

JUMP TO A SECTION IN THE TABLE OF CONTENTS

A B C D E F G H I J K L

Standard Plans

For Road, Bridge, and Municipal Construction

M 21-01
English



Washington State Department of Transportation



American Public Works Association
Washington State Chapter



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Foreword

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

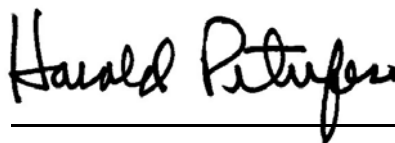
Updating the manual is a continuous process and revisions are issued periodically. Questions, comments, and recommendations for changes are welcome. The *Comment Request Form* on the reverse side of this page is provided to encourage comments and assure their prompt delivery. Use copies of the form to send any attachments, such as marked copies of specific standard plans. Your comments should be sent to **Design Standards**, Transportation Building, Olympia, WA 98504-7329.

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Harold Peterfeso
State Design Engineer

Comments

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Subject: Standard Plans Manual Comment

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Contents

Plan No.	Plan Title	Publication Approval Date
Section A	Concrete Pavement	
A-1	Cement Concrete Pavement Joints	5/13/02
A-2	Bridge Approach Slab	5/9/02 2 Sheets
A-3	Transition from Concrete Overlay	5/30/02 2 Sheets
A-4	Inlet Placement at Bridge End	3/7/97
A-5	Dowel Bar Retrofit for Cement Concrete Pavement	2/24/03 3 Sheets
A-6	Cement Concrete Pavement Repair	2/24/03 2 Sheets
Section B	Drainage Structures and Hydraulics	
B-1	Catch Basin Type 1	7/21/03
B-1a	Catch Basin Type 1L	7/31/01
B-1b	Catch Basin Type 1P, Parking Lot C.B.	3/7/97
B-1e	Catch Basin Type 2	1/28/02
B-1z	Miscellaneous Details for Manholes and Catch Basins	5/30/97
B-2	Solid Metal Cover for Catch Basin	6/17/02
B-2a	Reversible Frame for Catch Basin or Concrete Inlet	6/17/02
B-2b	Vaned Grate for Catch Basin and Concrete Inlet	6/17/02
B-2c	Bi-Directional Vaned Grate for Catch Basin and Inlet	6/17/02
B-2d	Herringbone Grate for Catch Basin and Inlet	6/17/02
B-3	Catch Basin Type 2 with Flow Restrictor-Oil Separator	1/28/02
B-3a	Catch Basin Type 2 with Baffle Type Flow Restrictor-Oil Separator	5/9/97
B-4b	Grate Inlet Type 1	5/9/97
B-4c	Grate Inlet Type 2	5/9/97 2 Sheets
B-4d	Frame and Vaned Grates for Grate Inlet Type 2	9/16/02
B-4f	Drop Inlet Type 1	5/9/97
B-4g	Drop Inlet Type 2	7/18/97
B-4h	Drop Inlet Grates	5/9/97
B-7	Flared End Sections	5/9/97
B-7a	Beveled End Sections for Culverts 30" Diameter or Less	6/17/02
B-8	Structural Plate Underpass Design 1	5/9/97
B-8a	Structural Plate Underpass Design 2	7/25/97
B-9	Headwalls for Culvert Pipes	5/9/97
B-9a	Type 1 Safety Bars for Stepped Culvert Pipe or Pipe Arch	5/9/97
B-9b	Type 2 Safety Bars for Culvert Pipe or Pipe Arch (On Cross Road)	5/9/97
B-9c	Tapered End Section with Type 3 Safety Bars	7/18/97
B-9d	Tapered End Section with Type 4 Safety Bars (On Cross Road)	7/18/97
B-11	Pipe Zone Bedding and Backfill	7/31/01
B-13	Coupling Bands for Corrugated Metal Pipe	12/4/98
B-18	Drop Connection for Sanitary Sewers	5/9/97
B-18a	Vertical Connection	5/9/97
B-18b	8 Inch Clean Out	7/18/97
B-19	Hydrant Setting Types A and B	5/30/97
B-20d	Residential Sidewalk Drain	7/18/97
B-21	2 Inch Blowoff Assembly	7/18/97
B-21a	Combination Air Release/Air Vacuum Valve Assembly	8/10/98
B-22	Concrete Blocking for Convex Vertical Bends	7/21/03
B-22a	Concrete Thrust Block	8/1/97
B-23a	Manhole Type 1	5/9/97
B-23b	Manhole Type 2	5/9/97

Contents

Plan No.	Plan Title	Publication	Approval Date
B-23c	Manhole Type 3		5/9/97
B-23d	Manhole Type 4		5/9/97
B-25	Manhole Ring and Cover		5/9/97
B-26	Concrete Inlet		7/18/97
B-27	Precast Concrete Drywell		8/1/97
B-28	Connection Details for Dissimilar Culvert Pipe		10/6/99
B-29	Side Sewer		4/24/98
B-30	Standing Side Sewer Connection		8/10/98
Section C	Traffic Barrier		
C-1	Beam Guardrail (W-Beam)	10/31/03	2 Sheets
C-1a	Beam Guardrail (Thrie Beam)	7/31/98	
C-1b	Beam Guardrail Posts and Blocks	10/31/03	2 Sheets
C-1c	Beam Guardrail	5/30/97	
C-1d	Thrie Beam Guardrail Reducer Section	10/31/03	
C-2	Guardrail Placement (Cases 1, 2 & 3)	1/6/00	
C-2a	Guardrail Placement (Cases 4, 5 & 6)	7/17/98	
C-2b	Guardrail Placement (Cases 7 & 8)	6/12/98	
C-2c	Guardrail Placement, Median Bull Nose (Cases 9A, 9B & 9C)	2/20/03	
C-2d	Guardrail Placement (Cases 10A, 10B & 10C)	5/22/98	
C-2e	Guardrail Placement (Cases 11A, 11B & 11C)	3/7/97	2 Sheets
C-2f	Guardrail Placement, Weak Post Intersection Design (8' - 6" Max. Radius) (Cases 12AC, 12AD, 12BC & 12BD)	3/14/97	
C-2g	Guardrail Placement, Weak Post Intersection Design (35' Max. Radius) (Cases 13AC, 13AD, 13BC & 13BD)	7/27/01	
C-2h	Guardrail Placement (Case 14)	3/28/97	
C-2i	Guardrail Placement (Case 15)	3/28/97	
C-2j	Guardrail Placement (Cases 16, 17 & 18)	6/12/98	
C-2k	Guardrail Placement 12'-6" Span (Cases 19A & 19B)	7/27/01	
C-2n	Guardrail Placement 18'-9" Span (Case 20)	7/27/01	
C-2o	Guardrail Placement 25' Span (Case 21)	7/13/01	
C-2p	Guardrail Placement, Strong Post Intersection Design (Cases 22AC, 22AD, 22BC & 22BD)	10/31/03	
C-3	Guardrail Transition Sections	10/31/03	
C-3a	Guardrail Transition Sections	10/31/03	
C-3b	Guardrail Transition Sections	10/31/03	2 Sheets
C-3c	Guardrail Transition Sections	10/31/03	
C-4	Beam Guardrail Buried Terminal Type 1	7/13/01	
C-4a	Beam Guardrail Buried Terminal Type 2	7/13/01	
C-4b	Beam Guardrail Flared Terminal	6/23/00	
C-4e	Beam Guardrail Non-Flared Terminal	2/20/03	
C-4f	Beam Guardrail Bull Nose Terminal	2/20/03	4 Sheets
C-5	Guardrail Connection to Bridge Rail or Concrete Barrier	10/31/03	
C-6	Beam Guardrail Anchor Type 1	5/30/97	2 Sheets
C-6a	Beam Guardrail Anchor Type 2	3/14/97	
C-6c	Beam Guardrail Anchor Type 4	1/6/00	
C-6d	Beam Guardrail Anchor Type 5	5/30/97	
C-6f	Beam Guardrail Anchor Type 7	7/25/97	
C-7	Beam Guardrail End Sections	10/31/03	

Contents

Plan No.	Plan Title	Publication Approval Date	
C-7a	Thrie Beam End Sections	10/31/03	
C-8	DELETED		
C-8a	Concrete Barrier Type 4 and Transition Section	7/25/97	
C-8b	Concrete Barrier Light Standard Section	7/17/98	2 Sheets
C-8c	Concrete Barrier Type 5	5/30/97	
C-8d	Alternative Temporary Concrete Barrier	7/25/97	
C-8e	Precast Concrete Barrier Anchors	6/24/02	
C-10	Box Culvert Guardrail Steel Post	7/31/98	2 Sheets
C-11	Cable Barrier	5/30/97	
C-11a	Cable Barrier Placement	2/19/99	
C-11b	Cable Barrier Terminal	9/28/01	2 Sheets
C-12	Impact Attenuator Inertial Barrier Configurations	7/27/01	
C-13	Single Slope Barrier Pre-Cast Type	4/16/99	2 Sheets
C-13a	Single Slope Barrier Pre-Cast Type Transition Section	4/16/99	
C-13b	Single Slope Barrier Pre-Cast Type Single Sided Section	4/16/99	
C-14a	Single Slope Concrete Barrier (Dual Face)	7/26/02	
C-14b	Concrete Barrier Transition Type 2 to Single Slope	7/26/02	
C-14c	Single Slope Concrete Barrier Terminal	7/26/02	
C-14d	Single Slope Concrete Barrier Transition Section	7/26/02	
C-14e	Single Slope Concrete Barrier (Vertical Back)	7/26/02	
C-14f	Single Slope Concrete Barrier Placement	7/26/02	
C-14g	Single Slope Concrete Barrier Placement	10/31/03	

Section D Retaining Walls, Noise Walls, and Slope Protection

D-1a	Reinforced Concrete Retaining Wall Type 1 and 1 SW	1/23/02	2 Sheets
D-1b	Reinforced Concrete Retaining Wall Type 2 and 2 SW	10/6/99	2 Sheets
D-1c	Reinforced Concrete Retaining Wall Type 3 and 3 SW	10/6/99	2 Sheets
D-1d	Reinforced Concrete Retaining Wall Type 4 and 4 SW	10/6/99	2 Sheets
D-1e	Reinforced Concrete Retaining Wall Type 5 and 5 SW	1/23/02	2 Sheets
D-1f	Reinforced Concrete Retaining Wall Type 6 and 6 SW	10/6/99	2 Sheets
D-2a	Noise Barrier - Type 1	3/14/97	
D-2b	Noise Barrier - Type 2	3/14/97	2 Sheets
D-2c	Noise Barrier - Type 3	3/14/97	2 Sheets
D-2d	Noise Barrier - Type 4	3/14/97	2 Sheets
D-2e	Noise Barrier - Type 5	3/14/97	
D-2f	Noise Barrier - Type 6	3/14/97	
D-2g	Noise Barrier - Type 7	3/14/97	
D-2h	Noise Barrier - Type 8	3/14/97	
D-2i	Noise Barrier - Type 9	3/14/97	2 Sheets
D-2j	Noise Barrier - Type 10	3/14/97	2 Sheets
D-2k	Noise Barrier - Type 11	3/14/97	3 Sheets
D-2l	Noise Barrier - Type 12	3/14/97	2 Sheets
D-2m	Noise Barrier - Type 13	3/14/97	2 Sheets
D-2n	Noise Barrier - Type 14	3/14/97	2 Sheets
D-2o	Noise Barrier - Type 15	3/14/97	
D-2p	Noise Barrier - Type 16	3/14/97	2 Sheets
D-2q	Noise Barrier - Type 17	3/14/97	2 Sheets
D-2r	Noise Barrier - Type 18	3/14/97	2 Sheets

Contents

Plan No.	Plan Title	Publication	Approval Date
D-2s	Noise Barrier - Type 19	3/14/97	2 Sheets
D-2t	Noise Barrier - Type 20	3/14/97	2 Sheets
D-2u	Access Door - Type 1	3/7/97	
D-2v	Access Door - Type 2	3/7/97	
D-2w	Access Door - Type 3	3/7/97	
D-2x	Access Door - Type 4	3/7/97	
D-2y	Access Door - Type 5	9/12/97	
D-3	Permanent Geosynthetic Wall Types 1-6	1/23/02	4 Sheets
D-4	Backfill and Drainage for Retaining Walls	12/11/98	
D-6	Gabions	6/19/98	
D-7	Wire Mesh Slope Protection	10/6/99	
D-7a	Wire Mesh Slope Protection Anchors	10/6/99	
D-9	Concrete Slope Protection	12/11/98	2 Sheets
Section E	Bridges and Trestles		
E-1	Date Numerals	7/25/97	
E-2	Pile or Frame Detour Bridge with Asphalt Overlay	5/29/98	2 Sheets
E-4	Precast Prestressed Concrete Piles	8/27/03	
E-4a	Precast Prestressed Concrete Piles Handling & Capping	8/27/03	
E-5	Manhole Ring and Cover for Bridges	5/29/98	
Section F	Curbs, Approaches, Gutters, and Sidewalks		
F-1	Cement Concrete Curbs	12/17/02	
F-1a	Cement Concrete Curb and Gutter Pan	12/17/02	
F-2	Precast Traffic Curb	8/27/99	
F-2a	Block Traffic Curb	5/30/97	
F-2b	Extruded Curb	3/14/97	2 Sheets
F-3	Cement Concrete Sidewalk	1/13/03	
F-3a	Sidewalk Ramp Types 1A, 1B, 1C & 1D	1/29/03	
F-3b	Sidewalk Ramp Types 2A & 2B	1/13/03	
F-3c	Sidewalk Ramp Types 3A, 3B, 3C & 3D	1/13/03	2 Sheets
F-3d	Sidewalk Ramp Type 4A	1/29/03	
F-3e	Sidewalk Ramp Type 4B	1/13/03	
F-4	Cement Concrete Driveway Entrances Types 1, 2, 3 & 4	1/13/03	2 Sheets
Section G	Signs and Sign Supports		
G-1	Ground Mounted Sign Placement	9/12/01	
G-2	Sign Bridge	6/4/02	3 Sheets
G-2a	Sign Bridge Foundations	6/4/02	
G-3	Cantilever Sign Structures	6/4/02	
G-3a	Cantilever Sign Structure Foundations	6/4/02	2 Sheets
G-4a	Roadside Sign Structures on Timber Posts	1/23/02	
G-4b	Roadside Signs on Laminated Wood Box Posts	8/12/94	
G-6	Maintenance Walkway for Overhead Sign Structures	8/27/03	3 Sheets
G-6a	Maintenance Walkway Mounting for Monotube Overhead Sign Structure	8/27/03	3 Sheets
G-6b	Maintenance Walkway Mounting for Truss-Type Overhead Sign Structure	8/27/03	2 Sheets

Contents

Plan No.	Plan Title	Publication Approval Date	
G-7	Milepost	7/18/97	
G-8a	Roadside Sign Structures for Multiple Steel Post Signs	10/6/99	3 Sheets
G-8b	Small Steel Sign Support	6/4/02	3 Sheets
G-9a	Overhead Sign Mounting Details	6/25/02	4 Sheets
G-9b	Sign Mounting Details	4/2/99	3 Sheets

Section H Delineators and Miscellaneous Construction

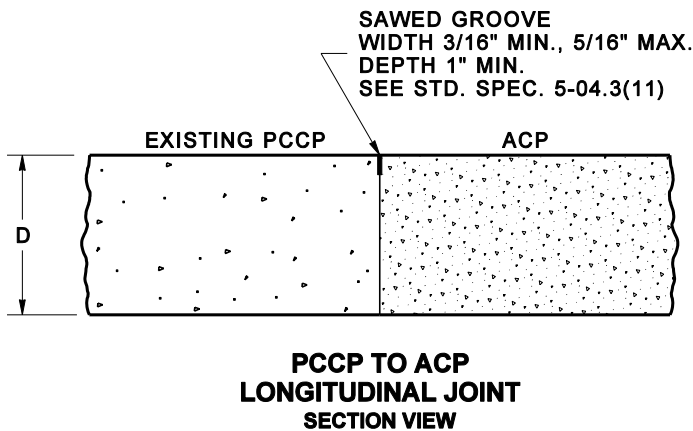
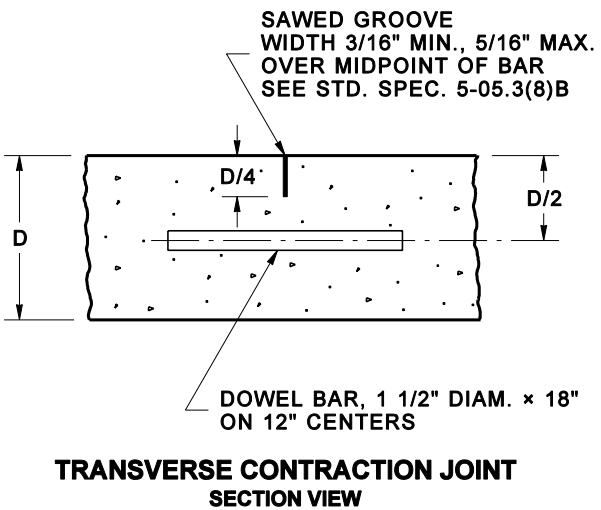
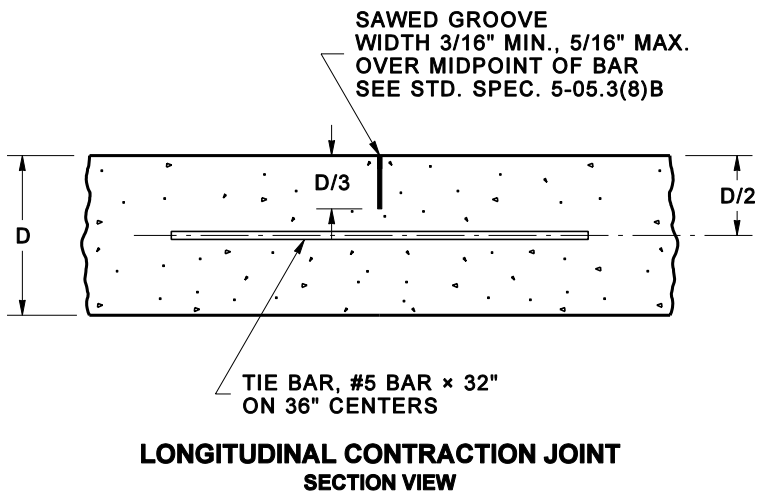
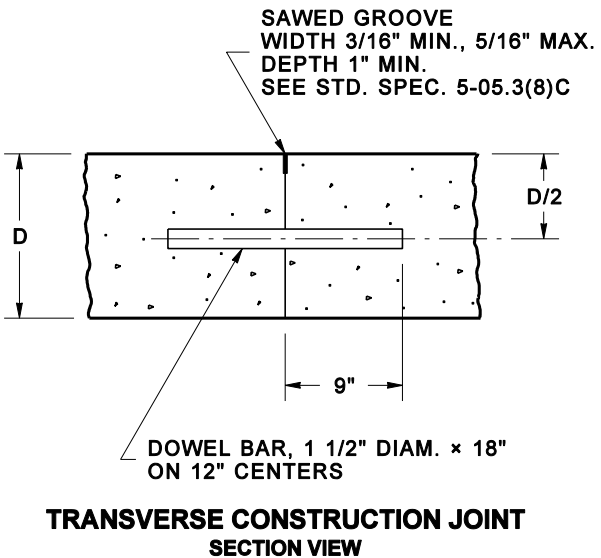
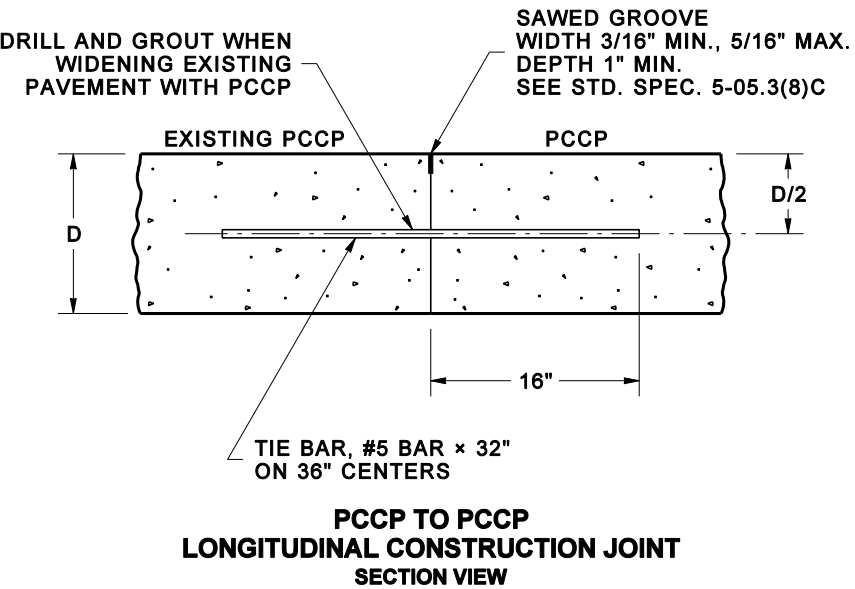
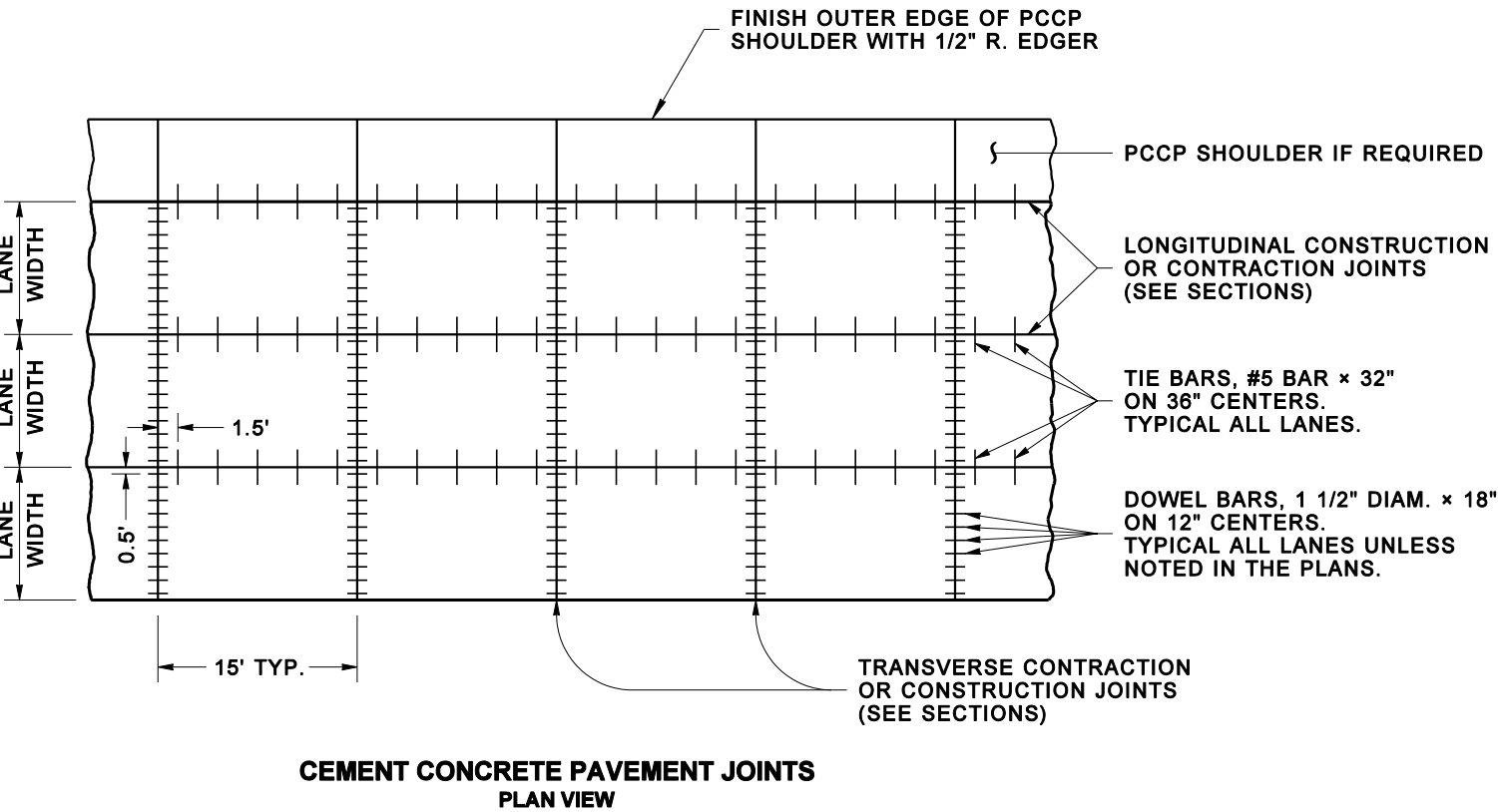
H-1	Guide Posts	1/10/02	
H-1a	Guide Post Placement Grade Intersection	4/14/00	
H-1b	Guide Post Placement for Interchanges	5/5/00	
H-1c	Guide Post Placement for Horizontal Curves	1/10/02	
H-1d	Miscellaneous Guide Post Placement	1/10/02	
H-1e	Guide Post Placement for Bridges	4/14/00	
H-2	Type 3 Barricade	5/29/02	2 Sheets
H-3	Raised Pavement Marking Details	4/14/00	
H-3a	Pavement Marking Details	6/23/00	2 Sheets
H-4	Shoulder Rumble Strip Type 1 for Divided Highways	10/29/03	3 Sheets
H-4a	Shoulder Rumble Strip Type 2,3 and 4 for Undivided Highways	3/11/03	2 Sheets
H-5	Pavement Marking Details	2/18/00	
H-5a	Pavement Marking Details	2/18/00	
H-5b	Pavement Marking Details	2/18/00	
H-5c	Pavement Markings	6/24/02	3 Sheets
H-5d	Raised Pavement Marker Substitution Patterns	4/14/00	2 Sheets
H-5e	Accessible Parking Pavement Markings	2/20/03	
H-6	Survey Monuments Type and Type 2	10/29/03	
H-7	Monument Case and Cover	8/10/98	
H-8	Slope Treatment	9/18/98	
H-9	Embankment at Bridge Ends	4/18/97	
H-10	Cement Concrete Stairway Construction Details	5/29/98	
H-12	Mailbox Installation	5/9/02	3 Sheets
H-13	Type 1 Bollard	7/25/97	
H-13a	Type 2 Bollard	7/25/97	
H-14	Survey Stakes	4/23/99	2 Sheets

Contents

Plan No.	Plan Title	Publication Approval Date
Section I	Roadside and Site Development	
I-1	Rest Area Septic Tank	7/18/97
I-2	Crest Gage	4/23/99
I-3	Automated Ground Water Monitoring Well	8/20/99
I-4	Silt Fence	7/17/03
I-5	Erosion Control At Culvert Ends	7/17/03
I-6	Temporary Silt Fence for Inlet Protection In Unpaved Areas	7/17/03
I-7	Storm Drain Inlet Protection	7/17/03
I-8	Wattle Installation On Slope	7/17/03
I-9	Straw Bale Barrier	7/17/03
I-10	Geotextile Encased Check Dam Installation	7/17/03
I-11	Check Dams	9/11/03
I-12	Erosion Control Blanket Placement On Slope	7/17/03
I-13	Erosion Control Blanket Placement In Channel	7/17/03
I-14	Miscellaneous Erosion Control Details	7/17/03
 Section J	 Illumination and Signals	
J-1b	Steel Light Standard Base Details	10/8/99 3 Sheets
J-1c	Slip Base Adaptor for 4-Bolt Light Standard Base	4/24/98
J-1e	Light Standards Wiring Details	8/1/97
J-1f	Timber Light Standards	6/23/00
J-3	Type A, B, and C Service Lighting Details	8/1/97 2 Sheets
J-3b	Service Cabinet Type B Modified (0 - 200 Amp Type, 120/240 Single Phase)	11/5/03 2 Sheets
J-3c	Service Cabinet Type D (0 - 200 Amp Type, 120/240 Single Phase)	6/24/02
J-3d	Service Cabinet Type E (0 - 200 Amp Type, 240/480 Single Phase)	11/5/03
J-5	Pedestrian Pushbutton Details	8/1/97
J-6c	Cabinet Foundation Details	4/24/98
J-6f	Signal Head Mounting Details Pole and Post Top Mountings	4/24/98
J-6g	Signal Head Mounting Details Mast Arm and Span Wire Mountings	12/12/02
J-6h	Miscellaneous Signal Details	4/24/98
J-7a	Signal Standard Type Designations and Type PPB, PS, I, RM, and FB Details	9/12/01 2 Sheets
J-7c	Strain Pole Standards Type IV and V	6/19/98
J-7d	Span Wire Installation	4/24/98
J-8a	Induction Loop Details	8/1/97 2 Sheets
J-9a	Typical Grounding Details	4/24/98
J-10	Electrical Conduit Placement	7/18/97
J-11a	Standard Junction Box	9/12/01

Contents

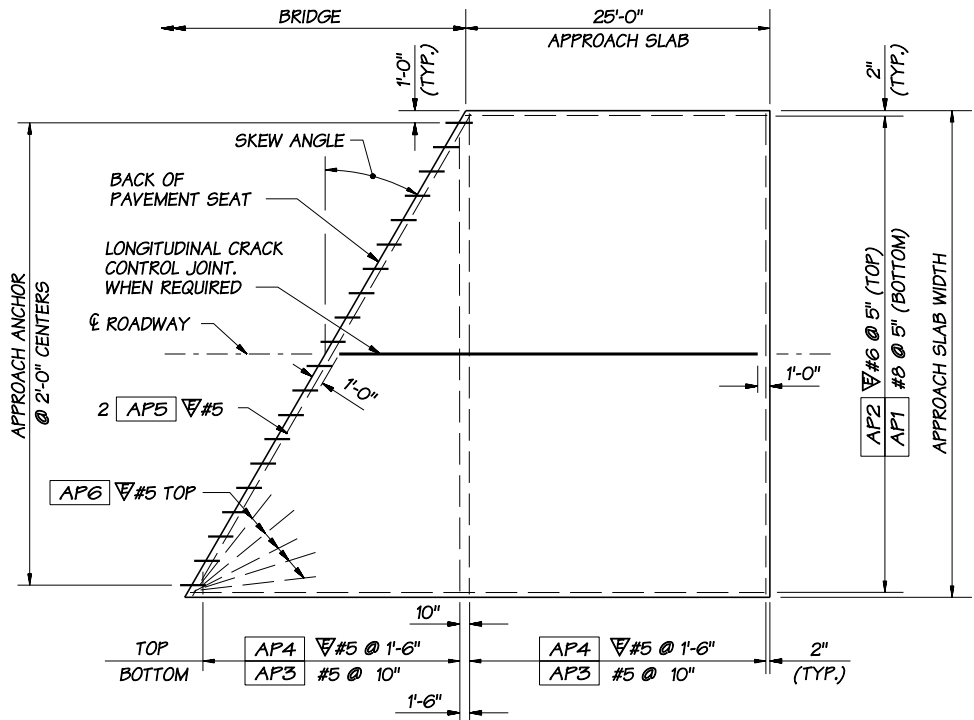
Plan No.	Plan Title	Publication Approval Date
Section K Work Zone Traffic Control Plans		
(Not for use on projects administered by WSDOT)		
K-1	Road Closure With Diversion	12/20/02
K-2	Road Closure With Off Site Detour	12/20/02
K-3	Alternating One Way Traffic, Flagger Controlled Or Pilot Car Controlled	12/20/02
K-4	Alternating One Way Traffic, Temporary Signal Controlled	12/20/02
K-5	Mobile Shoulder Operation With Lane Encroachment	12/20/02
K-6	Right Lane Closure For Divided Highway	12/20/02
K-7	Lane Closure With Temporary Concrete Barrier	12/20/02
K-8	Paving Operations Non-Working Hours	12/20/02
K-9	Shoulder Closure, High Speed	12/20/02
K-10	Shoulder Closure, Low Speed	12/20/02
K-11	Shoulder Work Areas	12/20/02
K-12	Short Term Duration Or Mobile Operation Shoulder Closure	12/20/02
K-13	Intersection Closure Work, 4 Way Intersection	12/20/02
K-14	Pedestrian Traffic Control At Intersections	12/20/02
K-15	Intersection Lane Closure, Three Lane Roadway	12/20/02
K-16	Intersection Lane Closure, Five Lane Roadway	12/20/02
K-17	Left Lane And Center Turn Lane Closure, Five Lane Roadway	12/20/02
K-18	Lane Shift, Three Lane Roadway	12/20/02
K-19	Right Lane Closure With Lane Shift, Five Lane Roadway	12/20/02
K-20	Half Road Closure	12/20/02
K-21	Multiple Lane Closures At Intersection	12/20/02
K-22	Lane Closure On Low Volume, Two Lane Road Without Flaggers	12/20/02
K-23	Work In Center Of Low Volume Road	12/20/02
K-24	Surveying Along Centerline Of Low Volume Road	12/20/02
K-25	Left Lane Closure On Far Side Of Intersection	12/20/02
K-26	Right Lane Closure On Far Side Of Intersection	12/20/02
K-27	One Lane Repair During Non-Working Hours	12/20/02
Section L Fence and Glare Screen		
L-1	Wire Fence	7/18/97 2 Sheets
L-2	Chain Link Fence	7/18/97 2 Sheets
L-3	Chain Link Gates	7/18/97
L-5	Glare Screen Type 1	7/31/98
L-5a	Glare Screen Type 2	7/31/98
L-6	Access Control Gate	7/25/97



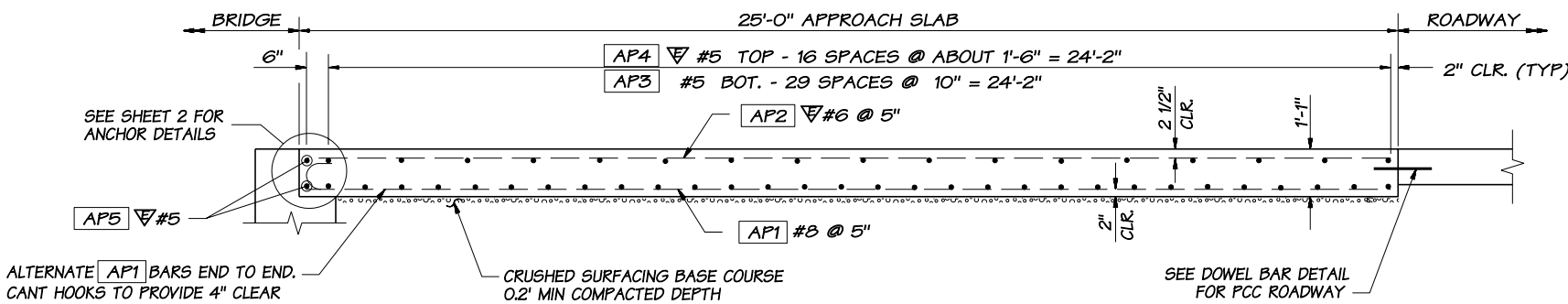
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**CEMENT CONCRETE
PAVEMENT JOINTS
STANDARD PLAN A-1**

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.			APPROVED FOR PUBLICATION	
01/2002		DELETED PLAIN JOINT LAYOUT PLAN; DELETED CURB/BARRIER JOINT SECTION; REVISED CONSTRUCTION JOINT GROOVE DEPTHS	MAS	Harold J. Peterfeso 05-13-02
DATE	REVISION		BY	STATE DESIGN ENGINEER DATE
				Washington State Department of Transportation



PLAN



LONGITUDINAL SECTION

BAR LIST FOR STANDARD 10' X 25' APP. SLAB QUANTITY MODULE					APPROXIMATE QUANTITIES (PER SY) FOR SLAB (BASED ON QUANTITY MODULE)	
LOCATION	MARK #	SIZE	NO.	LENGTH	SLAB EPOXY COATED REINFORCING BARS (TOP MAT)	38.52 LBS/SY
LONGITUDINAL BOTTOM	AP1	8	24	25'-7"	SLAB REINFORCING BARS (BOTTOM MAT)	72.38 LBS/SY
LONGITUDINAL TOP	AP2	6	24	24'-8"	CONCRETE (CU. YDS.)	0.361 CY/SY
TRANSVERSE BOTTOM	AP3	5	30	9'-8"	APPROACH ANCHORS AND PCC ROADWAY DOWELS	AS REQUIRED
TRANSVERSE TOP	AP4	5	17	9'-8"	10 - AP6 #5 (IF REQUIRED)	105 LBS.
TRANSVERSE END BAR	AP5	5	2	9'-8"		

AP1 24' - 8"

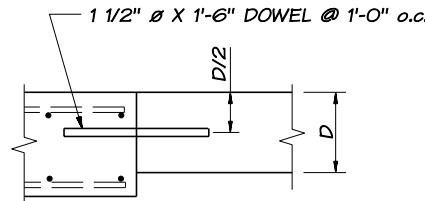
BENDING DETAIL FOR QUANTITIES

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

AP = EPOXY COATED REINFORCING STEEL

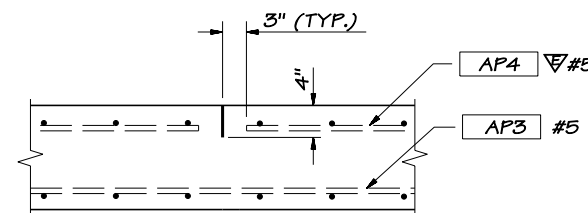
NOTES:

- ALL EDGES OF APPROACH SLAB SHALL HAVE 1/2" RADIUS.
- LONGITUDINAL JOINTS SHALL BE PLACED ON LANE LINES AND SHALL BE CONSTRUCTED AND SEALED IN ACCORDANCE WITH STD. SPEC. SECTION 5-05.3(8). JOINTS MAY BE EITHER A SAW CUT CRACK CONTROL JOINT OR A CONSTRUCTION JOINT. SAWCUT JOINTS SHALL TERMINATE 1'-0" BEFORE REACHING EDGE OF SLAB AND MUST BE SAW CUT AS SOON AS POSSIBLE AFTER PLACEMENT OF CONCRETE.
 - APPROACH SLABS LESS THAN 40' WIDE - NO JOINT IS REQUIRED.
 - APPROACH SLABS WIDER THAN 40' - ONE OR MORE JOINTS ARE REQUIRED TO DIVIDE THE SLAB INTO APPROXIMATELY 24' WIDE SECTIONS.

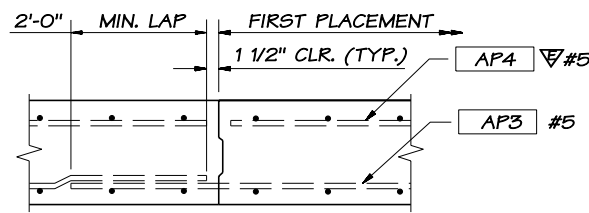


TYPICAL PCC ROADWAY
DOWEL BAR DETAIL

INSERT DOWELS PARALLEL TO CENTER LINE
ALONG TRANSVERSE CONSTRUCTION JOINT.

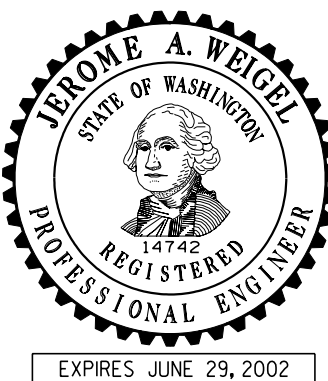


TYPICAL LONGITUDINAL CRACK
CONTROL JOINT DETAIL



TYPICAL LONGITUDINAL
CONSTRUCTION JOINT

EDGE FIRST POUR ONLY WITH 1/8" RADIUS.



BRIDGE APPROACH SLAB

STANDARD PLAN A-2

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

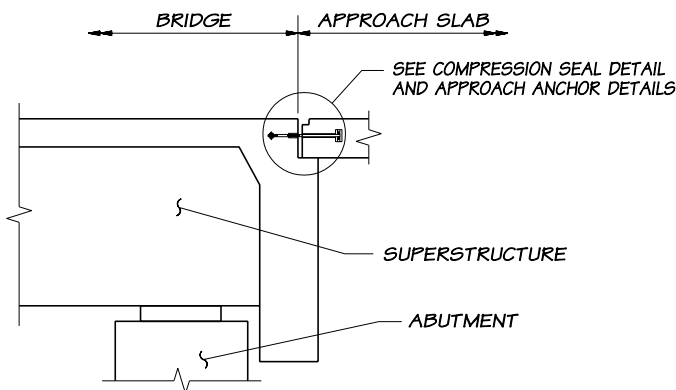
Harold J. Peterfeso 05-09-02

STATE DESIGN ENGINEER

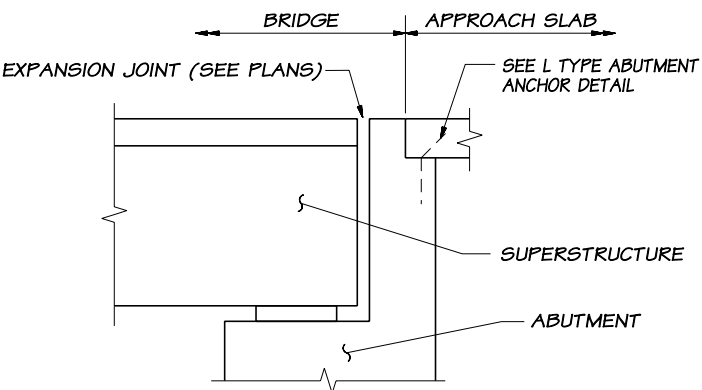
DATE



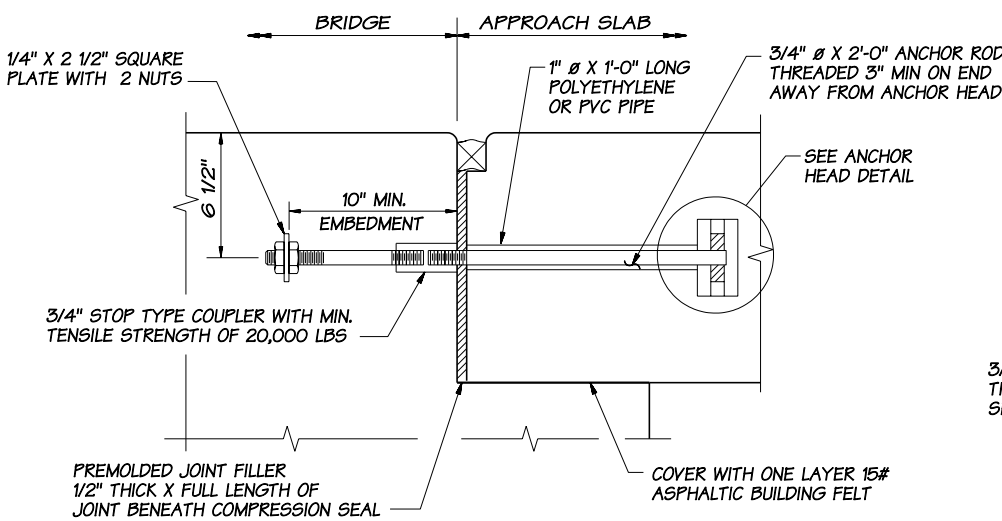
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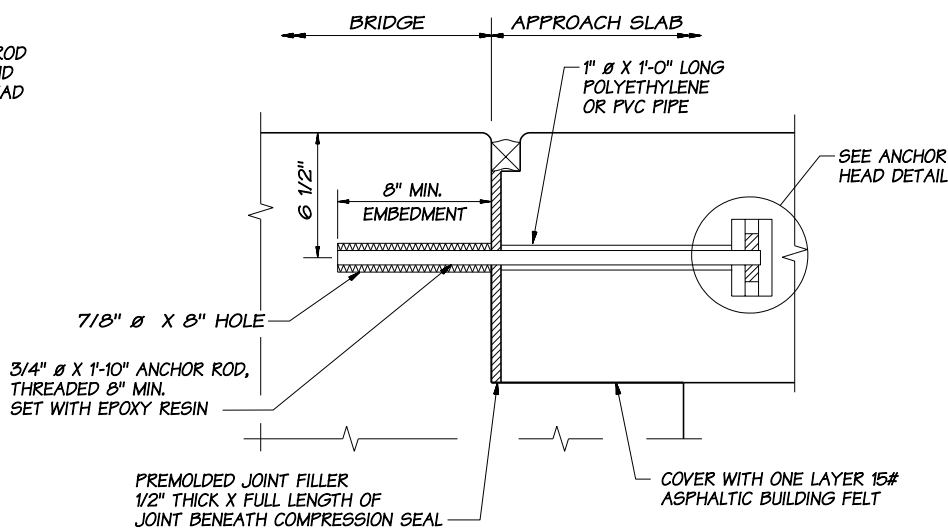
SEMI-INTEGRAL TYPE ABUTMENT



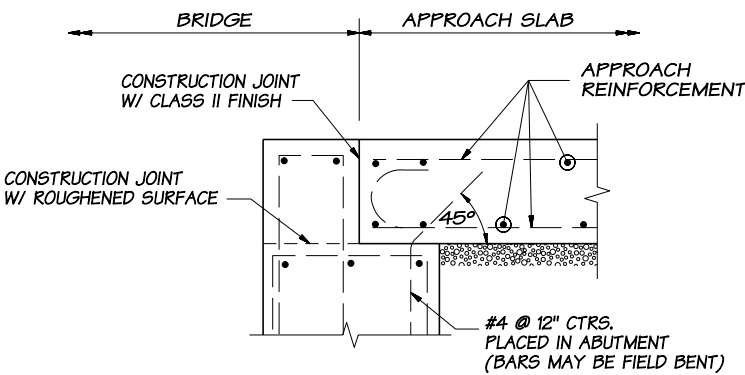
L TYPE ABUTMENT



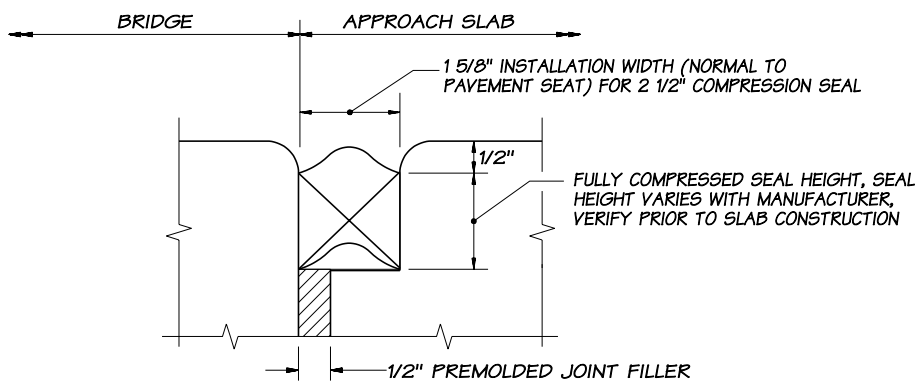
APPROACH ANCHOR - METHOD A
SEMI-INTEGRAL TYPE ONLY



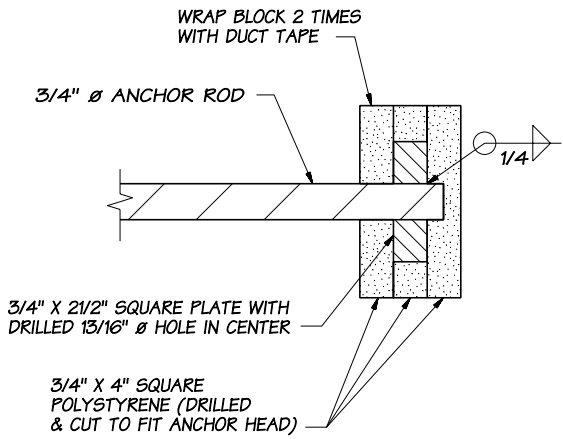
APPROACH ANCHOR - METHOD B
SEMI-INTEGRAL TYPE ONLY



L TYPE ABUTMENT ANCHOR DETAIL

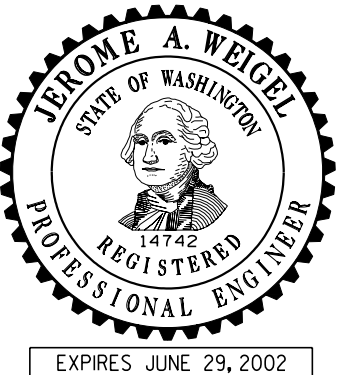


COMPRESSION SEAL DETAIL



ANCHOR HEAD DETAIL

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



**BRIDGE APPROACH SLAB
STANDARD PLAN A-2**

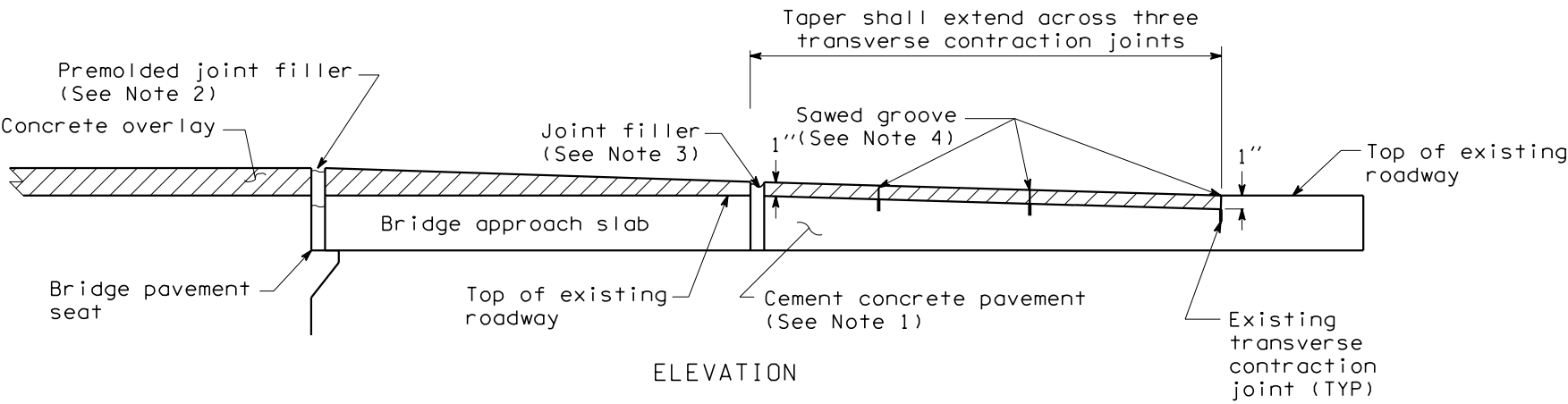
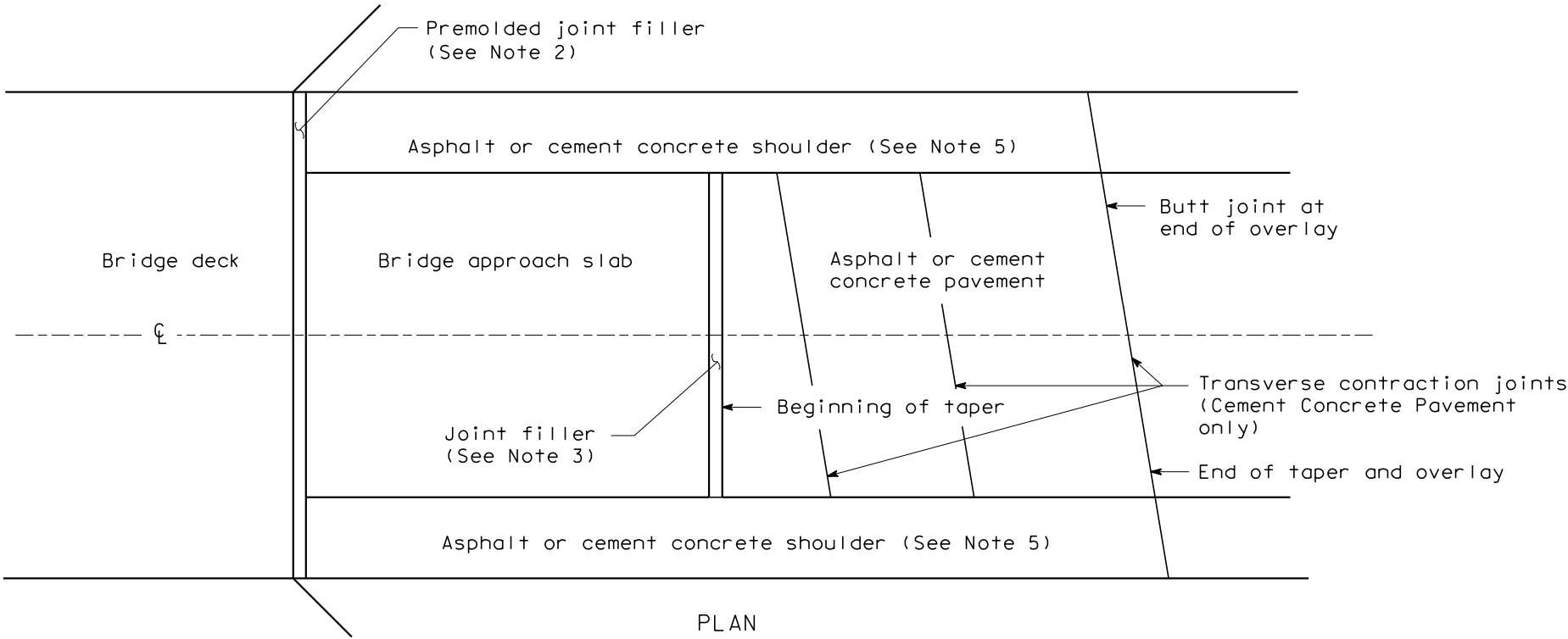
SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

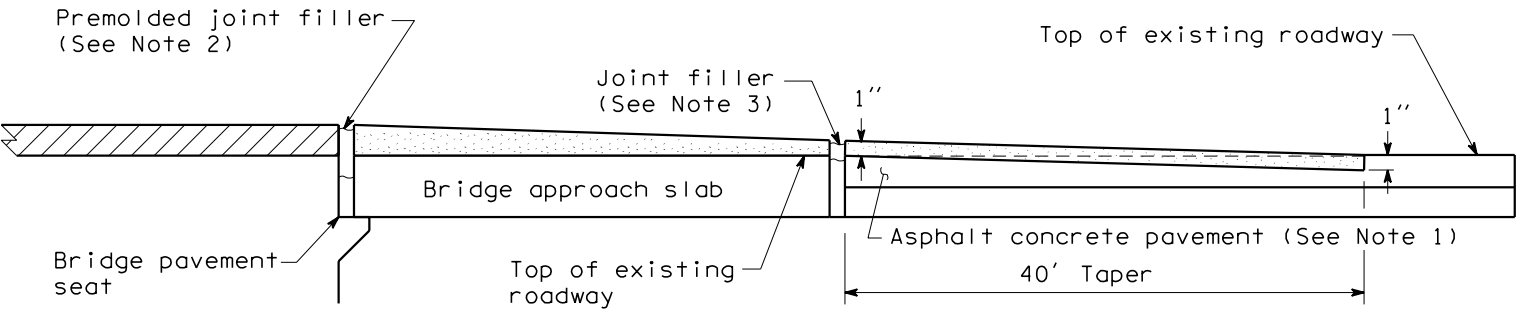
Harold J. Peterfeso 05-09-02
STATE DESIGN ENGINEER DATE



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CASE 1
CEMENT CONCRETE PAVEMENT WITH ASPHALT
OR CEMENT CONCRETE SHOULDER



CASE 2
ASPHALT CONCRETE PAVEMENT
(Diaphragm cast on structure)



EXPIRES JULY 27, 2003

**TRANSITION FROM
CONCRETE OVERLAY**
STANDARD PLAN A-3

SHEET 1 OF 2 SHEETS

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05/2002	CORRECTED TAPER LENGTH FROM 40" TO 40'.	RG
DATE	REVISION	BY

APPROVED FOR PUBLICATION

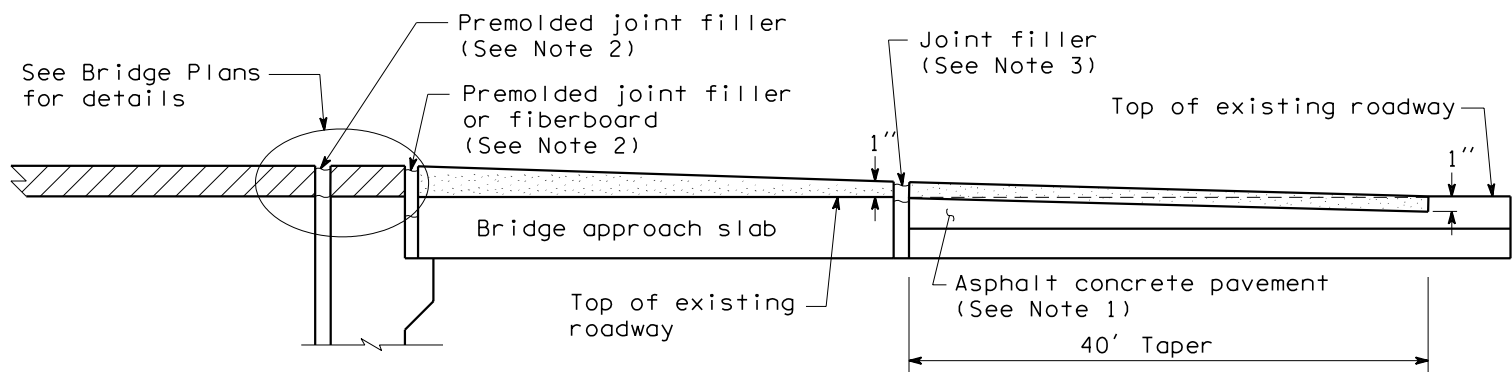
Harold J. Peterfeso 05-30-02

STATE DESIGN ENGINEER

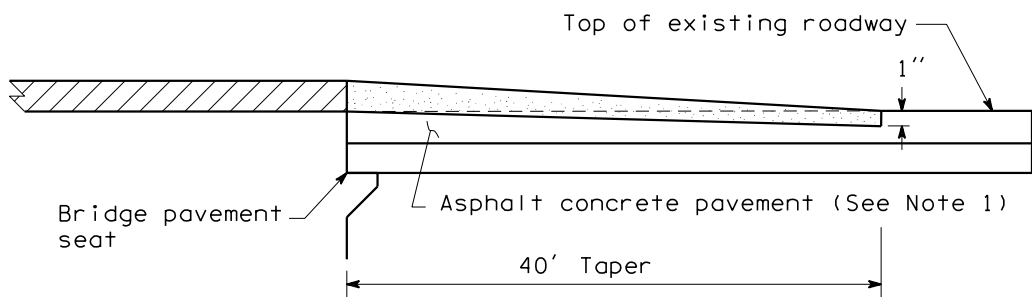
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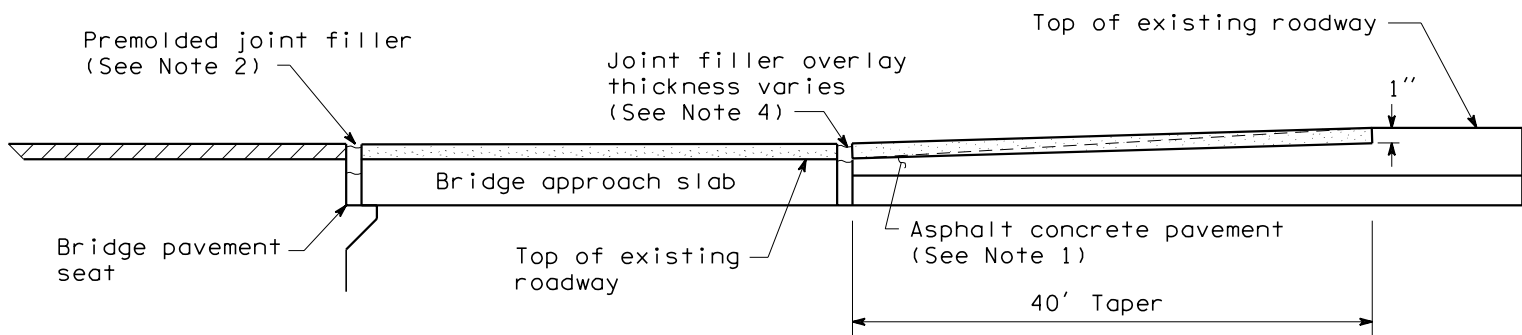
Washington State Department of Transportation



CASE 3
ASPHALT CONCRETE PAVEMENT
(L-Type Abutment)



CASE 4
ASPHALT CONCRETE PAVEMENT

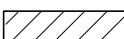



CASE 5
ASPHALT CONCRETE PAVEMENT
(ACP was on bridge and/or roadway
grade slopes up from bridge)

NOTES

1. Plane a taper into the existing pavement and shoulders (if paved). Depth shall taper from 0" at the beginning of pavement, to 1" at end of taper. Does not apply when existing pavement has been planed.
2. Before placing overlay, remove top 2" of existing joint filler, or 3" if existing joint is fiberboard, and block out the joint. After overlay, install new premolded joint filler. Top of joint filler shall be between $\frac{3}{16}$ " and $\frac{3}{8}$ " below overlay. When a compression seal is in place, see Bridge Plans.
3. Before placing overlay, block out the joint. After overlay, install premolded joint filler or rubberized asphalt filler. Top of joint filler shall be between $\frac{3}{16}$ " and $\frac{3}{8}$ " below overlay.
4. Full depth sawed grooves between $\frac{1}{8}$ " and $\frac{1}{4}$ " wide shall be placed directly over the existing sawed grooves in the cement concrete pavement and cement concrete shoulders.
5. Cement concrete shoulders shall be overlaid with cement concrete. Asphalt concrete shoulders shall be overlaid with asphalt concrete.

LEGEND

-  Concrete Overlay
-  Asphalt Concrete Overlay



EXPIRES JULY 27, 2003

**TRANSITION FROM
CONCRETE OVERLAY**

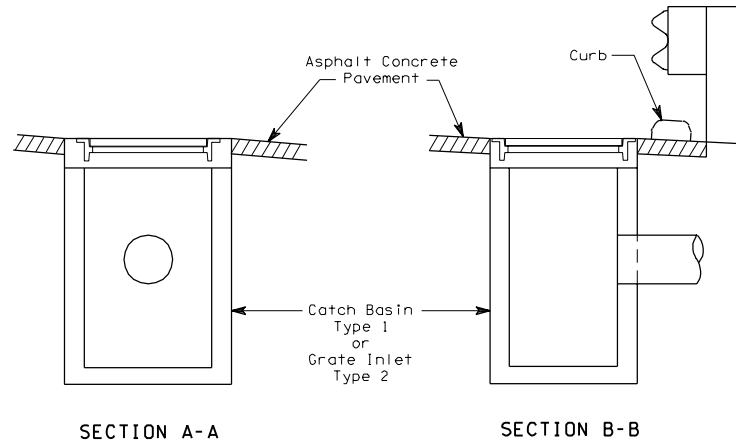
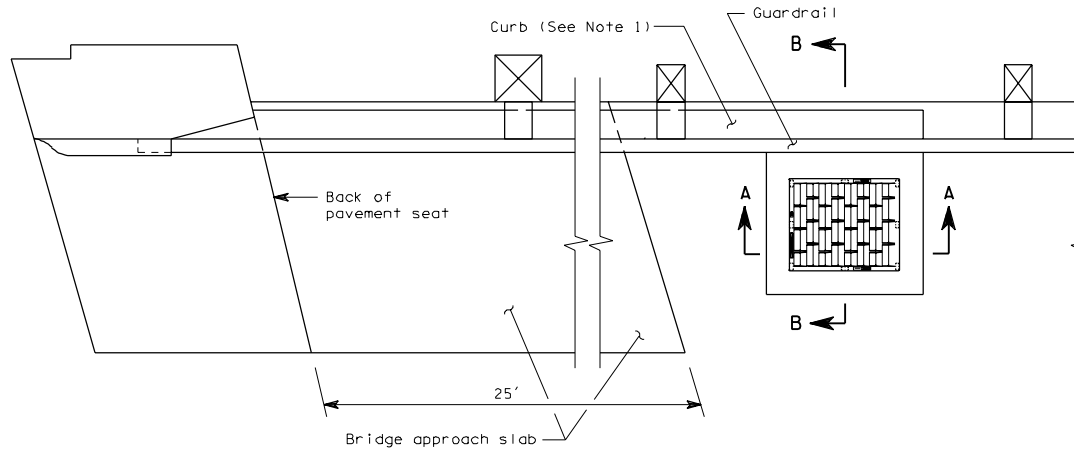
STANDARD PLAN A-3

SHEET 2 OF 2 SHEETS

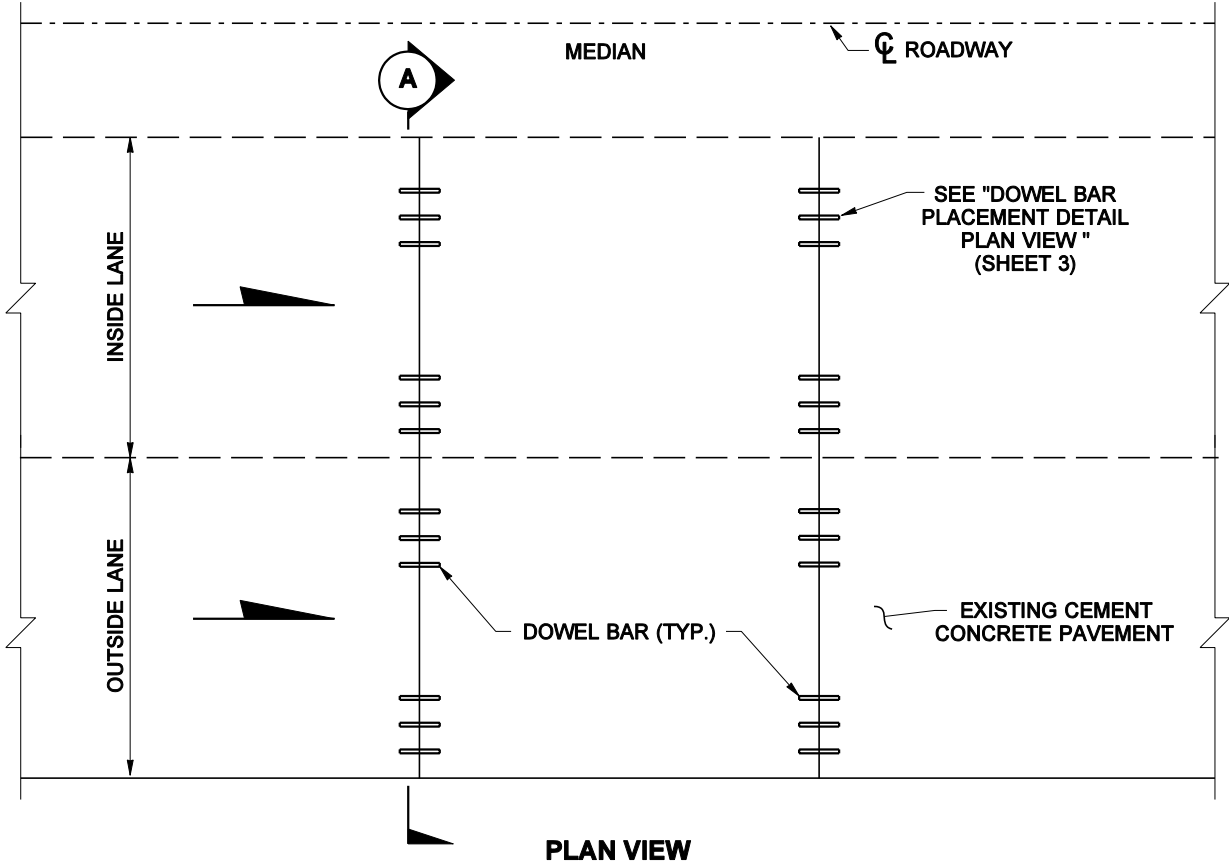
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05/2002		CORRECTED TAPER LENGTH FROM 40" TO 40'.	RG	DATE
DATE		REVISION	BY	DATE
			Washington State Department of Transportation	

NOTES

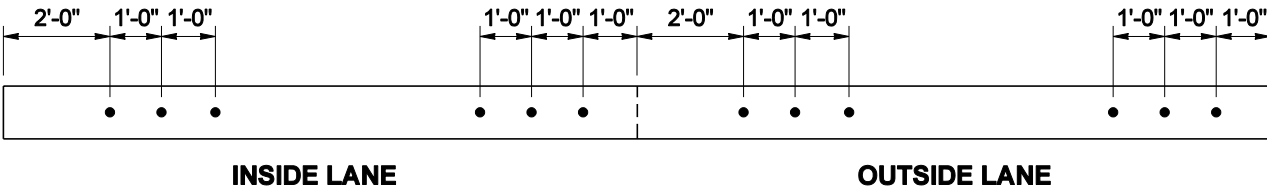
1. Curb shall be Extruded Curb Type 1, 2, 4, 4a, 5, or 5a, as specified in the contract.
2. Catch basin or grate inlet shall be located between guardrail posts.



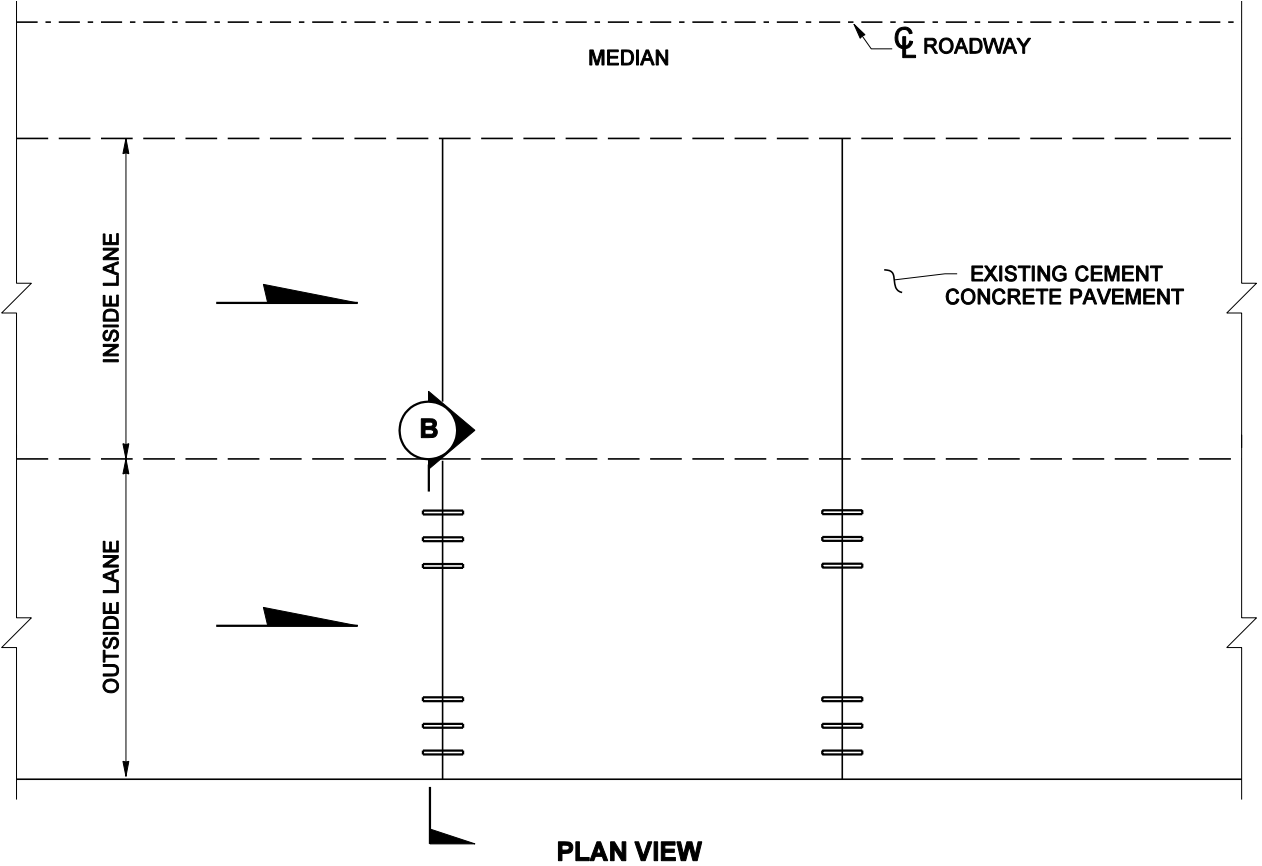
INLET PLACEMENT
AT BRIDGE END



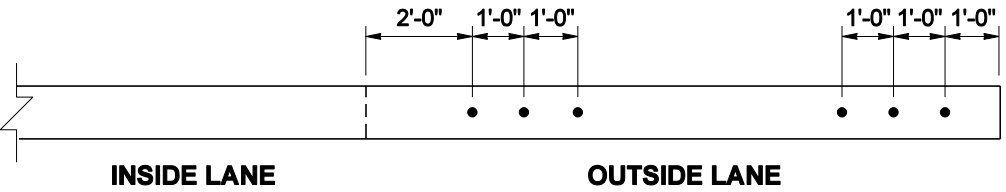
**DIVIDED HIGHWAY
(ONE WAY TRAFFIC)
DOWEL BAR RETROFIT
FOR TWO LANES**



SECTION A



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



SECTION B



EXPIRES JULY 27, 2003

**DOWEL BAR RETROFIT
FOR CEMENT
CONCRETE PAVEMENT
STANDARD PLAN A-5**

SHEET 1 OF 3 SHEETS

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Harold J. Peterfeso 02-24-03

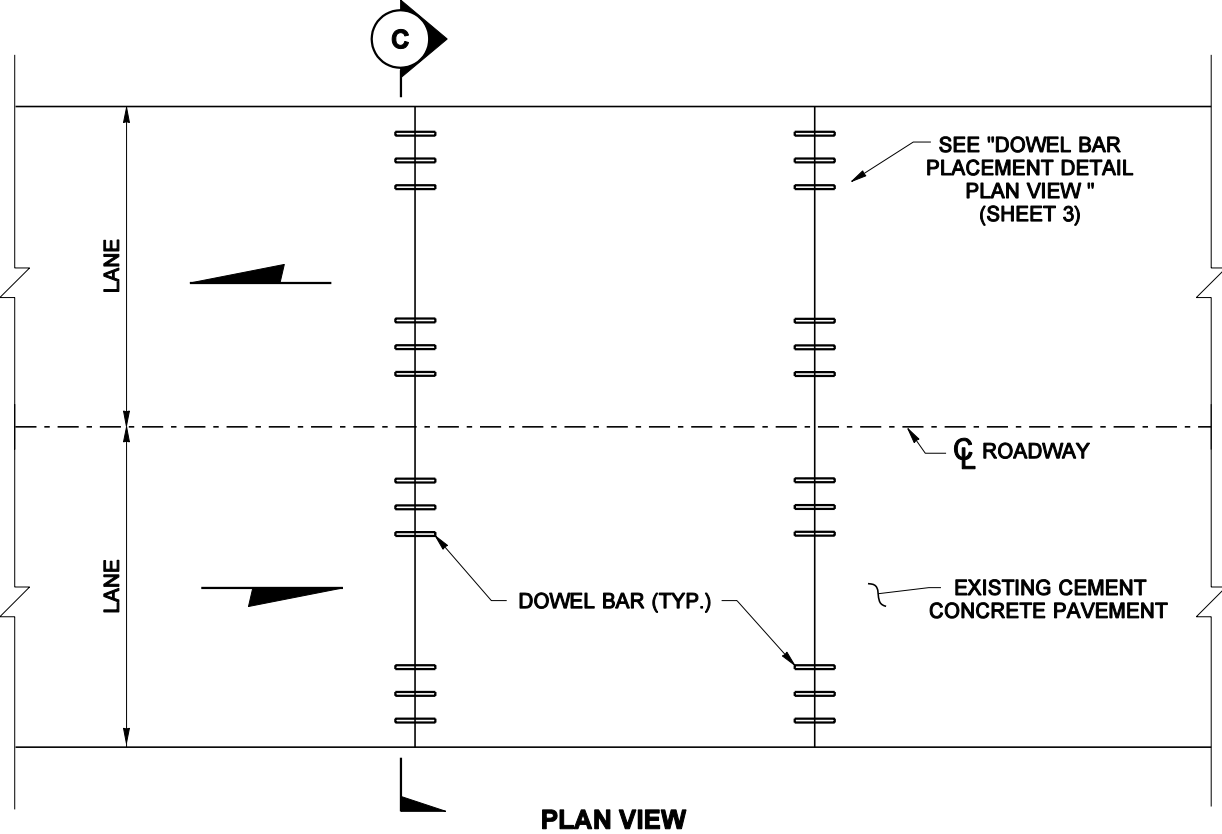
STATE DESIGN ENGINEER

DATE

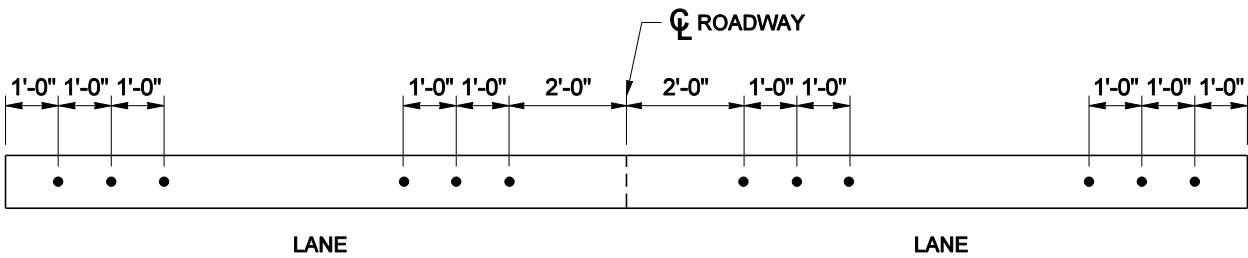


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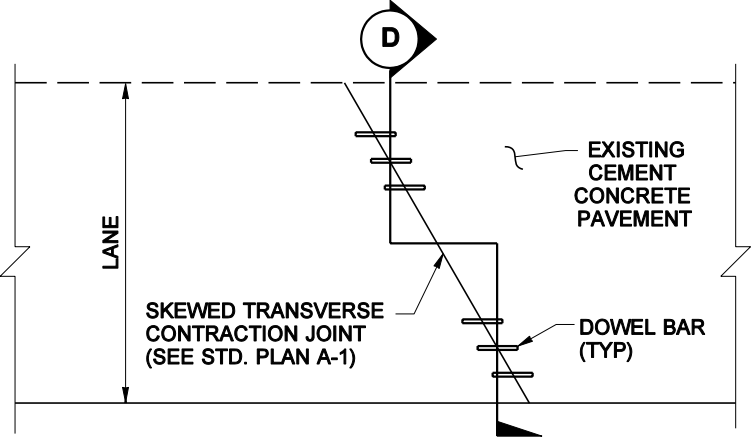
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UNDIVIDED HIGHWAY
(TWO WAY TRAFFIC)
DOWEL BAR RETROFIT
FOR EACH LANE

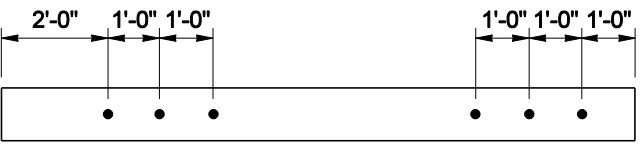


SECTION C



PLAN VIEW

SKEWED JOINT DETAIL



LANE

SECTION D



EXPIRES JULY 27, 2003

**DOWEL BAR RETROFIT
FOR CEMENT
CONCRETE PAVEMENT
STANDARD PLAN A-5**

SHEET 2 OF 3 SHEETS

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Harold J. Peterfeso 02-24-03

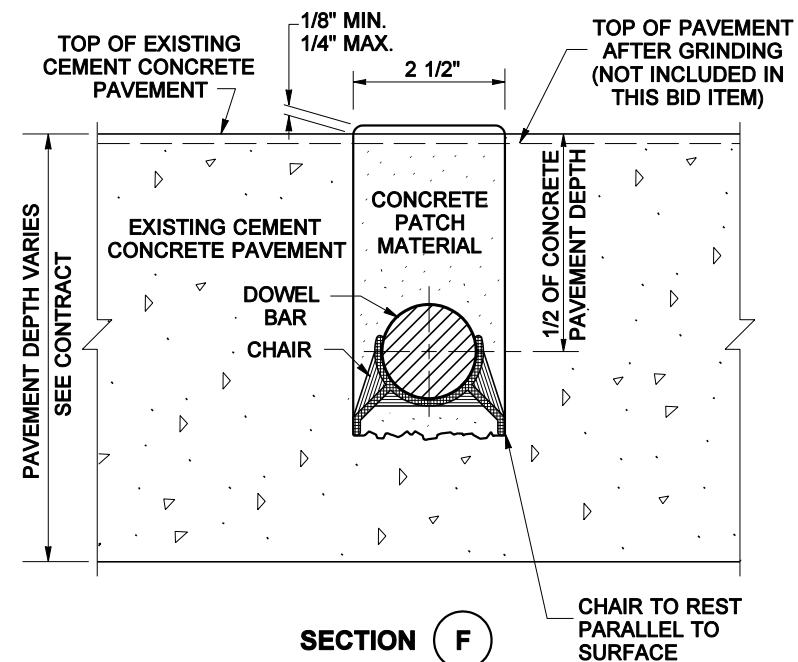
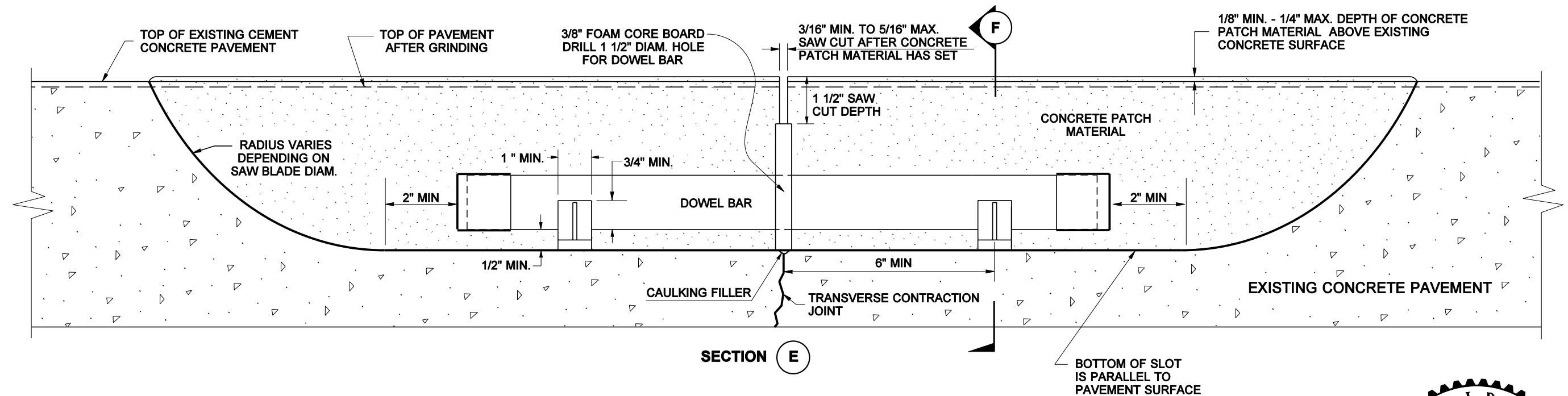
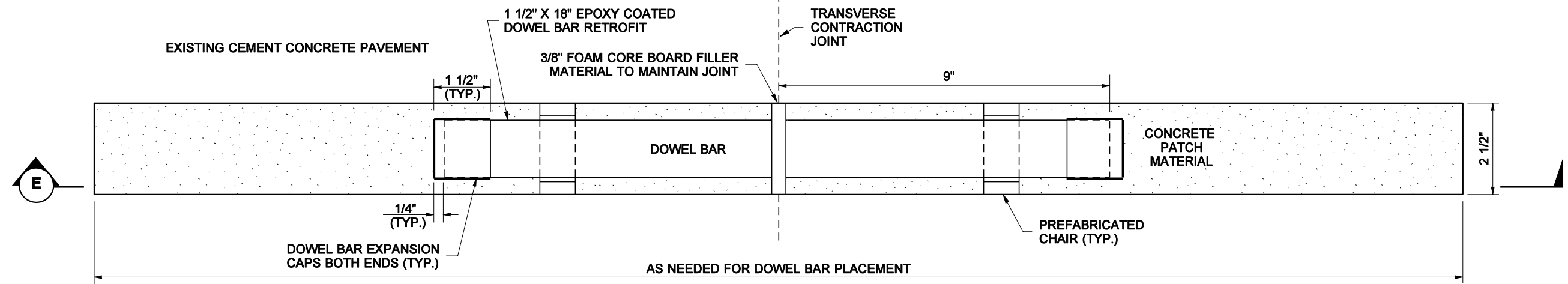
STATE DESIGN ENGINEER

DATE



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EXPIRES JULY 27, 2003

**DOWEL BAR RETROFIT
FOR CEMENT
CONCRETE PAVEMENT
STANDARD PLAN A-5**

SHEET 3 OF 3 SHEETS

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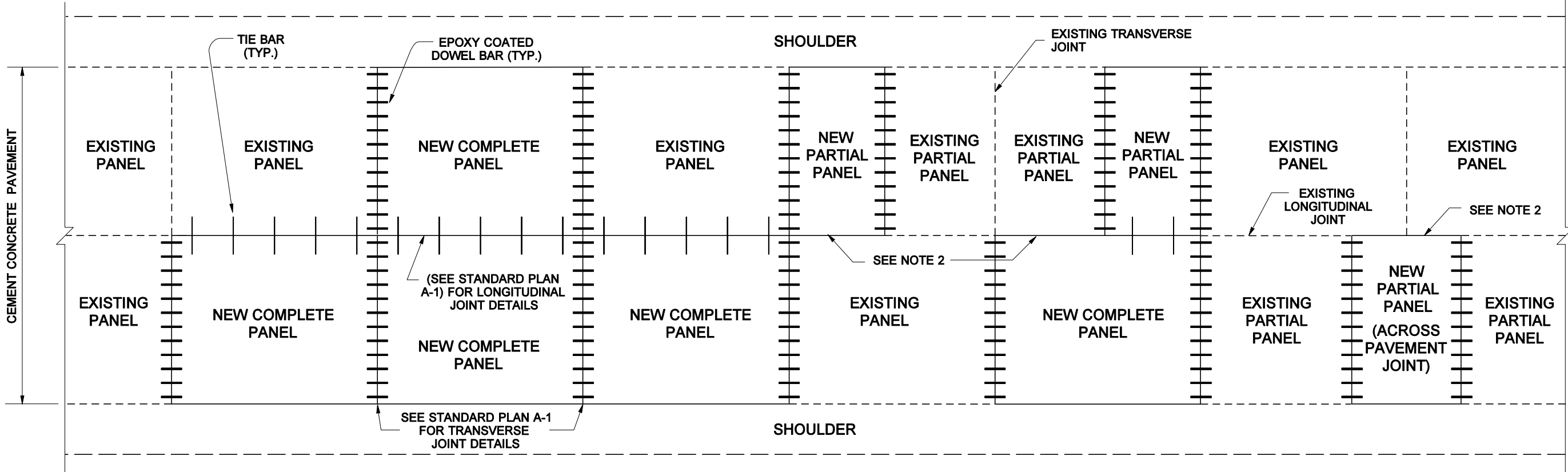
STATE DESIGN ENGINEER

DATE

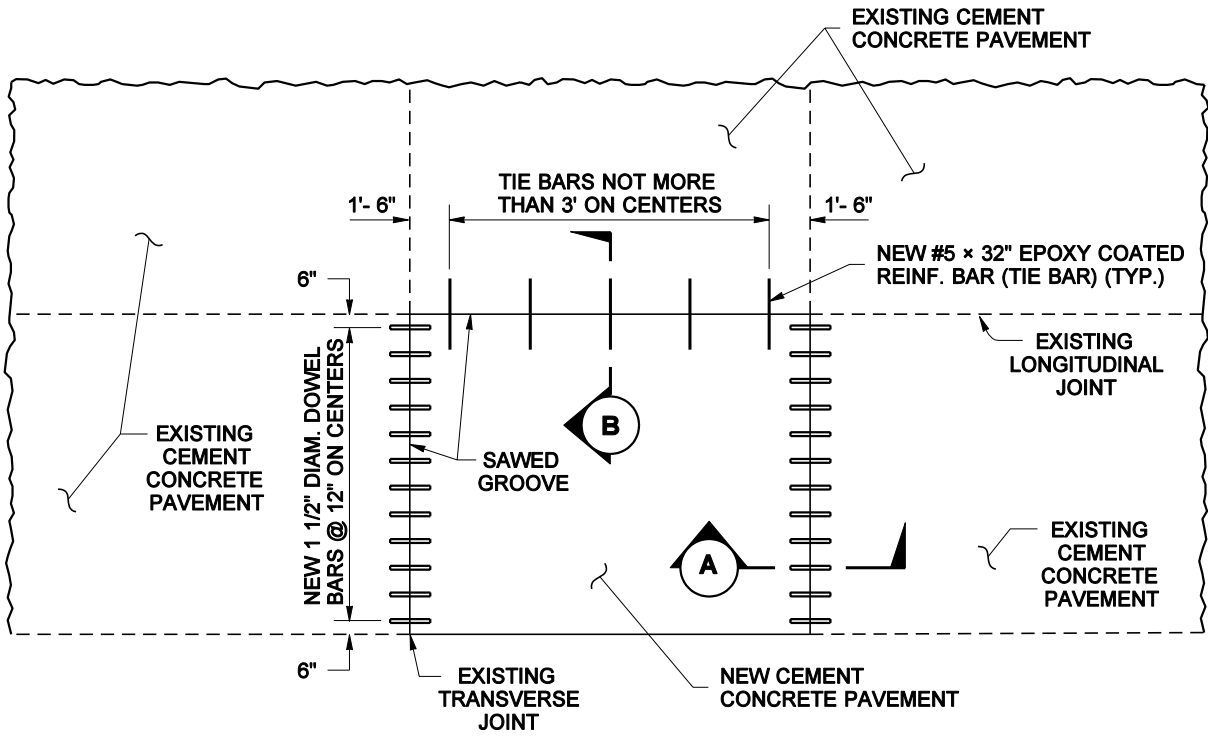


Washington State Department of Transportation

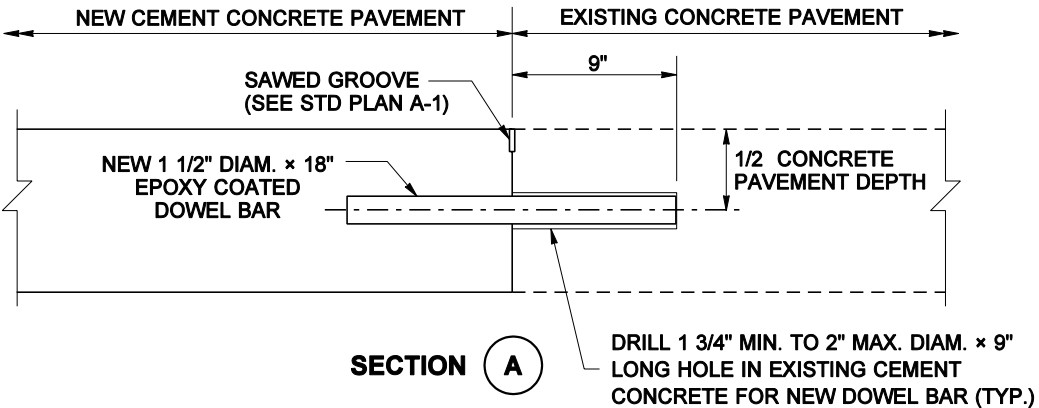
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PLAN VIEW
PANEL REPLACEMENT



PLAN VIEW
COMPLETE PANEL REPLACEMENT



NOTES

1. Install tie bars along longitudinal joint between full panel replacement and existing cement concrete pavement. Tie bars are not installed between cement concrete pavement and asphalt concrete shoulders.
2. Place polyethylene film (per AASHTO M 171-00) along the longitudinal joint between partial panel replacement and existing panel.

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EXPIRES JULY 27, 2003

**CEMENT CONCRETE
PAVEMENT REPAIR
STANDARD PLAN A-6**

SHEET 1 OF 2 SHEETS

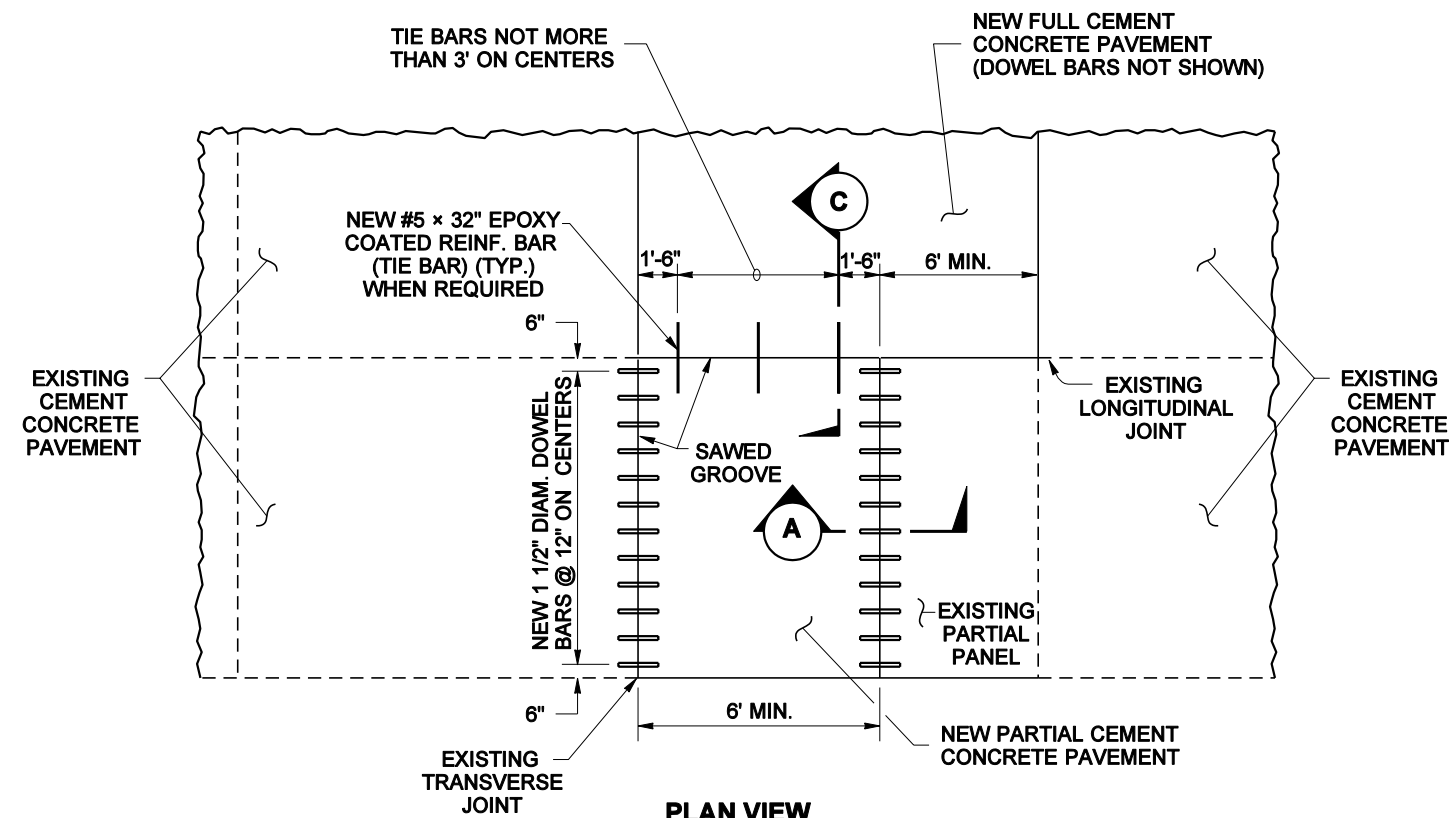
APPROVED FOR PUBLICATION

Harold J. Peterfeso 02-24-03

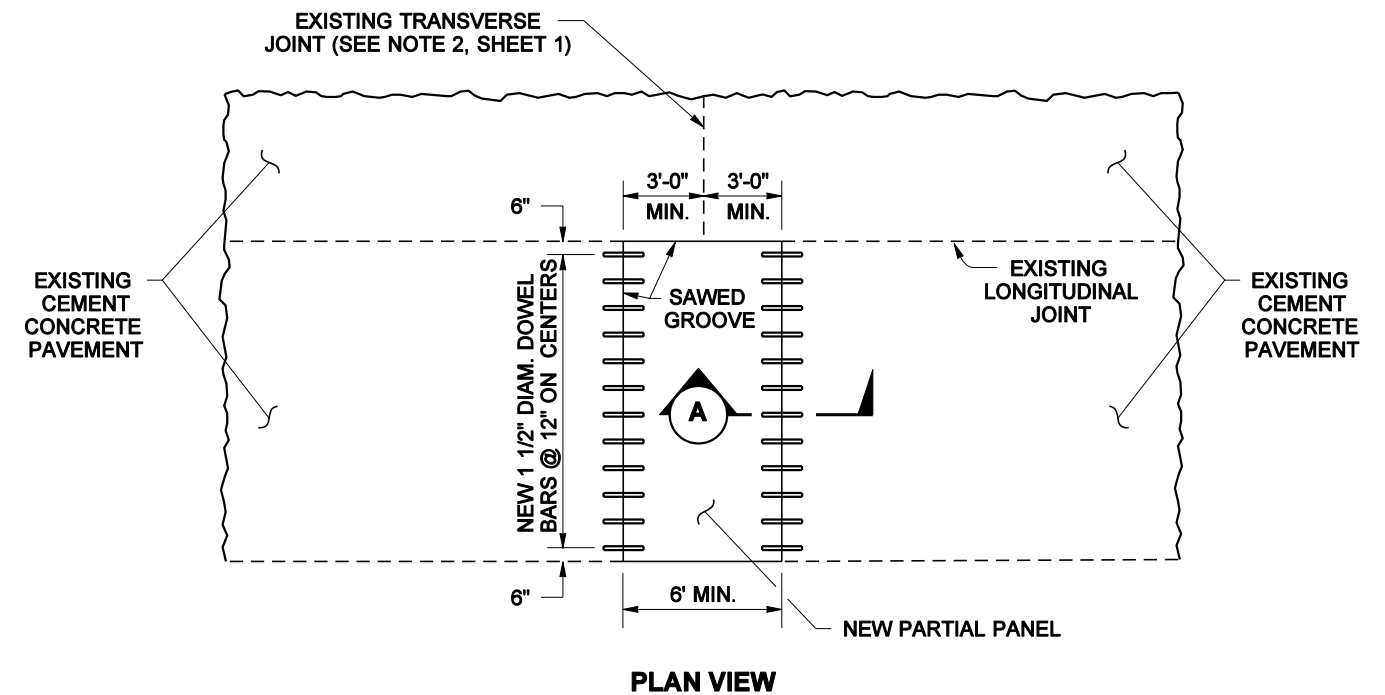
STATE DESIGN ENGINEER DATE



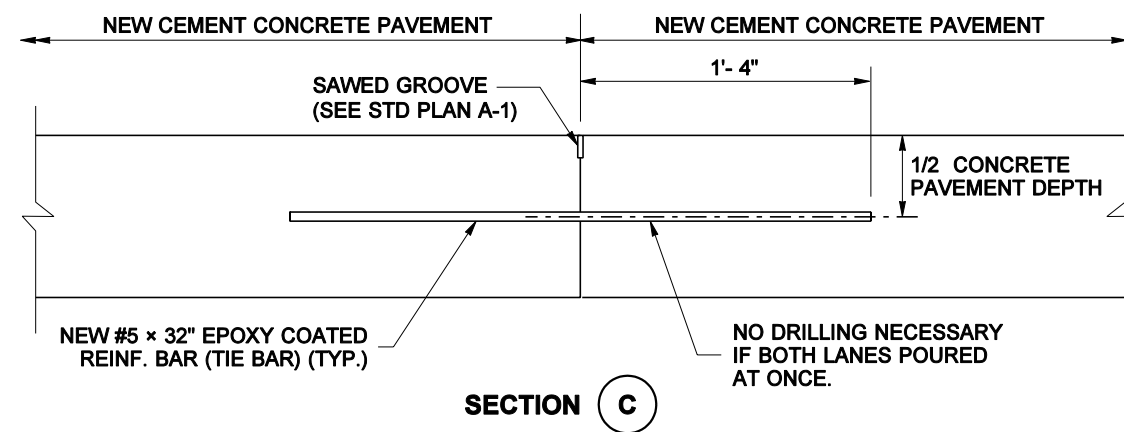
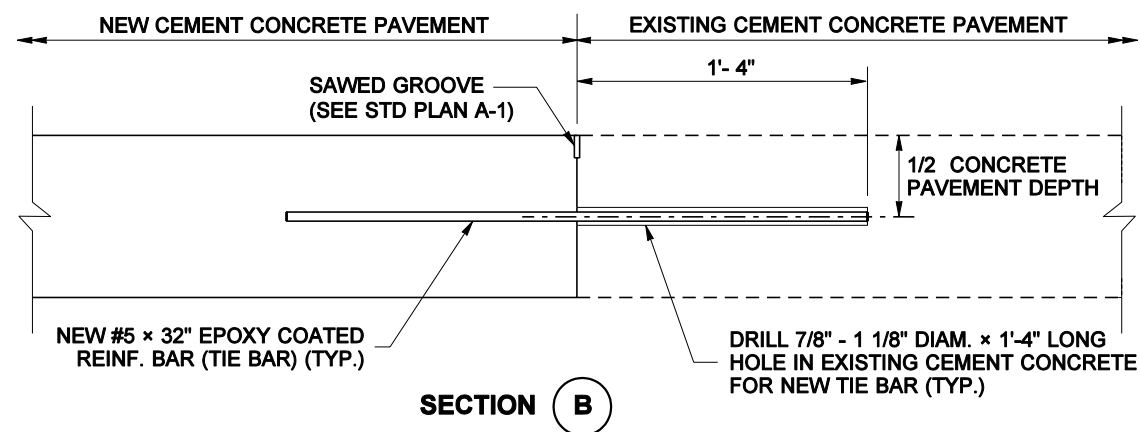
Washington State Department of Transportation



**PARTIAL PANEL REPLACEMENT
WITH TIE BARS**



**PARTIAL PANEL REPLACEMENT
WITHOUT TIE BARS**



EXPIRES JULY 27, 2003

**CEMENT CONCRETE
PAVEMENT REPAIR**

STANDARD PLAN A-6

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 02-24-03

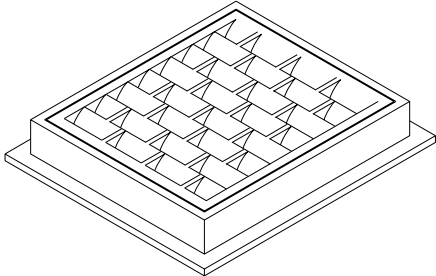
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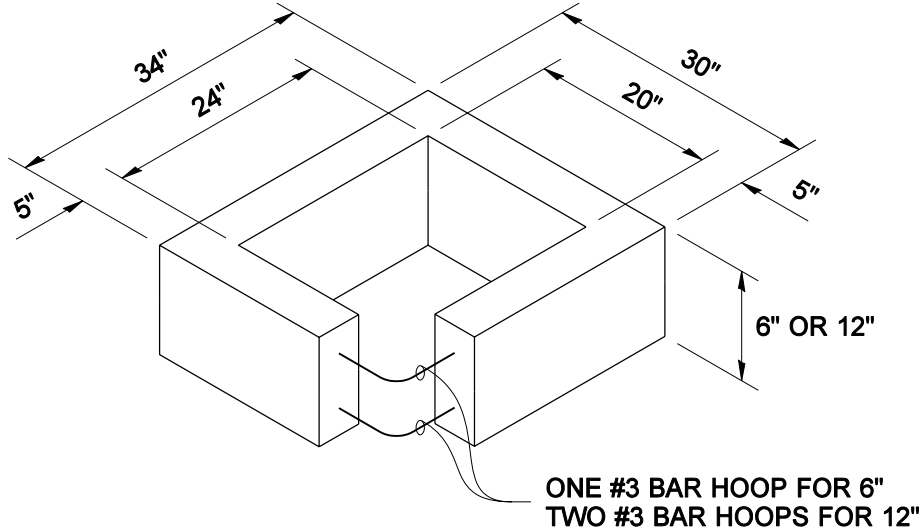


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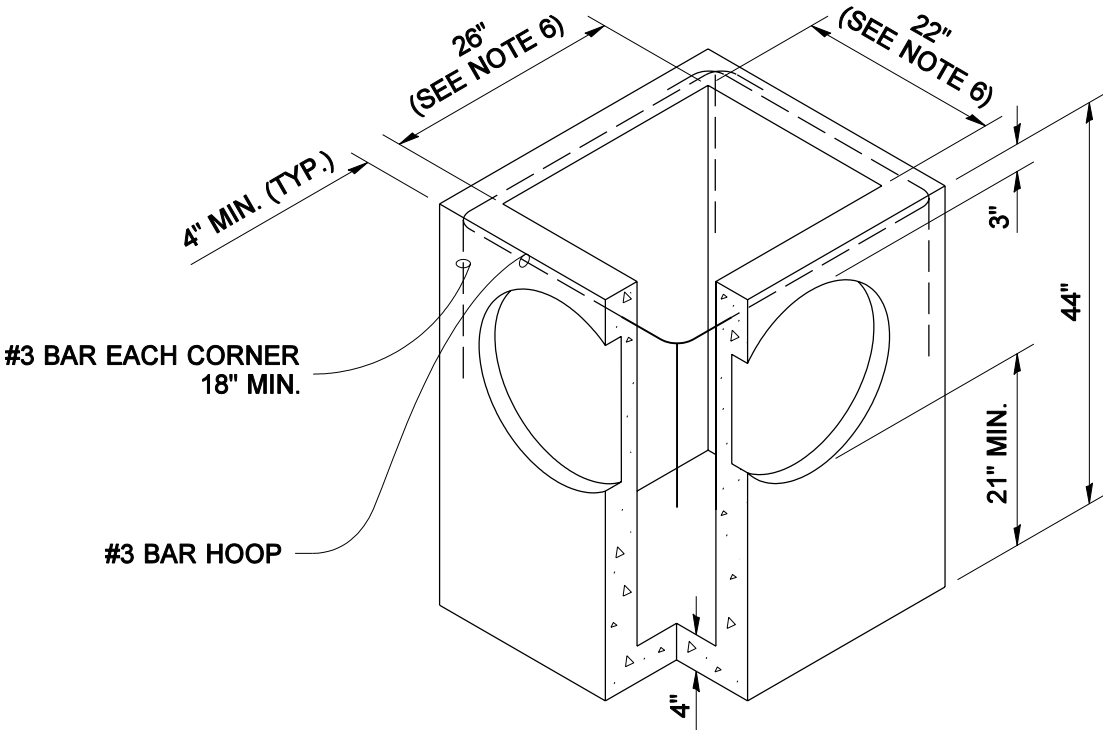
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FRAME AND VANED GRATE



RECTANGULAR ADJUSTMENT SECTION



PRECAST BASE SECTION

NOTES

- 1. AS AN ACCEPTABLE ALTERNATE TO REBAR, WIRE MESH HAVING A MINIMUM AREA OF 0.12 SQUARE INCHES PER FOOT MAY BE USED. WIRE MESH SHALL NOT BE PLACED IN KNOCKOUTS.
- 2. THE KNOCKOUT DIAMETER SHALL NOT BE GREATER THAN 20". KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MINIMUM TO 2.5" MAXIMUM. PROVIDE A 1.5" MINIMUM GAP BETWEEN THE KNOCKOUT WALL AND THE OUTSIDE OF THE PIPE. AFTER THE PIPE IS INSTALLED, FILL THE GAP WITH JOINT MORTAR IN ACCORDANCE WITH STANDARD SPECIFICATION 9-04.3.
- 3. THE MAXIMUM DEPTH FROM THE FINISHED GRADE TO THE PIPE INVERT SHALL BE 5'.
- 4. FRAME AND GRATE MAY BE INSTALLED WITH FLANGE DOWN OR CAST INTO ADJUSTMENT SECTION.
- 5. THE PRECAST BASE SECTION MAY HAVE A ROUNDED FLOOR AND THE WALLS MAY BE SLOPED AT A RATE OF 1:24 OR STEEPER.
- 6. OPENING SHALL BE MEASURED AT THE TOP OF THE PRECAST BASE SECTION.

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

* CORRUGATED POLYETHYLENE STORM SEWER PIPE



CATCH BASIN TYPE 1

STANDARD PLAN B-1

SHEET 1 OF 1 SHEET

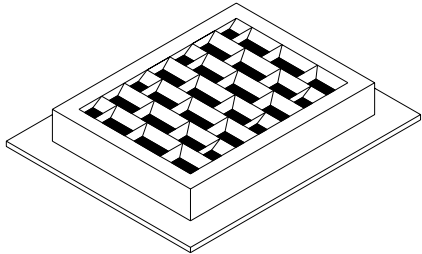
APPROVED FOR PUBLICATION

Harold J. Peterfeso 07-21-03

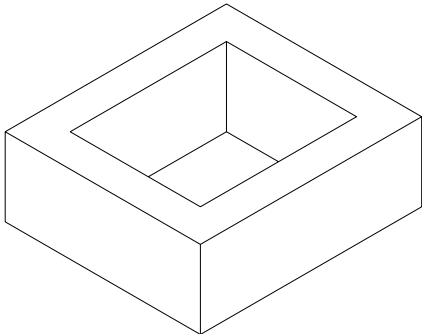
STATE DESIGN ENGINEER DATE



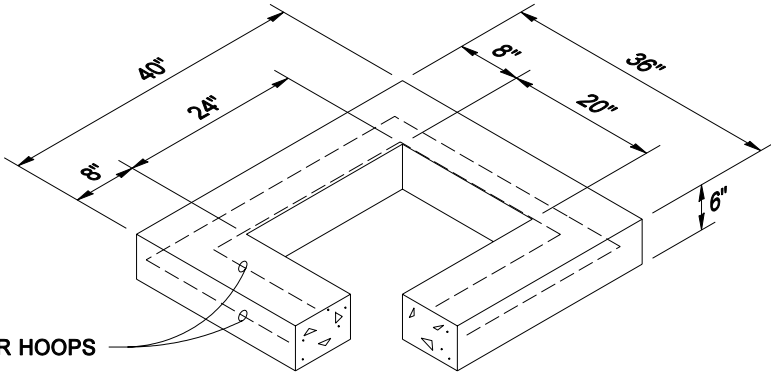
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FRAME AND VANED GRATE



RECTANGULAR ADJUSTMENT SECTION



TWO #3 BAR HOOPS

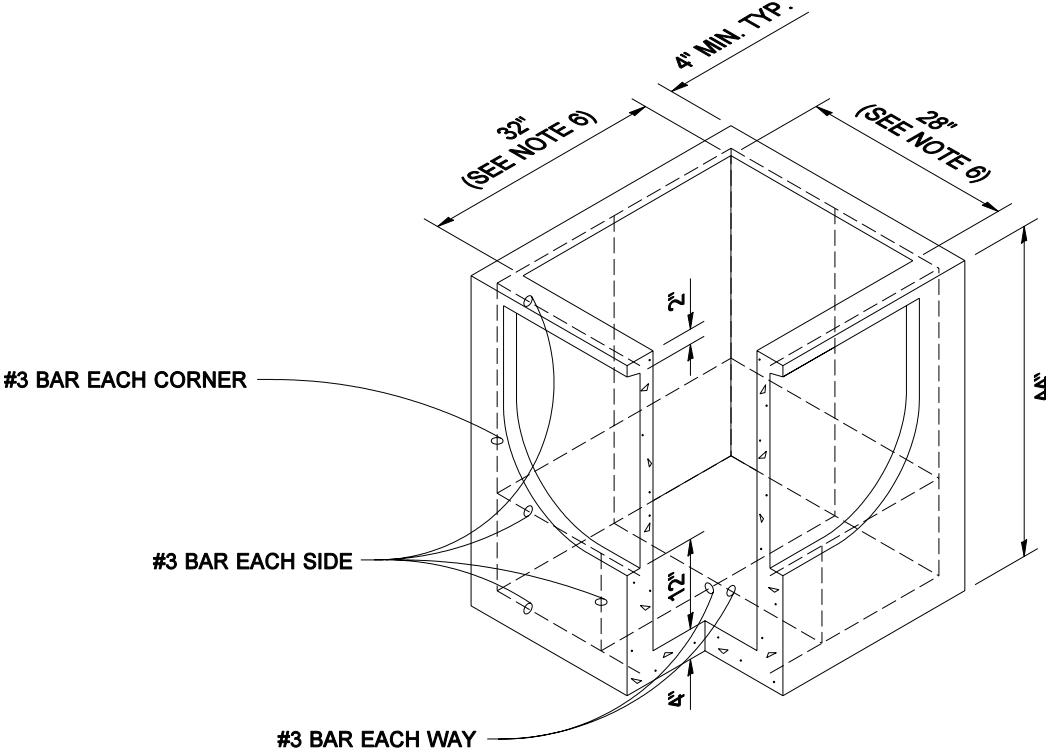
REDUCING SECTION

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

* CORRUGATED POLYETHYLENE STORM SEWER PIPE

NOTES

1. As an acceptable alternate to rebar, wire mesh having a minimum area of 0.12 square inches per foot may be used. Wire mesh shall not be placed in knockouts.
2. The knockout diameter shall not be greater than 26". Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum. Provide a 1.5" minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Std. Spec. 9-04.3.
3. The maximum depth from the finished grade to the pipe invert shall be 5'.
4. Frame and grate may be installed with flange down or cast into adjustment section.
5. The precast base section may have a rounded floor and the walls may be sloped at a rate of 1:24 or steeper.
6. Opening shall be measured at the top of the precast base section.

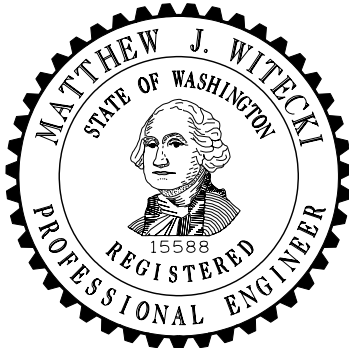


#3 BAR EACH CORNER

#3 BAR EACH SIDE

#3 BAR EACH WAY

PRECAST BASE SECTION



EXPIRES JULY 1, 2003

CATCH BASIN TYPE 1L
STANDARD PLAN B-1a

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7/01	ADDED PIPE ALLOWANCES TABLE	MAS
DATE	REVISION	BY

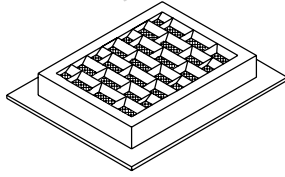
APPROVED FOR PUBLICATION

Clifford E. Mansfield
STATE DESIGN ENGINEER

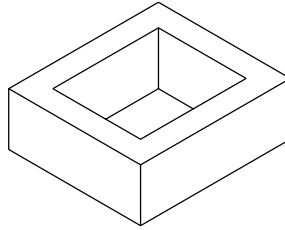
07-31-01
DATE



Washington State Department of Transportation



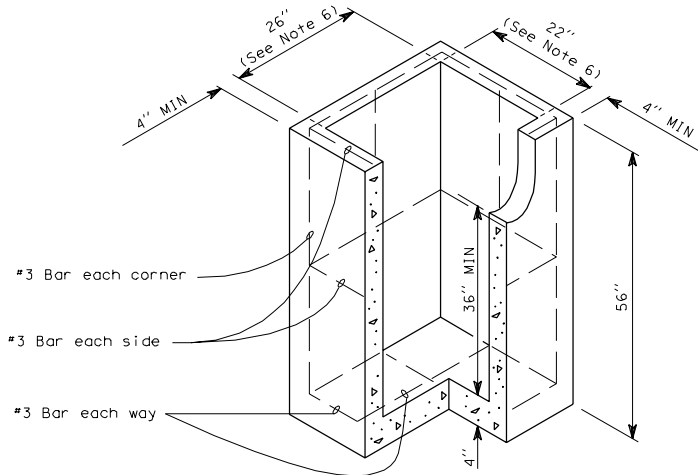
FRAME AND VANED GRATE



RECTANGULAR ADJUSTMENT SECTION

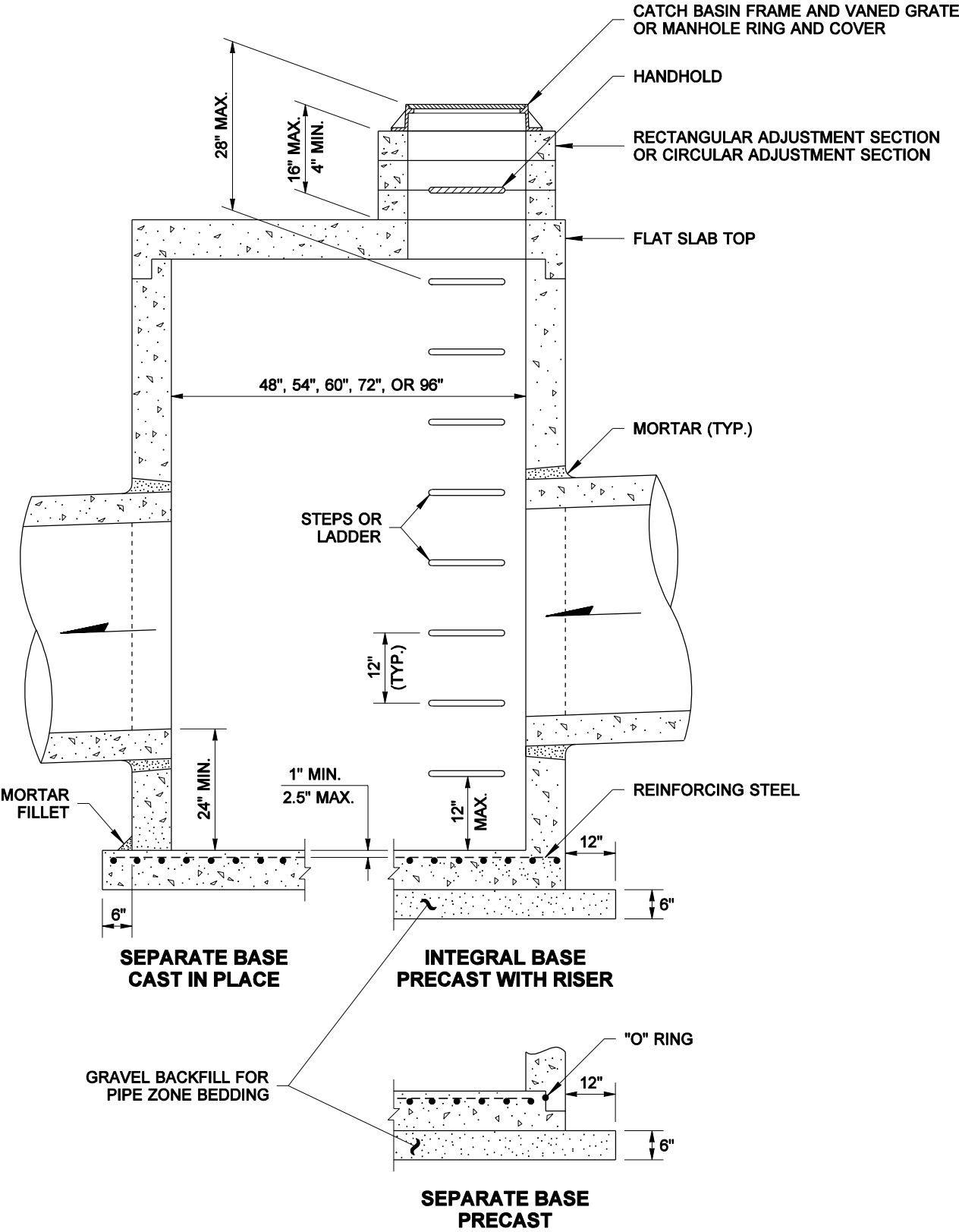
NOTES

1. As an acceptable alternate to rebar, wire mesh having a minimum area of 0.12 square inches per foot may be used. Wire mesh shall not be placed in knockouts.
2. The knockout diameter shall not be greater than 16". Knockouts shall have a wall thickness of 2" minimum to 2 1/2" maximum.
3. The maximum depth from the finished grade to the pipe invert shall be 5'.
4. Frame and grate may be installed with flange down or cast into adjustment section.
5. The precast base section may have a rounded floor and the walls may be sloped at a rate of 1:24 or steeper.
6. Openings shall be measured at the top of the precast base section.



PRECAST BASE SECTION

CATCH BASIN TYPE 1P
PARKING LOT C. B.



NOTES

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

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

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

- ① CORRUGATED POLYETHYLENE STORM SEWER PIPE (Std. Spec. 9-05.20)
② (Std. Spec. 9-05.12(1))
③ (Std. Spec. 9-05.12(2))



CATCH BASIN TYPE 2

STANDARD PLAN B-1e

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 01-28-02

STATE DESIGN ENGINEER

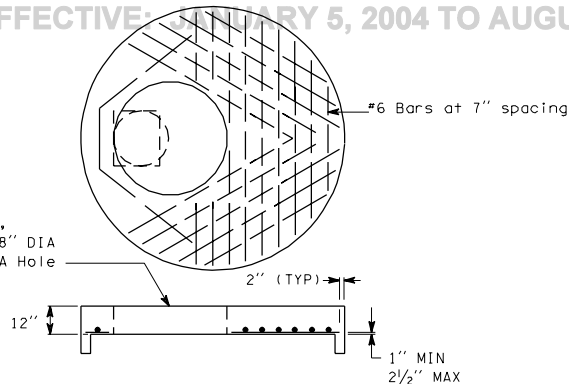
DATE



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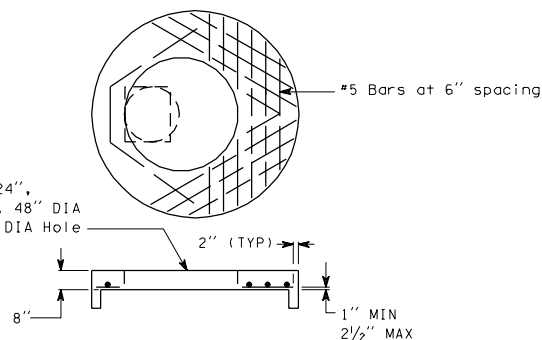
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8/01	ADDED PIPE ALLOWANCES TABLE	MAS
DATE	REVISION	BY

20" x 24",
24"DIA, 48" DIA
or 54" DIA Hole



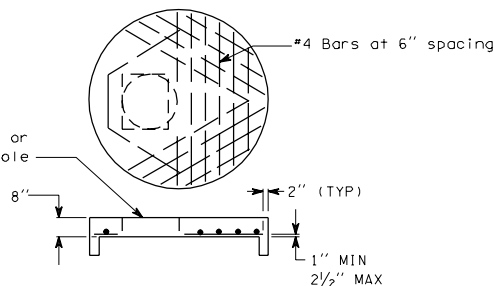
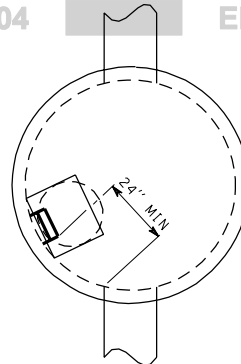
96" FLAT SLAB TOP

20" x 24",
24"DIA, 48" DIA
or 54" DIA Hole



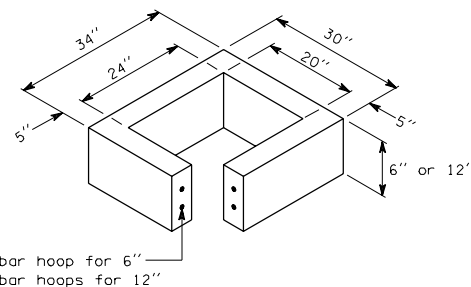
72" FLAT SLAB TOP

20" x 24" or
24" DIA Hole

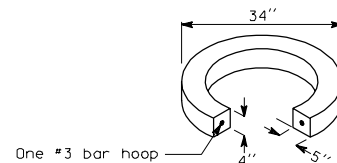
48", 54" or 60"
FLAT SLAB TOPTYPICAL ORIENTATION
FOR ACCESS AND STEPS

NOTES

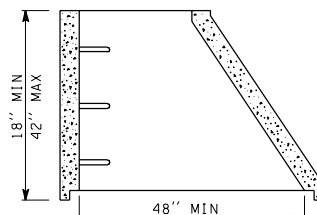
1. As an acceptable alternate to rebar, wire mesh having a minimum area of 0.12 square inches per foot may be used for adjustment sections.



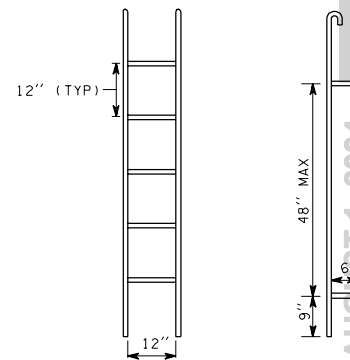
RECTANGULAR ADJUSTMENT SECTION



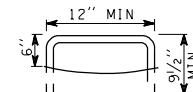
CIRCULAR ADJUSTMENT SECTION



ECCENTRIC CONE SECTION

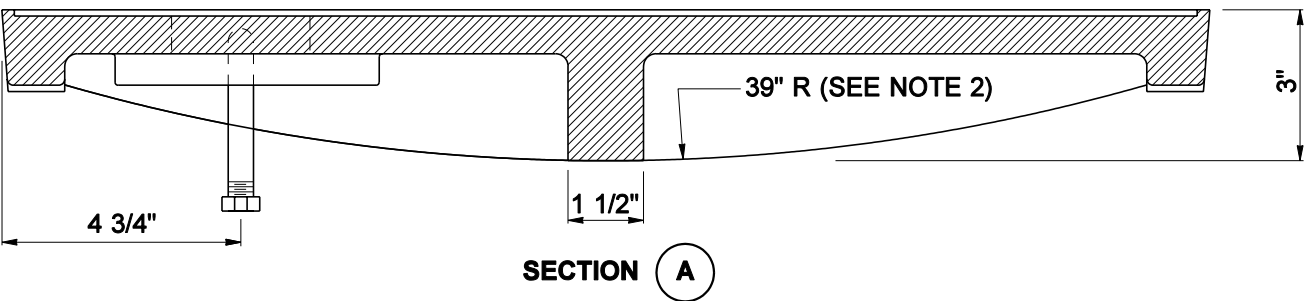
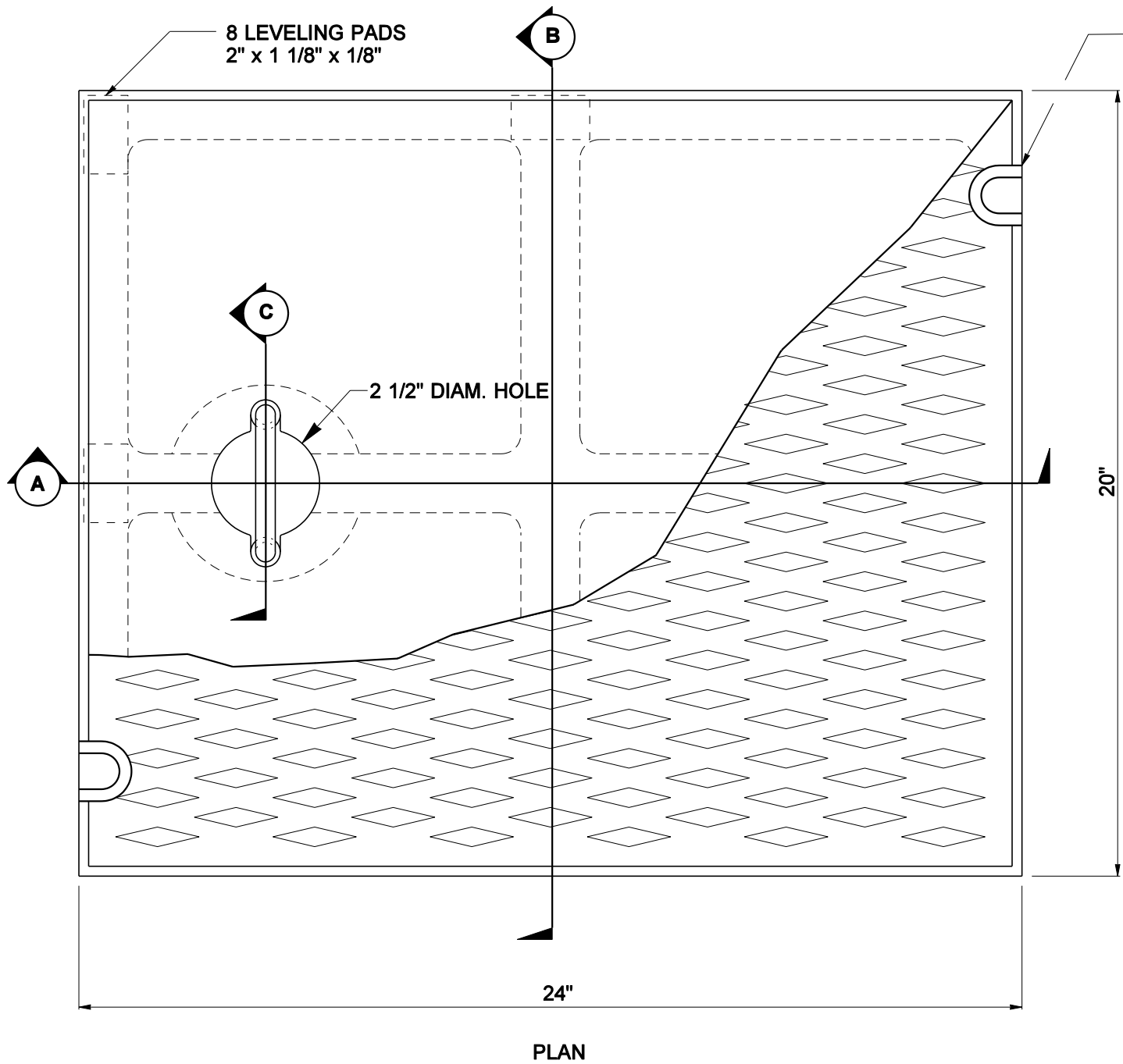


PREFABRICATED LADDER

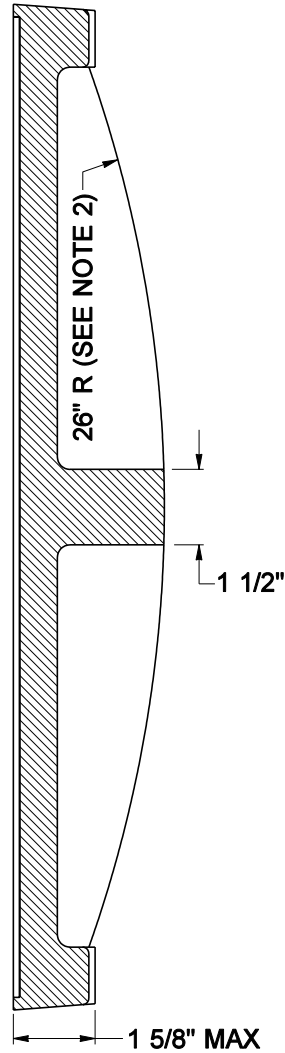


STEP

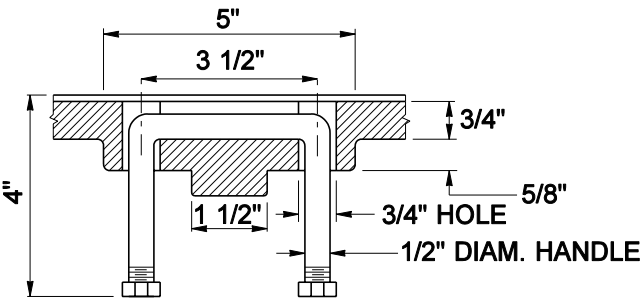
MISCELLANEOUS DETAILS
FOR MANHOLES
AND CATCH BASINS



SEE SLOT DETAIL & NOTE 1



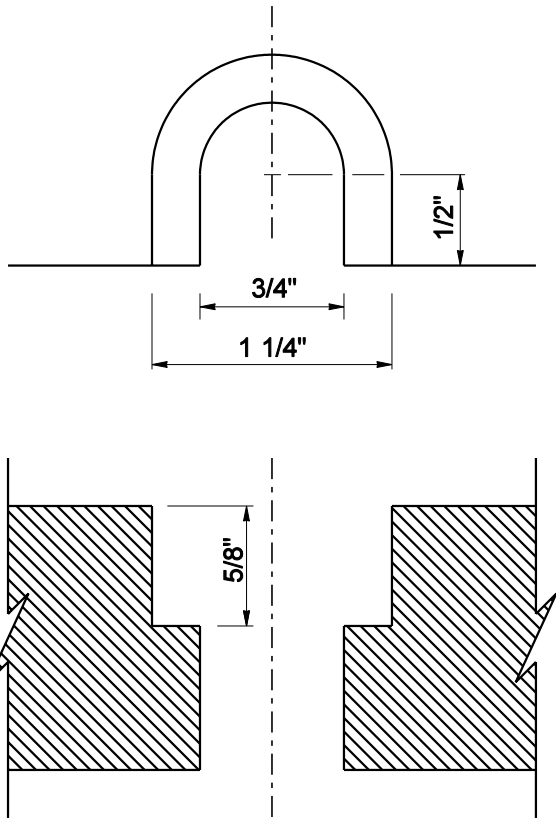
SECTION B



SECTION C

NOTES

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



SLOT DETAIL



SOLID METAL COVER
FOR CATCH BASIN

STANDARD PLAN B-2

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

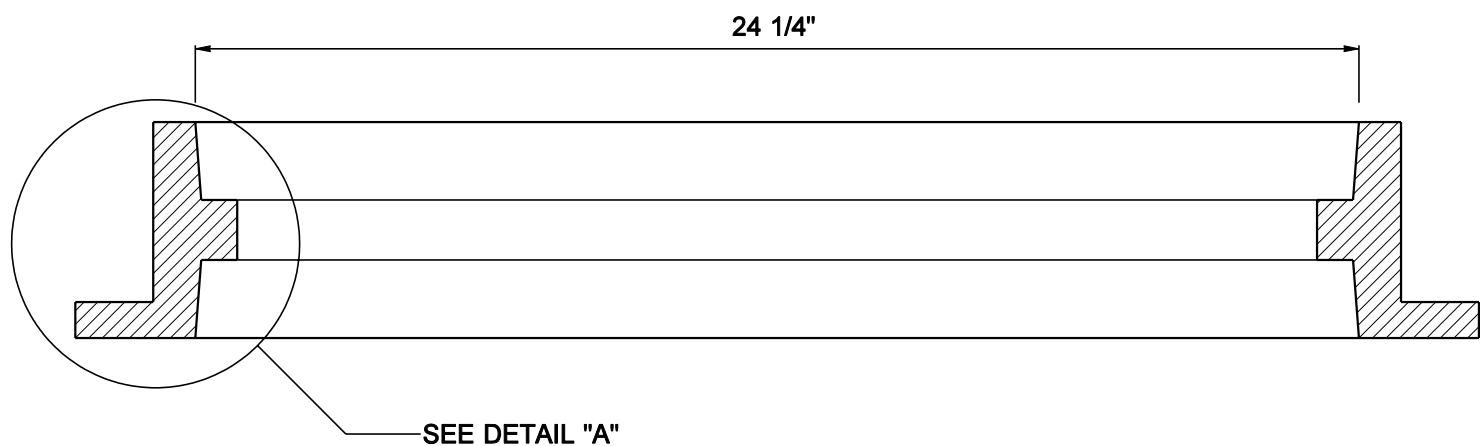
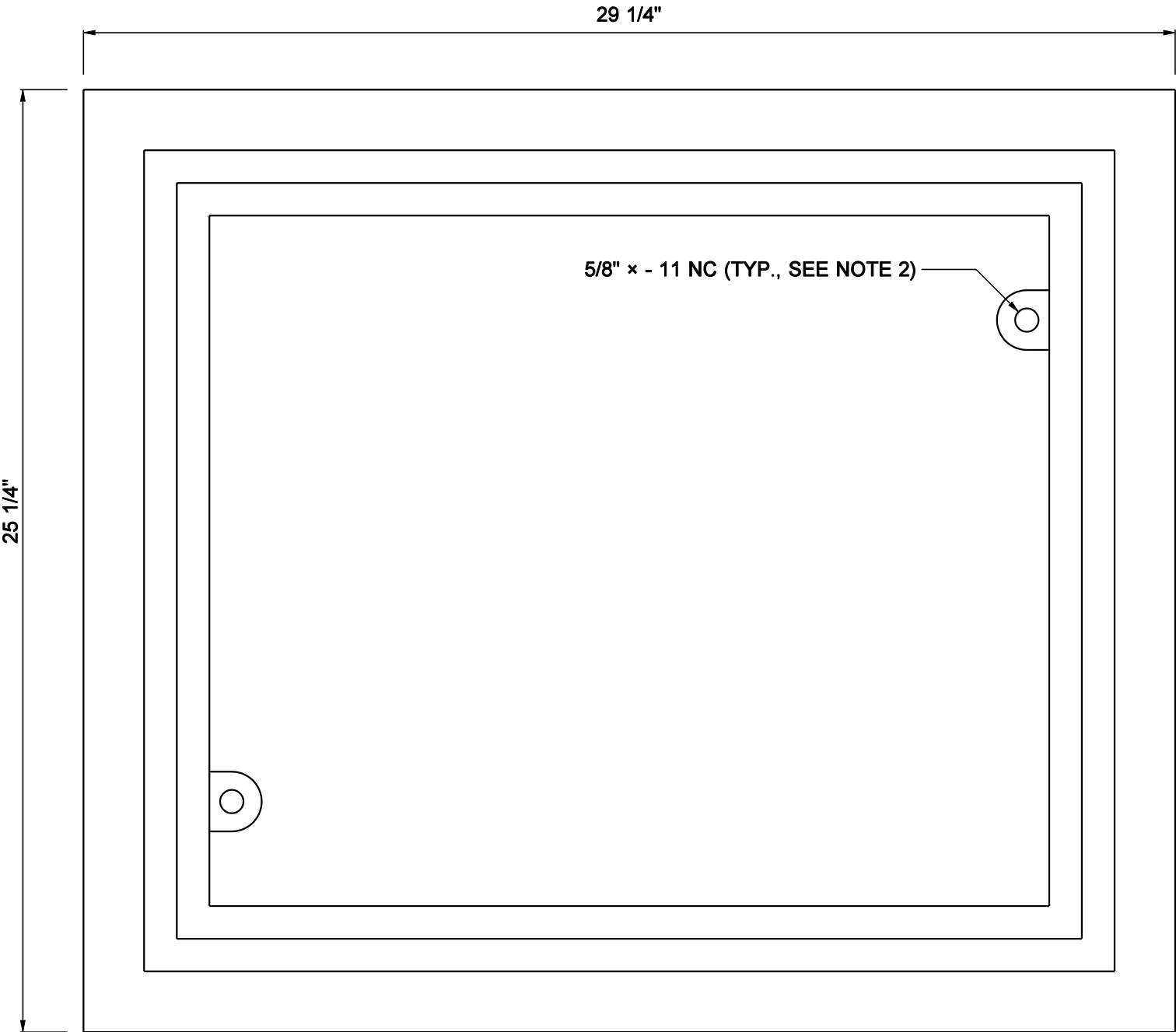
Harold J. Peterfeso 06-17-02

STATE DESIGN ENGINEER DATE

Washington State Department of Transportation

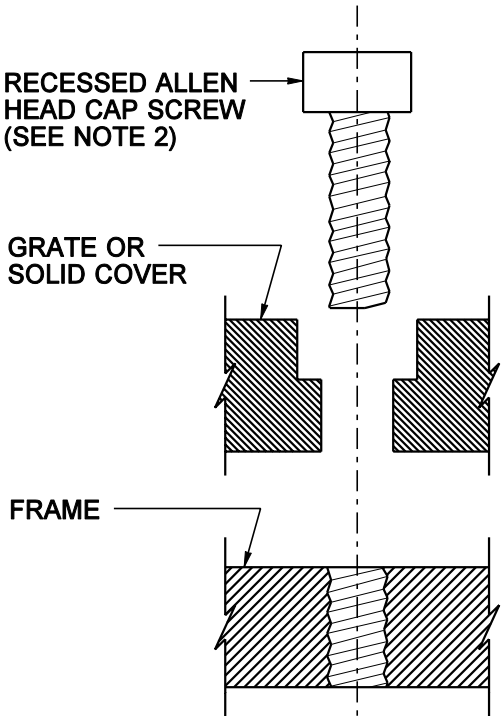
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05/2002	DELETED DETAIL "D"; ADDED SLOT DETAIL; REVISED NOTES.	RG
DATE	REVISION	BY

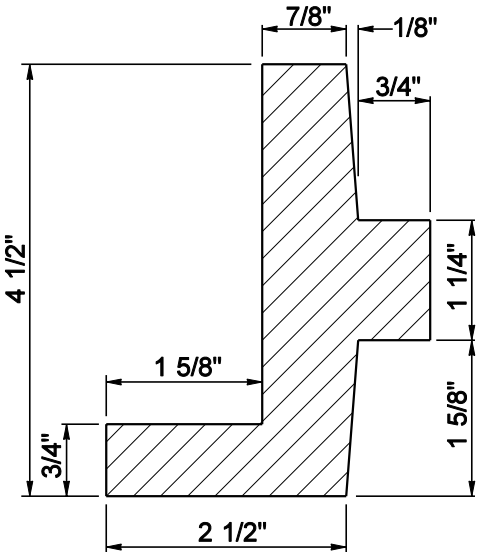


NOTES

1. This frame is designed to accommodate 20" x 24" grates or covers as shown on Standard Plans B-2, B-2b, B-2c and B-2d.
2. When bolt down grates or covers are specified in the Contract, provide two holes in the frame that are vertically aligned with the grate or cover slots. Tap each hole to accept a 5/8" x - 11 NC x 2" allen head cap screw. Location of bolt down holes varies among different manufacturers
3. Refer to Standard Specification 9-05.15(2) for additional requirements.



BOLT DOWN DETAIL



DETAIL "A"



EXPIRES JULY 1, 2003

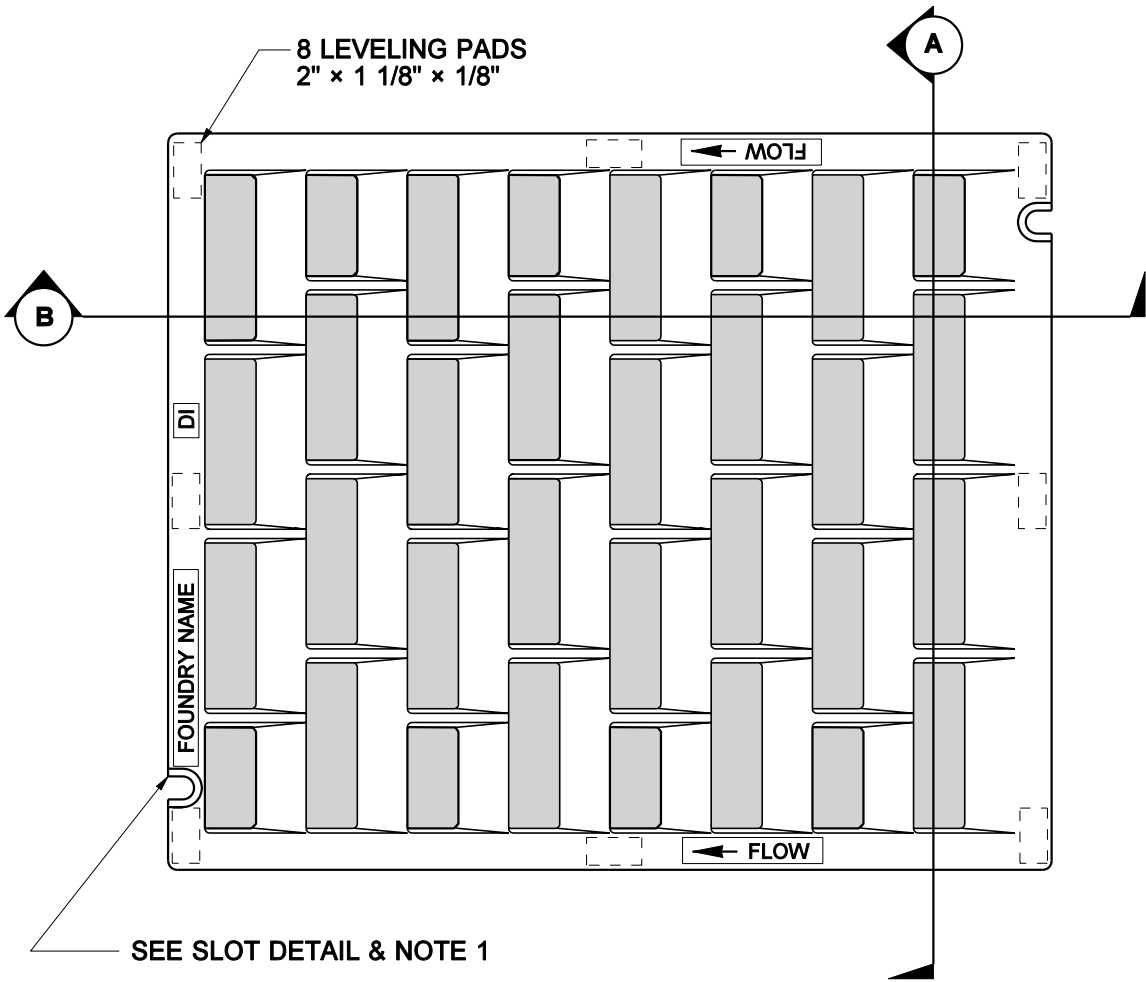
**REVERSIBLE FRAME FOR
CATCH BASIN OR
CONCRETE INLET
STANDARD PLAN B-2a**

SHEET 1 OF 1 SHEET

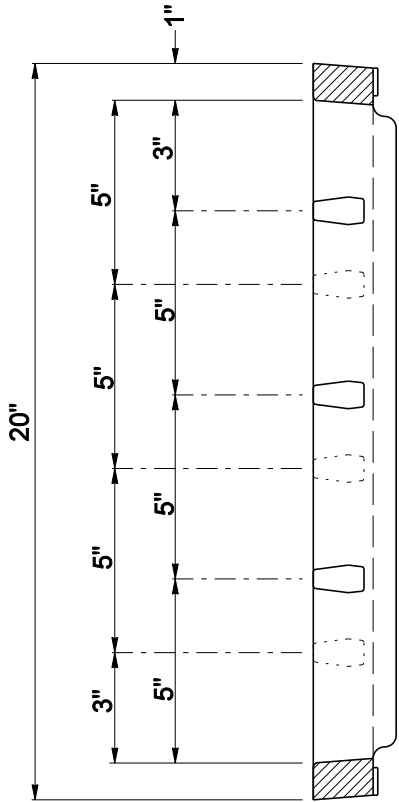
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05/2002		DELETED GRATE; ADDED BOLT DOWN DETAIL; REVISED NOTES	RG	DATE
DATE		REVISION	BY	DATE
				06-17-02
				STATE DESIGN ENGINEER
				Washington State Department of Transportation

NOTES

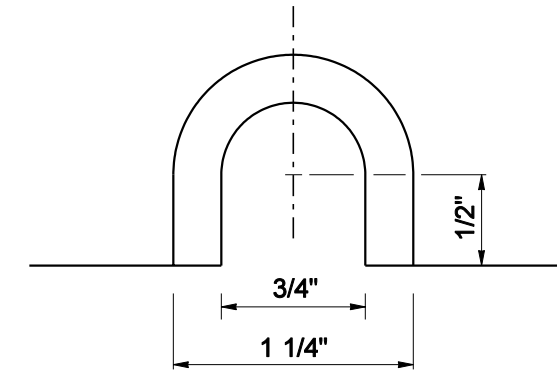
- 1. When bolt down grates are specified in the Contract, provide two slots in the grate that are vertically aligned with the holes in the frame. Location of bolt down slots varies among different manufacturers.
- 2. Refer to Standard Specification 9-05.15(2) for additional requirements.
- 3. For frame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



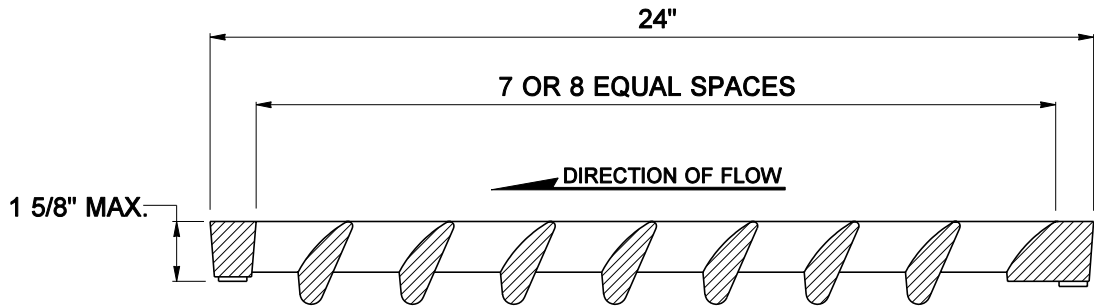
PLAN VIEW



SECTION A



SLOT DETAIL



SECTION B



**VANED GRATE FOR
CATCH BASIN AND
CONCRETE INLET
STANDARD PLAN B-2b**

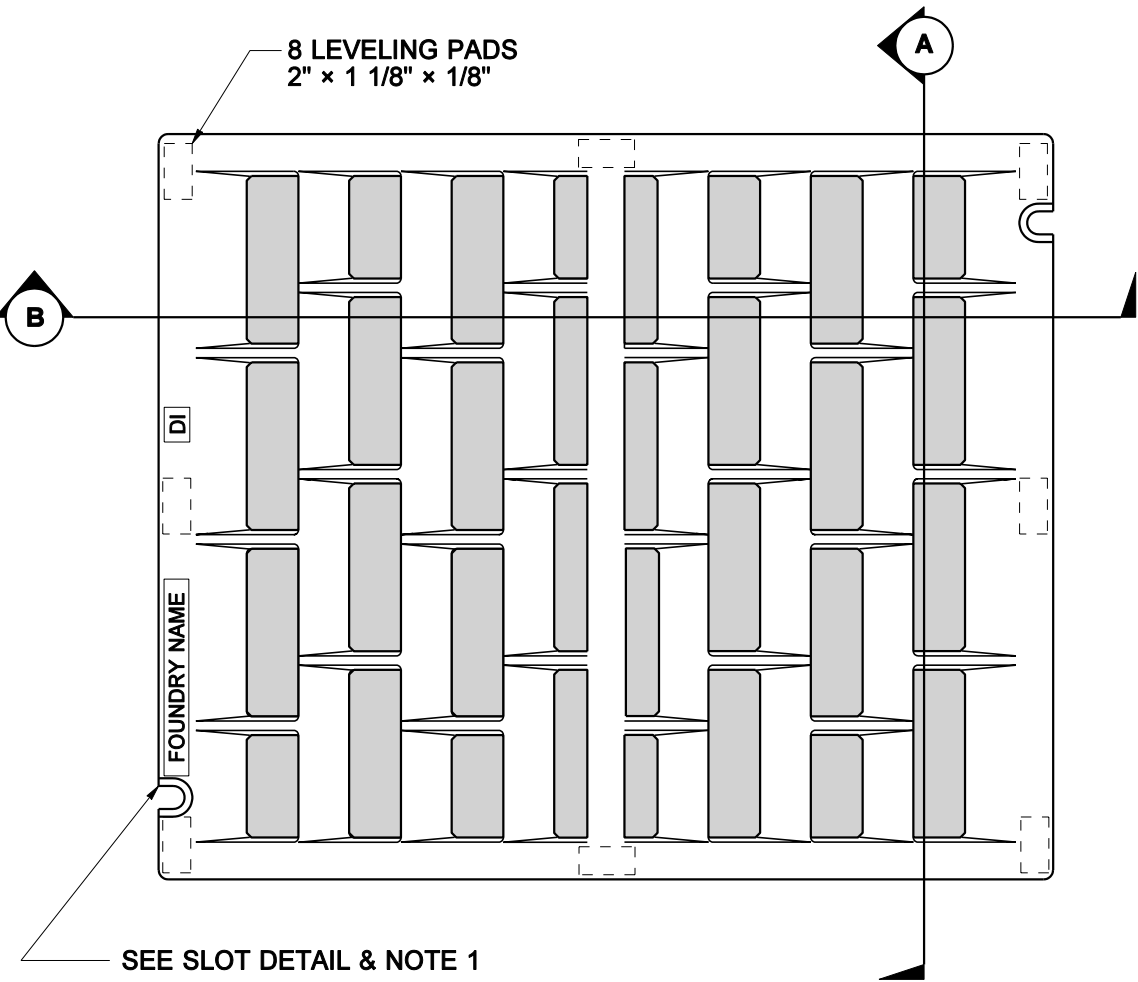
SHEET 1 OF 1 SHEET

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05/2002	DELETED VANE DETAIL; ADDED SLOT DETAIL; REVISED NOTES.	RG
DATE	REVISION	BY

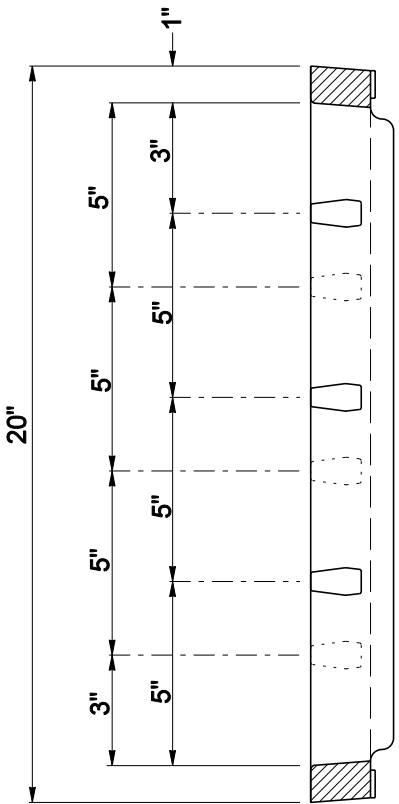
APPROVED FOR PUBLICATION	
Harold J. Peterfeso	06-17-02
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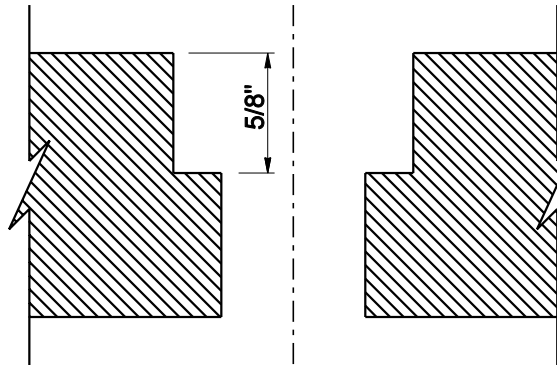
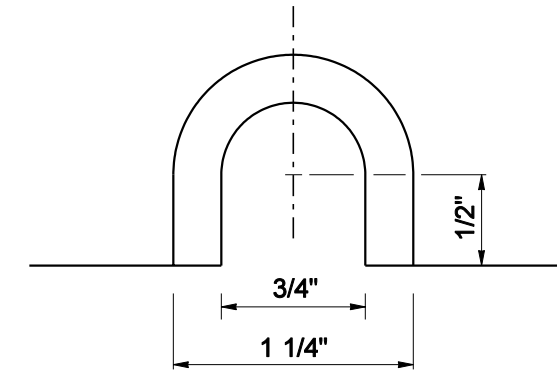
- 1. When bolt down grates are specified in the Contract, provide two slots in the grate that are vertically aligned with the holes in the frame. Location of bolt down slots varies among different manufacturers.
- 2. Refer to Standard Specification 9-05.15(2) for additional requirements.
- 3. For frame details, see Standard Plan B-2a.



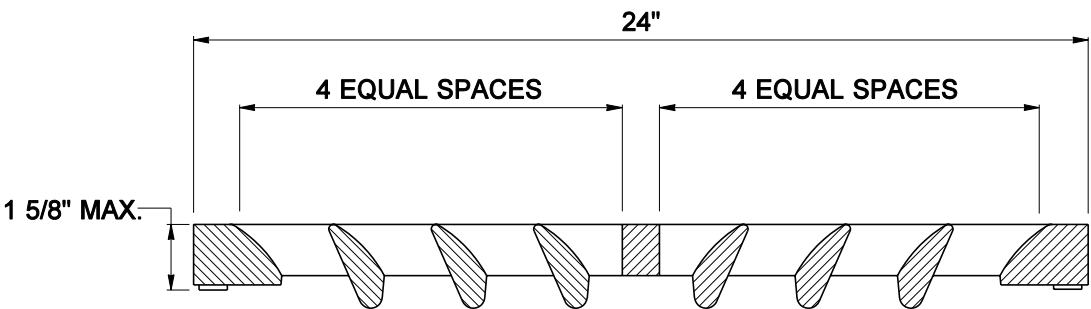
PLAN VIEW



SECTION A



SLOT DETAIL



SECTION B



EXPIRES JULY 1, 2003

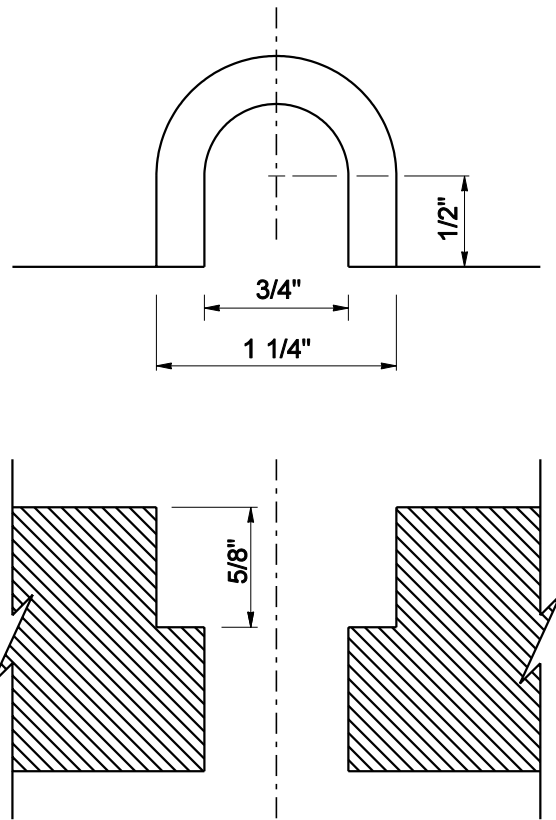
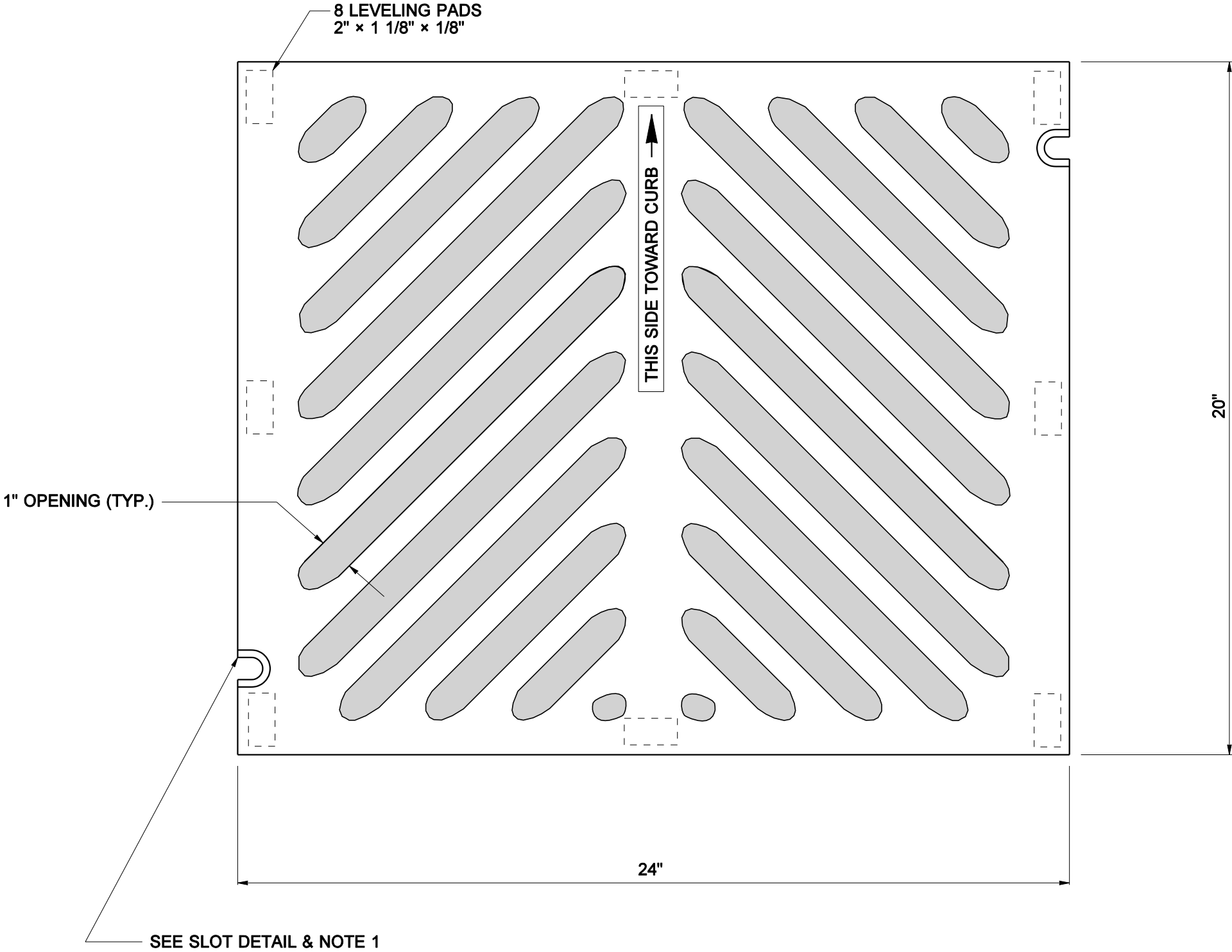
**BI-DIRECTIONAL VANED
GRATE FOR CATCH BASIN
AND INLET
STANDARD PLAN B-2c**

SHEET 1 OF 1 SHEET

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05/2002		DELETED VANE DETAIL; ADDED SLOT DETAIL; REVISED NOTES.	RG	DATE
DATE		REVISION	BY	DATE
				06-17-02
				STATE DESIGN ENGINEER
				Washington State Department of Transportation

NOTES

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



SLOT DETAIL



EXPIRES JULY 1, 2003

**HERRINGBONE GRATE FOR
CATCH BASIN
AND INLET
STANDARD PLAN B-2d**

SHEET 1 OF 1 SHEET

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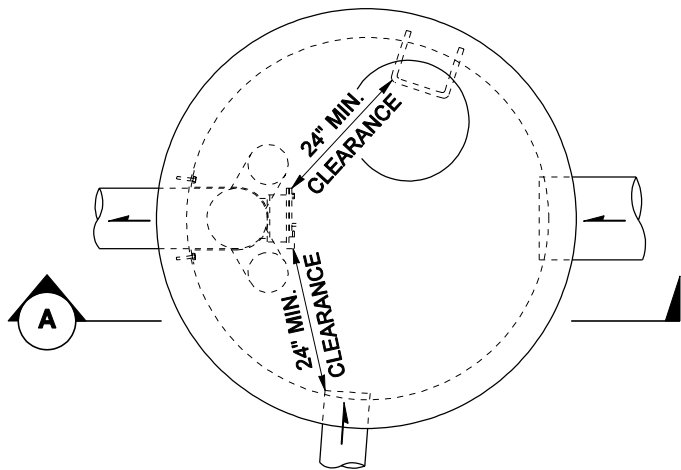
Harold J. Peterfeso 06-17-02

STATE DESIGN ENGINEER

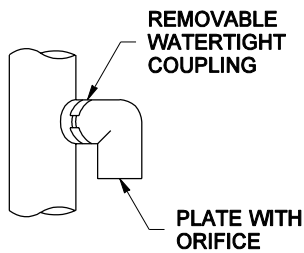
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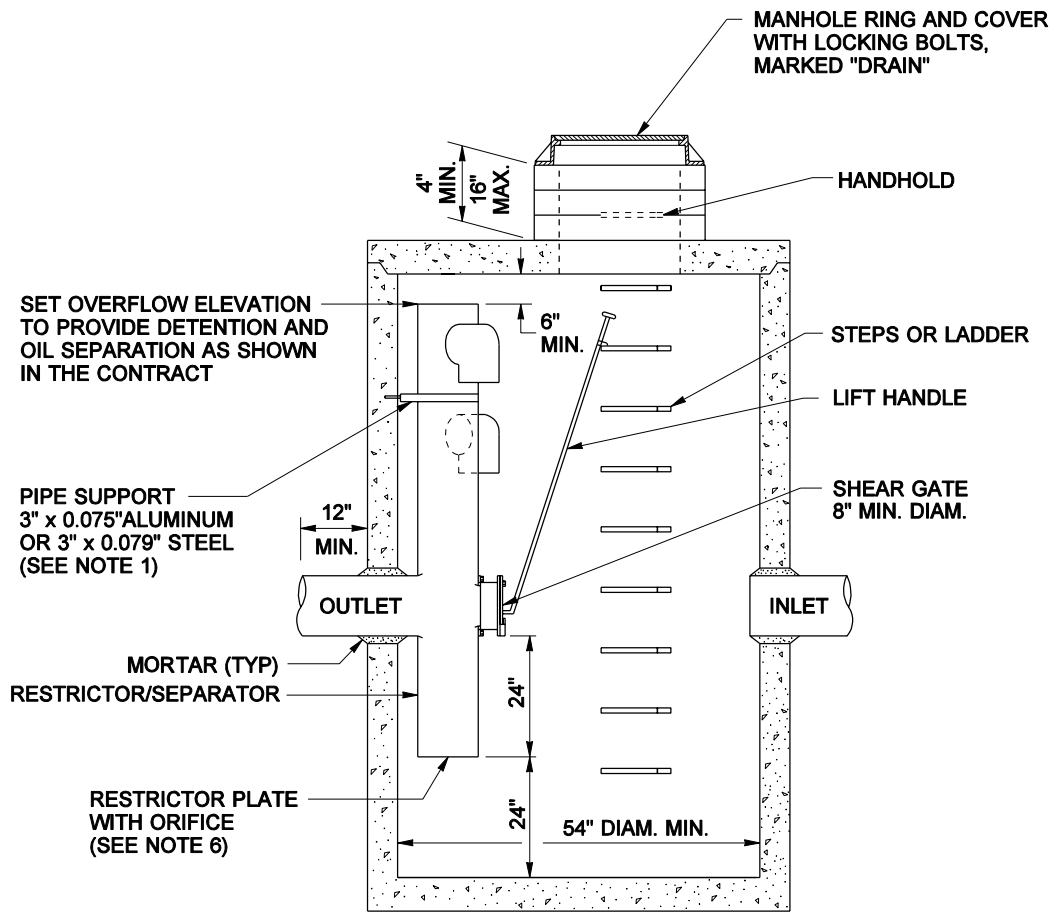
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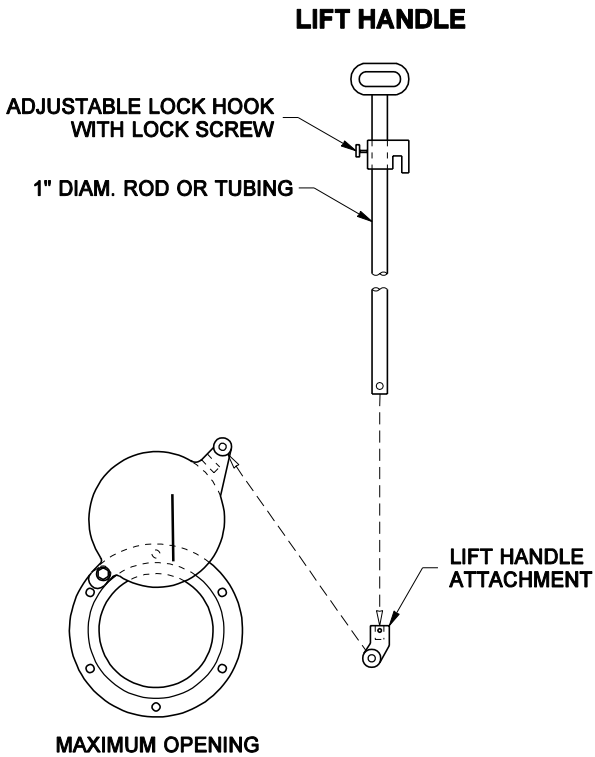
PLAN VIEW



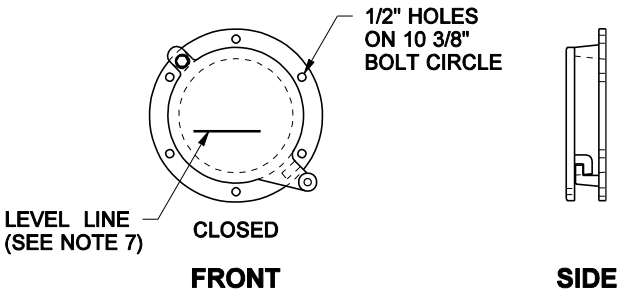
ELBOW DETAIL



VIEW A



LIFT HANDLE



SHEAR GATE DETAILS

NOTES

1. The pipe supports and the restrictor/separator shall be constructed of the same material and be anchored at a maximum spacing of 36". Attach the pipe supports to the manhole with 5/8" stainless steel expansion bolts or embed the supports into the manhole wall 2".
2. The vertical riser stem of the restrictor/separator shall be the same diameter as the horizontal outlet pipe with a minimum diameter of 8".
3. The flow restrictor/separator shall be fabricated from one of the following materials:
0.060" Corrugated Aluminum Alloy Drain Pipe
0.064" Corrugated Galvanized Steel Drain Pipe with Treatment 1
0.064" Corrugated Aluminized Steel Drain Pipe
0.060" Aluminum alloy flat sheet, in accordance with ASTM B 209M, 5052 H32 or EPS
High Density Polyethylene Storm Sewer Pipe
4. The frame and ladder or steps are to be offset so that: the shear gate is visible from the top; the climb-down space is clear of the riser and gate; the frame is clear of the curb.
5. The multi-orifice elbows may be located as shown, or all placed on one side of the riser to assure ladder clearance. The size of the elbows and their placement shall be specified in the Contract.
6. Restrictor plate with orifice as specified in the Contract. Omit plate if for oil pollution control only. The opening is to be cut round and smooth.
7. The shear gate shall be made of aluminum alloy in accordance with ASTM B 26M and ASTM B 275, designation ZG32A; or cast iron in accordance with ASTM A 48, Class 30B. The lift handle shall be made of a similar metal to the gate (to prevent galvanic corrosion), it may be of solid rod or hollow tubing, with adjustable hook as required. A neoprene rubber gasket is required between the riser mounting flange and the gate flange. Install the gate so that the level-line mark is level when the gate is closed. The mating surfaces of the lid and the body shall be machined for proper fit. All shear gate bolts shall be stainless steel.
8. The shear gate maximum opening shall be controlled by limited hinge movement, a stop tab, or some other device.
9. Alternate shear gate designs are acceptable, if material specifications are met and flange bolt pattern matches.



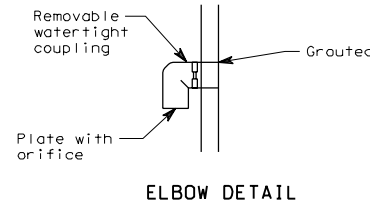
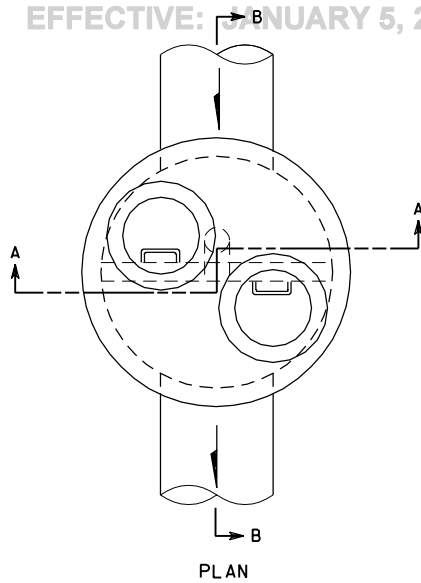
EXPIRES JULY 1, 2003

CATCH BASIN TYPE 2
WITH FLOW RESTRICTOR
-OIL SEPARATOR
STANDARD PLAN B-3

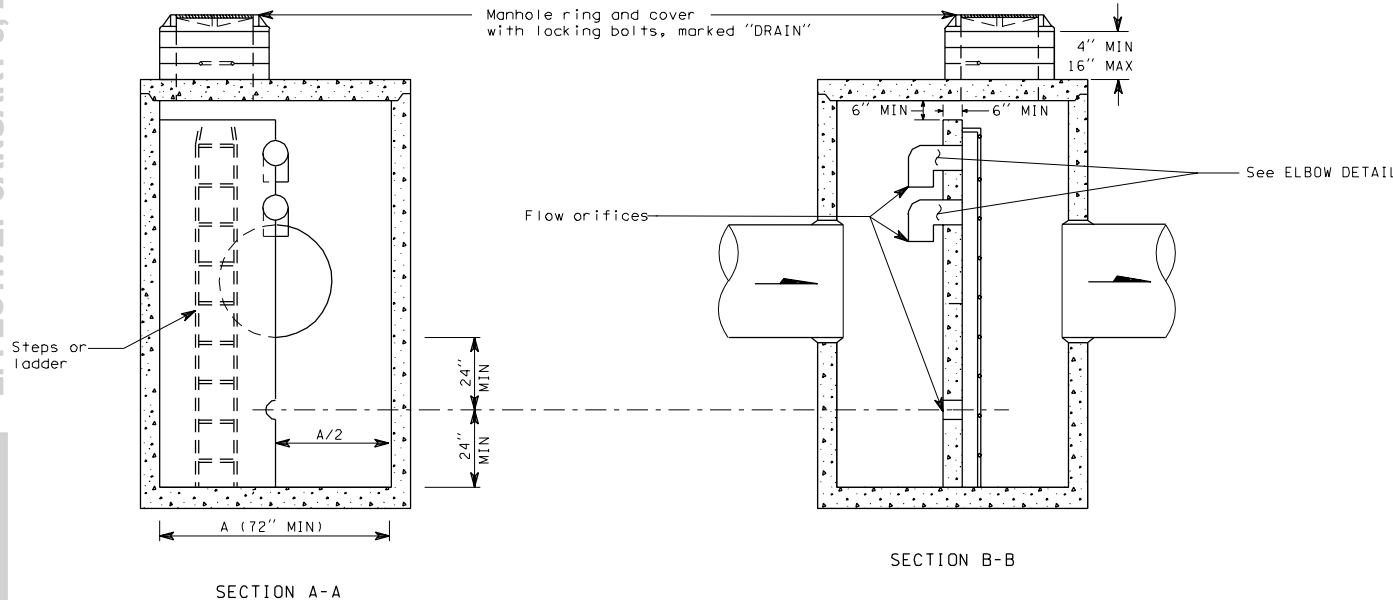
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09/01	REVISED NOTES 3, 7 AND VIEW A	MAS
DATE	REVISION	BY

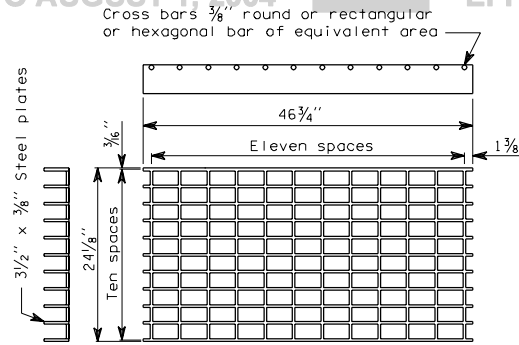
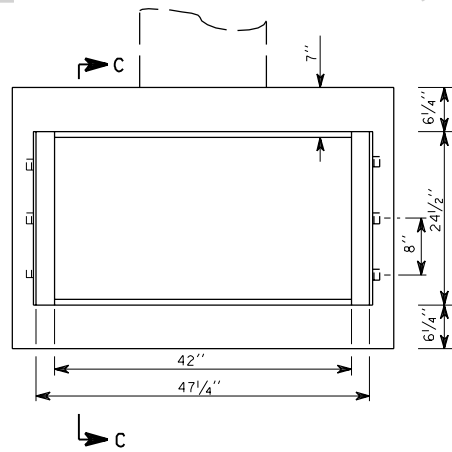
APPROVED FOR PUBLICATION	
Harold J. Peterfeso	01-28-02
STATE DESIGN ENGINEER	
DATE	
Washington State Department of Transportation	



1. See Contract for size and location of all pipes and orifices.
2. Baffle wall shall have #4 Bar at 12" spacing each way.
3. Precast baffle shall be keyed and grouted in place.
4. Bottom orifice plate shall be galvanized steel with a minimum thickness of $\frac{1}{4}$ ". Attach orifice with $\frac{1}{2}$ " stainless steel bolts. Orifice plate is not required when only oil separation is desired.
5. Upper flow orifice shall be aluminum, aluminized steel or galvanized steel. Galvanized steel shall have treatment 1.

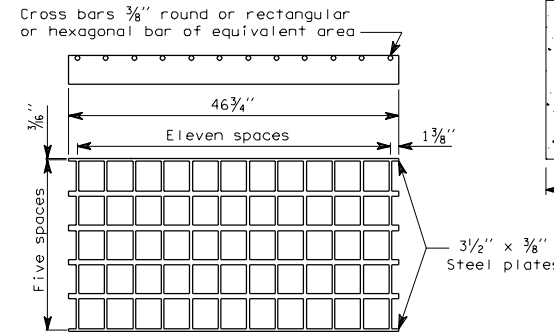


CATCH BASIN TYPE 2
WITH BAFFLE TYPE FLOW
RESTRICTOR-OIL SEPARATOR



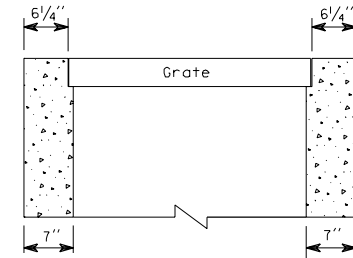
GRATE A

(Weight is approximately 215 Lbs)



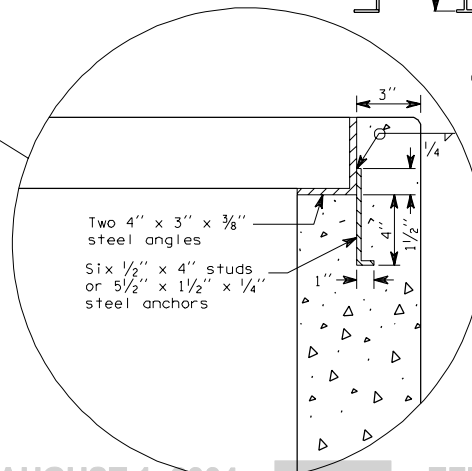
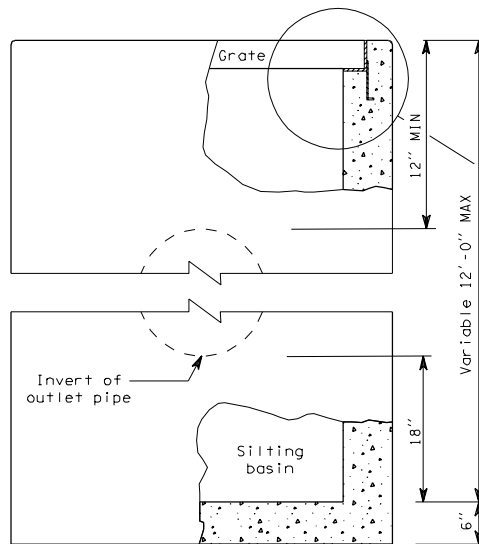
GRATE B

(Weight is approximately 215 Lbs)



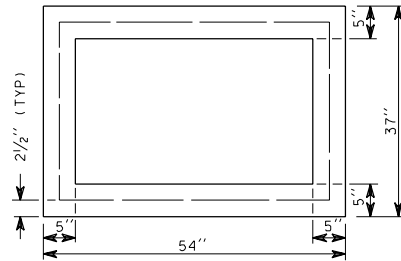
SECTION C-C

GRATE INLET TYPE 1

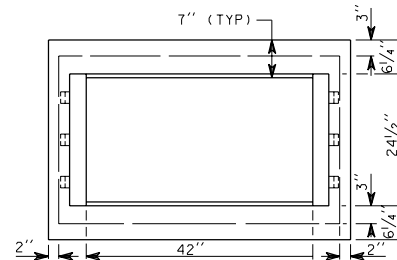


- NOTES
1. Angles shall be set so that each bearing bar of prefabricated grate shall have full bearing on both ends. The finished top of concrete shall be even with the grate surface.
 2. All exposed concrete shall be finished with a 1/2" radius edger tool.
 3. The grade line of the top inside of any pipe shall enter no lower than the grade line of the top inside of the outlet pipe.
 4. Culvert or sewer pipes may be set at any angle to the centerline of the highway and may enter the inlet on any side at any reasonable angle, provided the outside of the pipe can be contained between two opposite walls.
 5. Grate B will be used only when specified in the Contract.

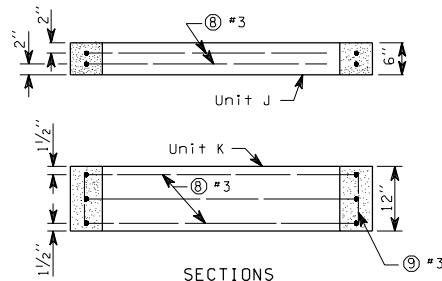
BAR LIST (All dimensions are out to out)					BENDING DIAGRAM	
MARK	LOCATION	QTY	SIZE	LENGTH		
1	Bottom slab and side wall	3	3	5'-9"		
2	Bottom slab and side wall	2		12'-5"		
3	Bottom slab and side wall	2		7'-2"		
4	Bottom slab and side wall	2		2'-9"		
5	Wall	4		9'-1"		
6	Side wall	3		14'-6"		
7	Unit H	2		14'-2"		
8	Unit J	2		14'-2"		
8	Unit K	3		14'-2"		
9	Unit K	4		0'-9"		
10	Side wall	8		2'-8"		
11	Bottom slab and side wall	4		7'-5"		
12	Bottom slab and side wall	3		6'-0"		
13	Side wall	4		14'-6"		



PLAN

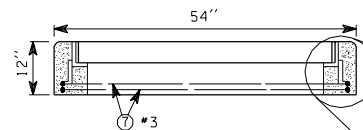


PLAN



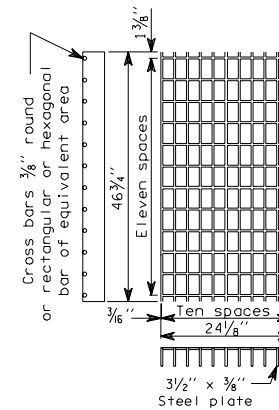
SECTIONS

UNITS J AND K



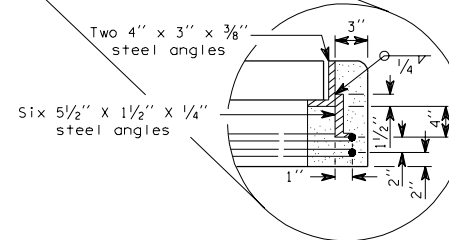
SECTION

UNIT H



GRATE DETAILS

GRATE INLET TYPE 2



B-4c

05-09-97

NOTES

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

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

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

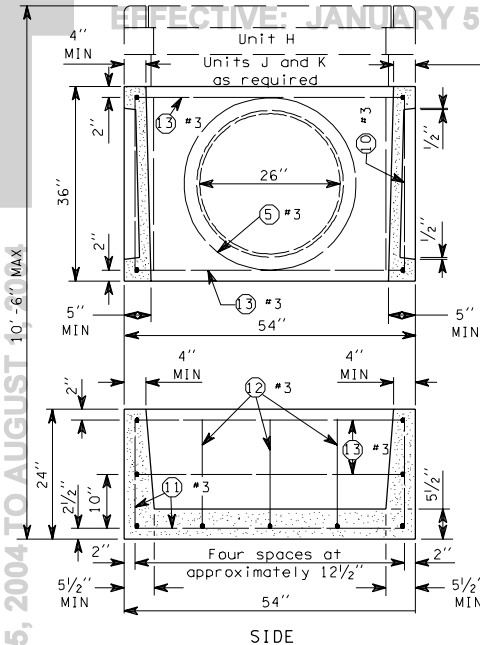
Pipes may enter through the knockouts on any side at any reasonable angle, provided the outside of the pipe can be contained between two opposite walls.

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

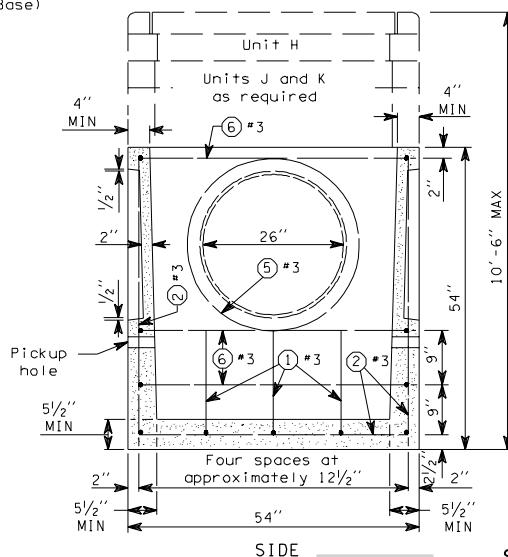
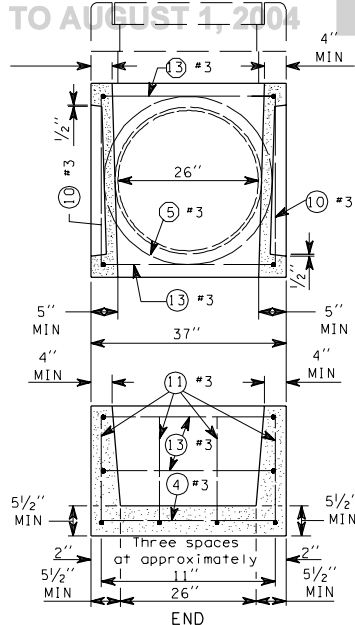
The grade line of the top inside of any inlet pipe shall enter at a point no lower than the grade line of the top inside of the outlet pipe.

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

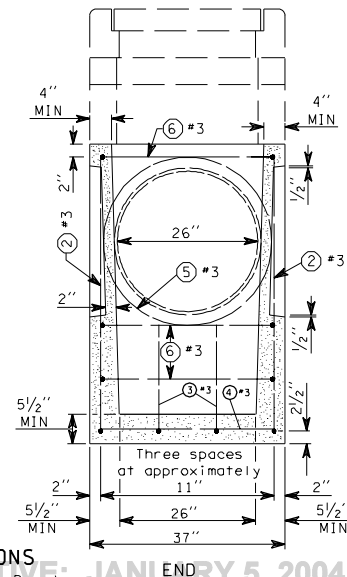
All pickup holes shall be grouted full after the basin has been placed.



SECTIONS
(Two Piece Base)



SECTIONS



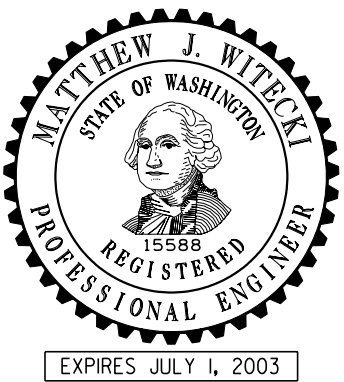
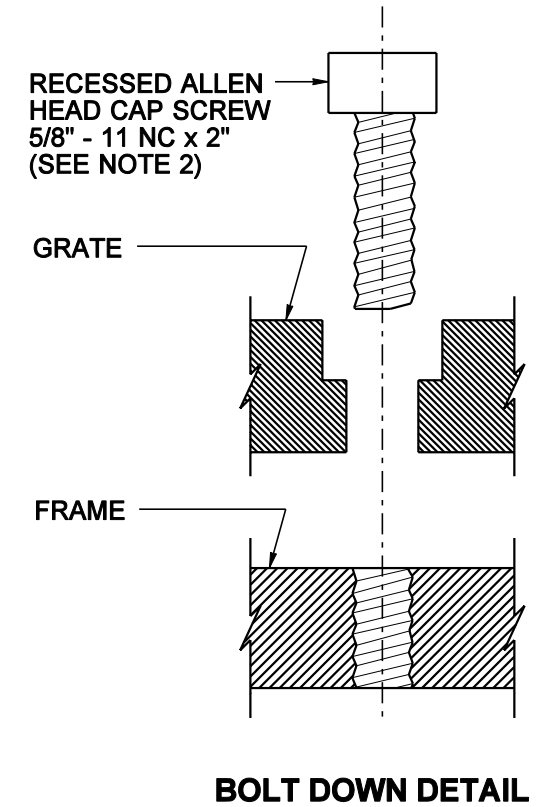
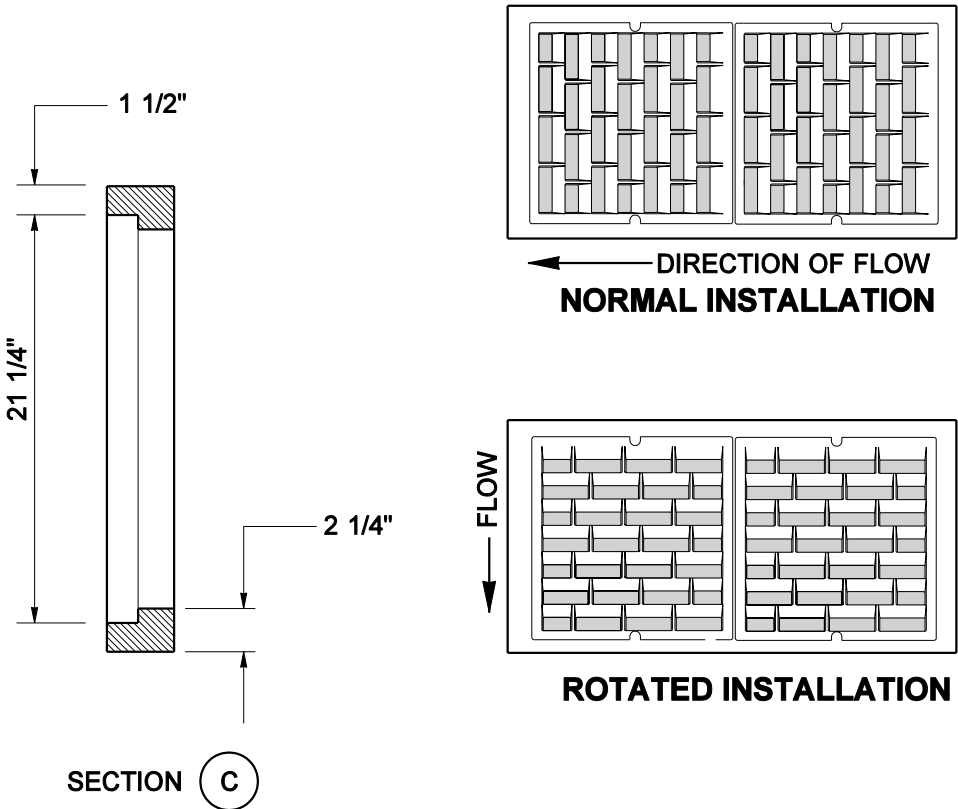
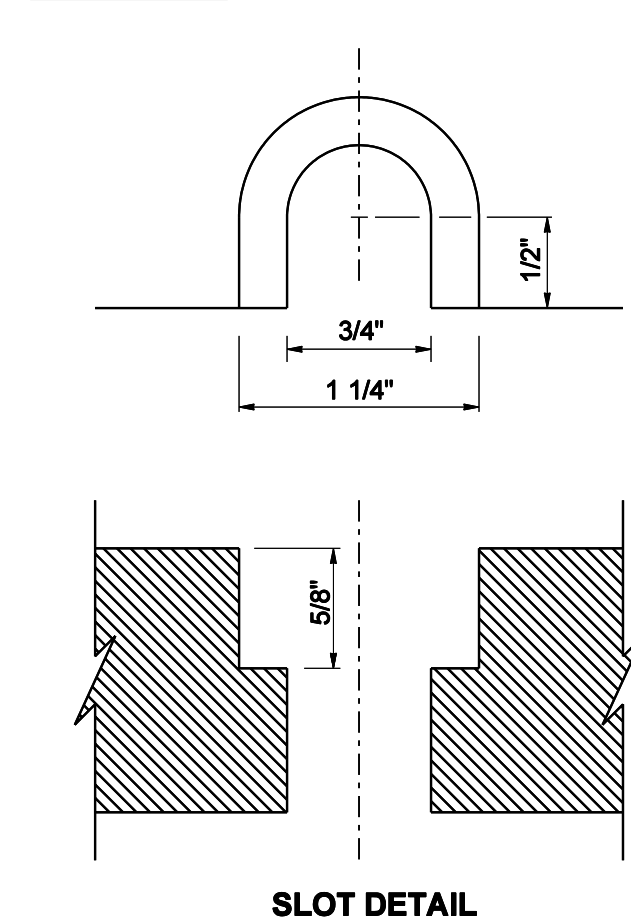
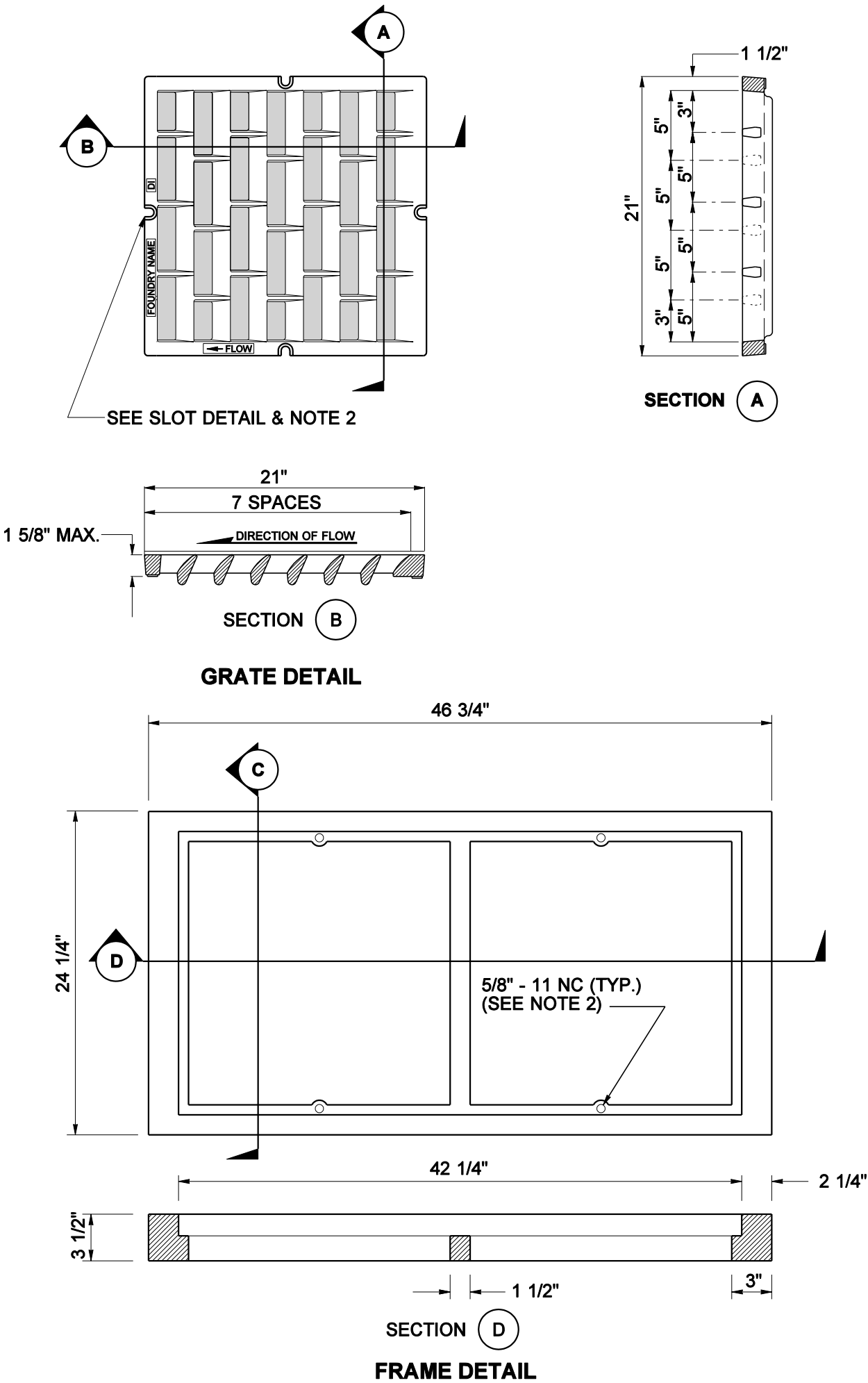
GRATE INLET TYPE 2

B-4c

05-09-97

NOTES

- 1. The frame and grate design shown on this plan is for use with the concrete drainage structure shown on Standard Plan B-4c.
- 2. When bolt down grates are specified in the Contract, provide two slots in the grate that are centered with the holes in the frame. Location of bolt down slots varies among different manufacturers.
- 3. Refer to Standard Specification 9-05.15(2) for additional requirements.



FRAME AND VANED GRATES FOR GRATE INLET TYPE 2

STANDARD PLAN B-4d

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 09-16-02

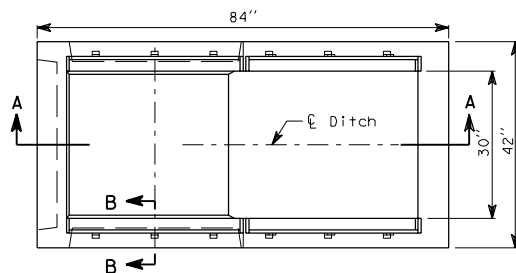
STATE DESIGN ENGINEER

DATE

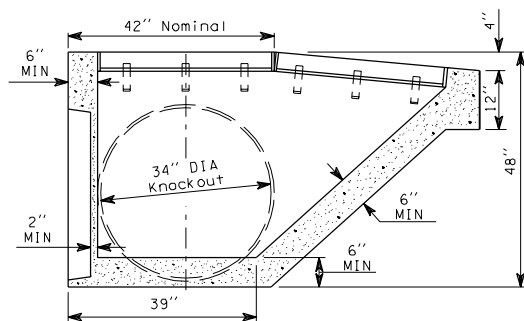


Washington State Department of Transportation

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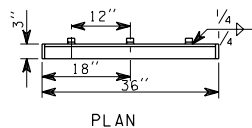
PLAN



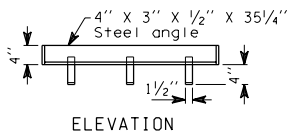
SECTION A-A



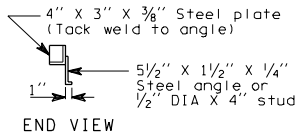
SECTION B-B



PLAN



ELEVATION



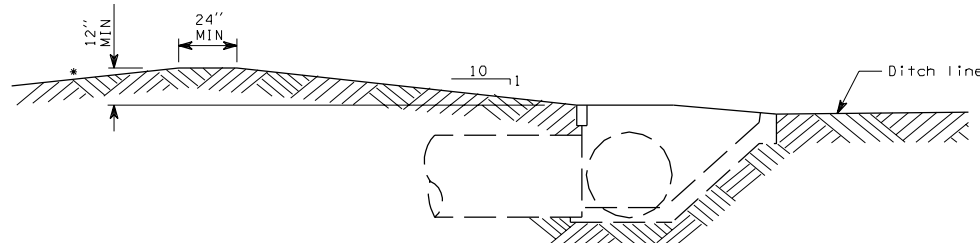
END VIEW

GRATE SUPPORT

(Two required per grate)

NOTES

1. Angles shall be set so that each bearing bar on the grate shall have full seating on both ends. The finished top of concrete shall be even with the grate surface.
2. Top of inlet shall be placed at ground level to present an unobstructed ditch or median section.
3. Bevel or round exposed concrete edges $\frac{1}{2}$ ".
4. Pipes may enter through the knockouts at any reasonable angle provided the outside of the pipe can be contained within the knockout provided.
5. The grade line of the lowest inlet pipe shall enter the structure at an elevation equal to or higher than the grade line of the outlet pipe.
6. Precast inlet shall be marked with manufacturer's identification inside the structure in some readily accessible location.
7. Inside wall taper for form removal shall not result in any wall section thinner than 6" except in pipe knockout areas.
8. Amount, type and grade of reinforcing steel is the responsibility of the manufacturer. The manufacturer is responsible for the structure until final acceptance in place with all required knockouts removed.



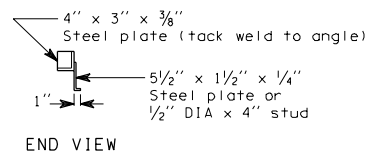
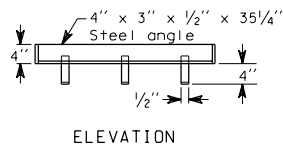
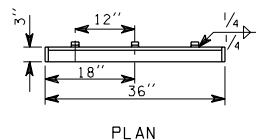
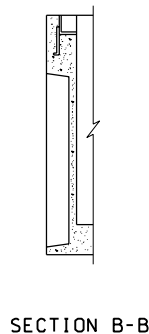
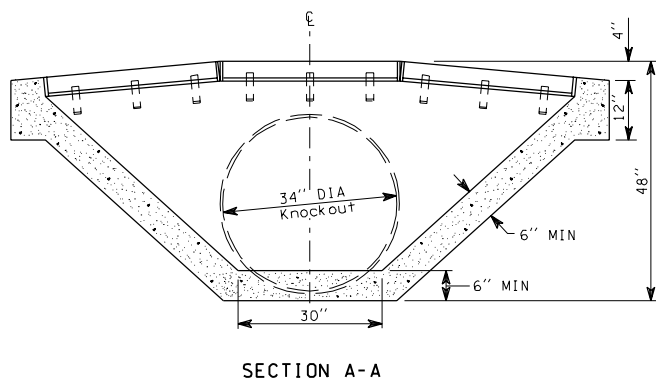
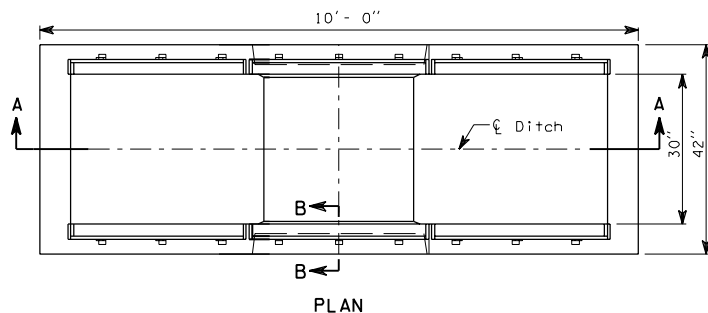
DIKE INSTALLATION FOR PREFERRED SLOPE

*See Contract For Backslope Details

DROP INLET TYPE 1

NOTES

1. Angles shall be set so that each bearing bar on the grate shall have full seating on both ends. The finished top of concrete shall be even with the grate surface.
2. Top of inlet shall be placed at ground level to present an unobstructed ditch or median section.
3. Bevel or round exposed concrete edges $\frac{1}{2}$ ".
4. Pipes may enter through the knockouts at any reasonable angle provided the outside of the pipe can be contained within the knockout provided.
5. The grade line of the lowest inlet pipe shall enter the structure at an elevation equal to or higher than the grade line of the outlet pipe.
6. Precast inlet shall be marked with the manufacturer's identification inside the structure in some readily accessible location.
7. Inside wall taper for form removal shall not result in any wall section thinner than 6" except in pipe knockout areas.
8. Amount, type and grade of reinforcing steel is the responsibility of the manufacturer. The manufacturer is responsible for the structure until final acceptance in place with all required knockouts removed.



GRATE SUPPORT

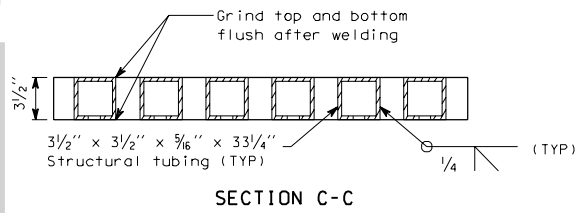
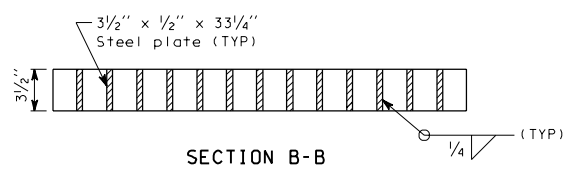
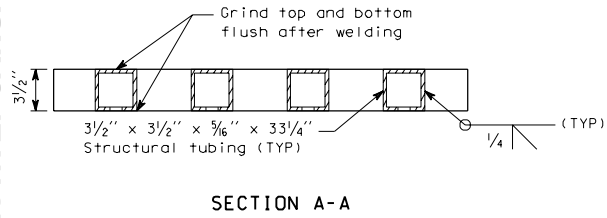
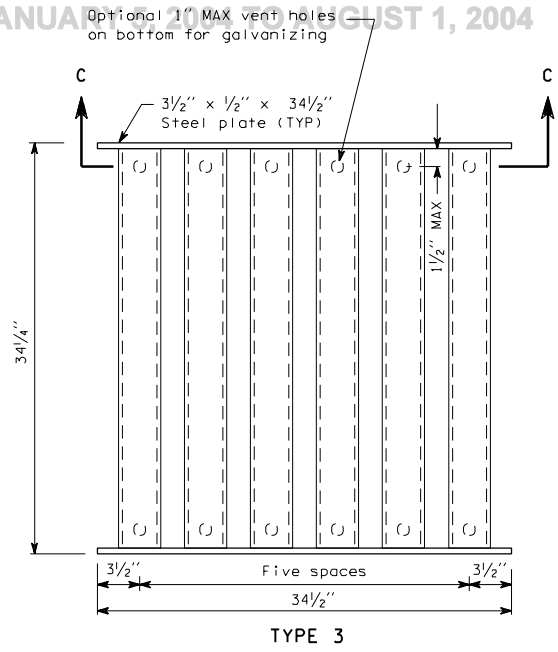
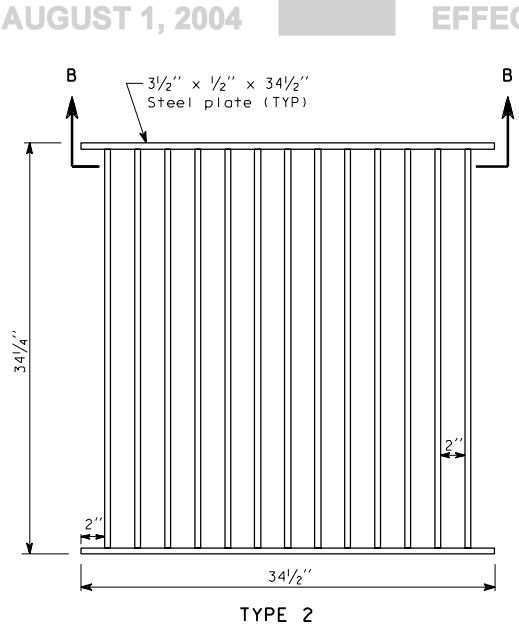
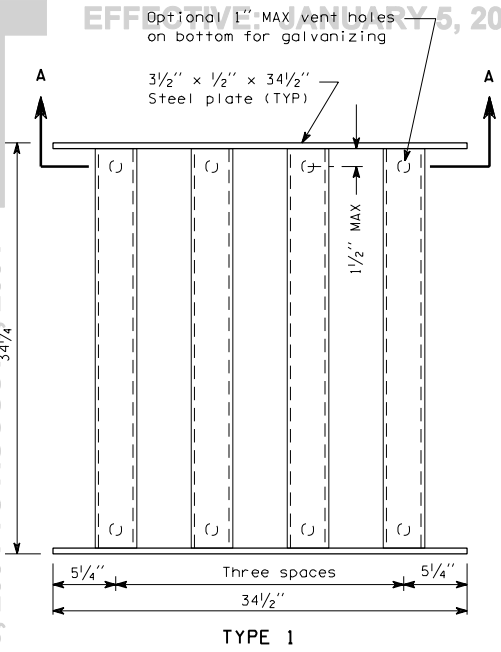
(Two required per grate)

DROP INLET TYPE 2

B-4g 1 of 1

07-18-97

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

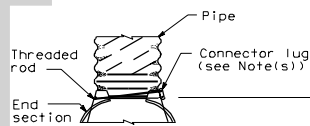


DROP INLET GRATES

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

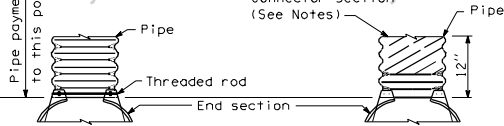
EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004



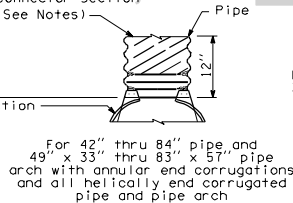
For 12" thru 24" pipe and 17" x 13" thru 28" x 20" pipe arch with annular end corrugations

TYPE 1



For 30" thru 84" pipe and 35" x 24" thru 83" x 57" pipe arch with annular end corrugations

TYPE 2

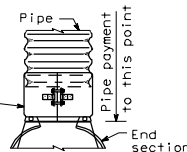


For 42" thru 84" pipe and 49" x 33" thru 83" x 57" pipe arch with annular end corrugations and all helically end corrugated pipe and pipe arch

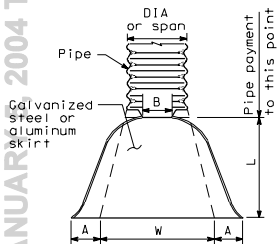
TYPE 3

DESIGN A CONNECTION TO METAL PIPE

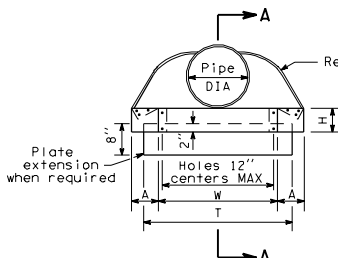
Pipe coupling band, shop bolted to flared end section with $\frac{3}{8}$ " bolts at 6" on center maximum or equivalent riveted or welded connection. For use with all sizes of pipe and pipe arch with annular ends.



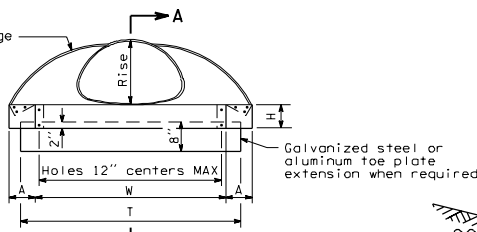
DESIGN C CONNECTION TO METAL PIPE OR CONCRETE PIPE, OUTLET ONLY



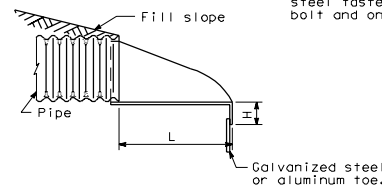
PLAN
PIPE AND PIPE ARCH



ELEVATION
PIPE



ELEVATION
PIPE ARCH



SECTION A-A
PIPE AND PIPE ARCH

PIPE											
PIPE DIA (Inches)	THICKNESS (Inches)		DIMENSION (Inches)						Skirt	END SECTION SLOPE	
			A	B	H	L	W	T			
	Steel	Alum	1" Toler	MAX	1" Toler	1 1/2" Toler	2" Toler	2" Toler			
12	0.064	0.060	6	6	6	21	24	34	1 Pc.	2 1/2:1	
15	0.064	0.060	7	8	6	26	30	40	1 Pc.	2 1/2:1	
18	0.064	0.060	8	10	6	31	36	46	1 Pc.	2 1/2:1	
21	0.064	0.060	9	12	6	36	42	52	1 Pc.	2 1/2:1	
24	0.064	0.075	10	13	6	41	48	58	1 Pc.	2 1/2:1	
30	0.079	0.075	12	16	8	51	60	70	2 Pc.	2 1/2:1	
36	0.079	0.105	14	19	9	60	72	94	2 Pc.	2 1/2:1	
42	0.109	0.105	16	22	11	69	84	106	2 Pc.	2 1/2:1	
48	0.109	0.105	18	27	12	78	90	112	2 Pc.	2 1/2:1	
54	0.109	—	18	30	12	84	102	122	2 Pc.	2 1/2:1	
60	0.109	0.138	18	33	12	87	114	134	3 Pc.	1 1/2:1	
66	0.109	0.138	18	36	12	87	120	142	3 Pc.	1 1/2:1	
72	0.109	0.138	18	39	12	87	126	146	3 Pc.	1 1/3:1	
78	0.109	0.138	18	42	12	87	132	152	3 Pc.	1 1/4:1	
84	0.109	0.138	18	45	12	87	138	158	3 Pc.	1 1/5:1	

PIPE ARCH DIMENSIONS (Inches)		THICKNESS (Inches)		PIPE ARCH							Skirt	END SECTION SLOPE
				DIMENSIONS (Inches)								
				A	B	H	L	W	T			
Span	Rise	Steel	Alum	1" Toler	max	1" Toler	1 1/2" Toler	2" Toler	2" Toler			
17	13	0.064	0.060	7	9	6	19	30	40	1 Pc.	2 1/2:1	
21	15	0.064	0.060	7	10	6	23	36	46	1 Pc.	2 1/2:1	
24	18	0.064	0.060	8	12	6	28	42	52	1 Pc.	2 1/2:1	
28	20	0.064	0.075	9	14	6	32	48	58	1 Pc.	2 1/2:1	
35	24	0.079	0.075	10	16	6	39	60	70	1 Pc.	2 1/2:1	
42	29	0.079	0.105	12	18	8	46	75	85	2 Pc.	2 1/2:1	
49	33	0.109	0.105	13	21	9	53	85	103	2 Pc.	2 1/2:1	
57	38	0.109	0.105	18	26	12	63	90	114	3 Pc.	2 1/2:1	
64	43	0.109	0.105	18	30	12	70	102	130	3 Pc.	2 1/2:1	
71	47	0.109 0.135	0.135	18	33	12	77	114	146	3 Pc.	2 1/2:1	
77	52	0.109 0.135	—	18	36	12	77	126	152	3 Pc.	1 1/2:1	
83	57	0.109 0.135	—	18	39	12	77	138	158	3 Pc.	1 1/2:1	

- The diameter of the end section of Design B shall match the inside diameter of the concrete pipe.
- Skirt sections shall be made in one piece for round pipe with a diameter of 12" to 24" inclusive and for pipe arches with a rise of 13" to 20" inclusive. Skirt sections for larger sizes of pipes may be multiple pieces in conformance with the tabulated values shown.
- Design A end sections for 42" thru 84" diameter and 49" x 33" thru 83" x 57" arch with annular corrugations and all helically corrugated pipe arch include one foot of pipe length as a connector section. The connector section shall be attached to the end section by welds, rivets or bolts and shall be the same thickness as the end section.
- Design C may be used in lieu of Design A for all metal pipe sizes except as noted. Coupling bands may be any acceptable type for the pipe specified.
- Multiple panel skirts shall have lap seams which are to be tightly joined by $\frac{3}{8}$ " galvanized rivets or bolts.
- For 60" thru 84" diameter pipe and 77" x 52" and 83" x 57" pipe arch, the reinforced end shall be supplemented with galvanized stiffener angles of the following sizes:

60" thru 72" diameter pipe
(2" x 2" x $\frac{1}{4}$ " galvanized angle)

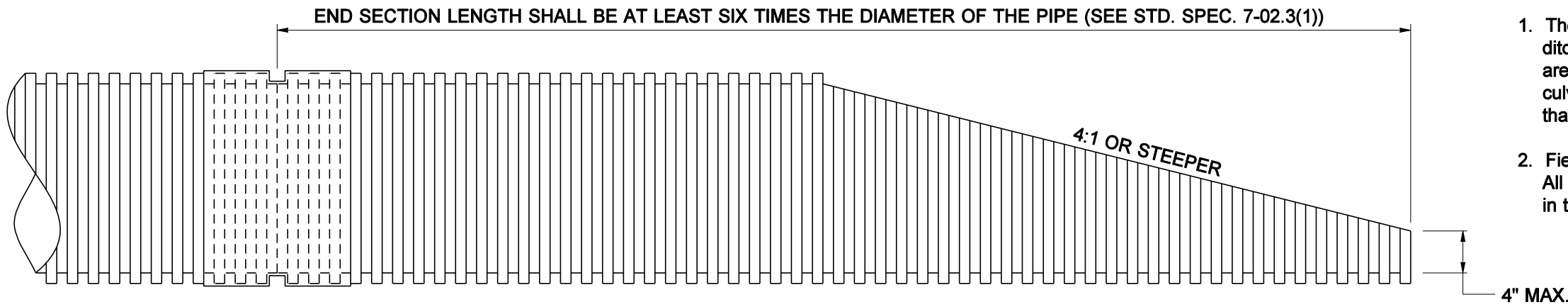
77" x 52" and 83" x 57" pipe arch
78" and 84" diameter pipe
(2" x 2" x $\frac{1}{4}$ " galvanized angle)

The above galvanized angles shall be attached by $\frac{3}{8}$ " galvanized nuts and bolts.
- Angle reinforcement will be placed under the center panel seams on the 77" x 52" and 83" x 57" pipe arch sizes.
- As an alternative to the connector lug and threaded rod used on 12" thru 24" culvert pipe, the attachment may be made with a 1" wide strap, 16 gage galvanized steel fastened with a $\frac{1}{2}$ " diameter, 6" long galvanized bolt and one squarehead nut.

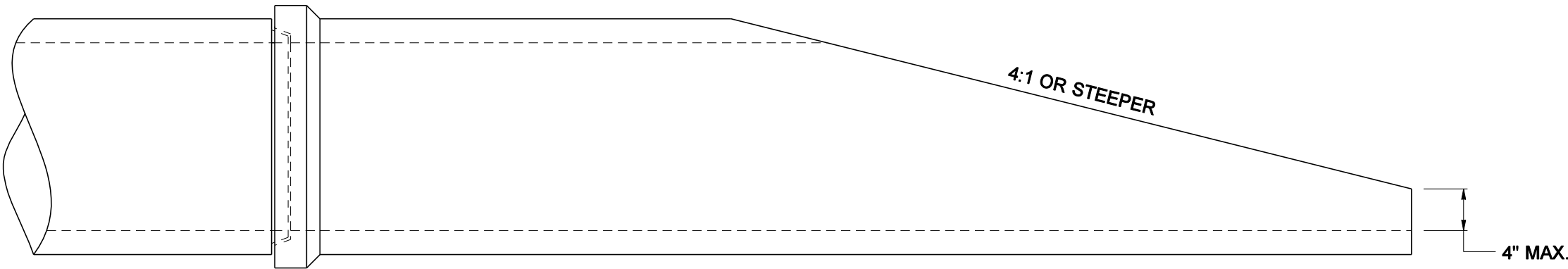
FLARED END SECTIONS

NOTES

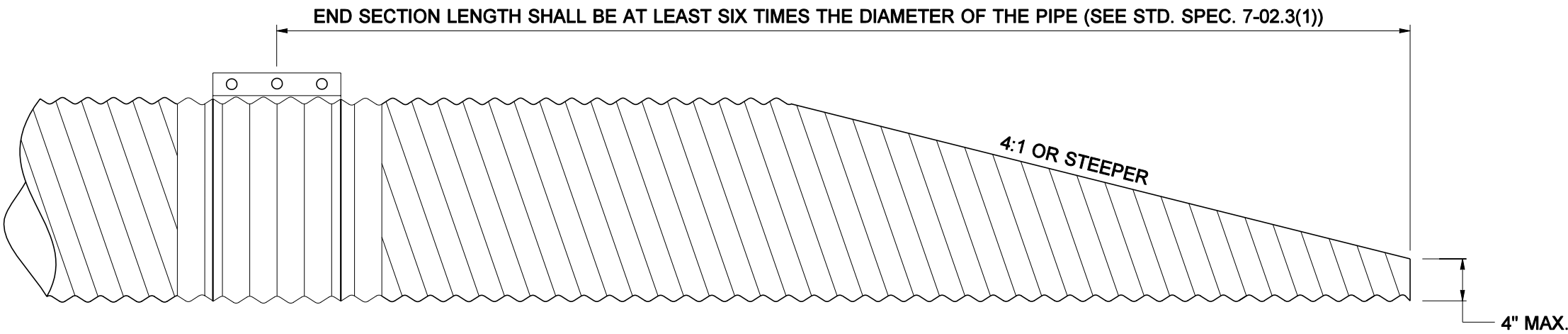
- 1. The culvert ends shall be beveled to match the embankment or ditch slope and shall not be beveled flatter than 4:1. When slopes are between 4:1 and 6:1, shape the slope in the vicinity of the culvert end to ensure that no part of the culvert protrudes more than 4" above the ground line.
- 2. Field cut of culvert ends is permitted, when approved by the Engineer. All field cut culvert pipe shall be treated with treatment as shown in the Standard Specifications or General Special Provisions.



THERMOPLASTIC PIPE



CONCRETE PIPE



METAL PIPE



EXPIRES JULY 1, 2003

BEVELED END SECTIONS
FOR CULVERTS
30" DIAMETER OR LESS
STANDARD PLAN B-7a

SHEET 1 OF 1 SHEET

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05/2002	REVISED MAX. SLOPE AND MIN. LENGTH FOR METAL PIPE, REV. NOTES. ADDED MAX. PIPE SIZE	RG
DATE	REVISION	BY

APPROVED FOR PUBLICATION

Harold J. Peterfeso 06-17-02

STATE DESIGN ENGINEER

DATE

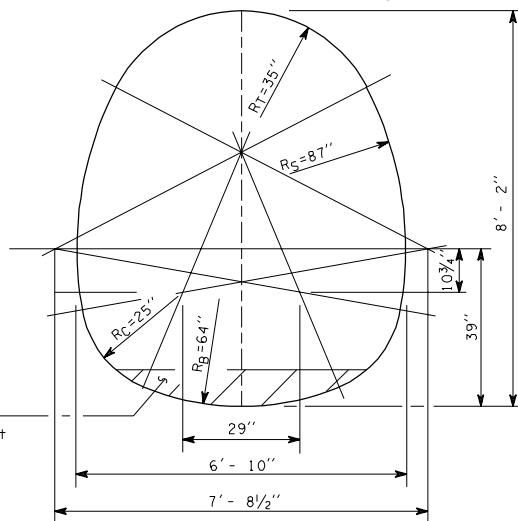
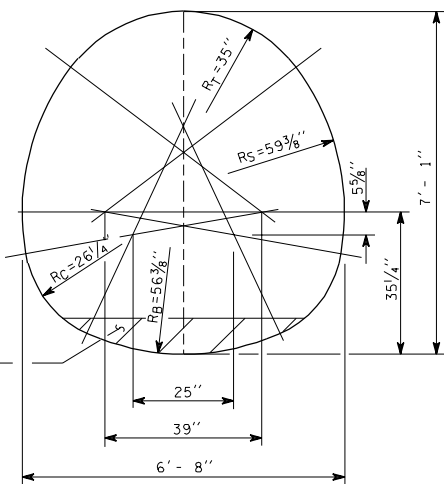


Washington State Department of Transportation

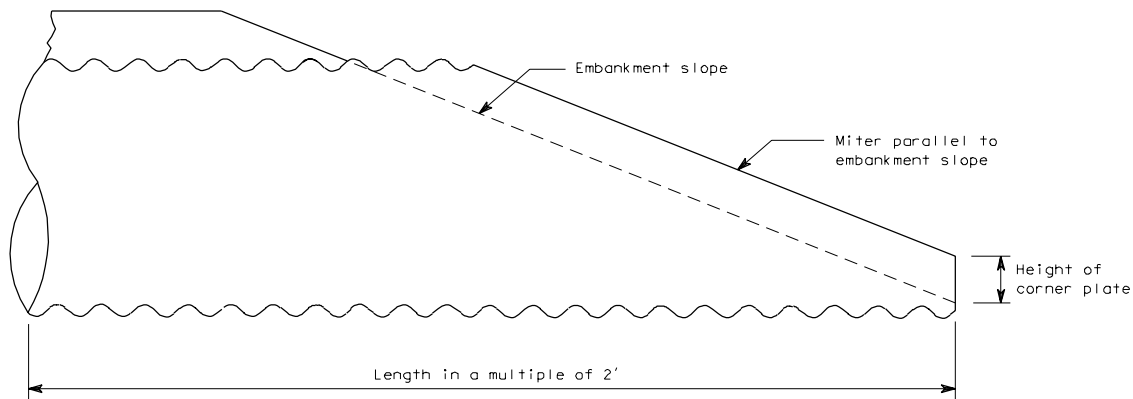
NOTES

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

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

Invert
treatmentInvert
treatment

SECTION



ELEVATION

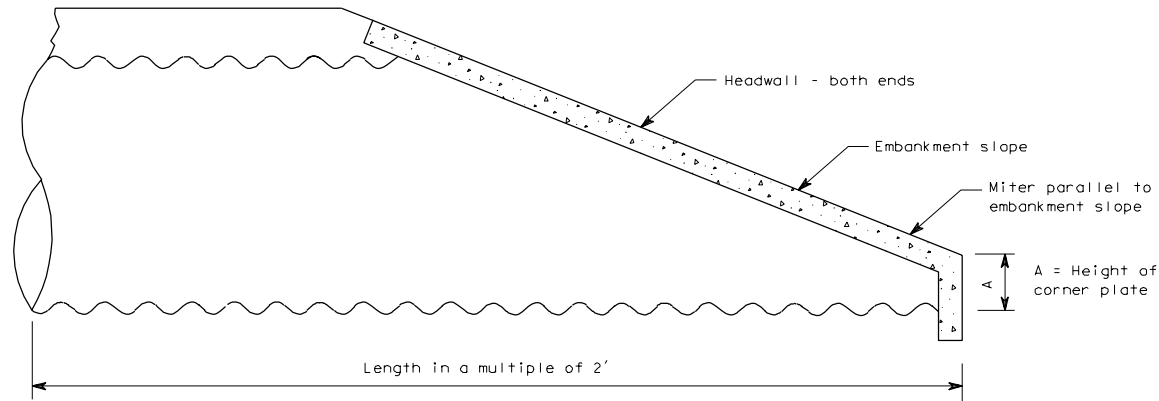
STRUCTURAL PLATE
UNDERPASS DESIGN 1

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

CORRUGATED METAL

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

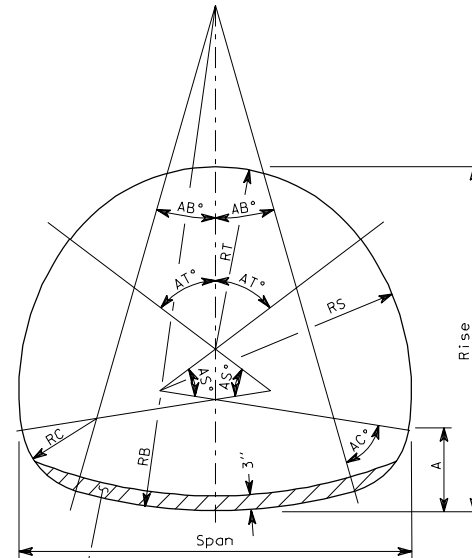
- NOTES
- Span and rise dimensions are measured to the inside crests of corrugations and may vary slightly depending on manufacturer.



ELEVATION

CORRUGATED METAL

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

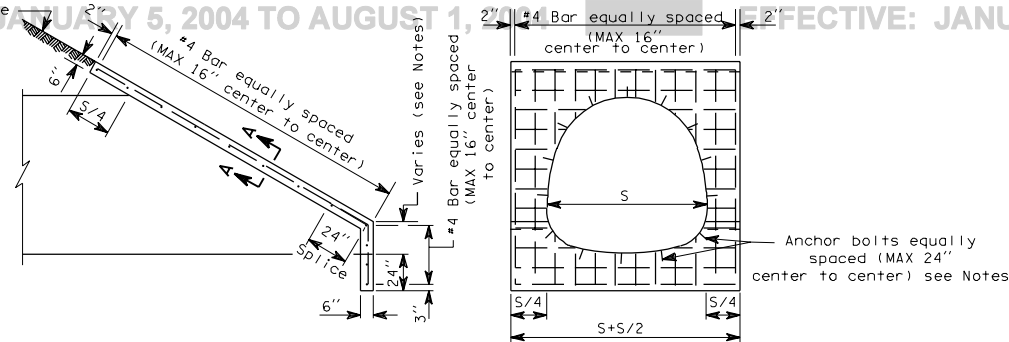
Invert
treatment

SECTION

STRUCTURAL PLATE
UNDERPASS DESIGN 2

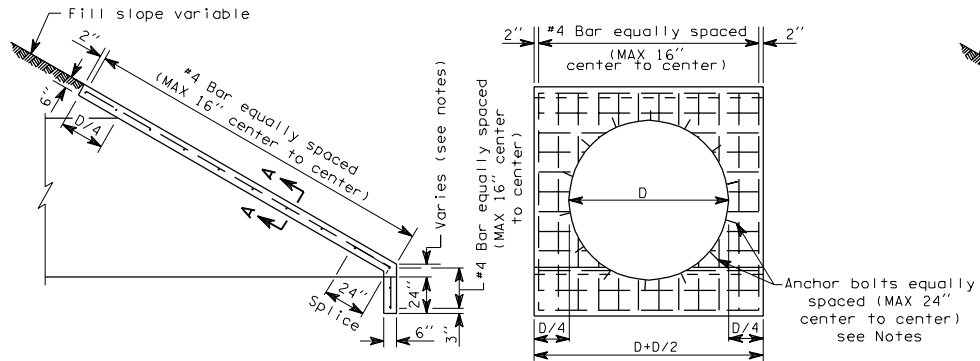
B-8a 1 of 1

07-25-97

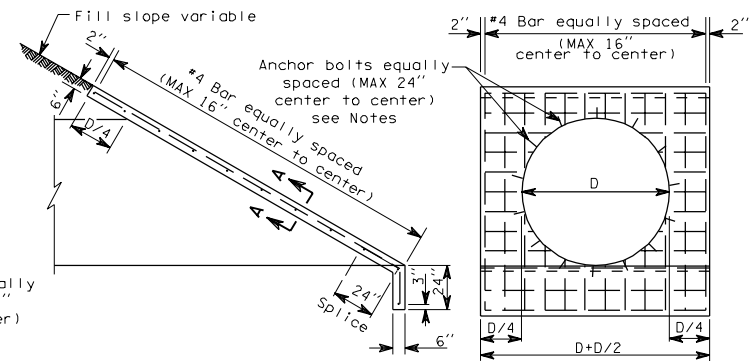


STRUCTURAL PLATE PIPE ARCHES AND UNDERPASSES

- NOTES
1. The variable dimension indicated for the height of step for step mitered pipes shall conform to manufacturers recommendations unless specified differently on the plans or in the special provisions.
 2. Reinforcing steel shall have 1/2" clear cover to all concrete surfaces.
 3. Headwalls for concrete culvert pipe may omit anchor bolt attachment.
 4. When steel pipe safety bars are used, headwall thickness shall be increased to 8".



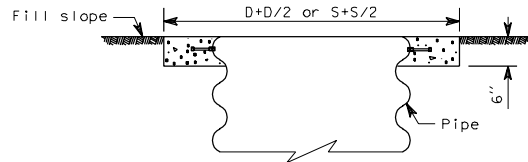
STEP MITERED PIPE



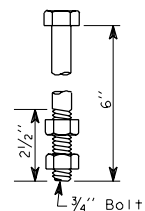
FULL MITERED PIPE

PIPES AND STRUCTURAL PLATE PIPES

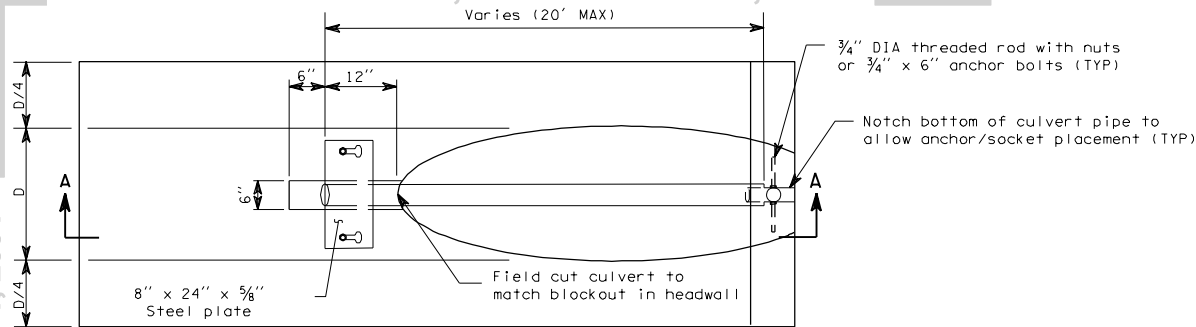
HEADWALLS FOR CULVERT PIPES



SECTION A-A

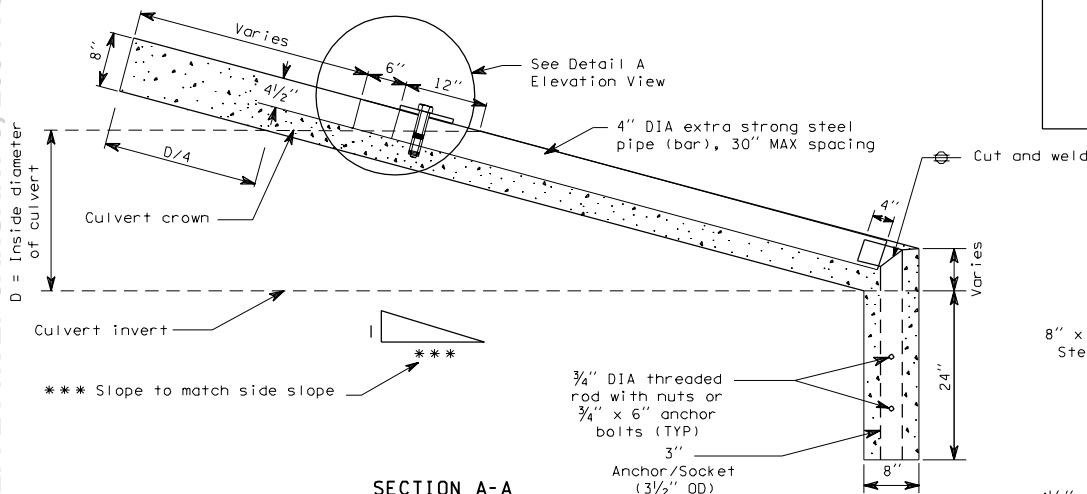


ANCHOR BOLT DETAILS

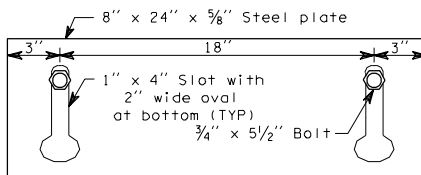


TOP VIEW

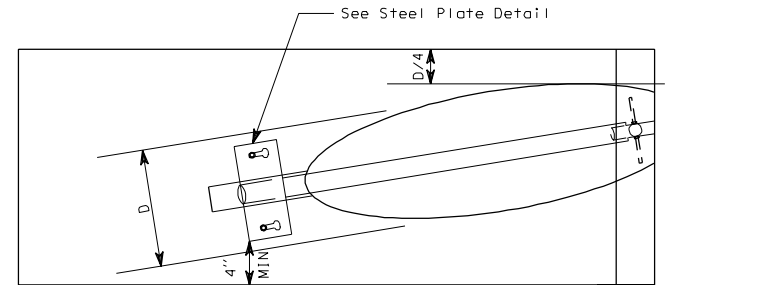
Culvert is perpendicular to roadway
Headwall is placed parallel to roadway



SECTION A-A

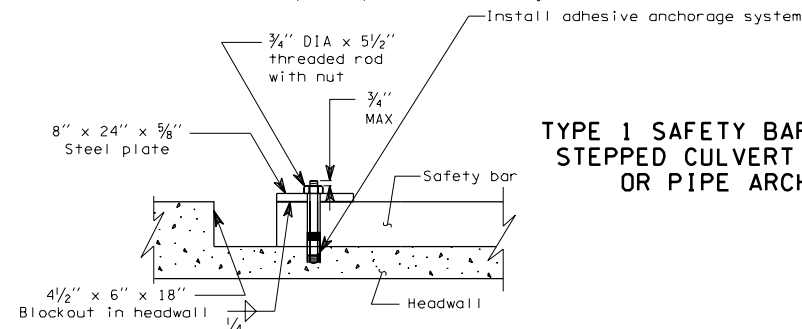


STEEL PLATE



TOP

Culvert is skewed to roadway
Headwall is placed parallel to roadway



ELEVATION

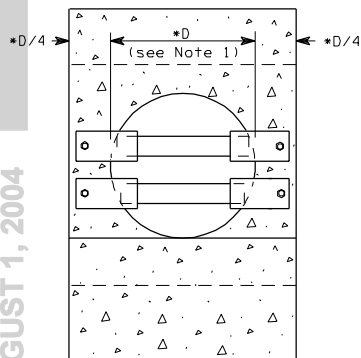
DETAIL A

1. Sockets shall be 3" extra strong steel pipe (3½" OD). Sockets must be the proper angle to allow safety bar to be easily removed.
2. Safety Bar shall be 4" extra strong (4½" OD) steel pipe.
3. Bevel culvert pipe to match side slope.

Culvert DIA	Required number of pipes
Up to 36"	None
42" - 60"	1
66" - 90"	2
96" - 120"	3

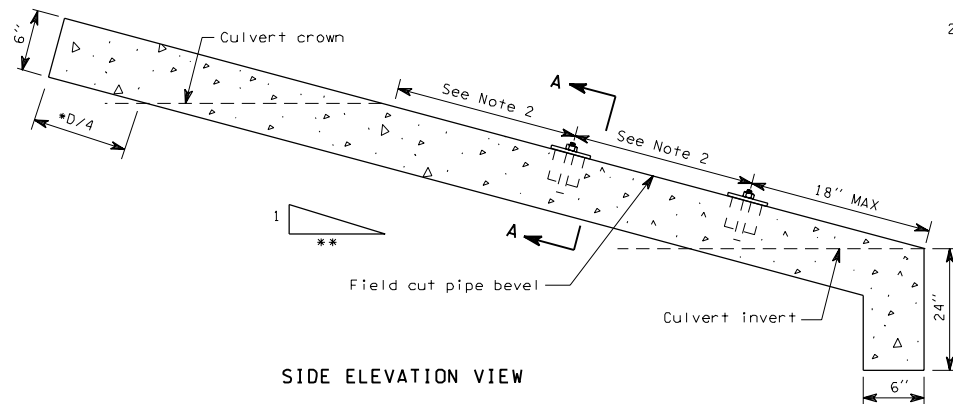
TYPE 1 SAFETY BARS FOR
STEPPED CULVERT PIPE
OR PIPE ARCH

1. Maximum span width is 54".
2. Spacing between safety bars, or between bars and the culvert crown shall be equal spaces of 30" maximum.

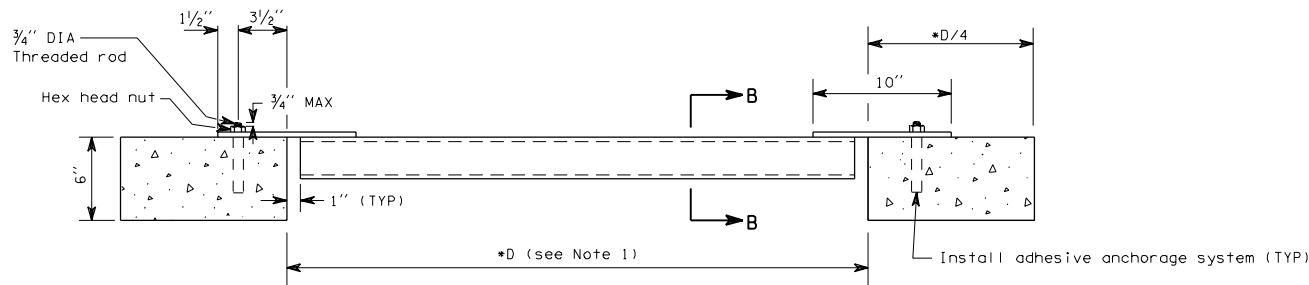


FRONT VIEW OF
CROSS ROAD CULVERT

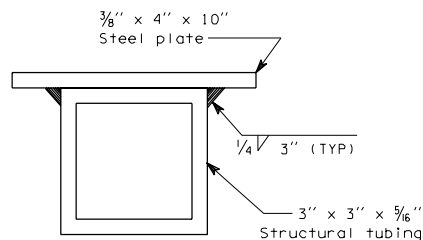
- * D = Inside DIA of culvert
- ** Slope to match side slope, 6:1 preferred, not steeper than 4:1



SIDE ELEVATION VIEW

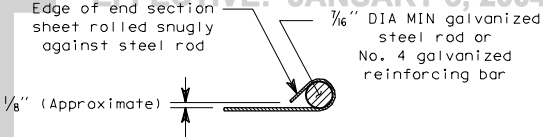


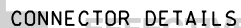
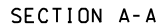
SECTION A-A



SECTION B-B

TYPE 2 SAFETY BARS FOR
CULVERT PIPE OR PIPE
ARCH (ON CROSS ROAD)

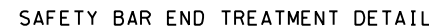


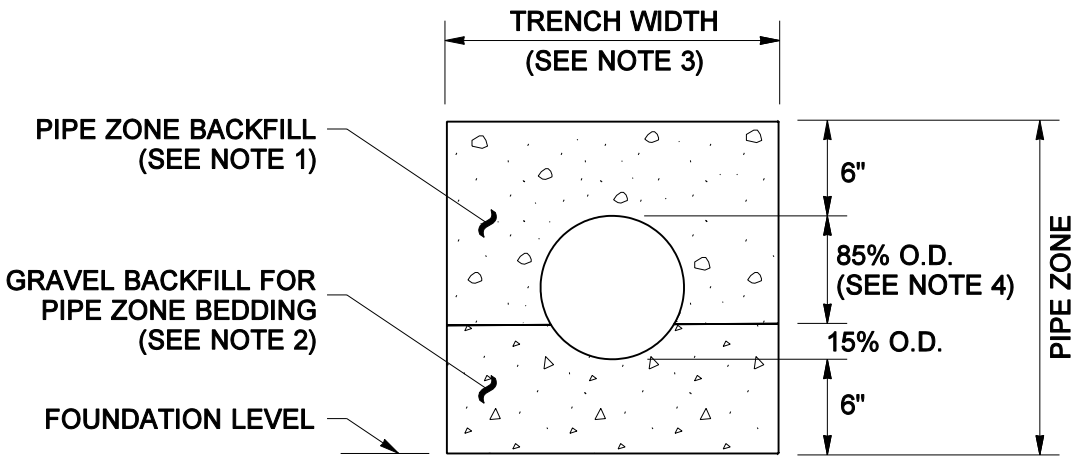


- | METAL END SECTIONS FOR CIRCULAR PIPES | | | | | | | | | | |
|---------------------------------------|----------------------|------|---------------------|----|----|------------------|--------------|--------------------|-------|--------------------|
| Pipe
DIA
(Inches) | Minimum
Thickness | | Dimensions (Inches) | | | | L Dimensions | | | |
| | Inches | Gage | A | H | W | Overall
Width | Slope | Length
(Inches) | Slope | Length
(Inches) |
| 15 | .064 | 16 | 8 | 6 | 21 | 37 | 4:1 | 20 | 6:1 | 30 |
| 18 | .064 | 16 | 8 | 6 | 24 | 40 | 4:1 | 32 | 6:1 | 48 |
| 21 | .064 | 16 | 8 | 6 | 27 | 43 | 4:1 | 44 | 6:1 | 66 |
| 24 | .064 | 16 | 8 | 6 | 30 | 46 | 4:1 | 56 | 6:1 | 84 |
| 30 | .109 | 12 | 12 | 9 | 36 | 60 | 4:1 | 80 | 6:1 | 120 |
| 36 | .109 | 12 | 12 | 9 | 42 | 66 | 4:1 | 104 | 6:1 | 156 |
| 42 | .109 | 12 | 16 | 12 | 48 | 80 | 4:1 | 128 | 6:1 | 192 |
| 48 | .109 | 12 | 16 | 12 | 54 | 86 | 4:1 | 152 | 6:1 | 228 |
| 54 | .109 | 12 | 16 | 12 | 60 | 92 | 4:1 | 176 | 6:1 | 264 |
| 60 | .109 | 12 | 16 | 12 | 66 | 98 | 4:1 | 200 | 6:1 | 300 |

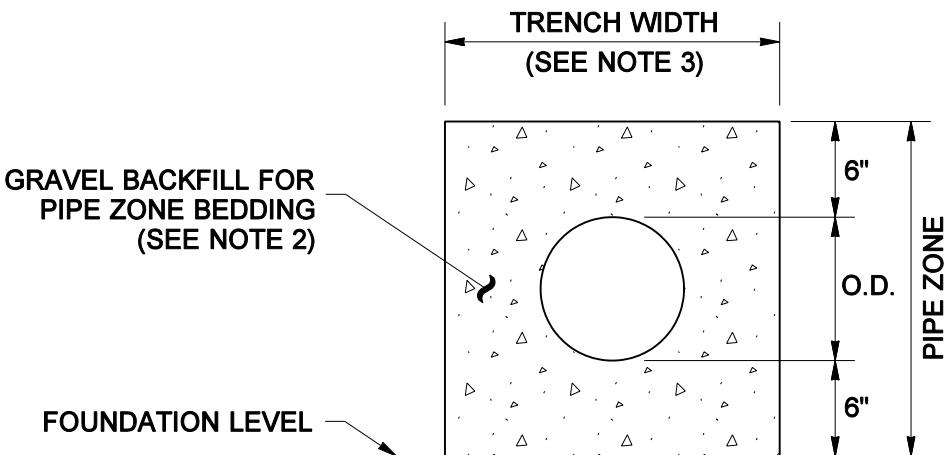
METAL END SECTIONS FOR ARCHED PIPES												
Equiv. DIA (Inches)	Inches		Minimum Thickness		Dimensions (Inches)				L Dimensions			
	Span	Rise	Inches	Gage	A	H	W	Overall Width	Slope	Length (Inches)	Slope	Length (Inches)
18	21	15	.064	16	8	6	27	43	4:1	20	6:1	30
21	24	18	.064	16	8	6	30	46	4:1	32	6:1	48
24	28	20	.064	16	8	6	34	50	4:1	40	6:1	60
30	35	24	.079	14	12	9	41	65	4:1	56	6:1	84
36	42	29	.109	12	12	9	48	72	4:1	76	6:1	114
42	49	33	.109	12	16	12	55	87	4:1	92	6:1	138
48	57	38	.109	12	16	12	63	95	4:1	112	6:1	168
54	64	43	.109	12	16	12	70	102	4:1	132	6:1	198
60	71	47	.109	12	16	12	77	109	4:1	148	6:1	222
72	83	57	.109	12	16	12	89	121	4:1	188	6:1	282

TAPERED END SECTION
WITH TYPE 4 SAFETY BARS
(ON CROSS ROAD)

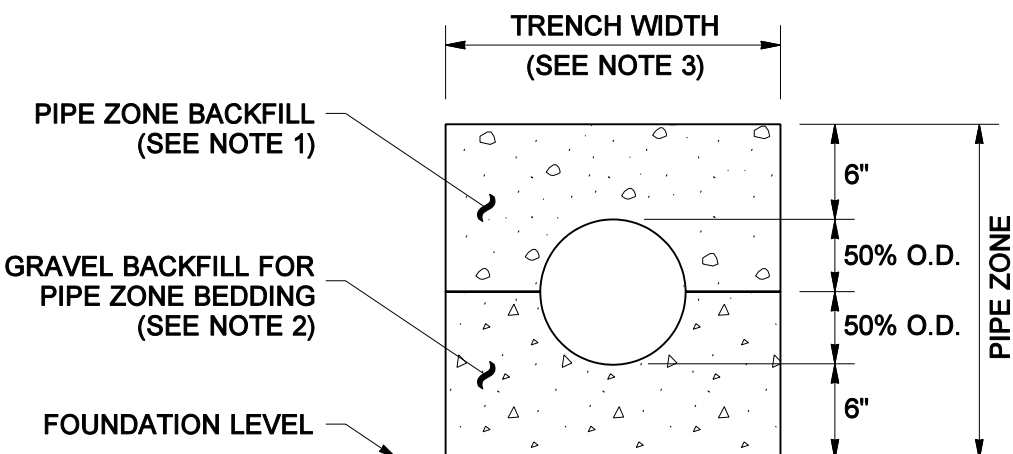




CONCRETE AND DUCTILE IRON PIPE



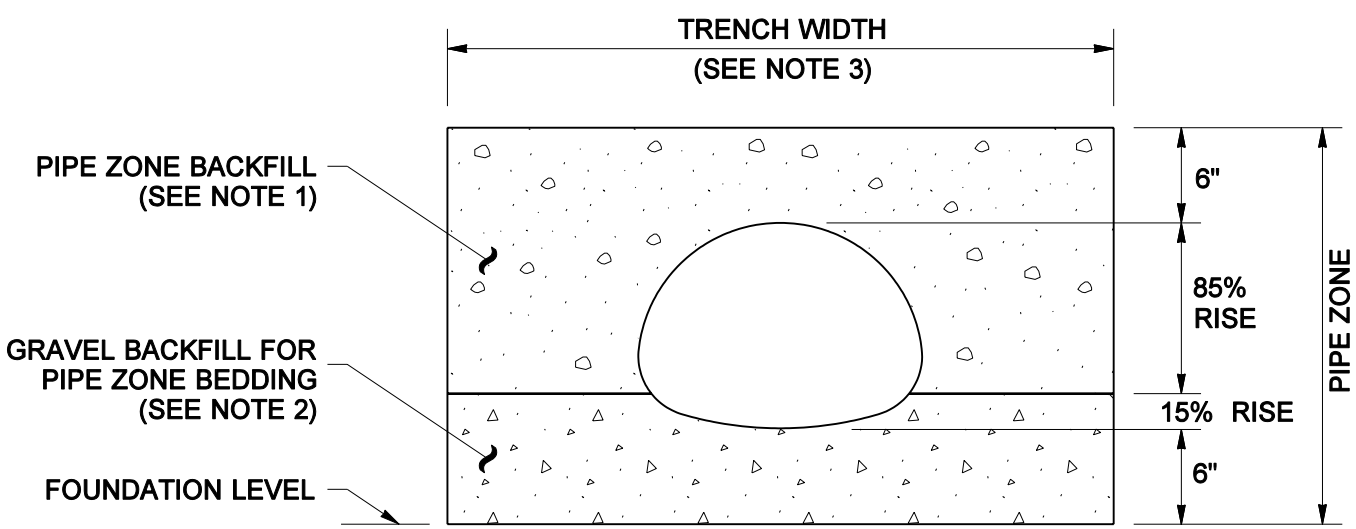
THERMOPLASTIC PIPE



METAL PIPE

NOTES

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



PIPE ARCHES

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



PIPE ZONE BEDDING AND BACKFILL
STANDARD PLAN B-11

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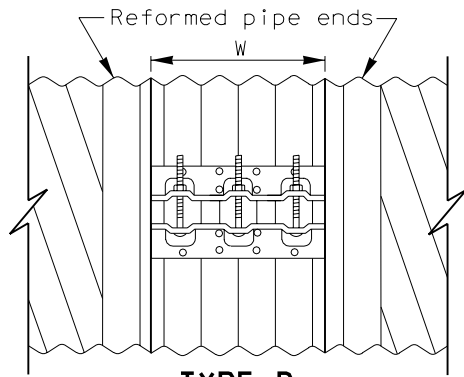
7/01	DELETED "Bedding material for thermoplastic pipe"	MAS
DATE	REVISION	BY

APPROVED FOR PUBLICATION

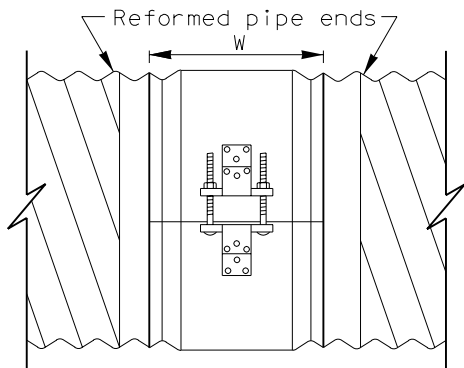
Clifford E. Mansfield 07-31-01
STATE DESIGN ENGINEER DATE

Washington State Department of Transportation

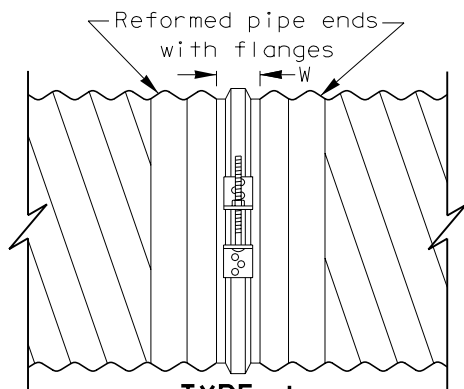
08 DEC 1998g:\standard plans\duel work\bl3dual.dgn Sheat



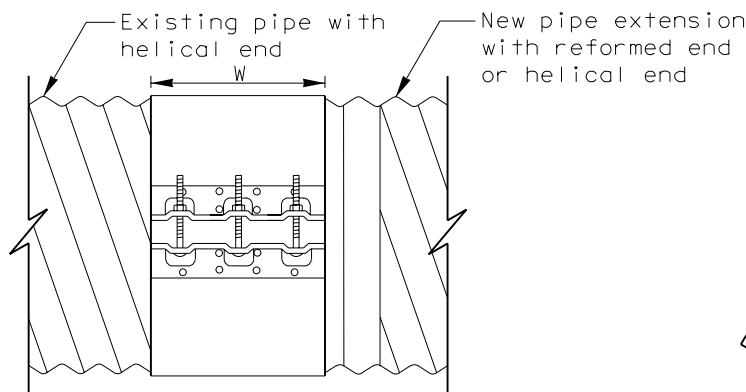
TYPE D
ANNULAR CORRUGATED BAND



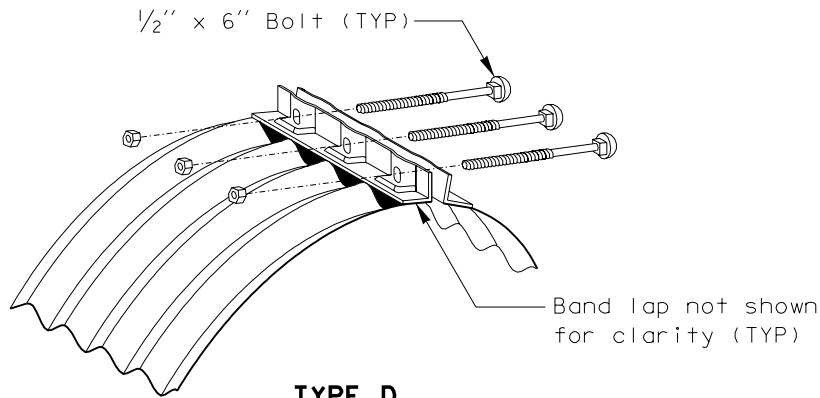
TYPE F
SEMI-CORRUGATED BAND



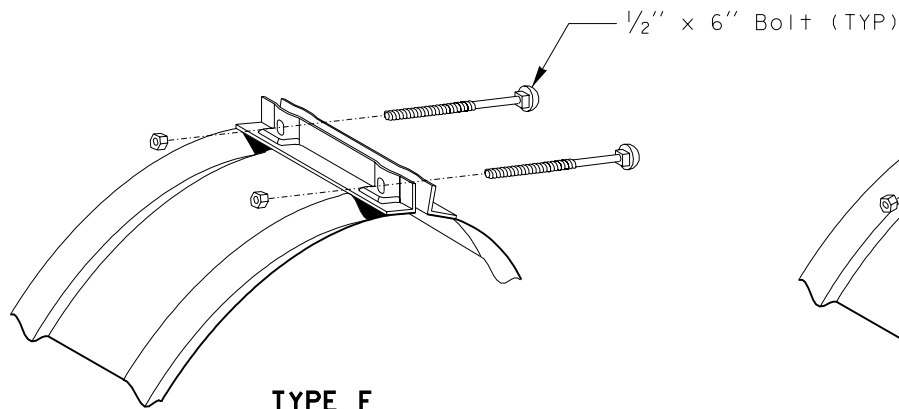
TYPE J
FLANGE BAND



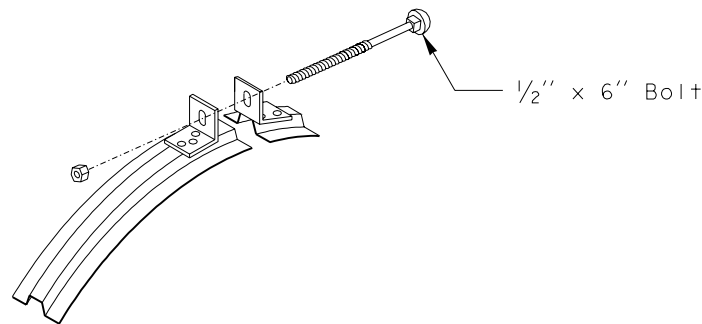
TYPE K
FLAT BAND OR DIMPLE BAND



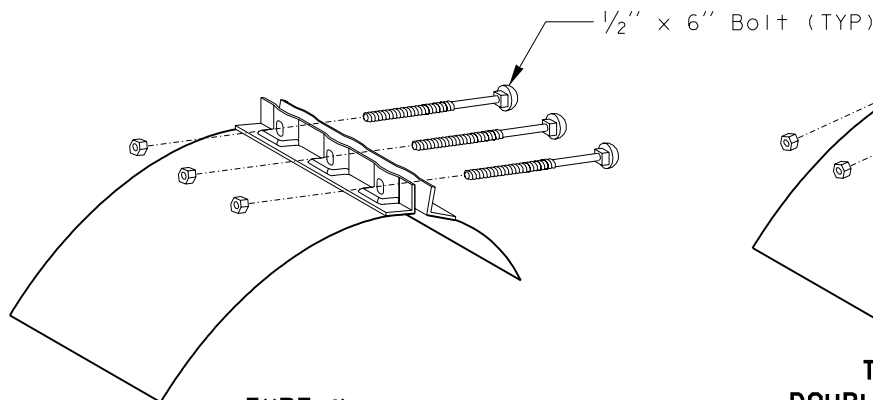
TYPE D
BAND ANGLE CONNECTOR DETAIL



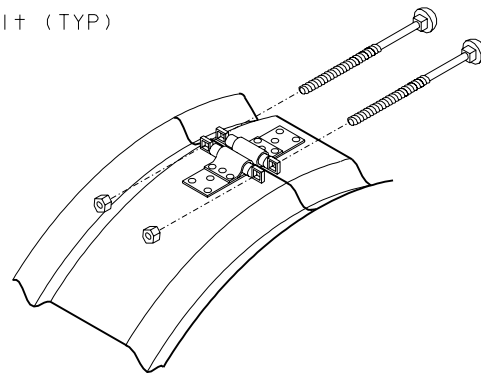
TYPE F
BAND ANGLE CONNECTOR DETAIL



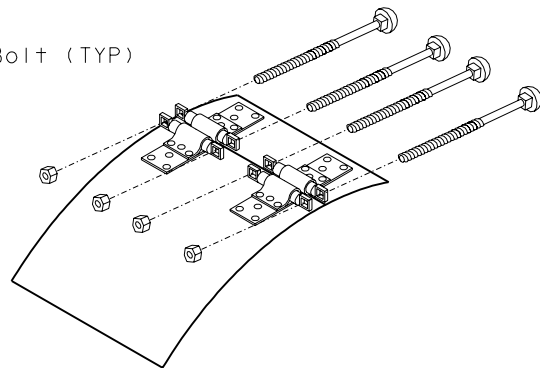
TYPE J
BAND ANGLE CONNECTOR DETAIL



TYPE K
BAND ANGLE CONNECTOR DETAIL



TYPE F
BAR AND STRAP CONNECTOR DETAIL



TYPE K
DOUBLE BAR AND
STRAP CONNECTOR
DETAIL

COUPLING BAND DIMENSION TABLE (All dimensions are in inches)					
BAND TYPE	CORRUGATION PITCH	DEPTH	PIPE DIA	MIN W	GASKET TYPE
STEEL	D	2 2/3 x 1/2 OR 3 x 1 REFORMED TO 2 2/3 x 1/2	12-84	12	SLEEVE
		3 x 1 REFORMED TO 2 2/3 x 1/2	90-144	24	SLEEVE
	F	2 2/3 x 1/2 OR 3 x 1 REFORMED TO 2 2/3 x 1/2	12-84	10 1/2	O-RING
	J	2 2/3 x 1/2	12-48	2 3/4	BUTYL
	K	2 2/3 x 1/2	12-48	12	SLEEVE
		* 3 x 1	54-84	24	
ALUMINUM	D	2 2/3 x 1/2	12-72	12	SLEEVE
		3 x 1	36-60	12	
		REFORMED TO 2 2/3 x 1/2	66-108	24	
	F	2 2/3 x 1/2	12-48	10 1/2	O-RING
	K	2 2/3 x 1/2	12-48	12	SLEEVE
		* 3 x 1	54-96	24	

*PIPE ARCH ONLY



COUPLING BANDS FOR
CORRUGATED METAL PIPE
STANDARD PLAN B-13

APPROVED FOR PUBLICATION

Clifford E. Mansfield

12/04/98

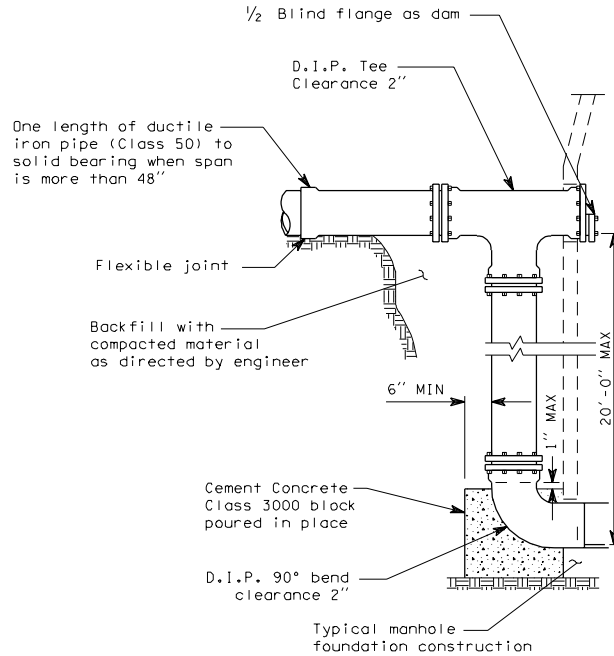
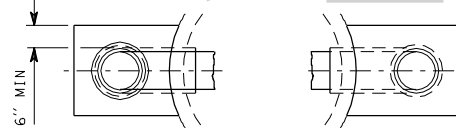
DEPUTY STATE DESIGN ENGINEER

DATE

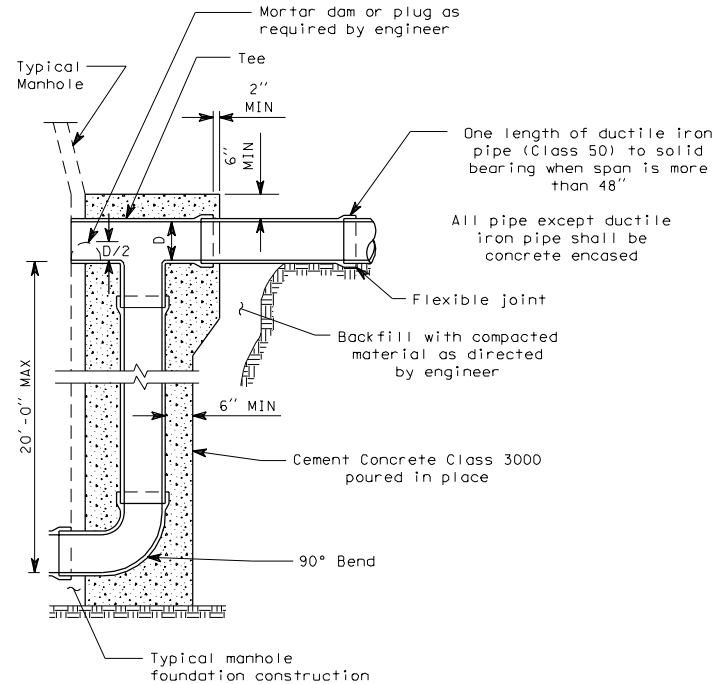


WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

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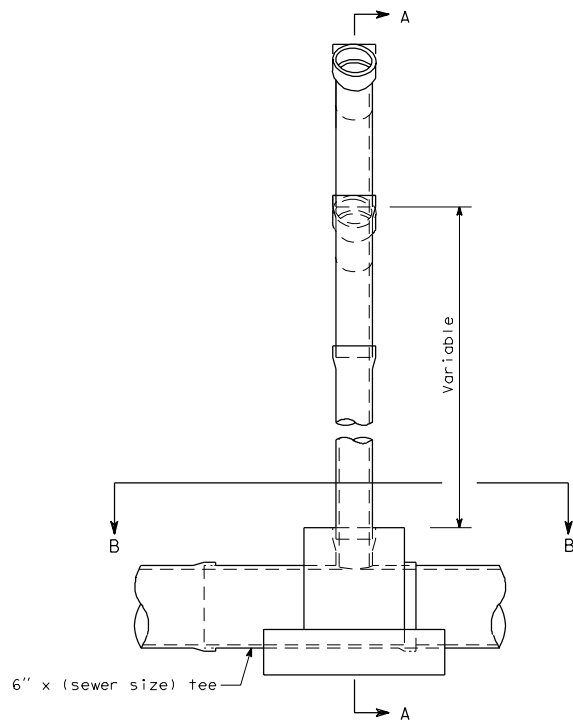


DUCTILE IRON
DROP CONNECTION

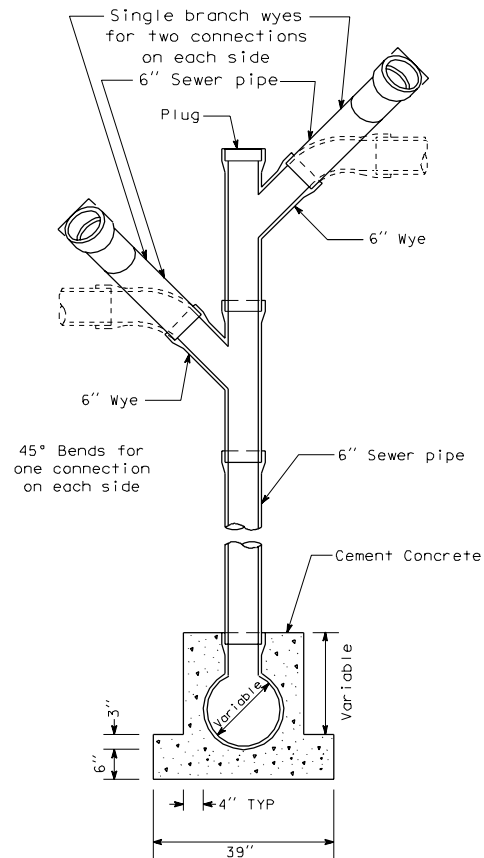


CONCRETE ENCASED
DROP CONNECTION

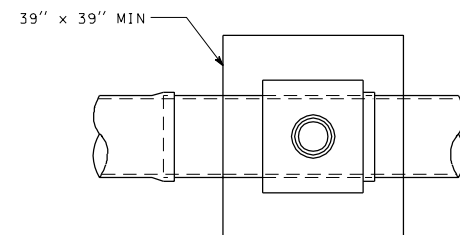
DROP CONNECTION
FOR SANITARY SEWERS



ELEVATION

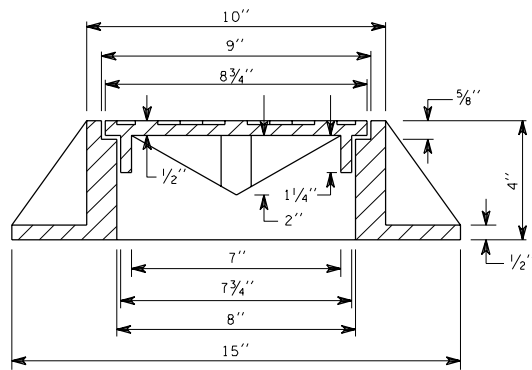
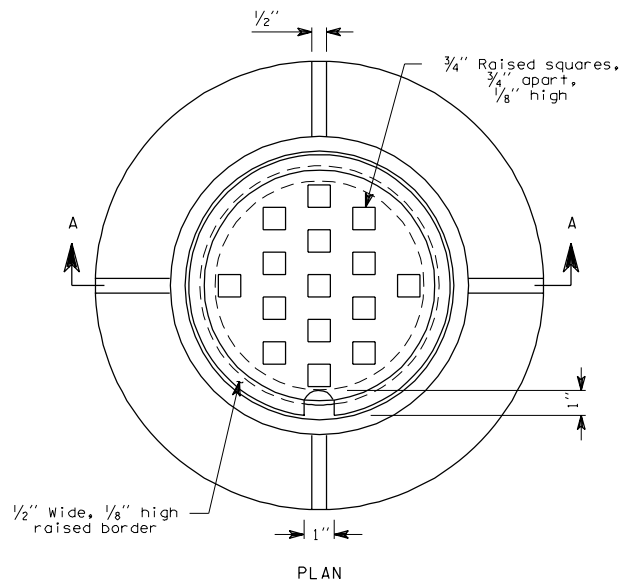


SECTION A-A

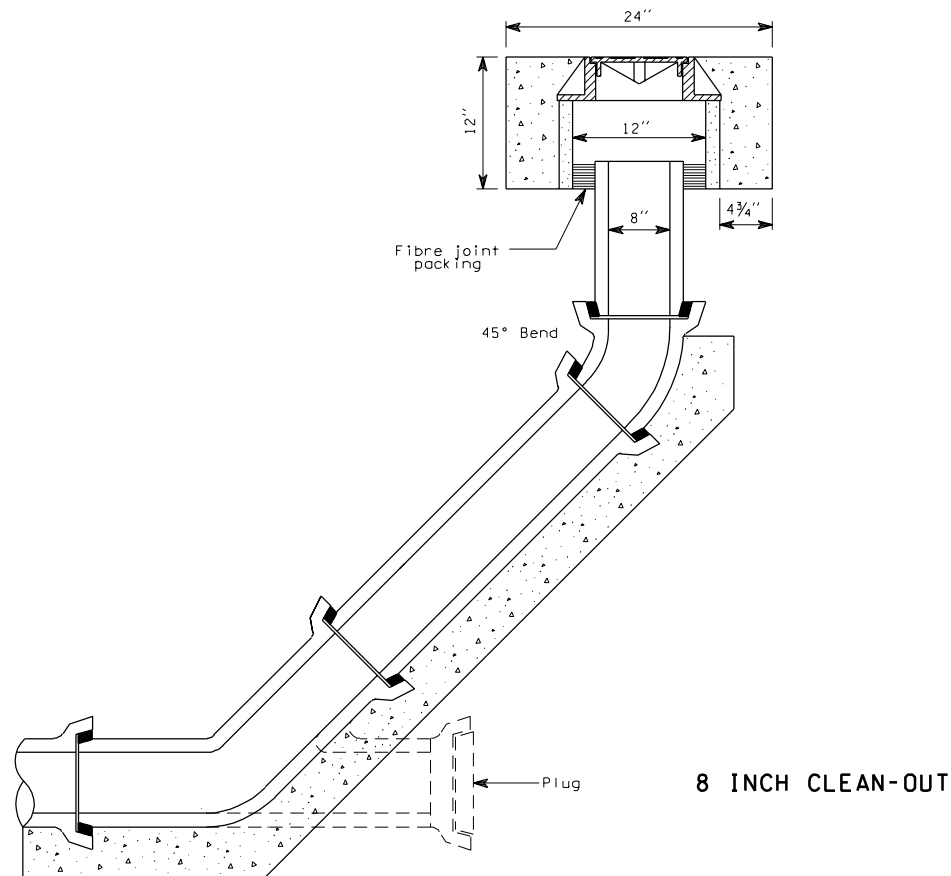


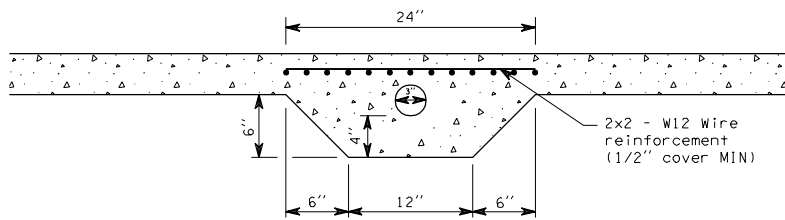
SECTION B-B

VERTICAL CONNECTION

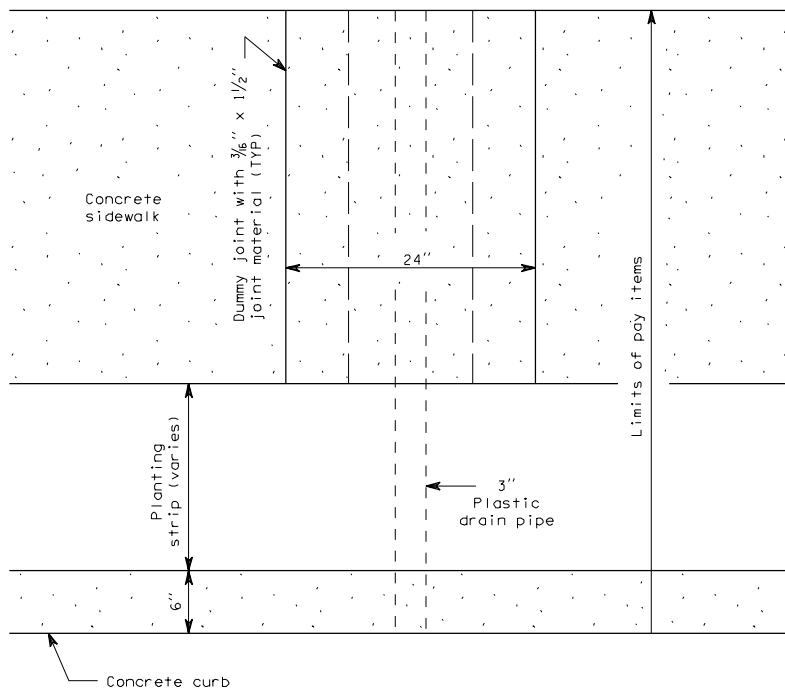


CAST IRON RING AND COVER





ELEVATION

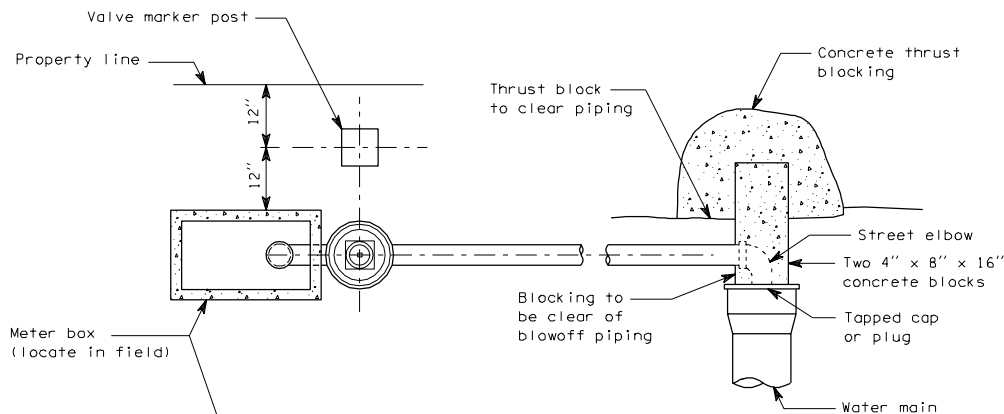


PLAN

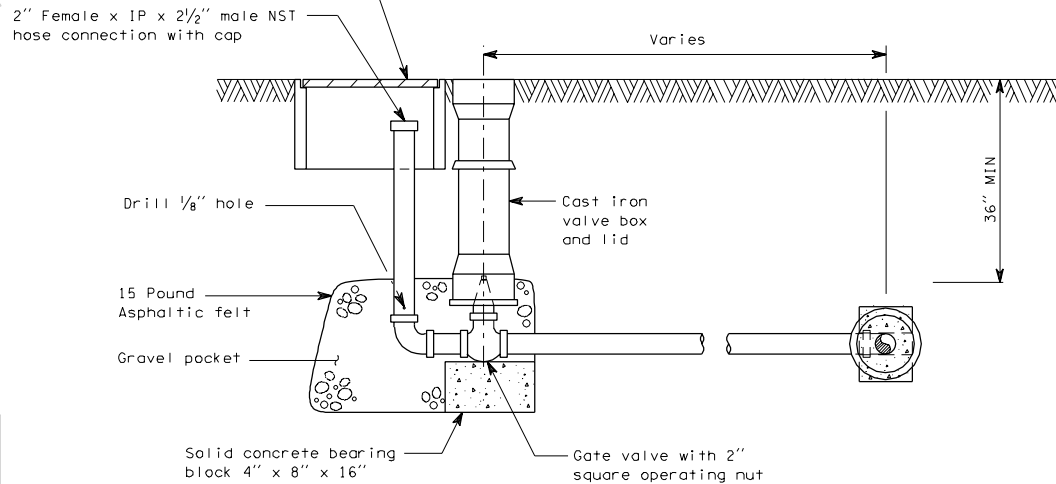
RESIDENTIAL
SIDEWALK DRAIN

NOTES

1. Paint pipe threads with asphalt paint after assembly.
2. All piping to be galvanized steel.
3. Valve and piping to valve to be 2" unless otherwise noted on plan.
4. Locate blowoff outlet near property corner if possible.



PLAN

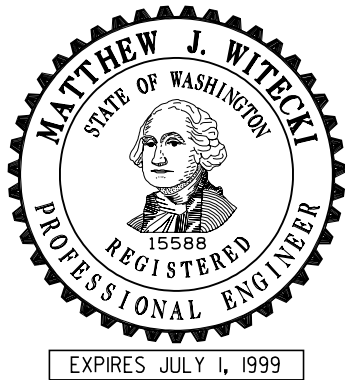
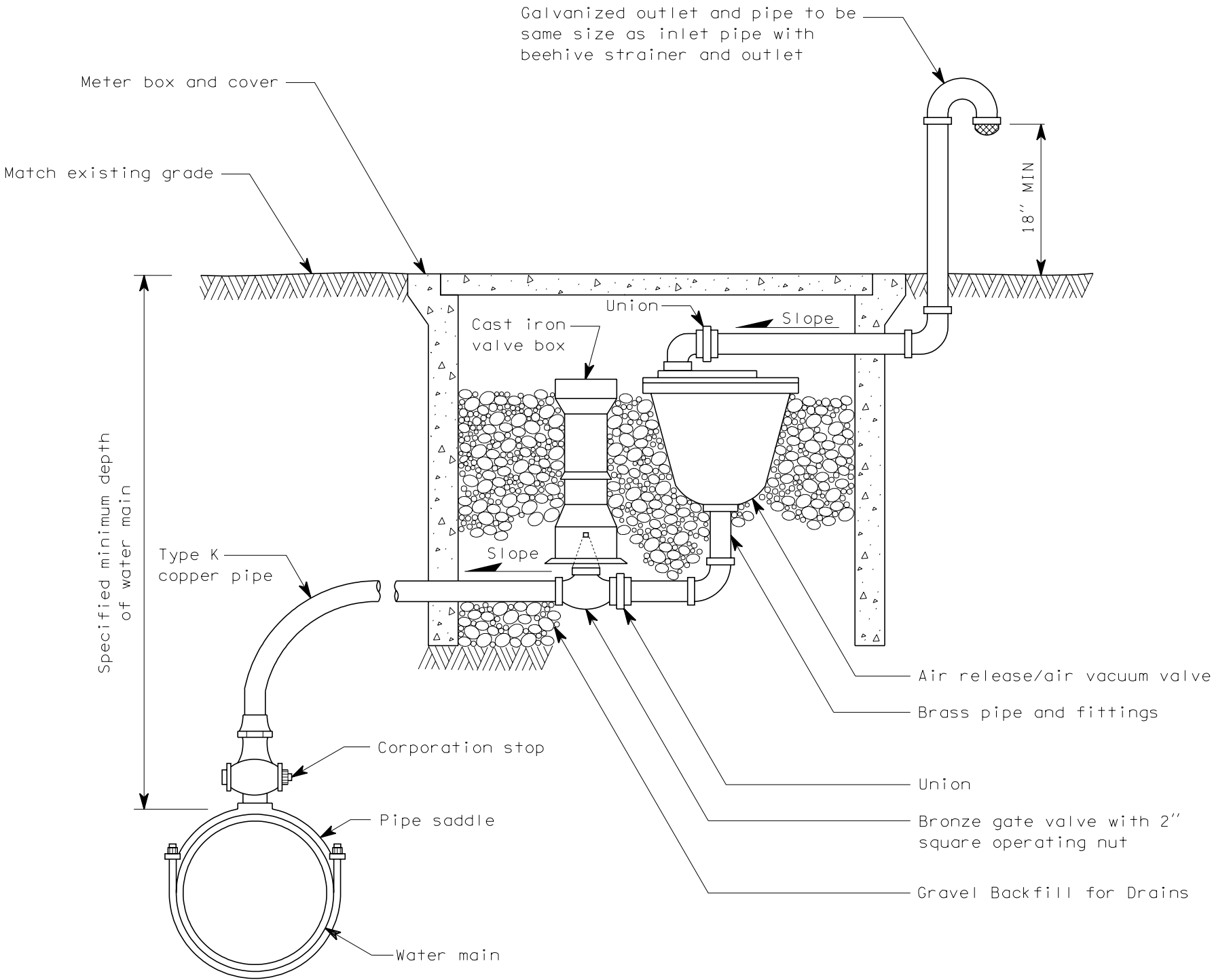


ELEVATION

2 INCH BLOWOFF ASSEMBLY

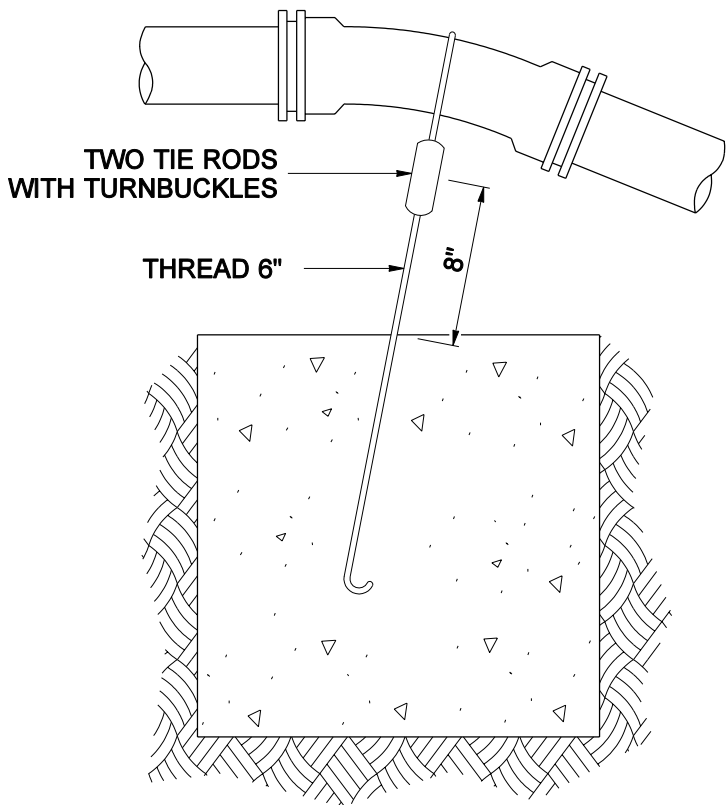
NOTES

- 1. Size of combination air release/air vacuum valve shall be specified in the Contract. Piping and valves shall be the same size as the combination air release/air vacuum valve.
- 2. Locate at the high point of the main, tap top of main.

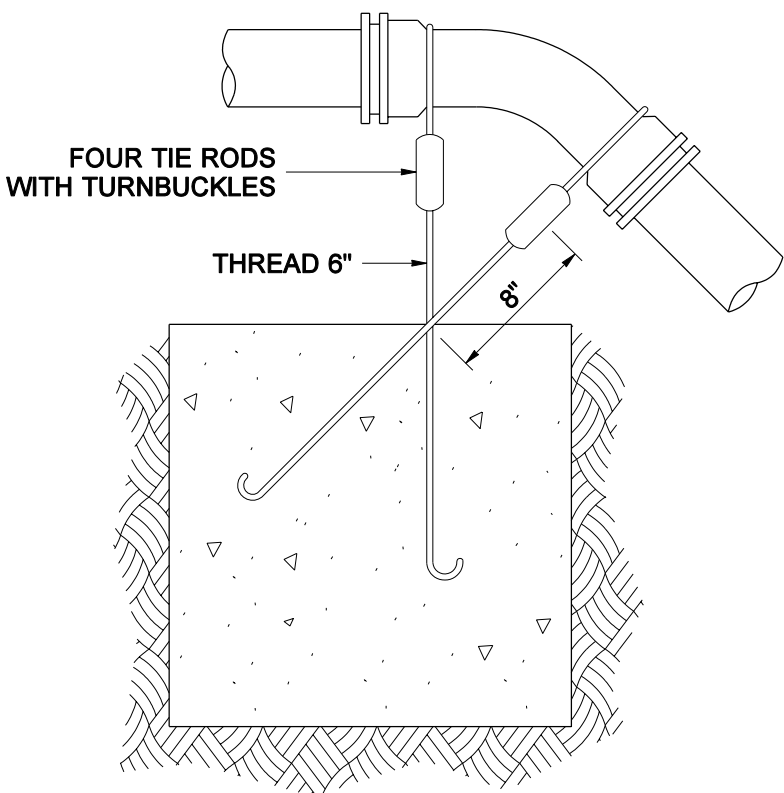


COMBINATION AIR RELEASE/
AIR VACUUM VALVE ASSEMBLY
STANDARD PLAN B-21a

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8/98		DELETED NOTES 3 & 4	RAG	Clifford E. Mansfield 8/10/98
DATE	REVISION	BY	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION OLYMPIA, WASHINGTON	DATE



BLOCKING FOR 11.25° OR 22.5° VERTICAL BENDS



BLOCKING FOR 45° VERTICAL BENDS

NOTE
STEEL TIE RODS TO BE HEAVILY COATED WITH ASPHALT AFTER INSTALLATION.

DIMENSION TABLE						
PIPE DIAM.	TEST PRESSURE (PSI)	BEND ANGLE	CONCRETE VOLUME (Ft³)	CUBE SIZE (Ft)	TIE ROD DIAM.	TIE ROD EMBEDMENT
4"	250	11.25°	6	1.8	5/8"	17"
		22.5°	12	2.3		
		45°	22	2.8		
6"	250	11.25°	14	2.4	5/8"	17"
		22.5°	27	3.0		
		45°	50	3.7		
8"	250	11.25°	25	2.9	5/8"	17"
		22.5°	48	3.6		
		45°	89	4.5		
10"	250	11.25°	38	3.4	5/8"	17"
		22.5°	75	4.2		
		45°	139	5.2		
12"	250	11.25°	55	3.8	5/8"	17"
		22.5°	108	4.8		
		45°	200	5.8	7/8"	24"
14"	250	11.25°	75	4.2	5/8"	17"
		22.5°	147	5.3	3/4"	20"
		45°	272	6.5	1"	27"
16"	250	11.25°	98	4.6	5/8"	17"
		22.5°	192	5.8	7/8"	24"
		45°	355	7.1	1 1/8"	30"



CONCRETE BLOCKING FOR CONVEX VERTICAL BENDS
STANDARD PLAN B-22

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 07-21-03

STATE DESIGN ENGINEER

DATE

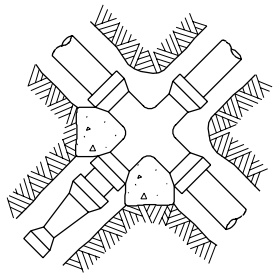


Washington State Department of Transportation

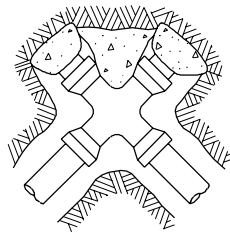
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NOTES:

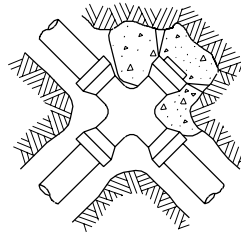
1. Contractor to provide blocking adequate to withstand full test pressure.
2. Divide thrust by safe bearing load to determine required area (in square feet) of concrete to distribute load.
3. Areas to be adjusted for other pressure conditions.
4. Provide two 1" minimum diameter rods on valves up through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



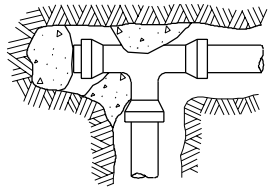
UNBALANCED CROSS
(Use column A)



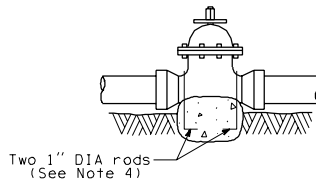
PLUGGED CROSS
(Use column B)



PLUGGED CROSS
(Use column A)

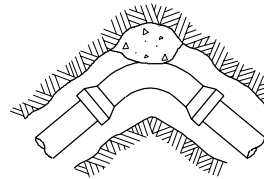


PLUGGED TEE
(Use column B)



Two 1" DIA rods
(See Note 4)

VALVE
(Use column A)

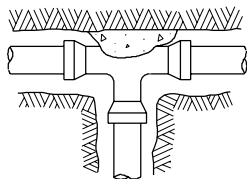


BEND

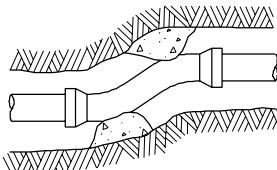
Size	Test Pressure PSI	Thrust at Fittings in Pounds				
		A Tee and Dead Ends	B 90° Bend	C 45° Bend	D 22.5° Bend	E 11.25° Bend
4"	250	3,140	4,440	2,405	1,225	615
6"	250	7,070	9,995	5,410	2,760	1,385
8"	250	12,565	17,770	9,620	4,905	2,465
10"	250	19,635	27,770	15,030	7,660	3,850
12"	250	28,275	39,985	21,640	11,030	5,545
14"	250	38,485	54,425	29,455	15,015	7,545
16"	250	50,265	71,085	38,470	19,615	9,855

Soil Type	Safe Bearing Load PSF
Muck, peat, etc.	0
Soft clay	1,000
Sand	2,000
Sand and gravel	3,000
Sand and gravel cemented with clay	4,000
Hard shale	10,000

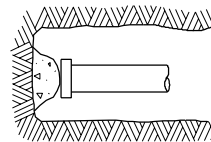
CONCRETE THRUST
BLOCK



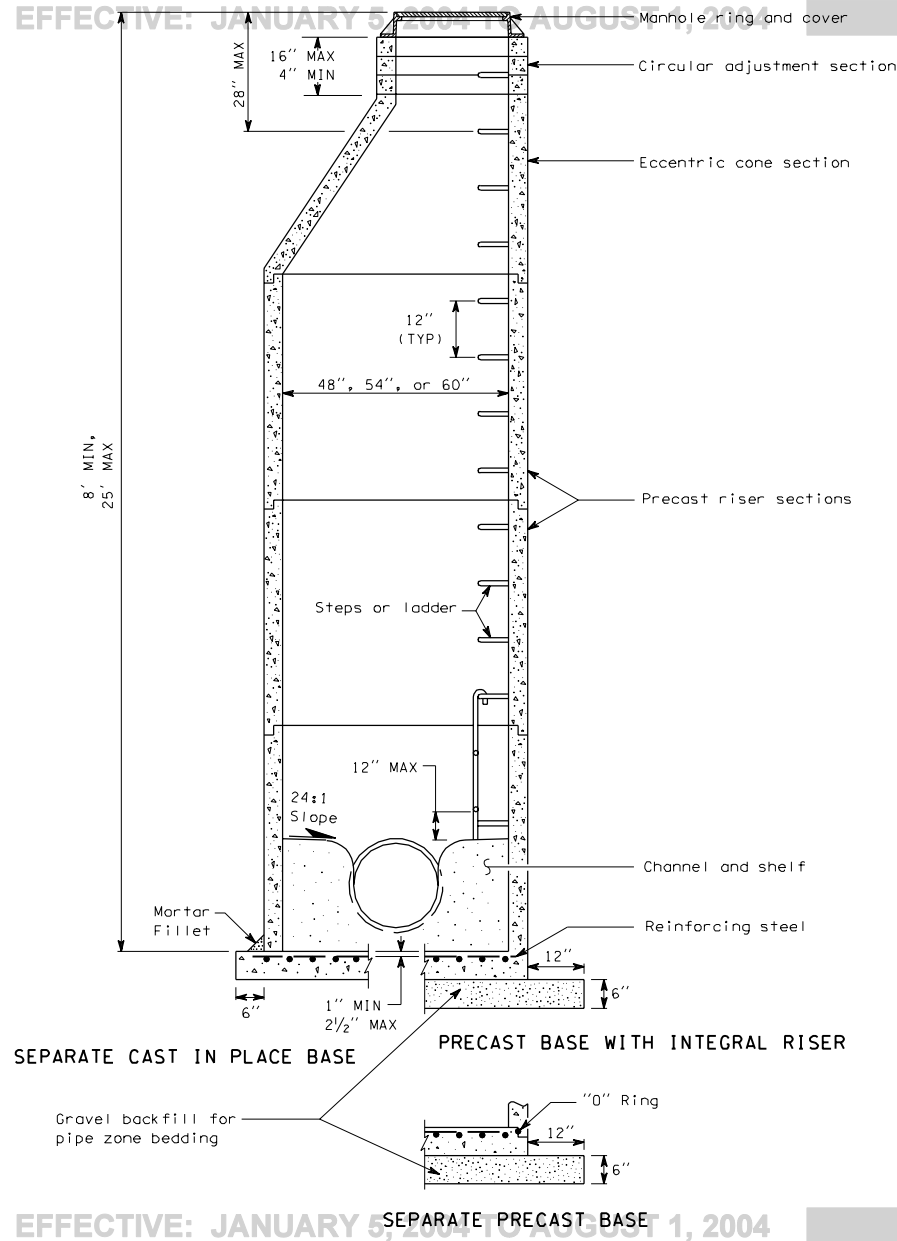
TEE



OFFSET
(Use columns B - E)



DEAD END



NOTES:

- Knockouts shall have a wall thickness of 2" minimum to 2 1/2" maximum.

