


OS-299 (2-05)		<b>TRANSMITTAL LETTER</b>	<b>Publication 72M April 2004 Edition Change No. 1</b>
			Date: March 30, 2006

**SUBJECT:**

**Revisions to Standards for Roadway Construction RCs 12M, 20M, 21M, 23M, 24M, 25M, 26M, 27M, 28M, 29M, 30M, 31M, 33M, 34M, 40M, 50M, 52M, 53M, 54M, 57M, 58M, 59M, and 63M.**

**INFORMATION AND SPECIAL INSTRUCTIONS:**

Incorporate the attached revisions into the April 2004 Edition of the Standards for Roadway Construction. These revisions should be adopted as soon as practical on all new and existing designs without affecting any letting schedules. PS&E submissions to Central Office after June 30, 2006 should include these revisions.

The major revisions for each Standard Drawing are presented below. Only revised sheets are listed. Remaining sheets of the standard show new dates only. Since all minor changes may not be indicated, it is strongly advised that all recipients thoroughly examine the changes and revisions incorporated in this Change.

<u>STANDARD</u>	<u>SHEET</u>	<u>DESCRIPTION OF CHANGES</u>
RC-12M	2 of 2	Changed Note 11.
RC-20M	1 of 3	In typical layout detail, changed distance of first tie bar or tiebolt to transverse joint.
		Minor change in Type D and Type E joint details.
		Minor changes to Note 4.
	2 of 3	Minor changes to Note 2.
RC-21M	3 of 3	Clarifications to Side Frame Details of Expansion Joint Assembly.
		Added anchor stake locations and placement details in expansion and contraction joint assembly details.
		Revised Notes 1, 2, and 3.
	1 of 1	Minor change in dimension units for consistency.
RC-23M		Changed Note 9.
	3 of 3	Added 450 (18") dimension for thickness of approach slab.  Changed 400 (16") to 650 (26") for #16 (#5) bar in Elevation View.

		Added reinforcement details in Roadway Flexible Pavement and Roadway Rigid Pavement details.
RC-24M	1 of 1	Minor correction to reinforcing details.
RC-25M	All Sheets	Renumbered to reflect new sheet 7.
	2 of 7	Changed Note 6.
	3 of 7	Changed "THOROUGHLY COAT VERTICAL FACE WITH PG 64-22" to "PAINT WITH PG 64-22" in Type 6 Shoulder details.
		Changed distance of first tie bar or tiebolt to transverse joint in typical section of concrete shoulders adjacent to plain concrete pavement for collectors and local roads.
		Added "ATPBC OR CTPBC 100 (4") MIN." to Concrete Shoulder Type 1, Type 2, and Full Depth Typical Sections.
		Changed Note 1.
		Changed "PARAPET" to "BARRIER" in Note 8.
	7 of 7	Added new sheet for "Ramp Gore Area".
RC-26M	All Sheets	Standard expanded from 5 sheets to 9 sheets. Renumbered to reflect new sheets.
	1 of 9	Minor changes to Notes 2, 6 and 7.
		Added Note 8.
		In concrete pavement patching typical section, changed $90 \pm 25$ (3 1/2" to 1") to 60 (2 1/2") min - d/2 - 15 (1/2") max.
	2 thru 5 of 9	Expanded old Sheet 2 into new sheets for Single Lane Patching, Multi-Lane Patching, Single Lane Patching Skewed Joints, and Multi-Lane Patching Skewed Joints.
	2 of 9	Dimension changes to single lane pavement patching typical.

		Changed Note 4. Removed old Note 6.			min.
	3 of 9	New Sheet from old Sheet 2. Dimension changes to multi-lane pavement patching typical.	RC-31M	All Sheets	Clarifications to D-E and E-S Endwall details. Moved "SUBSURFACE DRAIN OUTLET ENDWALL (SLOPED)" detail to Sheet 2.
		Changed Notes 4 and 8.			
	4 of 9	New Sheet from old Sheet 2. Dimension changes to single lane skewed joint pavement patching typical.		1 of 2	Changed Note 4 for clarity.
		Changed Notes 3, 4, and 8. Removed old Note 6.	RC-33M	1 of 2	Added Note 8: "PROVIDE TOE WALL OF CLASS A CONCRETE."
	5 of 9	Dimension changes to multi-lane skewed joint pavement patching typical.	RC-34M	3 of 10	Entire sheet revised to reflect re-design of structural steel inlet grates per Strike-Off-Letter 430-05-13.
		Changed Notes 4 and 8.	RC-40M	1 of 1	Added "GEOSYNTHETIC CLAY LINER" details.
	6 of 9	Minor dimensional format changes.			Minor revisions to stone slope wall and typical section details for clarity.
	8 of 9	Minor dimensional format changes.			Added Note 5.
		Added Dowel Retrofit details.	RC-50M	6 of 16	Revised dimensions and stud locations in end connection plate details for constructability.
	9 of 9	New sheet for Rehabilitation (Lane Widening).			Revised End Connection Angle size.
RC-27M	1 of 1	Changed distance of first tie bar or tiebolt to transverse joint from 375 (15") to 750(30") in interstate and other limited access freeways, arterials, and ramps.			Additions to Connection Plate Assembly Details for clarity.
RC-28M	1 of 1	Added "PAINT WITH PG 64-22" note to typical section of longitudinal notched wedge joint.	RC-52M	All sheets	Standard expanded form 6 sheets to 8 sheets. Renumbered to reflect new sheets.
RC-29M	All Sheets	Initial release of "BRIDGE ANTI-ICING SYSTEM". Companion to BC-723M.		1 of 8	Moved side and front views of Routed Offset Bracket to Sheet 5.
RC-30M	1 of 5	Added English dimensions to pavement base drain typical.			Added Note 9.
	2 of 5	Revised typical of combination storm sewer and underdrain; added Note 4 which reads "PLACE 2A AGGREGATE MATERIAL IN A LIFT 75 (3") THICK, COMPACT TO 95% SPECIFIC DENSITY".		4 of 8	Revised metric dimension for steel base plate for consistency.
	4 of 5	Added word "BARREL" after "PIPE" in "PIPE INSTALLATION PROCEDURES, STEP 3".		6 of 8	Revised to 2-S guide rail only into earth mounds.
		Changed dimension in typical of Step 6D from (75 min) to 75 (3")		7 of 8	New details for "TYPE 2 STRONG POST GUIDE RAIL ACROSS CULVERTS AND SMALL STRUCTURES 3810 (12'-6") SPAN".
				8 of 8	New details for "TYPE 2 STRONG POST GUIDE RAIL ACROSS CULVERTS AND SMALL STRUCTURES 5715 (18'-9") SPAN". New details for "TYPE 2 STRONG POST GUIDE RAIL ACROSS CULVERTS AND SMALL STRUCTURES 7620 (25'-0") SPAN".

RC-53M	2 of 2	Revised offset to face of Guide Rail to match DM-2 and other RC Standards.	6 of 7	Changes to plan and elevation views of anchor terminal for clarity and conformance to the Roadside Design Guide and FHWA recommendations.	
RC-54M	1 of 7	Revised Note 4. Added new Note 6. Changed "SOLID OBSTRUCTION" to "AREA OF CONCERN (OBSTACLE)". Minor revision to Table 1. Revised metric dimensions for consistency.	7 of 7	Changed Sections A-A, B-B and C-C to Sections H-H, J-J, and K-K. Revised Notes 2, 3, and 5. Changed height from 1125 (44 1/2") to 1140 (45") in TYPICAL ELEVATION, STEEL POST detail.	
	2 of 7	Changed "SOLID OBSTRUCTION" to "AREA OF CONCERN (OBSTACLE)". Revised offset from edge of shoulder to face of guide rail to be consistent with DM-2 and other RC standards. Revised metric dimensions for consistency.	RC-57M	1 of 8	Changed "TYPICAL REFLECTOR UNIT" to "TOP-MOUNT BARRIER DELINEATOR" and "TYPICAL BARRIER-MOUNT DELINEATOR" to "SIDE-MOUNT BARRIER DELINEATOR". Revised Note 5.
	3 of 7	Moved "GRADING DETAIL FOR FLARED TERMINALS" and Section B-B to Sheet 4. Revised notes in "TREATMENT AT OBSTRUCTION DETAILS".		3 of 8	Revised Slotted Plate Connection, Permissible Taper dimension
	4 of 7	Eliminated Median Earth Mound Detail for Overhead Structures and related section views. Moved "TYPICAL MEDIAN EARTH MOUND DETAIL FOR AT-GRADE DUAL BRIDGES" and Section A-A to Sheet 3 and renamed to Section B-B. Added detail for "GRADING DETAIL FOR FLARED TERMINALS" and new Sections C-C & D-D to this sheet.		All Sheets	Revised some dimensions on typical barrier sections to be more in line with the latest AASHTO-AGC-ARTBA Guide to Standardized Highway Barrier Hardware and industry standard practices. Dimensions on the bridge side of the Bridge to Highway Transitions match those in the Bridge Design (BD) Standards.
	5 of 7	Changes to plan and elevation views of anchor terminal for clarity and conformance to the Roadside Design Guide and FHWA recommendations. Changed Sections A-A, B-B, and C-C to Sections E-E, F-F, and G-G. Added new Note 1 and renumbered other notes with minor revisions.	RC-58M	1 of 5	Changed diagrams of Typical Delineator Devices to current delineators. Revised Note 3 and added Note 10.
				2 of 5	Revised dimension from 13 (1/2") to 15 (9/16") in bottom of tapered slotted plate connection detail.
				3 of 5	Revised Note 3 and added Note 5.
				4 of 5	Revised Sheet reference in "TYPICAL BARRIER TREATMENT AT PIERS" detail.
			RC-59M	1 of 2	Changed "TYPICAL REFLECTOR UNIT" to "TOP-MOUNT BARRIER DELINEATOR" and "SIDE-MOUNT BARRIER DELINEATOR" in typical cast-in-place and precast barrier.

Added Note 11.

	All Sheets	Revised some dimensions on typical barrier sections to be more in line with the latest AASHTO-AGC-ARTBA Guide to Standardized Highway Barrier Hardware and industry standard practices.
RC-63M	1 of 2	Revised Note 1: Replaced "CLASS I, CLASS I-A OR CLASS II REFLECTIVE SHEETING MATERIAL" with "TYPE III, IV, VII, VIII, OR IX RETROREFLECTIVE SHEETING MATERIAL."
	2 of 2	Replaced "CLASS I, CLASS I-A OR CLASS II REFLECTIVE MATERIAL APPLIED TO..." with "RETRO-REFLECTIVE SHEETING MATERIAL APPLIED TO...."

**CANCEL THE FOLLOWING:**

RC-12M	April 15, 2004
RC-20M	April 15, 2004
RC-21M	April 15, 2004
RC-23M	April 15, 2004
RC-24M	April 15, 2004
RC-25M	April 15, 2004
RC-26M	April 15, 2004
RC-27M	April 15, 2004
RC-28M	April 15, 2004
RC-29M	April 15, 2004
RC-30M	April 15, 2004
RC-31M	April 15, 2004
RC-33M	April 15, 2004
RC-34M	April, 15 2004
RC-40M	April 15, 2004
RC-50M	April 15, 2004
RC-52M	April 15, 2004
RC-53M	April 15, 2004
RC-54M	April 15, 2004
RC-57M	April 15, 2004
RC-58M	April 15, 2004
RC-59M	April 15, 2004
RC-63M	April 15, 2004

SOL 430-05-13

June 29,2005

**REQUEST ADDITIONAL COPIES FROM:**

For Department Personnel:  
DGS Warehouse #1  
905 Elmerton Avenue  
Harrisburg, PA 17105  
Telephone: (717) 787-6159,  
Ext. 3234

For All Others:  
PA Dept. of Transportation  
Sales Store  
P.O. Box 2028  
Harrisburg, PA 17105  
Telephone: (717) 787-6746

**APPROVED FOR ISSUANCE BY:**

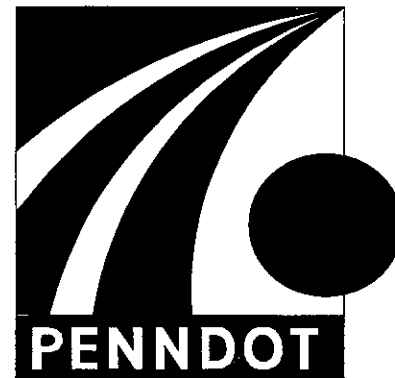
Allen D. Biehler, P.E. – Secretary of  
Transportation

By:





# COMMONWEALTH OF PENNSYLVANIA



## DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN

# STANDARDS FOR ROADWAY CONSTRUCTION SERIES RC-1M TO 100M

APRIL 2004 EDITION

PUB 72M (4-04)

# INDEX OF STANDARDS FOR ROADWAY CONSTRUCTION

STANDARD DRAWING NUMBER	DRAWING DATE	DESCRIPTION
<u>EARTHWORK</u>		
RC-10M	APR 15, 2004	CLASSIFICATION OF EARTHWORK
RC-11M (2 Sheets)	APR 15, 2004	CLASSIFICATION OF EARTHWORK FOR STRUCTURES
* RC-12M (2 Sheets)	MAR. 30, 2006	BACKFILL AT STRUCTURES
RC-13M	APR 15, 2004	PAY LIMIT OF SUBBASE

## PAVEMENTS

* RC-20M (3 Sheets)	MAR. 30, 2006	CONCRETE PAVEMENT JOINTS
* RC-21M	MAR. 30, 2006	REINFORCED CONCRETE PAVEMENT
* RC-23M (3 Sheets)	MAR. 30, 2006	BRIDGE APPROACH SLAB
* RC-24M	MAR. 30, 2006	PAVEMENT RELIEF JOINT
* RC-25M (7 Sheets)	MAR. 30, 2006	SHOULDERS
* RC-26M (9 Sheets)	MAR. 30, 2006	CONCRETE PAVEMENT REHABILITATION
* RC-27M	MAR. 30, 2006	PLAIN CONCRETE PAVEMENT
* RC-28M	MAR. 30, 2006	OVERLAY TRANSITIONS AND PAVING NOTCHES
* RC-29M (3 Sheets)	MAR. 30, 2006	BRIDGE ANTI-ICING SYSTEM APPROACH INSTALLATION

## DRAINAGE

* RC-30M (5 Sheets)	MAR. 30, 2006	SUBSURFACE DRAINS
* RC-31M (2 Sheets)	MAR. 30, 2006	ENDWALLS
RC-32M	APR 15, 2004	SLOPE PIPE FITTINGS, PIPE CONNECTORS AND CONCRETE COLLAR FOR PIPE EXTENSION
* RC-33M (2 Sheets)	MAR. 30, 2006	END SECTIONS FOR PIPE CULVERTS
* RC-34M (10 Sheets)	MAR. 30, 2006	INLETS
RC-35M	APR 15, 2004	DRAINAGE DIKE
RC-36M	APR 15, 2004	SPRING BOXES
RC-39M (6 Sheets)	APR 15, 2004	STANDARD MANHOLES
* RC-40M	MAR. 30, 2006	SLOPE PROTECTION
RC-43M	APR 15, 2004	GABIONS

STANDARD DRAWING NUMBER	DRAWING DATE	DESCRIPTION
----------------------------	-----------------	-------------

## GUIDE RAIL AND MEDIAN BARRIER

* RC-50M (16 Sheets)	MAR. 30, 2006	GUIDE RAIL TRANSITION AT END OF STRUCTURE
* RC-52M (8 Sheets)	MAR. 30, 2006	TYPE 2 STRONG POST GUIDE RAIL
* RC-53M (2 Sheets)	MAR. 30, 2006	TYPE 2 WEAK POST GUIDE RAIL
* RC-54M (7 Sheets)	MAR. 30, 2006	BARRIER PLACEMENT AT OBSTRUCTIONS
RC-55M	APR 15, 2004	TYPE 2 WEAK POST MEDIAN BARRIER
* RC-57M (8 Sheets)	MAR. 30, 2006	CONCRETE MEDIAN BARRIER
* RC-58M (5 Sheets)	MAR. 30, 2006	SINGLE FACE CONCRETE BARRIER
* RC-59M (2 Sheets)	MAR. 30, 2006	CONCRETE GLARE SCREEN

## FENCES AND CURBS

RC-60M (3 Sheets)	APR 15, 2004	RIGHT-OF-WAY FENCE
RC-61M	APR 15, 2004	RIGHT-OF-WAY GATES AND REMOVABLE FENCE SECTIONS
* RC-63M (2 Sheets)	MAR. 30, 2006	PERMANENT BARRICADES
RC-64M	APR 15, 2004	CURBS AND GUTTERS
RC-65M	APR 15, 2004	CONCRETE MOUNTABLE CURBS
RC-67M (3 Sheets)	APR 15, 2004	CURB RAMPS

## POLLUTION CONTROL

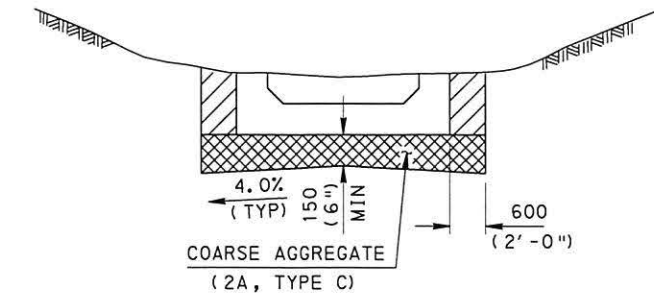
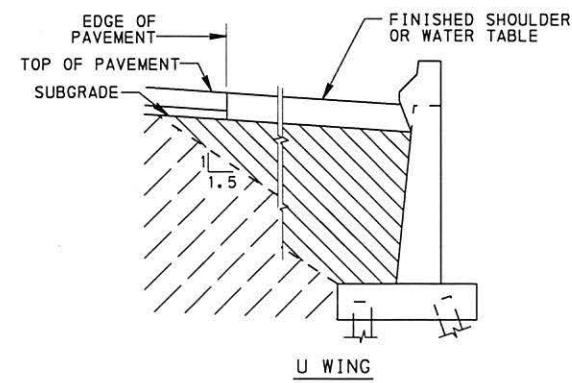
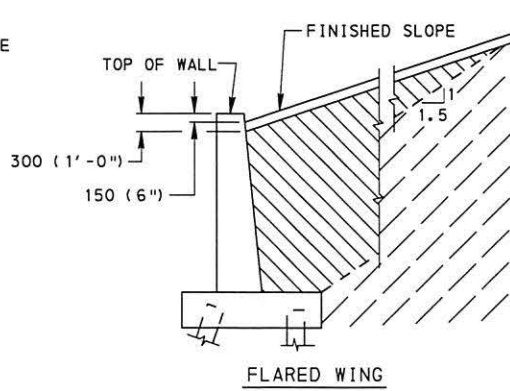
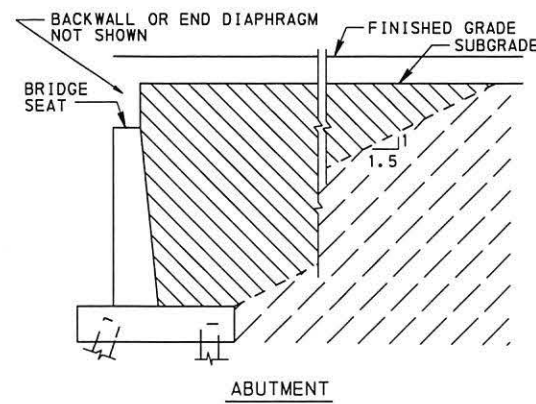
RC-70M (6 Sheets)	APR 15, 2004	EROSION AND SEDIMENT POLLUTION CONTROL
-------------------	--------------	--

## HIGHWAY LIGHTING

RC-80M (2 Sheets)	APR 15, 2004	HIGHWAY LIGHTING-FOUNDATIONS
RC-81M	APR 15, 2004	HIGHWAY LIGHTING-JUNCTION BOXES-LIGHT DUTY
RC-82M (2 Sheets)	APR 15, 2004	HIGHWAY LIGHTING-JUNCTION BOXES-HEAVY DUTY
RC-83M (2 Sheets)	APR 15, 2004	HIGHWAY LIGHTING-LIGHTING POLE DETAILS
RC-84M	APR 15, 2004	HIGHWAY LIGHTING-LIGHTING AND ELECTRICAL DETAILS

## ROADSIDE DEVELOPMENT AND PLANTING

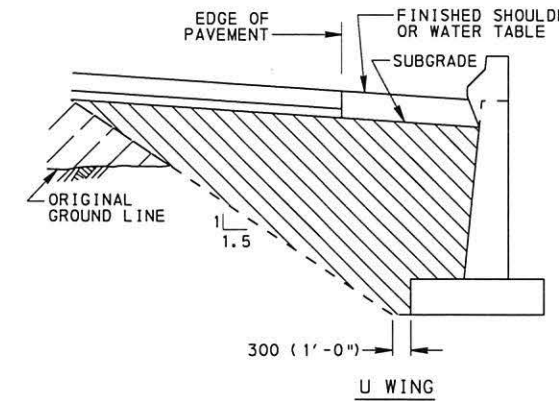
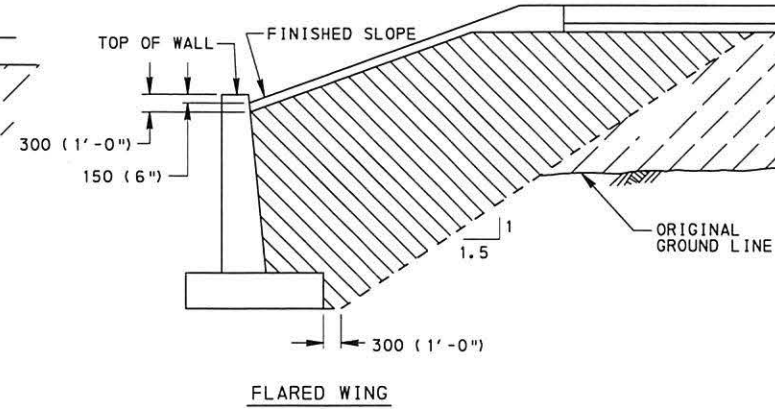
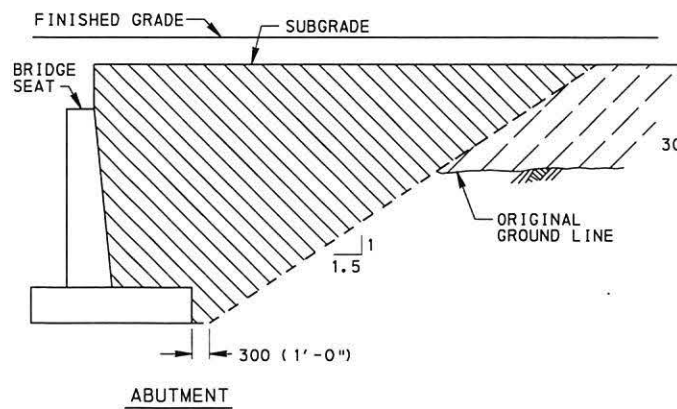
RC-91M (2 Sheets)	APR 15, 2004	BRACING AND PLANTING DETAILS
-------------------	--------------	------------------------------



**FOUNDATION PREPARATION FOR RC BOX AND ARCH CULVERTS ON FINE GRAIN SOIL ONLY**

NOTE: EXCAVATE THE LAST 600 (2 ft) WITH BUCKET WITHOUT TEETH TO KEEP THE FOUNDATION FIRM. FOR CULVERTS WITH SPANS LESS THAN 2500 (8'-0"), BOTTOM MAY BE SLOPED IN ONE DIRECTION.

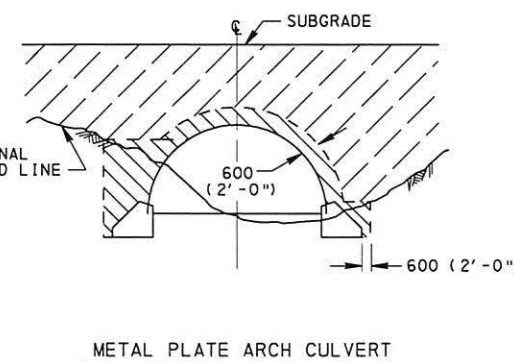
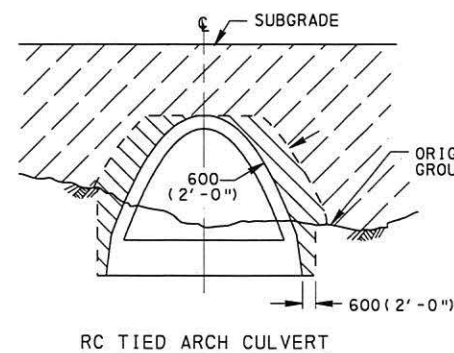
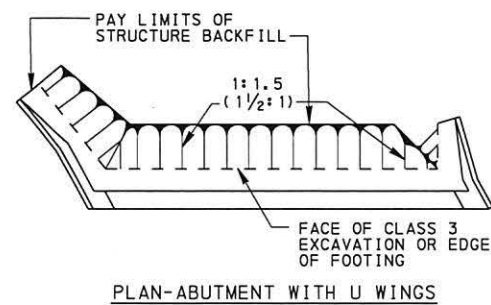
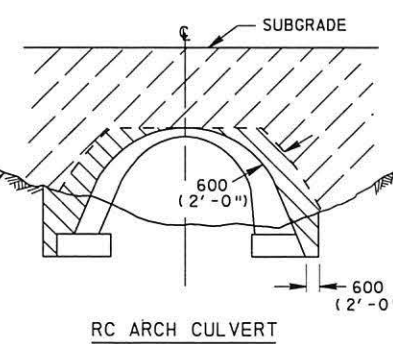
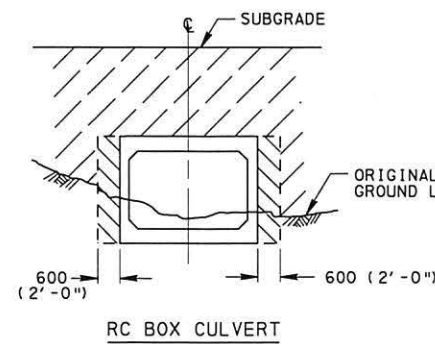
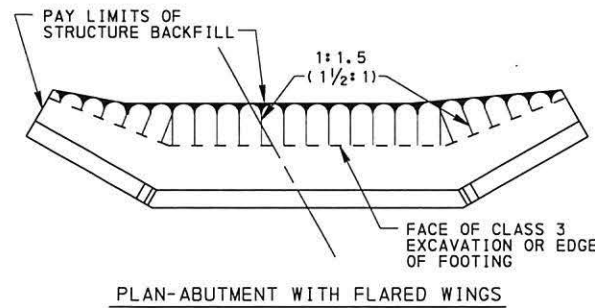
**TYPICAL CROSS SECTIONS - ABUTMENTS ON FILL**



**LEGEND**

- STRUCTURE BACKFILL
- EMBANKMENT MATERIAL

**TYPICAL CROSS SECTIONS - ABUTMENTS IN CUT**



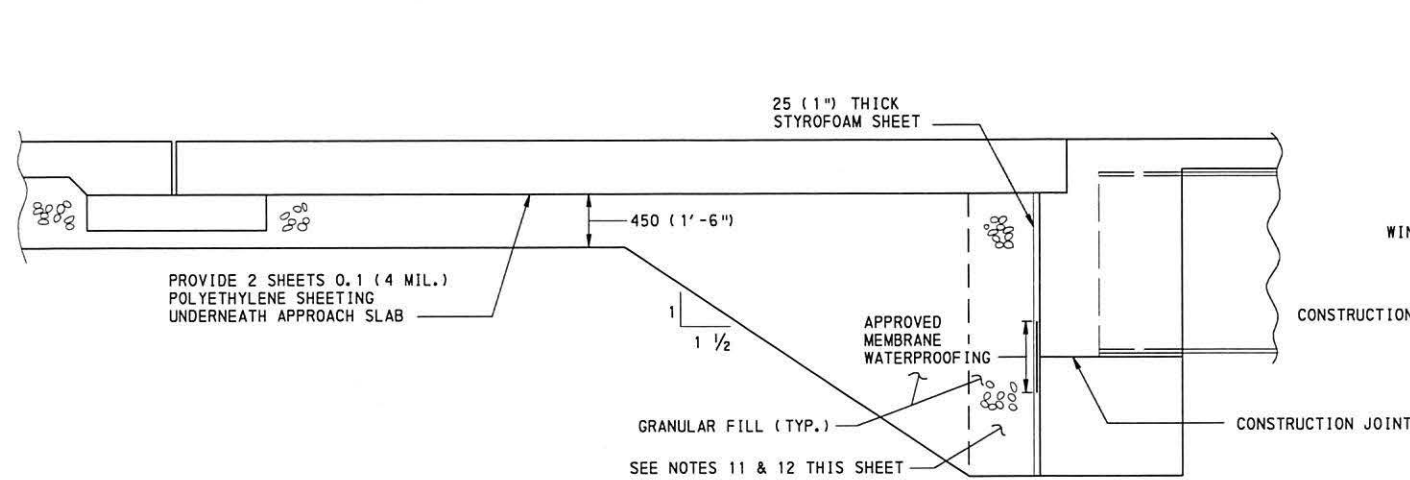
NOTE: SEE SHEET 2 FOR GENERAL NOTES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

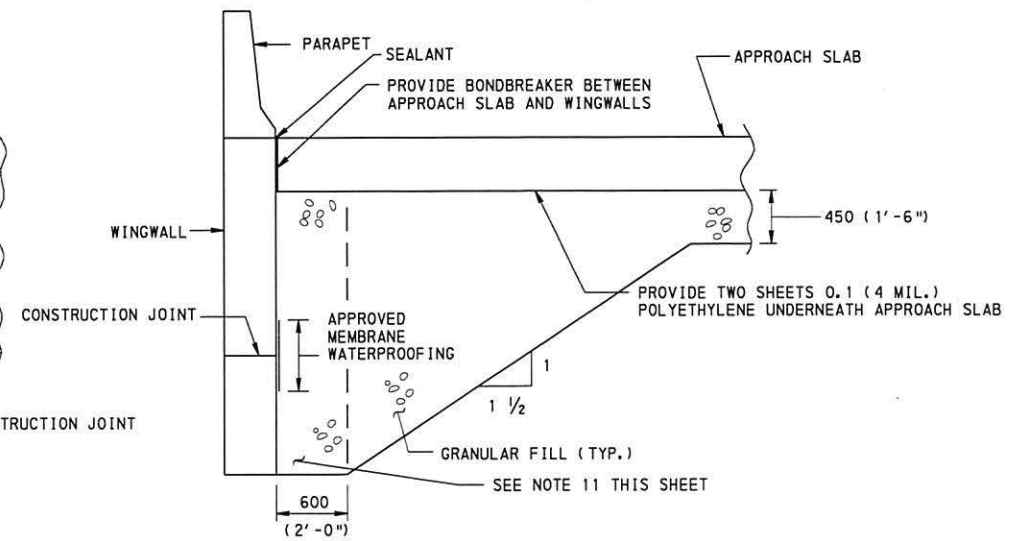
**BACKFILL & EMBANKMENT CONSTRUCTION AT STRUCTURES**

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

**BACKFILL AT STRUCTURES**



LIMITS OF BACKFILL  
INTEGRAL ABUTMENT



LIMITS OF BACKFILL  
WINGWALLS OF INTEGRAL ABUTMENTS

GENERAL NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUB 408. PLACE BACKFILL AND EMBANKMENT IN ACCORDANCE WITH THIS STANDARD DRAWING UNLESS OTHERWISE SHOWN ON THE STRUCTURE DRAWINGS.
2. USE ONLY R-3 ROCK LINING, MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 850.2(a); AASHTO NO. 1, 3, 5 OR 57 COARSE AGGREGATES, MEETING AT LEAST THE TYPE C QUALITY REQUIREMENTS IN PUBLICATION 408M, SECTION 703.2, TABLE B; OR TYPE OGS COARSE AGGREGATE, MEETING AT LEAST THE TYPE C QUALITY REQUIREMENTS IN PUBLICATION 408, SECTION 703.2, TABLE B. MEASURE AND PAY STRUCTURE BACKFILL AS SELECTED BORROW EXCAVATION-STRUCTURE BACKFILL. DO NOT USE R-3 FOR STRUCTURE BACKFILL FOR ANY TYPE RC OR METAL PLATE CULVERT. PLACE A CLASS 2, TYPE B GEOTEXTILE BLANKET AS A BARRIER BETWEEN THE STRUCTURE BACKFILL AND EXCAVATION/EMBANKMENT MATERIAL. PLACE A CLASS 2, TYPE B GEOTEXTILE BLANKET ON ENTIRE TOP OF THE COMPLETED STRUCTURE BACKFILL PRIOR TO PLACING ANY SUBBASE MATERIAL FOR THE ROADWAY. THE GEOTEXTILE IS CONSIDERED INCIDENTAL TO THE SELECTED BORROW EXCAVATION STRUCTURE BACKFILL AND WILL NOT BE PAID FOR SEPARATELY.
3. TREAT BACKFILL LIMITS AT RETAINING WALLS AND WINGWALLS FOR CULVERTS THE SAME AS FLARED ABUTMENT WINGWALLS.
4. TREAT BACKFILL CONSTRUCTION AT RC BOX CULVERTS WITH THE TOP SLAB AT ROADWAY GRADE THE SAME AS ABUTMENTS.
5. TREAT BACKFILL CONSTRUCTION AT CULVERTS, WHERE THE TOP OF THE CULVERT IS NEAR SUBGRADE, AS SHOWN ON THE STRUCTURE DRAWINGS OR AS DIRECTED BY THE ENGINEER.
6. PLACE STRUCTURE BACKFILL AND ADJOINING EMBANKMENT SIMULTANEOUSLY UNLESS OTHERWISE PERMITTED BY THE ENGINEER.
7. REPLACE MATERIAL REMOVED BEYOND THE SPECIFIED LIMITS OF CLASS 1, 2 OR 3 EXCAVATION WITH STRUCTURE BACKFILL. CONSIDER MATERIAL REMOVED OR STRUCTURE BACKFILL PLACED BEYOND THE SPECIFIED LIMITS OF CLASS 1, 2 OR 3 EXCAVATION AS INCIDENTAL TO THE CLASS OF EXCAVATION SPECIFIED.
8. REFER TO STRUCTURE DRAWINGS FOR DRAINAGE DETAILS, WEEP HOLES, ETC.
9. INDICATE STRUCTURE BACKFILL QUANTITIES ON THE STRUCTURE DRAWINGS.
10. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.
- \* 11. PLACE BACKFILL WITHIN 600 (24") FROM THE REAR FACE OF THE ABUTMENT AND THE WINGWALL IN LOOSE LIFTS OF 150 (6") FOR TYPE OGS, AASHTO NO. 3, 5 OR 57 COARSE AGGREGATE; 225 (9") AASHTO NO. 1; 300 (1'-0") FOR R-3 ROCK LINING. COMPACT EACH LAYER WITH TWO PASSES OF A WALK-BEHIND VIBRATORY PLATE SOIL COMPACTOR.
- \* 12. BACKFILL SIMULTANEOUSLY BEHIND BOTH ABUTMENTS. KEEP THE DIFFERENCE BETWEEN THE FILL HEIGHT AT BOTH ENDS OF THE BRIDGE BELOW 300 mm (12") AT ALL TIMES DURING BACKFILLING.

