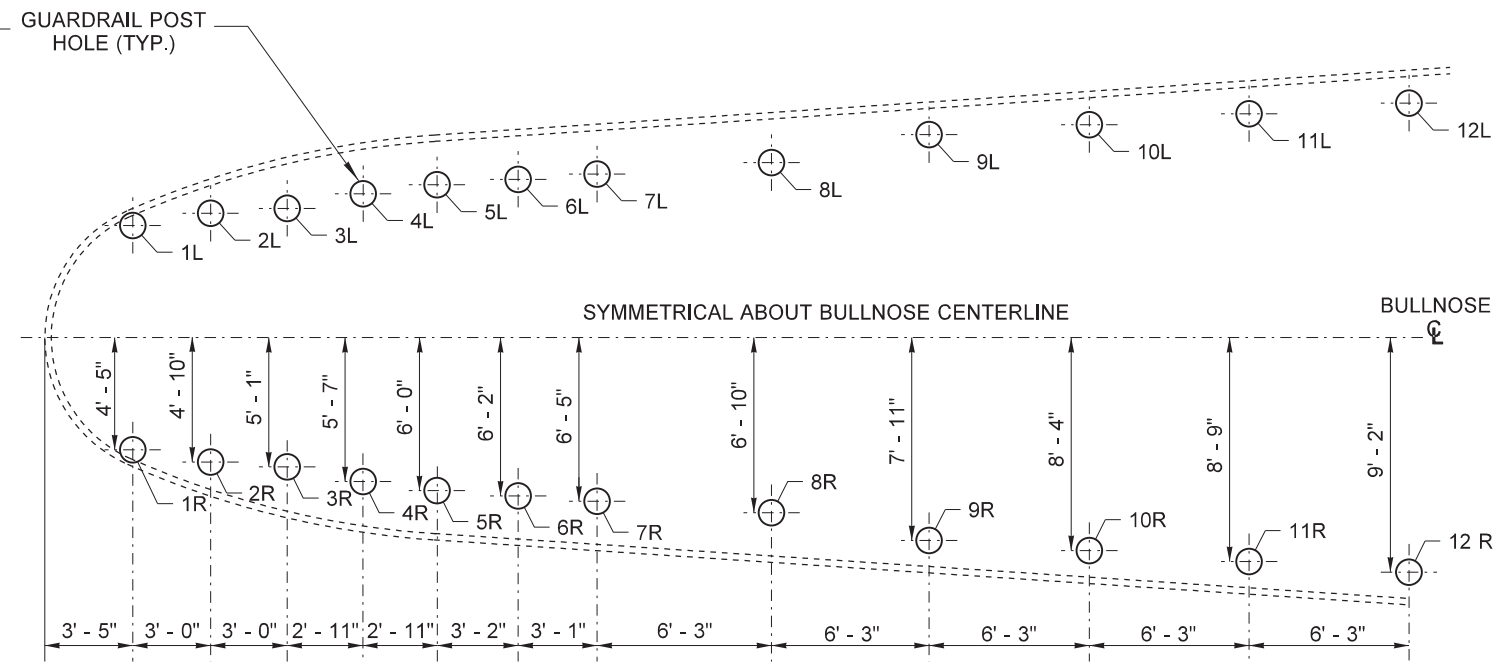


Washington State Department of Transportation

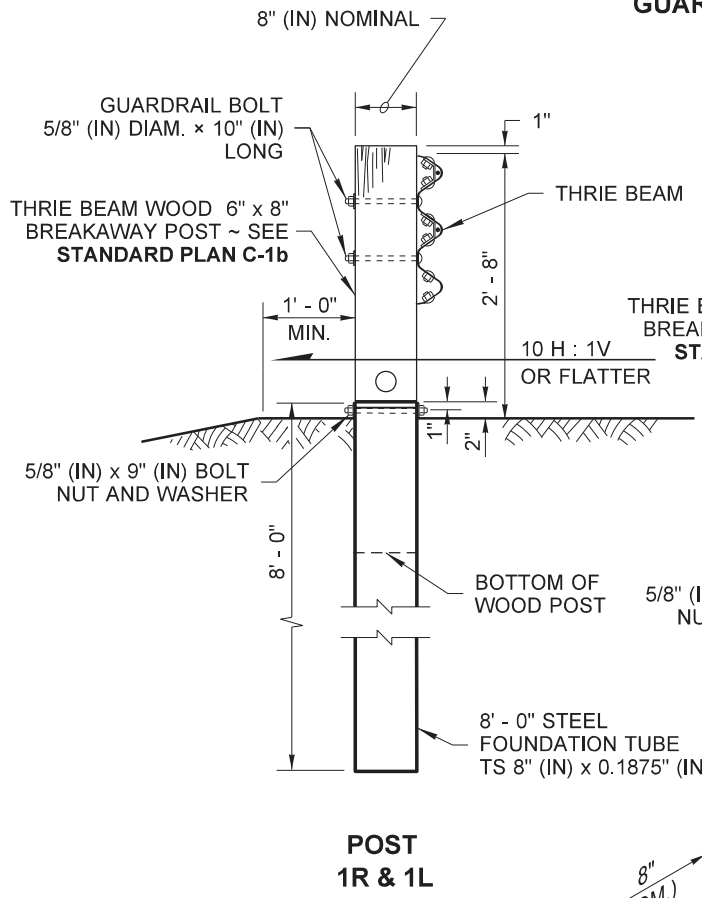
DRAWN BY: FERN LIDDELL



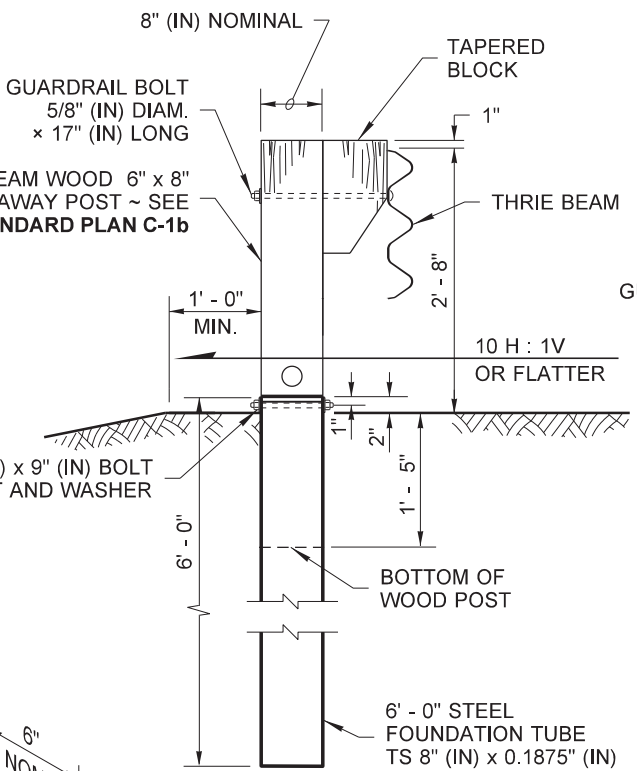
PLAN  
GUARDRAIL POST LAYOUT - DESIGN 1



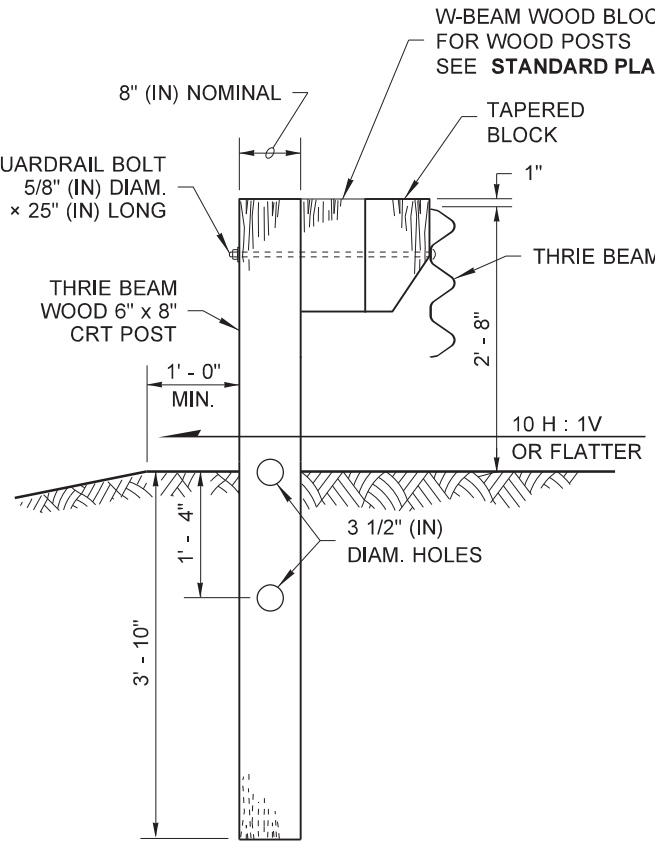
PLAN  
GUARDRAIL POST LAYOUT - DESIGN 2



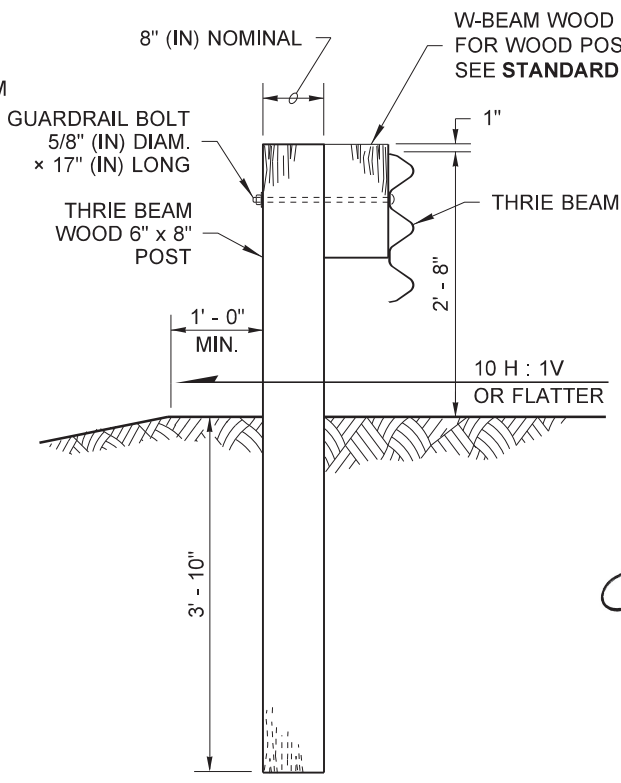
POST  
1R & 1L



POST  
2R & 2L

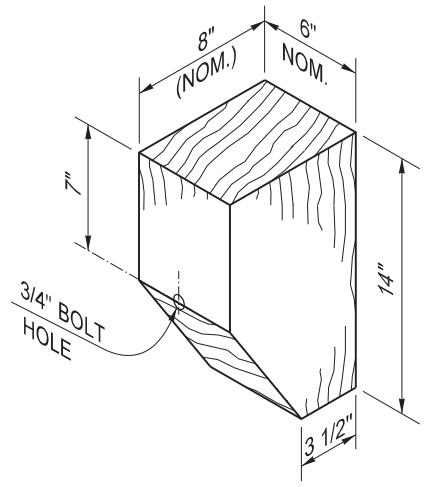


POST  
3R TO 8R  
3L TO 8L



POST  
9R TO 12R  
9L TO 12L

NOTE :  
CABLE BEARING PLATE  
NOT SHOWN



TAPERED BLOCK

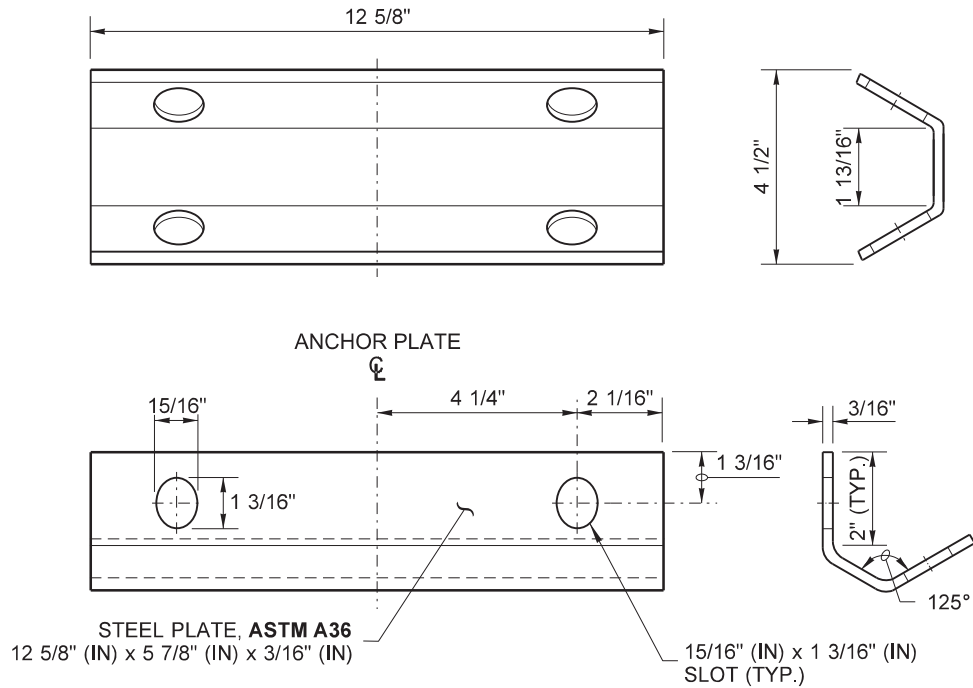


Donahue, John  
Aug 10 2019 1:41 PM

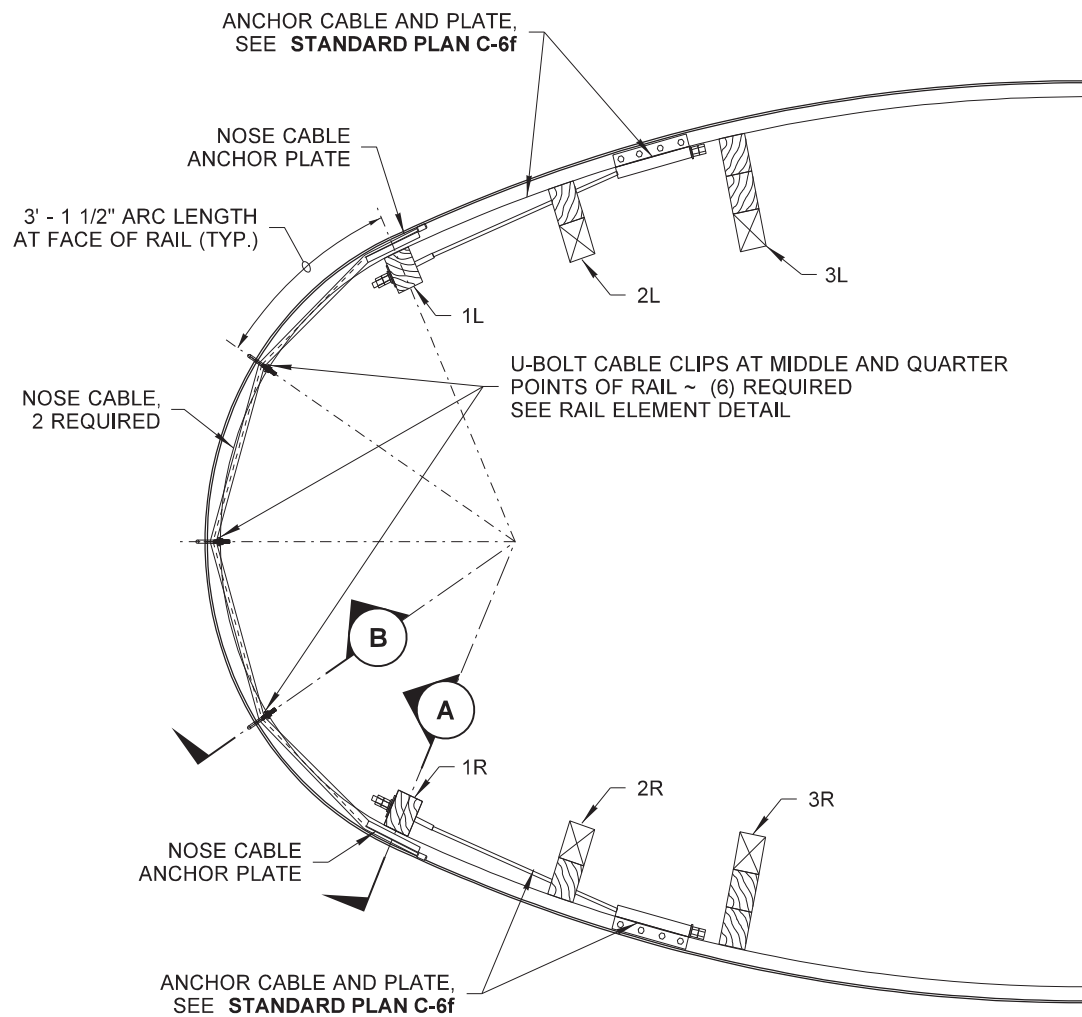
**BEAM GUARDRAIL  
BULL NOSE TERMINAL  
STANDARD PLAN C-4f**

SHEET 2 OF 4 SHEETS

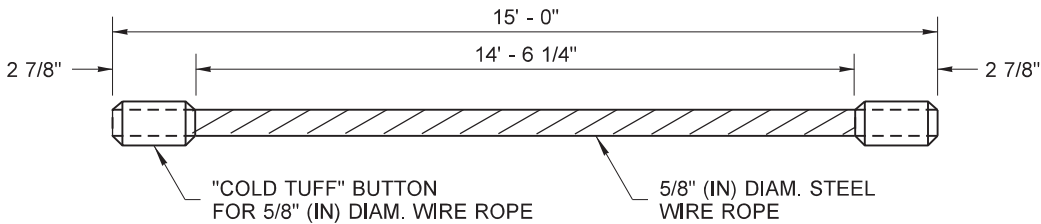
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Roark, Steve  
Aug 12 2019 9:56 AM  
STATE DESIGN ENGINEER  
Washington State Department of Transportation



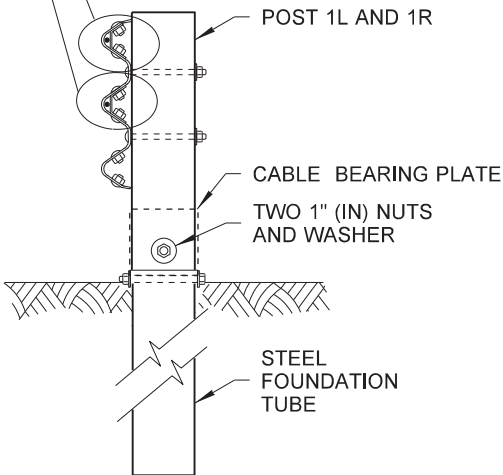
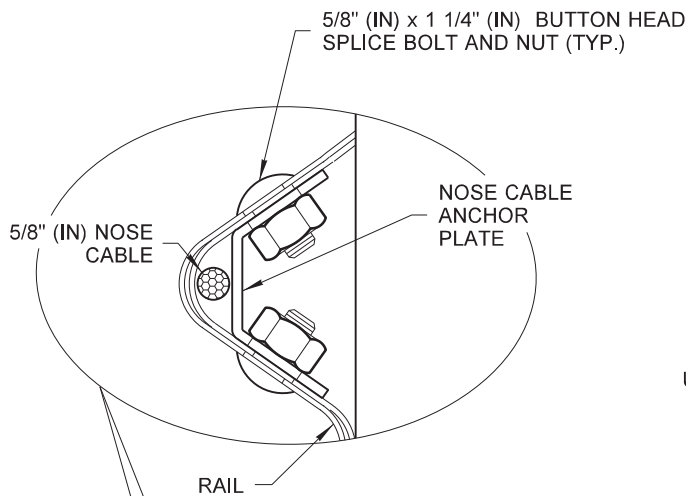
**NOSE CABLE ANCHOR PLATE**



**PLAN - THRIE BEAM NOSE**

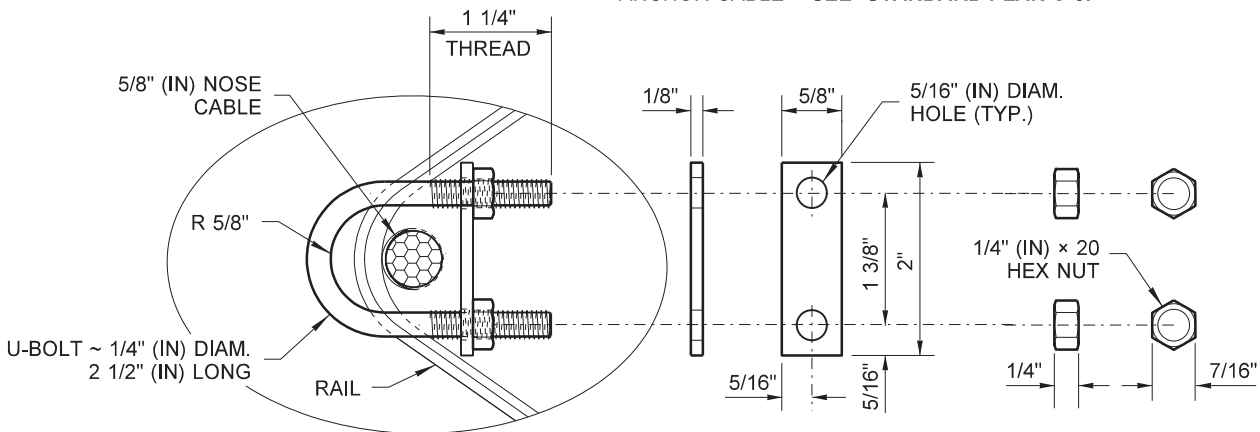


**NOSE CABLE**



**NOSE CABLE ASSEMBLY**

SECTION **A**

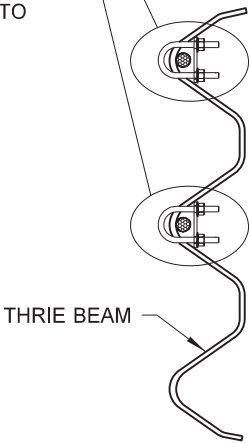


THE U-BOLT SHALL BE MADE FROM **ASTM A307** STEEL AND GALVANIZED ACCORDING TO **STANDARD SPECIFICATION, SECTION 9-16.3(3)**.

THE NUT SHALL BE **ASTM A307** STEEL, AND GALVANIZED ACCORDING TO **STANDARD SPECIFICATION, SECTION 9-16.3(3)**.

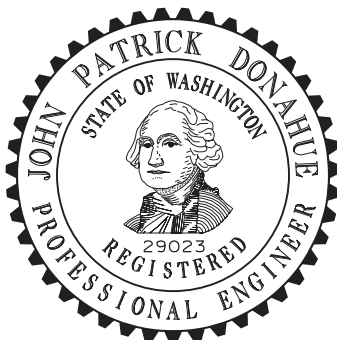
**U-BOLT PLATE WASHER**

THE U-BOLT PLATE WASHER SHALL BE MADE FROM **ASTM A36 OR A36M** PLATE STEEL, AND GALVANIZED ACCORDING TO **STANDARD SPECIFICATION SECTION 9-16.3(3)**.



**U-BOLT CABLE CLIP ASSEMBLY**

SECTION **B**



Donahue, John  
Aug 10 2019 1:42 PM  
cosign

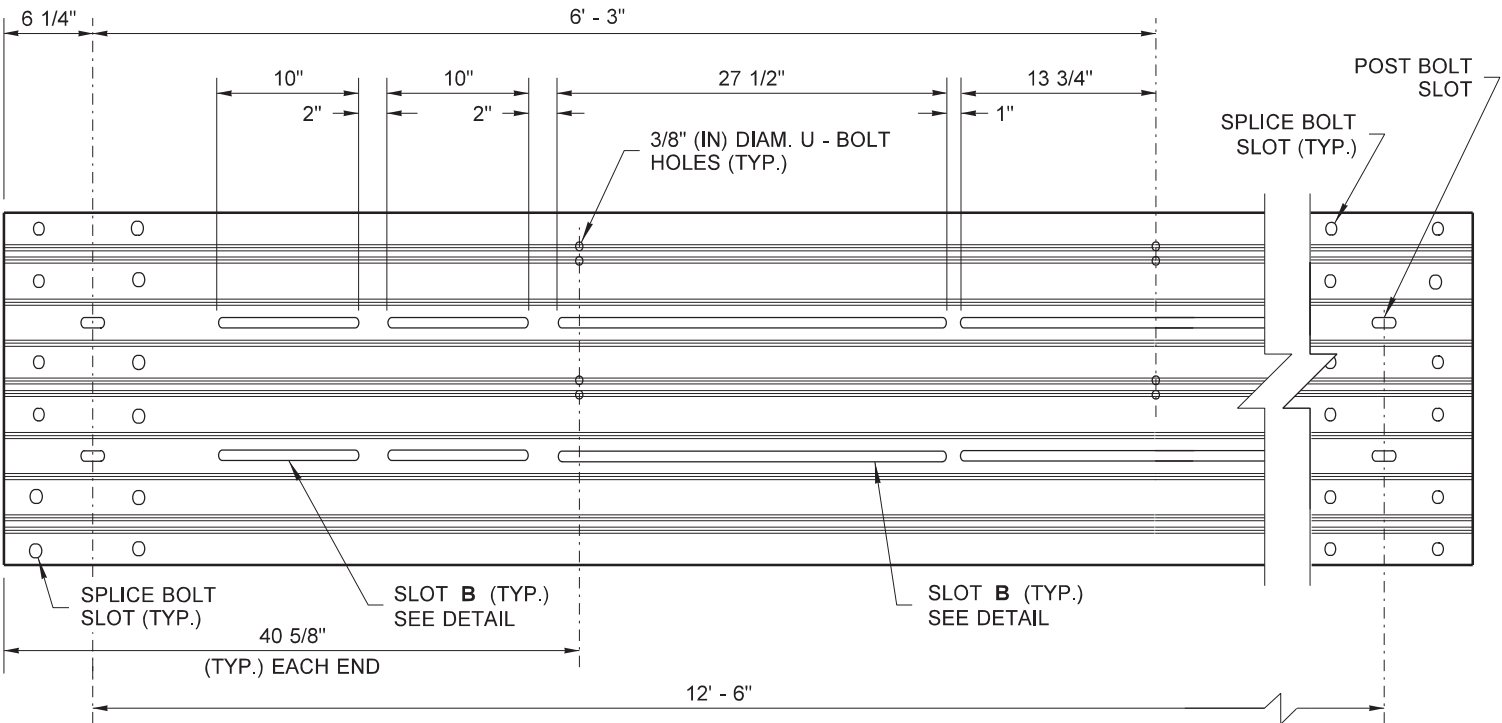
**BEAM GUARDRAIL  
BULL NOSE TERMINAL**

**STANDARD PLAN C-4f**

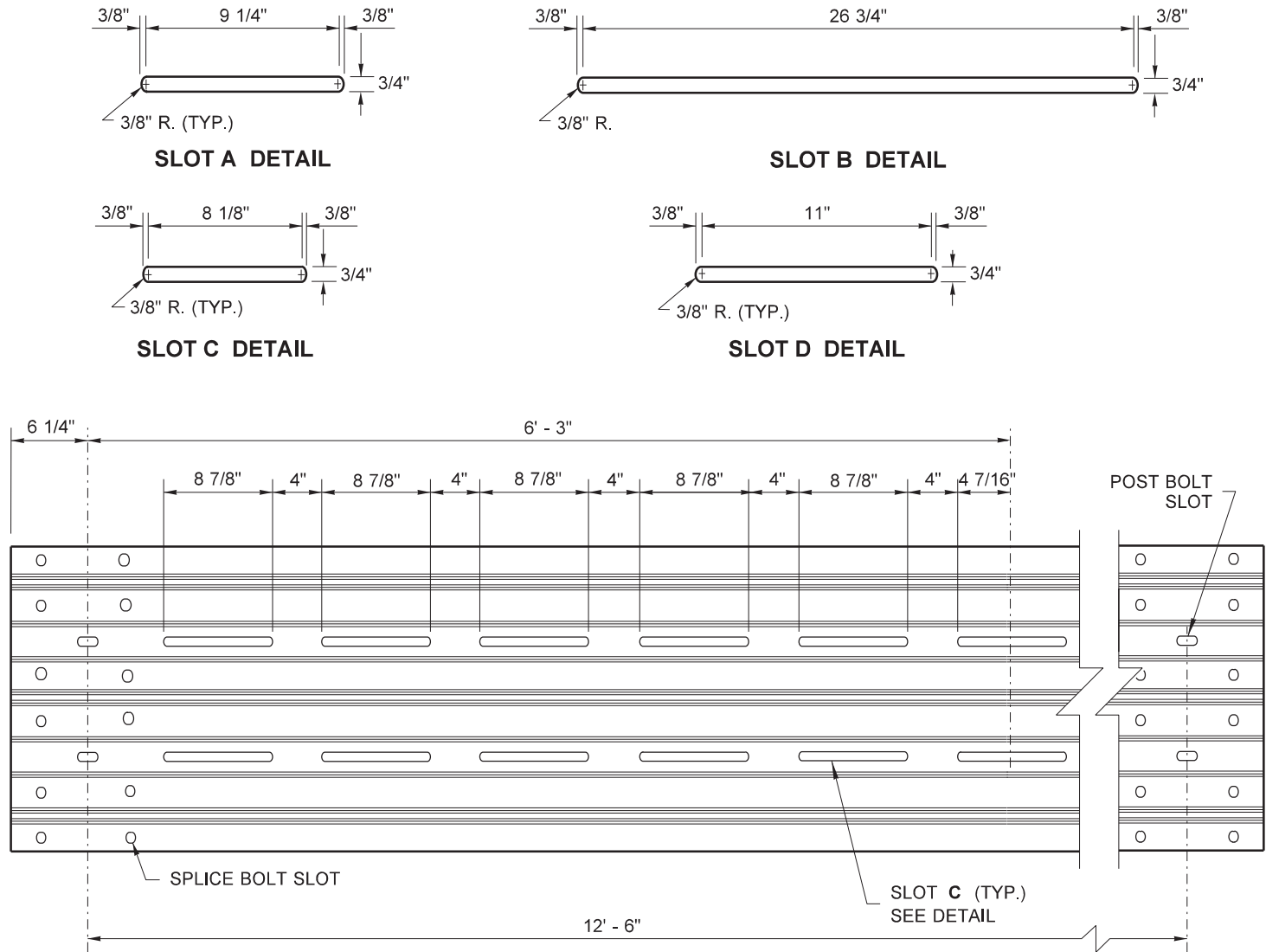
SHEET 3 OF 4 SHEETS



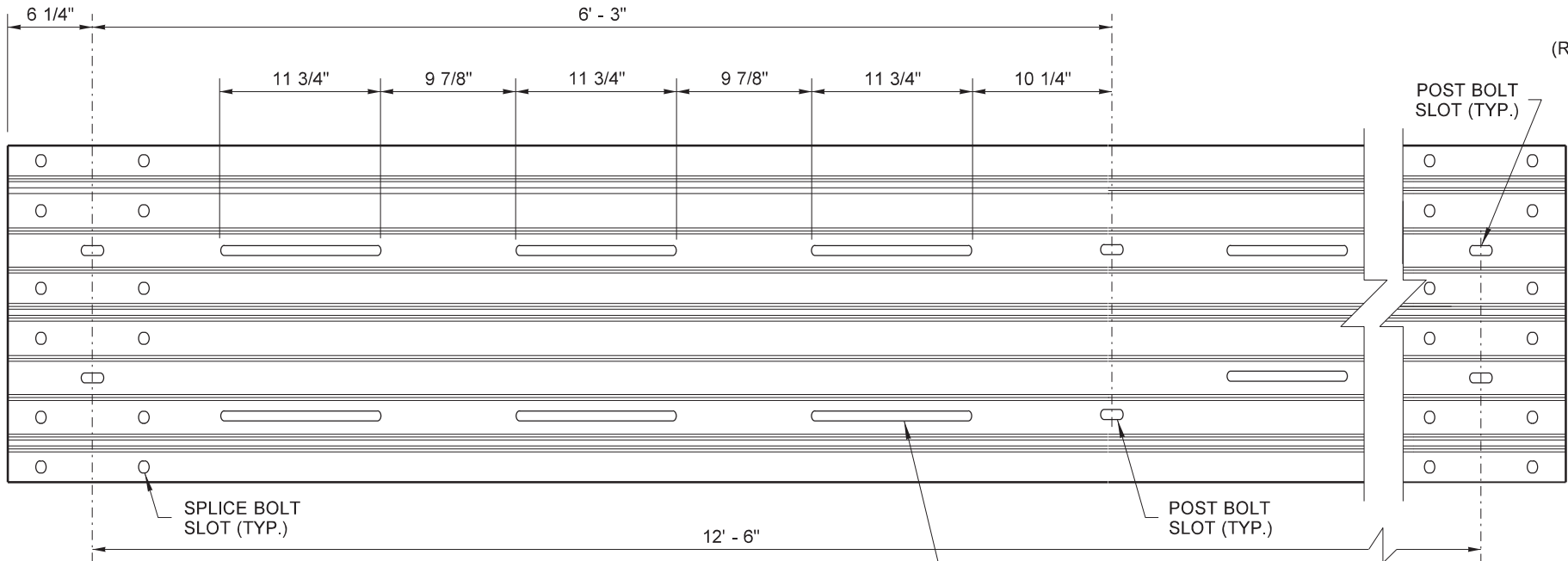
DRAWN BY: FERN LIDDELL



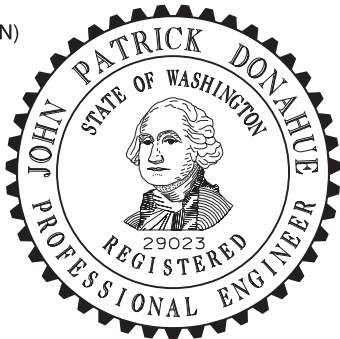
**SLOTTED THRIE BEAM RAIL ELEMENT #1**  
SEE STANDARD PLAN C-1a FOR RAIL ELEMENT DETAILS  
(RAIL DIMENSIONS SHOWN ARE BEFORE BENDING TO RADIUS SHOWN IN PLAN)



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



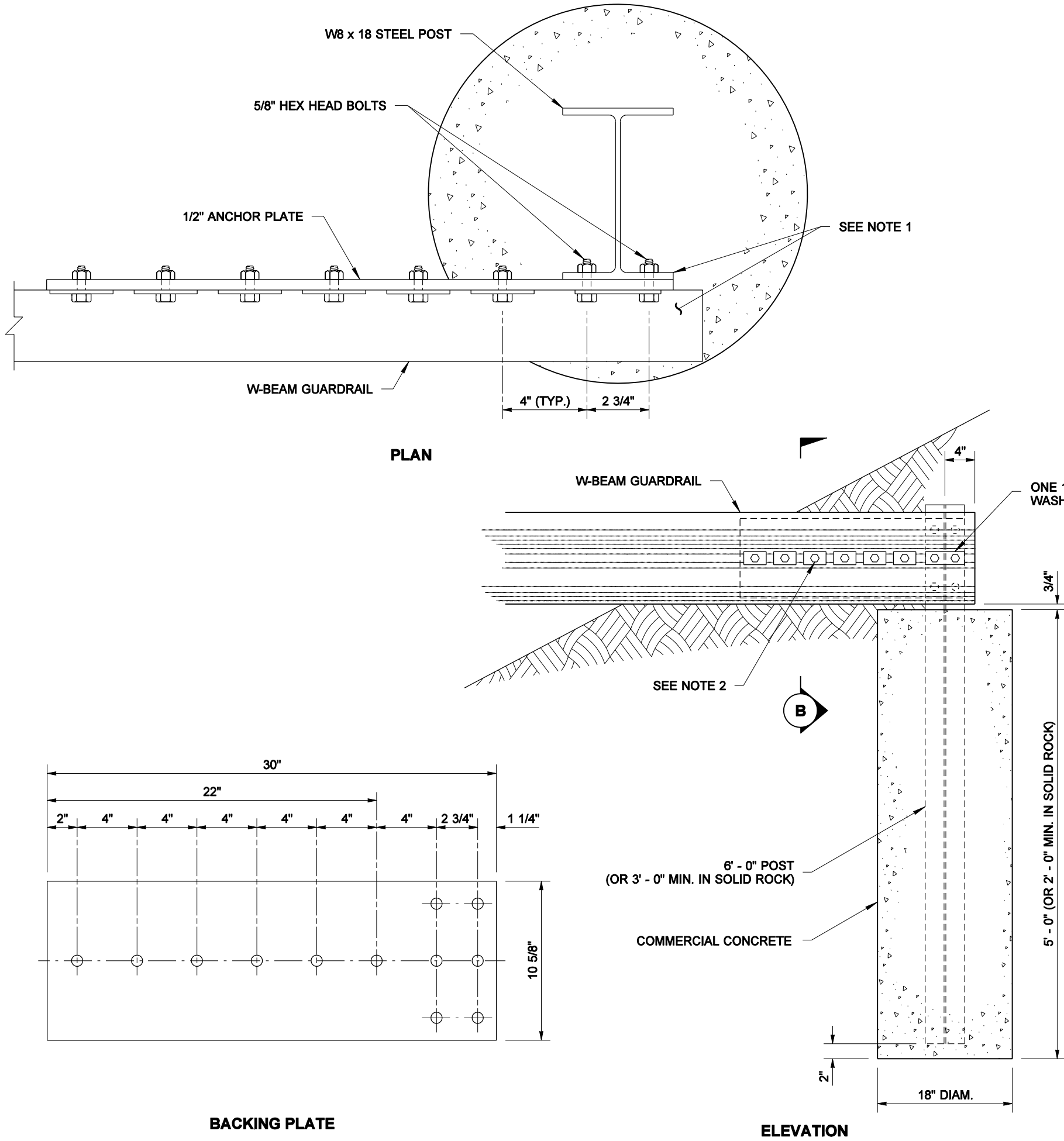
**SLOTTED THRIE BEAM RAIL ELEMENT #3**  
SEE STANDARD PLAN C-1a FOR RAIL ELEMENT DETAILS



Donahue, John  
Aug 10 2019 1:42 PM  
**BEAM GUARDRAIL  
BULL NOSE TERMINAL  
STANDARD PLAN C-4f**

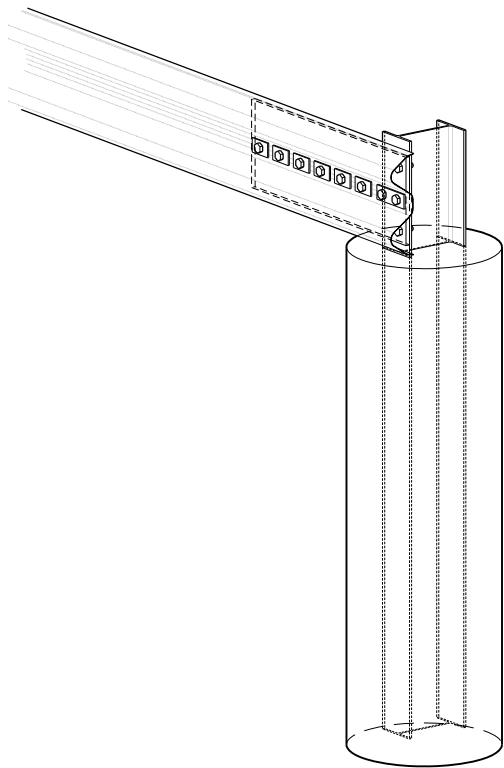
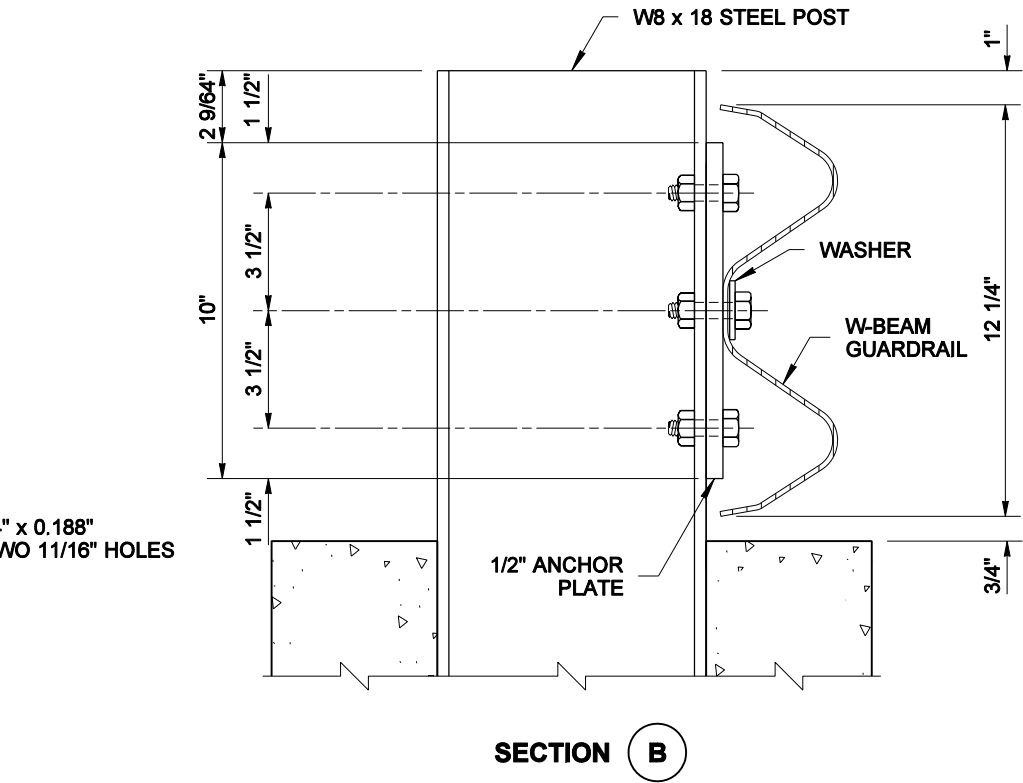
SHEET 4 OF 4 SHEETS

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Roark, Steve  
Aug 12 2019 9:57 AM  
STATE DESIGN ENGINEER  
Washington State Department of Transportation



NOTES

1. Rail section and W8 x 18 steel post shall be fabricated to receive 5/8" hex head bolts as shown.
2. All bolts shall be high strength 5/8" hex head bolts with anchor rail washers.



ISOMETRIC



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.

**BEAM GUARDRAIL ANCHOR  
TYPE 2**

**STANDARD PLAN C-6a**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

**Pasco Bakotich III**

STATE DESIGN ENGINEER

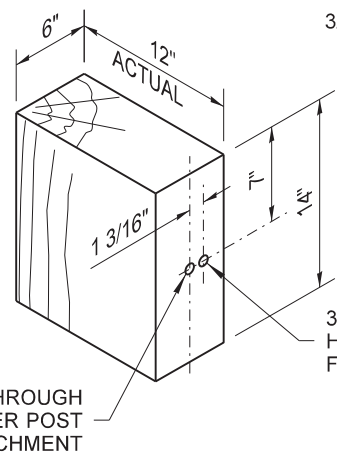
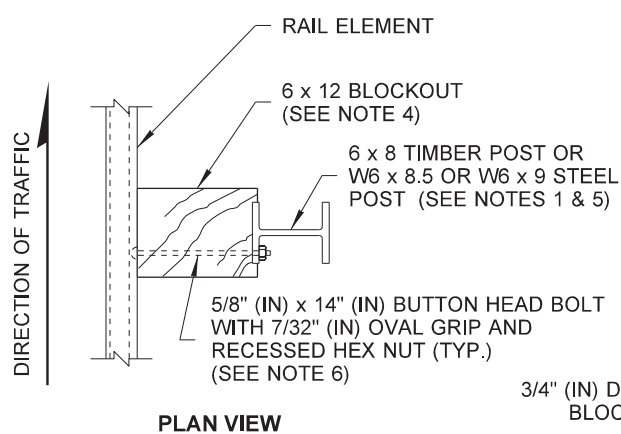
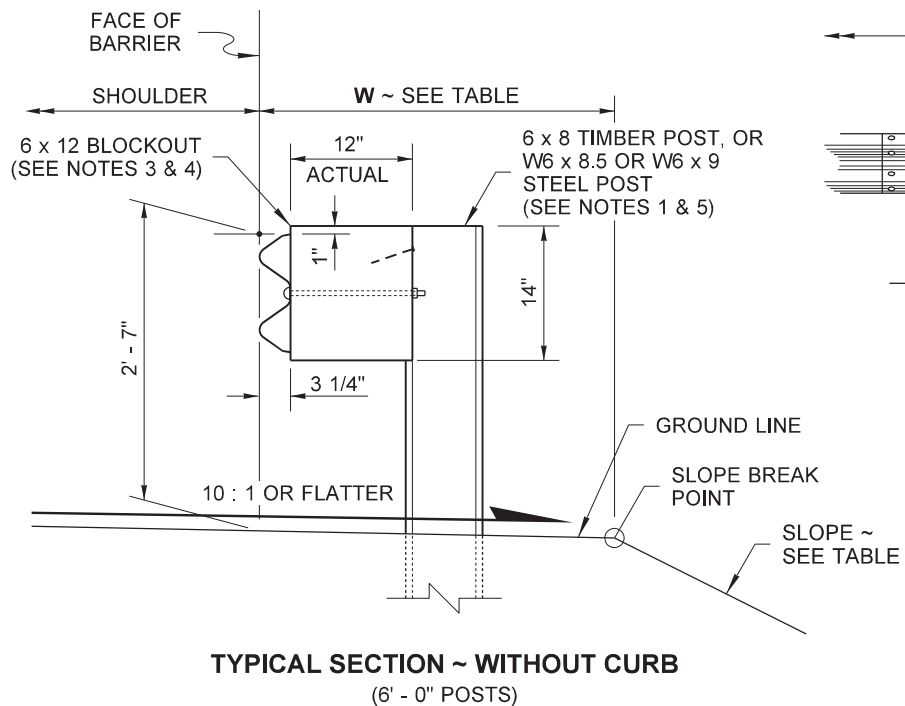
**10-14-09**

DATE



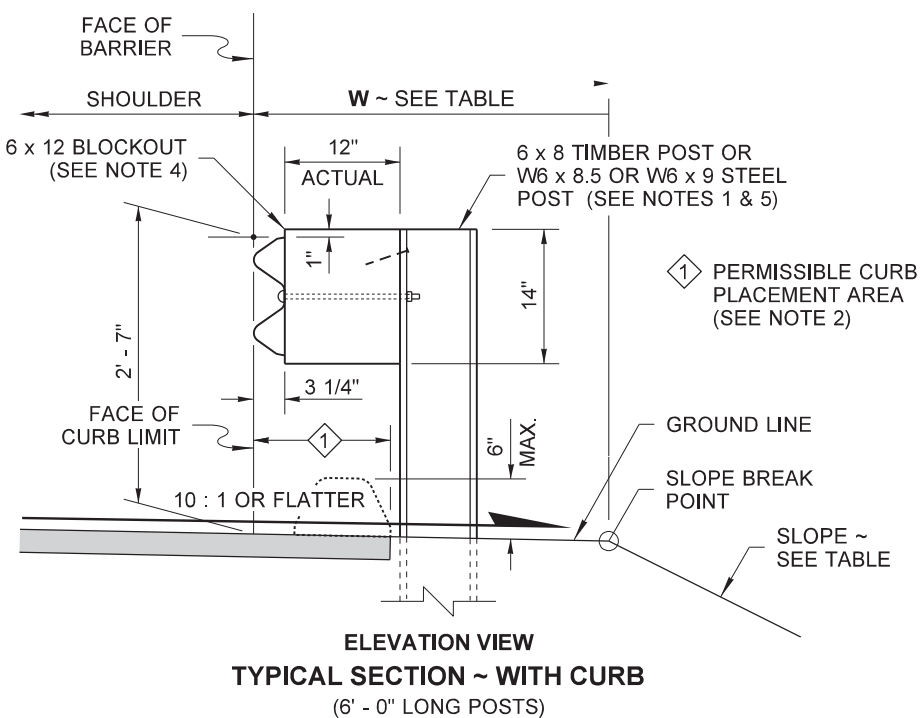
Washington State Department of Transportation

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WOOD BLOCK

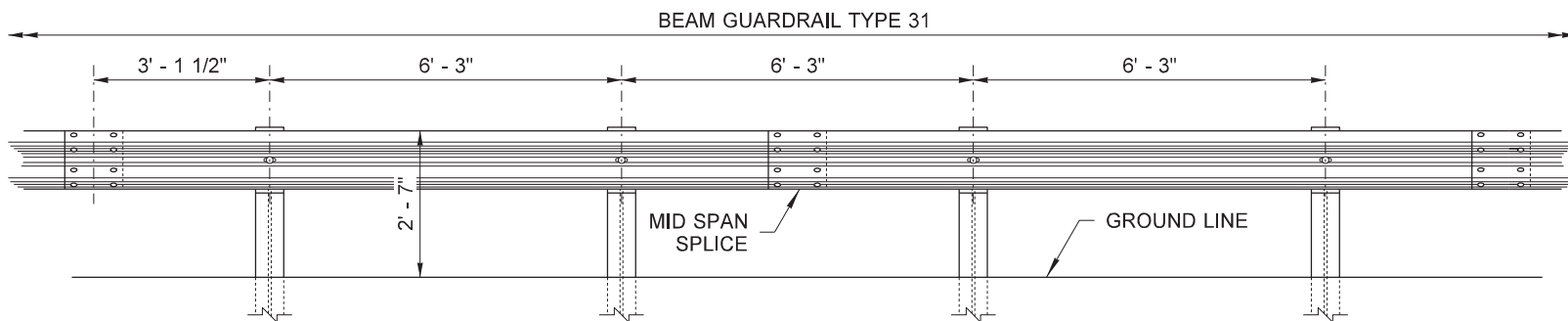
SLOPE \ EMBANKMENT TABLE FOR STD. 6' POSTS	
SLOPE	W (FT)
2H : 1V OR FLATTER	2.5' MIN.
STEEPER THAN 2H : 1V BUT NOT STEEPER THAN 1H : 1V	4.0' MIN.



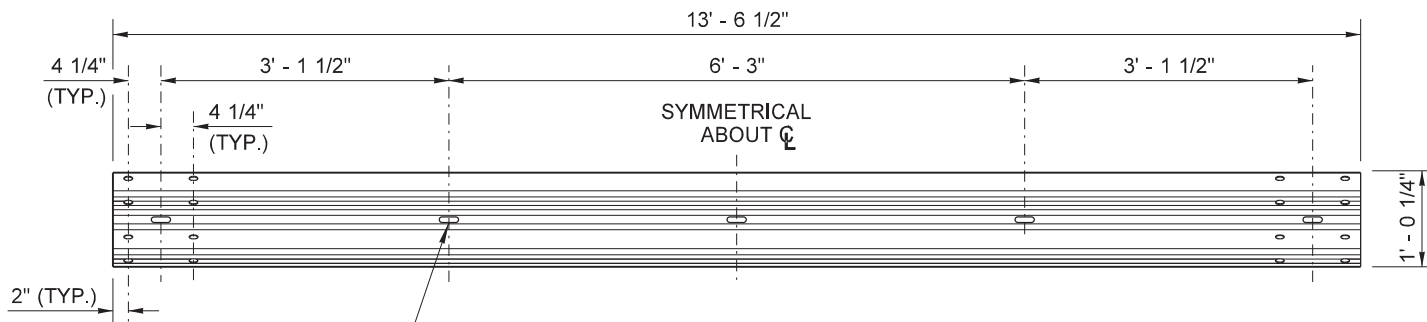
6 x 8 TIMBER POST OR  
W6 x 8.5 OR W6 x 9  
STEEL POST (TYP.)

(SEE NOTE 3)

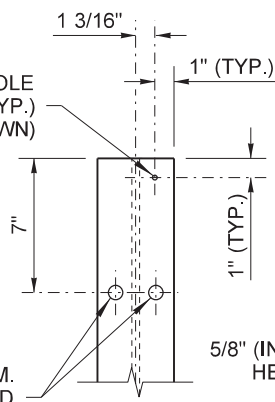
5/8" (IN) x 1 1/4" (IN) BUTTON HEAD BOLT  
WITH 7/32" (IN) OVAL GRIP (TYP.)  
AND RECESSED HEX NUTS ~  
EIGHT (8) REQUIRED PER SPLICE



TYPICAL ELEVATION



TYPICAL RAIL ELEMENT

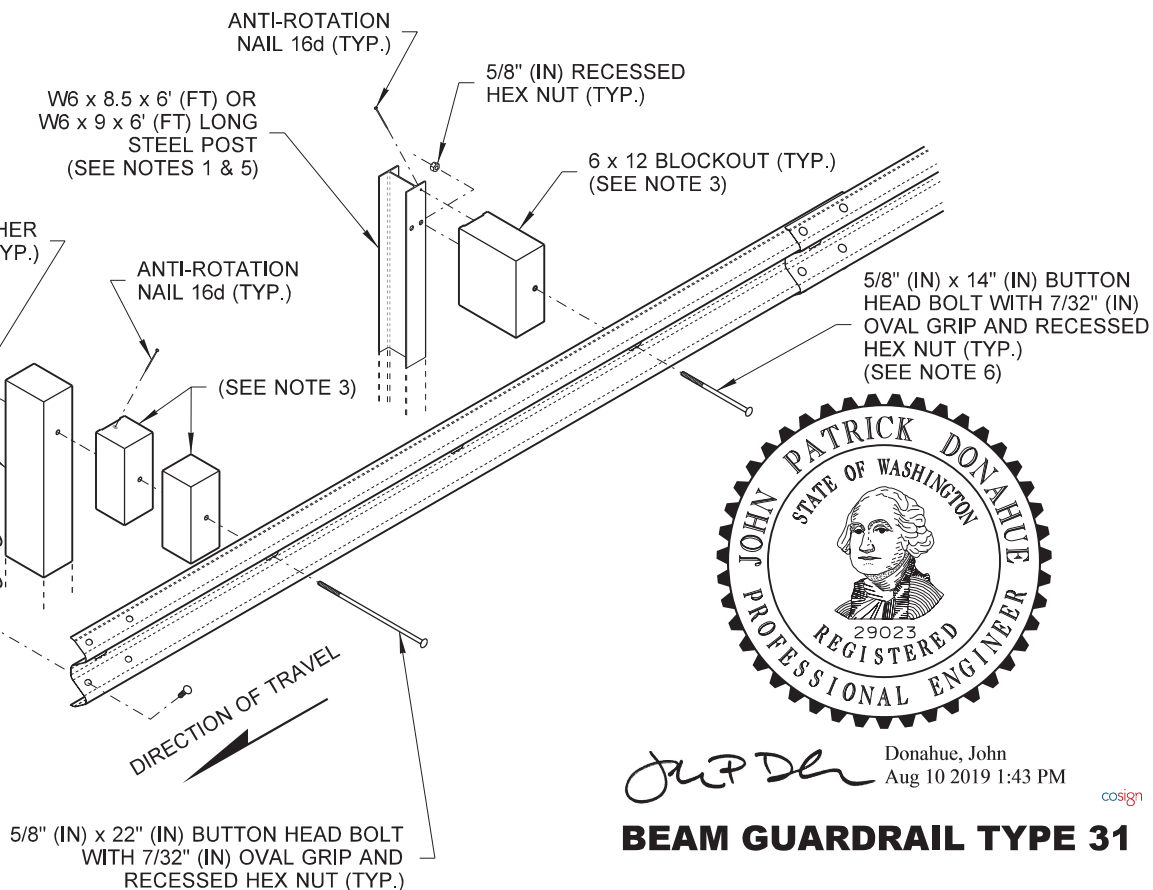


STEEL POST

6 x 8 x 6' (FT) LONG  
TIMBER POST  
(SEE NOTES 1 & 5)

(SEE NOTE 3)

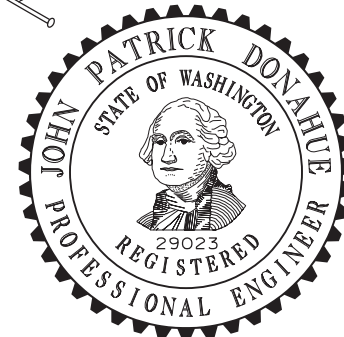
RAIL ELEMENT  
(TYP.)



ISOMETRIC VIEW

NOTES

1. Refer to **Standard Plan C-1b** and **C-20.11** for additional details not shown on this plan.
2. Extend shoulder pavement to provide a base for the extruded curb. See Contract Plans for exceptions to distances shown.
3. Use a single block or combination of blocks (no more than two (2) to achieve the actual 12" (in) offset. See **Standard Specification, Section 9-16.3(2)**. Wood blocks shall be secured to the posts with anti-rotation nails. If combination blocks are used, the adjacent blocks shall be toenailed with two 16d galvanized nails to prevent block rotation.
4. Wood blocks are shown. Blocks of an approved alternative material may be used. See **Standard Specification, Section 9-16.3(2)**.
5. All posts for any standard barrier run shall be of the same type: timber or steel.
6. Attach blockouts to steel posts using bolt holes on approaching traffic side of post web.



Donahue, John  
Aug 10 2019 1:43 PM

BEAM GUARDRAIL TYPE 31

STANDARD PLAN C-20.10-05

SHEET 1 OF 1 SHEET

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Roark, Steve  
Aug 12 2019 11:48 AM

STATE DESIGN ENGINEER



Washington State Department of Transportation

Diagram illustrating the elevation view of a bridge deck structure, showing the arrangement of splice bolt slots and post bolt slots across three panels.

**Dimensions:**

- Total length: 13' - 6 1/2"
- Panel lengths: 6' - 3" (each)
- Splice bolt slot spacing: 2" (edge to first slot), 4 1/4" (between slots), 4 1/4" (between slots).
- Post bolt slot spacing: 4 1/4" (between slots), 4 1/4" (between slots), 2" (edge to last slot).

**Slot Details:**

- SPlice BOLT SLOTS** ~ 29/32" (IN) x 1 1/8" (IN) (TYP.)
- POST BOLT SLOT** ~ 3/4" (IN) x 2 1/2" (IN) (TYP.)

13' - 6 1/2"

6' - 2 1/4"

6' - 3"

2 3/4"

4 1/4"

4 1/4"

4 1/4"

4 1/4"

2"

3/4" (IN)

LICE BOLT SLOTS ~ 29/32" (IN) x 2" (IN) (TYP.)

POST BOLT SLOTS ~ 3/4" (IN) x 3 3/4" (IN)

POST BOLT SLOT ~ 3/4" (IN) x 2 1/2" (IN)

SPLICE BOLT SLOTS ~ 29/32" (IN) x 1 1/8" (IN) (TYP.)

4"

2"

11/16" (IN) HOLE

1/4" (IN) PLATE

2"

4"

3/4" (IN) SPLICE HOLES IN CHANNEL RAIL AND SPLICE PLATE, FOR 5/8" (IN) CARRIAGE BOLTS

SLOTS ~ 1/8" (IN)

7 7/8"

1" 1 5/8" 3 3/8" 1 7/8"

1/4"

4 1/2"

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

3/4" (IN) x 2" (IN) POST BOLT SLOT IN CHANNEL RAIL AND SPLICE PLATE, FOR 5/8" (IN) BUTTON HEAD BOLT W/ 7/32" (IN) OVAL GRIP AND RECESSED NUT

POST CONNECTION

C6 x 8.2

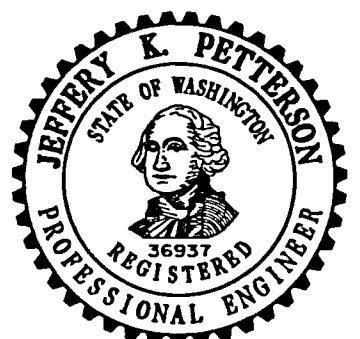
SPLICE PLATE ~ 3/8" (IN) x 4 1/2" (IN) x 7 7/8" (IN)

2" 2" 2"

3/4" (IN) x 2" (IN) SPLICE SLOT IN CHANNEL RAIL & SPLICE PLATE, FOR 5/8" (IN) CARRIAGE BOLT, HEX NUT & WASHER

CHANNEL RAIL SPLICE

1. When required by the Contract, a Snow Load Post Washer shall be used on the backside of the post (in lieu of the 1 3/4" (in) Post Bolt Washer) and a Snow Load Rail Washer shall be placed on the face side of Beam Guardrail Types 1 and 2. Snow Load Rail Washers shall not be installed on terminals.
2. Rail Washers, also called "Snow Load Rail Washers", are not required on new installation, except as called for in Note 1. Unnecessary Rail washers need not be removed from existing installations, except those on posts 2 through 8 of a BCT installation shall be removed.
3. Timber blocks shall be toe-nailed to the post with a 16d galvanized nail to prevent block rotation.
4. For post and block details, see **Standard Plan C-1b**.
5. When "Beam Guardrail Type - \_\_\_\_ Ft. Long Post" is specified in the Contract, the post length shall be stamped with numbers, 1 1/2" (in) min. high and 3/4" (in) wide at the location where the letter "H" is shown in the ASSEMBLY DETAIL. For wood post applications, the letter shall be stamped to a minimum depth of 1/4" (in). For steel post applications, the letter shall be legible after the post is galvanized. After post installation, it shall be the Contractor's responsibility to ensure the stamped numbers remain visible.
6. Existing posts shall not be raised. Replace posts as necessary to achieve required guardrail height.
7. Holes shall be located on approaching traffic side of web.



*Jeff Peterson*  
Pettersen, Jeff (HIQ Design)  
Jul 6 2017 3:11 PM  
cogn

**BEAM GUARDRAIL TYPE 31  
COMPONENTS**

**STANDARD PLAN C-20.11-00**

**SHEET 1 OF 1 SHEET**

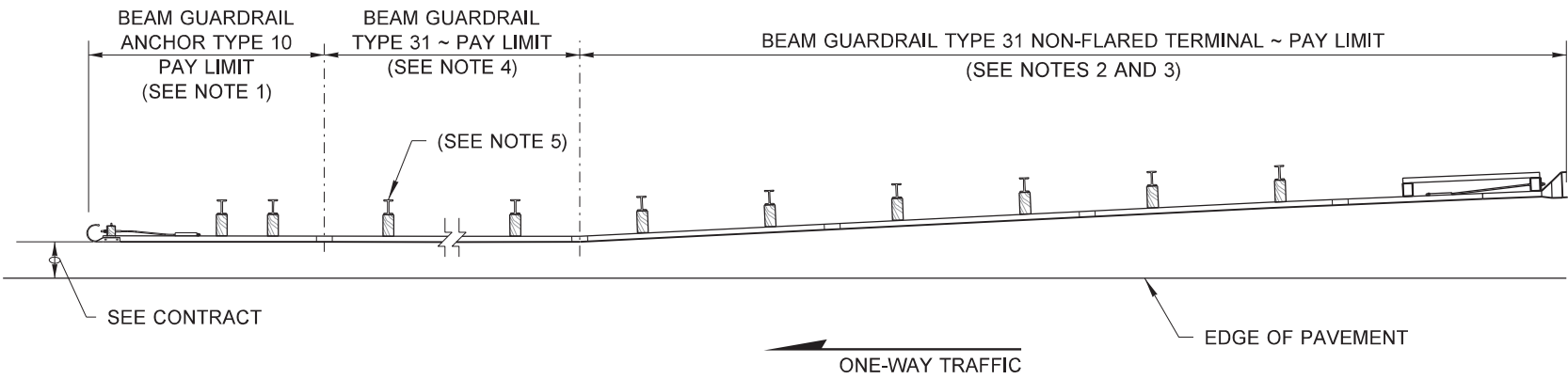
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Carpenter, Jeff  
Jul 21 2017 8:31 AM

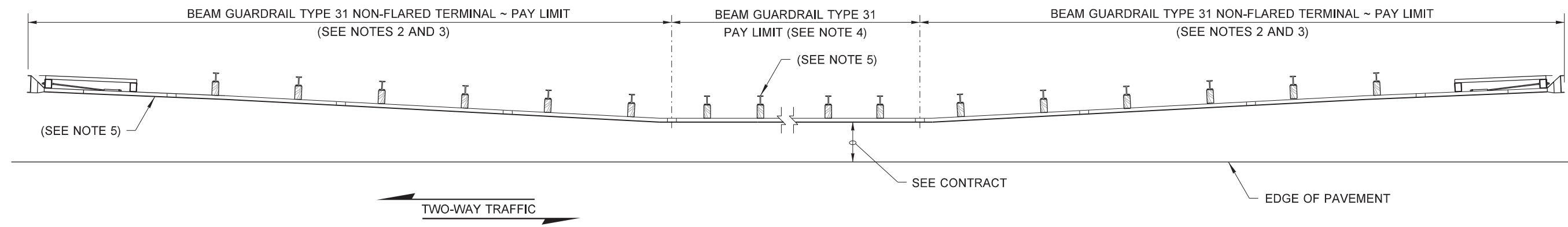
STATE DESIGN ENGINEER

 Washington State Department of Transportation

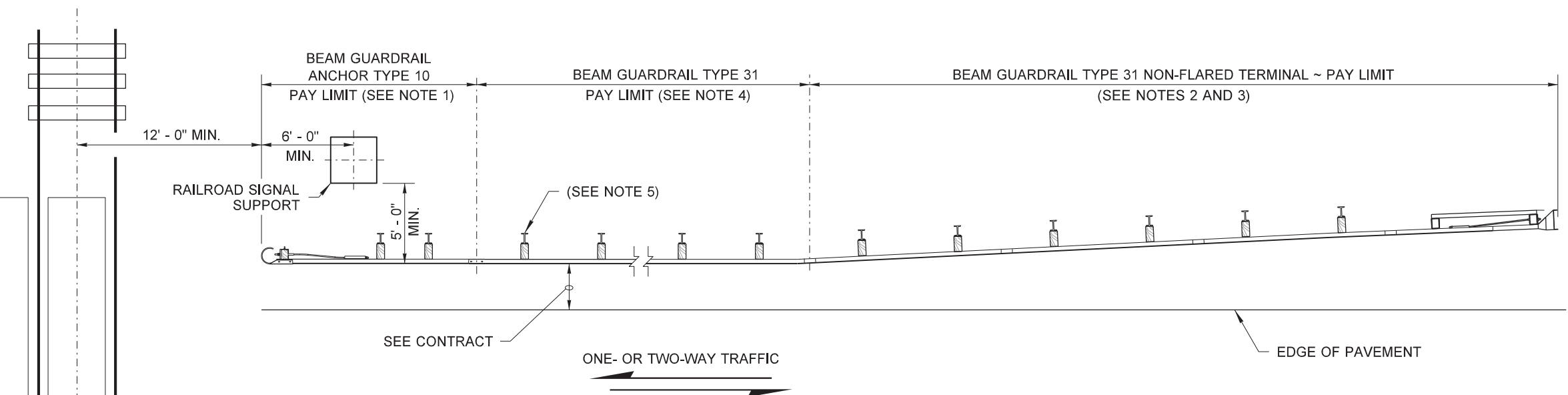
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CASE 1-31



CASE 2-31



CASE 3-31

NOTES

1. Where a crashworthy terminal is not required, use Beam Guardrail Type 10; see **Standard Plan C-23.60**.
2. Where a crashworthy terminal is required, use a Beam Guardrail Type 31 Non-Flared Terminal; see **Standard Plan C-22.40 or C-22.45**.
3. For terminal type and details, see Contract Plans and applicable drawings.
4. For additional details not shown on this plan, refer to **Standard Plan C-20.10**.
5. Timber or steel post. Steel post shown.

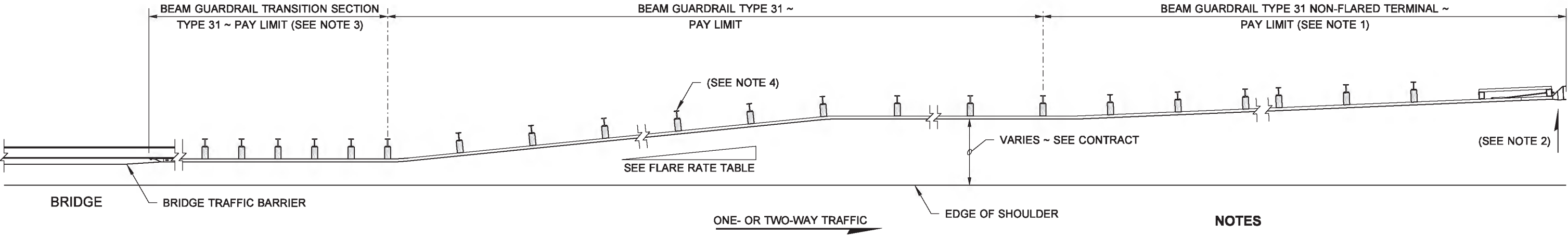


*John Patrick Donahue*  
Donahue, John  
Aug 10 2019 1:47 PM  
**BEAM GUARDRAIL TYPE 31  
PLACEMENT  
(CASES 1-31, 2-31 & 3-31)  
STANDARD PLAN C-20.14-04**

SHEET 1 OF 1 SHEET

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Washington State Department of Transportation

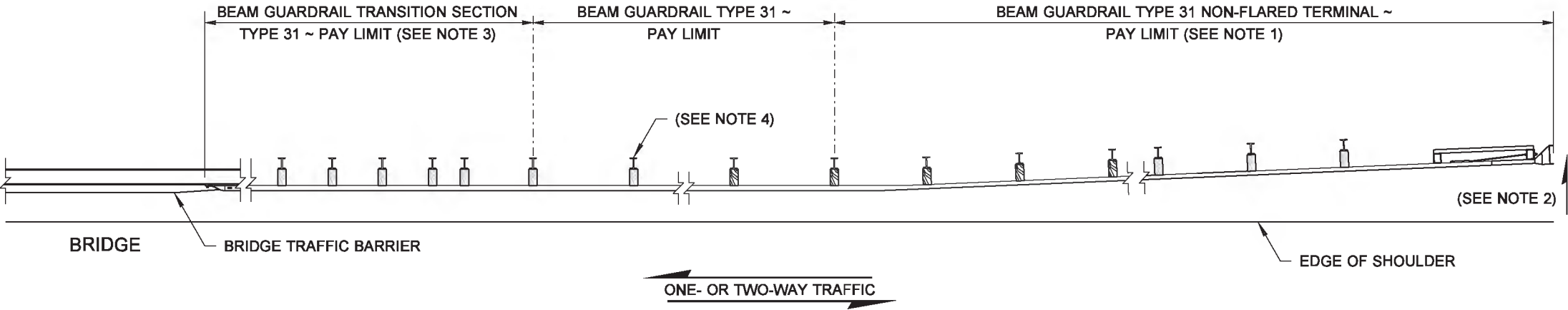
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CASE 4 - 31

NOTES

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



CASE 5 - 31

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



Barry, Ed  
May 2 2014 1:23 PM

**BEAM GUARDRAIL TYPE 31  
PLACEMENT  
(CASES 4-31 & 5-31)**

**STANDARD PLAN C-20.15-02**

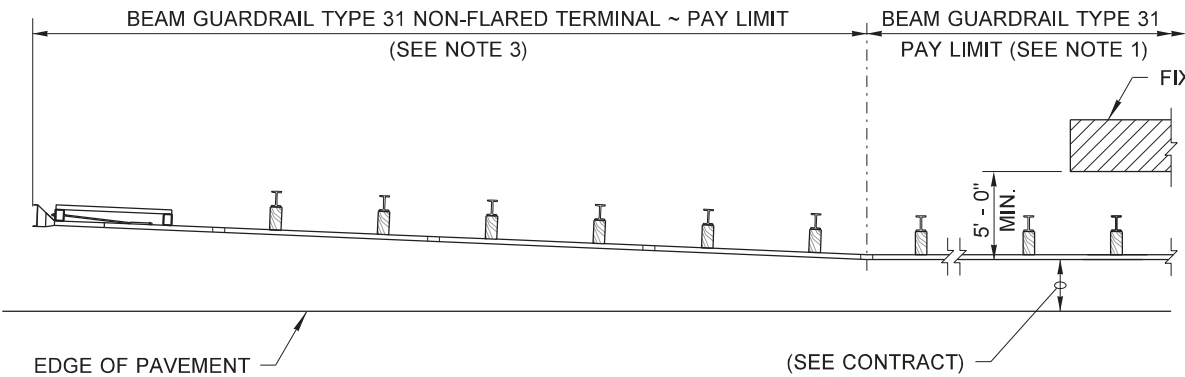
SHEET 1 OF 1 SHEET

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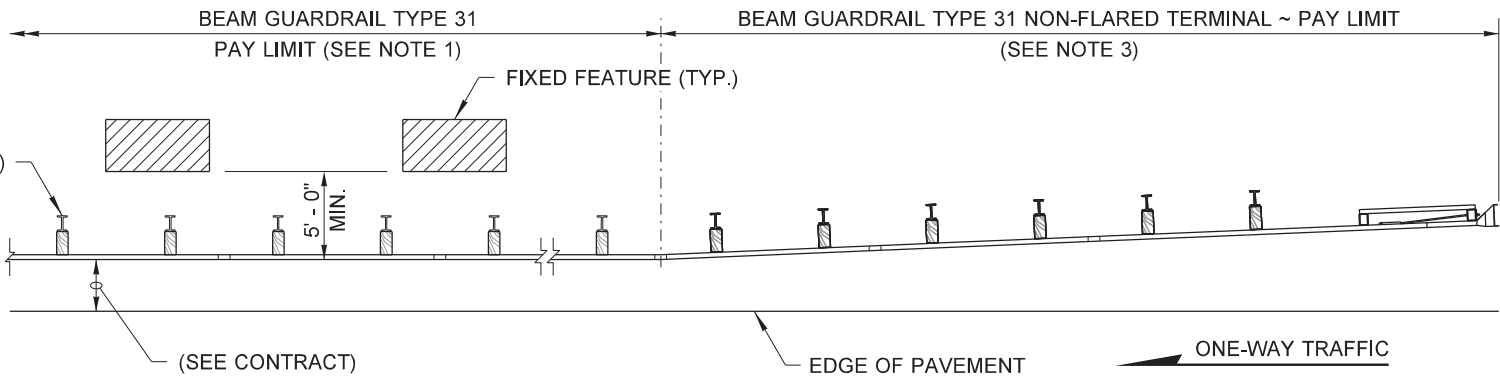
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Jun 11 2014 1:06 PM

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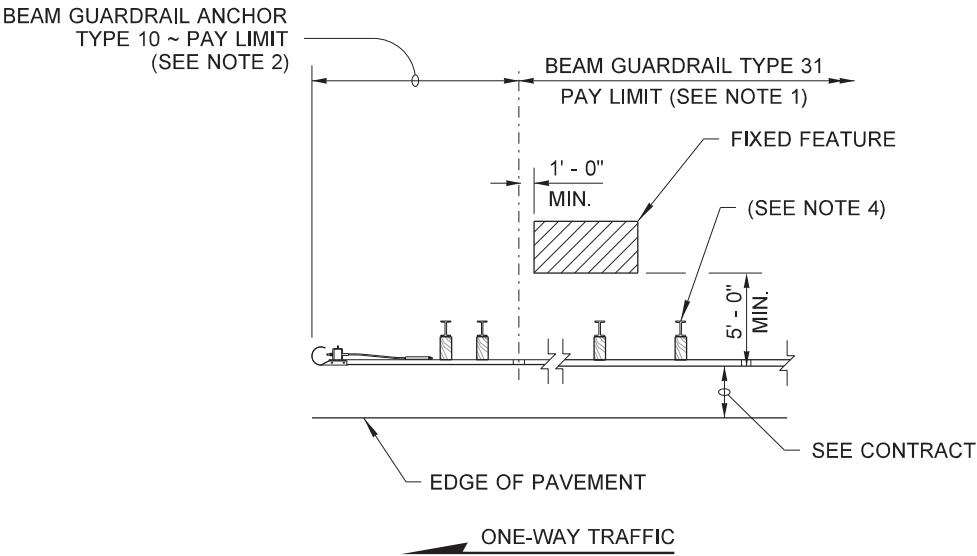
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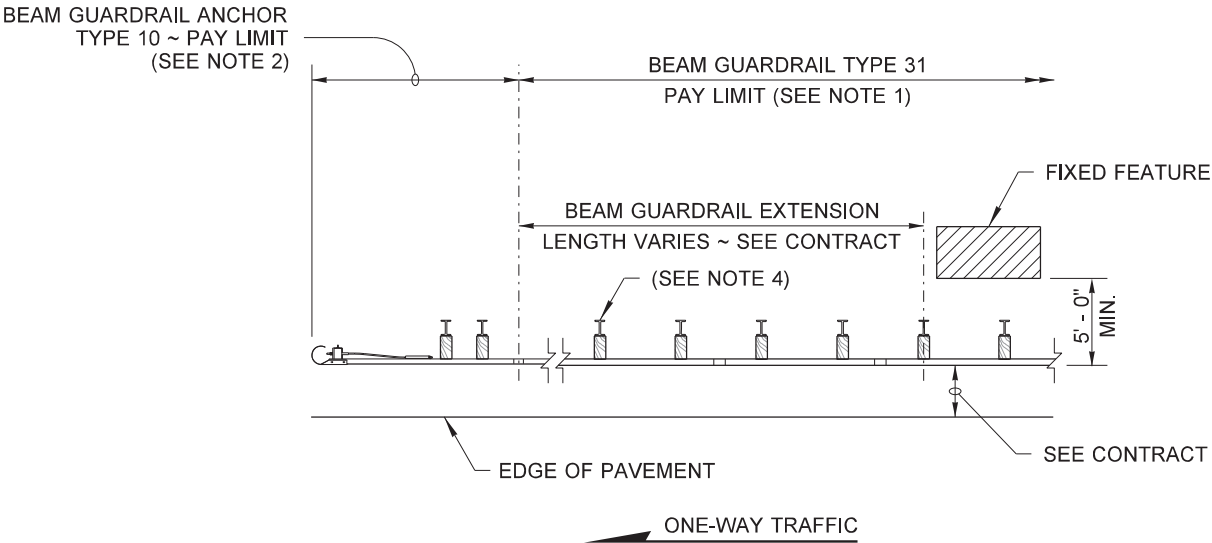
**CASE 10A - 31  
(TRAILING END)**



**CASE 10A-31, 10B-31, OR 10C-31  
(APPROACH END)**



**CASE 10B-31  
(TRAILING END)**



**CASE 10C-31  
(TRAILING END)**

**NOTES**

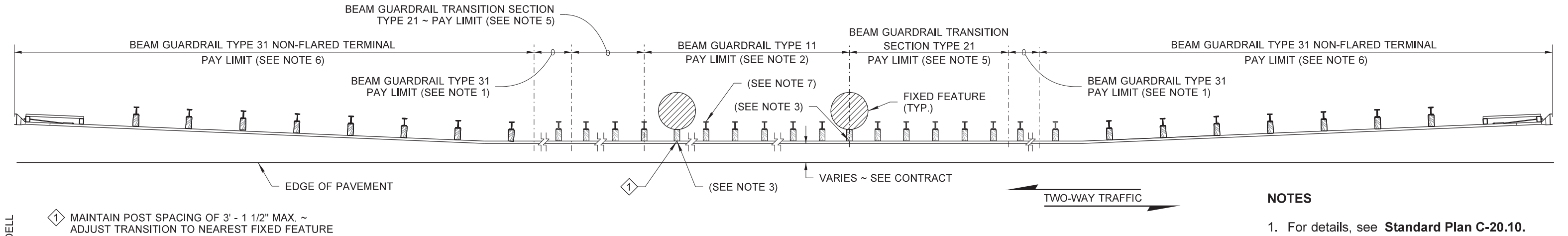
1. For details see **Standard Plan C-20.10**.
2. For details, see **Standard Plan C-23.60**.
3. For details, see **Standard Plan C-22.40** or **C-22.45**.
4. Timber or steel post. Steel post shown.



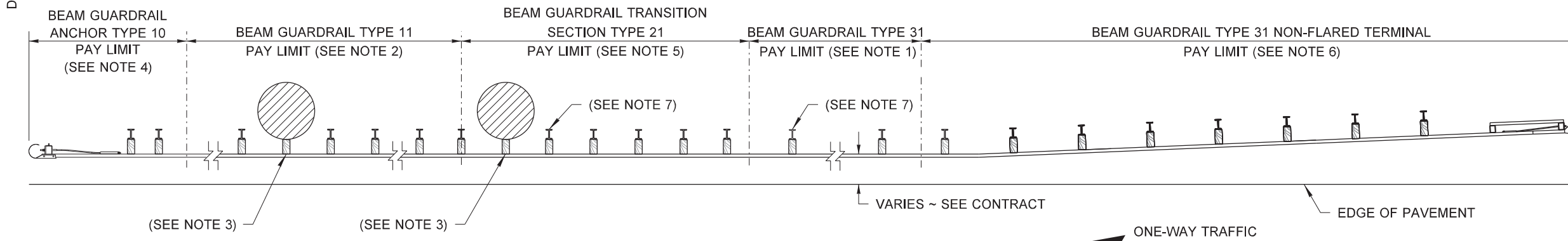
*John Patrick Donahue*  
Donahue, John  
Aug 10 2019 1:48 PM  
**BEAM GUARDRAIL TYPE 31  
PLACEMENT (CASES 10A-31,  
10B-31 & 10C-31)**  
**STANDARD PLAN C-20.18-03**

SHEET 1 OF 1 SHEET

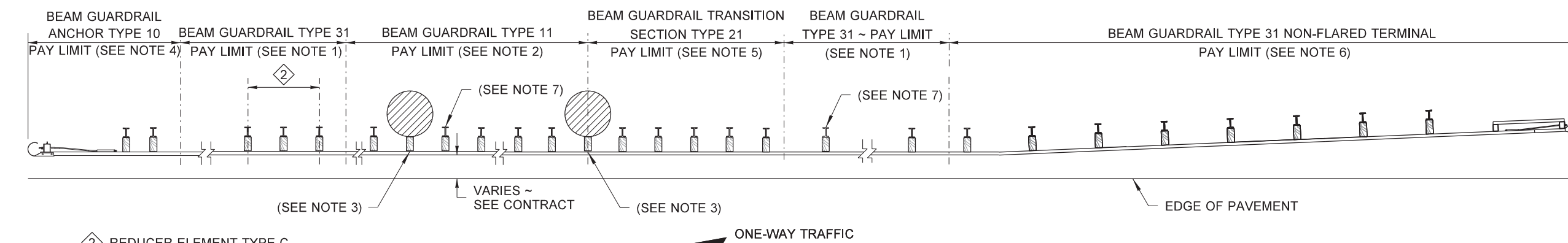
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Washington State Department of Transportation



CASE 11A-31



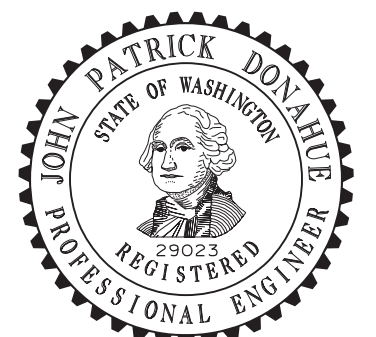
CASE 11B-31



CASE 11C-31

## NOTES

- For details, see **Standard Plan C-20.10**.
- For details, see **Standard Plan C-1a**.
- Attach a standard 12" (in) or 8" (in) wood blockout to the rail using two 5/8" (in) × 4" (in) lag bolts.
- Beam Guardrail Anchor Type 10 (W-Beam) or Type 10 (Thrie Beam) required. For details, see **Standard Plan C-23.60**.
- For details, see **Standard Plan C-25.20**.
- For details, see **Standard Plan C-22.40 or C-22.45**.
- Timber or steel post. Steel post shown.



Donahue, John  
Aug 10 2019 1:53 PM

**BEAM GUARDRAIL TYPE 31  
PLACEMENT (CASES 11A-31,  
11B-31 & 11C-31)**

**STANDARD PLAN C-20.19-03**

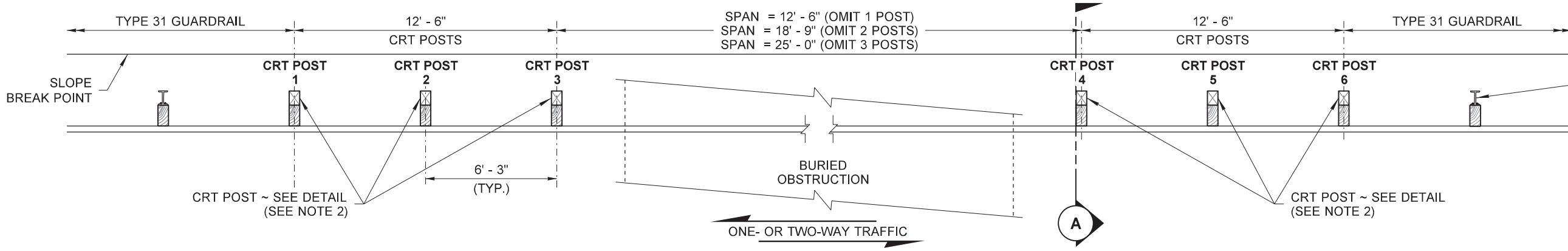
SHEET 1 OF 1 SHEET

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Aug 12 2019 11:50 AM

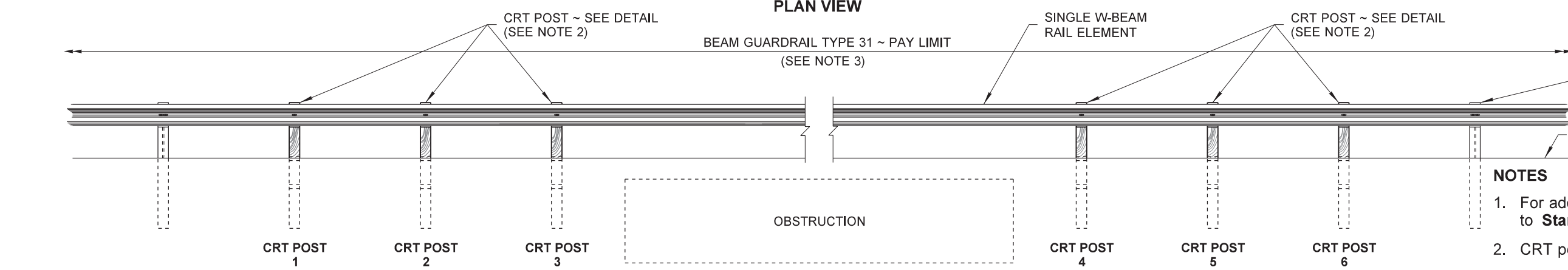
STATE DESIGN ENGINEER

Washington State Department of Transportation

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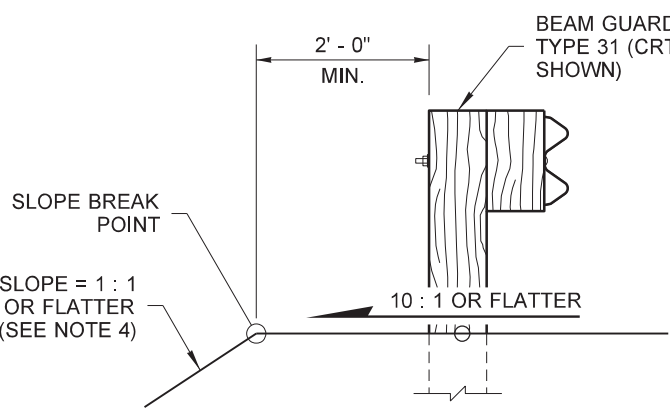


6 x 8 TIMBER POST, OR EITHER  
W6 x 8.5 OR W6 x 9 STEEL  
POST (TYP.) (SEE NOTE 3)

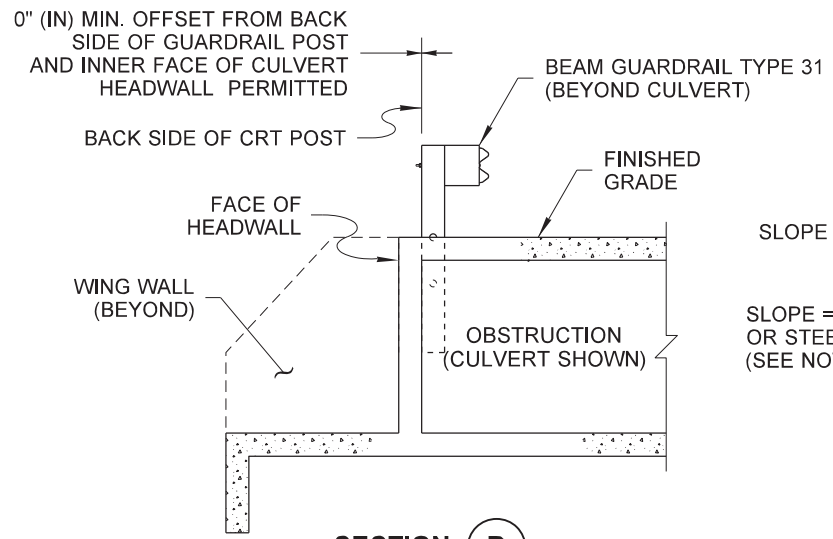


**NOTES**

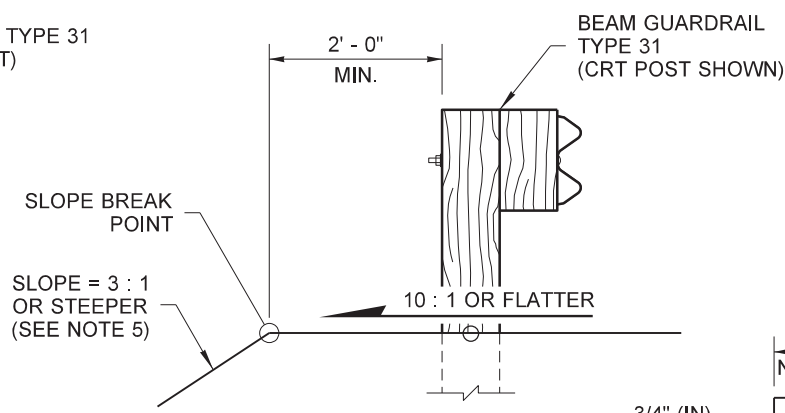
1. For additional details not shown on this plan, refer to **Standard Plan C-20.10** and **C-1b**.
2. CRT post to be wood.
3. Install at least **62' - 6"** (ft) (10 post spacings) of Type 31 guardrail upstream and downstream from CRT posts **1** thru **6**.
4. Grading requirements for spans without headwalls must begin at least **43.75'** (ft) (7 posts spacings) before CRT post **3**, extend thru the obstruction area, and end at least **43.75'** (ft) (7 post spacings) after CRT post **4**.
5. Grading requirements for spans w/ headwalls must extend **43.75'** (ft) (7 post spacings) minimum up stream and down-stream from CRT posts **3** and **4**.