MANHOLE DIMENSION TABLE

DIA	WALL THICKNESS	BASE THICKNESS	MAXIMUM KNOCKOUT SIZE	MINIMUM DISTANCE BETWEEN KNOCKOUTS	BASE REINFORCING STEEL SQ IN/FT EACH DIRECTION	
					INTEGRAL BASE	SEPARATE BASE
48"	4"	6"	36"	8"	0.15	0.23
54"	4 1/2"	8"	42"	8"	0.19	0.19
60"	5"	8"	48"	8"	0.25	0.25

MANHOLE TYPE 1



1. Knockouts shall have a wall thickness of 2" minimum to 2½" maximum.

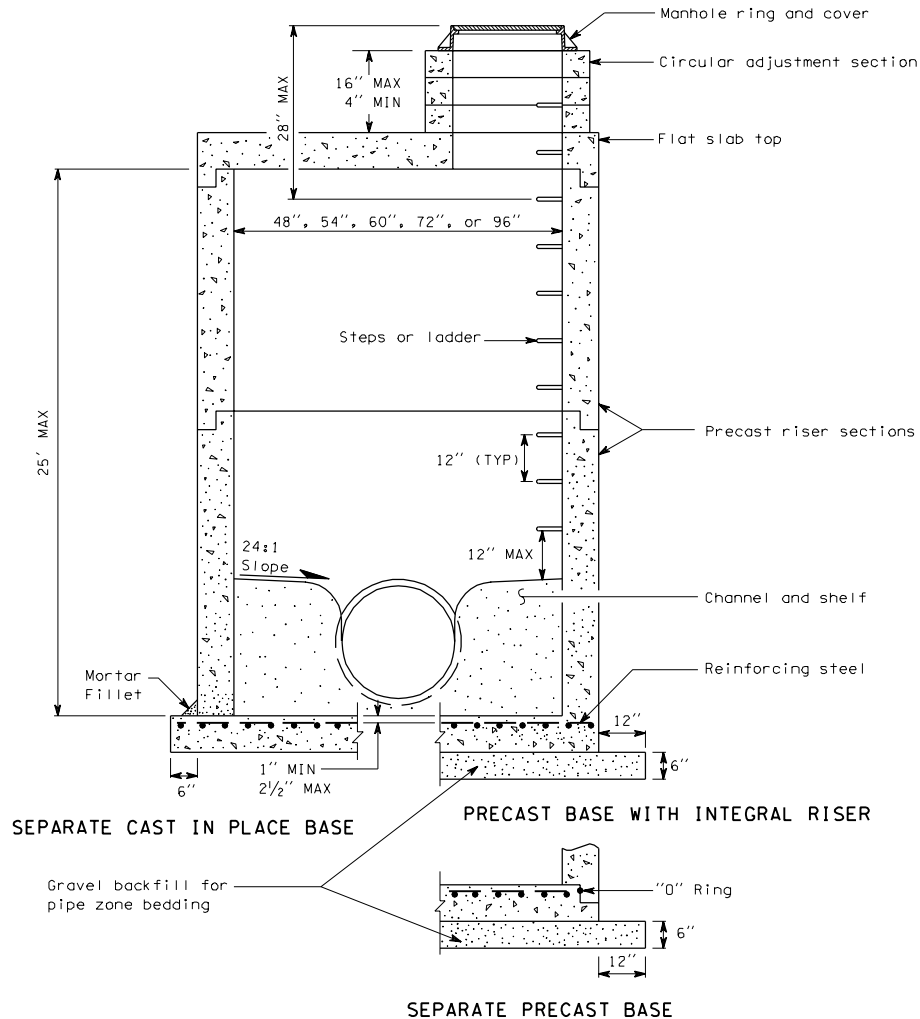
MANHOLE DIMENSION TABLE

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

MANHOLE TYPE 2

NOTES

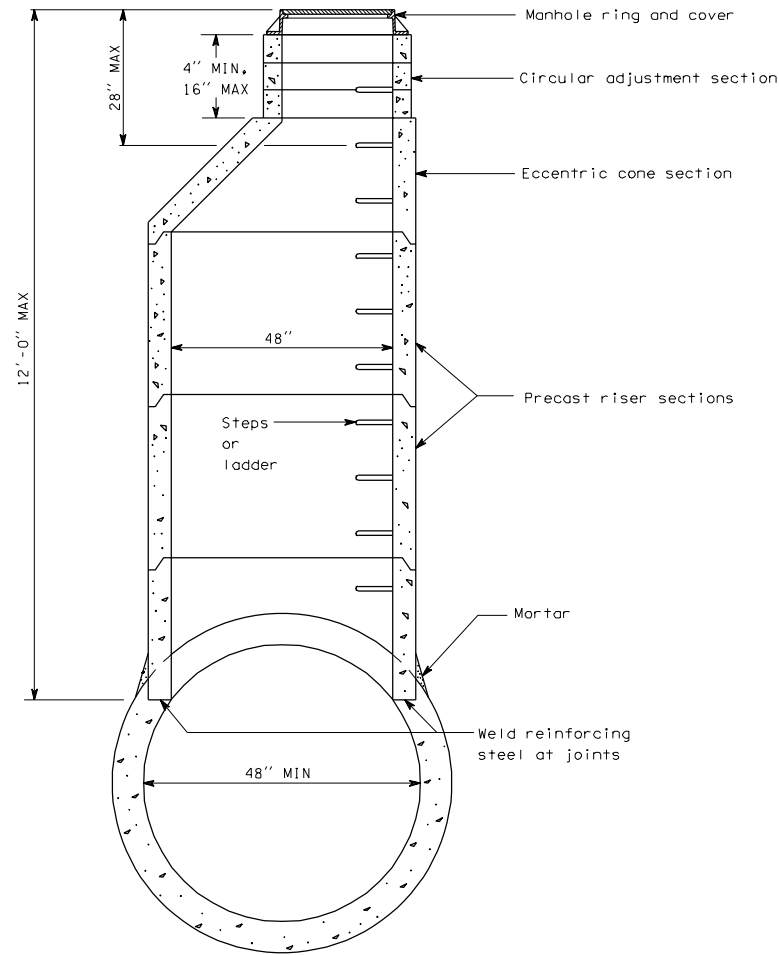
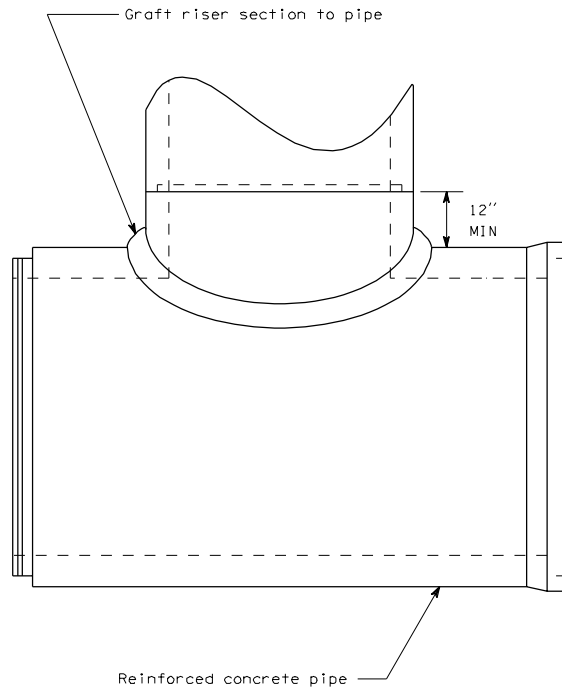
- Knockouts shall have a wall thickness of 2" minimum to 2 1/2" maximum.



MANHOLE DIMENSION TABLE

DIA	WALL THICKNESS	BASE THICKNESS	MAXIMUM KNOCKOUT SIZE	MINIMUM DISTANCE BETWEEN KNOCKOUTS	BASE REINFORCING STEEL in ² /ft IN EACH DIRECTION	
					INTEGRAL BASE	SEPARATE BASE
48"	4"	6"	36"	8"	0.15	0.23
54"	4 1/2"	8"	42"	8"	0.19	0.19
60"	5"	8"	48"	8"	0.25	0.25
72"	6"	8"	60"	12"	0.24	0.35
96"	8"	12"	84"	12"	0.29	0.39

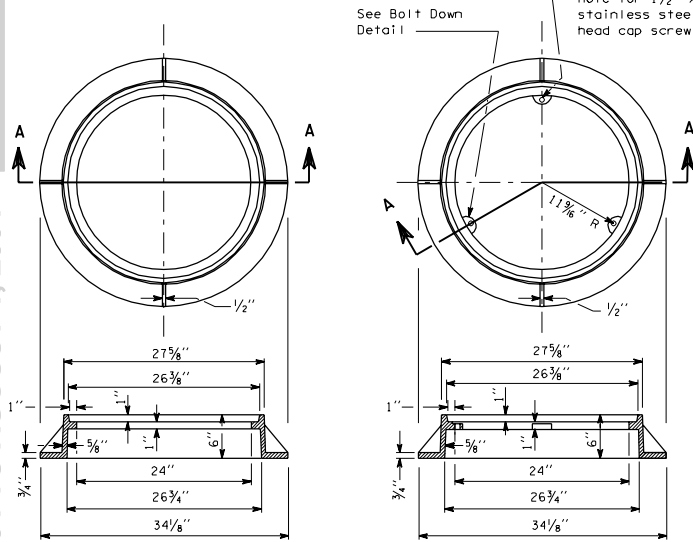
MANHOLE TYPE 3



MANHOLE TYPE 4

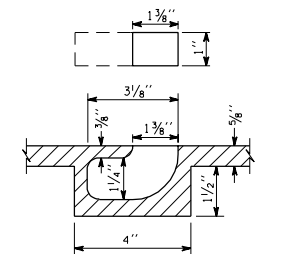
ELEVATION

SECTION

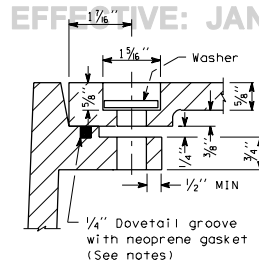
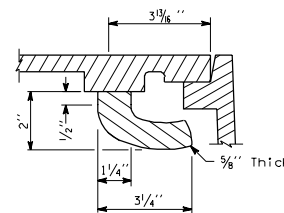


SECTION A-A

SECTION A-A

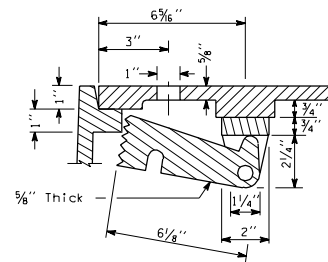
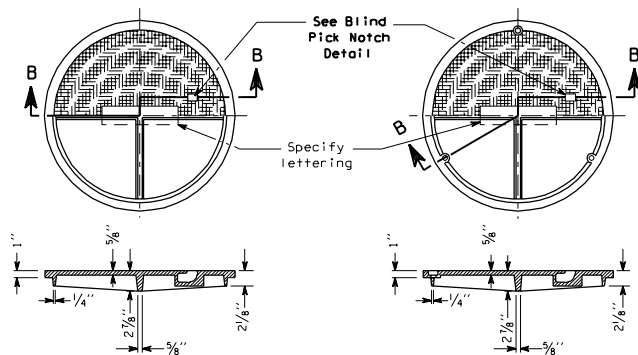
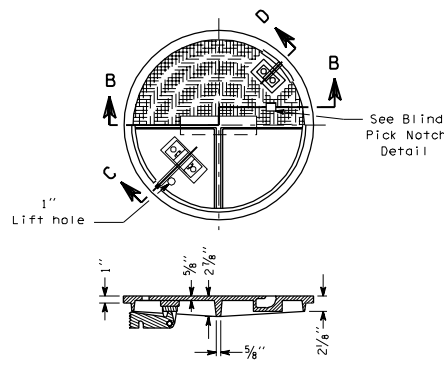
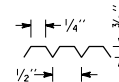


BLIND PICK NOTCH DETAIL

BOLT-DOWN
WATERTIGHT DETAILBOLT ON CAM TYPE
LOCKING DEVICE-SECTION D

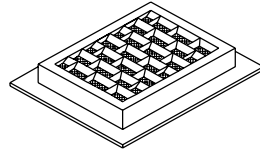
NOTES

1. Gasket and groove may be in the seat or underside of cover.
2. For bolt down manhole ring and covers that are not designated "watertight", the neoprene gasket, groove and washer are not required.
3. Washer shall be lead or neoprene.
4. In lieu of blind pick notch for storm sewer manhole covers, drill three 1" diameter holes at 120° spacing.
5. Proprietary manhole covers without bottom ribs are acceptable.

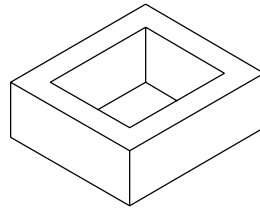
BOLT ON CAM TYPE
LOCKING DEVICE-SECTION CSECTION B-B
TYPE 1
STANDARDSECTION B-B
TYPE 2
BOLT-DOWN/WATERTIGHTSECTION B-B
TYPE 3
CAMLOCK

COVER SKID DESIGN DETAIL

MANHOLE RING
AND COVER



FRAME AND VANED GRATE

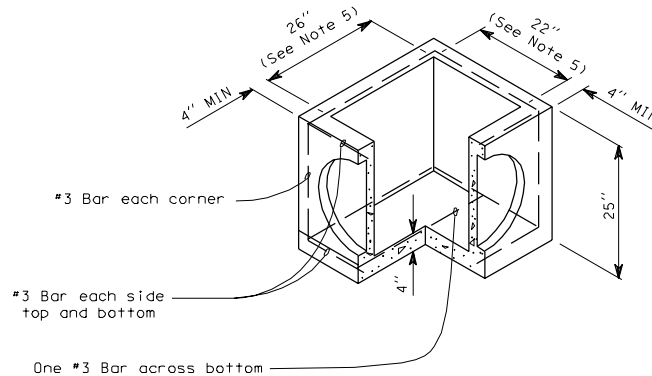


RECTANGULAR ADJUSTMENT SECTION

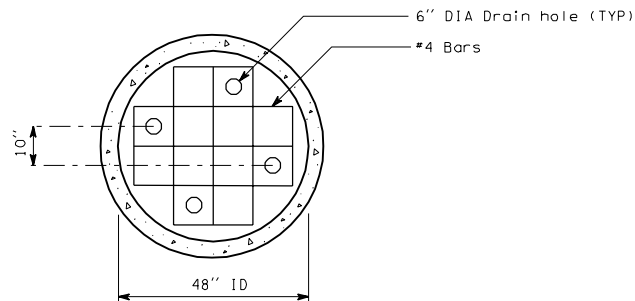
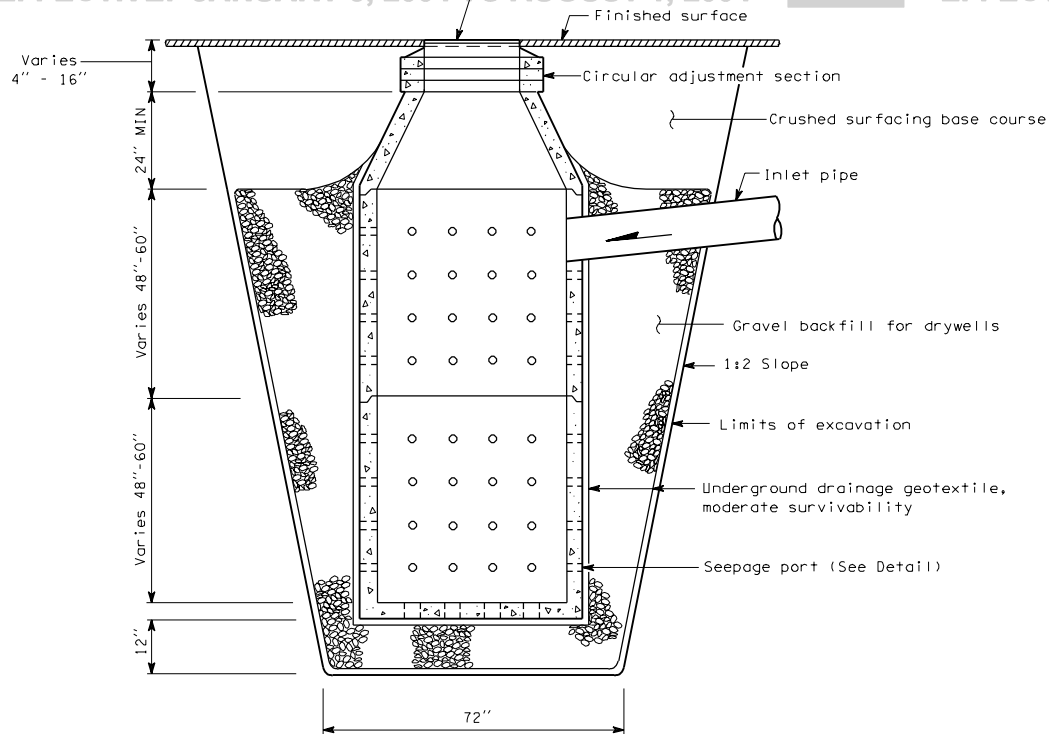
NOTES

1. As an acceptable alternate to rebar, wire mesh having a minimum area of 0.12 square inches per foot may be used. Wire mesh shall not be placed in knockouts.
2. The knockout diameter shall not be greater than 18". Knockouts shall have a wall thickness of 1½" minimum to 2" maximum.
3. Frame and grate may be installed with flange down or cast into adjustment section.
4. The precast base section may have a rounded floor and the walls may be sloped at a rate of 1:24 or steeper.
5. Opening shall be measured at the top of the precast base section.

CONCRETE INLET



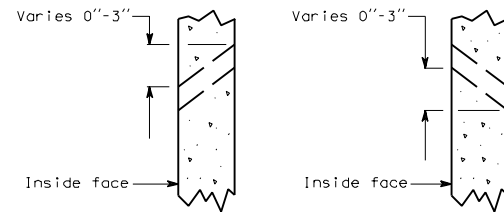
PRECAST BASE SECTION



BASE DETAIL

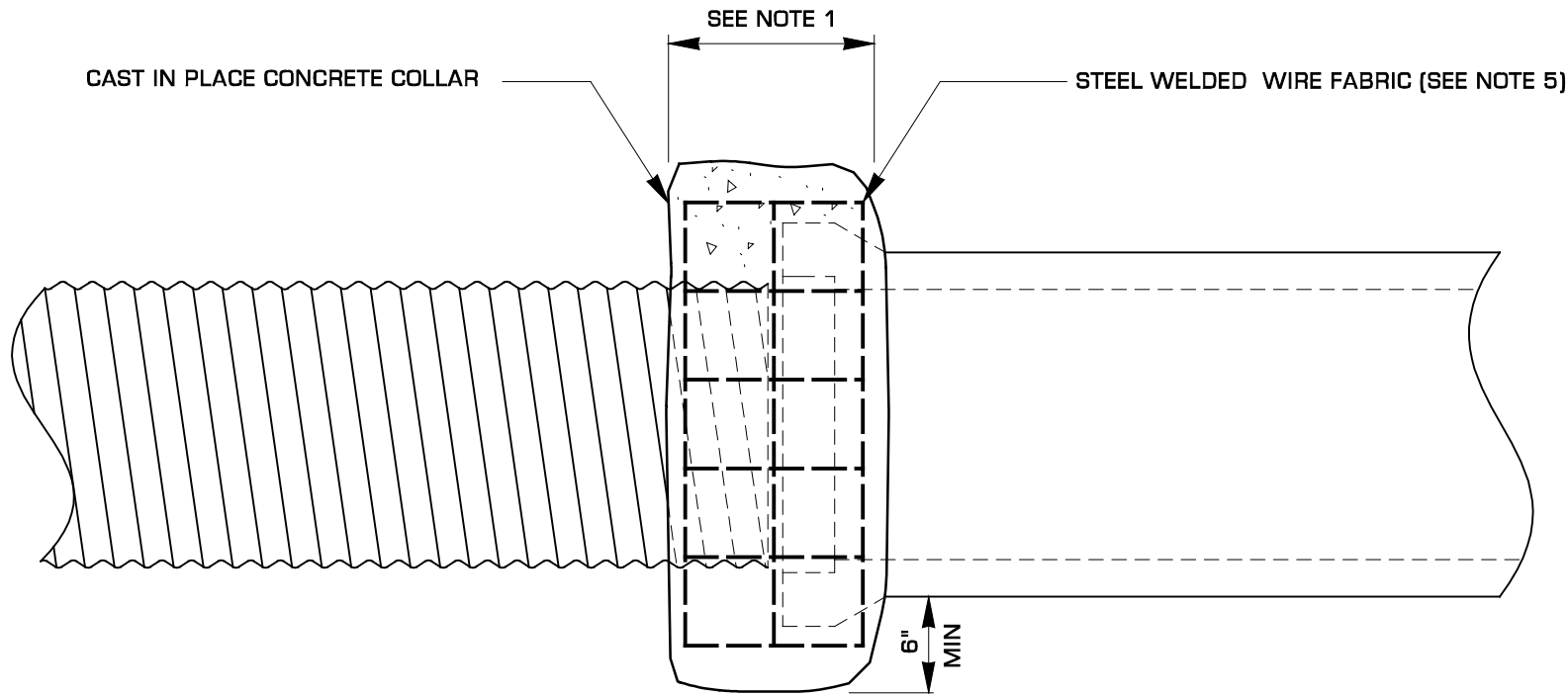
NOTES:

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

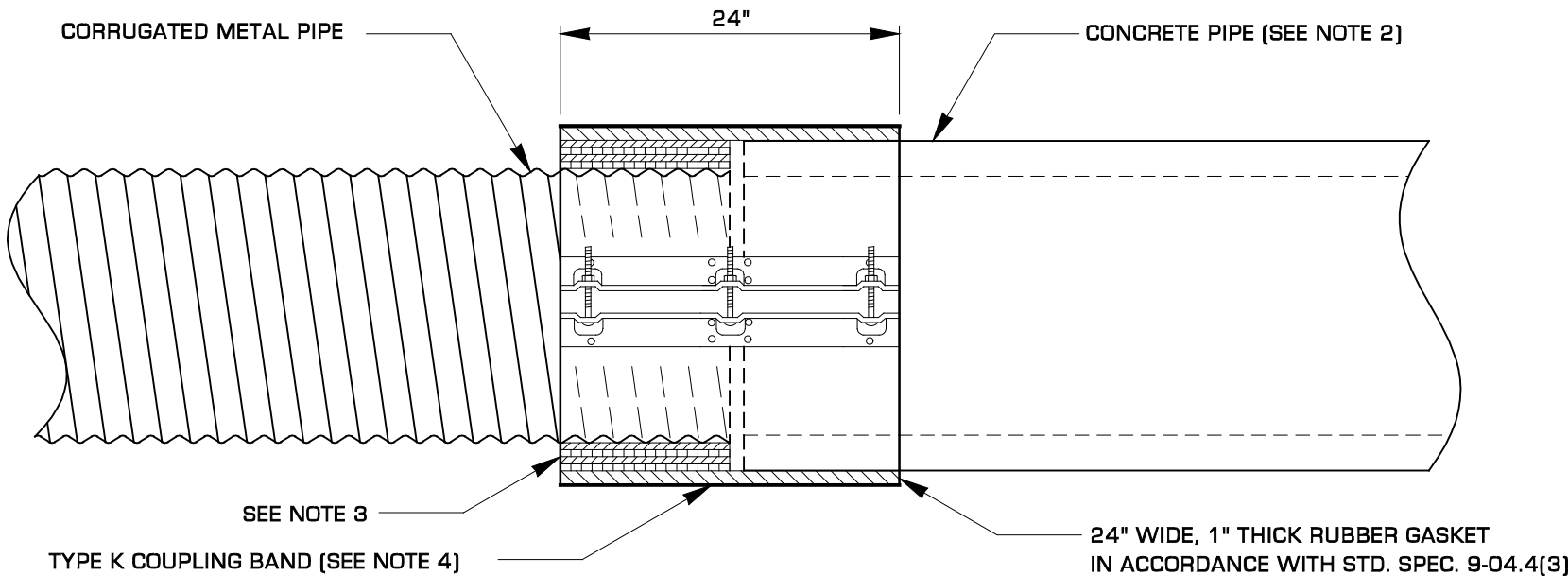
SEEPAGE PORT DETAIL
(See Note 2)PRECAST
CONCRETE DRYWELL

NOTES

1. CONCRETE COLLAR WIDTH SHALL BE ONE HALF OF THE OUTSIDE PIPE DIAMETER OF THE LARGEST PIPE. THE MINIMUM COLLAR WIDTH SHALL BE 12". CONCRETE COLLARS MAY BE USED WITH ALL PIPE MATERIALS AND DIAMETERS. THE CONCRETE COLLAR OPTION SHALL ONLY BE USED TO EXTEND EXISTING PIPES.
2. WHEN A COUPLING BAND CONNECTION REQUIRES ATTACHING A BELL END OF A CONCRETE PIPE, THE BELL END OF THE PIPE SHALL BE REMOVED BEFORE THE CONNECTION IS INSTALLED.
3. INCREASE THE OUTSIDE DIAMETER OF THE METAL PIPE TO MATCH THE OUTSIDE DIAMETER OF THE CONCRETE PIPE WITH 12" WIDE RUBBER GASKETS, THICKNESS AS REQUIRED. RUBBER GASKETS SHALL BE IN ACCORDANCE WITH SECTION 9-04.4(3) OF THE STANDARD SPECIFICATIONS.
4. USE A FLAT TYPE K COUPLING BAND. TYPE K COUPLING BANDS WITH DIMPLES ARE NOT ALLOWED FOR THE INSTALLATION DETAIL SHOWN. THE COUPLING BAND OPTION SHALL ONLY BE USED FOR EXTENDING EXISTING PIPES THAT HAVE AN INSIDE DIAMETER OF 36" OR LESS.
5. STEEL WELDED WIRE FABRIC SHALL BE IN ACCORDANCE WITH SECTION 9-07.7 OF THE STANDARD SPECIFICATIONS. INSTALL TWO WRAPS FOR SIZE 6 x 6 W1.4 x W1.4 [10 GAGE] STEEL WELDED WIRE FABRIC OR ONE WRAP FOR ANY OF THE FOLLOWING SIZES:
 - 6 x 6 W2.1 x W2.1 [8 GAGE]
 - 6 x 6 W2.9 x W2.9 [6 GAGE]
 - 4 x 4 W2.9 x W2.9 [6 GAGE]
 - 4 x 4 W4.0 x W4.0 [4 GAGE]



CONCRETE COLLAR OPTION



COUPLING BAND OPTION



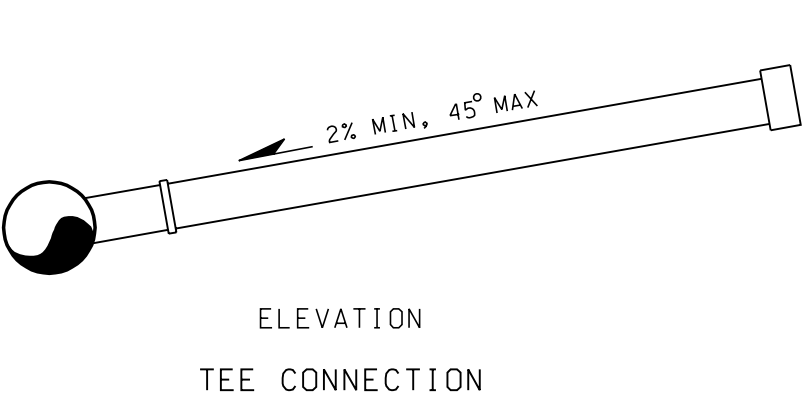
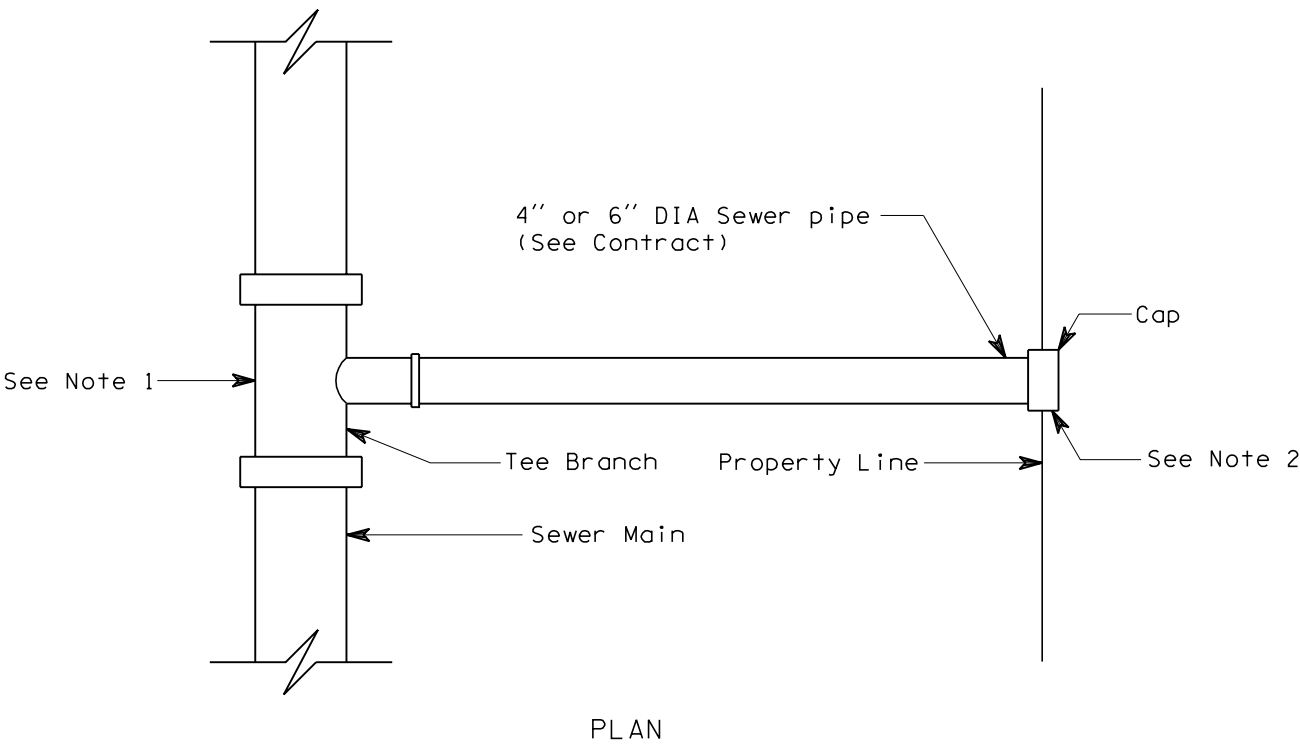
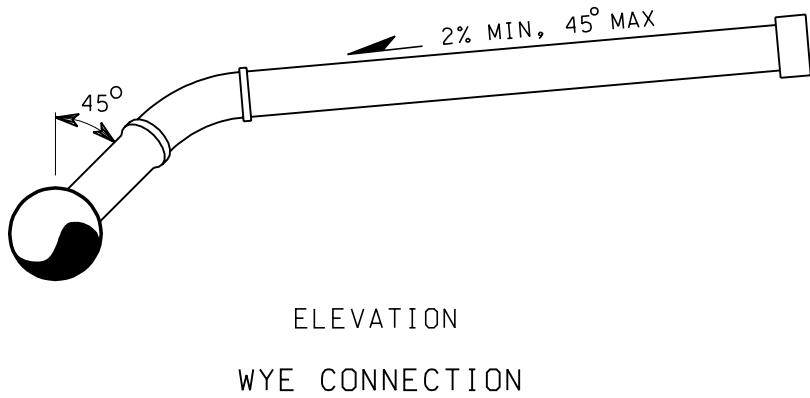
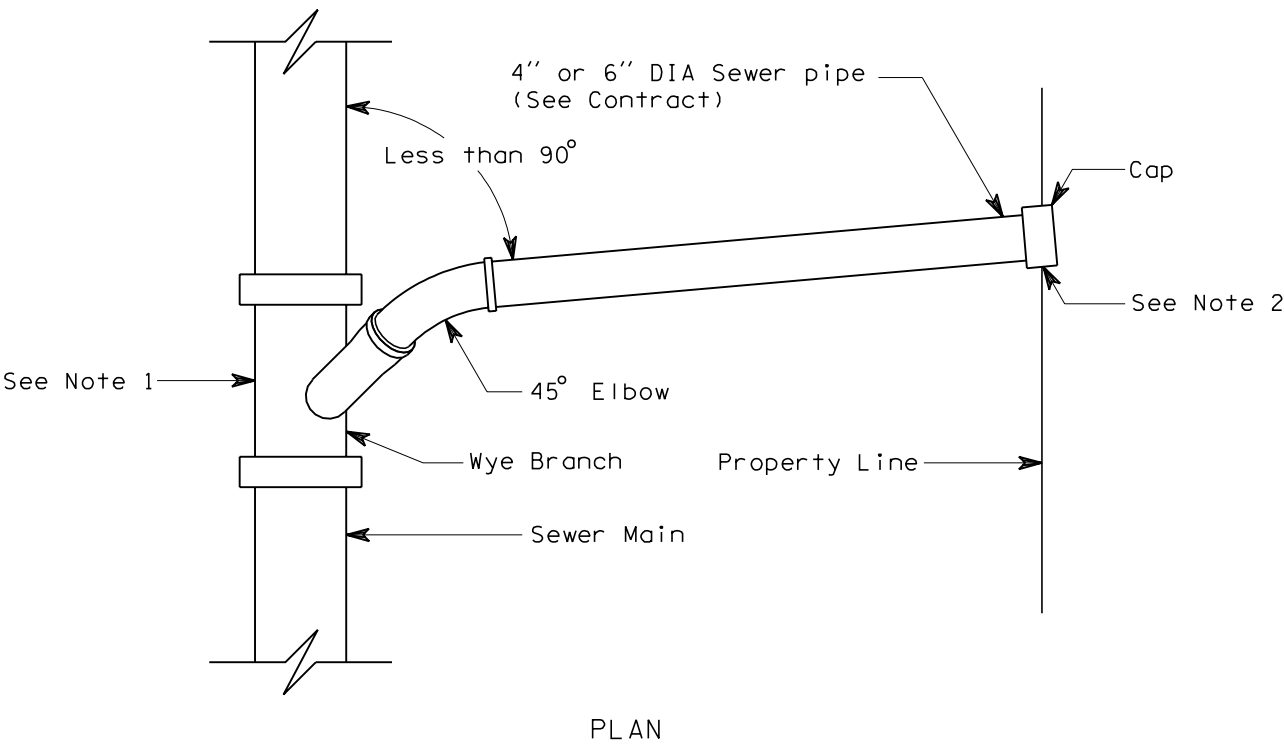
CONNECTION DETAILS FOR
DISSIMILAR CULVERT PIPE
STANDARD PLAN B-28

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10-99	ADDED COUPLING BAND OPTION, REVISED WIRE FABRIC SIZES.	TWS
DATE	REVISION	BY

APPROVED FOR PUBLICATION	
Clifford E. Mansfield	10-06-99
DEPUTY STATE DESIGN ENGINEER	DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION	OLYMPIA, WASHINGTON

NOTES

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



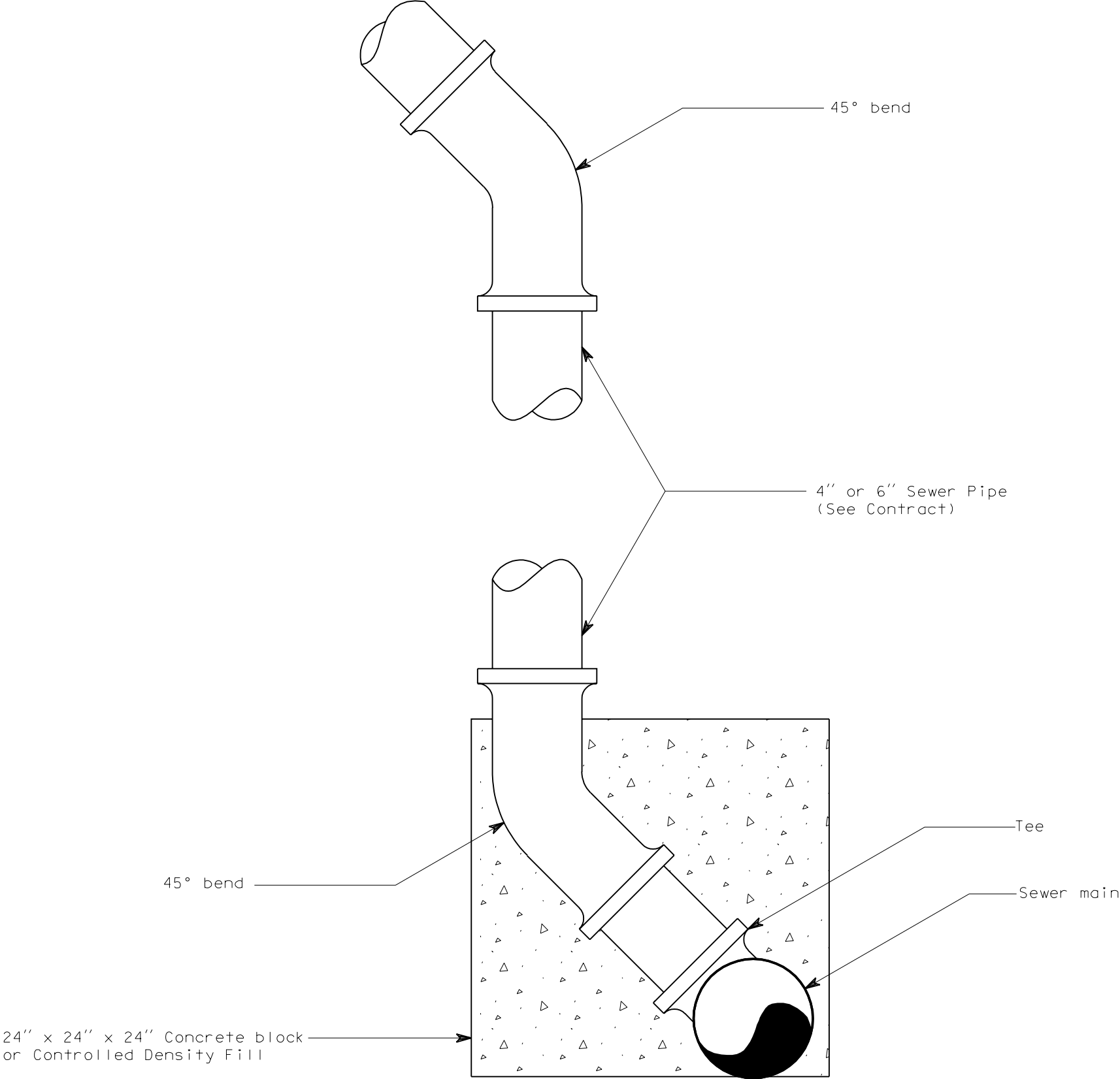
SIDE SEWER
STANDARD PLAN B-29

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APPROVED FOR PUBLICATION

Clifford E. Mansfield 4/24/98
DEPUTY STATE DESIGN ENGINEER DATE





STANDING SIDE SEWER
CONNECTION
STANDARD PLAN B-30

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APPROVED FOR PUBLICATION

Clifford E. Mansfield

DEPUTY STATE DESIGN ENGINEER

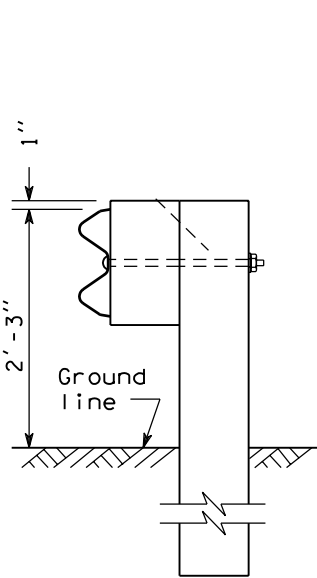
8/10/98

DATE

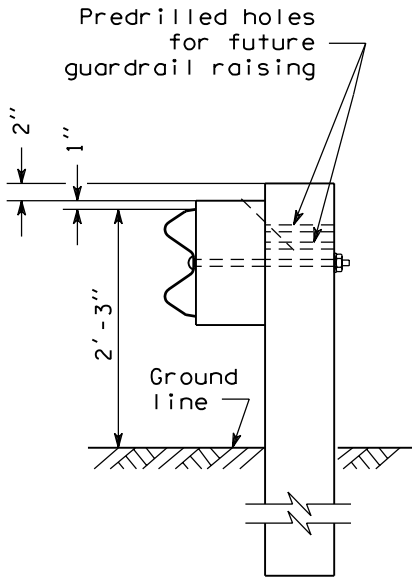


WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

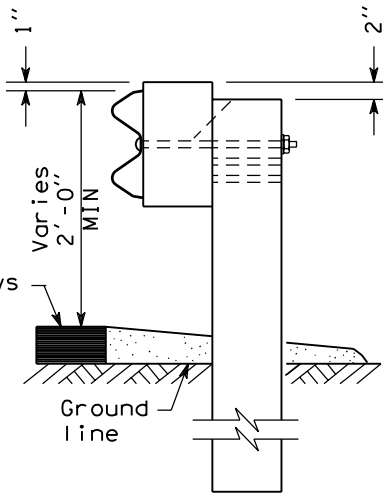
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TYPE 1

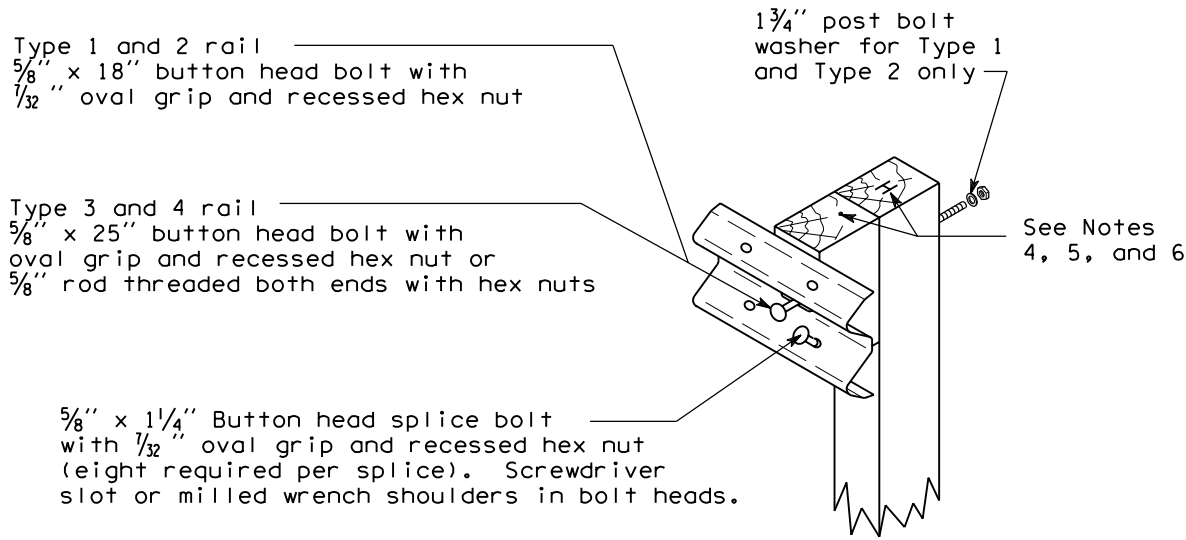


INITIAL INSTALLATION

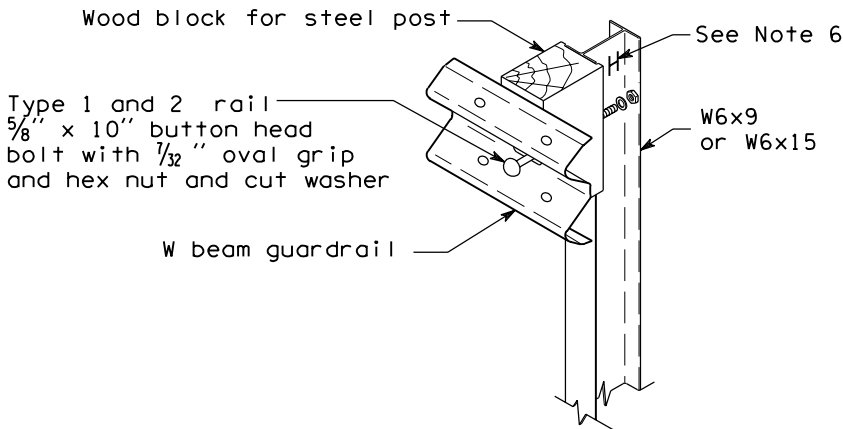


RAIL ELEMENT RAISED

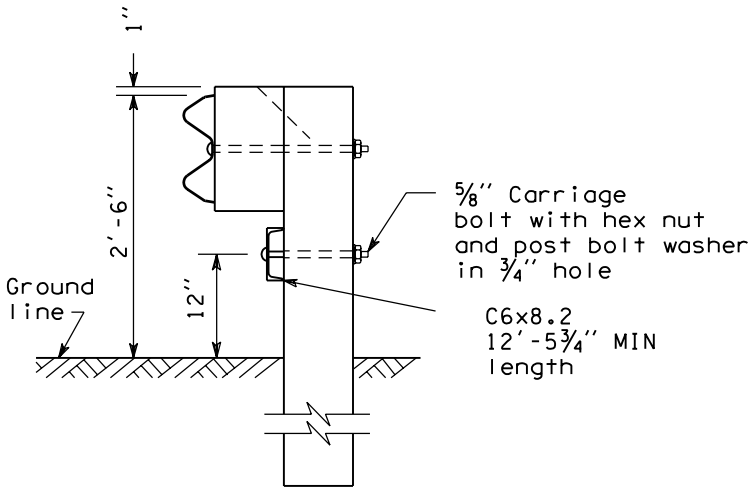
TYPE 1 ALTERNATE



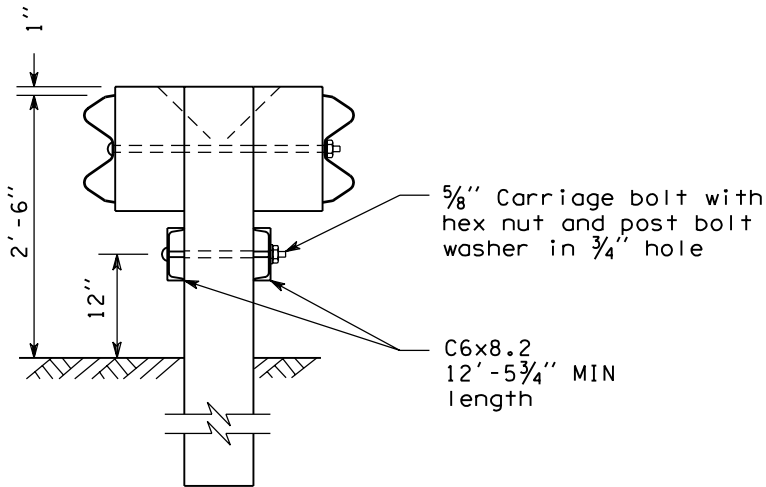
WOOD POST ASSEMBLY DETAIL



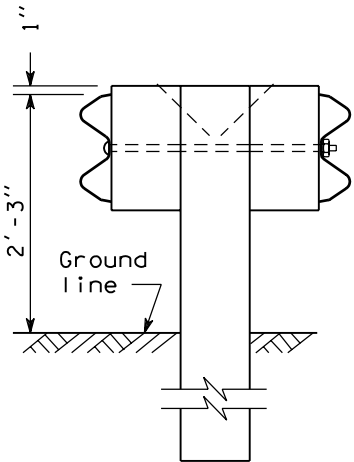
STEEL POST ASSEMBLY DETAIL
(All mounting hardware same as for wood post assembly, except as noted)



TYPE 2



TYPE 3



TYPE 4



EXPIRES JULY 24, 2004

**BEAM GUARDRAIL
(W-BEAM)**

STANDARD PLAN C-1

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 10-31-03

STATE DESIGN ENGINEER

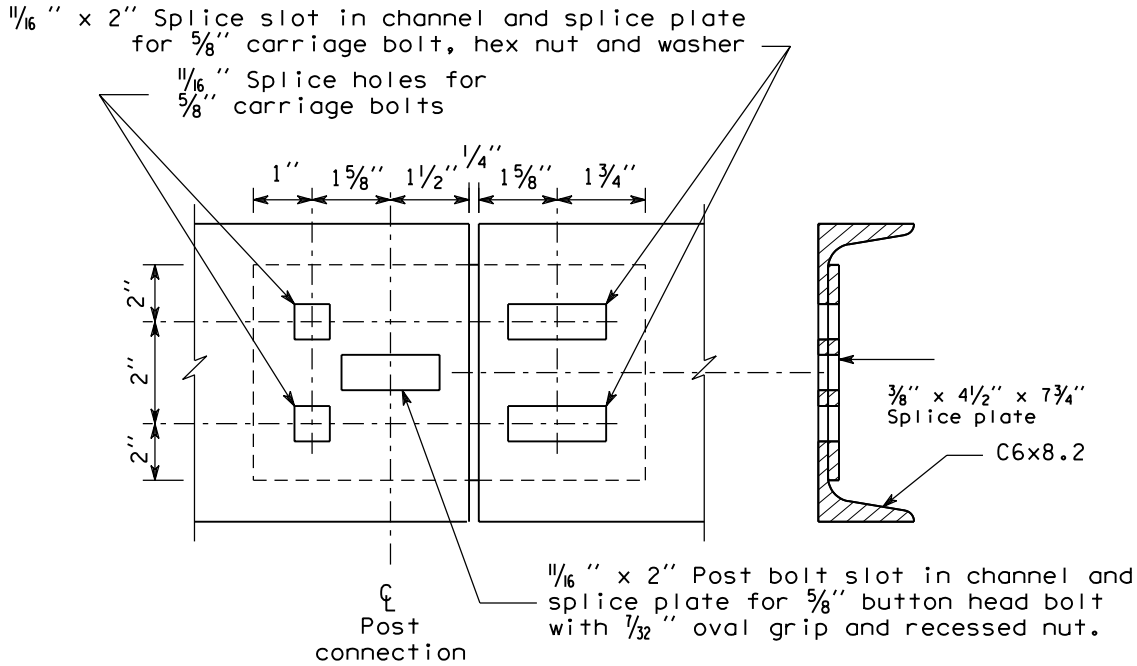
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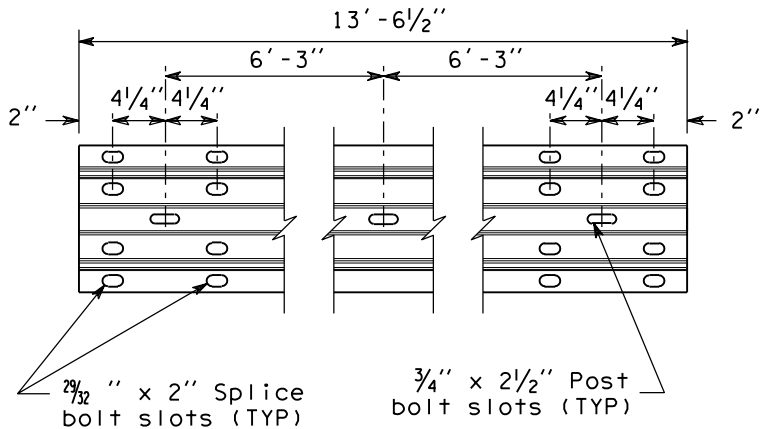
Washington State Department of Transportation

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

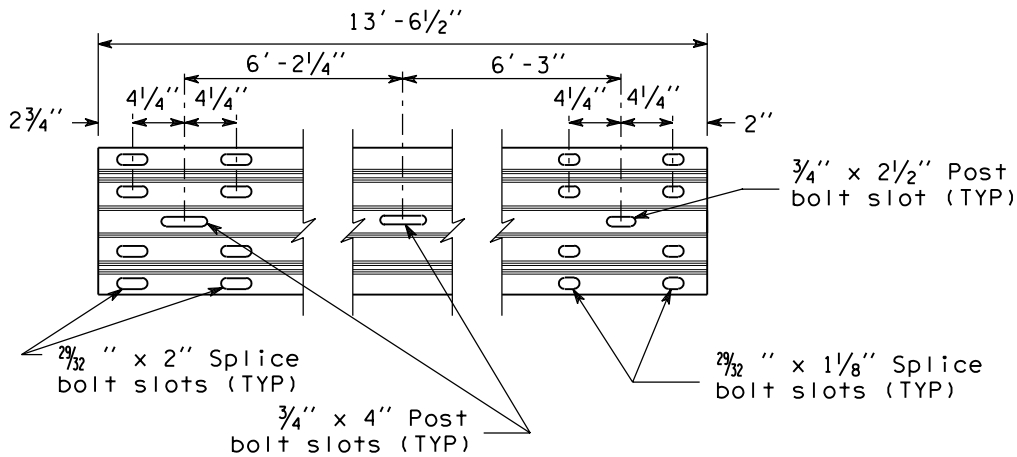
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CHANNEL RAIL SPLICE



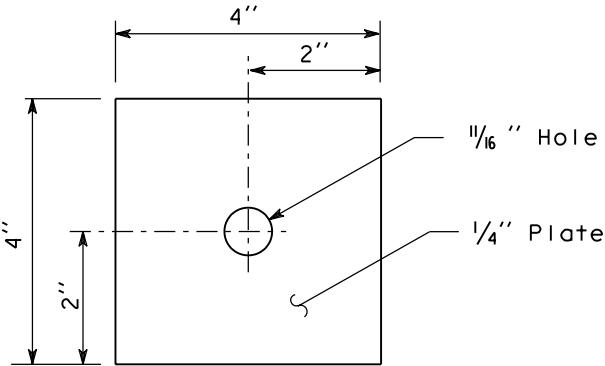
RAIL ELEMENT



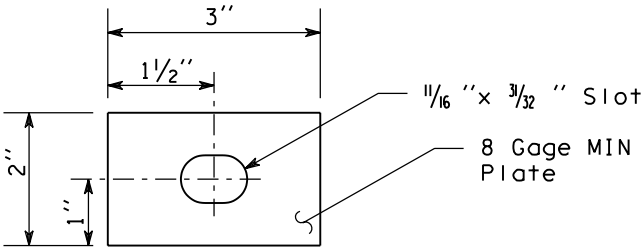
EXPANSION SECTION DETAIL

NOTES

1. When required by the contract, a Snow Load Post Washer shall be used on the backside of the post (in lieu of the 1 3/4" post bolt washer) and a Snow Load Rail Washer shall be placed on the face side of Type 1 and Type 2 Beam Guardrail. Snow load rail washers are not to be installed on terminals.
2. Rail washers, also called "snow load rail washers" are not required on new installations, except as called for in Note 1. Rail washers need not be removed on existing installations, except posts 2 through 8 of a BCT installation.
3. Guardrail post spacing for Types 1 through 4 shall be 6'-3" on centers.
4. Timber block shall be toe-nailed to post with a 16d galvanized nail to restrict block rotation.
5. For post and block details, see Standard Plan C-1b.
6. When Beam Guardrail Type 1, -- Foot Long Post, is specified in Contract, the post length shall be stamped with numbers 1 1/2" MIN height and 1/4" deep at the location where the letter "H" is shown on the detail. After installation of long post, it shall be the Contractor's responsibility to ensure that the stamped numbers are still legible and 1/4" deep.



SNOW LOAD POST WASHER
(See Note 1)



SNOW LOAD RAIL WASHER



EXPIRES JULY 24, 2004

**BEAM GUARDRAIL
(W-BEAM)**

STANDARD PLAN C-1

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 10-31-03

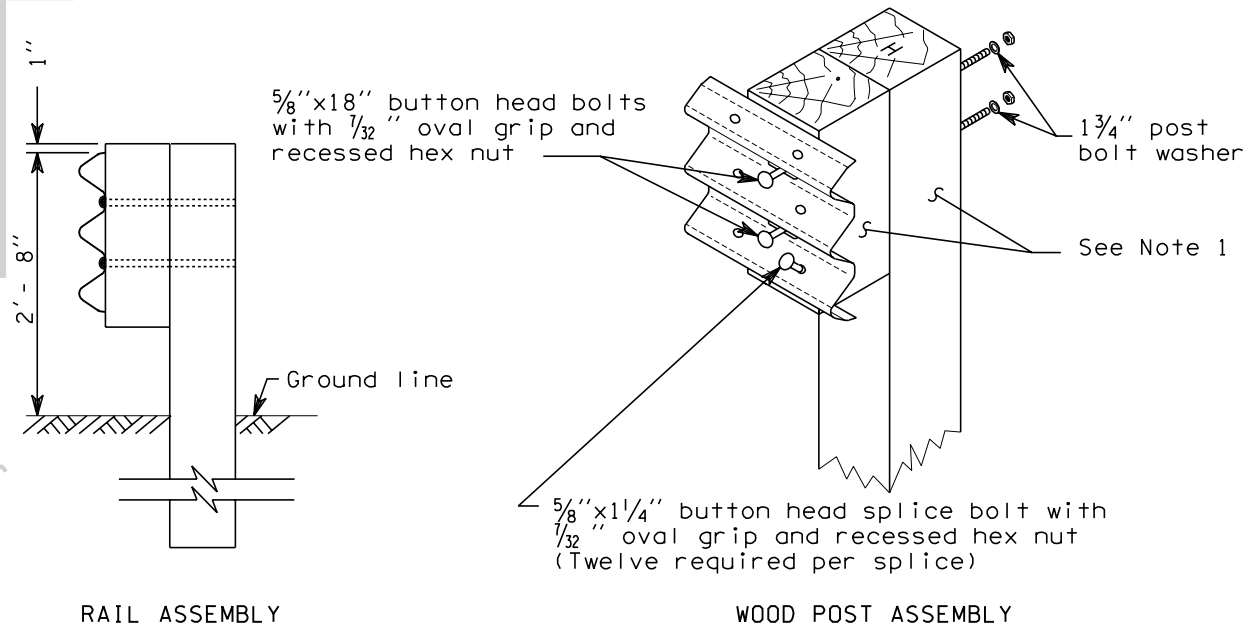
STATE DESIGN ENGINEER

DATE

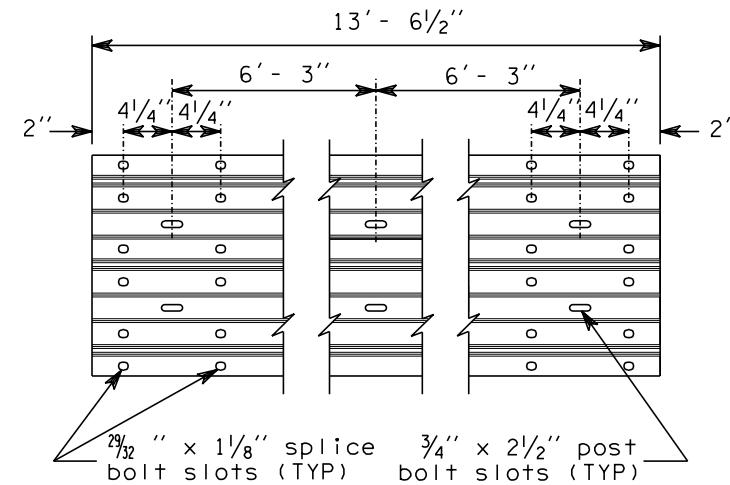


Washington State Department of Transportation

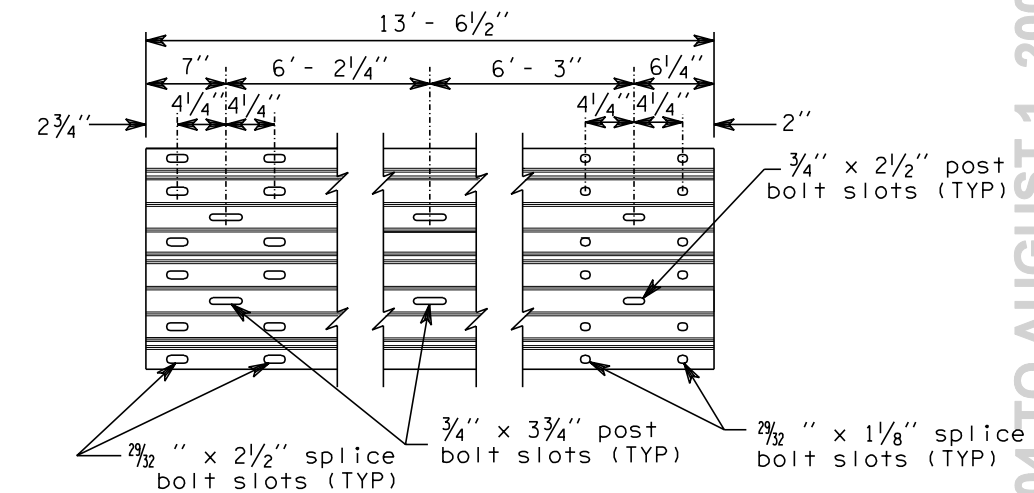
09/2003	REV. NOTES	RG
DATE	REVISION	BY



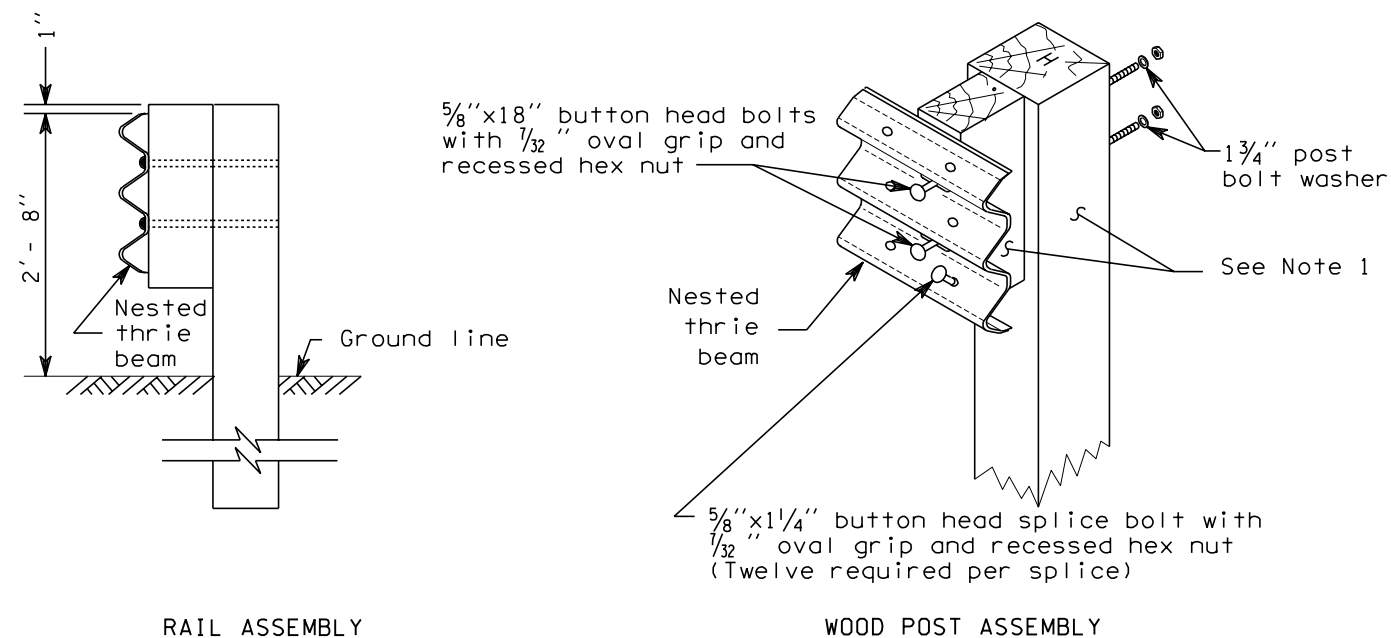
TYPE 10



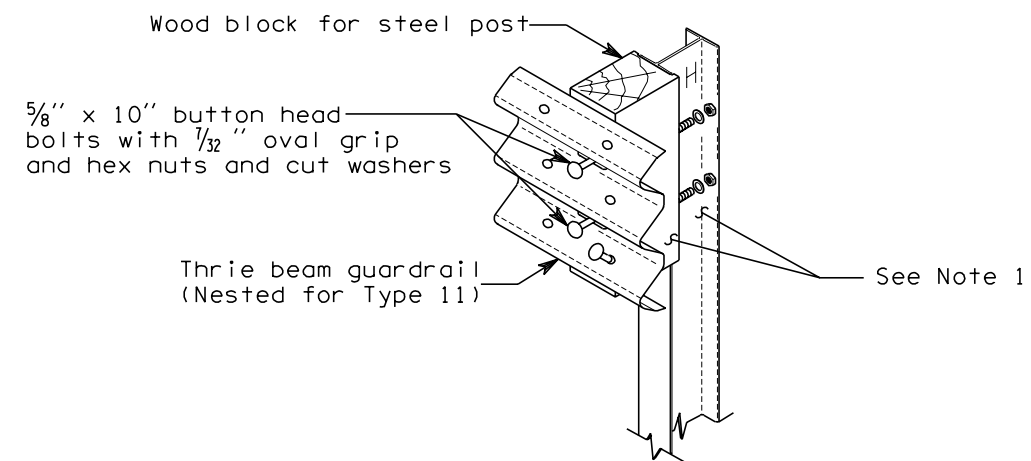
THRIE BEAM RAIL ELEMENT



THRIE BEAM EXPANSION SECTION



TYPE 11



STEEL POST ASSEMBLY

TYPE 10 and 11



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

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APPROVED FOR PUBLICATION

Clifford E. Mansfield

DEPUTY STATE DESIGN ENGINEER

7/31/98

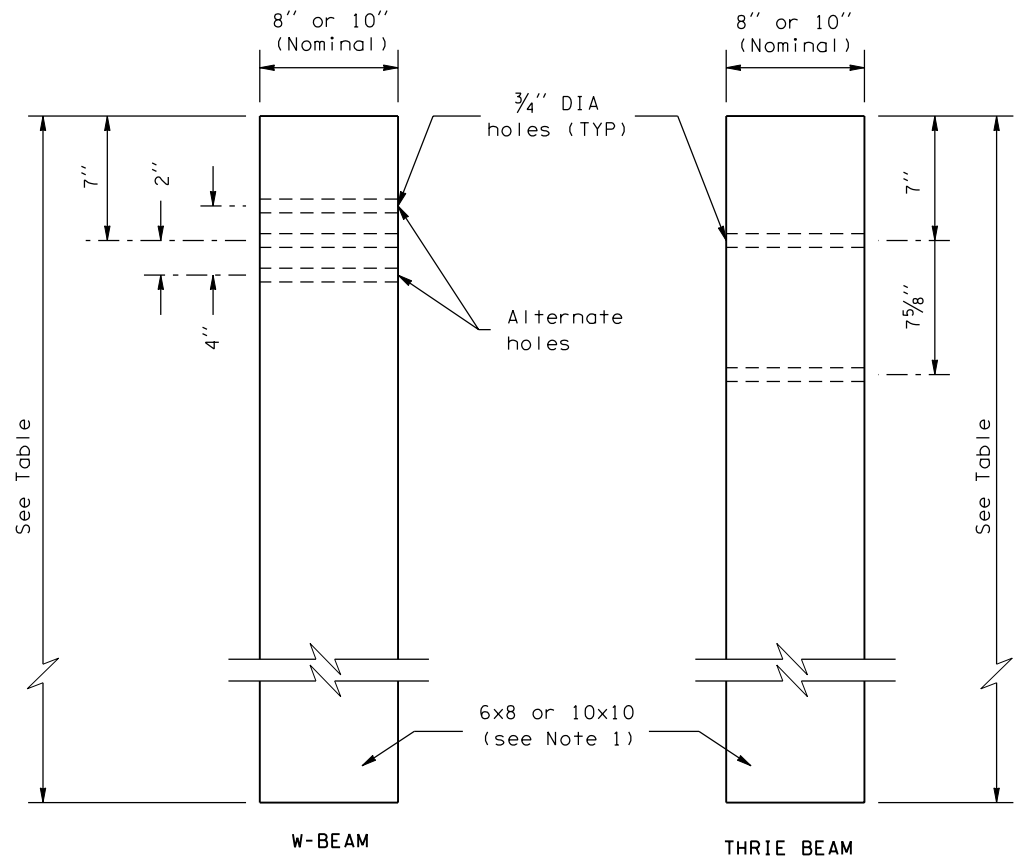
DATE



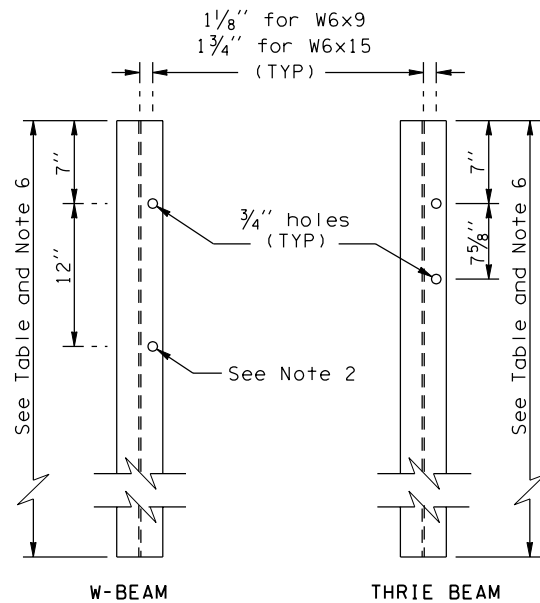
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

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

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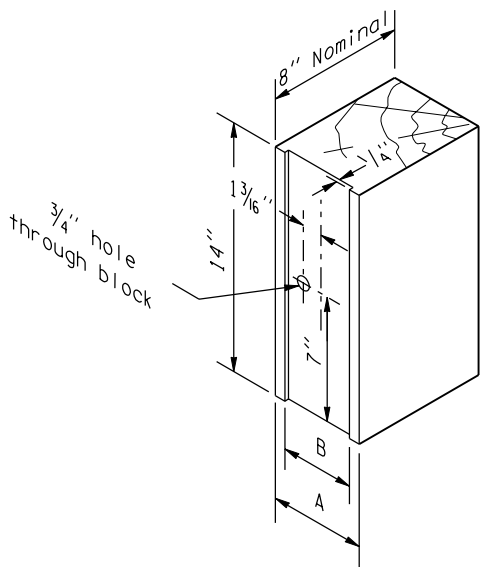


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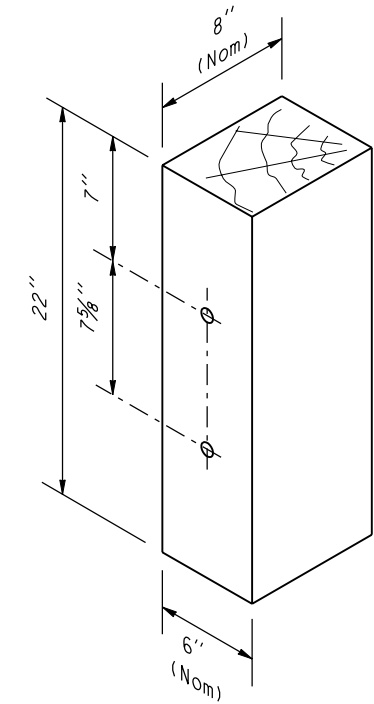


STEEL POST

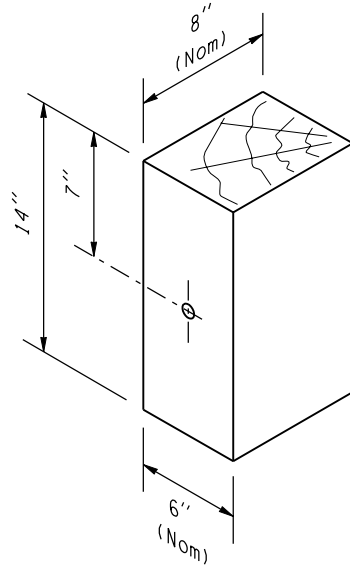
See Notes 3 and 4



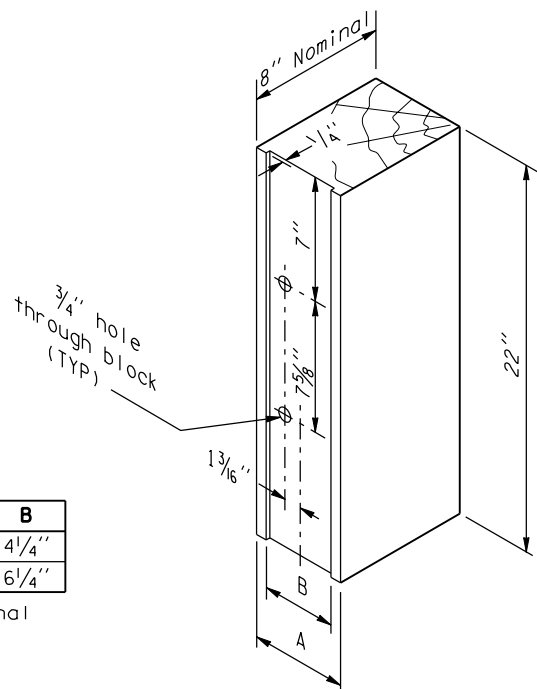
W BEAM WOOD BLOCK FOR STEEL POST



THRIE BEAM WOOD BLOCK FOR WOOD POST



W BEAM WOOD BLOCK FOR WOOD POSTS



THRIE BEAM WOOD BLOCK FOR STEEL POST

POST	A	B
W6X9	6" *	4 1/4"
W6X15	8" *	6 1/4"

*Nominal

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



EXPIRES JULY 24, 2004

BEAM GUARDRAIL POSTS AND BLOCKS

STANDARD PLAN C-1b

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso

10-31-03

STATE DESIGN ENGINEER

DATE

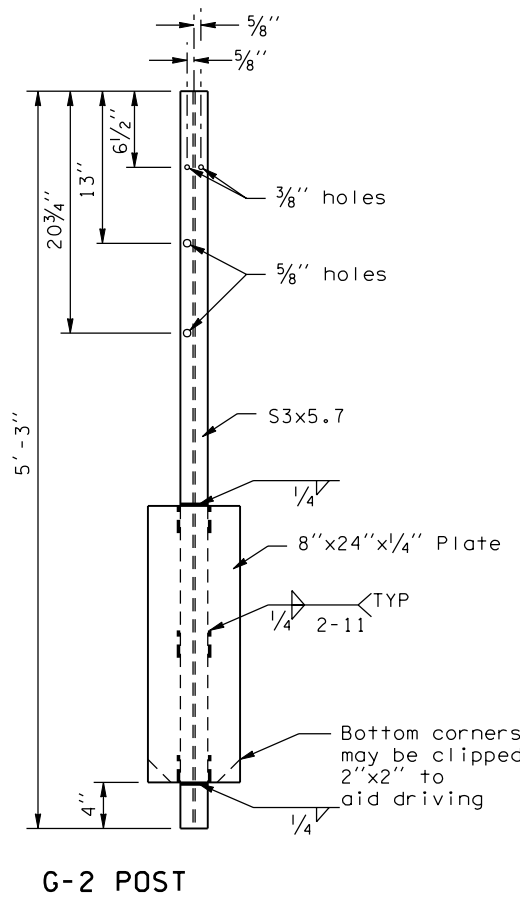
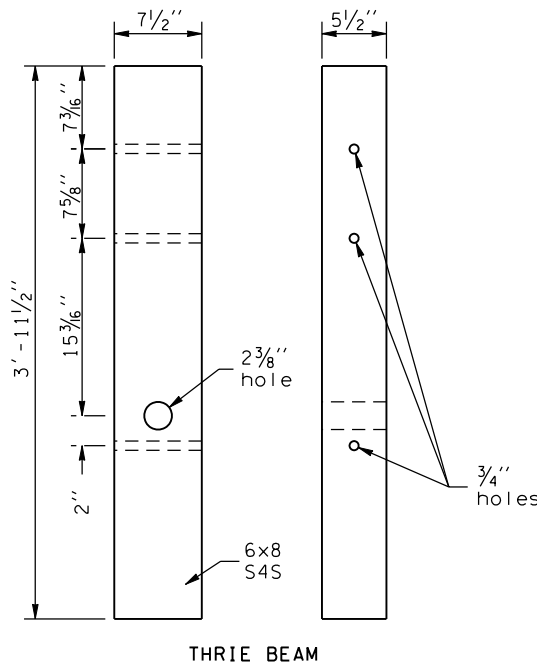
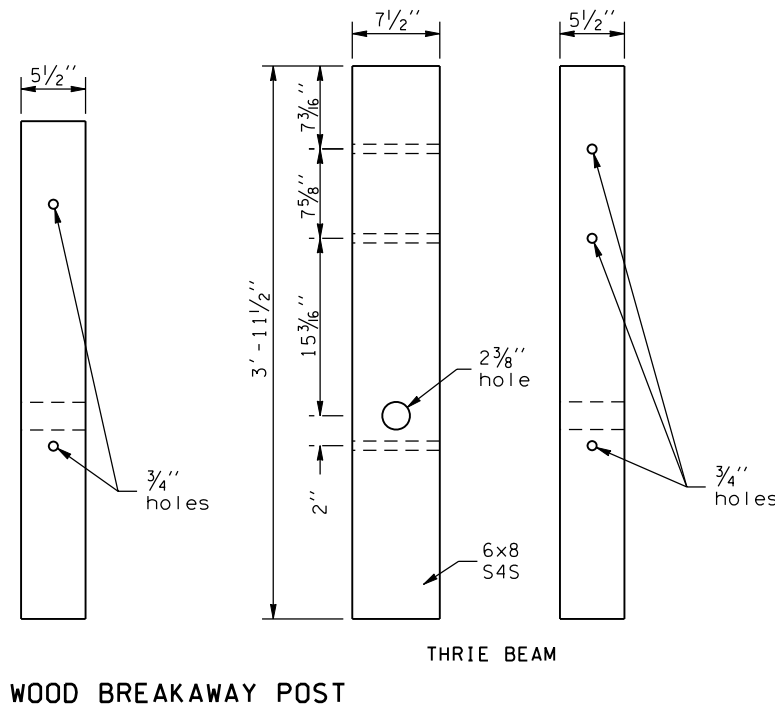
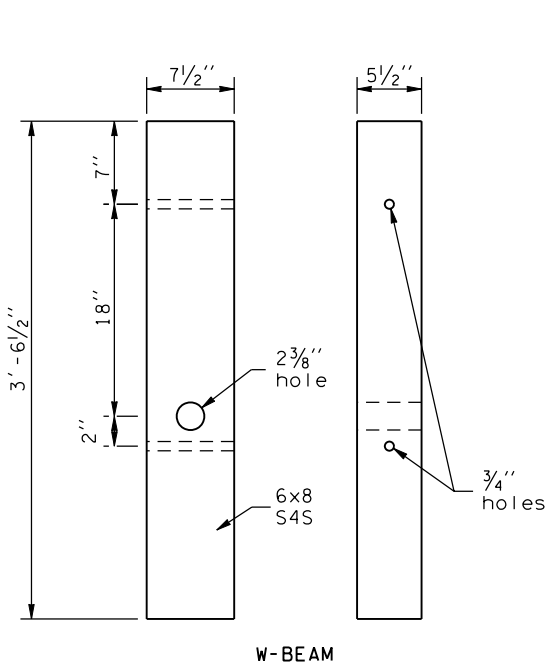
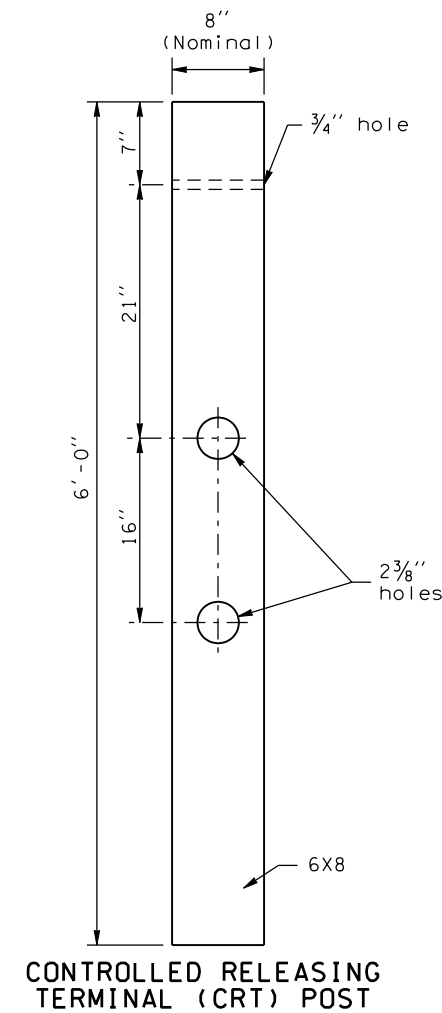
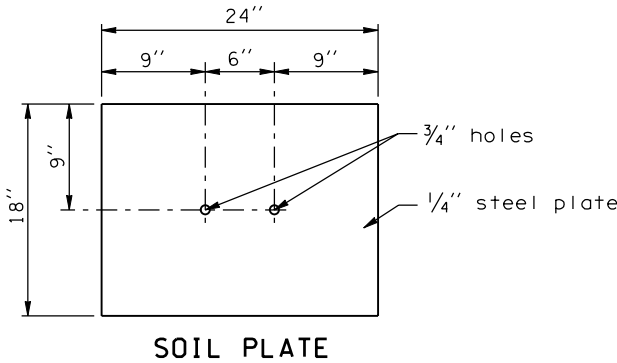
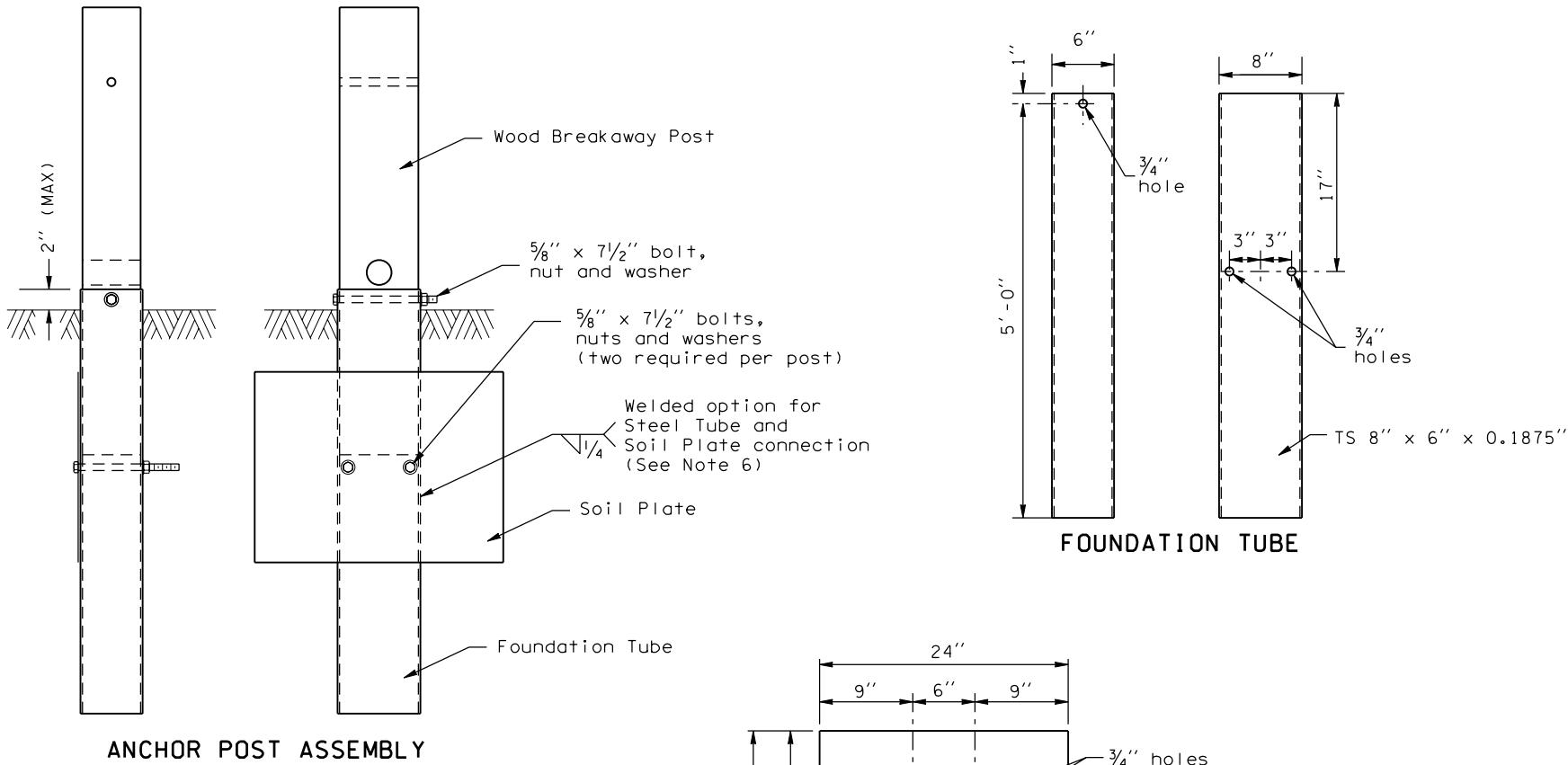


Washington State Department of Transportation

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

NOTES

- 1. Wood posts for all guardrail placement plans shall be 6x8 except where noted otherwise.
- 2. Lower hole is for rub rail of Type 2 and Type 3 Beam Guardrail.
- 3. W6x9 steel posts and timber blocks are alternates for 6x8 timber posts and blocks. W6x15 steel posts and timber blocks are alternates for 10x10 timber posts and blocks.
- 4. Holes shall be located on approaching traffic side of web.
- 5. When contract requires "Beam Guardrail Type 1, 11 Foot Long Post," the steel post length shall be marked with numbers to ensure permanent identification at the location where the letter "H" is shown on the detail. The marking shall be 1 1/2" MIN height.
- 6. Soil plate may be welded to foundation tube. If so, holes in soil plate and foundation tube may be omitted.



BEAM GUARDRAIL
POSTS AND BLOCKS
STANDARD PLAN C-1b

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 10-31-03

STATE DESIGN ENGINEER

DATE

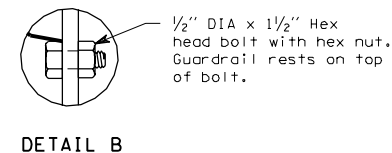
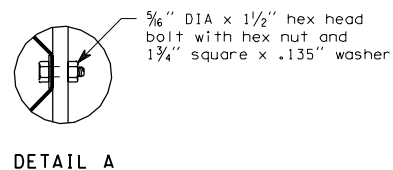
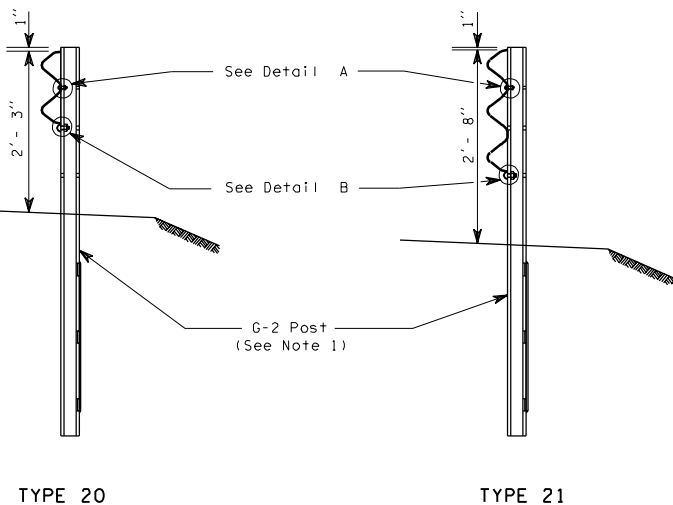


Washington State Department of Transportation

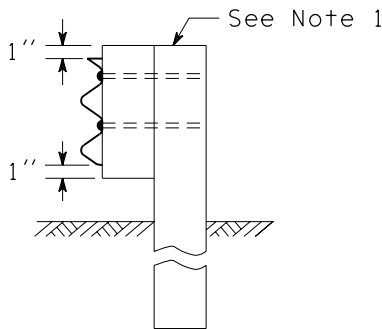
09/2003	REV. NOTES	RG
DATE	REVISION	BY

NOTES

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

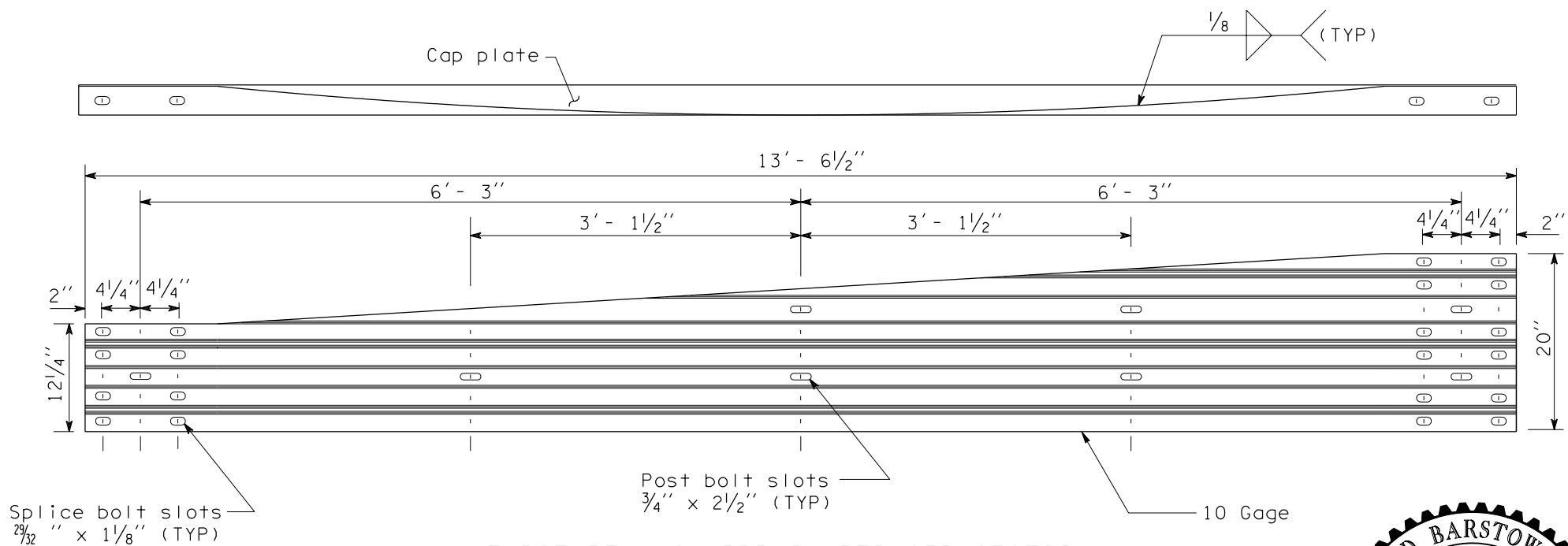


BEAM GUARDRAIL



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)



EXPIRES JULY 24, 2004

**THRIE BEAM GUARDRAIL
REDUCER SECTION**

STANDARD PLAN C-1d

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 10-31-03

STATE DESIGN ENGINEER

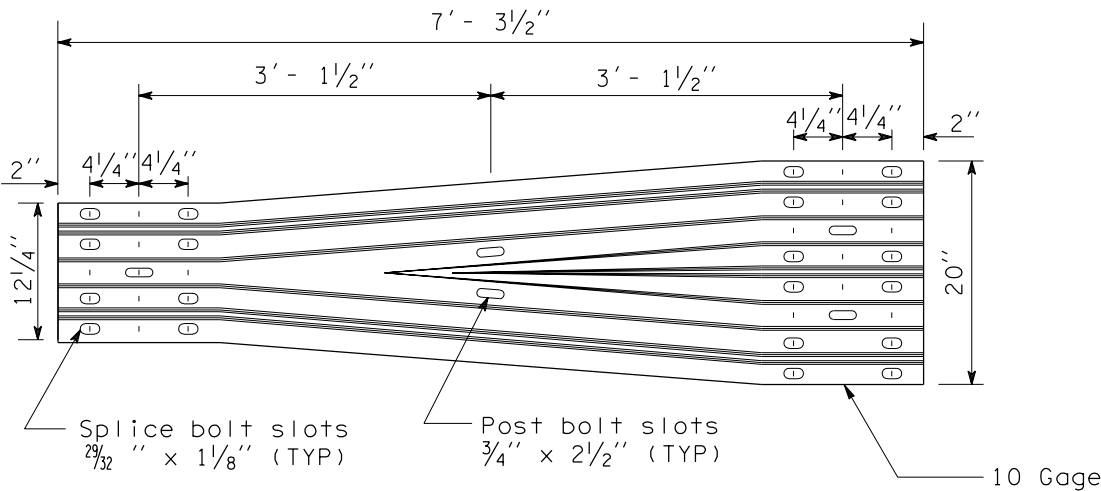
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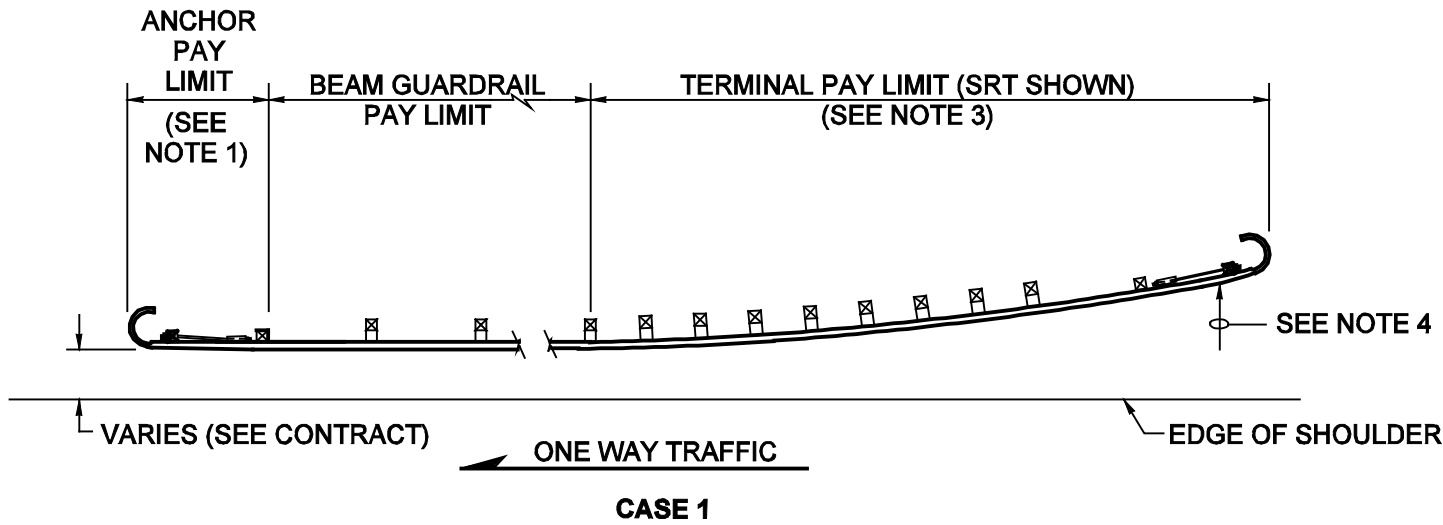
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09/2003	ADDED 10 GAGE STEEL DESIGNATION; REV. NOTE 1	RG
DATE	REVISION	BY

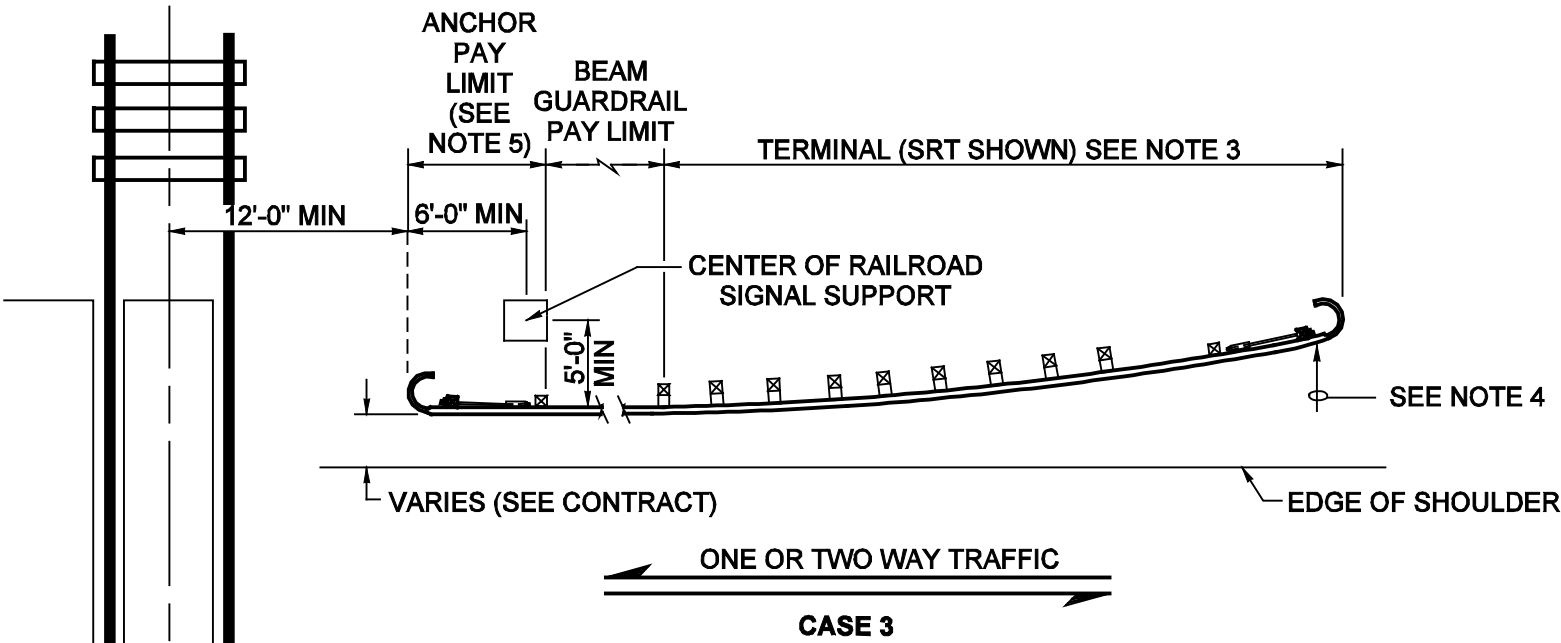
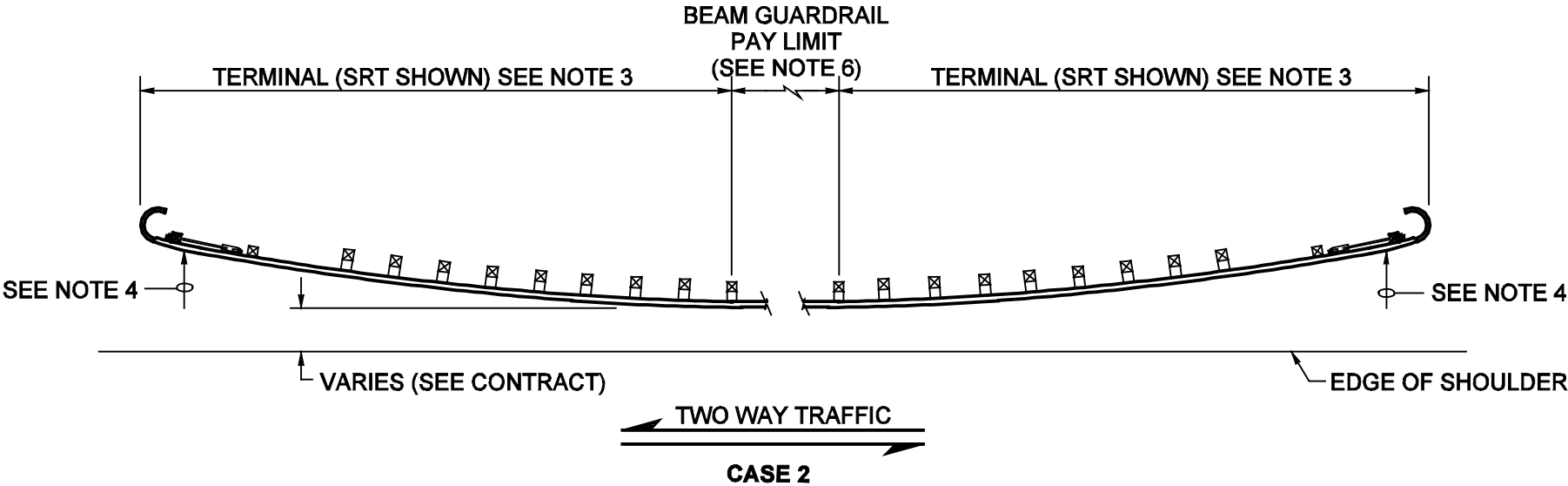


THRIE BEAM GUARDRAIL REDUCER SECTION
TYPE B



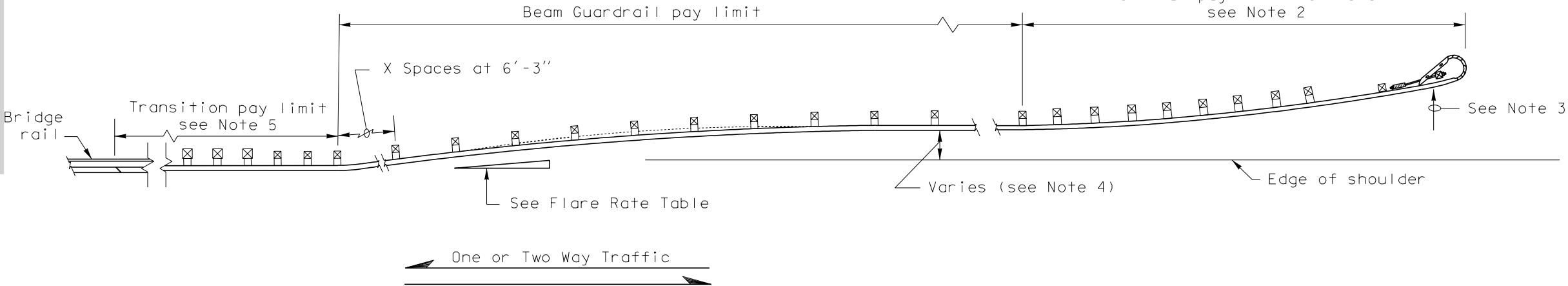
NOTES

1. Type 4 anchor required. For details, see Standard Plan C-6c.
2. Post spacing is 6'-3" unless otherwise shown.
3. For Terminal type and details, see Contract Plans and applicable Standard Plan(s).
4. The slope from the edge of the shoulder into the face of the guardrail should not exceed 10:1 when the face of the guardrail is less than 12'-0" from the edge of the shoulder.
5. For one-way traffic, use Type 4 anchor. For two-way traffic, use Type 1 anchor. See applicable Standard Plan(s) for details.
6. When Beam Guardrail Flared Terminals are used on both ends a minimum of 25'-0" of Beam Guardrail shall be installed.

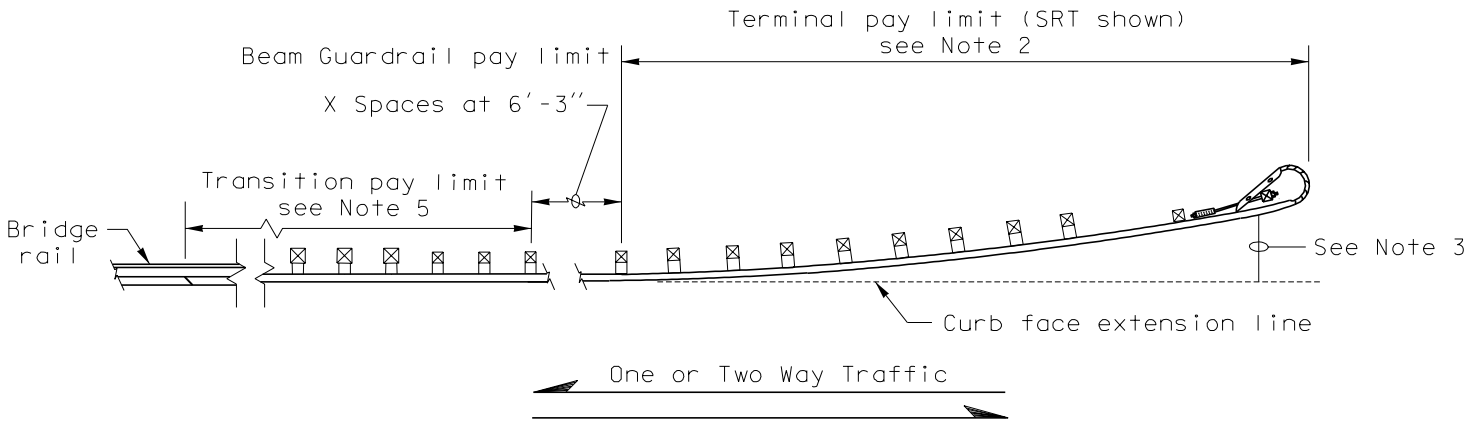


**GUARDRAIL PLACEMENT
STANDARD PLAN C-2**

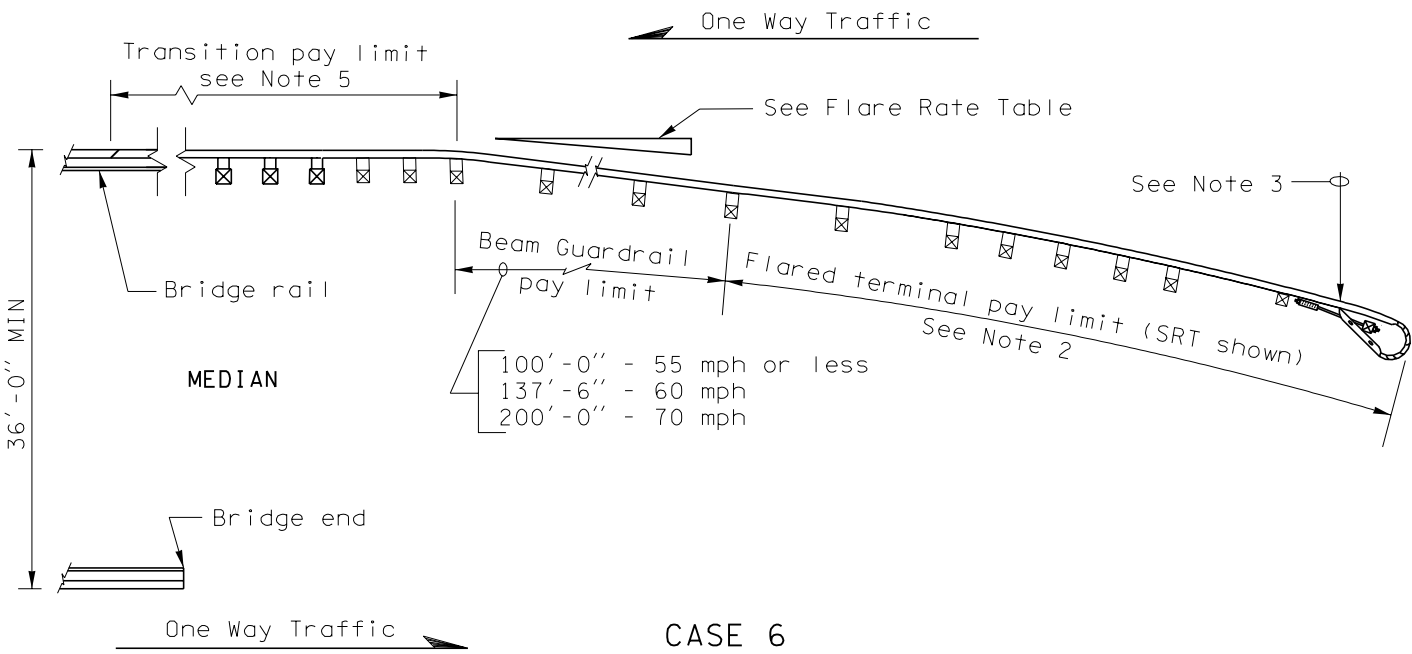
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12/99		ADDED NOTE 6. MODIFIED THE END SECTIONS TO DESIGN "C".	TWS	01-06-00
DATE	REVISION	BY	DEPUTY STATE DESIGN ENGINEER	DATE
			WASHINGTON STATE DEPARTMENT OF TRANSPORTATION	OLYMPIA, WASHINGTON



CASE 4



CASE 5



CASE 6

NOTES

1. Post spacing is 6'-3" except where noted.
2. For terminal type and details, see Contract and applicable Standard Plan(s).
3. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1 when the guardrail is within 12'-0" from the edge of the shoulder.
4. See Contract for dimensions.
5. See Contract for Guardrail Transition Section and Guardrail Connection to Bridge Rail or Concrete Barrier.

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



GUARDRAIL PLACEMENT
STANDARD PLAN C-2a

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7/98	Revised Flare Rate Table and Case 6 lengths	MKS
DATE	REVISION	BY

APPROVED FOR PUBLICATION

Clifford E. Mansfield

DEPUTY STATE DESIGN ENGINEER



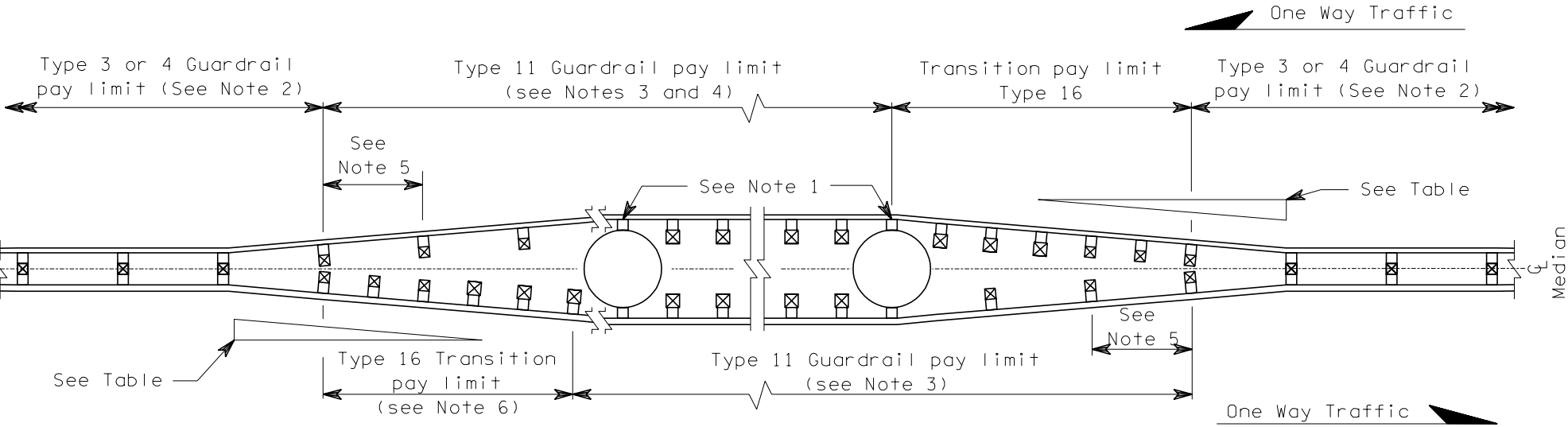
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

7/17/98

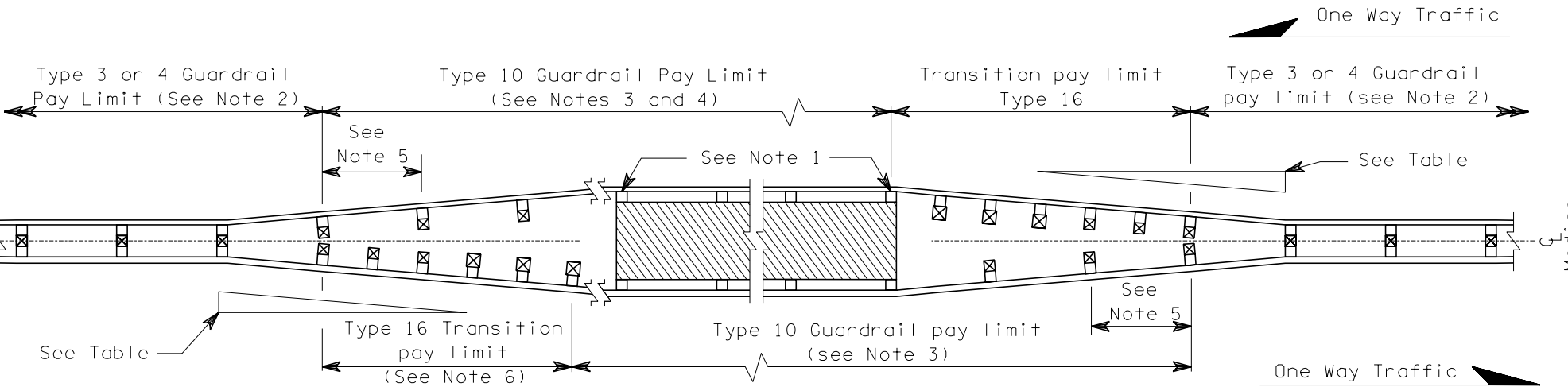
DATE

NOTES

1. Attach standard wood or steel blocks to concrete structure with $\frac{5}{8}$ " expansion anchor or $\frac{5}{8}$ " threaded rod in a 1" x 8" hole grouted with epoxy.
2. For Type 3 Guardrail, terminate the rub rail by lapping it behind the first 10 x 10 post of the Type 16 Transition Section, or as approved by the Engineer.
3. The Type 10 or Type 11 Guardrail shall extend 12'-6" MIN past the structure to allow installation of the Type 16 transition for the opposing traffic.
4. If the minimum number of 12'-6" thrie beam sections required to span the structure extends more than 6'-3" (but less than 12'-6") past the structure, then a 6'-3" section of nested thrie beam should be added. Otherwise, install an additional 12'-6" section.
5. Thrie Beam Guardrail Reducer Section Type B.
6. This Type 16 Transition shall end at a 10 x 10 post. Place nested thrie beam with 10 x 10 posts at 3'-1 1/2" MAX spacing between the end of the transition and the structure.



CASE 7



CASE 8

FLARE RATE TABLE	
Rate	Posted Speed (MPH)
15:1	70
14:1	60
12:1	55
11:1	50
10:1	45
9:1	40 or less

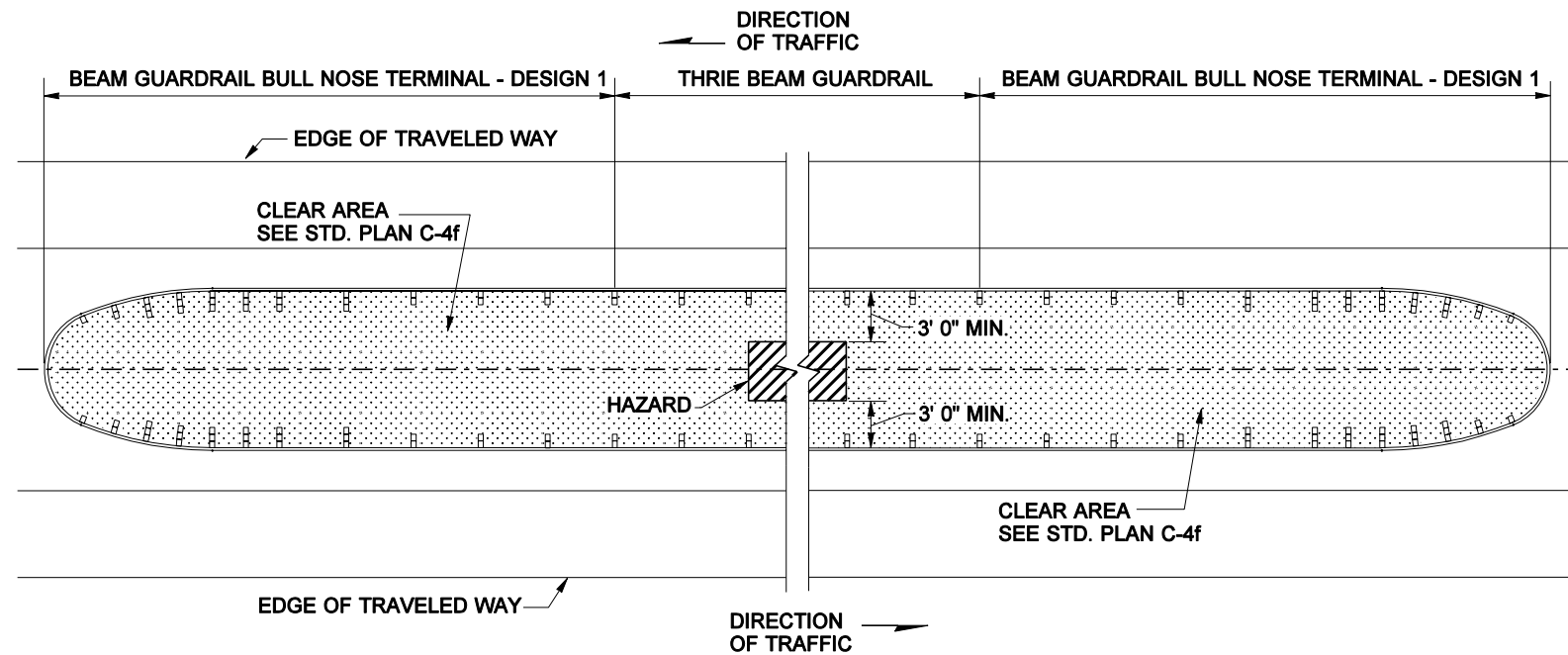


EXPIRES MAY 3, 2000

GUARDRAIL PLACEMENT
STANDARD PLAN C-2b

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

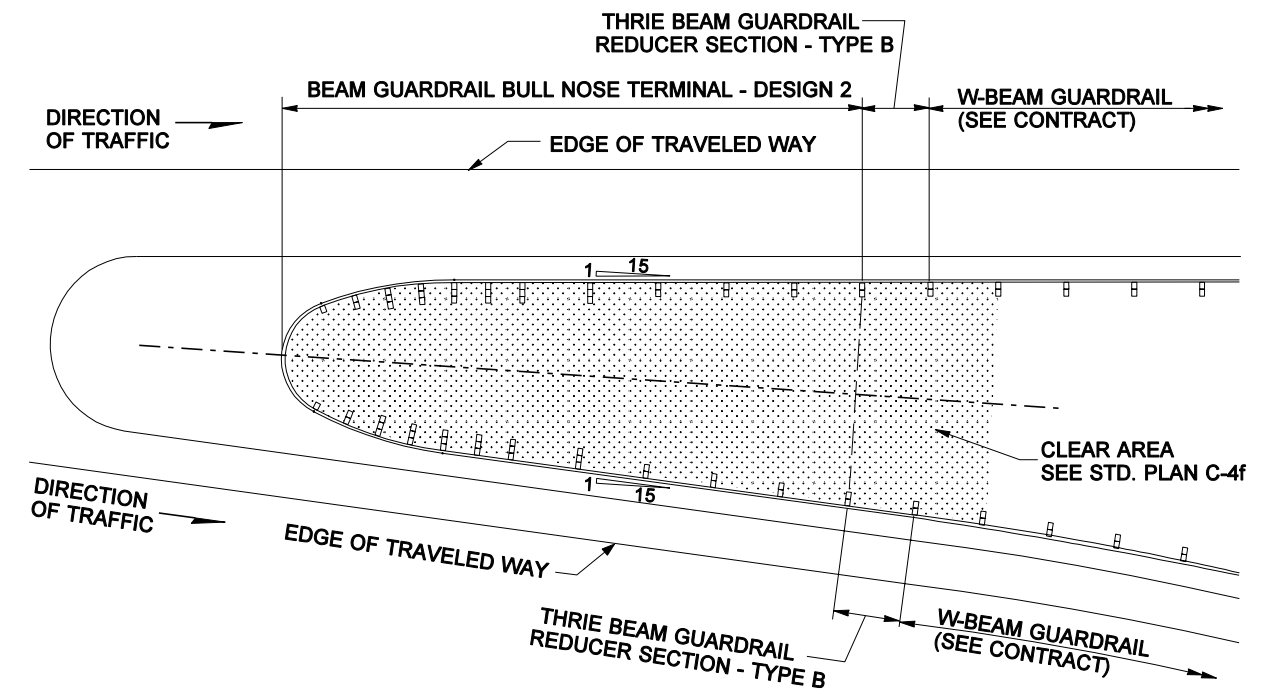
APPROVED FOR PUBLICATION	
Clifford E. Mansfield	6/12/98
DEPUTY STATE DESIGN ENGINEER	DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION OLYMPIA, WASHINGTON	



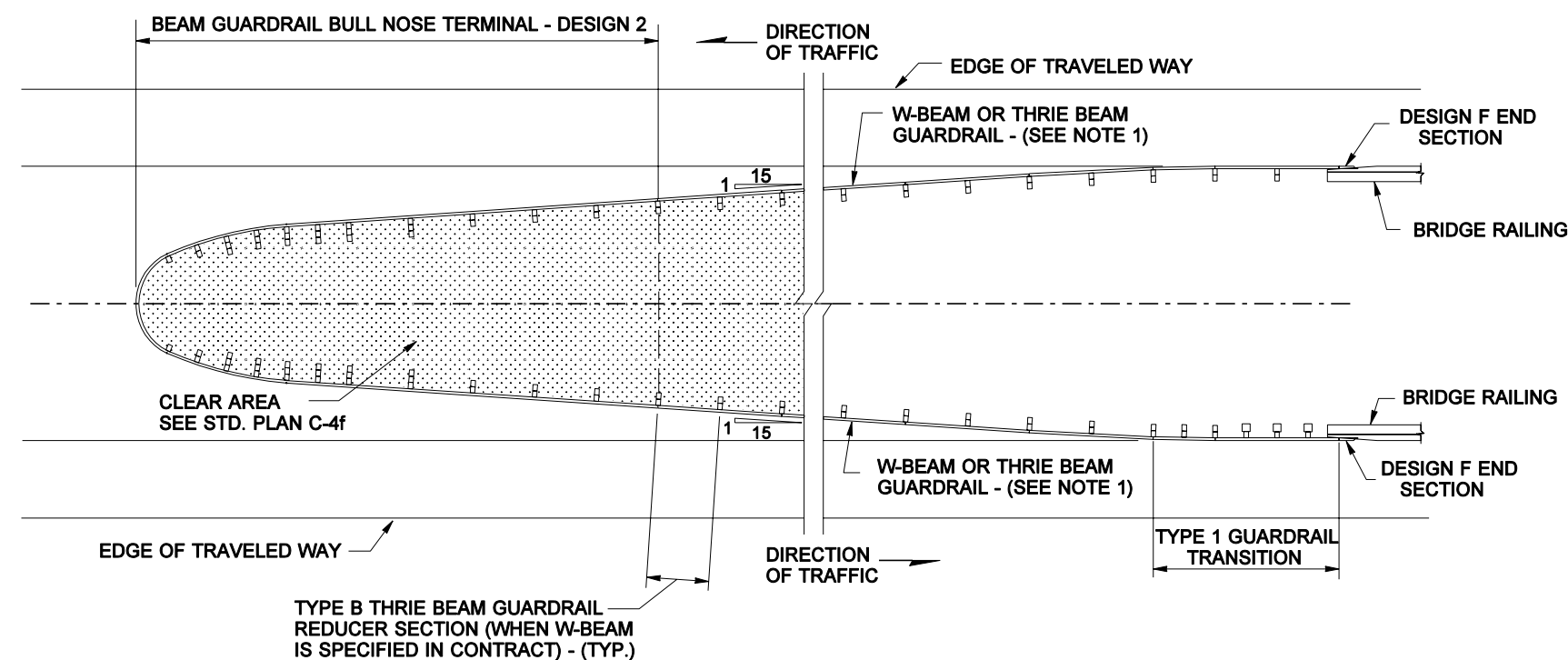
CASE 9A

NOTES

1. 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



CASE 9C



EXPIRES JULY 24, 2004

GUARDRAIL PLACEMENT MEDIAN BULL NOSE

STANDARD PLAN C-2c

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 02-20-03

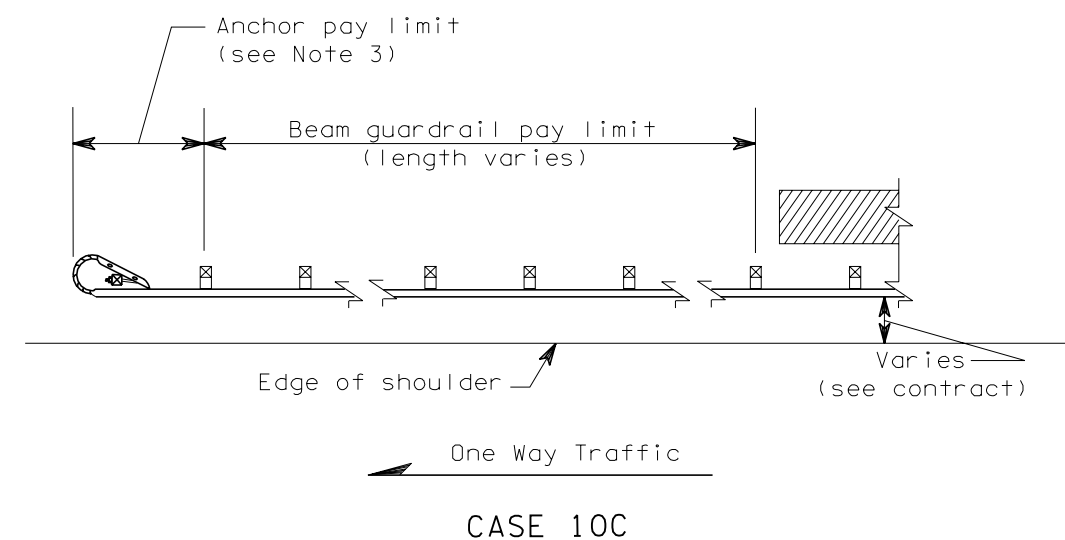
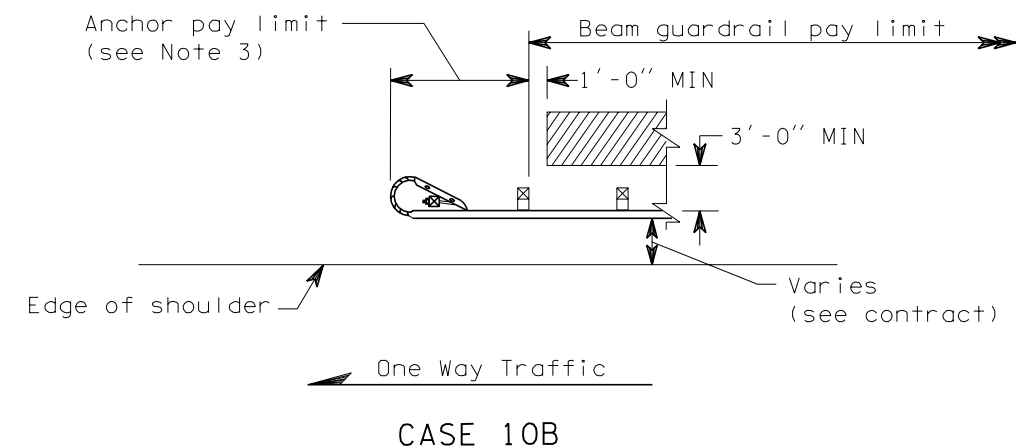
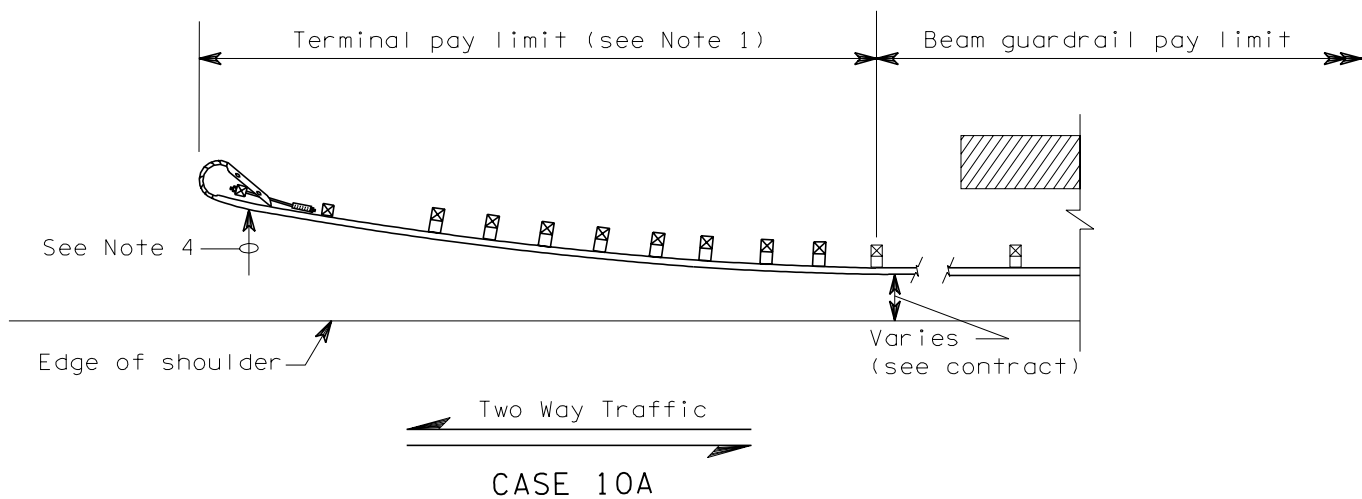
STATE DESIGN ENGINEER

DATE



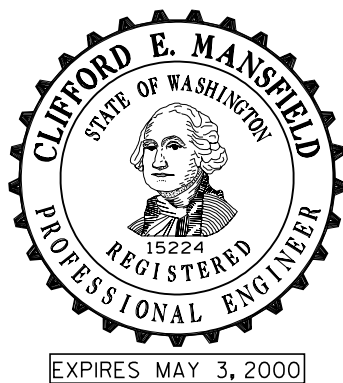
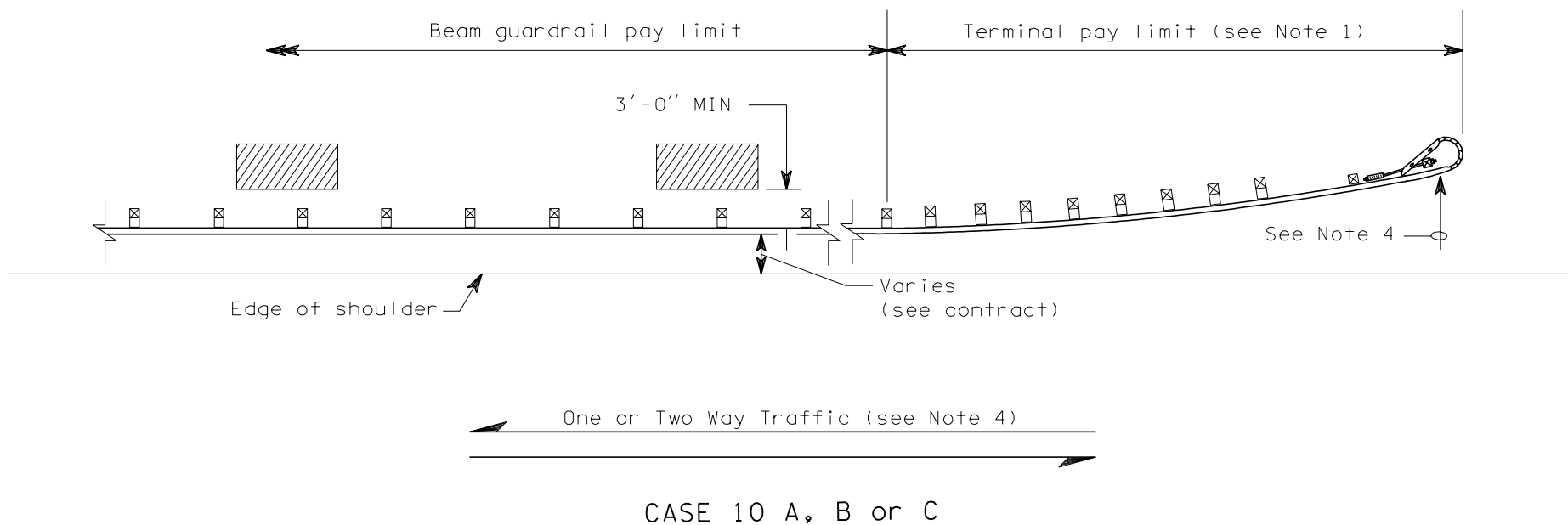
Washington State Department of Transportation

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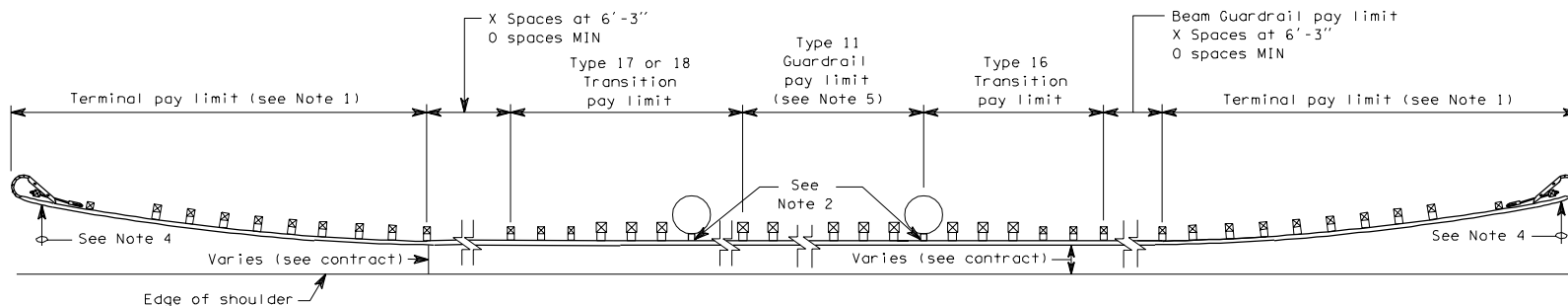
NOTES

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



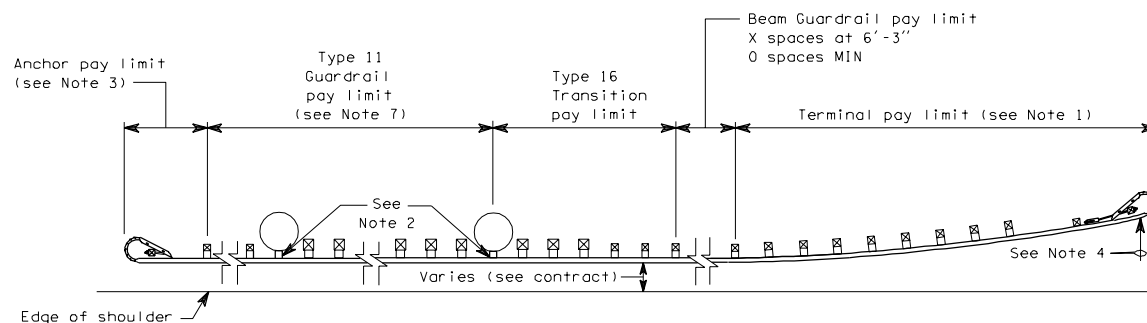
GUARDRAIL PLACEMENT
STANDARD PLAN C-2d

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			Brian Ziegler	5/22/98
			STATE DESIGN ENGINEER	DATE
			WASHINGTON STATE DEPARTMENT OF TRANSPORTATION	OLYMPIA, WASHINGTON
5/19/98	Deleted Flare Rate Table.	RBA		
DATE	REVISION	BY		



Two Way Traffic

CASE 11A



One Way Traffic

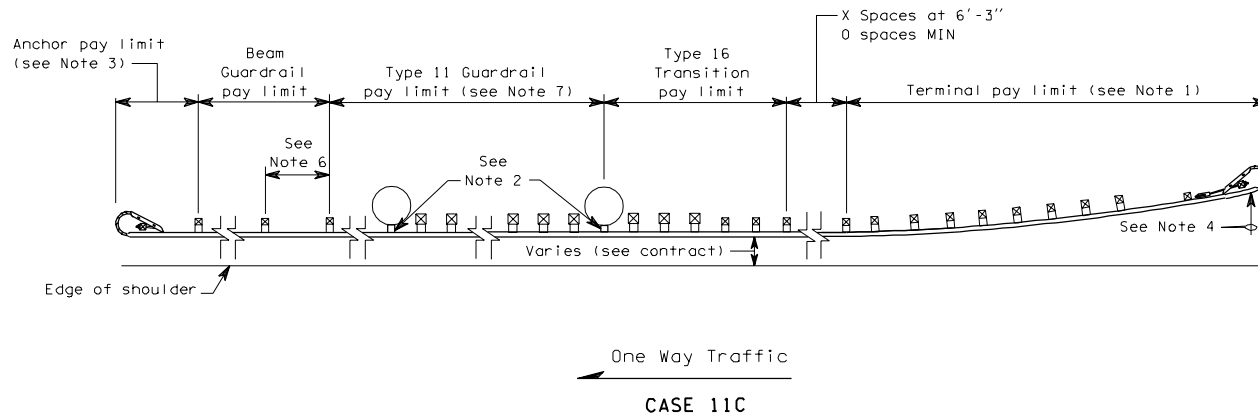
CASE 11B

GUARDRAIL PLACEMENT

C-2e
03-07-97

NOTES

1. SRT Terminal shown. For terminal type and details see Contract and applicable Standard Plan(s).
2. Attach standard blocks to concrete structure with $\frac{5}{8}$ " DIA expansion anchor or $\frac{5}{8}$ " DIA threaded rod in a 1" DIA x 8" hole grouted with epoxy.
3. Type 4 anchor or Type 4 anchor (Thrie Beam) required.
4. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1 when the guardrail is within 12'-0" from the edge of the shoulder.
5. If the distance from end of Type 11 Guardrail to column/structure exceeds 6'-3" using 12'-6" thrie beam sections, add a 6'-3" nested section of thrie beam with 10 x 10 posts, spaced at 3'-1 $\frac{1}{2}$ " (MAX), and begin transition.
6. Thrie Beam Guardrail Reducer Section Type B.
7. Guardrail post spacing for Type 11 Guardrail past the End Bridge Pier shall be at 6'-3" spacing, maximum, with 6 x 8 post and standard block.



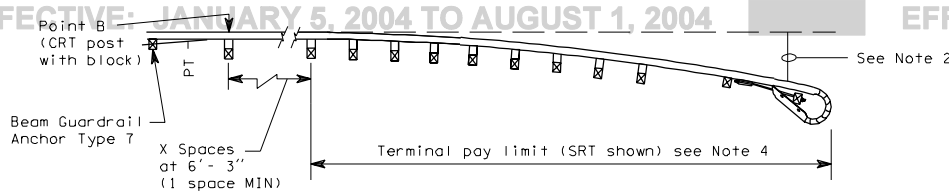
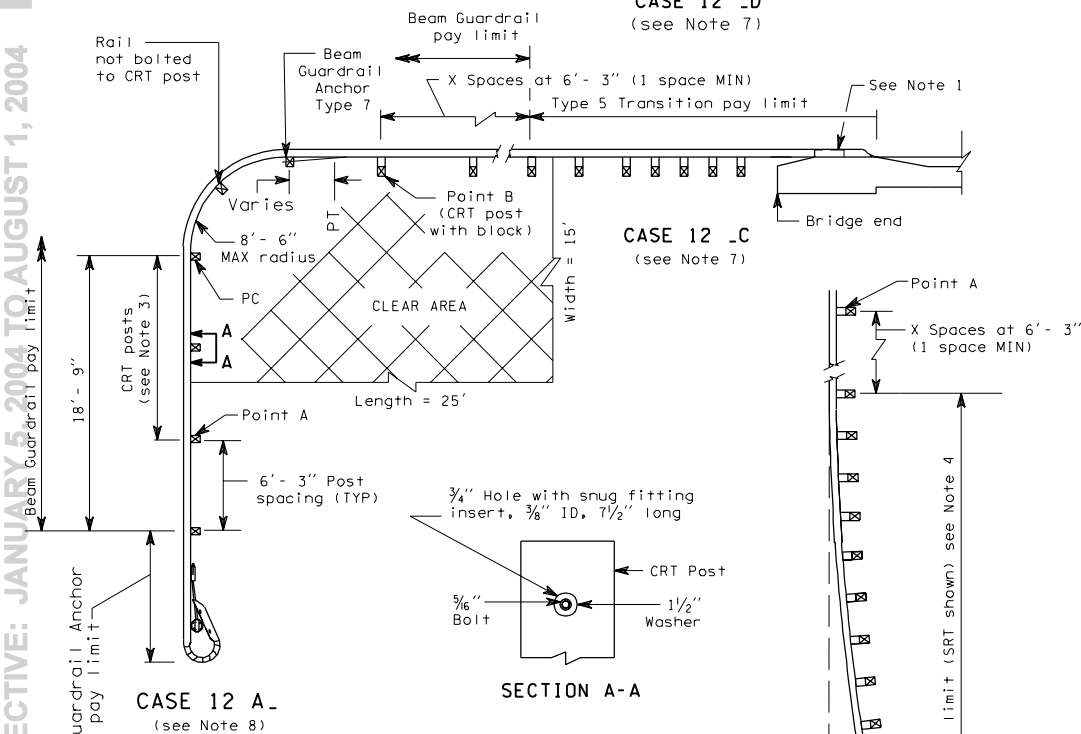
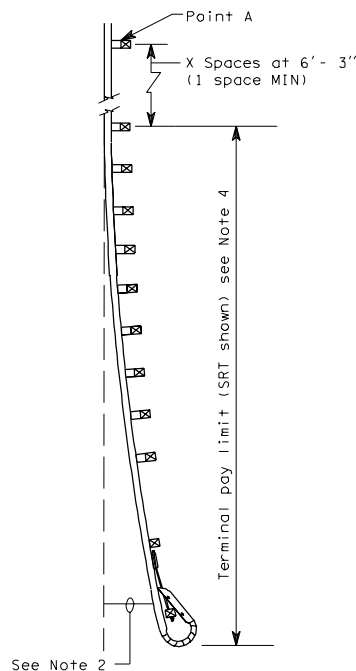
GUARDRAIL PLACEMENT

C-2e

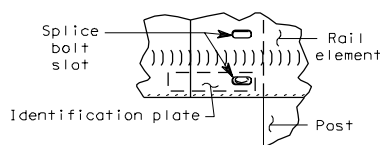
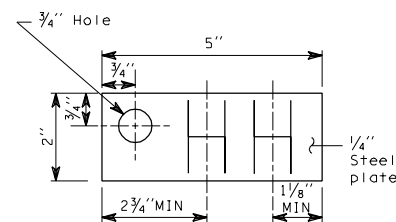
03-07-97

NOTES

1. See Contract for guardrail connection to bridge rail and concrete barrier.
2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
3. Attach to rail with $\frac{5}{16}$ " x 9" long bolt, nut and $1\frac{1}{2}$ " washer on back of post.
4. For terminal type and details, see Contract and applicable Standard Plan(s).
5. Radius dimensions shall be etched into plate replacing the letters "HH", shown on the Identification Plate Detail. Digits shall be $1\frac{1}{2}$ " MIN height and $\frac{3}{4}$ " MAX width. The plate shall be galvanized after etching.
6. The guardrail radius Identification Plate shall be mounted on the back side of the Rail Element using the lowest splice bolt at the P.C. of the guardrail radius.
7. First letter of case designation placement indicates end treatment on side road. Second letter indicates end treatment on main road. For instance, a Type 5 Anchor on the side road and a bridge connection on the main road would be Case 12 AC.
8. For the 8'-6" radius, five CRT posts are required including the CRT post at point B.
9. For CRT post details, see Standard Plan "Beam Guardrail Posts and Blocks".

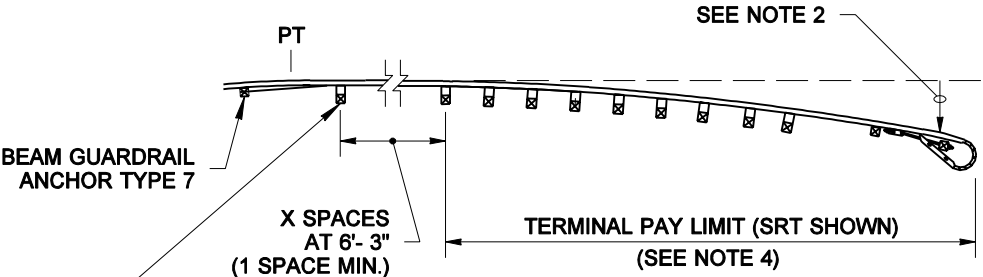
CASE 12 D
(see Note 7)CASE 12 C
(see Note 7)CASE 12 B
(see Note 7)CASE 12 A
(see Note 8)

SECTION A-A

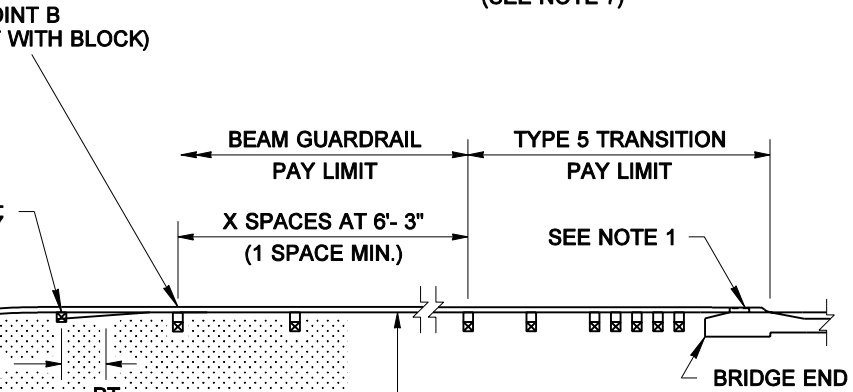
IDENTIFICATION PLATE
MOUNTING DETAIL
(see Note 6)IDENTIFICATION PLATE
(see Note 5)

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

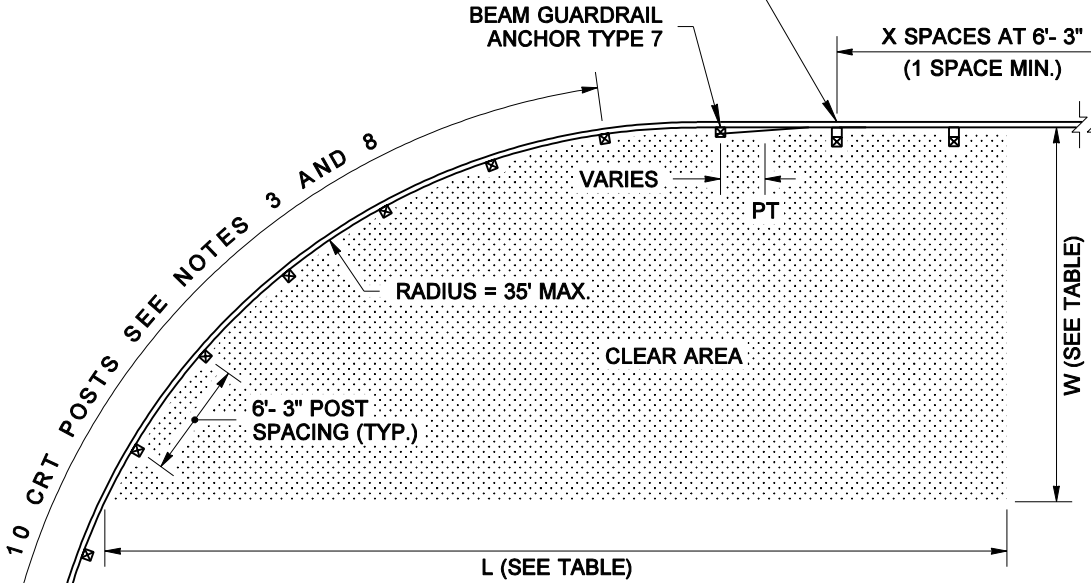
REQUIREMENTS			
RADIUS	NUMBER OF CRT POSTS (SEE NOTE 3)	CLEAR AREA	
		L	W
17'- 0"	6	30'	15'
25'- 6"	8	40'	20'
35'- 0"	11	50'	20'



CASE 13_D
(SEE NOTE 7)

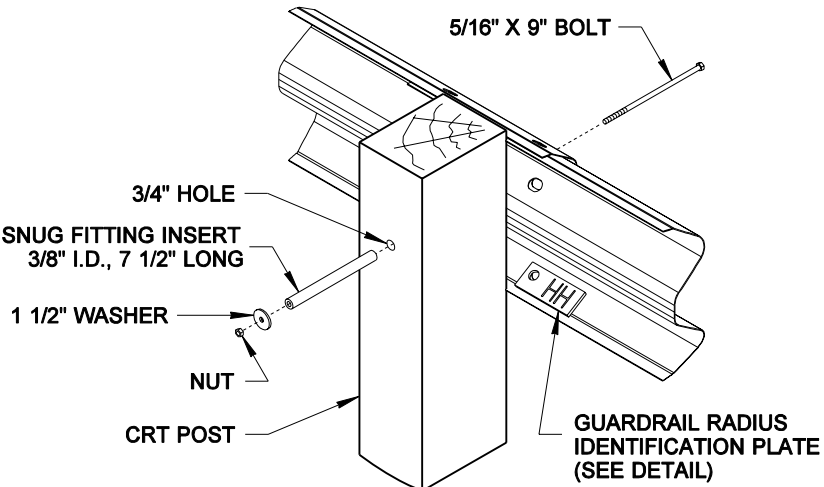


CASE 13_C
(SEE NOTE 7)

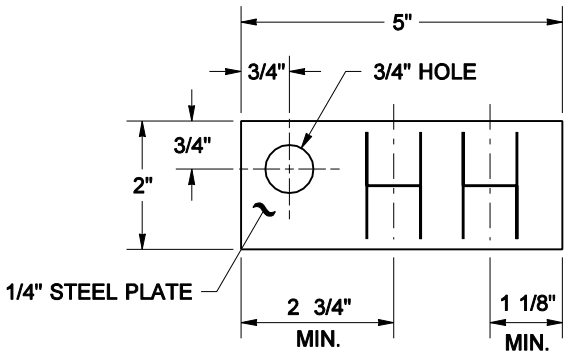


CASE 13 A_
(SEE NOTE 7)

CASE 13 B_
(SEE NOTE 7)



VIEW A



(SEE NOTE 5)
GUARDRAIL RADIUS
IDENTIFICATION PLATE
DETAIL

NOTES

1. See Contract Plans for guardrail connection to bridge rail and concrete barrier.
2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
3. Fewer CRT posts are required for smaller radii; include CRT Post at Point B. Attach guardrail to post with a 5/16" x 9" long bolt, a 3/8" I.D. x 7 1/2" snug fitting inser and a 1 1/2" washer with nut on back of post.
4. For terminal type and details, see Contract and applicable Standard Plan(s).
5. Radius dimensions shall be etched into plate replacing the letters "HH", shown on the GUARDRAIL RADIUS IDENTIFICATION PLATE DETAIL. Digits shall be 1 1/2" minimum height and 3/4" maximum width. Plate shall be galvanized after etching.
6. The guardrail radius Identification Plate shall be mounted on the back side of the rail element using the lowest splice bolt nearest the PC of the guardrail radius (See View A).
7. The first letter of the Case Designation indicates the end treatment on the side road. The second letter indicates the end treatment on the main road. For example, a Type 5 Anchor on the side road with a bridge connection on the main road would be Case 13 AC, the combination shown.
8. For CRT post details, see Standard Plan C-1b.



EXPIRES MAY 3, 2002

**GUARDRAIL PLACEMENT
WEAK POST INTERSECTION
DESIGN (35' MAX. RADIUS)
STANDARD PLAN C-2g**

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APPROVED FOR PUBLICATION

Clifford E. Mansfield
STATE DESIGN ENGINEER

07-27-01
DATE

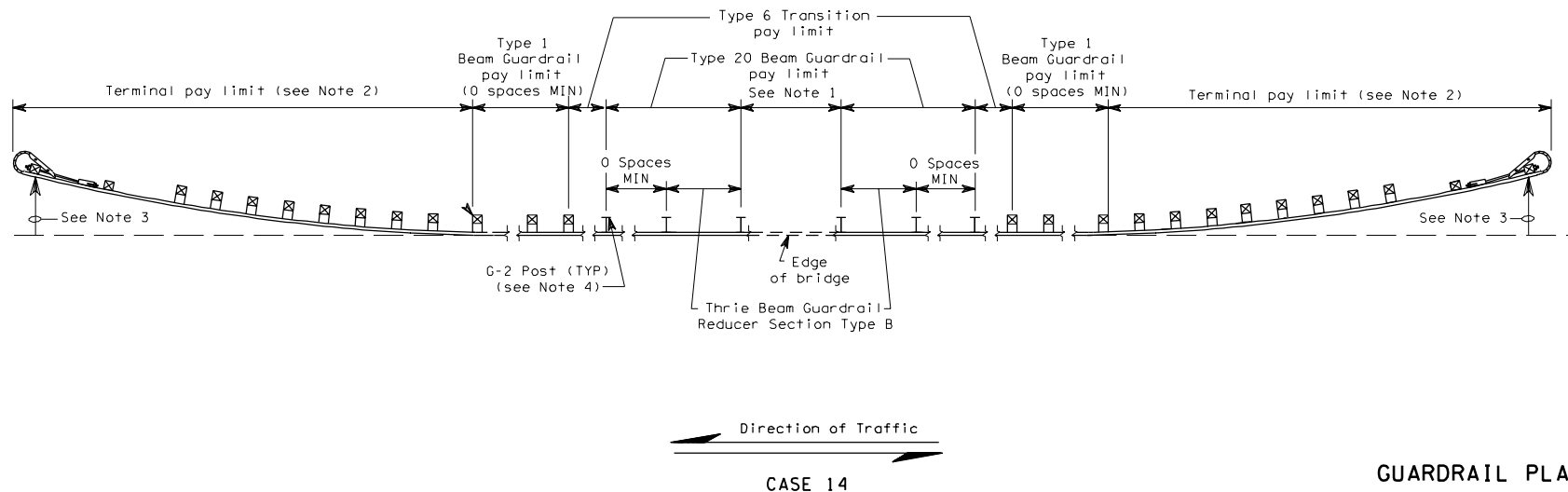


Washington State Department of Transportation

7/01	CORRECTED NOTES: ADDED "VIEW A"	MAS
DATE	REVISION	BY

NOTES

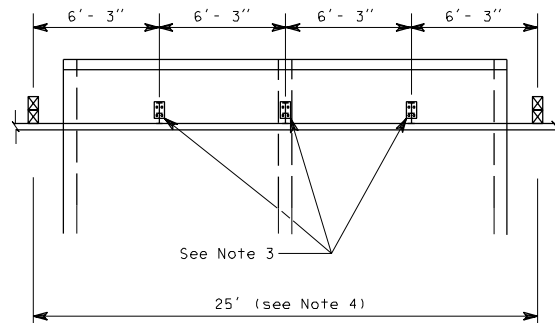
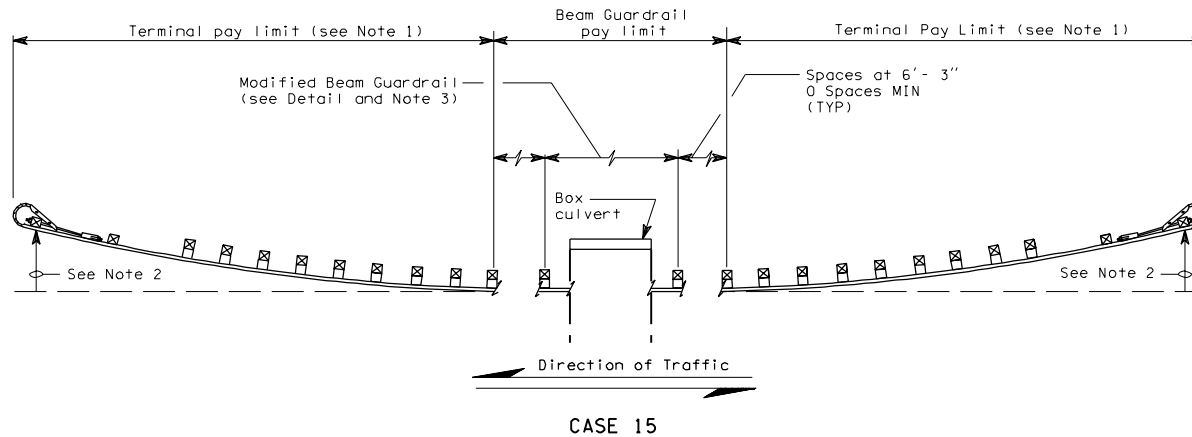
1. For Service Level 1, Weak Post Bridge Rail System, see Contract.
2. SRT Terminal shown. For Terminal type and details, see Contract and applicable Standard Plan(s).
3. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
4. See Standard Plan "Beam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



GUARDRAIL PLACEMENT

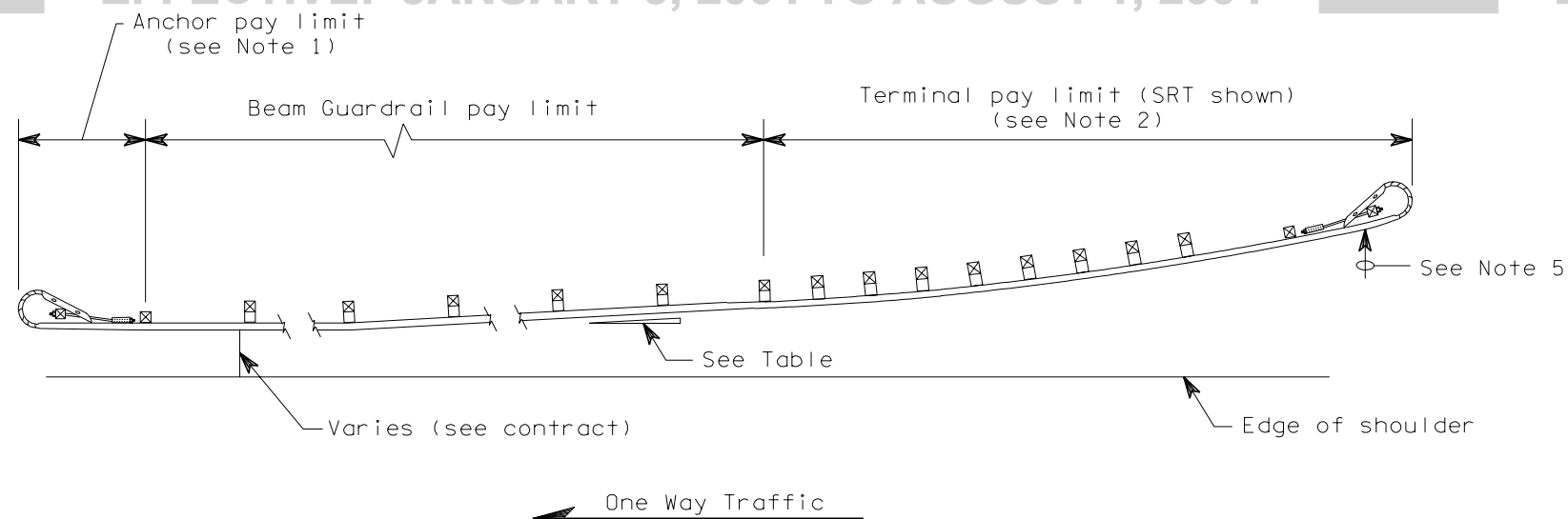
NOTES

1. SRT Terminal shown. For Terminal type and details, see Contract and applicable Standard Plan(s).
2. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1.
3. See Standard Plan for Box Culvert Guardrail Steel Post.
4. For spans up to 18'-9", see Standard Plan for Guardrail Placement Cases 19, 20, and 21.

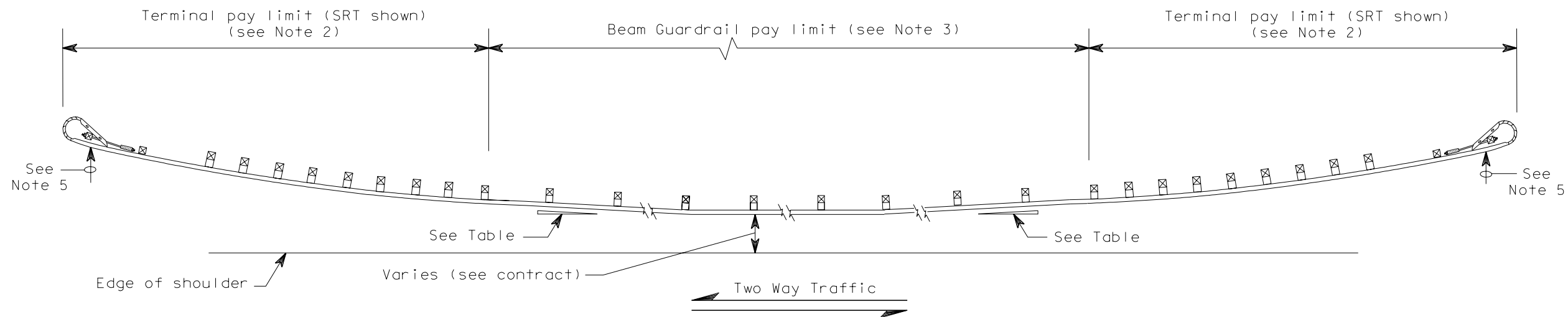


DETAIL

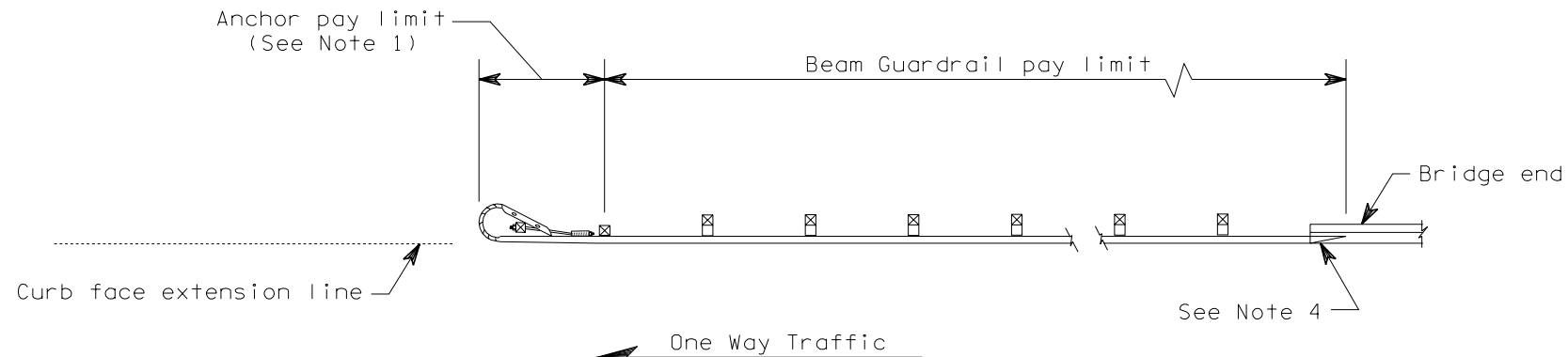
GUARDRAIL PLACEMENT



CASE 16



CASE 17



CASE 18

NOTES

1. Type 4 anchor required. For details, see applicable Standard Plan(s).
2. For terminal type and details, see contract and applicable Standard Plan(s).
3. Post spacing is 6'-3" except where noted.
4. For guardrail to bridge rail connection see applicable Standard Plan(s) or Contract.
5. The slope from the edge of the shoulder into the face of the guardrail should not be steeper than 10:1 when the guardrail is within 12'-0" from the edge of the shoulder. Beyond 12'-0", the slope shall not be steeper than 6:1.

FLARE RATE TABLE	
Rate	Posted Speed (MPH)
15:1	70
14:1	60
12:1	55
11:1	50
10:1	45
9:1	40 or less



EXPIRES MAY 3, 2000

GUARDRAIL PLACEMENT
STANDARD PLAN C-2j

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

APPROVED FOR PUBLICATION

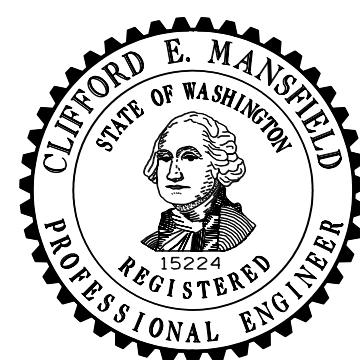
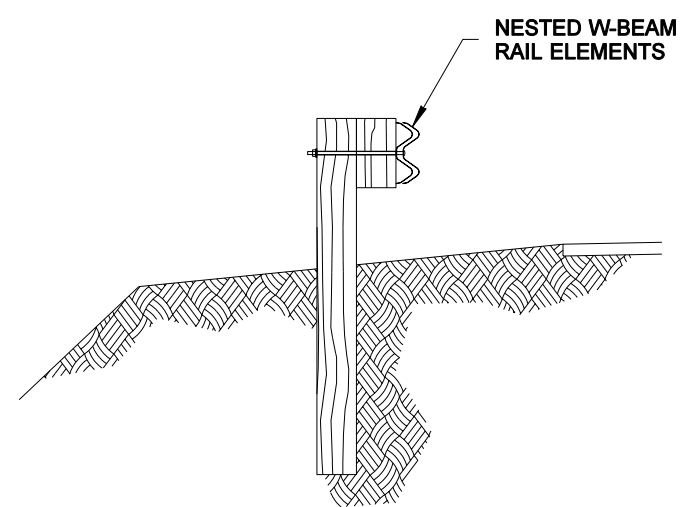
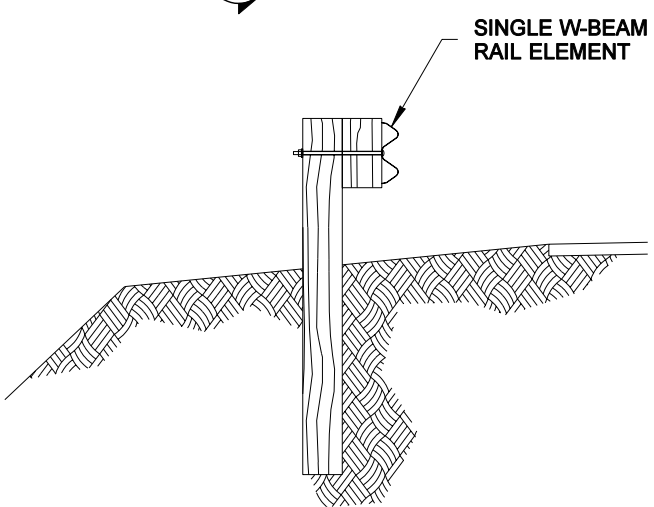
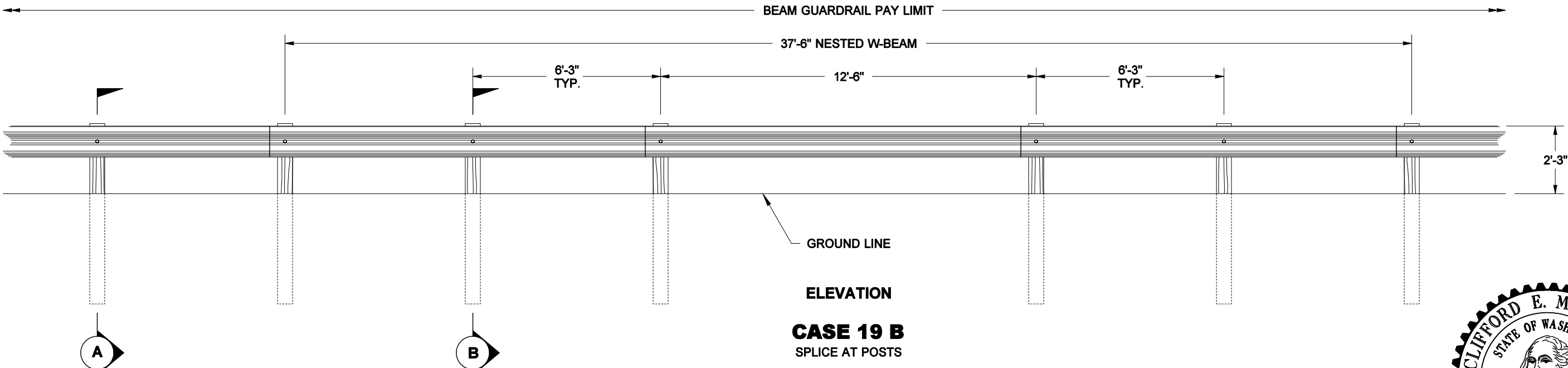
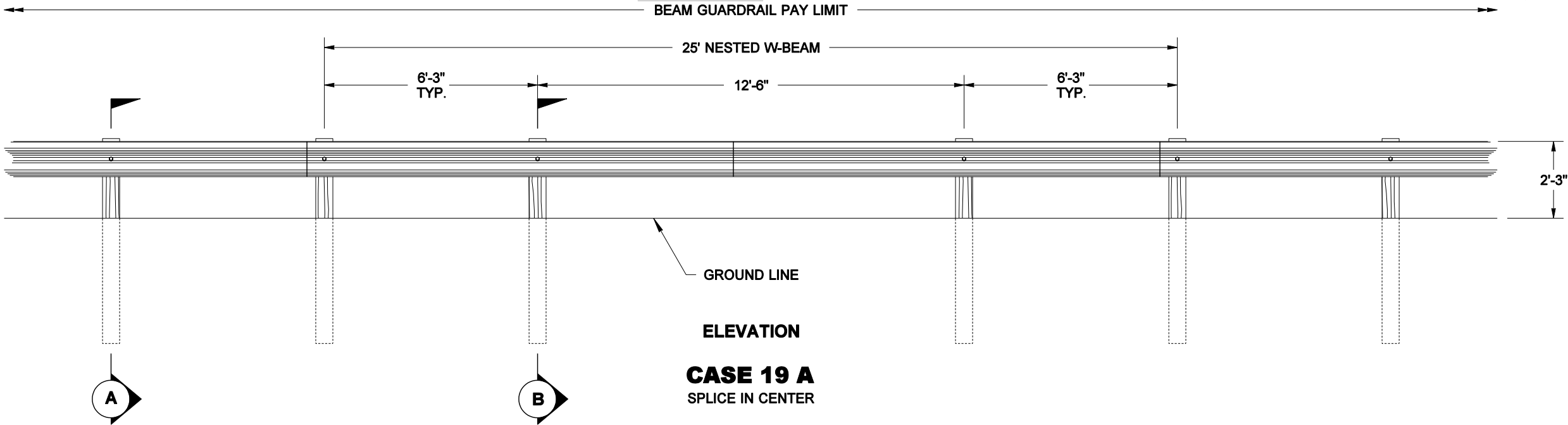
Clifford E. Mansfield

6/12/98

DEPUTY STATE DESIGN ENGINEER

DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON



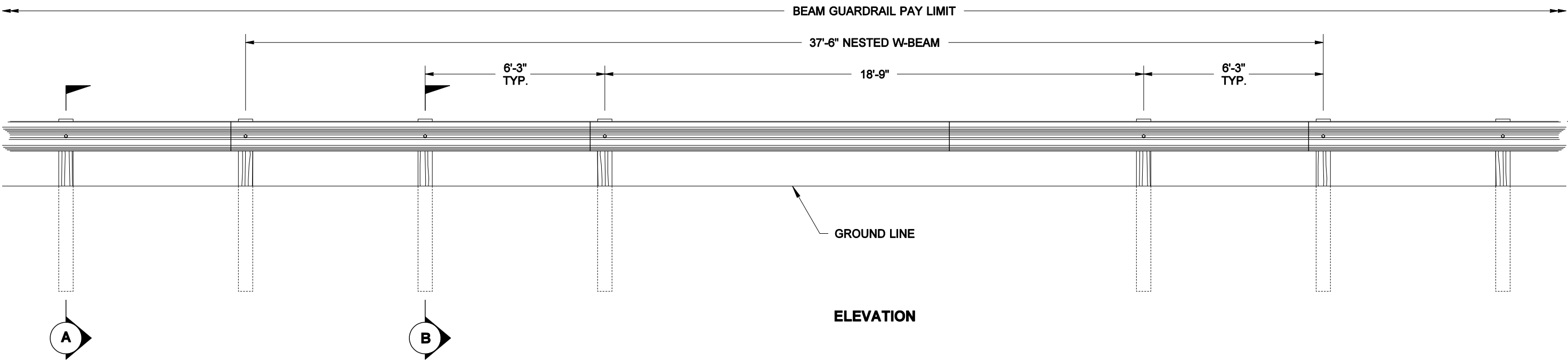
**GUARDRAIL PLACEMENT
12'-6" SPAN
STANDARD PLAN C-2k**

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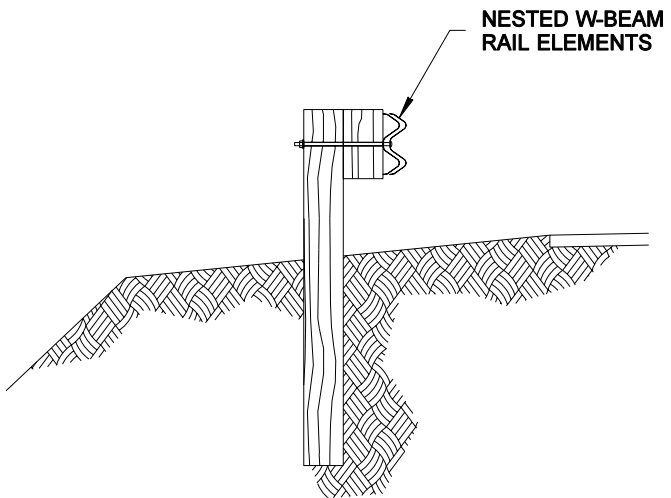
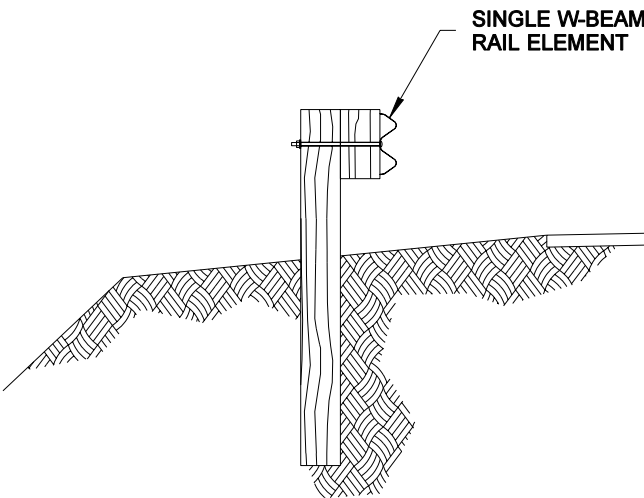
APPROVED FOR PUBLICATION

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

Washington State Department of Transportation



CASE 20



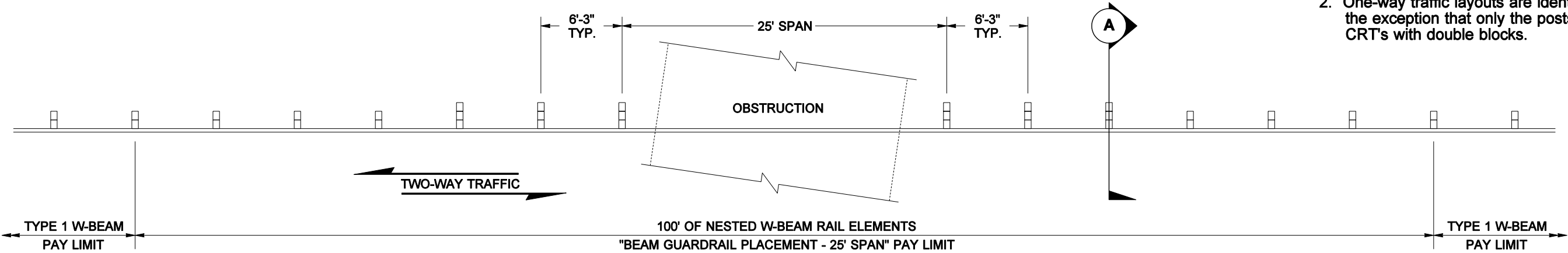
GUARDRAIL PLACEMENT
18'-9" SPAN
STANDARD PLAN C-2n

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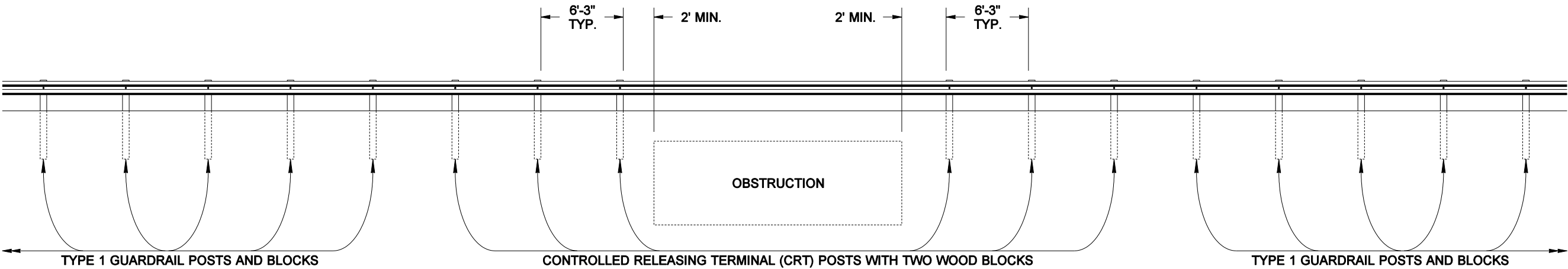
APPROVED FOR PUBLICATION	
Clifford E. Mansfield STATE DESIGN ENGINEER	07-27-01 DATE
Washington State Department of Transportation	

NOTES

- 1. See Standard Plan C-1b for additional details.
- 2. One-way traffic layouts are identical to the two-way layout with the exception that only the posts trailing the span need to be CRT's with double blocks.

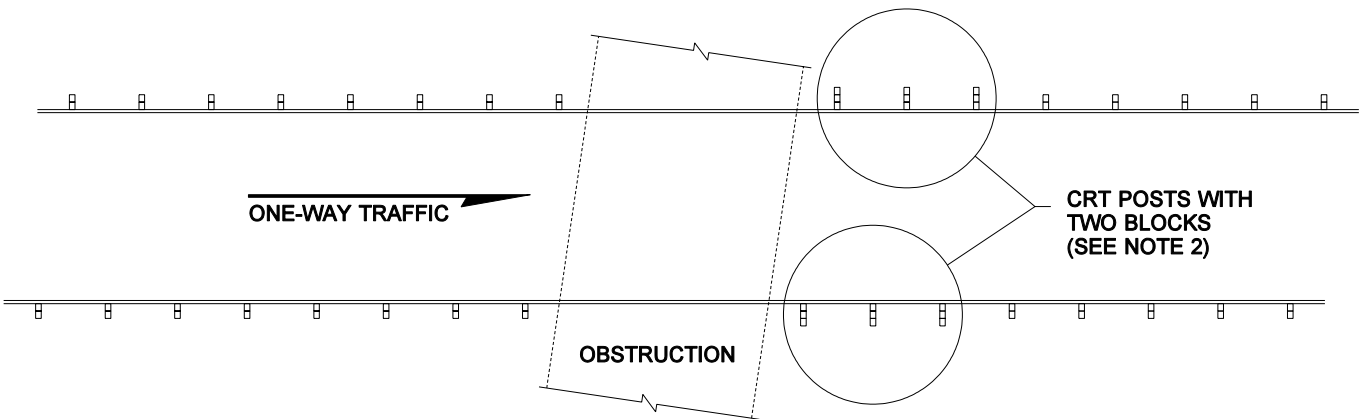


PLAN

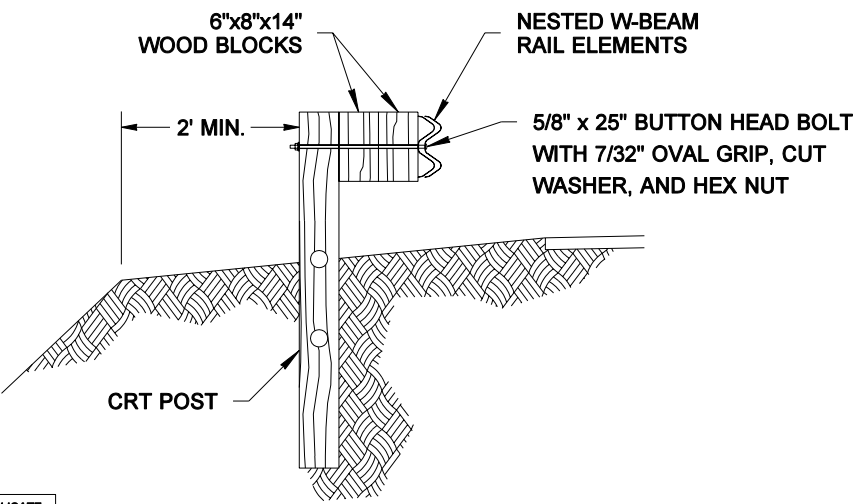


ELEVATION

CASE 21



ONE-WAY TRAFFIC LAYOUT



SECTION A



EXPIRES MAY 3, 2002

GUARDRAIL PLACEMENT
25' SPAN
STANDARD PLAN C-2o

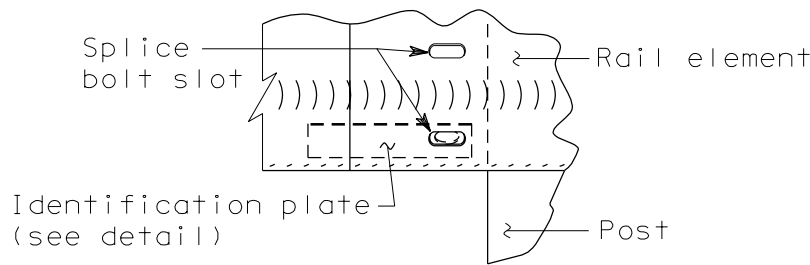
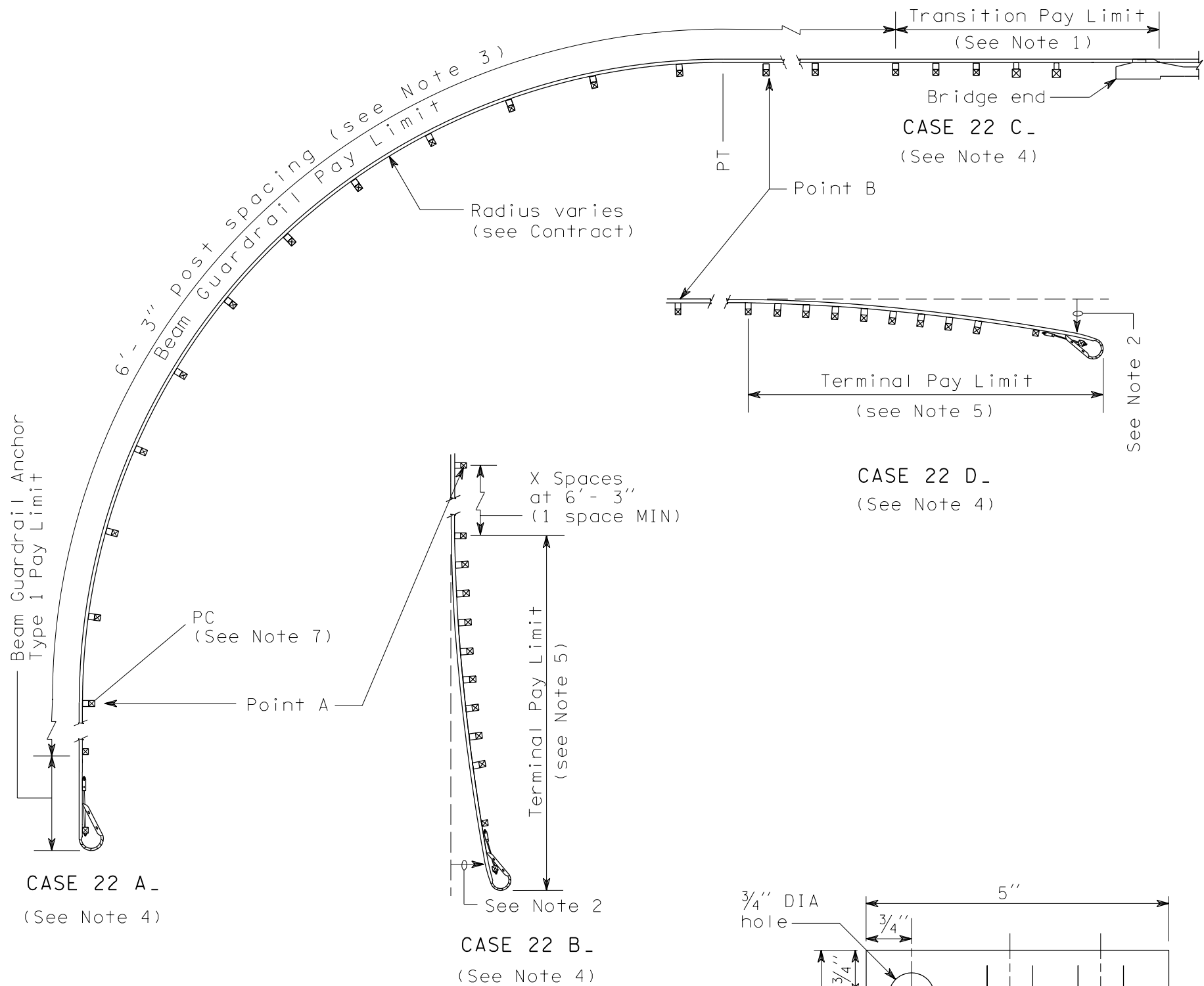
APPROVED FOR PUBLICATION

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

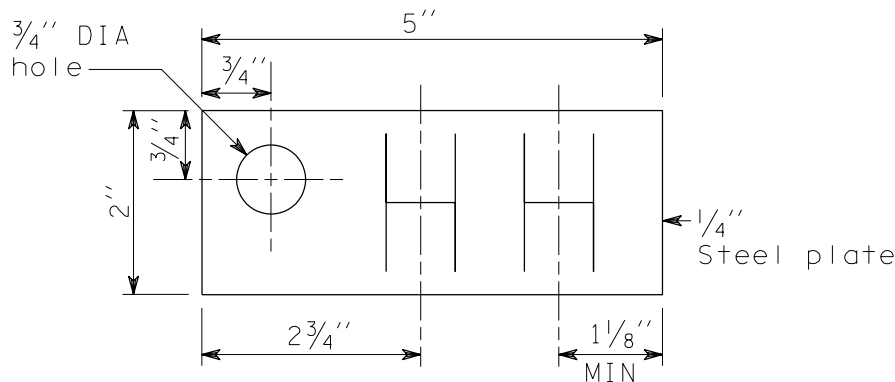
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IDENTIFICATION PLATE MOUNTING DETAIL
(See Note 7)



IDENTIFICATION PLATE DETAIL
(See Note 6)

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



EXPIRES JULY 24, 2004

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

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 10-31-03

STATE DESIGN ENGINEER

DATE

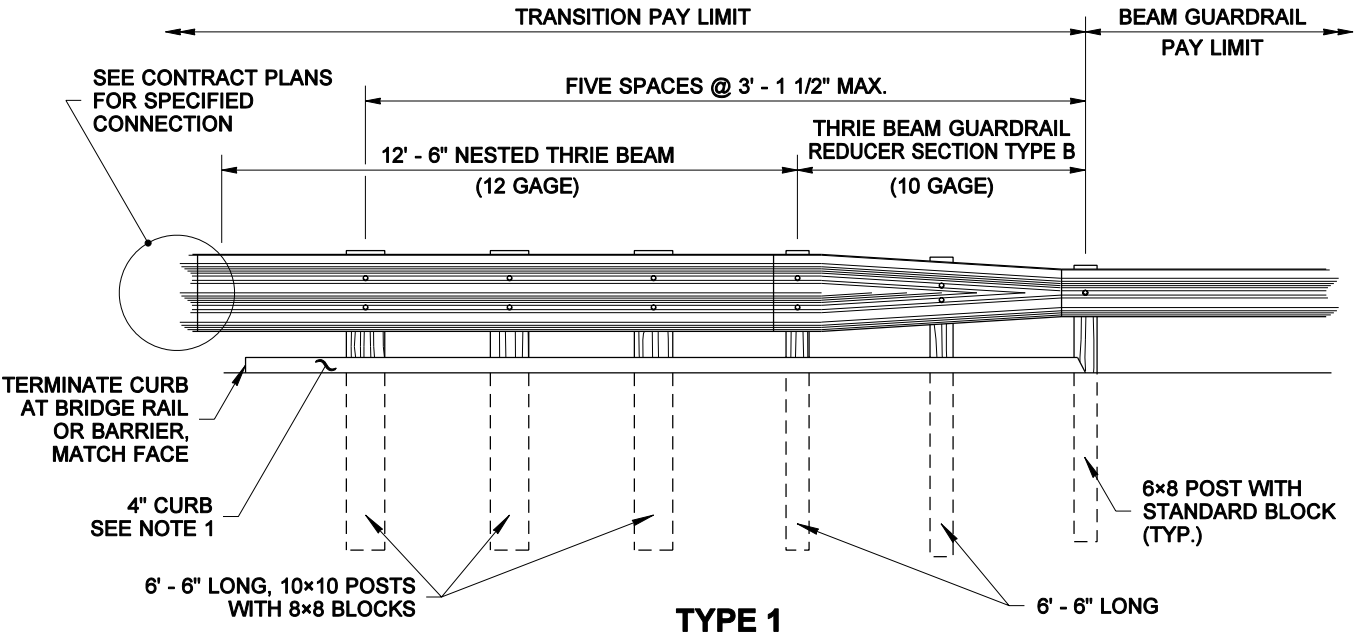


Washington State Department of Transportation

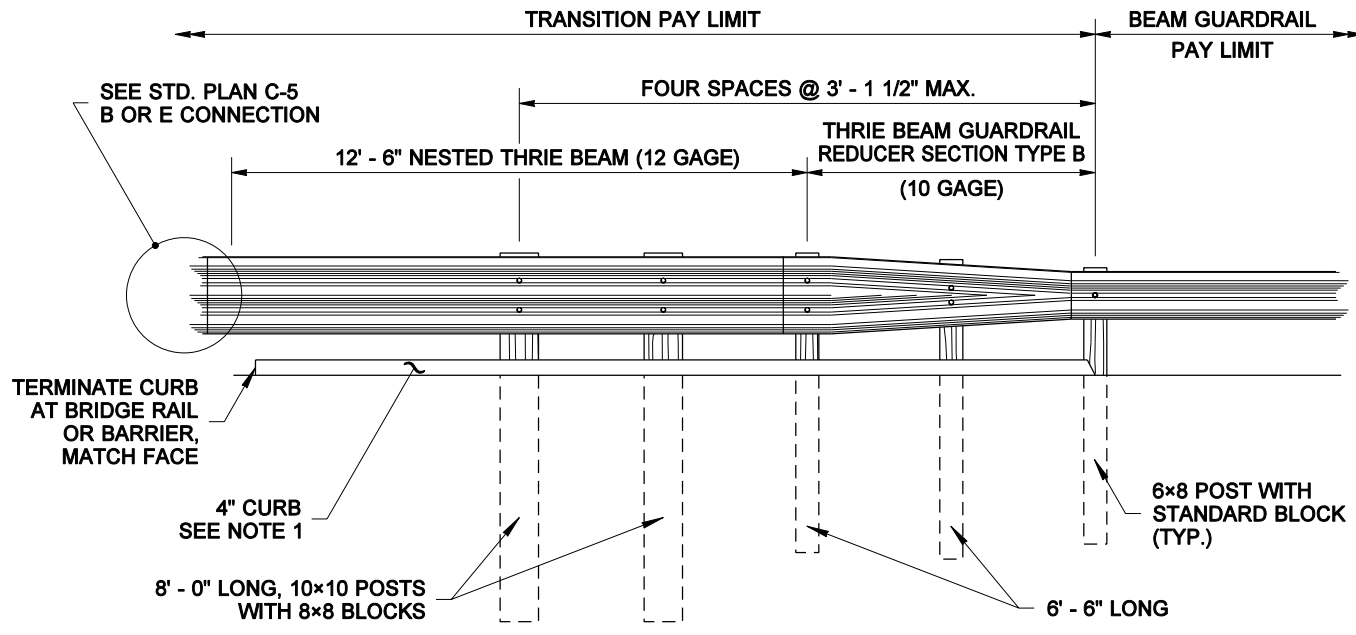
09/2003	CORRECTED REFERENCES TO NOTES.	MHG
DATE	REVISION	BY

NOTE

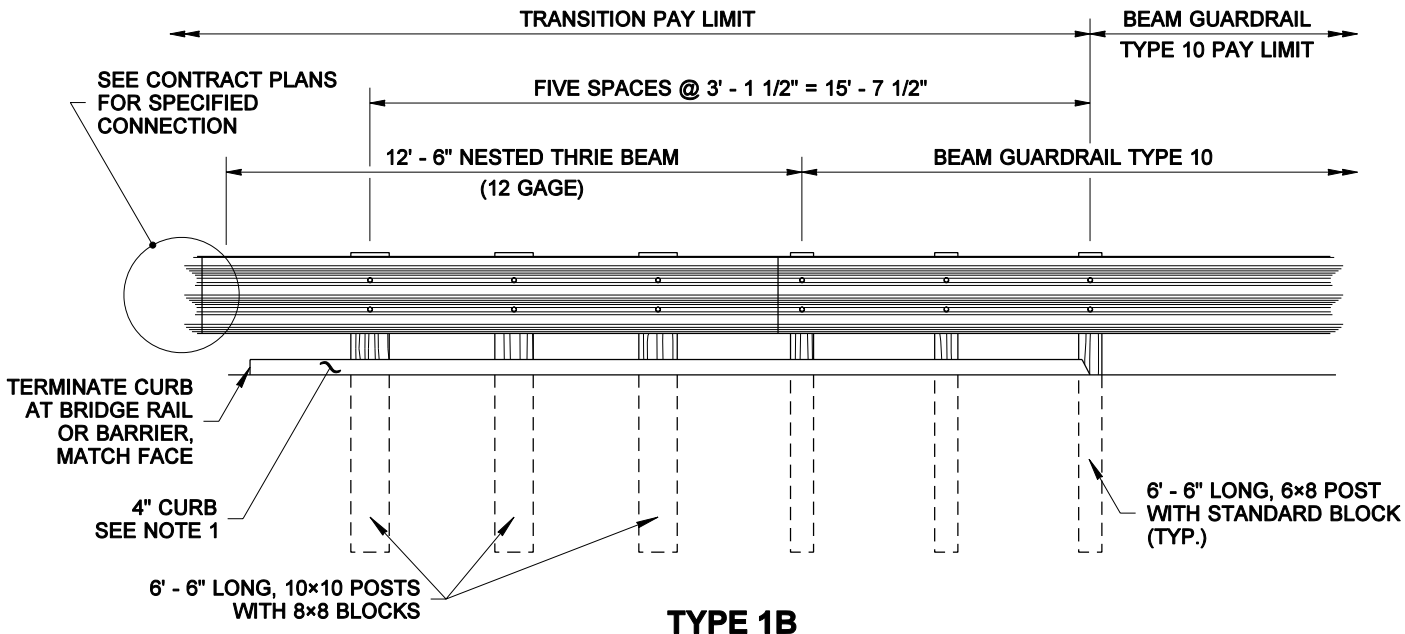
1. Install Type 2 Asphalt Extruded Curb at face of Guardrail.
See Standard Plan F-2b.



TYPE 1



TYPE 1A



TYPE 1B



EXPIRES JULY 24, 2004

**GUARDRAIL
TRANSITION SECTIONS
STANDARD PLAN C-3**

SHEET 1 OF 1 SHEET

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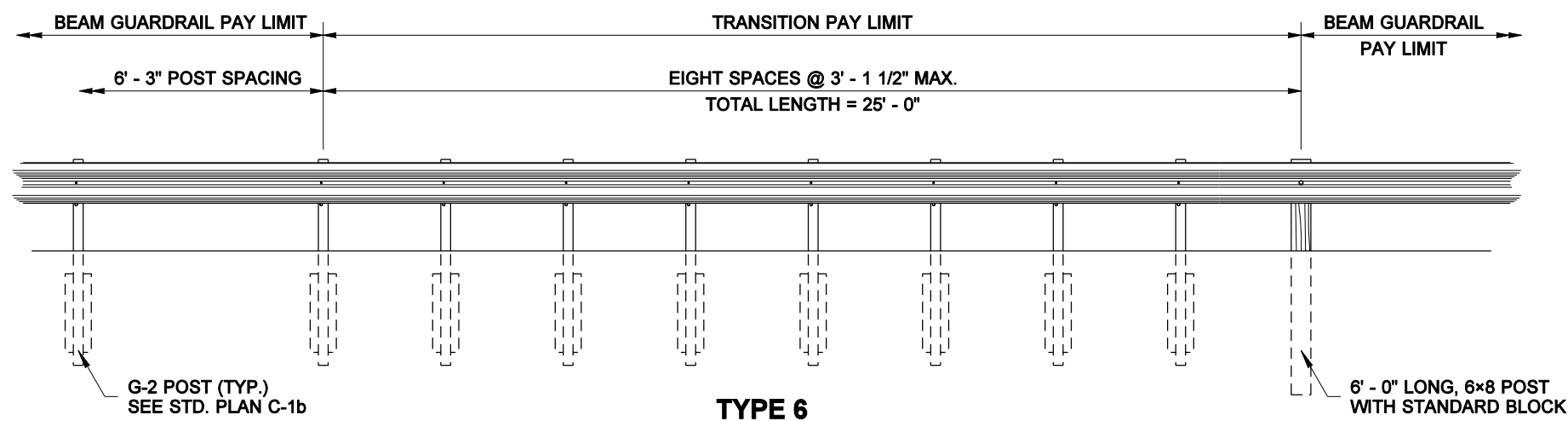
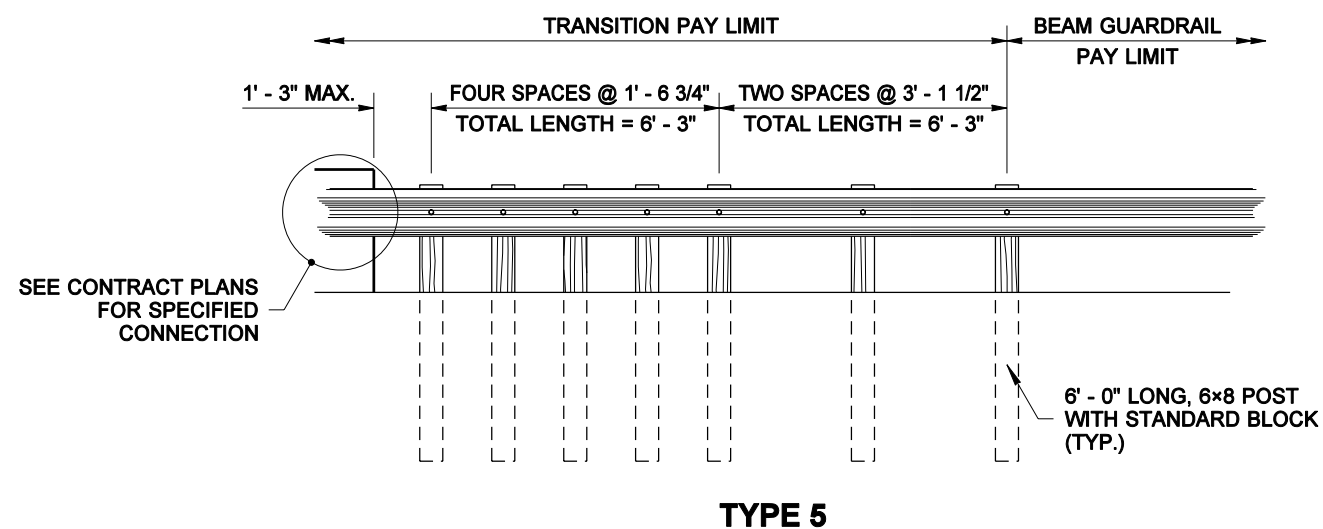
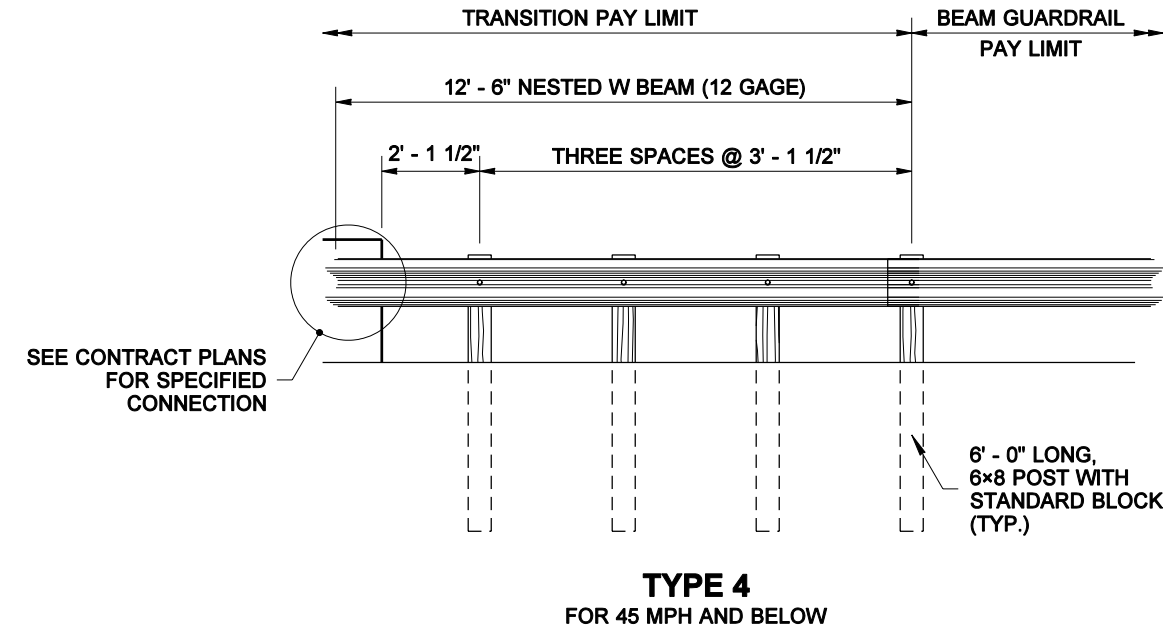
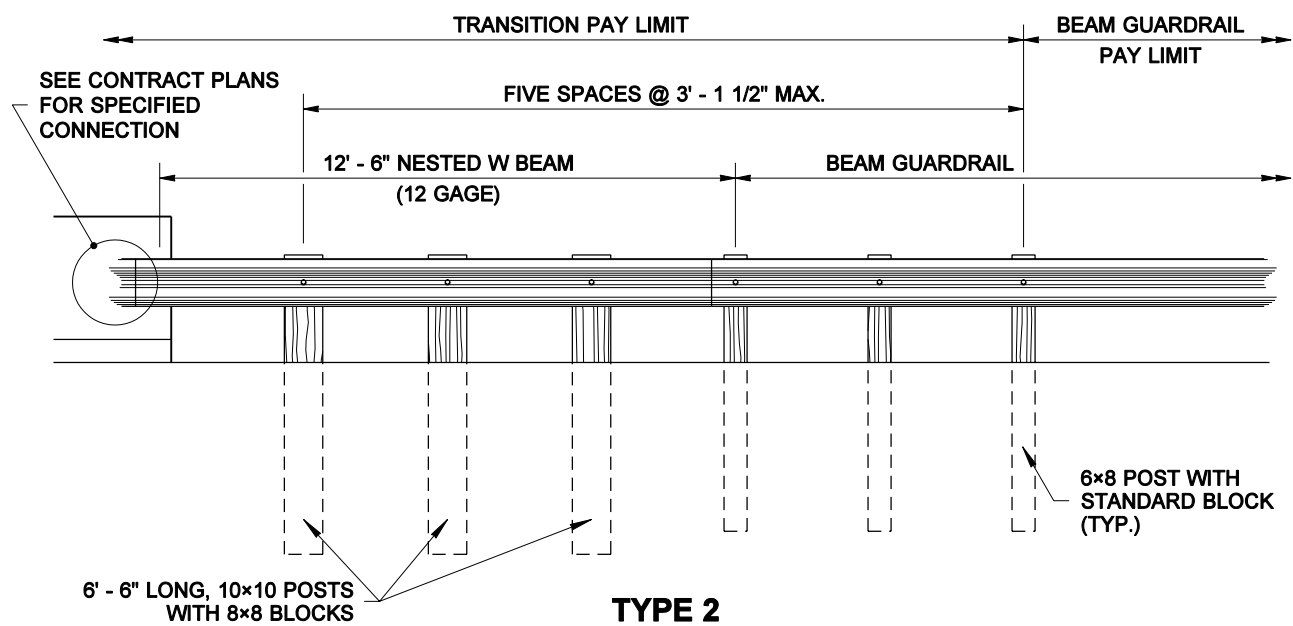
STATE DESIGN ENGINEER

DATE



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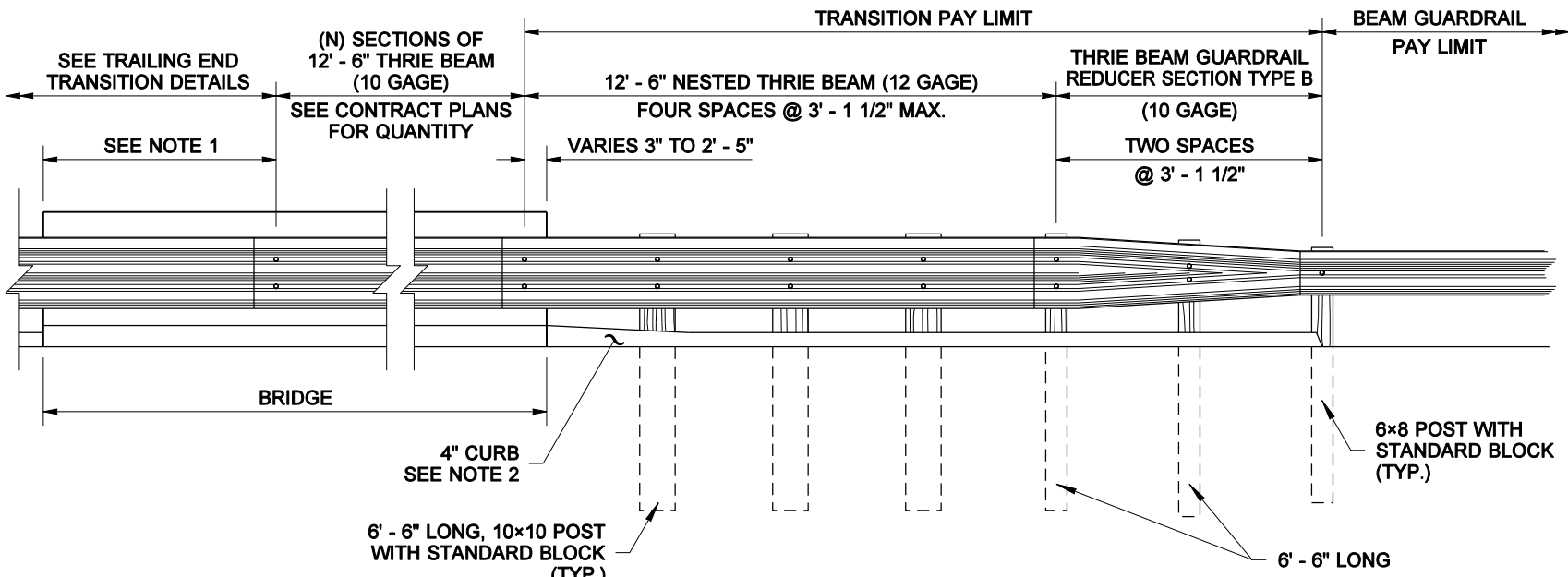
**GUARDRAIL
TRANSITION SECTIONS
STANDARD PLAN C-3a**

SHEET 1 OF 1 SHEET

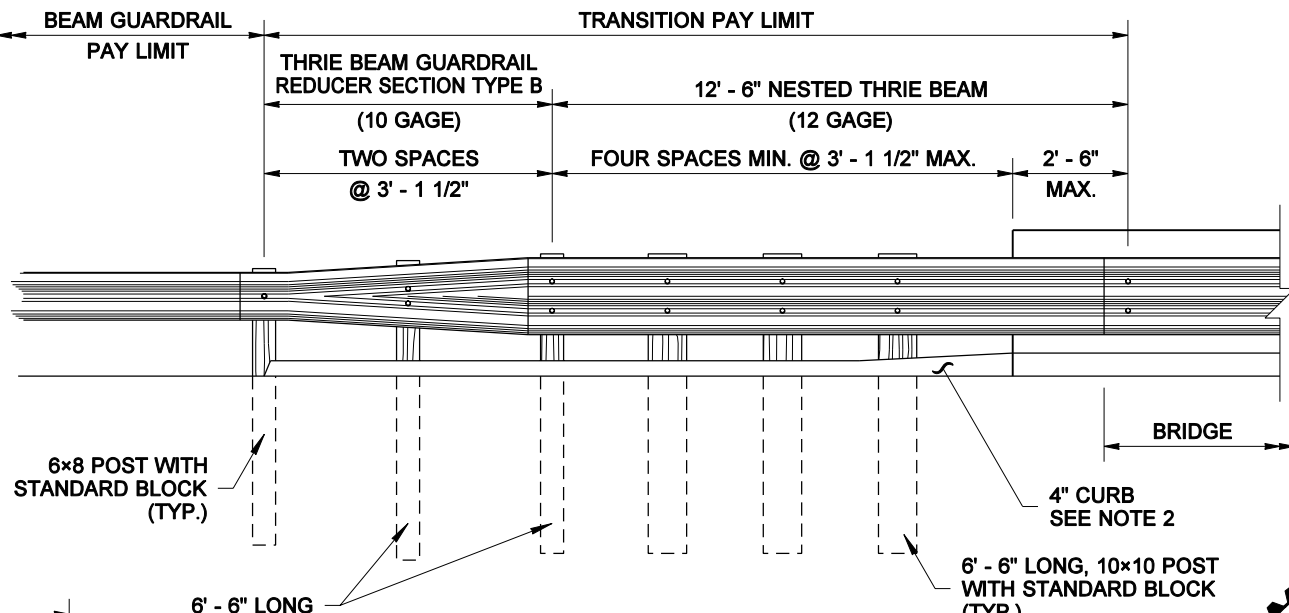
APPROVED FOR PUBLICATION

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

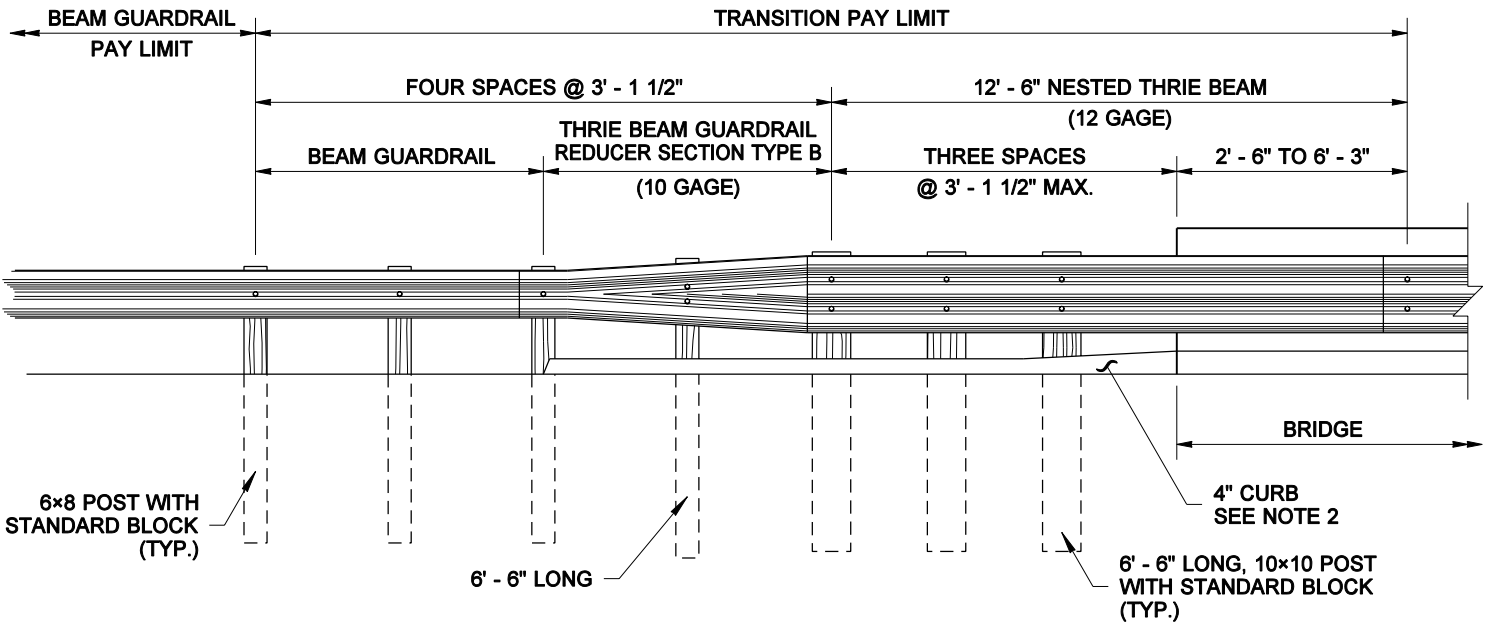




APPROACH END TYPE 10
THRIE BEAM INSTALLED AT FACE OF BRIDGE CURB



TRAILING END TYPE 11
THRIE BEAM INSTALLED AT FACE OF BRIDGE CURB



TRAILING END TYPE 12
THRIE BEAM INSTALLED AT FACE OF BRIDGE CURB

NOTES

1. If the distance from the end of the bridge to the end of the thrie beam bridge rail section exceeds 6'-3" using 12'-6" thrie beam sections, add a 6'-3" section of thrie beam bridge rail to reduce the length to less than 6'-3".
2. When thrie beam is installed at the face of the bridge curb, install a Type 2 Asphalt Extruded Curb at face of Guardrail. See Standard Plan F-2b. Match the height of existing bridge curb with a 20:1 transition.
3. When thrie beam is installed at the face of rigid bridge rail, an ACP ramp is required from the roadway surface to the top of the bridge curb or sidewalk. The slope of the ramp shall be 20:1 or flatter.



EXPIRES JULY 24, 2004

**GUARDRAIL
TRANSITION SECTIONS
STANDARD PLAN C-3b**

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 10-31-03

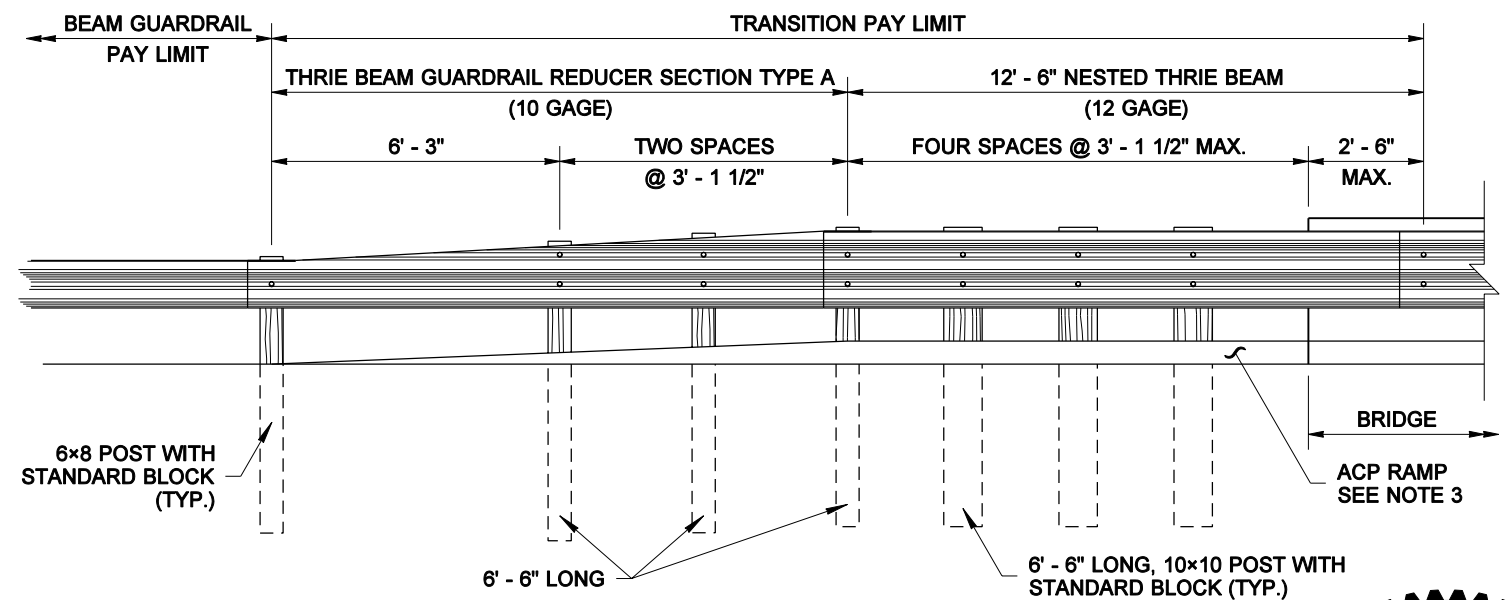
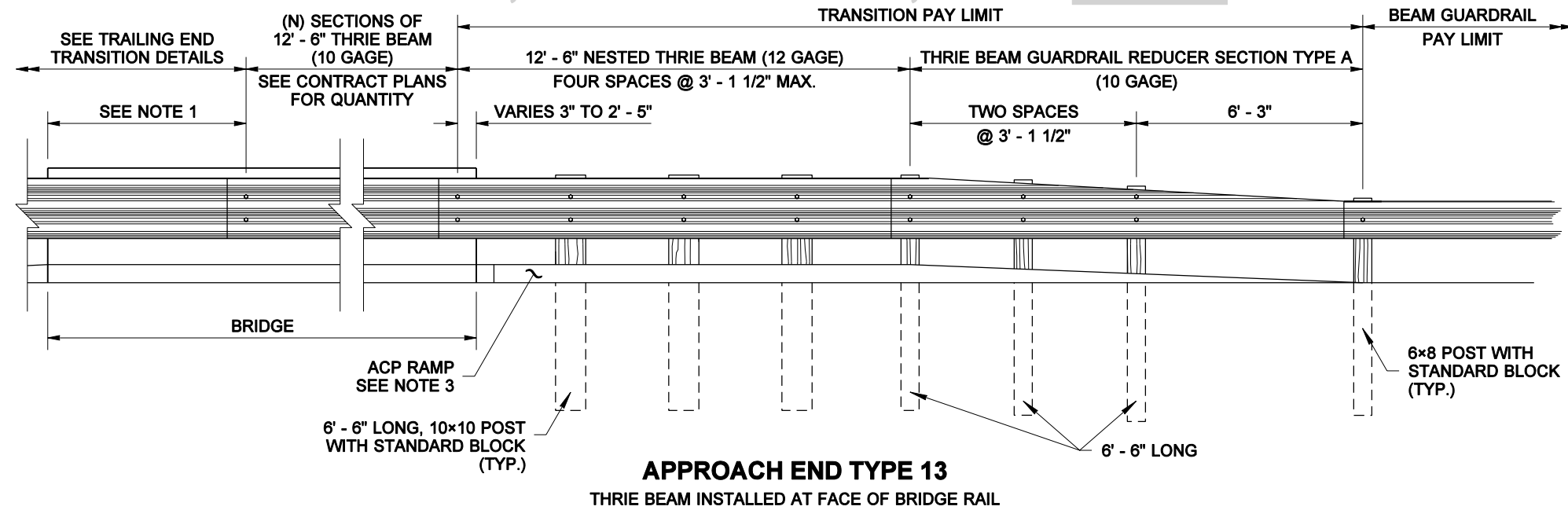
STATE DESIGN ENGINEER

DATE



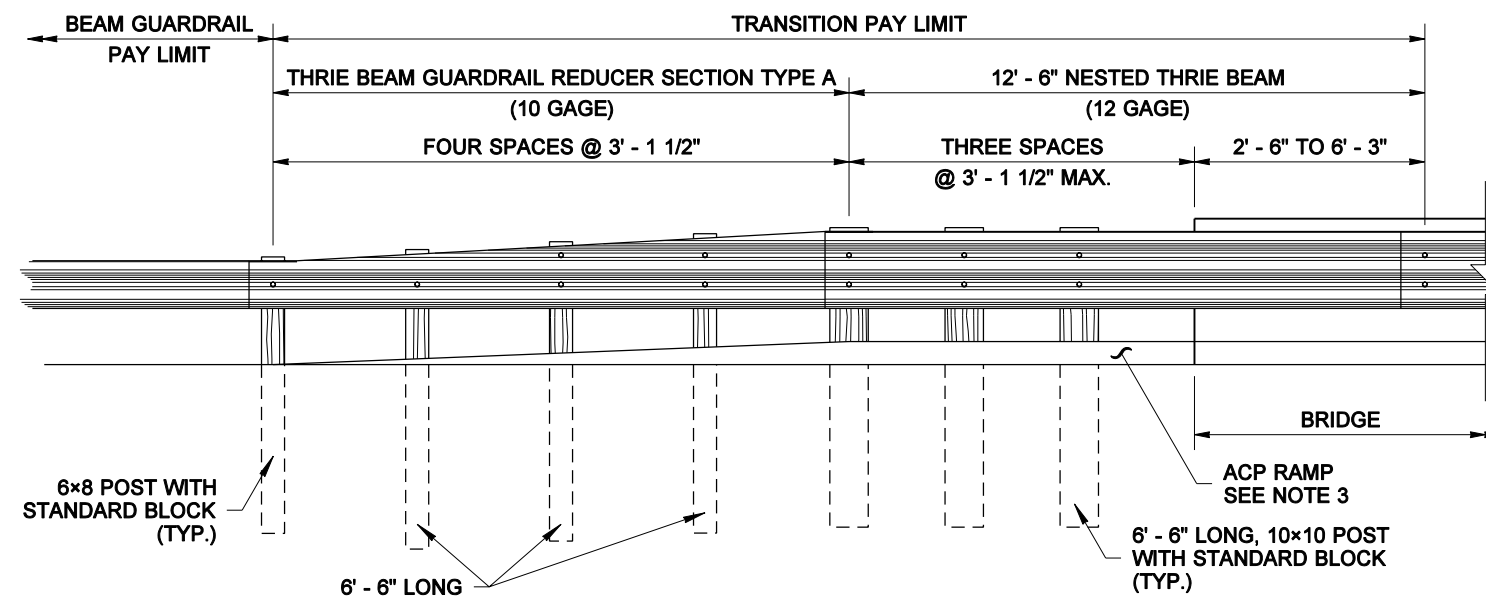
Washington State Department of Transportation

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TRAILING END TYPE 14

THRIE BEAM INSTALLED AT FACE OF BRIDGE RAIL



TRAILING END TYPE 15

THRIE BEAM INSTALLED AT FACE OF BRIDGE RAIL



EXPIRES JULY 24, 2004

**GUARDRAIL
TRANSITION SECTIONS
STANDARD PLAN C-3b**

SHEET 2 OF 2 SHEETS

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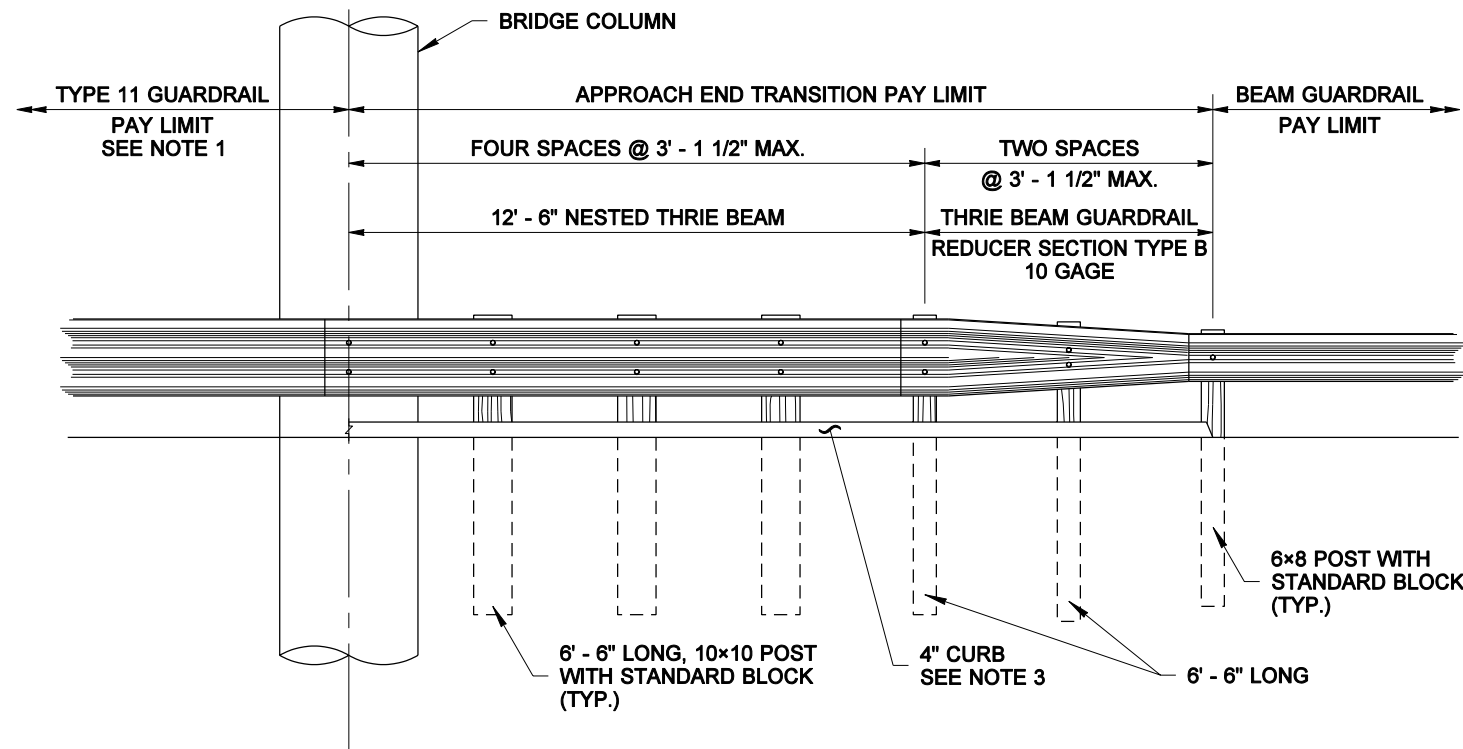
STATE DESIGN ENGINEER

DATE

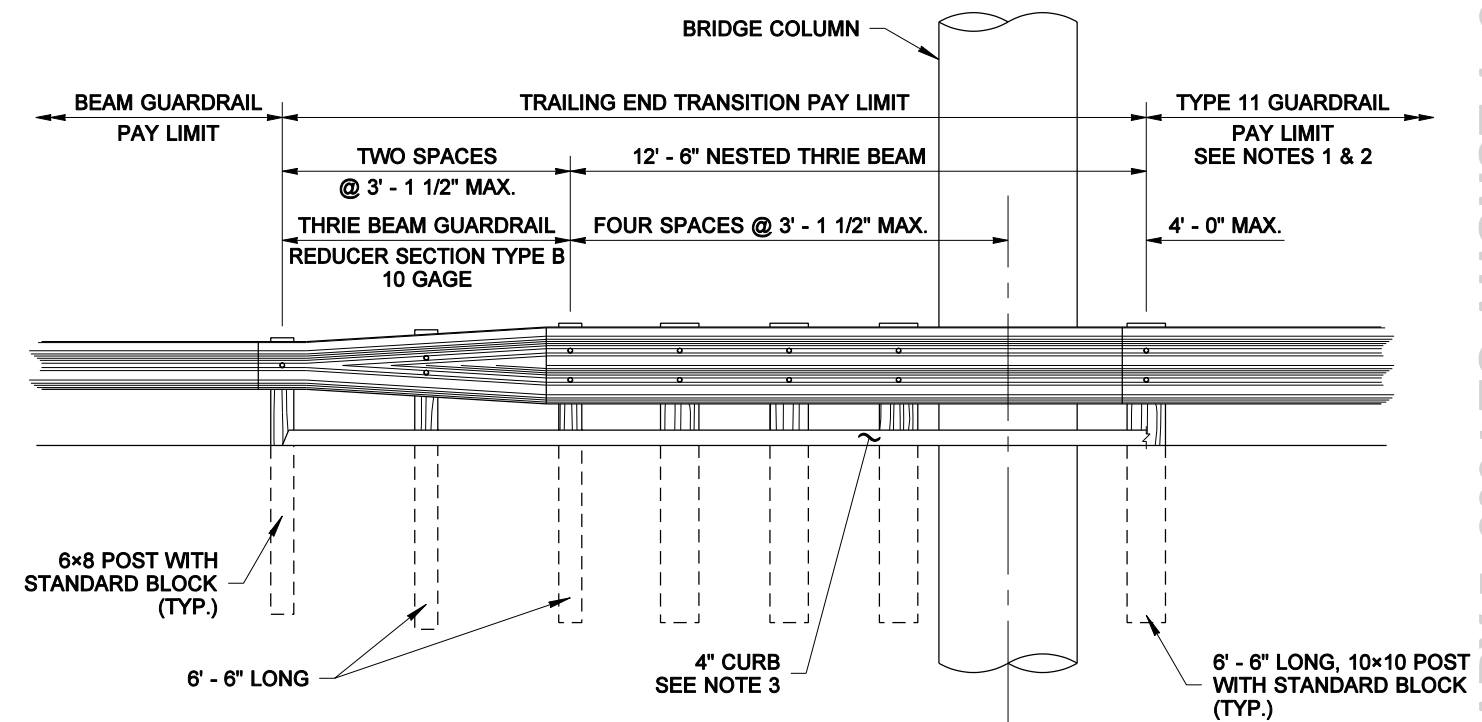


Washington State Department of Transportation

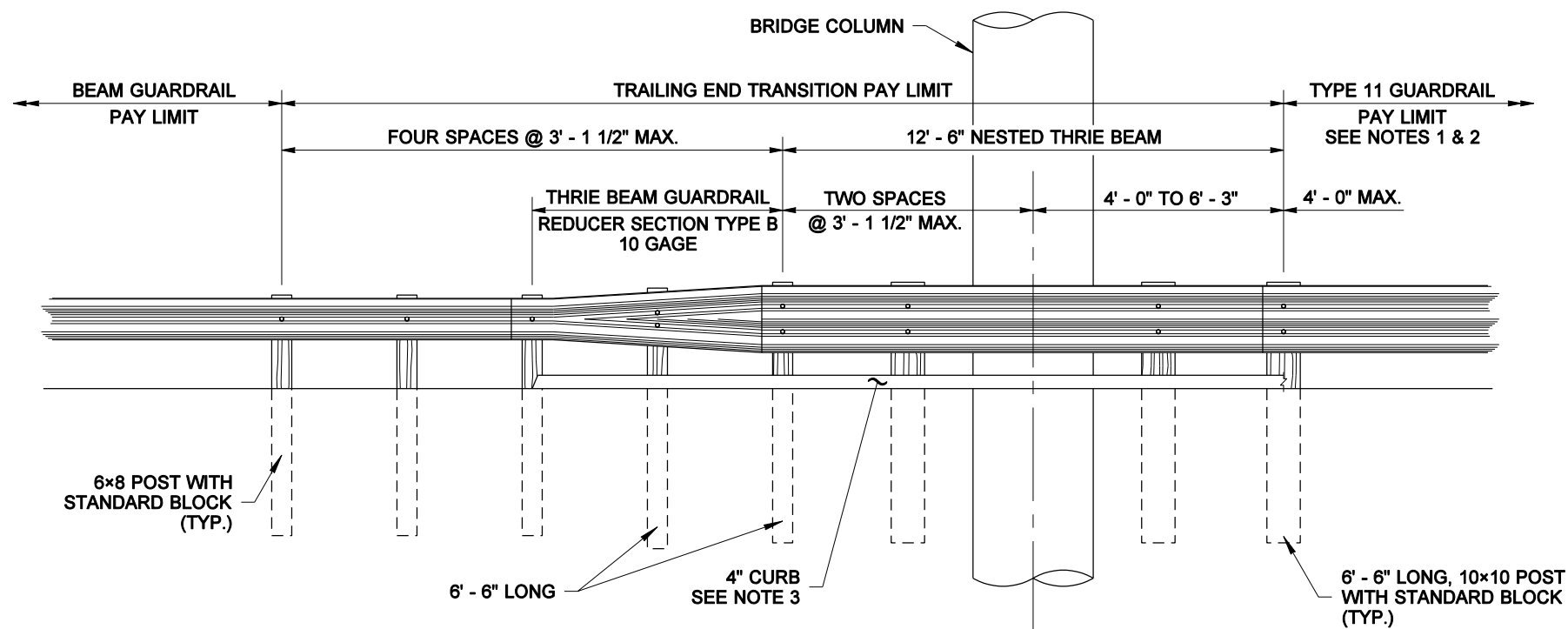
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APPROACH END TYPE 16



TRAILING END TYPE 17



TRAILING END TYPE 18

NOTES

1. See Contract for the number of thrie beam sections for Type 11 Guardrail.
2. If the distance from the end of the Type 11 Guardrail to column/structure exceeds 6'-3" using 12'-6" thrie beam sections, add a 6'-3" nested section of thrie beam to reduce the distance to less than 6'-3".
3. Install Type 2 Asphalt Extruded Curb at face of Guardrail. See Standard Plan F-2b.



EXPIRES JULY 24, 2004

**GUARDRAIL
TRANSITION SECTIONS
STANDARD PLAN C-3c**

SHEET 1 OF 1 SHEET

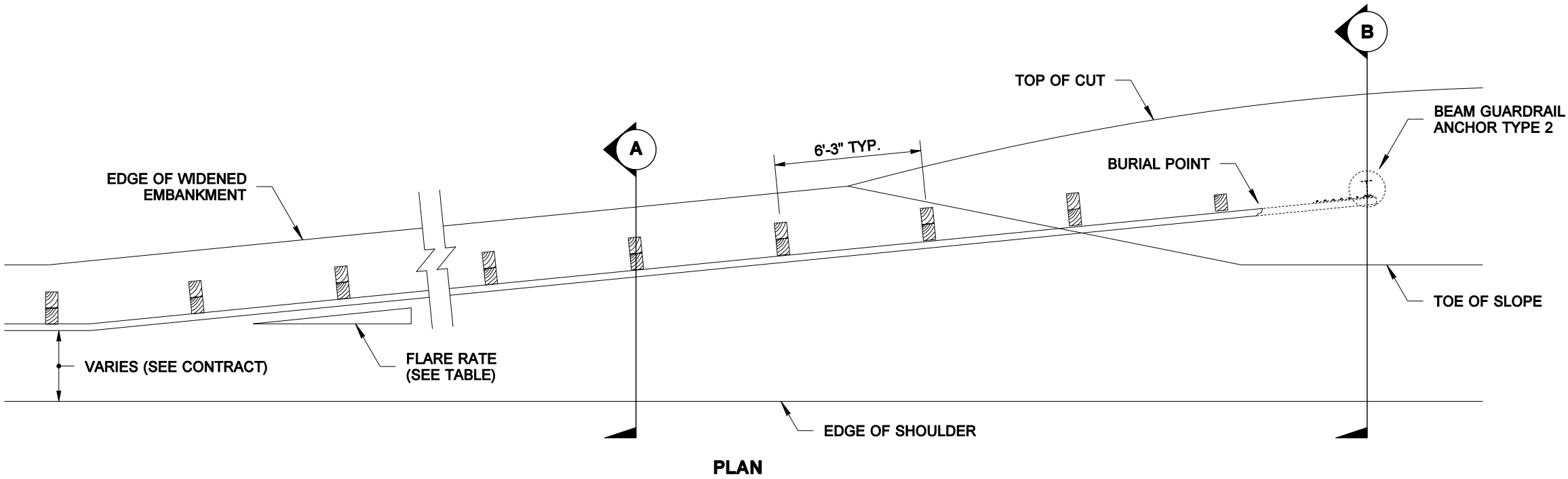
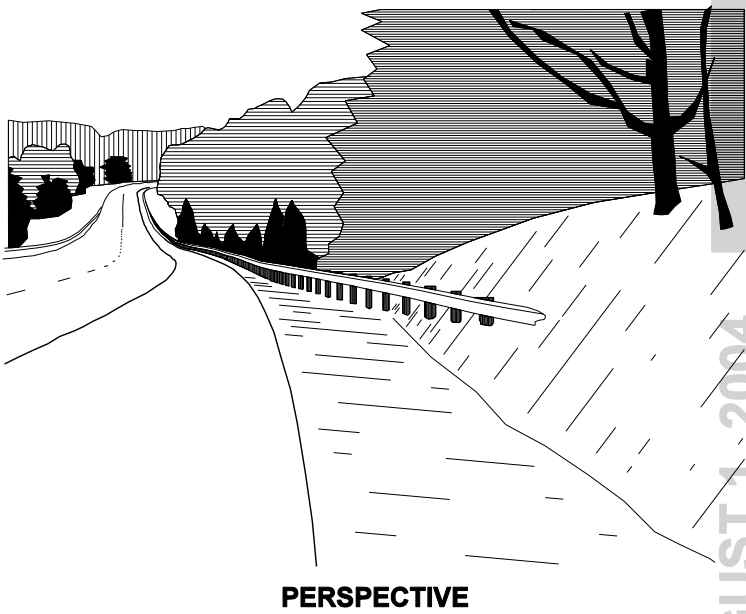
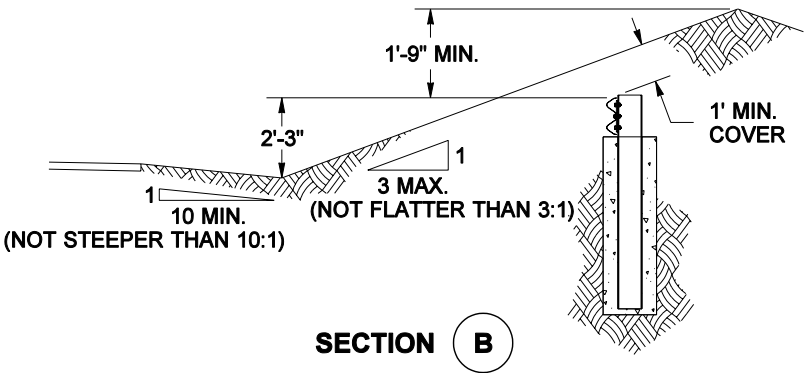
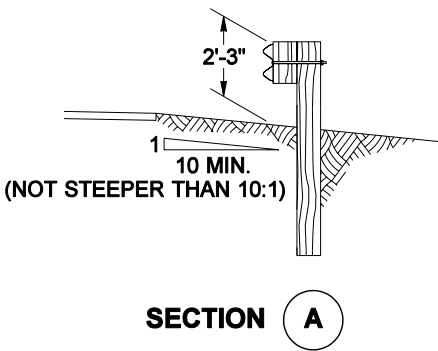
APPROVED FOR PUBLICATION

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

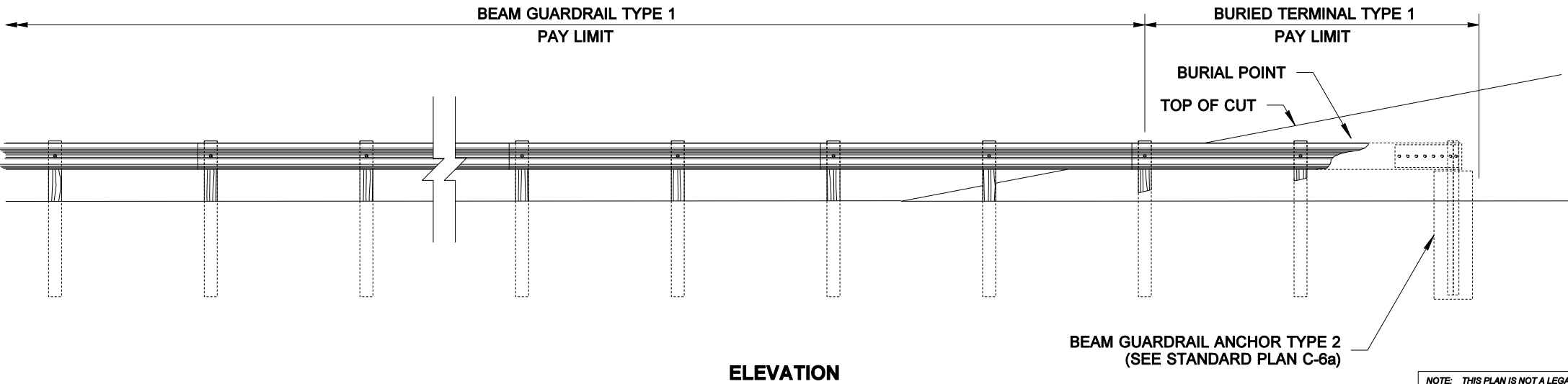


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FLARE RATE TABLE	
RATE	POSTED SPEED (mph)
15 : 1	70
14 : 1	60
12 : 1	55
11 : 1	50
10 : 1	45
9 : 1	40 or less

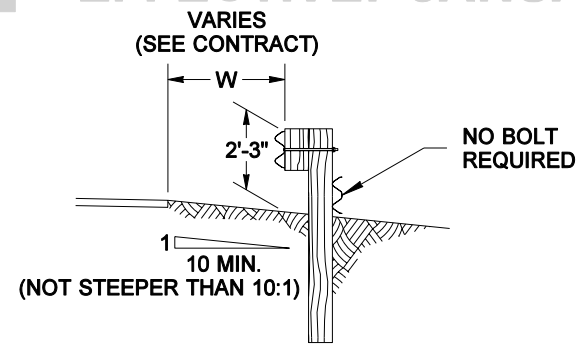


EXPIRES MAY 3, 2002

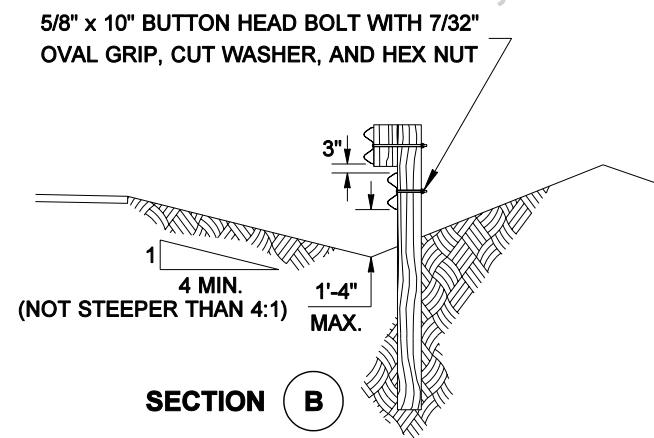
**BEAM GUARDRAIL
BURIED TERMINAL TYPE 1
STANDARD PLAN C-4**

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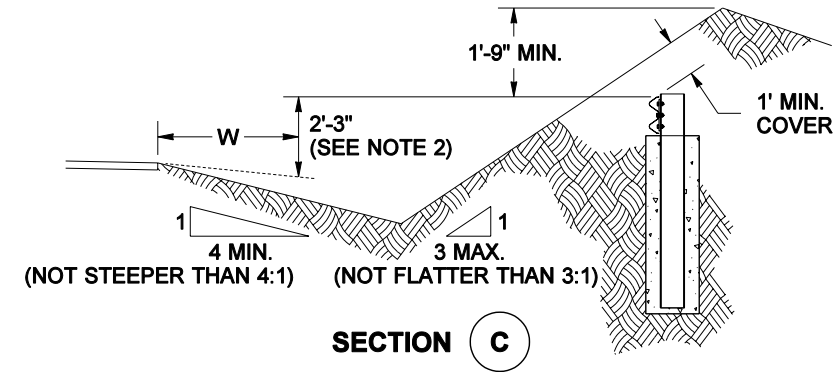
APPROVED FOR PUBLICATION
Clifford E. Mansfield 07-13-01
STATE DESIGN ENGINEER DATE
Washington State Department of Transportation



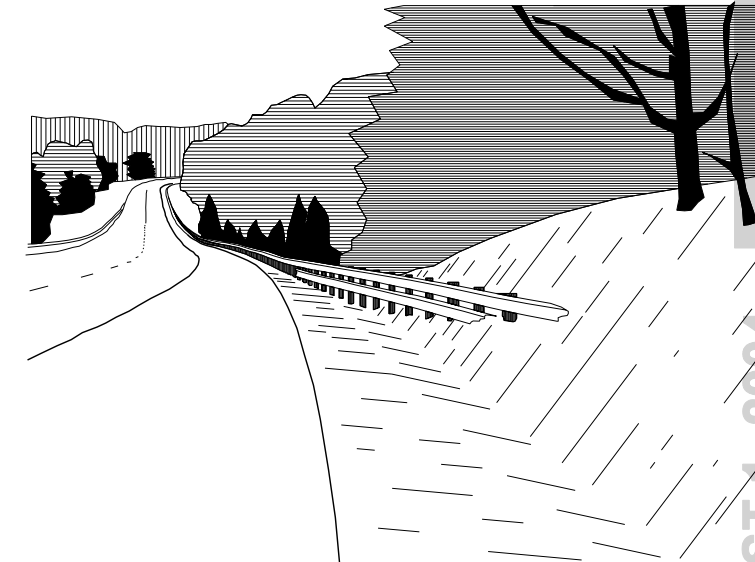
SECTION A



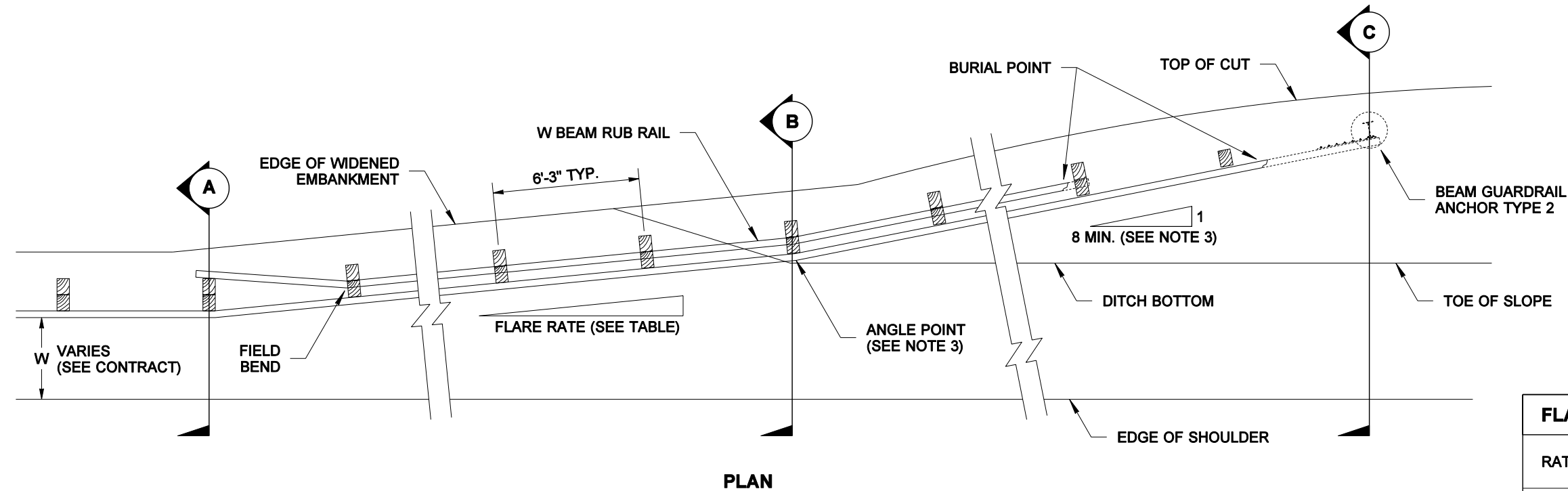
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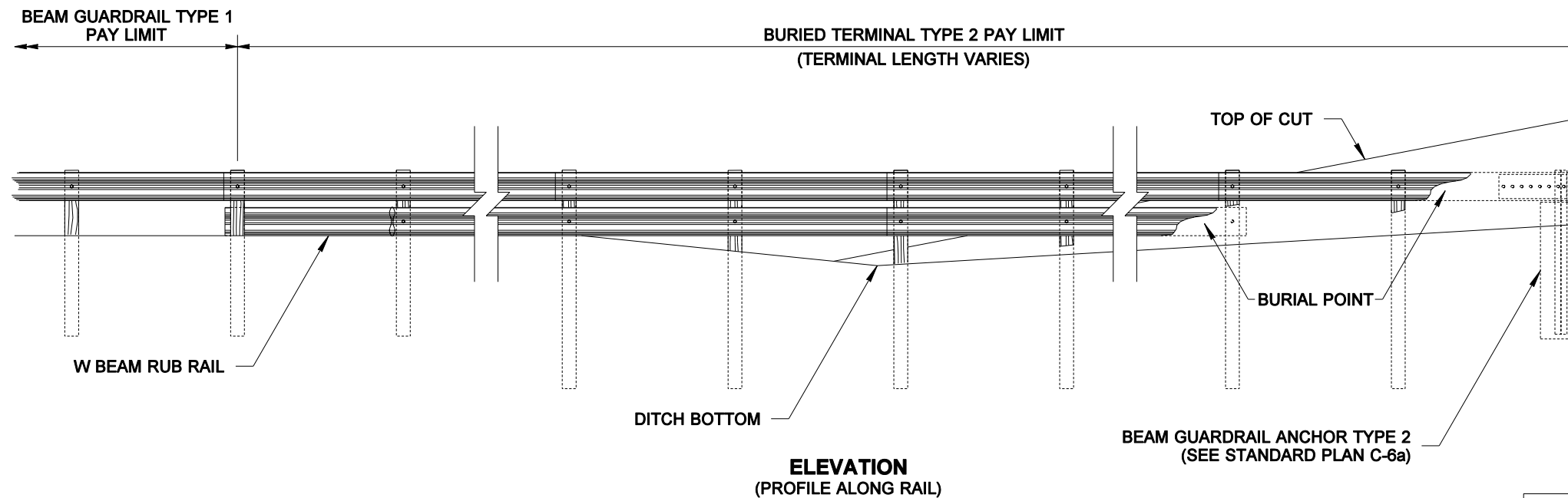
SECTION C



PERSPECTIVE



PLAN

ELEVATION
(PROFILE ALONG RAIL)

FLARE RATE TABLE	
RATE	POSTED SPEED (mph)
15 : 1	70
14 : 1	60
12 : 1	55
11 : 1	50
10 : 1	45
9 : 1	40 or less



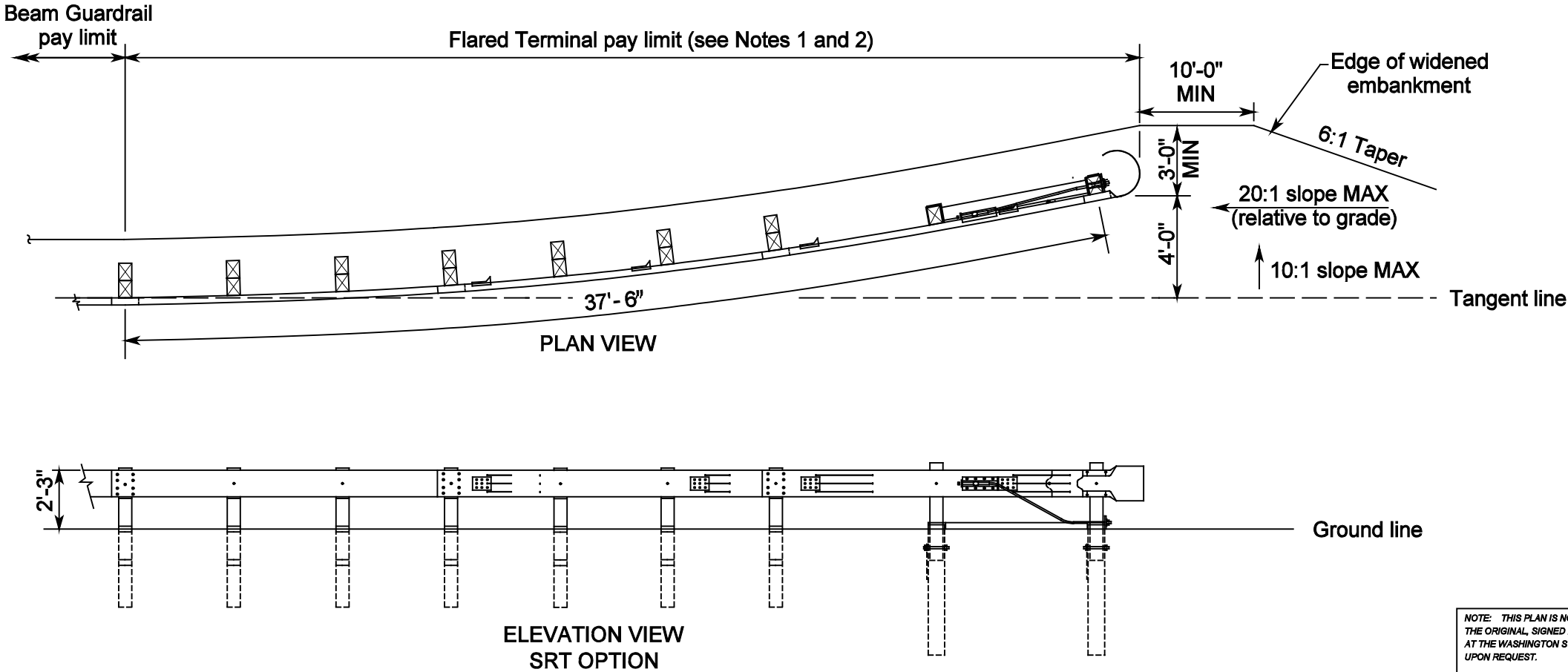
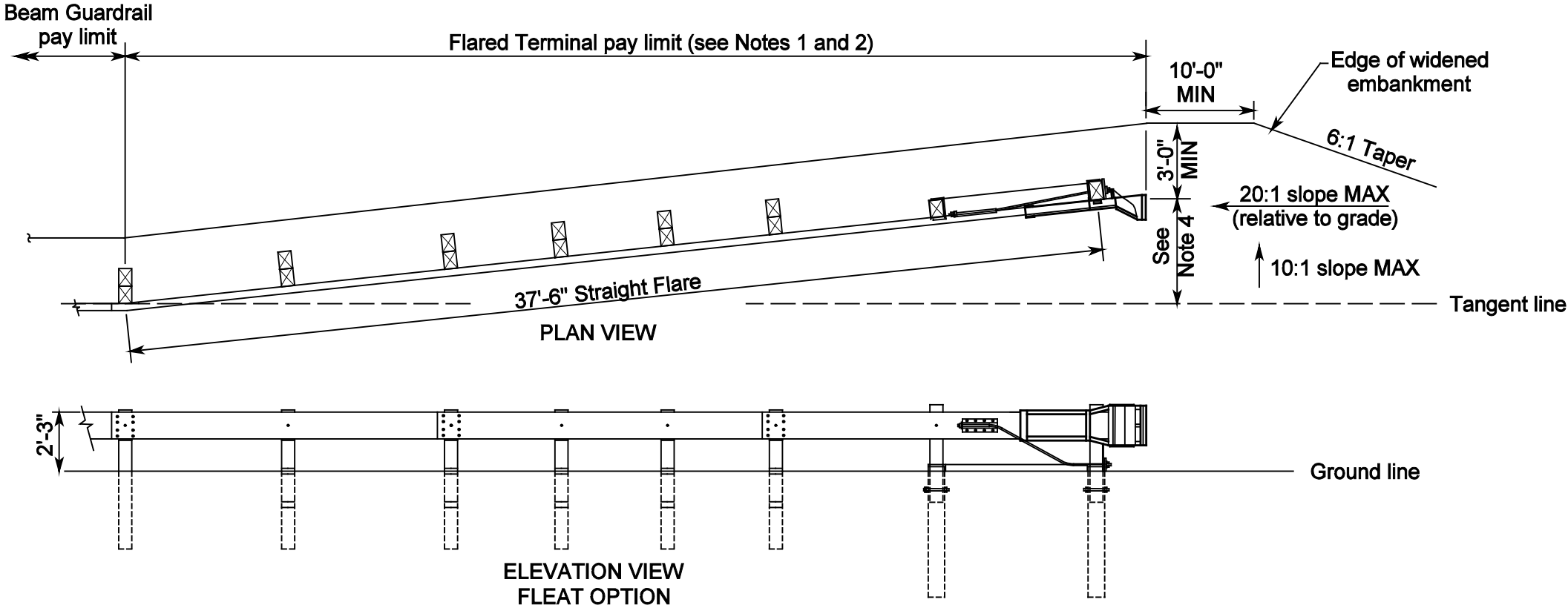
BEAM GUARDRAIL BURIED TERMINAL TYPE 2 STANDARD PLAN C-4a

APPROVED FOR PUBLICATION

Clifford E. Mansfield
STATE DESIGN ENGINEER07-13-01
DATE

Washington State Department of Transportation

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NOTES

1. Unless otherwise indicated in the contract, the SRT - 350 (12.5, 8 Post) as manufactured by Trinity Industries, Inc, or a FLEAT 350 as manufactured by Road Systems Inc, shall be installed per manufacturer's recommendations. If specified in the Contract, the FLEAT TL2 as manufactured by Road Systems, Inc. shall be installed per manufacturers recommendations.
2. Where terminal is placed on a curve, and post offsets would result in the rail encroaching onto the shoulder (e.g., the inside of a curve), the posts shall be installed so that the face of the rail is at the edge of the shoulder.
3. When snow load post washers and snow load rail washers are called for in the contract, the snow load rail washers must be omitted within the terminal limits.
4. Offset distances:
FLEAT 350 - 4'-0"
FLEAT TL2 - 1'-8" (MIN)



EXPIRES MAY 3, 2002

**BEAM GUARDRAIL
FLARED TERMINAL
STANDARD PLAN C-4b**

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6/00	Revised Note 1 and SRT End Section.	TWS
DATE	REVISION	BY

APPROVED FOR PUBLICATION

Clifford E. Mansfield 06/23/00

DEPUTY STATE DESIGN ENGINEER

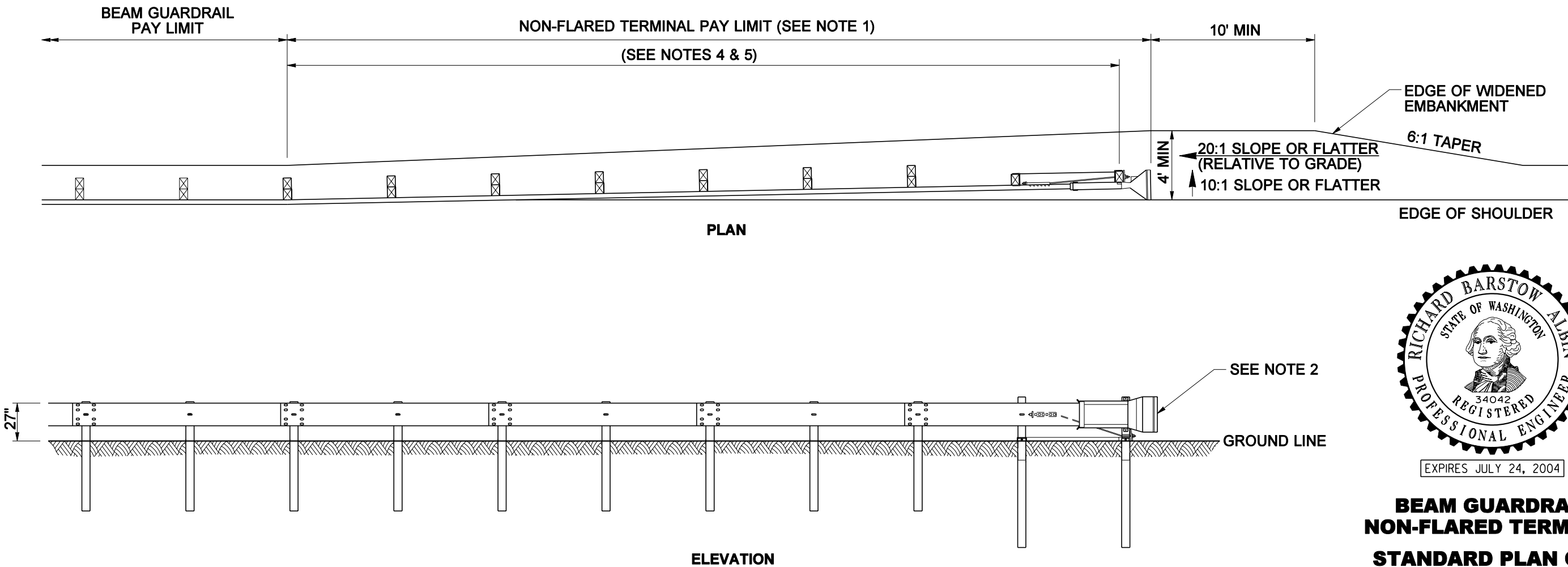
DATE



WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

NOTES

- 1. An ET-PLUS (TL3) as manufactured by Trinity Industries, Inc. or an SKT-350 as manufactured by Road Systems Inc. shall be installed according to manufacturer's recommendations. When a TL2 terminal is specified in the contract an ET-PLUS (TL2) as manufactured by Trinity Industries, Inc., or an SKT-TL2 as manufactured by Road Systems, Inc. shall be installed according to manufacturer's recommendations.
- 2. A reflectorized object marker shall be installed according to manufacturer's recommendations.
- 3. When snow load post washers and snow load rail washers are required by the contract, the snow load rail washers must not be installed within the terminal limits.
- 4. Terminal shall be installed at a taper, ensuring that end piece is entirely off shoulder.
- 5. Length for ET-PLUS (TL3) and SKT-350 is 50'. Length for ET-PLUS (TL2) and SKT-TL2 is 25'.



**BEAM GUARDRAIL
NON-FLARED TERMINAL
STANDARD PLAN C-4e**

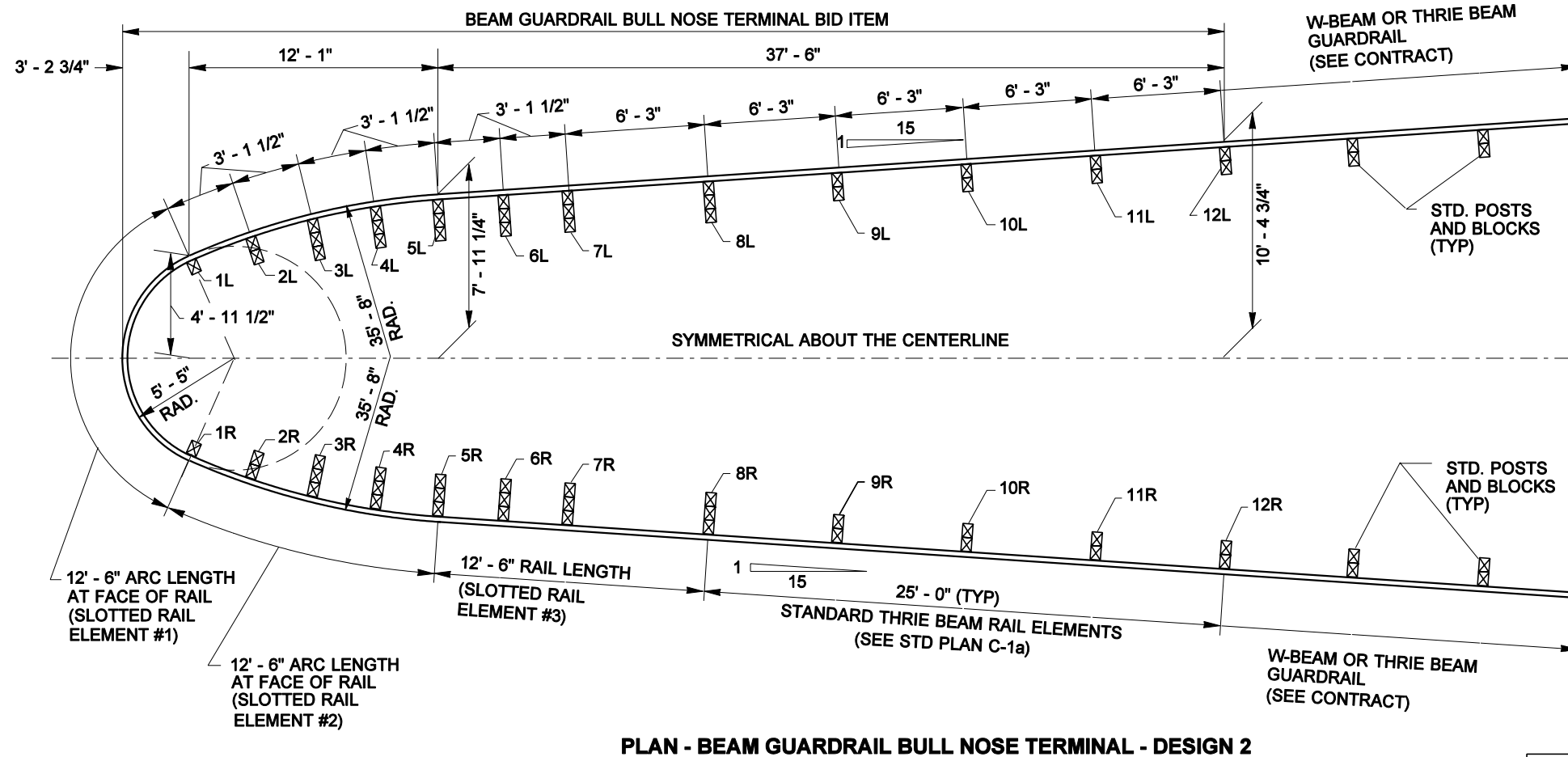
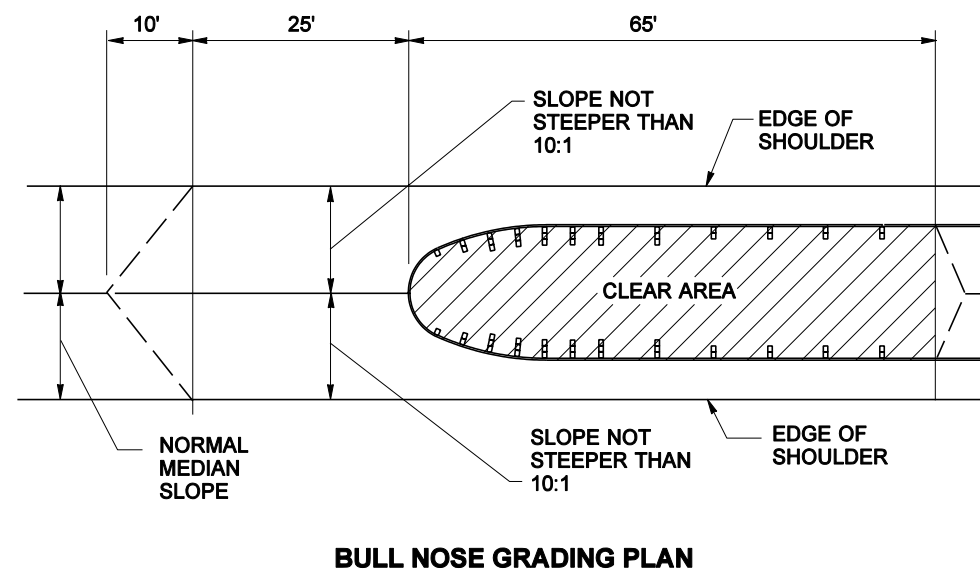
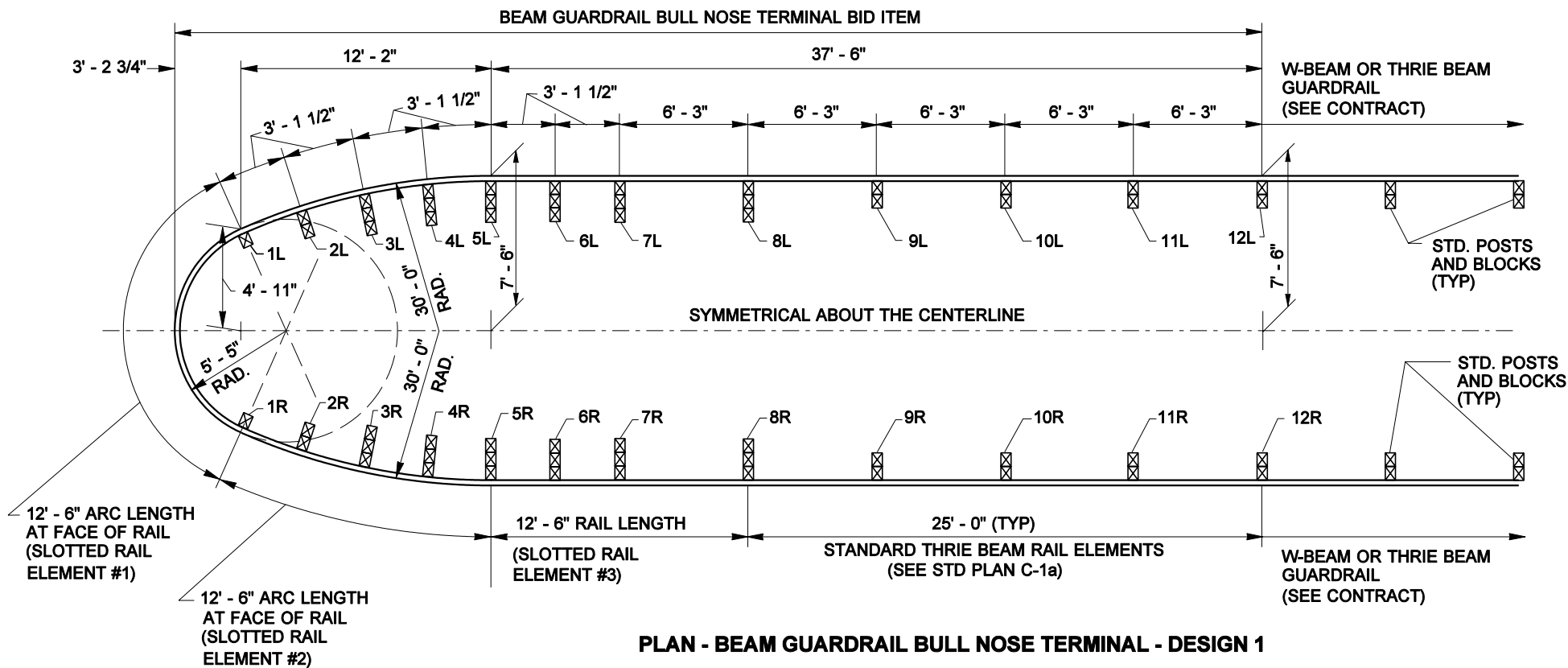
SHEET 1 OF 1 SHEET

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

APPROVED FOR PUBLICATION	
Harold J. Peterfeso	02-20-03
STATE DESIGN ENGINEER	DATE
Washington State Department of Transportation	

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004



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

SHEET 1 OF 4 SHEETS

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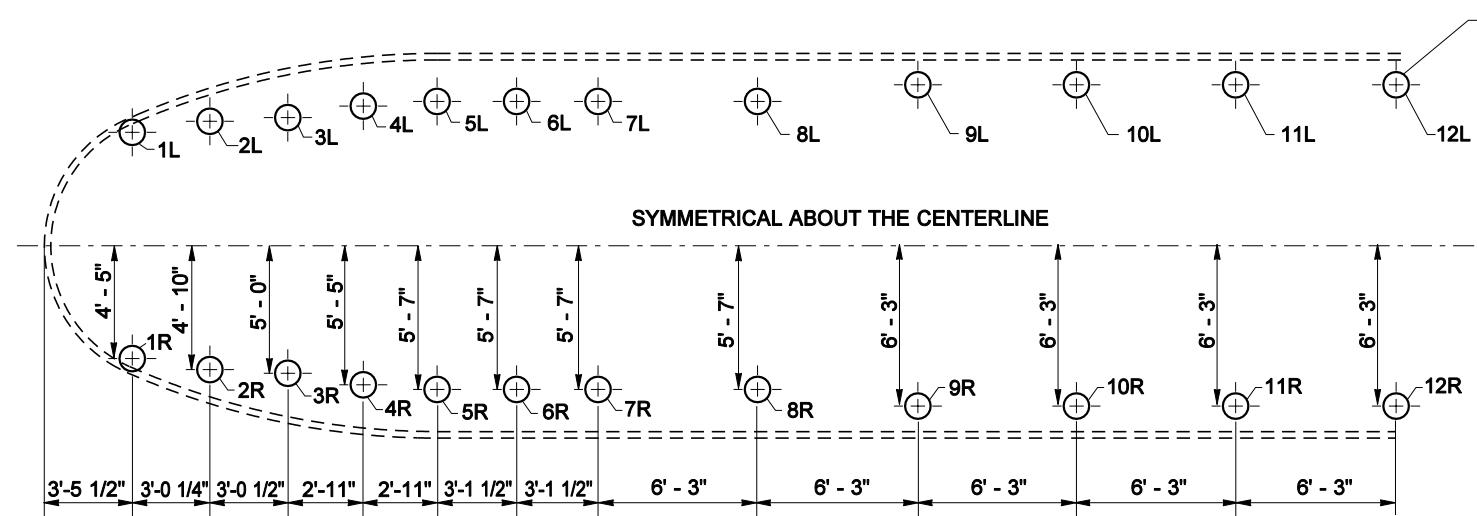
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DATE

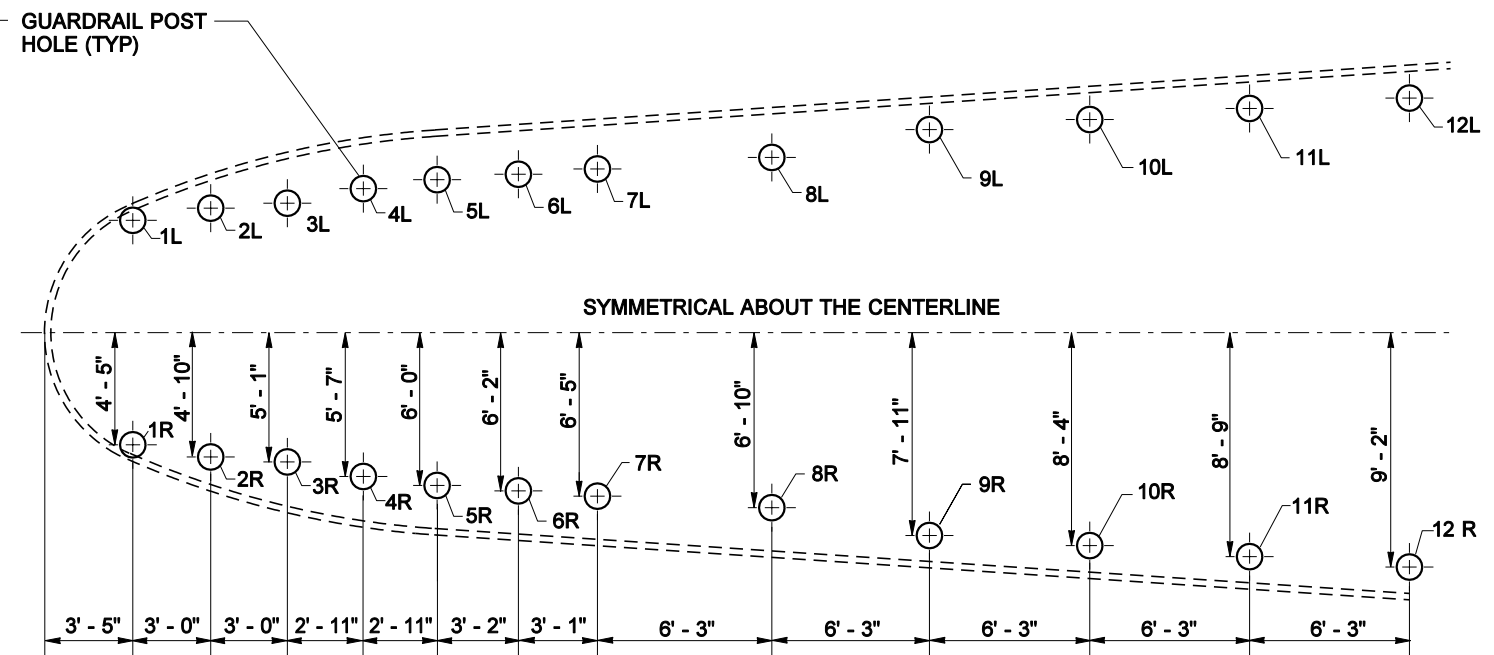


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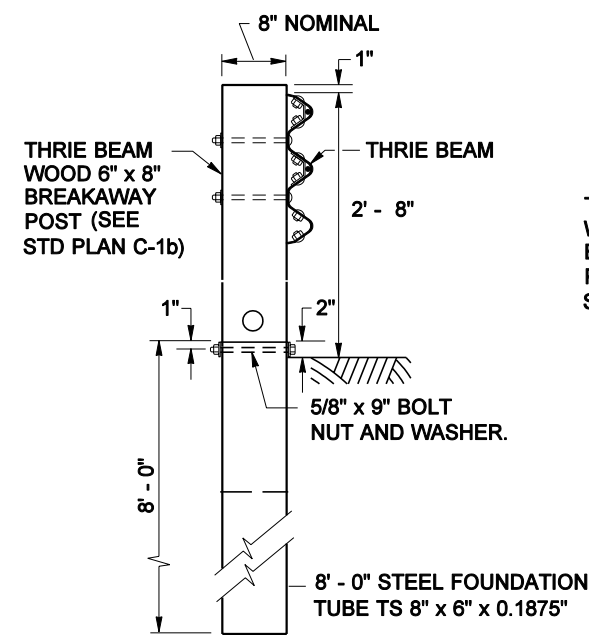
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DESIGN 1 - GUARDRAIL POST LAYOUT

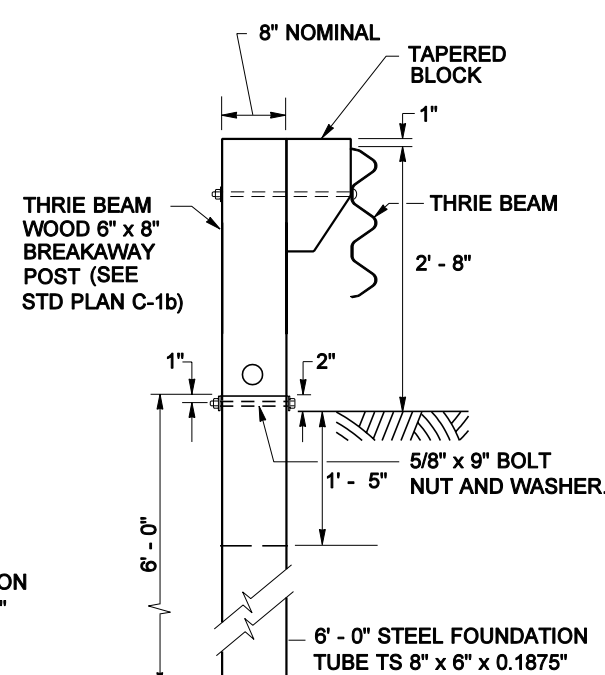


DESIGN 2 - GUARDRAIL POST LAYOUT

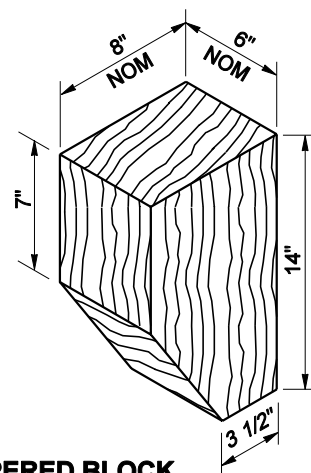


POST 1R & 1L

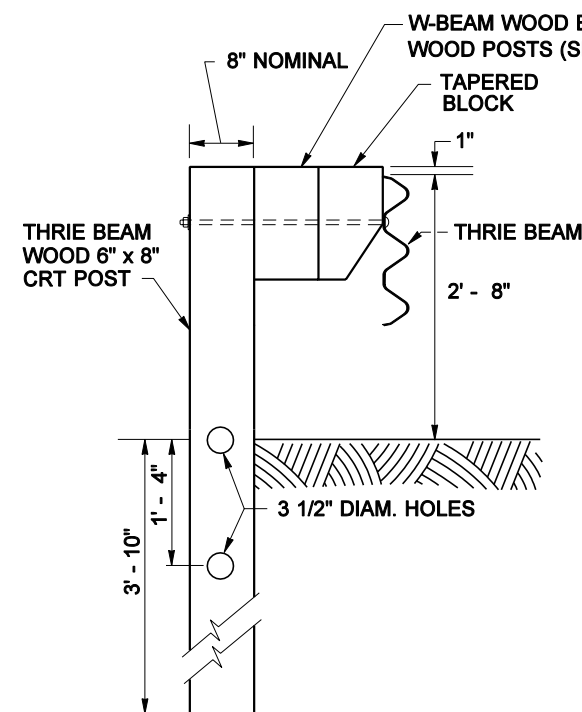
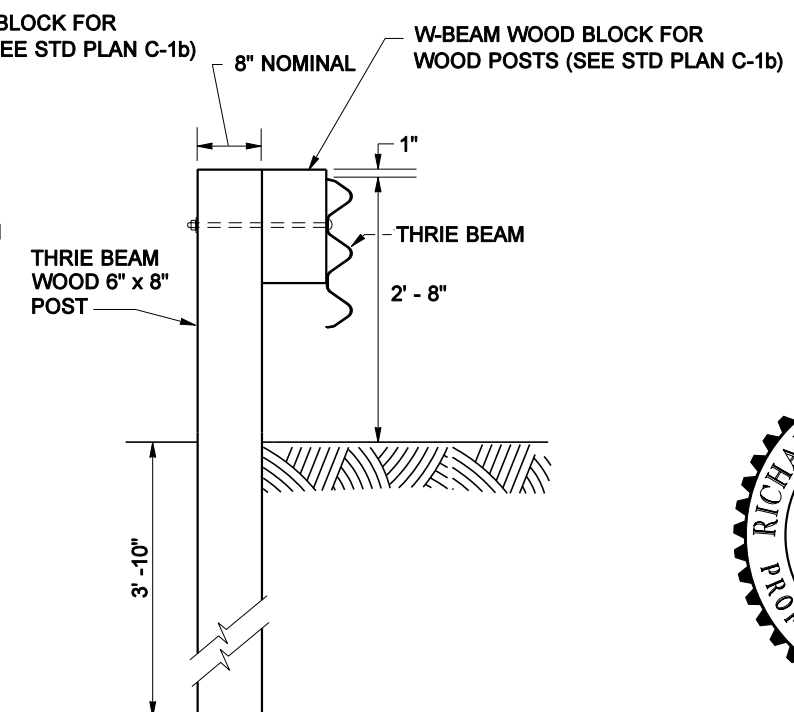
NOTE : CABLE BEARING PLATE NOT SHOWN



POST 2R & 2L



TAPERED BLOCK

POST 3R THRU 8R
3L THRU 8LPOST 9R THRU 12R
9L THRU 12L

EXPIRES JULY 24, 2004

BEAM GUARDRAIL BULL NOSE TERMINAL

STANDARD PLAN C-4f

SHEET 2 OF 4 SHEETS

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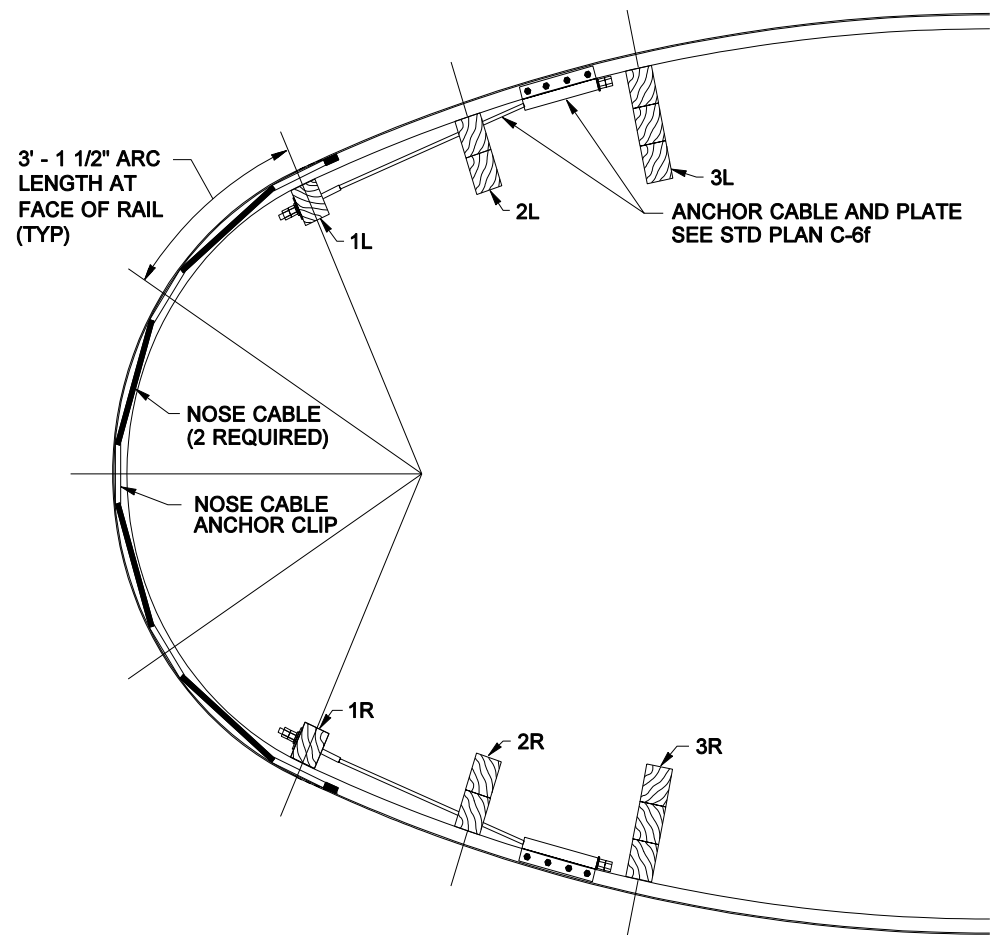
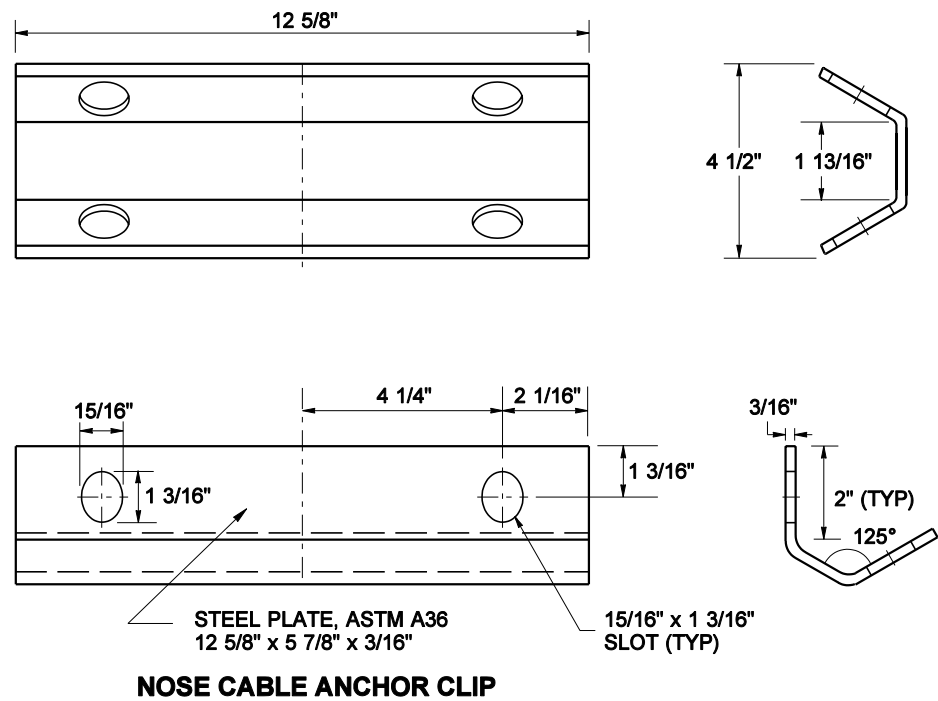
STATE DESIGN ENGINEER

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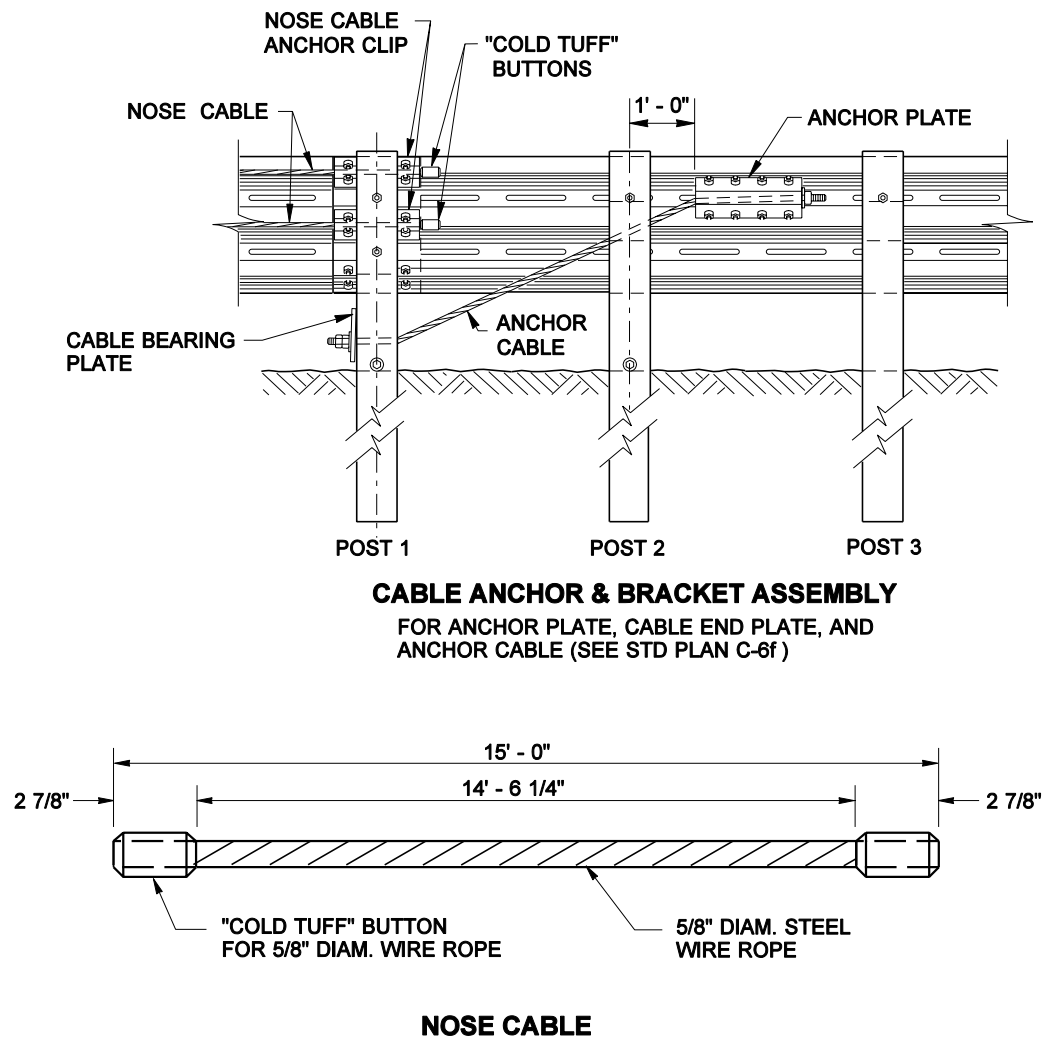
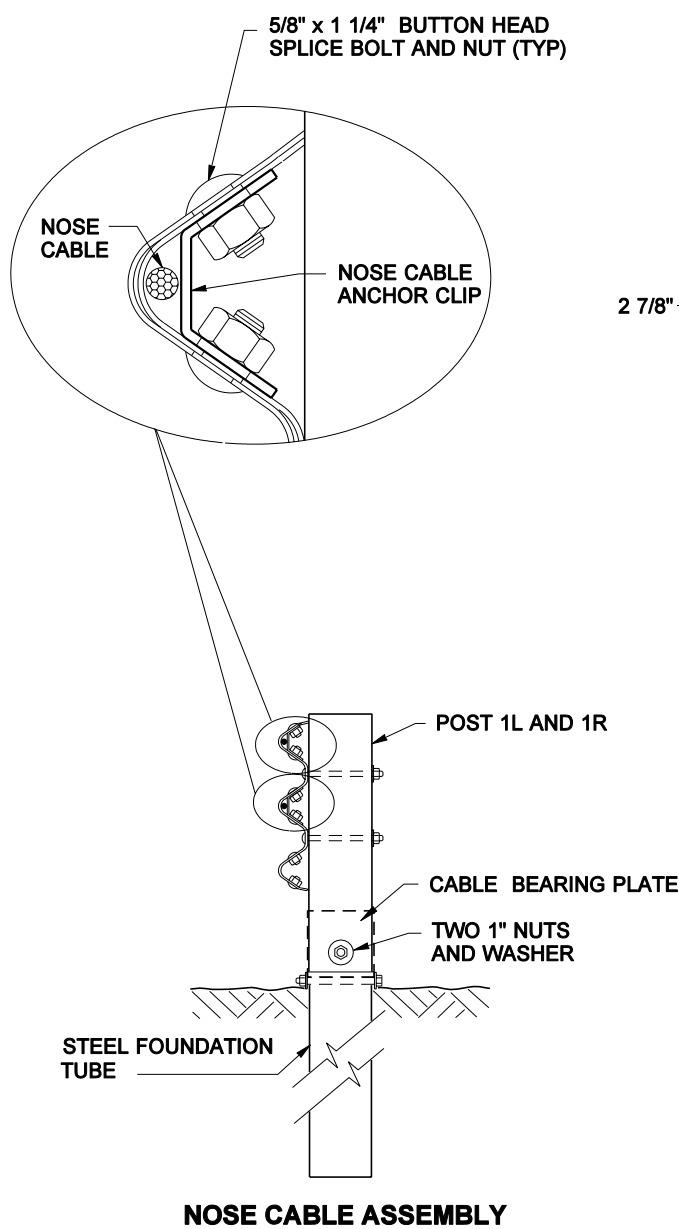


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PLAN - THREE BEAM NOSE



EXPIRES JULY 24, 2004

**BEAM GUARDRAIL
BULL NOSE TERMINAL**

STANDARD PLAN C-4f

SHEET 3 OF 4 SHEETS

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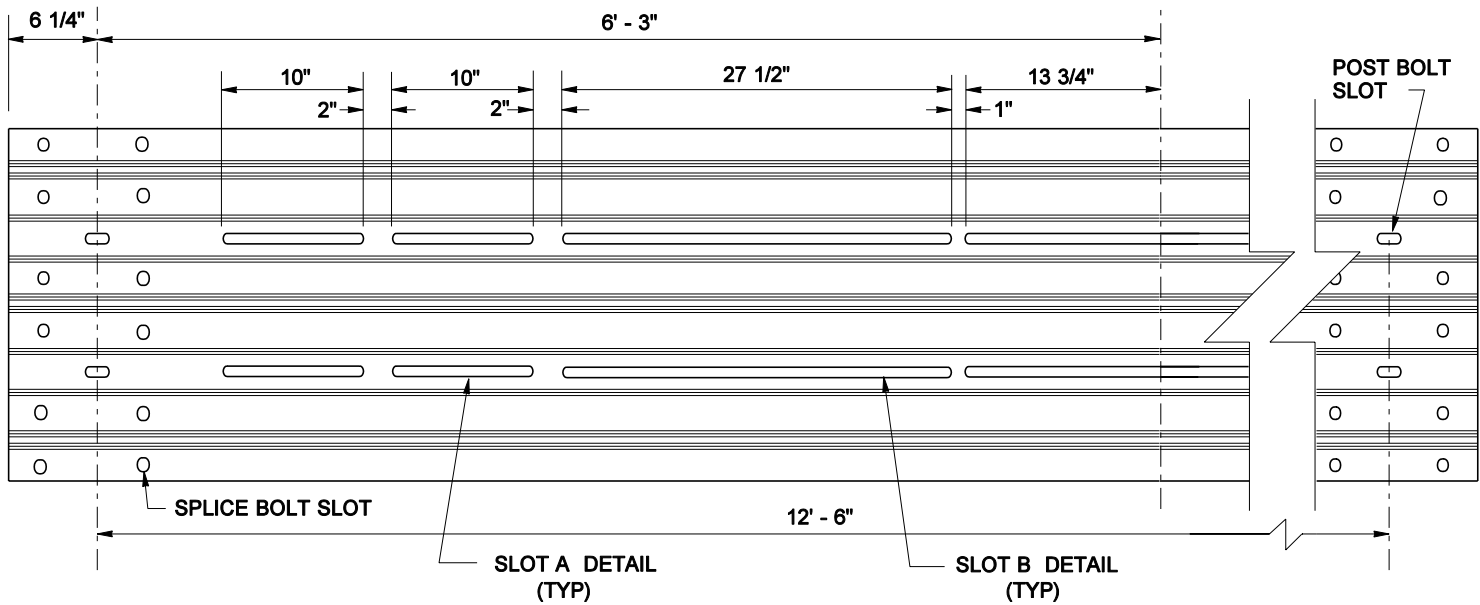


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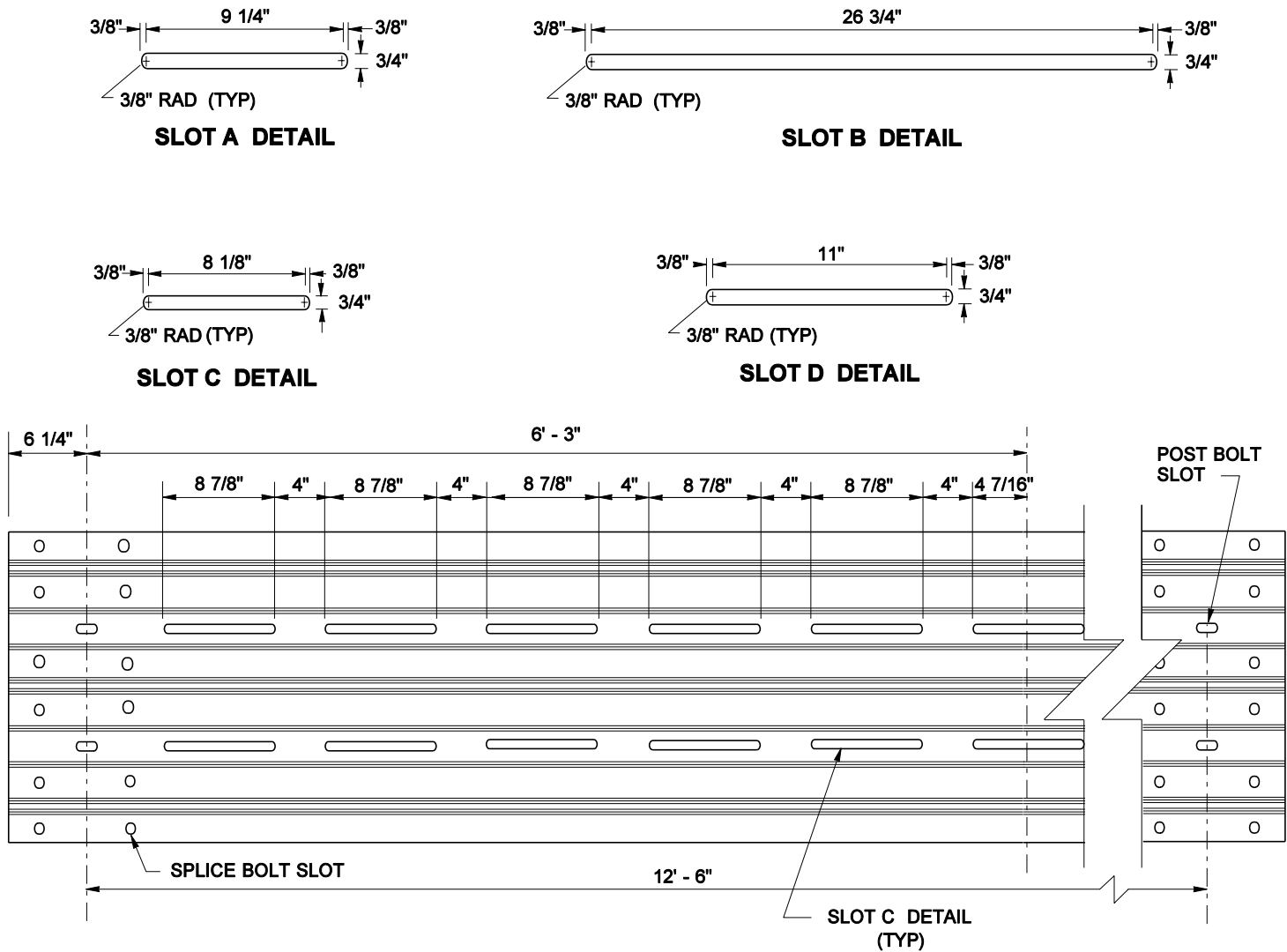
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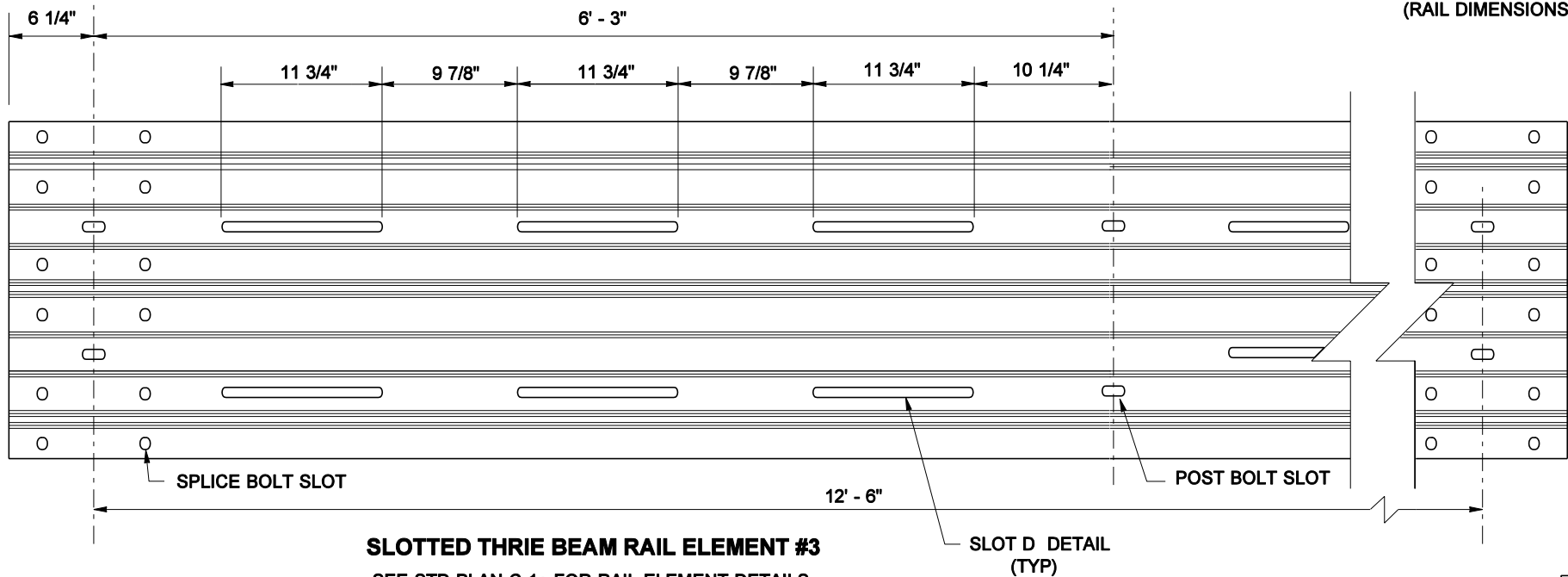
EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004



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



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



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



EXPIRES JULY 24, 2004

**BEAM GUARDRAIL
BULL NOSE TERMINAL**

STANDARD PLAN C-4f

SHEET 4 OF 4 SHEETS

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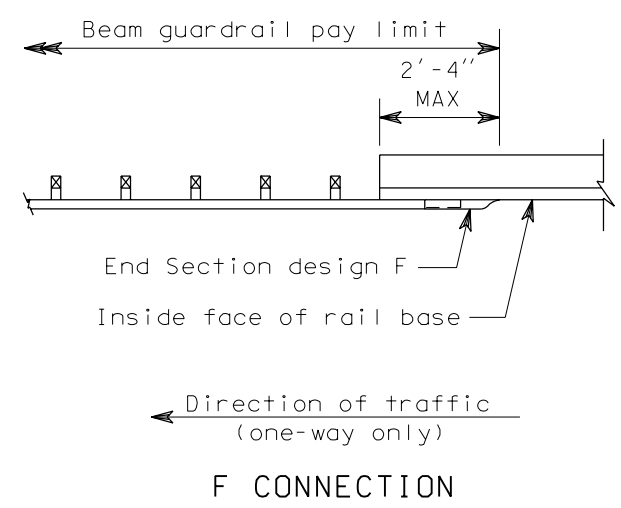
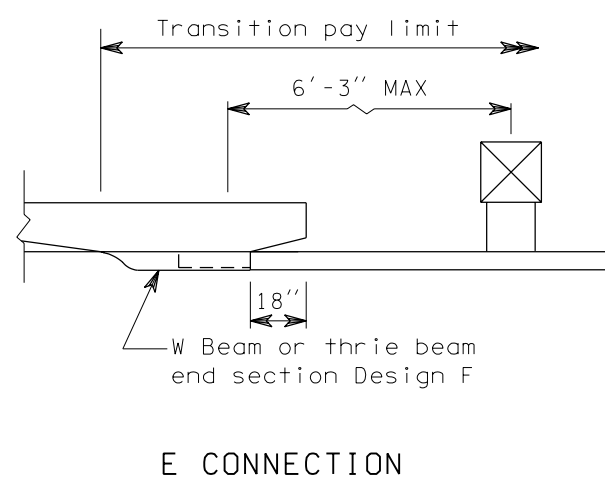
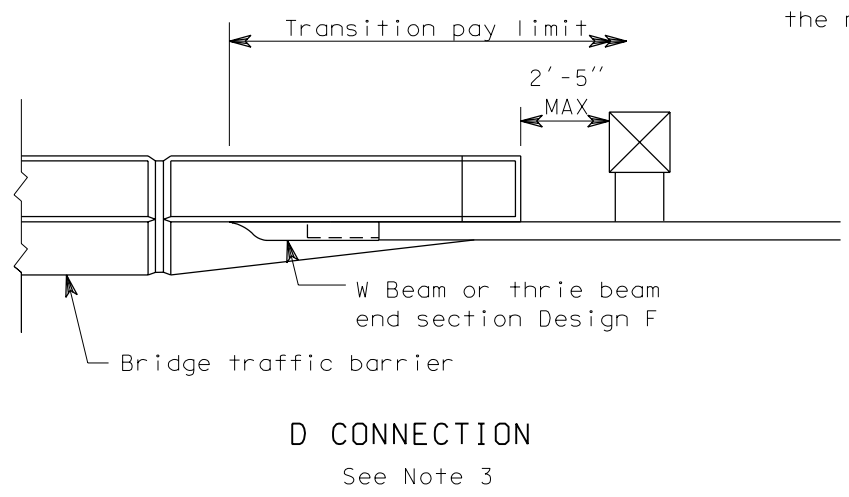
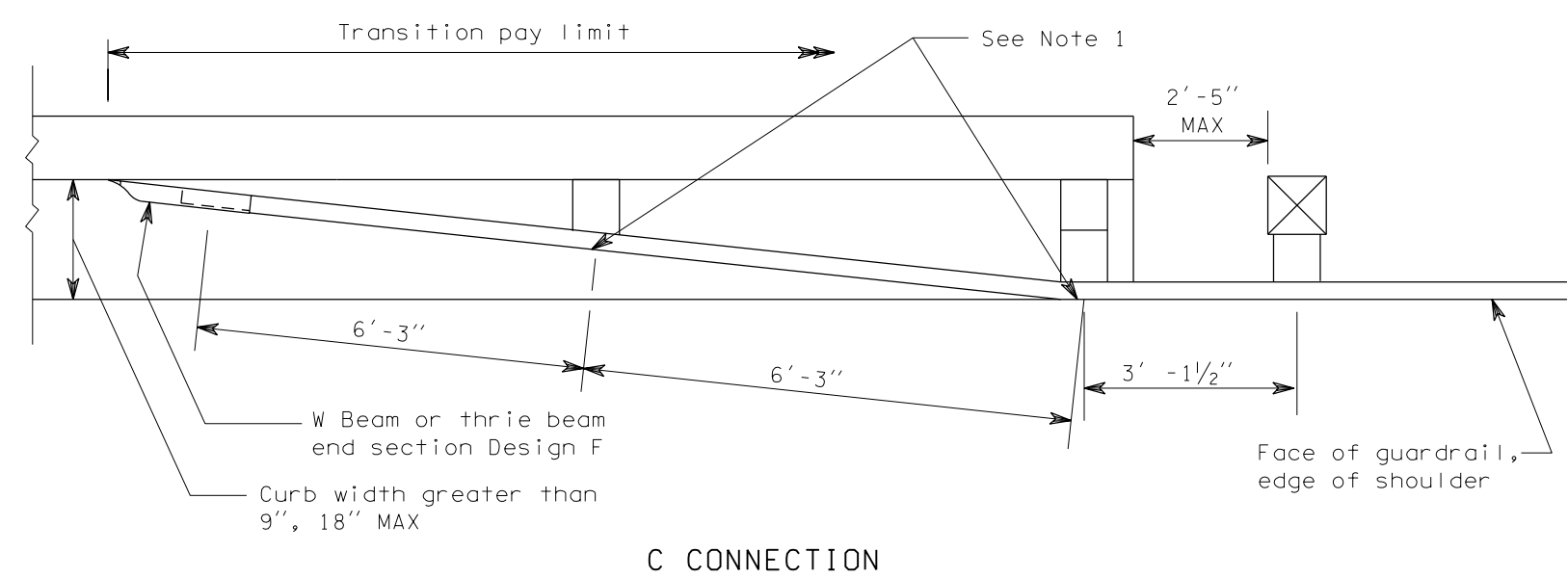
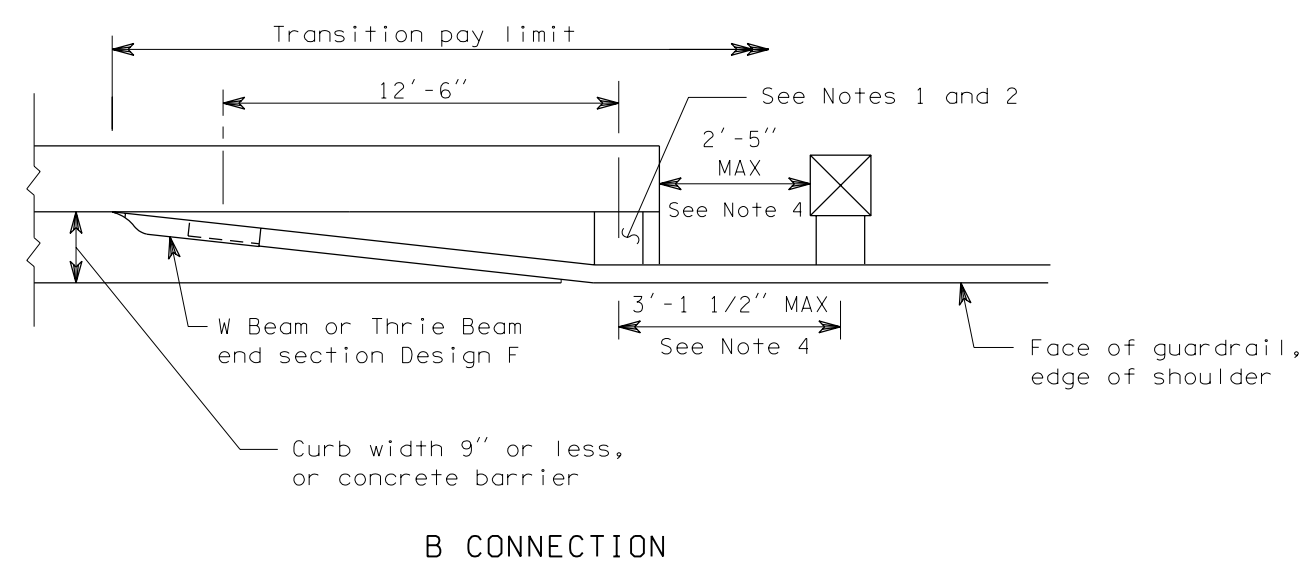
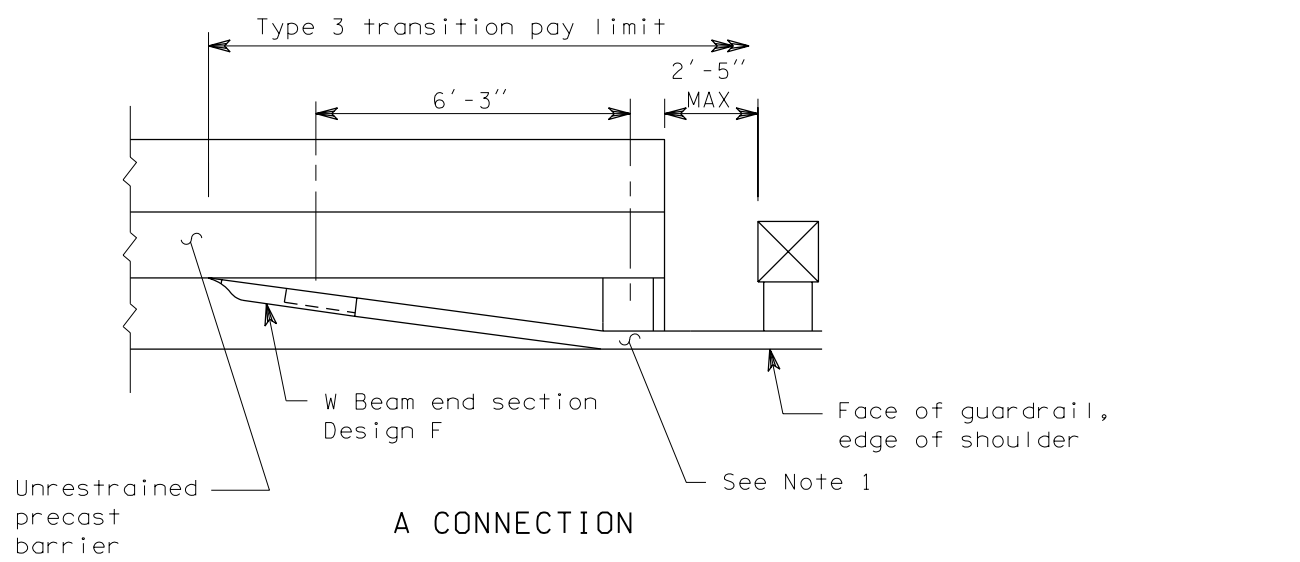
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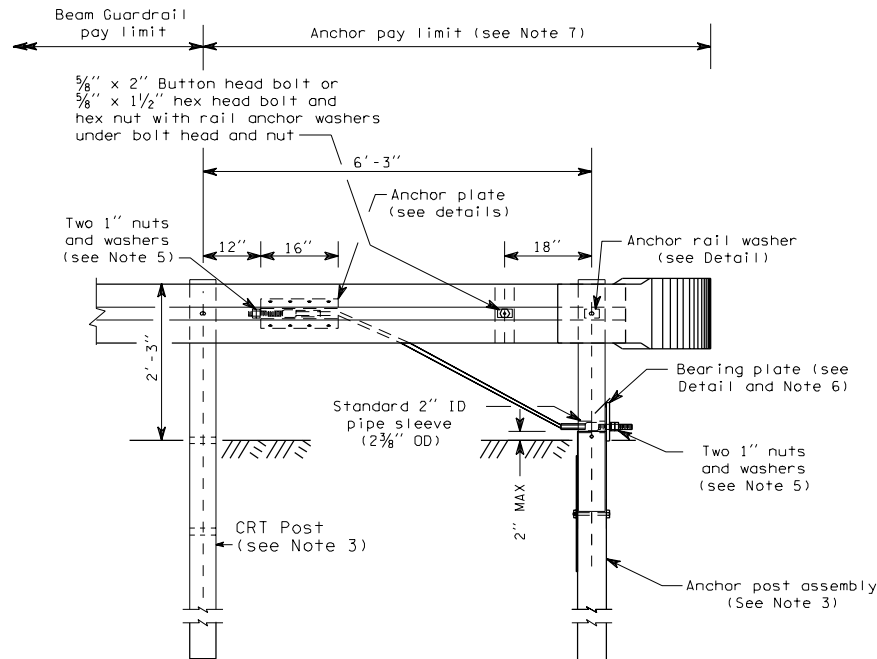
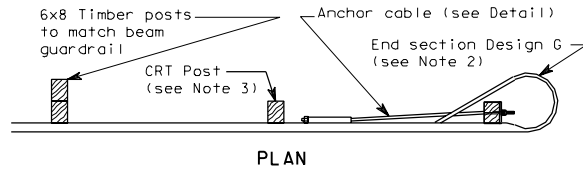
- NOTES
1. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter high strength bolts (Standard Specification 9-06.5(4)) with thin slab ferrule inserts or resin bonded anchors. See the Contract Plans.
 2. If the last guardrail post is 3" or less from the end of the bridge barrier, this attachment and blockout is not necessary.
 3. This case is also applicable for vertical faces with no curbs.
 4. When B Connection is used with Type 1A Transition, the maximum spacing between bolts is 6'-3".