LEGEND

- \* IDENTIFIES NOTES THAT APPLY ONLY TO INTEGRAL ABUTMENTS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

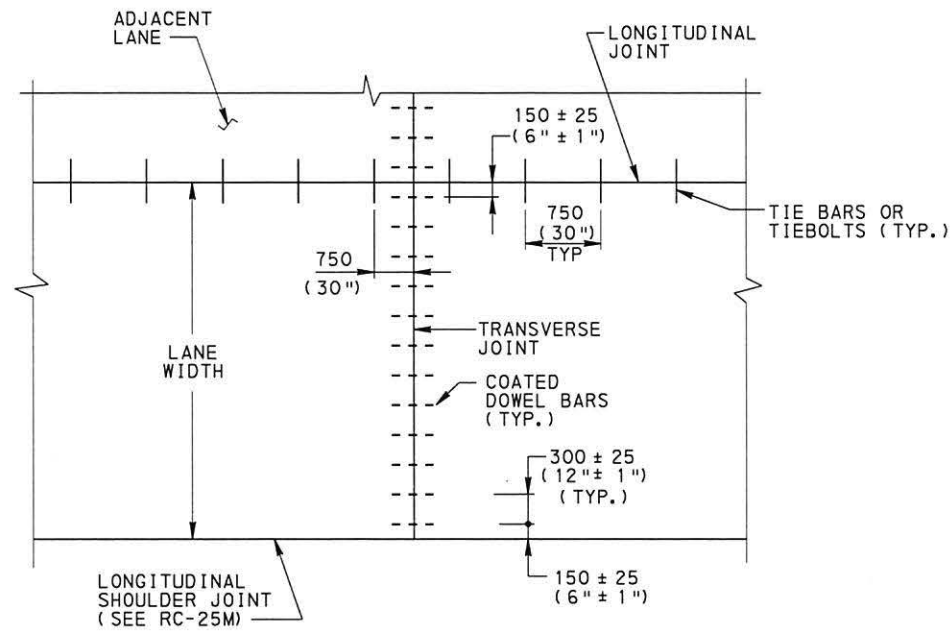
BACKFILL AT STRUCTURES

RECOMMENDED MAR. 30, 2006  
*Scott Christian*  
DIRECTOR, BUREAU OF DESIGN

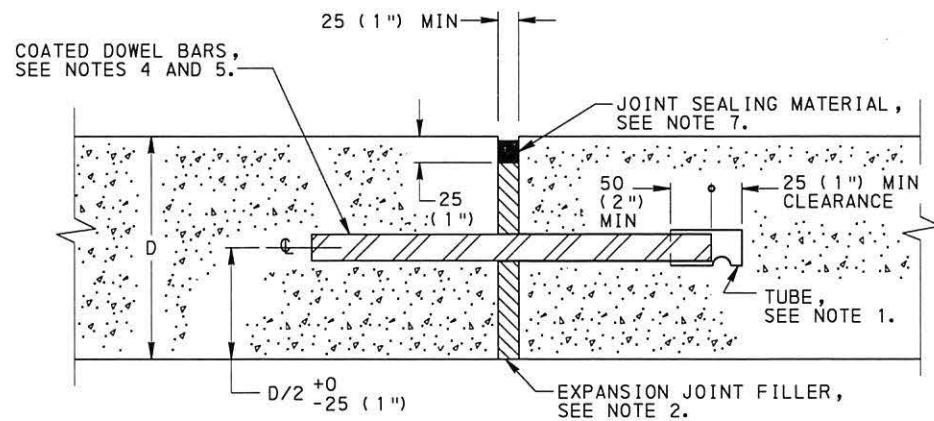
RECOMMENDED MAR. 30, 2006  
*M. Chitel*  
CHIEF ENGINEER

SHEET 2 OF 2  
RC-12M

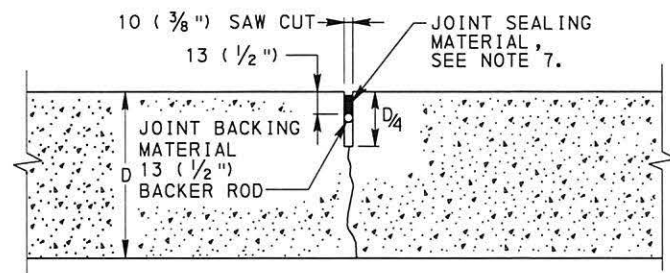




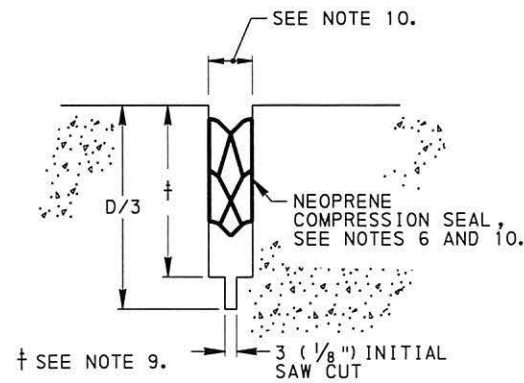
TYPICAL LAYOUT



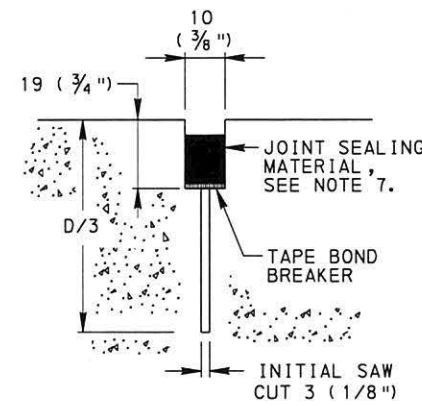
TYPE E



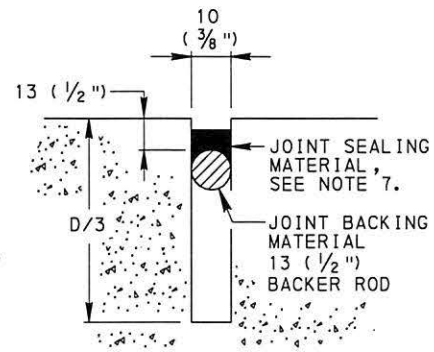
TYPE P  
SEE RC-27M



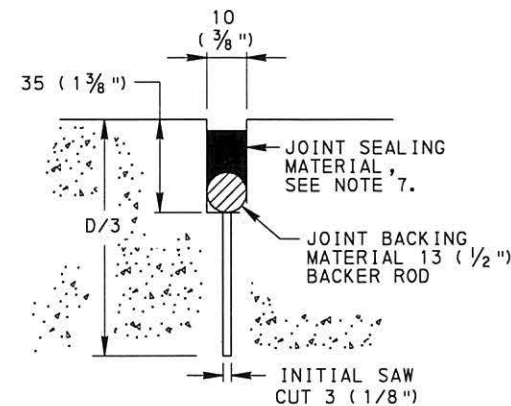
DETAIL A



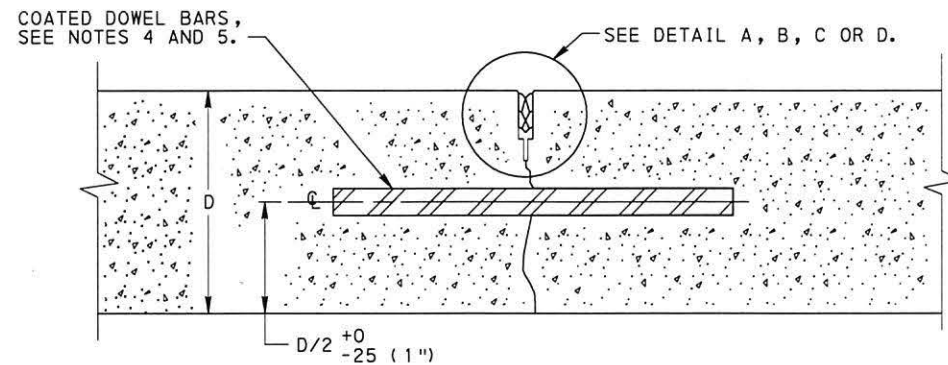
DETAIL C



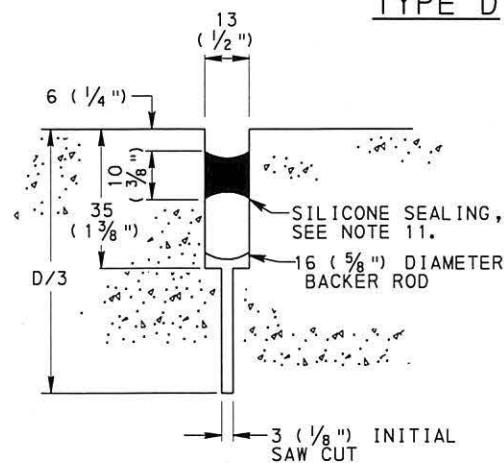
DETAIL B



DETAIL D



TYPE D



ALTERNATE TYPE P  
JOINT DETAIL

NOTES

- PLACE A TUBE FROM A MANUFACTURER LISTED IN BULLETIN 15 OVER THE LUBRICATED END OF ALL DOWEL BARS USED IN TYPE E JOINTS AND PROVIDE A MINIMUM 25 (1") CLEARANCE POCKET ASSURED BY MEANS OF A POSITIVE SPACING DEVICE.
- CUT EXPANSION JOINT FILLER MATERIAL TO CONFORM TO THE CROSS SECTION OF THE PAVEMENT AND FURNISH IN STRIPS EQUAL TO THE WIDTH OF THE PAVEMENT SLAB. MAKE THE TOP SURFACE SMOOTH AND HAVE HOLES PUNCHED FOR THE DOWEL BARS PROVIDE A SNUG FIT WITHOUT LOSS IN THICKNESS OF THE MATERIAL.
- CONSTRUCT ALL TRANSVERSE JOINTS PERPENDICULAR TO THE CENTERLINE.
- USE MINIMUM NO. 32 x 450 (1 1/4" x 18") LONG DOWEL BARS FOR PAVEMENT DEPTHS 250 (10") OR LESS AND MINIMUM NO. 38 x 450 (1 1/2" x 18") LONG DOWEL BARS FOR PAVEMENT DEPTHS GREATER THAN 250 (10"). APPROVED ALTERNATE DOWEL BARS HAVING EQUIVALENT PROPERTIES TO CONVENTIONAL ROUND DOWEL BARS MAY BE USED. COATED DOWEL BARS TO BE EITHER GRADE 300 (GRADE 40) OR GRADE 420 (GRADE 60).
- PLACE DOWEL BARS PARALLEL TO THE CENTERLINE AND SURFACE OF THE SLAB.
- USE ONLY APPROVED NEOPRENE SEALS, AS LISTED IN BULLETIN 15. INSTALL NEOPRENE SEALS TO A UNIFORM DEPTH WITH THE TOP OF THE SEAL FROM 6 (1/4") TO 10 (3/8") BELOW THE LEVEL OF THE PAVEMENT SURFACE. MAKE THE TOP EDGES OF THE CONTACT SURFACES ON BOTH SIDES OF THE SEAL AT THE SAME ELEVATION.
- MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (1/8") TO 6 (1/4") BELOW THE SURFACE OF THE PAVEMENT. USE HEAT RESISTANT JOINT BACKING MATERIAL FOR HOT Poured JOINTS.
- THE INITIAL SAW CUT FOR TYPE D JOINT IS NOT REQUIRED FOR CONSTRUCTION JOINTS.
- SAW DEPTHS OF NEOPRENE SEALS:  
SEAL SIZE      SAW CUT DEPTHS  
25 (1")      47-50 (1 1/8"-2")  
32 (1 1/4")      50-53 (2"-2 1/8")
- ADJUST THE WIDTH OF THE SECOND SAW CUT ACCORDING TO THE SEAL SIZE AND PAVEMENT SURFACE TEMPERATURE AT THE TIME OF SAWING, AS FOLLOWS:

JOINT SPACING	SEAL SIZE	WIDTH OF SAW CUT		
		<16°C	16°C TO 27°C	>27°C
4.5 m & 6.0 m	25	16	14	13
9.0 m	32	19	16	13

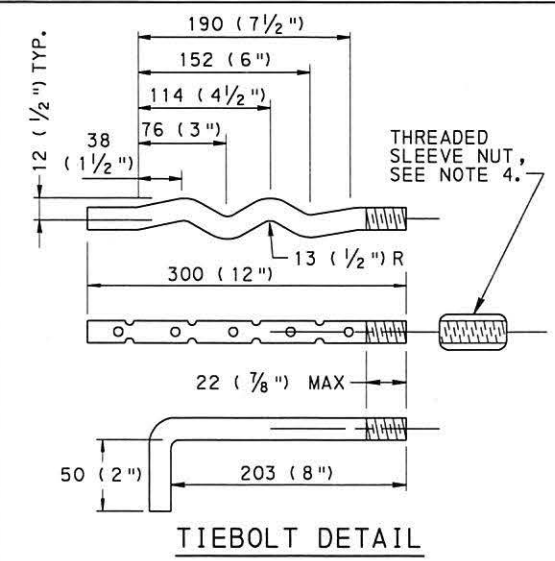
JOINT SPACING	SEAL SIZE	WIDTH OF SAW CUT		
		<60°F	60°F TO 80°F	>80°F
(15' & 20')	(1")	(5/8")	(9/16")	(1/2")
(30')	(1 1/4")	(3/4")	(5/8")	(1/2")

- WHEN SILICONE JOINT SEALING MATERIAL, AS SPECIFIED IN PUBLICATION 408, SECTION 705.4 (c), IS SELECTED FOR USE IN TRANSVERSE JOINTS (TYPE P ONLY) OR TRANSVERSE SHOULDER JOINTS, USE THE SAME JOINT SEALING MATERIAL IN THE LONGITUDINAL JOINTS (ALTERNATE TYPE L AND ALTERNATE LONGITUDINAL SHOULDER JOINTS).
- ALL DIMENSIONS ARE GIVEN IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.
- PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408.

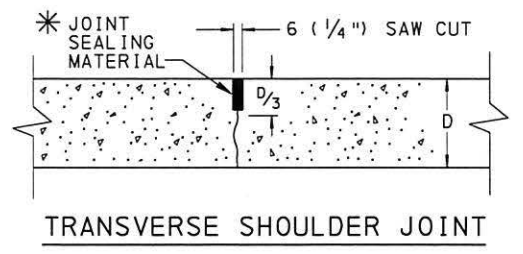
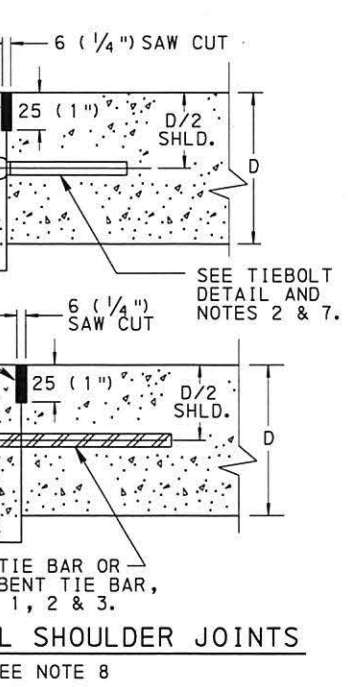
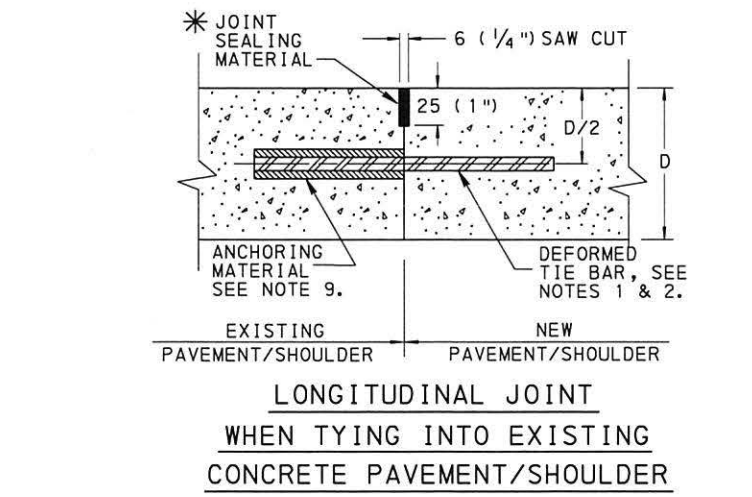
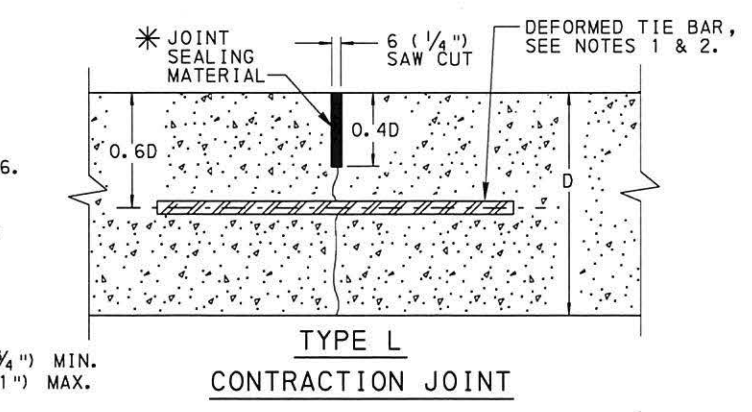
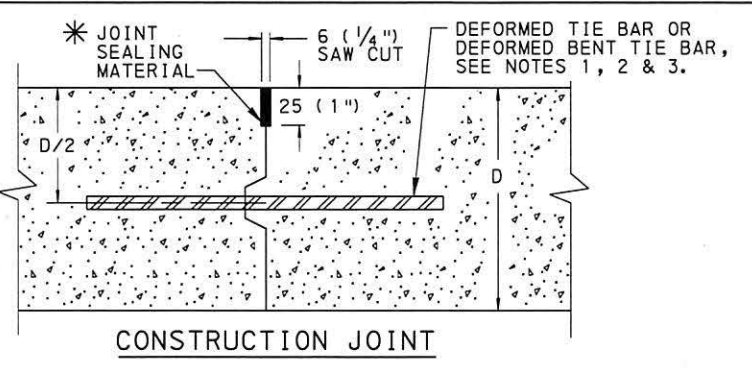
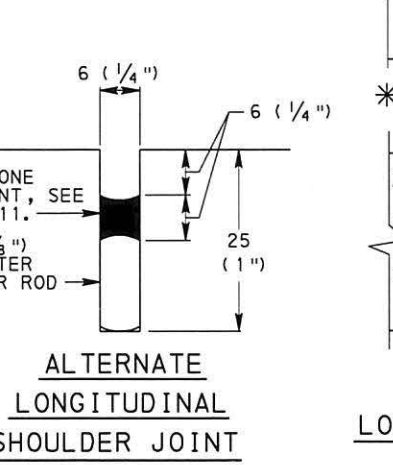
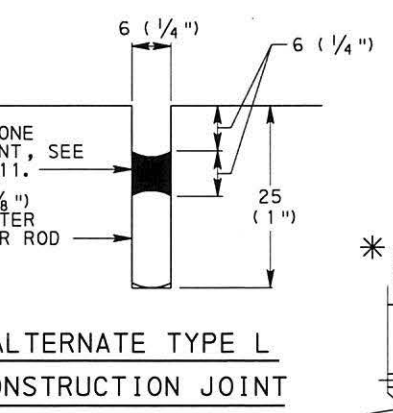
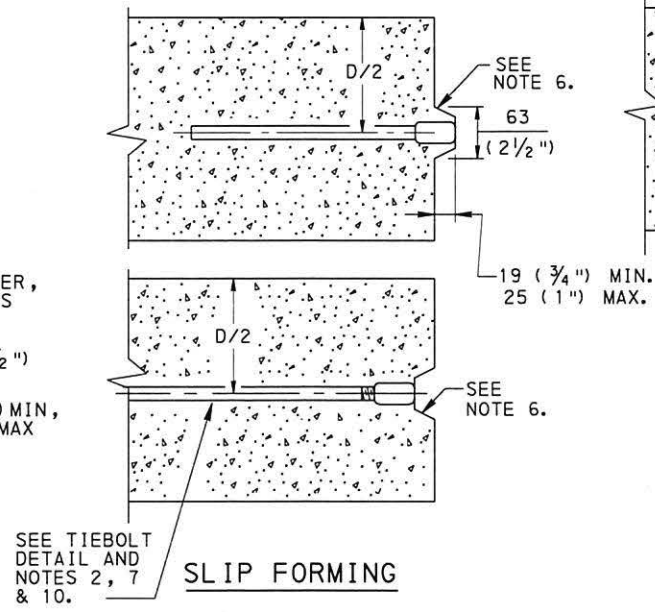
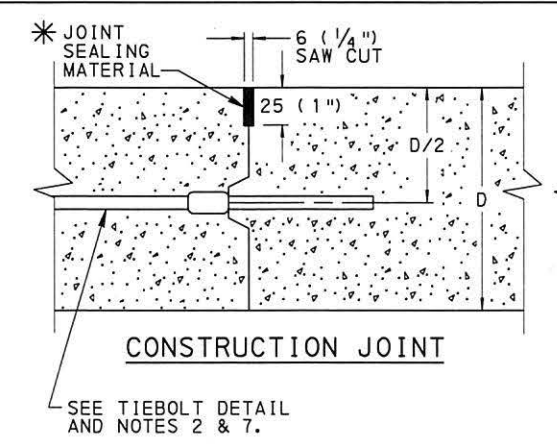
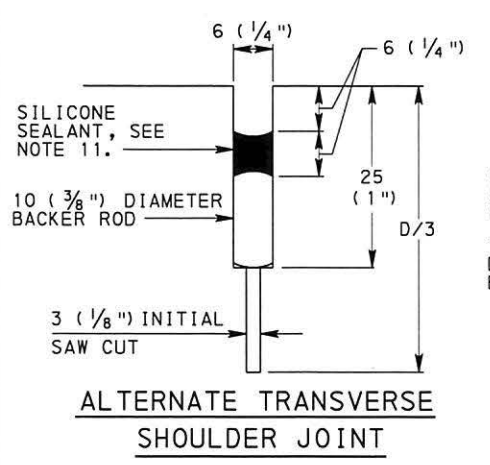
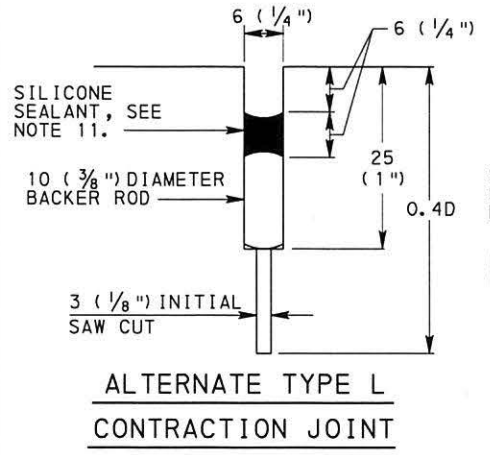
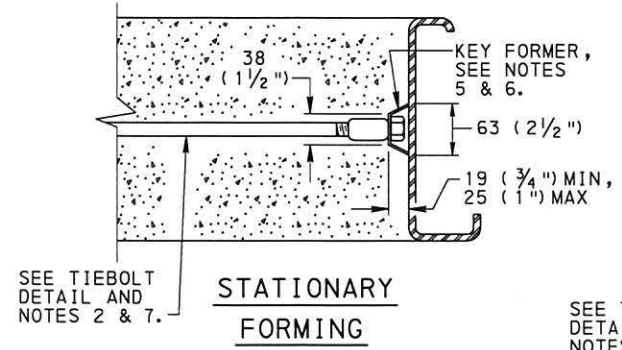
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

CONCRETE PAVEMENT JOINTS



MAKE TIEBOLTS 14 (9/16) Ø BAR WITH ROLLED THREADS OR 16 (5/8) Ø BAR WITH CUT THREADS. PERMIT ONLY TIEBOLTS WHICH ARE SUPPLIED BY AN APPROVED MANUFACTURER, AS LISTED IN BULLETIN 15. SEE PUBLICATION 408, SECTIONS 709.1 AND 705.2(b).



**NOTES**

- SPECIFY #16 (#5) TIE BARS 750 ±6 (30" ±1/4") LONG, SPACED 750 (30") CENTER TO CENTER MAXIMUM. PLACE PERPENDICULAR TO AND CENTERED OVER THE LONGITUDINAL JOINT ±25 (±1"). EMBED TIE BARS D/2 ±20 (±3/4") OR 100 ±13 (4" ±1/2"), WHICHEVER IS GREATER, EXCEPT FOR TYPE L CONTRACTION JOINTS. FOR TYPE L CONTRACTION JOINTS EMBED TIE BARS 0.6D. WHEN ADJOINING TO AN UNEQUAL PAVEMENT OR SHOULDER DEPTH, D IS THE DEPTH OF THE THINNER SECTION. TIE BARS MUST MEET THE MINIMUM PULL-OUT RESISTANCE SPECIFIED IN PUBLICATION 408, SECTION 501.3(j).
- EPOXY COAT TIE BARS AS SPECIFIED IN PUBLICATION 408, SECTION 709.1(c). EPOXY COAT OR GALVANIZE TIEBOLTS AND THREADED SLEEVE NUTS, EXCLUDING THREADS, AS SPECIFIED IN PUBLICATION 408, SECTION 709.1(c) OR SECTION 1105.02(s) RESPECTIVELY. STRAIGHT TIE BARS TO BE EITHER GRADE 300 (GRADE 40) OR GRADE 420 (GRADE 60). BENT TIE BARS TO BE GRADE 300 (GRADE 40) ONLY.
- STRAIGHTEN DEFORMED BENT TIE BARS SO THAT THE ANGLE MADE WITH THE LONGITUDINAL JOINT IS AT LEAST 60 DEGREES.
- MAKE THREADED SLEEVE NUT FROM STEEL PIPE OR HEXAGONAL STEEL BAR 27Ø x 48 (1 1/16"Ø x 1 7/8") LONG OR HIGH STRENGTH STEEL BAR 22Ø x 50 (7/32"Ø x 2") LONG.
- SECURELY FASTEN THE KEY FORMER TO THE STEEL FORM. THE CONTRACTOR SHALL HAVE A METHOD, ACCEPTABLE TO THE ENGINEER, OF TEMPORARILY SECURING THE TIEBOLT TO THE KEY FORMER OR FORM DURING PLACEMENT OF THE CONCRETE.
- FORM MALE OR FEMALE KEYWAYS AS INDICATED FOR PAVEMENT DEPTHS GREATER THAN 250 (10").
- PLACE TIEBOLTS AT 750 (30") CENTER TO CENTER MAXIMUM SPACING EMBED TIEBOLTS D/2 ±20 (±3/4") OR 100 ±13 (4" ±1/2"), WHICHEVER IS GREATER. WHEN ADJOINING TO AN UNEQUAL PAVEMENT OR SHOULDER DEPTH, D IS THE DEPTH OF THE THINNER SECTION. SCREW TIEBOLTS UNTIL SNUG. FOR 150, 180, AND 200 (6", 7" AND 8") PAVEMENTS AND/OR SHOULDERS, MAKE THE WIGGLE OR HOOK PORTION OF THE TIEBOLT PARALLEL TO THE GRADE. IF NECESSARY, LOOSEN TIEBOLTS SO THAT THE HOOK OR WIGGLE IS PARALLEL TO THE GRADE.
- AT THE CONTRACTOR'S OPTION, THE CONCRETE SHOULDER MAY BE CONSTRUCTED AT THE SAME TIME AS THE PAVEMENT. IN THIS CASE, USE A TYPE L CONTRACTION JOINT.
- USE AN APPROVED EPOXY ANCHORING MATERIAL TO WITHSTAND THE NECESSARY MINIMUM PULL-OUT RESISTANCE SPECIFIED IN PUBLICATION 408, SECTION 501.3(j) 1. TIE BAR HOLE DIAMETER IN EXISTING PAVEMENT SHOULD BE AS PER MANUFACTURER'S RECOMMENDATION. USE ROTARY IMPACT DRILL TO AVOID IMPACTING FINES INTO HOLE.
- DO NOT USE THE HOOK COMPONENT OF THE TIEBOLT ASSEMBLY WHEN SLIP FORMING.
- WHEN SILICONE JOINT SEALING MATERIAL, AS SPECIFIED IN PUBLICATION 408, SECTION 705.4(a), IS SELECTED FOR USE IN TRANSVERSE JOINTS (TYPE P ONLY) OR TRANSVERSE SHOULDER JOINTS, USE THE SAME JOINT SEALING MATERIAL IN THE LONGITUDINAL JOINTS (ALTERNATE TYPE L AND ALTERNATE LONGITUDINAL SHOULDER JOINTS).
- MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (1/8") TO 6 (1/4") BELOW THE PAVEMENT SURFACE.

(\* ) DENOTES, SEE NOTE 12.

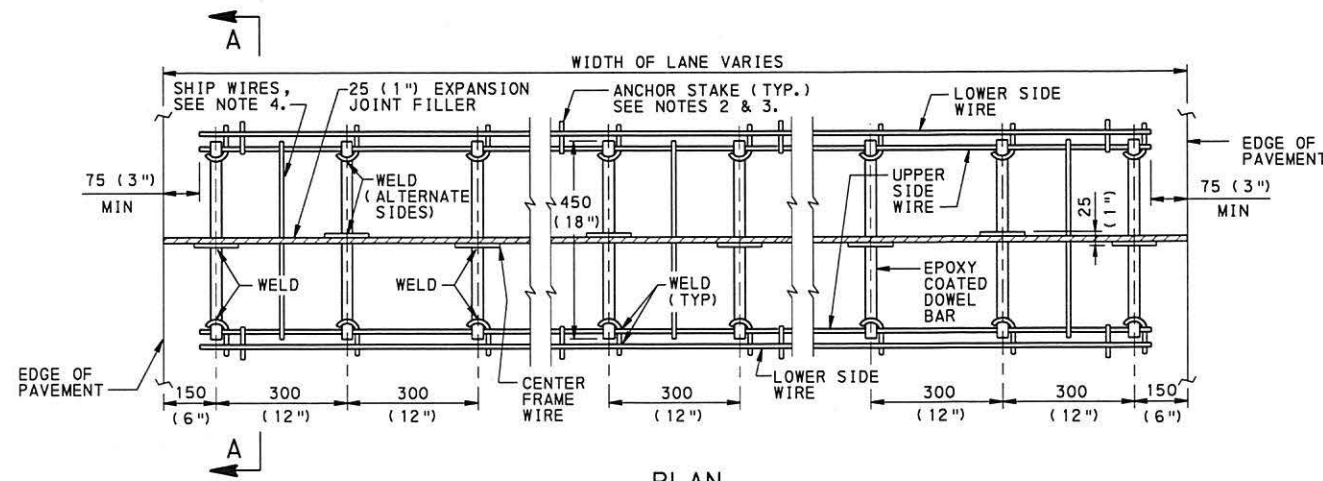
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

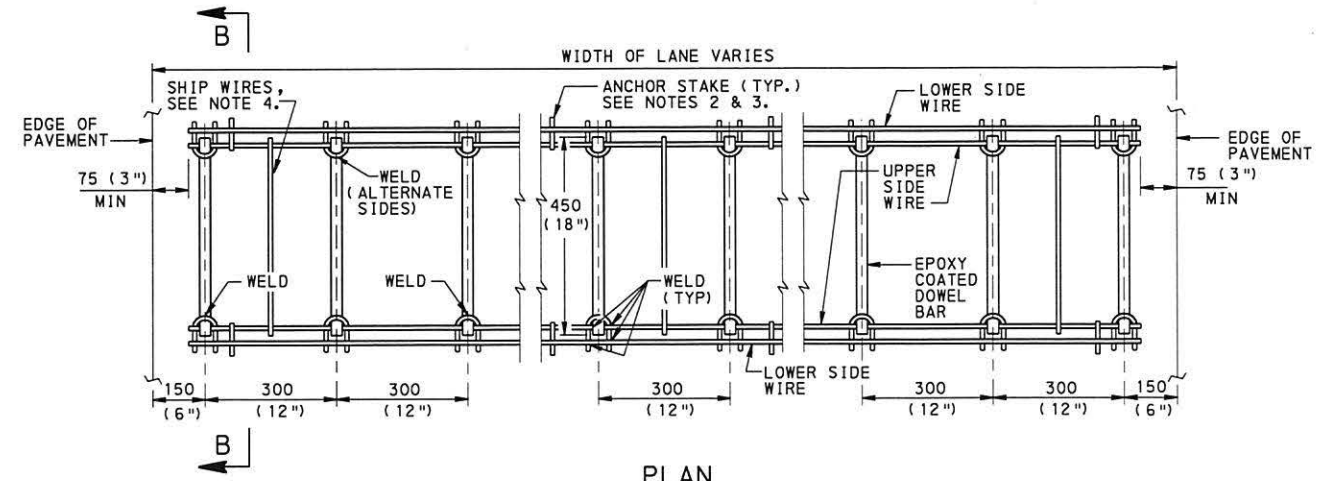
**CONCRETE PAVEMENT JOINTS**

RECOMMENDED MAR. 30, 2006 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Chel</i> CHIEF ENGINEER	SHT 2 OF 3 <b>RC-20M</b>
--	---	-----------------------------

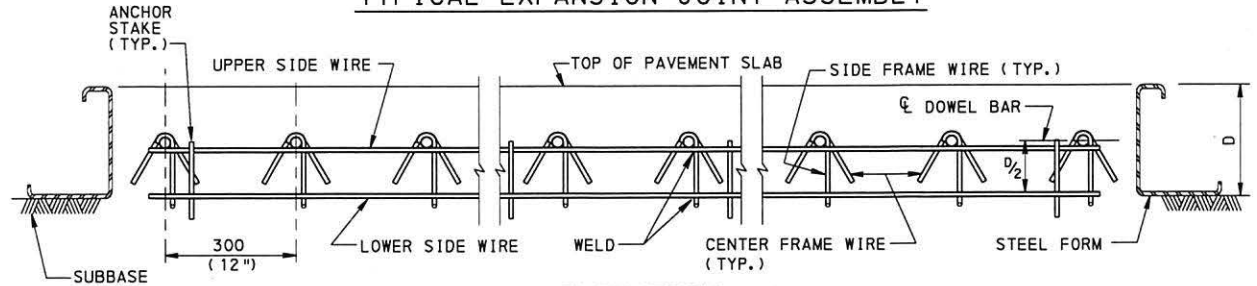




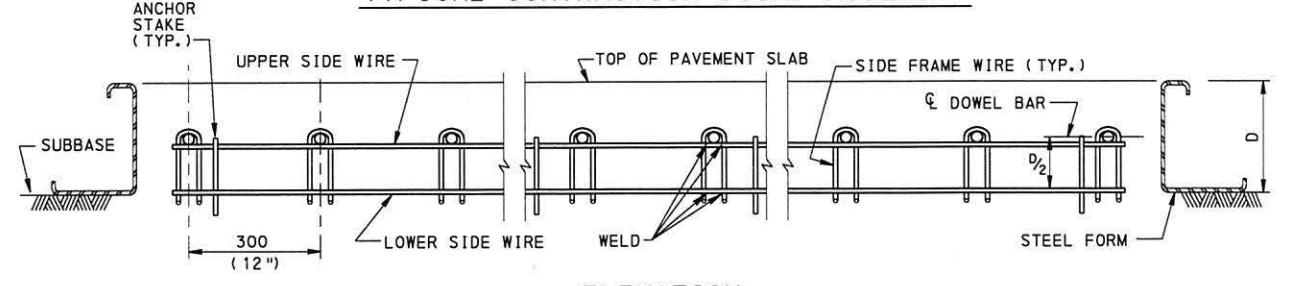
PLAN  
TYPICAL EXPANSION JOINT ASSEMBLY



PLAN  
TYPICAL CONTRACTION JOINT ASSEMBLY



ELEVATION  
EXPANSION JOINT ASSEMBLY

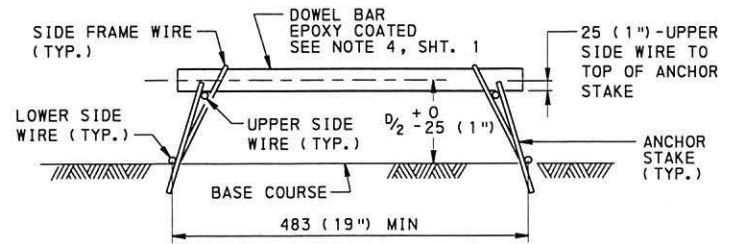


ELEVATION  
CONTRACTION JOINT ASSEMBLY

NOTES

- THIS STANDARD DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND COMPATIBILITY. IT DOES NOT INCLUDE ALL THE DETAILS REQUIRED FOR FABRICATION. ONLY ITEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED. ANCHOR STAKES SHOULD NOT TOUCH ANY DOWEL BAR AND MAY BE SPACED AS NEEDED TO PROVIDE STABILITY.
- PROVIDE ANCHOR STAKES TO SECURE UNIT FROM MOVEMENT INCLUDING UPLIFT. USE A MINIMUM OF EIGHT STAKES PER 3.6 m (12'-0") LANE UNIT (4 STAKES PER SIDE) THAT EXTEND 25 (1") ABOVE THE UPPER SIDE WIRE. STAKES SHOULD NOT TOUCH DOWEL BARS AND MAY BE SPACED AS NEEDED TO PROVIDE STABILITY.
- PROVIDE #13 (#4) DEFORMED REINFORCEMENT BARS OR 13 (1/2") SMOOTH RODS AS ANCHOR STAKES. STAKES SHALL BE OF SUFFICIENT LENGTH SUCH THAT A MINIMUM OF 200 (8") WILL BE EMBEDDED IN THE BASE COURSE (OGS, ASPHALT TREATED PERMEABLE BASE COURSE, CEMENT TREATED PERMEABLE BASE COURSE OR 2A). WHEN LEAN CONCRETE BASE COURSE OR UNBONDED CONCRETE OVERLAY IS DESIGNED PROVIDE SUFFICIENT ANCHORAGE TO PREVENT MOVEMENT OF THE BASKET ASSEMBLY. THIS MAY INCLUDE ANCHOR PINS, HILTI NAILS, TIE STRAPS TIED TO THE TOP SIDE OF THE BASKET, OR OTHER ACCEPTABLE MEANS TO HOLD THE ASSEMBLY STATIONARY DURING THE PAVING OPERATION AS DIRECTED BY THE ENGINEER.
- AFTER EACH LOAD TRANSFER ASSEMBLY IS SECURED IN PLACE, REMOVE AND PROPERLY DISPOSE OF ALL TIE WIRES OR SHIPPING WIRES.
- PROVIDE SIDE SUPPORT ASSEMBLY WIRES CONFORMING TO THE CURRENT ASTM DESIGNATION A-510 SPECIFICATIONS FOR WIRE RODS AND COURSE ROUND WIRE, CARBON STEEL AND OF A MINIMUM ALLOWABLE SIZE AS FOLLOWS:

PAVEMENT THICKNESS	UPPER AND LOWER SIDE FRAME WIRES	"J" SIDE SUPPORT WIRES	"A" SIDE SUPPORT WIRES
250 (10") OR LESS	8.41 (0.331"Ø MIN) 2/0 GAUGE	10.16 (0.400"Ø MIN) 2/0 GAUGE	8.41 (0.331"Ø MIN) 2/0 GAUGE
GREATER THAN 250 (10")	9.19 (0.362"Ø MIN) 3/0 GAUGE	11.35 (0.437"Ø MIN) 3/0 GAUGE	9.19 (0.362"Ø MIN) 3/0 GAUGE