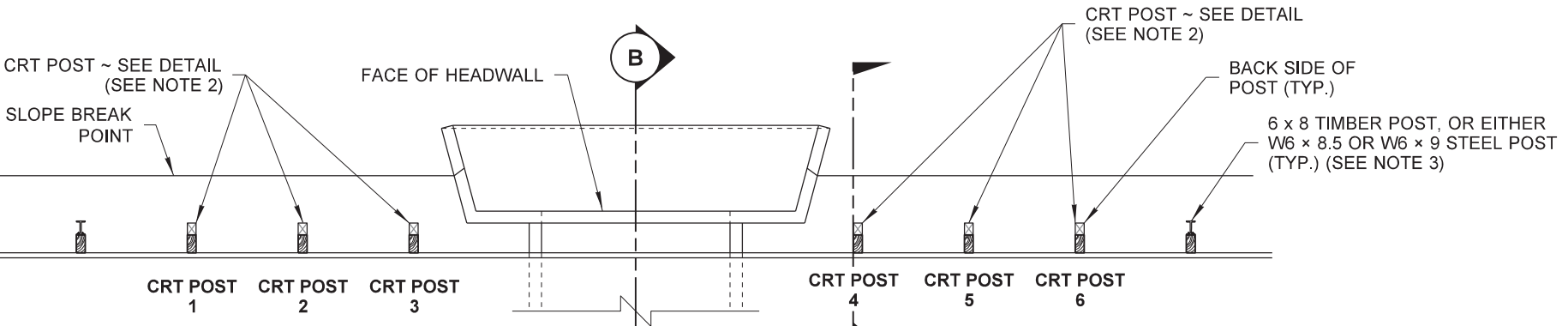
**SECTION A**



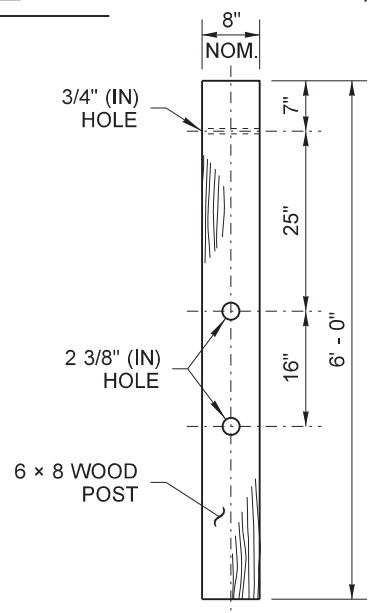
**SECTION B**



**SECTION C**



**SPAN WITH HEADWALL DETAIL  
(CULVERT SHOWN)**



**CONTROLLED RELEASING  
TERMINAL (CRT) POST DETAIL**

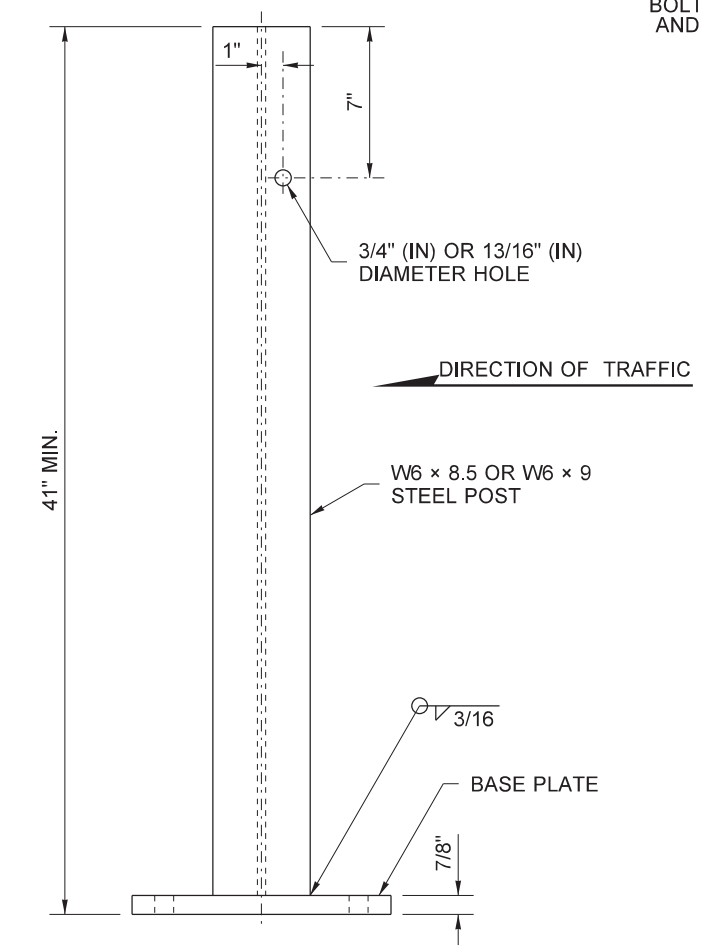
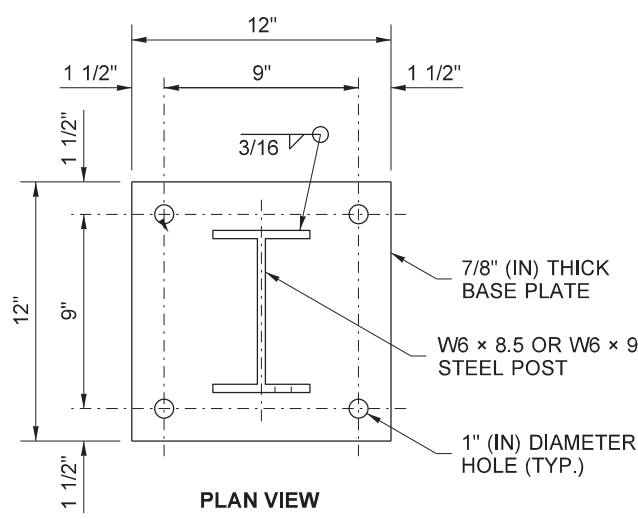


Donahue, John  
Aug 10 2019 1:56 PM  
**BEAM GUARDRAIL TYPE 31  
PLACEMENT 12'- 6", 18' - 9",  
OR 25' - 0" SPAN  
STANDARD PLAN C-20.40-07**

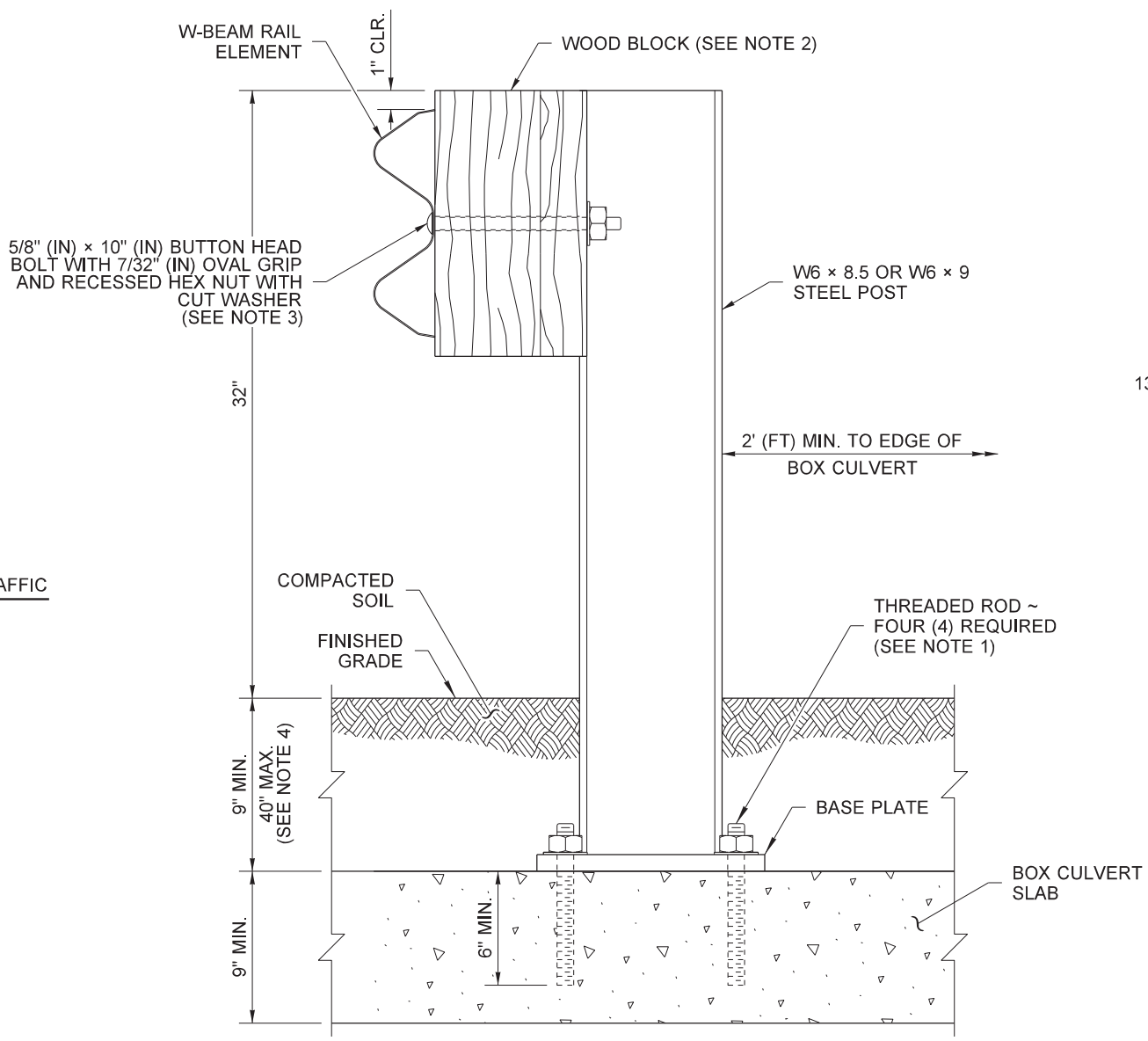
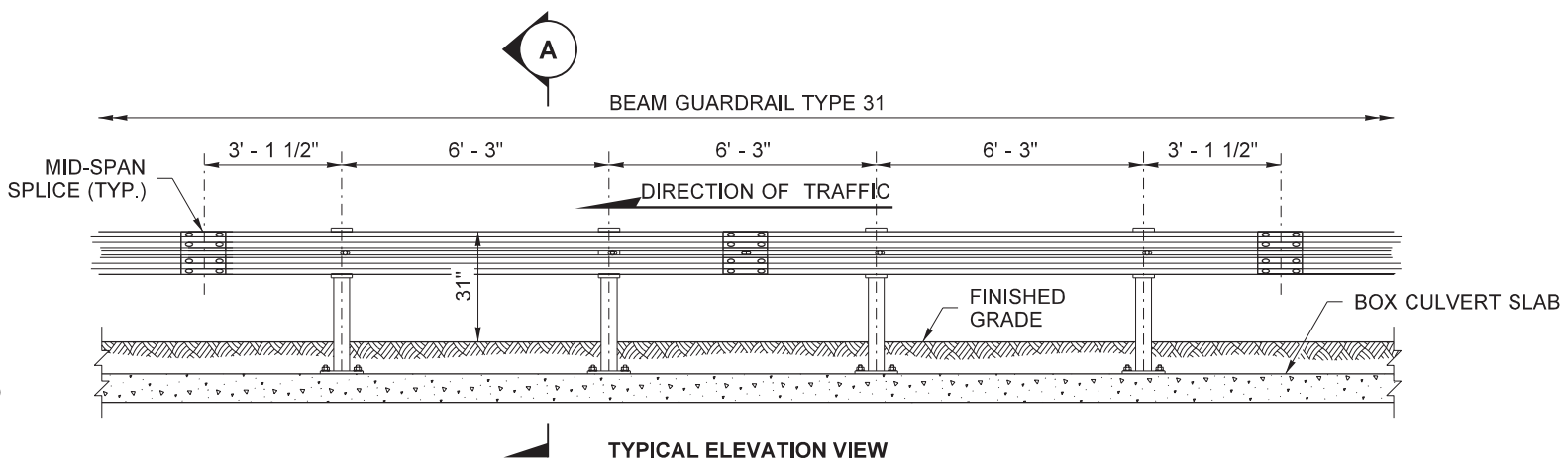
SHEET 1 OF 1 SHEET

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Aug 12 2019 11:50 AM  
STATE DESIGN ENGINEER  
Washington State Department of Transportation

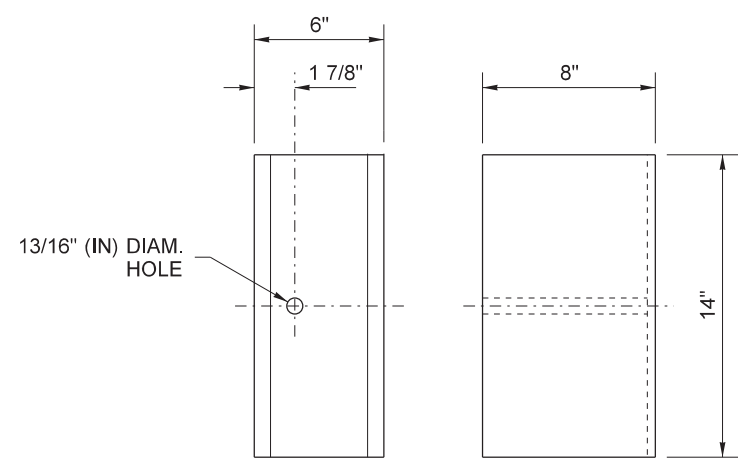
DRAWN BY: FERN LIDDELL



BOX CULVERT POST  
ELEVATION VIEW

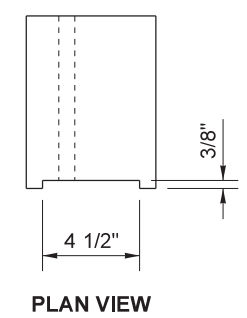


SECTION A  
BOX CULVERT GUARDRAIL  
STEEL POST TYPE 31



ELEVATION VIEW

SIDE VIEW

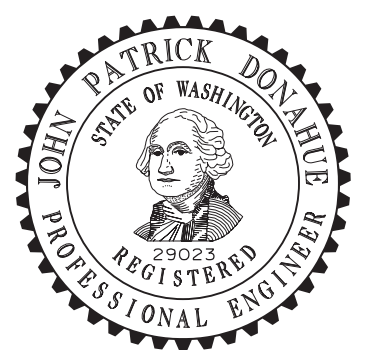


PLAN VIEW

WOOD BLOCKOUT  
(SEE NOTE 2)

NOTES

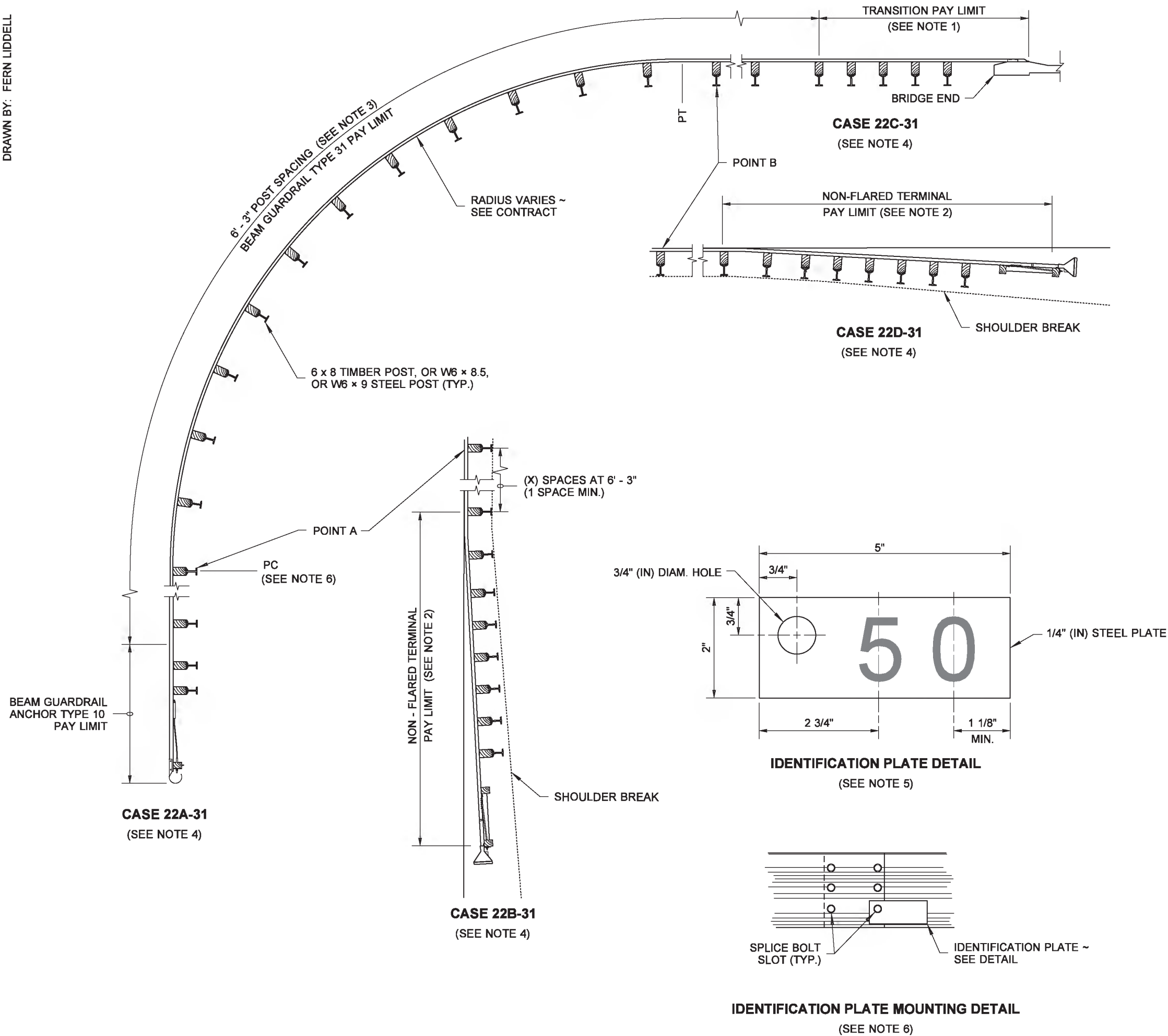
1. Attach Guardrail Post to Box Culvert with 7/8" (in) diameter high-strength threaded rods 8 1/2" (in) in length with resin-bonded anchors.
2. Wood blocks are shown. Blocks of an approved alternative may be used. See **Standard Specification, Section 9-16.3(2)**.
3. Attach blockouts to steel posts using bolt holes on approaching traffic side of post web.
4. For fill depths greater than 40 inches, drive standard guardrail posts and install guardrail per **Standard Plan C-20.10**.



Donahue, John  
Aug 10 2019 1:57 PM  
**BOX CULVERT  
GUARDRAIL STEEL  
POST ~ TYPE 31  
STANDARD PLAN C-20.41-02**


SHEET 1 OF 1 SHEET

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Roark, Steve  
Aug 12 2019 11:51 AM  
STATE DESIGN ENGINEER  
Washington State Department of Transportation



NOTES

1. See Contract for transition and connection type.
2. For additional installation requirements for Non-Flared Terminal placement, see **Standard Plan C-22.40**.
3. Guardrail installation shall be Beam Guardrail Type 31 with standard post and block. See **Standard Plan C-20.10** for additional details.
4. The first letter of case designation indicates the end treatment on the side road. The second letter indicates the end treatment on the main road. For instance, a terminal on a side road and a bridge connection on the main road would be Case 22BC-31.
5. The radius dimension shall be etched into the plate as shown in the example on the Identification Plate Detail. Numerals shall be 1 1/2" (in) high minimum, and 3/4" (in) wide maximum. Plate shall be galvanized after etching and the letter shall remain permanently legible.
6. The guardrail Identification Plate shall be mounted at the lower splice bolt on the back side of the rail element at the PC of the guardrail radius.




Barry, Ed  
Jul 14 2015 8:00 AM

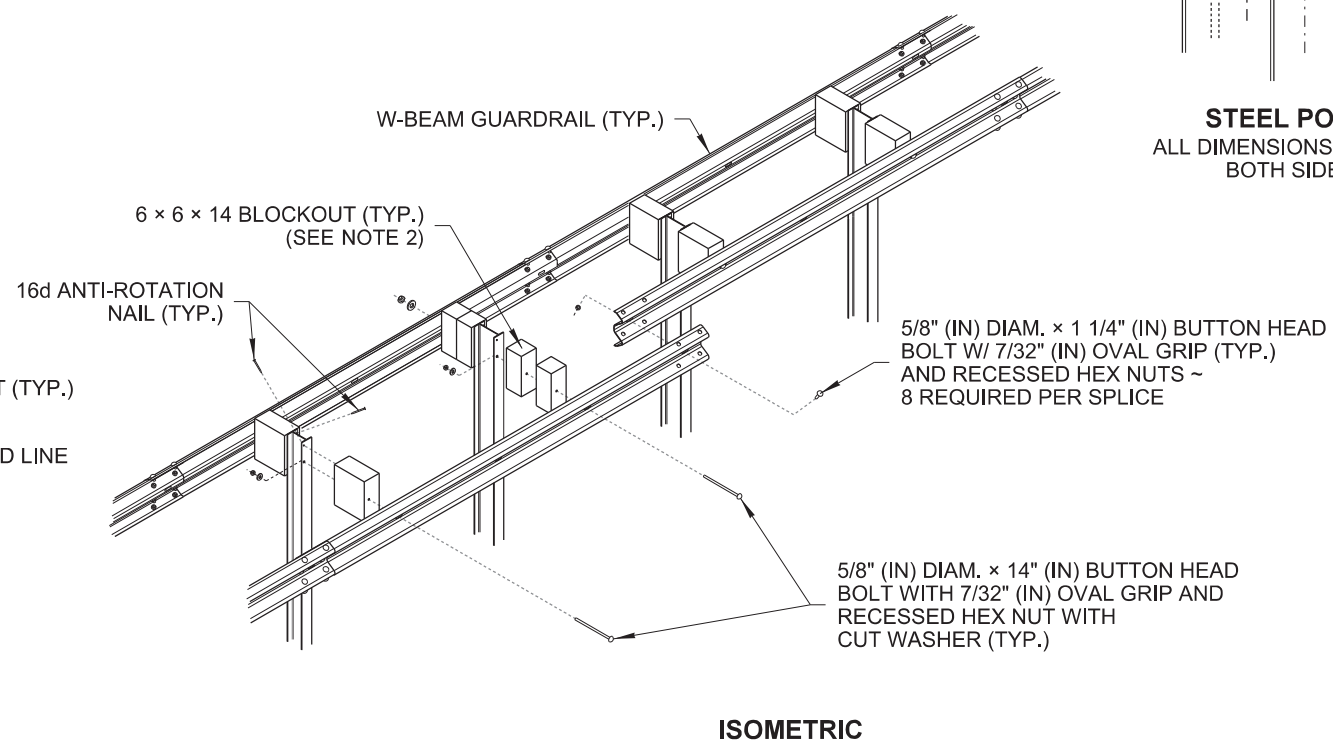
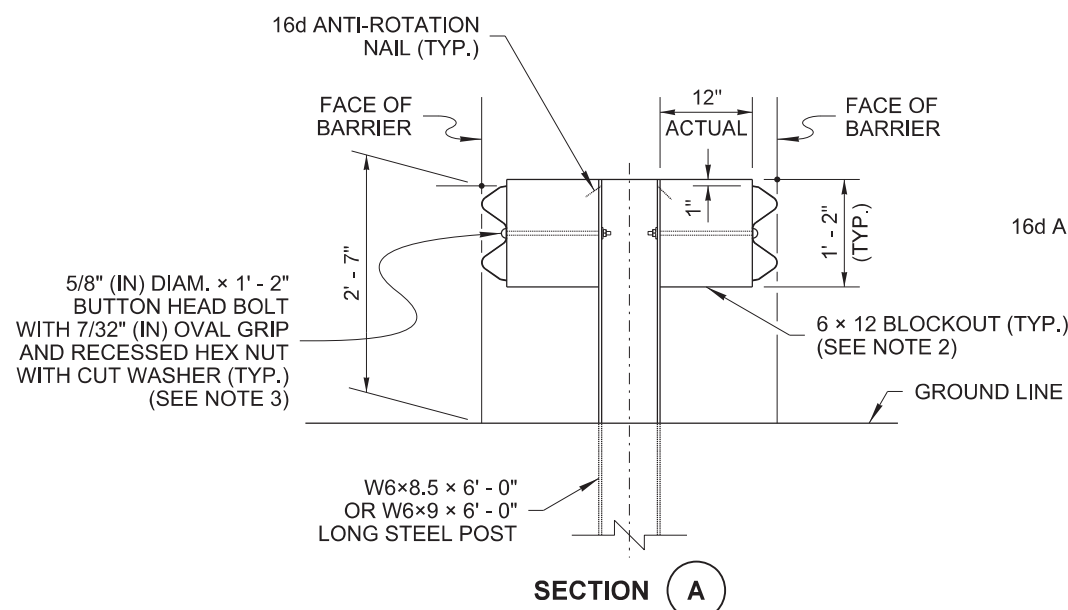
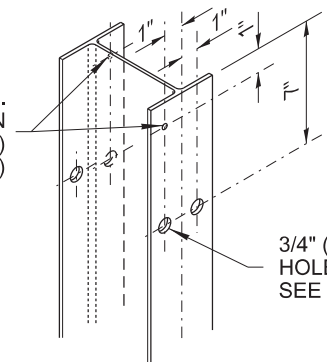
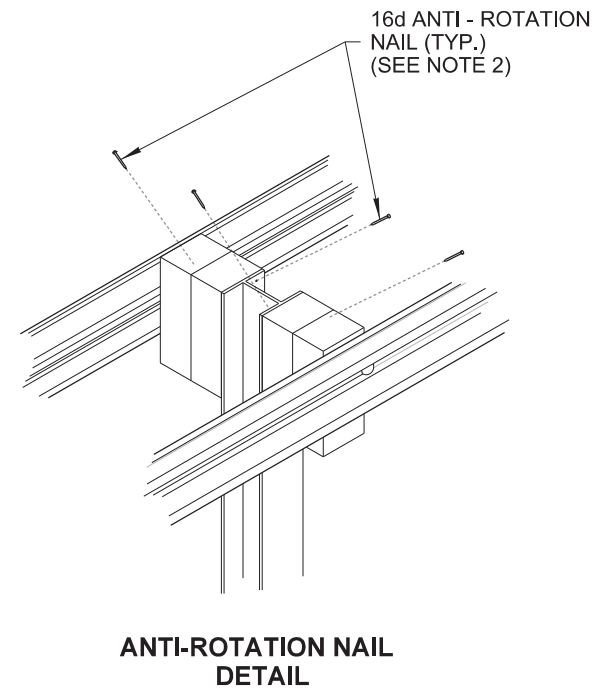
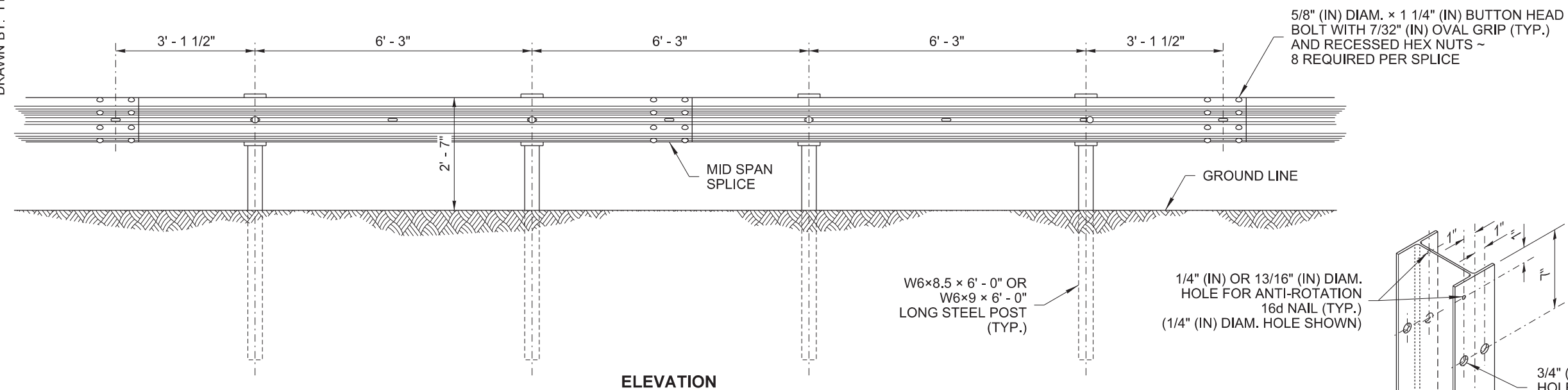
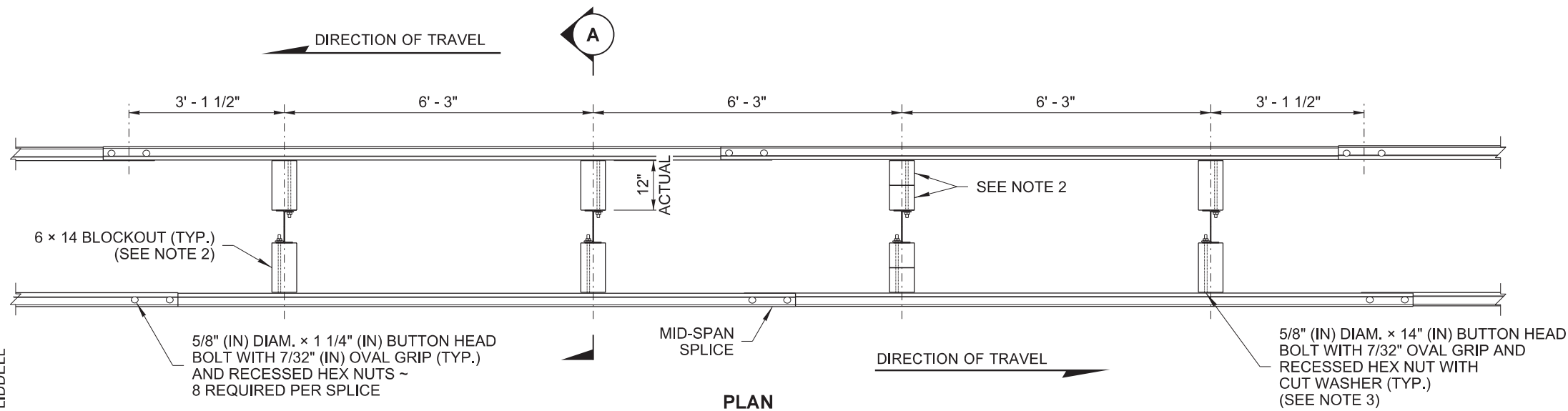
**GUARDRAIL PLACEMENT  
STRONG POST ~ TYPE 31  
INTERSECTION DESIGN  
STANDARD PLAN C-20.42-05**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION  
Carpenter, Jeff  
Jul 14 2015 11:27 AM  
STATE DESIGN ENGINEER

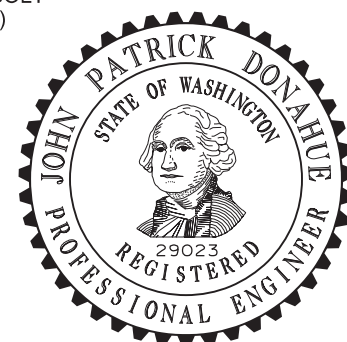
 Washington State Department of Transportation

DRAWN BY: FERN LIDDELL



## NOTES

1. Beam Guardrail post spacing shall be 6' - 3" on centers.
2. Use a single or combination of blockouts to achieve the actual 12" (in) offset. See **Standard Specification, Section 9-16.3(2)**. Wood blockouts shall be toe-nailed to post (and blocks, if block combinations are used) with 16d galvanized nails to prevent block rotation.
3. Attach blockouts to steel posts using bolt holes on approaching traffic side of post web.
4. For details not shown, see **Standard Plan C-20.10**.
5. Wood blockouts shown. Blocks of alternate material may be used. See **Standard Specification, Section 9-16.3(2)**.

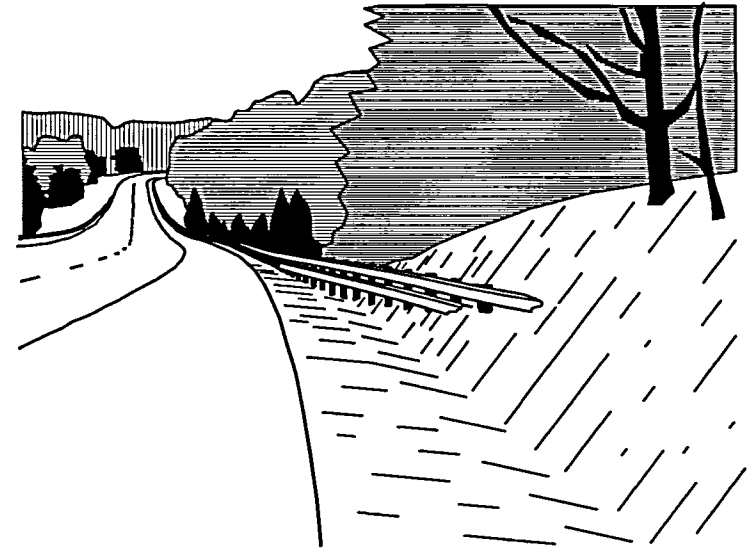
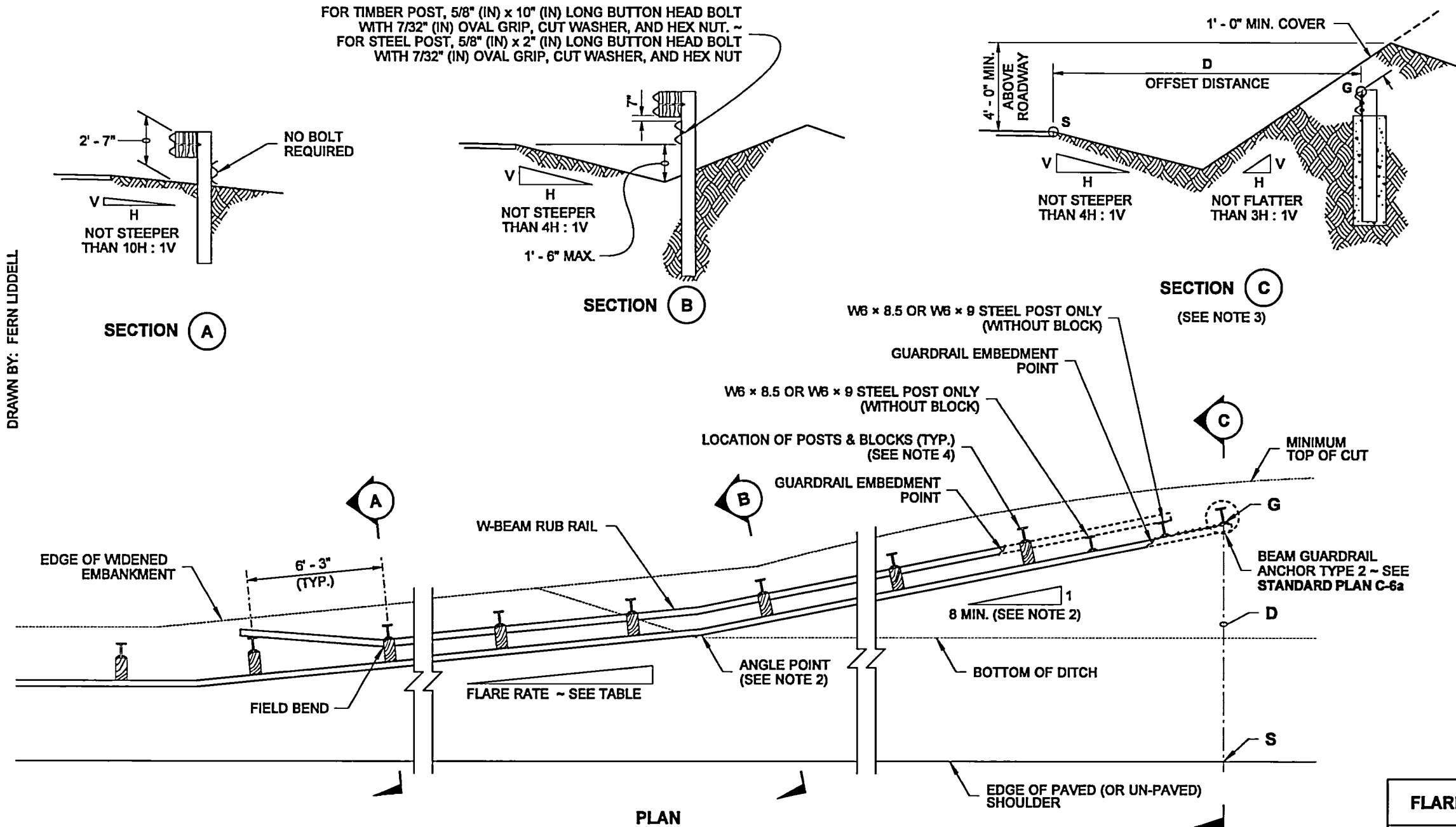


*John Patrick Donahue*  
Donahue, John  
Aug 10 2019 1:59 PM  
**BEAM GUARDRAIL TYPE 31 DS (DOUBLE SIDED) (W-BEAM)**  
**STANDARD PLAN C-20.45-02**

SHEET 1 OF 1 SHEET



DRAWN BY: FERN LIDDELL



PERSPECTIVE

NOTES

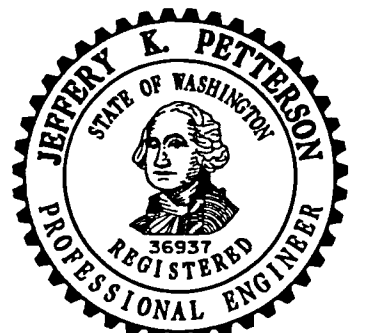
1. Posts installed on shoulder slopes steeper than 10H : 1V shall be 8' (ft) long.
2. The flare rate of the guardrail may be increased after crossing the ditch bottom to shorten the length of the terminal.
3. Determine the height of the W-Beam at the Anchor (G) by first calculating the perpendicular offset distance (D) from the edge of shoulder (S) to the Anchor (on station). Multiply that distance by 0.1, then subtract the product from the elevation of the same point (S) on the edge of shoulder used to obtain the offset distance (at the same station). Add Beam Guardrail design height (31" (in)) to that remainder for a sum that equals the elevation of the top of the W-Beam at the Anchor.

Refer to SECTION "C":

$$\text{Elevation } G = (\text{Elevation } S - D \times (0.1)) + 31$$

4. Timber or steel post. Steel post shown.

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



Petterson, Jeff (HQ Design)  
Jul 6 2017 3:13 PM

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

SHEET 1 OF 1 SHEET

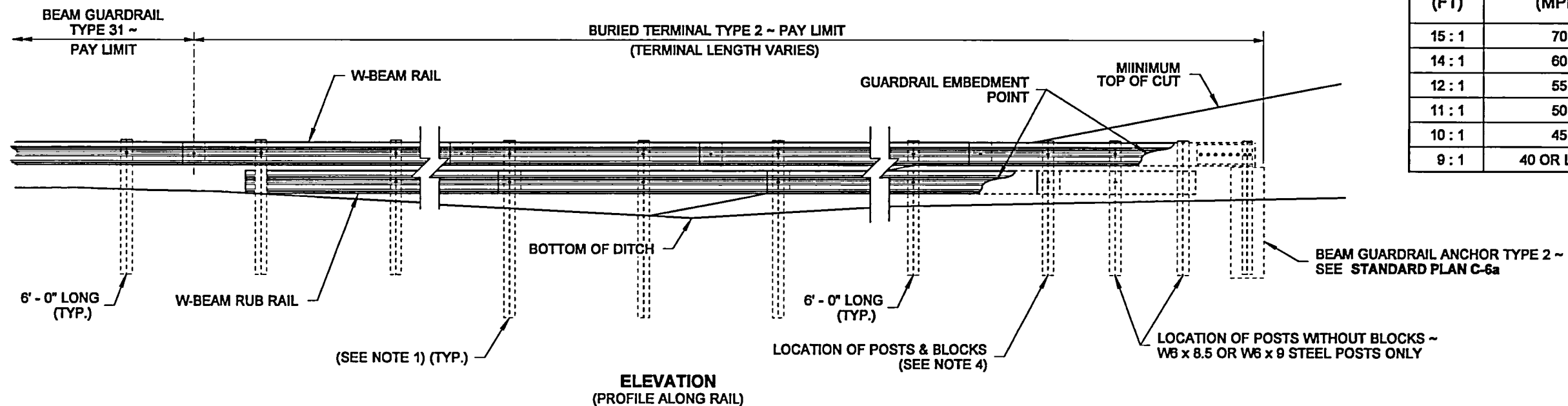
APPROVED FOR PUBLICATION

Carpenter, Jeff  
Jul 21 2017 8:26 AM

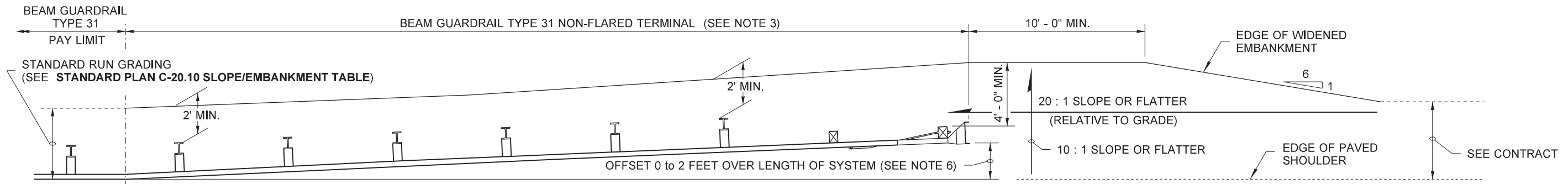
STATE DESIGN ENGINEER



Washington State Department of Transportation

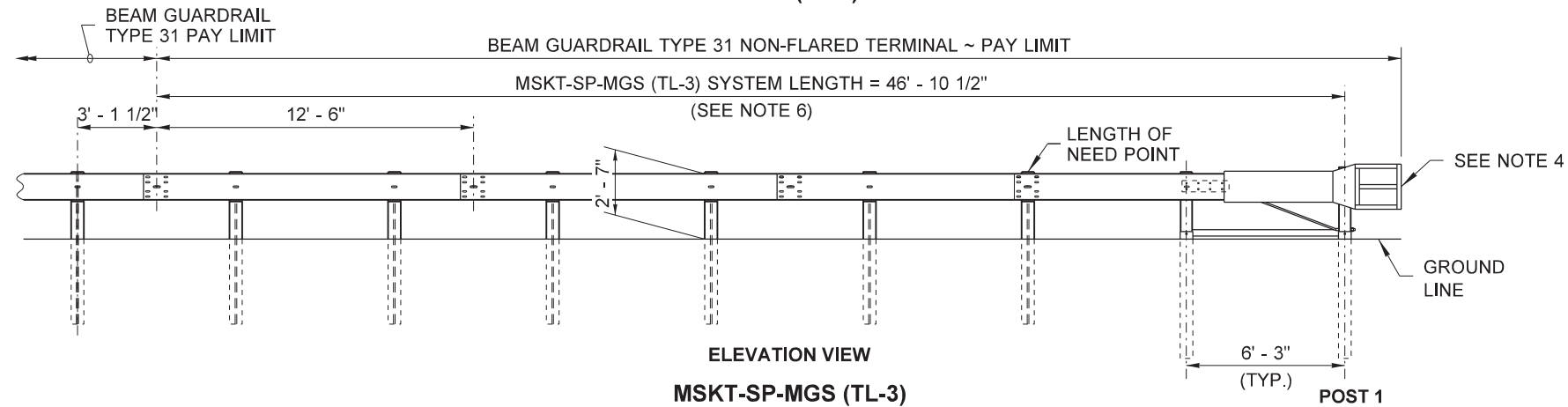


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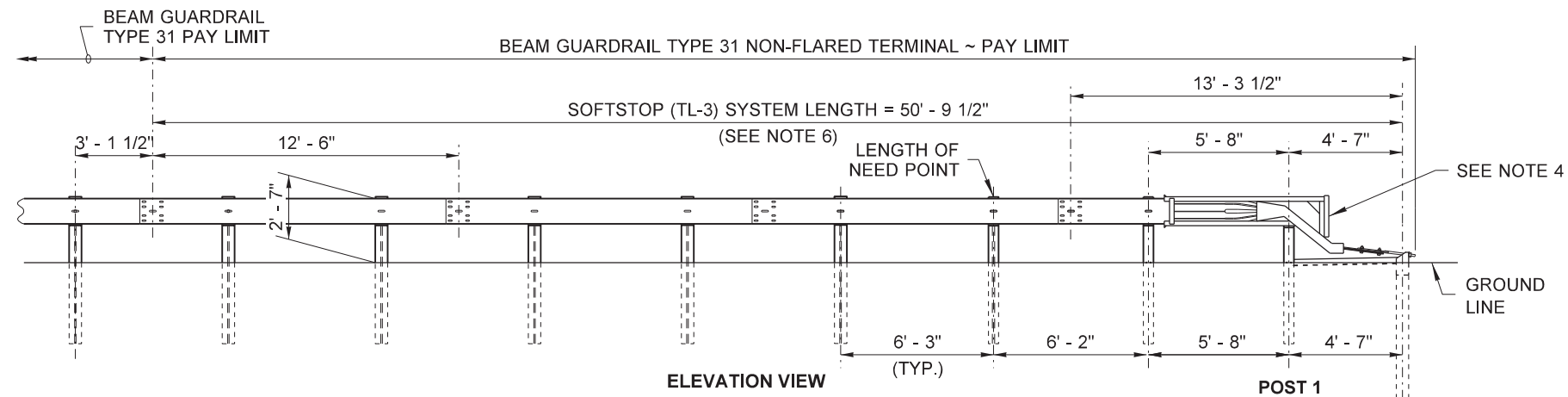
PLAN VIEW

**MSKT-SP-MGS (TL-3) SHOWN**



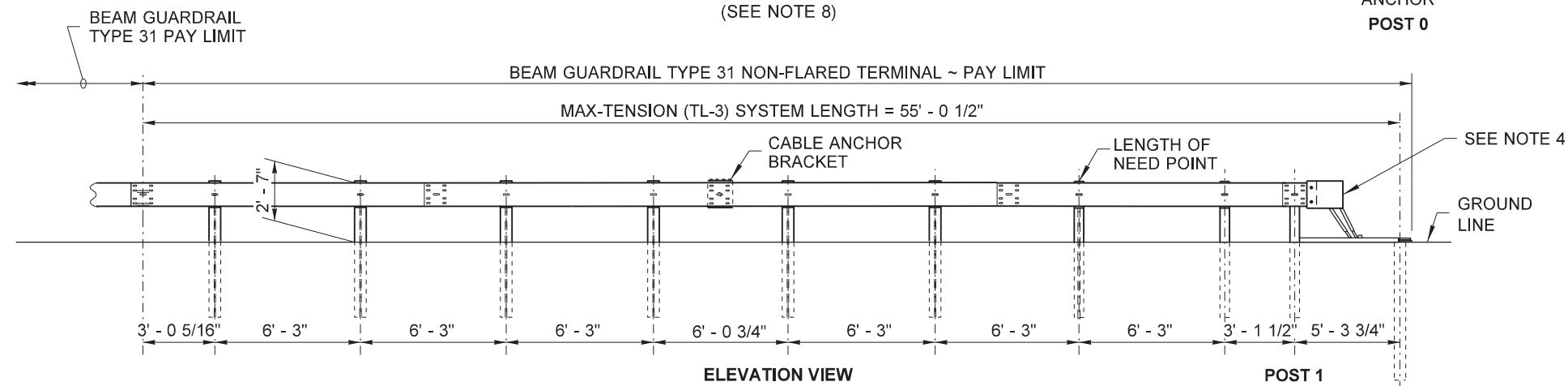
ELEVATION VIEW

**MSKT-SP-MGS (TL-3)**  
(SEE NOTE 8)



ELEVATION VIEW

**SOFTSTOP (TL-3)**  
(SEE NOTE 8)



ELEVATION VIEW

**MAX-TENSION (TL-3)**  
(SEE NOTE 8)

**NOTES**

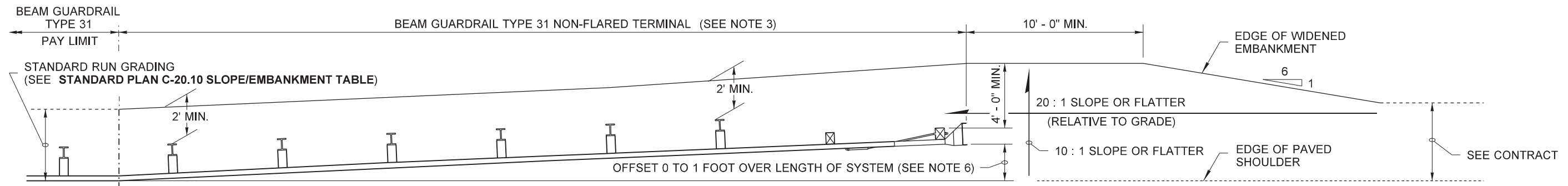
1. The Implementation of the Manual for Assessment of Safety Hardware (MASH) criteria may result in the acceptance of guardrail terminal systems currently not shown on this plan. Non-Flared terminals shall be selected from the WSDOT Qualified Products List (QPL) or approved through the WSDOT Request for Approval of Materials (RAM) process.
2. This terminal is MASH compliant at Test Level Three (TL-3) and may be used for all posted speeds.
3. An MSKT-SP-MGS (TL-3) as manufactured by Road Systems, Inc, SOFTSTOP (TL-3) as manufactured by Trinity Highway Products, LLC, or MAX-TENSION (TL-3) as manufactured by Lindsay Transportation Solutions, shall be installed according to manufacturer's recommendations.
4. A reflectorized object marker shall be installed according to manufacturer's recommendations.
5. Snow load rail washers shall not be installed within the terminal limits.
6. Provide an offset between 0 to 2 feet so that the impact head does not encroach onto the paved shoulder. The offset is provided over the length of the terminal system from the center of the last post splice to either:  
(1) The face of the impact head at its leading edge (MSKT-SP-MGS), or  
(2) The center of Anchor **Post 0** (Softstop or Max-Tension). Provide maximum offset where practicable.
7. For terminal details, see WSDOT approved manufacturer's drawings.
8. These terminals are supplied with steel posts only. They can be used with beam guardrail Type 31 runs composed of steel or wood guardrail posts.



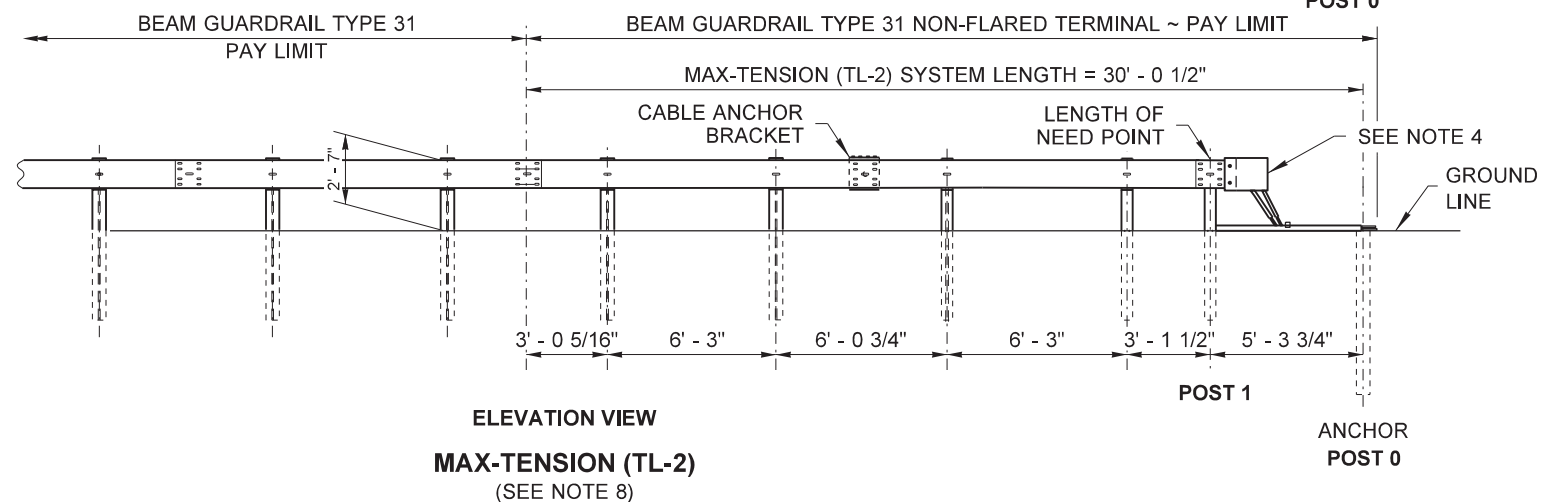
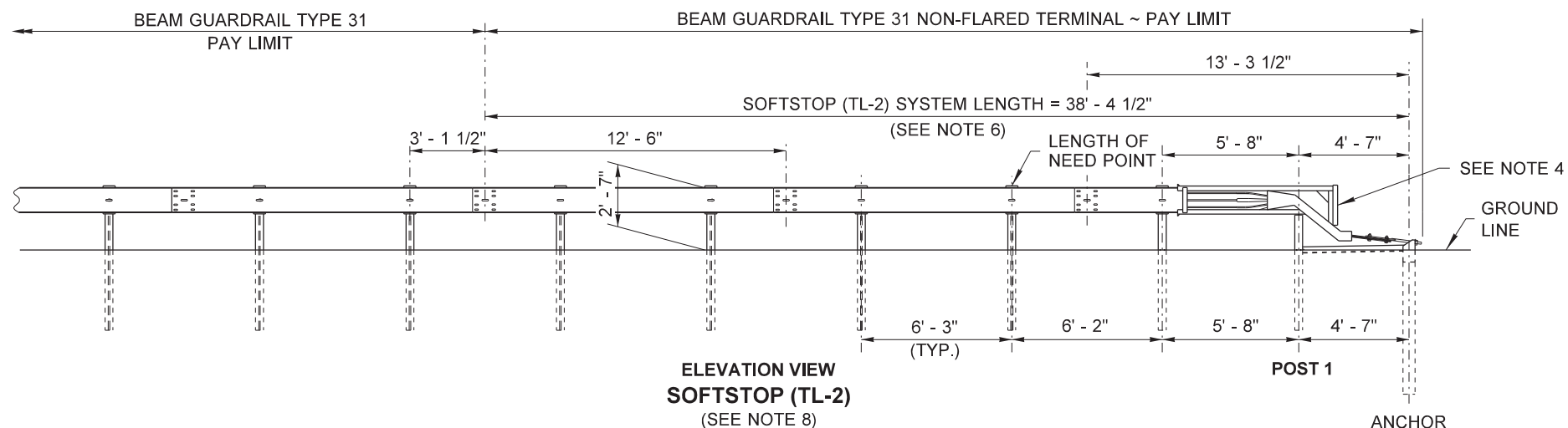
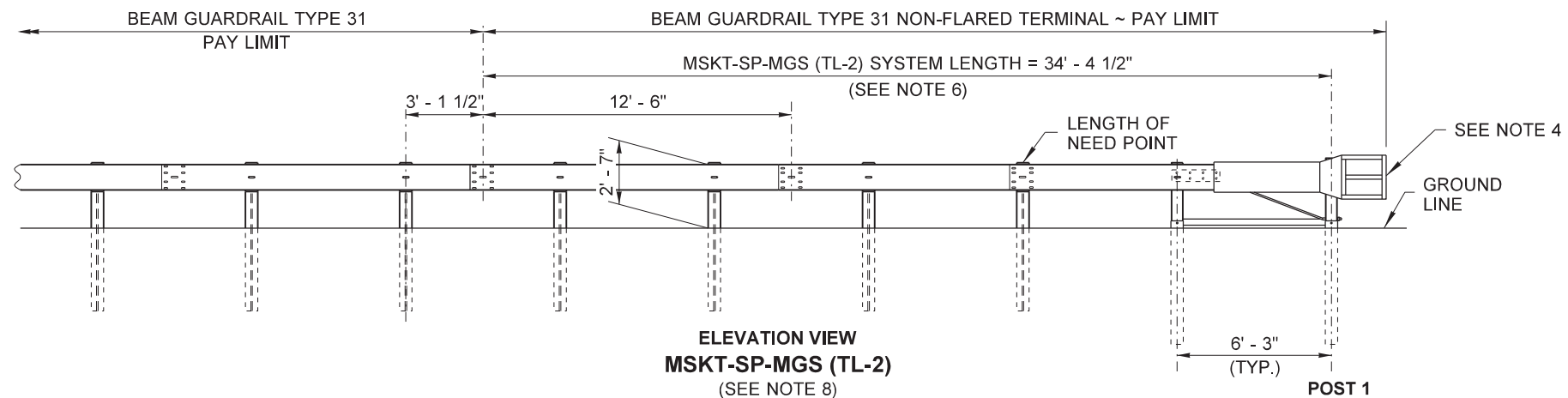
*John Patrick Donahue*  
Donahue, John  
Aug 10 2019 2:02 PM  
**BEAM GUARDRAIL TYPE 31  
NON-FLARED TERMINAL  
(ALL POSTED SPEEDS)  
STANDARD PLAN C-22.40-07**

SHEET 1 OF 1 SHEET



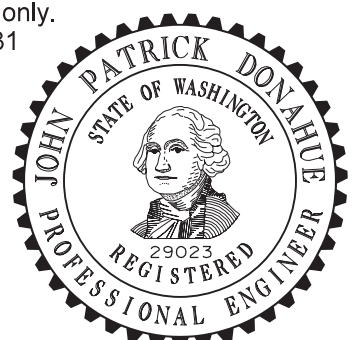


PLAN VIEW  
(MSKT-SP-MGS (TL-2) SHOWN)



## NOTES

1. The Implementation of the Manual for Assessment of Safety Hardware (MASH) criteria may result in the acceptance of guardrail terminal systems currently not shown on this plan. Non-Flared terminals shall be selected from the WSDOT Qualified Products List (QPL) or approved through the WSDOT Request for Approval of Materials (RAM) process.
2. This terminal is MASH compliant at Test Level Two (TL-2) and may be used in applications with posted speed of 45 mph or less.
3. An MSKT-SP-MGS (TL-2) as manufactured by Road Systems, Inc, SOFTSTOP (TL-2) as manufactured by Trinity Highway Products, LLC, or MAX-TENSION (TL-2) as manufactured by Lindsay Transportation Solutions, shall be installed according to manufacturer's recommendations.
4. A reflectorized object marker shall be installed according to manufacturer's recommendations.
5. Snow load rail washers shall not be installed within the terminal limits.
6. Provide an offset between 0 to 1 foot so that the impact head does not encroach onto the paved shoulder. The offset is provided over the length of the terminal system from the center of the last post splice to either:  
(1) The face of the impact head at its leading edge (MSKT-SP-MGS), or  
(2) The center of anchor **Post 0** (Softstop or Max-Tension). Provide the maximum offset where practicable.
7. For terminal details, see WSDOT approved manufacturer's drawings.
8. These terminals are supplied with steel posts only. They can be used with beam guardrail Type 31 runs, composed of steel or wood guardrail posts.



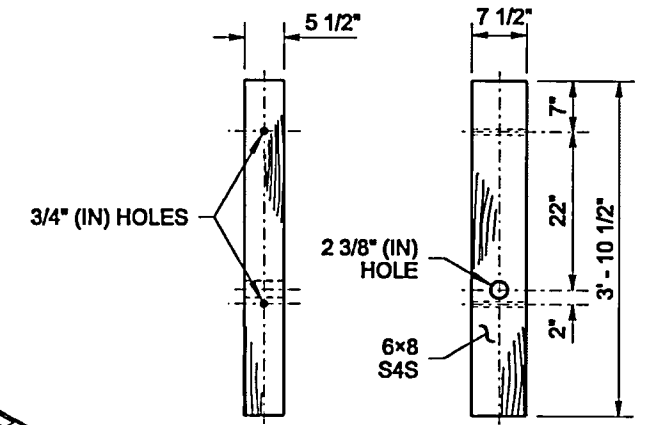
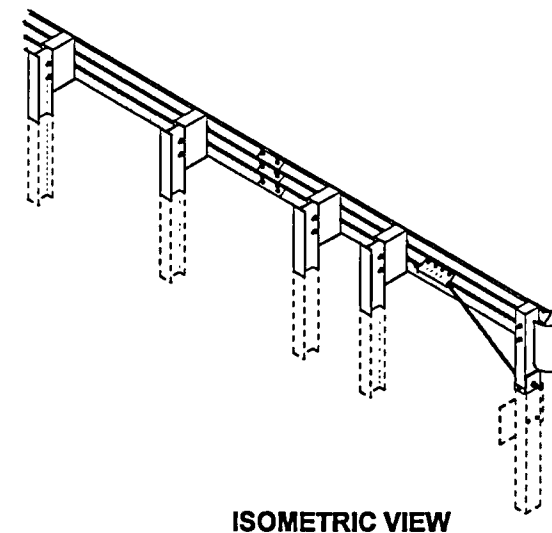
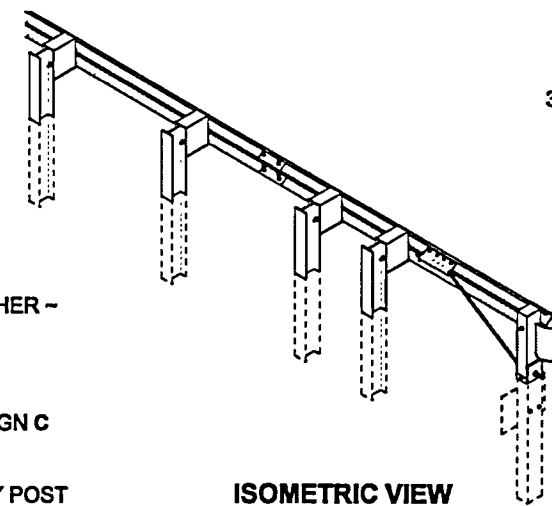
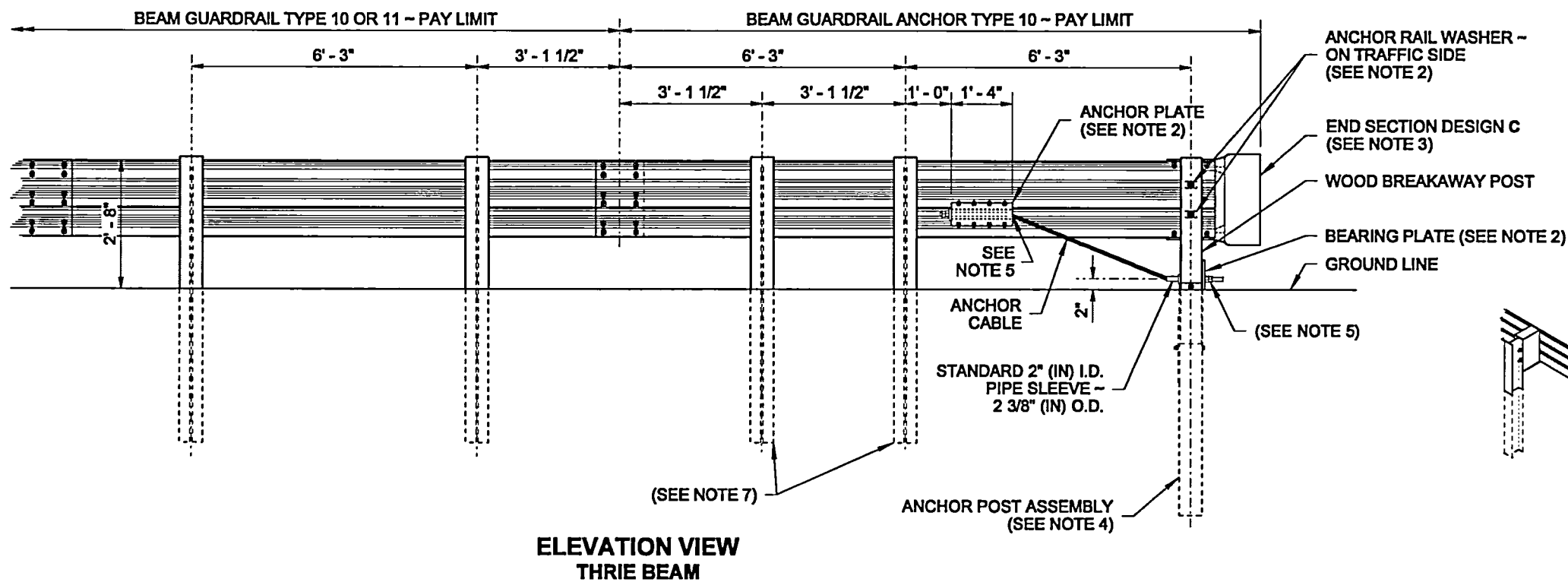
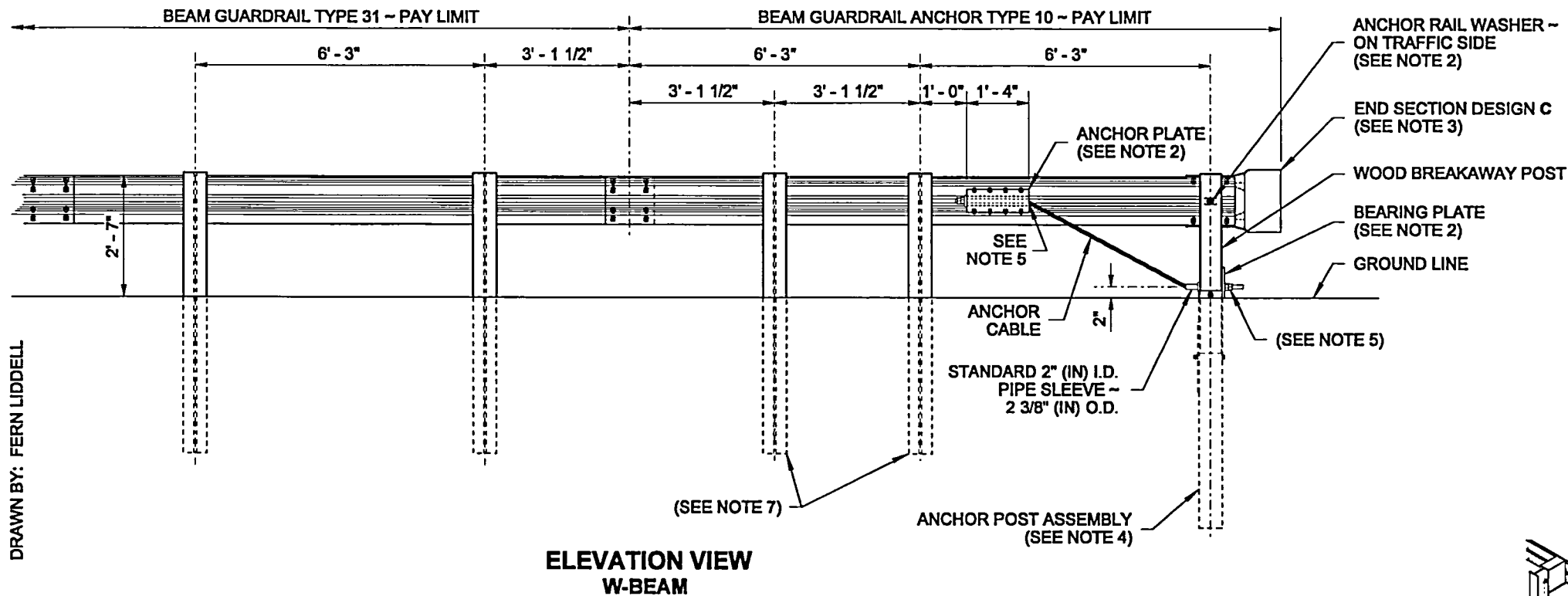
Donahue, John  
Aug 10 2019 2:03 PM

## BEAM GUARDRAIL TYPE 31 NON-FLARED TERMINAL (POSTED SPEED 45 MPH AND BELOW) STANDARD PLAN C-22.45-04

SHEET 1 OF 1 SHEET

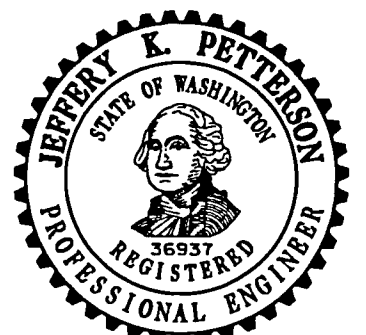
APPROVED FOR PUBLICATION  
Roark, Steve  
Aug 12 2019 11:52 AM





## NOTES

1. For use on the end of guardrail runs when a crashworthy terminal is not required.
2. For additional details not shown, see **Sheet 2** of this Plan.
3. For end section details, see **Standard Plans C-7** and **C-7a**.
4. Use details for Wood Breakaway post shown on this plan and components shown on **Standard Plan C-1b**.
5. Fasten the Anchor Cable using two 1" (in) nuts and washer, at both ends of cable. Outside nut shall be torqued against inside nut a minimum of 100 ft.-lbs.
6. Wood blocks shown. Blocks of alternate material may be used. See **Standard Specification, Section 9-16.3(2)**.
7. Posts shall match those of the connecting run: timber or steel.
8. Anchor plate may be constructed from 1/4" (in) plates welded to equal strength and dimensions as shown.
9. Eight 5/8" (in) x 1/2" (in) machine bolts with hex nut and washer. Place washer on face side of rail.



Petterson, Jeff (HIQ Design)  
Jul 6 2017 3:15 PM

**BEAM GUARDRAIL (TYPE 31)  
ANCHOR TYPE 10**

**STANDARD PLAN C-23.60-04**

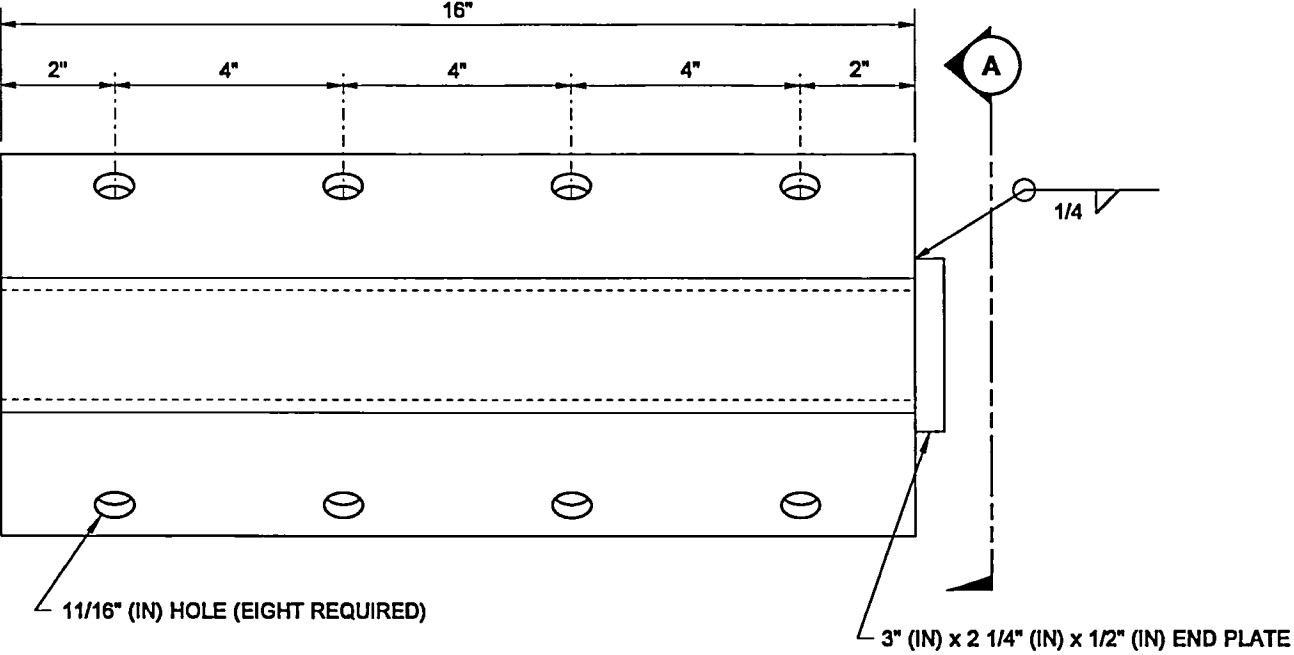
SHEET 1 OF 2 SHEETS

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Washington State Department of Transportation

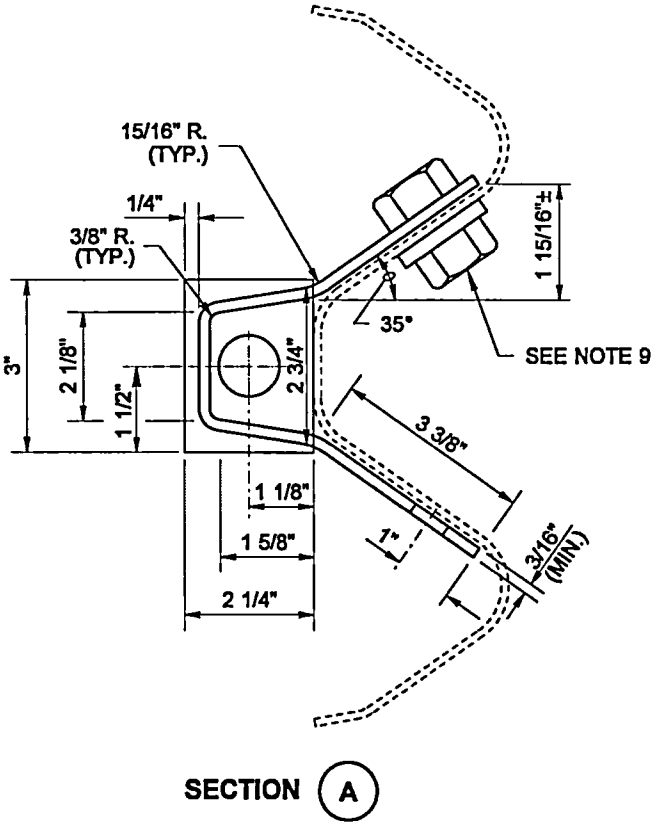
DRAWN BY: FERN LIDDELL

DRAWN BY: FERN LIDDELL

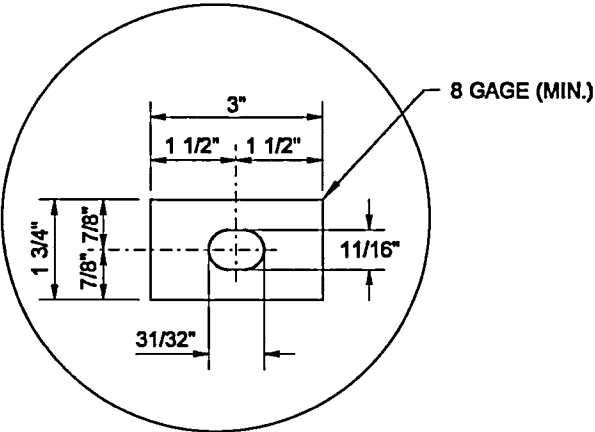


ELEVATION

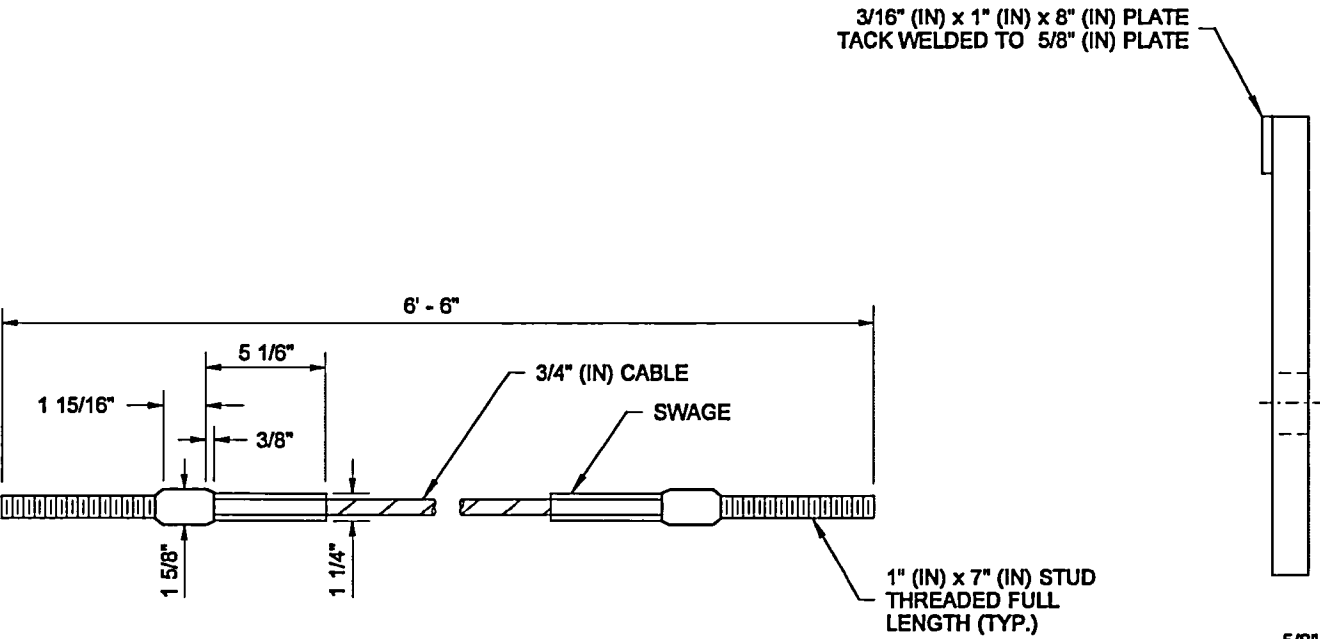
ANCHOR PLATE  
(SEE NOTE 8)



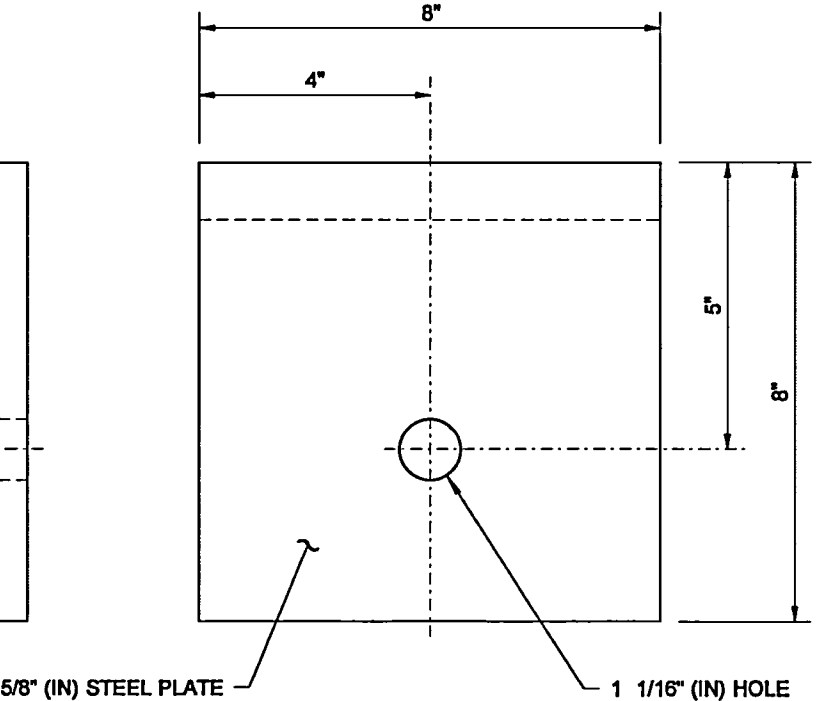
SECTION A



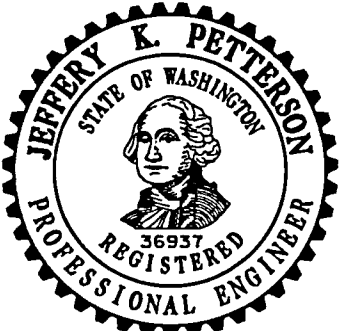
ANCHOR RAIL WASHER



ANCHOR CABLE



BEARING PLATE



Petterson, Jeff (HQ Design)  
Jul 6 2017 3:15 PM

**BEAM GUARDRAIL (TYPE 31)  
ANCHOR TYPE 10**

**STANDARD PLAN C-23.60-04**  
SHEET 2 OF 2 SHEETS

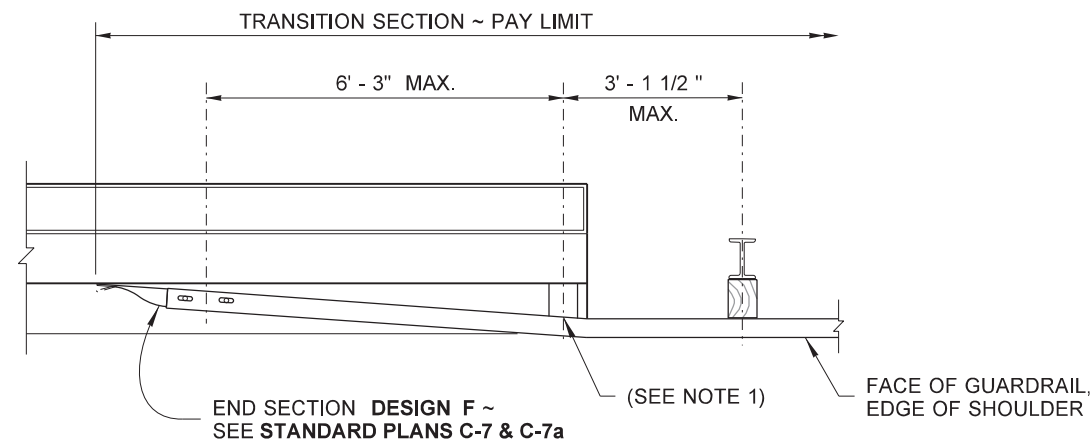
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Carpenter, Jeff  
Jul 21 2017 8:25 AM

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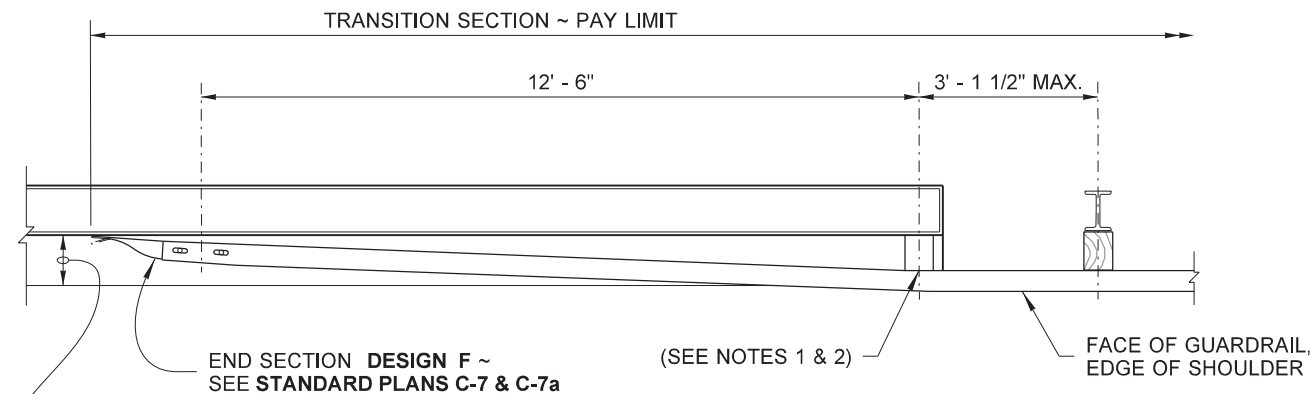
Washington State Department of Transportation

DRAWN BY: FERN LIDDELL



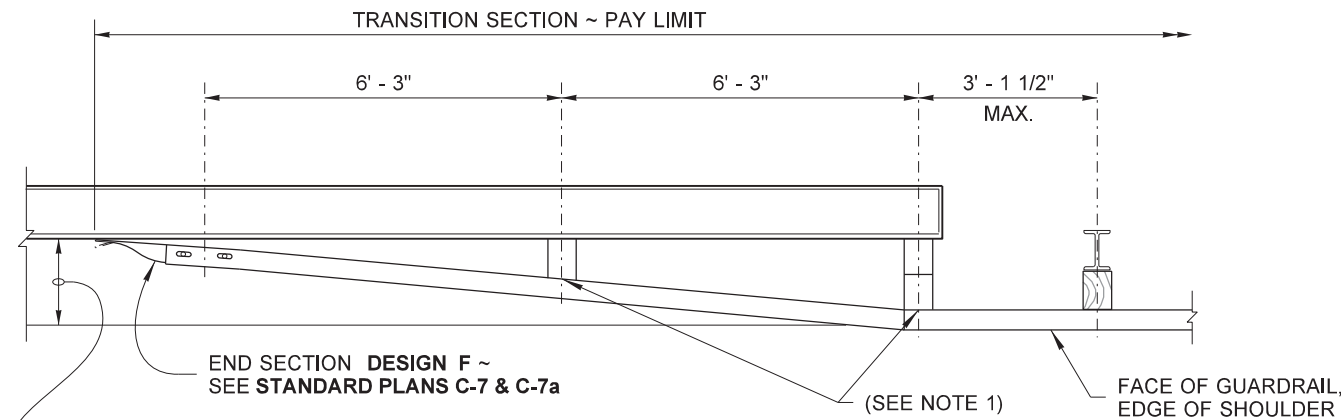
PLAN  
A CONNECTION

(FOR UNRESTRAINED PRECAST CONCRETE BARRIER)



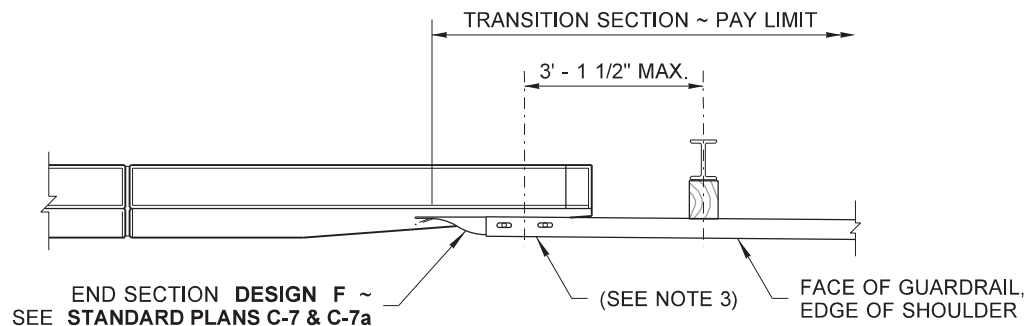
PLAN  
B CONNECTION

(FOR BRIDGE RAILS WITH CURBS 9" (IN) OR LESS, OR SAFETY SHAPE (TYPE F, TYPE 2) BRIDGE RAIL AND CONCRETE BARRIERS)



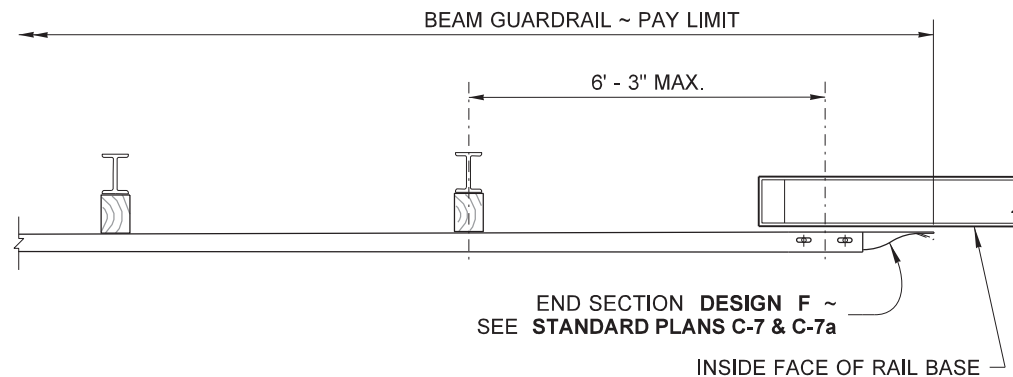
PLAN  
C CONNECTION

(FOR BRIDGE RAILS WITH CURBS BETWEEN 9"(IN) AND 18"(IN))



PLAN  
D CONNECTION

(FOR VERTICAL WALLS, SINGLE SLOPE BRIDGE RAIL AND CONCRETE BARRIER, OR TAPERED SAFETY SHAPE (TYPE F, TYPE 2) BARRIER)

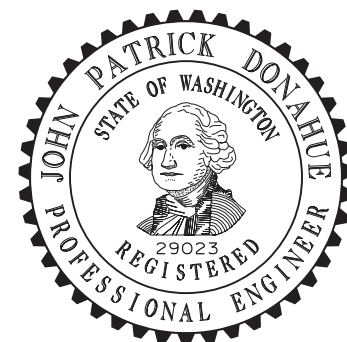


PLAN  
F CONNECTION

(FOR ALL BRIDGE RAIL AND CONCRETE BARRIER TYPES LOCATED ON TRAILING ENDS OF ONE-WAY TRAFFIC ROADWAYS)

NOTES

1. Attach guardrail to bridge rail or concrete barrier with 7/8" (in) diameter bolts in accordance with **Standard Specification, Section 9-06.5(4)**, with thin slab ferrule inserts or resin-bonded anchors. See Contract Plans.
2. If the last guardrail post is 3" (in) or less from the end of the bridge barrier, this attachment and blockout is not necessary.
3. See Bridge Plans for additional connection details.
4. Wood blocks shown. Blocks of alternate material may be used. See **Standard Specification, Section 9-16.3 (2)**.
5. Steel posts shown. Timber posts may be used.



Donahue, John  
Aug 10 2019 2:04 PM

**GUARDRAIL CONNECTION  
TO BRIDGE RAIL  
OR CONCRETE BARRIER  
STANDARD PLAN C-24.10-02**

SHEET 1 OF 1 SHEET

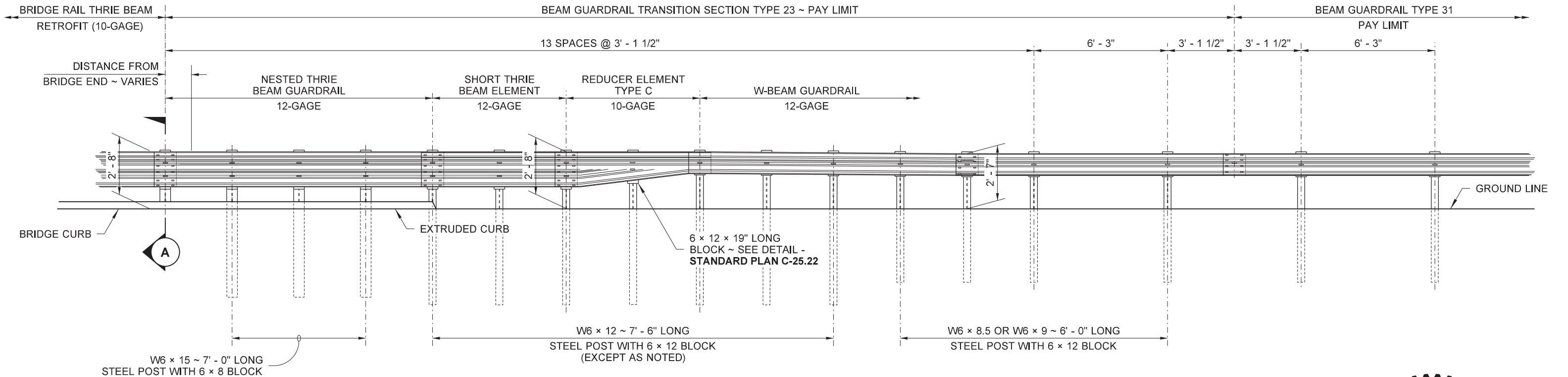
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Roark, Steve  
Aug 12 2019 11:53 AM

STATE DESIGN ENGINEER

Washington State Department of Transportation

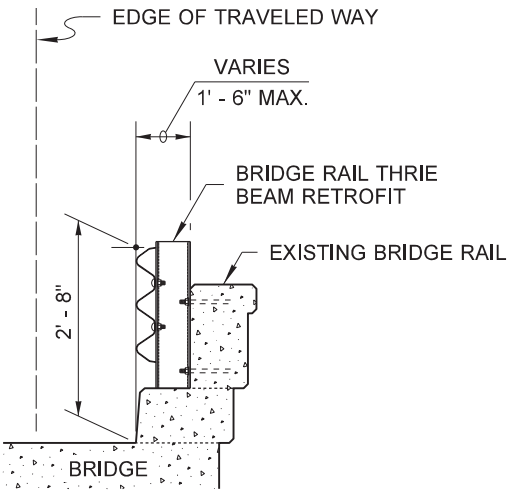
NOTES

1. See **Standard Plan C-1b, C-20.10, and C-25.20** for rail elements and thrie beam block details.
2. When a transition is required on the trailing end of the bridge, use a mirror image of this plan.
3. For additional alternatives not shown, see Contract Plans.



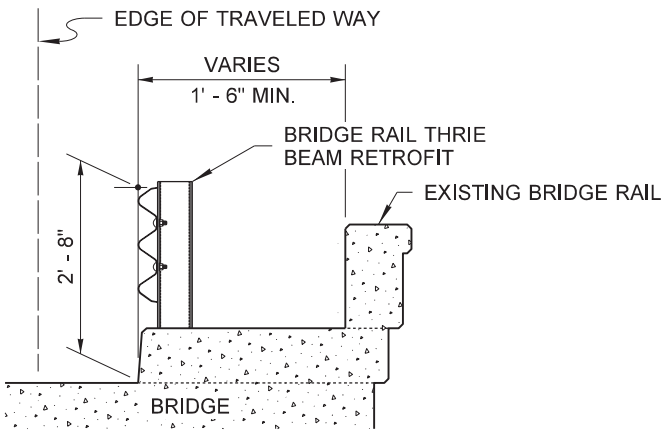
TYPE 23

APPROACH END (SHOWN - SEE NOTE 2)  
THRIE BEAM INSTALLED AT FACE OF CURB



ALTERNATIVE 1

SECTION **A**  
(SEE NOTE 3)



ALTERNATIVE 2



Donahue, John  
Aug 10 2019 2:07 PM

**BEAM GUARDRAIL (TYPE 31)  
TRANSITION SECTION  
TYPE 23**

**STANDARD PLAN C-25.26-04**

SHEET 1 OF 1 SHEET

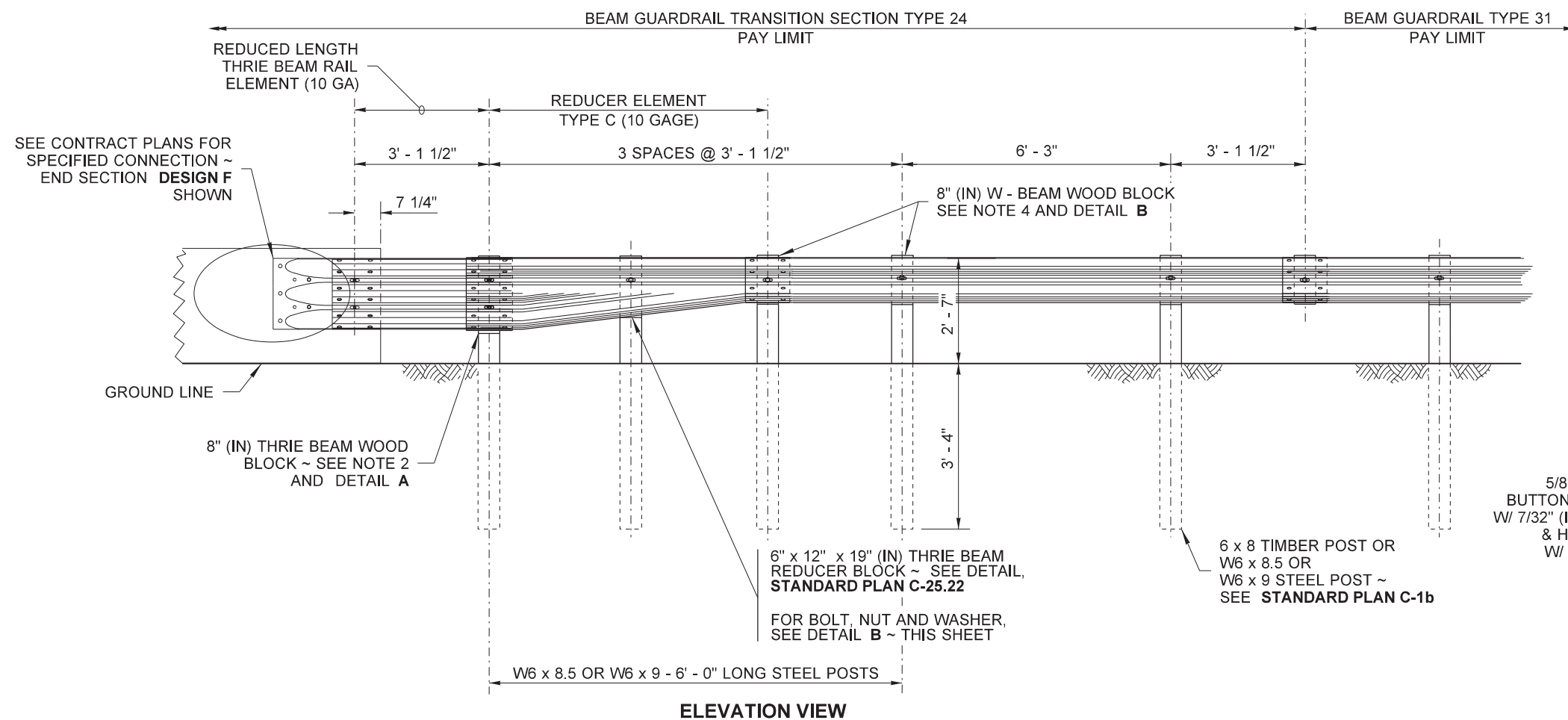
APPROVED FOR PUBLICATION

Roark, Steve  
Aug 12 2019 11:53 AM

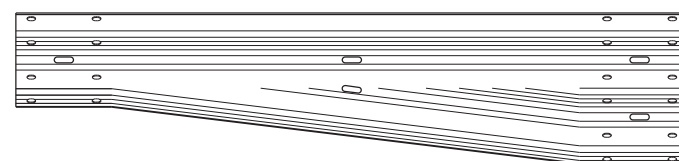
STATE DESIGN ENGINEER



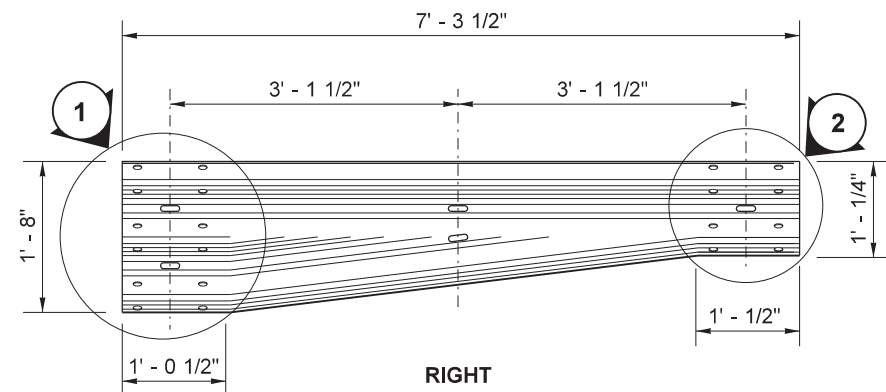
Washington State Department of Transportation



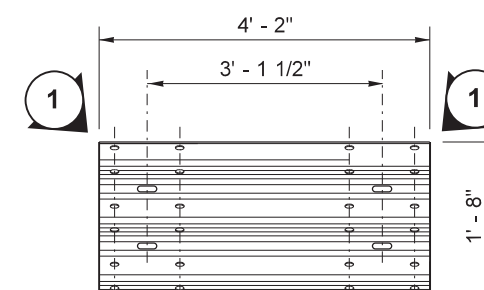
ELEVATION VIEW



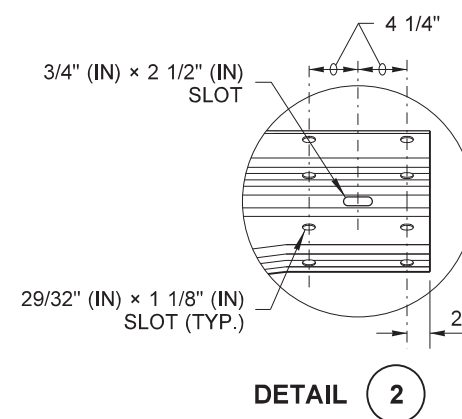
LEFT  
(MIRROR OF RIGHT)



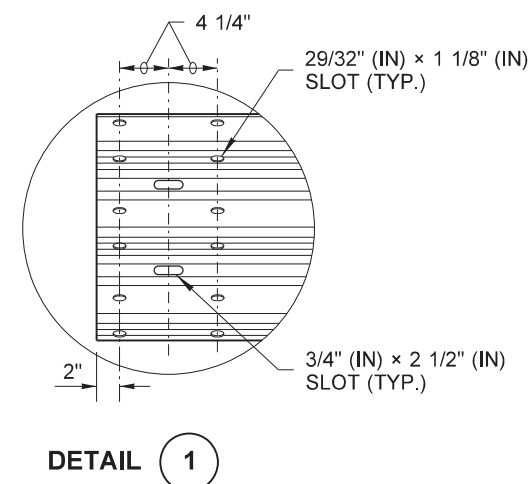
RIGHT  
REDUCER ELEMENT TYPE C



REDUCED LENGTH THRIE-BEAM  
RAIL ELEMENT  
10 GAGE



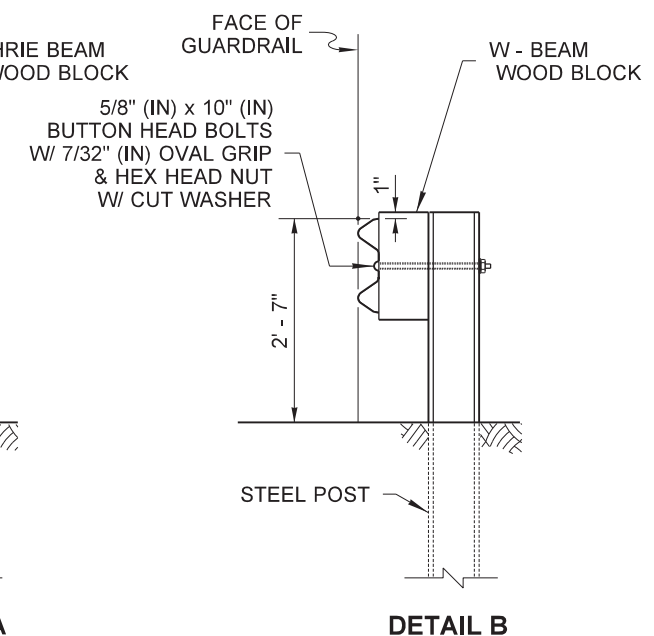
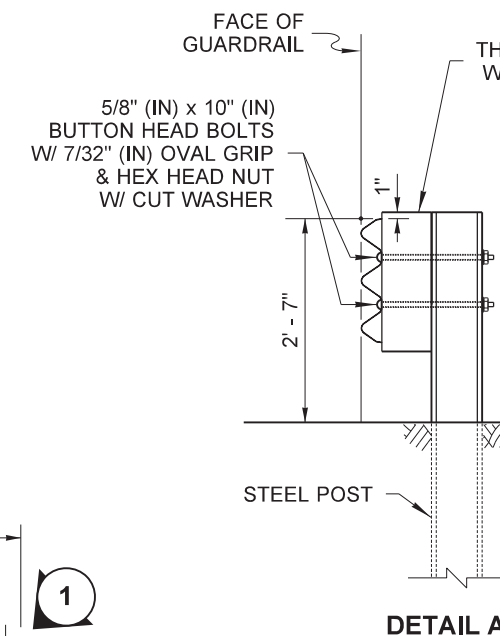
DETAIL 2



DETAIL 1

## NOTES

1. This guardrail transition is for connection to a vertical concrete shape, a single slope, or a safety-shape barrier. The toe of the single slope and the safety-shape barrier shall be tapered or the barrier blocked out so that the toe of the barrier does not project beyond the face of the approach guardrail.
2. See **Standard Plan C-1b** for thrie beam wood block detail.
3. See **Standard Plan C-20.10** for typical components (nuts, washers and bolts) at splices.
4. See **Standard Plan C-1b** for W-Beam wood block detail.
5. All rail sections shall be lapped in the direction of traffic.
6. See **Standard Plan C-24.10** for details regarding connection to bridge rail or traffic barrier.