EXPIRES JULY 24, 2004

GUARDRAIL CONNECTION TO BRIDGE RAIL OR CONCRETE BARRIER
STANDARD PLAN C-5
SHEET 1 OF 1 SHEET

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09/2003		REVISED NOTE 1; ADDED NOTE 4	RG	DATE
DATE		REVISION	BY	DATE
				10-31-03
				STATE DESIGN ENGINEER
				Washington State Department of Transportation



TYPE 1 ANCHOR

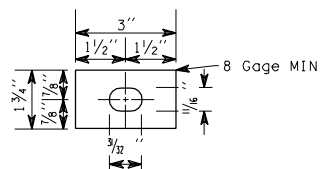
NOTES

1. Anchor plate may be constructed from $\frac{1}{4}$ " plates welded to equal strength and dimensions as shown.
2. For end section details see Standard Plan "Beam Guardrail End Sections".
3. For post details, see Standard Plan "Beam Guardrail Posts and Blocks".
4. Eight $\frac{5}{8}$ " x $1\frac{1}{2}$ " machine bolts with hex nut and washer. Place washer on face side of rail.
5. Outside nut shall be torqued against inside nut a minimum of 100 ft-lbs.
6. Toenail bearing plate with 10d nail at corners to prevent turning.
7. Anchor pay limit does not apply when anchor is included in a Beam Guardrail Terminal.

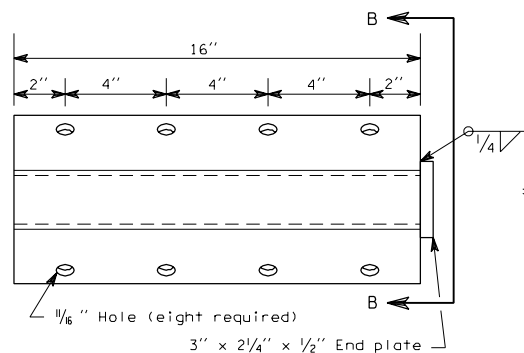
BEAM GUARDRAIL ANCHOR
TYPE 1

C-6

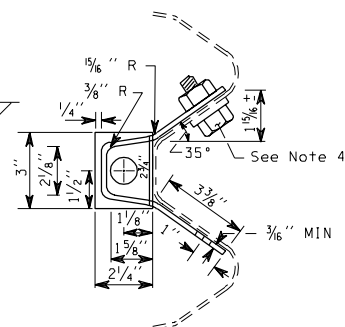
05-30-97



ANCHOR RAIL WASHER



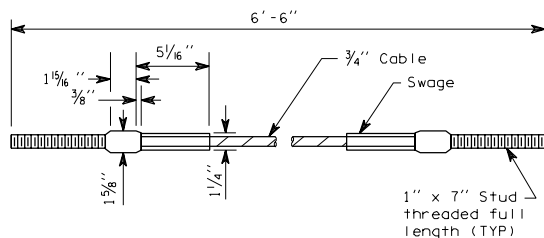
ELEVATION



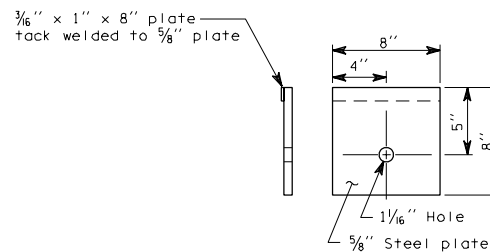
SECTION B-B

ANCHOR PLATE

(See Note 1)



ANCHOR CABLE

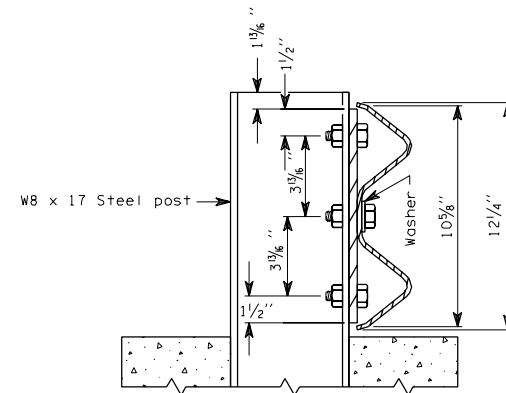
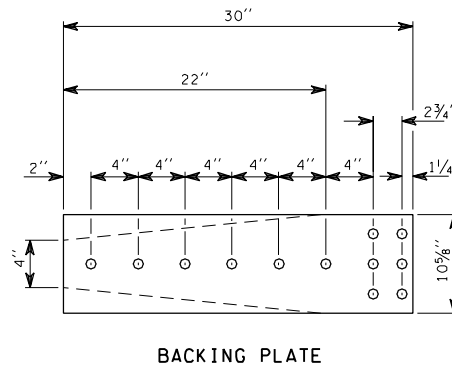
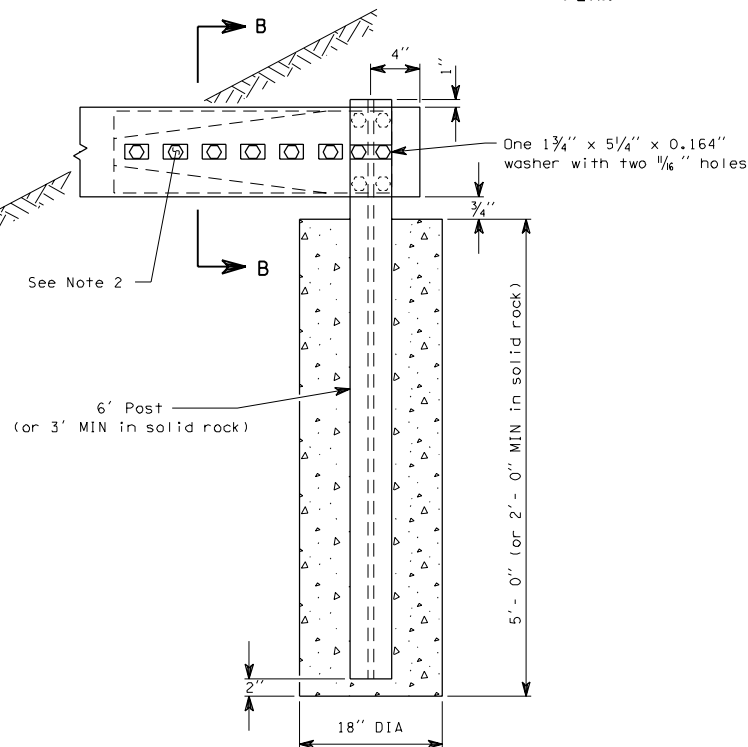
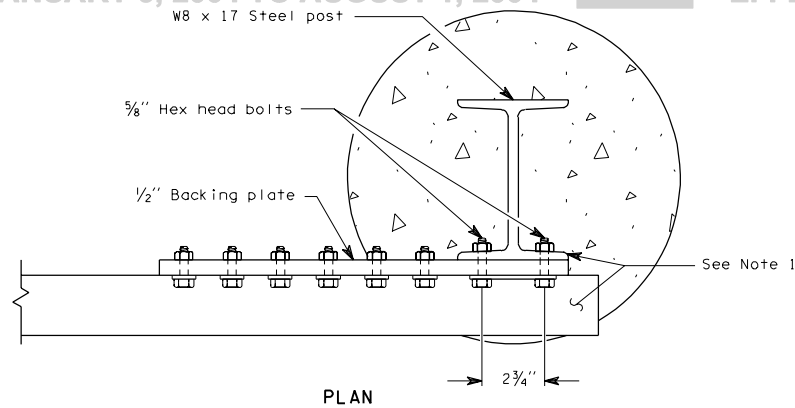


BEARING PLATE

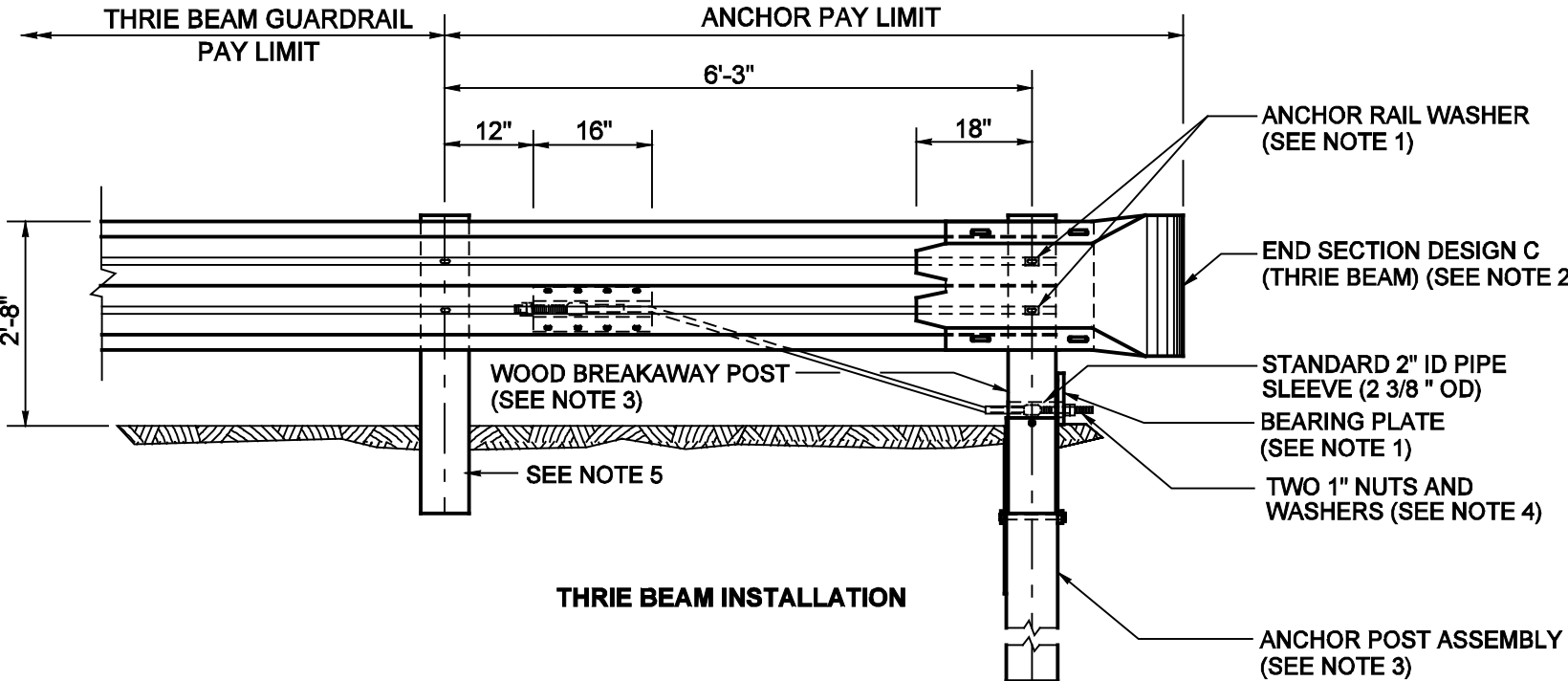
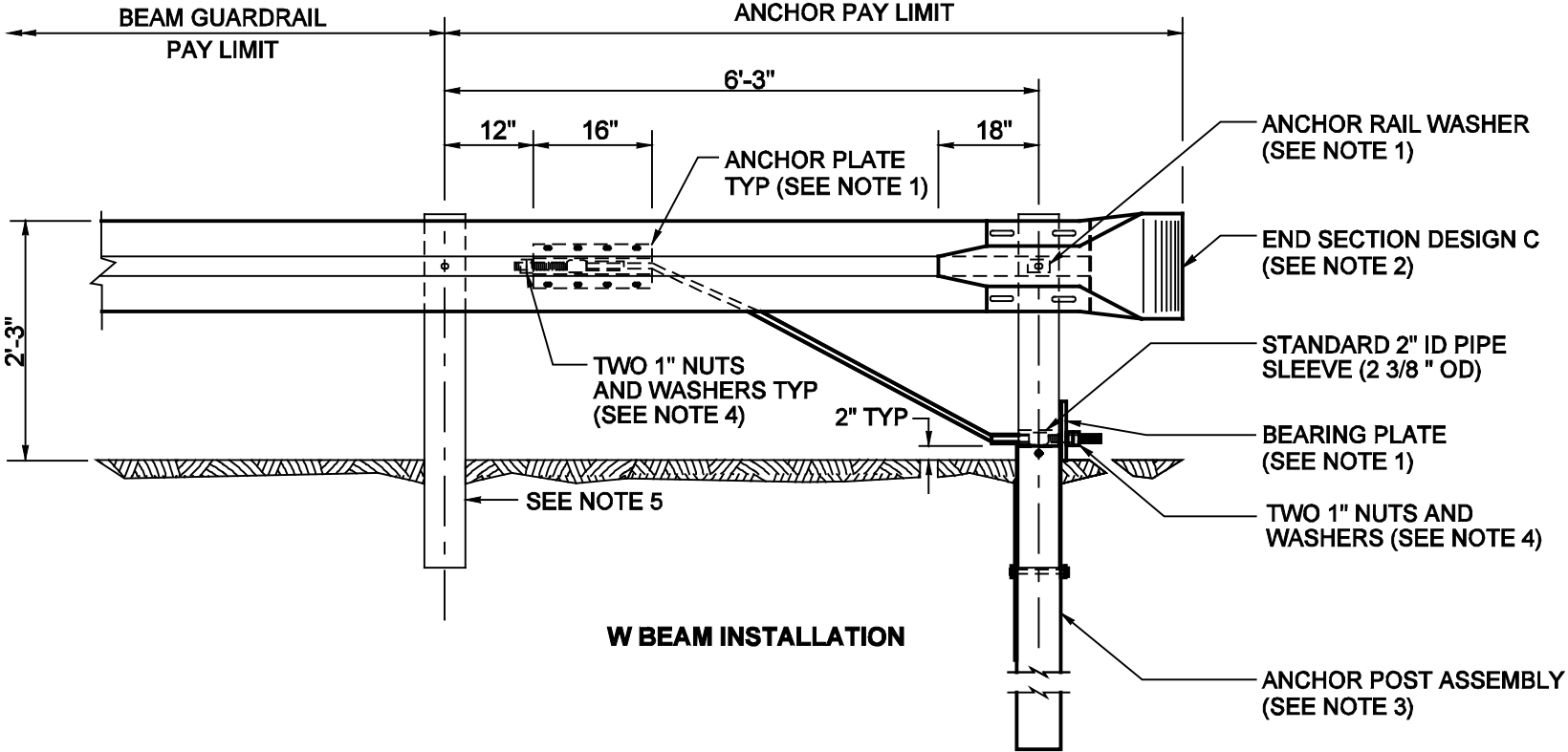
BEAM GUARDRAIL ANCHOR
TYPE 1

C-6
05-30-97

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



BEAM GUARDRAIL ANCHOR
TYPE 2



NOTES

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



EXPIRES MAY 3, 2000

**BEAM GUARDRAIL ANCHOR
TYPE 4**

STANDARD PLAN C-6c

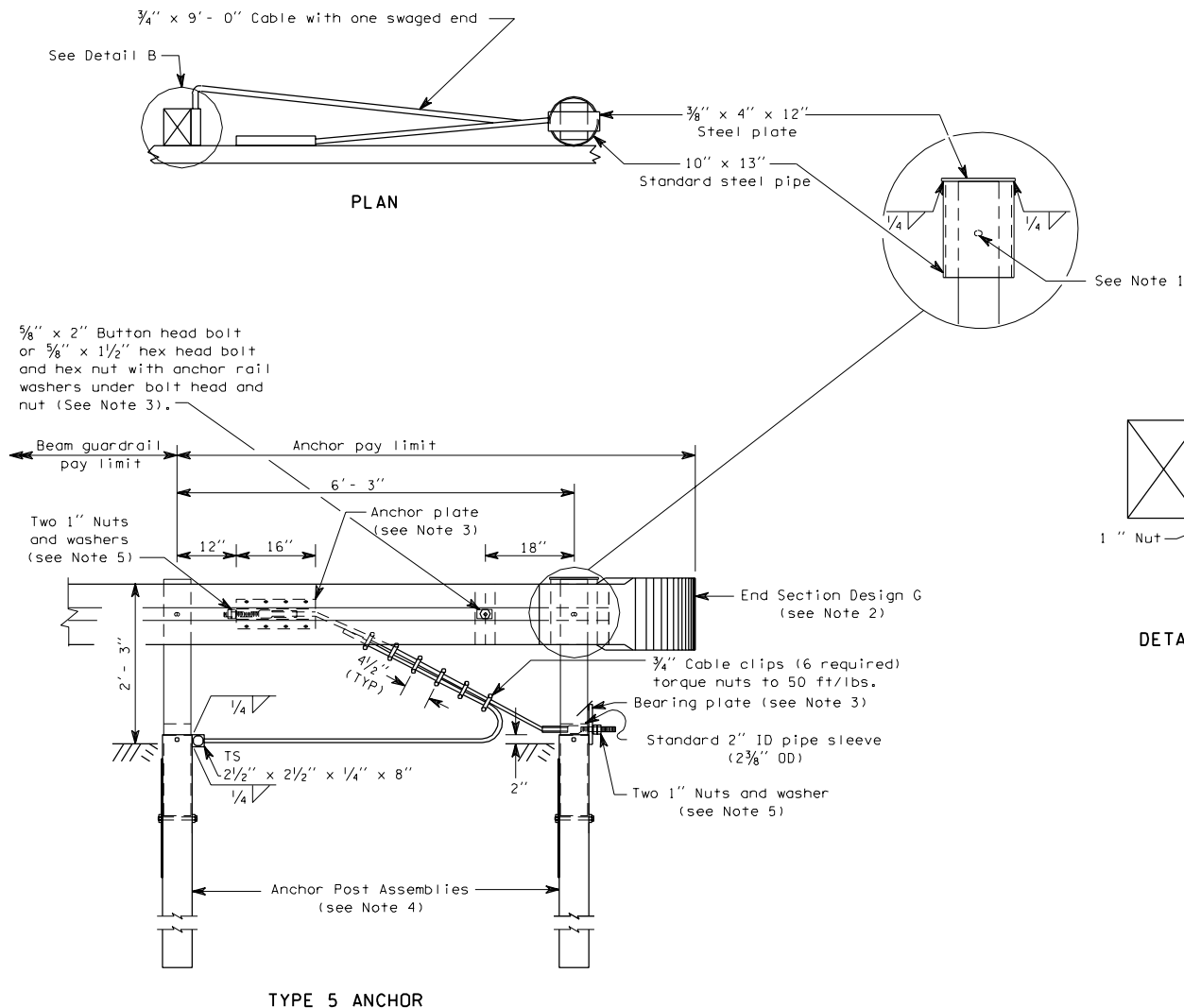
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APPROVED FOR PUBLICATION

Clifford E. Mansfield 01-06-00

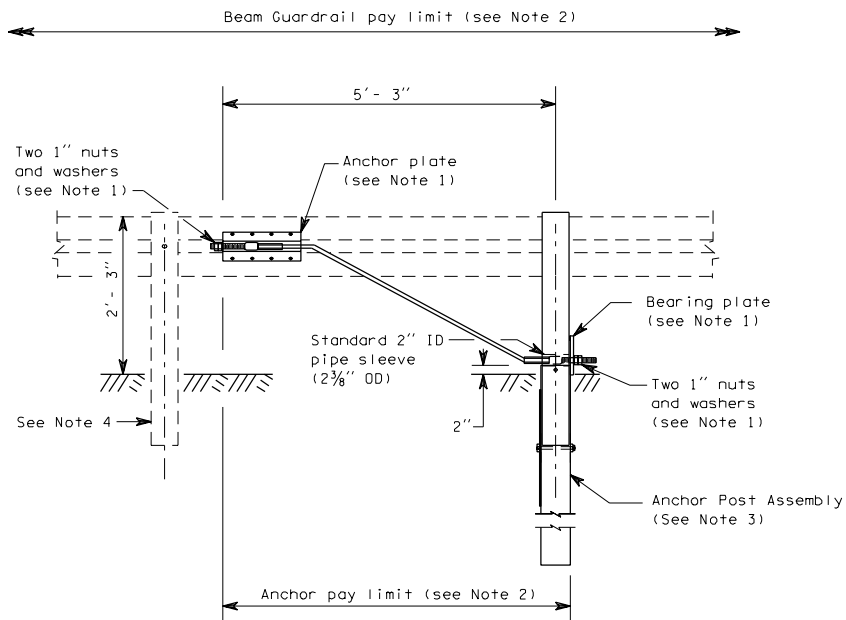
DEPUTY STATE DESIGN ENGINEER DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

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



- NOTES
1. Attach W-beam to steel pipe with $\frac{5}{8}$ " x $\frac{1}{4}$ " button head bolt with no washer. No connection to the post is required.
 2. For end section details see Standard Plan, "Beam Guardrail End Sections".
 3. For details see Standard Plan, "Beam Guardrail Anchor Type 1".
 4. For details see Standard Plan, "Beam Guardrail Posts".
 5. Outside nut shall be torqued against inside nut a minimum of 100 ft/lbs.

BEAM GUARDRAIL ANCHOR
TYPE 5



TYPE 7 ANCHOR

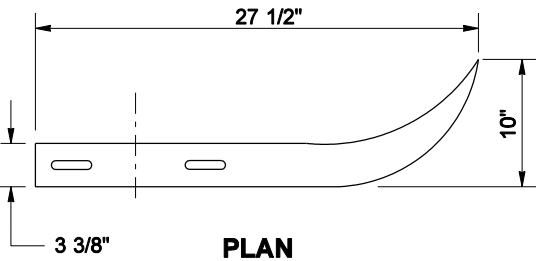
BEAM GUARDRAIL ANCHOR
TYPE 7

NOTES

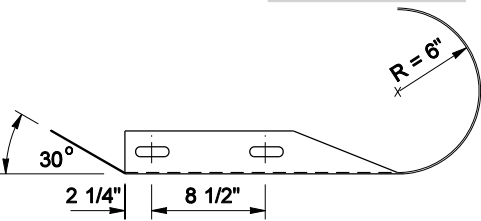
1. For details, see Standard Plan, "Beam Guardrail Anchor Type 1".
2. The rail element is to be included in the "Beam Guardrail" pay item. The "Anchor" pay item includes the anchor post, anchor plate, anchor cable, bearing plate, nuts and washers.
3. For details, see Standard Plan, "Beam Guardrail Posts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

NOTES

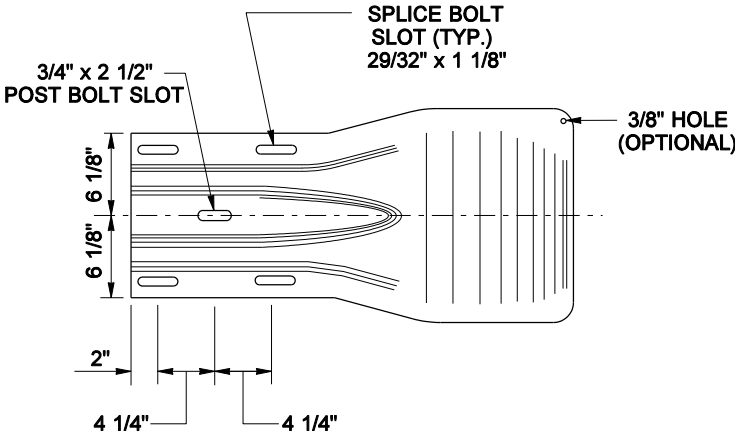
- 1. End Section Design G shall be used except where noted on the plans or contract.
- 2. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter high strength bolts (Standard Specification 9-06.5(4)) with thin slab ferrule inserts or resin bonded anchors. See the Contract Plans.
- 3. A single piece having similar dimensional shape to Design G and mating with the W-beam guardrail is an alternate.
- 4. In cases where Design "F" end section is lapped on the outside of the guardrail, a galvanized 1" ID, 2" OD, 0.134" thick, narrow Type A Plain Washer or a anchor rail washer shall be placed under the splice bolt heads.



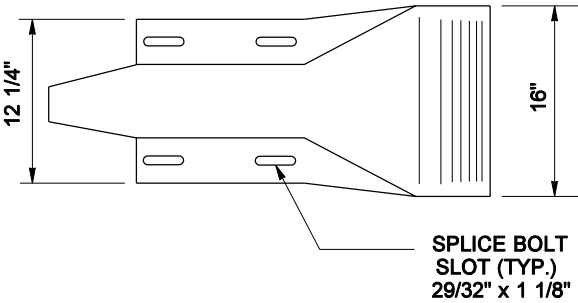
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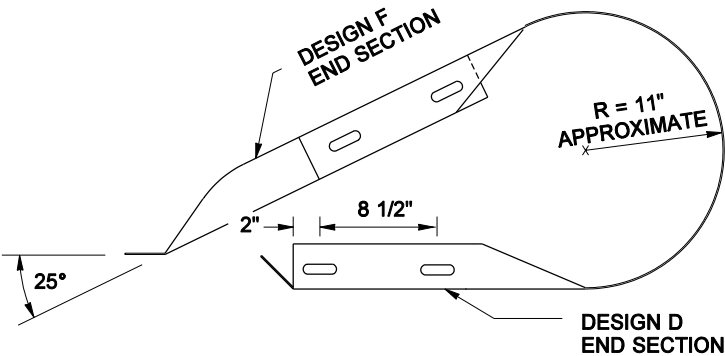
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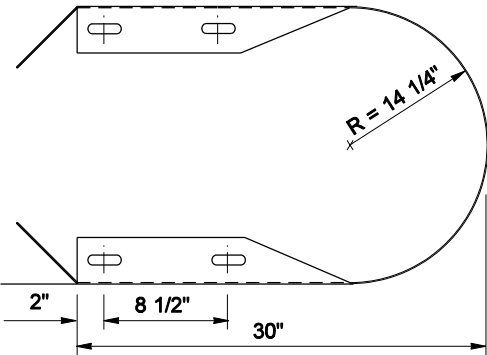
ELEVATION
DESIGN A



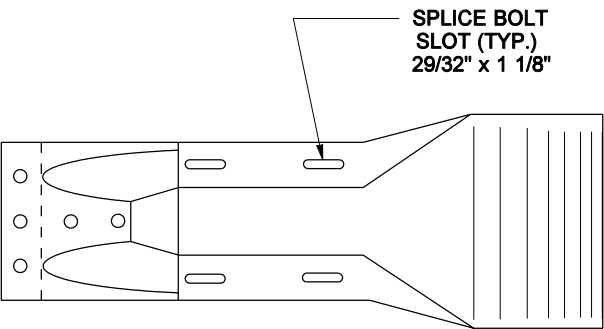
ELEVATION
DESIGN C



PLAN



PLAN



ELEVATION

DESIGN G
(SEE NOTE 3)



BEAM GUARDRAIL
END SECTIONS

STANDARD PLAN C-7

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 10-31-03

STATE DESIGN ENGINEER

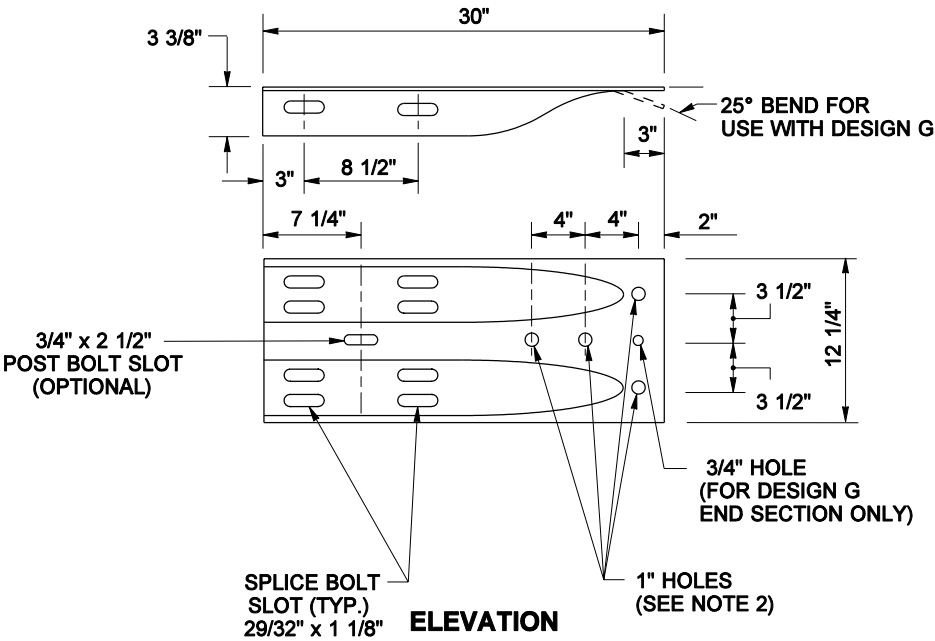
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Washington State Department of Transportation

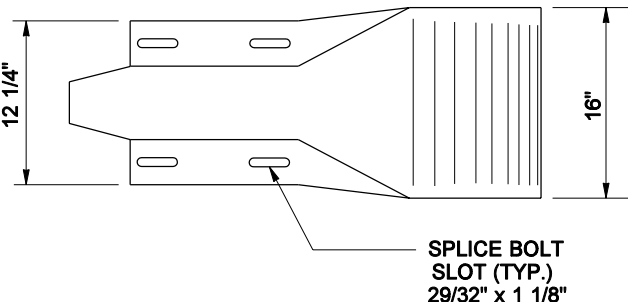
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10/2003	REV. NOTE 2.	MHG
DATE	REVISION	BY

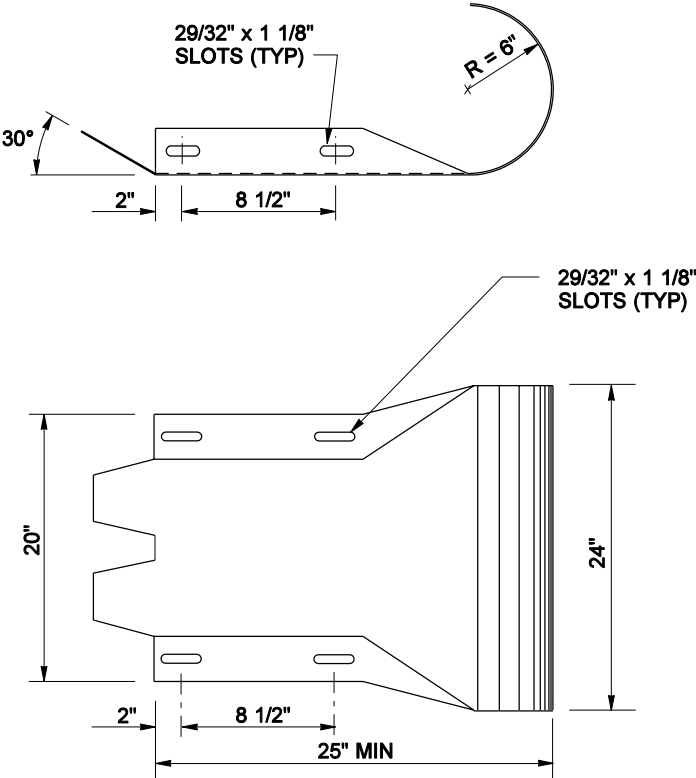


ELEVATION

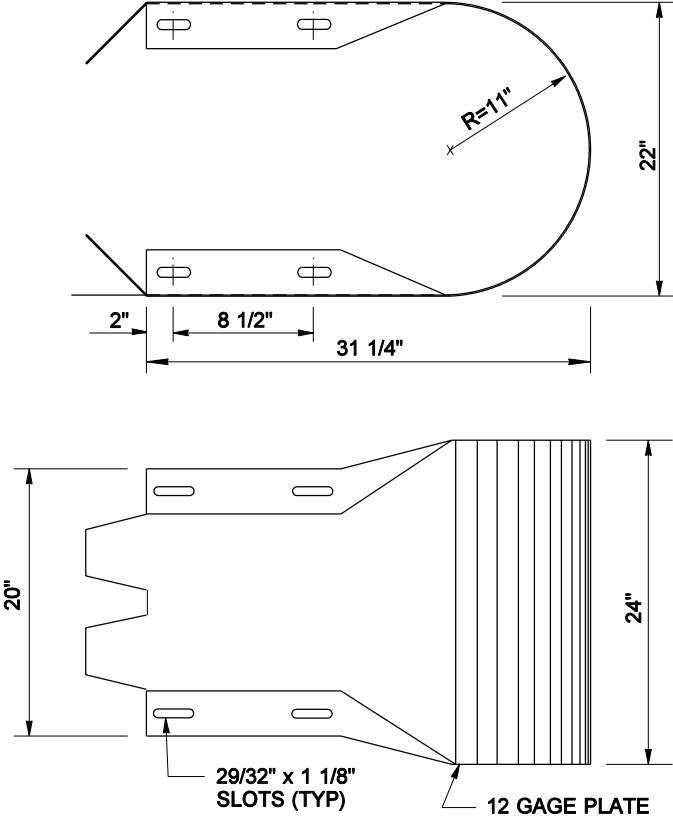
DESIGN F
(SEE NOTE 4)



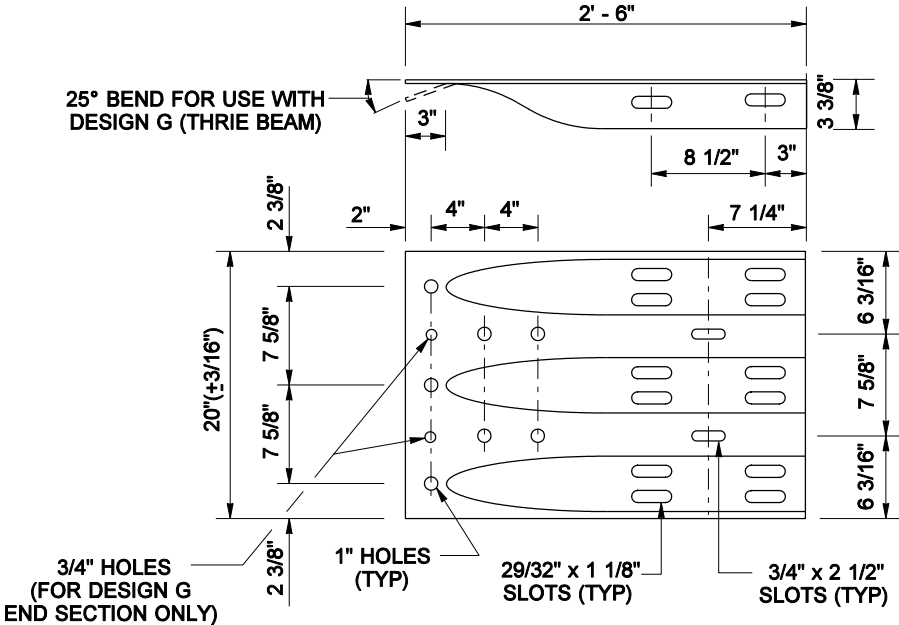
ELEVATION
DESIGN D



DESIGN C (THRIE BEAM)



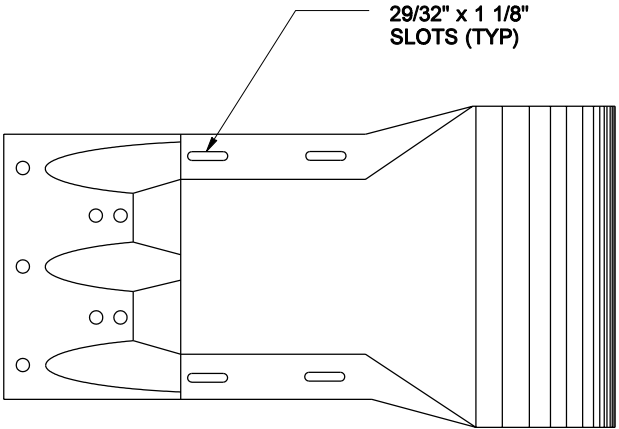
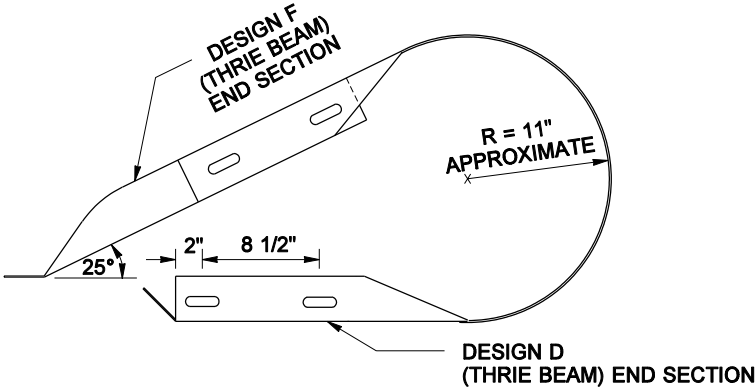
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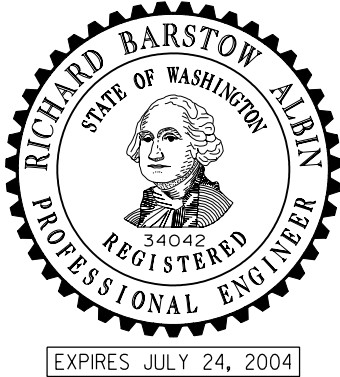
DESIGN F (THRIE BEAM)

NOTES

1. Attach guardrail to bridge rail or concrete barrier with 7/8" diameter high strength bolts (Standard Specification 9-06.5(4)) with thin slab ferrule inserts or resin bonded anchors. See the Contract Plans.
2. In cases where Design F End Section is lapped on the outside of the guardrail, a galvanized 1" ID, 2" OD, 0.134" thick, narrow Type A Plain Washer or an anchor rail washer will be placed under the splice bolt heads.




DESIGN G (THRIE BEAM)



**THRIE BEAM
END SECTIONS
STANDARD PLAN C-7a**

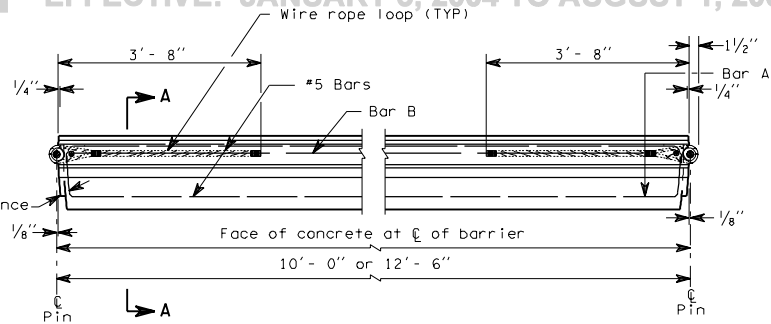
SHEET 1 OF 1 SHEET

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DATE		REVISION	BY	DATE

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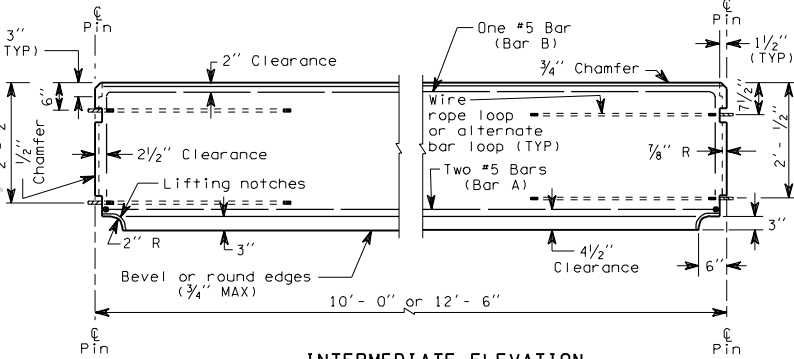
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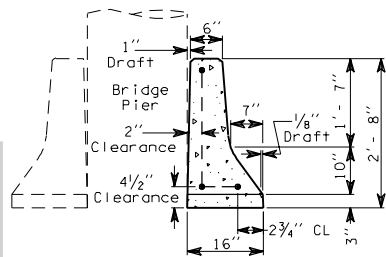
INTERMEDIATE PLAN

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

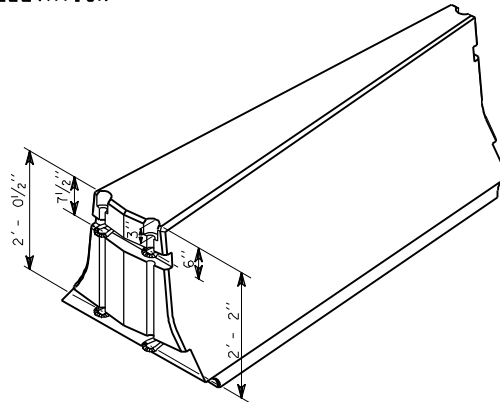


INTERMEDIATE ELEVATION



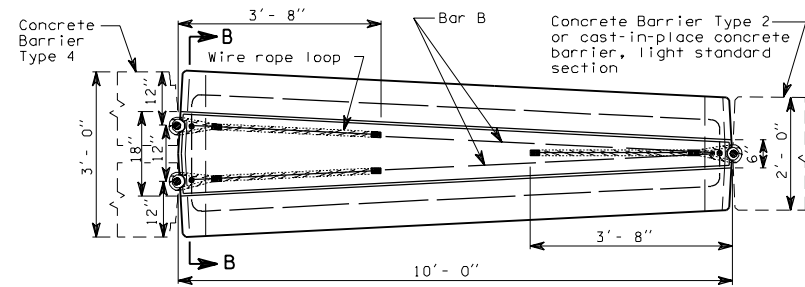
SECTION A-A

TYPE 4

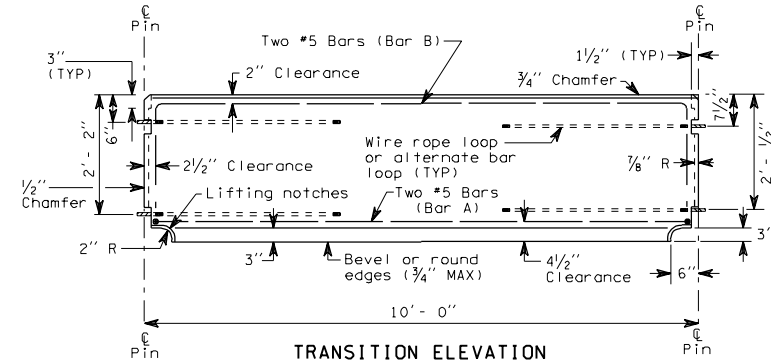


TRANSITION END VIEW

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

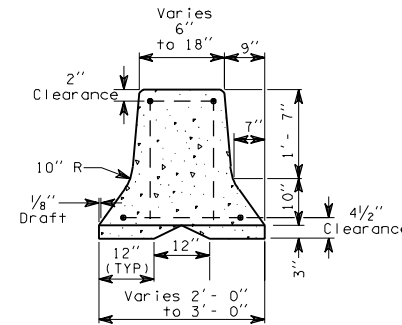


TRANSITION PLAN



TRANSITION ELEVATION

CONCRETE BARRIER TYPE 4 AND TRANSITION SECTION



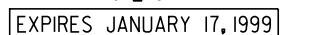
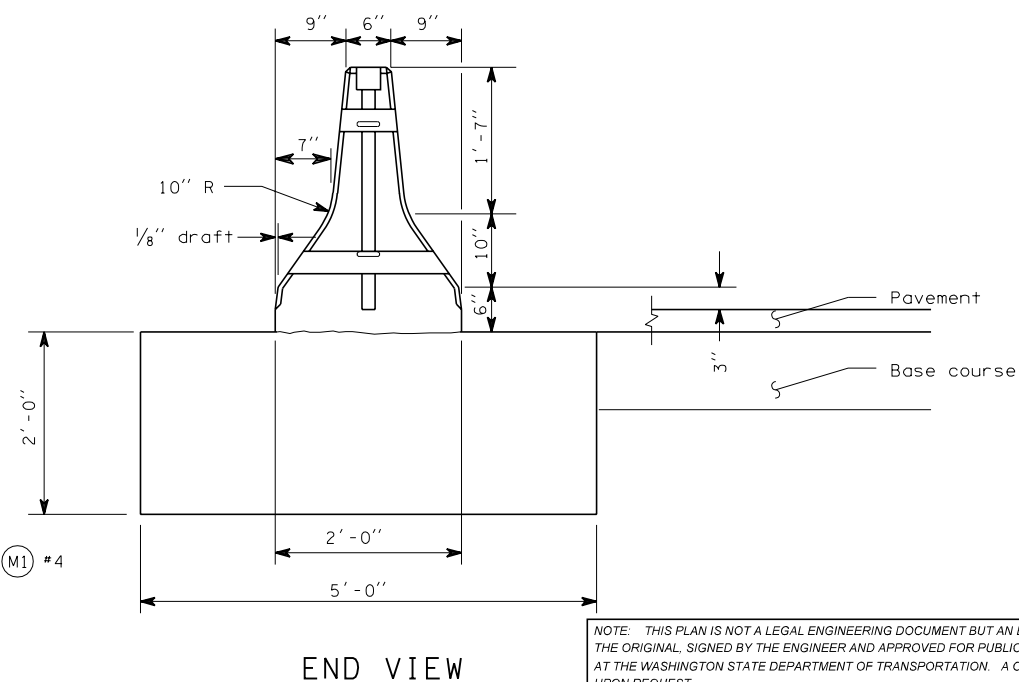
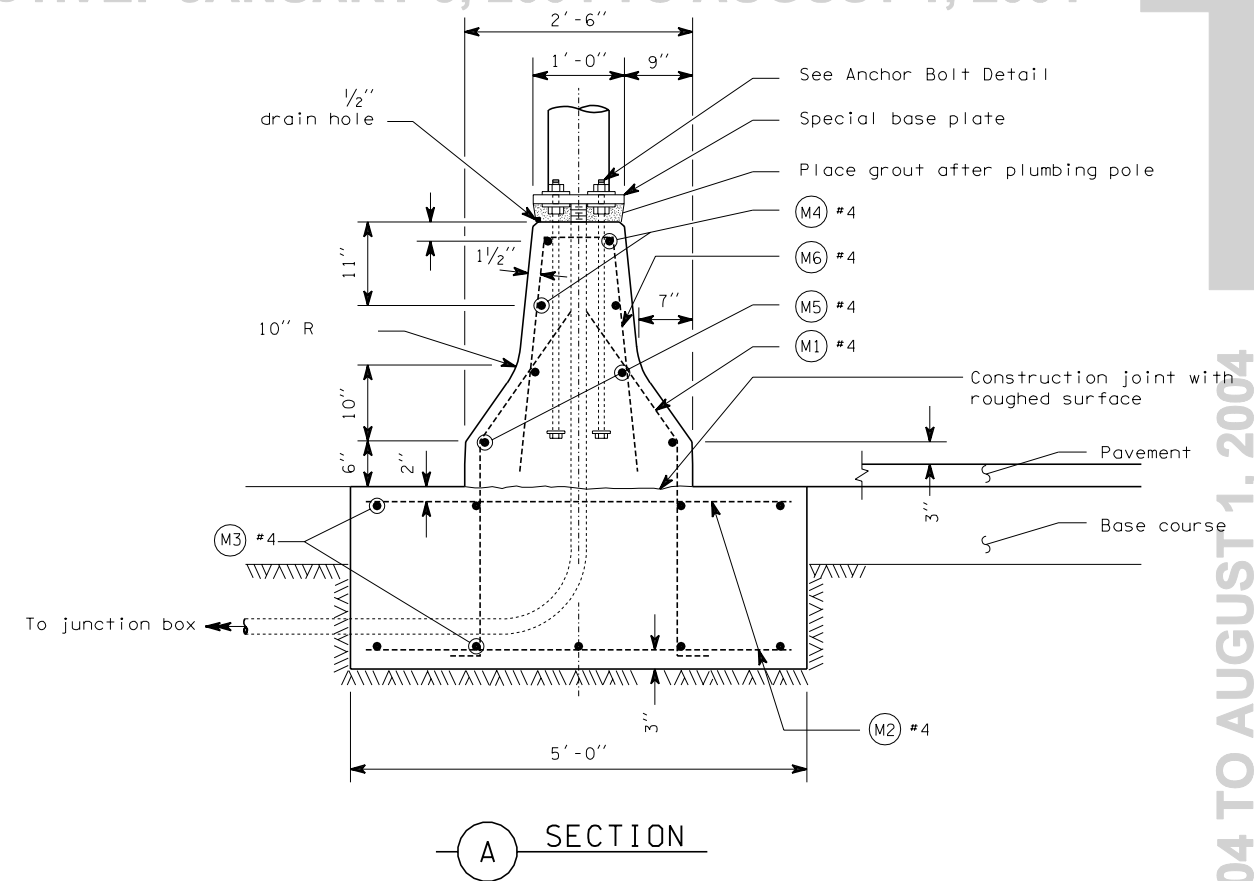
SECTION B-B

TRANSITION SECTION

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EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

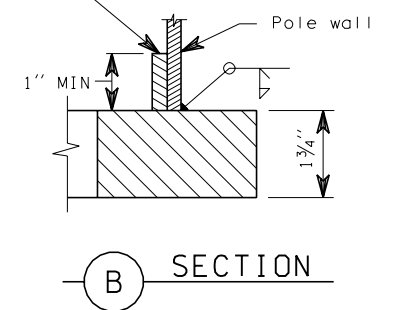


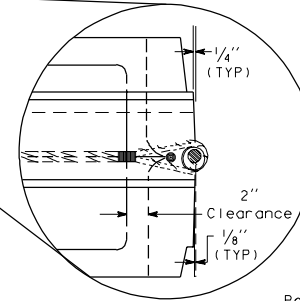
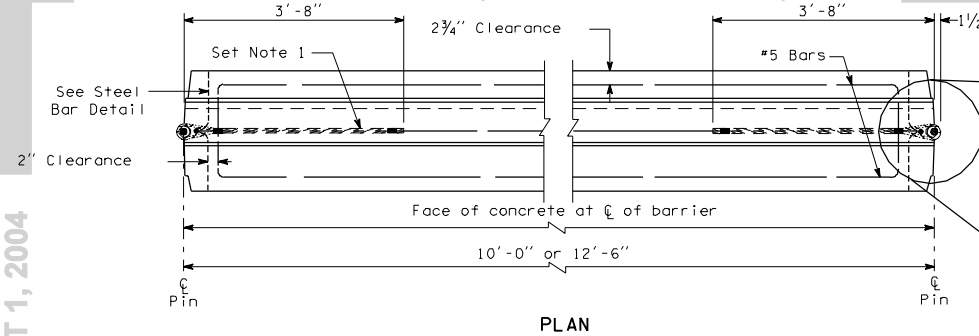
SHEET 1 OF 2 SHEETS

ATE

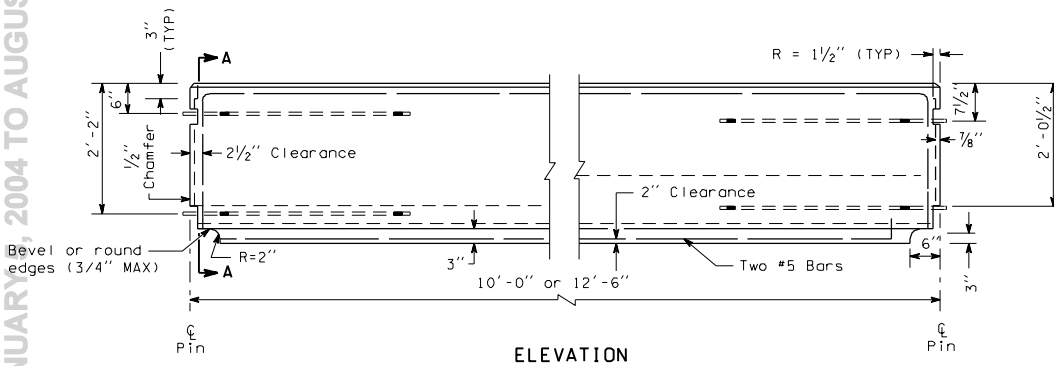


EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004  WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

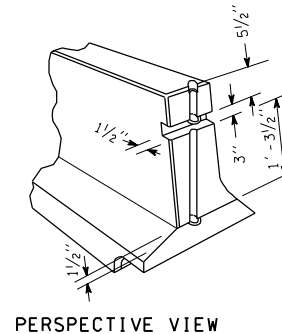
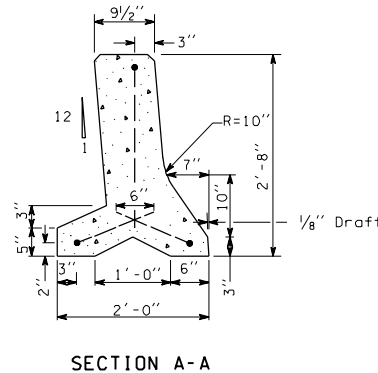
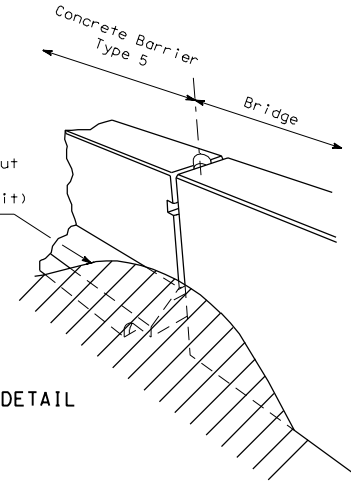


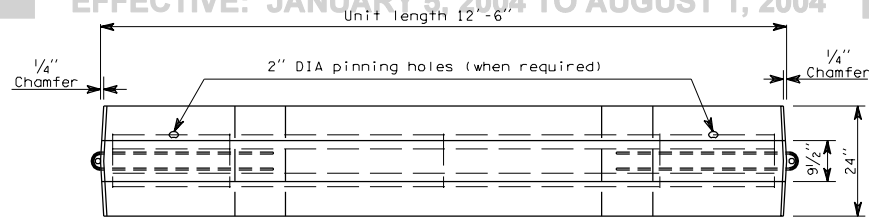
1. For details on loops, connecting pin, reinforcing steel, and terminal unit see Standard Plan Concrete Barrier Type 2.
2. See plans for surface treatment on back face of barrier.
3. At the juncture between the Concrete Barrier Type 5 and the Bridge Barrier, cover the exposed foot of the Type 5 Barrier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



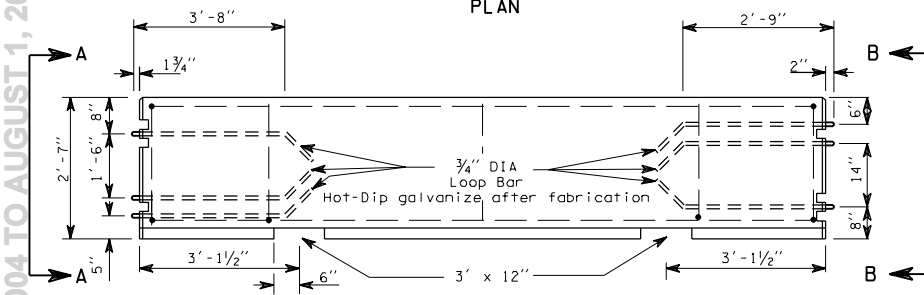
Point of cover
(extend fill about
half way down
first precast unit)
See Note 3

BERM DETAIL

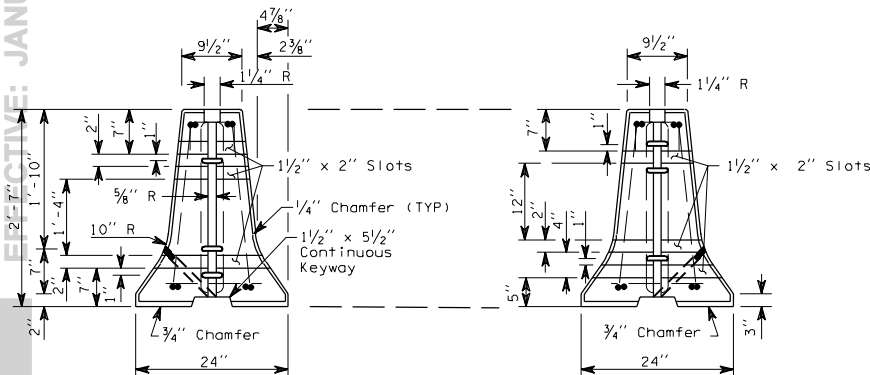
CONCRETE BARRIER
TYPE 5



PLAN

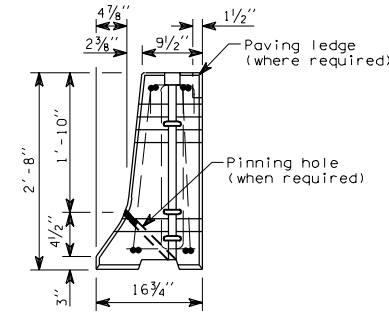


ELEVATION

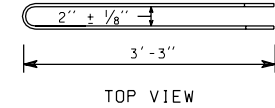


SECTION A-A

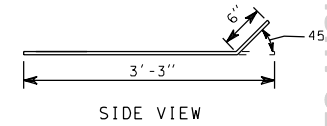
SECTION B-B



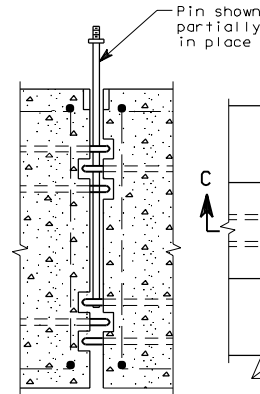
NARROW BASE



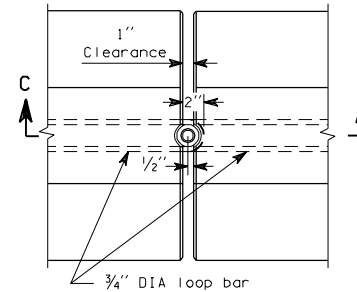
TOP VIEW



SIDE VIEW

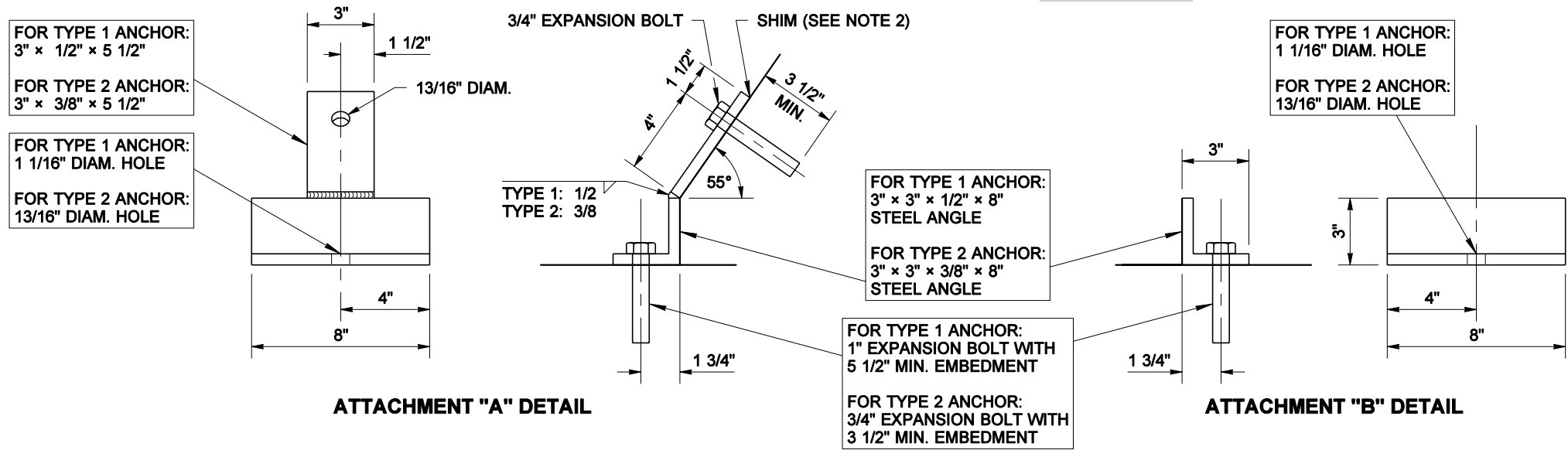
ALTERNATE LOOP BAR
3/4" DIA (A36)

SECTION C-C

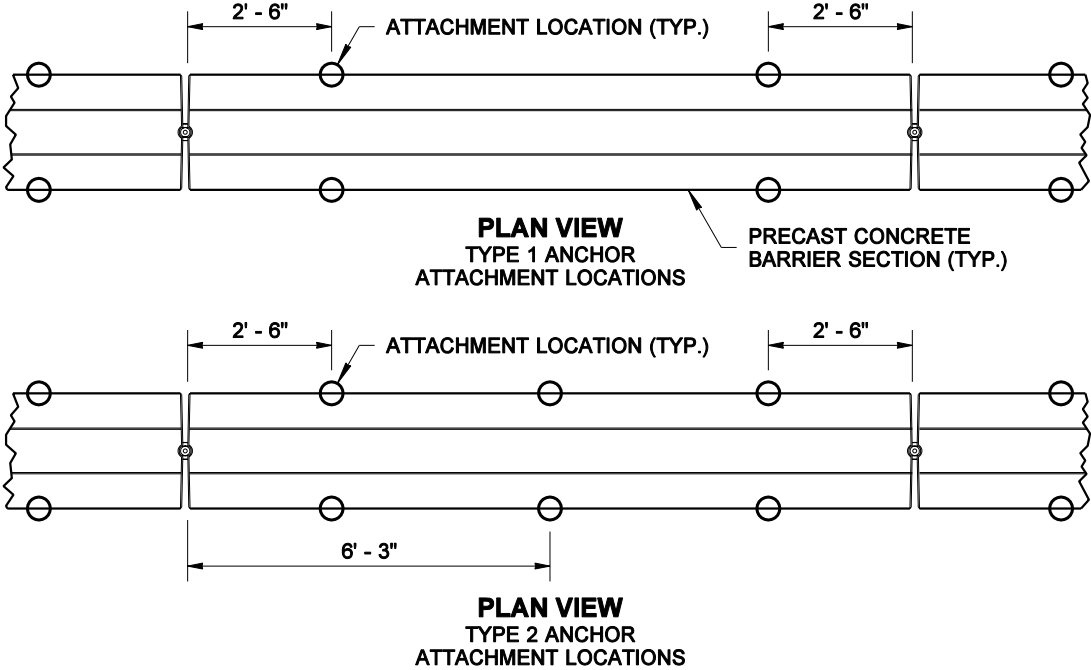
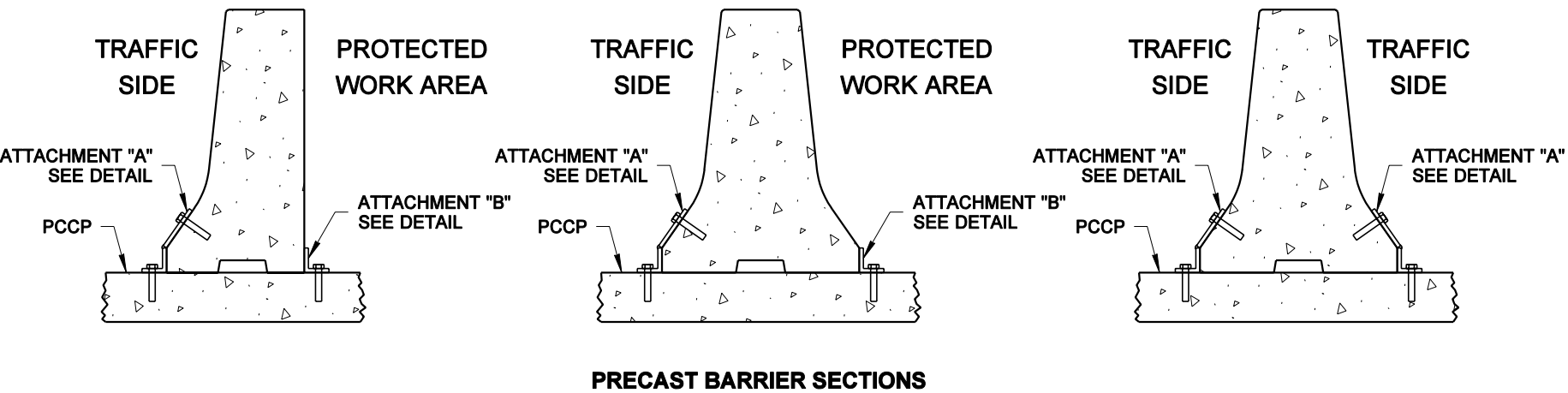


PLAN

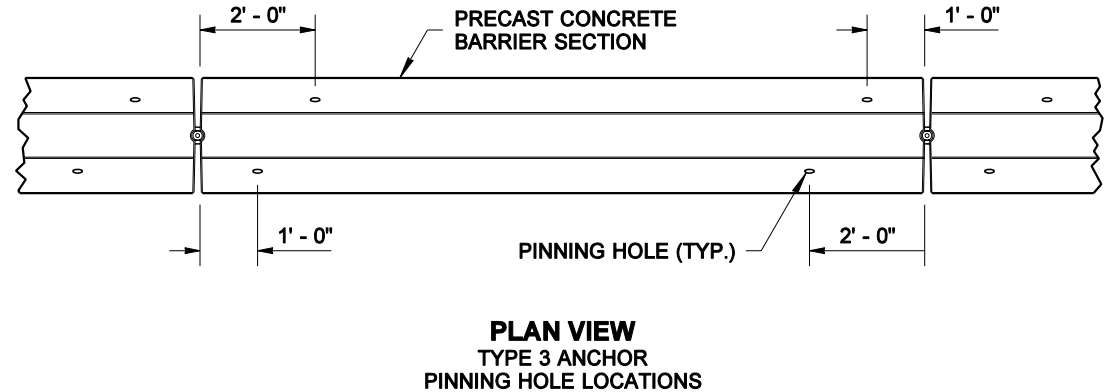
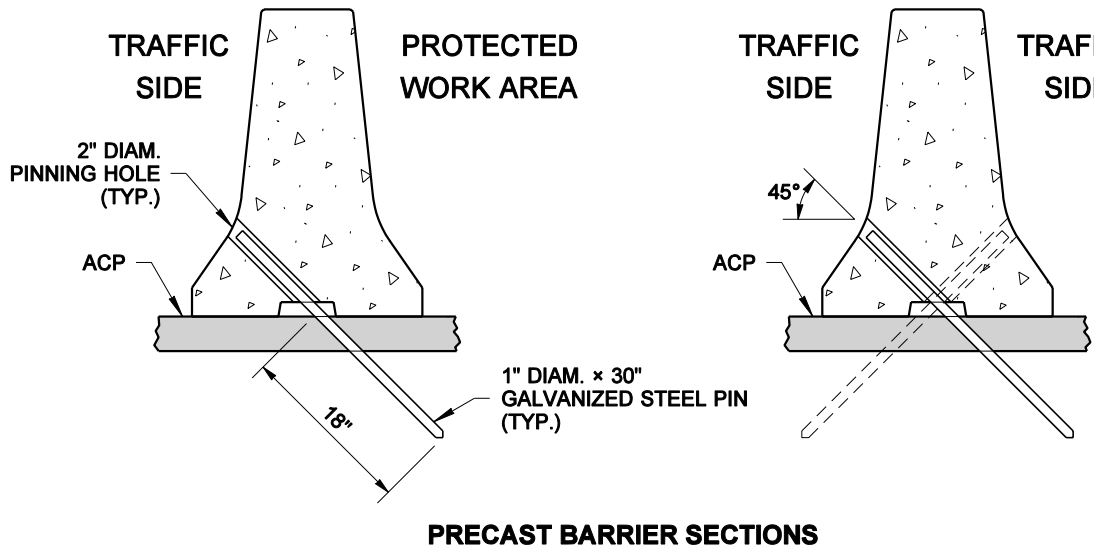
ALTERNATIVE TEMPORARY
CONCRETE BARRIER



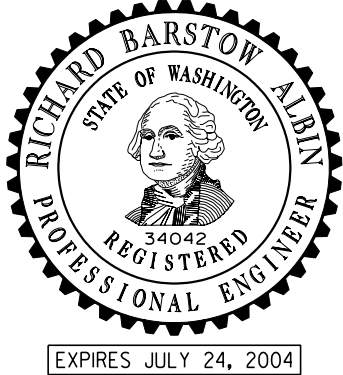
- NOTES**
1. Use Type 1 Anchors when a deeper embedment (5 1/2") into the bridge deck or conc. pavement is permitted by the Engineer.
 2. Adjust the location of the Type 1 or Type 2 Anchors to avoid the main reinforcing in the deck when drilling holes.
 3. Use shims to properly fit the Type 1 or Type 2 Anchors to the barrier and roadway surfaces.
 4. After removing Type 1 or Type 2 Anchors, clean the bolt holes and fill them with grout according to Std. Spec. 6.02.3(20).
 5. Remove the Type 3 Anchors by first driving the steel pins down through the barrier further into the pavement to allow lifting the barrier without interference, then remove the pins from the pavement.
 6. After removing Type 3 Anchors, clean the pin holes and fill them with sealant according to Std. Spec. 9-04.2.



TYPE 1 AND TYPE 2 ANCHORS
FOR TEMPORARY CONCRETE BARRIER INSTALLATIONS
ON CEMENT CONCRETE PAVEMENT



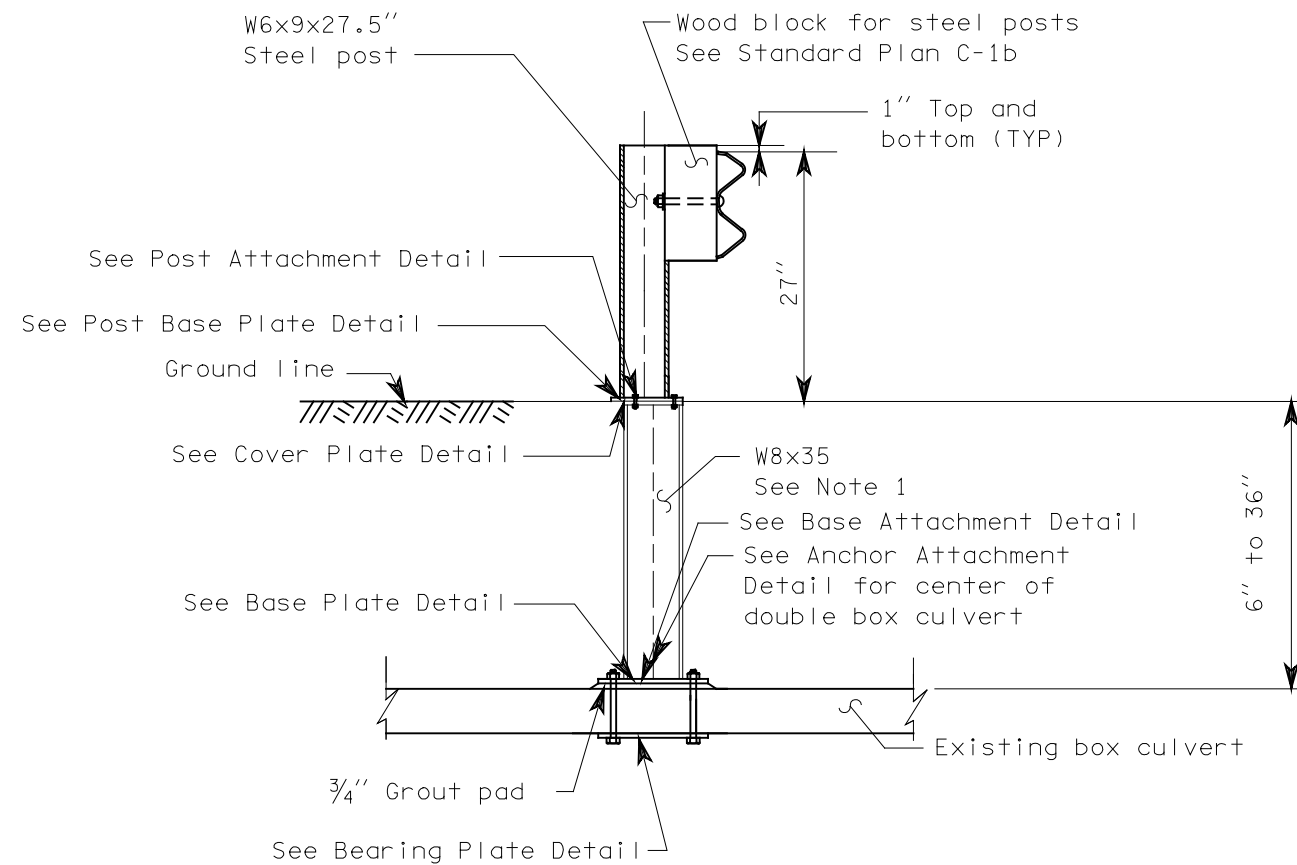
TYPE 3 ANCHOR
FOR TEMPORARY OR PERMANENT
PRECAST CONCRETE BARRIER INSTALLATIONS
ON ASPHALT CONCRETE PAVEMENT



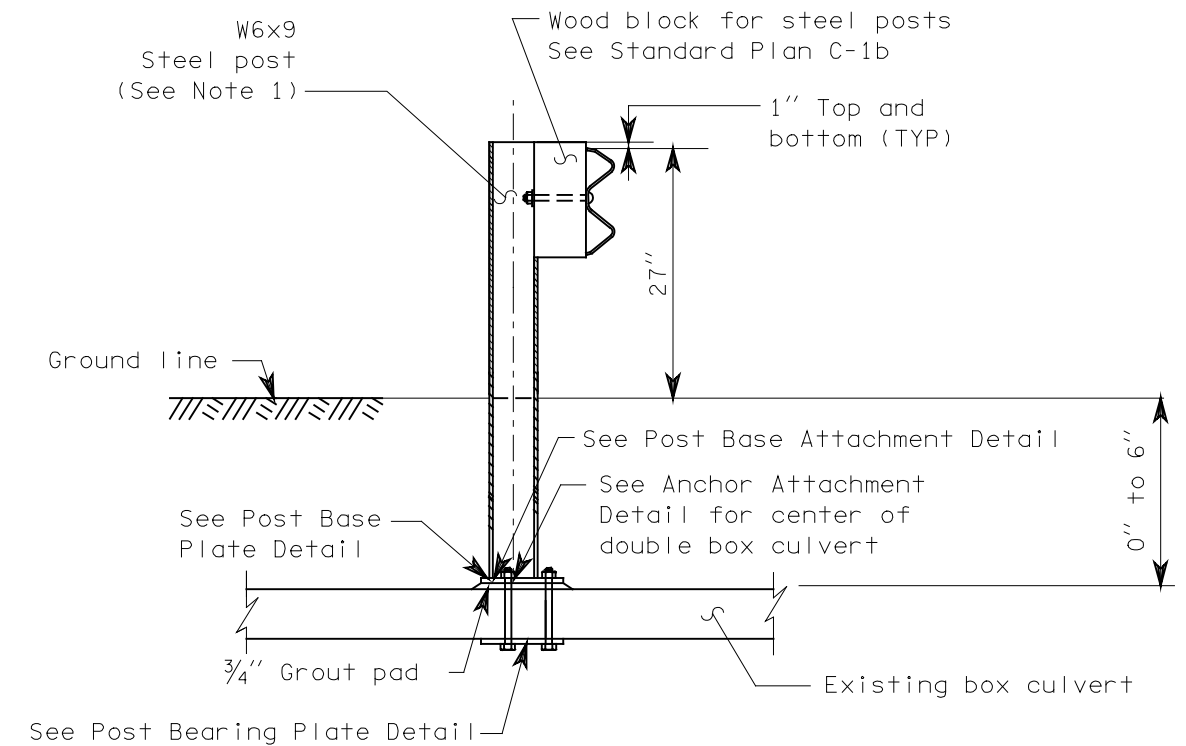
**PRECAST CONCRETE
BARRIER ANCHORS
STANDARD PLAN C-8e**

SHEET 1 OF 1 SHEET

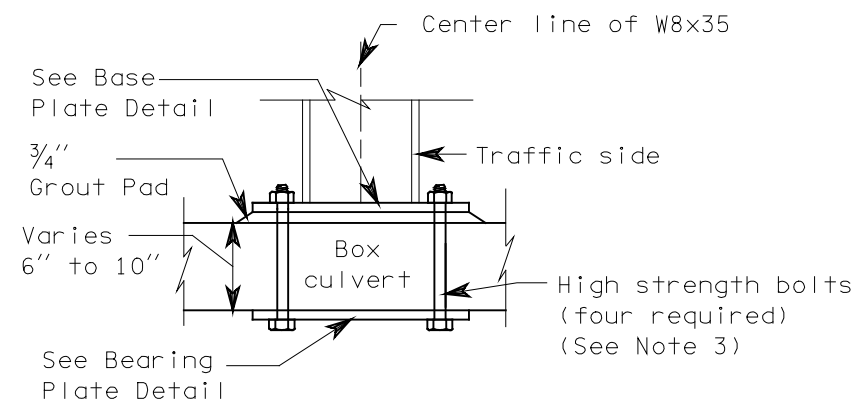
NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.			APPROVED FOR PUBLICATION	
06/2002		UPDATED ALL DETAILS AND NOTES.	MAS	DATE
DATE		REVISION	BY	DATE
				06-24-02
				STATE DESIGN ENGINEER
				Washington State Department of Transportation



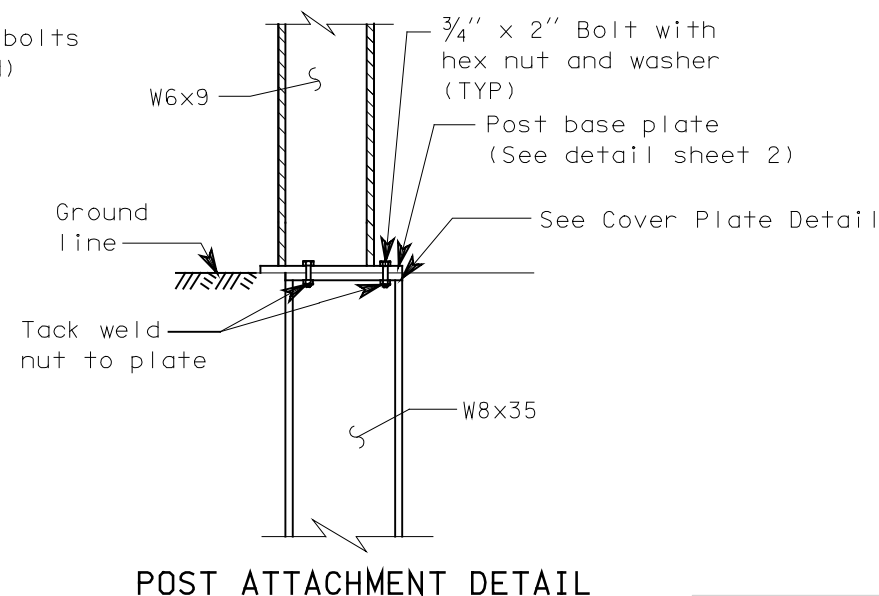
BOX CULVERT GUARDRAIL STEEL POST TYPE 1
(6" to 36" ground cover)



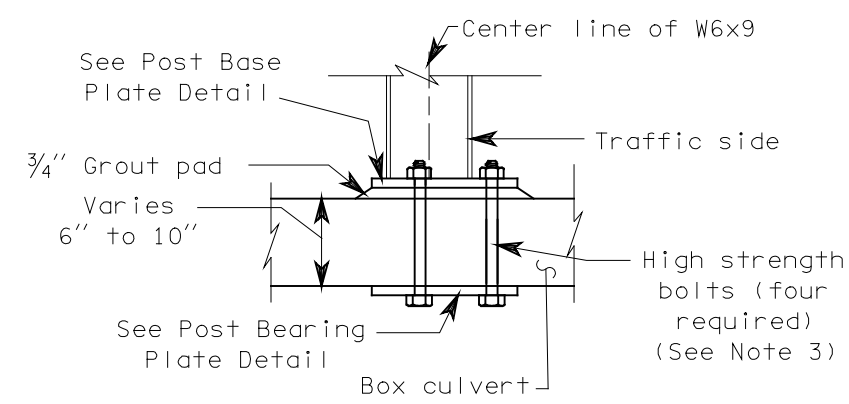
BOX CULVERT GUARDRAIL STEEL POST TYPE 2
(0" to 6" Ground cover)



BASE ATTACHMENT DETAIL



POST ATTACHMENT DETAIL




POST BASE ATTACHMENT DETAIL

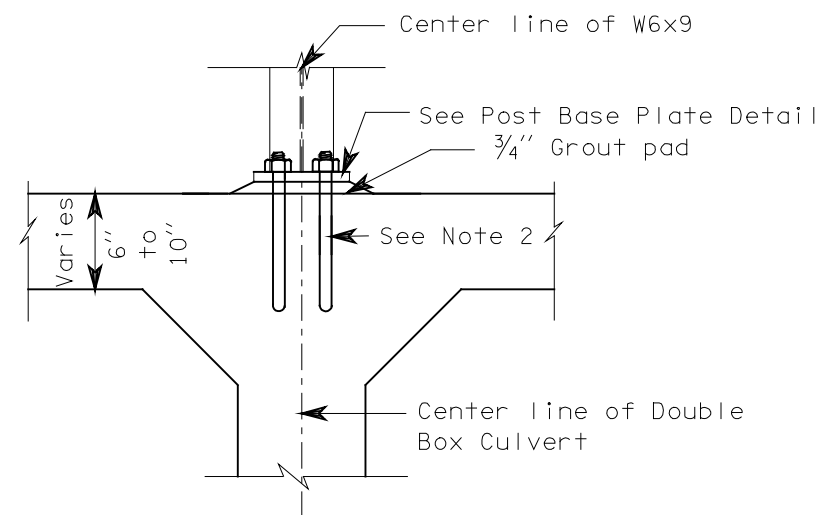


EXPIRES MAY 3, 2000

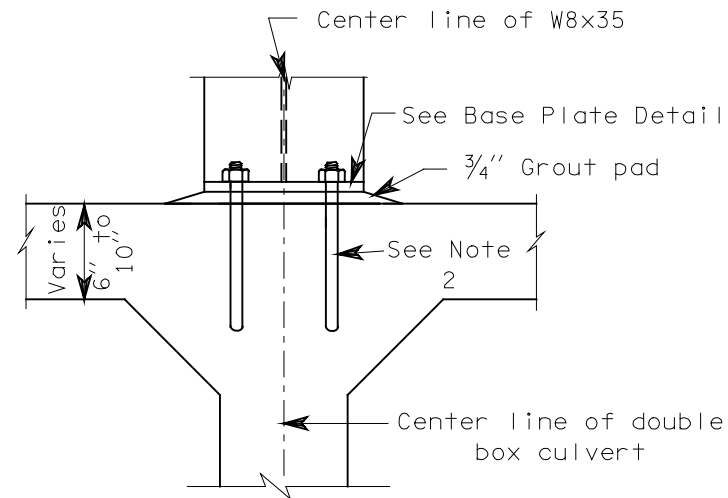
**BOX CULVERT GUARDRAIL
STEEL POST
STANDARD PLAN C-10**

SHEET 1 OF 2 SHEETS

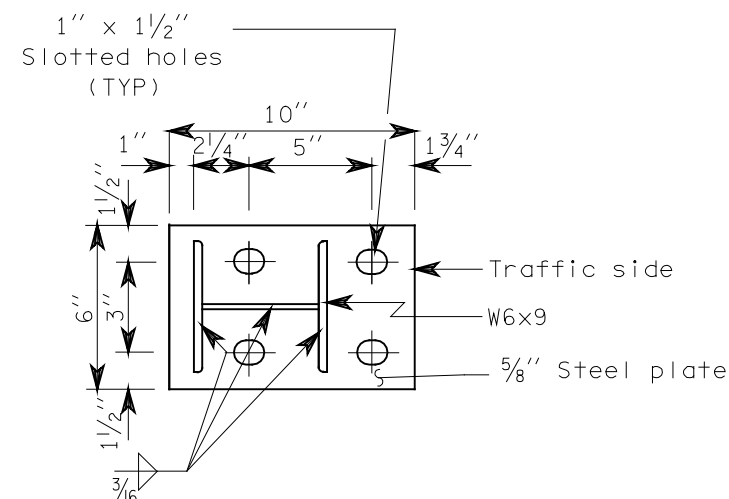
NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.			APPROVED FOR PUBLICATION	
6/98		Added wood block for steel posts.	RBA	DATE
DATE	REVISION	BY	 WASHINGTON STATE DEPARTMENT OF TRANSPORTATION OLYMPIA, WASHINGTON	



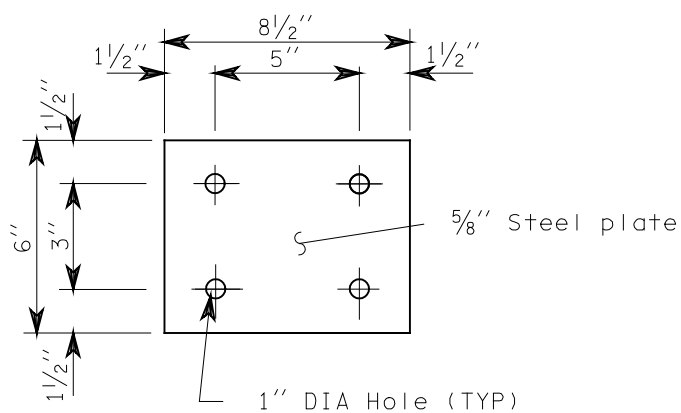
POST ANCHOR ATTACHMENT DETAIL
(See Note 4)



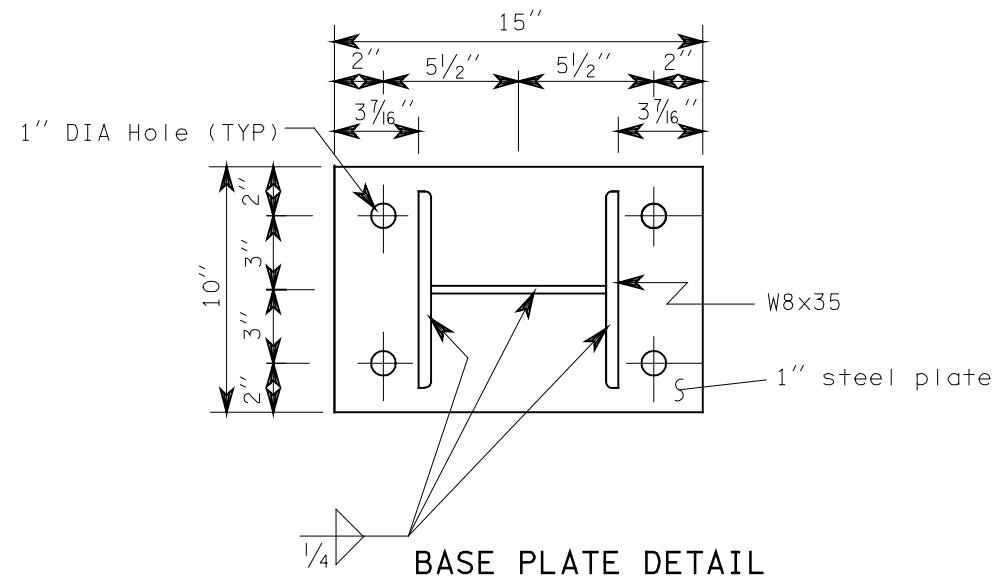
ANCHOR ATTACHMENT DETAIL
(See Note 4)



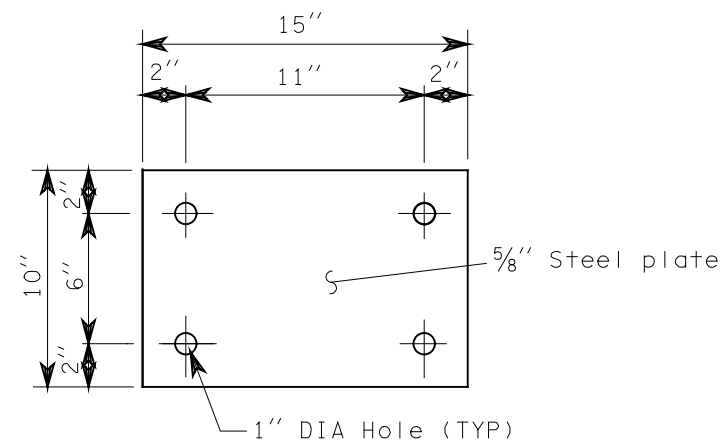
POST BASE PLATE DETAIL



POST BEARING PLATE DETAIL



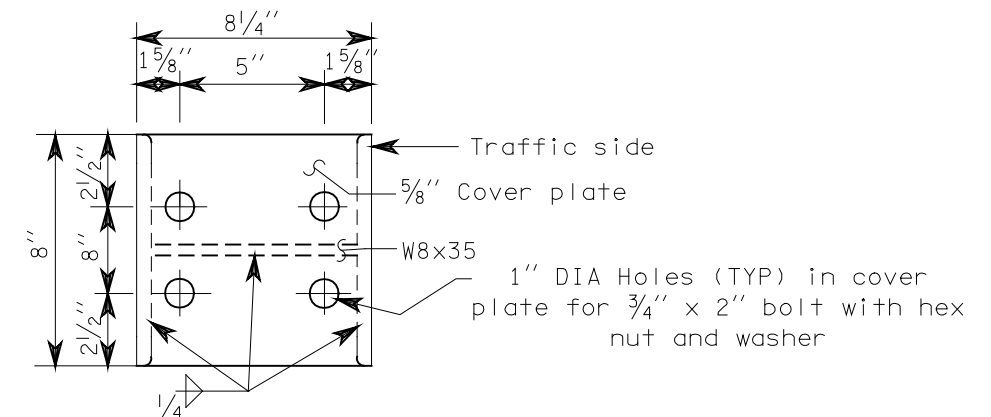
BASE PLATE DETAIL



BEARING PLATE DETAIL

NOTES

1. Length of W8x35 and W6x9 shall be determined by measurement from top of ground to top of grout pad. This distance shall be verified by the contractor.
2. Attach guardrail post to box culvert with $\frac{3}{4}$ " high strength bolts with resin bonded anchors.
3. Drill $\frac{1}{4}$ " diameter hole in concrete slab for $\frac{7}{8}$ " high strength bolts. Length of bolt is determined by top slab of box culvert thickness which shall be verified by the contractor.
4. For details of post attachment to double box culvert see Standard Plan "Guardrail Placement," Case 15.



COVER PLATE DETAIL



EXPIRES MAY 3, 2000

BOX CULVERT GUARDRAIL STEEL POST STANDARD PLAN C-10

SHEET 2 OF 2 SHEETS

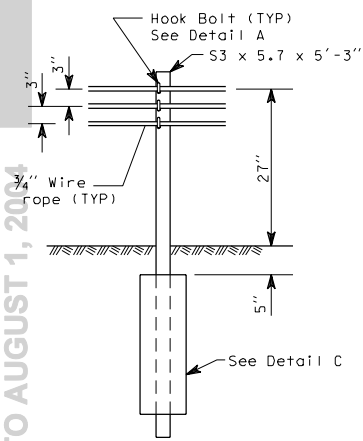
NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.

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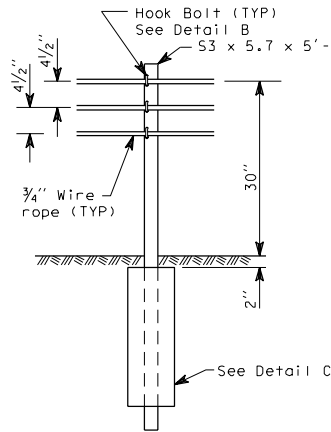
Clifford E. Mansfield 07/31/98

DEPUTY STATE DESIGN ENGINEER DATE

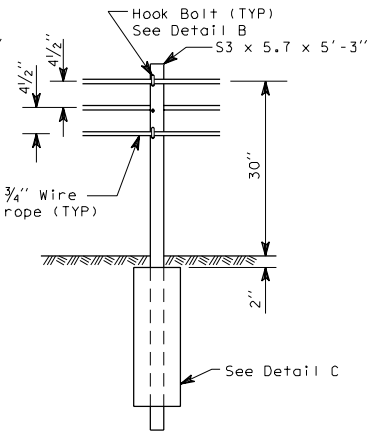
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON



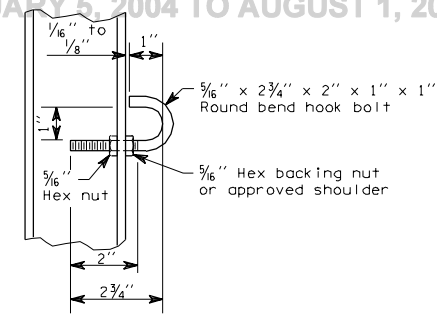
TYPE 1



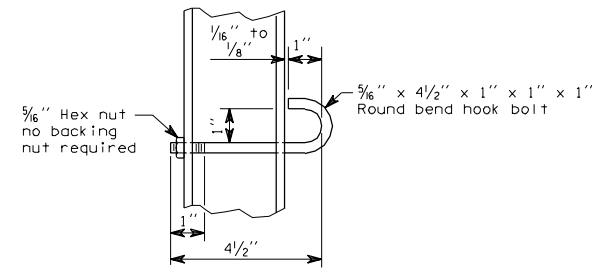
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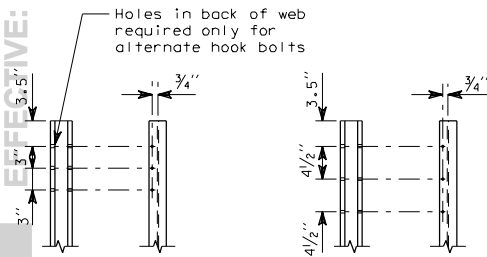
TYPE 3



HOOK BOLT

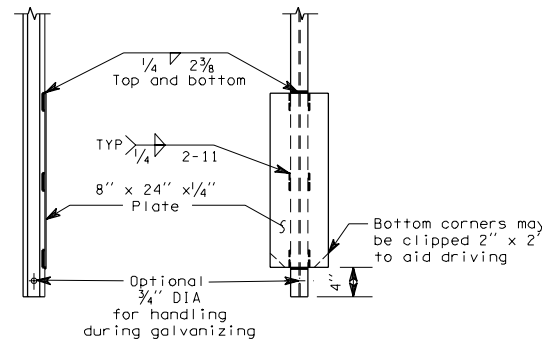


ALTERNATE HOOK BOLT



DETAIL A

DETAIL B



DETAIL C

CABLE BARRIER

NOTES

- 1. When installed in front of slopes steeper than 6:1 distance between posts and slope break point shall be 12" Min.
- 2. Where barrier is parallel to the edge of the travelled way, every sixth post shall have a reflector. Reflectors shall be white when installed on the right side of traffic, and yellow when installed on the left side of traffic.

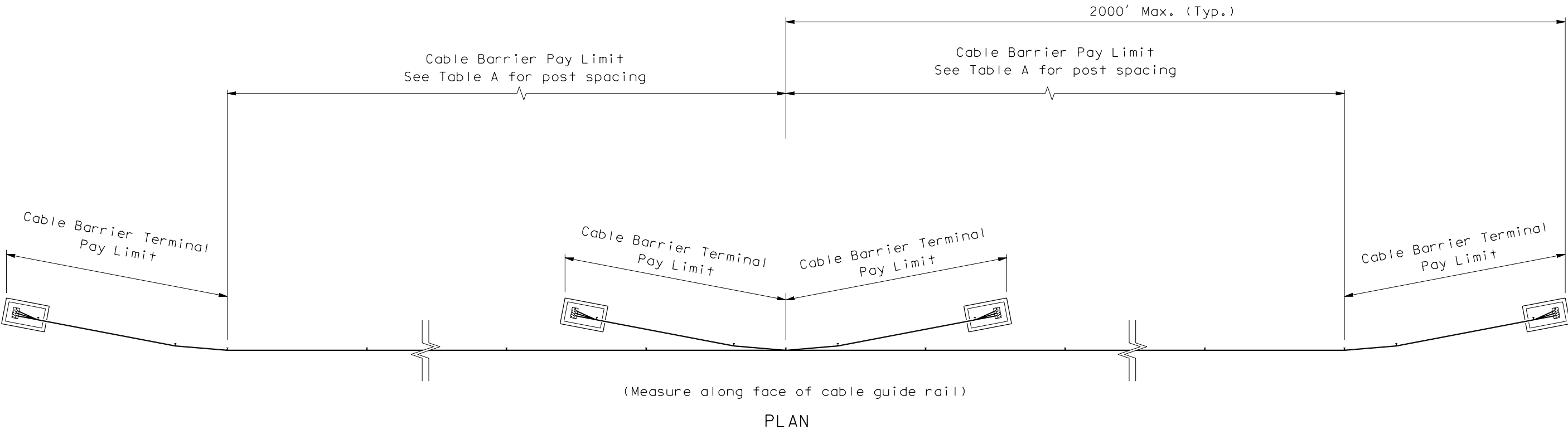
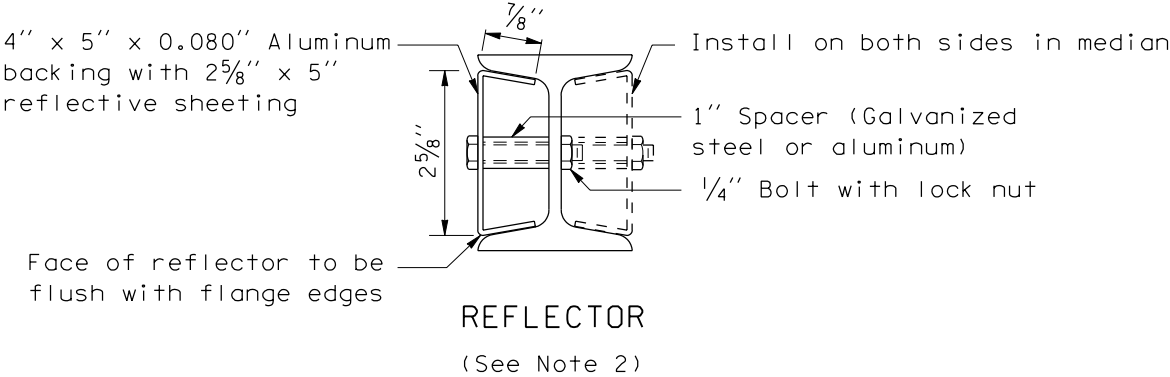


TABLE A	
Curve Radius	Post Spacing
700' or more	16'
699' to 220'	12'
219' to 110'	6'
Less Than 110'	Use Not Recommended



EXPIRES MAY 3, 2000

CABLE BARRIER
PLACEMENT
STANDARD PLAN C-110

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1/99	Noted maximum length on Plan View	RG
DATE	REVISION	BY

APPROVED FOR PUBLICATION

Brian Ziegler

2/19/99

DEPUTY STATE DESIGN ENGINEER

DATE



WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

NOTES

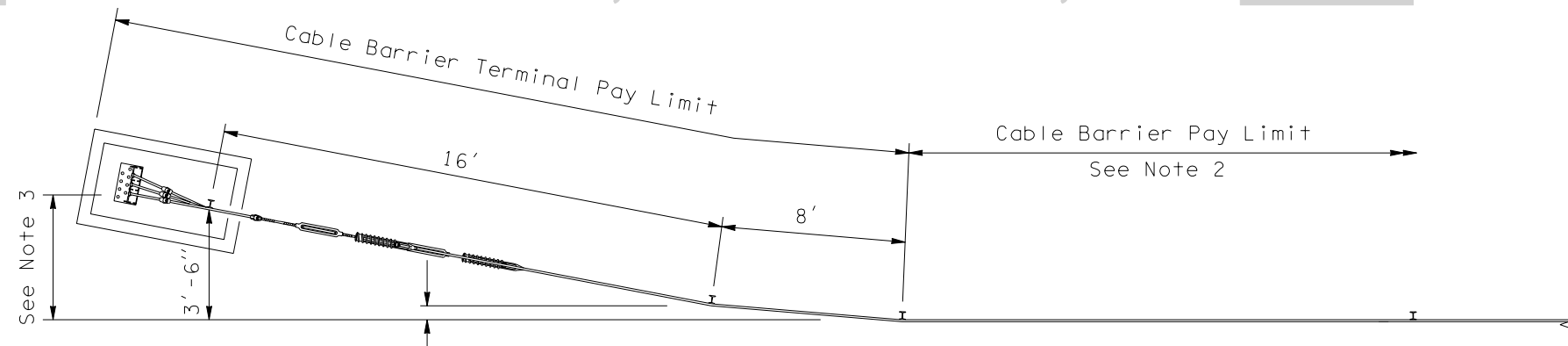
1. Stagger Spring Cable End assemblies for clearance between units. Installation of cable end assemblies shall be as follows:

LENGTH OF CABLE RUNS:

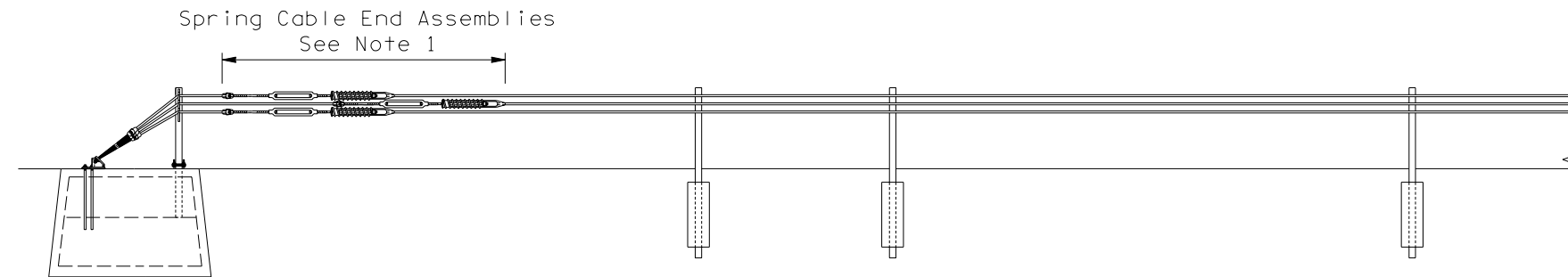
Up to 500' - Use the Spring Cable End Assembly on one end, and turnbuckle only on the other end of each cable.

Over 500' to 2000' - Use the Spring Cable End Assembly on each end of each cable.

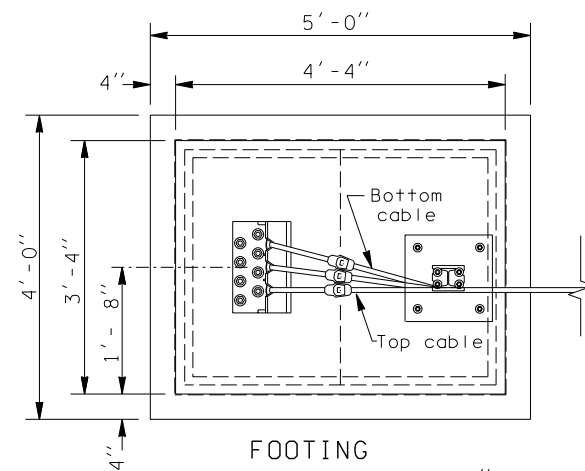
2. See Standard Plan C-11a for post spacing.
3. Distance from tangent of barrier run to notch for top cable on breakaway anchor angle shall be 4'.
4. The distance from the top of the footing to top of the highest cable is:
27" for TYPE 1 Cable Barrier,
30" for TYPE 2 and TYPE 3 Cable Barrier.
5. Where the cable is connected to a cable socket with a wedge type connector, one wire of the wire rope shall be crimped over the base of the wedge to hold it firmly in place.



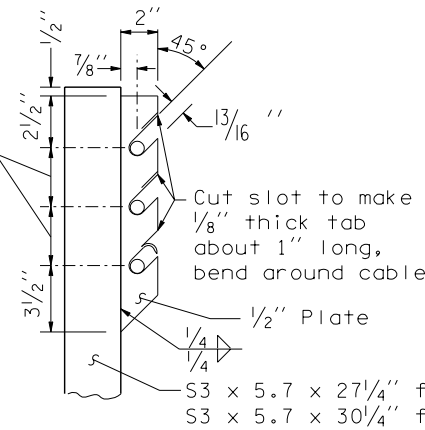
PLAN VIEW



ELEVATION

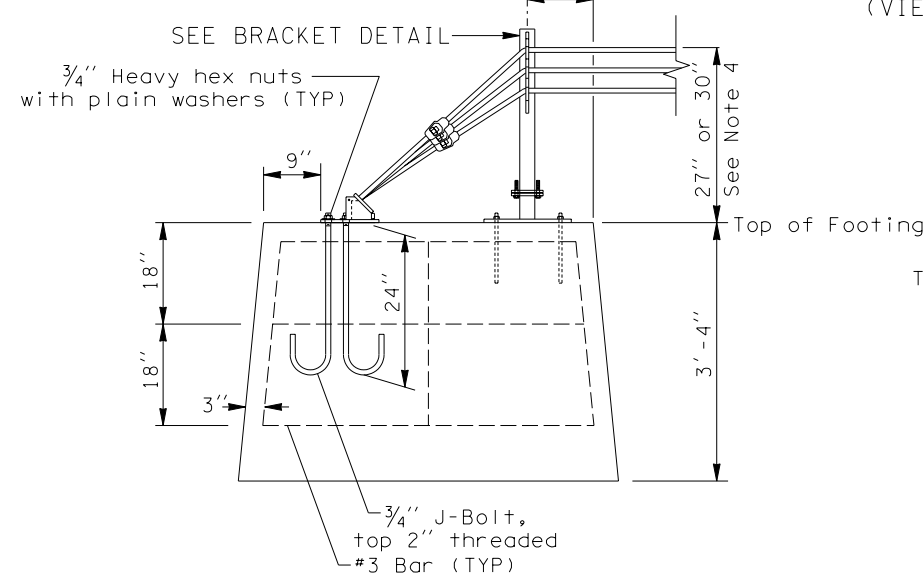
FOOTING
PLAN VIEW

3" For TYPE 1 Cable Barrier;
4 1/2" For TYPE 2 and TYPE 3 Cable Barrier

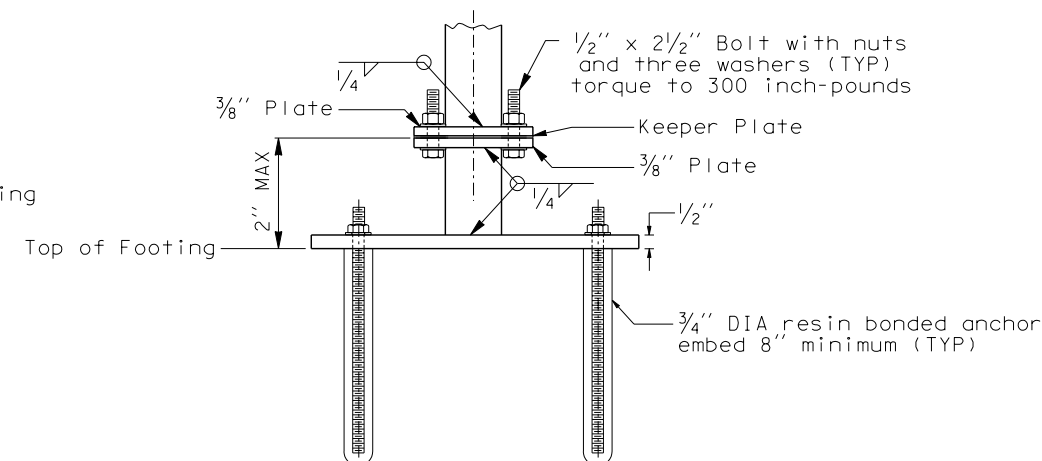
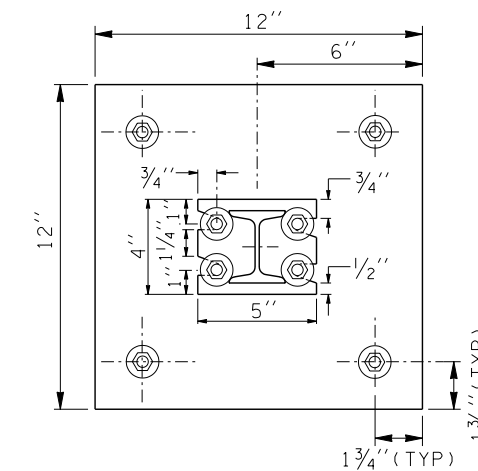


BRACKET DETAIL

(VIEW IS ORIENTED 90° FROM POST SLIP BASE VIEW SHOWN BELOW)



FOOTING ELEVATION

POST SLIP BASE
ELEVATIONPOST SLIP BASE
PLAN VIEW

EXPIRES MAY 16, 2003

**CABLE BARRIER
TERMINAL
STANDARD PLAN C-11b**

SHEET 1 OF 2 SHEETS

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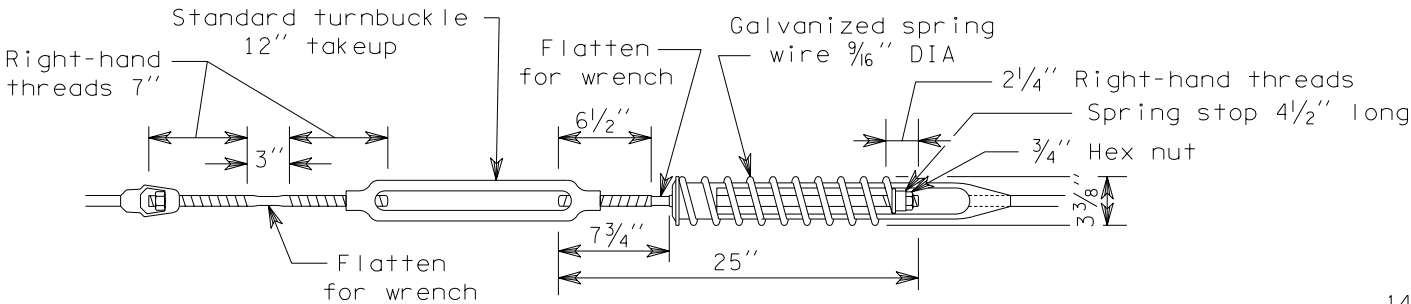
Harold J. Peterfeso
STATE DESIGN ENGINEER

09-28-01
DATE

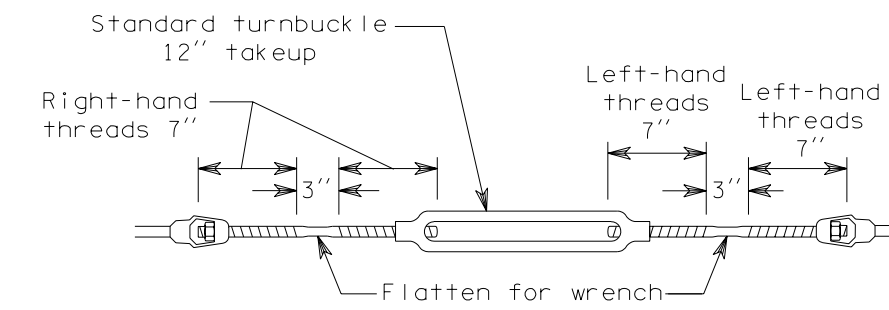


Washington State Department of Transportation

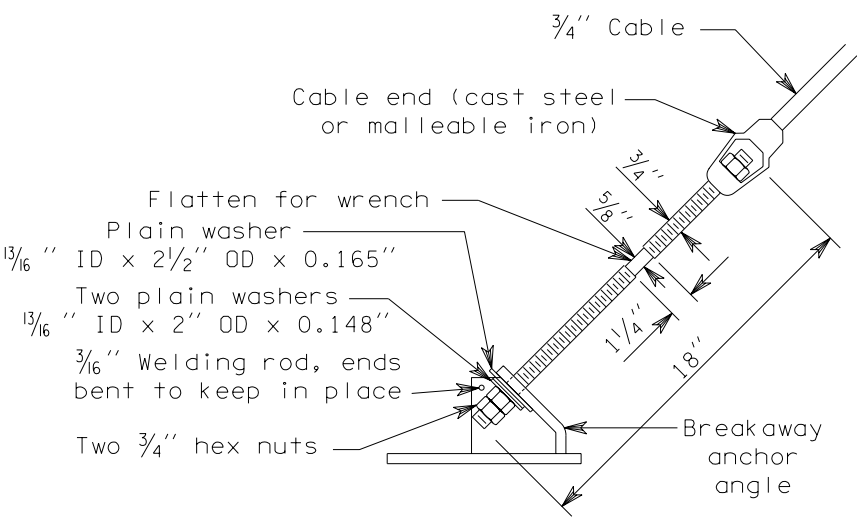
DATE 9/01 REVISION REVISED POST CONNECTION TO FOOTING RG BY



SPRING CABLE END ASSEMBLY

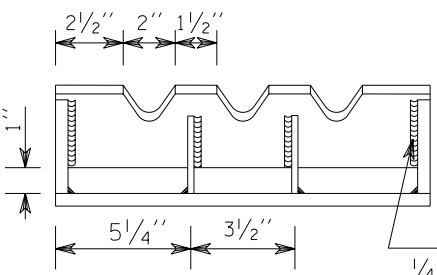
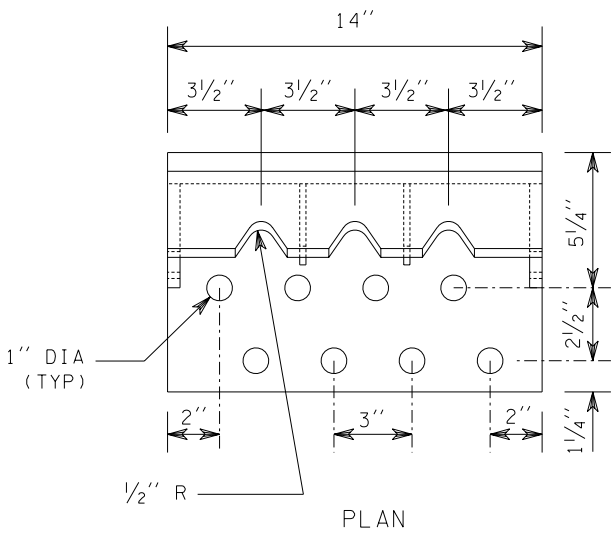


TURNBUCKLE ASSEMBLY

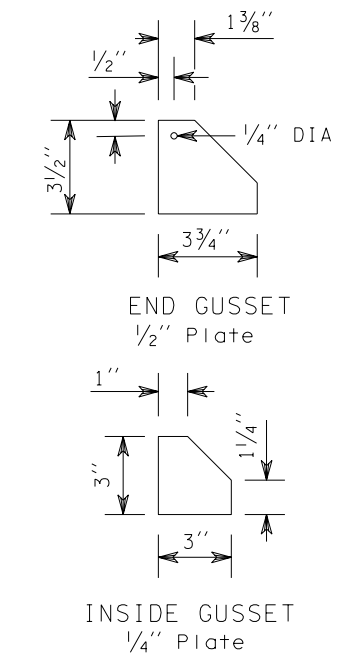


CABLE END ASSEMBLY TO BREAKAWAY ANCHOR ANGLE DETAIL

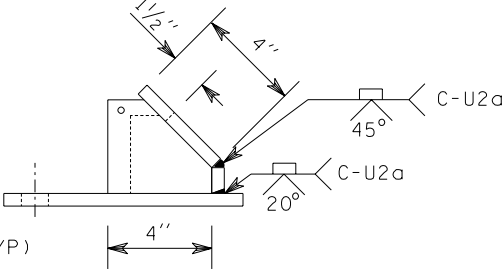
Brass keeper rod must be installed prior to tensioning cable



ELEVATION

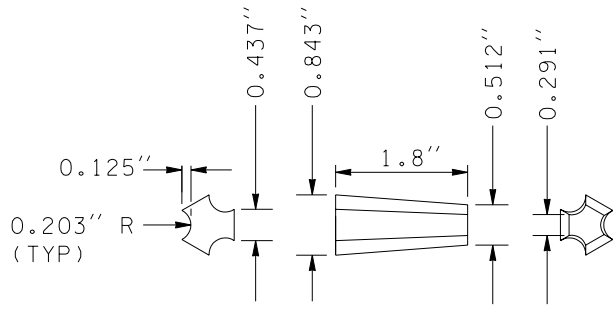


INSIDE GUSSET 1/4 inch Plate



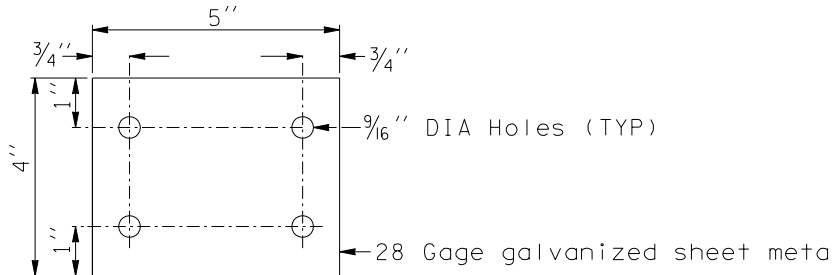
SIDE VIEW

BREAKAWAY ANCHOR ANGLE

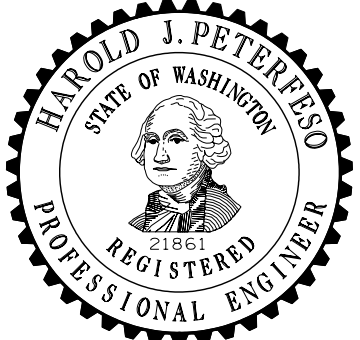


CABLE WEDGE

Use with all cable fittings



KEEPER PLATE DETAIL



EXPIRES MAY 16, 2003

CABLE BARRIER TERMINAL
STANDARD PLAN C-11b

SHEET 2 OF 2 SHEETS

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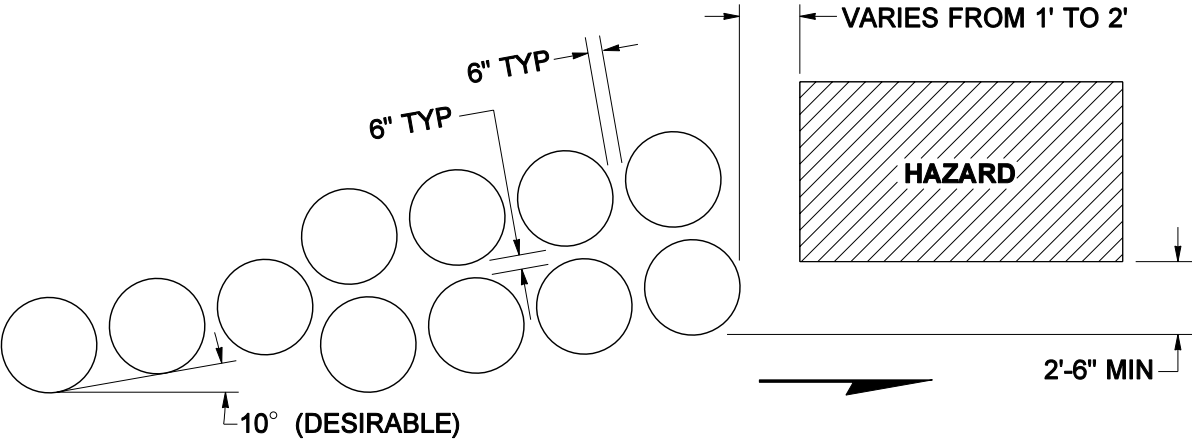
Harold J. Peterfeso
STATE DESIGN ENGINEER

09-28-01
DATE

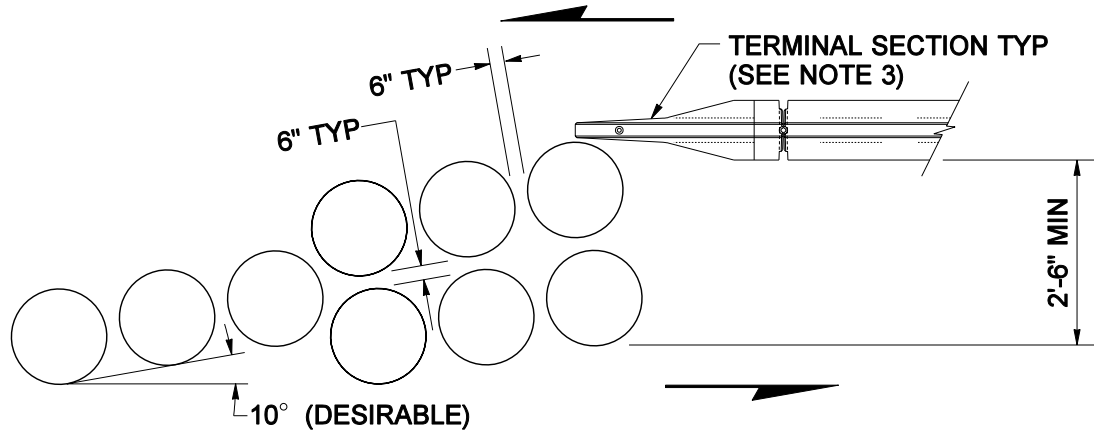


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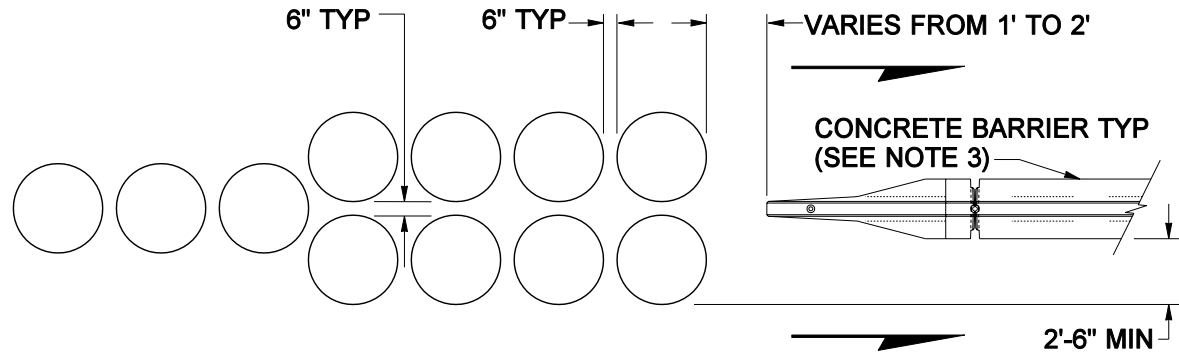
9/01	ADDED KEEPER PLATE DETAIL	RG
DATE	REVISION	BY



ROADSIDE INSTALLATION DETAIL



MEDIAN INSTALLATION DETAIL



GORE INSTALLATION DETAIL

INSTALLATION DETAILS

	200	200
	400	400
	400	700
400	700	700 700
1400 1400	1400 1400	1400 1400
1400 1400	1400 1400	1400 1400
1400 1400	1400 1400	1400 1400
TYPE 1	TYPE 2	TYPE 3
POSTED SPEED	POSTED SPEED	POSTED SPEED
40 MPH OR LESS	45 MPH	50 MPH
		200
200	200	200
400	400	200 200
400	400	200 200
700	400 400	400 400
700 700	700 700	700 700
700 700	1400 1400	1400 1400
1400 1400	1400 1400	1400 1400
2100 2100	2100 2100	2100 2100
TYPE 4	TYPE 5	TYPE 6
POSTED SPEED	POSTED SPEED	POSTED SPEED
55 MPH	60 MPH	70 MPH

ATTENUATOR CONFIGURATIONS

NOTES

1. An Energite III System, fabricated by Energy Absorption Systems, Inc., a Fitch System as fabricated by Roadway Safety Service, Inc., or a Traffix Sand Attenuator as fabricated by Traffix Devices, Inc. shall be installed in accordance with the manufacturer's recommendations.
2. For temporary installations, the inertial barriers may be placed on wood pallets that are 4" or less in height.
3. For Terminal Section or Concrete Barrier details see Standard Plan C-8.



EXPIRES MAY 3, 2002

IMPACT ATTENUATOR
INERTIAL BARRIER
CONFIGURATIONS
STANDARD PLAN C-12

APPROVED FOR PUBLICATION

Clifford E. Mansfield
STATE DESIGN ENGINEER

07-27-01
DATE



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7/01

CORRECTED GORE INSTALLATION DETAIL

MAS

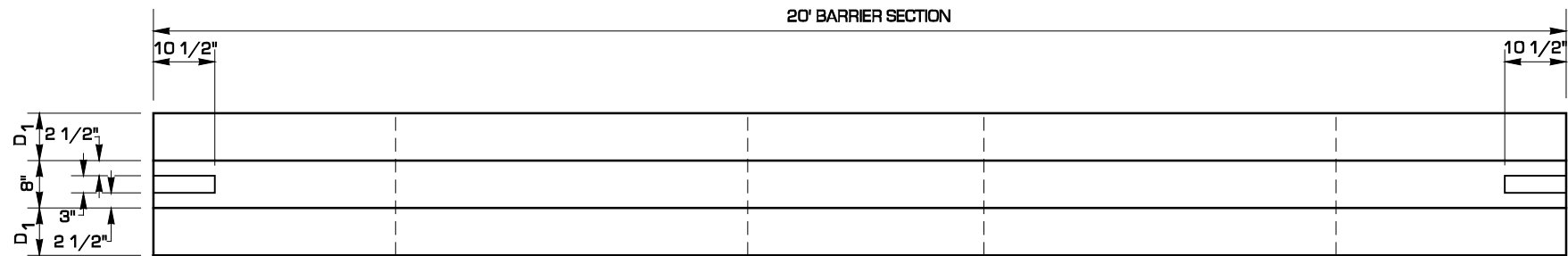
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REVISION

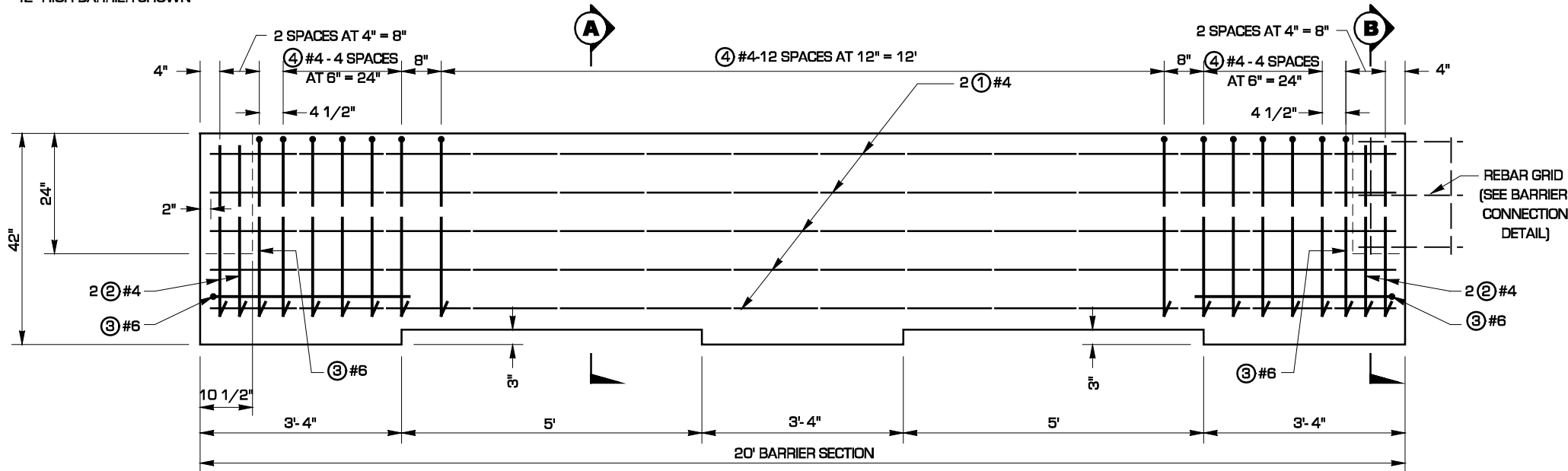
BY

THOMAS SHEA

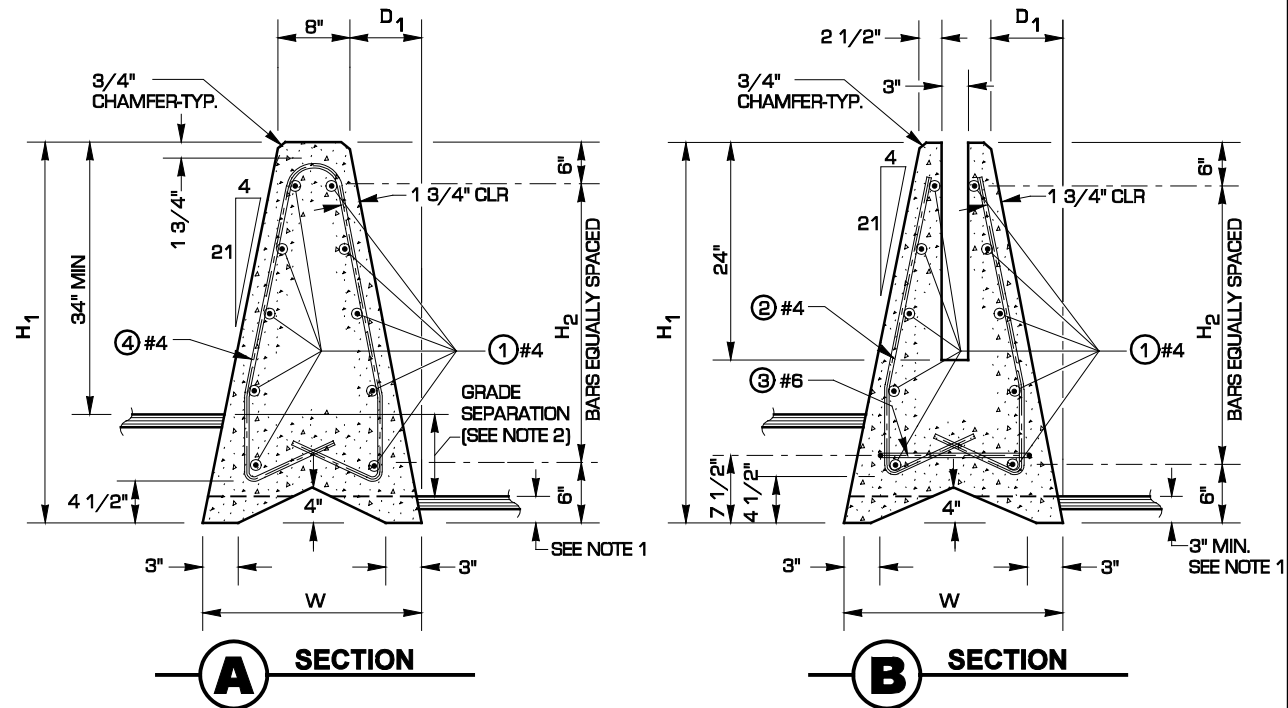
PLAN VIEW



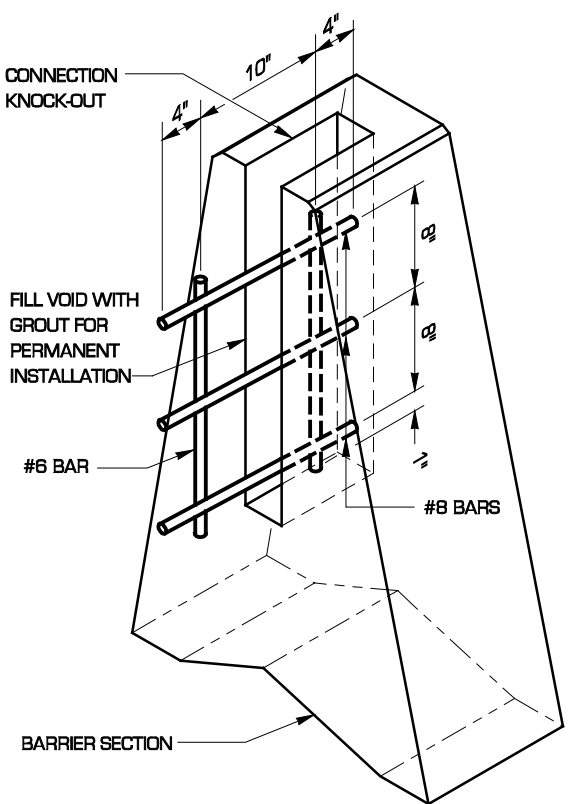
ELEVATION VIEW
42" HIGH BARRIER SHOWN



SECTIONS



BARRIER CONNECTION DETAIL



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NOTES

1. PERMANENT BARRIER SHALL BE PLACED INTO THE PAVEMENT A MINIMUM OF 3". NO EMBEDMENT REQUIRED FOR TEMPORARY BARRIER.
2. USE 42" BARRIER FOR GRADE SEPARATIONS UP TO 5".
USE 48" BARRIER FOR GRADE SEPARATIONS UP TO 7".
USE 54" BARRIER FOR GRADE SEPARATIONS UP TO 10".
3. USE ON A HORIZONTAL CURVE WITH RADII LESS THAN 2000' REQUIRES A MODIFIED END DESIGN.



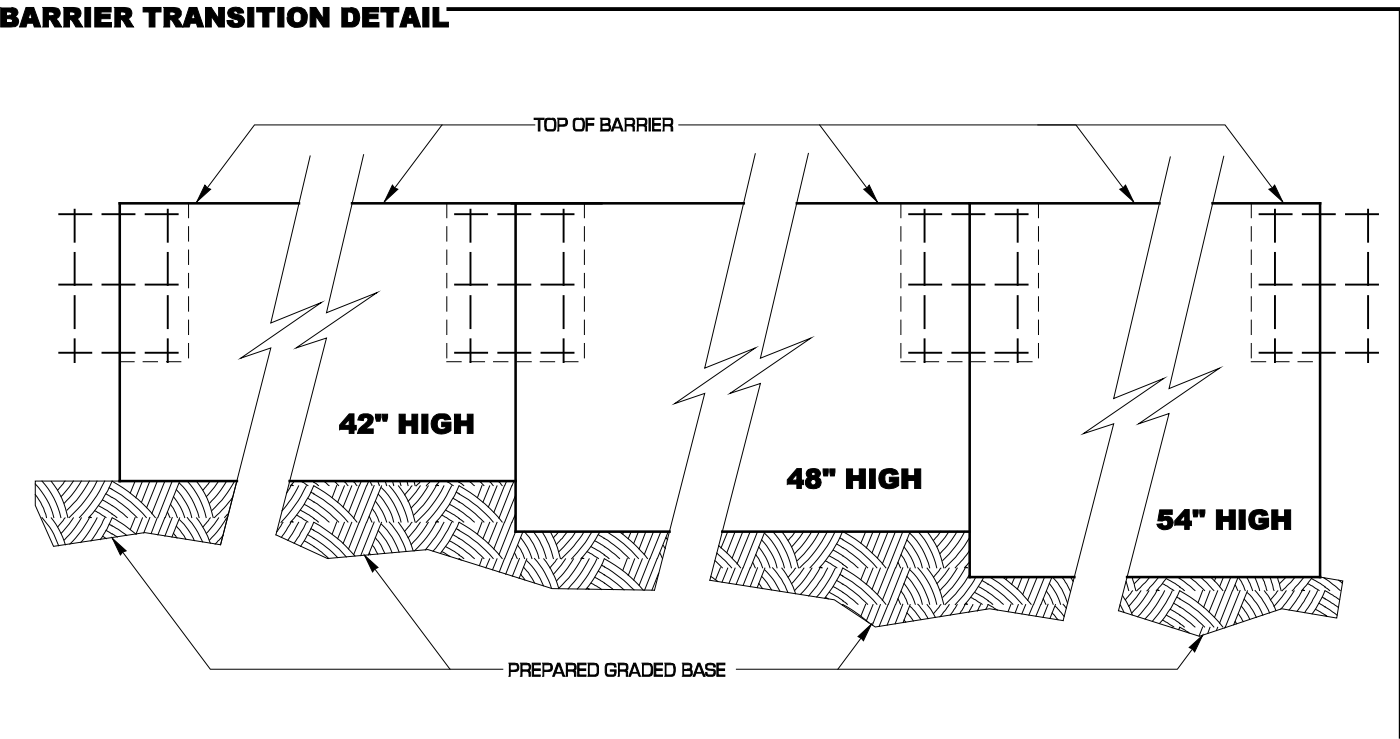
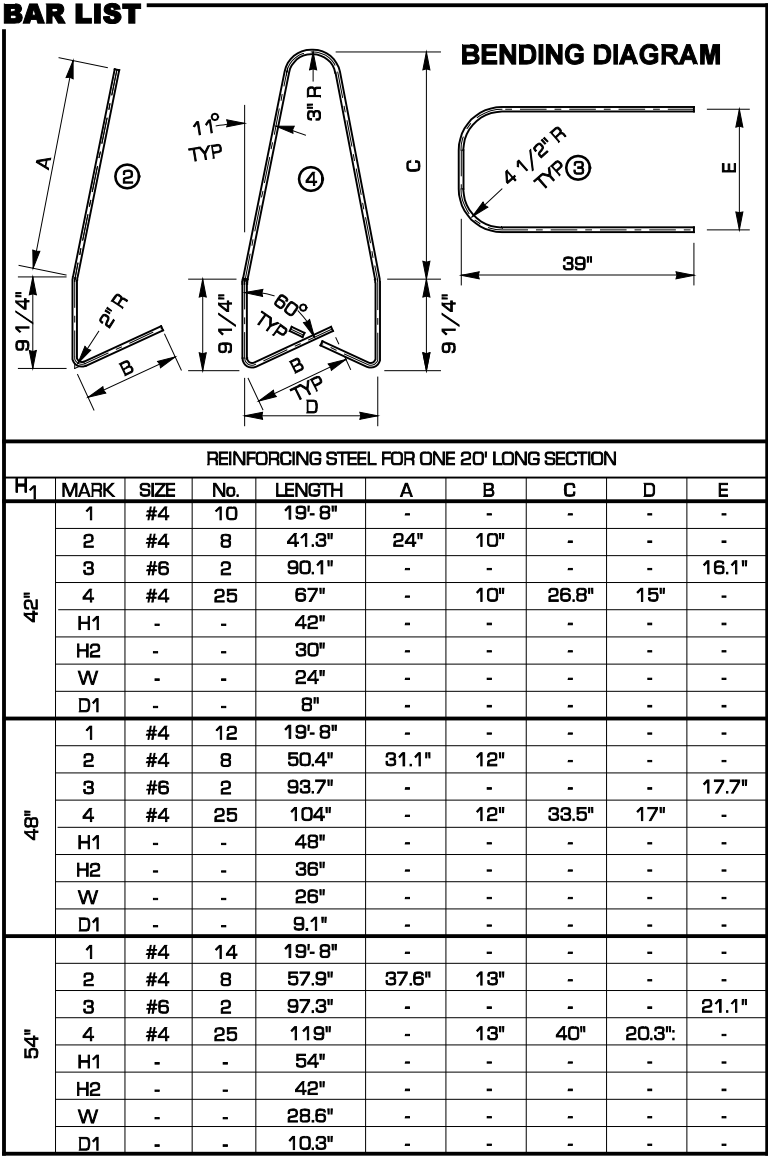
SINGLE SLOPE BARRIER
PRE-CAST TYPE
STANDARD PLAN C-13

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Clifford E. Mansfield 04-16-99

DEPUTY STATE DESIGN ENGINEER DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON



EXPIRES MAY 3, 2000

**SINGLE SLOPE BARRIER
PRE-CAST TYPE
STANDARD PLAN C-13**

SHEET 2 OF 2 SHEETS

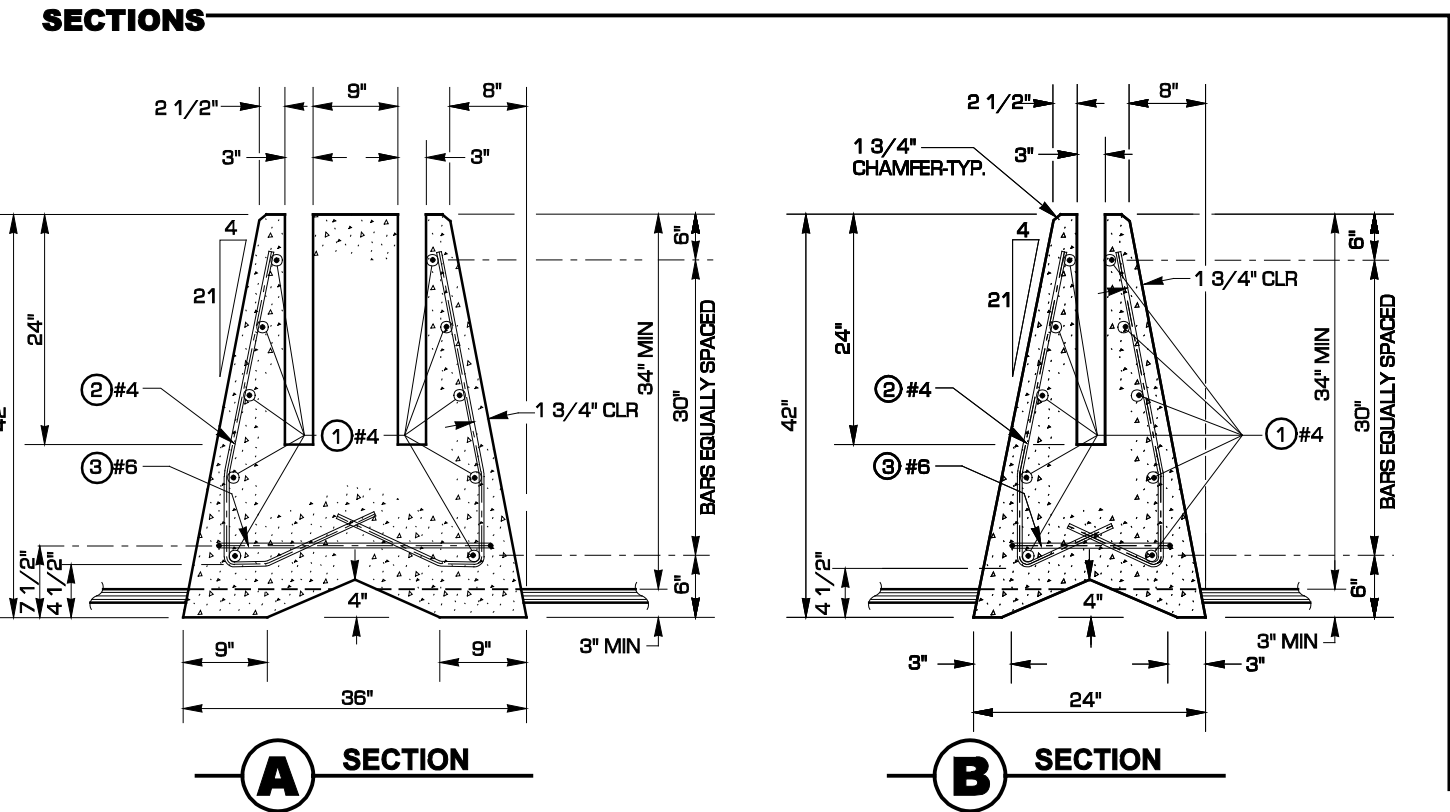
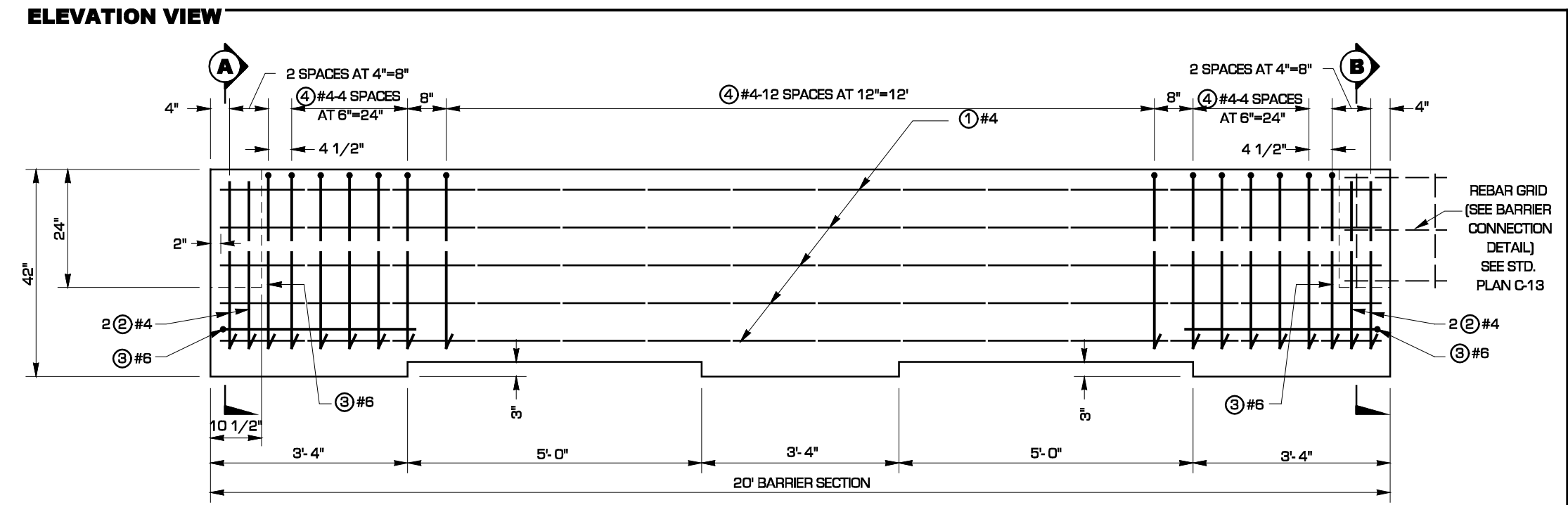
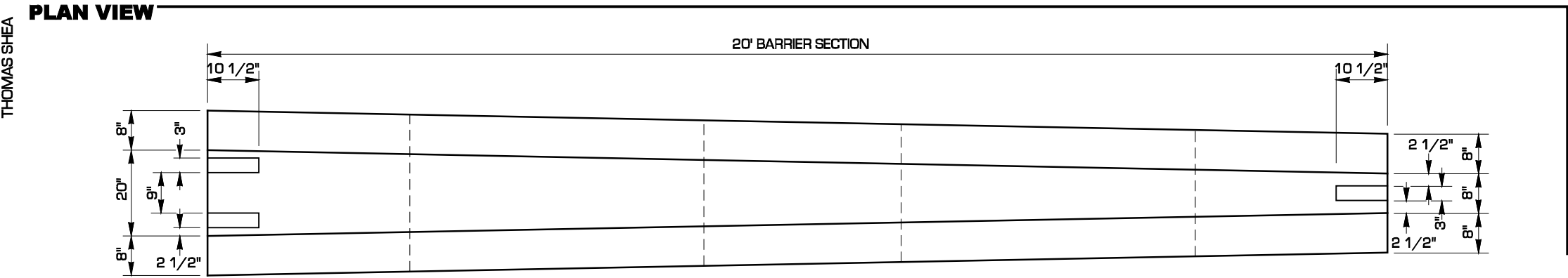
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Clifford E. Mansfield 04-16-99



DEPUTY STATE DESIGN ENGINEER DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON



BAR LIST

BENDING DIAGRAM

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

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**SINGLE SLOPE BARRIER
PRE-CAST TYPE
TRANSITION SECTION
STANDARD PLAN C-13a**

APPROVED FOR PUBLICATION

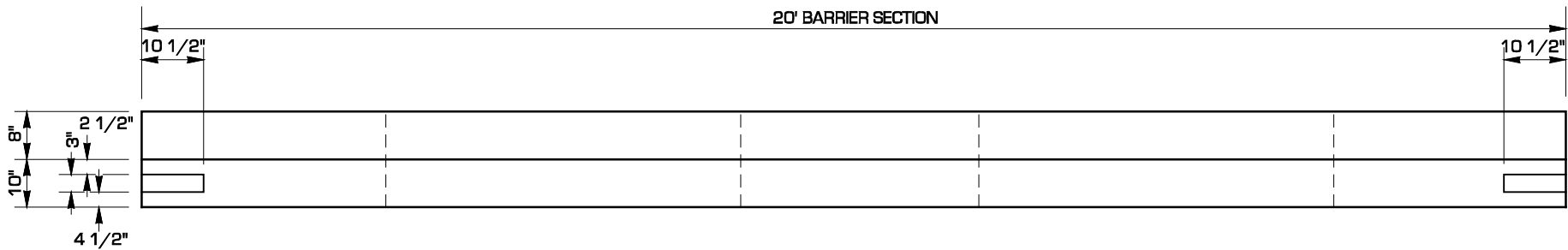
Clifford E. Mansfield 04-16-99



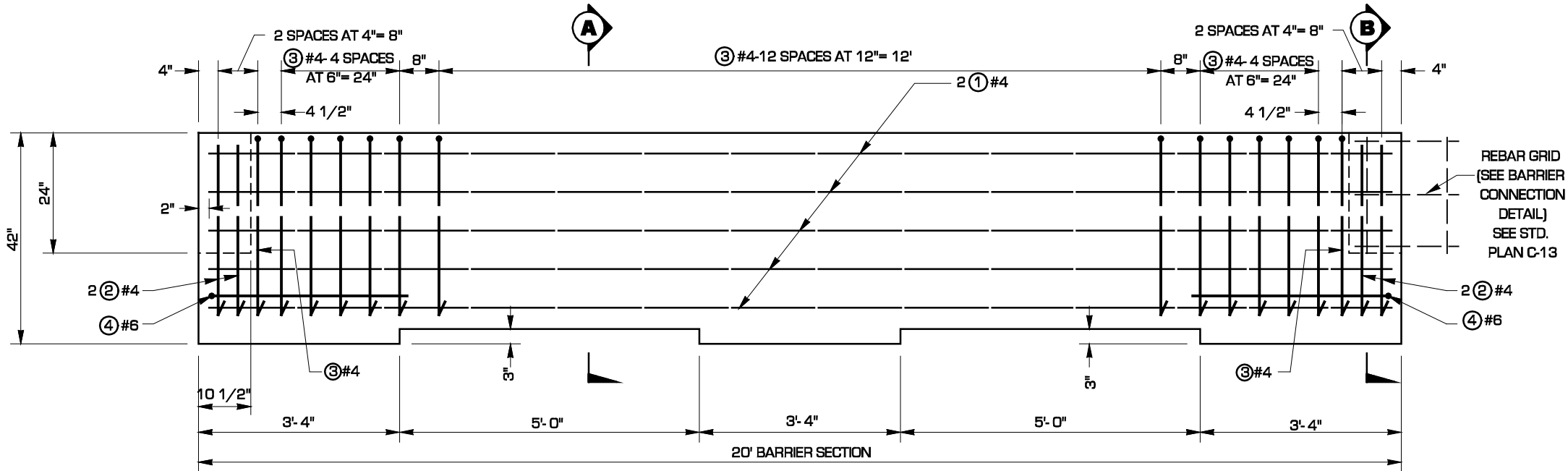
DEPUTY STATE DESIGN ENGINEER DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

THOMAS SHEA

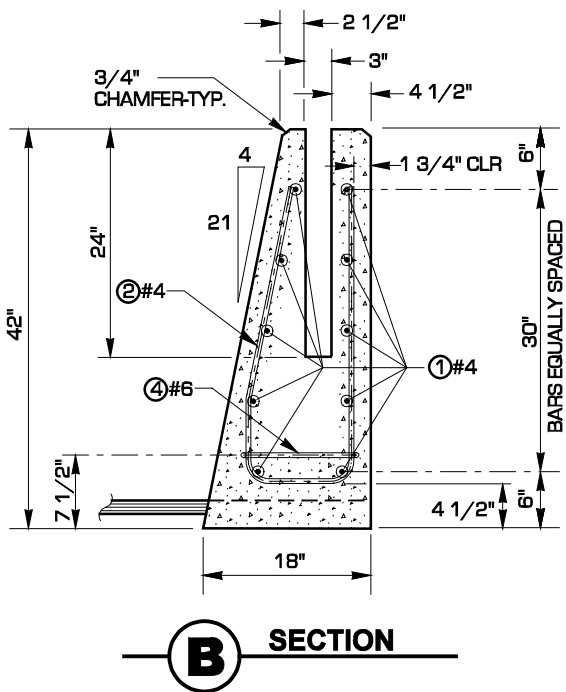
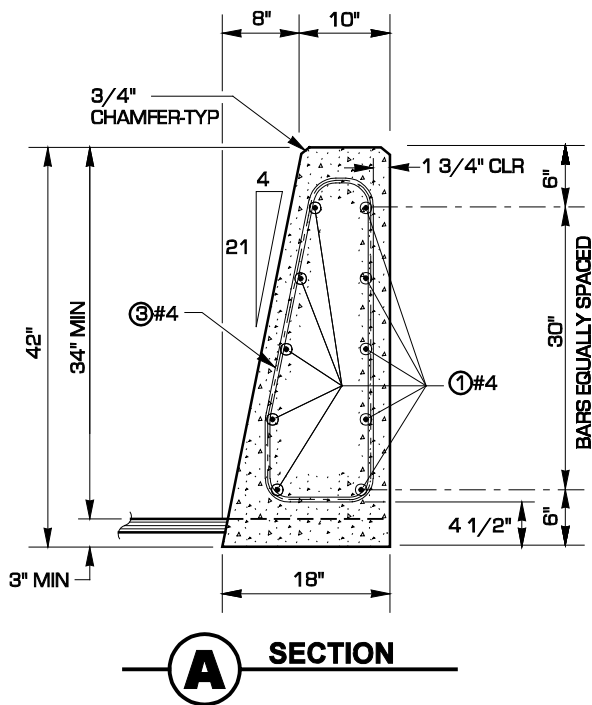
PLAN VIEW



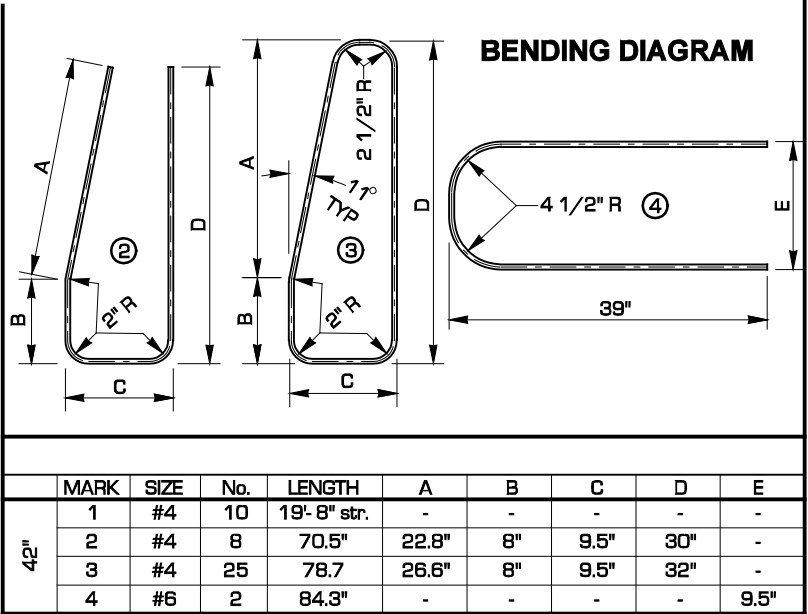
ELEVATION VIEW



SECTIONS



BAR LIST



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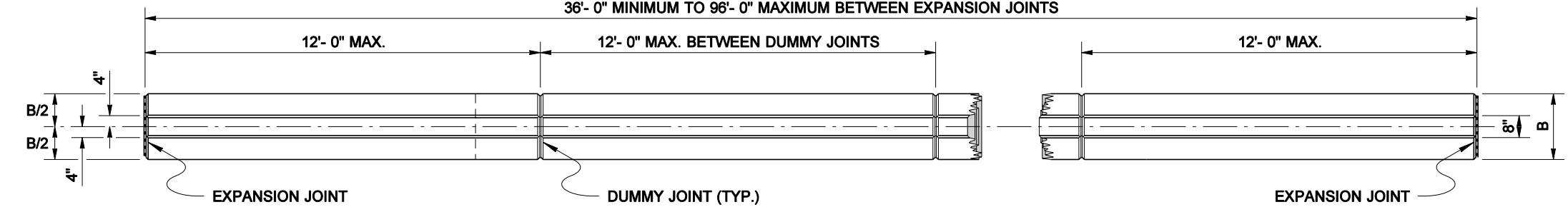
**SINGLE SLOPE BARRIER
PRE-CAST TYPE
SINGLE SIDED SECTION
STANDARD PLAN C-13b**

APPROVED FOR PUBLICATION

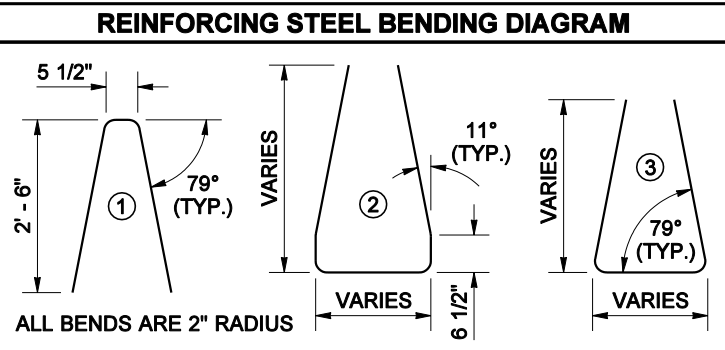
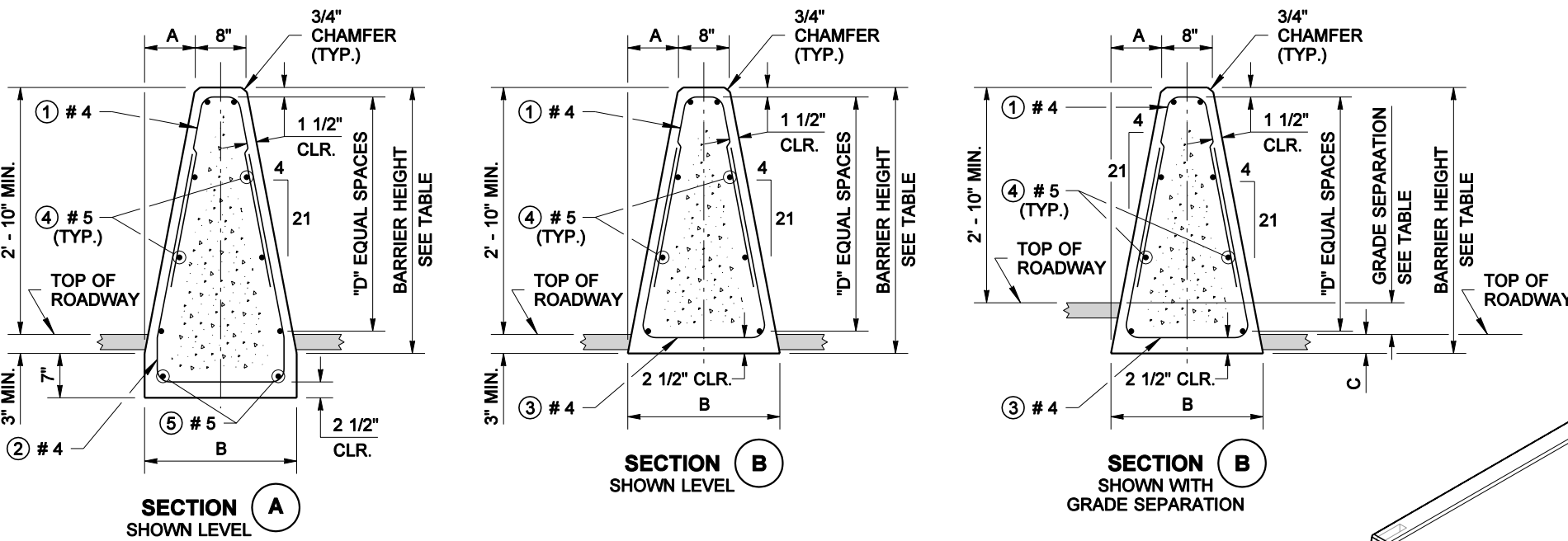
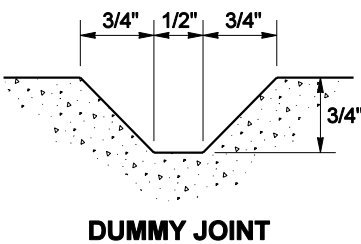
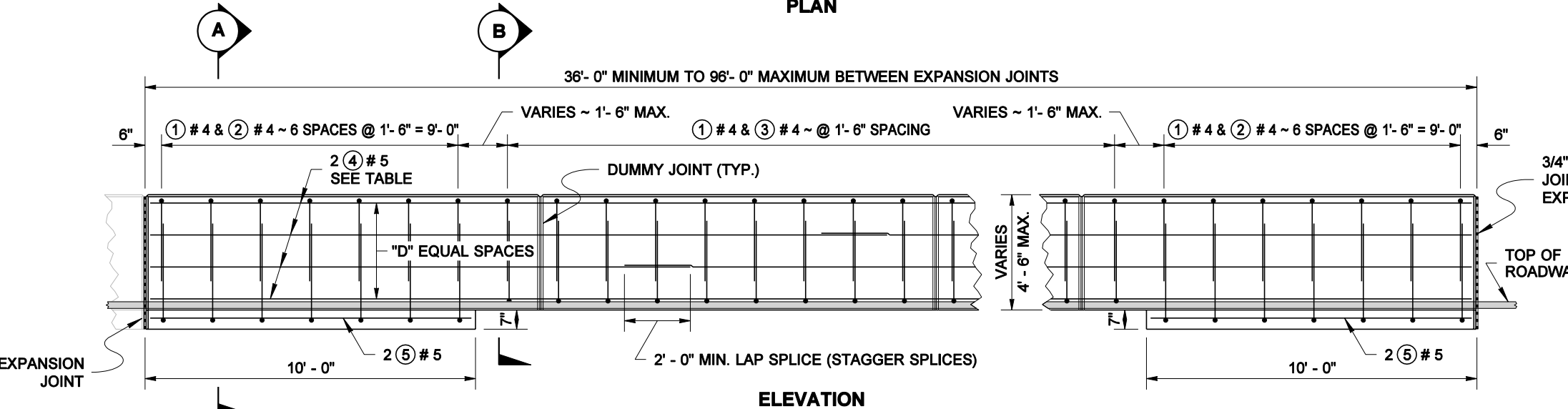
Clifford E. Mansfield 04-16-99



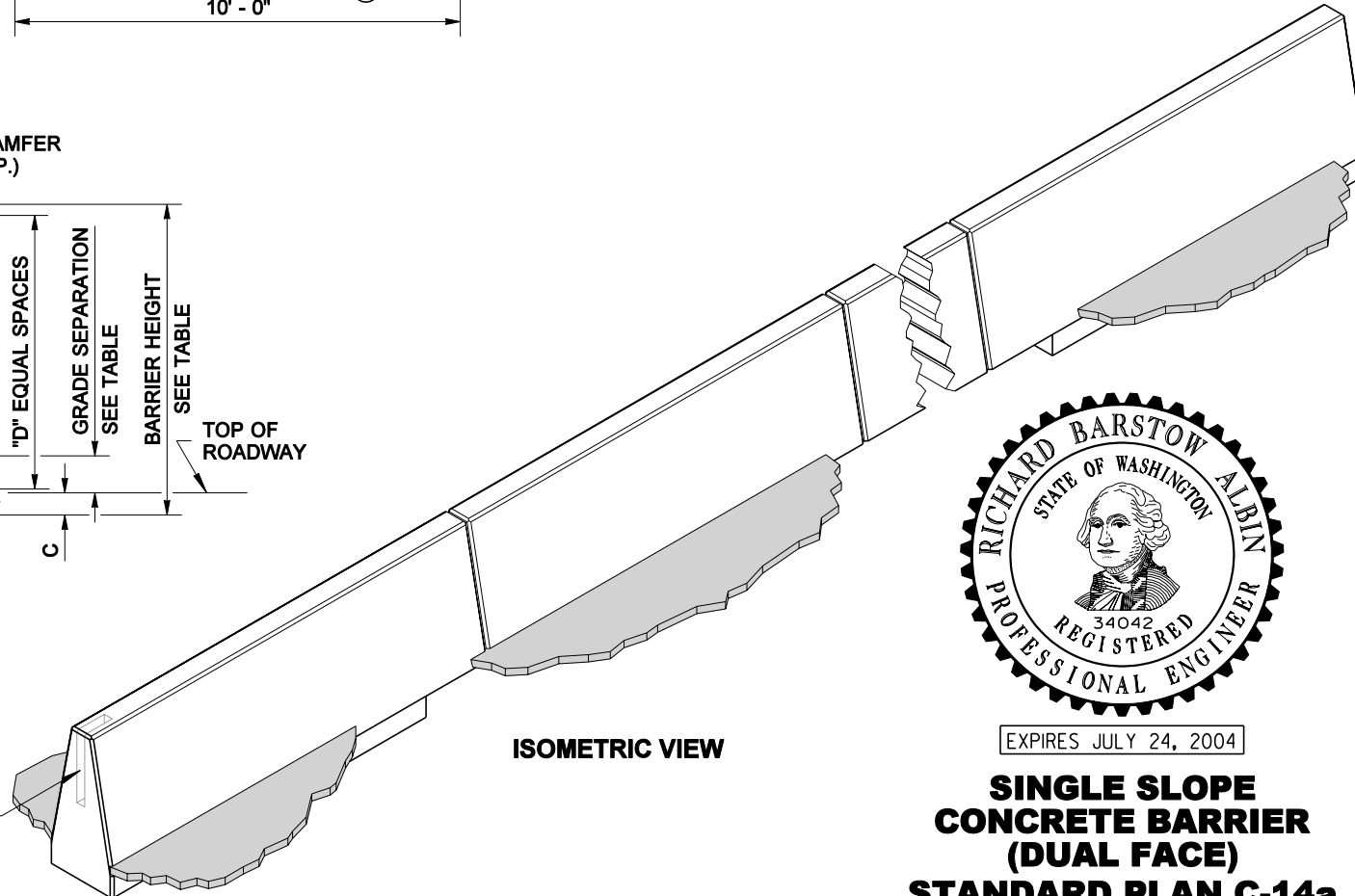
DEPUTY STATE DESIGN ENGINEER DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON



- NOTES**
1. Reinforcing steel dimensions and clearances are shown for stationary form construction. When slip-form construction is used, increase reinforcing steel clearances to the outside surfaces of the barrier to 2 1/2" and adjust the steel dimensions as required.
 2. When connecting between cast-in-place and precast single slope barrier, provide a slot and rebar grid as shown in Standard Plan C-13.



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



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

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 07-26-02

STATE DESIGN ENGINEER

DATE

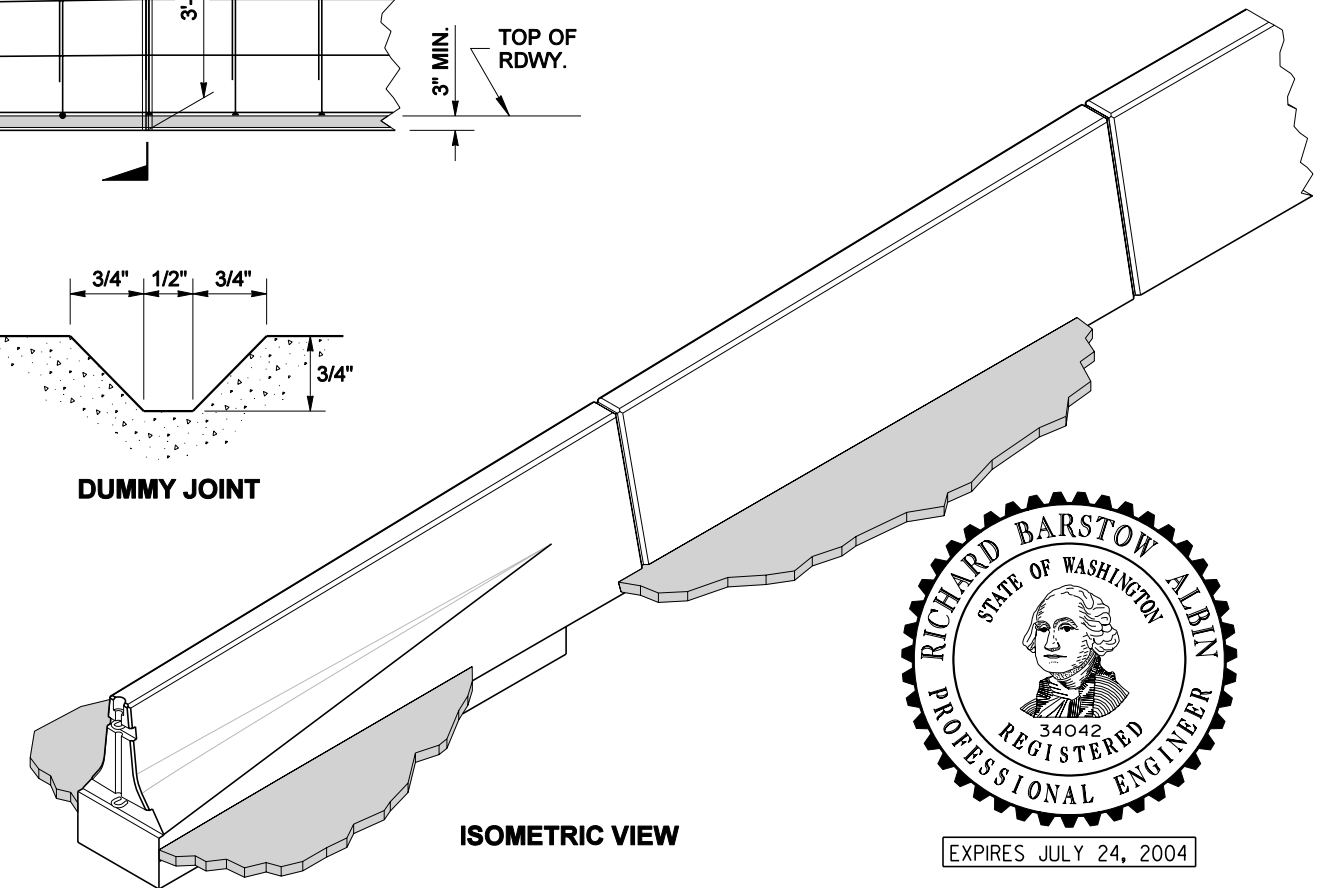
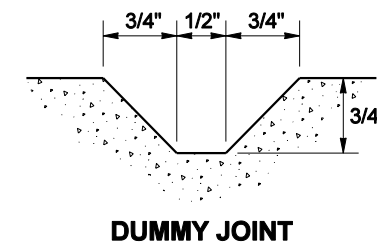
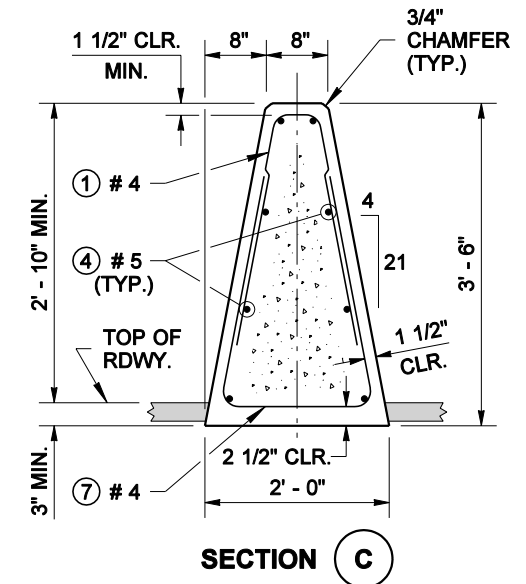
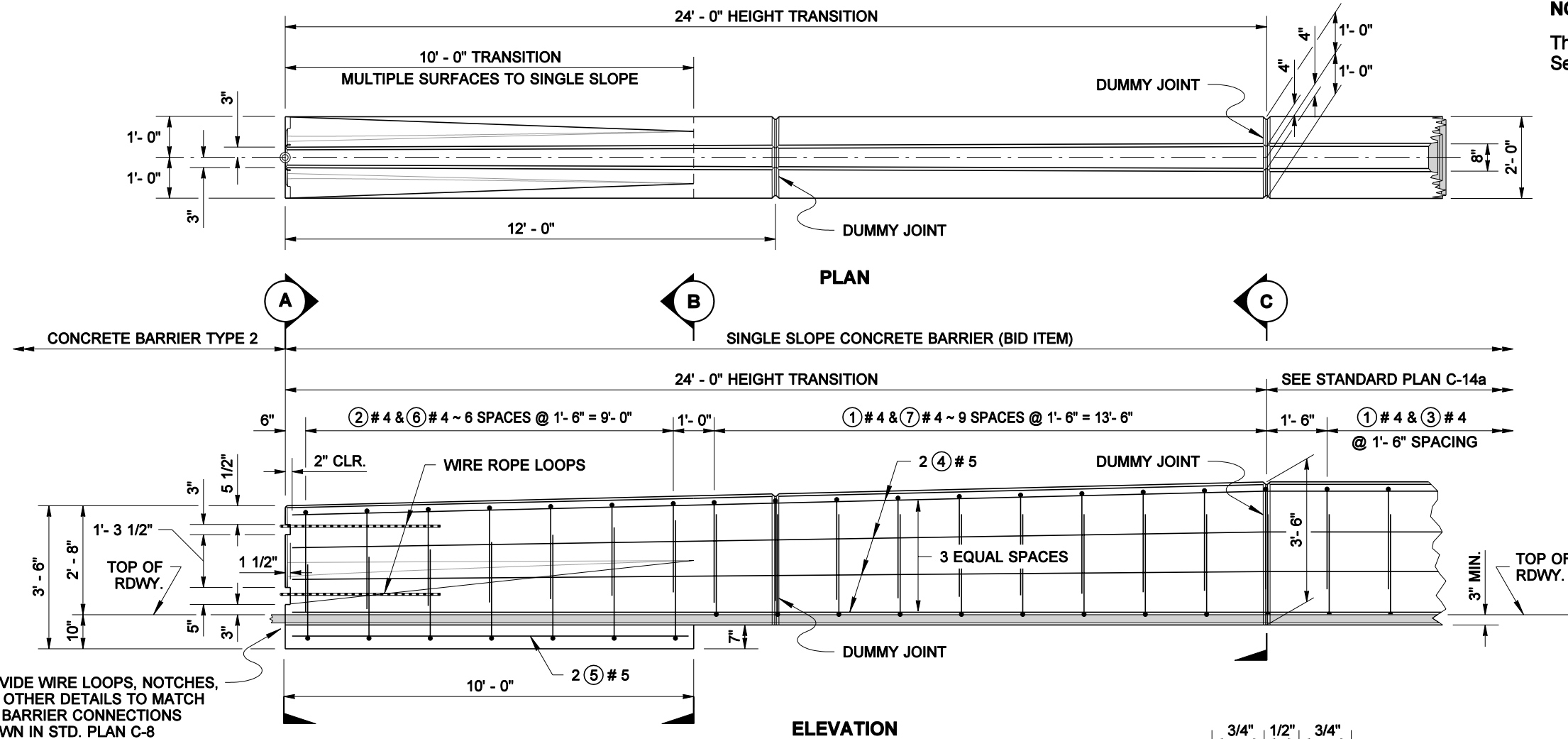


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NOTE

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



EXPIRES JULY 24, 2004

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

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

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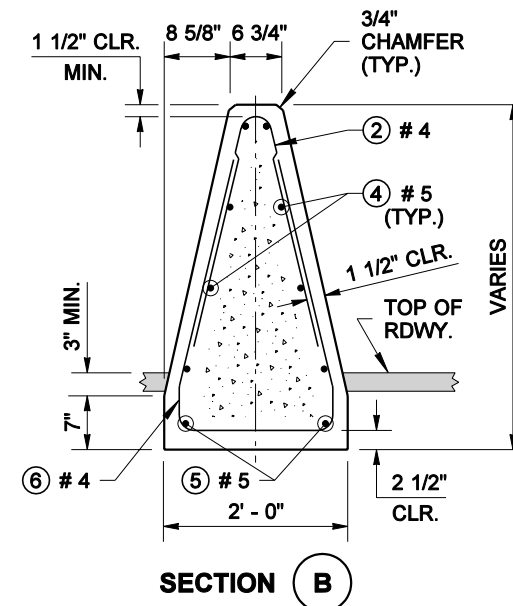
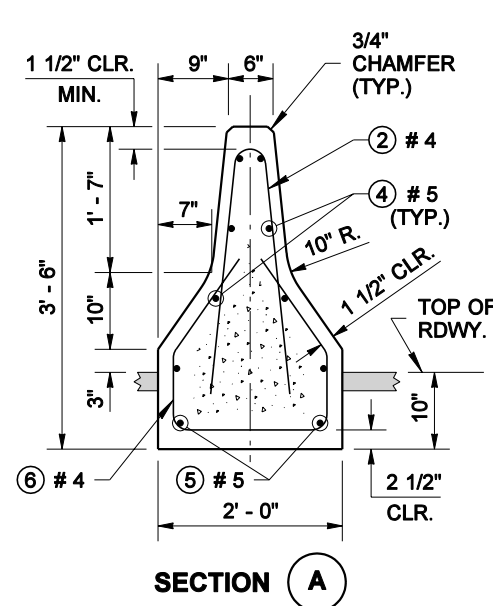
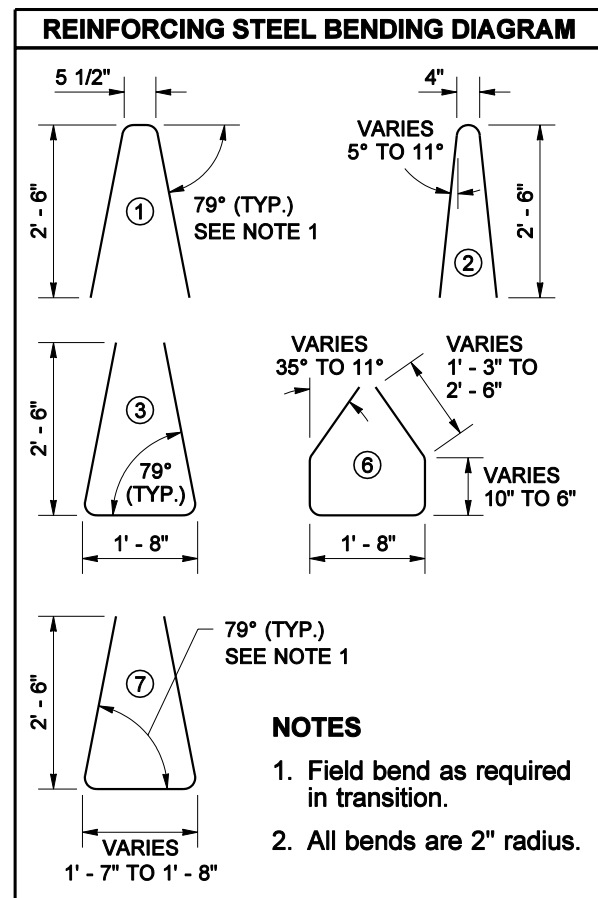
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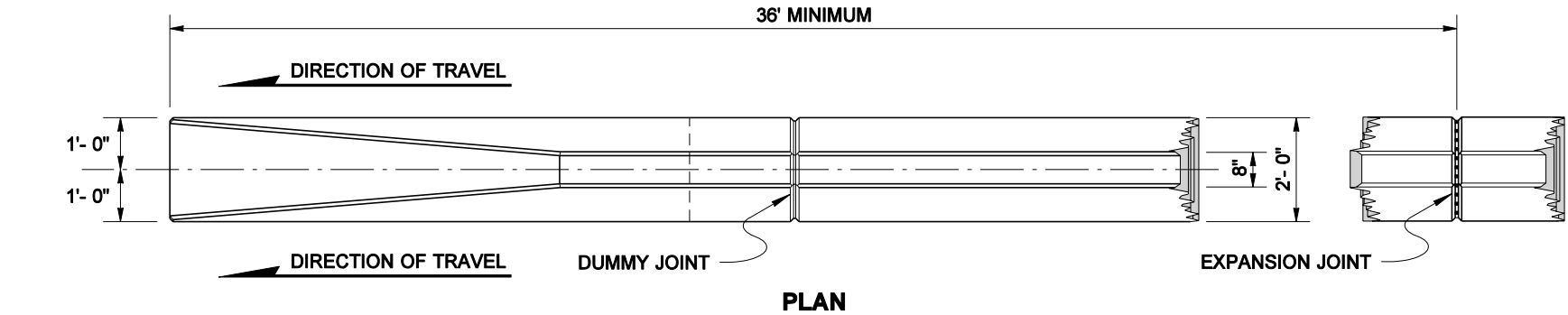
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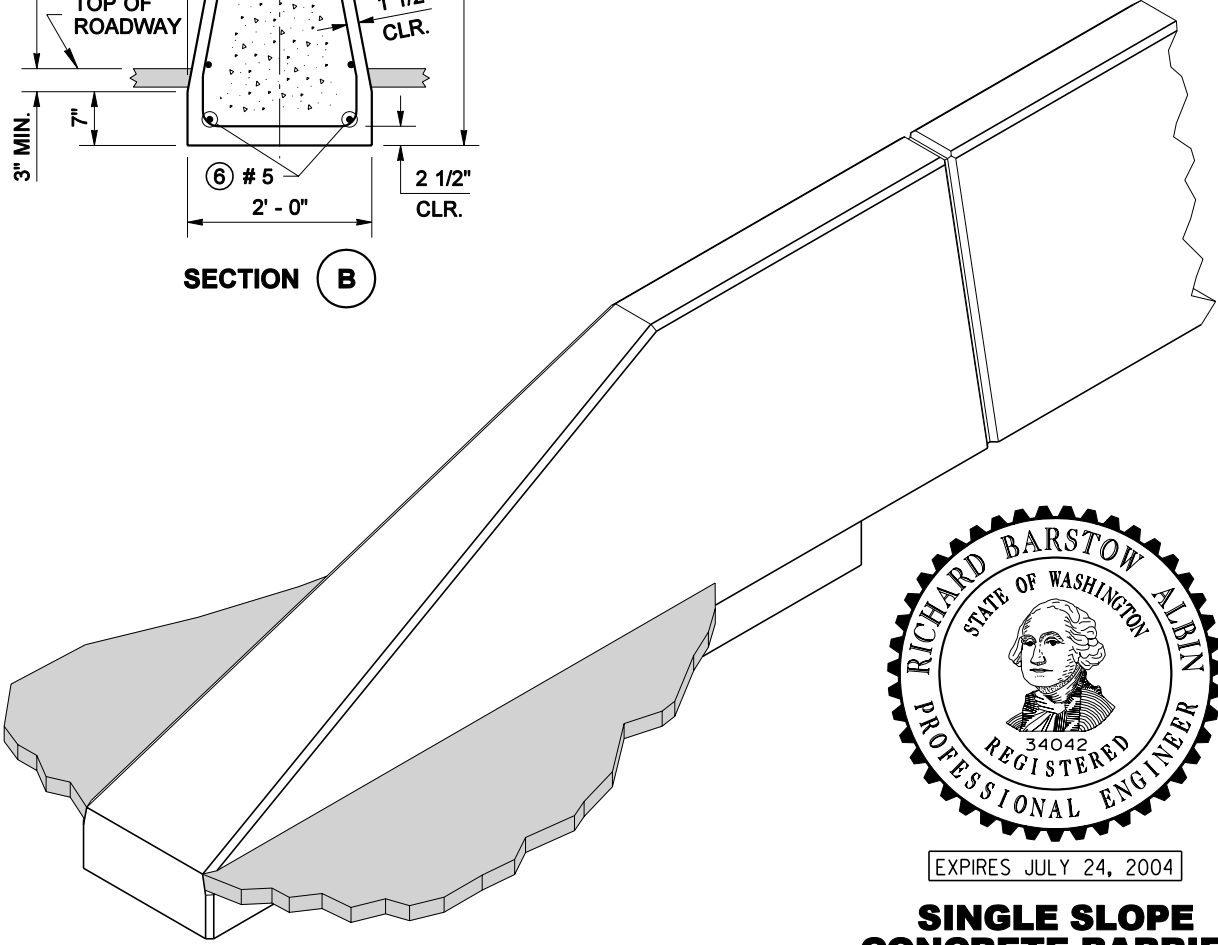
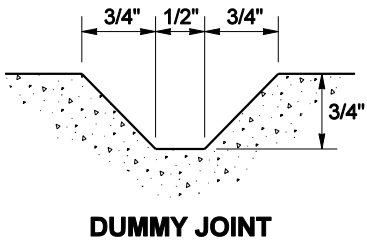
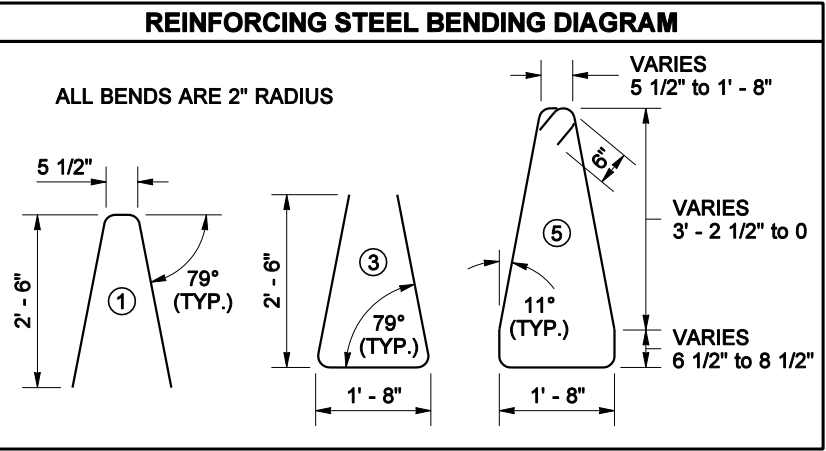
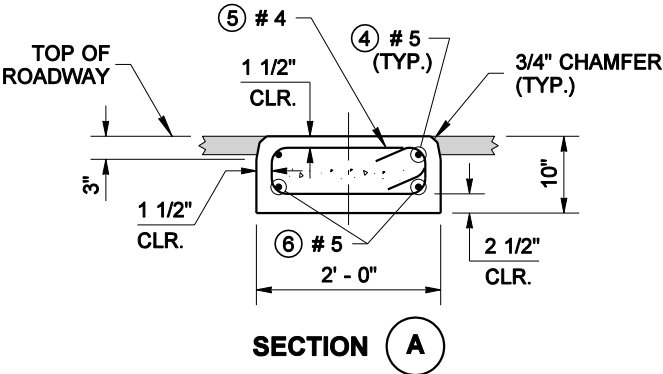
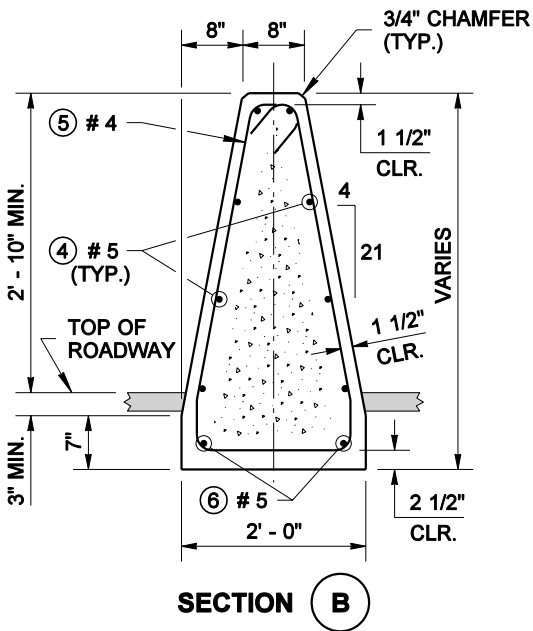
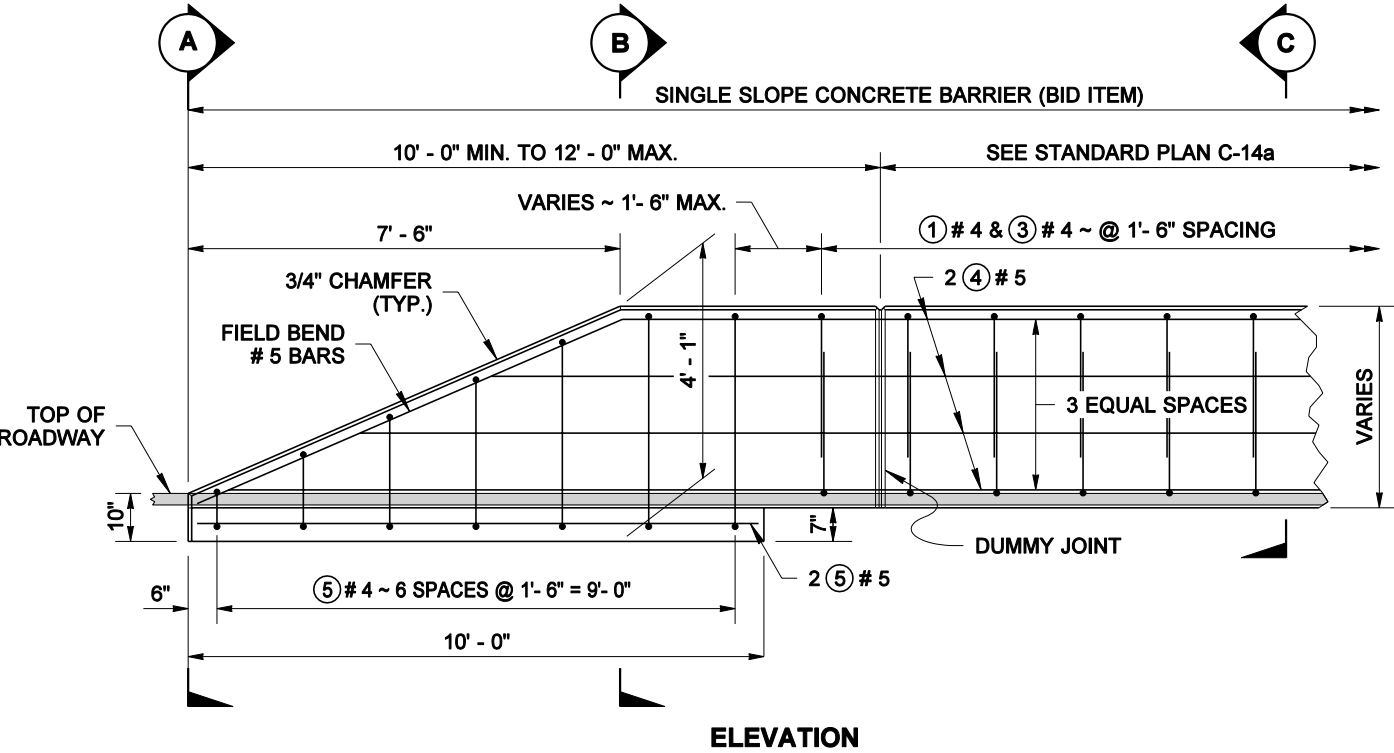
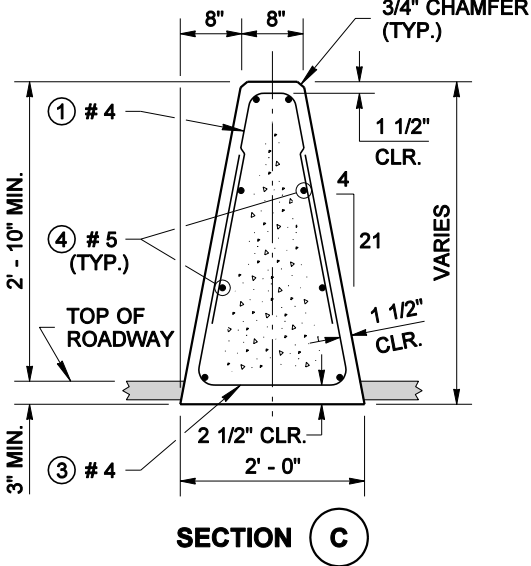
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NOTE

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



EXPIRES JULY 24, 2004

**SINGLE SLOPE
CONCRETE BARRIER
TERMINAL
STANDARD PLAN C-14c**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 07-26-02

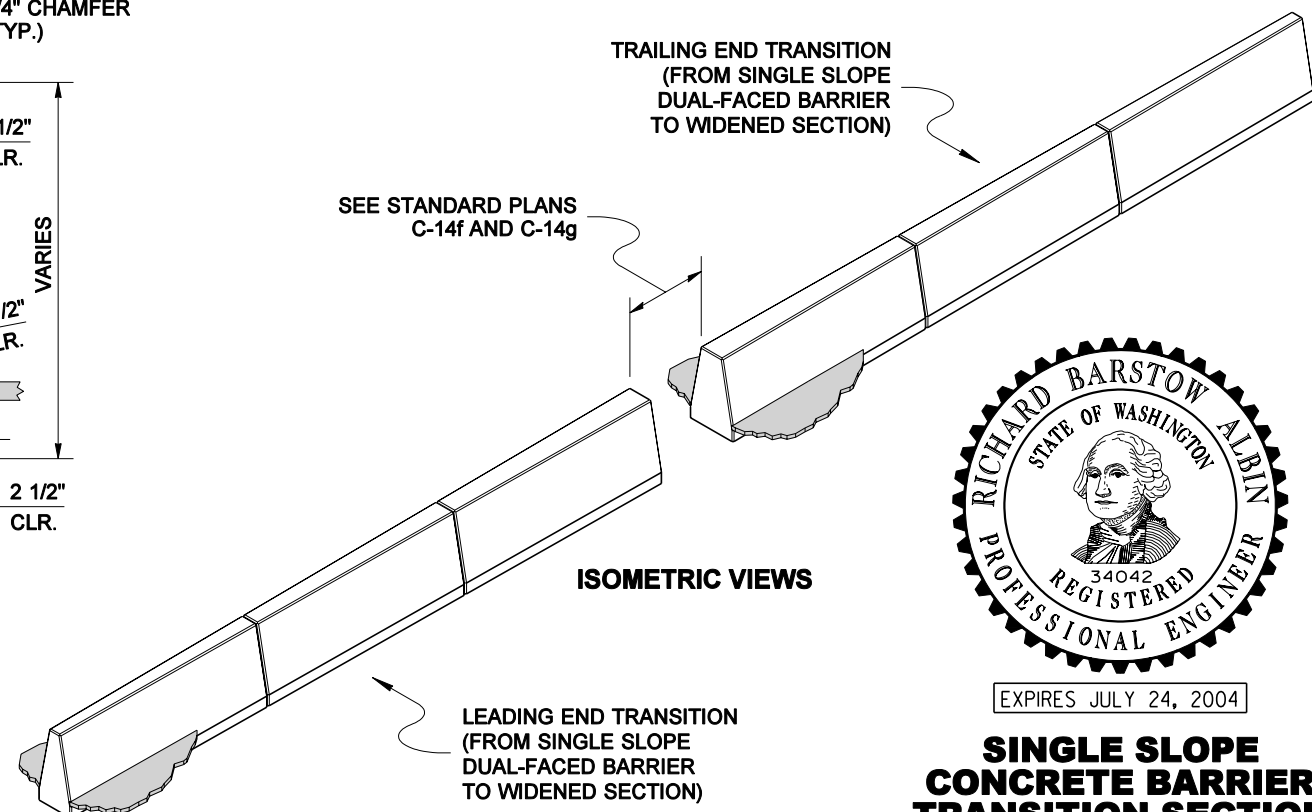
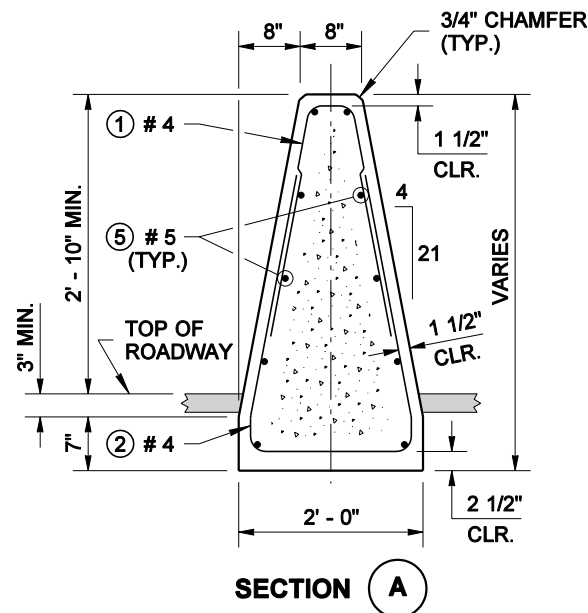
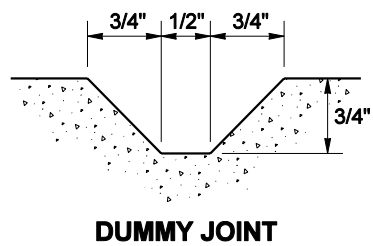
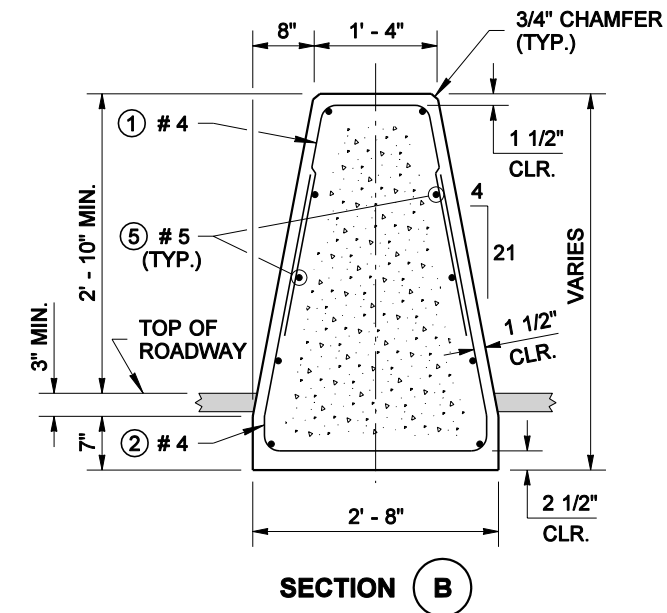
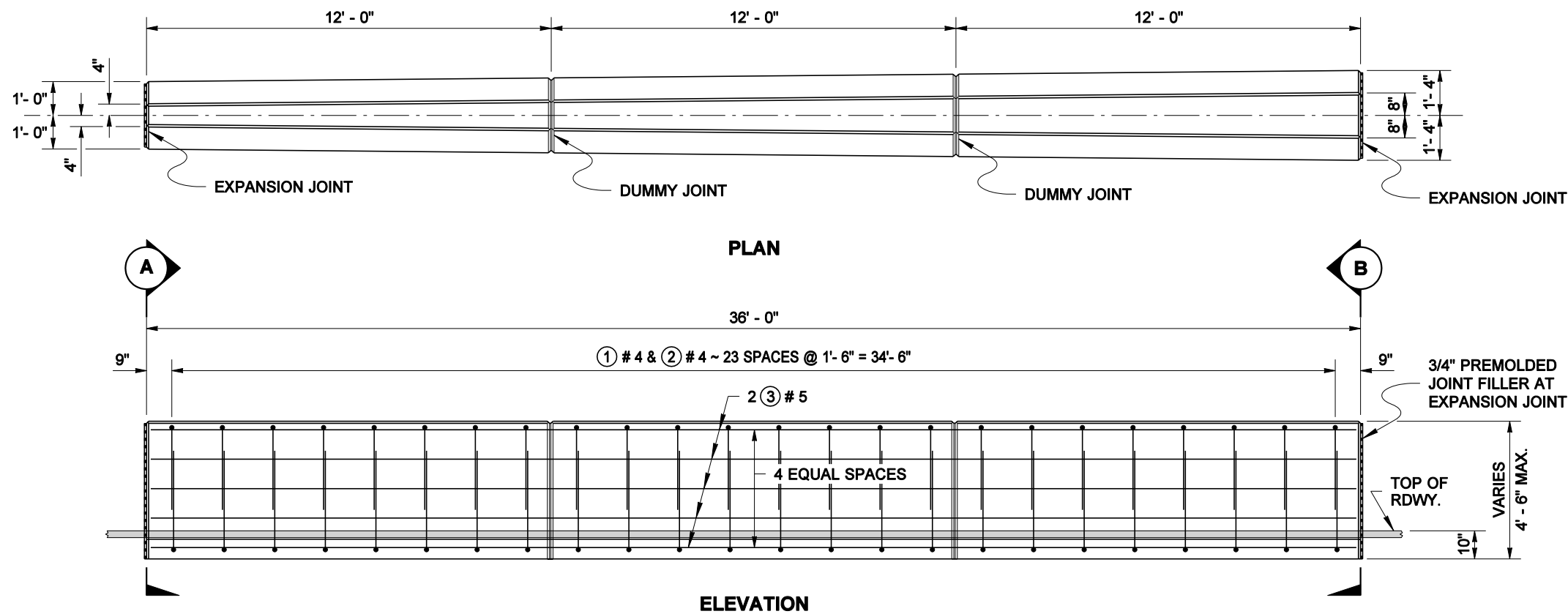
STATE DESIGN ENGINEER

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BAR LIST				
MARK	LOCATION	QTY.	SIZE	BENDING DIAGRAM
①	BARRIER ~ TOP VERTICAL	24	4	<p>VARIES 5 1/2" to 13"</p> <p>VARIES 1' - 9" to 2' - 4 1/2"</p> <p>VARIES 2' - 6" to 3' - 0"</p> <p>11° (TYP.)</p> <p>79° (TYP.)</p>
②	BARRIER ~ BOTTOM VERTICAL	24	4	
③	BARRIER ~ HORIZONTAL	10	5	

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



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

SHEET 1 OF 1 SHEET

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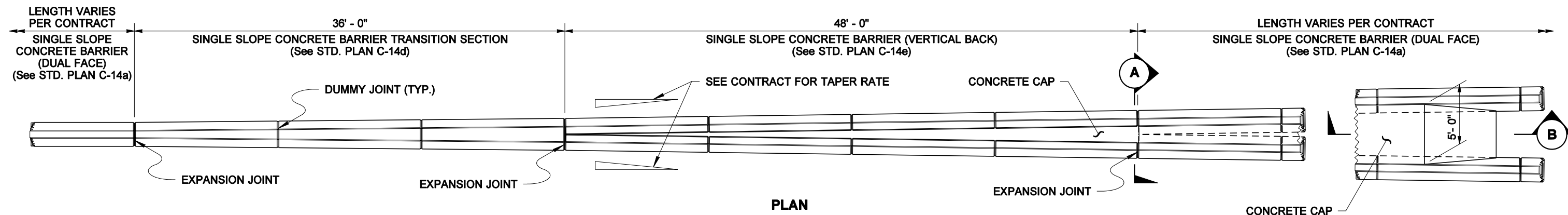
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STEEL WELDED WIRE FABRIC COMPLY WITH STD. SPEC. 9-07.7

6 × 6 W2.1 × W2.1 (8 GAGE)

6 × 6 W2.9 × W2.9 (6 GAGE)

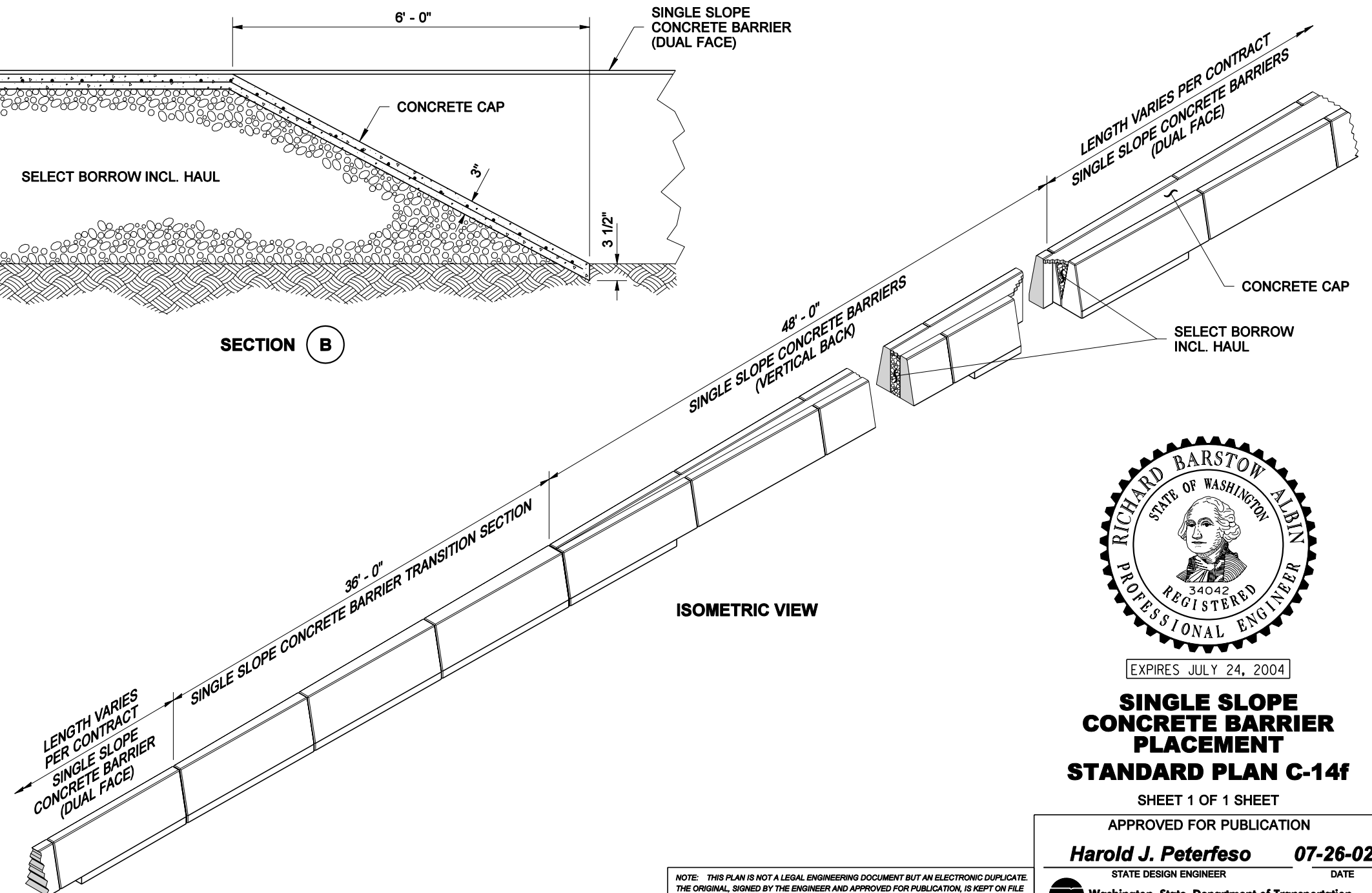
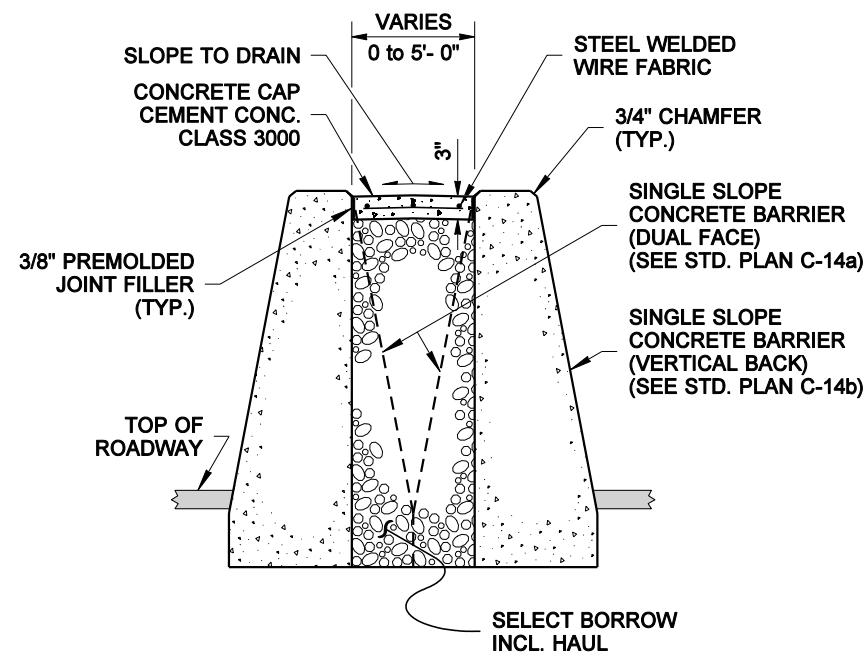
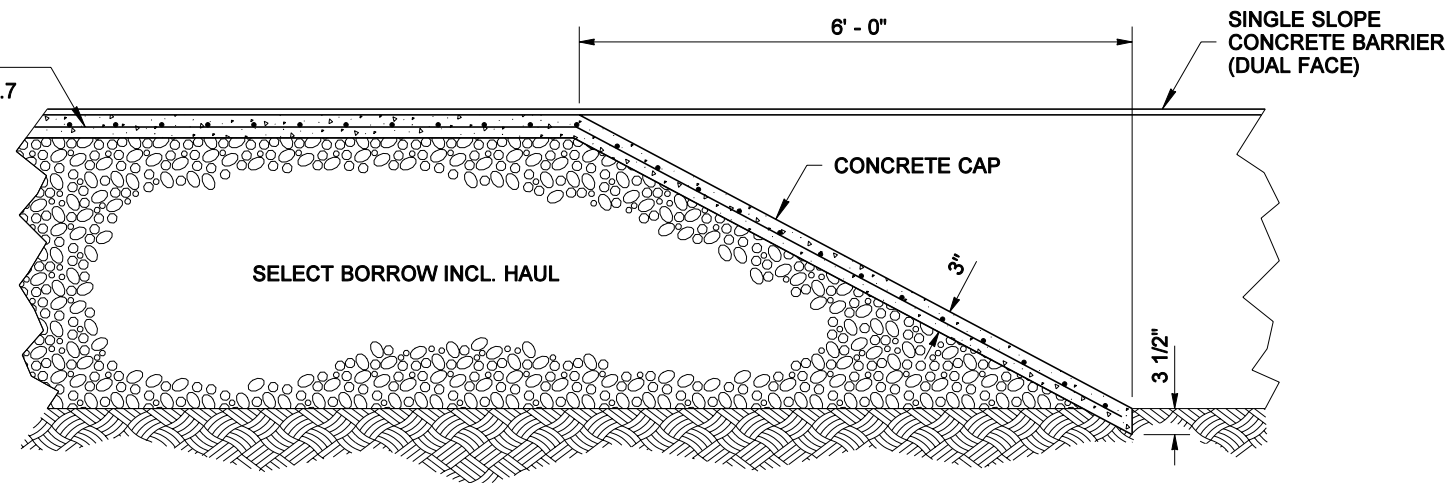
6 × 6 W4.0 × W4.0 (4 GAGE)

4 × 4 W1.4 × W1.4 (10 GAGE)

4 × 4 W2.1 × W2.1 (8 GAGE)

4 × 4 W2.9 × W2.9 (6 GAGE)

1 1/2" CLEARANCE ON ALL SURFACES



EXPIRES JULY 24, 2004

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

SHEET 1 OF 1 SHEET

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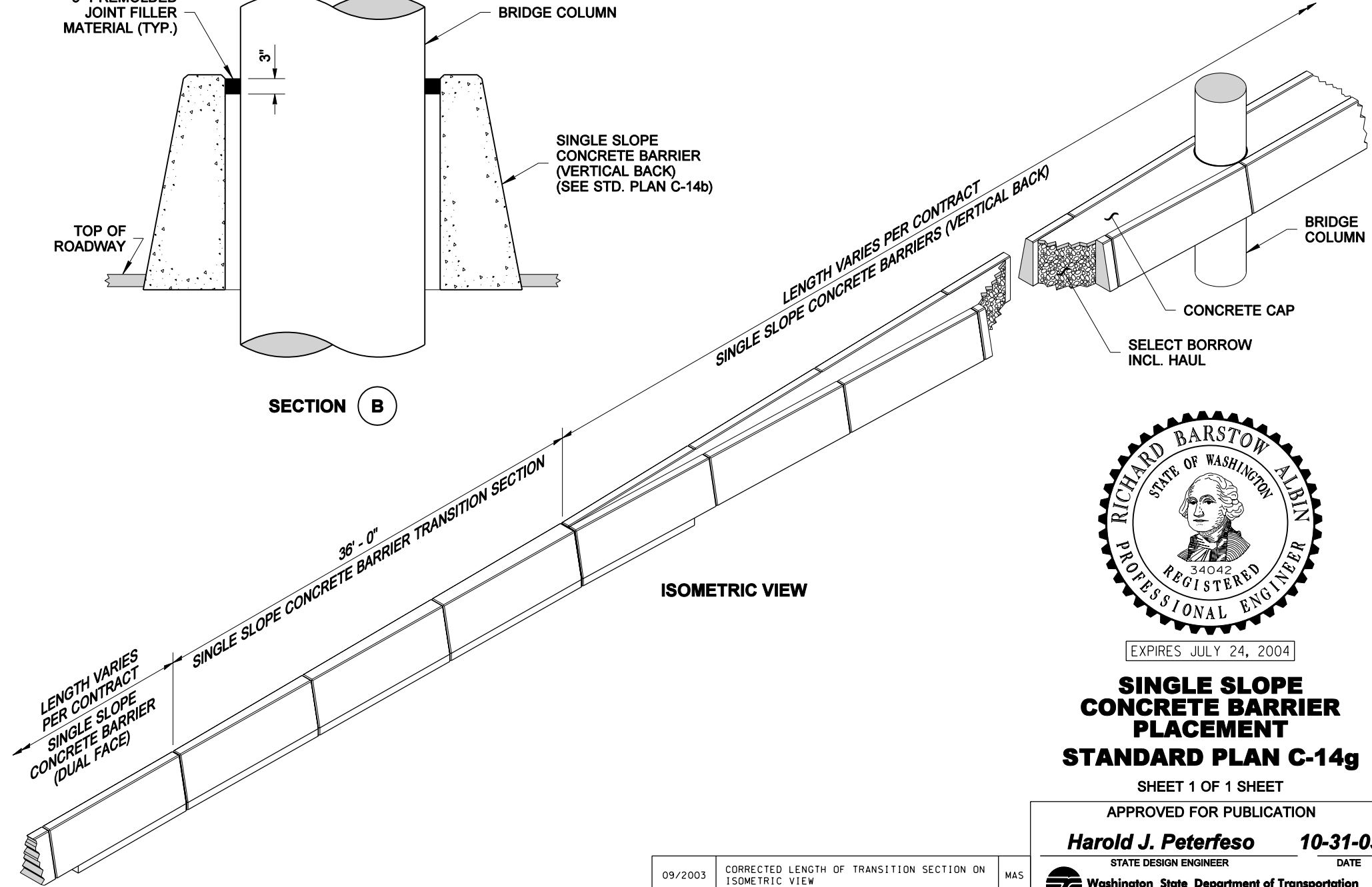
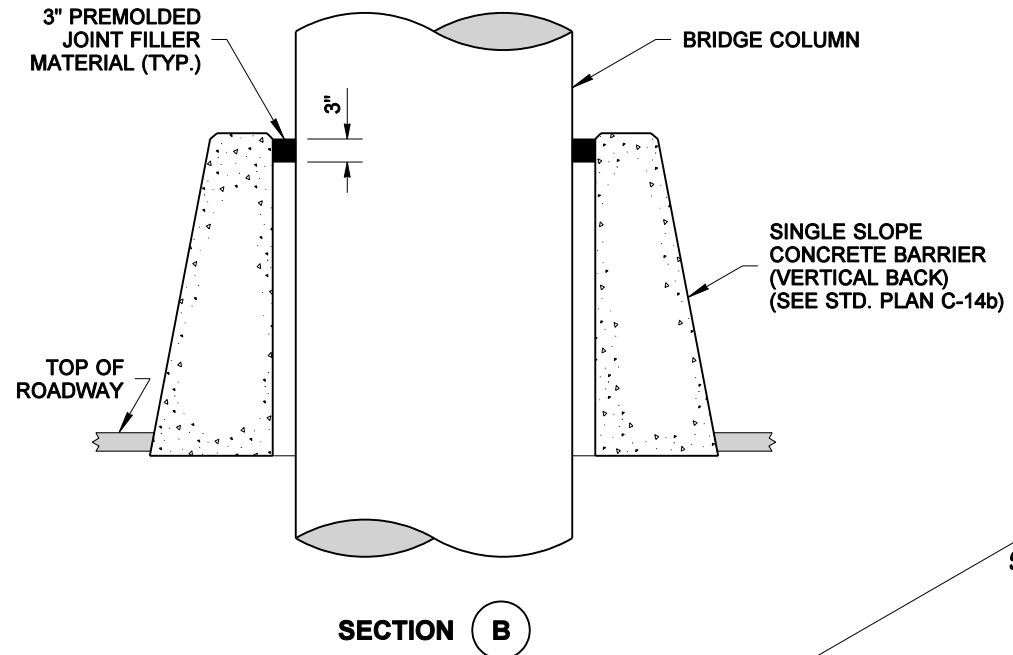
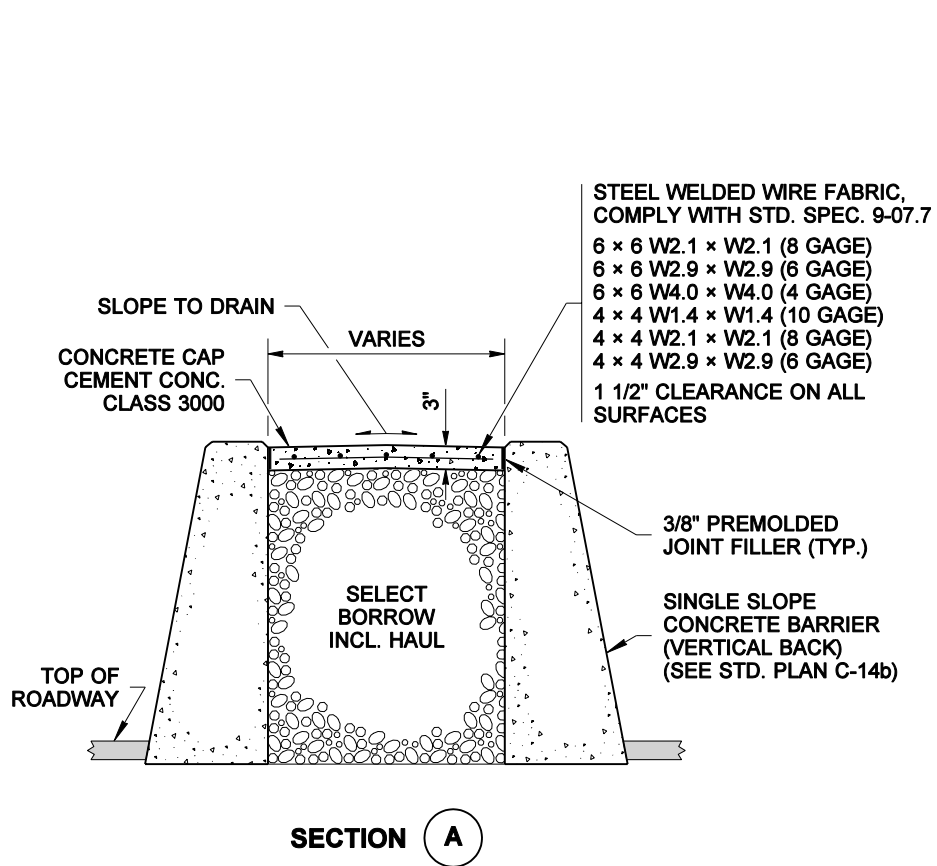
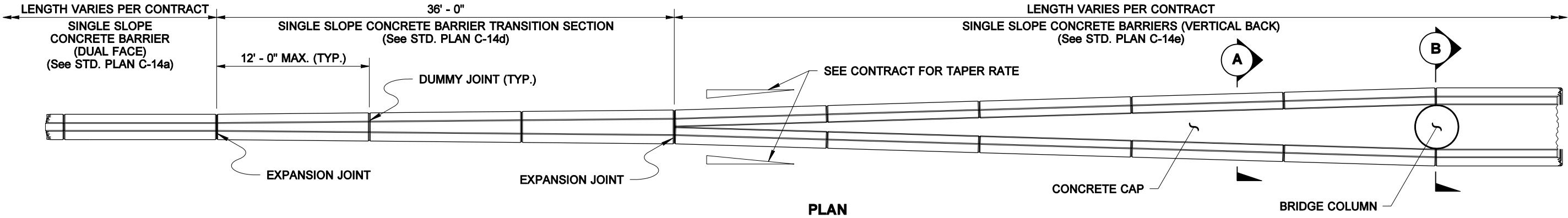
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SINGLE SLOPE CONCRETE BARRIER PLACEMENT
STANDARD PLAN C-14g

SHEET 1 OF 1 SHEET

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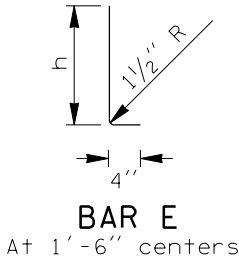
09/2003	CORRECTED LENGTH OF TRANSITION SECTION ON ISOMETRIC VIEW	MAS
DATE	REVISION	BY

DIMENSIONS (ft)				BAR E			BAR F			BAR K															BAR G (size #4)	MATERIAL QUANTITY		
H (ft)	B	C _v	D		h	SIZE	SPAC.	LENGTH	SIZE	SPAC.	LENGTH	h	b	LENGTH											CONCRETE CY/LF	STEEL LBS/LF	H (ft)	
5	5'-6"	2'-0"	1'-0"	3'-4"	2'-9"	#4	9"	3'-6"	#5	9"	7'-2"	4'-7"	3'-0"	* If traffic barrier is used, add 0.100 CY of Concrete Class 4000 for Barrier Alternate 1. Add 0.123 CY of Concrete Class 4000 for Barrier Alternate 2 - L.F. ** Add 28 LBS of reinforcing steel for Barrier Alternate 1 or 19 LBS of reinforcing steel for Barrier Alternate 2 - per LF.										3'-10"	0.36	26.3	5	
6	5'-6"	2'-0"	1'-0"	3'-4"	2'-9"	#4	9"	3'-5"	#5	9"	8'-3"	5'-7"	3'-1"											4'-10"	0.41	29.5	6	
7	5'-9"	2'-3"	1'-0"	3'-4"	2'-9"	#4	9"	3'-4"	#5	9"	9'-7"	6'-7"	3'-5"											5'-10"	0.47	31.8	7	
8	5'-9"	2'-3"	1'-0"	3'-4"	2'-9"	#4	9"	3'-3"	#5	9"	10'-8"	7'-7"	3'-6"											6'-10"	0.53	35.0	8	
9	6'-0"	2'-3"	1'-0"	3'-4"	2'-9"	#4	9"	3'-1"	#5	9"	12'-0"	8'-7"	3'-8"											7'-10"	0.60	38.5	9	
10	6'-3"	2'-3"	1'-0"	3'-4"	2'-9"	#4	9"	3'-6"	#5	9"	12'-11"	9'-7"	3'-9"											8'-10"	0.67	40.6	10	
11	6'-6"	2'-3"	1'-0"	3'-4"	2'-9"	#4	9"	3'-8"	#5	9"	14'-0"	10'-7"	3'-10"											9'-10"	0.75	44.7	11	
12	7'-0"	2'-6"	1'-0"	3'-4"	2'-9"	#4	9"	3'-10"	#5	8"	14'-4"	11'-7"	4'-2"											10'-10"	0.84	49.6	12	
13	7'-6"	2'-6"	1'-0"	3'-4"	2'-9"	#5	10"	4'-7"	#5	7"	15'-5"	12'-7"	4'-3"											11'-10"	0.93	57.5	13	
14	7'-9"	2'-6"	1'-0"	3'-4"	2'-9"	#5	9"	4'-8"	#5	7"	17'-7"	13'-7"	4'-4"											12'-10"	1.02	63.9	14	
15	8'-3"	2'-6"	1'-0"	3'-4"	2'-9"	#5	7"	4'-10"	#5	6"	17'-9"	14'-7"	4'-6"	13'-10"	1.12	73.4	15											
16	8'-9"	2'-9"	1'-3"	3'-8"	3'-0"	#6	10"	5'-6"	#5	6"	20'-1"	15'-7"	4'-10"	14'-7"	1.29	80.0	16											
17	9'-3"	3'-0"	1'-6"	3'-8"	3'-0"	#6	10"	5'-8"	#5	6"	21'-5"	16'-7"	5'-2"	15'-7"	1.46	84.8	17											
18	9'-9"	3'-3"	1'-6"	3'-11"	3'-3"	#6	9"	5'-10"	#6	7"	22'-7"	17'-7"	5'-5"	16'-4"	1.58	100.9	18											
19	10'-0"	3'-6"	1'-9"	3'-11"	3'-3"	#6	9"	6'-3"	#6	6"	24'-0"	18'-7"	5'-10"	17'-4"	1.77	118.1	19											
20	10'-9"	3'-6"	1'-9"	4'-2"	3'-6"	#6	8"	6'-5"	#6	6"	25'-2"	19'-7"	6'-0"	18'-1"	1.91	124.0	20											
21	11'-3"	3'-9"	2'-0"	4'-5"	3'-9"	#6	8"	6'-10"	#7	1'-2"	17'-8"	11'-11"	6'-4"	#7	1'-2"	18'-11"	18'-10"	2.12	133.8	21								
22	11'-9"	4'-0"	2'-0"	4'-5"	3'-9"	#6	7"	7'-0"	#7	1'-1"	18'-5"	12'-4"	6'-8"	#7	1'-1"	19'-11"	19'-10"	2.26	148.5	22								
23	12'-3"	4'-3"	2'-3"	4'-8"	4'-0"	#6	7"	7'-2"	#7	1'-0"	19'-2"	12'-10"	7'-0"	#7	1'-0"	20'-8"	20'-7"	2.49	161.3	23								
24	12'-9"	4'-3"	2'-3"	4'-8"	4'-0"	#6	6"	7'-7"	#8	1'-2"	20'-7"	14'-2"	7'-1"	#8	1'-2"	21'-8"	21'-7"	2.64	188.5	24								
25	13'-3"	4'-6"	2'-6"	4'-11"	4'-3"	#6	6"	7'-9"	#8	1'-1"	21'-7"	14'-9"	7'-6"	#8	1'-1"	22'-5"	22'-4"	2.89	205.0	25								
26	13'-9"	4'-9"	2'-6"	4'-11"	4'-3"	#6	6"	7'-11"	#8	1'-0"	22'-2"	15'-1"	7'-11"	#8	1'-0"	23'-5"	23'-4"	3.06	224.8	26								
27	14'-3"	5'-0"	2'-9"	5'-2"	4'-6"	#6	6"	8'-1"	#9	1'-2"	24'-2"	16'-9"	8'-2"	#9	1'-2"	24'-2"	24'-1"	3.33	253.9	27								
28	14'-9"	5'-3"	3'-0"	5'-5"	4'-9"	#6	6"	8'-3"	#9	1'-1"	25'-0"	17'-3"	8'-6"	#9	1'-1"	24'-11"	24'-10"	3.61	275.9	28								
29	15'-3"	5'-6"	3'-3"	5'-8"	5'-0"	#6	6"	8'-5"	#9	1'-0"	25'-3"	17'-9"	8'-11"	#9	1'-0"	25'-9"	25'-7"	3.90	299.0	29								
30	16'-0"	5'-9"	3'-3"	5'-8"	5'-0"	#7	7"	9'-8"	#9	11"	26'-8"	18'-2"	9'-3"	#9	11"	26'-6"	26'-7"	4.12	340.3	30								
31	16'-6"	6'-0"	3'-6"	5'-11"	5'-3"	#7	7"	9'-10"	#9	11"	27'-6"	18'-8"	9'-7"	#9	11"	27'-6"	27'-4"	4.43	352.3	31								
32	17'-0"	6'-3"	3'-9"	6'-2"	5'-6"	#7	7"	10'-0"	#9	10"	28'-5"	19'-3"	9'-11"	#9	10"	28'-3"	28'-1"	4.76	390.0	32								
33	17'-6"	6'-6"	4'-0"	6'-4"	5'-9"	#7	6"	10'-2"	#9	10"	29'-2"	19'-9"	10'-2"	#9	10"	29'-0"	28'-10"	5.09	406.4	33								
34	18'-0"	6'-9"	4'-3"	6'-8"	6'-0"	#7	6"	10'-4"	#9	10"	30'-2"	20'-3"	10'-8"	#9	10"	29'-9"	29'-7"	5.44	417.8	34								
35	18'-6"	7'-0"	4'-6"	6'-11"	6'-3"	#7	6"	10'-6"	#10	11"	32'-4"	22'-2"	11'-0"	#10	11"	30'-6"	30'-3"	5.79	491.0	35								

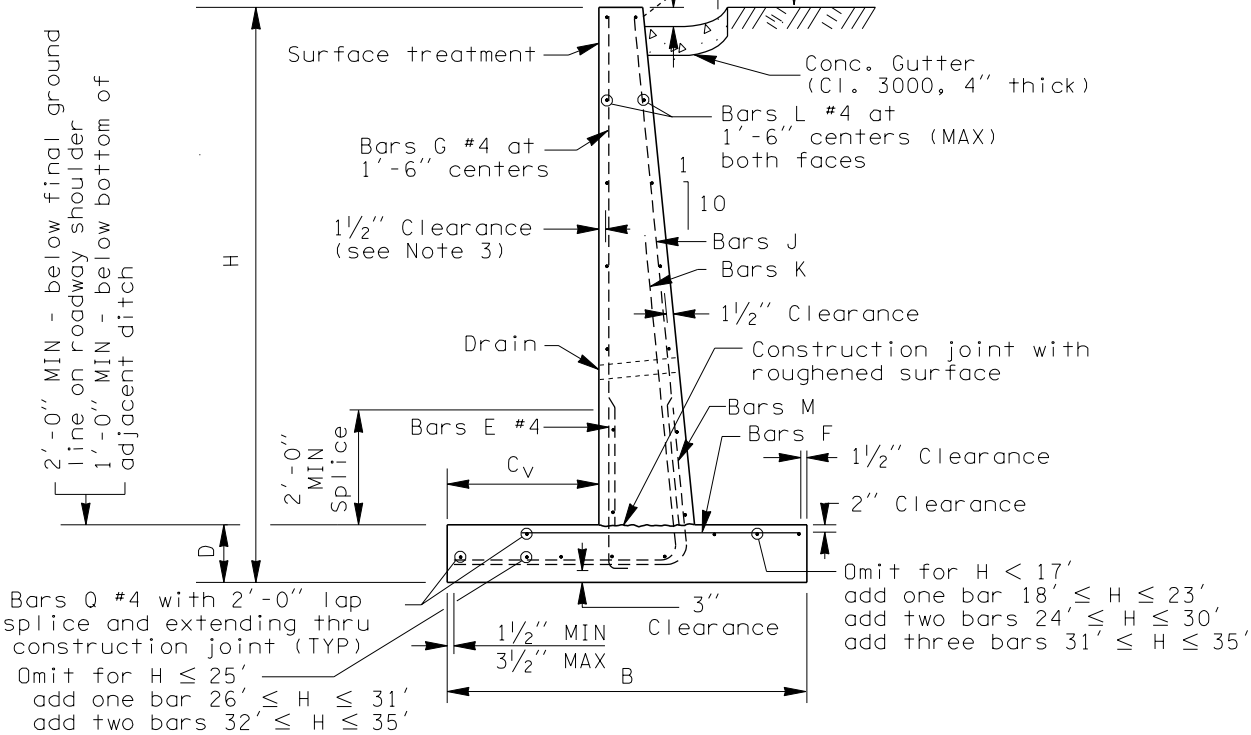
- * If traffic barrier is used, add 0.100 CY of Concrete Class 4000 for Barrier Alternate 1. Add 0.123 CY of Concrete Class 4000 for Barrier Alternate 2 - L.F.
- ** Add 28 LBS of reinforcing steel for Barrier Alternate 1 or 19 LBS of reinforcing steel for Barrier Alternate 2 - per LF.

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

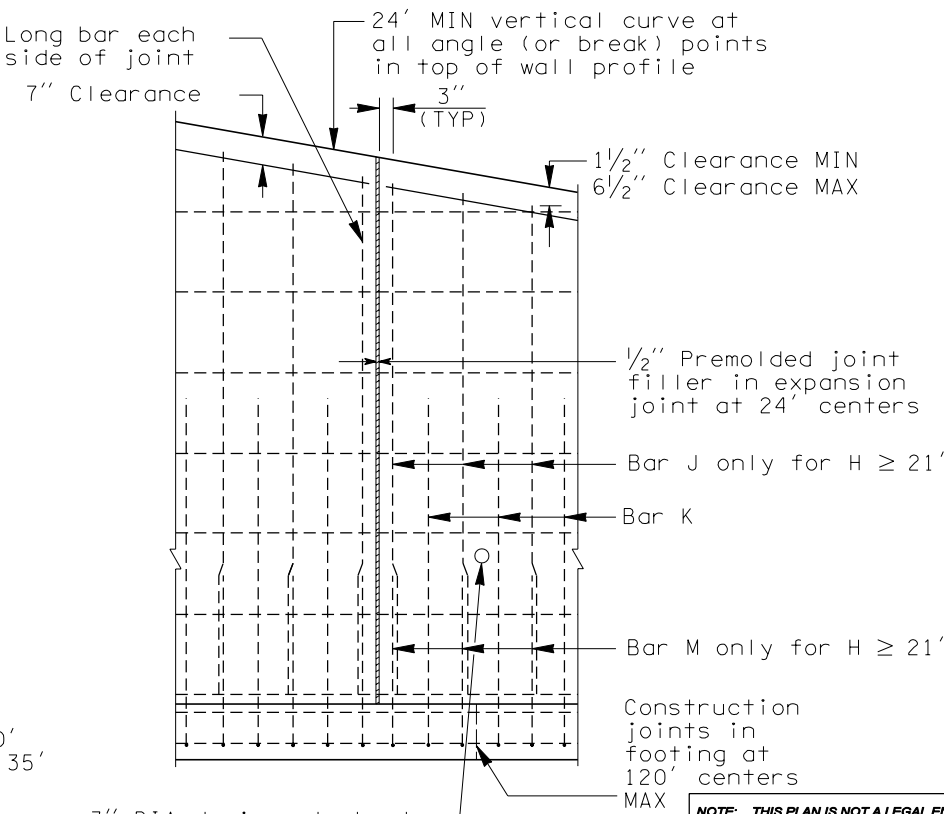
Bar	MIN Splice
#4	2'-0"
#5	2'-0"
#6	2'-1"
#7	2'-11"
#8	3'-9"
#9	4'-9"
#10	6'-1"



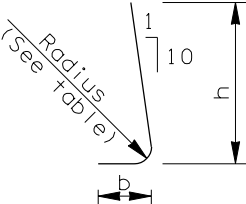
Set top of retaining wall back 1/2" from face of wall at footing for wall heights H to 20'. For above 20' use the formula: offset (inches) = $\frac{H}{8} - 2$ (H in feet)



SECTION - VERTICAL FACE



ELEVATION



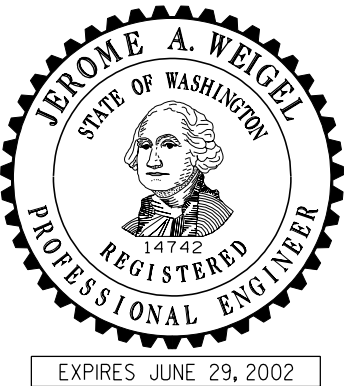
Bar	Radius
#5	9"
#6	11"
#7	1'-1"
#8	1'-3"
#9	1'-6"
#10	1'-8"

BARS K AND M

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

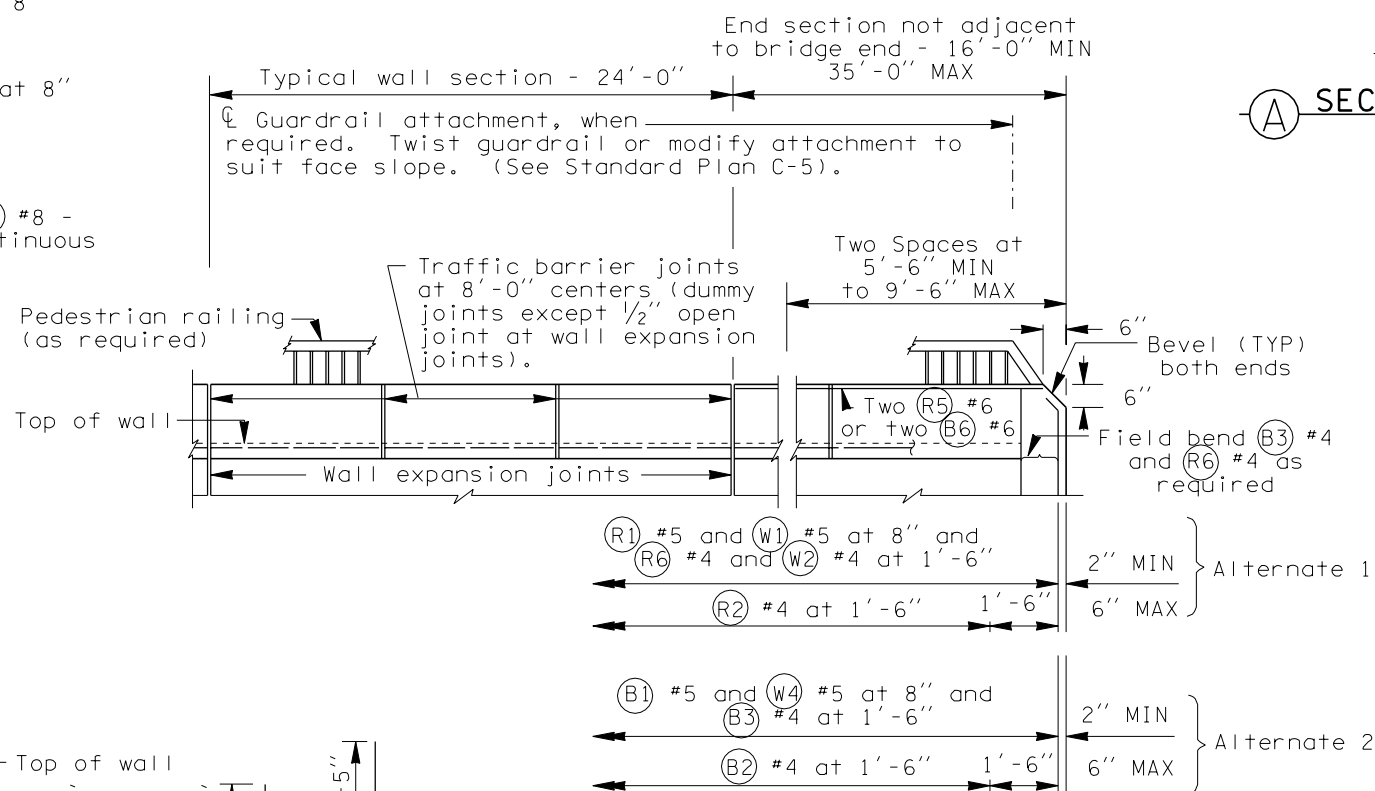
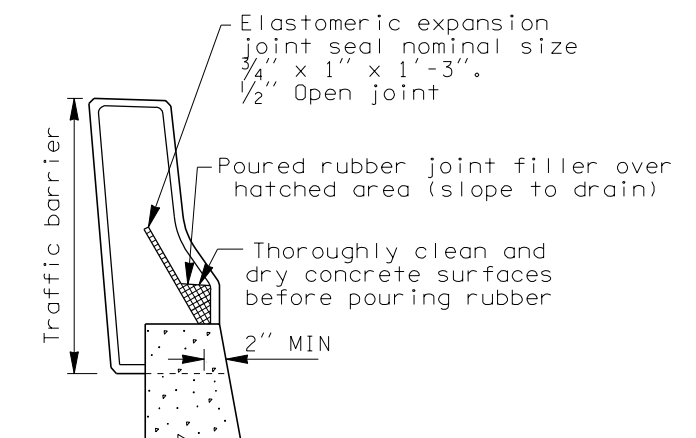
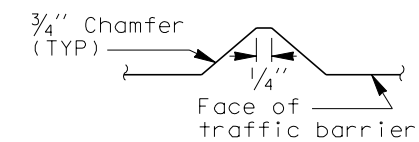
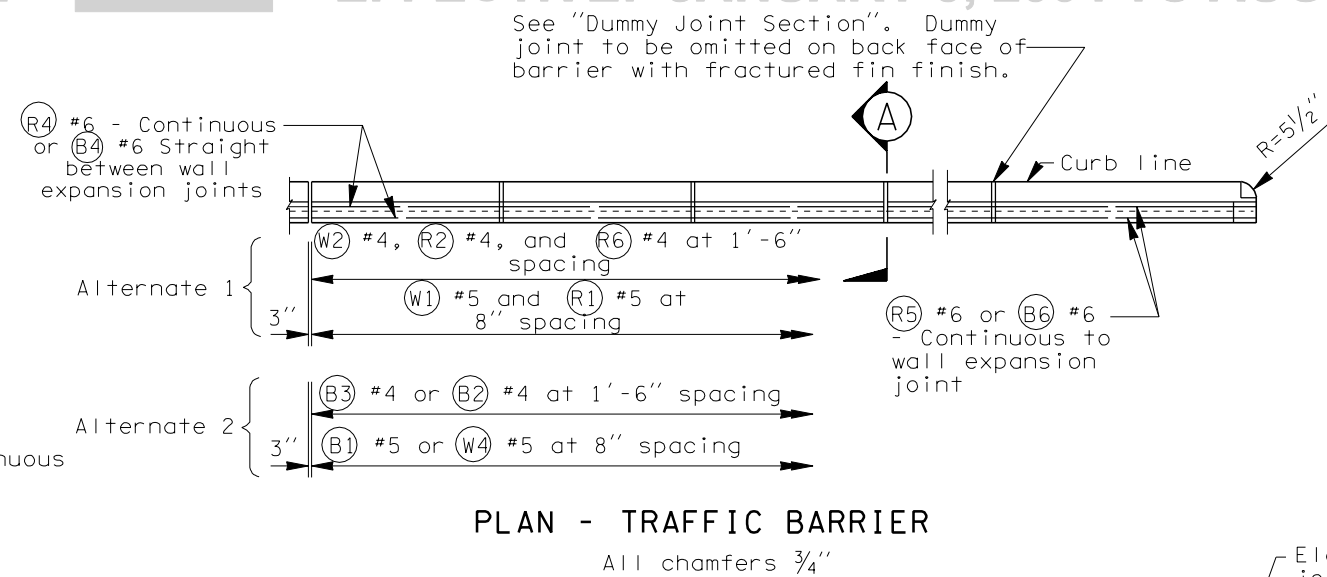
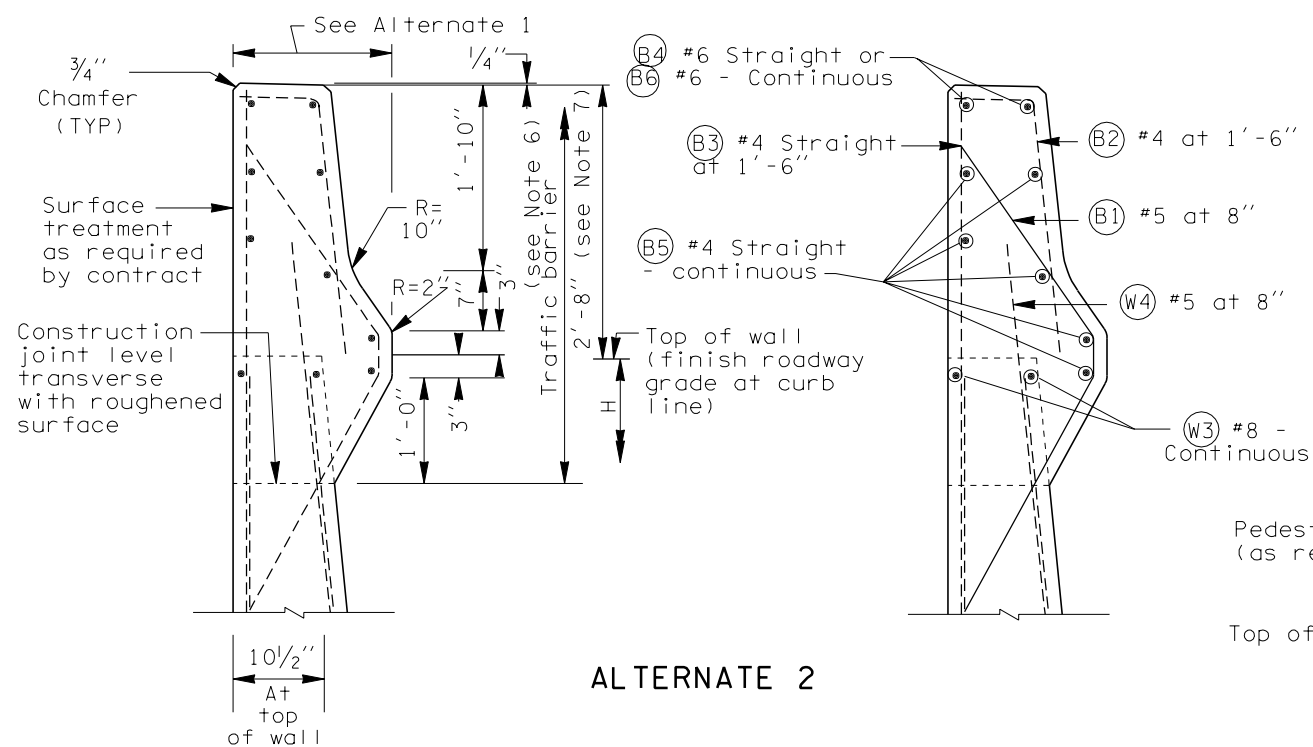
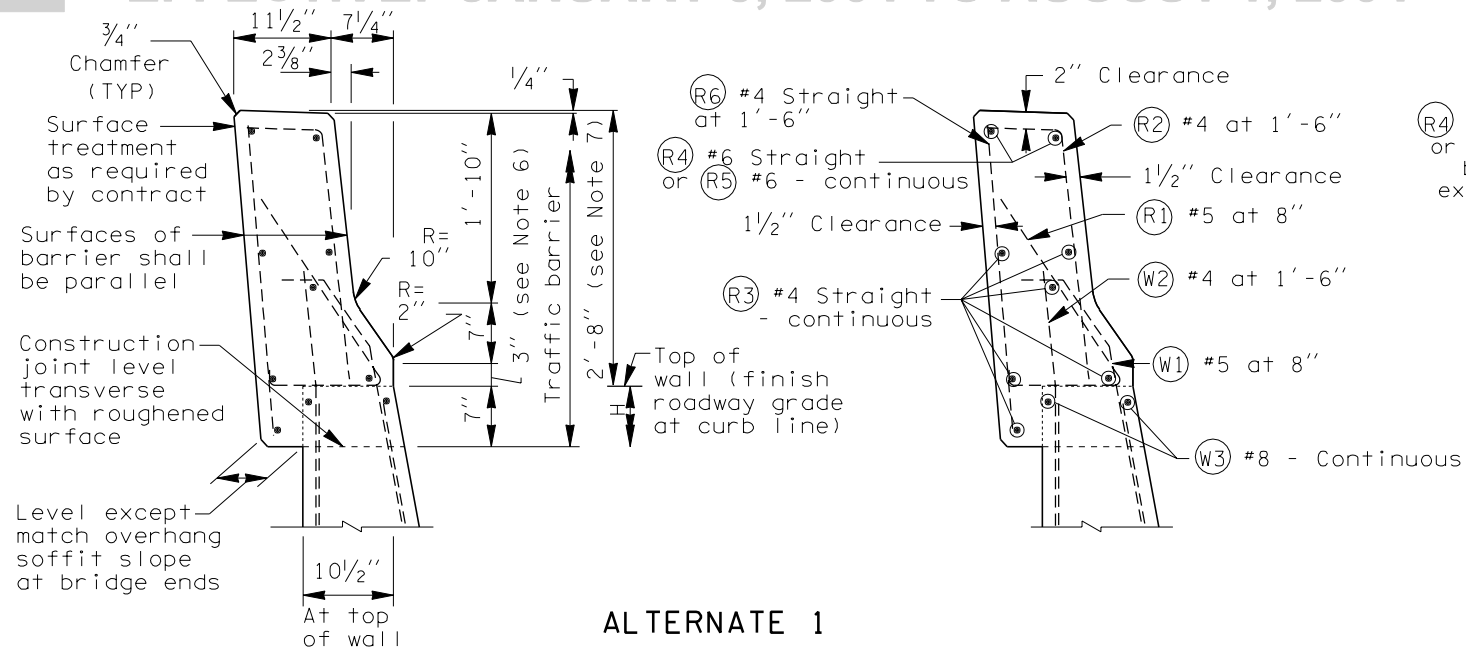
WALL DESIGN WITH VERTICAL FRONT FACE AND 2' SURCHARGE OR TRAFFIC BARRIER



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

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION	
Harold J. Peterfeso	01-23-02
STATE DESIGN ENGINEER	DATE
Washington State Department of Transportation	



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



EXPIRES JUNE 29, 2002

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

SHEET 2 OF 2 SHEETS

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

8/01	New Approval Date	MAS
DATE	REVISION	BY

APPROVED FOR PUBLICATION

Harold J. Peterfeso 01-23-02

STATE DESIGN ENGINEER

DATE

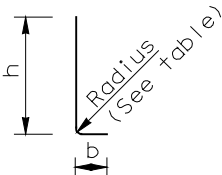


Washington State Department of Transportation

* Dimensions to point of intersection

DIMENSIONS				E BAR (size #4)		FOOTING REINFORCEMENT								STEM REINFORCEMENT						MATERIAL QUANTITY						
						F BAR			K BAR														G BAR (size #4)			
H (ft)	B	C _V	D	LENGTH	h	SIZE	SPACING	LENGTH	SIZE	SPACING	LENGTH	h	b							LENGTH	CONCRETE (CY/LF)	STEEL (LBS/LF)	H (ft)			
5	5'-6"	3'-0"	1'-0"	3'- 5"	2'- 9"	4	9"	3'-9"	5	9"	6'-10"	4'-7"	2'-7"	* If traffic barrier is used, add 0.110 CY of concrete Class 4000 for Barrier Alternate 1. Add 0.152 CY of concrete Class 4000 for Barrier Alternate 2 - per LF. ** Add 16 LB/FT of reinforcing steel for Barrier Alternate 1 or 23 LB/FT of reinforcing steel for Barrier Alternate 2 - per LF.	3'-10"	0.363	26.207	5								
6	5'-6"	3'-0"	1'-0"	3'- 5"	2'- 9"	4	9"	3'-9"	5	9"	7'-10"	5'-7"	2'-7"		4'-10"	0.412	29.379	6								
7	5'-9"	3'-3"	1'-0"	3'- 5"	2'- 9"	4	9"	3'-9"	5	9"	9'-1"	6'-7"	2'-10"		5'-10"	0.474	31.447	7								
8	5'-9"	3'-3"	1'-0"	3'- 5"	2'- 9"	4	9"	3'-9"	5	9"	10'-1"	7'-7"	2'-10"		6'-10"	0.531	34.619	8								
9	6'-0"	3'-6"	1'-0"	3'- 5"	2'- 9"	4	9"	3'-9"	5	9"	11'-4"	8'-7"	3'-1"		7'-11"	0.600	38.176	9								
10	6'-3"	3'-6"	1'-0"	3'- 5"	2'- 9"	4	9"	4'-0"	5	9"	12'-4"	9'-7"	3'-1"		8'-11"	0.673	40.235	10								
11	6'-6"	3'-6"	1'-0"	3'- 5"	2'- 9"	5	9"	4'-7"	5	9"	13'-4"	10'-7"	3'-1"		9'-11"	0.750	46.218	11								
12	7'-0"	3'-9"	1'-0"	3'- 5"	2'- 9"	5	9"	4'-10"	5	9"	14'-7"	11'-7"	3'-4"		10'-11"	0.840	50.753	12								
13	7'-6"	3'-9"	1'-0"	3'- 5"	2'- 9"	5	9"	5'-1"	5	9"	15'-10"	12'-7"	3'-4"		11'-11"	0.933	53.400	13								
14	7'-9"	3'-9"	1'-0"	3'- 5"	2'- 9"	6	8"	6'-1"	5	8"	16'-7"	13'-7"	3'-4"		12'-11"	1.021	62.745	14								
15	8'-0"	3'-9"	1'-0"	3'- 5"	2'- 9"	6	7"	6'-4"	5	7"	17'-7"	14'-7"	3'-4"		13'-11"	1.113	68.519	15								
16	8'-6"	4'-0"	1'-3"	3'- 8"	3'- 0"	6	7"	6'-7"	6	8"	18'-9"	15'-7"	3'-7"		14'-8"	1.274	87.587	16								
17	9'-0"	4'-3"	1'-3"	3'- 8"	3'- 0"	6	6"	6'-10"	6	8"	20'-0"	16'-7"	3'-10"		15'-8"	1.387	96.241	17								
18	9'-6"	4'-6"	1'-6"	3'-10"	3'- 3"	6	6"	7'-1"	6	7"	21'-3"	17'-7"	4'-1"		M BAR	J BAR	16'-5"	1.567	107.056	18						
19	10'-3"	5'-0"	1'-6"	3'-10"	3'- 3"	6	6"	7'-4"	6	6"	22'-9"	18'-7"	4'-7"		SIZE	SPACING	LENGTH	h	b	SIZE	SPACING	LENGTH	17'-5"	1.704	123.464	19
20	10'-6"	5'-0"	1'-9"	4'- 2"	3'- 6"	6	6"	7'-7"	6	6"	23'-9"	19'-7"	4'-7"		18'-2"	1.889	127.451	20								
21	11'-3"	5'-6"	2'-0"	4'- 5"	3'- 9"	6	6"	7'-10"	7	1'-2"	13'-5"	8'-10"	5'-1"		7	1'-2"	9'-4"	4'-9"	5'-1"	7	1'-2"	18'-10"	18'-11"	2.118	131.930	21
22	11'-9"	5'-9"	2'-0"	4'- 5"	3'- 9"	7	7"	8'-11"	7	1'-0"	14'-1"	9'-3"	5'-4"		7	1'-0"	9'-7"	4'-9"	5'-4"	7	1'-0"	19'-10"	19'-11"	2.259	157.217	22
23	12'-3"	6'-0"	2'-3"	4'- 8"	4'- 0"	7	7"	9'-2"	7	1'-0"	14'-10"	9'-9"	5'-7"	7	1'-0"	10'-1"	5'-0"	5'-7"	7	1'-0"	20'-7"	20'-8"	2.491	163.792	23	
24	12'-9"	6'-3"	2'-3"	4'- 8"	4'- 0"	7	6"	9'-5"	8	1'-2"	15'-5"	10'-2"	5'-10"	8	1'-2"	11'-3"	6'-0"	5'-10"	8	1'-2"	21'-7"	21'-8"	2.643	189.370	24	
25	13'-3"	6'-6"	2'-6"	4'-11"	4'- 0"	7	6"	9'-8"	8	1'-1"	16'-2"	10'-8"	6'-1"	8	1'-1"	11'-9"	6'-3"	6'-1"	8	1'-1"	22'-4"	22'-5"	2.894	206.931	25	
26	13'-9"	6'-9"	2'-6"	4'-11"	4'- 3"	7	6"	9'-11"	8	1'-0"	16'-10"	11'-1"	6'-4"	8	1'-0"	12'-0"	6'-3"	6'-4"	8	1'-0"	23'-4"	23'-5"	3.057	222.725	26	
27	14'-3"	7'-0"	2'-9"	5'- 2"	4'- 6"	8	7"	11'-2"	9	1'-2"	17'-5"	11'-6"	6'-7"	9	1'-2"	13'-6"	7'-7"	6'-7"	9	1'-2"	24'-1"	24'-2"	3.326	254.763	27	
28	14'-9"	7'-3"	3'-0"	5'- 5"	4'- 9"	8	7"	11'-5"	9	1'-1"	18'-9"	12'-0"	6'-10"	9	1'-1"	14'-0"	7'-10"	7'-10"	9	1'-1"	24'-10"	25'-0"	3.607	276.351	28	
29	15'-3"	7'-6"	3'-3"	5'- 8"	5'- 0"	8	7"	11'-8"	9	1'-0"	19'-0"	12'-5"	7'-1"	9	1'-0"	14'-6"	8'-1"	7'-1"	9	1'-0"	25'-7"	25'-9"	3.898	300.338	29	
30	16'-0"	8'-0"	3'-3"	5'- 8"	5'- 0"	8	6"	11'-11"	9	11"	19'-11"	13'-0"	7'-7"	9	11"	15'-0"	8'-1"	7'-7"	9	11"	26'-7"	26'-9"	4.118	340.248	30	
31	16'-6"	8'-3"	3'-6"	5'-11"	5'- 3"	8	6"	12'-2"	9	11"	20'-2"	13'-6"	7'-10"	9	11"	15'-6"	8'-4"	7'-10"	9	11"	27'-4"	27'-6"	4.431	350.783	31	
32	17'-0"	8'-6"	3'-9"	6'- 2"	5'- 6"	8	6"	12'-5"	9	10"	20'-11"	14'-0"	8'-1"	9	10"	16'-0"	8'-7"	8'-1"	9	10"	28'-1"	28'-3"	4.755	384.956	32	
33	17'-6"	8'-9"	4'-0"	6'- 5"	5'- 9"	8	6"	12'-8"	9	10"	21'-8"	14'-7"	8'-4"	9	10"	16'-6"	8'-10"	8'-4"	9	10"	28'-11"	29'-0"	5.090	395.892	33	
34	18'-0"	9'-0"	4'-3"	6'- 8"	6'- 0"	8	6"	12'-11"	9	10"	22'-6"	15'-1"	8'-7"	9	10"	17'-0"	9'-1"	8'-7"	9	10"	29'-7"	29'-9"	5.437	406.513	34	
35	18'-6"	9'-3"	4'-6"	6'-11"	6'- 3"	8	6"	13'-2"	10	11"	23'-1"	15'-7"	8'-10"	10	11"	18'-9"	10'-8"	8'-10"	10	11"	30'-4"	30'-6"	5.794	467.610	35	

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

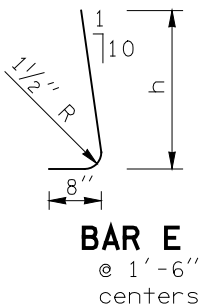


Bar	Radius R
#5	9"
#6	11"
#7	1'-1"
#8	1'-3"
#9	1'-6"
#10	1'-8"

BARS K AND M

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

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



BAR E
@ 1'-6" centers



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

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Clifford E. Mansfield

10/06/99

DEPUTY STATE DESIGN ENGINEER

DATE



WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

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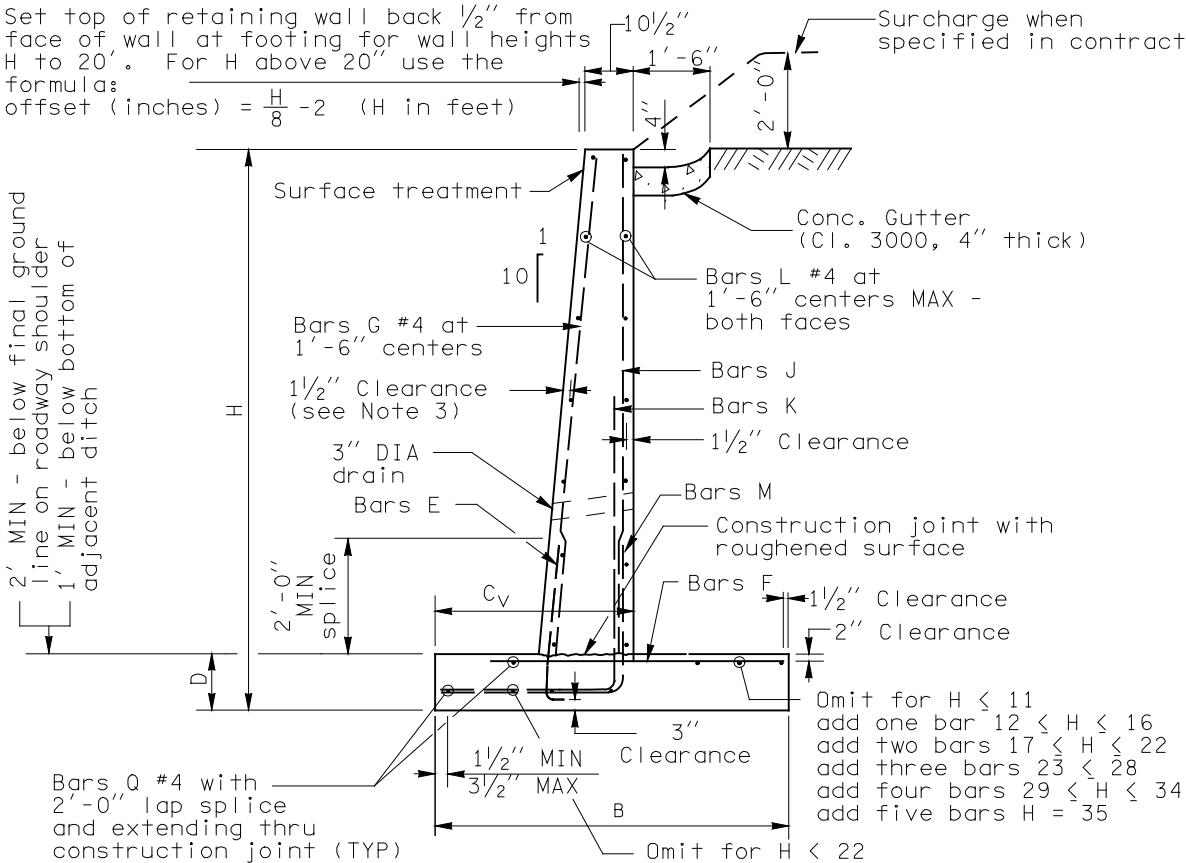
Added note 8.

TWS

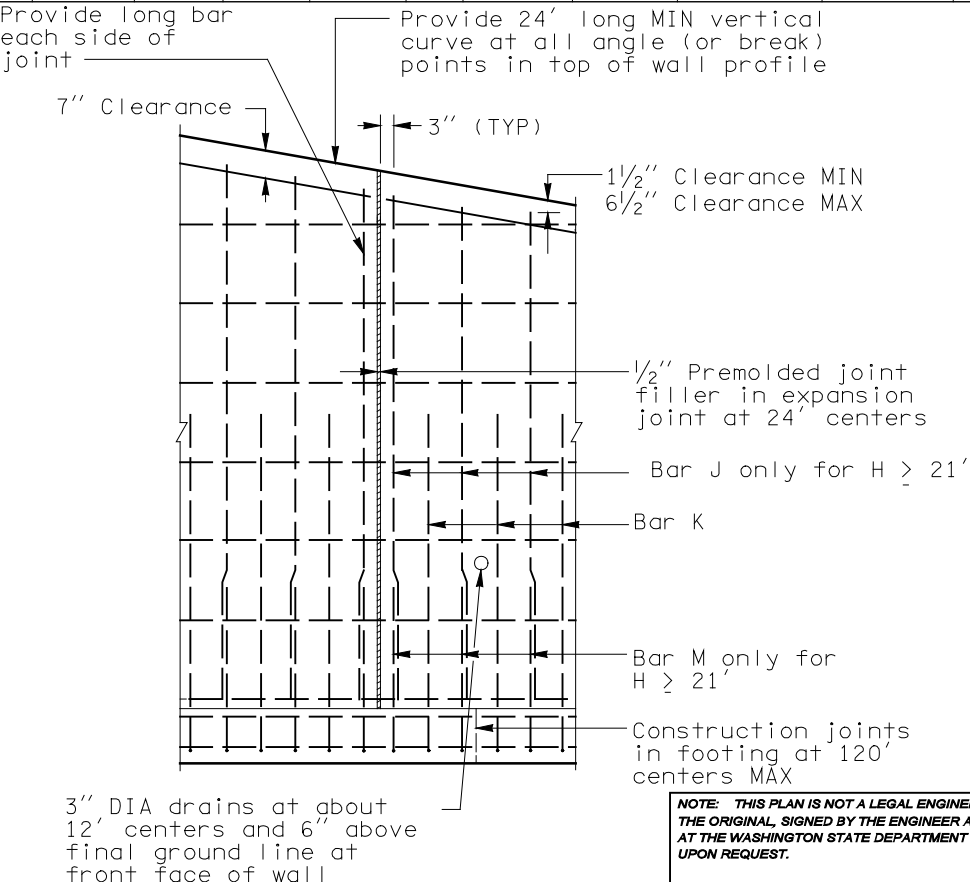
DATE

REVISION

BY

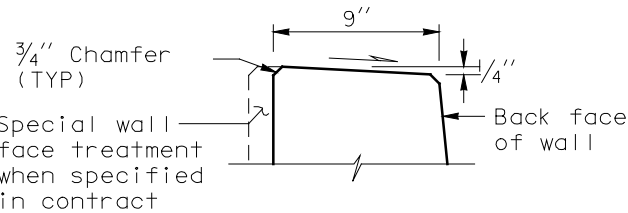


SECTION - SLOPING FACE

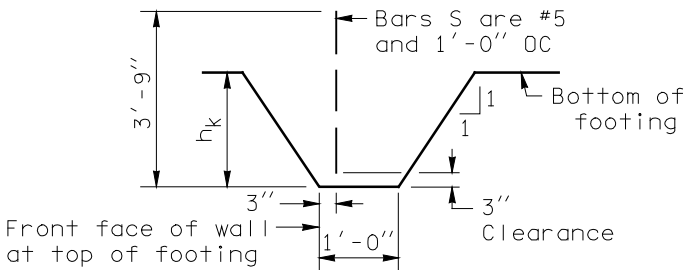


ELEVATION





WALL TOP DETAIL

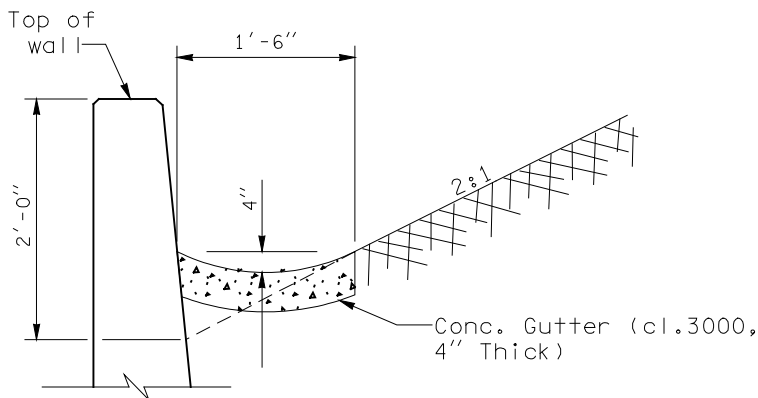


Not required on walls
H = 5' thru H = 12'

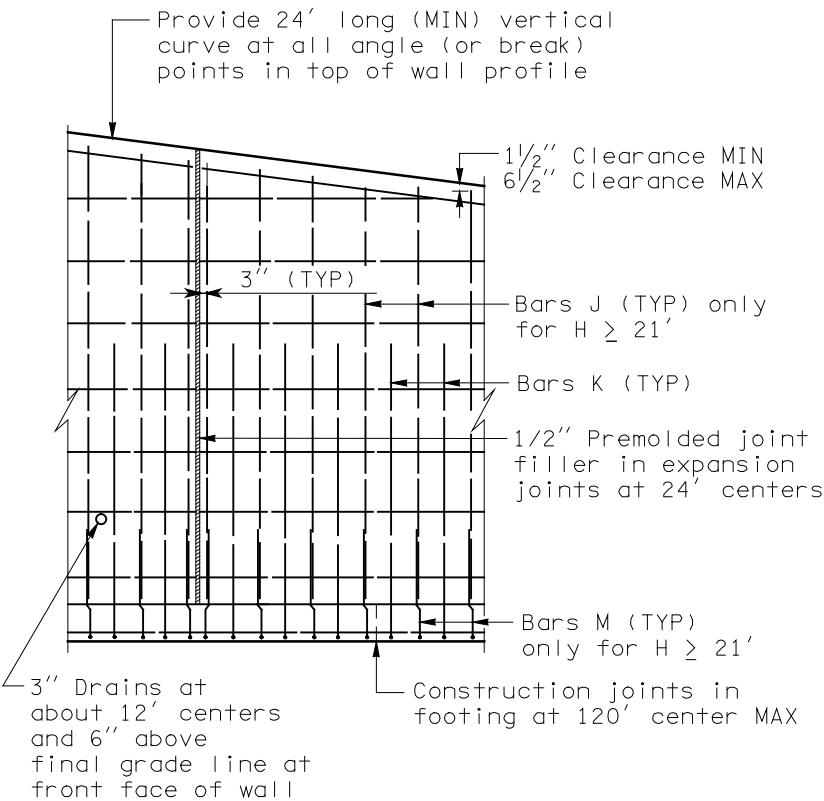
KEY DETAIL

- NOTES
1. All concrete shall be Class 4000 except as noted.
 2. For backfill requirements, see Standard Plan "D-4".
 3. When Wall Type 3-SW (saltwater) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1".
 4. When Wall Type 3-SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by 0.003 x H CY/LF.
 5. Concrete in the 24 foot wall sections shall be placed separately between expansion joints with a minimum 12 hour period between concrete placement.

Set top of retaining wall back 1/2" from face of wall at footing for wall heights H to 20'. For H above 20' use formula: offset (inches) = $\frac{H}{8} - 2$ (h in feet)



GUTTER DETAIL



ELEVATION

WALL DESIGN WITH VERTICAL FRONT FACE AND 2:1 BACKSLOPE



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

SHEET 1 OF 2 SHEETS

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10/99	Added note 5.	TWS
DATE	REVISION	BY

APPROVED FOR PUBLICATION

Clifford E. Mansfield

10/06/99

DEPUTY STATE DESIGN ENGINEER

DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

SECTION - VERTICAL FACE

Omit on walls H = 14' and lower.
Add one bar 15' ≤ H ≤ 18'
Add two bars 19' ≤ H ≤ 22'
Add three bars 23' ≤ H ≤ 26'
Add five bars 27' ≤ H ≤ 30'
Add six bars H = 31'

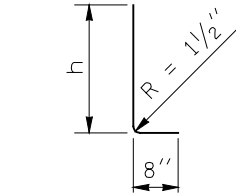
Omit on walls H = 12' and lower
Add one bar 13' ≤ H ≤ 20'
Add two bars 21' ≤ H ≤ 25'
Add three bars 26' ≤ H ≤ 31'

Construction joint with roughened surface

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

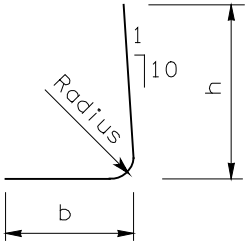
WALL DESIGN WITH VERTICAL
FRONT FACE AND 2:1 BACKSLOPE

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



BAR E
at 1'-6" centers

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



BARS K AND M



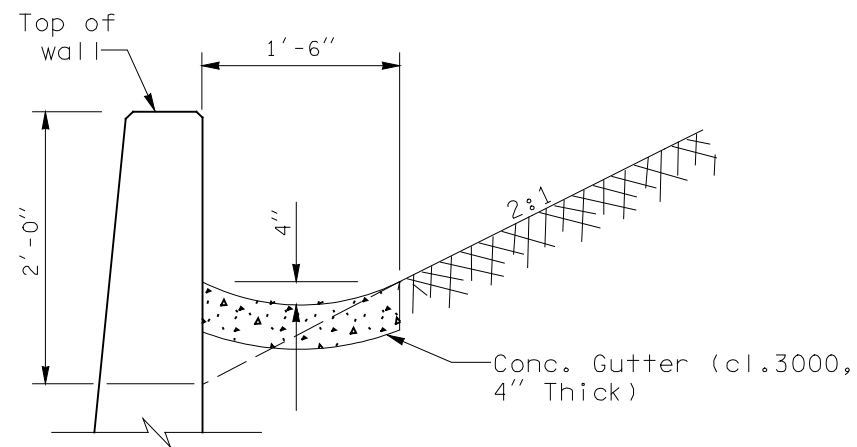
EXPIRES JUNE 29, 2000

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

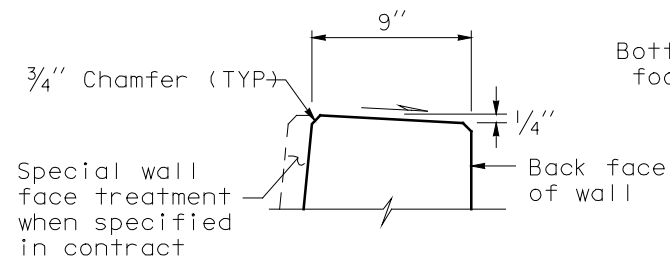
SHEET 2 OF 2 SHEETS

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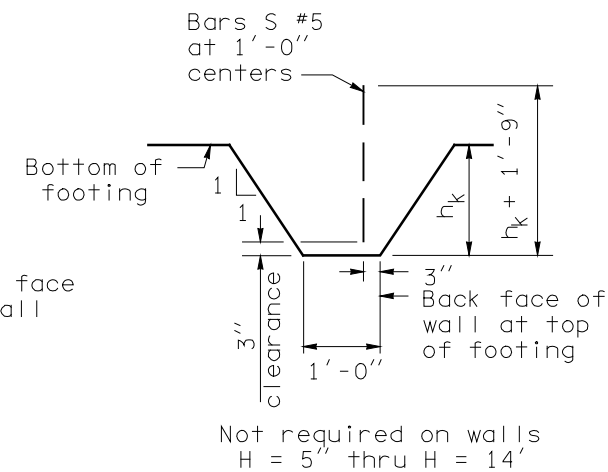
10/99	New approval date.	TWS
DATE	REVISION	BY
APPROVED FOR PUBLICATION		DATE
Clifford E. Mansfield		10/06/99
DEPUTY STATE DESIGN ENGINEER		WASHINGTON STATE DEPARTMENT OF TRANSPORTATION OLYMPIA, WASHINGTON



GUTTER DETAIL



WALL TOP DETAIL



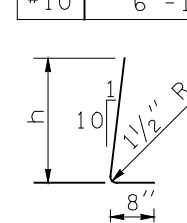
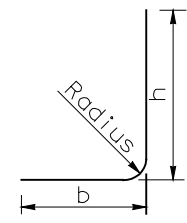
KEY DETAIL

NOTES

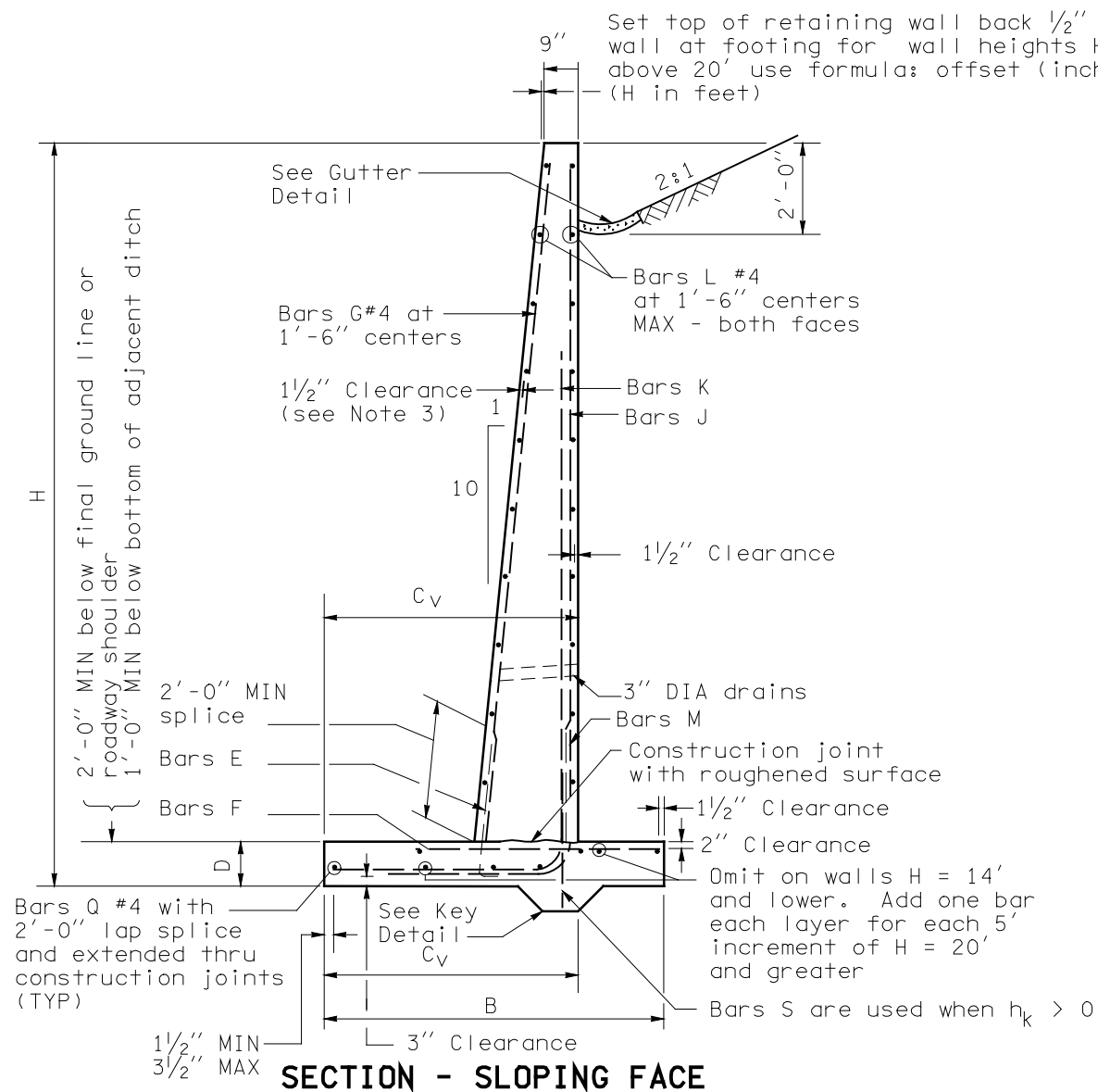
1. All concrete shall be Class 4000 except as noted.
2. For backfill requirements, see Standard Plan "D-4".
3. When Wall Type 4-SW (saltwater) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1".
4. When Wall Type 4-SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by $0.003 \times H$ CY/LF.
5. Concrete in the 24 foot wall sections shall be placed separately between expansion joints with a minimum 12 hour period between concrete placement.