SECTION B-B  
CONTRACTION JOINT ASSEMBLY

TYPICAL LOAD TRANSFER ASSEMBLY

LANE WIDTH	OVERALL UNIT LENGTH	NO. OF DOWELS
2.7 m (9'-0")	2.55 m (8'-6")	9
3.0 m (10'-0")	2.85 m (9'-6")	10
3.3 m (11'-0")	3.15 m (10'-6")	11
3.6 m (12'-0")	3.45 m (11'-6")	12

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

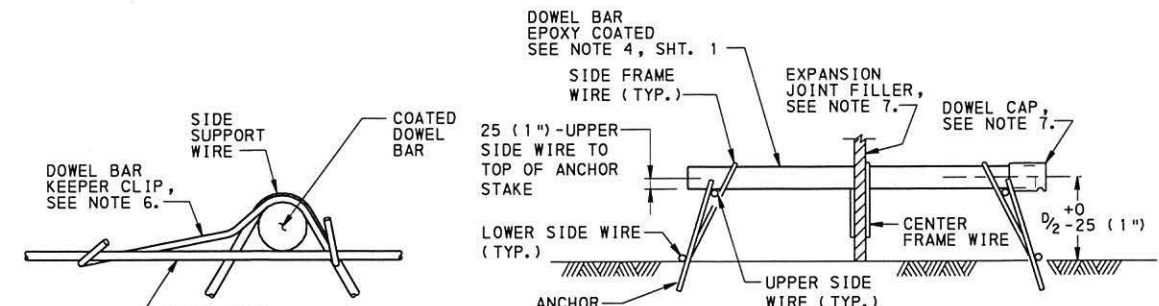
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

CONCRETE PAVEMENT JOINTS  
NON-SKEWED  
LOAD TRANSFER ASSEMBLIES

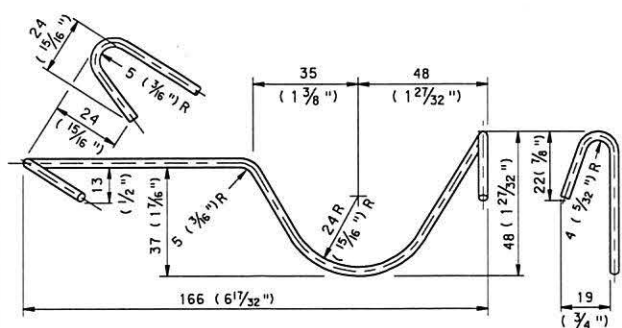
RECOMMENDED MAR. 30, 2006  
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006  
CHIEF ENGINEER

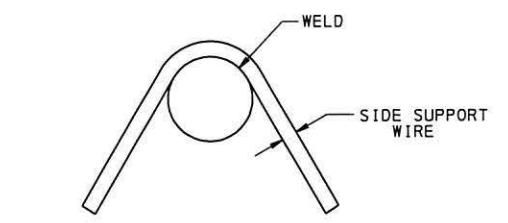
SHT 3 OF 3  
RC-20M



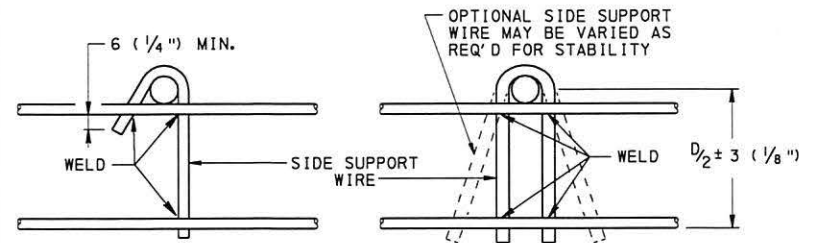
SECTION A-A  
EXPANSION JOINT ASSEMBLY



DOWEL BAR KEEPER CLIP

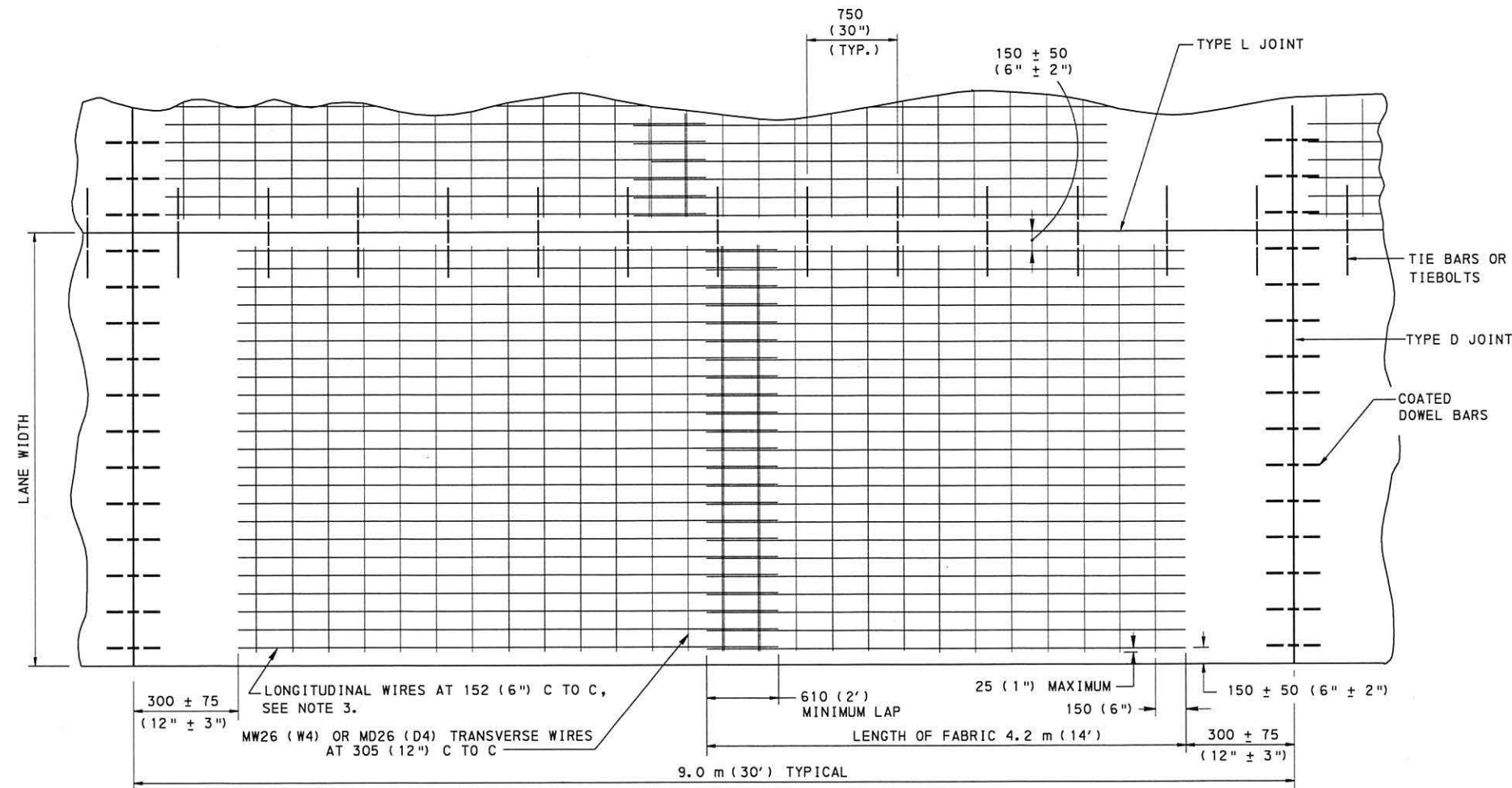


CENTER FRAME WIRE DETAIL

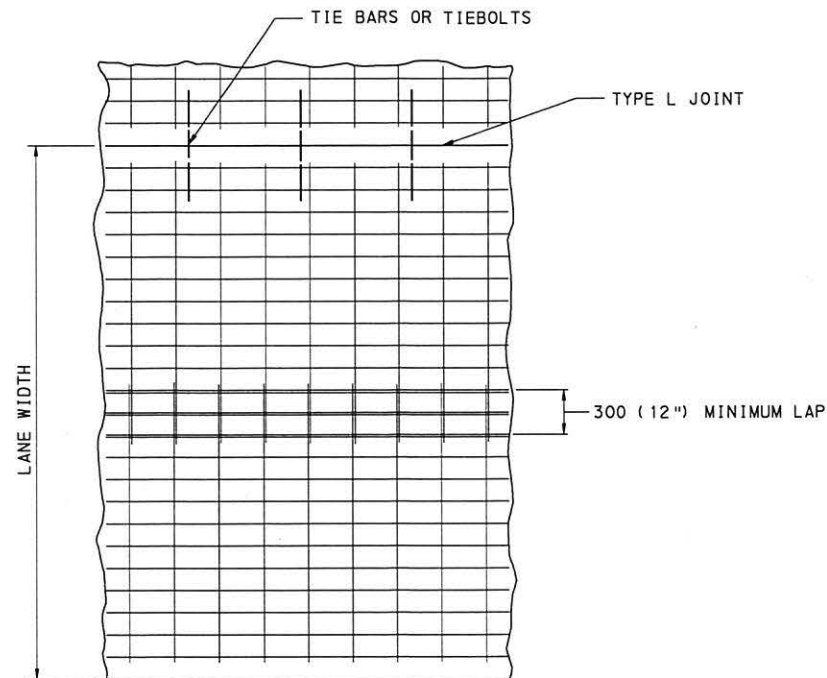


"J" DESIGN  
"A" DESIGN  
TYPICAL SIDE FRAME DETAILS

PAVEMENT THICKNESS	UPPER & LOWER WIRE TO "A" & "J" SIDE SUPPORT	DOWEL TO SUPPORT ASSEMBLY
250 (10") OR LESS	360 kg (794 lbs)	540 kg (1190 lbs)
GREATER THAN 250 (10")	540 kg (1190 lbs)	900 kg (1984 lbs)



**WIRE FABRIC REINFORCEMENT**



**ALTERNATE LAPPED FABRIC**

**NOTES**

- FOR VARIABLE WIDTH PAVEMENT CUT THE REINFORCEMENT AS REQUIRED.
- WIRE FABRIC REINFORCEMENT MAY BE PLACED WITH TRANSVERSE WIRES ABOVE OR BELOW LONGITUDINAL WIRES.
- PROVIDE LONGITUDINAL WIRES FOR WIRE FABRIC REINFORCEMENT OF THE FOLLOWING MINIMUM SIZES:
 

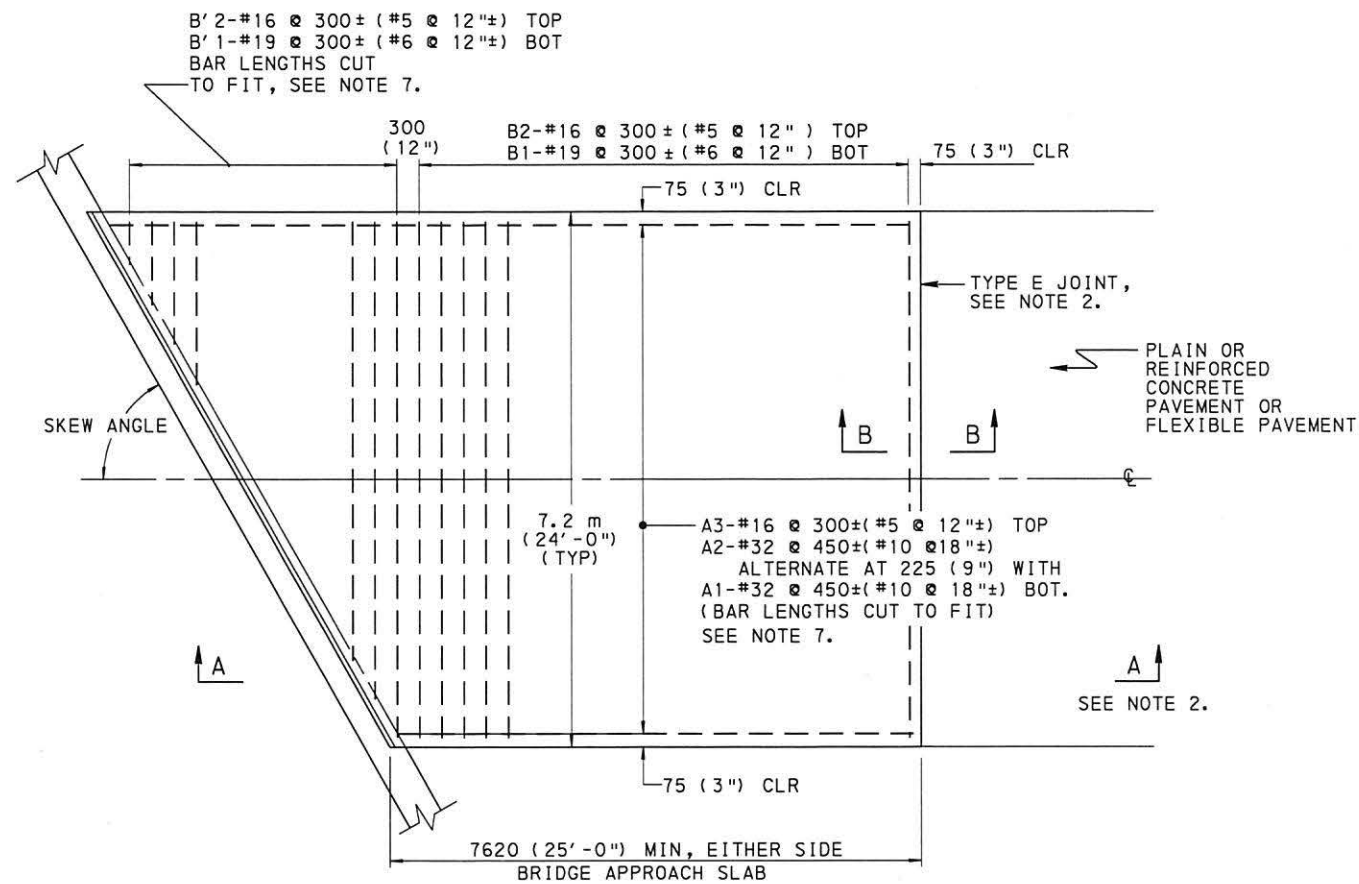
PAV'T DEPTH	MIN LONG WIRE SIZE
200 (8")	MW35 OR MD35 (W5.5 OR D5)
230 (9")	MW40 OR MD35 (W6 OR D5.5)
250 (10")	MW45 OR MD45 (W7 OR D6.5)
280 (11")	MW50 OR MD45 (W7.5 OR D7)
300 (12")	MW55 OR MD50 (W8 OR D7.5)
330 (13")	MW60 OR MD50 (W9 OR D8)
- HINGED FABRIC REINFORCEMENT MAY BE USED. HAVE HINGE DETAIL APPROVED BY THE ENGINEER.
- SECURELY TIE ALL LONGITUDINAL AND TRANSVERSE LAPS OF WIRE FABRIC REINFORCEMENT.
- ON PROJECTS WHERE ADDITIONAL LANES ARE ADDED TO EXISTING CEMENT CONCRETE PAVEMENTS AND THE EXISTING JOINT SPACING IS MORE THAN 14.2 m (46.5'), USE A MINIMUM LONGITUDINAL WIRE SIZE OF MW60 OR MD60 (W9.5 OR D9).
- WIRE FABRIC REINFORCEMENT MAY BE CONSTRUCTED OF SMOOTH WIRE (SIZES DESIGNATED BY W) OR DEFORMED WIRE (SIZES DESIGNATED BY D) OR A COMBINATION OF BOTH.
- SEE RC-20M FOR JOINT DETAILS.
- PROVIDE A MINIMUM DEPTH FOR PLACEMENT OF WIRE FABRIC REINFORCEMENT, MEASURED FROM TOP OF PAVEMENT TO TOP OF FABRIC OF 60 (2 1/2") TO A MAXIMUM OF ONE HALF THE PAVEMENT DEPTH MINUS 15 (d/2 - 1/2").
- WHEN THE RAMP OR LANE WIDTH EXCEEDS 4.2 m (14'), A TYPE L JOINT IS REQUIRED AT THE MID-POINT.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

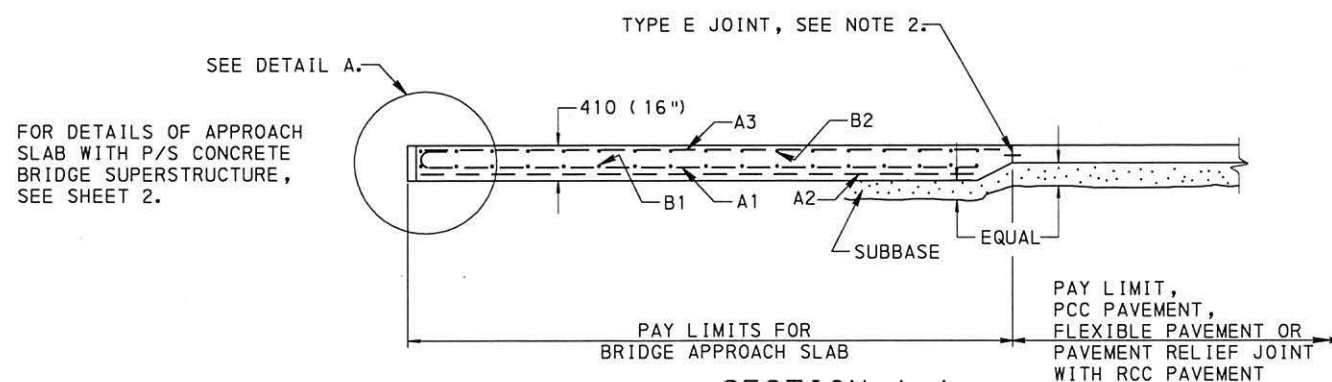
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

REINFORCED  
CONCRETE PAVEMENT

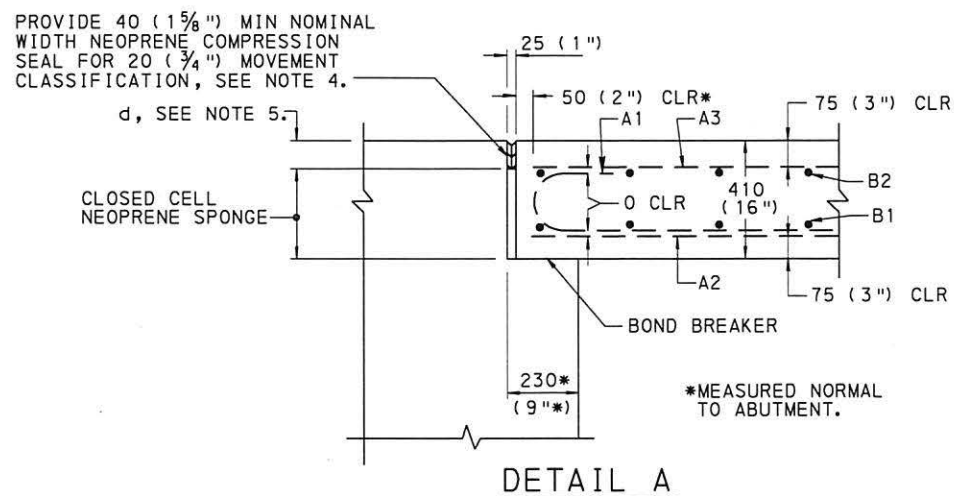




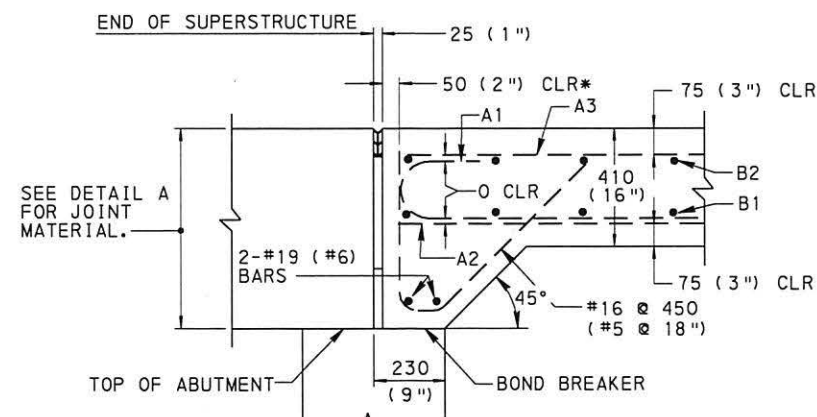
PLAN



SECTION A-A

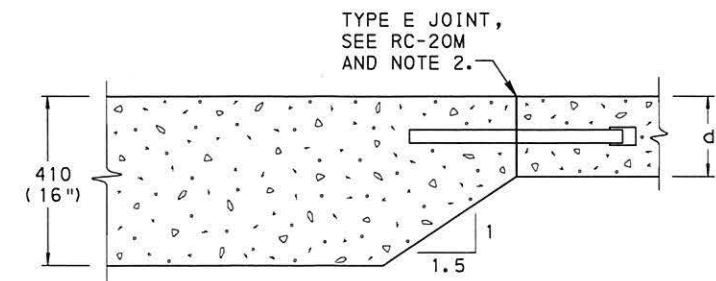


DETAIL A



DETAIL A (ALTERNATE)

TO APPLY ONLY WHEN INDICATED ON STRUCTURE DRAWINGS



SECTION B-B

NOTES

- CONSTRUCT IN ACCORDANCE WITH THIS STANDARD DRAWING OR AS INDICATED ON THE STRUCTURE DRAWINGS.
- THE TYPE E JOINT DOES NOT APPLY WHEN APPROACH SLAB IS CONSTRUCTED IN CONJUNCTION WITH A PAVEMENT RELIEF JOINT OR WITH A FLEXIBLE PAVEMENT. SEE RC-24M.
- WHEN CONSTRUCTION INVOLVES MORE THAN 2 LANES, CONNECT ADDITIONAL LANES REQUIRED TO STANDARD 2 LANE BRIDGE APPROACH SLAB USING TYPE L CONSTRUCTION JOINTS, AS SHOWN ON RC-20M, SHEET 2.
- INSTALL NEOPRENE COMPRESSION SEALS TO A UNIFORM DEPTH WITH TOP OF THE SEAL FROM 6 (1/4") TO 10 (3/8") BELOW THE LEVEL OF THE PAVEMENT SURFACE. MAKE THE TOP EDGES OF THE CONTACT SURFACES ON BOTH SIDES OF THE SEAL AT THE SAME ELEVATION.
- DETERMINE "d" BY ADDING 20 (3/4") TO THE MAXIMUM COMPRESSED HEIGHT OF THE NEOPRENE COMPRESSION SEAL. (SEE MANUFACTURER'S INFORMATION.)
- CONSTRUCT THE BRIDGE APPROACH SLAB AFTER THE BRIDGE DECK IS CONSTRUCTED.
- PROVIDE REINFORCEMENT BARS, EPOXY COATED IN ACCORDANCE WITH PUBLICATION 408, SECTION 709.1 (c).
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

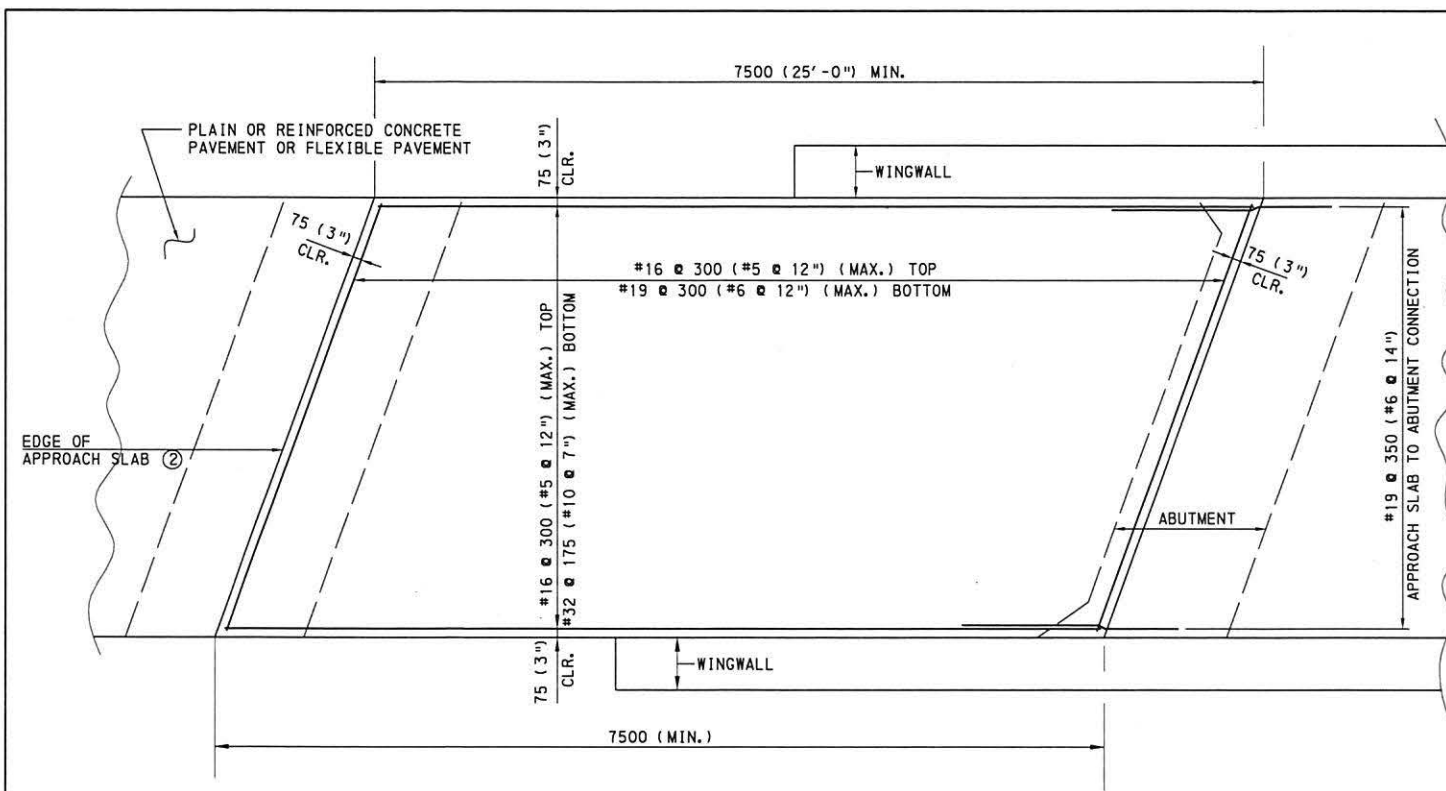
BRIDGE APPROACH SLAB

RECOMMENDED MAR. 30, 2006  
*Scott Christie*  
DIRECTOR, BUREAU OF DESIGN

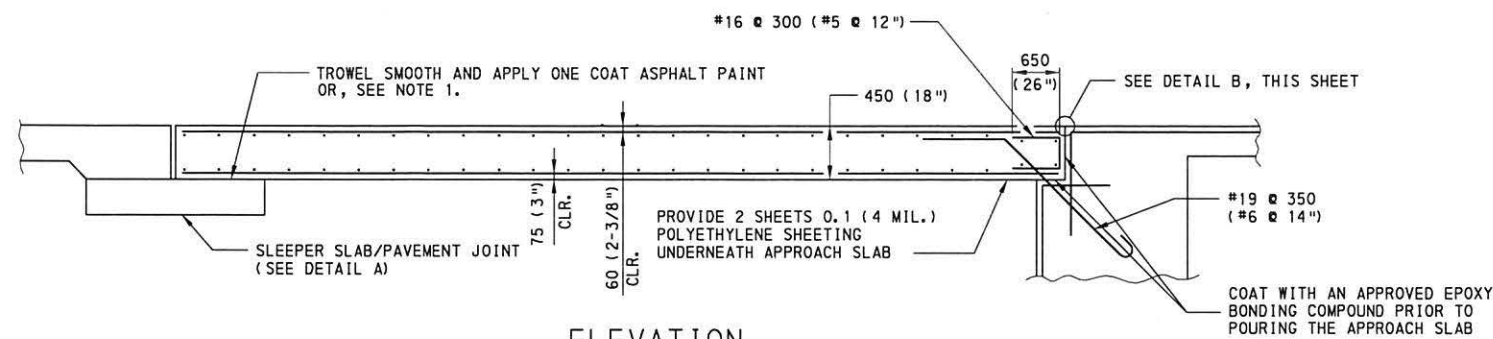
RECOMMENDED MAR. 30, 2006  
*M. Chitel*  
CHIEF ENGINEER

SHT 1 OF 3  
RC-23M



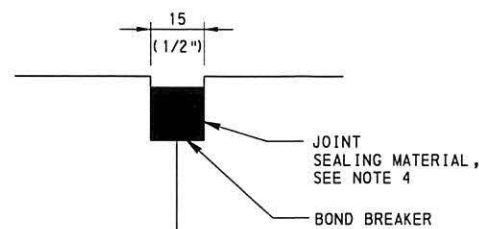


PLAN



ELEVATION

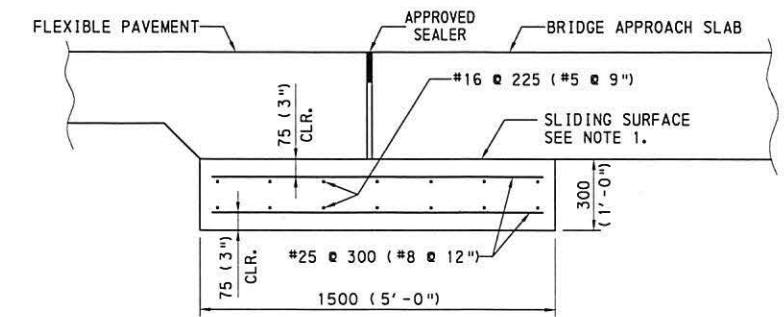
APPROACH SLAB - INTEGRAL ABUTMENTS



DETAIL B

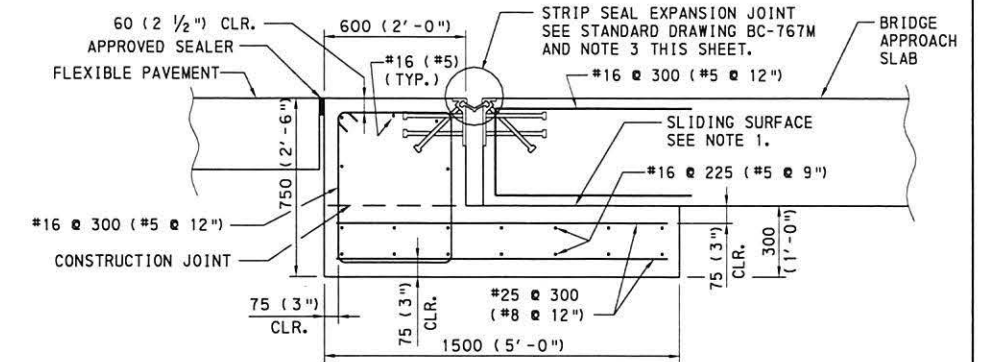
NOTES:

- TROWEL SMOOTH AND PLACE 2 LAYERS OF 0.1 mm (4 MIL.) POLYETHYLENE SHEETING AS BOND BREAKER.
- ORIENT THE EDGE OF THE APPROACH SLAB PARALLEL TO THE INTEGRAL ABUTMENT FOR BRIDGE SKEWS LESS THAN 80.5 DEGREES I.e. 1:6 (6:1) SLOPE TO THE PERPENDICULAR TO THE DIRECTION OF TRAFFIC.  
FOR LARGER BRIDGE SKEWS, ORIENT THE EDGE OF THE APPROACH SLAB AT A SLOPE OF 1:6 (6:1) TO THE PERPENDICULAR TO THE DIRECTION OF TRAFFIC.
- DETERMINE THE REQUIRED EXPANSION DAM OPENING AT THE TIME OF CONSTRUCTION AND THE MOVEMENT REQUIREMENTS OF THE EXPANSION JOINT AT THE END OF THE APPROACH SLAB IN ACCORDANCE WITH DESIGN MANUAL PART 4 APPENDIX G, SECTION 1.6.
- MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (1/8") TO 6 (1/4") BELOW THE SURFACE OF THE PAVEMENT.



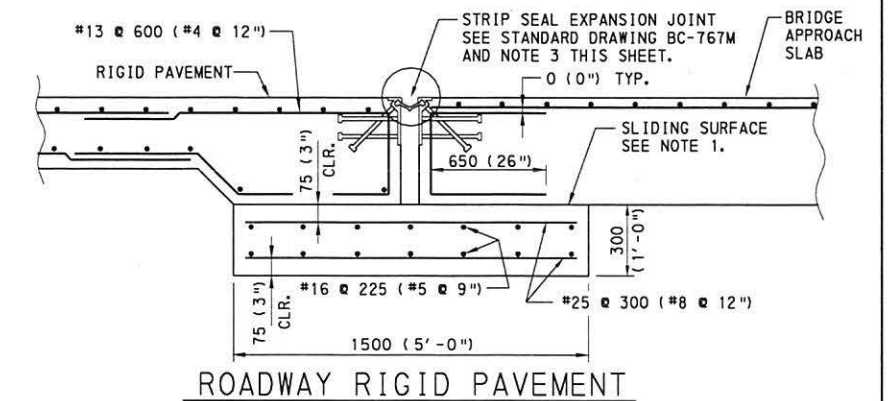
ROADWAY FLEXIBLE PAVEMENT

(BRIDGE TOTAL LENGTH LESS THAN 45 000 (150'))



ROADWAY FLEXIBLE PAVEMENT

(BRIDGE TOTAL LENGTH EXCEEDS 45 000 (150'))



ROADWAY RIGID PAVEMENT

DETAIL A

(SLEEPER SLAB)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

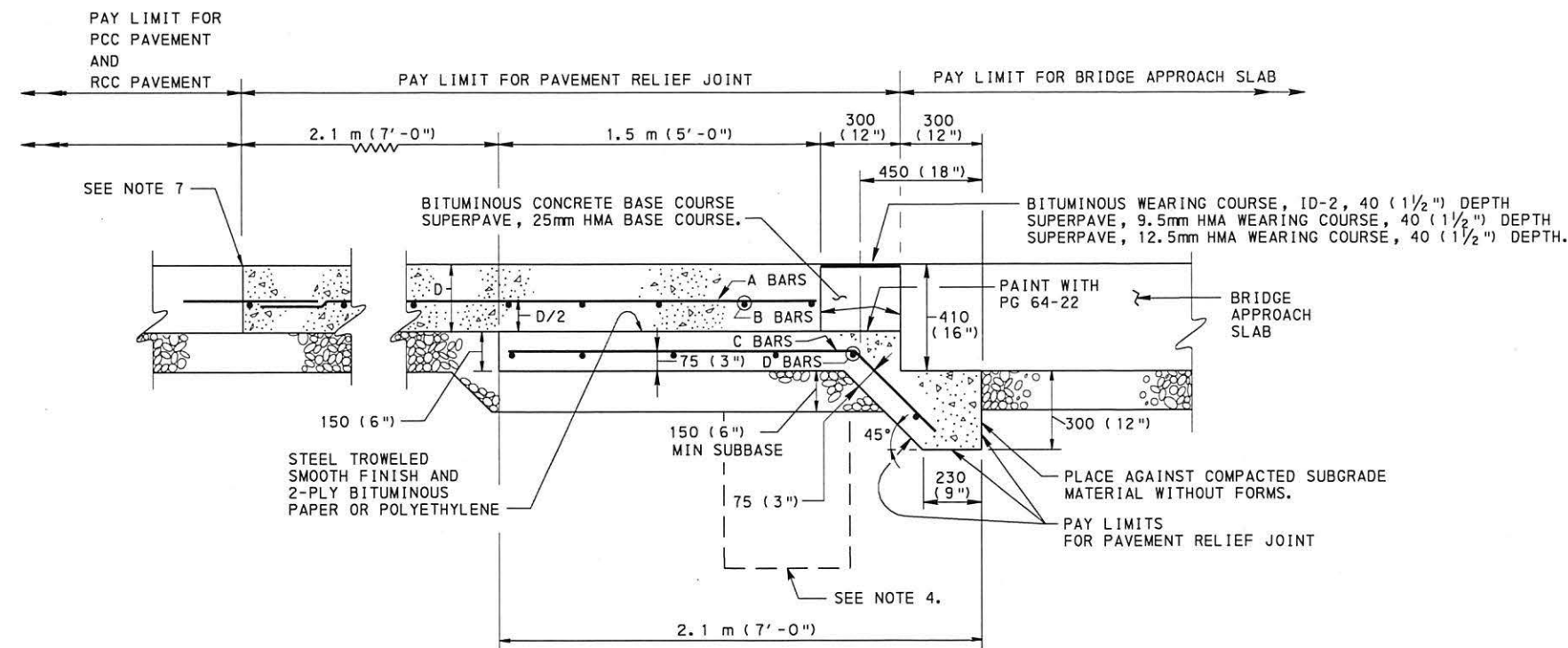
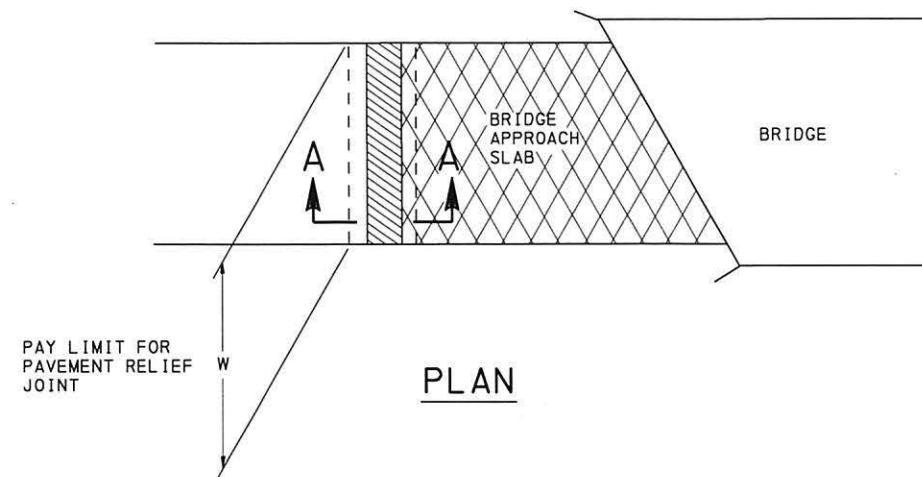
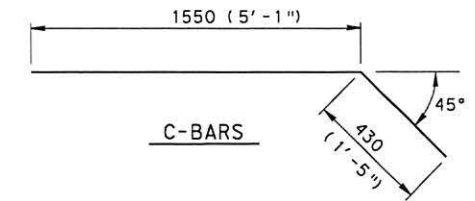
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

BRIDGE APPROACH SLAB

BC-767M	NEOPRENE STRIP SEAL FOR PRESTRESSED CONCRETE AND STEEL I-BEAM BRIDGES	RECOMMENDED MAR. 30, 2006	RECOMMENDED MAR. 30, 2006	SHEET 3 OF 3
	REFERENCE DRAWINGS	<i>Scott Christa</i> DIRECTOR, BUREAU OF DESIGN	<i>M. L. Patel</i> CHIEF ENGINEER	RC-23M

SCHEDULE OF REINFORCEMENT STEEL

MARK	SIZE	SPACING C - C	LENGTH	NUMBER REQUIRED
A	#13 (#4)	300 (12")	3.2 m (10'-6")	W/O. 3
B	#13 (#4)	300 (12")	W-100 (4")	5
C	#13 (#4)	150 (6")	2.0 m (6'-6")	W/O. 3x2
D	#13 (#4)	300 (12")	W-100 (4")	7



NOTES

- PAVEMENT RELIEF JOINTS ARE APPLICABLE FOR ALL CEMENT CONCRETE PAVEMENTS.
- USE CLASS AA CONCRETE IN SUBSLAB. (AT CONTRACTOR'S OPTION, SUBSLAB CONCRETE MAY BE HES.)
- INCLUDE PORTIONS OF REINFORCING BARS WHICH ARE LOCATED OUTSIDE THE INDICATED PAY LINES IN BID PRICE FOR PAVEMENT RELIEF JOINT.
- WHEN THE PAVEMENT GRADE CAUSES DRAINAGE TOWARDS THE BRIDGE, PLACE A SUBGRADE DRAIN (SEE RC-30M.) UNDER THE 150 (6") PORTION OF THE SUBSLAB. MEASURE AND PAY FOR AS SPECIFIED IN PUBLICATION 408, SECTION 612.
- WHERE BRIDGES ARE LOCATED LESS THAN 300 m (900') APART, AS MEASURED FROM THE FACE OF THE NEAREST ABUTMENTS, DO NOT USE A RELIEF JOINT BETWEEN THE BRIDGES.
- WHERE BRIDGES ARE LOCATED BETWEEN 300 m (900') AND 450 m (1350') APART, AND THE PAVEMENT STRUCTURE IS CEMENT CONCRETE, PLACE ONE RELIEF JOINT MIDWAY BETWEEN THE BRIDGES. IN THESE CASES, PROVIDE THE SUBSLAB AS A UNIFORM 150 (6") THICK AND 2.1 m (7') WIDE.
- FOR JOINT DETAILS ON NEW CONSTRUCTION, SEE RC-20M. FOR JOINT DETAILS ON RECONSTRUCTION, SEE RC-26M. IF THE DISTANCE TO THE NEAREST JOINT IS LESS THAN 3.0 m (10'), REMOVE THE EXISTING PAVEMENT TO THE JOINT.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.