Petterson, Jeff (HQ Design)  
Jun 26 2018 9:48 AM

## BEAM GUARDRAIL (TYPE 31) TRANSITION SECTION TYPE 24 (POSTED SPEED 45 MPH AND BELOW) STANDARD PLAN C-25.30-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION  
Carpenter, Jeff  
Jun 28 2018 10:43 AM

STATE DESIGN ENGINEER

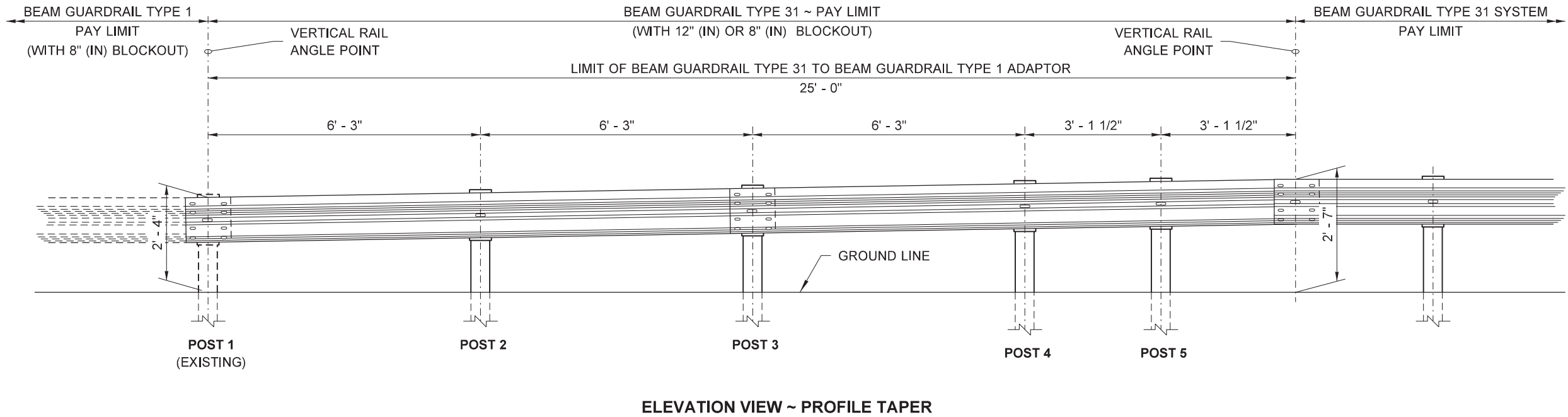
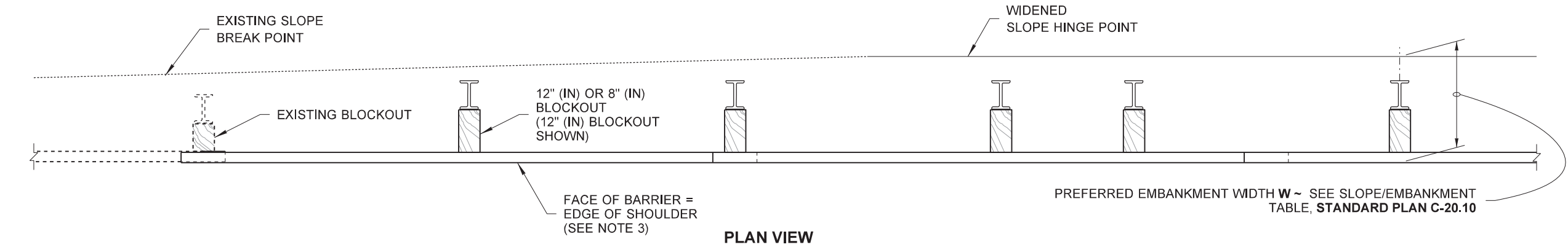


Washington State Department of Transportation

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NOTES

- 1. Refer to **Standard Plan C-20.10** for component details for Beam Guardrail Type 31 (not shown on this plan).
- 2. Accommodating the wider blockout (12" (in) width) used with Type 31 guardrail will require widening the embankment.
- 3. Wood blockouts shown. Blockouts of alternate material may be used. See **Standard Specification, Section 9-16.3(2)**.
- 4. All posts for any standard barrier run shall be of the same type: timber or steel.
- 5. **Post 1** is an existing Type 1 post. **Post 2** through **5** are new posts with 12" (in) or 8" (in) blockouts. All blockouts shall be uniform in size. The blockout size shall match the size used on the Type 31 Guardrail run or non-flared terminal.

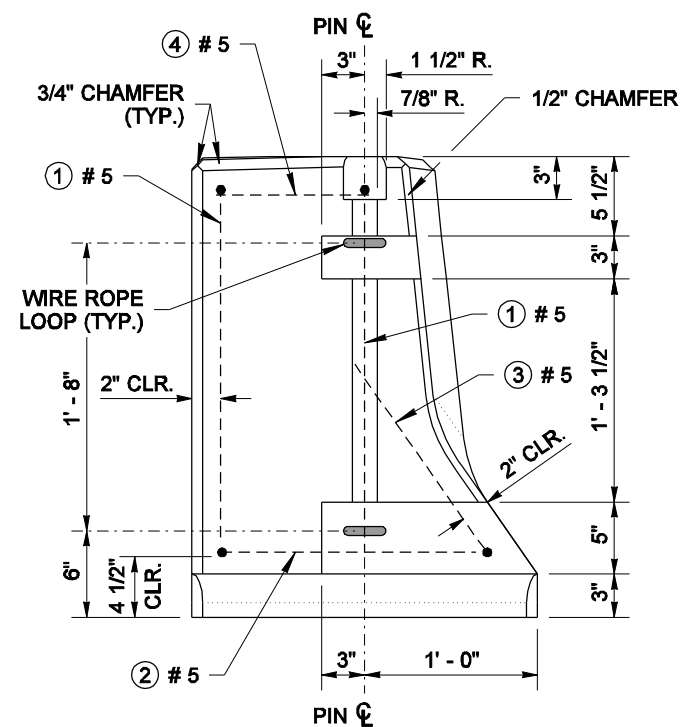


*John Patrick Donahue*  
Donahue, John  
Aug 10 2019 2:11 PM  
**BEAM GUARDRAIL TYPE 31  
TO BEAM GUARDRAIL TYPE 1  
ADAPTOR**  
**STANDARD PLAN C-25.80-05**

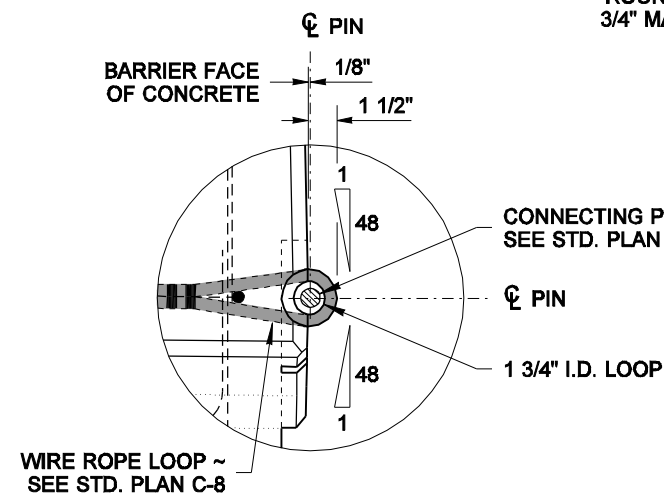
SHEET 1 OF 1 SHEET



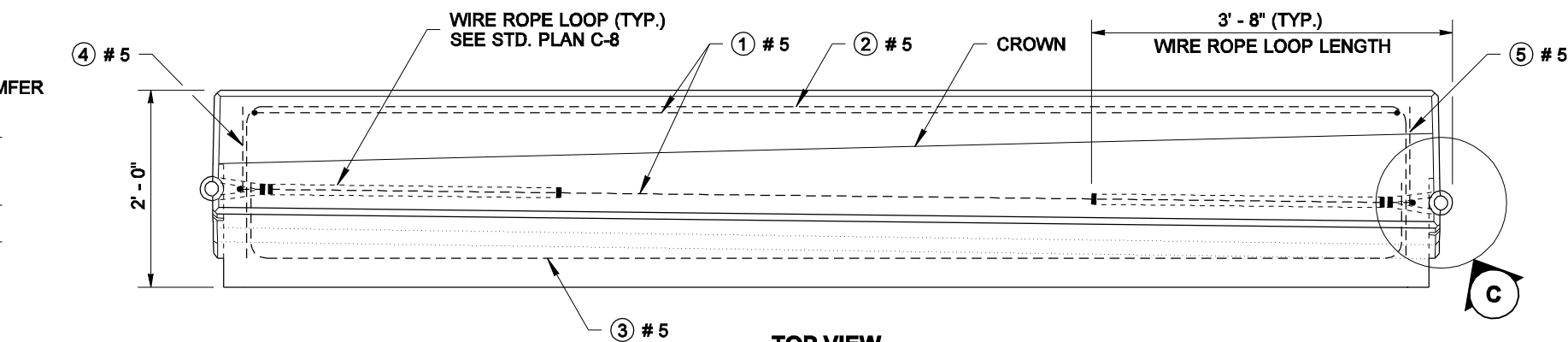
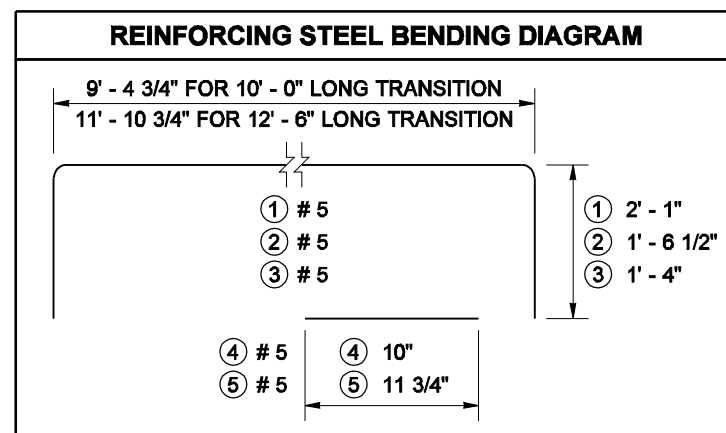
DRAWN BY: MARK SUJKA



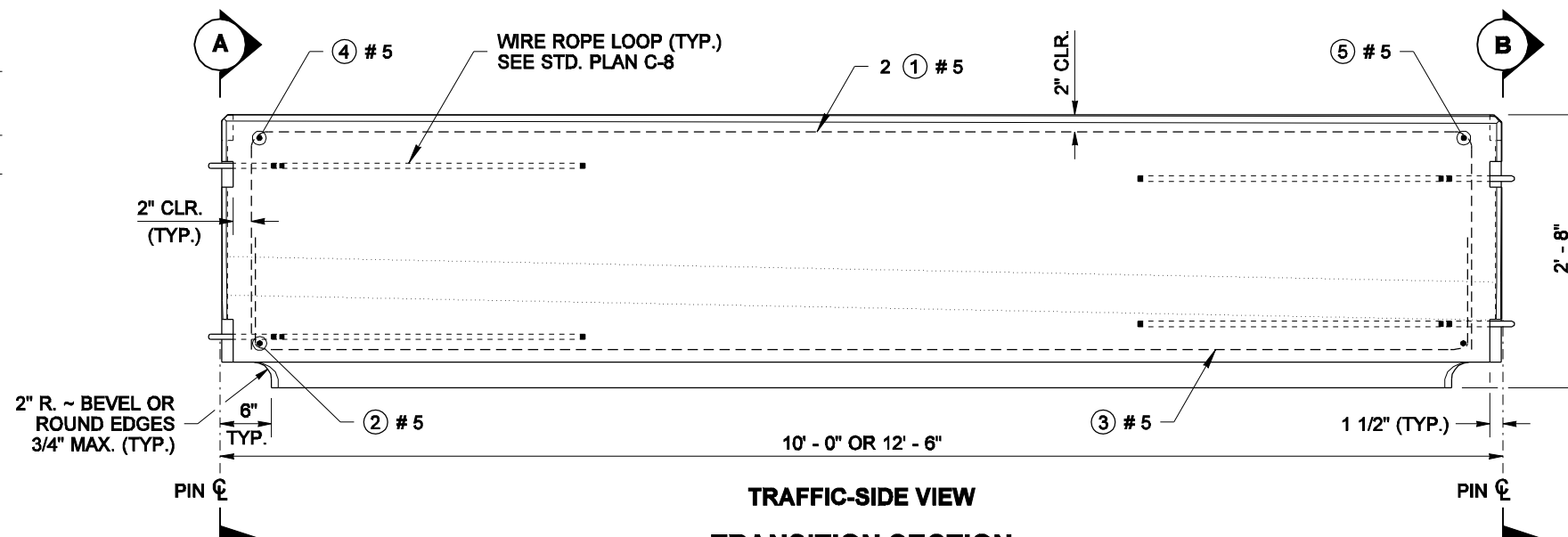
**CONCRETE BARRIER TYPE 2 (NJ-SHAPE)**  
**END VIEW**



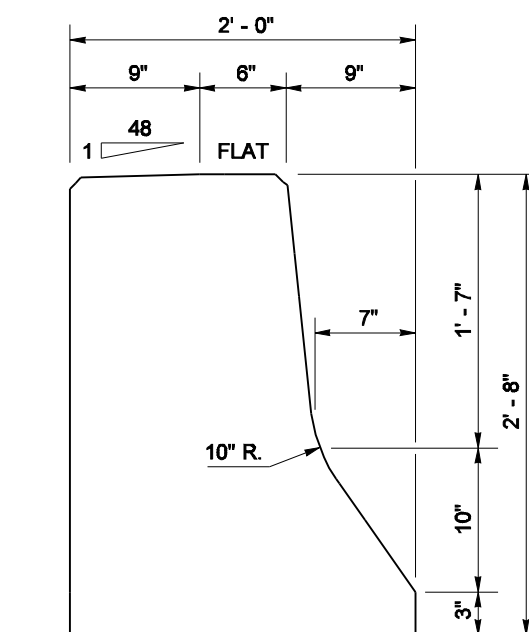
**TYPICAL ~ BOTH ENDS**



### TOP VIEW



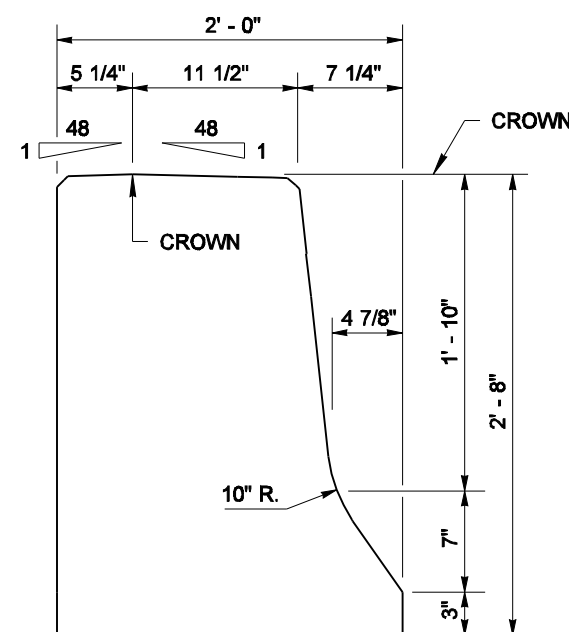
**TRAFFIC-SIDE VIEW**  
**TRANSITION SECTION**



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

SECTION A

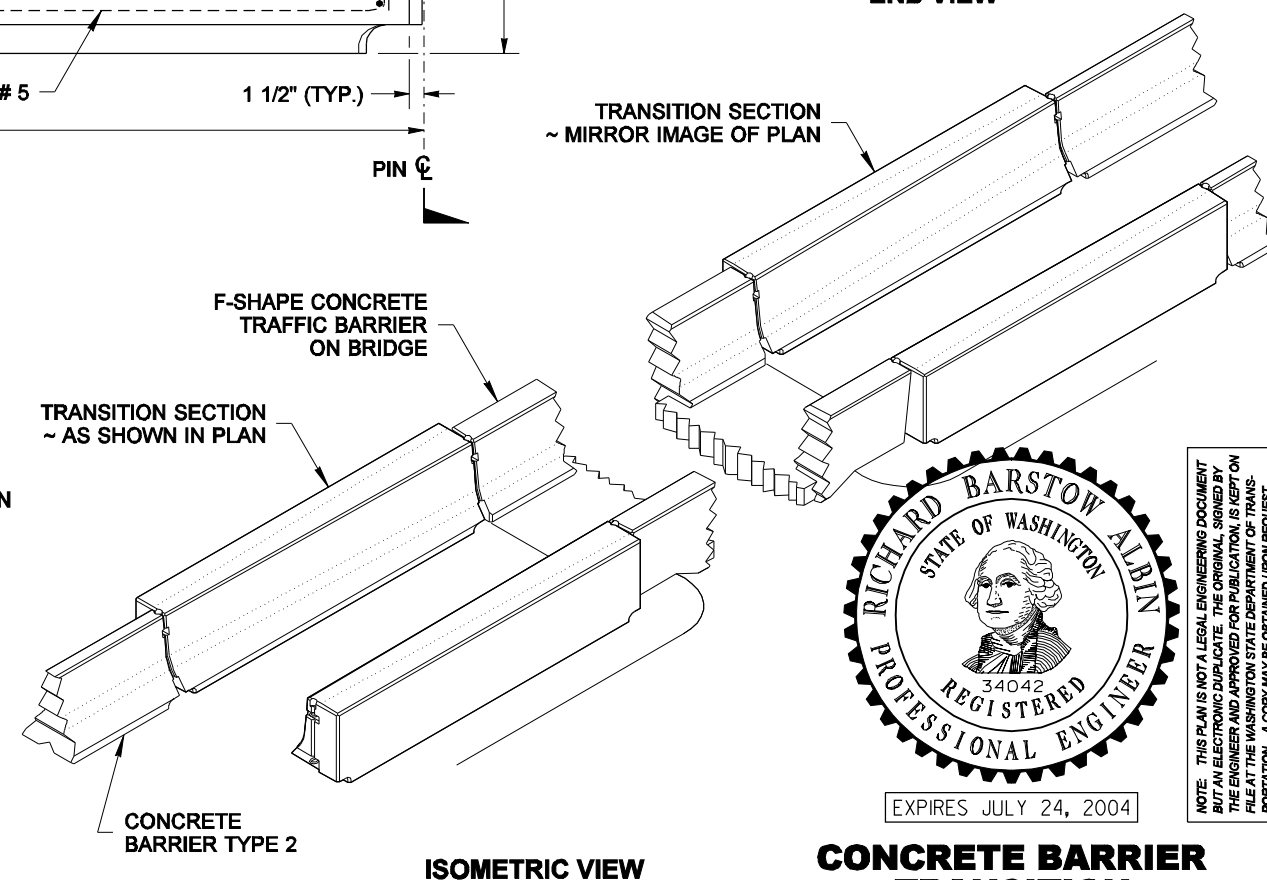
(SHOWN AT LIMIT OF TRANSITION)



## BRIDGE F-SHAPE TRAFFIC BARRIER

**SECTION B**

**(SHOWN AT LIMIT OF TRANSITION)**



### ISOMETRIC VIEW

### 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.



EXPIRES JULY 24, 2004

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

**SHEET 1 OF 1 SHEET**

APPROVED FOR PUBLICATION

**Harold J. Peterfeso**

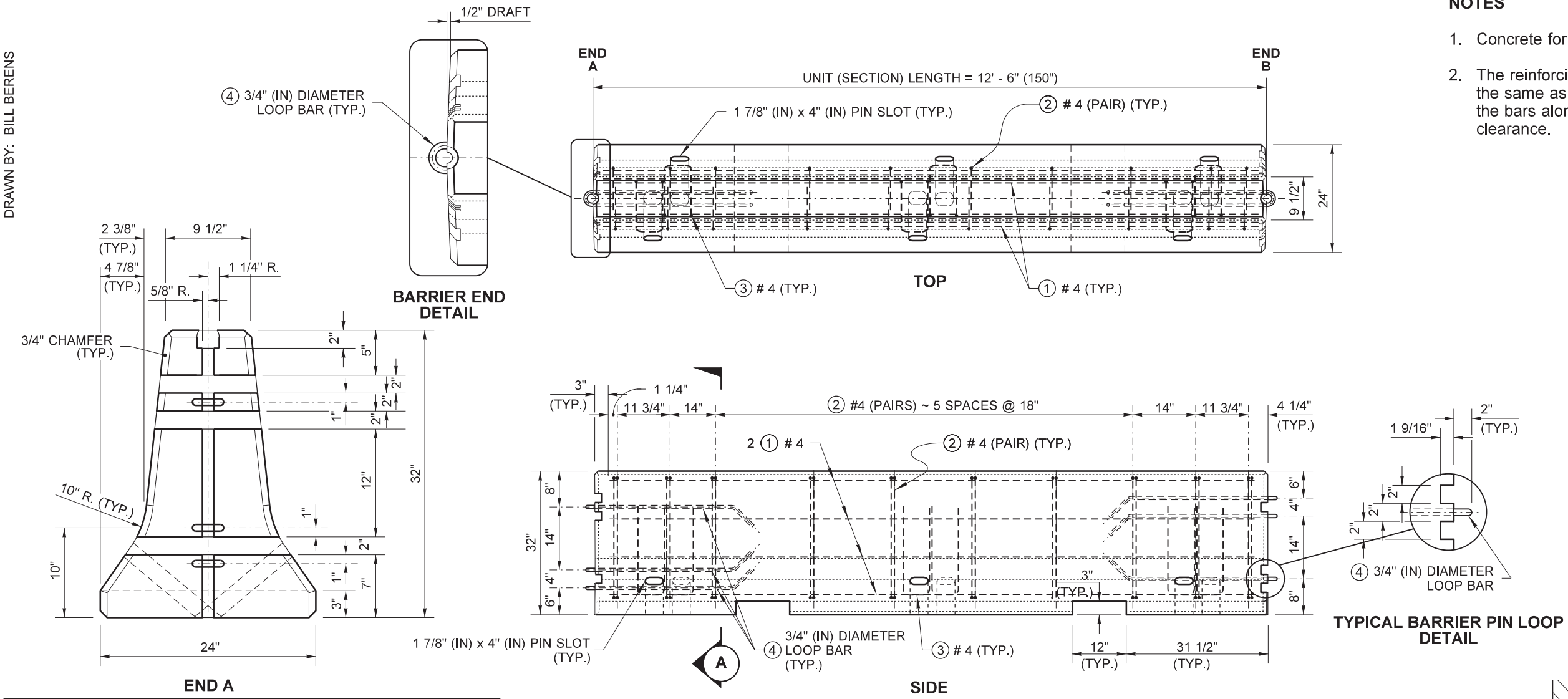
STATE DESIGN ENGINEER

**06-30-04**

 **Washington State Department of Transportation**

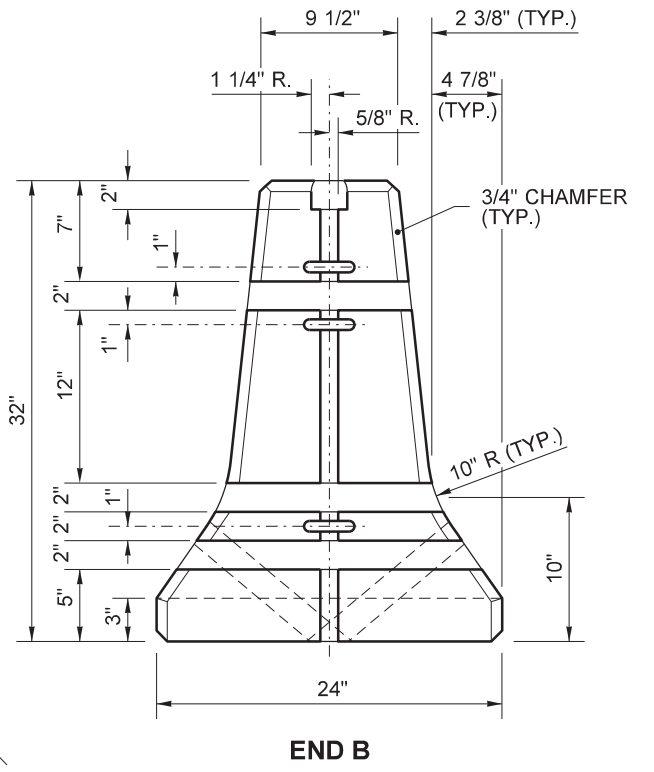
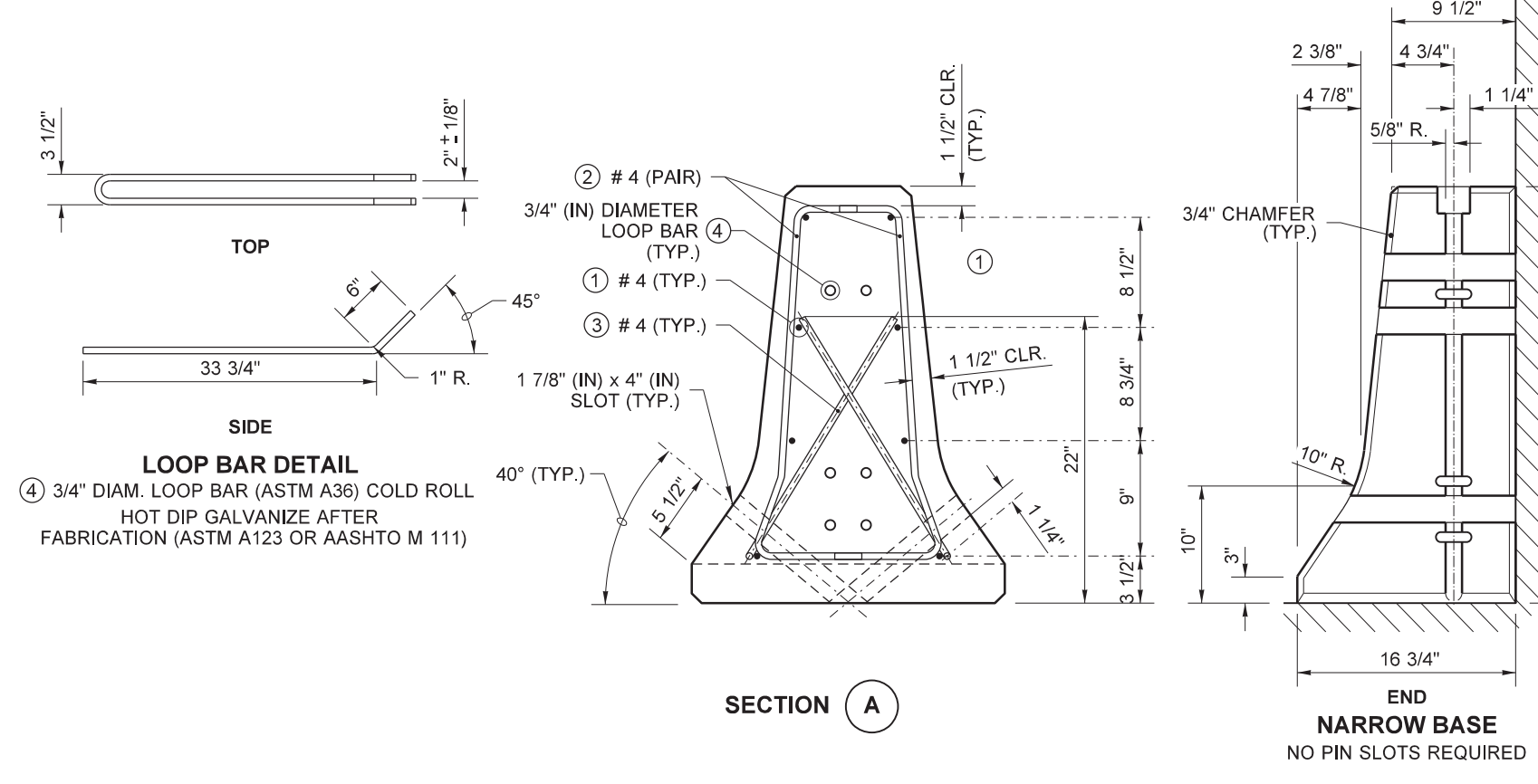
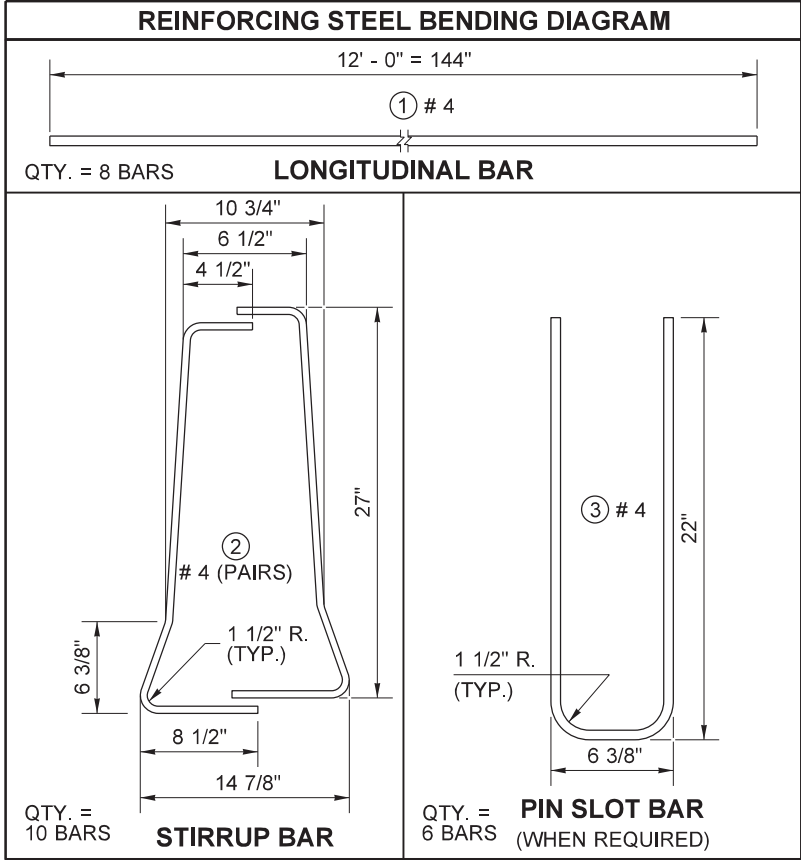
**NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION, 4000 54th AVENUE NORTH, TACOMA, WASH.**

DRAWN BY: BILL BERENS



NOTES

- Concrete for Type F Barrier shall be Class 5000.
- The reinforcing steel details for the NARROW BASE barrier are the same as those shown for the 24" (in) wide barrier except that the bars along the vertical face run vertically with a 1 1/2" (in) clearance.



Donahue, John  
Aug 21 2019 12:38 PM

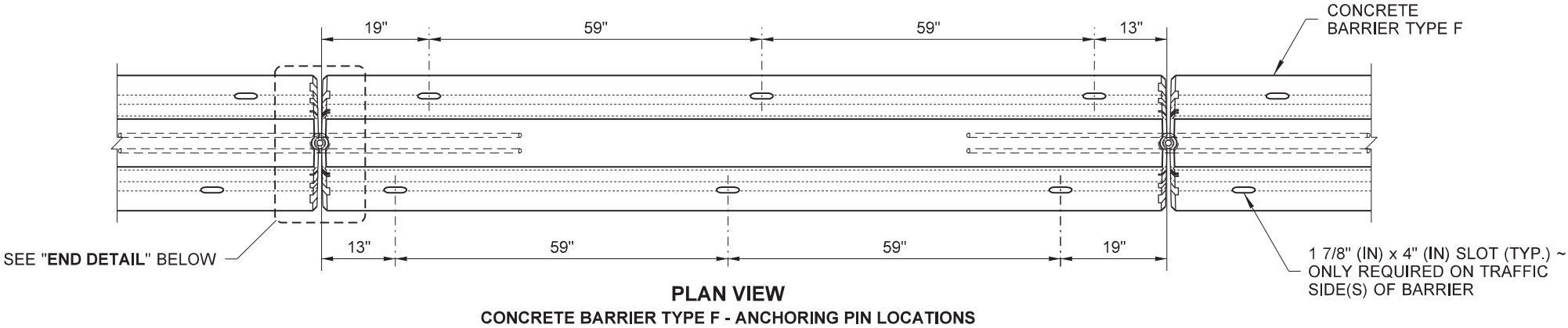
**CONCRETE BARRIER  
TYPE F (PRECAST)**

**STANDARD PLAN C-60.10-00**

SHEET 1 OF 2 SHEETS

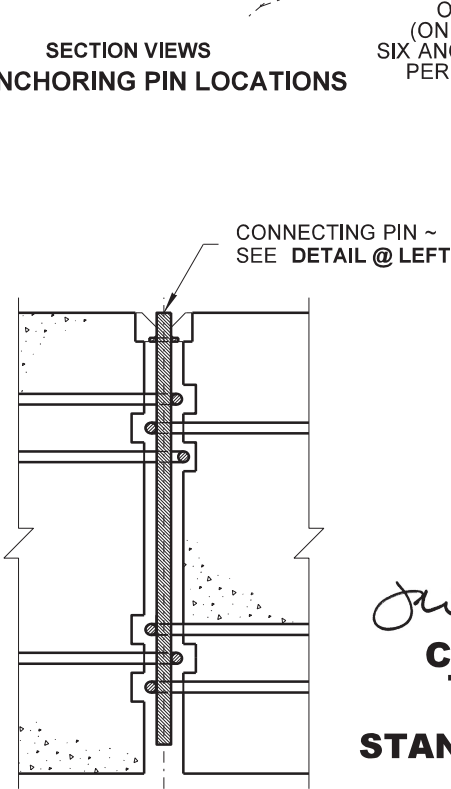
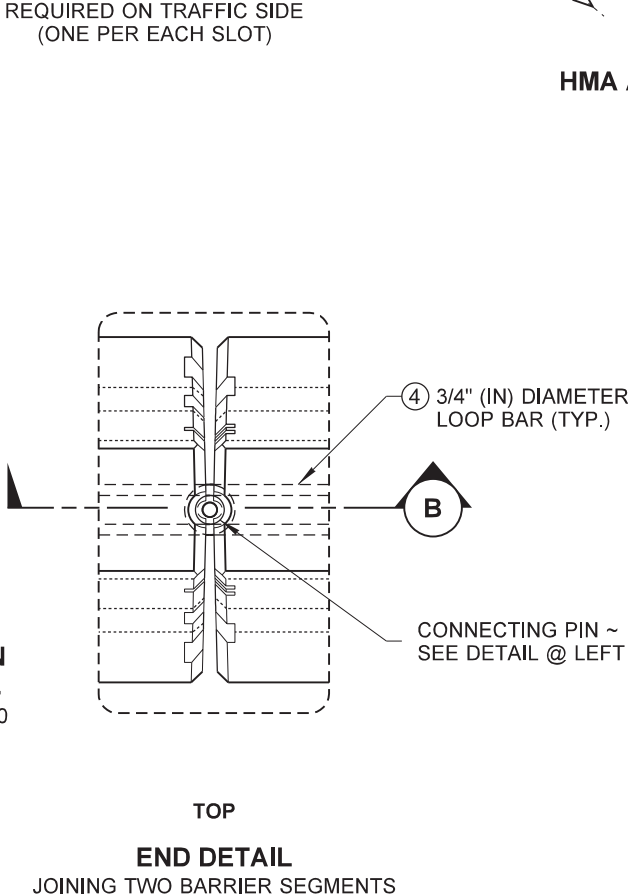
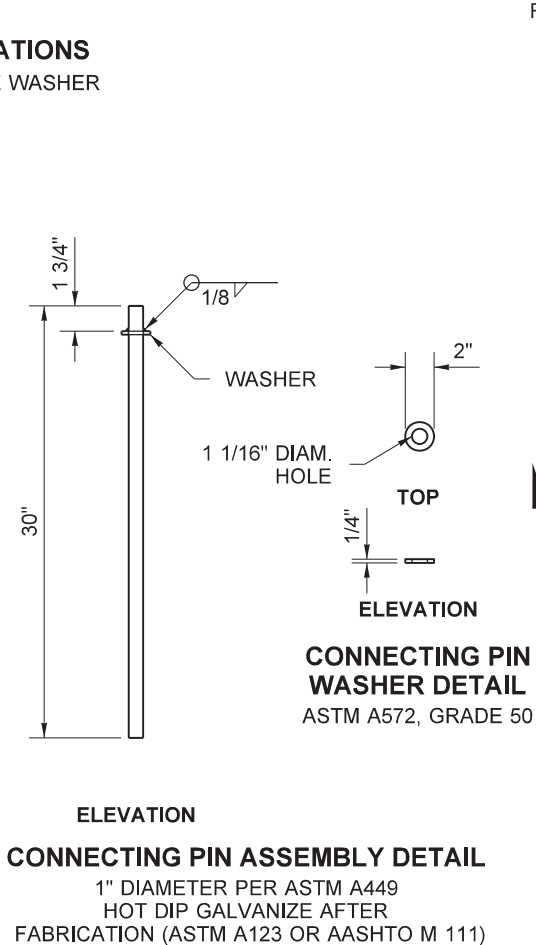
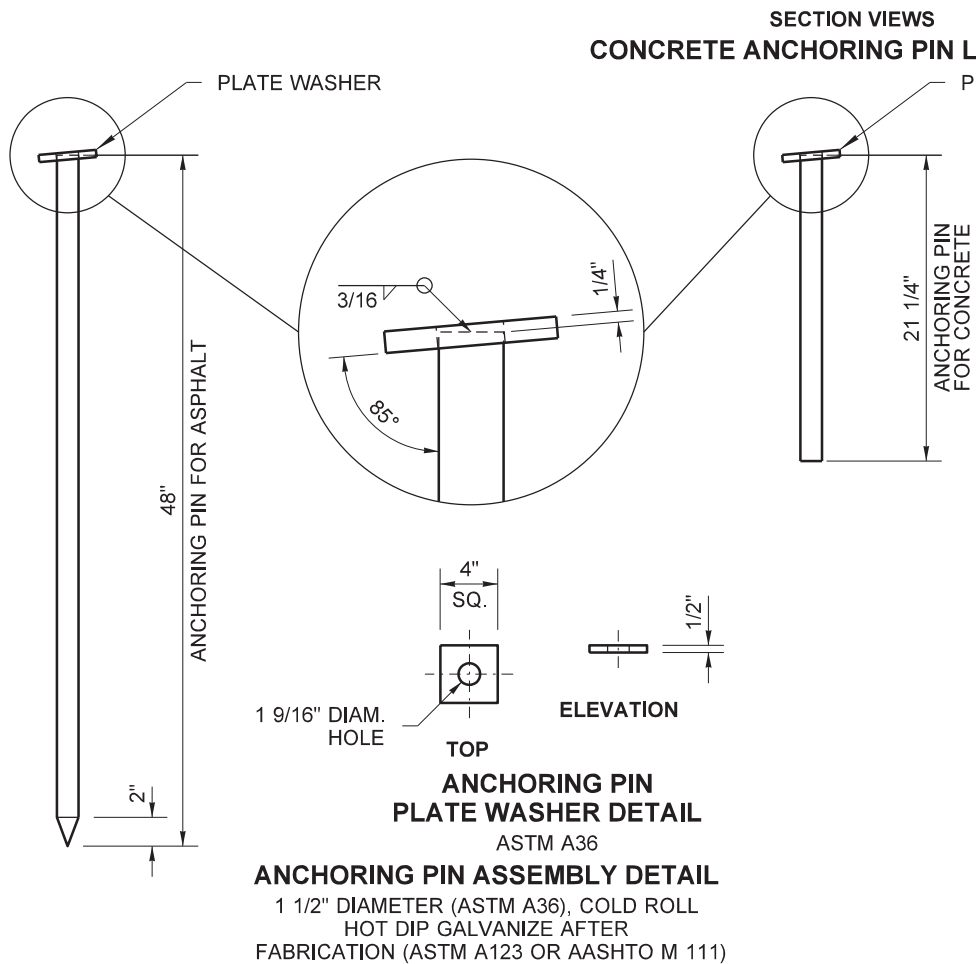
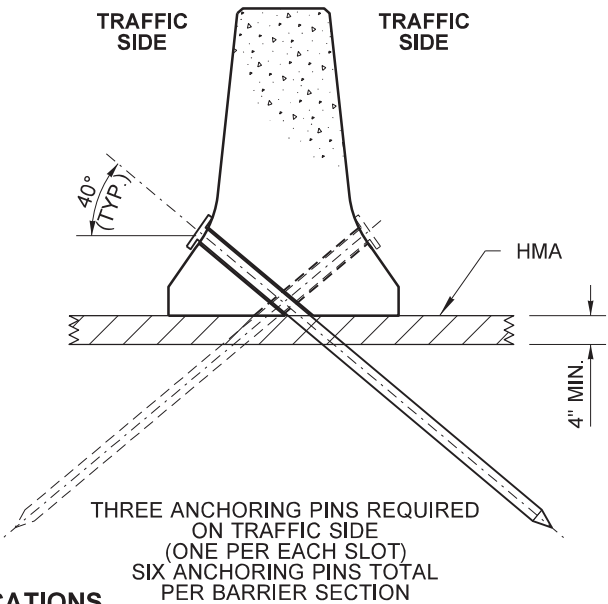
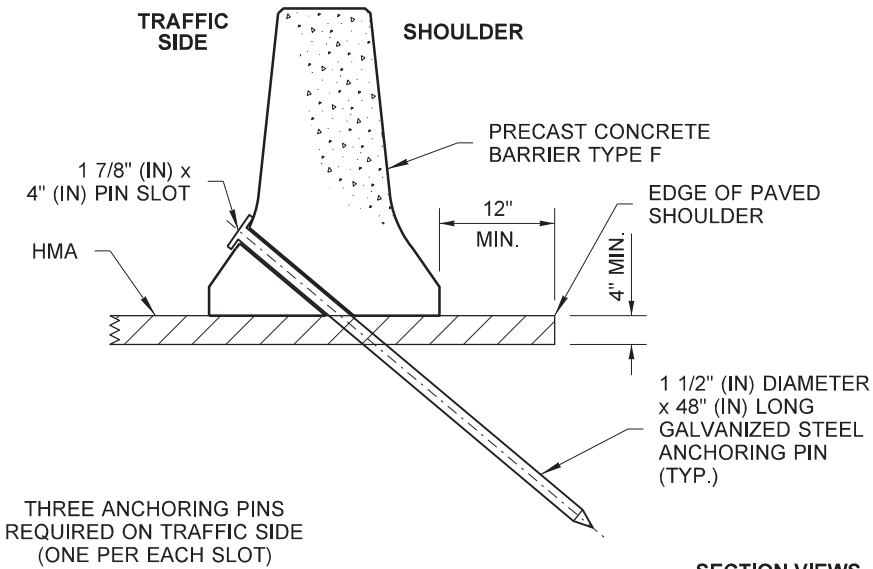
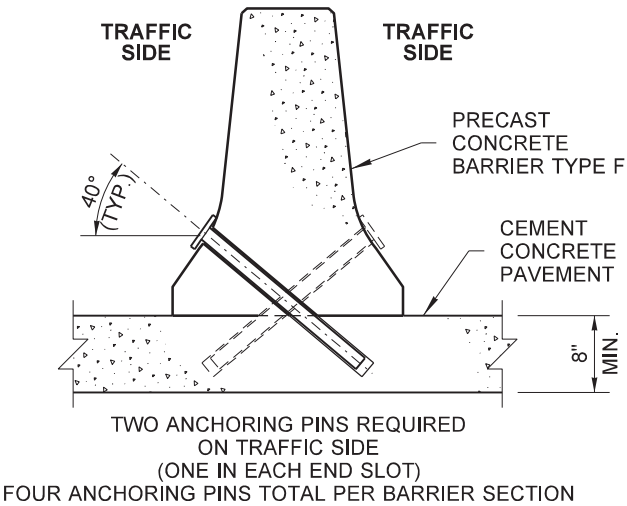
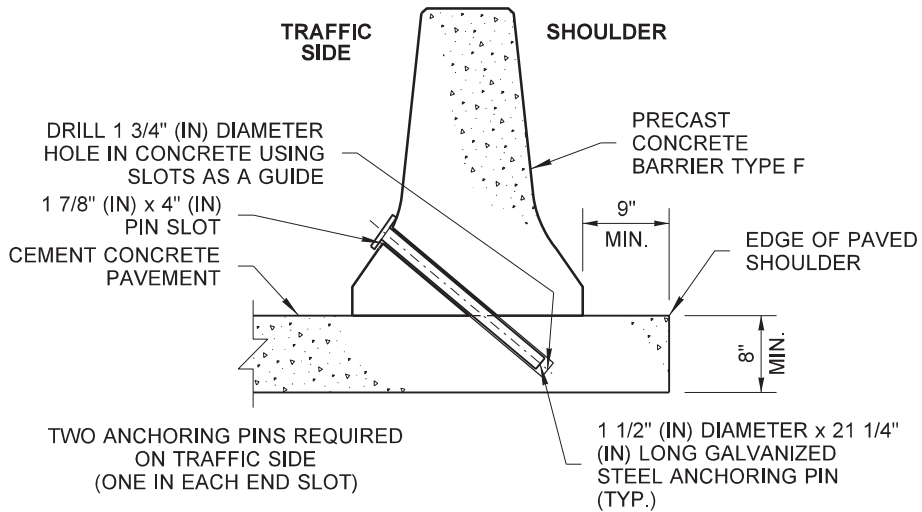
APPROVED FOR PUBLICATION  
Roark, Steve  
Aug 22 2019 6:59 AM

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NOTES (Anchoring and joining Barrier)

1. The intended use of this plan is for the anchoring of **Precast Concrete Barrier Type F** on hot mix asphalt (HMA) or cement concrete pavement in permanent or temporary installations. See **Standard Plan K-80.37** for anchoring **Narrow Base Barrier** in **Temporary Installations Only**.
2. After removing the anchoring pins, clean the pin holes and fill them with sealant according to **Standard Specification Section 9-04.2**.
3. Remove slack between barrier segments after inserting the connecting pin.



SECTION **B**  
(SEE NOTE 3)

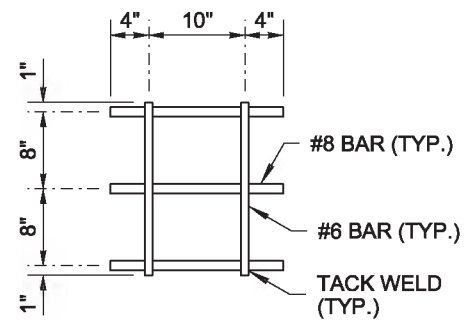


Donahue, John  
Aug 21 2019 12:38 PM  
**CONCRETE BARRIER  
TYPE F (PRECAST)**

**STANDARD PLAN C-60.10-00**

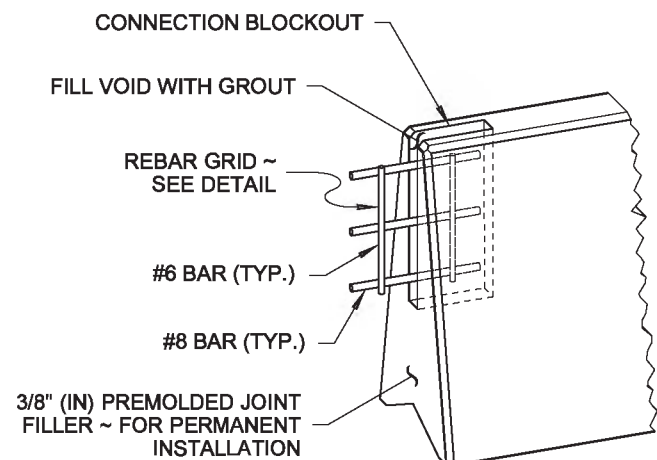
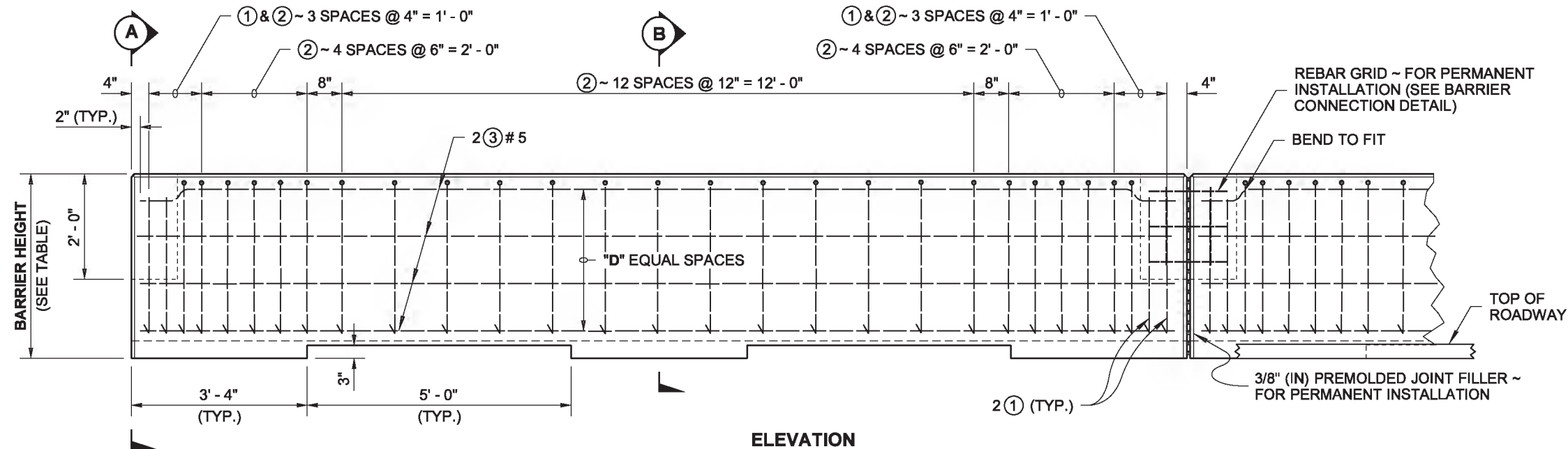
SHEET 2 OF 2 SHEETS

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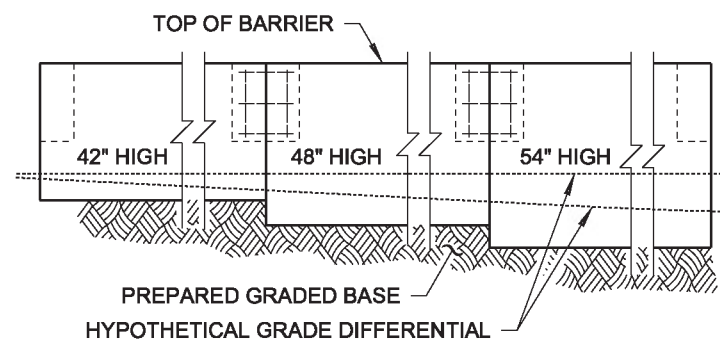
### REBAR GRID DETAIL FOR PERMANENT INSTALLATION

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



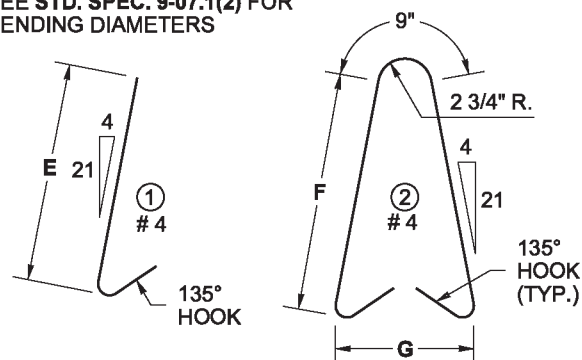
### BARRIER CONNECTION DETAIL FOR PERMANENT INSTALLATION

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

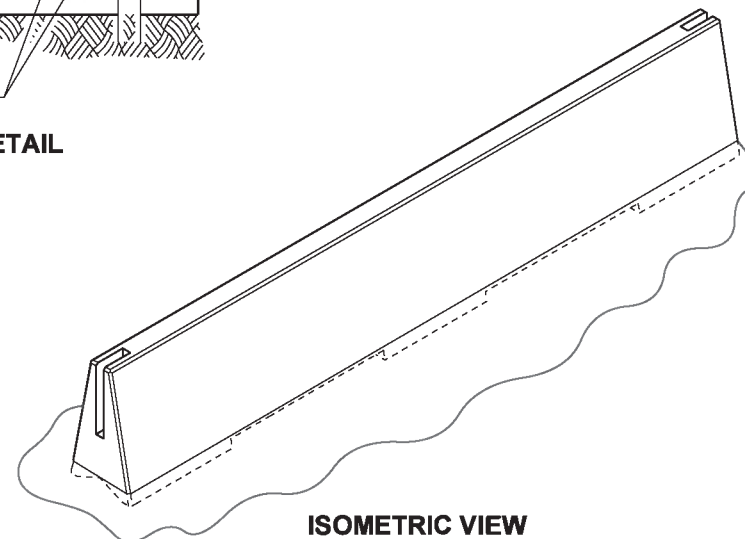


## BARRIER TRANSITION DETAIL

**SEE STD. SPEC. 9-07.1(2) FOR  
BENDING DIAMETERS**



DIMENSION TABLE							
BARRIER HEIGHT	A	B	D	E	F	G	HORIZONTAL BARS (QTY.)
3' - 6"	8"	2' - 0"	3	2' - 8"	2' - 10"	1' - 7"	8
4' - 0"	9 1/8"	2' - 2 1/4"	4	3' - 2"	3' - 4"	1' - 9"	10
4' - 6"	10 1/4"	2' - 4 1/2"	5	3' - 8"	3' - 10"	1' - 11"	12



### ISOMETRIC VIEW



Barry, Ed  
May 19 2014 8:24 AM

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

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

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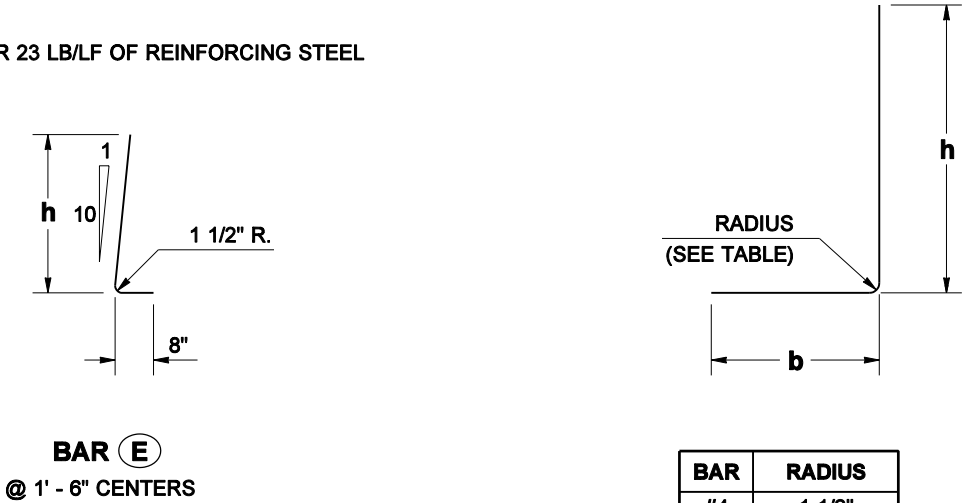
WALL HT H	DIMENSIONS				FOOTING REINFORCEMENT																	STEM REINFORCEMENT				MATERIAL QUANTITY		MAXIMUM SOIL PRESSURE (PSF)				
					BAR ⑤ #4		BAR ⑥		BAR ⑧		BAR ⑫					BAR ⑭					BAR ⑪			⑥ #4								
	B	C <sub>v</sub>	D	A	LENGTH	h	SIZE	SPA.	LENGTH	SIZE	SPA.	LENGTH	SIZE	SPA.	LENGTH	h	b	SIZE	SPA.	LENGTH	h	b	SIZE	SPA.	LENGTH	LENGTH	CONC. CY / LF	STEEL LBS / LF	SERVICE	STRENGTH	EXTREME EVENT 1	EXTREME EVENT 2
5'	6' - 9"	3' - 0"	1' - 0"	1' - 4"	2' - 7"	2' - 0"	#4	1' - 6"	6' - 6"	#4	1' - 6"	6' - 6"	#4	1' - 6"	5' - 2"	4' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3' - 10 1/2"	0.41	23.8	900	1244	1163	1620
6'	6' - 9"	3' - 0"	1' - 0"	1' - 5 1/2"	2' - 7"	2' - 0"	#4	1' - 6"	6' - 6"	#4	1' - 6"	6' - 6"	#4	1' - 6"	6' - 2"	5' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4' - 10 1/2"	0.46	26.3	987	1351	1380	1878
7'	7' - 0"	3' - 3"	1' - 0"	1' - 6 1/2"	2' - 7"	2' - 0"	#4	1' - 6"	6' - 9"	#4	1' - 6"	6' - 9"	#4	1' - 6"	7' - 2"	6' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5' - 10 1/2"	0.53	28.9	1076	1476	1548	2006
8'	7' - 0"	3' - 3"	1' - 0"	1' - 7 1/2"	2' - 7"	2' - 0"	#4	1' - 0"	6' - 9"	#4	1' - 6"	6' - 9"	#4	1' - 0"	8' - 2"	7' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6' - 10 1/2"	0.58	34.7	1225	1687	1837	2332
9'	7' - 3"	3' - 6"	1' - 0"	1' - 9"	2' - 7"	2' - 0"	#4	1' - 0"	7' - 0"	#4	1' - 6"	7' - 0"	#4	1' - 0"	9' - 2"	8' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7' - 10 1/2"	0.65	37.7	1325	1833	2043	2486
10'	7' - 6"	3' - 6"	1' - 0"	1' - 10"	2' - 7"	2' - 0"	#4	9"	7' - 3"	#4	1' - 6"	7' - 3"	#4	1' - 0"	10' - 2"	9' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8' - 10 1/2"	0.73	42.2	1493	2075	2385	2744
11'	7' - 9"	3' - 6"	1' - 0"	1' - 11 1/2"	2' - 7"	2' - 0"	#4	7"	7' - 6"	#4	1' - 6"	7' - 6"	#4	10"	11' - 2"	10' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9' - 10 1/2"	0.81	48.6	1677	2341	2780	3027
12'	8' - 0"	3' - 9"	1' - 0"	2' - 0 1/2"	2' - 7"	2' - 0"	#5	9"	7' - 9"	#4	1' - 6"	7' - 9"	#4	9"	12' - 2"	11' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10' - 11"	0.89	53.8	1797	2522	3066	3221
13'	8' - 3"	3' - 9"	1' - 0"	2' - 1 1/2"	2' - 7"	2' - 0"	#5	7"	8' - 0"	#4	1' - 6"	8' - 0"	#4	8"	13' - 2"	12' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11' - 11"	0.97	62.7	2004	2826	3563	3545
14'	8' - 9"	3' - 9"	1' - 0"	2' - 3"	2' - 7"	2' - 0"	#5	5"	8' - 6"	#4	1' - 6"	8' - 6"	#4	7"	14' - 2"	13' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12' - 11"	1.07	74.4	2190	3089	3977	3706
15'	9' - 6"	3' - 9"	1' - 3"	2' - 4"	2' - 10"	2' - 3"	#5	5"	9' - 3"	#4	1' - 6"	9' - 3"	#4	7"	15' - 2"	14' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	13' - 8"	1.25	80.4	2359	3313	4280	3766
16'	10' - 0"	4' - 0"	1' - 3"	2' - 5"	2' - 10"	2' - 3"	#6	6"	9' - 9"	#4	1' - 6"	9' - 9"	#4	6"	16' - 2"	15' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	14' - 8"	1.36	95.6	2459	3455	4496	3845
17'	10' - 6"	4' - 3"	1' - 6"	2' - 6"	3' - 1"	2' - 6"	#6	6"	10' - 3"	#4	1' - 6"	10' - 3"	#4	5"	17' - 2"	16' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15' - 5"	1.55	103.9	2572	3615	4733	3951
18'	11' - 0"	4' - 6"	1' - 6"	2' - 7"	3' - 1"	2' - 6"	#6	5"	10' - 9"	#4	1' - 0"	10' - 9"	#5	7"	18' - 3"	17' - 7"	10"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	16' - 5"	1.67	121.6	2671	3756	4951	4047
19'	11' - 6"	5' - 0"	1' - 9"	2' - 8"	3' - 4"	2' - 9"	#6	6"	11' - 3"	#4	1' - 0"	11' - 3"	#5	6"	19' - 3"	18' - 7"	10"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	17' - 2"	1.87	126.5	2701	3800	4989	4051
20'	12' - 3"	5' - 0"	1' - 9"	2' - 9 1/2"	3' - 4"	2' - 9"	#6	5"	12' - 0"	#4	1' - 0"	12' - 0"	#5	5"	20' - 3"	19' - 7"	10"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	18' - 2"	2.02	149.0	2855	4005	5275	4186
21'	12' - 9"	5' - 6"	2' - 0"	2' - 10"	3' - 7"	3' - 0"	#7	7"	12' - 6"	#4	11"	12' - 6"	#6	1' - 4"	10' - 4 1/2"	9' - 7"	12"	#6	1' - 4"	5' - 2"	4' - 4"	11"	#6	1' - 4"	19' - 4"	18' - 11 1/2"	2.25	141.1	2888	4052	5322	4207
22'	13' - 3"	5' - 9"	2' - 0"	2' - 11 1/2"	3' - 7"	3' - 0"	#7	6"	13' - 0"	#4	10"	13' - 0"	#6	1' - 4"	11' - 5"	10' - 7 1/2"	12"	#6	1' - 4"	5' - 2"	4' - 4"	11"	#6	1' - 4"	20' - 4"	19' - 11 1/2"	2.39	157.4	2987	4193	5540	4323
23'	13' - 9"	6' - 0"	2' - 3"	3' - 0 1/2"	3' - 10"	3' - 3"	#7	6"	13' - 6"	#4	10"	13' - 6"	#6	1' - 4"	12' - 6 1/2"	11' - 9"	12"	#6	1' - 4"	5' - 5"	4' - 7"	11"	#6	1' - 4"	21' - 1"	20' - 8 1/2"	2.64	164.2	3103	4356	5786	4462
24'	14' - 3"	6' - 3"	2' - 3"	3' - 1 1/2"	3' - 10"	3' - 3"	#7	6"	14' - 0"	#4	8"	14' - 0"	#6	1' - 4"	13' - 7"	12' - 9 1/2"	12"	#6	1' - 4"	5' - 5"	4' - 7"	11"	#6	1' - 4"	22' - 1"	21' - 8 1/2"	2.79	175.1	3202	4497	6004	4582
25'	14' - 9"	6' - 6"	2' - 6"	3' - 2 1/2"	4' - 1"	3' - 6"	#7	6"	14' - 6"	#4	8"	14' - 6"	#6	1' - 4"	14' - 8"	13' - 10 1/2"	12"	#6	1' - 4"	5' - 8"	4' - 10"	11"	#6	1' - 4"	22' - 10"	22' - 5 1/2"	3.06	180.6	3318	4660	6252	4725
26'	15' - 6"	6' - 9"	2' - 6"	3' - 3 1/2"	4' - 1"	3' - 6"	#8	7"	15' - 3"	#4	7"	15' - 3"	#6	1' - 4"	15' - 8 1/2"	14' - 11"	12"	#6	1' - 4"	5' - 8"	4' - 10"	11"	#6	1' - 4"	23' - 10"	23' - 5 1/2"	3.24	198.4	3391	4753	6346	4785
27'	16' - 0"	7' - 0"	2' - 9"	3' - 4 1/2"	4' - 4"	3' - 9"	#8	7"	15' - 9"	#4	7"	15' - 9"	#6	1' - 2"	16' - 9 1/2"	16' - 0"	12"	#6	1' - 2"	5' - 11"	5' - 1"	11"	#6	1' - 2"	24' - 7"	24' - 2 1/2"	3.53	214.5	3508	4916	6593	4933
28'	16' - 6"	7' - 3"	3' - 0"	3' - 5 1/2"	4' - 7"	4' - 0"	#8	7"	16' - 3"	#4	7"	16' - 3"	#6	10"	15' - 11"	15' - 1 1/2"	12"	#6	10"	6' - 2"	5' - 4"	11"	#6	10"	25' - 4"	24' - 11 1/2"	3.83	243.9	3626	5079	6842	5082
29'	17' - 0"	7' - 6"	3' - 3"	3' - 6 1/2"	4' - 10"	4' - 3"	#8	7"	16' - 9"	#4	6"	16' - 9"	#8	1' - 4"	16' - 0"	15' - 0"	1' - 3"	#8	1' - 4"	8' - 4"	7' - 2"	1' - 3"	#8	1' - 4"	26' - 1"	25' - 8 1/2"	4.14	267.4	3743	5243	7092	5232
30'	17' - 6"	8' - 0"	3' - 3"	3' - 7 1/2"	4' - 10"	4' - 3"	#8	6"	17' - 3"	#5	9"	17' - 3"	#8	1' - 4"	17' - 0 1/2"	16' - 0"	1' - 3"	#8	1' - 4"	8' - 4"	7' - 2"	1' - 3"	#8	1' - 4"	27' - 1"	26' - 9"	4.33	290.5	3765	5279	7128	5258
31'	18' - 0"	8' - 3"	3' - 6"	3' - 8 1/2"	5' - 1"	4' - 6"	#8	6"	17' - 9"	#5	8"	17' - 9"	#8	1' - 4"	18' - 1 1/2"	17' - 1"	1' - 3"	#8	1' - 4"	8' - 7"	7' - 5 1/2"	1' - 3"	#8	1' - 4"	27' - 10"	27' - 6"	4.65	303.1	3883	5444	7379	5411
32'	18' - 9"	8' - 6"	3' - 9"	3' - 9 1/2"	5' - 4"	4' - 9"	#8	6"	18' - 6"	#5	8"	18' - 6"	#8	1' - 2"	19' - 2 1/2"	18' - 2"	1' - 3"	#8	1' - 2"	8' - 10"	7' - 8"	1' - 3"	#8	1' - 2"	28' - 7"	28' - 3"	5.03	330.6	3978	5563	7509	5512
33'	19' - 3"	8' - 9"	4' - 0"	3' - 10"	5' - 7"	5' - 0"	#8	6"	19' - 0"	#5	8"	19' - 0"	#8	1' - 0"	19' - 2"	18' - 1 1/2"	1' - 3"	#8	1' - 0"	9' - 1"	7' - 11"	1' - 3"	#8	1' - 0"	29' - 4"	29' - 0"	5.38	361.5	4096	5727	7760	5667
34'	19' - 9"	9' - 0"	4' - 3"	3' - 11"	5' - 10"	5' - 3"	#8	6"	19' - 6"	#5	7"	19' - 6"	#9	10"	17' - 4 1/2"	16' - 1 1/2"	1' - 6"	#9	10"	10' - 8"	9' - 3 1/2"	1' - 6"	#9	10"	30' - 1"	29' - 9"	5.74	454.5	4214	5892	8012	5822
35'	20' - 3"	9' - 3"	4' - 6"	4' - 0"	6' - 1"	5' - 6"	#8	6"	20' - 0"	#5	7"	20' - 0"	#10	1' - 0"	18' - 9"	17' - 4 1/2"	1' - 8"	#10	1' - 0"	12' - 3 1/2"	10' - 9 1/2"	1' - 8"	#10	1' - 0"	30' - 10"	30' - 6"	6.12	487.8	4332	6057	8265	5978

REINFORCEMENT NOTES

- 1

IF TRAFFIC BARRIER IS USED, ADD 0.110 CY OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 1.  
ADD 0.152 CY/LF OF CONCRETE CLASS 4000 FOR BARRIER ALTERNATE 2. SEE STANDARD PLAN D-15.10
- 2

ADD 16 LB/LF OF REINFORCING STEEL FOR BARRIER ALTERNATE 1 OR 23 LB/LF OF REINFORCING STEEL  
FOR BARRIER ALTERNATE 2. SEE STANDARD PLAN D-15.10



BAR	MIN. SPLICE
#4	2' - 0"
#5	2' - 0"
#6	2' - 0"
#7	2' - 6"
#8	3' - 3"
#9	4' - 2"
#10	5' - 3"

SLOPING FACE WALL DESIGN  
WITH A 250 PSF SURCHARGE



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.

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

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III

STATE DESIGN ENGINEER

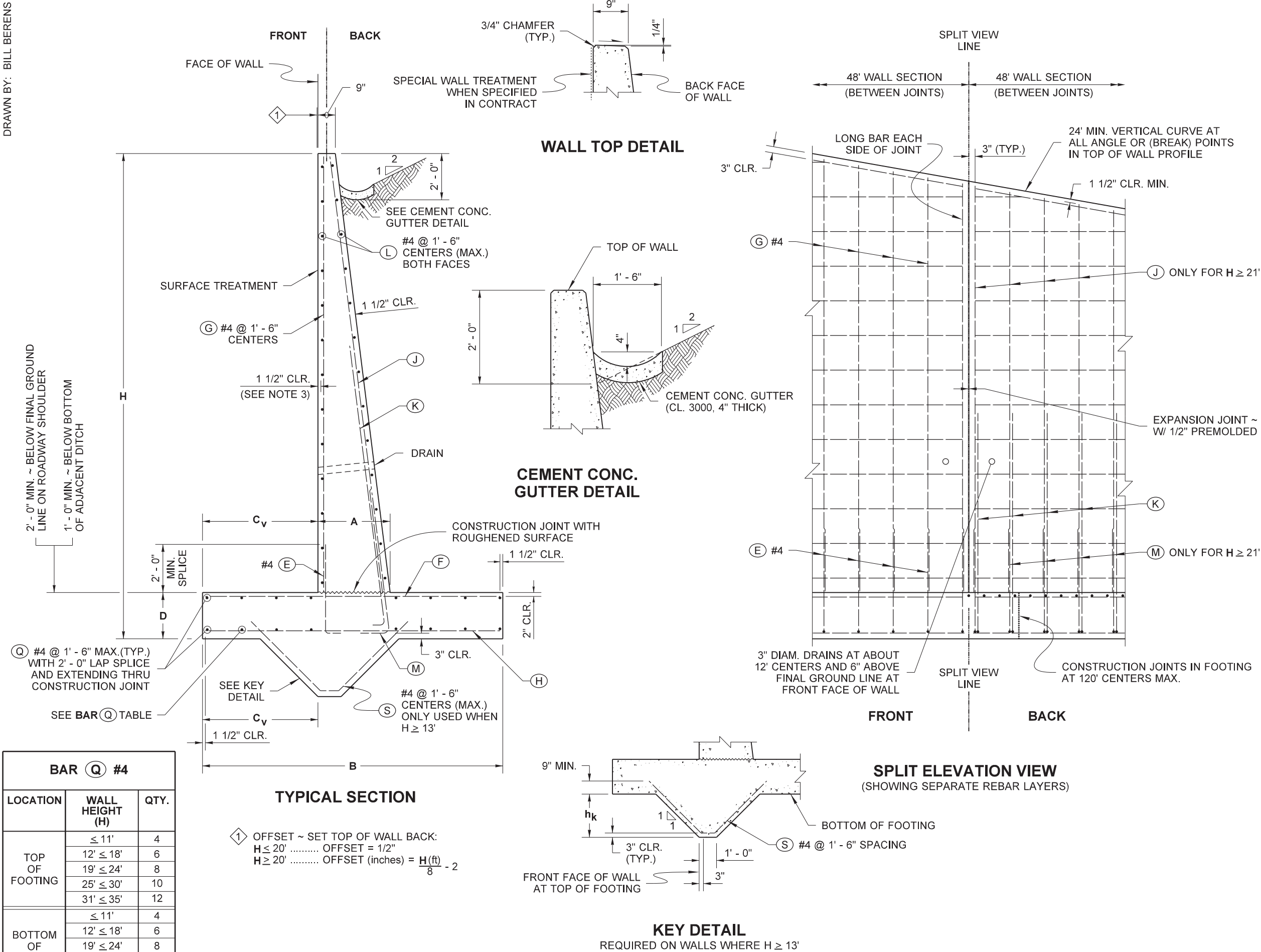
12-02-08

DATE



Washington State Department of Transportation

DRAWN BY: BILL BERENS



NOTES

1. All concrete shall be Class 4000, except as noted.
2. For backfill requirements, see Standard Plan D-4.
3. When Wall Type 3SW (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 3SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by  $(0.003 \times H)$  CY/LF.
5. Concrete in the 48 foot wall sections shall be placed separately between expansion joints with a minimum 24 hour period before placing concrete in the adjacent section.
6. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and interims through 2008. The seismic design of these walls has been completed using an effective PGA of 0.32 g.

VERTICAL FACE WALL DESIGN  
WITH 2 :1 BACKSLOPE



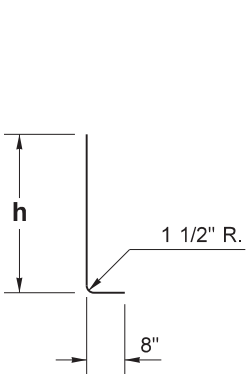
*Bijan Khaleghi* Khaleghi, Bijan  
Aug 7 2019 8:27 AM  
**REINFORCED CONCRETE  
RETAINING WALL  
TYPE 3 AND 3SW  
STANDARD PLAN D-10.20-01**

SHEET 1 OF 2 SHEETS

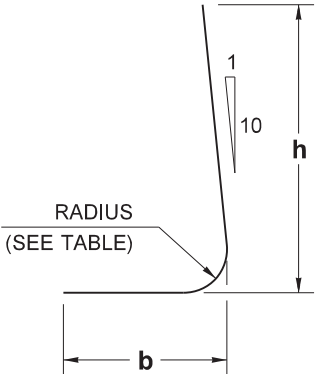
APPROVED FOR PUBLICATION  
Roark, Steve  
Aug 7 2019 10:29 AM  
STATE DESIGN ENGINEER  
Washington State Department of Transportation

DRAWN BY: BILL BERENS

WALL HT H	DIMENSIONS					FOOTING REINFORCEMENT															STEM REINFORCEMENT					MATERIAL QUANTITY		MAXIMUM SOIL PRESSURE (PSF)				
						BAR Ⓔ #4		BAR Ⓕ Ⓕ			BAR Ⓗ Ⓗ			BAR Ⓚ Ⓚ					BAR Ⓜ Ⓜ					BAR ⓐ ⓐ							Ⓖ #4	
	B	C <sub>v</sub>	D	h <sub>k</sub>	A	LENGTH	h	SIZE	SPA.	LENGTH	SIZE	SPA.	LENGTH	SIZE	SPA.	LENGTH	h	b	SIZE	SPA.	LENGTH	h	b	SIZE	SPA.	LENGTH	LENGTH	CONC. CY / LF	STEEL LBS / LF	SERVICE	STRENGTH	EXTREME EVENT 1
5'	4' - 3"	1' - 6"	1' - 0"	N/A	1' - 3"	3' - 3 1/2"	2' - 9"	#4	1' - 6"	4' - 0"	#4	1' - 6"	4' - 0"	#4	1' - 6"	5' - 2"	4' - 7 1/2"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3' - 10"	0.31	20.6	707	928	1019
6'	4' - 3"	1' - 6"	1' - 0"	N/A	1' - 4 1/2"	3' - 3 1/2"	2' - 9"	#4	1' - 6"	4' - 0"	#4	1' - 6"	4' - 0"	#4	1' - 6"	6' - 2"	5' - 7 1/2"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4' - 10"	0.35	21.7	827	1084	1296
7'	4' - 3"	1' - 9"	1' - 0"	N/A	1' - 6"	3' - 3 1/2"	2' - 9"	#4	1' - 6"	4' - 0"	#4	1' - 6"	4' - 0"	#4	1' - 6"	7' - 2"	6' - 7 1/2"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5' - 10"	0.41	24.2	920	1198	1557
8'	4' - 6"	1' - 9"	1' - 0"	N/A	1' - 7 1/2"	3' - 3 1/2"	2' - 9"	#4	1' - 6"	4' - 3"	#4	1' - 6"	4' - 3"	#4	1' - 6"	8' - 2"	7' - 7 1/2"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6' - 10"	0.47	26.8	1020	1328	2018
9'	4' - 9"	1' - 9"	1' - 0"	N/A	1' - 9"	3' - 3 1/2"	2' - 9"	#4	1' - 6"	4' - 6"	#4	1' - 6"	4' - 6"	#4	1' - 6"	9' - 2"	8' - 7 1/2"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7' - 10"	0.55	29.5	1129	1525	2647
10'	5' - 6"	2' - 0"	1' - 0"	N/A	1' - 10 1/2"	3' - 3 1/2"	2' - 9"	#4	1' - 6"	5' - 3"	#4	1' - 6"	5' - 3"	#4	1' - 0"	10' - 2"	9' - 7 1/2"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8' - 10"	0.64	36.2	1238	1678	2868
11'	6' - 9"	2' - 0"	1' - 0"	N/A	2' - 0"	3' - 3 1/2"	2' - 9"	#4	1' - 6"	6' - 6"	#4	1' - 6"	6' - 6"	#5	1' - 0"	11' - 3 1/2"	10' - 7 1/2"	9"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9' - 10"	0.76	44.3	1419	1923	3126
12'	8' - 3"	3' - 0"	1' - 0"	N/A	2' - 1 1/2"	3' - 3 1/2"	2' - 9"	#4	1' - 0"	8' - 0"	#4	9"	8' - 0"	#5	10"	12' - 3 1/2"	11' - 7 1/2"	9"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10' - 10"	0.89	59.3	1493	1970	2650
13'	8' - 3"	3' - 3"	1' - 0"	1' - 0"	2' - 3"	3' - 3 1/2"	2' - 9"	#4	1' - 0"	8' - 0"	#4	7"	8' - 0"	#5	8"	13' - 3 1/2"	12' - 7 1/2"	9"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11' - 10"	1.05	67.8	1594	2088	3050
14'	8' - 3"	3' - 6"	1' - 3"	1' - 3"	2' - 4"	3' - 6 1/2"	3' - 0"	#4	1' - 0"	8' - 0"	#4	7"	8' - 0"	#5	7"	14' - 3 1/2"	13' - 7 1/2"	9"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12' - 7"	1.22	73.2	1672	2199	3539
15'	9' - 0"	3' - 9"	1' - 3"	1' - 3"	2' - 5 1/2"	3' - 6 1/2"	3' - 0"	#4	1' - 0"	8' - 9"	#5	8"	8' - 9"	#5	6"	15' - 3 1/2"	14' - 7 1/2"	9"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	13' - 7"	1.34	86.6	1777	2347	3783
16'	9' - 3"	4' - 0"	1' - 6"	1' - 6"	2' - 6 1/2"	3' - 9 1/2"	3' - 3"	#4	1' - 0"	9' - 0"	#5	6"	9' - 0"	#6	7"	16' - 5"	15' - 7 1/2"	11"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	14' - 4"	1.54	104.3	1869	2554	4266
17'	10' - 0"	4' - 3"	1' - 9"	1' - 9"	2' - 7 1/2"	4' - 0 1/2"	3' - 6"	#4	1' - 0"	9' - 9"	#6	8"	9' - 9"	#7	8"	17' - 6 1/2"	16' - 8"	1' - 1"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15' - 1"	1.79	122.9	2007	2756	4560
18'	10' - 9"	4' - 3"	1' - 9"	1' - 9"	2' - 9"	4' - 0 1/2"	3' - 6"	#4	10"	10' - 6"	#6	8"	10' - 6"	#7	7"	18' - 7"	17' - 8"	1' - 1"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	16' - 1"	1.94	139.7	2186	3007	5040
19'	11' - 0"	4' - 6"	2' - 0"	2' - 0"	2' - 10 1/2"	4' - 3 1/2"	3' - 9"	#4	10"	10' - 9"	#6	8"	10' - 9"	#7	6"	19' - 7"	18' - 8"	1' - 1"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	16' - 10"	2.18	158.7	2336	3225	5583
20'	11' - 9"	4' - 6"	2' - 3"	2' - 3"	2' - 11 1/2"	4' - 6 1/2"	4' - 0"	#4	9"	11' - 6"	#6	7"	11' - 6"	#8	7"	20' - 8 1/2"	19' - 8"	1' - 3"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	17' - 7"	2.47	181.2	2561	3537	6137
21'	13' - 0"	5' - 0"	2' - 3"	2' - 3"	3' - 1"	4' - 6 1/2"	4' - 0"	#4	7"	12' - 9"	#6	7"	12' - 9"	#8	1' - 0"	13' - 4 1/2"	12' - 4"	1' - 3"	#8	1' - 0"	7' - 5"	6' - 2"	1' - 3"	#8	1' - 0"	18' - 8"	2.69	192.8	2583	3556	5870	
22'	13' - 3"	5' - 3"	2' - 6"	2' - 6"	3' - 2"	4' - 9 1/2"	4' - 3"	#4	7"	13' - 0"	#6	6"	13' - 0"	#9	1' - 2"	14' - 10"	13' - 8 1/2"	1' - 6"	#9	1' - 2"	9' - 0"	7' - 6 1/2"	1' - 6"	#9	1' - 2"	19' - 5"	2.97	246.3	2733	3774	6394	
23'	13' - 9"	5' - 6"	2' - 9"	2' - 9"	3' - 3"	5' - 0 1/2"	4' - 6"	#4	7"	13' - 6"	#6	6"	13' - 6"	#9	1' - 0"	14' - 11"	13' - 9 1/2"	1' - 6"	#9	1' - 0"	9' - 3"	7' - 9 1/2"	1' - 6"	#9	1' - 0"	20' - 2"	3.29	261.3	2881	3986	6813	
24'	14' - 9"	5' - 9"	2' - 9"	2' - 9"	3' - 4 1/2"	5' - 0 1/2"	4' - 6"	#4	6"	14' - 6"	#6	6"	14' - 6"	#10	1' - 0"	15' - 2 1/2"	13' - 11 1/2"	1' - 8"	#10	1' - 0"	10' - 8"	9' - 0 1/2"	1' - 8"	#10	1' - 0"	21' - 2"	3.52	322.1	2984	4122	6926	
25'	15' - 0"	6' - 0"	3' - 0"	3' - 0"	3' - 6"	5' - 3 1/2"	4' - 9"	#4	6"	14' - 9"	#7	7"	14' - 9"	#10	1' - 0"	16' - 7 1/2"	15' - 4 1/2"	1' - 8"	#10	1' - 0"	10' - 11"	9' - 3 1/2"	1' - 8"	#10	1' - 0"	21' - 11"	3.84	324.2	3136	4344	7476	
26'	15' - 9"	6' - 3"	3' - 0"	3' - 0"	3' - 7 1/2"	5' - 3 1/2"	4' - 9"	#5	8"	15' - 6"	#7	6"	15' - 6"	#10	10"	16' - 1 1/2"	14' - 10 1/2"	1' - 8"	#10	10"	10' - 11"	9' - 3 1/2"	1' - 8"	#10	10"	22' - 11"	4.06	378.8	3241	4489	7715	
27'	16' - 9"	6' - 6"	3' - 3"	3' - 3"	3' - 8 1/2"	5' - 6 1/2"	5' - 0"	#5	6"	16' - 6"	#7	6"	16' - 6"	#10	10"	17' - 7"	16' - 4"	1' - 8"	#10	10"	11' - 2"	9' - 6 1/2"	1' - 8"	#10	10"	23' - 8"	4.49	406.8	3382	4679	7870	
28'	17' - 9"	6' - 9"	3' - 3"	3' - 3"	3' - 10"	5' - 6 1/2"	5' - 0"	#6	8"	17' - 6"	#7	6"	17' - 6"	#10	9"	17' - 10"	16' - 7"	1' - 8"	#10	9"	11' - 2"	9' - 6 1/2"	1' - 8"	#10	9"	24' - 8 1/2"	4.75	433.8	3485	4816	7995	
29'	18' - 3"	7' - 0"	3' - 6"	3' - 6"	4' - 0"	5' - 9 1/2"	5' - 3"	#6	8"	18' - 0"	#8	7"	18' - 0"	#10	8"	17' - 10 1/2"	16' - 7 1/2"	1' - 8"	#10	8"	11' - 5"	9' - 9 1/2"	1' - 8"	#10	8"	25' - 5 1/2"	5.16	442.5	3633	5026	8403	
30'	18' - 6"	7' - 3"	3' - 9"	3' - 9"	4' - 0 1/2"	6' - 0 1/2"	5' - 6"	#6	8"	18' - 3"	#8	7"	18' - 3"	#10	8"	19' - 3 1/2"	18' - 0 1/2"	1' - 8"	#10	8"	11' - 8"	10' - 0 1/2"	1' - 8"	#10	8"	26' - 2 1/2"	5.55	459.3	3785	5249	8947	
31'	19' - 0"	7' - 6"	4' - 0"	4' - 0"	4' - 1 1/2"	6' - 3 1/2"	5' - 9"	#6	8"	18' - 9"	#8	7"	18' - 9"	#11	9"	20' - 10"	19' - 5"	1' - 10"	#11	9"	13' - 5 1/2"	11' - 8"	1' - 10"	#11	9"	26' - 11 1/2"	5.99	533.5	3934	5462	9370	
32'	19' - 6"	7' - 9"	4' - 0"	4' - 0"	4' - 3"	6' - 4 1/2"	5' - 10"	#6	8"	19' - 3"	#8	6"	19' - 3"	#11	8"	20' - 7"	19' - 2 1/2"	1' - 10"	#11	8"	13' - 7"	11' - 10"	1' - 10"	#11	8"	27' - 11 1/2"	6.22	661.9	4044	5620	9757	
33'	20' - 3"	8' - 0"	4' - 1"	4' - 1"	4' - 4"	6' - 6 1/2"	6' - 0"	#6	8"	20' - 0"	#8	6"	20' - 0"	#11	7"	20' - 0"	18' - 7 1/2"	1' - 10"	#11	7"	13' - 9 1/2"	12' - 0"	1' - 10"	#11	7"	28' - 10 1/2"	6.57	746.0	4162	5783	10009	
34'	21' - 6"	8' - 3"	4' - 3"	4' - 3"	4' - 5 1/2"	6' - 9 1/2"	6' - 3"	#6	6"	21' - 3"	#8	6"	21' - 3"	#11	7"	21' - 4"	19' - 11 1/2"	1' - 10"	#11	7"	14' - 1"	12' - 4"	1' - 10"	#11	7"	29' - 8 1/2"	7.09	849.0	4285	5941	10005	
35'	23' - 0"	8' - 6"	4' - 3"	4' - 3"	4' - 7"	6' - 10 1/2"	6' - 4"	#7	7"	22' - 9"	#8	6"	22' - 9"	#11	6"	20' - 2 1/2"	18' - 10"	1' - 10"	#11	6"	14' - 3"	12' - 5 1/2"	1' - 10"	#11	6"	30' - 8 1/2"	7.49	968.6	4381	6058	9904	



BAR Ⓔ  
@ 1' - 6" CENTERS



BAR	RADIUS
#4	1 1/2"
#5	1 7/8"
#6	2 1/4"
#7	2 5/8"
#8	3"
#9	4 3/4"
#10	5 3/8"
#11	6"

BARS Ⓚ AND Ⓜ

BAR	MIN. SPLICE
#4	2' - 0"
#5	2' - 0"
#6	2' - 0"
#7	2' - 6"
#8	3' - 3"
#9	4' - 2"
#10	5' - 3"

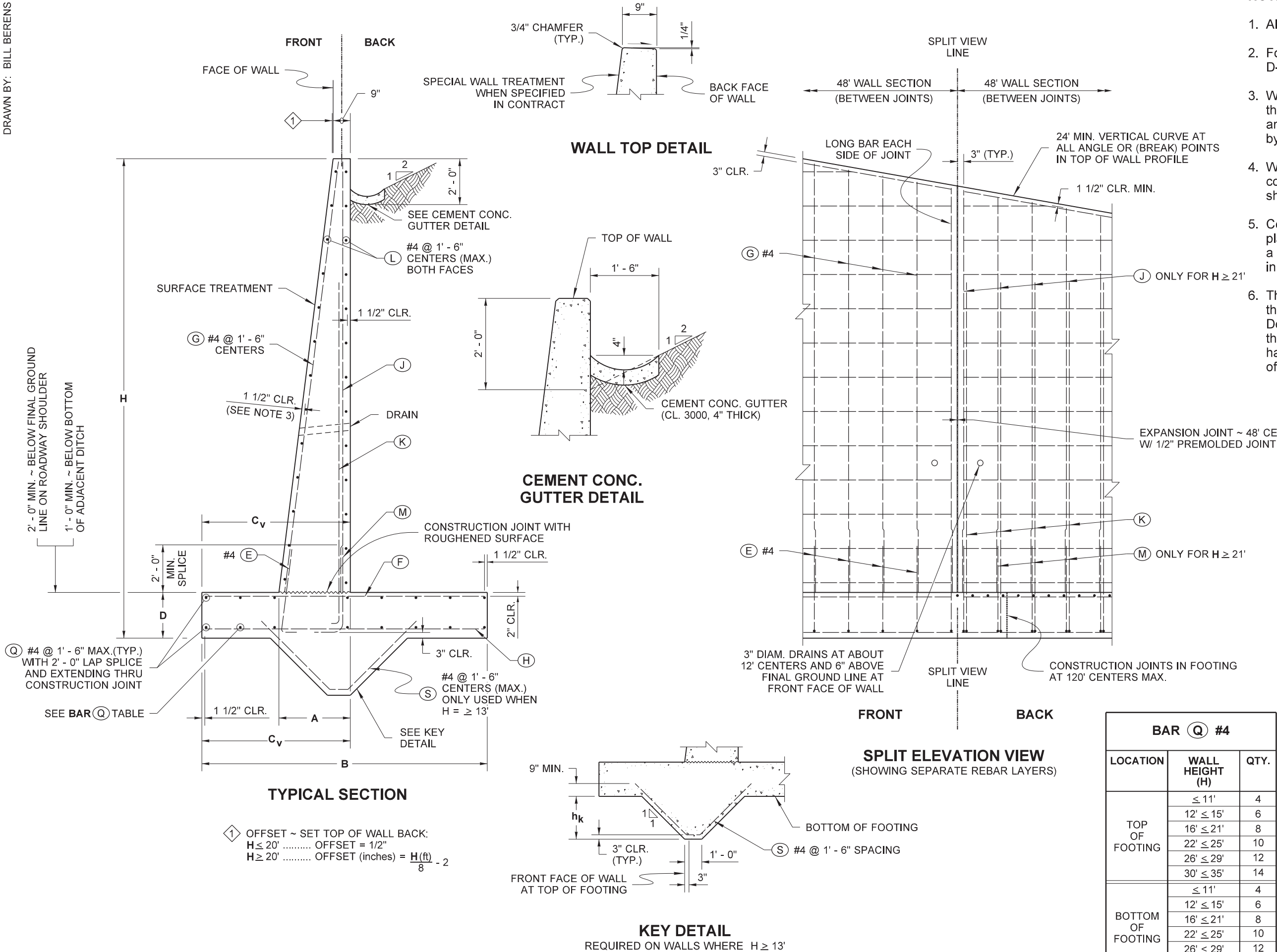
VERTICAL FACE WALL DESIGN  
WITH 2 :1 BACKSLOPE



Khaleghi, Bijan  
Aug 7 2019 8:27 AM  
**REINFORCED CONCRETE  
RETAINING WALL  
TYPE 3 AND 3SW  
STANDARD PLAN D-10.20-01**

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION  
Roark, Steve  
Aug 7 2019 10:29 AM  
STATE DESIGN ENGINEER  
Washington State Department of Transportation



NOTES

1. All concrete shall be Class 4000, except as noted.
2. For backfill requirements, see Standard Plan D-4.
3. When Wall Type 4SW (saltwater) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1".
4. When Wall Type 4SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by  $(0.003 \times H)$  CY/LF.
5. Concrete in the 48 foot wall sections shall be placed separately between expansion joints with a minimum 24 hour period before placing concrete in the adjacent section.
6. This wall has been designed in accordance with the requirements of the AASHTO LRFD Bridge Design Specifications 4th Edition 2007 and interims through 2008. The seismic design of these walls has been completed using an effective PGA of 0.32 g.