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

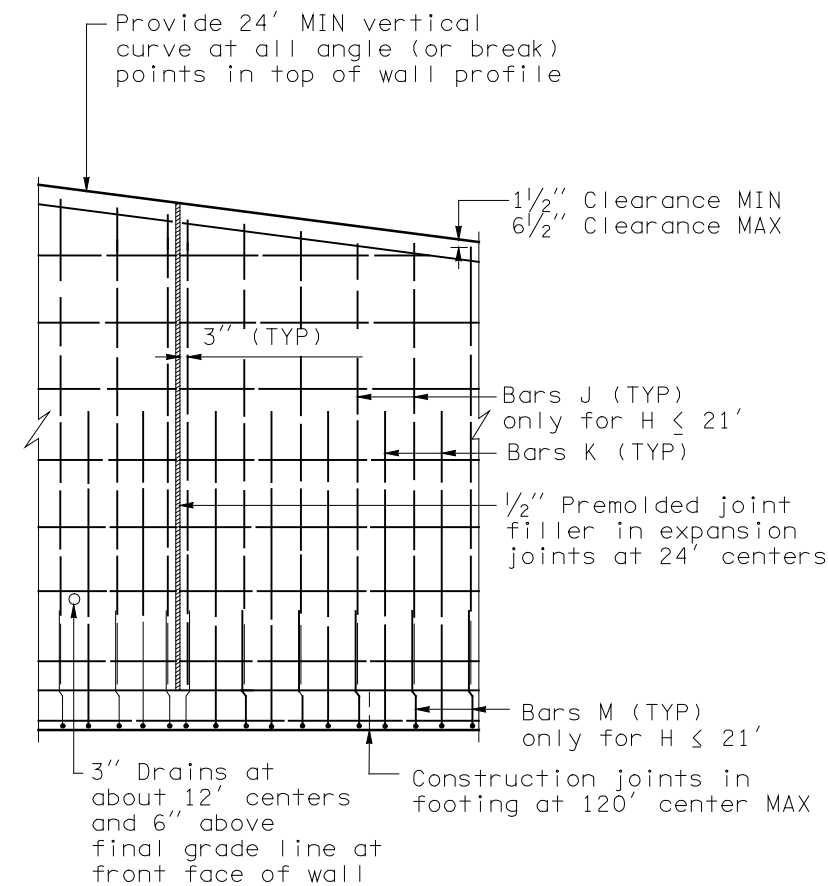
Bar	Radius
#5	9"
#6	11"
#7	1'-1"
#8	1'-3"
#9	1'-6"
#10	1'-8"

BAR E
At 1'-6" centers

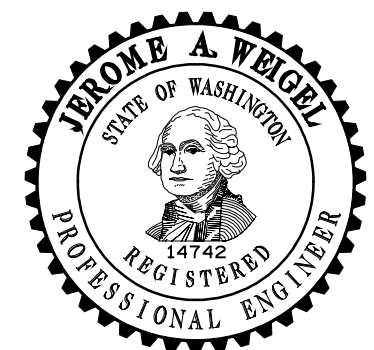
BARS K AND M

WALL DESIGN WITH SLOPING
FRONT FACE AND 2:1 BACKSLOPE

SECTION - SLOPING FACE



ELEVATION

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

SHEET 1 OF 2 SHEETS

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10/99	Added note 5.	TWS
DATE	REVISION	BY

APPROVED FOR PUBLICATION

Clifford E. Mansfield 10/06/99

DEPUTY STATE DESIGN ENGINEER DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

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

WALL DESIGN WITH SLOPING
FRONT FACE AND 2:1 BACKSLOPE

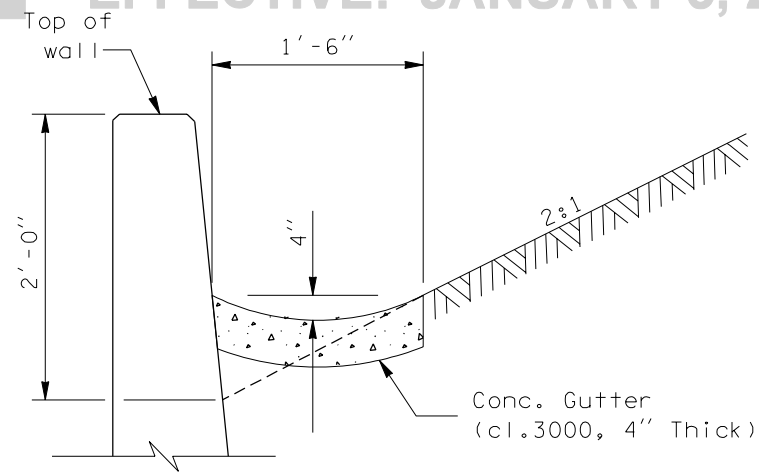


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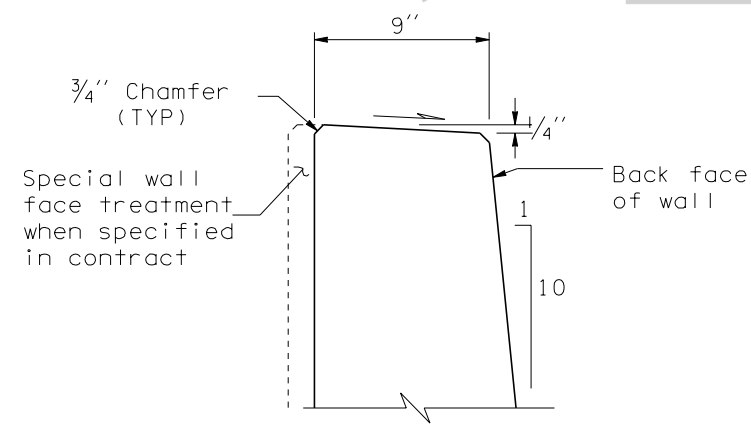
REINFORCED CONCRETE
RETAINING WALL
TYPE 4 AND 4 SW
STANDARD PLAN D-1d

SHEET 2 OF 2 SHEETS

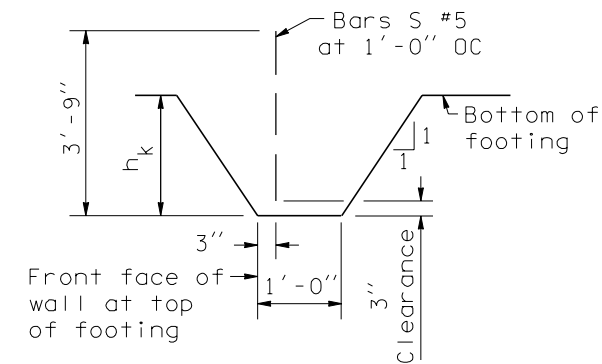
<small>NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.</small>			APPROVED FOR PUBLICATION	
10/99 New approval date.		TWS	Clifford E. Mansfield 10/06/99	
DATE		REVISION	BY	
			WASHINGTON STATE DEPARTMENT OF TRANSPORTATION OLYMPIA, WASHINGTON	



GUTTER DETAIL



WALL TOP DETAIL



KEY DETAIL

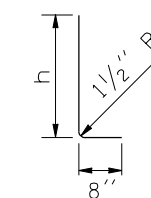
Not required on
walls H = 5'
thru H = 25'

NOTES

1. All concrete shall be Class 4000 except as noted.
2. For backfill requirements, see Standard Plan "D-4".
3. When Wall Type 5-SW (saltwater) is specified, the concrete cover over steel in the front face and the total wall thickness shall be increased by 1".
4. When Wall Type 5-SW (saltwater) is specified, concrete in the table column "Material Quantity" shall be increased by $0.003 \times H$ CY/LF.
5. Concrete in the 24 foot wall sections shall be placed separately between expansion joints with a minimum 12 hour period between concrete placement.

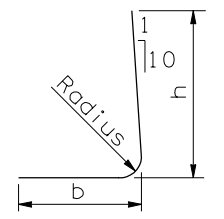
Bar	MIN Splice
#4	2'-0"
#5	2'-0"
#6	2'-1"
#7	2'-11"
#8	3'-9"
#9	4'-9"
#10	6'-1"

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



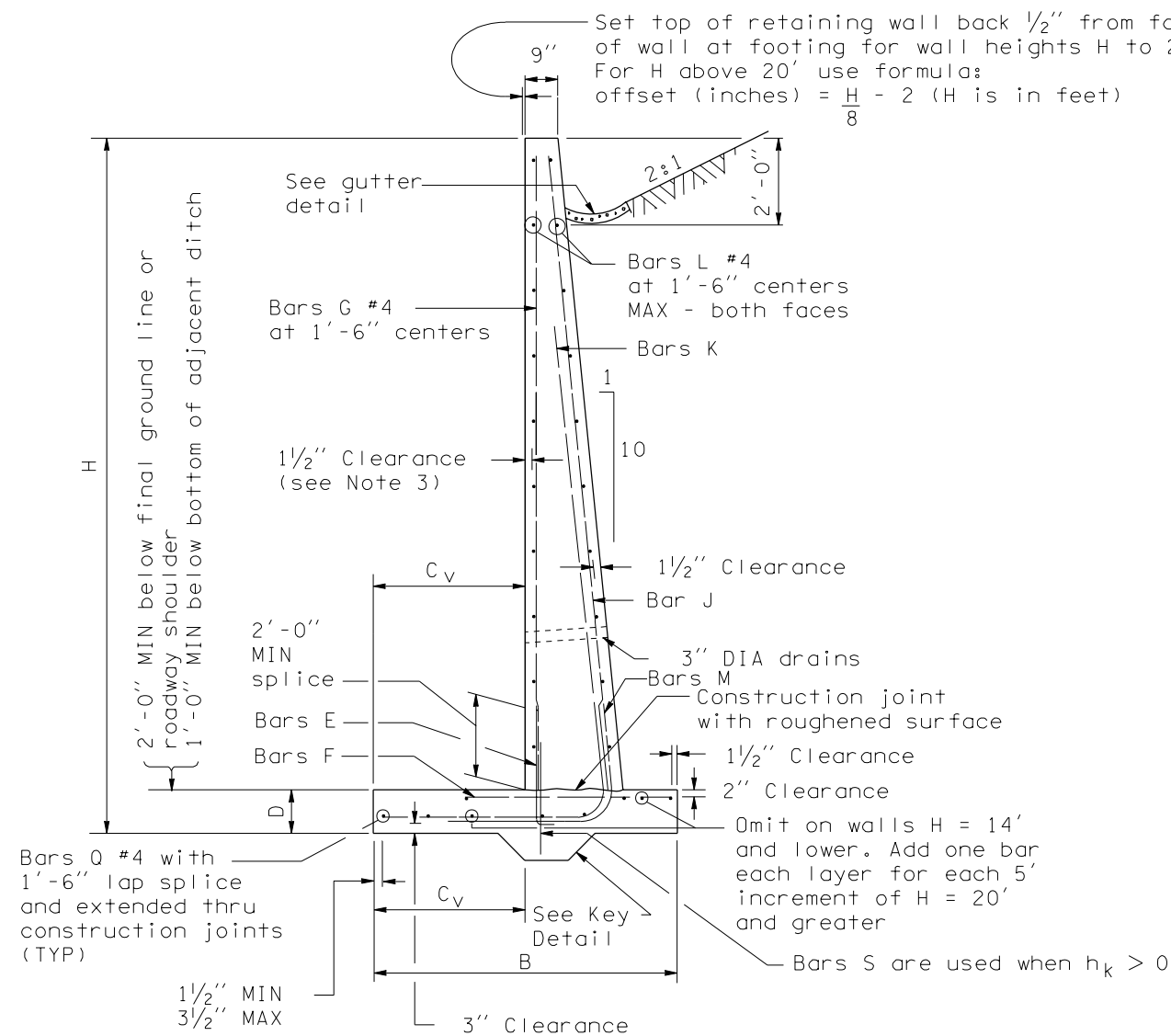
BAR E

At 1'-6" centers

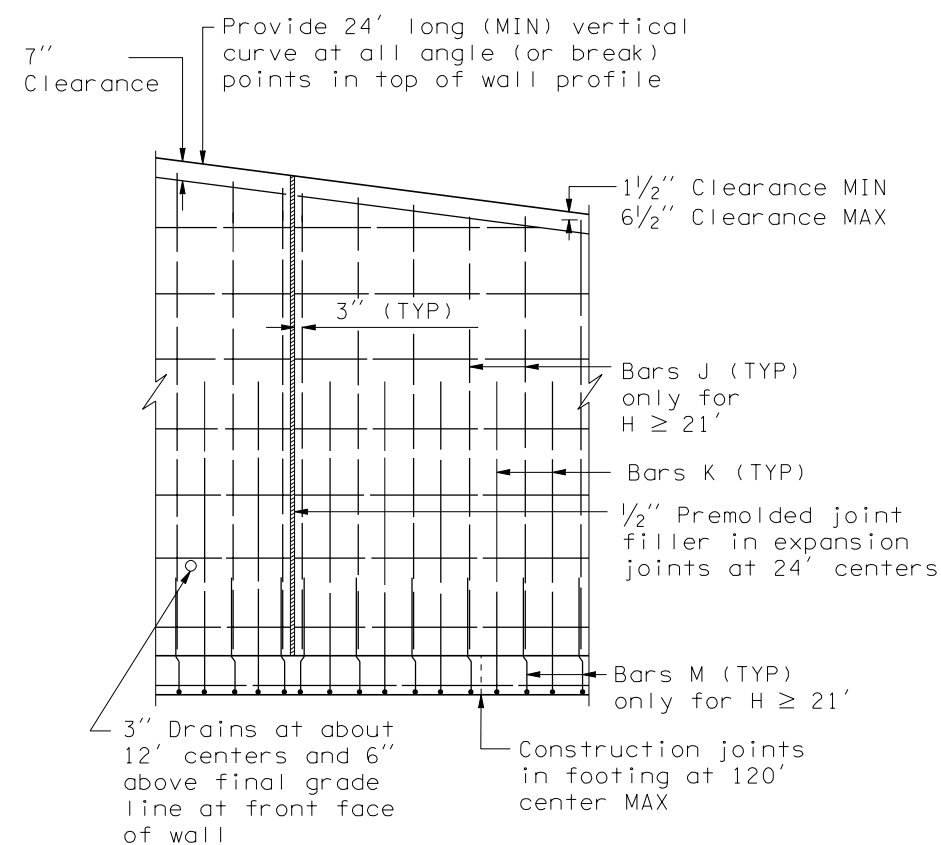


BARS K AND M

WALL DESIGN WITH VERTICAL
FRONT FACE AND 2:1 BACKSLOPE



SECTION - VERTICAL FACE



ELEVATION



EXPIRES JUNE 29, 2002

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

SHEET 1 OF 2 SHEETS

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8/01	New Approval Date	MAS
DATE	REVISION	BY

APPROVED FOR PUBLICATION

Harold J. Peterfeso 01-23-02

STATE DESIGN ENGINEER

DATE



Washington State Department of Transportation

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

WALL DESIGN WITH VERTICAL
FRONT FACE AND 2:1 BACKSLOPE



EXPIRES JUNE 29, 2002

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

SHEET 2 OF 2 SHEETS

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8/01		CORRECTED TABLE	MAS	
DATE	REVISION	BY	STATE DESIGN ENGINEER	
			Washington State Department of Transportation	
			DATE	
			01-23-02	



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

WALL DESIGN WITH SLOPING
FRONT FACE AND 2:1 BACKSLOPE



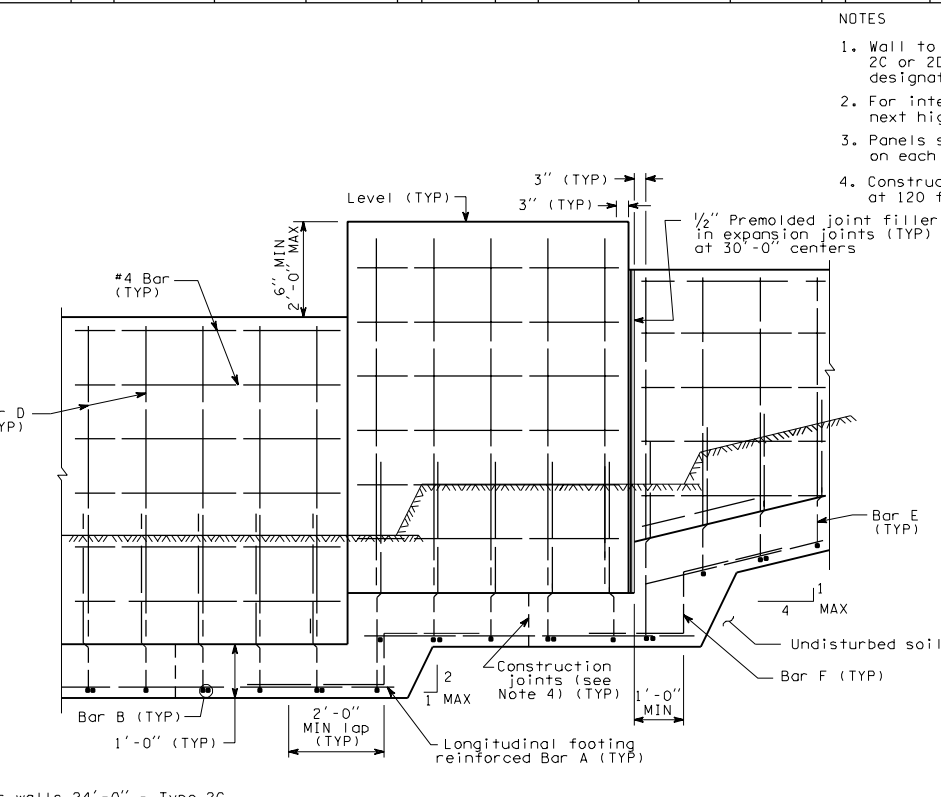
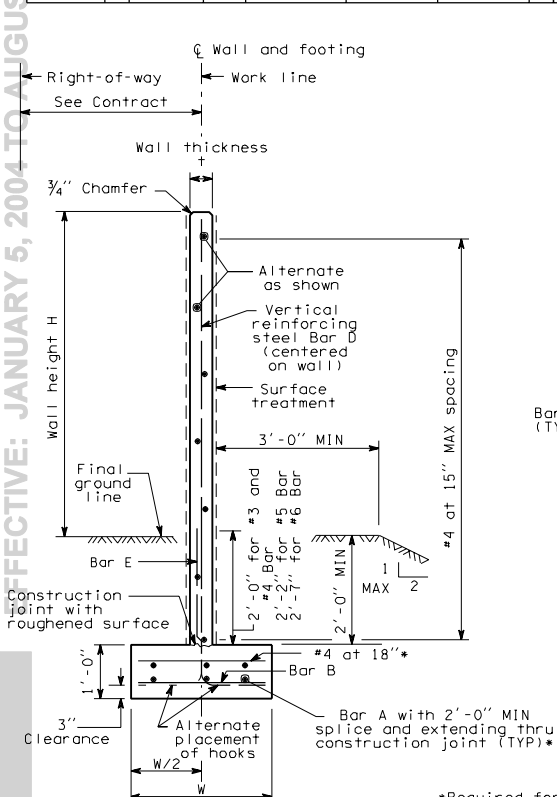
EXPIRES JUNE 29, 2000

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

SHEET 2 OF 2 SHEETS

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.			APPROVED FOR PUBLICATION	
10/99 New approval date.		TWS	Clifford E. Mansfield	10/06/99
DATE		REVISION	DEPUTY STATE DESIGN ENGINEER	DATE
		BY	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION OLYMPIA, WASHINGTON	

WALL HT	EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004 TYPE 2A						EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004 TYPE 2B						EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004 TYPE 2C						EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004 TYPE 2D						WALL HT
	W	+	BARS A AND F	BAR B	BARS D AND E		W	+	BARS A AND F	BAR B	BARS D AND E		W	+	BARS A AND F	BAR B	BARS D AND E		W	+	BARS A AND F	BAR B	BARS D AND E		
6'-0"	2'-0"	5"	3 - #4	#4 at 18"	#3 at 15"		2'-3"	5"	3 - #4	#4 at 18"	#3 at 12"		2'-0"	5"	3 - #4	#4 at 18"	#3 at 15"		2'-6"	5"	3 - #4	#4 at 18"	#3 at 11"		6'-0"
8'-0"	2'-3"	5"	3 - #4	#4 at 18"	#3 at 12"		2'-9"	5"	3 - #4	#4 at 18"	#4 at 15"		2'-6"	5"	3 - #4	#4 at 18"	#3 at 10"		3'-3"	5"	5 - #4	#4 at 18"	#4 at 12"		8'-0"
10'-0"	2'-6"	5"	3 - #4	#4 at 18"	#3 at 9"		3'-3"	5"	5 - #4	#4 at 18"	#4 at 10"		2'-9"	5"	3 - #4	#4 at 18"	#4 at 12"		3'-6"	5"	5 - #4	#4 at 18"	#4 at 10"		10'-0"
12'-0"	3'-0"	5"	3 - #4	#4 at 18"	#4 at 12"		3'-9"	5"	5 - #4	#4 at 18"	#4 at 10"		3'-3"	5"	3 - #4	#4 at 18"	#4 at 10"		4'-3"	5"	5 - #4	#4 at 18"	#5 at 12"		12'-0"
14'-0"	3'-3"	5"	3 - #4	#4 at 18"	#4 at 10"		4'-3"	5"	5 - #4	#4 at 18"	#5 at 11"		3'-9"	5"	3 - #4	#4 at 18"	#4 at 9"		4'-9"	5"	5 - #4	#4 at 18"	#5 at 8"		14'-0"
16'-0"	3'-9"	5"	5 - #4	#4 at 18"	#4 at 9"		4'-9"	5"	5 - #4	#4 at 18"	#6 at 12"		4'-3"	5"	5 - #4	#4 at 18"	#5 at 11"		5'-6"	5"	5 - #4	#4 at 18"	#6 at 9"		16'-0"
18'-0"	4'-0"	5"	5 - #4	#4 at 18"	#5 at 11"		5'-3"	5"	5 - #4	#4 at 18"	#6 at 9"		4'-6"	5"	5 - #4	#4 at 18"	#6 at 12"		6'-0"	6"	5 - #4	#4 at 18"	#6 at 9"		18'-0"
20'-0"	5'-0"	5"	5 - #4	#4 at 18"	#5 at 9"		6'-0"	6"	5 - #4	#4 at 18"	#6 at 9"		5'-3"	5"	5 - #4	#4 at 18"	#6 at 10"		6'-6"	6"	5 - #4	#4 at 12"	#6 at 7 1/4"		20'-0"
22'-0"	5'-6"	5"	5 - #4	#4 at 18"	#5 at 7"		6'-3"	6"	5 - #4	#4 at 12"	#6 at 8"		5'-9"	6"	5 - #4	#4 at 18"	#6 at 9"		7'-0"	7"	5 - #4	#4 at 11"	#6 at 7"		22'-0"
24'-0"	6'-0"	5"	5 - #4	#4 at 15"	#5 at 6"		6'-9"	7"	5 - #4	#4 at 11"	#6 at 8"		6'-3"	6"	5 - #4	#4 at 12"	#6 at 8"		7'-6"	7"	5 - #4	#4 at 9"	#6 at 6 1/4"		24'-0"



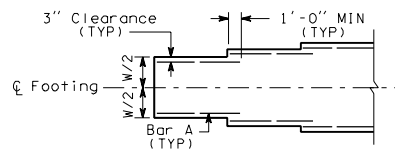
- NOTES
1. Wall to be designated Noise Barrier Type 2A, 2B, 2C or 2D. The Contract specifies actual wall designations.
 2. For intermediate wall heights not listed, use the next higher H.
 3. Panels shall have at least 3 feet of level ground on each side.
 4. Construction joints in the footing shall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

NOISE BARRIER - TYPE 2
CAST-IN-PLACE CONCRETE WALL
ON SPREAD FOOTING

D-2b
03-14-97

*Required for walls 24'-0" - Type 2C,
 wall height 22'-0" and 24'-0" - Type 2B and
 walls 20'-0", 22'-0" and 24'-0" - Type 2D

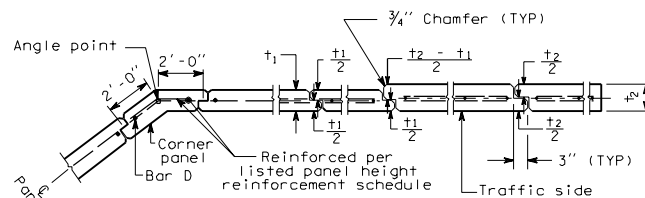
ELEVATION



FOOTING WIDTH TRANSITION DETAIL

(For locations without footing step)

NOTE: Transverse bars not shown



JOINT AND CORNER DETAIL

NOISE BARRIER - TYPE 2
CAST-IN-PLACE CONCRETE WALL
ON SPREAD FOOTING

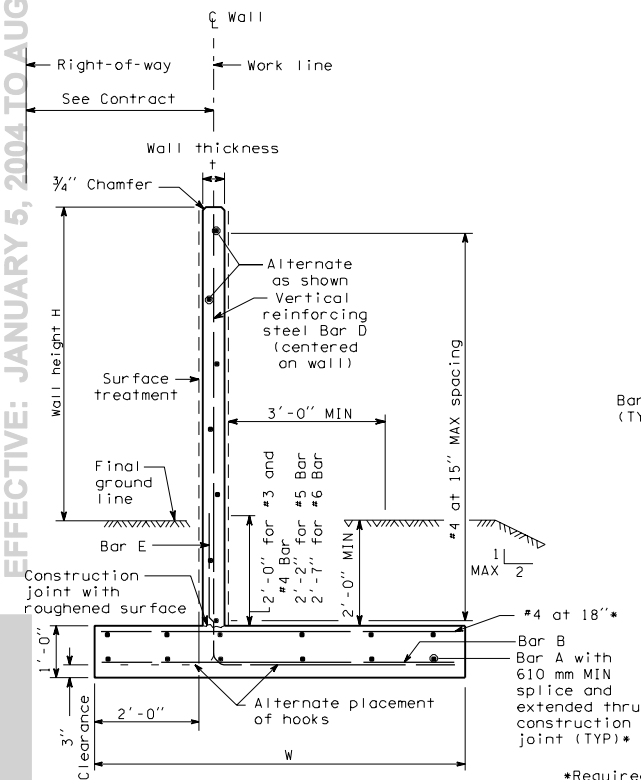
D-2b

03-14-97

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

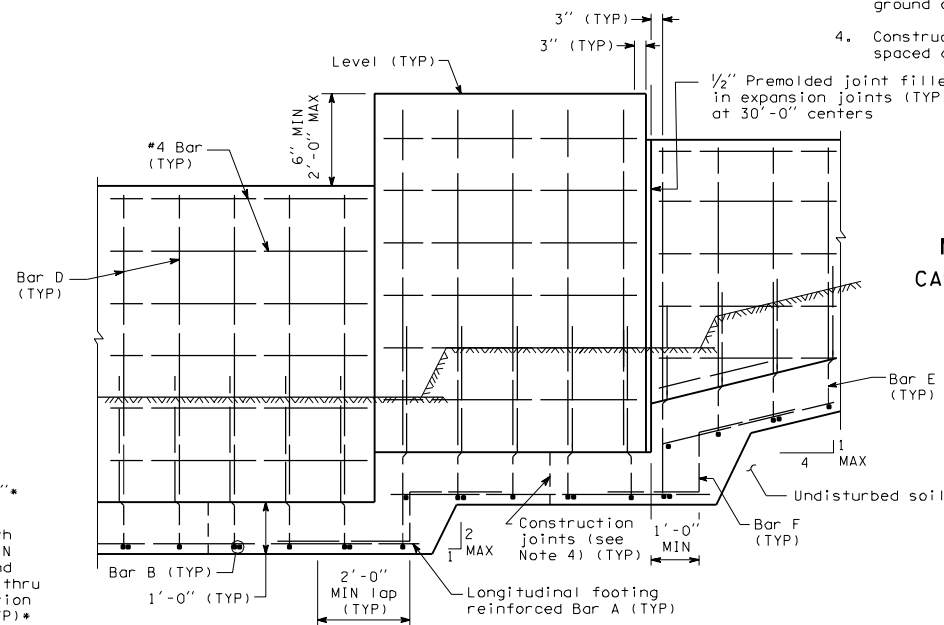
NOTES

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



TYPICAL SECTION

*Required for walls 24'-0" - Type 3C, wall height 22'-0" and 24'-0" - Type 3B, and walls 20'-0", 22'-0" and 24'-0" - Type 3D

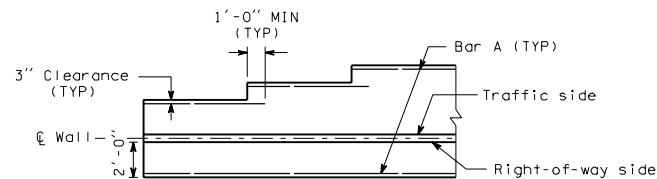


ELEVATION

NOISE BARRIER - TYPE 3 CAST-IN-PLACE CONCRETE WALL ON SPREAD FOOTING (OFFSET FOOTING)

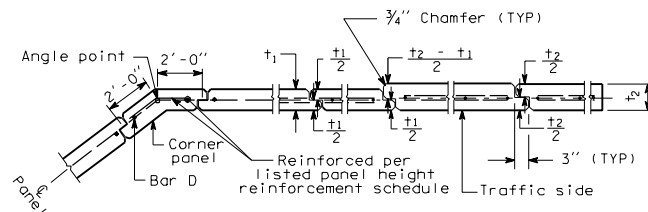
D-2c

03-14-97



FOOTING WIDTH TRANSITION DETAIL
(For locations without footing step)

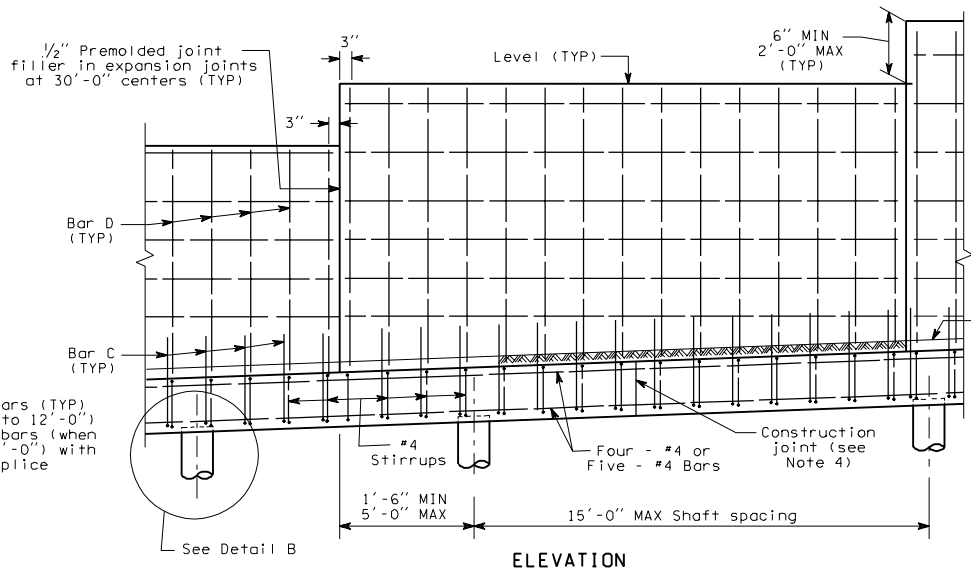
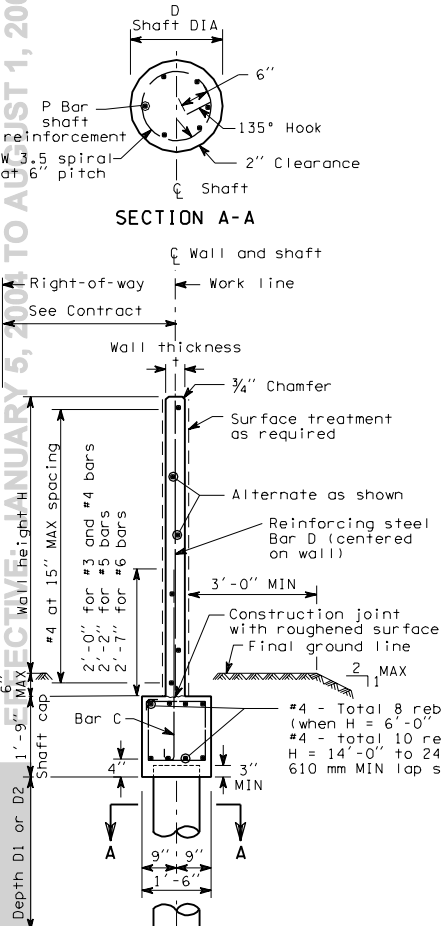
NOTE: Transverse bars not shown



JOINT AND CORNER DETAIL

NOISE BARRIER - TYPE 3
CAST-IN-PLACE CONCRETE WALL
ON SPREAD FOOTING
(OFFSET FOOTING)

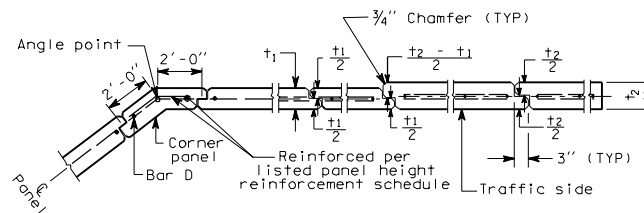
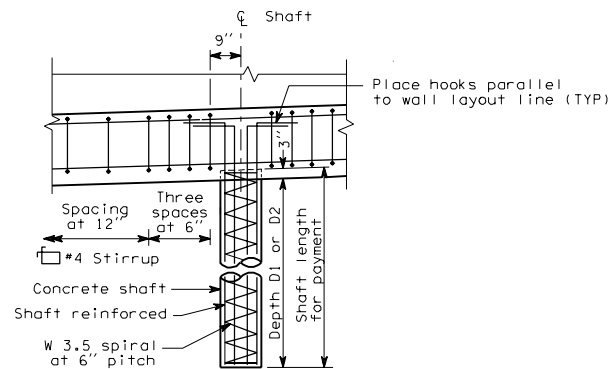
WALL HT H	TYPE 4A						TYPE 4B						TYPE 4C						TYPE 4D						WALL HT H
	+	SHAFT DIA D	DEPTH D1	DEPTH D2	SHAFT REINF P BARS	BARS C and D	+	SHAFT DIA D	DEPTH D1	DEPTH D2	SHAFT REINF P BARS	BARS C and D	+	SHAFT DIA D	DEPTH D1	DEPTH D2	SHAFT REINF P BARS	BARS C and D	+	SHAFT DIA D	DEPTH D1	DEPTH D2	SHAFT REINF P BARS	BARS C and D	
6'-0"	5"	12"	5'-3"	4'-9"	6 - #5	#3 at 15"	5"	12"	6'-0"	5'-3"	6 - #5	#3 at 15"	5"	12"	5'-9"	5'-0"	6 - #5	#3 at 15"	5"	12"	6'-6"	5'-9"	6 - #5	#3 at 15"	6'-0"
8'-0"	5"	12"	6'-0"	5'-3"	6 - #5	#3 at 15"	5"	12"	7'-0"	6'-0"	6 - #5	#3 at 12"	5"	12"	6'-6"	5'-6"	6 - #5	#3 at 15"	5"	12"	7'-6"	6'-6"	6 - #6	#3 at 10"	8'-0"
10'-0"	5"	12"	6'-9"	5'-9"	6 - #5	#3 at 13"	5"	12"	7'-9"	6'-9"	6 - #6	#4 at 15"	5"	12"	7'-3"	6'-3"	6 - #5	#3 at 10"	5"	12"	8'-3"	7'-0"	6 - #7	#4 at 12"	10'-0"
12'-0"	5"	12"	7'-3"	6'-3"	6 - #5	#3 at 9"	5"	12"	8'-6"	7'-3"	6 - #7	#4 at 10"	5"	12"	7'-9"	6'-9"	6 - #6	#4 at 12"	5"	14"	8'-6"	7'-3"	8 - #7	#4 at 10"	12'-0"
14'-0"	5"	12"	7'-9"	6'-9"	6 - #6	#4 at 12"	5"	14"	8'-6"	7'-3"	8 - #7	#4 at 9"	5"	12"	8'-6"	7'-3"	6 - #7	#4 at 10"	5"	14"	9'-3"	8'-0"	8 - #7	#5 at 11"	14'-0"
16'-0"	5"	12"	8'-6"	7'-3"	6 - #7	#4 at 10"	5"	16"	9'-3"	8'-0"	8 - #7	#5 at 11"	5"	14"	8'-6"	7'-3"	8 - #6	#4 at 9"	5"	16"	9'-6"	8'-0"	8 - #8	#5 at 8"	16'-0"
18'-0"	5"	12"	9'-0"	7'-9"	6 - #8	#4 at 9"	5"	16"	9'-3"	8'-0"	6 - #8	#5 at 8"	5"	14"	9'-0"	7'-9"	8 - #7	#5 at 11"	5"	16"	10'-0"	8'-6"	8 - #8	#6 at 9"	18'-0"
20'-0"	5"	12"	9'-3"	7'-9"	6 - #9	#4 at 7"	5"	16"	10'-0"	8'-6"	8 - #7	#5 at 7"	5"	14"	9'-9"	8'-3"	8 - #8	#5 at 8"	5"	16"	10'-9"	9'-3"	8 - #9	#6 at 9"	20'-0"
22'-0"	5"	14"	9'-3"	7'-9"	8 - #7	#4 at 6"	6"	16"	10'-6"	9'-0"	8 - #8	#5 at 6"	5"	14"	10'-3"	8'-9"	8 - #9	#5 at 8"	6"	16"	11'-6"	9'-9"	8 - #10	#6 at 7"	22'-0"
24'-0"	5"	14"	9'-9"	8'-3"	8 - #8	#5 at 8"	6"	16"	11'-3"	9'-6"	8 - #8	#6 at 7"	6"	16"	10'-3"	8'-9"	8 - #8	#6 at 7"	7"	18"	11'-6"	9'-9"	8 - #10	#6 at 7"	24'-0"



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

NOISE BARRIER - TYPE 4 CAST-IN-PLACE CONCRETE WALL ON SHAFT FOUNDATION

D-2d
03-14-97



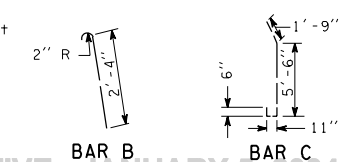
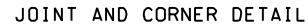
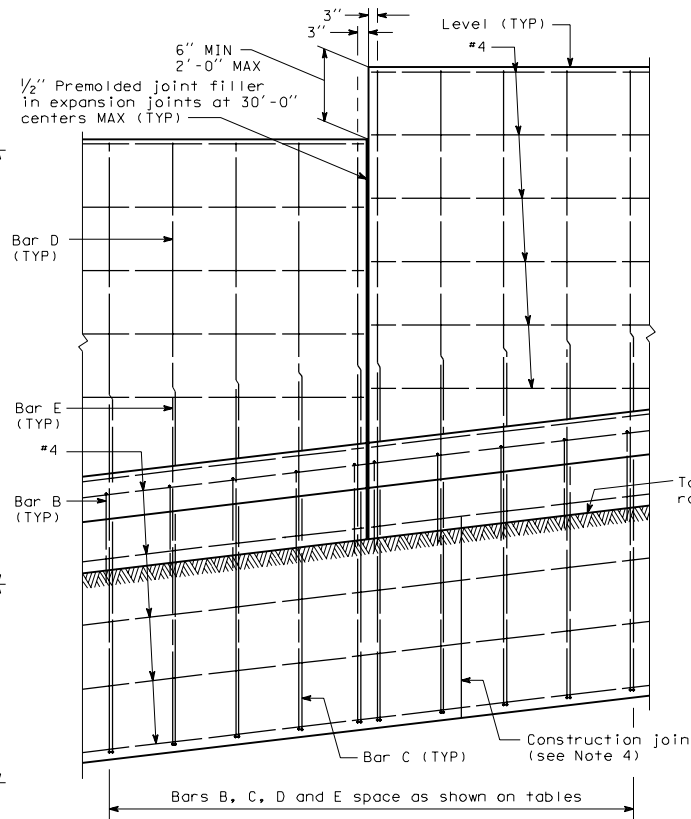
NOISE BARRIER - TYPE 4
CAST-IN-PLACE CONCRETE WALL
ON SHAFT FOUNDATION

D-2d
03-14-97

NOTES

JANUARY 5, 2004 TO AUGUST 1, 2004

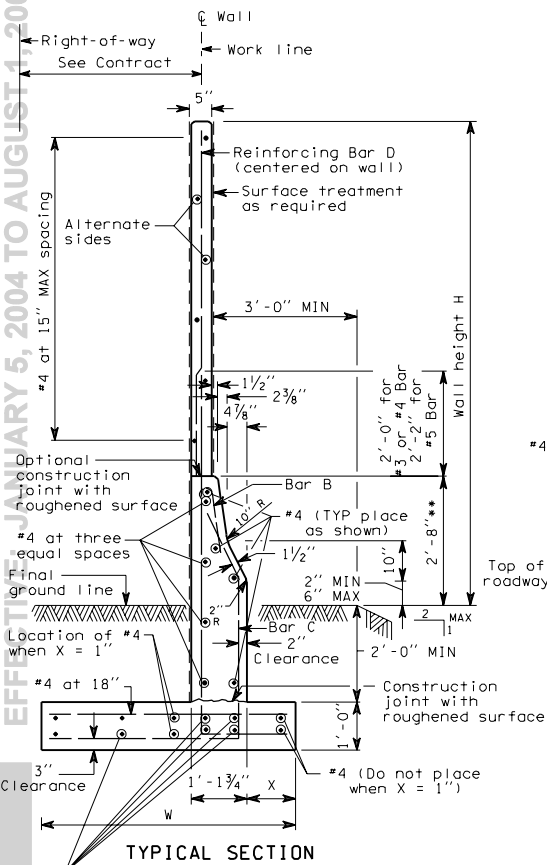
1. Wall to be designated Noise Barrier Type 5A, 5B, 5C or 5D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet MIN of level ground on each side.
4. Construction joints in the footing shall be spaced at 120 feet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



NOISE BARRIER - TYPE 5
CAST-IN-PLACE
WITH TRAFFIC BARRIER
ON TRENCH FOOTINGS

WALL HT H	TYPE 6A				TYPE 6B				TYPE 6C				TYPE 6D				WALL HT H
	W	X	BAR B and C	BAR D and E	W	X	BAR B and C	BAR D and E	W	X	BAR B and C	BAR D and E	W	X	BAR B and C	BAR D and E	
6'-0"	5'-6"	1"	#4 at 12"	#4 at 12"	5'-6"	1"	#4 at 12"	#4 at 12"	5'-6"	1"	#4 at 12"	#4 at 12"	5'-6"	1"	#4 at 12"	#4 at 12"	6'-0"
8'-0"	5'-3"	1"	#4 at 12"	#4 at 12"	5'-3"	1"	#4 at 12"	#4 at 12"	5'-3"	1"	#4 at 12"	#4 at 12"	5'-3"	1"	#4 at 12"	#4 at 12"	8'-0"
10'-0"	5'-3"	1"	#4 at 12"	#4 at 12"	5'-3"	1"	#4 at 12"	#4 at 12"	5'-3"	1"	#4 at 12"	#4 at 12"	5'-3"	1"	#4 at 12"	#4 at 12"	10'-0"
12'-0"	5'-0"	1"	#4 at 12"	#4 at 12"	5'-0"	1"	#4 at 12"	#4 at 12"	5'-0"	1"	#4 at 12"	#4 at 12"	5'-0"	1"	#4 at 12"	#4 at 12"	12'-0"
14'-0"	4'-9"	1"	#4 at 12"	#4 at 12"	5'-0"	1"	#4 at 11"	#4 at 11"	4'-9"	1"	#4 at 12"	#4 at 12"	5'-3"	10"	#4 at 10"	#4 at 10"	14'-0"
16'-0"	5'-0"	10"	#4 at 12"	#4 at 12"	5'-0"	10"	#4 at 10"	#4 at 10"	5'-0"	10"	#4 at 10"	#4 at 10"	5'-6"	1'-6"	#4 at 12"	#5 at 12"	16'-0"
18'-0"	5'-0"	10"	#4 at 10"	#4 at 10"	5'-3"	1'-6"	#4 at 12"	#5 at 12"	5'-3"	1'-6"	#4 at 10"	#4 at 10"	5'-9"	1'-9"	#4 at 9"	#5 at 9"	18'-0"

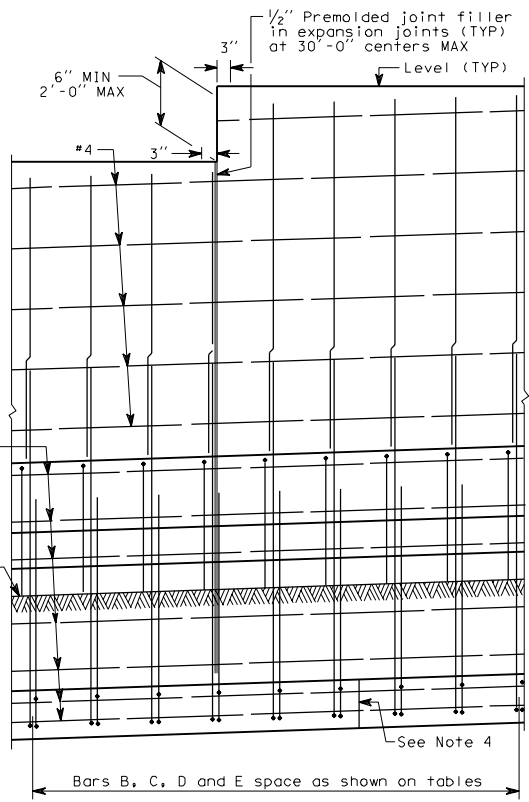
- NOTES
1. Wall to be designated Noise Wall Type 6A, 6B, 6C and 6D. The Contract specifies actual wall designations.
 2. For intermediate wall heights not listed, use the next higher H.
 3. Panels shall have at least 3 feet of level ground on each side.
 4. Construction joints in the footing shall be spaced at 120 feet MAX.



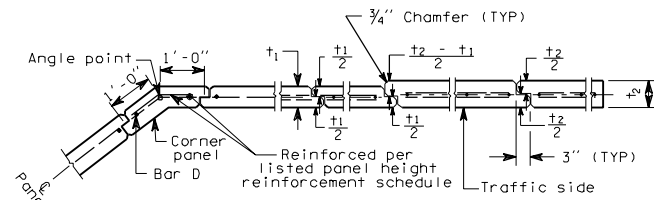
TYPICAL SECTION

#4 (TYP). Place as shown with 2'-0" splice and extending thru construction joints

**Height may vary if required to provide a smooth profile constant with roadway profile



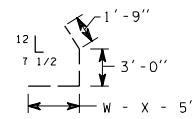
ELEVATION



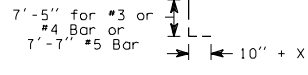
JOINT AND CORNER DETAIL



BAR B

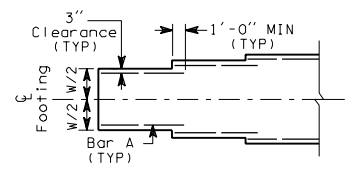


BAR C



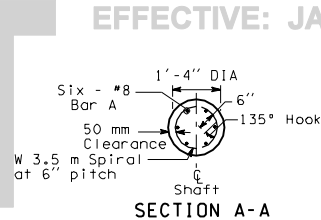
BAR E

NOISE BARRIER - TYPE 6 CAST-IN-PLACE CONCRETE WALL WITH TRAFFIC BARRIER ON SPREAD FOOTING



FOOTING WIDTH TRANSITION DETAIL
(For locations without footing step)

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

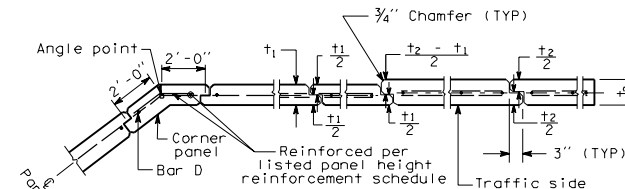


WALL HT H	TYPE 7A BARS B and C	TYPE 7B BARS B and C	TYPE 7C BARS B and C	TYPE 7D BARS B and C	WALL HT H
6'-0"	#4 at 15"	#4 at 15"	#4 at 15"	#4 at 15"	6'-0"
8'-0"	#4 at 15"	#4 at 15"	#4 at 15"	#4 at 15"	8'-0"
10'-0"	#4 at 15"	#4 at 15"	#4 at 15"	#4 at 15"	10'-0"
12'-0"	#4 at 15"	#4 at 15"	#4 at 15"	#4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

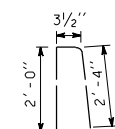
EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

NOTES

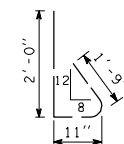
1. Wall to be designated Noise Wall Type 7A, 7B, 7C or 7D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3 feet of level ground on each side.
4. Construction joints in the footing shall be spaced at 120 feet maximum.
5. The Contract specifies actual foundation requirements D1 or D2.



JOINT AND CORNER DETAIL

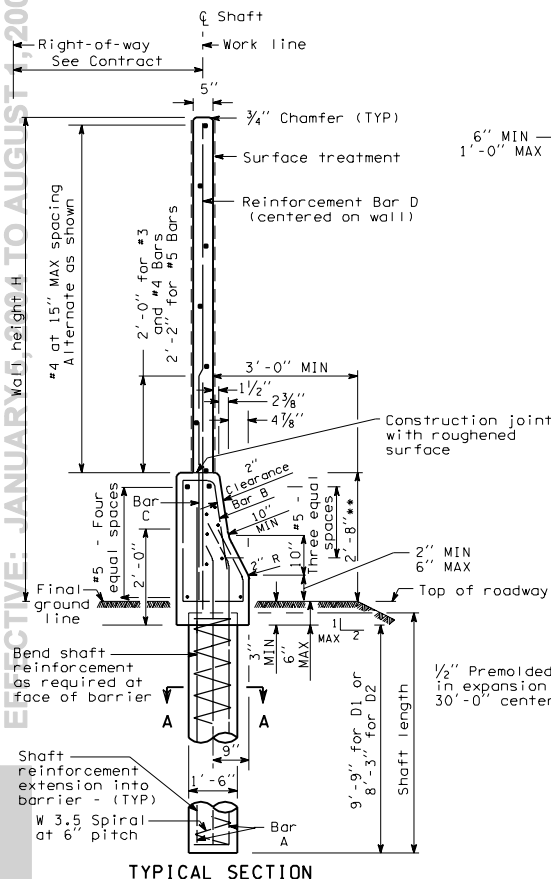


BAR B - #4

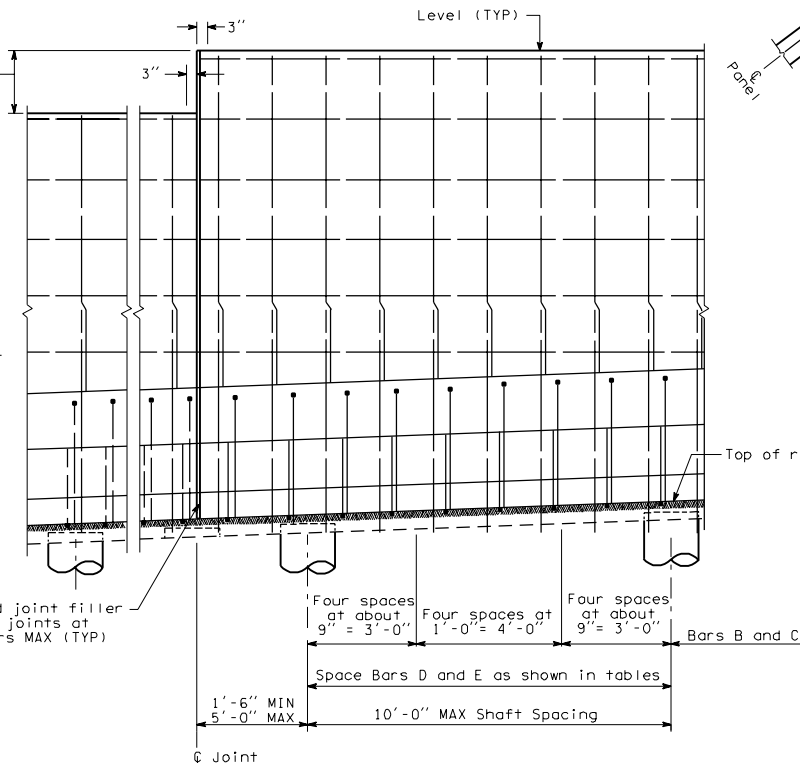


BAR C - #4

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004



TYPICAL SECTION



ELEVATION

NOISE BARRIER - TYPE 7
CAST-IN-PLACE CONCRETE WALL
WITH TRAFFIC BARRIER
ON SHAFT FOUNDATION

** Height may vary if required to provide a smooth profile consistent with the roadway profile

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

D-2g 1 of 1

03-14-97

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

TYPE 8A

WALL HT H	WALL THICK T	DEPTH D1	DEPTH D2	BAR D
6'-0"	5"	3'-6"	3'-3"	#3 at 15"
8'-0"	5"	3'-9"	3'-3"	#3 at 13"
10'-0"	5"	4'-0"	3'-6"	#3 at 8 1/2"
12'-0"	5"	4'-3"	3'-9"	#4 at 12"
14'-0"	5"	4'-6"	4'-0"	#4 at 10 1/2"
16'-0"	5"	4'-9"	4'-3"	#5 at 14"
18'-0"	5"	5'-0"	4'-6"	#5 at 11"
20'-0"	5"	5'-3"	4'-9"	#5 at 6"
22'-0"	5"	5'-6"	5'-0"	#5 at 7"
24'-0"	5"	5'-9"	5'-3"	#6 at 8"

TYPE 8B

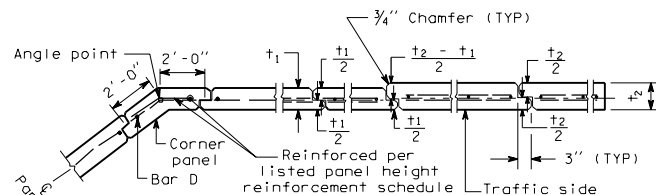
WALL THICK T	DEPTH D1	DEPTH D2	BAR D
5"	3'-9"	3'-6"	#3 at 13 1/2"
5"	4'-0"	3'-9"	#3 at 8 1/2"
5"	4'-3"	4'-0"	#4 at 10 1/2"
5"	4'-9"	4'-3"	#4 at 10"
5"	5'-0"	4'-6"	#5 at 11"
5"	5'-3"	4'-9"	#5 at 8 1/2"
5"	5'-6"	5'-0"	#6 at 9 1/2"
6"	5'-9"	5'-3"	#6 at 9 1/2"
6"	6'-0"	5'-6"	#6 at 8"
7"	6'-3"	5'-9"	#6 at 6 1/2"

TYPE 8C

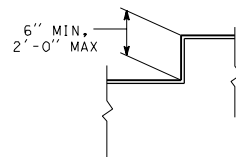
WALL THICK T	DEPTH D1	DEPTH D2	BAR D
5"	3'-6"	3'-3"	#3 at 15"
5"	3'-9"	3'-6"	#3 at 11"
5"	4'-0"	3'-9"	#3 at 12 1/2"
5"	4'-6"	4'-0"	#4 at 10 1/2"
5"	4'-9"	4'-3"	#4 at 9 1/2"
5"	5'-0"	4'-6"	#5 at 11"
5"	5'-3"	4'-9"	#5 at 8 1/2"
5"	5'-6"	5'-0"	#5 at 6"
6"	5'-9"	5'-3"	#5 at 8"
6"	6'-0"	5'-6"	#5 at 6"

TYPE 8D

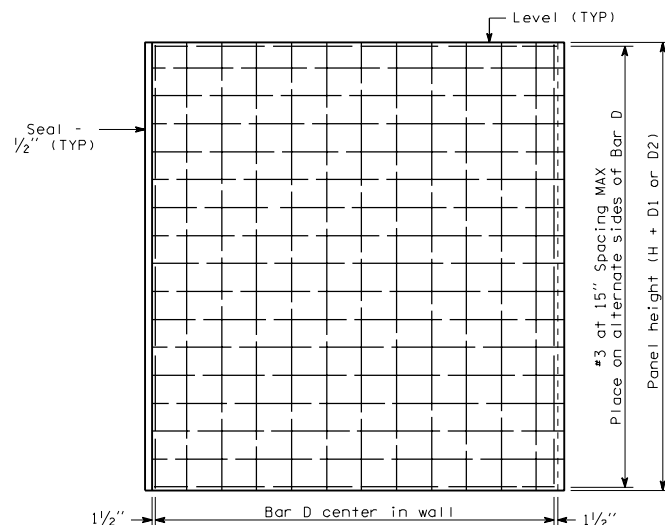
WALL THICK T	DEPTH D1	DEPTH D2	BAR D	WALL HT H
5"	3'-9"	3'-6"	#3 at 11"	6'-0"
5"	4'-3"	3'-9"	#4 at 12"	8'-0"
5"	4'-6"	4'-0"	#4 at 11"	10'-0"
5"	5'-0"	4'-6"	#5 at 12"	12'-0"
5"	5'-3"	4'-9"	#5 at 8 3/4"	14'-0"
5"	5'-9"	5'-0"	#6 at 9 1/2"	16'-0"
6"	6'-0"	5'-3"	#6 at 9"	18'-0"
6"	6'-3"	5'-6"	#6 at 7 1/2"	20'-0"
7"	6'-6"	5'-9"	#6 at 7"	22'-0"
7"	6'-9"	6'-0"	#6 at 6"	24'-0"



JOINT AND CORNER DETAIL



STEP IN PANEL TOP

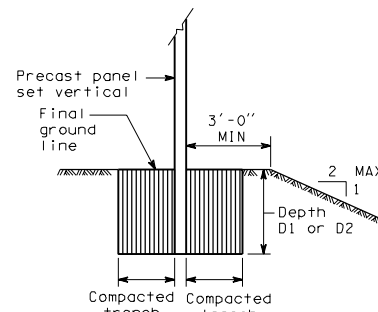


ELEVATION

NOTES

1. Wall to be designated Noise Wall Type 8A, 8B, 8C or 8D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. Panels shall have at least 3'-0" of level ground on each side.
4. Construction joints in the footing shall be spaced at 120 feet maximum.
5. All joints shall be in full contact and sealed.
6. The Contract specifies actual foundation requirements D1 or D2.

NOISE BARRIER - TYPE 8

PRECAST CONCRETE WALL
ON TRENCH FOOTING

TRENCH FOOTING

There shall not be more than 1'-0" differential backfill height

D-2h 1 of 1

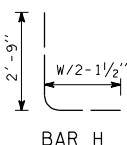
03-14-97

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: 9 JANUARY 5, 2004 TO AUGUST

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



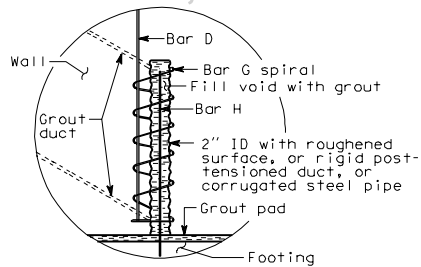
BAR H



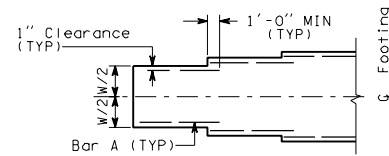
ELEVATION

D-2i
03-14-97

Sheet 1 of 2 Sheets



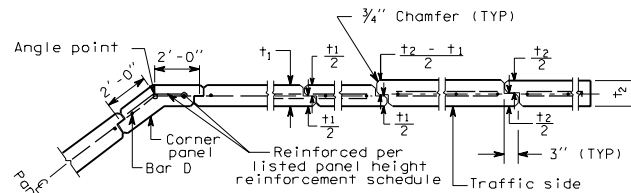
DETAIL B



FOOTING WIDTH TRANSITION DETAIL

(For locations without footing step)

NOTE: Transverse bars not shown



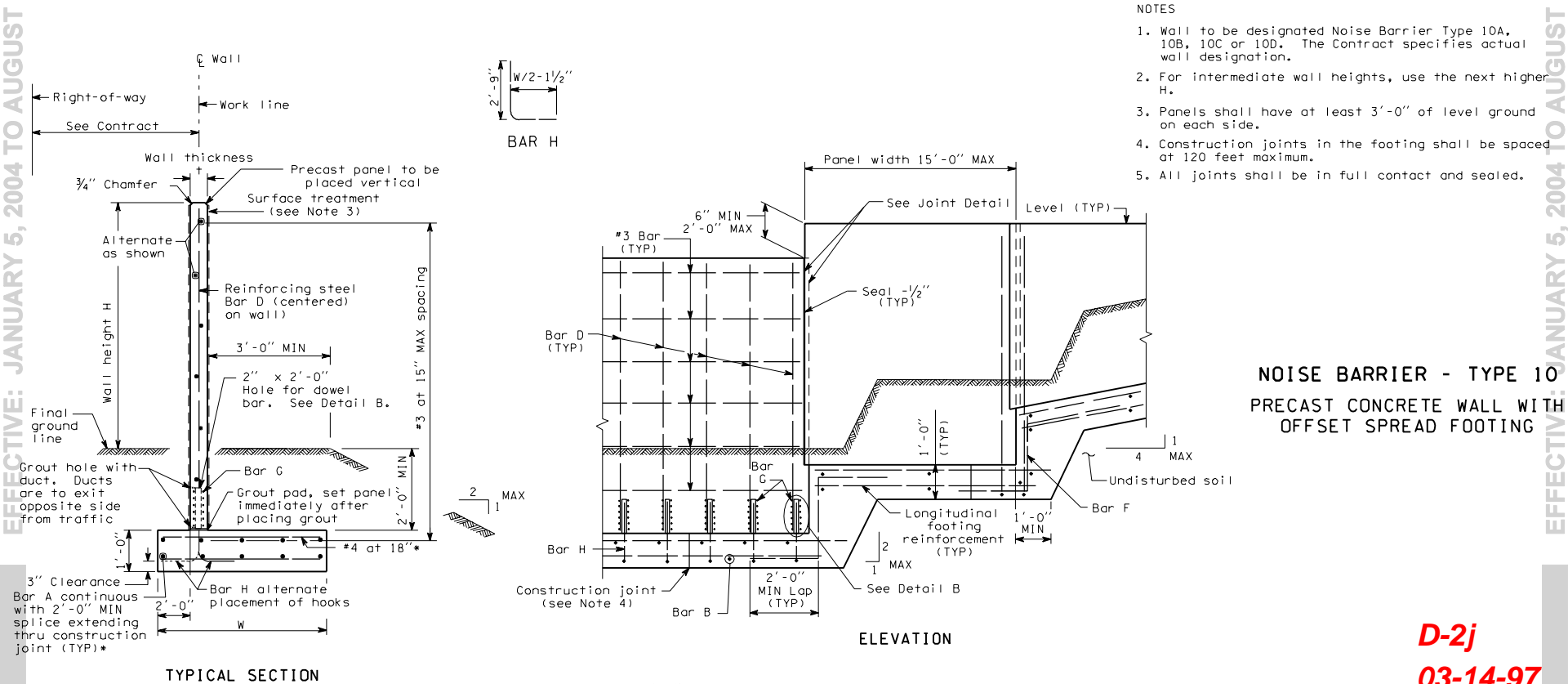
JOINT AND CORNER DETAIL

NOISE BARRIER - TYPE 9
 PRECAST CONCRETE WALL
 WITH SPREAD FOOTING

D-2i

03-14-97

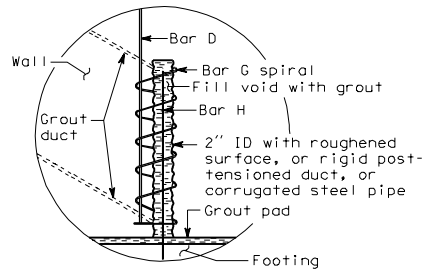
WALL HT H	TYPE 10A						TYPE 10B						TYPE 10C						TYPE 10D						WALL HT H
	W	BARS A and F	+	BAR B	SPIRAL BAR G	BARS D and H	W	A BARS and F	+	BAR B	SPIRAL BAR G	BARS D and H	W	A BARS and F	+	BAR B	SPIRAL BAR G	BARS D and H	W	A BARS and F	+	BAR B	SPIRAL BAR G	BARS D and H	
6'-0"	2'-0"	3-#4	5"	#4 at 18"	W2.0 at 2"	#3 at 15"	2'-3"	3-#4	5"	#4 at 18"	W2.0 at 2"	#3 at 12"	2'-0"	3-#4	5"	#4 at 18"	W2.0 at 2"	#3 at 15"	2'-6"	3-#4	5"	#4 at 18"	W2.0 at 2"	#3 at 11"	6'-0"
8'-0"	2'-3"	3-#4	5"	#4 at 18"	W2.0 at 2"	#3 at 12"	2'-9"	3-#4	5"	#4 at 18"	W3.0 at 2"	#4 at 15"	2'-6"	3-#4	5"	#4 at 18"	W2.0 at 2"	#3 at 10"	3'-3"	5-#4	5"	#4 at 18"	W3.0 at 2"	#4 at 12"	8'-0"
10'-0"	2'-6"	3-#4	5"	#4 at 18"	W2.0 at 2"	#3 at 9"	3'-3"	5-#4	5"	#4 at 18"	W3.0 at 2"	#4 at 10"	2'-9"	3-#4	5"	#4 at 18"	W3.0 at 2"	#4 at 12"	3'-6"	5-#4	5"	#4 at 18"	W3.0 at 2"	#4 at 10"	10'-0"
12'-0"	3'-0"	5-#4	5"	#4 at 18"	W3.0 at 2"	#4 at 12"	3'-9"	5-#4	5"	#4 at 18"	W3.0 at 2"	#4 at 10"	3'-3"	5-#4	5"	#4 at 18"	W3.0 at 2"	#4 at 10"	4'-3"	5-#4	5"	#4 at 18"	W3.0 at 1 3/4"	#5 at 12"	12'-0"
14'-0"	3'-3"	5-#4	5"	#4 at 18"	W3.0 at 2"	#4 at 10"	4'-3"	5-#4	5"	#4 at 18"	W3.0 at 1 3/4"	#5 at 11"	3'-9"	5-#4	5"	#4 at 18"	W3.0 at 2"	#4 at 9"	5'-3"	5-#4	5"	#4 at 18"	W3.0 at 1 3/4"	#5 at 8"	14'-0"
16'-0"	3'-9"	5-#4	5"	#4 at 18"	W3.0 at 2"	#4 at 9"	5'-3"	5-#4	5"	#4 at 18"	W4.0 at 2"	#6 at 12"	4'-3"	5-#4	5"	#4 at 18"	W3.0 at 1 3/4"	#5 at 11"	6'-3"	5-#4	5"	#4 at 18"	W4.0 at 2"	#6 at 9"	16'-0"
18'-0"	4'-0"	5-#4	5"	#4 at 18"	W3.0 at 1 3/4"	#5 at 11"	6'-0"	5-#4	5"	#4 at 18"	W4.0 at 2"	#6 at 9"	5'-0"	5-#4	5"	#4 at 18"	W4.0 at 2"	#6 at 12"	7'-0"	5-#4	6"	#4 at 18"	W4.0 at 2"	#6 at 9"	18'-0"
20'-0"	5'-0"	5-#4	5"	#4 at 18"	W3.0 at 1 1/2"	#5 at 9"	7'-0"	5-#4	6"	#4 at 18"	W4.0 at 2"	#6 at 9"	5'-9"	5-#4	5"	#4 at 18"	W4.0 at 2"	#6 at 10"	8'-0"	6-#4	6"	#4 at 12"	W4.0 at 1 3/4"	#6 at 7"	20'-0"
22'-0"	5'-6"	5-#4	5"	#4 at 18"	W3.0 at 1 1/2"	#5 at 7"	7'-9"	5-#4	6"	#4 at 12"	W4.0 at 1 3/4"	#6 at 8"	6'-6"	5-#4	6"	#4 at 18"	W4.0 at 2"	#6 at 9"	9'-0"	6-#4	7"	#4 at 305	W4.0 at 1 3/4"	#6 at 7"	22'-0"
24'-0"	6'-3"	5-#4	5"	#4 at 15"	W3.0 at 1 1/2"	#5 at 6"	8'-6"	5-#4	7"	#4 at 11"	W4.0 at 1 3/4"	#6 at 8"	7'-6"	5-#4	6"	#4 at 12"	W4.0 at 1 3/4"	#6 at 9"	9'-9"	6-#4	7"	#4 at 15"	W4.0 at 1 3/4"	#6 at 6"	24'-0"



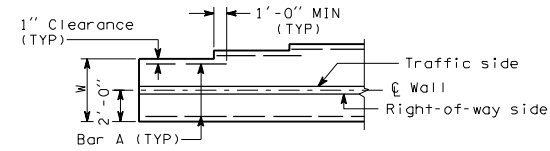
- NOTES
1. Wall to be designated Noise Barrier Type 10A, 10B, 10C or 10D. The Contract specifies actual wall designation.
 2. For intermediate wall heights, use the next higher H.
 3. Panels shall have at least 3'-0" of level ground on each side.
 4. Construction joints in the footing shall be spaced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

*Required for wall height 24'-0" - Type 10C,
walls 22'-0" - 24'-0" - Type 10B and
walls 20'-0" - 22'-0" - Type 10D

D-2j
03-14-97



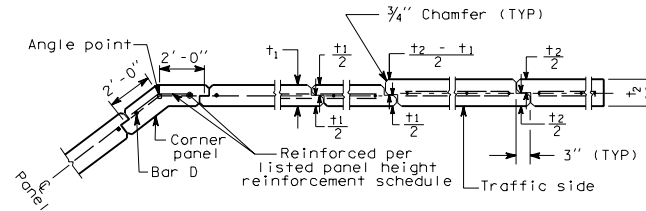
DETAIL B



FOOTING WIDTH TRANSITION DETAIL

(For locations without footing step)

NOTE: Transverse bars not shown



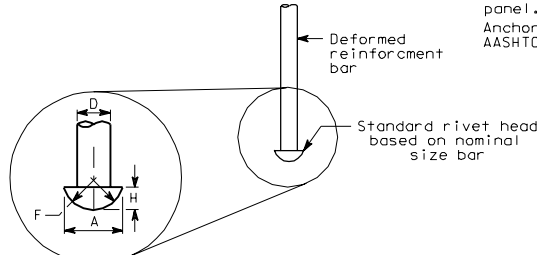
JOINT AND CORNER DETAIL

NOISE BARRIER - TYPE 10

PRECAST CONCRETE WALL WITH OFFSET SPREAD FOOTING

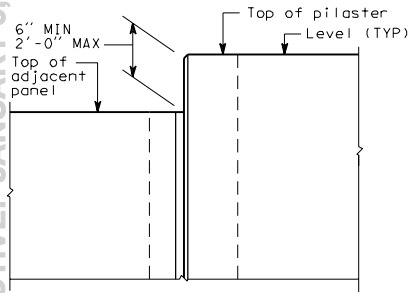
D	#5	#6	#7	#8	#9	#10	#11
A	1 1/16"	1 1/4"	1 7/16"	1 5/8"	1 3/4"	2"	2 1/8"
H	7/16"	1/2"	5/8"	3/4"	1 1/8"	1 1/4"	1 1/2"
F	1 1/8"	1 1/4"	1 1/2"	1 3/4"	1 7/8"	2 1/8"	2 1/4"

BOLT DIA	HOLE DIA	SLOT G
5/8"	3/4"	—
3/4"	7/8"	—
7/8"	1"	—
1"	1 1/8"	1 1/8" x 1 1/2"
1 1/8"	1 1/4"	1 1/4" x 1 5/8"
1 1/4"	1 5/8"	1 3/8" x 1 3/4"
1 3/8"	1 1/2"	—

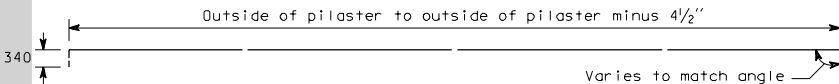
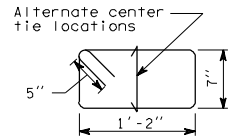
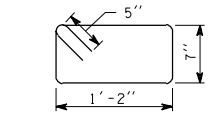


Button head shall bear firmly and uniform against base plate. Bar B shall be held secure during concrete placement to prevent gaps between button head and base plate.

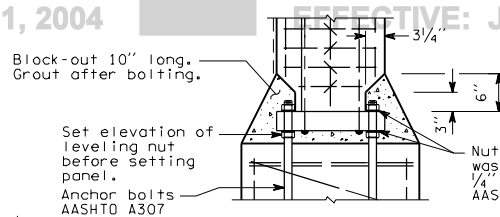
BAR B



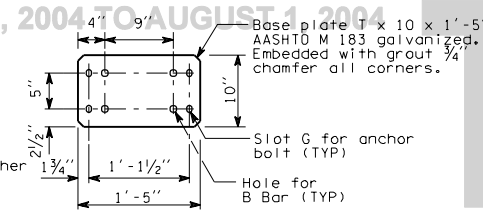
STEP DETAIL



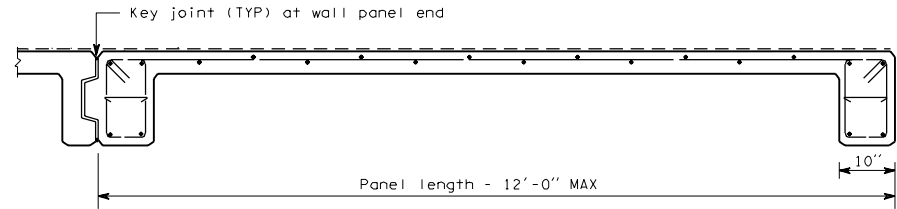
WALL REINFORCEMENT



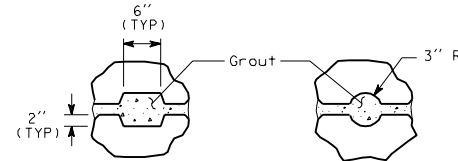
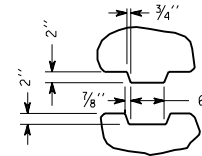
DETAIL D



BASE PLATE DETAIL



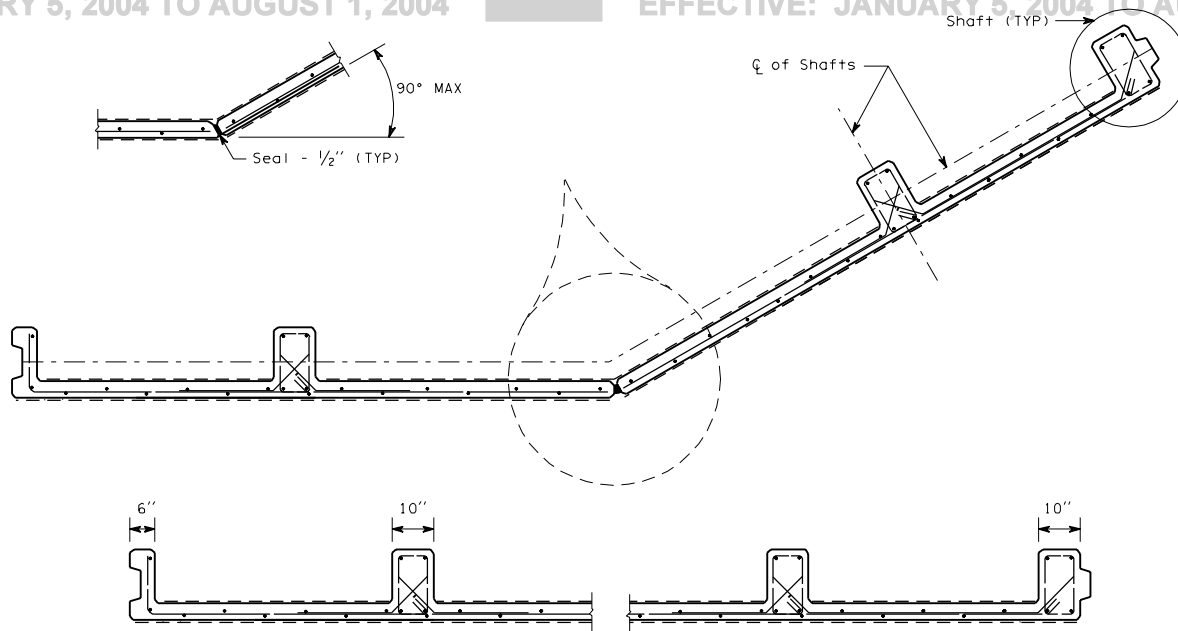
END PANEL



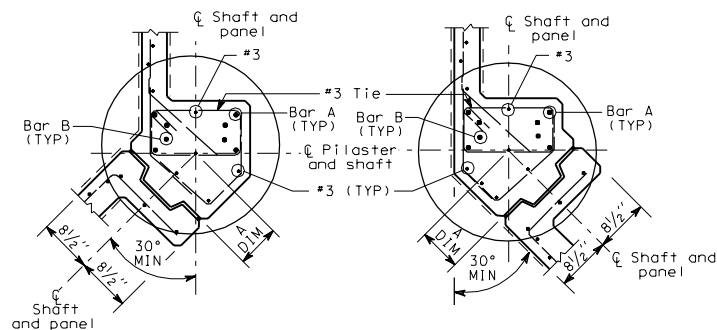
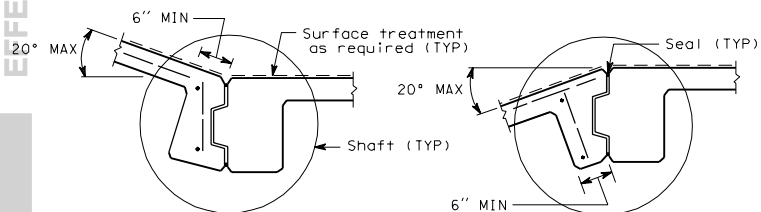
NOISE BARRIER - TYPE 11
PRECAST CONCRETE WALL
ON SHAFT FOUNDATION

D-2k
03-14-97

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



OPTIONAL ANGLE POINT

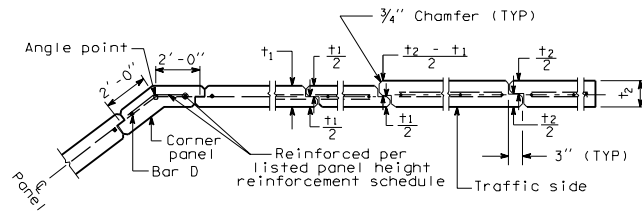


NOISE BARRIER - TYPE 111
PRECAST CONCRETE WALL
ON SHAFT FOUNDATION

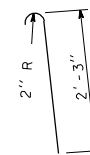
D-2k
03-14-97

NOTI

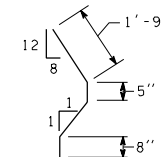
- Sheet 1 of 2 Sheets



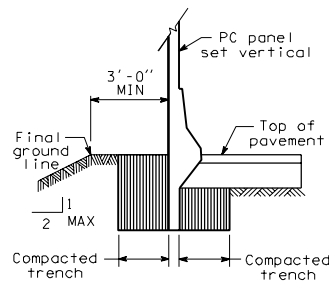
JOINT AND CORNER DETAIL



BAR A



BAR C



TRENCH FOOTING

See Note 3

NOISE BARRIER - TYPE 12
PRECAST CONCRETE WALL
WITH TRAFFIC BARRIER
ON TRENCH FOOTING

D-21**03-14-97**

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

TYPE 13A

WALL HT H	W	X	BAR B and C	BAR E	BAR D	BAR J
6'-0"	5'-6"	1"	#4 at 15"	#4 at 15"	#3 at 15"	#5 at 15"
8'-0"	5'-3"	1"	#4 at 15"	#4 at 15"	#3 at 15"	#5 at 15"
10'-0"	5'-3"	1"	#4 at 15"	#4 at 15"	#3 at 15"	#5 at 15"
12'-0"	5'-0"	1"	#4 at 15"	#4 at 15"	#3 at 15"	#5 at 15"
14'-0"	4'-9"	1"	#4 at 11"	#4 at 11"	#3 at 11"	#5 at 11"
16'-0"	5'-0"	10"	#4 at 12"	#5 at 12"	#4 at 12"	#5 at 12"
18'-0"	5'-0"	10"	#4 at 10"	#5 at 10"	#4 at 10"	#5 at 10"
WALL HT H	W	X	BAR B and C	BAR E	BAR D	BAR J
6'-0"	5'-6"	1"	#4 at 15"	#4 at 15"	#3 at 15"	#5 at 15"
8'-0"	5'-3"	1"	#4 at 15"	#4 at 15"	#3 at 15"	#5 at 15"
10'-0"	5'-3"	1"	#4 at 15"	#4 at 15"	#3 at 15"	#5 at 15"
12'-0"	5'-0"	1"	#4 at 12"	#4 at 12"	#3 at 12"	#5 at 12"
14'-0"	4'-9"	1"	#4 at 12"	#5 at 12"	#4 at 12"	#5 at 12"
16'-0"	5'-0"	10"	#4 at 10"	#5 at 10"	#4 at 10"	#5 at 10"
18'-0"	5'-0"	1'-0"	#4 at 10"	#5 at 10"	#4 at 10"	#5 at 10"

TYPE 13C

TYPE 13B

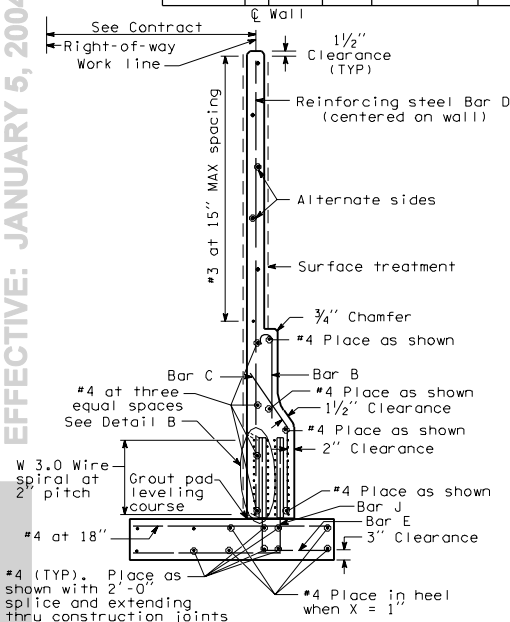
W	X	BAR B and C	BAR E (mm)	BAR D	BAR J	WALL HT H
5'-6"	1"	#4 at 15"	#4 at 15"	#3 at 15"	#5 at 15"	6'-0"
5'-3"	1"	#4 at 15"	#4 at 15"	#3 at 15"	#5 at 15"	8'-0"
5'-3"	1"	#4 at 15"	#4 at 15"	#3 at 15"	#5 at 15"	10'-0"
5'-0"	1"	#4 at 10"	#4 at 10"	#3 at 10"	#5 at 10"	12'-0"
5'-0"	1"	#4 at 12"	#5 at 12"	#4 at 12"	#5 at 12"	14'-0"
5'-0"	10"	#4 at 10"	#5 at 10"	#4 at 10"	#5 at 10"	16'-0"
5'-3"	1'-6"	#4 at 12"	#5 at 12"	#5 at 12"	#5 at 12"	18'-0"
W	X	BAR B and C	BAR E	BAR D	BAR J	WALL HT H
5'-6"	1"	#4 at 15"	#4 at 15"	#3 at 15"	#5 at 15"	6'-0"
5'-3"	1"	#4 at 15"	#4 at 15"	#3 at 15"	#5 at 15"	8'-0"
5'-3"	1"	#4 at 12"	#4 at 12"	#3 at 12"	#5 at 12"	10'-0"
5'-0"	1"	#4 at 12"	#5 at 12"	#4 at 12"	#5 at 12"	12'-0"
5'-3"	10"	#4 at 10"	#5 at 10"	#4 at 10"	#5 at 10"	14'-0"
5'-6"	1'-6"	#4 at 13"	#5 at 13"	#5 at 13"	#5 at 13"	16'-0"
5'-9"	1'-9"	#4 at 9"	#5 at 9"	#5 at 9"	#5 at 9"	18'-0"

TYPE 13D

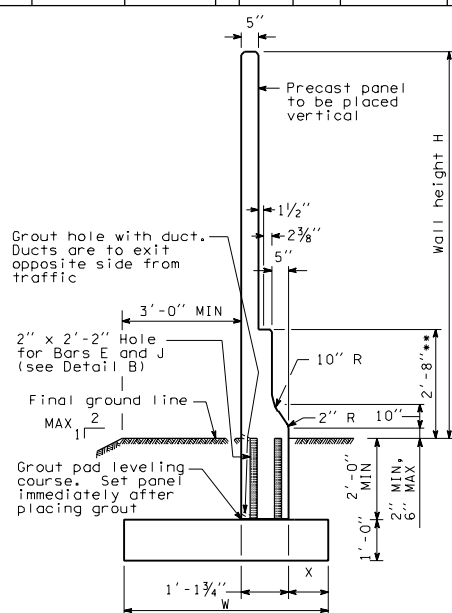
EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

NOTES

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

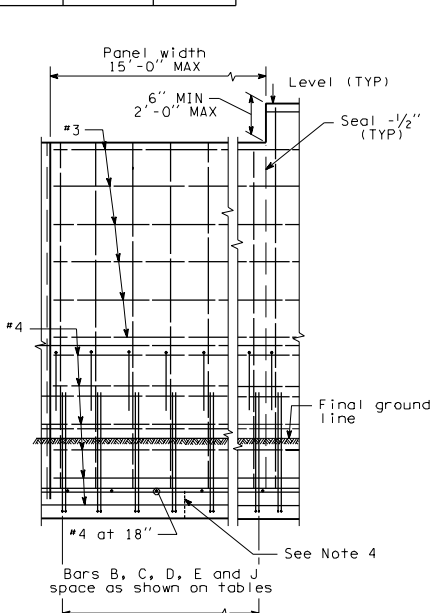


REINFORCEMENT SECTION



TYPICAL SECTION

Height may vary if required to provide a smooth profile consistent with the roadway profile



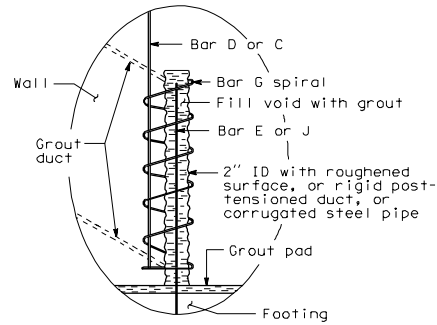
ELEVATION

NOISE BARRIER - TYPE 13 PRECAST CONCRETE WALL WITH TRAFFIC BARRIER ON SPREAD FOOTING

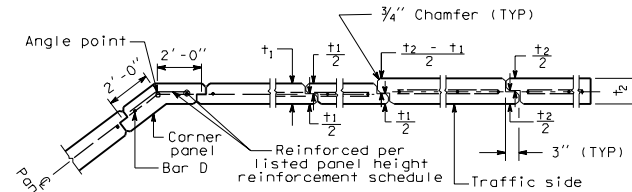
D-2m

03-14-97

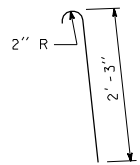
Sheet 1 of 2 Sheets



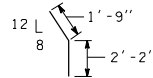
DETAIL B



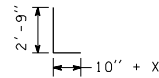
JOINT AND CORNER DETAIL



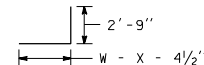
BAR B



BAR C



BAR E



BAR J

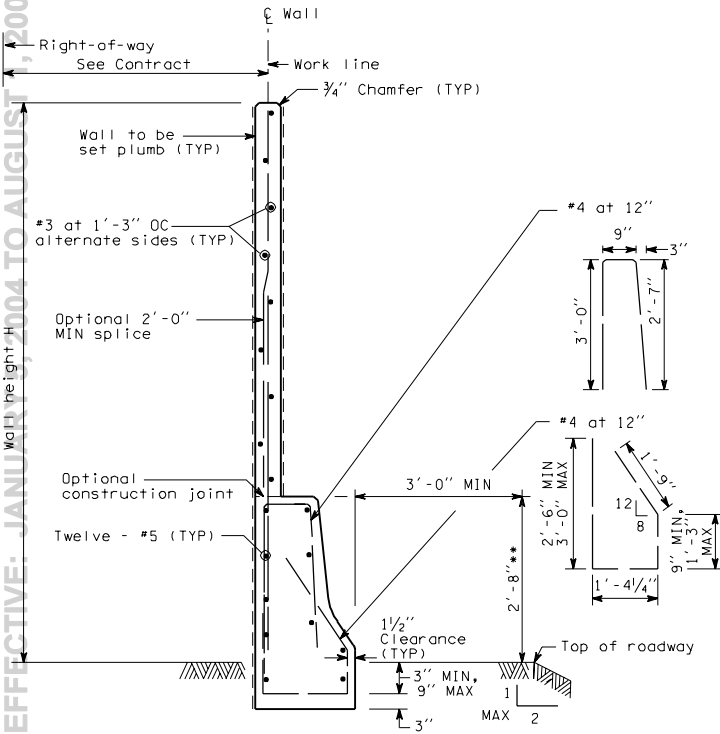
NOISE BARRIER - TYPE 13
PRECAST CONCRETE WALL
WITH TRAFFIC BARRIER ON
SPREAD FOOTING

D-2m

03-14-97

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

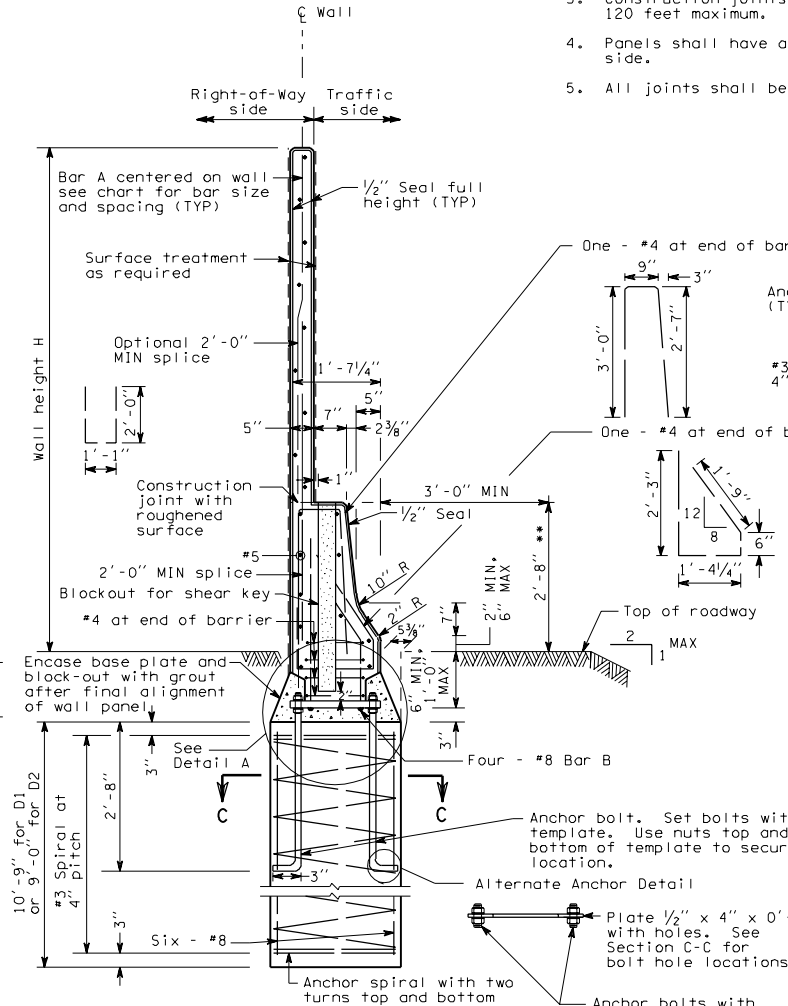
WALL HT H	TYPE 14A	TYPE 14B	TYPE 14C	TYPE 14D	WALL HT H
6'-0"	#4 at 15"	#4 at 15"	#4 at 15"	#4 at 15"	6'-0"
8'-0"	#4 at 15"	#4 at 15"	#4 at 15"	#4 at 15"	8'-0"
10'-0"	#4 at 15"	#4 at 15"	#4 at 15"	#4 at 15"	10'-0"
12'-0"	#4 at 15"	#4 at 15"	#4 at 15"	#4 at 12"	12'-0"
14'-0"	#4 at 15"	#4 at 11"	#4 at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



**Height may vary if required to provide a smooth profile consistent with the roadway profile

TYPICAL SECTION

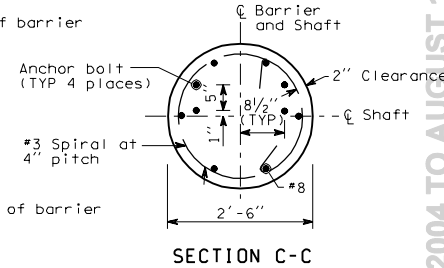
EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004



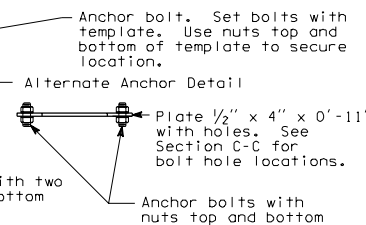
SECTION AT SHAFT SUPPORT

NOTES

1. Wall to be designated Noise Barrier Type 14A, 14B, 14C or 14D. The Contract specifies actual wall dimensions.
2. For intermediate wall heights, use the next higher H.
3. Construction joints in the footing wall shall be spaced at 120 feet maximum.
4. Panels shall have at least 3 feet level ground on each side.
5. All joints shall be in full contact and sealed.



NOISE BARRIER - TYPE 14
PRECAST CONCRETE WALL
WITH TRAFFIC BARRIER ON
SHAFT FOUNDATION



D-2n
03-14-97

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

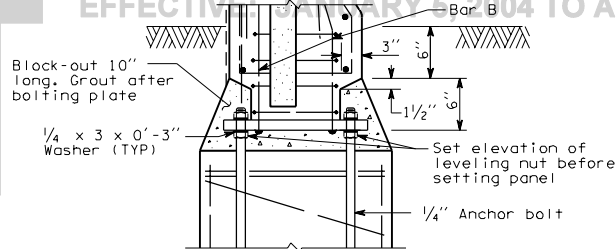
EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

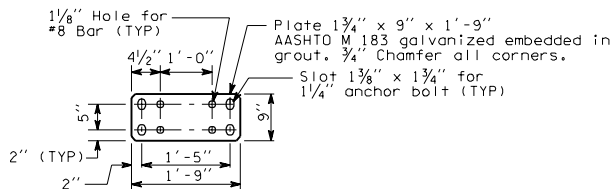
EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

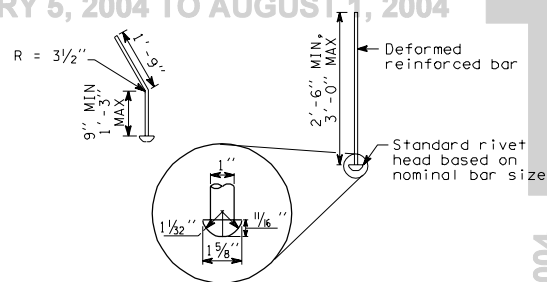
EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004



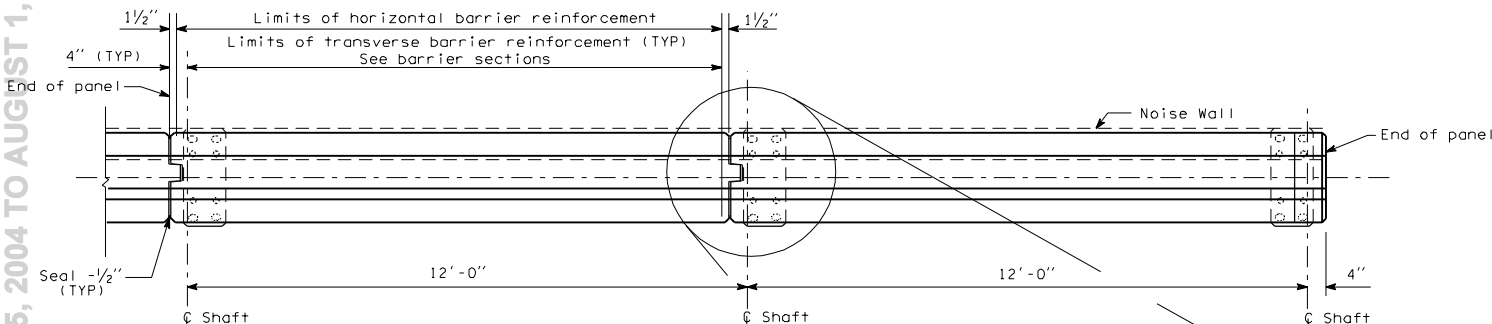
DETAIL A



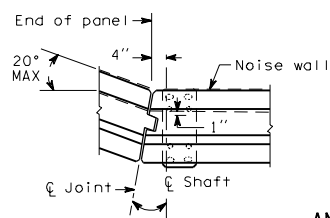
BASEPLATE DETAIL



BAR B

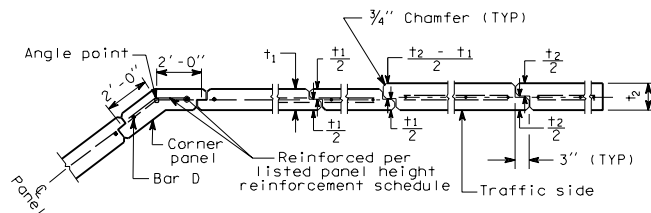
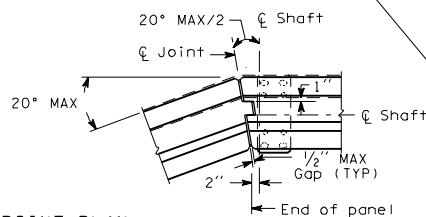


TYPICAL INTERMEDIATE AND END PANEL

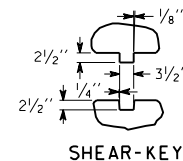


ANGLE POINT PLAN

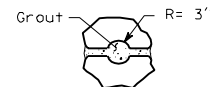
Adjust reinforcement as necessary to accommodate angle point



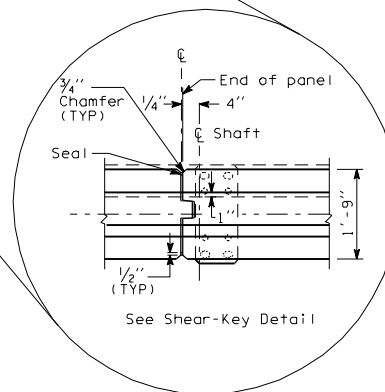
JOINT AND CORNER DETAIL



SHEAR-KEY



OPTIONAL SHEAR-KEY



See Shear-Key Detail

NOISE BARRIER - TYPE 14
PRECAST CONCRETE WALL
WITH TRAFFIC BARRIER ON
SHAFT FOUNDATION

D-2n

03-14-97

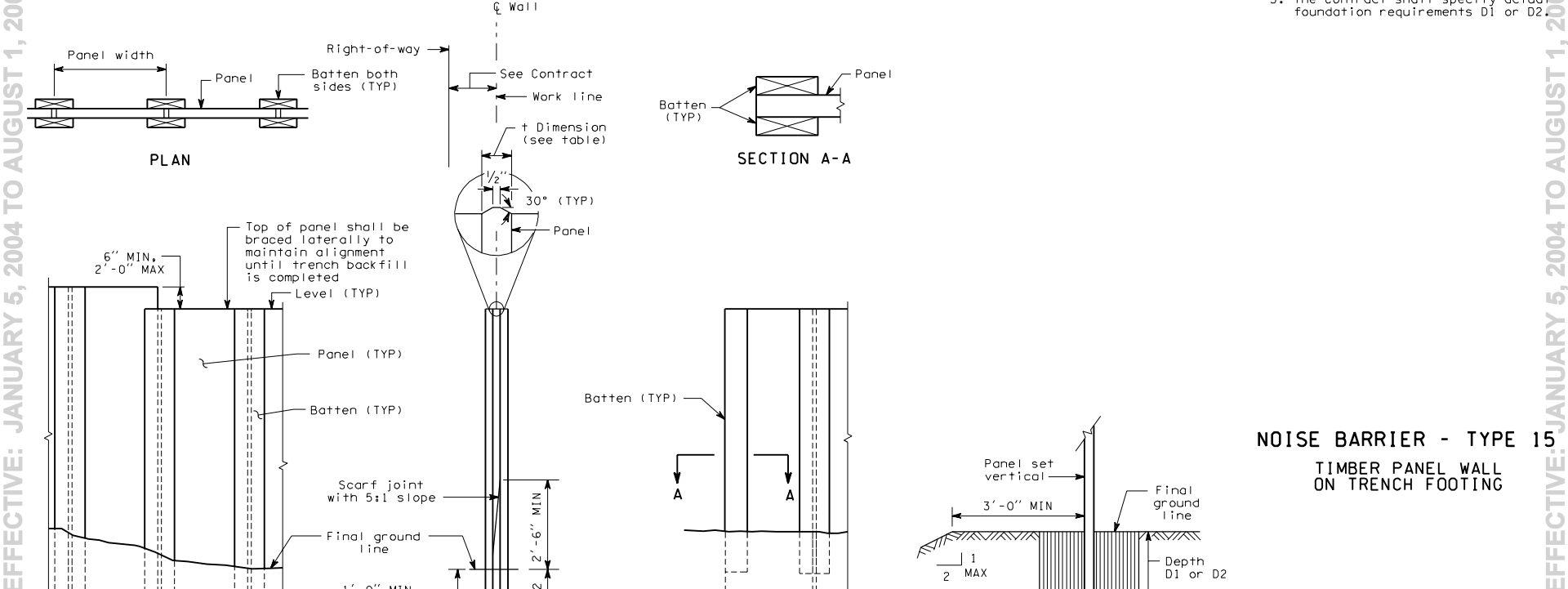
Sheet 2 of 2 Sheets

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

WALL HT H	TYPE 15A				TYPE 15B				TYPE 15C				TYPE 15D				WALL HT H
	DEPTH D1	DEPTH D2	GLULAM +	PLYWOOD +	DEPTH D1	DEPTH D2	GLULAM +	PLYWOOD +	DEPTH D1	DEPTH D2	GLULAM +	PLYWOOD +	DEPTH D1	DEPTH D2	GLULAM +	PLYWOOD +	
6'-0"	3'-3"	3'-0"	1"	1 1/4"	3'-9"	3'-6"	1 1/4"	1 1/2"	3'-6"	3'-3"	1 1/8"	1 3/8"	4'-0"	3'-6"	1 1/2"	1 3/4"	6'-0"
8'-0"	3'-6"	3'-3"	1 1/4"	1 3/8"	4'-0"	3'-9"	1 5/8"	1 7/8"	3'-9"	3'-6"	1 3/8"	1 5/8"	4'-3"	3'-9"	1 7/8"	2 1/8"	8'-0"
10'-0"	4'-0"	3'-6"	1 1/2"	1 3/8"	4'-6"	4'-0"	1 7/8"	2 1/4"	4'-0"	3'-9"	1 5/8"	2"	4'-6"	4'-0"	2 1/4"	2 1/2"	10'-0"
12'-0"	4'-3"	3'-9"	1 5/8"	2"	4'-9"	4'-3"	2 1/4"	2 5/8"	4'-6"	4'-0"	2"	2 1/4"	4'-9"	4'-3"	2 1/2"	3"	12'-0"
14'-0"	4'-6"	4'-0"	2"	2 1/4"	5'-0"	4'-6"	2 1/2"	3"	4'-9"	4'-3"	2 1/4"	2 5/8"	5'-3"	4'-9"	2 7/8"	3 3/8"	14'-0"
16'-0"	4'-9"	4'-0"	2 1/4"	2 1/2"	5'-3"	4'-9"	2 3/8"	3 1/4"	5'-0"	4'-6"	2 1/2"	3"	5'-6"	5'-0"	3 3/4"	3 3/4"	16'-0"
18'-0"	5'-0"	4'-3"	2 1/2"	2 3/8"	5'-6"	5'-0"	3 1/4"	3 5/8"	5'-3"	4'-9"	2 3/8"	3 1/4"	6'-0"	5'-3"	3 5/8"	4 1/4"	18'-0"

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



NOISE BARRIER - TYPE 15 TIMBER PANEL WALL ON TRENCH FOOTING

WALL HT H	EFFECTIVE DATE: JANUARY 5, 2016					
	CMU	DIM X	DEPTH D1	DEPTH D2	BAR C	BAR D
6'-0"	8"	---	3'-3"	3'-0"	---	#6 @ 48"
8'-0"	8"	---	3'-6"	3'-4"	---	#6 @ 48"
10'-0"	8"	---	3'-10"	3'-6"	---	#6 @ 48"
12'-0"	8"	---	4'-7"	3'-8"	---	#6 @ 48"
14'-0"	8"	---	4'-4"	3'-10"	---	#6 @ 32"
16'-0"	8"	---	4'-7"	4'-1"	---	#6 @ 24"
18'-0"	10"	5'-4"	4'-10"	4'-3"	#6 @ 48"	#6 @ 48"
20'-0"	10"	6'-0"	5'-3"	4'-9"	#6 @ 32"	#6 @ 32"
22'-0"	10"	6'-8"	5'-6"	5'-0"	#6 @ 24"	#6 @ 24"
24'-0"	10"	7'-4"	5'-9"	5'-3"	#6 @ 18"	#6 @ 18"

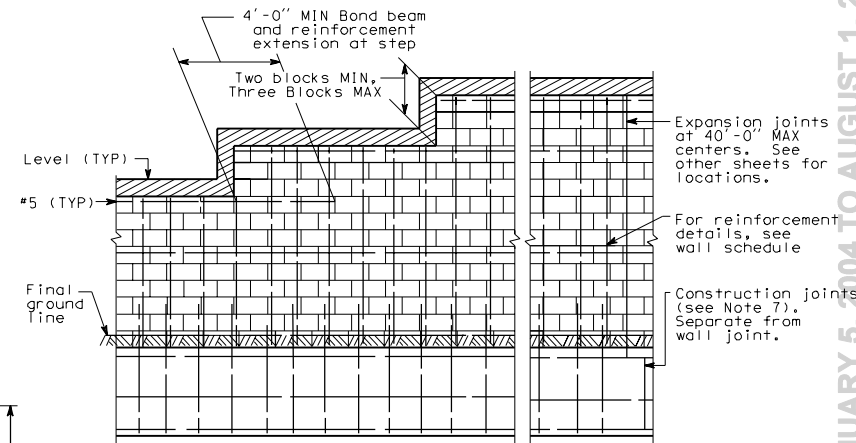
WALL HT H	TYPE 16C					
	CMU	DIM X	DEPTH D1	DEPTH D2	BAR C	BAR D
6'-0"	8"	—	3'-6"	3'-3"	—	#6 @ 48"
8'-0"	8"	—	3'-9"	3'-5"	—	#6 @ 48"
10'-0"	8"	—	4'-7"	3'-8"	—	#6 @ 48"
12'-0"	8"	—	4'-4"	3'-11"	—	#6 @ 32"
14'-0"	8"	—	4'-8"	4'-2"	—	#6 @ 24"
16'-0"	10"	4'-0"	4'-11"	4'-5"	#6 @ 40"	#6 @ 40"
18'-0"	10"	4'-8"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

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

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

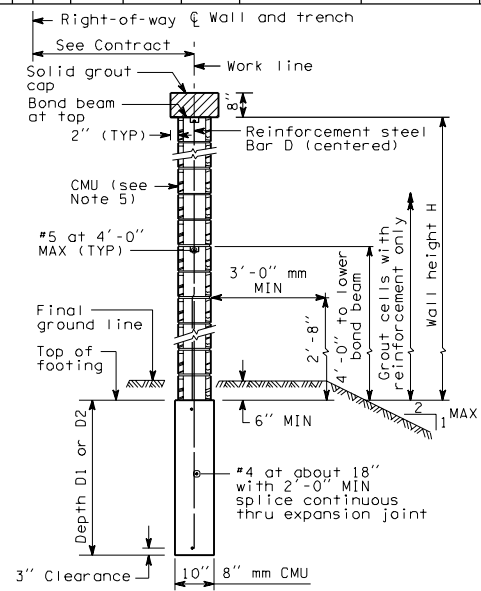
NOTE

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

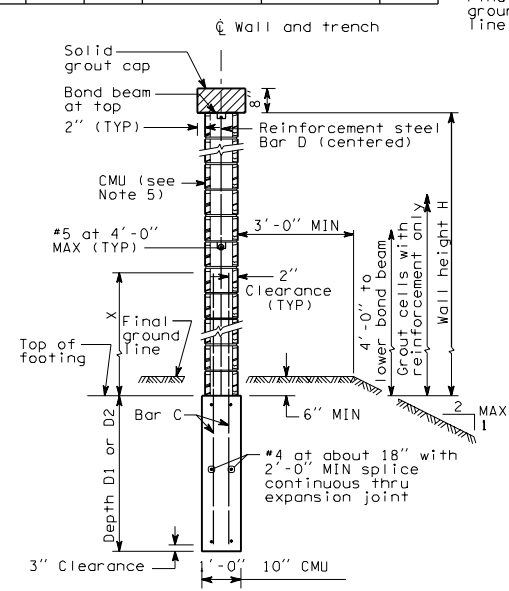


ELEVATION

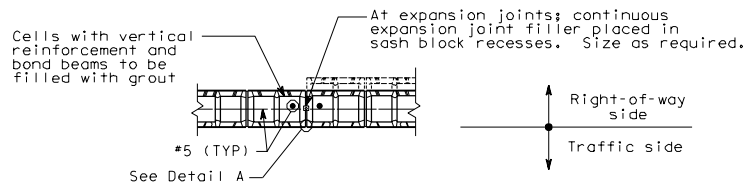
NOISE BARRIER - TYPE 16
MASONRY WALL
ON TRENCH FOOTING



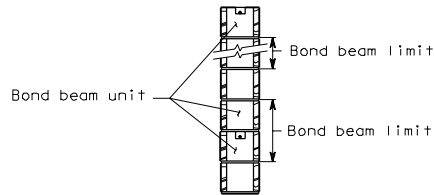
TYPICAL SECTION



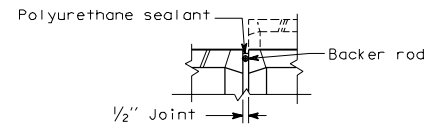
TYPICAL SECTION



TYPICAL EXPANSION JOINT



BOND BEAM DETAIL

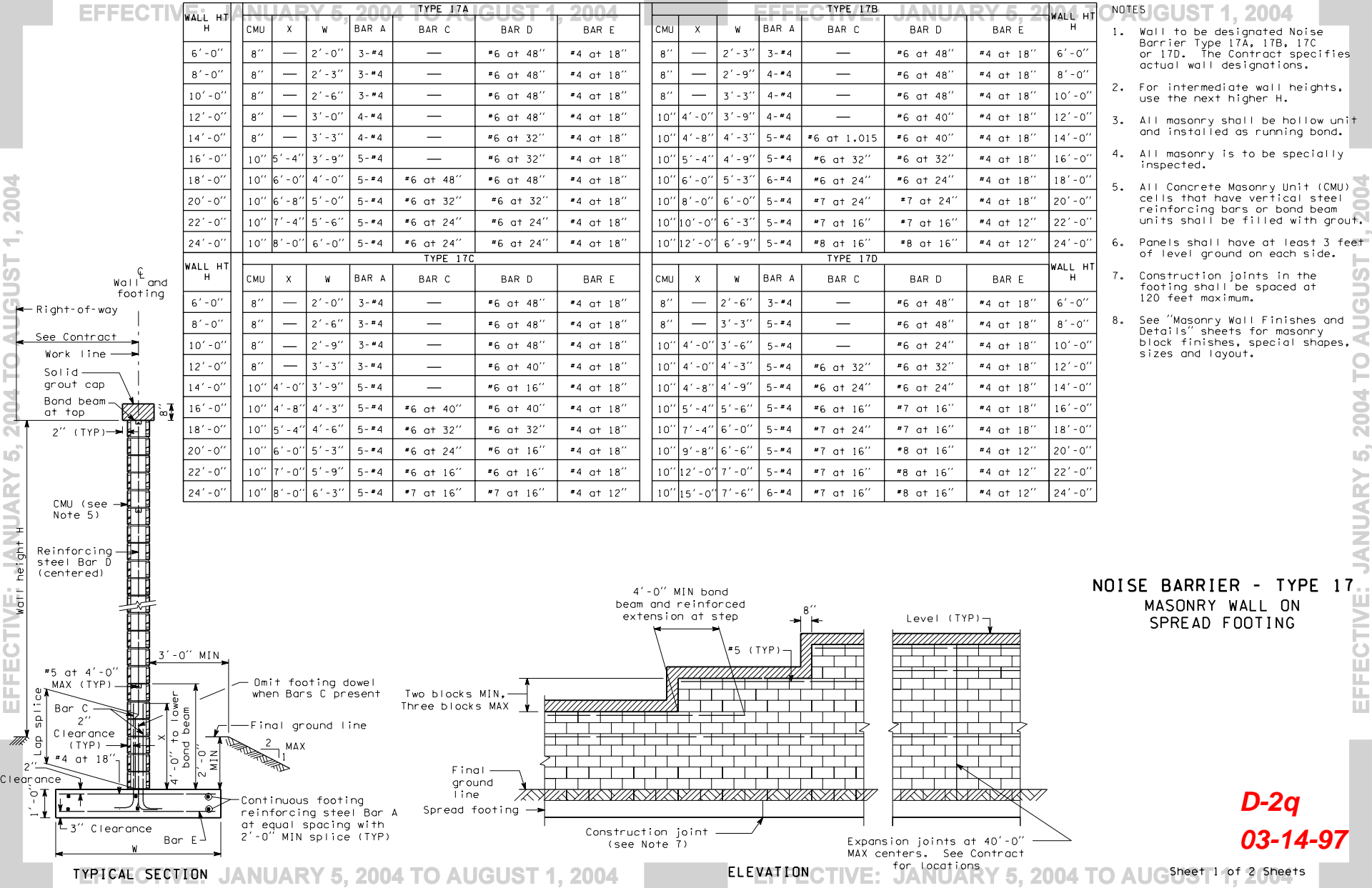


DETAIL A

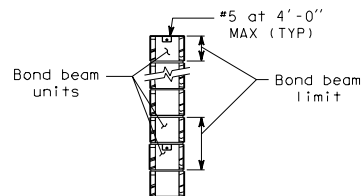
Typical both sides of wall

NOISE BARRIER - TYPE 16
MASONRY WALL
ON TRENCH FOOTING

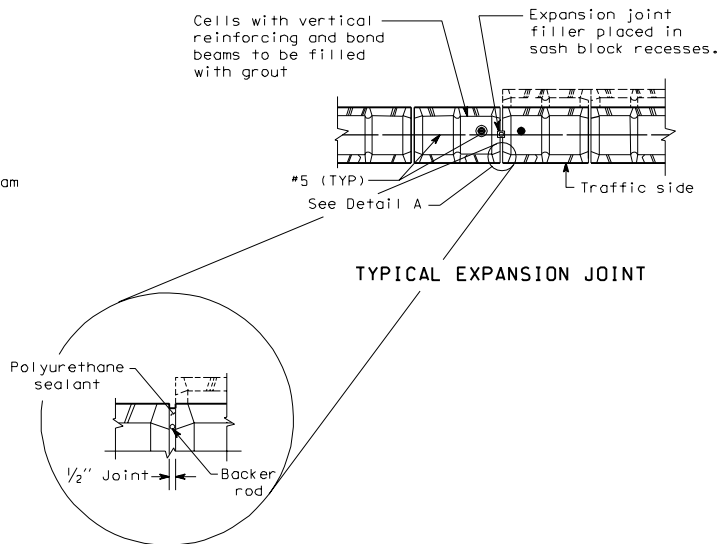
D-2p
03-14-97



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



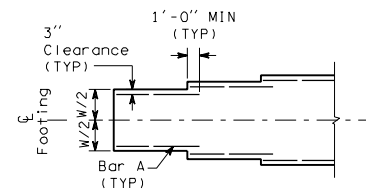
BOND BEAM DETAIL



TYPICAL EXPANSION JOINT

DETAIL A

Typical both sides of wall



FOOTING WIDTH TRANSITION DETAIL

(For locations without footing step)

NOTE: Transverse bars not shown

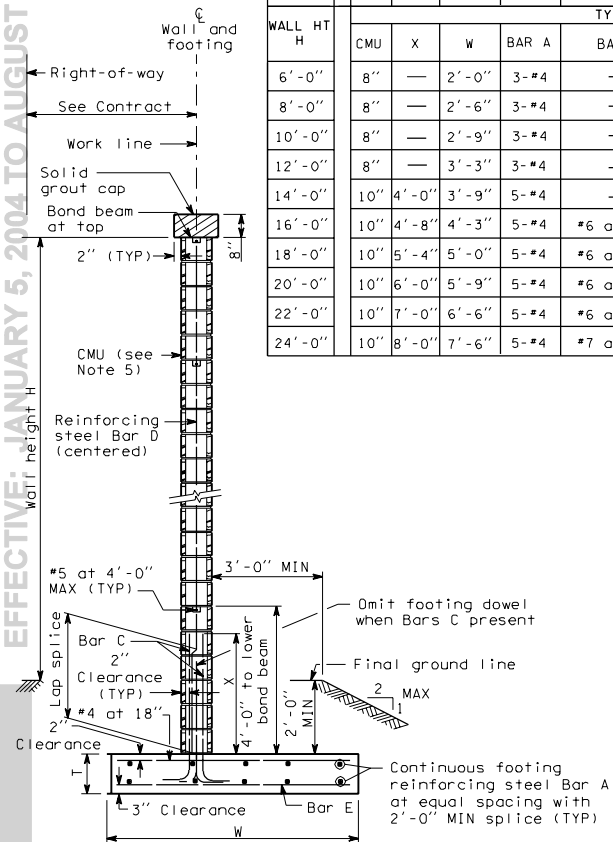
NOISE BARRIER - TYPE 17

MASONRY WALL ON
SPREAD FOOTING

D-2q

03-14-97

Sheet 2 of 2 Sheets



TYPICAL SECTION

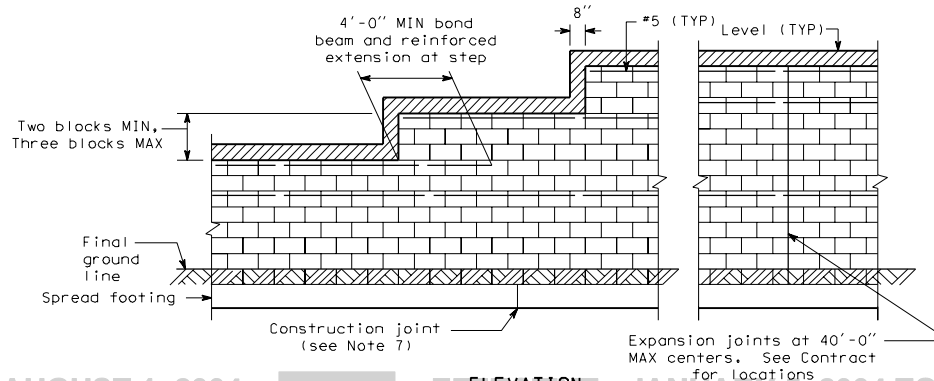
WALL HT H	TYPE 18A						
	CMU	X	W	BAR A	BAR C	BAR D	BAR E
6'-0"	8"	—	2'-0"	3-#4	—	#6 at 48"	#4 at 18"
8'-0"	8"	—	2'-3"	3-#4	—	#6 at 48"	#4 at 18"
10'-0"	8"	—	2'-6"	3-#4	—	#6 at 48"	#4 at 18"
12'-0"	8"	—	3'-0"	4-#4	—	#6 at 48"	#4 at 18"
14'-0"	8"	—	3'-3"	4-#4	—	#6 at 36"	#4 at 18"
16'-0"	10"	5'-4"	3'-9"	5-#4	—	#6 at 16"	#4 at 18"
18'-0"	10"	6'-0"	4'-0"	5-#4	#6 at 48"	#6 at 48"	#4 at 18"
20'-0"	10"	6'-8"	5'-0"	5-#4	#6 at 32"	#6 at 32"	#4 at 18"
22'-0"	10"	7'-4"	5'-6"	5-#4	#6 at 24"	#6 at 24"	#4 at 18"
24'-0"	10"	8'-0"	6'-3"	5-#4	#6 at 16"	#6 at 16"	#4 at 18"
WALL HT H	TYPE 18C						
	CMU	X	W	BAR A	BAR C	BAR D	BAR E
6'-0"	8"	—	2'-0"	3-#4	—	#6 at 48"	#4 at 18"
8'-0"	8"	—	2'-6"	3-#4	—	#6 at 48"	#4 at 18"
10'-0"	8"	—	2'-9"	3-#4	—	#6 at 48"	#4 at 18"
12'-0"	8"	—	3'-3"	3-#4	—	#6 at 40"	#4 at 18"
14'-0"	10"	4'-0"	3'-9"	5-#4	—	#6 at 16"	#4 at 18"
16'-0"	10"	4'-8"	4'-3"	5-#4	#6 at 40"	#6 at 40"	#4 at 18"
18'-0"	10"	5'-4"	5'-0"	5-#4	#6 at 32"	#6 at 32"	#4 at 18"
20'-0"	10"	6'-0"	5'-9"	5-#4	#6 at 24"	#6 at 24"	#4 at 18"
22'-0"	10"	7'-0"	6'-6"	5-#4	#6 at 16"	#6 at 16"	#4 at 18"
24'-0"	10"	8'-0"	7'-6"	5-#4	#7 at 16"	#7 at 16"	#4 at 12"

WALL HT H	TYPE 18B						
	CMU	X	W	BAR A	BAR C	BAR D	BAR E
6'-0"	8"	—	2'-3"	3-#4	—	#6 at 48"	#4 at 18"
8'-0"	8"	—	2'-9"	4-#4	—	#6 at 48"	#4 at 18"
10'-0"	8"	—	3'-3"	4-#4	—	#6 at 48"	#4 at 18"
12'-0"	10"	4'-0"	3'-9"	4-#4	—	#6 at 40"	#4 at 18"
14'-0"	10"	4'-8"	4'-3"	5-#4	#6 at 40"	#6 at 40"	#4 at 18"
16'-0"	10"	5'-4"	5'-3"	5-#4	#6 at 32"	#6 at 32"	#4 at 18"
18'-0"	10"	6'-0"	6'-0"	6-#4	#6 at 24"	#6 at 24"	#4 at 18"
20'-0"	10"	8'-0"	7'-0"	5-#4	#7 at 24"	#7 at 24"	#4 at 18"
22'-0"	10"	10'-0"	7'-9"	5-#4	#7 at 16"	#7 at 16"	#4 at 12"
24'-0"	10"	12'-0"	8'-6"	5-#4	#8 at 16"	#8 at 16"	#4 at 12"
WALL HT H	TYPE 18D						
	CMU	X	W	BAR A	BAR C	BAR D	BAR E
6'-0"	8"	—	2'-6"	3-#4	—	#6 at 48"	#4 at 18"
8'-0"	8"	—	3'-3"	5-#4	—	#6 at 48"	#4 at 18"
10'-0"	10"	4'-0"	3'-6"	5-#4	—	#6 at 32"	#4 at 18"
12'-0"	10"	4'-0"	4'-3"	5-#4	#6 at 48"	#6 at 40"	#4 at 18"
14'-0"	10"	4'-8"	5'-3"	5-#4	#6 at 32"	#6 at 32"	#4 at 18"
16'-0"	10"	5'-4"	6'-3"	5-#4	#6 at 24"	#6 at 24"	#4 at 18"
18'-0"	10"	7'-4"	7'-0"	5-#4	#6 at 16"	#6 at 16"	#4 at 18"
20'-0"	10"	9'-8"	8'-0"	5-#4	#7 at 16"	#7 at 16"	#4 at 12"
22'-0"	10"	12'-0"	9'-0"	5-#4	#8 at 16"	#8 at 16"	#4 at 12"
24'-0"	10"	15'-0"	9'-9"	6-#4	#9 at 16"	#9 at 16"	#4 at 12"

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

NOISE BARRIER - TYPE 18

MASONRY WALL ON OFFSET SPREAD FOOTING

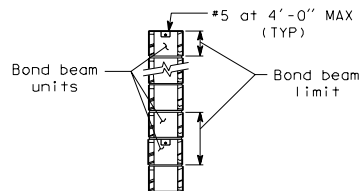


ELEVATION

D-2r

03-14-97

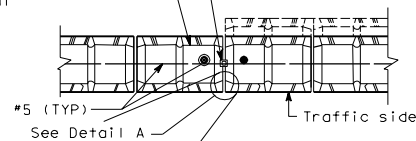
BAR SIZE	SPLICE LENGTH
#6	2'-8"
#7	3'-8"
#8	4'-10"



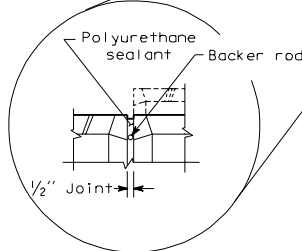
BOND BEAM DETAIL

Cells with vertical reinforcing and bond beams to be filled with grout

Expansion joint filler placed in sash block recesses.

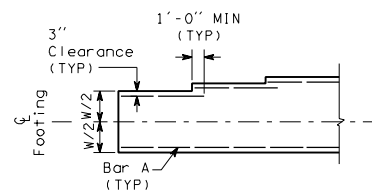


TYPICAL EXPANSION JOINT



DETAIL A

Typical both sides of wall

FOOTING WIDTH TRANSITION DETAIL
(For locations without footing step)

NOTE: Transverse bars not shown

NOISE BARRIER - TYPE 18
MASONRY WALL ON
OFFSET SPREAD FOOTING

D-2r**03-14-97**

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

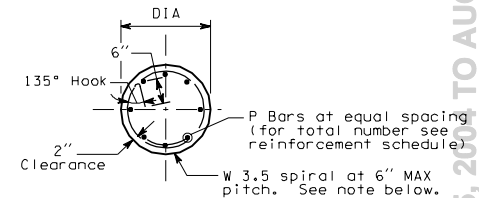
WALL HT H	CMU	DIM X	BAR D	BAR C	DIA	P BARS	DEPTH D1	DEPTH D2
6'-0"	8"	—	#6 at 48"	—	12"	6 - #5	5'-3"	4'-9"
8'-0"	8"	—	#6 at 48"	—	12"	6 - #5	6'-0"	5'-3"
10'-0"	8"	—	#6 at 48"	—	12"	6 - #5	6'-9"	5'-9"
12'-0"	8"	—	#6 at 48"	—	12"	6 - #5	7'-3"	6'-3"
14'-0"	8"	—	#6 at 32"	—	12"	6 - #6	7'-9"	6'-9"
16'-0"	10"	5'-4"	#6 at 32"	—	12"	6 - #7	8'-3"	7'-0"
18'-0"	10"	6'-0"	#6 at 48"	#6 at 48"	12"	6 - #8	8'-9"	7'-6"
20'-0"	10"	6'-8"	#6 at 32"	#6 at 32"	12"	6 - #9	9'-3"	7'-9"
22'-0"	10"	7'-4"	#6 at 24"	#6 at 24"	14"	8 - #7	9'-3"	7'-9"
24'-0"	10"	8'-0"	#6 at 24"	#6 at 24"	14"	8 - #8	9'-9"	8'-3"

WALL HT H	CMU	DIM X	BAR D	BAR C	DIA	P BARS	DEPTH D1	DEPTH D2
6'-0"	8"	—	#6 at 48"	—	12"	6 - #5	5'-9"	5'-0"
8'-0"	8"	—	#6 at 48"	—	12"	6 - #5	6'-6"	5'-6"
10'-0"	8"	—	#6 at 48"	—	12"	6 - #5	7'-3"	6'-3"
12'-0"	8"	—	#6 at 40"	—	12"	6 - #6	7'-9"	6'-9"
14'-0"	10"	4'-0"	#6 at 40"	—	12"	6 - #7	8'-6"	7'-3"
16'-0"	10"	4'-8"	#6 at 32"	#6 at 32"	14"	8 - #6	8'-6"	7'-3"
18'-0"	10"	5'-4"	#6 at 24"	#6 at 24"	14"	8 - #7	9'-0"	7'-9"
20'-0"	10"	6'-0"	#6 at 24"	#6 at 16"	14"	8 - #8	9'-9"	8'-3"
22'-0"	10"	7'-8"	#6 at 16"	#6 at 16"	14"	8 - #9	10'-3"	8'-9"
24'-0"	10"	8'-0"	#6 at 16"	#6 at 16"	16"	8 - #8	10'-3"	8'-9"

WALL HT H	CMU	DIM X	BAR D	BAR C	DIA	P BARS	DEPTH D1	DEPTH D2
6'-0"	8"	—	#6 at 48"	—	12"	6 - #5	6'-0"	5'-3"
8'-0"	8"	—	#6 at 48"	—	12"	6 - #5	7'-0"	6'-0"
10'-0"	8"	—	#6 at 48"	—	12"	6 - #6	7'-9"	6'-9"
12'-0"	10"	4'-0"	#6 at 40"	—	12"	6 - #7	8'-6"	7'-3"
14'-0"	10"	4'-8"	#6 at 32"	#6 at 32"	14"	8 - #7	8'-6"	7'-3"
16'-0"	10"	5'-4"	#6 at 24"	#6 at 24"	14"	8 - #7	9'-3"	8'-0"
18'-0"	10"	6'-0"	#6 at 16"	#6 at 16"	16"	6 - #8	9'-3"	8'-0"
20'-0"	10"	6'-8"	#7 at 16"	#7 at 32"	16"	8 - #7	10'-0"	8'-6"
22'-0"	10"	7'-4"	#7 at 16"	#7 at 24"	16"	8 - #8	10'-6"	9'-0"
24'-0"	10"	8'-0"	#8 at 16"	#7 at 16"	16"	8 - #8	11'-3"	9'-6"

WALL HT H	CMU	DIM X	BAR D	BAR C	DIA	P BARS	DEPTH D1	DEPTH D2
6'-0"	8"	—	#6 at 48"	—	12"	6 - #5	6'-6"	5'-9"
8'-0"	8"	—	#6 at 48"	—	12"	6 - #6	7'-6"	6'-6"
10'-0"	10"	4'-0"	#6 at 24"	—	12"	6 - #7	8'-3"	7'-0"
12'-0"	10"	4'-0"	#6 at 32"	#6 at 32"	14"	8 - #7	8'-6"	7'-3"
14'-0"	10"	4'-8"	#6 at 24"	#6 at 24"	14"	8 - #7	9'-3"	8'-0"
16'-0"	10"	5'-4"	#6 at 16"	#6 at 16"	16"	6 - #8	9'-6"	8'-0"
18'-0"	10"	6'-0"	#7 at 16"	#7 at 24"	16"	8 - #8	10'-0"	8'-6"
20'-0"	10"	6'-8"	#8 at 16"	#7 at 16"	16"	8 - #9	10'-9"	9'-3"
22'-0"	10"	7'-4"	#8 at 16"	#7 at 16"	16"	8 - #10	11'-6"	9'-9"
24'-0"	10"	8'-0"	#8 at 16"	#7 at 16"	18"	8 - #10	11'-6"	9'-9"

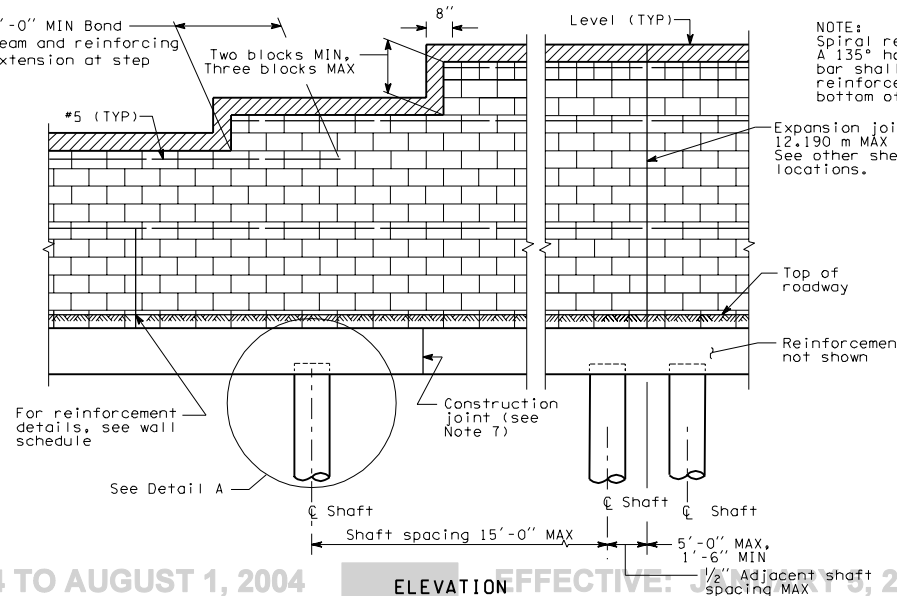
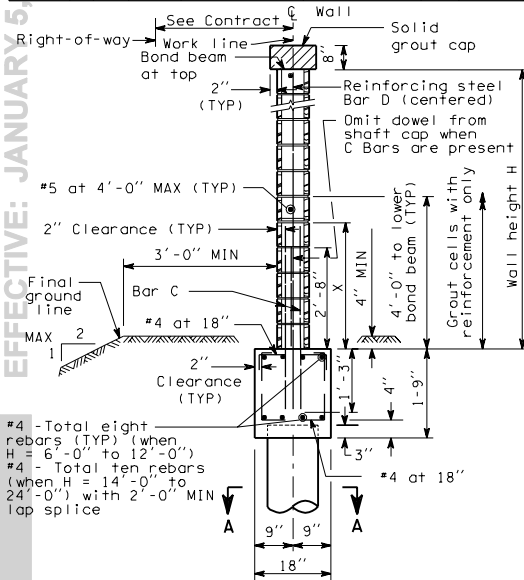
- NOTES
1. Wall to be designated "Noise Barrier Type 19A, 19B, 19C, or 19D. The Contract specifies actual wall designations.
 2. For intermediate wall heights, use the next higher H.
 3. All masonry shall be hollow unit and installed as running bond.
 4. All masonry is to be specially inspected.
 5. All Concrete Masonry Unit (CMU) cells the have vertical steel reinforcing bars or bond beam units shall be filled with grout.
 6. Panels shall have at least 3 feet of level ground on each side.
 7. Construction joints in the footing shall be spaced 120 feet maximum.
 8. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layouts.



SECTION A-A

NOTE:
Spiral reinforcement shall be lapped 17" MIN.
A 135° hook that is hooked around a longitudinal bar shall be used to terminate the ends of the spiral reinforcement at lapped splices and at the top and bottom of shaft

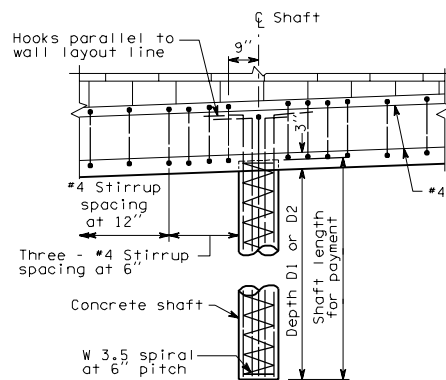
NOISE BARRIER - TYPE 19 MASONRY WALL ON SHAFT WITH GRADE BEAM FOUNDATION



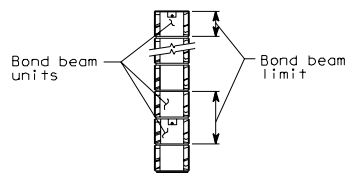
D-2s

03-14-97

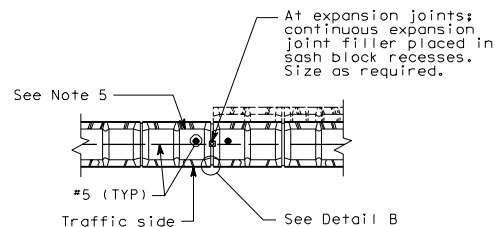
EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004



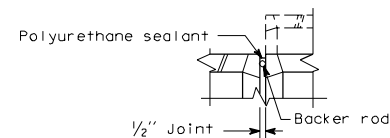
DETAIL A



BOND BEAM DETAIL

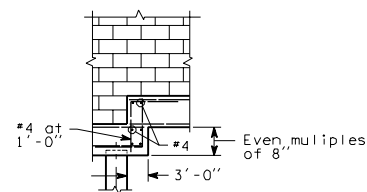


TYPICAL EXPANSION JOINT



DETAIL B

Typical both sides of wall



STEP DETAIL

NOISE BARRIER - TYPE 19
MASONRY WALL ON SHAFT
WITH GRADE BEAM FOUNDATION

D-2s

03-14-97

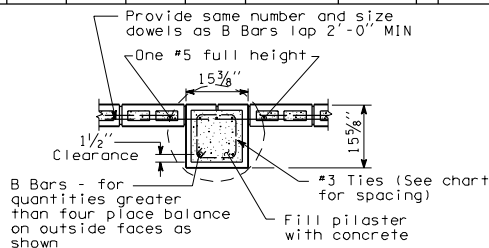
Sheet 2 of 2 Sheets

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

DEPTH D1	DEPTH D2	BAR A	BAR B	BAR C	PILASTER SPACING L
6'-6"	5'-9"	6-#6	4-#4	#5 at 32"	16'-0"
7'-6"	6'-6"	6-#6	4-#4	#5 at 32"	16'-0"
8'-6"	7'-0"	6-#6	4-#5	#5 at 32"	16'-0"
9'-3"	7'-9"	6-#6	4-#6	#5 at 32"	16'-0"
10'-0"	8'-6"	6-#6	4-#7	#5 at 32"	16'-0"
11'-0"	9'-0"	6-#6	6-#8	#5 at 32"	16'-0"
11'-9"	9'-9"	6-#6	6-#9	#5 at 32"	16'-0"
12'-6"	10'-3"	6-#7	6-#10	#5 at 32"	16'-0"
12'-6"	10'-3"	6-#7	6-#10	#5 at 32"	16'-0"
12'-6"	10'-3"	6-#7	6-#10	#5 at 32"	12'-0"

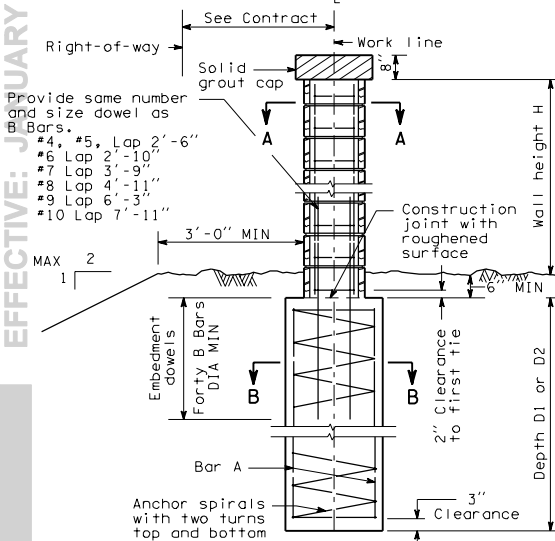
DEPTH D1	DEPTH D2	BAR A	BAR B	BAR C	PILASTER SPACING L
6'-3"	5'-3"	6-#6	4-#4	#6 at 32"	16'-0"
7'-0"	6'-0"	6-#6	4-#4	#6 at 32"	16'-0"
7'-9"	6'-6"	6-#6	4-#5	#6 at 32"	16'-0"
8'-6"	7'-3"	6-#6	4-#5	#6 at 32"	16'-0"
9'-3"	7'-9"	6-#6	4-#6	#6 at 32"	16'-0"
10'-0"	8'-3"	6-#6	4-#7	#6 at 32"	16'-0"
10'-9"	9'-0"	6-#6	6-#7	#6 at 32"	16'-0"
11'-3"	9'-6"	6-#6	6-#8	#6 at 32"	16'-0"
12'-0"	10'-0"	6-#7	6-#9	#6 at 32"	16'-0"
12'-9"	10'-6"	6-#7	6-#10	#6 at 32"	16'-0"

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



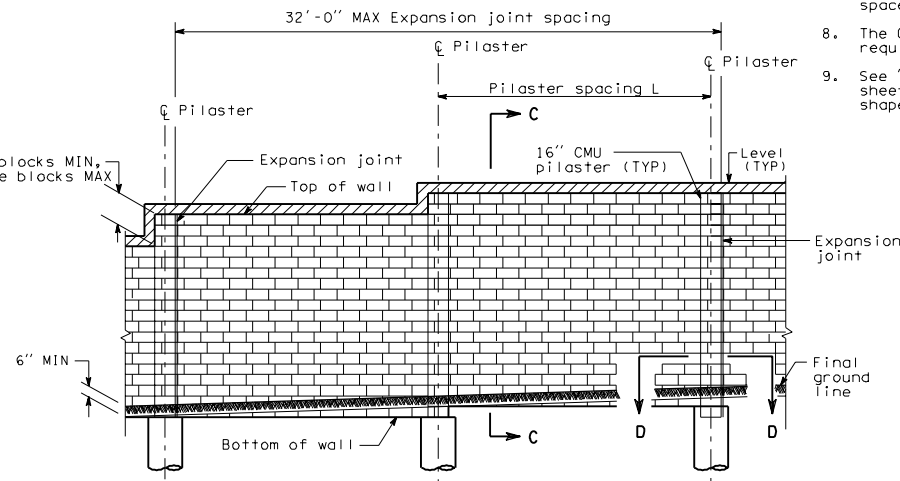
SECTION A-A

Pilaster and shaft



TYPICAL PILASTER AND PILE

TIE SPACING	
BAR A SIZE	SPACING
#4	6" OC
#5	6" OC
#6	5" OC
#7, #8, #9, #10	4" OC



ELEVATION

NOTES

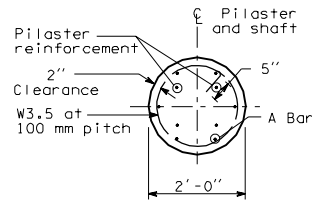
1. Wall to be designated Noise Barrier Type 20A, 20B, 20C or 20D. The Contract specifies actual wall designations.
2. For intermediate wall heights, use the next higher H.
3. All masonry shall be a hollow unit and installed as running bond.
4. All masonry is to be specially inspected.
5. All Concrete Masonry Unit (CMU) cells that have vertical steel reinforcing bars or bond beam units shall be filled with grout.
6. Panels shall have at least 3 feet of level ground on each side.
7. Construction joints in the footing shall be spaced at 120 feet maximum.
8. The Contract shall specify actual foundation requirements D1 or D2.
9. See "Masonry Wall Finishes and Details" sheet for masonry block finishes, special shapes, sizes and layouts.

NOISE BARRIER - TYPE 20

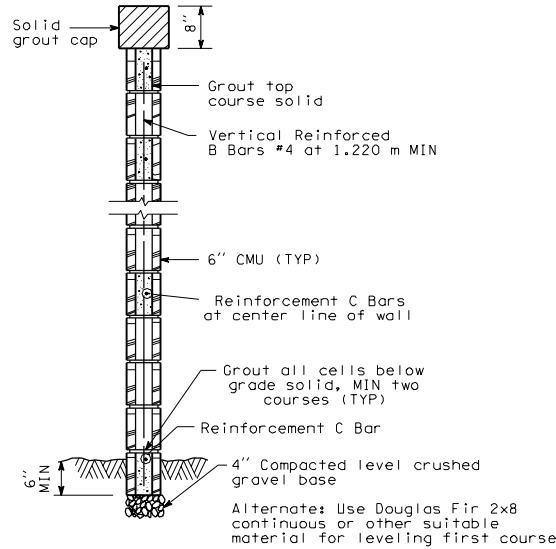
MASONRY WALL ON SHAFT FOUNDATION

D-2t

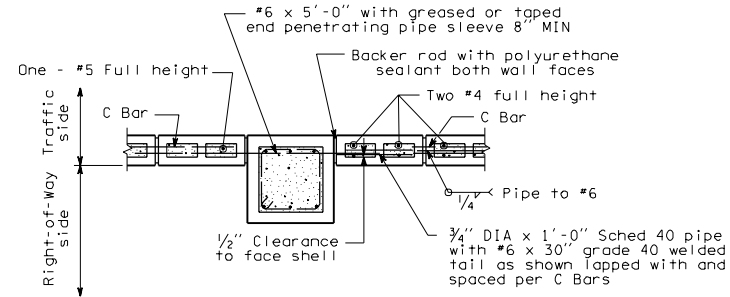
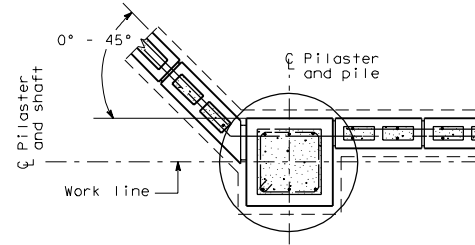
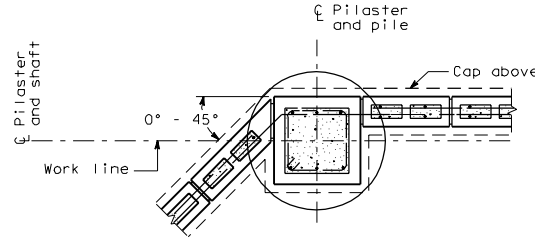
03-14-97



SECTION B-B



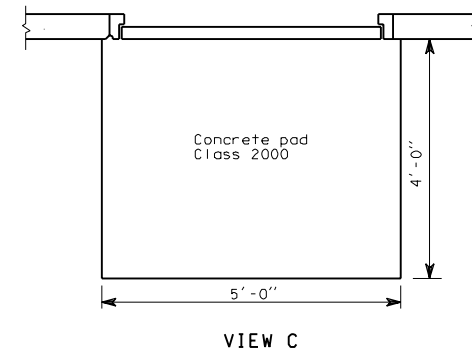
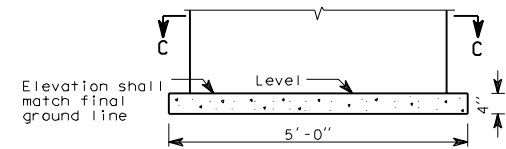
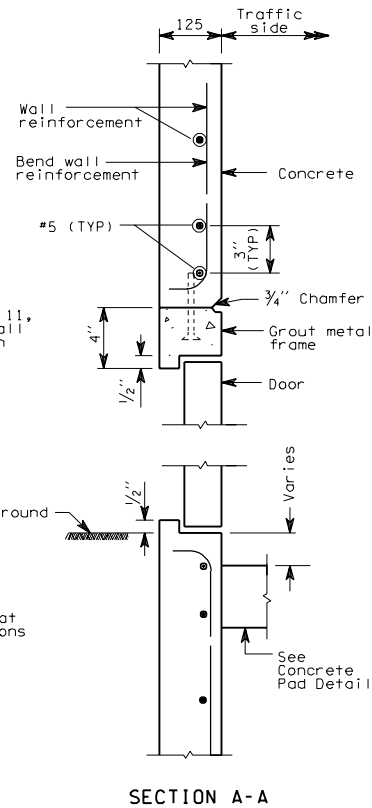
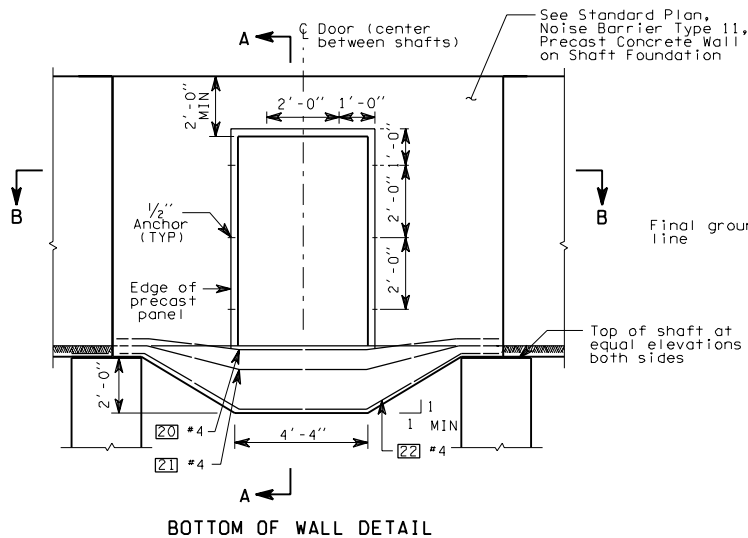
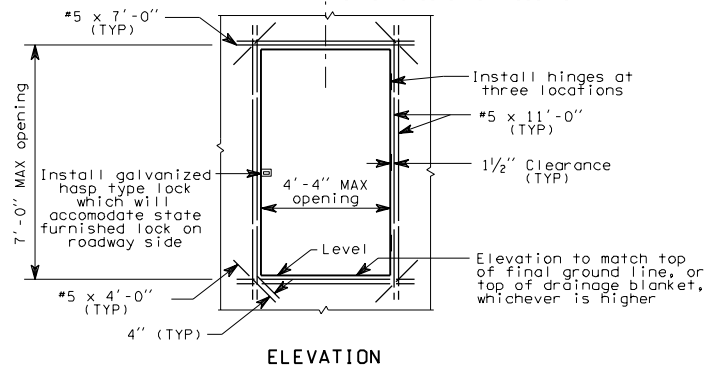
SECTION C-C

SECTION D-D
Typical Expansion Joint

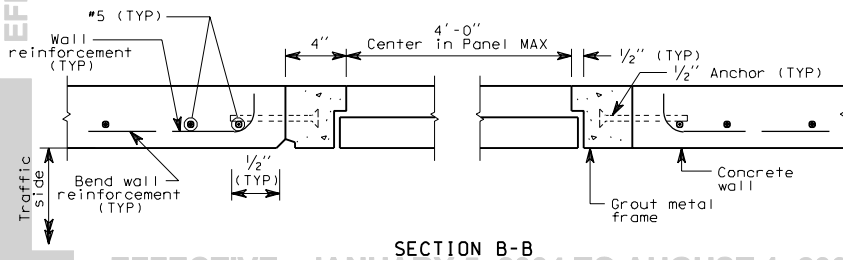
ANGLE POINT PLAN

NOISE BARRIER - TYPE 20
MASONRY WALL ON
SHAFT FOUNDATION

D-2t**03-14-97**



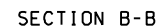
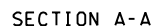
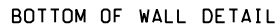
**ACCESS DOOR - TYPE 1
PRECAST CONCRETE WALL
ON SHAFT FOUNDATION**



MK NUMBER	BAR SIZE	BEND TYPE	NUMBER PER DOOR	X	Y	Z	H	J	TOTAL LENGTH	
20	4	91	1	1'-1"	2'-11"	4'-3"	8"	1'-5"	11'-5"	
21	4	91	1	11"	3'-1"	4'-3"	1'-4"	1'-4"	11'-10"	
22	4	91	1	10"	3'-2"	4'-3"	2'-0"	1'-3"	12'-1"	

D-2u 1 of 1

03-07-97



ACCESS DOOR - TYPE 2
PRECAST CONCRETE WALL
WITH TRAFFIC BARRIER
ON SHAFT FOUNDATION

MK	BAR	BEND	NUMBER	X	Y	Z	H	J	TOTAL
NUMBERS	SIZE	TYPE	PER						LENGTH
			DOOR						
20	4	91	1	1'-1"	2'-11"	4'-3"	8"	1'-5"	11'-5"
21	4	91	1	11"	3'-1"	4'-3"	1'-4"	1'-4"	11'-10"
22	4	91	1	10"	3'-2"	4'-3"	2'-0"	1'-3"	12'-1"

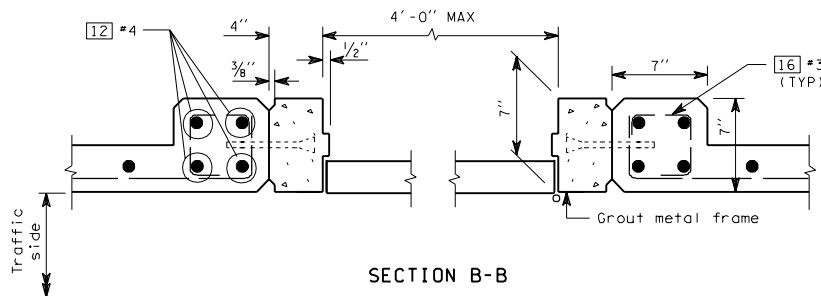
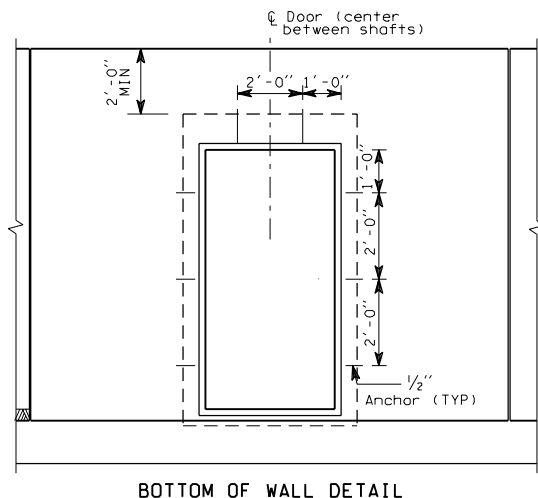
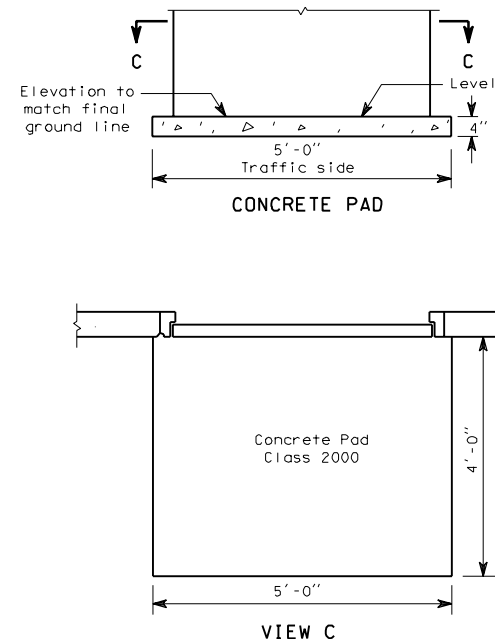
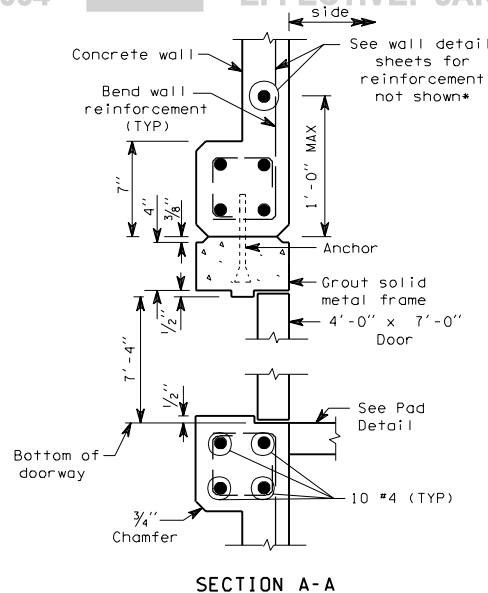
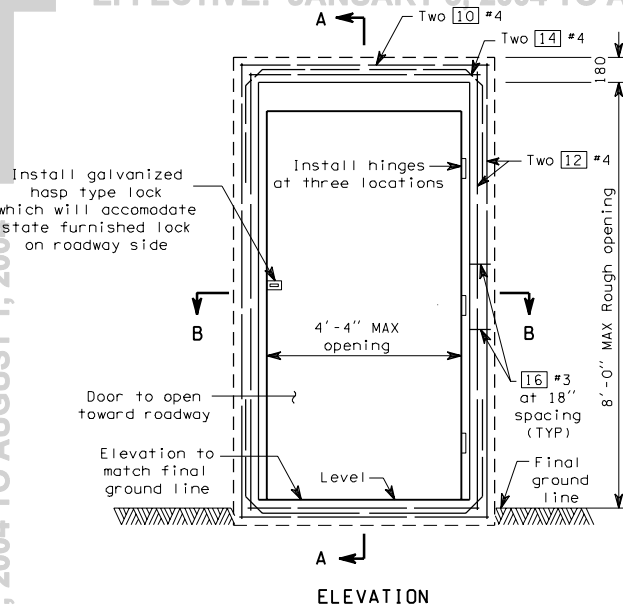
EFFECTIVE VIEW C JANUARY 5, 2004 TO AUGUST 1, 2004 03-0

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

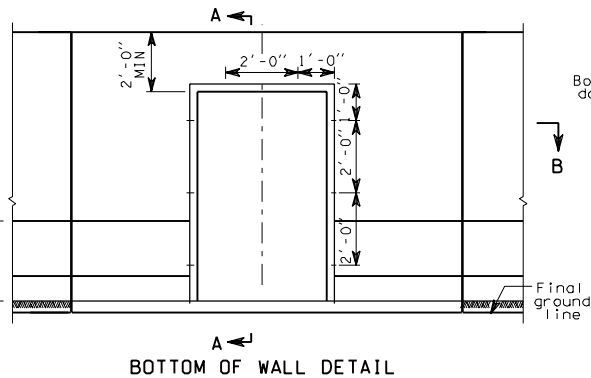
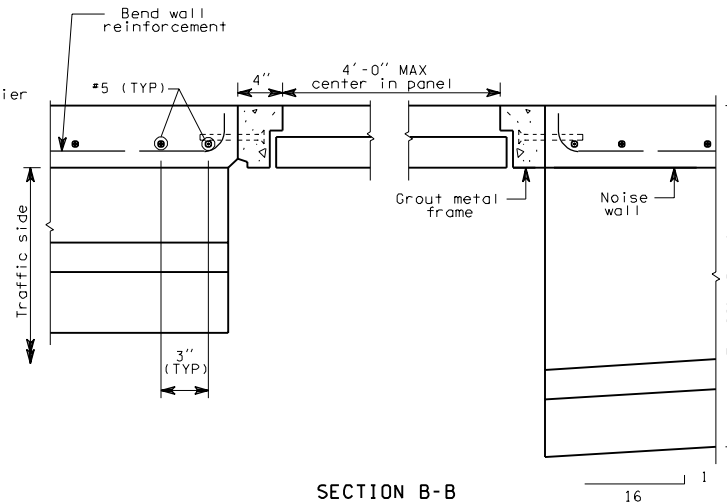
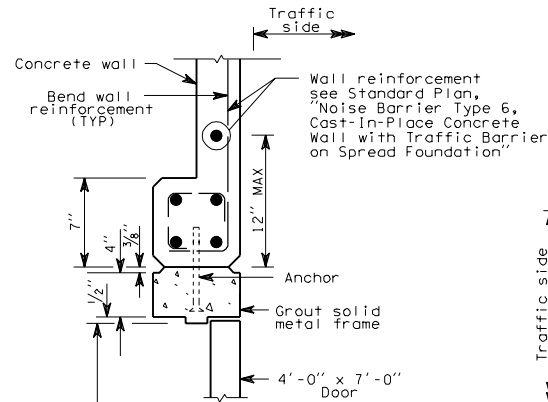
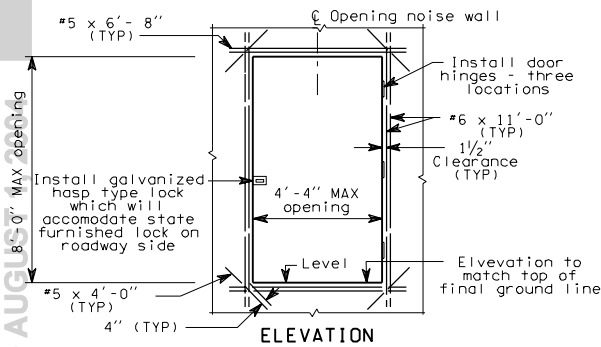
EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004



ACCESS DOOR - TYPE 4
CAST-IN-PLACE
CONCRETE WALL

MK Number	Bar Size	Bend Type	Number Per Door	X	Y	Total Length	
10	4	50	8	4'-0"	4'-0"	4'-0"	
12	4	50	8	8'-2"	8'-2"	8'-2"	
14	4	90	8	5 3/4'	4'-8"	4'-8"	
16	5	92	16	4 1/2'	1'-0"	1'-0"	
							Bend Type 92
							Bend Type 90
							Bend Type 50

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

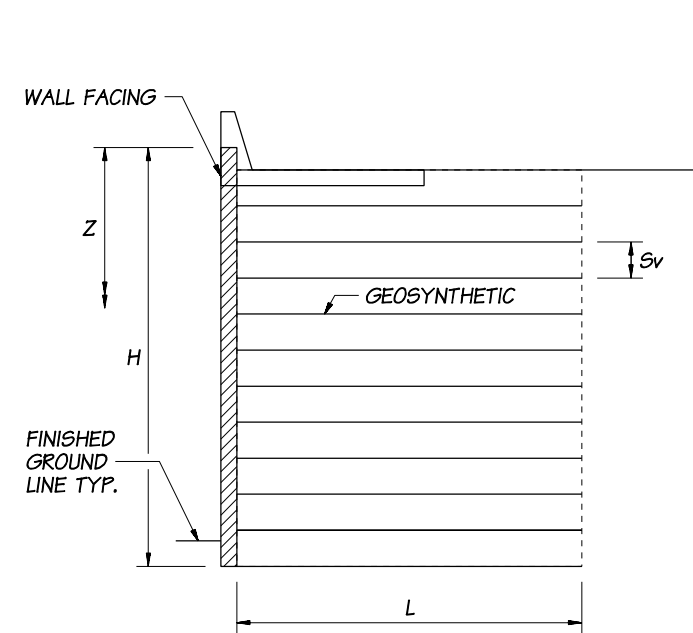


**ACCESS DOOR - TYPE 5
CAST-IN-PLACE WALL
WITH TRAFFIC BARRIER**

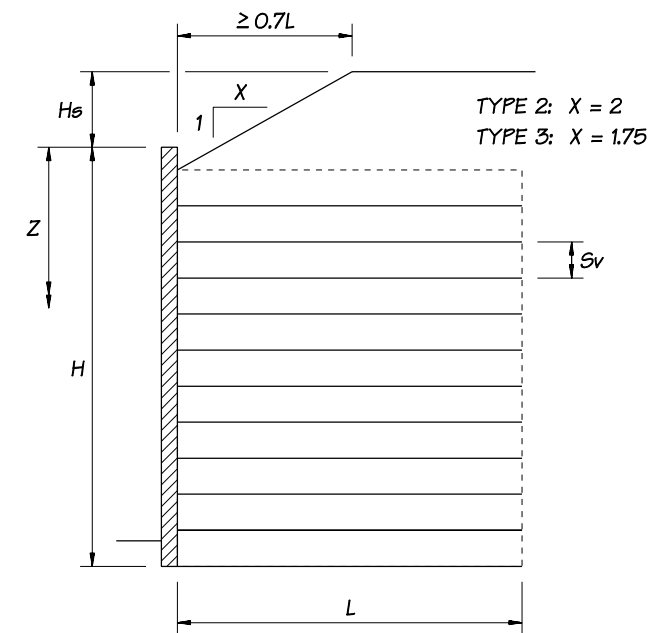
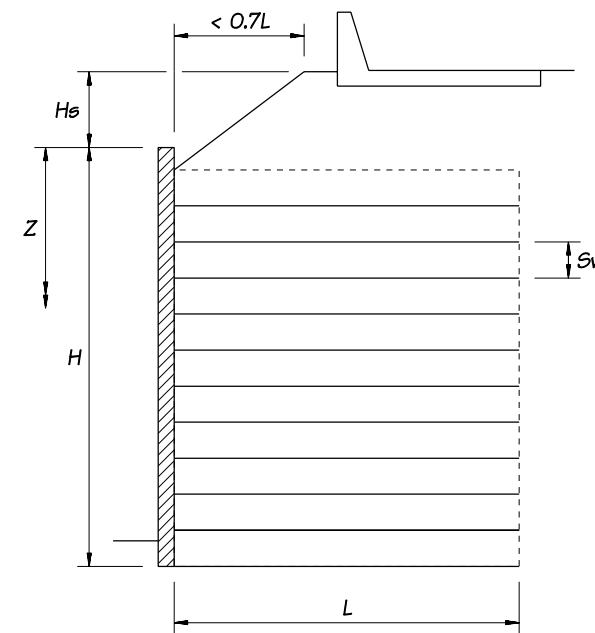
*Height may vary if required to provide a smooth profile consistent with the roadway profile

MK NUMBER	BAR SIZE	BEND TYPE	NUMBER PER DOOR	X	Y	TOTAL LENGTH
10	4	50	8	4'-0"	4'-0"	4'-0"
12	4	50	8	8'-2"	8'-2"	8'-2"
14	4	90	8	5 3/4"	2'-0"	4'-8"
16	5	92	16	4 1/2"	1 1/2"	1'-0"

<p>Bend Type 92</p>	<p>Bend Type 90</p>	<p>Bend Type 50</p>
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GEOSYNTHETIC WALL, TYPE 1
HORIZONTAL BACKSLOPE WITH 2 FT. TRAFFIC SURCHARGE



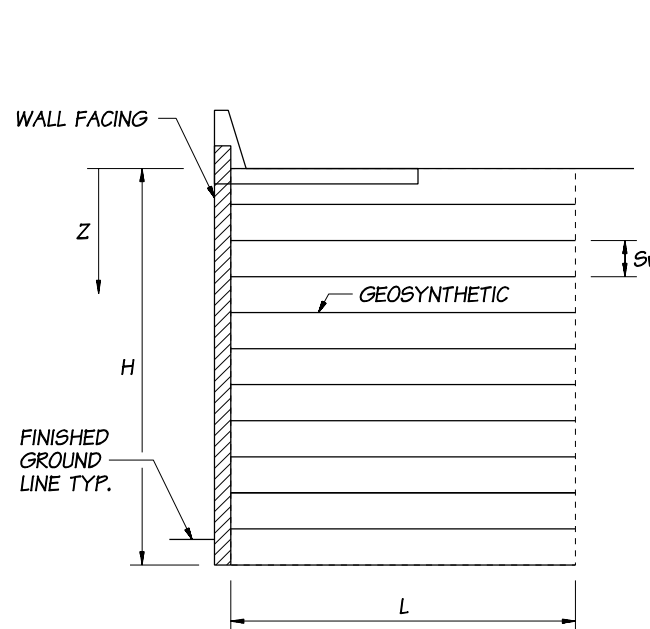
GEOSYNTHETIC WALL, TYPES 2 & 3

PERMANENT GEOSYNTHETIC WALL CROSS SECTION

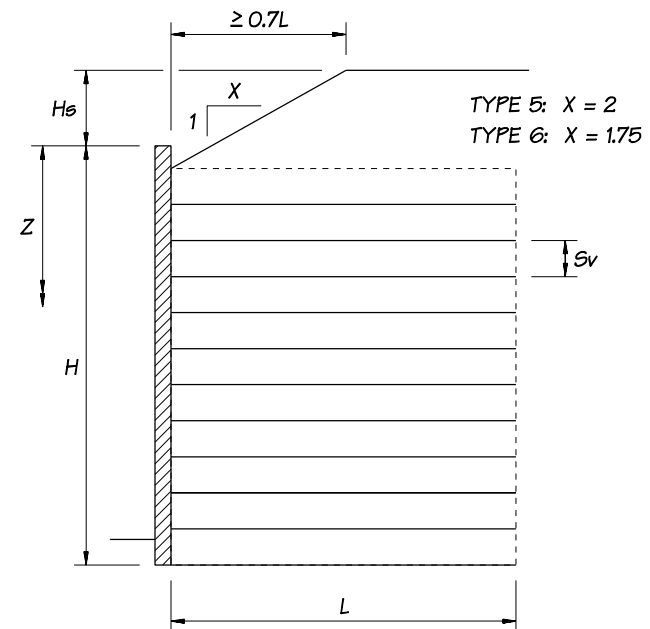
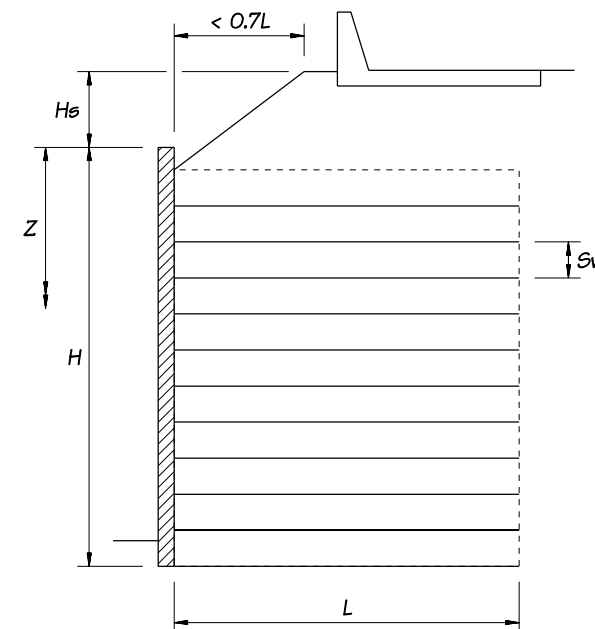
(INCLUDES SEISMIC DESIGN)
GROUND ACCELERATION COEFFICIENT, $A=0.16g$ TO $0.30g$.

NOTES:

1. THE LONG-TERM GEOSYNTHETIC DESIGN STRENGTH, T_{al} SHALL BE DETERMINED IN ACCORDANCE WITH WSDOT TEST METHOD 925. SEE QUALIFIED PRODUCTS LIST FOR PRODUCTS IN WHICH T_{al} HAS BEEN DETERMINED.
2. SEE PLANS FOR T_{al} REQUIRED FOR VARIOUS WALL GEOMETRIES.



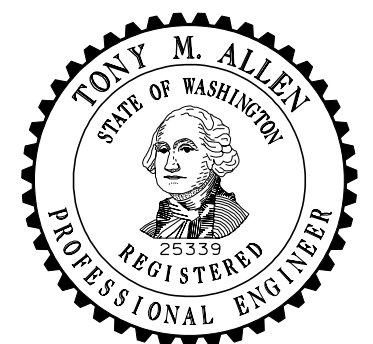
GEOSYNTHETIC WALL, TYPE 4
HORIZONTAL BACKSLOPE WITH 2 FT. TRAFFIC SURCHARGE



GEOSYNTHETIC WALL, TYPES 5 & 6

PERMANENT GEOSYNTHETIC WALL CROSS SECTION

(STATIC DESIGN ONLY)
GROUND ACCELERATION COEFFICIENT, $A=0.15g$ OR LESS.



EXPIRES JULY 1, 2003

PERMANENT GEOSYNTHETIC WALL TYPES 1-6

STANDARD PLAN D-3

SHEET 1 OF 4 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 01-23-02

STATE DESIGN ENGINEER

DATE _____

 Washington State Department of Transportation

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EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

GEOSYNTHETIC REINFORCEMENT LENGTH AND DOWELS

TOTAL WALL HEIGHT H+H _s (ft)	CIP CONC FASCIA B (ft-in)	GEOSYNTHETIC REINFORCEMENT LENGTH L (ft)						#4 ∇ DOWEL REINFORCEMENT REQUIRED N (qty.)	TOTAL WALL HEIGHT H+H _s (ft)
		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6		
≤ 5'	1'-0"	6.0	6.0	6.5	6.0	6.0	6.0	2	≤ 5'
6'	1'-0"	6.0	6.0	7.9	6.0	6.0	6.0	3	6'
7'	1'-0"	6.4	6.9	9.3	6.4	6.4	6.4	3	7'
8'	1'-0"	6.9	7.9	10.7	6.9	6.9	7.1	3	8'
9'	1'-0"	7.4	8.9	12.1	7.4	7.4	8.1	3	9'
10'	1'-0"	7.9	10.0	13.5	7.9	7.9	9.0	4	10'
11'	1'-0½"	8.4	11.0	14.7	8.4	8.4	10.0	4	11'
12'	1'-0½"	8.8	12.0	16.1	8.8	8.8	10.9	4	12'
13'	1'-1"	9.3	13.0	17.5	9.3	9.3	11.9	4	13'
14'	1'-1"	9.8	13.9	18.9	9.8	9.8	12.8	4	14'
15'	1'-2"	10.5	14.9	20.3	10.5	10.5	13.7	6	15'
16'	1'-2"	11.2	16.0	21.7	11.2	11.2	14.7	6	16'
17'	1'-2½"	11.9	17.0	22.9	11.9	11.9	15.6	8	17'
18'	1'-2½"	12.6	18.0	24.3	12.6	12.6	16.6	8	18'
19'	1'-3"	13.3	19.0	25.7	13.3	13.4	17.5	8	19'
20'	1'-3"	14.0	20.1	27.1	14.0	14.1	18.5	10	20'
21'	1'-3½"	14.7	21.1	28.5	14.7	14.8	19.4	10	21'
22'	1'-3½"	15.4	22.2	29.9	15.4	15.5	20.4	10	22'
23'	1'-4"	16.1	23.2	31.1	16.1	16.2	21.3	10	23'
24'	1'-4"	16.8	24.2	32.5	16.8	16.9	22.3	10	24'
25'	1'-5"	17.5	25.2	33.9	17.5	17.7	23.2	10	25'
26'	1'-5"	18.2	26.3	35.3	18.2	18.4	24.2	10	26'
27'	1'-5½"	18.9	27.3	36.7	18.9	19.1	25.1	10	27'
28'	1'-5½"	19.6	28.2	38.1	19.6	19.9	26.1	10	28'
29'	1'-6"	20.3	29.2	39.5	20.3	20.6	27.0	10	29'
30'	1'-6"	21.0	30.3	40.7	21.0	21.3	28.0	10	30'
31'	1'-6½"	21.7	31.4	42.1	21.7	22.0	28.9	10	31'
32'	1'-6½"	22.4	32.3	43.5	22.4	22.8	29.9	10	32'
33'	1'-7"	23.1	33.3	44.9	23.1	23.4	30.8	10	33'
34'	1'-7"	23.8	34.3	46.3	23.8	24.2	31.8	10	34'
35'	1'-8"	24.5	35.4	47.7	24.5	24.9	32.7	10	35'

GEOSYNTHETIC REINFORCEMENT SPACING AND STRENGTH

TOTAL WALL HEIGHT H+H _s (ft)	DEPTH BELOW TOP OF SURCHARGE Z+H _s (ft)	GEOSYNTHETIC REINFORCEMENT VERTICAL SPACING S _v (ft)	LONG-TERM GEOSYNTHETIC REINFORCEMENT STRENGTH REQUIRED T _{al} (lbs/in.)						TOTAL WALL HEIGHT H+H _s (ft)
			TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6	
UP TO 5	5	0.75	20.3	18.3	19.0	20.3	18.3	19.0	UP TO 5
	5	1.0	27.1	24.5	25.4	27.1	24.5	25.4	
	5	1.25	33.8	30.6	31.7	33.8	30.6	31.7	
5 < H+H _s ≤ 10	0 to 10	0.75	34.8	34.6	36.5	34.8	34.6	36.5	5 < H+H _s ≤ 10
	0 to 10	1.0	46.4	46.1	48.7	46.4	46.1	48.7	
	0 to 10	1.25	58.0	57.6	60.9	58.0	57.6	60.9	
10 < H+H _s ≤ 20	0 to 10	0.75	34.8	41.5	48.3	34.8	38.9	44.5	10 < H+H _s ≤ 20
	10.1 to 20	0.75	63.8	67.9	73.5	63.8	67.9	73.5	
	0 to 10	1.0	46.4	55.4	64.5	46.4	51.9	59.3	
	10.1 to 20	1.0	85.0	90.6	98.0	85.0	90.6	98.0	
	0 to 10	1.25	58.0	69.2	80.6	58.0	64.9	74.1	
	10.1 to 20	1.25	106	113	122	106	113	122	
20 < H+H _s ≤ 30	0 to 10	0.75	36.8	51.7	62.0	34.8	44.0	52.4	20 < H+H _s ≤ 30
	10.1 to 20	0.75	63.8	73.0	83.3	63.8	73.0	81.4	
	20.1 to 30	0.75	92.8	102	110	92.8	102	110	
	0 to 10	1.0	49.1	69.0	82.6	46.4	58.7	69.9	
	10.1 to 20	1.0	85.0	97.4	111	85.0	97.3	109	
	20.1 to 30	1.0	124	136	147	124	136	147	
	0 to 10	1.25	61.3	86.2	103	58.0	73.4	87.3	
	10.1 to 20	1.25	106	122	139	106	122	136	
30 < H+H _s ≤ 35	20.1 to 30	1.25	155	170	184	155	170	184	30 < H+H _s ≤ 35
	0 to 10	0.75	38.7	56.9	68.8	34.8	46.6	56.4	
	10.1 to 20	0.75	63.8	78.1	90.1	63.8	75.6	85.4	
	20.1 to 30	0.75	92.8	104.5	114	92.8	104.5	114	
	30.1 to 35	0.75	107	119	129	107	119	129	
	0 to 10	1.0	51.6	75.8	91.8	46.4	62.1	75.2	
	10.1 to 20	1.0	85.0	104	120	85.0	101	114	
	20.1 to 30	1.0	124	139	152	124	139	152	
	30.1 to 35	1.0	143	159	172	143	159	172	
	0 to 10	1.25	64.4	94.8	115	58.0	77.6	93.9	
	10.1 to 20	1.25	106	130	150	106	126	142	
	20.1 to 30	1.25	155	174	191	155	174	191	
	30.1 to 35	1.25	179	198	215	179	198	215	

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

SHEET 2 OF 4 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 01-23-02

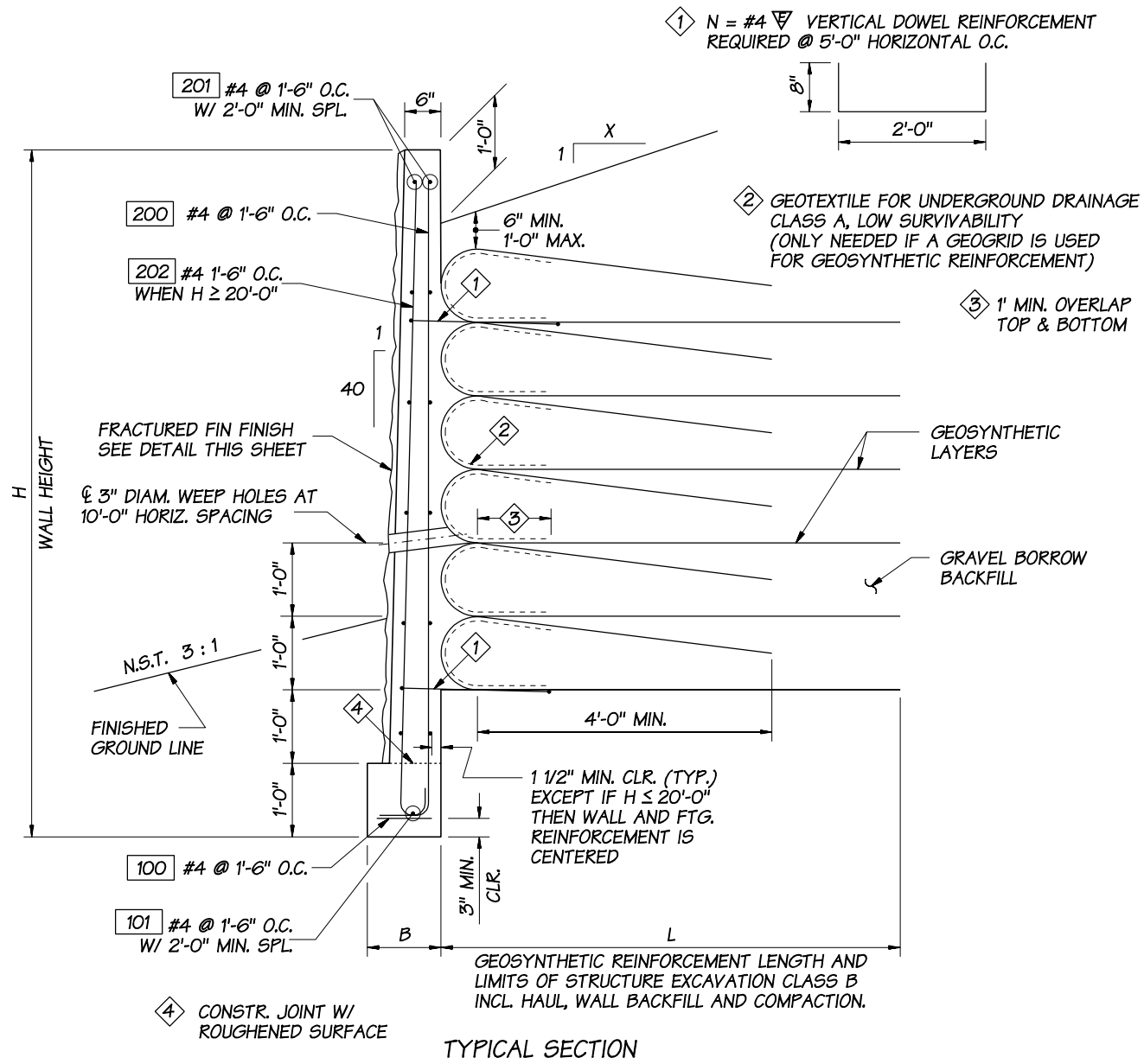
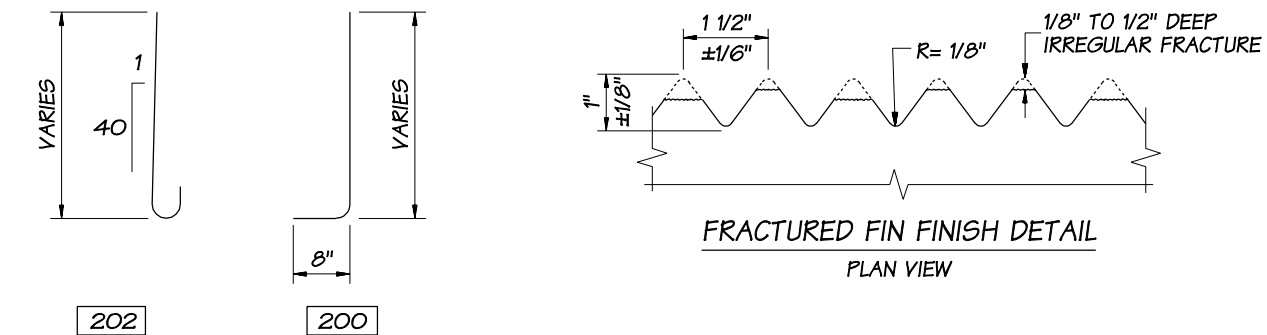
STATE DESIGN ENGINEER

DATE



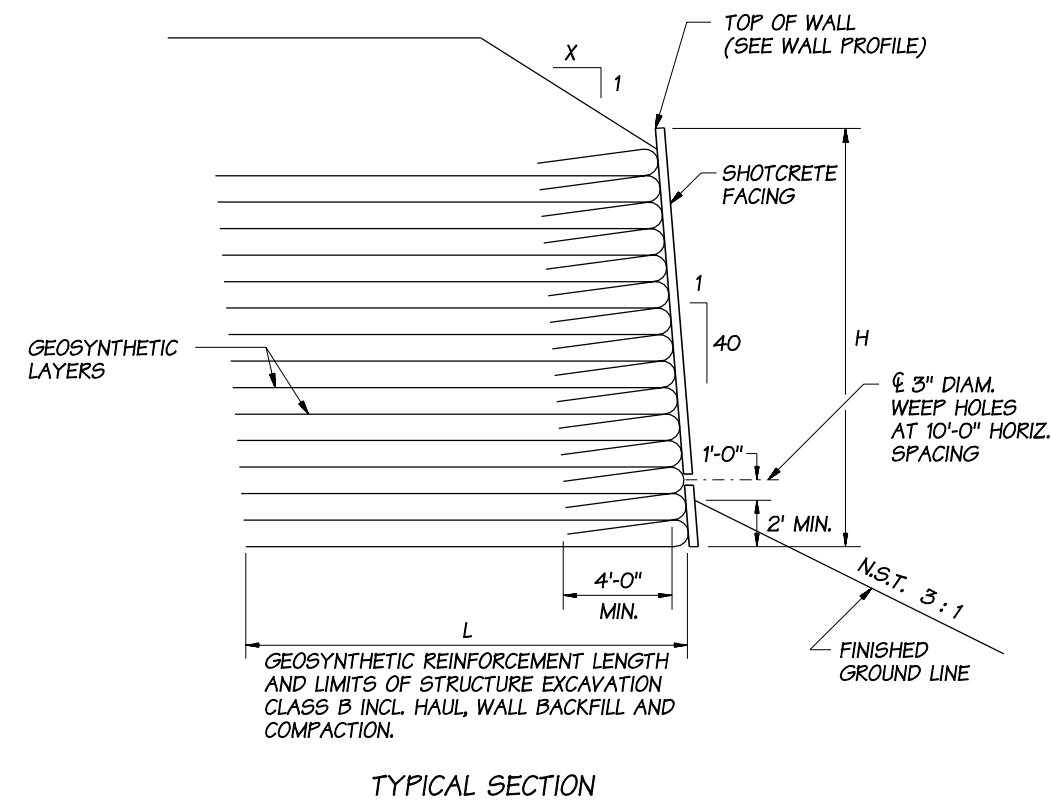
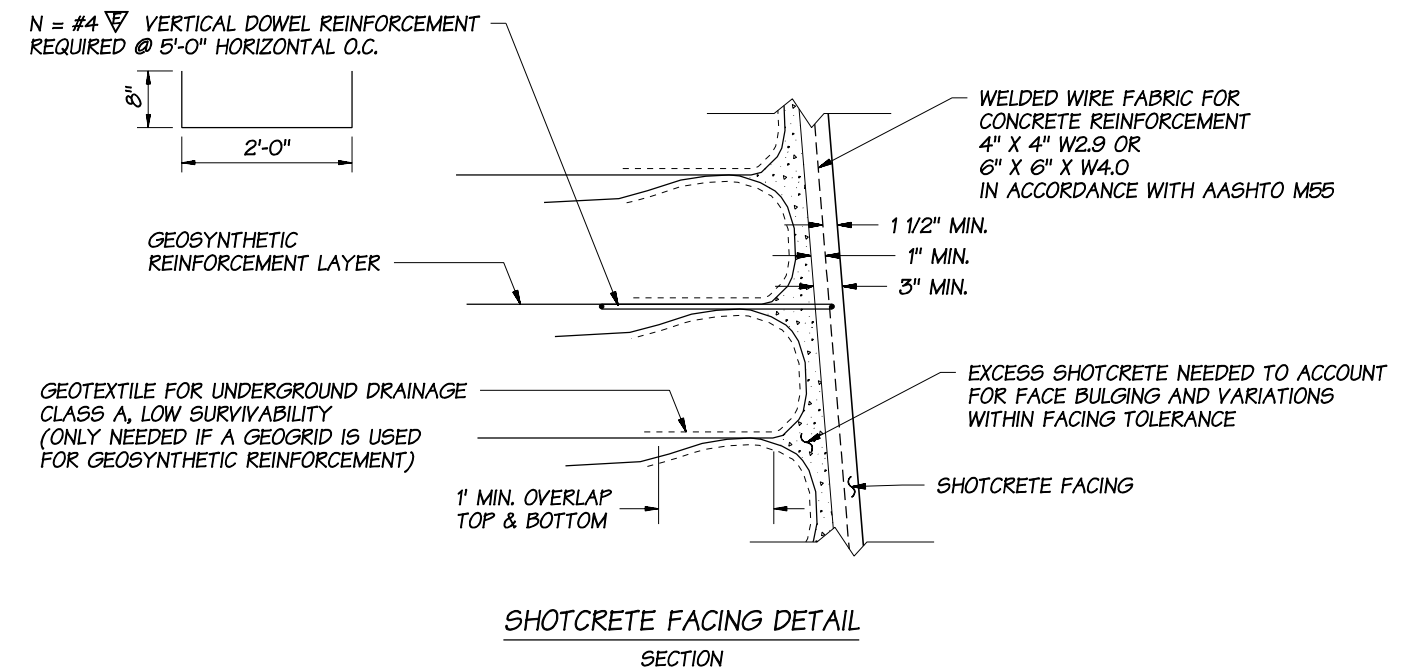
Washington State Department of Transportation

EXPIRES JULY 1, 2003



PERMANENT GEOSYNTHETIC RETAINING WALL
WITH CIP CONC. FASCIA

∇ = EPOXY COATED
N.S.T. = NOT STEEPER THAN



PERMANENT GEOSYNTHETIC RETAINING WALL
WITH SHOTCRETE FACING



EXPIRES JUNE 29, 2002

**PERMANENT
GEOSYNTHETIC WALL
TYPES 1-6
STANDARD PLAN D-3**

SHEET 3 OF 4 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 01-23-02

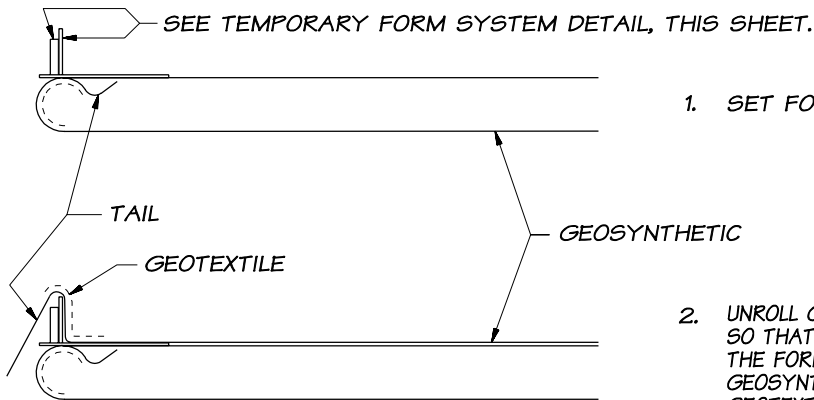
STATE DESIGN ENGINEER

DATE



Washington State Department of Transportation

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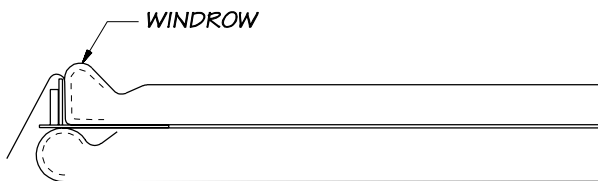


1. SET FORM ON COMPLETED LIFT.

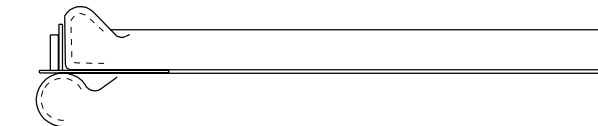
2. UNROLL GEOSYNTHETIC AND POSITION IT SO THAT A 4'-0" WIDE "TAIL" DRAPES OVER THE FORM. IF A GEOGRID IS USED FOR THE GEOSYNTHETIC REINFORCEMENT, POSITION GEOTEXTILE TO PREVENT BACKFILL FROM SPILLING THROUGH GEOGRID OPENINGS.



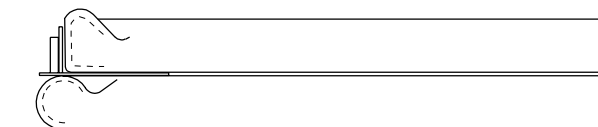
3. PLACE THE BACKFILL UNTIL THE BACKFILL IS UP TO HALF OF THE REQUIRED VERTICAL GEOSYNTHETIC LAYER SPACING.



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



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



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

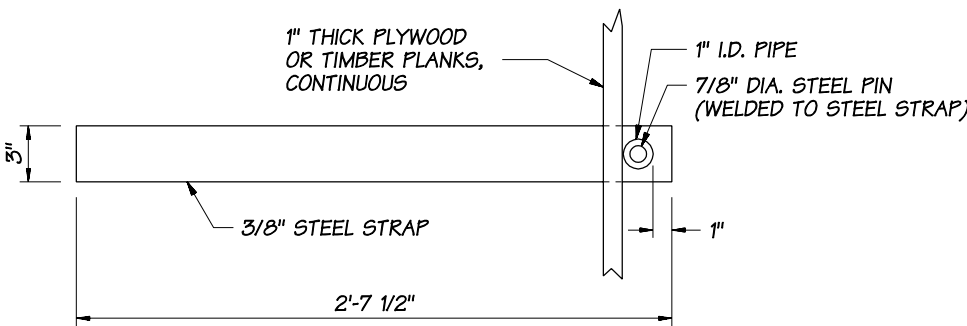


7. RESET THE FORM AND REPEAT THE SEQUENCE.

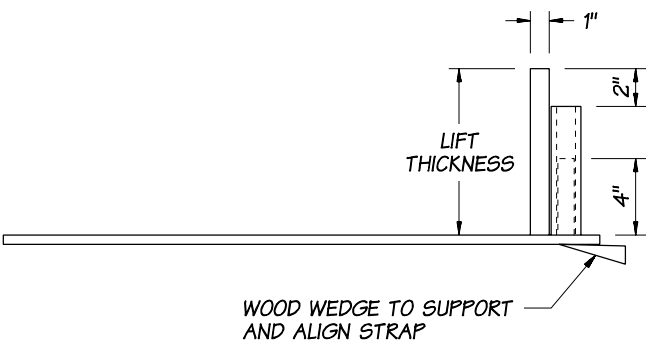
GEOSYNTHETIC WALL
CONSTRUCTION SEQUENCE

NOTES

1. FORMING TWO LAYERS AT A TIME WILL HELP MAINTAIN THE WALL FACE BATTER.
2. CONSTRUCTION JOINTS IN THE CONC. FASCIA BASE SHALL BE SPACED AT 120.00 FT. MAX.
3. FOR DETAILS OF EXPANSION JOINTS IN CONC. FASCIA, SEE STANDARD PLAN D-1e, SHEET 2, ELEVATION.



PLAN



ELEVATION

PLACE STRAPS AT 4' TO 6' CENTERS ALONG WALL FACE.

TEMPORARY FORM SYSTEM DETAIL
(OPTIONAL)



EXPIRES JULY 1, 2003

**PERMANENT
GEOSYNTHETIC WALL
TYPES 1-6
STANDARD PLAN D-3**

SHEET 4 OF 4 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 01-23-02

STATE DESIGN ENGINEER

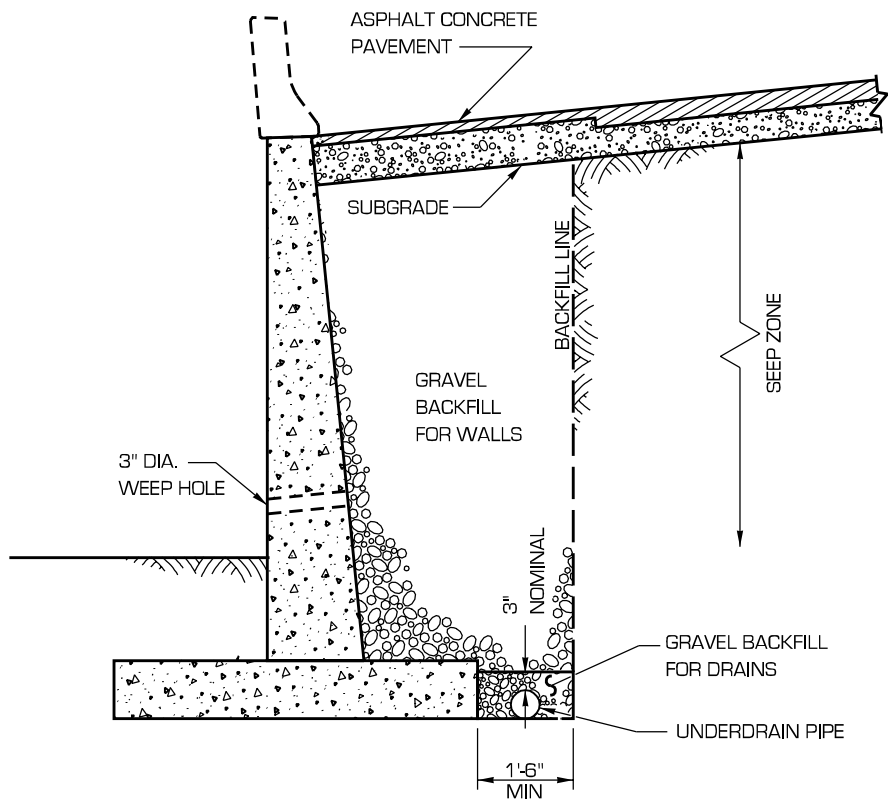
DATE



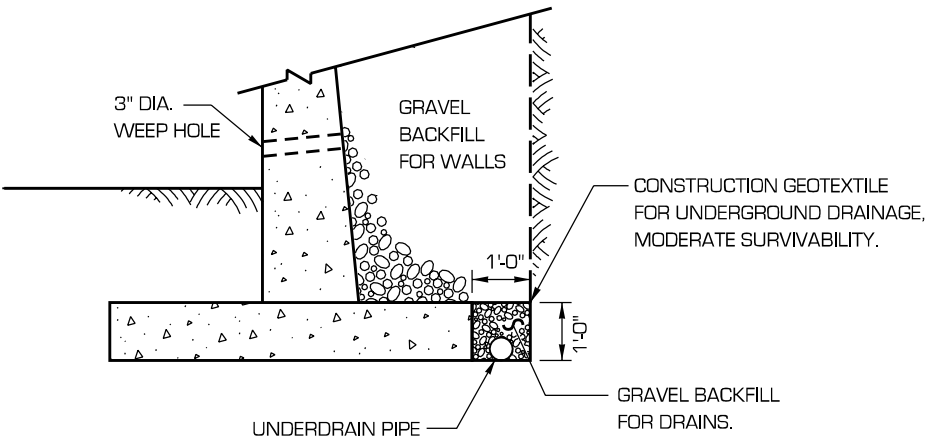
Washington State Department of Transportation

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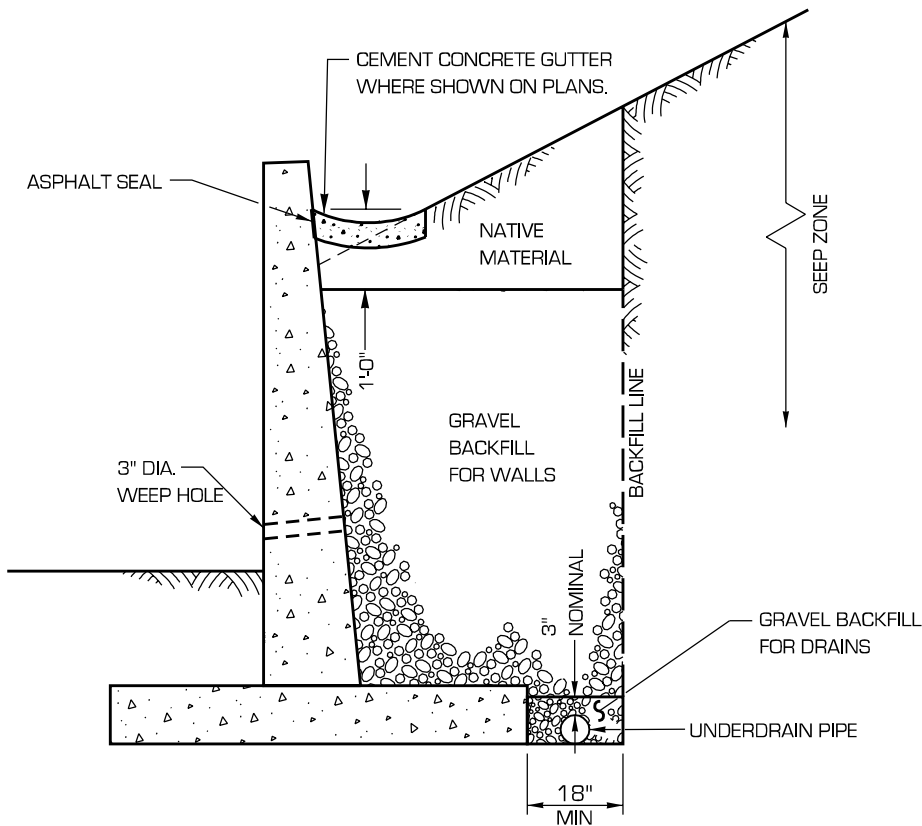
NOTES
1. SEE CONTRACT FOR BACKFILL LIMITS AND GEOTEXTILE CLASS.



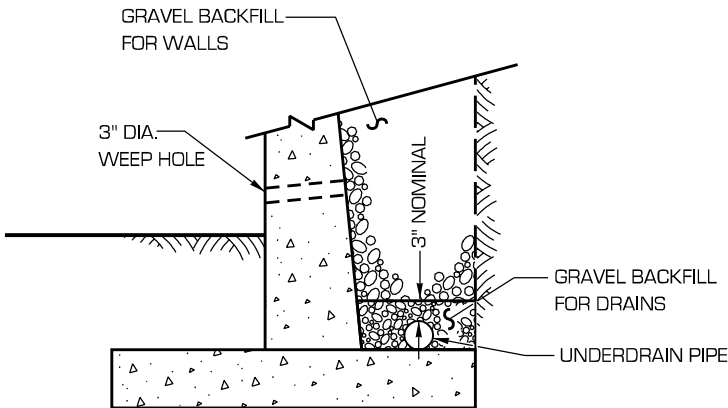
CONDITION A



CONDITION A OR CONDITION B
WITH GEOTEXTILE



CONDITION B



ALTERNATE DETAIL
TYPICAL FOR CONSTRUCTION WITH SHORING.



EXPIRES JANUARY 17, 1999

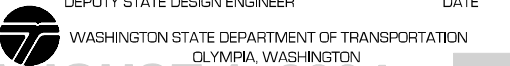
**BACKFILL AND DRAINAGE
FOR RETAINING WALLS
STANDARD PLAN D-4**

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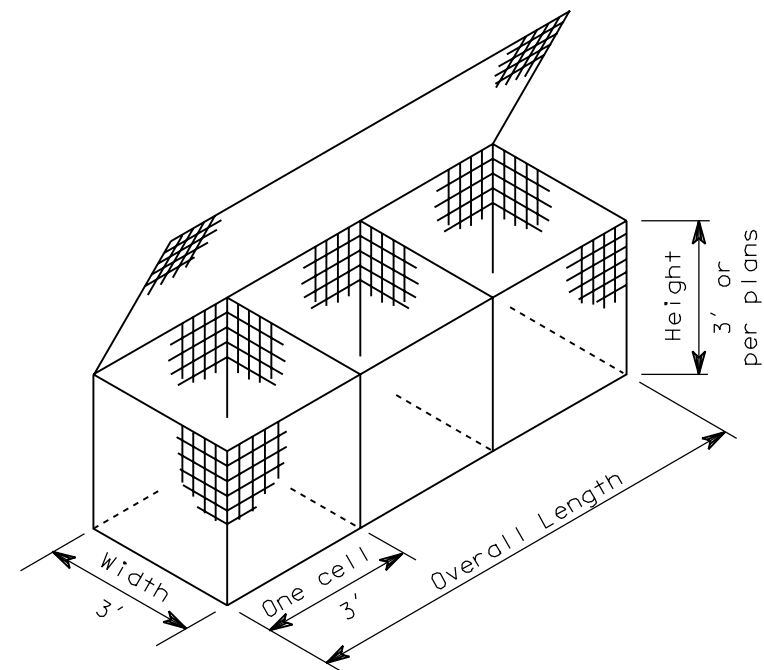
10/98	REMOVED GURADRAIL, CURB & METAL CRIB WALLS.	MT
DATE	REVISION	BY

APPROVED FOR PUBLICATION

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

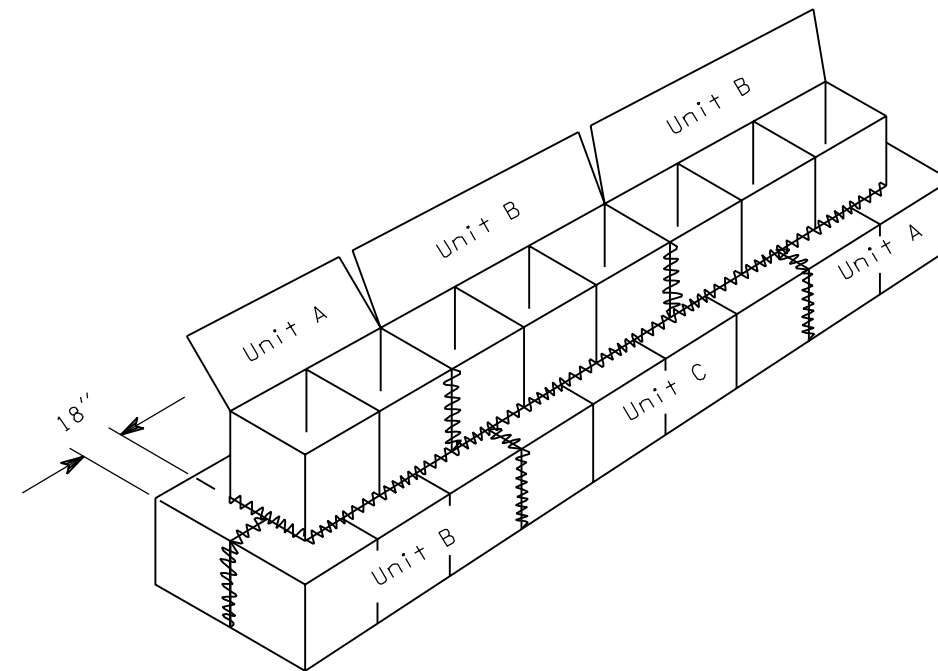


WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

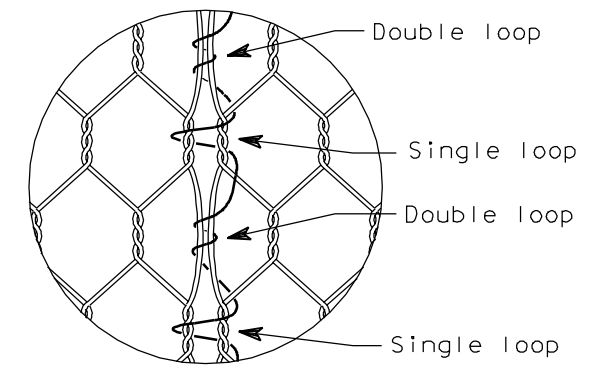


Unit A - 2 cell gabion = 6'
 Unit B - 3 cell gabion = 9'
 Unit C - 4 cell gabion = 12'

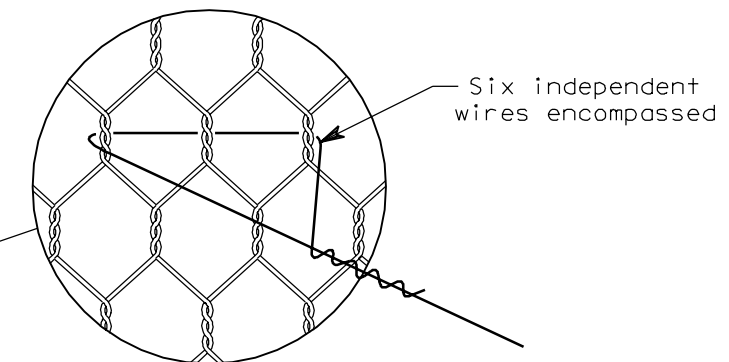
TYPICAL GABION



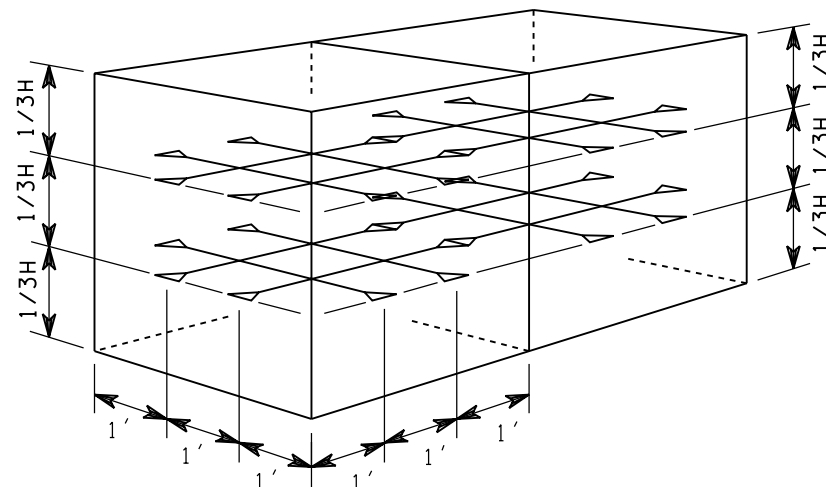
FASTENING ADJACENT BASKETS



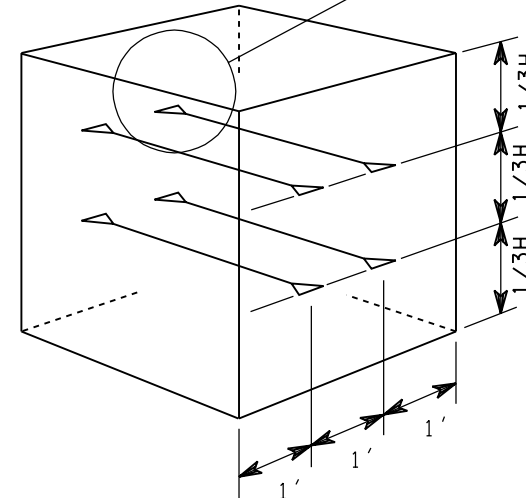
LACING DETAIL



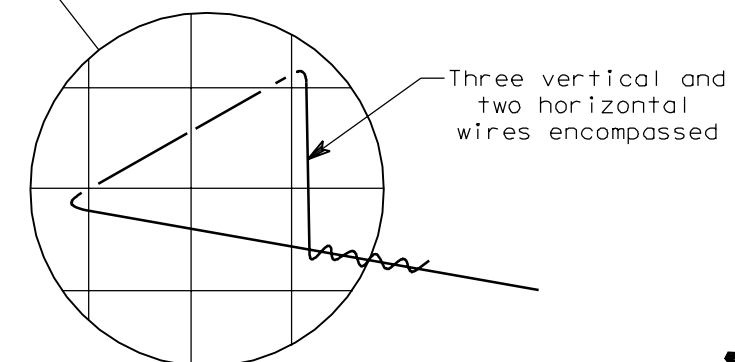
TWISTED FABRIC



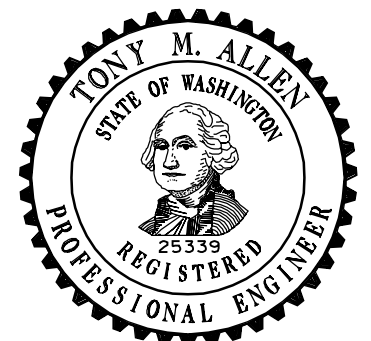
CROSS-CONNECTING WIRE PLACEMENT, END CELLS



CROSS CONNECTING WIRE PLACEMENT, INTERIOR CELLS OF FRONT GABIONS



WELDED FABRIC



EXPIRES JULY 1, 1999

GABIONS

STANDARD PLAN D-6

APPROVED FOR PUBLICATION

Clifford E. Mansfield

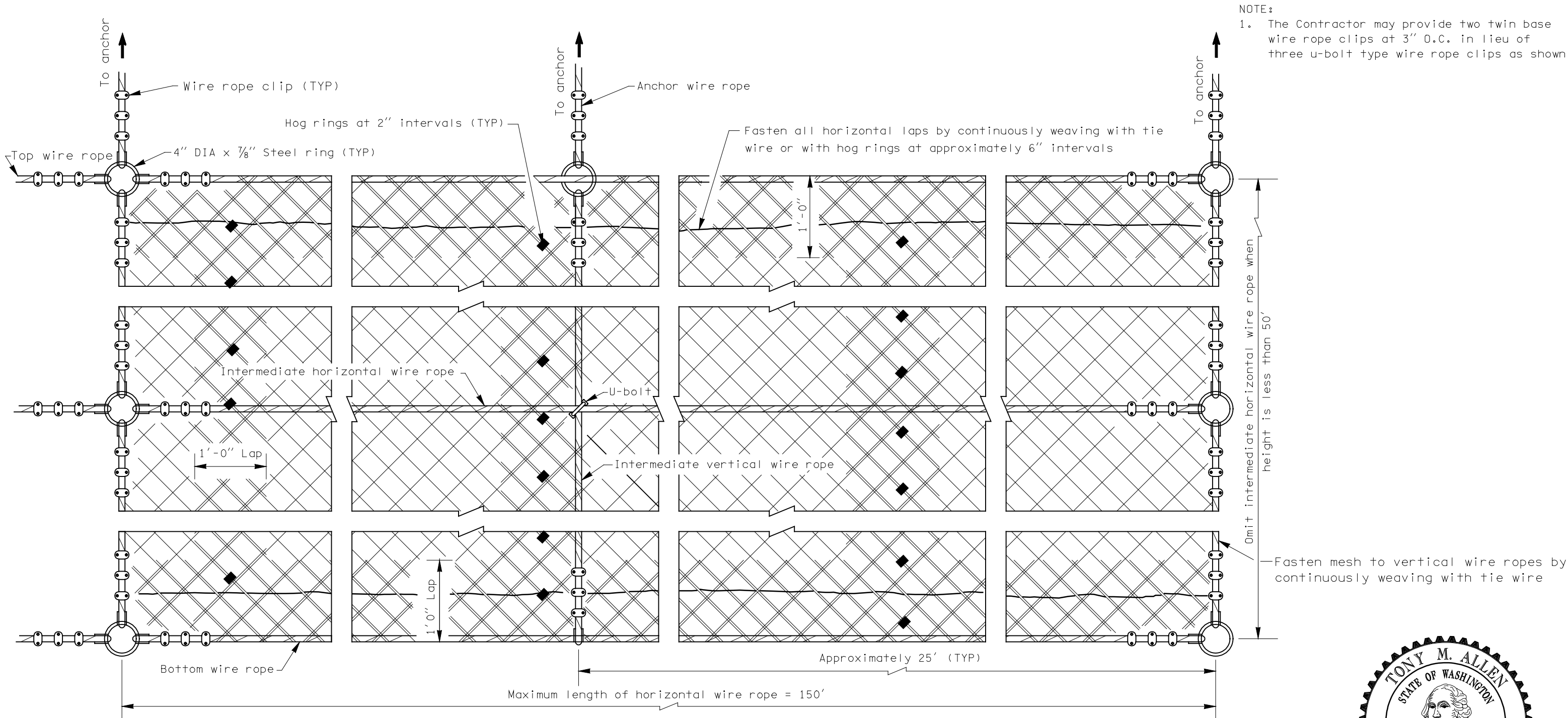
6/19/98

DEPUTY STATE DESIGN ENGINEER

DATE

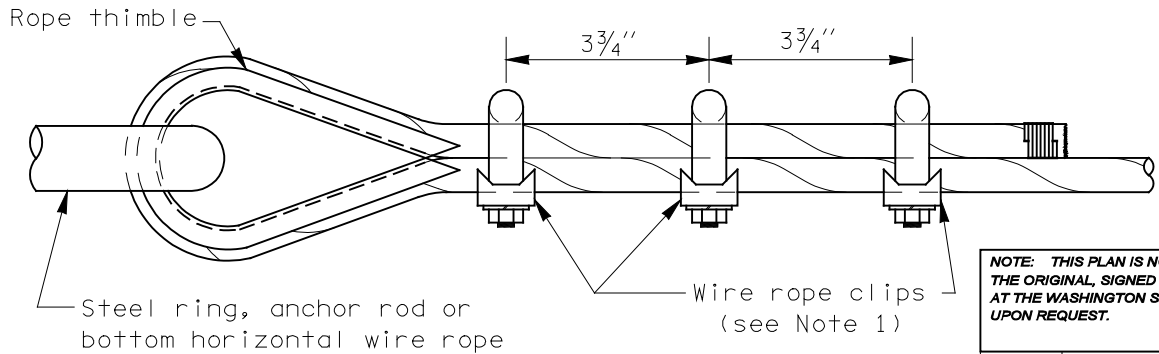
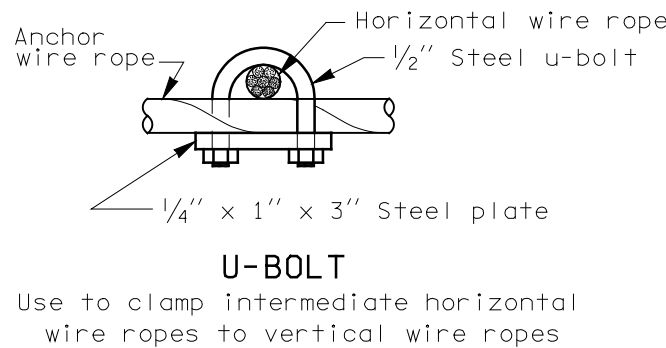
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

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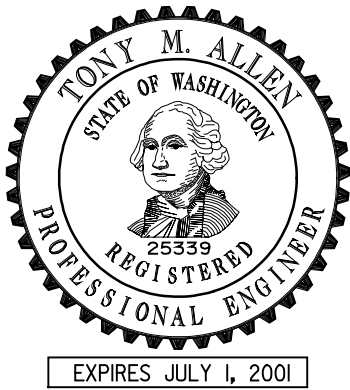
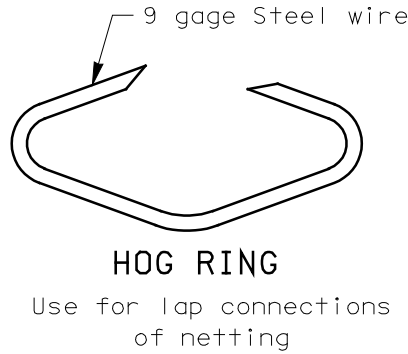


NOTE:
1. The Contractor may provide two twin base wire rope clips at 3" O.C. in lieu of three u-bolt type wire rope clips as shown.

ASSEMBLY DETAILS



WIRE ROPE CONNECTION



**WIRE MESH
SLOPE PROTECTION
STANDARD PLAN D-7**

APPROVED FOR PUBLICATION

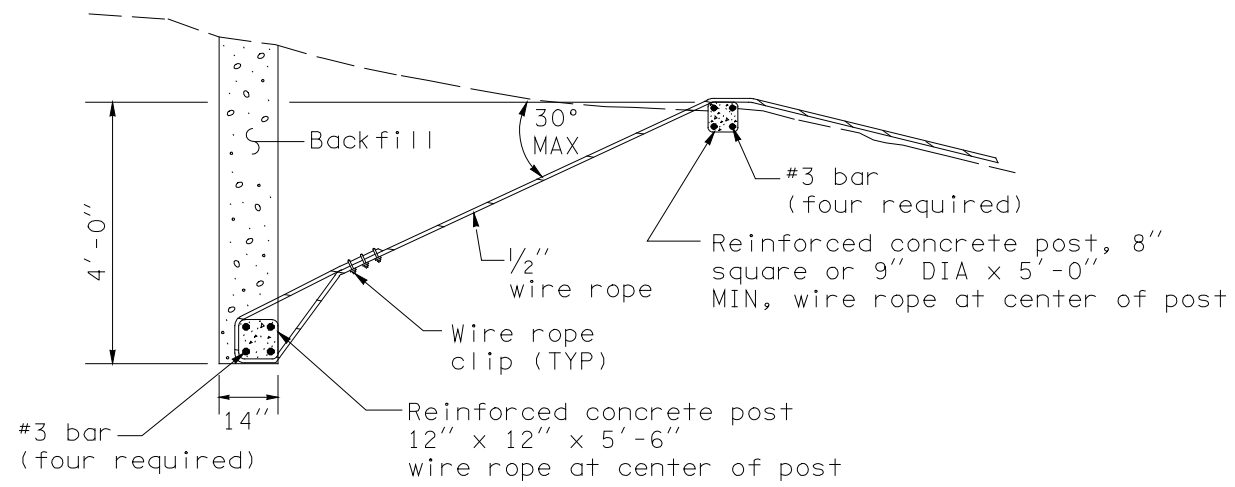
Clifford E. Mansfield 10/06/99

DEPUTY STATE DESIGN ENGINEER DATE

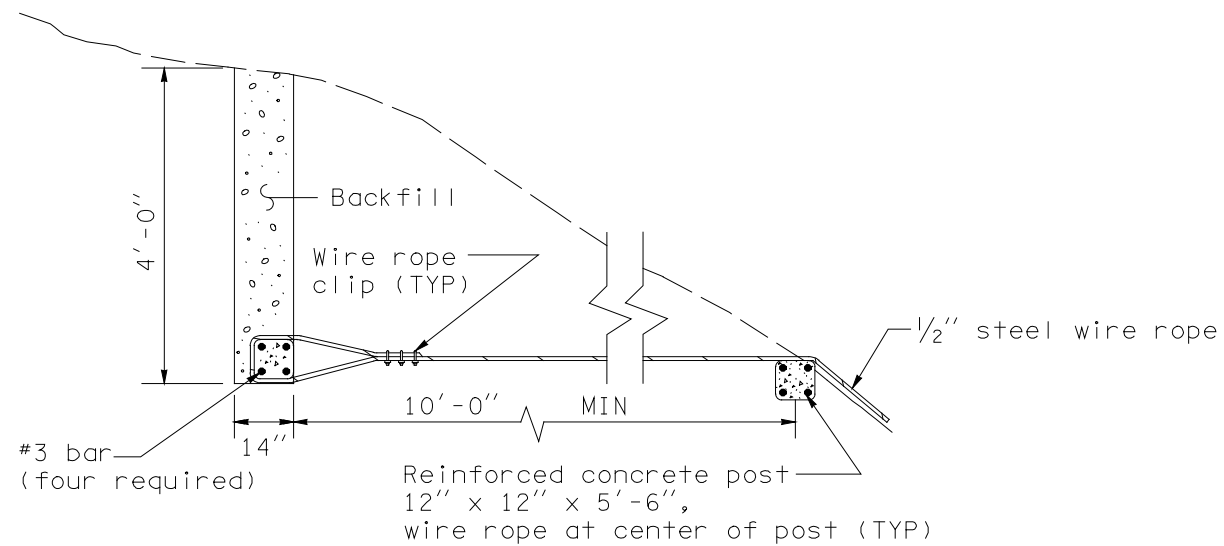
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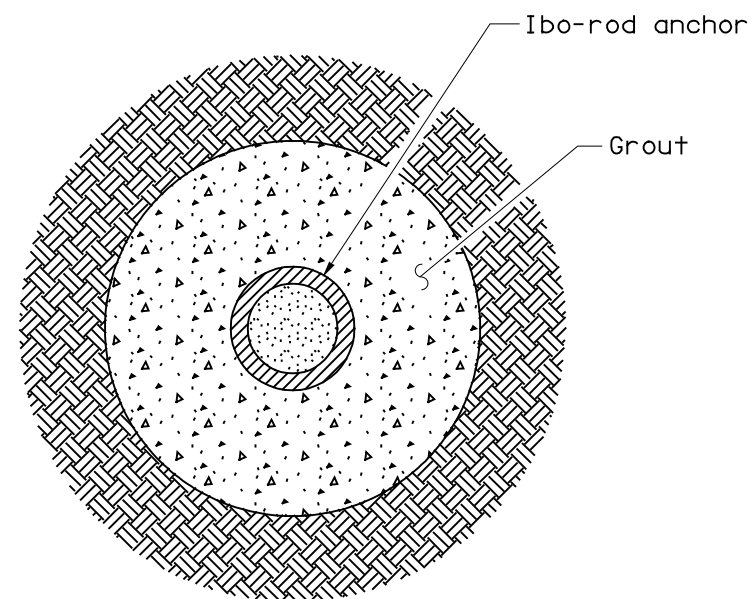
9/99	Title changed; cable references changed to wire rope.	JR
DATE	REVISION	BY



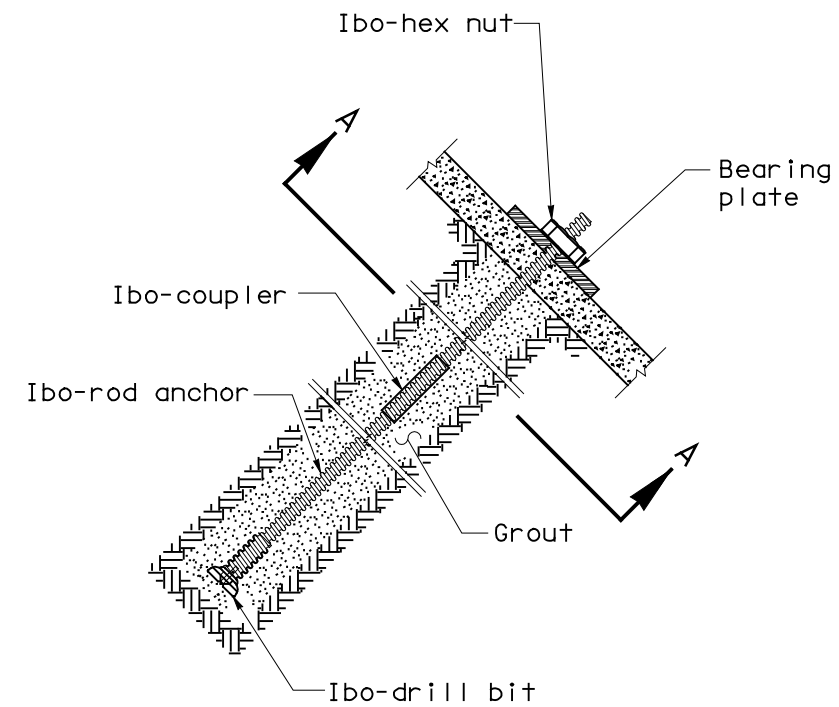
TYPE 1 ANCHOR
(FOR USE IN EARTH)



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



TYPE 3 ANCHOR
(FOR USE IN SOLID ROCK)



TYPE 4 ANCHOR
(FOR USE IN SOLID ROCK)



**WIRE MESH
SLOPE PROTECTION
STANDARD PLAN D-7a**

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

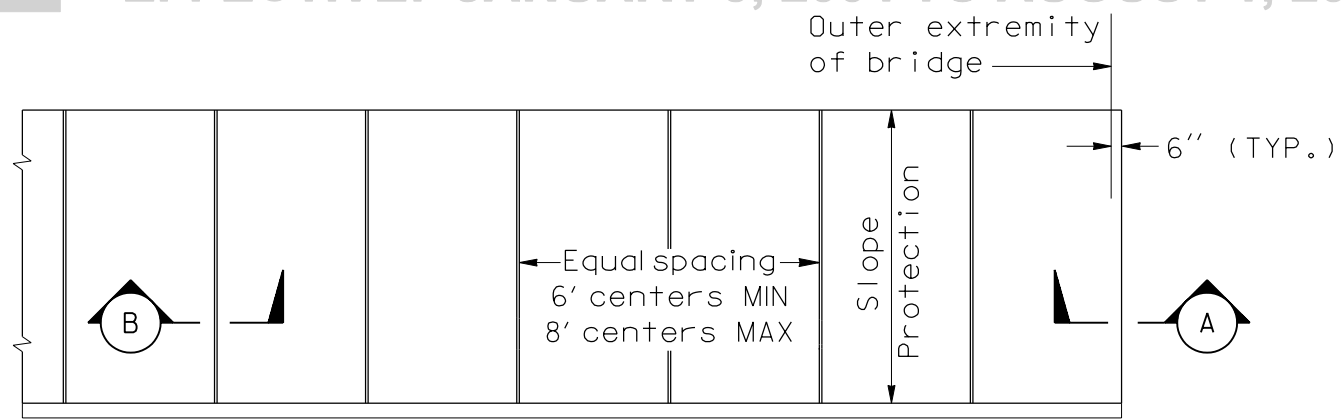
APPROVED FOR PUBLICATION

Clifford E. Mansfield 10/06/99

DEPUTY STATE DESIGN ENGINEER DATE

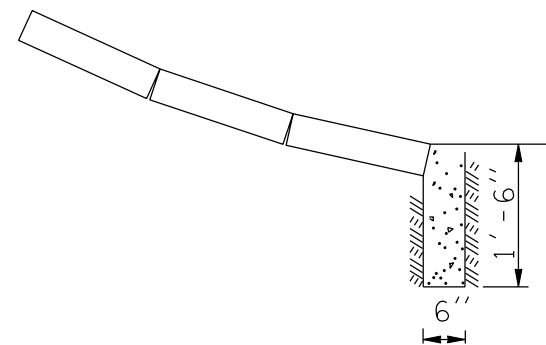
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

SECTION A-A

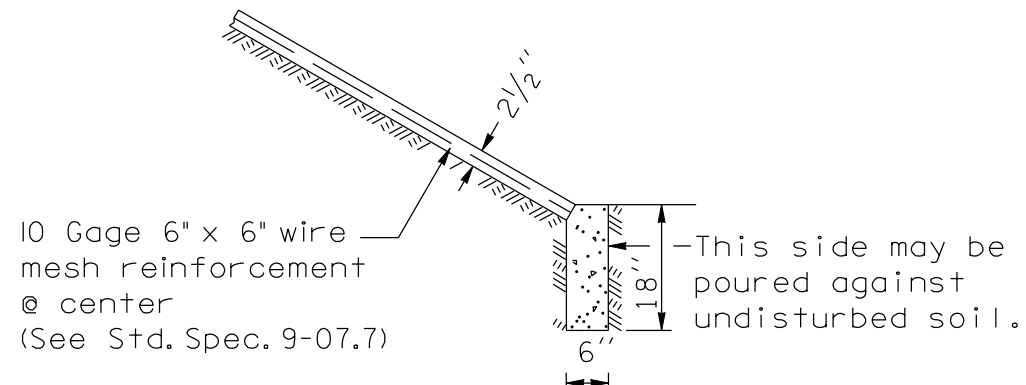


ELEVATION CONCRETE SLOPE PROTECTION

(Pneumatically placed or poured in place cement concrete shown)

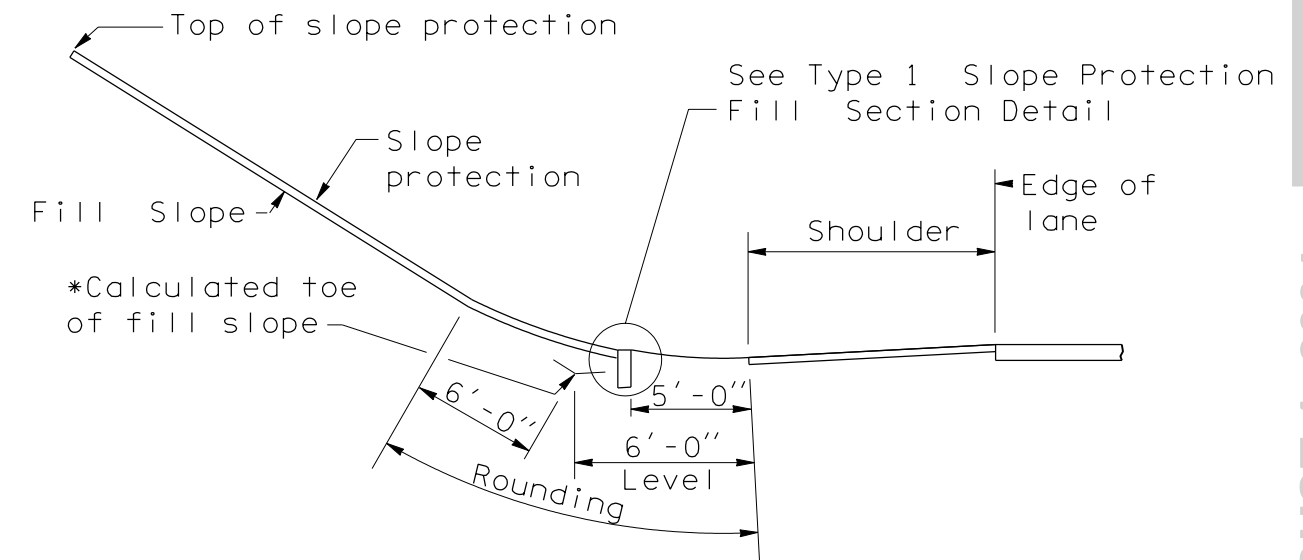


TYPE 1 SLOPE PROTECTION FILL SECTION DETAIL
(Semi-open concrete masonry units shown)



TYPE 2 SLOPE PROTECTION CUT SECTION DETAIL

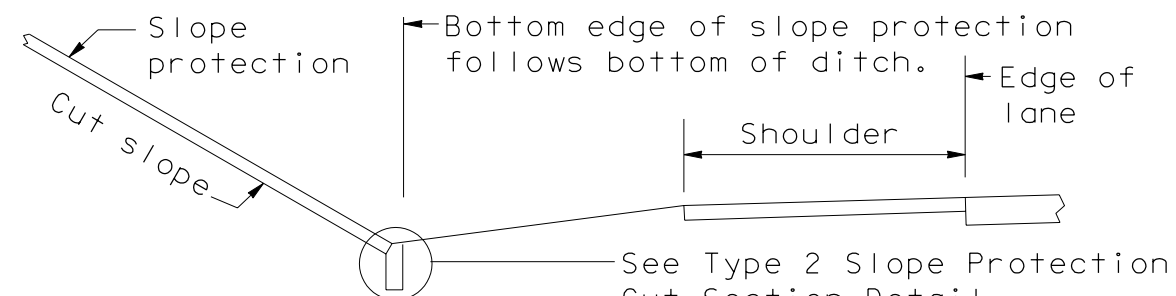
(Pneumatically placed or poured in place cement concrete shown)



SIDE ELEVATION

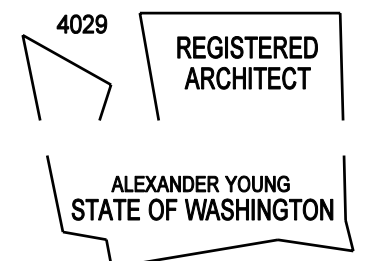
(For fill section on lower roadway)

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



SIDE ELEVATION

(For cut section on lower roadway)



Principal Architect

CONCRETE SLOPE PROTECTION STANDARD PLAN D-9

SHEET 1 OF 2 SHEETS

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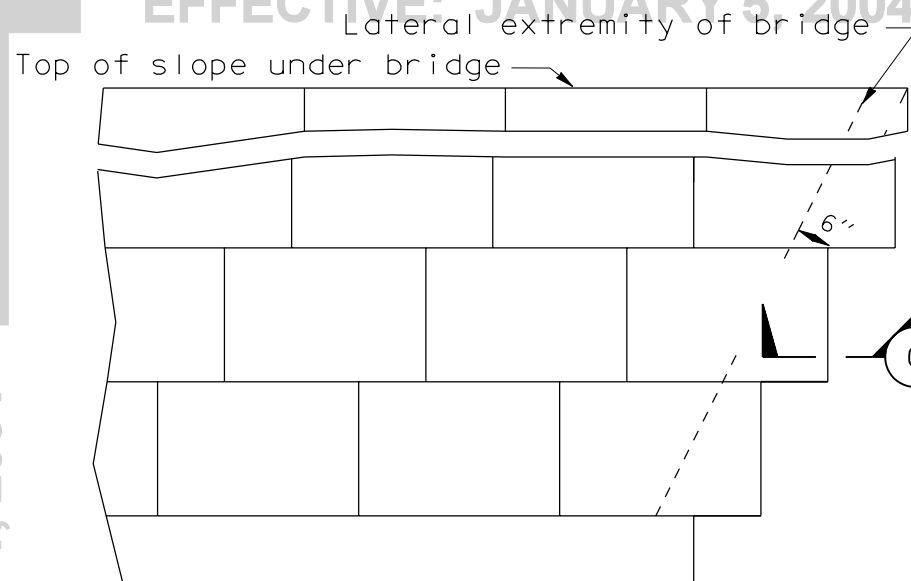
APPROVED FOR PUBLICATION

Clifford E. Mansfield

DEPUTY STATE DESIGN ENGINEER

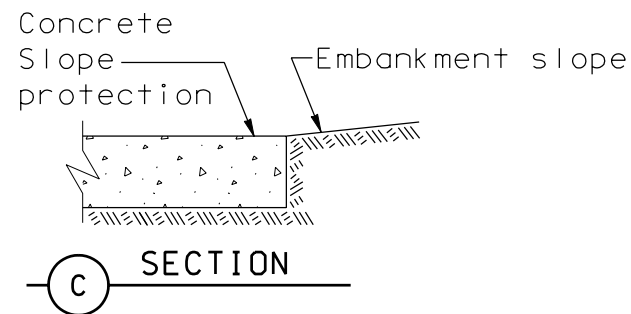
12/11/98

DATE

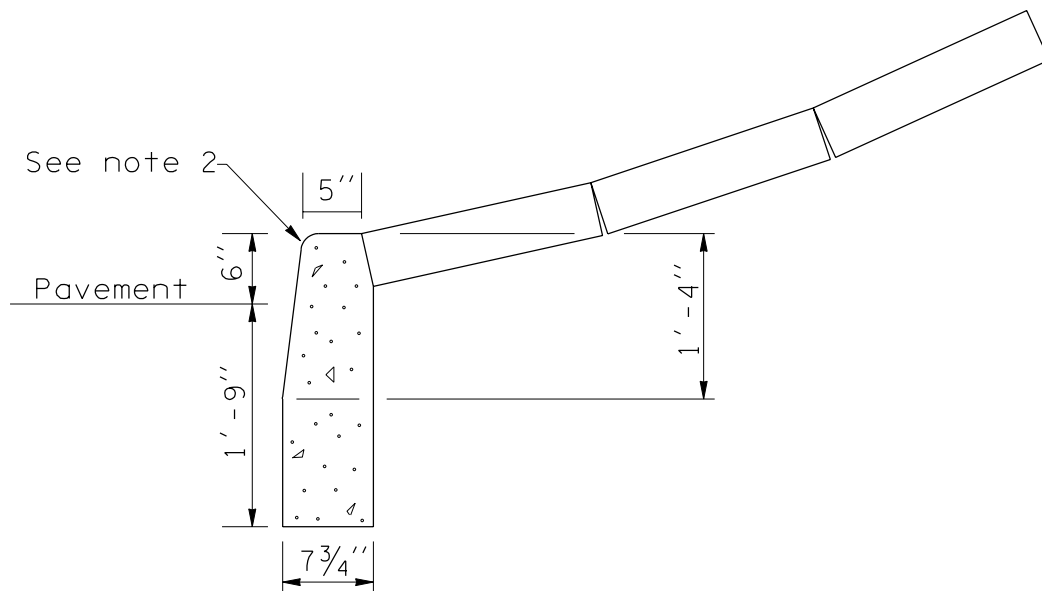


SKEWED BRIDGE PLAN

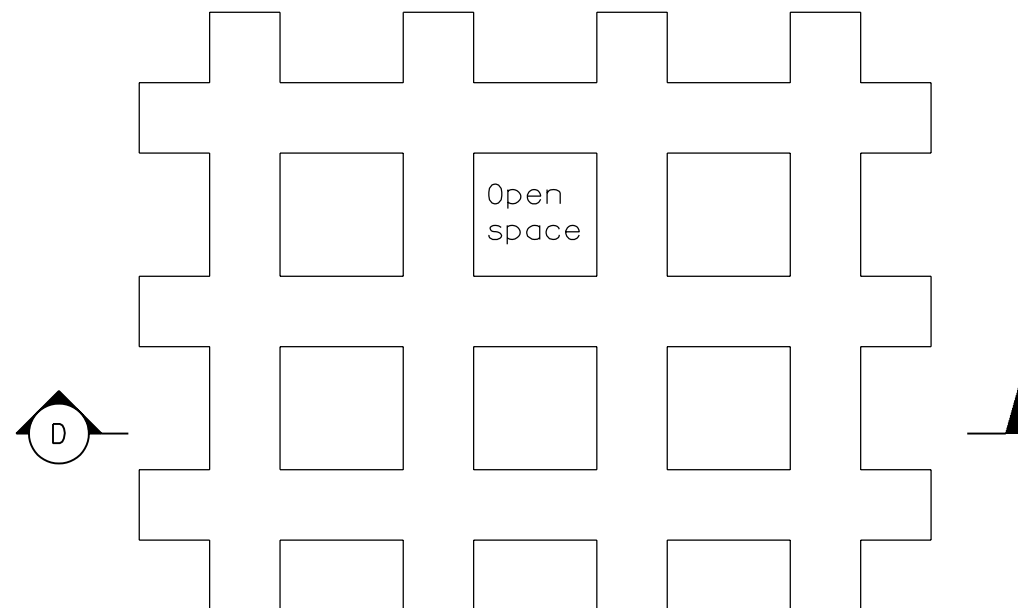
(Semi-open concrete masonry units shown)



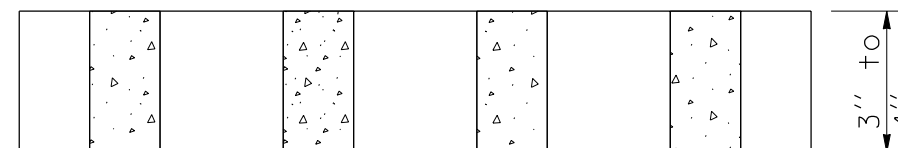
SECTION

TYPE 3 SLOPE PROTECTION
CURB DETAIL (Elevation)

(Semi-open concrete masonry units shown)



PLAN



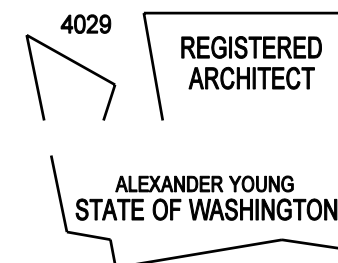
SECTION

SEMI-OPEN CONCRETE MASONRY UNITS

(See note 1 & 2)

NOTES

1. The design and shape of the semi-open concrete masonry unit shown is only one example of the products that may be used.
2. The Type 3 Slope Protection Curb Detail shall be used only when the lower roadway cross section requires a curb.



Principal Architect

CONCRETE
SLOPE PROTECTION
STANDARD PLAN D-9

SHEET 2 OF 2 SHEETS

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APPROVED FOR PUBLICATION

Clifford E. Mansfield

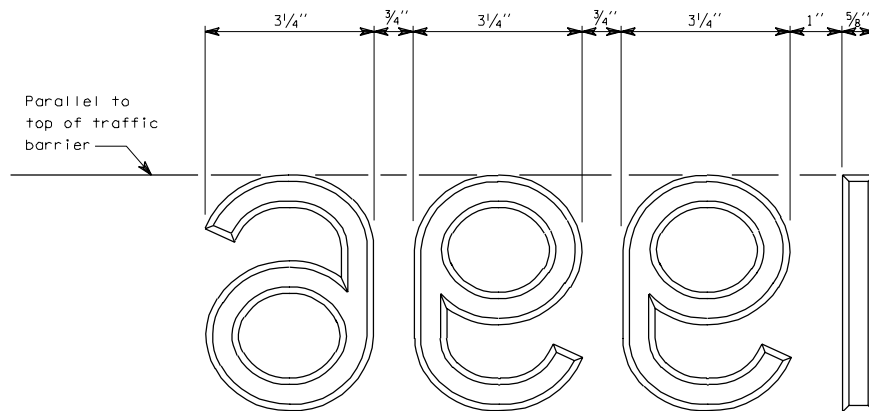
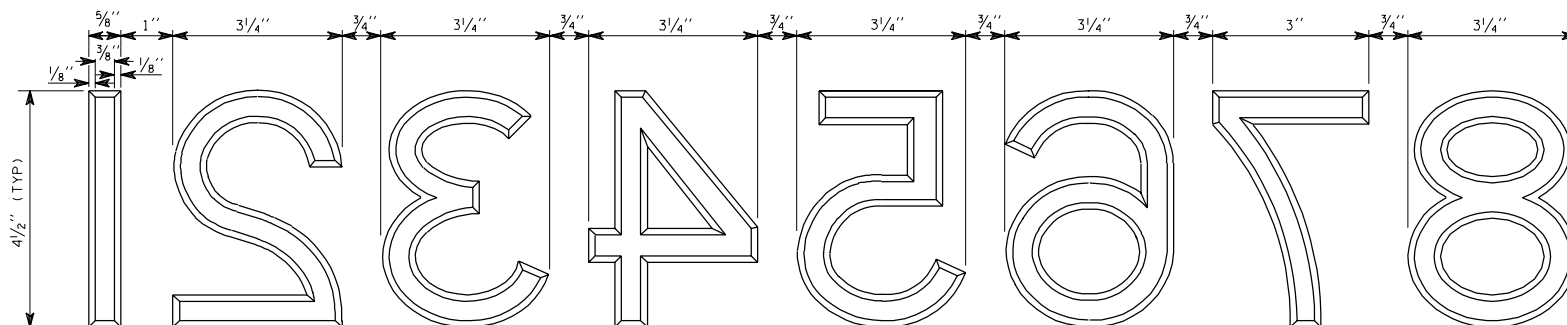
DEPUTY STATE DESIGN ENGINEER

12/11/98

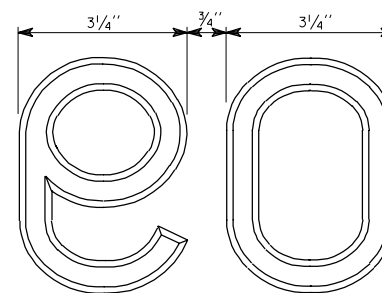
DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

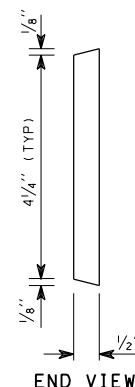
NOTE
Spacing between the numeral "1" and any other numeral is 1". Spacing between all other numerals is $\frac{3}{4}$ ".



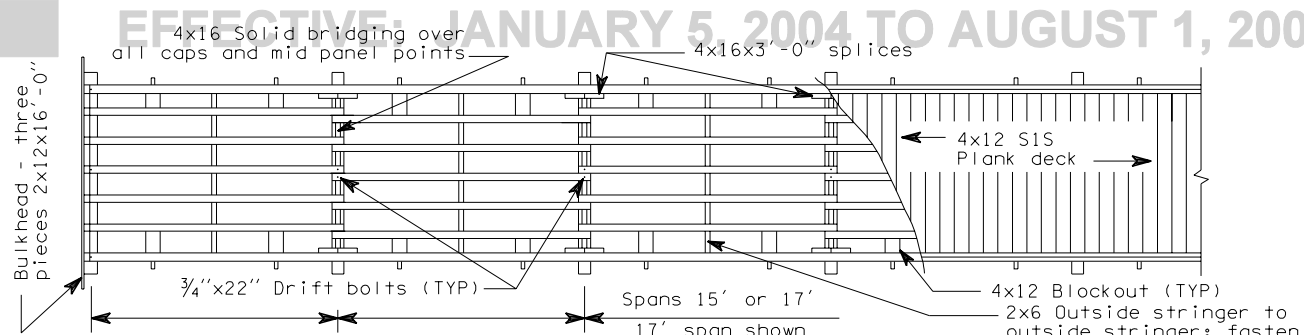
TYPICAL DATE



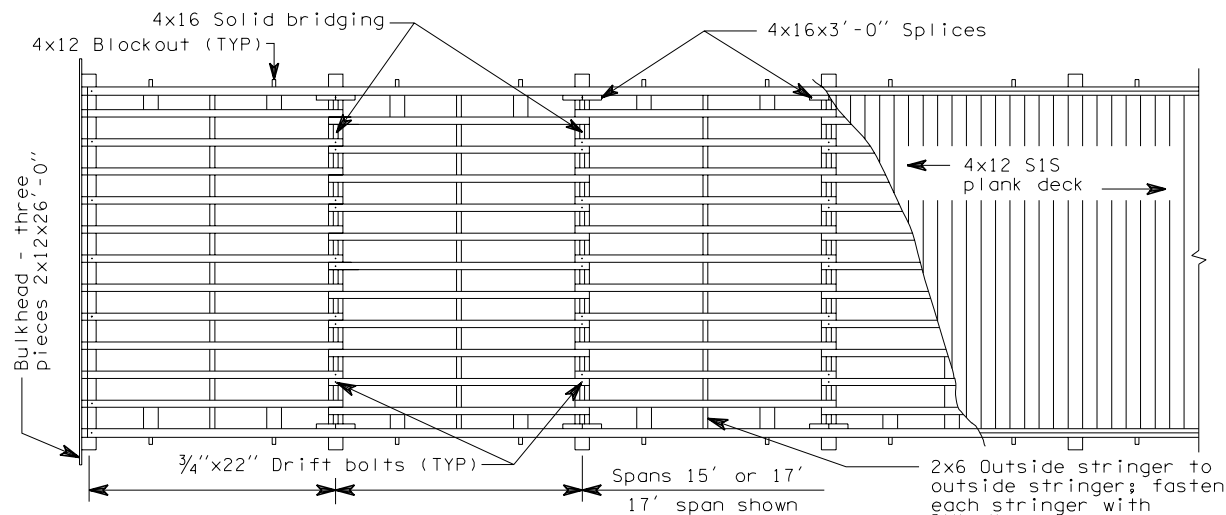
DATE NUMERALS



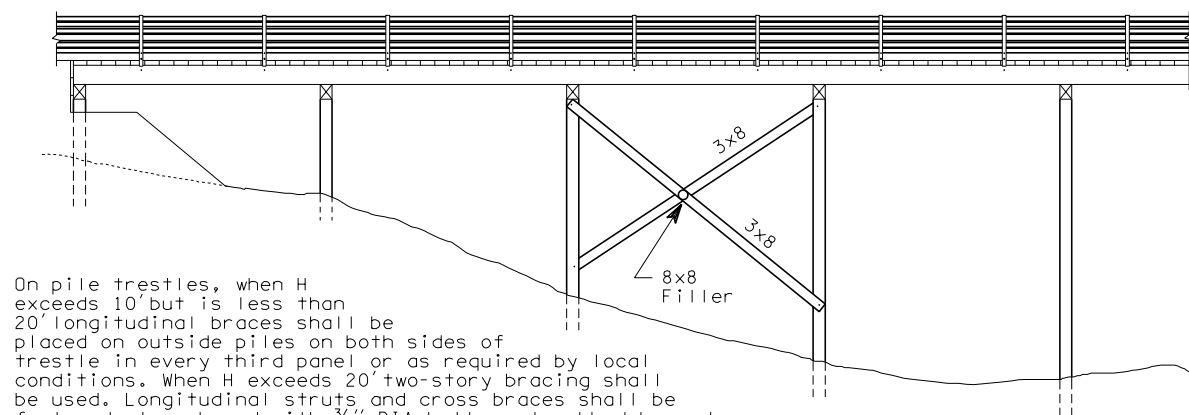
END VIEW



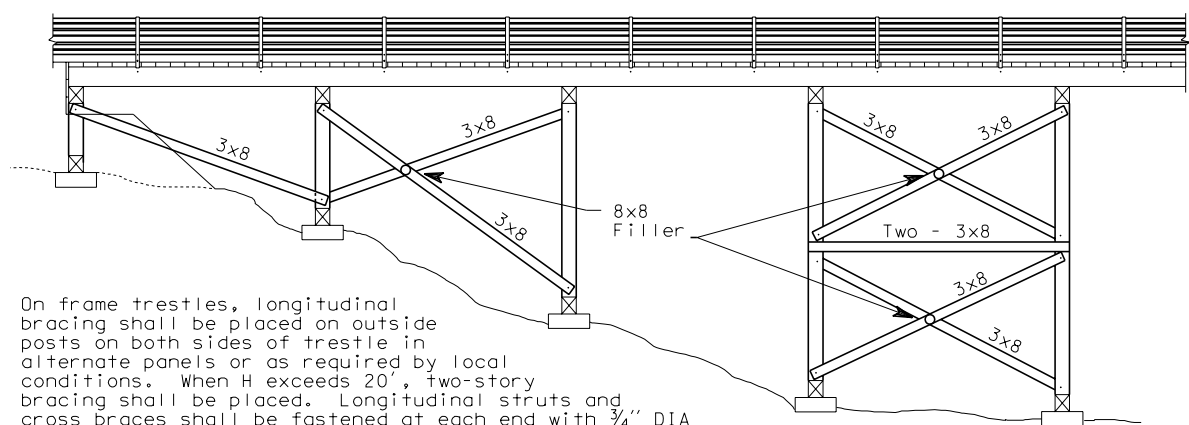
DECK FRAMING PLAN - SINGLE LANE



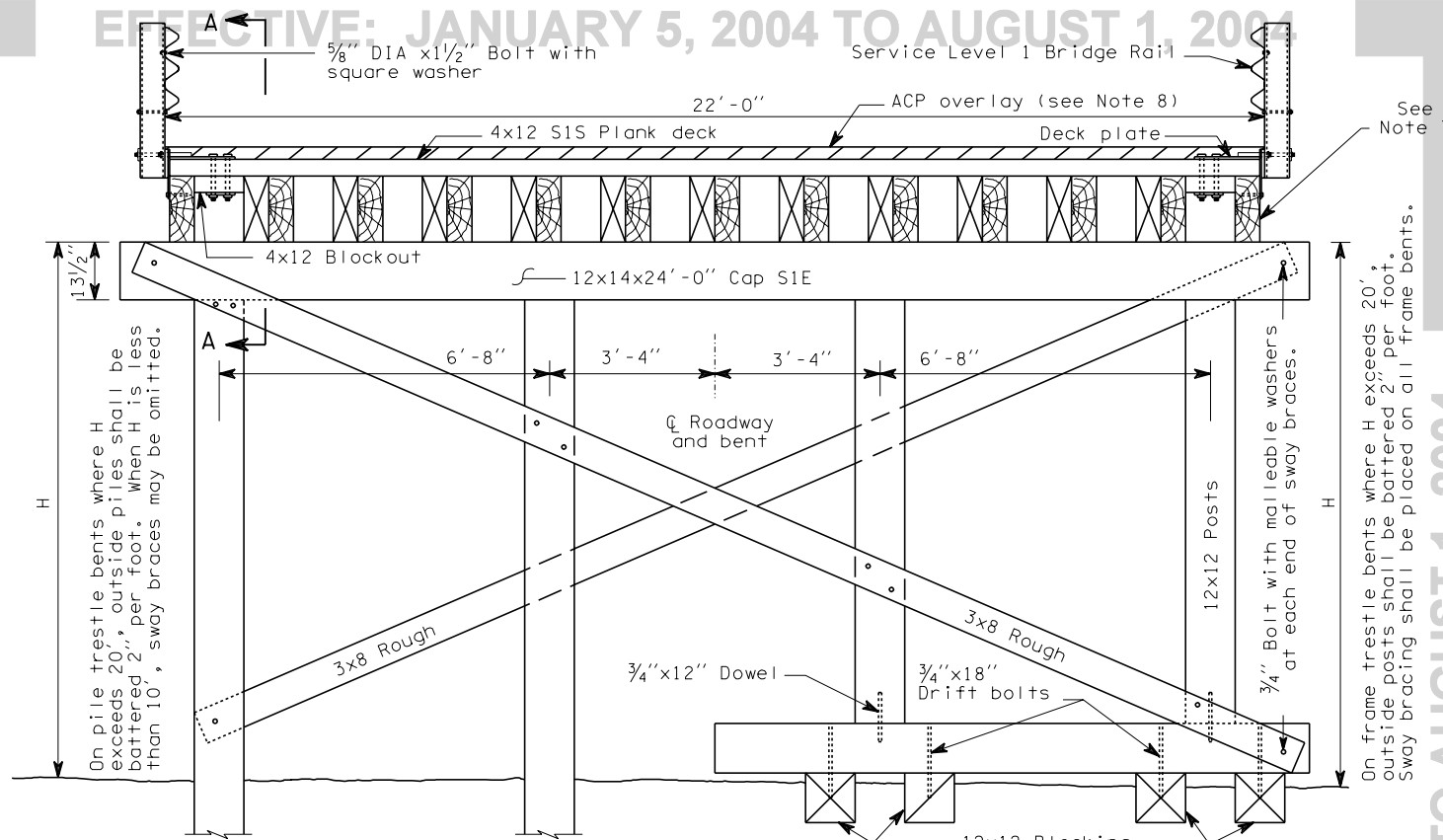
DECK FRAMING PLAN - TWO LANE



ELEVATION - PILE TRESTLE



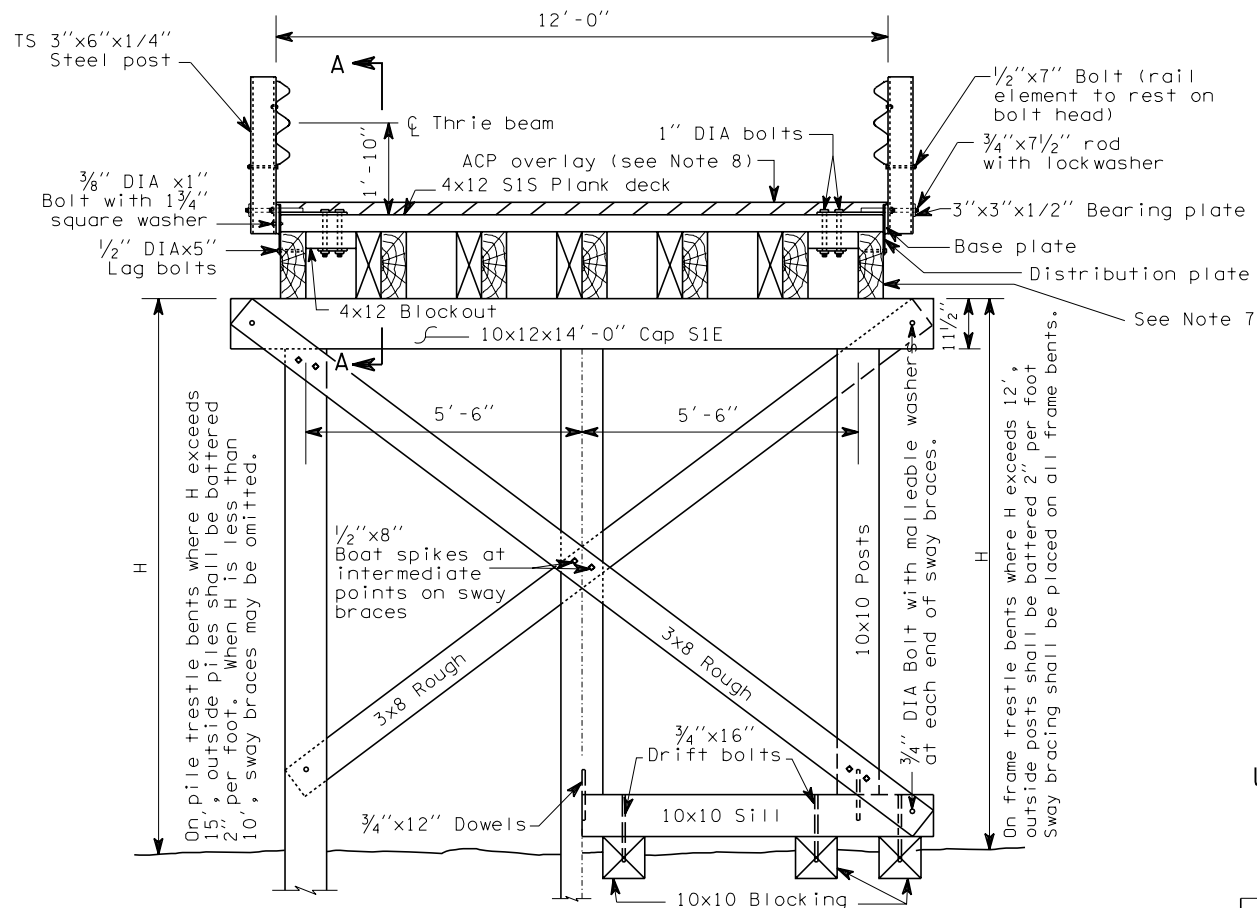
ELEVATION - FRAME TRESTLE



HALF SECTION-PILE BENT

HALF SECTION-FRAME BENT

TYPICAL SECTION-TWO LANE BRIDGE



HALF SECTION-PILE BENT

HALF SECTION-FRAME BENT

TYPICAL SECTION

SINGLE LANE BRIDGE

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EXPIRES JANUARY 17, 1999

PILE OR FRAME
DETOUR BRIDGE WITH
ASPHALT OVERLAY

USE ONLY FOR TEMPORARY BRIDGES

STANDARD PLAN E-2

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Brian Ziegler

STATE DESIGN ENGINEER

5/29/98

DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON



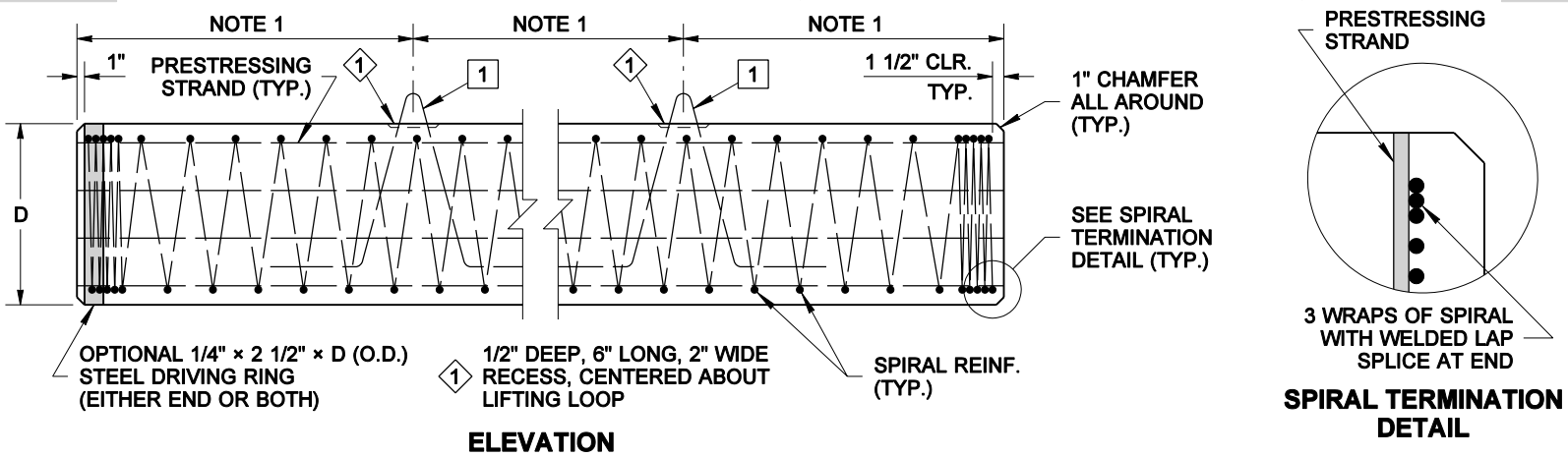
EFFECTIVE: JANUARY 5, 2004 TO

- ## BACKING PLATE DETAIL

STATE DESIGN ENGINEER DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

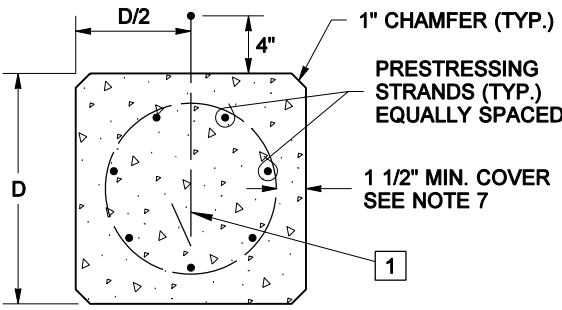
PILE TYPE	D (in.)	PERIMETER (in.)	UNIT WEIGHT (lbs./ft.)	AREA (in. ²)	MOMENT OF INERTIA (in. ⁴)	RADIUS OF GYRATION (in.)	NUMBER OF STRANDS	
							MINIMUM	MAXIMUM
SQUARE	12	48.0	158	144	1728	3.5	4	7
	14	56.0	215	196	3201	4.0	6	10
	16	64.0	281	256	5461	4.6	7	13
OCTAGONAL	14	46.4	178	162	2103	3.6	5	8
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



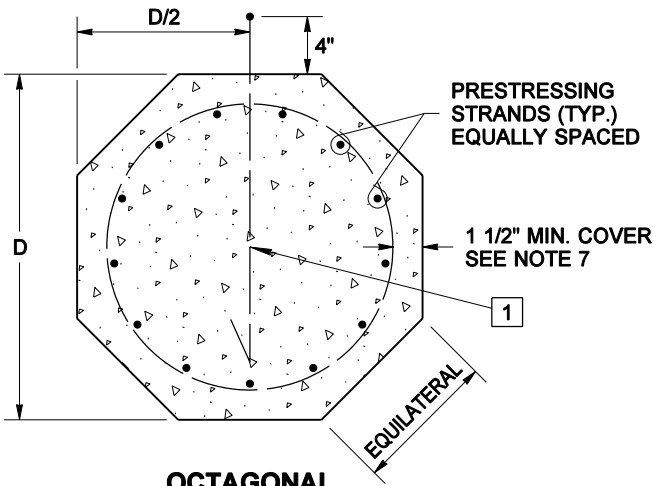
PILE DETAILS

NOTES

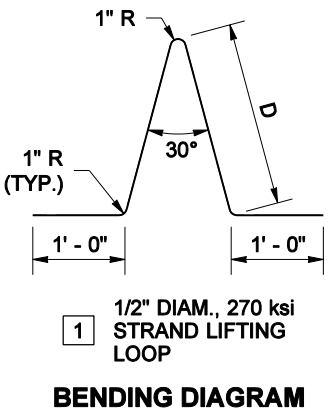
1. Place lifting loops at the lifting points shown in the PILE HANDLING DIAGRAM, Standard Plan E-4a, for the case stated in the contract.
2. Spirals shall be spliced either by lapping one full turn and bending the end of the spiral to a 135° seismic hook, by welding, or by the use of a mechanical connector that develops 125% of the minimum yield strength of the spiral. Welding shall meet the requirements of Standard Specification 6-02.3(24)E.
3. All prestressing strands are 1/2" or 0.6" diameter (d_{ps}), Grade 270, uncoated strands, AASHTO M203, jack to 0.75 Fpu maximum.
4. Strength of concrete shall be 5.0 ksi at release and 7.0 ksi at final.
5. 2 1/2" cover if pile is exposed to salt water.



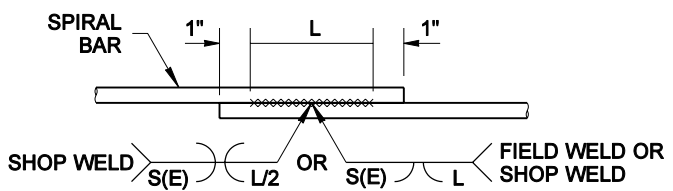
SQUARE



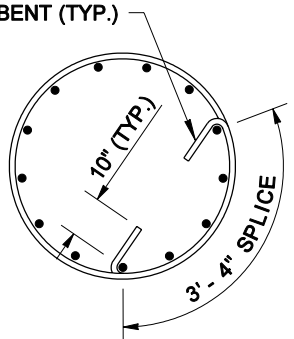
OCTAGONAL
TYPICAL SECTIONS



BENDING DIAGRAM

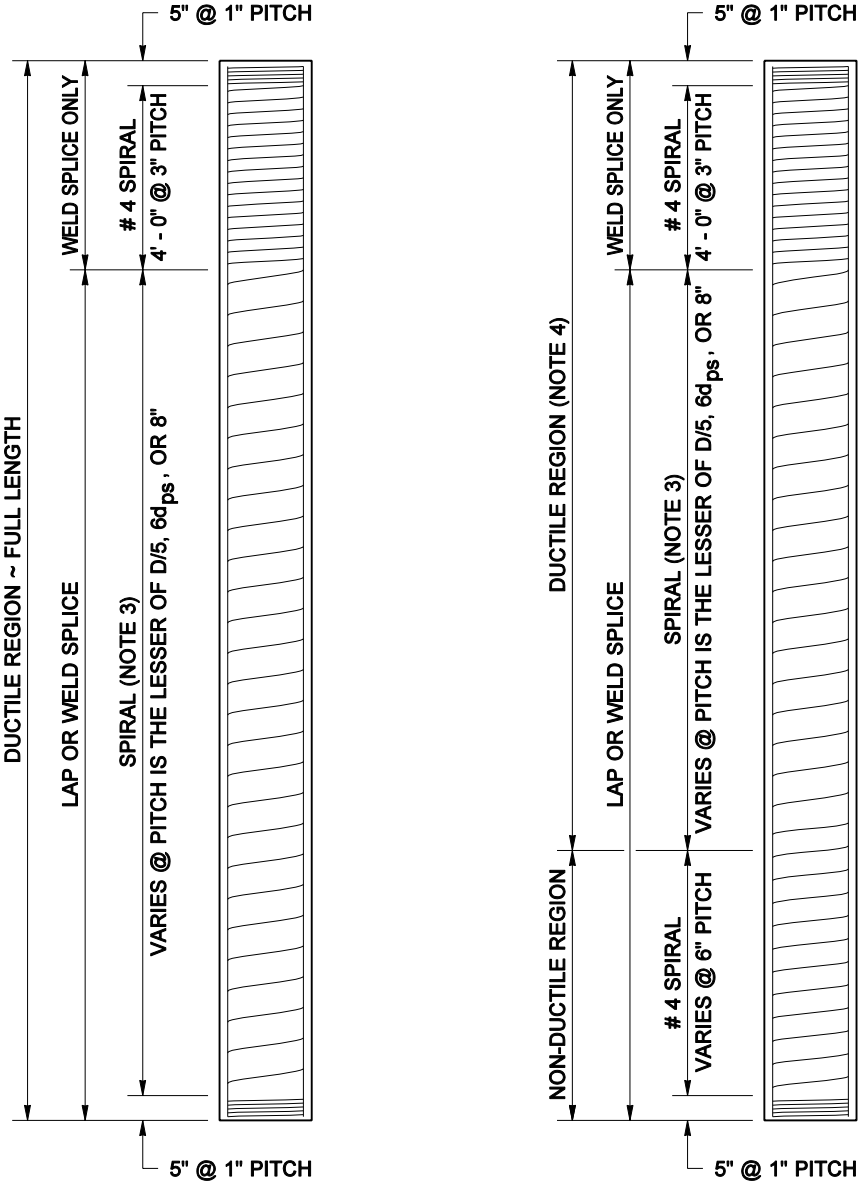


SEE TABLE FOR WELD DIMENSIONS
SPIRAL WELDED LAP SPLICE DETAIL



SPIRAL LAP SPLICE DETAIL

NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE OF THE ORIGINAL. 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.



SPIRAL REINFORCEMENT

DEFORMED BAR AASHTO M 31 GR. 60	PLAIN STEEL BAR AASHTO M 31 GR. 60	COLD DRAWN WIRE AASHTO M 32	DEFORMED WIRE AASHTO M 225	WELD DIMENSIONS		
# 4	1/2" DIAM.	W 20	D 20	S	E	LENGTH (L)
# 5	5/8" DIAM.	W 31	D 31	6	3	4"
				8	5	6"



EXPIRES AUGUST 23, 2004

PRECAST PRESTRESSED
CONCRETE PILES
STANDARD PLAN E-4

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

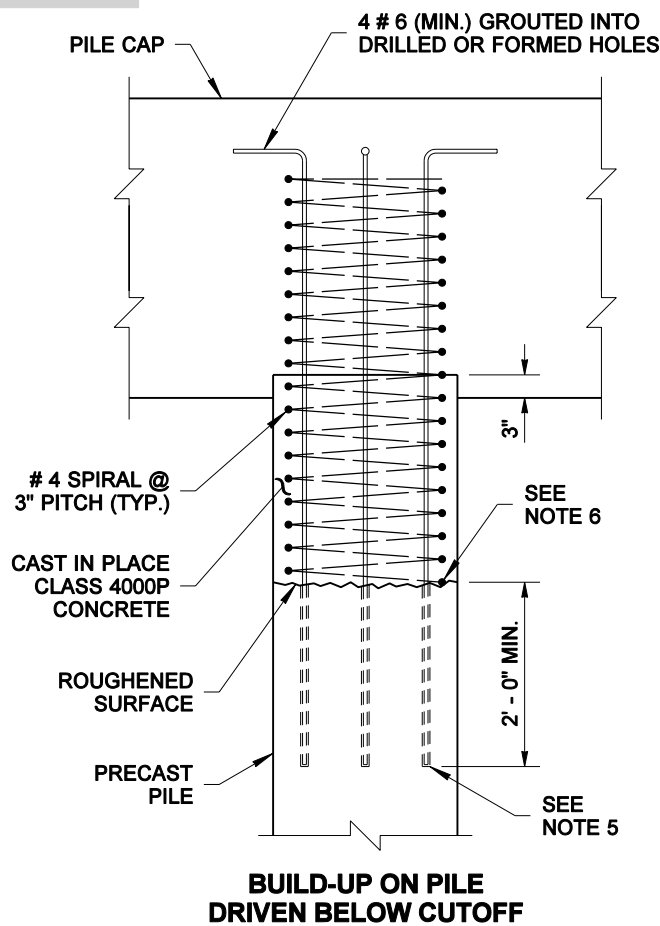
Harold J. Peterfeso 08-27-03

STATE DESIGN ENGINEER

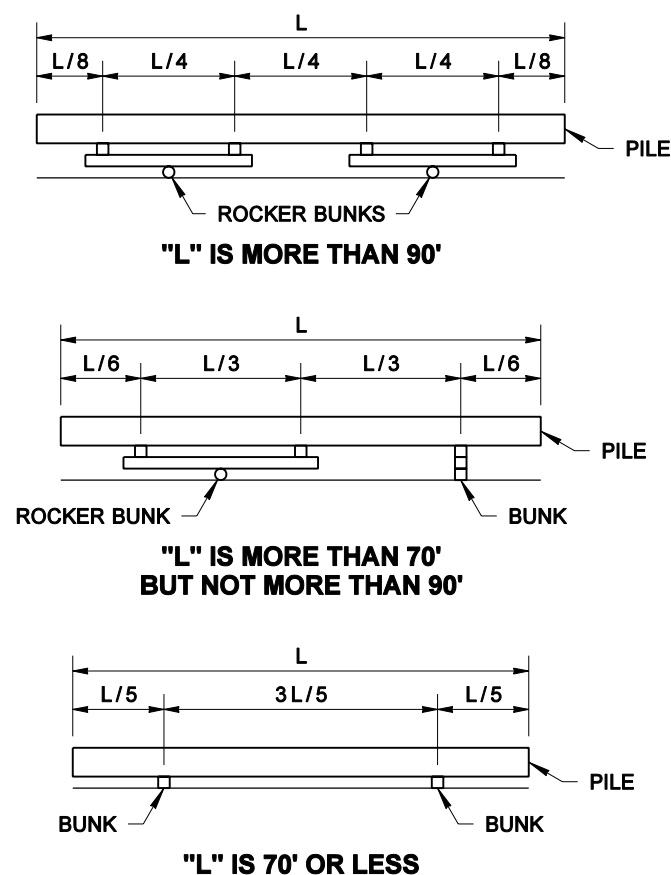
DATE



Washington State Department of Transportation



- ## PRECAST PILES, HANDLING NOTES



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EXPIRES AUGUST 23, 2004

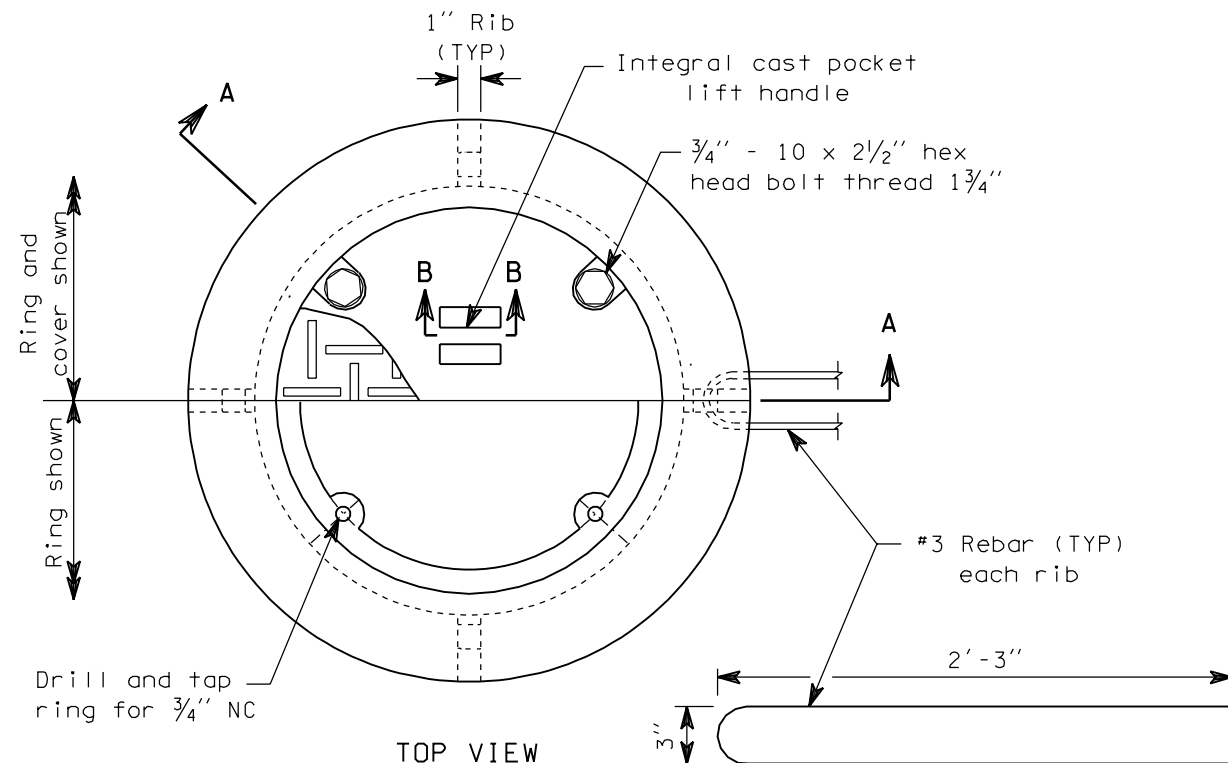
PRECAST PRESTRESSED CONCRETE PILES HANDLING AND CAPPING STANDARD PLAN E-4a

SHEET 1 OF 1 SHEET

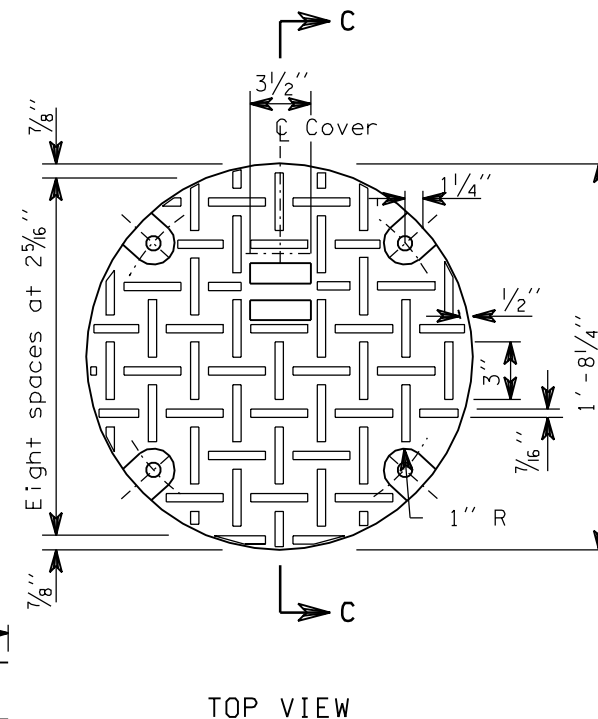
APPROVED FOR PUBLICATION

Harold J. Peterfeso 08-27-03

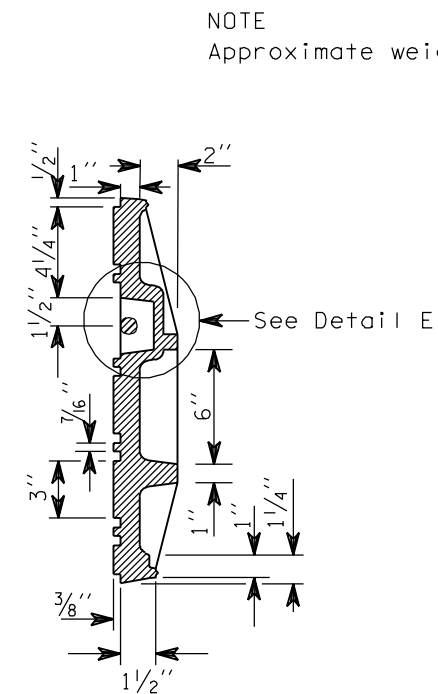
 **Washington State Department of Transportation**



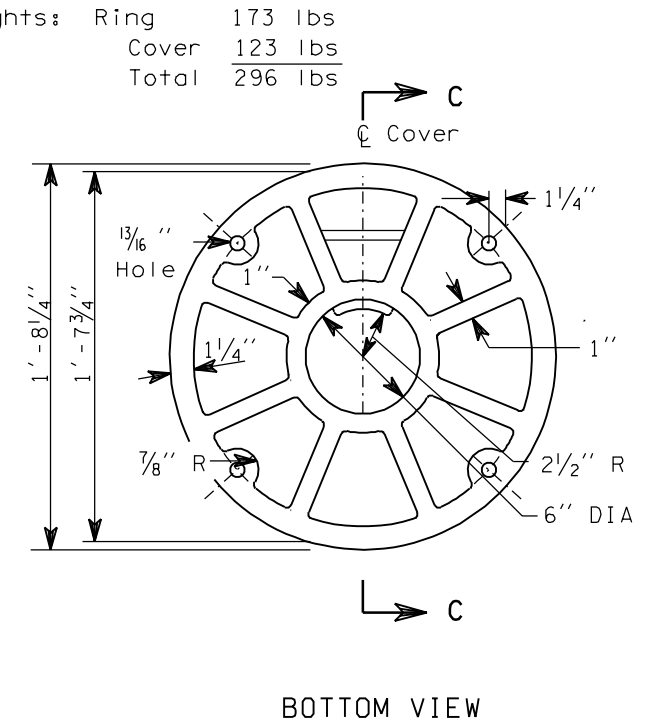
RING AND COVER



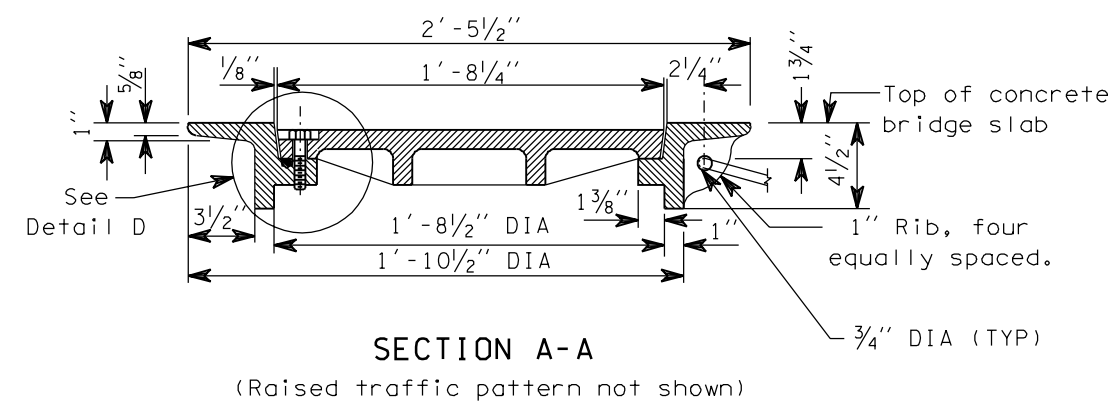
TOP VIEW



SECTION C-C

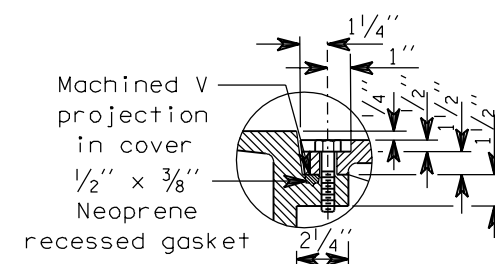


BOTTOM VIEW

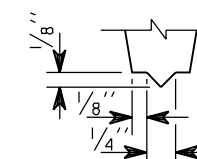


SECTION A-A

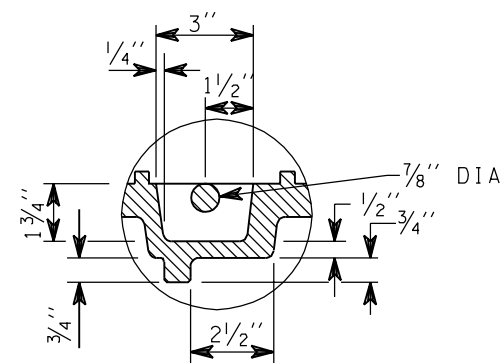
(Raised traffic pattern not shown)



DETAIL D

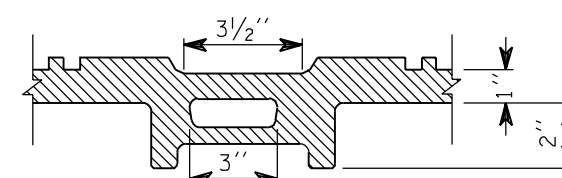


V PROJECTION
DETAIL



DETAIL E

(Turned 90°)



SECTION B-B



EXPIRES JANUARY 17, 1999

MANHOLE RING AND COVER
FOR BRIDGES
STANDARD PLAN E-5

APPROVED FOR PUBLICATION

Brian Ziegler

5/29/98

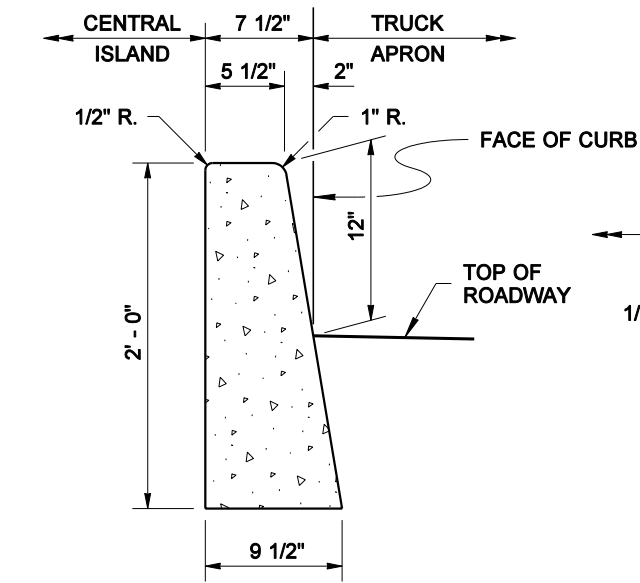
STATE DESIGN ENGINEER

DATE _____

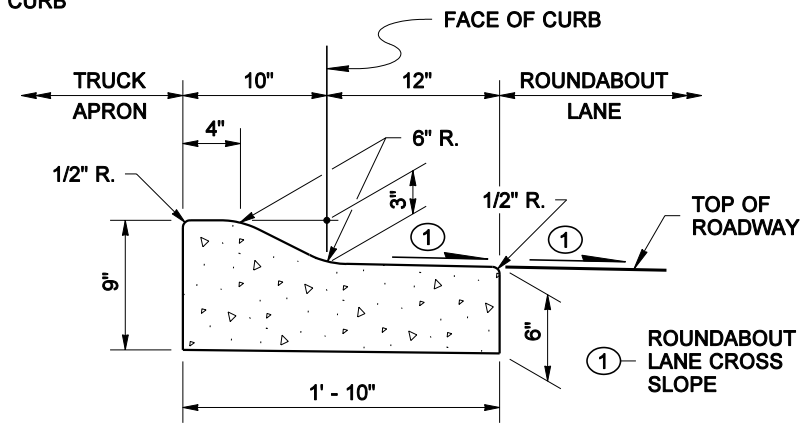


WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

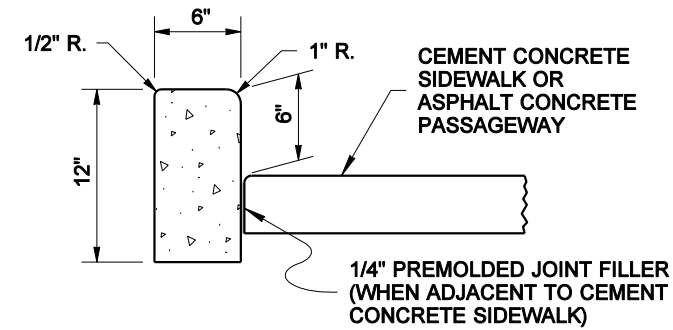
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UPON REQUEST



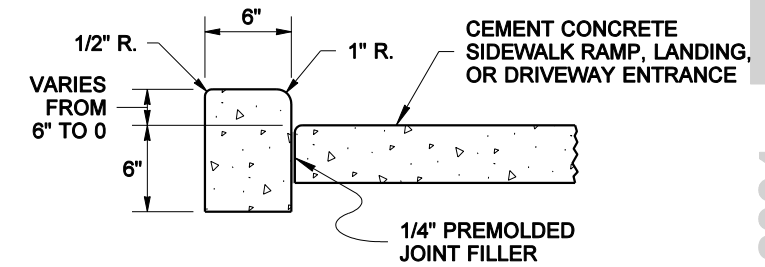
**ROUNDABOUT TRUCK APRON
INNER CEMENT CONCRETE CURB**



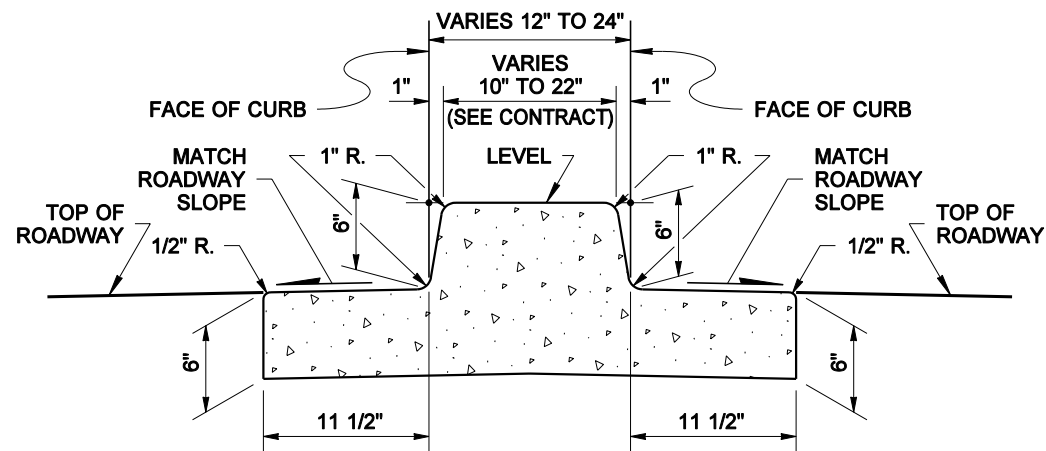
**ROUNDABOUT TRUCK APRON
OUTER CEMENT CONCRETE
CURB AND GUTTER**



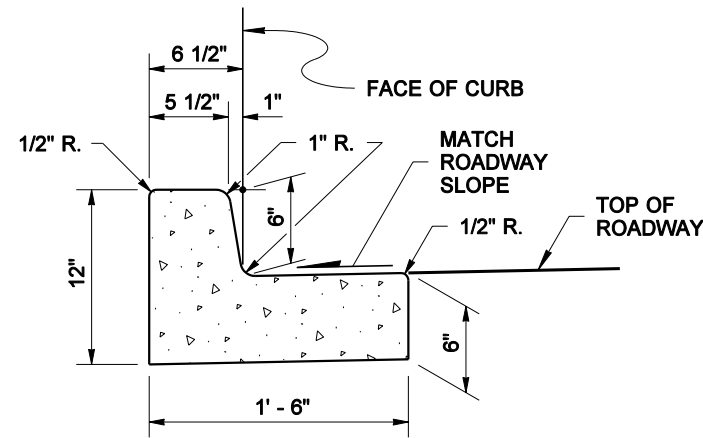
**CEMENT CONCRETE
PEDESTRIAN CURB**



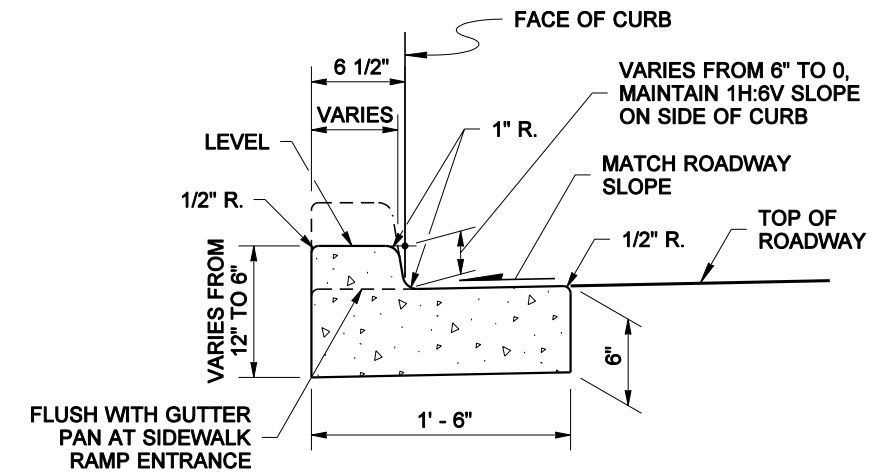
**CEMENT CONCRETE
PEDESTRIAN CURB
AT SIDEWALK RAMP, LANDING,
AND DRIVEWAY ENTRANCES**



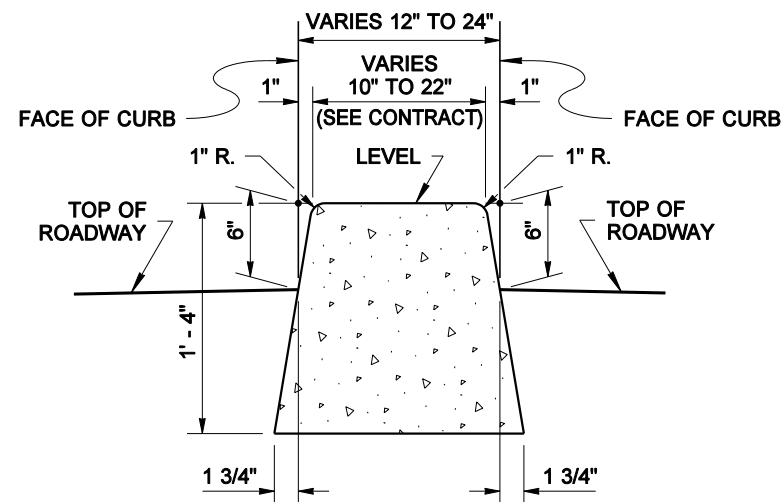
**DUAL-FACED CEMENT CONCRETE
TRAFFIC CURB AND GUTTER**



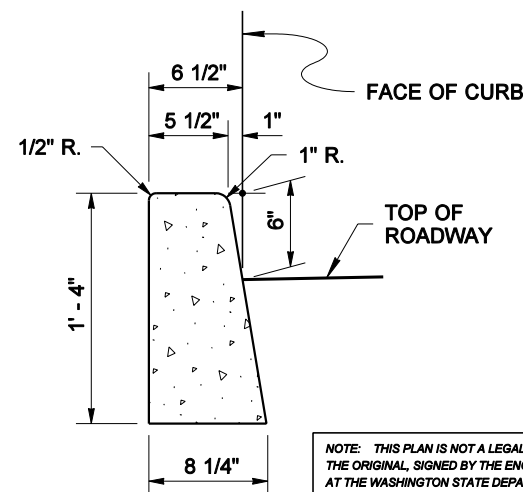
**CEMENT CONCRETE
TRAFFIC CURB AND GUTTER**



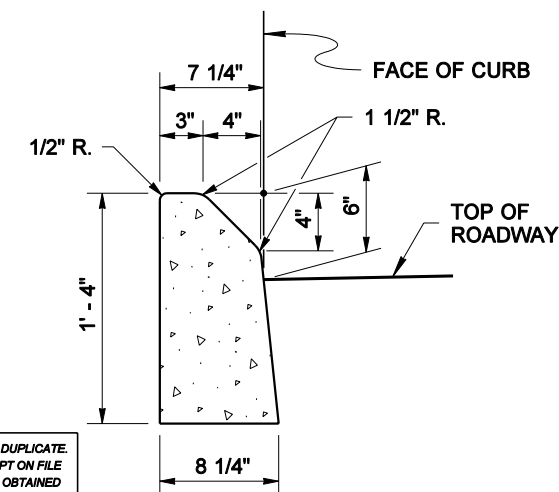
**DEPRESSED CURB SECTION
AT SIDEWALK RAMPS AND
DRIVEWAY ENTRANCES**



**DUAL-FACED CEMENT
CONCRETE TRAFFIC CURB**

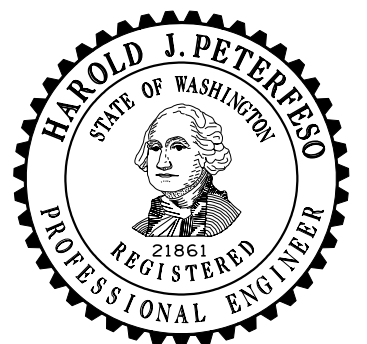


**CEMENT CONCRETE
TRAFFIC CURB**



**MOUNTABLE CEMENT
CONCRETE TRAFFIC CURB**

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EXPIRES MAY 16, 2003

**CEMENT CONCRETE
CURBS**

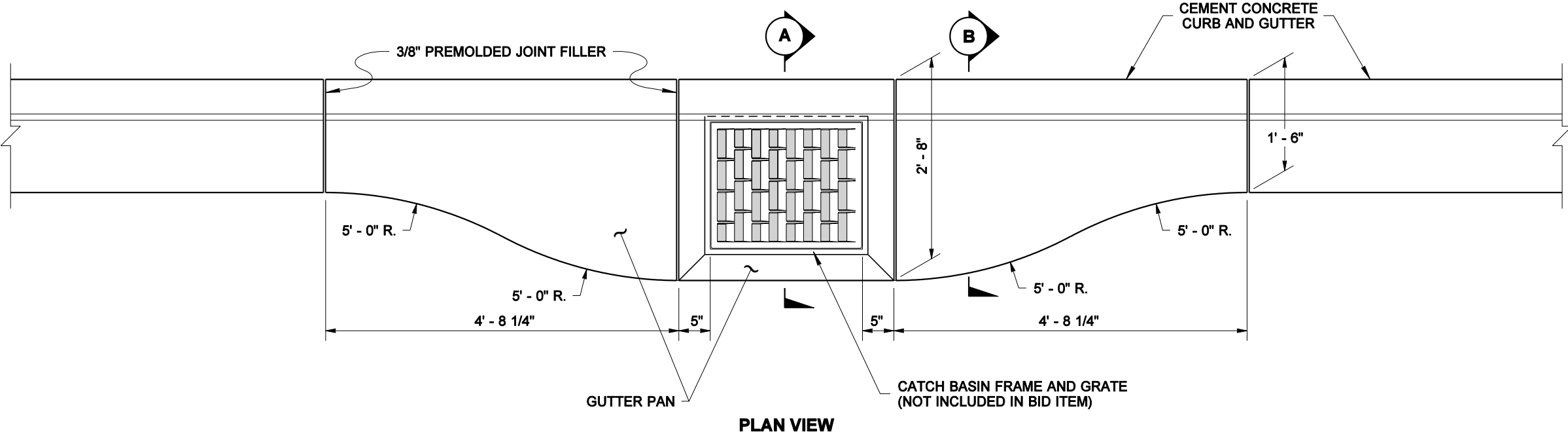
STANDARD PLAN F-1

SHEET 1 OF 1 SHEET

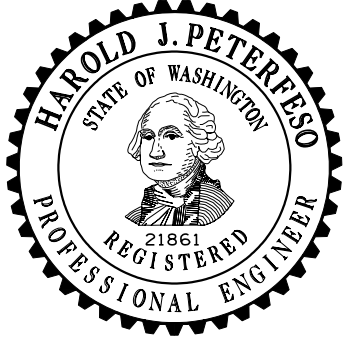
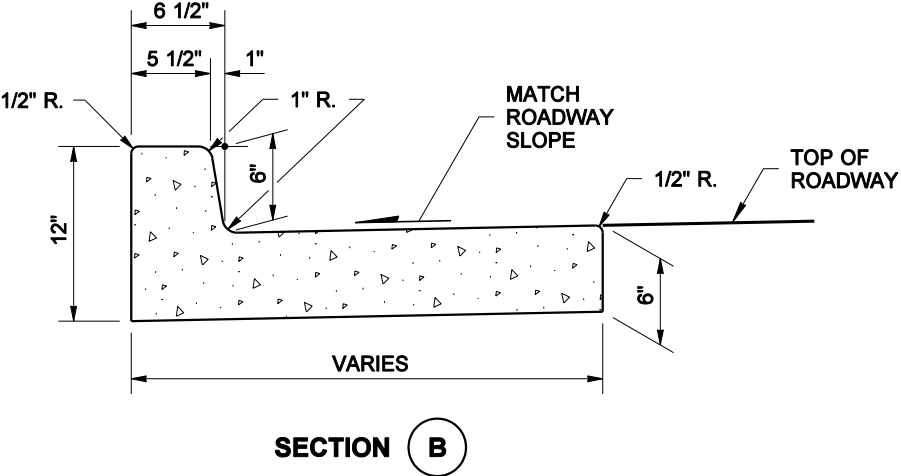
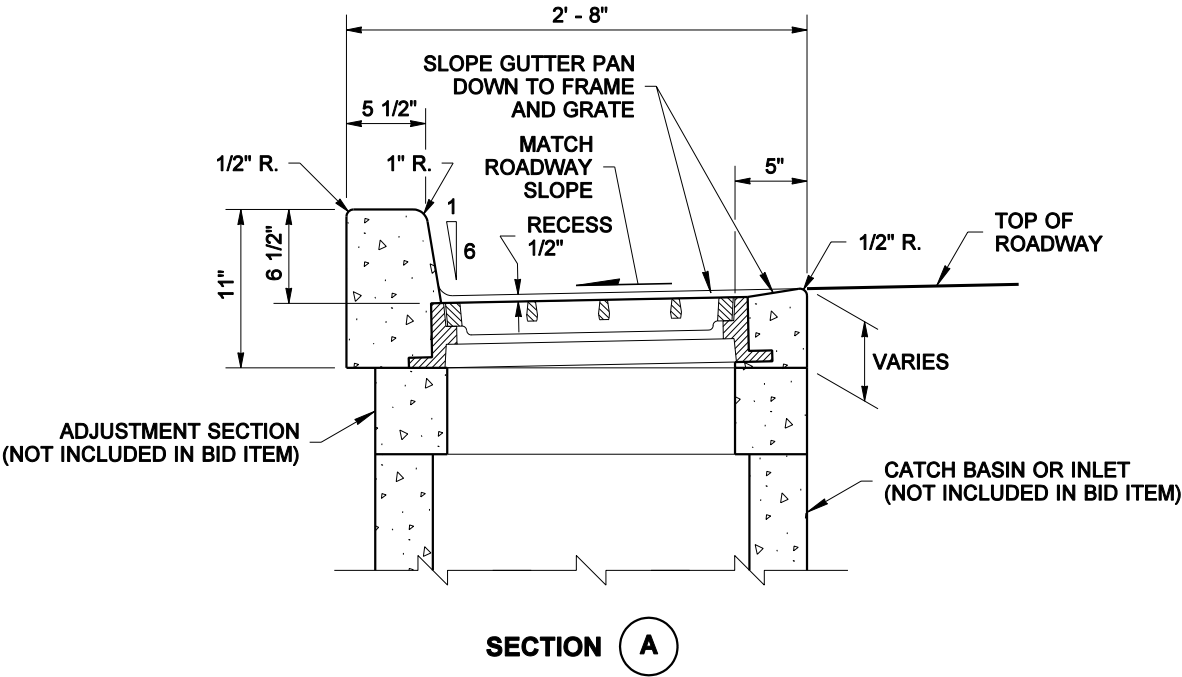
APPROVED FOR PUBLICATION

Harold J. Peterfeso 12-17-02

STATE DESIGN ENGINEER DATE
Washington State Department of Transportation



CATCH BASIN GUTTER PAN



CEMENT CONCRETE CURB AND GUTTER PAN
STANDARD PLAN F-1a

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 12-17-02

STATE DESIGN ENGINEER

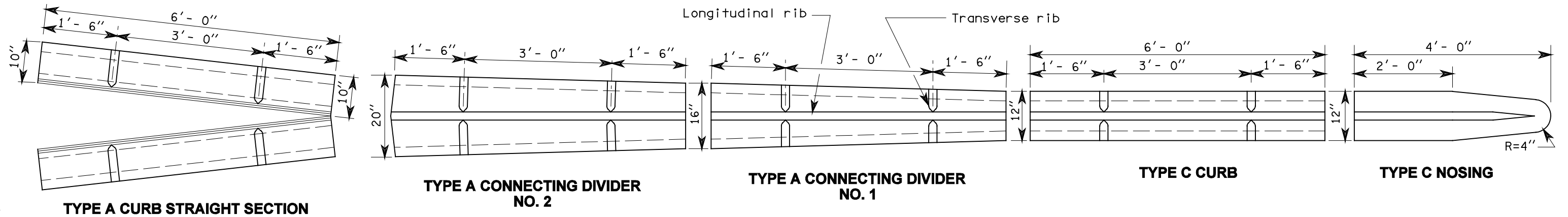
DATE



Washington State Department of Transportation

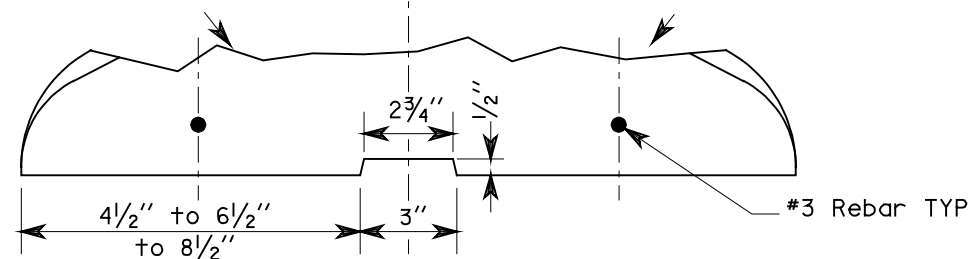
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Note: Scuppers to be provided at intervals as required by the Engineer.