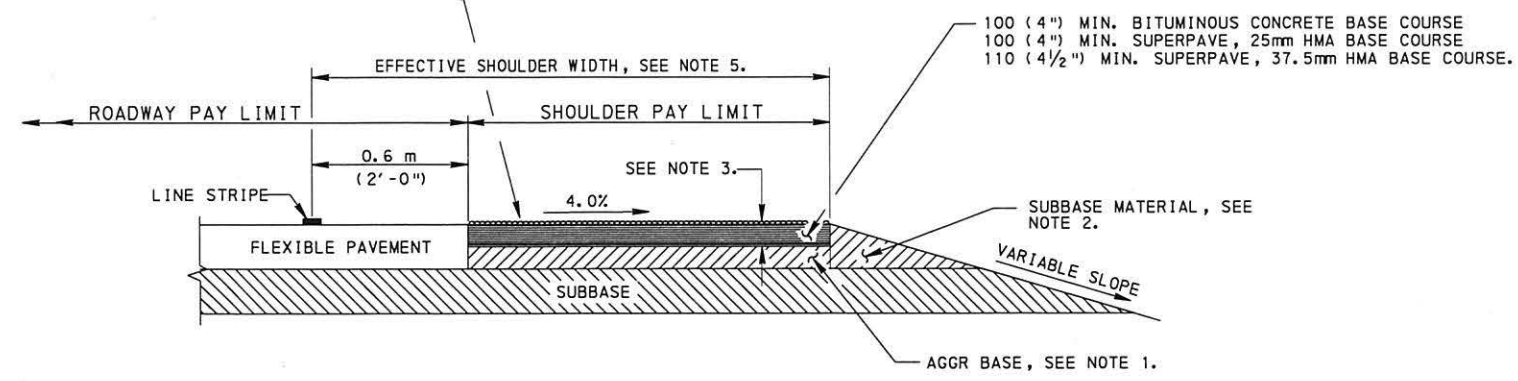
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

PAVEMENT RELIEF JOINT

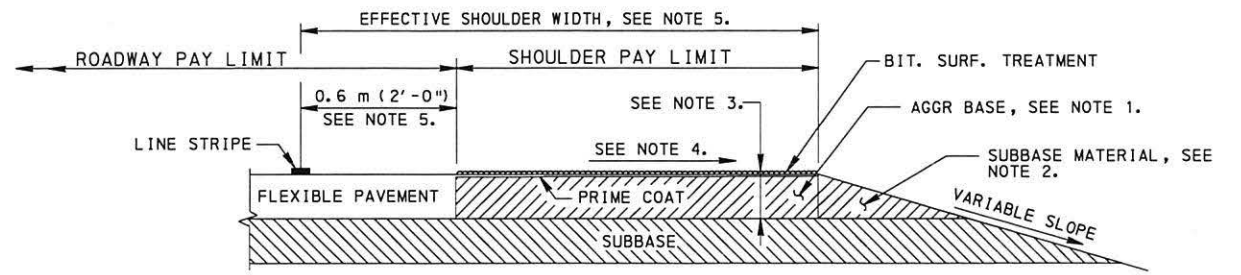


BIT. SURF. TREATMENT-INCIDENTAL TO TYPE 1 SHOULDERS, 20 (3/4") DEPTH  
 BIT. SURF. CRSE, FJ-1-INCIDENTAL TO TYPE 1-F SHOULDERS, 25 (1") DEPTH  
 BIT. WEAR. CRSE, ID-2-INCIDENTAL TO TYPE 1-I SHOULDERS, 40 (1 1/2") DEPTH  
 DOUBLE SLURRY SEAL-INCIDENTAL TO TYPE 1-S SHOULDERS, 20 (3/4") DEPTH  
 SUPERPAVE, 9.5mm HMA WEARING COURSE, INCIDENTAL TO TYPE 1-SP SHOULDERS,  
 40 (1 1/2") DEPTH  
 SUPERPAVE, 12.5mm HMA WEARING COURSE, INCIDENTAL TO TYPE 1-SP SHOULDERS,  
 40 (1 1/2") DEPTH

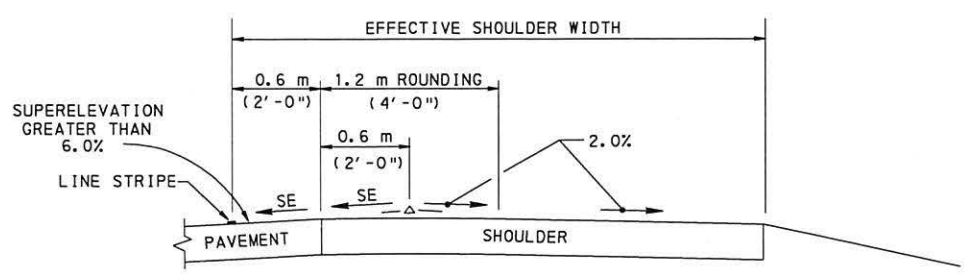


TYPE 1 SHOULDER  
 TYPE 1-F SHOULDER  
 TYPE 1-I SHOULDER  
 TYPE 1-S SHOULDER  
 TYPE 1-SP SHOULDER

- NOTES**
1. CONSTRUCT AGGREGATE BASE AS SPECIFIED IN PUBLICATION 408, SECTION 350.3 AND CONSIDER AS PART OF THE SHOULDER.
  2. CONSIDER THE PAYMENT FOR THIS AREA OF SUBBASE MATERIAL INCIDENTAL TO THE SHOULDER.
  3. MAKE DEPTH OF SHOULDER THE COMBINED DEPTH OF SURFACE AND BASE COURSE.
  4. SLOPE SHOULDER AT 6.0% FOR EFFECTIVE SHOULDER WIDTHS  $\leq$  2.4 m (8'). SLOPE SHOULDER AT 4.0% FOR EFFECTIVE SHOULDER WIDTHS  $>$  2.4 m (8').
  5. FOR EFFECTIVE SHOULDER WIDTHS 1.8 m (6') AND LESS, PAVE OUT-TO-OUT OF SHOULDERS WITH FULL DEPTH ROADWAY PAVEMENT.
  6. FOR SHOULDERS THAT SPECIFY RUMBLE STRIPS INSTALLATIONS, USE ONLY BITUMINOUS WEARING COURSE, ID-2 OR ID-3, OR SUPERPAVE, 9.5mm OR 12.5mm, HMA WEARING COURSE, 40 (1 1/2") DEPTH MINIMUM.
  7. WHEN INSTALLING RUMBLE STRIPS ON A TYPE 1-I OR TYPE 1-SP SHOULDER, CONSTRUCT THE PAVEMENT / SHOULDER JOINT AT THE BEGINNING OF THE EFFECTIVE SHOULDER, OR PAVE FULL DEPTH INTO THE EFFECTIVE SHOULDER FAR ENOUGH SO THAT THE RUMBLE STRIPS ARE NOT CONSTRUCTED OVER THE LONGITUDINAL JOINT.
  8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.
  9. SEE SHEETS 4 AND 5 FOR RUMBLE STRIPS DETAILS.
  10. SHOULDER PAY QUANTITIES ARE INCLUDED IN MAINLINE ITEMS FOR SECTION 409 OF PUB.408 PAVING ITEMS.

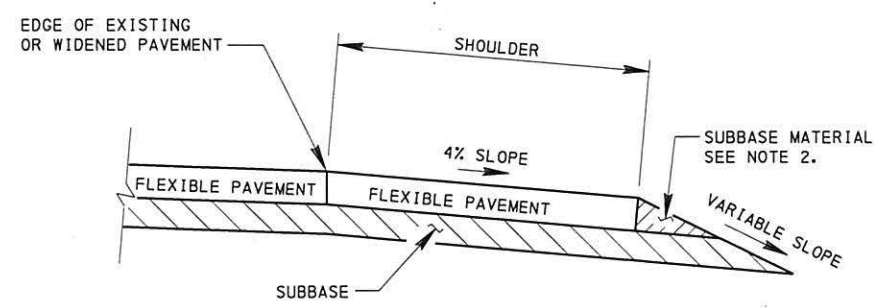


TYPE 3 SHOULDER



FOR SUPERELEVATION UNDER 6.0%, ELIMINATE THE 1.2 m (4'-0") ROUNING AND USE THE 2.0% SHOULDER SLOPE BEGINNING FROM THE EDGE OF PAVEMENT.

SHOULDER ROUNING ON HIGH SIDE  
 OF SUPERELEVATED CURVES



FULL DEPTH FLEXIBLE  
 PAVEMENT SHOULDERS

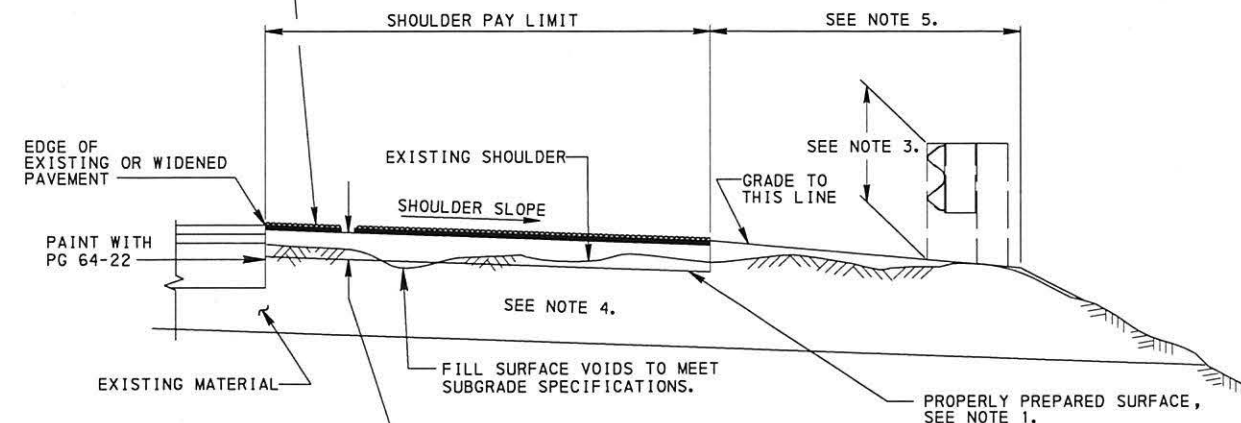
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF TRANSPORTATION  
 BUREAU OF DESIGN

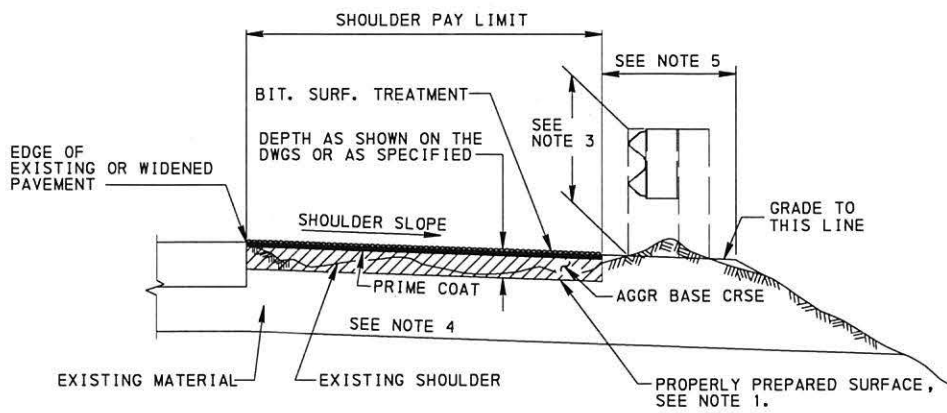
SHOULDERS

RECOMMENDED MAR. 30, 2006 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Patel</i> CHIEF ENGINEER	SHT. 1 OF 7 RC-25M
--	--	-----------------------

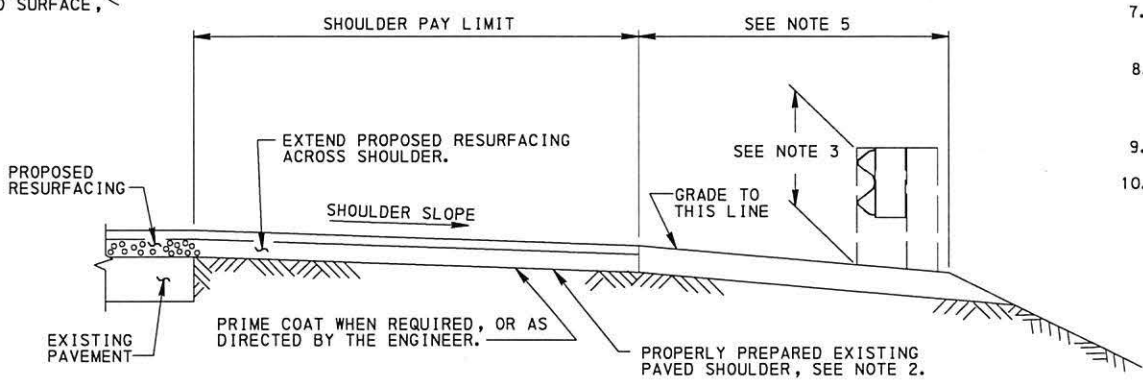
BIT. SURF. TREATMENT-INCIDENTAL TO TYPE 6 SHOULDERS, 20 (3/4") DEPTH  
 BIT. SURF. CRSE, FJ-1-INCIDENTAL TO TYPE 6-F SHOULDERS, 25 (1") DEPTH  
 BIT. WEAR. CRSE, ID-2-INCIDENTAL TO TYPE 6-I SHOULDERS, 40 (1 1/2") DEPTH  
 DOUBLE SLURRY SEAL-INCIDENTAL TO TYPE 6-S SHOULDERS, 20 (3/4") DEPTH  
 SUPERPAVE, 9.5mm HMA WEARING COURSE, INCIDENTAL TO TYPE 6-SP SHOULDERS, 40 (1 1/2") DEPTH  
 SUPERPAVE, 12.5mm HMA WEARING COURSE, INCIDENTAL TO TYPE 6-SP SHOULDERS, 40 (1 1/2") DEPTH



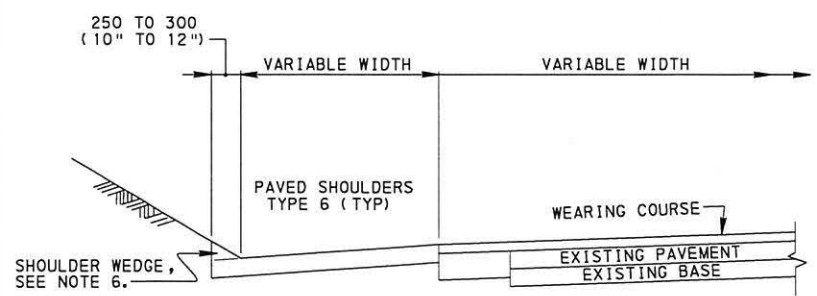
**TYPE 6 SHOULDER**  
 TYPE 6-F SHOULDER  
 TYPE 6-I SHOULDER  
 TYPE 6-S SHOULDER  
 TYPE 6-SP SHOULDER



**TYPE 4 SHOULDER**



**TYPE 7 SHOULDER**



**TYPICAL SHOULDER DETAIL**  
**WITH BITUMINOUS TAPER SHOULDER WEDGE**

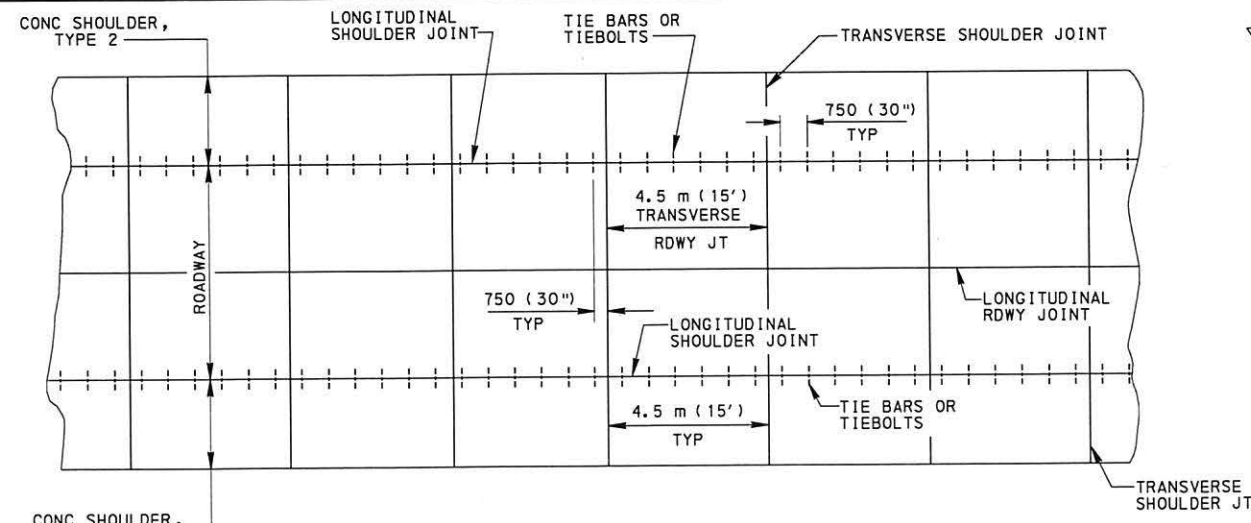
**NOTES**

- FOR TYPE 4 AND TYPE 6 SHOULDERS PROPERLY PREPARE SURFACE BY EITHER SHAPING AND/OR SCARIFYING AND/OR COMPACTING. SHAPING INCLUDES REMOVAL OF EXISTING SHOULDER MATERIAL AND THE PLACEMENT OF GRADED MATERIAL FROM THE SHAPING OPERATION INTO THE LOW AREAS. WHERE THERE IS INSUFFICIENT GRADED MATERIAL FROM THE SHAPING OPERATION, COMPLETE THE WORK BY EITHER ADDING ADDITIONAL AGGR BASE CRSE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350 OR MILLED BITUMINOUS MATERIAL. THE ADDITIONAL MATERIAL IS INCIDENTAL TO THE SHOULDER ITEM.
- FOR TYPE 7 SHOULDERS PROPERLY PREPARE EXISTING PAVED SHOULDER BY CLEANING AND PATCHING.
- THE GUIDE RAIL TYPE, HEIGHT AND LOCATION FROM SHOULDER MAY VARY, BUT WHEN THE HEIGHT FROM THE TOP OF RAIL TO PROPOSED SURFACE BECOMES LESS THAN 610 (24"), REMOVE, REPLACE AND/OR RESET THE GUIDE RAIL IN ACCORDANCE WITH CURRENT GUIDE RAIL STANDARDS. WHERE GUIDE RAIL HAS RUBBING RAIL ATTACHED, REMOVE THE RUBBING RAIL WHEN THE HEIGHT OF GUIDE RAIL BECOMES LESS THAN 700 (27").
- REMOVE UNSUITABLE MATERIAL AS DIRECTED, EXCAVATE, AND BACKFILL WITH MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350. MEASURE AND PAY FOR SHOULDER EXCAVATION AND BACKFILL IN ACCORDANCE WITH PUBLICATION 408, SECTIONS 654 AND 656. (CROSS SECTIONS ARE NOT REQUIRED.)
- CONSIDER GRADING INCIDENTAL TO THE SHOULDER PAY ITEM. WHERE THERE IS INSUFFICIENT GRADED MATERIAL FROM THE GRADING OPERATION TO COMPLETE THIS OPERATION, USE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350 AND PAY FOR AS TONNES OF SELECTED BORROW EXCAVATION. WHERE THERE IS AN EXCESS OF MATERIAL FROM THE SHOULDER EXCAVATION OR GRADING OPERATION, REMOVE THIS MATERIAL AS SOON AS POSSIBLE AND CONSIDER AS INCIDENTAL TO THE SHOULDER PAY ITEM.
- PROVIDE BITUMINOUS TAPER SHOULDER WEDGE IN ALL CUT AREAS AND CONSIDER AS INCIDENTAL TO THE SHOULDER PAY ITEM.
- "LUMP SUM" ITEMS INCLUDE ALL MATERIALS AND OPERATIONS OF WORK NECESSARY TO COMPLETE THAT ENTIRE ITEM WHETHER TABULATED OR NOT.
- FOR SHOULDERS THAT SPECIFY RUMBLE STRIP INSTALLATIONS, USE ONLY BITUMINOUS WEARING COURSE, ID-2 OR ID-3, OR SUPERPAVE, 9.5mm OR 12.5mm HMA WEARING COURSE, 40 (1 1/2") DEPTH MINIMUM.
- SEE SHEETS 4 AND 5 FOR RUMBLE STRIP DETAILS.
- REMOVE VEGETATION PRIOR TO FILLING LOW AREAS AND USE MATERIAL FREE OF ORGANIC MATERIALS.

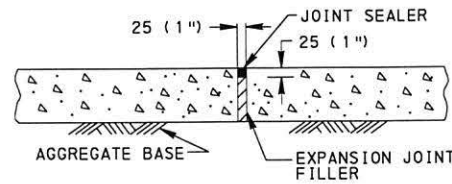
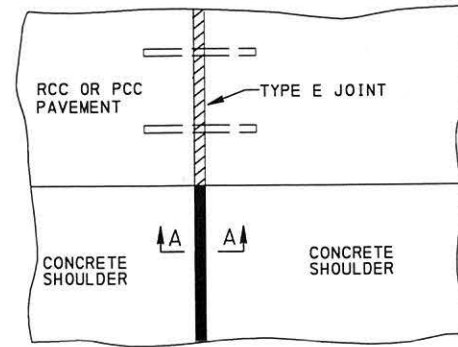
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF TRANSPORTATION  
 BUREAU OF DESIGN

SHOULDERS  
 (RECONSTRUCTED)

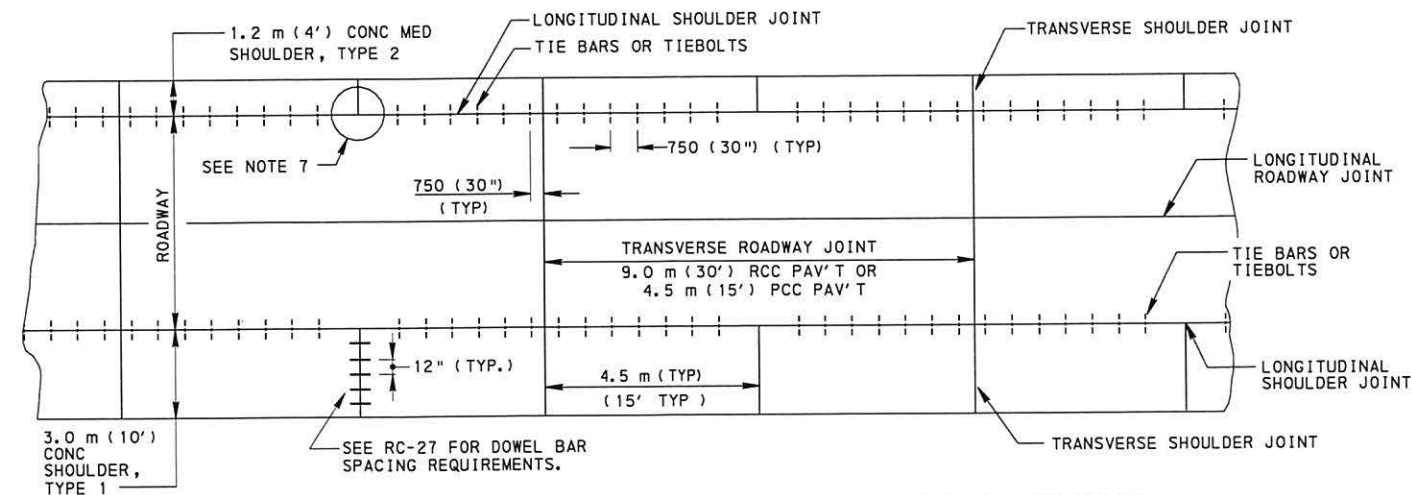


**CONCRETE SHOULDERS ADJACENT TO PLAIN CONCRETE PAVEMENT FOR COLLECTORS AND LOCAL ROADS**

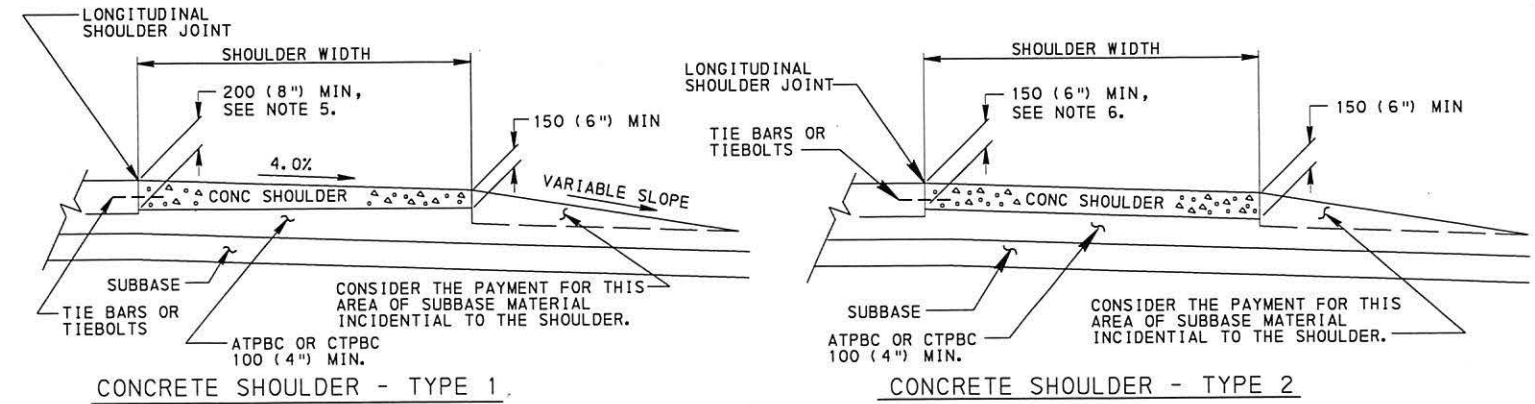


SECTION A-A

**CONCRETE SHOULDER EXPANSION JOINTS**

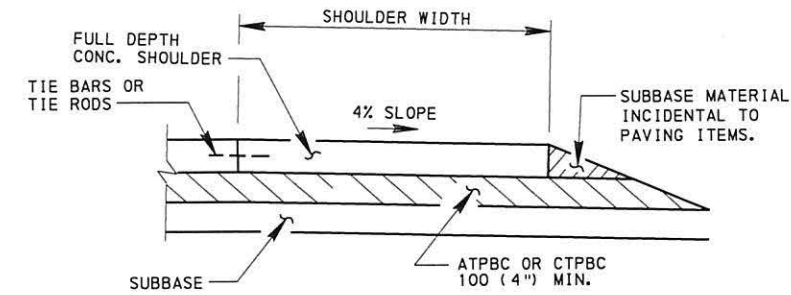


**CONCRETE SHOULDERS ADJACENT TO RCC PAVEMENT AND PCC PAVEMENT FOR INTERSTATE AND OTHER LIMITED ACCESS FREEWAYS, ARTERIALS AND RAMPS**



CONCRETE SHOULDER - TYPE 1

CONCRETE SHOULDER - TYPE 2



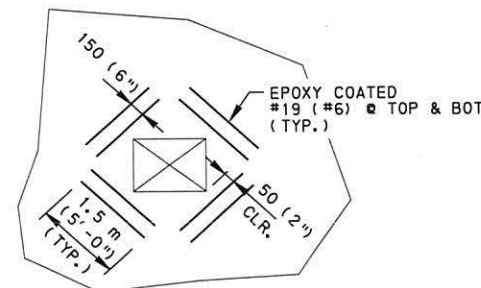
FULL DEPTH CONCRETE SHOULDER

**TYPICAL SECTIONS**

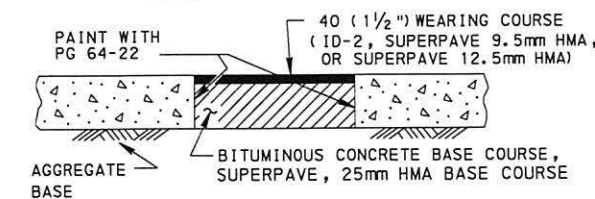
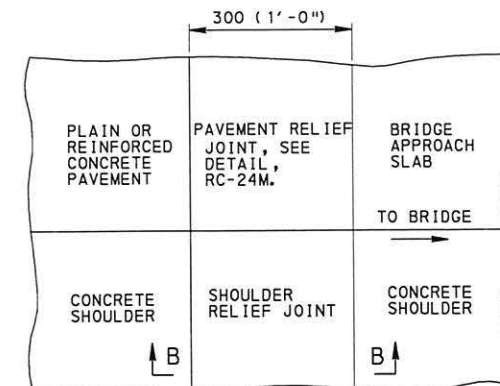
**NOTES:**

1. ATPBC/CTPBC MAY BE SUBSTITUTED WITH OGS MATERIAL AS PER SEC. 350.3 OF PUB. 408.
2. SEAL ALL SHOULDER JOINTS IN ACCORDANCE WITH PUBLICATION 408, SECTION 501.3 (n).
3. FOR JOINT DETAILS, SEE RC-20M.
4. ALIGN SHOULDER TRANSVERSE JOINTS TO ADJACENT PAVEMENT JOINTS.
5. SEE RC-25M, SHEET 1, FOR SHOULDER ROUNDING DETAIL ON HIGH SIDE OF SUPERELEVATION.
6. AT THE CONTRACTOR'S OPTION, TYPE 2 CONCRETE SHOULDERS MAY BE CONSTRUCTED ON A TAPER, WITH A 150 (6") MINIMUM DEPTH, OR AT THE SAME DEPTH AS THE PAVEMENT, AT NO ADDITIONAL EXPENSE TO THE DEPARTMENT.
7. TYPICALLY, DO NOT PLACE TIE BARS OR TIEBOLTS ON EITHER SIDE OF INTERMEDIATE SHOULDER JOINTS ADJACENT TO RCC PAVEMENTS.
8. WHEN THE SHOULDER IS STRUCTURALLY PART OF A BARRIER MOMENT RESISTANCE SLAB (I.E. BARRIER/SLAB ON AN MSE WALL) SEE BC-799 SHEET 3 FOR REQUIRED MINIMUM SPACING OF THE TRANSVERSE SHOULDER JOINTS.
9. SEE SHEETS 4 AND 5 FOR RUMBLE STRIP DETAILS.
10. FOR USE ON FULL DEPTH CONCRETE SHOULDERS. SHOULDER PAY QUANTITIES ARE INCLUDED IN MAINLINE ITEMS FOR SECTION 501 OR 506 OF PUB. 408 PAVING QUANTITIES.
11. CONSTRUCT ONLY RCC SHOULDER ADJACENT TO RCC PAVEMENT AND PCC SHOULDER ADJACENT TO PCC PAVEMENT.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



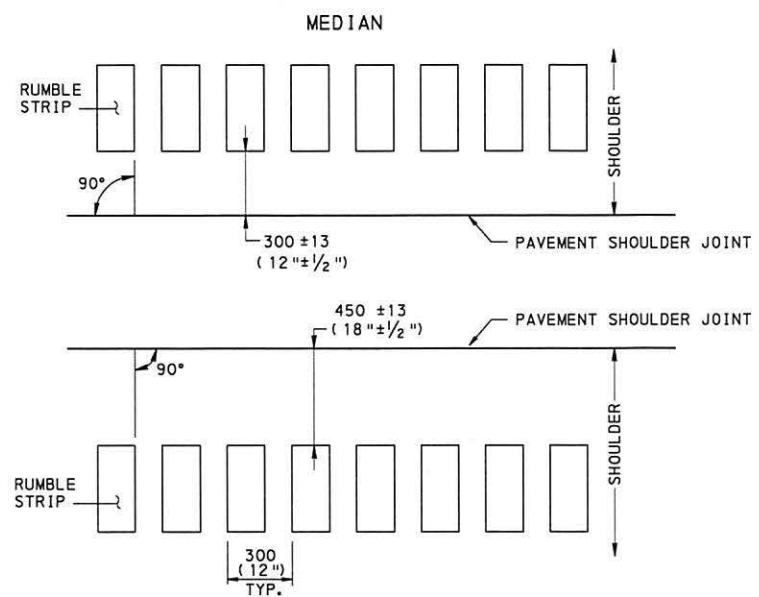
**REINFORCEMENT AT OPENINGS**



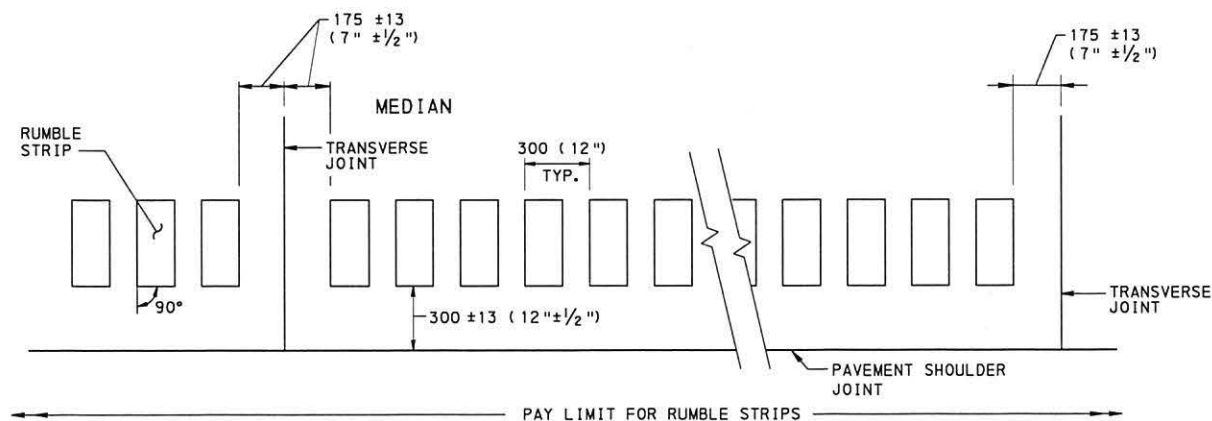
SECTION B-B  
**SHOULDER RELIEF JOINTS**