SLOPING FACE WALL DESIGN  
WITH 2 :1 BACKSLOPE



Bijan Khaleghi  
Khaleghi, Bijan  
Aug 7 2019 8:28 AM

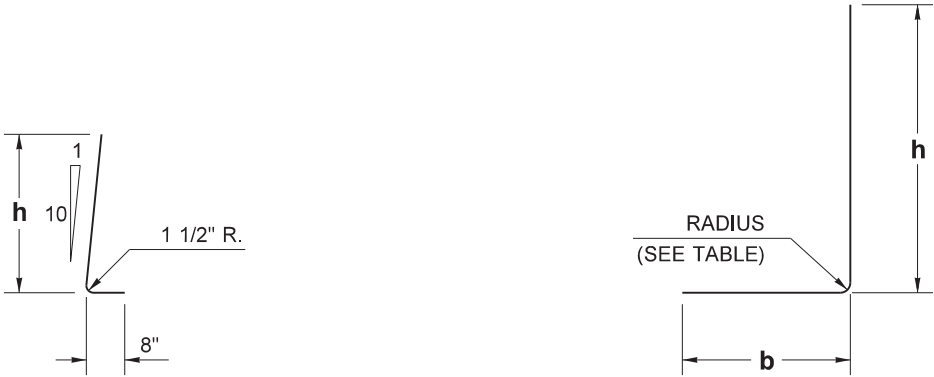
**REINFORCED CONCRETE  
RETAINING WALL  
TYPE 4 AND 4SW  
STANDARD PLAN D-10.25-01**

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION  
Roark, Steve  
Aug 7 2019 10:30 AM  
STATE DESIGN ENGINEER  
Washington State Department of Transportation

BAR Q #4		
LOCATION	WALL HEIGHT (H)	QTY.
TOP OF FOOTING	$\leq 11'$	4
	$12' \leq 15'$	6
	$16' \leq 21'$	8
	$22' \leq 25'$	10
	$26' \leq 29'$	12
	$30' \leq 35'$	14
BOTTOM OF FOOTING	$\leq 11'$	4
	$12' \leq 15'$	6
	$16' \leq 21'$	8
	$22' \leq 25'$	10
	$26' \leq 29'$	12
	$30' \leq 35'$	14

WALL HT H	DIMENSIONS					FOOTING REINFORCEMENT																STEM REINFORCEMENT						MATERIAL QUANTITY		MAXIMUM SOIL PRESSURE (PSF)			
						BAR (E) #4		BAR (F)			BAR (H)			BAR (K)						BAR (M)					BAR (J)								(G) #4
	B	C <sub>v</sub>	D	h <sub>k</sub>	A	LENGTH	h	SIZE	SPA.	LENGTH	SIZE	SPA.	LENGTH	SIZE	SPA.	LENGTH	h	b	SIZE	SPA.	LENGTH	h	b	SIZE	SPA.	LENGTH	LENGTH	CONC. CY / LF	STEEL LBS / LF	SERVICE	STRENGTH	EXTREME EVENT 1	
5'	4' - 3"	2' - 9"	1' - 0"	N/A	1' - 3"	3' - 4"	2' - 9"	#4	1' - 6"	4' - 0"	#4	1' - 6"	4' - 0"	#4	1' - 6"	5' - 1 1/2"	4' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3' - 10"	0.31	20.6	552	718	856
6'	4' - 3"	3' - 0"	1' - 0"	N/A	1' - 4 1/2"	3' - 4"	2' - 9"	#4	1' - 6"	4' - 0"	#4	1' - 6"	4' - 0"	#4	1' - 6"	6' - 1 1/2"	5' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4' - 10"	0.35	23.0	666	864	1030
7'	4' - 3"	3' - 0"	1' - 0"	N/A	1' - 6"	3' - 4"	2' - 9"	#4	1' - 6"	4' - 0"	#4	1' - 6"	4' - 0"	#4	1' - 6"	7' - 1 1/2"	6' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5' - 10"	0.41	25.5	771	998	1335
8'	4' - 6"	3' - 3"	1' - 0"	N/A	1' - 7 1/2"	3' - 4"	2' - 9"	#4	1' - 6"	4' - 3"	#4	1' - 6"	4' - 3"	#4	1' - 6"	8' - 1 1/2"	7' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6' - 10 1/2"	0.47	28.2	862	1112	1612	
9'	5' - 0"	3' - 3"	1' - 0"	N/A	1' - 9"	3' - 4"	2' - 9"	#4	1' - 6"	4' - 9"	#4	1' - 6"	4' - 9"	#4	1' - 6"	9' - 1 1/2"	8' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	7' - 10 1/2"	0.56	31.1	969	1281	2056
10'	5' - 6"	3' - 6"	1' - 0"	N/A	1' - 10 1/2"	3' - 4"	2' - 9"	#4	1' - 6"	5' - 3"	#4	1' - 6"	5' - 3"	#4	1' - 0"	10' - 1 1/2"	9' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8' - 10 1/2"	0.64	36.2	1067	1440	2383
11'	6' - 0"	3' - 9"	1' - 0"	N/A	2' - 0"	3' - 4"	2' - 9"	#4	1' - 6"	5' - 9"	#4	1' - 6"	5' - 9"	#4	11"	11' - 1 1/2"	10' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9' - 10 1/2"	0.73	40.0	1184	1605	2732
12'	6' - 9"	4' - 0"	1' - 0"	N/A	2' - 1 1/2"	3' - 4"	2' - 9"	#4	1' - 0"	6' - 6"	#4	1' - 0"	6' - 6"	#4	8"	12' - 1 1/2"	11' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10' - 10 1/2"	0.84	51.0	1301	1767	2989
13'	7' - 0"	4' - 6"	1' - 0"	1' - 0"	2' - 3"	3' - 4"	2' - 9"	#4	1' - 0"	6' - 9"	#4	1' - 0"	6' - 9"	#4	7"	13' - 1 1/2"	12' - 7"	8"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11' - 10 1/2"	1.00	57.5	1388	1896	3229
14'	7' - 9"	4' - 9"	1' - 3"	1' - 3"	2' - 4"	3' - 7"	3' - 0"	#4	1' - 0"	7' - 6"	#4	11"	7' - 6"	#5	8"	14' - 3"	13' - 7"	9"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12' - 7 1/2"	1.19	66.8	1539	2104	3537
15'	8' - 3"	5' - 0"	1' - 3"	1' - 3"	2' - 5 1/2"	3' - 7"	3' - 0"	#4	11"	8' - 0"	#4	9"	8' - 0"	#5	7"	15' - 3"	14' - 7"	9"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	13' - 7 1/2"	1.31	77.7	1657	2271	3915
16'	9' - 0"	5' - 3"	1' - 6"	1' - 6"	2' - 6 1/2"	3' - 10"	3' - 3"	#4	9"	8' - 9"	#4	7"	8' - 9"	#5	6"	16' - 3"	15' - 7"	9"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	14' - 8"	1.53	92.5	1809	2480	4220
17'	9' - 9"	5' - 6"	1' - 6"	1' - 6"	2' - 8"	3' - 10"	3' - 3"	#4	6"	9' - 6"	#4	6"	9' - 6"	#6	7"	17' - 4"	16' - 7"	11"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15' - 8"	1.67	113.0	1927	2642	4489
18'	10' - 6"	5' - 6"	1' - 6"	1' - 6"	2' - 9 1/2"	3' - 10"	3' - 3"	#5	8"	10' - 3"	#4	6"	10' - 3"	#7	8"	18' - 6"	17' - 7"	1' - 1"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	16' - 5"	1.81	132.6	2121	2909	5006
19'	11' - 0"	6' - 3"	1' - 9"	1' - 9"	2' - 10 1/2"	4' - 1"	3' - 6"	#5	8"	10' - 9"	#4	6"	10' - 9"	#7	7"	19' - 6"	18' - 7"	1' - 1"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	17' - 2"	2.06	146.5	2126	2921	4937
20'	11' - 9"	6' - 6"	1' - 9"	1' - 9"	3' - 0"	4' - 1"	3' - 6"	#5	8"	11' - 6"	#5	8"	11' - 6"	#7	6"	20' - 6"	19' - 7"	1' - 1"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	18' - 2"	2.22	170.2	2245	3085	5207
21'	12' - 6"	6' - 6"	2' - 0"	2' - 0"	3' - 1 1/2"	4' - 4"	3' - 9"	#5	7"	12' - 3"	#5	8"	12' - 3"	#8	1' -2"	14' - 2"	13' - 1 1/2"	1' - 3"	#8	1' - 2"	7' - 0"	5' - 11"	1' - 3"	#8	1' - 2"	18' - 10"	18' - 11"	2.51	185.2	2472	3396	5756	
22'	13' - 6"	6' - 6"	2' - 3"	2' - 3"	3' - 2 1/2"	4' - 7"	4' - 0"	#5	6"	13' - 3"	#5	8"	13' - 3"	#9	1' -0"	14' - 5 1/2"	13' - 4"	1' - 6"	#9	1' - 0"	8' - 7"	7' - 3"	1' - 6"	#9	1' - 0"	19' - 7"	19' - 8"	2.85	227.4	2698	3703	6200	
23'	13' - 9"	7' - 0"	2' - 3"	2' - 3"	3' - 4"	4' - 7"	4' - 0"	#5	6"	13' - 6"	#5	8"	13' - 6"	#9	1' -2"	15' - 10"	14' - 8 1/2"	1' - 6"	#9	1' - 2"	8' - 7"	7' - 3"	1' - 6"	#9	1' - 2"	20' - 7"	20' - 8"	2.99	237.4	2746	3778	6450	
24'	14' - 6"	7' - 3"	2' - 6"	2' - 6"	3' - 5"	4' - 10"	4' - 3"	#6	7"	14' - 3"	#5	8"	14' - 3"	#9	1' -0"	15' - 10 1/2"	14' - 9"	1' - 6"	#9	1' - 0"	8' - 10"	7' - 6"	1' - 6"	#9	1' - 0"	21' - 4"	21' - 5"	3.33	275.9	2899	3989	6759	
25'	15' - 0"	7' - 9"	2' - 6"	2' - 6"	3' - 6 1/2"	4' - 10"	4' - 3"	#6	7"	14' - 9"	#5	6"	14' - 9"	#10	1' -2"	17' - 7 1/2"	16' - 4 1/2"	1' - 8"	#10	1' - 0"	10' - 2 1/2"	8' - 9"	1' - 8"	#10	1' - 2"	22' - 4"	22' - 5"	3.51	316.5	2944	4056	6897	
26'	15' - 9"	7' - 9"	2' - 6"	2' - 6"	3' - 8"	4' - 10"	4' - 3"	#6	6"	15' - 6"	#5	6"	15' - 6"	#10	1' -0"	17' - 7"	16' - 4"	1' - 8"	#10	1' - 0"	10' - 2 1/2"	8' - 9"	1' - 8"	#10	1' - 0"	23' - 4"	23' - 5 1/2"	3.71	364.9	3141	4328	7416	
27'	16' - 3"	8' - 3"	2' - 9"	2' - 9"	3' - 9"	5' - 1"	4' - 6"	#6	6"	16' - 0"	#6	8"	16' - 0"	#10	10"	17' - 0 1/2"	15' - 9 1/2"	1' - 8"	#10	10"	10' - 5 1/2"	9' - 0"	1' - 8"	#10	10"	24' - 1"	24' - 2 1/2"	4.07	418.8	3219	4439	7593	
28'	16' - 9"	8' - 9"	3' - 0"	3' - 0"	3' - 10 1/2"	5' - 4"	4' - 9"	#6	6"	16' - 6"	#6	7"	16' - 6"	#10	10"	18' - 5 1/2"	17' - 2 1/2"	1' - 8"	#10	10"	10' - 8 1/2"	9' - 3"	1' - 8"	#10	10"	24' - 10"	24' - 11 1/2"	4.45	441.3	3298	4552	7773	
29'	17' - 6"	9' - 0"	3' - 3"	3' - 3"	3' - 11 1/2"	5' - 7"	5' - 0"	#6	6"	17' - 3"	#6	7"	17' - 3"	#10	9"	18' - 8 1/2"	17' - 5 1/2"	1' - 8"	#10	9"	10' - 11 1/2"	9' - 6"	1' - 8"	#10	9"	25' - 7"	25' - 8 1/2"	4.87	485.7	3451	4763	8081	
30'	18' - 0"	9' - 3"	3' - 6"	3' - 6"	4' - 0 1/2"	5' - 10"	5' - 3"	#6	6"	17' - 9"	#6	7"	17' - 9"	#10	9"	20' - 1 1/2"	18' - 10 1/2"	1' - 8"	#10	9"	11' - 2 1/2"	9' - 9"	1' - 8"	#10	9"	26' - 4"	26' - 5 1/2"	5.28	505.6	3606	4982	8510	
31'	18' - 9"	9' - 6"	4' - 0"	4' - 0"	4' - 1 1/2"	6' - 4"	5' - 9"	#6	6"	18' - 6"	#6	7"	18' - 6"	#10	8"	20' - 1 1/2"	18' - 10 1/2"	1' - 8"	#10	8"	11' - 8 1/2"	10' - 3"	1' - 8"	#10	8"	26' - 10"	26' - 11 1/2"	5.96	559.9	3793	5241	8856	
32'	19' - 6"	9' - 9"	3' - 9"	3' - 9"	4' - 3"	6' - 1"	5' - 6"	#7	7"	19' - 3"	#6	6"	19' - 3"	#10	7"	19' - 10 1/2"	18' - 7 1/2"	1' - 8"	#10	7"	11' - 5 1/2"	10' - 0"	1' - 8"	#10	7"	28' - 1"	28' - 2 1/2"	6.00	643.8	3879	5357	9087	
33'	20' - 0"	10' - 0"	4' - 0"	4' - 0"	4' - 4 1/2"	6' - 4"	5' - 9"	#7	7"	19' - 9"	#6	6"	19' - 9"	#10	7"	21' - 3 1/2"	20' - 0 1/2"	1' - 8"	#10	7"	11' - 8 1/2"	10' - 3"	1' - 8"	#10	7"	28' - 10"	28' - 11 1/2"	6.46	668.3	4034	5577	9518	
34'	20' - 9"	10' - 3"	4' - 1"	4' - 1"	4' - 5 1/2"	6' - 6"	5' - 11"	#7	6"	20' - 6"	#6	6"	20' - 6"	#10	6"	19' - 10 1/2"	18' - 7 1/2"	1' - 8"	#10	6"	11' - 2 1/2"	9' - 9"	1' - 8"	#10	6"	29' - 9"	29' - 10 1/2"	6.81	831.8	4324	5833	9880	
35'	21' - 3"	10' - 6"	4' - 2"	4' - 2"	4' - 7"	6' - 8"	6' - 1"	#7	6"	21' - 0"	#7	7"	21' - 0"	#10	6"	20' - 8"	19' - 5"	1' - 8"	#10	6"	10' - 10"	9' - 5"	1' - 8"	#10	6"	30' - 8"	30' - 9 1/2"	7.13	969.0	4611	6094	10364	



BAR  $\textcircled{\text{E}}$   
@ 1' - 6" CENTERS

BAR	RADIUS
#4	1 1/2"
#5	1 7/8"
#6	2 1/4"
#7	2 5/8"
#8	3"
#9	4 3/4"
#10	5 3/8"
#11	6"

BARS  $\textcircled{\text{K}}$  AND  $\textcircled{\text{M}}$

BAR	MIN. SPLICE
#4	2' - 0"
#5	2' - 0"
#6	2' - 0"
#7	2' - 6"
#8	3' - 3"
#9	4' - 2"
#10	5' - 3"

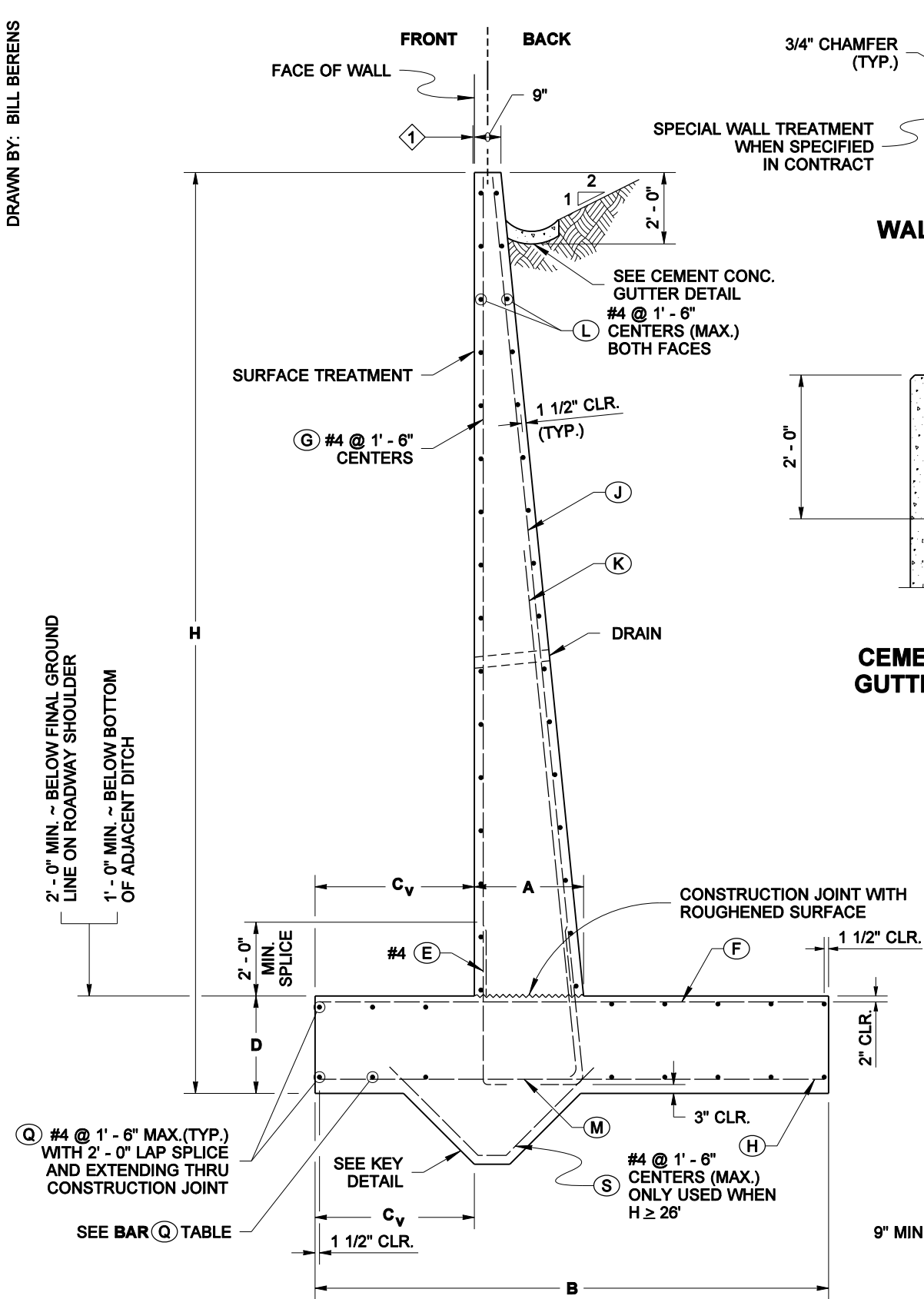
VERTICAL FACE WALL DESIGN  
WITH 2 :1 BACKSLOPE



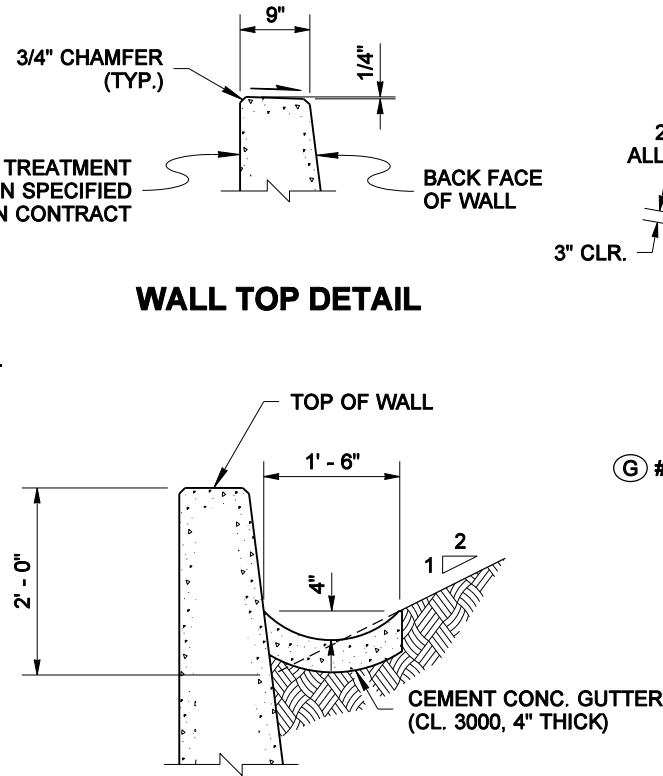
Khaleghi, Bijan  
Aug 7 2019 8:28 AM  
**REINFORCED CONCRETE  
RETAINING WALL  
TYPE 4 AND 4SW  
STANDARD PLAN D-10.25-01**

SHEET 2 OF 2 SHEETS



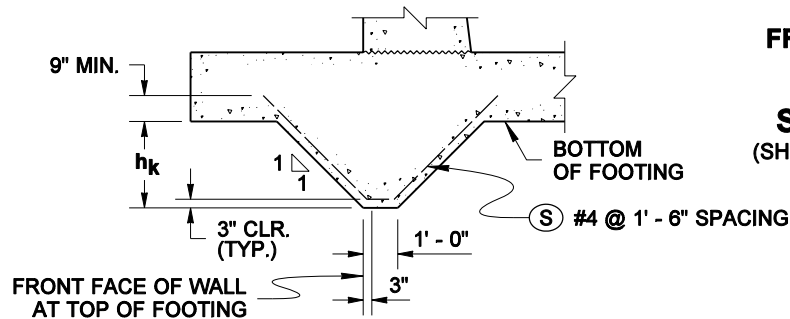


1 OFFSET ~ SET TOP OF WALL BACK:  
 $H \leq 20'$  ..... OFFSET = 1/2"  
 $H \geq 20'$  ..... OFFSET (inches) =  $\frac{H(ft)}{8} - 2$

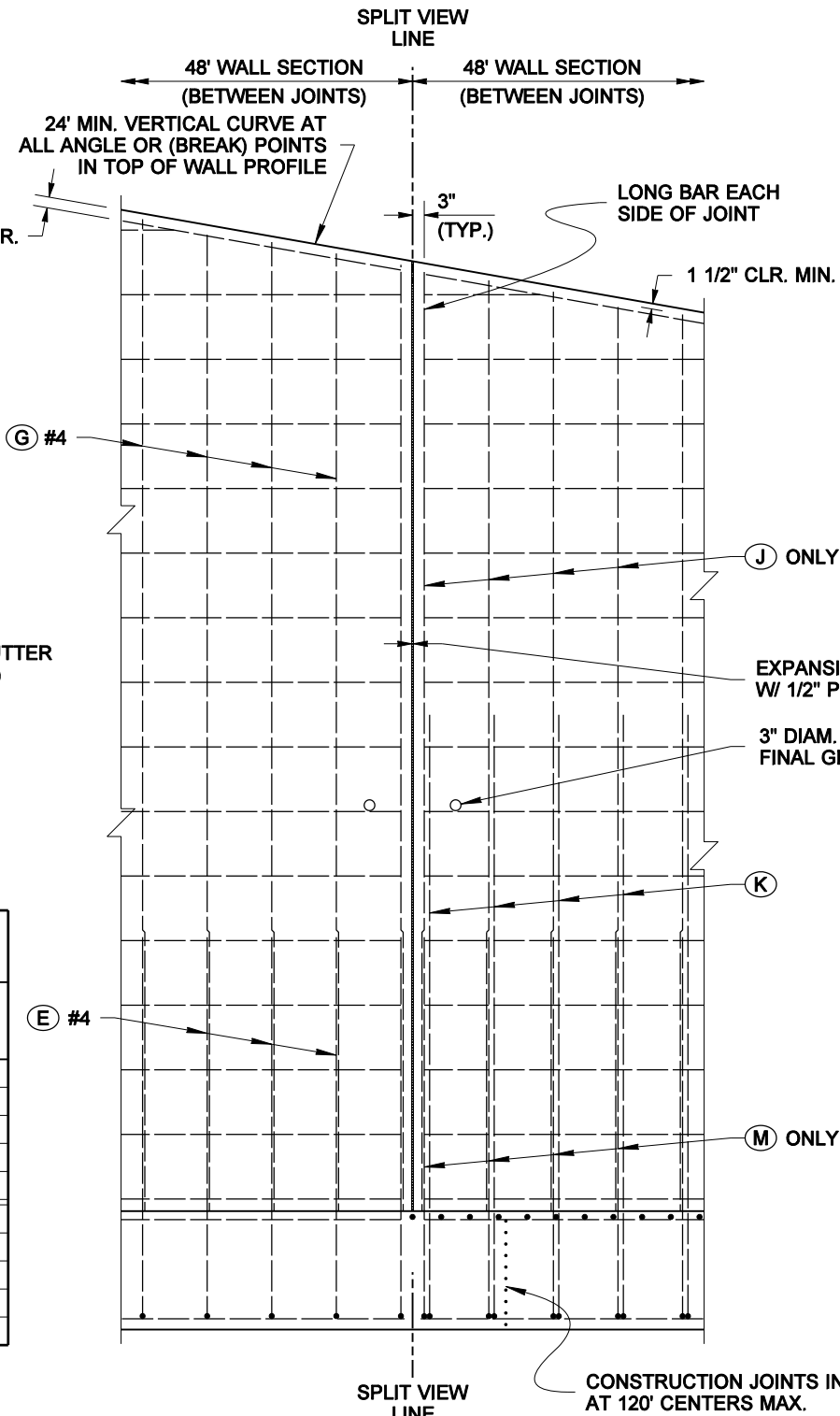


CEMENT CONC. GUTTER DETAIL

BAR Q #4		
LOCATION	WALL HEIGHT (H)	QTY.
TOP OF FOOTING	$\leq 13'$	4
	$12' \leq 17'$	5
	$18' \leq 22'$	7
	$23' \leq 29'$	9
	$30' \leq 35'$	13
BOTTOM OF FOOTING	$\leq 13'$	4
	$12' \leq 17'$	5
	$18' \leq 22'$	7
	$23' \leq 29'$	9
	$30' \leq 35'$	13



KEY DETAIL  
REQUIRED ON WALLS WHERE  $H > 26'$



SPLIT ELEVATION VIEW  
(SHOWING SEPARATE REBAR LAYERS)

NOTES

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

J ONLY FOR  $H \geq 21'$

EXPANSION JOINT ~ 48' CENTERS, W/ 1/2" PREMOLDED JOINT FILLER

3" DIAM. DRAINS AT ABOUT 12' CENTERS AND 6" ABOVE FINAL GROUND LINE AT FRONT FACE OF WALL

M ONLY FOR  $H \geq 21'$

VERTICAL FACE WALL DESIGN  
WITH 2 :1 BACKSLOPE



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.

REINFORCED CONCRETE  
RETAINING WALL  
TYPE 5  
STANDARD PLAN D-10.30-00

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Pasco Bakotich III 07-08-08

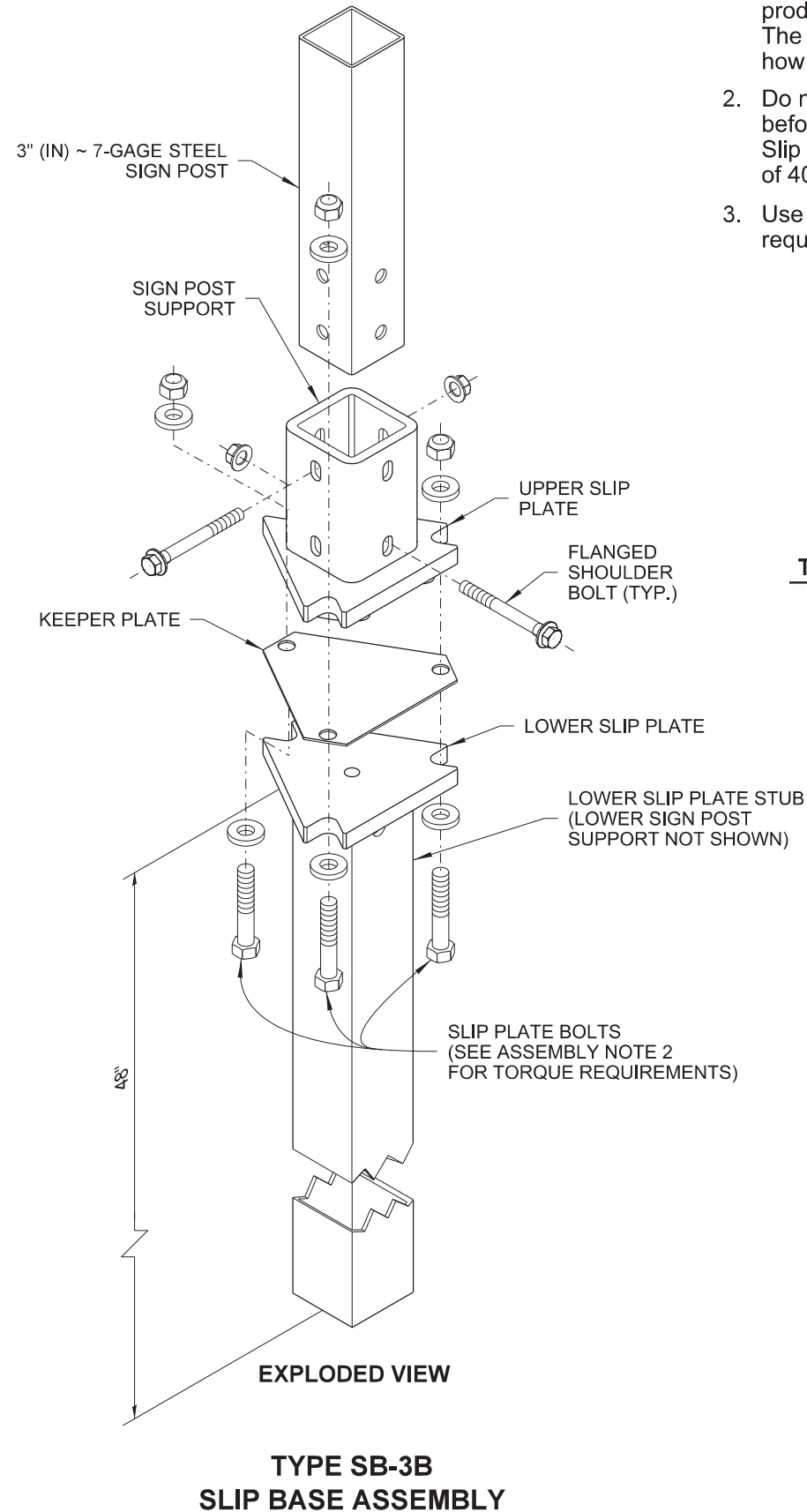
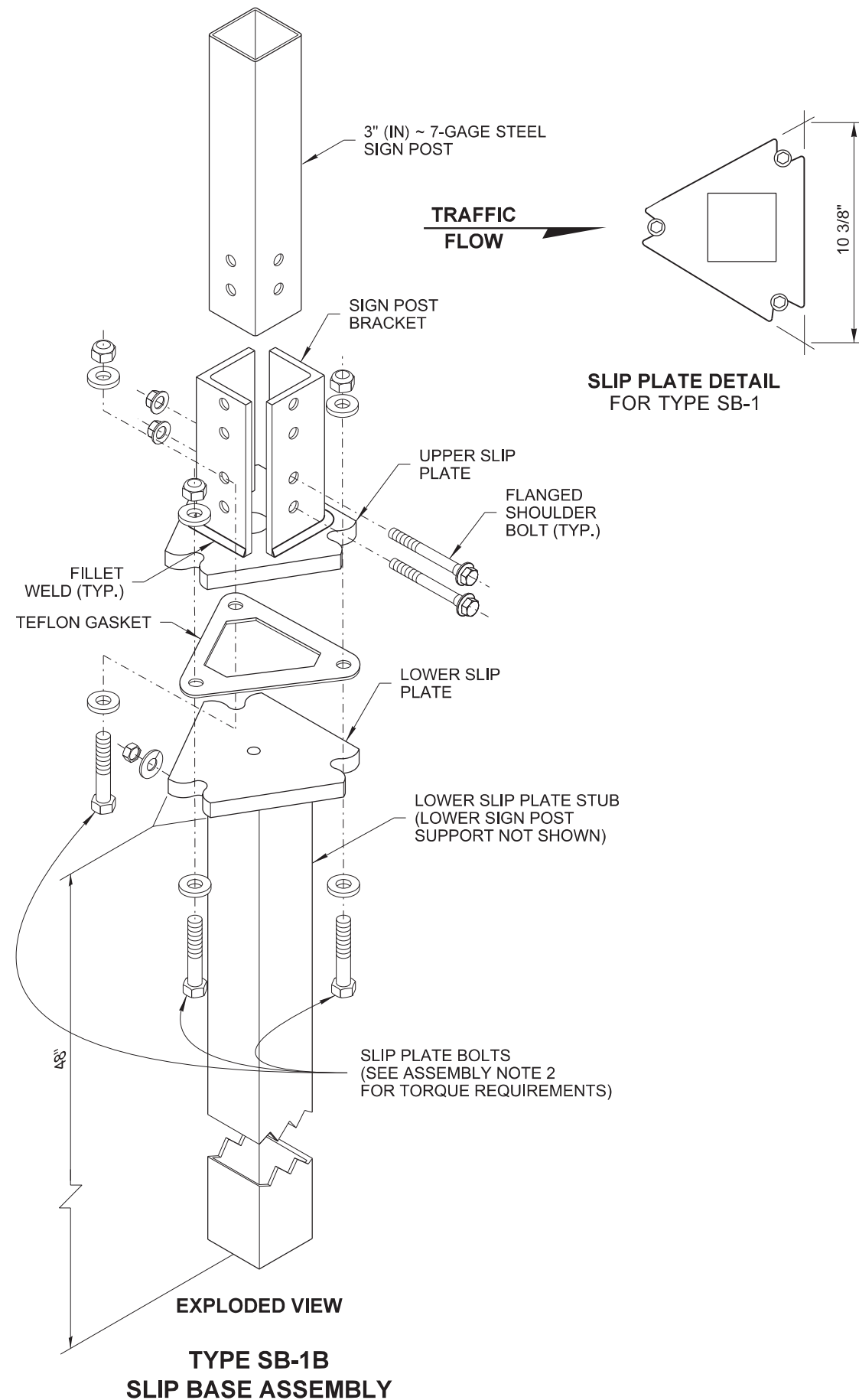
STATE DESIGN ENGINEER

DATE



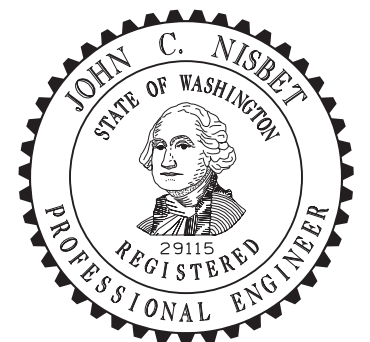
Washington State Department of Transportation

DRAWN BY: FERN LIDDELL



#### ASSEMBLY NOTES

1. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are shown on this plan only to illustrate how the parts are assembled.
2. Do not tighten any single Slip Plate Bolt to the recommended torque before pretightening the other bolts. Progressively tighten the three Slip Plate Bolts in 10 ft-lb increments, alternately, to a final torque of 40 ft-lbs on each.
3. Use only Slip Base manufacturer supplied hardware that meets the requirements of **Standard Specification Sections 9-06 and 9-28**.



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

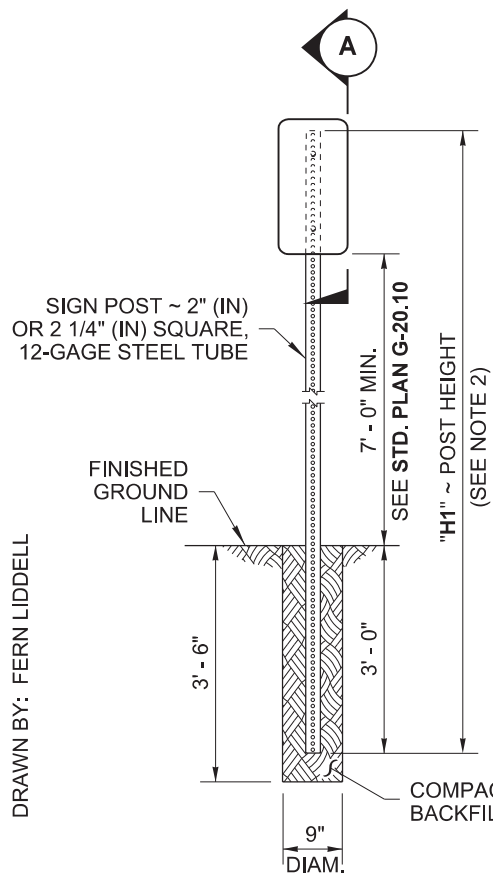
SHEET 6 OF 6 SHEETS

APPROVED FOR PUBLICATION  
Carpenter, Jeff  
Jun 28 2018 10:40 AM



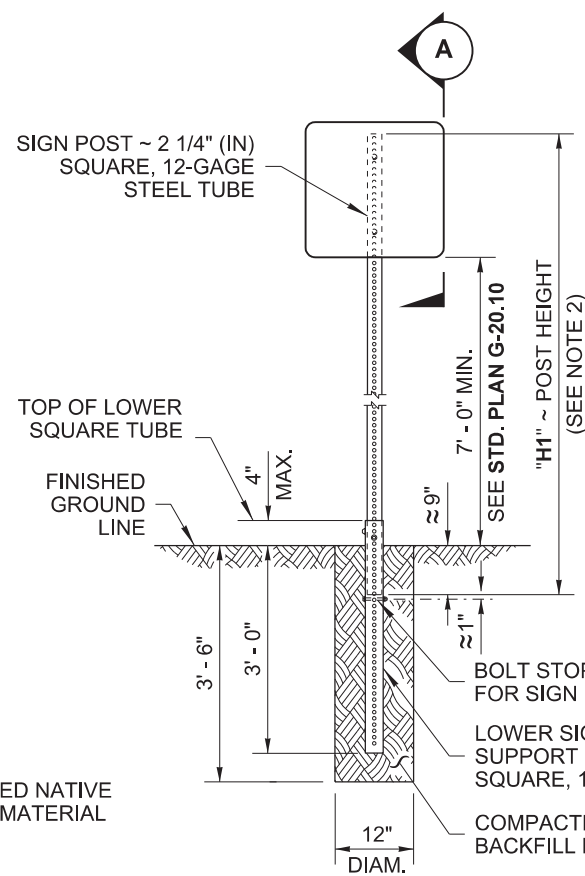
STATE DESIGN ENGINEER  
Washington State Department of Transportation

DRAWN BY: FERN LIDDELL



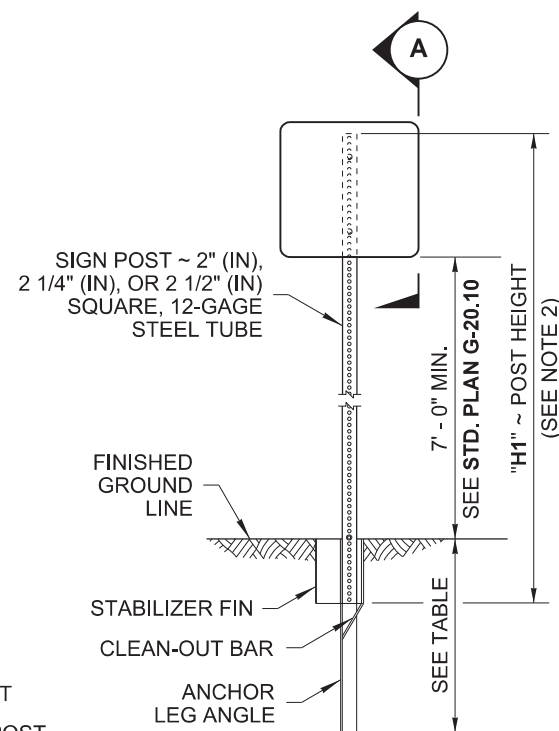
ELEVATION

TYPE ST-1 SIGN SUPPORT



ELEVATION

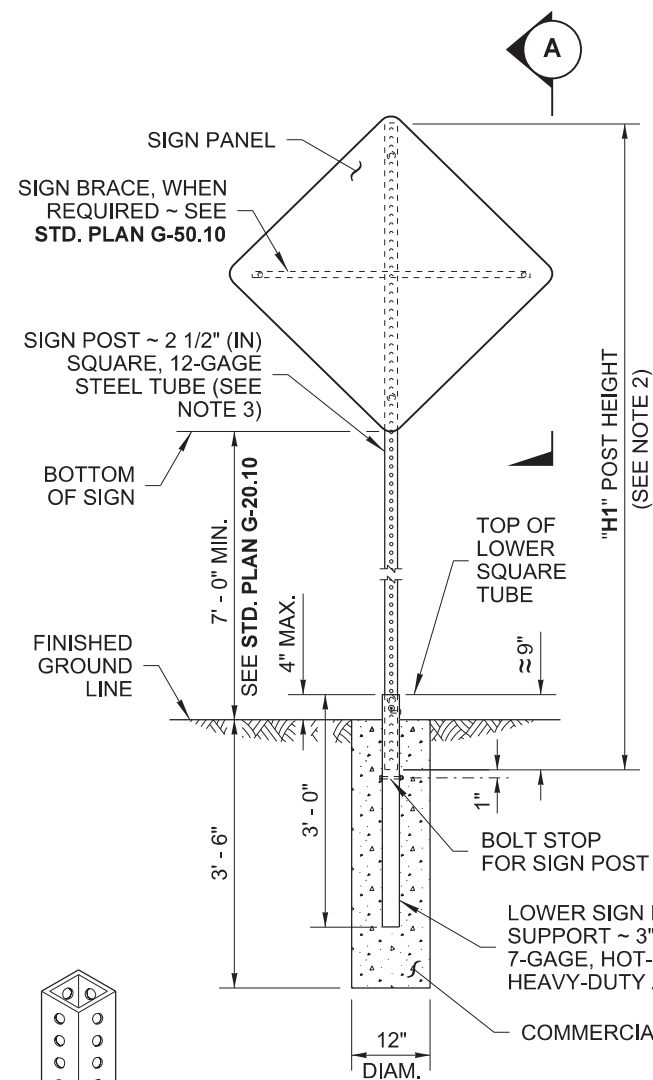
TYPE ST-2 SIGN SUPPORT



ELEVATION

TYPE ST-3 SIGN SUPPORT

BURIED DEPTH	POST SIZE
2' - 6"	2", 2 1/4"
3' - 0"	2 1/2"

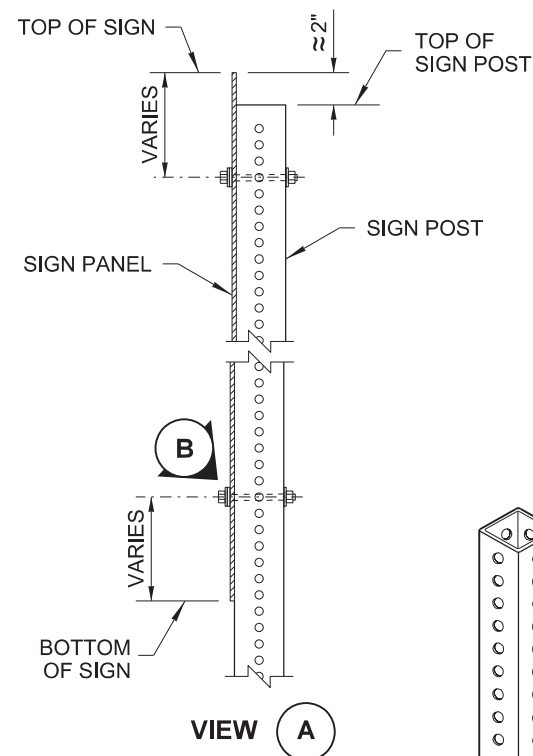
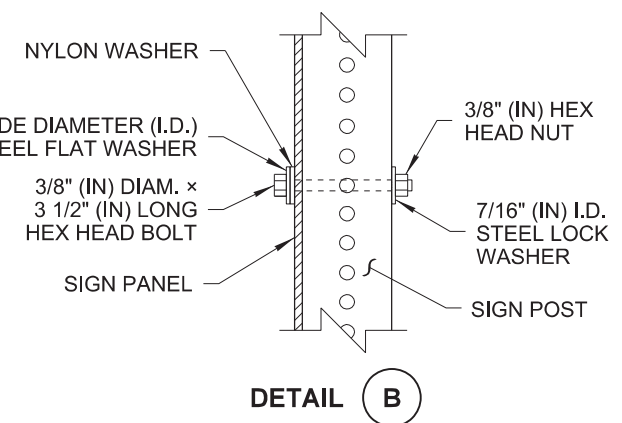


ELEVATION

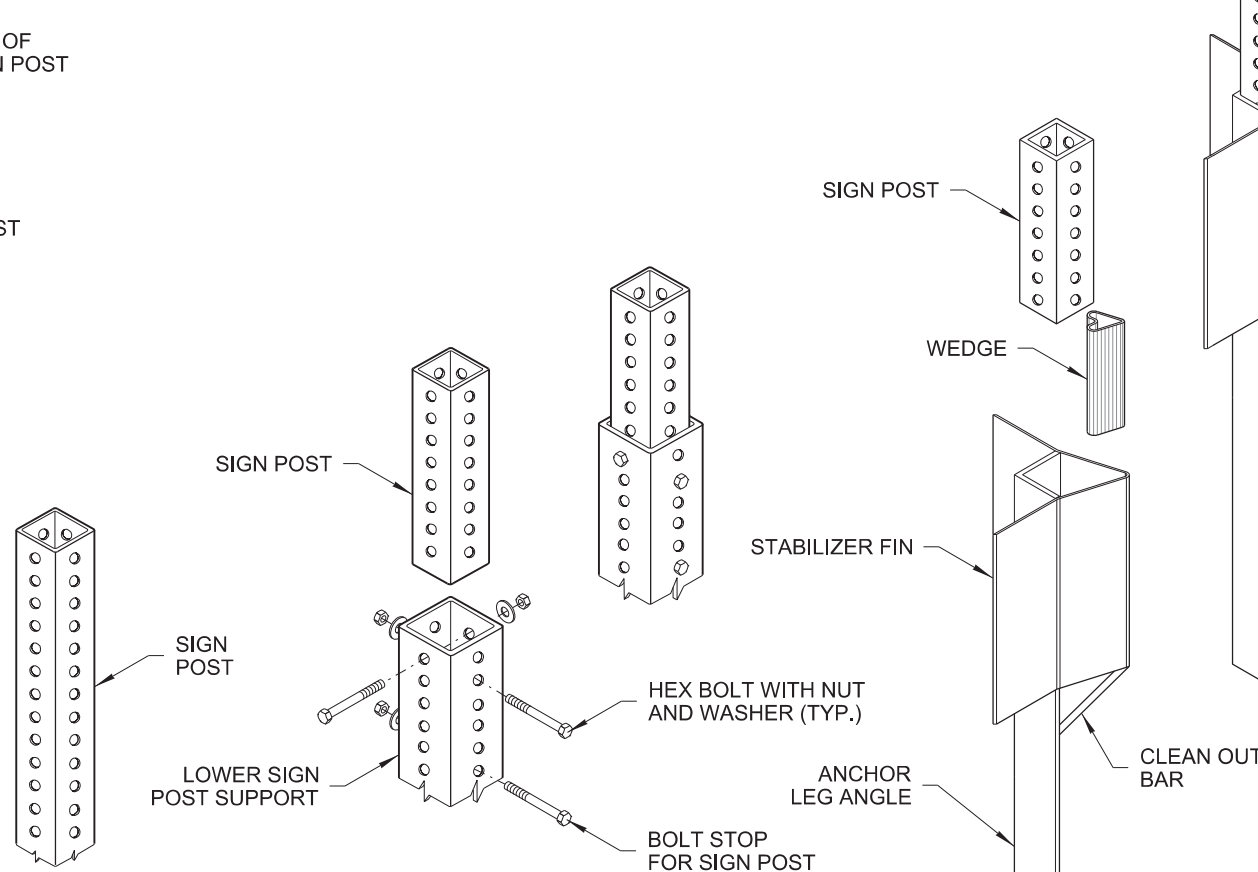
TYPE ST-4 SIGN SUPPORT

## NOTES

- Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented, manufactured products that are in compliance with NCHRP 350 crash test criteria. The base connection details are shown on this plan only to illustrate how the parts are assembled.
- For "H1", refer to the Sign Specification Sheet in the Contract.
- A 2" (in) post with a 2 1/4" (in) PSST anchor or a 2 1/4" (in) post with a 2 1/2" (in) PSST anchor may be substituted. See Contract Plans.
- Perforated square steel post shall meet the requirements of **Standard Specification, Section 9-06**.
- Use only base connection manufacturer supplied hardware that meets the requirements of **Standard Specification, Sections 9-06 and 9-28**.



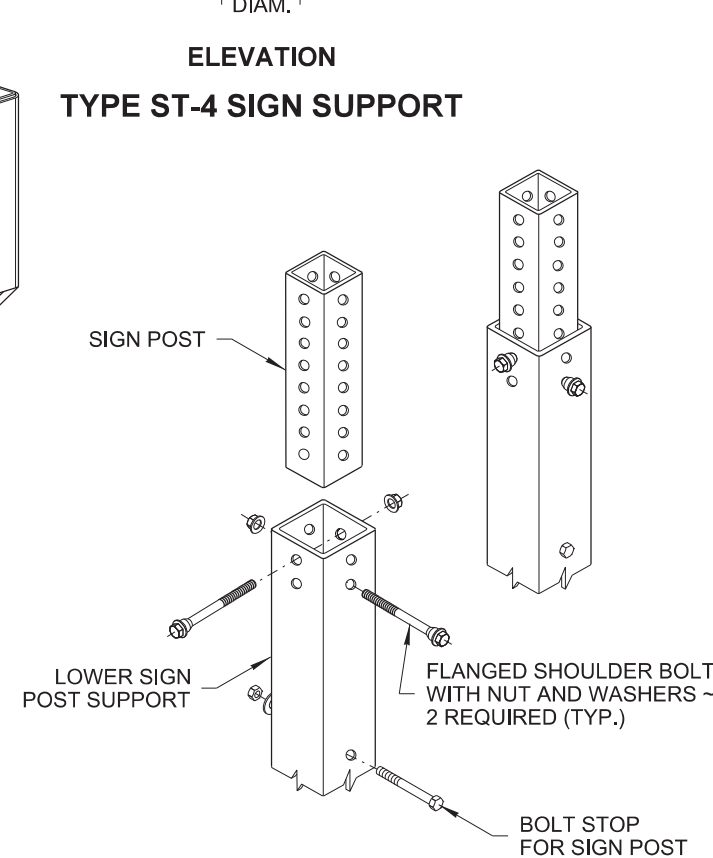
VIEW A



TYPE ST-1

TYPE ST-2

TYPE ST-3



TYPE ST-4

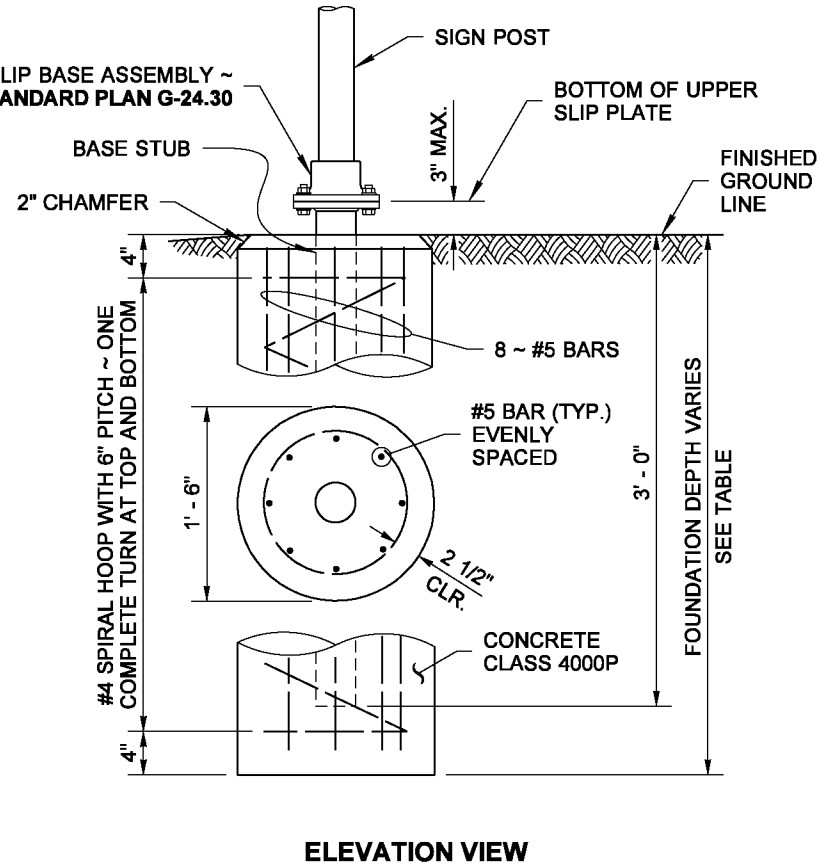
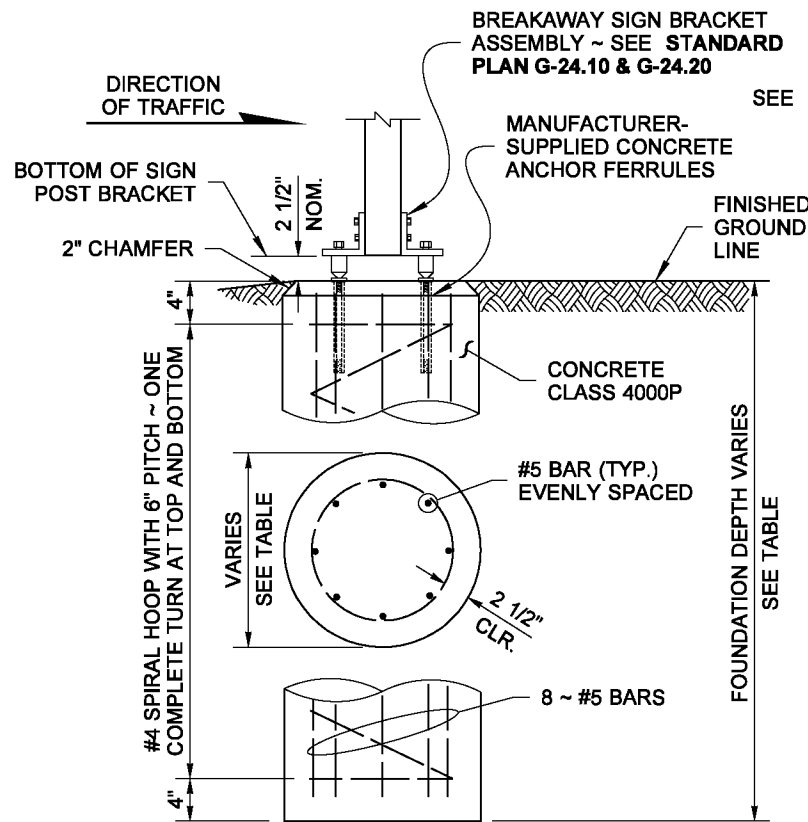
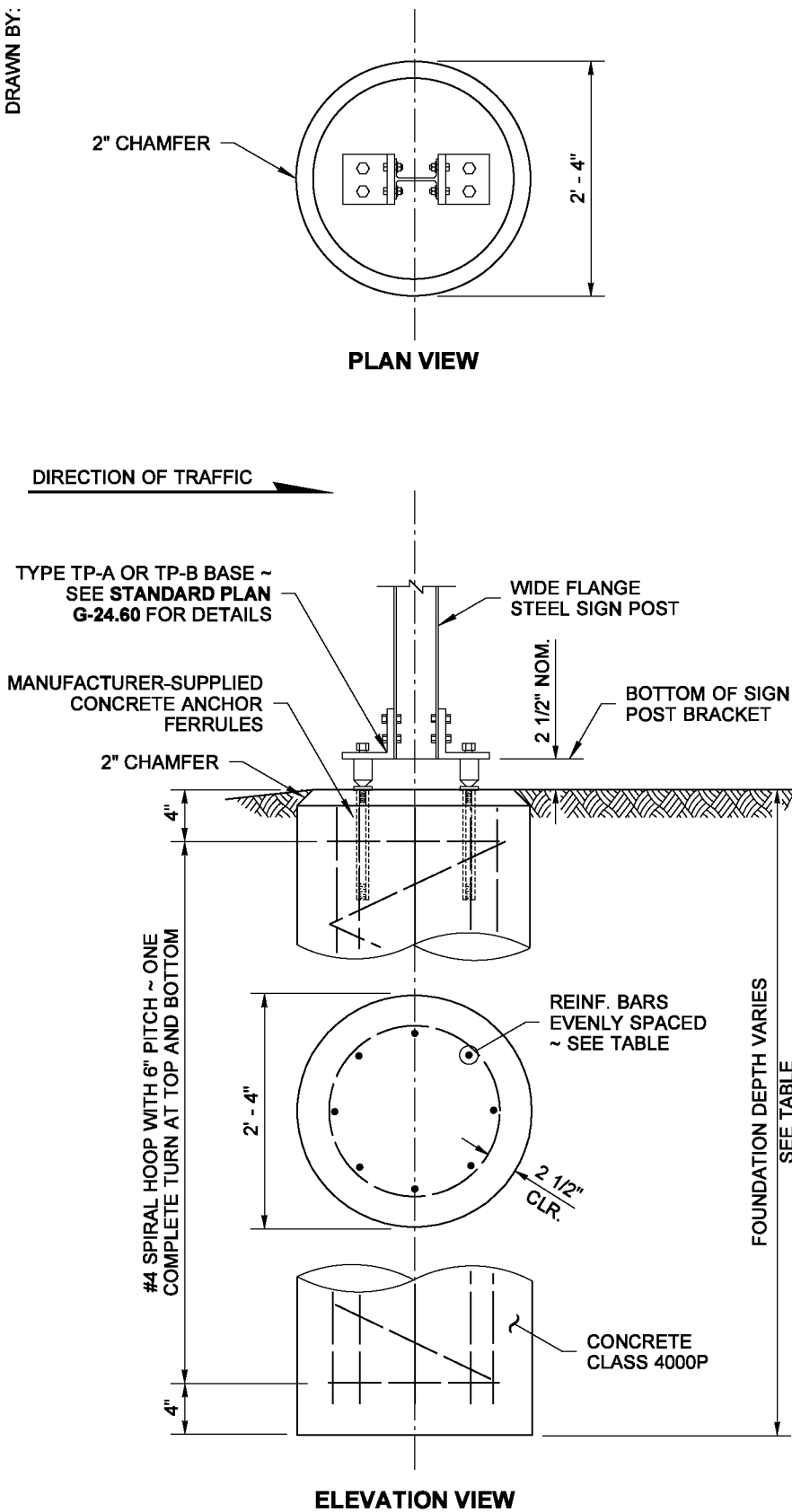


Nisbet, John  
Aug 5 2019 1:46 PM  
**STEEL SIGN SUPPORT  
TYPES ST-1 - ST-4  
INSTALLATION DETAILS  
STANDARD PLAN G-24.50-05**

SHEET 1 OF 1 SHEET



DRAWN BY: LISA CYFORD



#### NOTES

1. Per TRANSP: 5" to 8" square steel posts are acceptable and require type TP-B foundations.
2. Install conduit for post-mounted Junction Box in the concrete foundation, when required. See **Standard Plan J-40.35, Sheet 2.**

#### KEY NOTES

- ① Foundation depths based on allowable lateral bearing pressure in excess of 2500 PSF.
- ② Two-post installation.
- ③ Single-post installations require square steel posts. For single-post installations, divide the ② post MAX. XYZ in half.

#### TYPE AS & TYPE AP FOUNDATION

TYPE AS FOUNDATION TABLE			
POST SIZE	MAX. XYZ	FDN. DIAM.	FDN. DEPTH ①
4" SQ.	250	18"	4' - 0"

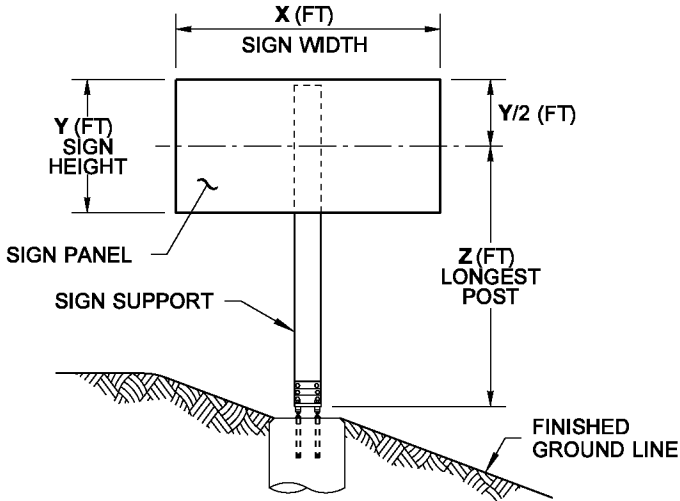
TYPE AP FOUNDATION TABLE			
POST SIZE	MAX. XYZ	FDN. DIAM.	FDN. DEPTH ①
3" O.D.	225	18"	3' - 6"
3 1/2" O.D.	250	18"	4' - 0"
4" O.D.	275	24"	4' - 0"
4 1/2" O.D.	300	24"	4' - 0"

#### TYPE TP-A & TYPE TP-B FOUNDATION

TYPE TP-A & TP-B FOUNDATION TABLE					
SEE NOTE 1					
POST SIZE		MAX. XYZ		VERTICAL REBAR	FDN. DEPTH ①
ASTM A 36	ASTM A 992	2 POST ③	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"

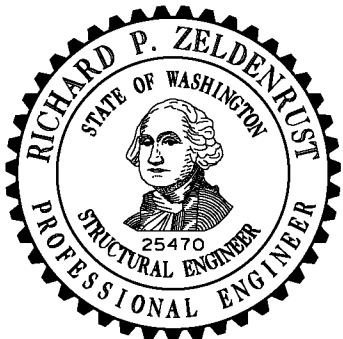
#### TYPE PL, TYPE PL-T & TYPE PL-U FOUNDATION

TYPE PL, TYPE PL-T & TYPE PL-U FOUNDATION TABLE	
MAX. XYZ	FDN. 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



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 WITH THE ENGINEER'S FIRM. A COPY MAY BE OBTAINED UPON REQUEST.

## STEEL SIGN SUPPORT FOUNDATION DETAILS

### STANDARD PLAN G-25.10-04

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

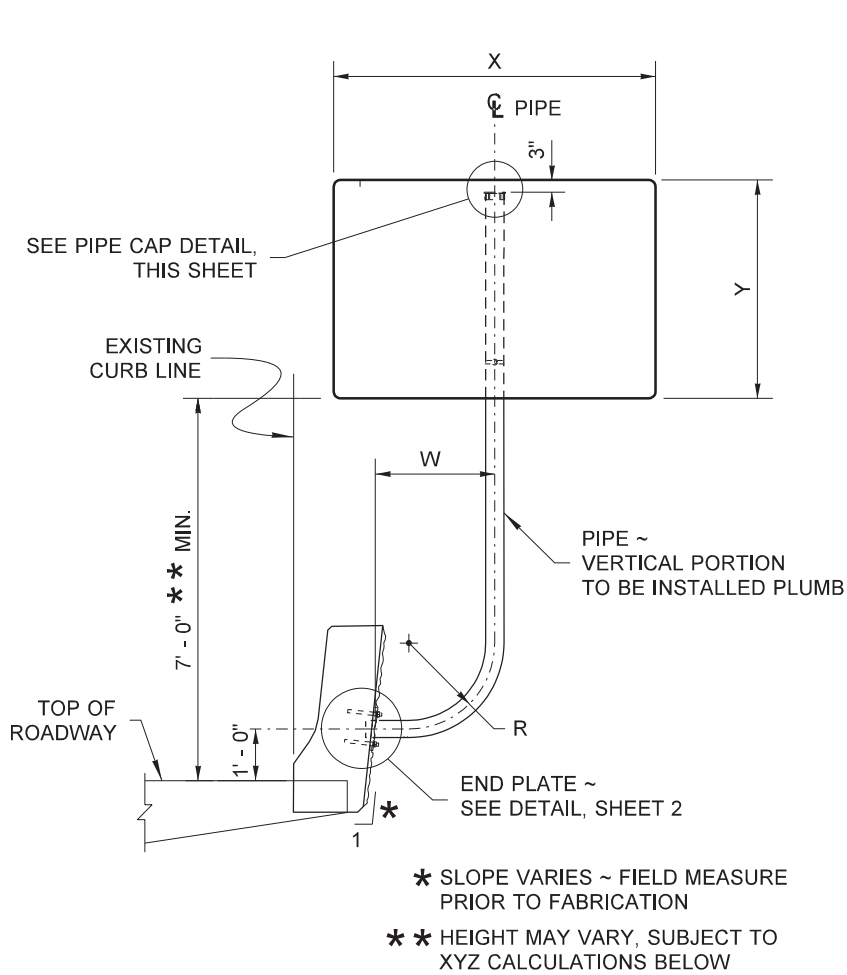
**Pasco Bakotich III** 6/10/13

STATE DESIGN ENGINEER

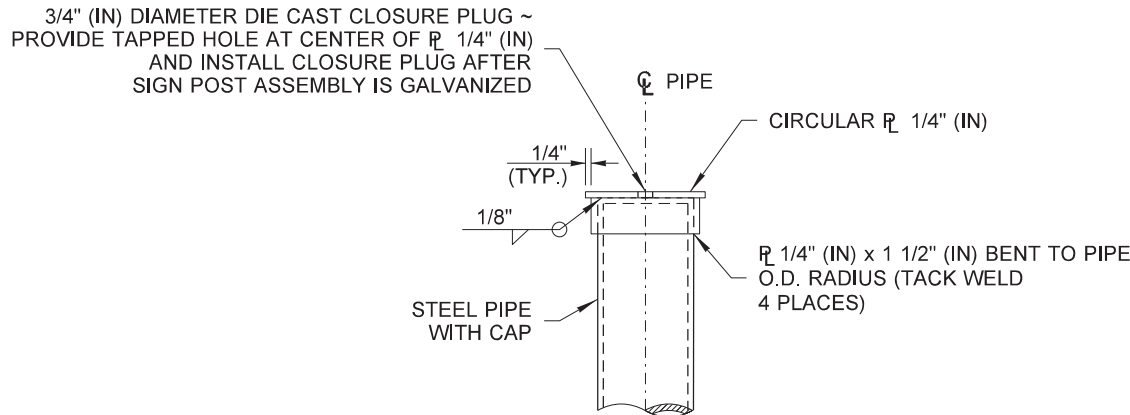
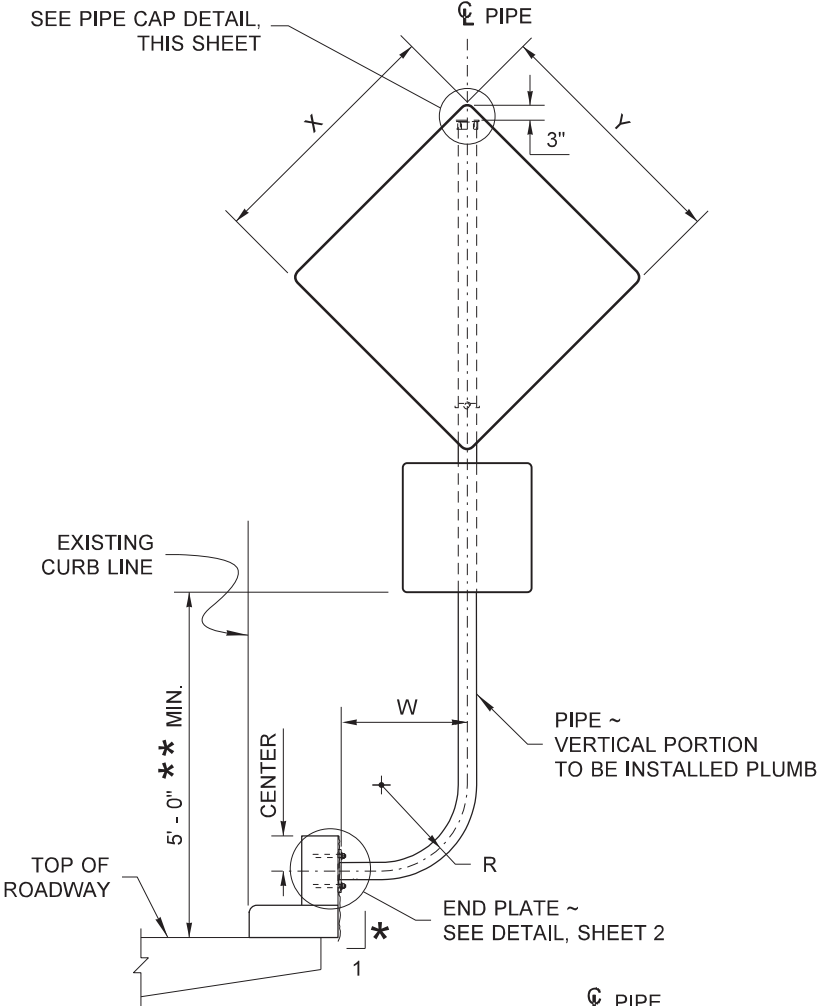
DATE



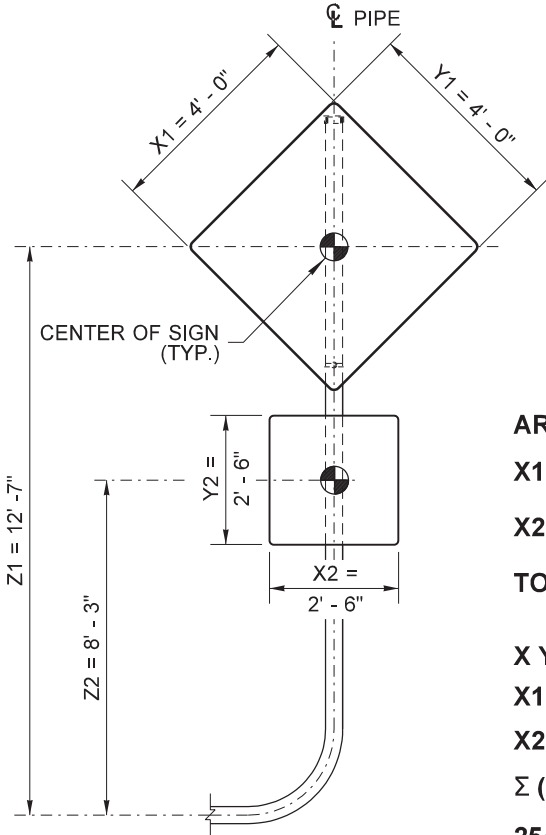
Washington State Department of Transportation



BARRIER MOUNTED ELBOW SIGN SUPPORT



PIPE CAP DETAIL



SAMPLE DESIGN CHECK CALCULATIONS  
(OTHER SIGN CONFIGURATIONS OK)

NOTES

1. All material and workmanship shall be in accordance with the current requirements of the Washington State Department Of Transportation **Standard Specifications for Road, Bridge, Municipal Construction and Amendments**.
2. Sign support components have been designed to meet the requirements of **AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals**, dated 2015 and interim's, using basic wind speed of 115 mph, and 50 year design life.
3. All non-stainless steel parts shall be galvanized in accordance with **AASHTO M111** after fabrication. Bolts and hardware shall be galvanized in accordance with **AASHTO M232**.
4. Size of fillet weld shall be 1/4" (in) minimum except where noted.
5. For sign bracing details, see **Standard Plan G-30.10 or G-50.10**.
6. Rotate sign on post to be normal to traffic.
7. No resin bonded anchors shall be nearer than 1' - 6" from a vertical expansion joint and all resin bonded anchors shall clear any embedded electrical conduit.
8. Sign support shall be installed on cast-in-place concrete barriers rigidly connected to bridge or retaining wall.
9. Anchors shall be bolted into reinforced concrete only with a nominal thickness no less than 9" (in). Base plate shall be installed such that full bearing contact is achieved.
10. Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be moved and the hole abandoned. Fill hole with grout conforming to **Standard Specification, Section 6.02.3(20)**.

PART	MATERIAL SPECIFICATION
PLATES AND BARS	ASTM A36 OR ASTM 572
PIPES	ASTM A53 GRADE B TYPE E OR S, OR EQUIVALENT HSS ASTM A500 ROUND GRADE B
RESIN BONDED ANCHORS	ASTM F1554 GRADE 55 GALV.
NUTS	ASTM A563 GRADE A
WASHERS	ASTM F436 TYPE 1
EPOXY RESIN	STD. SPEC. SECT. 9-26.1 (TYPE IV)

PIPE SIZE	X Y Z	W
4" STD.	< 160 FT <sup>3</sup>	< 2' - 6"
4" X-S	< 220 FT <sup>3</sup>	< 2' - 6"
5" STD.	< 260 FT <sup>3</sup>	< 3' - 6"

AREA CALCULATIONS

$X1 \times Y1 = 4' \times 4' = 16 \text{ FT}^2$

$X2 \times Y2 = 2.5' \times 2.5' = 6.3 \text{ FT}^2$

$\text{TOTAL AREA} = 16' + 6.3' = 22.3 \text{ FT}^2$

X Y Z CALCULATIONS

$X1 \times Y1 \times Z1 = 4' \times 4' \times 12.6' = 203.2 \text{ FT}^3$

$X2 \times Y2 \times Z2 = 2.5' \times 2.5' \times 8.25' = 51.6 \text{ FT}^3$

$\Sigma (XYZ) = 203.2 + 51.6 = 254.8 \text{ FT}^3$

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



Zeldenrust, Richard  
Jul 19 2019 7:37 AM

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

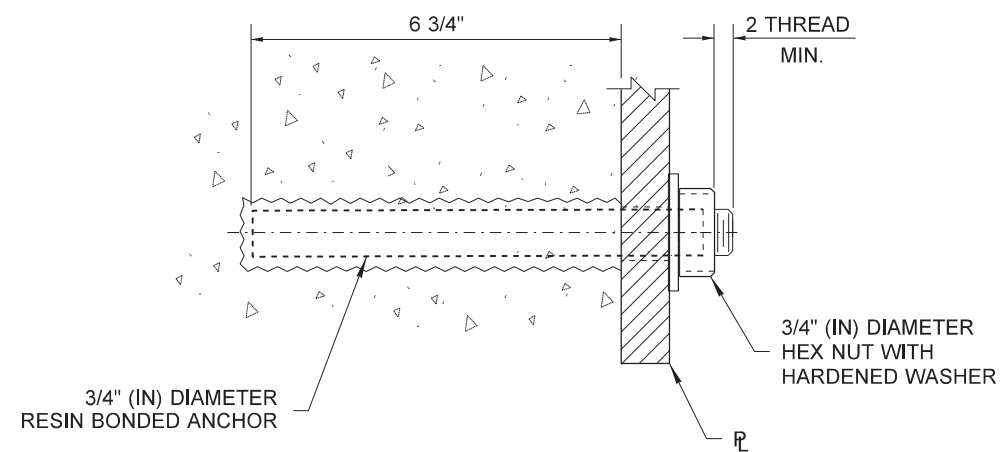
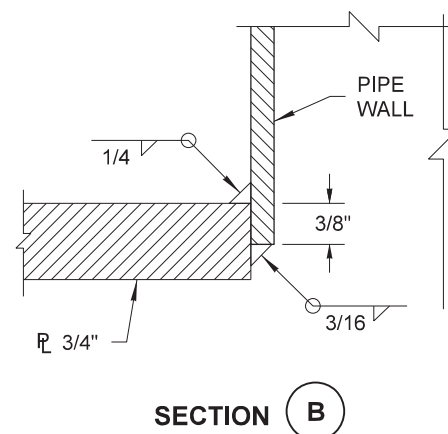
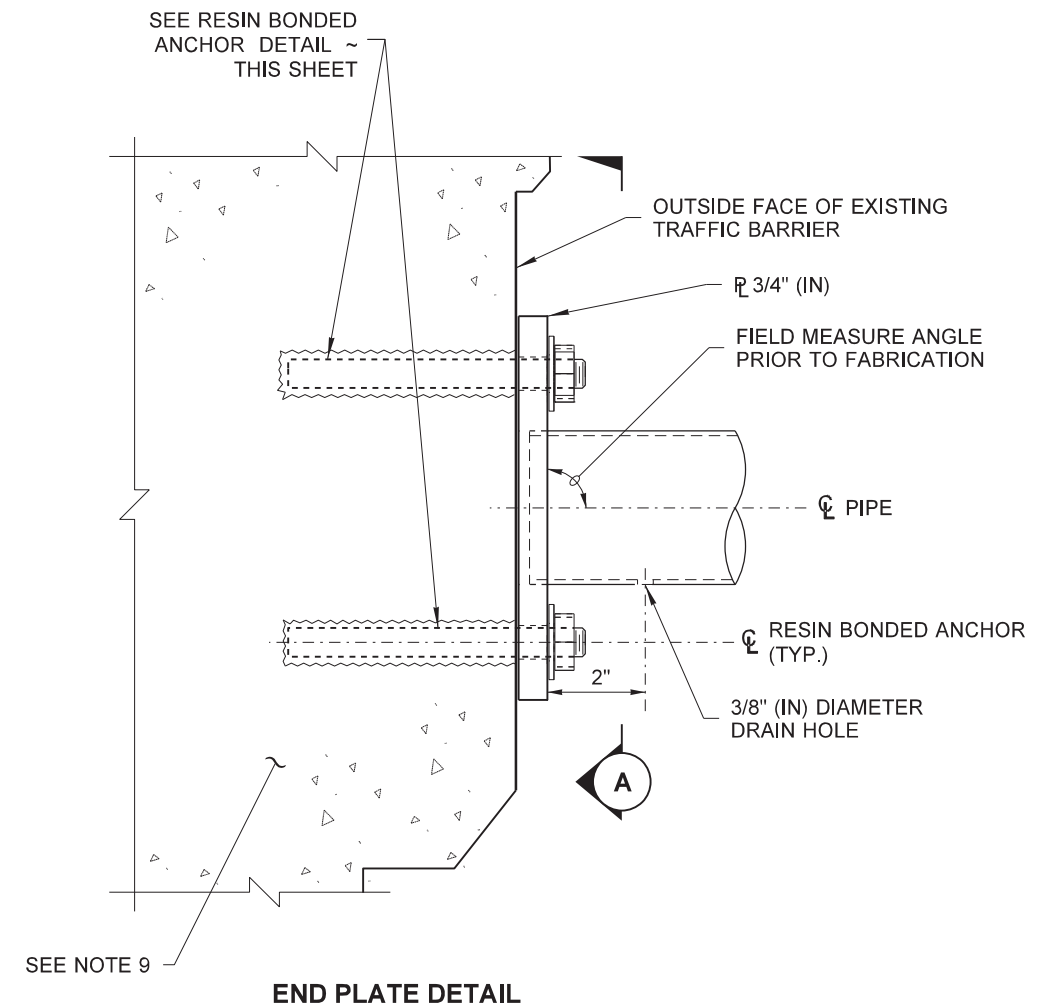
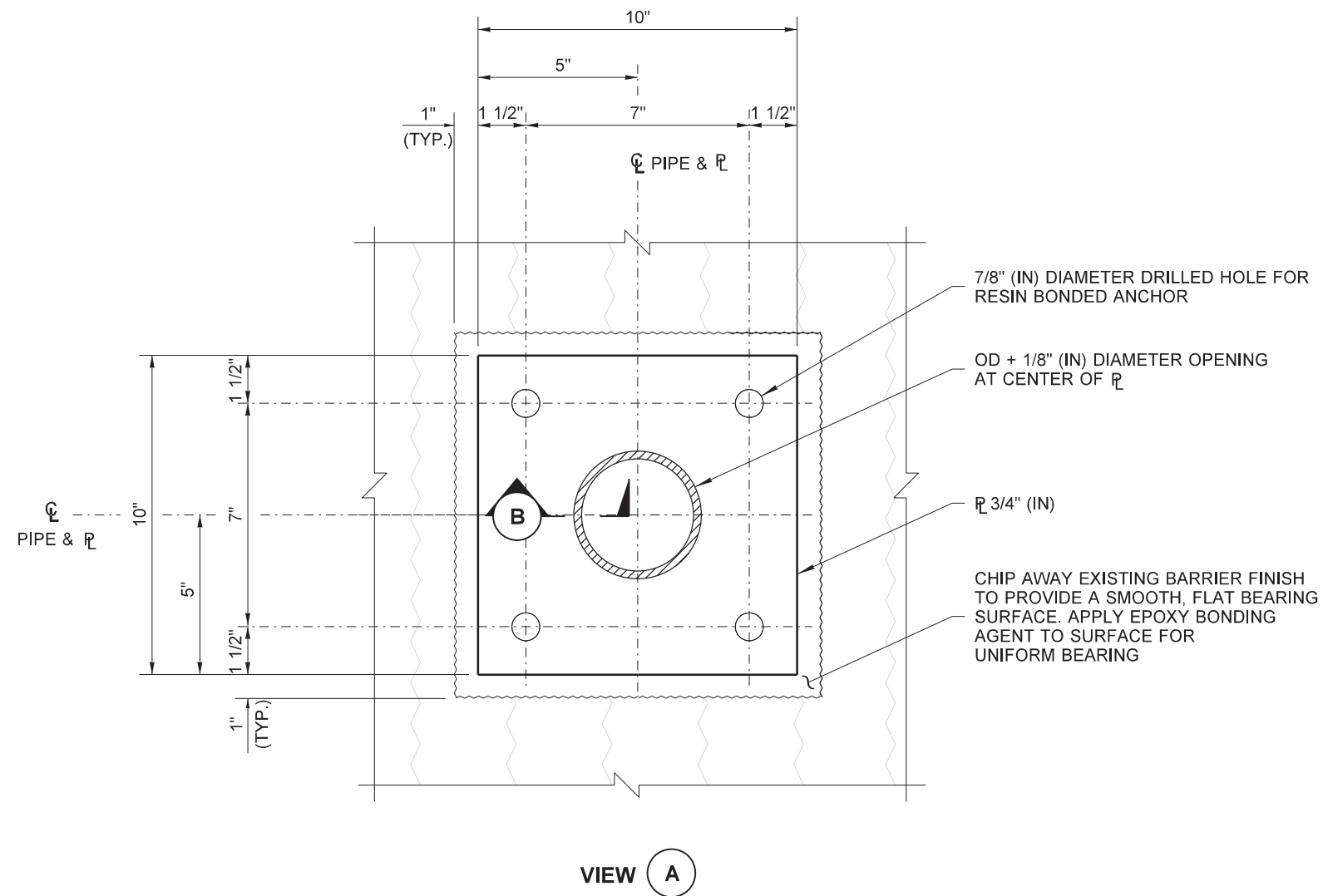
SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Roark, Steve  
Jul 31 2019 12:17 PM

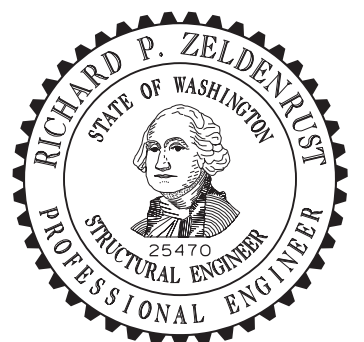
STATE DESIGN ENGINEER

Washington State Department of Transportation



### RESIN BONDED ANCHOR DETAIL

INSTALL ANCHOR BOLT NORMAL TO CONCRETE SURFACE



*Richard P. Zeldenrust* Zeldenrust, Richard  
Jul 19 2019 7:37 AM

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

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

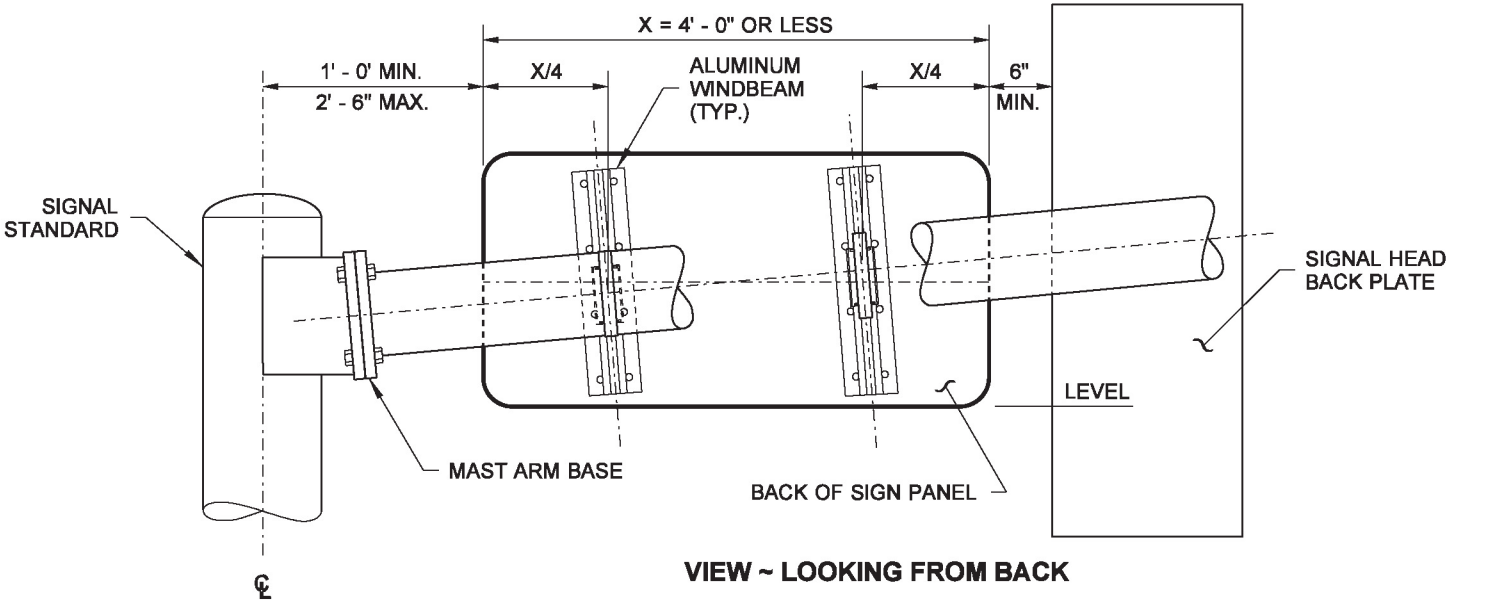
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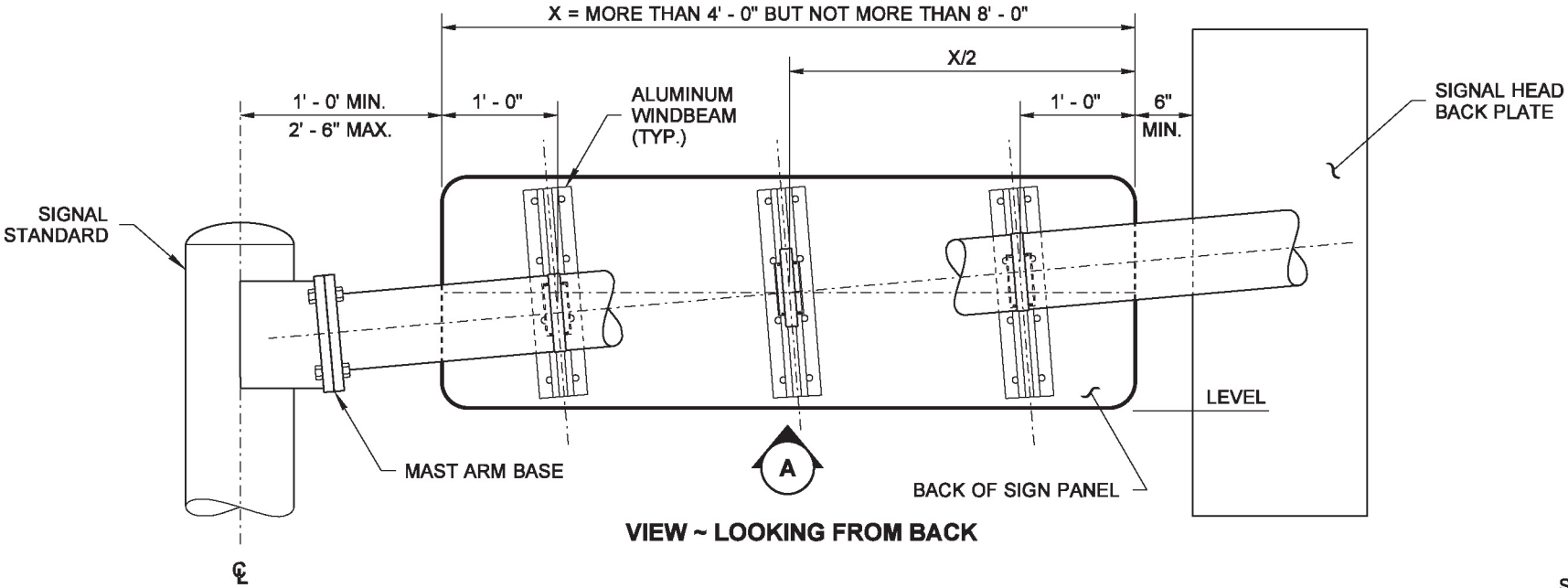


Washington State Department of Transportation

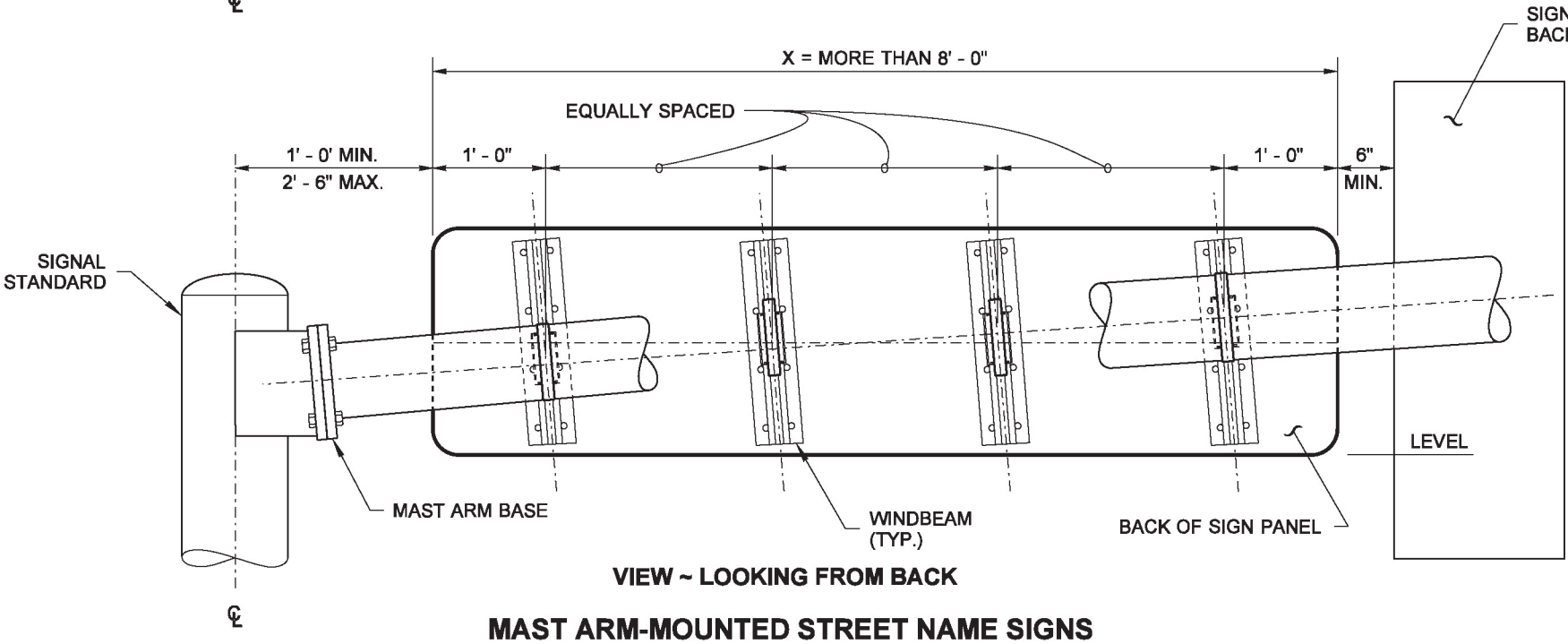
DRAWN BY: FERN LIDDELL



VIEW ~ LOOKING FROM BACK

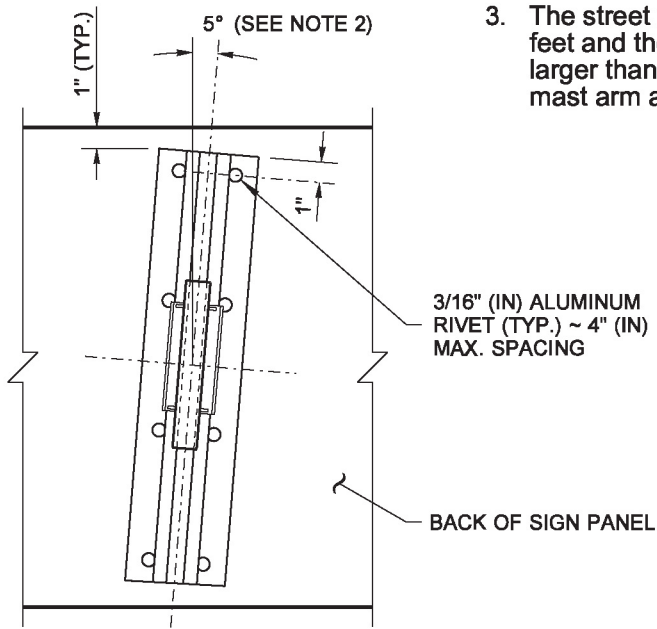


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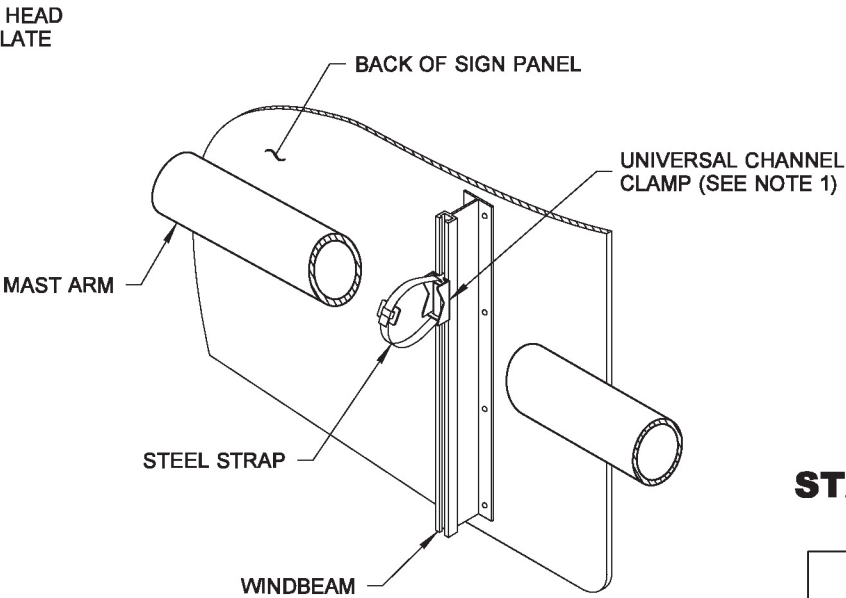
VIEW ~ LOOKING FROM BACK

MAST ARM-MOUNTED STREET NAME SIGNS



DETAIL A

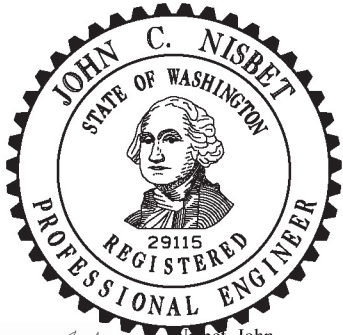
TYPICAL FOR EACH CONNECTION



TYPICAL MAST ARM INSTALLATION

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" (in) wide and 0.030" (in) thick.
2. All signs installed on mast arms or standards (poles) require windbeams. All signs shall be installed with horizontal edges level. A skewed windbeam is required only when the sign is mounted within 12" (in) of the mast arm base (see Detail "A").
3. The street name sign shall be a maximum of 36 square feet and the sign height is a maximum of 3' (ft); signs larger than 36 square feet require a special design mast arm and signal pole.



Nisbet, John  
Jun 22 2015 9:49 AM

**SIGN INSTALLATION  
ON SIGNAL AND  
LIGHT STANDARDS  
STANDARD PLAN G-30.10-04**

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Carpenter, Jeff

Jun 23 2015 7:31 AM

STATE DESIGN ENGINEER



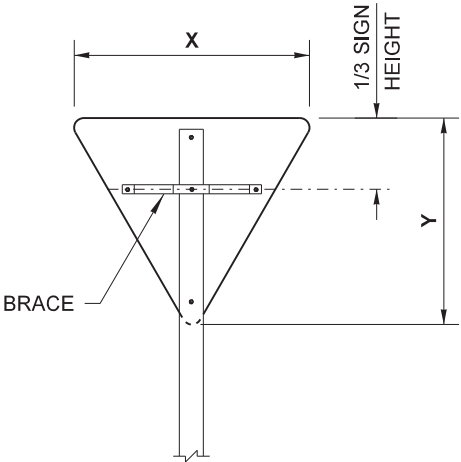
Washington State Department of Transportation

DRAWN BY: FERN LIDDELL

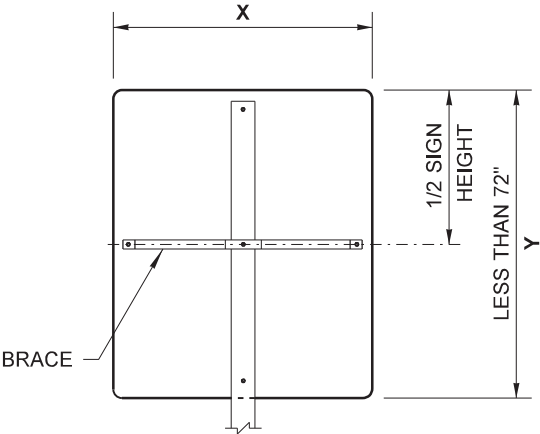
SIGN BRACE DIMENSIONS				
	SIGN TYPE			
	YIELD	DIAMOND-SHAPED		OTHERS
A	1/3 SIGN WIDTH - 1 3/4"	1/2 SIGN WIDTH - 2 1/4"		1/2 SIGN WIDTH - 1"
	SIGN POST TYPE			
	4x6 OR 6x6 TIMBER POST	6x8 TIMBER POST	3" DIAM. STEEL PIPE	2 1/2" SQUARE TUBE
B	5 1/2"	7 1/2"	4 3/4"	2 1/2"

NOTE

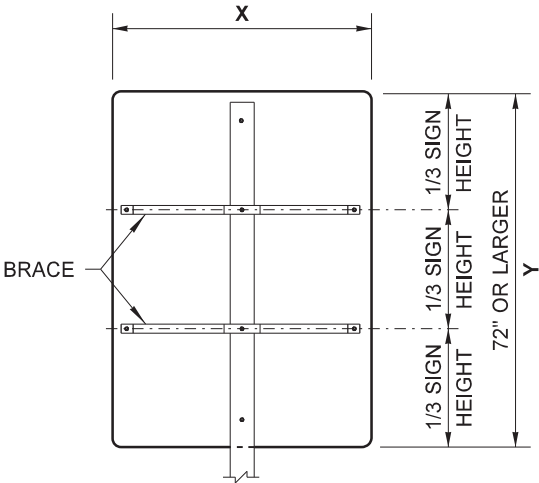
1. For sign installations on round steel posts, see  
Standard Plan G-30.10, sheet 2 of 2.