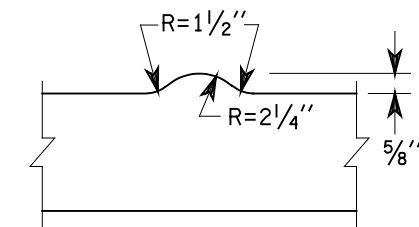


PLAN VIEW

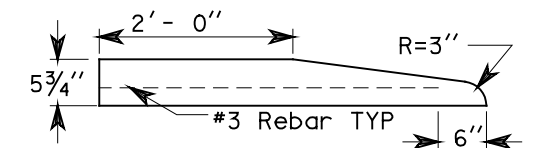
The main body of the curb and the longitudinal rib shall form a uniform transition from a Type C section to a Type A (back to back) section.



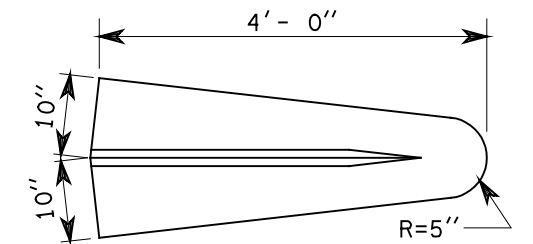
TYPE A CONNECTING DIVIDER SECTION



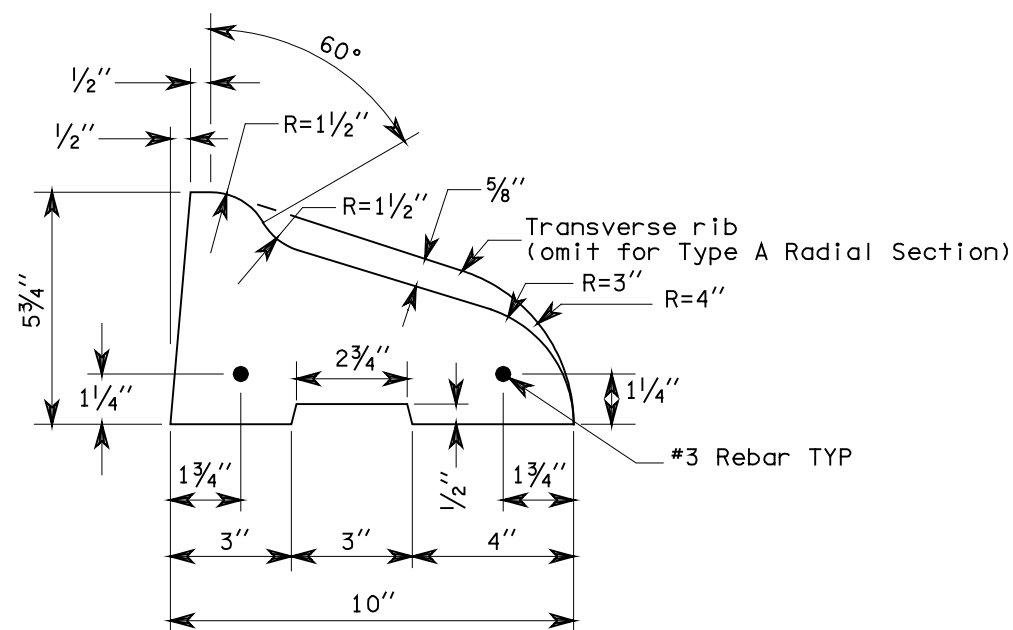
LONGITUDINAL SECTION THROUGH TRANSVERSE RIB



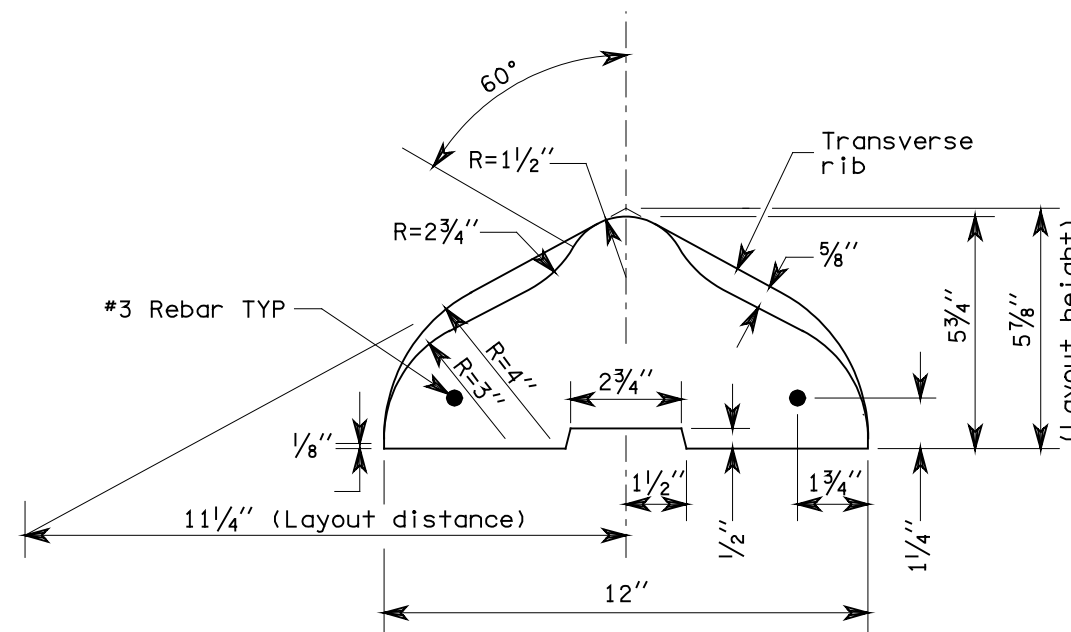
TYPE A AND C NOSING ELEVATION



TYPE A NOSING



TYPE A CURB SECTION



TYPE C CURB SECTION

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



**PRECAST
TRAFFIC CURB
STANDARD PLAN F-2**

APPROVED FOR PUBLICATION

Clifford E. Mansfield

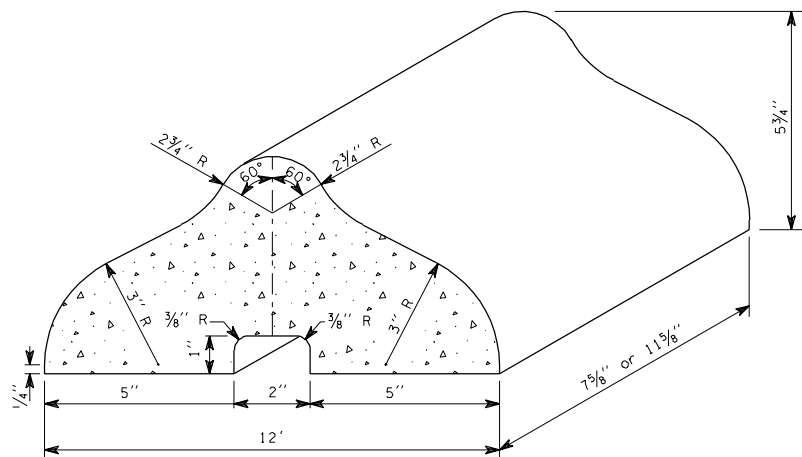
08/27/99

DEPUTY STATE DESIGN ENGINEER

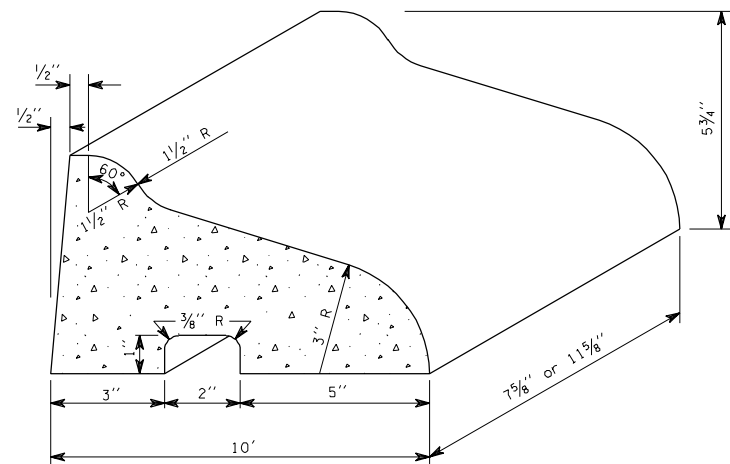
DATE



WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

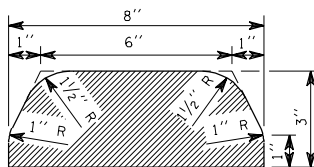


TYPE C BLOCK

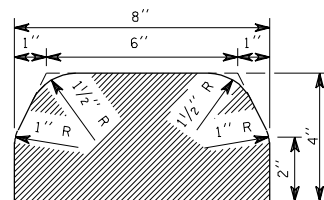


TYPE A BLOCK

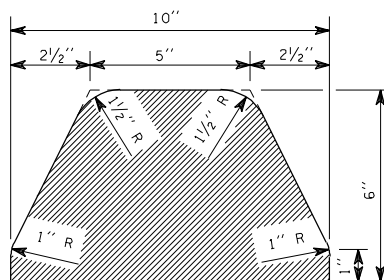
BLOCK TRAFFIC CURB



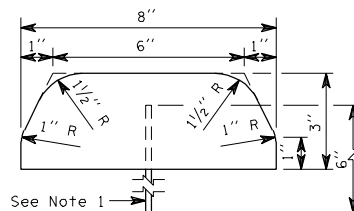
TYPE 1
(ASPHALT)



TYPE 2
(ASPHALT)

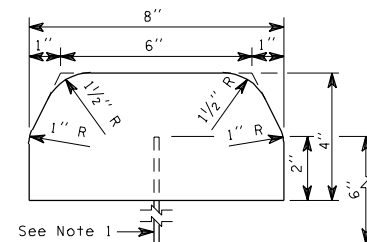


TYPE 3
(ASPHALT)



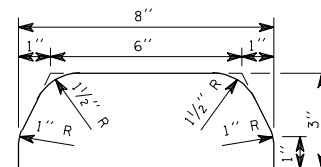
See Note 1

TYPE 4
(CEMENT CONCRETE)

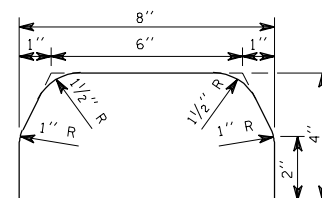


See Note 1

TYPE 5
(CEMENT CONCRETE)

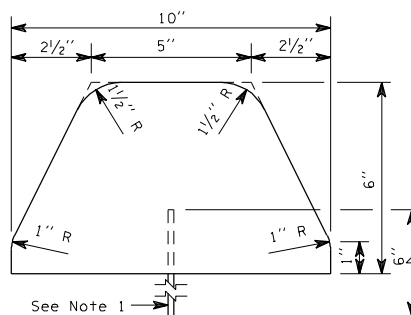


TYPE 4a
(CEMENT CONCRETE)
See Note 2



TYPE 5a
(CEMENT CONCRETE)
See Note 2

EXTRUDED CURB



See Note 1

TYPE 6
(CEMENT CONCRETE)

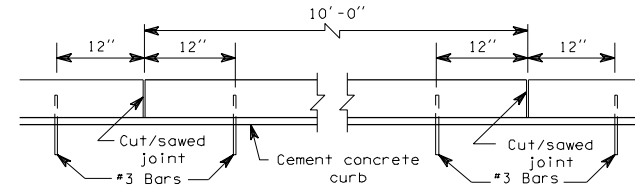
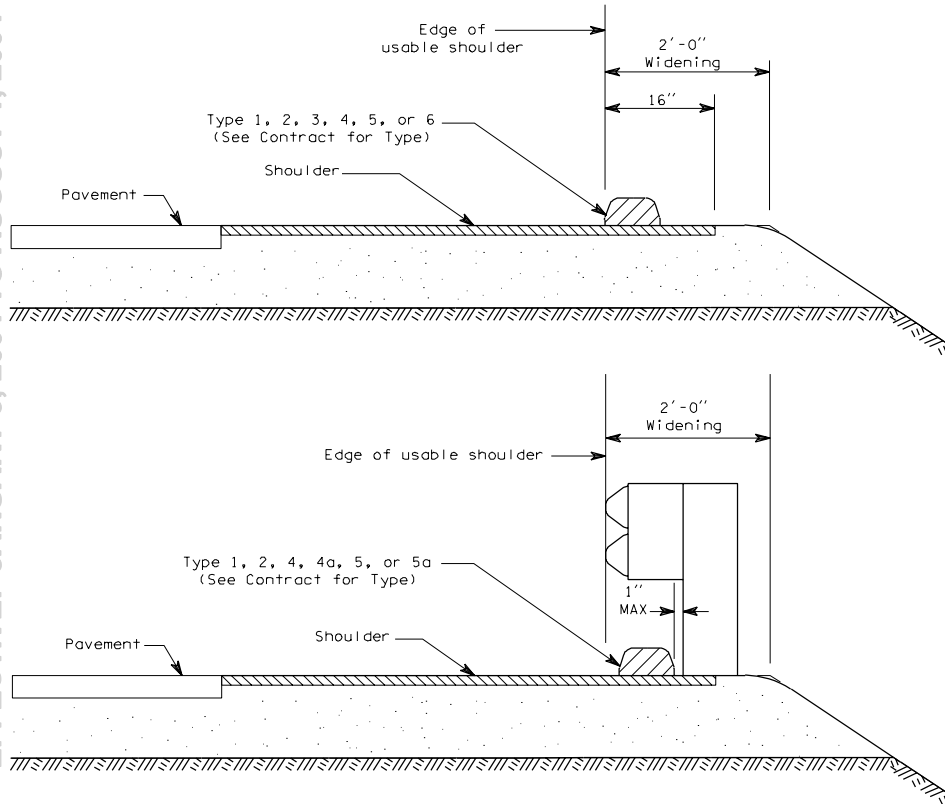
F-2b

03-14-97

Sheet 1 of 2 Sheets

NOTES

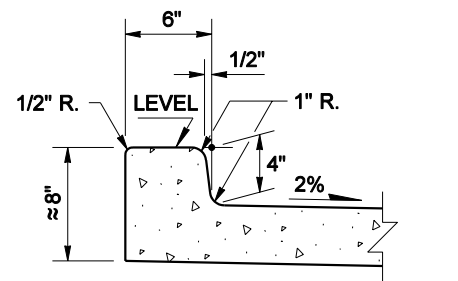
1. See Standard Specifications for anchoring methods.
2. Type 4a and Type 5a curbs do not require steel tie bars or adhesive for anchoring.



SPACING OF ANCHOR BARS

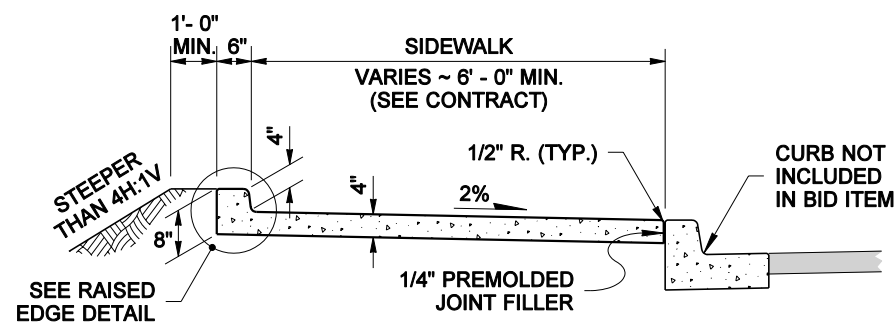
EXTRUDED CURB

F-2b**03-14-97**

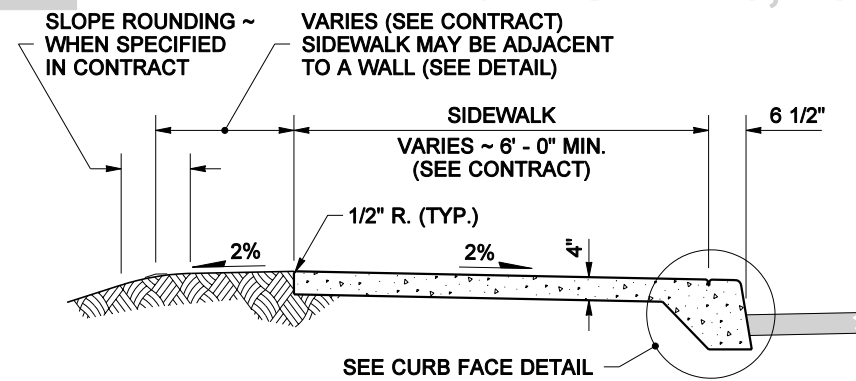


NOTE: EXTEND SIDEWALK TRANSVERSE JOINTS TO INCLUDE RAISED EDGE

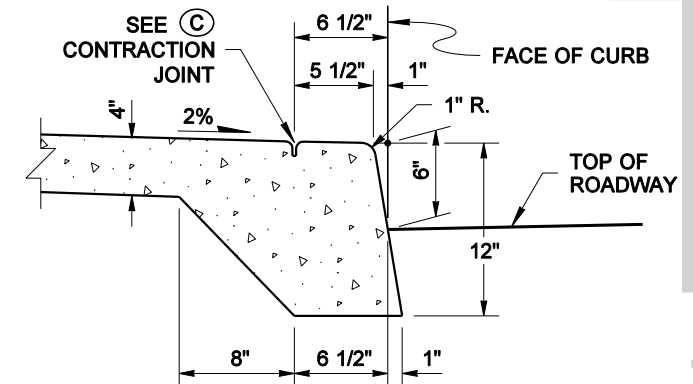
RAISED EDGE DETAIL



CEMENT CONCRETE SIDEWALK WITH RAISED EDGE

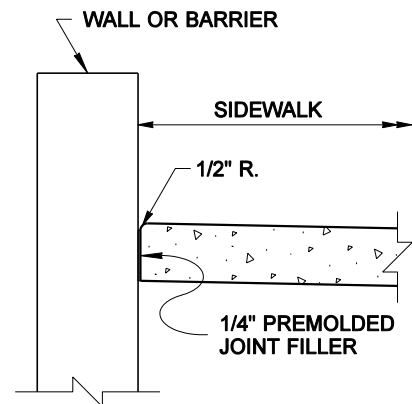


MONOLITHIC CEMENT CONCRETE CURB AND SIDEWALK

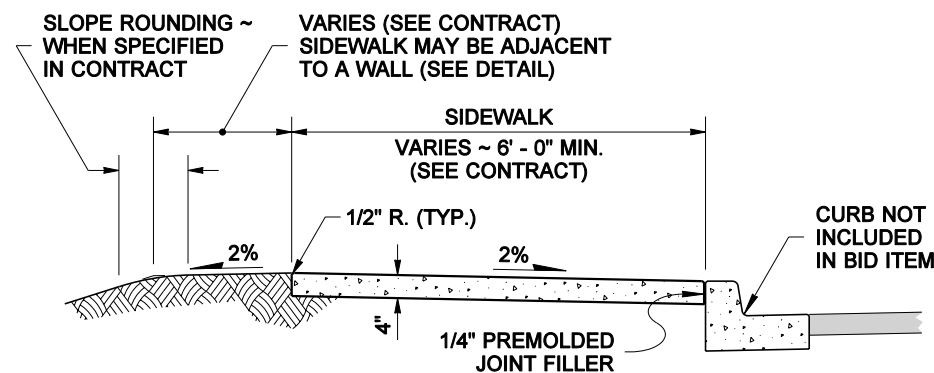


NOTE: EXTEND SIDEWALK TRANSVERSE EXPANSION JOINTS TO INCLUDE CURB (FULL DEPTH)

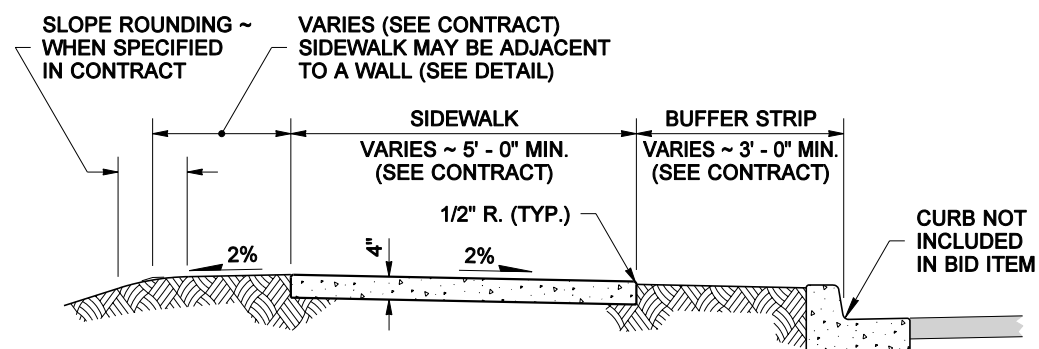
CURB FACE DETAIL



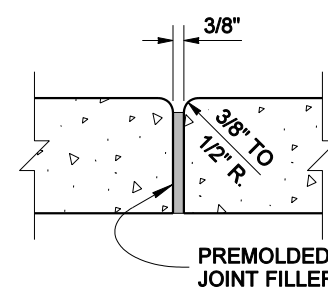
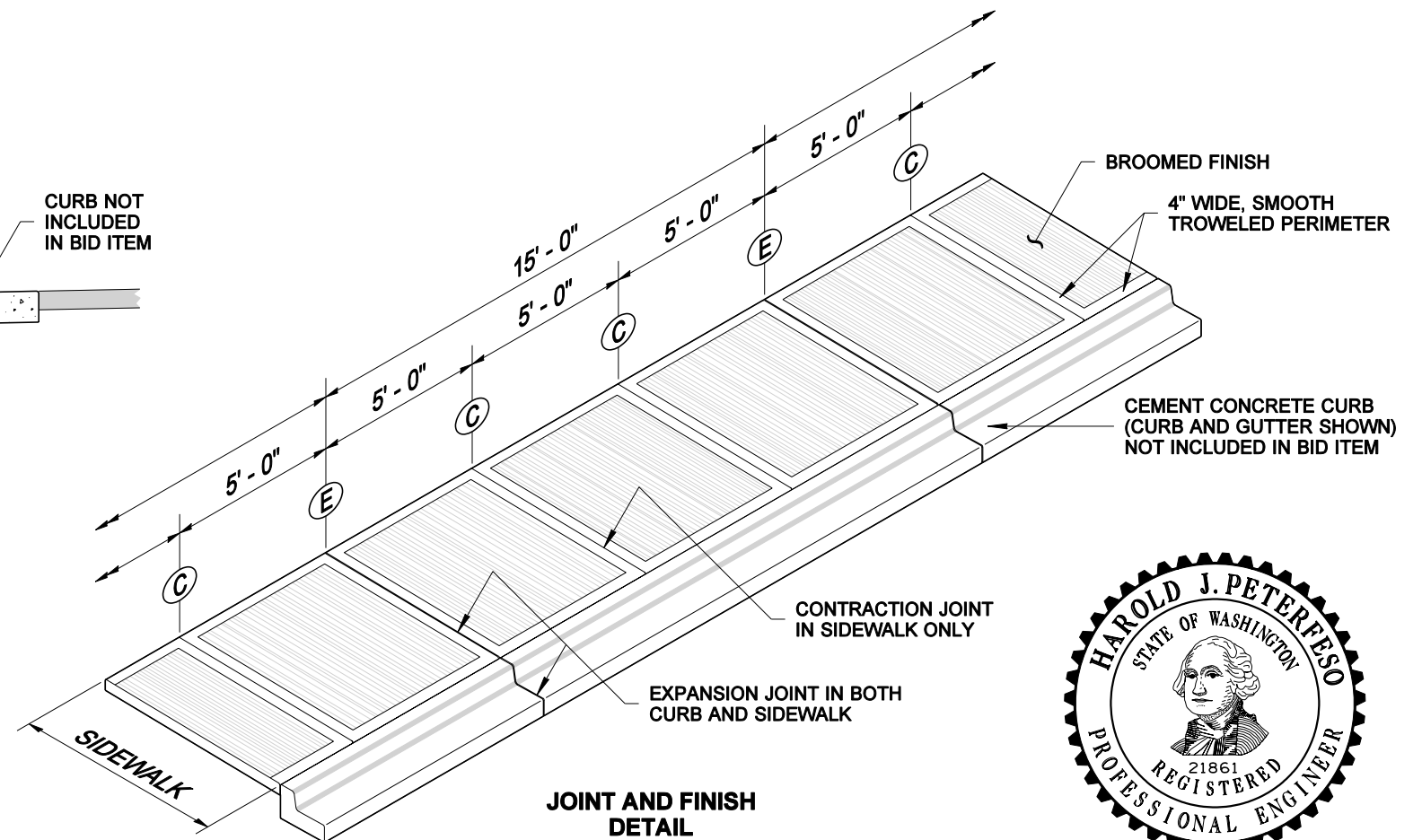
SIDEWALK ADJACENT TO WALL DETAIL



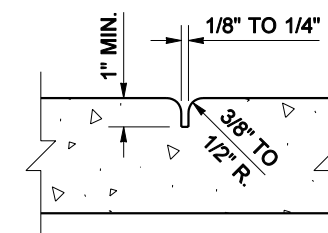
CEMENT CONCRETE SIDEWALK ADJACENT TO CURB



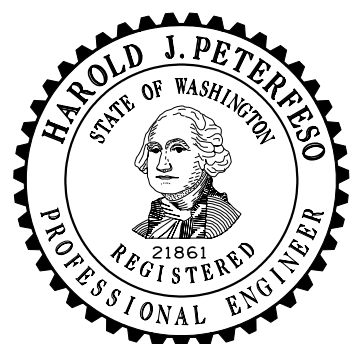
CEMENT CONCRETE SIDEWALK ADJACENT TO BUFFER STRIP



EXPANSION JOINT



CONTRACTION JOINT



CEMENT CONCRETE SIDEWALK

STANDARD PLAN F-3

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

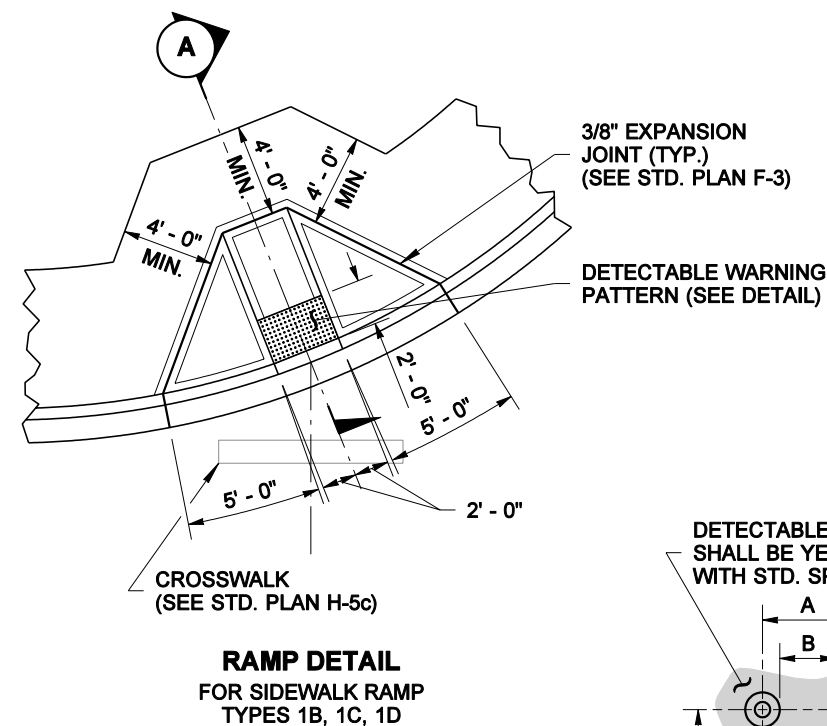
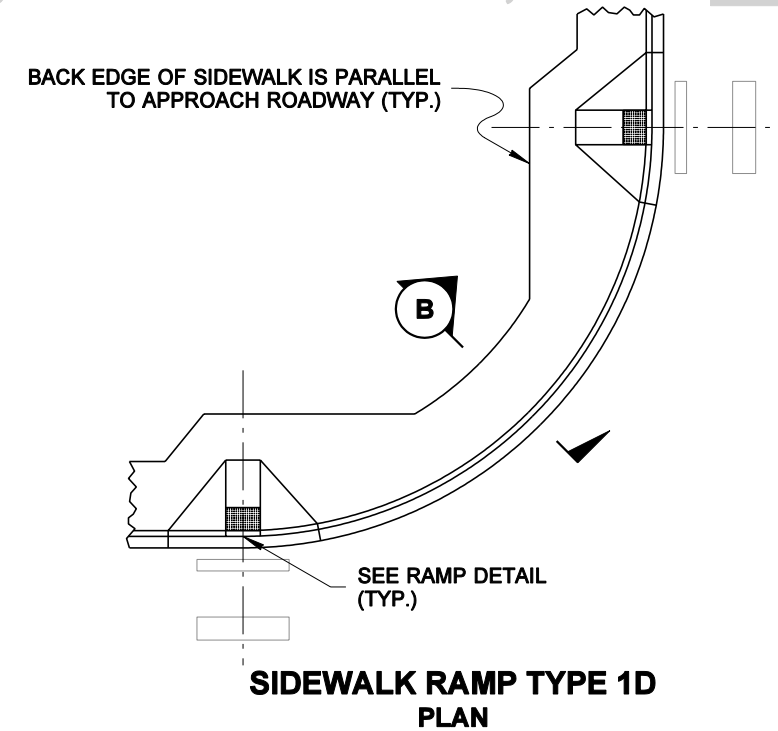
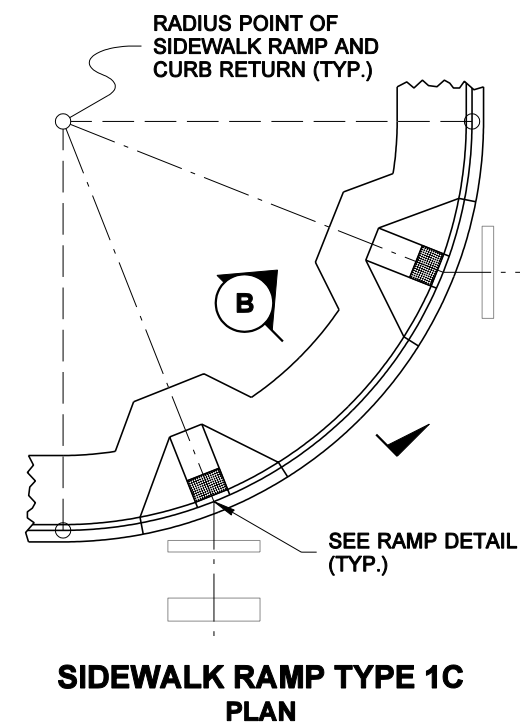
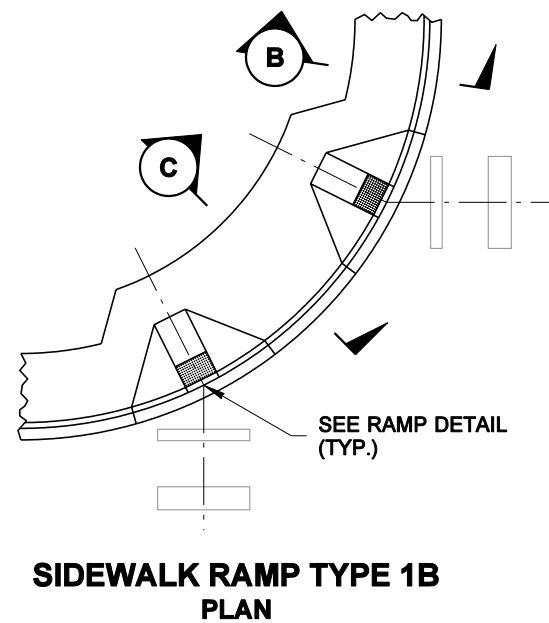
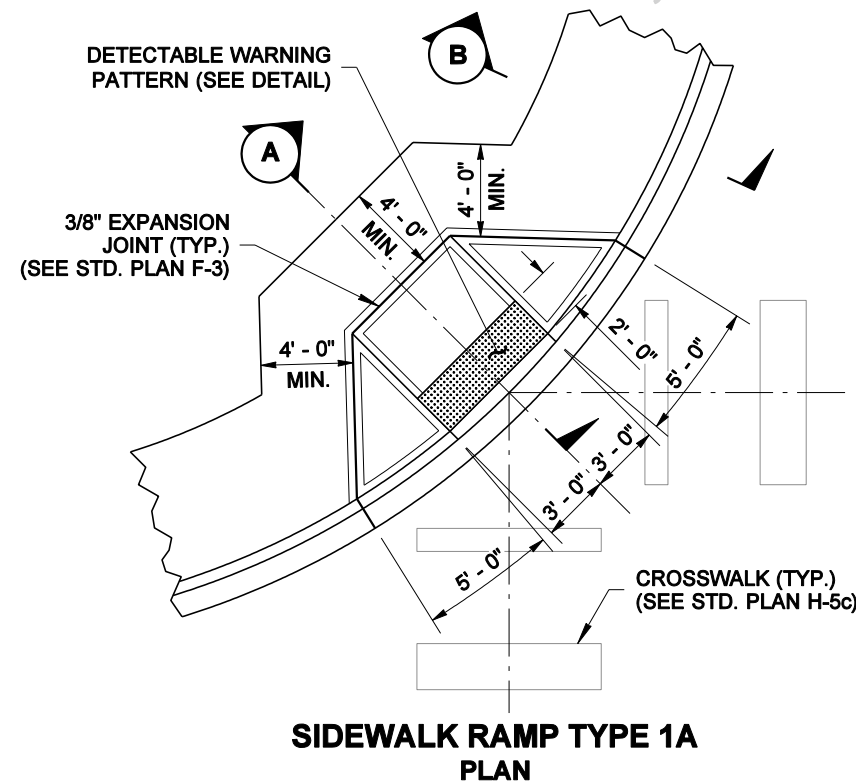
Harold J. Peterfeso 01-13-03

STATE DESIGN ENGINEER

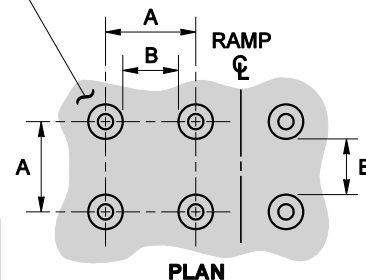
DATE

Washington State Department of Transportation

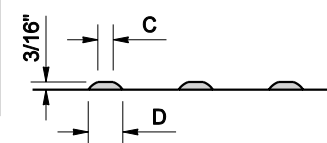
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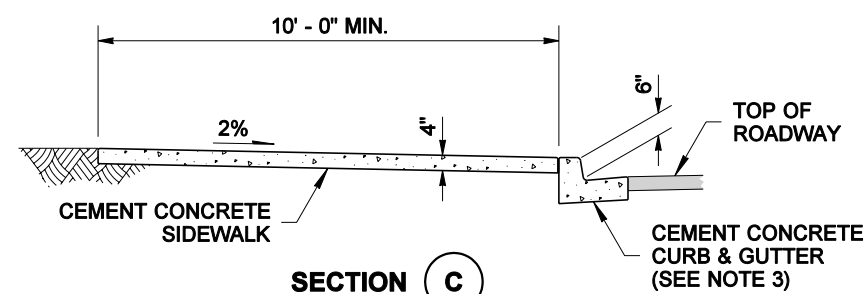
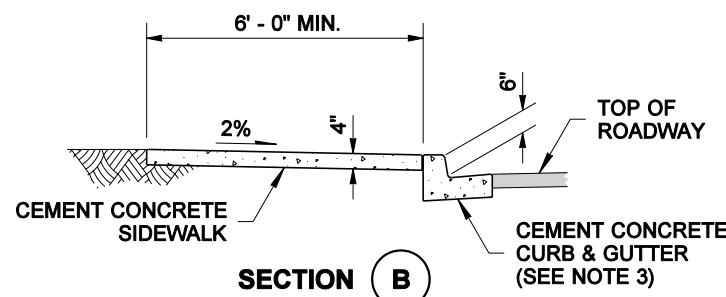
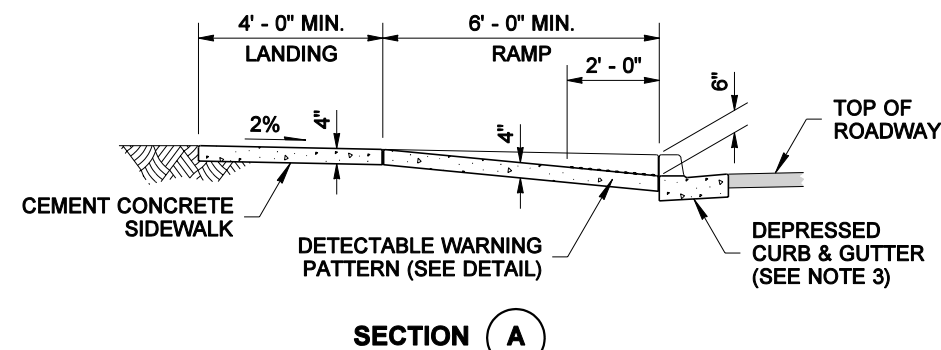
DETECTABLE WARNING PATTERN AREA
SHALL BE YELLOW, IN COMPLIANCE
WITH STD. SPEC. 8-14.3(3)



	MIN.	MAX.
A	1 5/8"	2 3/8"
B	5/8"	1 1/2"
C	7/16"	3/4"
D	7/8"	1 7/16"

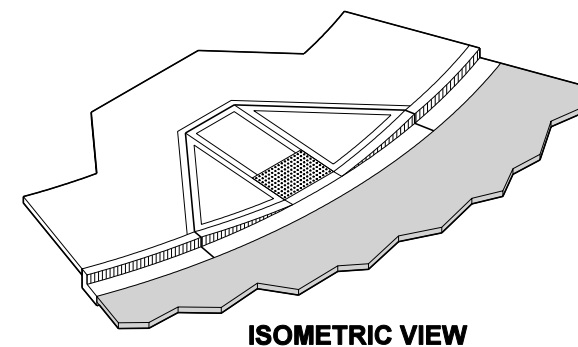


TRUNCATED DOMES (SEE NOTE 2)
**DETECTABLE WARNING
PATTERN DETAIL**



NOTES

1. Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.
2. Detectable warning patterns may be created by any method that will achieve the truncated dome dimensions and spacing shown.
3. Curb and gutter shown, see the Contract Plans for the curb design specified. See Std. Plan F-1 for curb details.
4. The plan views for SIDEWALK RAMP TYPES 1B, 1C & 1D are provided to define each ramp type. See the RAMP DETAIL on this sheet. See Std. Plan F-3 for sidewalk joint placement and details.
5. Ramp slopes shall not be steeper than 12H:1V.



EXPIRES MAY 16, 2003

SIDEWALK RAMP TYPES 1A, 1B, 1C & 1D STANDARD PLAN F-3a

SHEET 1 OF 1 SHEET

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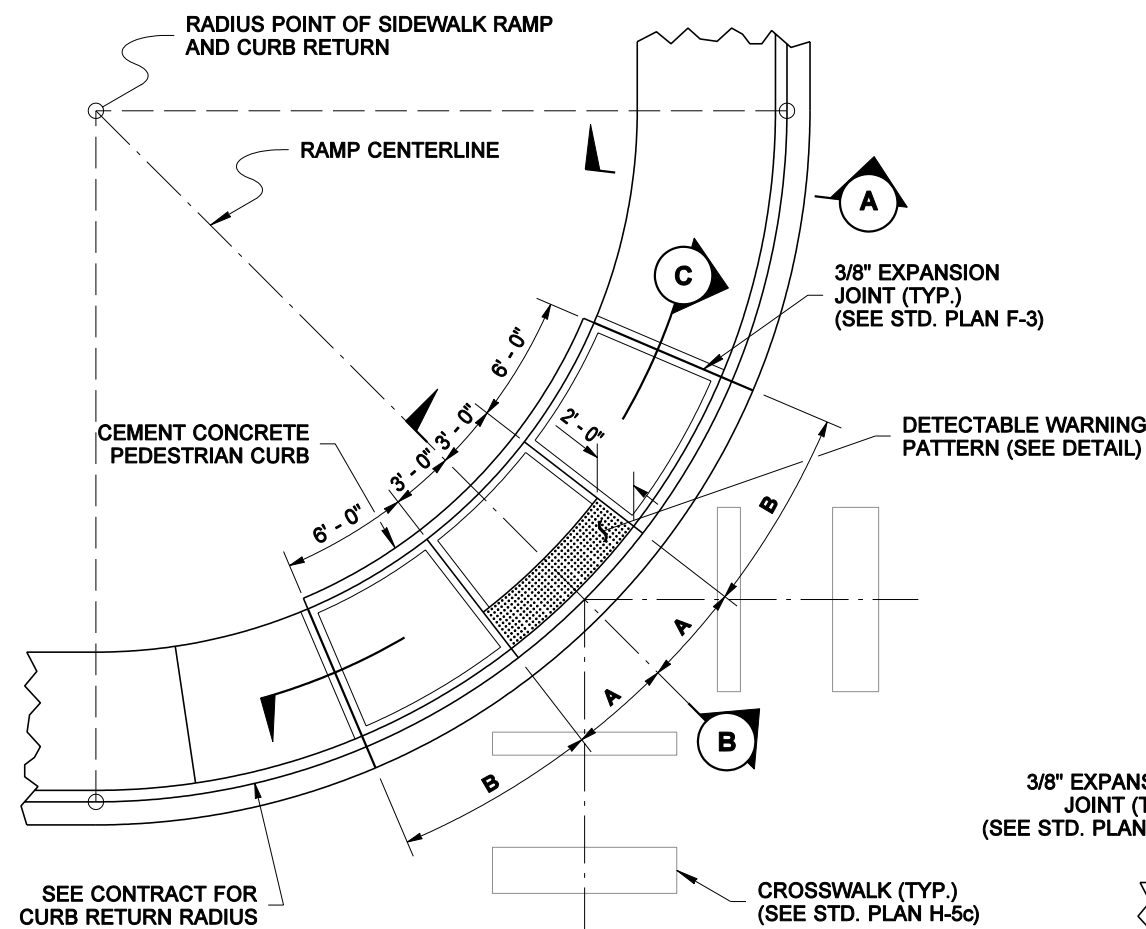
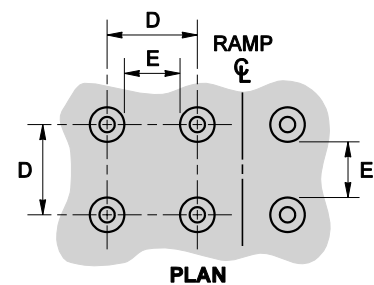
STATE DESIGN ENGINEER

DATE

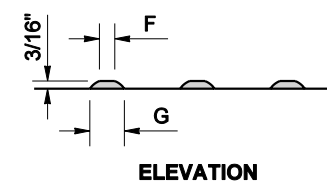
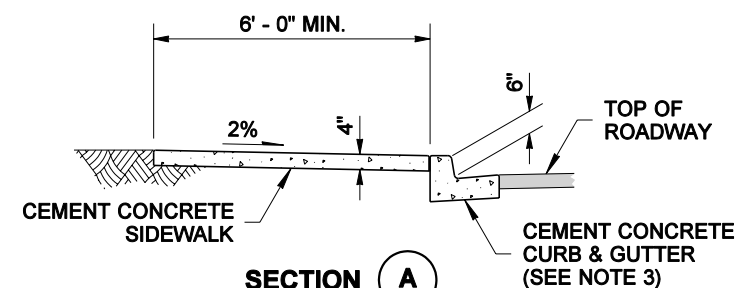


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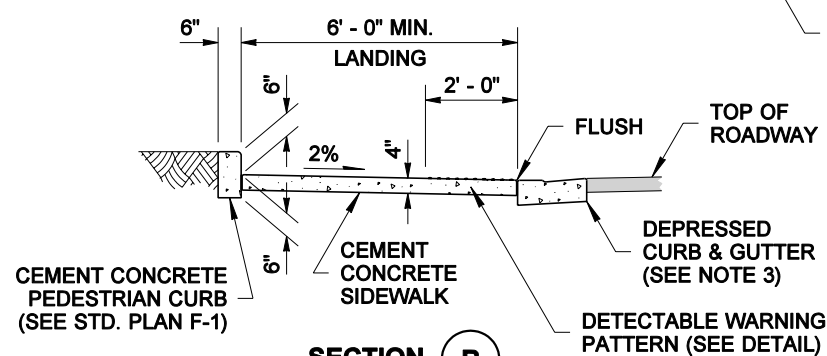
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SIDEWALK RAMP TYPE 2A
PLAN

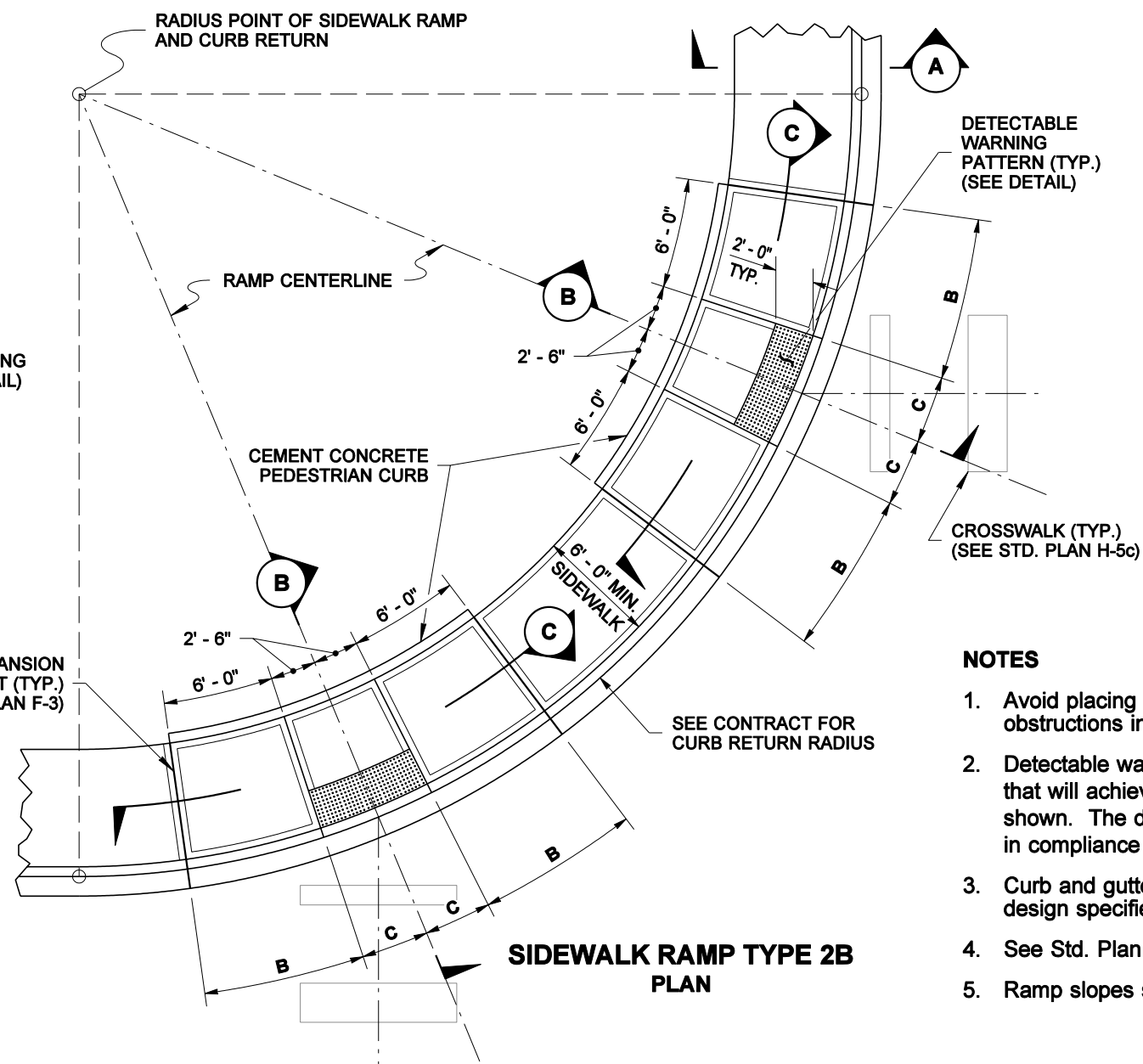
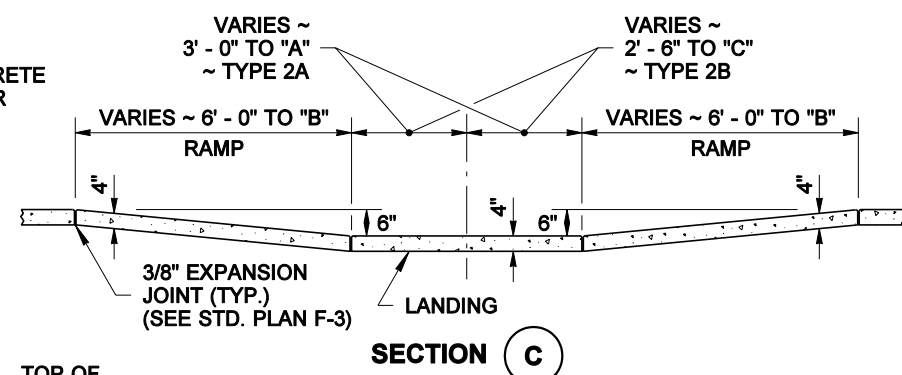
	MIN.	MAX.
D	1 5/8"	2 3/8"
E	5/8"	1 1/2"
F	7/16"	3/4"
G	7/8"	1 7/16"

TRUNCATED DOMES (SEE NOTE 2)
DETECTABLE WARNING
PATTERN DETAIL

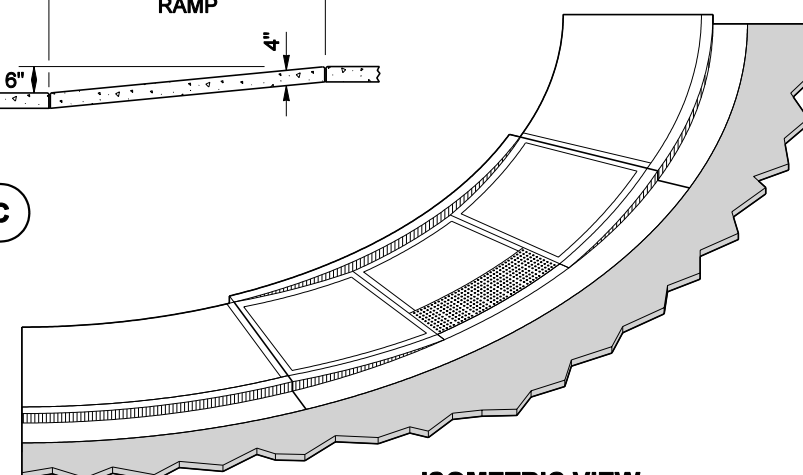
SECTION A



SECTION B

SIDEWALK RAMP TYPE 2B
PLAN

SECTION C



ISOMETRIC VIEW

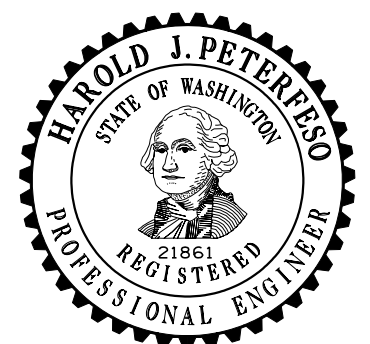
RADIUS (AT CURB FACE)	A	B	C
20 FEET	4' - 5 1/4"	8' - 10 1/2"	3' - 8 1/2"
30 FEET	3' - 10"	7' - 8"	3' - 2 1/4"
40 FEET	3' - 7"	7' - 2"	3' - 0"
50 FEET	3' - 5 1/2"	6' - 10 3/4"	2' - 10 1/2"
60 FEET	3' - 4 1/2"	6' - 8 3/4"	2' - 9 1/2"
70 FEET	3' - 3 3/4"	6' - 7 1/2"	2' - 9"
80 FEET	3' - 3 1/4"	6' - 6 1/2"	2' - 8 1/2"
90 FEET	3' - 2 3/4"	6' - 5 1/2"	2' - 8 1/4"
100 FEET	3' - 2 1/2"	6' - 5"	2' - 8"

INTERMEDIATE RADII CAN BE INTERPOLATED

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NOTES

1. Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.
2. Detectable warning patterns may be created by any method that will achieve the truncated dome dimensions and spacing shown. The detectable warning pattern area shall be yellow, in compliance with Std. Spec. 8-14.3(3)
3. Curb and gutter shown, see the Contract Plans for the curb design specified. See Std. Plan F-1 for curb details.
4. See Std. Plan F-3 for sidewalk joint placement and details.
5. Ramp slopes shall not be steeper than 12H:1V.



EXPIRES MAY 16, 2003

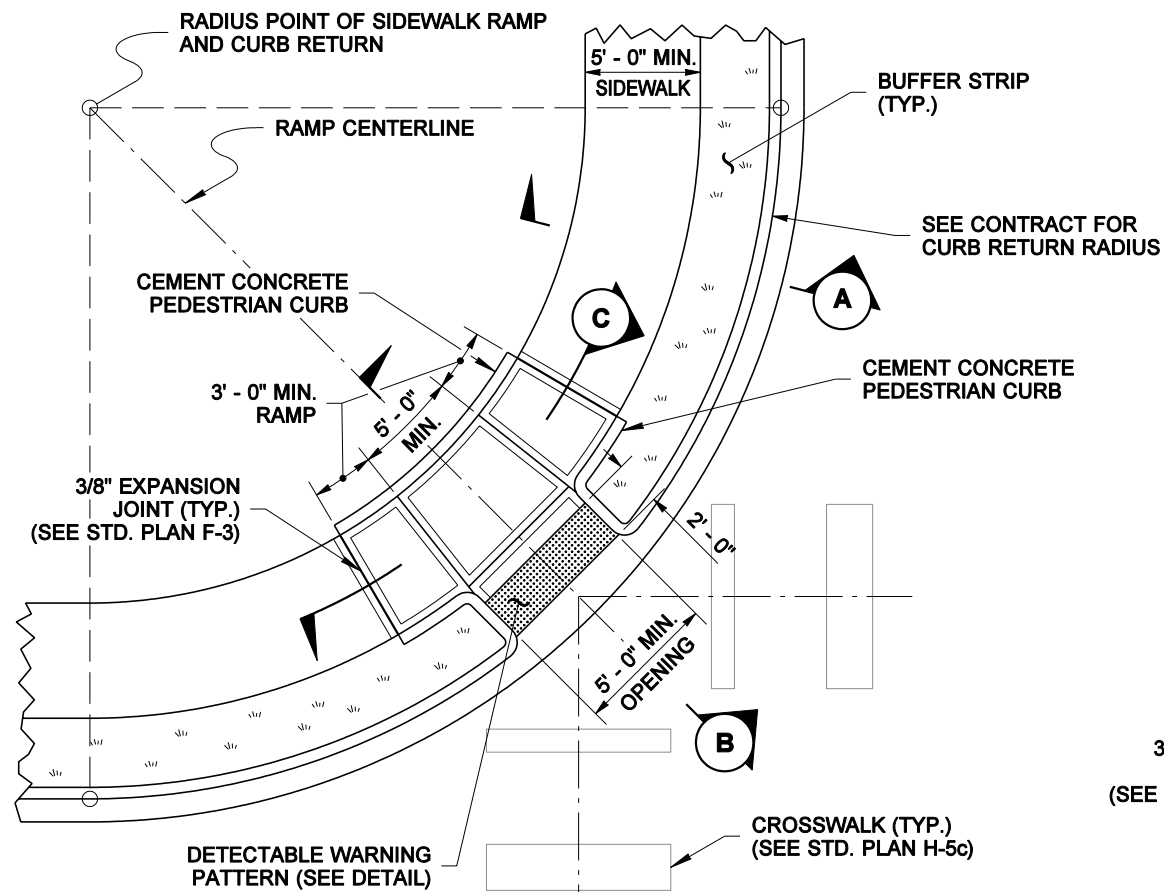
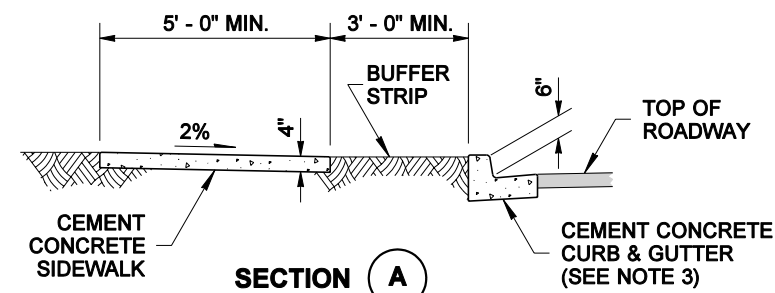
**SIDEWALK RAMP
TYPES 2A & 2B
STANDARD PLAN F-3b**

SHEET 1 OF 1 SHEET

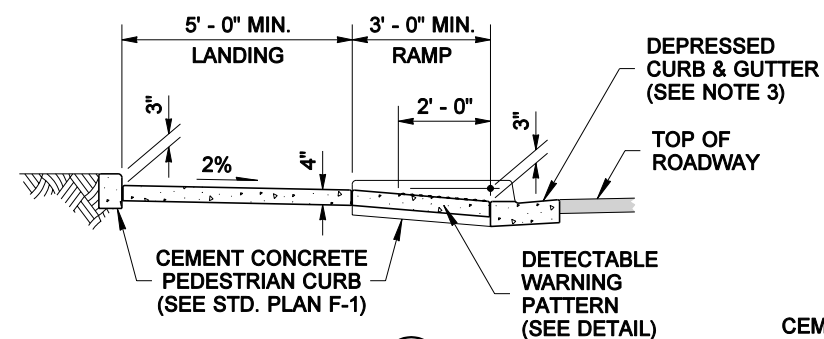
APPROVED FOR PUBLICATION

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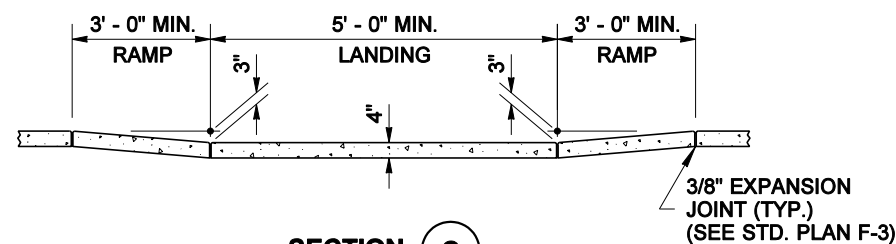
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 Washington State Department of Transportation

SIDEWALK RAMP TYPE 3A
PLAN

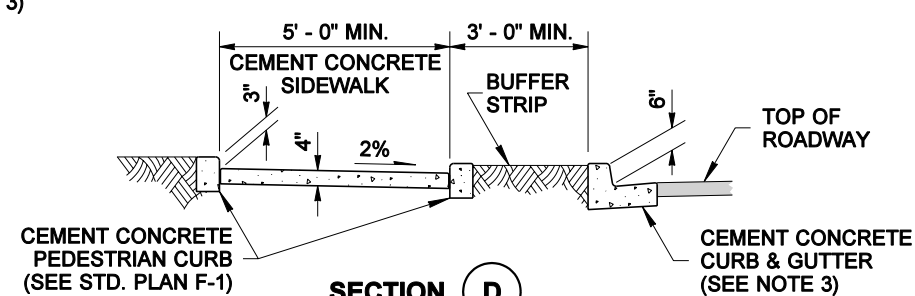
SECTION A



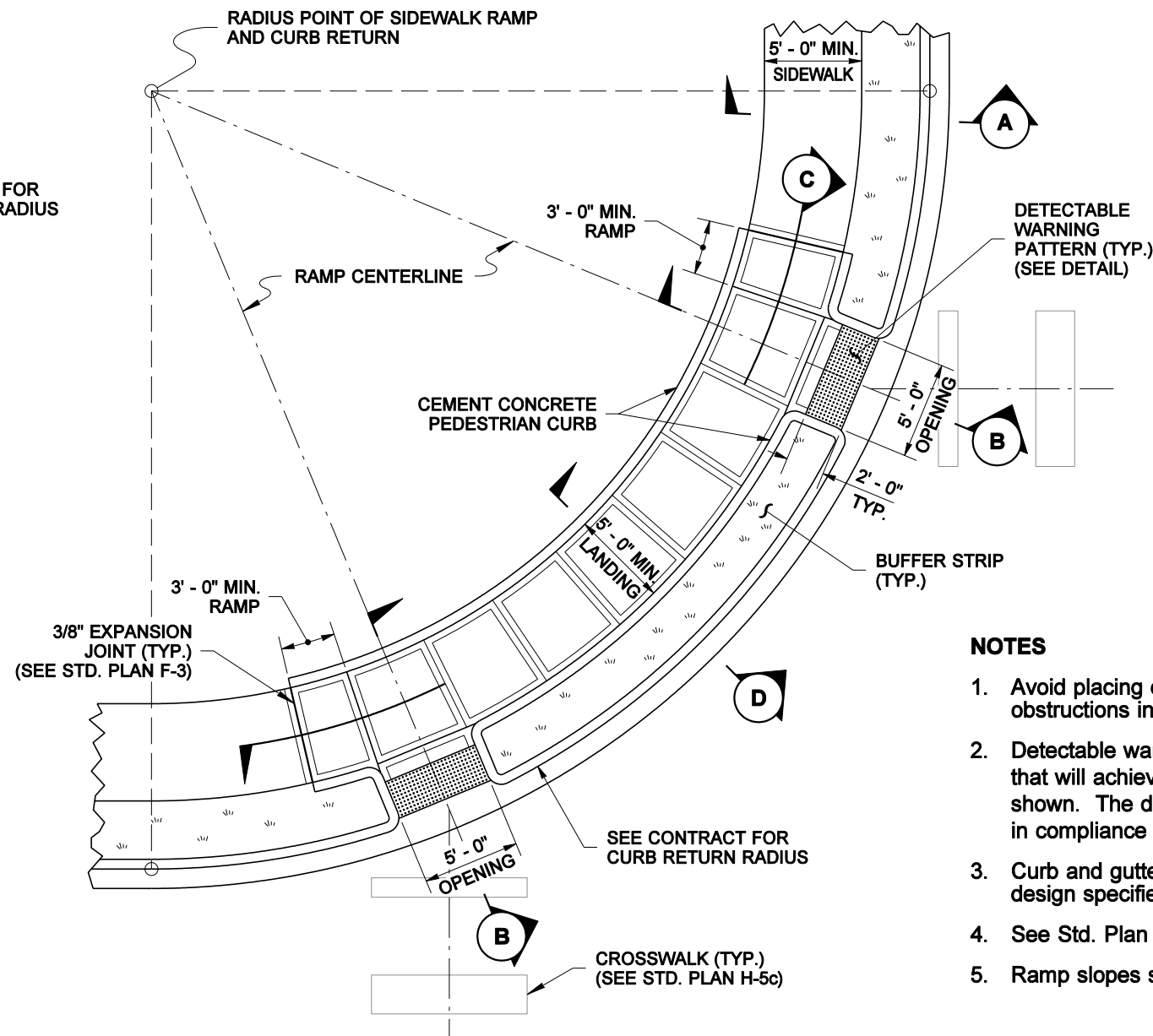
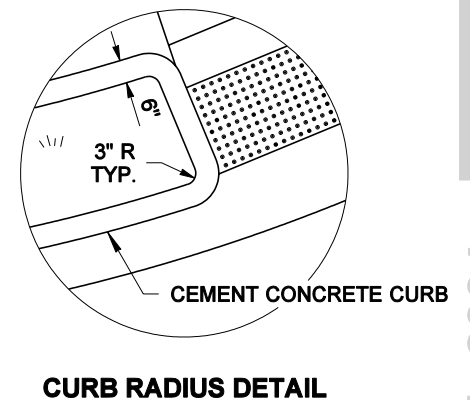
SECTION B



SECTION C



SECTION D

SIDEWALK RAMP TYPE 3B
PLAN

CURB RADIUS DETAIL

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NOTES

1. Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.
2. Detectable warning patterns may be created by any method that will achieve the truncated dome dimensions and spacing shown. The detectable warning pattern area shall be yellow, in compliance with Std. Spec. 8-14.3(3)
3. Curb and gutter shown, see the Contract Plans for the curb design specified. See Std. Plan F-1 for curb details.
4. See Std. Plan F-3 for sidewalk joint placement and details.
5. Ramp slopes shall not be steeper than 12H:1V.



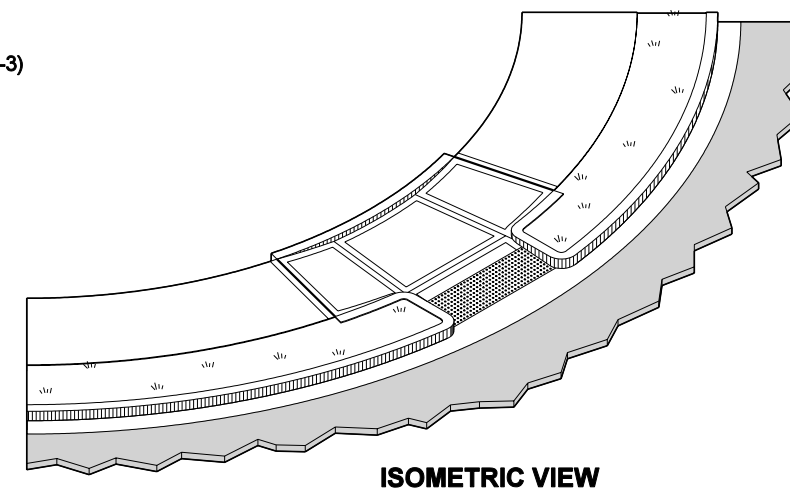
EXPIRES MAY 16, 2003

SIDEWALK RAMP
TYPES 3A, 3B, 3C & 3D
STANDARD PLAN F-3c

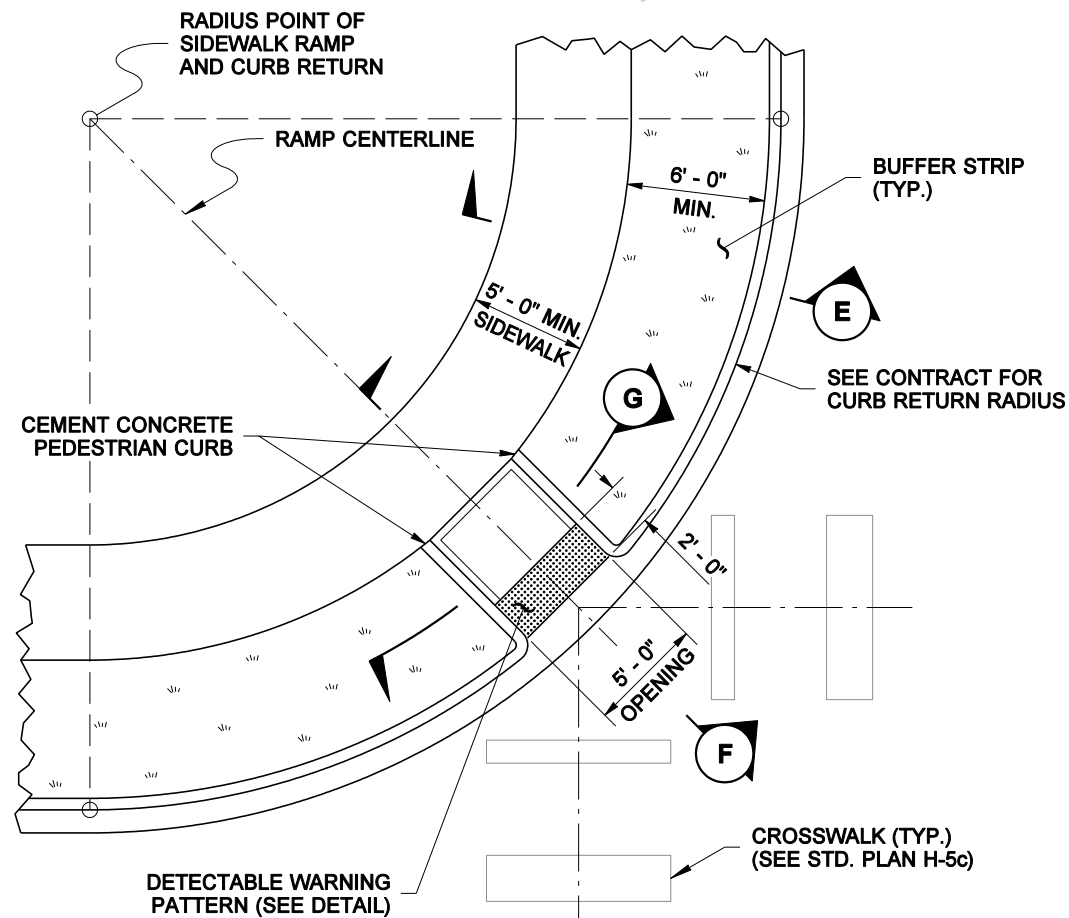
SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

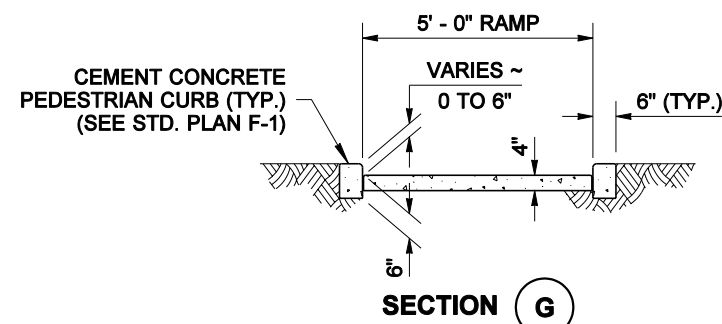
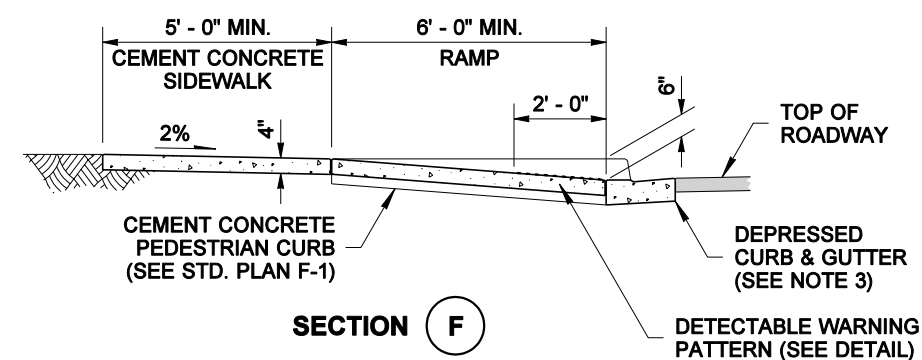
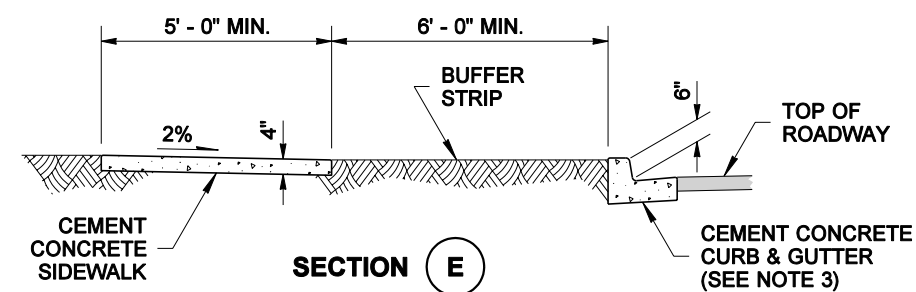
Harold J. Peterfeso 01-13-03

STATE DESIGN ENGINEER DATE
Washington State Department of Transportation

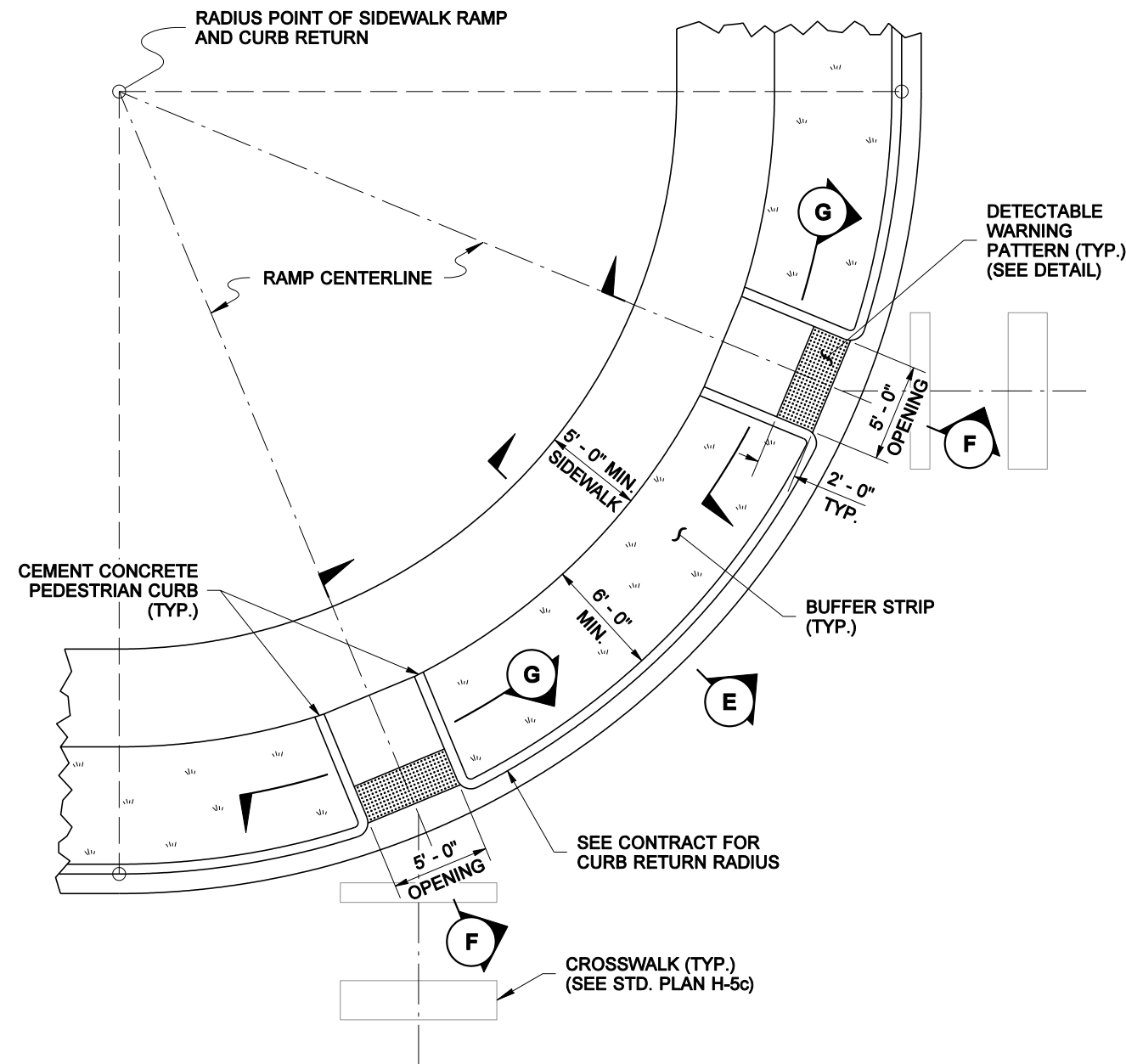
ISOMETRIC VIEW



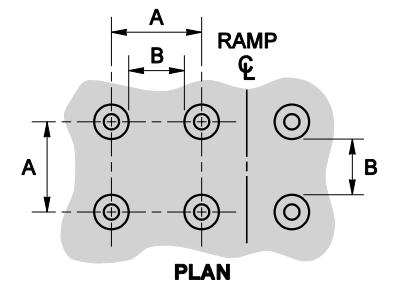
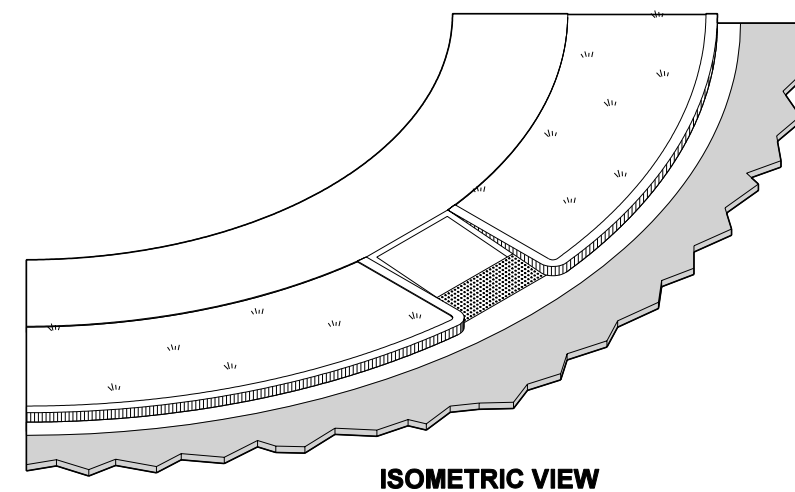
**SIDEWALK RAMP TYPE 3C
PLAN**



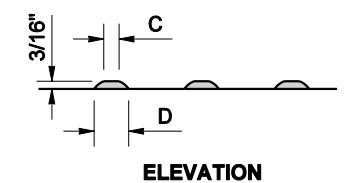
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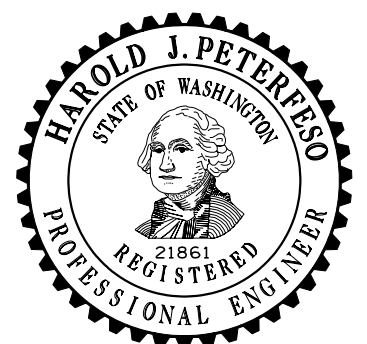
**SIDEWALK RAMP TYPE 3D
PLAN**



	MIN.	MAX.
A	1 5/8"	2 3/8"
B	5/8"	1 1/2"
C	7/16"	3/4"
D	7/8"	1 7/16"



TRUNCATED DOMES (SEE NOTE 2)
**DETECTABLE WARNING
PATTERN DETAIL**



EXPIRES MAY 16, 2003

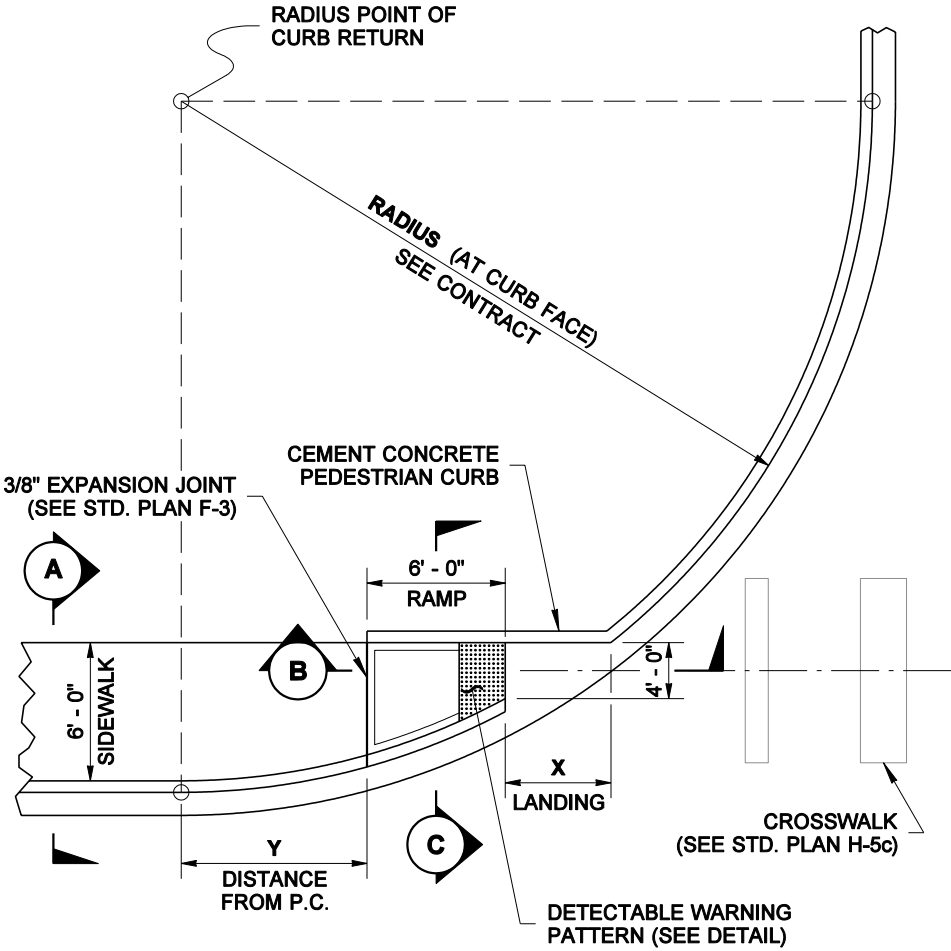
**SIDEWALK RAMP
TYPES 3A, 3B, 3C & 3D
STANDARD PLAN F-3c**

SHEET 2 OF 2 SHEETS

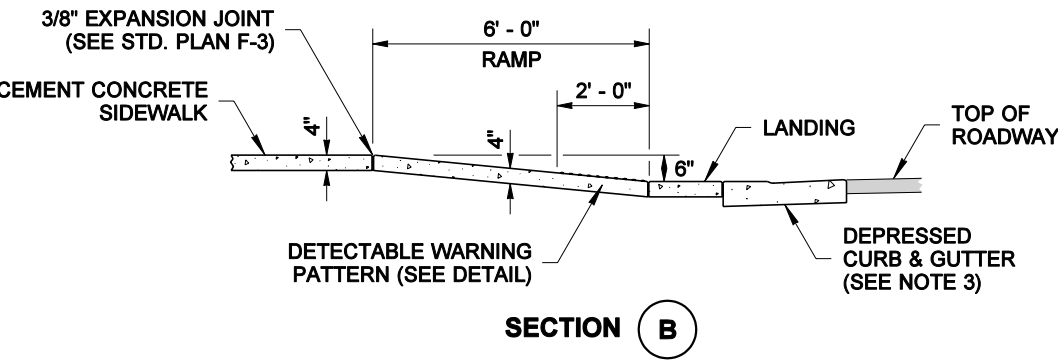
APPROVED FOR PUBLICATION

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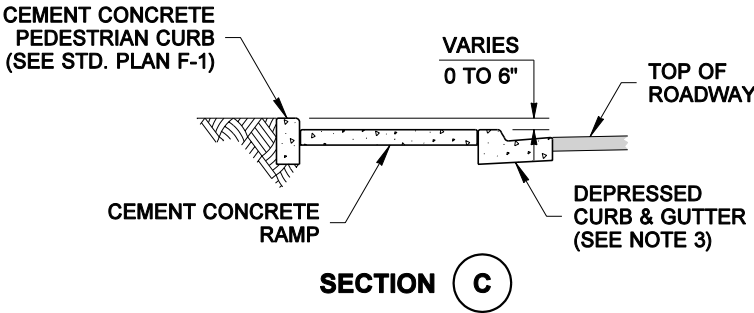
STATE DESIGN ENGINEER DATE
Washington State Department of Transportation



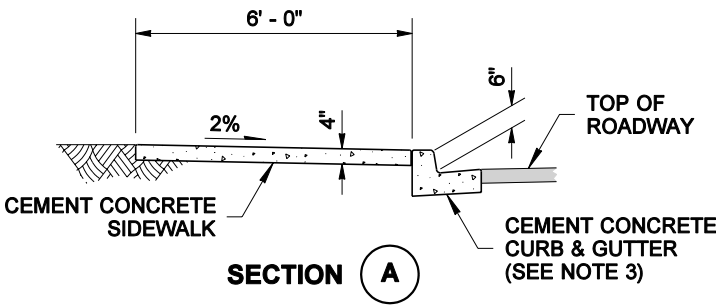
SIDEWALK RAMP TYPE 4A
PLAN



SECTION A



SECTION B



SECTION C

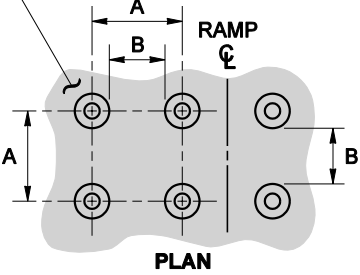
RADIUS (AT CURB FACE)	X	Y
20 FEET	6' - 1 3/4"	2' - 7 1/4"
30 FEET	7' - 11 3/4"	4' - 8 1/4"
40 FEET	9' - 5 1/4"	6' - 5"
50 FEET	10' - 8 3/4"	7' - 11 1/4"
60 FEET	11' - 10 1/4"	9' - 3 1/2"
70 FEET	12' - 10 3/4"	10' - 6 3/4"
80 FEET	13' - 10 1/2"	11' - 8 3/4"
90 FEET	14' - 9 1/4"	12' - 9 3/4"
100 FEET	15' - 7 1/2"	13' - 10 1/4"

INTERMEDIATE RADII CAN BE INTERPOLATED

NOTES

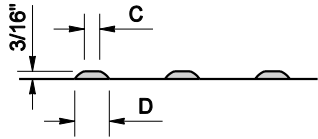
1. Avoid placing drainage structures, junction boxes or other obstructions in front of ramp access areas.
2. Detectable warning patterns may be created by any method that will achieve the truncated dome dimensions and spacing shown.
3. Curb and gutter shown, see the Contract Plans for the curb design specified. See Std. Plan F-1 for curb details.
4. See Std. Plan F-3 for sidewalk joint placement and details.
5. Ramp slopes shall not be steeper than 12H:1V.

DETECTABLE WARNING PATTERN AREA SHALL BE YELLOW, IN COMPLIANCE WITH STD. SPEC. 8-14.3(3)



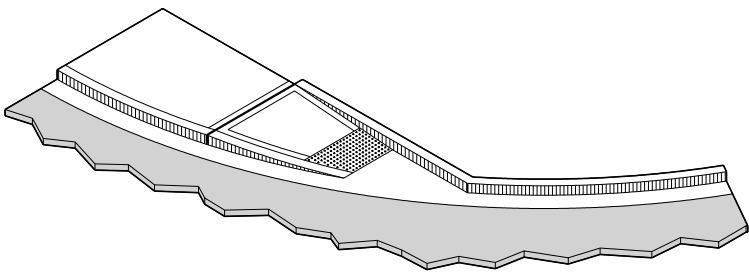
PLAN

	MIN.	MAX.
A	1 5/8"	2 3/8"
B	5/8"	1 1/2"
C	7/16"	3/4"
D	7/8"	1 7/16"



ELEVATION

TRUNCATED DOMES (SEE NOTE 2)
DETECTABLE WARNING
PATTERN DETAIL



ISOMETRIC VIEW



SIDEWALK RAMP TYPE 4A

STANDARD PLAN F-3d

SHEET 1 OF 1 SHEET

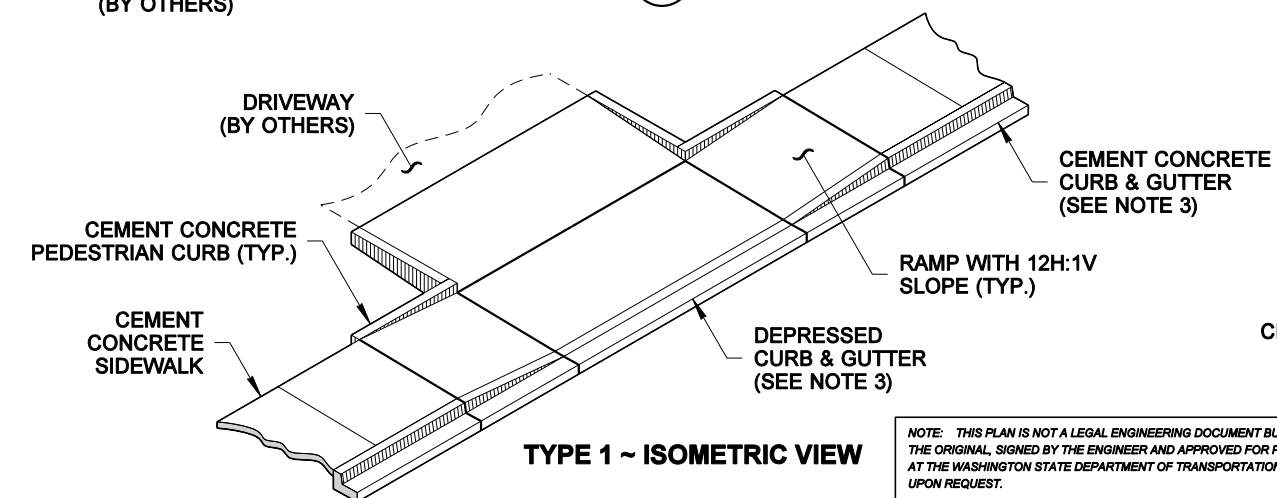
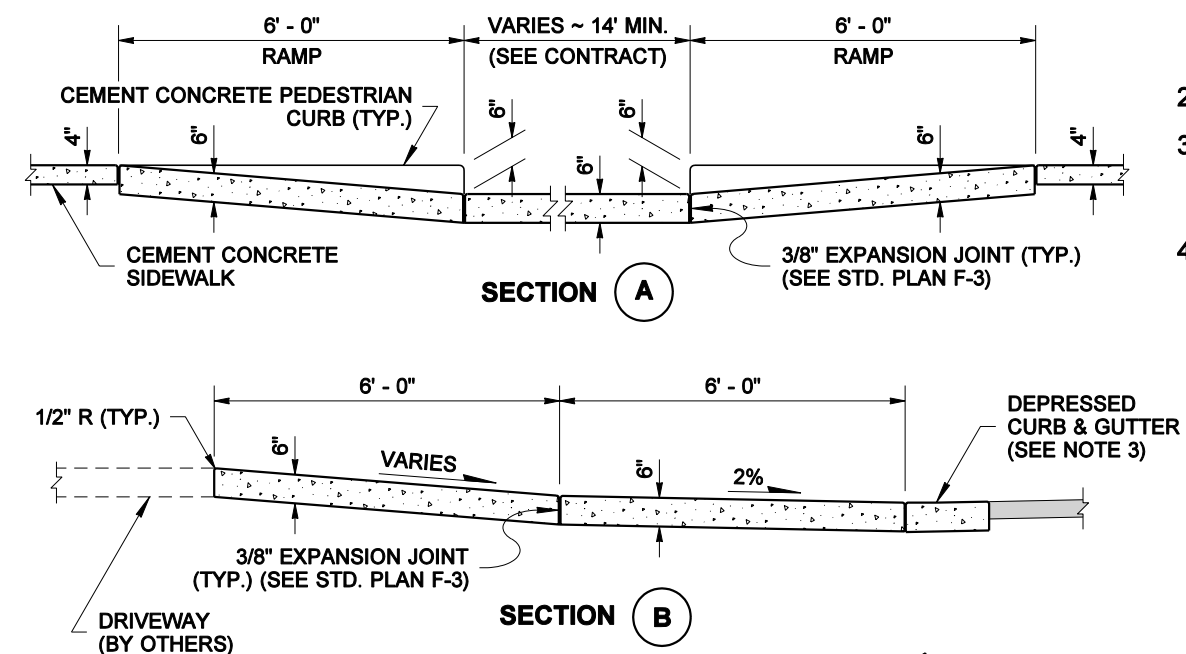
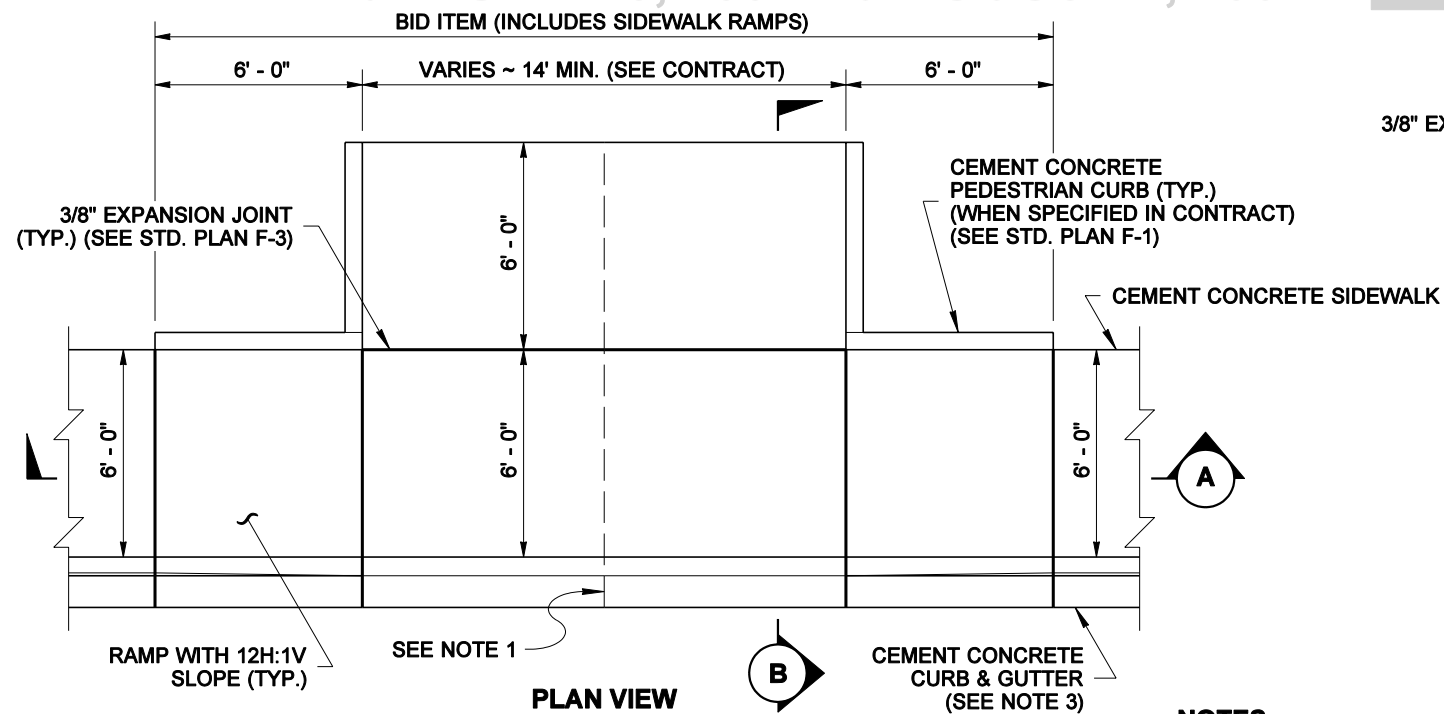
APPROVED FOR PUBLICATION

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STATE DESIGN ENGINEER DATE



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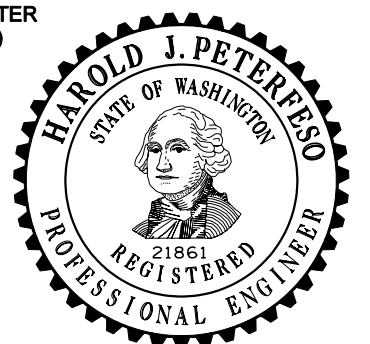
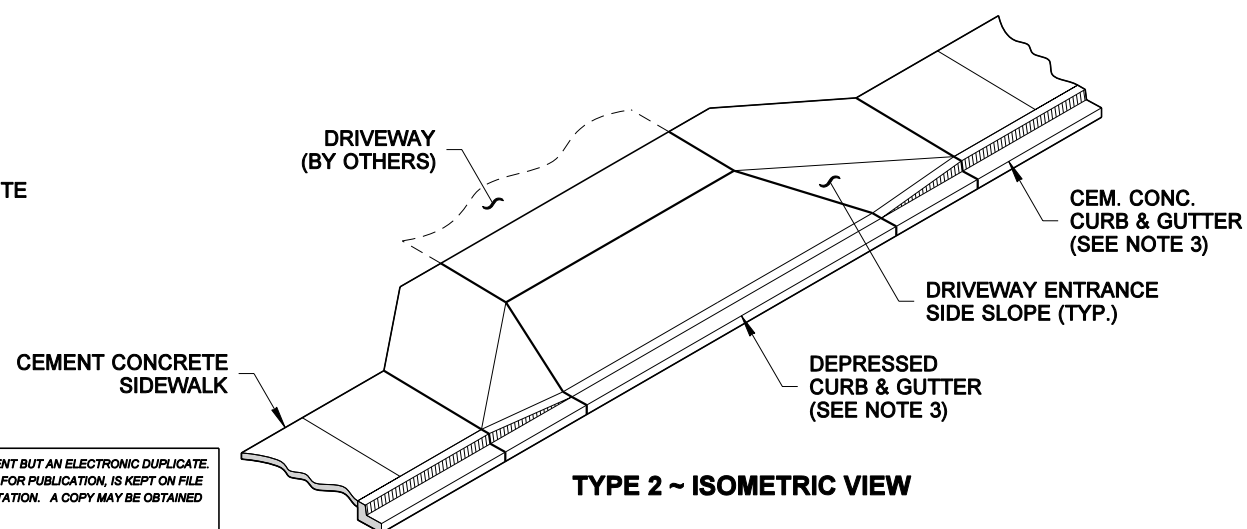
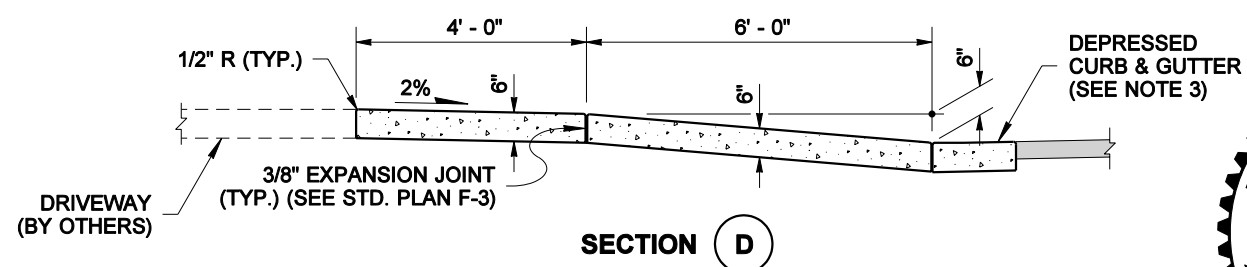
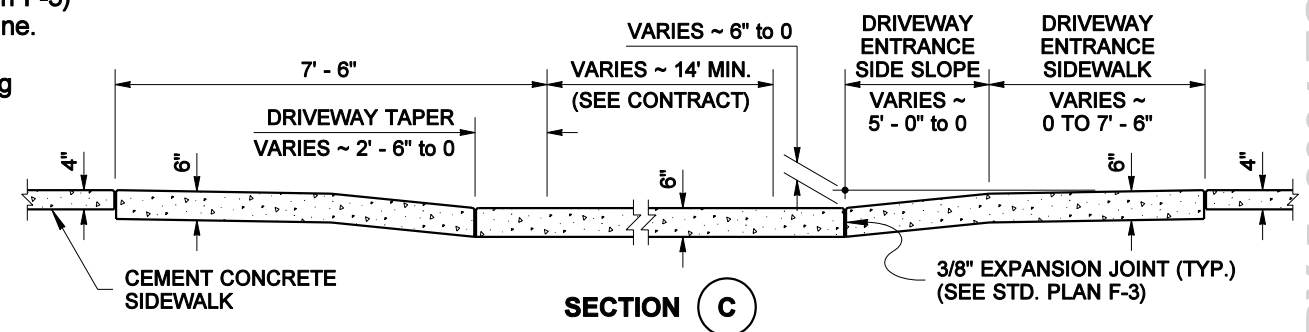
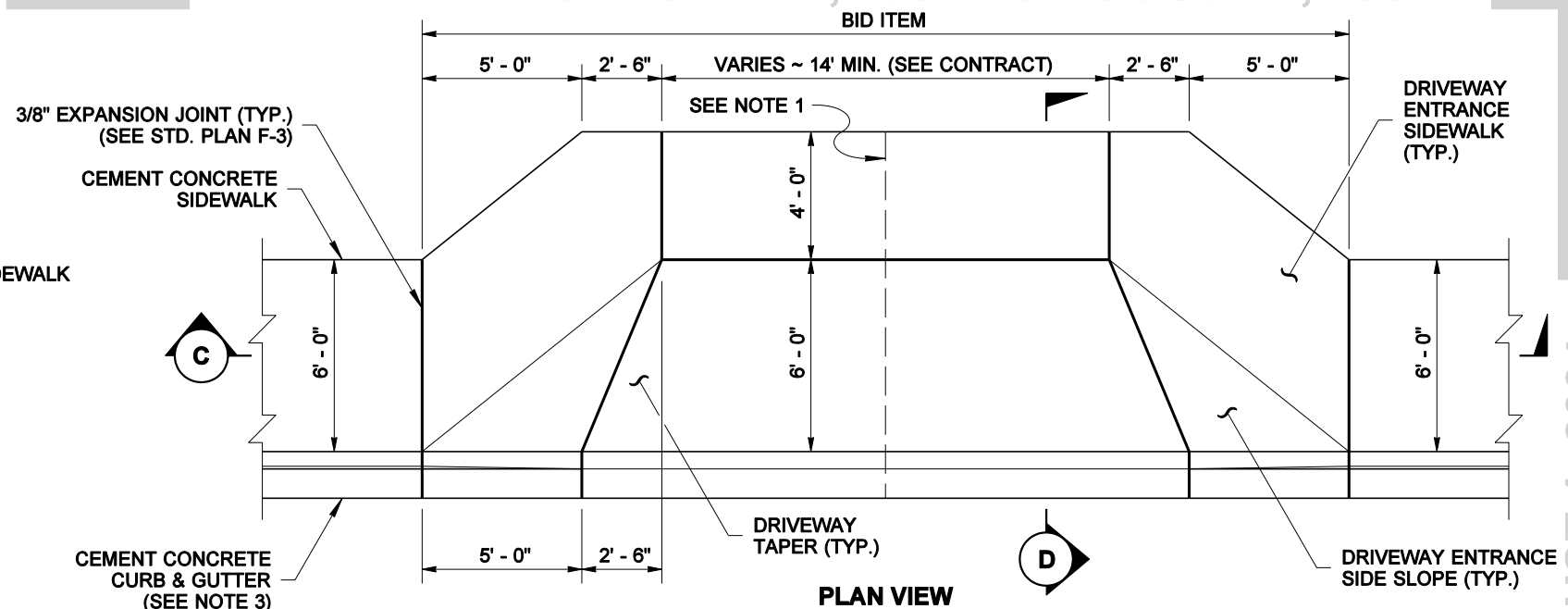


TYPE 1 ~ ISOMETRIC VIEW

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NOTES

1. When the driveway width exceeds 15 feet, construct a full depth expansion joint (see Standard Plan F-3) with 3/8" joint filler along the driveway centerline. Construct expansion joints parallel with the centerline as required at 15' maximum spacing when driveway widths exceed 30'.
2. See Std. Plan F-3 for sidewalk details.
3. Curb and gutter shown, see the Contract Plans for the curb design specified. See Std. Plan F-1 for curb details.
4. Avoid placing drainage structures, junction boxes or other obstructions in front of driveway entrances.



EXPIRES MAY 16, 2003

CEMENT CONCRETE DRIVEWAY ENTRANCE TYPES 1, 2, 3 & 4

STANDARD PLAN F-4

SHEET 1 OF 2 SHEETS

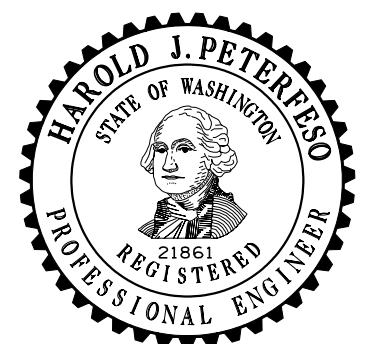
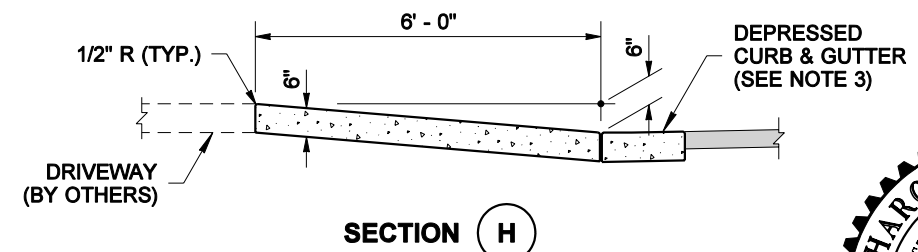
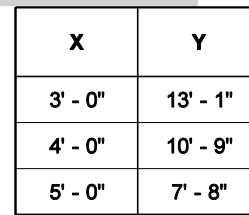
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STATE DESIGN ENGINEER

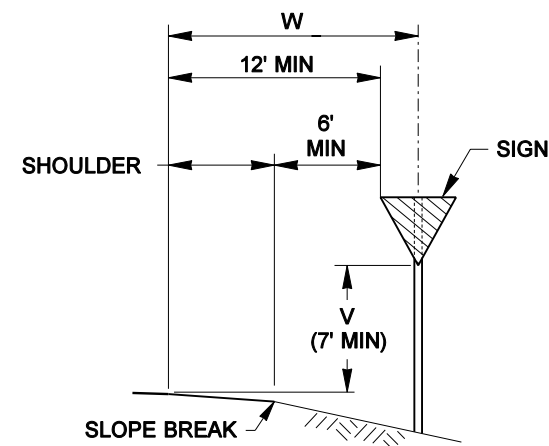
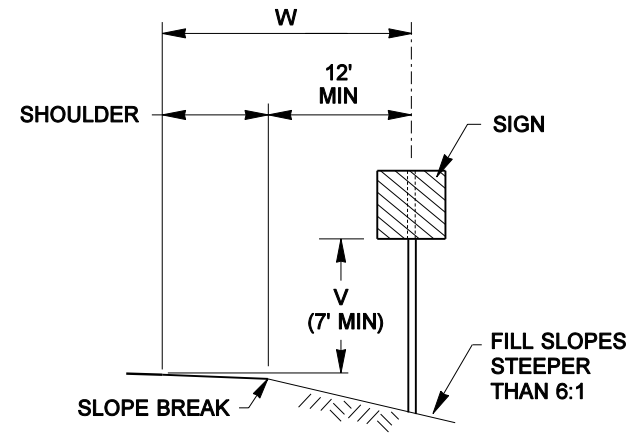
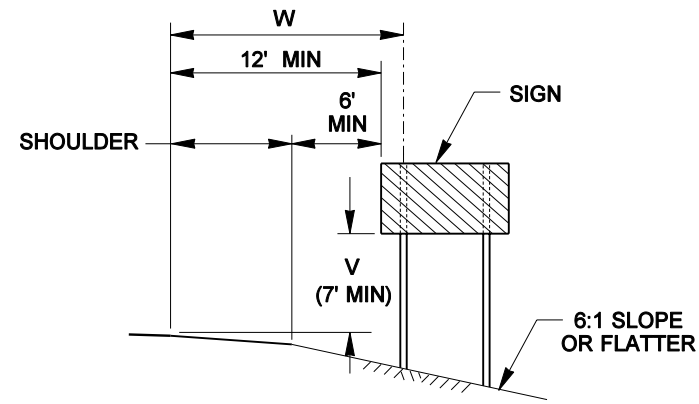
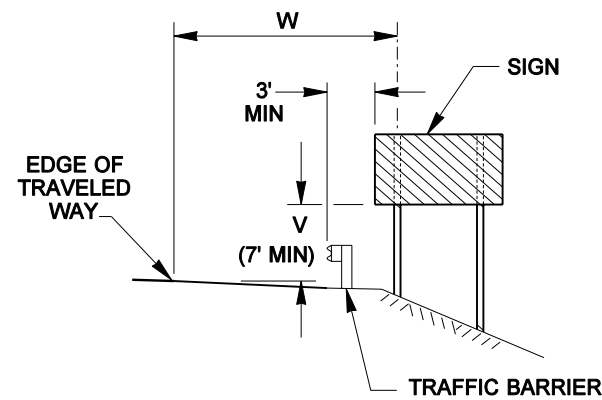
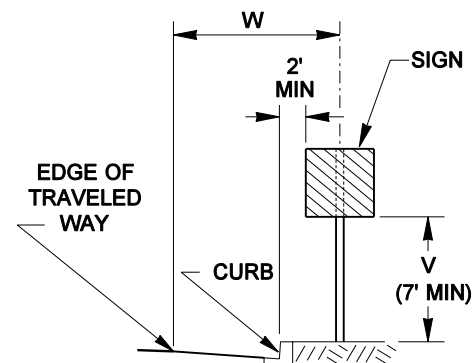
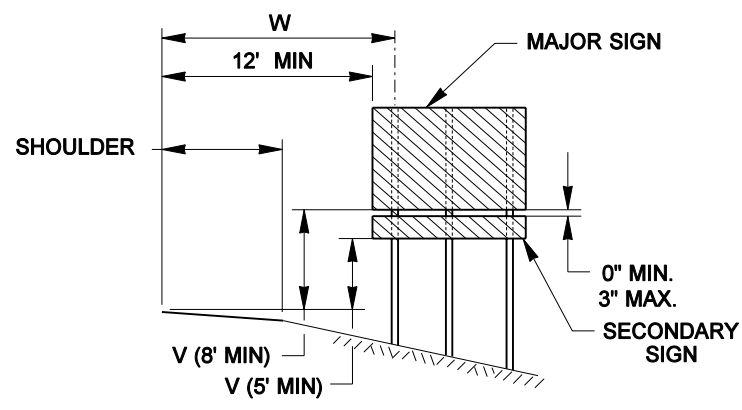
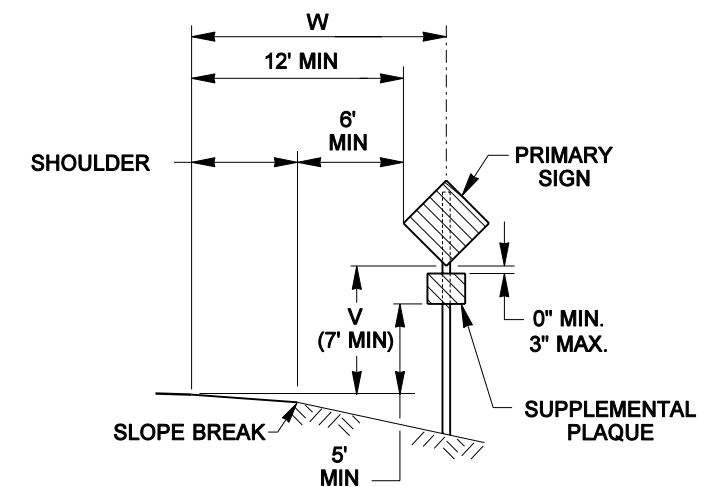
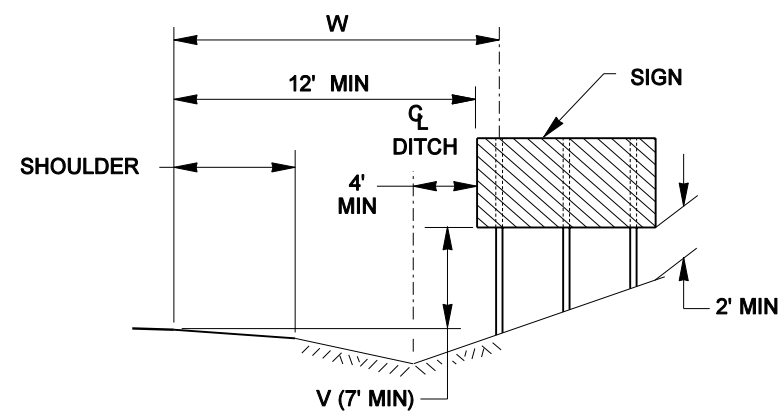
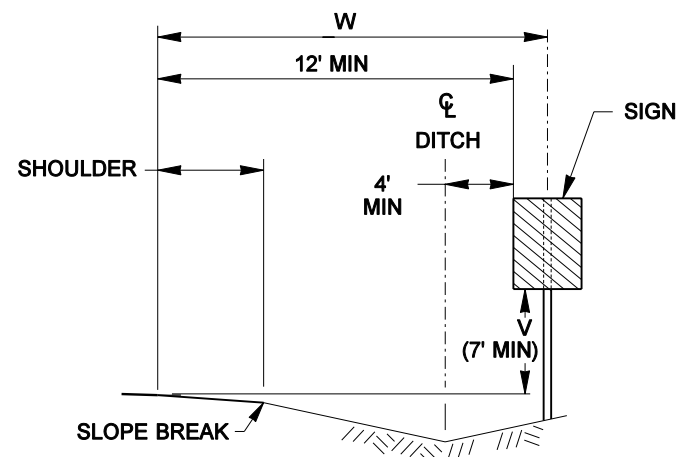
DATE

Washington State Department of Transportation




 STATE DESIGN ENGINEER _____ DATE _____
 Washington State Department of Transportation

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

SIGN INSTALLATION
IN FILL SECTIONSIGN INSTALLATION
ON STEEP FILL SLOPESMULTIPLE SIGN POST INSTALLATION
IN FILL SECTIONSIGN INSTALLATION
BEHIND TRAFFIC BARRIERSIGN INSTALLATION
IN CURB SECTIONGUIDE OR DIRECTIONAL SIGN WITH
SECONDARY SIGN INSTALLATION ON
EXPRESSWAYS AND FREEWAYSSIGN WITH SUPPLEMENTAL
PLAQUE INSTALLATION
IN FILL SECTIONMULTIPLE SIGN POST INSTALLATION
IN DITCH SECTIONSIGN INSTALLATION
IN DITCH SECTION

NOTES

1. Refer to the Sign Specification Sheet of the contract for the 'V' and 'W' distances



EXPIRES OCTOBER 26, 2002

GROUND MOUNTED
SIGN PLACEMENT
STANDARD PLAN G-1

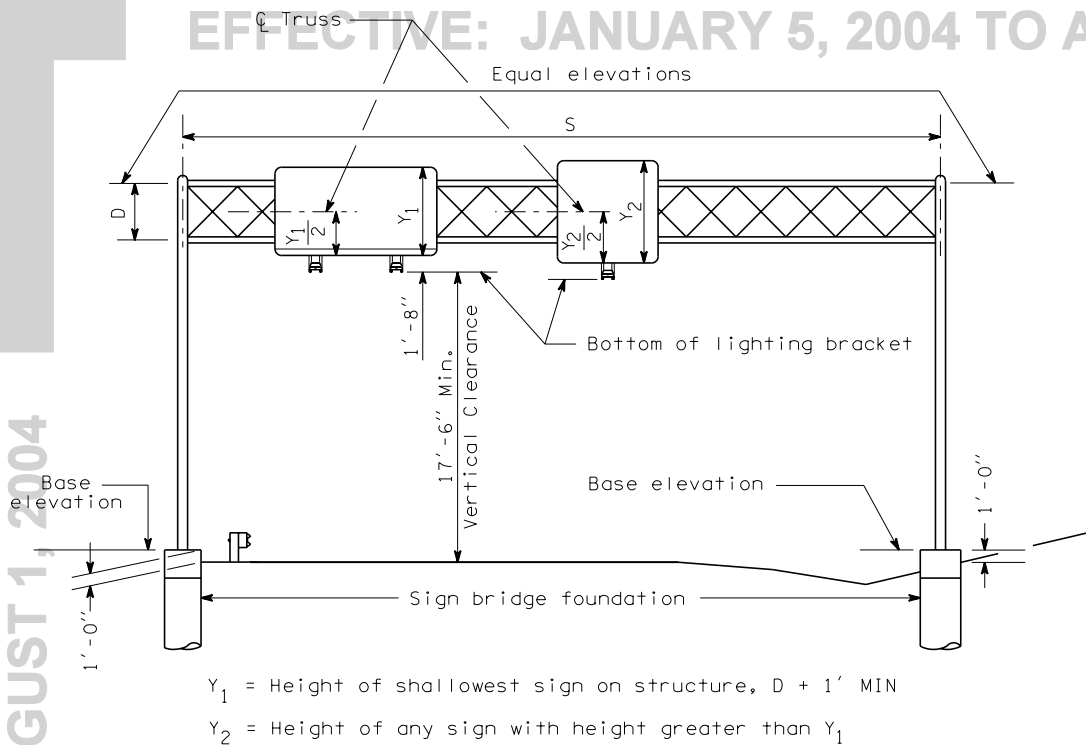
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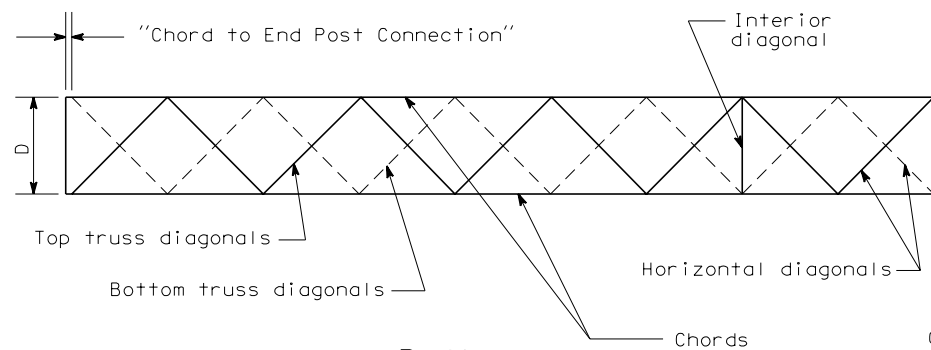
Harold J. Peterfeso
STATE DESIGN ENGINEER

09-12-01
DATE

Washington State Department of Transportation

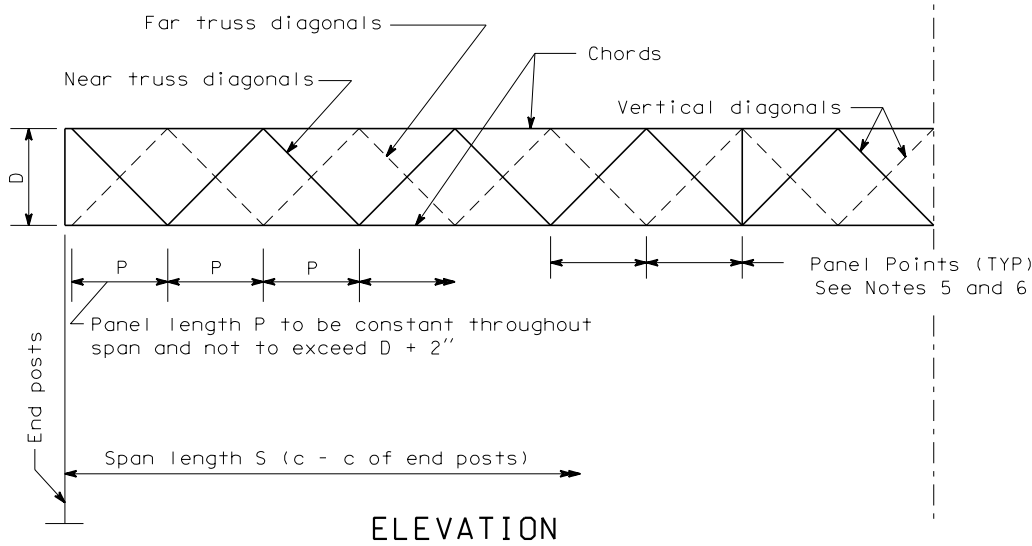


SIGN BRIDGE LAYOUT

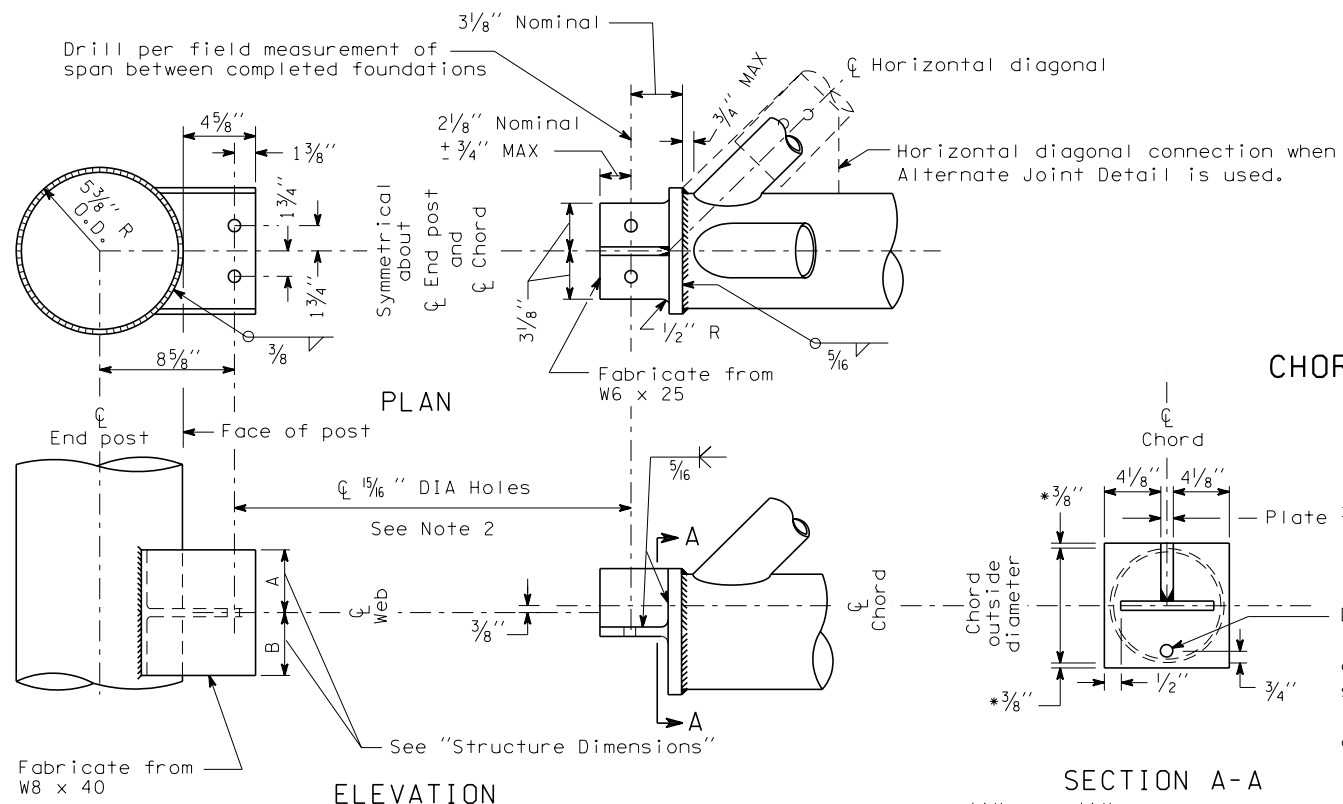


PLAN

℄ Symmetrical about ℄ span (except framing with odd number of panels).



ELEVATION



ELEVATION

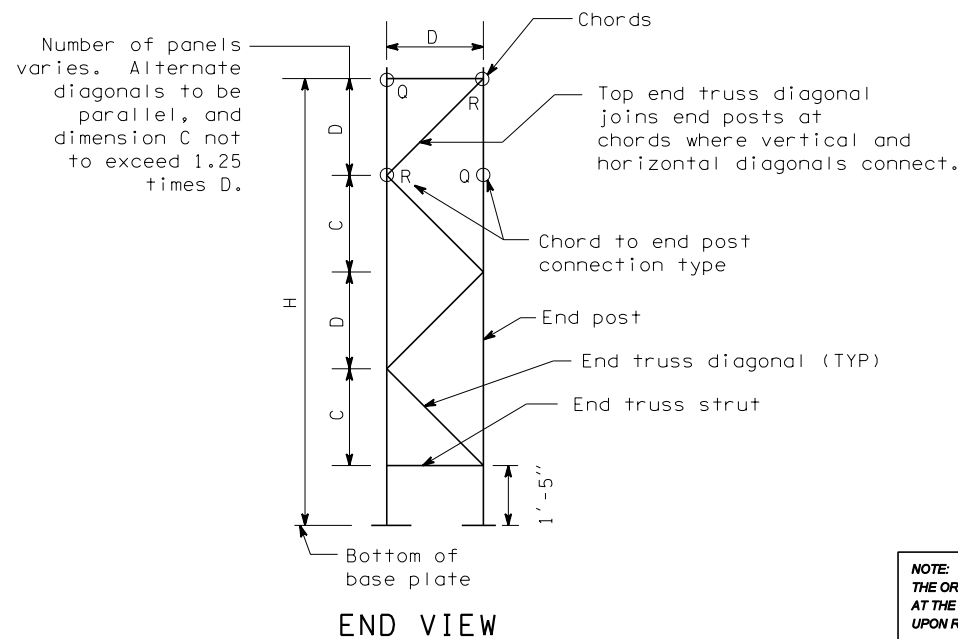
CHORD TO END POST CONNECTION TYPE R

Where diagonals connect

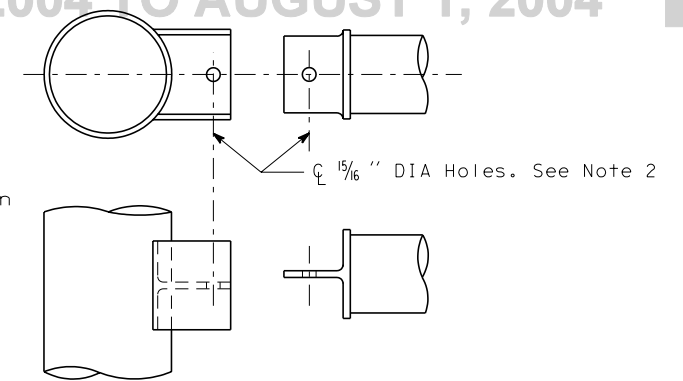
SPAN LENGTH S	DIMENSION D	TOP AND BOT CHORDS	DIAGONALS	END TRUSS POSTS	END TRUSS STRUTS AND DIAGONALS	TOTAL SIGN AREA (MAX)	A	B
60' or less	4'-0"	3" x .216"	1 1/4" x .140"	10" x .250"	2 1/2" x .203"	384 sq ft	2 3/8"	1 5/8"
61' to 90'	5'-0"	4" x .237"	2" x .154"	10" x .250"	2 1/2" x .203"	624 sq ft	2 7/8"	2 1/8"
91' to 120'	6'-0"	5" x .258"	2" x .154"	10" x .307"	3" x .216"	864 sq ft	3 3/8"	2 5/8"
121' to 150'	7'-0"	6" x .280"	2 1/2" x .203"	10" x .365"	3 1/2" x .226"	1104 sq ft	4 1/16"	3 1/4"

All members are pipe. Values shown are nominal pipe size and wall thickness.

STRUCTURE DIMENSIONS

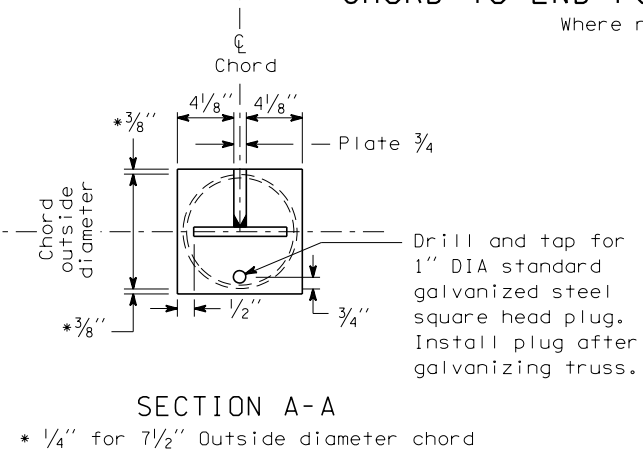


END VIEW



CHORD TO END POST CONNECTION TYPE Q

Where no diagonals connect
See Note 3



SECTION A-A

* 1/4" for 7 1/2" Outside diameter chord

MATERIAL SPECIFICATIONS

PIPE (Chords, Diagonals, Struts and Posts)	ASTM A 36 or ASTM A 53 Grade B, Type E or S, or A 500 Grade B
PLATES & SHAPES	ASTM A 36
BOLTS, NUTS, AND WASHERS	STD. SPEC. 9-06.5(3)
PIPE, PLATE & SHAPE GALVANIZING	AASHTO M 111
FASTENER GALVANIZING	AASHTO M 232



EXPIRES JUNE 29, 2004

SIGN BRIDGE
STANDARD PLAN G-2

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso

STATE DESIGN ENGINEER

06-04-02

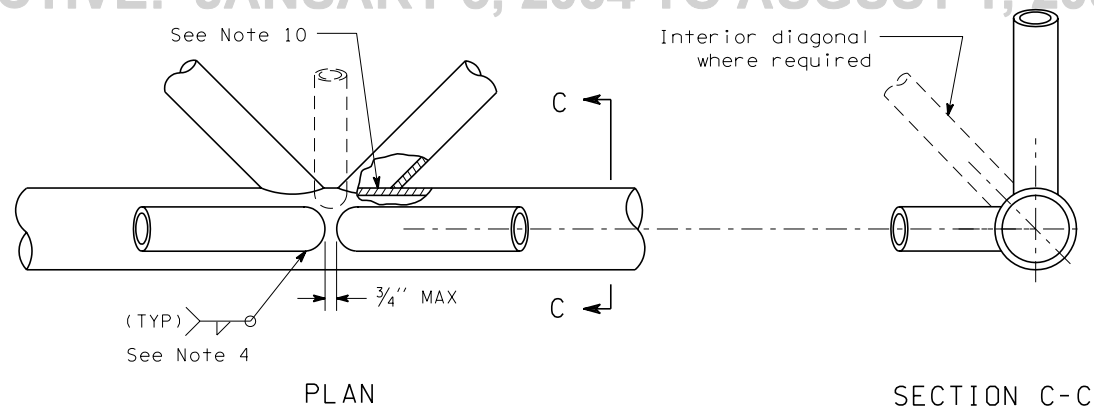
DATE



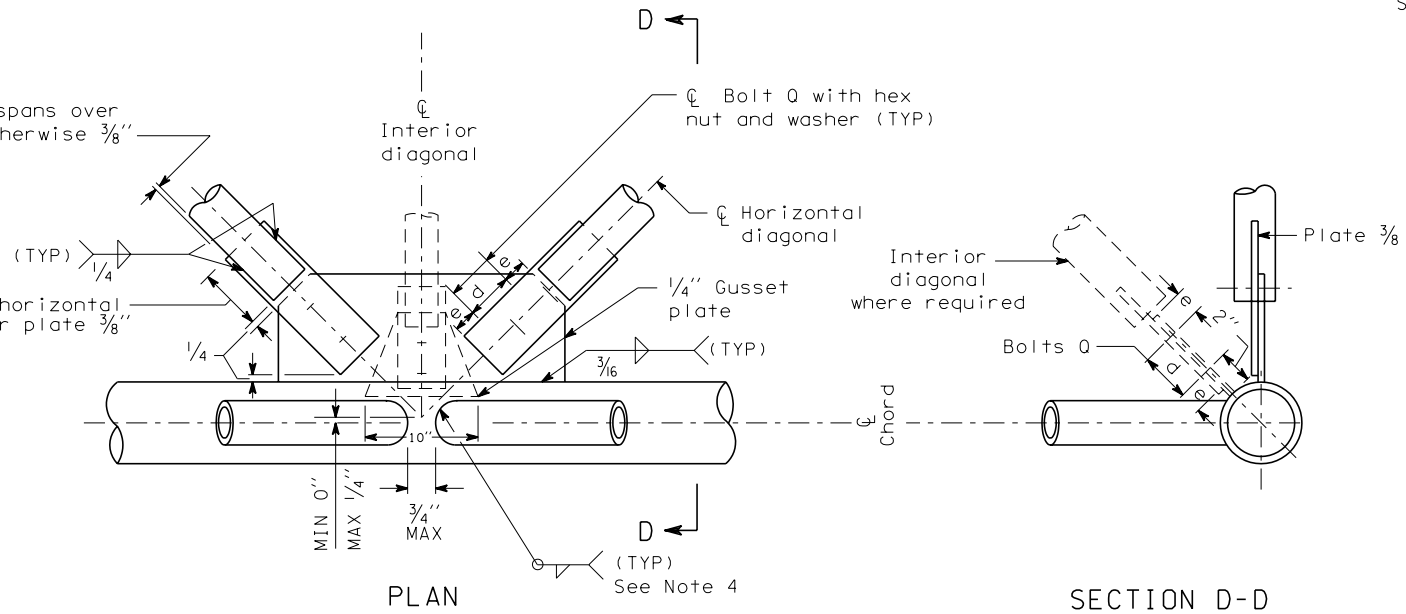
Washington State Department of Transportation

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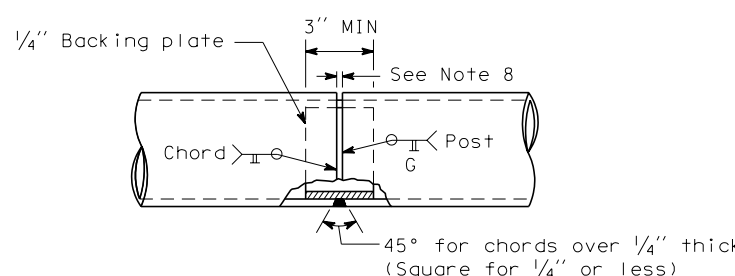
03/2002	ADDED MATERIALS SPECIFICATIONS	MAS
DATE	REVISION	BY



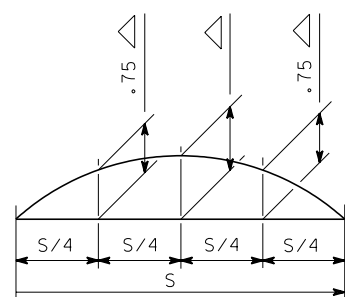
TYPICAL JOINT DETAIL
Chord shown - End Post Similar



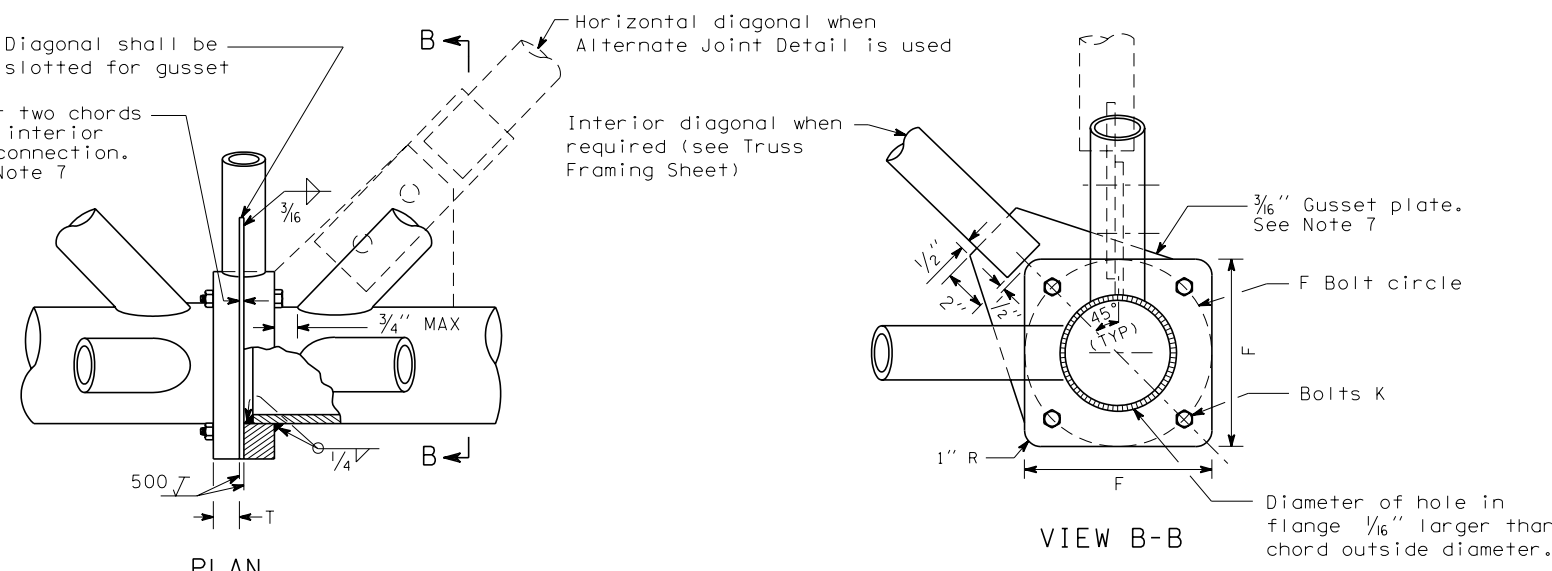
ALTERNATE JOINT DETAIL
Not for connections between vertical diagonals and chords.



END POST OR CHORD SHOP SPLICE
See Note 9



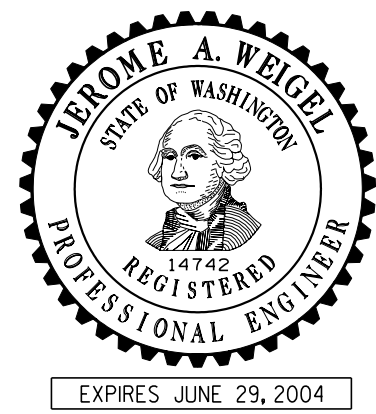
DEAD LOAD CAMBER
For span lengths not listed, interpolate values of Δ .
Fabricate truss with chords curved to provide camber. Do not camber by using shims between chord at splices.




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

SPAN LENGTH S (ft)	Δ - (in)
40'	1/2
50'	3/4
60'	7/8
61'	7/8
70'	1
80'	1 1/4
90'	1 1/2
91'	1 3/8
100'	1 5/8
110'	2
120'	2 3/8
121'	2 1/8
130'	2 1/2
140'	2 7/8
150'	3 3/8

SPAN LENGTH	ALTERNATE JOINT DETAIL DATA		
	e	d	BOLT Q DIAMETER
60' or less	1 1/4"	2 1/2"	3/4"
61' to 90'	1 1/2"	3"	7/8"
91' to 120'	1 1/2"	3"	7/8"
121' to 150'	1 3/4"	3 1/2"	1"



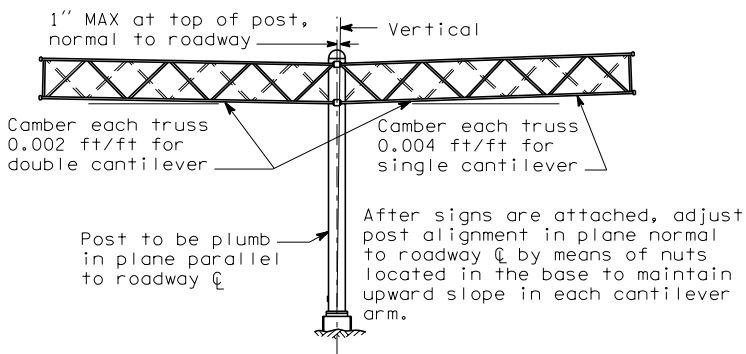
**SIGN BRIDGE
STANDARD PLAN G-2**
SHEET 2 OF 3 SHEETS

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			<div>Harold J. Peterfeso06-04-02</div> <div>STATE DESIGN ENGINEERDATE</div>	
03/2002	CORRECTED WELDING SYMBOL	MAS	<div>Washington State Department of Transportation</div>	
DATE	REVISION	BY		

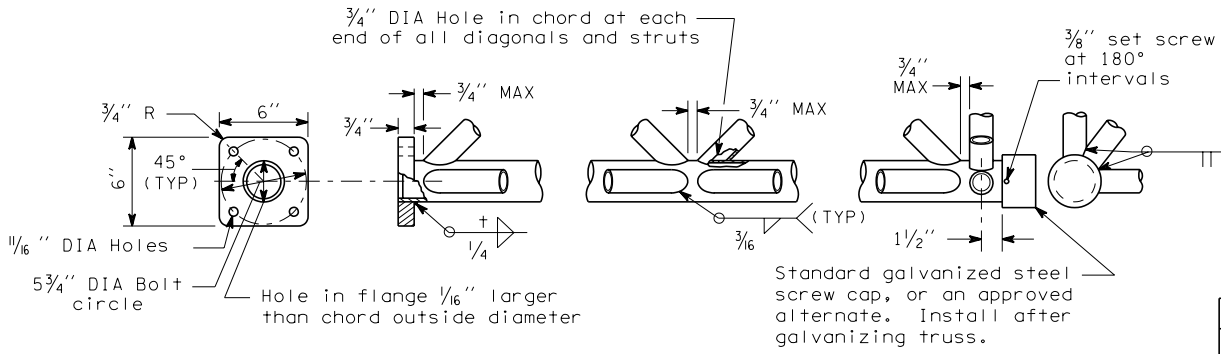


EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004



CAMBER



TYPICAL TRUSS DETAILS

Ends of diagonals shall be cut to fit neatly against chords.
t = chord wall thickness

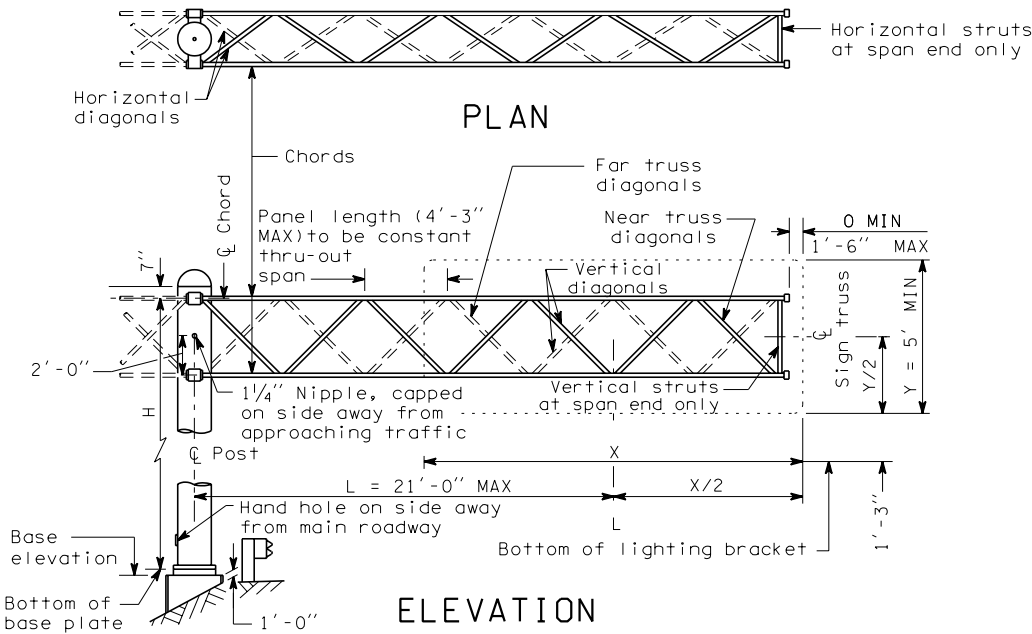
NOTES

1. Vertical and horizontal clearance requirements shall be as shown on the contract plans.
2. No post splices permitted in lower third of height, nor closer than 3'-0" to bottom chord. No chord shop splices permitted in first two-thirds of the span. Only one splice permitted in post. For post or chord shop splice details, see Standard Plan "Sign Bridge".
3. All bolt holes shall be drilled, and the diameter shall be 1/16" larger than the nominal bolt diameter except as noted.

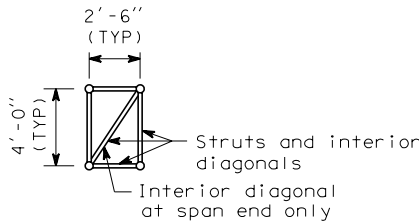
CHORD SELECTION		
Sign Area (X times Y) (ft) ²	Chord Size	
	NOM DIA	Wall
50 or less	2"	.154"
50+ to 100	2"	.218"
100+ to 150	2 1/2"	.203"
150+ to 200	3"	.216"

POST SELECTION		
Total Sign Area* Σ(X times Y) (ft) ²	Post Size	
	OD	Wall
50 or less	16"	.500"
50+ to 100	16"	.500"
100+ to 150	18"	.438"
150+ to 200	18"	.500"
200+ to 250	20"	.500"
250+ to 300	24"	.375"
300+ to 350	24"	.438"
350+ to 400	24"	.500"

*Sum of sign areas for double cantilever

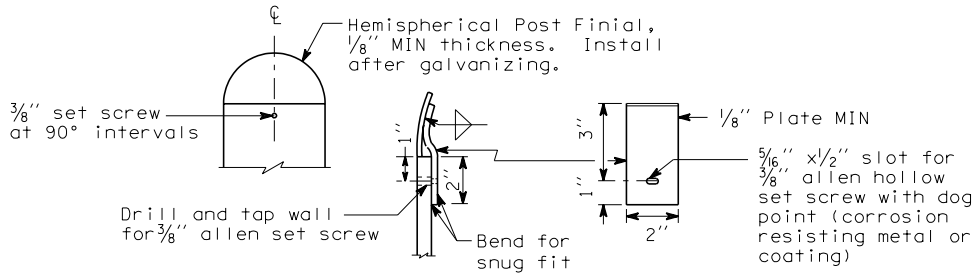


ELEVATION

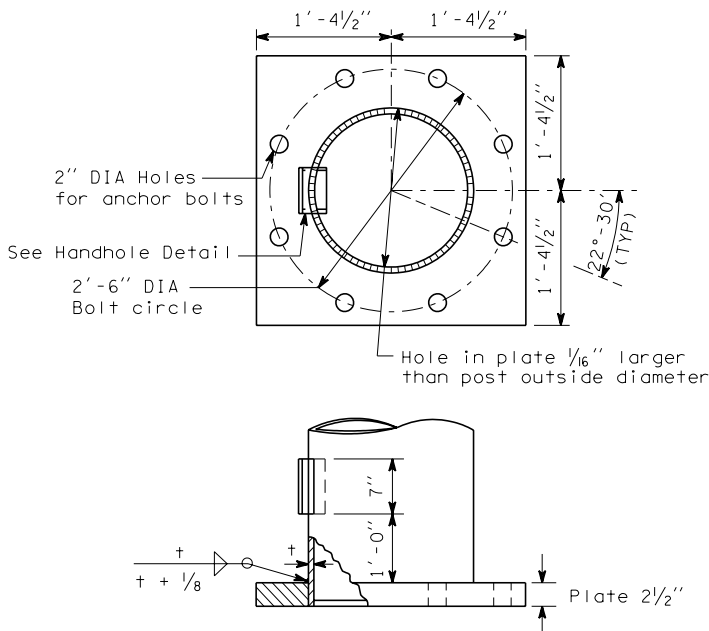


END VIEW

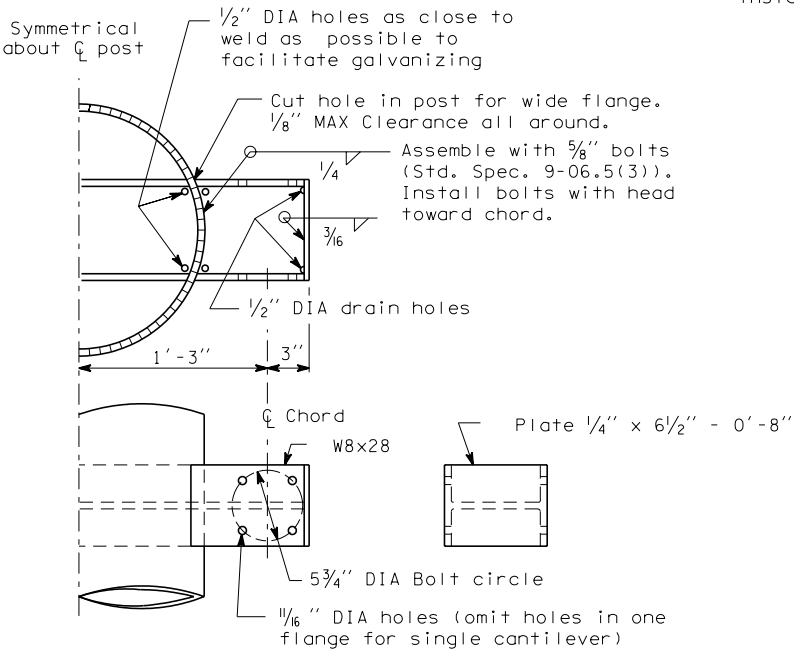
All diagonals and struts shall be 1 1/4" pipe (0.140" wall)



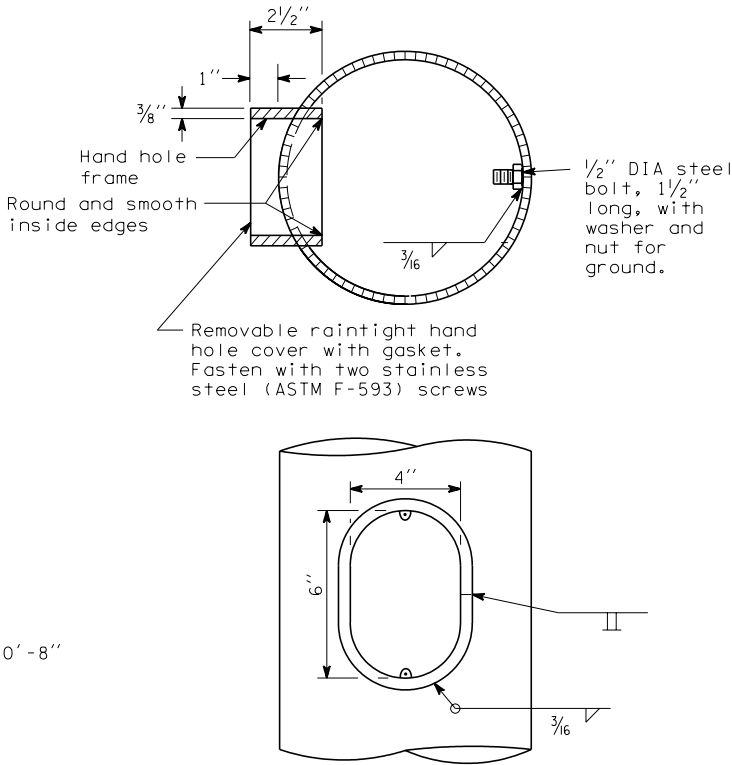
FINIAL DETAIL



POST BASE DETAIL



CHORD TO POST CONNECTION

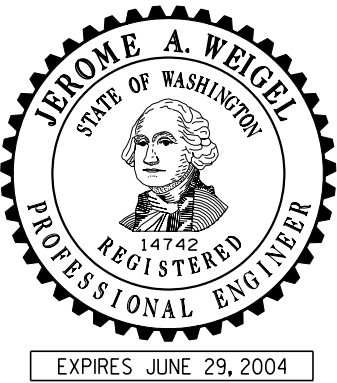


HANDHOLE DETAIL

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03/2002	ADDED MATERIAL SPECIFICATIONS CORRECTED WELD SYMBOL	MAS
DATE	REVISION	BY

APPROVED FOR PUBLICATION		
Harold J. Peterfeso		06-04-02
STATE DESIGN ENGINEER		DATE
Washington State Department of Transportation		



CANTILEVER
SIGN STRUCTURES

STANDARD PLAN G-3

SHEET 1 OF 1 SHEET





ELEVATION SINGLE POST SIGNS

ELEVATION TWO POST SIGNS

POST INSTALLATION TABLE		
POST SIZE	D	NOTCH DEPTH & HOLE DIAM.
4 x 4	3'-0"	NOT REQ'D
4 x 6	4'-0"	1 1/2"
6 x 6	4'-0"	2"
6 x 8	4' 0"	3"
6 x 10	5'-0"	NOT REQ'D
8 x 10	5'-0"	NOT REQ'D
8 x 12	6'-0"	NOT REQ'D

**ELEVATION
THREE POST SIGNS**

ELEVATION FOUR POST SIGNS

NOTES

1. See "Sign Specifications" sheet of contract for H_1 , H_2 , H_3 , H_4 , X & Y
2. Post sizes 6" X 10" , 8" X 10" & 8" X 12" can only be installed behind traffic barrier.
3. Use two 3/8" X 3" lag screws to hold the sign posts into the foundation sleeve.
4. See Std. Plan G-1 for sign placement requirements.

SINGLE POST DETAIL

MULTIPLE POST DETAIL
*NOTCH REQUIRED FOR MULTIPLE
POST INSTALLATIONS ONLY

CONCRETE FOUNDATION SLEEVE DETAIL
(TO BE USED WHEN PLACING POST IN A PAVED AREA)



EXPIRES JUNE 29, 2002

ROADSIDE SIGN STRUCTURES ON TIMBER POSTS STANDARD PLAN G-4a

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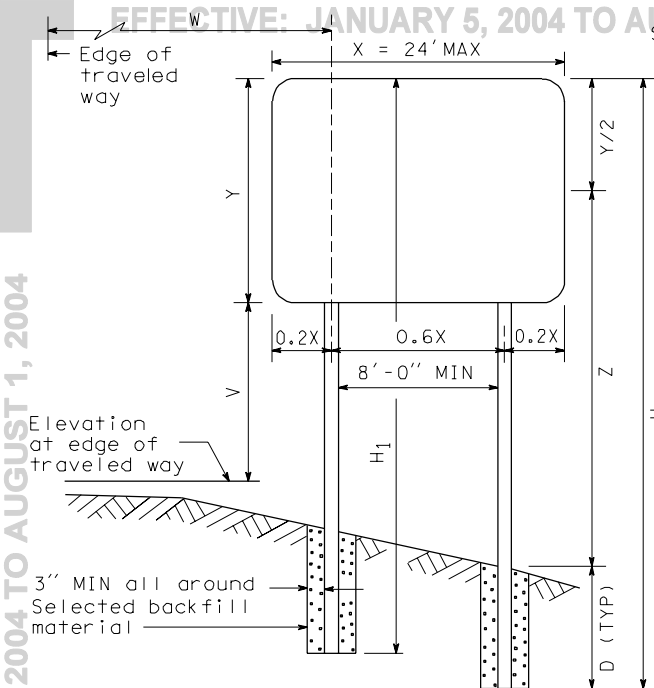
7/01	Added multiple post detail; revised foundation sleeve; deleted back slope detail
DATE	REVISION

APPROVED FOR PUBLICATION

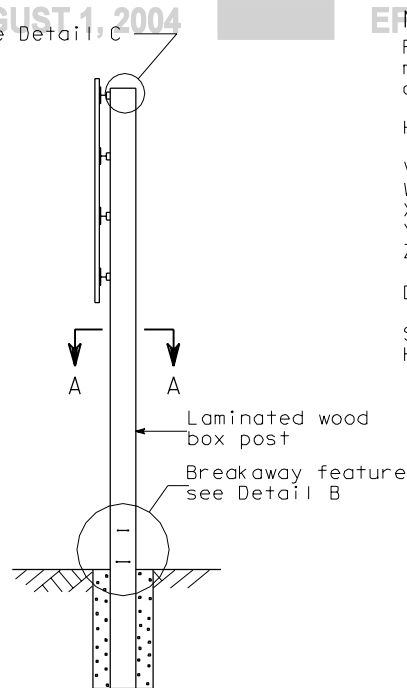
Harold J. Peterfeso 01-23-02


STATE DESIGN ENGINEER
DATE

Washington State Department of Transportation

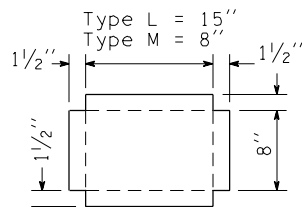


ELEVATION

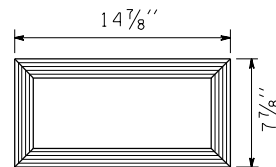


SIDE VIEW

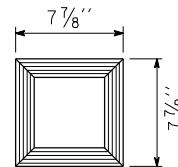
Height Z (FT)	Total Sign Area (Square Feet)					
	Up to 50	51 to 100	101 to 150	151 to 200	201 to 250	251 to 290
9 to 12	6	6	7	8	9	10
13 to 15	6	6	7.5	8	9	10
16 to 18	7	7.5	9	Not Permitted		
19 to 22	7	8	10			
23 to 26	7.5	8.5				

LAMINATED POST EMBEDMENT DEPTH
DEPTH (D) IN FEET

GALVANIZED METAL CAP



TYPE L POST



TYPE M POST

Traffic Direction
SECTION A-A

Post will be Micro-Lam® laminated veneer Type L or Type M post manufactured by Trus Joist or an equivalent that has been crash tested and approved by the FHWA.

H_1 , H_2 , H_3 , H_4 = Length of post.

V = Elevation difference from edge of lane to bottom of sign.

W = Distance from edge of lane to center of nearest post.

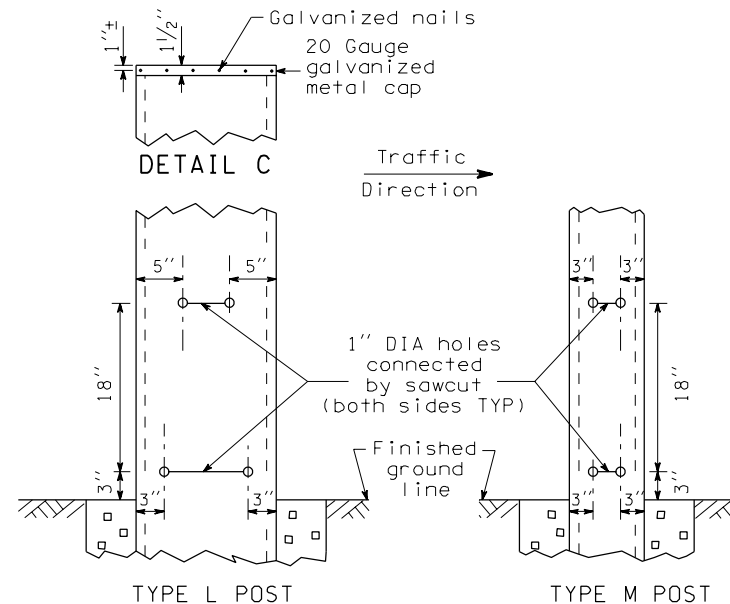
X = Horizontal measurement of sign.

Y = Vertical measurement of sign (or signs).

Z = Height from ground to mid-height of sign (or signs) at longest post.

D = Post embedment.

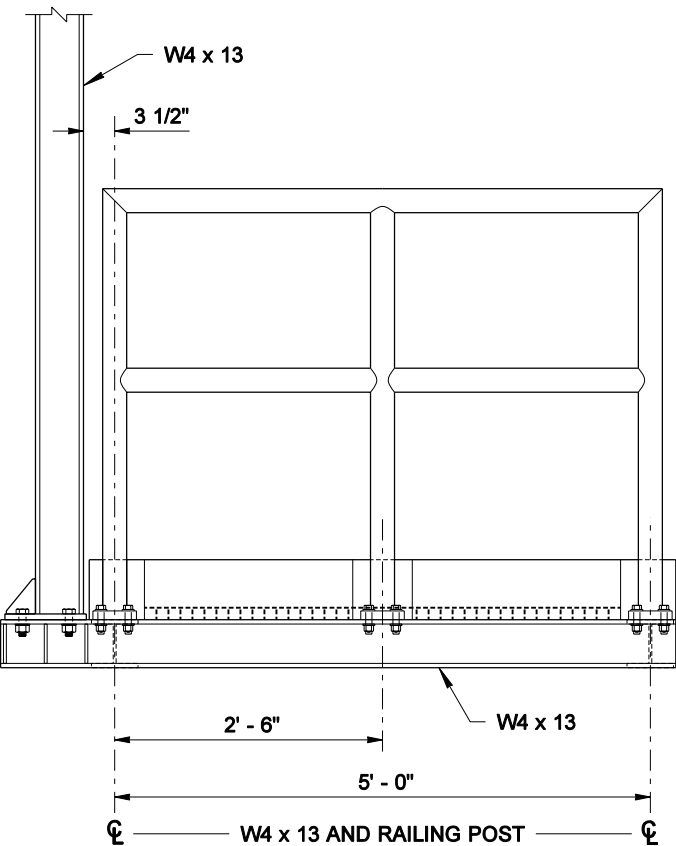
See "Sign Specifications" sheet of Contract Plans for H , V , W , X , and Y values.



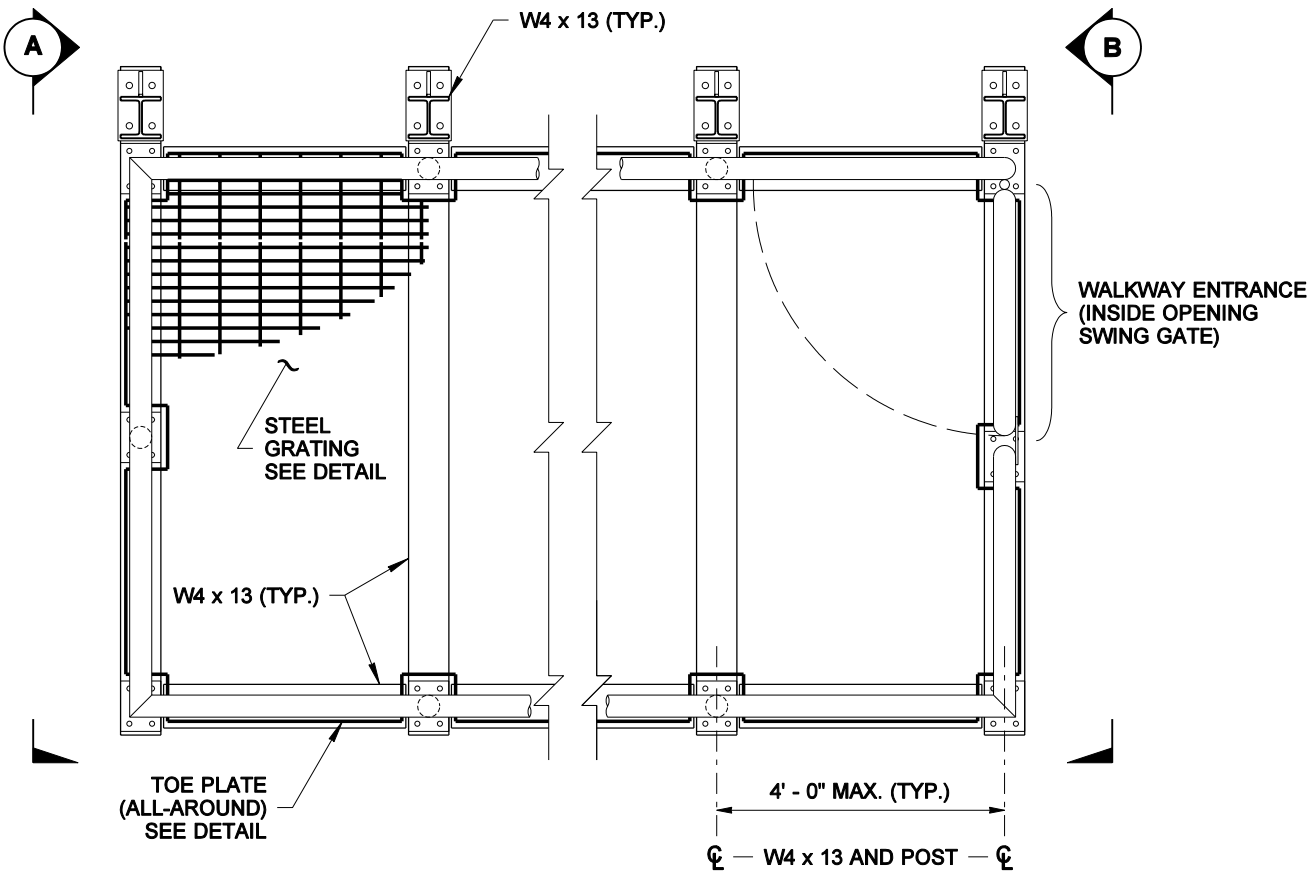
DETAIL B

ROADSIDE SIGNS ON
LAMINATED WOOD BOX POSTS

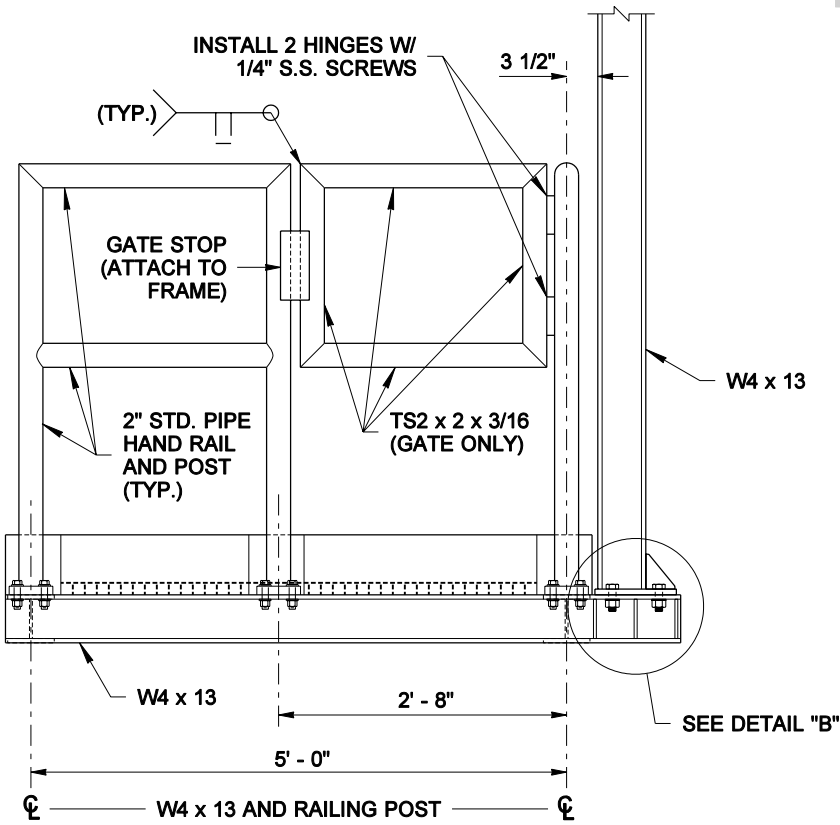
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END VIEW A



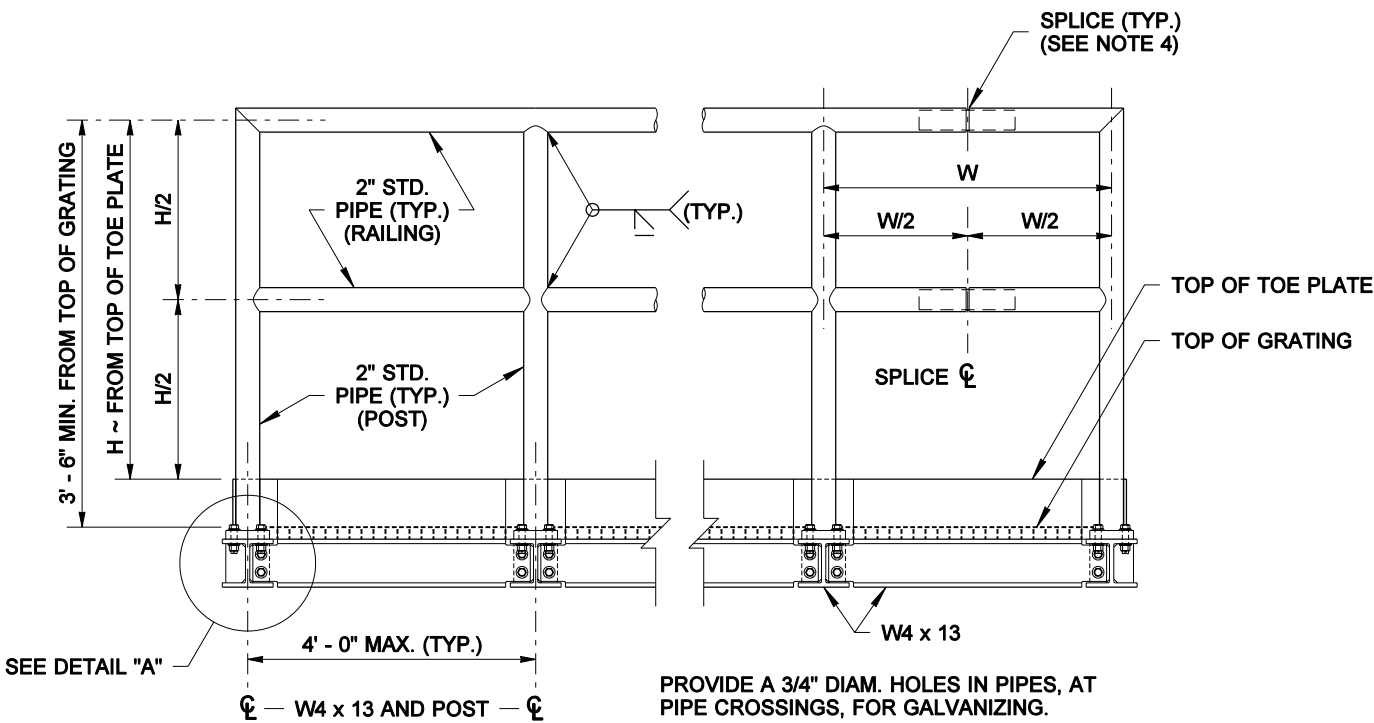
PLAN
MAINTENANCE WALKWAY



MAINTENANCE WALKWAY GATE

END VIEW B

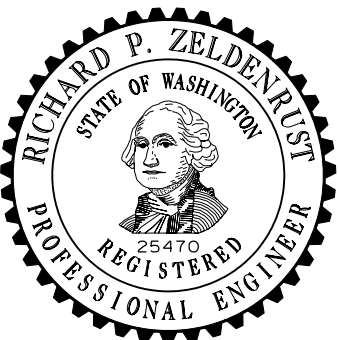
MATERIAL SPECIFICATIONS	
PIPE	ASTM A 36 OR ASTM A 53 GRADE B, TYPE E OR S, OR ASTM A 500 GRADE B
PLATES AND SHAPES	ASTM A 36
STRUCTURAL TUBING	ASTM A 500 GRADE B
GALVANIZING FOR PIPE PLATES AND SHAPES	AASHTO M 111
HIGH STRENGTH BOLTS, NUTS, & WASHERS; INCL. MOUNTING BEAM BOLTS	STD SPEC. 9-06.5(3)
ALL OTHER BOLTS	STD SPEC. 9-06.5(1)
FASTENER GALVANIZING	AASHTO M 232
STEEL GRATING	ASTM A 36



ELEVATION
MAINTENANCE WALKWAY

NOTES

1. NOT INTENDED FOR USE IN FRONT OF STATIC SIGNS.
2. FOR MOUNTING THE MAINTENANCE WALKWAY TO A MONOTUBE OVERHEAD SIGN STRUCTURE, SEE STANDARD PLAN G-6a.
3. FOR MOUNTING THE MAINTENANCE WALKWAY TO A TRUSS-TYPE OVERHEAD SIGN STRUCTURE, SEE STANDARD PLAN G-6b.
4. LOCATION OF RAILING SPLICES TO BE DETERMINED BY FABRICATOR. SEE "RAILING SPLICE DETAIL".



EXPIRES NOVEMBER 14, 2004

MAINTENANCE WALKWAY
FOR OVERHEAD
SIGN STRUCTURES
STANDARD PLAN G-6

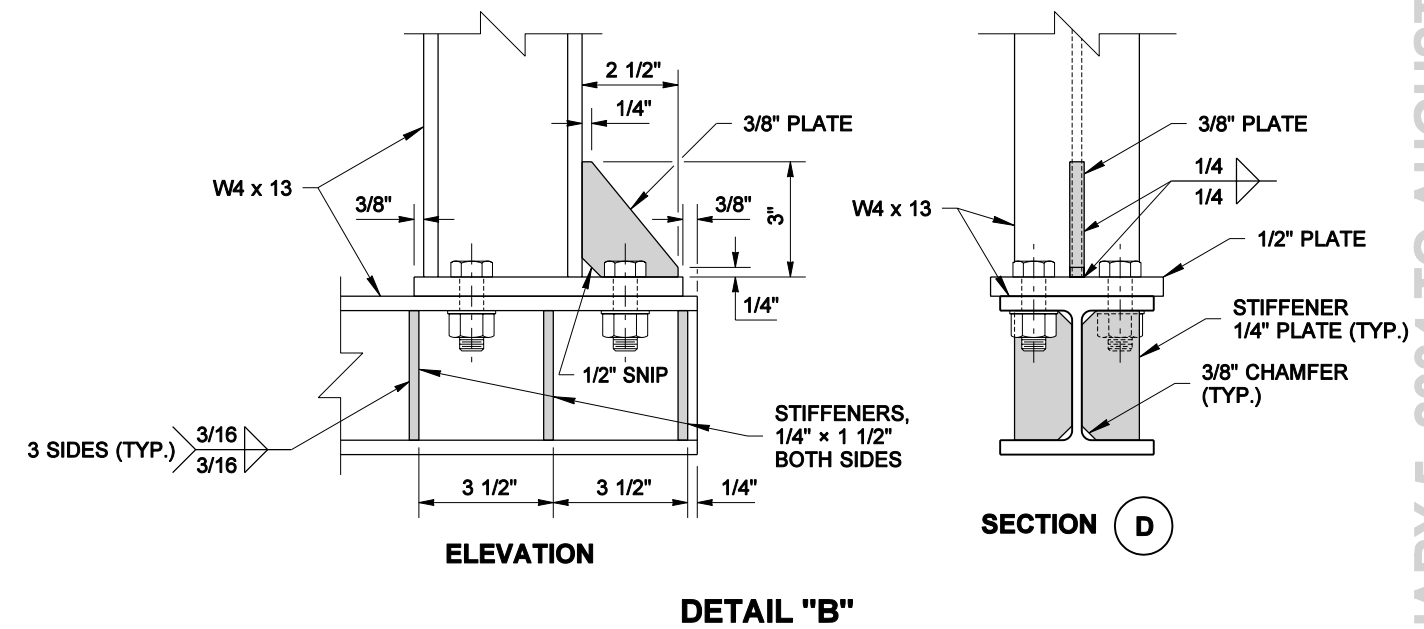
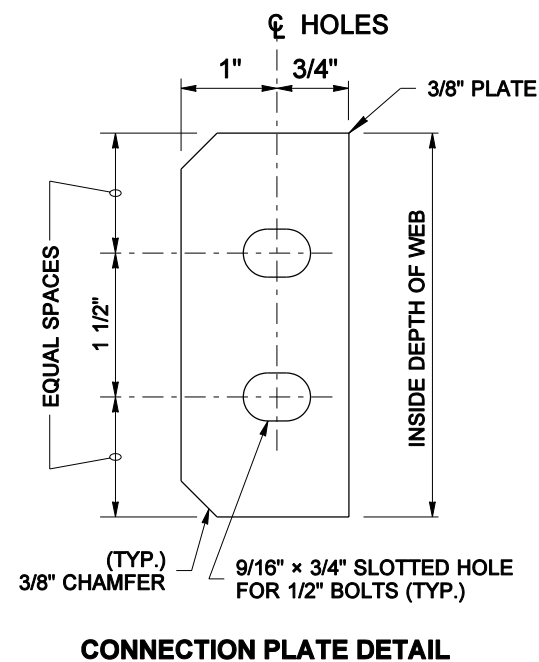
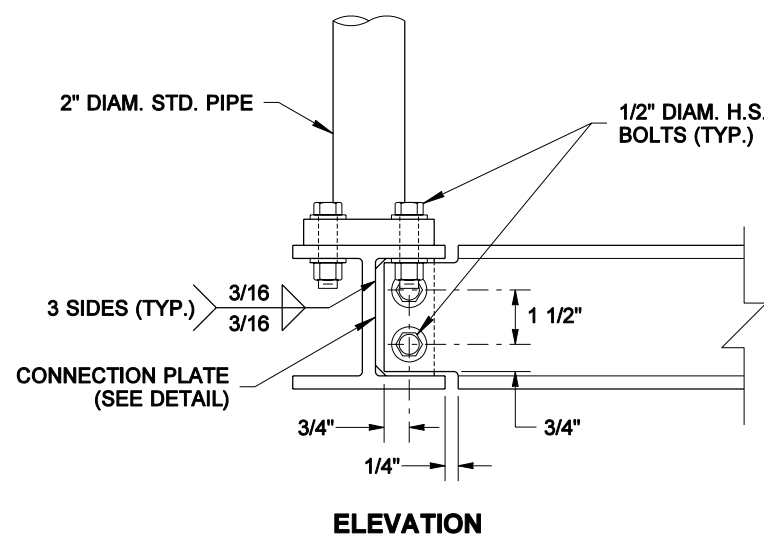
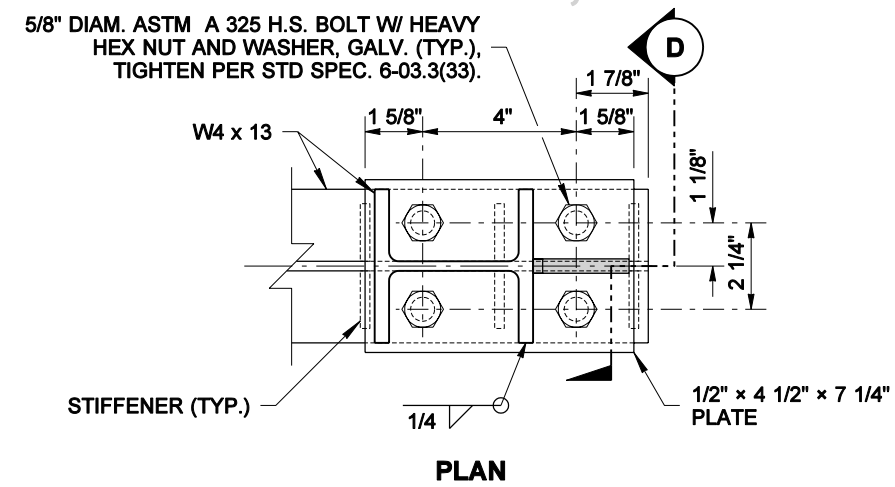
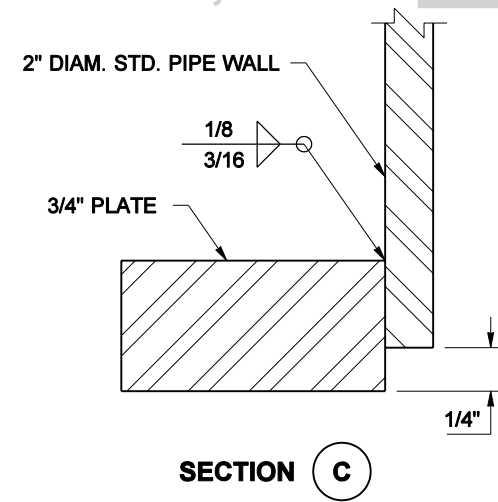
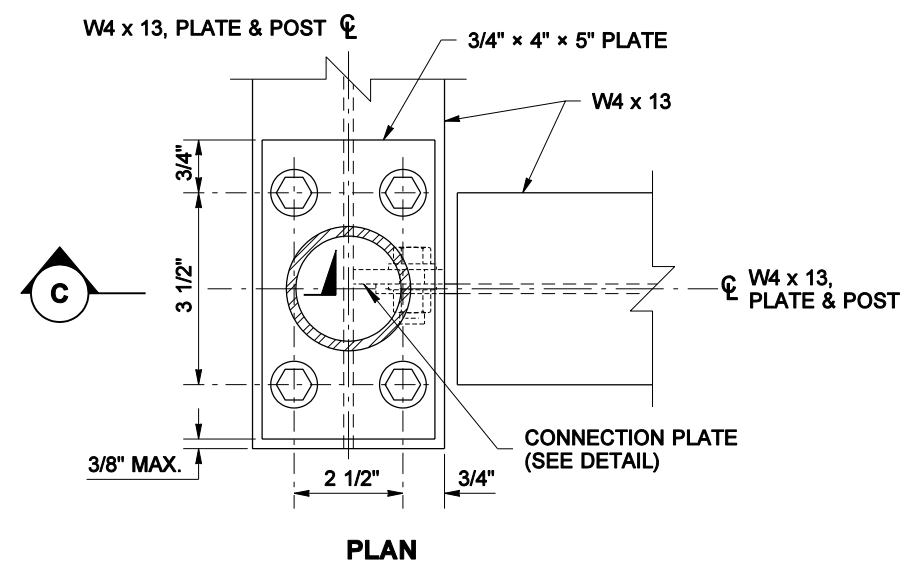
SHEET 1 OF 3 SHEETS

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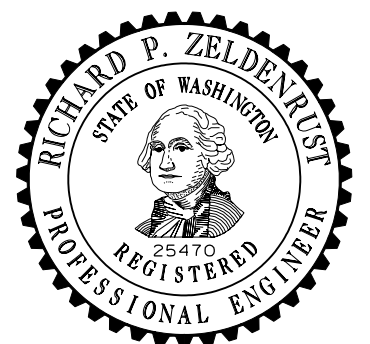
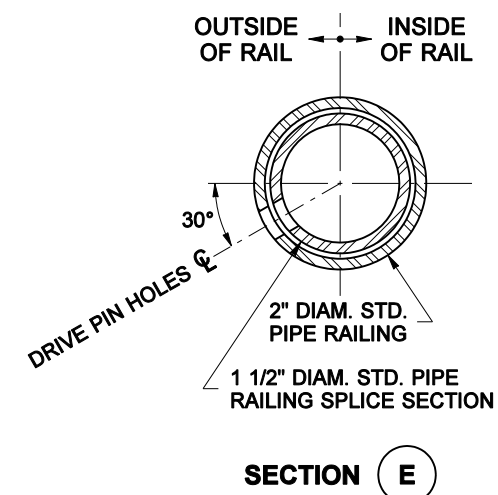
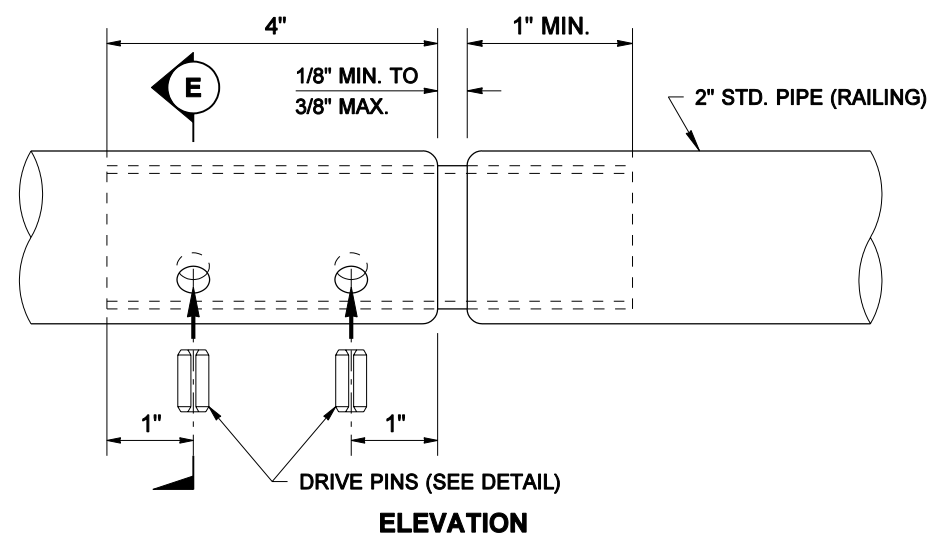
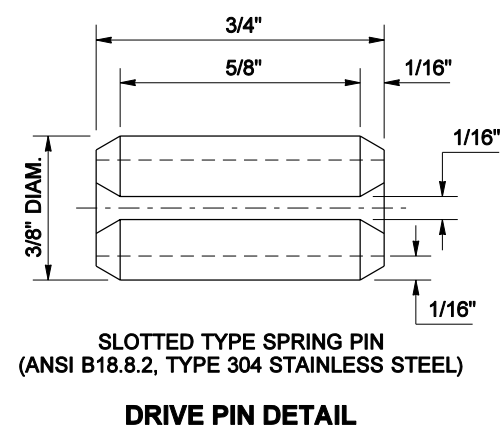
Harold J. Peterfeso 08-27-03

STATE DESIGN ENGINEER DATE

Washington State Department of Transportation



DETAIL "A"



EXPIRES NOVEMBER 14, 2004

**MAINTENANCE WALKWAY
FOR OVERHEAD
SIGN STRUCTURES
STANDARD PLAN G-6**

SHEET 2 OF 3 SHEETS

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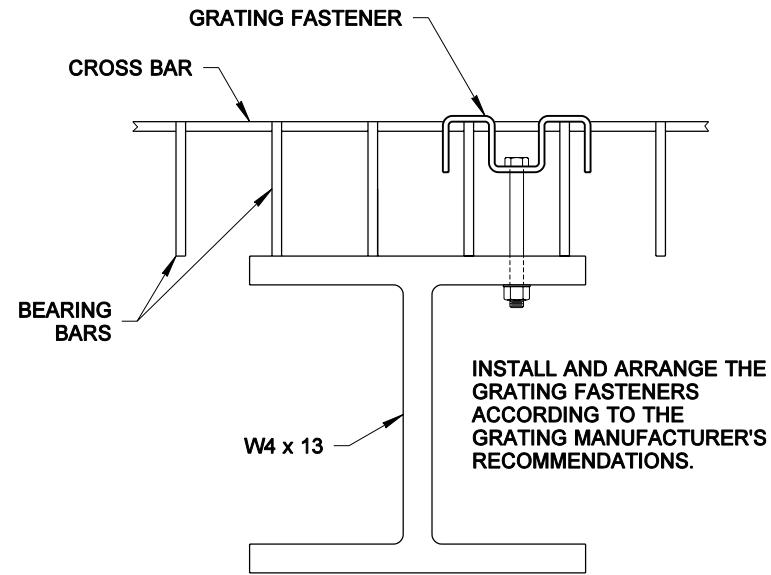
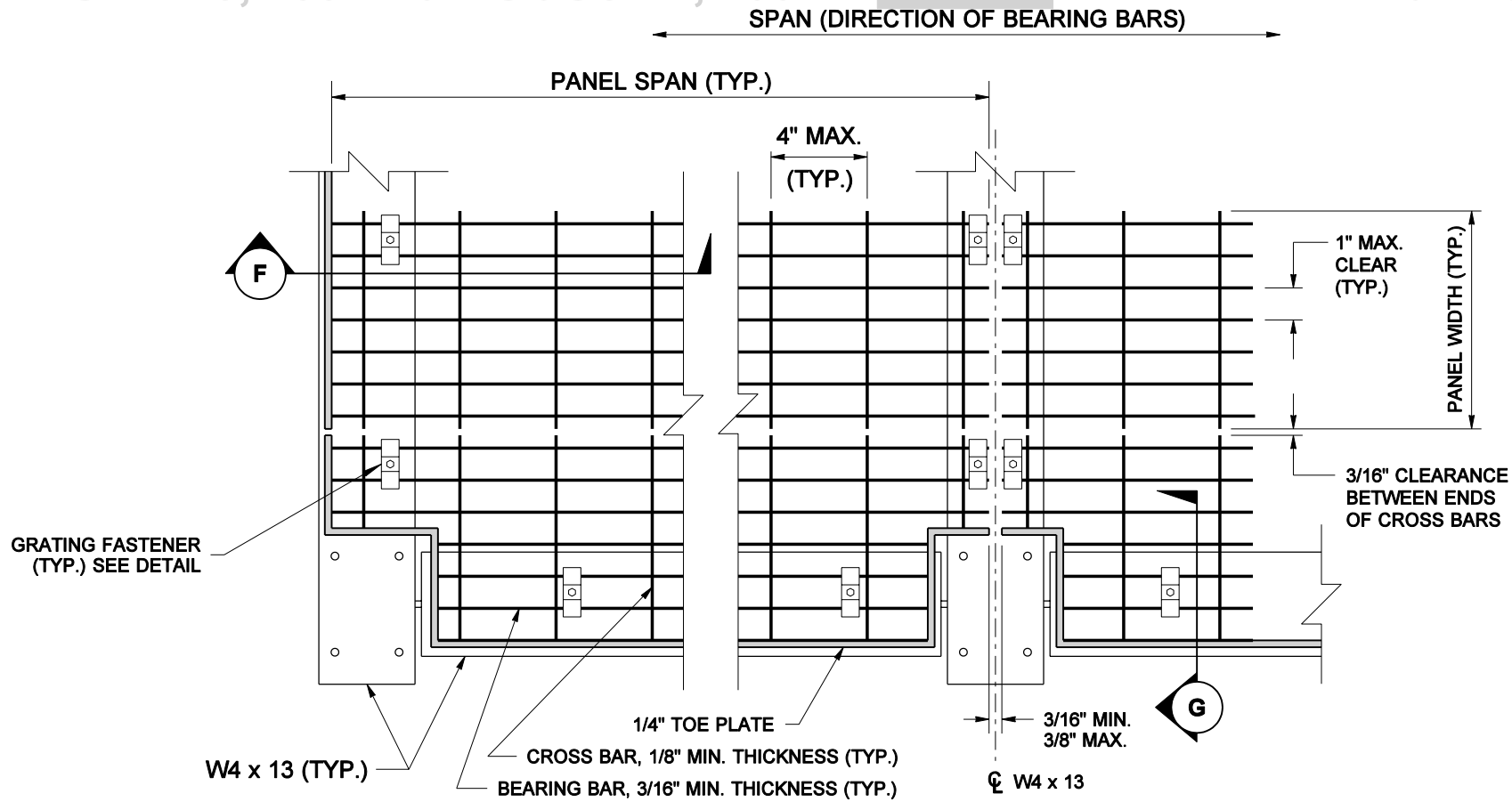
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STATE DESIGN ENGINEER

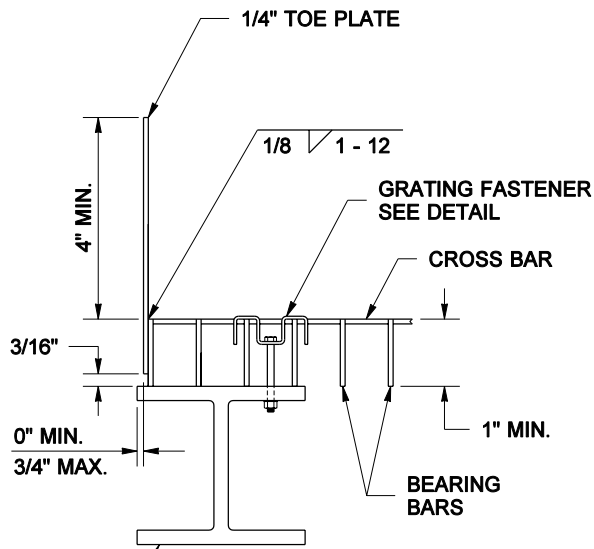
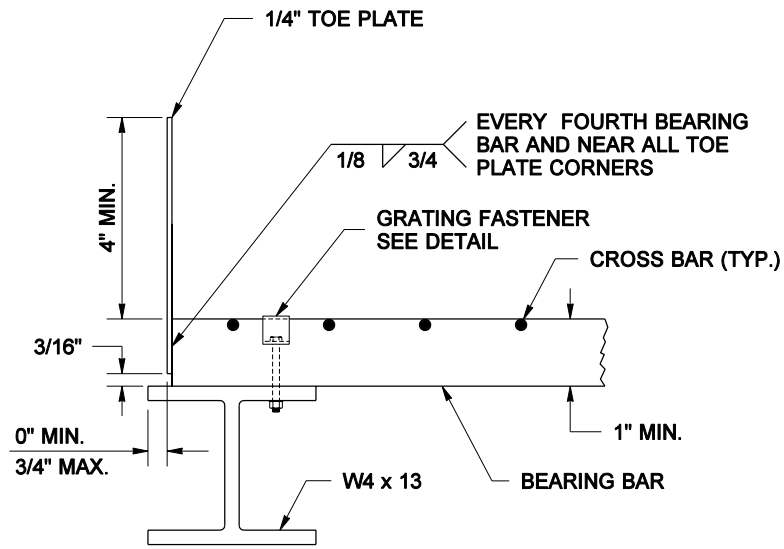
DATE



Washington State Department of Transportation



GRATING FASTENER DETAIL



EXPIRES NOVEMBER 14, 2004

**MAINTENANCE WALKWAY
FOR OVERHEAD
SIGN STRUCTURES
STANDARD PLAN G-6**

SHEET 3 OF 3 SHEETS

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STATE DESIGN ENGINEER

DATE

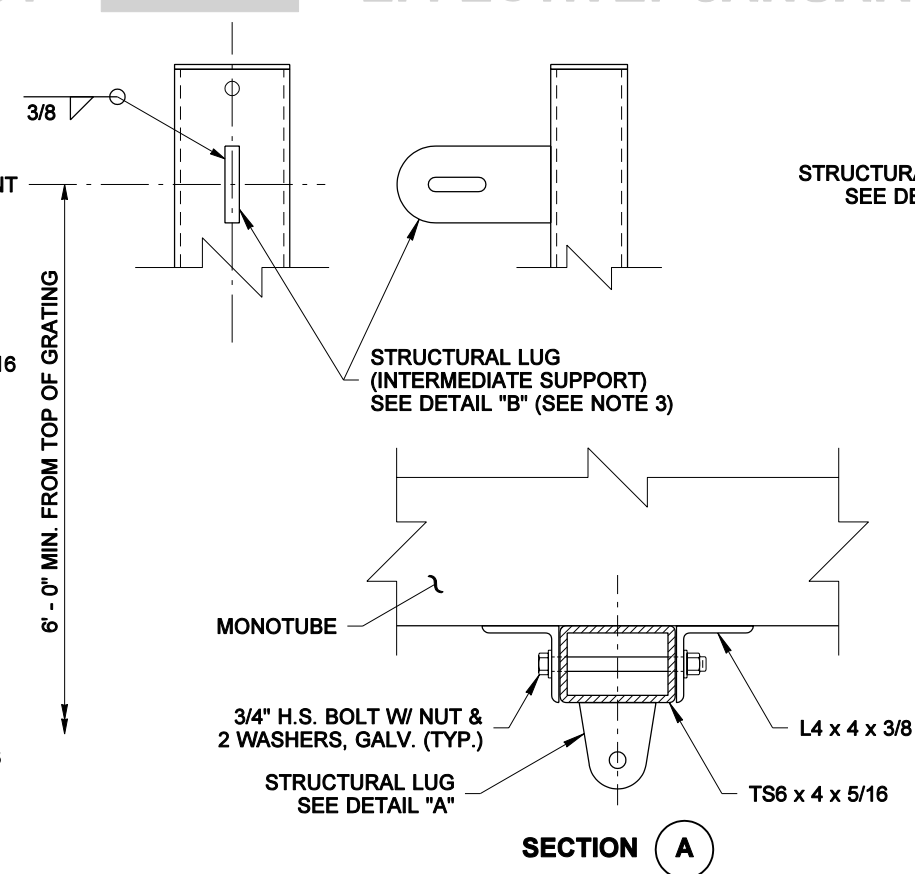
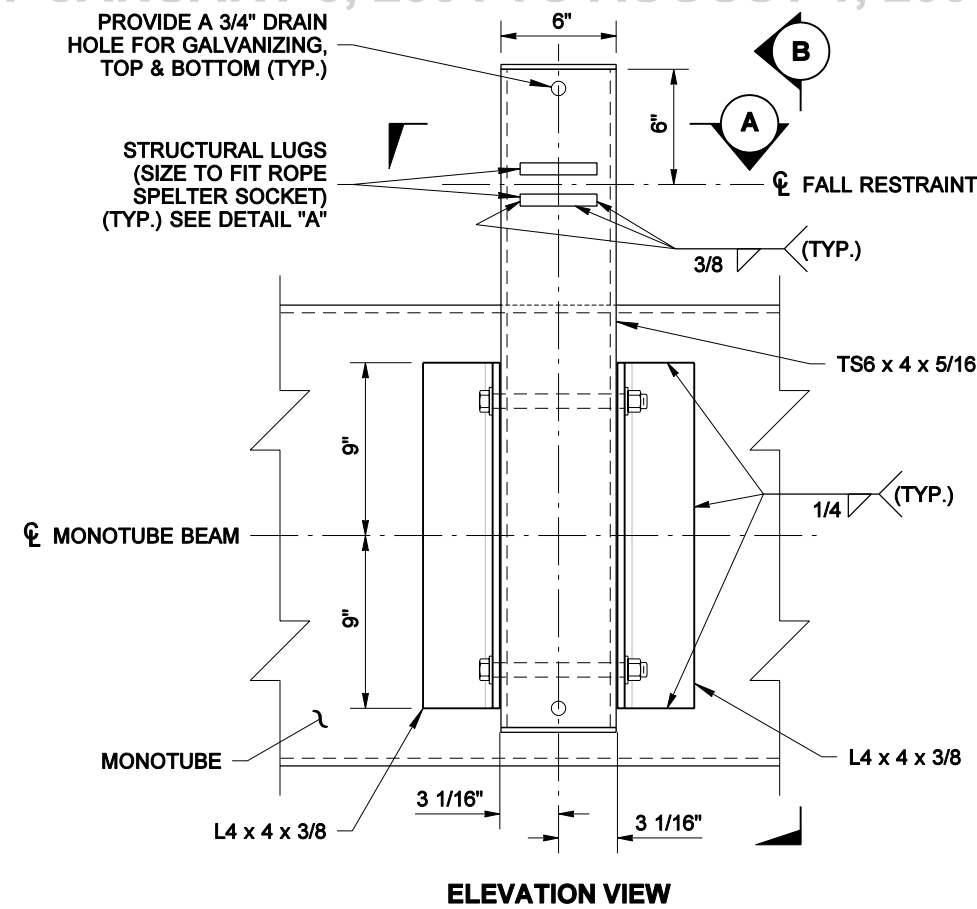


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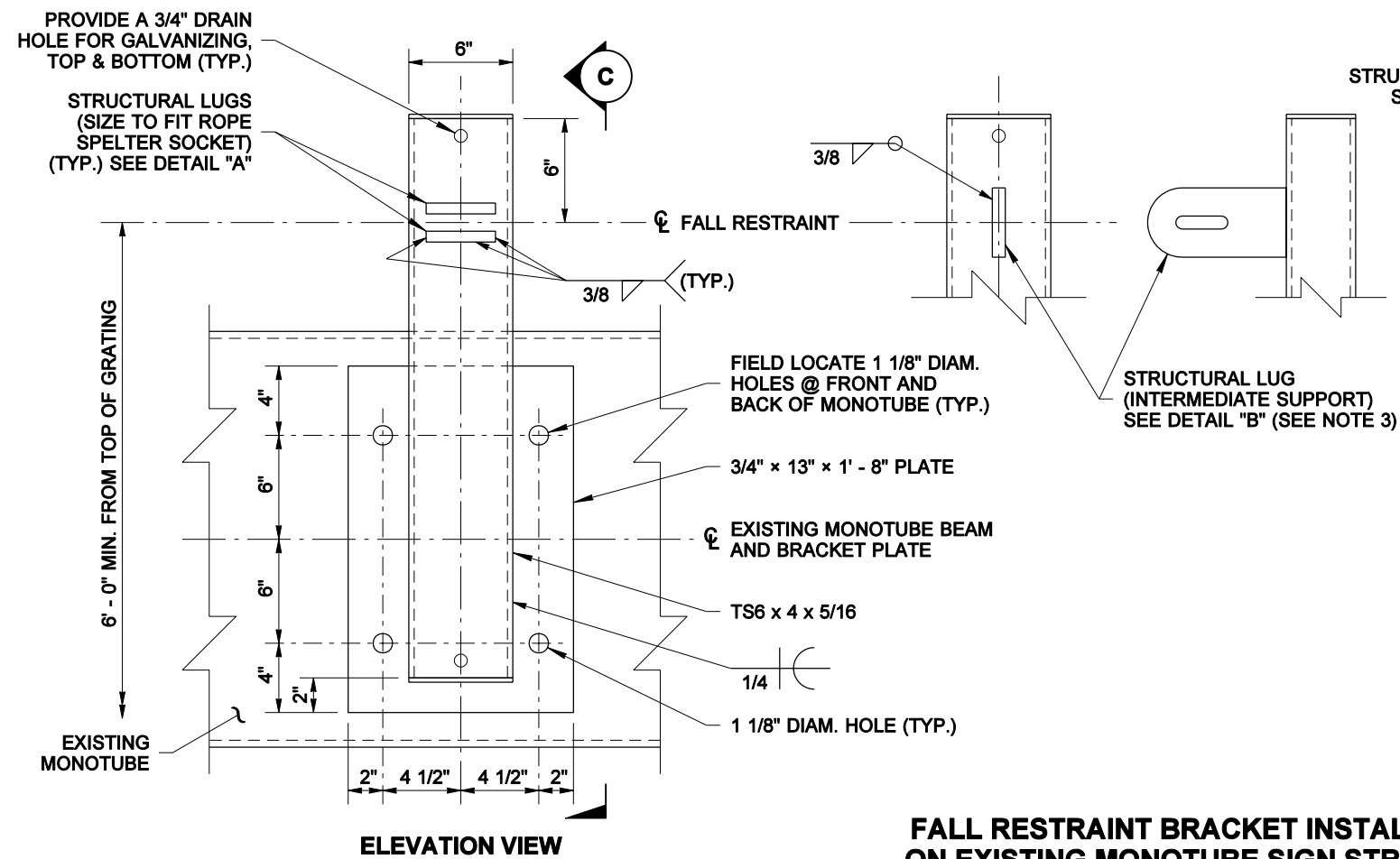
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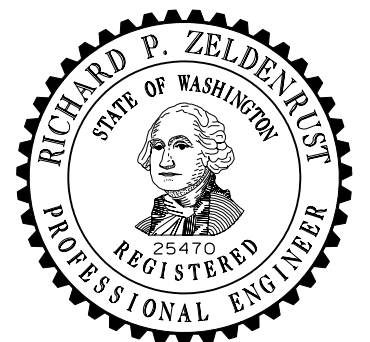
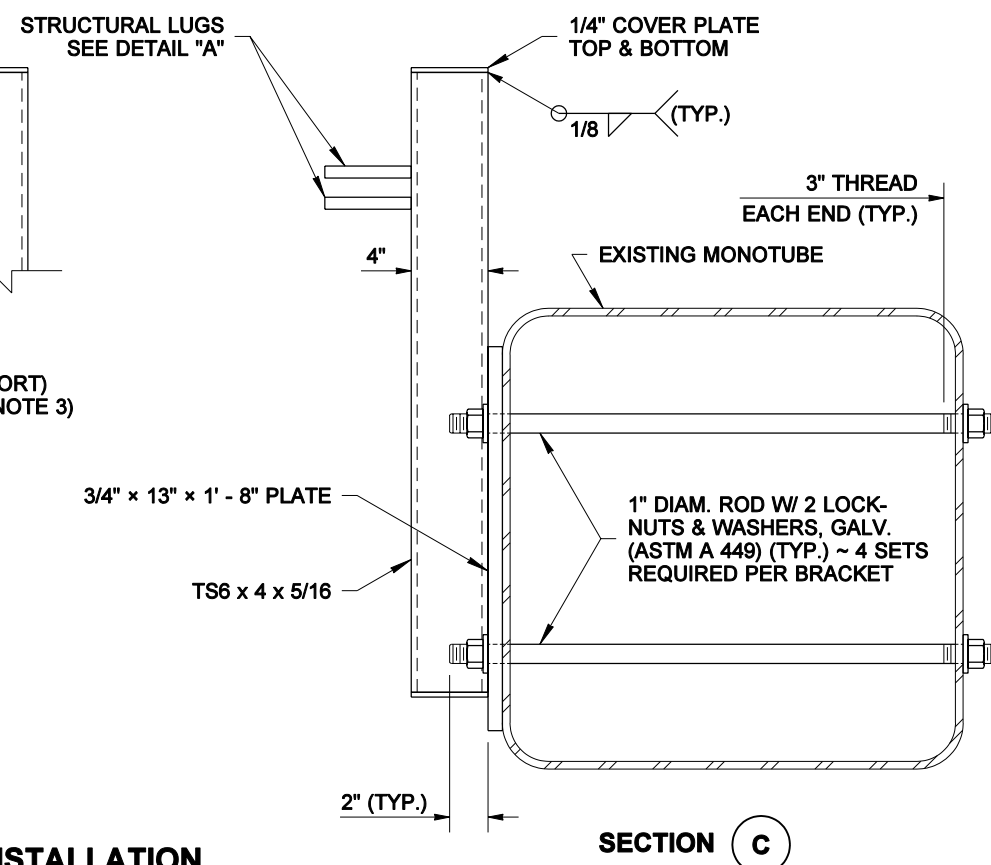
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FALL RESTRAINT BRACKET INSTALLATION ON NEW MONOTUBE SIGN STRUCTURE



FALL RESTRAINT BRACKET INSTALLATION ON EXISTING MONOTUBE SIGN STRUCTURE



EXPIRES NOVEMBER 14, 2004

MAINTENANCE WALKWAY MOUNTING FOR MONOTUBE OVERHEAD SIGN STRUCTURE
STANDARD PLAN G-6a

SHEET 2 OF 3 SHEETS

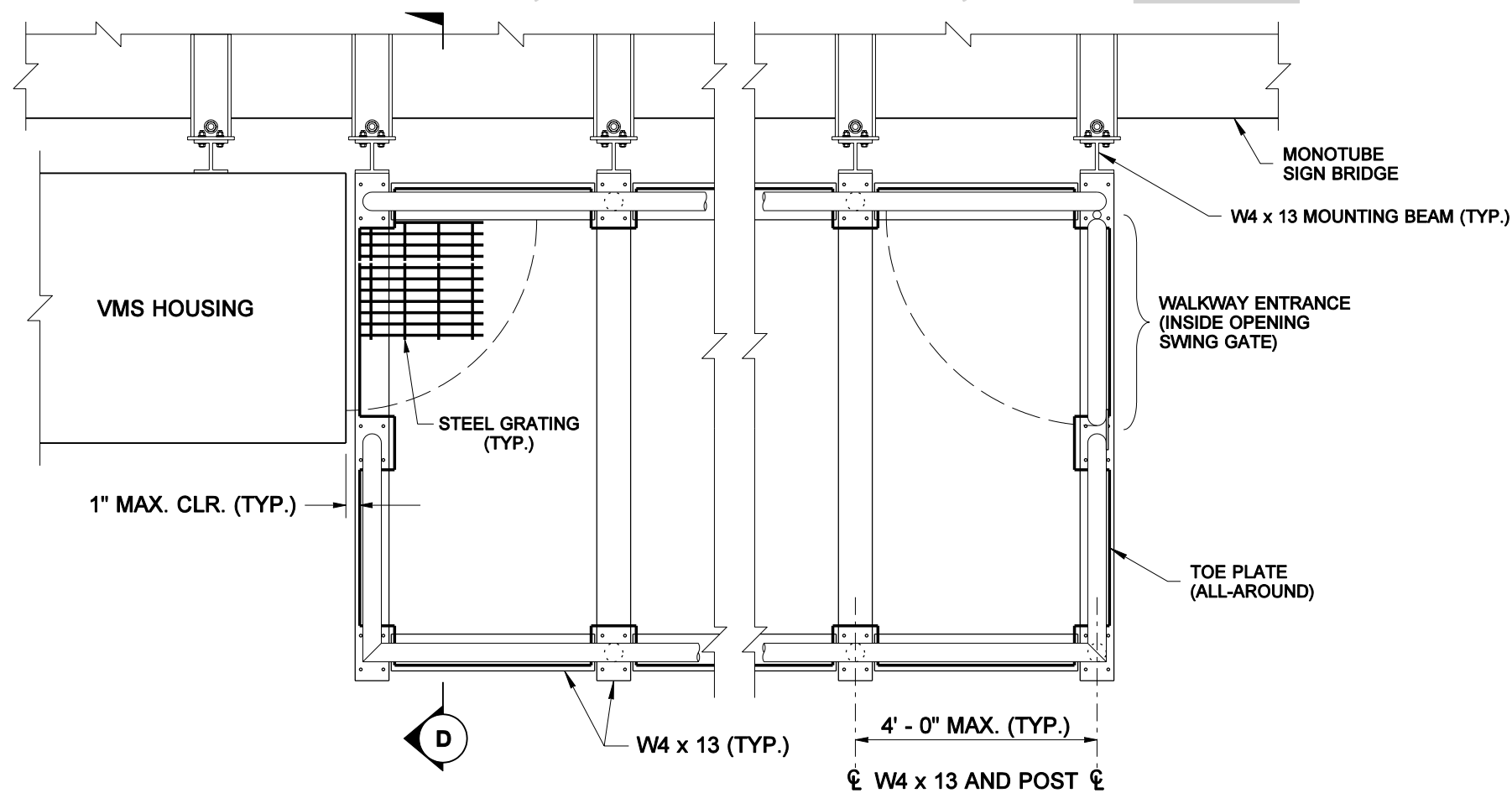
APPROVED FOR PUBLICATION

Harold J. Peterfeso 08-27-03

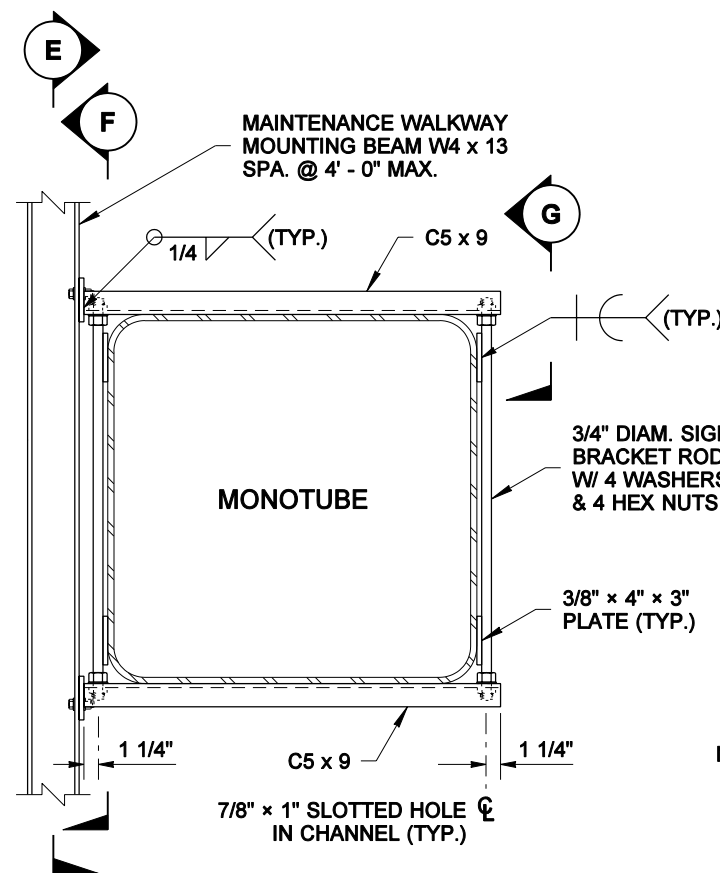
STATE DESIGN ENGINEER

DATE

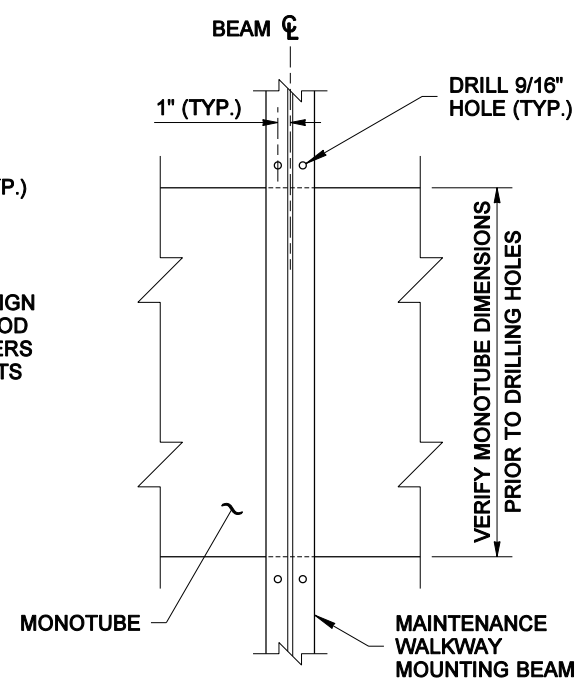
Washington State Department of Transportation



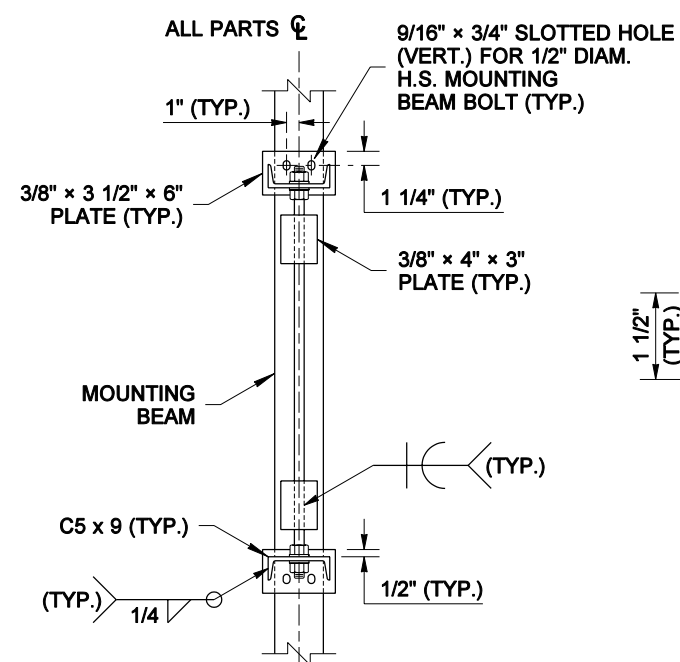
**MAINTENANCE WALKWAY
PARTIAL PLAN**



ATTACHMENT BRACKET DETAIL



SECTION E

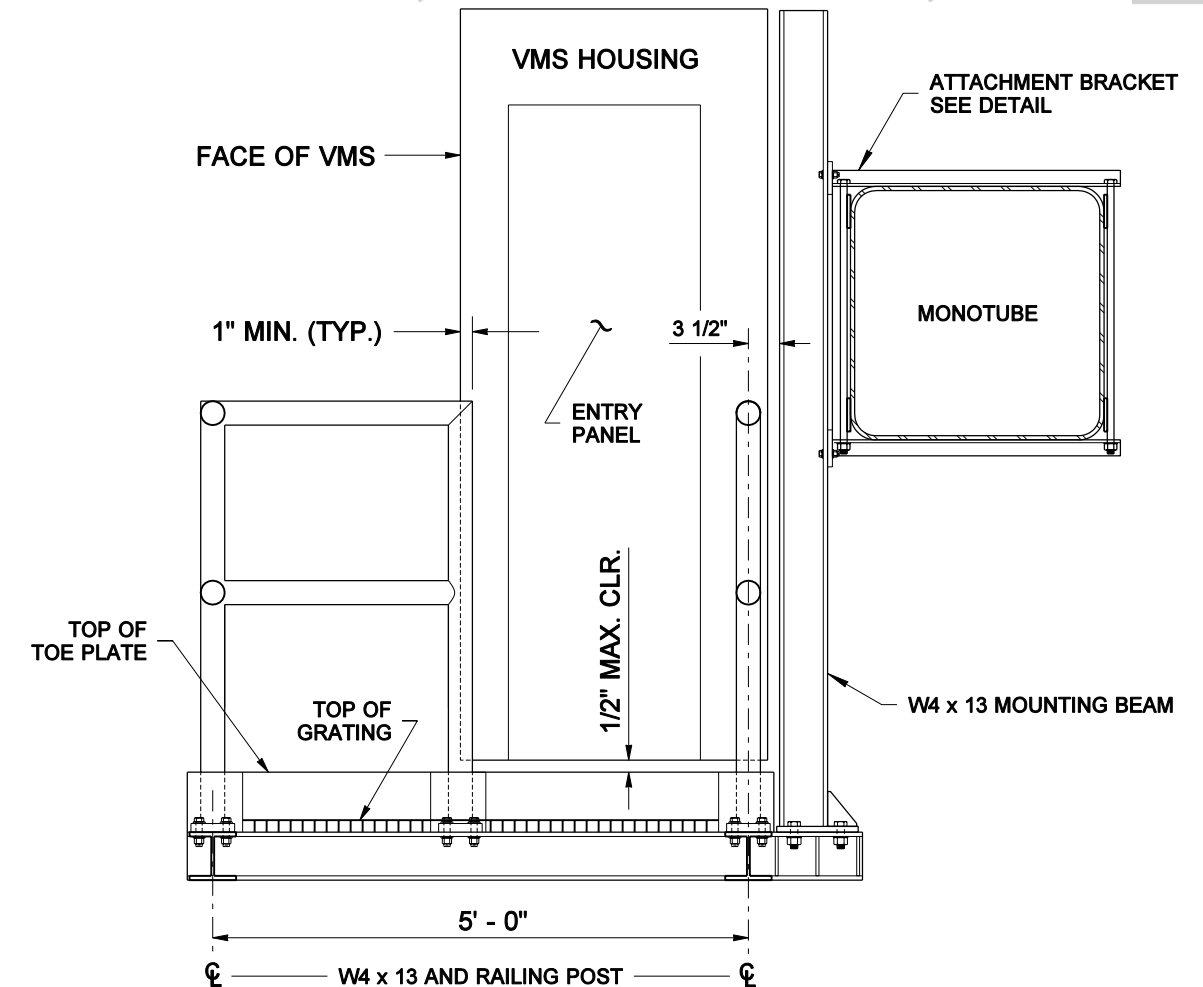


SECTION F

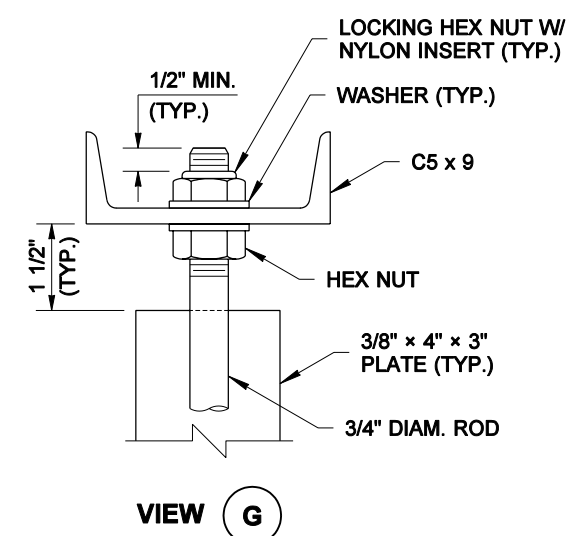
BRACKET NOTES

PAINT ENTIRE ATTACHMENT BRACKET TO MATCH EXISTING STRUCTURE EXCEPT FOR MOUNTING BEAM.

SIGN, LIGHT, BEAM LENGTHS, SIZE AND SPACING SHALL BE DETERMINED FROM THE CONTRACT PLANS OR WSDOT STANDARD PLANS.



SECTION D



VIEW G



EXPIRES NOVEMBER 14, 2004

**MAINTENANCE WALKWAY
MOUNTING FOR MONOTUBE
OVERHEAD SIGN STRUCTURE
STANDARD PLAN G-6a**

SHEET 3 OF 3 SHEETS

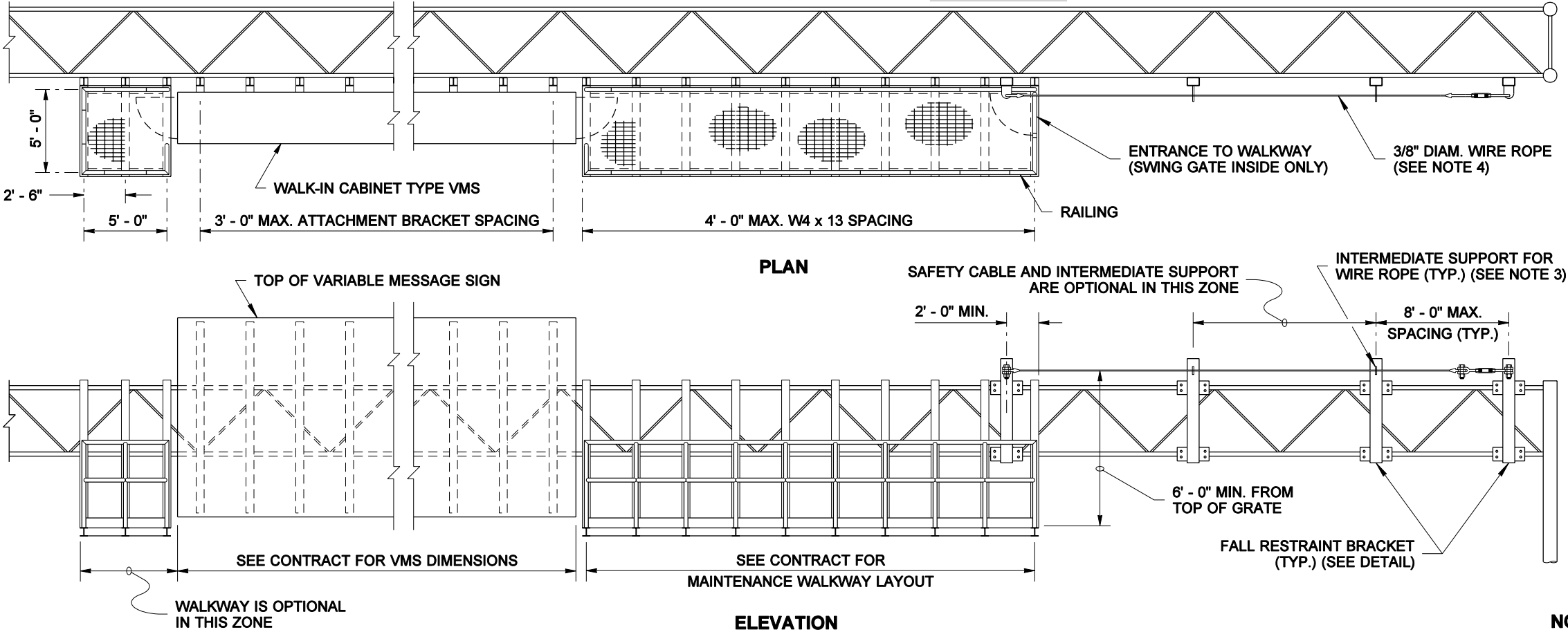
APPROVED FOR PUBLICATION

Harold J. Peterfeso 08-27-03

STATE DESIGN ENGINEER

DATE

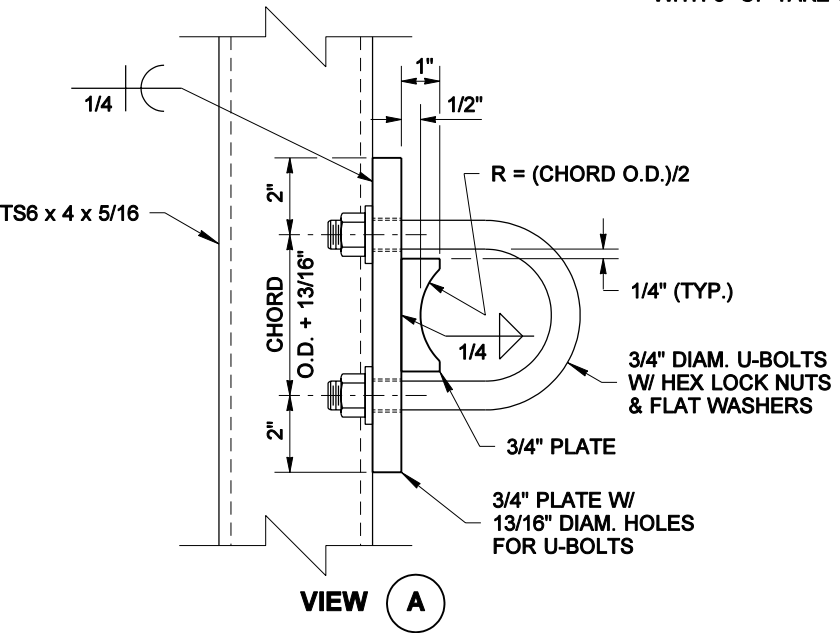
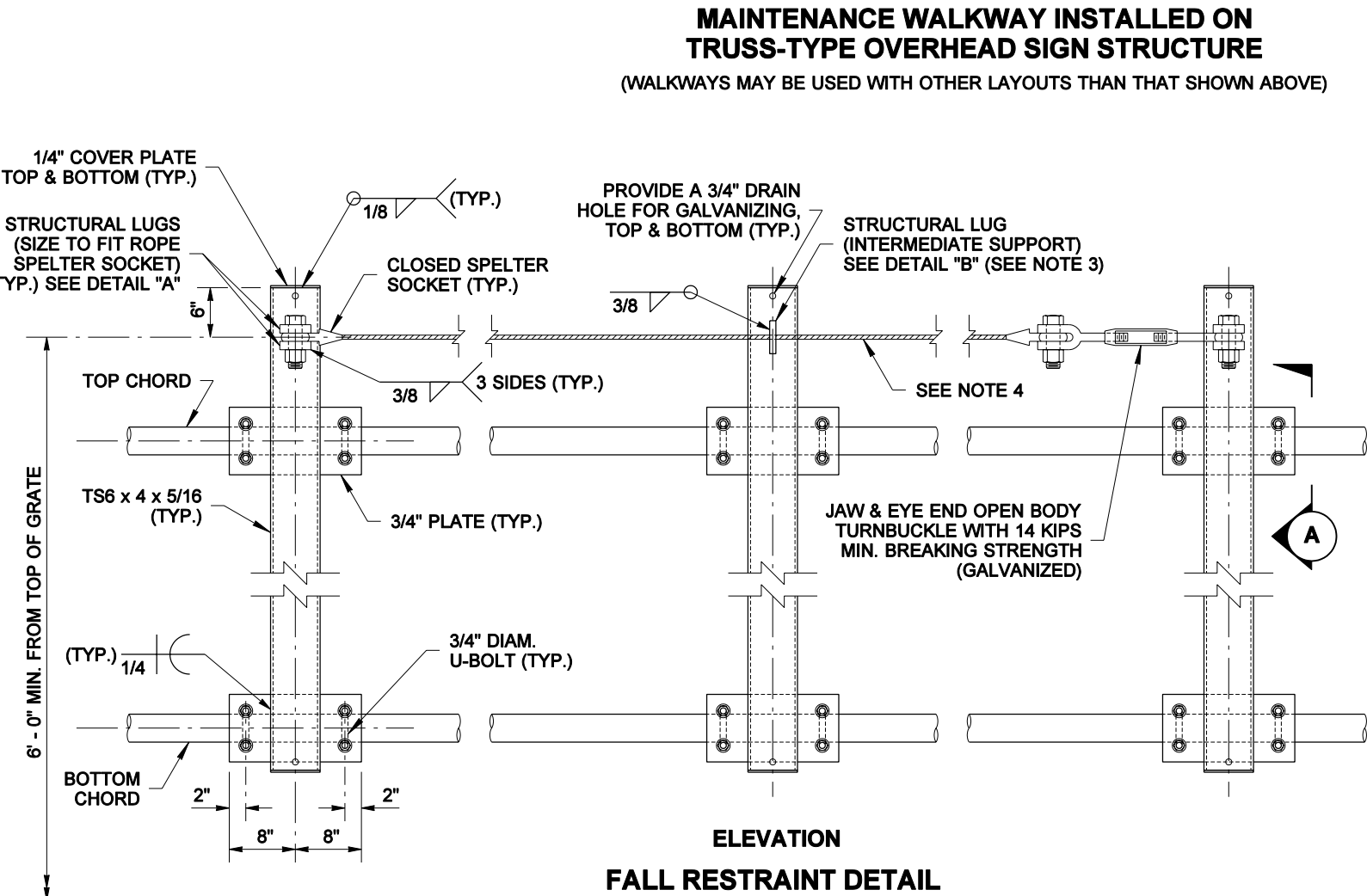
Washington State Department of Transportation



MATERIAL SPECIFICATIONS	
PIPE	ASTM A 36 OR ASTM A 53 GRADE B, TYPE E OR S, OR ASTM A 500 GRADE B
PLATES AND SHAPES	ASTM A 36
STRUCTURAL TUBING	ASTM A 500 GRADE B
GALVANIZING FOR PIPE PLATES AND SHAPES	AASHTO M 111
HIGH STRENGTH BOLTS, NUTS, & WASHERS; INCL. MOUNTING BEAM BOLTS	STD SPEC. 9-06.5(3)
ALL OTHER BOLTS	STD SPEC. 9-06.5(1)
FASTENER GALVANIZING	AASHTO M 232
STEEL GRATING	ASTM A 36
WIRE ROPE	ASTM A 603 W/ CLASS A WEIGHT ZINC COATED WIRES THROUGHOUT
U-BOLTS, NUTS, AND WASHERS	ASTM F 593 AND ASTM F 594, TYPE 304

NOTES

1. NOT INTENDED FOR USE IN FRONT OF STATIC SIGNS.
2. FOR MAINTENANCE WALKWAY, RAILING, GRATING, AND TOE PLATE DETAILS, SEE STANDARD PLAN G-6.
3. USE TWO LANYARDS THROUGH INTERMEDIATE WIRE ROPE SUPPORT.
4. 3/8" DIAM. WIRE ROPE WITH 14 KIPS MIN. BREAKING STRENGTH. THE WIRE ROPE SHALL BE INSTALLED WITH 450 LBS. OF TENSION, AND WITH 6" OF TAKE UP ADJUSTMENT AVAILABLE IN THE TURNBUCKLE.



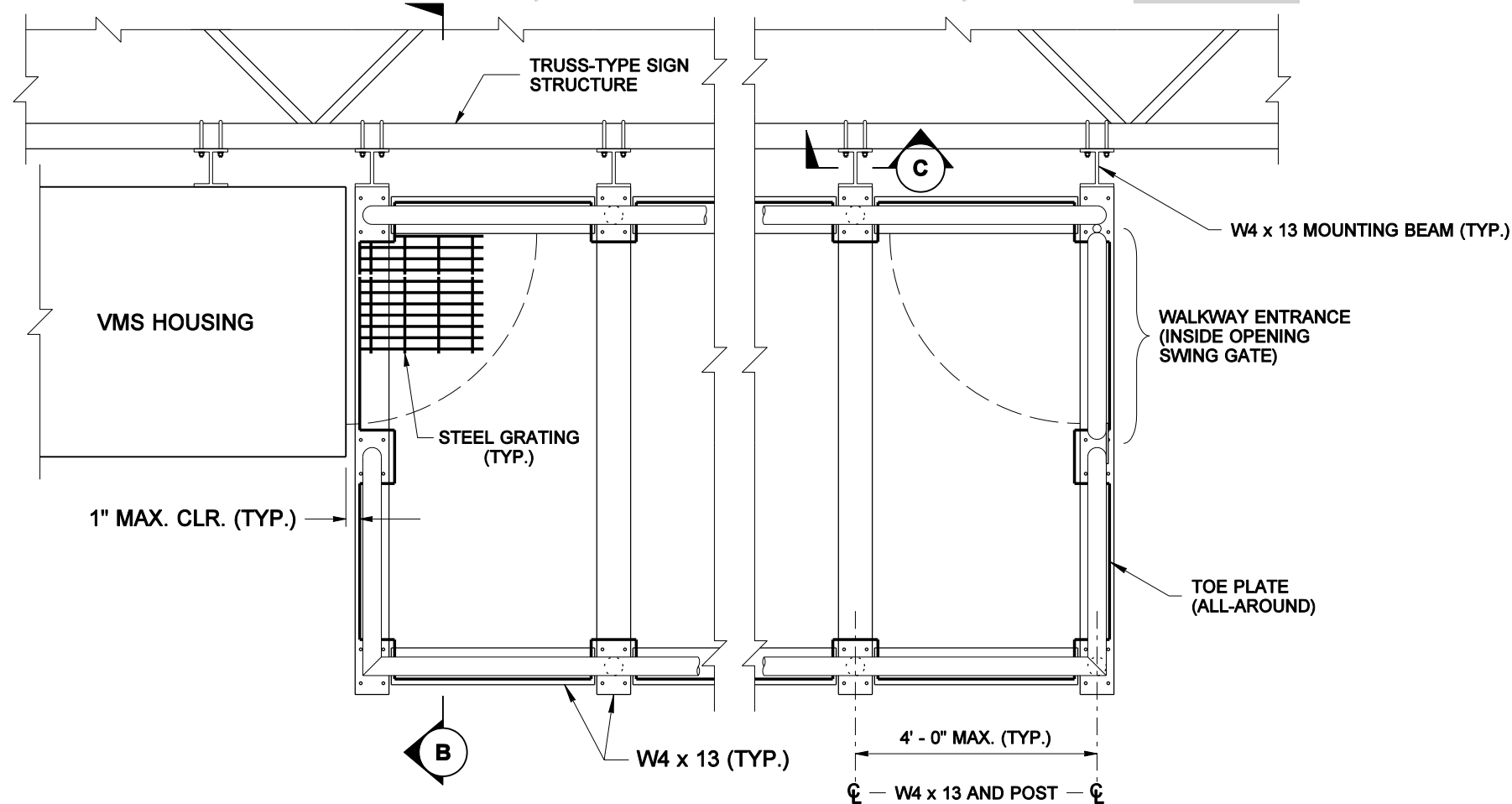
MAINTENANCE WALKWAY MOUNTING FOR TRUSS-TYPE OVERHEAD SIGN STRUCTURE
STANDARD PLAN G-6b

SHEET 1 OF 2 SHEETS

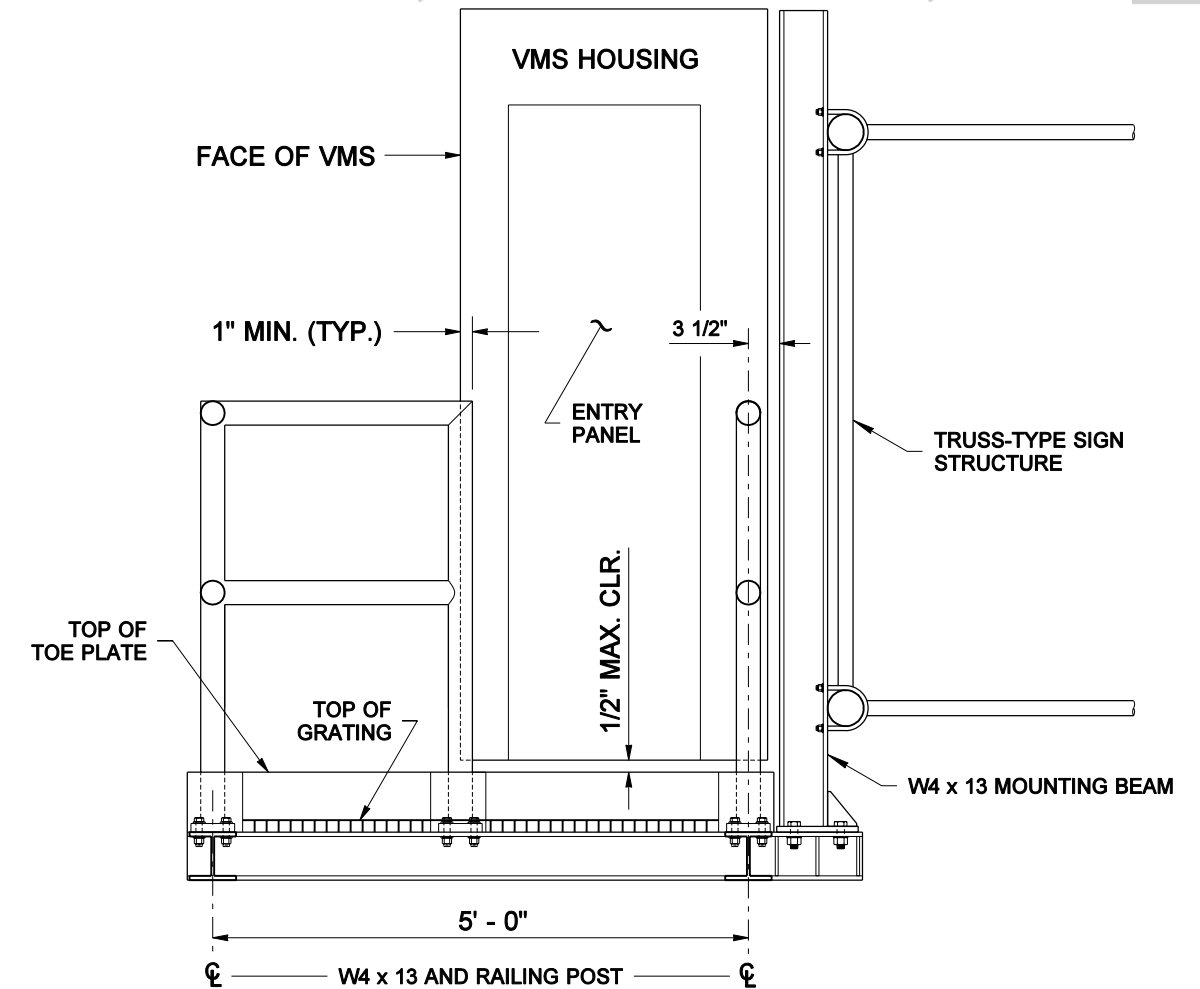
APPROVED FOR PUBLICATION

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

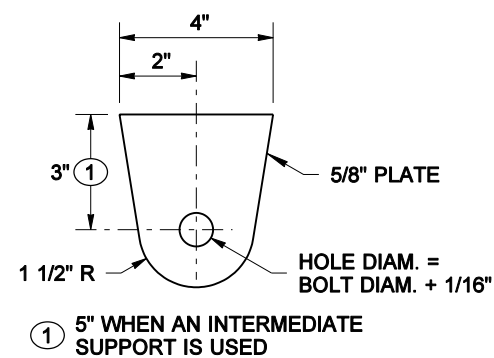




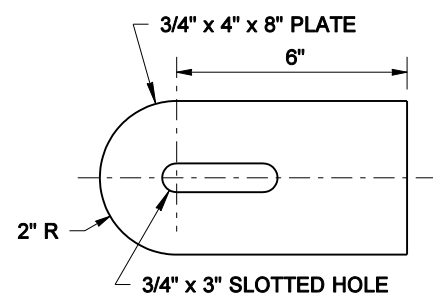
**MAINTENANCE WALKWAY
PARTIAL PLAN**



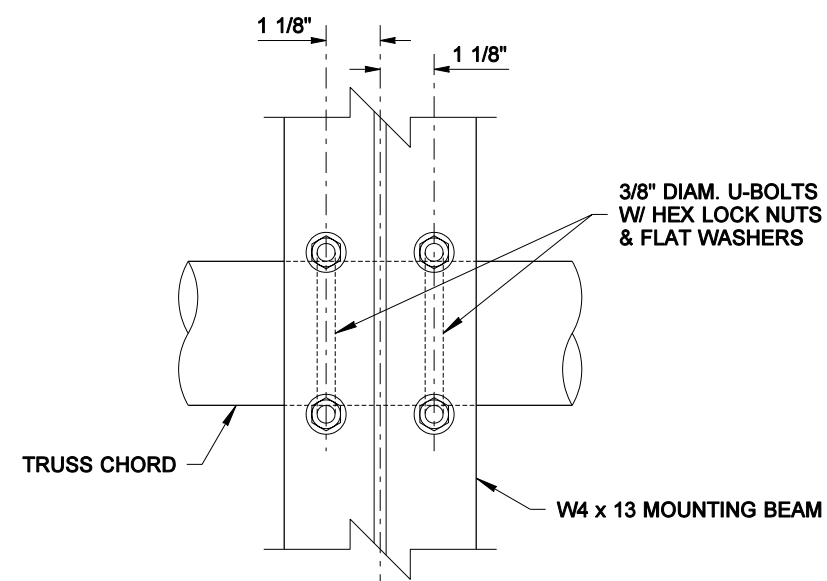
SECTION B



DETAIL "A"



DETAIL "B"



SECTION C



EXPIRES NOVEMBER 14, 2004

**MAINTENANCE WALKWAY
MOUNTING FOR TRUSS-TYPE
OVERHEAD SIGN STRUCTURE
STANDARD PLAN G-6b**

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

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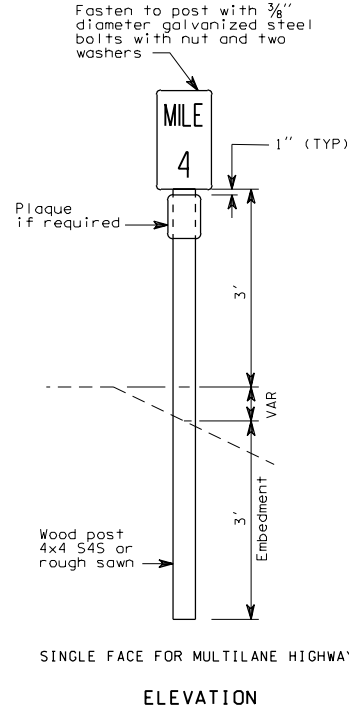
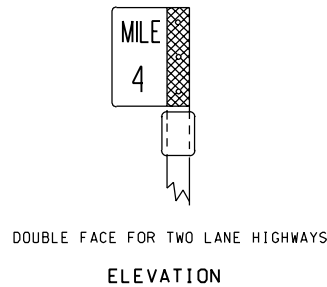
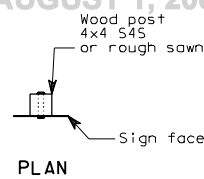
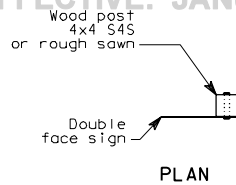
08-27-03

STATE DESIGN ENGINEER

DATE

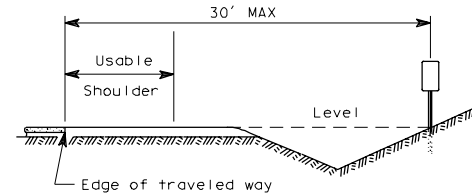


Washington State Department of Transportation



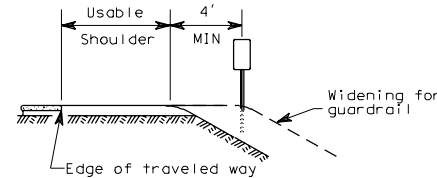
NOTES

1. Mileposts of the type specified shall be placed as shown hereon. If conditions preclude placement at the correct location, the mileposts may be moved as much as 50' in either direction; mileposts that cannot be placed within this degree of accuracy shall be omitted entirely.
2. Mileage for mileposts shall commence at the south or west terminus of the highway route and progress in a north or east direction.
3. All Spur and Equation signs shall have "S" and "B" plaques.
4. Mileposts in cut sections shall be placed at back of ditch. Milepost markers may be placed up to 30' from the edge of the traveled way.
5. See "Washington State Sign Fabrication Manual" for the dimensions and colors of the Milepost/Plaque.

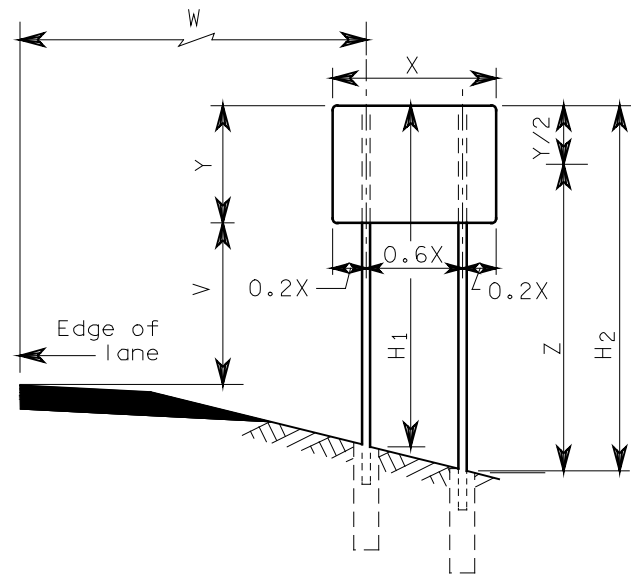


PLACEMENT OF MILEPOST AT CUT SECTION

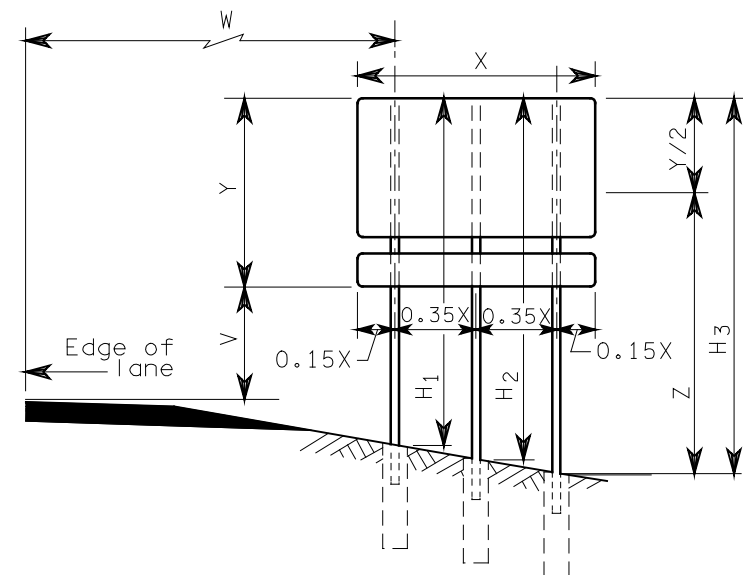
MILEPOST



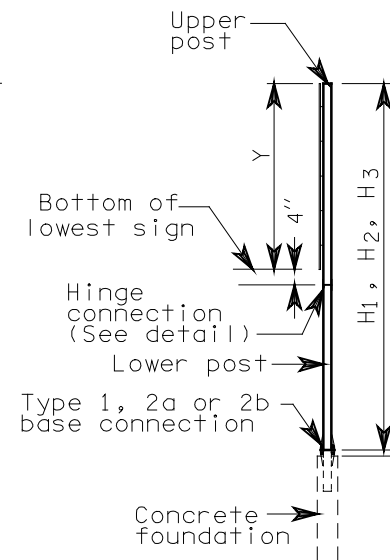
PLACEMENT OF MILEPOST AT FILL SECTION



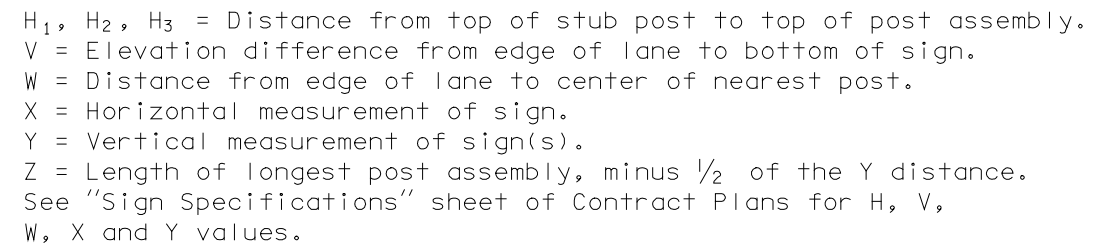
TWO POST SIGN INSTALLATION



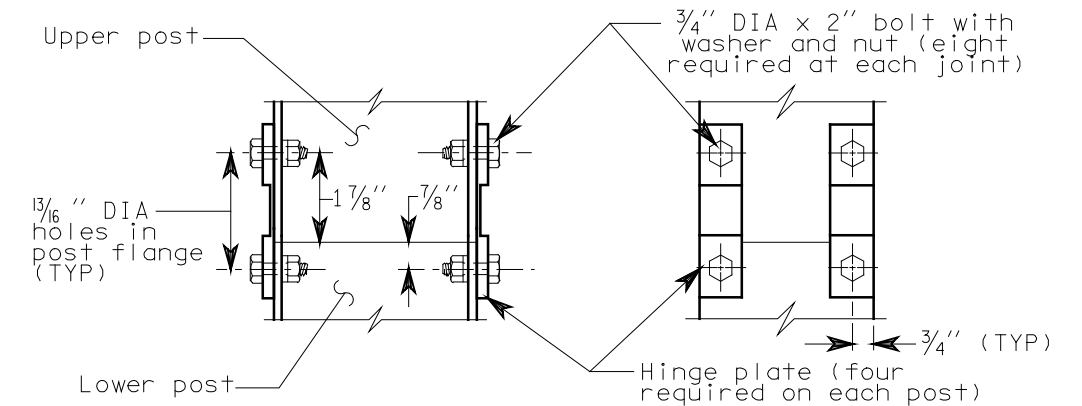
THREE POST SIGN INSTALLATION



SIDE VIEW
SIGN INSTALLATION



For material requirements, see Standard Specification 9-06.16.



HINGE CONNECTION DETAIL

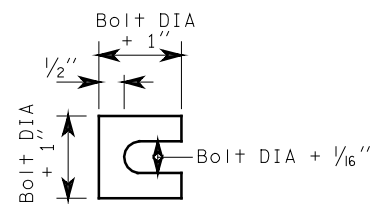
All multiple steel post signs

Hinge Connection Bolts shall be tightened 1/2 turn past snug tight.

Hinge plate shall be Type B-650 as manufactured by Transpo Industries, Inc., or an equal that has been crash tested and approved by FHWA.

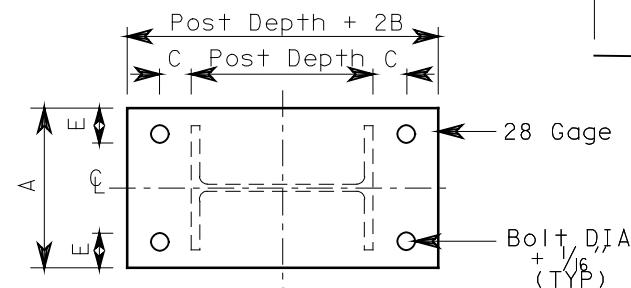
Dimension Table for Type 1 Bases												
Post Size		Base Connection Data								Foundation Data		
		Bolt		Dimensions								
Primary	Alternate	Size	Torque	A	B	C	E	T ₁	T ₂	S	D	Bars
W10x26	W10x22	1" x 3 3/4"	60 ft-lbs	6 3/4"	2 3/4"	1 5/8"	1 1/2"	1"	1/2"	2'-0"	7'-0"	8-#7
W8x21	W8x18	7/8" x 3 3/4"	50 ft-lbs	6 1/2"	2 1/2"	1 1/2"	1 3/8"	1"	1/2"	2'-0"	6'-0"	8-#6
W6x16	W6x12	3/4" x 3"	45 ft-lbs	5 5/8"	2 1/4"	1 3/8"	1 1/4"	3/4"	3/8"	1'-6"	5'-0"	8-#5
W6x12	W6x9	5/8" x 2 3/4"	25 ft-lbs	5 1/8"	2"	1 1/4"	1 1/8"	3/4"	3/8"	1'-6"	4'-0"	8-#5

Primary posts are AASHTO M 183
Alternate posts are AASHTO M 222 or AASHTO M 223, Grade 50



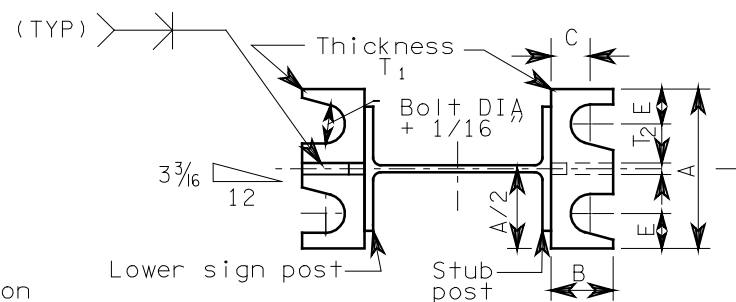
BRASS SHIM DETAIL

Furnish two .012" \pm thick and
two .032" \pm thick shims per post



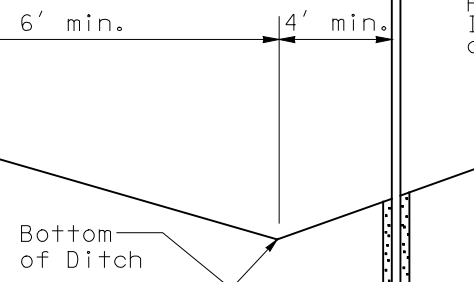
KEEPER PLATE

Galvanized Sheet Steel

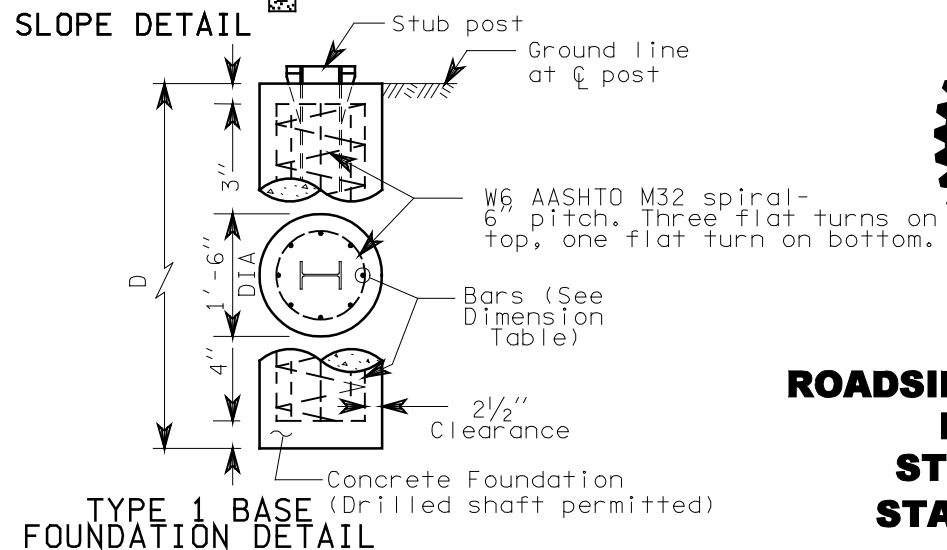


SECTION A-A

Section shown is for installations at right shoulder or in gore. Reverse plate slot bevels for installation at left shoulder. Slots are typical for top and bottom plates.



BACK SLOPE DETAIL



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9-99	MODIFIED BACK SLOPE DETAIL	RG
DATE	REVISION	BY

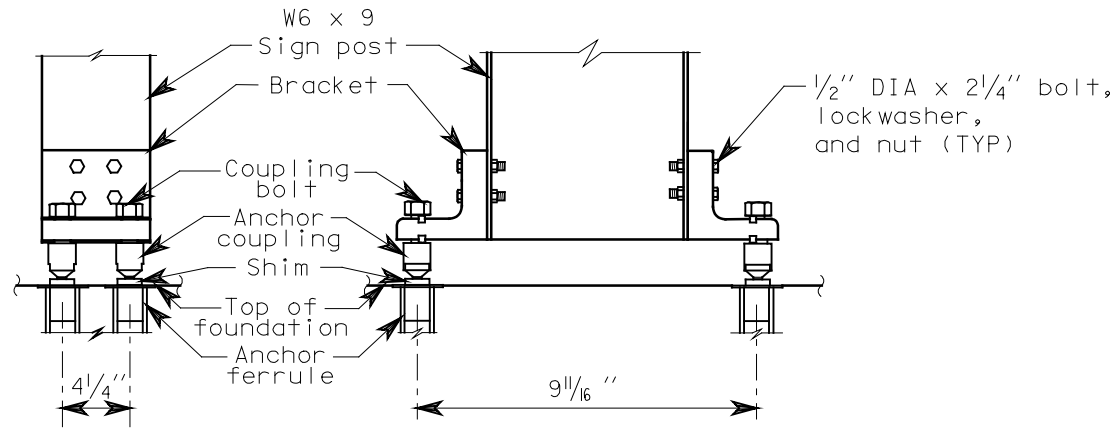
The seal is circular with a serrated outer edge. The text "JEROME A. WEIGEL" is arched across the top. "STATE OF WASHINGTON" is arched across the middle. "REGISTERED ENGINEER" is arched across the bottom. In the center is a portrait of a man with the year "14742" below it. Below the seal, a rectangular box contains the text "EXPIRES JUNE 29, 2000".

ROADSIDE SIGN STRUCTURES FOR MULTIPLE STEEL POST SIGNS STANDARD PLAN G-8a

APPROVED FOR PUBLICATION

Clifford E. Mansfield 10/06/99

DEPUTY STATE DESIGN ENGINEER DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

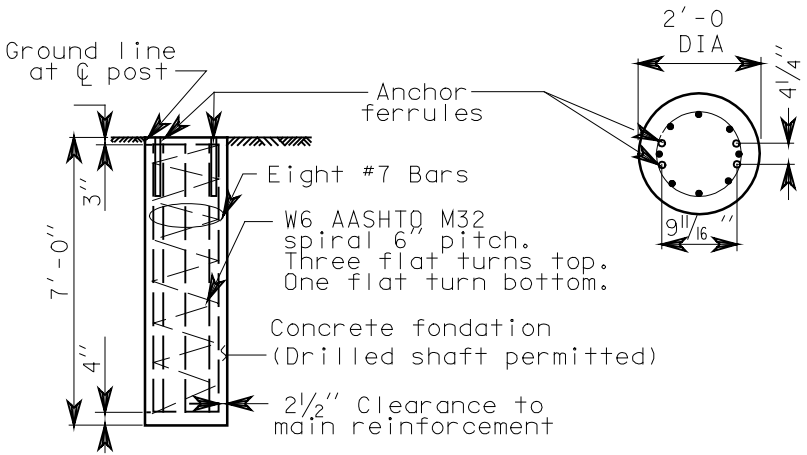


FRONT VIEW SIDE VIEW

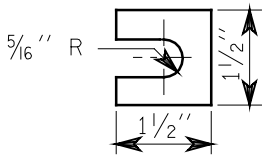
TYPE 2A BASE CONNECTION DETAIL

Use only when sign area is less than 35 square feet per post.

BOSS ϕ OFFSET TABLE	
When $Z > 8'$ $\leq 10'$	0.0875"
When $Z > 10'$ $\leq 14'$	0.0625"
When $Z > 14'$ $\leq 15'$	0.0375"



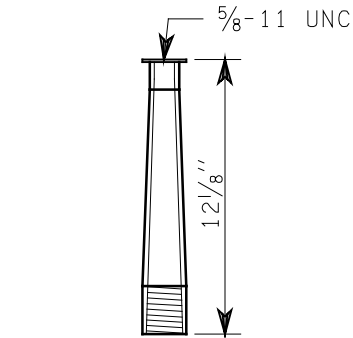
TYPE 2A FOUNDATION DETAIL



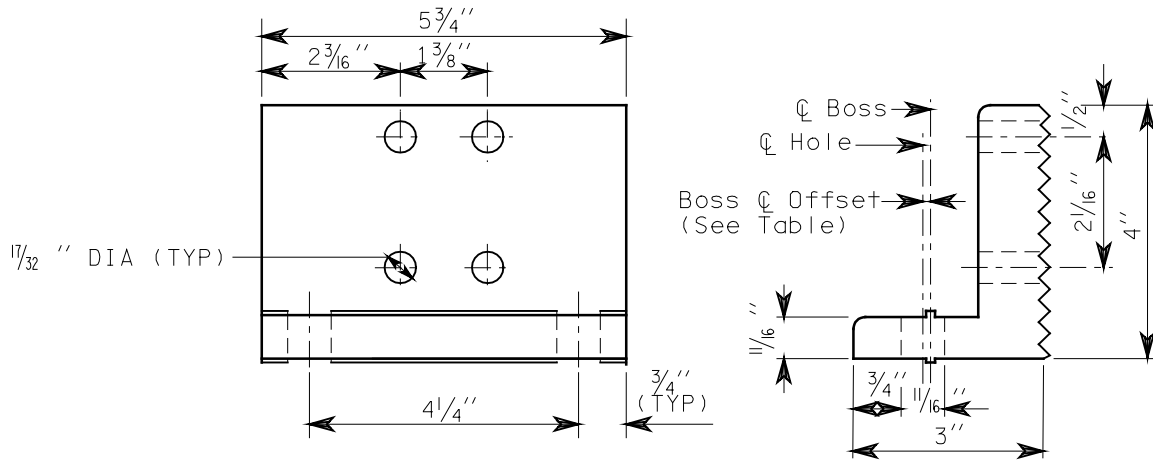
Shims shall be 14 gage or 18 gage

SHIM DETAIL - TYPE 2A

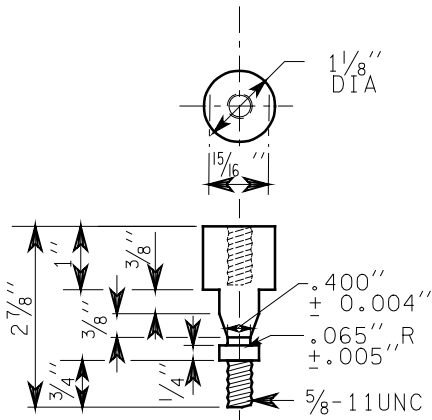
Use no more than two shims per anchor coupling.
Use no more than three shims for any two anchor couplings.



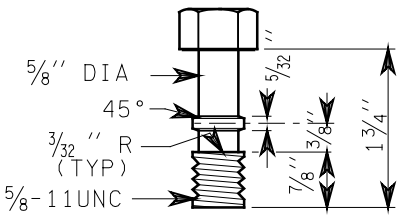
ANCHOR FERRULE DETAIL - TYPE 2A



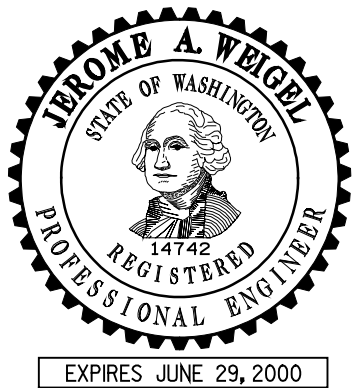
BRACKET DETAIL - TYPE 2A



ANCHOR COUPLING DETAIL - TYPE 2A







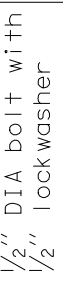
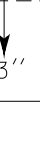
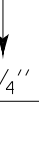
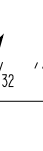


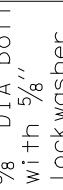
COUPLING BOLT DETAIL - TYPE 2A

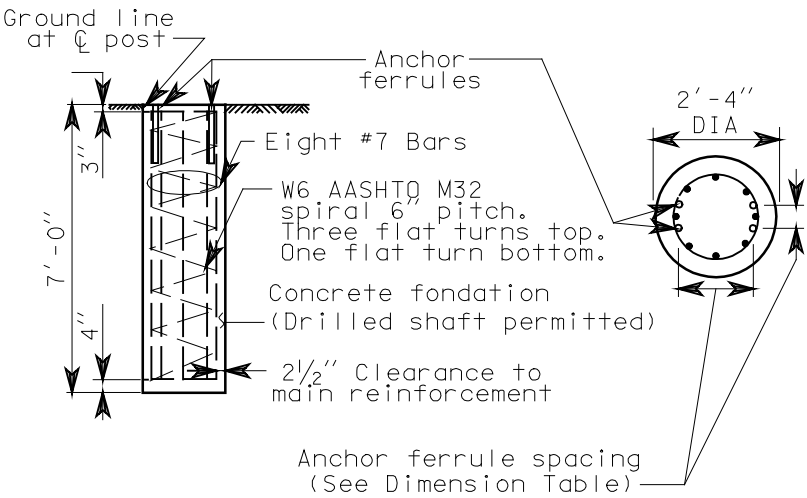


**ROADSIDE SIGN STRUCTURES
FOR MULTIPLE
STEEL POST SIGNS
STANDARD PLAN G-8a**

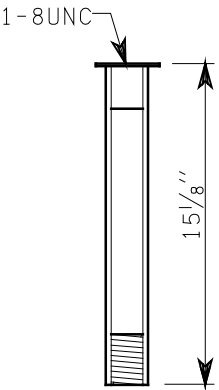
SHEET 2 OF 3 SHEETS

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9-99 NEW APPROVAL DATE		Clifford E. Mansfield 10/06/99	
DATE REVISION		DEPUTY STATE DESIGN ENGINEER DATE	
BY		WASHINGTON STATE DEPARTMENT OF TRANSPORTATION OLYMPIA, WASHINGTON	

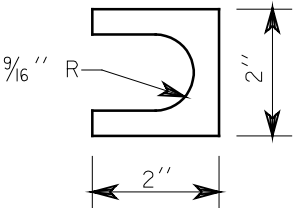
DIMENSION TABLE FOR TYPE 2B BASES											
Post Size	Anchor Ferrule Spacing		Keyway Offset K K Distances are ± 0.004"			Bracket Width BW	Hole DIA HD	Spacing S	Fastners		
	Length	Width	K = .200"	K = .150"	K = .100"				Fastner	Length	Size
W6x9	13 ⁵ / ₁₆ "		When Z > 7' < 9'	When Z > 9' < 12'	When Z > 12' < 25'				Top bolt	2 ¹ / ₂ "	
W6x12	14 ¹ / ₁₆ "								Middle bolt	2 ³ / ₄ "	
W6x16	14 ⁵ / ₁₆ "								Bottom bolt	3 "	
W8x18	16 ³ / ₁₆ "		When Z > 8' < 10'	When Z > 10' < 14'	When Z > 14' < 25'				Cap screw	1 ¹ / ₄ "	
W8x21	16 ⁵ / ₁₆ "										
W10x22	18 ³ / ₁₆ "		When Z > 9' < 11'	When Z > 11' < 16'	When Z > 16' < 25'	6 ¹ / ₂ "	2 ¹ / ₃₂ "	2 "	Top bolt	2 ³ / ₄ "	
W10x26	18 ⁷ / ₁₆ "								Middle bolt	3 "	
									Bottom bolt	3 ¹ / ₄ "	
									Cap screw	1 ¹ / ₄ "	



TYPE 2B FOUNDATION DETAIL

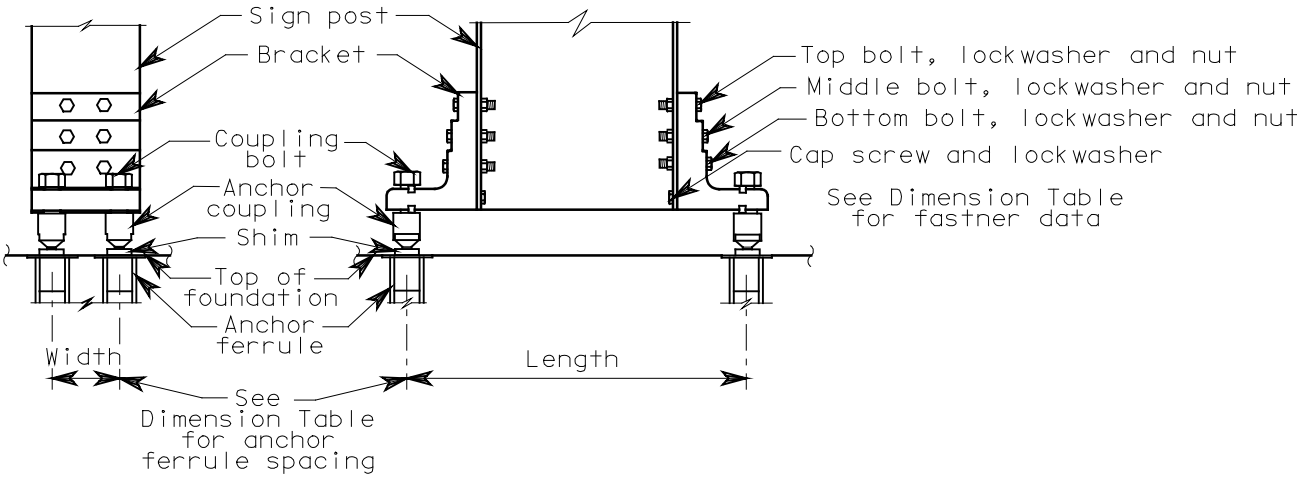


ANCHOR FERRULE DETAIL - TYPE 2B

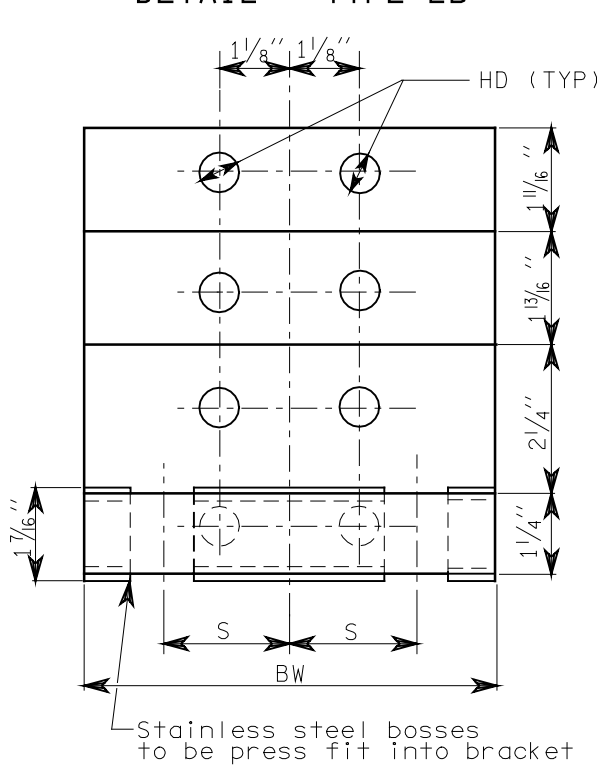


SHIM DETAIL - TYPE 2B

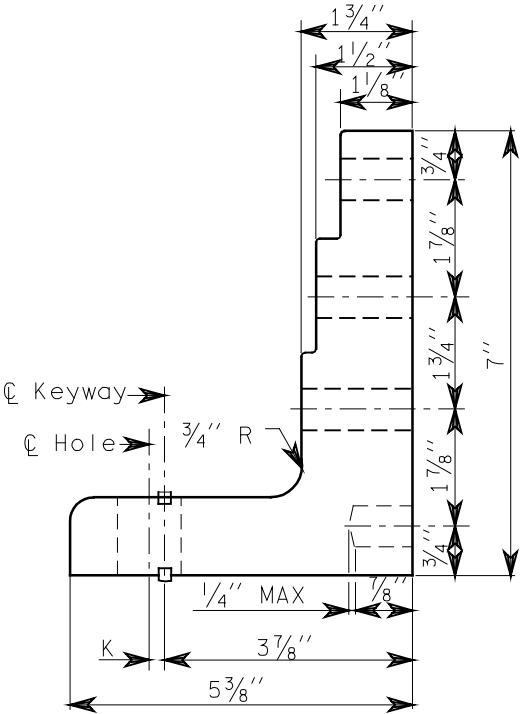
Use no more than two shims per anchor coupling.
Use no more than three shims for any two anchor couplings.