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

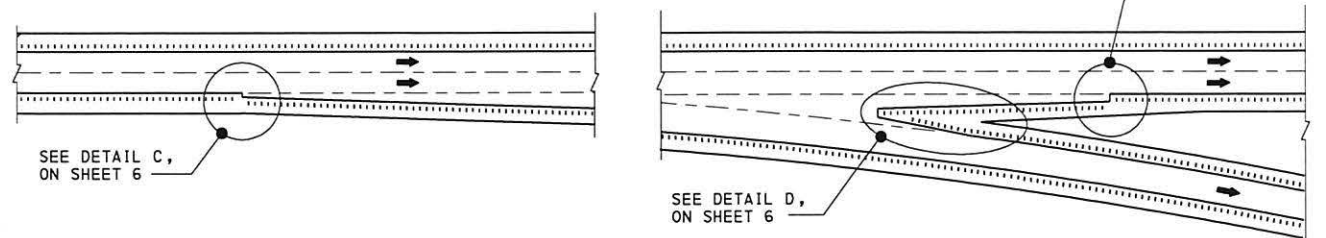
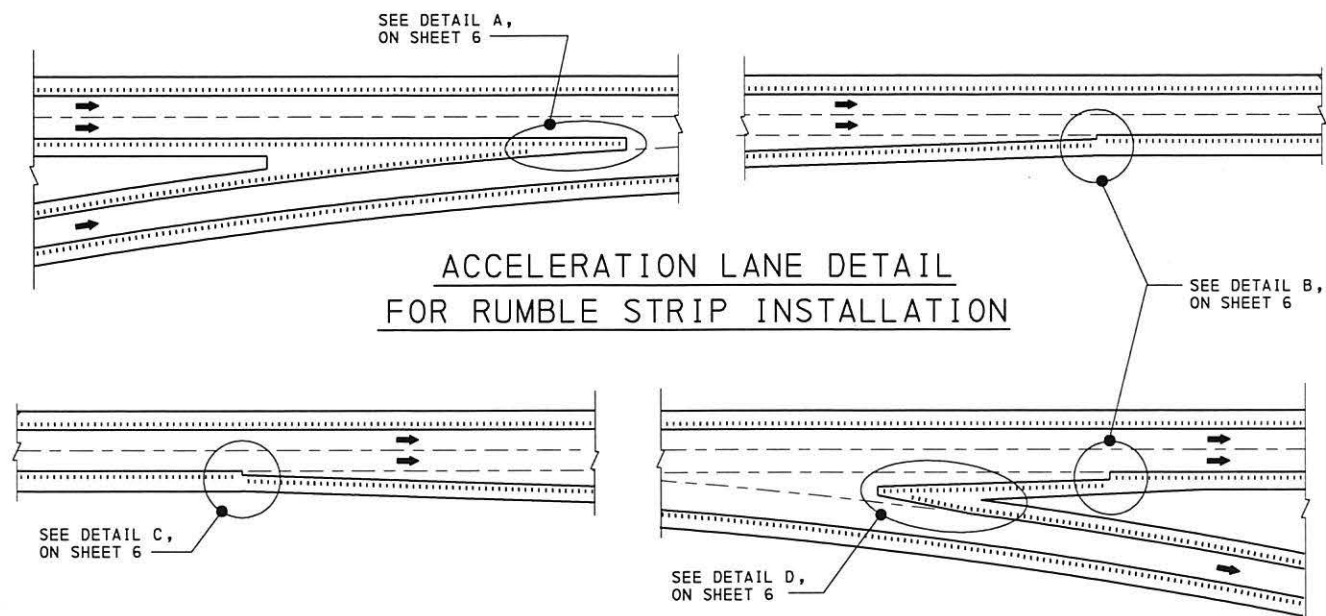
**SHOULDERS**  
**(CONCRETE)**



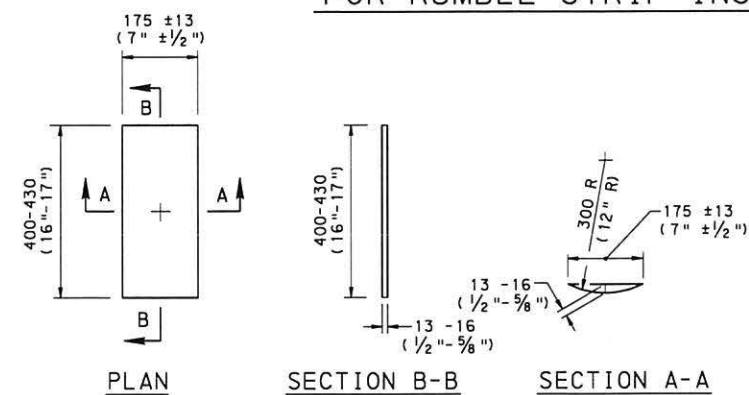
TYPICAL PLAN VIEW FOR  
RUMBLE STRIPS ON BITUMINOUS SHOULDERS



TYPICAL PLAN VIEW FOR  
RUMBLE STRIPS ON CONCRETE SHOULDERS

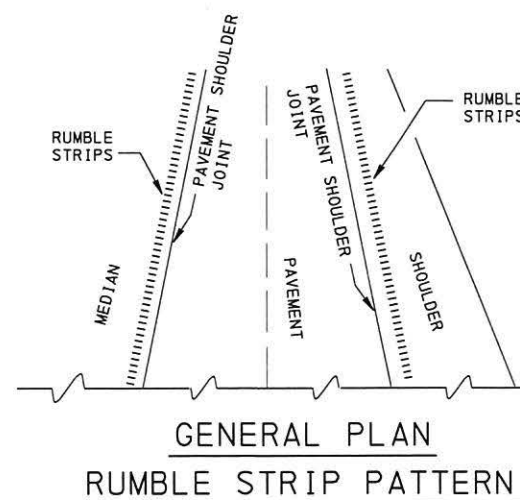


NOTE:  
SEE SHEET 5, FOR  
INTERSECTION DETAILS.



SECTION DETAILS OF  
RUMBLE STRIP PATTERN

- NOTES**
1. IF THERE IS NO ACTUAL PAVEMENT SHOULDER JOINT, MEASURE THE OFFSET FROM THE PAVEMENT SHOULDER TRAFFIC LINE.
  2. DO NOT CONSTRUCT SHOULDER RUMBLE STRIPS ACROSS A JOINT.
  3. CONSTRUCT RUMBLE STRIPS IN ACCORDANCE WITH PUBLICATION 408 SECTION 660.



NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

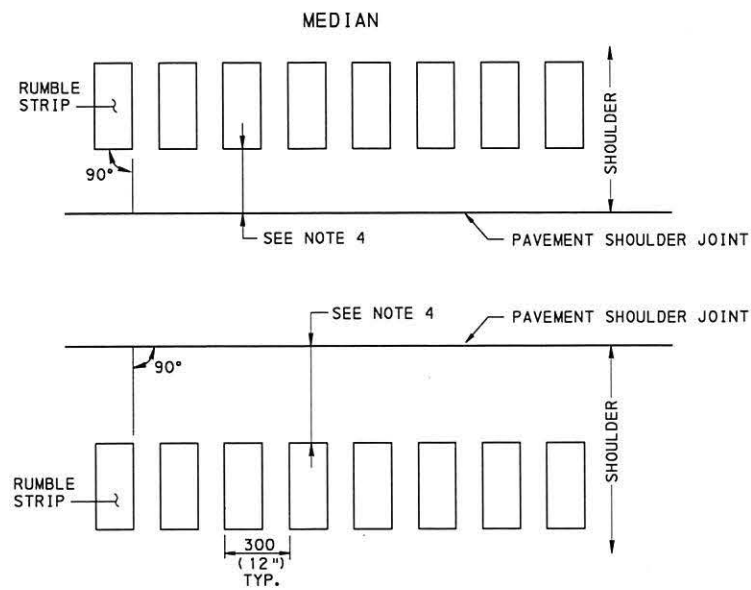
SHOULDERS  
RUMBLE STRIPS  
(LIMITED ACCESS HIGHWAYS)

RECOMMENDED MAR. 30, 2006  
*Scott Christie*  
DIRECTOR, BUREAU OF DESIGN

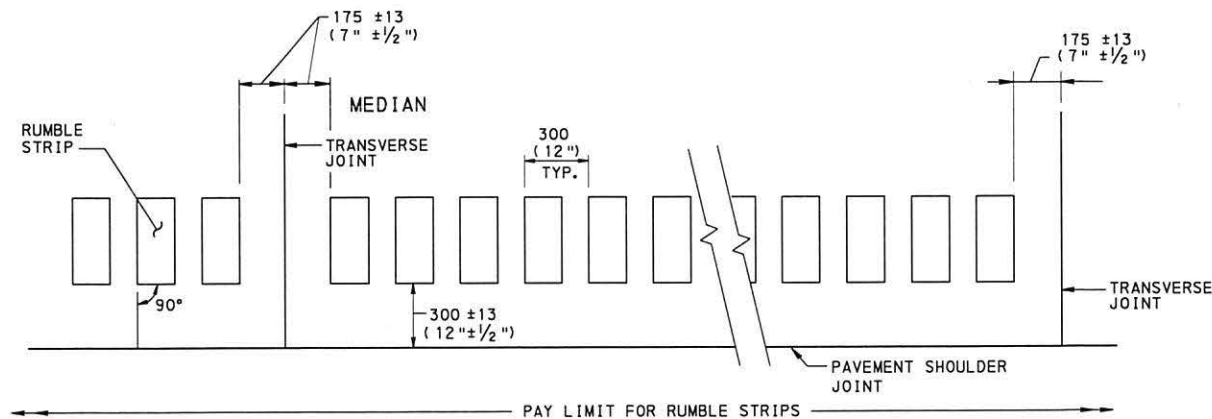
RECOMMENDED MAR. 30, 2006  
*M. Chateau*  
CHIEF ENGINEER

SHT. 4 OF 7  
RC-25M

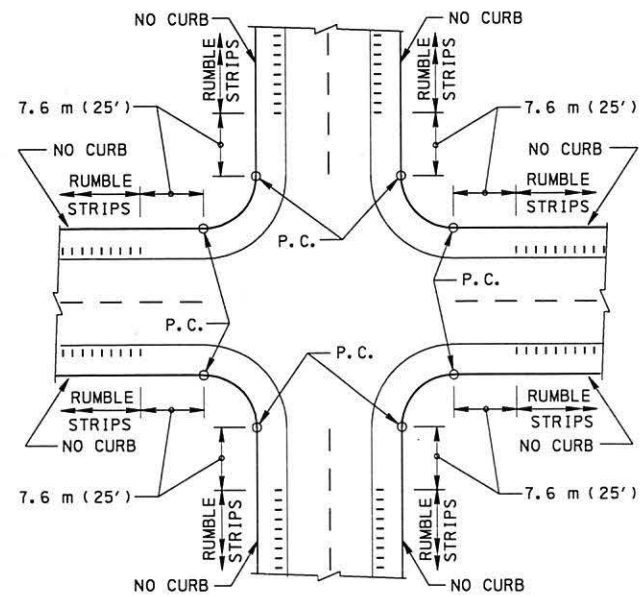




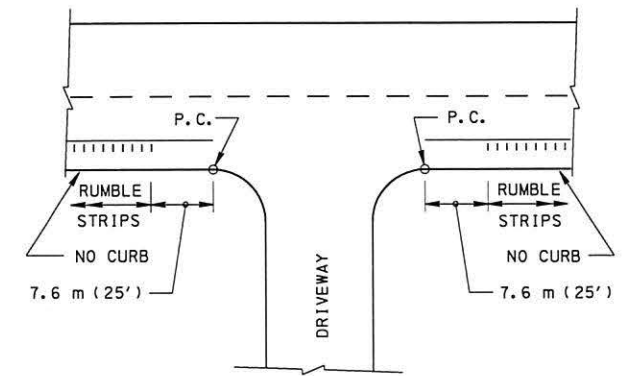
TYPICAL PLAN VIEW FOR RUMBLE STRIP ON BITUMINOUS SHOULDERS



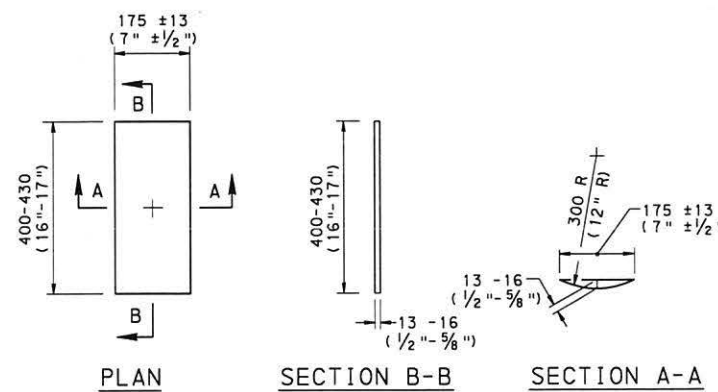
TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON CONCRETE SHOULDERS



TYPICAL INTERSECTION DETAIL FOR RUMBLE STRIP INSTALLATION



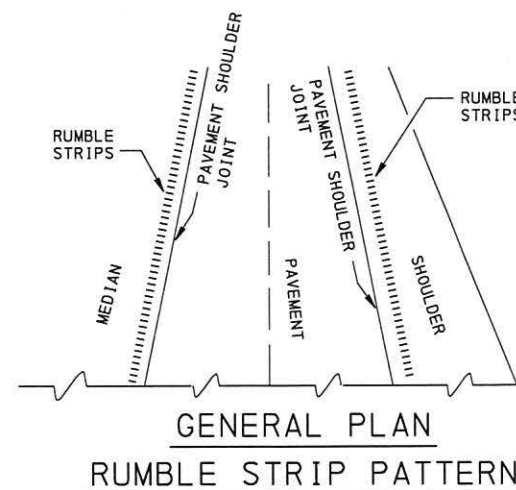
TYPICAL DRIVEWAY DETAIL FOR RUMBLE STRIP INSTALLATION



SECTION DETAILS OF RUMBLE STRIP PATTERN

NOTES

1. SHOULDER RUMBLE STRIPS FOR FREE ACCESS HIGHWAYS ARE CONSIDERED ON A PROJECT BY PROJECT BASIS AS INDICATED ON THE CONSTRUCTION PLANS.
2. CONSTRUCT RUMBLE STRIP IN ACCORDANCE WITH PUBLICATION 408, SECTION 660.
3. DO NOT CONSTRUCT SHOULDER RUMBLE STRIPS ACROSS A JOINT.
4. 300 ± 13 (12" ± 1/2") FOR LEFT (MEDIAN) SHOULDERS. 450 ± 13 (18" ± 1/2") FOR RIGHT SHOULDERS ≥ 2.4 m (8') WIDE. FOR RIGHT SHOULDERS LESS THAN 2.4 m (8') WIDE, SEE CONSTRUCTION PLANS FOR OFFSET DIMENSION.
5. IF THERE IS NO ACTUAL PAVEMENT SHOULDER JOINT, MEASURE THE OFFSET FROM THE PAVEMENT SHOULDER TRAFFIC LINE.



GENERAL PLAN RUMBLE STRIP PATTERN

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

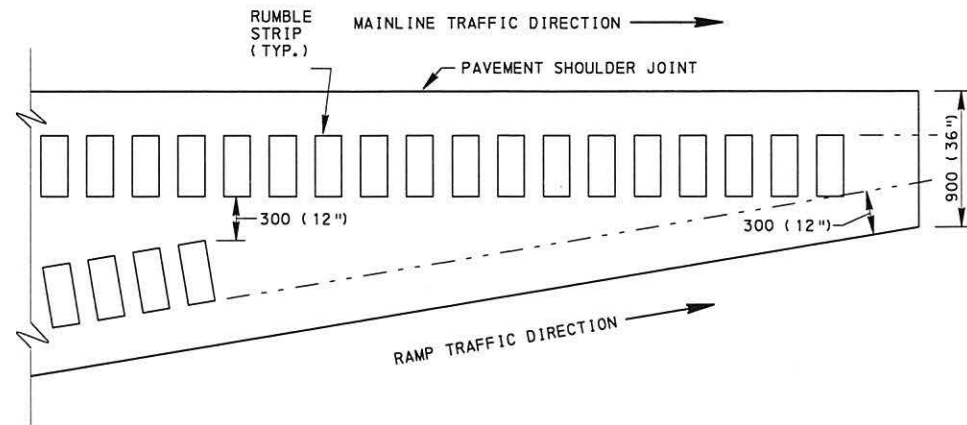
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

SHOULDERS  
RUMBLE STRIPS  
(FREE ACCESS HIGHWAYS)

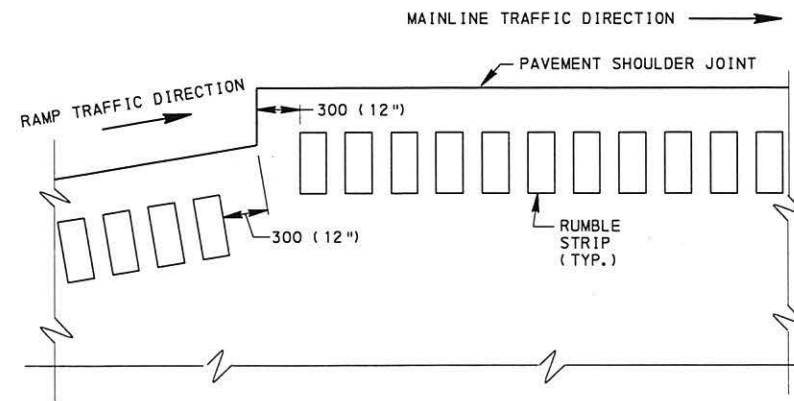
RECOMMENDED MAR. 30, 2006  
*Scott Christa*  
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006  
*M. Chatel*  
CHIEF ENGINEER

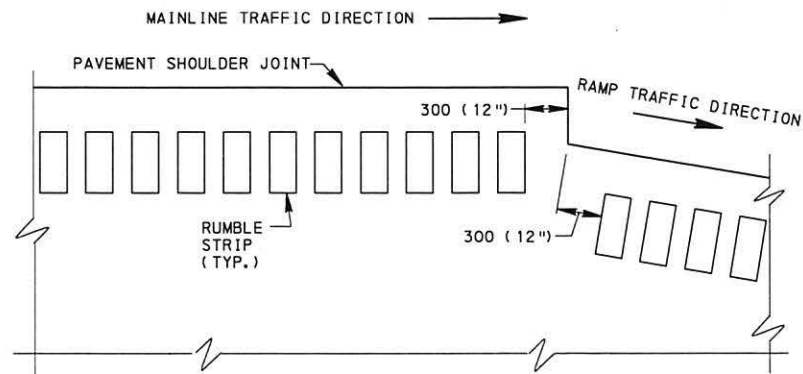
SHT. 5 OF 7  
RC-25M



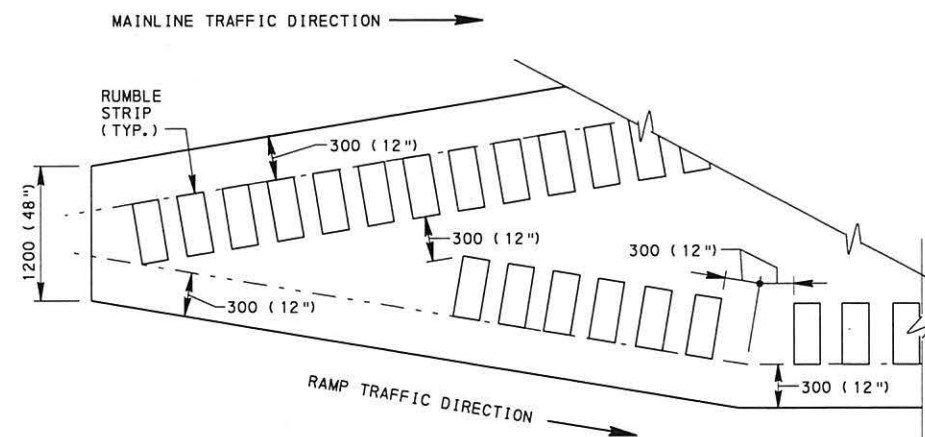
DETAIL A  
ACCELERATION LANE  
GORE AREA RUMBLE STRIPS



DETAIL B  
ACCELERATION LANE  
OUTSIDE SHOULDER RUMBLE STRIPS



DETAIL C  
DECELERATION LANE  
OUTSIDE SHOULDER RUMBLE STRIPS



DETAIL D  
DECELERATION LANE  
GORE AREA RUMBLE STRIPS

NOTES

1. IF THERE IS NO ACTUAL PAVEMENT SHOULDER JOINT, MEASURE FROM THE PAVEMENT SHOULDER TRAFFIC LINE.
2. DO NOT CONSTRUCT SHOULDER RUMBLE STRIPS ACROSS A JOINT.
3. CONSTRUCT RUMBLE STRIPS IN ACCORDANCE WITH PUBLICATION 408 SECTION 660.
4. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS SUCH THAT A CONTINUOUS TRANSVERSE JOINT IS FORMED ACROSS MAINLINE, SEPARATOR, AND RAMP PAVEMENTS.
5. FORM JOINTS IN GORE AREA CONNECTING MAINLINE AND RAMP TRANSVERSE JOINTS SUCH THAT ANGLES LESS THAN 80° ARE AVOIDED IN GORE PAVEMENT WHERE POSSIBLE.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

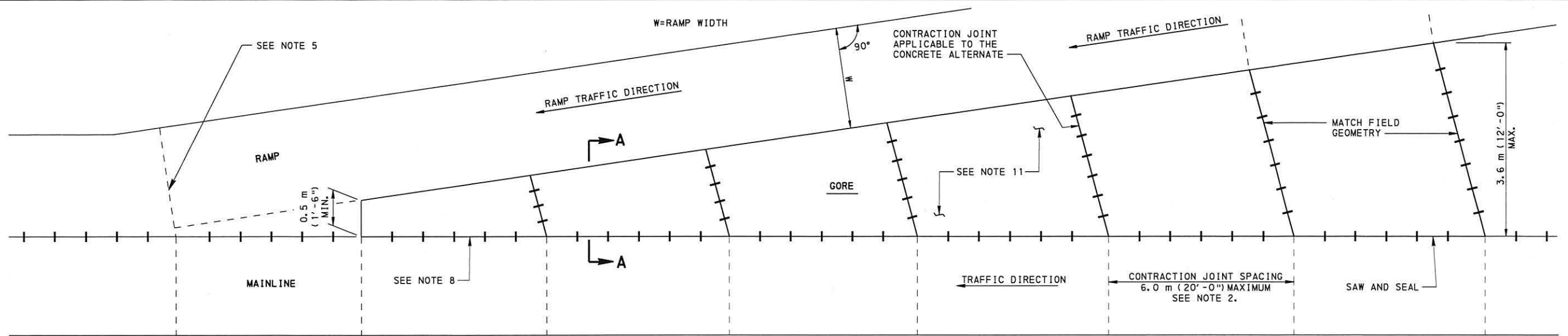
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

SHOULDERS  
RUMBLE STRIPS  
(GORE AREA)

RECOMMENDED MAR. 30, 2006  
*Scott Christian*  
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006  
*M. L. Patel*  
CHIEF ENGINEER

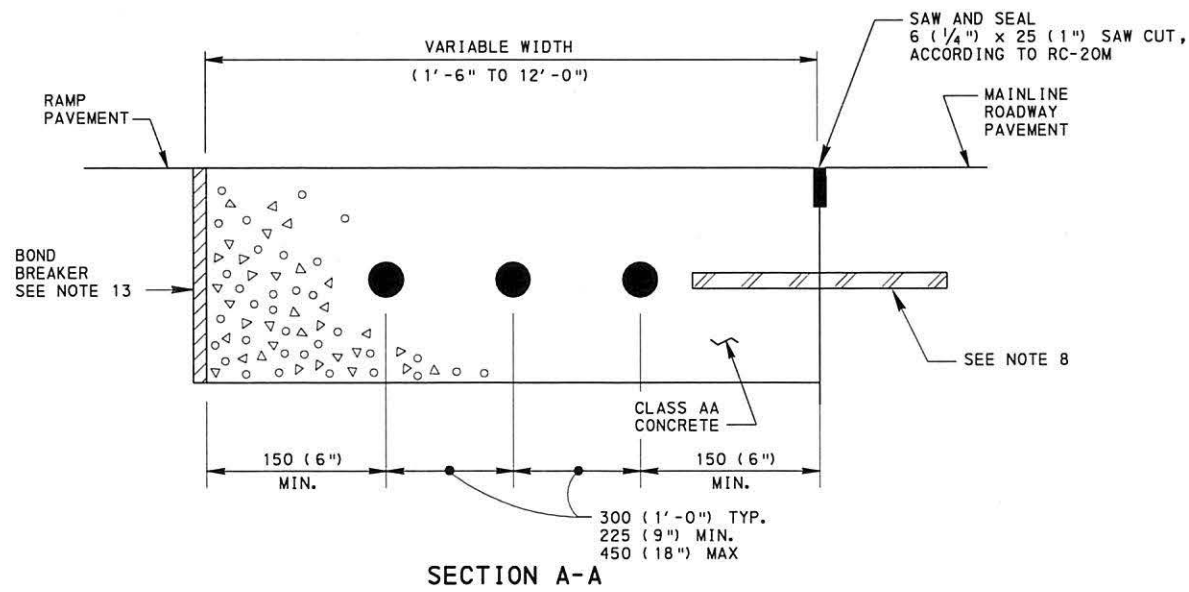
SHT. 6 OF 7  
RC-25M



**RAMP GORE AREA**

**NOTES**

1. USE MATERIALS AND CONSTRUCTION METHODS WHICH MEET THE REQUIREMENTS OF PUBLICATION 408, SECTION 501 OR 658.
2. BEGIN AND END PAVEMENT AT MAINLINE TRANSVERSE JOINTS WITH A MINIMUM PAVEMENT WIDTH OF 0.5m (1'-6") AND A MAXIMUM WIDTH OF 3.6m (12'-0").
3. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS SUCH THAT A CONTINUOUS TRANSVERSE JOINT IS FORMED ACROSS MAINLINE, SEPARATOR, AND RAMP PAVEMENTS.
4. PLACE 19.05 (¾") PREMOLDED EXPANSION JOINT FILLER MATERIAL AT STRUCTURES AND AT THE END OF THE WORK DAY. CUT MATERIAL TO CONFORM TO AREA ADJACENT TO CURB OR TO CROSS SECTIONAL AREA.
5. WHEN RAMP OR LANE WIDTH EXCEEDS 4.2 m (14'-0"), A TYPE L JOINT IS REQUIRED AT THE MIDPOINT.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.
7. CONSTRUCT GORE PAVEMENT THE SAME DEPTH AS MAINLINE SHOULDER DEPTH.
8. TIE GORE TO MAINLINE SHOULDER PAVEMENT IN ACCORDANCE WITH RC-25M.
9. CONSTRUCT GORE UTILIZING SECTION 501 OR 658 (WHICHEVER ITEM NUMBER THE MAINLINE SHOULDER IS CONSTRUCTED OF) MEASUREMENT AND PAYMENT WILL BE USING SAME ITEM NUMBER.
10. DO NOT USE LONGITUDINAL TIE BARS TO TIE GORE TO RAMP/SHOULDER PAVEMENT.
11. INSTALL RUMBLE STRIPS IN ACCORDANCE WITH RC-25M, SHEET 6 OF 7.
12. USE LOAD TRANSFER UNITS IF MAINLINE SHOULDER IS CONSTRUCTED USING LOAD TRANSFER UNITS. INSTALL IN ACCORDANCE WITH RC-27M.
13. PLACE A 6 (¼"), FULL DEPTH, POLYSTYRENE BOARD BOND BREAKER.

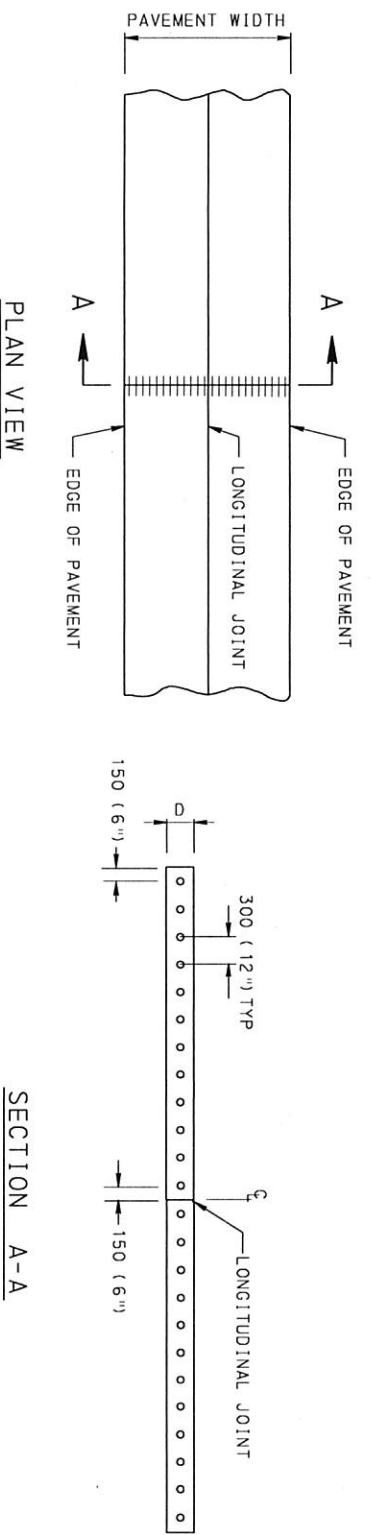


NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

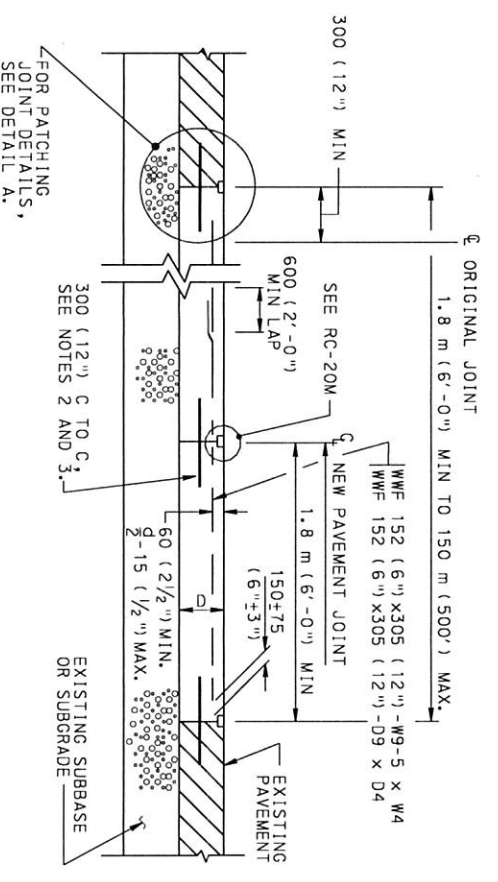
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

**RAMP GORE AREA**

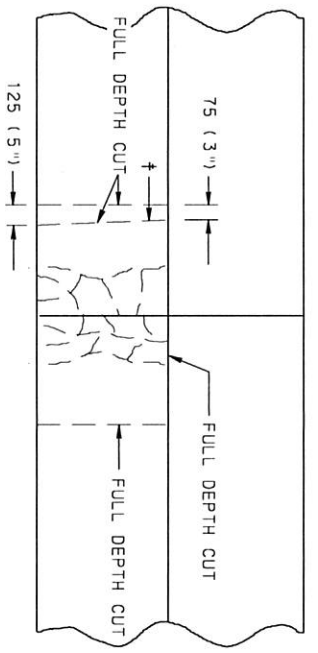
RECOMMENDED MAR. 30, 2006 <i>Scott Christian</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Chitel</i> CHIEF ENGINEER	SHT 7 OF 7 RC-25M
---	---	----------------------



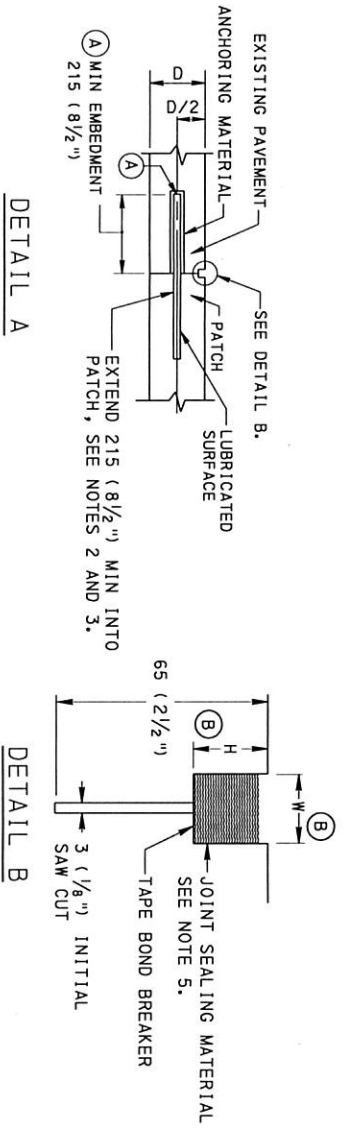
TYPICAL PAVEMENT PATCHING JOINT



TYPICAL SECTION  
CONCRETE PAVEMENT PATCHING



SAW CUTS FOR LIFT OUT METHOD



PATCHING JOINT DETAILS

- LEGEND
- (A) EMBEDDED END OF DOWEL BAR NEED NOT BE SQUARE. IF A CHISEL POINT IS NEEDED FOR EMBEDDING METHOD, INCREASE LENGTH OF DOWEL AND EMBEDMENT BY 25 (1 inch).
  - (B) JOINT SPACING

JOINT SPACING	W	H
215 M (50')	25 (1 inch)	32 (1 1/4 inch)
26 M (20') AND <15 M (50')	19 (3/4 inch)	25 (1 inch)
<6 M (20')	10 (3/8 inch)	19 (3/4 inch)

NOTES

1. WHEN ANY PAVEMENT PATCH REPLACES AN EXISTING EXPANSION JOINT AND THE EXISTING EXPANSION JOINT IN AN ADJACENT LANE REMAINS IN PLACE, INSTALL EXPANSION JOINT MATERIAL 19 (3/4 inch) THICK IN THE PATCHING JOINT OR NEW PAVEMENT JOINT NEAREST TO THE REMAINING EXPANSION JOINT. PLACE AN APPROVED TUBE HAVING A MINIMUM 25 (1 inch) CLEARANCE POCKET OVER THE LUBRICATED END OF ALL DOWEL BARS IN THE NEW EXPANSION JOINT.
2. USE 32 (1 1/4 inch)  $\phi$  x 450 (1'-6 inch) LONG DOWEL BARS FOR PAVEMENT DEPTHS 250 (10 inch) OR LESS AND 38 (1 1/2 inch)  $\phi$  x 450 (1'-6 inch) LONG DOWEL BARS FOR PAVEMENT DEPTHS GREATER THAN 250 (10 inch).
3. PLACE DOWEL BARS PARALLEL TO THE CENTERLINE AND SURFACE OF THE SLAB. THE VERTICAL OR HORIZONTAL SKEW FROM ONE END OF THE DOWEL BAR TO THE OTHER END IS NOT TO EXCEED 6 (1/4 inch).
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
5. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.
6. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (1/8 inch) TO 6 (1/4 inch) BELOW THE SURFACE OF THE PAVEMENT.
7. INITIAL SAW CUT IS NOT REQUIRED WHEN EXPANSION JOINT MATERIAL IS USED.
8. WHEN ROADWAY IS NOT TO BE OVERLAID, SAW & SEAL JOINTS IN ACCORDANCE WITH DETAIL B.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