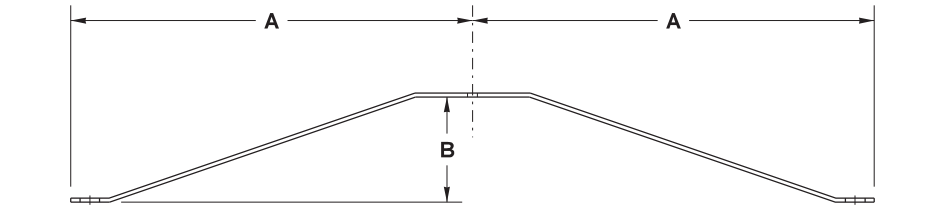
YIELD SIGN



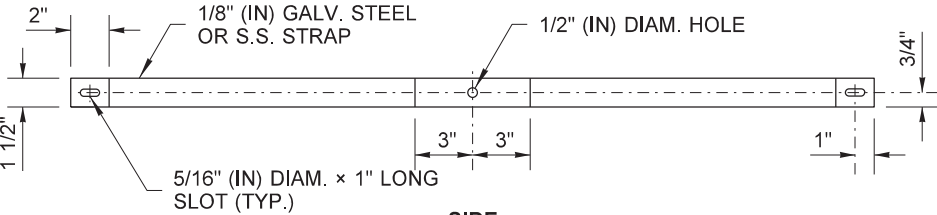
SMALL RECTANGULAR SIGN



LARGE RECTANGULAR SIGN

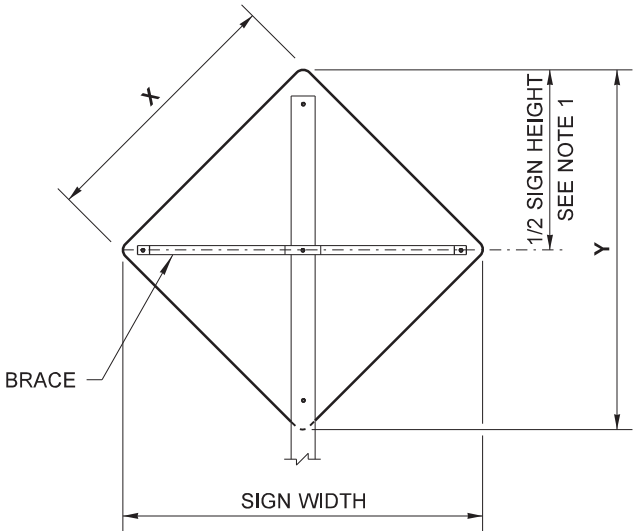


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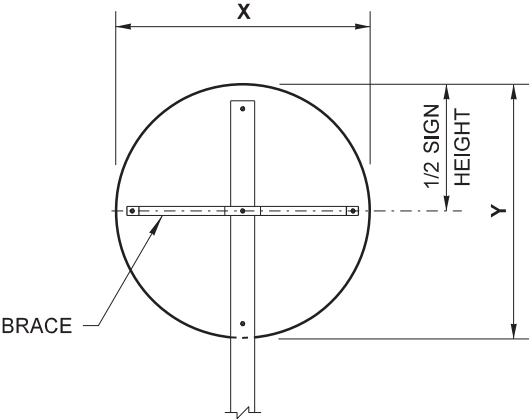


SIDE

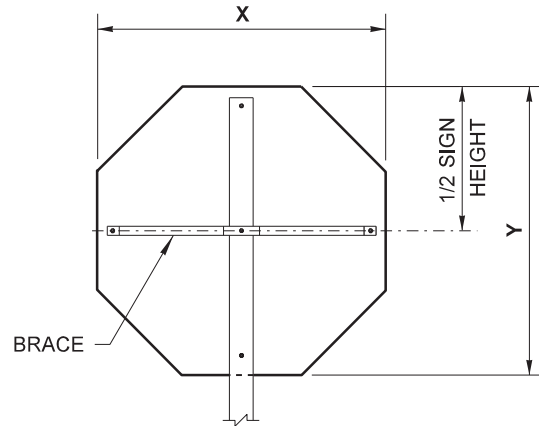
SIGN BRACE DETAIL



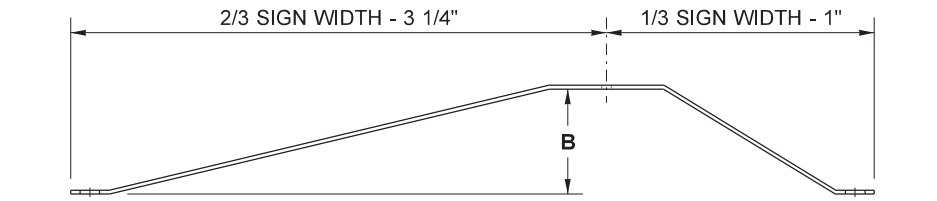
DIAMOND-SHAPED SIGN



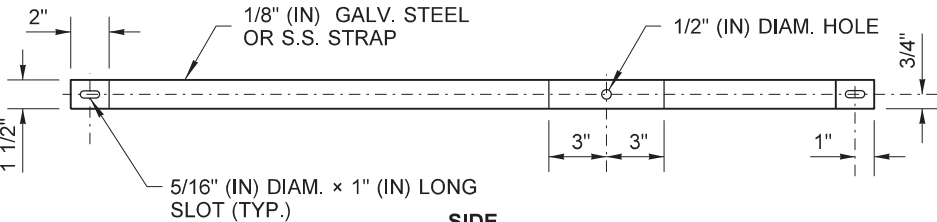
RAILROAD WARNING SIGN



STOP SIGN

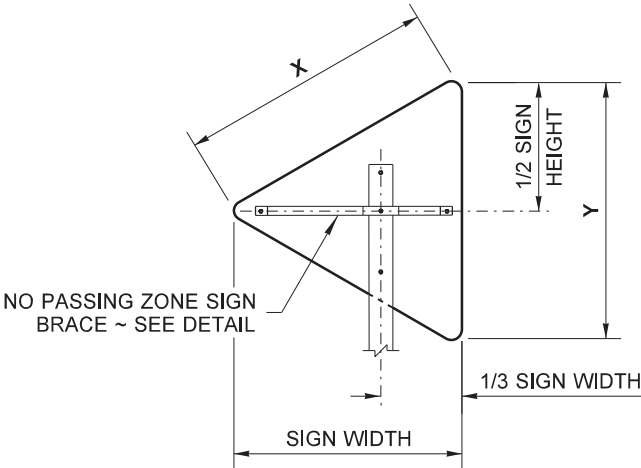


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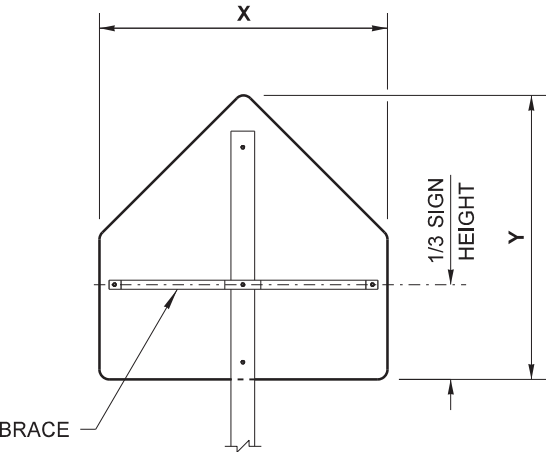


SIDE

NO PASSING ZONE  
SIGN BRACE DETAIL



NO PASSING ZONE SIGN



SCHOOL ZONE SIGN

SIGN BRACE PLACEMENT



Nisbet, John  
Digitally signed by Nisbet, John  
Date: 2018.06.27 11:42:51  
-07'00'

SIGN BRACING

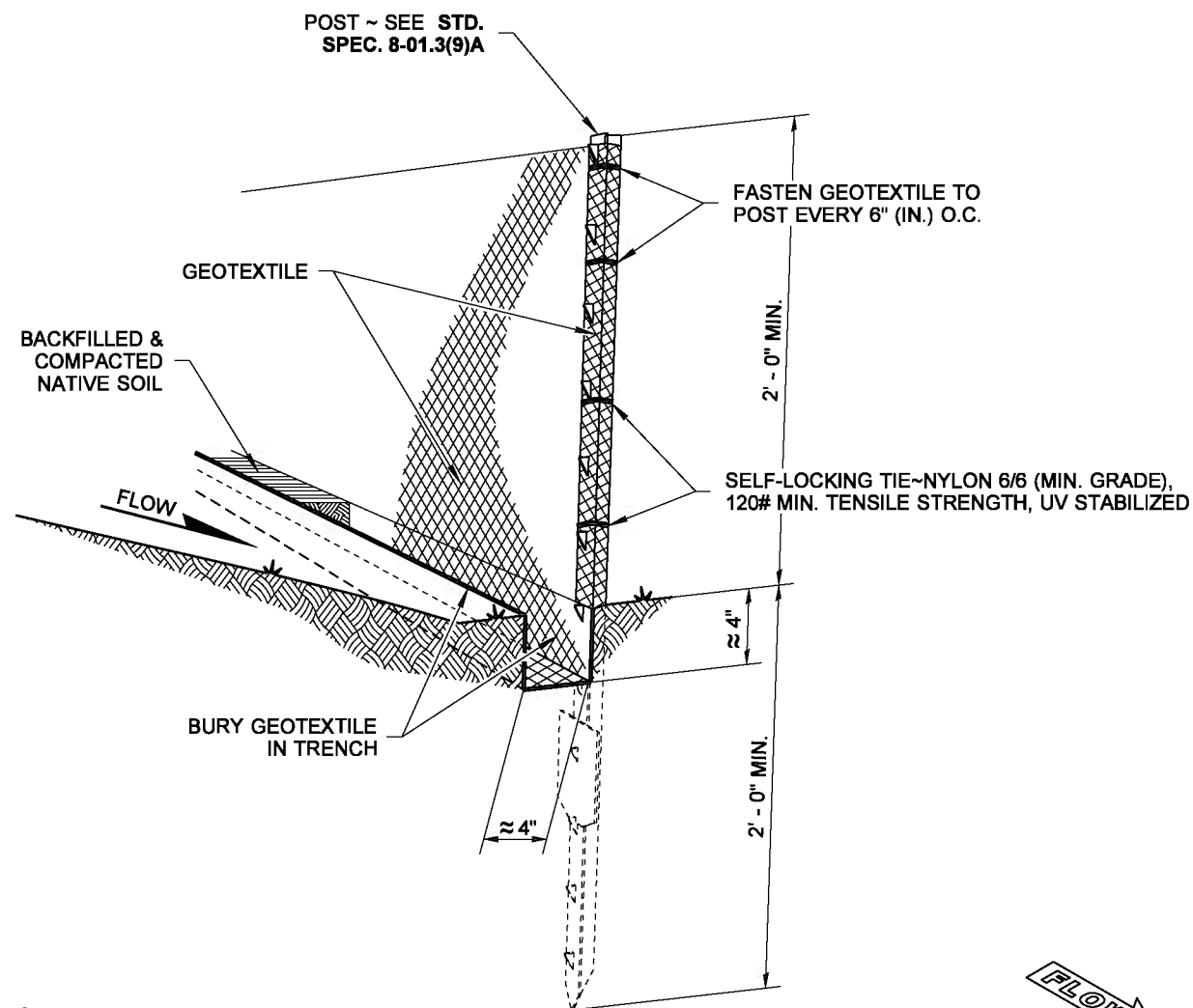
STANDARD PLAN G-50.10-03

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION  
Carpenter, Jeff  
Jun 28 2018 10:38 AM  
STATE DESIGN ENGINEER  
Washington State Department of Transportation

cosign

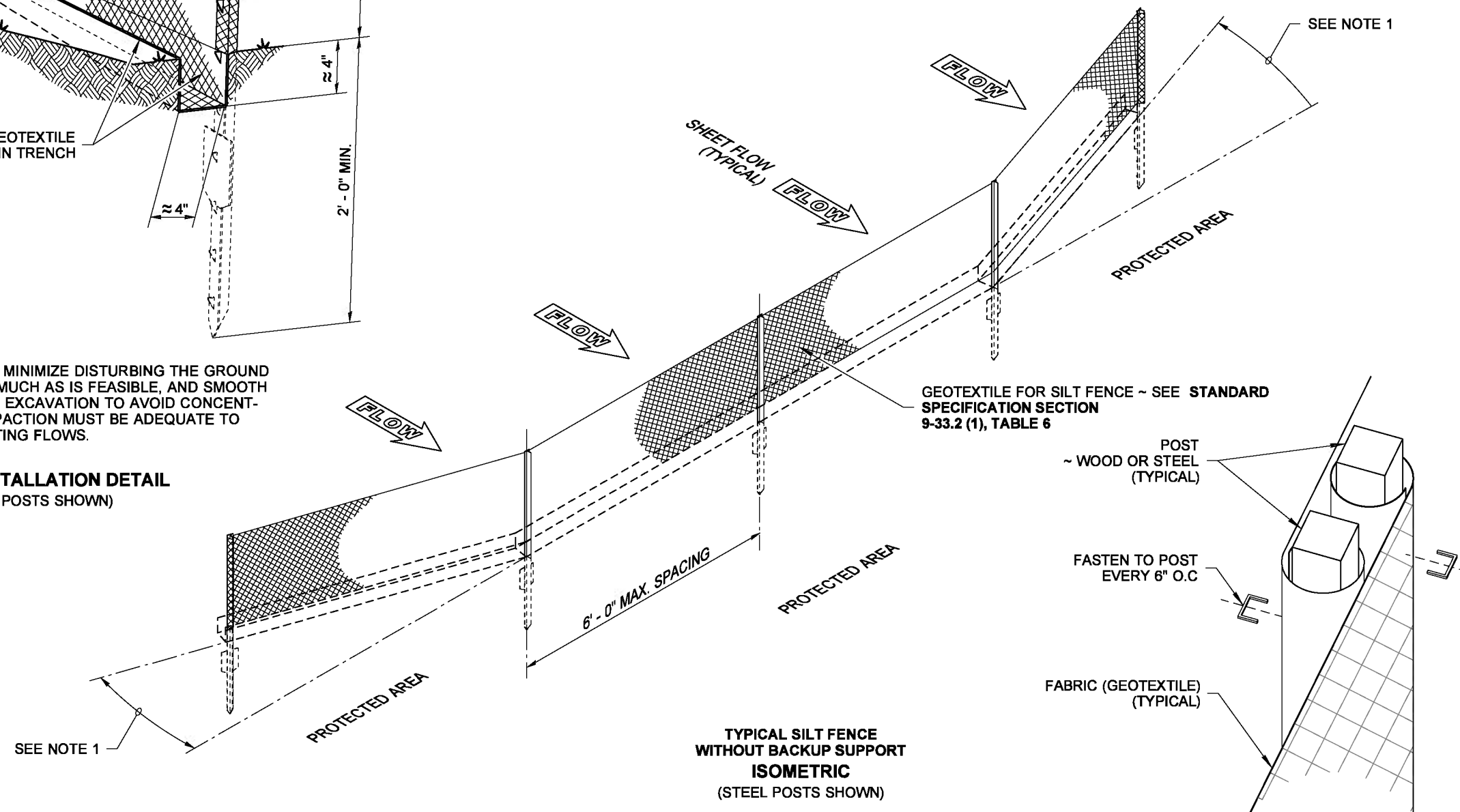
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### NOTE

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

**TYPICAL INSTALLATION DETAIL**  
(STEEL POSTS SHOWN)



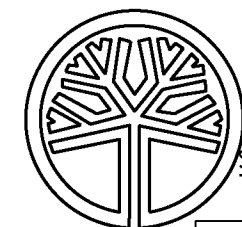
**TYPICAL SILT FENCE  
WITHOUT BACKUP SUPPORT  
ISOMETRIC  
(STEEL POSTS SHOWN)**

**SPLICED FENCE SECTIONS SHALL BE CLOSE ENOUGH TOGETHER TO PREVENT SILT LADEN WATER FROM ESCAPING THROUGH THE FENCE AT THE OVERLAP.**

**SPLICE DETAIL**  
(WOOD POSTS SHOWN)

## NOTES

1. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
2. Perform maintenance in accordance with **Standard Specifications 8-01.3(9)A and 8-01.3(15)**.
3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.
4. Install silt fencing parallel to mapped contour lines.



STATE OF  
WASHINGTON  
REGISTERED  
LANDSCAPE ARCHITECT

SANDRA L. SALISBURY  
CERTIFICATE NO. 000860

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.

## SILT FENCE

## STANDARD PLAN I-30.15-02

**SHEET 1 OF 1 SHEET**

APPROVED FOR PUBLICATION

**Pasco Bakotich III**

**3/22/13**

STATE DESIGN ENGINEER

DATE \_\_\_\_\_

 Washington State Department of Transportation

ATTACH IN A MANNER THAT ASSURES FABRIC  
IS FIRMLY HELD BY THE BACKUP SUPPORT  
IN A WAY THAT REDUCES THE POTENTIAL  
FOR FABRIC TEARING

## GEOTEXTILE

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

BACKFILLED &  
COMPACTED  
NATIVE SOIL

SELF-LOCKING TIE~NYLON 6/6 (MIN. GRADE),  
120# MIN. TENSILE STRENGTH. UV STABILIZED

## BURY GEOTEXTILE IN TRENCH

## NOTE

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

**TYPICAL INSTALLATION DETAIL**  
(STEEL POSTS SHOWN)

SEE NOTE 1

PROTECTED AREA

**TYPICAL HIGH VISIBILITY SILT FENCE  
WITH BACKUP SUPPORT  
ISOMETRIC  
(STEEL POSTS SHOWN)**

POST ~  
WOOD OR STEEL  
(TYPICAL)

BACKUP  
— SUPPORT  
(TYPICAL)

GEOTEXTILE FOR HIGH VISIBILITY SILT FENCE  
COLOR - ORANGE ~ SEE **STANDARD**  
**SPECIFICATION, SECTION**  
**9-33.2 (1), TABLE 6**

INSTALL BACKUP SUPPORT FOR THE GEOTEXTILE ~  
SEE **STANDARD SPECIFICATION,**  
**SECTION 8.01.3(9)A**

— SEE NOTE 1

PROTECTED AREA

MAX  
PROTECTED AREA

FABRIC  
(GEOTEXTILE)  
(TYPICAL)

SPliced fence sections shall be close enough together to prevent silt laden water from escaping through the fence at the overlap.

**SPLICE DETAIL**  
(STEEL POSTS SHOWN)

## NOTES

1. Angle high visibility silt fence terminal end uphill 24" (in) to 48" (in) to prevent sediment from flowing around the end of the fence.
2. Perform maintenance in accordance with **Standard Specification, Sections 8-01.3(9)A and 8-01.3(15)**.
3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.
4. Install silt fencing parallel to mapped contour lines.



Hartwig, Juli  
Jul 11 2019 11:26 AM

## HIGH VISIBILITY SILT FENCE WITH BACKUP SUPPORT

## STANDARD PLAN I-30.16-01

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

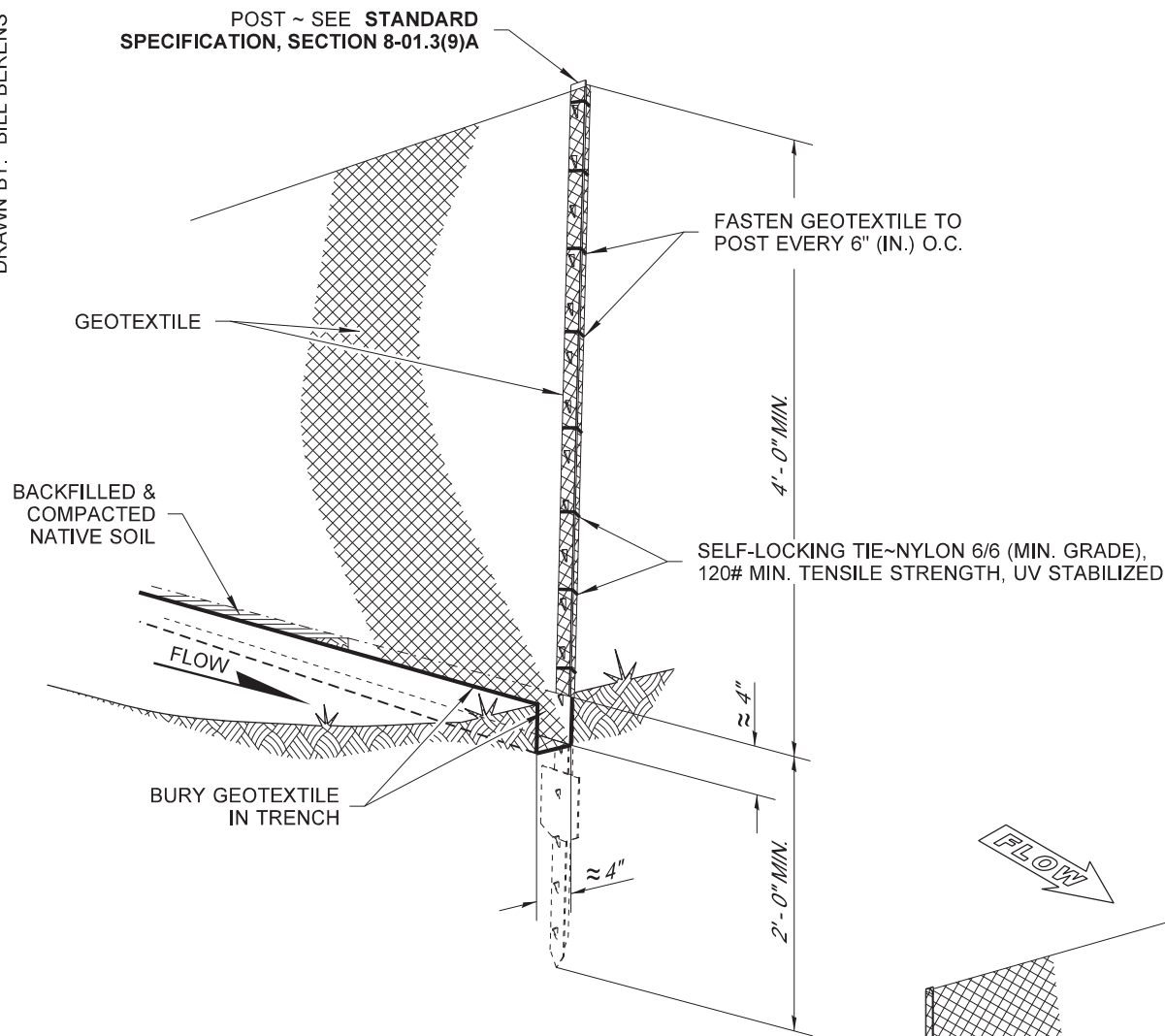
Roark, Steve  
Jul 11 2019 12:30 PM

STATE DESIGN ENGINEER

 Washington State Department of Transportation

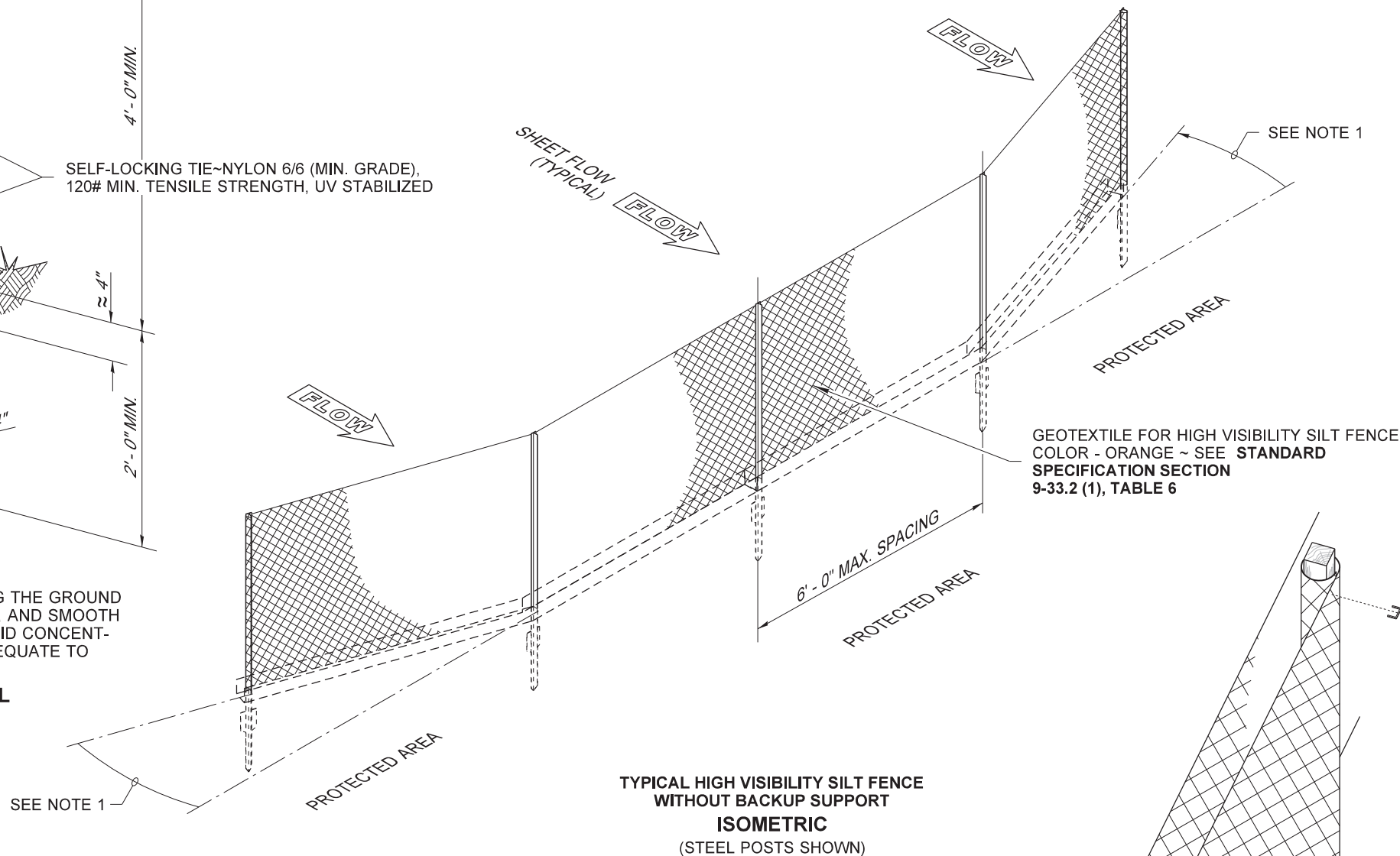
DRAWN BY: BILL BERENS

DRAWN BY: BILL BERENS

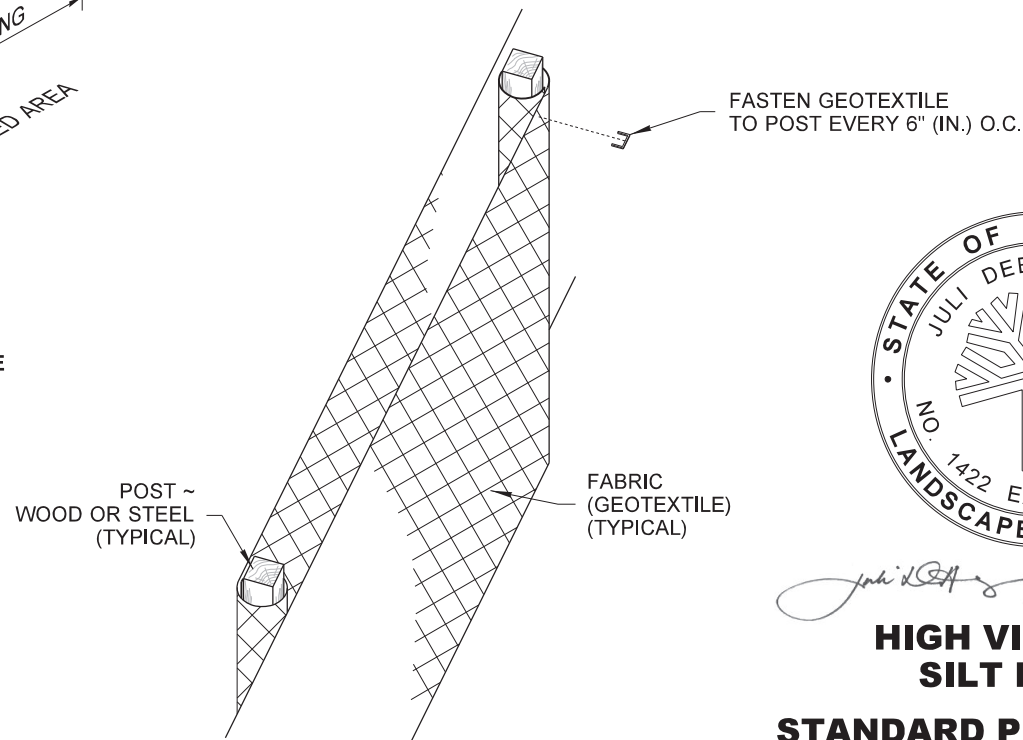


**NOTE**  
DURING EXCAVATION, MINIMIZE DISTURBING THE GROUND AROUND TRENCH AS MUCH AS IS FEASIBLE, AND SMOOTH SURFACE FOLLOWING EXCAVATION TO AVOID CONCENT-RATING FLOWS. COMPACTION MUST BE ADEQUATE TO PREVENT UNDERCUTTING FLOWS.

**TYPICAL INSTALLATION DETAIL**  
(STEEL POSTS SHOWN)



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



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

**SPlice DETAIL**  
(WOOD POSTS SHOWN)

**NOTES**

1. Angle Terminal end uphill 24" (in) to 48" (in) to prevent flow around fence (Typical).
2. Perform maintenance in accordance with **Standard Specification, Sections 8-01.3(9)A and 8-01.3(15)**.
3. Splices shall never be placed in low spots or sump locations. If splices are located in low or sump areas, the fence may need to be reinstalled unless the Project Engineer approves the installation.
4. Install silt fencing parallel to mapped contour lines.



Hartwig, Juli  
Jun 4 2019 10:48 AM

**HIGH VISIBILITY SILT FENCE**

**STANDARD PLAN I-30.17-01**

SHEET 1 OF 1 SHEET

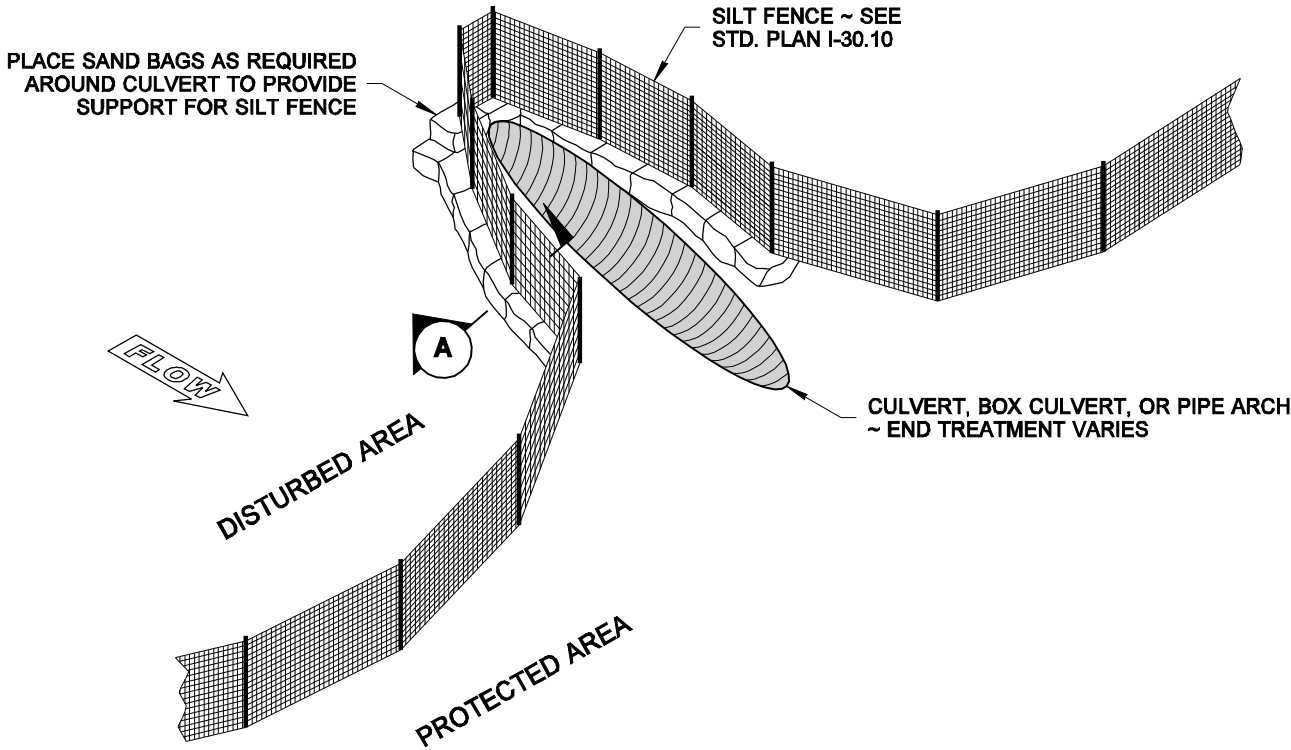
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Jun 12 2019 7:42 AM

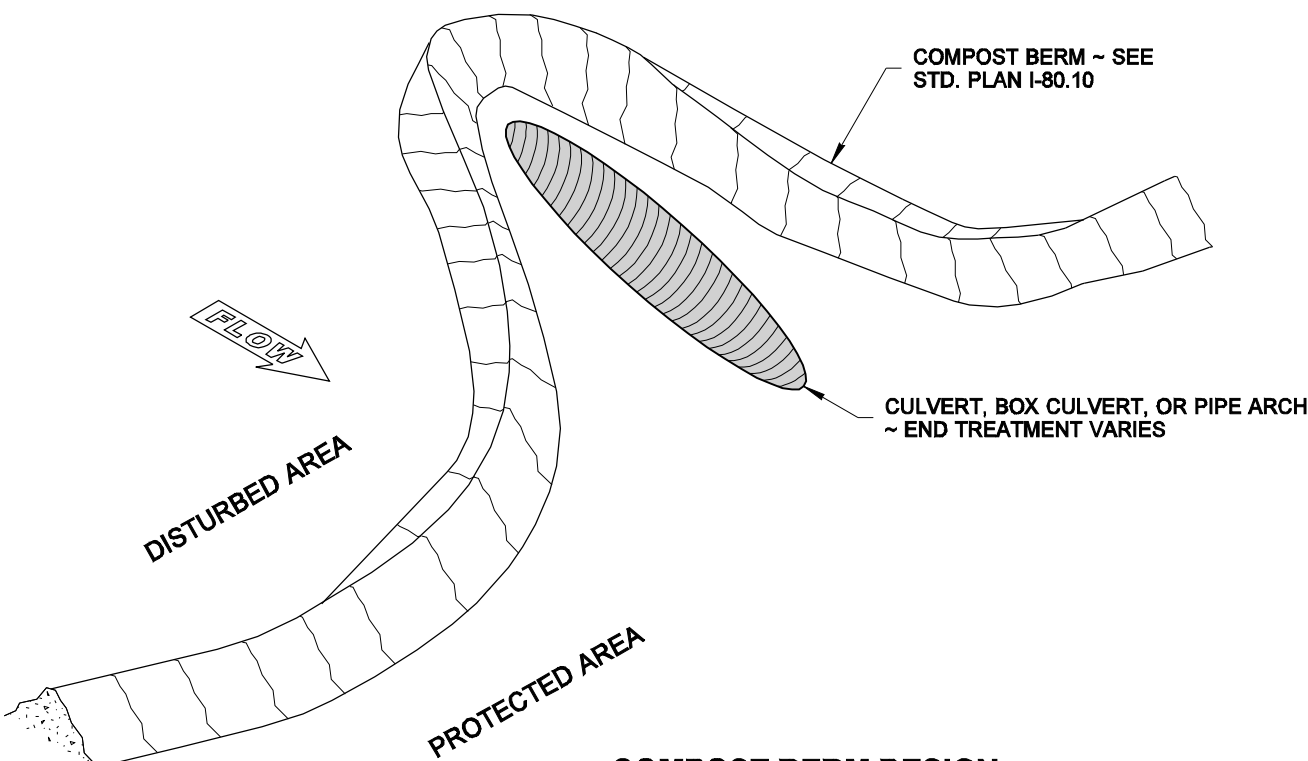
STATE DESIGN ENGINEER

Washington State Department of Transportation

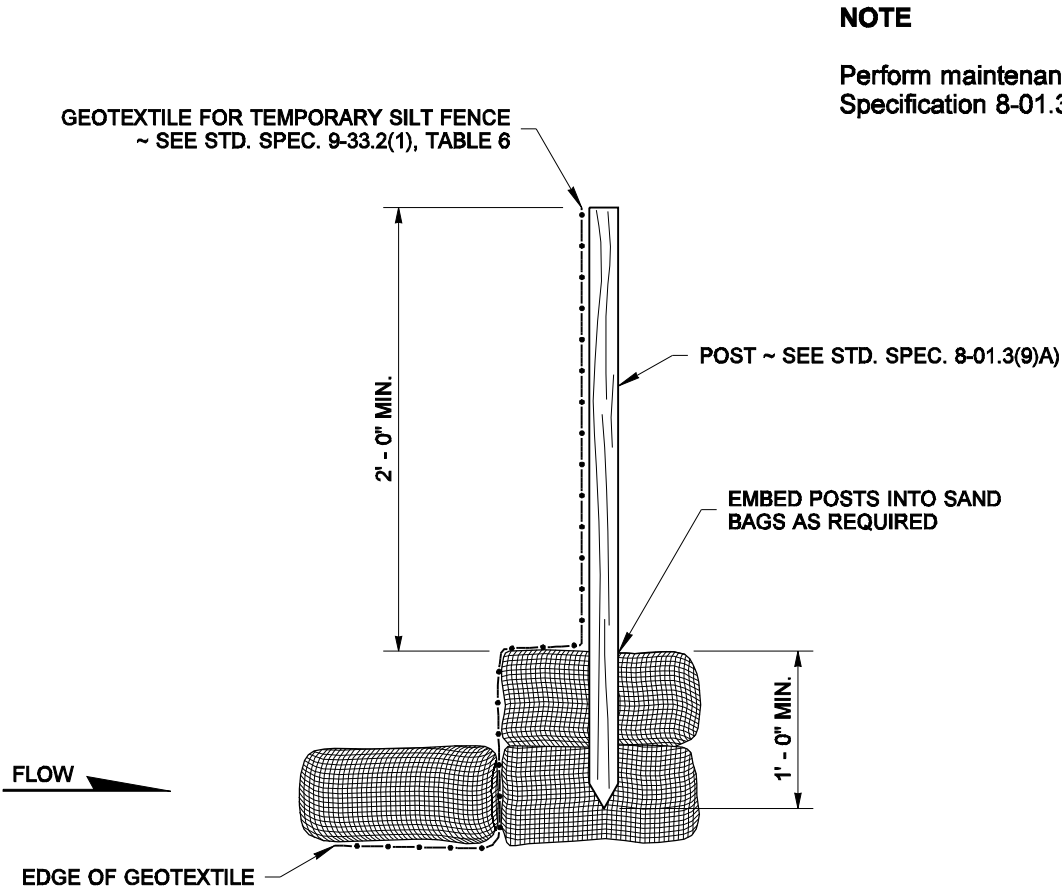
DRAWN BY: LISA CYFORD



SILT FENCE DESIGN

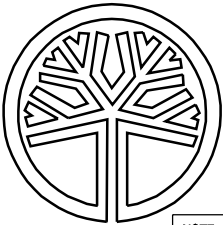


COMPOST BERM DESIGN



SECTION A

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



STATE OF  
WASHINGTON  
REGISTERED  
LANDSCAPE ARCHITECT  
  
MARK W. MAURER  
CERTIFICATE NO. 000598

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**EROSION CONTROL  
AT CULVERT ENDS  
STANDARD PLAN I-30.20-00**

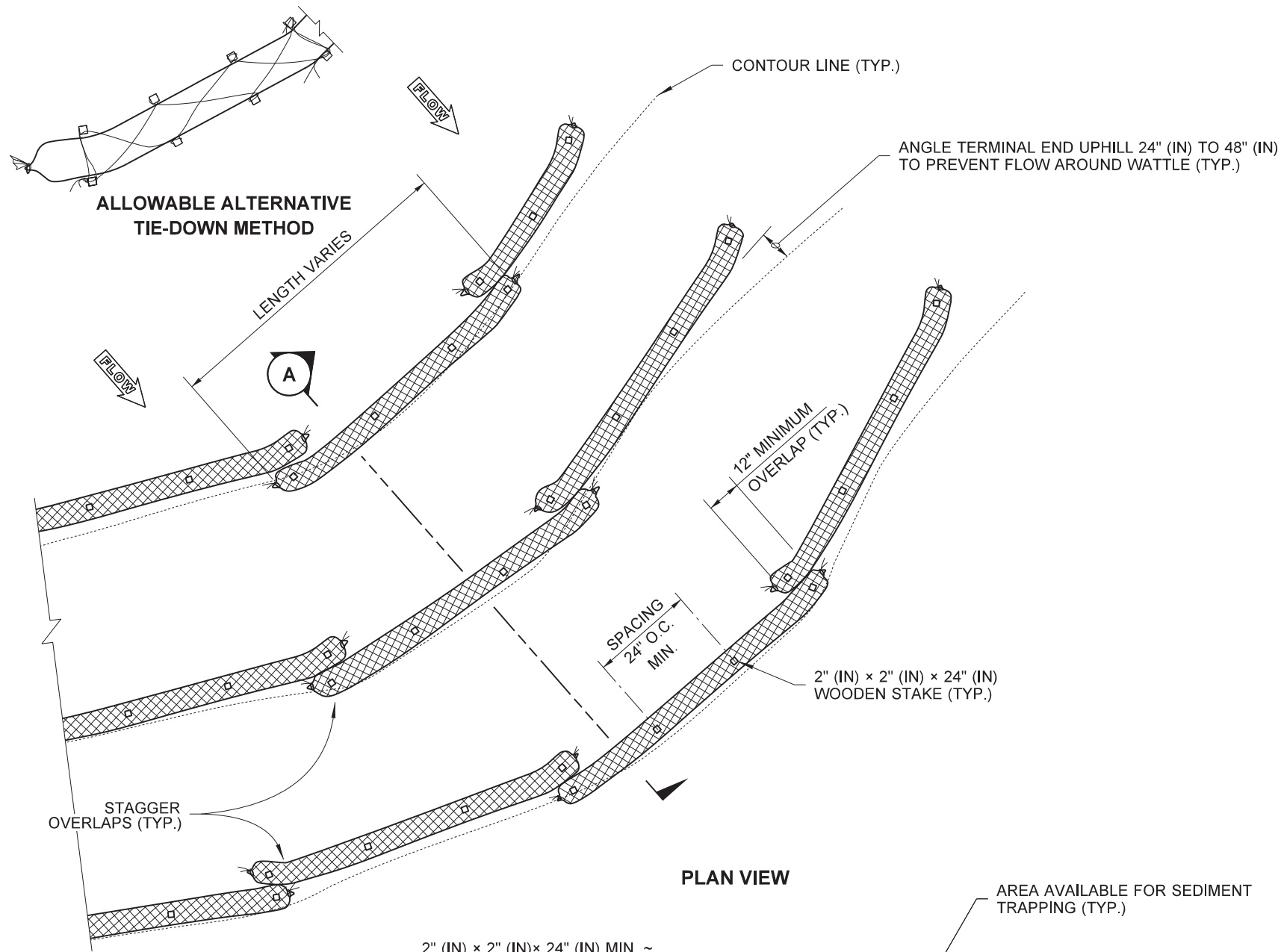
SHEET 1 OF 1 SHEET

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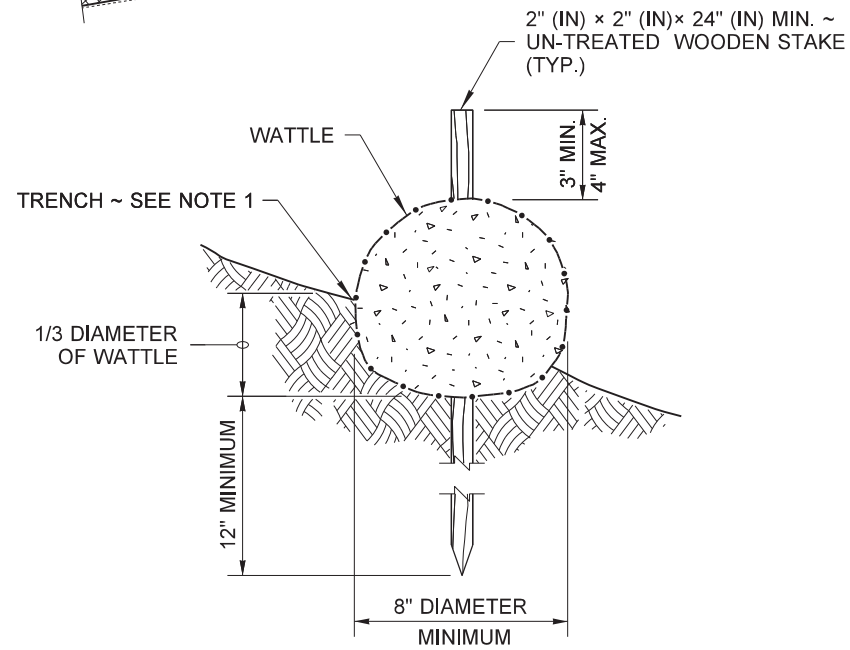
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STATE DESIGN ENGINEER DATE



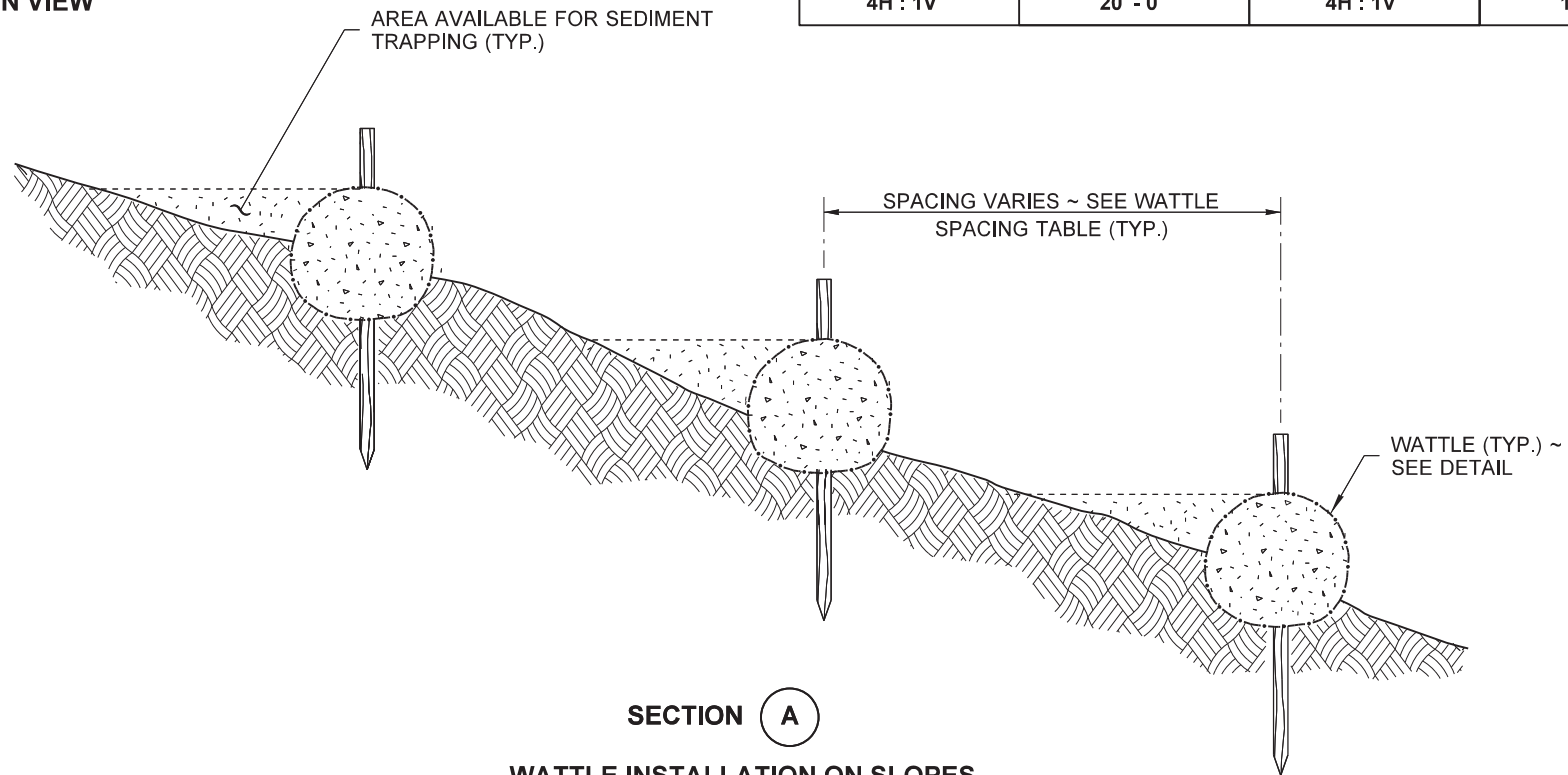
DRAWN BY: FERN LIDDELL



PLAN VIEW



WATTLE DETAIL



SECTION A

WATTLE INSTALLATION ON SLOPES

## NOTES

1. Wattles shall be in accordance with **Standard Specification, Section 9-14.5(5)**. Install Wattles along contours. Installation shall be in accordance with **Standard Specification, Section 8-01.3(10)**.
2. Securely knot each end of Wattle. Overlap adjacent Wattle ends 12" (in) behind one another and securely tie together.
3. Compact excavated soil and trenches to prevent undercutting. Additional staking may be necessary to prevent undercutting.
4. Install Wattle perpendicular to flow along contours.
5. Wattles shall be inspected regularly, and immediately after a rainfall produces runoff, to ensure they remain thoroughly entrenched and in contact with the soil.
6. Perform maintenance in accordance with **Standard Specification, Section 8-01.3(15)**.
7. Refer to **Standard Specification, Section 8-01.3(16)** for removal.

WATTLE SPACING TABLE			
TEMPORARY		PERMANENT	
8" - 10" OR 10" - 12" DIAM.		10" - 12" DIAM.	
SLOPE	MAX. SPACING	SLOPE	MAX. SPACING
1H : 1V	5' - 0"	-	-
2H : 1V	10' - 0"	2H : 1V	5' - 0"
3H : 1V	15' - 0"	3H : 1V	10' - 0"
4H : 1V	20' - 0"	4H : 1V	15' - 0"



Hartwig, Juli  
Jun 4 2019 8:05 AM  
**WATTLE INSTALLATION  
ON SLOPE**

**STANDARD PLAN I-30.30-02**

SHEET 1 OF 1 SHEET

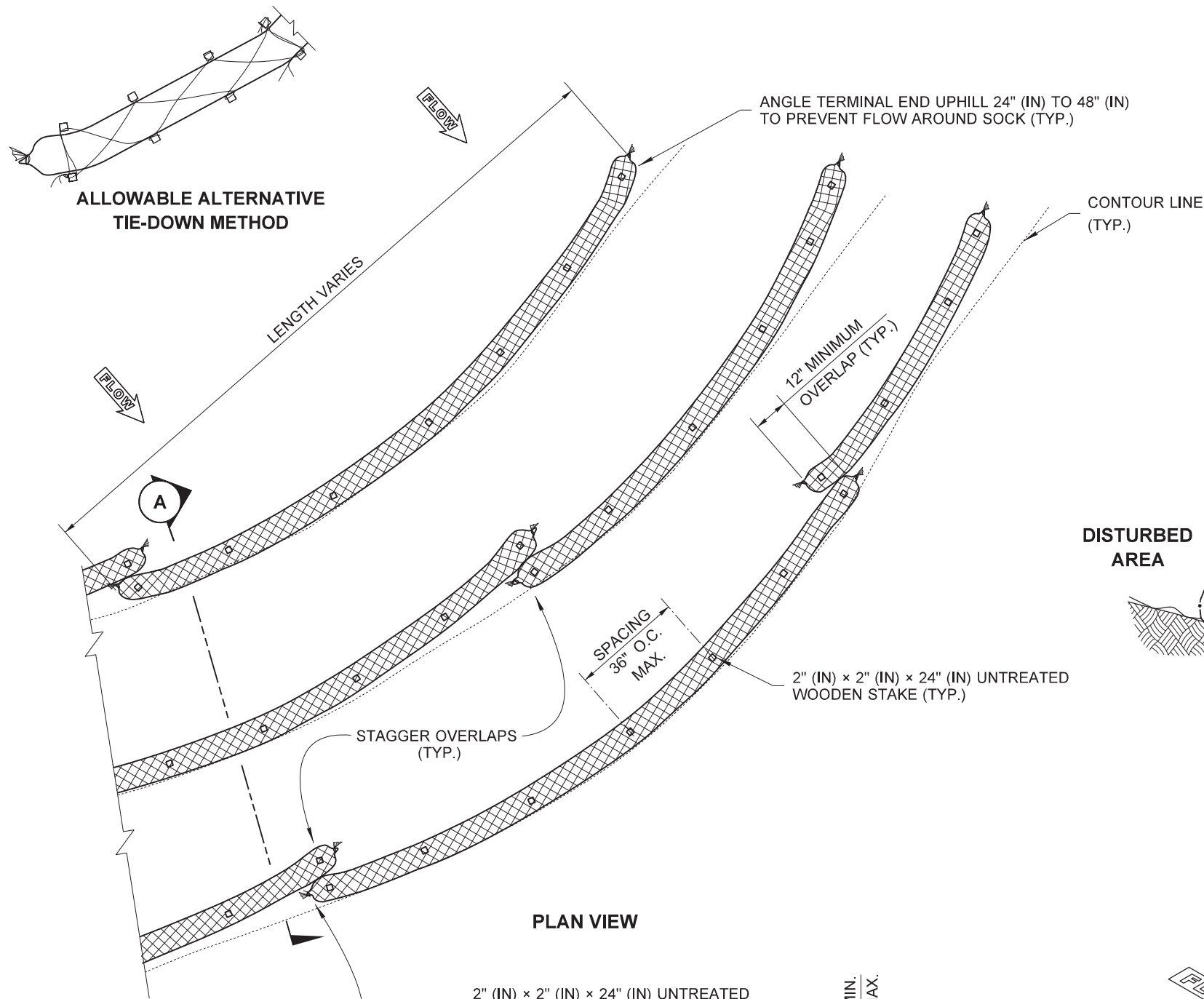
APPROVED FOR PUBLICATION

Roark, Steve  
Jun 12 2019 7:41 AM

STATE DESIGN ENGINEER

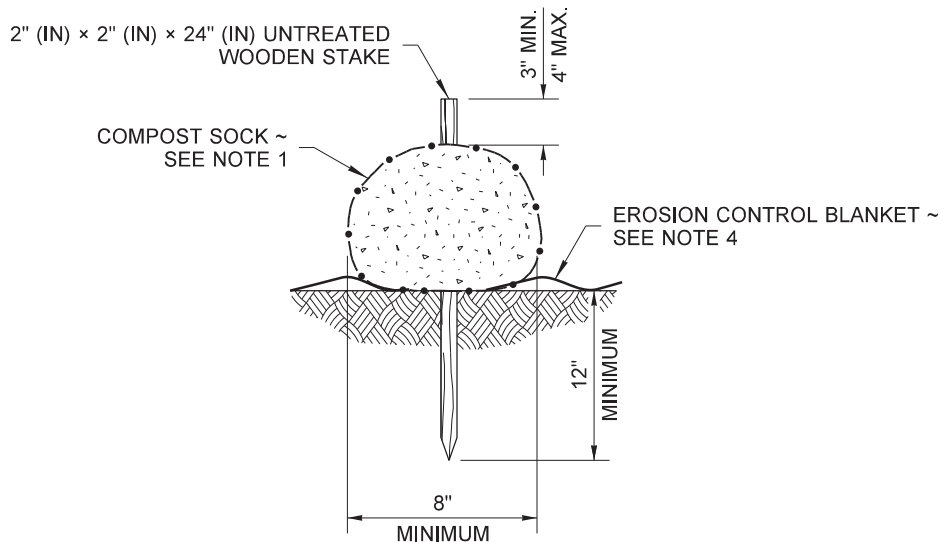
Washington State Department of Transportation

DRAWN BY: FERN LIDDELL

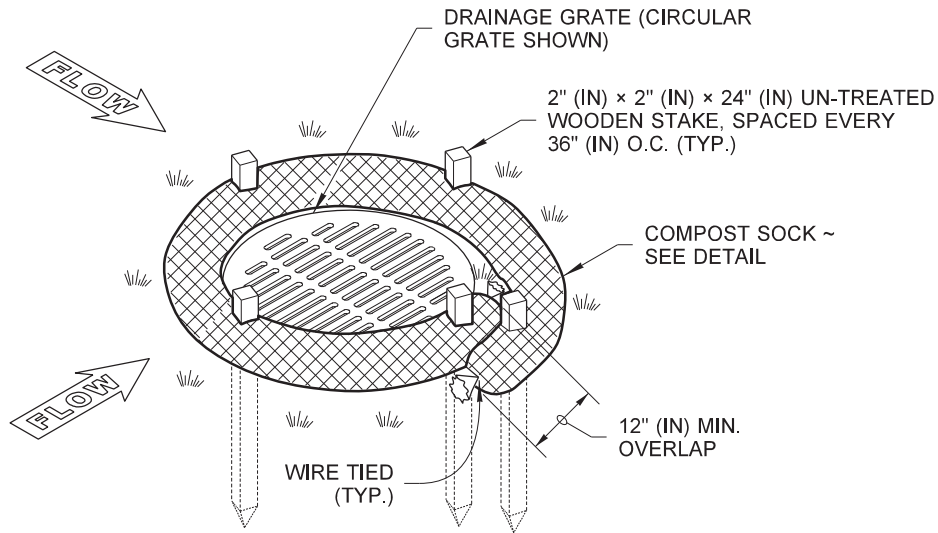
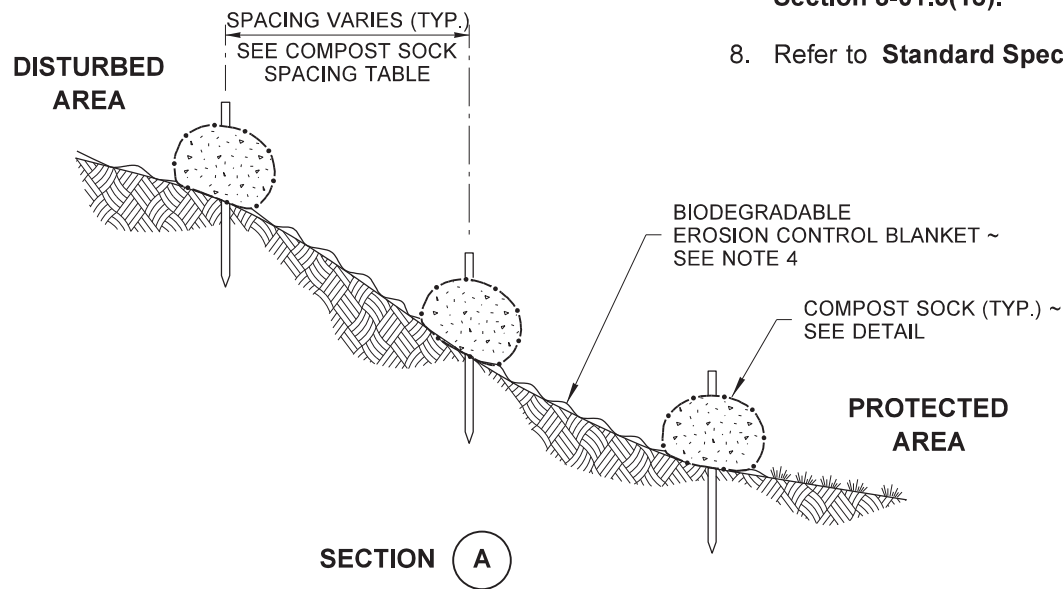


PLAN VIEW

8" DIAMETER MINIMUM COMPOST SOCK SPACING TABLE	
SLOPE	MAXIMUM SPACING
1H : 1V	5' - 0"
2H : 1V	10' - 0"
3H : 1V	15' - 0"
4H : 1V	20' - 0"



COMPOST SOCK DETAIL



ISOMETRIC VIEW  
CATCH BASIN INSTALLATION

NOTES

1. Compost Sock shall be in accordance with **Standard Specification, Section 9-14.5(6)**.
2. Securely knot each end of Compost Sock. Overlap adjacent Compost Sock ends 12" (in) behind one another and securley tie together.
3. Compost to be dispersed on site as determined by the Engineer, when vegetation covers the surface.
4. If Erosion Control Blanket is specified, place Compost Sock on top of blanket. See **Standard Plan I-60.10**.
5. Install Compost Sock perpendicular to flow along contours.
6. Remove sediment from the up slope side of the Compost Sock when accumulation has reached 1/2 of the effective height of the Compost Sock without compromising the intended function of the Compost Sock per **Standard Specification, section 8-01.3(12)** as determined by the Engineer.
7. Perform maintenance in accordance with **Standard Specification, Section 8-01.3(15)**.
8. Refer to **Standard Specification, Section 8-01.3(16)** for removal.



Hartwig, Juli  
Jun 4 2019 8:06 AM  
cosign

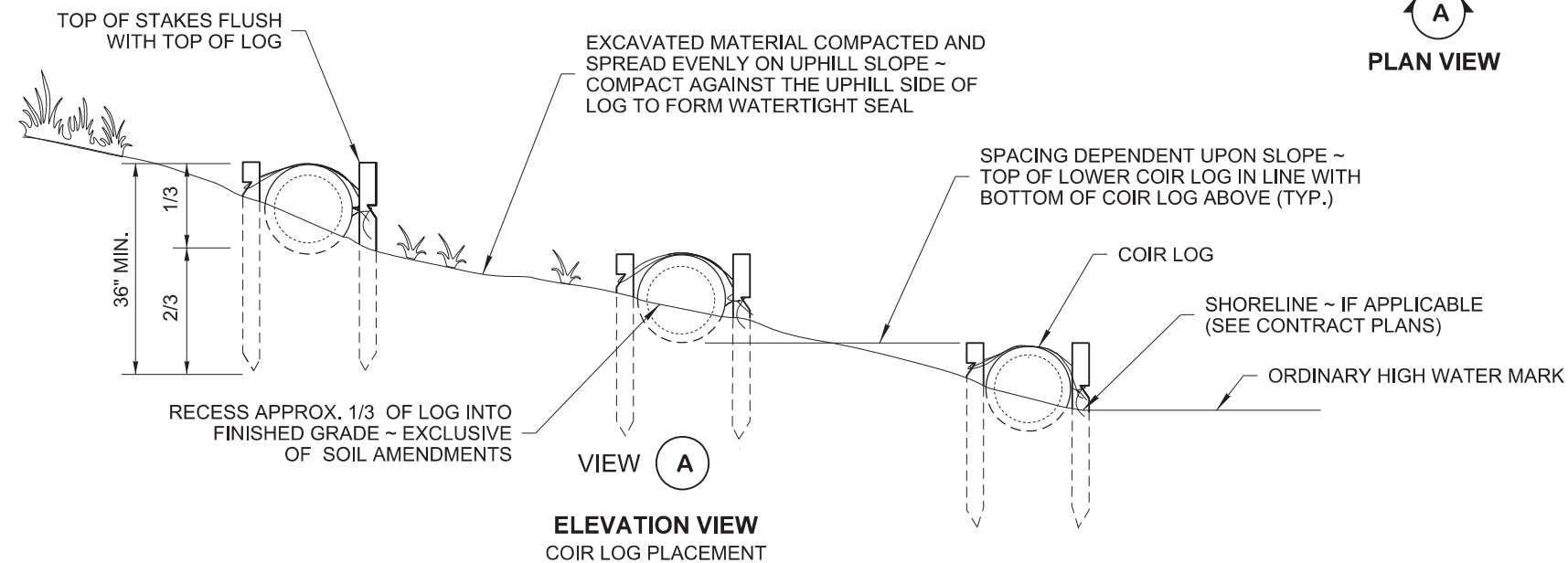
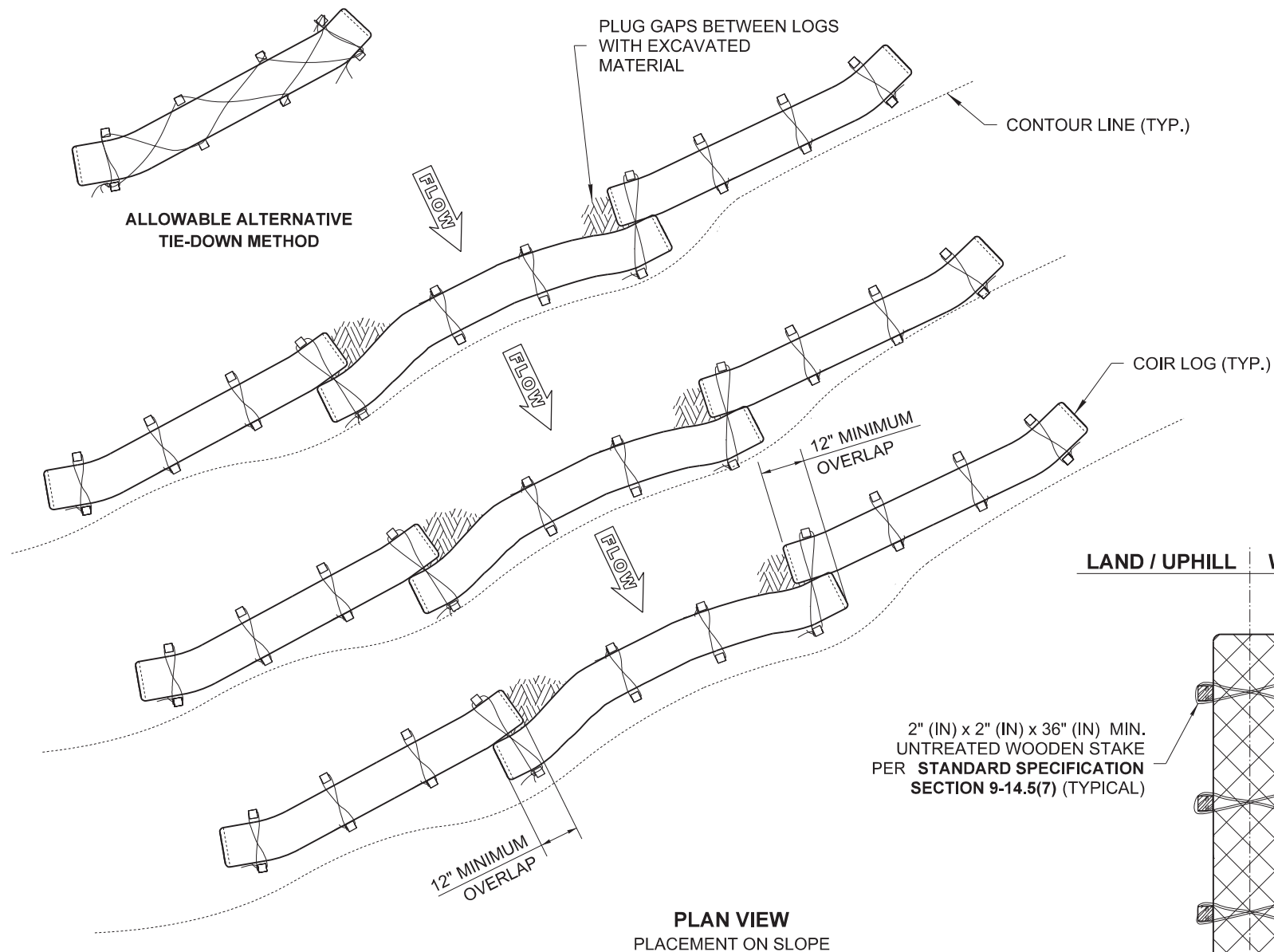
**COMPOST SOCK**

**STANDARD PLAN I-30.40-02**

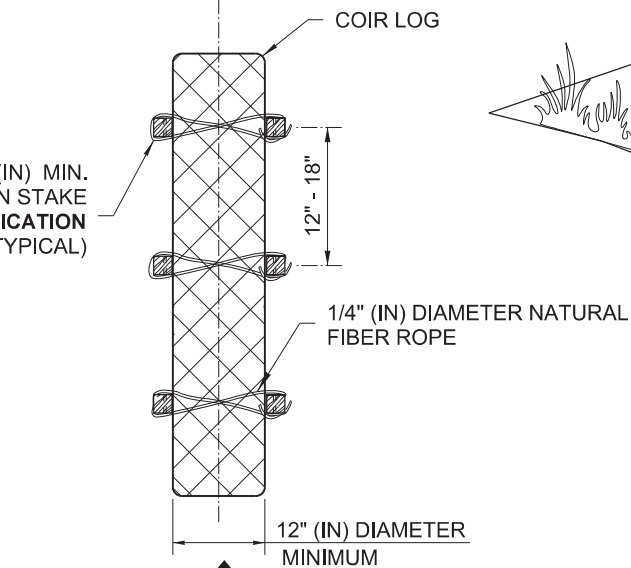
SHEET 1 OF 1 SHEET

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cosign  
STATE DESIGN ENGINEER  
Washington State Department of Transportation

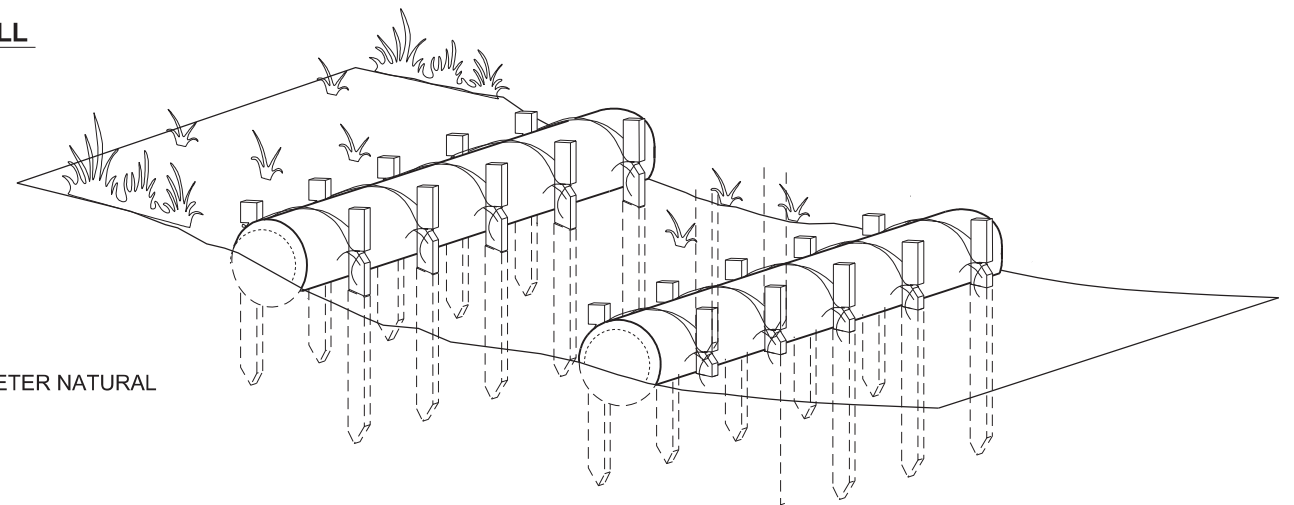
DRAWN BY: FERN LIDDELL



LAND / UPHILL    WATER / DOWNHILL



PLAN VIEW



ISOMETRIC VIEW

## NOTES

1. Coir logs shall be installed starting at the bottom of the slope and working uphill.
2. Excavated material shall be spread evenly along the uphill slope and compacted by hand tamping or other methods approved by the Engineer.
3. Overlap Coir log ends by 12" (in) to prevent water from moving between logs.
4. Always install Coir log perpendicular to slope along contour lines. Ends shall angle uphill to prevent flow around the Coir log.
5. Use an adequate number of stakes to ensure logs are secure.
6. Coir logs shall be in accordance with **Standard Specification, Section 9-14.5(7)**, and be installed in accordance with **Standard Specification, Section 8-01.3(6)A**.
7. Perform maintenance in accordance with **Standard Specification, Section 8-01.3(15)**.

12" DIAMETER MINIMUM COIR LOG SPACING TABLE	
SLOPE	MAXIMUM SPACING
1H : 1V	5' - 0"
2H : 1V	10' - 0"
3H : 1V	15' - 0"
4H : 1V	20' - 0"



Hartwig, Juli  
Jun 4 2019 8:06 AM  
**EROSION CONTROL DETAILS**  
**COIR LOG PLACEMENT**

**STANDARD PLAN I-30.60-02**

SHEET 1 OF 1 SHEET

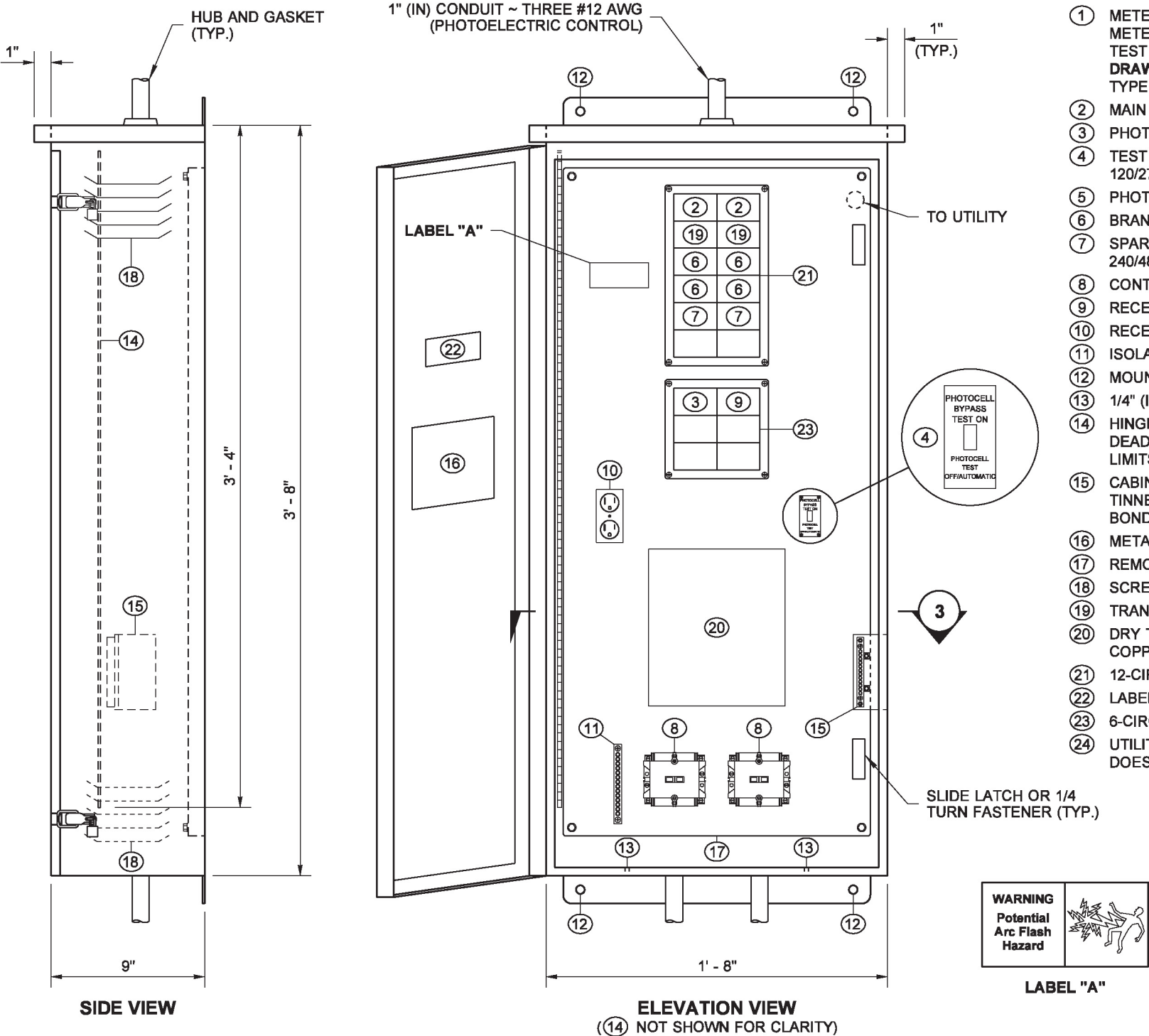
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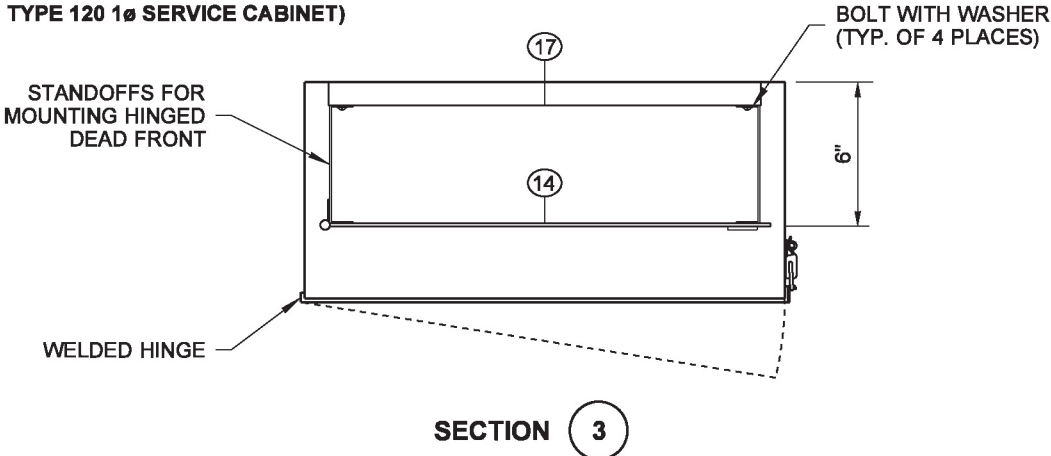
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NOTES (CONTINUED)

9. See **Standard Specification 9-29.24** (Service Cabinets).
10. Hinges shall have stainless steel or brass pins.
11. Cabinet shall be rated NEMA 3R and shall include two rain-tight vents.
12. The metering equipment door shall be pad-lockable. Each door shall be gasketed. See **Standard Plan J-10.20** for door hinge details. Concealed heavy-duty stainless steel lift-off hinges are allowed as an alternative. Upper left door shall have three hinges, lower left door shall have two hinges, and right door shall have three hinges. All doors shall have a two-position door stop assembly.
13. The following equipment within the service enclosure shall have an appropriately engraved phenolic name plate attached with screws or rivets:  
Key Numbers 2, 3, 4, 6, 7, 8, and 9.  
Key Number 4 name plate shall read as follows:  
"PHOTOCELL BYPASS TEST ON" AND "PHOTOCELL TEST OFF - AUTOMATIC."  
See service cabinet detail.
14. Dimensions shown are minimum and shall be adjusted to accommodate the various sizes of equipment installed.
15. All busswork shall be high-grade copper and shall equal or exceed the main breaker rating. All breakers shall bolt on to the busswork. Jumpering of breakers shall not be allowed. Busswork shall accommodate all future equipment as shown in the Breaker Schedule.
16. The photoelectric control unit shall be centered in the photoelectric control enclosure to permit 360 degree rotation of the photoelectric control unit without removal of the photoelectric control unit or the photoelectric control enclosure.
17. 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.
18. All nuts, bolts, screws, and washers used for mounting the photoelectric control enclosure, conduit body covers, and junction box cover shall be **ASTM F593** or **A193 Type 304** or **Type 316** stainless steel.
19. A 1% tolerance is allowed for all dimensions.
20. See Contract for Breaker Schedule.
21. Install conduit couplings on all conduits.
22. The photoelectric control enclosure shall be fabricated from 5/8" (in) expanded steel mesh with welded seams and mounting flanges and shall be hot-dip galvanized after fabrication. Type 5052 - H32 aluminum with 5/8" (in) x 5/8" (in) expanded steel mesh may be used as an alternative material. See **Standard Plan J-10.20** for enclosure mounting details.
23. Slotted steel channel and mounting hardware components shall be stainless steel. Conduit clamps shall be hot-dip galvanized steel or stainless steel.
24. When using alternate door hinge, remove hinge pin prior to welding the hinge to the cabinet and prior to hot-dip galvanizing. After galvanizing, replace pin with a brass pin or solder in place. See **Standard Plan J-10.20** for alternate door hinge details.



**TYPE C SERVICE CABINET**  
(60 AMP TYPE 120 1Ø SERVICE CABINET)



DRAWN BY: COLBY FLETCHER

**THEODORE JOSEPH BAILEY**  
STATE OF WASHINGTON  
REGISTERED PROFESSIONAL ENGINEER  
39820

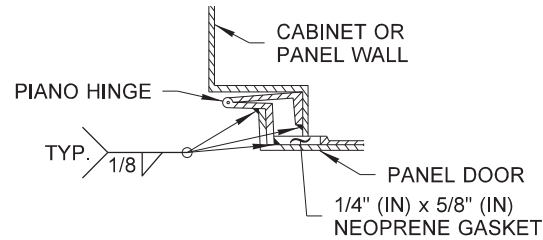
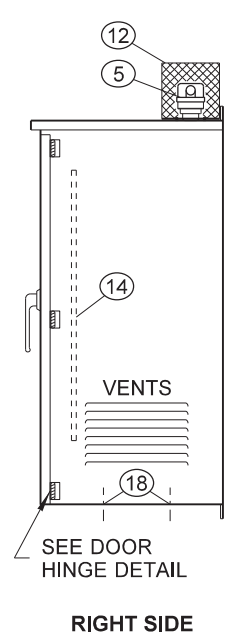
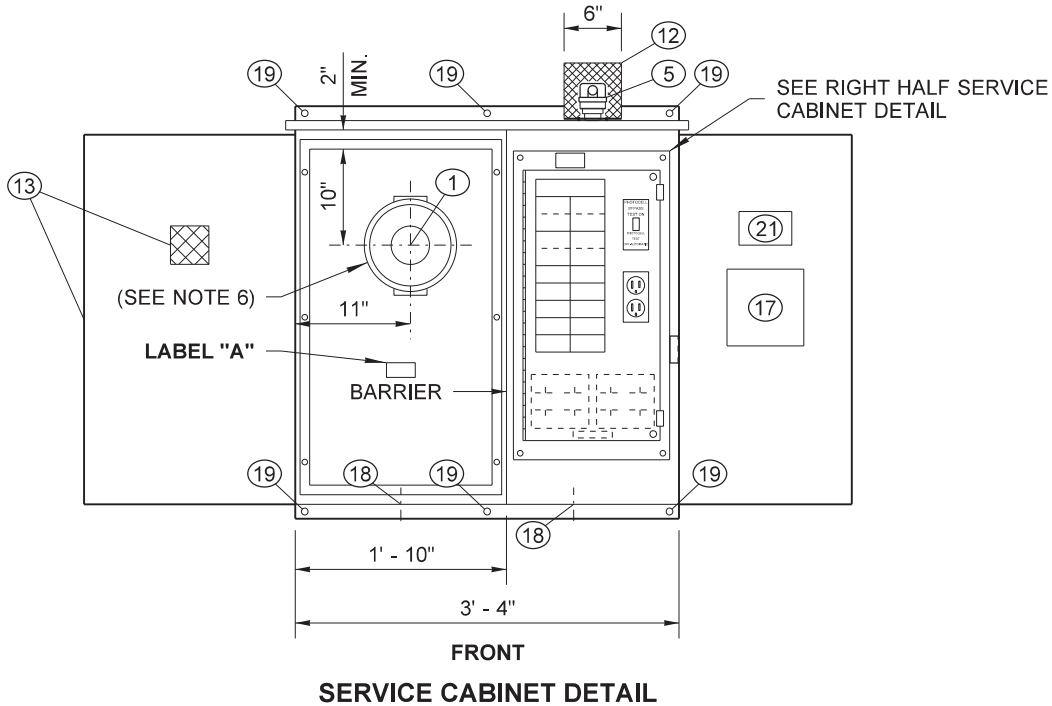
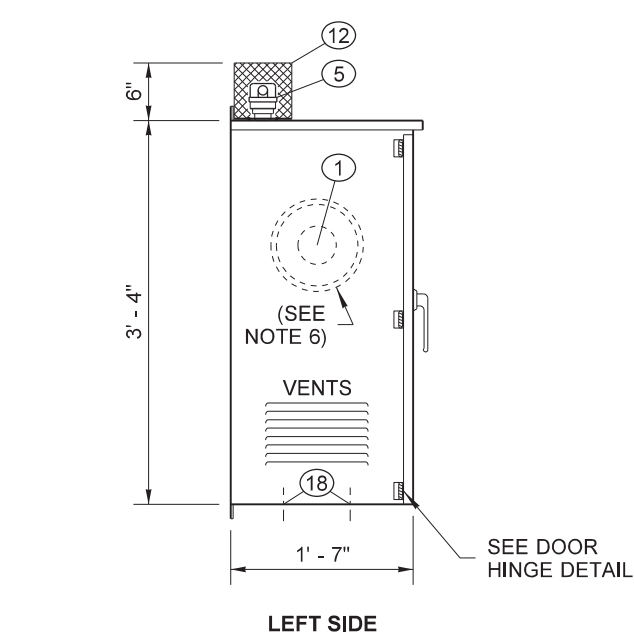
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**SERVICE CABINET TYPE C**  
(0 - 60 AMP TYPE 240/480  
VOLT SINGLE PHASE)  
**STANDARD PLAN J-10.18-00**

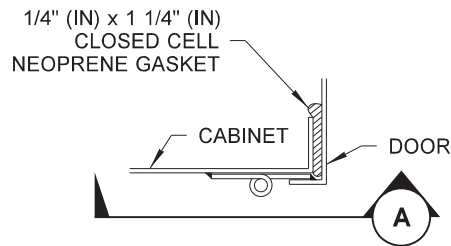
SHEET 2 OF 2 SHEETS

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Bakotich, Pasco  
Jun 3 2015 4:20 PM  
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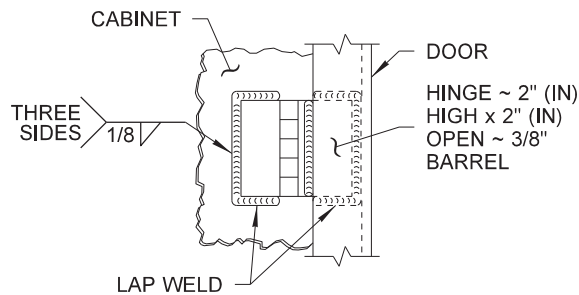
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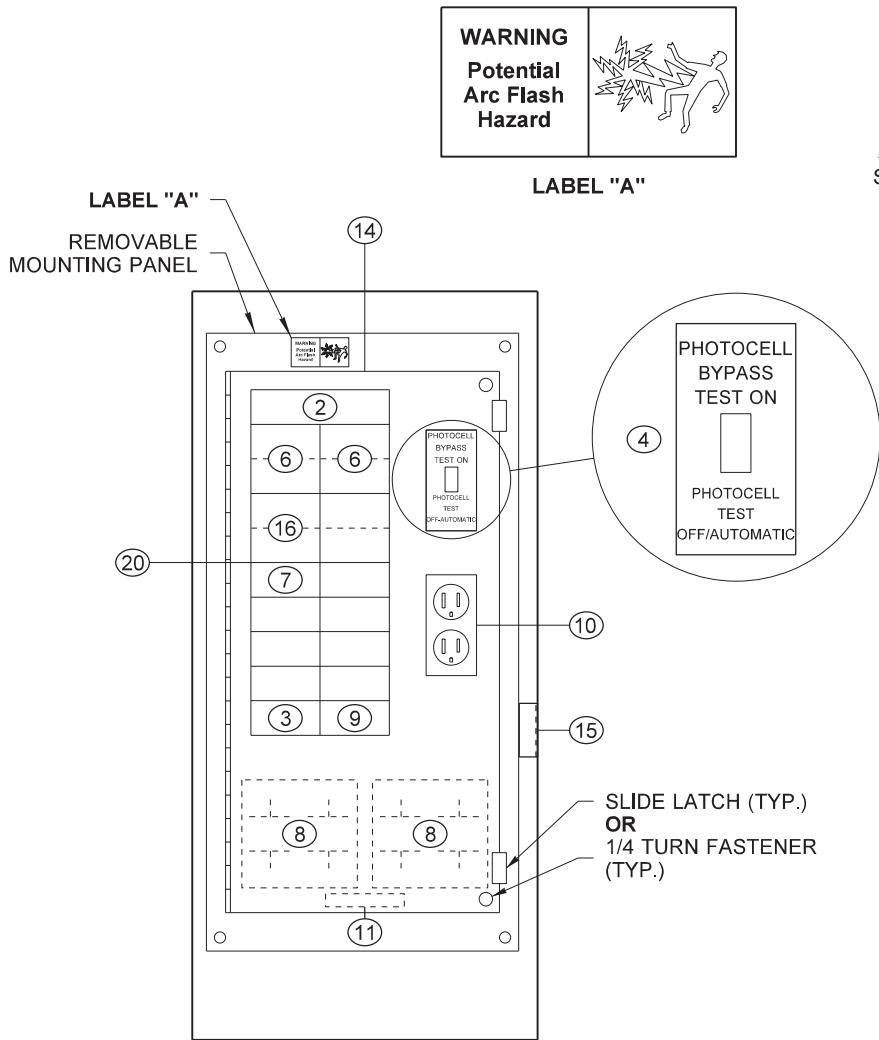
DOOR HINGE DETAIL



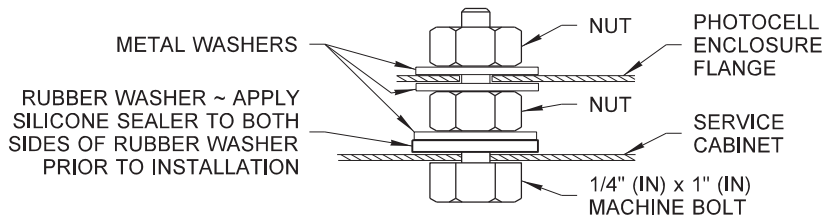
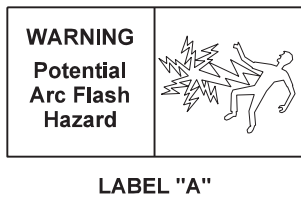
DOOR HINGE DETAIL  
ALTERNATE TYPE B MODIFIED  
CABINET (SEE NOTE 15)



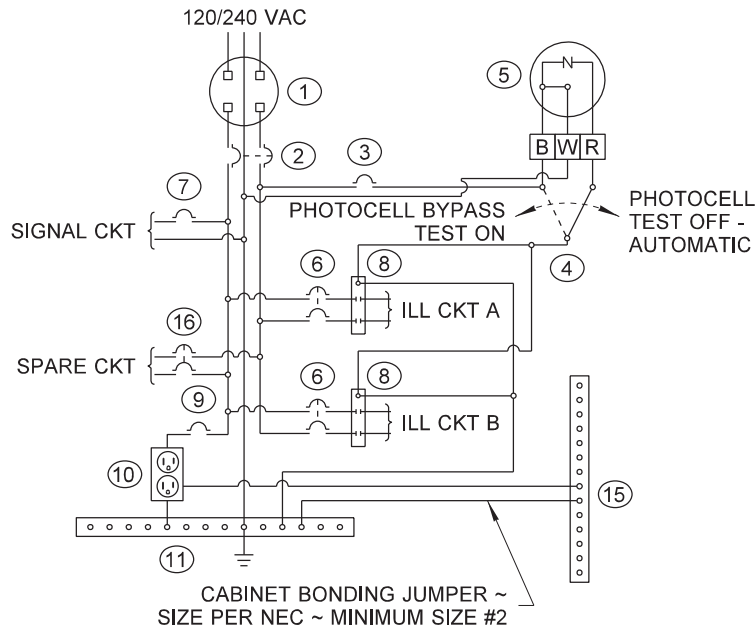
SECTION A



RIGHT HALF SERVICE CABINET DETAIL



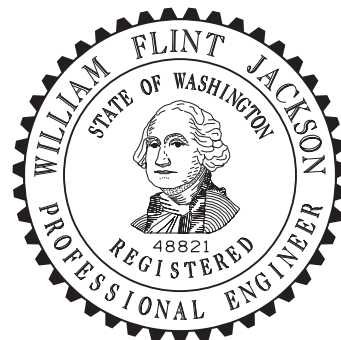
PHOTOCELL ENCLOSURE MOUNTING DETAIL



WIRING DIAGRAM

KEY

- 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** ~ WHEN THE UTILITY REQUIRES METER BASE TO BE MOUNTED ON THE SIDE OR BACK OF THE SERVICE CABINET, THE METER BASE ENCLOSURE SHALL BE FABRICATED FROM TYPE 304 STAINLESS STEEL
- MAIN BREAKER ~ DPST ~ SIZE PER BREAKER SCHEDULE
- PHOTOCELL BREAKER ~ SPST 15 AMP - 120/240 VOLT
- TEST SWITCH ~ SPDT SNAP ACTION - POSITIVE CLOSE 15 AMP - 120/277 VOLT - "T" RATED
- PHOTOELECTRIC CONTROL ~ SEE **STANDARD SPECIFICATION, SECTION 9-29.11(2)**.
- BRANCH BREAKER ~ SEE BREAKER SCHEDULE
- SIGNAL BREAKER ~ SEE BREAKER SCHEDULE
- CONTACTOR (BEHIND DEAD FRONT) ~ SEE BREAKER SCHEDULE
- RECEPTACLE BREAKER ~ SPST 20 AMP - 120/240 VOLT
- RECEPTACLE (GROUNDED) ~ GFCI 20 AMP - 125 VOLT
- ISOLATED NEUTRAL BUSS ~ 14 LUG COPPER
- PHOTOCELL ENCLOSURE ~ ENCLOSURE TO BE FABRICATED FROM 5/8" (IN) EXPANDED STEEL MESH WITH WELDED SEAMS AND MOUNTING FLANGES ~ HOT-DIP GALVANIZED AFTER FABRICATION ~ TYPE 5052 - H32 ALUMINUM WITH 5/8" (IN) x 5/8" (IN) OPENINGS EQUIVALENT TO 5/8" (IN) EXPANDED STEEL MESH MAY BE USED AS ALTERNATIVE MATERIAL ~ SEE PHOTOCELL MOUNTING DETAIL
- HINGED FRONT FACING DOOR WITH 4" (IN) x 4" (IN) MINIMUM POLISHED WIRE GLASS WINDOW
- HINGED DEAD FRONT WITH 1/4 TURN FASTENERS OR SLIDE LATCHES ~ DEAD FRONT PANEL BOLTS SHALL NOT EXTEND INTO VERTICAL LIMITS OF THE BREAKER ARRAY(S)
- CABINET MAIN BONDING JUMPER ASSEMBLY ~ BUSS SHALL BE 14 LUG TINNED COPPER ~ SEE CABINET MAIN BONDING JUMPER ASSEMBLY DETAIL
- SPARE BRANCH BREAKER ~ DPST 20 AMP - 120/240 VOLT
- METAL WIRING DIAGRAM HOLDER
- 1/4" (IN) DIAMETER DRAIN HOLE ~ DRILL BEFORE GALVANIZING
- MOUNTING HOLE ~ SEE SERVICE CABINET MOUNTING DETAILS
- 18-CIRCUIT PANEL BOARD ~ MINIMUM SIZE WITH SEPARATE MAIN BREAKER
- LABEL CABINET WITH BUSSWORK RATING



Jackson, Flint  
Jul 24 2019 5:42 PM  
**SERVICE CABINET TYPE B  
MODIFIED (0 - 200 AMP TYPE  
120/240 SINGLE PHASE)  
STANDARD PLAN J-10.20-02**