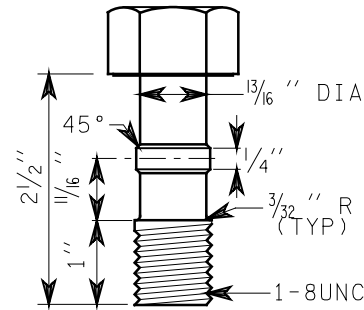
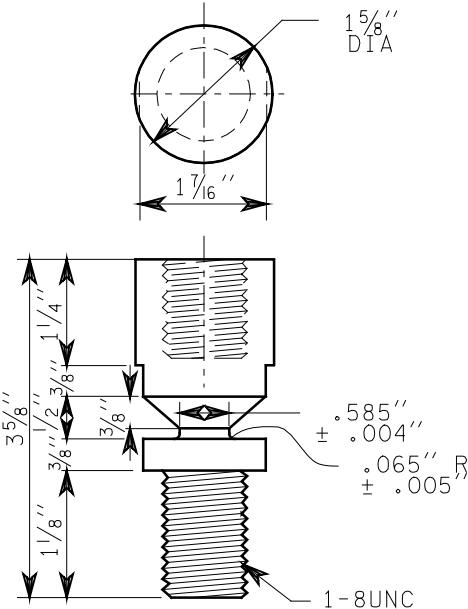
FRONT VIEW TYPE 2B BASE CONNECTION DETAIL



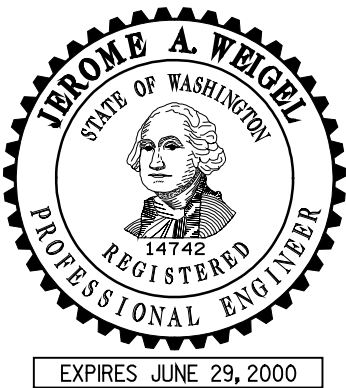
BRACKET DETAIL - TYPE 2B



ANCHOR COUPLING DETAIL - TYPE 2B

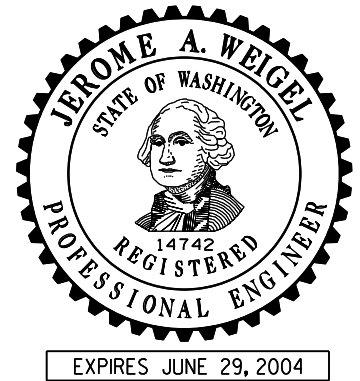
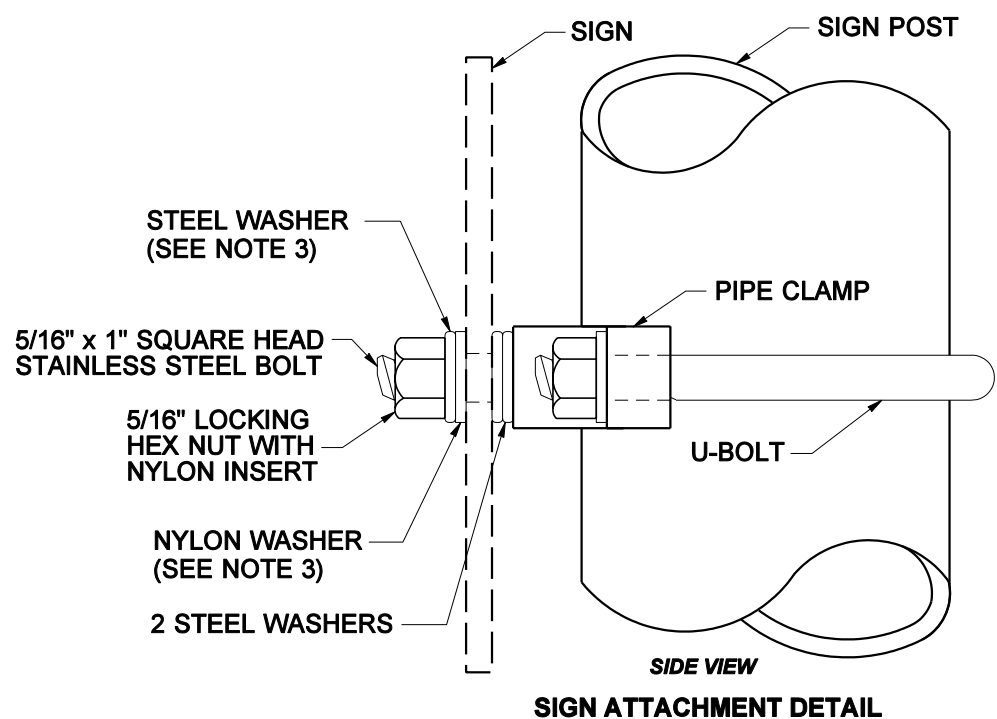
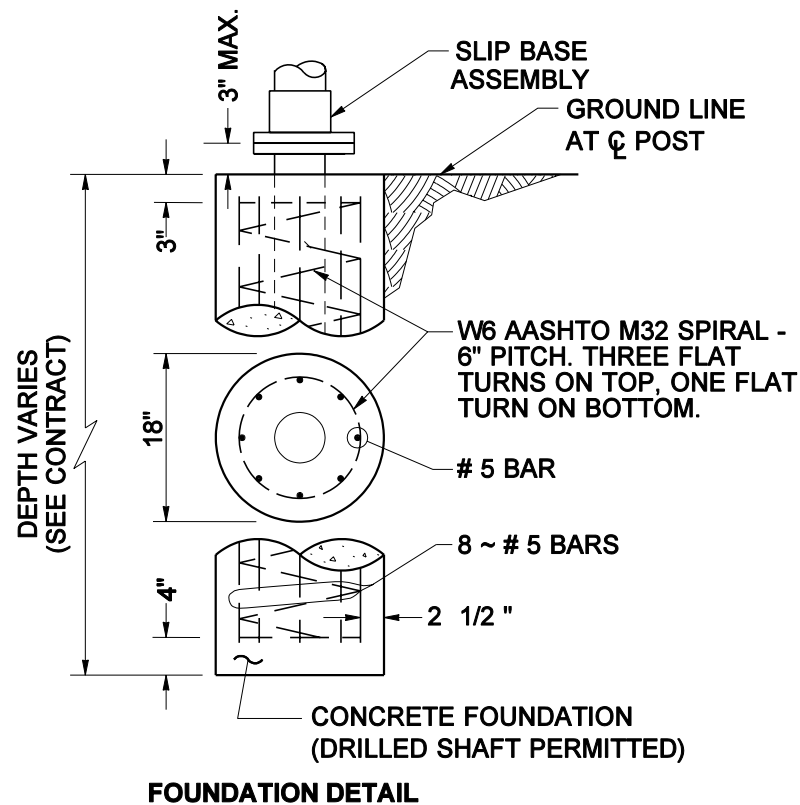
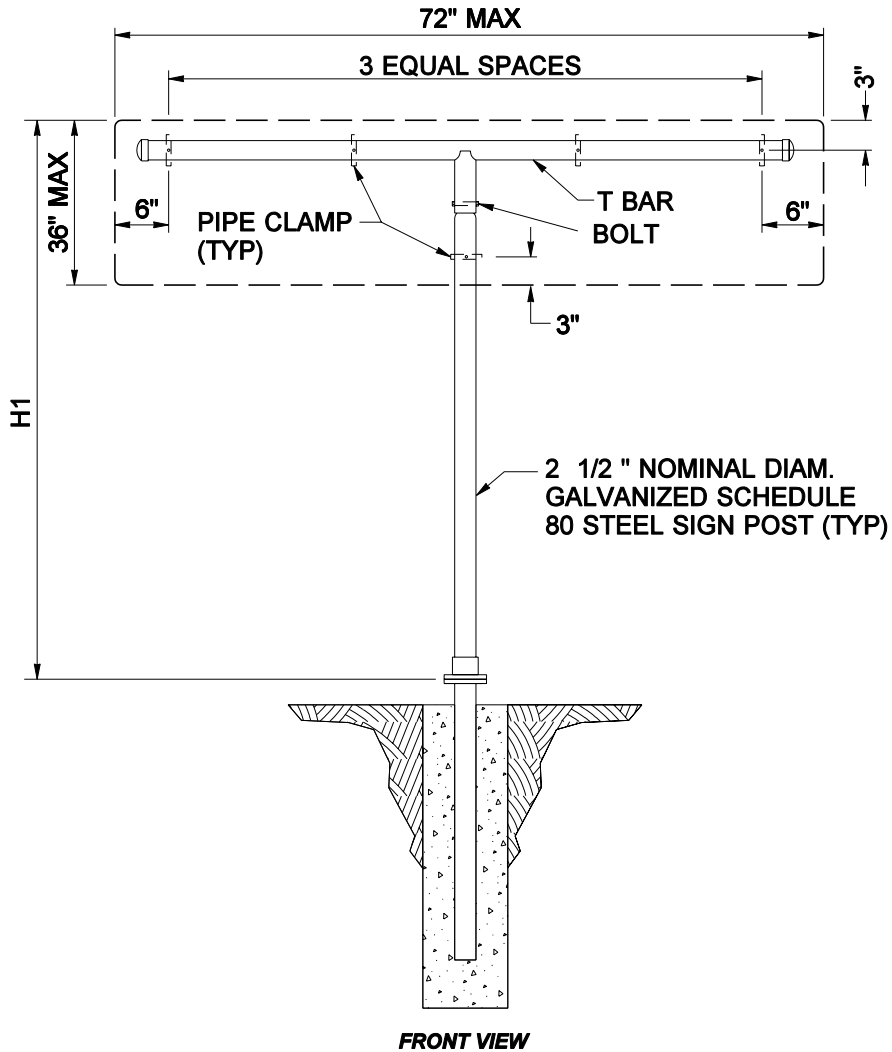
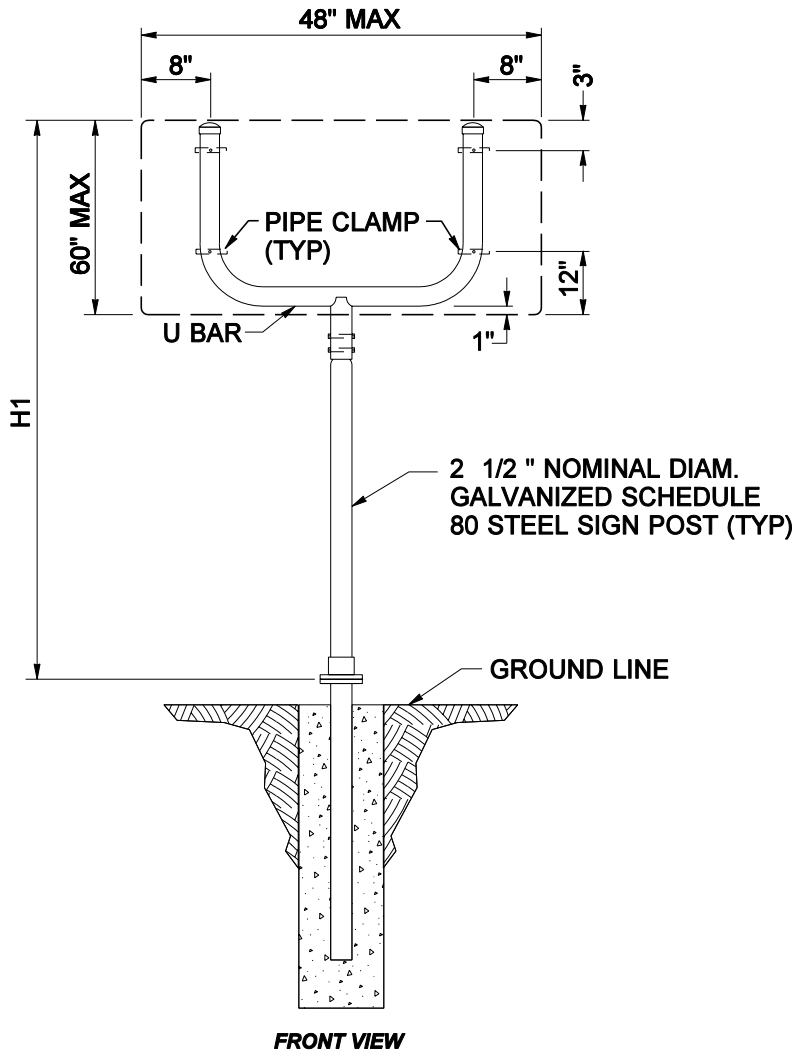
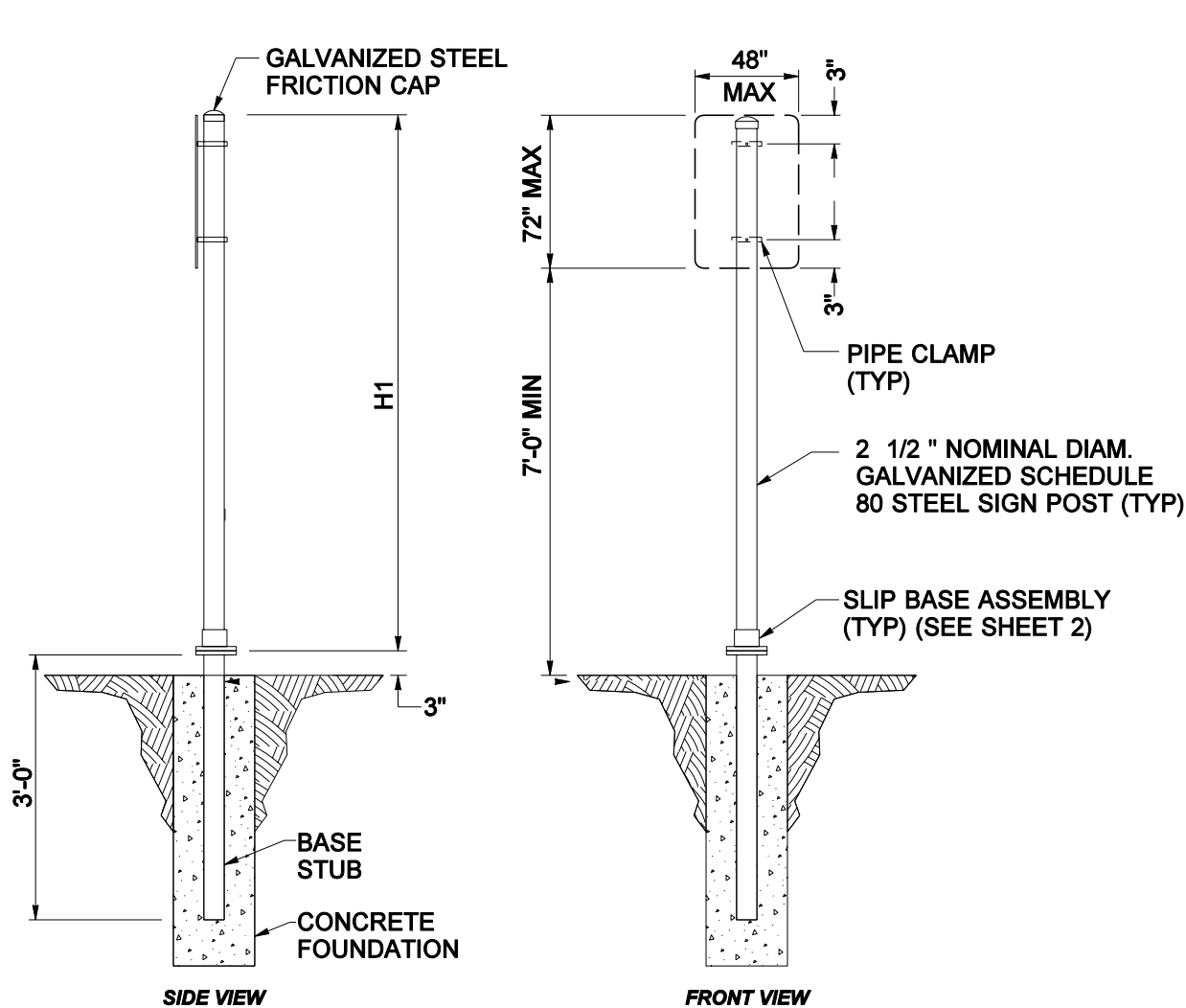


COUPLING BOLT DETAIL - TYPE 2B



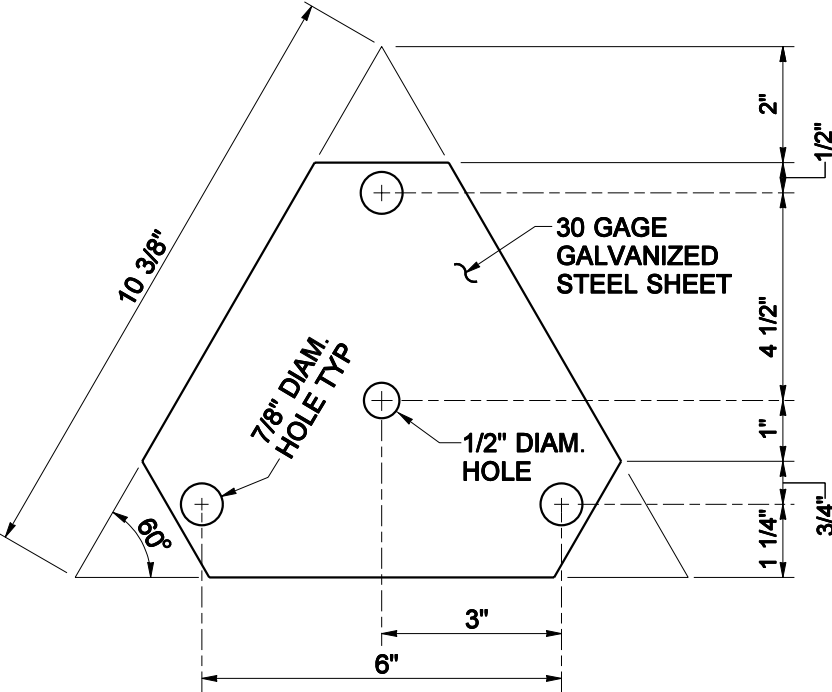
**ROADSIDE SIGN STRUCTURES
FOR MULTIPLE
STEEL POST SIGNS
STANDARD PLAN G-8a**
SHEET 3 OF 3 SHEETS

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9-99		NEW APPROVAL DATE	RG	DATE
DATE		REVISION	BY	
			Clifford E. Mansfield 10/06/99	
			DEPUTY STATE DESIGN ENGINEER	
			WASHINGTON STATE DEPARTMENT OF TRANSPORTATION OLYMPIA, WASHINGTON	

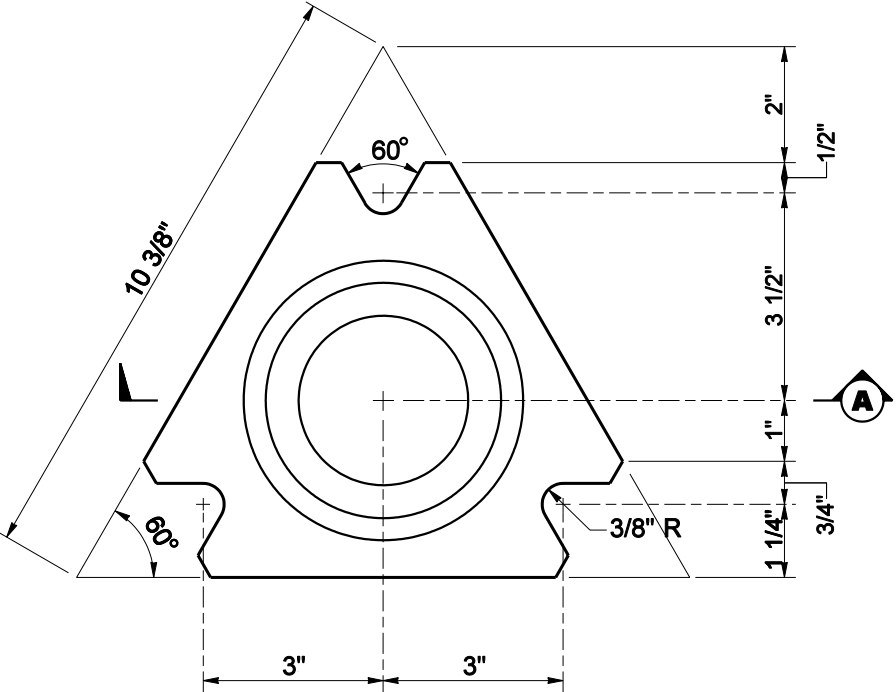


**SMALL STEEL
SIGN SUPPORT**
STANDARD PLAN G-8b
SHEET 1 OF 3 SHEETS

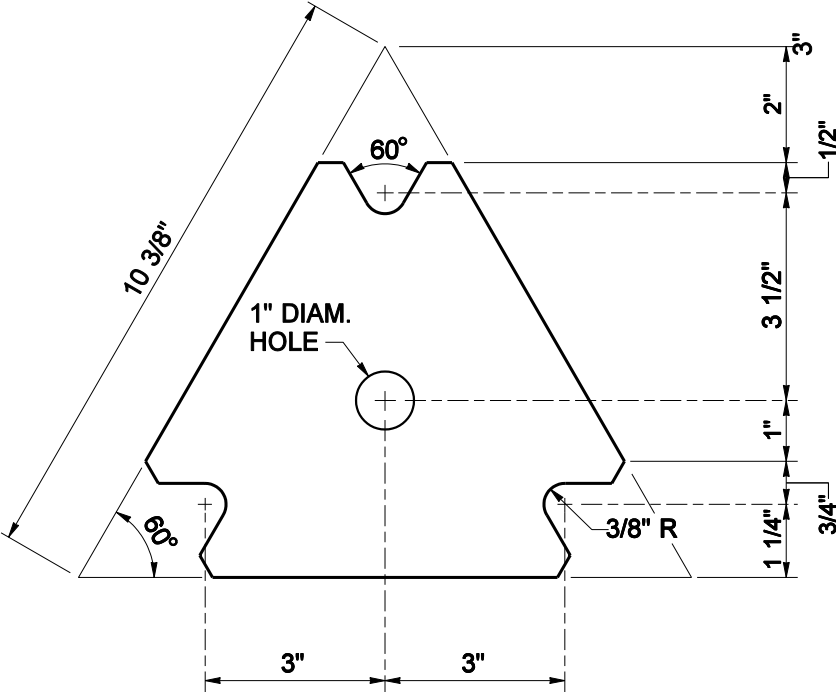
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05/2002		CORRECTED SIGN POST DIAM.; PIPE CLAMP LOCATION	MG	DATE
DATE		REVISION	BY	DATE
				06-04-02
				STATE DESIGN ENGINEER
				Washington State Department of Transportation



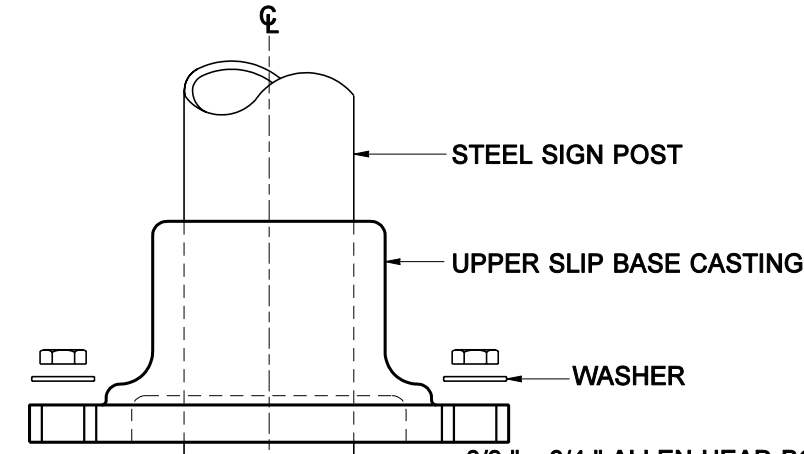
PLAN VIEW
KEEPER PLATE



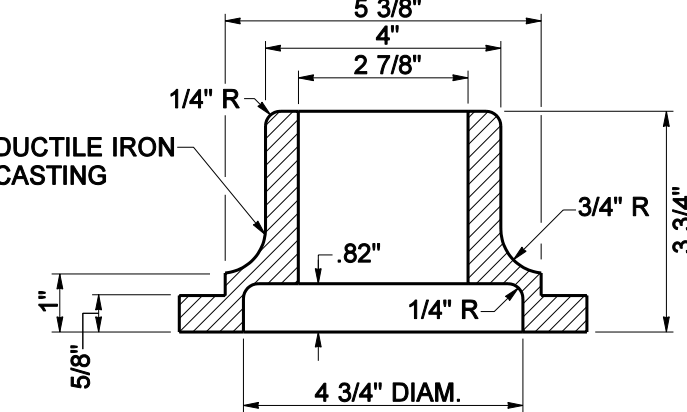
PLAN VIEW
UPPER SLIP BASE



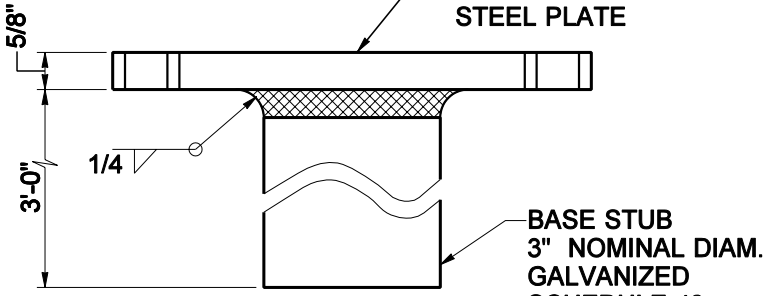
PLAN VIEW
ASTM A-36 GALVANIZED
STEEL PLATE



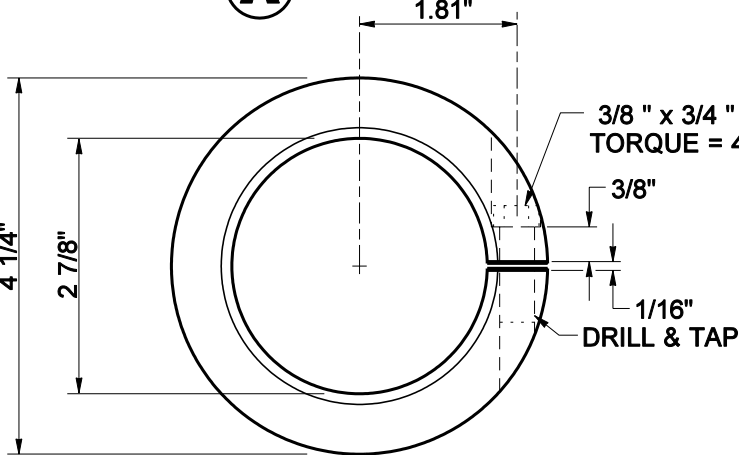
ELEVATION VIEW
SLIP BASE ASSEMBLY



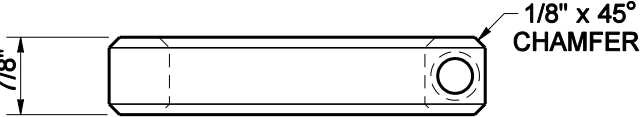
SECTION
A-A



ELEVATION VIEW
BASE PLATE



PLAN VIEW



ELEVATION VIEW
SPLIT SHAFT COLLAR



**SMALL STEEL
SIGN SUPPORT**

STANDARD PLAN G-8b

SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 06-04-02

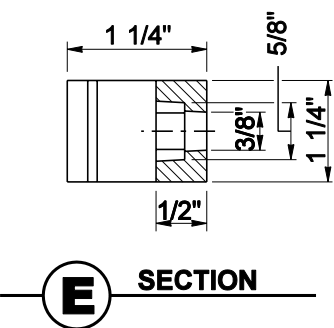
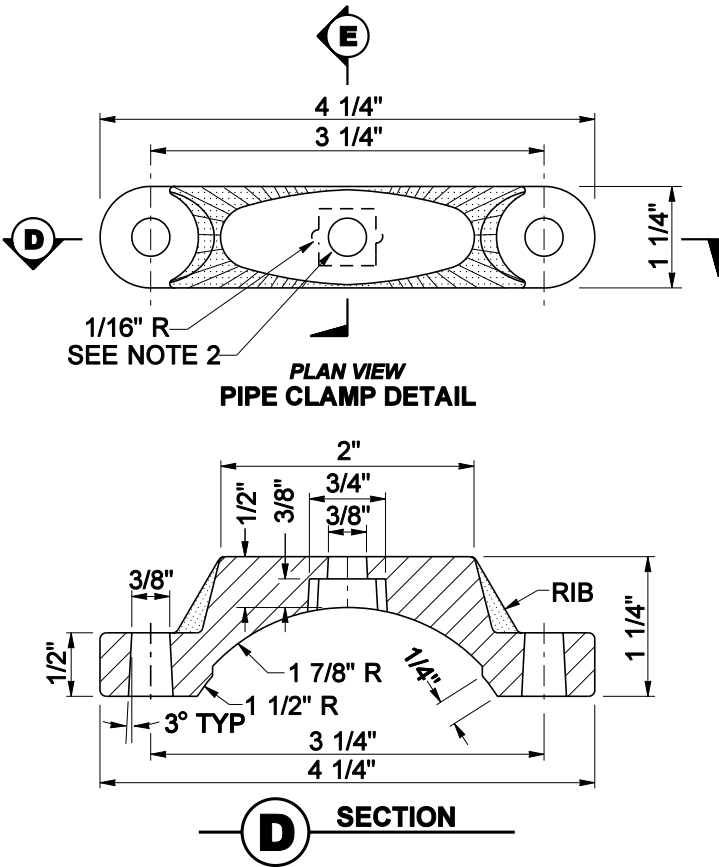
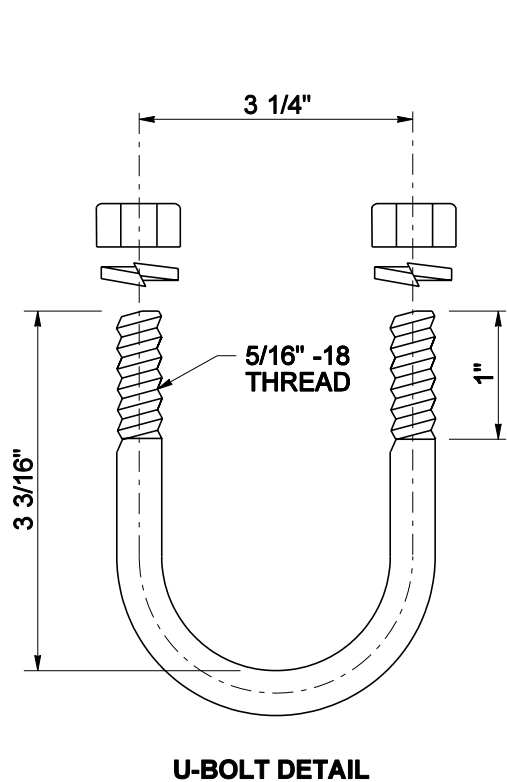
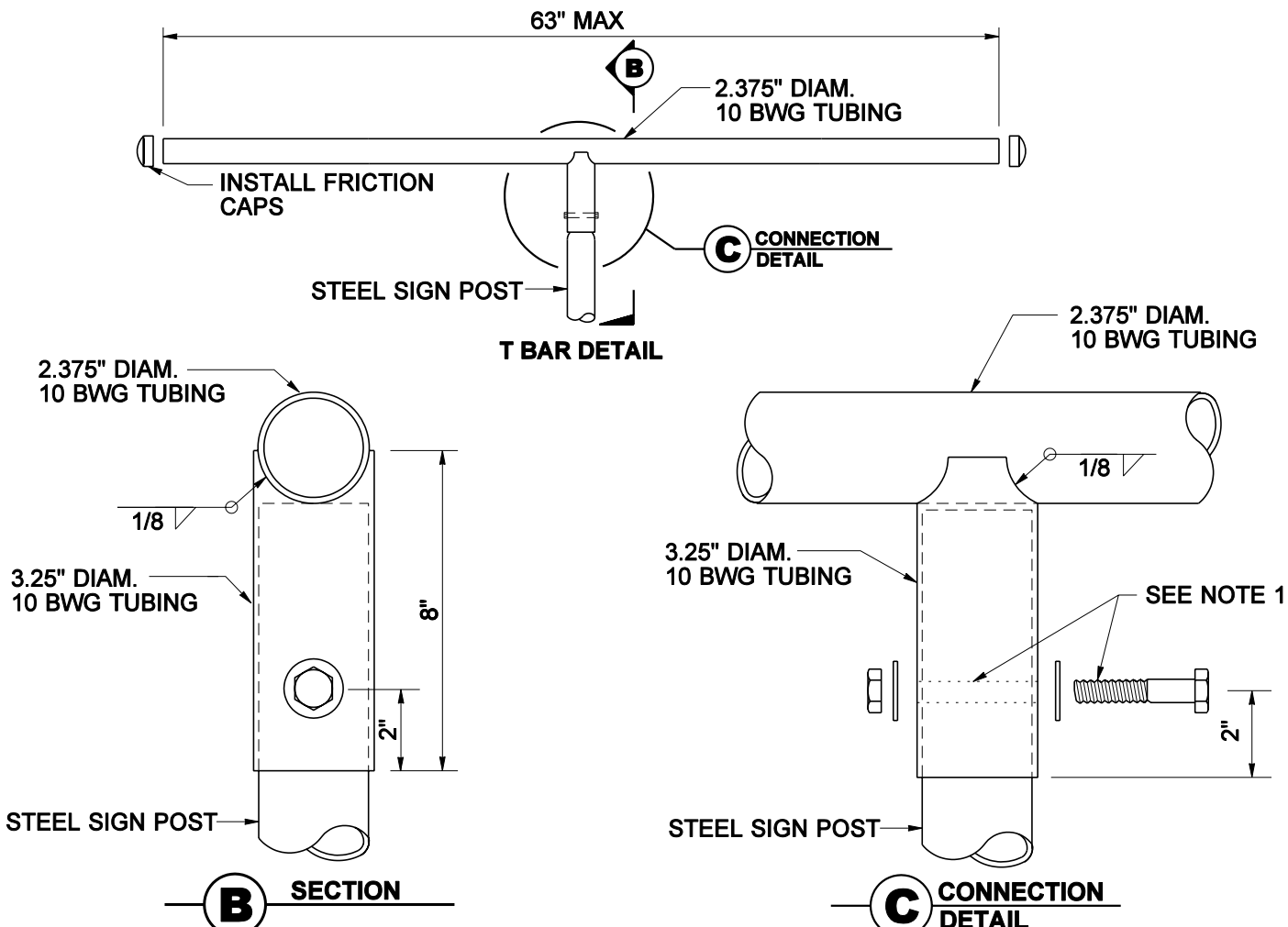
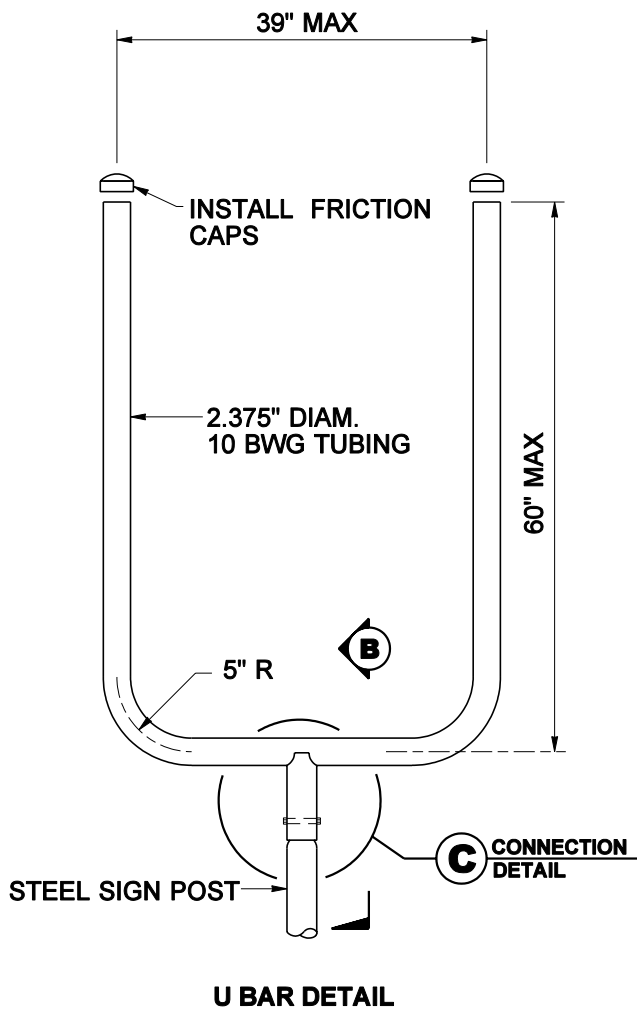
STATE DESIGN ENGINEER



Washington State Department of Transportation

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05/2002	REV. TORQUE; PIPE DIAM.	MG
DATE	REVISION	BY



NOTES:

- 1. "T" & "U" bars mounted to post with 1/2" x 5 1/2" hex bolt, nut & washer; drill 9/16" hole in sign post.
- 2. Use a 5/16" x 1" square head bolt with full threads in slot. The bolt head must not turn in the slot.
- 3. Install the medium nylon washer against sign face to prevent scratching. Use the medium sized steel washer between the nylon washer and the 5/16" galvanized steel or aluminum self-locking hex head nut.

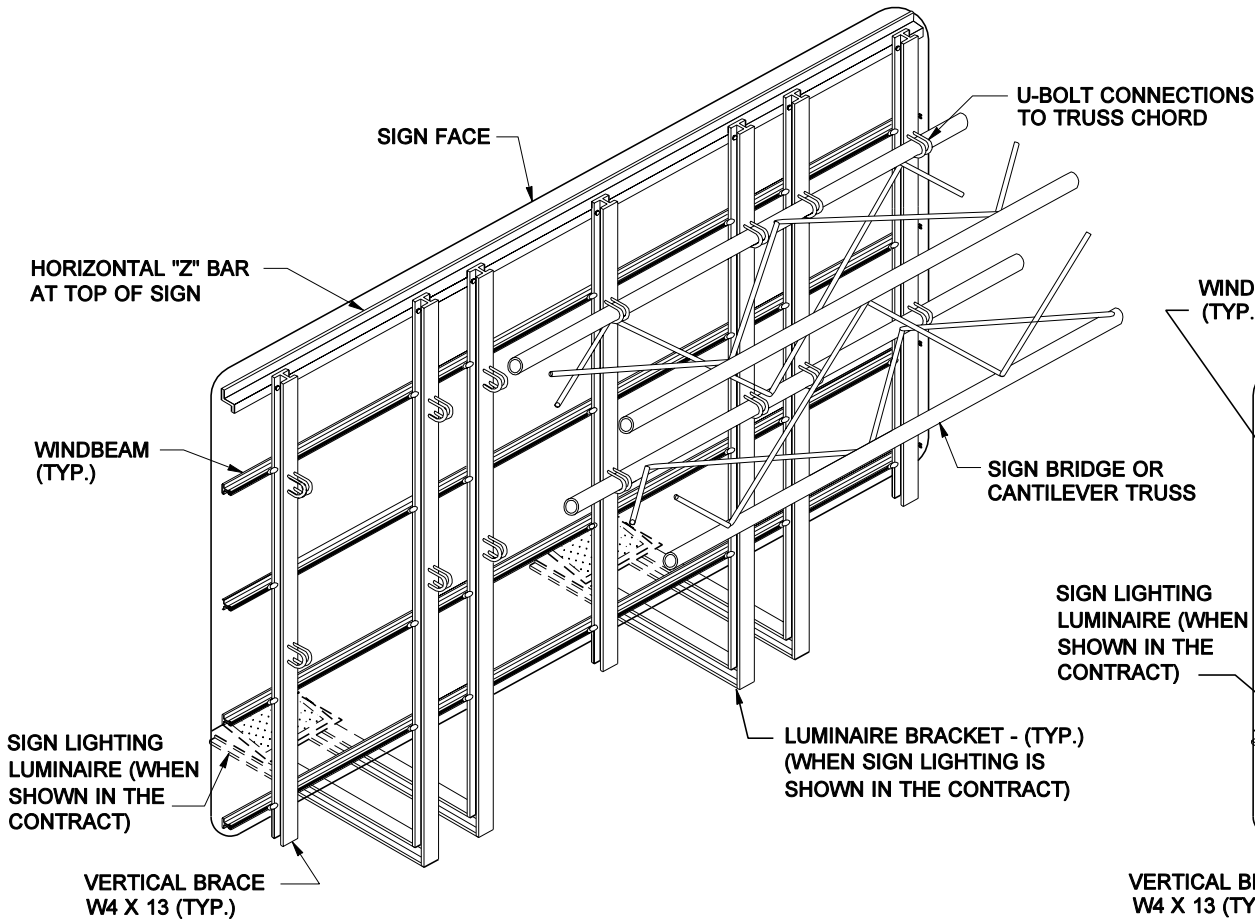
MATERIALS	
Steel Pipe	ASTM A500 Gr. B or ASTM A 53 Gr. B, Galv. AASHTO M111
Steel Keeper Plate	ASTM A653 G 90
Upper Slip Base	Ductile iron casting ASTM A536 Gr. 65-45-12, Galv. AASHTO M232
Base Plate	ASTM A 36, Galv. AASHTO M111
Split Shaft Collar	AASHTO M169 12L14, Zinc plating ASTM B-633 SC-2 with Type 1 clear coat
Pipe Clamp	Steel casting ASTM B26 or B108 or Alum. alloy A 444.0-T4 or 356.0-F
1/2" & 5/8" Diam. High Strength Bolts, Nuts and Washers	AASHTO M164 or AASHTO M291 Gr. DH, ASTM F436 Galv. AASHTO M232
U-Bolts, Nuts, and Washers	ASTM F 593 and F 594, TYPE 304
Mechanical Tubing	ASTM A 513 S5 Gr. 50 Type 1 or 2, Galv. AASHTO M 111



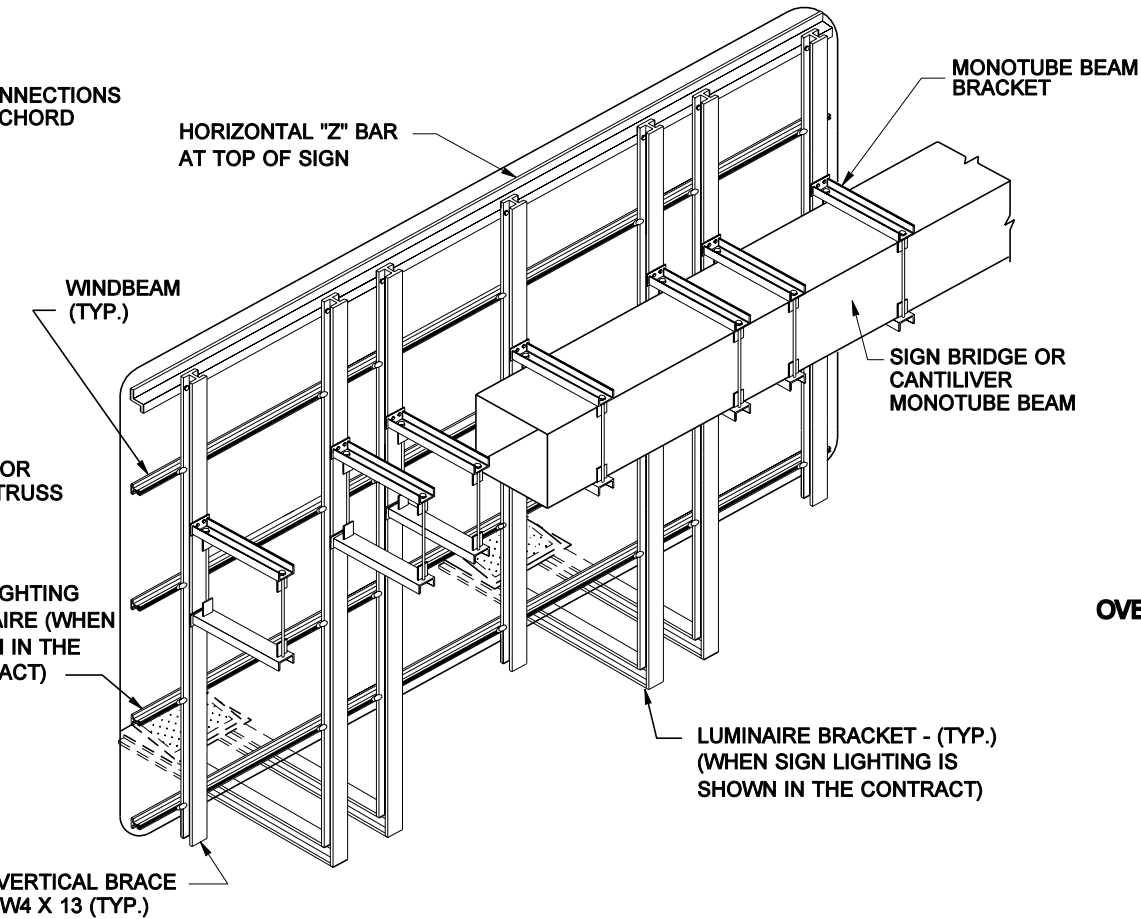
EXPIRES JUNE 29, 2004

SMALL STEEL SIGN SUPPORT
STANDARD PLAN G-8b
SHEET 3 OF 3 SHEETS

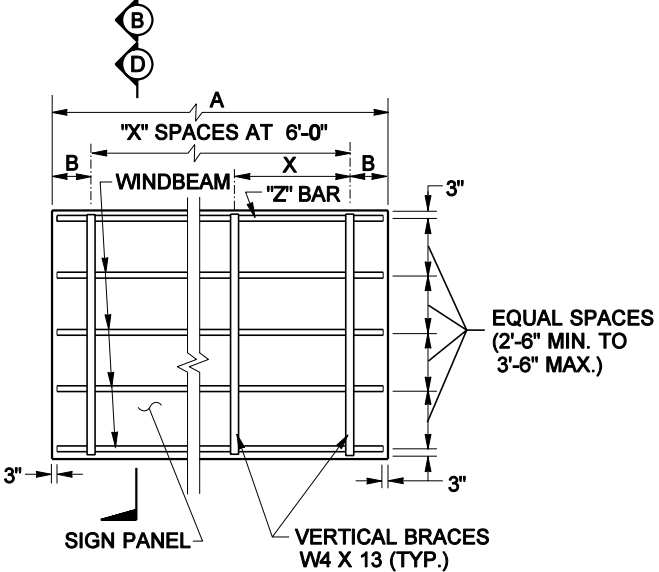
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05/2002		REV. PIPE DIAM., MATERIALS.	MG	DATE
DATE		REVISION	BY	DATE
			Washington State Department of Transportation	



SIGN ATTACHMENT TO TRUSS-TYPE STRUCTURES

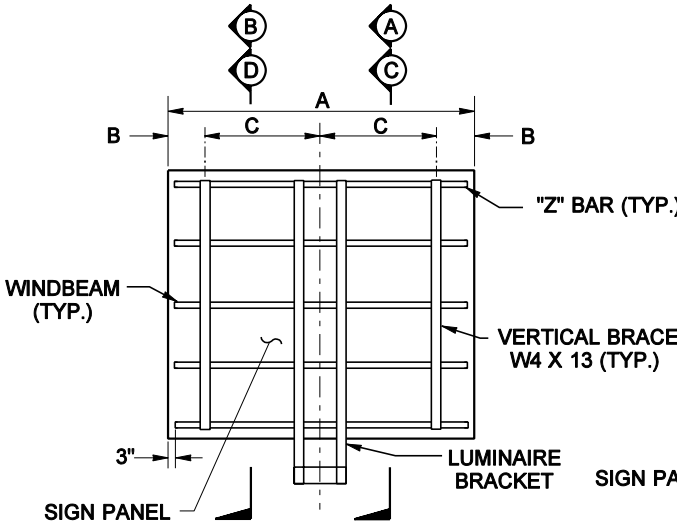


SIGN ATTACHMENT TO MONOTUBE STRUCTURES



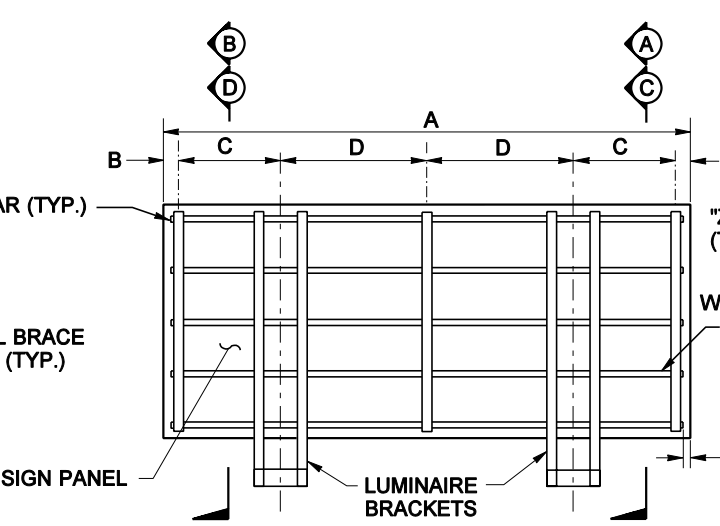
OVERHEAD SIGNS WITHOUT SIGN LIGHTING LUMINAIRES

A	B	X	A	B	X
8'-0"	1'-0"	1	24'-0"	3'-0"	3
10'-0"	2'-0"	1	26'-0"	1'-0"	4
12'-0"	3'-0"	1	28'-0"	2'-0"	4
14'-0"	1'-0"	2	30'-0"	3'-0"	4
16'-0"	2'-0"	2	32'-0"	1'-0"	5
18'-0"	3'-0"	2	34'-0"	2'-0"	5
20'-0"	1'-0"	3	36'-0"	3'-0"	5
22'-0"	2'-0"	3			



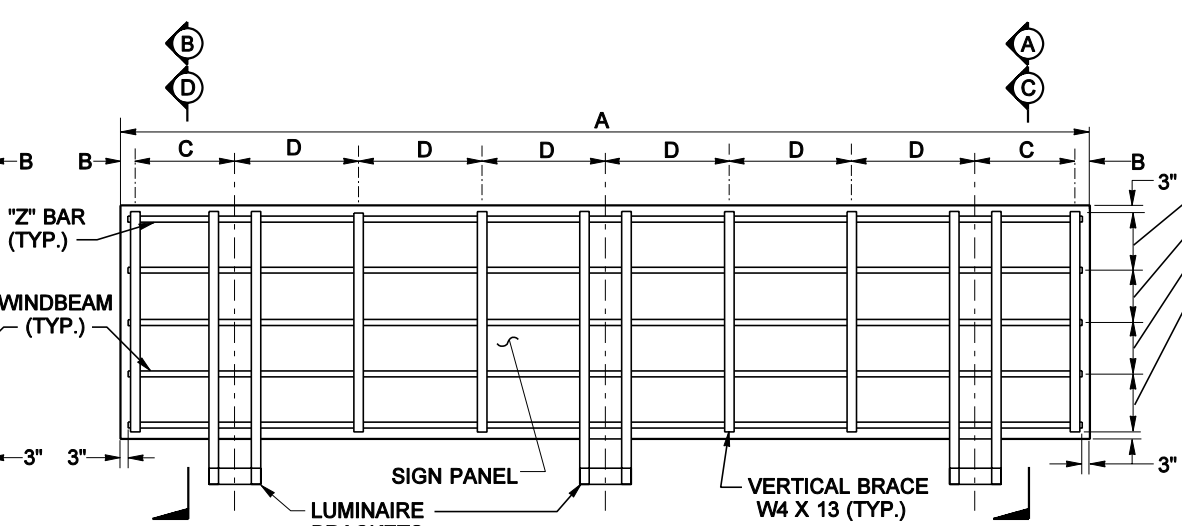
SIGN WITH ONE SIGN LIGHTING LUMINAIRE

A	B	C
8'-0"	6"	3'-6"
10'-0"	6"	4'-6"
12'-0"	6"	5'-6"
14'-0"	1'-0"	6'-0"
16'-0"	2'-0"	6'-0"



SIGN WITH TWO SIGN LIGHTING LUMINAIRES

A	B	C	D
18'-0"	6"	3'-6"	5'-0"
20'-0"	6"	3'-6"	6'-0"
22'-0"	6"	3'-6"	4'-8"
24'-0"	6"	3'-6"	5'-4"



SIGN WITH THREE SIGN LIGHTING LUMINAIRES

A	B	C	D
34'-0"	6"	3'-6"	4'-4"
36'-0"	6"	3'-6"	4'-8"

EQUAL SPACES
(2'-6" MIN. TO 3'-6" MAX.)



EXPIRES JUNE 29, 2004

OVERHEAD SIGN
MOUNTING DETAILS
STANDARD PLAN G-9a

SHEET 1 OF 4 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 06-25-02

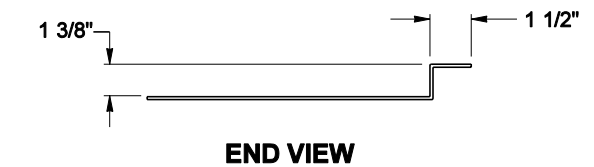
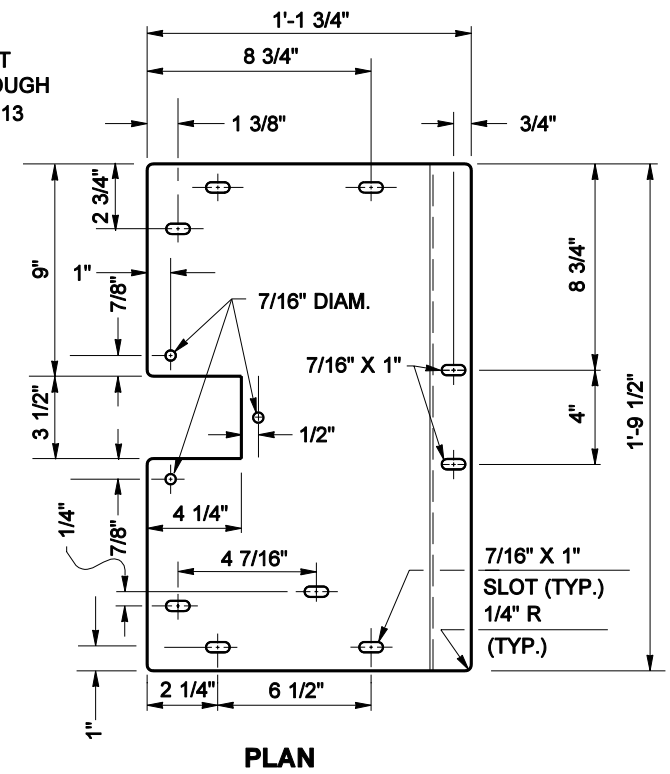
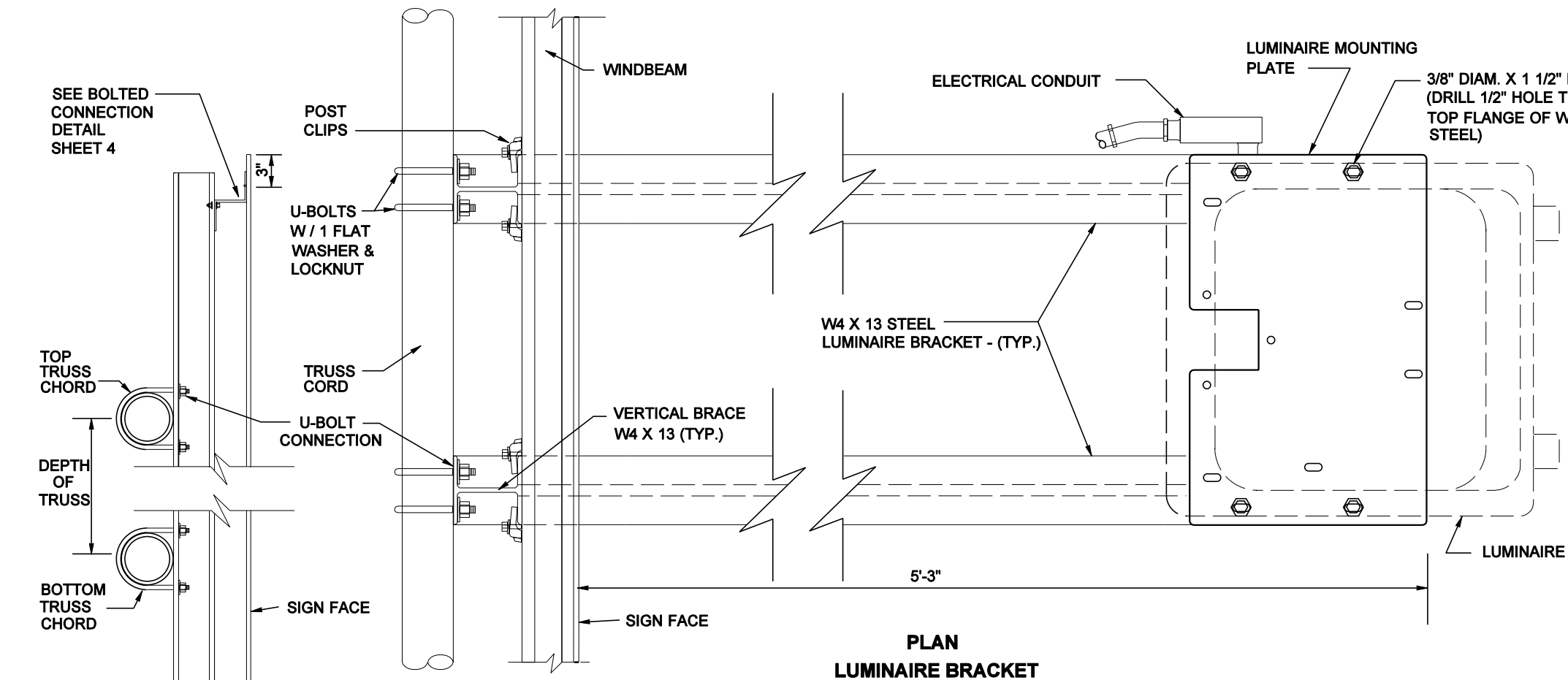
STATE DESIGN ENGINEER

DATE

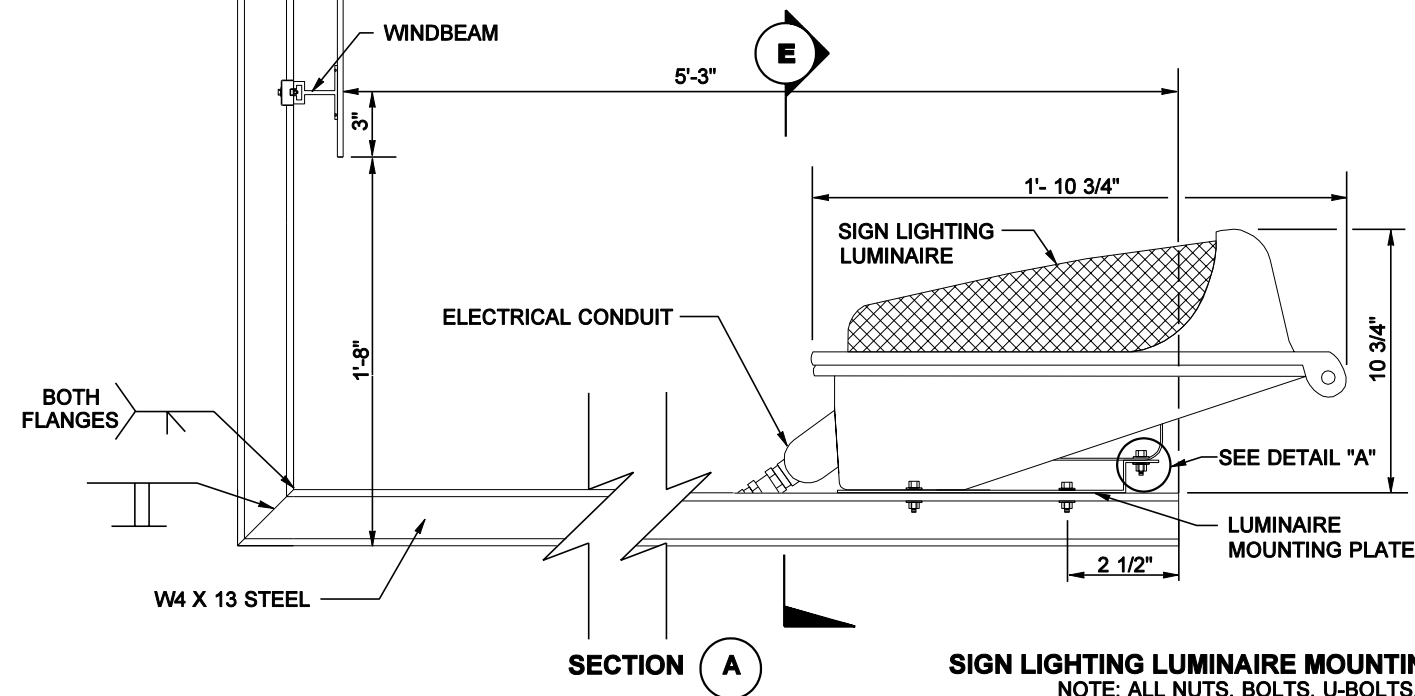
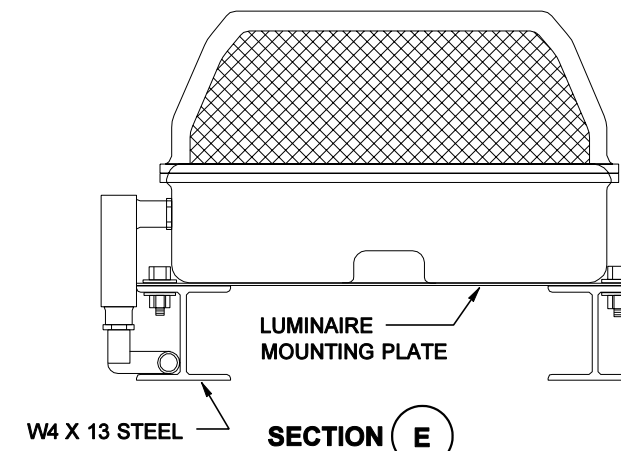


Washington State Department of Transportation

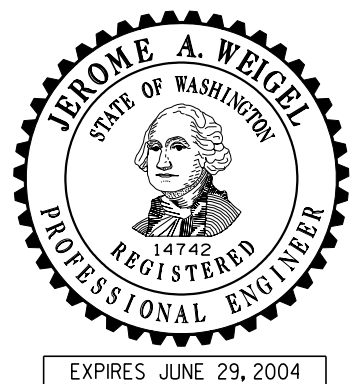
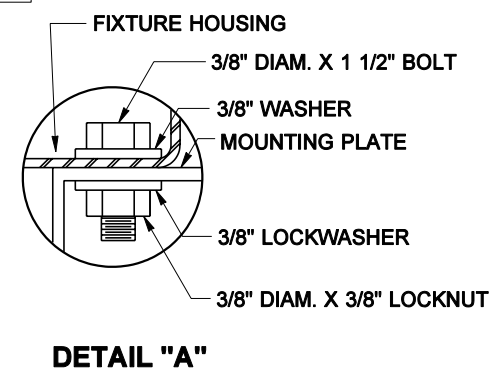
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LUMINAIRE MOUNTING PLATE
ITEM AVAILABLE FROM FIXTURE MANUFACTURER,
MATERIAL IS GALV. 10 GAGE STEEL PLATE



SIGN LIGHTING LUMINAIRE MOUNTING DETAILS FOR TRUSS STRUCTURES
NOTE: ALL NUTS, BOLTS, U-BOLTS, WASHERS AND OTHER HARDWARE
SHALL BE STAINLESS STEEL, EXCEPT AS NOTED.



OVERHEAD SIGN MOUNTING DETAILS STANDARD PLAN G-9a

SHEET 2 OF 4 SHEETS

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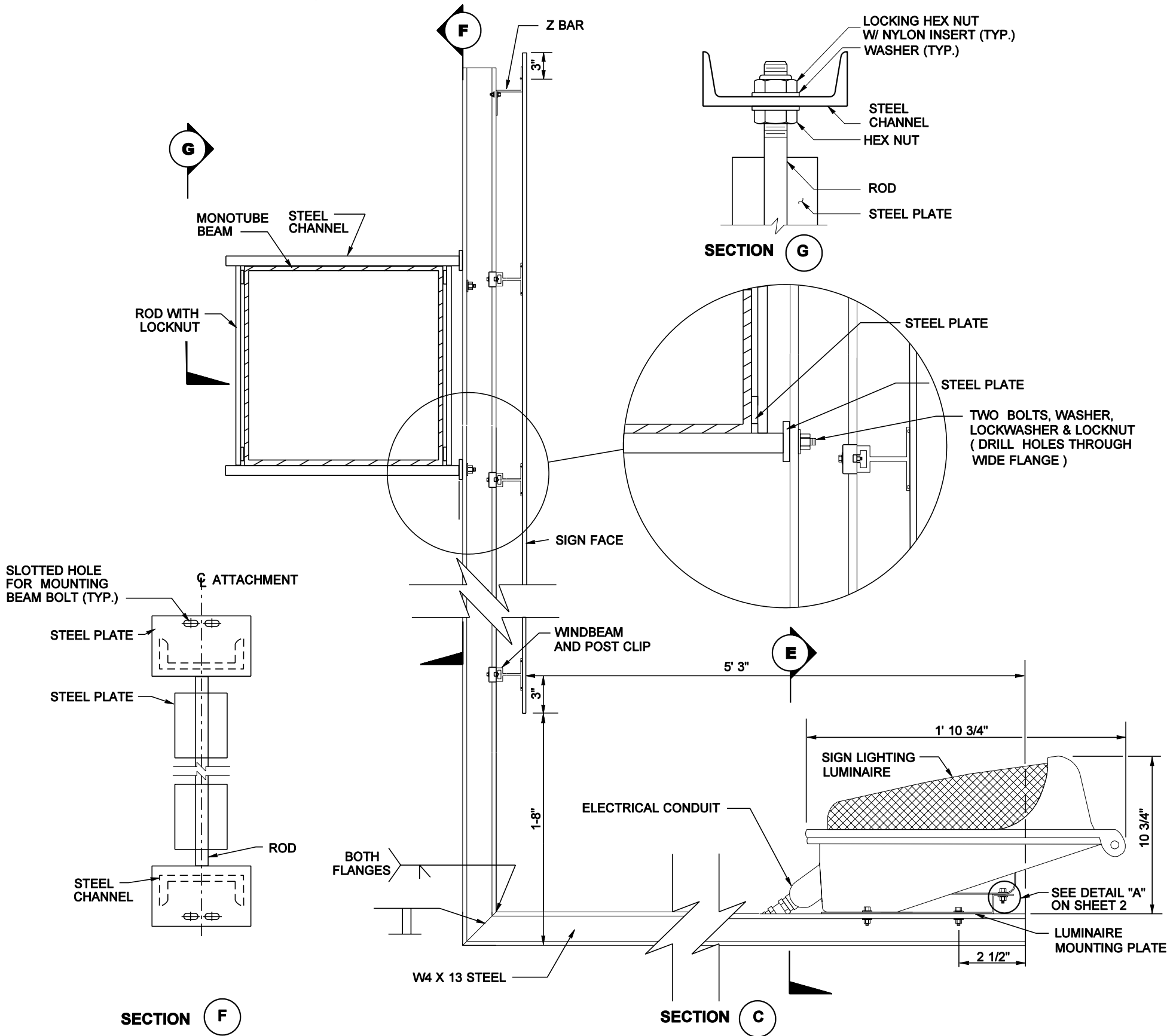
STATE DESIGN ENGINEER

DATE

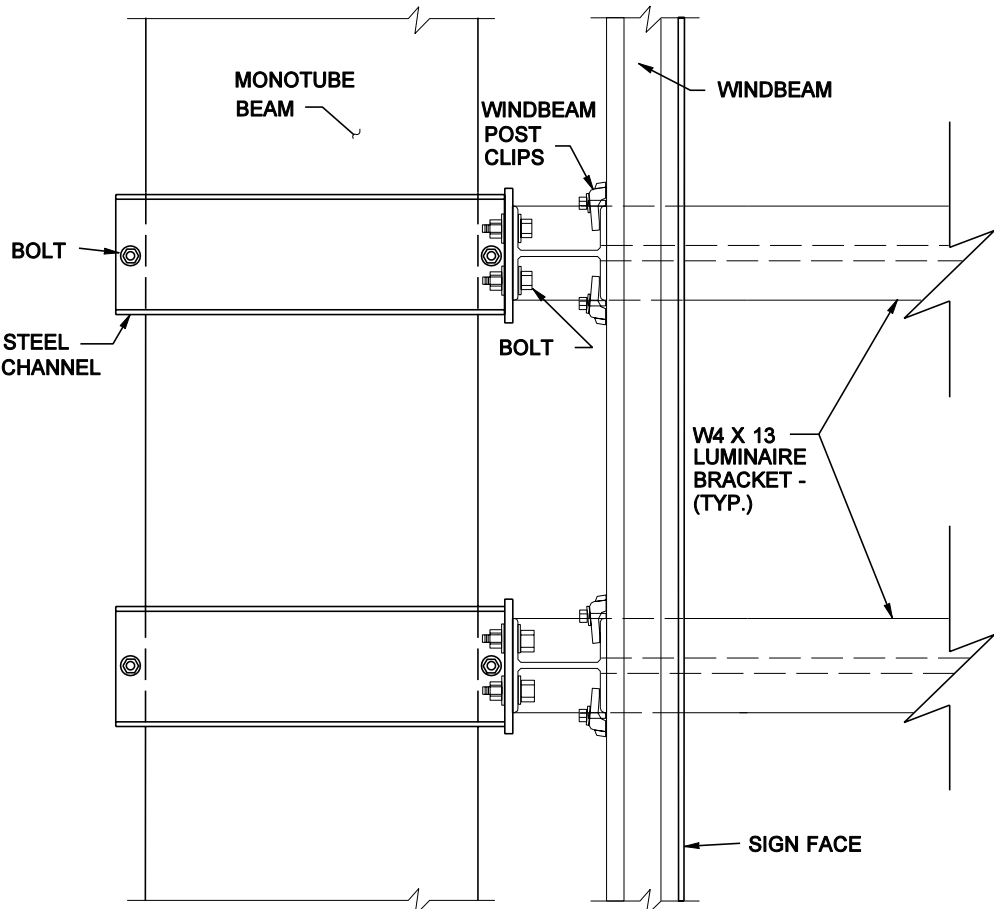


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NOTES
1. Refer to Contract Plans for Monotube Beam Bracket element sizes, dimensions and weld symbols.



PLAN



**OVERHEAD SIGN MOUNTING DETAILS
STANDARD PLAN G-9a**

SHEET 3 OF 4 SHEETS

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STATE DESIGN ENGINEER

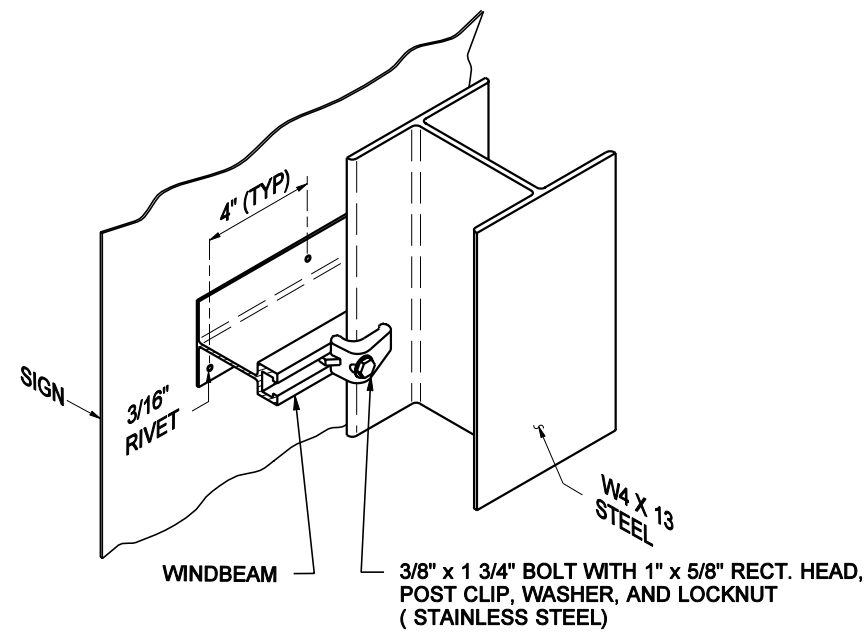
DATE



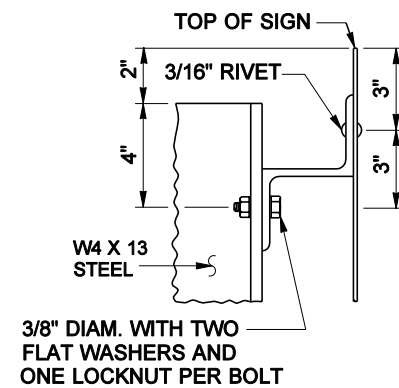
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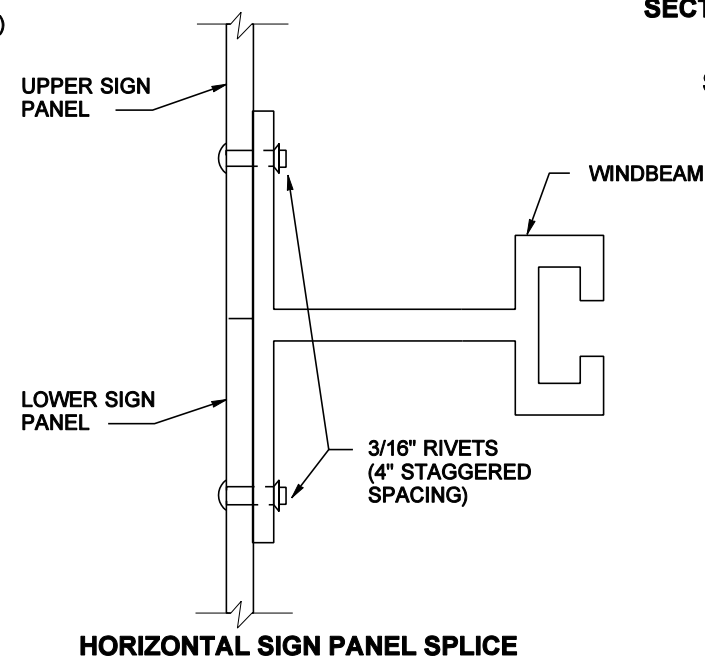
SIGN LIGHTING LUMINAIRE MOUNTING DETAILS FOR MONOTUBE STRUCTURES



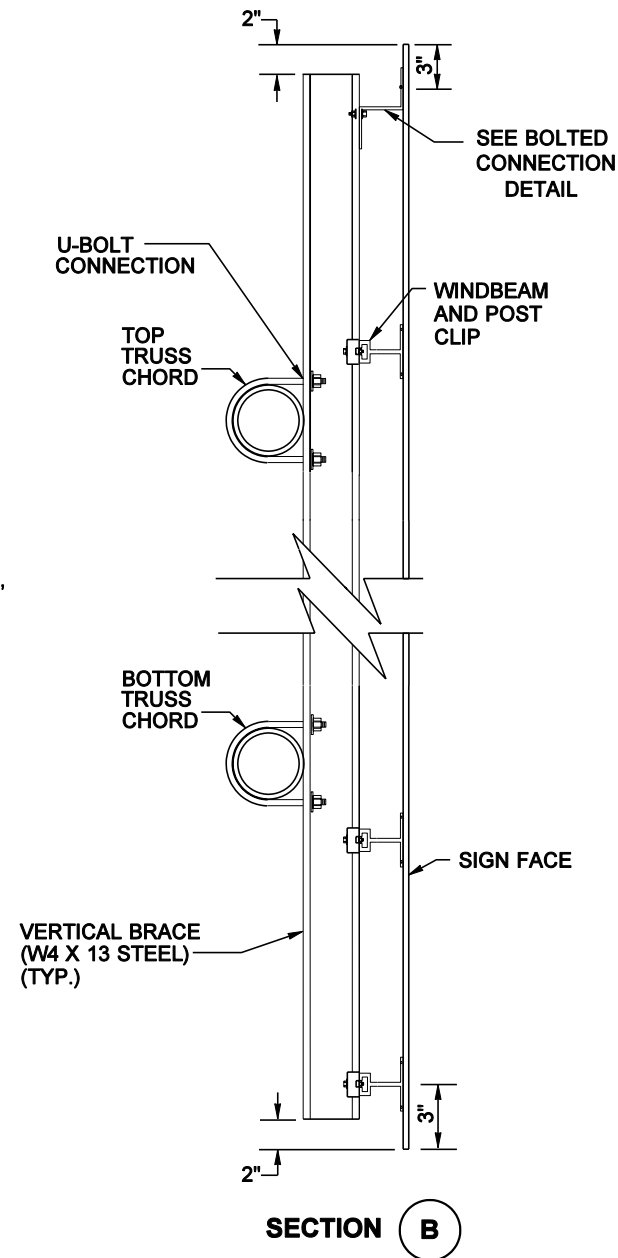
WINDBEAM CONNECTION DETAIL
(ON BOTH SIDES OF WIDE FLANGE)



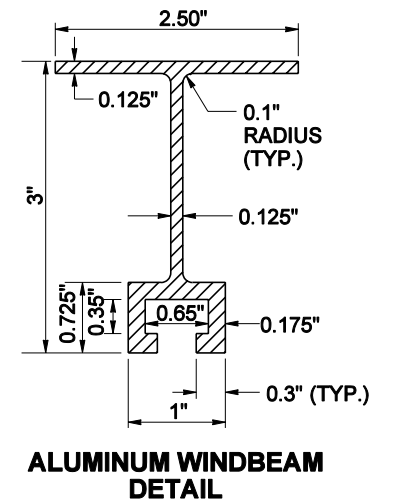
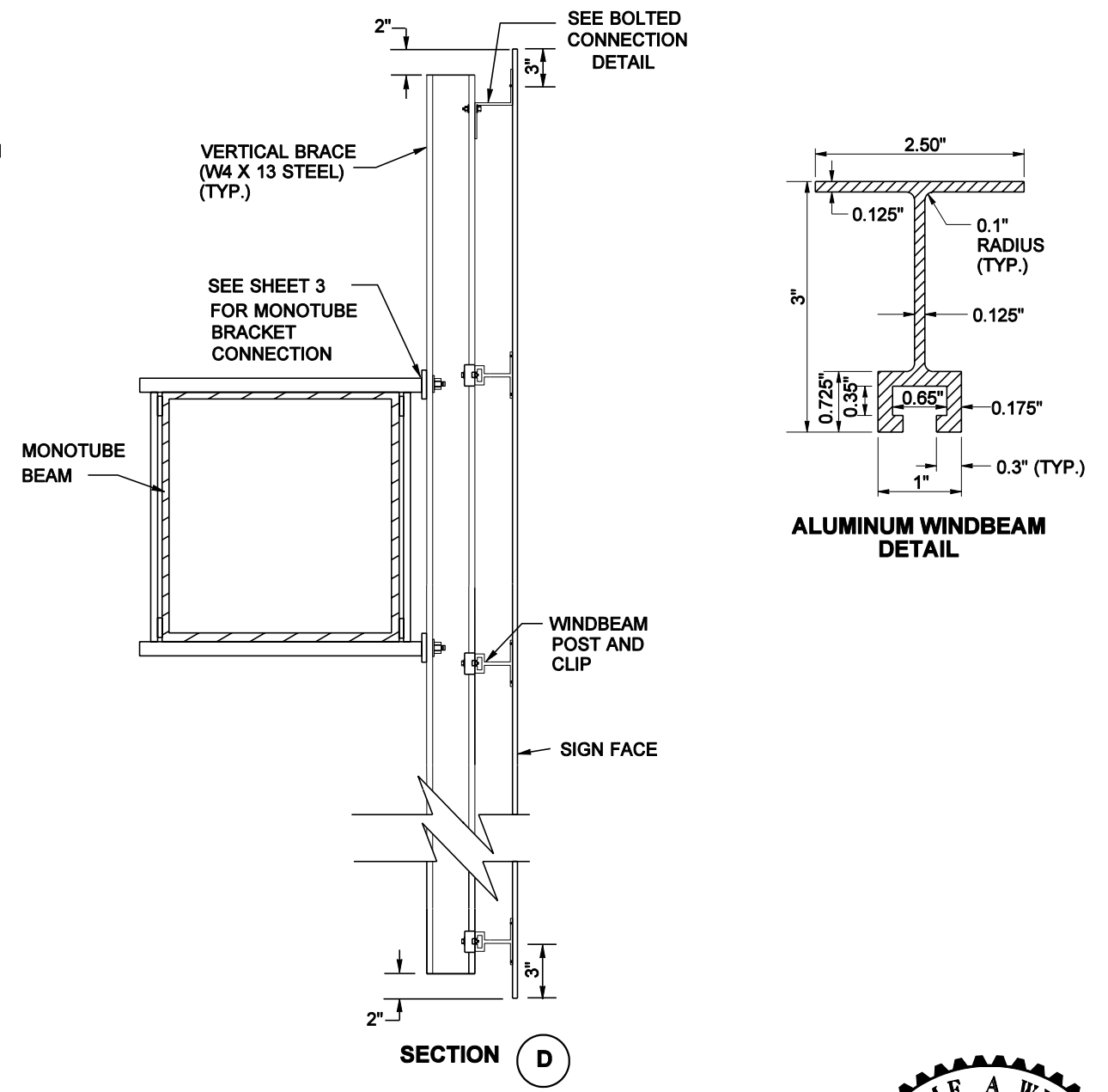
BOLTED CONNECTION DETAIL
(ON BOTH SIDES OF WIDE FLANGE)



HORIZONTAL SIGN PANEL SPLICE



SIGN ATTACHMENT DETAILS FOR TRUSS-TYPE AND MONOTUBE STRUCTURES



EXPIRES JUNE 29, 2004

OVERHEAD SIGN MOUNTING DETAILS STANDARD PLAN G-9a

SHEET 4 OF 4 SHEETS

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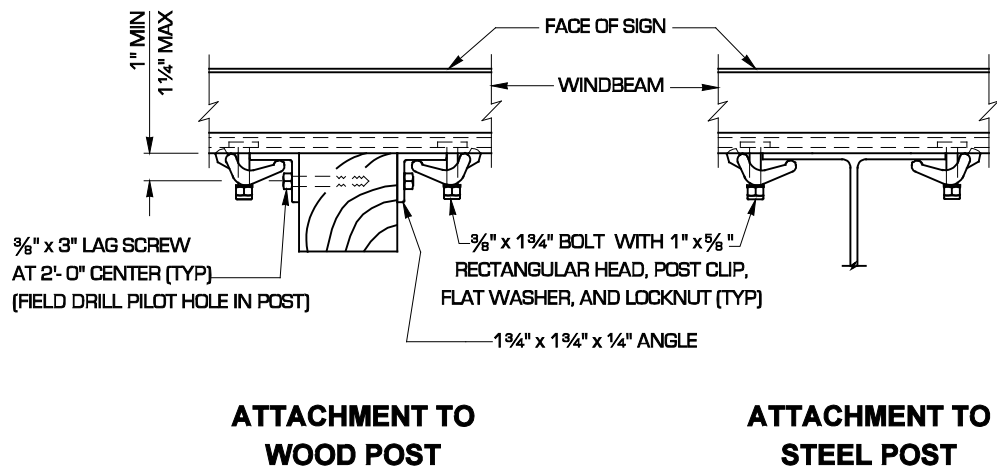
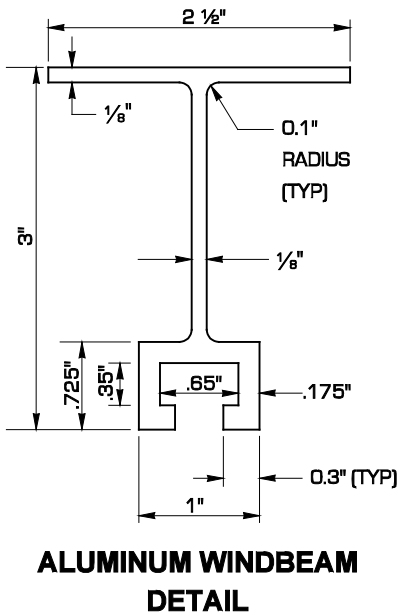
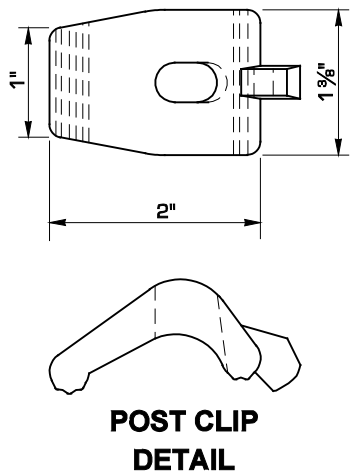
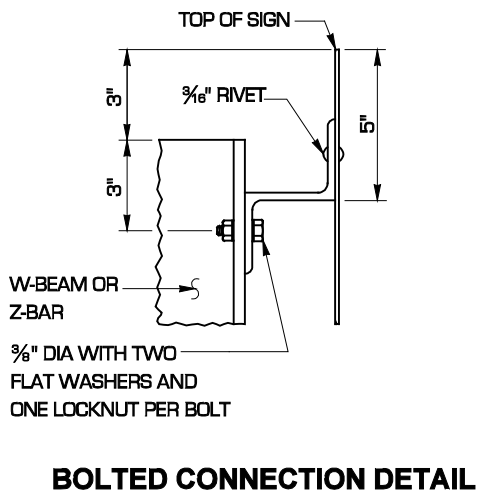
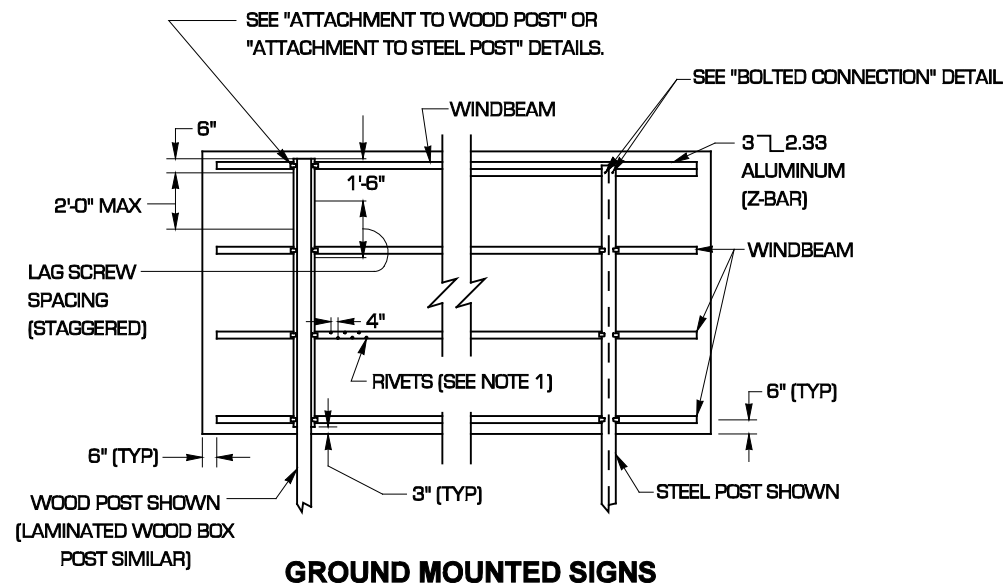


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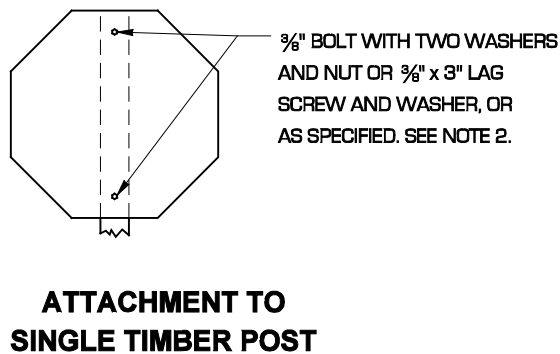
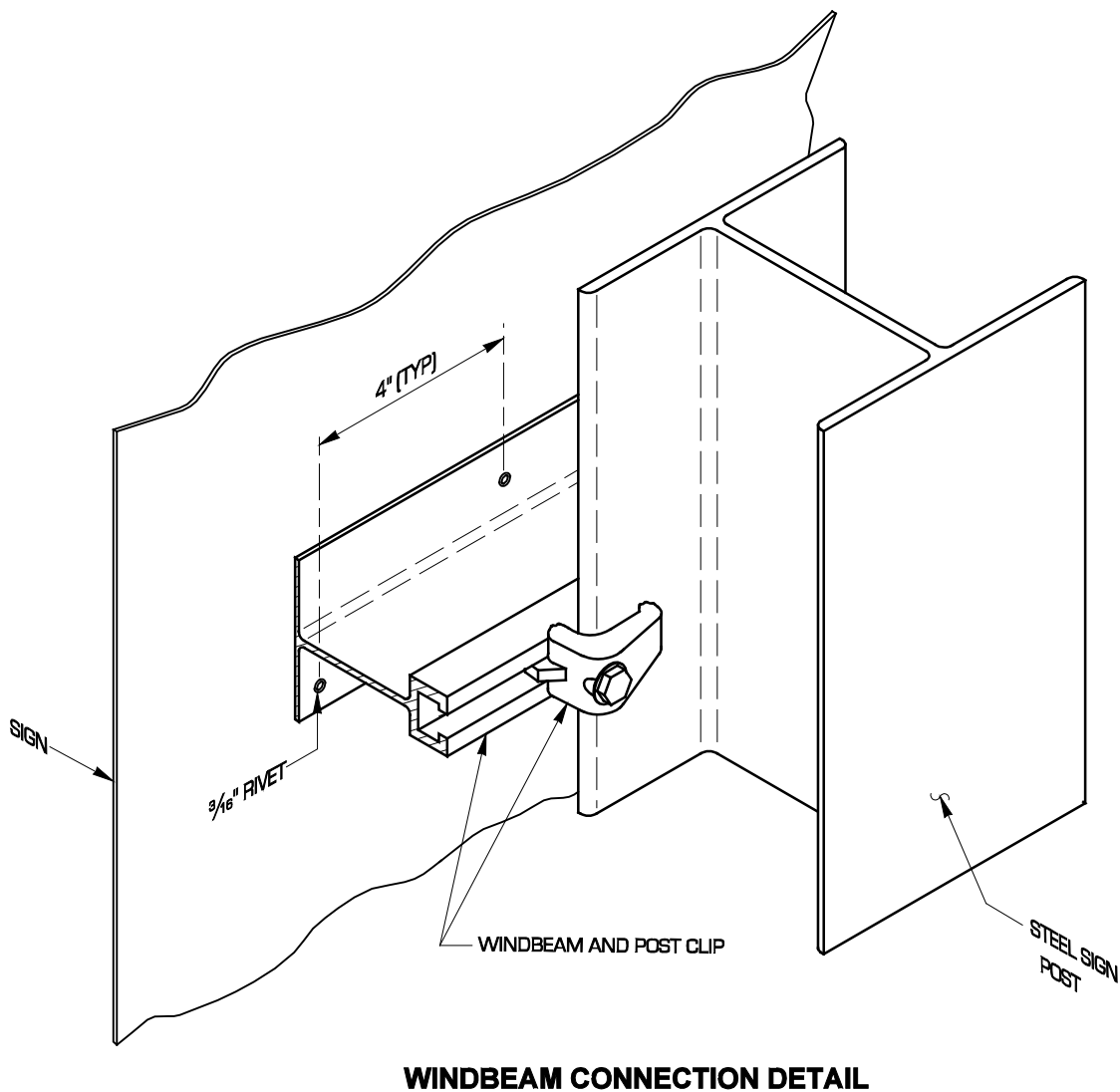
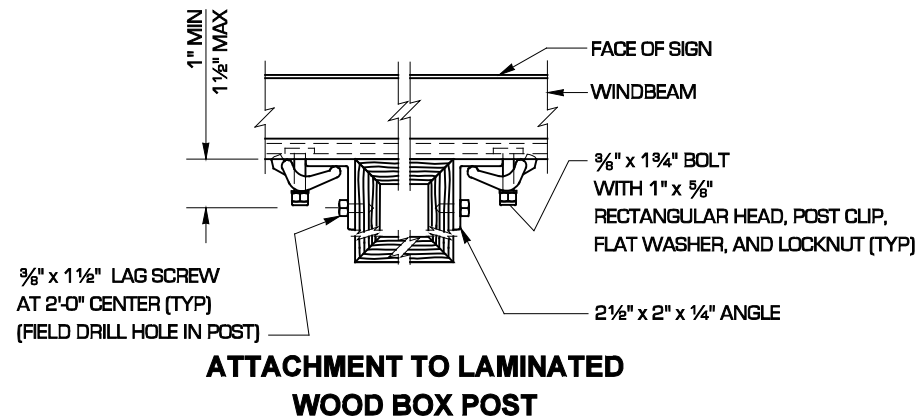
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EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004



ATTACHMENT TO STEEL POST



SIGN MOUNTING DETAILS
STANDARD PLAN G-9b

SHEET 1 OF 3 SHEETS

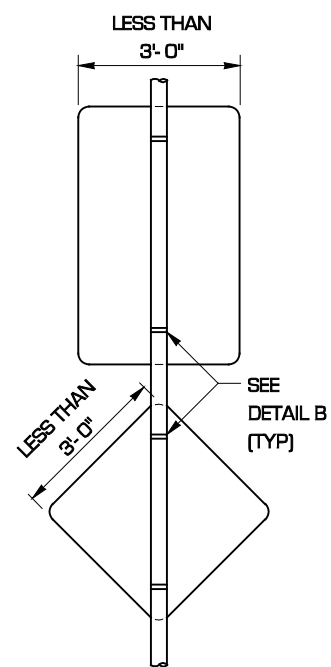
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Clifford E. Mansfield 04/02/99

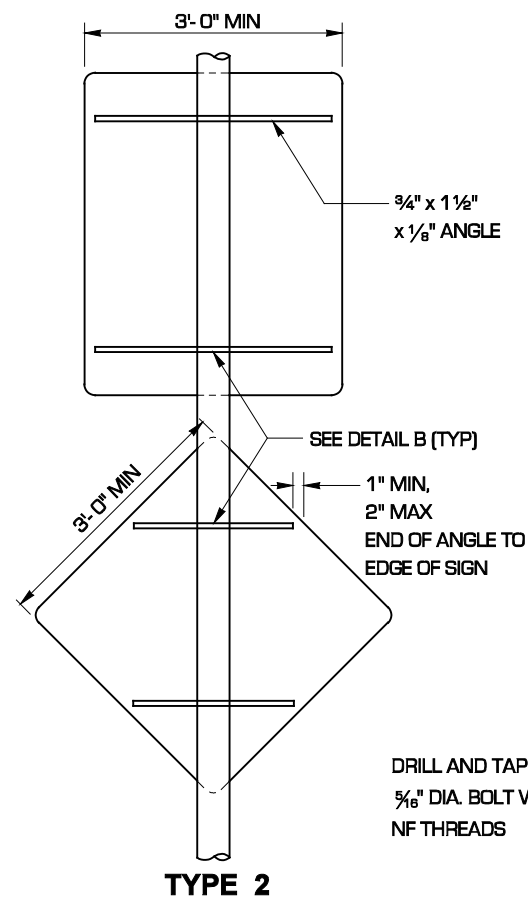


DEPUTY STATE DESIGN ENGINEER DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON



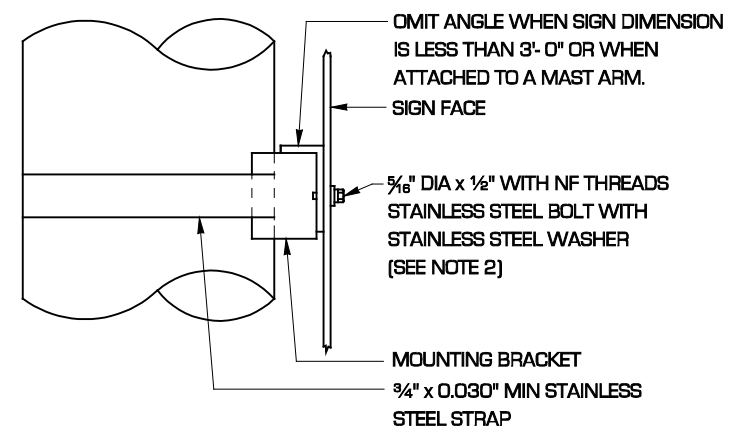
TYPE 1

ATTACHMENT TO ROUND POST

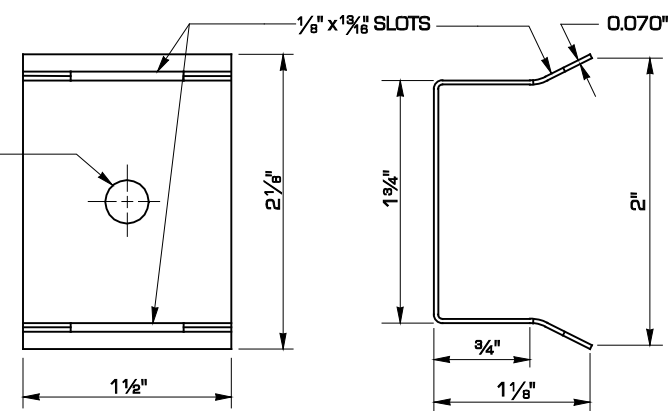


TYPE 2

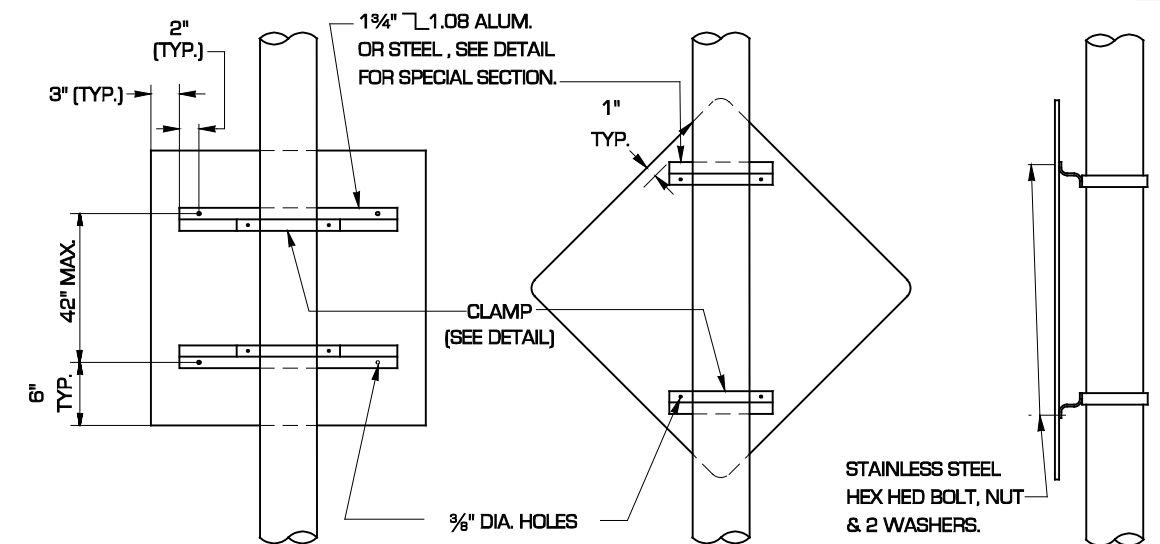
DRILL AND TAP FOR
5/16" DIA. BOLT WITH
NF THREADS



DETAIL B
FOR ALTERNATE 2
(SHOWN FOR VERTICAL POST)



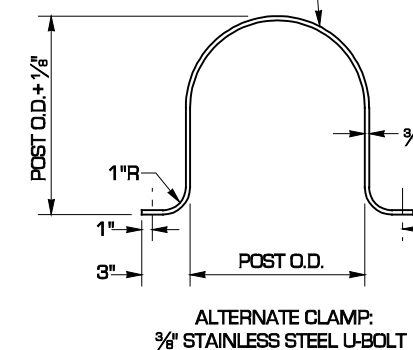
MOUNTING BRACKET DETAIL
FOR ALTERNATE 2



ALTERNATE 1 - ATTACHMENT TO ROUND POST

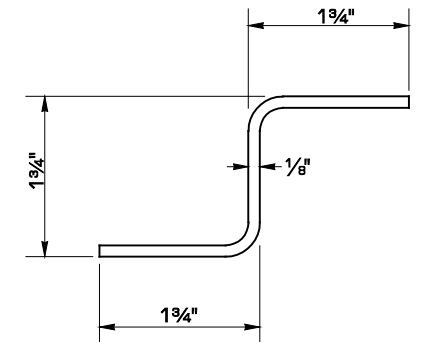
MATERIAL SPECIFICATIONS
PLATE-ASTM A 36
PIPE - ASTM A 53 GR. B
FINISH - GALV. PER ASTM A 123
AFTER FABRICATION

STEEL OR ALUMINUM
F.B. CLAMP 2" WIDE.

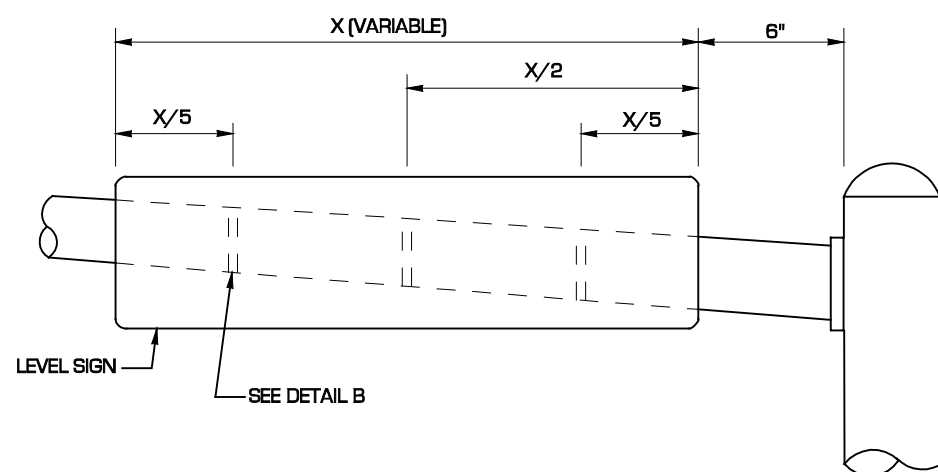


CLAMP DETAIL
FOR ALTERNATE 1

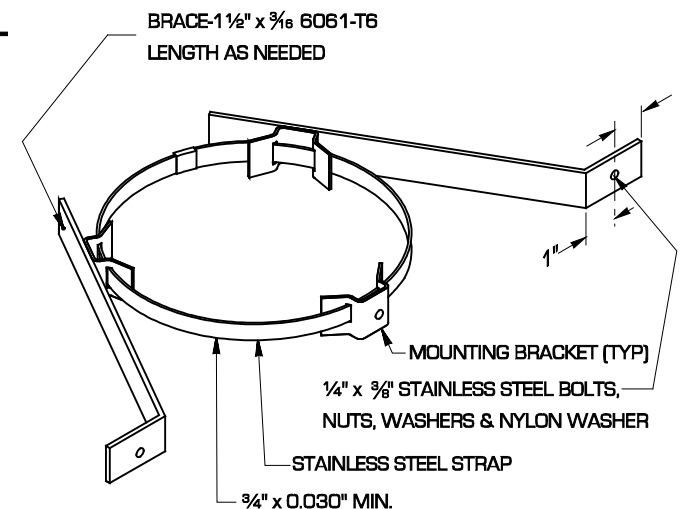
PROVIDE 7/16" DIA. HOLES
FOR 5/8" STAINLESS STEEL
HEX HD. BOLT & NUT &
2 WASHERS PER BOLT.



STEEL
SPECIAL SECTION
FOR ALTERNATE 1



ATTACHMENT TO MAST ARM



ALTERNATE 2 - ATTACHMENT TO ROUNDPOST

2 MOUNTING STRAPS MINIMUM PER SIGN.
42" MAX. SPACING BETWEEN MOUNTING
STRAPS.



EXPIRES JUNE 29, 2000

SIGN MOUNTING DETAILS
STANDARD PLAN G-9b

SHEET 2 OF 3 SHEETS

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04/02/99

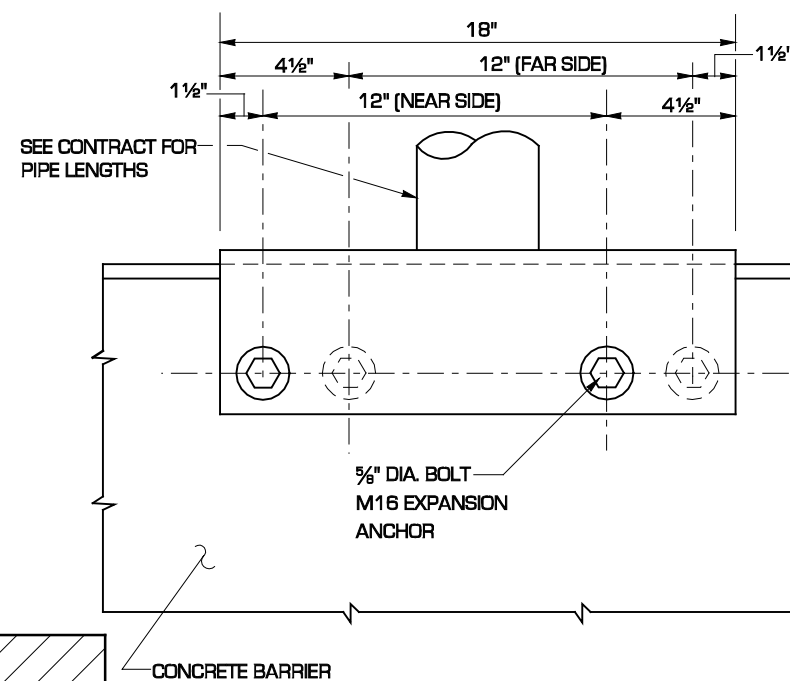
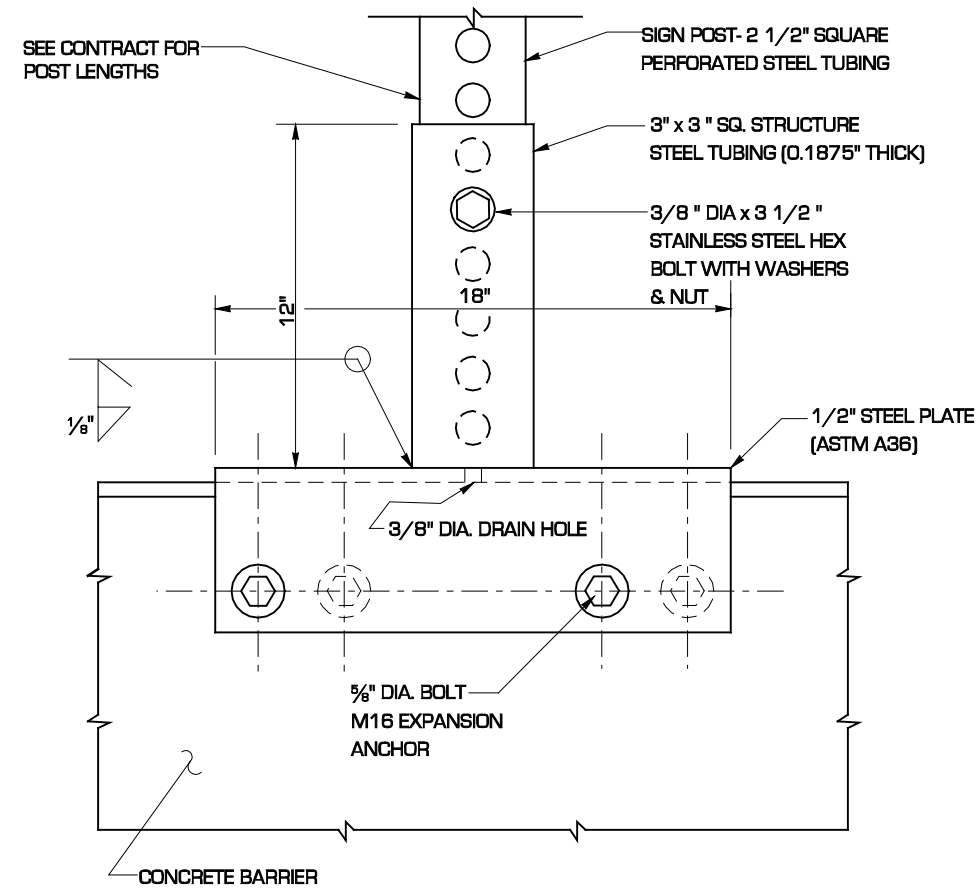
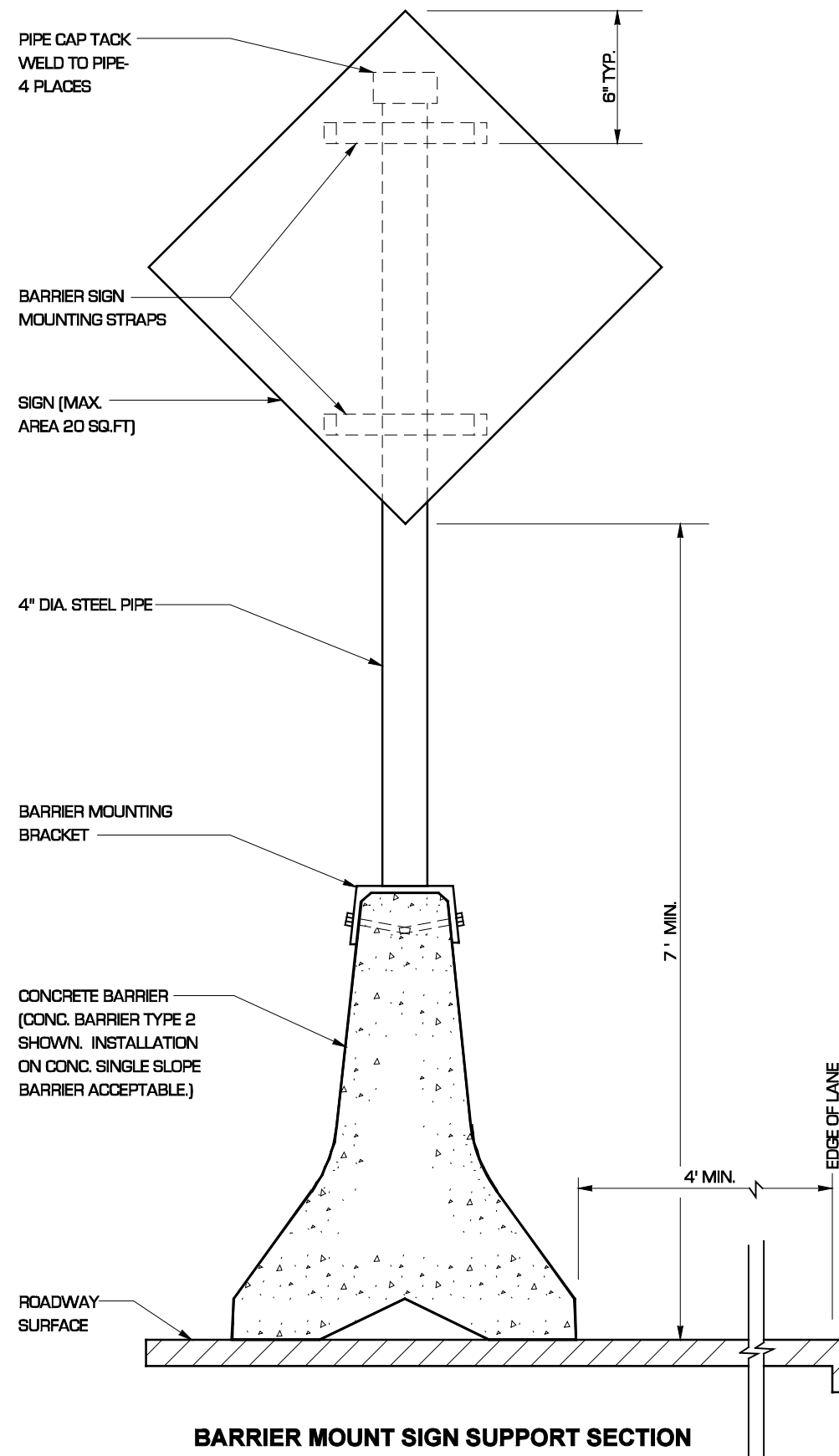


DEPUTY STATE DESIGN ENGINEER
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

DATE

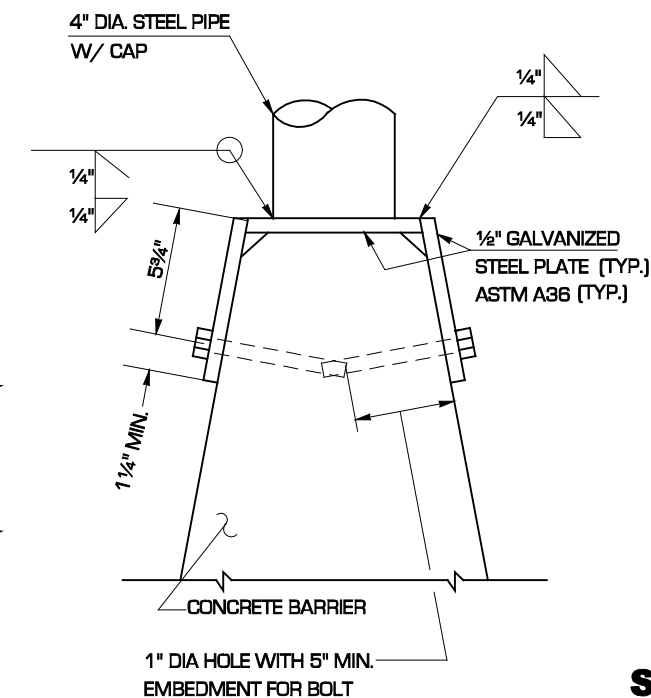
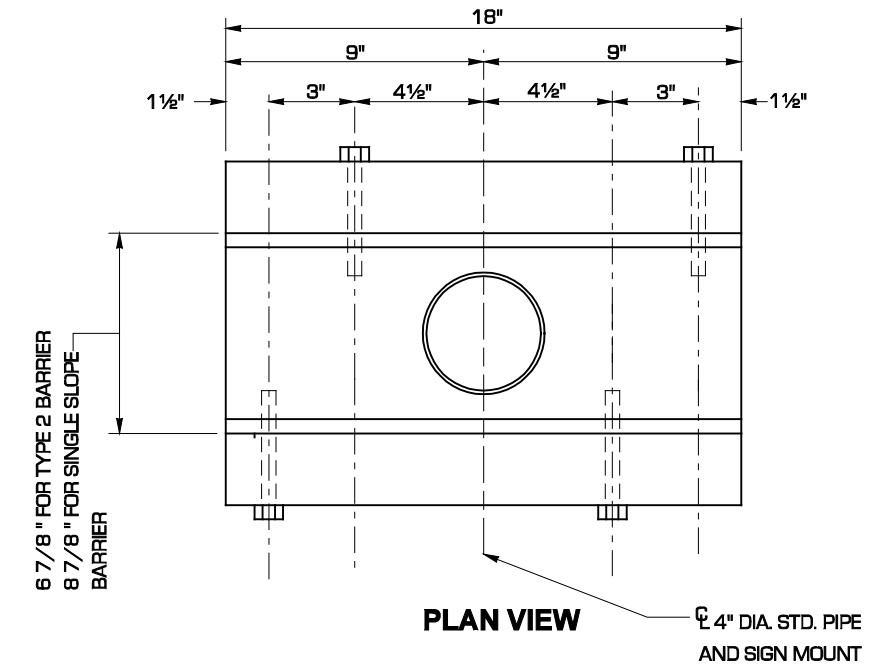
NOTES

1. ATTACH SIGN TO Z-BAR OR WINDBEAM WITH 3/16" RIVETS AT 4" STAGGERED SPACING.
2. A NYLON WASHER SHALL BE PLACED BETWEEN THE SIGN FACE AND ANY OTHER WASHER REQUIRED ON SIGNS CONSTRUCTED OF TYPE III OR IV SHEETING.
3. BARRIER MOUNTING BRACKET IS DESIGNED FOR A MAXIMUM SIGN AREA OF 20 SQ. FT. WITH THE CENTER OF AREA NO HIGHER THAN 8' - 6" ABOVE THE BARRIER MOUNTING BRACKET.



SIDE VIEW

(SEE NOTE 3)

A BENT PLATE MAY BE USED IN
LIEU OF THE WELDED PLATES SHOWN

EXPIRES JUNE 29, 2000

**SIGN MOUNTING DETAILS
STANDARD PLAN G-9b**

SHEET 3 OF 3 SHEETS

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04/02/99

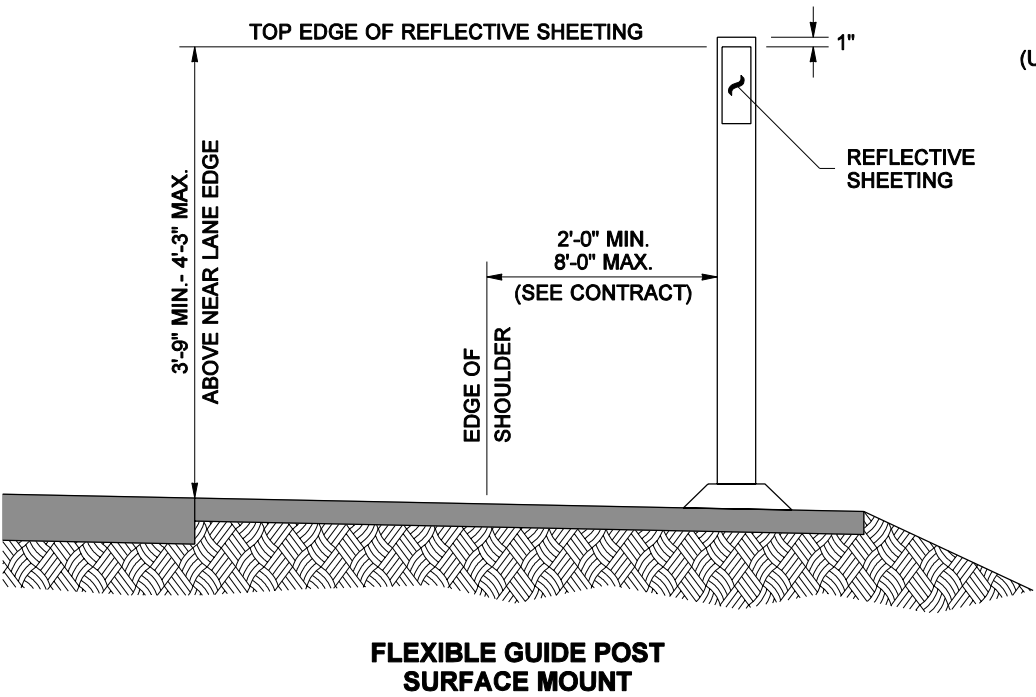
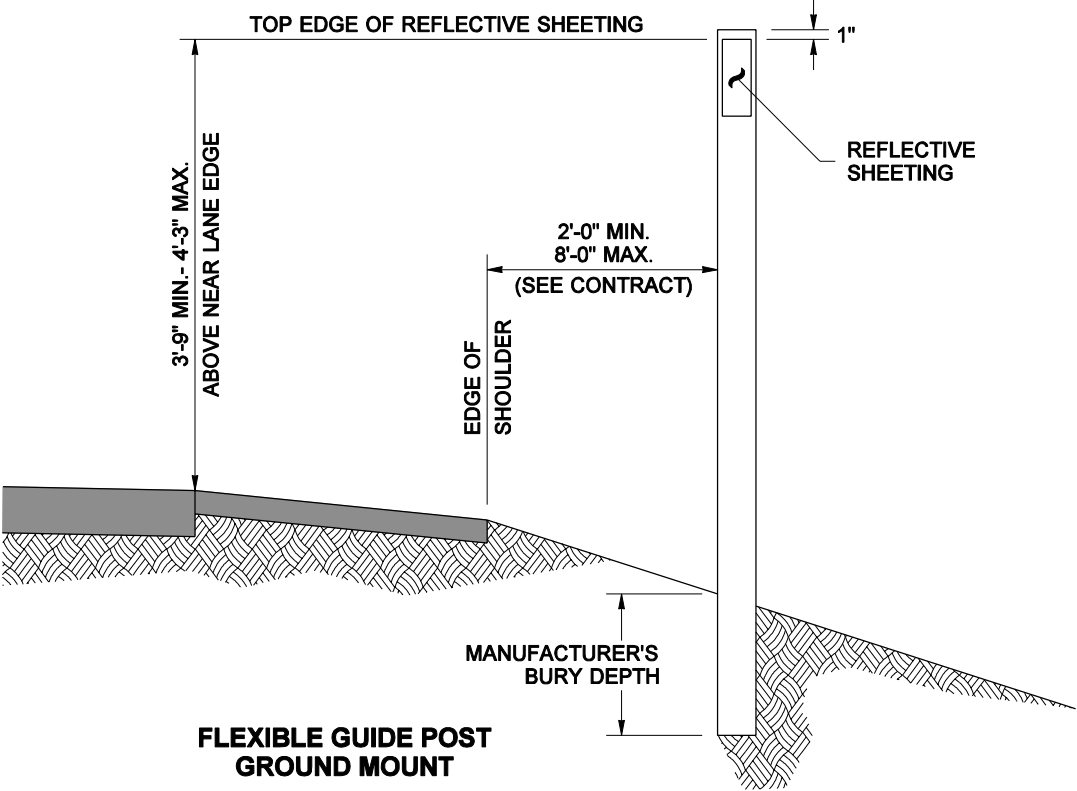
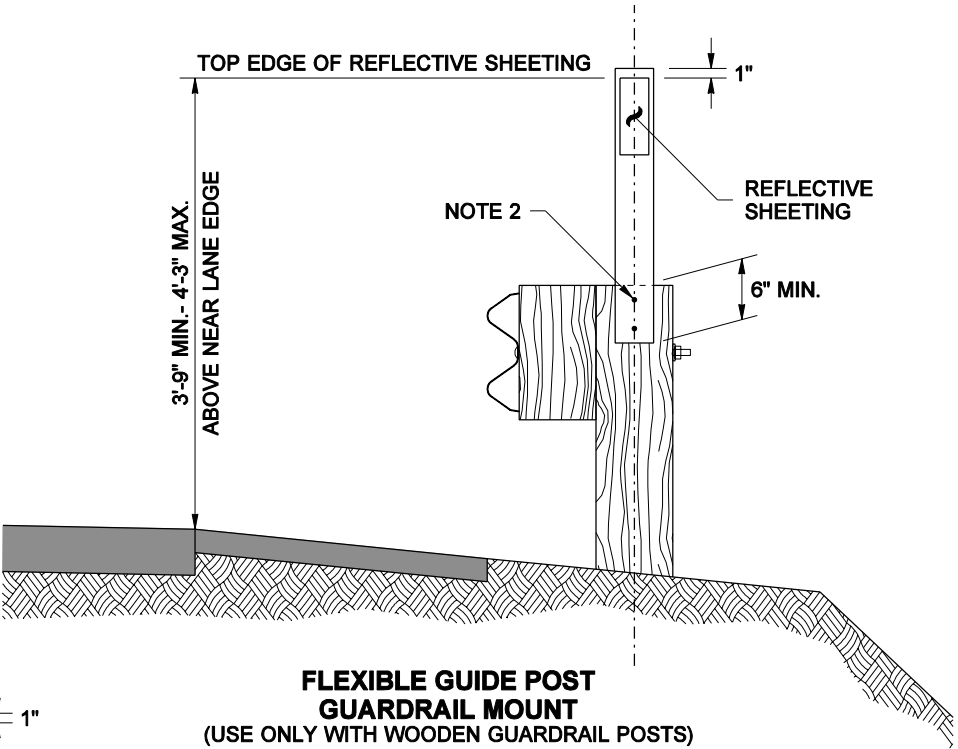
DEPUTY STATE DESIGN ENGINEER
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

DATE

GUIDE POST REFLECTIVE SHEETING APPLICATIONS					
TYPE W	TYPE WW		TYPE Y	TYPE YY	
TYPE G1 (STD. PLAN H-1d)	TYPE G2 (STD. PLAN H-1d)				
FACING TRAFFIC 	FACING TRAFFIC 	BACK SIDE 	FACING TRAFFIC 	FACING TRAFFIC 	BACK SIDE
FACING TRAFFIC 	FACING TRAFFIC 	BACK SIDE 			

NOTES

- When guardrail runs concurrent, the contractor shall either:
A. Drive the flexible guide post in line with the guardrail posts, or
B. Mount the shorter flexible guide post onto the guardrail post.
- Guide posts shall be fastened to the guardrail posts using two 2" x 3/8" lag screws with washers, along centerline of post. Also acceptable is any approved method submitted by the guide post manufacturer.
- When concrete barrier runs concurrent, the contractor shall mount barrier delineators where guideposts are required.



EXPIRES OCTOBER 26, 2002

GUIDE POSTS

STANDARD PLAN H-1

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 01-10-02

STATE DESIGN ENGINEER

DATE



Washington State Department of Transportation

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THREE EQUAL SPACES WHEN $R < 75'$
FOUR EQUAL SPACES WHEN $R \geq 75'$ (TYP)

100' DECELERATION TAPER

40'

60'

500'

100' (TYP)

200'

DIVIDED HIGHWAY

LEGEND

○ TYPE W

● TYPE Y

⊕ TYPE WW

SEE TABLE IN STANDARD
PLAN H-1 FOR DEFINITION
OF GUIDE POST TYPES



EXPIRES OCTOBER 26, 2000

GUIDE POST PLACEMENT
GRADE INTERSECTION
STANDARD PLAN H-1a

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APPROVED FOR PUBLICATION

Clifford E. Mansfield 4/14/00

DEPUTY STATE DESIGN ENGINEER

DATE

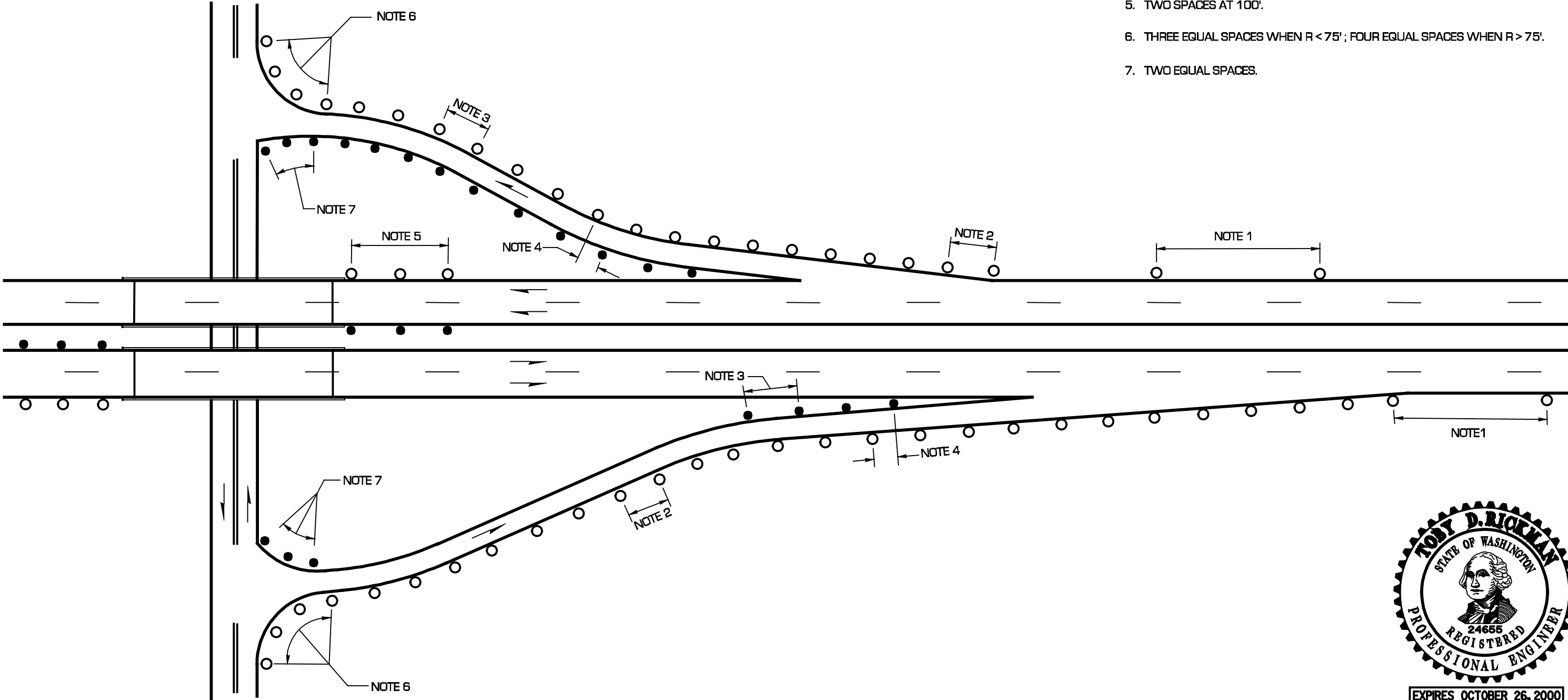
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

3/00	DELETED "RED REFLECTIVE SHEETING".	TWS
DATE	REVISION	BY

LEGEND	
○	TYPE W
●	TYPE Y

SEE TABLE SHOWN ON STANDARD
PLAN H-1 FOR DEFINITIONS OF GUIDE
POST TYPES

- NOTES:
1. SEE PLANS FOR GUIDE POST REQUIREMENTS BETWEEN INTERCHANGES.
 2. GUIDE POSTS SHALL BE PLACED AT 100' ON RAMP TANGENTS AND TAPERS.
 3. "S" DIMENSION SHOWN ON STANDARD PLAN H-1c OR 100', WHICHEVER IS SMALLER.
 4. ONE HALF OF "S" DIMENSION SHOWN ON STANDARD PLAN H-1c OR 50', WHICHEVER IS SMALLER.
 5. TWO SPACES AT 100'.
 6. THREE EQUAL SPACES WHEN $R < 75'$; FOUR EQUAL SPACES WHEN $R > 75'$.
 7. TWO EQUAL SPACES.



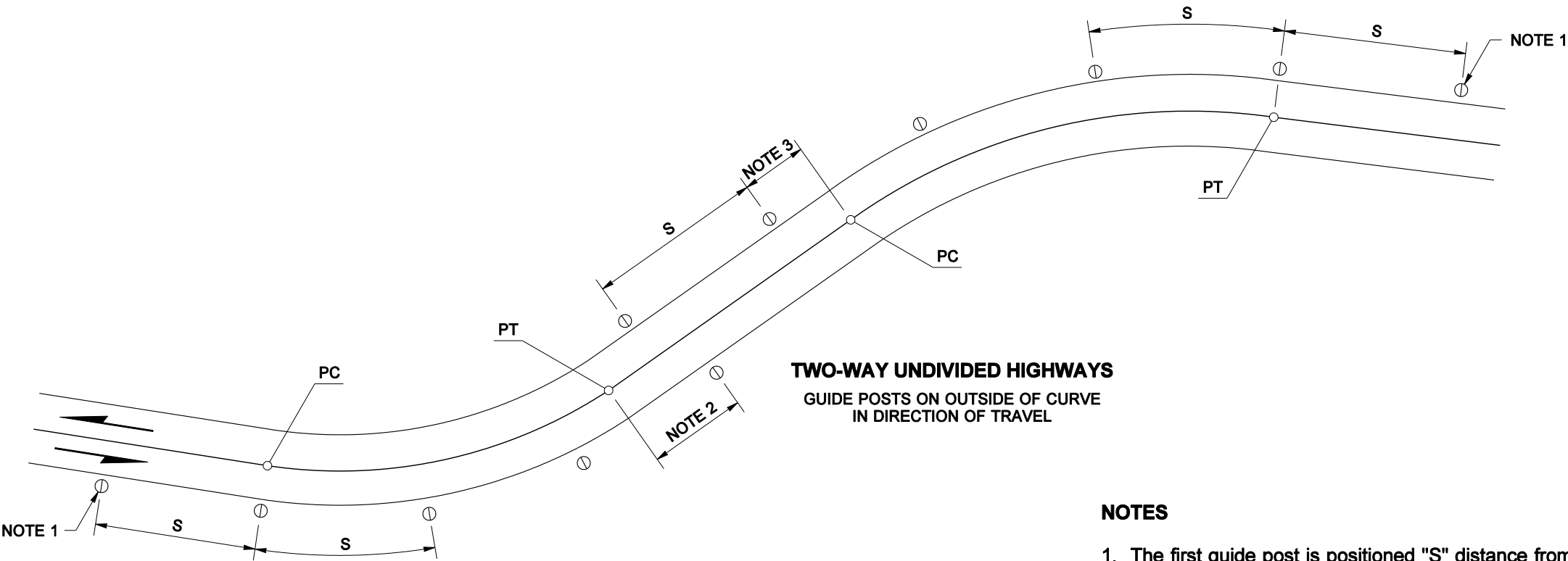
EXPIRES OCTOBER 26, 2000

**GUIDE POST PLACEMENT
FOR INTERCHANGES
STANDARD PLAN H-1b**

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4/00		DELETED "RED REFLECTIVE SHEETING" DESIGNATIONS ON GUIDE POSTS.		DATE
DATE	REVISION	BY	TWS	DATE
				05/05/00
			DEPUTY STATE DESIGN ENGINEER	
			WASHINGTON STATE DEPARTMENT OF TRANSPORTATION	
			OLYMPIA, WASHINGTON	

GUIDE POST SPACING (FEET)			
RADIUS	S	RADIUS	S
50	30	3,000	240
100	40	3,500	260
150	50	4,000	280
200	60	4,500	300
250	70	5,000	320
300	80	6,000	350
500	100	7,000	380
600	110	8,000	400
700	120	9,000	420
800	130	10,000	450
900	140	11,000	470
1,000	150	12,000	490
1,500	170	13,000	510
2,000	200	14,000	530
2,500	220	TANGENT	530

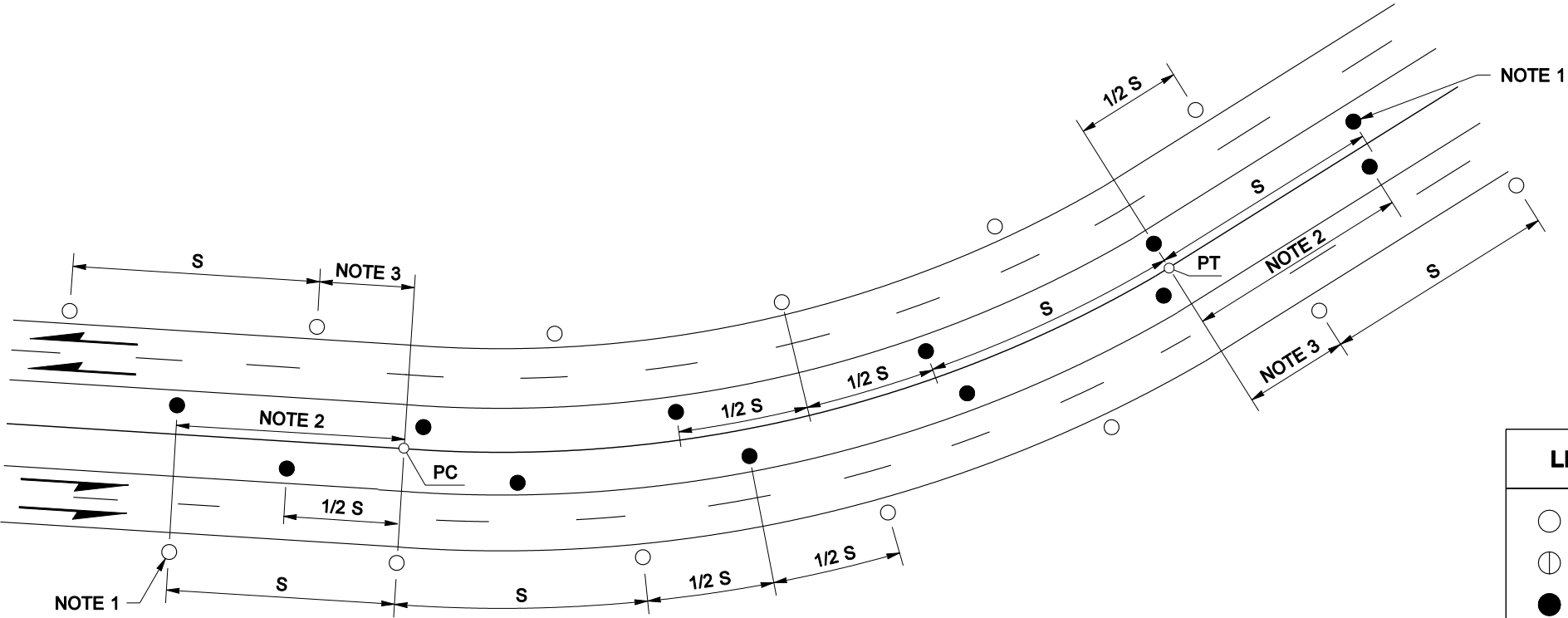
INTERPOLATE FROM THE TABLE FOR RADII NOT SHOWN



TWO-WAY UNDIVIDED HIGHWAYS
GUIDE POSTS ON OUTSIDE OF CURVE
IN DIRECTION OF TRAVEL

NOTES

1. The first guide post is positioned "S" distance from the beginning of curvature.
2. If the last guide post beyond the curve is 1/2 "S" or more, no additional posts are required.
3. If the last guide post beyond the curve is less than 1/2 "S", one additional post is required.
4. For definitions of guide post types, see Standard Plan H-1, GUIDE POSTS.



MULTI-LANE DIVIDED HIGHWAYS
GUIDE POSTS ON INSIDE AND OUTSIDE OF CURVE
FOR EACH DIRECTION OF TRAVEL

LEGEND

○

TYPE W

⊙

TYPE WW

●

TYPE Y



**GUIDE POST PLACEMENT
FOR HORIZONTAL CURVES**

STANDARD PLAN H-1c

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 01-10-02

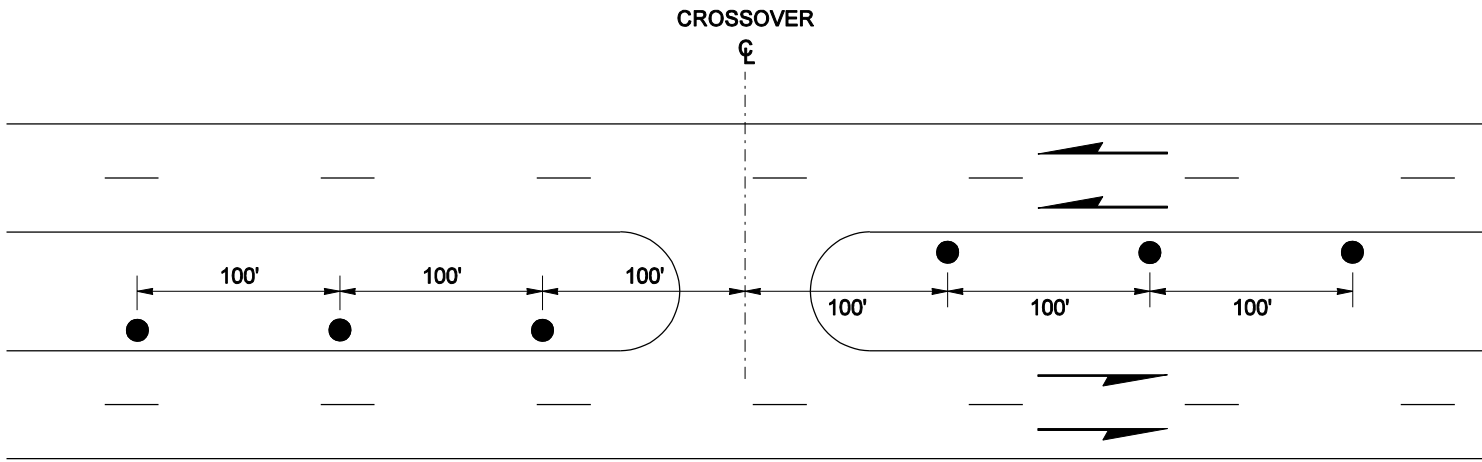
STATE DESIGN ENGINEER

DATE

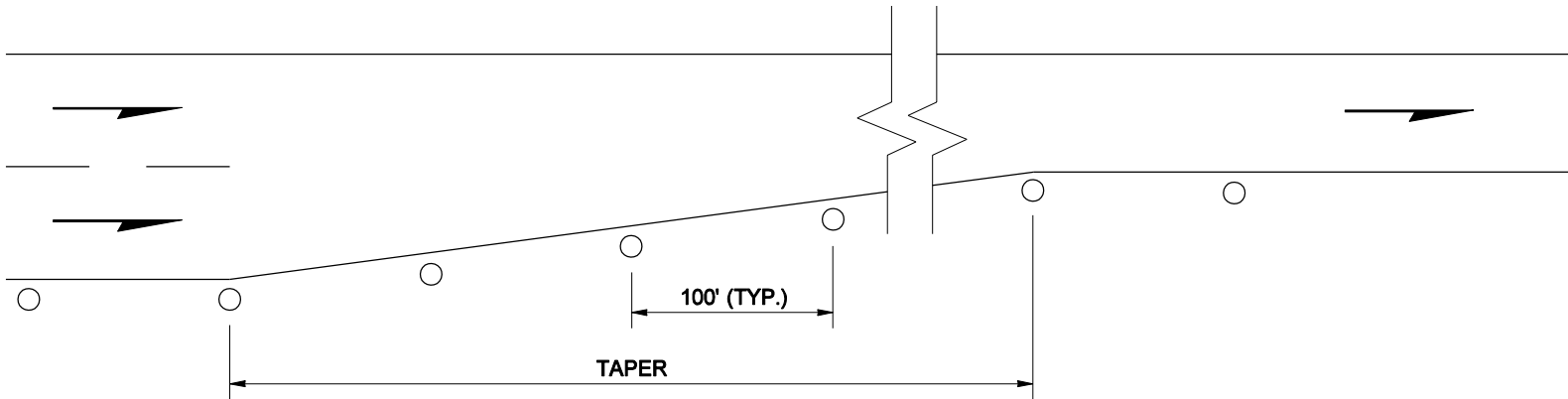


Washington State Department of Transportation

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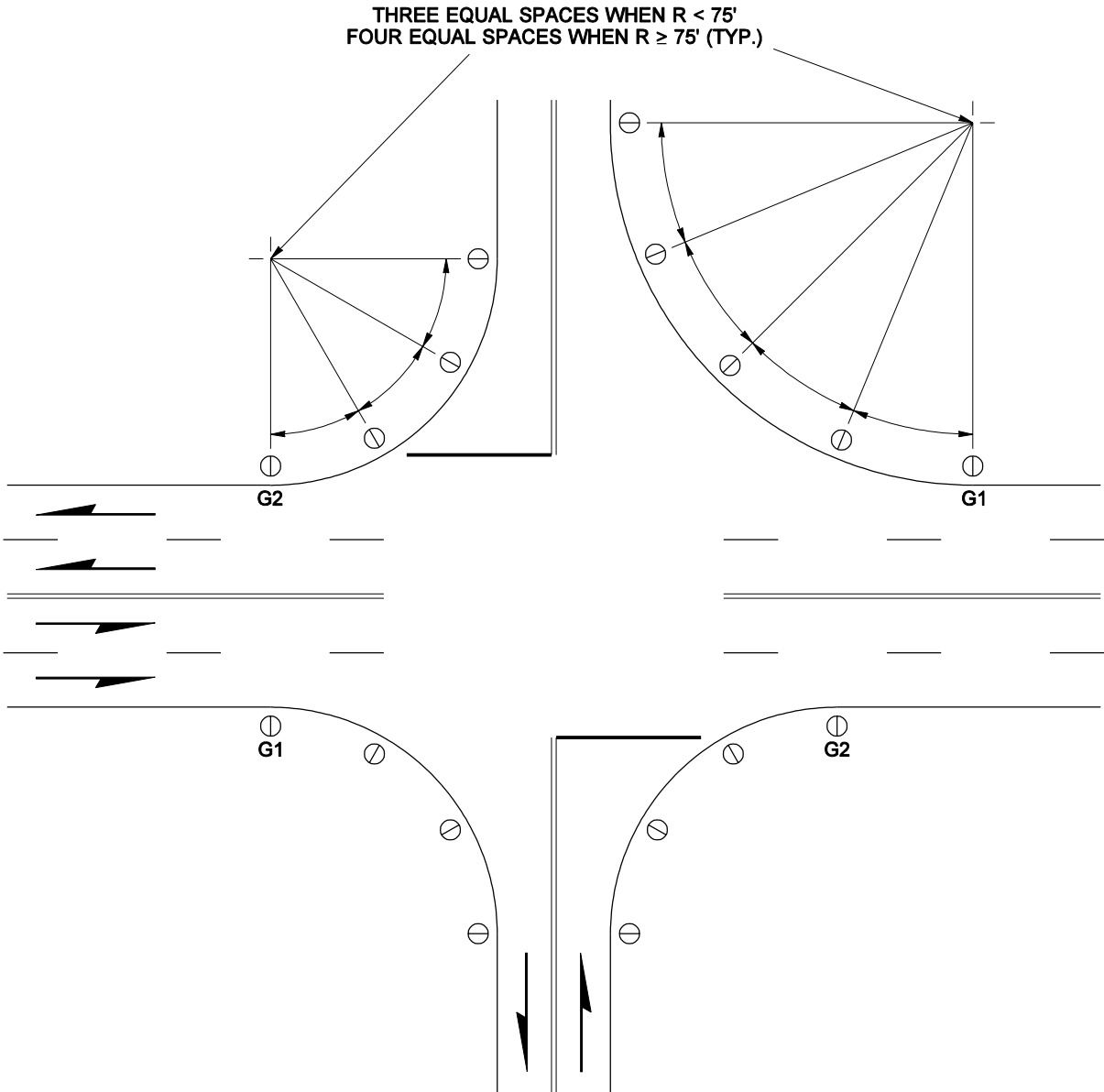
MEDIAN CROSSOVERS



LANE REDUCTIONS

LEGEND	
○	TYPE W
⊖	TYPE WW
●	TYPE Y
⊖ G1	TYPE G1
⊖ G2	TYPE G2

FOR DEFINITION OF GUIDE POST TYPES,
SEE STANDARD PLAN H-1, GUIDE POSTS



UNDIVIDED HIGHWAY
WITHOUT ILLUMINATION



MISCELLANEOUS
GUIDE POST PLACEMENT
STANDARD PLAN H-1d

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 01-10-02

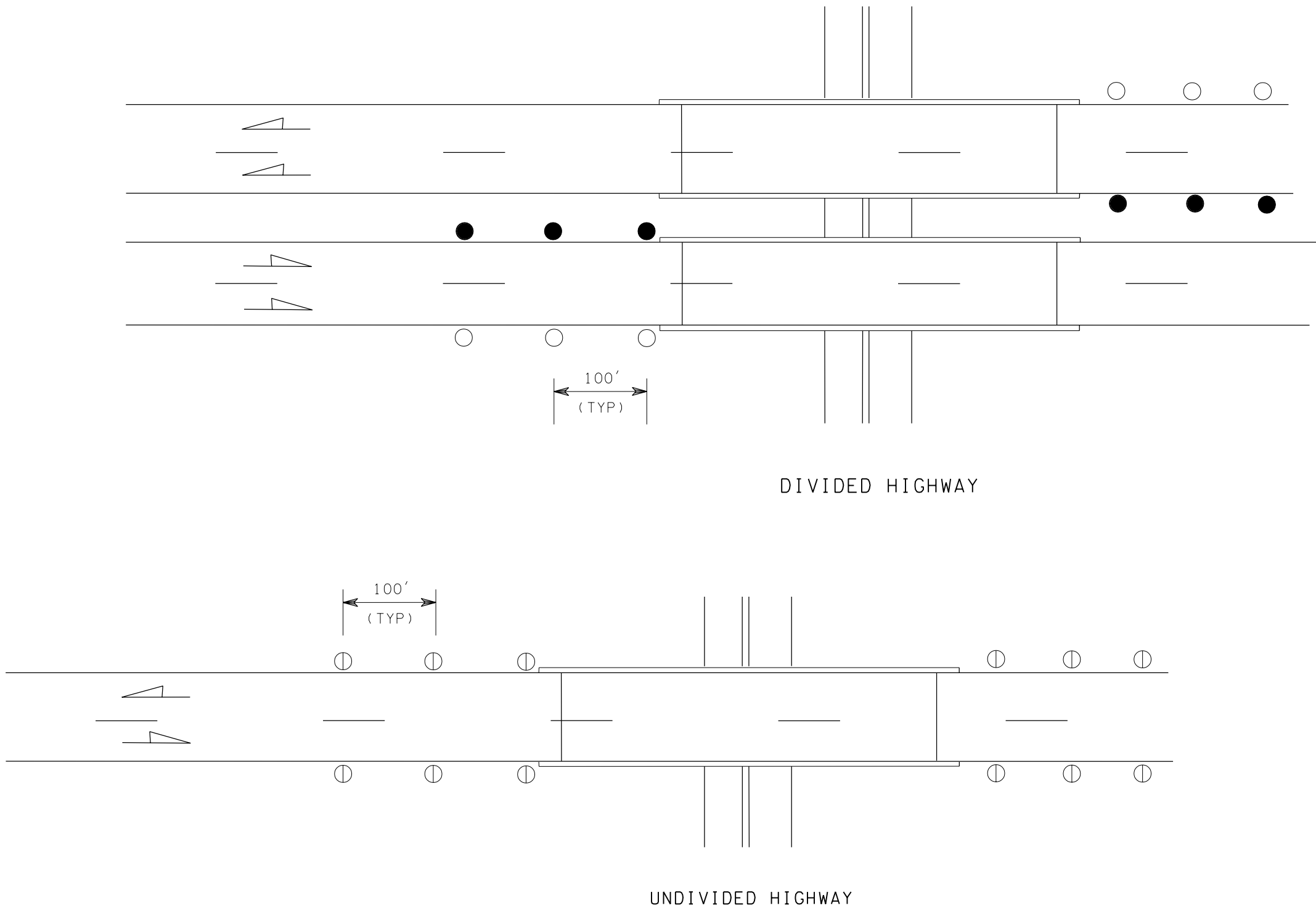
STATE DESIGN ENGINEER

DATE



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LEGEND	
○	Type W
●	Type Y
⊕	Type WW

See table in Standard Plan H-1 for definition of guide post types



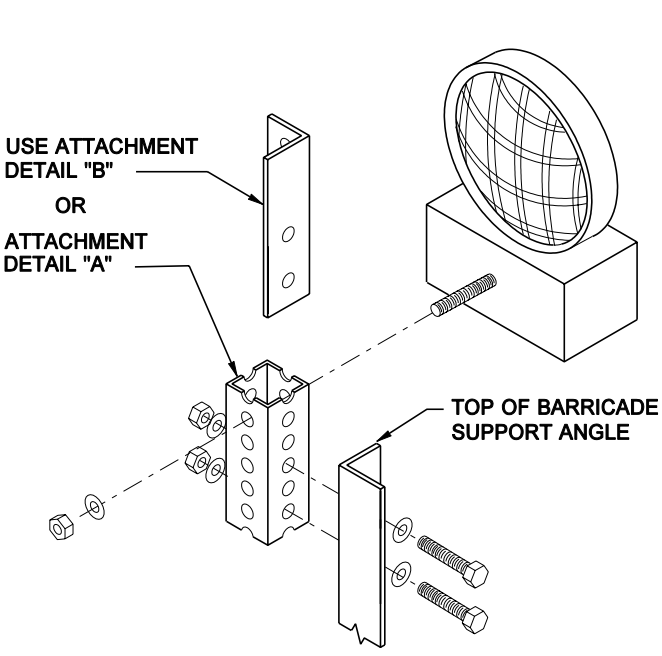
EXPIRES OCTOBER 26, 2000

**GUIDE POST PLACEMENT
FOR BRIDGES
STANDARD PLAN H-1e**

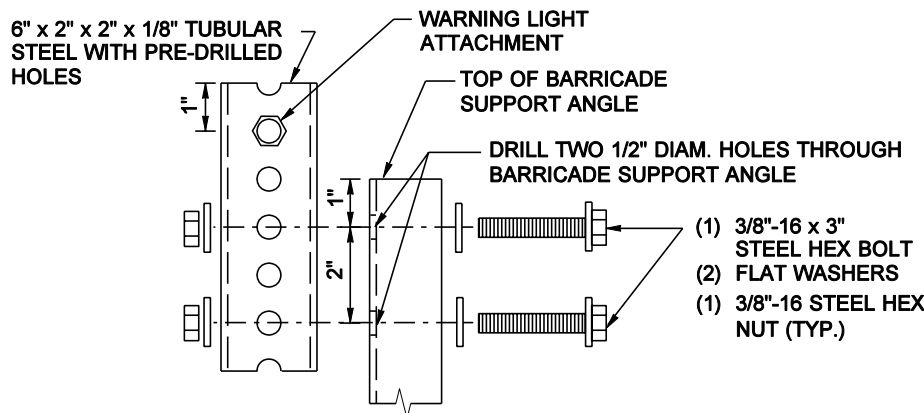
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3/00	NEW STAMP & APPROVAL DATE	TWS
DATE	REVISION	BY

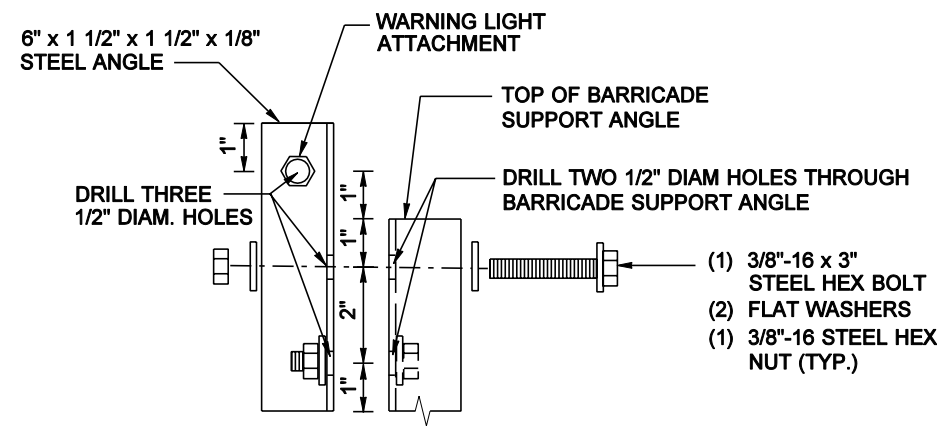
APPROVED FOR PUBLICATION	
Clifford E. Mansfield	4/14/00
DEPUTY STATE DESIGN ENGINEER	DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION OLYMPIA, WASHINGTON	



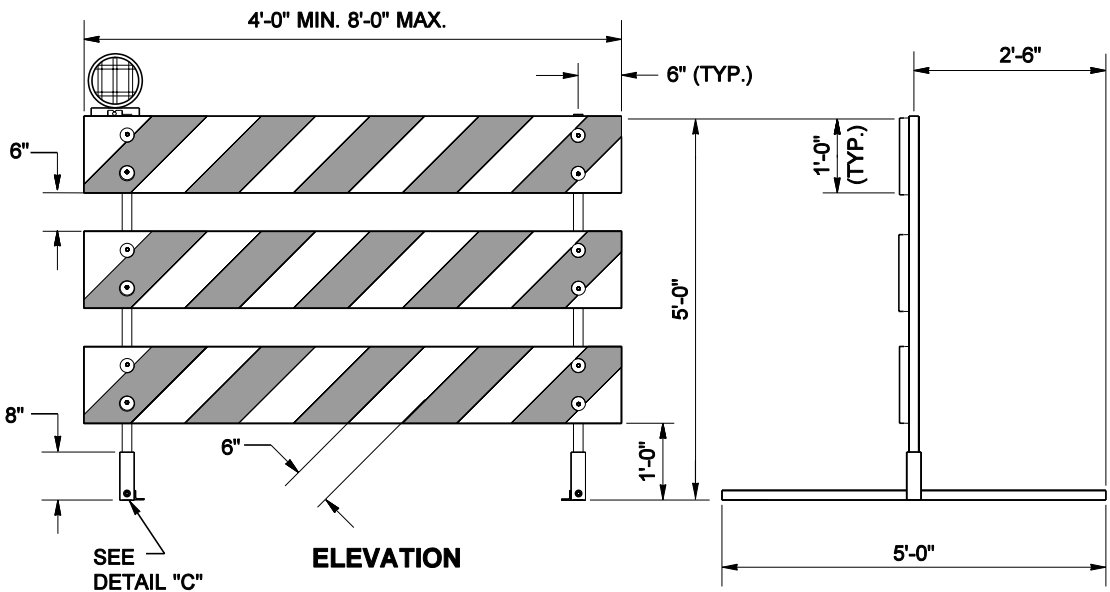
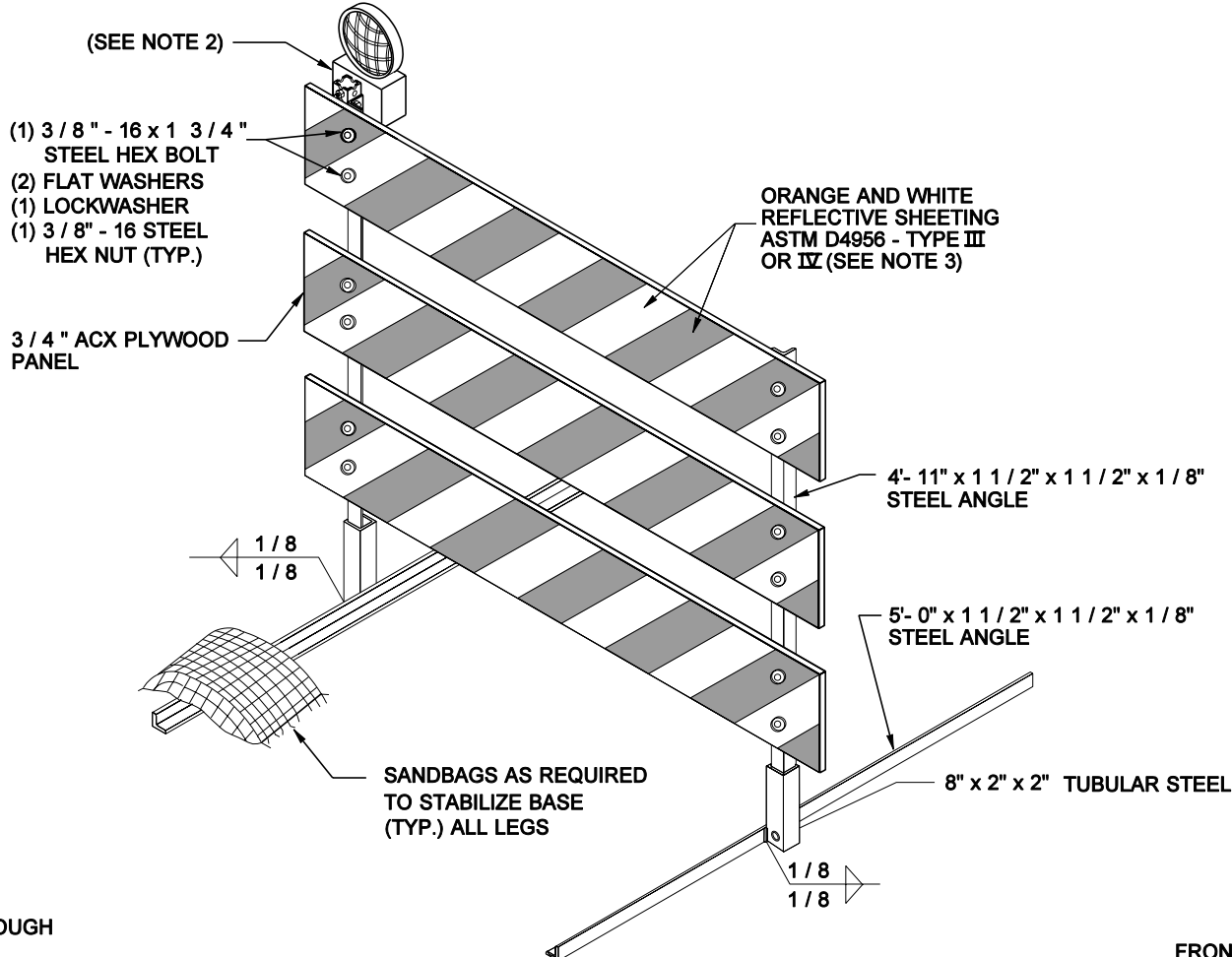
WARNING LIGHT ATTACHMENT DETAIL



ATTACHMENT DETAIL "A"



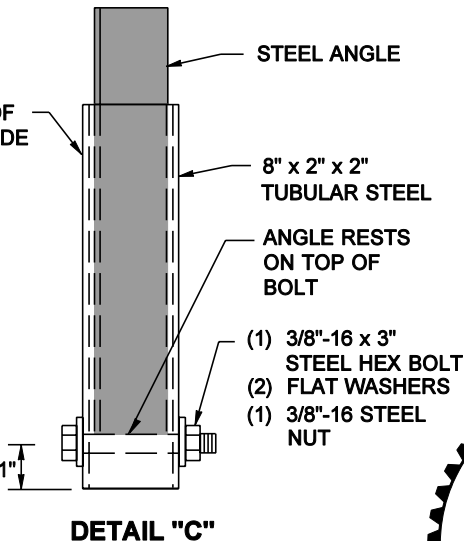
ATTACHMENT DETAIL "B"



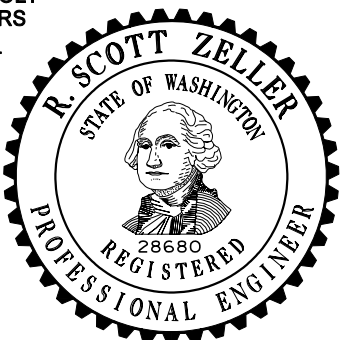
TYPE 3 BARRICADE

NOTES

1. All fasteners may be zinc plated, galvanized or stainless steel. All steel angle and tubular steel shall be hot-rolled, high carbon steel, painted or galvanized.
2. Install one lightweight Type A Low-Intensity flashing warning light on the traffic side of the barricade. Install two Type A Low-Intensity flashing warning lights per barricade when the barricades are used to close a roadway. Attach the light to the barricade according to the light manufacturer's recommendations or use the details shown on this plan.
3. Stripes on barricade rails shall be alternating orange and white retroreflective stripes (sloping downward at an angle of 45 degrees in the direction traffic is to pass).
4. The Type 3 barricade design shown on this plan meets the crash test requirements of NCHRP 350. Alternate designs may be approved if they conform to the NCHRP 350 crash test criteria.
5. When a sign is mounted on the barricade, it shall be securely bolted to at least two plywood panels. The top of the sign shall not be higher than the top panel of the barricade.
6. When sandbags are used in freezing weather, urea fertilizer shall be mixed with the sand in a quantity to prevent the sand from freezing.



DETAIL "C"



TYPE 3 BARRICADE
STANDARD PLAN H-2

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 05-29-02

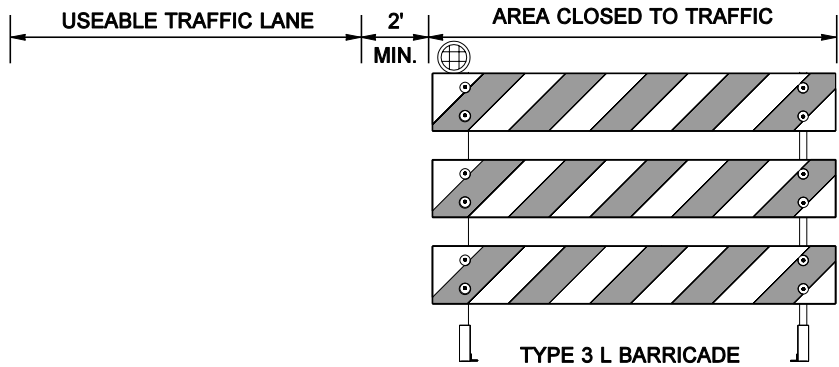
STATE DESIGN ENGINEER

DATE

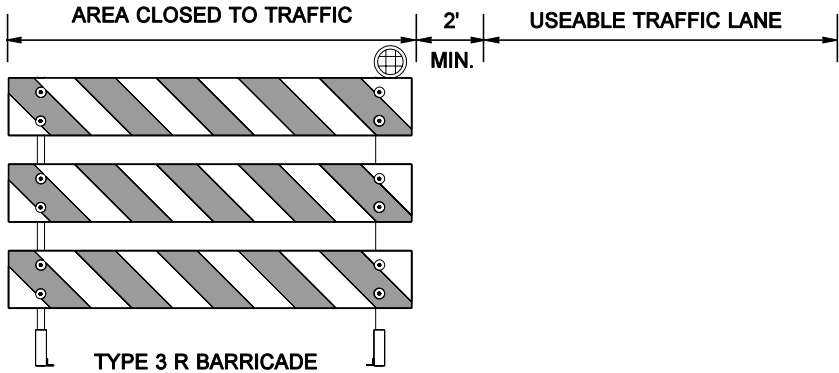


Washington State Department of Transportation

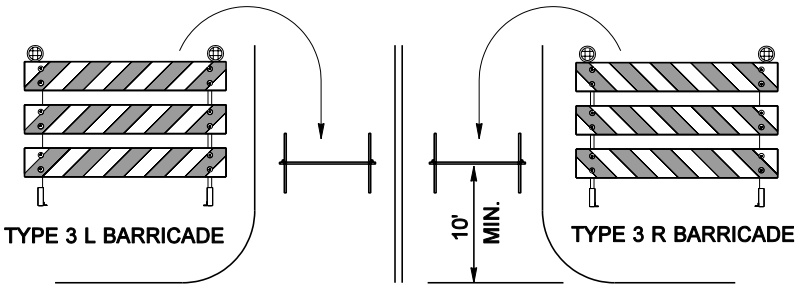
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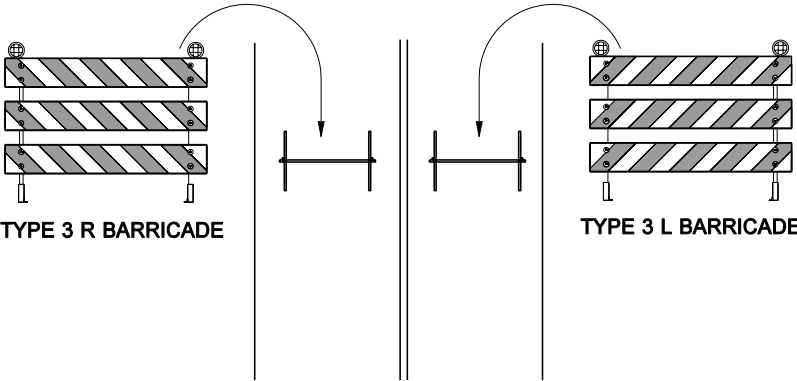
STRIPE ON THE BARRICADES SHALL SLOPE
DOWNWARD IN THE DIRECTION TRAFFIC IS TO PASS



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



ROAD CLOSURE AT INTERSECTION



ROAD CLOSURE AT OTHER LOCATIONS



EXPIRES MAY 5, 2003

**TYPE 3 BARRICADE
STANDARD PLAN H-2**

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 05-29-02

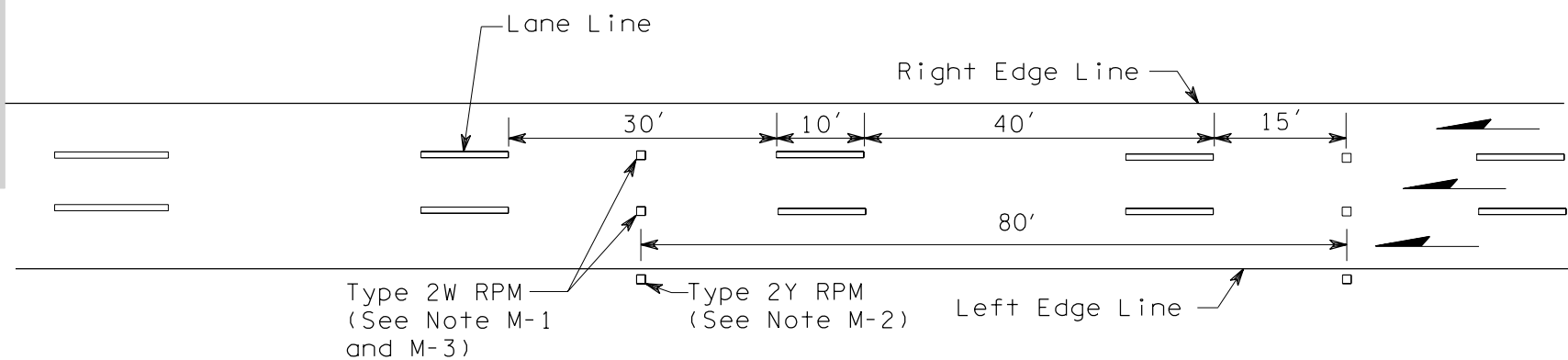
STATE DESIGN ENGINEER

DATE

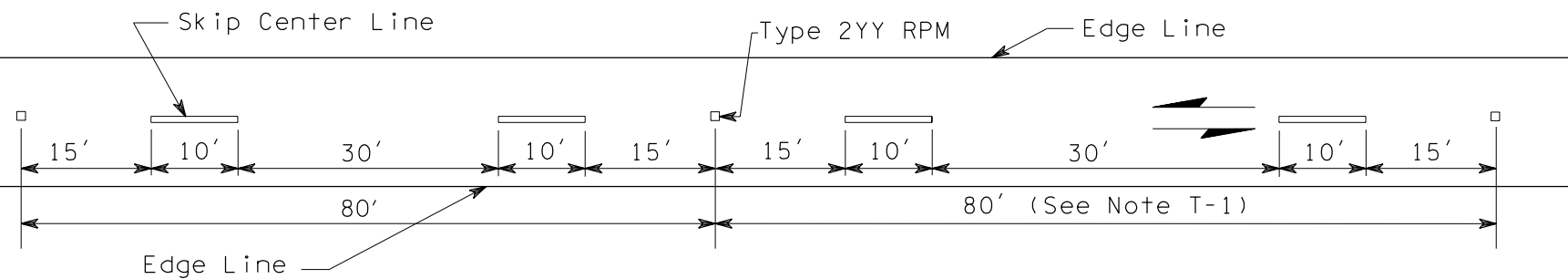


Washington State Department of Transportation

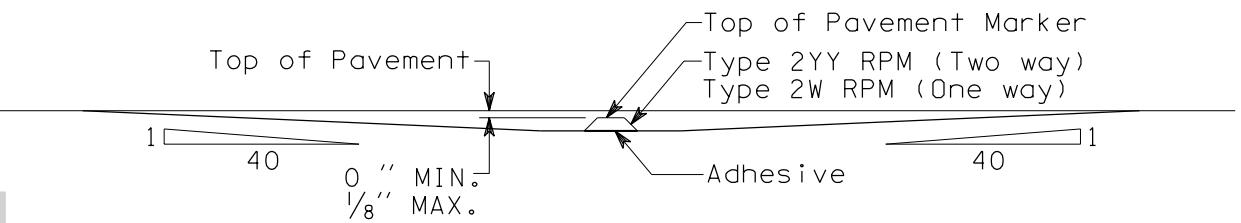
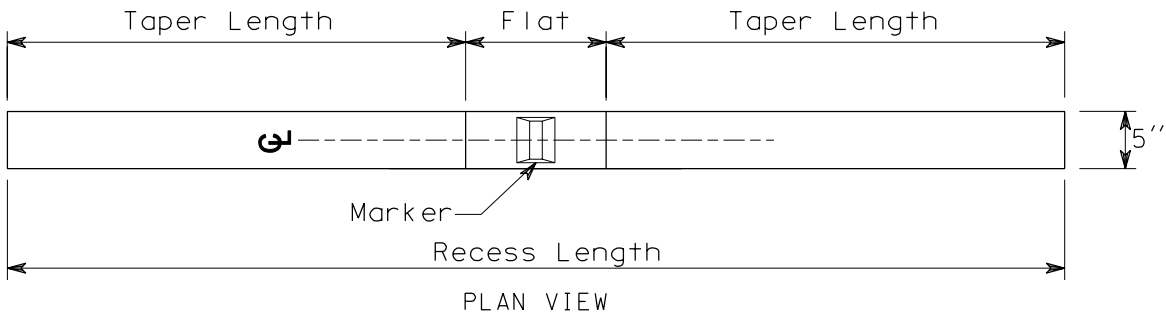
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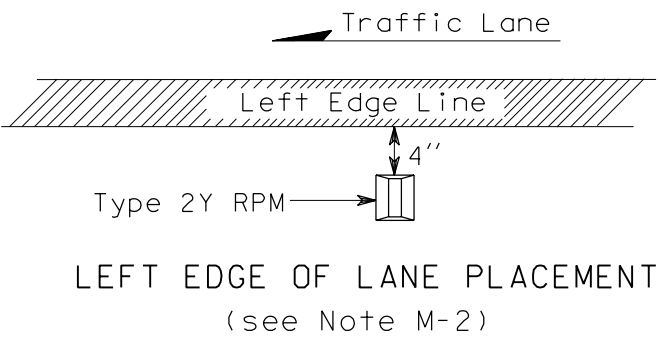
RPM POSITIONING GUIDE SPACING FOR MULTILANE ONE WAY TRAFFIC



RPM POSITIONING GUIDE SPACING FOR TWO LANE TWO WAY TRAFFIC



ELEVATION VIEW
RECESSED PAVEMENT MARKER DETAILS



LEFT EDGE OF LANE PLACEMENT
(see Note M-2)

NOTES:

1. Recessed pavement markers, when specified, shall be installed at the locations shown for Type 2W RPM's on multilane one way roadways, and type 2YY RPM's on two lane two way roadways.

MULTILANE ONE WAY TRAFFIC

M-1. For lane lines, Type 2W RPM's shall be spaced at 80' intervals on tangents and horizontal curves with a radius of 5000' or more, and 40' intervals on horizontal curves having radii of less than 5000'.

M-2. When specified, Type 2Y RPM's shall be placed outside the left edge line. Placement is shown on "Left Edge of Lane Placement".

TWO LANE TWO WAY TRAFFIC

T-1. For center lines, Type 2YY RPM's shall be spaced at 80' intervals on tangents and horizontal curves with a radius of 5000' or more, and 40' intervals on horizontal curves having radii less than 5000'. Type 2YY RPM's are to be centered between skip lines.

Type 2 RPM Raised Face Colors	
Type 2YY	yellow and yellow
Type 2W	white - one side only
Type 2Y	yellow - one side only
Type 1 RPM Colors	
Type 1W	white
Type 1Y	yellow



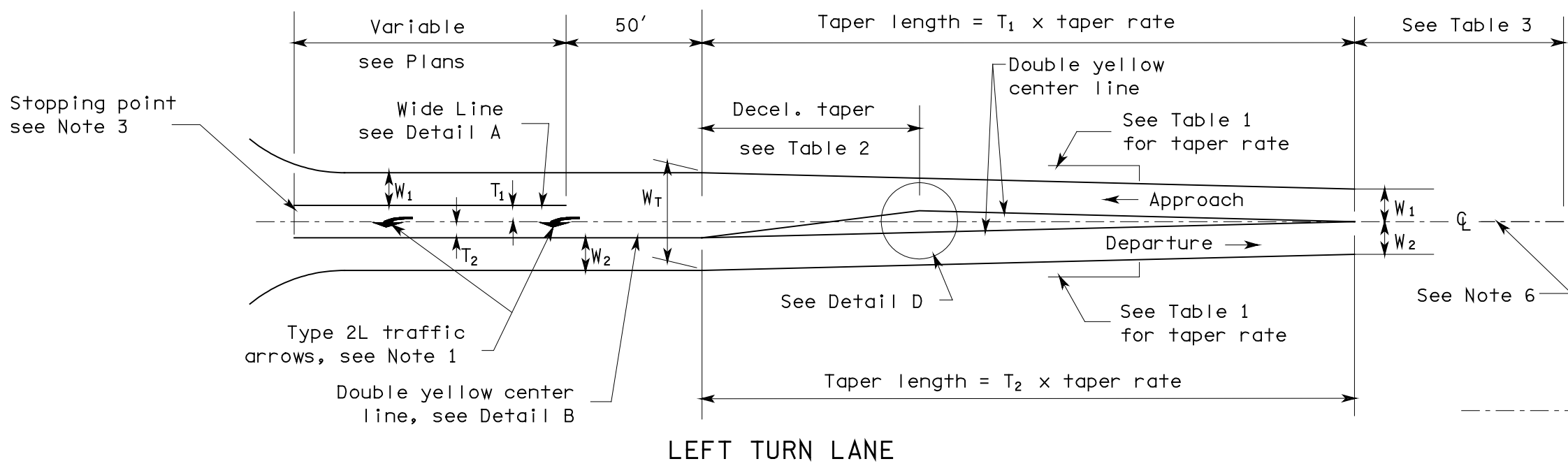
EXPIRES OCTOBER 26, 2000

**RAISED PAVEMENT
MARKING DETAILS
STANDARD PLAN H-3**

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3/00	DELETED RED RPM's & MODIFIED "RECESSED PAVEMENT MARKER DETAILS".	TWS
DATE	REVISION	BY

APPROVED FOR PUBLICATION	
Clifford E. Mansfield	4/14/00
DEPUTY STATE DESIGN ENGINEER	DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION	OLYMPIA, WASHINGTON



- NOTES:
1. First Type 2L arrow is installed 50' back of stop bar or crosswalk. Second arrow is located 100' back, or at left turn pocket.
 2. "S" = 140' for posted speed < 50 MPH.
"S" = 170' for posted speed ≥ 50 MPH.
 3. Stopping point shall be marked with stop bar only when mainline movement is controlled by a stop sign or traffic signal.
 4. Raised pavement markers shall be installed only when specified in the Contract Plans.
 5. See Standard Plan H-3 for marker designation.
 6. No Pass Line on approach side with skip center line on departure side unless Double Yellow Center Line is required in the contract.

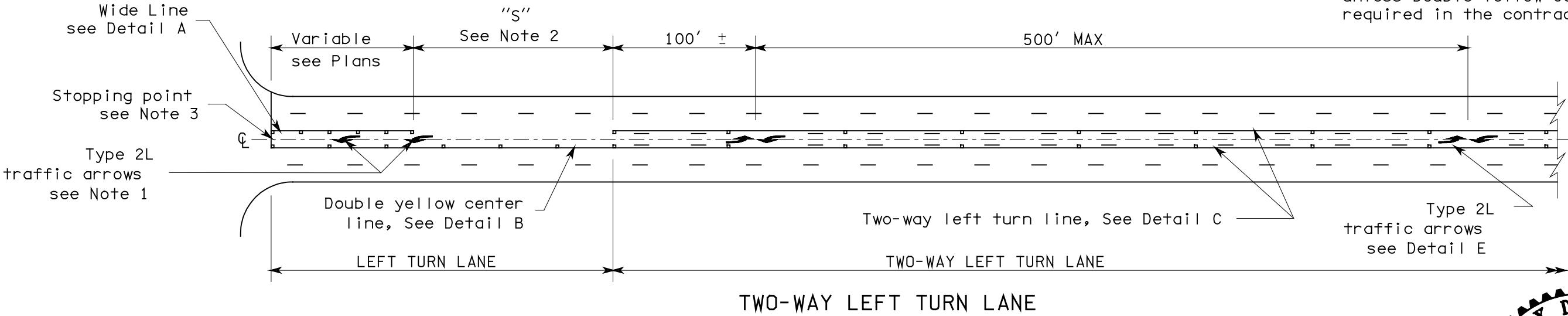
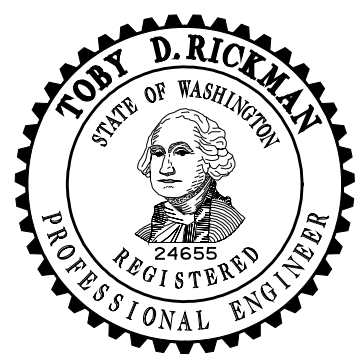
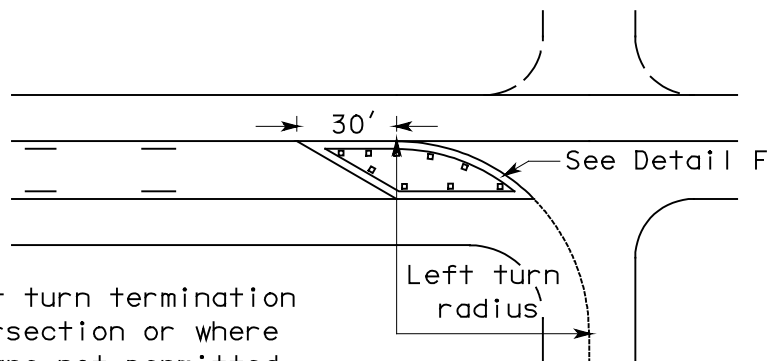


TABLE 1		TABLE 2		TABLE 3	
Posted Speed	Taper Rate	Posted Speed	Decel. Taper Length	Posted Speed	No pass length (Minimum)
60 mph	60:1	60 mph	180'	60 mph	790'
55 mph	55:1	55 mph	165'	55 mph	725'
50 mph	50:1	50 mph	150'	50 mph	660'
45 mph	45:1	45 mph	135'	45 mph	590'
40 mph	40:1	40 mph	120'	40 mph	360'
35 mph	35:1	35 mph	105'	35 mph	260'
30 mph	30:1	30 mph	90'	30 mph	200'
25 mph	25:1	25 mph	75'	25 mph	150'

W_1 = Approaching through lane
 W_2 = Departing lane
 T_1 = Width of left turn lane on approach side of \mathcal{C}
 T_2 = Width of left turn lane on departure side of \mathcal{C}
 W_T = Total width of channelization ($W_1 + W_2 + T_1 + T_2$)

Two way left turn termination at tee intersection or where left turns are not permitted and two way left turn is not continued beyond intersection.

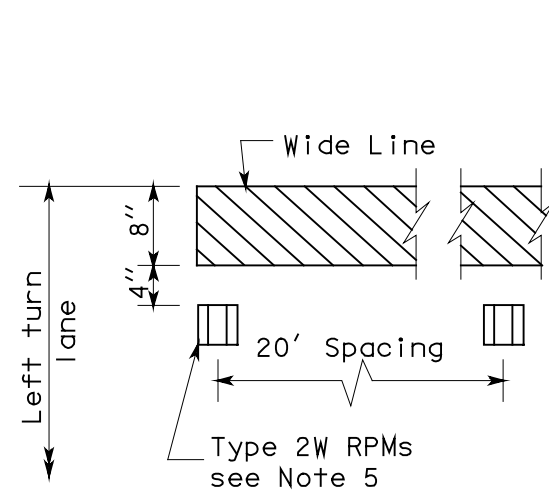
END TWO-WAY LEFT TURN LANE



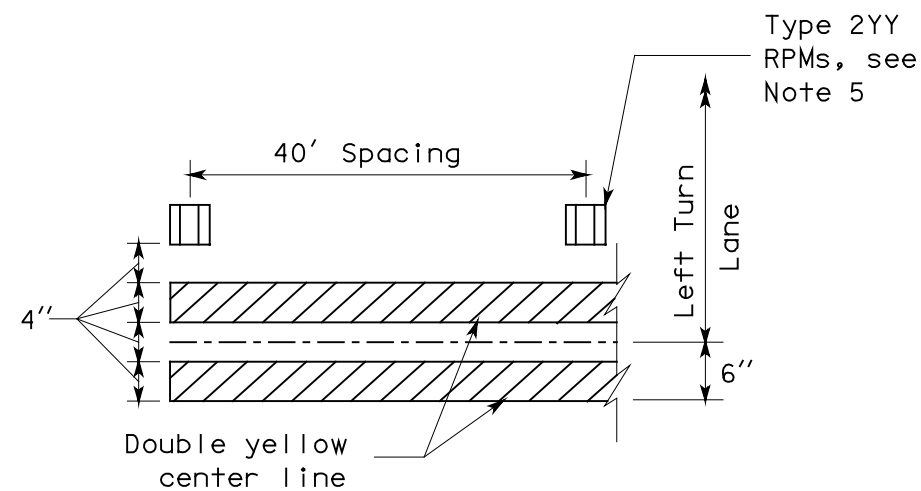
PAVEMENT MARKING DETAILS
STANDARD PLAN H-3a

SHEET 1 OF 2 SHEETS

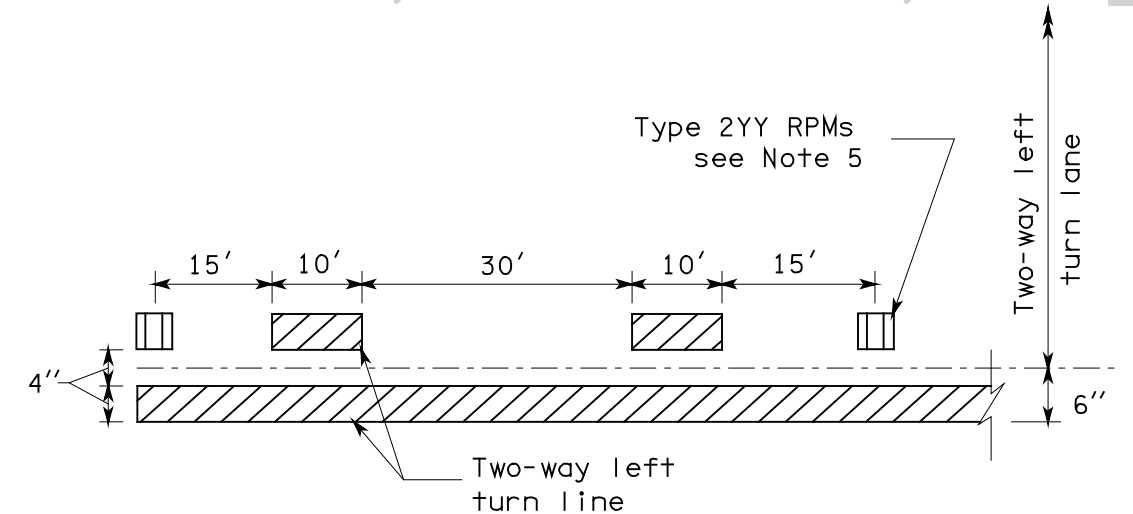
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5/00		CHANGE "GORE STRIPE" TO "WIDE LINE". CHANGE WIDE TRAFFIC ARROWS TO NARROW TRAFFIC ARROWS. ADDED 60 mph TO TABLE 1, 2, AND 3. NOTE 6 ADDED.		TWS
DATE	REVISION	BY	Clifford E. Mansfield 6/23/00	
			DEPUTY STATE DESIGN ENGINEER DATE	
			WASHINGTON STATE DEPARTMENT OF TRANSPORTATION OLYMPIA, WASHINGTON	



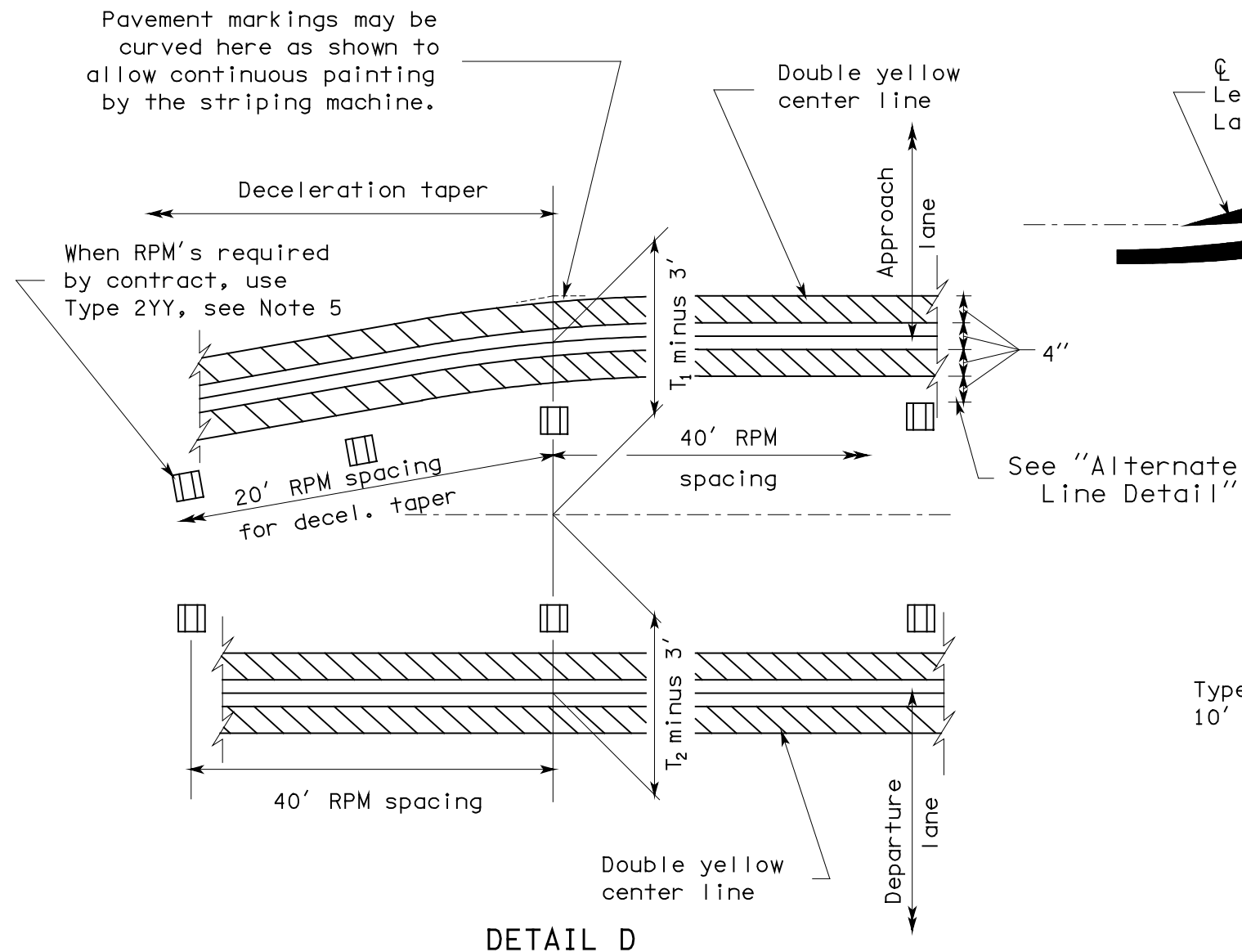
DETAIL A



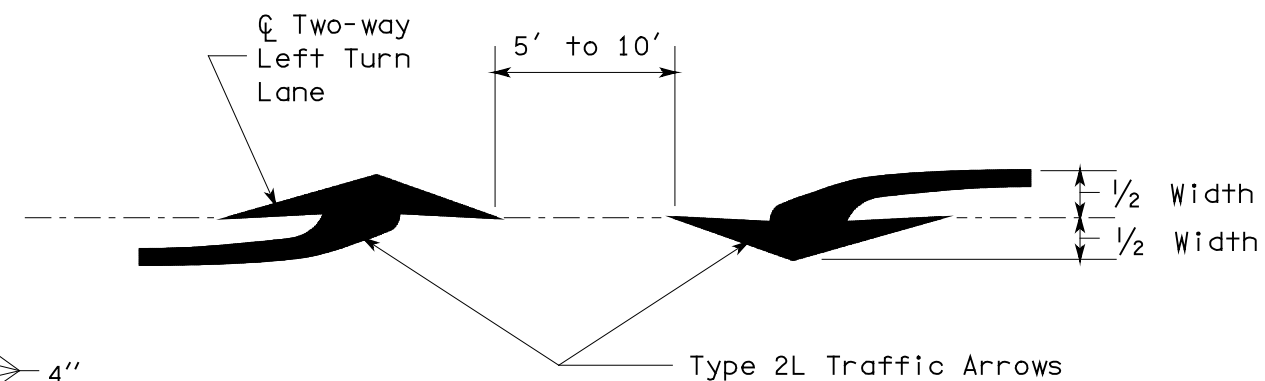
DETAIL B



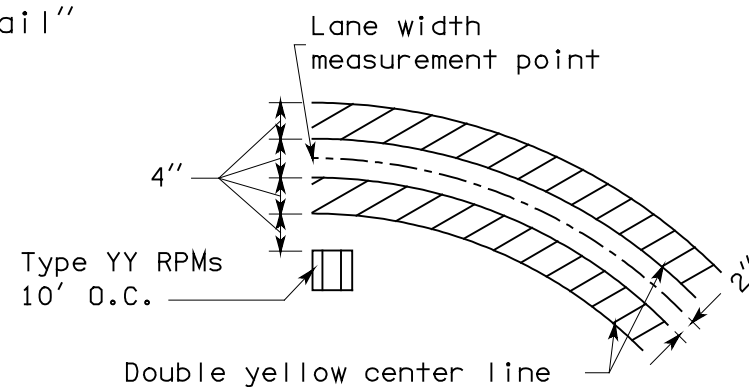
DETAIL C



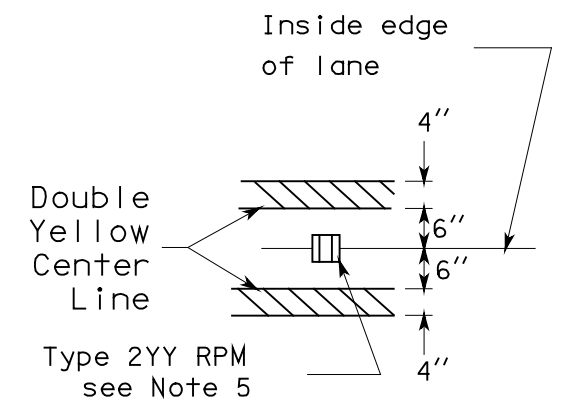
DETAIL D



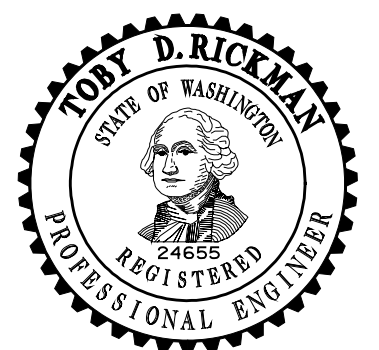
DETAIL E



DETAIL F



ALTERNATE LINE DETAIL



EXPIRES OCTOBER 26, 2000

PAVEMENT MARKING DETAILS

STANDARD PLAN H-3a

SHEET 2 OF 2 SHEETS

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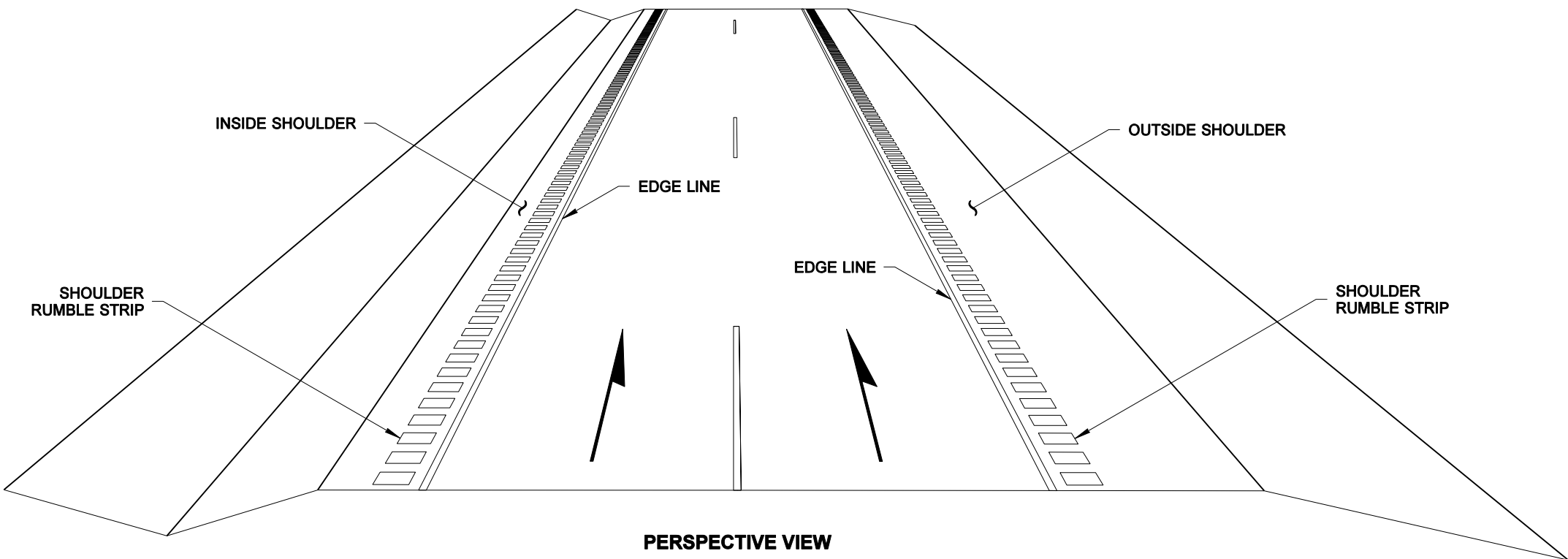
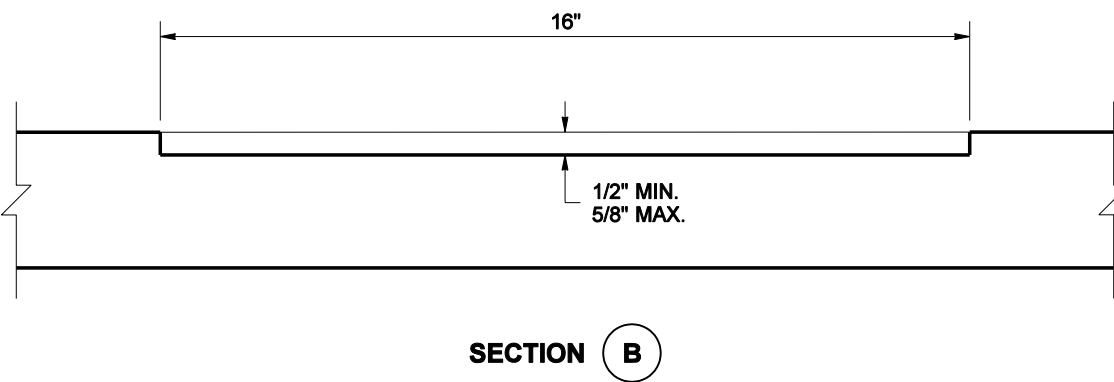
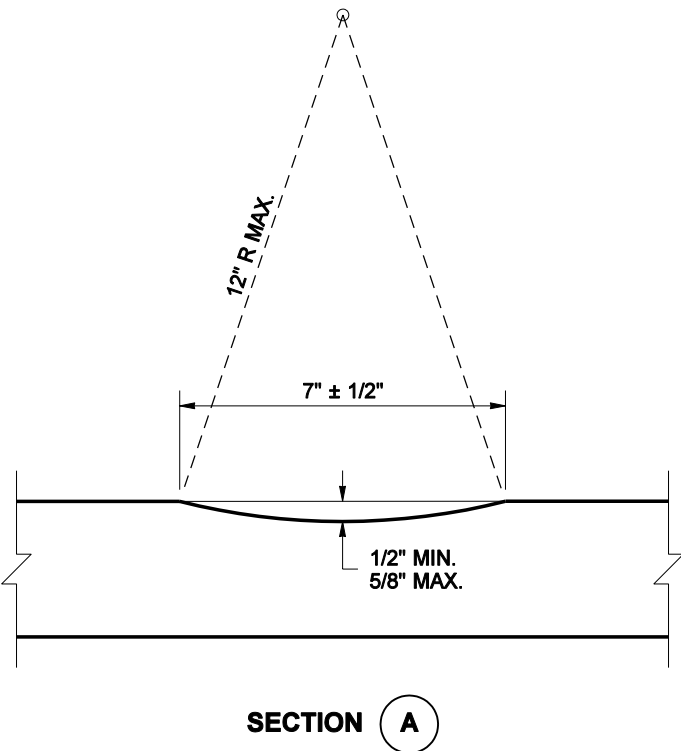
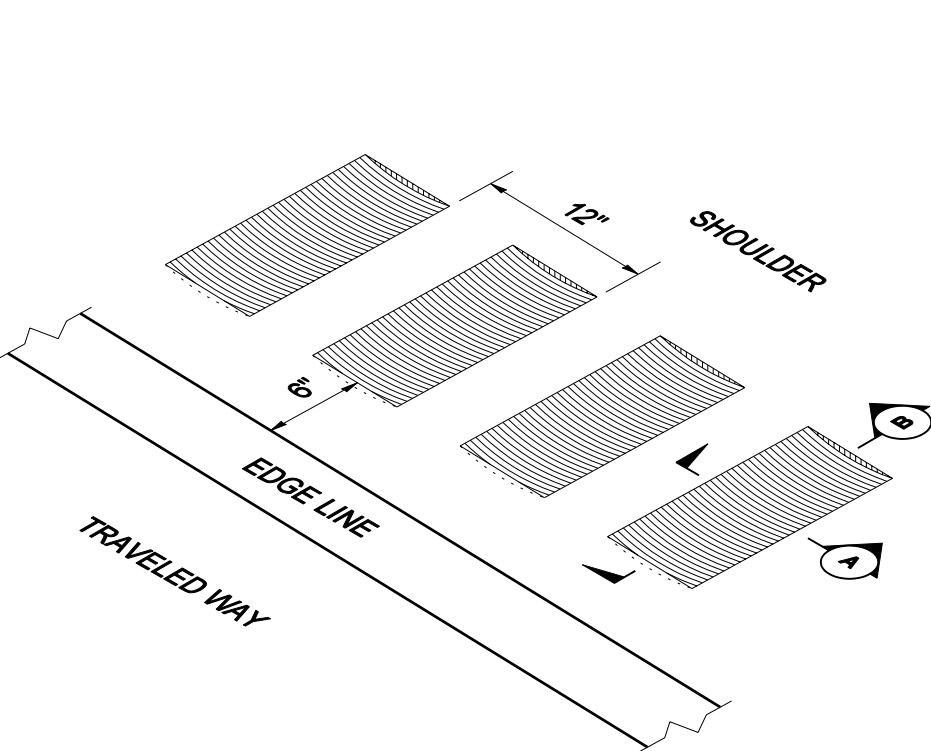
5/00	CHANGED "GORE STRIPE" TO "WIDE LINE". CHANGED WIDE TRAFFIC ARROWS TO NARROW TRAFFIC ARROWS.	TWS
DATE	REVISION	BY

APPROVED FOR PUBLICATION

Clifford E. Mansfield 6/23/00



DEPUTY STATE DESIGN ENGINEER DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON



EXPIRES MAY 16, 2005

**SHOULDER RUMBLE STRIP
TYPE 1
FOR DIVIDED HIGHWAYS
STANDARD PLAN H-4**

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 10-29-03

STATE DESIGN ENGINEER

DATE



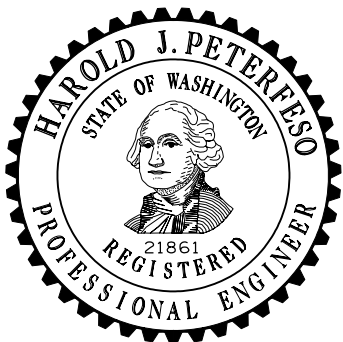
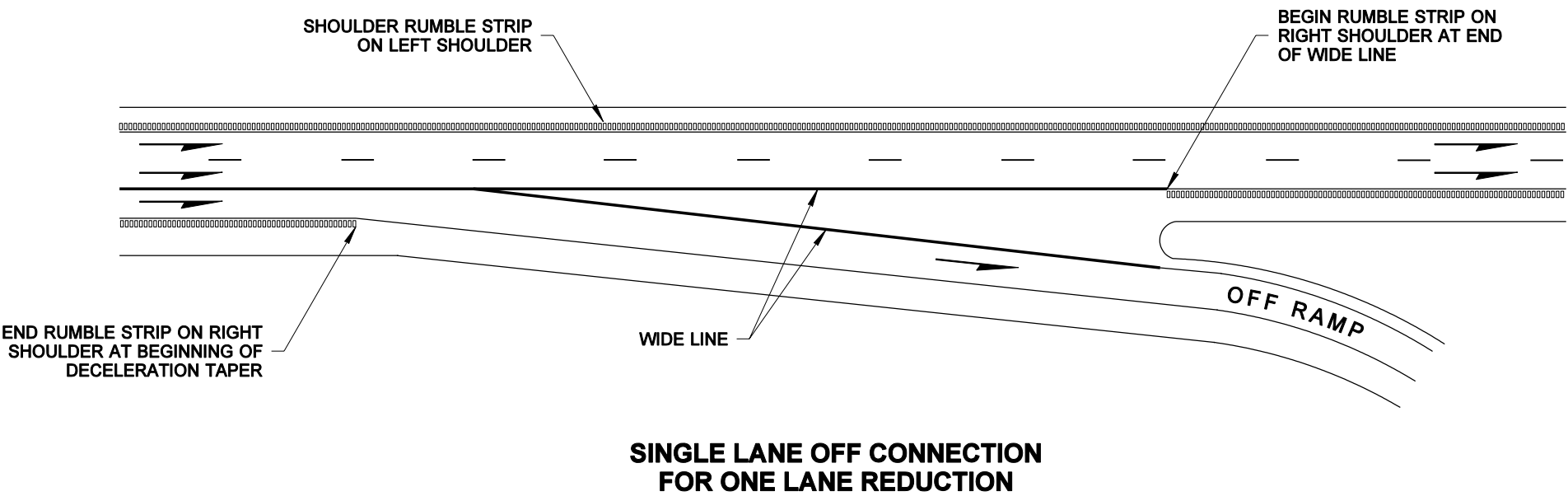
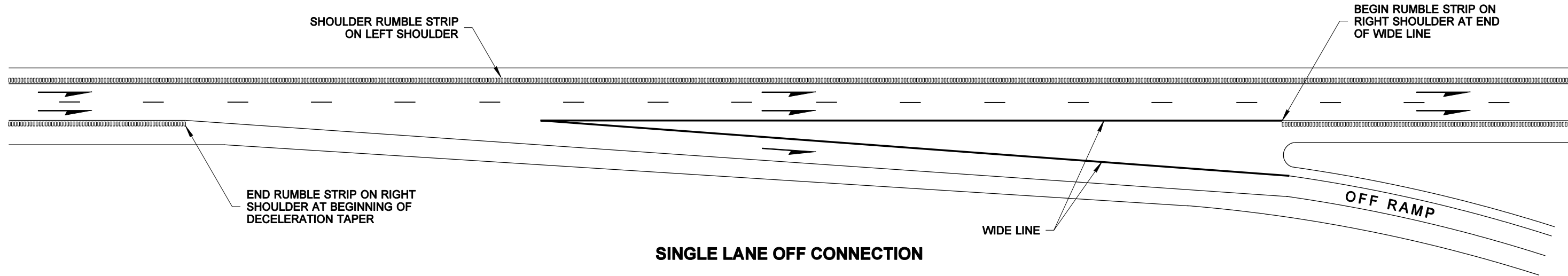
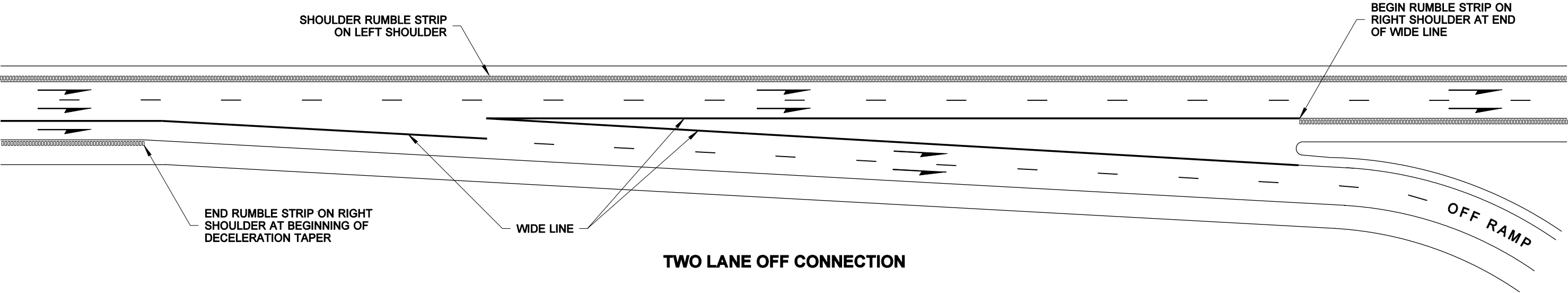
Washington State Department of Transportation

09/2003	REVISED SHOULDER TAPER DETAIL, SHEET 3, FROM "60' MIN." TO "100' MIN."	MAS
DATE	REVISION	BY

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

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EXPIRES MAY 16, 2005

**SHOULDER RUMBLE STRIP
TYPE 1
FOR DIVIDED HIGHWAYS
STANDARD PLAN H-4**

SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso **10-29-03**

STATE DESIGN ENGINEER

DATE



Washington State Department of Transportation

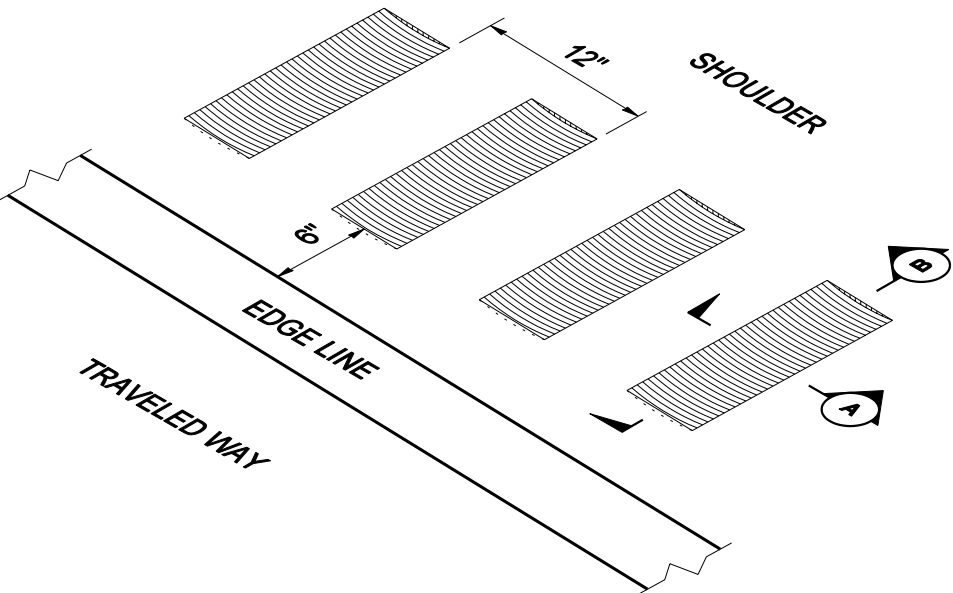


MEDIAN CROSSOVER

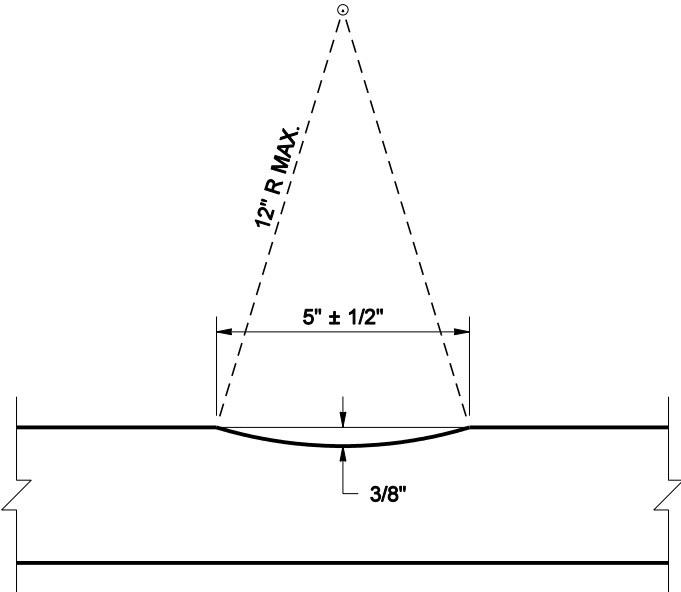


NOTE

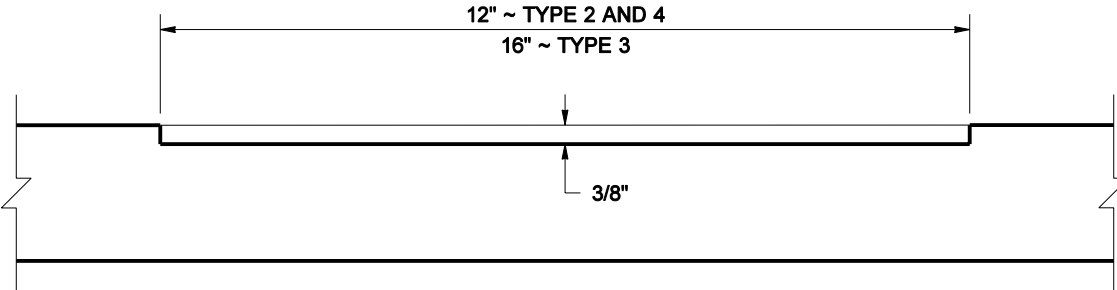
Rumble strips are not installed in certain reduced-width shoulder locations. See the SHOULDER TAPER DETAIL on Standard Plan H-4.



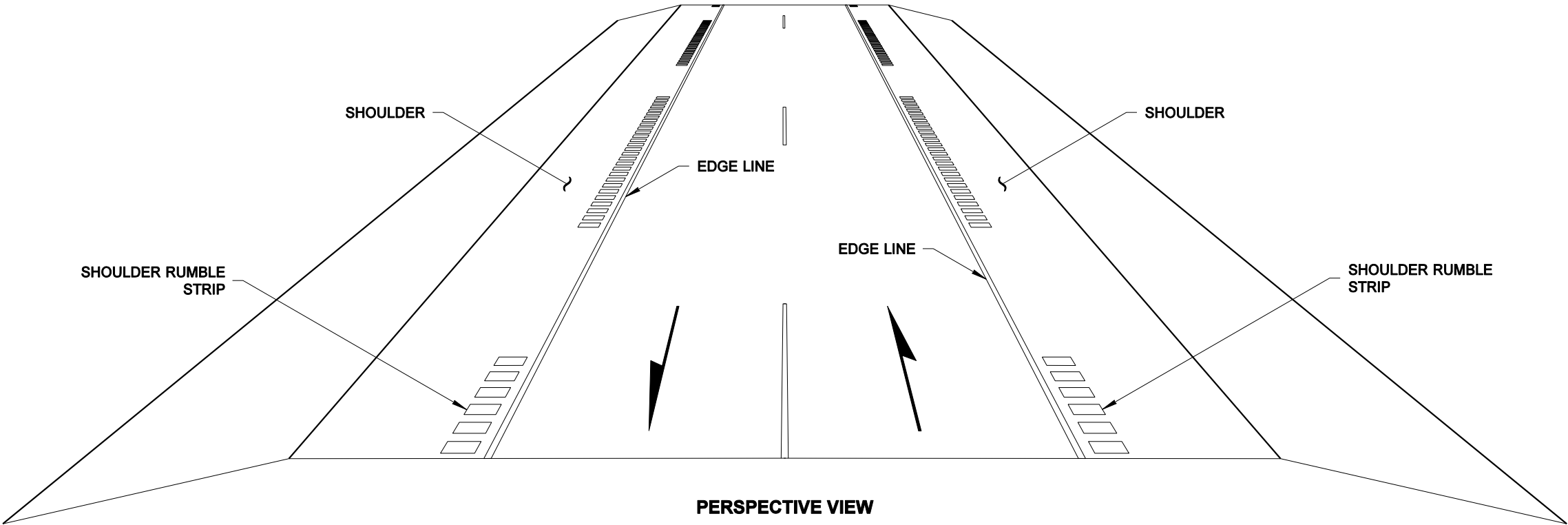
ISOMETRIC VIEW
TYPICAL SHOULDER INSTALLATION



SECTION A



SECTION B



PERSPECTIVE VIEW
UNDIVIDED HIGHWAY
(TYPE 4 PATTERN SHOWN)



EXPIRES MAY 16, 2003

**SHOULDER RUMBLE STRIP
TYPE 2, 3 AND 4
FOR UNDIVIDED HIGHWAYS
STANDARD PLAN H-4a**

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 03-11-03

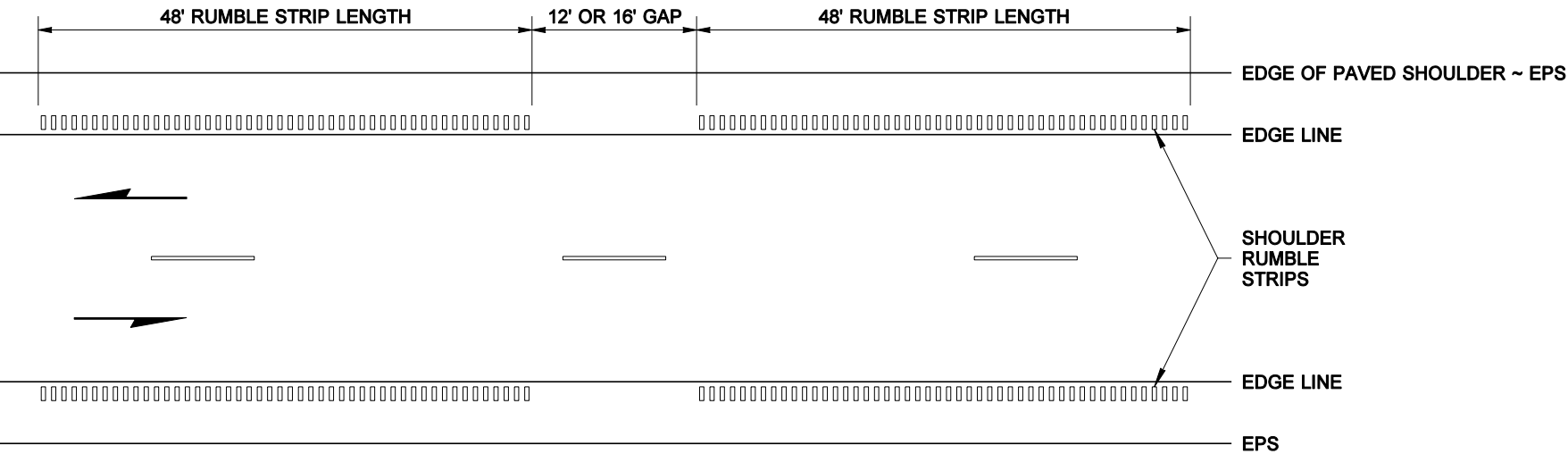
STATE DESIGN ENGINEER

DATE

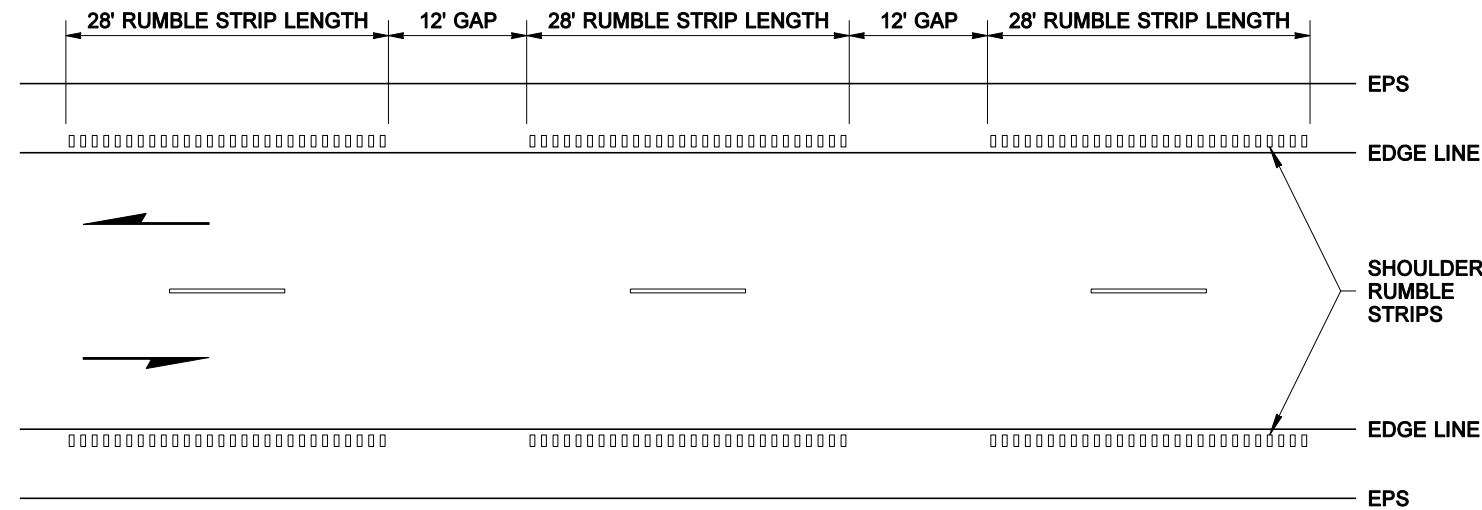


Washington State Department of Transportation

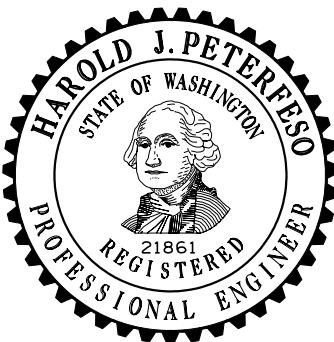
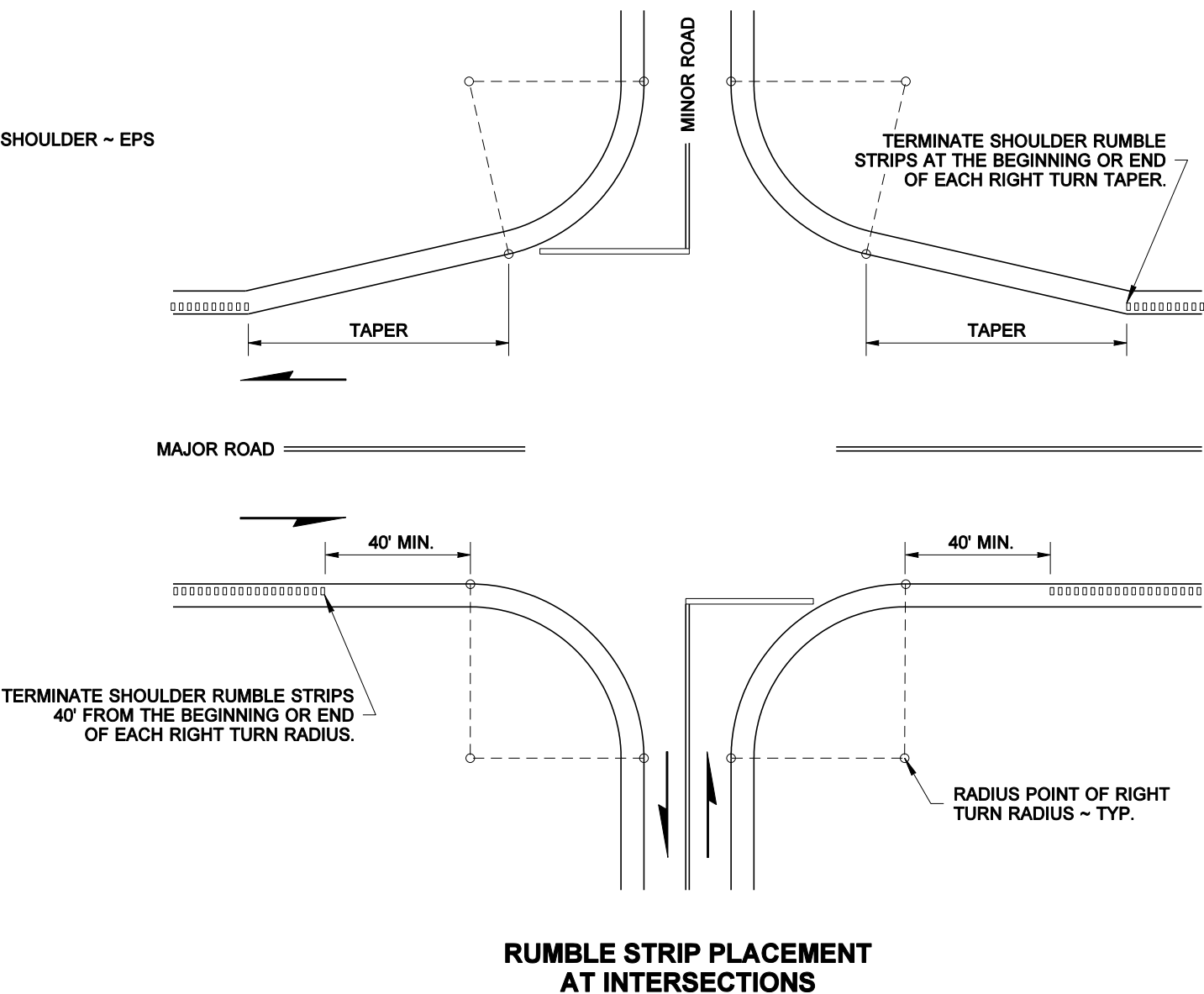
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TYPE 2 ~ 12' GAP AND 12" WIDE STRIP
TYPE 3 ~ 16' GAP AND 16" WIDE STRIP



TYPE 4 ~ 12" WIDE STRIP



EXPIRES MAY 16, 2003

**SHOULDER RUMBLE STRIP
TYPE 2, 3 AND 4
FOR UNDIVIDED HIGHWAYS
STANDARD PLAN H-4a**

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso **03-11-03**

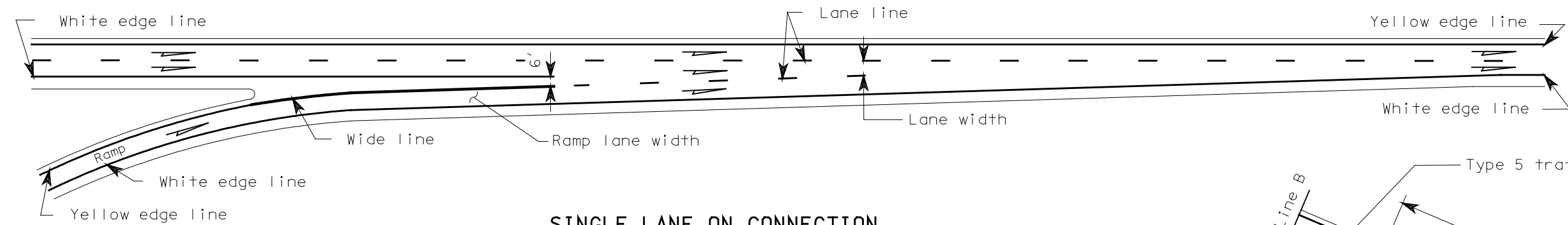
STATE DESIGN ENGINEER

DATE



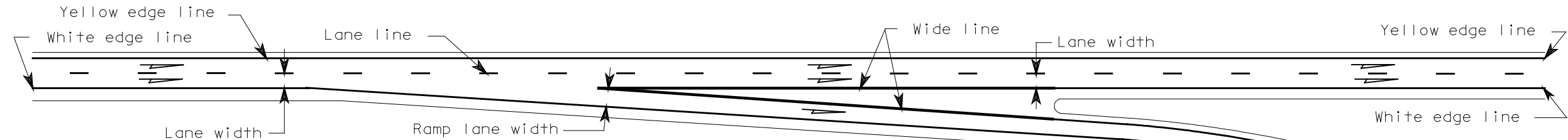
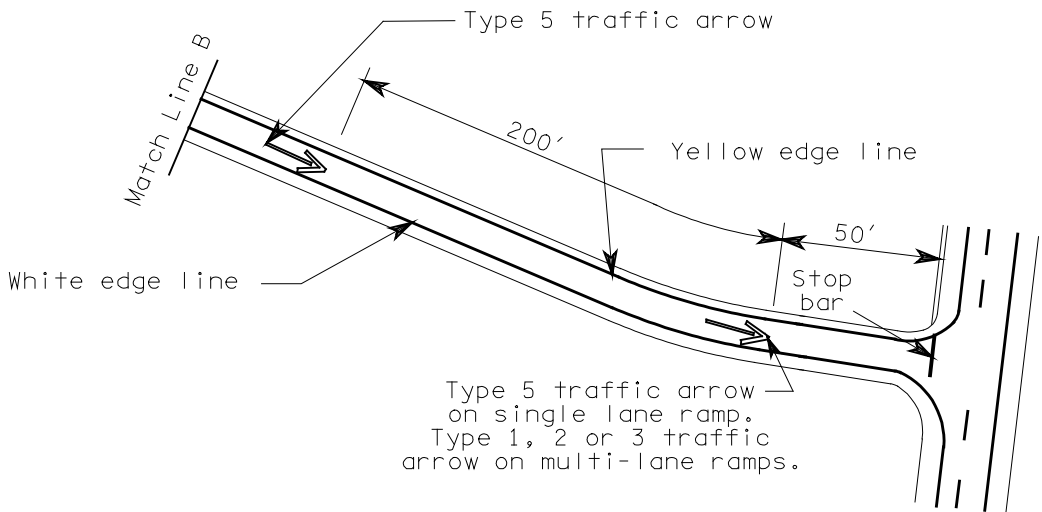
Washington State Department of Transportation

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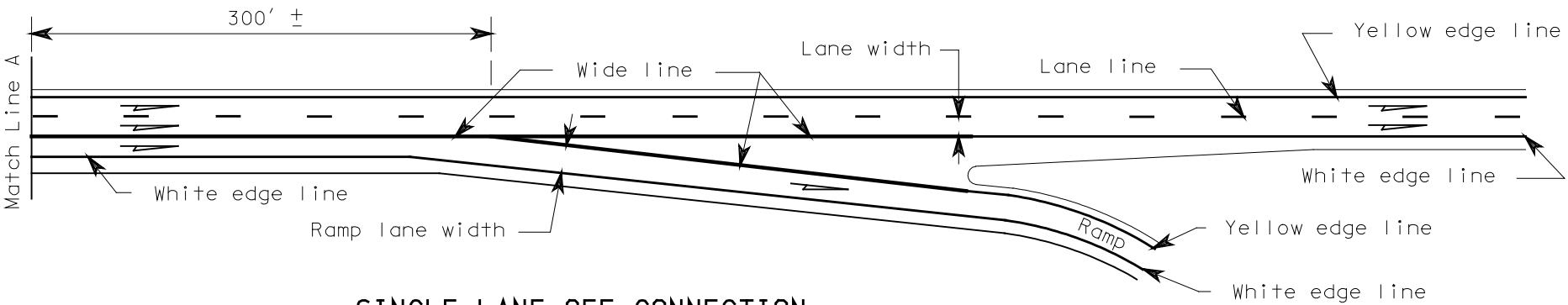
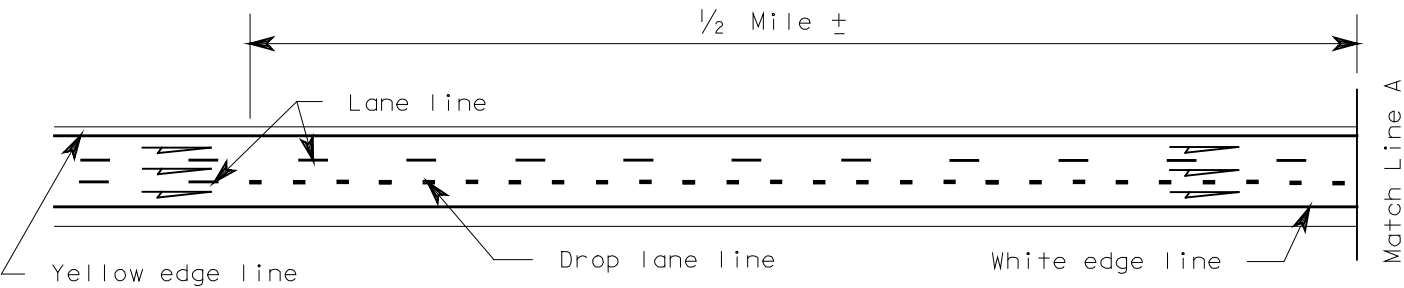
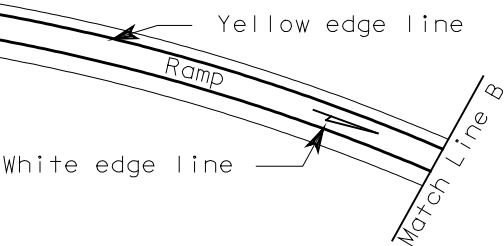


SINGLE LANE ON CONNECTION

NOTE:
Where shown on the plans or specified in special provisions, raised pavement markers shall be used to supplement or substitute for the painted pavement markings shown hereon.



SINGLE LANE OFF CONNECTION



SINGLE LANE OFF CONNECTION
FOR ONE LANE REDUCTION

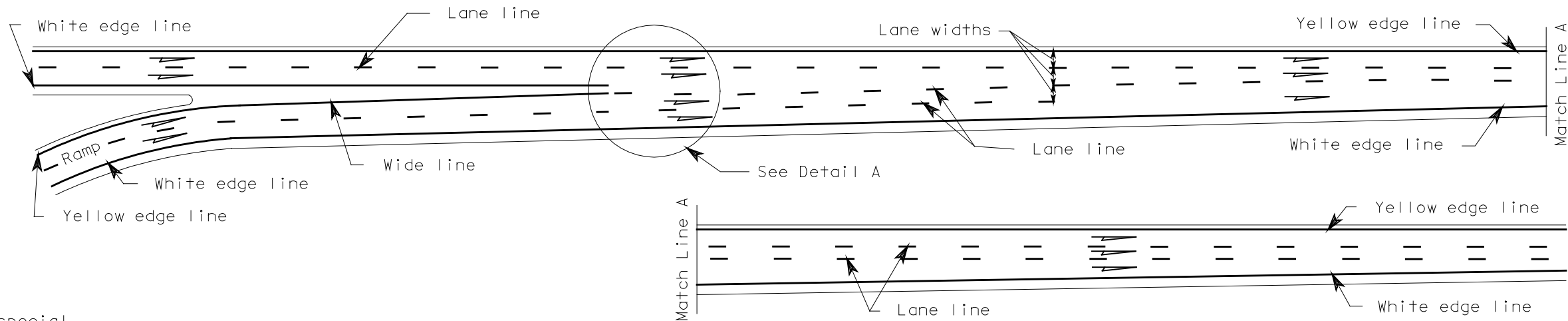


EXPIRES OCTOBER 26, 2000

PAVEMENT MARKING DETAILS
STANDARD PLAN H-5

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2/00	CHANGED "GORE STRIPE" TO "WIDE LINE".	TWS
DATE	REVISION	BY

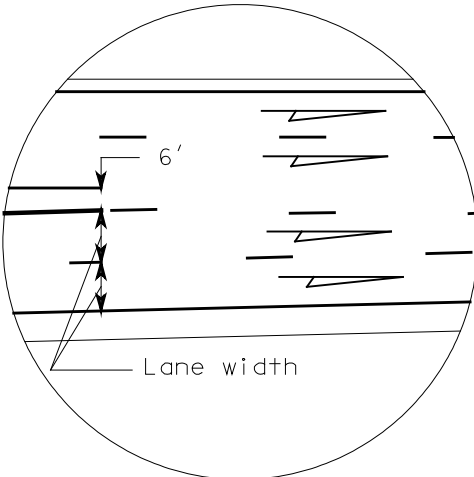
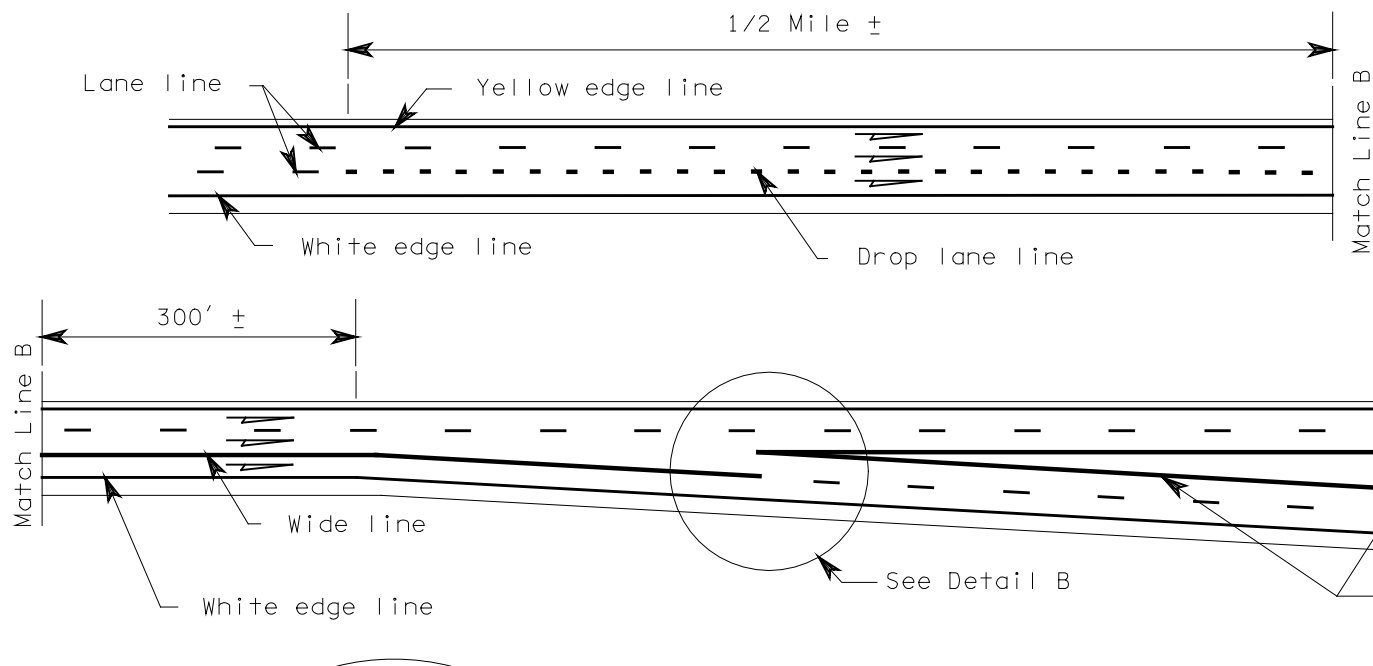
APPROVED FOR PUBLICATION	
Clifford E. Mansfield	2/18/00
DEPUTY STATE DESIGN ENGINEER	DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION OLYMPIA, WASHINGTON	



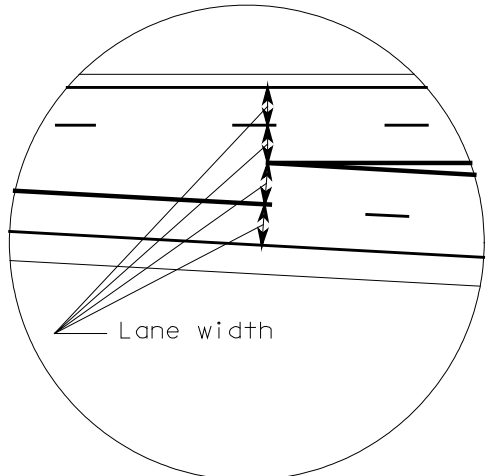
NOTES:

Where indicated on the plans or special provisions, raised pavement markers shall be used to supplement or substitute for painted pavement markings.

TWO LANE ON CONNECTION

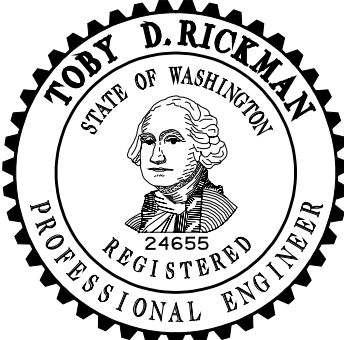


DETAIL A



DETAIL B

TWO LANE OFF CONNECTION



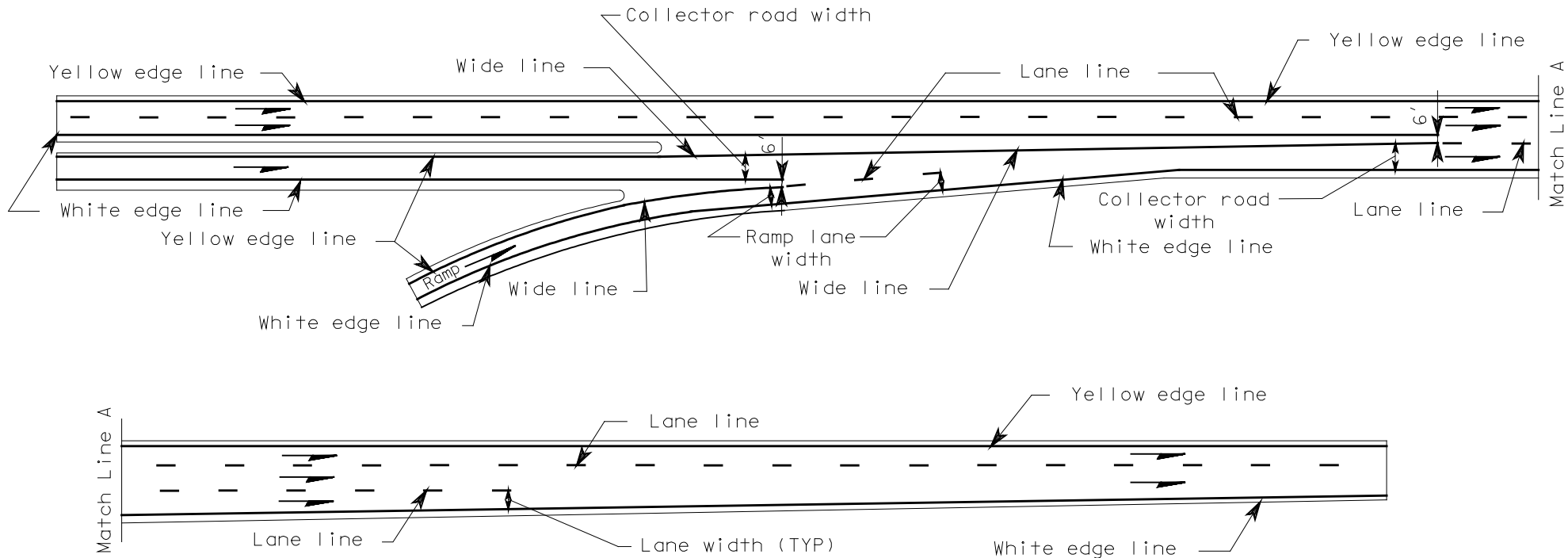
EXPIRES OCTOBER 26, 2000

PAVEMENT MARKING DETAILS
STANDARD PLAN H-5a

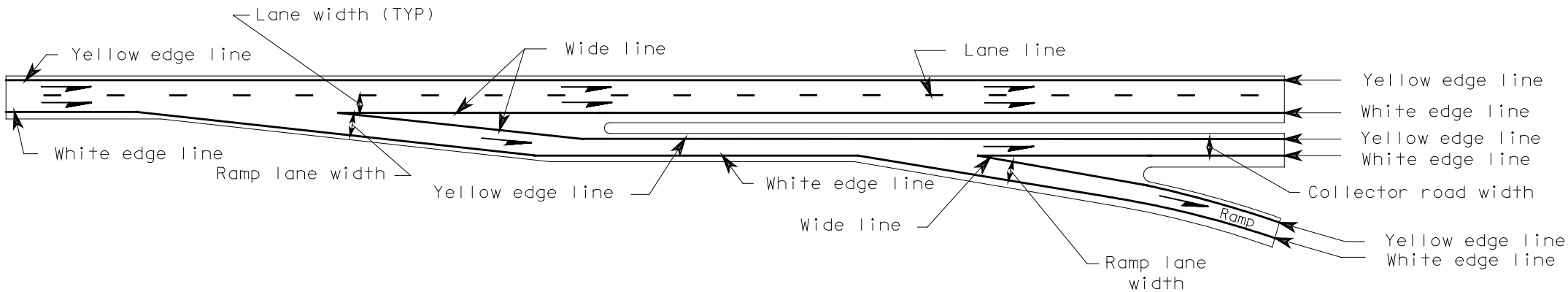
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2/00		CHANGED "GORE STRIPE" TO "WIDE LINE".	TWS	Clifford E. Mansfield 2/18/00
DATE	REVISION		BY	DEPUTY STATE DESIGN ENGINEER DATE
				WASHINGTON STATE DEPARTMENT OF TRANSPORTATION OLYMPIA, WASHINGTON

NOTES

Where shown on the plans or specified in special provisions, lane markers shall be used in lieu of or supplementary to the painted pavement markings shown hereon.



COLLECTOR ROAD ON CONNECTION



COLLECTOR ROAD OFF CONNECTION



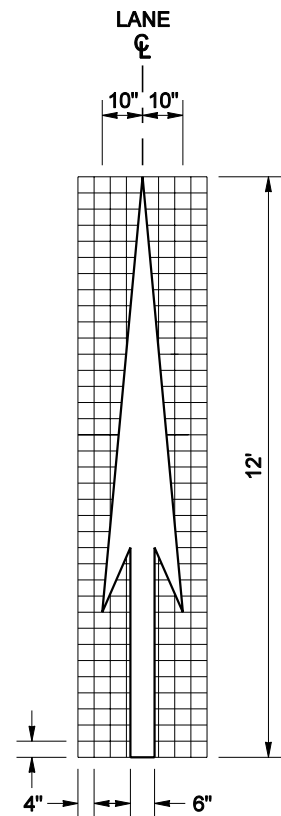
EXPIRES OCTOBER 26, 2000

**PAVEMENT MARKING DETAILS
STANDARD PLAN H-5b**

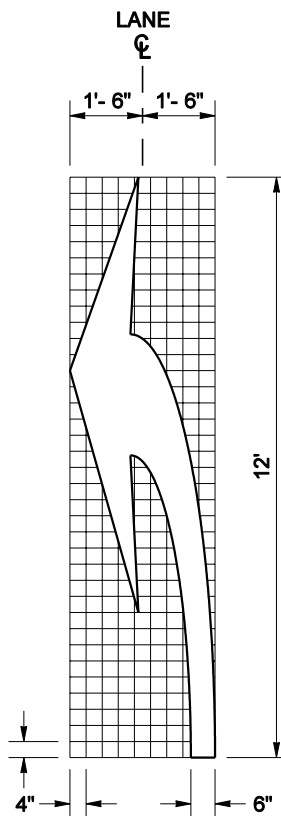
NOTE: THIS PLAN IS NOT A LEGAL ENGINEERING DOCUMENT BUT AN ELECTRONIC DUPLICATE. THE ORIGINAL, SIGNED BY THE ENGINEER AND APPROVED FOR PUBLICATION, IS KEPT ON FILE AT THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION. A COPY MAY BE OBTAINED UPON REQUEST.			APPROVED FOR PUBLICATION	
			Clifford E. Mansfield	2/18/00
			DEPUTY STATE DESIGN ENGINEER	DATE
			WASHINGTON STATE DEPARTMENT OF TRANSPORTATION	OLYMPIA, WASHINGTON
2/00	CHANGED "GORE STRIPE" TO "WIDE LINE".	TWS		
DATE	REVISION	BY		

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

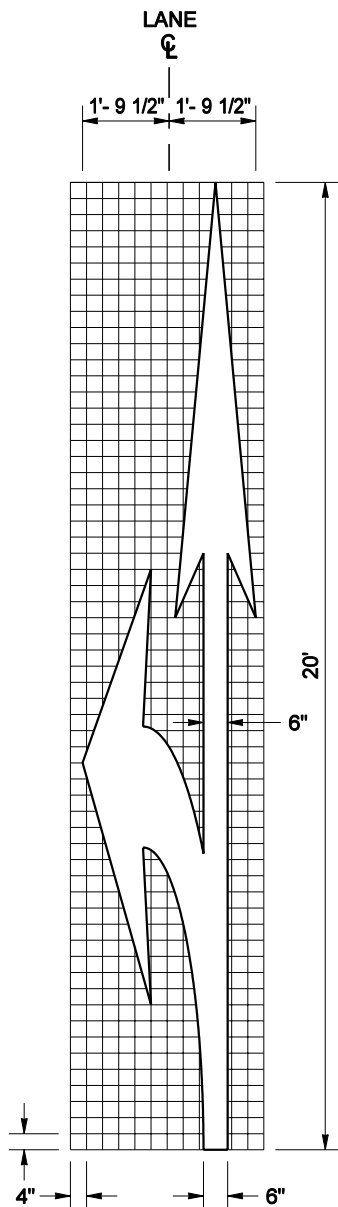


TYPE 1



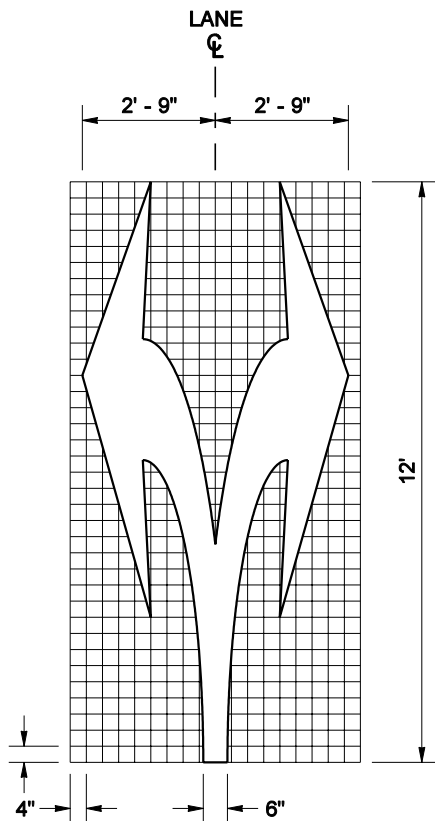
TYPE 2L (LEFT)
SHOWN

TYPE 2R (RIGHT)
MIRROR IMAGE OF ABOVE



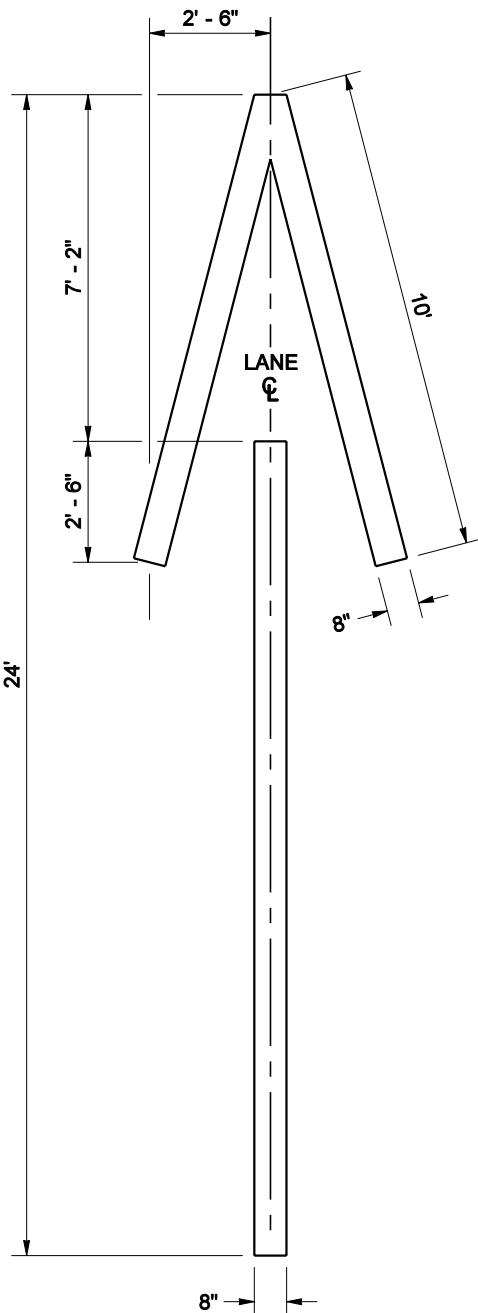
TYPE 3L (LEFT)
SHOWN

TYPE 3R (RIGHT)
MIRROR IMAGE OF ABOVE

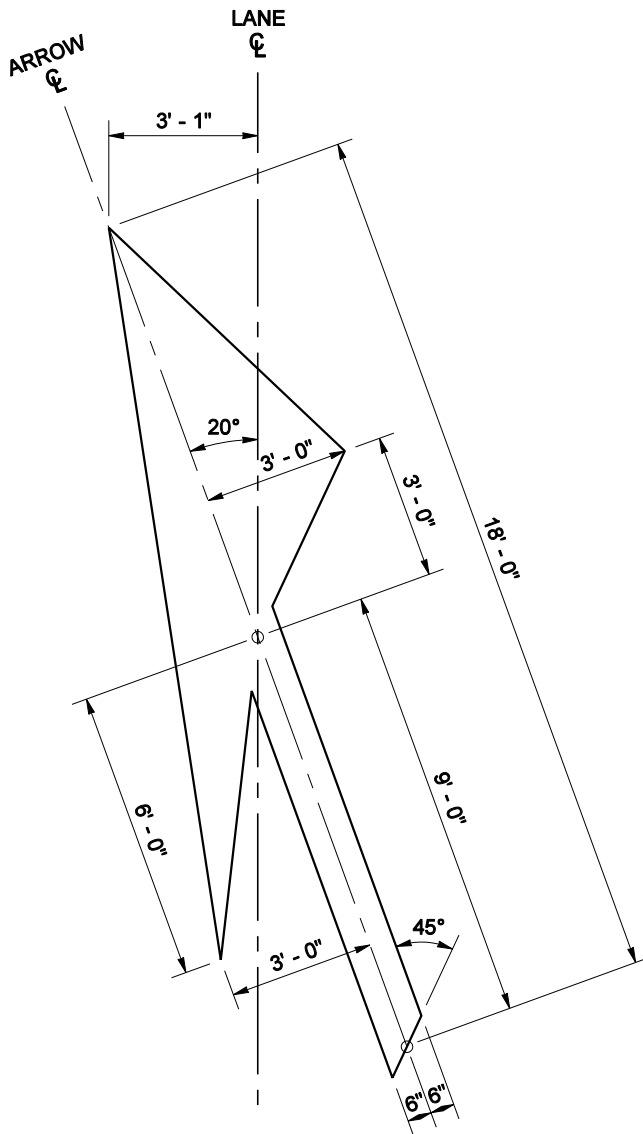


TYPE 4

TRAFFIC ARROWS



TYPE 5

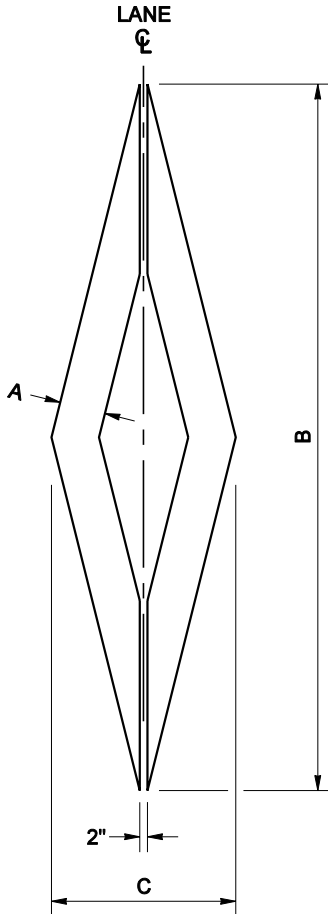


TYPE 6L (LEFT)
SHOWN

TYPE 6R (RIGHT)
MIRROR IMAGE OF ABOVE

GENERAL NOTE

See contract for location and material requirements.



	A	B	C	USE
TYPE 1	12"	16'	4'	FREEWAYS
TYPE 2	6"	12'	3'	ARTERIALS & RAMPS

HOV LANE SYMBOL



EXPIRES MAY 5, 2003

PAVEMENT MARKINGS

STANDARD PLAN H-5c

SHEET 1 OF 3 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso

06-24-02

STATE DESIGN ENGINEER

DATE

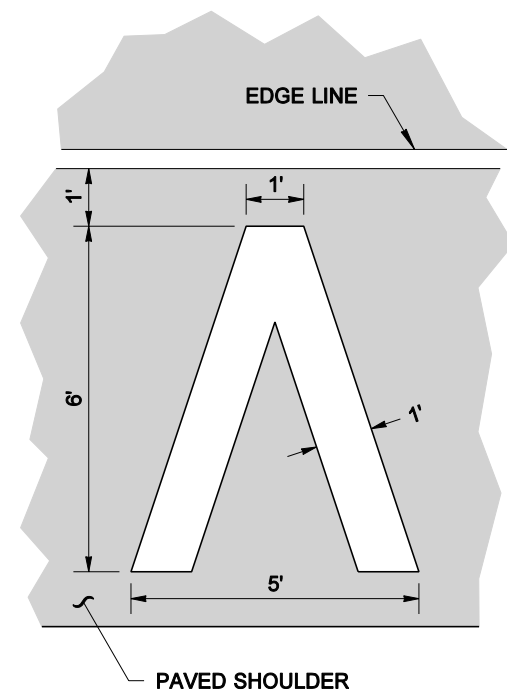


Washington State Department of Transportation

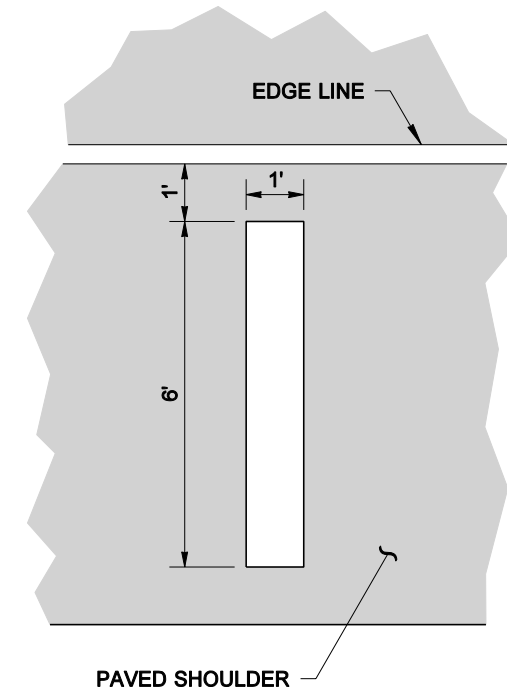
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EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

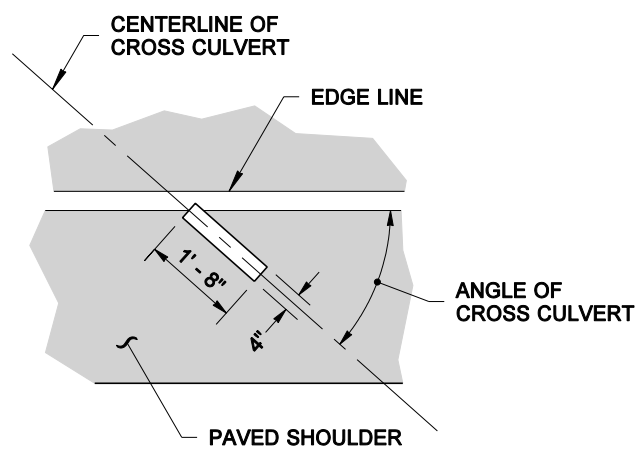


HALF MARKER
(1/2 MILE INTERVAL)

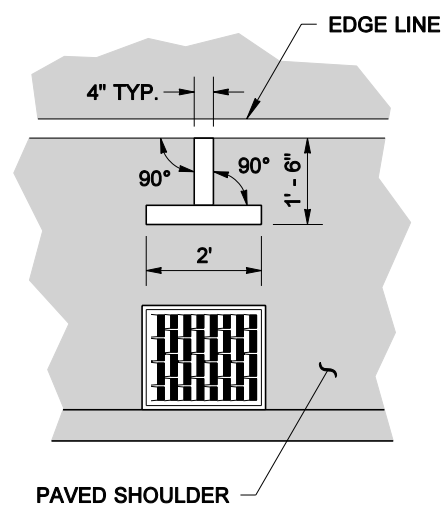


FULL MARKER
(1 MILE INTERVAL)

AERIAL SURVEILLANCE MARKERS

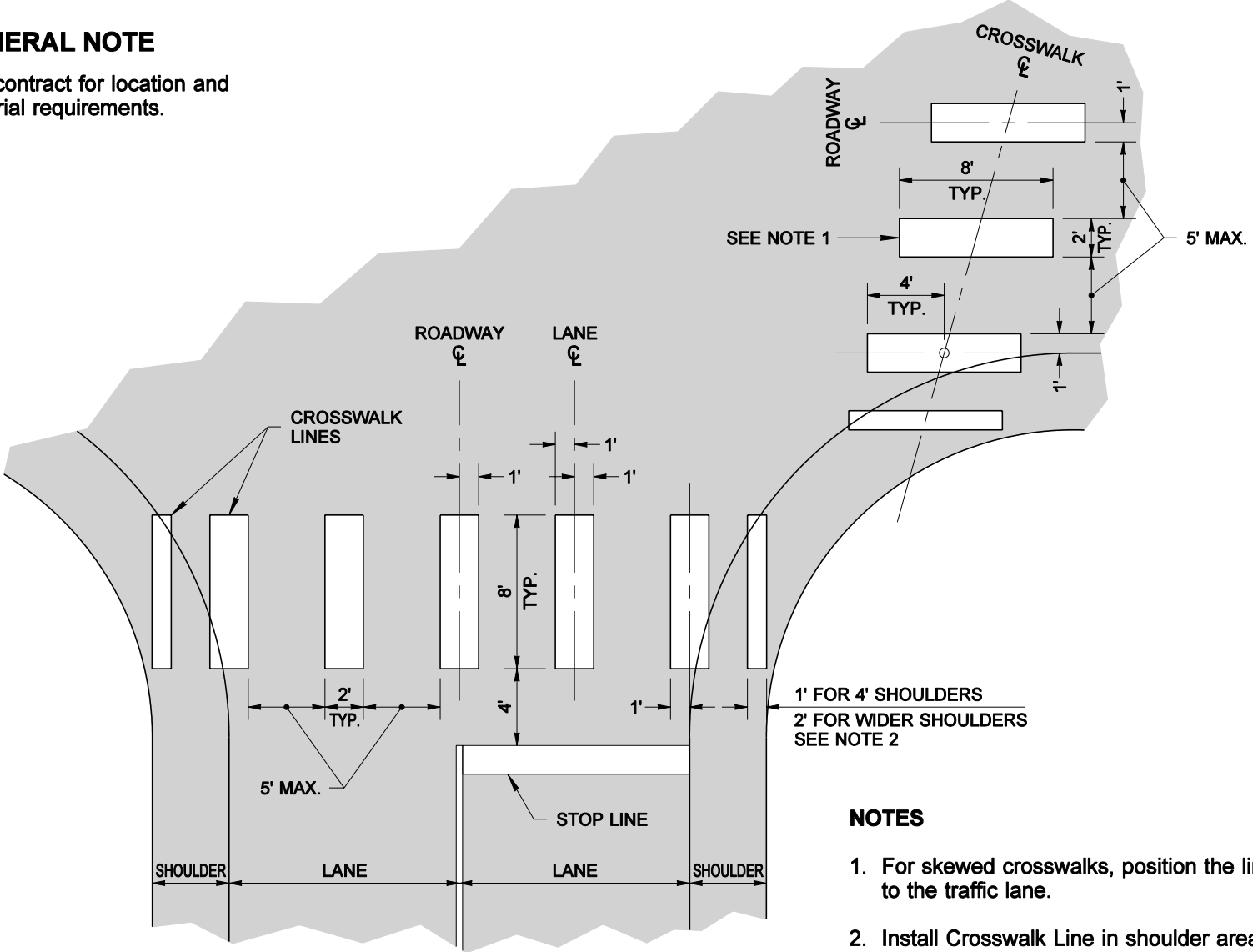


CROSS CULVERT



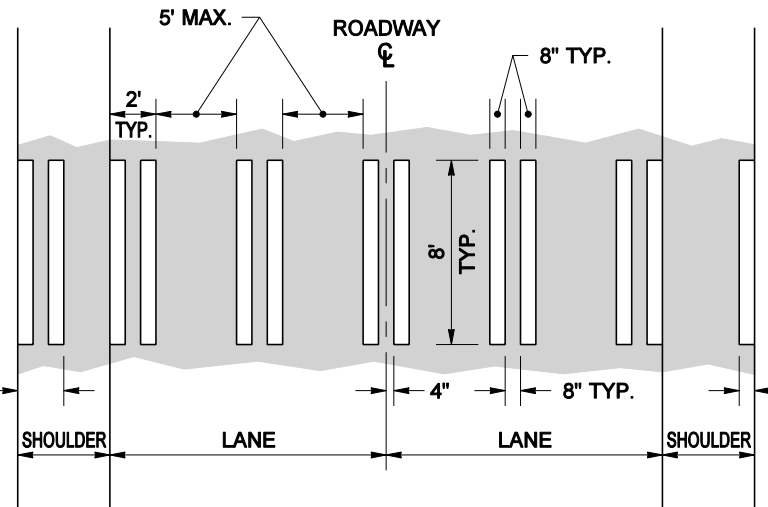
CATCH BASIN OR GRATE INLET
DRAINAGE MARKING

GENERAL NOTE
See contract for location and material requirements.



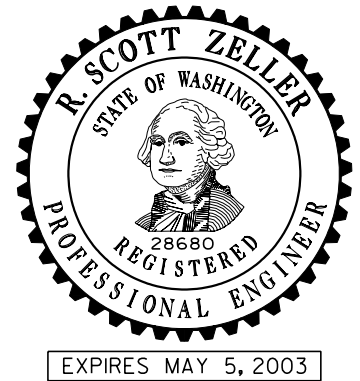
STANDARD PATTERN

- NOTES**
1. For skewed crosswalks, position the lines parallel to the traffic lane.
 2. Install Crosswalk Line in shoulder area only when adjacent to sidewalk or separate walkway.



LOCAL AGENCY OPTIONAL PATTERN

CROSSWALK LINES



PAVEMENT MARKINGS

STANDARD PLAN H-5c

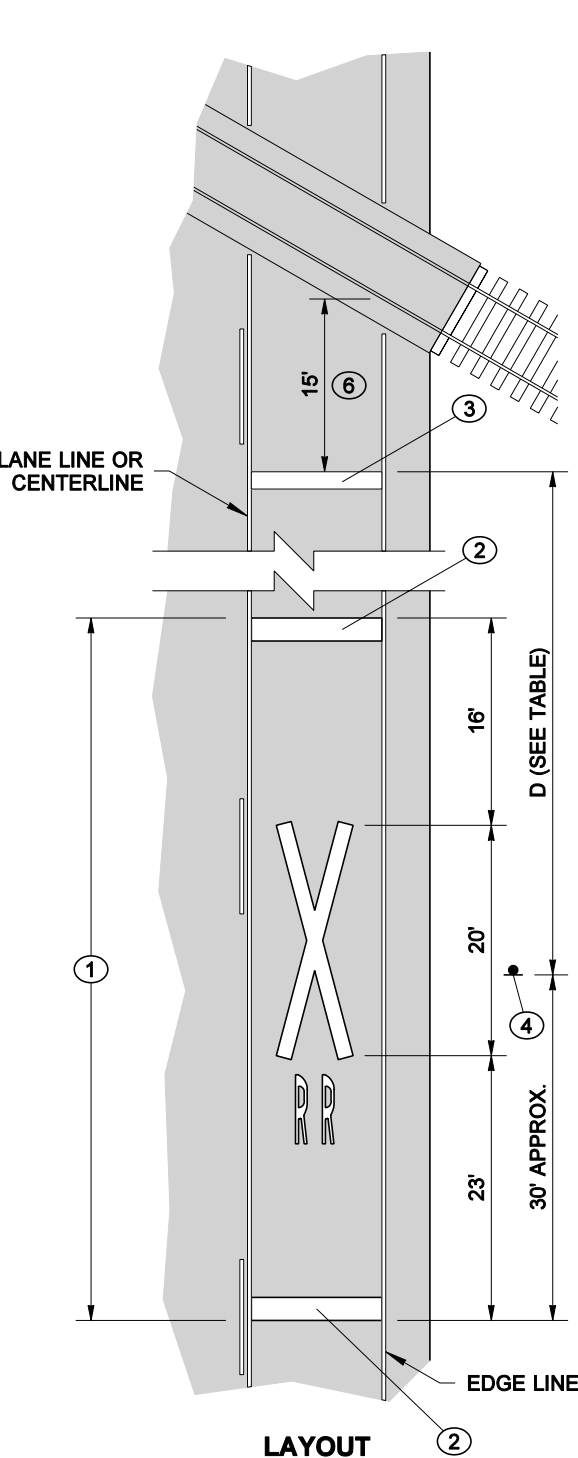
SHEET 2 OF 3 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 06-24-02
STATE DESIGN ENGINEER DATE



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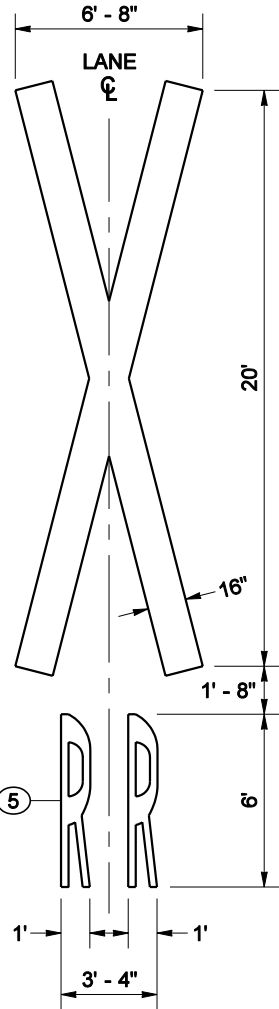


- NOTES**
- ① Bid Item "Railroad Crossing Symbol" includes "X" symbol, letters, and two 24" white transverse lines.
 - ② 24" white transverse line
 - ③ Stop Line
 - ④ W10-1 Advance Warning Sign (not included in RR Crossing Symbol Bid Item)
 - ⑤ See "Standard Alphabets for Highway Signs and Pavement Markings," 1977 Edition (FHWA)
 - ⑥ Place Stop Line 15' from the nearest rail or approximately 8 feet from RR gate, if present.

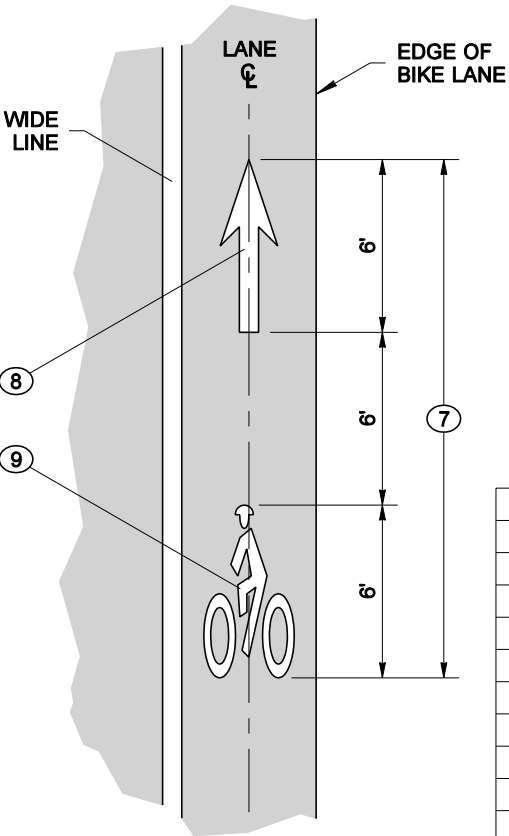
RAILROAD CROSSING SYMBOL

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.



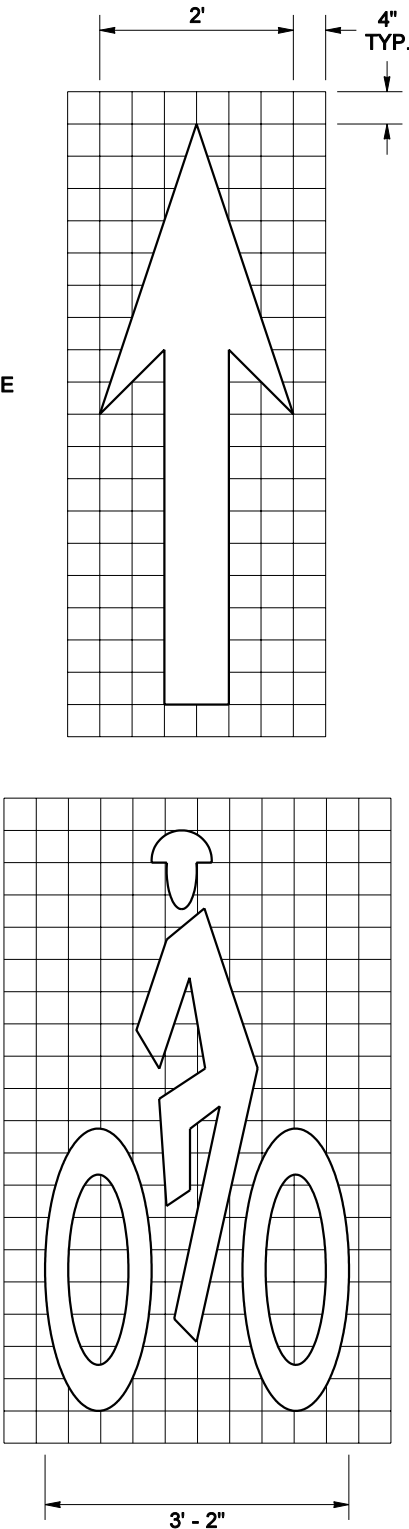
DETAIL



LAYOUT

- NOTES**
- ⑦ Bid Item "Bicycle Lane Symbol" includes arrow and bike rider symbol.
 - ⑧ 2' x 6' White Arrow
 - ⑨ Bike Rider symbol

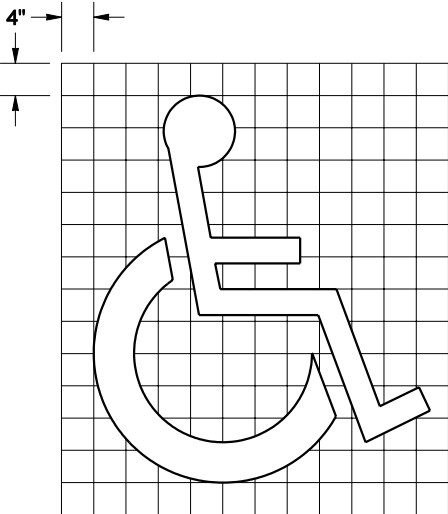
BICYCLE LANE SYMBOL



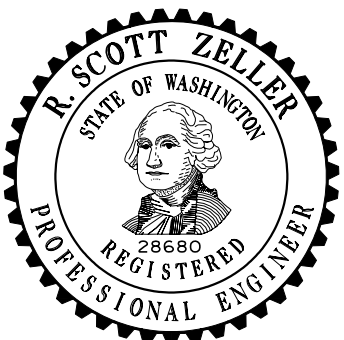
DETAILS

GENERAL NOTE

See contract for location and material requirements.



ACCESS PARKING SPACE SYMBOL



EXPIRES MAY 5, 2003

PAVEMENT MARKINGS

STANDARD PLAN H-5c

SHEET 3 OF 3 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso

06-24-02

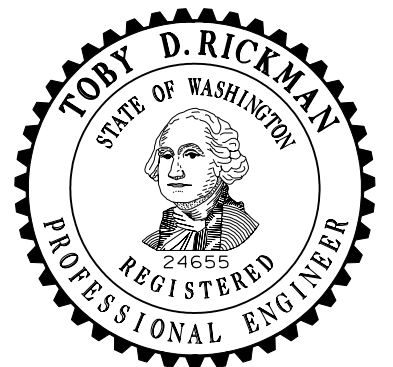
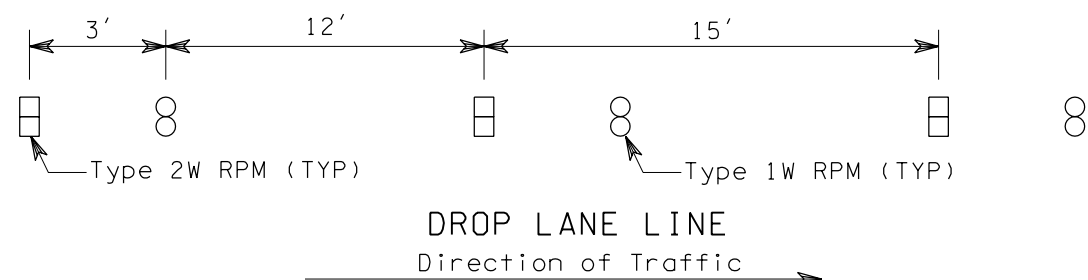
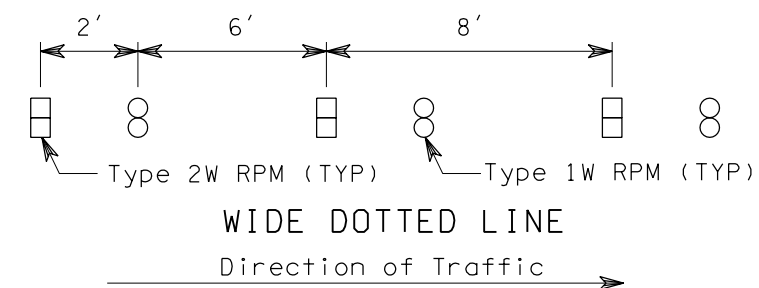
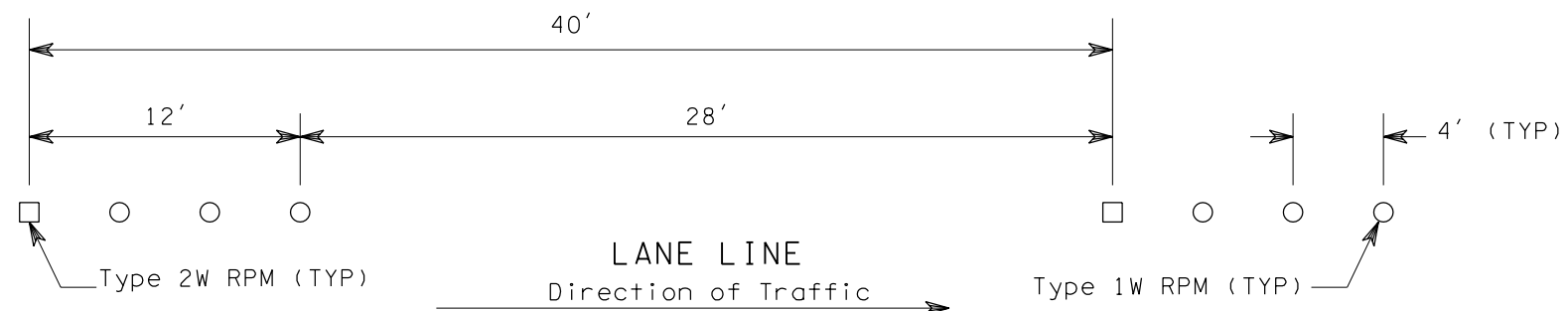
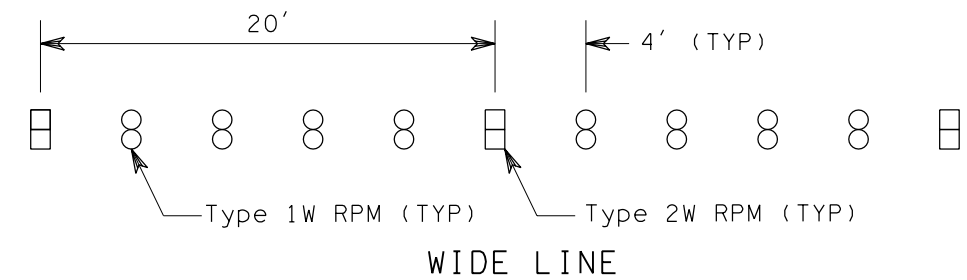
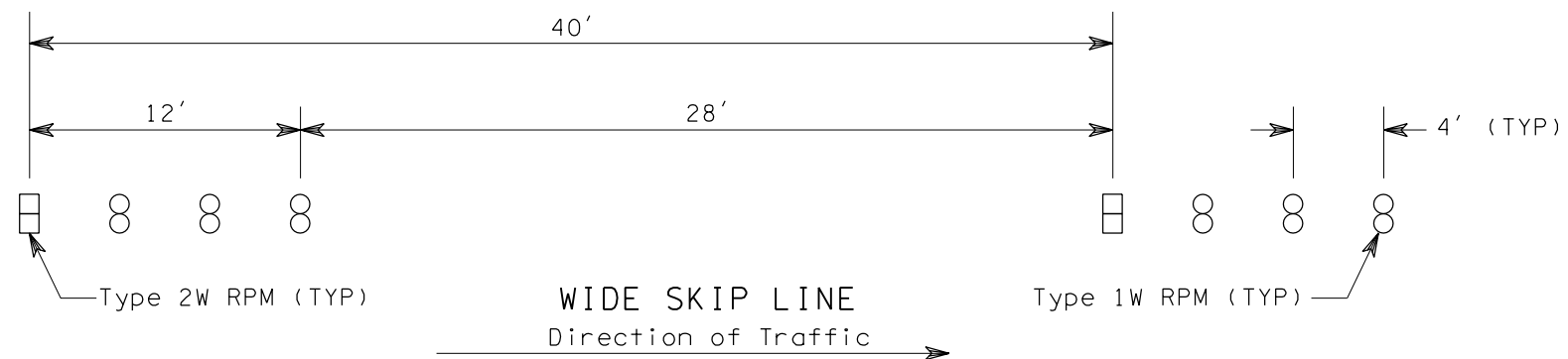
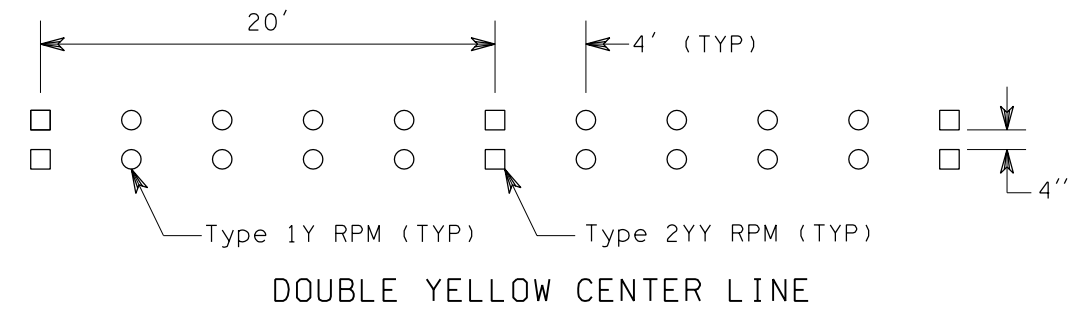
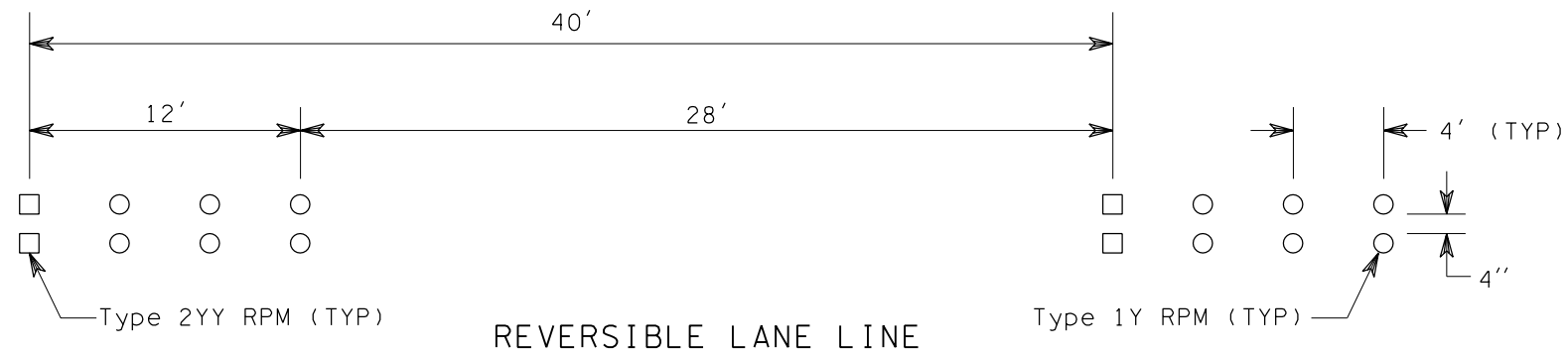
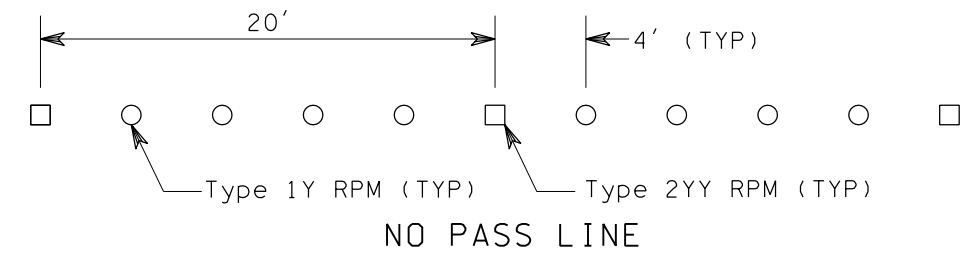
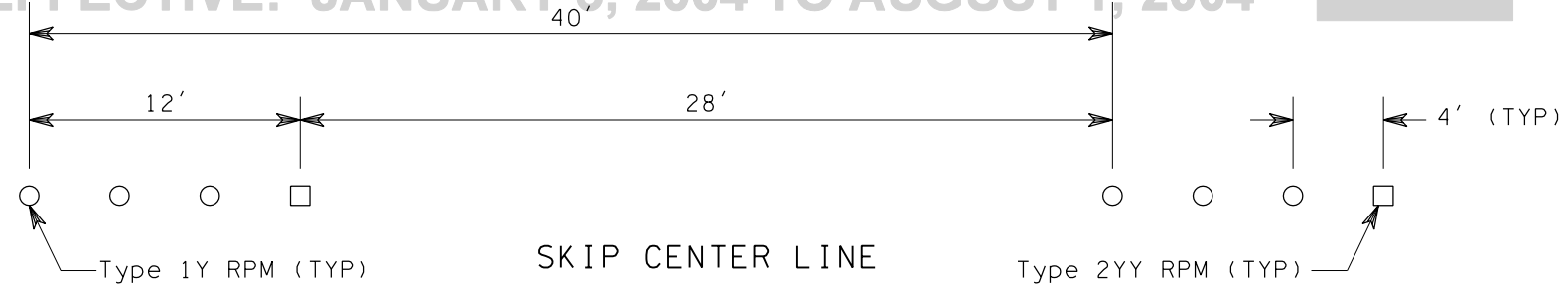
STATE DESIGN ENGINEER

DATE



Washington State Department of Transportation

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EXPIRES OCTOBER 26, 2000

**RAISED PAVEMENT MARKER
SUBSTITUTION PATTERNS
STANDARD PLAN H-5d**

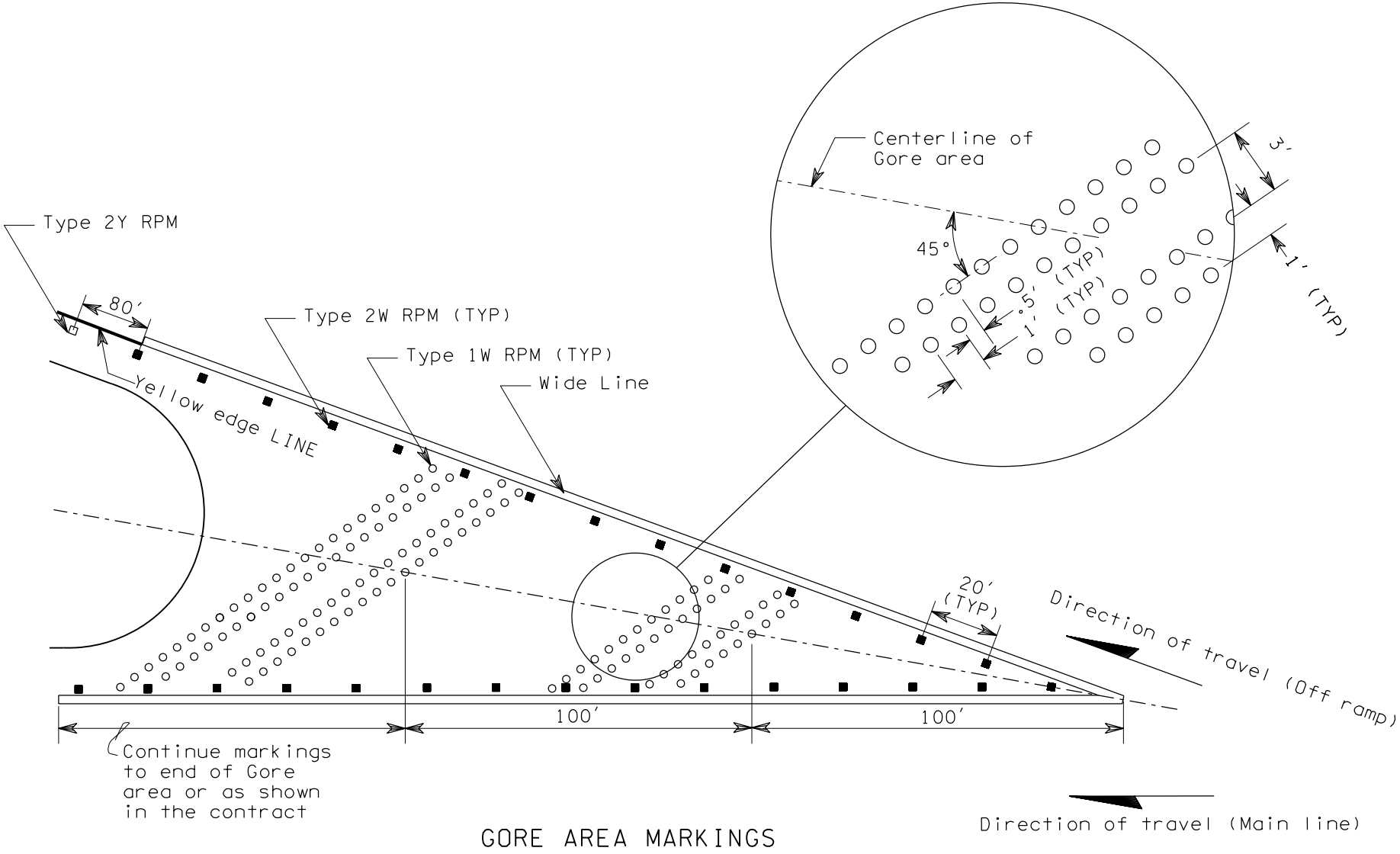
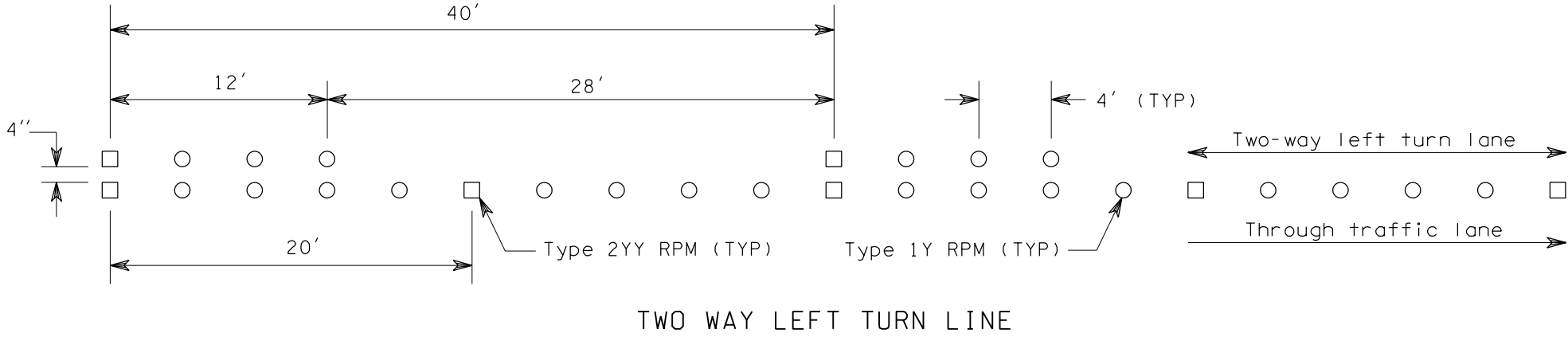
SHEET 1 OF 2 SHEETS

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2/00	CHANGED "GORE STRIPE" TO "WIDE LINE". ADDED WIDE DOTTED LINE. CHANGED RPM PATTERN DBL YELLOW, WIDE, DROP, & NO PASS	DATE	BY
	REVISION		

APPROVED FOR PUBLICATION

Clifford E. Mansfield 4/14/00DEPUTY STATE DESIGN ENGINEER
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

DATE



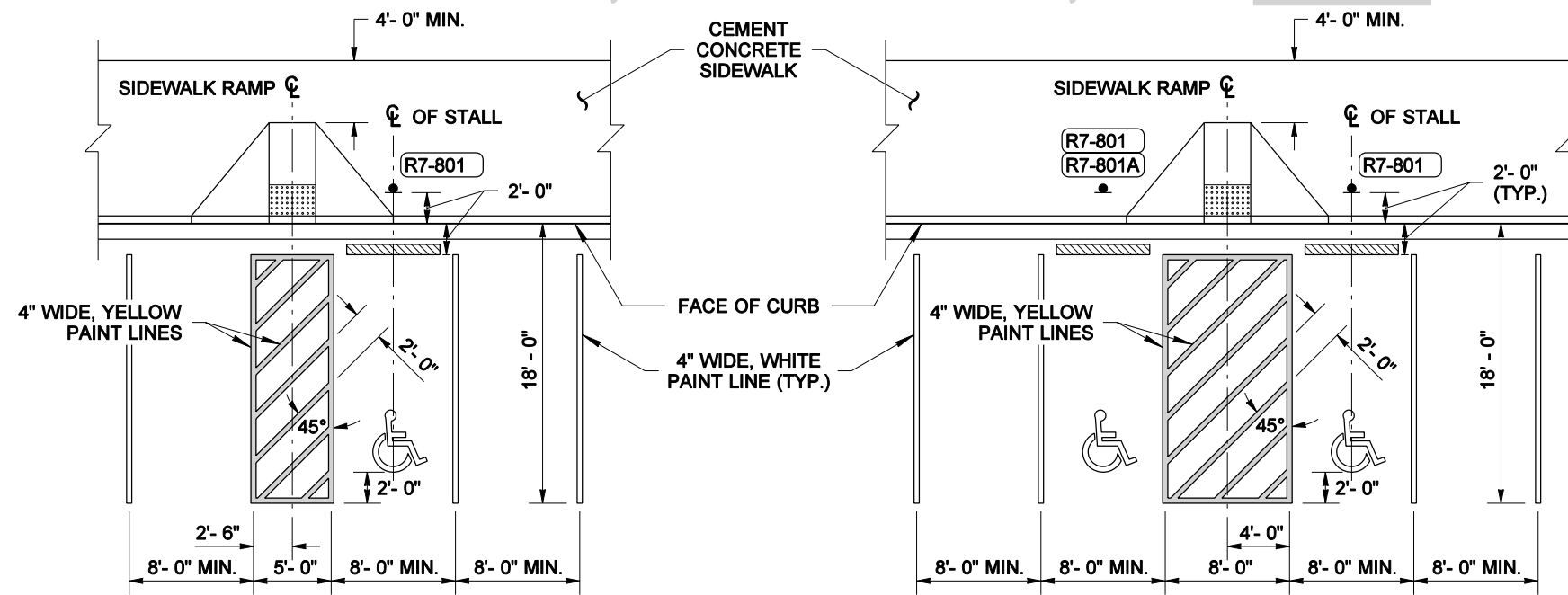
EXPIRES OCTOBER 26, 2000

**RAISED PAVEMENT MARKER
SUBSTITUTION PATTERNS
STANDARD PLAN H-5d**

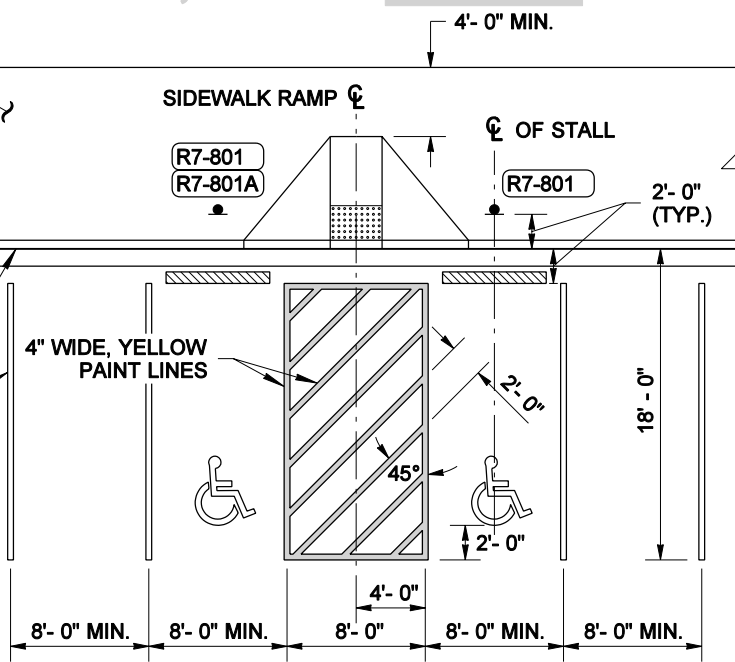
SHEET 2 OF 2 SHEETS

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2/00	CHANGED "GORE STRIPE" TO "WIDE LINE". DELETED BARRIER STRIPE. DELETED RED RPM's	TWS	BY
DATE	REVISION	DATE	BY

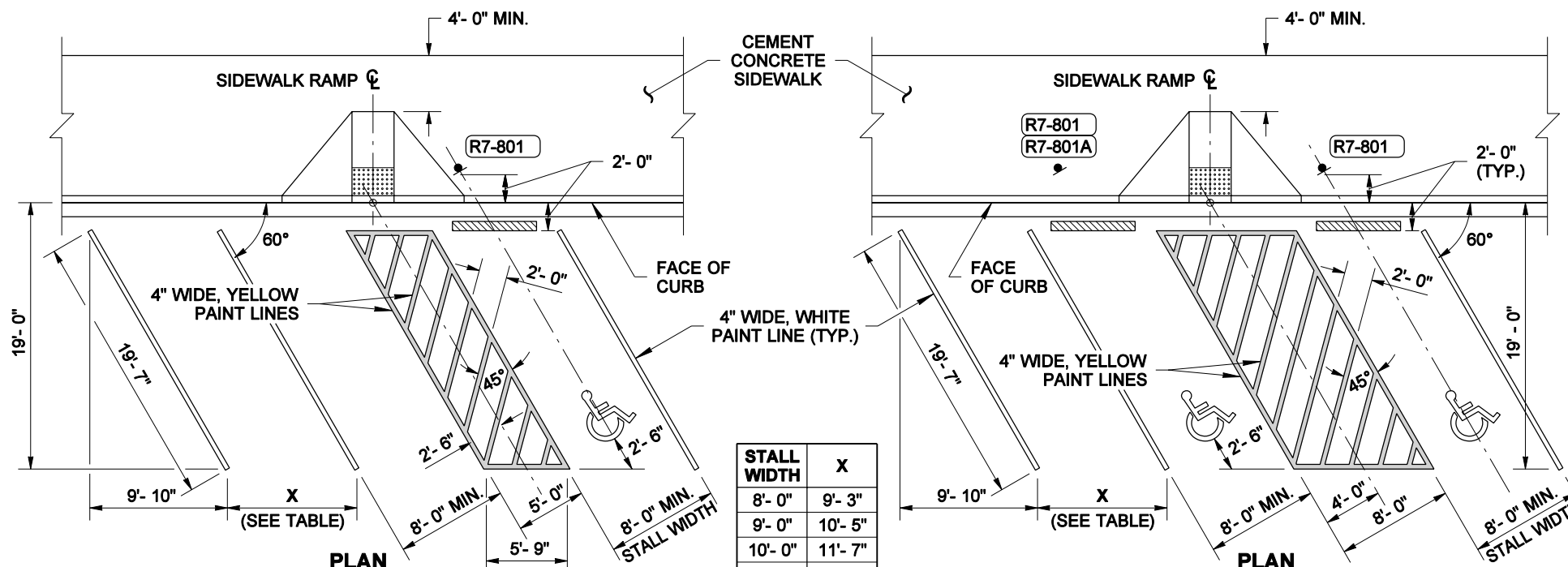
APPROVED FOR PUBLICATION	
Clifford E. Mansfield	4/14/00
DEPUTY STATE DESIGN ENGINEER	
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION	
OLYMPIA, WASHINGTON	



PLAN
ONE ACCESSIBLE STALL
90° PARKING STALL ARRANGEMENT

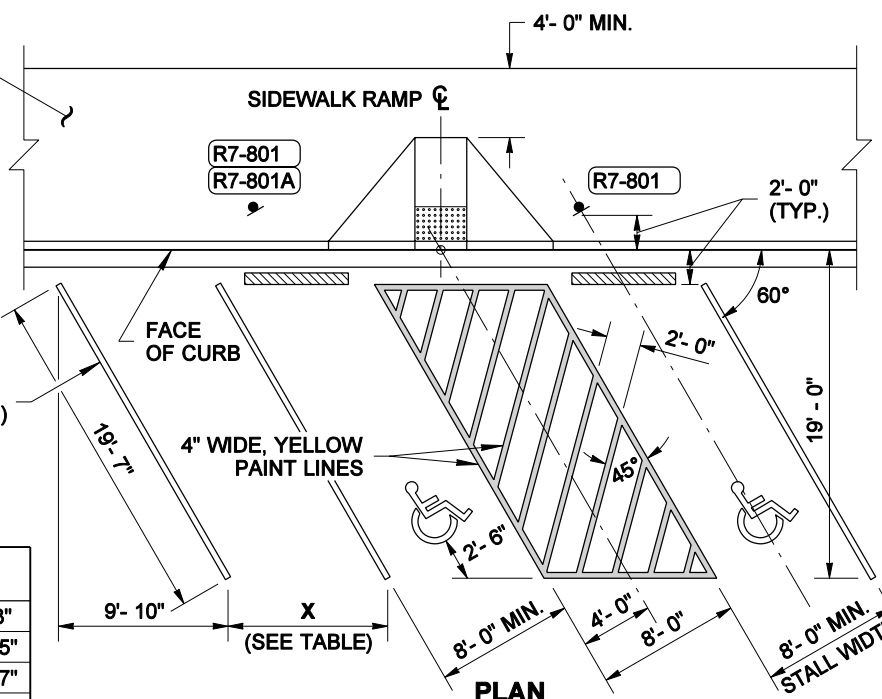


PLAN
TWO ACCESSIBLE STALLS
90° PARKING STALL ARRANGEMENT

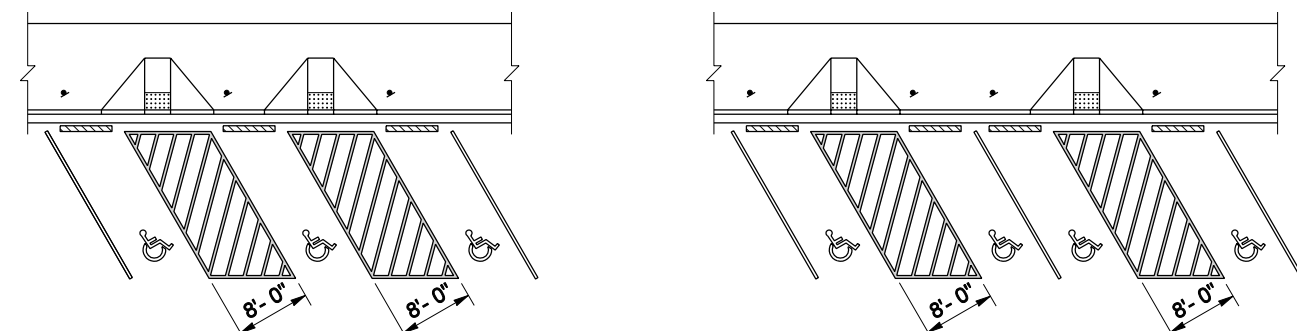


PLAN
ONE ACCESSIBLE STALL
60° PARKING STALL ARRANGEMENT

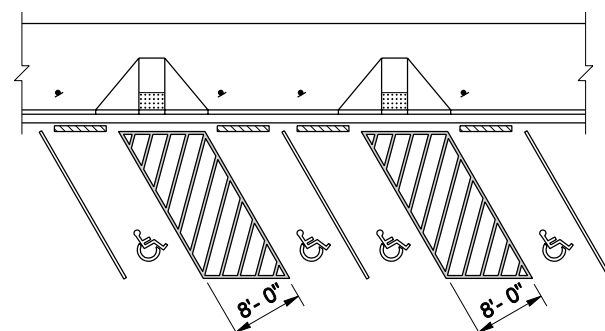
STALL WIDTH	X
8'-0"	9'-3"
9'-0"	10'-5"
10'-0"	11'-7"
11'-0"	12'-8"
12'-0"	13'-10"



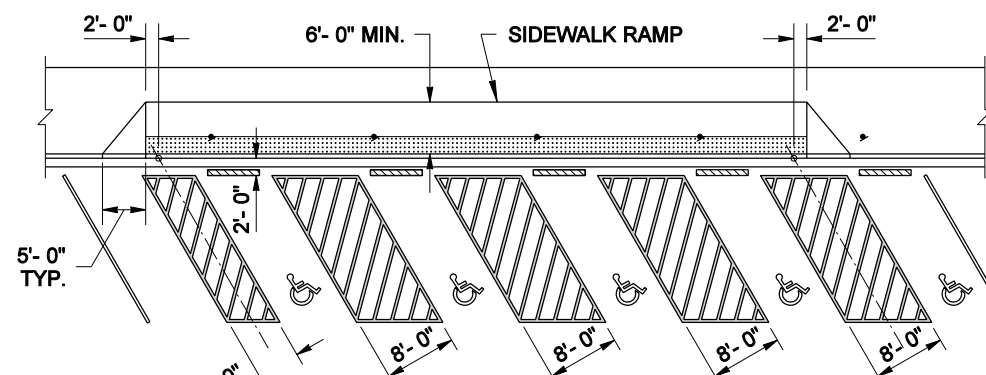
PLAN
TWO ACCESSIBLE STALLS
60° PARKING STALL ARRANGEMENT



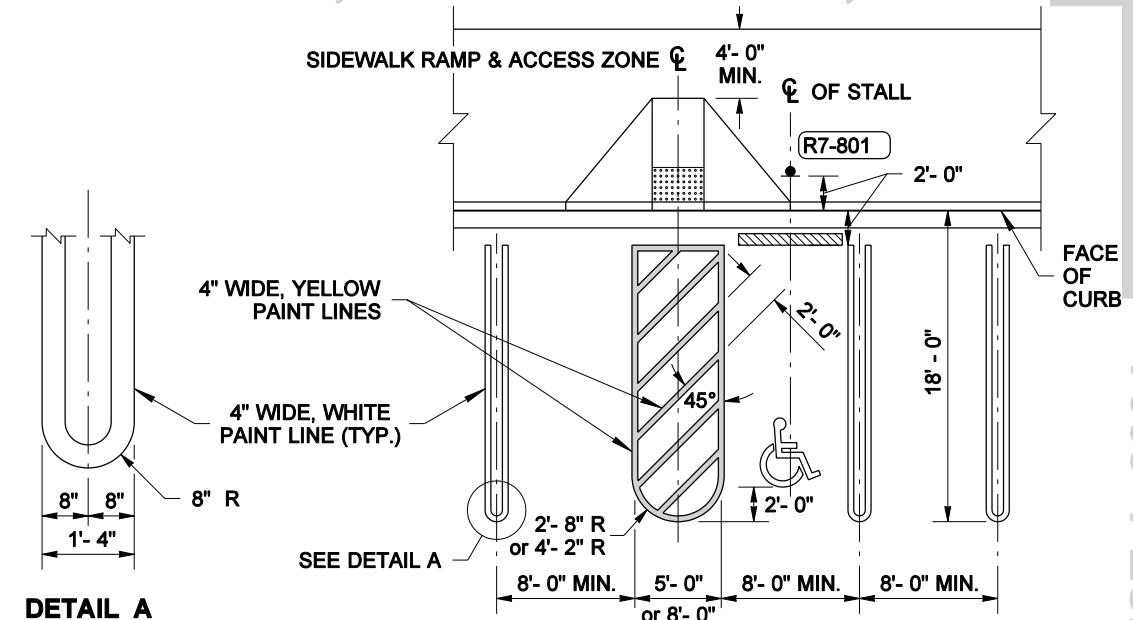
THREE ACCESSIBLE STALLS



FOUR ACCESSIBLE STALLS



FIVE ACCESSIBLE STALLS



DETAIL A

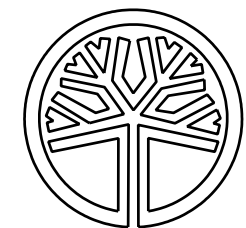
PLAN
ALTERNATE PARKING STALL MARKINGS
USE ONLY WHEN SPECIFIED IN THE CONTRACT

NOTES

- Three, four and five accessible stall arrangements may be either 60° angle or 90° perpendicular parking arrangements. See contract.
- Signs indicating a parking space or stall for a physically disabled person shall be installed between 36" and 84" above the sidewalk surface.
- An Access Parking Space Symbol is required for each accessible parking stall. A blue background and white border are required when the symbol is installed on a cement concrete surface.
- Wheel stops, when specified in the contract, shall be approximately 6" high and a minimum of 6' long.
- Refer to the Standard Plans for sidewalk ramp, detectable warning pattern, and curb details.