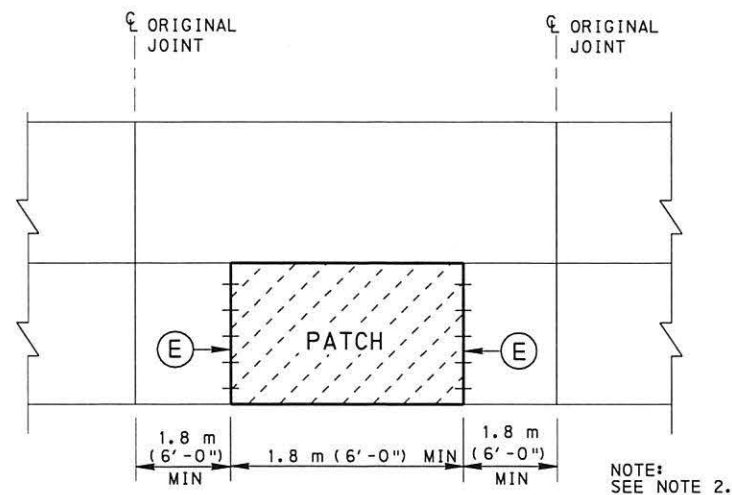
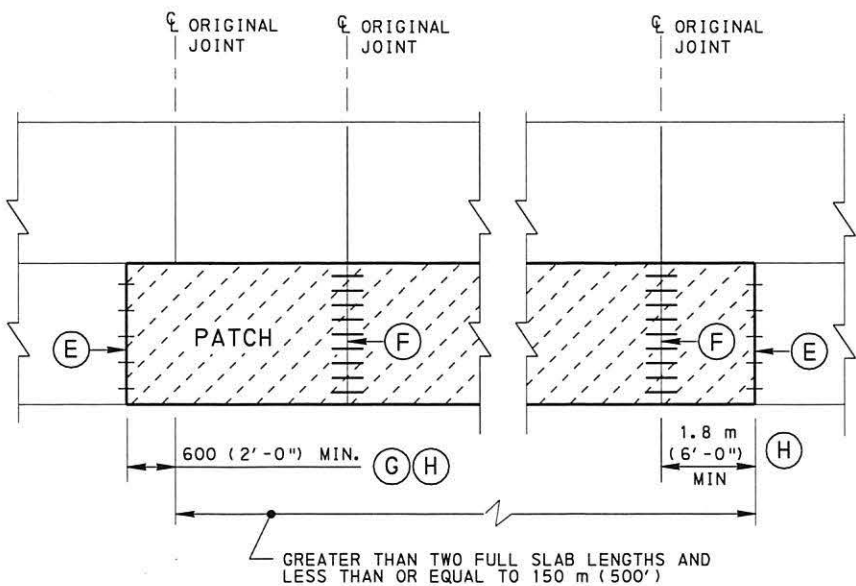
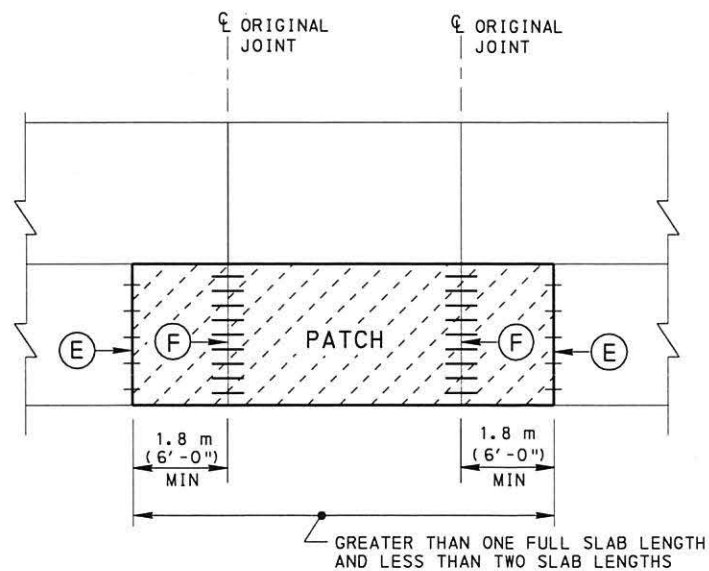
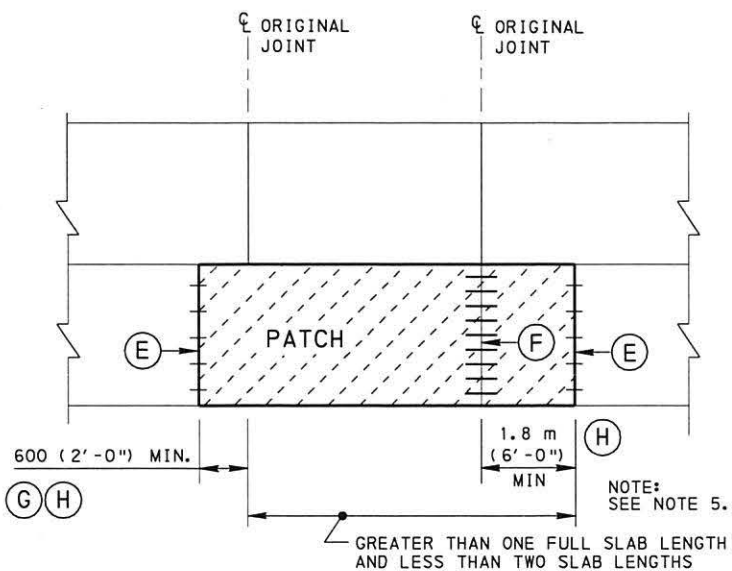
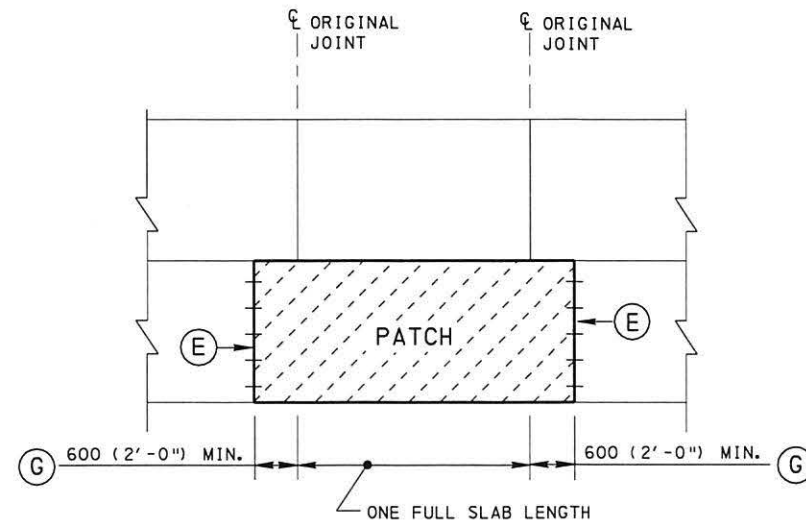
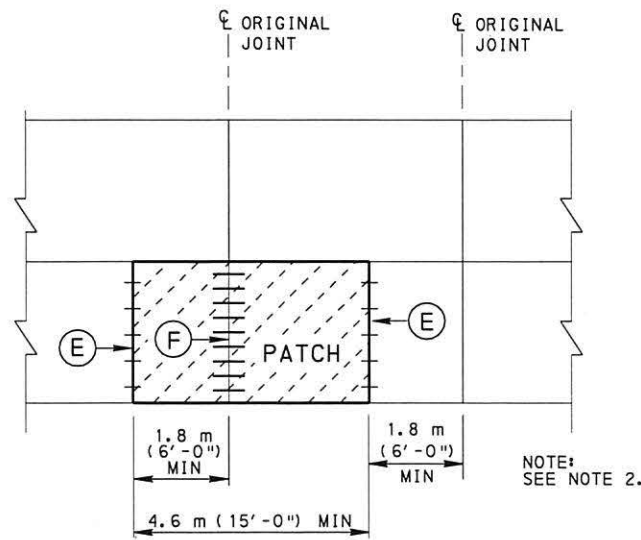
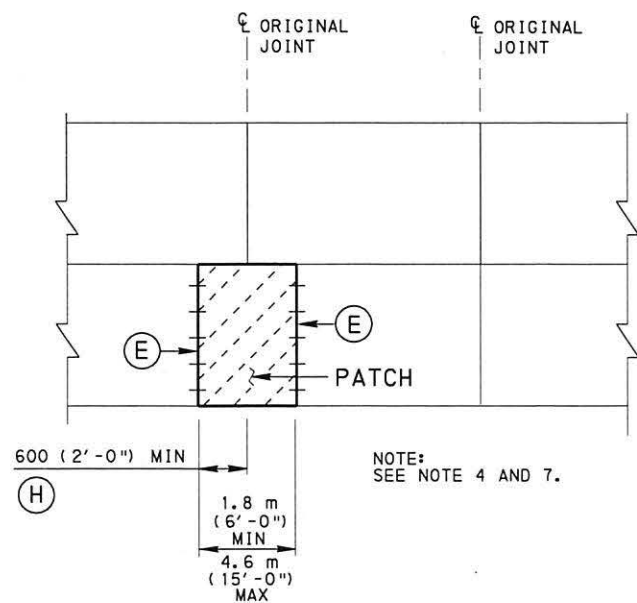
CONCRETE PAVEMENT  
REHABILITATION  
(PATCHING)

RECOMMENDED MAR. 30, 2006  
  
 DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006  
  
 CHIEF ENGINEER

SHT 1 OF 9  
 RC-26M

† MAKE FULL DEPTH SAWCUT TO FACILITATE OPENING A TRENCH ACROSS THE SLAB TO RELIEVE COMPRESSION IN PAVEMENT PRIOR TO LIFTING OUT FAILED AREA. SAWCUT MAY BE OMITTED PROVIDED NO SPALLING ON SURFACE OR UNDERSIDE OF REMAINING CONCRETE PAVEMENT OCCURS. IF SPALLING OCCURS, MAKE THIS SAWCUT ON SUBSEQUENT PATCHES. SAWCUTS FOR COMPRESSION RELIEF NEED NOT BE AT PATCH EDGE. AT CONTRACTOR'S OPTION, MAKE ADDITIONAL SAWCUTS INSIDE REPAIR LIMITS TO FACILITATE REMOVAL.



**LEGEND**

- (E) PAVEMENT PATCHING JOINT, SEE SHEET 1.
- (F) NEW PAVEMENT JOINT, SEE RC-20M.
- (G) EXCEPTION TO 1.5 m (5'-0") MAXIMUM REMOVAL.
- (H) DETAILS APPLY TO EITHER END OF PATCH.

**NOTES**

1. CONSTRUCT PAVEMENT PATCHES IN ADJACENT LANES, WITH LENGTHS THAT ARE WITHIN 1.8 m (6'-0") OF EACH OTHER, TO THE SAME LENGTH. THIS LENGTH IS THE LENGTH OF THE LARGER PAVEMENT PATCH. IF THE PATCH LENGTHS DIFFER BY MORE THAN 1.8 m (6'-0"), THEN CONSTRUCT TO THE REQUIRED LENGTHS.
2. DO NOT LEAVE LESS THAN 1.8 m (6'-0") OF ORIGINAL PAVEMENT IN PLACE BETWEEN PATCHES OR BETWEEN JOINTS.
3. WHEN PERFORMING SINGLE LANE PAVEMENT PATCHING, OR PATCHING ONE LANE AT A TIME, PLACE A 6 (1/4") FULL DEPTH, POLYSTYRENE BOARD BOND BREAKER IN THE LONGITUDINAL JOINT OF ALL PATCHES UNDER 20.0 m (60'-0") IN LENGTH, PRIOR TO PLACING THE NEW CONCRETE IN THE PATCH AREA.
4. WHEN PATCHING ADJACENT TO AN EXISTING JOINT, REMOVE A MINIMUM OF 600 (2'-0") OF PAVEMENT IN THE NEXT SLAB TO AVOID THE EXISTING DOWEL BARS.
5. WHEN REPLACING ONE FULL SLAB LENGTH AND THE DETERIORATION EXTENDS MORE THAN 600 (2'-0") INTO THE NEXT SLAB, REMOVE A MINIMUM OF 1.8 m (6'-0") AND INSTALL A NEW PAVEMENT JOINT IN THE SAME POSITION AS THE ORIGINAL JOINT.
6. THESE DRAWINGS ARE PROVIDED AS EXAMPLES TO SHOW CERTAIN PATCHING CRITERIA. THEY MAY NOT COVER EVERY FIELD SITUATION.
7. WHEN ONLY ONE LANE IS BEING PATCHED, DO NOT REMOVE MORE THAN 1.5 m (5'-0") INTO NEXT SLAB. IF MORE THAN 1.5 m (5'-0") IS REQUIRED, REMOVE A MINIMUM OF 1.8 m (6'-0") AND PROVIDE NEW PAVEMENT JOINT AT ORIGINAL JOINT LOCATION. FOREXCEPTION, SEE (G) IN LEGEND.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

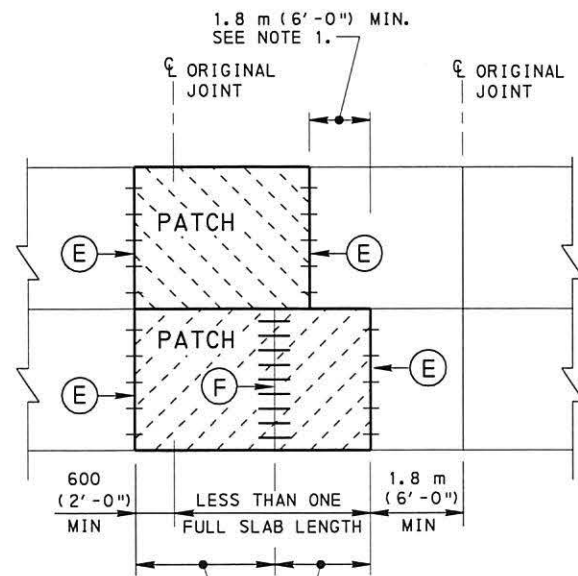
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

CONCRETE PAVEMENT  
REHABILITATION  
(SINGLE LANE PATCHING)

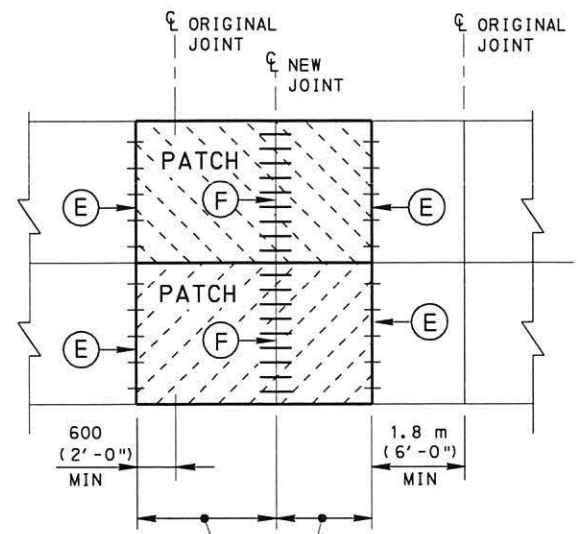
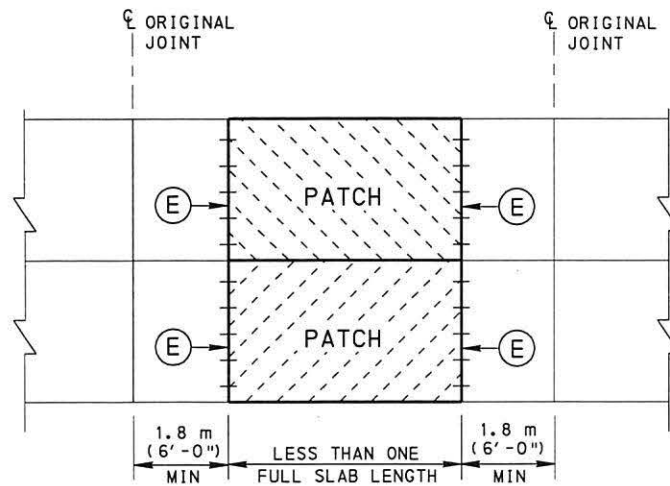
RECOMMENDED MAR. 30, 2006 <i>Scott Christian</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Ghel</i> CHIEF ENGINEER	SHT 2 OF 9 RC-26M
---	---	----------------------

SINGLE LANE PAVEMENT PATCHING

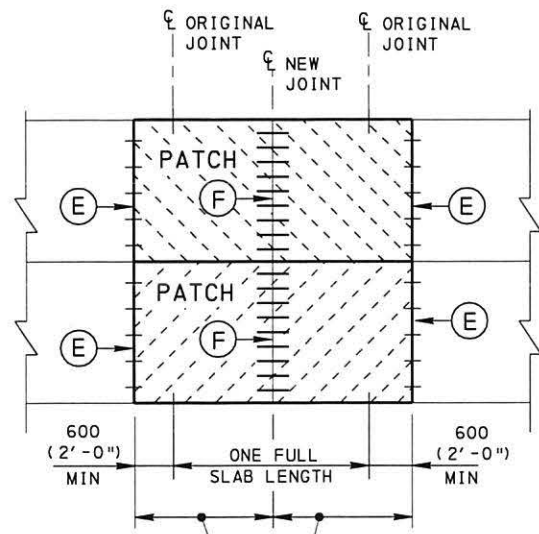




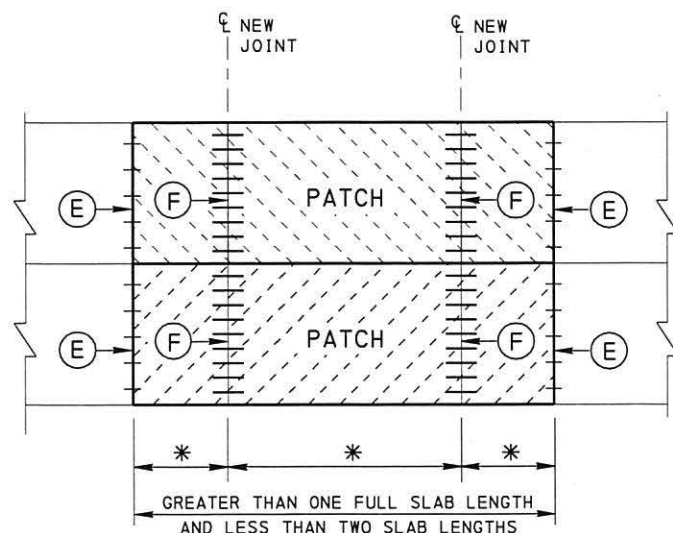
1.8 m (6'-0") MIN. TO  
4.5 m (15'-0") MAX., (TYP. PCC) OR  
9.0 m (30'-0") MAX., (TYP. RCC)



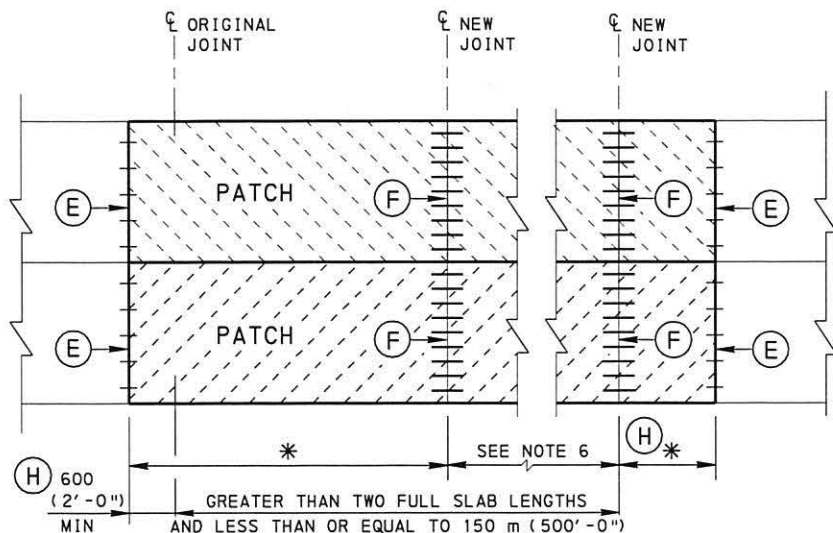
1.8 m (6'-0") MIN. TO  
4.5 m (15'-0") MAX., (TYP. PCC) OR  
9.0 m (30'-0") MAX., (TYP. RCC)



1.8 m (6'-0") MIN. TO  
4.5 m (15'-0") MAX., (TYP. PCC) OR  
9.0 m (30'-0") MAX., (TYP. RCC)



NOTE: \* = 1.8 m (6'-0") MIN. TO  
4.5 m (15'-0") MAX., (TYP. PCC) OR  
9.0 m (30'-0") MAX., (TYP. RCC)



NOTE: \* = 1.8 m (6'-0") MIN. TO  
4.5 m (15'-0") MAX., (TYP. PCC) OR  
9.0 m (30'-0") MAX., (TYP. RCC)

**LEGEND**

- (E) PAVEMENT PATCHING JOINT, SEE SHEET 1.
- (F) NEW PAVEMENT JOINT, SEE RC-20M.
- (G) EXCEPTION TO 1.5 m (5'-0") MAXIMUM REMOVAL.
- (H) DETAILS APPLY TO EITHER END OF PATCH.

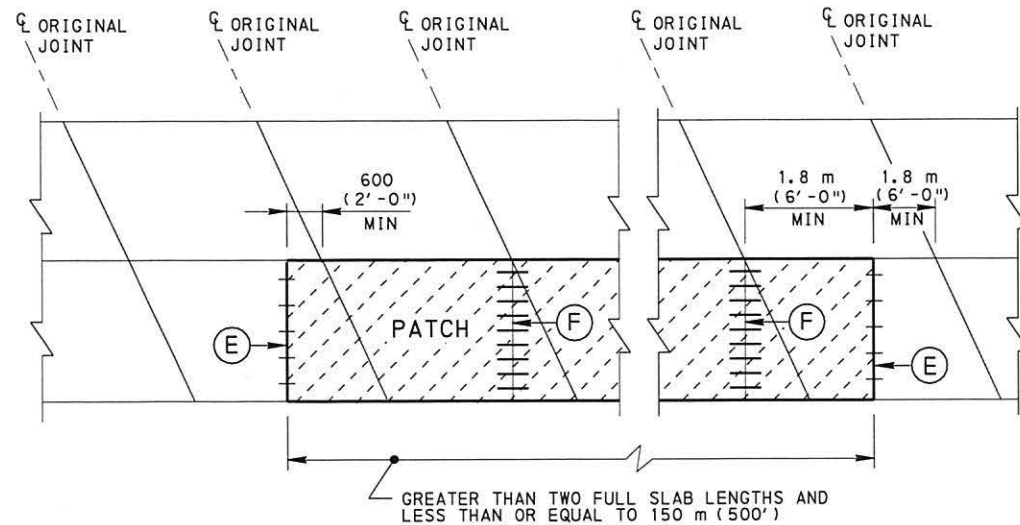
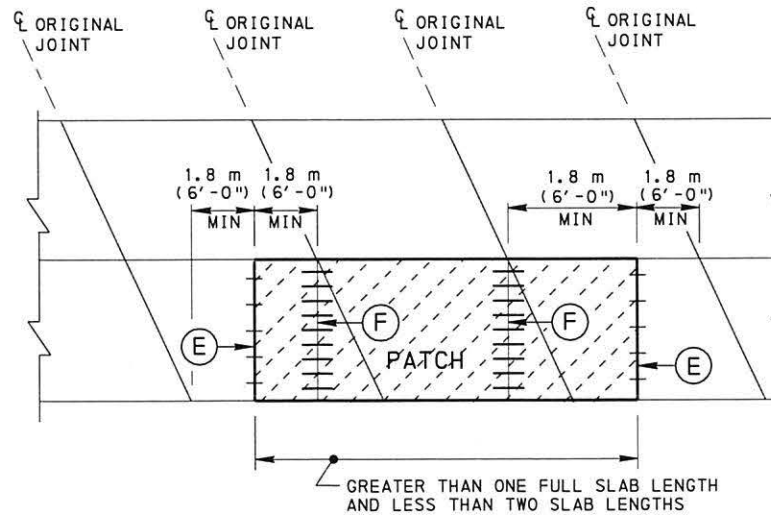
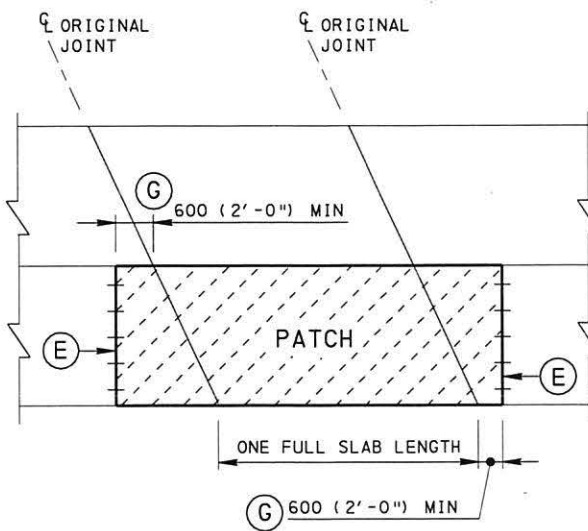
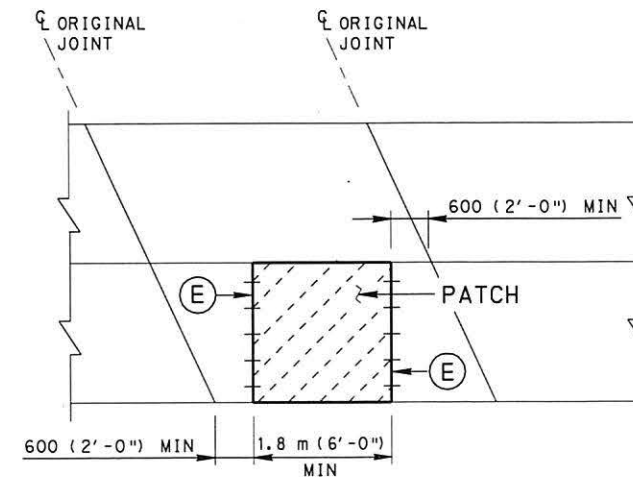
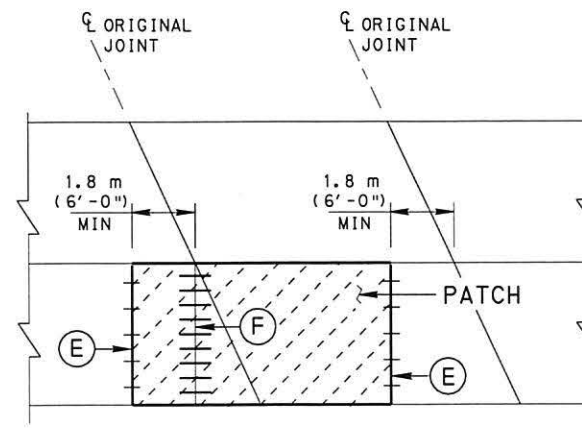
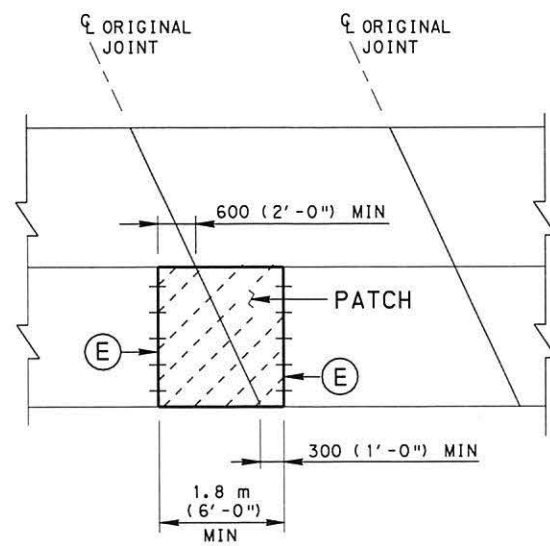
**NOTES**

1. CONSTRUCT PAVEMENT PATCHES IN ADJACENT LANES, WITH LENGTHS THAT ARE WITHIN 1.8 m (6'-0") OF EACH OTHER, TO THE SAME LENGTH. THIS LENGTH IS THE LENGTH OF THE LARGER PAVEMENT PATCH. IF THE PATCH LENGTHS DIFFER BY MORE THAN 1.8 m (6'-0"), THEN CONSTRUCT TO THE REQUIRED LENGTHS.
2. DO NOT LEAVE LESS THAN 1.8 m (6'-0") OF ORIGINAL PAVEMENT IN PLACE BETWEEN PATCHES OR BETWEEN JOINTS.
3. WHEN PERFORMING SINGLE LANE PAVEMENT PATCHING, OR PATCHING ONE LANE AT A TIME, PLACE A 6 (1/4") FULL DEPTH, POLYSTYRENE BOARD BOND BREAKER IN THE LONGITUDINAL JOINT OF ALL PATCHES UNDER 20.0 m (60'-0") IN LENGTH, PRIOR TO PLACING THE NEW CONCRETE IN THE PATCH AREA.
4. WHEN PATCHING ADJACENT TO AN EXISTING JOINT, REMOVE A MINIMUM OF 600 (2'-0") OF PAVEMENT IN THE NEXT SLAB TO AVOID THE EXISTING DOWEL BARS.
5. WHEN REPLACING ONE FULL SLAB LENGTH AND THE DETERIORATION EXTENDS MORE THAN 600 (2'-0") INTO THE NEXT SLAB, REMOVE A MINIMUM OF 1.8 m (6'-0") AND INSTALL A NEW PAVEMENT JOINT PERPENDICULAR IN THE LOCATION OF THE ORIGINAL JOINT IN THE ADJACENT LANE.
6. WHEN PERFORMING MULTILANE PATCHING, AND THE PATCHES ARE GREATER THAN TWO SLAB LENGTHS AND LESS THAN OR EQUAL TO 150 m (500'-0"), THE JOINT SPACING OF THE AREA BEING PATCHED IS TO CONFORM TO RC-21M OR RC-27M FOR THE SPECIFIC TYPE OF PAVEMENT BEING PLACED (I.E., RCC OR PCC).
7. THESE DRAWINGS ARE PROVIDED AS EXAMPLES TO SHOW CERTAIN PATCHING CRITERIA. THEY MAY NOT COVER EVERY FIELD SITUATION.
8. WHEN PERFORMING MULTILANE PATCHING, FOR MIDSLAB PROBLEMS, REMOVE ENTIRE SLAB IN BOTH LANES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

CONCRETE PAVEMENT  
REHABILITATION  
(MULTI-LANE PATCHING)



**LEGEND**

- (E) PAVEMENT PATCHING JOINT, SEE SHEET 1.
- (F) NEW PAVEMENT JOINT, SEE RC-20M.
- (G) EXCEPTION TO 1.5 m (5'-0") MAXIMUM REMOVAL.

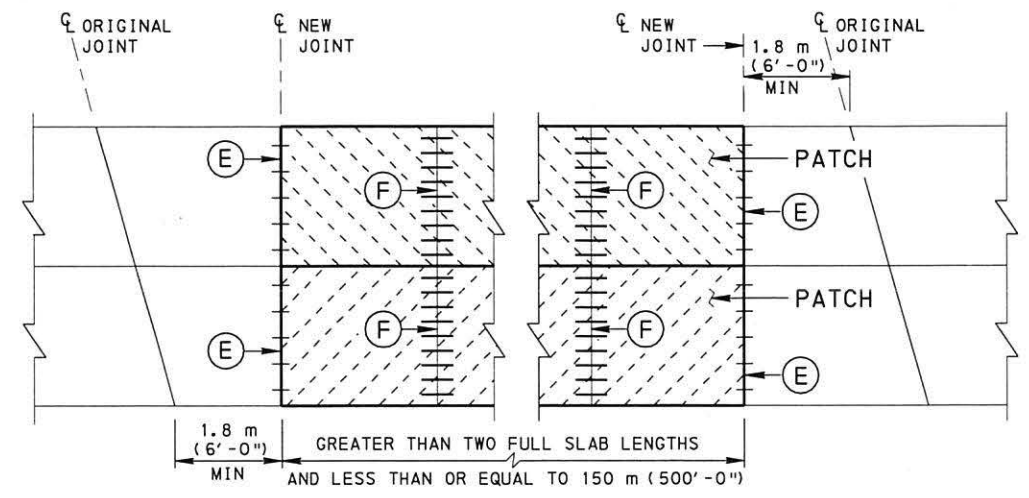
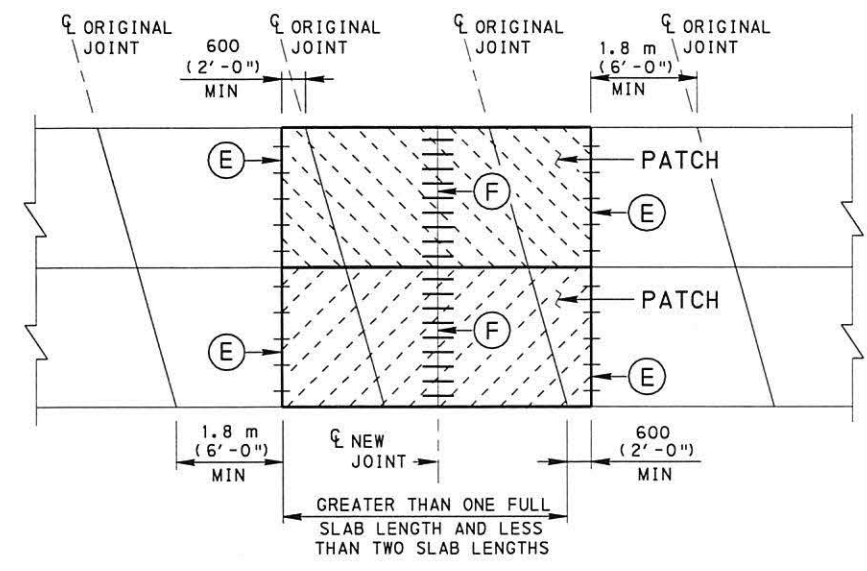
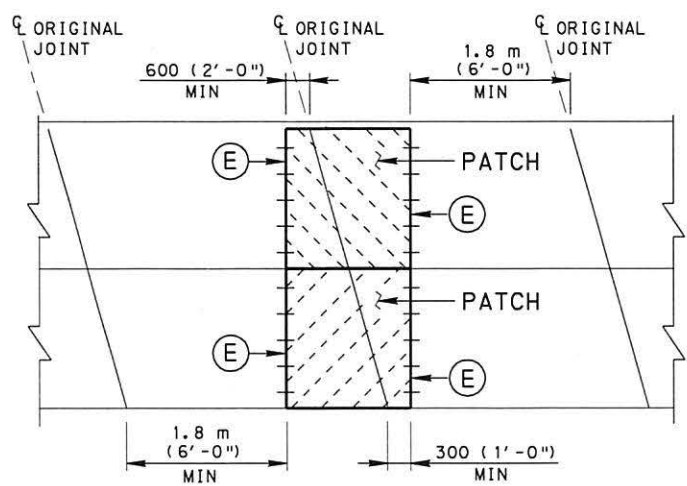
**NOTES**

1. CONSTRUCT PAVEMENT PATCHES IN ADJACENT LANES, WITH LENGTHS THAT ARE WITHIN 1.8 m (6'-0") OF EACH OTHER, TO THE SAME LENGTH. THIS LENGTH IS THE LENGTH OF THE LARGER PAVEMENT PATCH. IF THE PATCH LENGTHS DIFFER BY MORE THAN 1.8 m (6'-0"), THEN CONSTRUCT TO THE REQUIRED LENGTHS.
2. DO NOT LEAVE LESS THAN 1.8 m (6'-0") OF ORIGINAL PAVEMENT IN PLACE BETWEEN PATCHES OR BETWEEN JOINTS.
3. WHEN PERFORMING SINGLE LANE PAVEMENT PATCHING, OR PATCHING ONE LANE AT A TIME, PLACE A 6 (1/4") FULL DEPTH, POLYSTYRENE BOARD BOND BREAKER IN THE LONGITUDINAL JOINT OF ALL PATCHES UNDER 20.0 m (60'-0") IN LENGTH, PRIOR TO PLACING THE NEW CONCRETE IN THE PATCH AREA.
4. WHEN PATCHING ADJACENT TO AN EXISTING JOINT, REMOVE A MINIMUM OF 600 (2'-0") OF PAVEMENT IN THE NEXT SLAB TO AVOID THE EXISTING DOWEL BARS.
5. WHEN REPLACING ONE FULL SLAB LENGTH AND THE DETERIORATION EXTENDS MORE THAN 600 (2'-0") INTO THE NEXT SLAB, REMOVE A MINIMUM OF 1.8 m (6'-0") AND INSTALL A NEW PAVEMENT JOINT PERPENDICULAR IN THE LOCATION OF THE ORIGINAL JOINT IN THE ADJACENT LANE.
6. THESE DRAWINGS ARE PROVIDED AS EXAMPLES TO SHOW CERTAIN PATCHING CRITERIA. THEY MAY NOT COVER EVERY FIELD SITUATION.
7. WHEN ONLY ONE LANE IS BEING PATCHED, DO NOT REMOVE MORE THAN 1.5 m (5'-0") INTO NEXT SLAB FROM THE FAR POINT OF THE SKEW. IF MORE THAN 1.5 m (5'-0") IS REQUIRED, REMOVE A MINIMUM OF 1.8 m (6'-0") AND PROVIDE NEW PAVEMENT JOINT PERPENDICULAR AT ORIGINAL JOINT LOCATION AT THE ADJACENT SLAB EDGE. FOR EXCEPTION, SEE (G) IN LEGEND.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

CONCRETE PAVEMENT  
REHABILITATION  
(SINGLE LANE PATCHING)  
SKEWED JOINTS



**LEGEND**

- (E) PAVEMENT PATCHING JOINT, SEE SHEET 1.
- (F) NEW PAVEMENT JOINT, SEE RC-20M.