SHEET 1 OF 5 SHEETS

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Jul 31 2019 12:12 PM

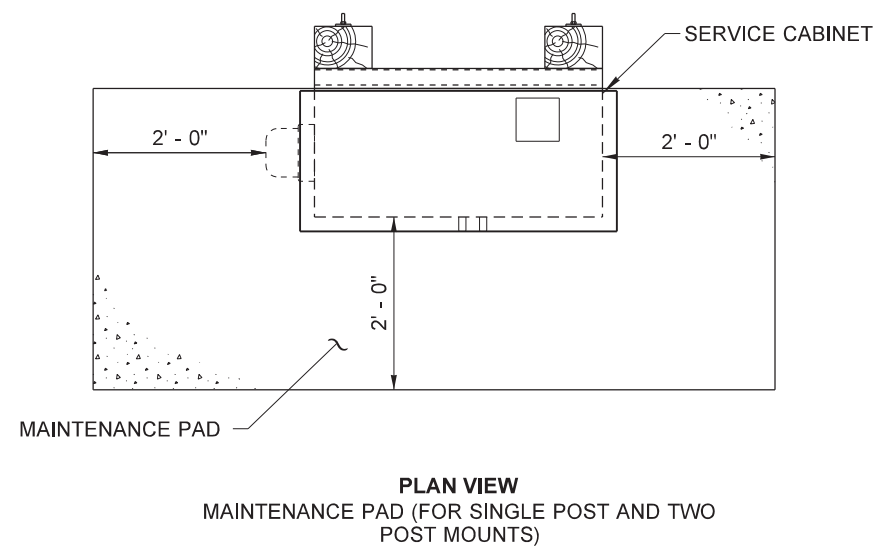
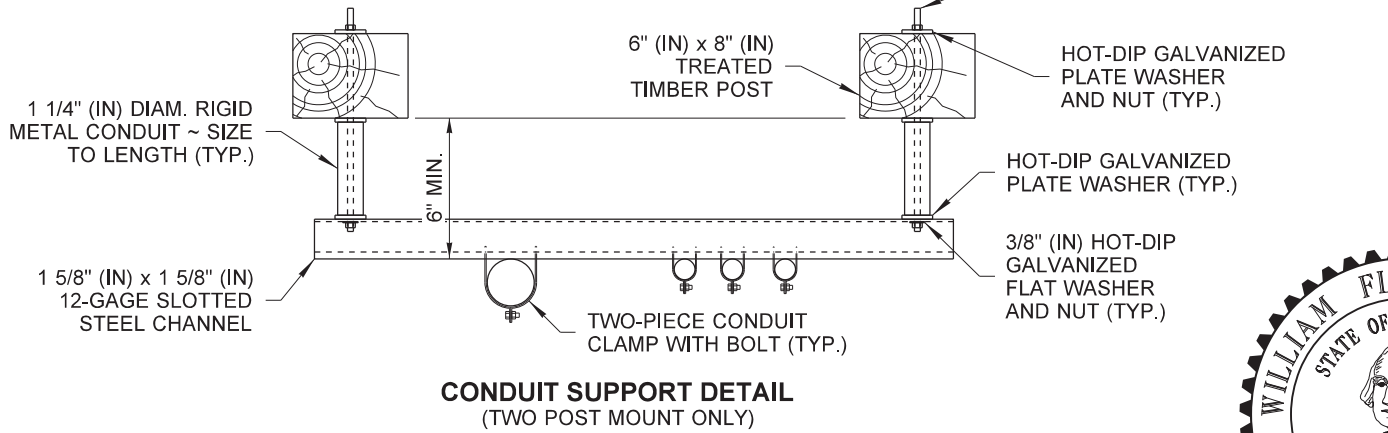
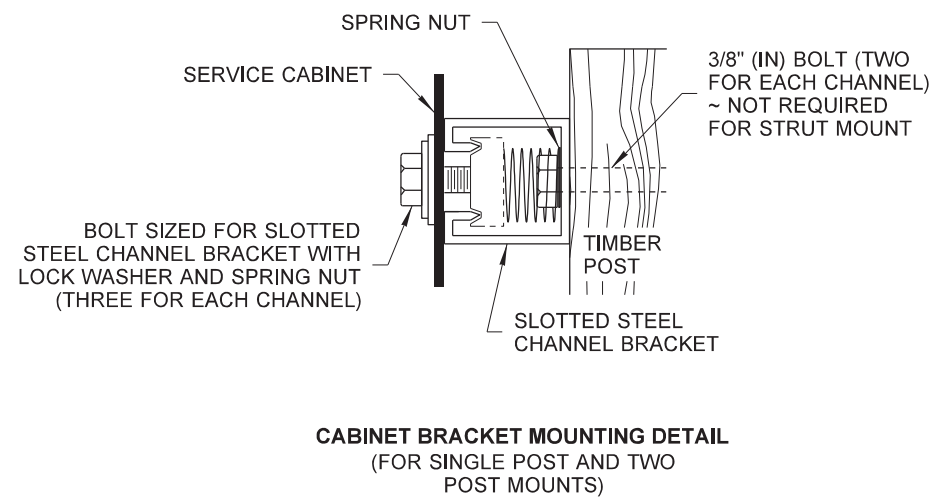
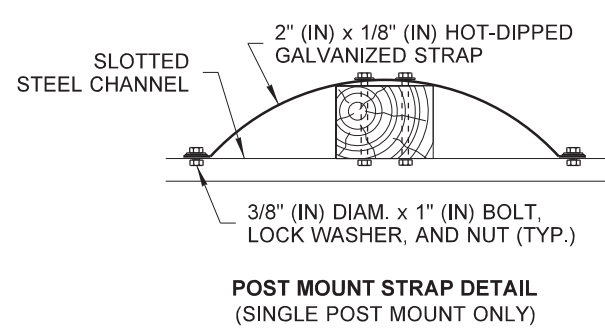
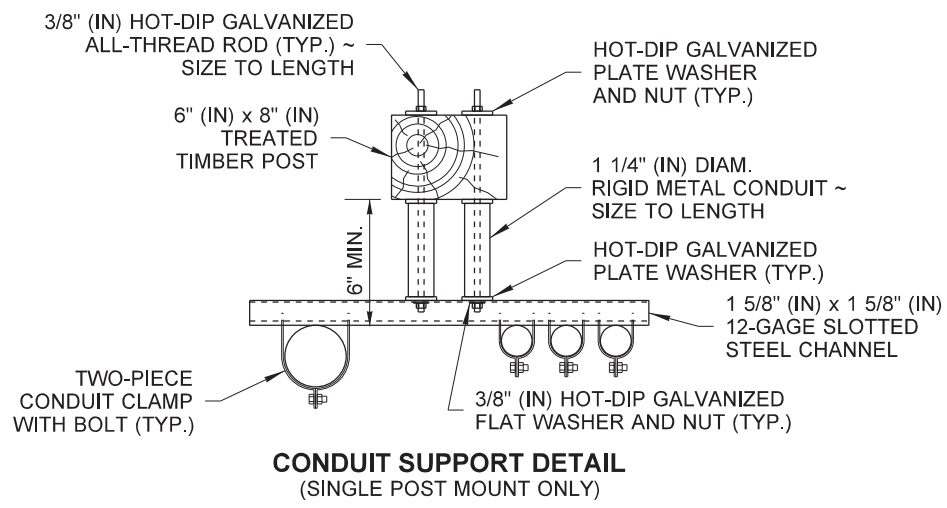
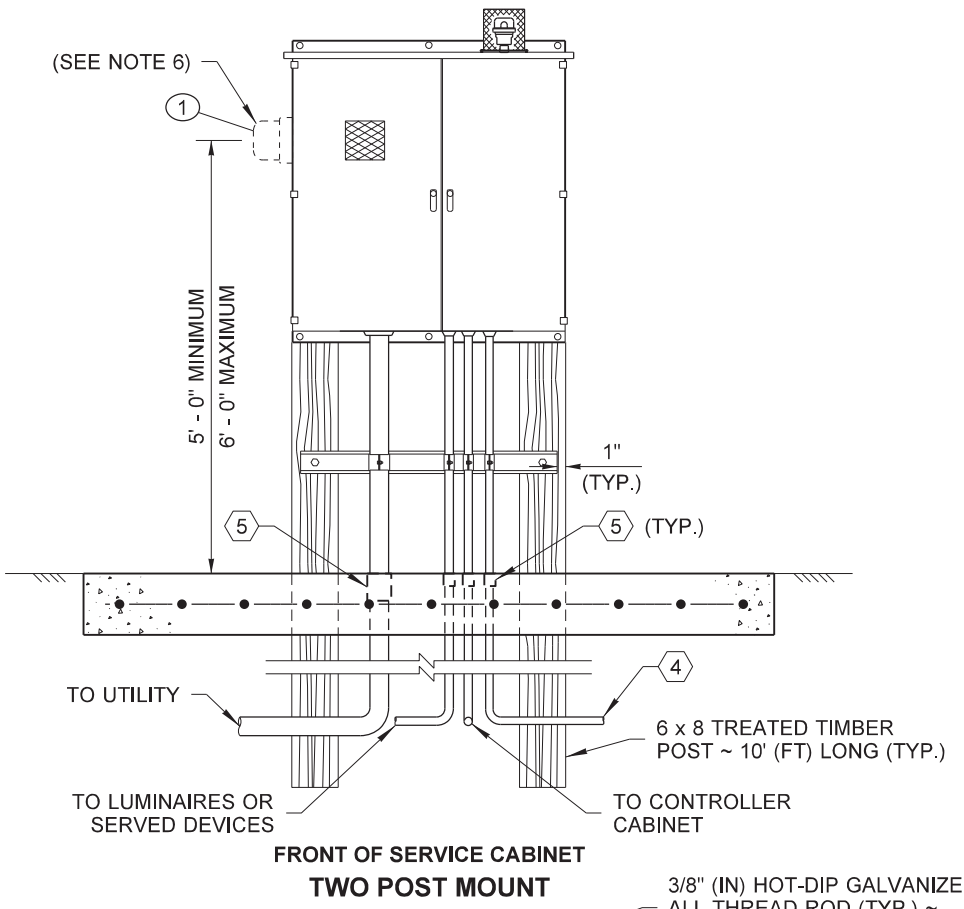
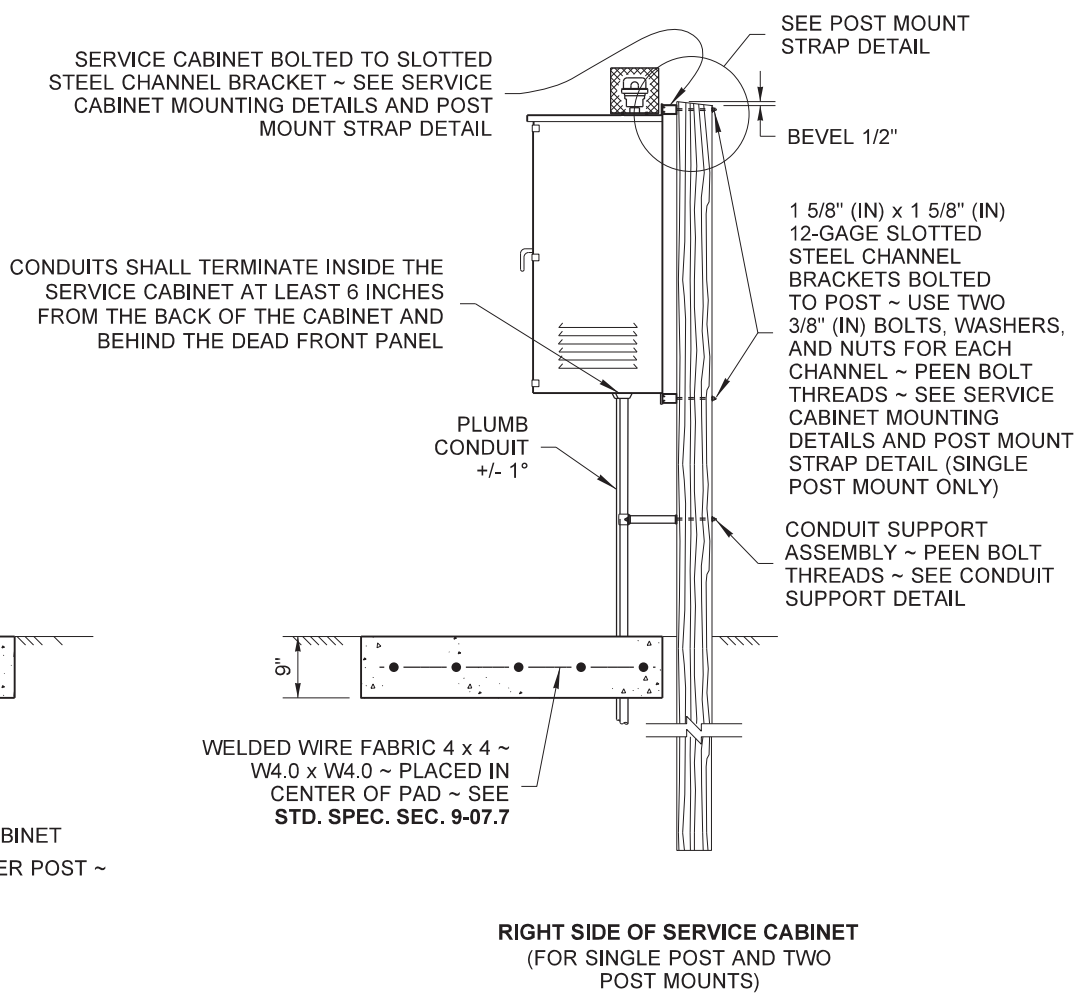
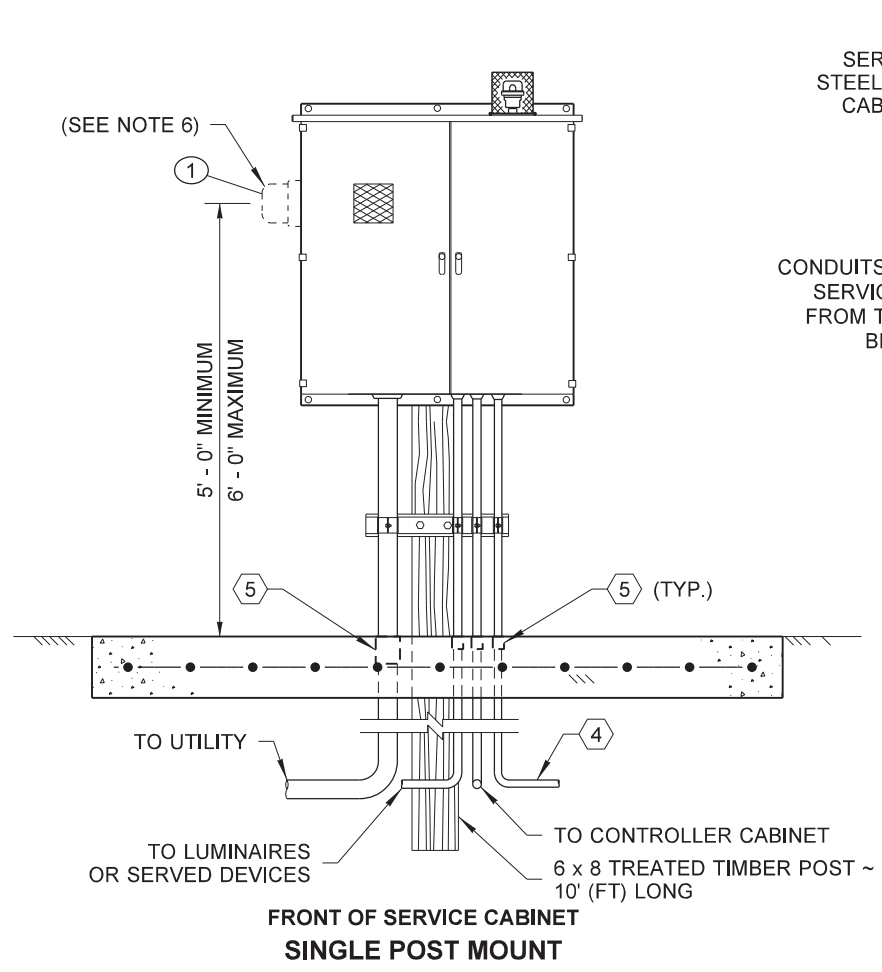
STATE DESIGN ENGINEER



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Jackson, Flint  
Jul 24 2019 5:42 PM

**SERVICE CABINET TYPE B  
MODIFIED (0 - 200 AMP TYPE  
120/240 SINGLE PHASE)  
STANDARD PLAN J-10.20-02**

SHEET 3 OF 5 SHEETS

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Roark, Steve  
Jul 31 2019 12:11 PM

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Washington State Department of Transportation



DRAWN BY: FERN LIDDELL

BRONZE GROUND CLAMP ~  
WITH BRONZE U-BOLT,  
WASHERS AND SET SCREWS

# 6 INSULATED  
STRANDED

CONDUIT

DETAIL A

BRONZE GROUND  
CLAMP (TYP.)

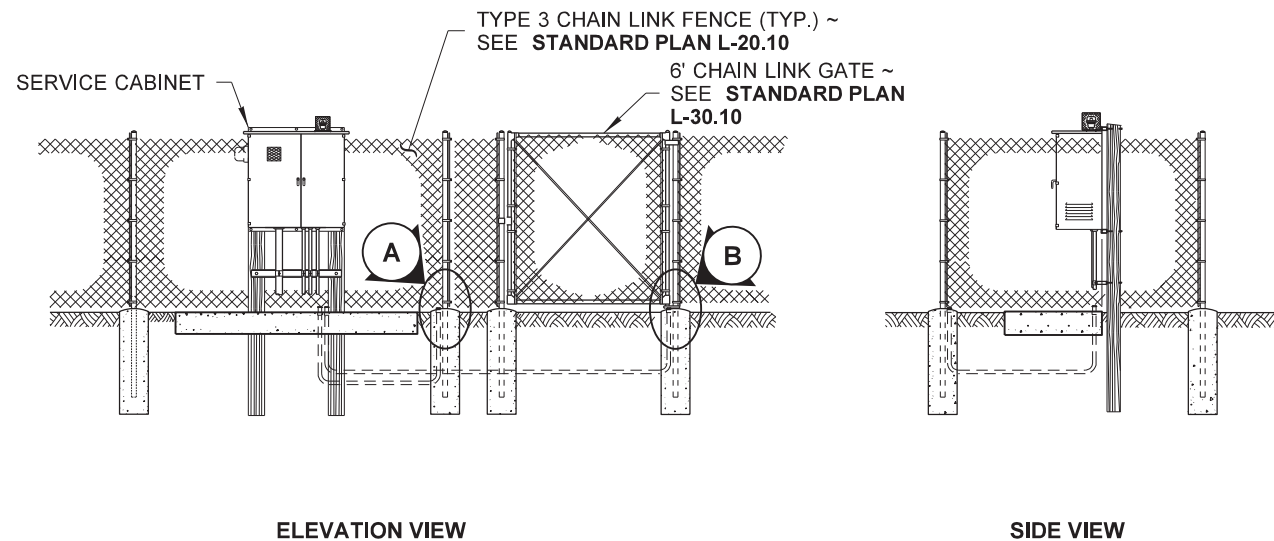
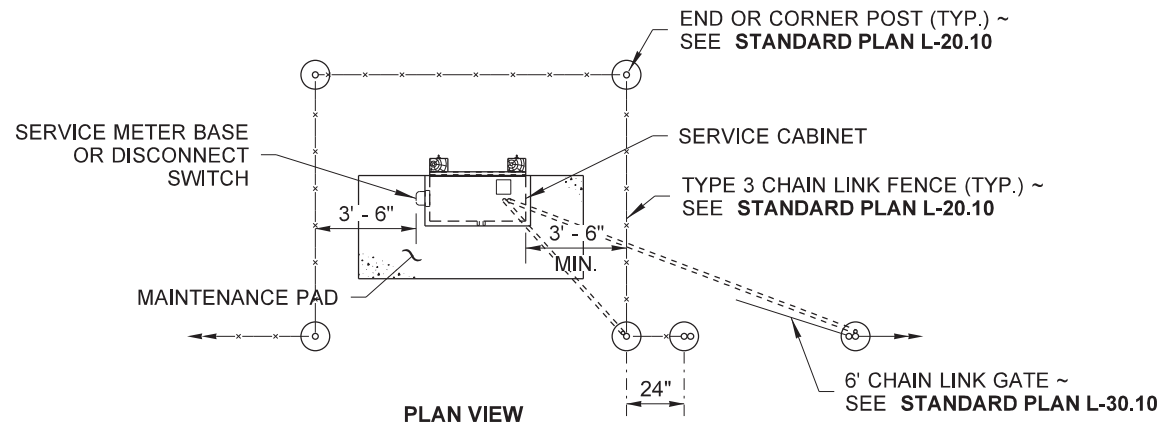
# 6 INSULATED  
STRANDED

CONDUIT

DETAIL B

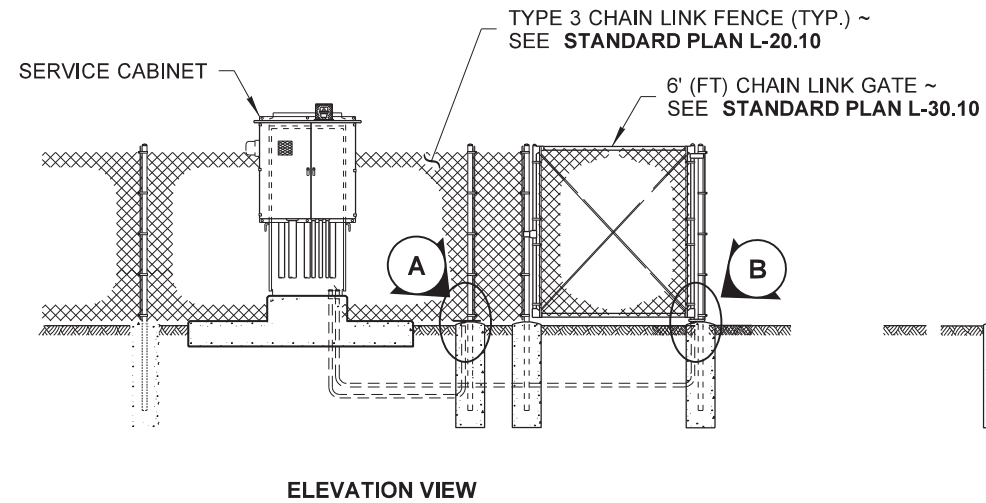
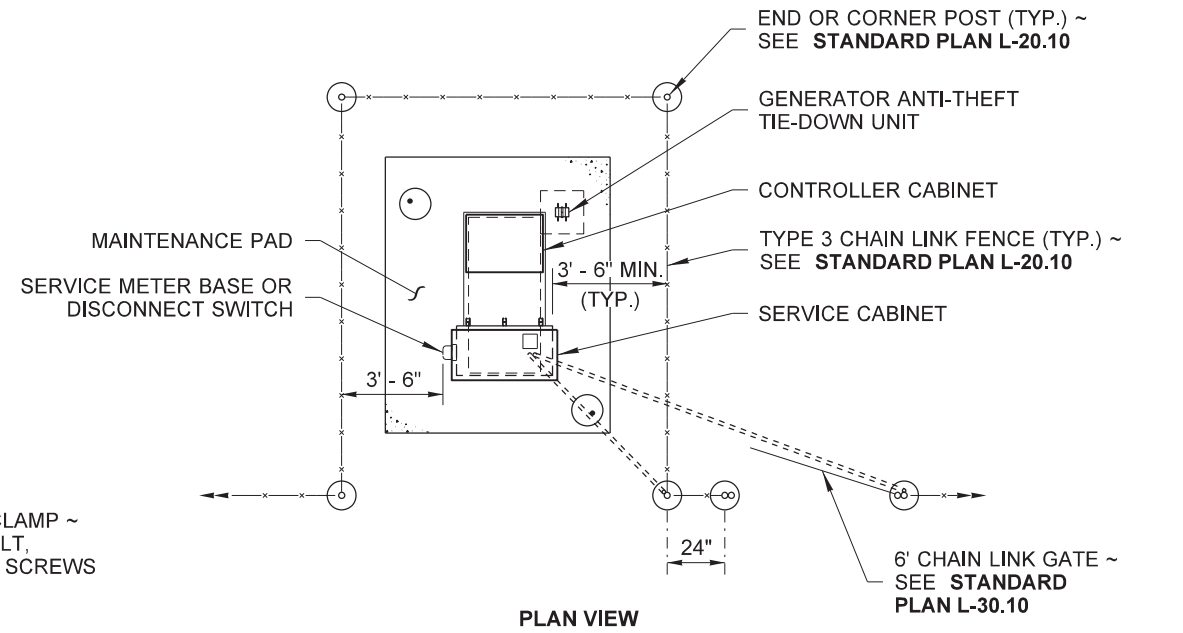
# 8 AWG MIN. x 1 FT OF  
TINNED BRAIDED COPPER

BRONZE GROUND CLAMP ~  
WITH BRONZE U-BOLT,  
WASHERS AND SET SCREWS



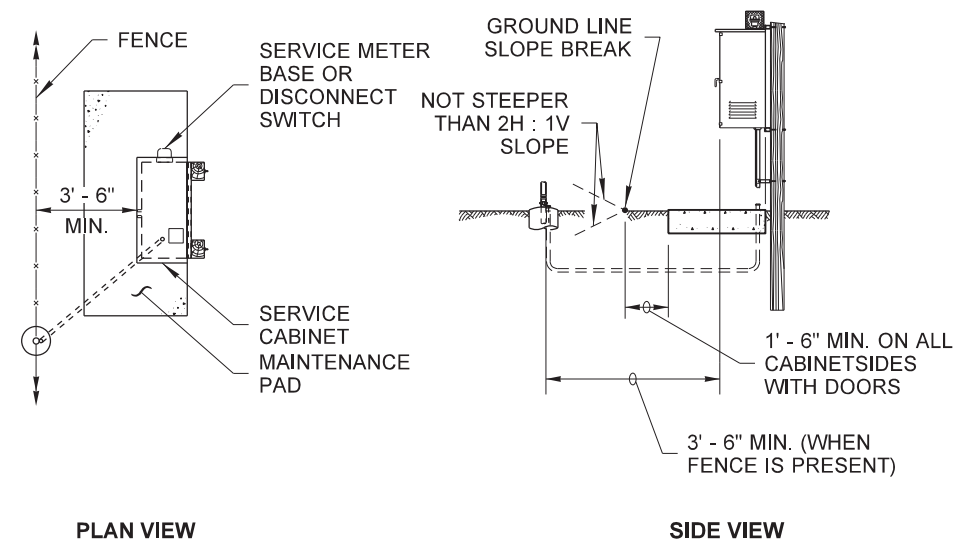
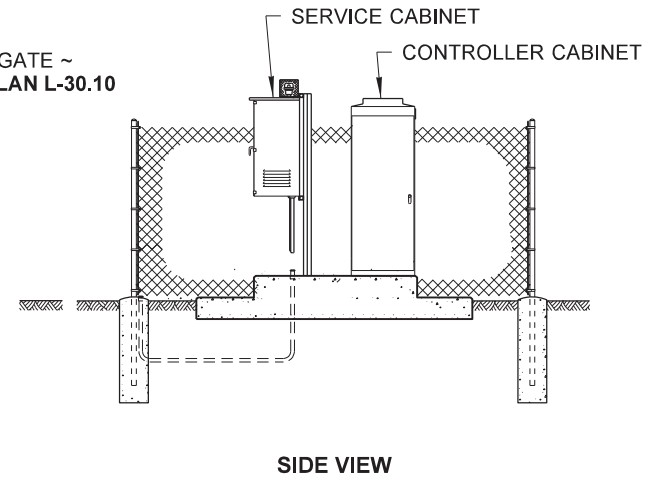
### POST MOUNTED SERVICE CABINET WITHIN RIGHT-OF-WAY FENCE

FOR CONDUITS NOT SHOWN, DRAIN TILE FOR GROUNDING, DRAIN TUBES, REINFORCING STEEL, ETC.  
OMITTED FOR CLARITY, SEE SHEET 4 FOR ADDITIONAL DETAILS.



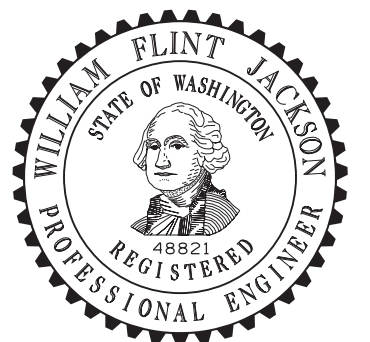
### PAD MOUNTED SERVICE CABINET WITHIN RIGHT-OF-WAY FENCE

FOR CONDUITS NOT SHOWN, DRAIN TILE FOR GROUNDING, DRAIN TUBES, REINFORCING STEEL, ETC.  
OMITTED FOR CLARITY, SEE SHEET 4 FOR ADDITIONAL DETAILS.



### SERVICE CABINET IN VICINITY OF CHAIN LINK FENCE

POST MOUNTED SERVICE CABINET SHOWN,  
PAD MOUNTED SERVICE CABINET SIMILAR



Jackson, Flint  
Jul 24 2019 5:42 PM

**SERVICE CABINET TYPE B  
MODIFIED (0 - 200 AMP TYPE  
120/240 SINGLE PHASE)  
STANDARD PLAN J-10.20-02**

SHEET 5 OF 5 SHEETS

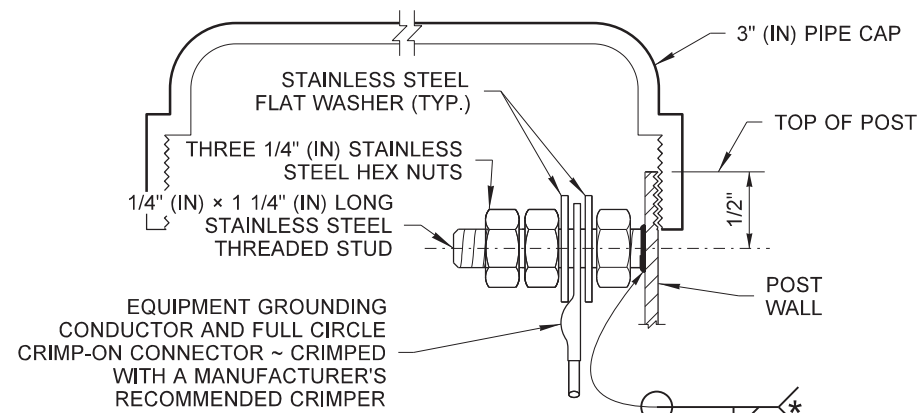
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Roark, Steve  
Jul 31 2019 12:11 PM

STATE DESIGN ENGINEER

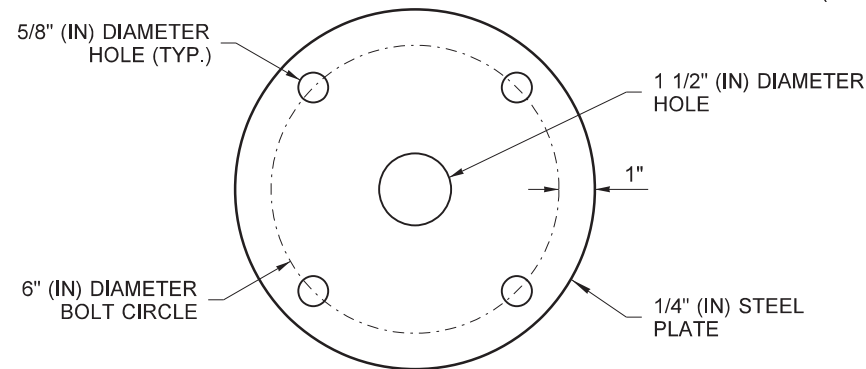
Washington State Department of Transportation

DRAWN BY: FERN LIDDELL

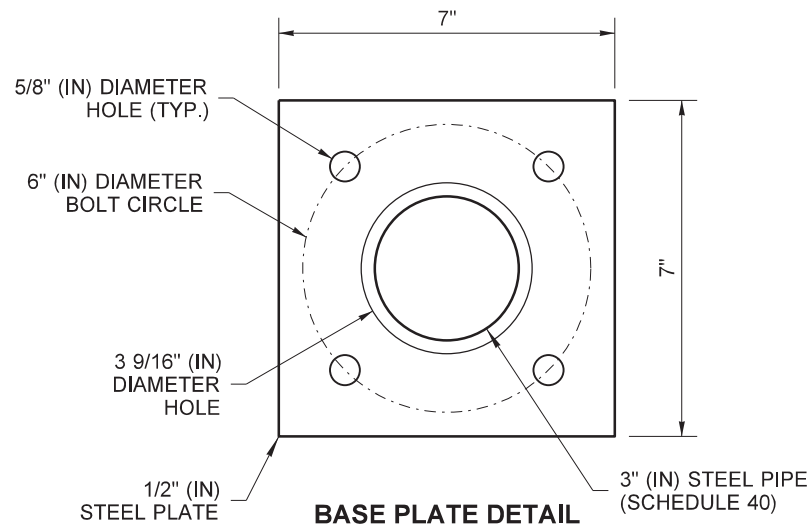


**GROUNDING CONNECTION  
DETAIL**

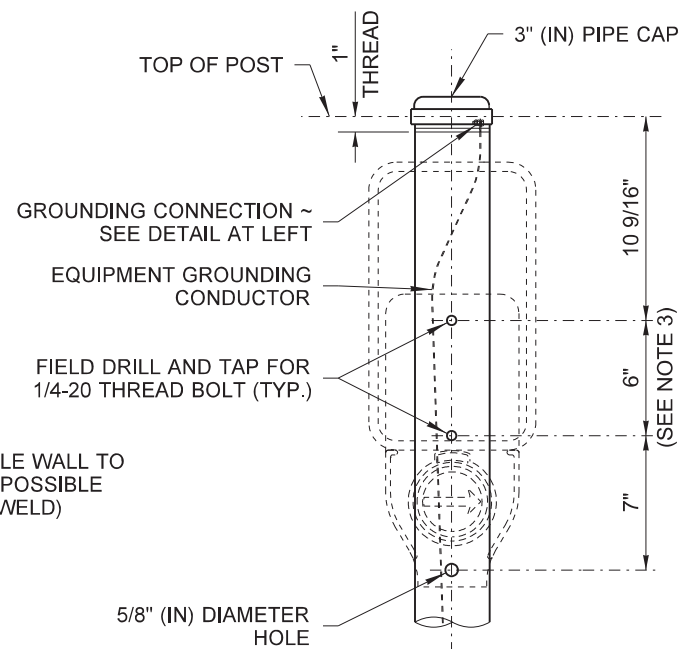
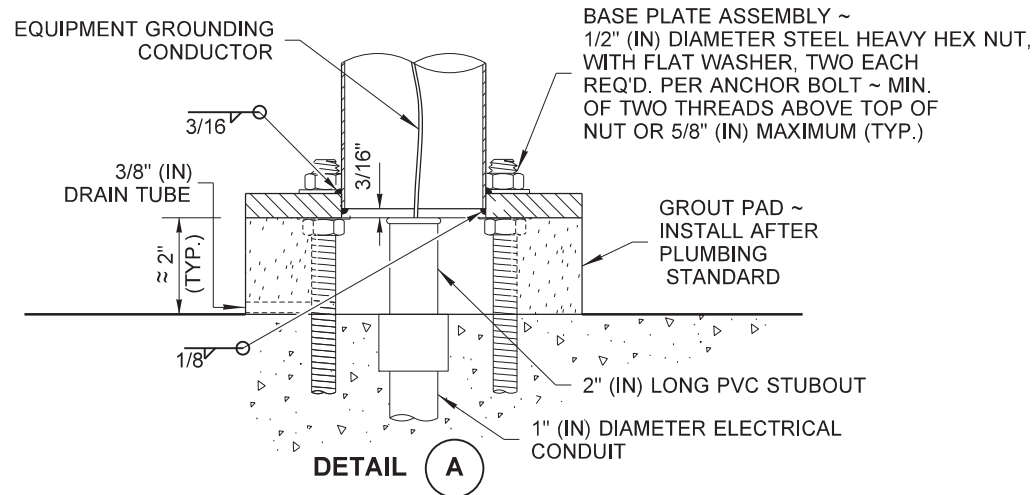
\* WELD STUD TO POLE WALL TO  
MAXIMUM EXTENT POSSIBLE  
(1/2" (IN) MINIMUM WELD)



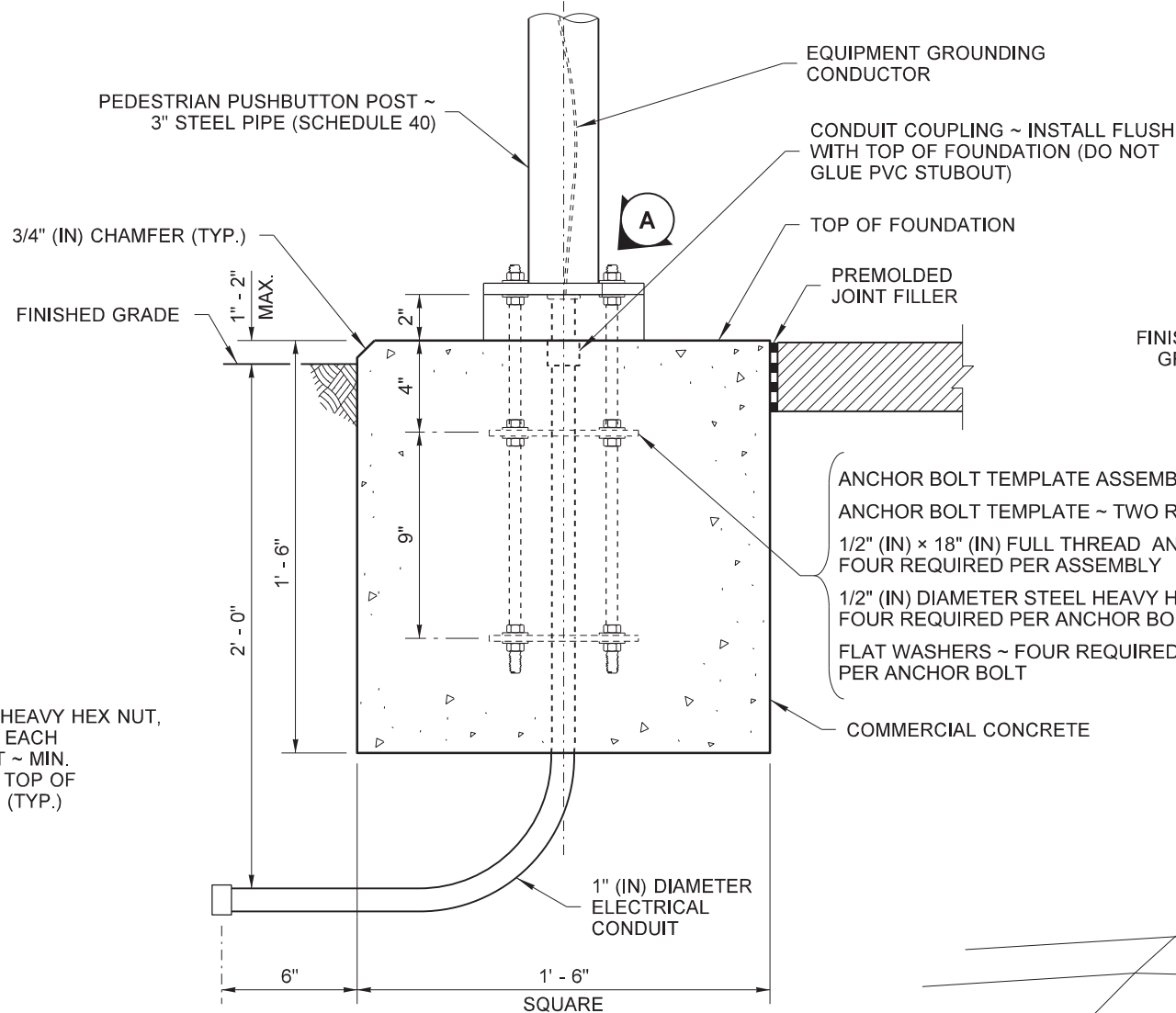
**ANCHOR BOLT TEMPLATE**



**BASE PLATE DETAIL**



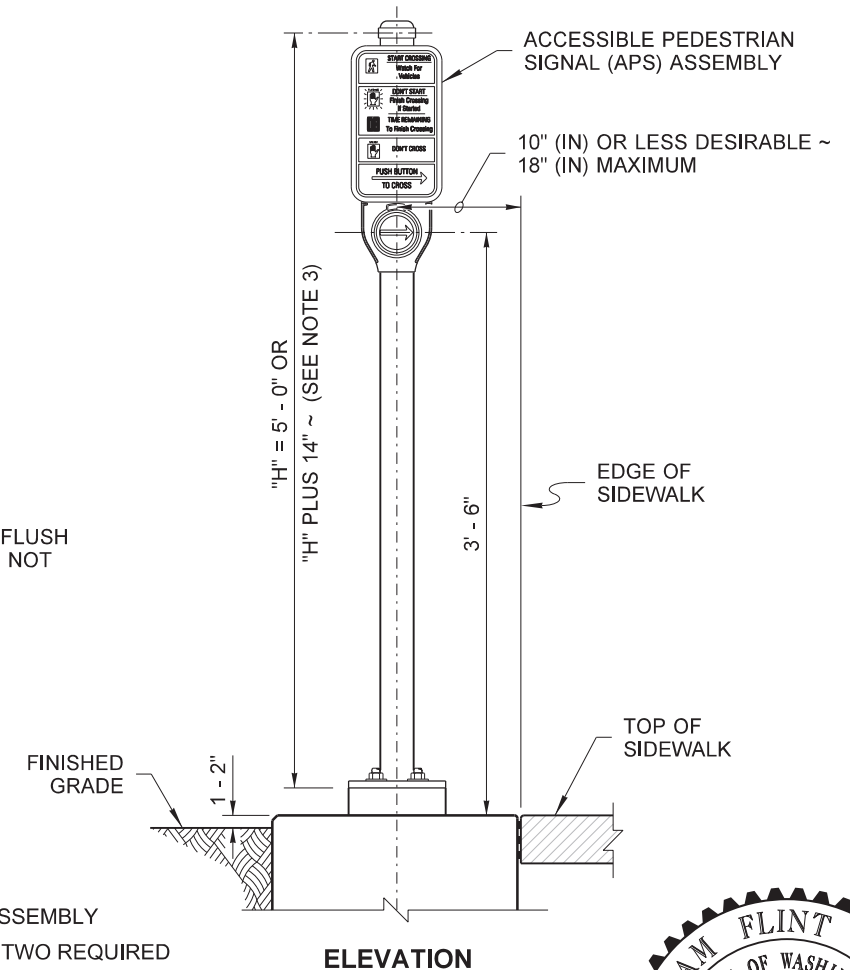
**POST DETAIL**



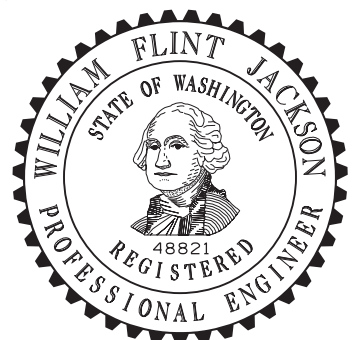
**FOUNDATION DETAIL**

**NOTES**

1. See **Standard Plan J-20.26** for Accessible Pedestrian Pushbutton details.
2. Where shown in the plans, install plaque (R10-32P) "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" above the Accessible Pedestrian Signal (APS) assembly. Add 14" (in) to post height to accommodate plaque and leave a 2" (in) space between signs.
3. Mounting distances vary between manufacturers. See manufacturers recommendations for mounting information.
4. Junction Box serving the Standard shall preferably be located 5' - 0" (10' - 0" Max.) from the Standard.
5. Two button installation may require adaptor(s).



**ELEVATION**



Jackson, Flint  
Jul 29 2019 2:53 PM

**ACCESSIBLE PEDESTRIAN  
PUSHBUTTON POST (PPB)  
AND FOUNDATION**

**STANDARD PLAN J-20.10-04**

SHEET 1 OF 1 SHEET

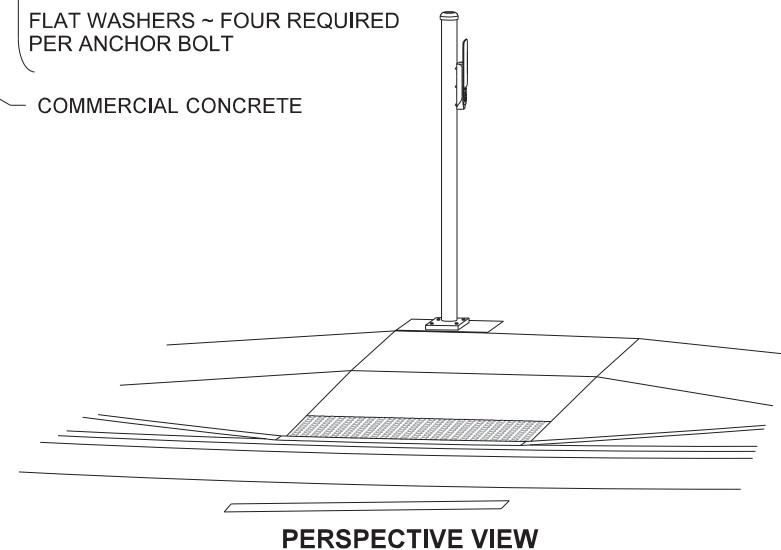
APPROVED FOR PUBLICATION

Roark, Steve  
Jul 31 2019 12:13 PM

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**PERSPECTIVE VIEW**

**REINFORCING STEEL BENDING DIAGRAM**

SEE **STD. SPEC. SECTN. 9-07.1(2)**  
FOR BENDING DIAMETERS

135° HOOK (TYP.)

1' - 6"

1' - 1"

9.5"

① # 4

② # 4

DIMENSIONS ARE OUT TO OUT

**PLAN VIEW**

① # 4

② # 4 (TYP.)

2 1/2" CLR. (TYP.)

3 1/2"

1' - 6"

SQUARE

2 1/2" (TYP.)

**BASE PLATE DETAIL**

5/8" (IN) DIAM. HOLE (TYP.)

6" (IN) DIAM. BOLT CIRCLE

3 9/16" (IN) DIAM. HOLE

7"

7"

1/2" (IN) STEEL PLATE

3" (IN) STEEL PIPE (SCHEDULE 40)

**SECTION A**

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

FINISHED GRADE

1" MIN. TO 2" MAX.

2 1/2" (IN) CLR. (TYP.)

1' - 6"

SQUARE

1" (IN) DIAMETER ELECTRICAL CONDUIT

1 1/2" CLR.

6"

TOP OF SIDEWALK

PREMOLDED JOINT FILLER

① # 4 (TYP.)

② # 4 (TYP.)

ANCHOR BOLT TEMPLATE ASSEMBLY

ANCHOR BOLT TEMPLATE ~ TWO REQUIRED

1/2" (IN) x 24" (IN) FULL THREAD ANCHOR BOLTS ~ FOUR REQUIRED

1/2" (IN) DIAM. STEEL HEAVY HEX NUTS ~ FOUR REQUIRED PER ANCHOR BOLT

FLAT WASHERS ~ FOUR REQUIRED PER ANCHOR BOLT

**ELEVATION**

TOP OF POST

1/2"

3" (IN) PIPE CAP

1" THREAD

16 9/16"

GROUNDING CONNECTION ~ SEE DETAIL

ACCESSIBLE PEDESTRIAN SIGNAL (APS) ASSEMBLY

FIELD DRILL AND TAP FOR 1/4-20 THREAD BOLT (TYP.)

6"

7"

"H" = 5' - 0" OR "H" PLUS 14" ~ SEE NOTE 2

5/8" (IN) DIAM. HOLE

3" (IN) STEEL (SCHEDULE 40)

EQUIPMENT GROUNDING CONDUCTOR

1/2" (IN) BASE SEE DETAIL

① # 4 (TYP.)

1 1/2" CLR.

3"

4"

1' - 6"

10"

6"

6"

1' - 6"

1" (IN) DIAMETER ELECTRICAL CONDUIT

**TYPE PPB ST**

**REINFORCING STEEL BENDING DIAGRAM**

SEE **STD. SPEC. SECTN. 9-07.1(2)**  
FOR BENDING DIAMETERS

135° HOOK (TYP.)

1' - 6"

1' - 1"

9.5"

① # 4

② # 4

DIMENSIONS ARE OUT TO OUT

**PLAN VIEW**

① # 4

② # 4 (TYP.)

2 1/2" CLR. (TYP.)

3 1/2"

1' - 6"

SQUARE

2 1/2" (TYP.)

**BASE PLATE DETAIL**

5/8" (IN) DIAM. HOLE (TYP.)

6" (IN) DIAM. BOLT CIRCLE

3 9/16" (IN) DIAM. HOLE

7"

7"

1/2" (IN) STEEL PLATE

3" (IN) STEEL PIPE (SCHEDULE 40)

**SECTION A**

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

FINISHED GRADE

1" MIN. TO 2" MAX.

2 1/2" (IN) CLR. (TYP.)

1' - 6"

SQUARE

1" (IN) DIAMETER ELECTRICAL CONDUIT

1 1/2" CLR.

6"

TOP OF SIDEWALK

PREMOLDED JOINT FILLER

① # 4 (TYP.)

② # 4 (TYP.)

ANCHOR BOLT TEMPLATE ASSEMBLY

ANCHOR BOLT TEMPLATE ~ TWO REQUIRED

1/2" (IN) x 24" (IN) FULL THREAD ANCHOR BOLTS ~ FOUR REQUIRED

1/2" (IN) DIAM. STEEL HEAVY HEX NUTS ~ FOUR REQUIRED PER ANCHOR BOLT

FLAT WASHERS ~ FOUR REQUIRED PER ANCHOR BOLT

**ELEVATION**

TOP OF POST

1/2"

3" (IN) PIPE CAP

1" THREAD

16 9/16"

GROUNDING CONNECTION ~ SEE DETAIL

ACCESSIBLE PEDESTRIAN SIGNAL (APS) ASSEMBLY

FIELD DRILL AND TAP FOR 1/4-20 THREAD BOLT (TYP.)

6"

7"

"H" = 5' - 0" OR "H" PLUS 14" ~ SEE NOTE 2

5/8" (IN) DIAM. HOLE

3" (IN) STEEL (SCHEDULE 40)

EQUIPMENT GROUNDING CONDUCTOR

1/2" (IN) BASE SEE DETAIL

① # 4 (TYP.)

1 1/2" CLR.

3"

4"

1' - 6"

10"

6"

6"

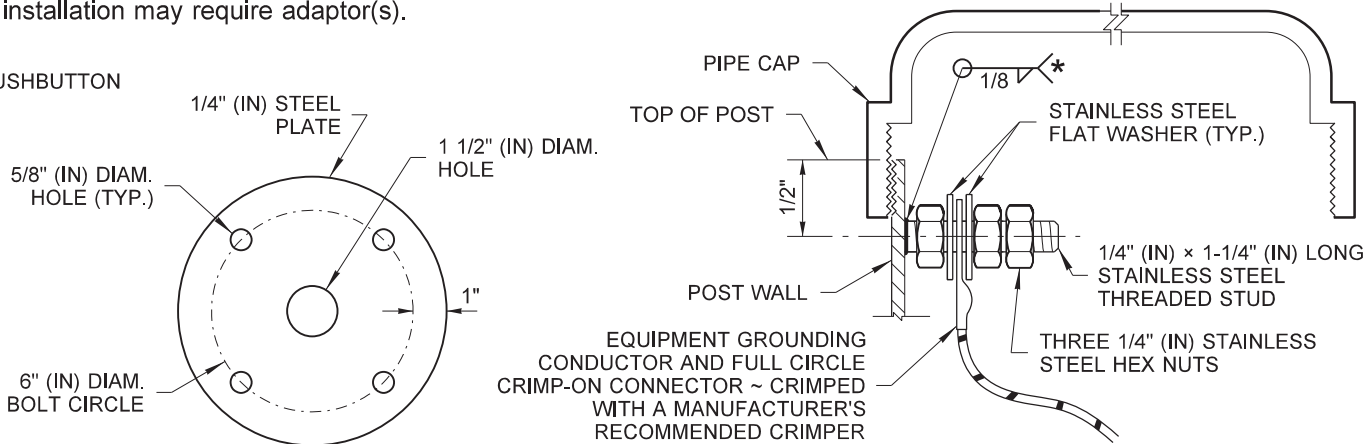
1' - 6"

1" (IN) DIAMETER ELECTRICAL CONDUIT

**TYPE PPB ST**

## NOTES

1. See **Standard Plan J-20.26** for Accessible Pedestrian Pushbutton details.
2. Where shown in the plans, install plaque (R10-32P) "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" above the Accessible Pedestrian Signal (APS) assembly. Add 14" (in) to the PPB post height to accommodate plaque and leave a 2" (in) space between signs.
3. Mounting distances vary between manufacturers. See manufacturers recommendations for mounting information.
4. Junction Box serving the Standard shall preferably be located 5' - 0" (10' - 0" Max.) from the Standard.
5. Supplemental Grounding Conductor shall be non-insulated #4 AWG stranded copper and shall be clamped to vertical rebar with a connector suitable for use embedded in concrete: Provide 3' - 0" min. slack. Attach to pole grounding stud with a full circle crimp-on connector (crimped with a manufacturer recommended crimper).
6. Two button installation may require adaptor(s).

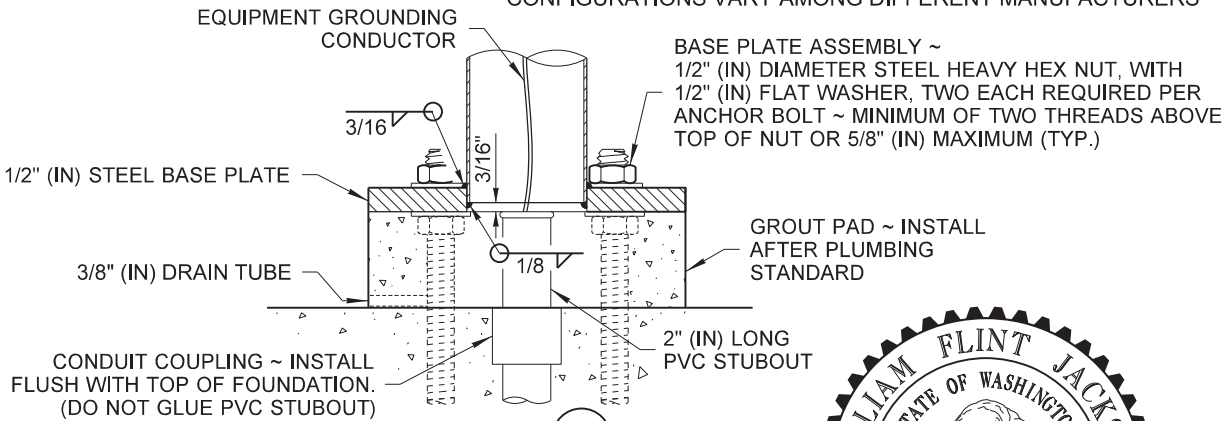


## ANCHOR BOLT TEMPLATE

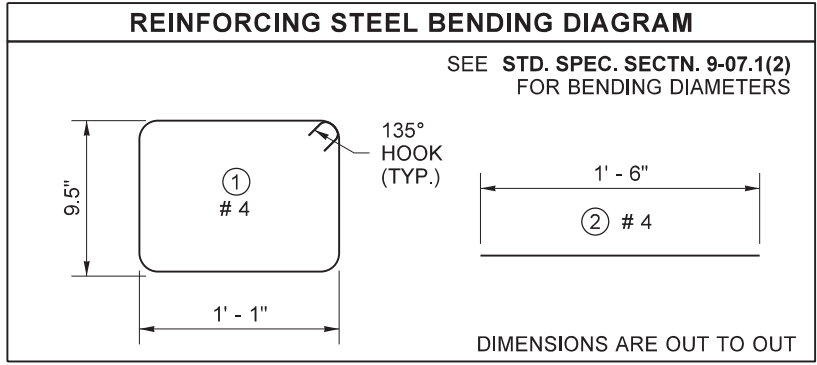
## GROUNDING CONNECTION DETAIL

\* WELD STUD TO POLE WALL TO MAXIMUM EXTENT POSSIBLE ~ 1/2" (IN) MINIMUM WELD

## CONFIGURATIONS VARY AMONG DIFFERENT MANUFACTURERS

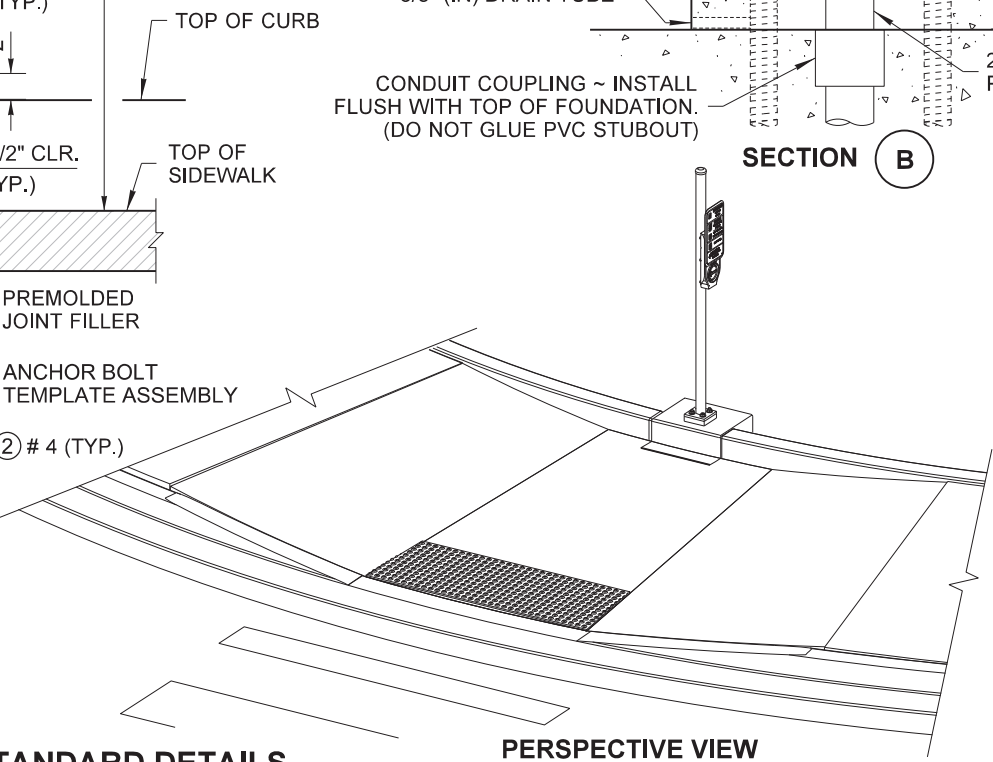


**SECTION ( B )**

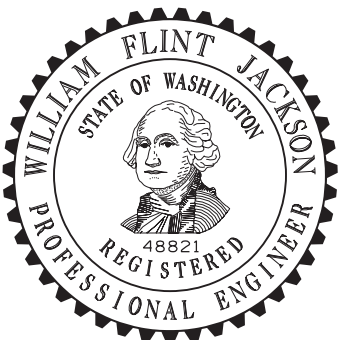


## ELEVATION

## TYPE PPB STANDARD DETAILS



### PERSPECTIVE VIEW

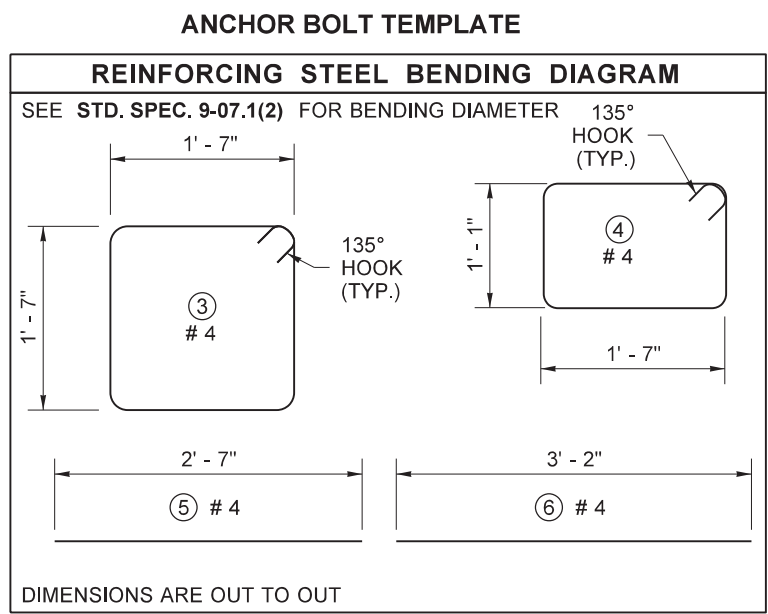
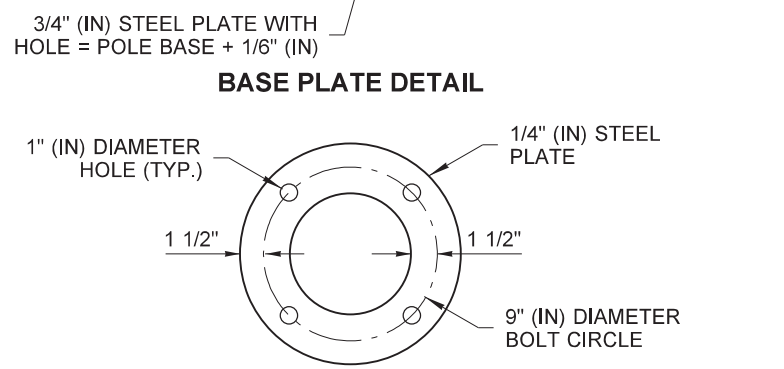
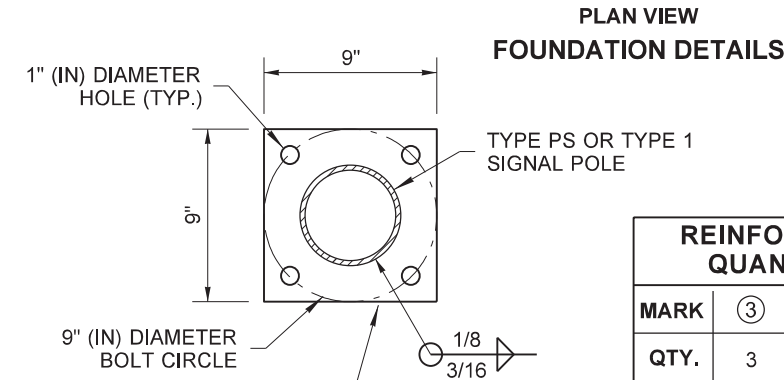
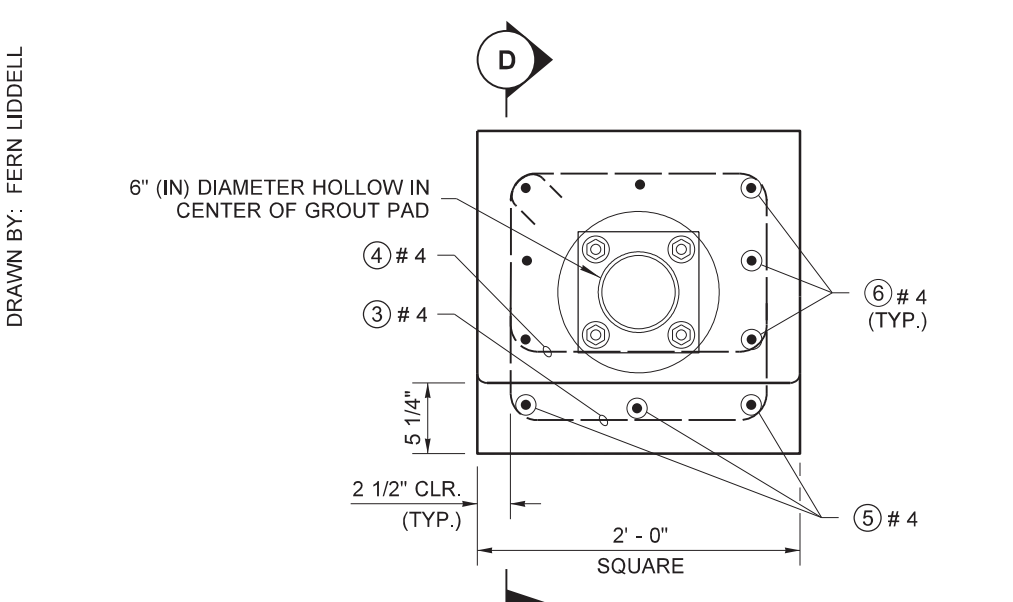


*L.M. Allen*  
JACKSON, FLINT  
Jul 29 2019 2:54 PM  
cosign

**ACCESSIBLE PEDESTRIAN  
PUSHBUTTON WITH  
CURB BASE  
STANDARD PLAN J-20.11-03**

APPROVED FOR PUBLICATION  
Roark, Steve  
Jul 31 2019 12:14 PM  
STATE DESIGN ENGINEER  
Washington State Department of Transportation

DRAWN BY: FERN LIDDELL



REINFORCING STEEL QUANTITIES LIST				
MARK	③	④	⑤	⑥
QTY.	3	2	3	7

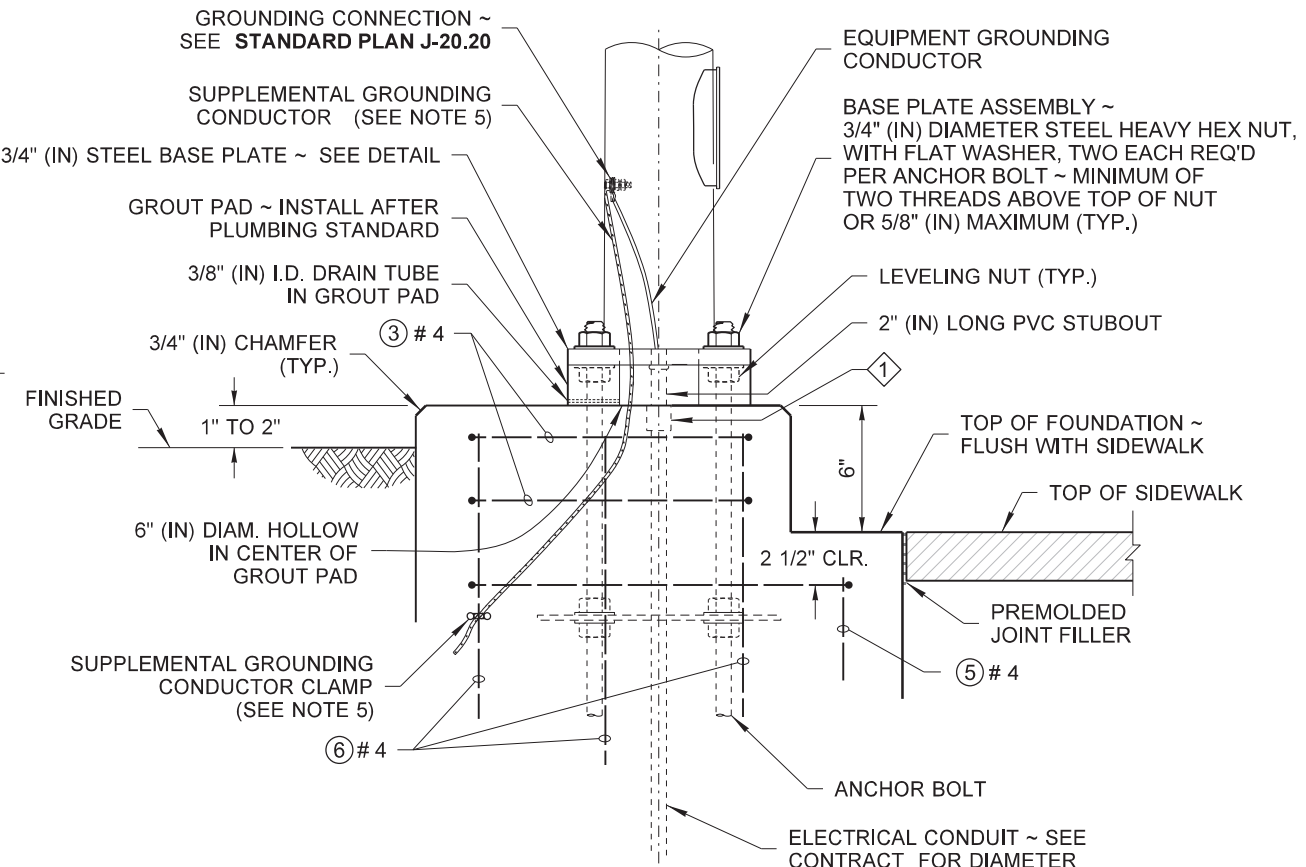
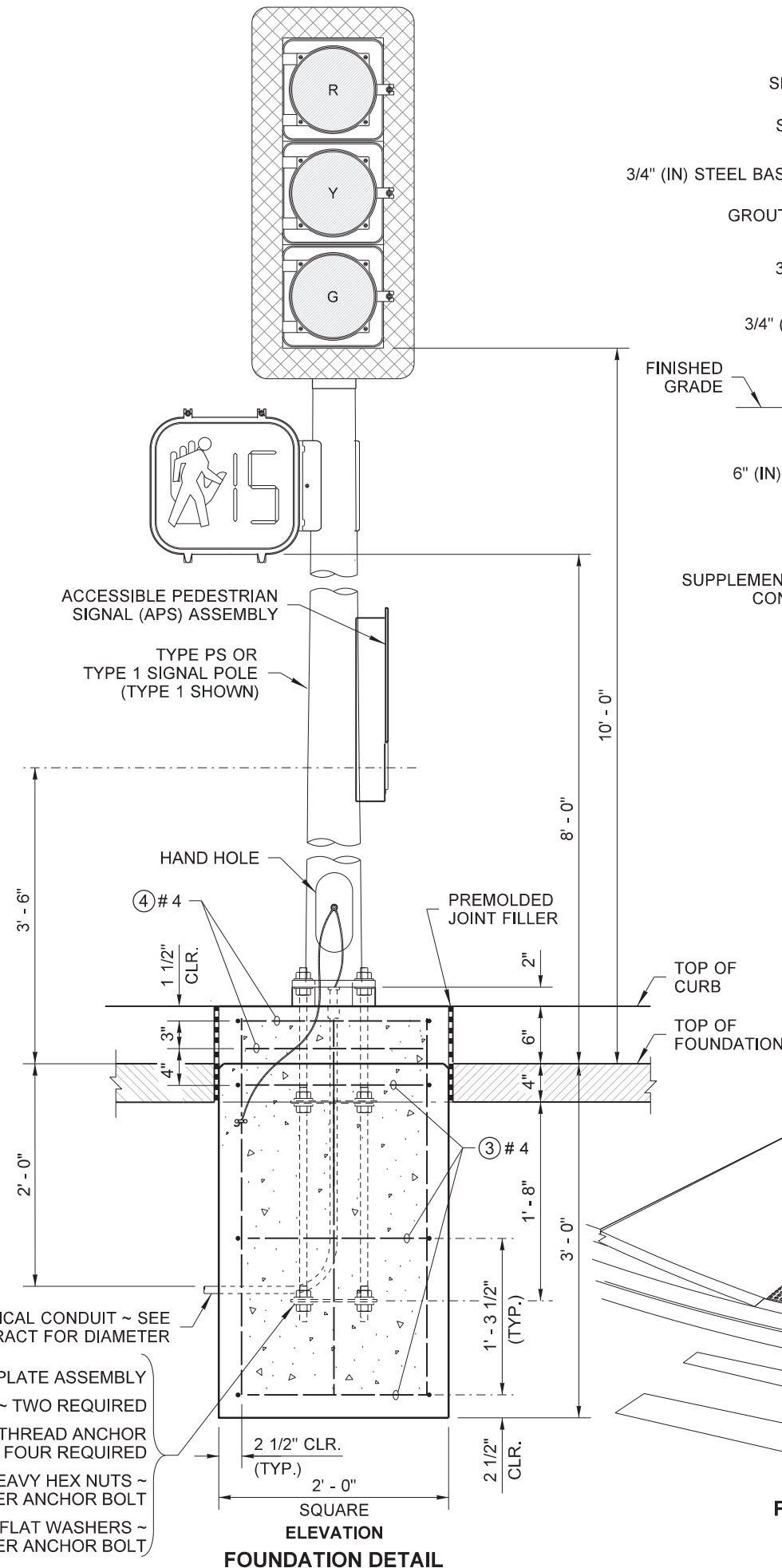
ANCHOR BOLT TEMPLATE ASSEMBLY

ANCHOR BOLT TEMPLATE ~ TWO REQUIRED

3/4" (IN) × 36" (IN) FULL THREAD ANCHOR BOLT ~ FOUR REQUIRED

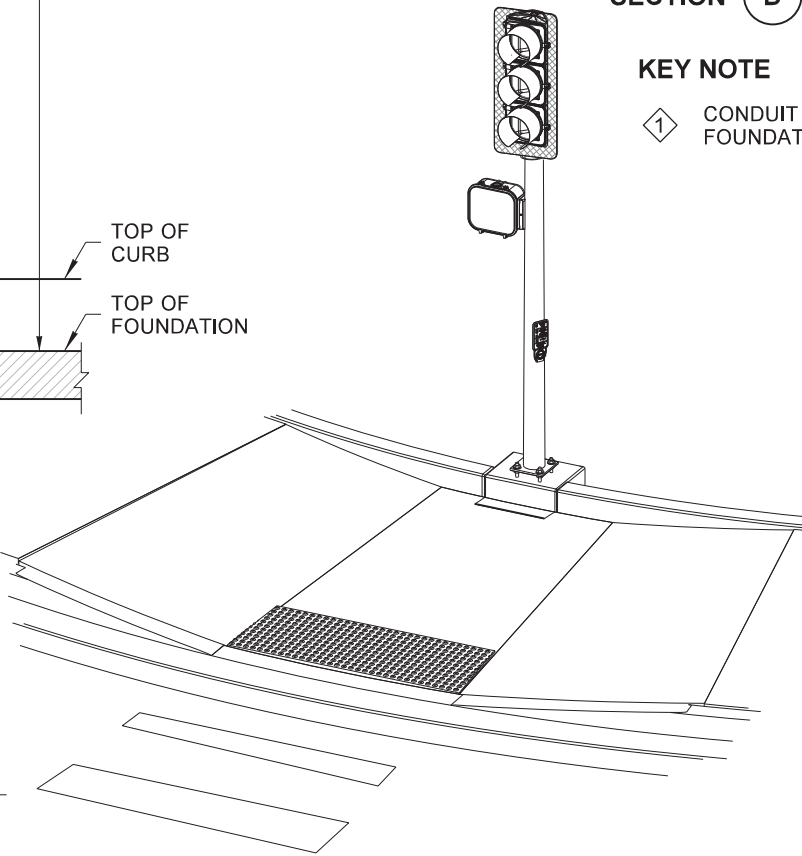
3/4" (IN) DIAM. STEEL HEAVY HEX NUTS ~ FOUR REQUIRED PER ANCHOR BOLT

FLAT WASHERS ~ FOUR REQUIRED PER ANCHOR BOLT



KEY NOTE

① CONDUIT COUPLING ~ INSTALL FLUSH WITH TOP OF FOUNDATION. (DO NOT GLUE PVC STUBOUT)



Jackson, Flint  
Jul 29 2019 2:54 PM

**ACCESSIBLE PEDESTRIAN PUSHBUTTON WITH CURB BASE**

**STANDARD PLAN J-20.11-03**

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

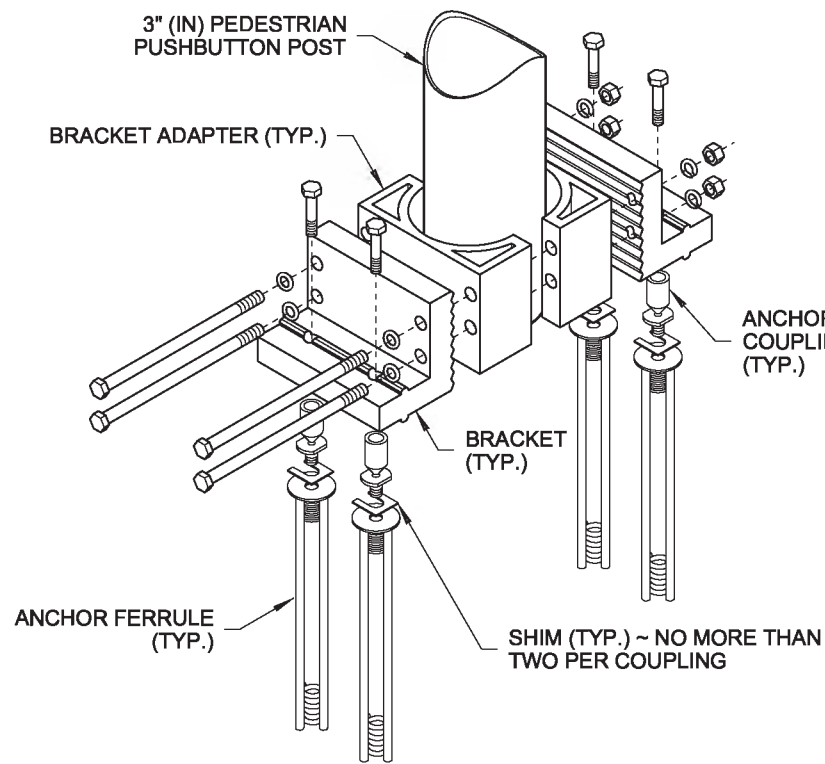
Roark, Steve  
Jul 31 2019 12:14 PM

STATE DESIGN ENGINEER

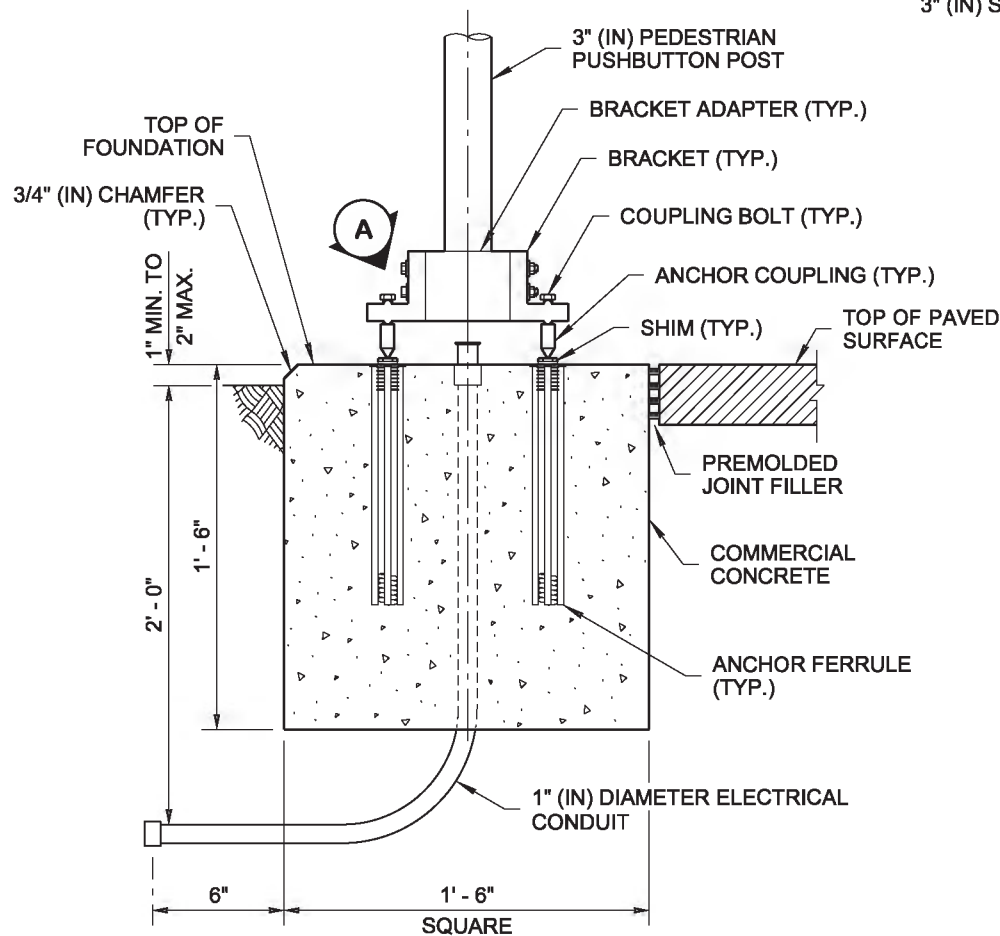
Washington State Department of Transportation

TYPE 1 SIGNAL STANDARD DETAILS

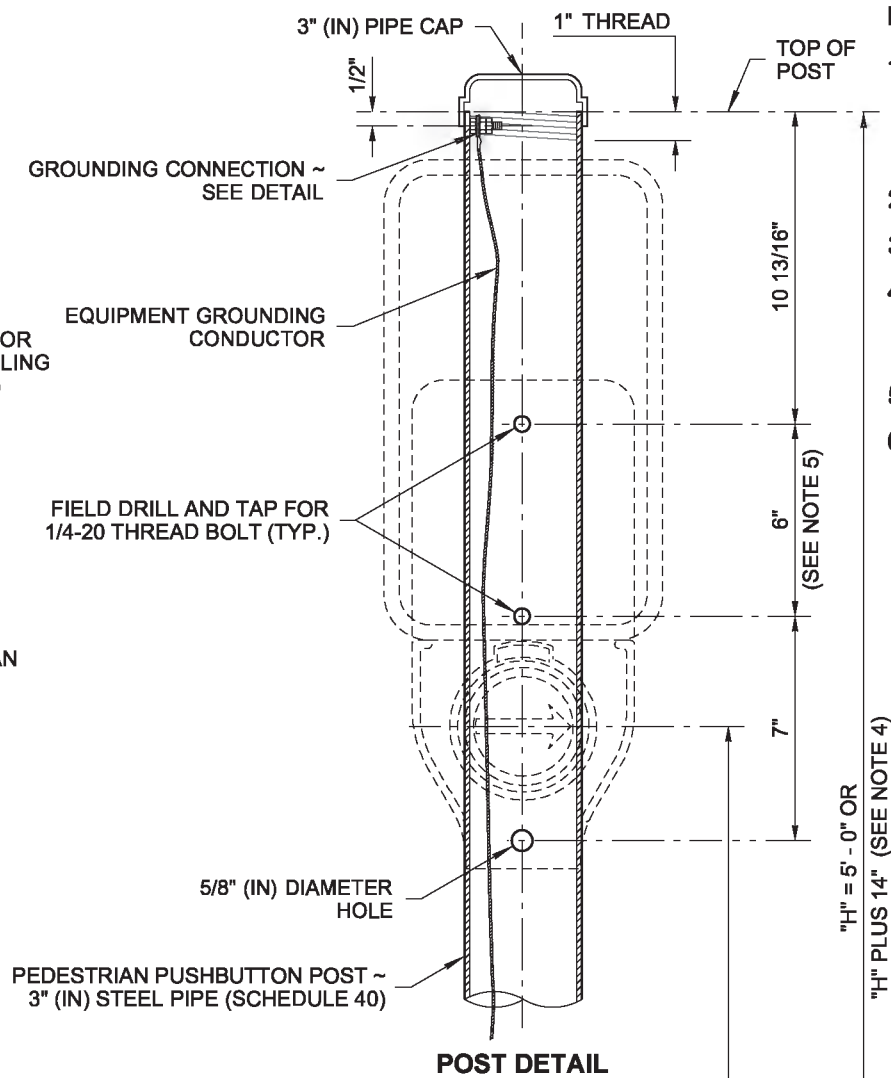
DRAWN BY: FERN LIDDELL



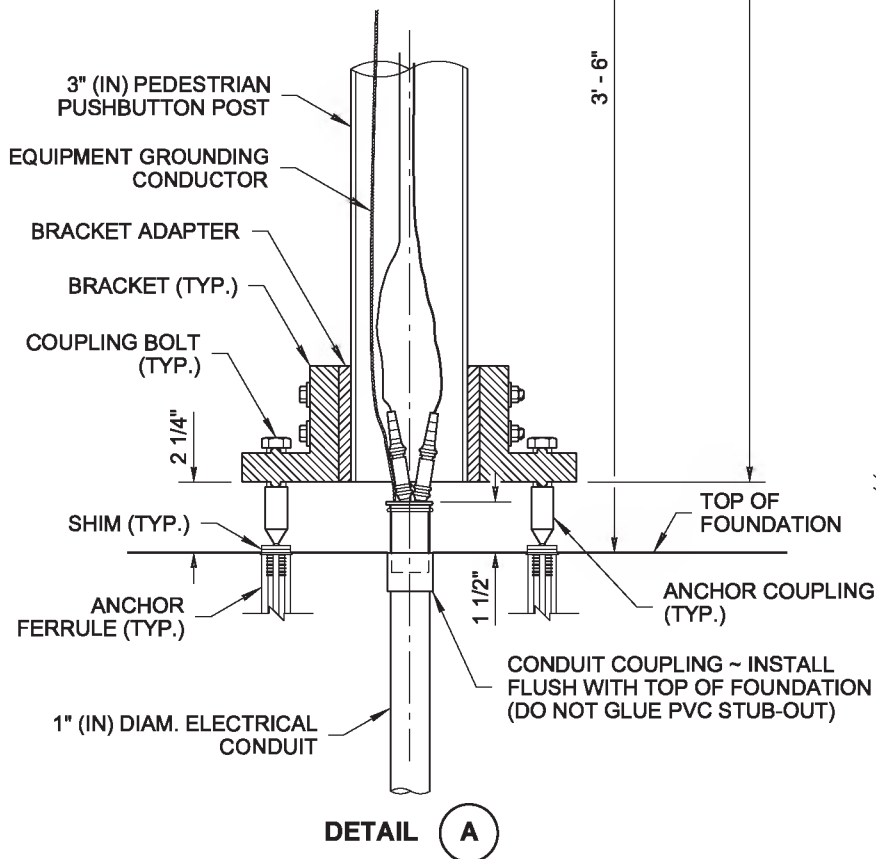
**EXPLODED VIEW  
BREAKAWAY BASE CONNECTOR**  
(SEE NOTE 1)



**FOUNDATION DETAIL**



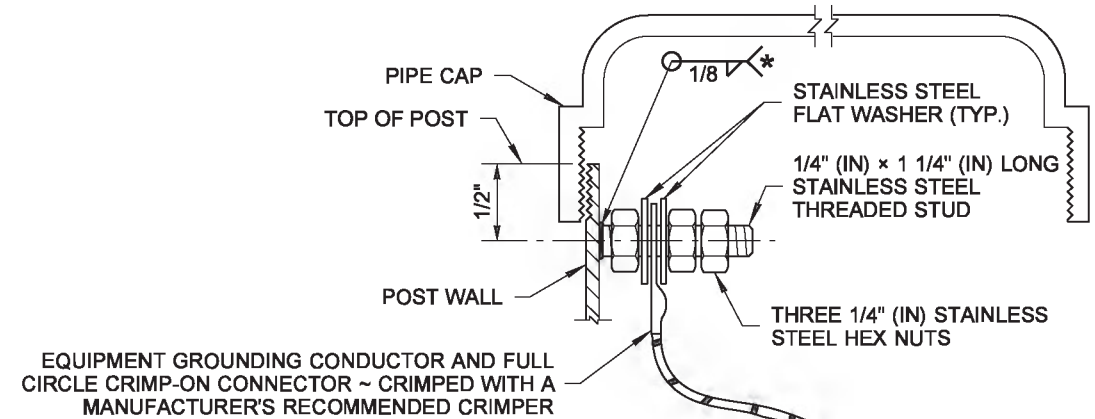
**POST DETAIL**



**DETAIL A**

**NOTES**

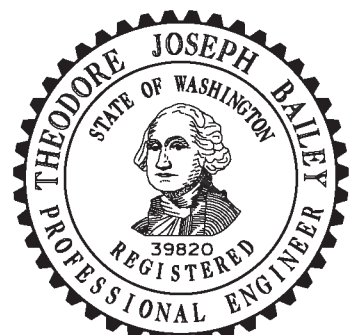
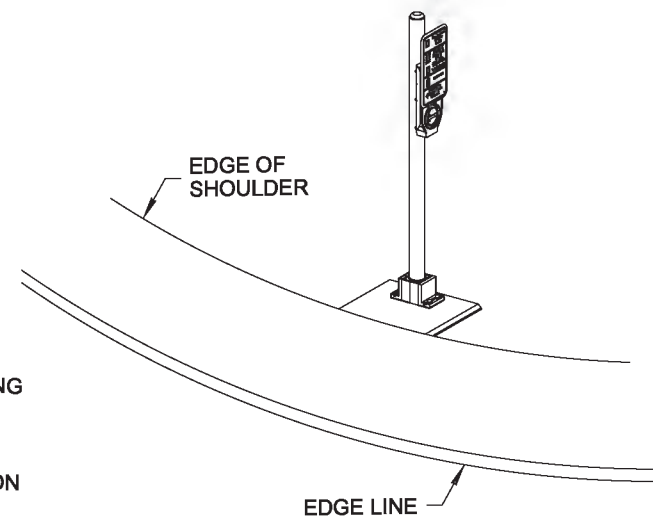
1. See **Standard Specification 9-06.16** for Breakaway Base Connection details. Dimensions for the parts used to assemble the base connections are intentionally not shown. Base connections are patented manufactured products that are in compliance with NCHRP 350 crash test criteria. The Breakaway Base Connection details are only shown on this plan to illustrate how parts are assembled.
2. See **Standard Plan J-20.26** for Accessible Pedestrian Pushbutton details.
3. Secure conductor in adjacent Junction Box per detail in **Standard Plan J-28.70**.
4. Where shown in the plans, install plaque (R10-32P) "PUSH BUTTON FOR 2 SECONDS FOR EXTRA CROSSING TIME" above the Accessible Pedestrian Signal (APS) assembly. Add 14" (in) to post height to accommodate plaque and leave a 2" (in) space between signs.
5. Mounting distances vary between manufacturers. See manufacturer's recommendations for mounting information.
6. Junction Box serving the Standard shall preferably be located 5' - 0" (10' - 0" Max.) from the Standard.



**GROUNDING CONNECTION DETAIL**

\* WELD STUD TO POLE WALL TO MAXIMUM EXTENT POSSIBLE ~ 1/2" (IN) MINIMUM WELD

CONFIGURATIONS VARY AMONG DIFFERENT MANUFACTURERS  
(SHOWN EXPLODED FOR CLARITY)



*Theodore Joseph Bailey*  
Bailey, Ted  
Jun 26 2014 4:25 PM

**ACCESSIBLE BREAKAWAY  
PEDESTRIAN PUSHBUTTON  
(PPB) POST**  
**STANDARD PLAN J-20.15-03**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

*Paula B. Bickel*  
Jun 30 2014 3:11 PM

STATE DESIGN ENGINEER

Washington State Department of Transportation

DRAWN BY: LISA CYFORD

18" MIN.

1/8

1/8" MIN.

1/4 G

1" PLATE CENTERED

3/16

This technical drawing shows a tapered pipe fitting. The drawing includes a vertical dimension line on the left indicating a minimum height of 18 inches. A callout '1/8' points to the top flange. Another callout '1/8" MIN.' points to the tapered body. A callout '1/4 G' points to a horizontal line, likely representing a gasket or a specific material grade. A callout '1" PLATE CENTERED' points to the bottom flange. A callout '3/16' points to a small circular feature on the bottom flange. The drawing uses solid lines for the outer profile and dashed lines for the inner profile to show the taper.

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 GAGE OR THICKNESS *	3	3	1/4	5/16	5/16	5/16	5/16
A	BASE PLATE	15"	17"	19"	20"	20"	22"	22"
B	ANCHOR BOLT CIRCLE DIAM.	15"	17"	19"	20"	20"	22"	22"
C	POLE BASE DIAMETER *	11"	12 1/2"	14"	14"	15"	16"	17"
D	BASE PLATE THICKNESS *	1 1/2"	1 1/2"	1 1/2"	1 3/4"	1 3/4"	1 3/4"	1 3/4"
E	ANCHOR BOLT DIAMETER	1 1/4"	1 1/2"	1 1/2"	1 3/4"	1 3/4"	1 3/4"	1 3/4"

### CONE SECTION DETAIL

Technical drawing of a circular component. The drawing shows a cross-section of a cylinder. The top edge is labeled "1/2\" WIT". The bottom edge is labeled "R H G". The left side has a vertical dimension line with "2 1/2\" and "1\". The right side has a horizontal dimension line with "3/8\". The drawing includes a dashed line representing the back edge of the cylinder.

REMOVABLE RAINTIGHT  
HAND HOLE COVER WITH  
GASKET ~ FASTEN WITH  
2 STAINLESS STEEL  
(ASTM F-592) SCREWS

Technical drawing of a cylindrical specimen. The overall diameter is 4" and the length is 6". A central oval hole is shown with a width of 3/16" and a depth of 0.005". The drawing includes dimension lines and labels for the hole's width and depth.

The diagram shows a square plate with side length  $A$ . A central circular hole has a diameter  $B$ . Four small circles are positioned at the corners of the square, each tangent to the two adjacent sides of the square and the central circular hole.

Diagram illustrating the components of a roof penetration assembly:

- BOLT  $\frac{1}{4}$ "
- POLE WALL
- 2 1/2" SPLIT COUPLING
- 2 1/2" DIAMETER ELBOW (SEE NOTE 2)
- 2 1/2" DIAMETER CHASE NIPPLE
- 2 1/2" DIAMETER SHORT NIPPLE

A technical drawing of a circular manhole. The drawing shows the top and side views. The top view is a circle with a radius line extending from the center to the edge, labeled "RADIUS AS REQUIRED". The side view shows the circular profile with a vertical centerline. Dimensions are provided: a top width of  $2\frac{1}{4}"$  (TYP.) and a bottom width of  $1\frac{1}{8}"$  (TYP.).

**3/8" THICK (A36)  
STEEL CLAMP**

**1" DIAMETER x 1"  
SCHEDULE 80  
PIPE SLEEVE**


**CABLE CONNECT  
BOLT**

**7"**

**1 1/8"  
(TYP.)**

**3 1/2"**

**STRAIN CLAMP  
DETAIL**



MAST ARM LENGTH ~  
AS NOTED IN CONTRACT

40' - 0" OR 50' - 0"  
FROM LIGHT SOURCE  
TO BASE PLATE  
(SEE CONTRACT)

40' - 0" OR 50' - 0"  
FROM LIGHT SOURCE  
TO BASE PLATE  
(SEE CONTRACT)

**ATTACHMENT POINT ANGLES**

ALL HAND HOLES 180° 0° LUMINAIRE AND WIREWAY

90° WIREWAY

**ATTACHMENT POINT ANGLES**

**CONE SECTION  
(SEE DETAIL)**

WIREWAY ~  
- TWO PER POLE  
(SEE DETAIL)

STRAIN CLAMP ~ ONE  
- PER CABLE CONNECTION  
(SEE DETAIL)

- A "J" OR "C" HOOK AT  
 90° OR 180° OFF  
 UPPER HAND HOLE

BASE PLATE  
(SEE DETAIL)

## TYPE V STANDARD

1. This structure has been designed according to the Fifth Edition 2009 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals: Basic wind velocity 90 mph, Design Life/Recurrence Interval 50 years, and Fatigue Category III.
2. 2 1/2" diameter weatherhead may be substituted for the elbow and nipple assembly.
3. Pole shaft shall have 0.14" ft/taper.
4. See **Standard Plan J-15.15** for Span Wire Installation details.
5. Hand holes may be 6" x 4", oval or rectangle. Provide a "J" or "C" hook at 90° or 180° off upper hand hole.
6. See **Standard Plan J-27.10** for Type IV and V Strain Pole Foundation.

ANCHOR PLATE ~  
2 REQUIRED

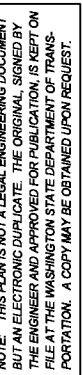
BOLT CIRCLE + 4"

BOLT CIRCLE - 4"

B

ANCHOR BOLT  
DIAM. + 1/8" (TYP.)