LEGEND

- R7-801 Reserved Parking Sign and post with R7-801A Plaque, if indicated (See Sign Fabrication Manual)
- Access Parking Space Symbol See Standard Plan H-5c
- Manufactured wheel stop
- Detectable Warning Pattern



STATE OF
WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

ACCESSIBLE PARKING PAVEMENT MARKINGS

STANDARD PLAN H-5e

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 02-20-03

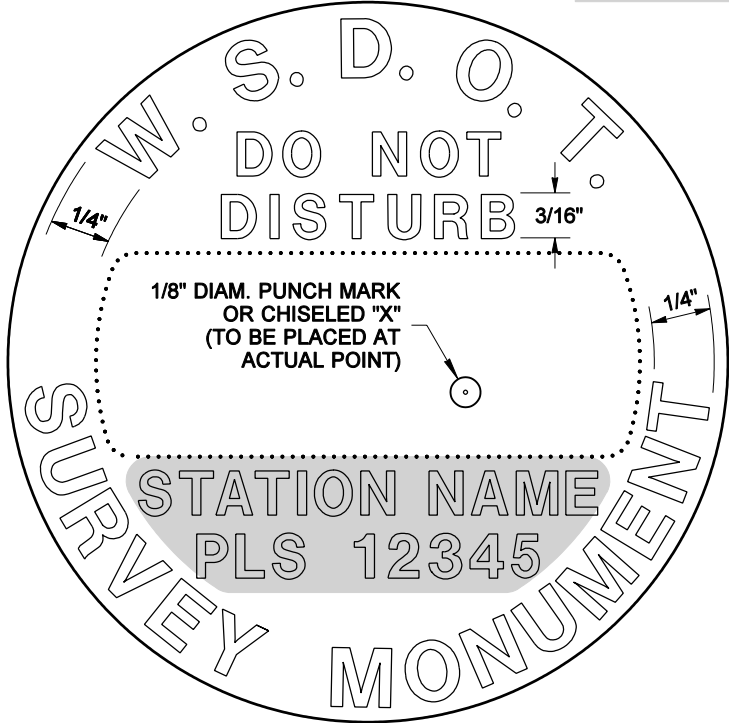
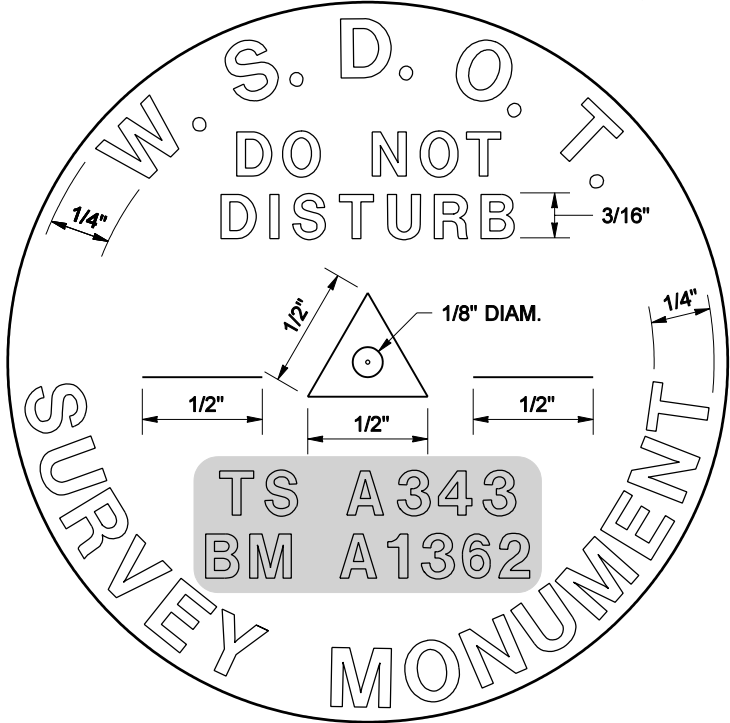
STATE DESIGN ENGINEER

DATE



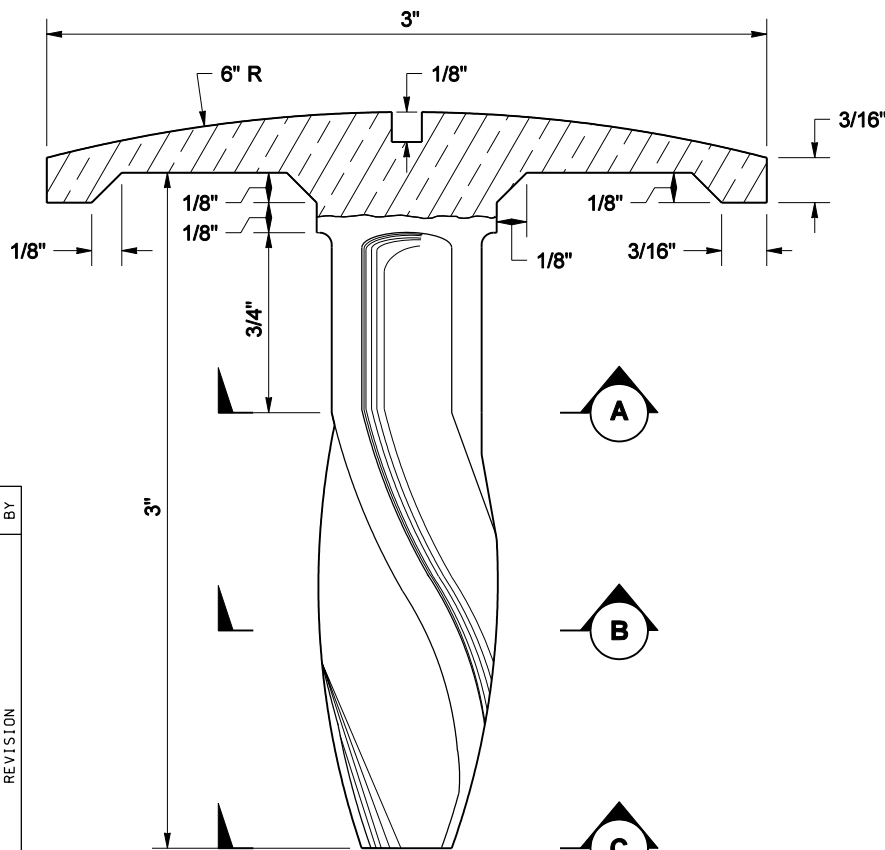
Washington State Department of Transportation

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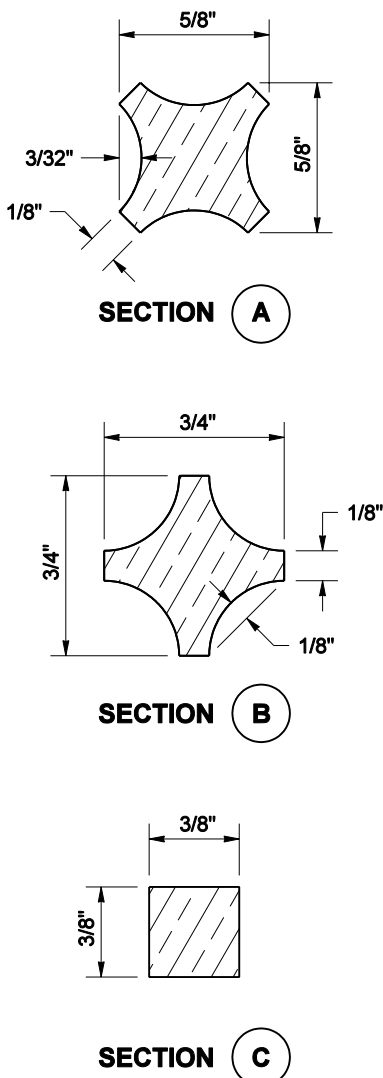


TYPE 1
TOP VIEW
BRASS DISC

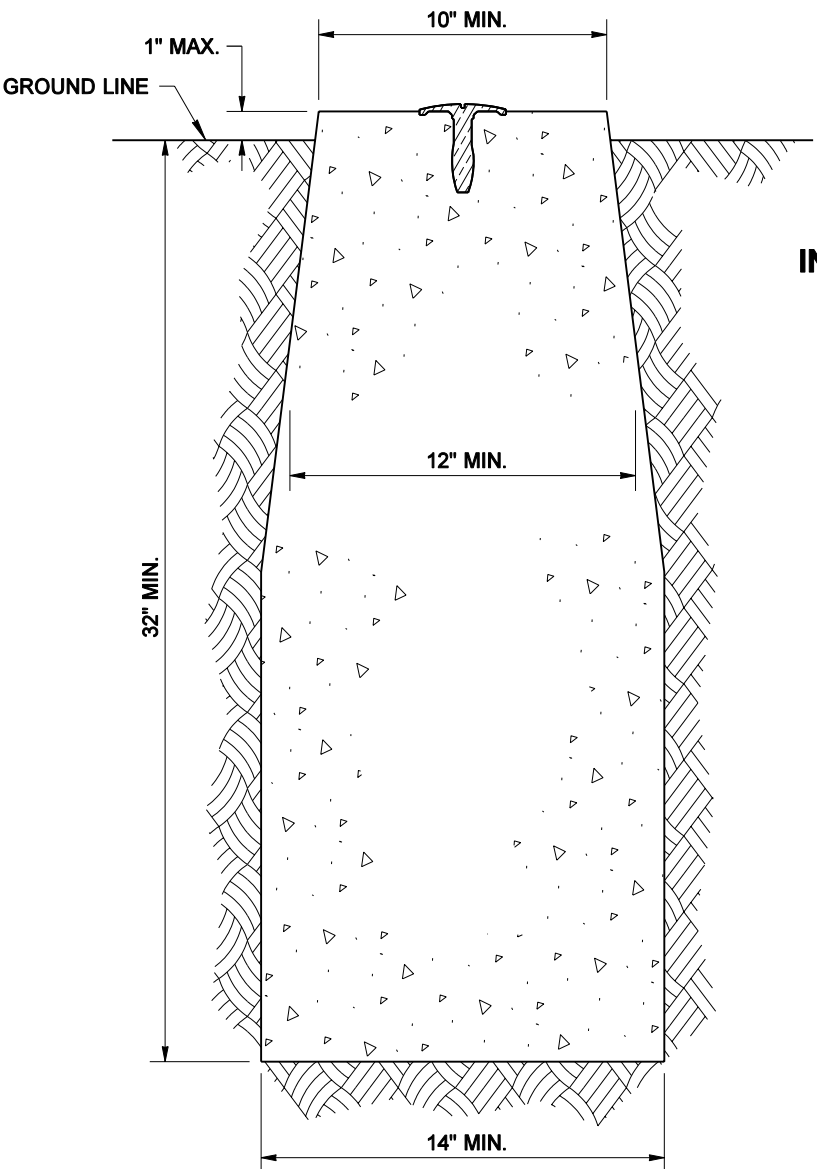
TYPE 2



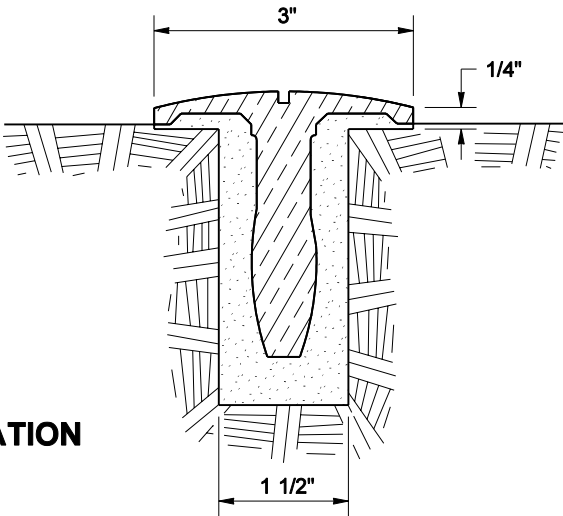
SIDE VIEW



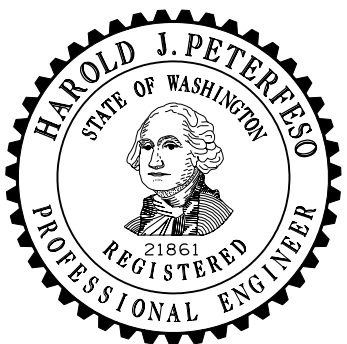
SECTION C



SECTION VIEW OF
GENERAL INSTALLATION



SECTION VIEW OF
LEDGE ROCK, CONCRETE
OR ASPHALT INSTALLATION



EXPIRES MAY 16, 2005

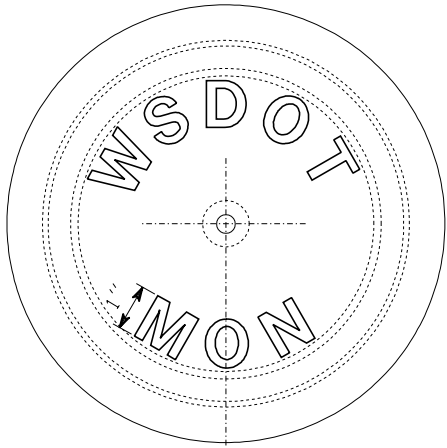
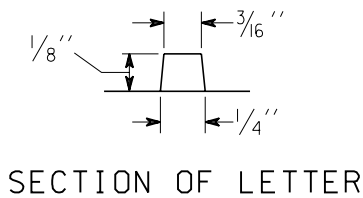
**SURVEY MONUMENTS
TYPE 1 AND TYPE 2
STANDARD PLAN H-6**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

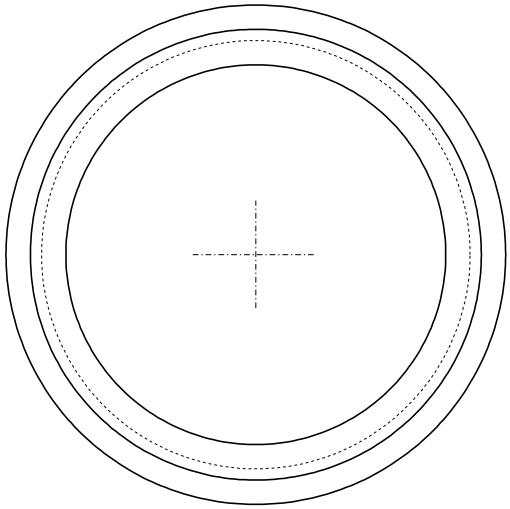
Harold J. Peterfeso 10-29-03
STATE DESIGN ENGINEER DATE





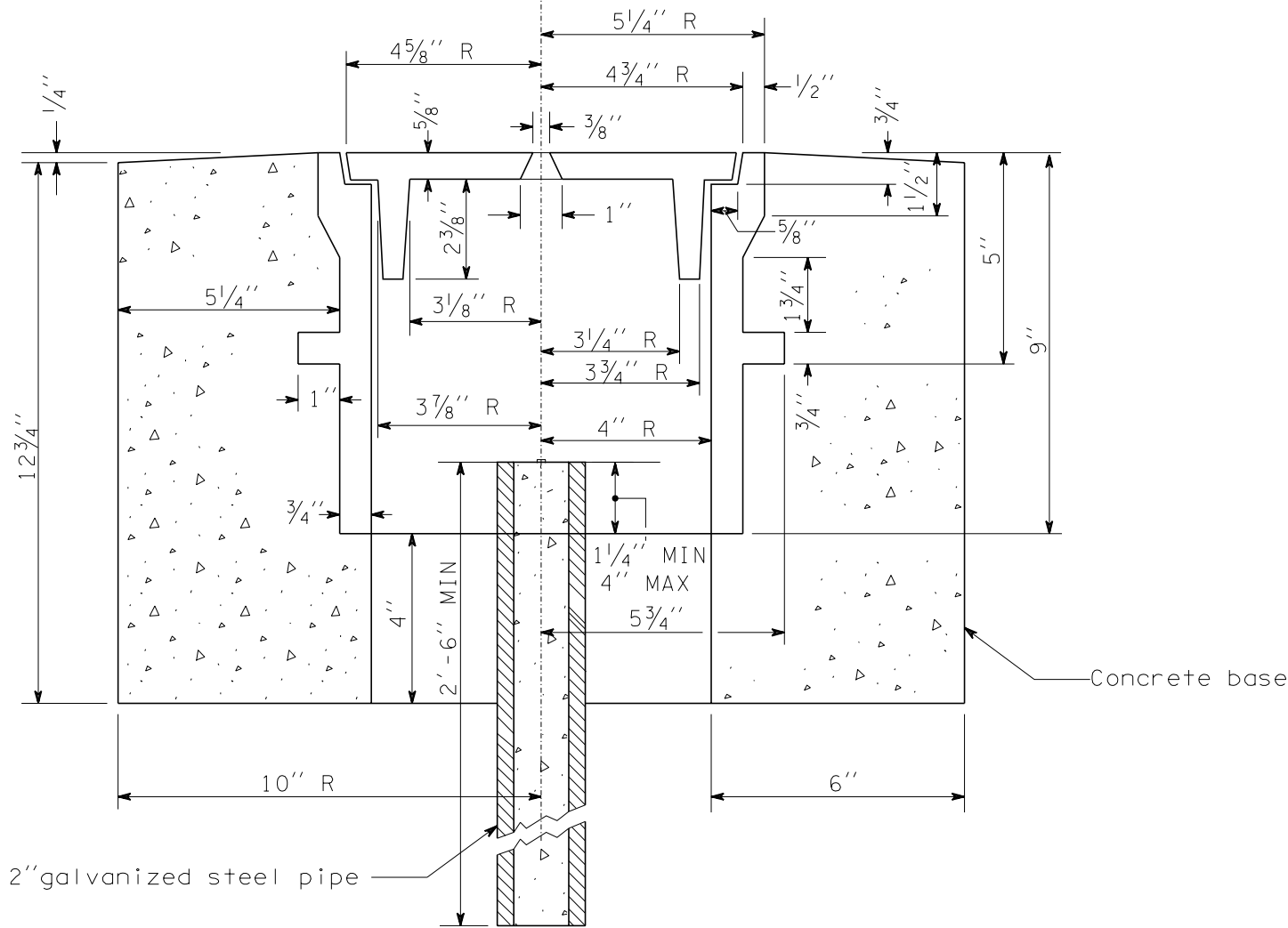
MONUMENT COVER

APPROXIMATE WEIGHTS	
Case	60 lbs
Cover	19 lbs
Total	79 lbs

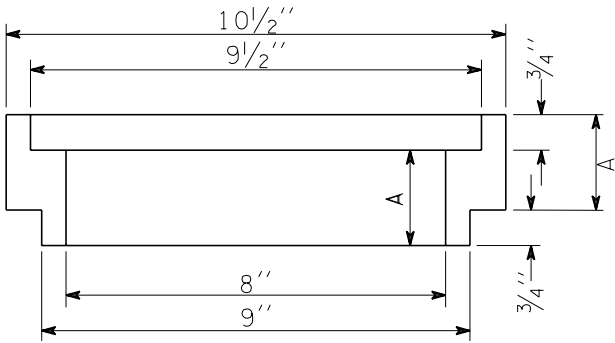


PLAN
RISER RING

RISER RING DIMENSIONS			
A (SIZE)	1 1/2"	2"	3"



ASSEMBLY SECTION



SECTION
RISER RING



EXPIRES MAY 3, 2000

MONUMENT CASE
AND COVER
STANDARD PLAN H-7

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APPROVED FOR PUBLICATION

Clifford E. Mansfield

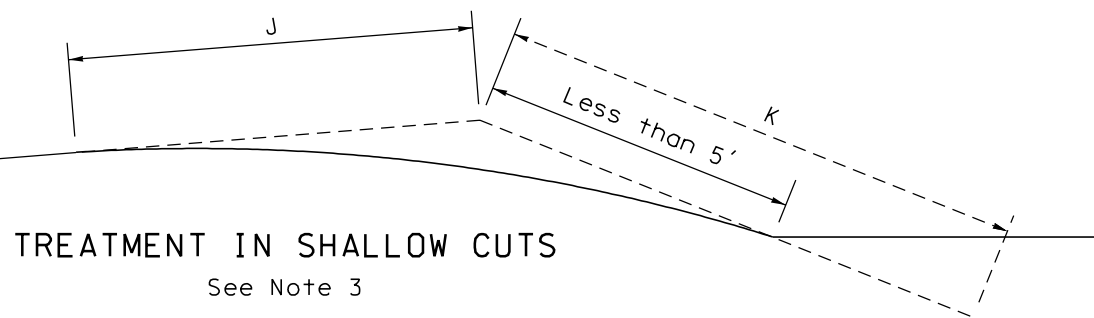
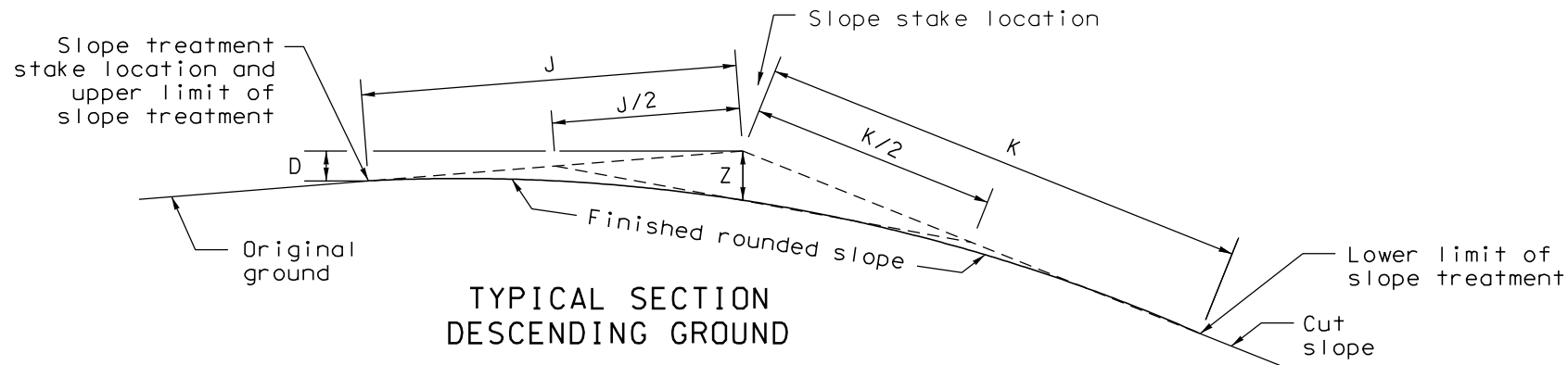
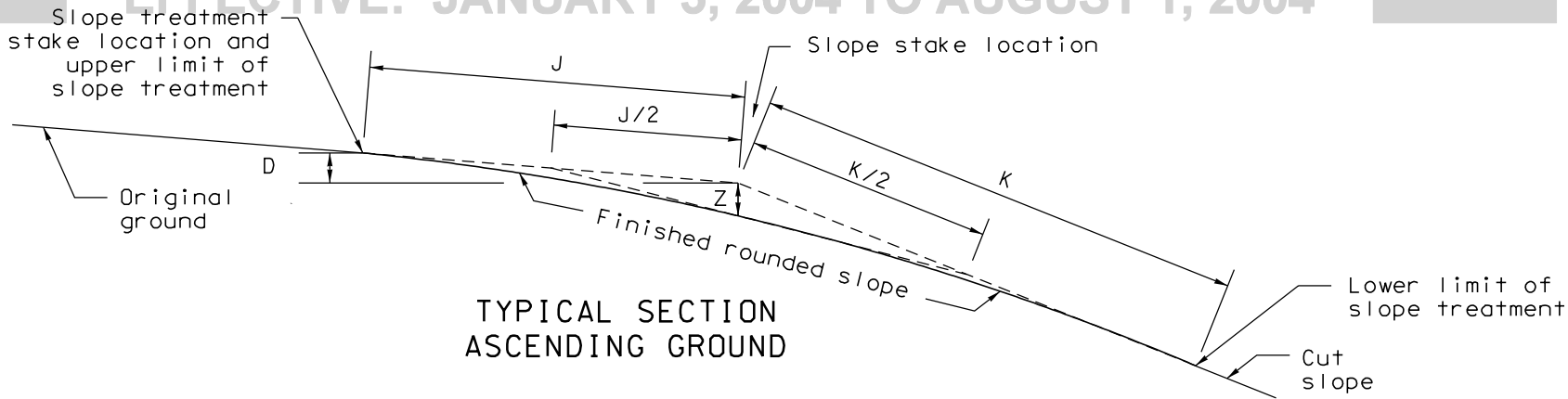
DEPUTY STATE DESIGN ENGINEER

8/10/98

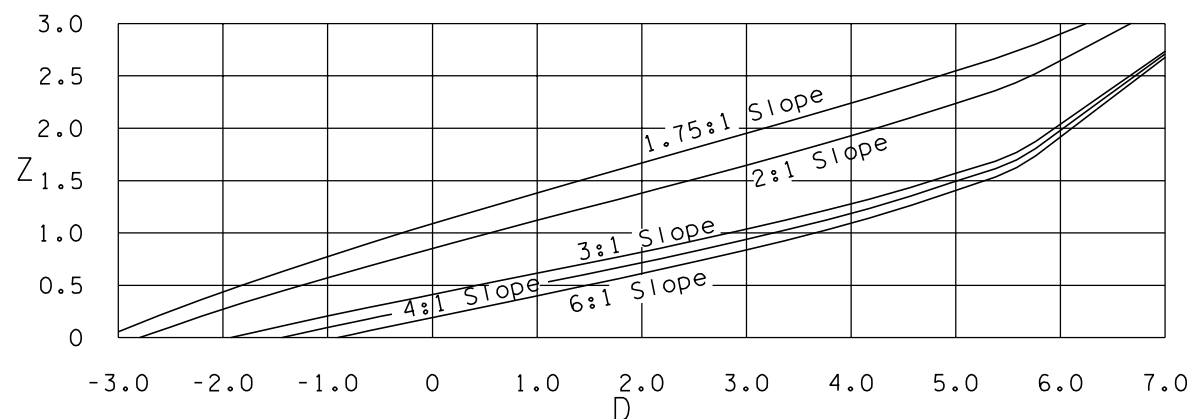
DATE



WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON



VALUES OF Z (feet)
For Class A Slope Treatment



$$Z = \frac{\frac{K}{2} \sqrt{\left(\frac{J}{2}\right)^2 - \left(\frac{D}{2}\right)^2} \pm \left(\frac{DKS}{4}\right)}{\frac{KS}{2} + \left(\sqrt{1+S^2}\right) \left(\sqrt{\left(\frac{J}{2}\right)^2 - \left(\frac{D}{2}\right)^2}\right)}$$

In this equation the term $\pm DKS/4$ is positive when the slope treatment stake is lower than the slope stake (descending ground); and negative when the slope treatment stake is higher than the slope stake (ascending ground).

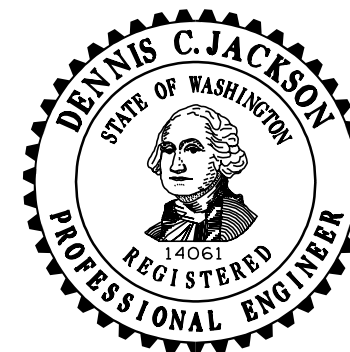
NOTES

1. Slope treatment shall be constructed simultaneously with the roadway excavation. Ordinarily hand trimming will not be required if satisfactory results are obtained with mechanical equipment.
2. It is essential that the construction of cut and fill slopes and the application of slope treatment fit as naturally as possible into the existing landscape to provide an aesthetically and geometrically satisfactory completed roadway.
3. When the distance K is greater than the distance from the top of cut to the bottom of ditch, slope treatment shall begin at bottom of ditch.

LEGEND:

- J Distance from slope stake to slope treatment stake, measured on natural ground slope.
- K Distance from slope stake to lower limit of slope treatment, measured down face of cut slope.
- H Difference in elevation between finished shoulder grade and slope stake.
- D Difference in elevation between slope stake and slope treatment stake.
- Z Depth of slope treatment at slope stake as determined by a straight line between the midpoints of J and K.
- S Horizontal distance per foot cut for the slope under consideration. (For a 3:1 slope, S=3)

CUT SLOPE	Class A		Class B
	J	K	J and K
4:1	7'	5'	5'
3:1	7'	5'	5'
2:1	7'	9'	5'
1.75:1	7'	12'	5'



EXPIRES NOVEMBER 8, 1998

SLOPE TREATMENT

STANDARD PLAN H-8

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APPROVED FOR PUBLICATION

Clifford E. Mansfield

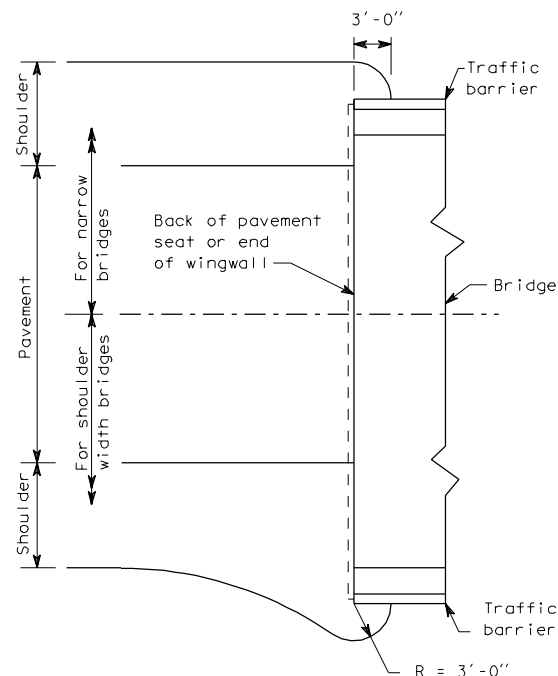
09/18/98

DEPUTY STATE DESIGN ENGINEER

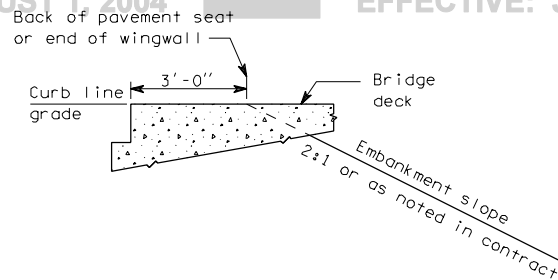
DATE



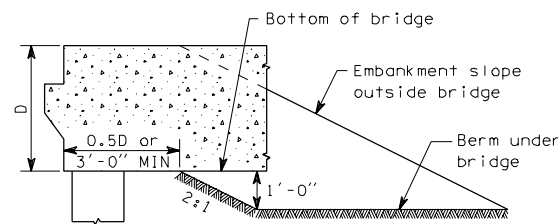
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON



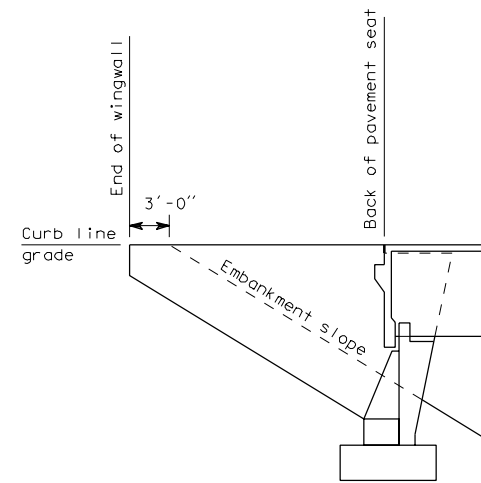
PLAN AT BRIDGE END



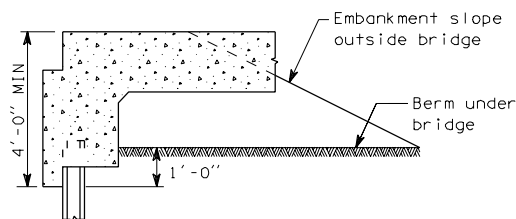
GENERAL SECTION AT BRIDGE END



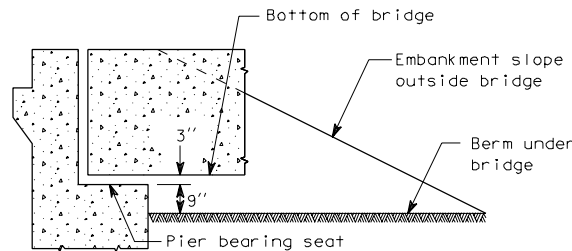
BRIDGE ON COLUMNS OR PILES



BRIDGE WITH WING WALLS

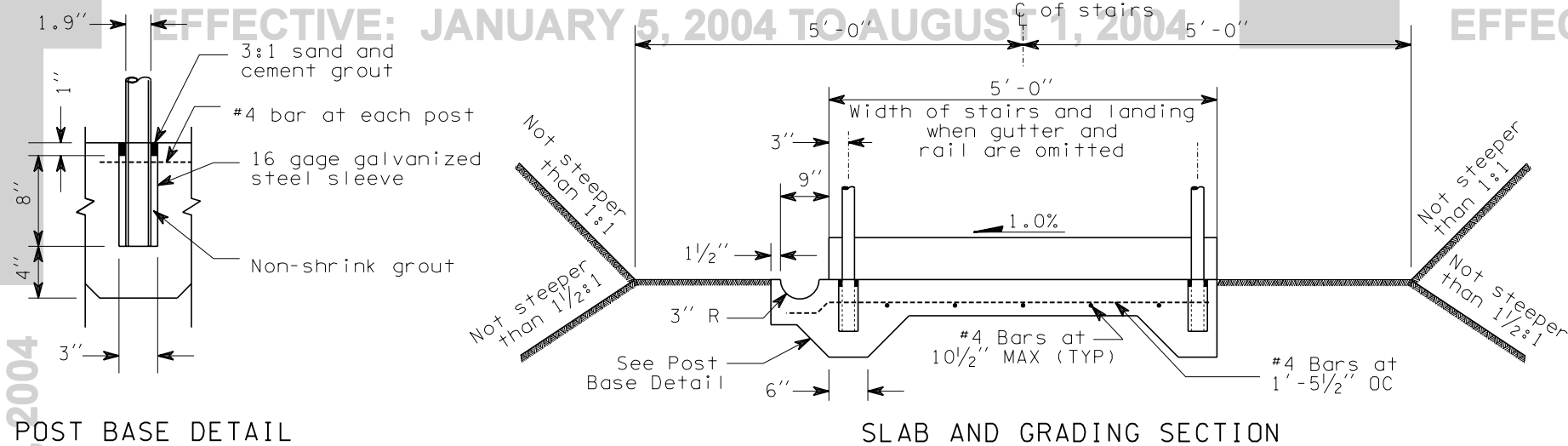


FLAT SLAB BRIDGE

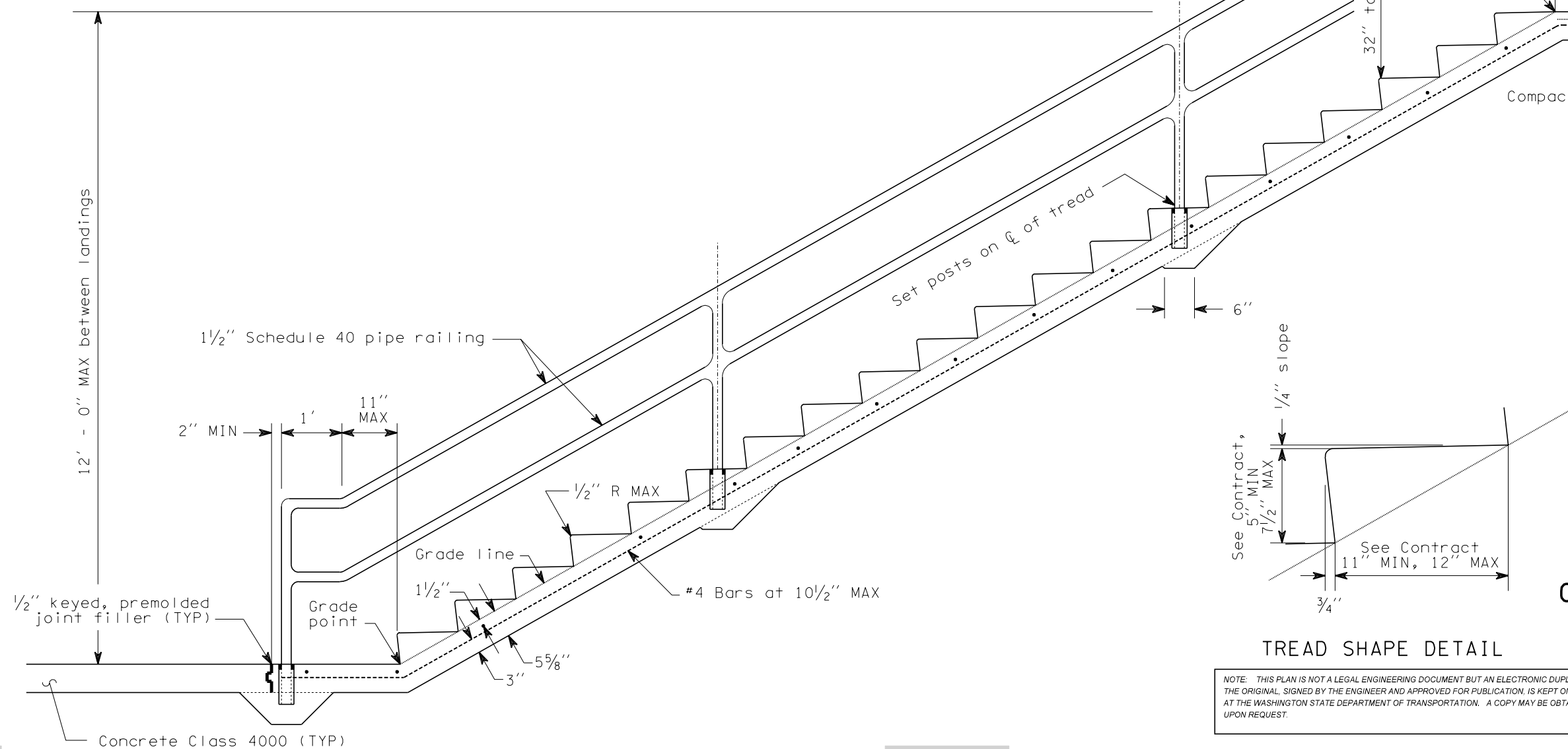
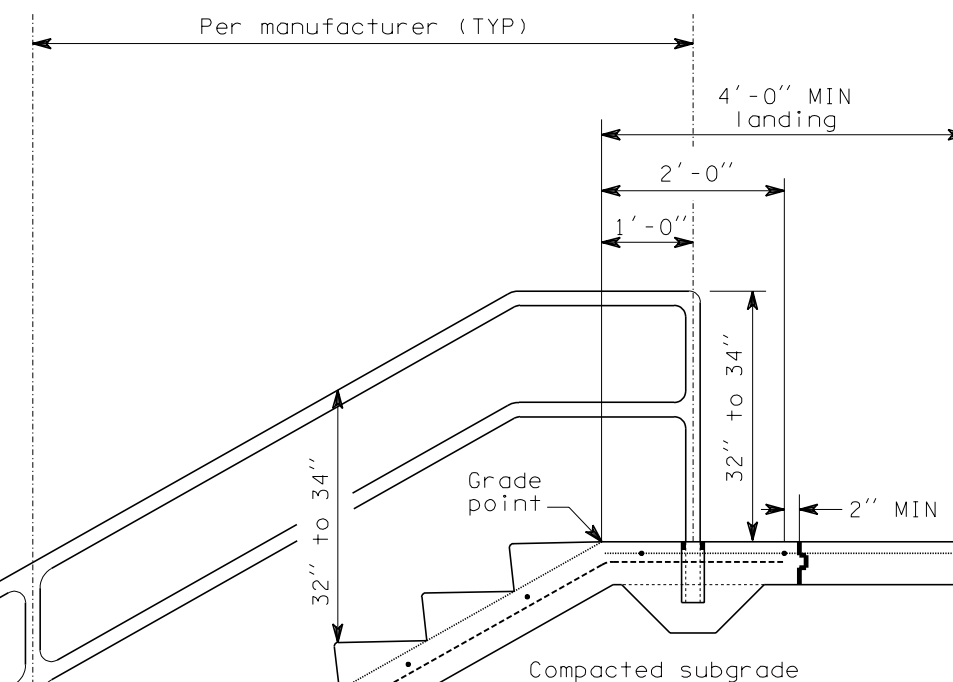


BRIDGE ON BEARINGS

EMBANKMENT AT BRIDGE ENDS



1. Manufacturer shall submit shop drawings of pipe railing for review. Design shall be in accordance with AASHTO specifications.
2. Aluminum pipe railing shall have no external surface welds.



CEMENT CONCRETE STAIRWAY CONSTRUCTION DETAILS STANDARD PLAN H-10

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APPROVED FOR PUBLICATION

Brian Ziegler

5/29/98

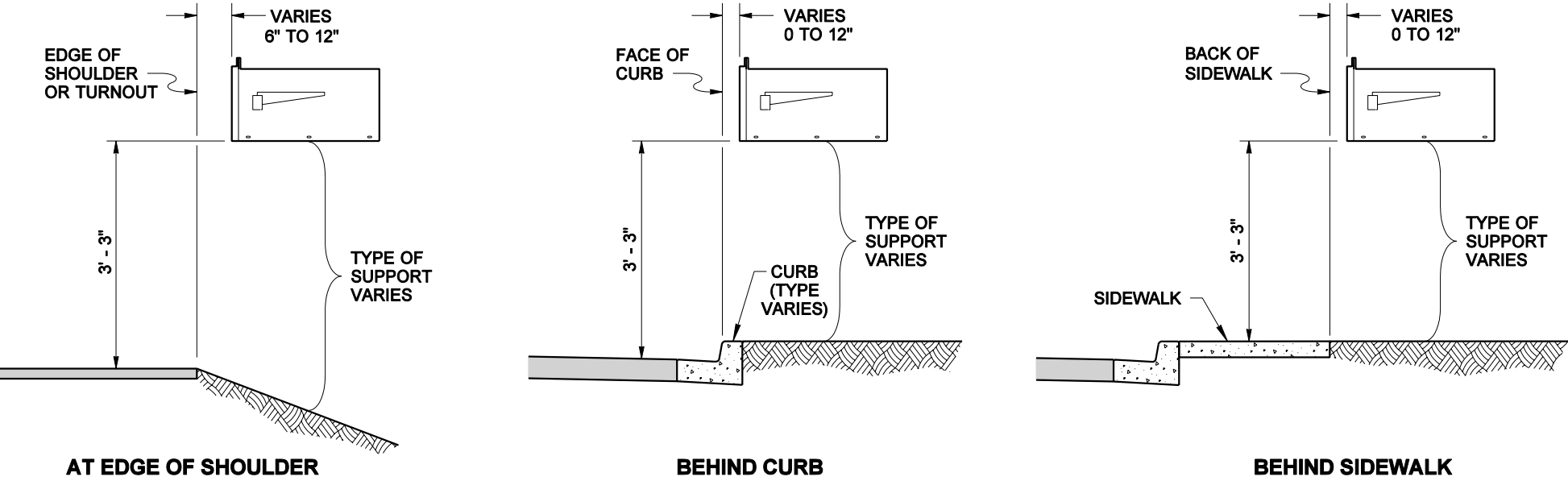
STATE DESIGN ENGINEER

DATE _____

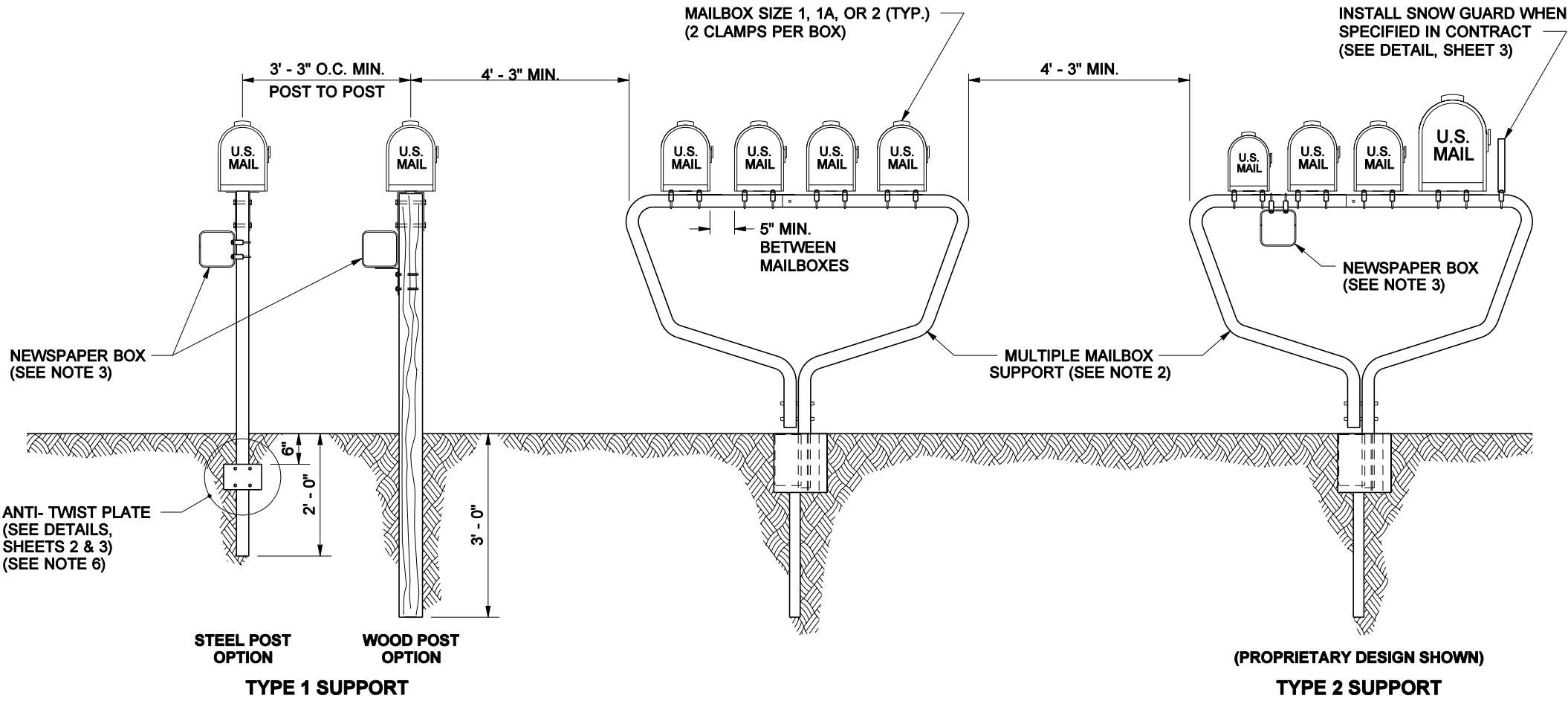
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

NOTES:

- 1. An adjustable platform may be used in lieu of the platform design shown on this plan. Adjustable platforms must fit the bracket design shown on this plan. Brackets are required for all single post installations. Field drilling may be required.
- 2. A Type 2 support is required when 2 or more mailboxes are to be installed on one support. A maximum of 5 mailboxes may be installed on a Type 2 support. See Std. Spec. 9-32.7.
- 3. Attach a newspaper box to a steel post with two 1 7/8" Muffler Clamps spaced 4" apart. Field drill 7/16" holes in the newspaper box to fit. Use 2 1/2" x 1/4" lag bolts to attach newspaper boxes to wood posts. Newspaper boxes must not extend beyond the front of the mailbox when the mailbox door is closed.
- 4. Spacing of mailbox mounting holes varies among manufacturers. Attachment of the mailbox to the platform may require drilling additional holes through the mailbox to fit the platform.
- 5. Center the mailbox on the platform to ensure space for the mailbox door to open and to allow space for installing the fasteners.
- 6. A socket and wedge anchoring system may be substituted in lieu of the anti-twist plate assembly for single steel posts shown on this plan. The socket and wedge anchoring system shall meet NCHRP 350 crash test criteria. Anti-twist plates are not required for wood post installations.



MAILBOX PLACEMENT SECTIONS



MAILBOX SPACING DETAIL



EXPIRES MAY 16, 2003

MAILBOX
INSTALLATION
TYPE 1 & TYPE 2
STANDARD PLAN H-12

SHEET 1 OF 3 SHEETS

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04/2002	CLARIFIED INSTALLATION DETAILS	MAS
DATE	REVISION	BY

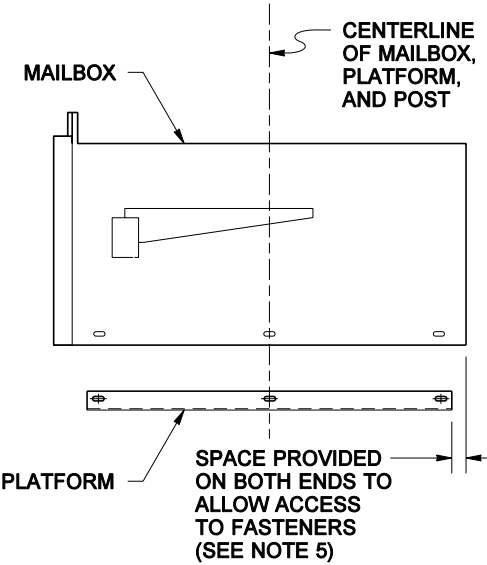
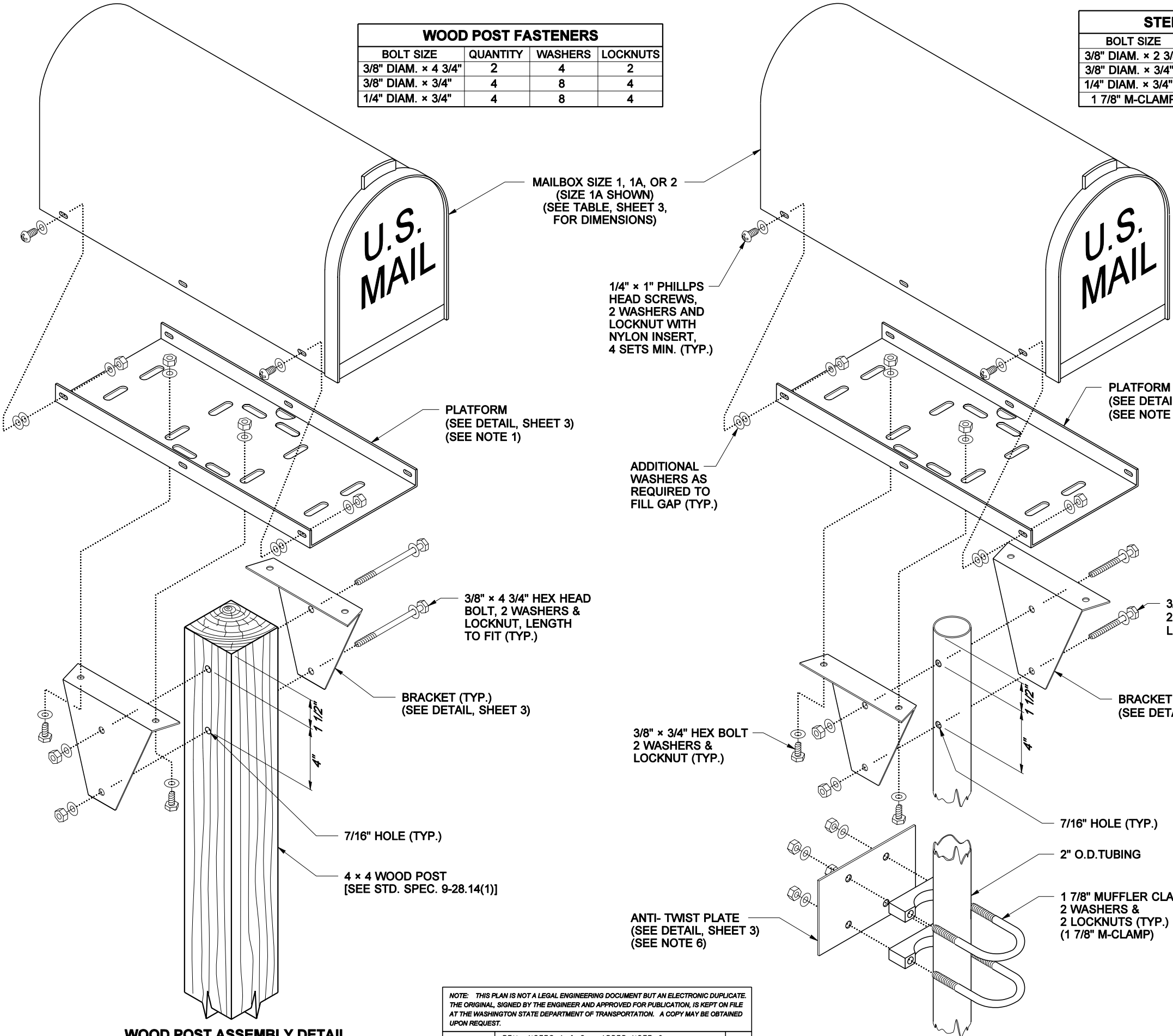
APPROVED FOR PUBLICATION	
Harold J. Peterfeso	05-09-02
STATE DESIGN ENGINEER	DATE
Washington State Department of Transportation	

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

WOOD POST FASTENERS			
BOLT SIZE	QUANTITY	WASHERS	LOCKNUTS
3/8" DIAM. x 4 3/4"	2	4	2
3/8" DIAM. x 3/4"	4	8	4
1/4" DIAM. x 3/4"	4	8	4

STEEL POST FASTENERS			
BOLT SIZE	QUANTITY	WASHERS	LOCKNUTS
3/8" DIAM. x 2 3/4"	2	4	2
3/8" DIAM. x 3/4"	4	8	4
1/4" DIAM. x 3/4"	4	8	4
1 7/8" M-CLAMP	2	4	4

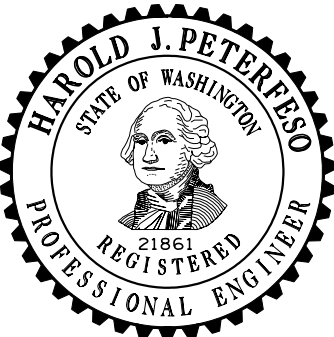


ALIGNMENT DETAIL

WOOD POST ASSEMBLY DETAIL
(SEE STEEL POST ASSEMBLY DETAIL FOR DETAILS NOT SHOWN)

STEEL POST ASSEMBLY DETAIL

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04/2002	REV. NOTES 1 & 2; ADDED NOTE 6; REV. PLATFORM WIDTHS; ADDED SPACER WASHERS	MAS
DATE	REVISION	BY

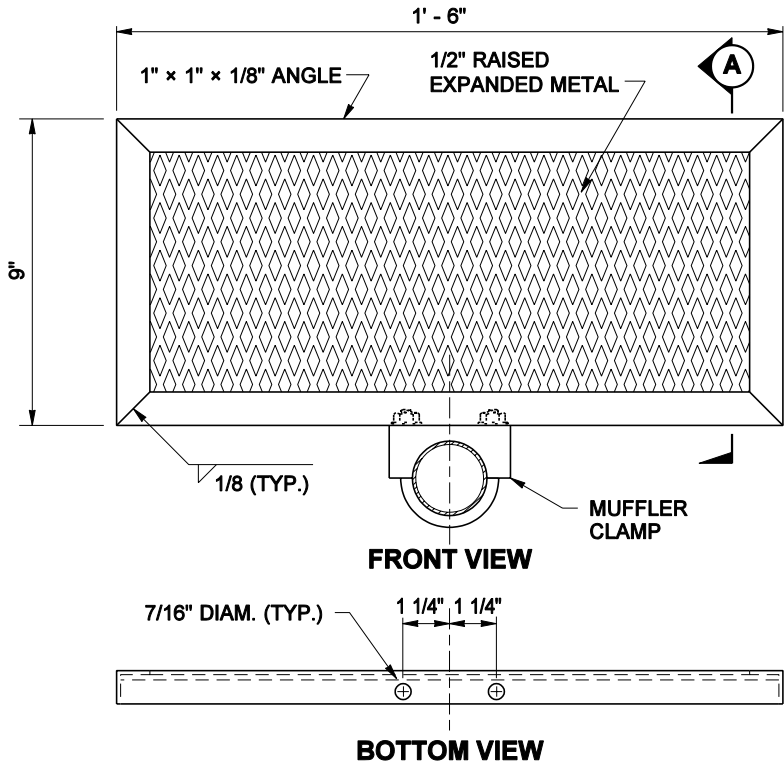


EXPIRES MAY 16, 2003

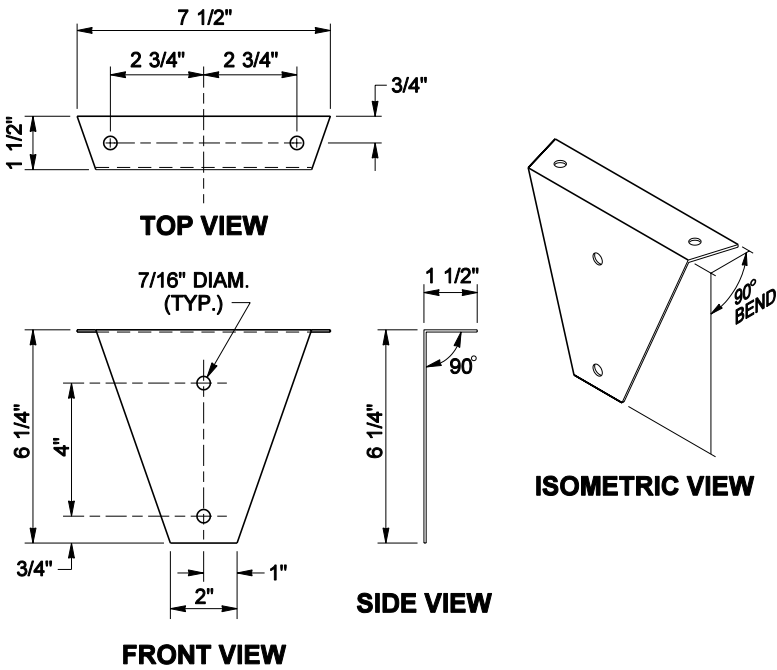
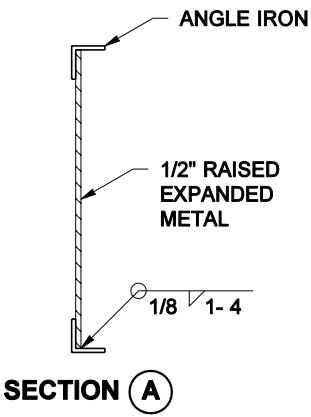
**MAILBOX
INSTALLATION
TYPE 1 & TYPE 2
STANDARD PLAN H-12**

SHEET 2 OF 3 SHEETS

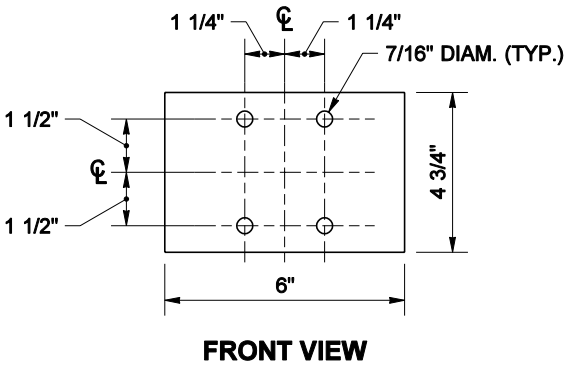
APPROVED FOR PUBLICATION	
Harold J. Peterfeso	05-09-02
STATE DESIGN ENGINEER	DATE
Washington State Department of Transportation	



SNOW GUARD DETAIL

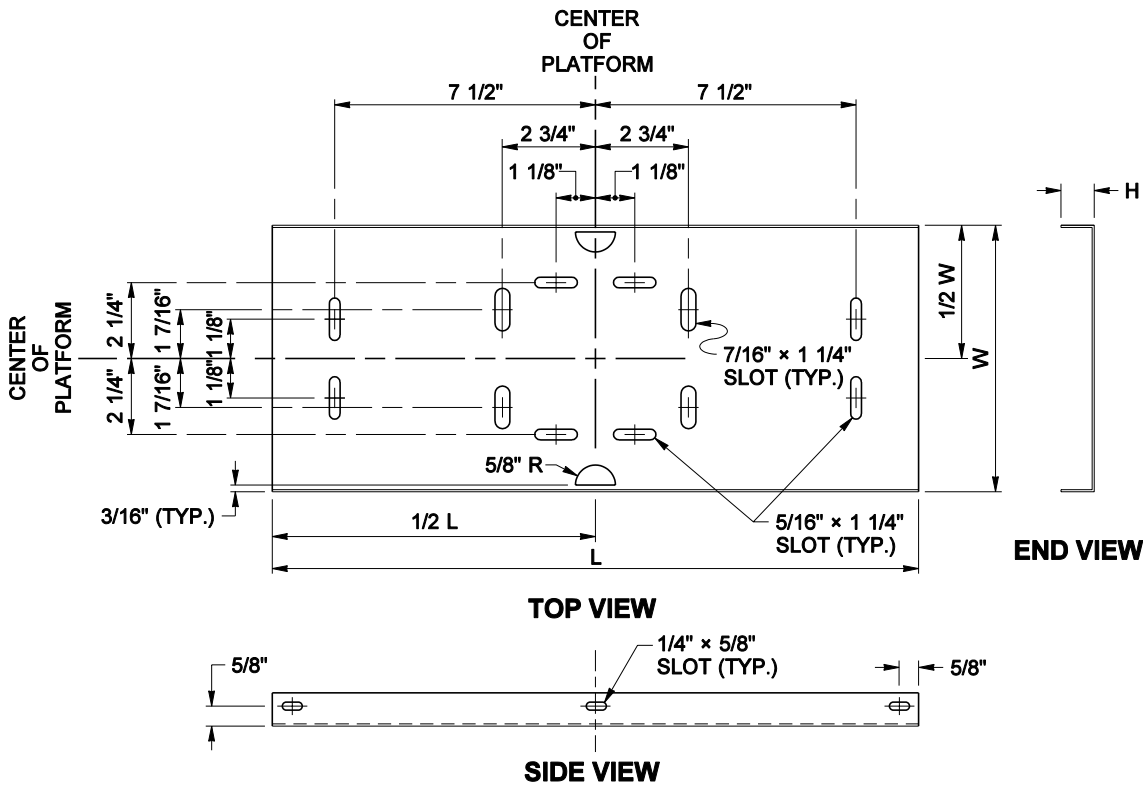


BRACKET DETAIL



ANTI-TWIST PLATE DETAIL

MAILBOX & PLATFORM DIMENSIONS						
SIZE	MAILBOX DIMENSIONS			PLATFORM DIMENSIONS		
	L	W	H	L	W	H
1	19"	6 1/2"	8 1/2"	17"	6"	1"
1A	21"	8"	10 1/2"	19"	7 1/2"	1"
2	24"	11 1/2"	13 1/2"	21"	11"	1"



PLATFORM DETAIL

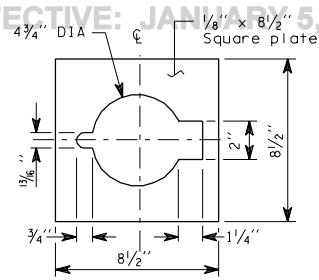


EXPIRES MAY 16, 2003

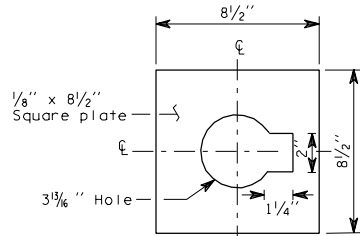
**MAILBOX
INSTALLATION
TYPE 1 & TYPE 2
STANDARD PLAN H-12**

SHEET 3 OF 3 SHEETS

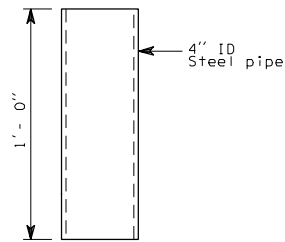
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Harold J. Peterfeso		05-09-02		DATE
STATE DESIGN ENGINEER		Washington State Department of Transportation		BY
04/2002	REVISED PLACEMENT DETAIL	MAS		
DATE	REVISION	BY		



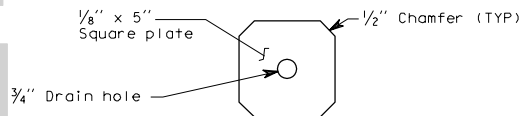
COVER PLATE



TOP PLATE

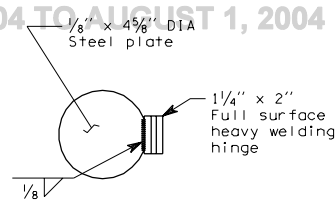


PIPE SLEEVE

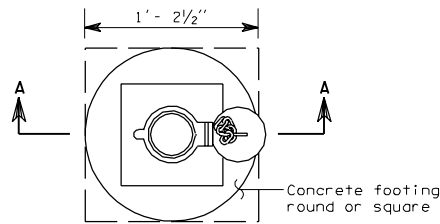


BASE PLATE

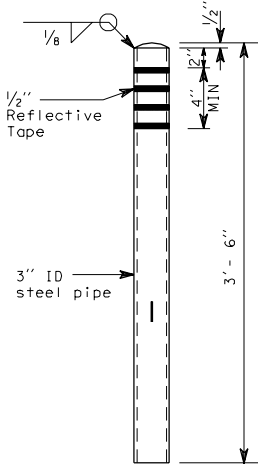
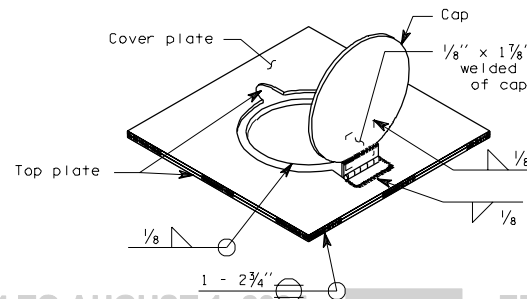
BASE ASSEMBLY



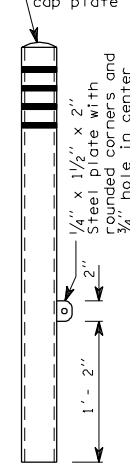
CAP AND HINGE

Direction of
Pedestrian/
Bicycle Traffic

PLAN

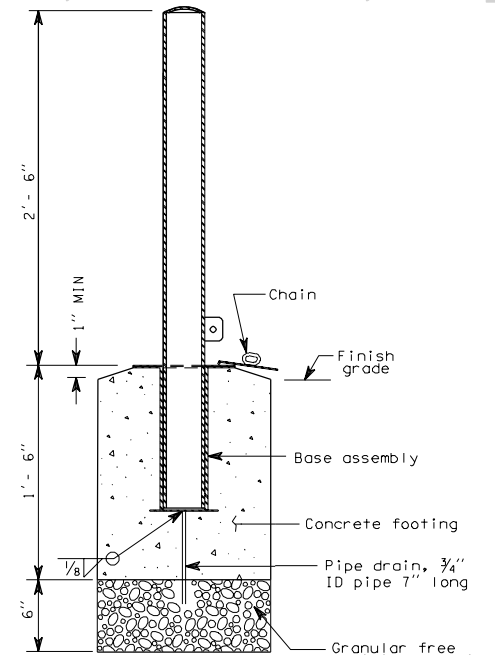


FRONT VIEW

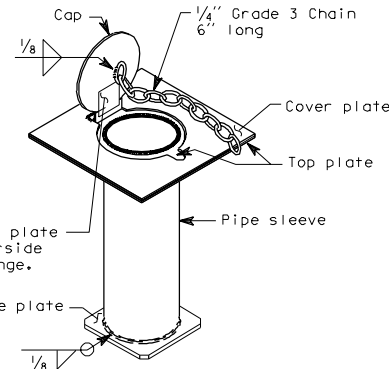


SIDE VIEW

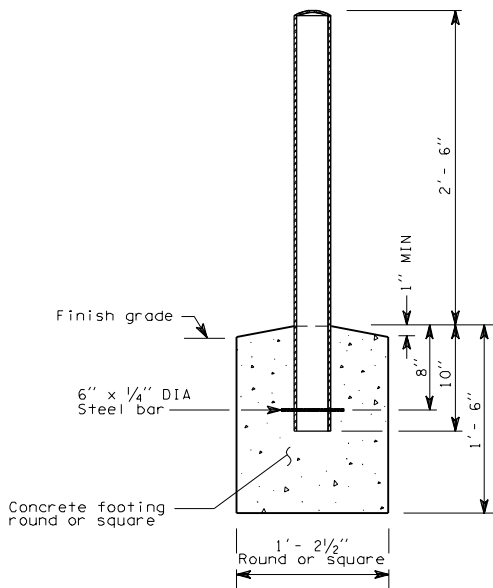
POST



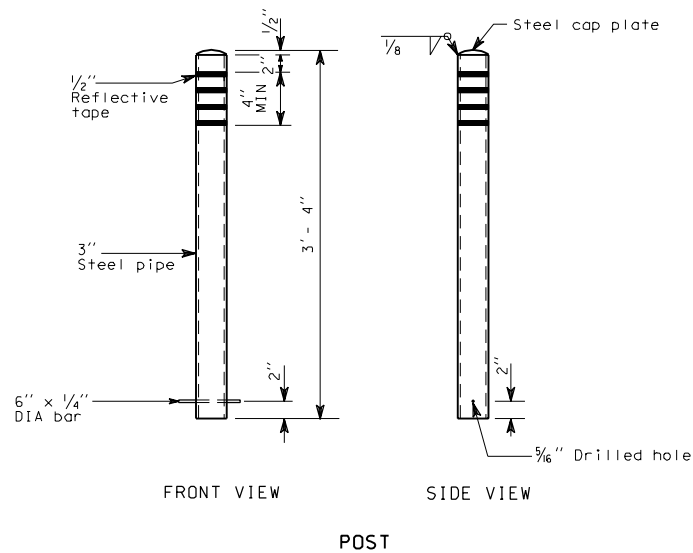
SECTION A - A



TYPE 1 BOLLARD



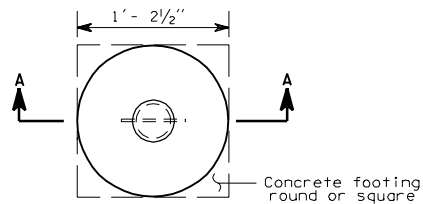
SECTION A-A



FRONT VIEW

SIDE VIEW

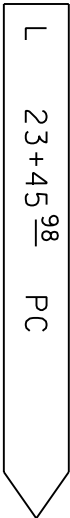
POST



PLAN

TYPE 2 BOLLARD

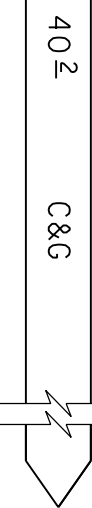
Line designation
Line stationing
Hundred foot increments
Control point



ALIGNMENT STAKE

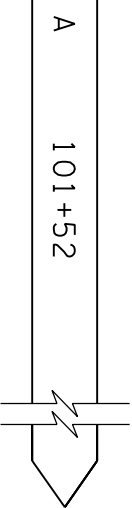
Stake every 100 feet on tangents,
every 25 feet on curves

Distance from \mathcal{C}
(40.2 feet)



FRONT

Line designation
Line stationing
Hundred foot increments



BACK

CLEARING/GRUBBING LATH

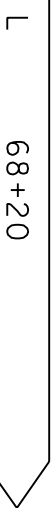
Stake at each full station,
100 feet on tangents,
every 25 feet on curves.
No hub necessary.

Cut to back of
ditch (2.2 feet)
Distance from \mathcal{C}
to catch (back of
ditch) (25.68 feet)
Side Slope Ratio
(4:1)
Back of Ditch



FRONT

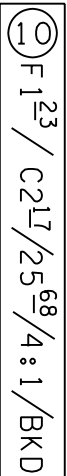
Line designation
Line stationing
Hundred foot increments



BACK

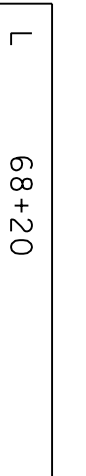
SLOPE STAKE

Offset from
slope stake
catch (10 feet)
Fill at RP stake
(1.23 feet)
Cut at Catch Point
(Back of Ditch)
Distance from \mathcal{C}
to Catch Point
Side Slope Ratio
(4:1)
Back of Ditch



FRONT

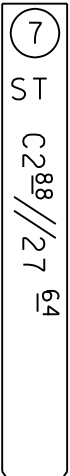
Line designation
Line stationing
Hundred foot increments



BACK

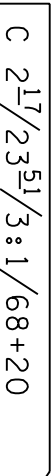
SLOPE LATH REFERENCES

Offset from
slope stake
catch (7 feet)
Cut at ST
Stake (2.88 feet)
Distance from \mathcal{C}
(27.64 feet)



FRONT

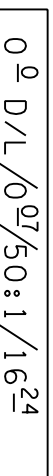
Cut at catch point
(2.17 feet)
Distance from \mathcal{C}
to catch (back of
ditch) (23.51 feet)
Side Slope Ratio
(3:1)
Line stationing
Hundred foot increments



BACK

SLOPE TREATMENT (ST) STAKES
FOR CUT SECTIONS

Daylight catch
(cut 0.0 feet)
Fill (0.07 feet)
Side slope to
a 2% roadway
slope (50:1)
Distance from \mathcal{C}
(16.24 feet)



DAYLIGHT STAKE



EXPIRES MAY 3, 2000

SURVEY STAKES

STANDARD PLAN H-14

SHEET 1 OF 2 SHEETS

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Clifford E. Mansfield

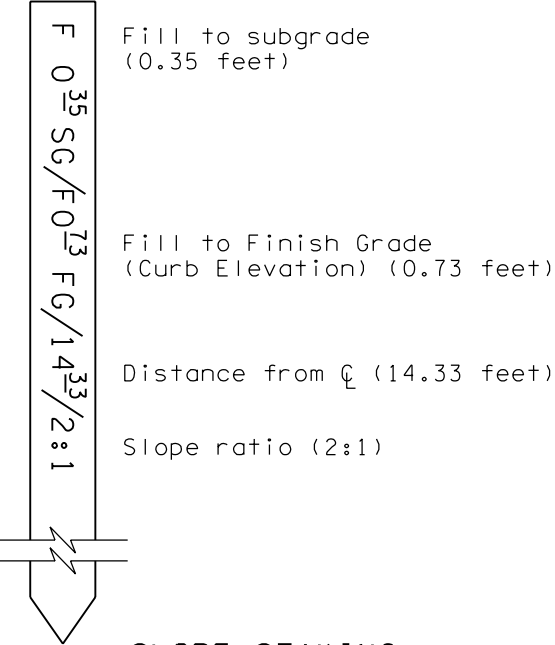
04/23/99

DEPUTY STATE DESIGN ENGINEER

DATE

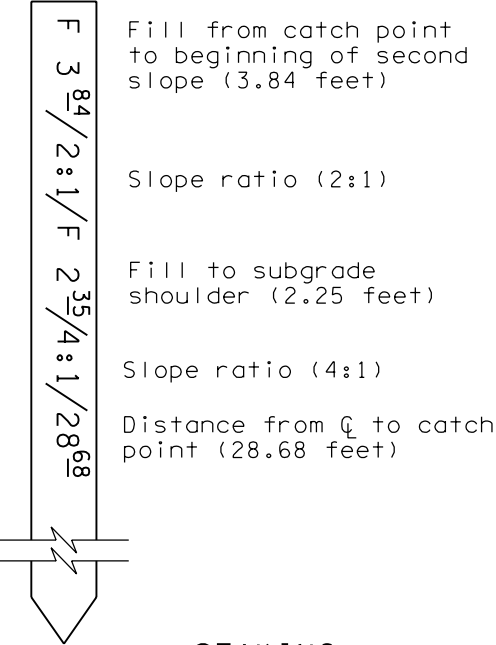


WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON



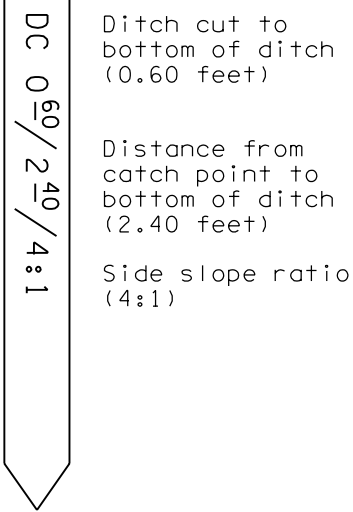
SLOPE STAKING CURB SECTION

Use lath instead of stake

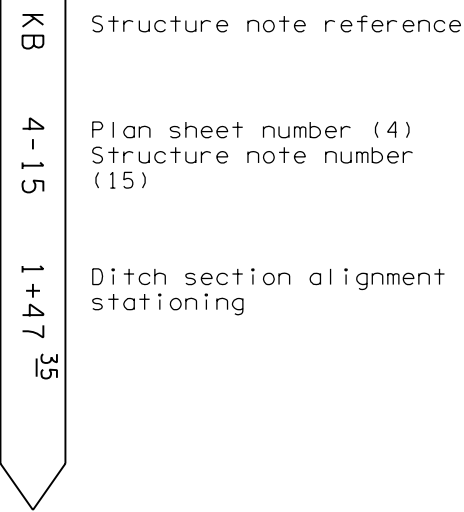


STAKING COMPOUND SLOPES

Use lath instead of stake

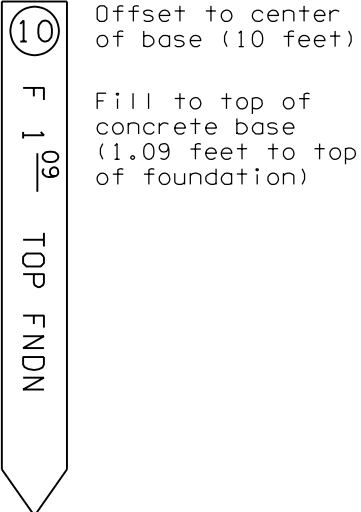


FRONT

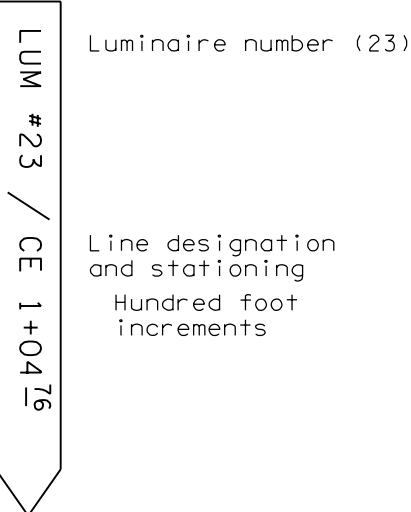


BACK

STAKES FOR DITCH CONSTRUCTION

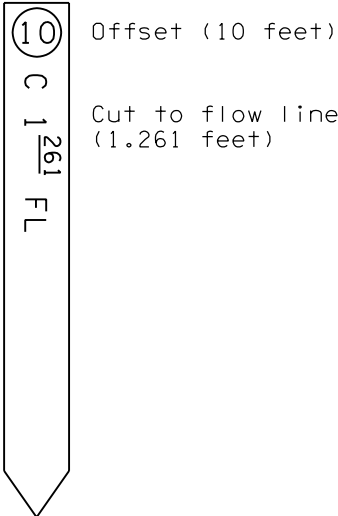


FRONT

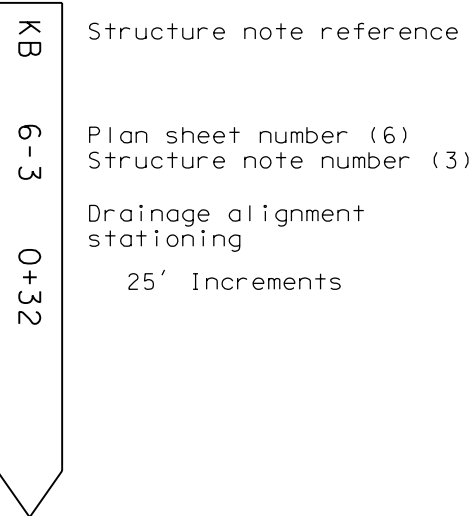


BACK

STAKING FOUNDATION FOR LUMINAIRES, SIGNALS OR SIGN STRUCTURES

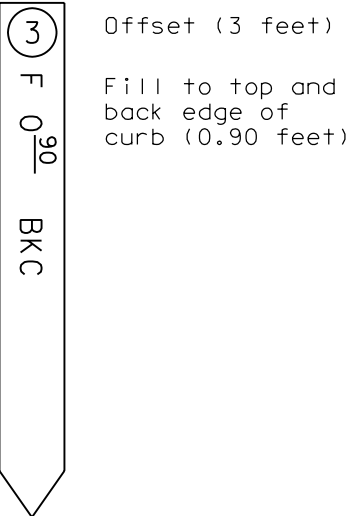


FRONT

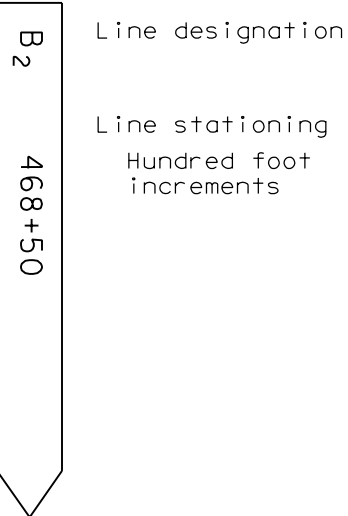


BACK

STAKES FOR DRAINAGE



FRONT



BACK

STAKES FOR CURB/GUTTER



EXPIRES MAY 3, 2000

SURVEY STAKES

STANDARD PLAN H-14

SHEET 2 OF 2 SHEETS

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04/23/99

DEPUTY STATE DESIGN ENGINEER

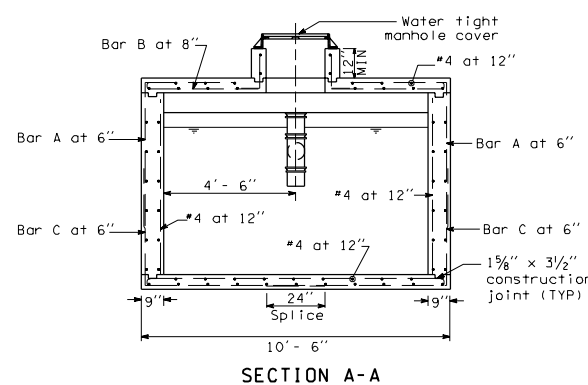
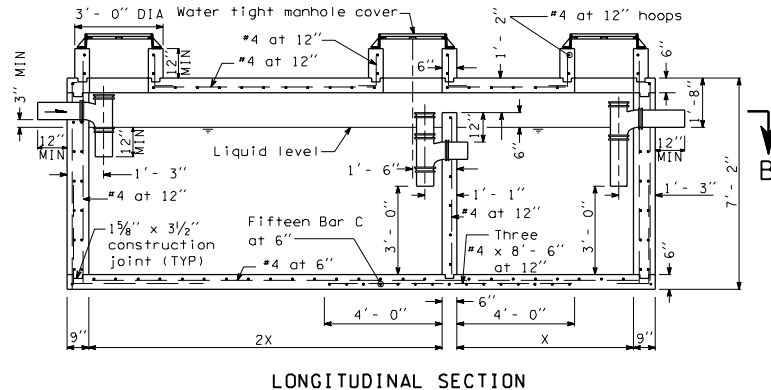
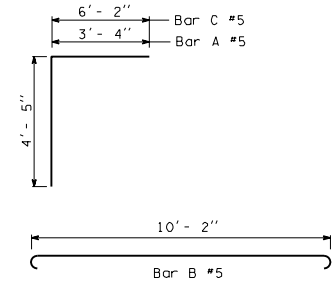
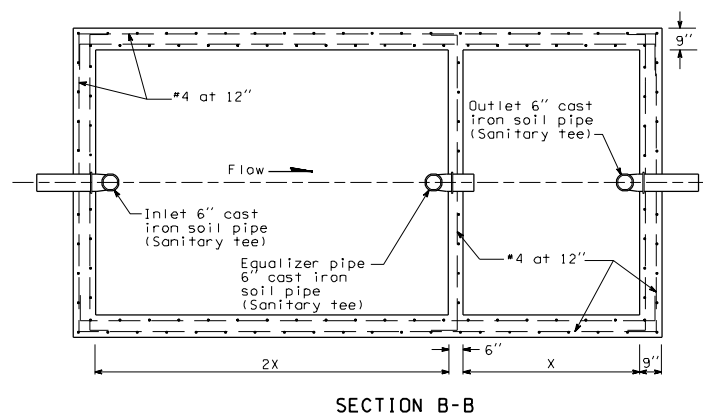
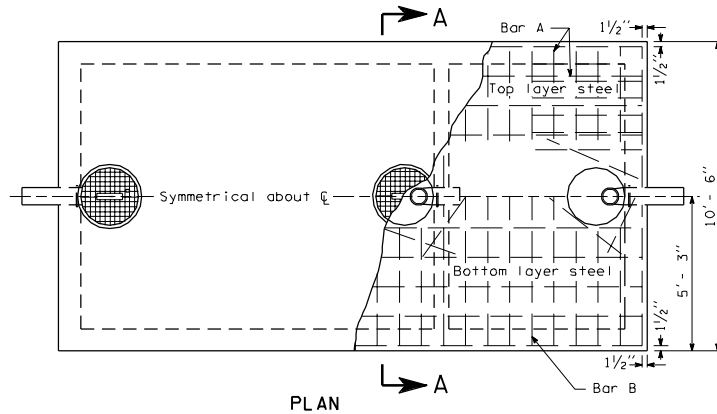
DATE



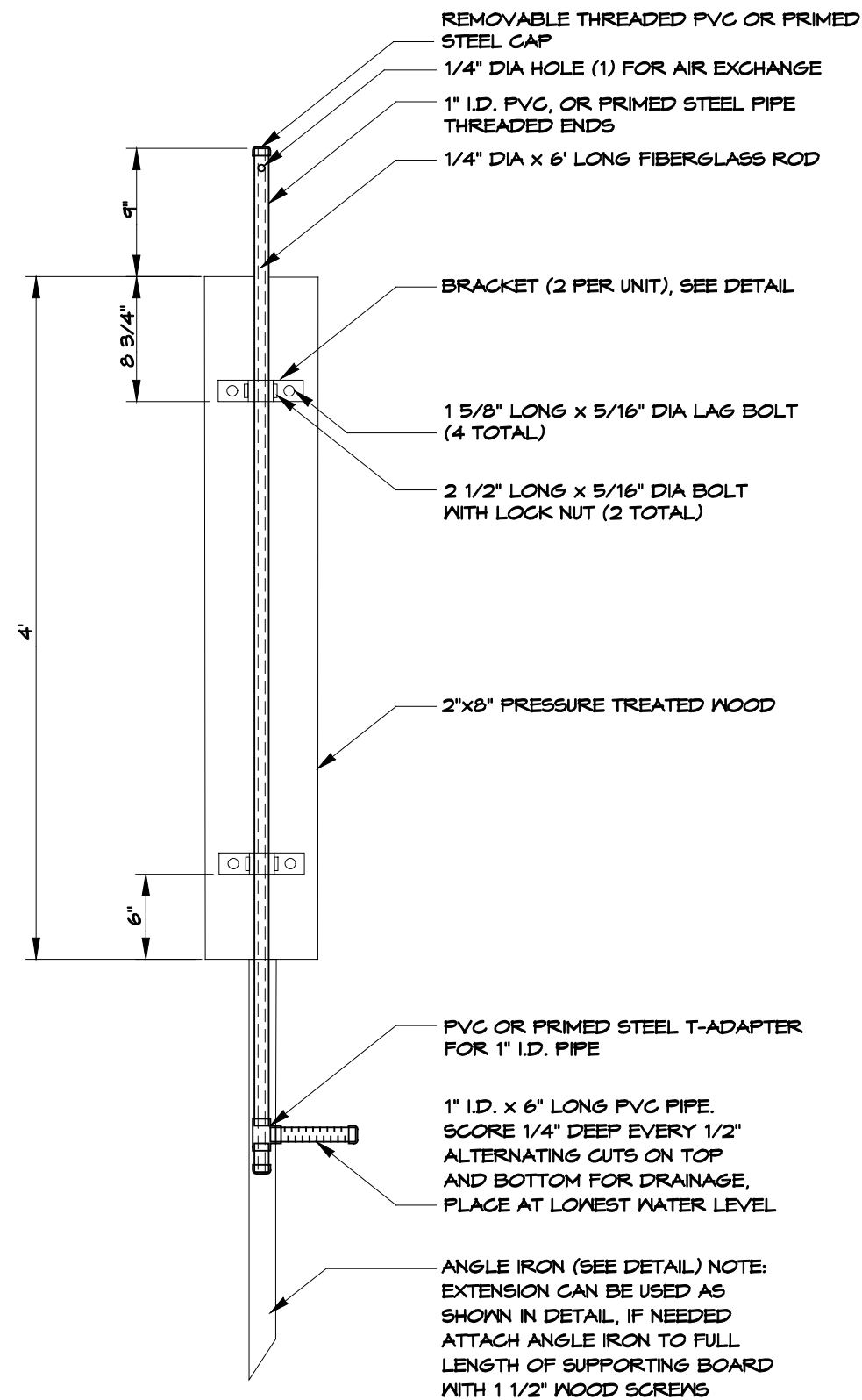
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

APPROXIMATE QUANTITIES				
Tank Capacity	Length (X)	Concrete	Steel Reinf. Bars	Cast Iron Soil Pipe & Fitting
Gal.	Ft.	C.Y.	Lbs.	Lbs.
6000	6	23	3800	471
8000	8	28	4600	471
10000	10	32	5400	471
12000	12	37	6300	471
14000	14	42	7100	471

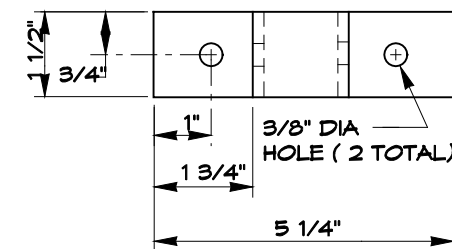
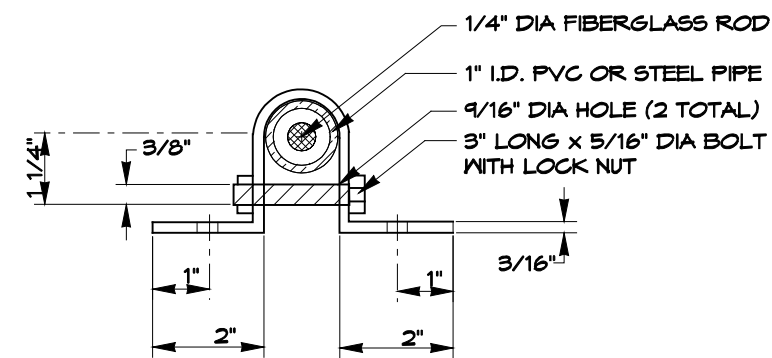
- NOTES:
1. Approval of local health department is required before work is started.
 2. Excavated material shall be disposed of as directed by the Engineer.
 3. All work shall be left open until inspected and approved by the Health Officer and the Engineer.
 4. All grades shall be checked and approved by the Engineer.
 5. Water tight manhole covers shall be approved by the Engineer prior to installation.
 6. Precast septic tanks are acceptable, subject to the approval of the Engineer. Materials shall meet or exceed those shown.
 7. Plan dimensions may vary as site conditions and system design permit.
 8. All concrete shall be Class 4000.
 9. Reinforcing steel shall be Grade 300 or Grade 400.



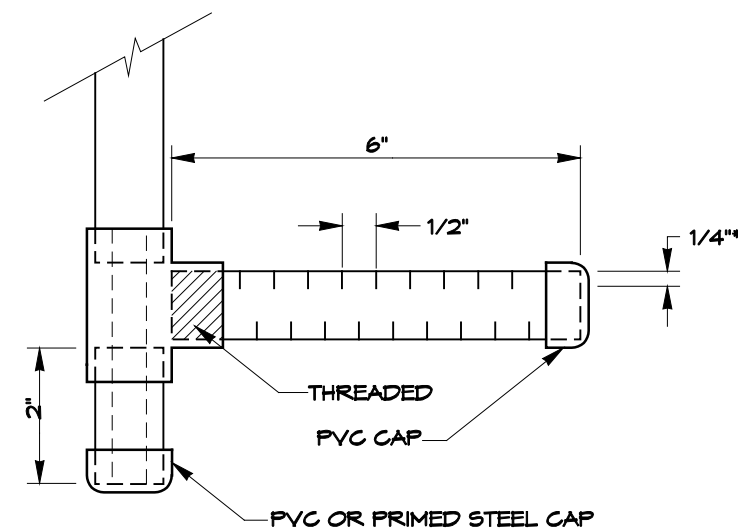
REST AREA SEPTIC TANK



CREST GAGE
NOT TO SCALE

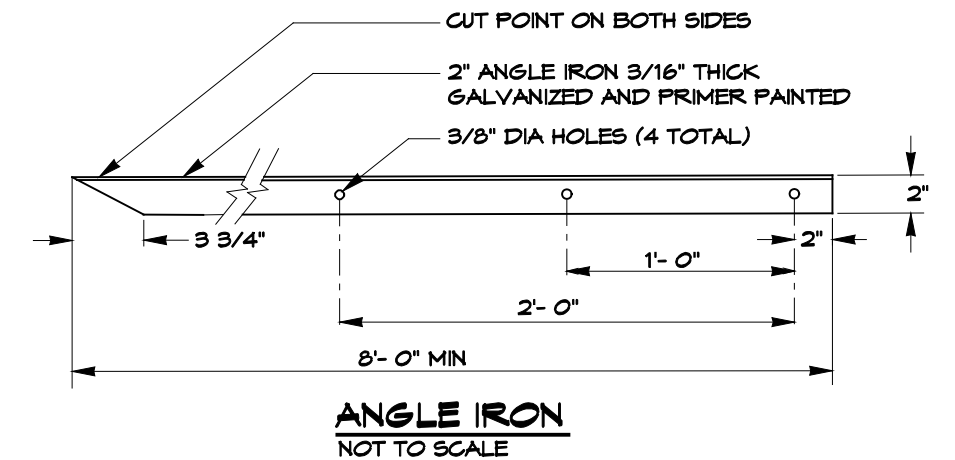


BRACKET (2 PER UNIT)
NOT TO SCALE

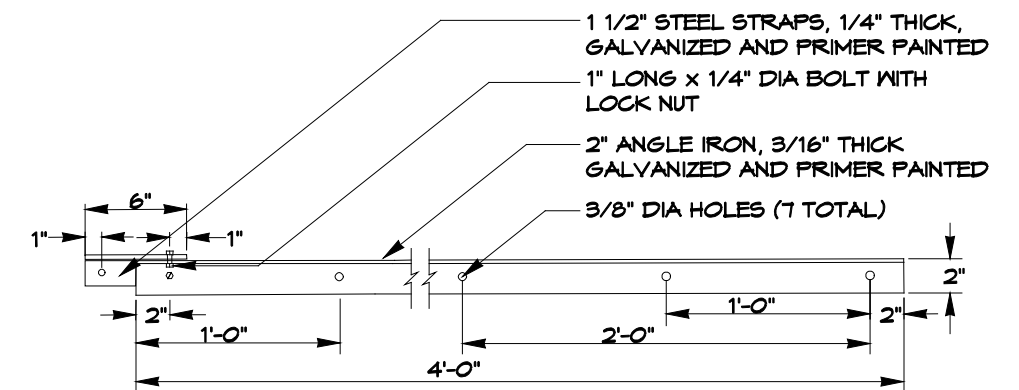


* REFERS TO DRAINAGE CUTS ON TOP AND BOTTOM OF PIPE

WATER INTAKE & CLEAN-OUT ASSEMBLY
NOT TO SCALE



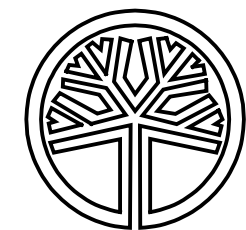
ANGLE IRON
NOT TO SCALE



ANGLE IRON EXTENSION
NOT TO SCALE

NOTE: POUR IN APPROXIMATELY 1 TABLESPOON OF CORK DUST AT INSTALLATION AND AFTER EACH READING

NOTE: GAGE ASSEMBLY BACKING BOARD, PIPE, ROD, AND ANGLE IRON CAN BE EXTENDED AS NEEDED TO FIT SITE REQUIREMENTS.



STATE OF
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CERTIFICATE NO. 000598

CREST GAGE

STANDARD PLAN I-2

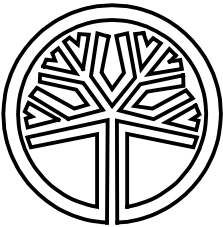
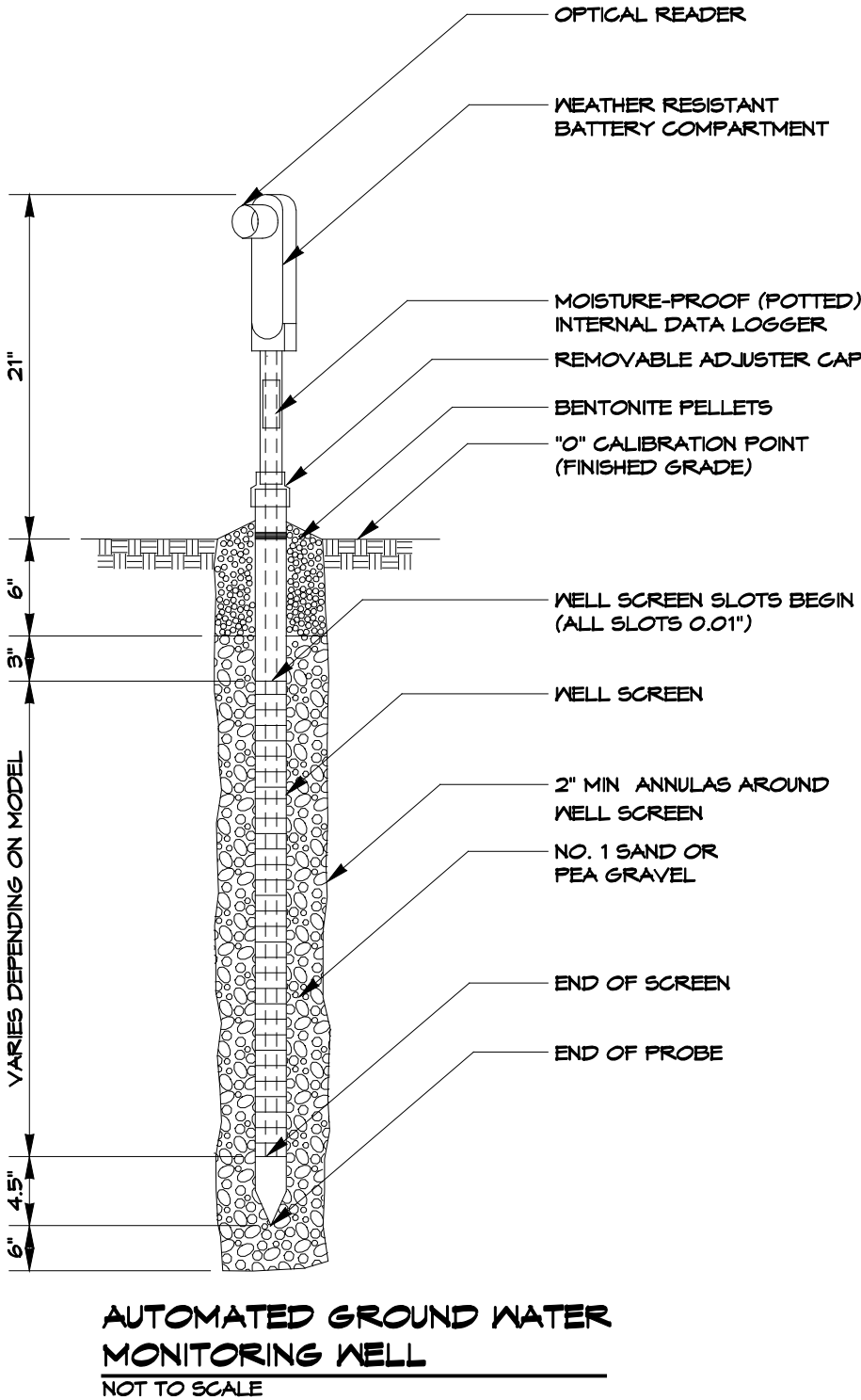
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Clifford E. Mansfield 04-23-99



DEPUTY STATE DESIGN ENGINEER DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON



STATE OF
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REGISTERED
LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

**AUTOMATED GROUND
WATER MONITORING WELL**

STANDARD PLAN I-3

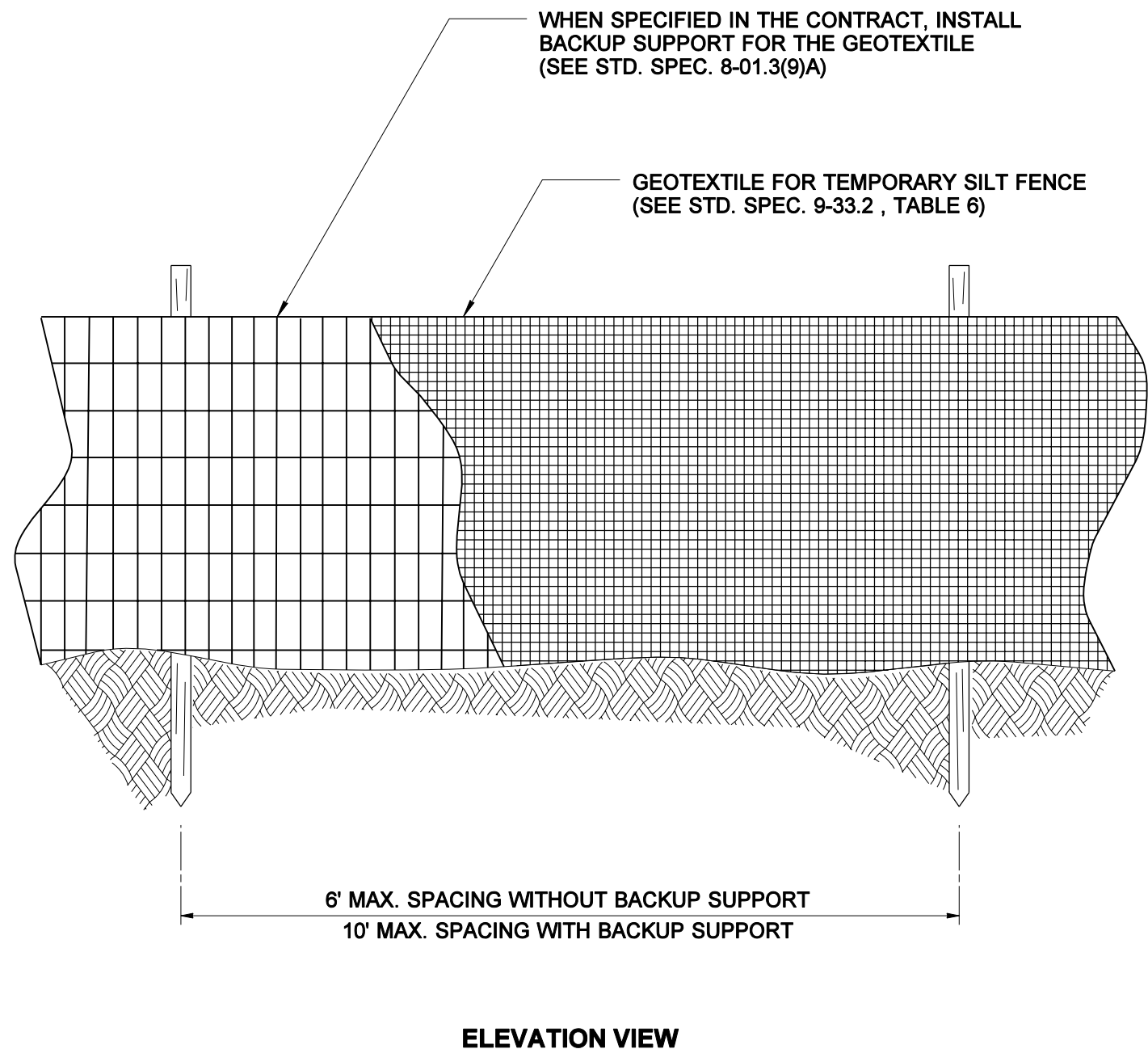
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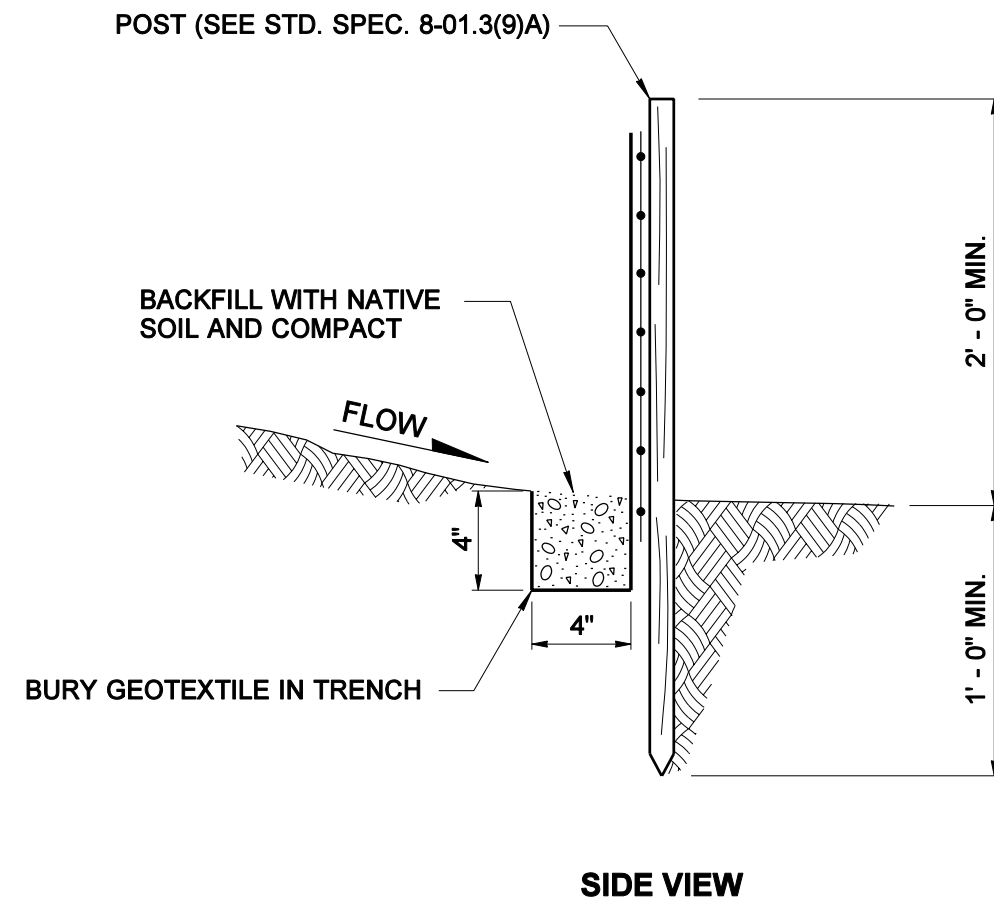
Clifford E. Mansfield 08-20-99



DEPUTY STATE DESIGN ENGINEER DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

**NOTES**

1. MAXIMIZE DETENTION OF STORMWATER BY PLACING FENCE AS FAR AWAY FROM THE TOE OF SLOPE AS POSSIBLE WITHOUT ENCROACHING ON SENSITIVE AREAS OR OUTSIDE OF THE CLEARING BOUNDARIES.
2. INSTALL SILT FENCING ALONG CONTOURS WHENEVER POSSIBLE.
3. INSTALL THE ENDS OF THE SILT FENCE TO POINT SLIGHTLY UP-SLOPE TO PREVENT SEDIMENT FROM FLOWING AROUND THE ENDS OF THE FENCE.
4. PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATIONS 8-01.3(9)A AND 8-01.3(15).



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SILT FENCE**STANDARD PLAN I-4**

SHEET 1 OF 1 SHEET

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Harold J. Peterfeso 07-17-03

STATE DESIGN ENGINEER

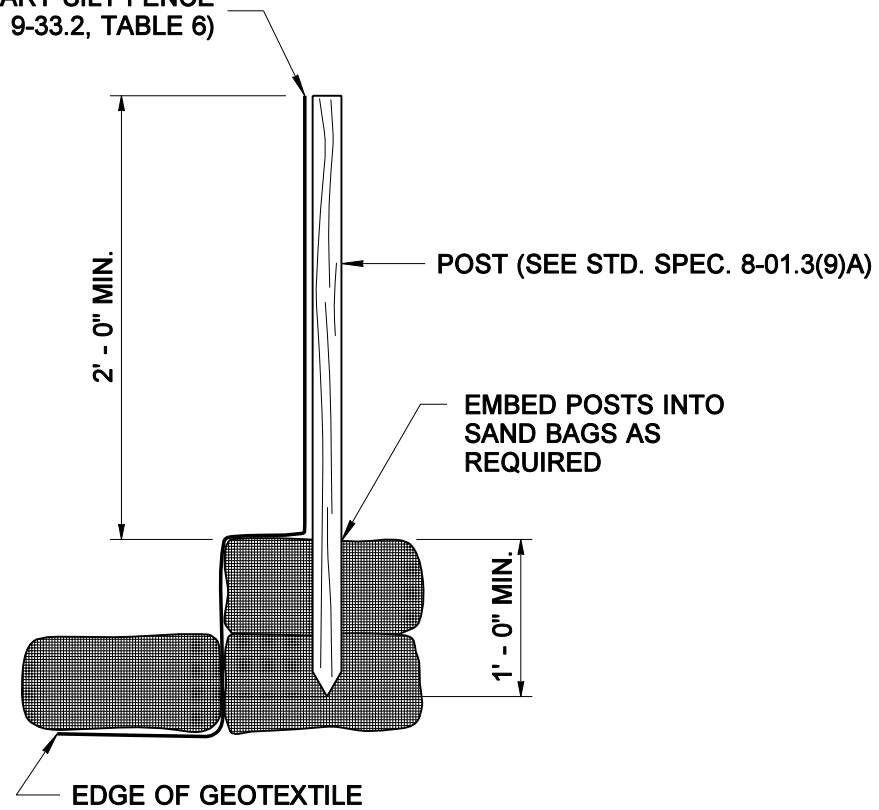
DATE



Washington State Department of Transportation

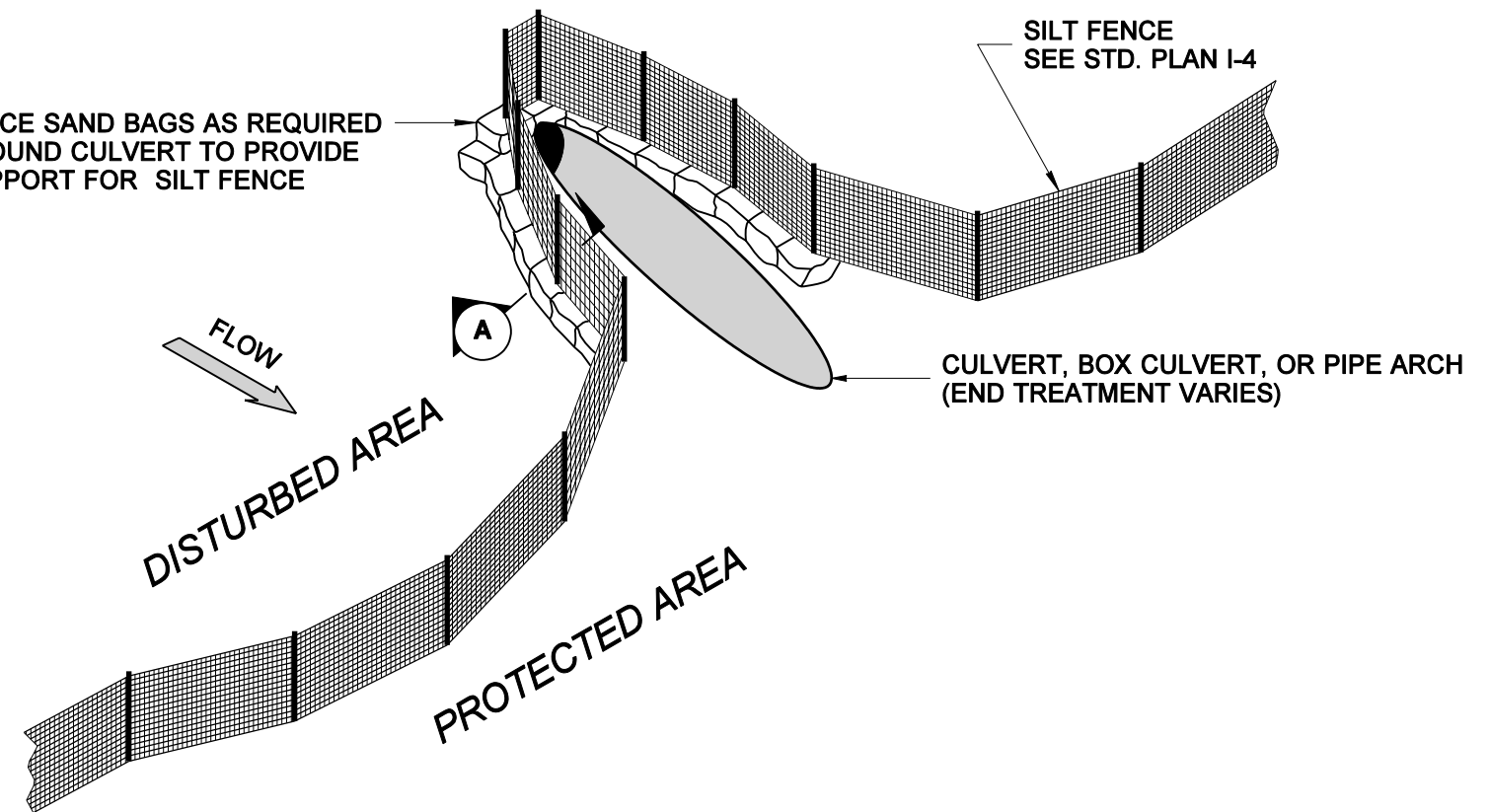
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GEOTEXTILE FOR TEMPORARY SILT FENCE
(SEE STD. SPEC. 9-33.2, TABLE 6)



SECTION A

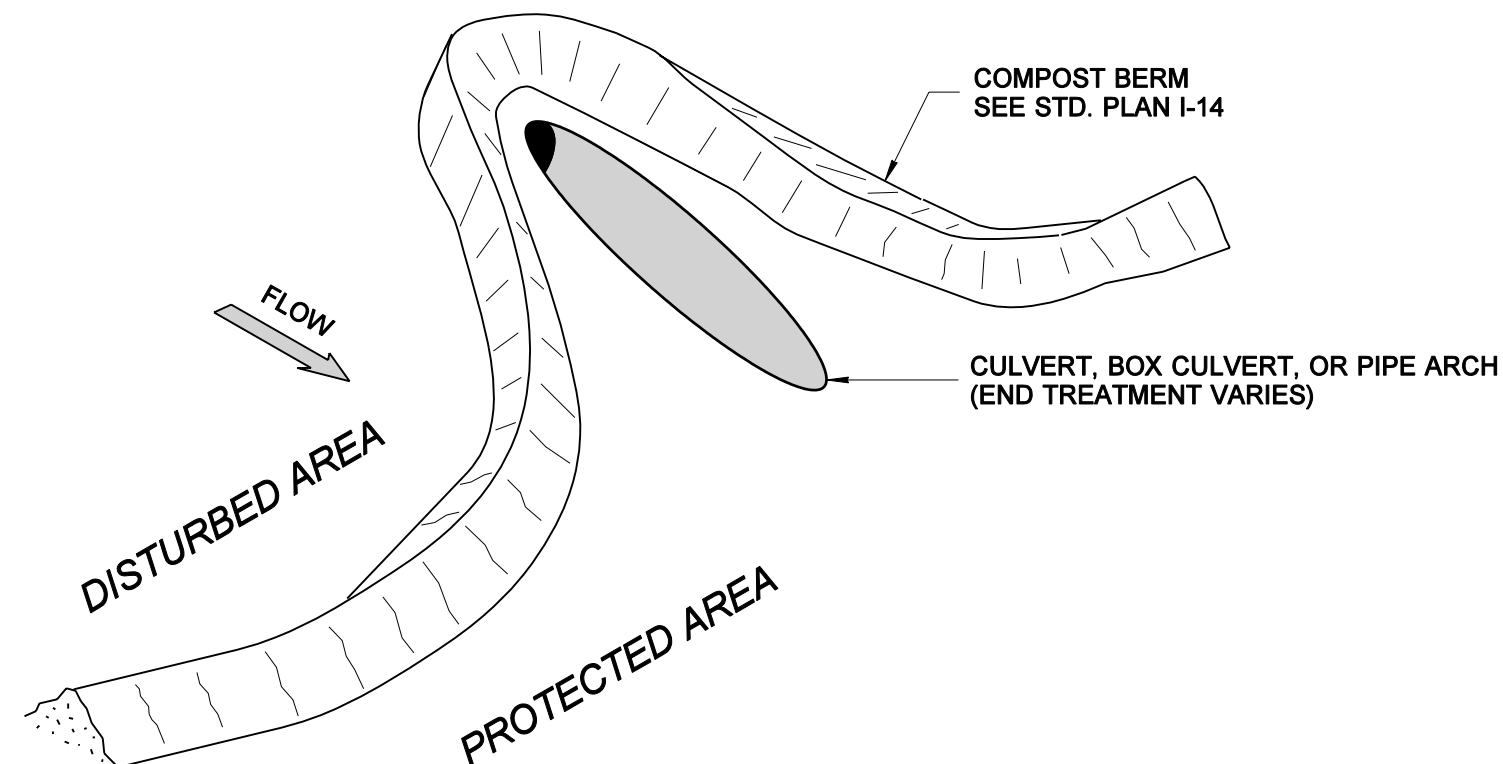
PLACE SAND BAGS AS REQUIRED
AROUND CULVERT TO PROVIDE
SUPPORT FOR SILT FENCE



SILT FENCE DESIGN

NOTE

PERFORM MAINTENANCE IN ACCORDANCE
WITH STANDARD SPECIFICATIONS
8-01.3(9)A AND 8-01.3(15).



COMPOST BERM DESIGN



STATE OF
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CERTIFICATE NO. 000598

**EROSION CONTROL
AT CULVERT ENDS**

STANDARD PLAN I-5

SHEET 1 OF 1 SHEET

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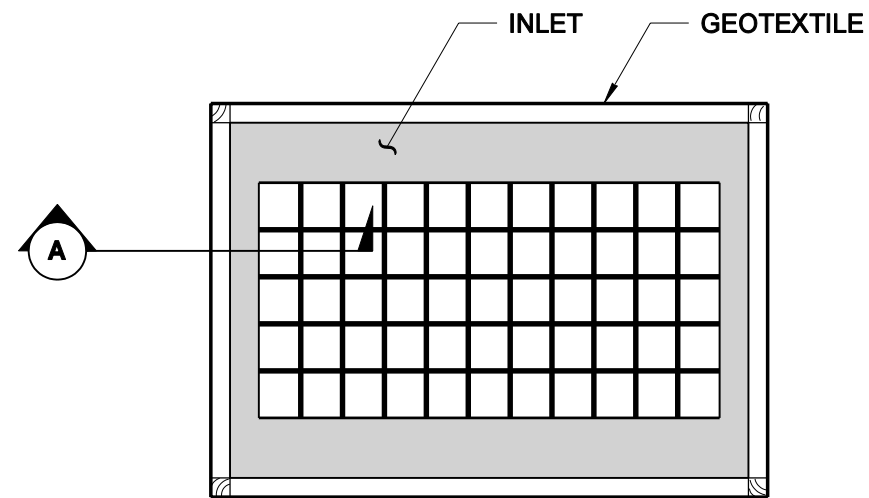
STATE DESIGN ENGINEER

DATE

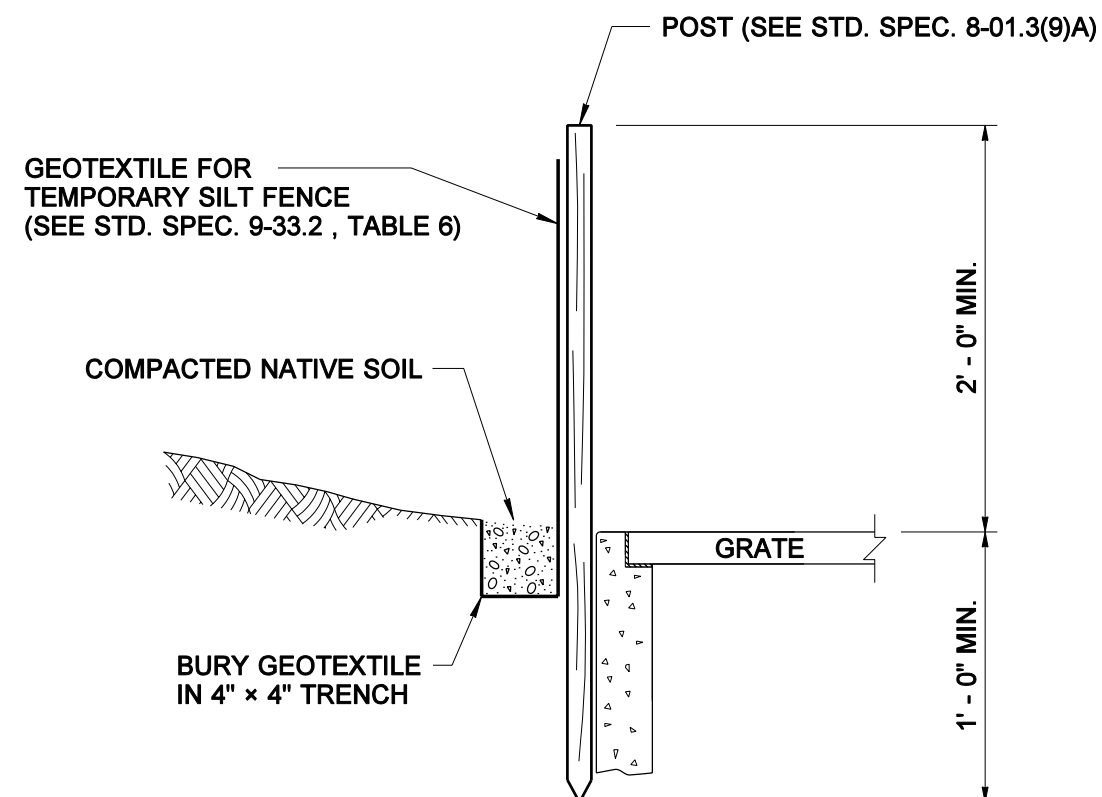


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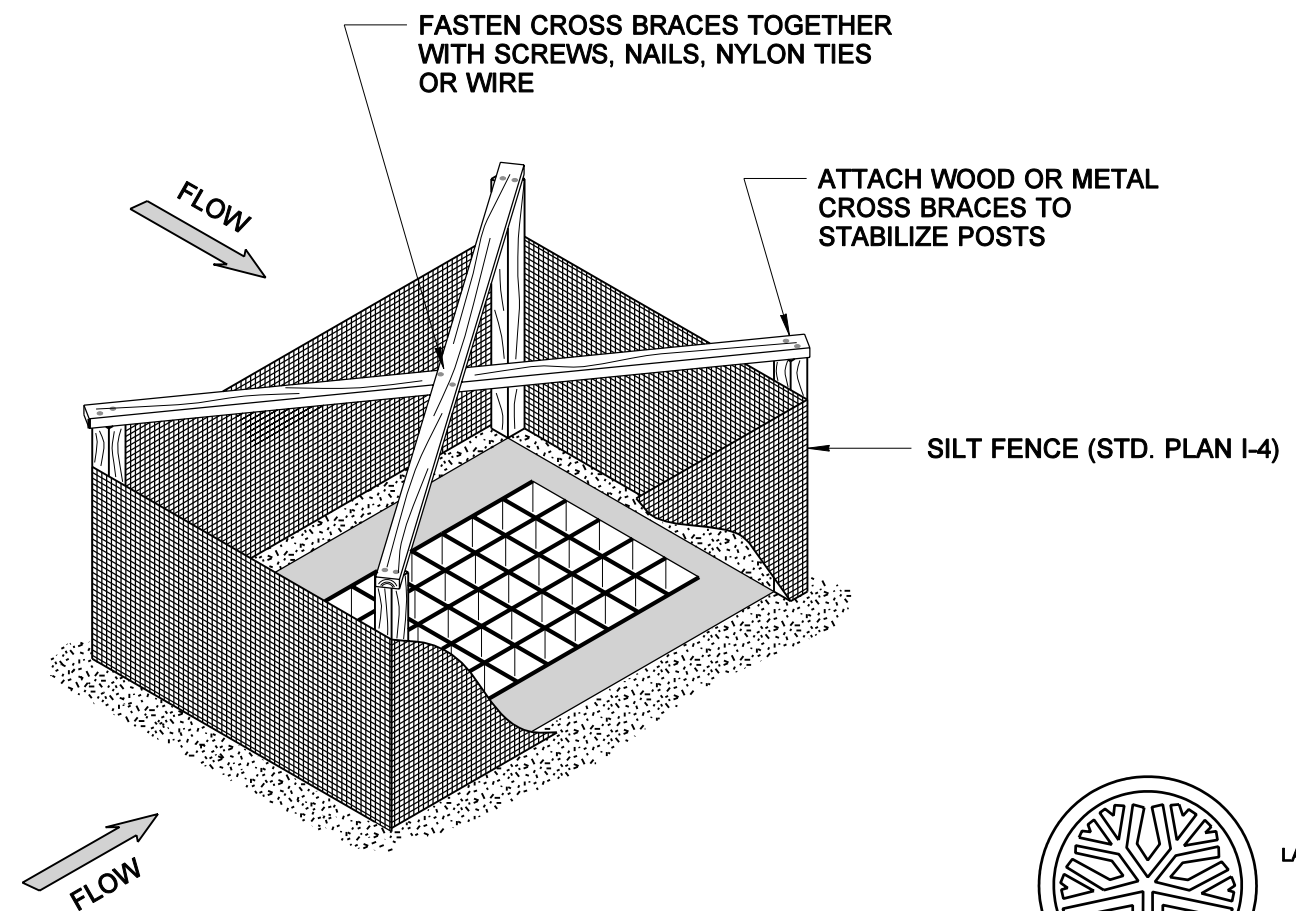
PLAN VIEW
(CROSS BRACES NOT SHOWN)



SECTION A

NOTES

1. PREFABRICATED UNITS MAY BE USED IN LIEU OF THE DESIGN SHOWN ON THIS PLAN UPON APPROVAL OF THE ENGINEER.
2. STRUCTURE SHALL BE CONSTRUCTED SUCH THAT GEOTEXTILE MATERIAL SHALL BE FASTENED TO POSTS CREATING A SEAMLESS JOINT.
3. ENSURE THAT PONDING HEIGHT OF WATER DOES NOT CAUSE FLOODING ON ADJACENT ROADWAYS OR PRIVATE PROPERTY.
4. PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATION 8-01.3(15).



ISOMETRIC VIEW
(ENTIRE FENCE NOT SHOWN FOR ILLUSTRATIVE PURPOSES)



STATE OF
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REGISTERED
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MARK W. MAURER
CERTIFICATE NO. 000598

TEMPORARY SILT FENCE FOR INLET PROTECTION IN UNPAVED AREAS STANDARD PLAN I-6

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 07-17-03

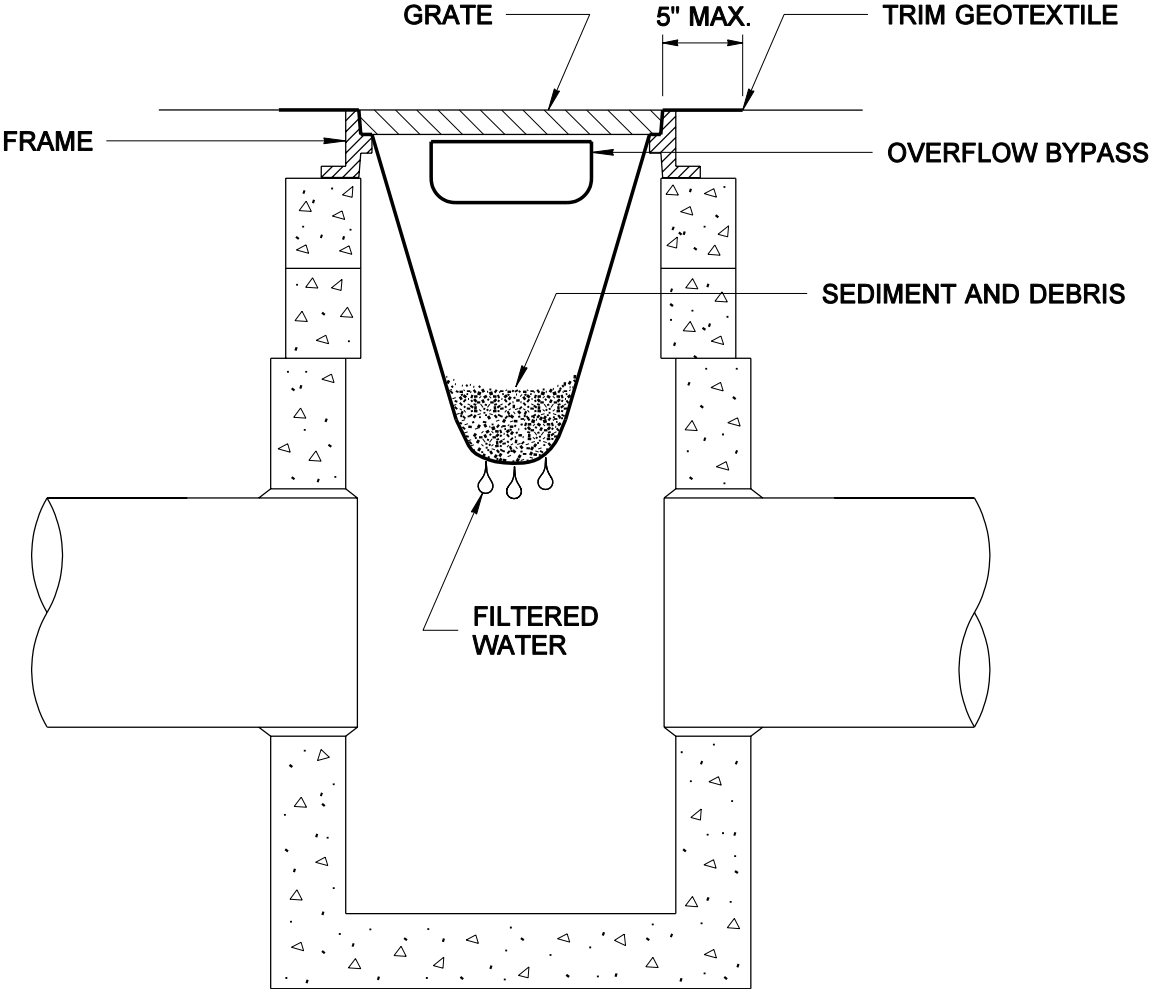
STATE DESIGN ENGINEER

DATE

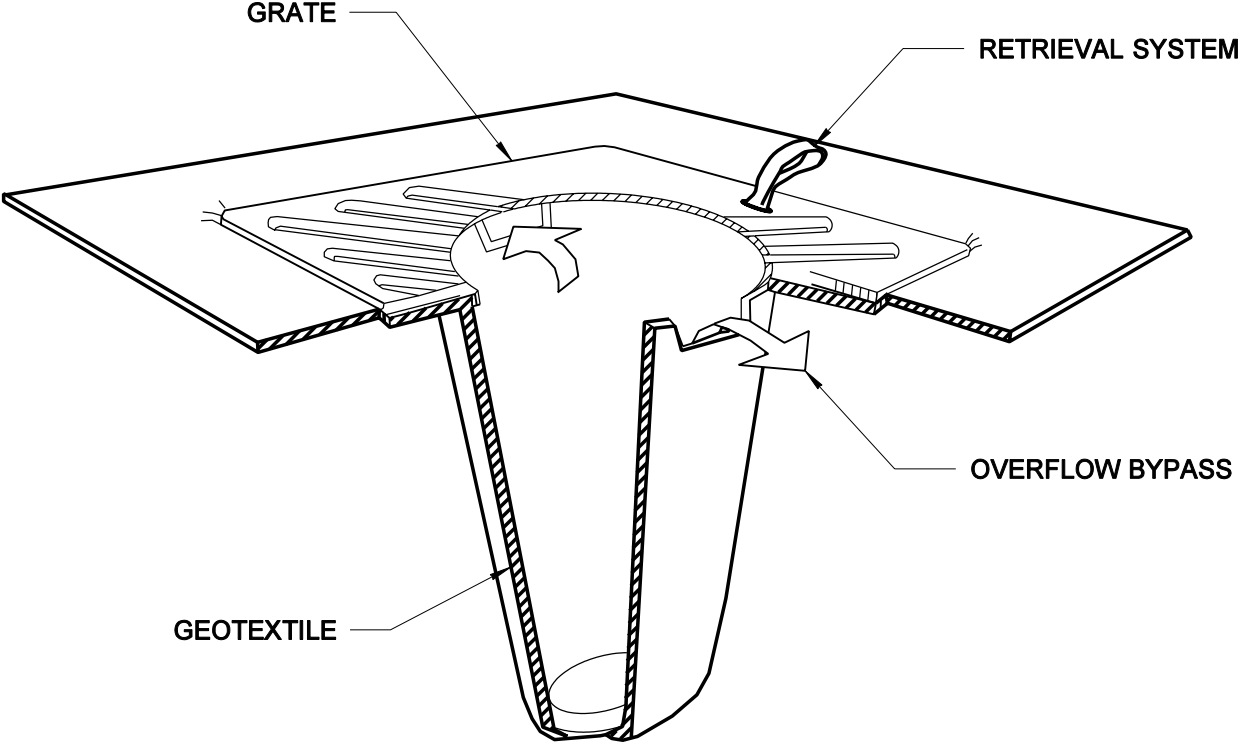


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CROSS SECTION
NOT TO SCALE



ISOMETRIC VIEW
NOT TO SCALE

PREFABRICATED BELOW GRATE
INLET DEVICE DETAILS

NOTES

1. PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATION 8-01.3(15).
2. SIZE THE BELOW GRATE INLET DEVICE (BGID) FOR THE STORM WATER STRUCTURE IT WILL SERVICE.
3. THE BGID SHALL HAVE A BUILT-IN HIGH-FLOW RELIEF SYSTEM (OVERFLOW BYPASS).
4. THE RETRIEVAL SYSTEM MUST ALLOW REMOVAL OF THE BGID WITHOUT SPILLING THE COLLECTED MATERIAL.



STATE OF
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CERTIFICATE NO. 000598

STORM DRAIN
INLET PROTECTION
STANDARD PLAN I-7

SHEET 1 OF 1 SHEET

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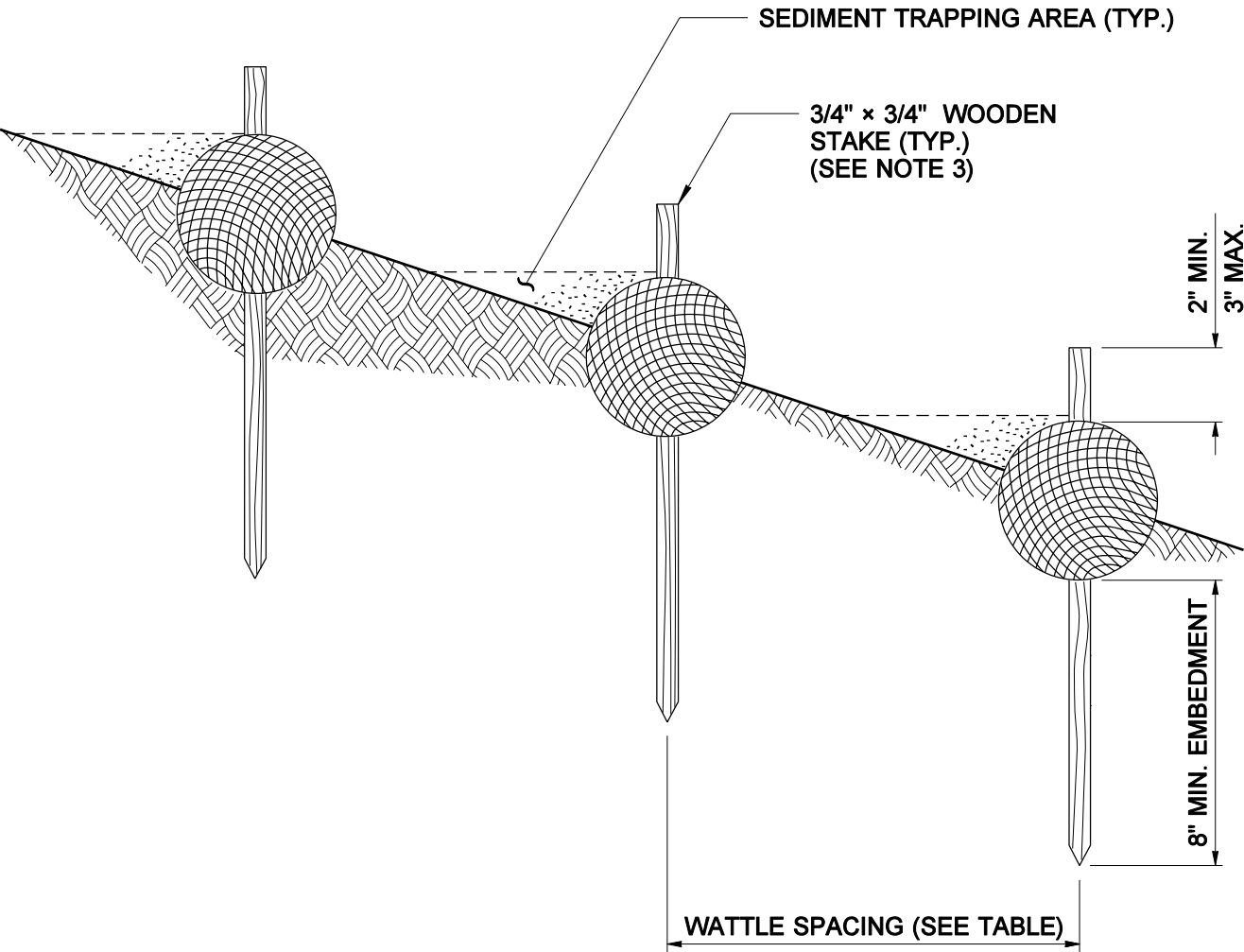
STATE DESIGN ENGINEER DATE



Washington State Department of Transportation

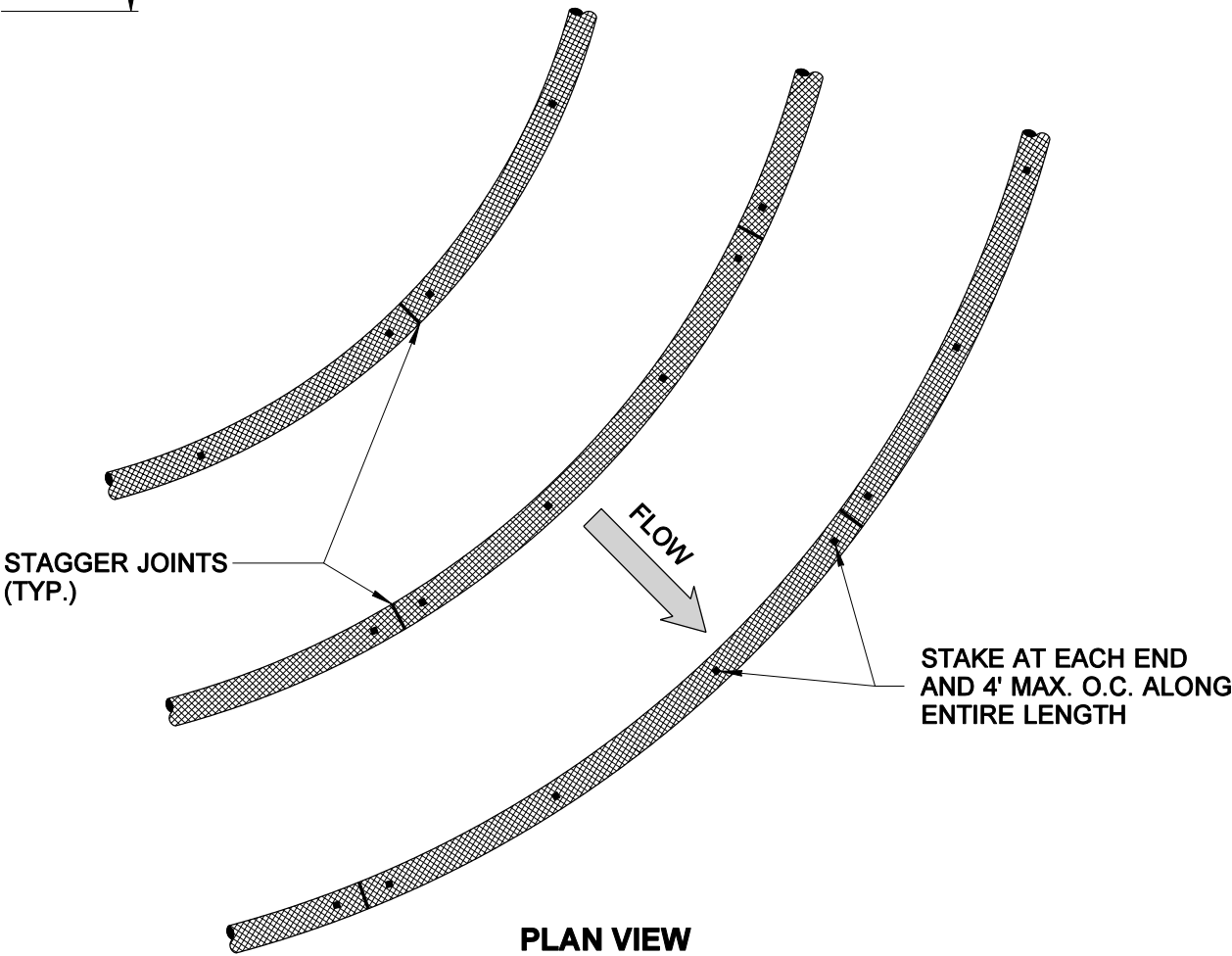
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ELEVATION VIEW

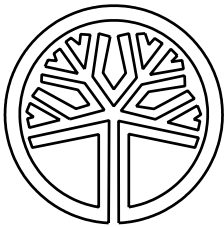
WATTLE SPACING TABLE	
SLOPE	MAXIMUM SPACING
1:1	10 FEET
2:1	20 FEET
3:1	30 FEET
4:1	40 FEET



PLAN VIEW

NOTES

- 1. INSTALL WATTLES ALONG CONTOURS (SEE STANDARD SPECIFICATION 8-01.3(10)).
- 2. WATTLES SHALL BE INSPECTED REGULARLY, AND IMMEDIATELY AFTER A RUNOFF PRODUCING RAINFALL, TO ENSURE THEY REMAIN THOROUGHLY ENTRENCHED AND IN CONTACT WITH THE SOIL.
- 3. LIVE STAKES MAY BE USED FOR PERMANENT INSTALLATIONS.
- 4. PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATION 8-01.3(15).
- 5. INSTALL WATTLES SNUGLY INTO THE TRENCH. ABUT ADJACENT WATTLES TIGHTLY, END TO END, WITHOUT OVERLAPPING THE ENDS.
- 6. PILOT HOLES MAY BE DRIVEN THROUGH THE WATTLE AND INTO THE SOIL, WHEN SOIL CONDITIONS REQUIRE.



STATE OF
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LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

WATTLE INSTALLATION
ON SLOPE

STANDARD PLAN I-8

SHEET 1 OF 1 SHEET

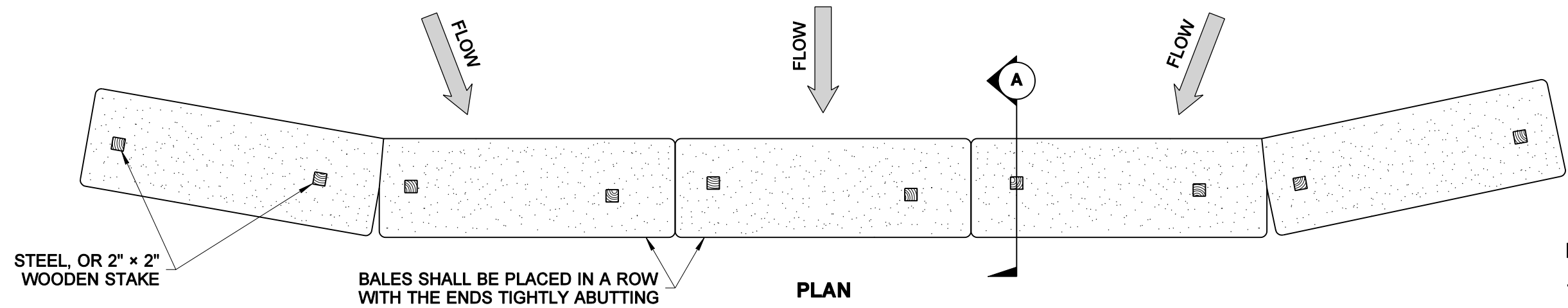
APPROVED FOR PUBLICATION

Harold J. Peterfeso 07-17-03

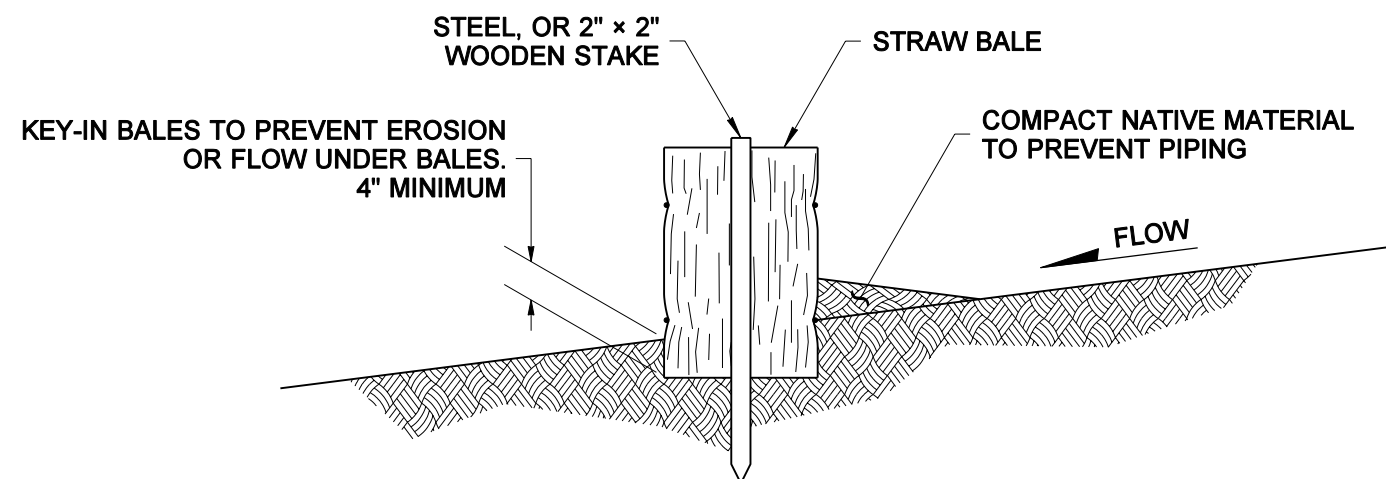
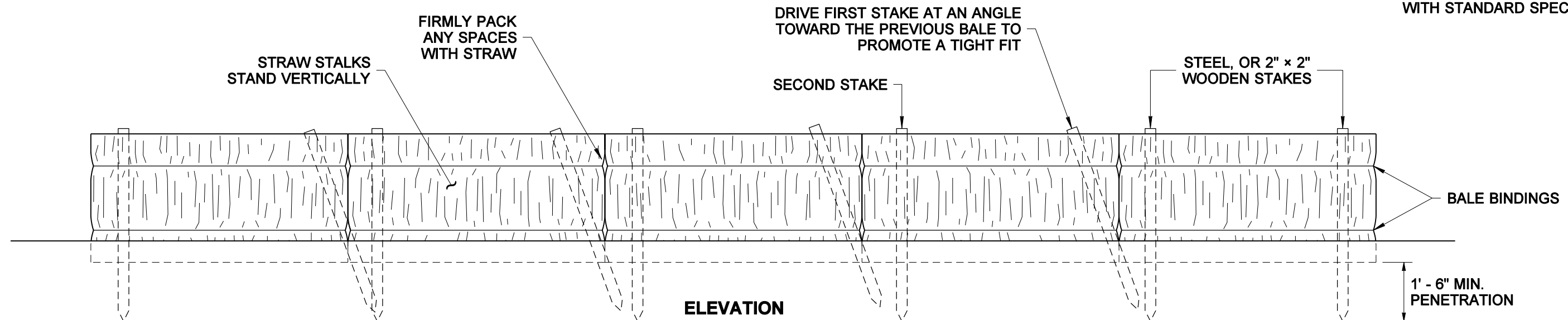
STATE DESIGN ENGINEER DATE



Washington State Department of Transportation

**NOTES**

1. SEE STANDARD SPECIFICATION 8-01.3(9)D, FOR ADDITIONAL INFORMATION.
2. PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATION 8-01.3(15).

**SECTION A**

STATE OF
WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

STRAW BALE BARRIER**STANDARD PLAN I-9**

SHEET 1 OF 1 SHEET

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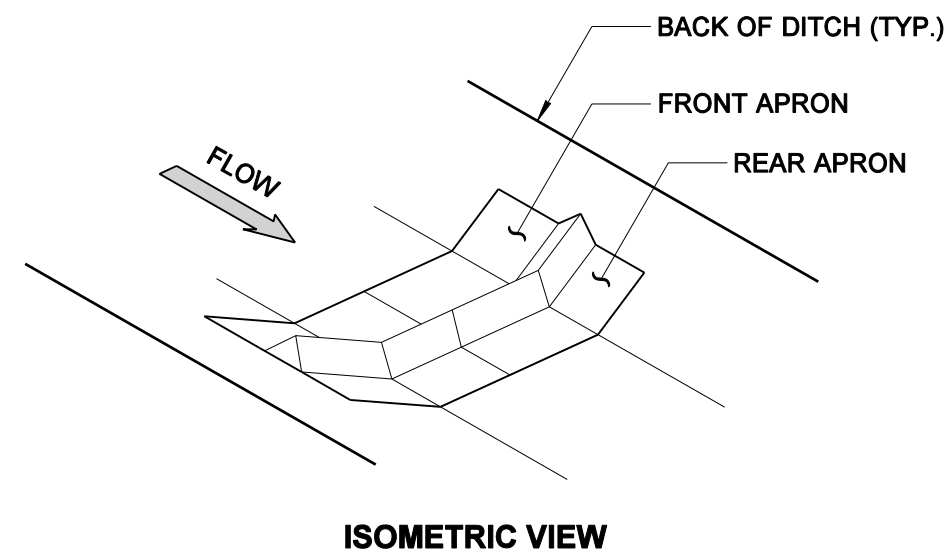
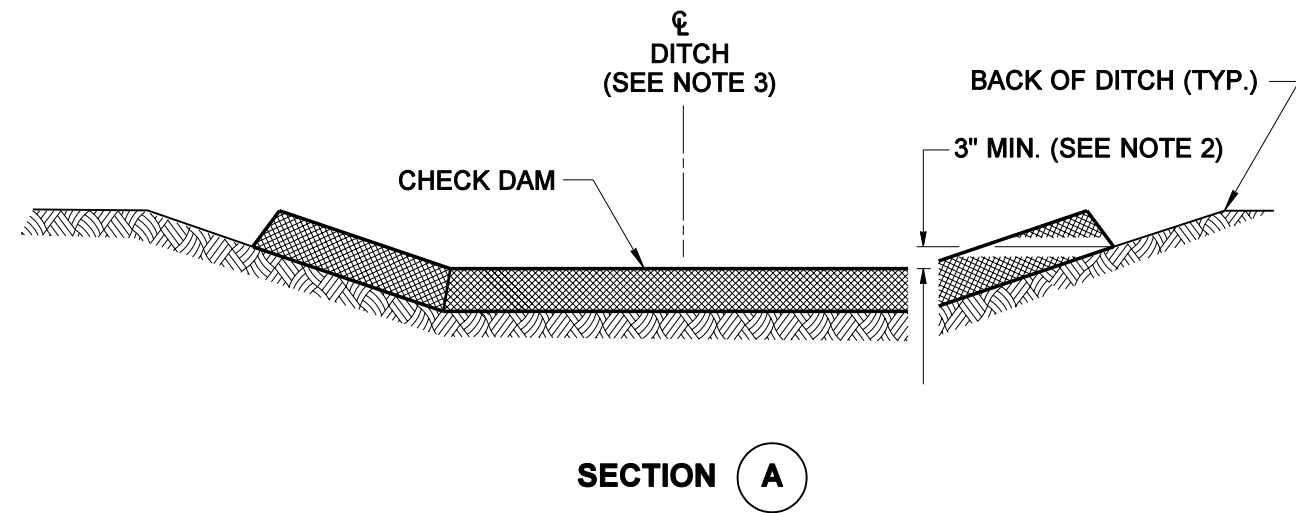
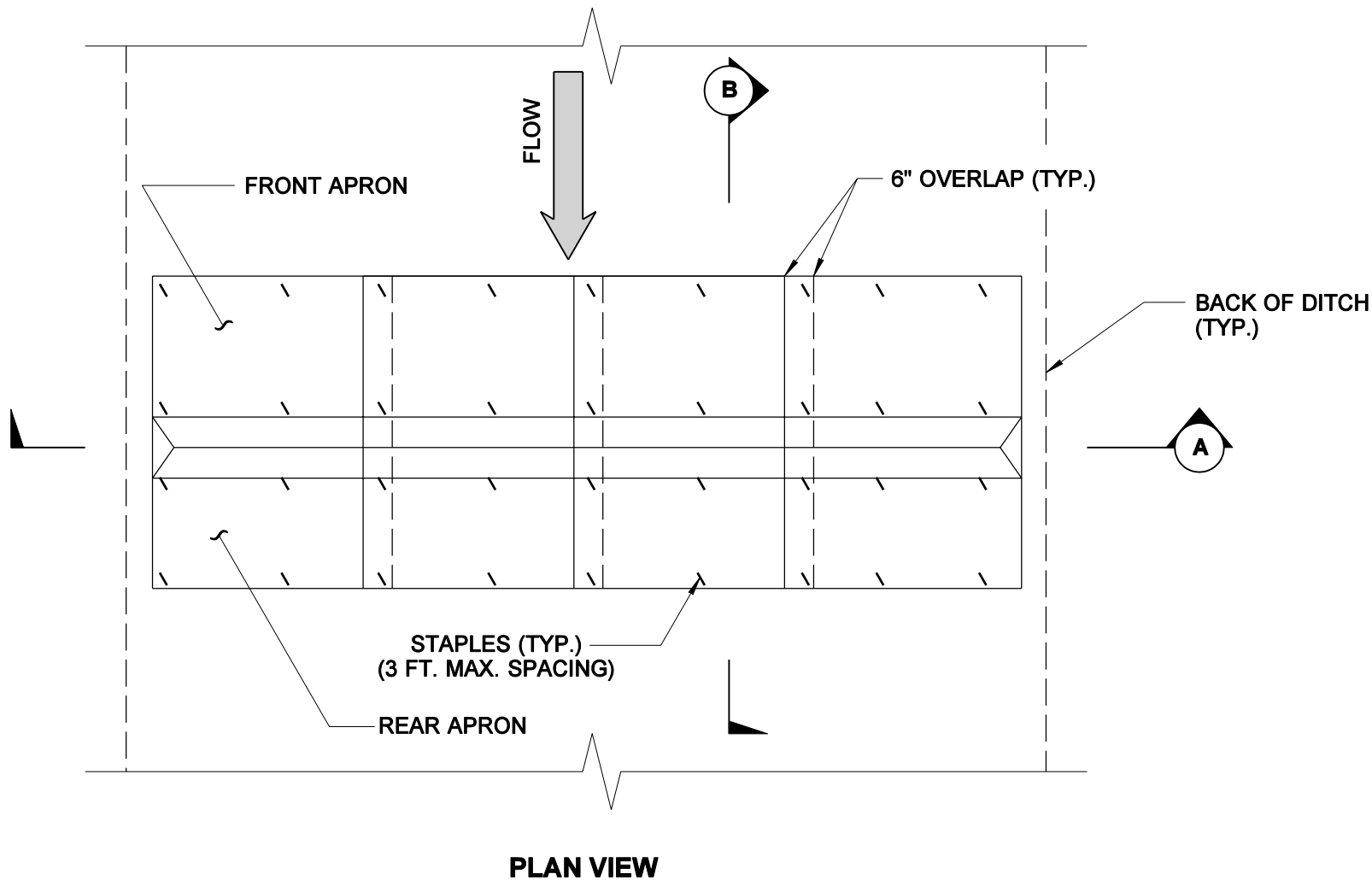
STATE DESIGN ENGINEER

DATE

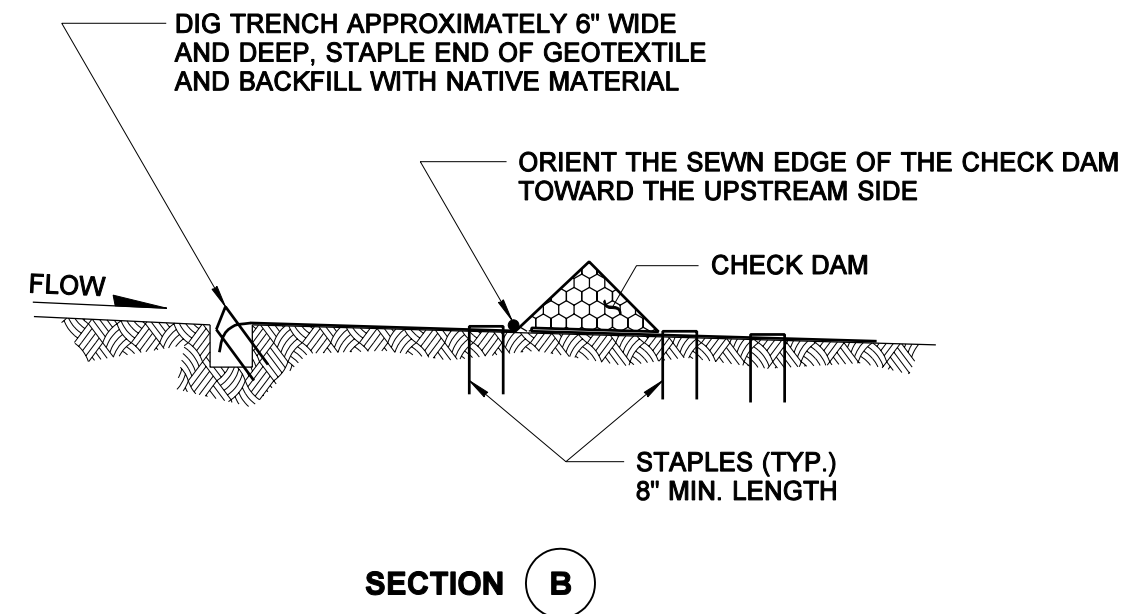


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- NOTES**
1. GEOTEXTILE ENCASED CHECK DAMS SHALL MEET THE REQUIREMENTS OF STANDARD SPECIFICATIONS 8-01.3(5)A AND 9-14.5(4).
 2. INSTALL THE SLOPED ENDS OF THE CHECK DAM A MINIMUM OF 3" HIGHER THAN THE TOP OF THE CHECK DAM IN THE CHANNEL TO ENSURE THAT WATER FLOWS OVER THE DAM AND NOT AROUND IT.
 3. FLAT BOTTOM DITCH DESIGN SHOWN, CHECK DAM INSTALLATION DETAILS ARE SIMILAR FOR "V" BOTTOM DITCHES.
 4. PERFORM MAINTENANCE IN ACCORDANCE WITH STANDARD SPECIFICATION 8-01.3(15).



STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

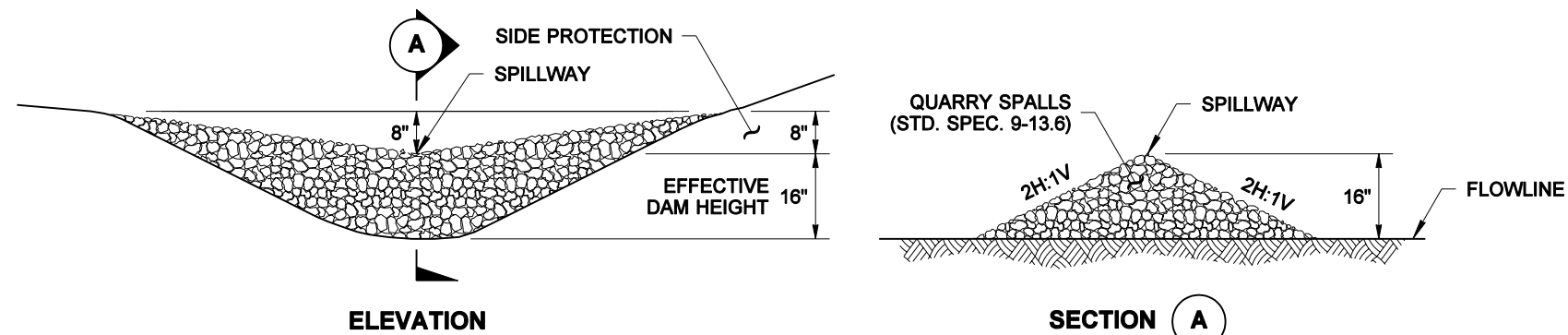
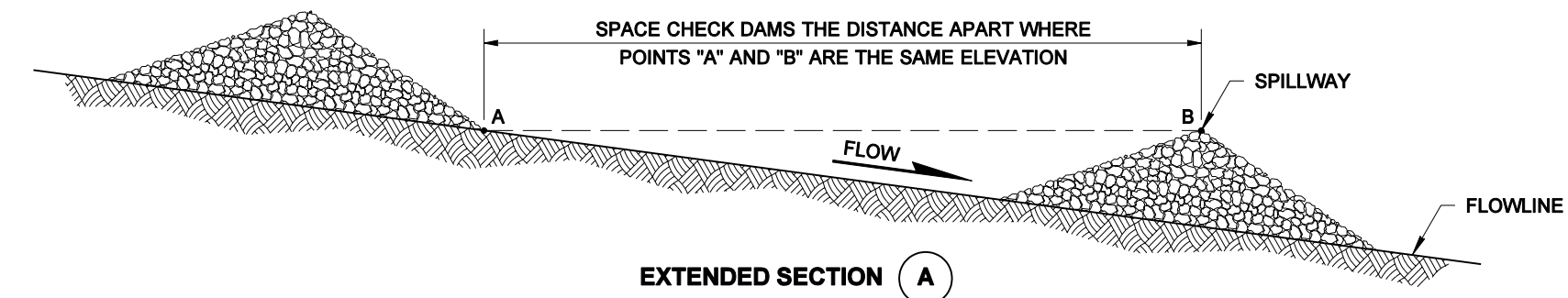
**GEOTEXTILE ENCASED
CHECK DAM
INSTALLATION
STANDARD PLAN I-10**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

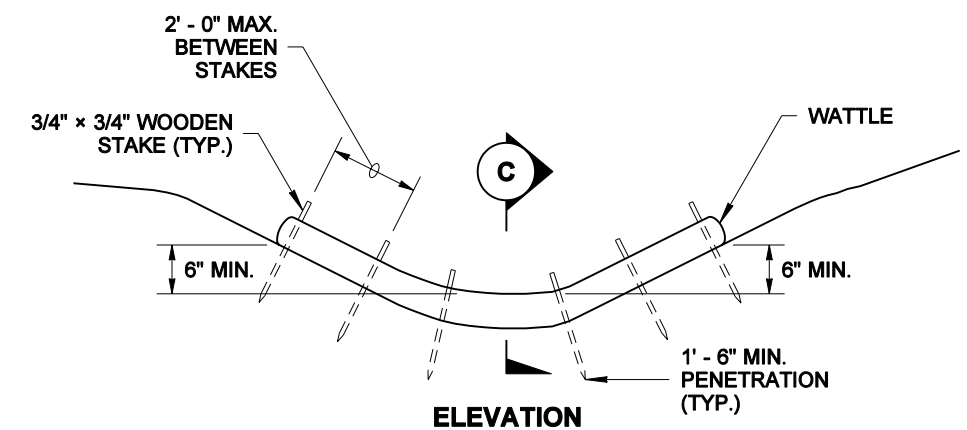
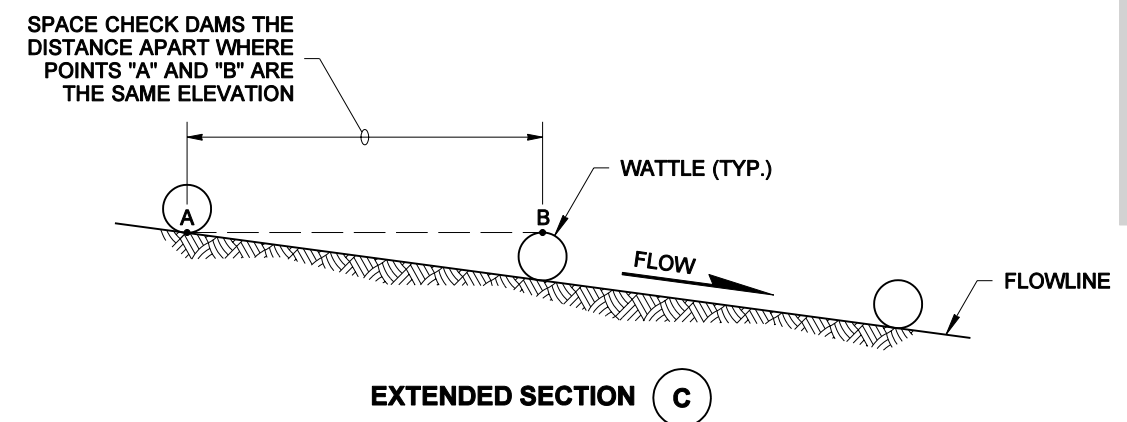
Harold J. Peterfeso 07-17-03
STATE DESIGN ENGINEER DATE

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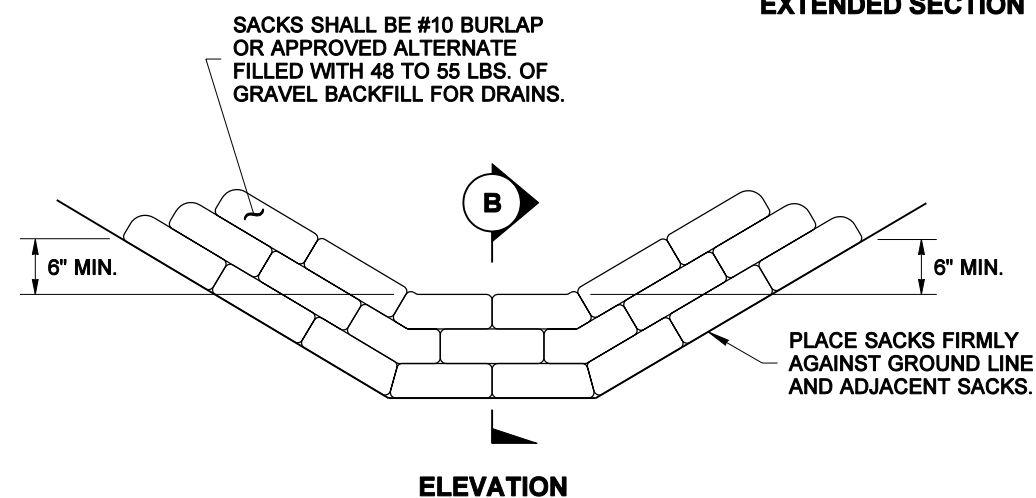
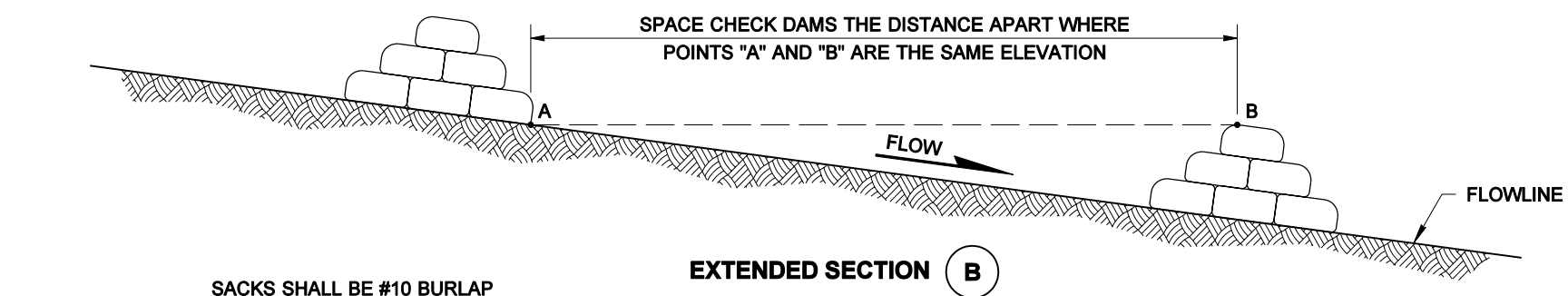


NOTE
ROCK CHECK DAMS SHALL BE PLACED OUTSIDE OF THE CLEAR ZONE, OR BEHIND TRAFFIC BARRIER.

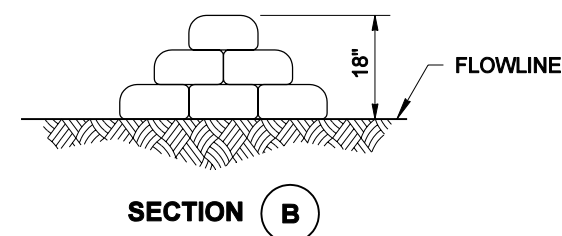
ROCK CHECK DAM



WATTLE CHECK DAM



SANDBAG CHECK DAM



STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

CHECK DAMS

STANDARD PLAN I-11

SHEET 1 OF 1 SHEET

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Harold J. Peterfeso 09-11-03

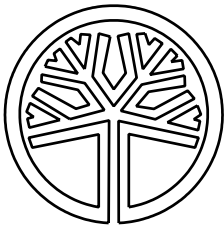
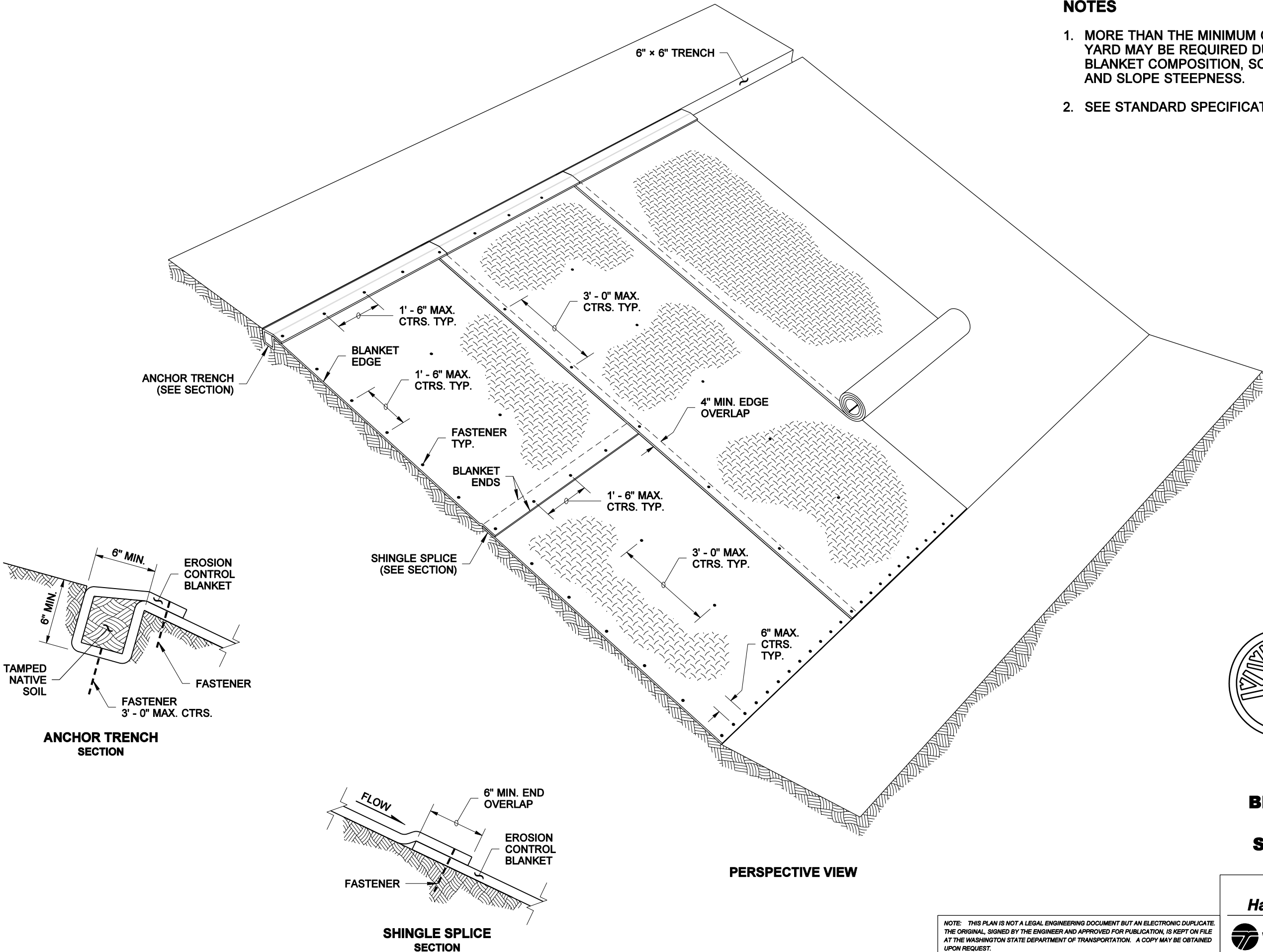
STATE DESIGN ENGINEER

DATE

Washington State Department of Transportation

NOTES

- 1. MORE THAN THE MINIMUM OF ONE FASTENER PER SQUARE YARD MAY BE REQUIRED DUE TO CONDITIONS SUCH AS BLANKET COMPOSITION, SOIL TYPE, SURFACE UNIFORMITY, AND SLOPE STEEPNESS.
- 2. SEE STANDARD SPECIFICATION 8-01.3(3).



STATE OF WASHINGTON
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MARK W. MAURER
CERTIFICATE NO. 000598

EROSION CONTROL
BLANKET PLACEMENT
ON SLOPE
STANDARD PLAN I-12

SHEET 1 OF 1 SHEET

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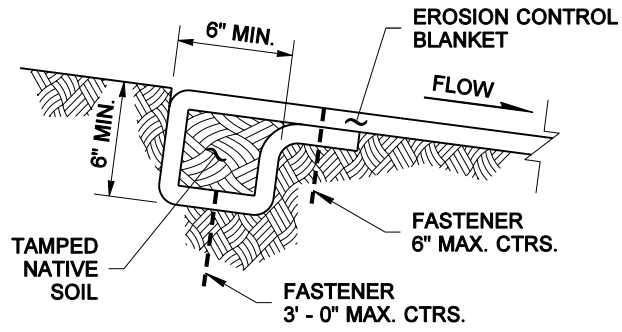
STATE DESIGN ENGINEER

DATE



Washington State Department of Transportation

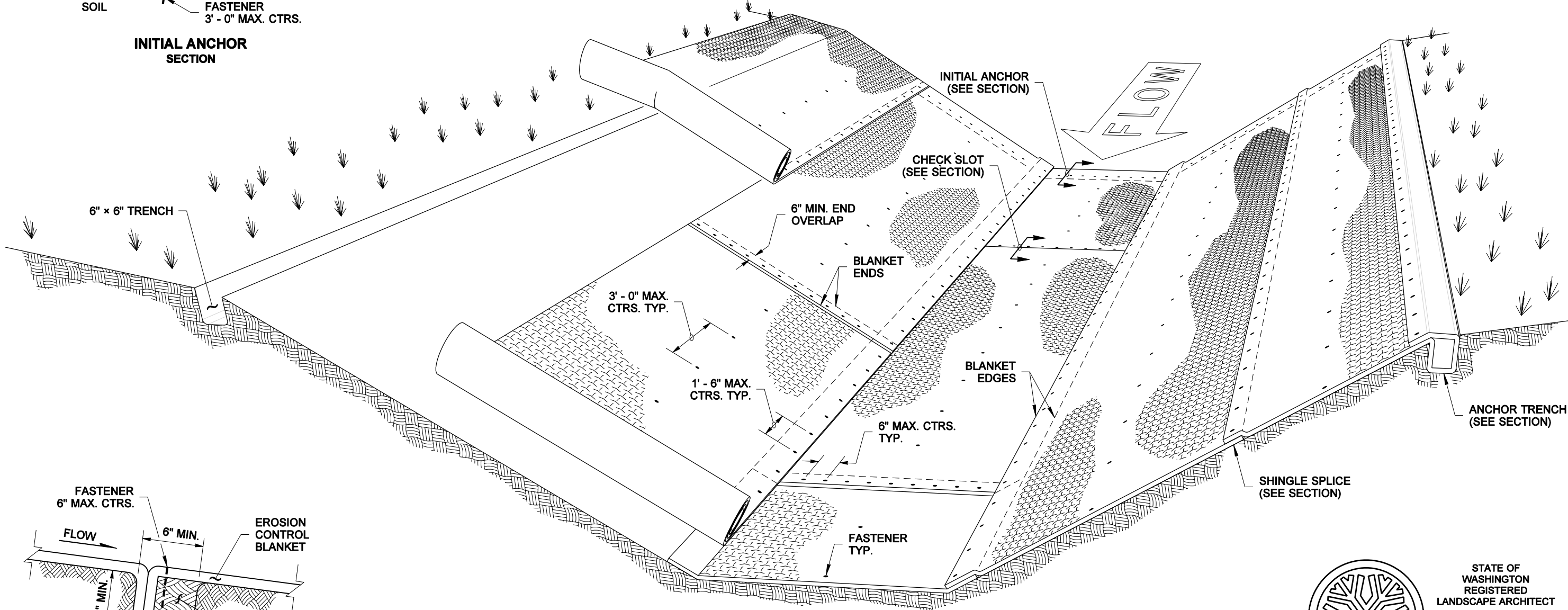
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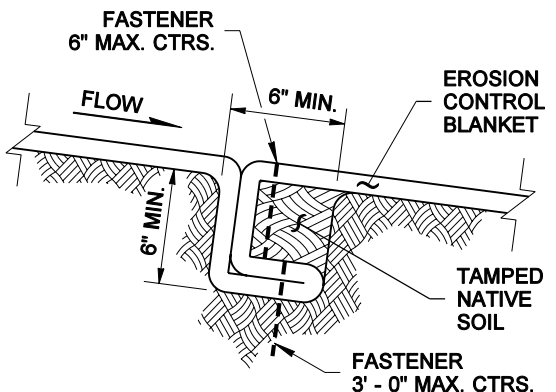
INITIAL ANCHOR SECTION

NOTES

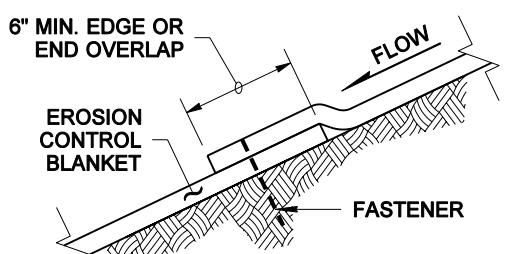
1. MORE THAN THE MINIMUM OF ONE FASTENER PER SQUARE YARD MAY BE REQUIRED DUE TO CONDITIONS SUCH AS BLANKET COMPOSITION, SOIL TYPE, SURFACE UNIFORMITY, AND FLOW VELOCITY.
2. ROLL ENDS MAY BE SPLICED IN A CHECK SLOT.
3. SEE STANDARD SPECIFICATION 8-01.3(3).



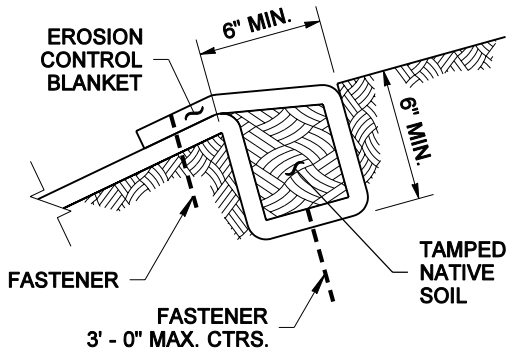
PERSPECTIVE VIEW



CHECK SLOT SECTION



SHINGLE SPLICE SECTION



ANCHOR TRENCH SECTION



STATE OF
WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

**EROSION CONTROL
BLANKET PLACEMENT
IN CHANNEL
STANDARD PLAN I-13**

SHEET 1 OF 1 SHEET

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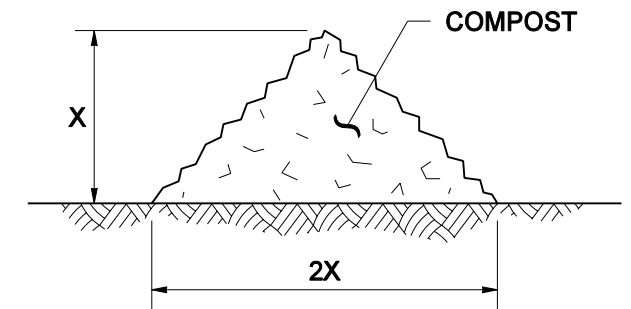
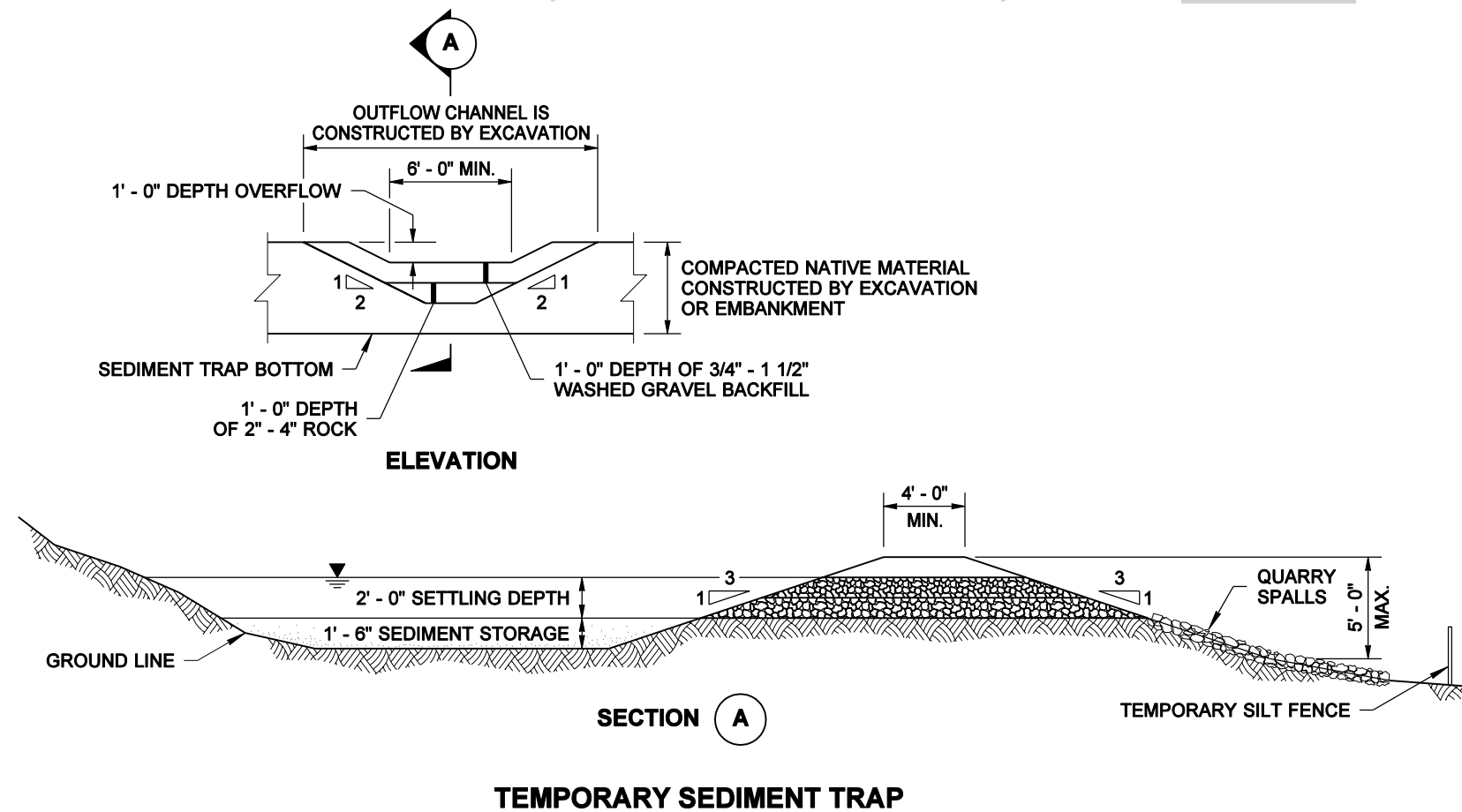
Harold J. Peterfeso 07-17-03

STATE DESIGN ENGINEER

DATE

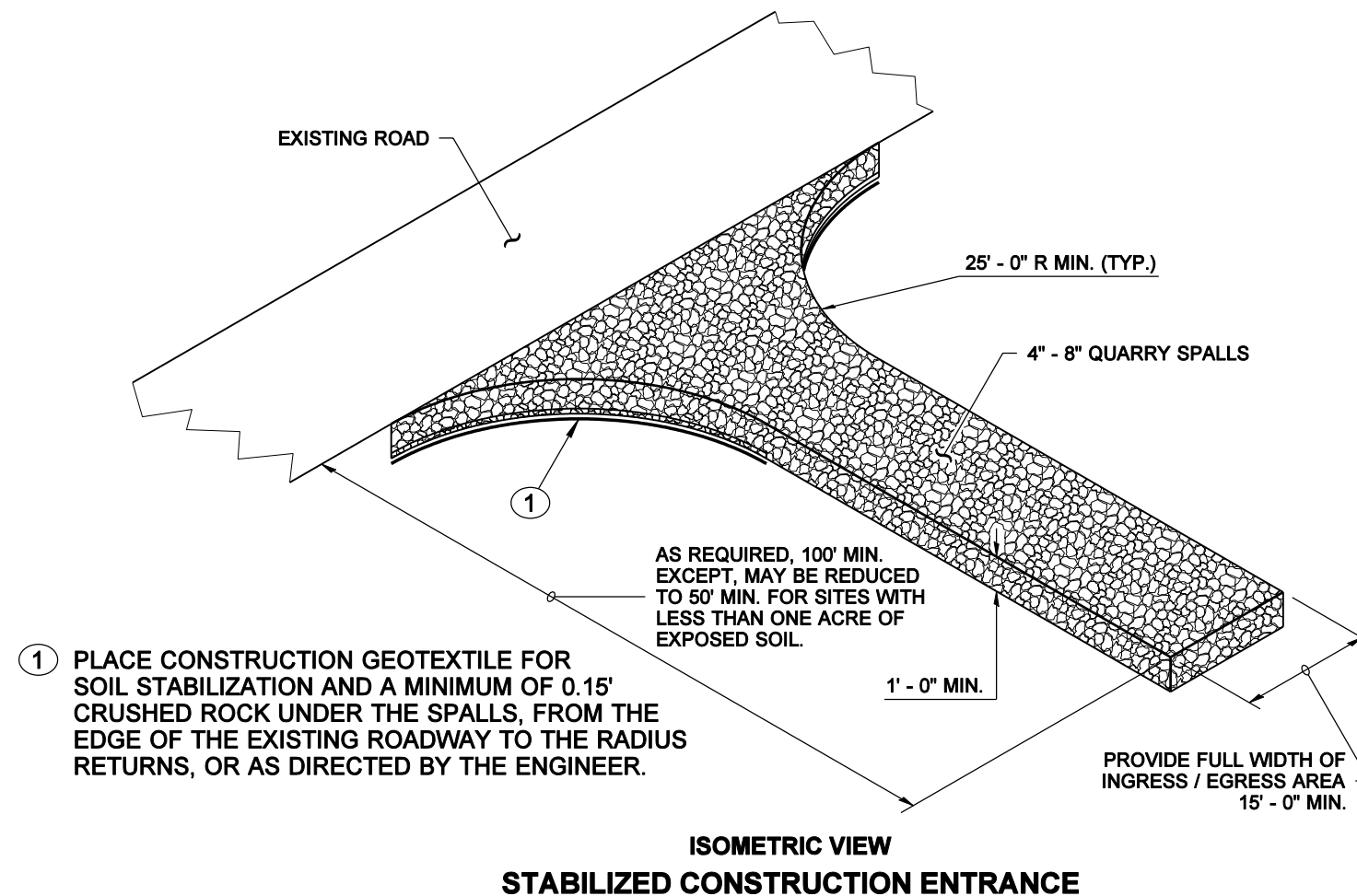


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X = 1' - 0" FOR SLOPES 4H:1V OR FLATTER
X = 1' - 6" FOR SLOPES STEEPER THAN 4H:1V

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STATE OF
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LANDSCAPE ARCHITECT

MARK W. MAURER
CERTIFICATE NO. 000598

**MISCELLANEOUS
EROSION CONTROL DETAILS**

STANDARD PLAN I-14

SHEET 1 OF 1 SHEET

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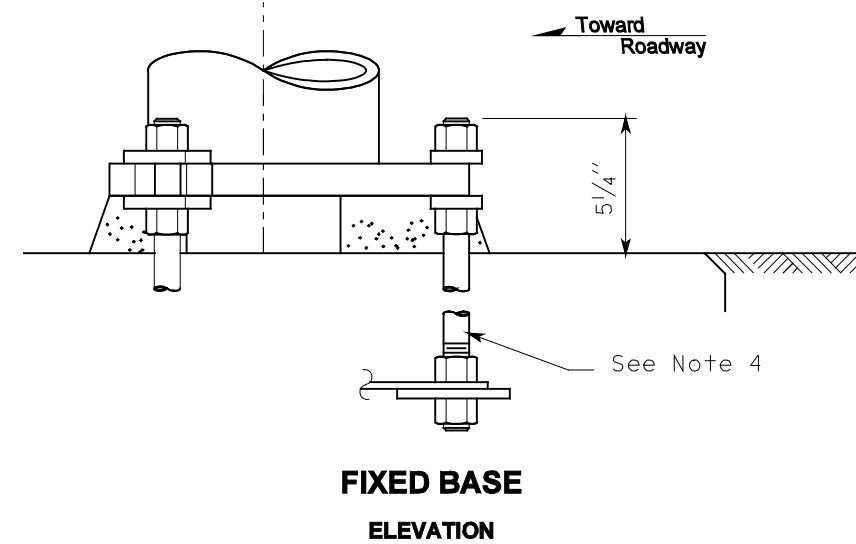
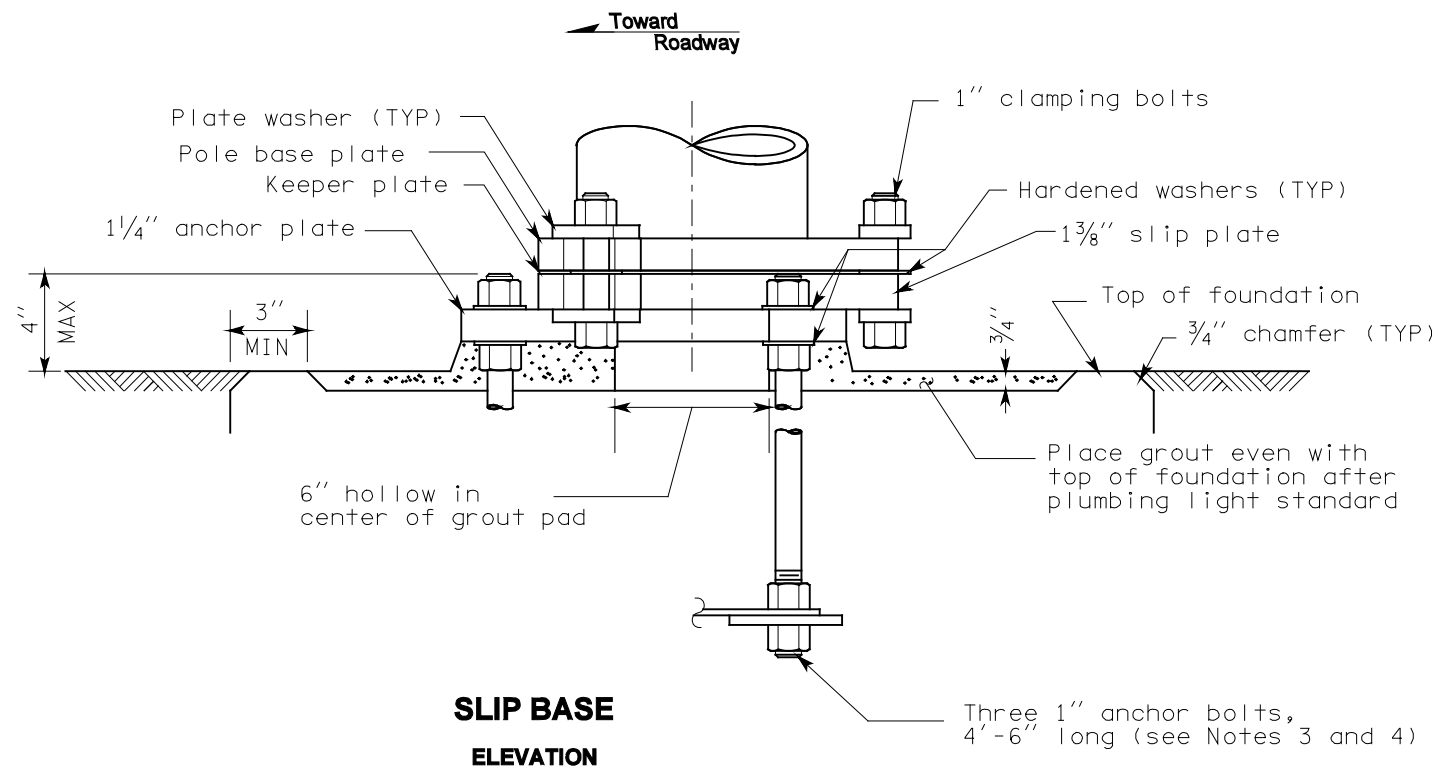
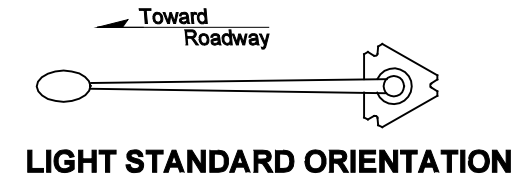
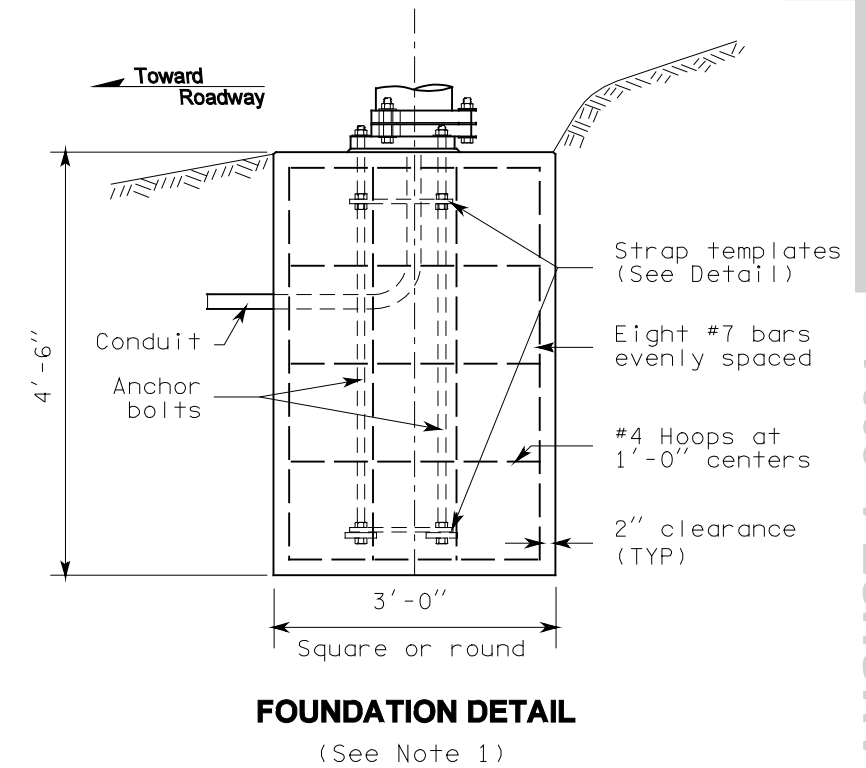
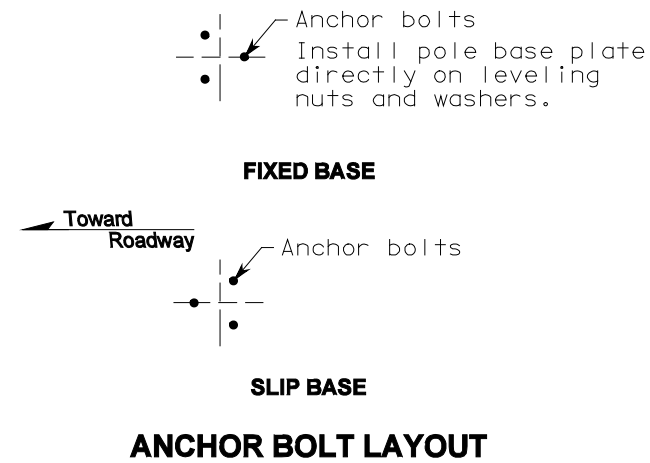
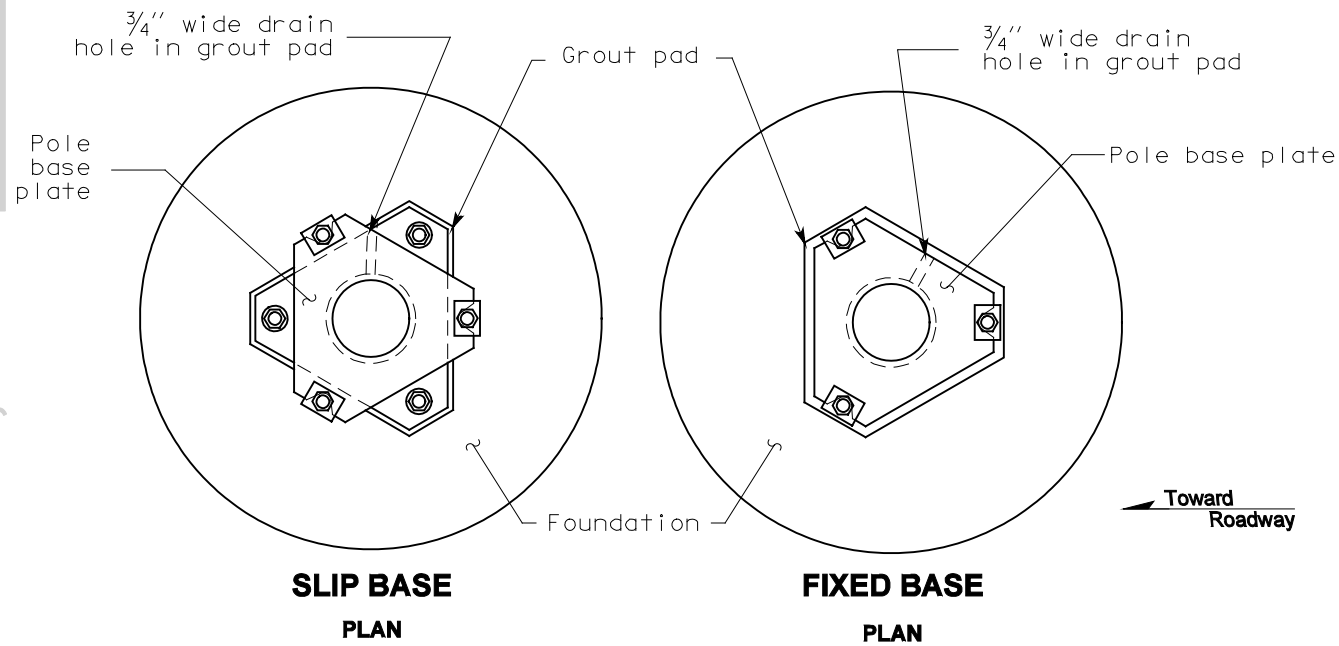
Harold J. Peterfeso 07-17-03

STATE DESIGN ENGINEER

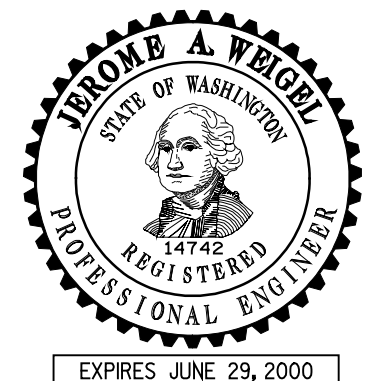
DATE



Washington State Department of Transportation



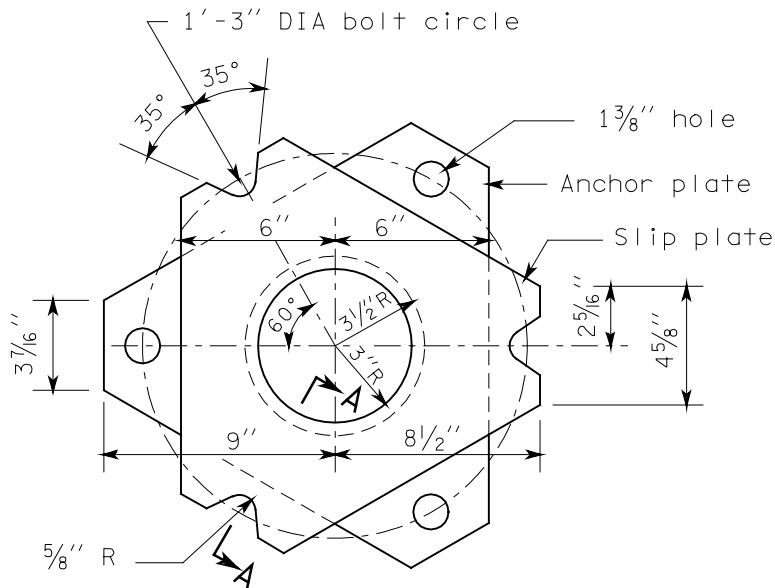
Details similar to slip base except where noted



**STEEL LIGHT STANDARD
BASE DETAILS
STANDARD PLAN J-1b**

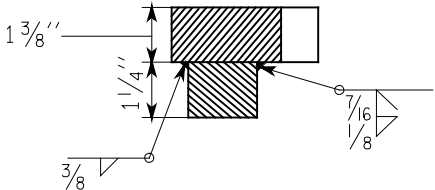
SHEET 1 OF 3 SHEETS

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10-99		TWS	Clifford E. Mansfield 10/08/99	
DATE		REVISION	DEPUTY STATE DESIGN ENGINEER DATE	
		BY	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION	
			OLYMPIA, WASHINGTON	

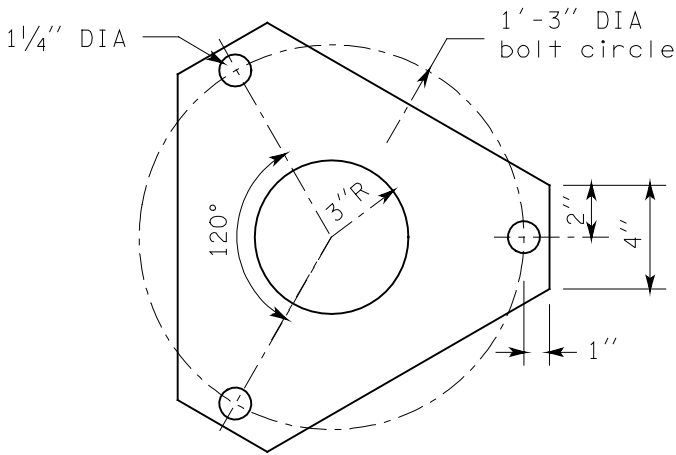


SLIP/ANCHOR PLATES DETAIL

Smooth finish top, bottom, and notched surfaces

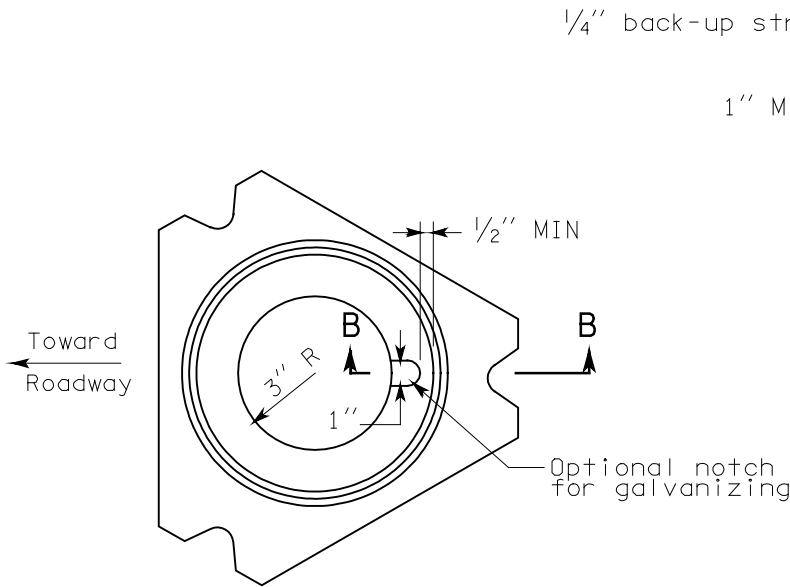


SECTION A-A



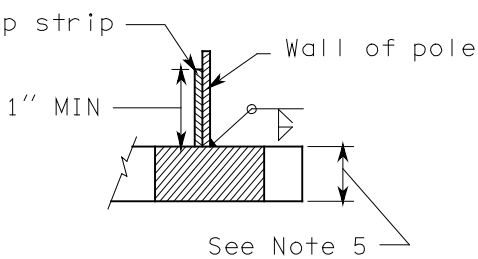
KEEPER PLATE

Place between pole base plate and slip plate on top of middle washers.



POLE BASE PLATE

Smooth finish top, bottom, and notched surfaces



SECTION B-B

See Note 5

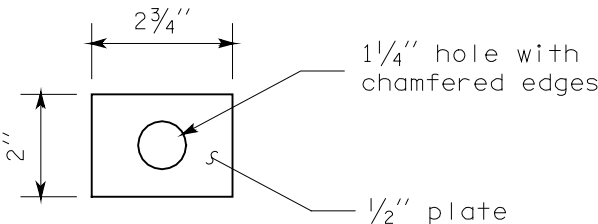
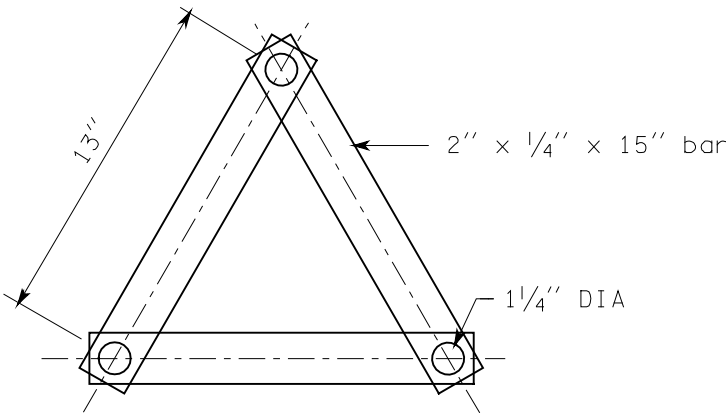


PLATE WASHER



STRAP TEMPLATE ASSEMBLY DETAIL

Place over anchor bolts
(See Note 4)



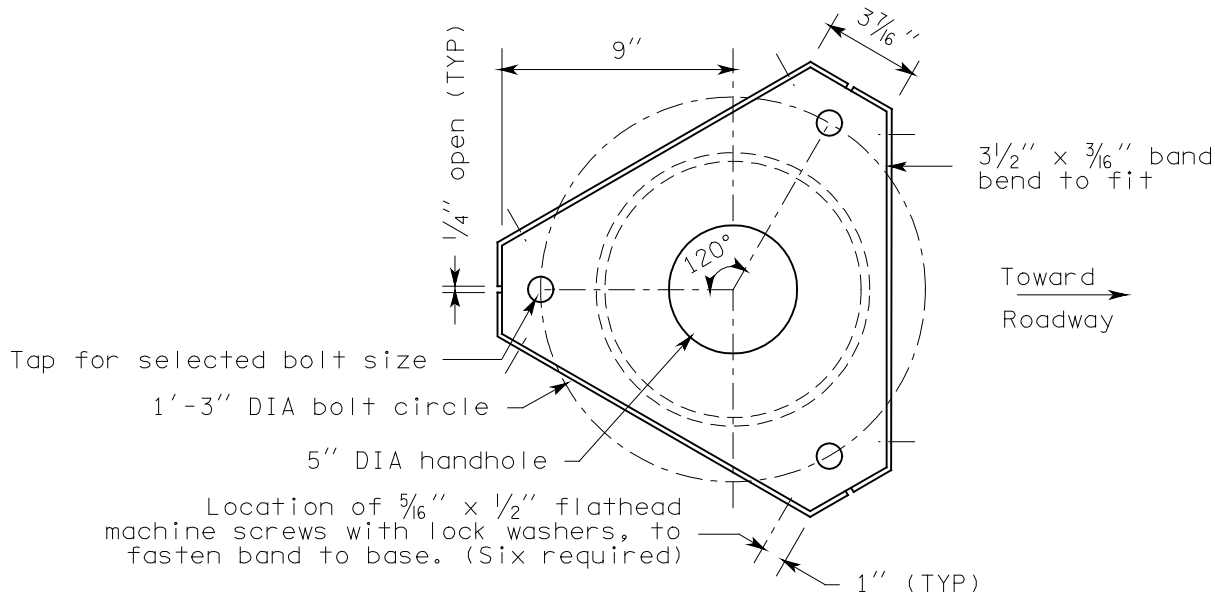
**STEEL LIGHT STANDARD
BASE DETAILS
STANDARD PLAN J-1b**

SHEET 2 OF 3 SHEETS

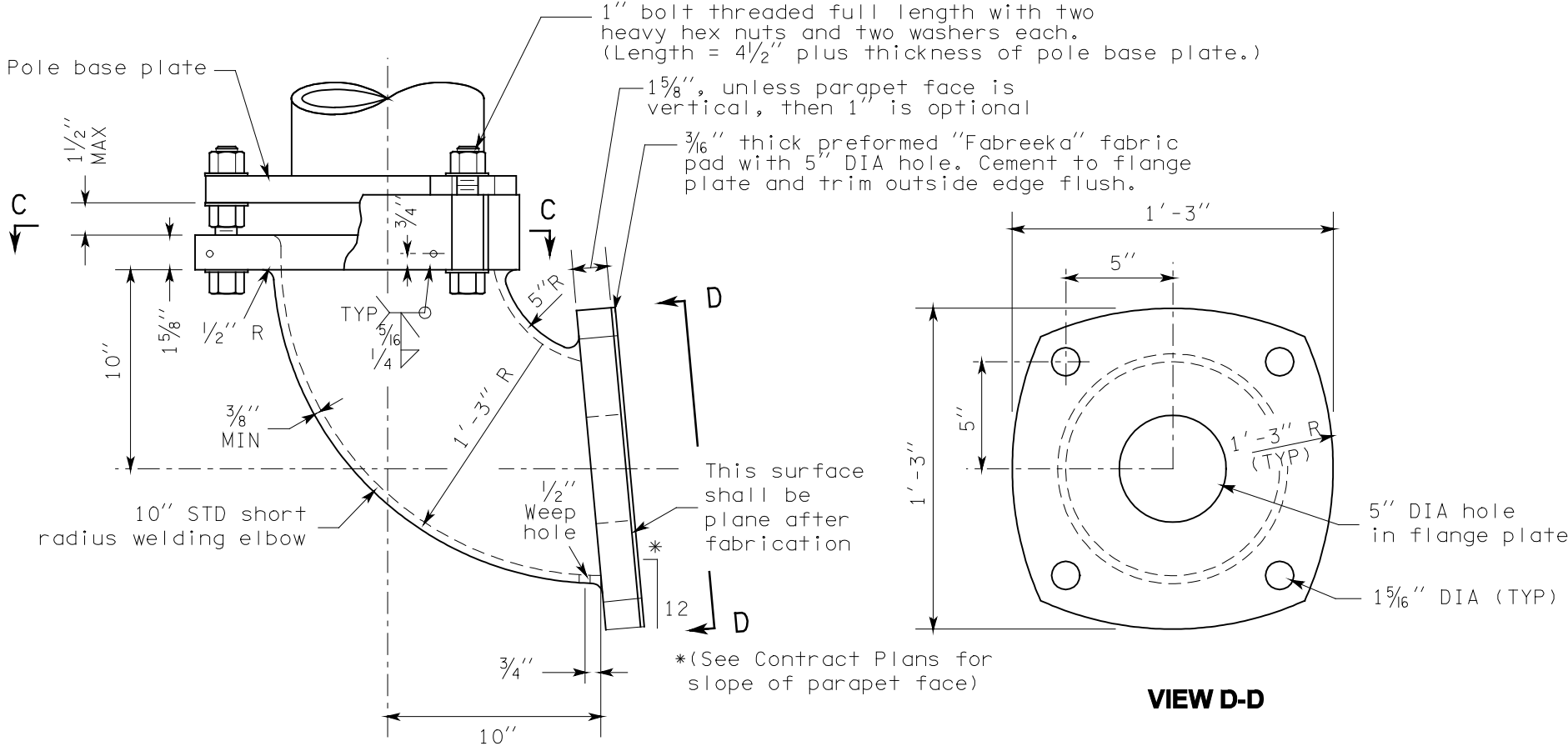
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10-99		REVISED SECTION B-B.	TWS	DATE
DATE		REVISION	BY	10/08/99
			Clifford E. Mansfield DEPUTY STATE DESIGN ENGINEER WASHINGTON STATE DEPARTMENT OF TRANSPORTATION OLYMPIA, WASHINGTON	

NOTES

1. See Standard Plan C-8b for base plate and foundation requirements when light standards are mounted on concrete barrier.
2. Round and smooth all edges along wire-way to protect conductors. See Standard Plan J-1e for wiring details.
3. The top of the anchor rod shall be both threaded and galvanized a minimum of 12". The bottom of the anchor rod shall be threaded a minimum of 3". Galvanizing shall be in accordance with AASHTO M111 after threading. Hooked anchor bolts are not allowed.
4. Strap templates shall be held in place by nuts 6" from the top of the foundation, and at bottom of anchor bolts resting on 4" x 3/8" square washers.
5. Pole base plate for a slip base design shall be 1/4" AASHTO M223 Gr. 345. Pole base plate for a fixed base design may be either 1/4" AASHTO M223 Gr. 345 or 1/2" AASHTO M183.
6. Installation of a 50' pole with double mast arms on a slip base is not allowed.



SECTION C-C



ELEVATION
LIGHTING BRACKET DETAIL

For light standards with single arm 12' or less and double arms 8' or less mounted on bridges or retaining walls.



STEEL LIGHT STANDARD
BASE DETAILS
STANDARD PLAN J-1b

SHEET 3 OF 3 SHEETS

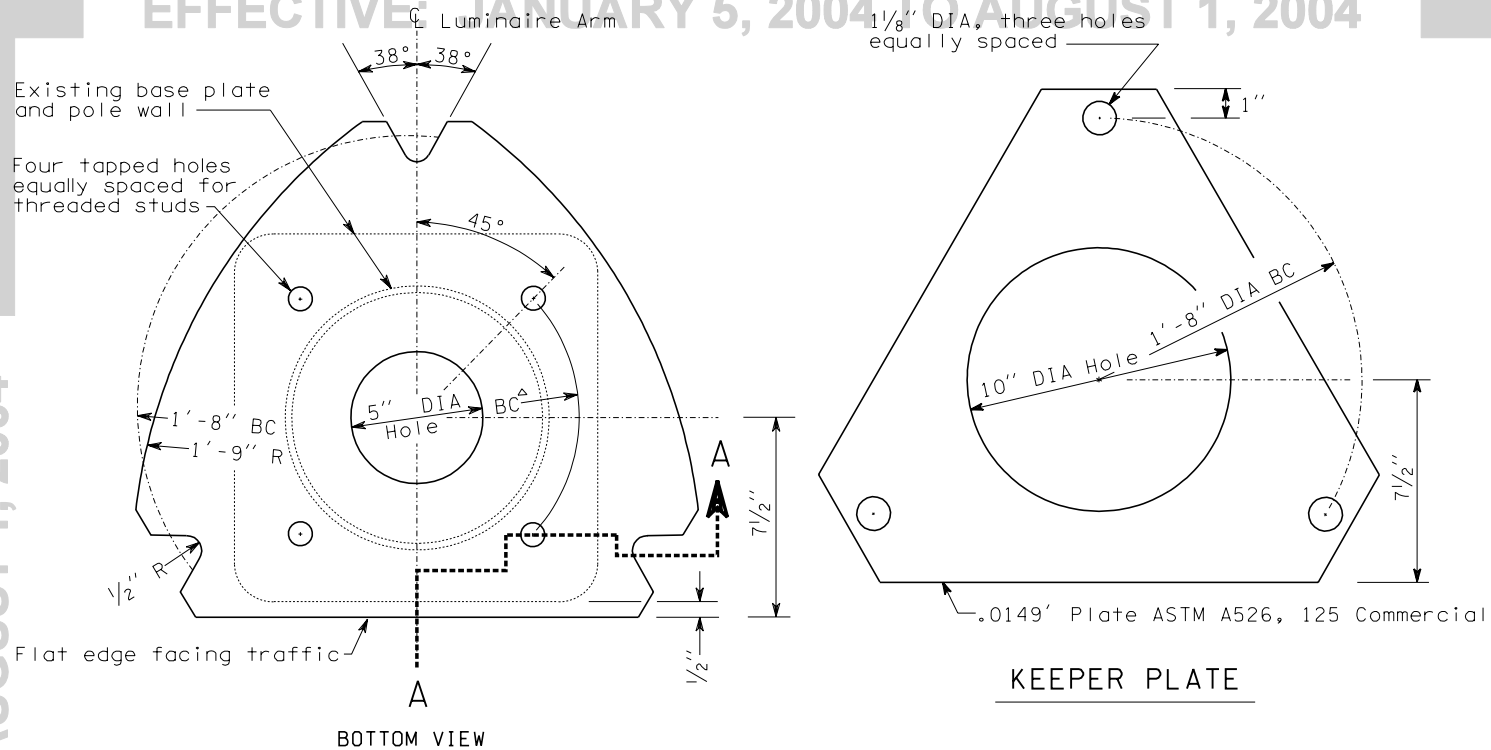
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10-99	REVISED NOTES 1, 2 & 5; ADDED NOTE 6.	TWS
DATE	REVISION	BY

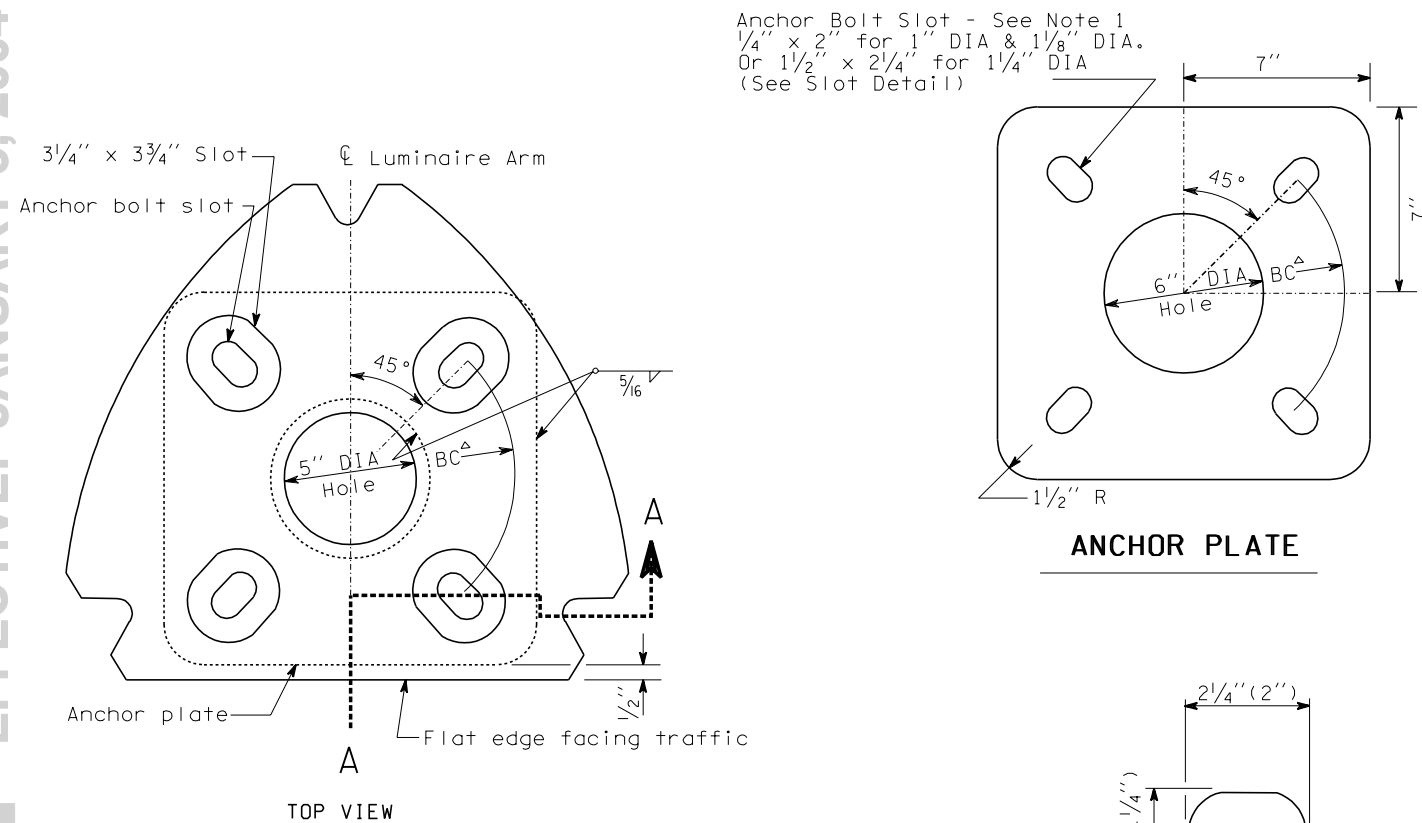
APPROVED FOR PUBLICATION

Clifford E. Mansfield 10/08/99
DEPUTY STATE DESIGN ENGINEER DATE



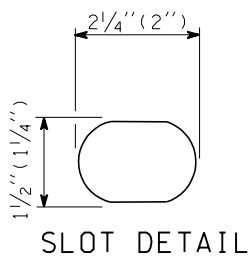


PLAN - TOP SLIP PLATE



PLAN - BOTTOM SLIP PLATE

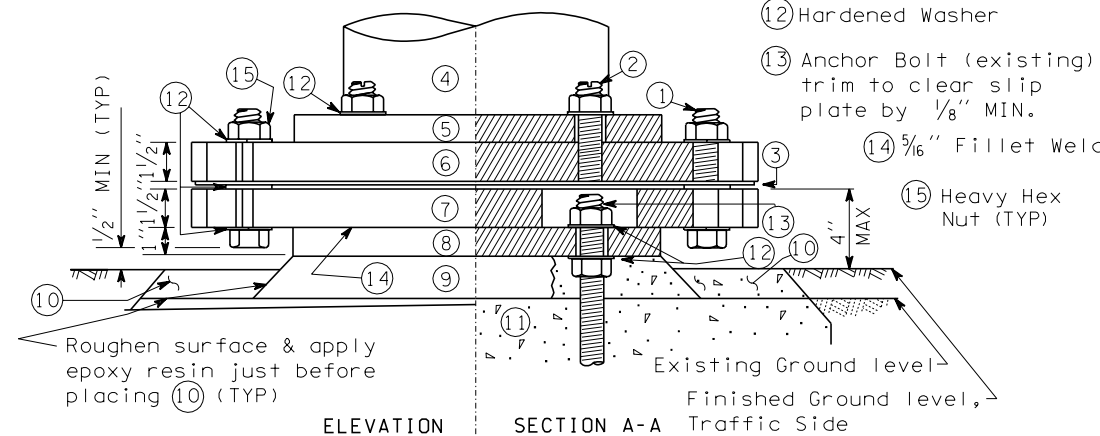
NOTE:
Plate shall conform to AASHTO M183 M (ASTM A36) except as noted.
Flat washer shall conform to AASHTO M164 M (ASTM A325).



SLOT DETAIL

KEY

- Clamping Bolts, 7/8" DIA hex head bolt & nut, three plate washers, 50 ft.-lbs. torque. (Three per slip base)
- Threaded Slotted Stud, see SCHEDULE for DIA, hardened washer and heavy hex nut (four per base plate). Insert stud and center punch at bottom periphery to lock tapped stud in place prior to galvanizing.
- Keeper Plate
- Pole Wall (existing)
- Base Plate (existing)
- Top Slip Plate
- Bottom Slip Plate
- Anchor Plate
- Grout (exist. w/drain)
- New Grout Pad
- Foundation (existing)
- Hardened Washer
- Anchor Bolt (existing), trim to clear slip plate by 1/8" MIN.
- 5/16" Fillet Weld
- Heavy Hex Nut (TYP)



ASSEMBLY DETAILS

After bolting bottom slip plate assembly to foundation, fill slotted bolt holes with mastic.

Grade around foundation to ensure stub height does not exceed 4".

Removal of the frangible base from the existing base plate is required.

Misaligned anchor bolts must be removed and replaced.

SCHEDULE				
Adapter Type	Anchor Bolt*	BC*(Bolt Circle)*	Existing Base Type	Luminaire Height #
A-1	1"	11"	Welded Plate	30'
A-2	1"	1'-0 1/4"	Cast Aluminum	30'
A-3	1"	1'-0 3/4"	Steel Transformer	30'
A-4	1 1/8"	1'-2 1/8"	2-Pc. Alum. Clamp	40'
A-5	1 1/4"	1'-2 1/8"	2-Pc. Alum. Clamp	40'

* Use matching diameter for threaded studs

+ Contractor shall verify BC in field before ordering. If BC or anchor bolt sizes differ from those listed, contact Bridge and Structures Office.

Plus or minus 2'-6"

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EXPIRES JANUARY 17, 1999

SLIP BASE ADAPTOR FOR 4-BOLT LIGHT STANDARD BASE STANDARD PLAN J-1c

APPROVED FOR PUBLICATION

Clifford E. Mansfield

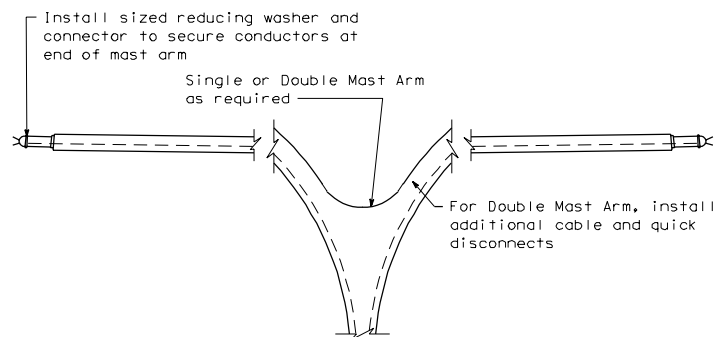
DEPUTY STATE DESIGN ENGINEER



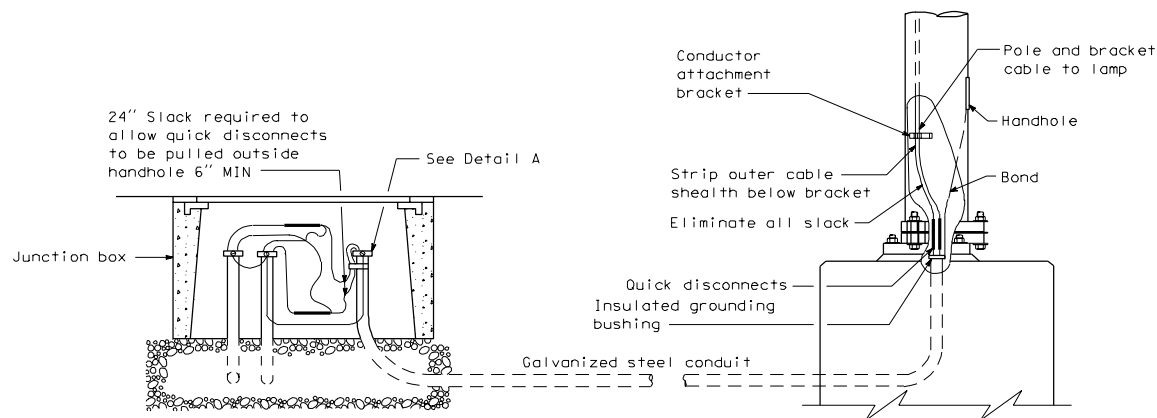
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

4/24/98

DATE

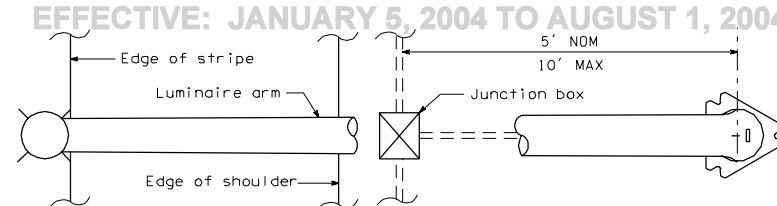


MAST ARM WIRING DETAIL



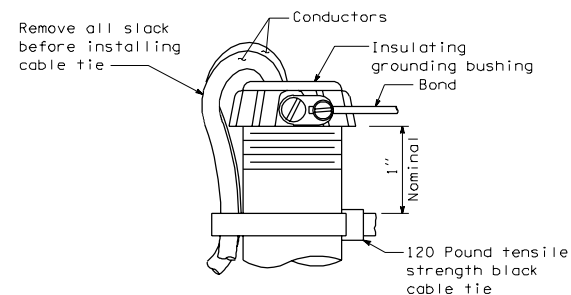
WIRING DETAIL LIGHT STANDARD SLIP BASE*

*Application for fixed base similar except no cable tie is required at junction box.



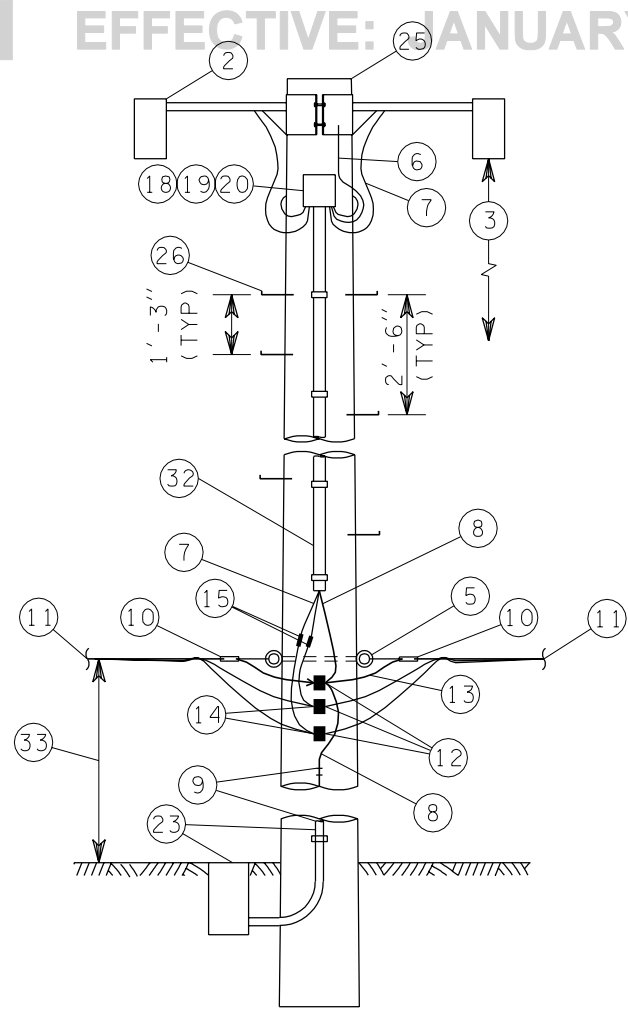
Alternate locations allowed provided junction box to base distance does not exceed 10'

TYPICAL JUNCTION BOX LOCATION



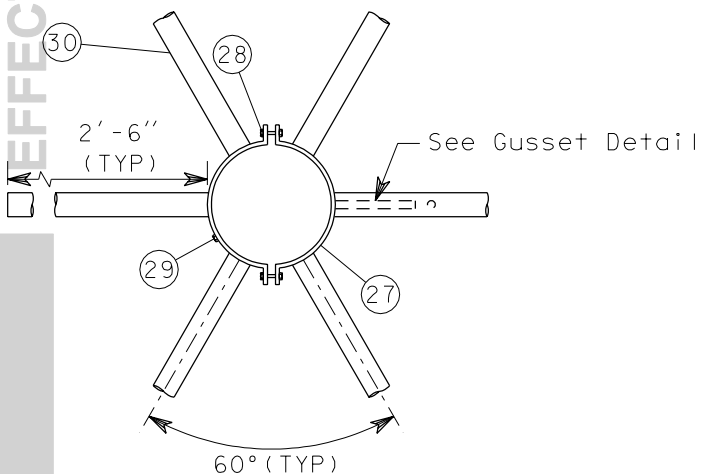
DETAIL A

LIGHT STANDARDS WIRING DETAILS



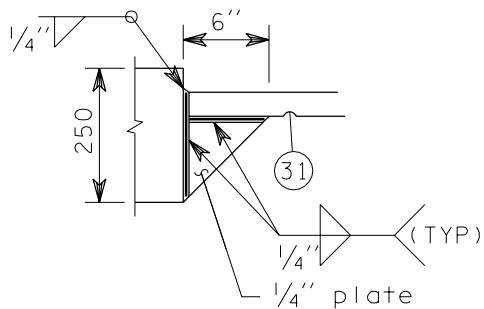
HIGH MAST TIMBER LUMINAIRE SUPPORT

Shown for 480 VAC power feed.
Increase conductor and fuse size
as required for 240 VAC power feed.

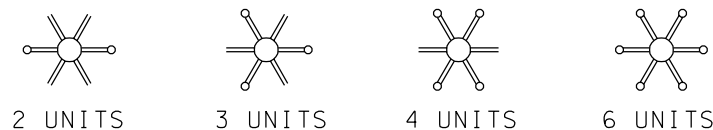


PLAN VIEW
LUMINAIRE SUPPORT BRACKET
GALVANIZE AFTER FABRICATION

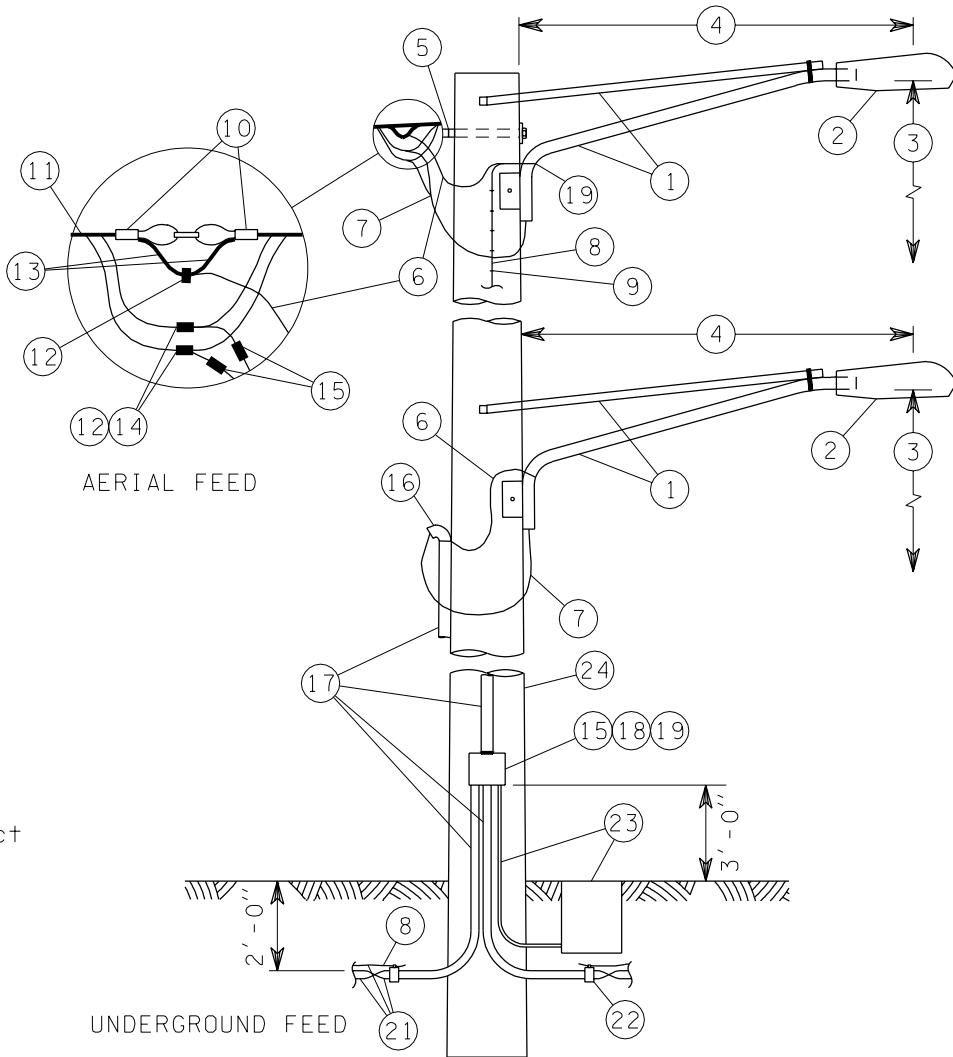
- KEY
- Galvanized steel mast arm - configuration varies with manufacturer
 - Luminaire - see Contract for type and number
 - Mounting height - roadway to luminaire elevation difference $\pm 2\%$, see Contract
 - Mast arm length - see Contract
 - $\frac{5}{8}$ " galvanized thimble eyebolt (single or double) with washers and nuts or eyenut
 - Bonding jumper
 - Pole and bracket cable
 - Equipment grounding conductor see Standard Plan J-9a.
 - From ground line to 10' above ground, enclose equipment grounding conductor in galvanized steel conduit, code sized. Above 10' from ground, staple equipment grounding conductor to pole. Connect to supplemental ground per Standard Plan J-9a.
 - Service wedge clamp
 - ACSR triplex or fourplex conductors - see Contract
 - Copper split bolt connector
 - Messenger cable
 - Insulating tape for waterproof connection
 - Fused quick disconnect - use 30 amp fuses for high mast supports
 - Weatherhead - size as required
 - Steel conduit
 - 8" x 8" x 4" NEMA 3R junction box with raintight hubs and removable cover
 - Grounding lug
 - 12 pole terminal block
 - Direct burial conductors or galvanized steel conduits with conductors - see Contract
 - Grounding bushing
 - Supplemental ground - see Standard Plan J-9a.
 - Class 5 timber pole - length sufficient for mounting height and burial depth
 - Class 2 timber pole - length sufficient for mounting height and burial depth.
 - $\frac{5}{8}$ " x 9" step bolt
 - $\frac{1}{4}$ " x 10" plate collar bent to fit pole diameter (8" - 10")
 - $\frac{3}{8}$ " x 4" machine bolts (four required) with washers and nuts
 - $\frac{1}{2}$ " lag bolts (six required) - drill $\frac{5}{16}$ " hole in plate
 - 2" pipe
 - $\frac{3}{4}$ " wire hole 2" from gusset plate, smooth hole edges
 - 1" nonmetallic conduit with $\frac{3}{4}$ " straps at code spacing
 - Distance varies, 35' MIN, 50' MAX, depending on line clearance requirements



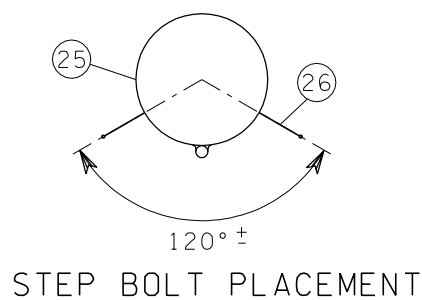
GUSSET DETAIL



PLAN VIEW
TYPICAL LUMINAIRE MOUNTING
CONFIGURATIONS



TIMBER LUMINAIRE SUPPORT



STEP BOLT PLACEMENT



TIMBER LIGHT STANDARDS STANDARD PLAN J-1f

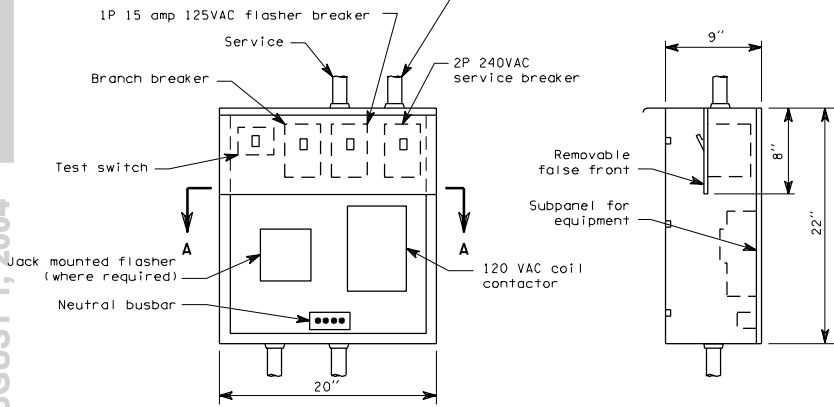
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5/00	REPLACED PLAN TITLE REFERENCES WITH PLAN NUMBERS.	TWS	
DATE	REVISION	BY	

APPROVED FOR PUBLICATION

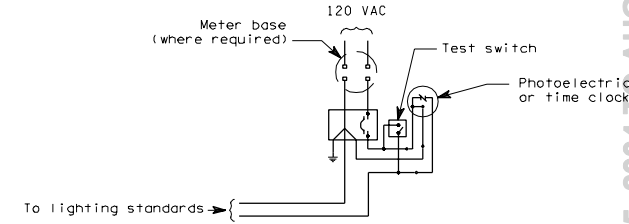
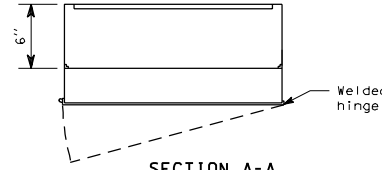
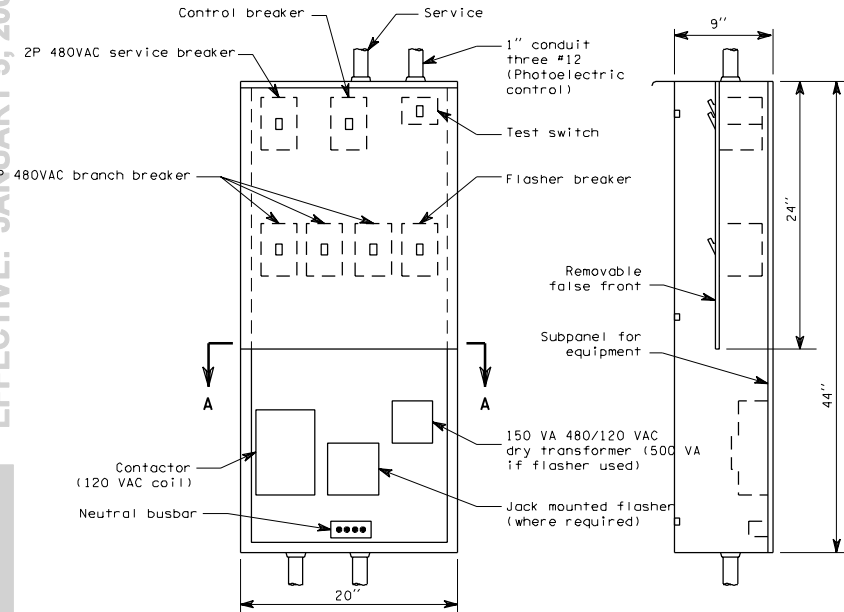
Clifford E. Mansfield 6/23/00

DEPUTY STATE DESIGN ENGINEER
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

1. Metering arrangements may vary with different serving utilities. The contractor shall verify the requirements of the utility prior to installing the service equipment.
2. All service pole conduit shall be secured to the pole with conduit strap at 5' centers.
3. All risers and service equipment shall be installed on side of pole that is away from traffic.
4. Where required by the serving utility, service breakers shall be installed above the meter socket in a separate raintight enclosure.
5. Bend and attach to pole within 1' of enclosure. See Standard Plan "Typical Grounding Details."
6. For Type B service wiring diagram, use Standard Plan "Modified Type B Service". For Type C service wiring diagram, use Standard Plan, "Type E Service."
7. See breaker schedule in contract for breaker and contactor sizes.



TYPE B SERVICE CABINET

TYPE A WIRING DIAGRAM
120 VOLTTYPE A, B AND C SERVICE
LIGHTING DETAILS

TYPE C SERVICE CABINET

J-3

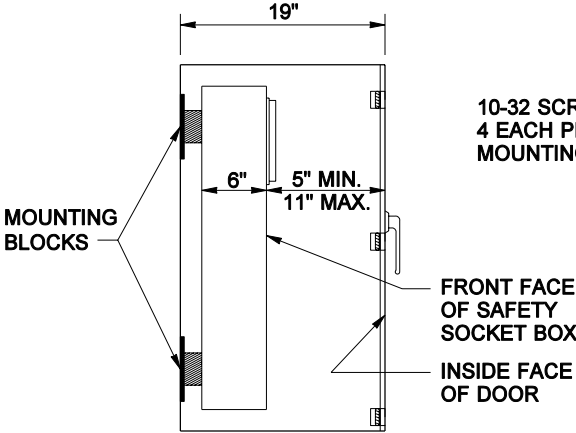
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Sheet 2 of 2 Sheets

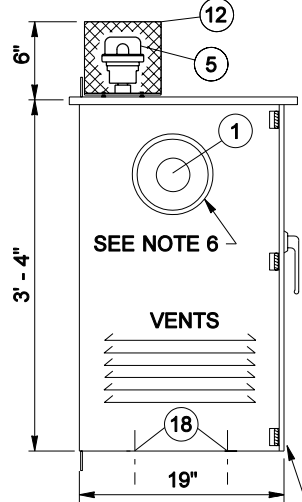
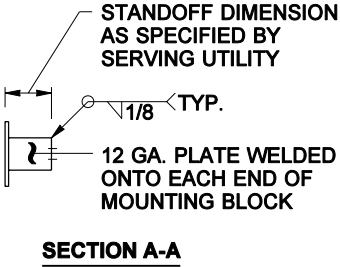
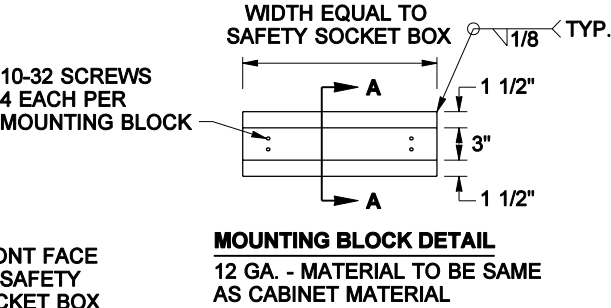
GENERAL NOTES

200 AMP TYPE 120/240 1Ø SERVICE CABINET

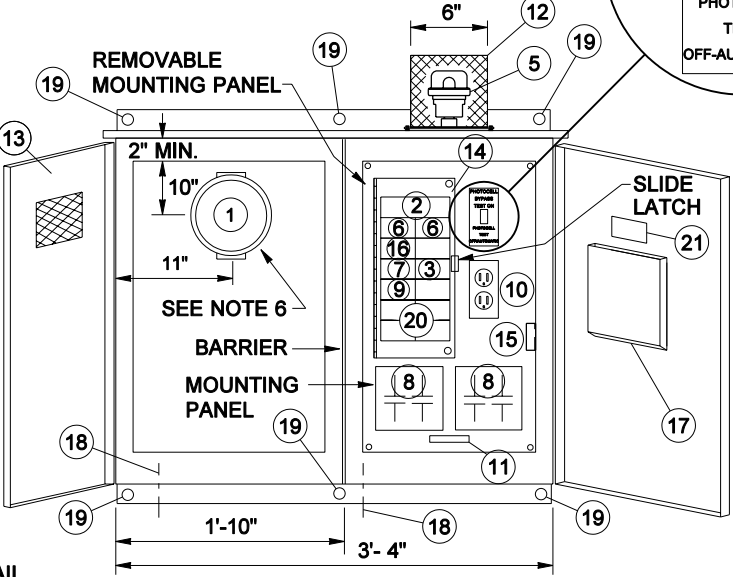
1. SEE STANDARD SPECIFICATION 9-29.24, SERVICE CABINETS.
2. HINGES SHALL HAVE STAINLESS STEEL OR BRASS PINS.
3. CABINETS SHALL BE RATED NEMA 3R AND SHALL INCLUDE TWO RAIN TIGHT VENTS.
4. METERING EQUIPMENT DOOR SHALL BE PAD LOCKABLE. EACH DOOR SHALL BE GASKETED. INSTALL BEST CX CONSTRUCTION CORE ON RIGHT DOOR. SEE DOOR HINGE DETAIL, SHEET 1 OF 2.
5. THE FOLLOWING EQUIPMENT WITHIN THE SERVICE ENCLOSURE SHALL HAVE AN APPROPRIATELY ENGRAVED PHENOLIC NAME PLATE ATTACHED WITH SCREWS OR RIVETS: KEY NUMBERS 2, 3, 4, 6, 7, 8, 9 AND 16. KEY NUMBER 4 NAME PLATE SHALL READ: "PHOTOCELL BYPASS TEST ON" AND "PHOTOCELL TEST OFF- AUTOMATIC". SEE SERVICE CABINET DETAIL.
6. METERING ARRANGEMENTS VARY WITH DIFFERENT SERVING UTILITIES. THE UTILITY MAY REQUIRE METER BASE MOUNTING IN THE ENCLOSURE, ON THE SIDE OR ON THE BACK OF THE ENCLOSURE. THE UTILITY MAY REQUIRE THE DIMENSION BETWEEN THE DOOR AND THE FRONT OF THE SAFETY SOCKET BOX TO BE LESS THAN THE 11 INCHES SHOWN IN THE LEFT SIDE- SAFETY SOCKET BOX MOUNTING DETAIL. THE CONTRACTOR SHALL VERIFY THE SERVING UTILITY'S REQUIREMENTS PRIOR TO FABRICATION OF AND INSTALLING THE SERVICE EQUIPMENT.
7. DIMENSIONS SHOWN ARE MINIMUM AND SHALL BE ADJUSTED TO ACCOMMODATE THE VARIOUS SIZES OF EQUIPMENT INSTALLED.
8. ALL BUSSWORK SHALL BE HIGH GRADE COPPER AND SHALL EQUAL OR EXCEED THE MAIN BREAKER RATING. ALL BREAKERS SHALL BOLT ONTO THE BUSSWORK. JUMPERING OF BREAKERS SHALL NOT BE ALLOWED. BUSSWORK SHALL ACCOMMODATE ALL FUTURE EQUIPMENT AS SHOWN IN THE BREAKER SCHEDULE.
9. THE PHOTOCELL UNIT SHALL BE CENTERED IN THE PHOTOCELL ENCLOSURE TO PERMIT 360 DEGREE ROTATION OF THE PHOTOCELL WITHOUT REMOVAL OF THE PHOTOCELL UNIT OR THE PHOTOCELL ENCLOSURE.
10. ALL INTERNAL WIRE RUNS SHALL BE IDENTIFIED WITH "TO - FROM" CODED TAGS LABELED WITH THE CODE LETTERS AND/OR NUMBERS SHOWN ON THE SCHEDULES. APPROVED PVC OR POLYOLEFIN WIRE MARKING SLEEVES SHALL BE USED.
11. ALL NUTS, BOLTS AND WASHERS USED FOR MOUNTING THE PHOTOCELL ENCLOSURE SHALL BE STAINLESS STEEL.
12. A 1% TOLERANCE IS ALLOWED FOR ALL DIMENSIONS.
13. UNISTRUT TYPE CHANNEL AND MOUNTING HARDWARE COMPONENTS SHALL BE STAINLESS STEEL. CONDUIT CLAMPS SHALL BE HOT DIPPED, GALVANIZED STEEL OR STAINLESS STEEL.
14. INSTALL CONDUIT COUPLINGS ON ALL CONDUITS. PLACE COUPLINGS FLUSH WITH TOP OF CONCRETE FOUNDATION.
15. NOTE 15 HAS BEEN DELETED.
16. THE METER BASE PORTION OF THIS SERVICE WAS DESIGNED TO MEET METERING PORTION OF EUSERC DRAWING 309 REQUIREMENTS.
17. WHEN USING ALTERNATE DOOR HINGE: REMOVE HINGE PIN PRIOR TO WELDING HINGE TO CABINET AND PRIOR TO HOT DIP GALVANIZING CABINET. AFTER GALVANIZING, REPLACE PIN WITH BRASS PIN AND SOLDER IN PLACE.



LEFT SIDE- SAFETY SOCKET BOX MOUNTING DETAIL
FABRICATE MOUNTING BLOCKS AFTER VERIFYING THE SERVICE UTILITY STAND OFF DIMENSION.

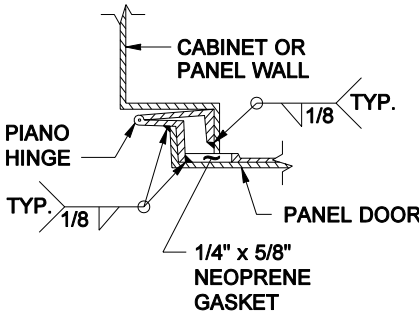


LEFT SIDE

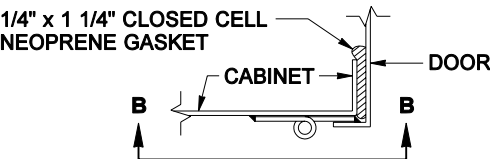


FRONT

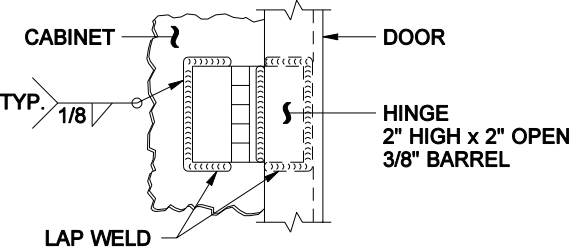
SERVICE CABINET DETAIL



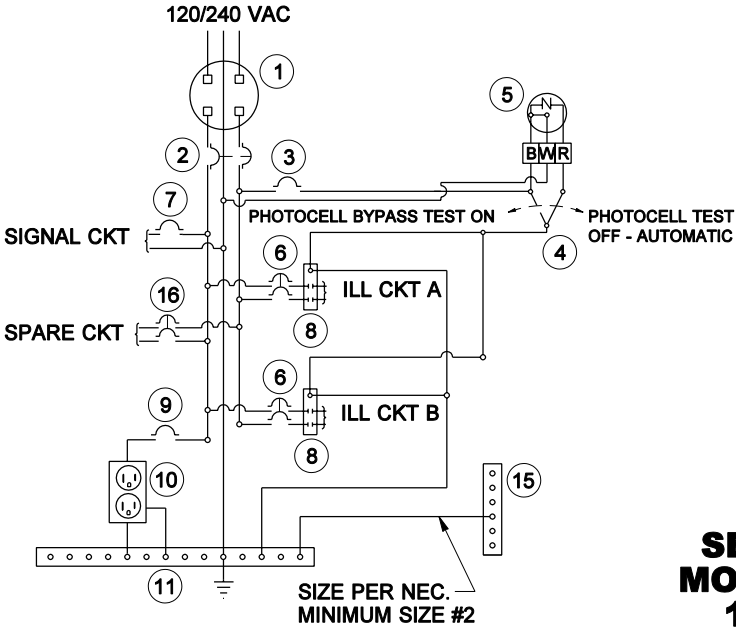
DOOR HINGE DETAIL



DOOR HINGE DETAIL
ALTERNATE FOR TYPE B MODIFIED CABINET
SEE NOTE 17



VIEW B-B



WIRING SCHEMATIC

KEY

- 1 METER BASE PER SERVING UTILITY REQUIREMENTS. AS A MINIMUM, THE METER BASE SHALL BE SAFETY SOCKET BOX WITH FACTORY INSTALLED TEST BYPASS FACILITY THAT MEETS THE REQUIREMENTS OF EUSERC DRAWING 305.
- 2 MAIN BREAKER (SEE BREAKER SCHEDULE)
- 3 PHOTOCELL BREAKER (SPST 15 AMP - 120/240 VOLT)
- 4 TEST SWITCH (SPDT SNAP ACTION, POSITIVE CLOSE 15 AMP - 120/277 VOLT - "T" RATED)
- 5 PHOTOELECTRIC CONTROL, STD. SPEC. 9 - 29.11(2)
- 6 BRANCH BREAKER (SEE BREAKER SCHEDULE)
- 7 SIGNAL BREAKER (SEE BREAKER SCHEDULE)
- 8 CONTACTOR (SEE BREAKER SCHEDULE)
- 9 RECEPTACLE BREAKER (SPST 20 AMP - 120/240 VOLT)
- 10 RECEPTACLE, GROUNDED (GFCI 20 AMP - 125 VOLT)
- 11 NEUTRAL BUSS, 14 LUG COPPER
- 12 PHOTOCELL ENCLOSURE - ENCLOSURE TO BE FABRICATED FROM 5/8" EXPANDED STEEL MESH WITH WELDED SEAMS AND MOUNTING FLANGES. HOT DIP GALVANIZED AFTER FABRICATION. TYPE 5052 - H32 ALUMINUM WITH 5/8" x 5/8" OPENINGS EQUIVALENT TO 5/8" EXPANDED STEEL MESH MAY BE USED AS ALTERNATIVE MATERIAL. SEE PHOTOCELL ENCLOSURE MOUNTING DETAIL, SHEET 2 OF 2.
- 13 HINGED FRONT FACING DOOR WITH 4" x 4" MIN. POLISHED WIRE GLASS WINDOW.
- 14 HINGED DEAD FRONT WITH 1/4 TURN FASTENERS OR SLIDE LATCH.
- 15 CABINET MAIN BONDING JUMPER. BUSS SHALL BE 4 LUG TINNED COPPER. SEE CABINET MAIN BONDING JUMPER DETAIL ON SHEET 2 OF 2.
- 16 SPARE BRANCH BREAKER (DPST 20AMP- 120/240 VOLT)
- 17 METAL WIRING DIAGRAM HOLDER
- 18 1/4" DIAMETER DRAIN HOLE. DRILL BEFORE GALVANIZING.
- 19 MOUNTING HOLE. SEE SERVICE CABINET MOUNTING DETAILS.
- 20 18 CIRCUIT PANEL BOARD - MINIMUM SIZE WITH SEPARATE MAIN BREAKER.
- 21 LABEL CABINET WITH BUSSWORK RATING.



EXPIRES MAY 5, 2005

SERVICE CABINET TYPE B
MODIFIED (0 - 200 AMP TYPE
120/240 SINGLE PHASE)
STANDARD PLAN J-3b

SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 11-05-03

STATE DESIGN ENGINEER

DATE



Washington State Department of Transportation

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09/2003

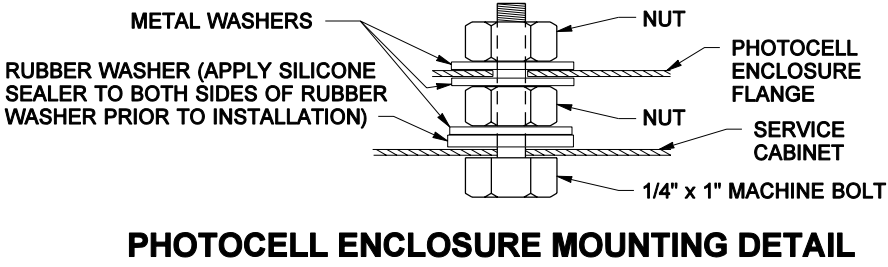
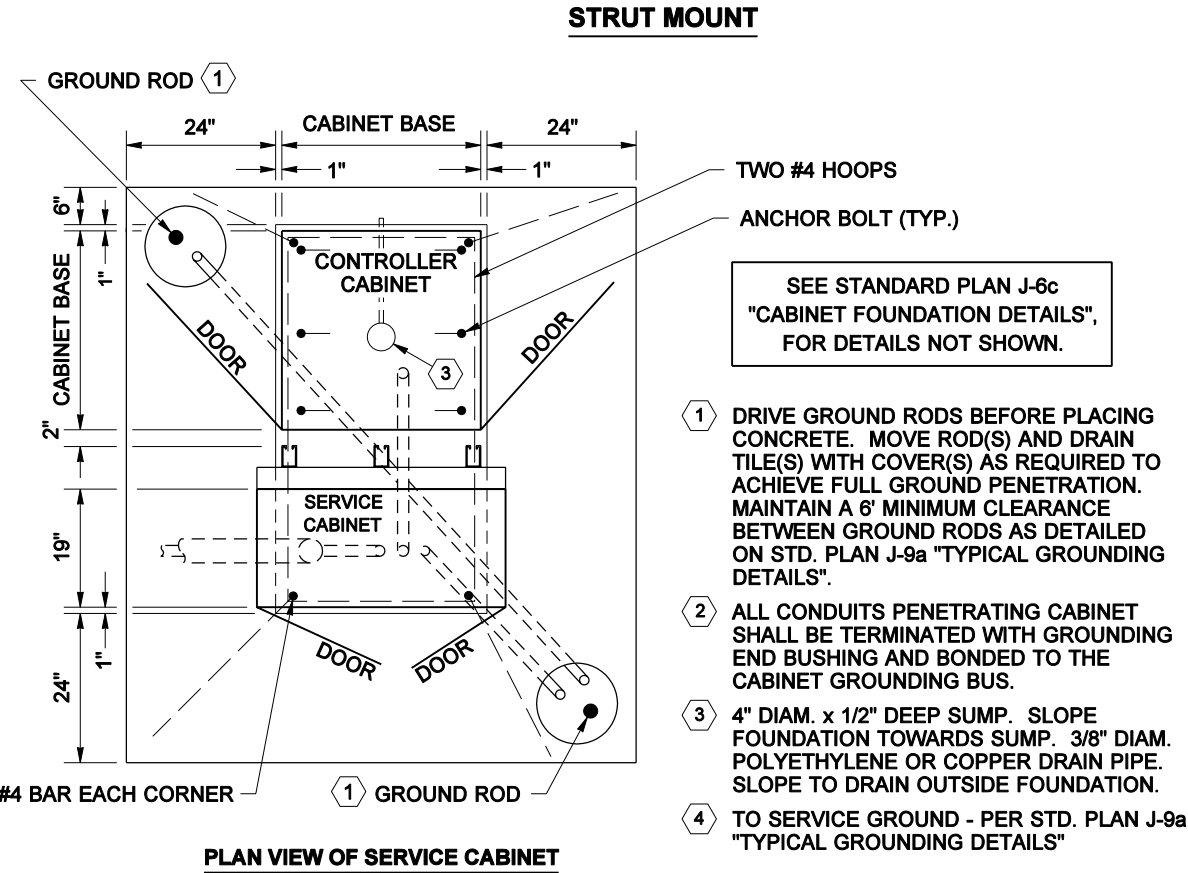
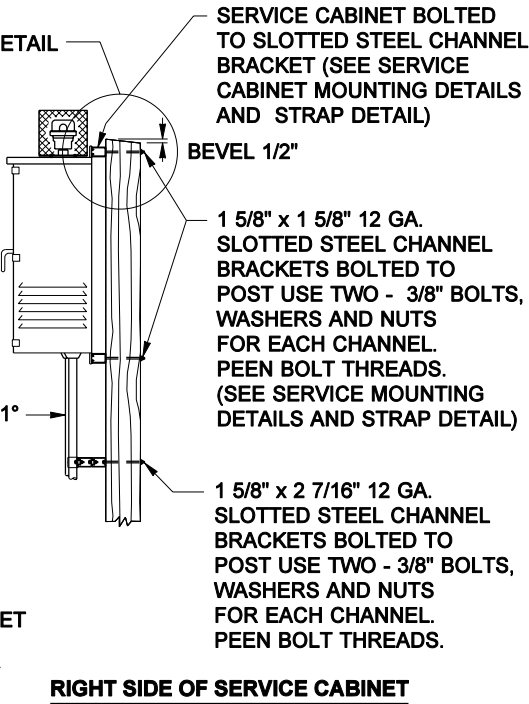
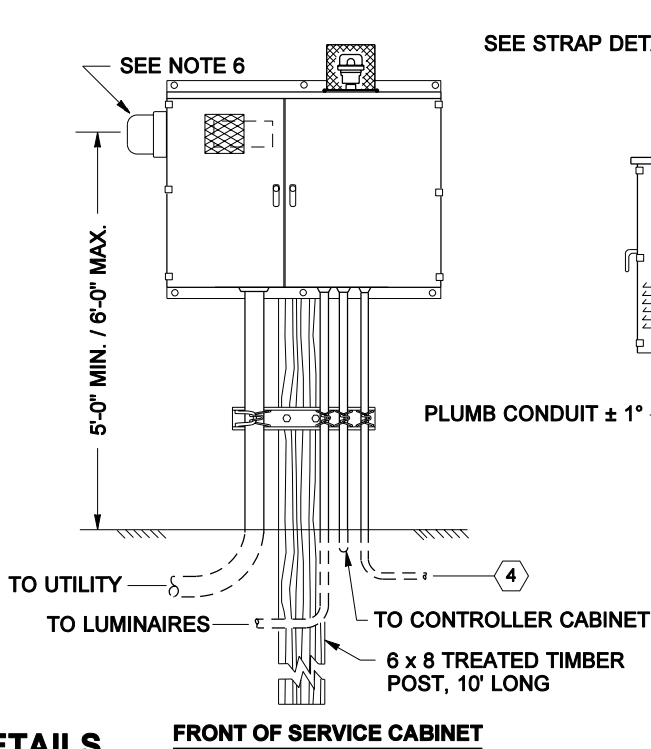
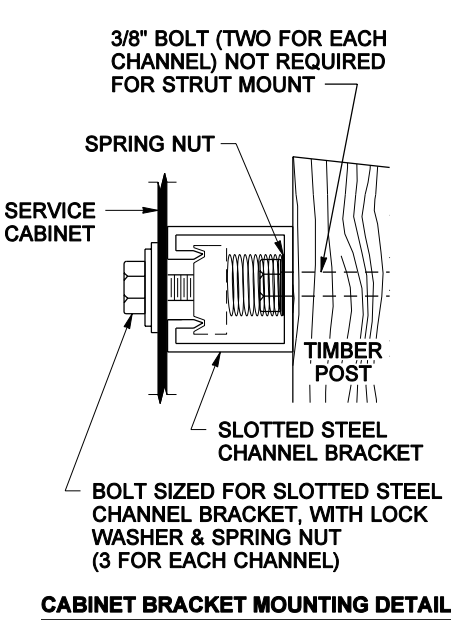
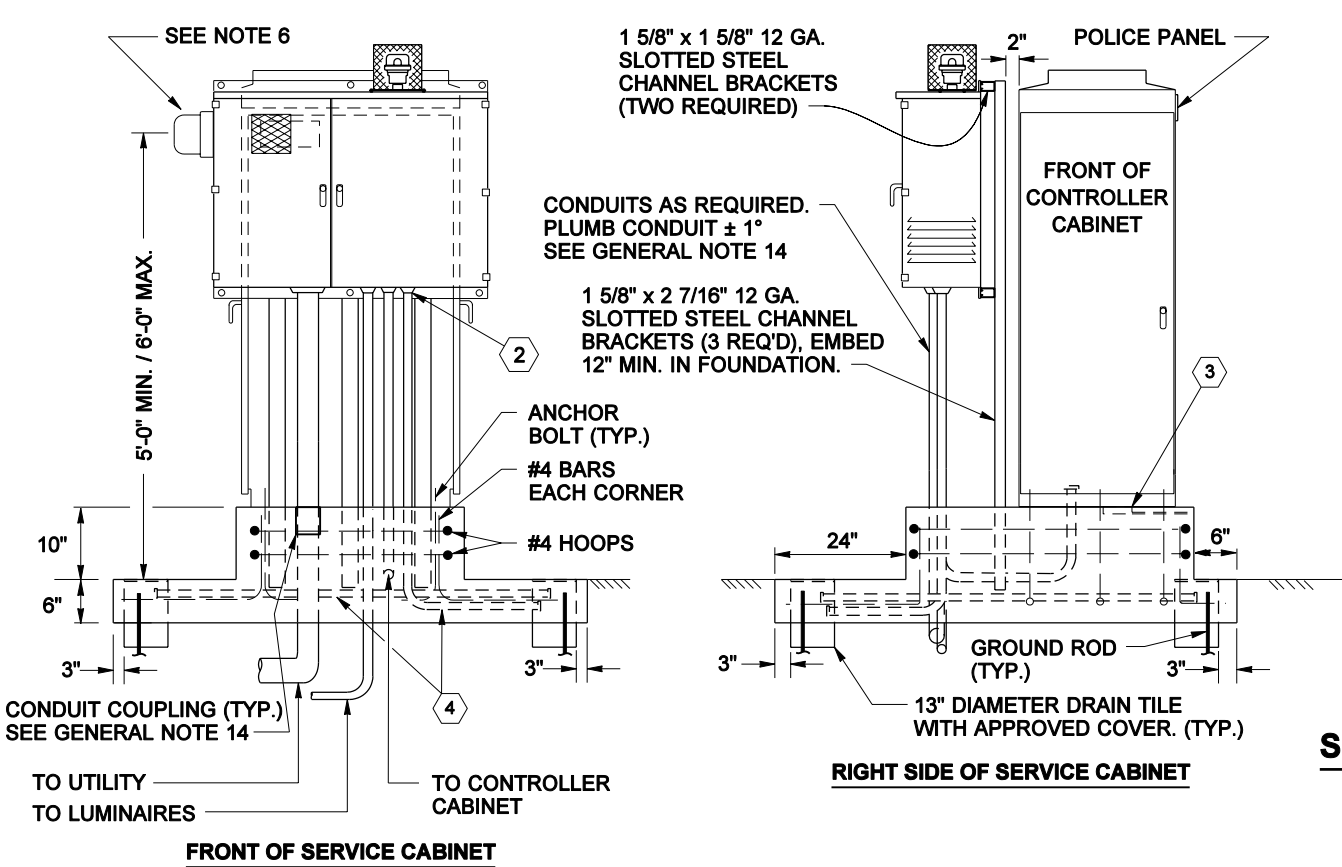
REVISED NOTE 13

MHG

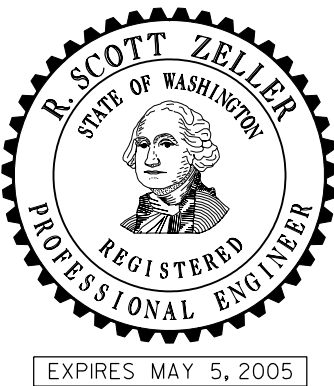
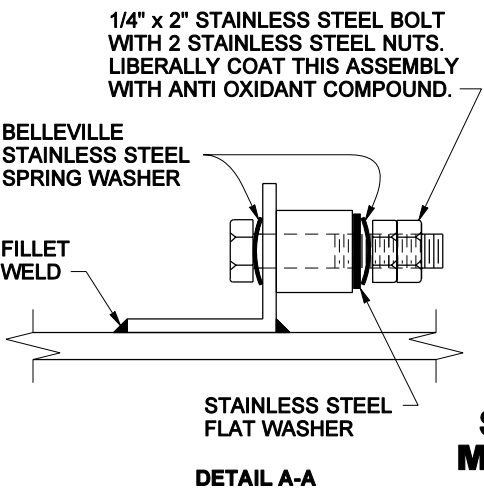
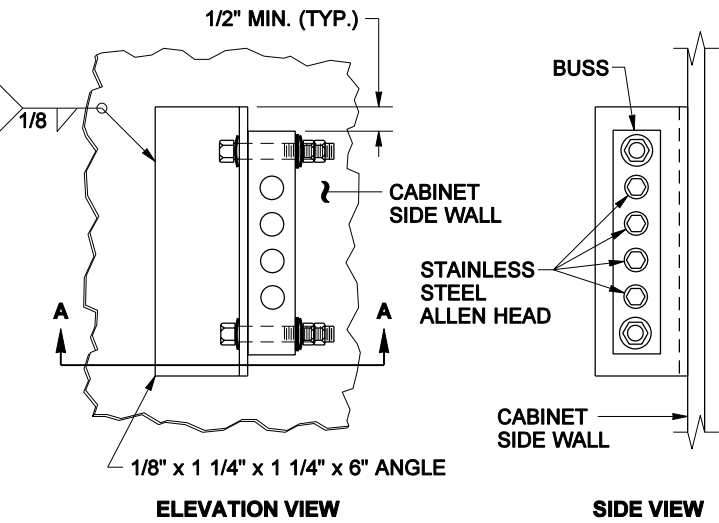
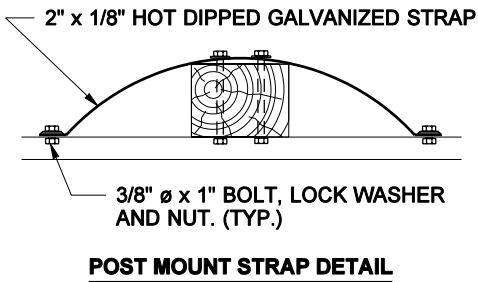
DATE

REVISION

BY



POST MOUNT



SERVICE CABINET TYPE B MODIFIED (0 - 200 AMP TYPE 120/240 SINGLE PHASE) STANDARD PLAN J-3b

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

Harold J. Peterfeso 11-05-03

STATE DESIGN ENGINEER

DATE

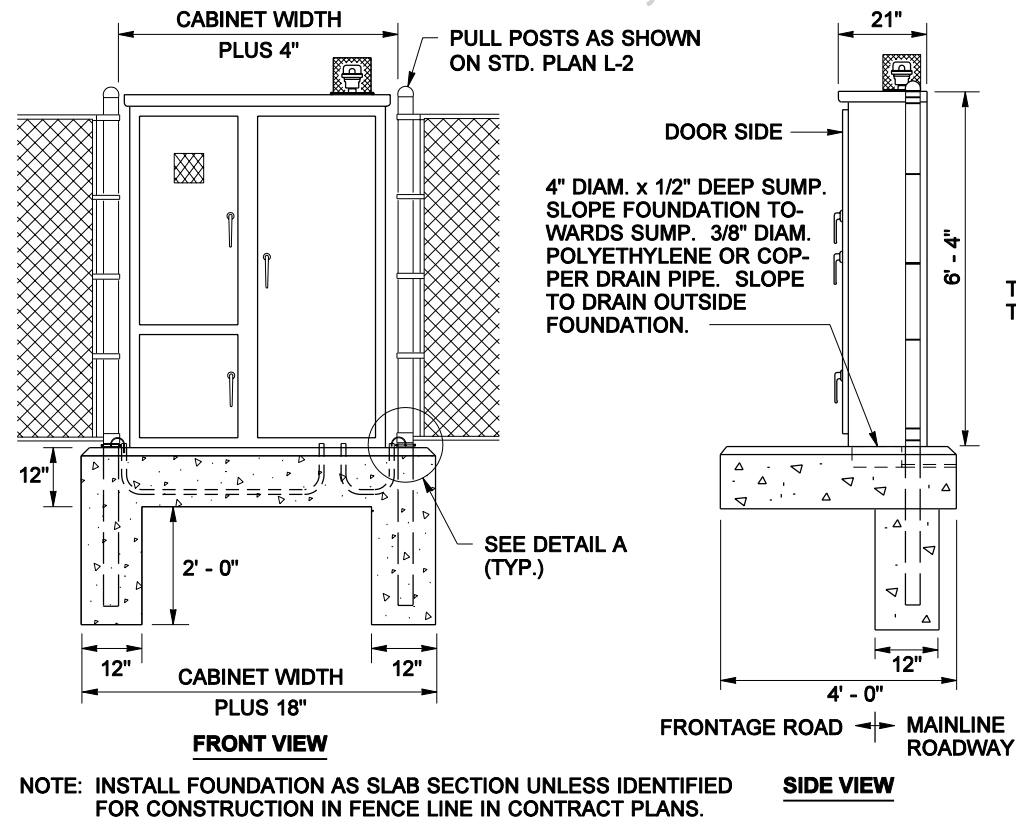
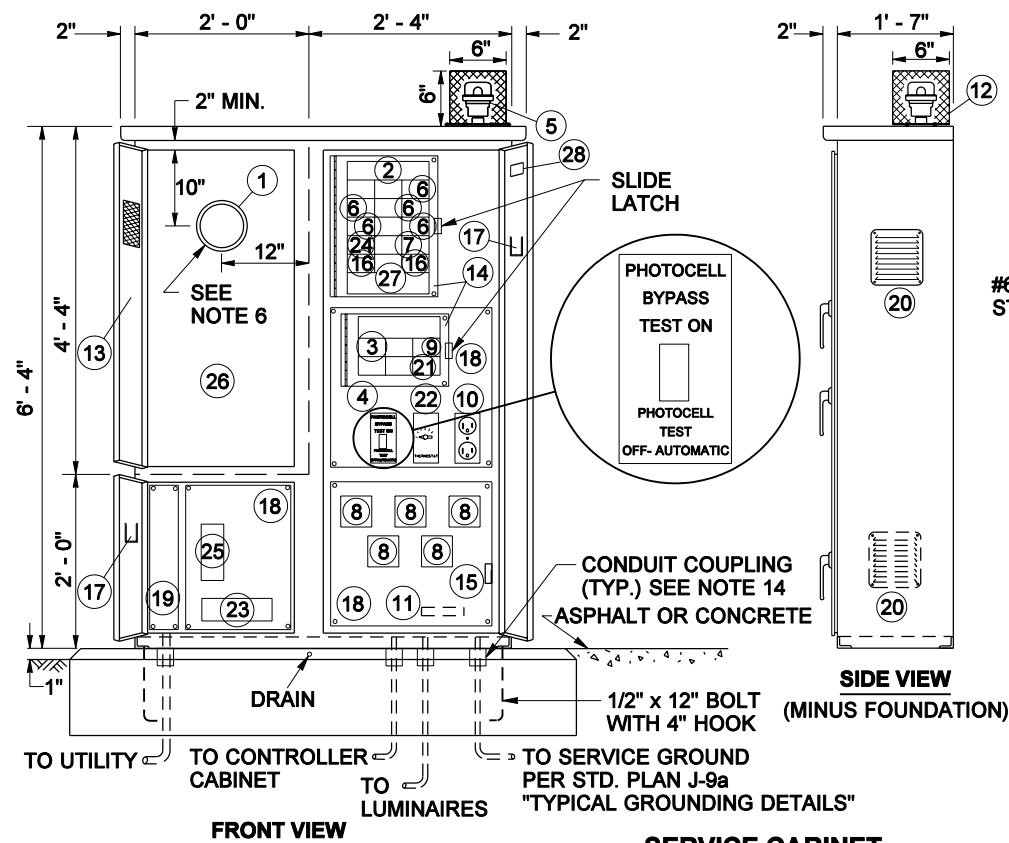
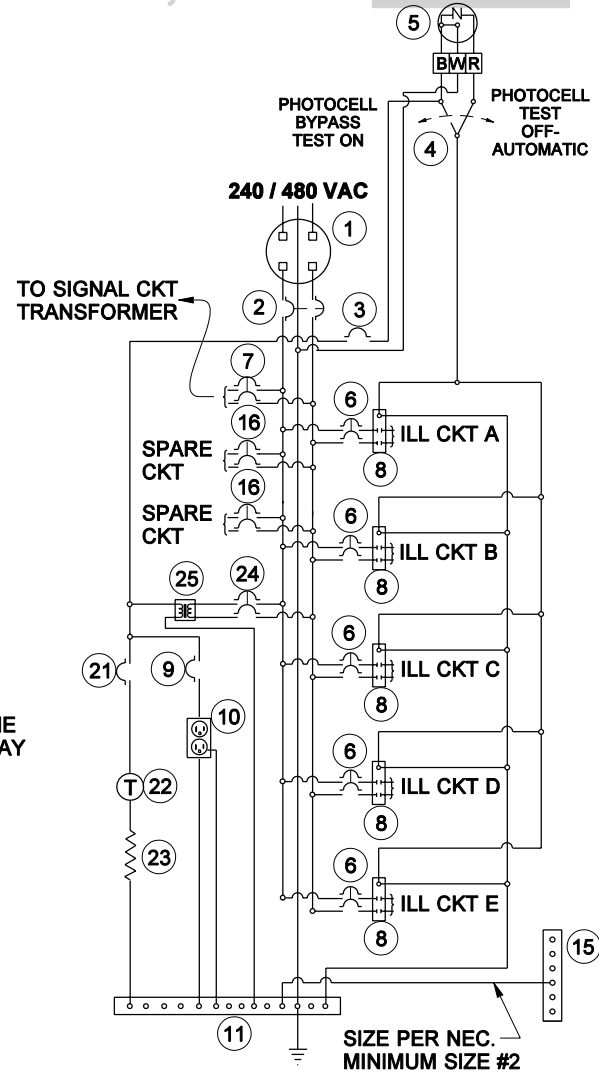
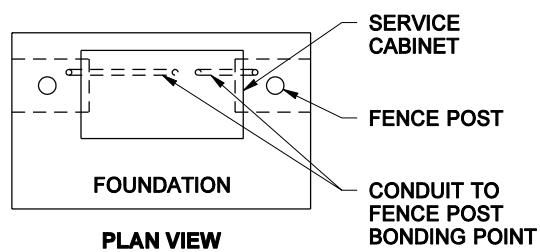
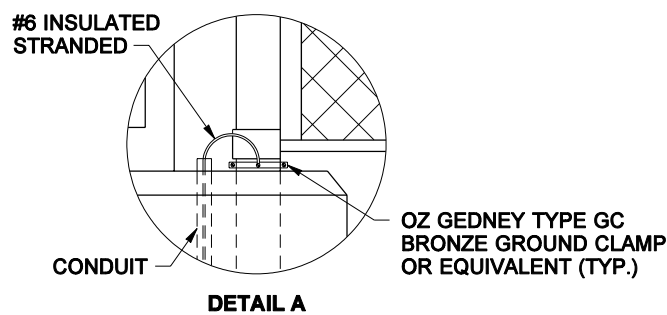


Washington State Department of Transportation

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09/2003	REVISED SERVICE CABINET MOUNTING DETAIL	MHG
DATE	REVISION	BY



**INSTALLATION DETAIL****SERVICE CABINET****WIRING SCHEMATIC****PLAN VIEW**

- 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.
 - MAIN BREAKER (SEE 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, STD. SPEC. 9 - 29.11(2)
 - BRANCH BREAKER (SEE BREAKER SCHEDULE)
 - SIGNAL TRANSFORMER BREAKER (SEE BREAKER SCHEDULE)
 - CONTACTOR (SEE BREAKER SCHEDULE)
 - RECEPTACLE BREAKER (SPST 20 AMP - 120/240 VOLT)
 - RECEPTACLE, GROUNDED (GFCI 20 AMP - 125 VOLT)
 - NEUTRAL BUSS, 14 LUG COPPER
 - PHOTOCELL ENCLOSURE - ENCLOSURE TO BE FABRICATED FROM 5/8" EXPANDED STEEL MESH WITH WELDED SEAMS AND MOUNTING FLANGES. HOT DIP GALVANIZED AFTER FABRICATION. TYPE 5052 - H32 ALUMINUM WITH 5/8" x 5/8" OPENINGS EQUIVALENT TO 5/8" EXPANDED STEEL MESH MAY BE USED AS ALTERNATIVE MATERIAL. SEE PHOTOCELL ENCLOSURE MOUNTING DETAILS, STANDARD PLAN J-3b.
 - HINGED FRONT FACING DOOR WITH 4" x 4" MIN. POLISHED WIRE GLASS WINDOW.
 - HINGED DEAD FRONT WITH 1/4 TURN FASTENERS OR SLIDE LATCH
 - CABINET MAIN BONDING JUMPER. BUSS SHALL BE 4 LUG TINNED COPPER. SEE CABINET MAIN BONDING JUMPER DETAIL, STANDARD PLAN J-3b.
 - SPARE BRANCH BREAKER (DPST 20AMP- 240/480 VOLT)
 - METAL WIRING DIAGRAM HOLDER
 - REMOVABLE EQUIPMENT MOUNTING PAN
 - 6" x 6" MIN. UNDERGROUND FEED - SERVICE WIREWAY (LEFT REAR CORNER)
 - SCREENED VENTS, 2 REQUIRED, 1 EACH SIDE, LOUVERED PLATES
 - HEATER BREAKER (SPST 15 AMP - 120/240 VOLT)
 - THERMOSTAT, 40°F CLOSURE - 3 DIFFERENTIAL
 - STRIP HEATER (100 WATT NOMINAL), WITH TERMINAL STRIP COVER
 - TRANSFORMER BREAKER (DPST 15 AMP - 480 VOLT)
 - DRY TRANSFORMER (480/120 VOLT) 3 KVA COPPER BUSSED AND COPPER WOUND
 - RESERVED FOR METER, CURRENT TRANSFORMER AND/OR DISCONNECT SWITCH AS REQUIRED BY THE UTILITY
 - 24 CIRCUIT PANEL BOARD - MINIMUM SIZE WITH SEPARATE MAIN BREAKER.
 - LABEL CABINET WITH BUSSWORK RATING

GENERAL NOTES**200 AMP TYPE 240/480 1ø SERVICE CABINET**

- SEE STD. SPECIFICATION 9-29.24, SERVICE CABINETS.
- HINGES SHALL HAVE STAINLESS STEEL OR BRASS PINS.
- CABINETS SHALL BE RATED NEMA 3R AND SHALL INCLUDE TWO RAIN TIGHT VENTS.
- METERING EQUIPMENT DOORS SHALL BE PAD LOCKABLE. EACH DOOR SHALL BE GASKETED. INSTALL BEST CX CONSTRUCTION CORE ON BOTTOM LEFT AND RIGHT DOORS. SEE DOOR HINGE DETAIL, STD. PLAN J-3b; CONCEALED HEAVY DUTY STAINLESS STEEL LIFT OFF HINGES ARE ALLOWED AS AN ALTERNATIVE. UPPER LEFT DOOR SHALL HAVE 3 HINGES, LOWER LEFT DOOR SHALL HAVE 2 HINGES, AND RIGHT DOOR SHALL HAVE 3 HINGES. LOWER DOOR SHALL HAVE A TWO POSITION DOOR STOP ASSEMBLY.

- THE FOLLOWING EQUIPMENT WITHIN THE SERVICE ENCLOSURE SHALL HAVE AN APPROPRIATELY ENGRAVED PHENOLIC NAME PLATE ATTACHED WITH SCREWS OR RIVETS: KEY NUMBERS 2, 3, 4, 6, 7, 8, 9, 16, 21 AND 25. KEY NUMBER 4 NAME PLATE SHALL READ: "PHOTOCELL BYPASS TEST ON" AND "PHOTOCELL TEST OFF- AUTOMATIC". SEE SERVICE CABINET DETAIL.
- METERING ARRANGEMENTS VARY WITH DIFFERENT SERVING UTILITIES. THE UTILITY MAY REQUIRE METER BASE MOUNTING IN THE ENCLOSURE, ON THE SIDE, OR ON THE BACK OF THE ENCLOSURE. THE UTILITY MAY REQUIRE THE DIMENSION BETWEEN THE DOOR AND THE FRONT OF THE SAFETY SOCKET BOX TO BE LESS THAN THE 11 INCHES SHOWN IN THE LEFT SIDE. SAFETY SOCKET BOX MOUNTING DETAIL, SEE STD. PLAN J-3b. THE CONTRACTOR SHALL VERIFY THE SERVING UTILITY'S REQUIREMENTS PRIOR TO FABRICATION OF AND INSTALLING THE SERVICE EQUIPMENT.
- THE DIMENSIONS SHOWN ARE MINIMUM AND SHALL BE ADJUSTED TO ACCOMMODATE THE VARIOUS SIZES OF EQUIPMENT INSTALLED.
- ALL BUSSWORK SHALL BE HIGH GRADE COPPER AND SHALL EQUAL OR EXCEED THE MAIN BREAKER RATING. ALL BREAKERS SHALL BOLT ONTO THE BUSSWORK. JUMPERING OF BREAKERS SHALL NOT BE ALLOWED. BUSSWORK SHALL ACCOMMODATE ALL FUTURE EQUIPMENT AS SHOWN IN THE BREAKER SCHEDULE.
- THE PHOTOCELL UNIT SHALL BE CENTERED IN THE PHOTOCELL ENCLOSURE TO PERMIT 360 DEGREE ROTATION OF THE PHOTOCELL WITHOUT REMOVAL OF THE PHOTOCELL UNIT OR THE PHOTOCELL ENCLOSURE.
- ALL INTERNAL WIRE RUNS SHALL BE IDENTIFIED WITH "TO - FROM" CODED TAGS LABELED WITH THE CODE LETTERS AND/OR NUMBERS SHOWN ON THE SCHEDULES. APPROVED PVC OR POLYOLEFIN WIRE MARKING SLEEVES SHALL BE USED.
- ALL NUTS, BOLTS, AND WASHERS USED FOR MOUNTING PHOTOCELL ENCLOSURE SHALL BE STAINLESS STEEL.
- A 1% TOLERANCE IS ALLOWED FOR ALL DIMENSIONS.
- SEE PLANS FOR BREAKER SCHEDULE.
- INSTALL CONDUIT COUPLINGS ON ALL CONDUITS. PLACE COUPLINGS FLUSH WITH TOP OF CONCRETE FOUNDATION.
- SEAL CABINET TO FOUNDATION WITH A 1/2" BEAD OF SILICONE. APPLY SILICONE TO DRY SURFACE ONLY.
- THE METER BASE PORTION OF THIS SERVICE WAS DESIGNED TO MEET METERING PORTION OF EUSERC DRAWING 309 REQUIREMENTS.