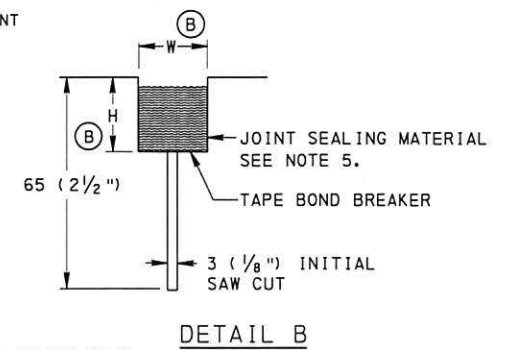
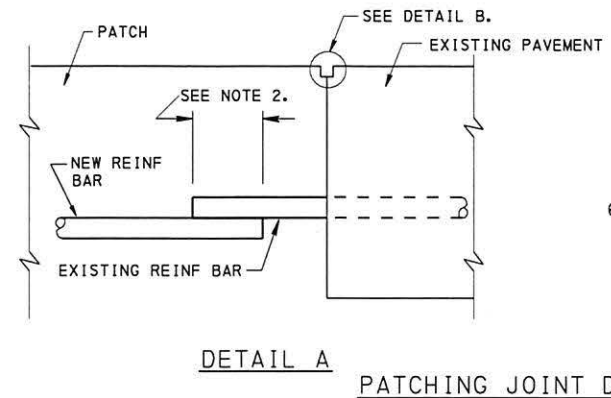
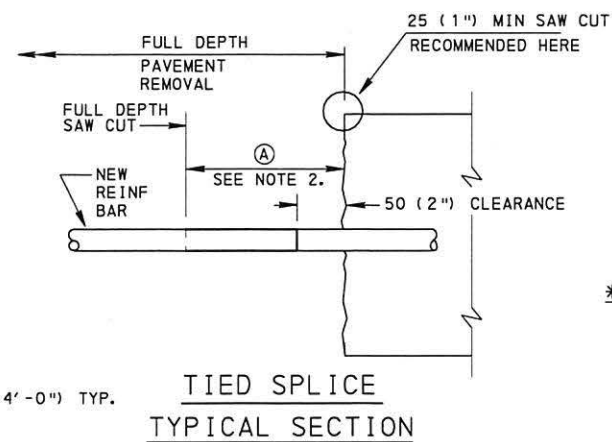
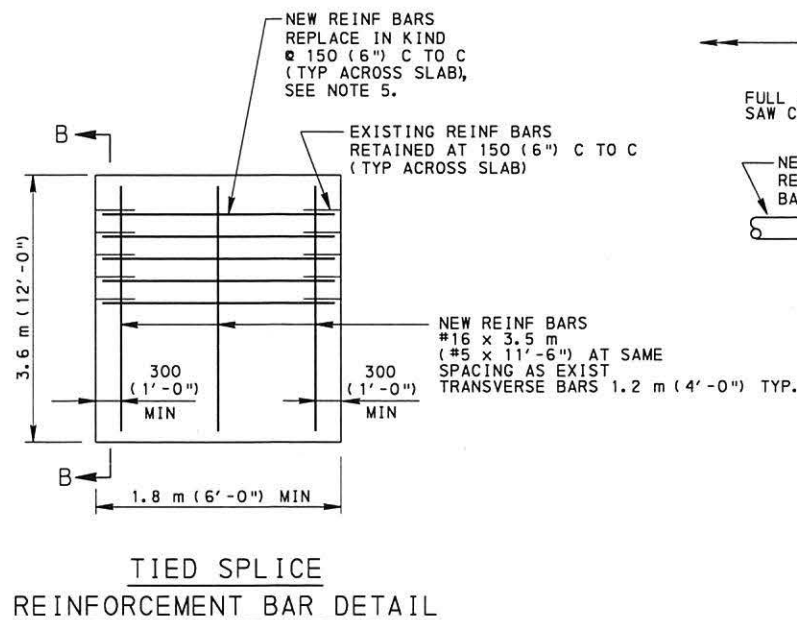
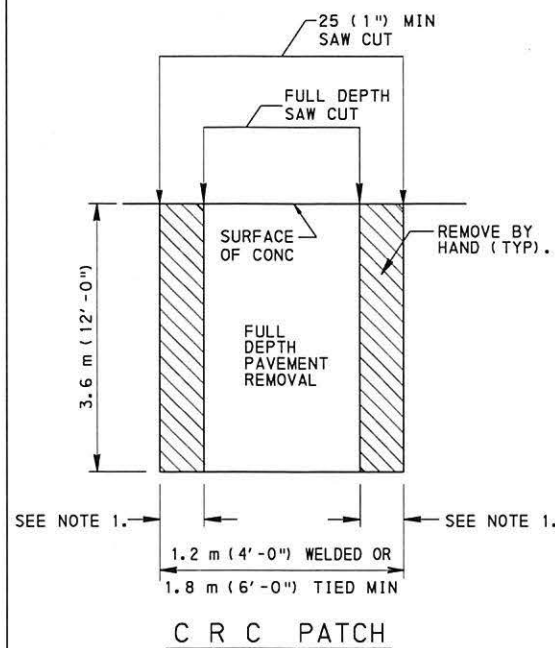
**NOTES**

1. CONSTRUCT PAVEMENT PATCHES IN ADJACENT LANES, WITH LENGTHS THAT ARE WITHIN 1.8 m (6'-0") OF EACH OTHER, TO THE SAME LENGTH. THIS LENGTH IS THE LENGTH OF THE LARGER PAVEMENT PATCH. IF THE PATCH LENGTHS DIFFER BY MORE THAN 1.8 m (6'-0"), THEN CONSTRUCT TO THE REQUIRED LENGTHS.
2. DO NOT LEAVE LESS THAN 1.8 m (6'-0") OF ORIGINAL PAVEMENT IN PLACE BETWEEN PATCHES OR BETWEEN JOINTS.
3. WHEN PERFORMING SINGLE LANE PAVEMENT PATCHING, OR PATCHING ONE LANE AT A TIME, PLACE A 6 (1/4") FULL DEPTH, POLYSTYRENE BOARD BOND BREAKER IN THE LONGITUDINAL JOINT OF ALL PATCHES UNDER 20.0 m (60'-0") IN LENGTH, PRIOR TO PLACING THE NEW CONCRETE IN THE PATCH AREA.
4. WHEN PATCHING ADJACENT TO AN EXISTING JOINT, REMOVE A MINIMUM OF 600 (2'-0") OF PAVEMENT IN THE NEXT SLAB TO AVOID THE EXISTING DOWEL BARS.
5. WHEN REPLACING ONE FULL SLAB LENGTH AND THE DETERIORATION EXTENDS MORE THAN 600 (2'-0") INTO THE NEXT SLAB, REMOVE A MINIMUM OF 1.8 m (6'-0") AND INSTALL A NEW PAVEMENT JOINT IN THE SAME POSITION AS THE ORIGINAL JOINT.
6. WHEN PERFORMING MULTILANE PATCHING, AND THE PATCHES ARE GREATER THAN TWO SLAB LENGTHS AND LESS THAN OR EQUAL TO 150 m (500'-0"), THE JOINT SPACING OF THE AREA BEING PATCHED IS TO CONFORM TO RC-21M OR RC-27M FOR THE SPECIFIC TYPE OF PAVEMENT BEING PLACED (I.E., RCC OR PCC).
7. THESE DRAWINGS ARE PROVIDED AS EXAMPLES TO SHOW CERTAIN PATCHING CRITERIA. THEY MAY NOT COVER EVERY FIELD SITUATION.
8. WHEN PERFORMING MULTILANE PATCHING, FOR MIDSLAB PROBLEMS, REMOVE ENTIRE SLAB IN BOTH LANES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

<p><b>COMMONWEALTH OF PENNSYLVANIA</b>  <b>DEPARTMENT OF TRANSPORTATION</b>          BUREAU OF DESIGN</p>		
<p><b>CONCRETE PAVEMENT</b>  <b>REHABILITATION</b>          (MULTI-LANE PATCHING)  <b>SKewed JOINTS</b></p>		
RECOMMENDED MAR. 30, 2006 <i>Scott Christian</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Ghelber</i> CHIEF ENGINEER	SHT 5 OF 9 <b>RC-26M</b>





DETAIL A PATCHING JOINT DETAILS

DETAIL B

LEGEND

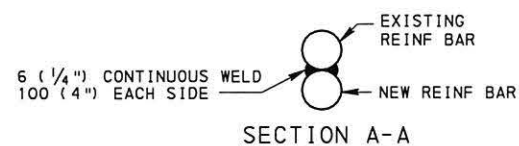
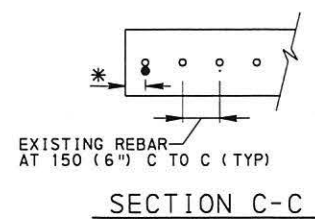
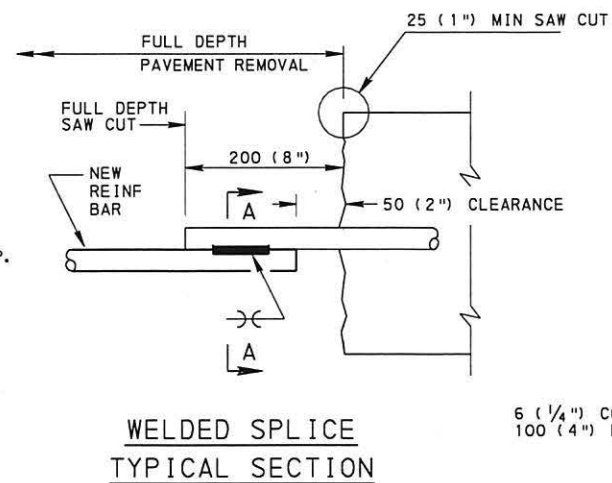
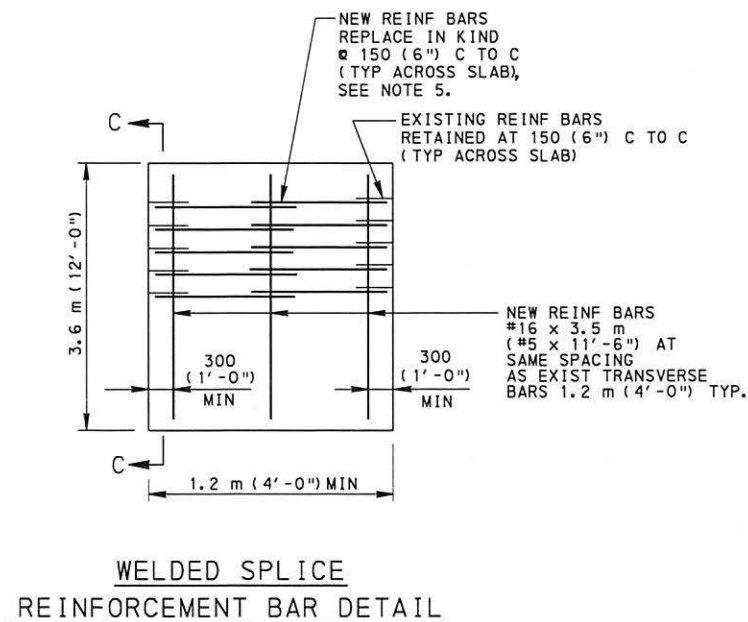
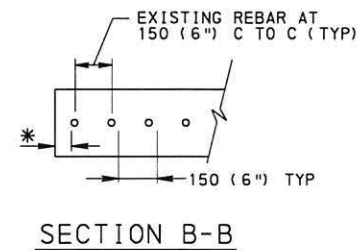
- \* MAINTAIN EXISTING EDGE CLEARANCE.
- o EXISTING REBARS
- o NEW REBARS

(A) USE THE FOLLOWING TABLE TO DETERMINE DEVELOPMENT LENGTH:

BAR SIZE	DEVELOPMENT LENGTH
#16 (#5)	480 (1'-8")
#19 (#6)	585 (1'-9")
#22 (#7)	755 (2'-3")

(B)

PATCH LENGTH	W	H
≥ 15 m (50'-0")	25 (1")	32 (1 1/4")
≥ 6 m (20'-0") & < 15 m (50'-0")	19 (3/4")	25 (1")
< 6 m (20'-0")	10 (3/8")	19 (3/4")



NOTES

1. REMOVE 510 (20") MIN BY HAND FOR TIED SPLICES. REMOVE 200 (8") BY HAND FOR WELDED SPLICES.
2. OVERLAP TIED SPLICES BY AT LEAST 30 BAR DIAMETERS. OVERLAP WELDED SPLICES BY 150 (6").
3. REMOVE PAVEMENT FULL DEPTH UNDER RETAINED REINFORCEMENT BARS.
4. MINIMUM DISTANCE FROM PATCH EDGE TO EXISTING CRACK IN CRC PAVEMENT IS 600 (2'-0").
5. WHEN TRANSVERSE SPACING OF LONGITUDINAL REINFORCING BARS IS OTHER THAN 150 (6") C TO C, MATCH EXISTING REINFORCING.
6. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (1/8") TO 6 (1/4") BELOW THE PAVEMENT SURFACE.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

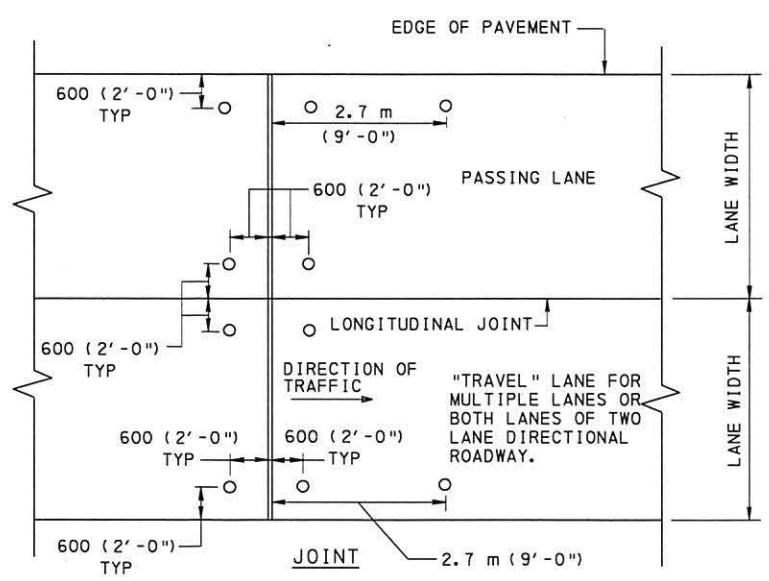
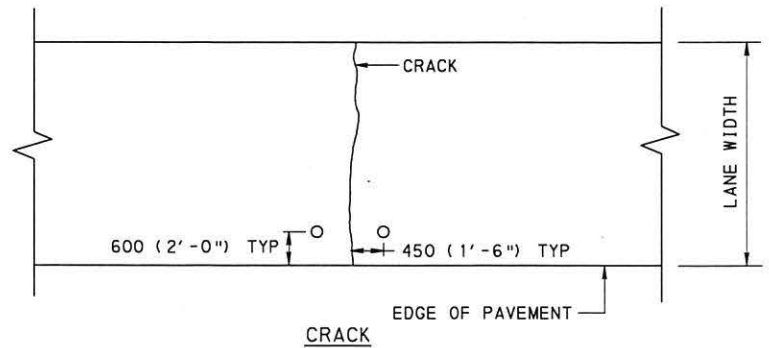
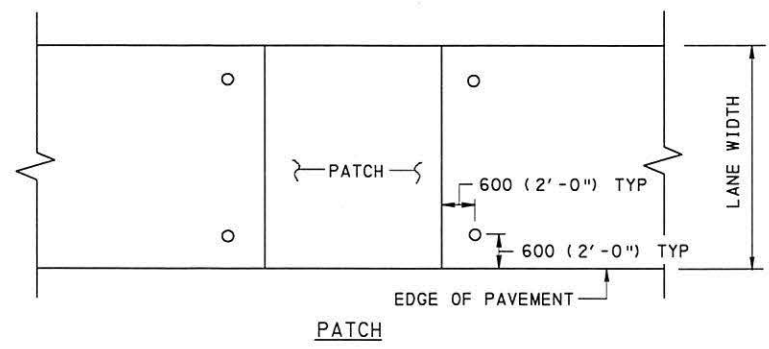
CONCRETE PAVEMENT  
REHABILITATION

(C R C PATCHING)

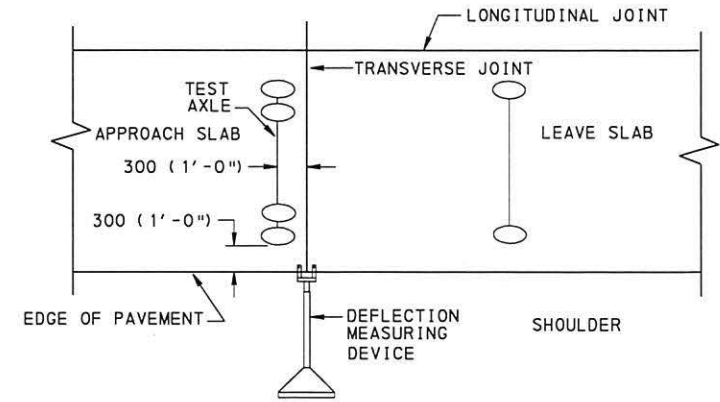
RECOMMENDED MAR. 30, 2006  
*Scott Christie*  
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006  
*M. Patel*  
CHIEF ENGINEER

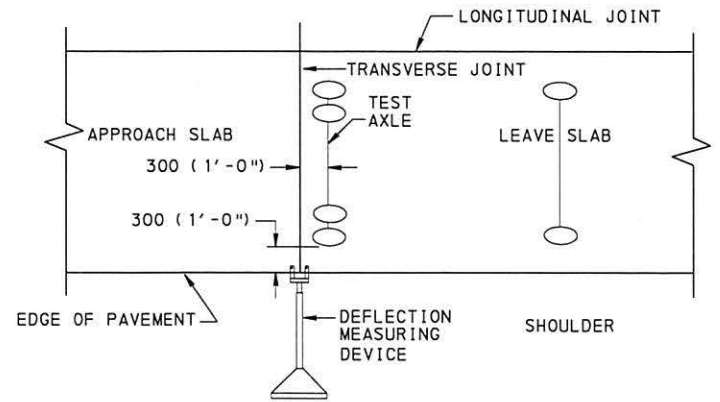
SHT 6 OF 9  
RC-26M



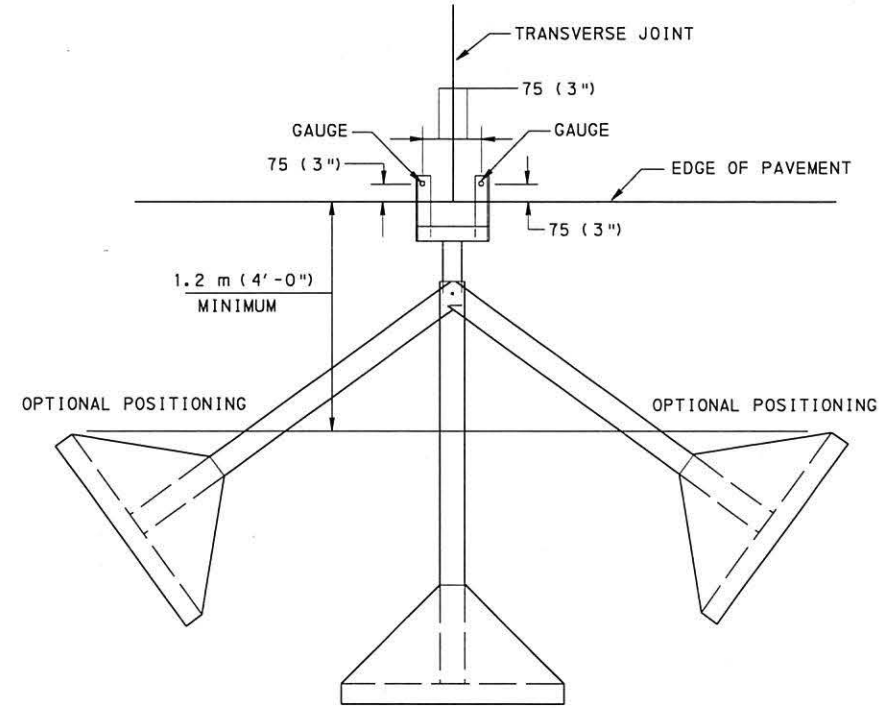
HOLE PATTERNS FOR PAVEMENT SLAB STABILIZATION



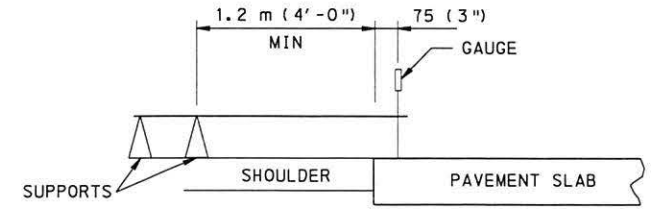
POSITION OF TEST AXLE FOR TAKING DEFLECTIONS WITH LOADED APPROACH SLAB



POSITION OF TEST AXLE FOR TAKING DEFLECTIONS WITH LOADED LEAVE SLAB



TYPICAL PLACEMENT OF APPROVED DEFLECTION MEASURING DEVICE AT JOINT



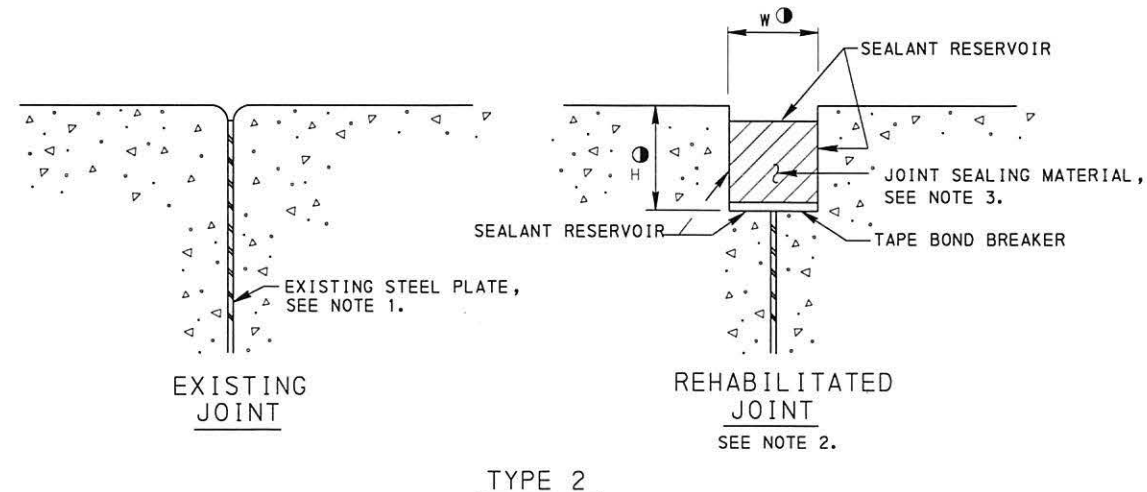
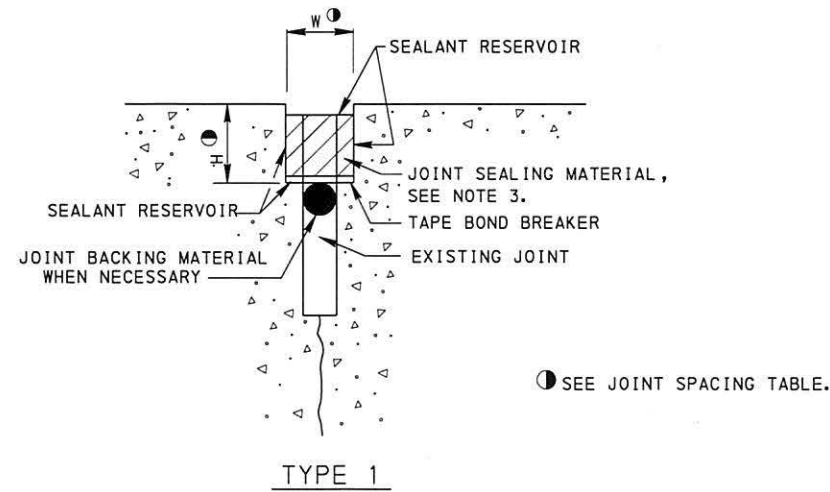
ELEVATION VIEW

- NOTE
1. DRILL NEW HOLES FOR REGROUTING 150 (6") CLOSER TO JOINT OR CRACK.

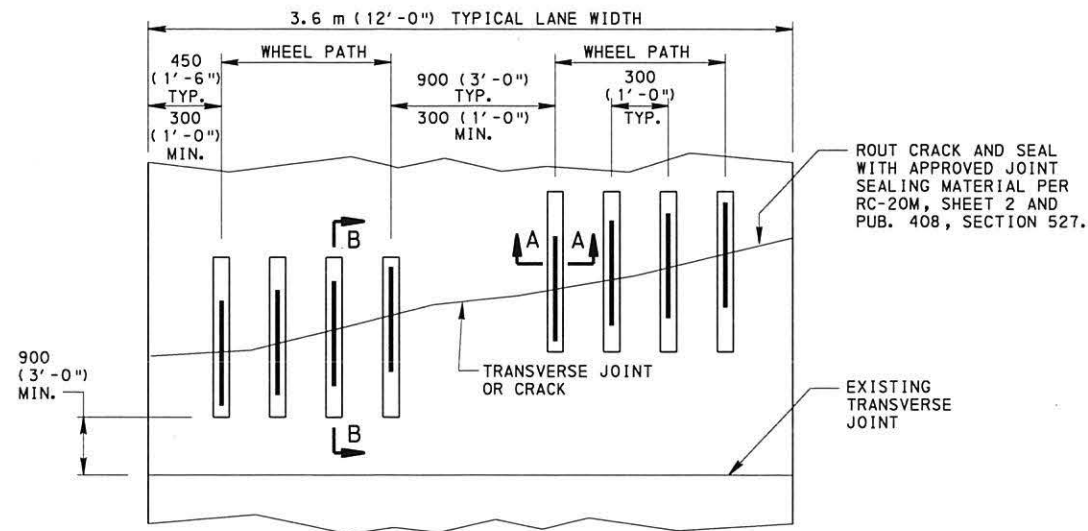
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

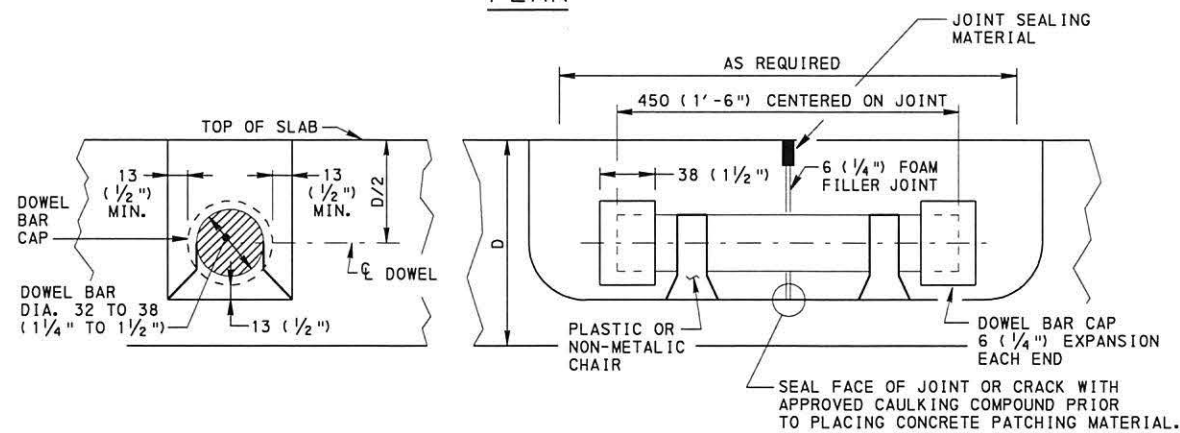
CONCRETE PAVEMENT  
REHABILITATION  
(PATCHING)



## JOINT REHABILITATION



PLAN



SECTION A-A

SECTION B-B

## DOWEL RETROFIT

- NOTES:
- FOR DIFFERENT LANE WIDTHS, ADJUST SPACING FROM OUTSIDE BAR TO LANE EDGE AND SPACING BETWEEN CENTER BARS.
  - SIZE DOWEL BAR AS SHOWN ON RC-20M, SHT. 1.
  - PLACE DOWEL BAR AT THE MID-DEPTH OF THE THINNER PAVEMENT SLAB WHEN REPAIR AREA SPANS DIFFERENT PAVEMENT SLABS.

JOINT SPACING	W	H
≥ 15 m (50'-0")	25 (1")	32 (1 1/4")
≥ 6 m (20'-0") AND < 15 m (50'-0")	19 (3/4")	25 (1")
< 6 m (20'-0")	10 (3/8")	19 (3/4")

### NOTES

1. EXISTING STEEL PLATE IS EITHER 2.01 THICK (14 GAUGE) WITH LAPPED TOP OR FLAT PLATE 3 (1/8") THICK.
2. REMOVE THE STEEL PLATE WITHIN THE SEALANT RESERVOIR.
3. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (1/8") TO 6 (1/4") BELOW THE SURFACE OF THE PAVEMENT.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

CONCRETE PAVEMENT  
REHABILITATION  
(JOINTS)

RECOMMENDED MAR. 30, 2006

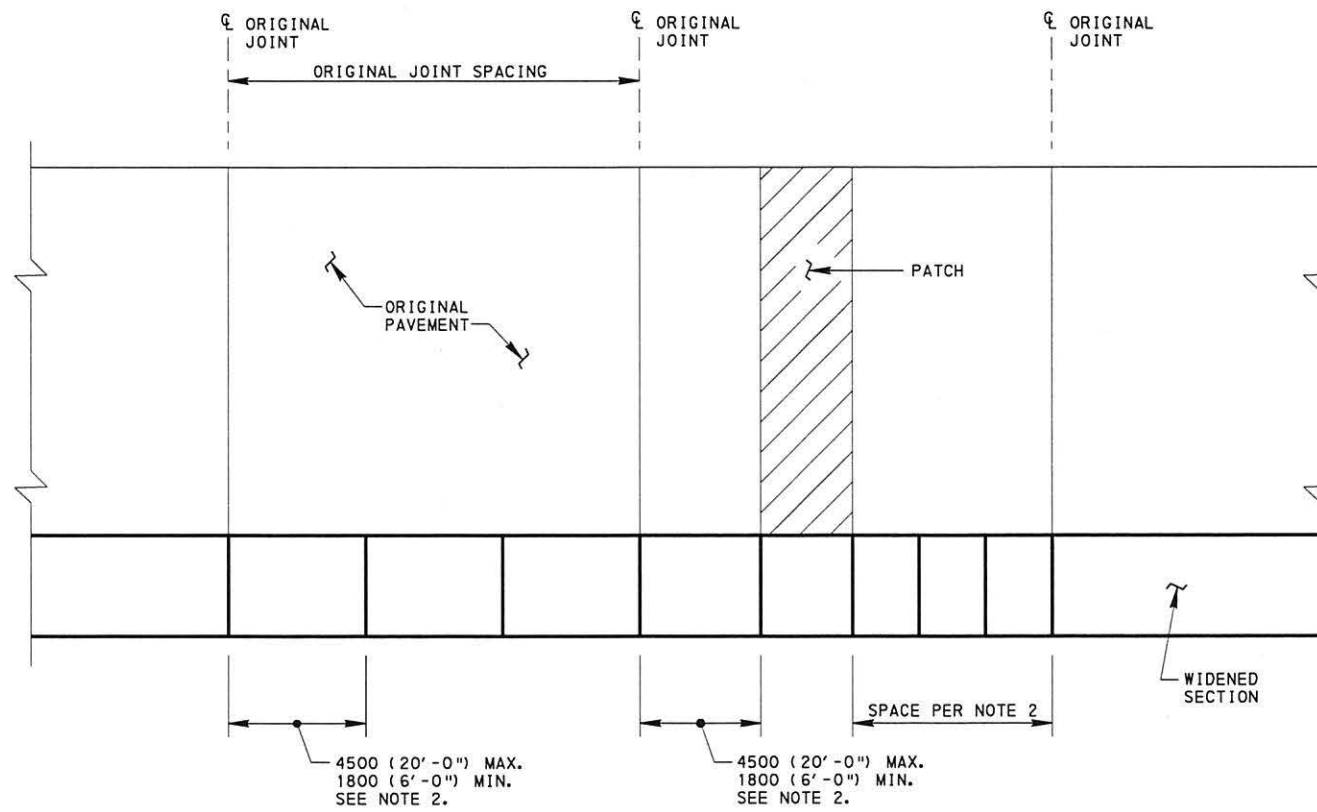
*Scott Christian*  
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006

*M. K. Patel*  
CHIEF ENGINEER

SHT 8 OF 9

RC-26M



**LANE WIDENING PLAN**

**NOTES:**

1. MATCH ORIGINAL JOINTS AND PATCH JOINTS. IF INTERMEDIATE JOINTS ARE REQUIRED SPACE EVENLY IN BETWEEN.
2. THE RATIO OF SLAB WIDTH TO LENGTH SHOULD NOT EXCEED 1.25 EXCEPT TO MATCH AN EXISTING JOINT WITHIN 1.5 m (5'-0").
3. SPACE TIE BARS IN ACCORDANCE WITH RC-27M.
4. SPACE LOAD TRANSFER UNIT IN ACCORDANCE WITH RC-20M.
5. FOR JOINT TYPES, SEE RC-27M. MATCH MAINLINE JOINT TYPE REQUIREMENTS, IF JOINTS ARE SPACED AT 4500 (20'-0"), USE 4500 (20'-0") SPACING FOR WIDENING.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

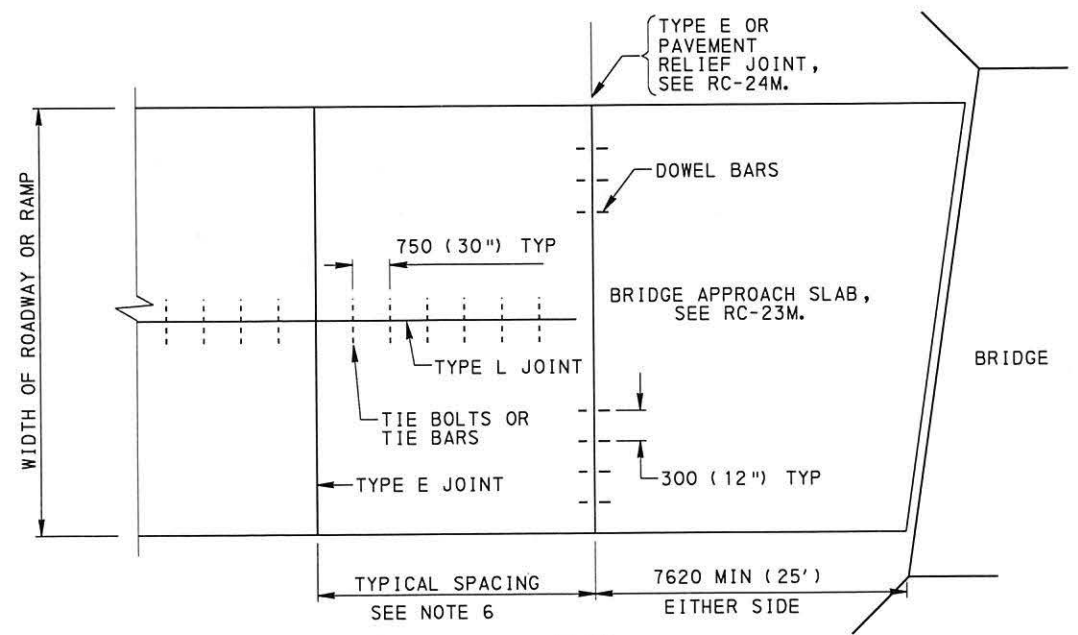
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

CONCRETE PAVEMENT  
REHABILITATION  
(LANE WIDENING)

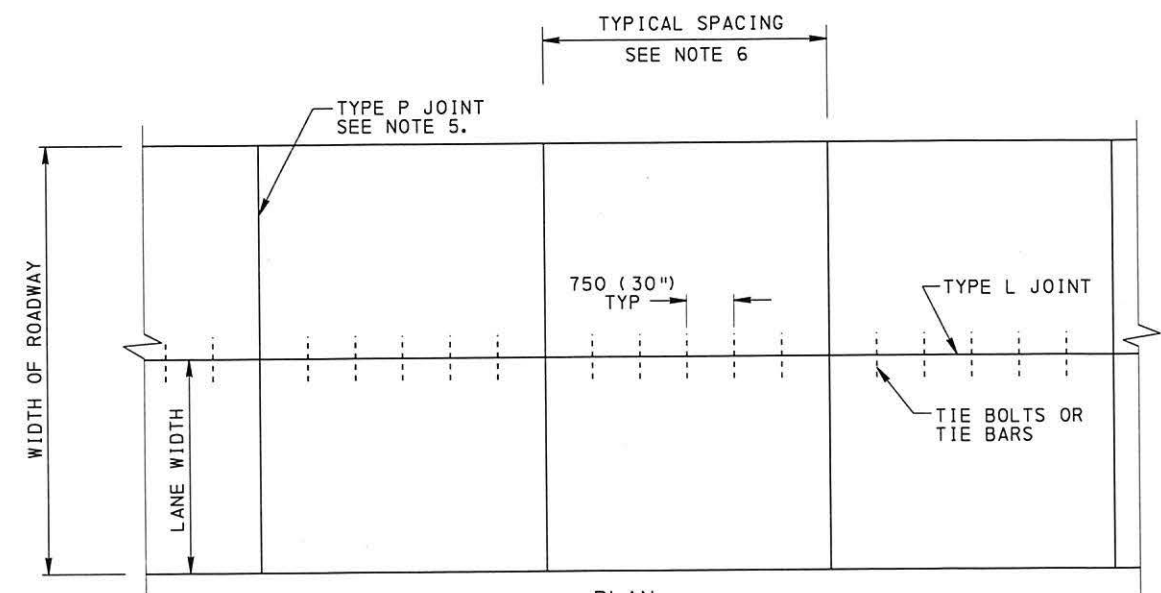
RECOMMENDED MAR. 30, 2006  
*Scott Christian*  
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006  
*M. L. Kattel*  
CHIEF ENGINEER