ANCHOR BOLT AND  
ANCHOR PLATE ASSEMBLY  
DETAIL



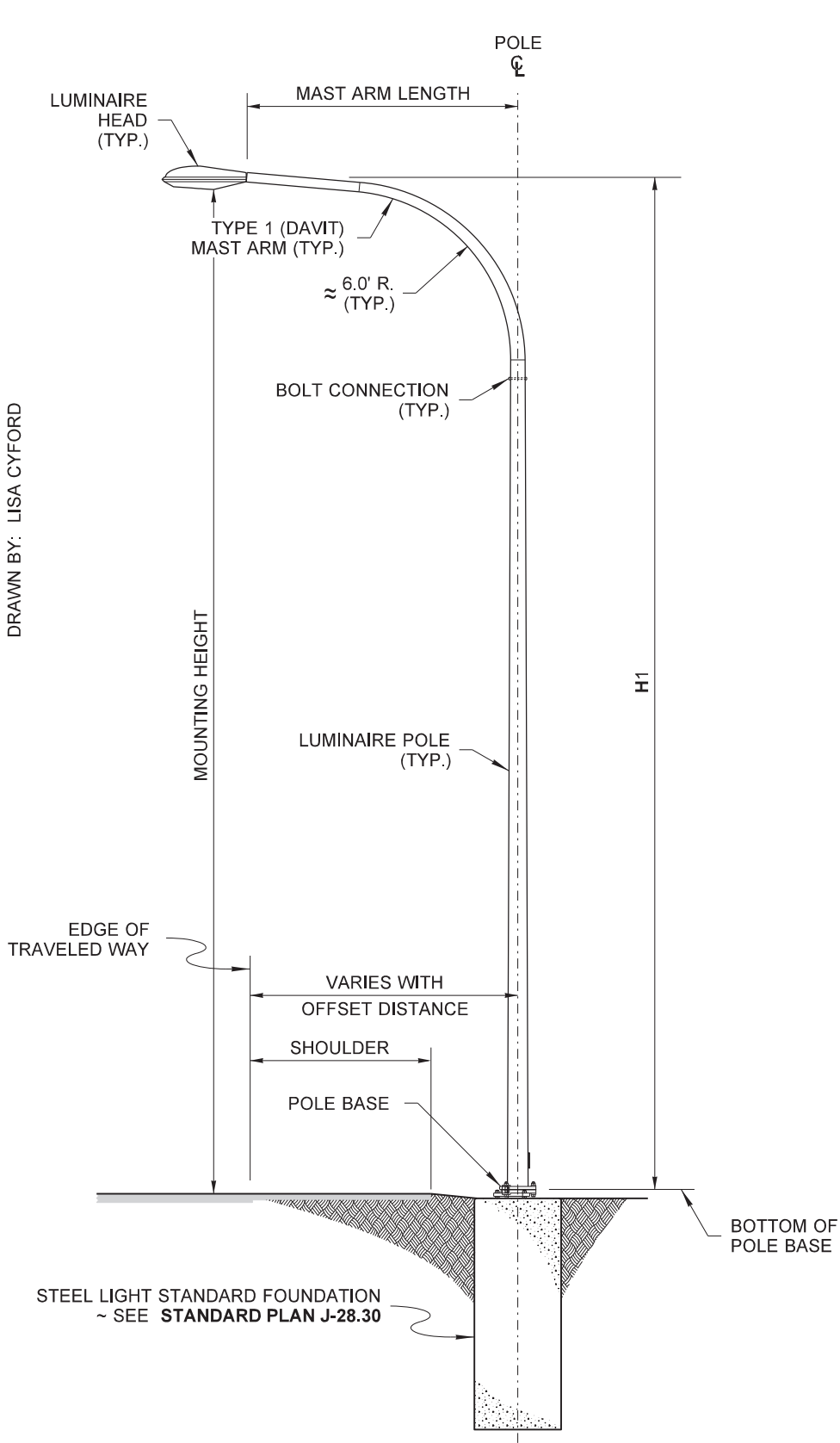
## STANDARD PLAN J-27.15-00

APPROVED FOR PUBLICATION

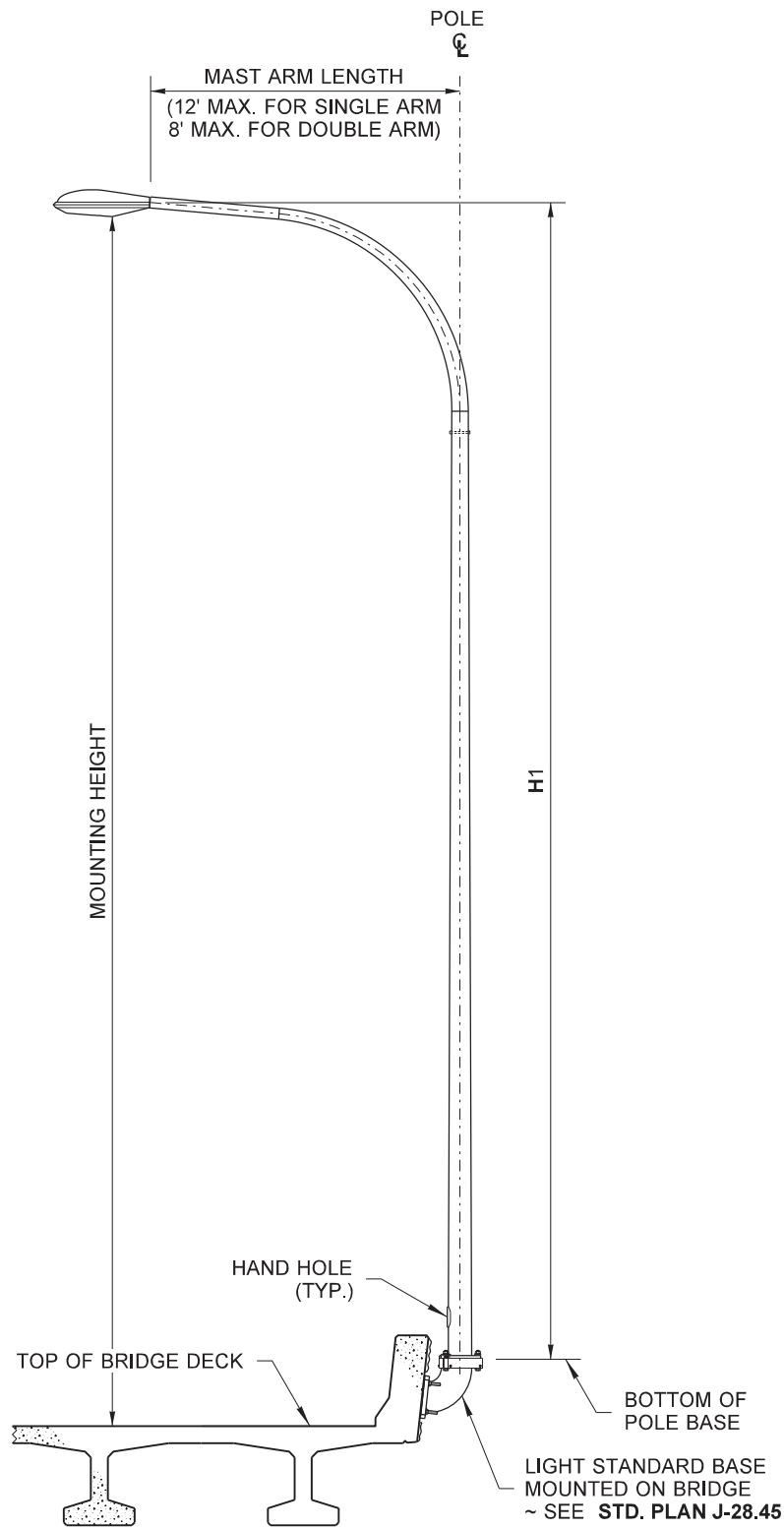
03-15-12

STATE DESIGN ENGINEER DATE  
 Washington State Department of Transportation

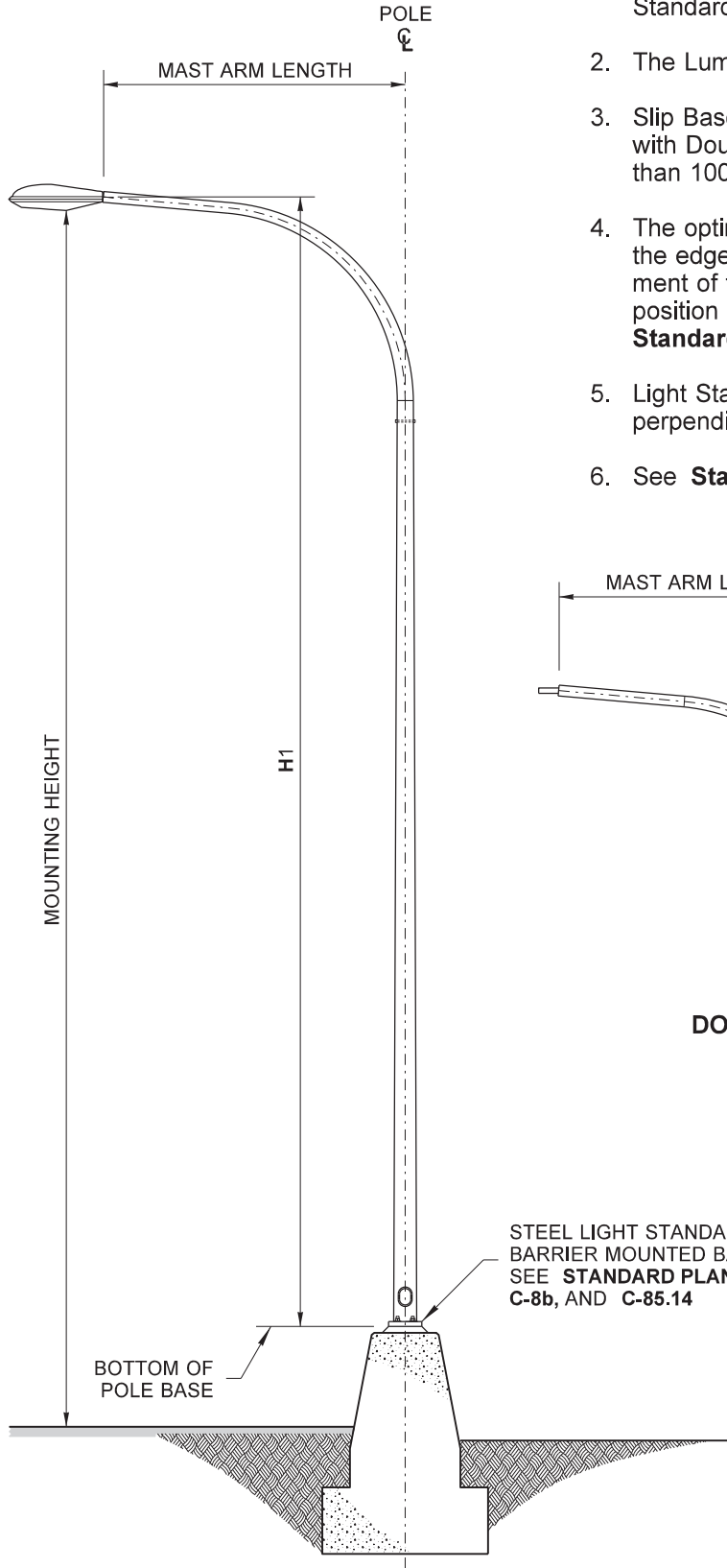
DRAWN BY: LISA CYFORD



**STANDARD GROUND MOUNT**  
(SLIP BASE SHOWN)



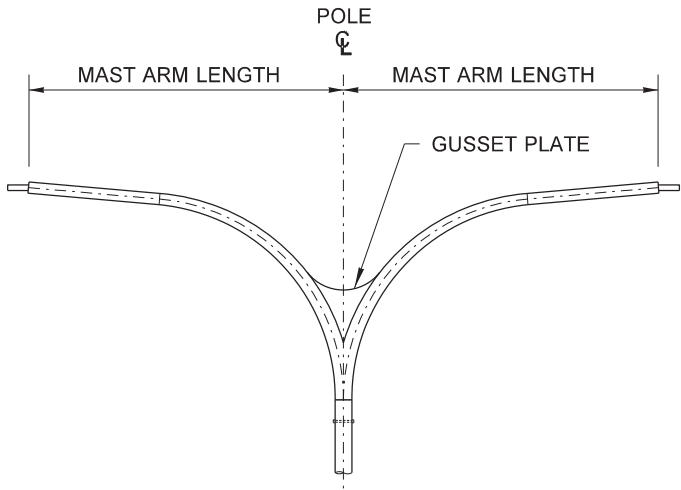
**BARRIER ELBOW MOUNT**  
(BRIDGE BARRIER SHOWN)



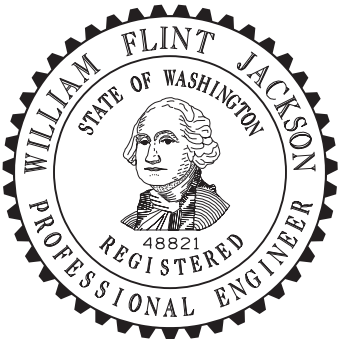
**TOP OF BARRIER MOUNT**

**NOTES**

1. This plan depicts the Steel Light Standard types and terms commonly referred to in the Contract. All Steel Light Standards are fabricated in accordance with the Standard Specifications and the Contract Provisions.
2. The Luminaire Pole height shall not exceed 50' (ft)(H1).
3. Slip Bases shall not be installed on 50' (ft)(H1) poles with Double Mast Arms, nor on poles weighing more than 1000 lbs.
4. The optimal location of the Luminaire head is over the edge of the traveled way. Based on the placement of the Steel Light Standard foundation, the position of the Luminaire head may vary. See **Standard Plan J-28.22**.
5. Light Standard mast arm orientation is typically perpendicular to roadway centerline.
6. See **Standard Plan J-28.50** for Hand Hole details.



**DOUBLE TYPE 1 MAST ARM**



Jackson, Flint  
Jul 31 2019 4:13 PM  
cosign

**STEEL LIGHT STANDARD**

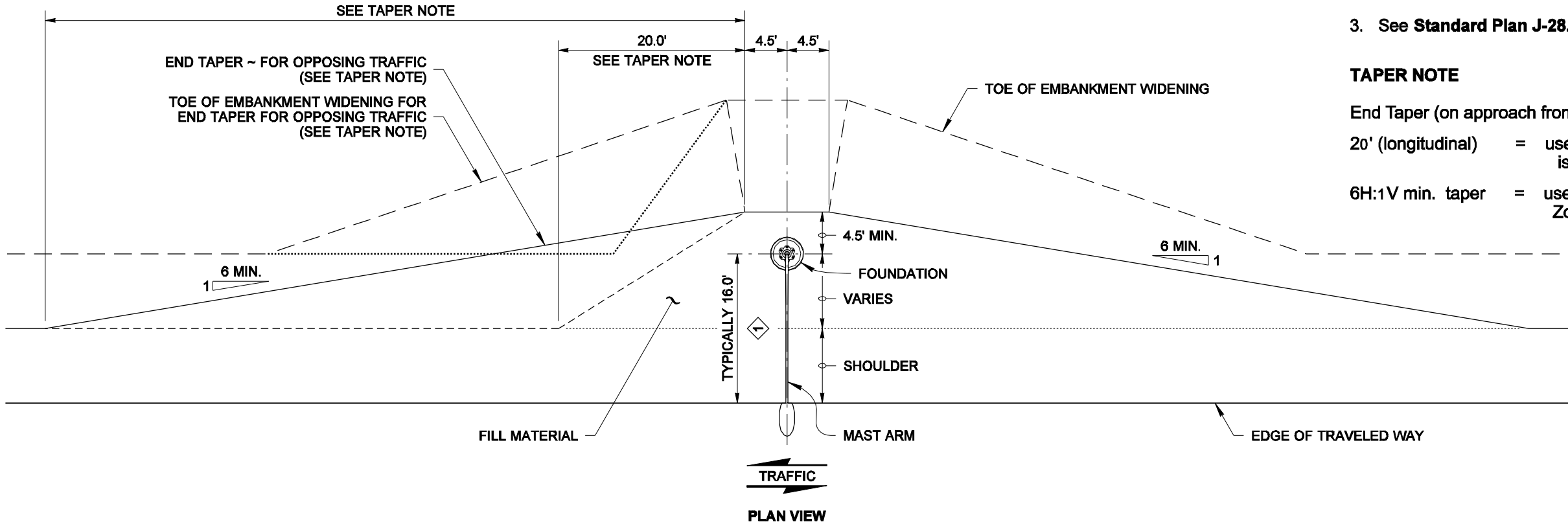
**STANDARD PLAN J-28.10-02**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION  
Roark, Steve  
Aug 7 2019 11:54 AM  
cosign  
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Washington State Department of Transportation

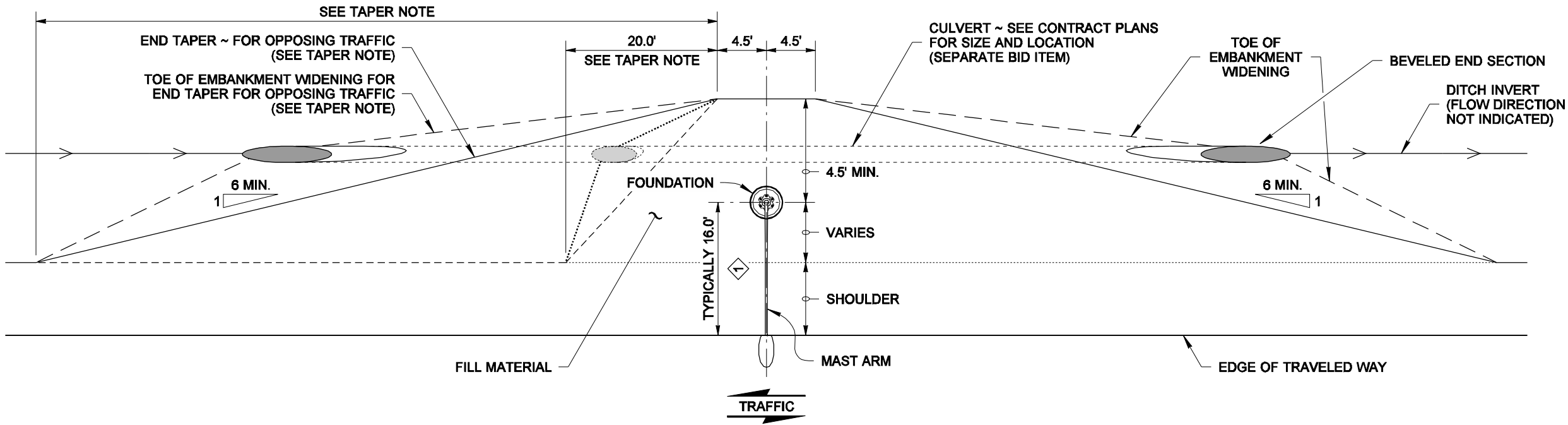
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DRAWN BY: BILL BERENS



CASES A & B  
EMBANKMENTS

1 BASED ON FIELD CONDITIONS, STEEL LIGHT STANDARD  
PLACEMENT CAN BE ADJUSTED  $\pm 4.0'$ , WHEN  
APPROVED BY THE PROJECT ENGINEER.



CASE C  
DITCH SECTIONS

NOTES

1. The Steel Light Standard Placement depicted on this plan is only intended for installations where roadside conditions allow its usage. Roadside conditions may require a special design by the Bridge Office, as determined by the Project Engineer.
2. See **Standard Plan J-28.30** for foundation details and construction methods.
3. See **Standard Plan J-28.50** for pole base and hand hole details.

TAPER NOTE

End Taper (on approach from opposing traffic):

- 20' (longitudinal) = use on one-way roadways or where the Light Standard is not in the Design Clear Zone of the opposing traffic.
- 6H:1V min. taper = use when the Light Standard is in the Design Clear Zone of the opposing traffic.



EXPIRES AUGUST 9, 2007

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PLAN TO BE VALID. THE WASHINGTON STATE DEPARTMENT OF  
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**STEEL LIGHT STANDARD  
PLACEMENT (SLIP BASE)**

**STANDARD PLAN J-28.22-00**

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

**Pasco Bakotich III**

STATE DESIGN ENGINEER

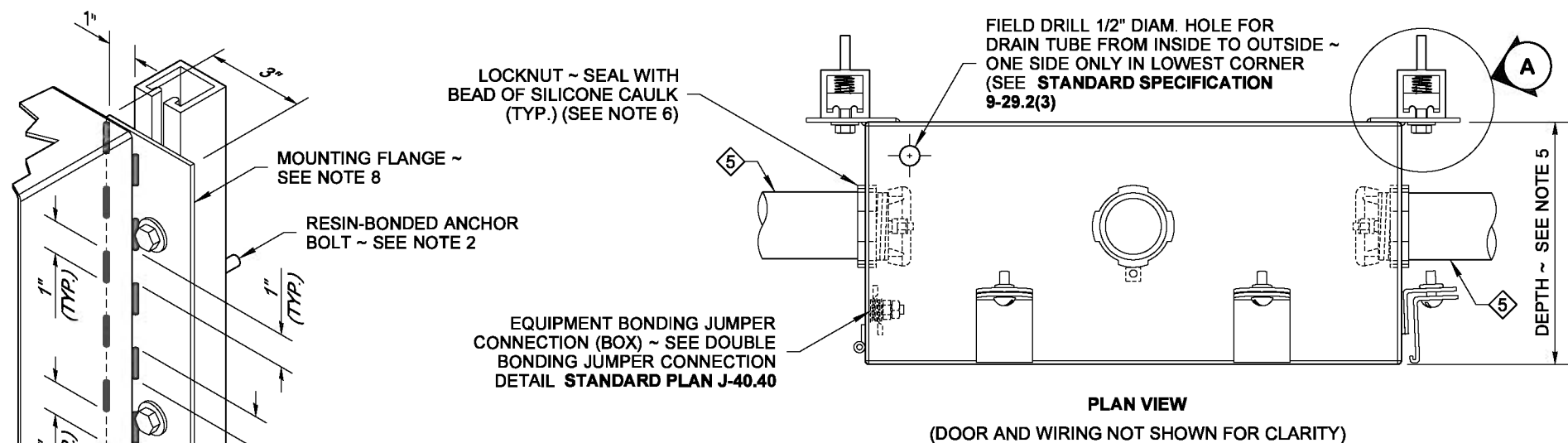
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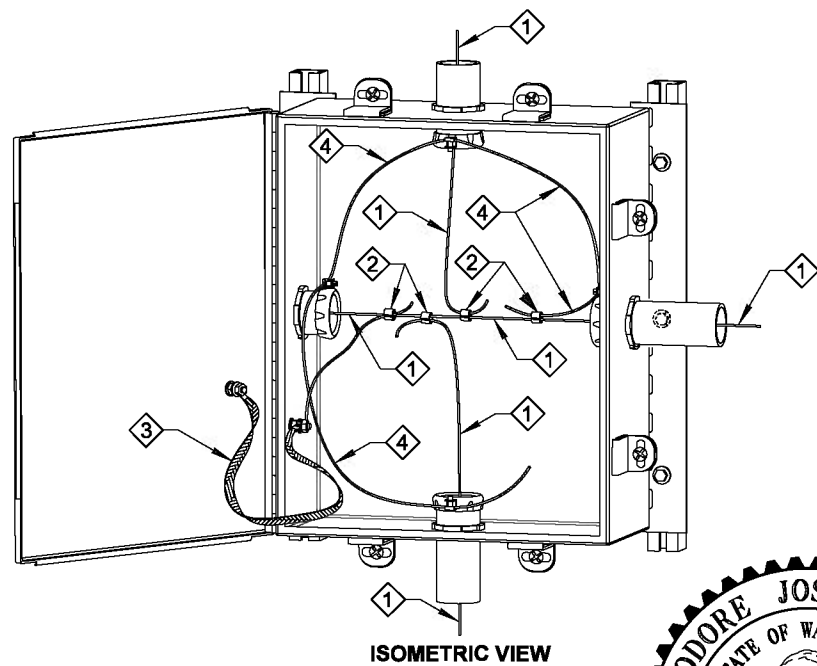
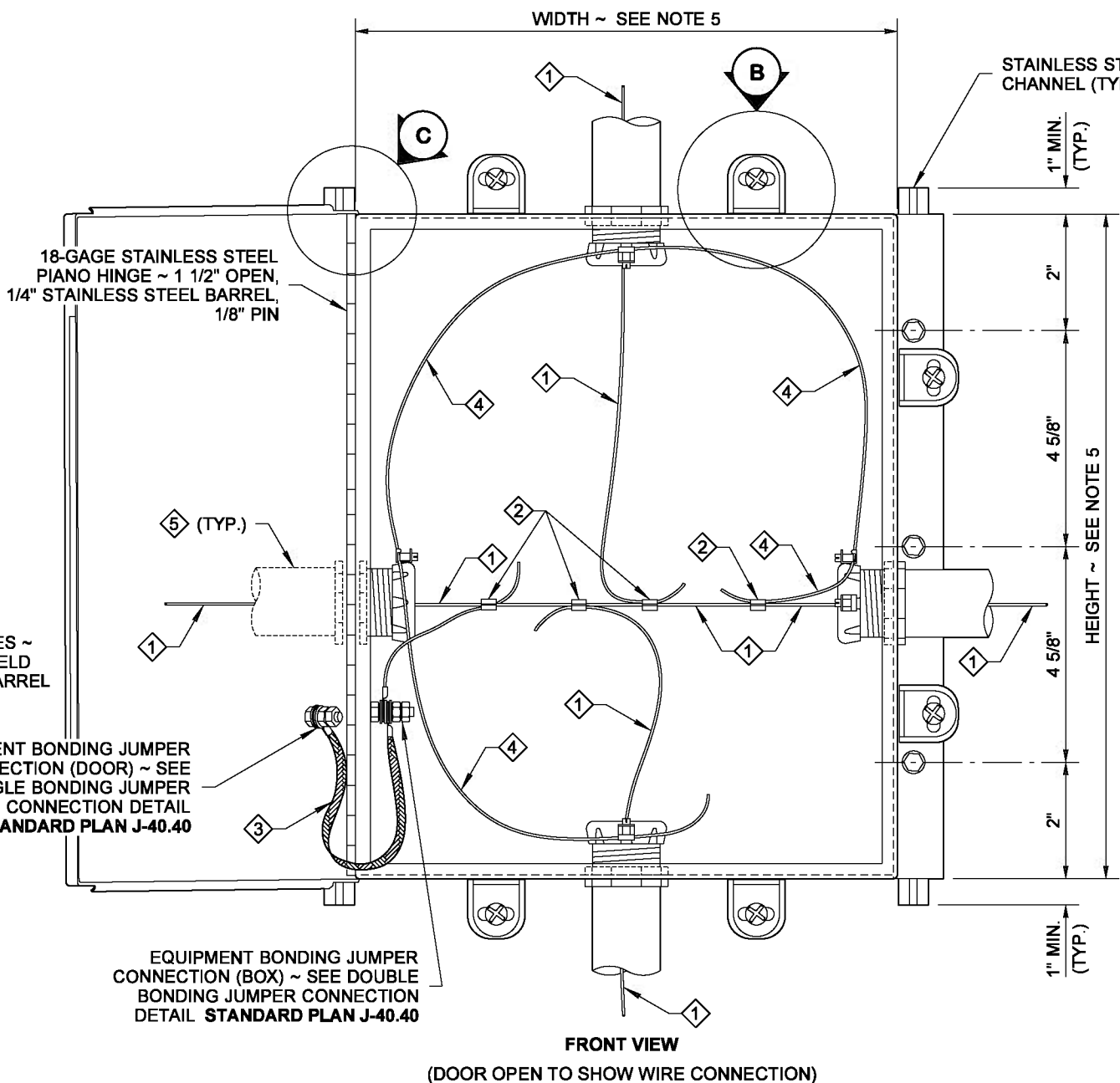
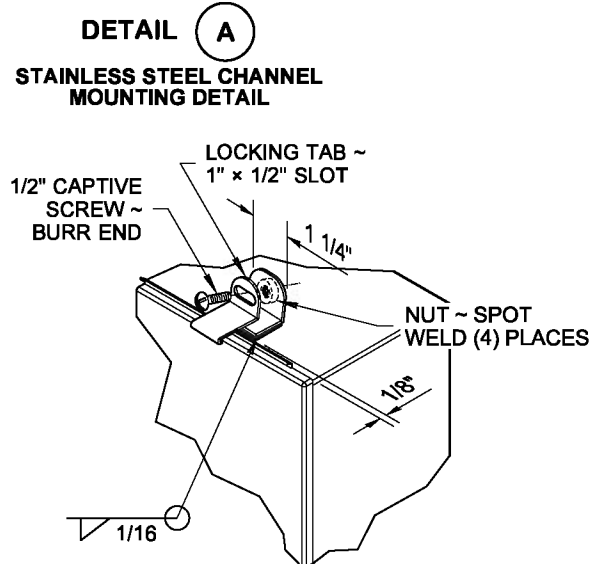
Washington State Department of Transportation

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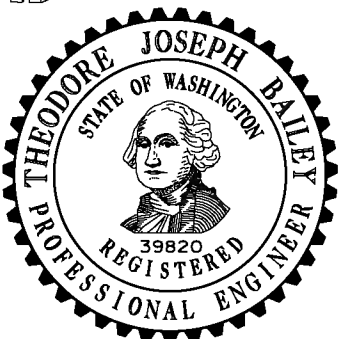
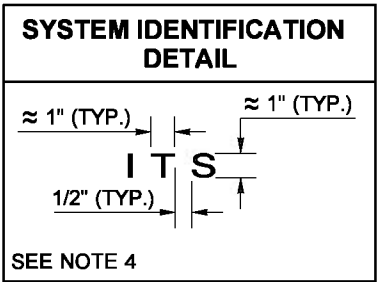


- ## NOTES

1. Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be moved and the abandoned hole filled with grout conforming to **Standard Specification 6-02.3(20)**.
2. Mount the stainless steel support using an approved resin-bonded anchor system, installed per manufacturer's recommendation. Resin-bonded anchors shall be stainless steel and shall be of 3/8" diameter (Expansion Anchors are not allowed). Anchor bolt embedment shall be 4 1/2" min.
3. There shall be a minimum of 3" edge distance to the centerline of anchor holes in concrete. See **Standard Plan J-60.13** for Stainless Steel Channel details.
4. The System Identification letters on the box lid shall be 1/8" line thickness formed by engraving, stamping, or with a stainless steel weld bead. See System Identification Detail and **Standard Specifications 9-29.2(4)**.
5. Junction Box shall be dimensioned as shown in the Contract. If the conduit sizes shown in the Contract are changed, the box dimensions shall be revised in accordance with **NEC 314.28** using the 8 times multiplier for length and width dimensions.
6. Fittings shall be UL listed and CSA-certified watertight on the outside of the Junction Box conduit connection. An insulated grounded end bushing shall be used to terminate Rigid Metal Conduit.
7. Equipment Bonding Jumper shall be # 8 AWG (min.) × 1 foot of tinned, braided copper.
8. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with welded seam construction and # 4 finish. Mounting Flange shall also be 12-gage, Type 304 stainless steel.



- ① Equipment Grounding Conductor
- ② Copper Solderless Crimp Connector
- ③ Equipment Bonding Jumper ~ See note 7
- ④ Equipment Bonding Jumper shall be a continuous conductor. Route to each grounded end bushing and then terminate at equipment grounding conductor.
- ⑤ See Contract for conduit size and number



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**FRONT ENTRY  
NEMA 4X SURFACE-MOUNT  
JUNCTION BOX  
STANDARD PLAN J-40.39-00**

**SHEET 1 OF 1 SHEET**

APPROVED FOR PUBLICATION

***Pasco Bakotich III***

STATE DESIGN ENGINEER

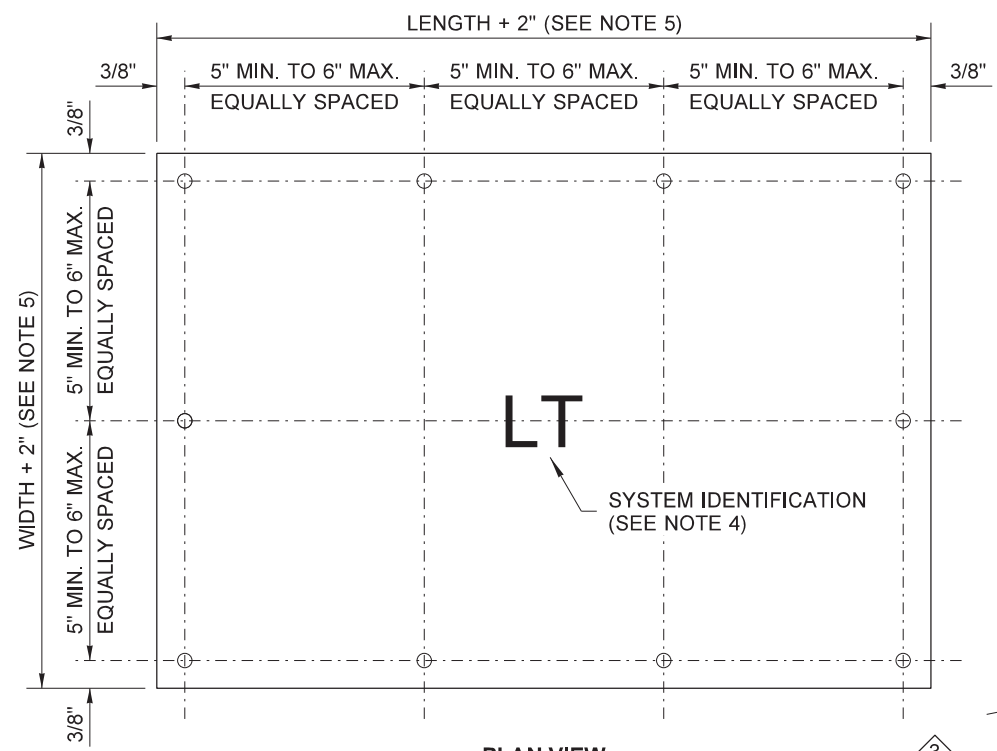
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DATE \_\_\_\_\_

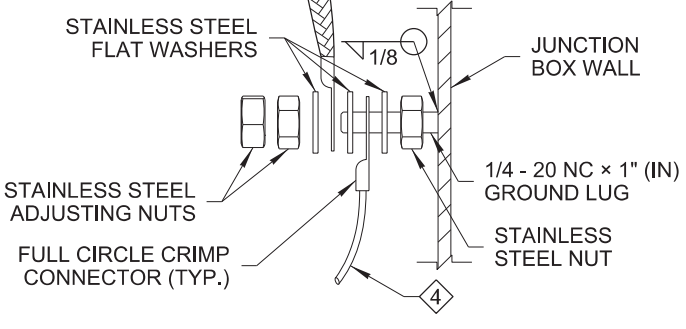
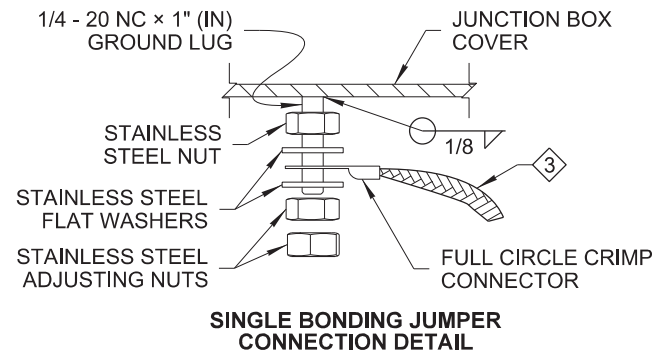


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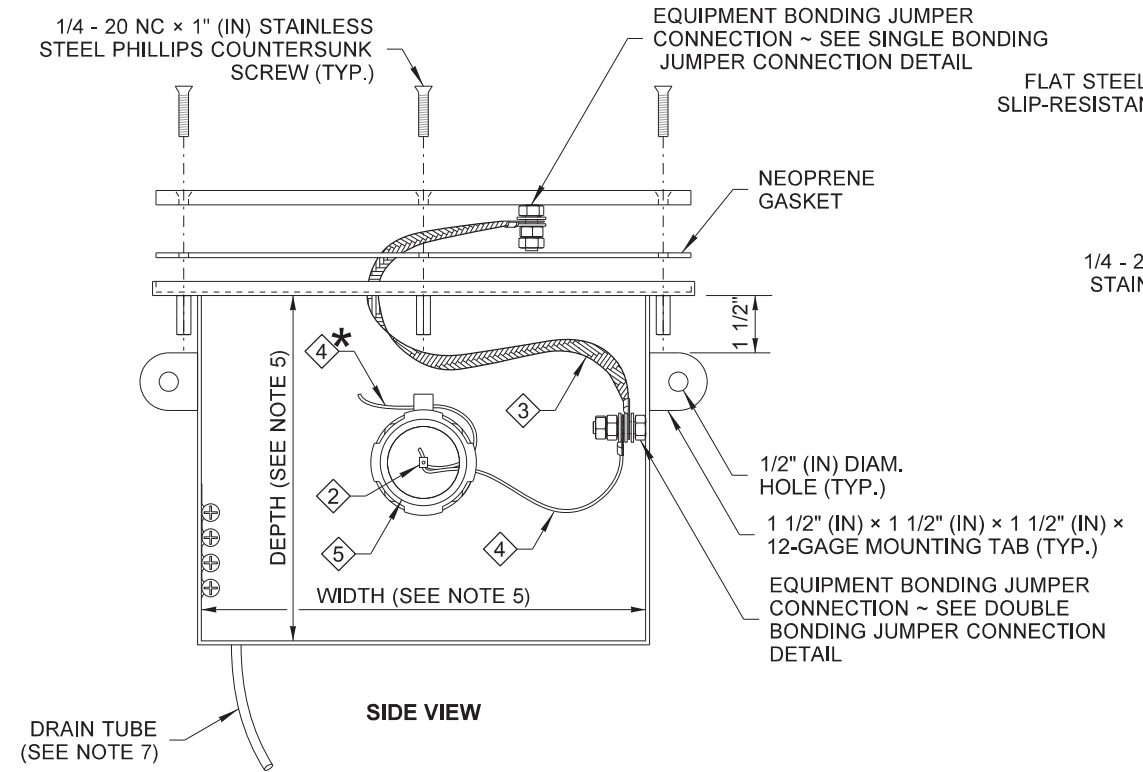
DRAWN BY: LISA CYFORD



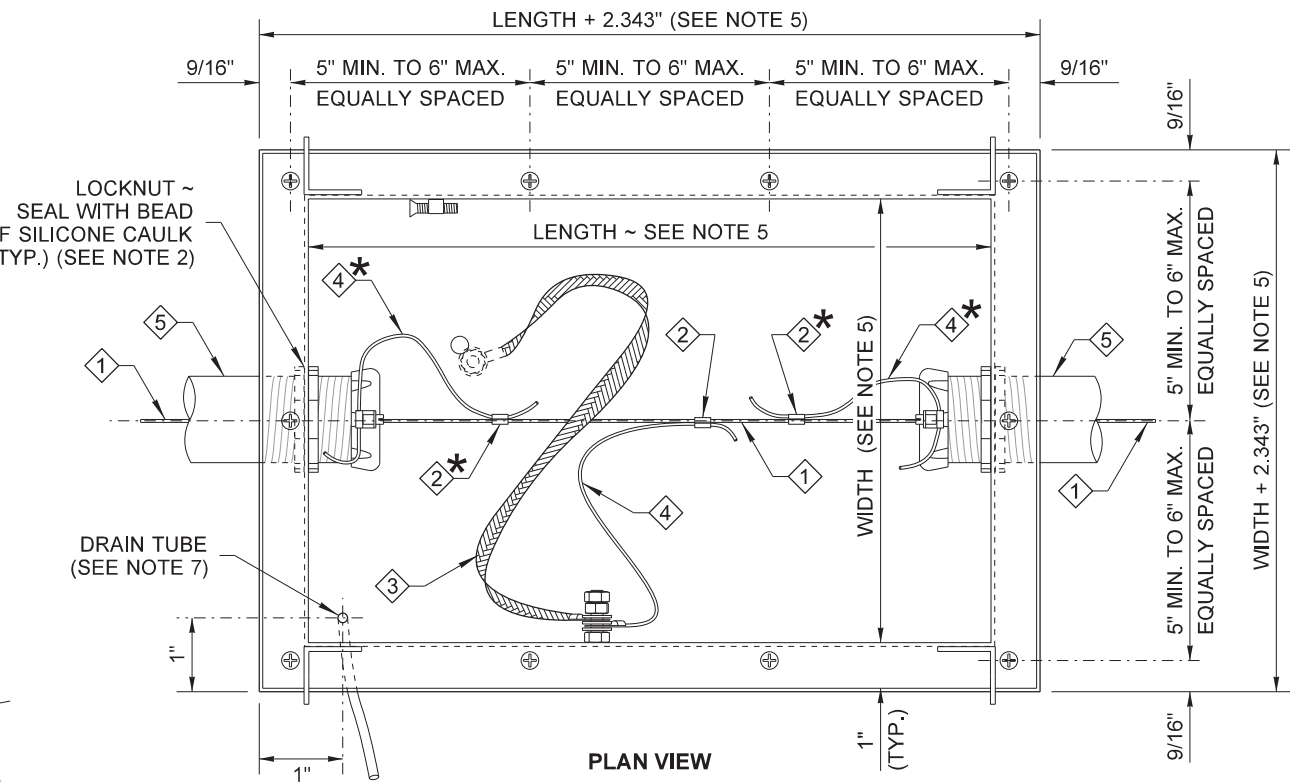
PLAN VIEW  
JUNCTION BOX COVER



DOUBLE BONDING JUMPER  
CONNECTION DETAIL



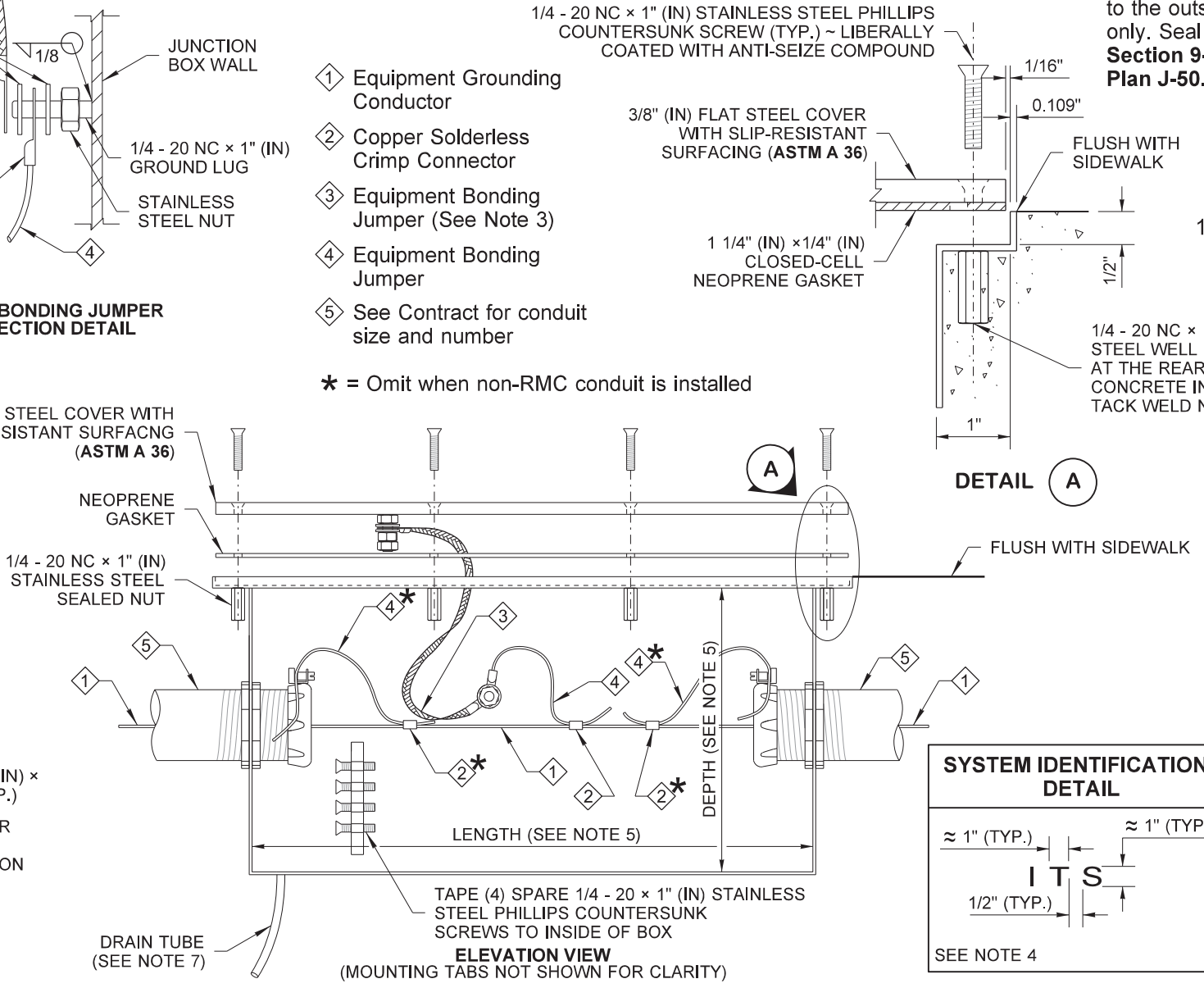
SIDE VIEW



PLAN VIEW

- ① Equipment Grounding Conductor
- ② Copper Solderless Crimp Connector
- ③ Equipment Bonding Jumper (See Note 3)
- ④ Equipment Bonding Jumper
- ⑤ See Contract for conduit size and number

\* = Omit when non-RMC conduit is installed



ELEVATION VIEW  
(MOUNTING TABS NOT SHOWN FOR CLARITY)

1/4 - 20 NC x 1" (IN) STAINLESS STEEL PHILLIPS COUNTERSUNK SCREW (TYP.) ~ LIBERALLY COATED WITH ANTI-SEIZE COMPOUND

3/8" (IN) FLAT STEEL COVER WITH SLIP-RESISTANT SURFACING (ASTM A 36)

1 1/4" (IN) x 1/4" (IN) CLOSED-CELL NEOPRENE GASKET

DETAIL A

1/4 - 20 NC x 1" (IN) STAINLESS STEEL WELL NUT WITH A DAM AT THE REAR TO PREVENT CONCRETE INFILTRATION ~ TACK WELD NUT IN (3) PLACES

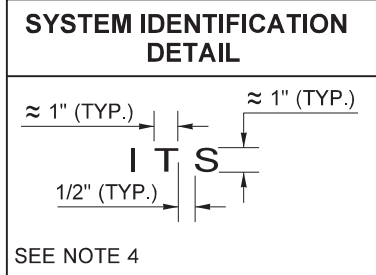
NOTES

1. Junction Box shall be constructed of 12-gage, Type 304 stainless steel with welded seam construction. Mounting Tabs shall be constructed of 12-gage, Type 304 stainless steel. Cover shall be constructed of **ASTM A 36** steel with slip-resistant surfacing.
2. Fittings shall be UL listed and CSA-certified concrete tight on the outside of the Junction Box connection. Use an insulated, grounding end bushing on the inside for Rigid Metal Conduit.
3. Equipment Bonding Jumper shall be # 8 AWG (min.) x 3 feet minimum of tinned, braided copper.
4. The System Identification letters shall be 1/8" (in) line thickness formed by a mild steel weld bead. See **Standard Specification, Section 9-29.2(4)**.
5. Junction Box shall be dimensioned as shown in the Contract. If the conduit sizes shown in the Contract are changed, the box dimensions shall be revised in accordance with **NEC 314.28** using the 8 times multiplier for length and width dimension.
  - Maximum Height = Sidewalk Depth
  - Maximum Interior Length = 29" (in)
  - Maximum Interior Width = 18" (in)
6. See **Standard Plan J-40.36** for additional requirements.
7. Field drill 1/2" (in) diameter hole for Drain Tube from the inside to the outside of Junction Box. One place, on the lowest side only. Seal with bead of silicone. See **Standard Specification, Section 9-29.2(3)**. For drain tube routing, see **Standard Plan J-50.16**.
8. Conduit capacity is 12" (in) ~ 4" (in) per side.
9. Conduits shall enter through the sides as shown. Conduits shall not enter through the bottom of Junction Box.
10. Liberally coat the threads of the cover fasteners with anti-seize compound during construction and before final closure.



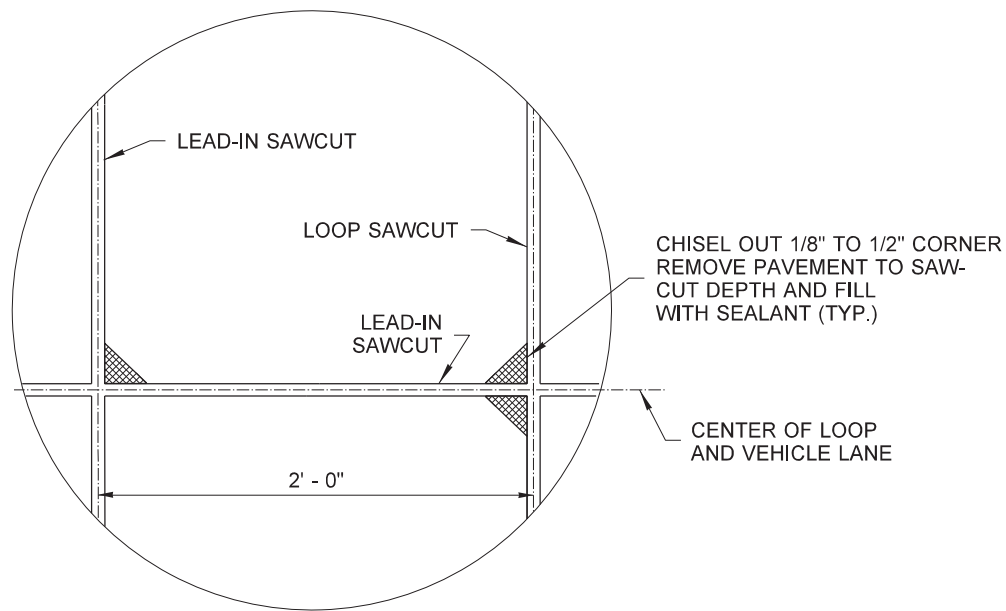
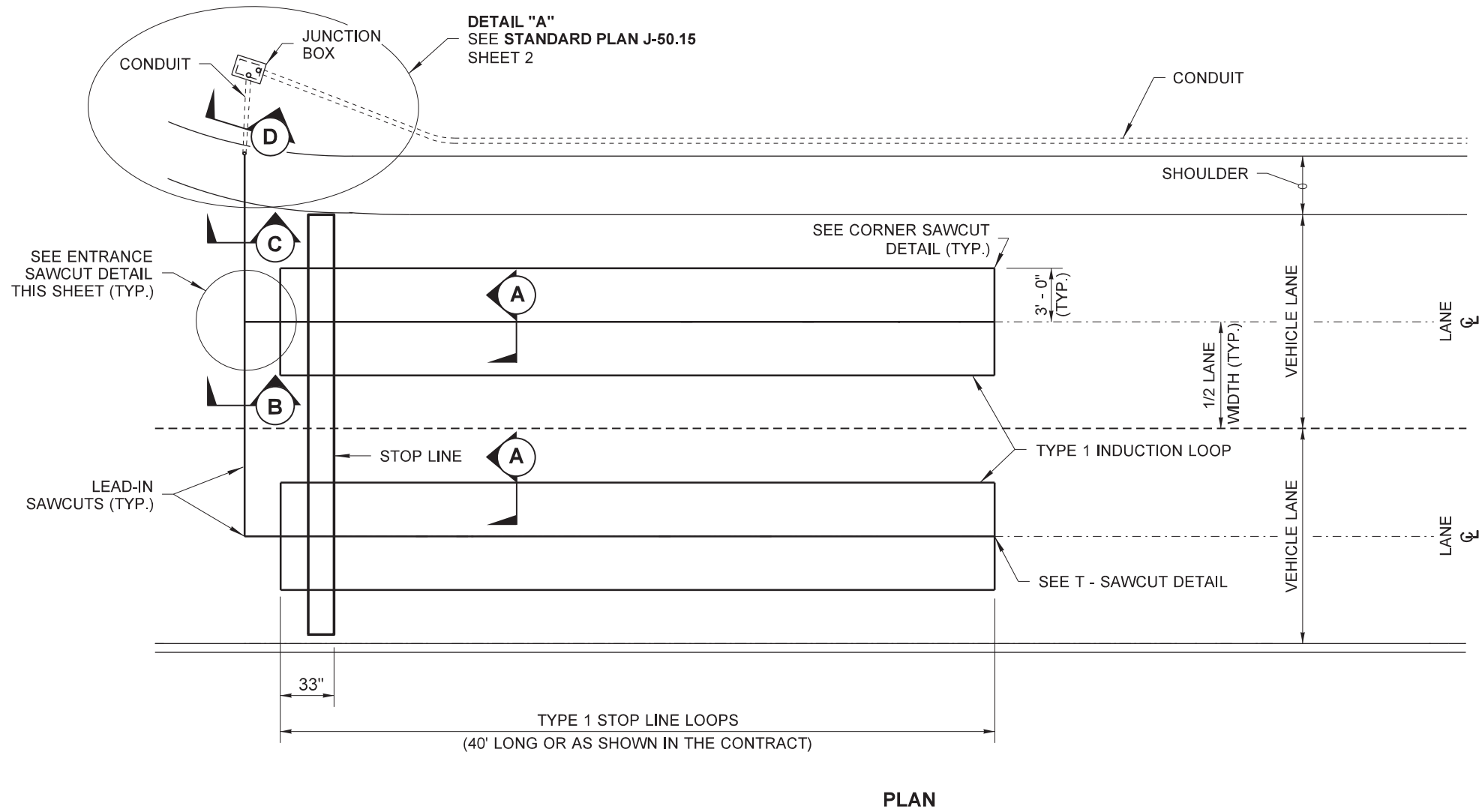
Jackson, Flint  
Jul 29 2019 2:55 PM  
**NEMA 4X JUNCTION BOX  
IN SIDEWALK LOCATED  
ON STRUCTURE**  
**STANDARD PLAN J-40.40-02**  
SHEET 1 OF 1 SHEET

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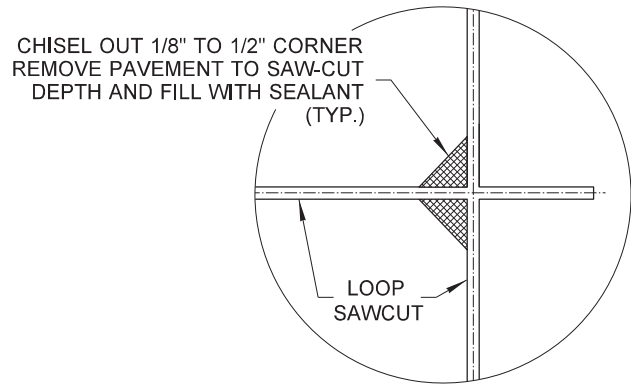


NOTES

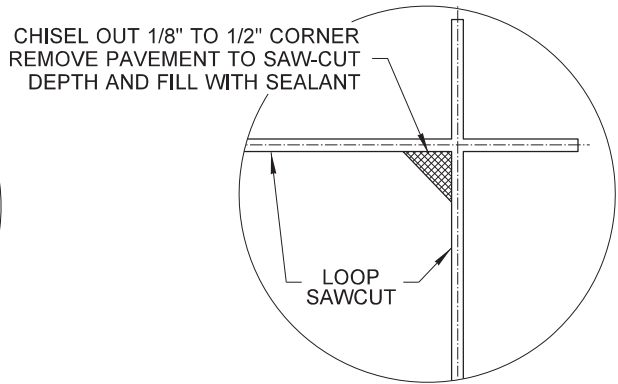
- 1. For Installation Notes and Details see **Standard Plan J-50.15**.
- 2. For **Sections A, B, C, and D**, see **Standard Plan J-50.15**.
- 3. For wiring details, see **Standard Plan J-50.18**



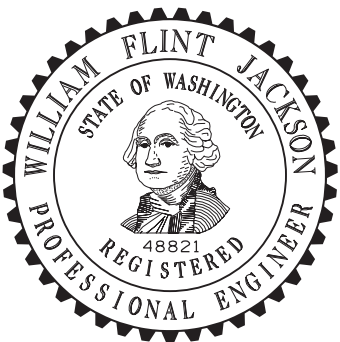
ENTRANCE SAWCUT DETAIL



T - SAWCUT DETAIL



CORNER SAWCUT DETAIL



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**TYPE 1 INDUCTION LOOP**

**STANDARD PLAN J-50.10-01**

SHEET 1 OF 1 SHEET

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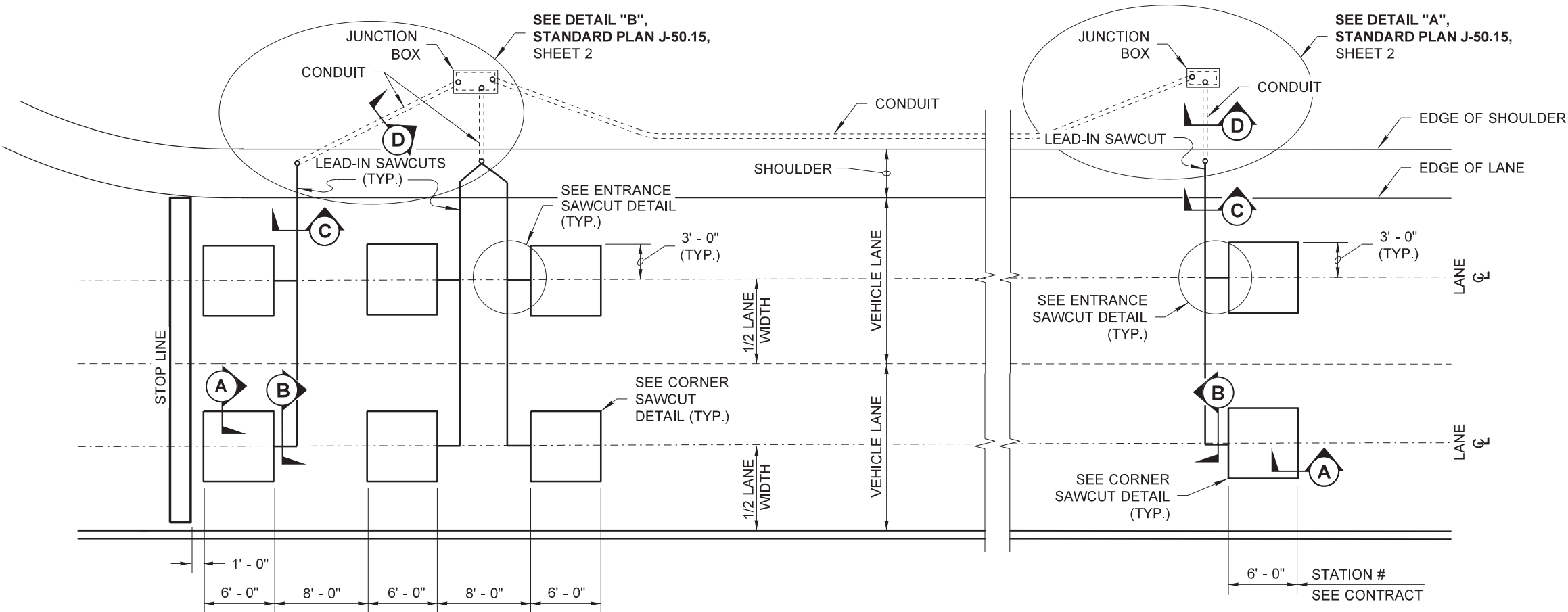
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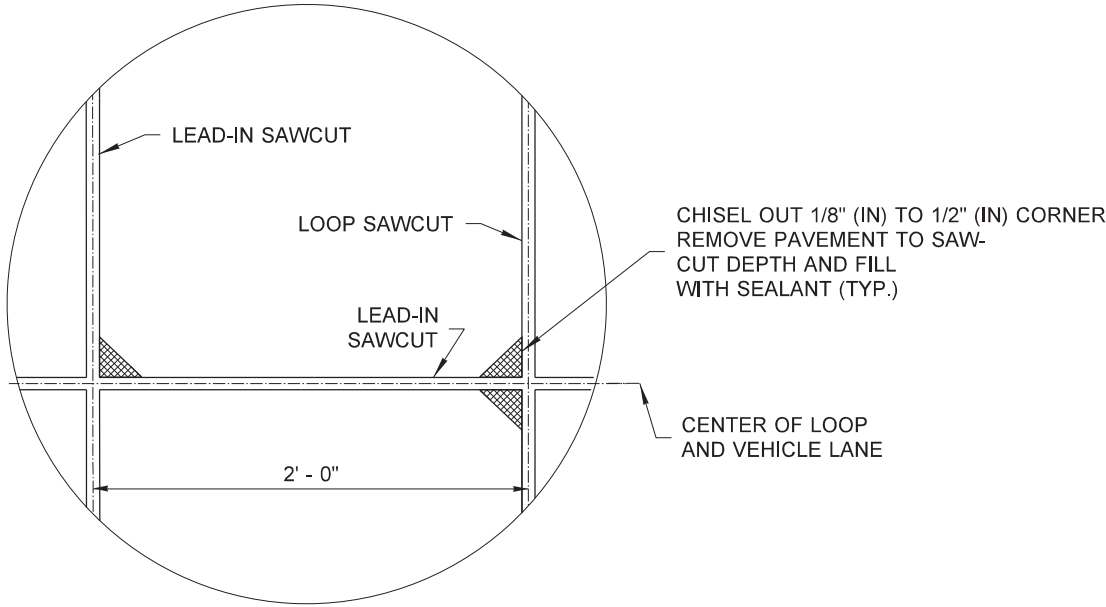
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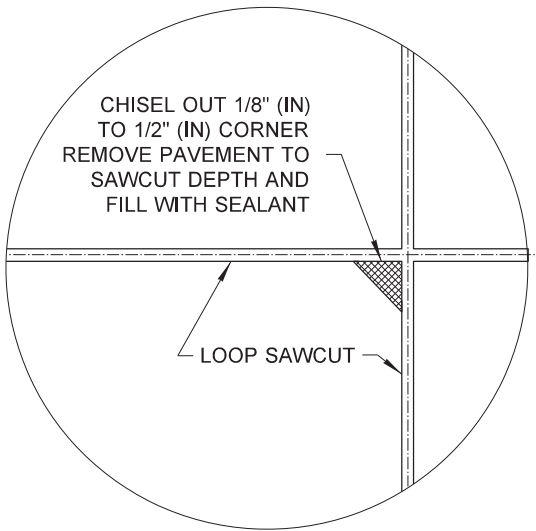
TYPE 2S (STOP LINE) LOOP ARRAY

TYPE 2A (ADVANCE) LOOPS

PLAN



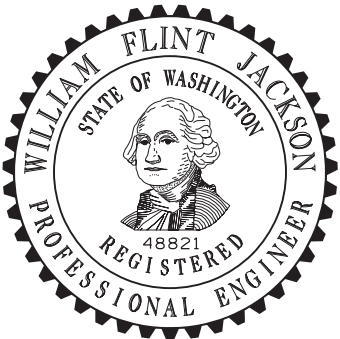
ENTRANCE SAWCUT DETAIL



CORNER SAWCUT DETAIL

NOTES

1. For Installation Notes and Details see **Standard Plan J-50.15**.
2. For **Sections A, B, C, and D**, see **Standard Plan J-50.15**.
3. All of the loop lead-in wires shall return to the Junction Box.
4. For additional Induction Loop details, see **Standard Plan J-50.15**.
5. For wiring details, see **Standard Plan J-50.18**.



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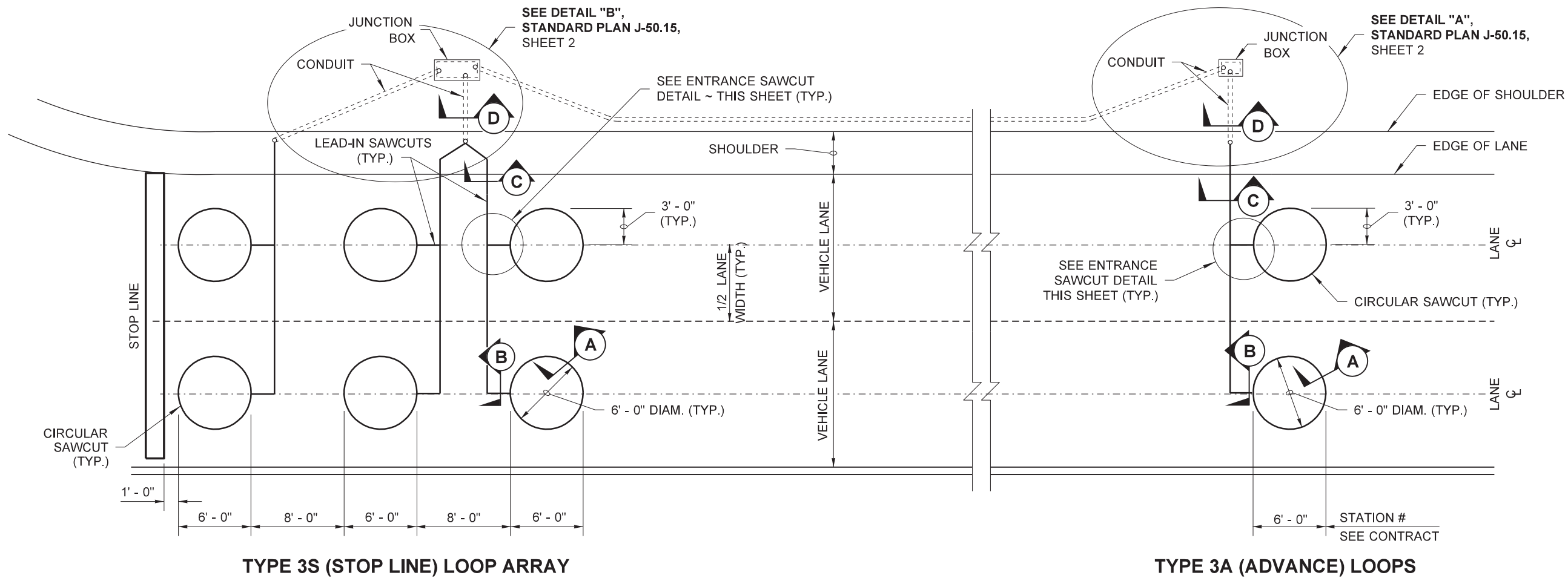
TYPE 2 INDUCTION LOOP

STANDARD PLAN J-50.11-02

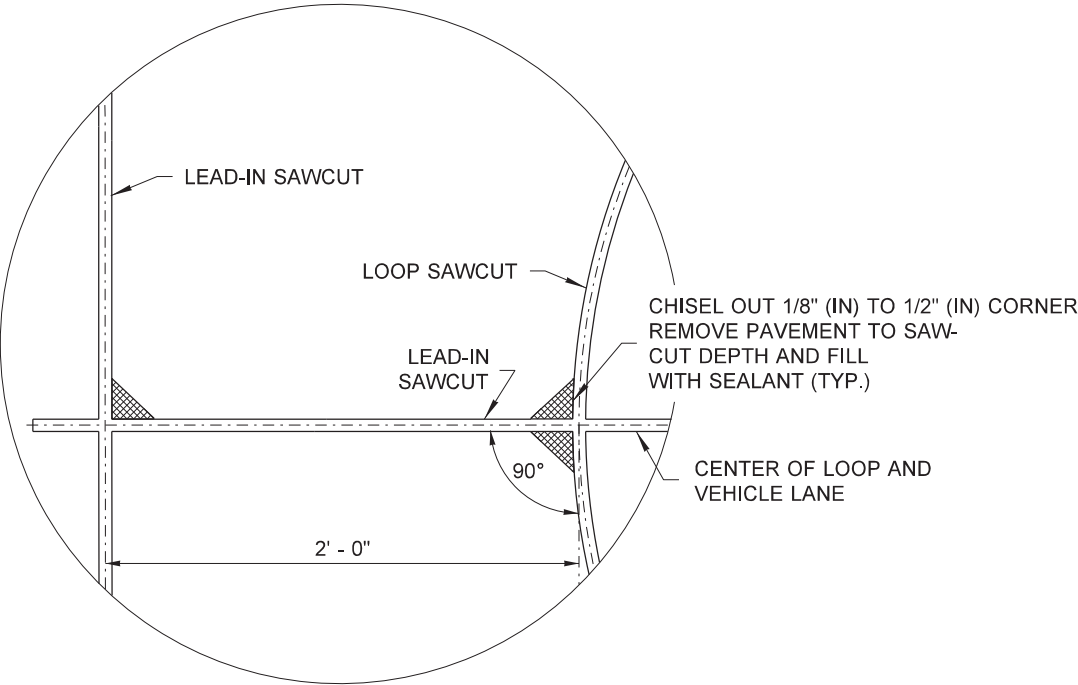
SHEET 1 OF 1 SHEET

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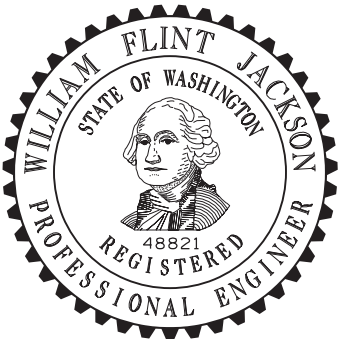


PLAN



NOTES

- 1 For Installation Notes and Details see **Standard Plan J-50.15**.
2. For **Sections A, B, C, and D**, see **Standard Plan J-50.15**.
3. All of the loop lead-in wires shall return to the Junction Box
4. For additional Induction Loop Details, see **Standard Plan J-50.15**.



Jackson, Flint  
Jul 31 2019 4:13 PM

**TYPE 3 INDUCTION LOOP**

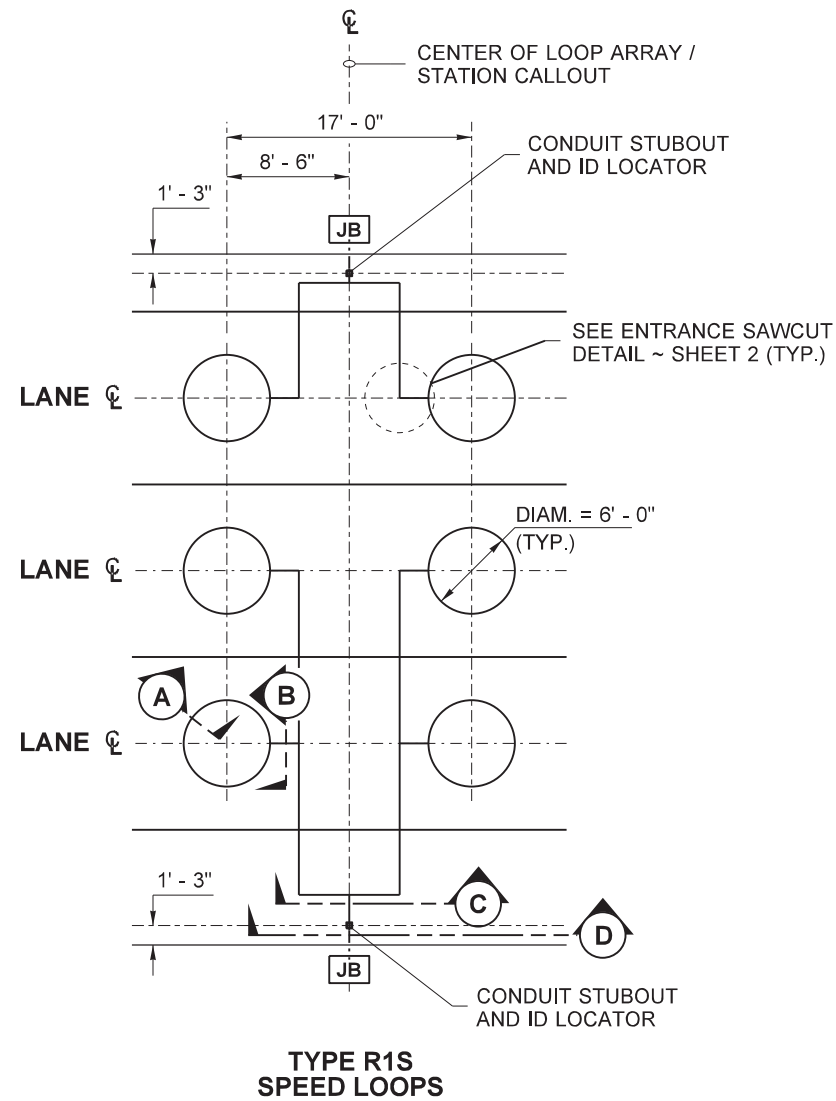
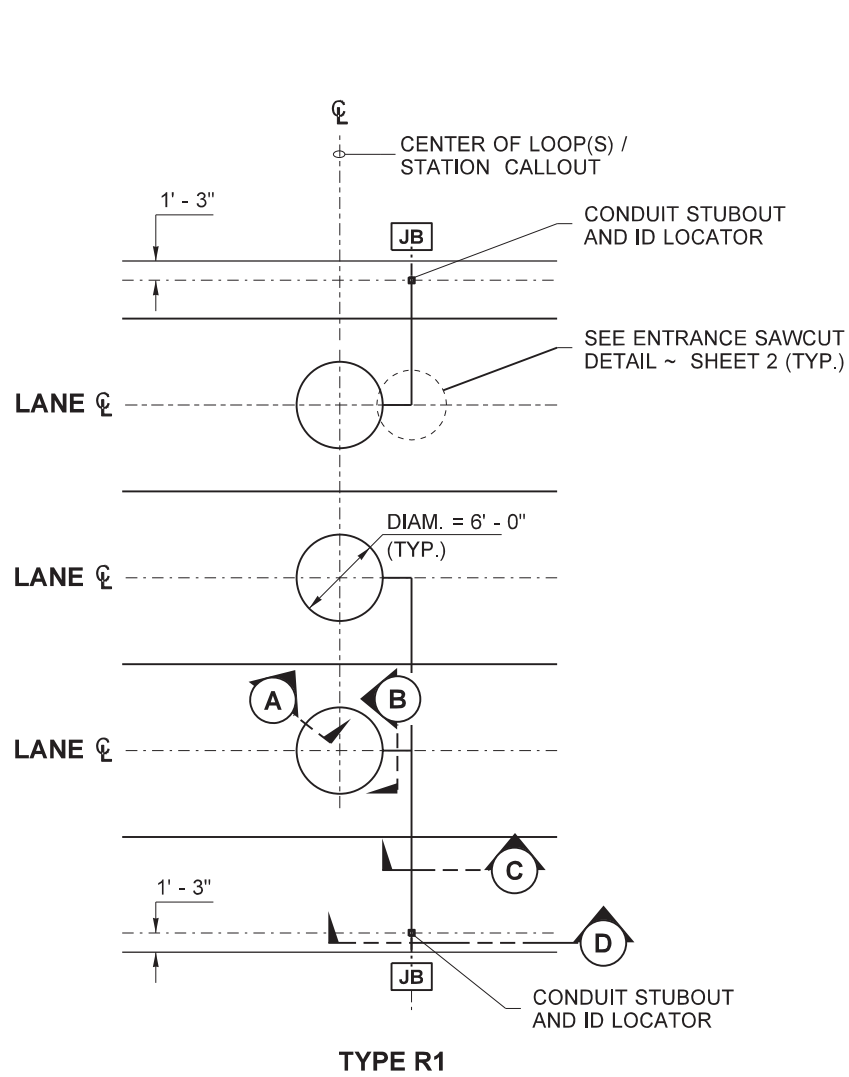
**STANDARD PLAN J-50.12-02**

SHEET 1 OF 1 SHEET

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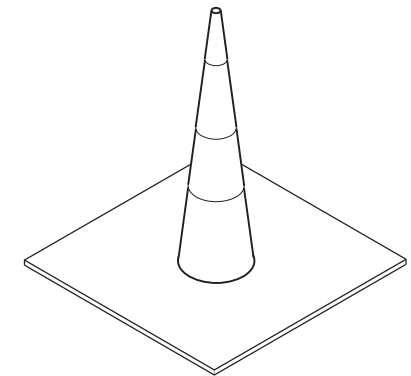
STATE DESIGN ENGINEER

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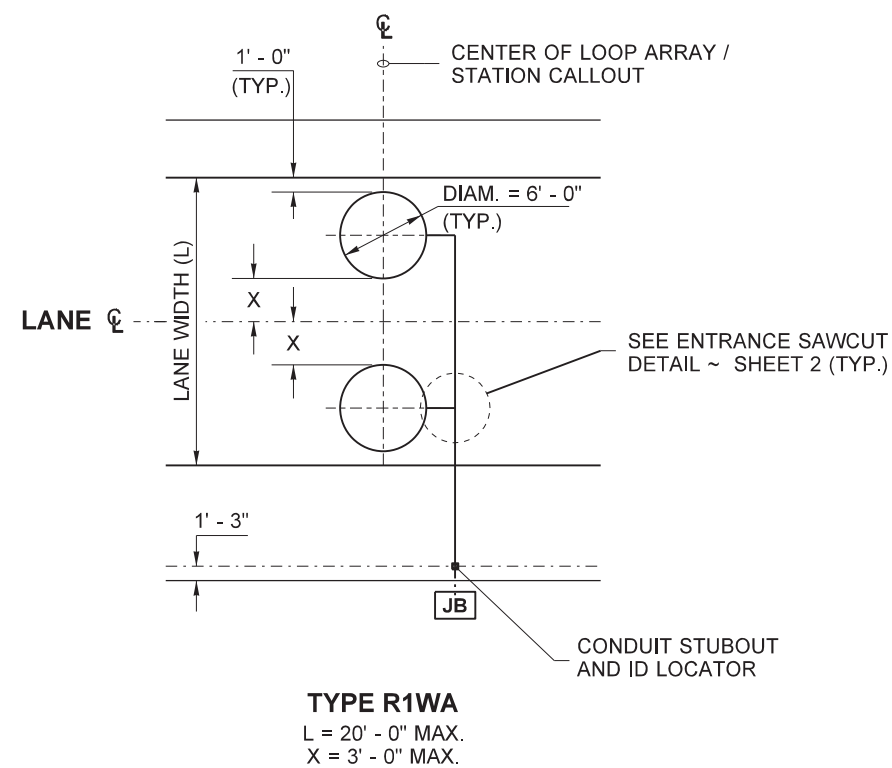
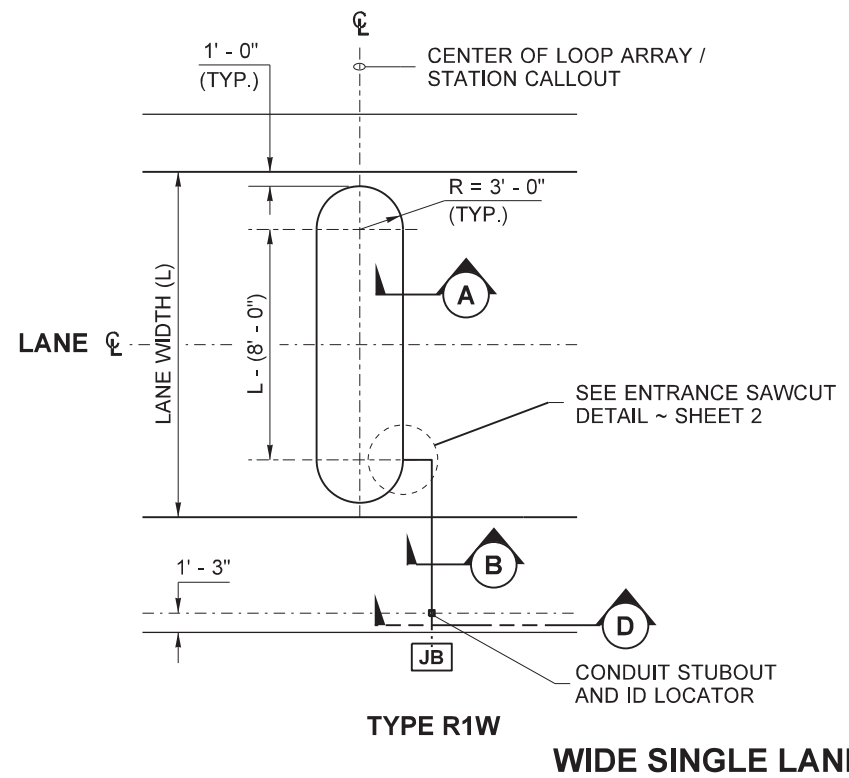


## NOTES

1. For an odd number of lanes, the higher number of loops shall be cut to the right side of the roadway (example: 1 left and 2 right), unless the left-most lane is an HOV lane, in which case the higher number of loops shall be cut to the left side of the roadway.
2. Square loops may be used in place of round loops - see **Standard Plan J-50.11** for square saw cut details.
3. For installation Notes and Details, see **Standard Plan J-50.15**.
4. For Sections A, B, C or D, see **Standard Plan J-50.15**.



**RUBBER LOOP ID LOCATER**  
3.5" SQUARE X 4" TALL



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## METERING AND DATA INDUCTION LOOPS

### STANDARD PLAN J-50.13-00

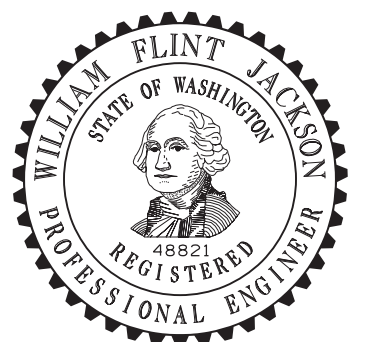
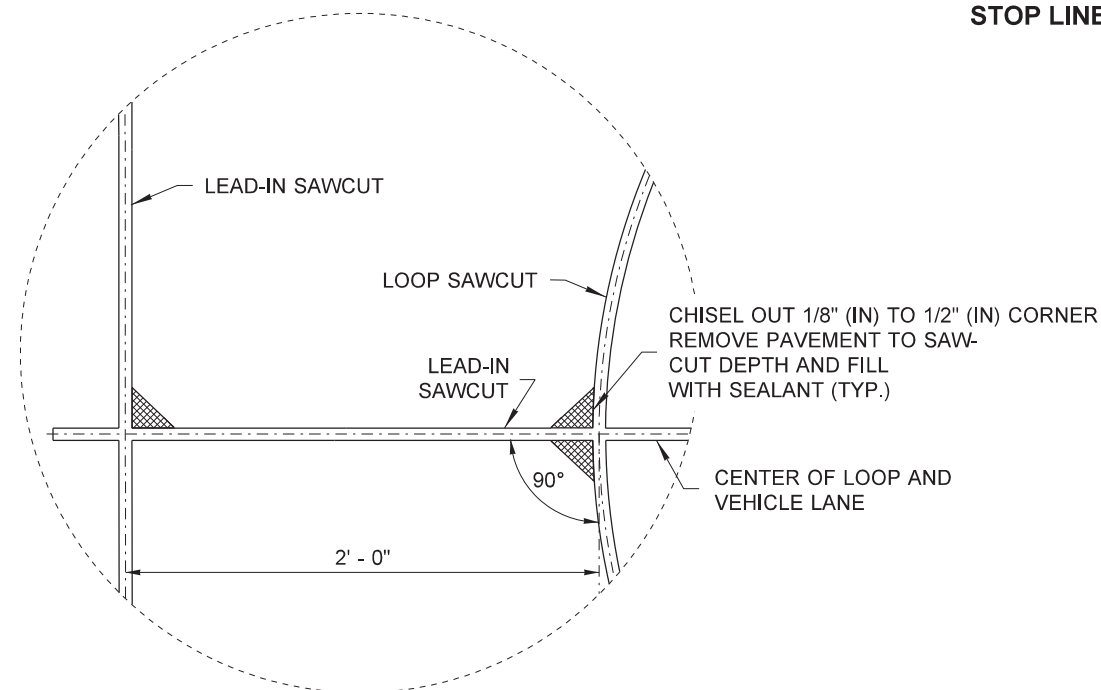
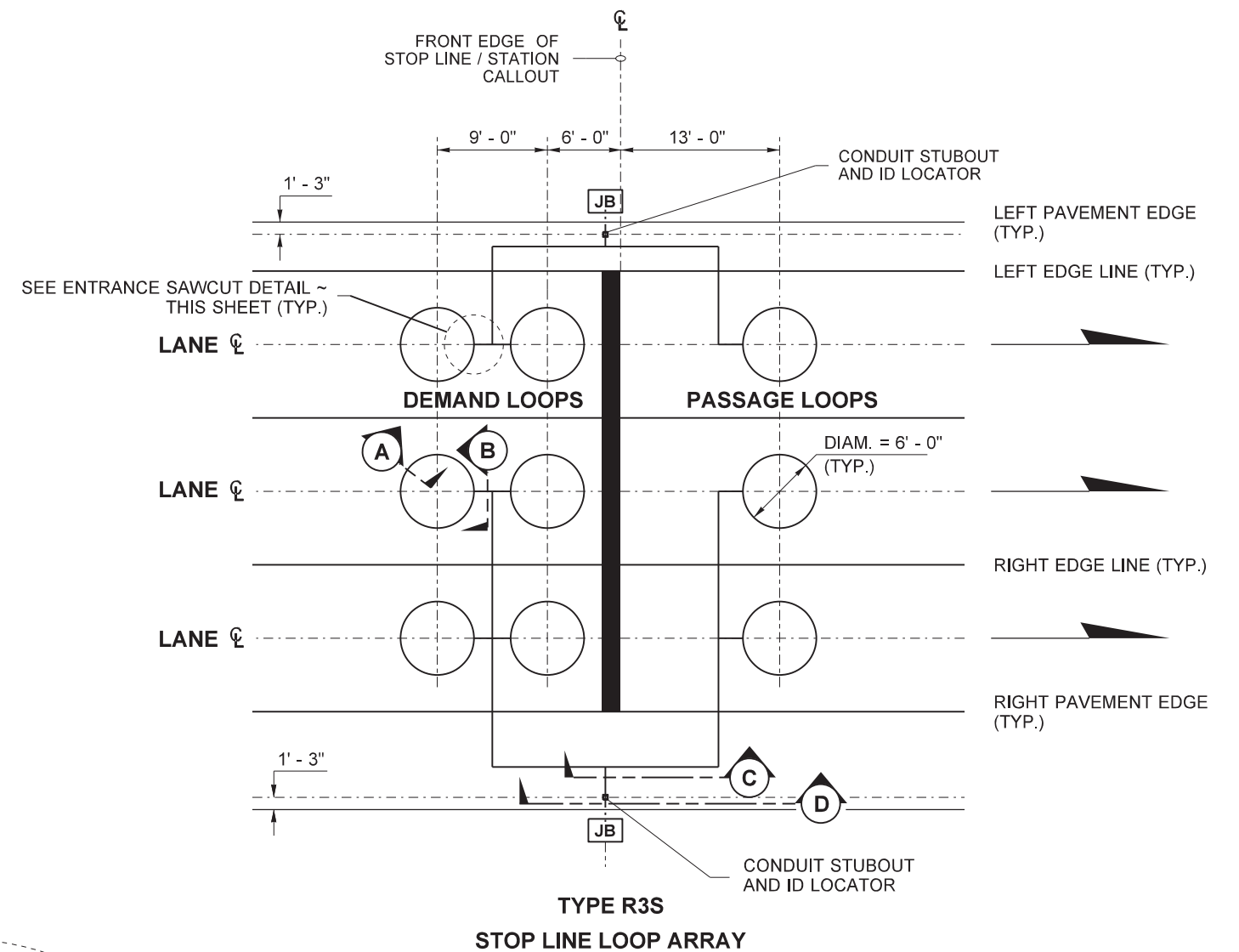
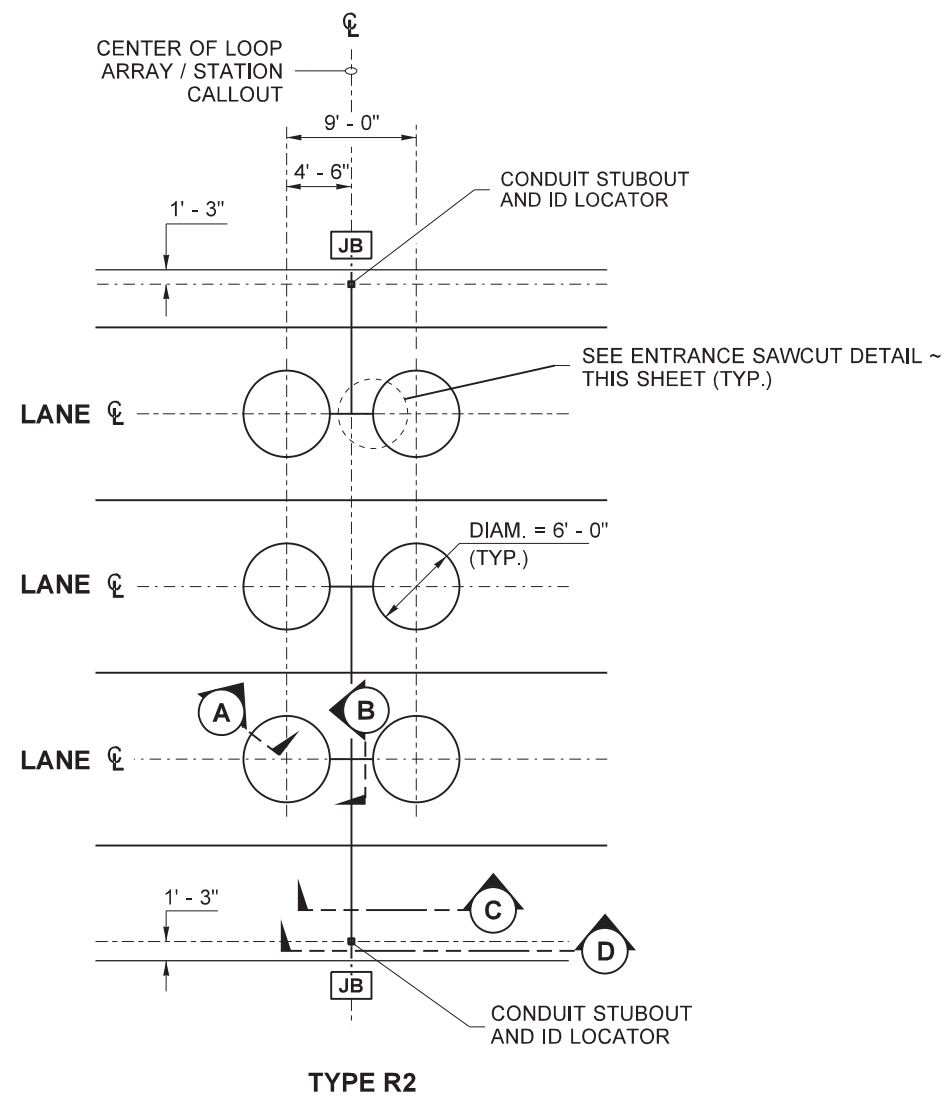
SHEET 1 OF 2 SHEETS

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Jackson, Flint  
Aug 21 2019 9:47 AM

## METERING AND DATA INDUCTION LOOPS

### STANDARD PLAN J-50.13-00

SHEET 2 OF 2 SHEETS

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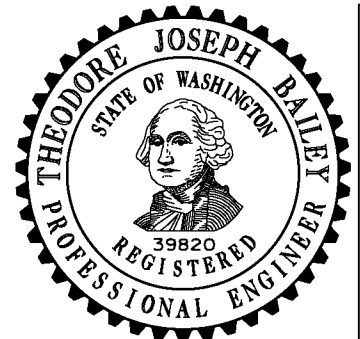
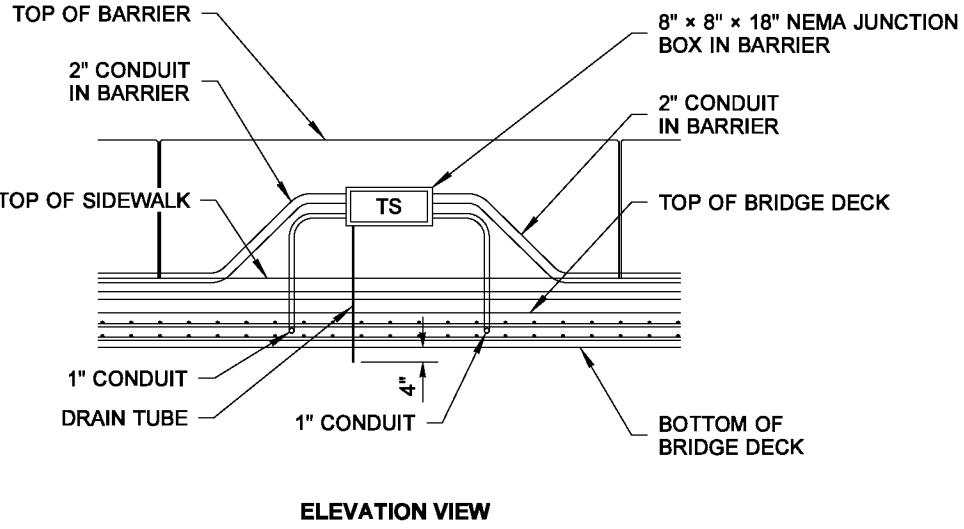
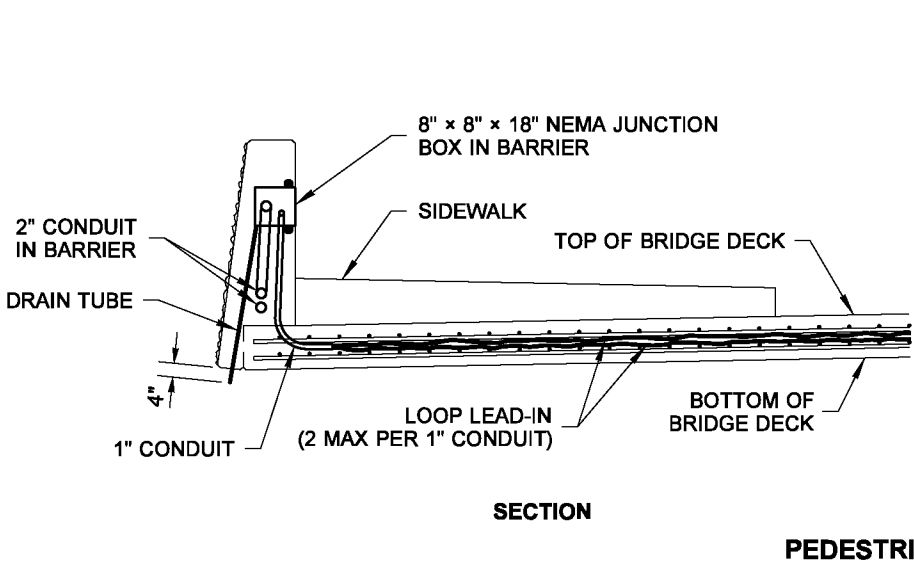
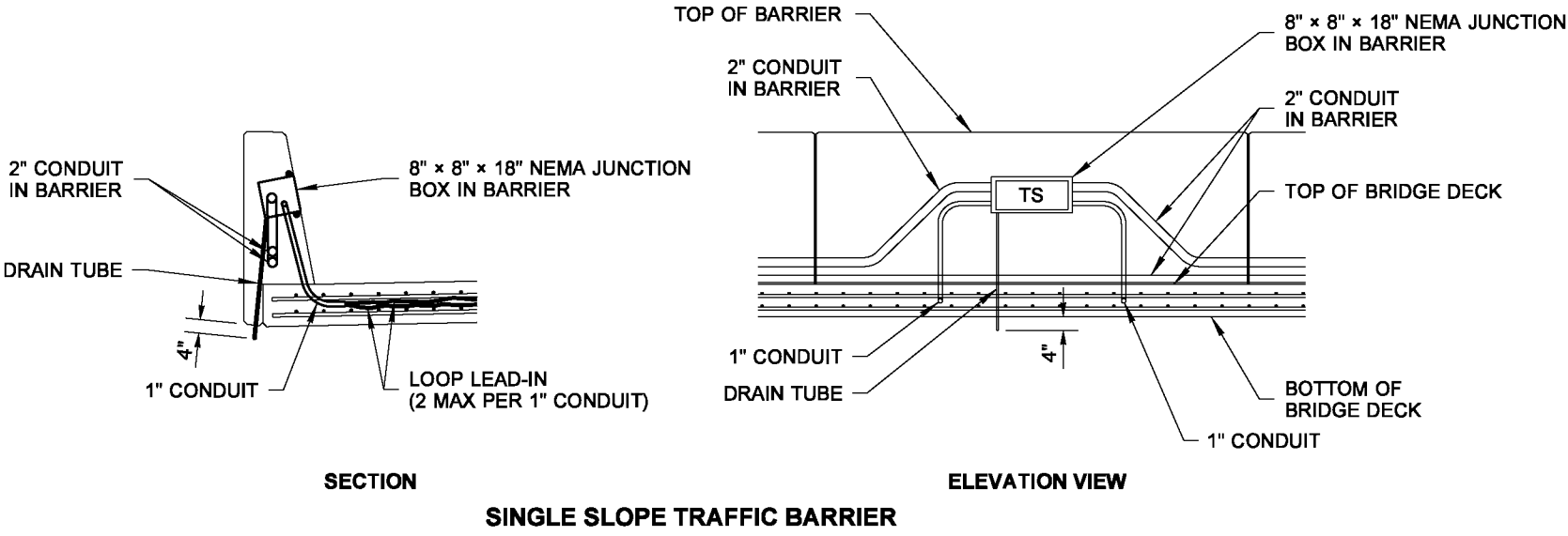
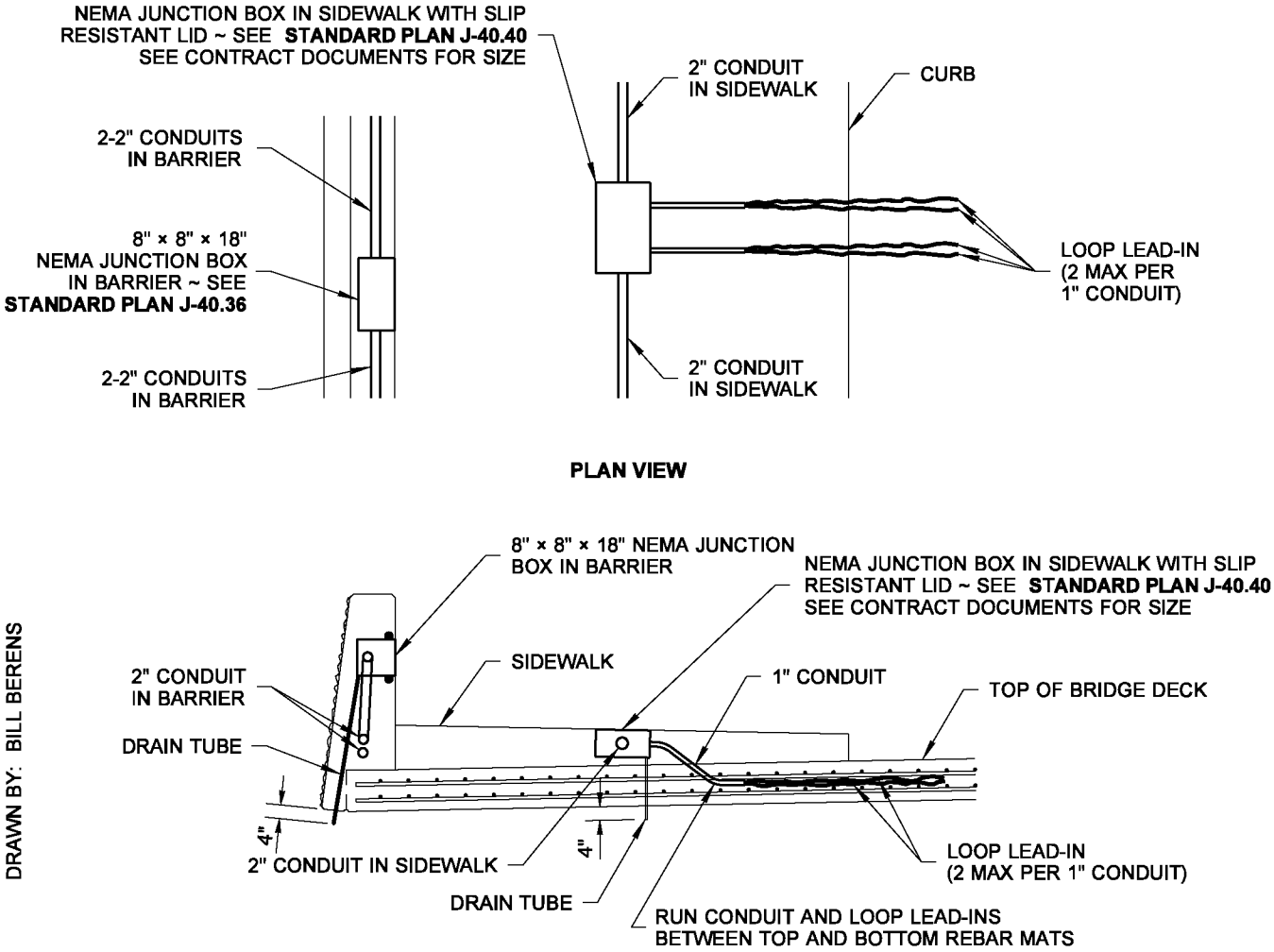
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Aug 22 2019 7:00 AM