EXPIRES MAY 5, 2005

**SERVICE CABINET TYPE E
(0 - 200 AMP TYPE 240/480
SINGLE PHASE)
STANDARD PLAN J-3d**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 11-05-03

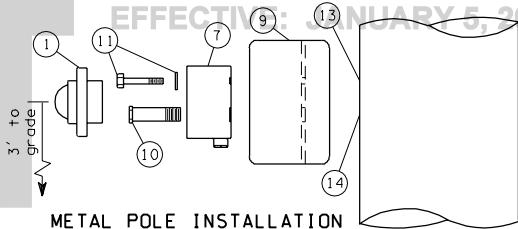
STATE DESIGN ENGINEER

DATE



Washington State Department of Transportation

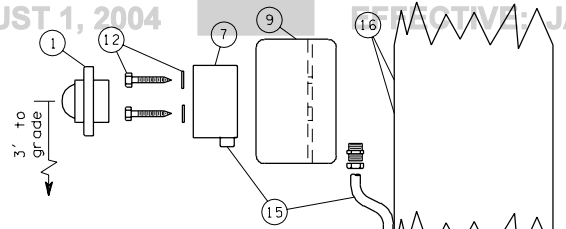
09/2003	REVISED KEY NOTE 16	MHG
DATE	REVISION	BY



METAL POLE INSTALLATION

PPB-M

(Pedestrian PushButton - Metal Pole)



WOOD POLE INSTALLATION

PPB-W

(Pedestrian PushButton - Wood Pole)

(Bottom feed shown)

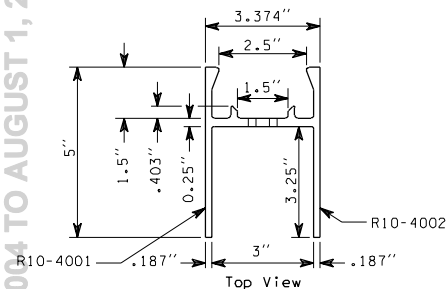


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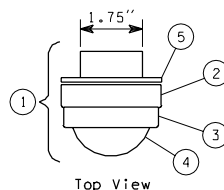


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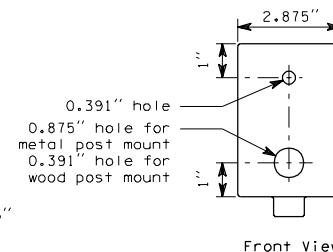
NOTE:
When "PPB-MR" or "PPB-WR" are specified in the contract, the arrow shall be installed in the opposite direction than as shown for "PPB-M" or "PPB-W"



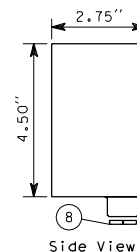
Top View



Top View

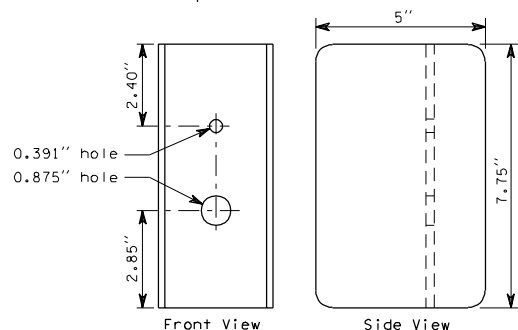


Front View



Side View

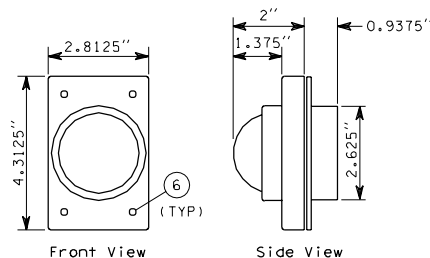
CAST ALUMINUM CONDULET



Front View

Side View

ALUMINUM 'H' EXTRUSION



Front View

Side View

PUSHBUTTON SWITCH ASSEMBLY

PEDESTRIAN PUSHBUTTON DETAILS

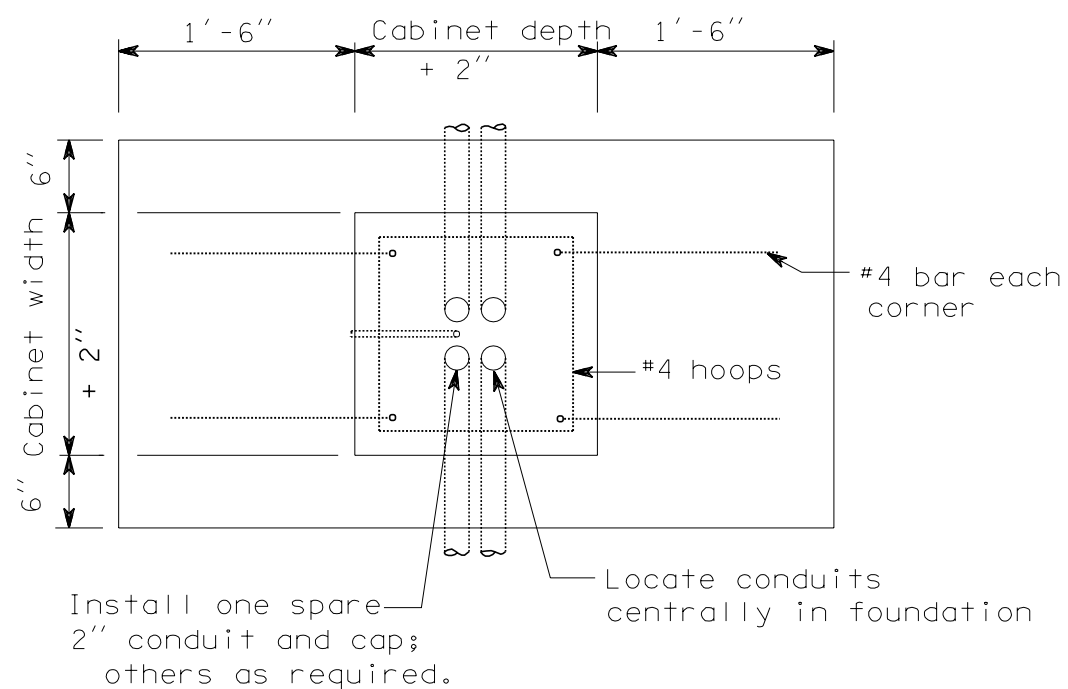
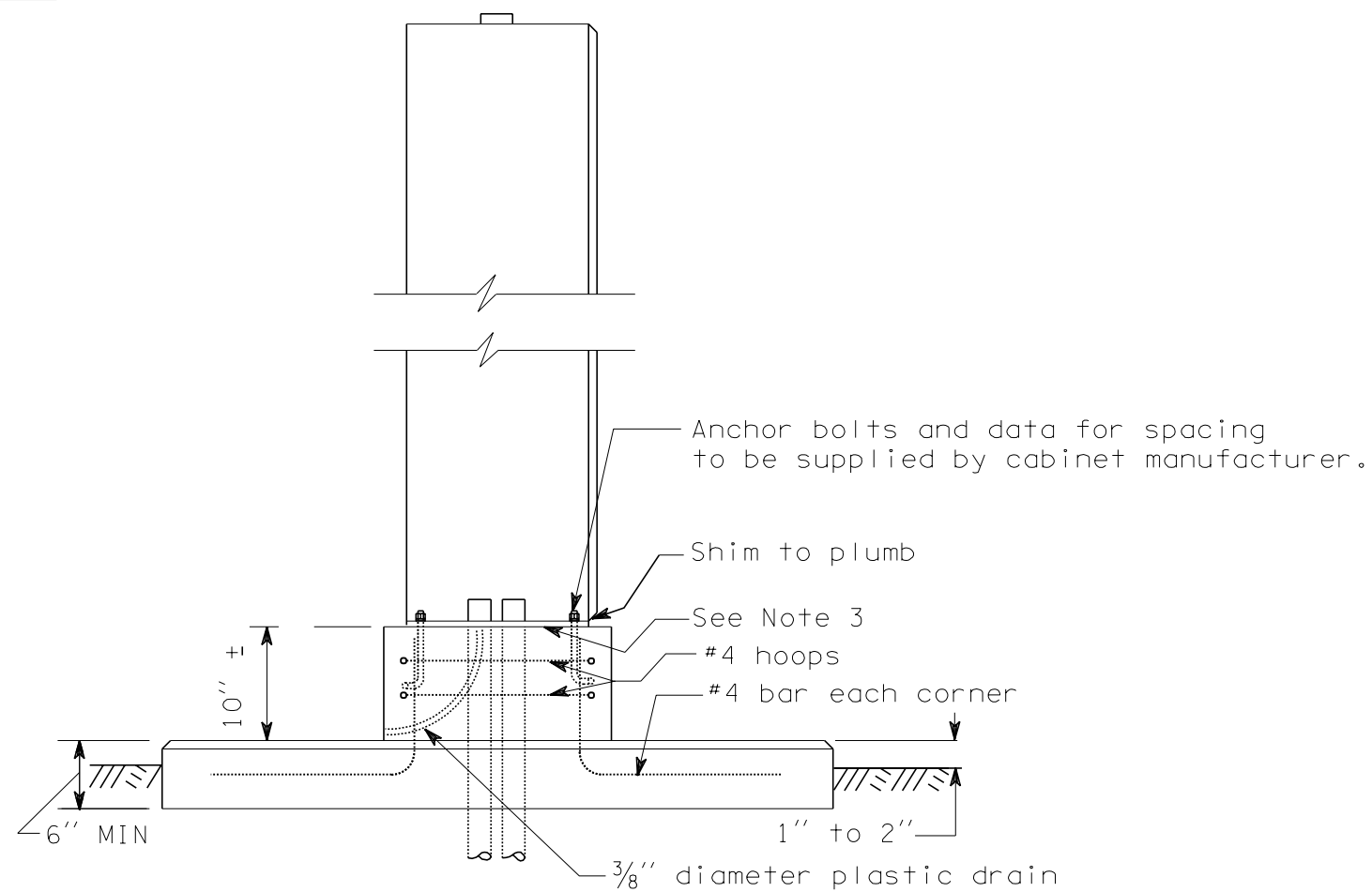
KEY

- 1 Pushbutton switch assembly
- 2 Cast metal housing
- 3 Protective collar
- 4 Pushbutton switch
- 5 Gasket
- 6 Stainless steel fastener
- 7 Cast aluminum condulet
- 8 Aluminum plug with $\frac{1}{8}$ " drilled weep hole. On timber pole installation, remove plug for wire entrance and drill weep hole in conduit.

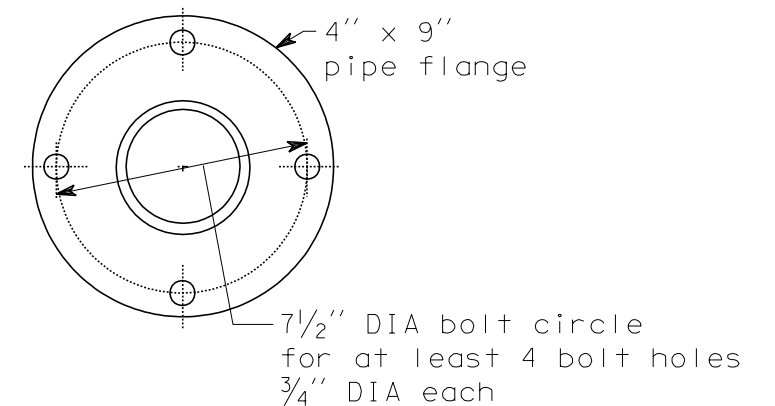
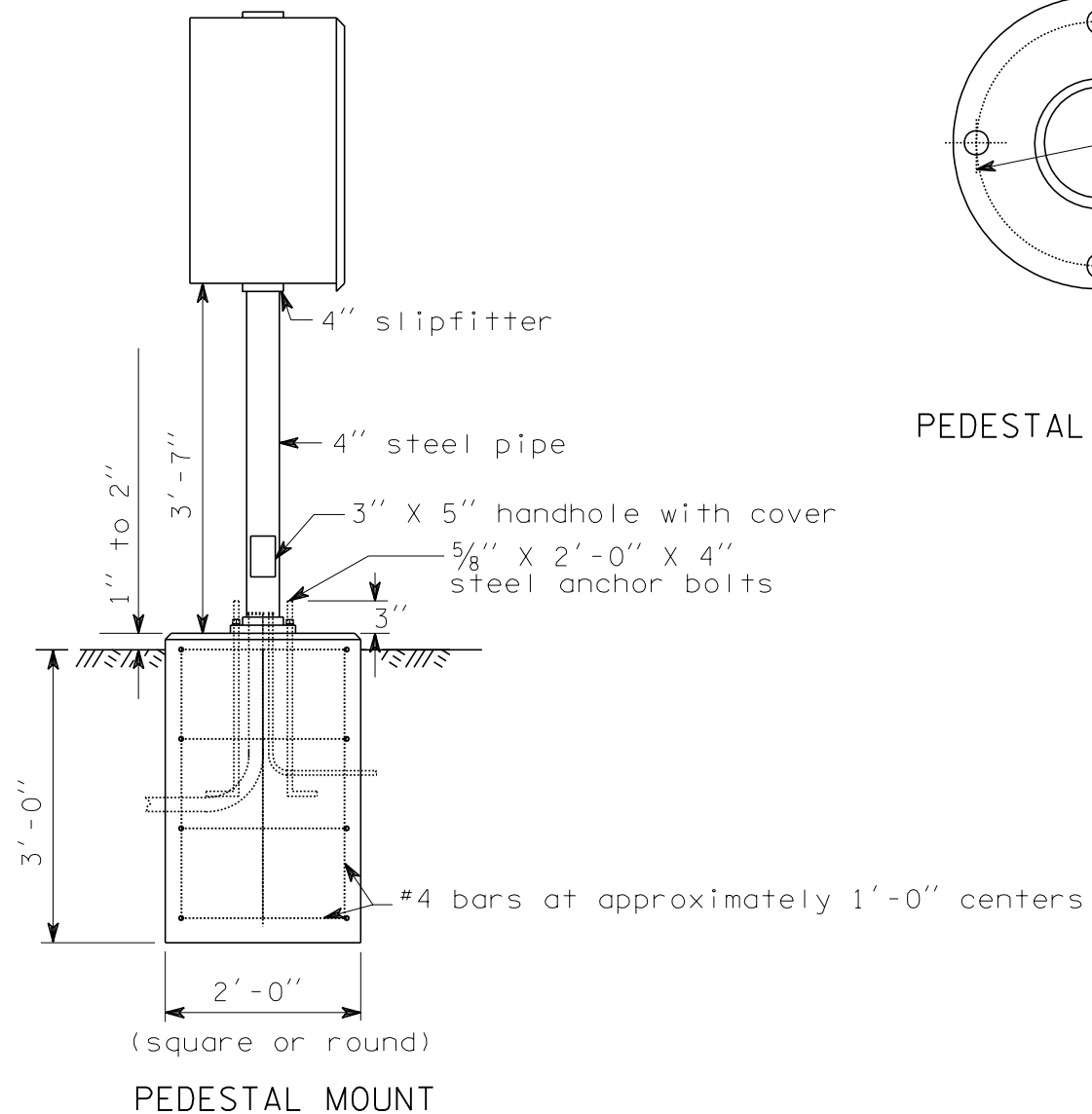
- 9 Aluminum 'H' extrusion
- 10 Chase nipple - $\frac{7}{8}$ " hex head x $\frac{1}{2}$ " pipe thread x $2\frac{1}{2}$ " long
- 11 $\frac{3}{8}$ " - 16 X $2\frac{1}{2}$ " stainless steel bolt with washer
- 12 $\frac{3}{8}$ " X 4" lag bolt with washer
- 13 Drill and tap shaft for $\frac{3}{8}$ " bolt
- 14 Drill and tap shaft for $\frac{1}{2}$ " nipple
- 15 Conduit and fittings as required for timber pole installation; reverse condulet and conduit for top feed
- 16 Drill pilot hole for $\frac{3}{8}$ " lag bolt

J-5 1 of 1

08-01-97



PAD MOUNT



PEDESTAL BASE DETAILS



EXPIRES JUNE 4, 1999

CABINET
FOUNDATION DETAILS
STANDARD PLAN J-6c

NOTES

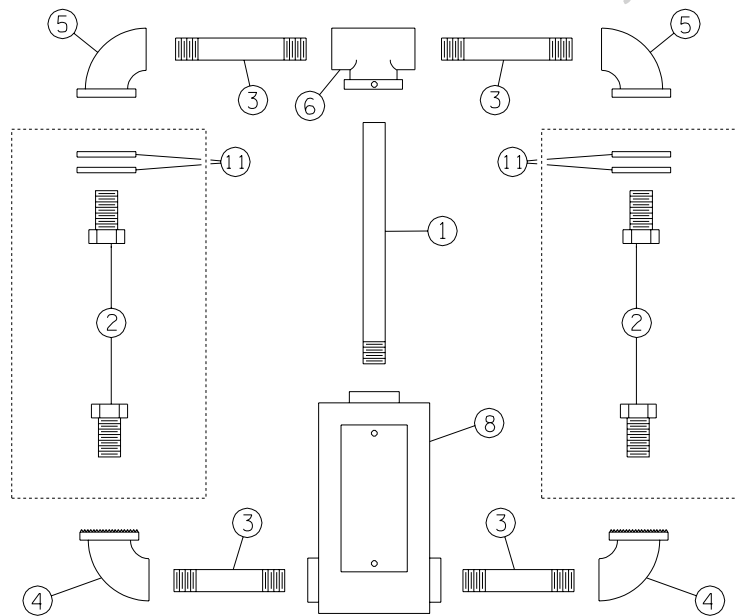
1. Where pad or pedestal mounts are located in a sidewalk, construct mount top flush with sidewalk grade, omitting chamfer where top and sidewalk abut.
2. Pad mount design is typical.
3. Place a silicone seal between the cabinet foundation and the cabinet for the pad mount design.

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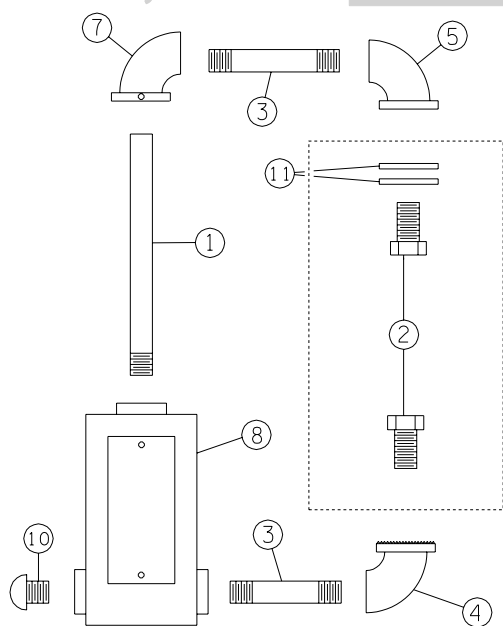
APPROVED FOR PUBLICATION

Clifford E. Mansfield 4/24/98
 DEPUTY STATE DESIGN ENGINEER DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON



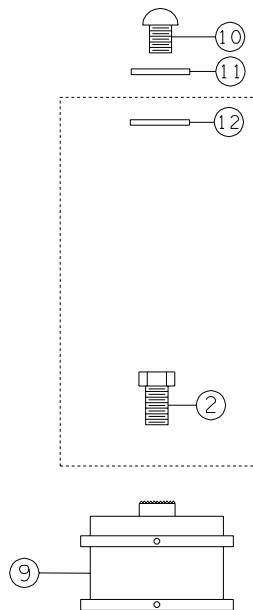
SIDE MOUNT
TYPE A - PED.
TYPE H - VEHICLE



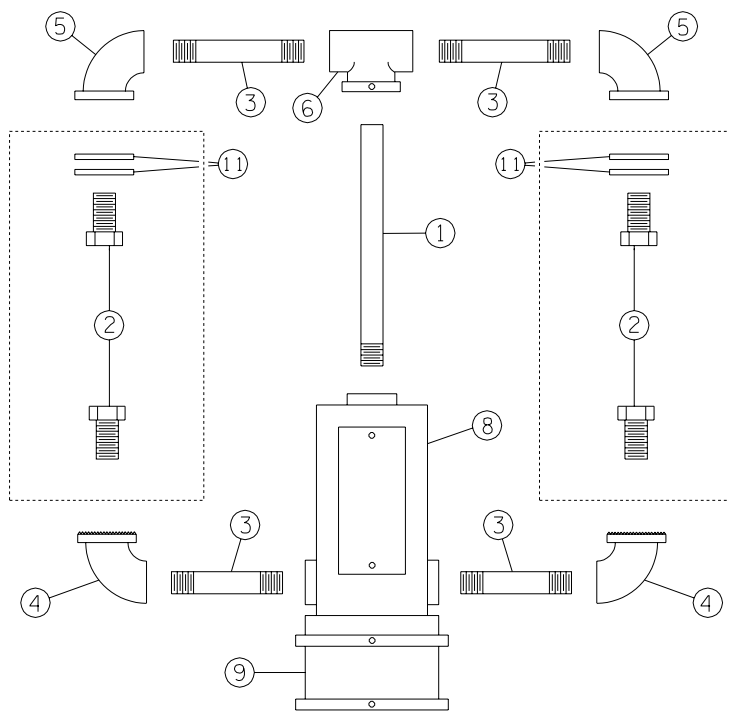
SIDE MOUNT
TYPE B - PED.
TYPE K - VEHICLE

KEY

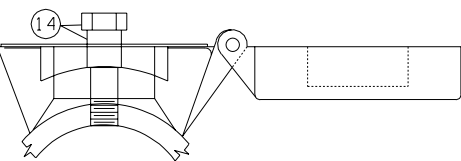
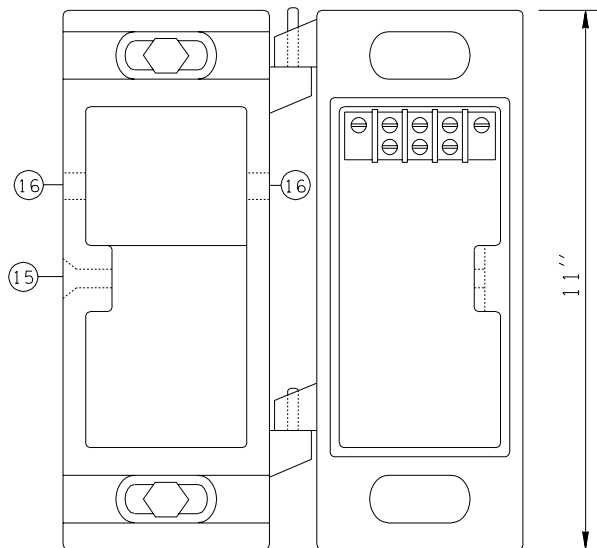
- ① CENTER PIPE
- ② LOCKNIPPLE
- ③ NIPPLE
- ④ SERRATED ELBOW
- ⑤ SERRATED OR FLANGED ELBOW
- ⑥ REAMED TEE WITH SET SCREW
- ⑦ REAMED ELBOW WITH SET SCREW
- ⑧ BRONZE TERMINAL COMPARTMENT WITH:
 - GASKETED COVER
 - FASTENERS
 - WIRE LEADS
 - MOUNTING SADDLE FOR SIDE MOUNTS
 - 1/4" DIA DRAIN HOLE
 - 12 POSITION TERMINAL STRIP
 - WIREWAY FOR SIDE MOUNTS
- ⑨ BRONZE COLLAR, 4 1/4" I.D. WITH SET SCREWS
- ⑩ ORNAMENT CAP
- ⑪ GASKET AND WASHER
- ⑫ CONDUIT LOCKNUT
- ⑬ TYPE E HINGE MOUNTING
- ⑭ FASTENER WITH SPACER
 - 1/2" LAG SCREWS ON WOOD POLE
 - 1/2" BOLTS TAPPED TO METAL POLE
- ⑮ FLATHEAD SOCKET BOLT
- ⑯ 1/2" INSERT HOLE FOR EXTERNAL WIRE ENTRANCE
REQUIRED ON TIMBER POLE MOUNTINGS ONLY.



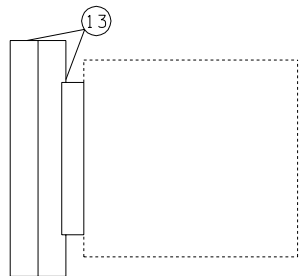
TOP MOUNT
TYPE D - PED.
OR VEHICLE



TOP MOUNT
TYPE C - PED.
TYPE F - VEHICLE



TYPE E MOUNTING DETAILS

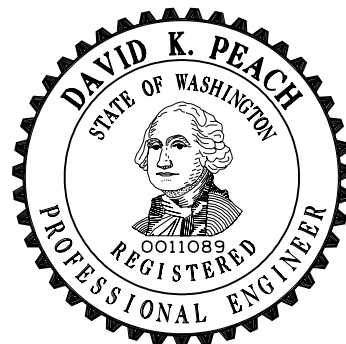


SIDE MOUNT
TYPE E

(NEON GRID OR SIMILAR SIZE
INCANDESCENT PEDESTRIAN HEAD)

NOTES:

1. SEE CONTRACT FOR HEAD TYPE, MOUNTING HEIGHT AND ORIENTATION.
2. ALL NIPPLES, FITTINGS AND CENTER PIPES SHALL BE 1 1/2" DIA NOMINAL TRADE SIZE (NEC).
3. INSTALL NEOPRENE GASKET OUTSIDE HEAD WHEN FLANGED ELBOWS ARE SUPPLIED.



SIGNAL HEAD MOUNTING
DETAILS POLE & POST
TOP MOUNTINGS

STANDARD PLAN J-6f

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Clifford E. Mansfield 4/24/98

DEPUTY STATE DESIGN ENGINEER

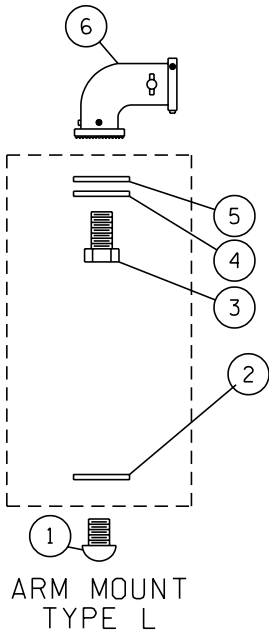
DATE



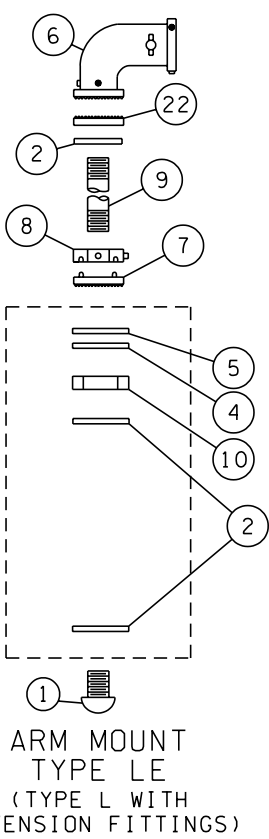
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

KEY:

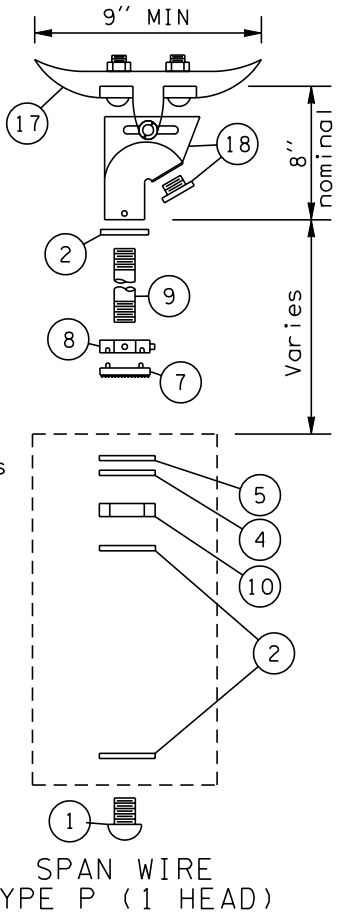
- ① End cap
- ② Conduit locknut, 1½" DIA
- ③ Locknipple, 1½" DIA
- ④ Steel washer
- ⑤ Neoprene gasket
- ⑥ Bronze serrated ell fitting with:
 - 3/8" stainless steel through bolt and nuts
 - Three set screws at slipfitter connection
 - Three allen head stainless steel set screws at conduit nipple connection
- ⑦ Serrated ring with pins
- ⑧ Hex locknut with:
 - Two allen head stainless steel set screws
 - Pin receptacles
- ⑨ Conduit nipple, 1 1/2 " DIA
- ⑩ Hex locknut, 1½" DIA
- ⑪ Mounting assembly
- ⑫ Bronze elevator plumbizer with 3/8" stainless steel through bolt, washers, and two nuts
- ⑬ Aluminum arm with set screw
- ⑭ Slotted tube with closure strip
- ⑮ Tube clamp, 2½" ID, MIN
- ⑯ Internally threaded clamp assembly with:
 - Two set screws
 - 1/2" x 0.045" stainless steel bands
 - Screw buckles, 7/16" with swivels, nuts, and washers
 - Band clips with allen head stainless steel set screws
- ⑰ Bronze messenger hanger with:
 - ½" DIA J bolts
 - Cable lock bar
 - Rivet
 - Cotter key
- ⑱ Bronze internally threaded wire entrance with:
 - Bushing insert
 - Allen head stainless steel set screw
- ⑲ Bronze balance adjuster
- ⑳ Multi-head mounting assembly
- ㉑ Spider assembly
- ㉒ Serrated ring with no pins



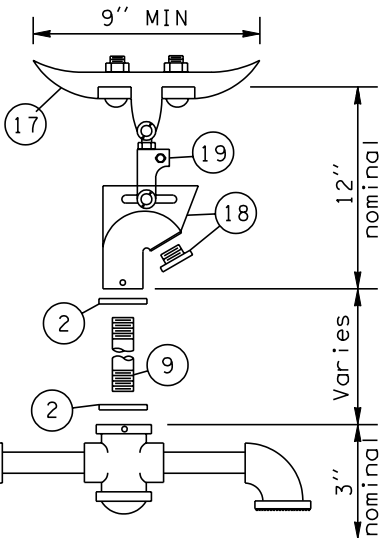
ARM MOUNT
TYPE L



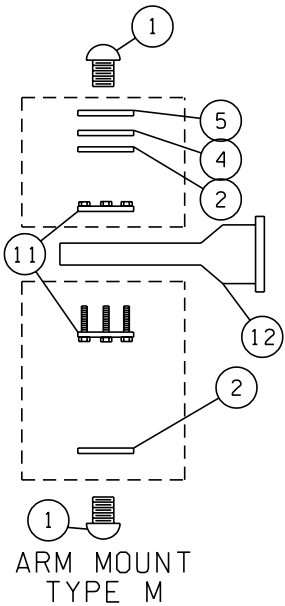
ARM MOUNT
TYPE LE
(TYPE L WITH
EXTENSION FITTINGS)



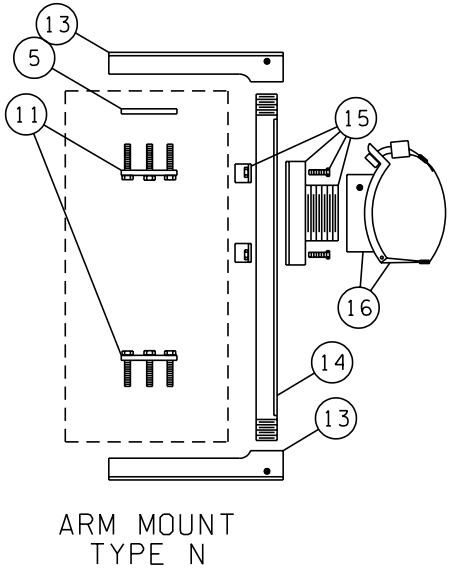
SPAN WIRE
TYPE P (1 HEAD)



SPAN WIRE
TYPE Q (2 HEADS)
TYPE R (3 HEADS)
TYPE S (4 HEADS)



ARM MOUNT
TYPE M



ARM MOUNT
TYPE N

NOTES:

- 1. Type M mounting shall have "O" ring groove and seal top and bottom at signal attachment.
- 2. Type M mounting for conventional heads shall have a 2" diameter opening at the signal attachment.
- 3. Type M mounting for optically programmed heads shall have a 3½" DIA opening at the signal attachment.
- 4. Type N mounting with optically programmed heads shall be installed with 14" nominal arms.
- 5. See Standard Plan J-6h for tether wire, and backplate requirements.



EXPIRES MAY 5, 2003

**SIGNAL HEAD MOUNTING
DETAILS MAST ARM &
SPAN WIRE MOUNTINGS
STANDARD PLAN J-6g**

SHEET 1 OF 1 SHEET

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11/2002	REV. KEY NOTES 6, 9, 16 & 18; REV. NOTE 5; REV. SPAN WIRE TYPE P DETAIL	RG
DATE	REVISION	BY

APPROVED FOR PUBLICATION

Harold J. Peterfeso

12-12-02

STATE DESIGN ENGINEER

DATE



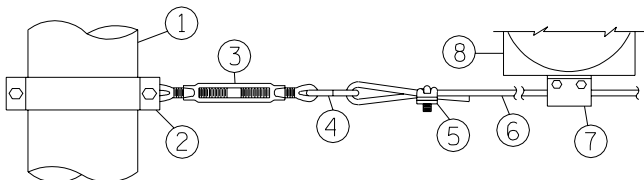
Washington State Department of Transportation

NOTES:

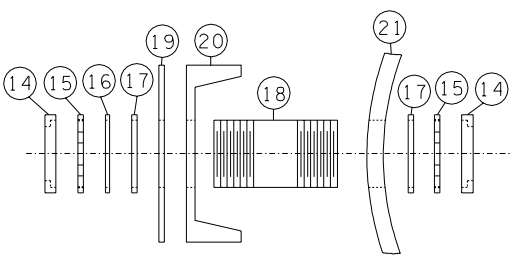
1. BACKPLATES SHALL BE INSTALLED WITH 6 STAINLESS STEEL SCREWS AND WASHERS.

KEY:

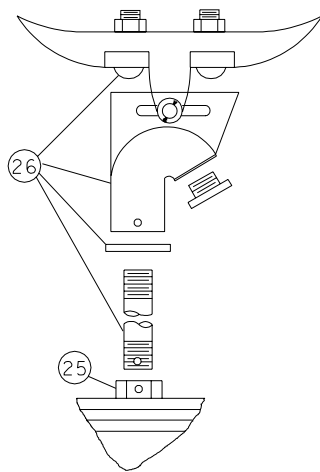
- ① METAL OR TIMBER POLE
② 2" x 3/16" S.S. BAND WITH 2 EACH, 3/8-16NC x 3/4" STAINLESS STEEL HEX HEAD BOLT, LOCK WASHERS AND NUTS
③ 5/16", EYE AND EYE, TURNBUCKLE
④ S HOOK, 3/8" MILD STEEL
⑤ 1/8" WIRE ROPE CLAMP (U BOLT TYPE)
⑥ 1/8" STAINLESS STEEL TETHER WIRE
⑦ WIRE CLAMP WITH LEAD WIRE WRAP
⑧ SIGNAL HEAD
⑨ 6 X 8.2 LB/FT CHANNEL
⑩ 2 EACH, 1/2-20 NF X 2 1/2" HEX HEAD BOLT, LOCK WASHER (DRILL AND TAP POLE TO ACCEPT)
⑪ WIREWAY (SEE DETAIL THIS SHEET)
⑫ METAL POLE
⑬ CABINET
⑭ END BUSHING
⑮ CONDUIT LOCKNUT
⑯ STEEL WASHER
⑰ WEATHERPROOF SEAL
⑱ 2" DIA x 4" NIPPLE
⑲ UNLESS OTHERWISE NOTED
⑲ CABINET WALL DRILLED 1/8" OVERSIZE OF NIPPLE
⑲ CHANNEL DRILLED 1/8" OVERSIZE OF NIPPLE
⑲ POLE DRILLED 1/8" OVERSIZE OF NIPPLE
⑲ 6063 EXTRUDED ALUMINUM FRAME
⑲ 4 EACH, F24T12/CW FLOURESCENT TUBES
⑲ TRANSLUCENT PLEXIGLASS SIGN FACE
⑲ 1 1/2" CAST IRON HUB WITH 5/16" PIN AND COTTER KEY
⑲ SEE KEY 2,9,17, AND 18, STANDARD PLAN "SIGNAL HEAD MOUNTING DETAILS MAST ARM AND SPAN WIRE MOUNTINGS".
⑲ SEE KEY 2,6,9 AND 22, STANDARD PLAN "SIGNAL HEAD MOUNTING DETAILS MAST ARM AND SPAN WIRE MOUNTINGS".
⑲ SEE KEY 2,9 AND 22, STANDARD PLAN "SIGNAL HEAD MOUNTING DETAILS MAST ARM AND SPAN WIRE MOUNTINGS".
⑲ SERRATED 1 1/2" ELBOW
⑲ 1 1/2" DIA NIPPLE (DRILL AND TAP POLE TO ACCEPT)
⑲ 2 EACH, 1/2-20NF x 3/4" STAINLESS STEEL HEX HEAD BOLT AND LOCK WASHERS (DRILL AND TAP POLE TO ACCEPT)
⑲ MOUNTING BRACKET



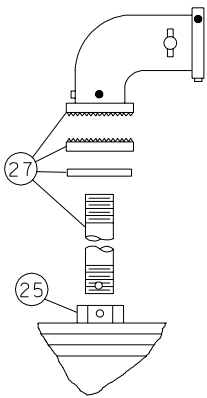
TETHER WIRE DETAIL



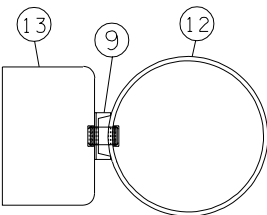
WIREWAY DETAIL



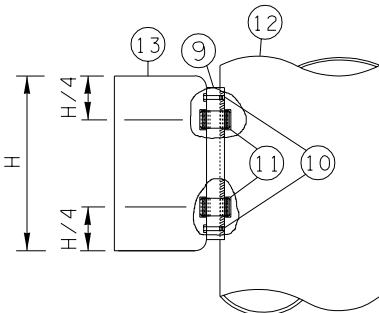
SPAN WIRE MOUNT



MAST ARM MOUNT

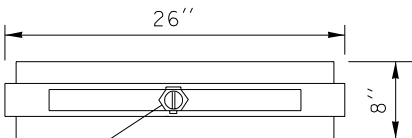


PLAN VIEW

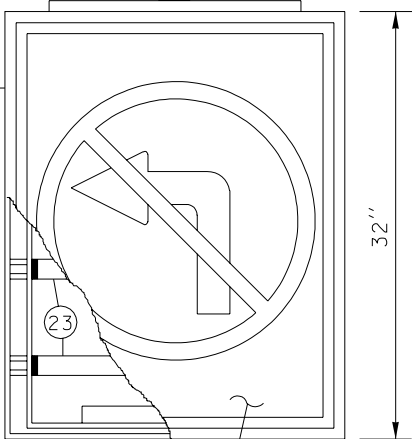


ELEVATION

CABINET MOUNTING DETAIL

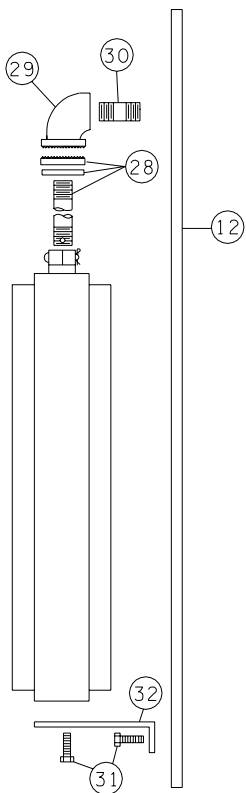


PLAN VIEW

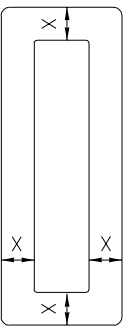


ELEVATION

INTERNALLY ILLUMINATED SIGN DETAILS



SIDE POLE MOUNT



8" OR 12" SECTIONS

8" SECTION X = 8" ± 1/2"
12" SECTION X = 5 1/2" ± 1/2"

BACKPLATE DETAIL



EXPIRES JUNE 4, 1999

MISCELLANEOUS
SIGNAL DETAILS
STANDARD PLAN J-6h

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APPROVED FOR PUBLICATION

Clifford E. Mansfield 4/24/98

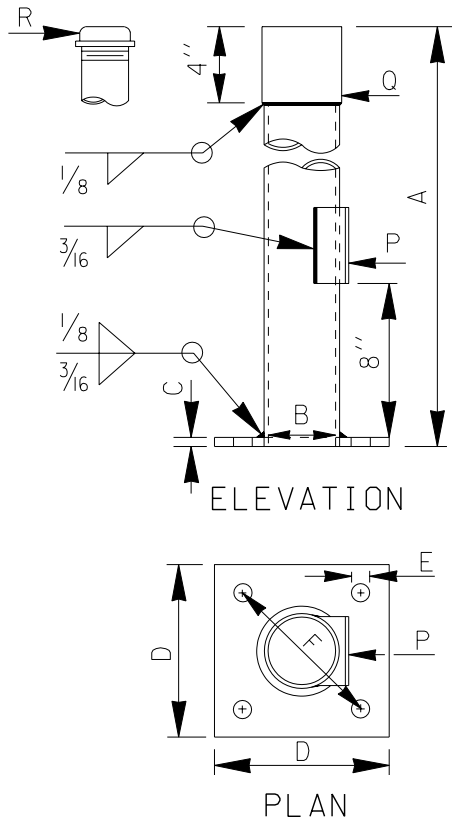
DEPUTY STATE DESIGN ENGINEER

DATE



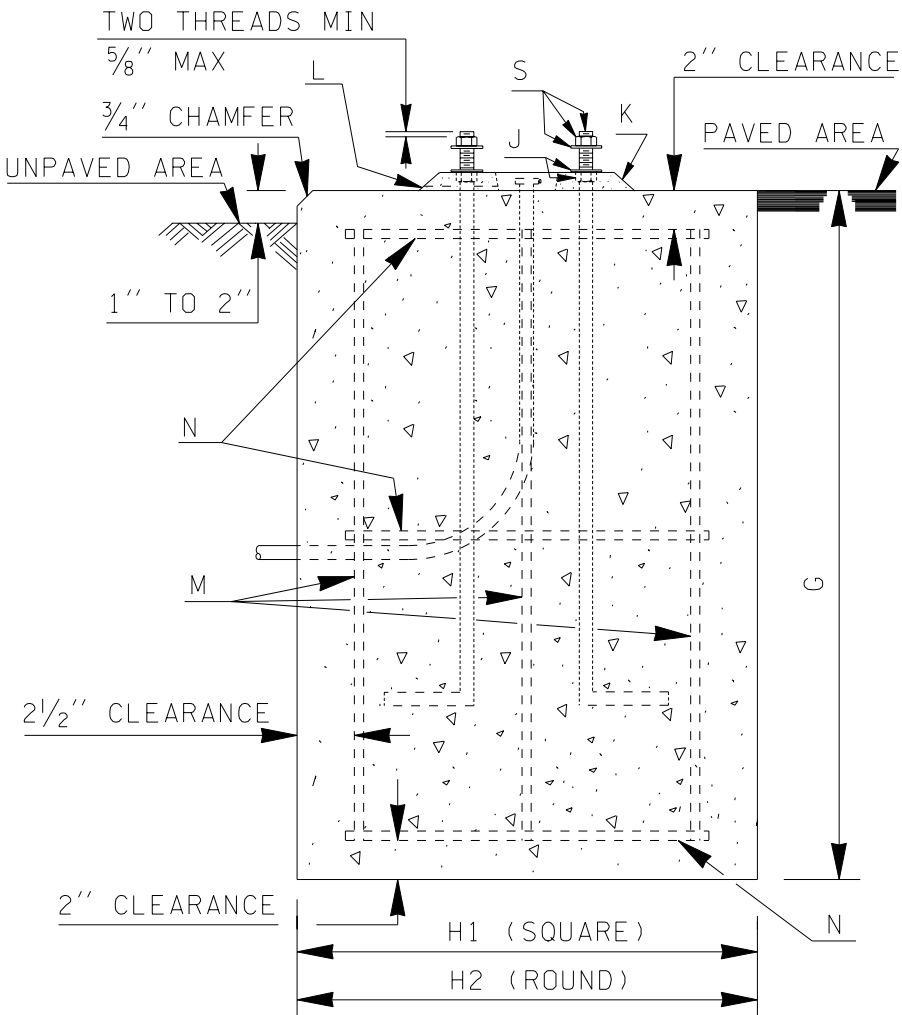
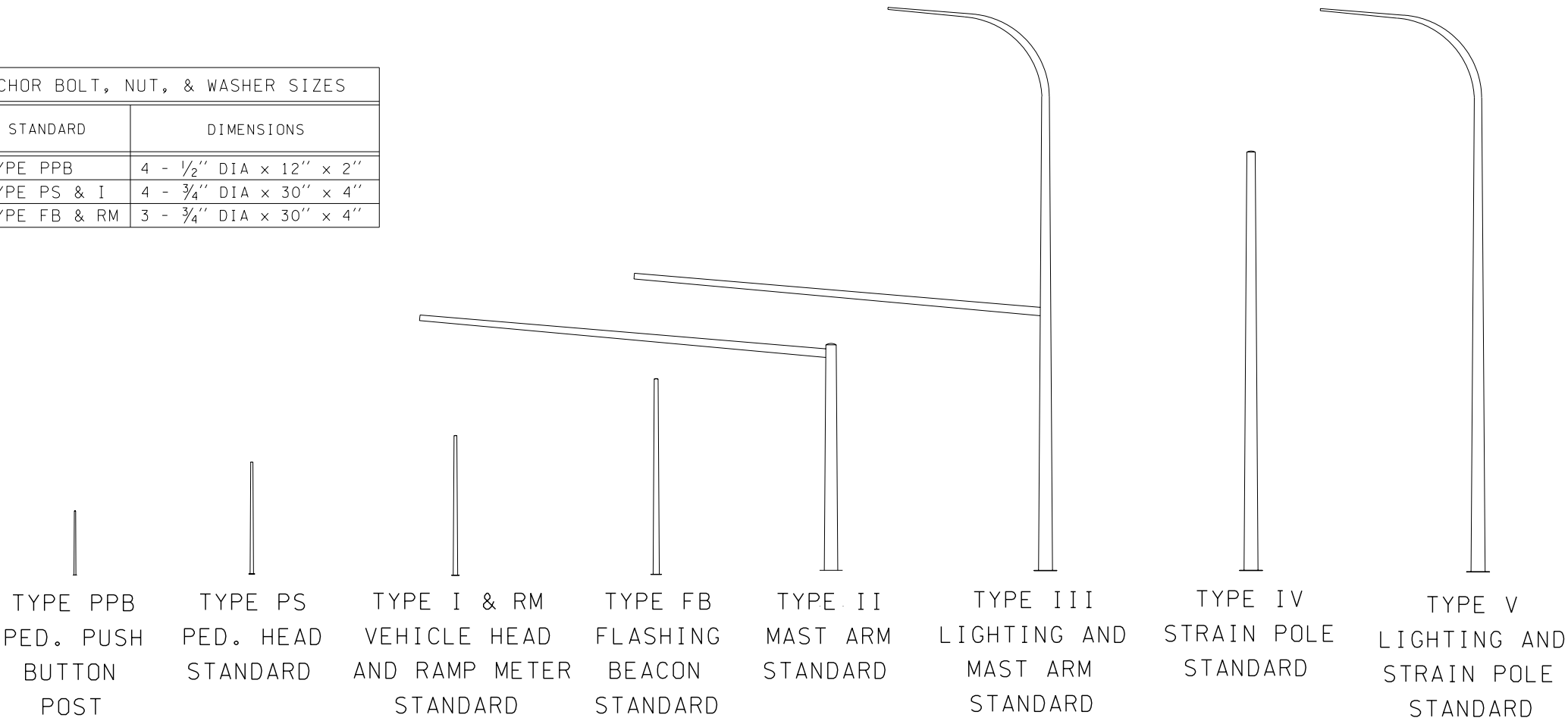
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

TYPE PPB, PS, & I STANDARD DETAILS



ANCHOR BOLT, NUT, & WASHER SIZES		
MARK	STANDARD	DIMENSIONS
S	TYPE PPB	4 - 1/2" DIA x 12" x 2"
S	TYPE PS & I	4 - 3/4" DIA x 30" x 4"
S	TYPE FB & RM	3 - 3/4" DIA x 30" x 4"

SIGNAL STANDARD TYPE DESIGNATIONS



TYPE PPB, PS, I, RM & FB STANDARD DIMENSION CHART						
MARK	ITEM	TYPE PPB	TYPE PS	TYPE I	TYPE RM	TYPE FB
A	HEIGHT	4'-6"	8'-0"	10'-0"	SEE SHEET 2	SEE SHEET 2
B	POLE BASE DIA	2 1/2"	*	*	*	*
C	PLATE THICKNESS	1/2"	1/2"	1/2"	SEE SHEET 2	SEE SHEET 2
D	PLATE WIDTH	5"	9"	9"	SEE SHEET 2	SEE SHEET 2
E	HOLE DIA	5/8"	1"	1"	SEE SHEET 2	SEE SHEET 2
F	BOLT CIRCLE	4 1/2"	8 1/2"	8 1/2"	SEE SHEET 2	SEE SHEET 2
G	FOUNDATION DEPTH	1'-6"	3'-0"	3'-0"	3'-0"	3'-0"
H1	FOUNDATION WIDTH	1'-6"	2'-0"	2'-0"	2'-0"	2'-0"
H2	FOUNDATION DIA	2'-0"	2'-3"	2'-3"	2'-3"	2'-3"
J	NUT & WASHER	Four 1/2"	3/4"	3/4"	3/4"	3/4"
K	GROUT PAD THICKNESS	NONE	**	**	SEE SHEET 2	SEE SHEET 2
L	PLASTIC DRAIN TUBE DIA	NONE	3/8"	3/8"	3/8"	3/8"
M	VERTICAL RE-BAR	NONE	Eight #4	Eight #4	Eight #4	Eight #4
N	HORIZ. RE-BAR HOOP	NONE	Three #4	Three #4	Three #4	Three #4
P	HANDHOLE SIZE	NONE	3 1/2" x 4"	3 1/2" x 4"	3 1/2" x 4"	3 1/2" x 4"
Q	SLIPFITTER DIA (I.D.)	NONE	4"	4"	4"	4"
R	CAP DIA	2 1/2"	NONE	NONE	NONE	NONE

* TAPERED ROUND OR OCTAGONAL SHAFT, 11 GAGE, 4" OD AT SLIPFITTER WELD. TAPER = 0.14 INCHES/FT.
** LEVELING NUT HEIGHT 1" MAXIMUM.
LEVELING NUTS NOT REQUIRED FOR TYPE PPB STANDARD



SIGNAL STANDARD TYPE DESIGNATIONS AND TYPE PPB, PS, I, RM, & FB DETAILS

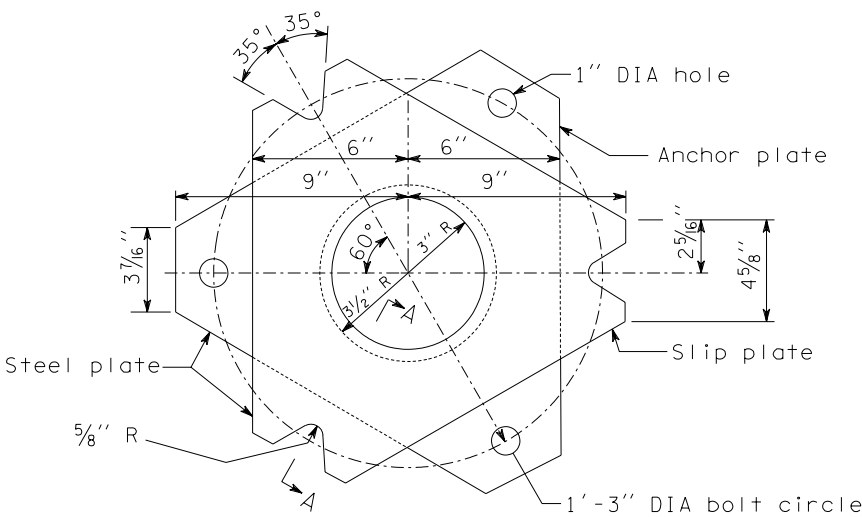
STANDARD PLAN J-7a

SHEET 1 OF 2 SHEETS

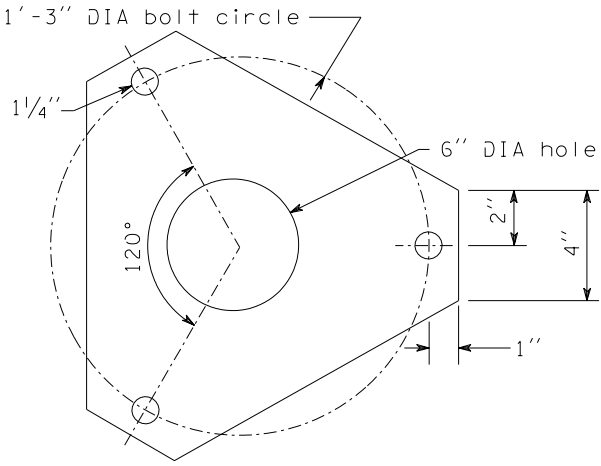
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7/01	WELDING SYMBOL SIZES	MHG
DATE	REVISION	BY

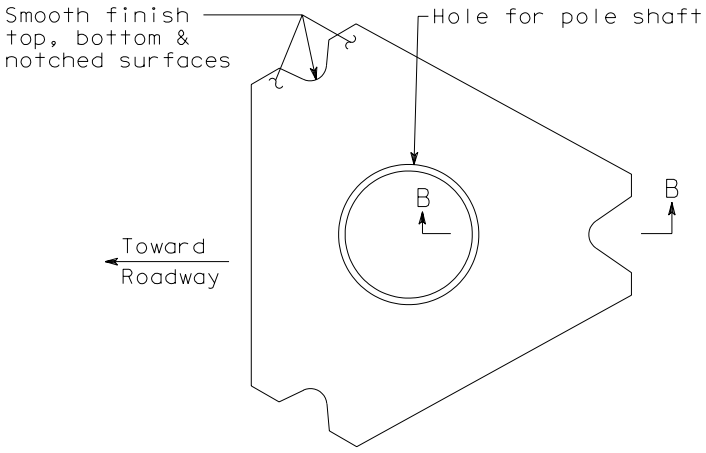
APPROVED FOR PUBLICATION	
Harold J. Peterfeso	09-12-01
STATE DESIGN ENGINEER	DATE
Washington State Department of Transportation	



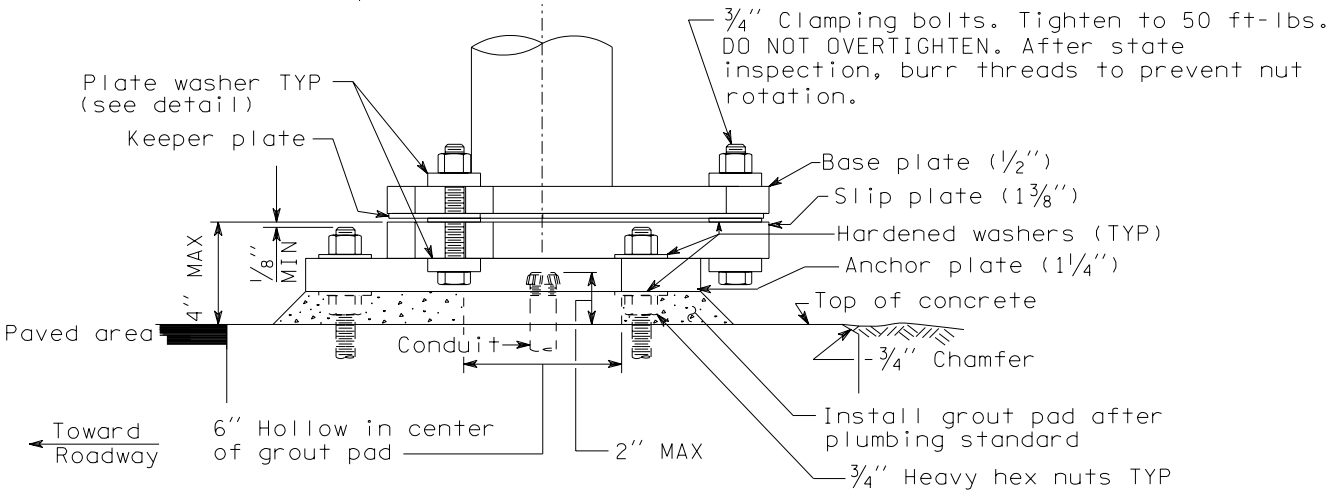
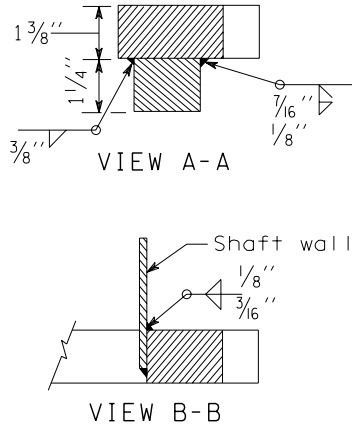
SLIP/ANCHOR PLATES DETAIL



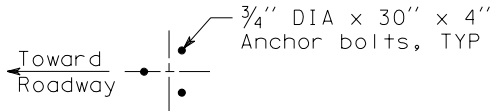
KEEPER PLATE
Place between pole base plate and slip plate on top of middle washers.



BASE PLATE
See Slip Anchor Plate Detail for dimensions not shown. Match Slip Plate dimensions.



FLASHING BEACON AND RAMP METER BASE ELEVATION
See "FOUNDATION DETAIL" for other requirements.



ANCHOR BOLT LAYOUT

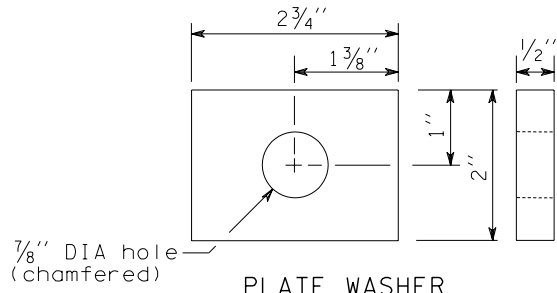
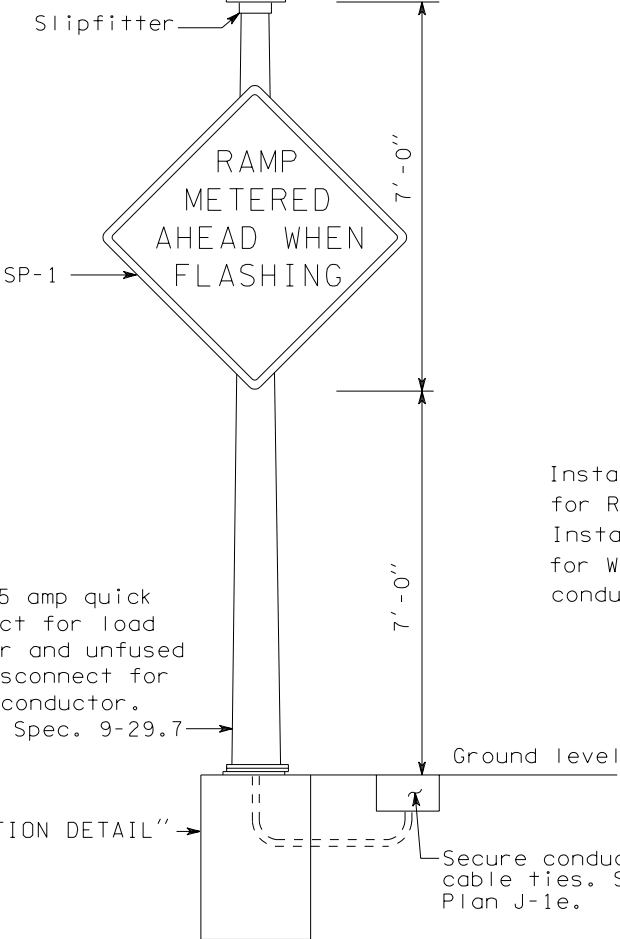


PLATE WASHER

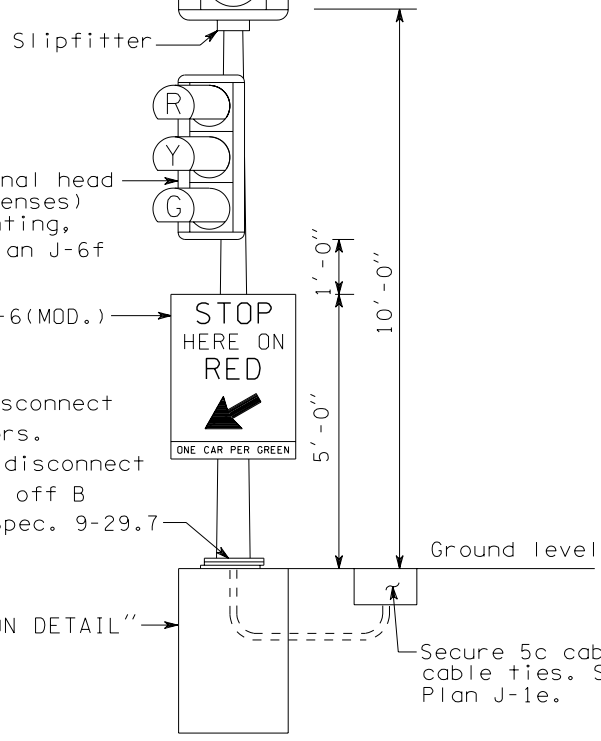
Flashing Warning Beacon
(8" amber lens)
Type D standard signal
head mounting,
Standard Plan J-6f
(drill slipfitter
to seat set screws)



FLASHING BEACON DETAIL

Shaft, slipfitter, welds and handhole are the same as shown for Type 1 Standards, except shaft length is 14'.

Traffic signal head
(three 12" Lenses)
Type D standard signal
head mounting,
Standard Plan J-6f
(drill slipfitter
to seat set screws)



RAMP METER DETAIL

Shaft, slipfitter, welds and handhole are the same as shown for Type 1 Standards.

Traffic signal head
(three 8" Lenses)
Type K mounting,
Standard Plan J-6f

Install 5 amp quick disconnect
for R, O, & G conductors.
Install unfused quick disconnect
for W conductor. Tape off B
conductor. See Std. Spec. 9-29.7

See "FOUNDATION DETAIL"

Secure conductors with
cable ties. See Std.
Plan J-1e.



EXPIRES OCTOBER 26, 2002

**SIGNAL STANDARD TYPE
DESIGNATIONS AND TYPE
PPB, PS, I, RM, & FB DETAILS**

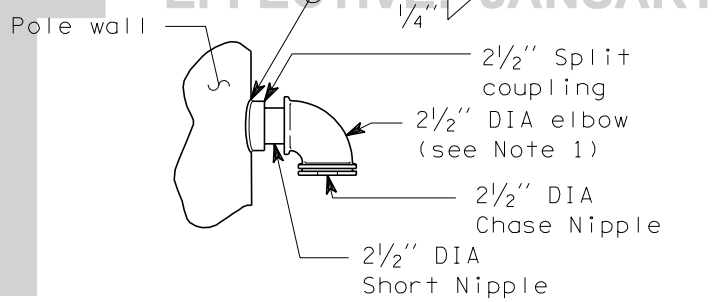
STANDARD PLAN J-7a

SHEET 2 OF 2 SHEETS

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7/01	CORRECTED - FLASHING BEACON DETAIL	MHG
DATE	REVISION	BY

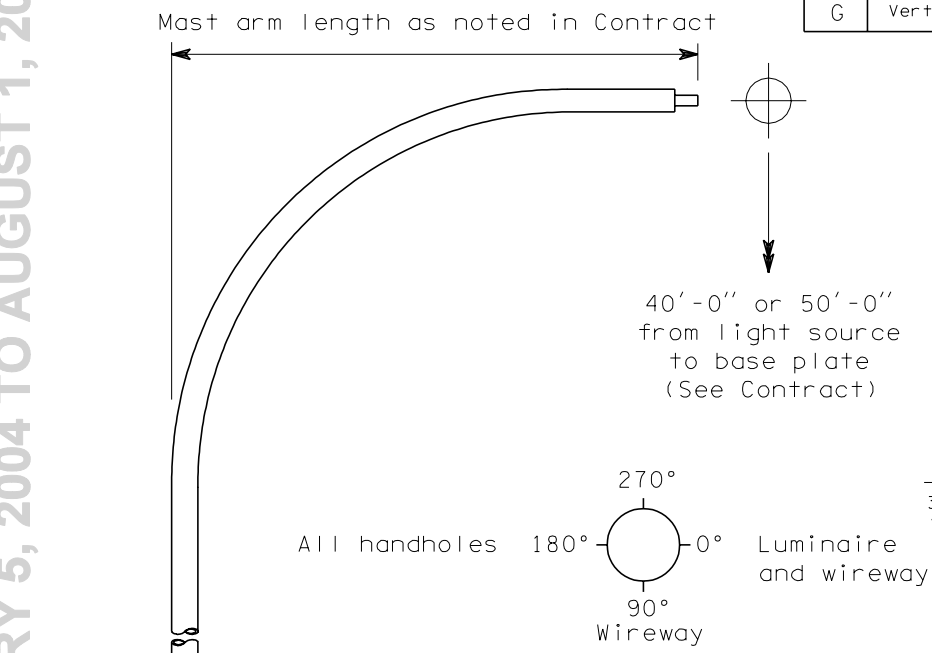
APPROVED FOR PUBLICATION	
Harold J. Peterfeso	09-12-01
STATE DESIGN ENGINEER	DATE
Washington State Department of Transportation	



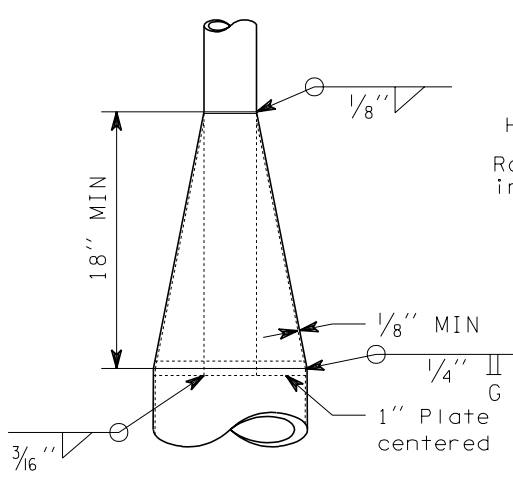
WIREWAY DETAIL

STRAIN POLE DIMENSION CHART								
KEY	ITEM	POLE CLASS (Resultant Horizontal Tension)						
		1900 LB	2700 LB	3700 LB	4800 LB	5600 LB	6300 LB	7200 LB
	Pole gauge	3	3	3	1/0	1/0	1/0	1/0
A	Base plate width	15"	15"	17"	18"	18"	20"	20"
B	Anchor bolt circle diameter	16"	16"	19"	20"	20"	22"	22"
C	Pole base diameter	10"	12"	14"	14"	15"	16"	17"
D	Base plate thickness	1 3/4"	1 3/4"	1 3/4"	2"	2"	2"	2"
E	Anchor bolt size	1"x36"	1 1/4"x60"	1 3/8"x60"	1 1/2"x60"	1 1/2"x60"	1 3/4"x66"	1 3/4"x66"
F	Anchor plate size	1"x3"x3"	1"x4"x4"	1"x4"x4"	1"x5"x5"	1"x5"x5"	1"x6"x6"	1"x6"x6"
G	Vertical steel number and size	Eight #5	Eight #6	Eight #7	Eight #7	Eight #8	Eight #8	Eight #9

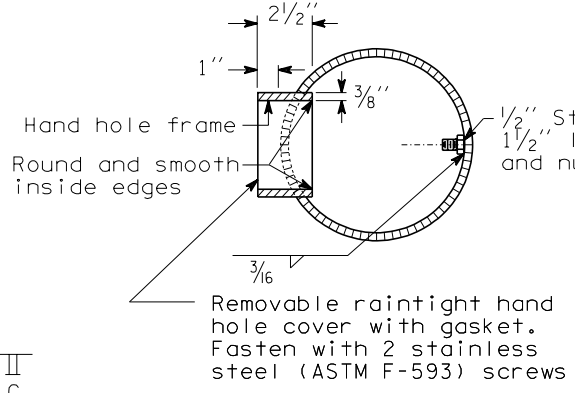
- NOTES
- 2 1/2" diameter weatherhead may be substituted for the elbow and nipple assembly.
 - Pole shaft shall have 0.14"/ft taper.
 - See Standard Plan J-7d for details.
 - Handholes may be 6" x 4" oval or rectangle.



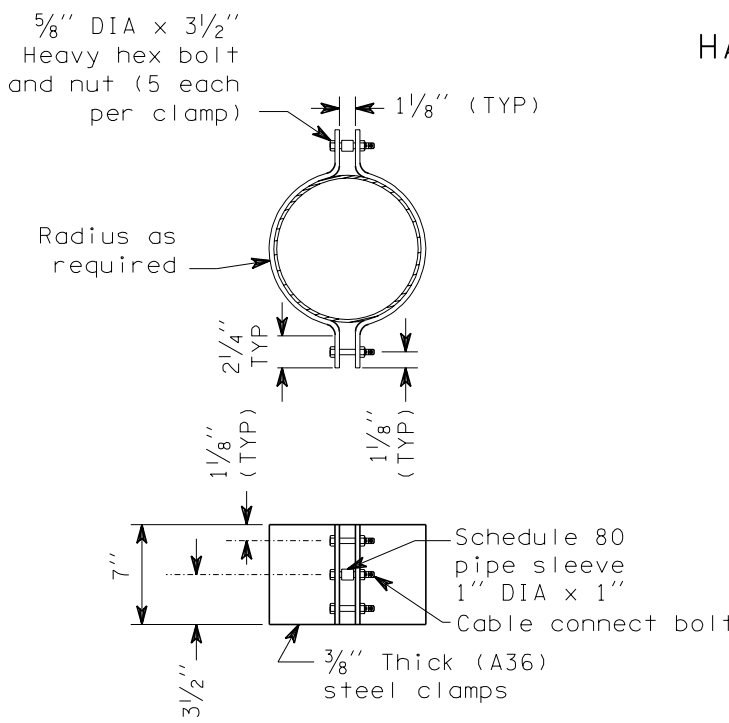
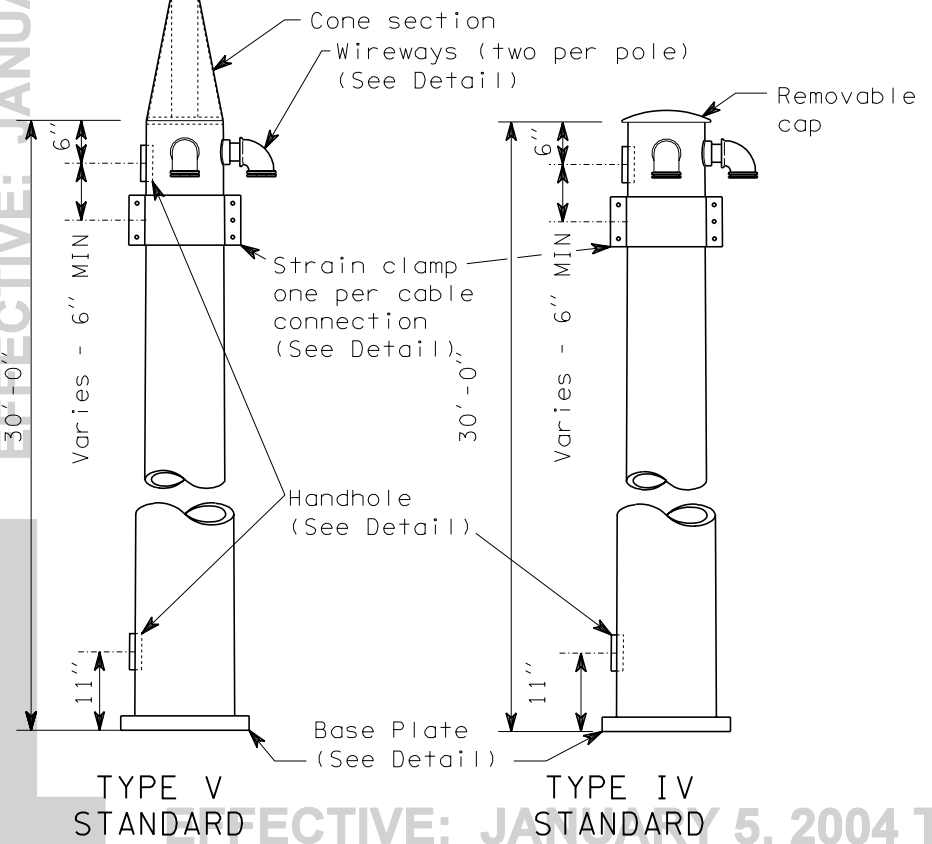
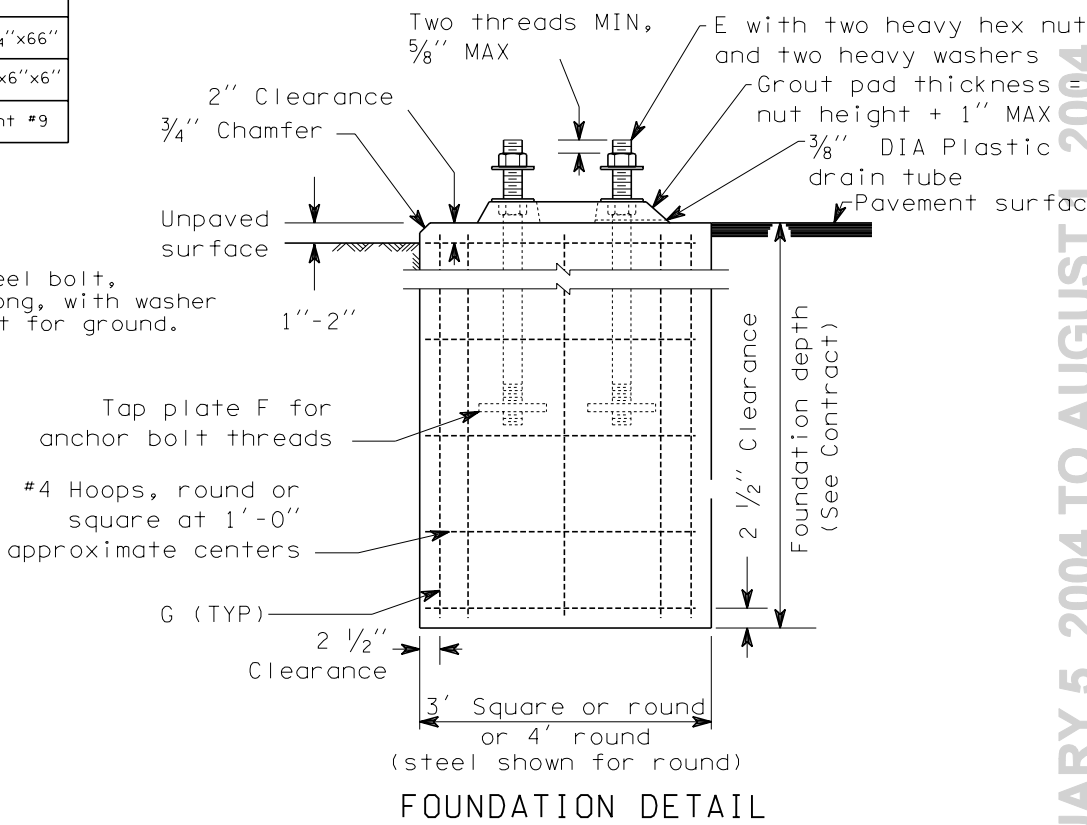
ATTACHMENT POINT ANGLES



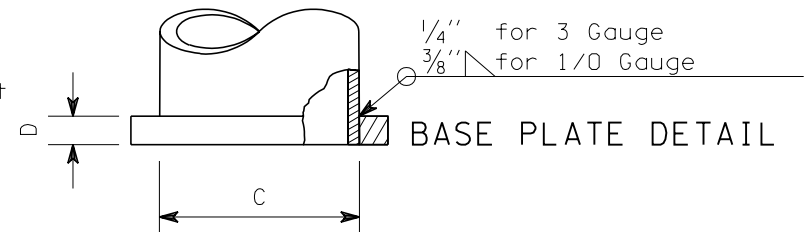
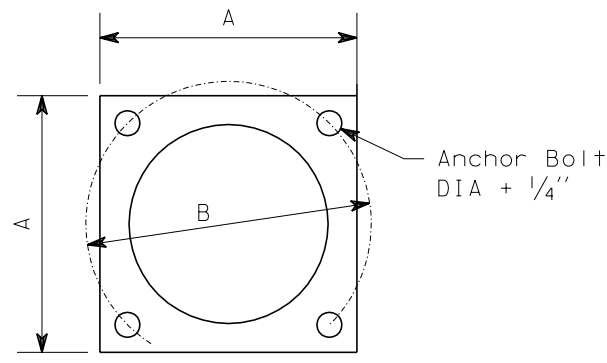
CONE SECTION DETAIL



HANDHOLE DETAIL
See Note 4



STRAIN CLAMP DETAIL



BASE PLATE DETAIL



STRAIN POLE STANDARDS
TYPE IV AND V
STANDARD PLAN J-7c

APPROVED FOR PUBLICATION
Clifford E. Mansfield 6/19/98
for STATE DESIGN ENGINEER DATE
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

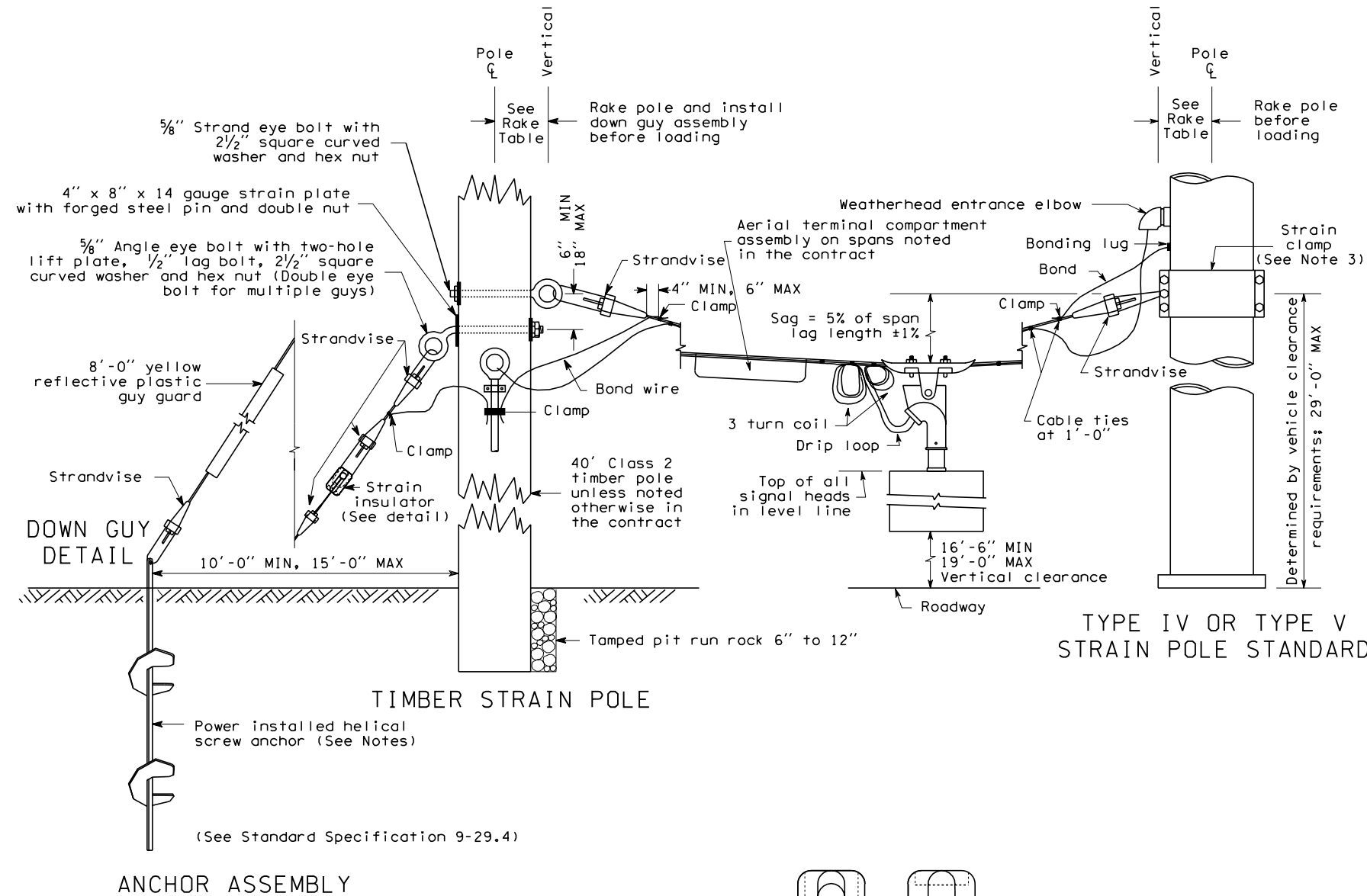
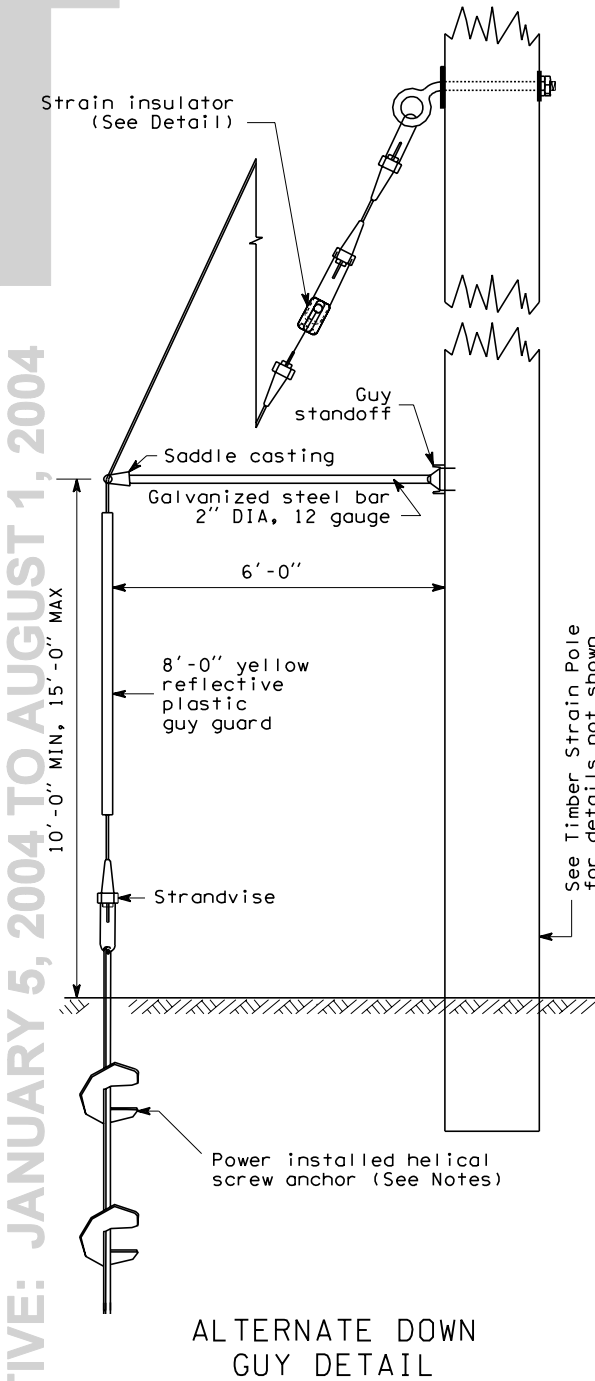
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NOTES

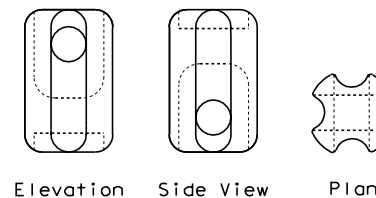
1. An eight-way expanding anchor may be used as an acceptable alternate to power installed helical screw anchor.
2. If anchor hole diameter is greater than nominal diameter of folded anchors, a 5' cover of 6" to 12" size rock shall be tamped in to replace the disturbed soil immediately above the anchor.
3. See "Strain Clamp Detail" on Standard Plan, "Strain Pole Standards: Type IV and Type V".

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004



RAKE TABLE	
POLE CLASS	RAKE
1900#	7"
2700#	6"
3700#	5"
4800#	5"
5400#	4"
4300#	4"
7200#	4"
TIMBER	6"



STRAIN INSULATOR DETAIL



EXPIRES JUNE 4, 1999

SPAN WIRE
INSTALLATION

STANDARD PLAN J-7d

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4/98	Delete bury depth of pole.	ABN	WDB
DATE	REVISION	BY	APPR'D

APPROVED FOR PUBLICATION

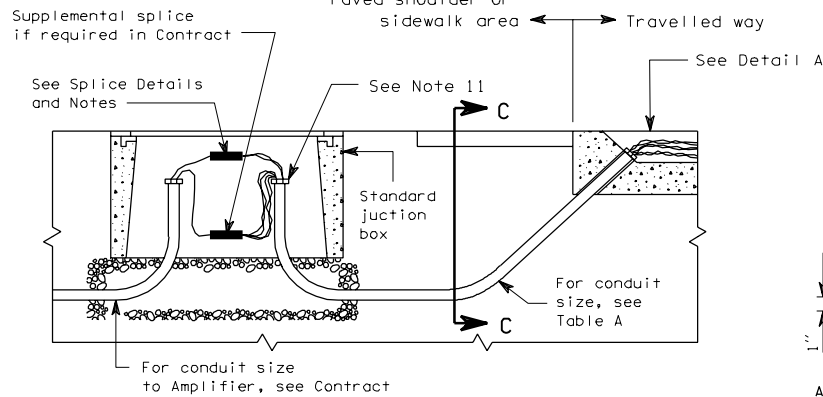
Clifford E. Mansfield

4/24/98

DEPUTY STATE DESIGN ENGINEER

DATE

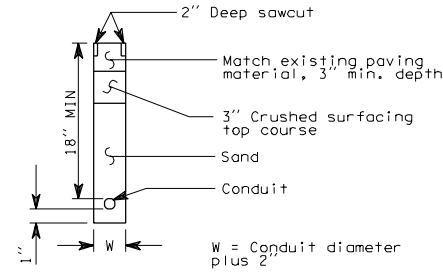
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON



TYPICAL CONDUIT PLACEMENT FOR LOOP
LEAD-IN WIRES

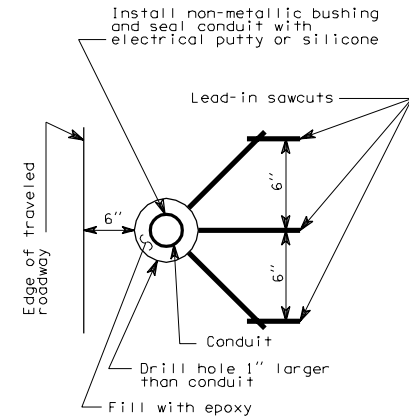
Loop lead pairs	1-2	3	4-5	6-8	9-12
Conduit size (MIN)	1"	1 1/4"	1 1/2"	2"	3"

TABLE A



APPLICABLE FOR OFF-ROAD
PAVED AREAS ONLY

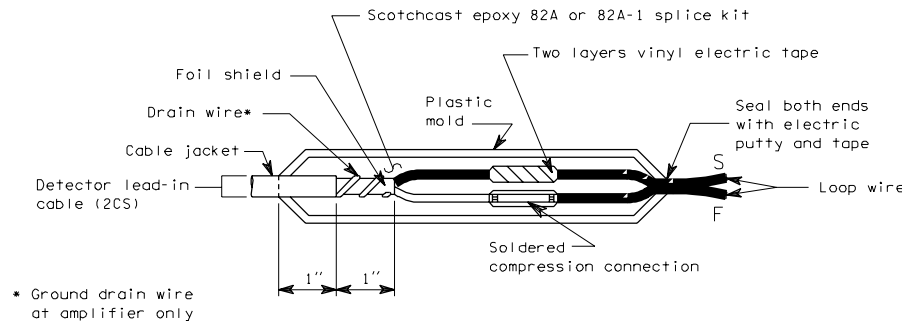
SECTION C-C



LEAD - IN SAWCUTS AND CONDUIT PLACEMENT DETAIL

DETAIL A

INDUCTION LOOP
DETAILS

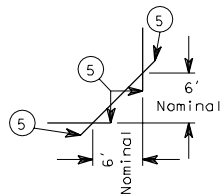
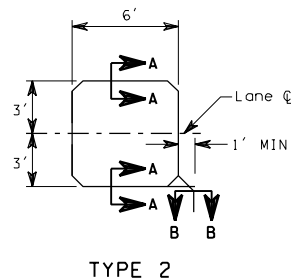
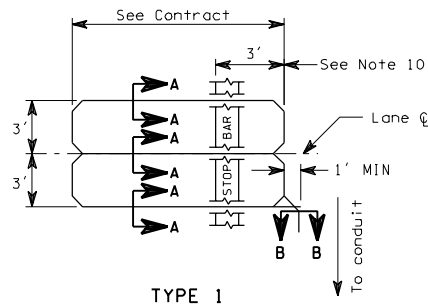


SPLICE DETAIL

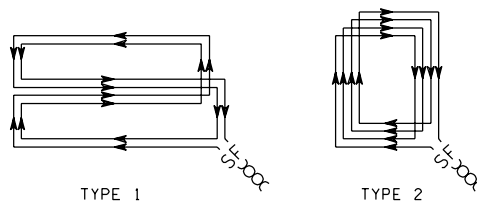
* Ground drain wire
at amplifier only

J-8a

08-01-97

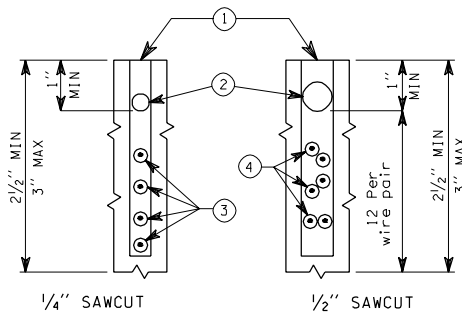


TYPICAL CORNER SAWCUT
LOOP SAWCUT DETAILS



LOOP INSTALLATION NOTES

1. Install junction box and lead-in conduit.
2. Saw loop slots and lead-in slots.
3. Lay out loop wire beginning at junction box, allowing 5' minimum slack.
4. Install wire in loop slot. See Loop Winding Detail.
5. Return to junction box and identify leads with plan detector number and "S" for start and "F" for finish.
6. Twist each pair of lead-in wires two turns per foot from loop to junction box and install in lead-in slot and conduit. Reverse direction of twist for each successive pair installed.
7. Construct supplemental splice containing any series or parallel loop connections required in plans. Supplemental splices are subject to the same requirements shown for the loop lead and shielded cable splice.
8. Splice loop leads or supplemental splice leads to shielded cable as noted.
9. Complete installation and test loop circuits or combination loop circuits.
10. Front of loop should be measured from back of stop bar, or back of crosswalk where no stop bar is installed.
11. Seal ends of conduit.



- ① Sealant
- ② Twisted polypropylene rope (Sized for snug fit)
- ③ Loop wire - number varies (See Loop Winding Details)
- ④ Lead-in wires: One pair for each loop served, three pairs maximum per sawcut (See installation notes)
- ⑤ Extend sawcut sufficient length to provide full sawcut depth around corners

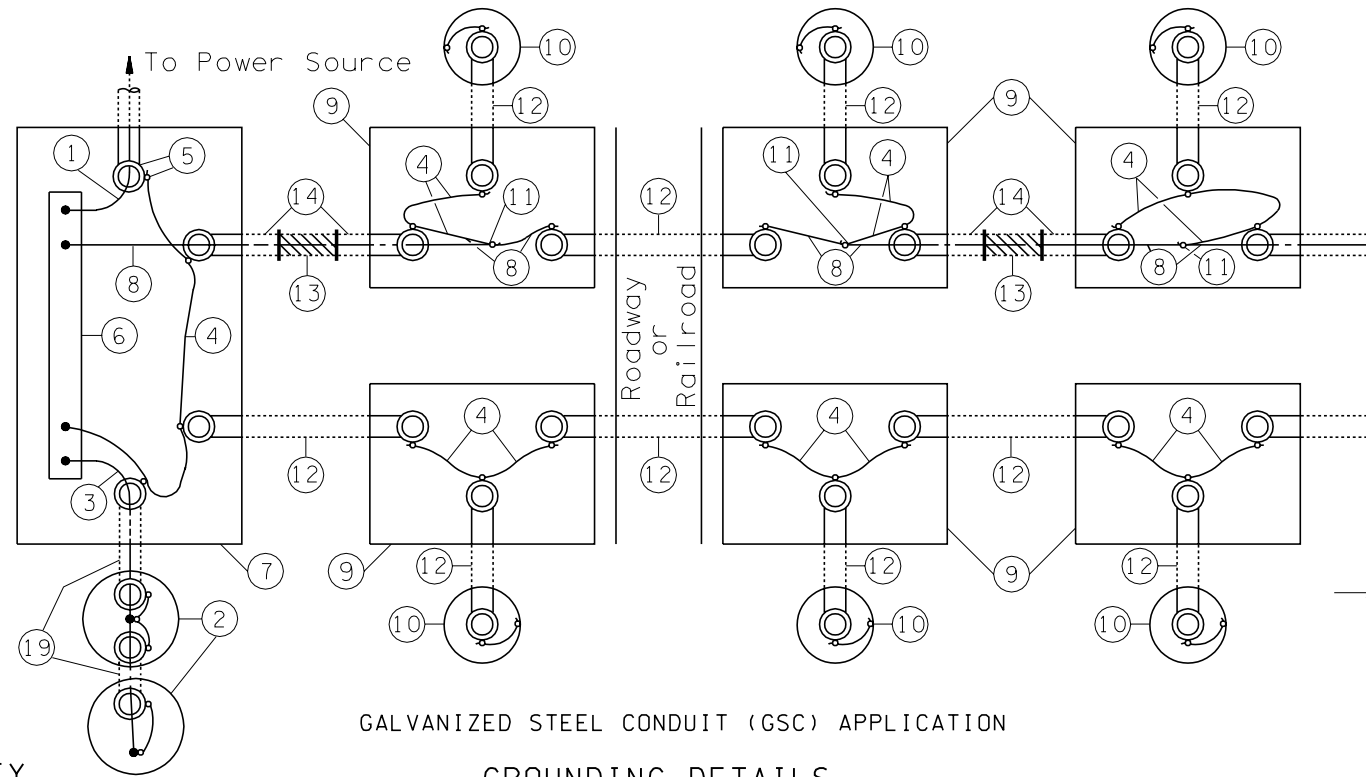
INDUCTION LOOP DETAILS

J-8a

08-01-97

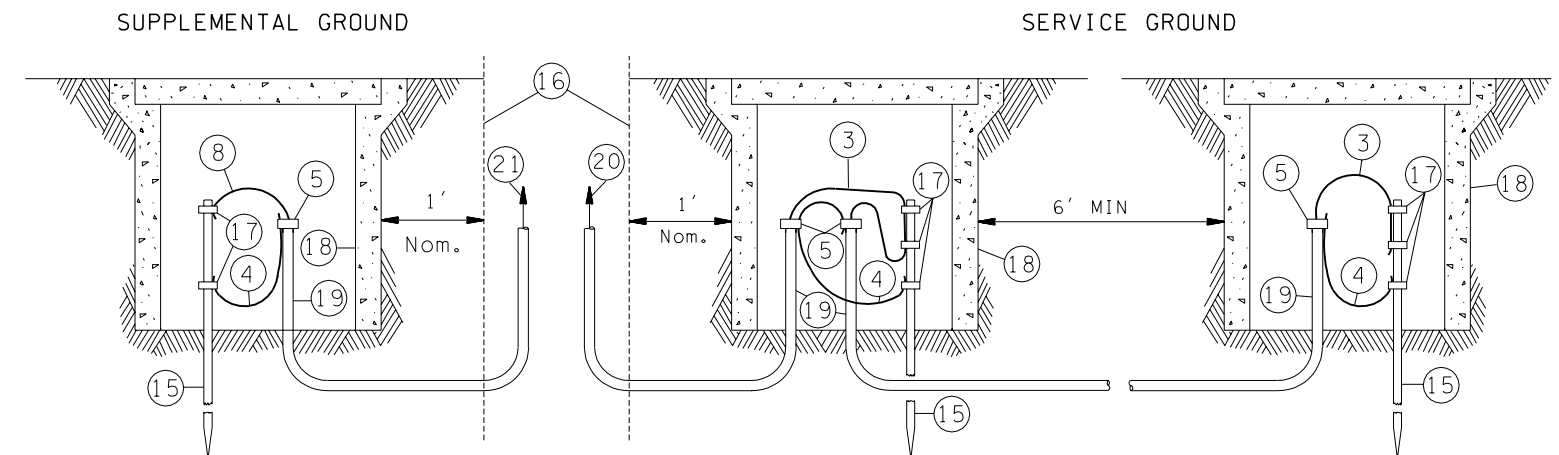
Sheet 2 of 2 Sheets

1. If parallel circuits of different sizes are contained in one conduit, the size of the grounding conductor shall be determined on the basis of the largest conductor. Only one grounding conductor is required for each conduit regardless of the number of circuits contained.
2. Service ground per serving utility requirement. If the utility uses aluminum service conductors, an approved Al-Cu pressure type ground connector shall be used to secure the service neutral to the copper neutral bar in the service enclosure. Except for the above, all grounding conductors shall be copper.
3. Equipment grounding conductors and grounding electrode conductors shall be sized in accordance with the National Electric Code (No. 8 minimum).



KEY

- 1 Service Neutral
- 2 Service Ground
- 3 Grounding Electrode Conductor
- 4 Bonding Jumper
- 5 Grounding Bushing (typ. all conduit terminations)
- 6 Service Neutral Bus (Copper)
- 7 Service Enclosure
- 8 Equipment Grounding Conductor
- 9 Junction Box
- 10 Electrical Load Support (luminaire pole)
- 11 Copper Split Bolt Clamp
- 12 Galvanized Steel Conduit (GSC)
- 13 Non-metallic Conduit (NMC)
- 14 Option A - 10' GSC with Field Bend
 - Approved Adapter Fitting
 - Grounding Bushing
- Option B - 10' GSC
 - GS Factory Elbows
 - Approved Adapter Fitting
 - GS Coupling
 - Grounding Bushing
- 15 Ground Rod
- 16 Edge of Foundation, Pole or Service Support
- 17 Clamp
- 18 Junction Box or 8" Drain Tile with Approved Cover
- 19 Code Sized GSC
- 20 To Service Neutral Bus
- 21 To Grounding Terminal or Connection to Equipment Grounding System

GALVANIZED STEEL CONDUIT (GSC) APPLICATION
GROUNDING DETAILS

Required to supplement equipment grounding for luminaire standards with direct burial, aerial feeds, or where required in plans.

Required at all services and separately derived systems.

GROUND ROD DETAILS

TYPICAL
GROUNDING DETAILS
STANDARD PLAN J-9a

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DATE	REVISION	BY	APPR'D
	Note 3, change "connectors" to "conductors".	ABN	

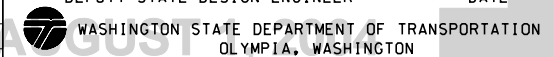
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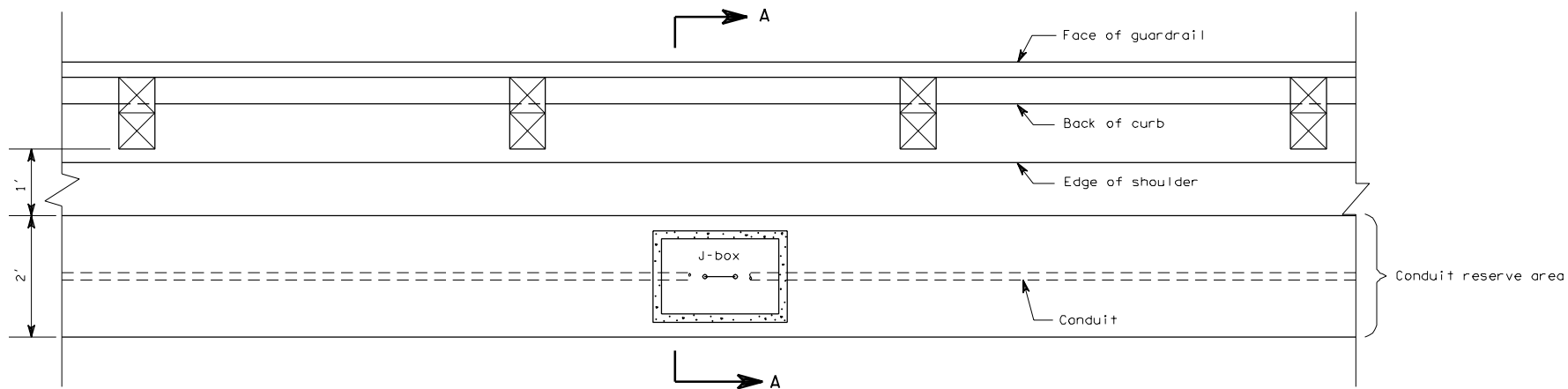
Clifford E. Mansfield

4/24/98

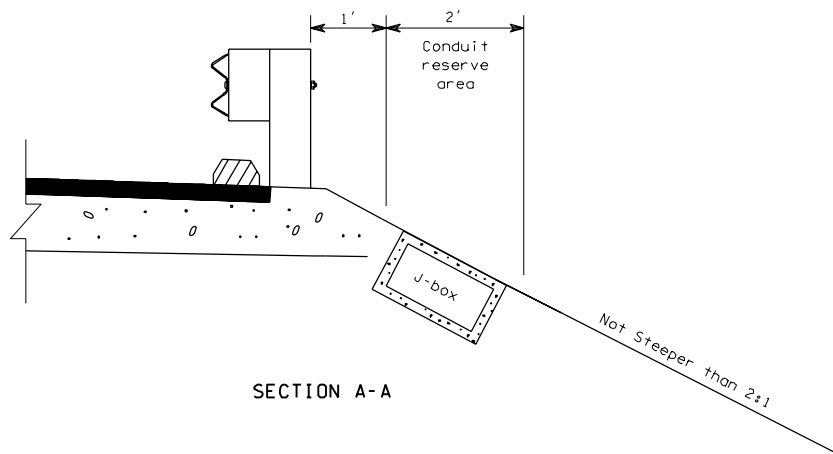
DEPUTY STATE DESIGN ENGINEER

DATE



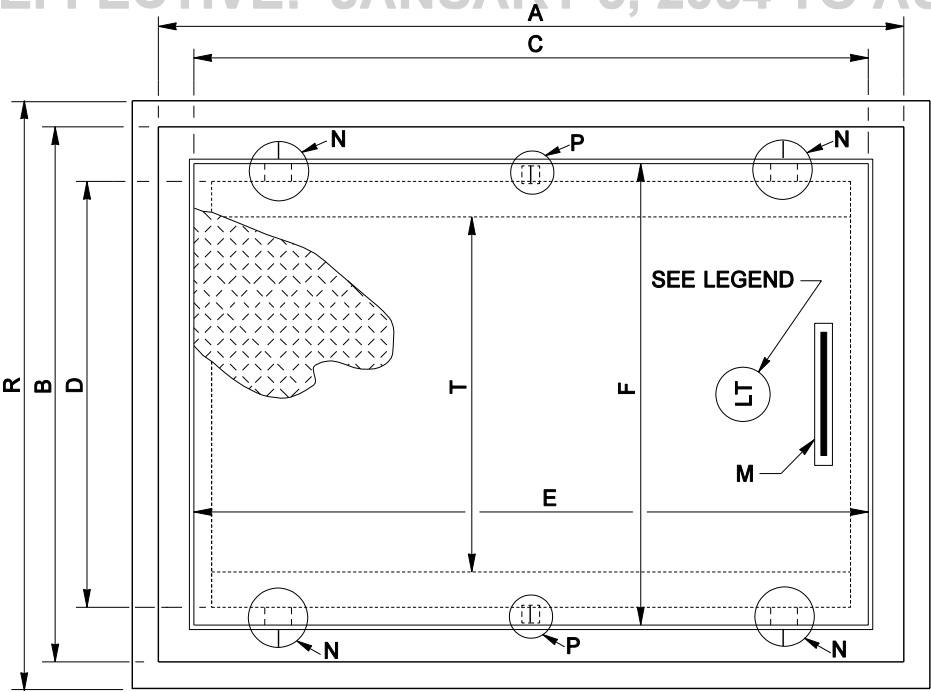


PLAN

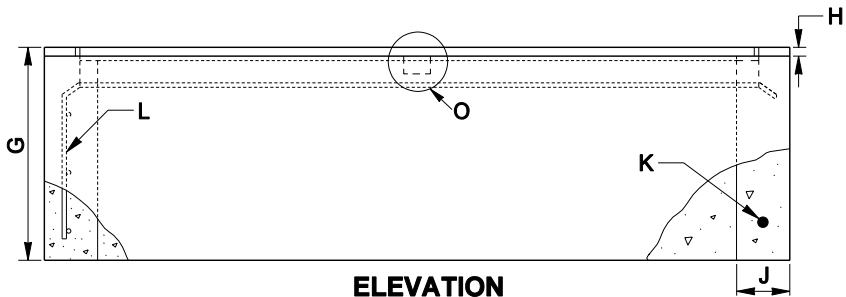


SECTION A-A

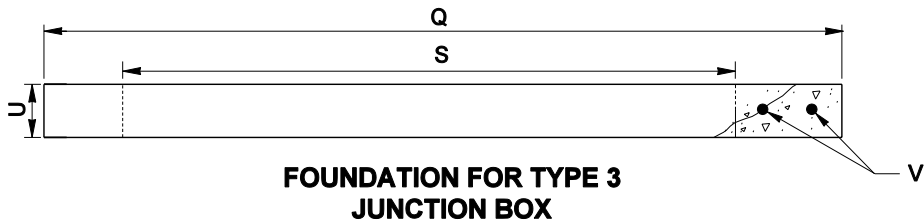
ELECTRICAL CONDUIT
PLACEMENT



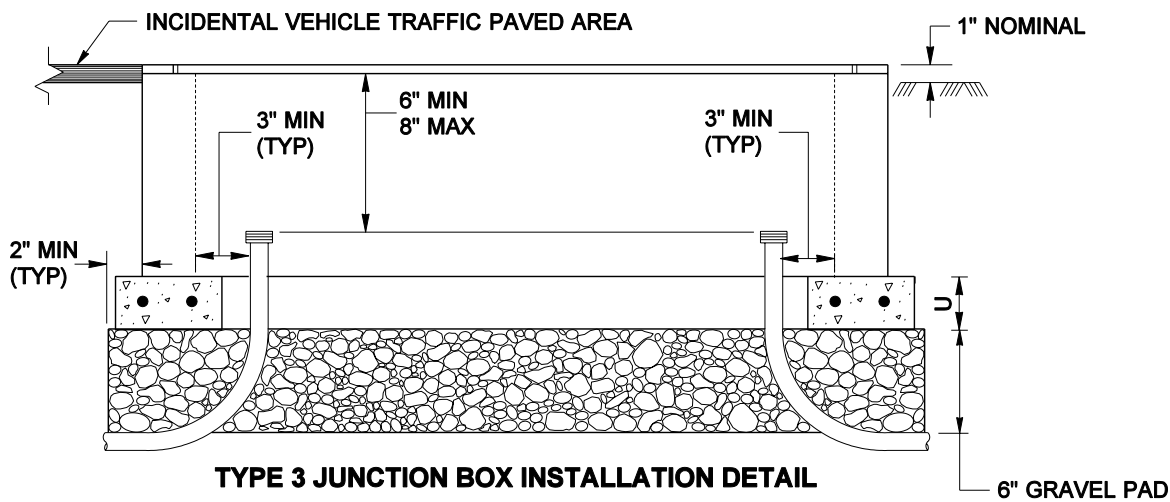
PLAN



ELEVATION

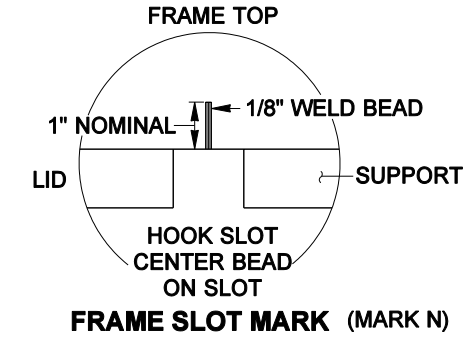
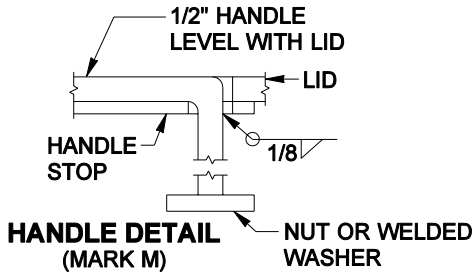


FOUNDATION FOR TYPE 3 JUNCTION BOX

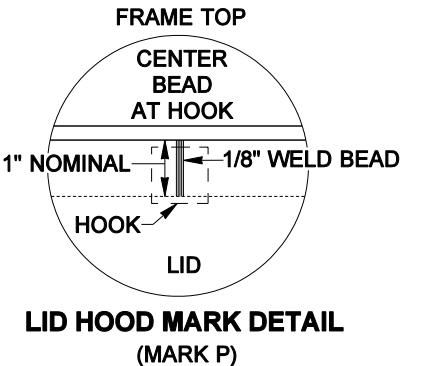
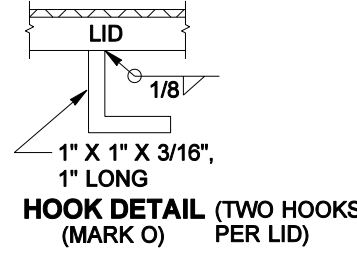


TYPE 3 JUNCTION BOX INSTALLATION DETAIL

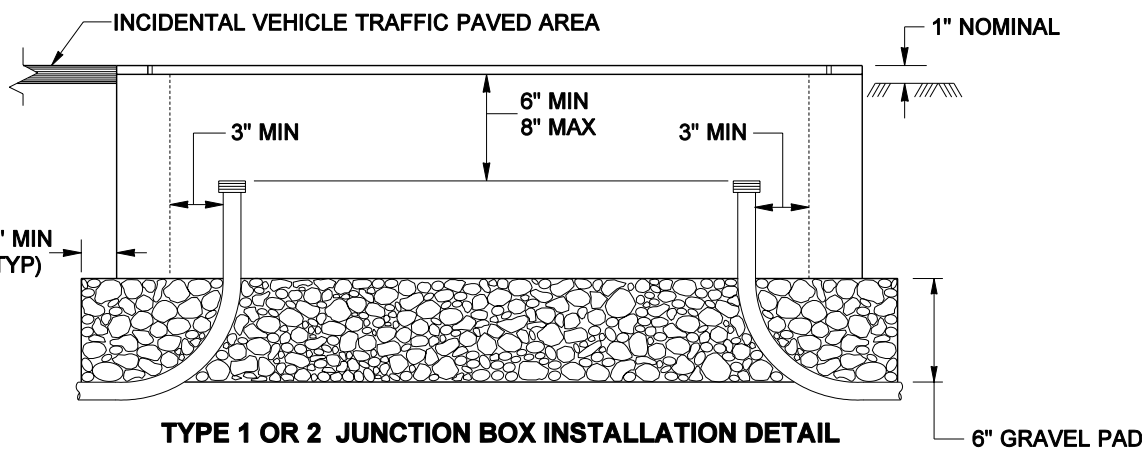
MARK	ITEM	BOX TYPE		
		TYPE 1	TYPE 2	TYPE 3
A	OUTSIDE LENGTH OF JUNCTION BOX	22"	33"	42"
B	OUTSIDE WIDTH OF JUNCTION BOX	17"	22 1/2"	30"
C	INSIDE LENGTH OF JUNCTION BOX	18"-19"	28"	36"
D	INSIDE WIDTH OF JUNCTION BOX	13"-14"	17"	24"
E	LID LENGTH	18"	26 1/2"	38"
F	LID WIDTH	13"	17"	26"
G	DEPTH OF JUNCTION BOX	12"	12"	12"
H	LID AND FRAME DEPTH	5/16"	5/16"	1/2"
J	MINIMUM WALL THICKNESS	1 1/2"	1 1/2"	3"
K	WELDED WIRE HOOP - SIZE NUMBER (SEE NOTE 6)	W 2.9 (6 GAGE)	W 2.9 (6 GAGE)	W 5 (3 GAGE)
L	WELDED WIRE FABRIC - SIZE (SEE NOTE 6)	4 X 4 W 2.9 X W 2.9 (6 GAGE)		
M	HANDLE	N/A	N/A	SEE DETAIL
N	FRAME SLOT MARK	N/A	N/A	SEE DETAIL
O	HOOK	SEE DETAIL	SEE DETAIL	SEE DETAIL
P	LID HOOD MARK	N/A	N/A	SEE DETAIL
Q	OUTSIDE LENGTH OF FOUNDATION	N/A	N/A	48"
R	OUTSIDE WIDTH OF FOUNDATION	N/A	N/A	36"
S	INSIDE LENGTH OF FOUNDATION	N/A	N/A	36"
T	INSIDE WIDTH OF FOUNDATION	N/A	N/A	20"
U	MINIMUM FOUNDATION DEPTH	N/A	N/A	3"
V	WELDED WIRE HOOP - SIZE NUMBER	N/A	N/A	W 5 (3 GAGE)
	CAPACITY - CONDUIT DIAMETERS	6"	12"	24"
	NOTE: A 1% TOLERANCE IS ALLOWED			



FRAME SLOT MARK (MARK N)



LID HOOD MARK DETAIL (MARK P)



TYPE 1 OR 2 JUNCTION BOX INSTALLATION DETAIL

NOTES:

1. All box dimensions are nominal. Exact configurations vary among different manufacturers.
2. The noted lid thicknesses are overall minimums. The diamond pattern for Type 1 or 2 boxes shall be 28% minimum of overall thickness. The diamond pattern for Type 3 boxes shall have a minimum thickness of 3/32 ".
3. Lid support members shall be 3/16 " min. thick steel C, L or T shape welded to the frame.
4. When specified in the Contract, Type 2 and Type 3 boxes shall be provided with 12" deep extension boxes.
5. A 1/4" NC x 3/4" Stainless Steel Ground Stud with S.S. Nut shall be welded to the bottom of the lid.
6. See the Standard Specifications for alternate use of reinforcement.

LEGEND

LT
LIGHTING SYSTEM

COMM
COMMUNICATION SYSTEM

TS
TRAFFIC SIGNAL SYSTEM

TEL
TELEPHONE SYSTEM

ITS
INTELLIGENT TRANSPORTATION SYSTEM

FORM LETTERS WITH 1/8" WELD BEAD.

ALL DIMENSIONS ARE NOMINAL



STANDARD JUNCTION BOX
STANDARD PLAN J-11a

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APPROVED FOR PUBLICATION

Harold J. Peterfeso 09-12-01

STATE DESIGN ENGINEER DATE

Washington State Department of Transportation

NOTES

- 1. SIGN SEQUENCE IS THE SAME FOR BOTH DIRECTIONS OF TRAVEL, ADJUSTED FOR THE DIRECTION OF ROADWAY CURVES.
- 2. FLASHING WARNING LIGHTS (TYPE B, MUTCD) AND/OR FLAGS SHALL BE USED TO CALL ATTENTION TO THE ADVANCE WARNING SIGNS.
- 3. EXISTING CONFLICTING PAVEMENT MARKINGS AND SIGNS NO LONGER APPLICABLE SHALL BE REMOVED. TEMPORARY PAVEMENT MARKINGS SHALL BE USED TO DELINEATE BYPASS DETOUR.
- 4. RAISED PAVEMENT MARKERS AND/OR TEMPORARY GUIDEPOSTS MAY BE USED ON BYPASS AS DIRECTED BY THE ENGINEER.
- 5. STEADY BURNING WARNING LIGHTS (TYPE C, MUTCD) SHALL BE USED TO MARK TRAFFIC CONTROL DEVICES AT NIGHT.
- 6. WHERE ADVISORY SPEEDS ARE 30 MPH OR LESS, REVERSE TURN SIGNS SHOULD BE USED. OTHER CURVE OR TURN WARNING SIGNS MAY BE SUBSTITUTED TO DEPICT ROADWAY ALIGNMENT AS APPROPRIATE.
- 7. ROADSIDE BARRIERS AND END TREATMENTS SHALL BE CRASHWORTHY.

SIGN SPACING = X (FEET)		
Rural Roads	45/55 MPH	500'+-
Urban Arterials & Rural Roads	35/40 MPH	350'+-
Rural Roads Urban Streets Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/70	40	80
35/45	30	60
25/30	20	40



EXPIRES NOVEMBER 23, 2003

ROAD CLOSURE
WITH DIVERSION
STANDARD PLAN K-1

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 12-20-02

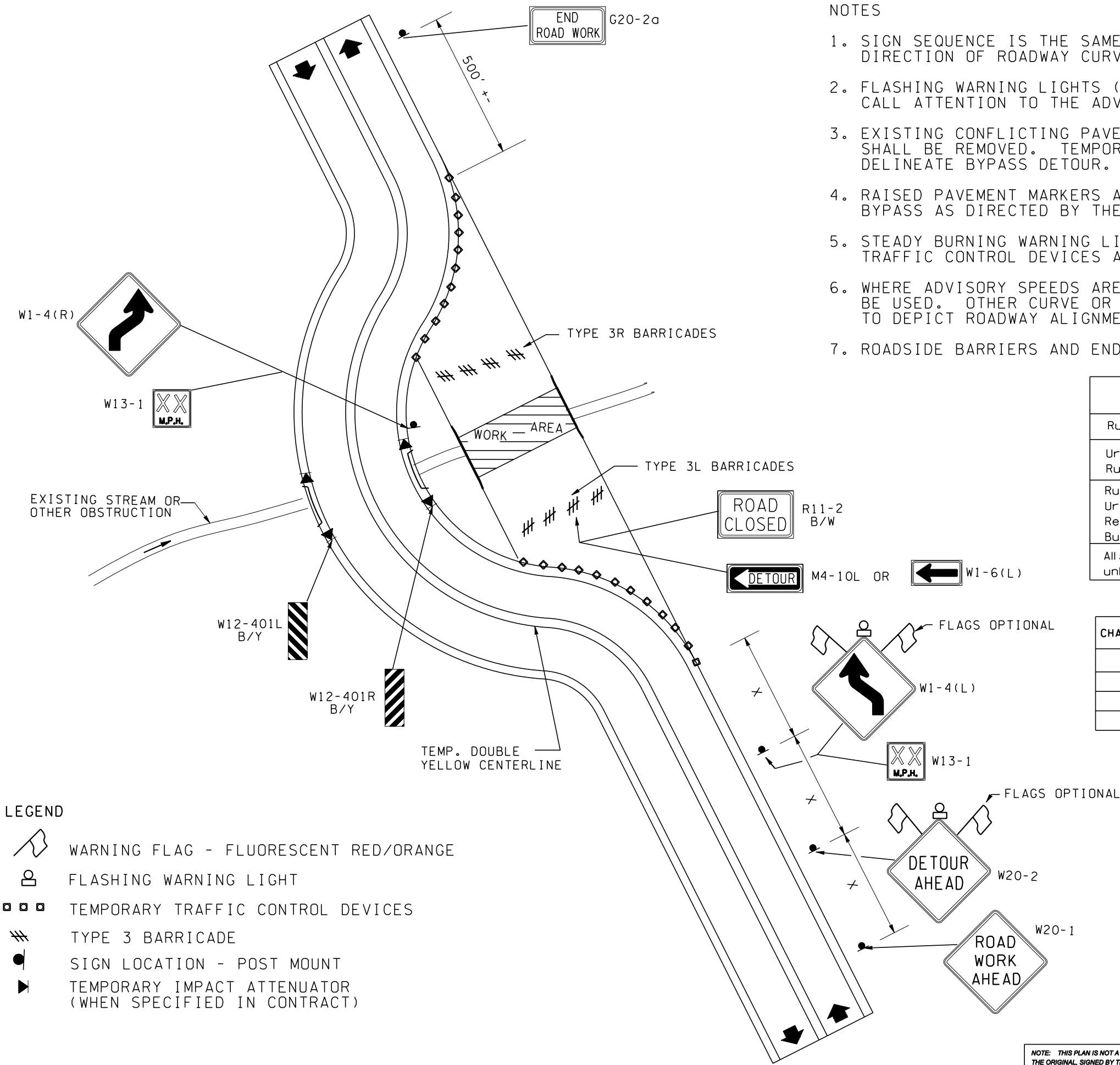
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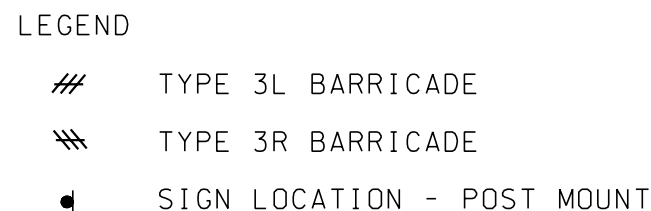
DATE



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1. MODIFY REGULATORY TRAFFIC CONTROL DEVICES FOR THE DURATION OF THE DETOUR.
2. TWO FLASHING WARNING LIGHTS (TYPE A, MUTCD) SHALL BE USED TO MARK EACH BARRICADE AT NIGHT.
3. DETOUR TRAILBLAZERS SHALL BE INSTALLED THROUGHOUT THE DETOUR.
4. SIGNING SHOWN FOR ONE DIRECTION ONLY.
5. COORDINATE WITH EMERGENCY SERVICES.

SIGN SPACING = X (FEET)		
Rural Roads	45/55 MPH	500'+-
Urban Arterials & Rural Roads	35/40 MPH	350'+-
Rural Roads Urban Streets Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		



EXPIRES NOVEMBER 23, 2003

ROAD CLOSURE WITH OFF-SITE DETOUR

STANDARD PLAN K-2

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 12-20-02

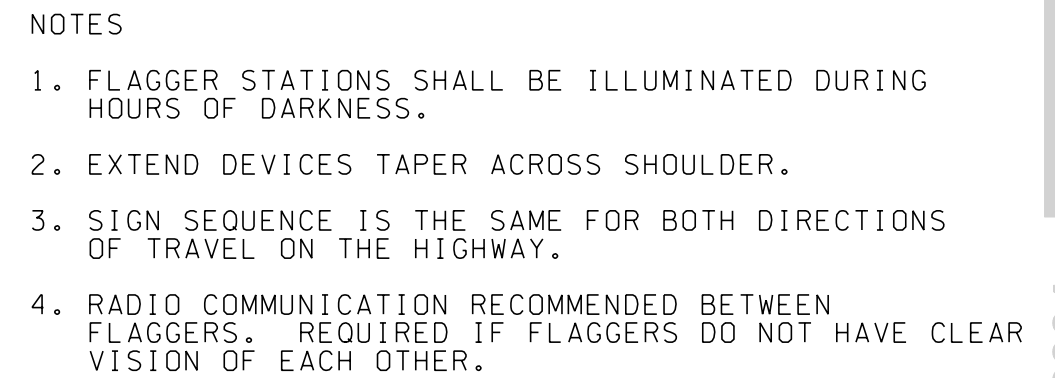
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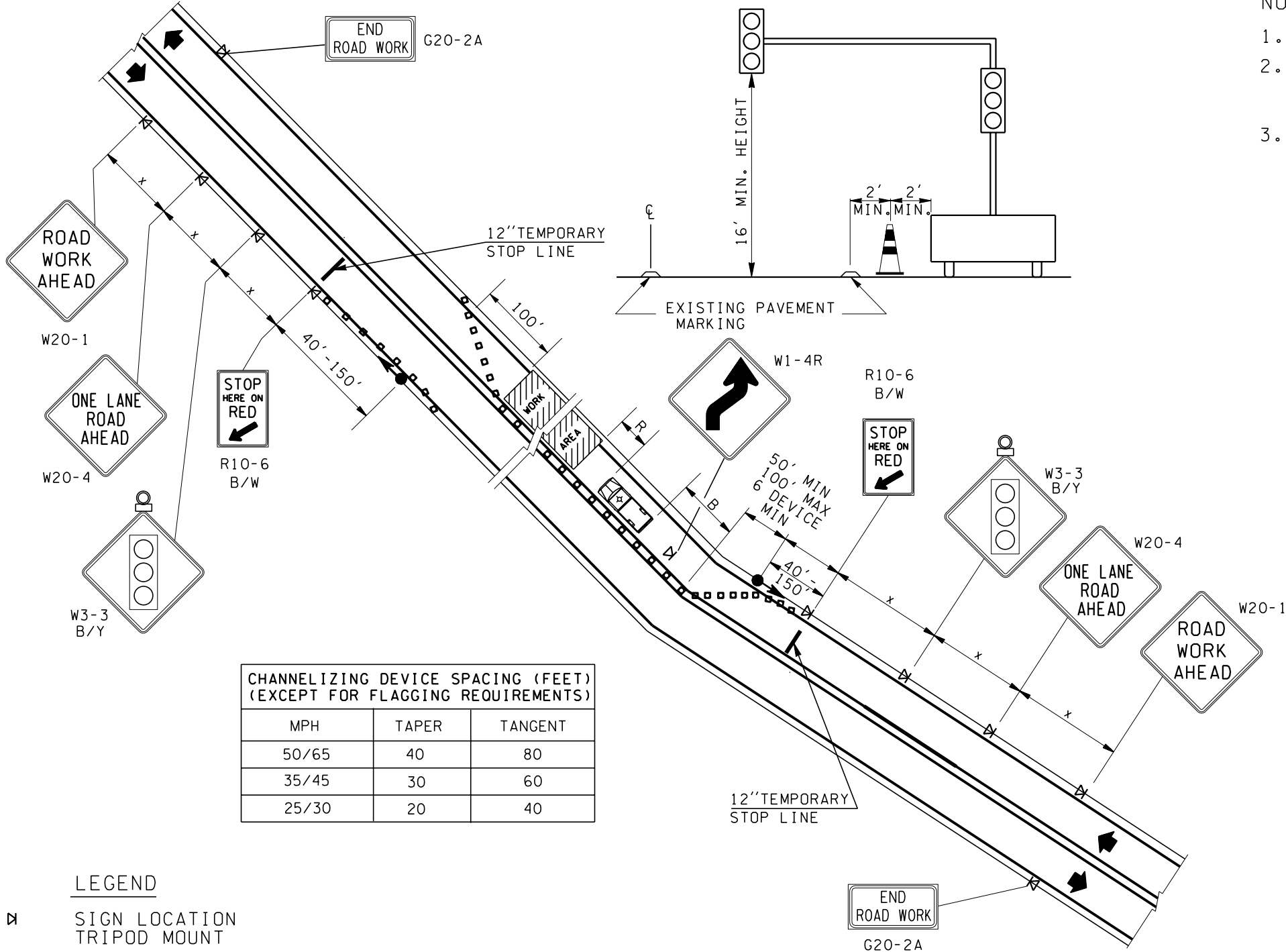


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A circular professional engineer seal for Alan O. King. The outer ring contains the text "ALAN O. KING" at the top and "PROFESSIONAL ENGINEER" at the bottom. Inside this ring, the text "STATE OF WASHINGTON" is at the top and "REGISTERED ENGINEER" is at the bottom. In the center is a portrait of a man with curly hair, wearing a suit and bow tie. Below the portrait is the number "15213". The entire seal is enclosed in a gear-like border.

(FOR ROAD APPROACHES
AS NEEDED)



- NOTES
- 1. EXTEND TAPER ACROSS SHOULDER.
 - 2. THE MAXIMUM LENGTH OF WORK AREA CONTROLLED BY ONE-WAY TRAFFIC SIGNAL IS 400 FT. SIGNAL TIMING SHALL BE ESTABLISHED BY QUALIFIED PERSONNEL.
 - 3. SIGNS SHALL BE POST MOUNTED IF SIGNAL REMAINS IN PLACE MORE THAN 3 DAYS.

BUFFER DATA									
BUFFER SPACE = B									
SPEED (MPH)	25	30	35	40	45	50	55		
LENGTH (feet)	55	85	120	170	220	280	335		
PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R									
VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)		POSTED SPEED (mph)		STATIONARY OPERATION (feet)				
4 YARD DUMP TRUCK	24,000								
			50-55		75				
			45		50				
2 TON CARGO TRUCK	15,000								
			50-55		100				
			45		75				
1 TON CARGO TRUCK	10,000								
			50-55		150				
			45		100				
ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT.									

CHANNELIZING DEVICE SPACING (FEET) (EXCEPT FOR FLAGGING REQUIREMENTS)		
MPH	TAPER	TANGENT
50/65	40	80
35/45	30	60
25/30	20	40

- LEGEND
- SIGN LOCATION
 - TRIPOD MOUNT
 - TEMPORARY TRAFFIC CONTROL DEVICES
 - FLAGGING STATION
 - PROTECTIVE VEHICLE (WHEN SPECIFIED IN CONTRACT)
 - PORTABLE SIGNAL
 - FLASHING BEACON

SIGN SPACING = X (feet)		
Rural Roads	45/55 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Urban Streets Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		



EXPIRES NOVEMBER 23, 2003

ALTERNATING ONE-WAY TRAFFIC TEMPORARY SIGNAL CONTROLLED

STANDARD PLAN K-4

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 12-20-02

STATE DESIGN ENGINEER DATE

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SIGHT DISTANCE DATA									
MIN. STOPPING SIGHT DIST. = S									
SPEED LIMIT MPH	25	30	35	40	45	50	55		
DISTANCE FEET	75'	100'	150'	225'	300'	375'	450'		
DISTANCES SHOWN ARE MINIMUMS. USE ADDITIONAL DISTANCE WHEN POSSIBLE.									

W21-1
BLACK ON
ORANGE

WORKERS

MOUNT TO BACK
OF WORK VEHICLE

SHADOW VEHICLE MAINTAIN MIN. SIGHT DISTANCE
"S" (SEE CHART) TO APPROACHING TRAFFIC.

W20-1
BLACK ON
ORANGE

ROAD
WORK
AHEAD

MOUNT TO BACK
OF SHADOW VEHICLE

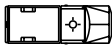
OR

PORTABLE CHANGEABLE
MESSAGE SIGN DISPLAYS

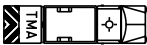
PCMS	
1	2
WORKERS ON ROADWAY	BE PREPARED TO STOP
1.5 SEC	1.5 SEC

MOUNT TO BACK
OF SHADOW VEHICLE

LEGEND



WORK VEHICLE WITH FLASHING AMBER WARNING BEACON



SHADOW VEHICLE WITH FLASHING AMBER WARNING BEACON
(WITH TRUCK MOUNTED ATTENUATOR WHEN SPECIFIED IN CONTRACT)

NOTES

1. DAYLIGHT HOURS ONLY.
2. RADIO CONTACT BETWEEN WORK CREW AND SHADOW VEHICLE RECOMMENDED.



EXPIRES NOVEMBER 23, 2003

MOBILE SHOULDER
OPERATION WITH
LANE ENCROACHMENT
STANDARD PLAN K-5

SHEET 1 OF 1 SHEET

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12-20-02

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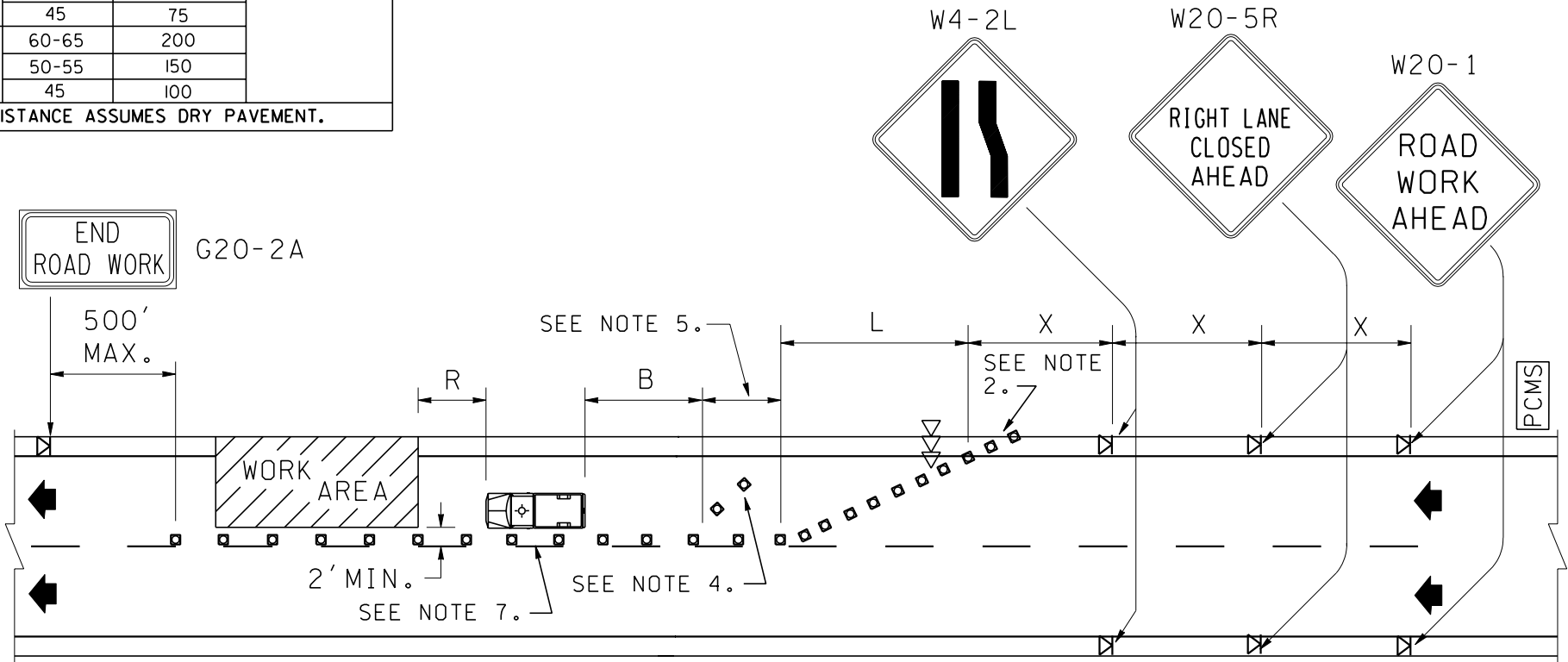
BUFFER DATA										
BUFFER SPACE = B										
SPEED (MPH)	25	30	35	40	45	50	55	60	65	—
LENGTH (feet)	55	85	120	170	220	280	335	415	485	—
PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R										
VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)		POSTED SPEED (mph)		STATIONARY OPERATION (feet)					
4 YARD DUMP TRUCK	24,000		60-65		100					
			50-55		75					
			45		50					
2 TON CARGO TRUCK	15,000		60-65		150					
			50-55		100					
			45		75					
1 TON CARGO TRUCK	10,000		60-65		200					
			50-55		150					
			45		100					
ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT.										

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/65	40	80
35/45	30	60
25/30	20	40

MINIMUM TAPER LENGTH = L (FEET)										
LANE WIDTH (feet)	Posted Speed (mph)									
	25	30	35	40	45	50	55	60	65	
10	105	150	205	270	450	500	550	-	-	
11	115	165	225	295	495	550	605	660	-	
12	125	180	245	320	540	600	660	720	780	

- NOTES
1. EXTEND DEVICE TAPER ACROSS SHOULDER.
 2. DEVICES SHOULD NOT ENCROACH INTO ADJACENT LANES.
 3. INSTALL PORTABLE CHANGEABLE MESSAGE SIGN (WHEN SPECIFIED) APPROXIMATELY 1 MILE IN ADVANCE OF LANE CLOSURE.
 4. USE TRANSVERSE DEVICES IN CLOSED LANE EVERY 1000' +/-
 5. TRAFFIC SAFETY DRUMS RECOMMENDED FOR HIGH SPEED ROADWAYS AND IN TAPER SECTIONS. USE (IN LIEU OF CONES).
 6. ANALYZE THE TRAFFIC VOLUMES TO DETERMINE WORK HOURS TO MINIMIZE TRAFFIC IMPACTS.
 7. A TEMPORARY RIGHT EDGE LINE IS REQUIRED FOR A LONG TERM CLOSURE.

SIGN SPACING = X (FEET)		
Rural Roads	45/65 MPH	500'+-
Urban Arterials & Rural Roads	35/40 MPH	350'+-
Rural Roads Urban Streets Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		



LEGEND

- ▣ SIGN LOCATION-TRIPOD MOUNTED
- ▢ SEQUENTIAL ARROW SIGN
- ▣▣▣ TEMPORARY TRAFFIC CONTROL DEVICES
- ▣ PROTECTIVE VEHICLE (WHEN SPECIFIED IN CONTRACT)
- ▣ TMA PROTECTIVE VEHICLE WITH TRUCK MOUNTED ATTENUATOR (WHEN SPECIFIED IN CONTRACT FOR HIGH SPEED ROADWAYS)
- PCMS PORTABLE CHANGEABLE MESSAGE SIGN (WHEN SPECIFIED IN CONTRACT)

PCMS	
1	2
RIGHT LANE CLOSED	1 MILE AHEAD
1.5 SEC	1.5 SEC



RIGHT LANE CLOSURE
FOR DIVIDED HIGHWAY
STANDARD PLAN K-6

SHEET 1 OF 1 SHEET

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NOTES

- 1. EXISTING CONFLICTING PAVEMENT MARKINGS NO LONGER APPLICABLE SHALL BE REMOVED OR OBLITERATED.
- 2. TEMPORARY MARKINGS SHALL BE USED AS NECESSARY.
- 3. EXPOSED ENDS OF CONCRETE BARRIERS SHALL BE MAINTAINED OUTSIDE THE CLEAR ZONE AND ADEQUATELY FLARED OR FITTED WITH IMPACT ATTENUATORS.
- 4. STEADY BURNING WARNING LIGHTS (TYPE C, MUTCD) SHALL BE USED TO MARK CHANNELIZING DEVICES AT NIGHT AS NEEDED.
- 5. ROADSIDE BARRIERS AND END TREATMENT SHALL BE CRASHWORTHY.
- 6. INSTALL PORTABLE CHANGEABLE MESSAGE SIGN (WHEN SPECIFIED) APPROXIMATELY 1 MILE IN ADVANCE OF LANE CLOSURE.

POSTED SPEED MPH	RIGID SYSTEM	UNRESTRAINED RIGID SYSTEM	SEMI RIGID SYSTEM
70	20:1	18:1	15:1
60	18:1	16:1	14:1
55	16:1	14:1	12:1
50	14:1	12:1	11:1
45	12:1	11:1	10:1
40	11:1	10:1	9:1
OR BELOW			

LONGITUDINAL BARRIER FLARE RATES

MINIMUM TAPER LENGTH = L (FEET)										
LANE WIDTH (feet)	Posted Speed (mph)									
	25	30	35	40	45	50	55	60	65	
10	105	150	205	270	450	500	550	-	-	
11	115	165	225	295	495	550	605	660	-	
12	125	180	245	320	540	600	660	720	780	

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/65	40	80
35/45	30	60
25/30	20	40

SIGN SPACING = X (FEET)		
Rural Roads	45/65 MPH	500'+-
Urban Arterials & Rural Roads	35/40 MPH	350'+-
Rural Roads	25/30 MPH	200'+-
Urban Streets		
Residential Areas & Business Districts		
All signs are black on orange unless otherwise designated.		



LANE CLOSURE WITH TEMPORARY CONCRETE BARRIER
STANDARD PLAN K-7

SHEET 1 OF 1 SHEET

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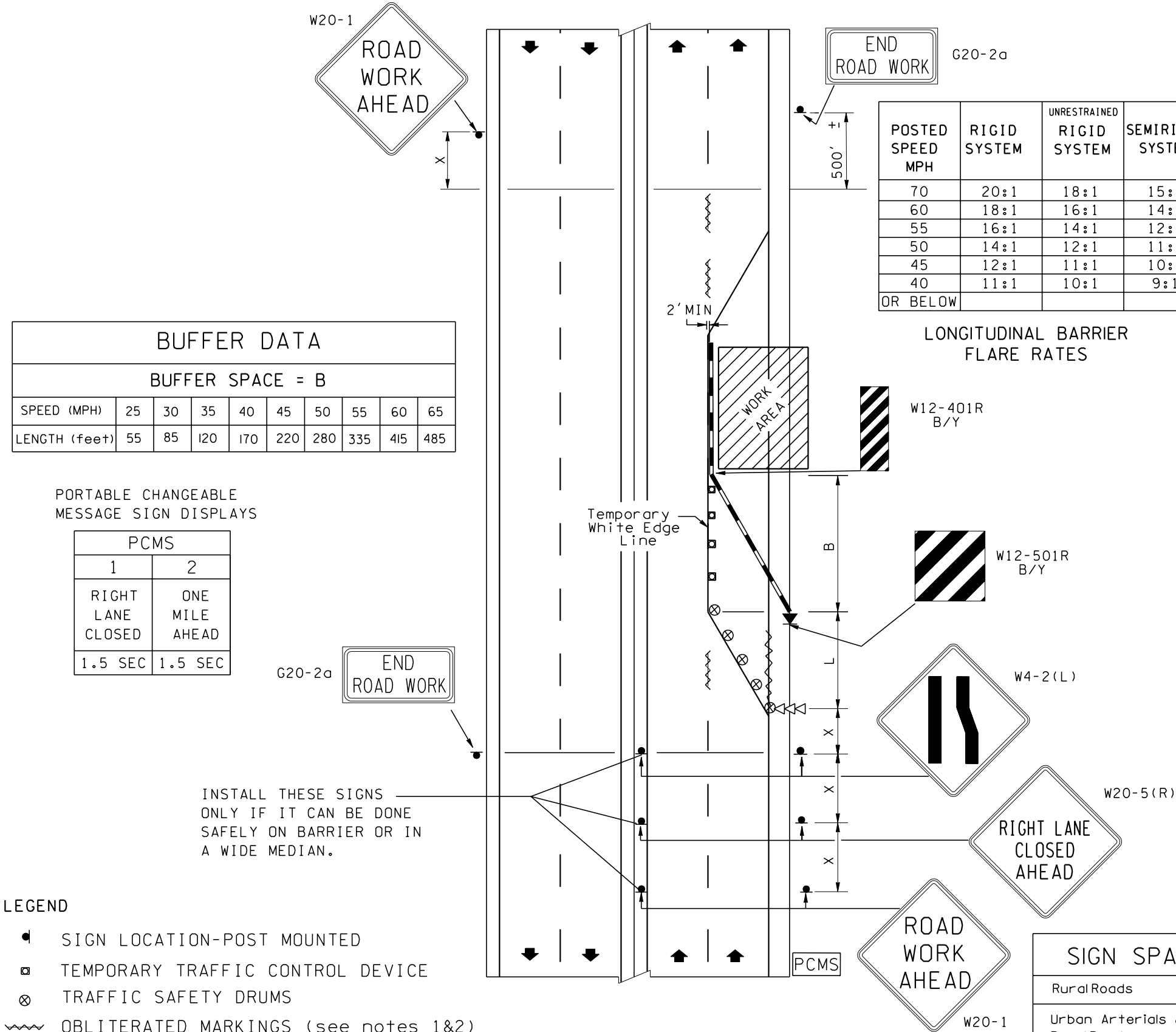
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STATE DESIGN ENGINEER

DATE



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BUFFER DATA										
BUFFER SPACE = B										
SPEED (MPH)	25	30	35	40	45	50	55	60	65	
LENGTH (feet)	55	85	120	170	220	280	335	415	485	

PORTABLE CHANGEABLE MESSAGE SIGN DISPLAYS

PCMS	
1	2
RIGHT LANE CLOSED	ONE MILE AHEAD
1.5 SEC	1.5 SEC

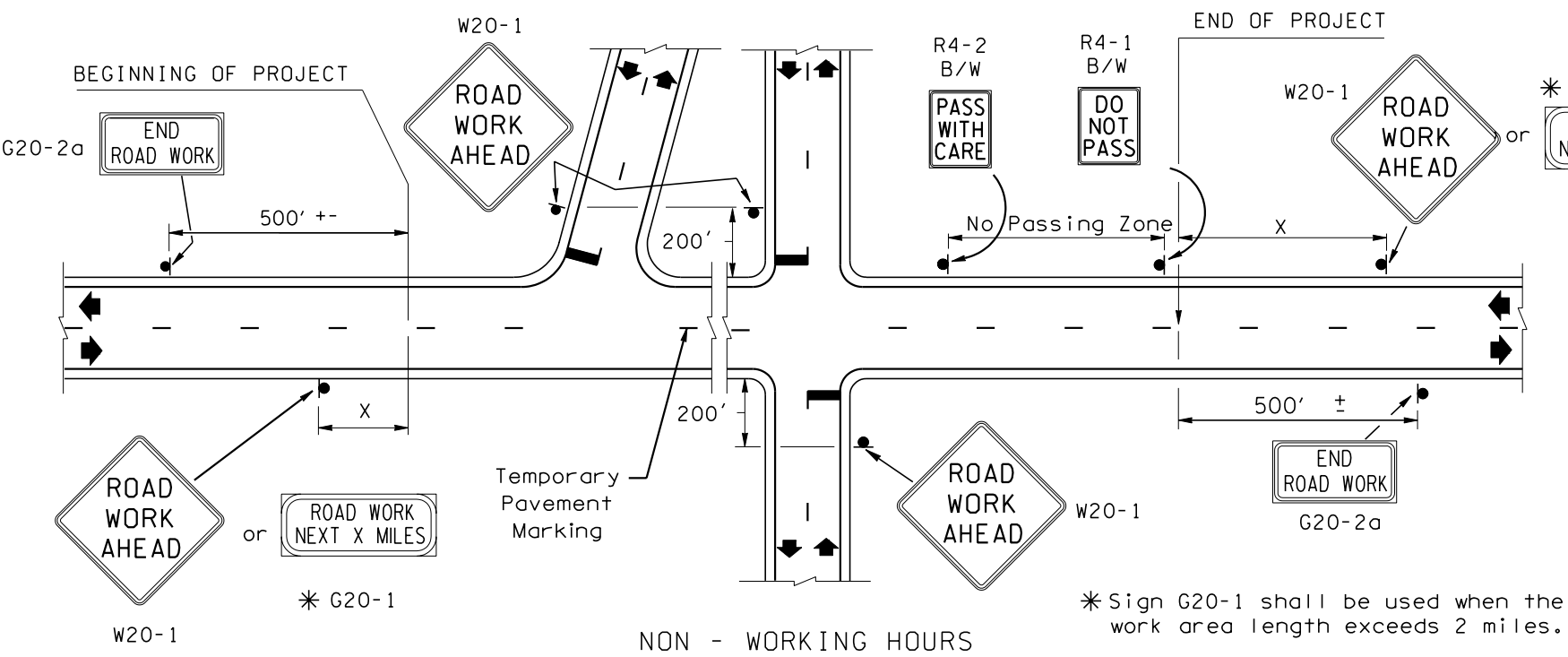
INSTALL THESE SIGNS ONLY IF IT CAN BE DONE SAFELY ON BARRIER OR IN A WIDE MEDIAN.

- LEGEND
- SIGN LOCATION-POST MOUNTED
 - TEMPORARY TRAFFIC CONTROL DEVICE
 - TRAFFIC SAFETY DRUMS
 - OBLITERATED MARKINGS (see notes 1&2)
 - TEMPORARY CONCRETE BARRIER W/REFLECTORS
 - SEQUENTIAL ARROW SIGN
 - TEMPORARY IMPACT ATTENUATORS (WHEN SPECIFIED IN CONTRACT).
 - PCMS PORTABLE CHANGEABLE MESSAGE SIGN (WHEN SPECIFIED IN CONTRACT)

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NOTES

- 1. OTHER WARNING SIGNS, SUCH AS LOOSE GRAVEL, TRUCK CROSSING, BUMP, ABRUPT LANE EDGE, ETC. SHALL BE USED AS NECESSARY ALONG WITH ADVISORY SPEED SIGNS.
- 2. ADVISORY SPEED SIGNS ARE DETERMINED BY THE ENGINEER.
- 3. FLOODLIGHTS SHALL BE PROVIDED TO MARK FLAGGER STATIONS AT NIGHT.



SIGN SPACING = X (FEET)		
Rural Roads	45/65 MPH	500'+-
Urban Arterials & Rural Roads	35/40 MPH	350'+-
Rural Roads Urban Streets Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		

LEGEND
SIGN LOCATION-POST MOUNTED



PAVING
OPERATIONS
NON-WORKING HOURS
STANDARD PLAN K-8

SHEET 1 OF 1 SHEET

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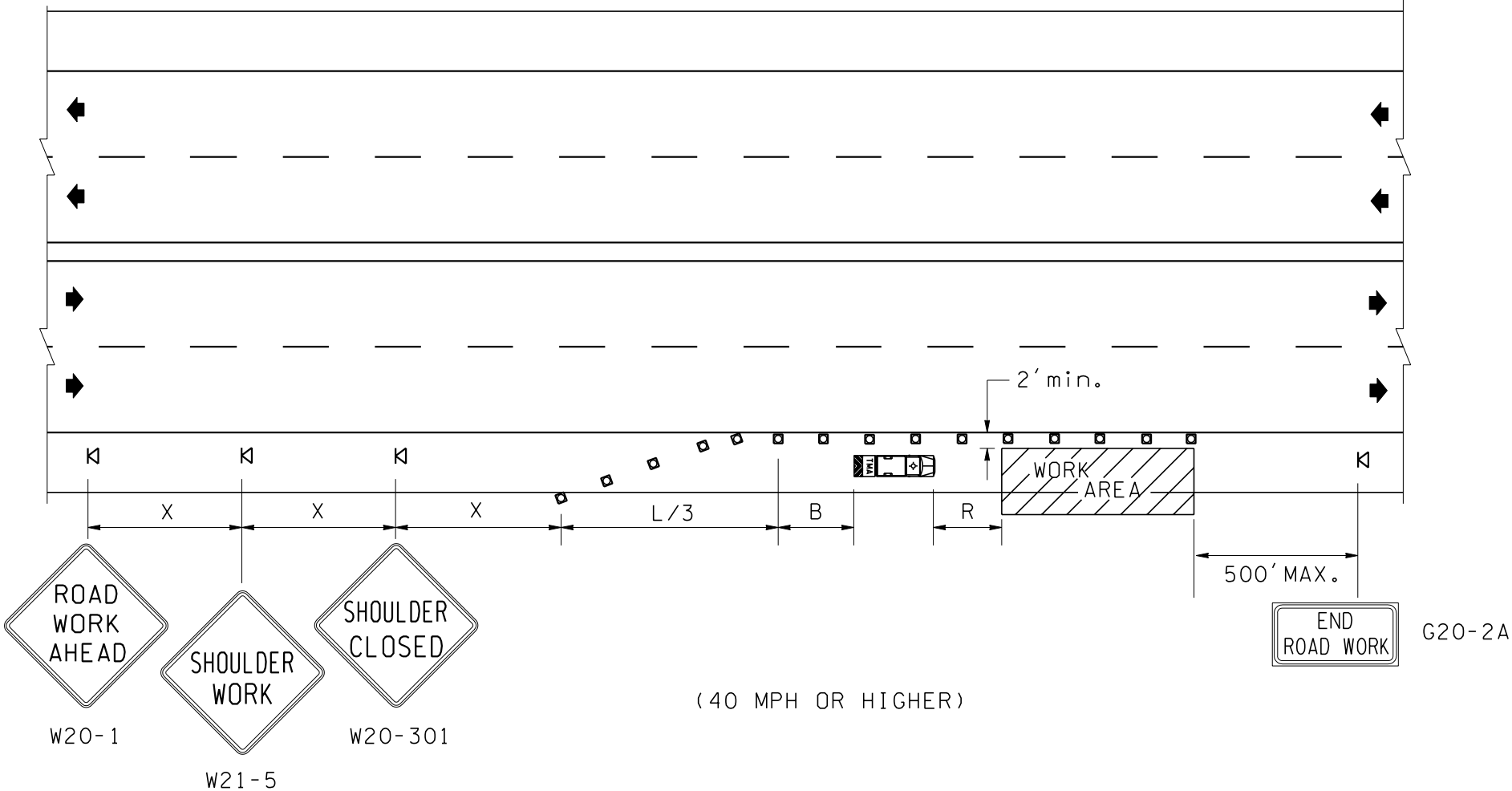
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BUFFER DATA										
BUFFER SPACE = B										
SPEED (MPH)	25	30	35	40	45	50	55	60	65	—
LENGTH (feet)				170	220	280	335	415	485	—
PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R										
VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)			POSTED SPEED (mph)		STATIONARY OPERATION (feet)				
4 YARD DUMP TRUCK	24,000			60-65		100				
				50-55		75				
				45		50				
2 TON CARGO TRUCK	15,000			60-65		150				
				50-55		100				
				45		75				
1 TON CARGO TRUCK	10,000			60-65		200				
				50-55		150				
				45		100				
ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT.										

SIGN SPACING = X (FEET)		
Rural Roads	45/65 MPH	500'+-
Urban Arterials	40 MPH	350'+-
All signs are black on orange unless otherwise designated.		

1. NO ENCROACHMENT ON TRAVELLED LANE IF ENCROACHMENT IS NECESSARY, LANE SHALL BE CLOSED.
2. FOR OPERATIONS OF 15 MINUTES OR LESS, ALL SIGNS AND CHANNELIZATION DEVICES MAY BE ELIMINATED.

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/70	40	80
40/45	30	60



MINIMUM TAPER LENGTH (L) IN FEET									
Lane Width (feet)	Posted Speed (mph)								
	25	30	35	40	45	50	55	60	65
10	-	-	-	265	450	500	550	-	-
11	-	-	-	295	495	550	605	660	-
12	-	-	-	320	540	600	660	720	780

- LEGEND
- ⊠

SIGN LOCATION-TRIPOD MOUNTED
- ⊠ ⊠ ⊠

TEMPORARY TRAFFIC CONTROL DEVICES
- PROTECTIVE VEHICLE WITH TRUCK MOUNTED ATTENUATOR (WHEN SPECIFIED IN CONTRACT)

SHOULDER CLOSURE
HIGH SPEED

STANDARD PLAN K-9

SHEET 1 OF 1 SHEET

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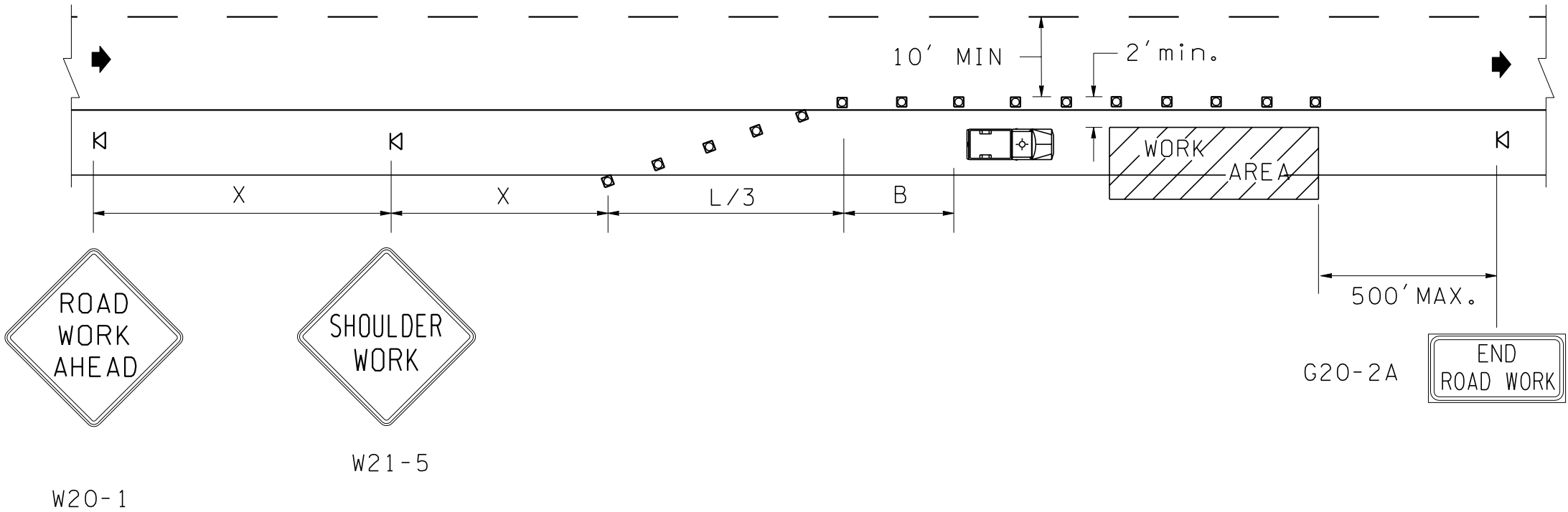
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BUFFER DATA								
BUFFER SPACE = B								
SPEED (MPH)	25	30	35	40	45			
LENGTH (feet)	55	85	120	—	—			

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
35	30	60
25/30	20	40

SIGN SPACING = X (FEET)		
Urban Arterials	35 MPH	350'+-
Urban Streets Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		

MINIMUM TAPER LENGTH (L) IN FEET					
Lane Width (feet)	Posted Speed (mph)				
	25	30	35	40	
10	105	150	205	—	
11	115	165	225	—	
12	125	180	245	—	



LEGEND

- ⌵ SIGN LOCATION-TRIPOD MOUNTED
 - □ □ TEMPORARY TRAFFIC CONTROL DEVICES
 - 🚚 PROTECTIVE VEHICLE (WHEN SPECIFIED IN CONTRACT)
- (35 MPH OR LESS)



SHOULDER CLOSURE
LOW SPEED

STANDARD PLAN K-10

SHEET 1 OF 1 SHEET

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STATE DESIGN ENGINEER

DATE

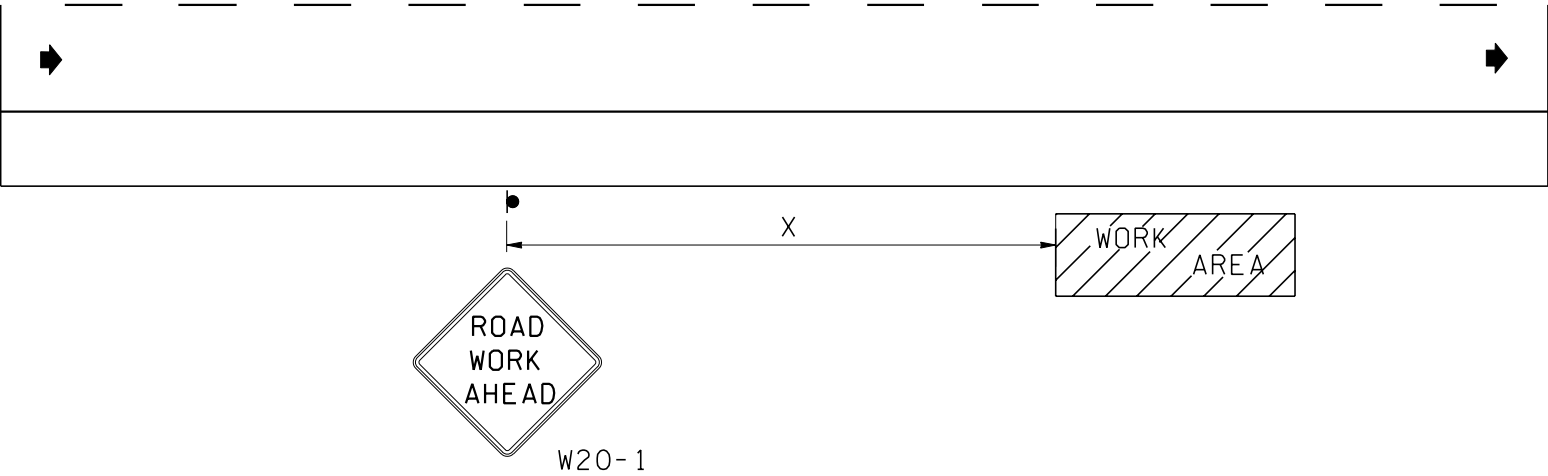


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EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

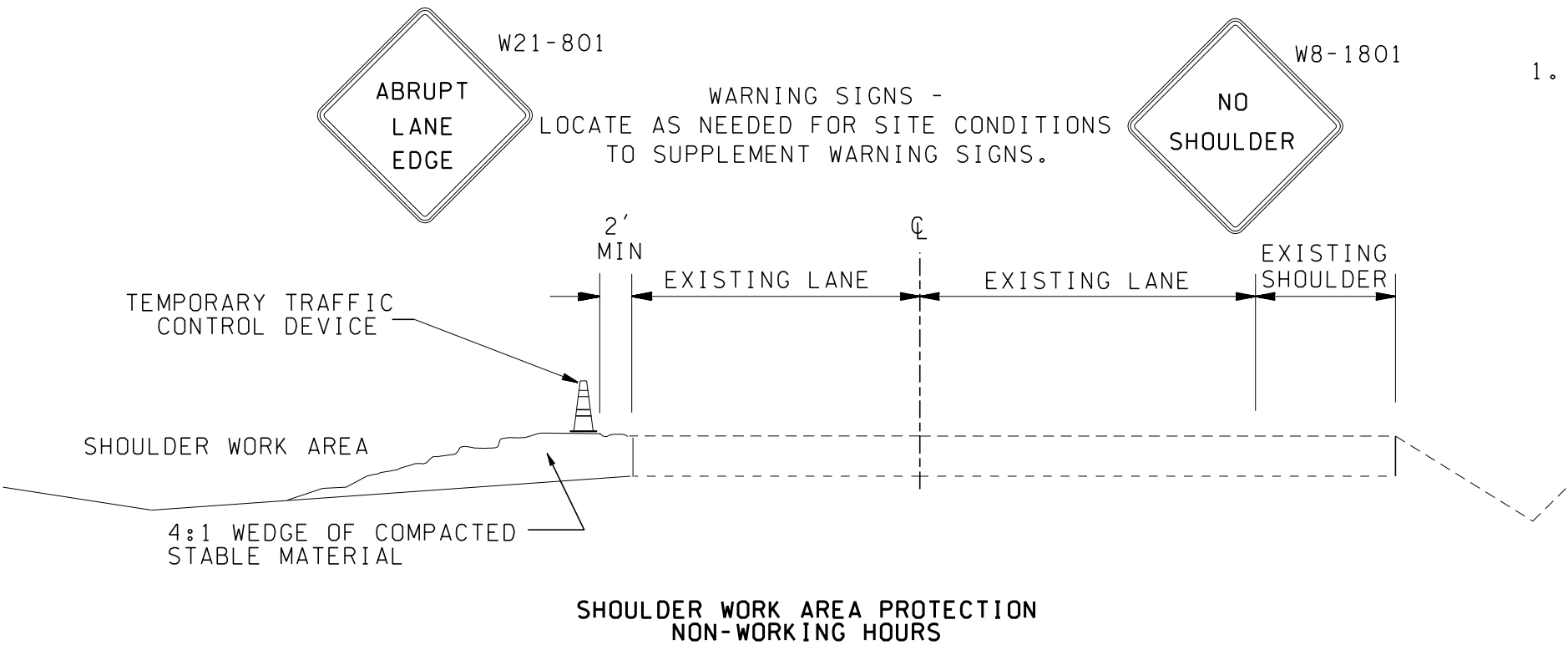


NOTES

1. THE SIGN SHOWN IS NOT REQUIRED IF THE WORK SPACE IS BEHIND A BARRIER, MORE THAN 2' BEHIND THE CURB, OR 15' OR MORE FROM THE EDGE OF ANY ROADWAY.

SIGN SPACING = X (feet)		
Rural Roads	45/55 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Urban Streets Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		

WORK BEYOND THE SHOULDER



1. SHOULDER EXCAVATION SHALL BE LIMITED TO ONE SIDE AT A TIME.



EXPIRES NOVEMBER 23, 2003

SHOULDER WORK AREAS

STANDARD PLAN K-11

SHEET 1 OF 1 SHEET

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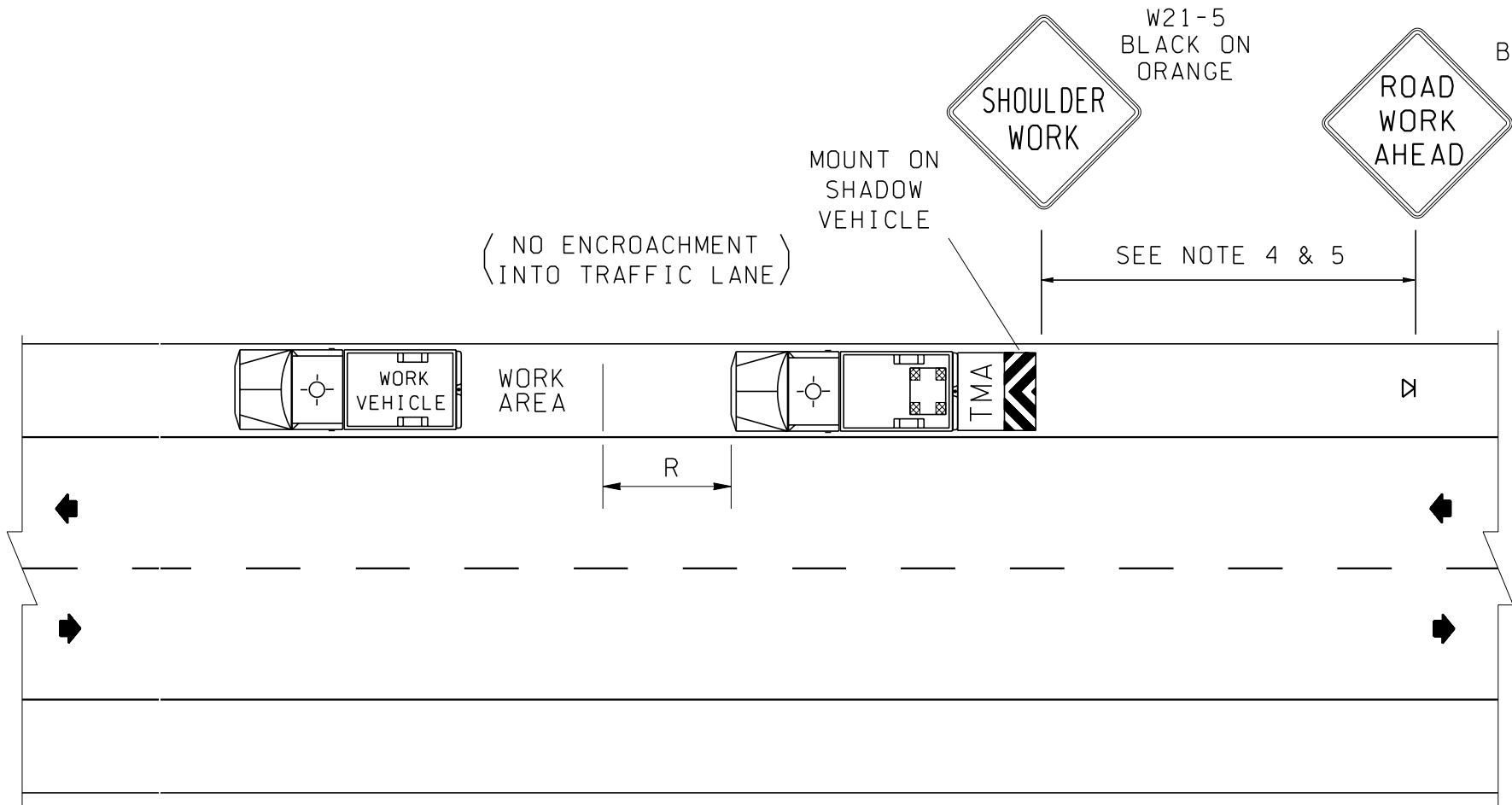
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PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R*			
VEHICLE TYPE	VEHICLE WEIGHT (LBS)	STATIONARY	MOBILE
4 YARD DUMP TRUCK	24,000	100'	175'
ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT			

NOTES

- 1. WORK VEHICLE AND SHADOW/PROTECTIVE VEHICLE SHALL USE WARNING BEACONS.
- 2. SHADOW/PROTECTIVE VEHICLE RECOMMENDED- SHALL MAINTAIN 500'-1000' OF SIGHT DISTANCE TO APPROACHING TRAFFIC.
- 3. THIS PLAN MAY BE IMPLEMENTED ON MULTI-LANE HIGHWAYS WITH LESS THAN 10,000 ADT.
- 4. IN THOSE SITUATIONS WHERE MULTIPLE WORK LOCATIONS WITHIN A LIMITED DISTANCE MAKE IT PRACTICAL TO PLACE STATIONARY SIGNS, THE DISTANCE BETWEEN THE ADVANCE WARNING SIGN AND THE WORK SHOULD NOT EXCEED 2 MILES.
- 5. IN THOSE SITUATIONS WHERE THE DISTANCE BETWEEN THE ADVANCE WARNING SIGNS AND THE WORK IS 1 TO 2 MILES, A SUPPLEMENTAL DISTANCE PLAQUE SHALL BE USED WITH THE ROAD WORK AHEAD SIGN.



LEGEND

- SEQUENTIAL ARROW PANEL - TYPE "B" (CAUTION MODE)
- TRUCK MOUNTED ATTENUATOR
- WARNING BEACON



EXPIRES NOVEMBER 23, 2003

SHORT TERM DURATION
OR MOBILE OPERATION
SHOULDER CLOSURE
STANDARD PLAN K-12

SHEET 1 OF 1 SHEET

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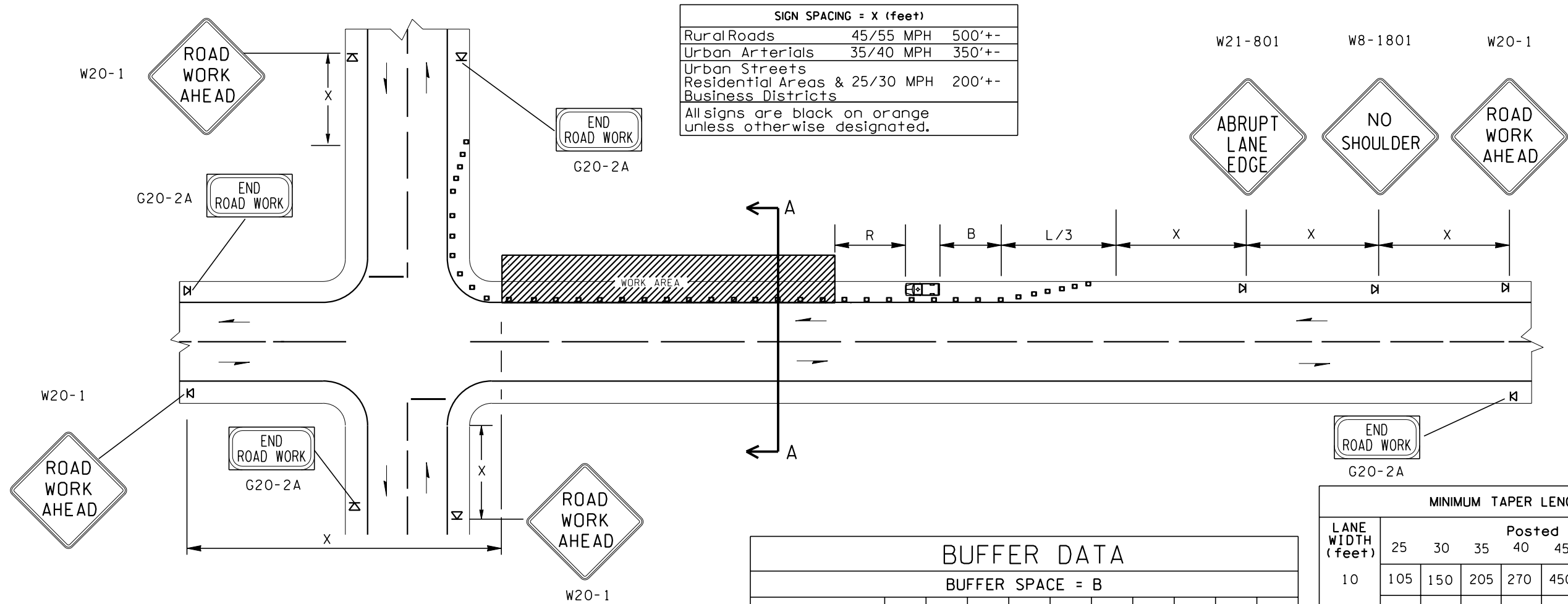
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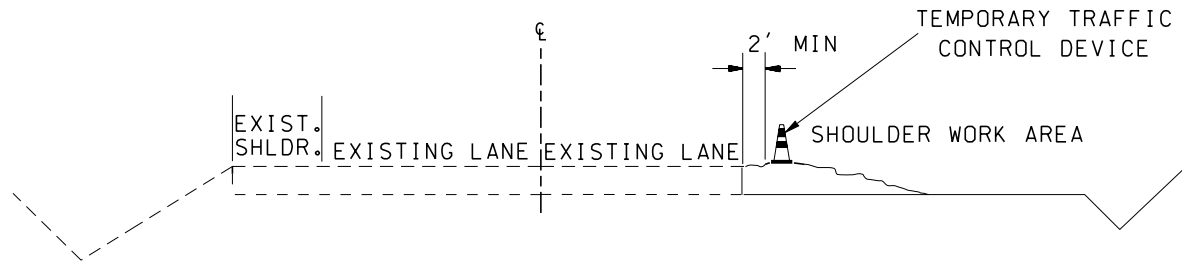


SIGN SPACING = X (feet)		
Rural Roads	45/55 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Urban Streets		
Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		

MINIMUM TAPER LENGTH = L (feet)											
LANE WIDTH (feet)	Posted Speed (mph)										
	25	30	35	40	45	50	55	60	65	70	
	10	105	150	205	270	450	500	550	-	-	-
	11	115	165	225	295	495	550	605	-	-	-
	12	125	180	245	320	540	600	660	-	-	-

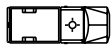
BUFFER DATA									
BUFFER SPACE = B									
SPEED (MPH)	25	30	35	40	45	50	55		
LENGTH (feet)	55	85	120	170	220	280	335		
BUFFER VEHICLE ROLL AHEAD DISTANCE = R									
VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (lbs)		POSTED SPEED (mph)		STATIONARY OPERATION (feet)		MOVING OPERATION (feet)		
4 YARD DUMP TRUCK	24,000						<div></div>		
			50-55		75				
			45		50				
2 TON CARGO TRUCK	15,000								
			50-55		100				
			45		75				
ROLL AHEAD STOPPING SIGHT DISTANCE ASSUMES DRY PAVEMENT									

TYPICAL ROADWAY SECTION A-A



LEGEND

- ⚡ SIGN LOCATION - TRIPOD MOUNT
- □ □ TEMPORARY TRAFFIC CONTROL DEVICES



PROTECTIVE VEHICLE (WHEN SPECIFIED IN CONTRACT)



PROTECTIVE VEHICLE WITH TRUCK MOUNTED ATTENUATOR (WHEN SPECIFIED IN CONTRACT FOR HIGH SPEED ROADWAYS)

NOTES

- FOR LONG-TERM PROJECTS, CONFLICTING PAVEMENT MARKINGS NO LONGER APPLICABLE SHALL BE REMOVED. TEMPORARY MARKINGS SHALL BE USED AS NECESSARY AND SIGNS SHALL BE POST MOUNTED.

CHANNELIZING DEVICE SPACING (feet)		
MPH	TAPER	TANGENT
50/70	40	80
35/45	30	60
25/30	20	40

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EXPIRES NOVEMBER 23, 2003

INTERSECTION SHOULDER WORK
4 WAY INTERSECTION
STANDARD PLAN K-13

SHEET 1 OF 1 SHEET

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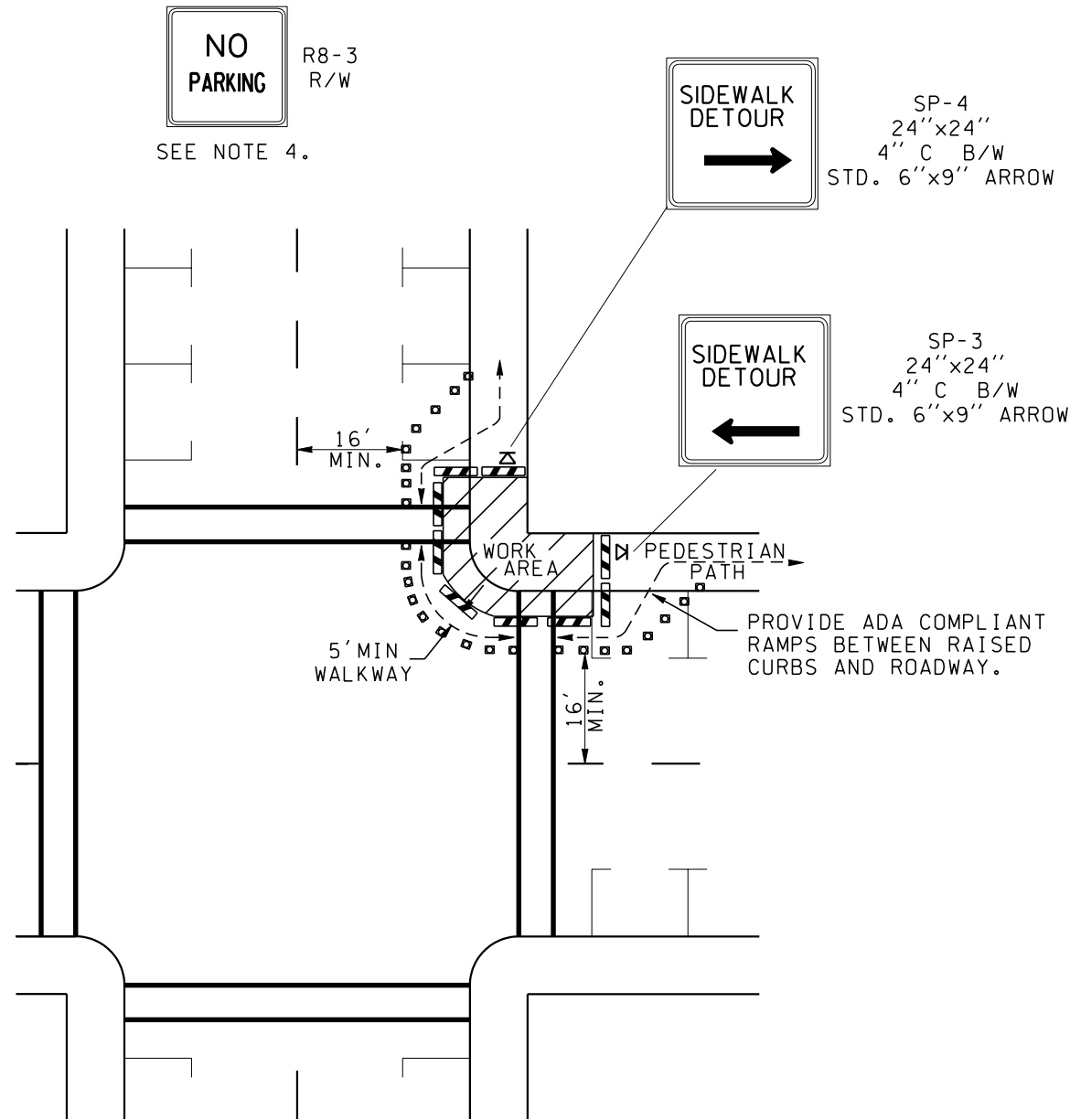
12-20-02

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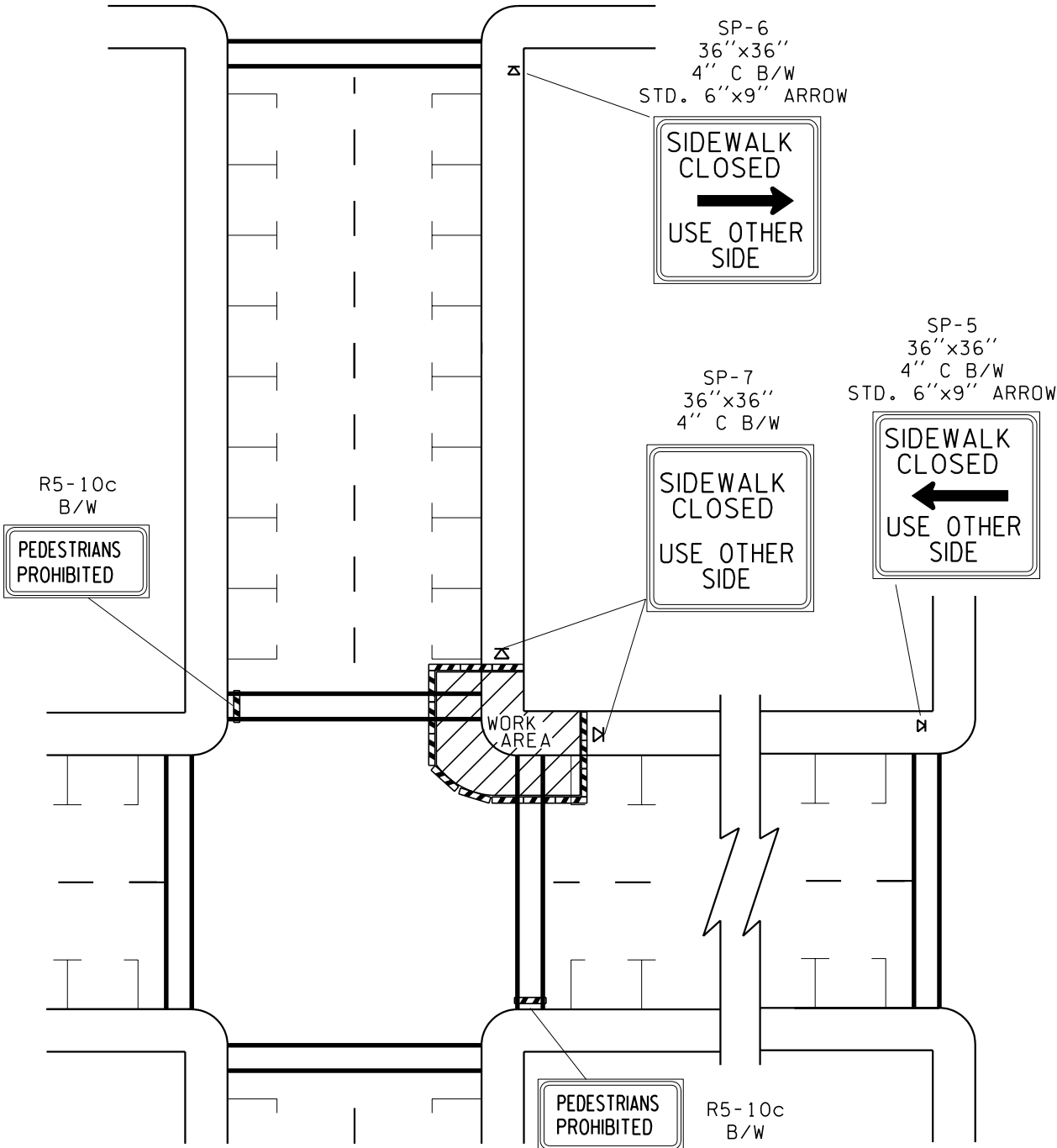
- NOTES
- 1. CONTROLS SHOWN ARE FOR PEDESTRIAN TRAFFIC ONLY.
 - 2. USE WARNING LIGHTS ON BARRICADES.
 - 3. TEMPORARY PEDESTRIAN ROUTES SHALL BE COMPLIANT WITH ADA REQUIREMENTS.
 - 4. CURB PARKING SHALL BE PROHIBITED FOR AT LEAST 50' IN ADVANCE OF A MID-BLOCK CROSSWALK.



PEDESTRIAN DETOUR
(NONWORKING HOURS)

LEGEND

- ▤ SIGN LOCATION-TRIPOD MOUNTED
- ▣▣▣ TEMPORARY TRAFFIC CONTROL DEVICES
- ▨ TYPE 2 BARRICADE



PEDESTRIAN DETOUR
(WORKING HOURS)

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**PEDESTRIAN TRAFFIC
CONTROL AT
INTERSECTIONS
STANDARD PLAN K-14**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 12-20-02

STATE DESIGN ENGINEER

DATE



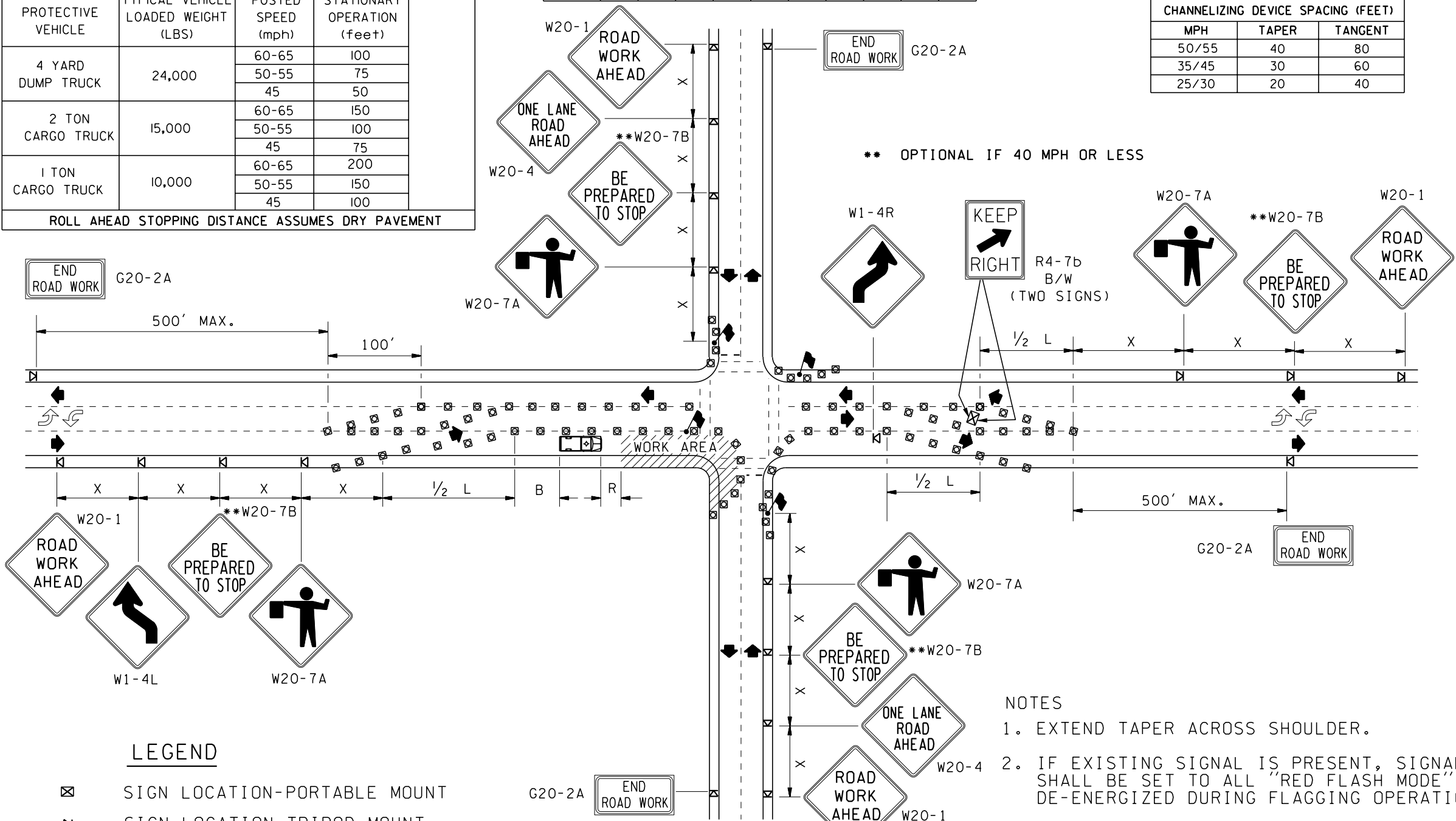
Washington State Department of Transportation

BUFFER DATA									
BUFFER SPACE = B									
SPEED (MPH)	25	30	35	40	45	50	55		
LENGTH (feet)	55	85	120	170	220	280	335		
PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R									
TYPICAL LOADED PROTECTIVE VEHICLE	TYPICAL VEHICLE LOADED WEIGHT (LBS)		POSTED SPEED (mph)		STATIONARY OPERATION (feet)				
4 YARD DUMP TRUCK	24,000		60-65		100				
			50-55		75				
			45		50				
2 TON CARGO TRUCK	15,000		60-65		150				
			50-55		100				
			45		75				
1 TON CARGO TRUCK	10,000		60-65		200				
			50-55		150				
			45		100				
ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT									

MINIMUM TAPER LENGTH = L (FEET)									
LANE WIDTH (feet)	Posted Speed (mph)								
	25	30	35	40	45	50	55		
10	105	150	205	270	450	500	550		
11	115	165	225	295	495	550	605		
12	125	180	245	320	540	600	660		

SIGN SPACING = X (FEET)		
Rural Roads	45/55 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Urban Streets Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/55	40	80
35/45	30	60
25/30	20	40



LEGEND

- ☒ SIGN LOCATION-PORTABLE MOUNT
- ☒ SIGN LOCATION-TRIPOD MOUNT
- 🚧 FLAGGING STATION
- ☒ ☒ ☒ TEMPORARY TRAFFIC CONTROL DEVICES
- 🚚 PROTECTIVE VEHICLE (WHEN SPECIFIED IN CONTRACT)
- 🚚🚚 PROTECTIVE VEHICLE WITH TRUCK MOUNTED ATTENUATOR (WHEN SPECIFIED IN CONTRACT FOR HIGH SPEED ROADWAYS)

- NOTES
1. EXTEND TAPER ACROSS SHOULDER.
 2. IF EXISTING SIGNAL IS PRESENT, SIGNAL SHALL BE SET TO ALL "RED FLASH MODE" OR DE-ENERGIZED DURING FLAGGING OPERATIONS.
 3. IF THE LANE SHIFT IS SHORT AND HAS SHARP CURVES (30 MPH OR LESS) USE SIGN W1-3 IN LIEU OF SIGN W1-4.



INTERSECTION
LANE CLOSURE
THREE LANE ROADWAY
STANDARD PLAN K-15

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 12-20-02

STATE DESIGN ENGINEER



Washington State Department of Transportation

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EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

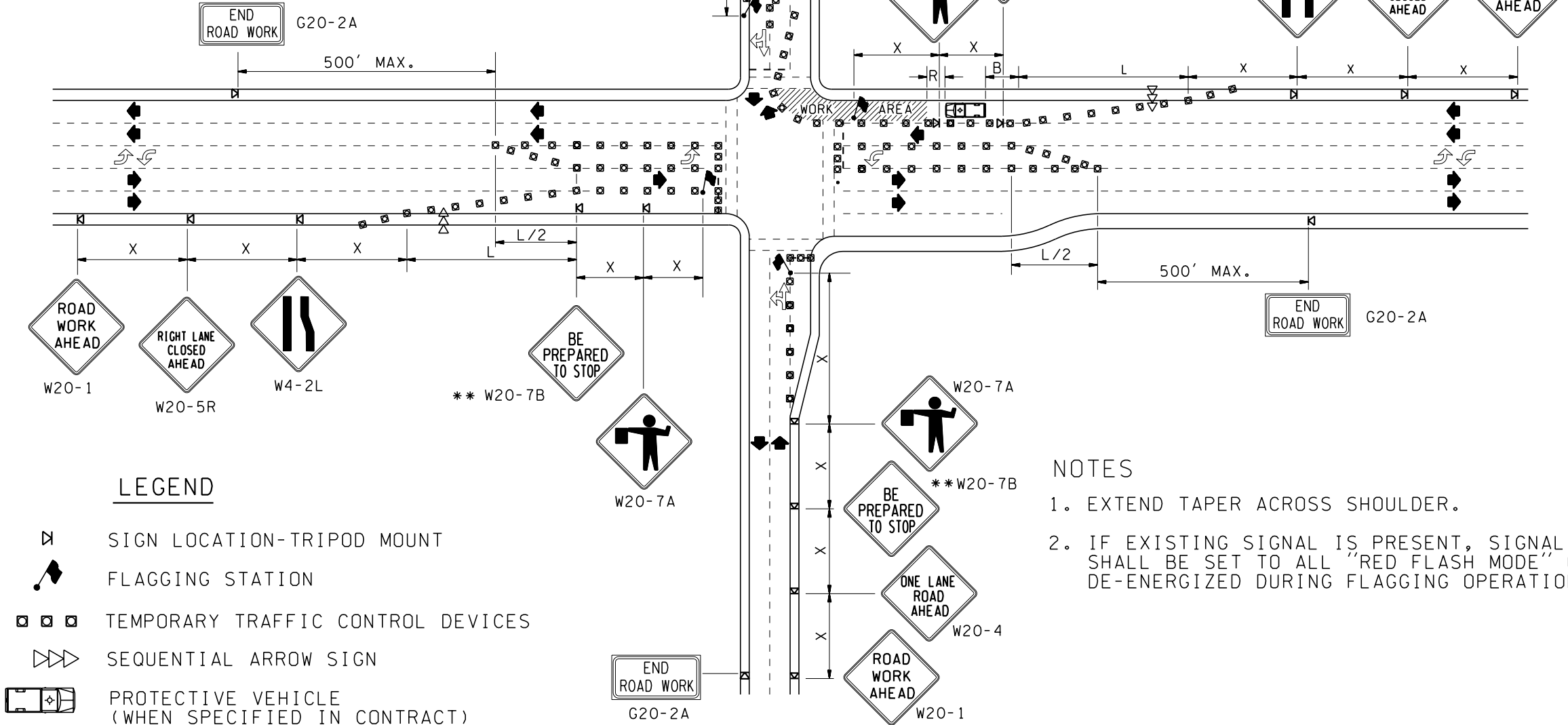
EFFECTIVE: JANUARY 5, 2004 TO AUGUST 1, 2004

BUFFER DATA									
BUFFER SPACE = B									
SPEED (MPH)	25	30	35	40	45	50	55		
LENGTH (feet)	55	85	120	170	220	280	335		
PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R									
TYPICAL LOADED PROTECTIVE VEHICLE	TYPICAL VEHICLE LOADED WEIGHT (LBS)		POSTED SPEED (mph)		STATIONARY OPERATION (feet)				
4 YARD DUMP TRUCK	24,000		60-65		100				
			50-55		75				
			45		50				
2 TON CARGO TRUCK	15,000		60-65		150				
			50-55		100				
			45		75				
1 TON CARGO TRUCK	10,000		60-65		200				
			50-55		150				
			45		100				
ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT									

MINIMUM TAPER LENGTH = L (FEET)									
LANE WIDTH (feet)	Posted Speed (mph)								
	25	30	35	40	45	50	55		
	10	105	150	205	270	450	500	550	
	11	115	165	225	295	495	550	605	
12	125	180	245	320	540	600	660		

SIGN SPACING = X (FEET)			
Rural Roads		45/55 MPH	500'+-
Urban Arterials		35/40 MPH	350'+-
Urban Streets Residential Areas & Business Districts		25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.			

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/55	40	80
35/45	30	60
25/30	20	40



LEGEND

- SIGN LOCATION-TRIPOD MOUNT
- FLAGGING STATION
- TEMPORARY TRAFFIC CONTROL DEVICES
- SEQUENTIAL ARROW SIGN
- PROTECTIVE VEHICLE (WHEN SPECIFIED IN CONTRACT)
- PROTECTIVE VEHICLE WITH TRUCK MOUNTED ATTENUATOR (WHEN SPECIFIED IN CONTRACT FOR HIGH SPEED ROADWAYS)

NOTES

1. EXTEND TAPER ACROSS SHOULDER.
2. IF EXISTING SIGNAL IS PRESENT, SIGNAL SHALL BE SET TO ALL "RED FLASH MODE" OR DE-ENERGIZED DURING FLAGGING OPERATIONS.



INTERSECTION
LANE CLOSURE
FIVE LANE ROADWAY
STANDARD PLAN K-16

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 12-20-02

STATE DESIGN ENGINEER

DATE



Washington State Department of Transportation

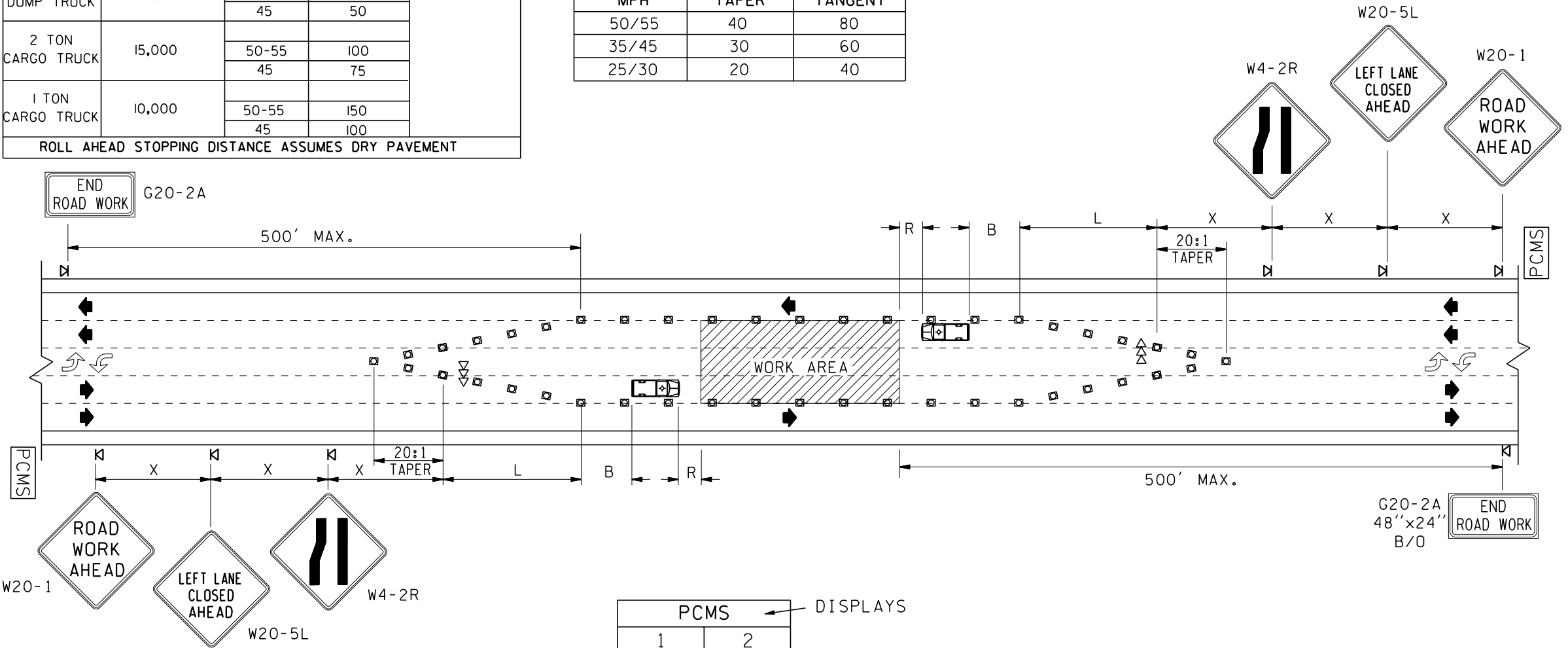
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BUFFER DATA									
BUFFER SPACE = B									
SPEED (MPH)	25	30	35	40	45	50	55		
LENGTH (feet)	55	85	120	170	220	280	335		
PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R									
VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)		POSTED SPEED (mph)		STATIONARY OPERATION (feet)				
4 YARD DUMP TRUCK	24,000								
			50-55		75				
			45		50				
2 TON CARGO TRUCK	15,000								
			50-55		100				
			45		75				
1 TON CARGO TRUCK	10,000								
			50-55		150				
			45		100				
ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT									

SIGN SPACING = X (FEET)		
Rural Roads	45/55 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Rural Roads		
Urban Streets		
Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/55	40	80
35/45	30	60
25/30	20	40

MINIMUM TAPER LENGTH = L (FEET)									
LANE WIDTH (feet)	Posted Speed (mph)								
	25	30	35	40	45	50	55		
10	105	150	205	270	450	500	550		
11	115	165	225	295	495	550	605		
12	125	180	245	320	540	600	660		



LEGEND

- ⚡ SIGN LOCATION-TRIPOD MOUNT
- ➡➡ SEQUENTIAL ARROW SIGN
- ⚡⚡⚡ TEMPORARY TRAFFIC CONTROL DEVICES
- 🚚 PROTECTIVE VEHICLE (WHEN SPECIFIED IN CONTRACT)
- 🚚🚚 PROTECTIVE VEHICLE WITH TRUCK MOUNTED ATTENUATOR (WHEN SPECIFIED IN CONTRACT FOR HIGH SPEED ROADWAYS)
- PCMS PORTABLE CHANGEABLE MESSAGE SIGN (WHEN SPECIFIED IN CONTRACT)

PCMS DISPLAYS	
1	2
CENTER LANE CLOSED	LIMITED TURNING
1.5 SEC	1.5 SEC

Field locate 1 mile +- in advance of lane closure.

NOTES

1. MAINTAIN A MINIMUM OF ONE ACCESS POINT FOR EACH BUSINESS WITHIN WORK AREA LIMITS.

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EXPIRES NOVEMBER 23, 2003

LEFT LANE AND CENTER TURN LANE CLOSURE
FIVE LANE ROADWAY
STANDARD PLAN K-17

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 12-20-02

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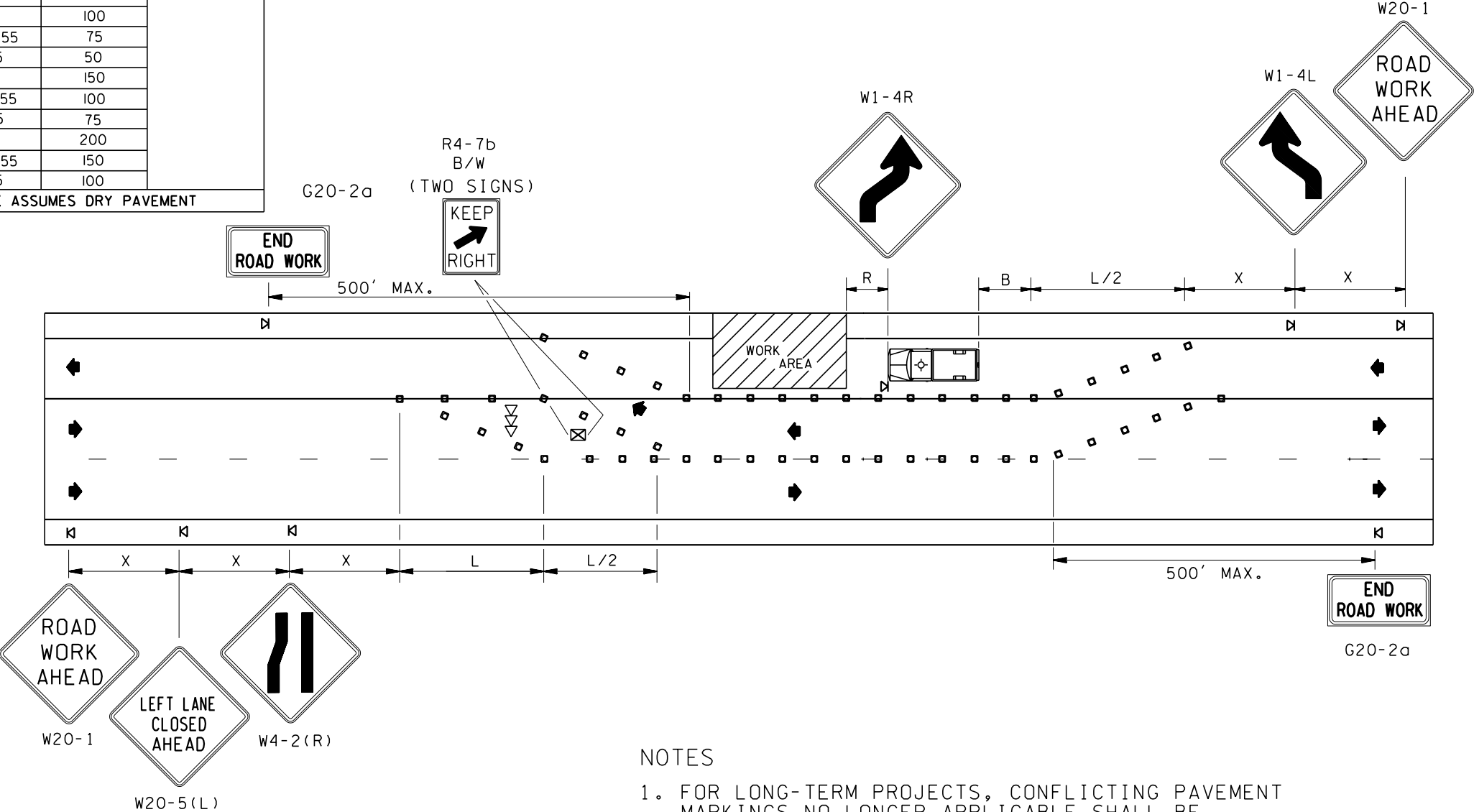
Washington State Department of Transportation

BUFFER DATA										
BUFFER SPACE = B										
SPEED (MPH)	25	30	35	40	45	50	55			
LENGTH (feet)	—	—	—	170	220	280	335			
PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R										
VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)		POSTED SPEED (mph)		STATIONARY OPERATION (feet)					
4 YARD DUMP TRUCK	24,000				100					
			50-55		75					
			45		50					
2 TON CARGO TRUCK	15,000				150					
			50-55		100					
			45		75					
1 TON CARGO TRUCK	10,000				200					
			50-55		150					
			45		100					
ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT										

MINIMUM TAPER LENGTH = L (FEET)										
LANE WIDTH (feet)	Posted Speed (mph)									
	25	30	35	40	45	50	55			
10	105	150	205	270	450	500	550			
11	115	165	225	295	495	550	605			
12	125	180	245	320	540	600	660			

SIGN SPACING = X (FEET)		
Rural Roads	45/55 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Urban Streets Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/60	40	80
35/45	30	60
25/30	20	40



LEGEND

- ☒ SIGN LOCATION-PORTABLE MOUNT
- ⌵ SIGN LOCATION-TRIPOD MOUNT
- ⇨⇨ SEQUENTIAL ARROW SIGN
- ◻ ◻ ◻ TEMPORARY TRAFFIC CONTROL DEVICES
- 🚚 PROTECTIVE VEHICLE (WHEN SPECIFIED IN CONTRACT)
- 🚚🚚 PROTECTIVE VEHICLE WITH TRUCK MOUNTED ATTENUATOR (WHEN SPECIFIED IN CONTRACT FOR HIGH SPEED ROADWAYS)

NOTES

- FOR LONG-TERM PROJECTS, CONFLICTING PAVEMENT MARKINGS NO LONGER APPLICABLE SHALL BE REMOVED OR OBLITERATED AS SOON AS PRACTICABLE. TEMPORARY MARKINGS SHALL BE USED AS NECESSARY AND SIGNS SHALL BE POST MOUNTED.
- STEADY BURNING WARNING LIGHTS (TYPE C, MUTCD) SHALL BE USED TO MARK CHANNELIZING DEVICES AT NIGHT AS NEEDED.
- IF THE LANE SHIFT IS SHORT AND HAS SHARP CURVES (30 MPH OR LESS) USE SIGN W1-3 IN LIEU OF SIGN W1-4.



LANE SHIFT
THREE LANE ROADWAY
STANDARD PLAN K-18

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 12-20-02

STATE DESIGN ENGINEER

DATE



Washington State Department of Transportation

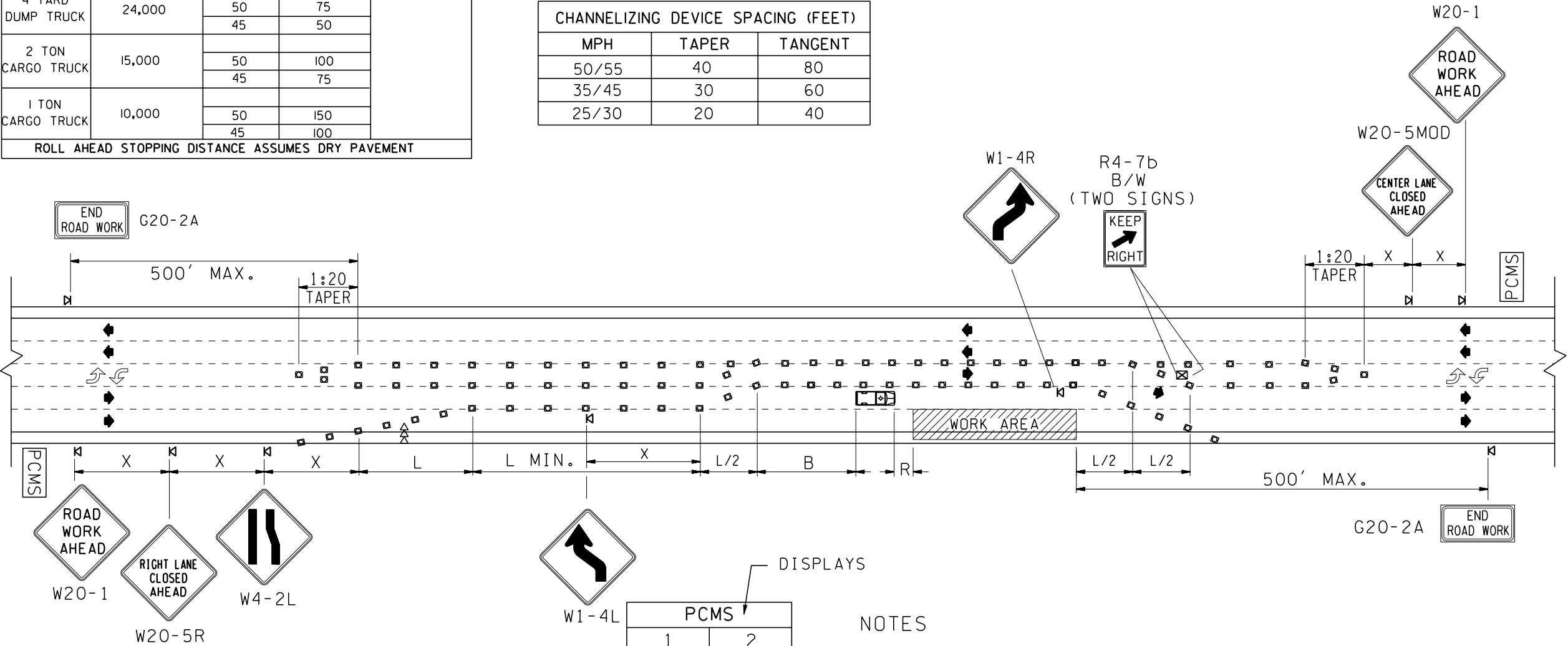
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BUFFER DATA										
BUFFER SPACE = B										
SPEED (MPH)	25	30	35	40	45	50	55			
LENGTH (feet)	55	85	120	170	220	280	335			
PROTECTIVE VEHICLE ROLL AHEAD DISTANCE = R										
VEHICLE TYPE	TYPICAL VEHICLE LOADED WEIGHT (LBS)		POSTED SPEED (mph)		STATIONARY OPERATION (feet)					
4 YARD DUMP TRUCK	24,000									
			50		75					
		45		50						
2 TON CARGO TRUCK	15,000									
			50		100					
		45		75						
1 TON CARGO TRUCK	10,000									
			50		150					
		45		100						
ROLL AHEAD STOPPING DISTANCE ASSUMES DRY PAVEMENT										

SIGN SPACING = X (FEET)		
Rural Roads	45/55 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Rural Roads		
Urban Streets	25/30 MPH	200'+-
Residential Areas & Business Districts		
All signs are black on orange unless otherwise designated.		

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/55	40	80
35/45	30	60
25/30	20	40

MINIMUM TAPER LENGTH = L (FEET)									
LANE WIDTH (feet)	Posted Speed (mph)								
	25	30	35	40	45	50	55		
10	105	150	205	270	450	500	550		
11	115	165	225	295	495	550	605		
12	125	180	245	320	540	600	660		



LEGEND

- ☒ SIGN LOCATION-PORTABLE MOUNT
- ⌵ SIGN LOCATION-TRIPOD MOUNT
- ⌵⌵ SEQUENTIAL ARROW SIGN
- ☐☐☐ TEMPORARY TRAFFIC CONTROL DEVICES
- ☐☐☐ PROTECTIVE VEHICLE WITH TRUCK MOUNTED ATTENUATOR (WHEN SPECIFIED IN CONTRACT)
- PCMS PORTABLE CHANGEABLE MESSAGE SIGN (WHEN SPECIFIED IN CONTRACT)

PCMS	
1	2
CENTER LANE CLOSED	LIMITED TURNING
1.5 SEC	1.5 SEC

Field locate after last intersection in advance of lane closure.

- NOTES
1. EXTEND TAPER ACROSS SHOULDER.
 2. MAINTAIN A MINIMUM OF ONE ACCESS POINT FOR EACH BUSINESS WITHIN WORK AREA LIMITS.
 3. IF THE LANE SHIFT IS SHORT AND HAS SHARP CURVES (30 MPH OR LESS) USE SIGN W1-3 IN LIEU OF SIGN W1-4.



RIGHT LANE CLOSURE WITH LANE SHIFT
FIVE LANE ROADWAY
STANDARD PLAN K-19

SHEET 1 OF 1 SHEET

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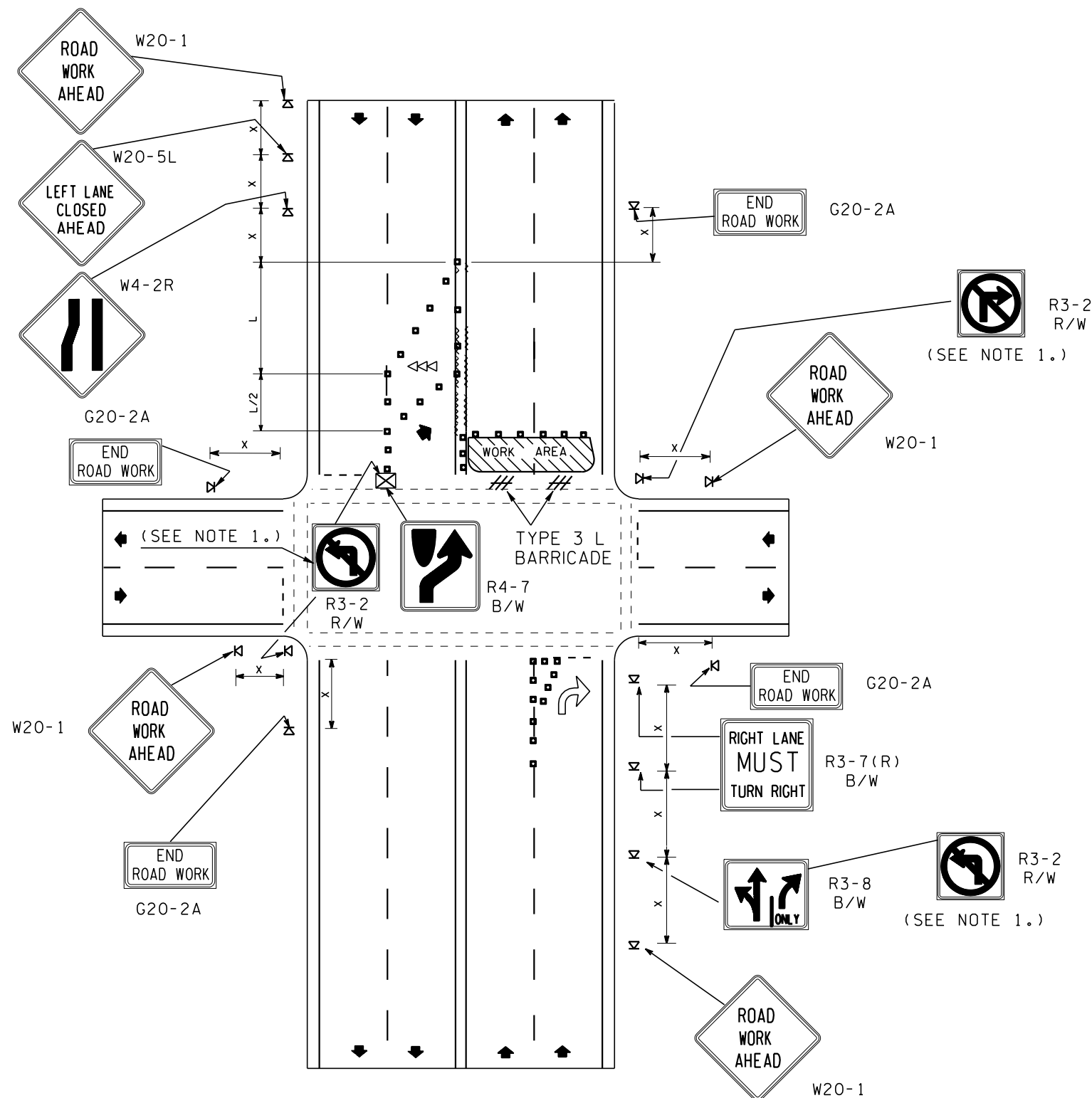
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STATE DESIGN ENGINEER



Washington State Department of Transportation

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NOTES

- 1. NO LEFT TURN SIGNS ARE TO BE USED IF TRAFFIC VOLUMES ARE TOO HIGH OR THERE IS A SIGNAL OPERATING. CLOSE LEFT TURN POCKET IF THERE IS ONE ON THE SIDE STREET.
- 2. FLASHING WARNING LIGHTS (TYPE A, MUTCD) SHOULD BE USED TO MARK BARRICADES AT NIGHT.
- 3. STEADY BURNING WARNING LIGHTS (TYPE C, MUTCD) SHALL BE USED TO MARK CHANNELIZING DEVICES AT NIGHT.
- 4. FOR LONG-TERM PROJECTS, CONFLICTING PAVEMENT MARKINGS NO LONGER APPLICABLE SHALL BE REMOVED OR OBLITERATED. TEMPORARY MARKINGS SHALL BE USED.

MINIMUM TAPER LENGTH = L (feet)									
LANE WIDTH (feet)	Posted Speed (mph)								
	25	30	35	40	45	50	55		
10	105	150	205	270	450	500	550		
11	115	165	225	295	495	550	605		
12	125	180	245	320	540	600	660		

SIGN SPACING = X (feet)		
Rural Roads	45/55 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Urban Streets Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		

CHANNELIZING DEVICE SPACING (feet)		
MPH	TAPER	TANGENT
50/70	40	80
35/45	30	60
25/30	20	40

- LEGEND
- ⊠ SIGN LOCATION-TRIPOD MOUNT
 - ⊞ SIGN LOCATION-PORTABLE MOUNT
 - ▣▣▣ TEMPORARY TRAFFIC CONTROL DEVICES
 - /// TYPE 3L BARRICADE
 - ↔ SEQUENTIAL ARROW SIGN
 - ~~~~~ OBLITERATED MARKINGS (SEE NOTE 4)
 - ↩ PAINTED TRAFFIC ARROW (OPTIONAL)



HALF ROAD CLOSURE

STANDARD PLAN K-20

SHEET 1 OF 1 SHEET

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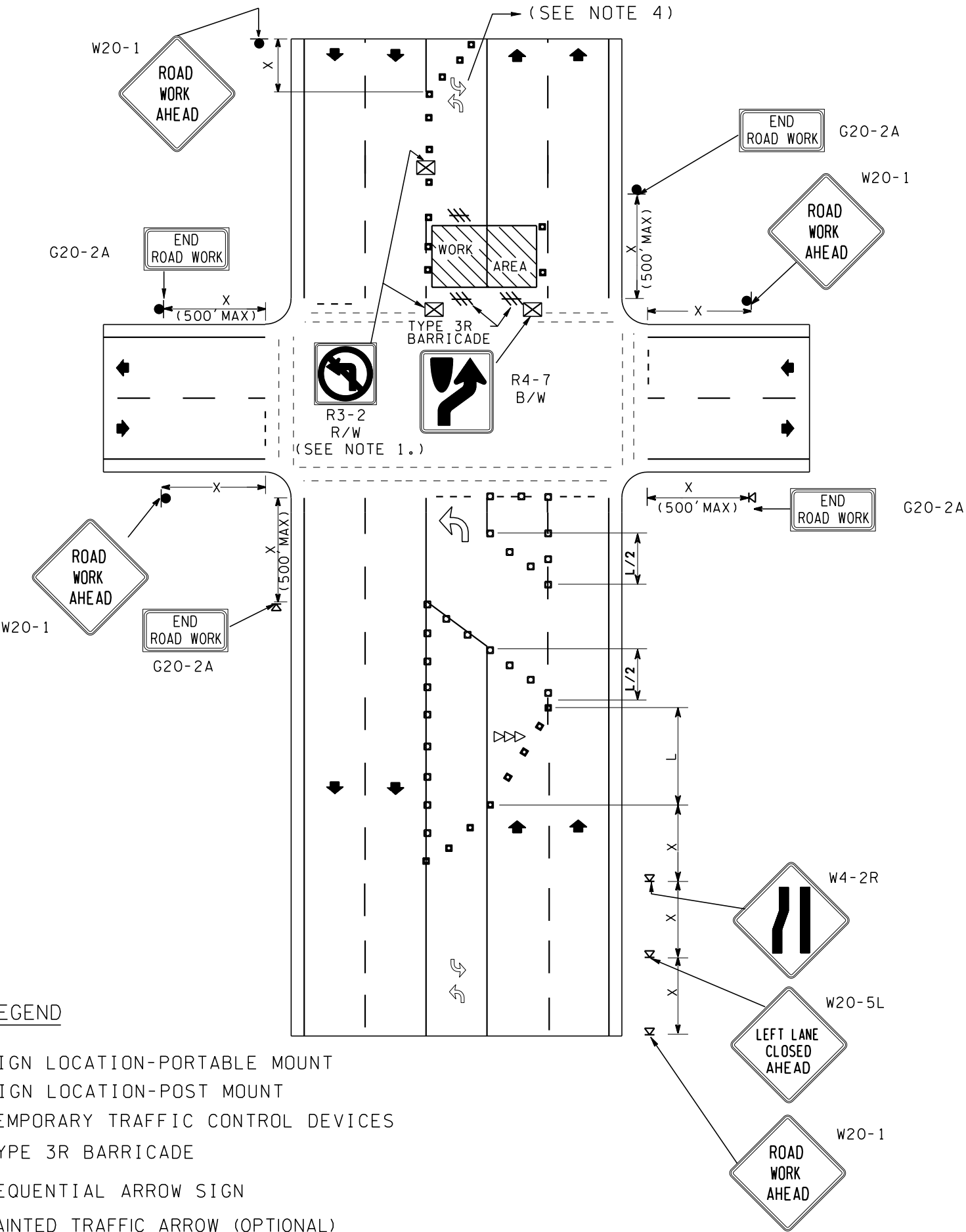
STATE DESIGN ENGINEER

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NOTES

- 1. PROHIBIT TURNS AS NECESSARY FOR TRAFFIC CONDITIONS. CLOSE LEFT TURN POCKET IF THERE IS ONE ON SIDE STREET.
- 2. FLASHING WARNING LIGHTS (TYPE A, MUTCD) SHOULD BE USED TO MARK BARRICADES AT NIGHT.
- 3. STEADY BURNING WARNING LIGHTS (TYPE C, MUTCD) SHALL BE USED TO MARK CHANNELIZING DEVICES AT NIGHT.
- 4. FOR LONG-TERM PROJECTS, CONFLICTING PAVEMENT MARKINGS NO LONGER APPLICABLE SHALL BE REMOVED OR OBLITERATED. TEMPORARY MARKINGS SHALL BE USED.

MINIMUM TAPER LENGTH = L (feet)									
LANE WIDTH (feet)	Posted Speed (mph)								
	25	30	35	40	45	50	55		
10	105	150	205	270	450	500	550		
11	115	165	225	295	495	550	605		
12	125	180	245	320	540	600	660		

SIGN SPACING = X (feet)		
Rural Roads	45/55 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Urban Streets Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		

CHANNELIZING DEVICE SPACING (feet)		
MPH	TAPER	TANGENT
50/70	40	80
35/45	30	60
25/30	20	40

LEGEND

- ☒ SIGN LOCATION-PORTABLE MOUNT
- SIGN LOCATION-POST MOUNT
- □ □ TEMPORARY TRAFFIC CONTROL DEVICES
- /// TYPE 3R BARRICADE
- ↔ SEQUENTIAL ARROW SIGN
- ↪ PAINTED TRAFFIC ARROW (OPTIONAL)



EXPIRES NOVEMBER 23, 2003

MULTIPLE LANE CLOSURES AT INTERSECTION
STANDARD PLAN K-21

SHEET 1 OF 1 SHEET

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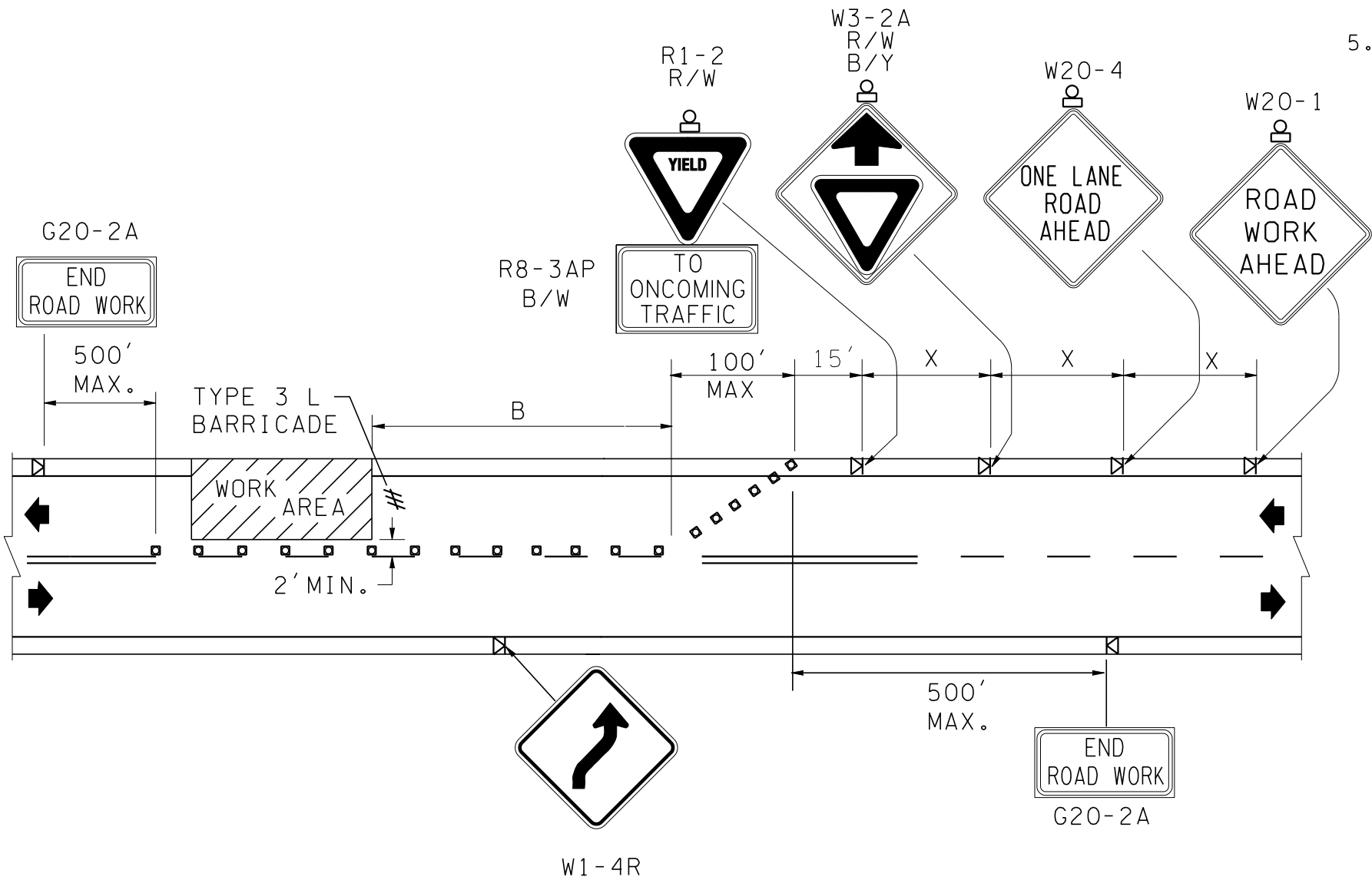
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SIGN SPACING = X (FEET)		
Rural Roads	45 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Urban Streets Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
35/45	30	60
25/30	20	40

NOTES

1. EXTEND DEVICES TAPER ACROSS SHOULDER.
2. SIGN SEQUENCE IS THE SAME FOR BOTH DIRECTIONS OF TRAVEL ON THE HIGHWAY.
3. STEADY BURNING WARNING LIGHTS (TYPE C, MUTCD) SHALL BE USED TO MARK TRAFFIC CONTROL DEVICES AT NIGHT.
4. FOR USE WHEN TRAFFIC VOLUMES ARE SUCH THAT SUFFICIENT GAPS EXIST FOR MOTOR VEHICLES THAT MUST YIELD.
5. DRIVERS MUST HAVE ADEQUATE SIGHT DISTANCE TO SEE OPPOSING TRAFFIC AS THEY APPROACH, OTHERWISE FLAGGERS AND/OR TEMPORARY SIGNAL IS REQUIRED.



BUFFER DATA						
BUFFER SPACE = B						
SPEED (MPH)	25	30	35	40	45	
LENGTH (feet)	55	85	120	170	220	

LEGEND

- ▣ SIGN LOCATION - TRIPOD MOUNT
- ▣▣▣ TEMPORARY TRAFFIC CONTROL DEVICES
- ⚡ FLASHING WARNING LIGHT
- ≡≡ TYPE 3L BARRICADE



EXPIRES NOVEMBER 23, 2003

**LANE CLOSURE ON LOW-VOLUME TWO-LANE ROAD WITHOUT FLAGGERS
STANDARD PLAN K-22**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 12-20-02

STATE DESIGN ENGINEER

DATE



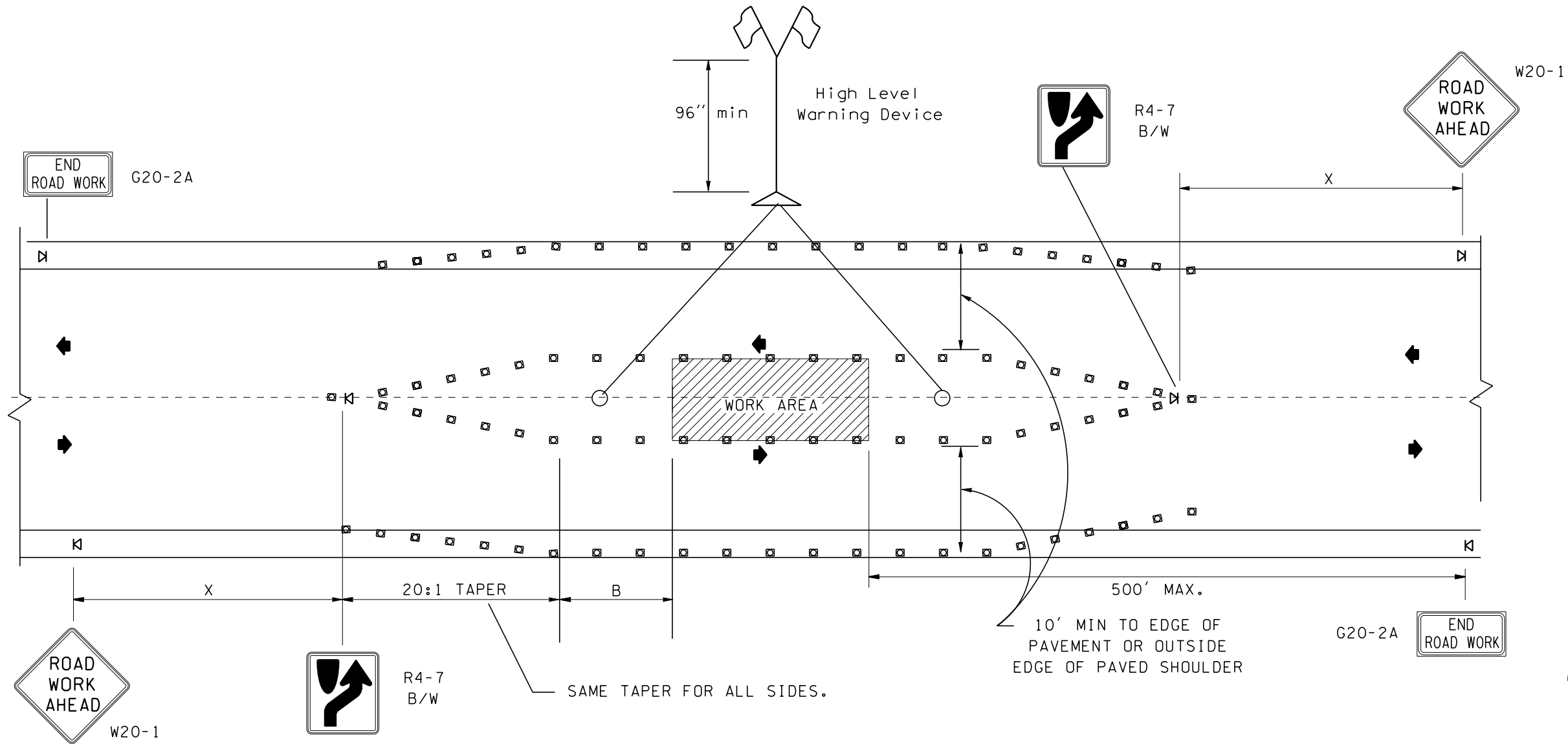
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SIGN SPACING = X (FEET)		
Rural Roads	45 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Urban Streets Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
35/45	30	60
25/30	20	40

BUFFER DATA						
BUFFER SPACE = B						
SPEED (MPH)	25	30	35	40	45	
LENGTH (feet)	55	85	120	170	220	



LEGEND

- ⌵ SIGN LOCATION-TRIPOD MOUNT
- □ □ TEMPORARY TRAFFIC CONTROL DEVICES



WORK IN CENTER OF
LOW-VOLUME ROAD
STANDARD PLAN K-23

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 12-20-02

STATE DESIGN ENGINEER

DATE



Washington State Department of Transportation

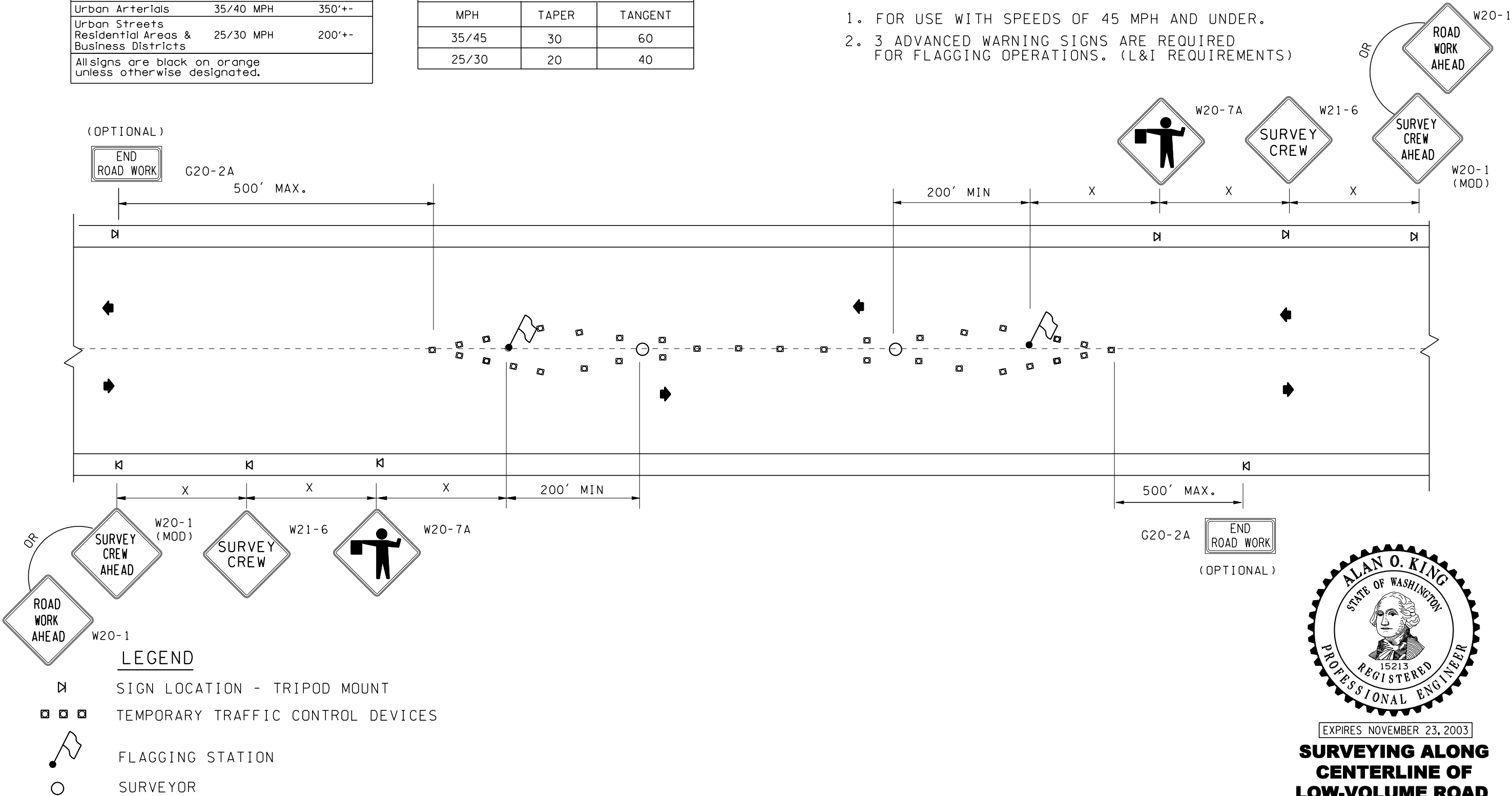
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SIGN SPACING = X (FEET)		
Rural Roads	45 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Urban Streets Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
35/45	30	60
25/30	20	40

NOTES

- 1. FOR USE WITH SPEEDS OF 45 MPH AND UNDER.
- 2. 3 ADVANCED WARNING SIGNS ARE REQUIRED FOR FLAGGING OPERATIONS. (L&I REQUIREMENTS)



**SURVEYING ALONG
CENTERLINE OF
LOW-VOLUME ROAD
STANDARD PLAN K-24**

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Harold J. Peterfeso 12-20-02

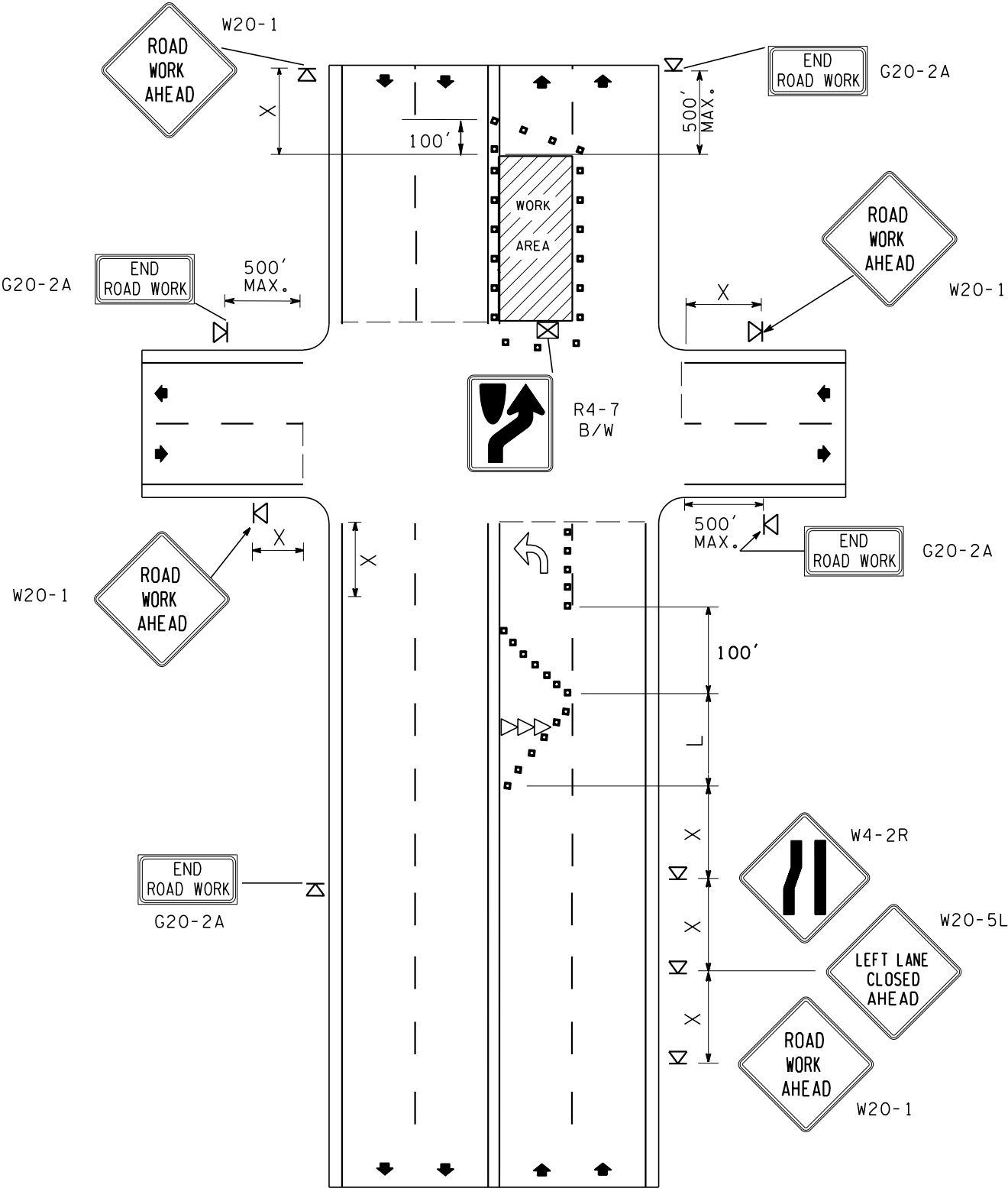
STATE DESIGN ENGINEER

DATE



Washington State Department of Transportation

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LEGEND

- ☒ SIGN LOCATION-PORTABLE MOUNT
- ⏏ SIGN MOUNT - TRIPOD MOUNT
- ▣▣▣ TEMPORARY TRAFFIC CONTROL DEVICES
- ➡➡ SEQUENTIAL ARROW SIGN
- ↩ PAINTED TRAFFIC ARROW (OPTIONAL)

NOTES

1. PROHIBIT TURNS AS NECESSARY FOR TRAFFIC CONDITIONS. CLOSE LEFT TURN POCKET IF THERE IS ONE ON SIDE STREET.
2. FLASHING WARNING LIGHTS (TYPE A, MUTCD) SHOULD BE USED TO MARK BARRICADES AT NIGHT, AS NEEDED.
3. STEADY BURNING WARNING LIGHTS (TYPE C, MUTCD) SHOULD BE USED TO MARK CHANNELIZING DEVICES AT NIGHT AS NEEDED.
4. FOR LONG-TERM PROJECTS, CONFLICTING PAVEMENT MARKINGS NO LONGER APPLICABLE SHALL BE REMOVED OR OBLITERATED AS SOON AS PRACTICABLE. TEMPORARY MARKINGS SHALL BE USED AS NECESSARY.

MINIMUM TAPER LENGTH = L (feet)									
LANE WIDTH (feet)	Posted Speed (mph)								
	25	30	35	40	45	50	55		
10	105	150	205	270	450	500	550		
11	115	165	225	295	495	550	605		
12	125	180	245	320	540	600	660		

SIGN SPACING = X (feet)		
Rural Roads	45/55 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Urban Streets Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		

CHANNELIZING DEVICE SPACING (feet)		
MPH	TAPER	TANGENT
50/70	40	80
35/45	30	60
25/30	20	40



LEFT LANE CLOSURE
ON FAR SIDE OF
INTERSECTION
STANDARD PLAN K-25

SHEET 1 OF 1 SHEET

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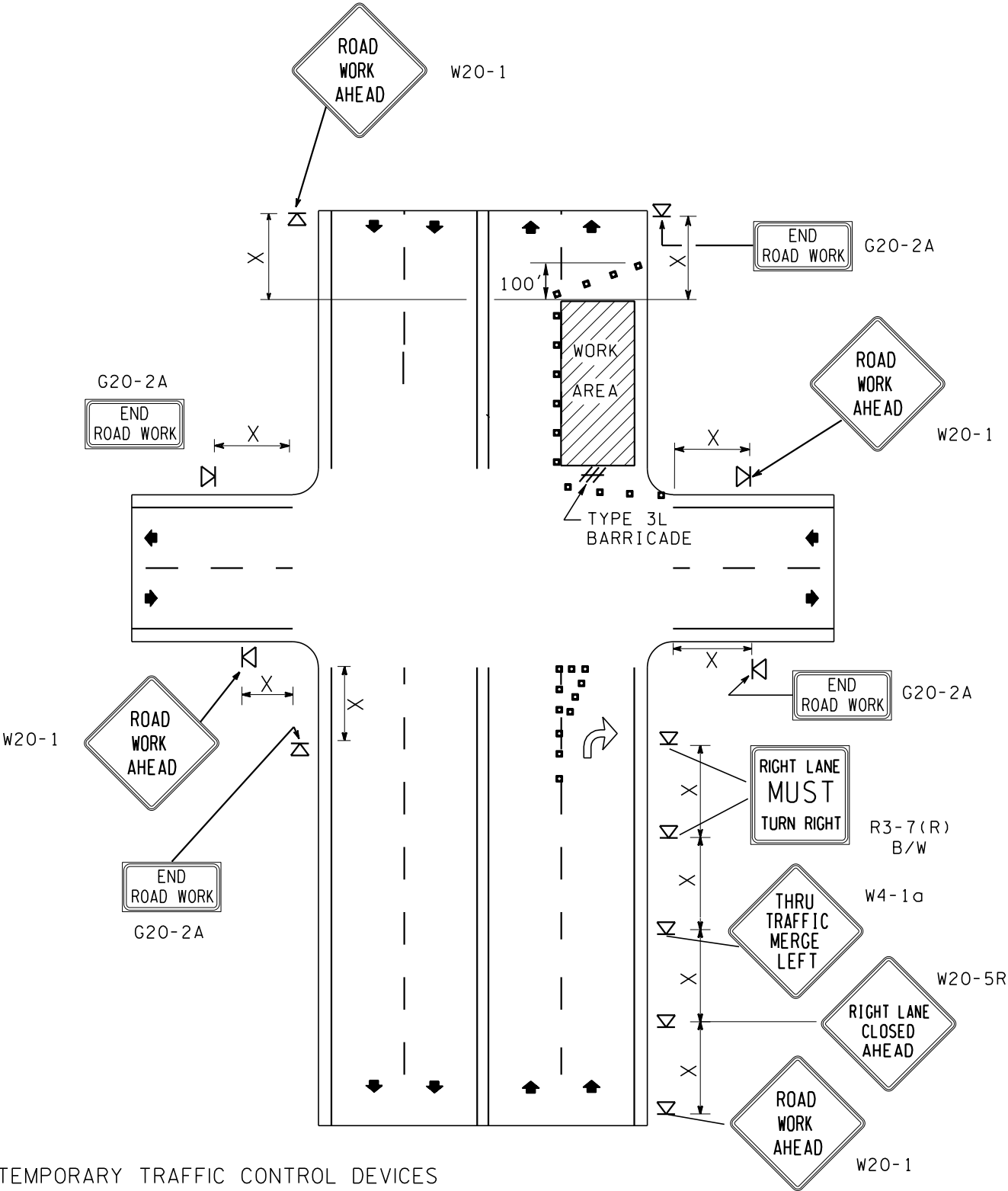
STATE DESIGN ENGINEER

DATE



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LEGEND

- □ □ TEMPORARY TRAFFIC CONTROL DEVICES
- /// TYPE 3L BARRICADE
- ⌵ SIGN MOUNT - TRIPOD MOUNT
- ↩ PAINTED TRAFFIC ARROW (OPTIONAL)

NOTES

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2. FLASHING WARNING LIGHTS (TYPE A, MUTCD) SHOULD BE USED TO MARK BARRICADES AT NIGHT, AS NEEDED.
3. STEADY BURNING WARNING LIGHTS (TYPE C, MUTCD) SHOULD BE USED TO MARK CHANNELIZING DEVICES AT NIGHT AS NEEDED.
4. FOR LONG-TERM PROJECTS, CONFLICTING PAVEMENT MARKINGS NO LONGER APPLICABLE SHALL BE REMOVED OR OBLITERATED AS SOON AS PRACTICABLE. TEMPORARY MARKINGS SHALL BE USED AS NECESSARY.

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Rural Roads	45/55 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Urban Streets Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		

CHANNELIZING DEVICE SPACING (feet)		
MPH	TAPER	TANGENT
50/70	40	80
35/45	30	60
25/30	20	40



EXPIRES NOVEMBER 23, 2003

**RIGHT LANE CLOSURE
ON FAR SIDE OF
INTERSECTION
STANDARD PLAN K-26**

SHEET 1 OF 1 SHEET

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STATE DESIGN ENGINEER

DATE

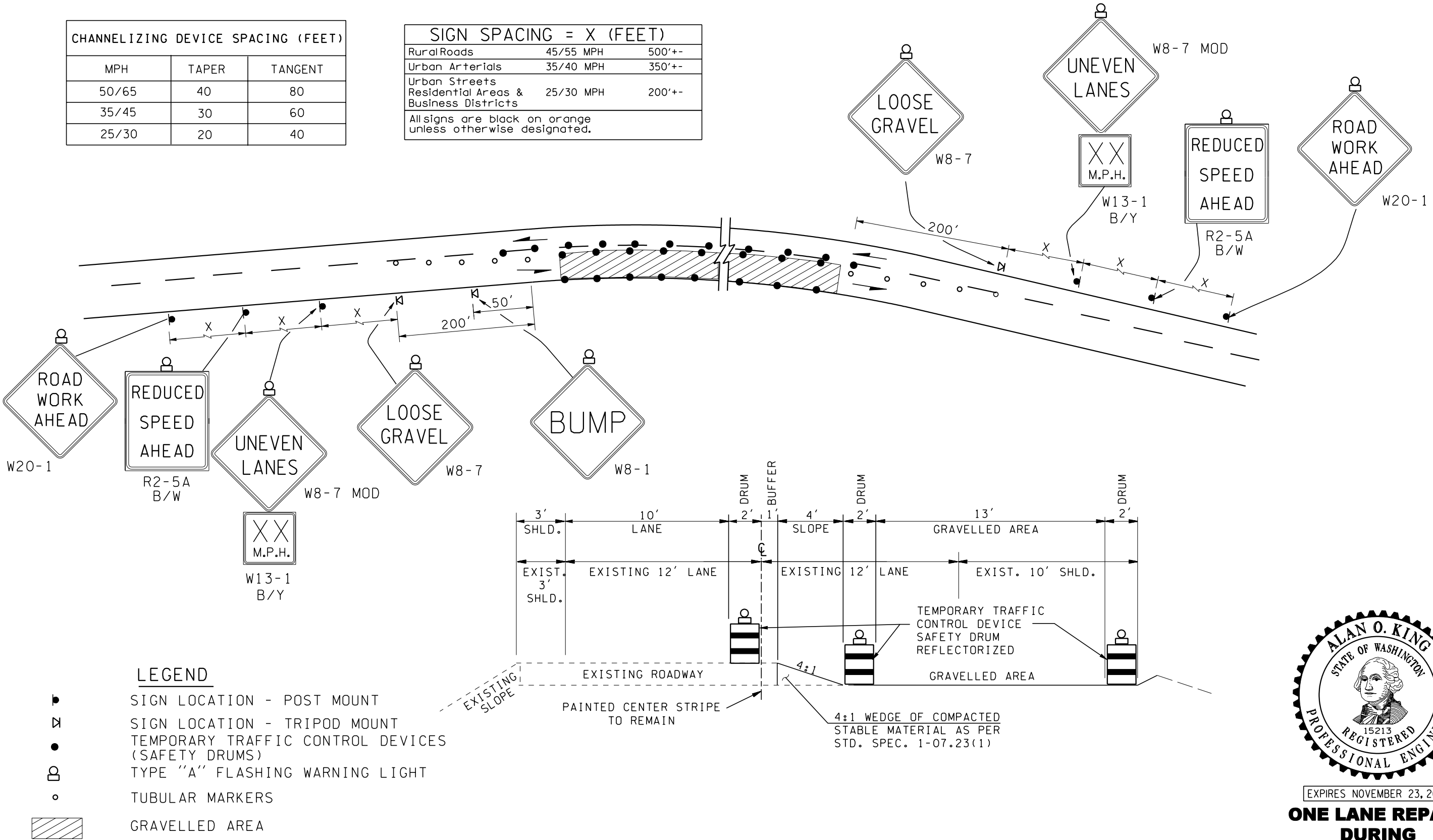


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CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
50/65	40	80
35/45	30	60
25/30	20	40

SIGN SPACING = X (FEET)		
Rural Roads	45/55 MPH	500'+-
Urban Arterials	35/40 MPH	350'+-
Urban Streets Residential Areas & Business Districts	25/30 MPH	200'+-
All signs are black on orange unless otherwise designated.		



**ONE LANE REPAIR
DURING
NON-WORKING HOURS
STANDARD PLAN K-27**

SHEET 1 OF 1 SHEET

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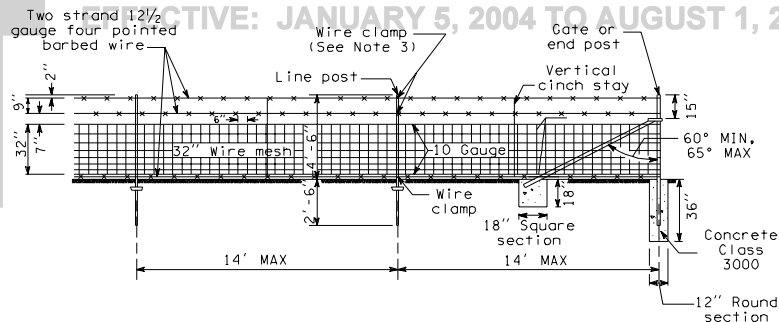
Harold J. Peterfeso 12-20-02

STATE DESIGN ENGINEER

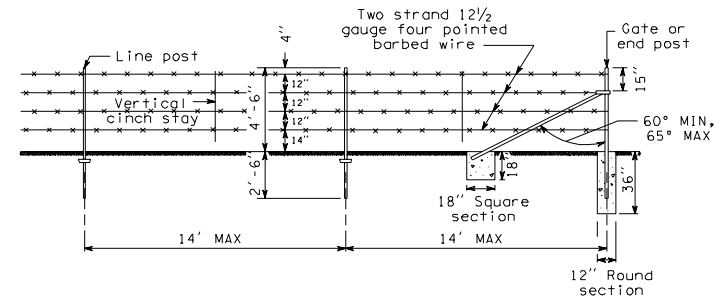


Washington State Department of Transportation

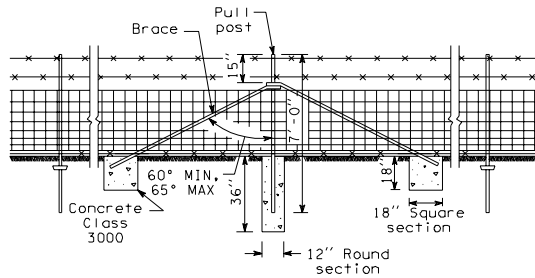
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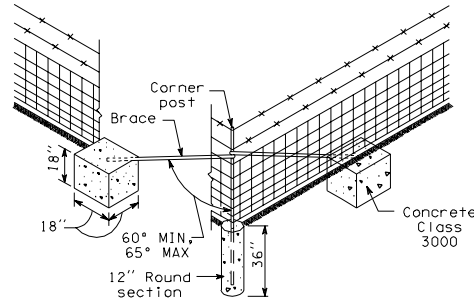
WIRE FENCE - TYPE 1



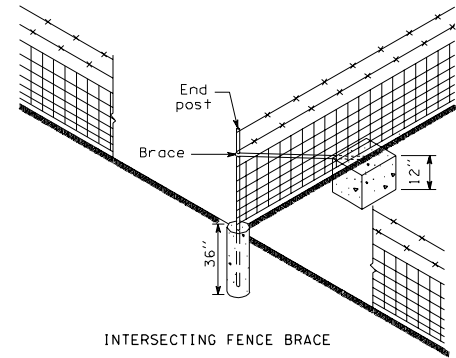
WIRE FENCE - TYPE 2



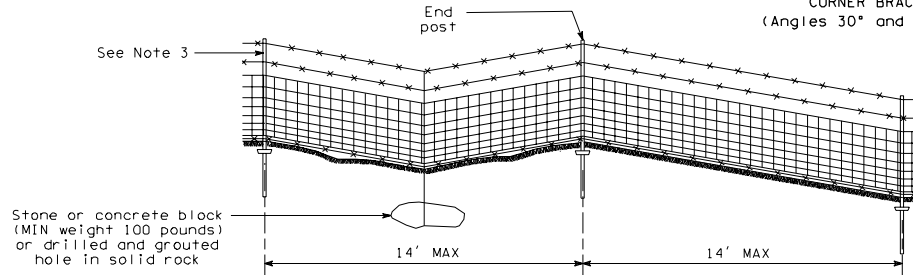
LINE BRACE
(Maximum spacing 1000 feet)



CORNER BRACE
(Angles 30° and over)



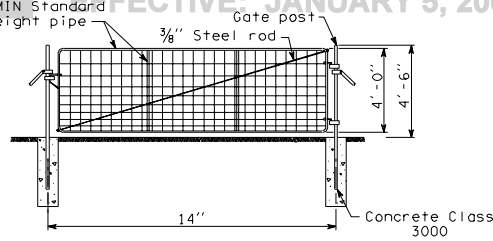
WIRE FENCE



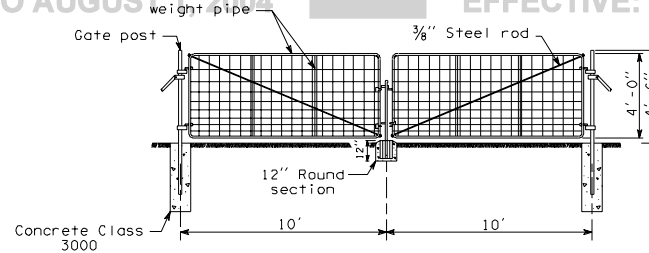
TREATMENT OF SAGS

STEEL POST DETAILS

Details for Type 2 Fence identical
as shown for Type 1 Fence



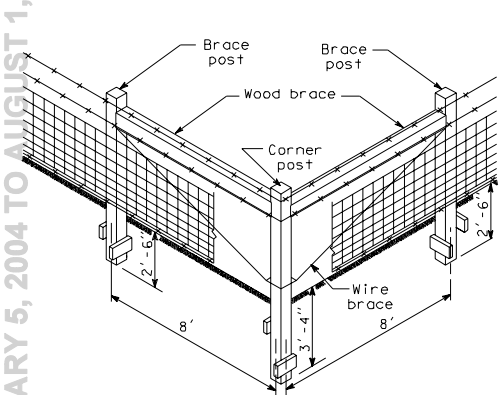
SINGLE WIRE GATE, 14' WIDE



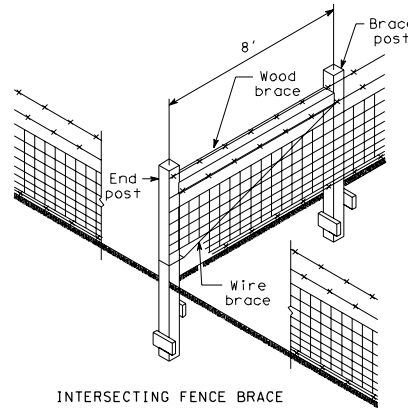
DOUBLE WIRE GATE, 20' WIDE

NOTES:

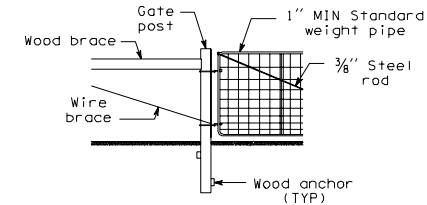
1. Details for Type 2 Fence, sme as Type 1.
2. Wood anchors shall be 2x4 lumber, 12" long MIN, fastened with three 16d galvanized nails.
3. Four wire clamps per post required for mesh wire. Three additional clamps per post required in sag section.



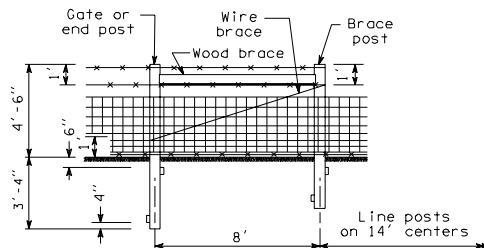
CORNER BRACE
(Angles 30° and over)



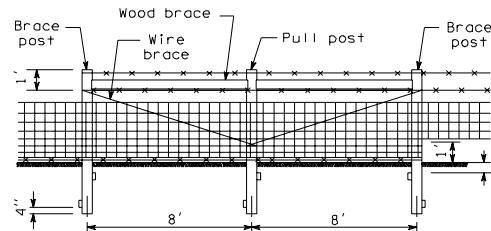
INTERSECTING FENCE BRACE



GATE POST



END BRACE



LINE BRACE
(Maximum spacing 1000 feet)

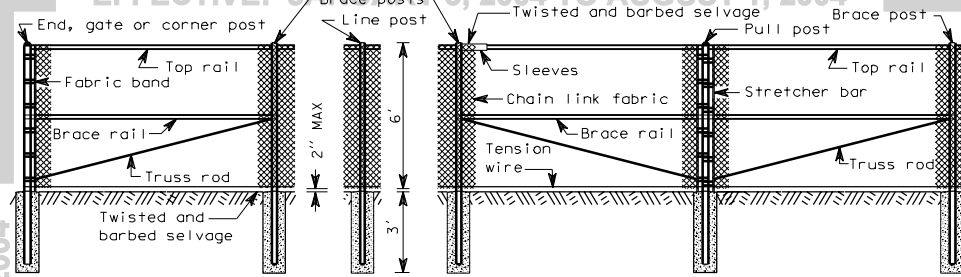
WIRE FENCE

WOOD POST DETAILS

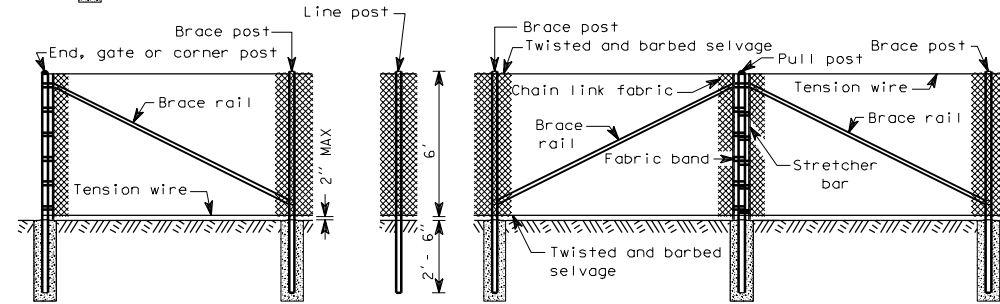
L-1

07-18-97

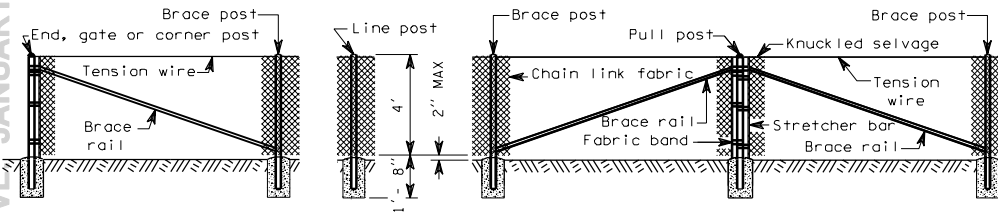
Sheet 2 of 2 Sheets



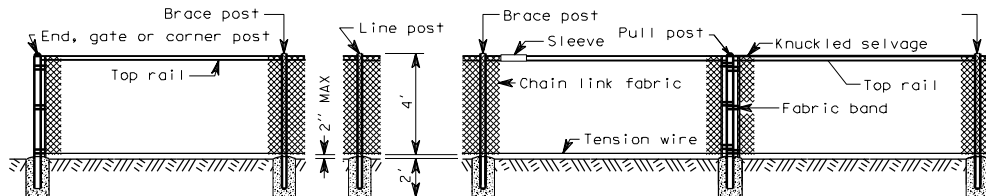
CHAIN LINK FENCE TYPE 1



CHAIN LINK FENCE TYPE 3



CHAIN LINK FENCE TYPE 4



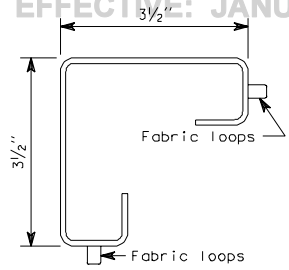
CHAIN LINK FENCE TYPE 6

CHAIN LINK FENCE

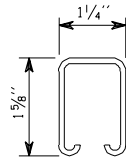
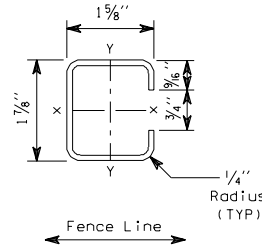
L-2

07-18-97

Sheet 1 of 2 Sheets



END, CORNER AND PULL POST

RAIL AND
BRACE

LINE POST

ROLL FORMED SECTIONS

NOTES:

All concrete post bases shall be 10" minimum diameter.

All posts shall be spaced at 10' maximum intervals unless otherwise directed by the Engineer.

Top or bottom tension wires shall be placed within the limits of the first full fabric weave.

Details are illustrative and shall not limit hardware design or post selection of any particular fence type.

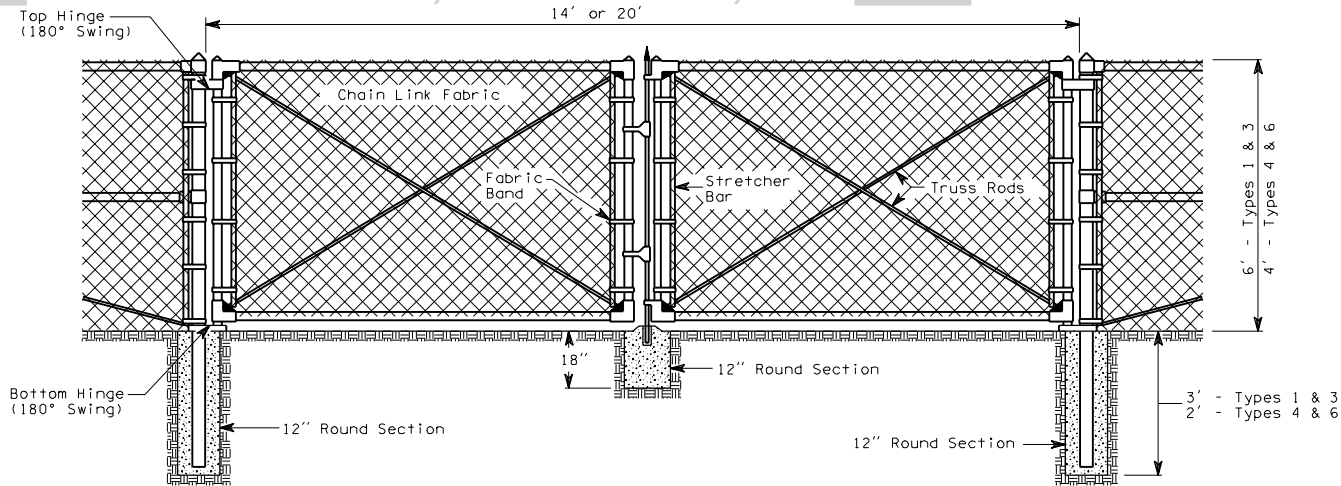
MEMBER

TYPE	MEMBER																				ALL POSTS
	BRACE RAIL & TOP RAIL						LINE & BRACE POST						END, CORNER, & PULL POST				GATE POST				
	ROUND		H-COLUMN		ROLL FORMED		ROUND		H-COLUMN		ROLL FORMED		ROUND		ROLL FORMED		ROUND				
	I.D. Pipe (Inches)	Weight Per Foot (Pounds)	Size (Inches)	Weight Per Foot (Pounds)	Size (Inches)	Weight Per Foot (Pounds)	I.D. Pipe (Inches)	Weight Per Foot (Pounds)	Size (Inches)	Weight Per Foot (Pounds)	Size (Inches)	Weight Per Foot (Pounds)	I.D. Pipe (Inches)	Weight Per Foot (Pounds)	Size (Inches)	Weight Per Foot (Pounds)	I.D. Pipe (Inches)	Weight Per Foot (Pounds)			
1	1¼	2.27	1¼ x 1½	1.35	1½ x 1¼	1.35	2	3.65	2¼	4.0	1⅝ x 1⅞	2.34	2½	5.79	3½ x 3½	5.14	3½	9.1	8'-8"		
3	1¼	2.27	1¼ x 1½	1.35	1½ x 1¼	1.35	1½	2.72	1⅞	2.72	1⅝ x 1⅞	1.85	2	3.65	3½ x 3½	5.14	3½	9.1	8'-8"		
4	1¼	2.27	1¼ x 1½	1.35	1½ x 1¼	1.35	1½	2.72	1⅞	2.72	1⅝ x 1⅞	1.85	2	3.65	3½ x 3½	5.14	3½	9.1	5'-6"		
6	1¼	2.27	1¼ x 1½	1.35	1½ x 1¼	1.35	2	3.65	2¼	4.0	1⅝ x 1⅞	2.34	2½	5.79	3½ x 3½	5.14	3½	9.1	5'-6"		

CHAIN LINK FENCE

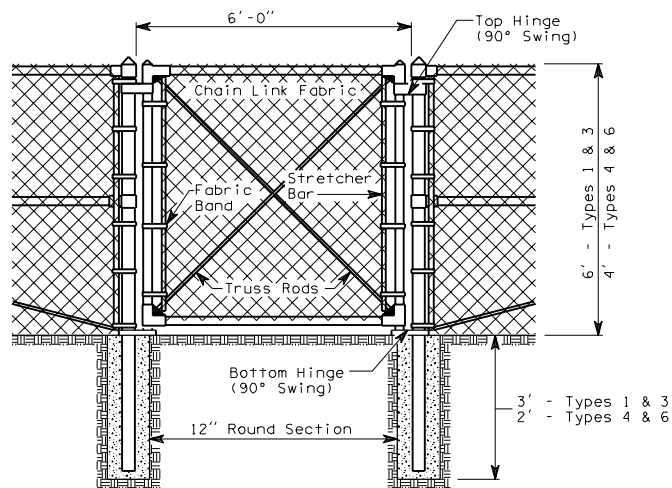
L-2

07-18-97

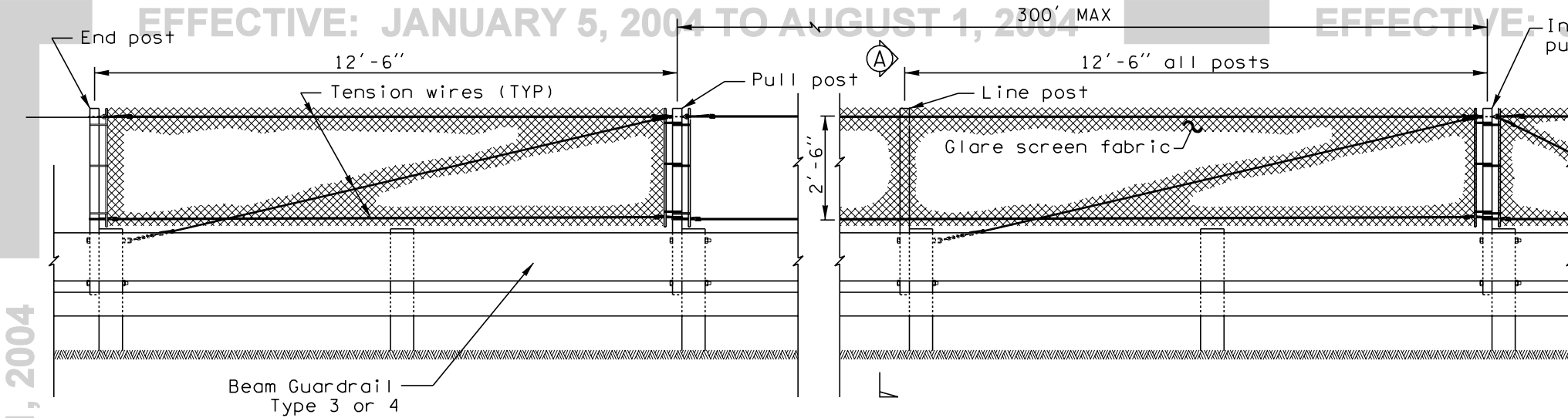


NOTES:

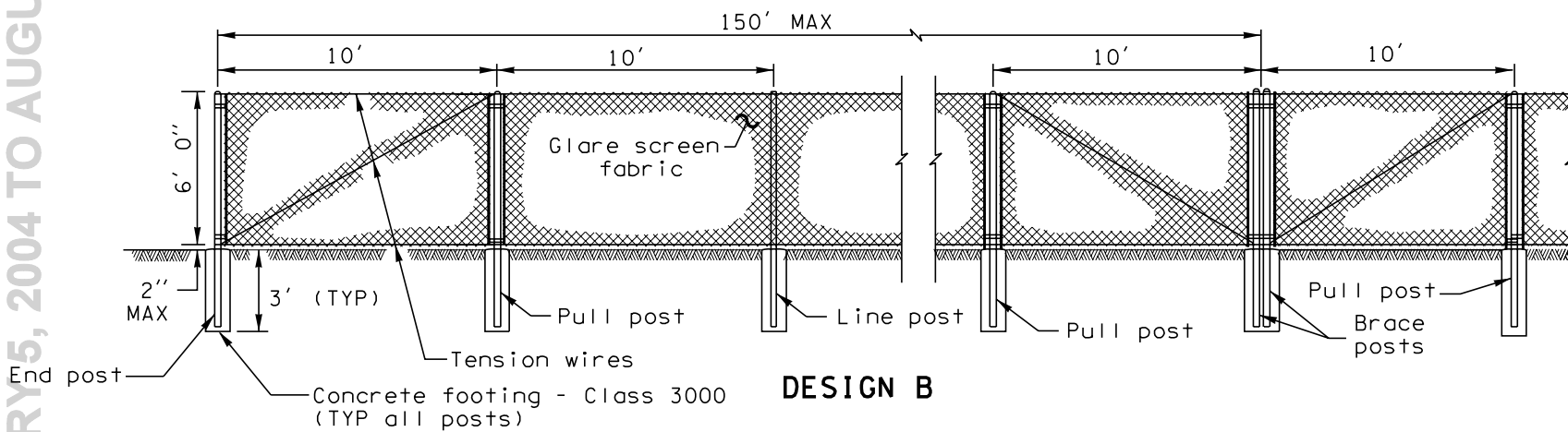
1. Fence fabric shall be secured to gate frames with knuckled selvage along top edge for Types 4 & 6 chain link fence installations.
2. Minimum post length:
Types 1 & 3 8'- 8"
Types 4 & 6 5'- 6"



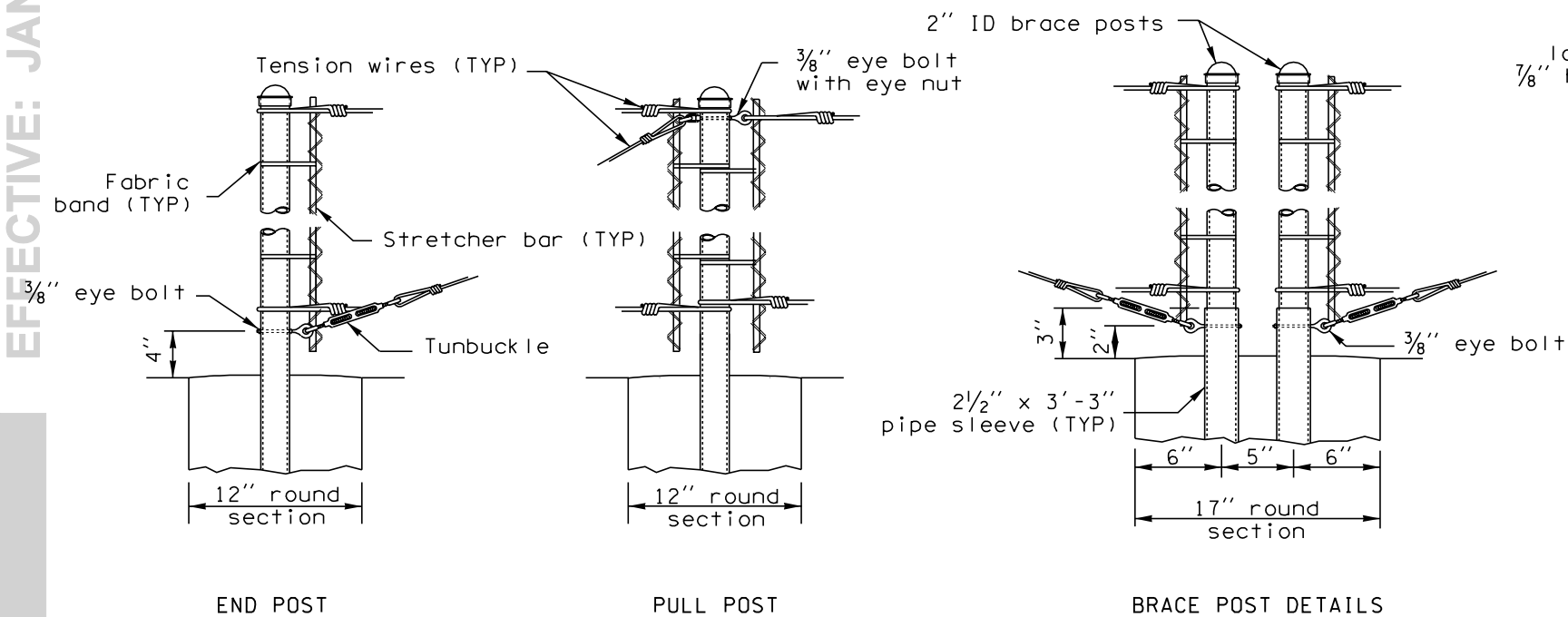
CHAIN LINK GATES



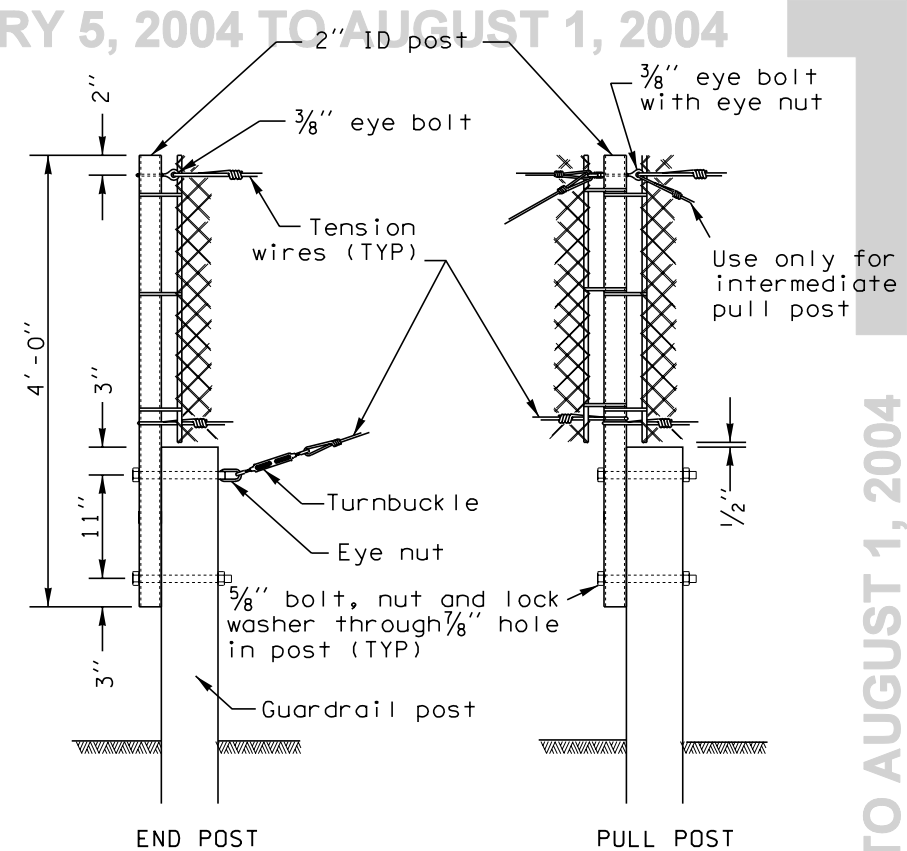
DESIGN A



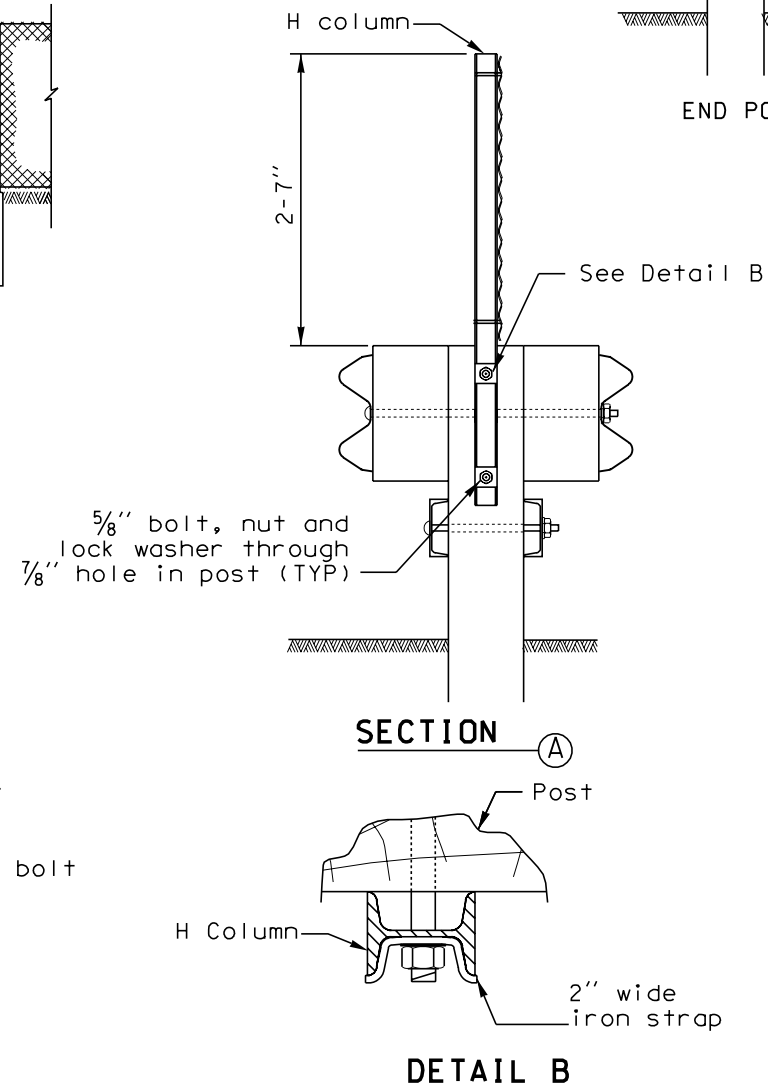
DESIGN B



DESIGN B DETAILS



DESIGN A DETAILS



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GLARE SCREEN
TYPE 1
STANDARD PLAN L-5

APPROVED FOR PUBLICATION

Clifford E. Mansfield

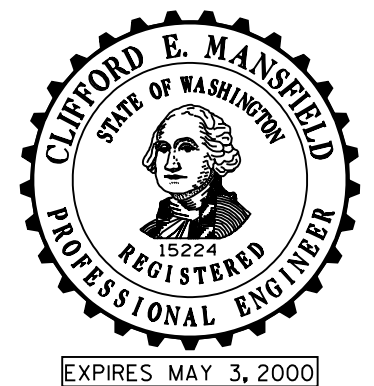
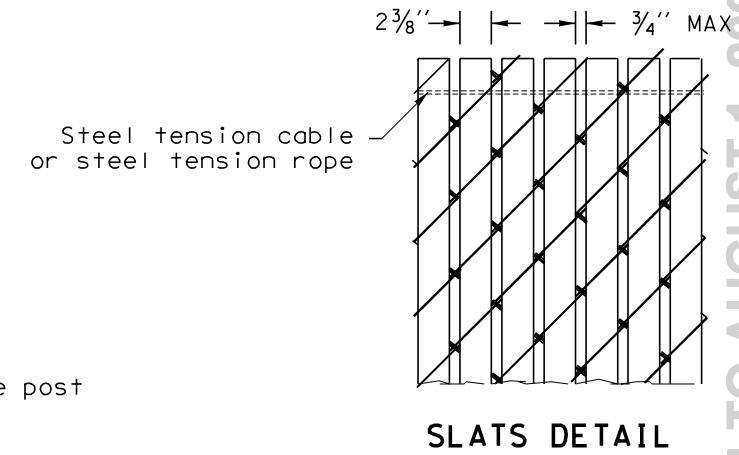
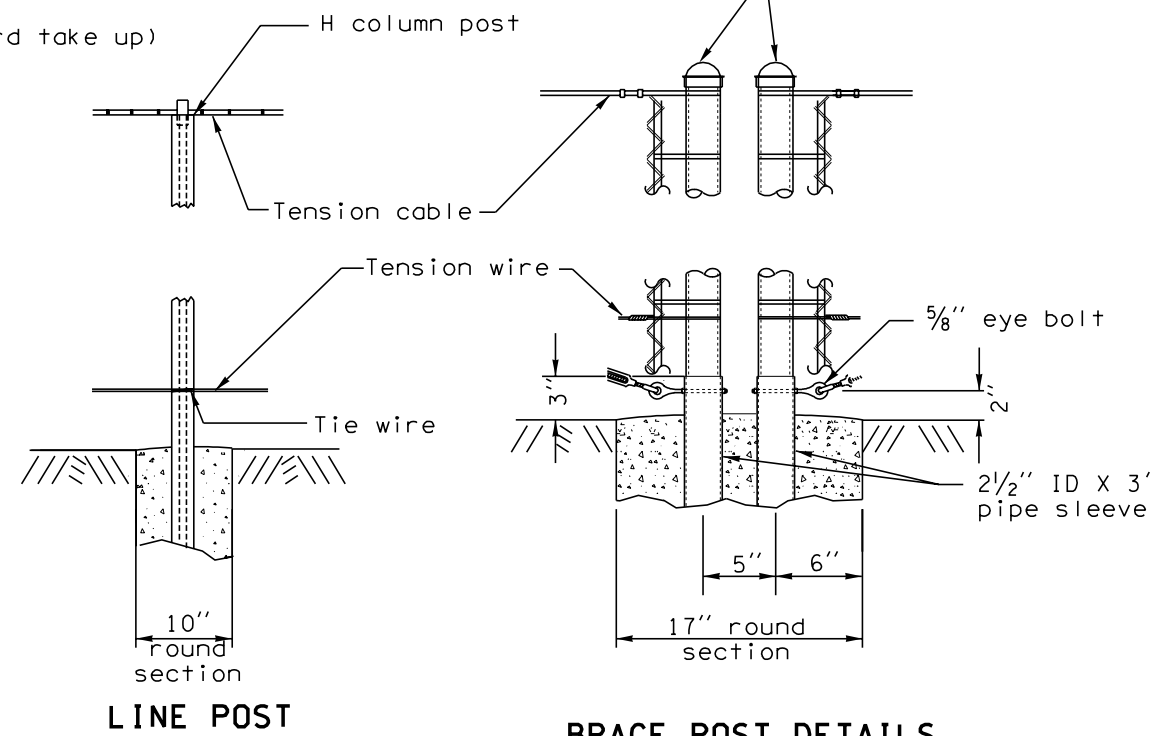
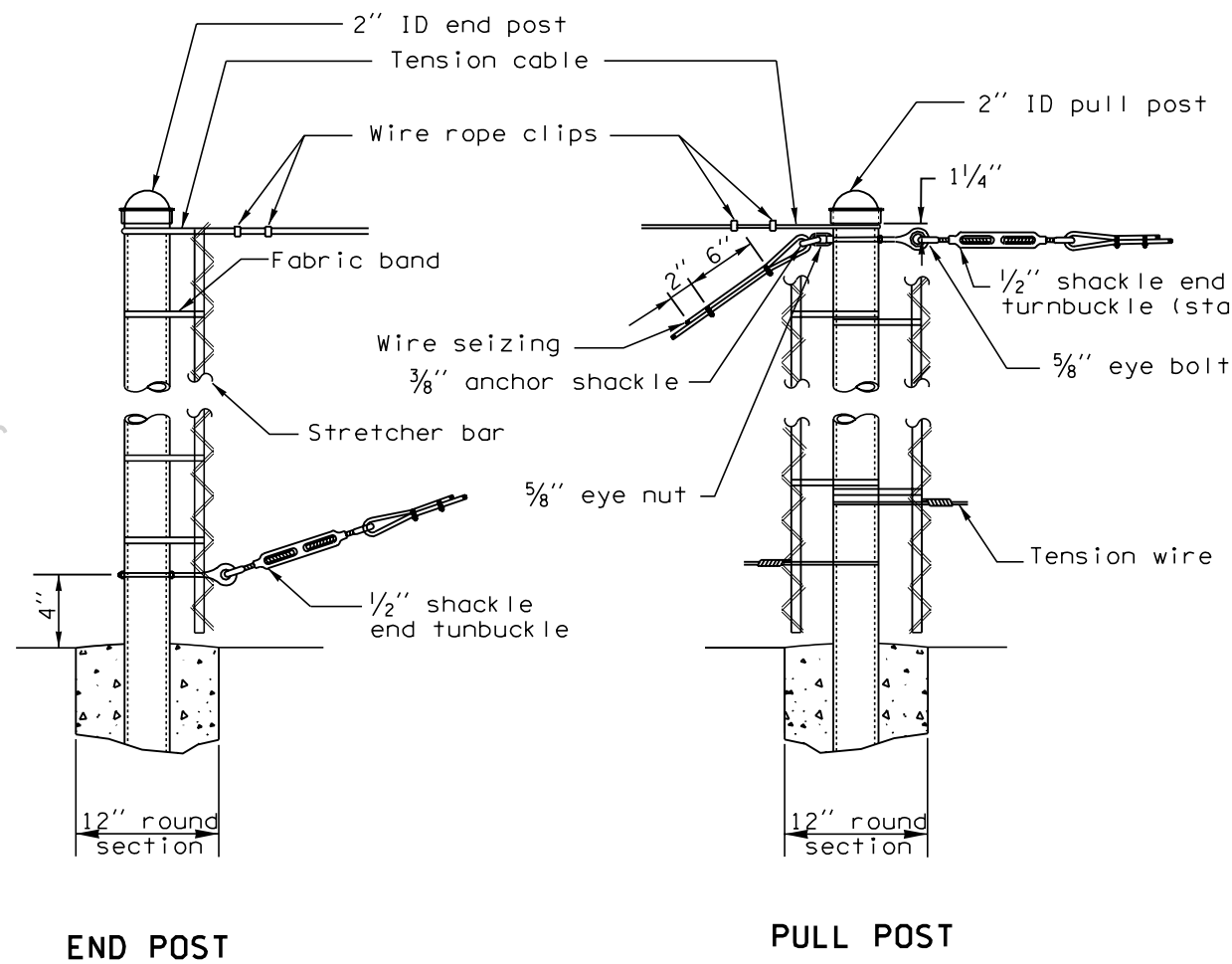
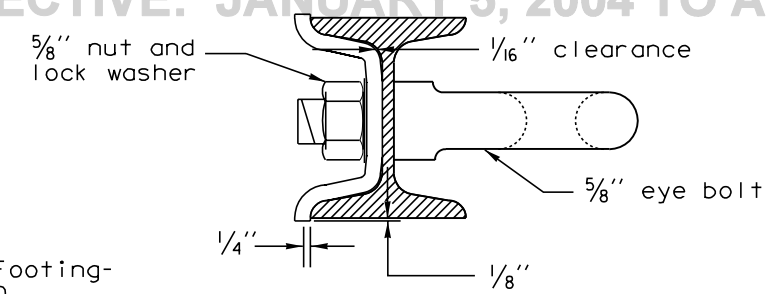
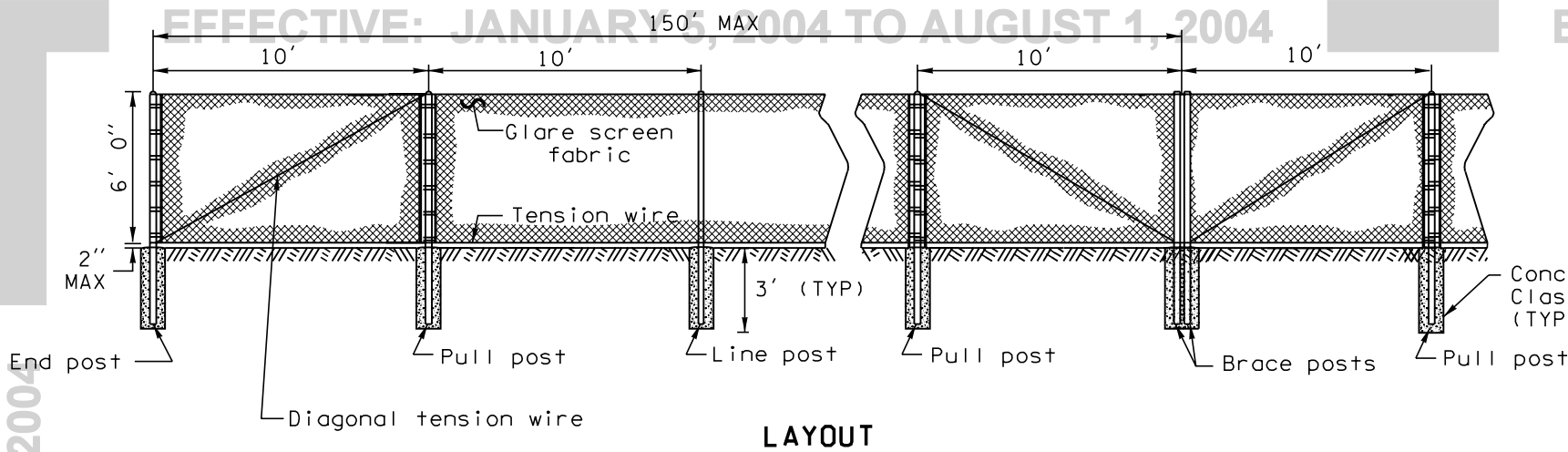
DEPUTY STATE DESIGN ENGINEER



WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON

7/31/98

DATE



**GLARE SCREEN
TYPE 2
STANDARD PLAN L-50**

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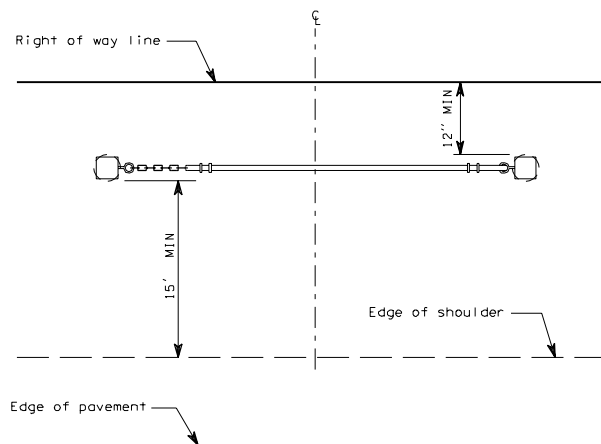
Clifford E. Mansfield

DEPUTY STATE DESIGN ENGINEER

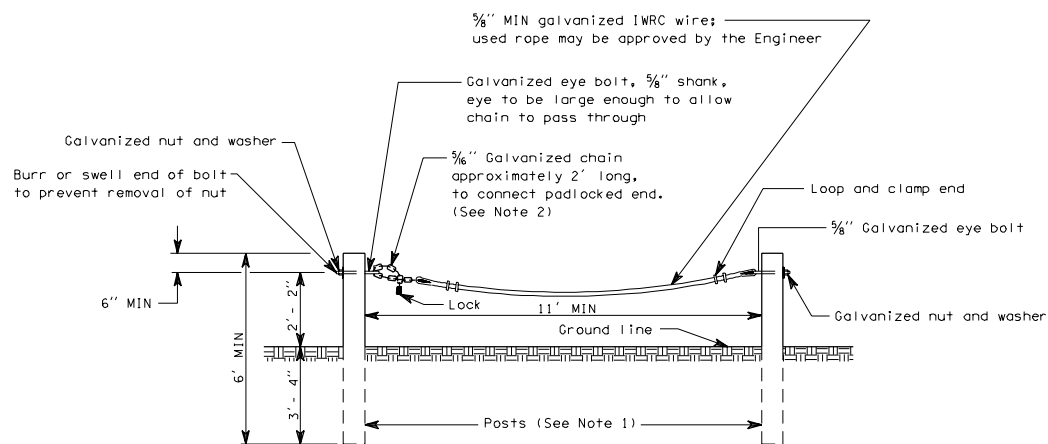
7/31/98

DATE

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
OLYMPIA, WASHINGTON



PLAN



ELEVATION

NOTES

1. Posts shall be 6 x 8 wood or W6 x 9 steel. See Standard Plan "Beam Guardrail Posts and Blocks".
2. Padlocked end shall be determined by the Project Engineer. Lock shall not be provided.

ACCESS CONTROL GATE