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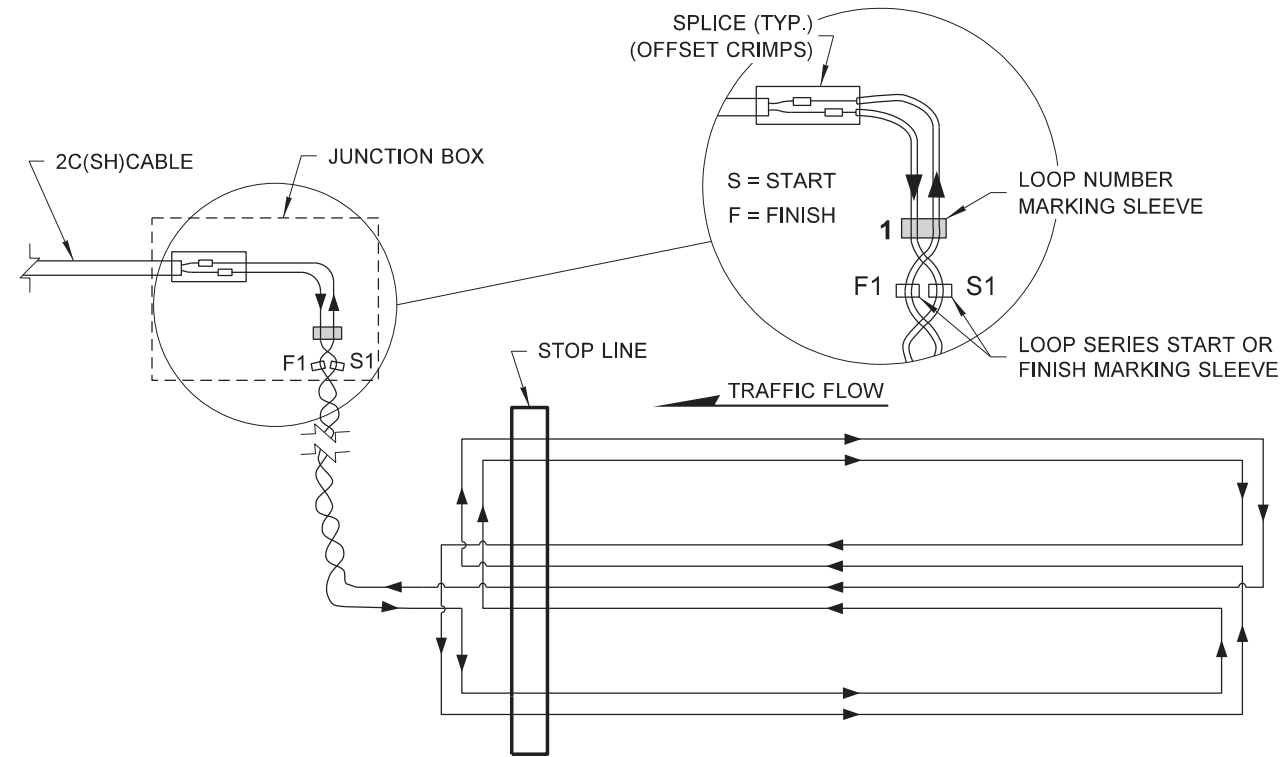
**PREFORMED LOOP  
INSTALLATION DETAILS  
FOR NEW BRIDGE DECKS  
STANDARD PLAN J-50.16-01**

SHEET 2 OF 2 SHEETS

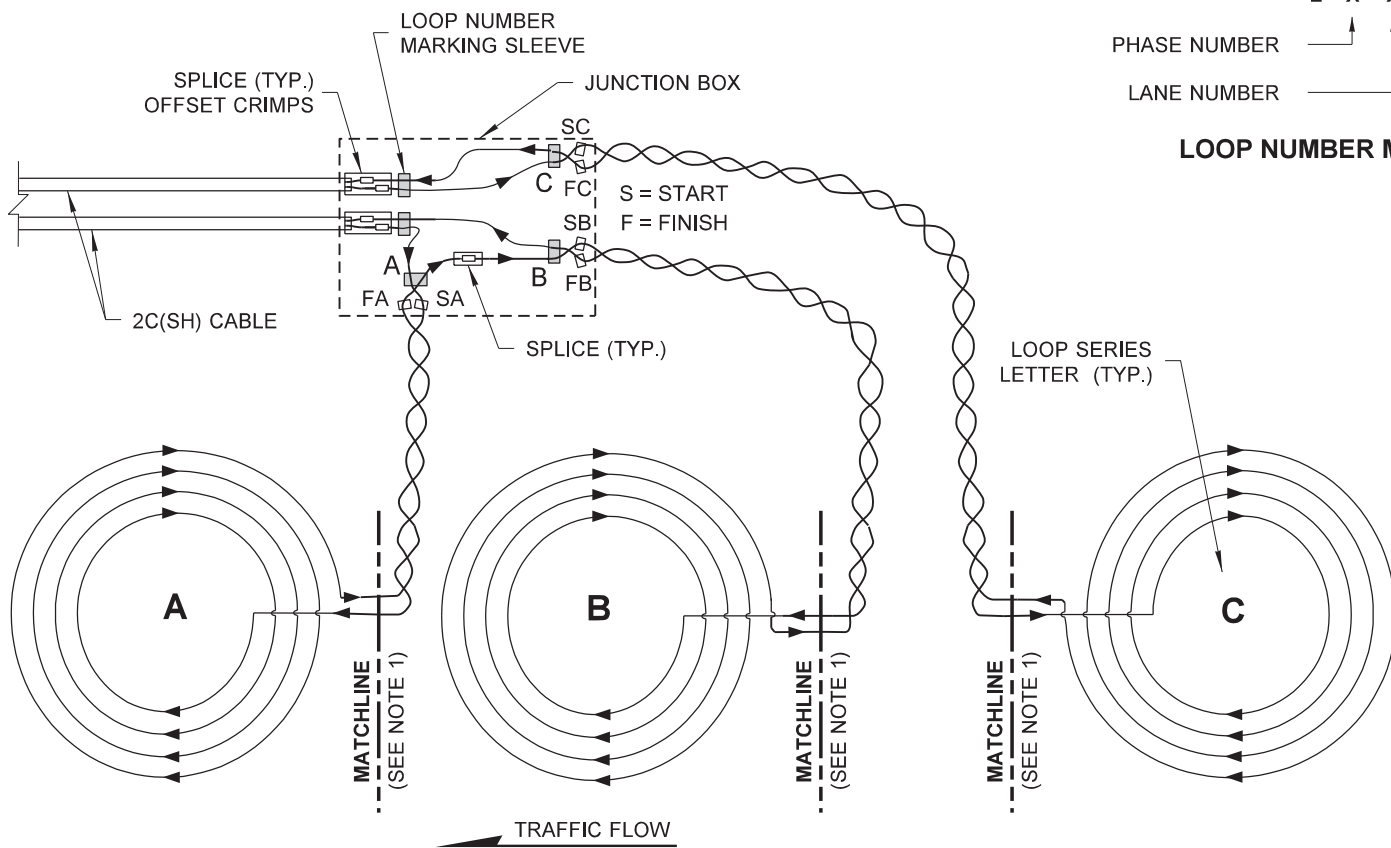
APPROVED FOR PUBLICATION

**Pasco Bakotich III** 3/22/13  
STATE DESIGN ENGINEER DATE



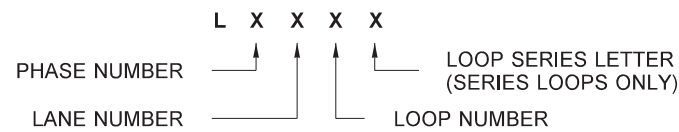


**TYPE 1 STOP LINE (QUADRAPOLE) LOOP WIRING DIAGRAM**

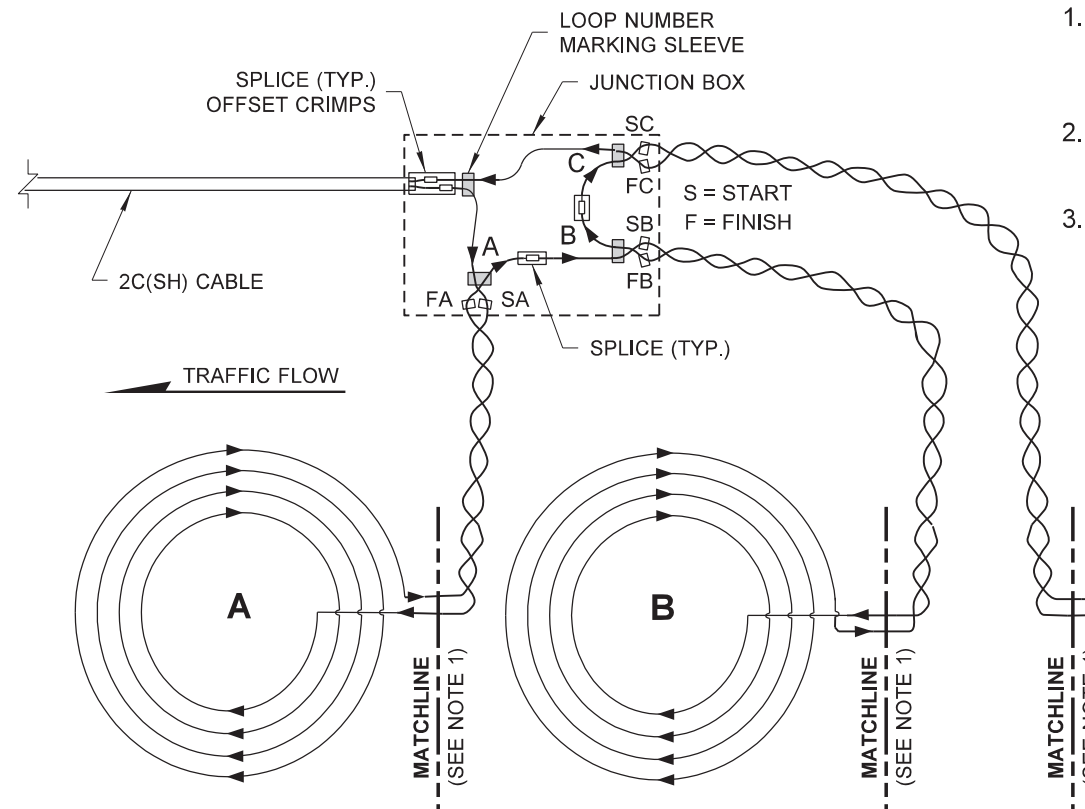


**TYPE 2S-ALT OR 3S-ALT (STOP LINE - ALTERNATE) WIRING DIAGRAM**

2-1 SERIES SPLIT SHOWN

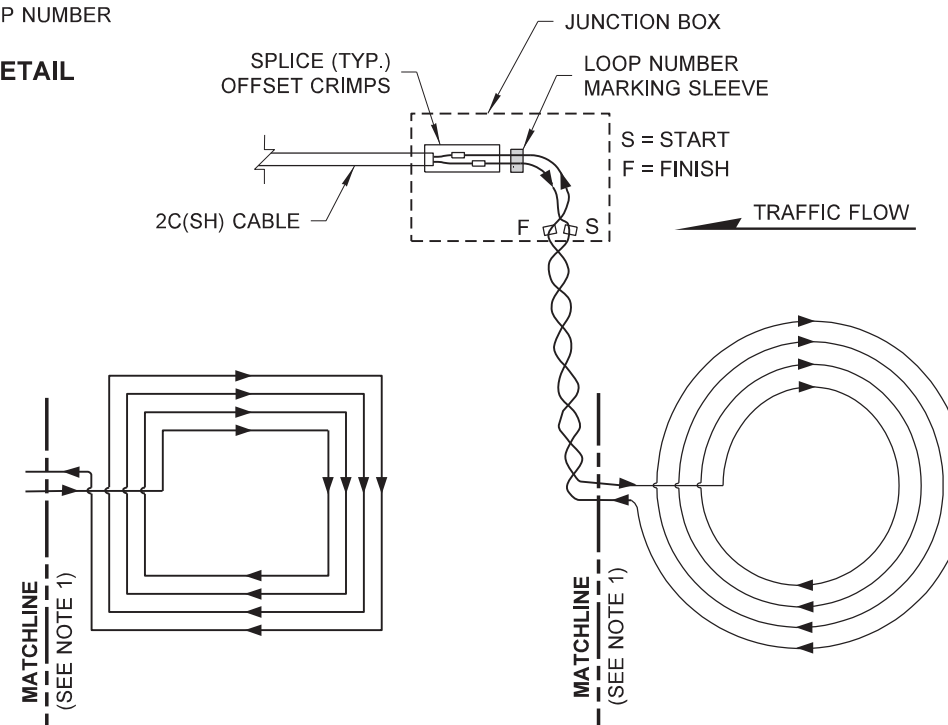


**LOOP NUMBER MARKING DETAIL**



**TYPE 2S OR 3S (STOP LINE) LOOP ARRAY WIRING DIAGRAM**

SERIES WIRING SHOWN



**SQUARE LOOP ALTERNATIVE (SEE NOTE 1)**

**TYPE 2A OR 3A (ADVANCE) LOOP WIRING DIAGRAM**

**NOTES**

1. Loops may be Round (shown) or Square (see detail). Square (Type 2) and Round (Type 3) Loop wiring is identical, with the exception of the shape of the sawcuts.
2. See **Standard Plan J-50.10, J-50.11, or J-50.12** for sawcutting details (as applicable).
3. See **Standard Plan J-50.05** for splice details.

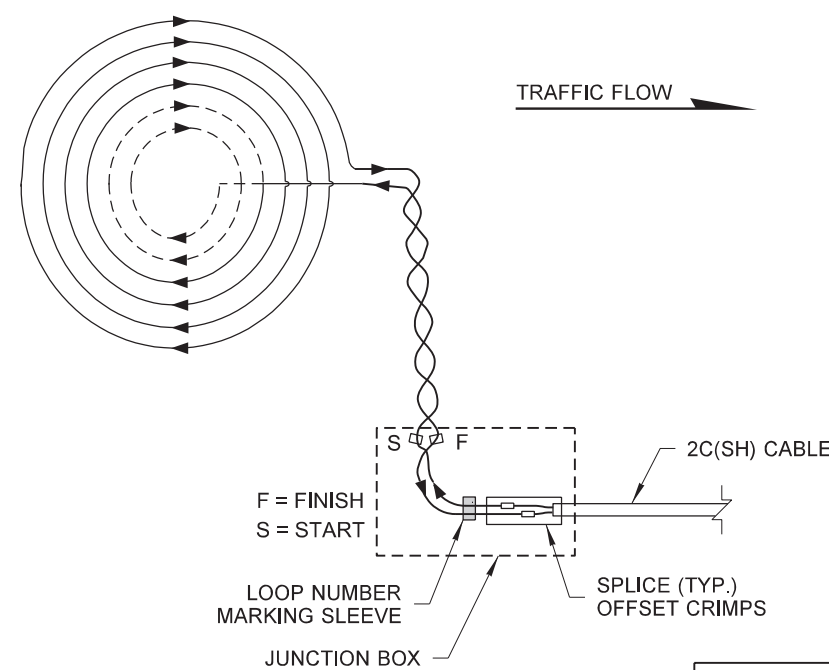


Jackson, Flint  
Jul 31 2019 4:14 PM  
**INDUCTION LOOP WIRING DETAILS**

**STANDARD PLAN J-50.18-00**

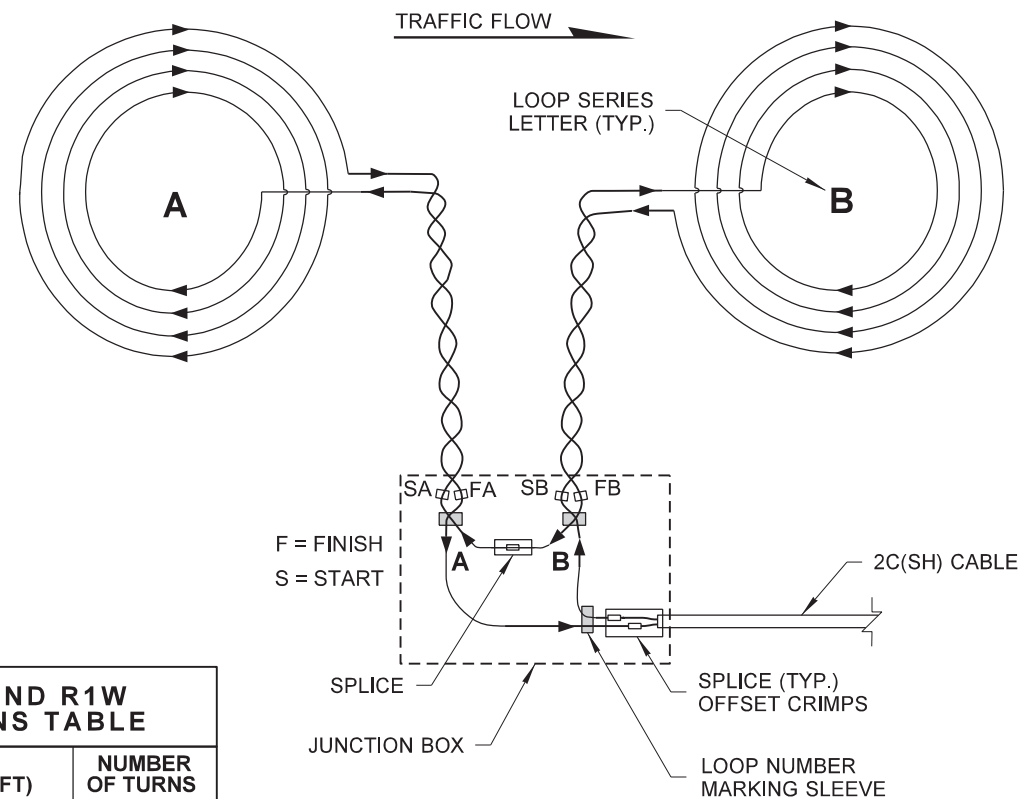
SHEET 1 OF 1 SHEET

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Washington State Department of Transportation

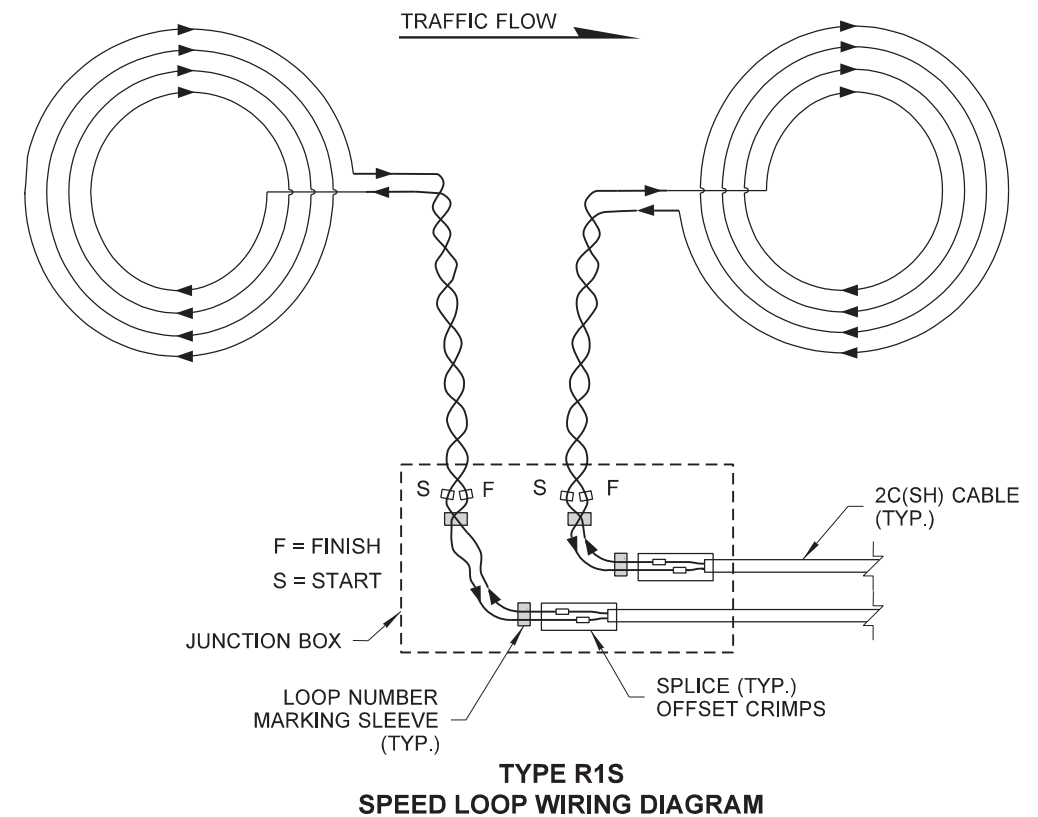


**TYPE R1 AND R1W  
LOOP WIRING DIAGRAM**

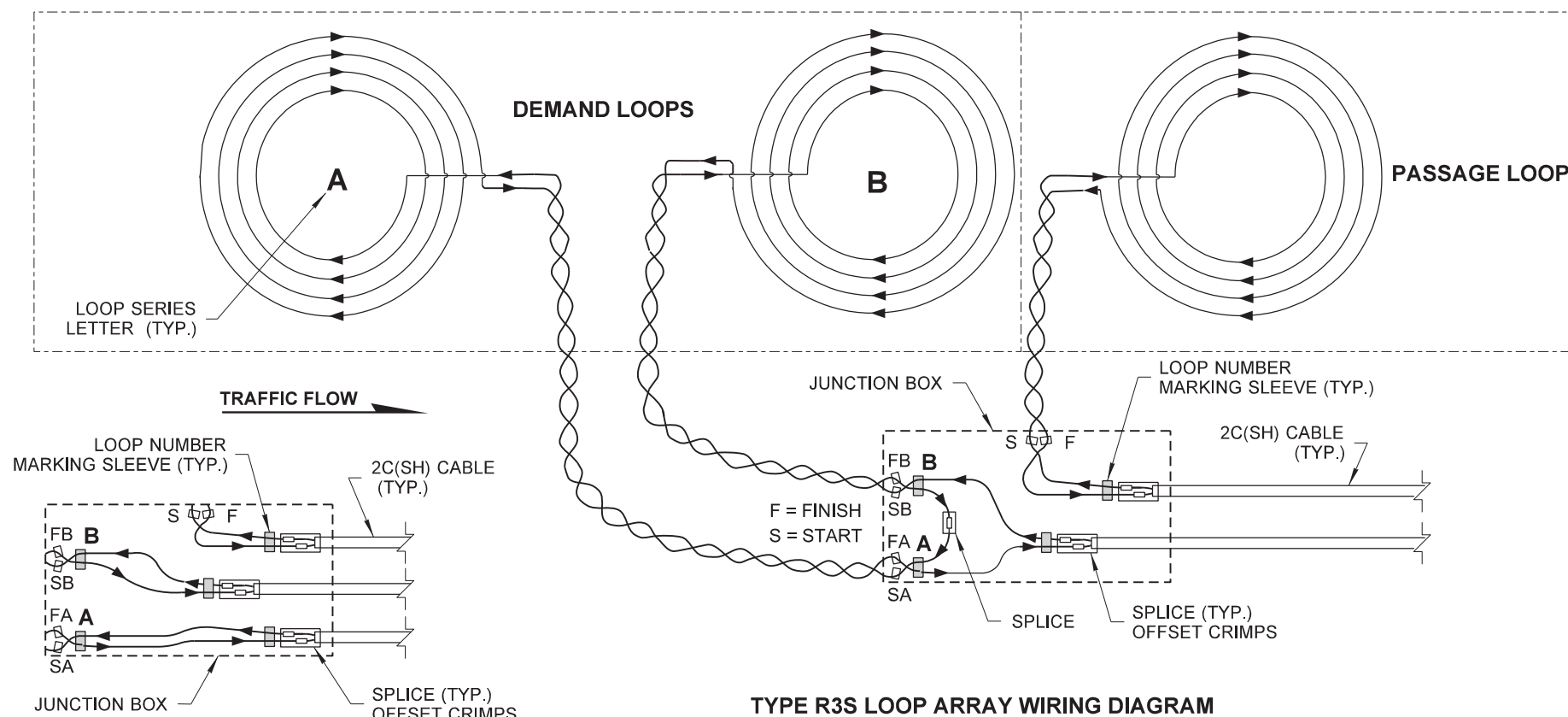
TYPE R1 AND R1W LOOP TURNS TABLE	
WIRE LENGTH CABINET TO LOOP (FT)	NUMBER OF TURNS
0 - 400	4
401 - 600	5
601 +	6



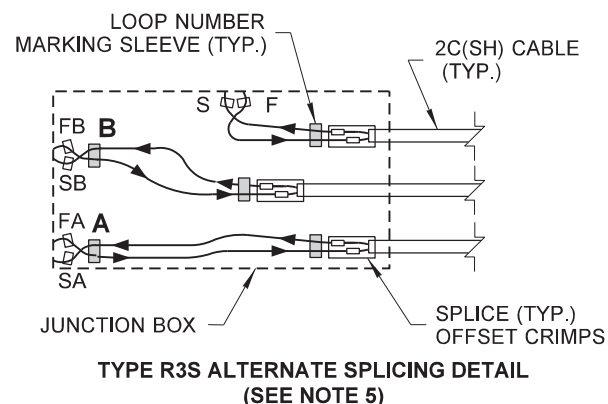
**TYPE R2 AND R1WA  
LOOP WIRING DIAGRAM**  
TYPE R2 LAYOUT SHOWN



**TYPE R1S  
SPEED LOOP WIRING DIAGRAM**



**TYPE R3S LOOP ARRAY WIRING DIAGRAM**



**TYPE R3S ALTERNATE SPLICING DETAIL  
(SEE NOTE 5)**

## NOTES

1. The number of loop turns for **Type R1** and **Type R1W** loops vary depending on the wire length from the cabinet to the center of the loop. See table for number of turns.
2. All loop lead in wires shall return to the junction box.
3. Cable identification sleeves shall be verified before splices are installed.
4. Detector Loop Wire shall meet the requirements of **Standard Specification Section 9-29.3(2)F** unless otherwise required by the Contract.
5. Where the **Type R3S Alternate Splicing Detail** is used, the Loop Number Marking Sleeves for the Demand Loops shall use the same Loop ID Numbers, but include the suffix "A" or "B", as applicable.



Jackson, Flint  
Jul 31 2019 4:15 PM

## METERING AND DATA INDUCTION LOOP WIRING DETAILS STANDARD PLAN J-50.19-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

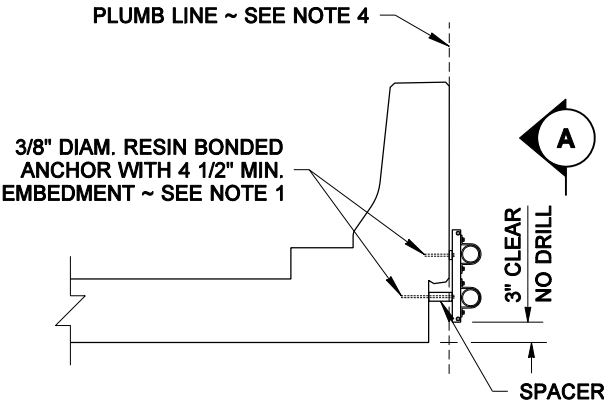
Roark, Steve  
Aug 7 2019 11:57 AM

STATE DESIGN ENGINEER

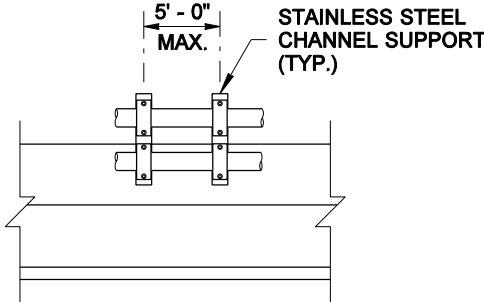


Washington State Department of Transportation

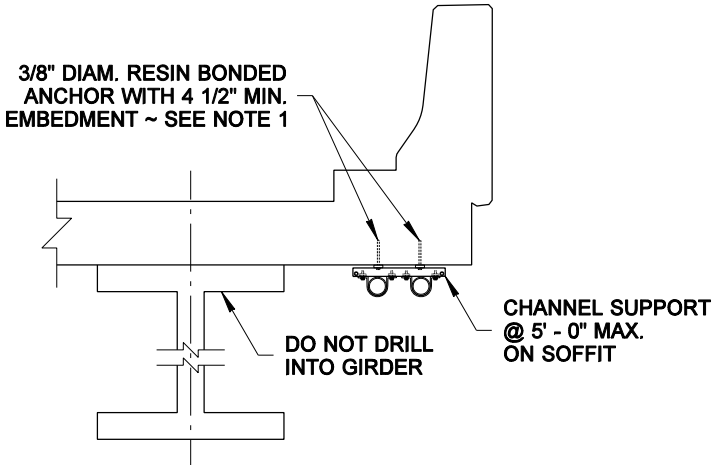
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**CONCRETE SLAB BRIDGE**  
(AUTHORIZED ONLY WITH WRITTEN BRIDGE OFFICE APPROVAL,  
WHERE VERTICAL CLEARANCE IS CONSTRAINED)



**SECTION A**

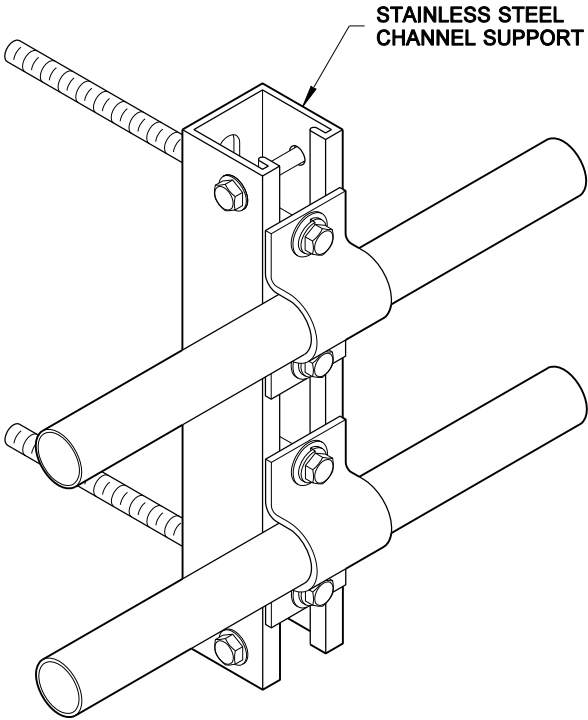


**HORIZONTAL CHANNEL MOUNT**  
(F-SHAPE BARRIER SHOWN  
APPLY TO ALL BARRIER TYPES)

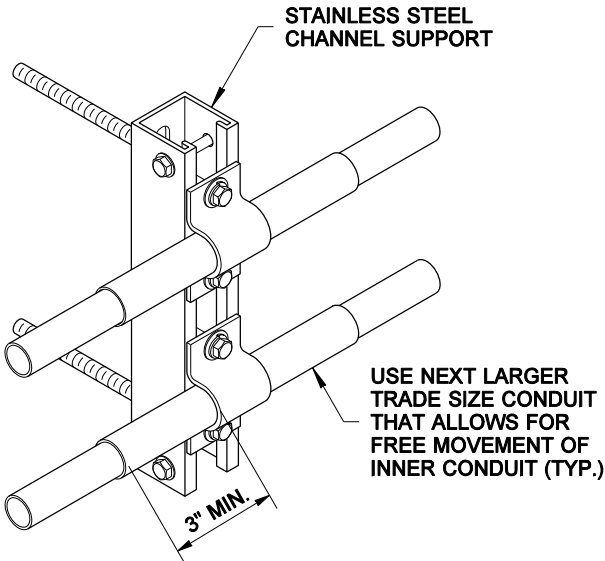
CONDUIT DIMENSIONS <sup>1</sup>	
NOMINAL TRADE SIZE (IN.)	OUTSIDE DIAMETERS
1/2	0.840
3/4	1.050
1	1.315
1 1/4	1.660
1 1/2	1.900
2	2.375
2 1/2	2.875
3	3.500
3 1/2	4.000
4	4.500
5	5.563
6	6.625

STRAP THICKNESS CHART	
NOMINAL PIPE SIZE (IN.)	STRAP THICKNESS
1/2 - 2	> OR = 1/8"
> 2 - 5	> OR = 1/4"
6	> OR = 1/4"

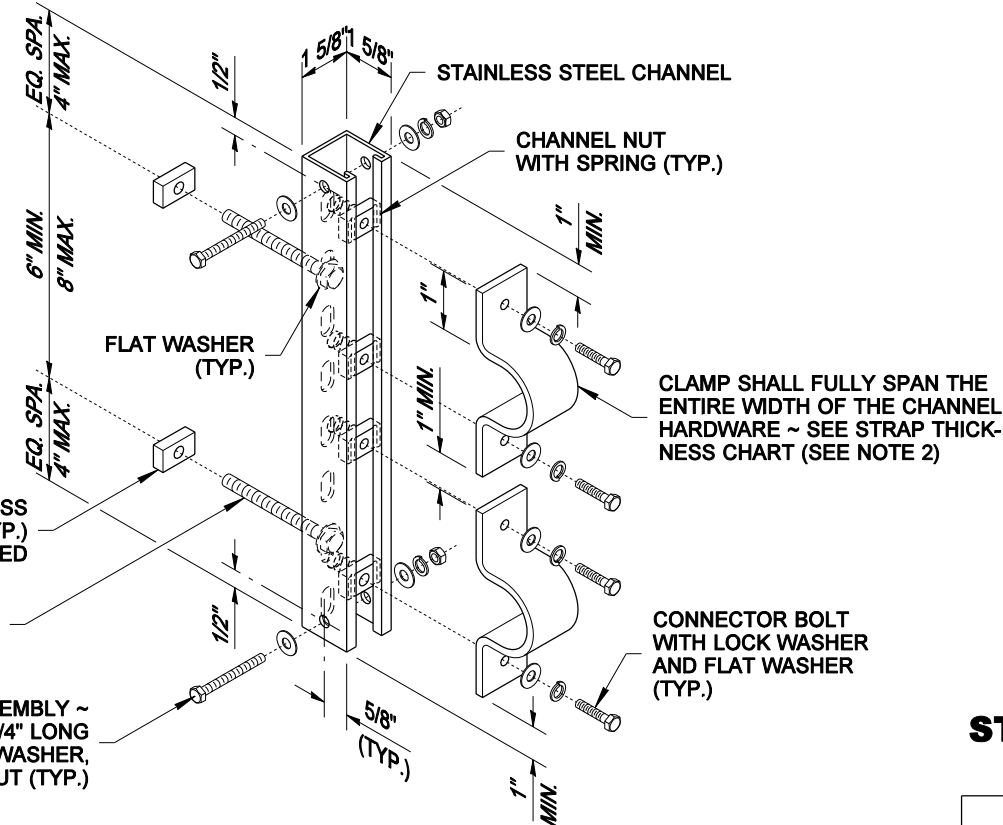
<sup>1</sup> CONDUIT DIAMETERS REFLECT THE DIMENSIONS FOR RIGID GALVANIZED STEEL, SCHEDULE 40 PVC AND SCHEDULE 80 PVC (3 1/2" SCHEDULE 80 PVC IS NOT AVAILABLE)



**ISOMETRIC VIEW  
CONDUIT SUPPORT DETAIL**



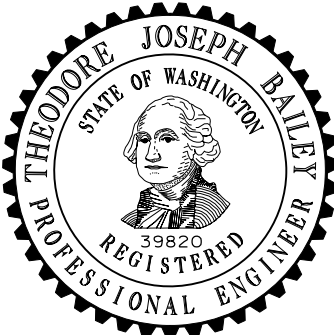
**ISOMETRIC VIEW  
PVC CONDUIT SUPPORT DETAIL**  
(FOR UTILITY COMPANY USE - ONLY ALLOWED IN RARE INSTANCES,  
AUTHORIZED ONLY WITH WRITTEN BRIDGE OFFICE APPROVAL,  
WHERE VERTICAL CLEARANCE IS CONSTRAINED)



**ISOMETRIC VIEW  
STAINLESS STEEL CHANNEL SUPPORT DETAIL**  
(VERTICAL MOUNT SHOWN)

**NOTES**

1. Drilling through reinforcing steel is not allowed. If steel is hit while drilling, the location shall be moved and the abandoned hole filled with grout conforming to **Standard Specification 6-02.3(20)**. There shall be a minimum of a 3" edge distance to the center-line of anchor holes in concrete. Mount the stainless steel support using an approved resin bonded anchor system. Anchors shall be stainless steel and shall be of 3/8" diameter (expansion anchors are not allowed). Anchor Bolt embedment of 4 1/2" minimum.
2. Number of clamps shall be determined by number of conduits to be attached to the Stainless Steel Channel Support. See Conduit Plans for conduit routing.
3. Add additional Attachment Bolts when required to maintain 8" maximum spacing between adjacent Attachment Bolts.
4. Stainless Steel Channel to be plumb to face of structure. Size spacer to maintain plumb line. When barrier is not plumb, size spacer to maintain back of barrier line.
5. See **Standard Plan J-60.14** for Column Mounting details.



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

**STAINLESS STEEL CHANNEL**  
**STANDARD PLAN J-60.13-00**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

**Pasco Bakotich III** 06-16-10

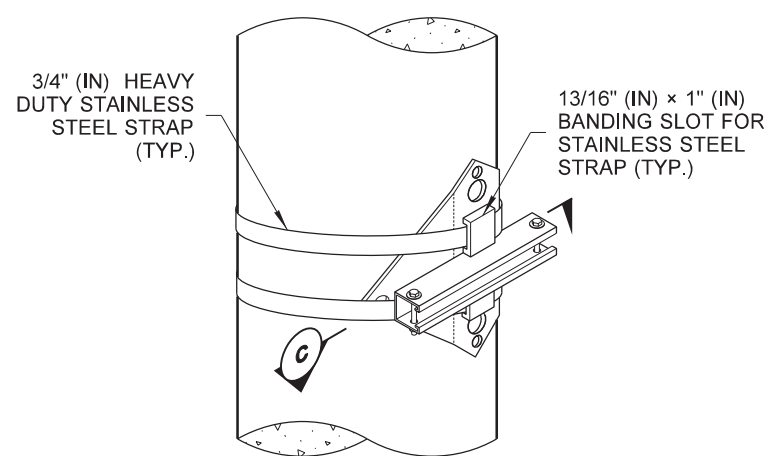
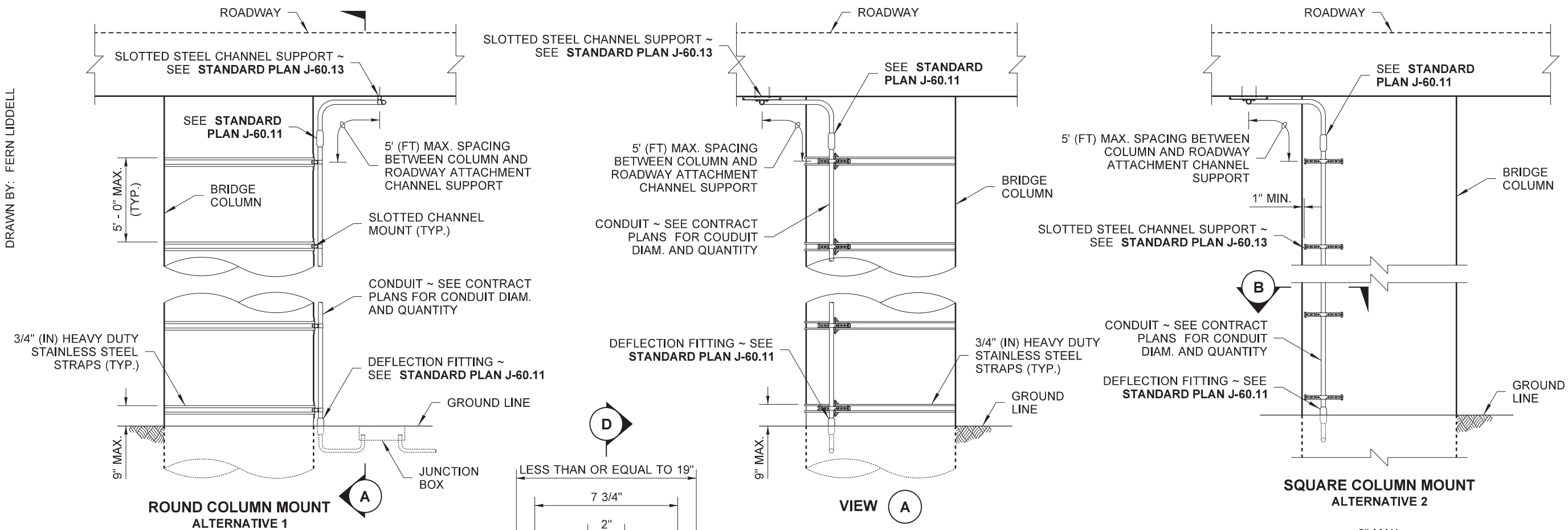
STATE DESIGN ENGINEER

DATE

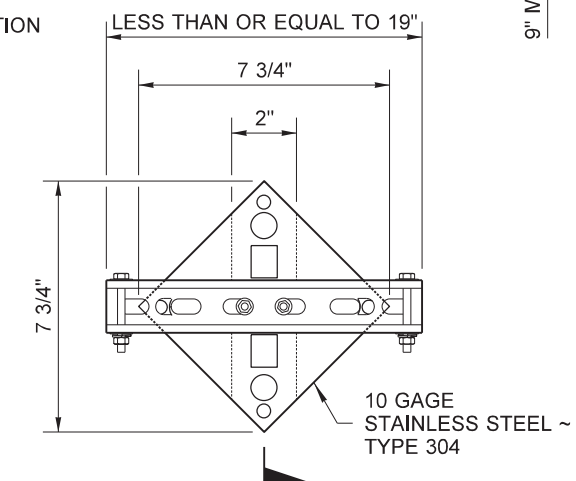


Washington State Department of Transportation

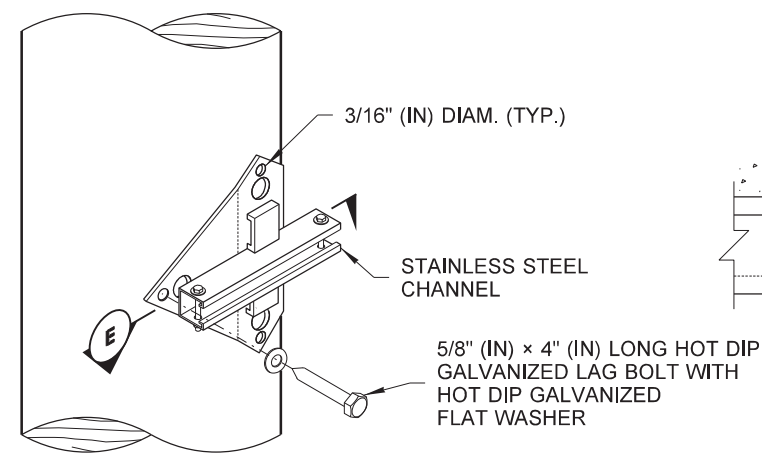
DRAWN BY: FERN LIDDELL



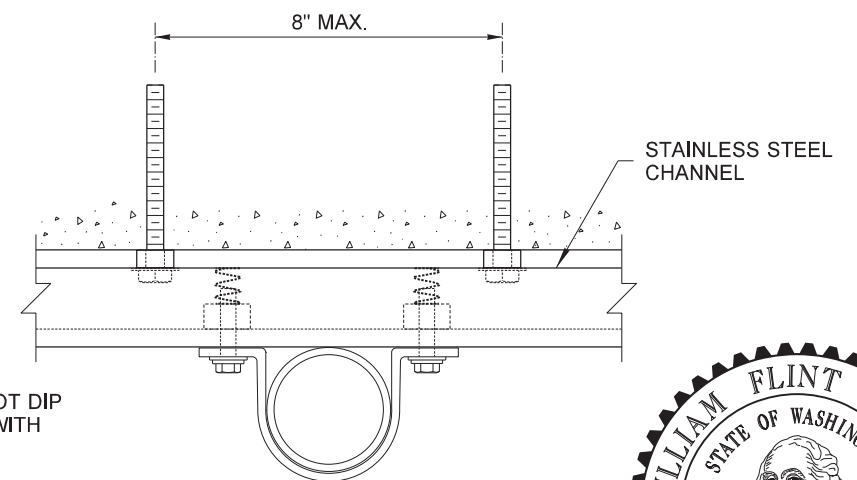
ISOMETRIC VIEW  
COLUMN MOUNT DETAILS



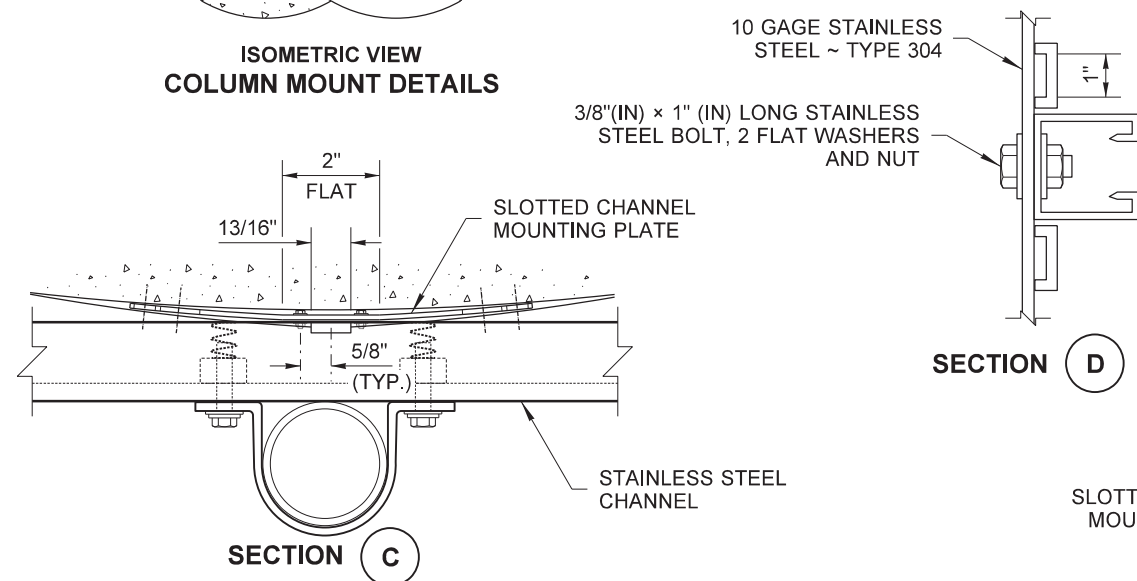
## SLOTTED CHANNEL MOUNTING PLATE



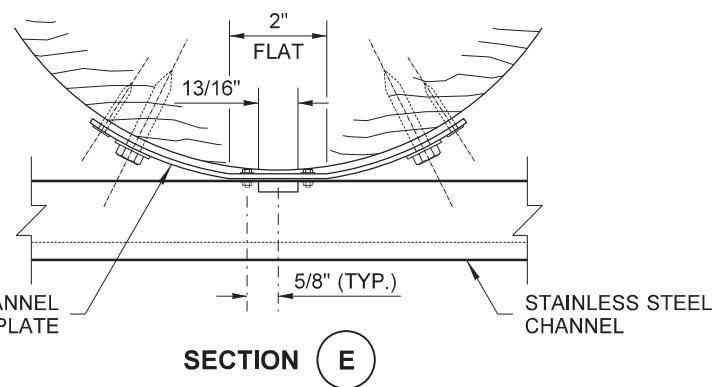
**ISOMETRIC VIEW**  
**WOOD POLE MOUNT DETAILS**



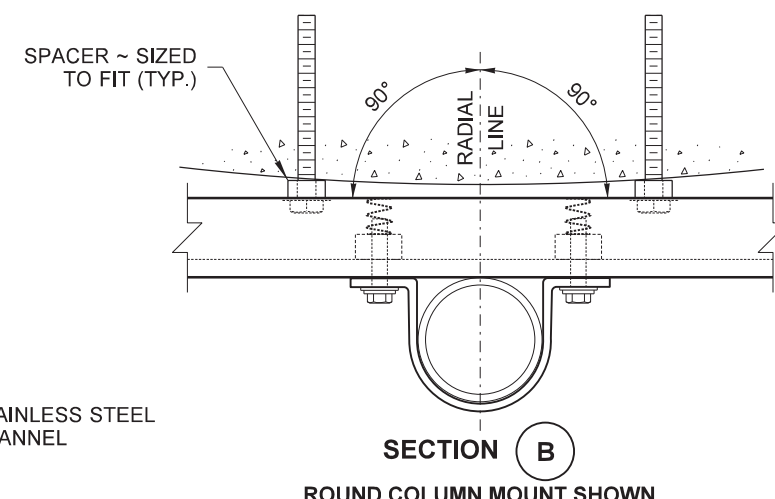
SECTION **(B)**  
SQUARE COLUMN MOUNT SHOWN



SECTION C

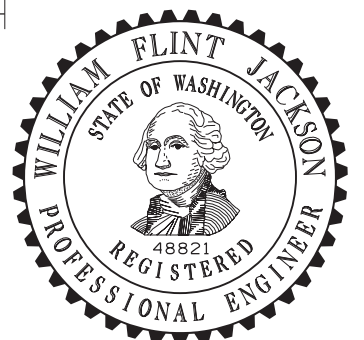



SECTION (E)



**SECTION B**  
ROUND COLUMN MOUNT SHOWN

- ## NOTES
1. See **Standard Plan J-60.13** for Slotted Steel Channel details.
  2. Stainless Steel Channel to be plumb to face of structure. Size spacer to maintain plumb line.
  3. Slotted Channel mounting plate shall be installed where conduit is routed along column.
  4. See Contract Plans for specified Alternative attachment type.



  
Jackson, Flint  
Jul 29 2019 2:57 PM  
oosign  
**STAINLESS STEEL CHANNEL  
MOUNTING DETAILS ON  
COLUMN OR POLE  
STANDARD PLAN J-60.14-01**

SHEET 1 OF 1 SHEET

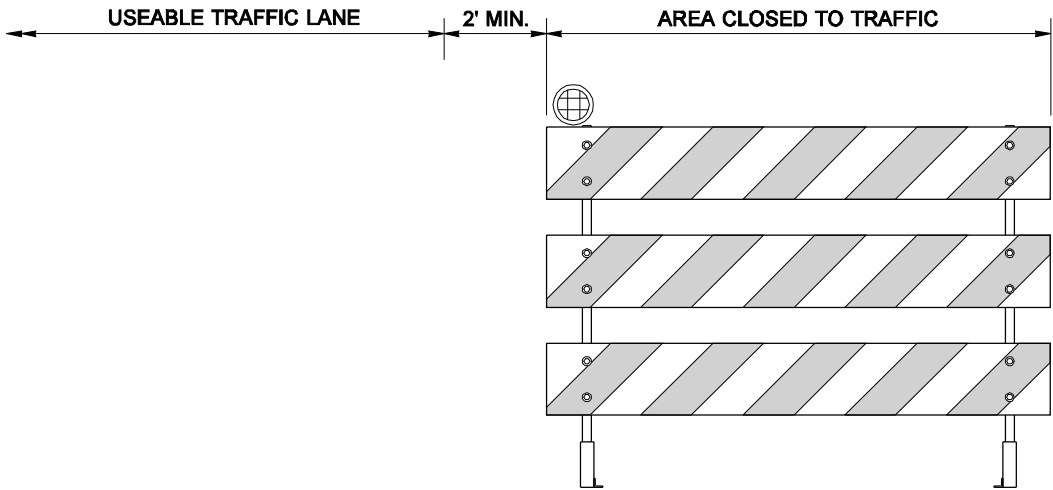
APPROVED FOR PUBLICATION

Roark, Steve  
Jul 31 2019 12:16 PM

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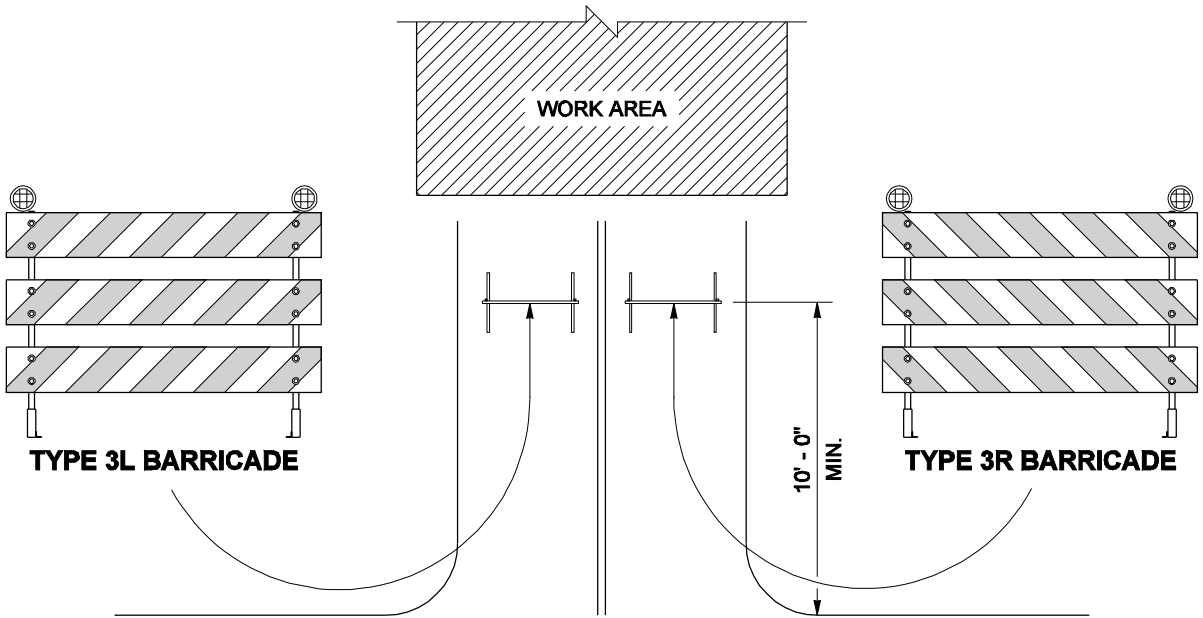
 Washington State Department of Transportation

DRAWN BY: LISA CYFORD

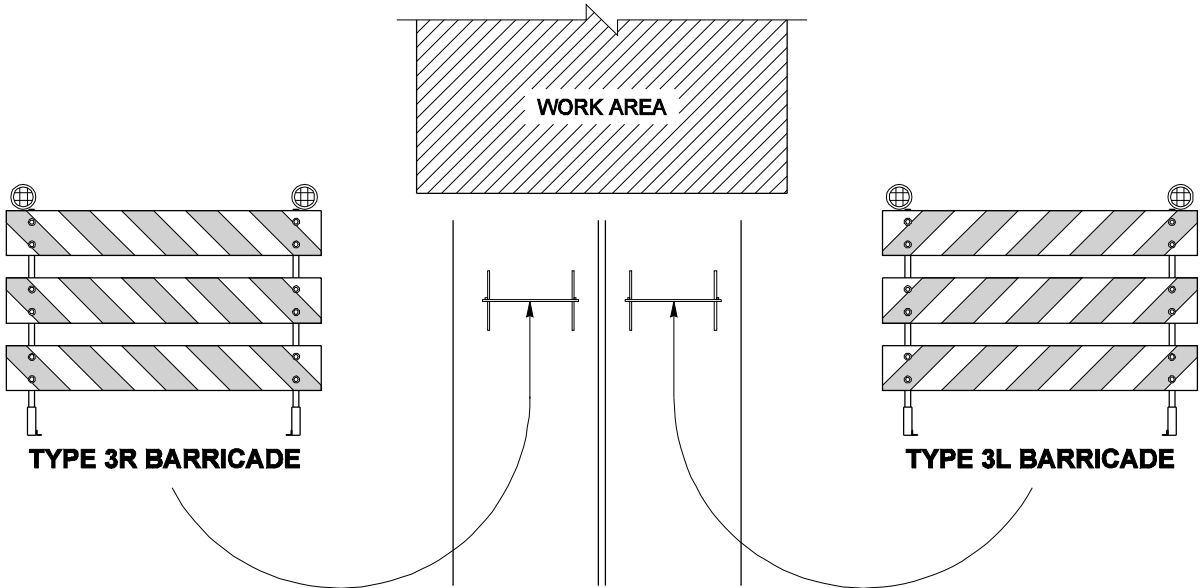


TYPE 3L BARRICADE

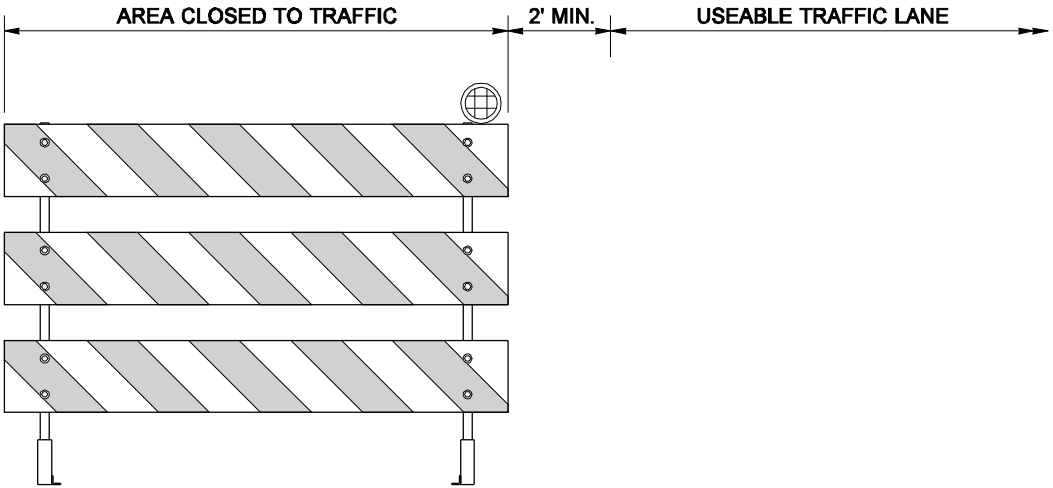
STRIPES ON THE BARRICADES SHALL SLOPE  
DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS



ROAD CLOSURE AT INTERSECTION



ROAD CLOSURE AT OTHER LOCATIONS



TYPE 3R BARRICADE



EXPIRES AUGUST 9, 2007

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT  
UNLESS IT IS SIGNED AND SEALED BY THE ENGINEER.  
THE ENGINEER'S SEAL AND SIGNATURE ARE REQUIRED FOR THE PLAN TO BE VALID.  
FILE WITH THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

TYPE 3 BARRICADE

STANDARD PLAN K-80.20-00

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Kevin J. Dayton

STATE DESIGN ENGINEER

12-20-06

DATE

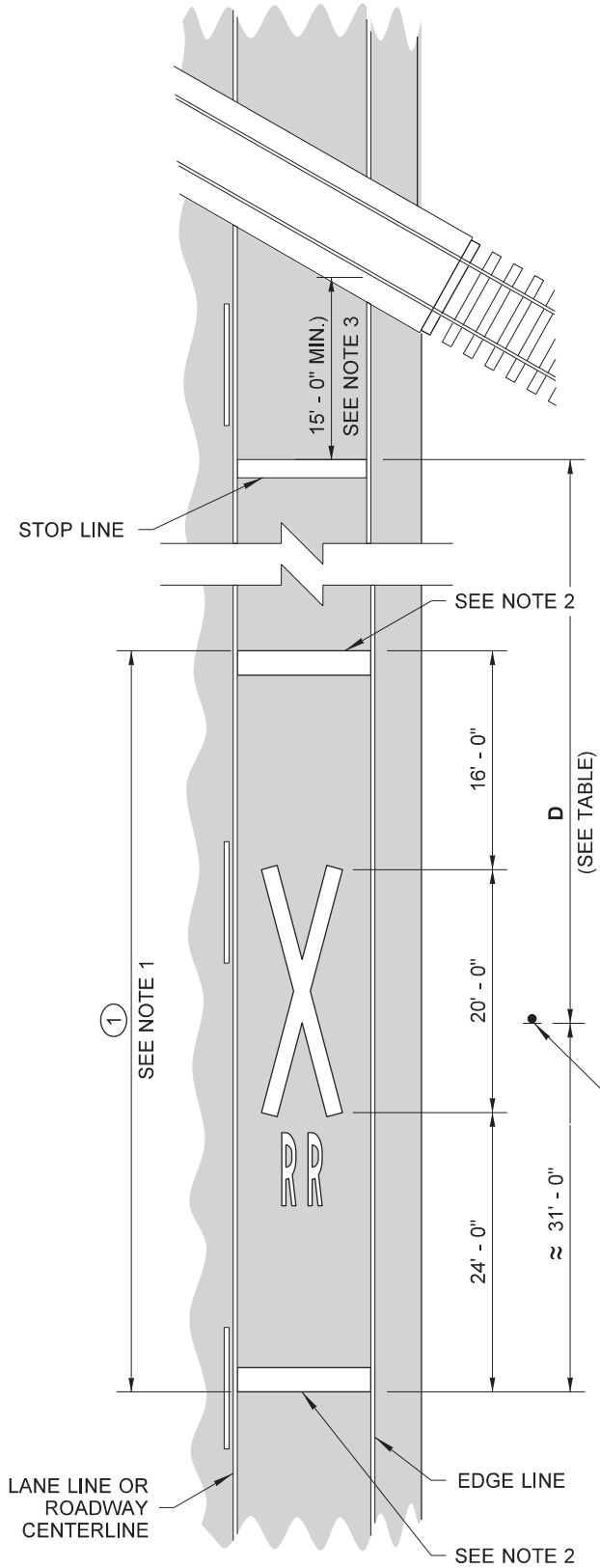


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BARRICADE PLACEMENT

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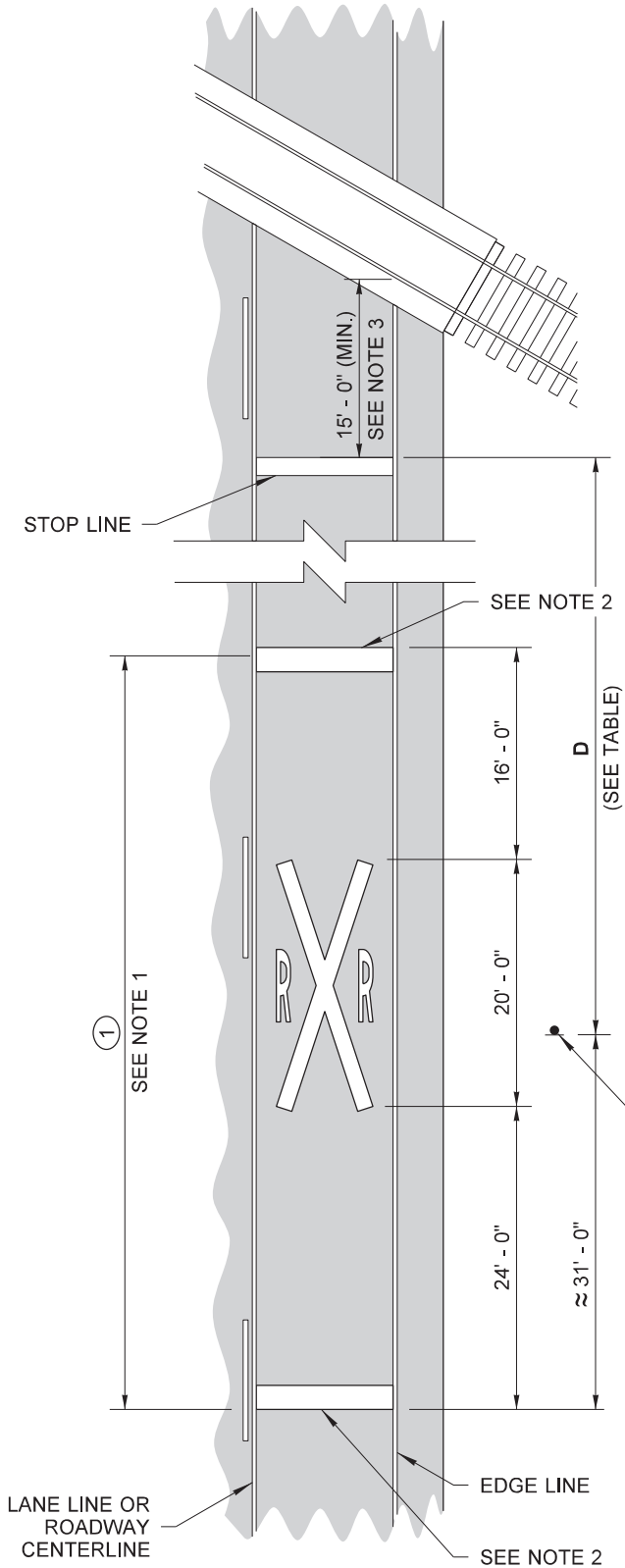
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MPH	D*
25	50 Ft.
30	100 Ft.
35	150 Ft.
40	225 Ft.
45	300 Ft.
50	375 Ft.
55	450 Ft.
60	550 Ft.
65	650 Ft.

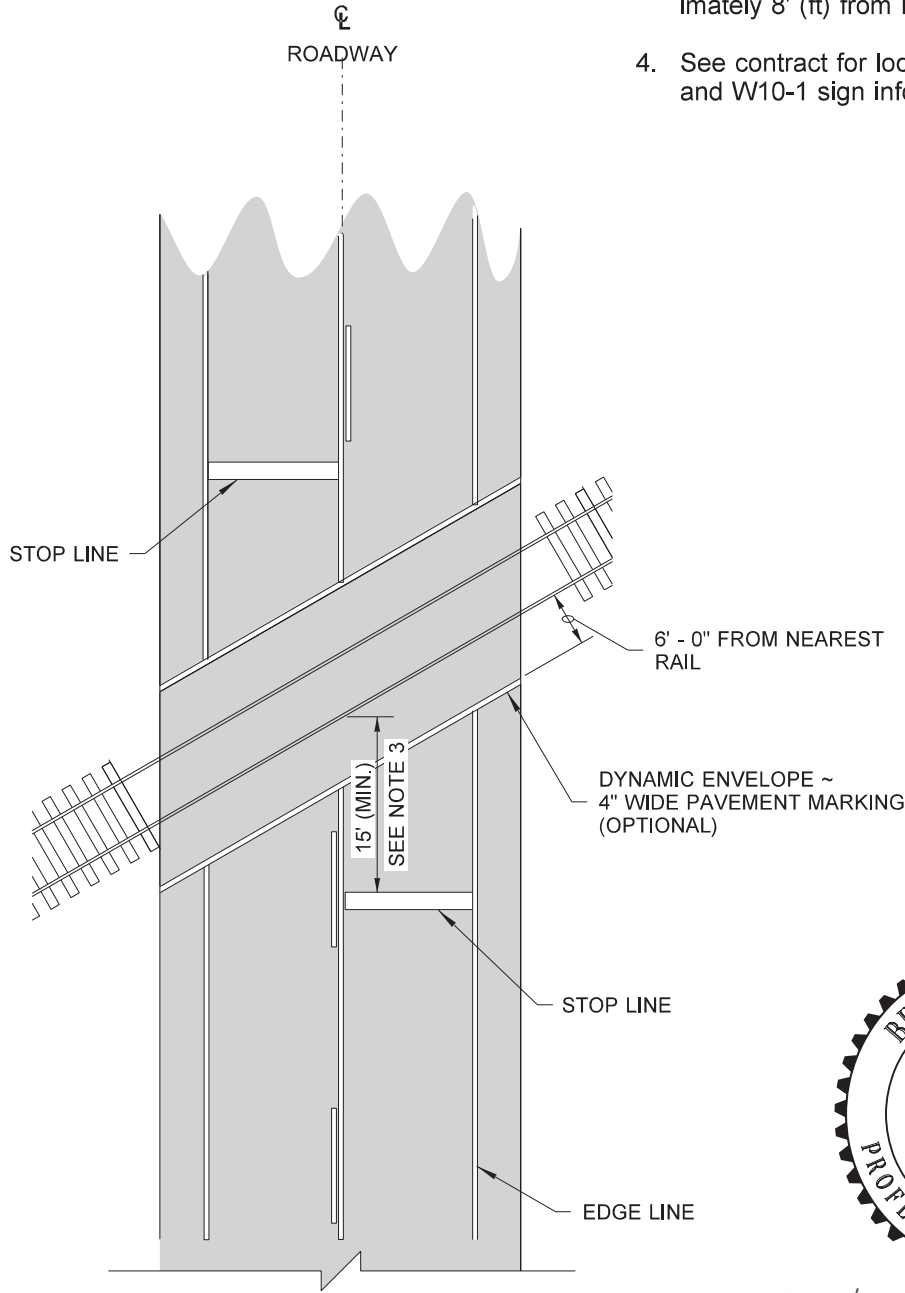
\* DIMENSIONS SHOWN ARE APPROXIMATE (SEE CONTRACT)

STANDARD SYMBOL



① TOTAL MARKING AREA (PER 12' (FT) WIDE LANE) = 111.59 SQ.FT.

ALTERNATIVE LAYOUT



RR CROSSING DETAIL (TRACKS OMITTED FOR CLARITY)

GENERAL NOTES

1. Bid Item "Railroad Crossing Symbol" includes "X" symbol, letters, and two 24" (in) white transverse lines.
2. 24" (in) white transverse line.
3. Place Stop Line 15' (ft) minimum from nearest rail. If gate is present, place stop line approximately 8' (ft) from RR gate.
4. See contract for location, material requirements, and W10-1 sign information



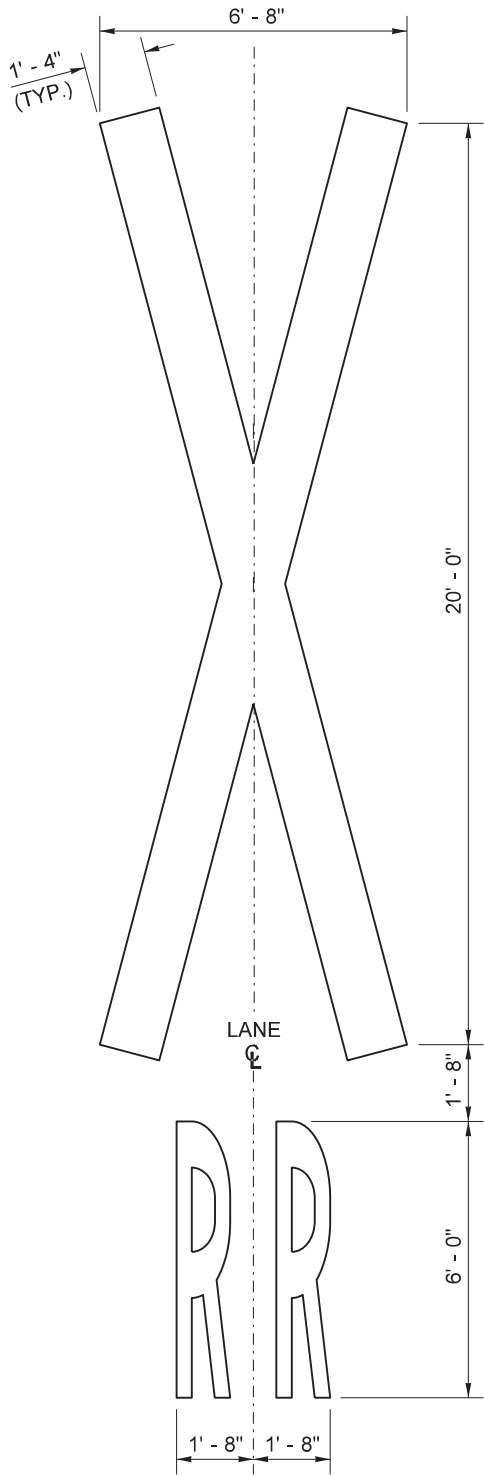
Walsh, Brian  
Aug 5 2019 8:14 AM

RAILROAD CROSSING LAYOUT

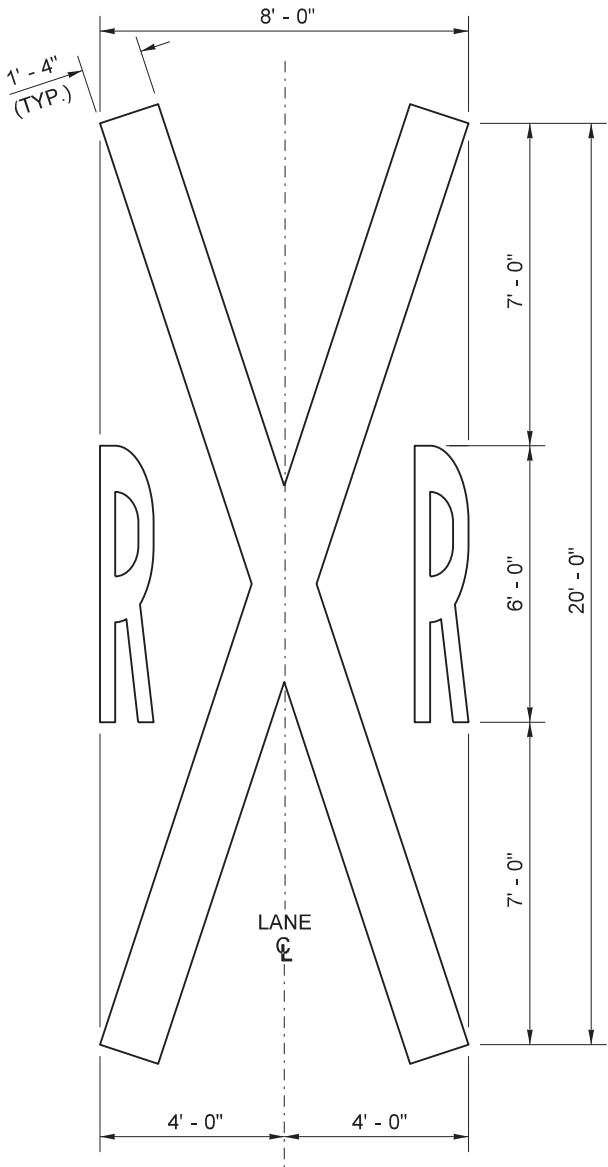
STANDARD PLAN M-11.10-03

SHEET 1 OF 2 SHEETS

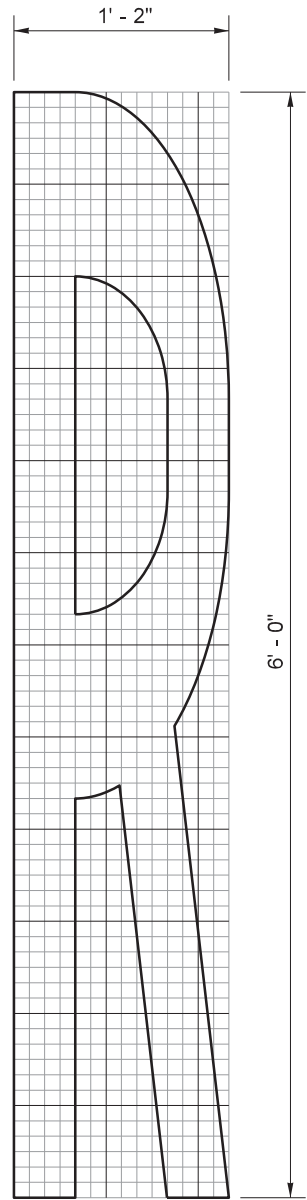
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Roark, Steve  
Aug 7 2019 11:58 AM  
STATE DESIGN ENGINEER  
Washington State Department of Transportation



SYMBOL DETAIL



ALTERNATIVE SYMBOL  
DETAIL



"R" DETAIL



*Brian J. Walsh* Walsh, Brian  
Aug 5 2019 8:15 AM  
**RAILROAD CROSSING  
LAYOUT**

**STANDARD PLAN M-11.10-03**

SHEET 2 OF 2 SHEETS

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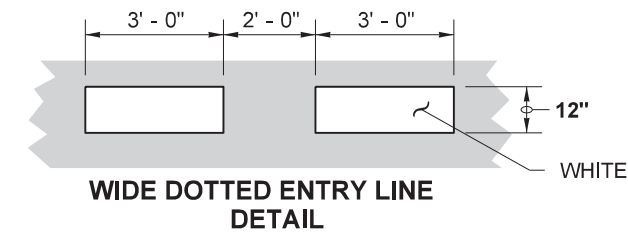
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 Washington State Department of Transportation

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DRAWN BY: FERN LIDDELL



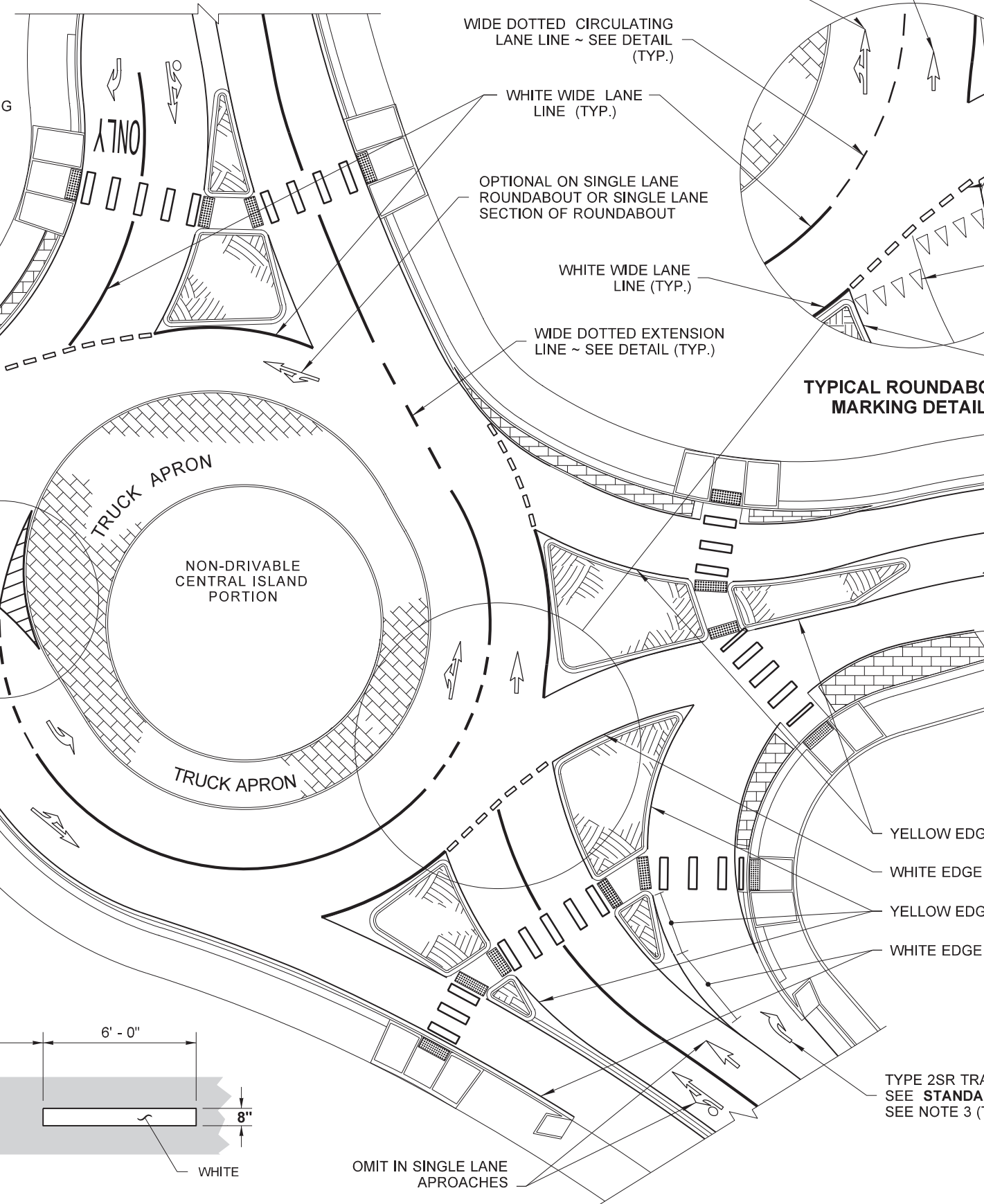
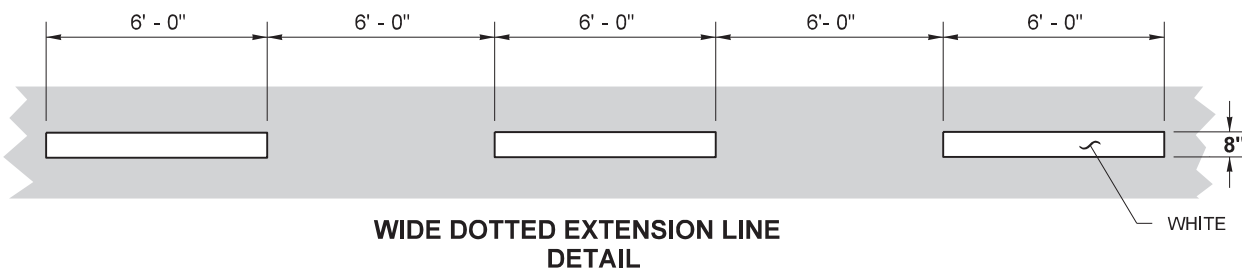
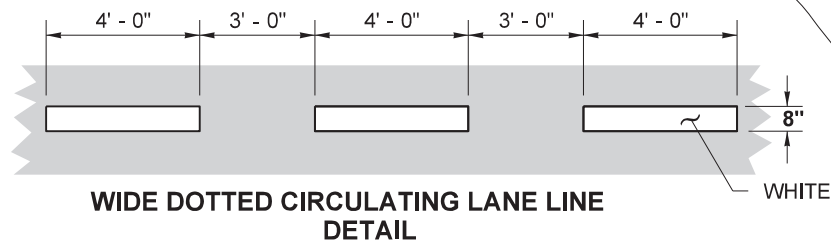
YELLOW CROSSHATCH MARKING ~ PER STANDARD PLAN M-24.60

8" (IN) YELLOW WIDE LANE LINE

TYPICAL ROUNDABOUT HATCHING DETAIL

WHITE WIDE LANE LINE (TYP.) FOR DETAIL ~ SEE STANDARD PLAN M-20.10

FOR CROSSWALK LAYOUT DETAILS ~ SEE STANDARD PLAN M-15.10



TYPE 1S TRAFFIC ARROW ~ SEE STANDARD PLAN M-24.40 SEE NOTE 3 (TYP.)

TYPE 3SL TRAFFIC ARROW SEE STANDARD PLAN M-24.40 SEE NOTE 3 (TYP.)

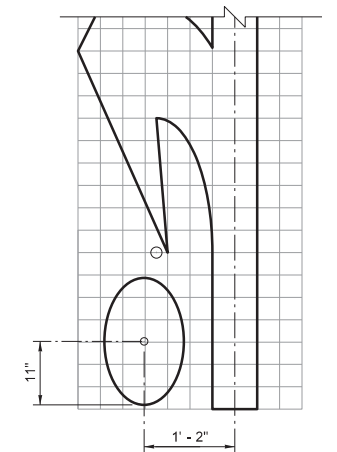
## NOTES

1. These details can vary greatly according to the Contract plans.
2. The need for Advance Roundabout Traffic Arrows is based upon posted speed of approach roadway.
3. Place Arrows in the circulating lanes as close as possible to the center of the lane to avoid having them in the wheel paths.
4. Local agencies (on non-state route intersections) may elect to use Yield Line Symbol Type 2 (sharks teeth) prior to the Wide Dotted Entry Line. See **Standard Plan M-24.60** for details.

WIDE DOTTED ENTRY LINE ~ SEE DETAIL (TYP.) (USE ON WSDOT PROJECTS)

YIELD LINE SYMBOL (SHARKS TEETH) MAY BE USED AS AN OPTION FOR LOCAL AGENCIES ~ SEE NOTE 4

SOLID EDGE LINE (TYP.) FOR DETAIL ~ SEE STANDARD PLAN M-20.10



ROUNDABOUT CIRCLE MARKING DETAIL WITH TYPE 3SL TRAFFIC ARROW ~ SEE STANDARD PLAN 24.40



*Brian J. Walsh* Walsh, Brian Jun 27 2018 9:29 AM

## ROUNDABOUT PAVEMENT MARKINGS

### STANDARD PLAN M-12.10-01

SHEET 1 OF 1 SHEET

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Carpenter, Jeff Jun 28 2018 10:15 AM

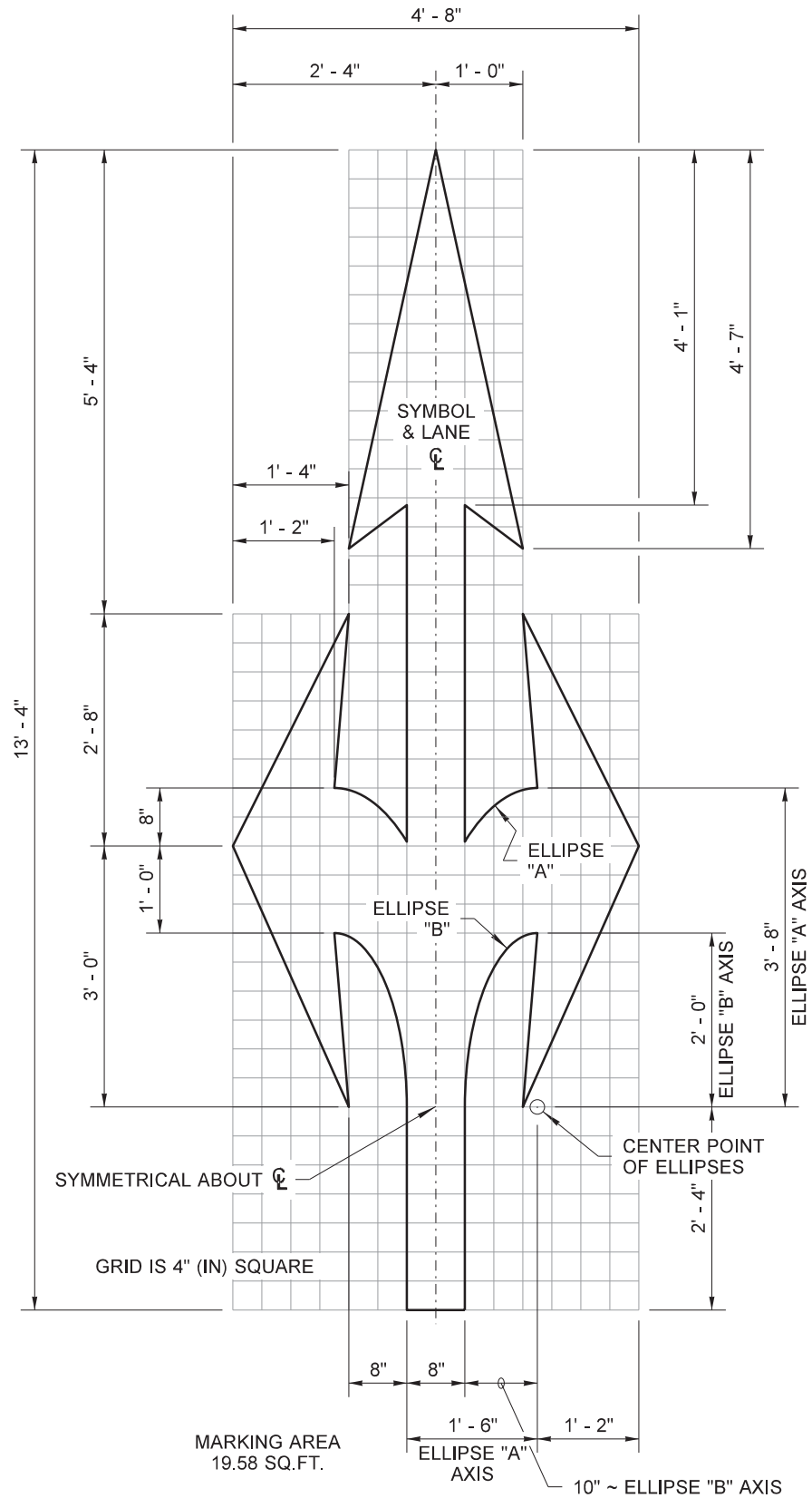
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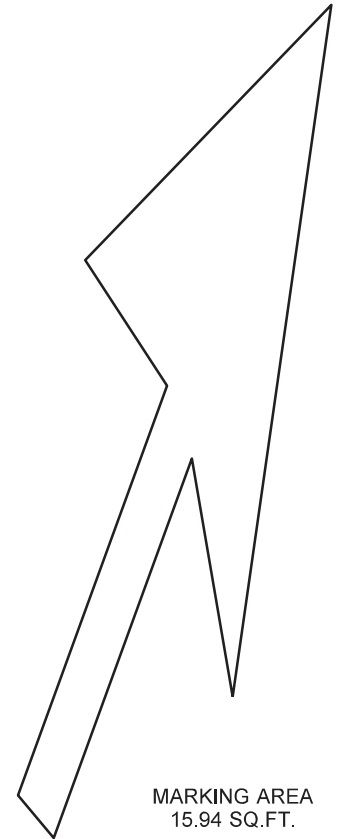
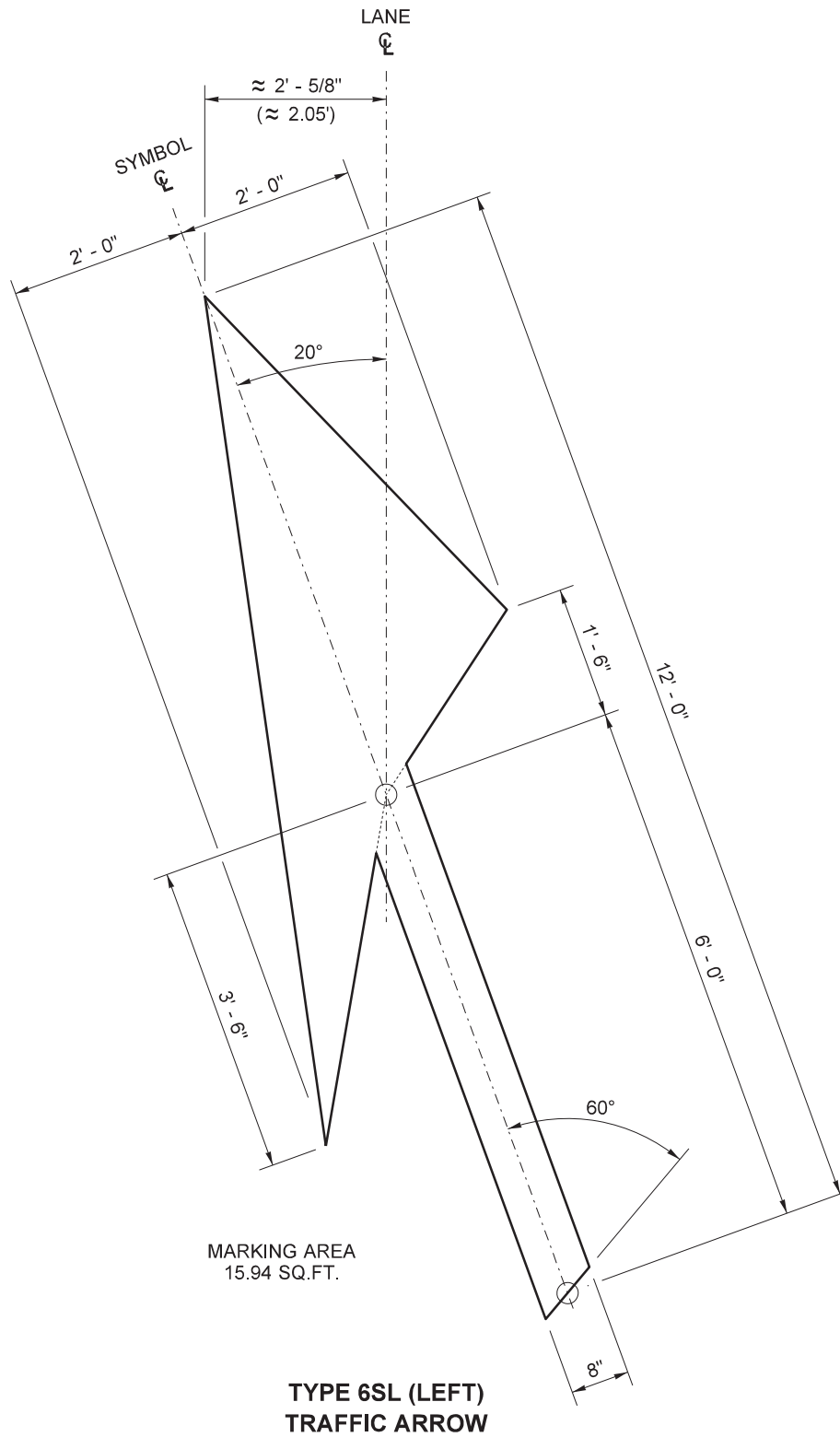
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DRAWN BY: COLBY FLETCHER



TYPE 7S TRAFFIC ARROW



TYPE 6SR (RIGHT) TRAFFIC ARROW

MIRROR IMAGE OF TYPE 6SL  
(MIRRORED ABOUT LANE CENTERLINE)  
(SHOWN AT REDUCED SCALE)



Walsh, Brian  
Apr 16 2015 2:21 PM

**SYMBOL MARKINGS ~  
TRAFFIC ARROWS FOR  
LOW-SPEED ROADWAYS  
STANDARD PLAN M-24.40-02**

SHEET 2 OF 2 SHEETS

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Bakotich, Pasco  
Apr 20 2015 10:11 AM

STATE DESIGN ENGINEER

Washington State Department of Transportation

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