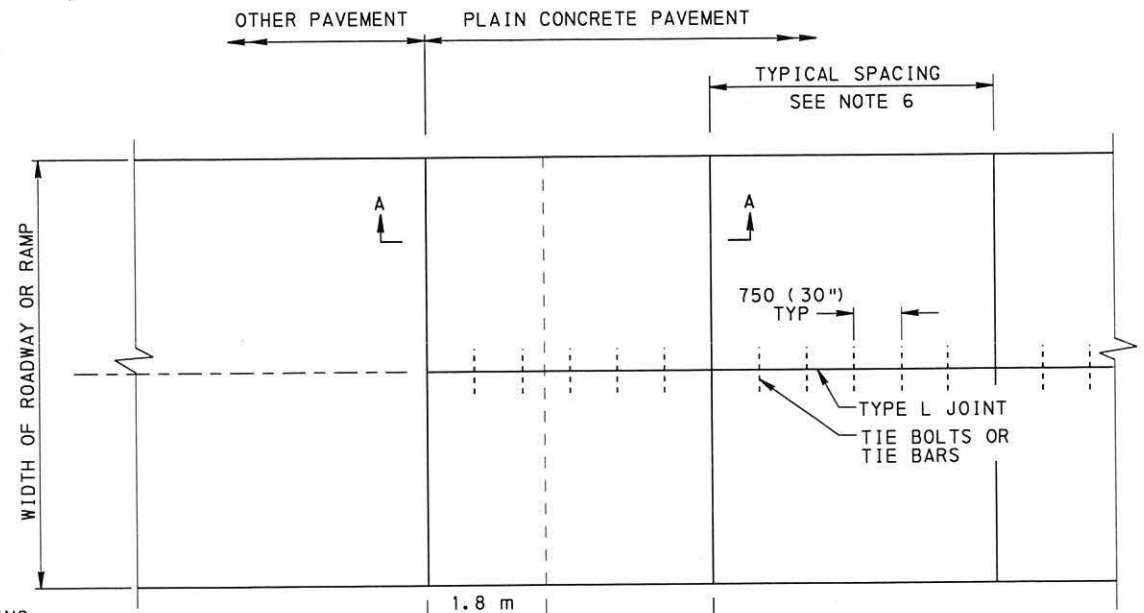
SHT 9 OF 9  
RC-26M



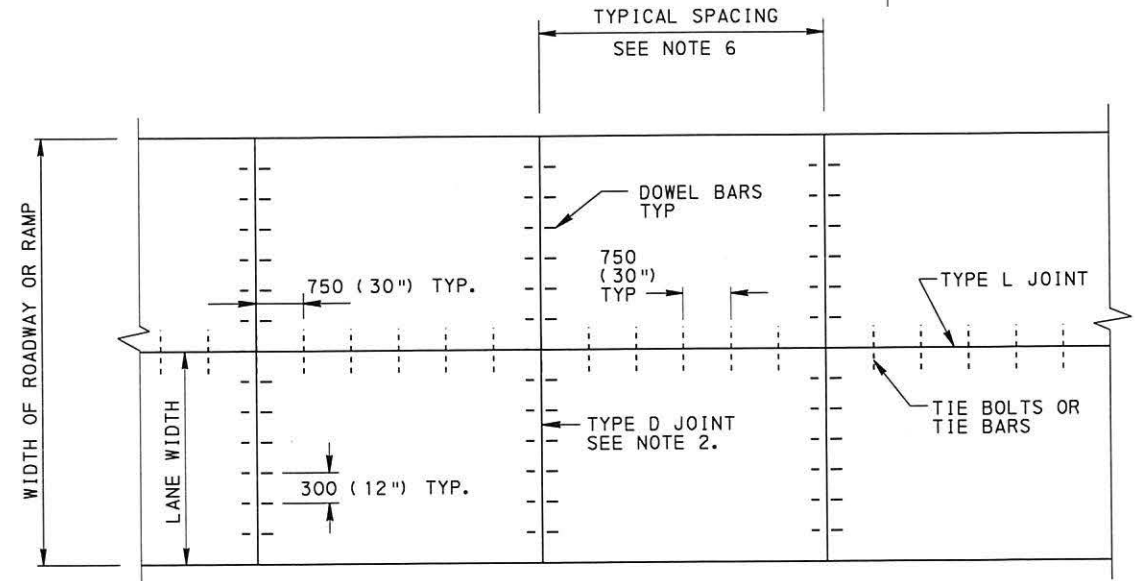
PLAN  
BRIDGE APPROACHES



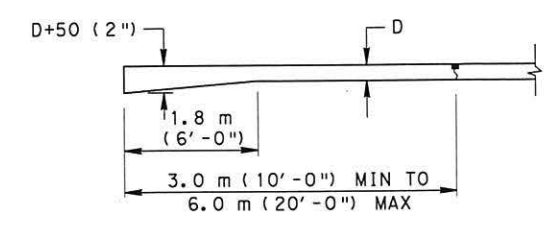
PLAN  
COLLECTORS AND LOCAL ROADS



PLAN  
TERMINAL SLAB



PLAN  
INTERSTATE AND OTHER LIMITED ACCESS  
FREEWAYS, ARTERIALS AND RAMPS



SECTION A-A

NOTES

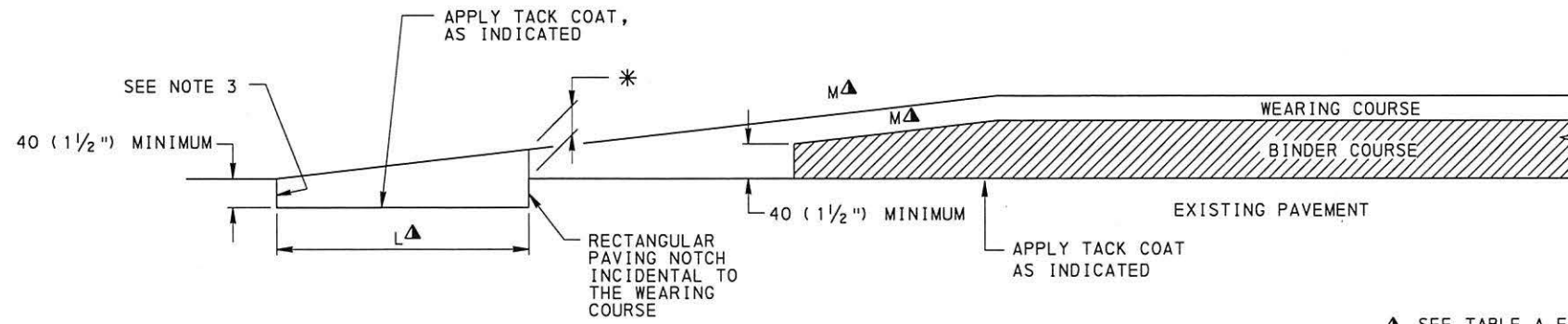
1. FOR JOINT DETAILS, SEE RC-20M.
2. CONSTRUCT TYPE D JOINTS ON INTERSTATE, EXPRESSWAY, ARTERIAL AND RAMP PAVEMENTS.
3. WHEN RAMP OR LANE WIDTH EXCEEDS 4.2 m (14'), A TYPE L JOINT IS REQUIRED AT THE MIDPOINT.
4. CONSTRUCT ACCELERATION AND DECELERATION PORTION OF RAMPS WITH THE SAME PAVEMENT STRUCTURE AS THE MAINLINE PAVEMENT TO THE FIRST TRANSVERSE JOINT BEYOND THE RAMP GORE.
5. CONSTRUCT TYPE P JOINT, AS INDICATED, ON COLLECTORS AND LOCAL ROADS.
6. USE A 4.5 m (15') JOINT SPACING ON ALL PAVEMENTS.
7. ON CURVES, THE JOINT SHALL BE CONSTRUCTED PERPENDICULAR TO THE TANGENT ON THE LONG RADIUS SIDE OF THE CURVE.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

PLAIN CONCRETE PAVEMENT

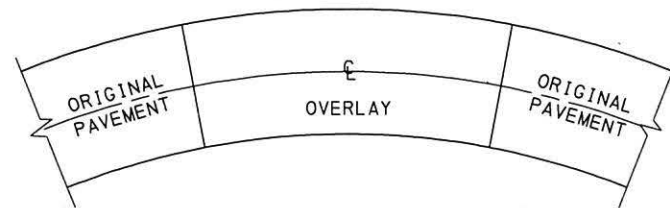
17-MAY-2006



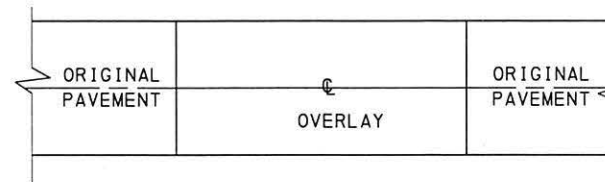
**OVERLAY TRANSITION WITH PAVING NOTCH ON CONCRETE AND BITUMINOUS PAVEMENTS**

▲ SEE TABLE A FOR DIMENSIONAL REQUIREMENTS

\* SHOULD EQUAL THE THICKNESS OF THE WEARING COURSE.

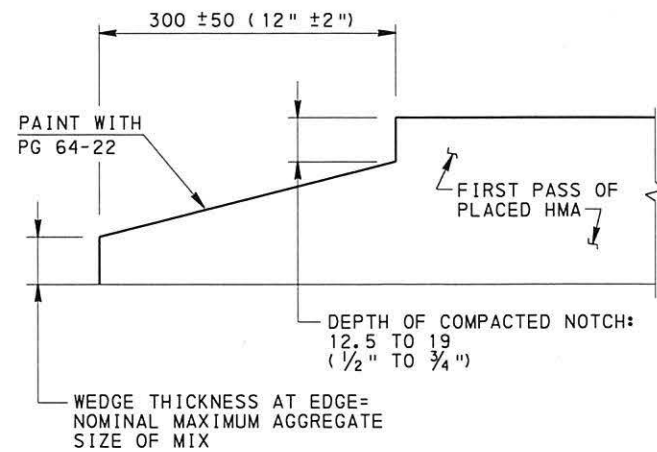


**PLAN VIEW  
SUPERELEVATION SECTION**



**PLAN VIEW  
TANGENT SECTION  
TWO-LANE, TWO-WAY TRAFFIC AND  
TWO-LANE DIRECTIONAL**

**OVERLAY TRANSITIONS**



**LONGITUDINAL NOTCHED WEDGE JOINT**

**TABLE A**

FUNCTIONAL CLASSIFICATION	SLOPE M (MAXIMUM)	PAVING NOTCH L (MINIMUM)
INTERSTATE AND OTHER LIMITED ACCESS FREEWAYS	0.17% (1" IN 50')	15 m (50')
ARTERIALS > 70 km/h (45 MPH) SEE NOTE 2.	0.28% (1" IN 30')	9 m (30')
ARTERIALS < 70 km/h (45 MPH) SEE NOTE 2	0.83% (1" IN 10')	3 m (10')
COLLECTORS AND LOCAL ROADS	0.83% (1" IN 10')	3 m (10')
CROSS STREETS SEE NOTE 1	8.33% (1" IN 12")	0.3 m (1')
DRIVEWAYS	8.33% (1" IN 12")	NO NOTCH

**TABLE B**

NOMINAL MAXIMUM AGGREGATE SIZE		
MIX	METRIC	ENGLISH
SP9.5 (ID-2W, ID-2W H.D.)	9.5	3/8"
SP12.5	12.5	1/2"
SP19 (ID-3B, ID-2B, ID-2B H.D.)	19	3/4"

**NOTES:**

- USE HIGHER APPROPRIATE CRITERIA IF A CROSS STREET HAS A FUNCTIONAL CLASSIFICATION OF COLLECTORS AND LOCAL ROADS OR HIGHER.
- USE 85TH PERCENTILE SPEED, IF AVAILABLE. OTHERWISE, USE THE POSTED SPEED.
- PLACE EDGE FLUSH WITH EXISTING PAVEMENT AND SEAL AS SPECIFIED IN PUBLICATION 408, SECTION 401.3(K)3.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN**

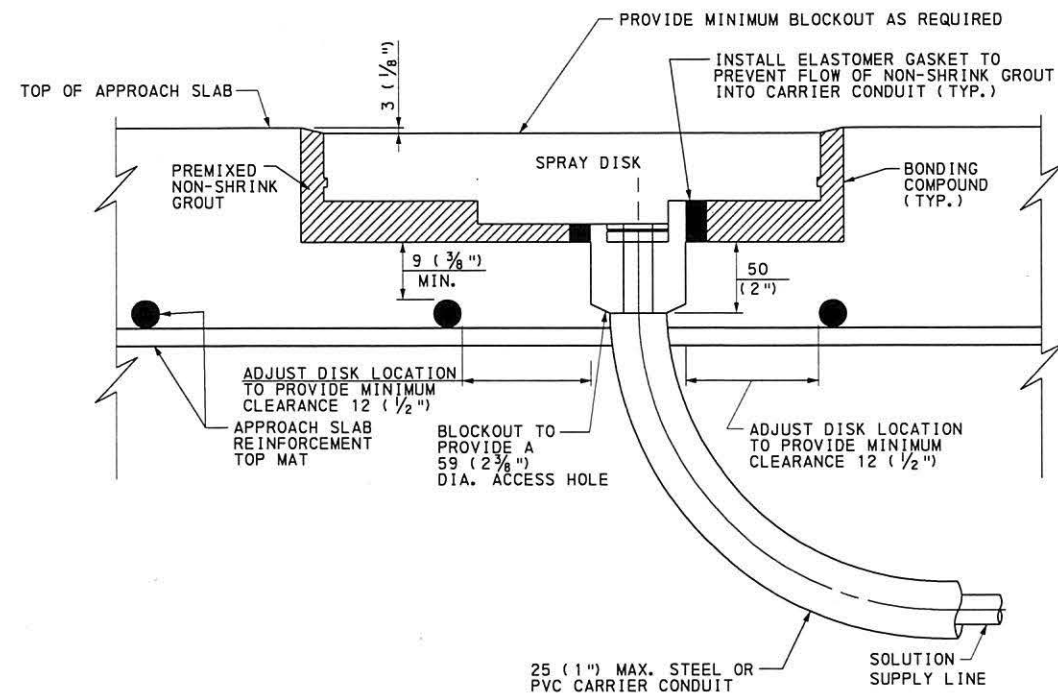
**OVERLAY TRANSITIONS  
AND  
PAVING NOTCHES**

RECOMMENDED MAR. 30, 2006  
*Scott Christa*  
DIRECTOR, BUREAU OF DESIGN

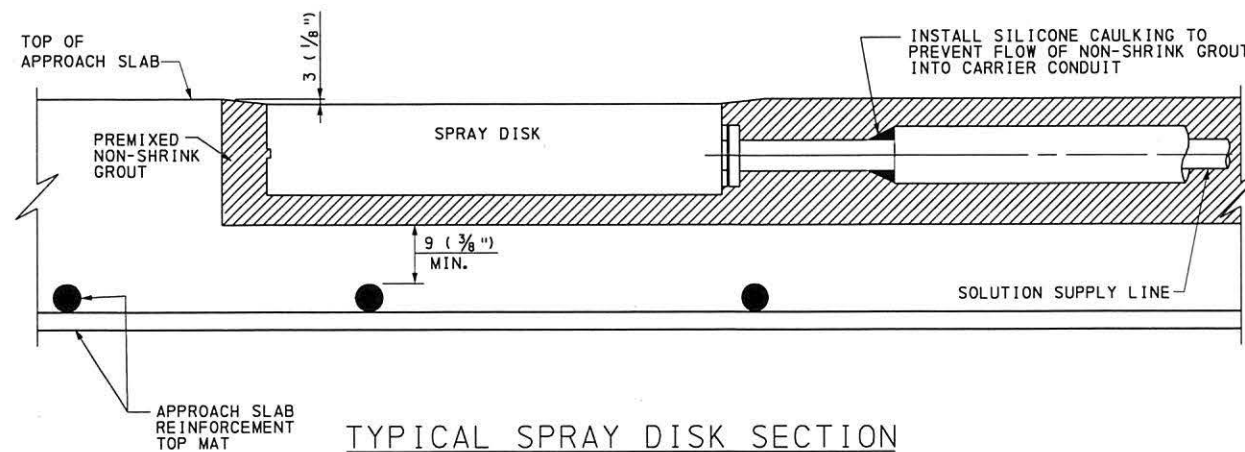
RECOMMENDED MAR. 30, 2006  
*M. Chitel*  
CHIEF ENGINEER

SHT 1 OF 1  
RC-28M

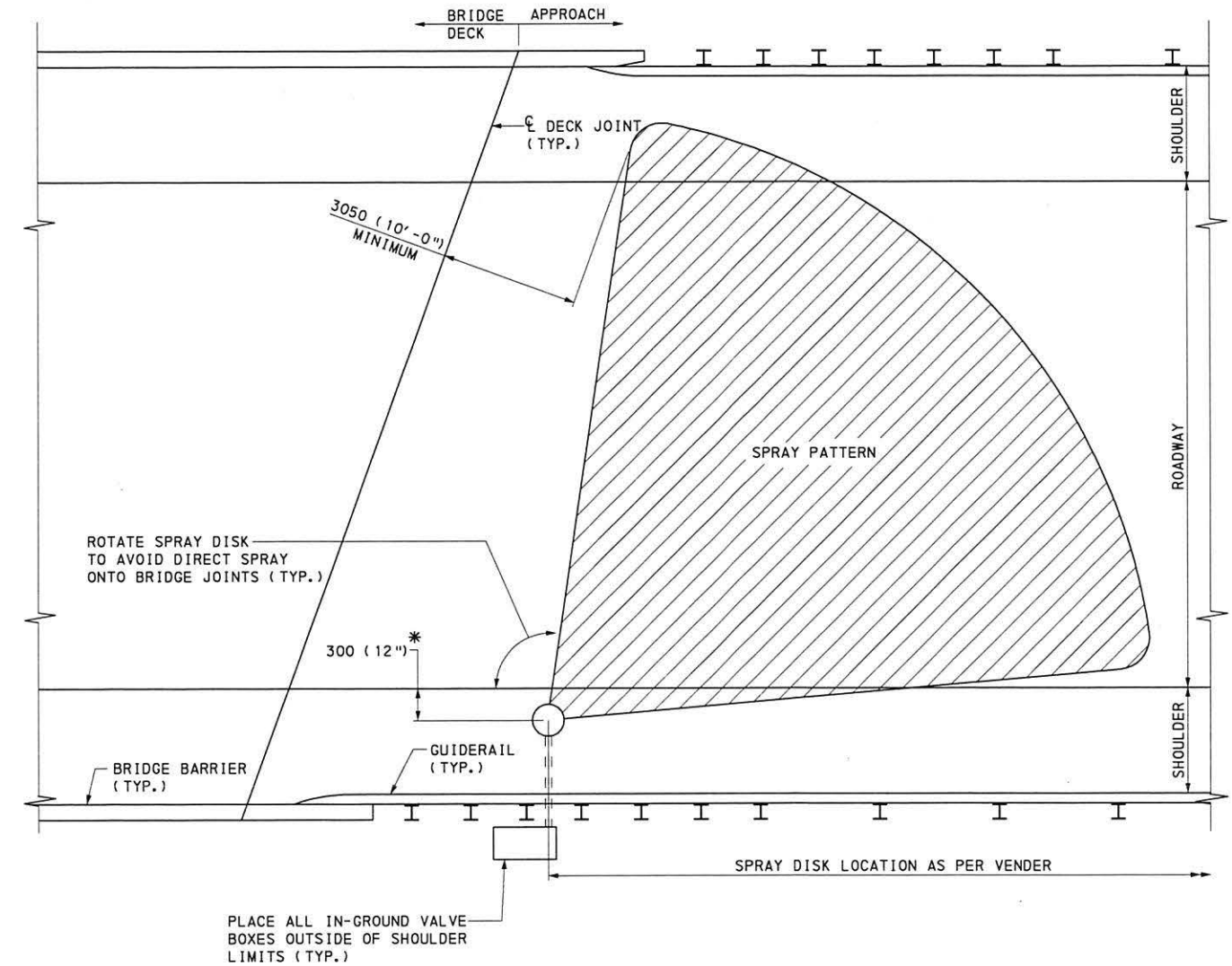




TYPICAL SPRAY DISK SECTION  
(NEW CONSTRUCTION)



TYPICAL SPRAY DISK SECTION  
(EXISTING APPROACH SLAB)



APPROACH PLAN

\* PREFERRED LOCATION FOR SPRAY DISKS IS AS SHOWN ON SHOULDER, WHICH MINIMIZES TRAFFIC DISRUPTIONS WHEN SPRAY DISKS REQUIRE MAINTENANCE. THE ADE OF MAINTENANCE MUST APPROVE ALL OTHER LOCATIONS. OTHER ACCEPTABLE LOCATIONS INCLUDE THE CENTER OF THE TRAVEL LANE.

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS ARE IN ( ) PARENTHESES.
2. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH PUBLICATION 408.
3. THESE STANDARDS ARE PRESENTED TO FACILITATE THE INSTALLATION OF SPRAY DISKS FOR AN ANTI-ICING SYSTEM. SEE BC-723M FOR ADDITIONAL INFORMATION, INSTALLATION METHODS, AND FOR AN ANTI-ICING SYSTEM INSTALLATION ON A BRIDGE STRUCTURE.
4. CONSTRUCT SPRAY DISKS USING STAINLESS STEEL OR OTHER DURABLE MATERIALS THAT ARE UV RESISTANT. PROVIDE SPRAY DISKS THAT WILL ACCOMMODATE ADJUSTMENTS TO THE SPRAY PATTERN AFTER INSTALLATION. ADJUSTMENT CHOICES INCLUDE NOZZLE ROTATION AND NOZZLE REPLACEMENT.
5. ENCLOSE ALL BURIED OR CONCRETE ENCASED SOLUTION SUPPLY LINES AND ELECTRICAL WIRING IN STEEL OR PVC CONDUIT IN ACCORDANCE WITH PUBLICATION 408, SECTION 1101.09(b).
6. WHEN INSTALLING ANTI-ICING SYSTEM IN AN EXISTING CONCRETE APPROACH SLAB, DRILL HOLE AND CUT KERF, PLACE CONDUIT AND SUPPLY LINE IN THE KERF AND THROUGH THE HOLE, AND FILL WITH PREMIXED NON-SHRINK GROUT AS INDICATED.

GENERAL NOTES (CONT'D):

7. USE A PREMIXED FLOWABLE NONSHRINK GROUT AS PER PUB. 408, SECTION 1080.2(c), FOR EMBEDDING ANTI-ICING HARDWARE IN CONCRETE.
8. TO AVOID DAMAGING OR CONFLICTING WITH REINFORCING STEEL IN EXISTING CONCRETE APPROACH SLABS, LIMIT MAXIMUM CORING AND SAW CUTTING FOR SPRAY DISKS AND CONDUITS TO DEPTH OF 60 (2 1/2").
9. NO CONDUIT JOINTS ARE PERMITTED FOR INSTALLATION IN EXISTING CONCRETE. FIELD BENDS ARE PERMITTED WHEN INTERNAL DIAMETER IS MAINTAINED.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

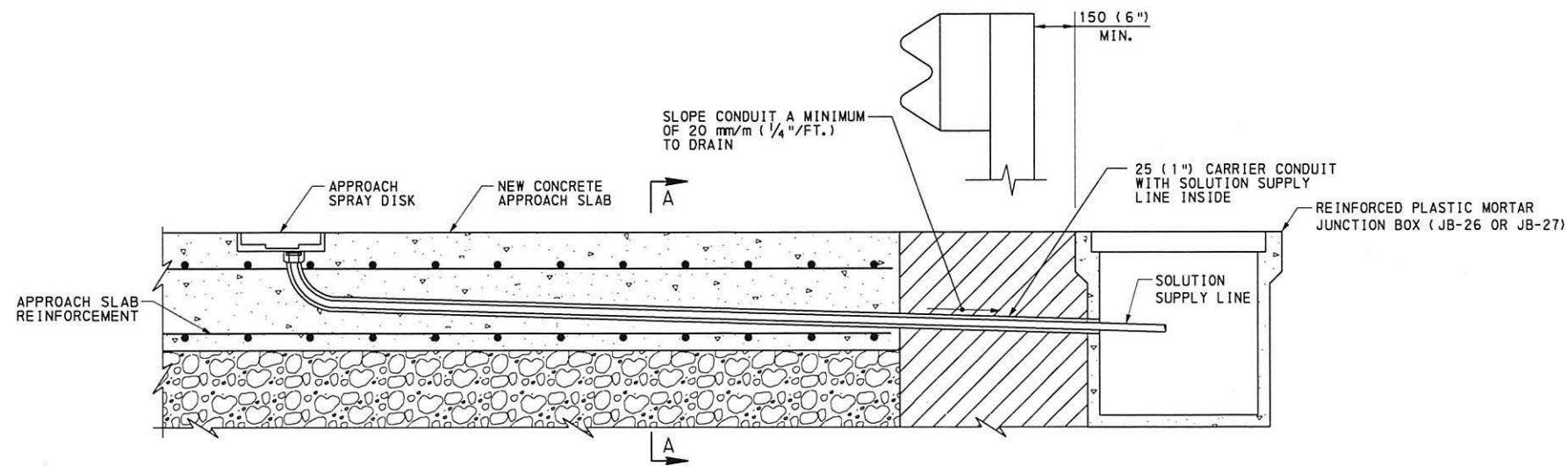
STANDARD  
BRIDGE ANTI-ICING SYSTEM  
APPROACH INSTALLATION

RC-23M	BRIDGE APPROACH SLAB
RC-81M	JUNCTION BOXES - LIGHT DUTY
REFERENCE DRAWINGS	

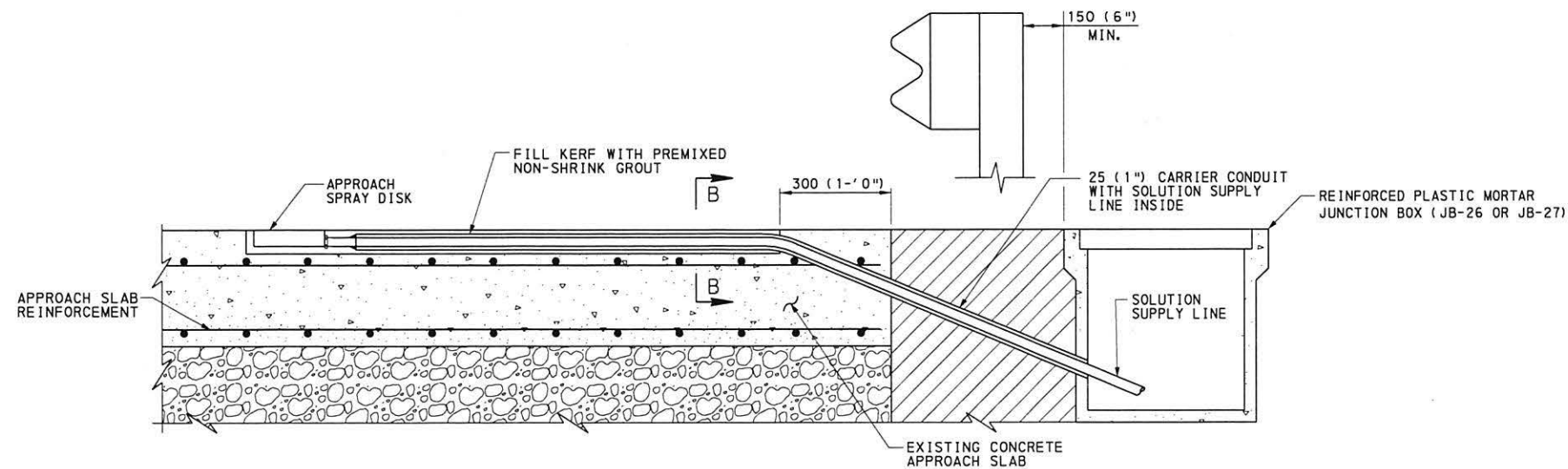
RECOMMENDED MAR. 30, 2006  
*Scott Christen*  
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006  
*M. Chitel*  
CHIEF ENGINEER

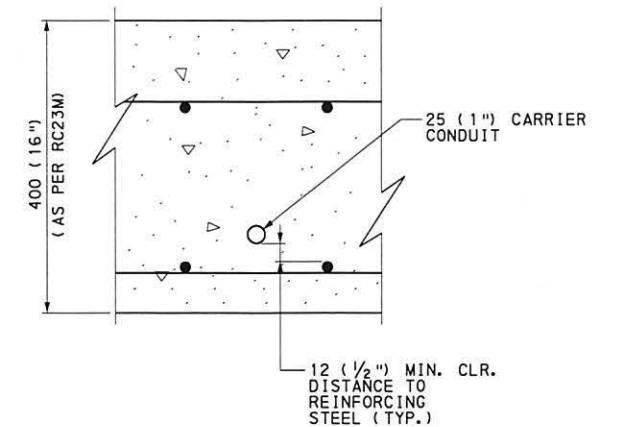
SHEET 1 OF 3  
RC-29M



INSTALLATION OF SPRAY DISK FOR ANTI-ICING SYSTEM  
(NEW APPROACH CONCRETE PAVEMENT)



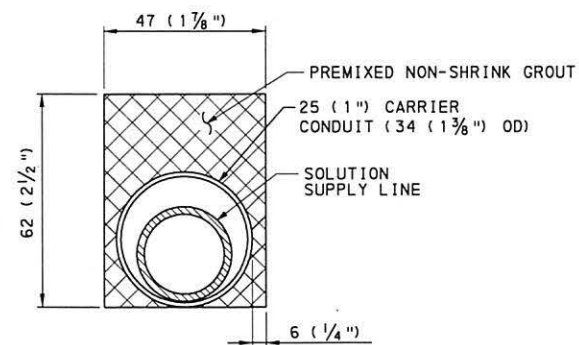
INSTALLATION OF SPRAY DISK FOR ANTI-ICING SYSTEM  
(EXISTING APPROACH CONCRETE PAVEMENT)



SECTION A-A

NOTES:

- FOR GENERAL NOTES, SEE SHEET 1.



SECTION B-B  
(SAW KERF DETAIL FOR CONCRETE PAVEMENT)

LEGEND:

- CONCRETE ROADWAY
- ROADWAY SUBBASE
- EMBANKMENT MATERIAL

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

STANDARD  
BRIDGE ANTI-ICING SYSTEM  
APPROACH INSTALLATION

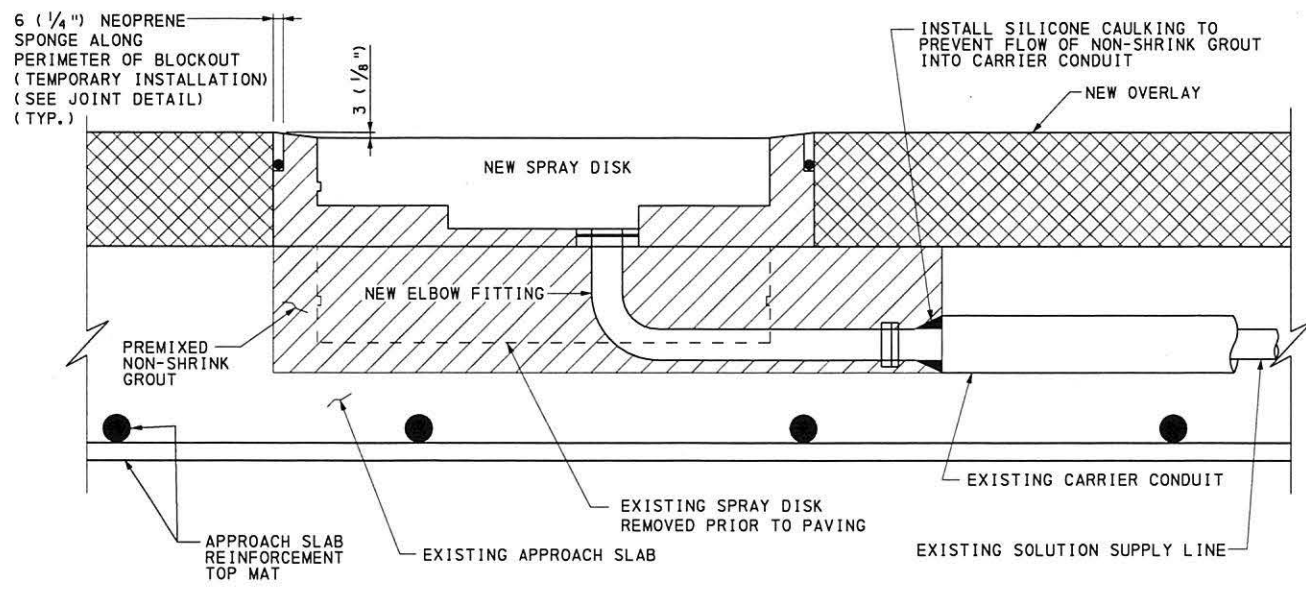
RC-23M	BRIDGE APPROACH SLAB
RC-81M	JUNCTION BOXES - LIGHT DUTY
REFERENCE DRAWINGS	

RECOMMENDED MAR. 30, 2006  
*Scott Christa*  
DIRECTOR, BUREAU OF DESIGN

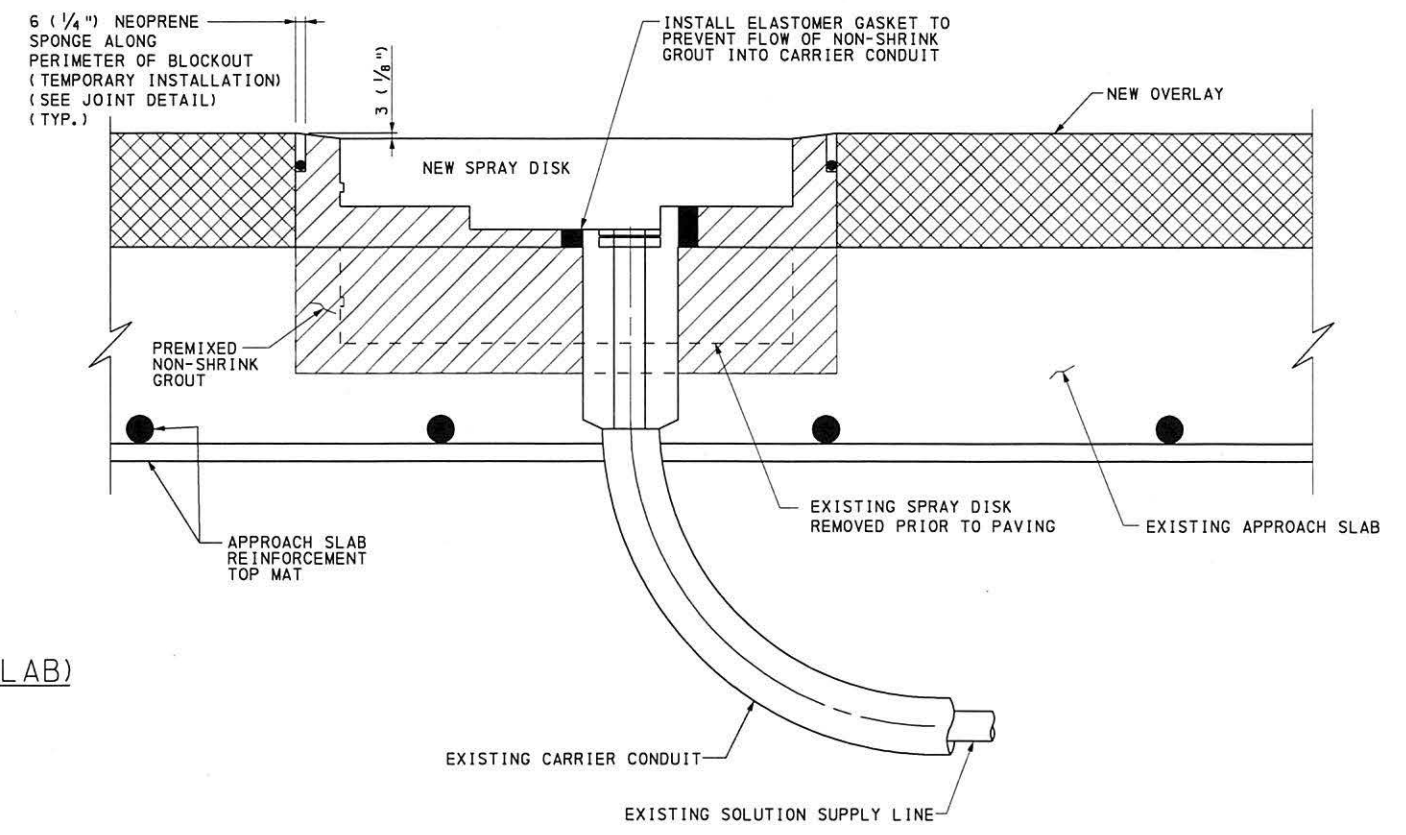
RECOMMENDED MAR. 30, 2006  
*M. Chitel*  
CHIEF ENGINEER

SHEET 2 OF 3  
RC-29M

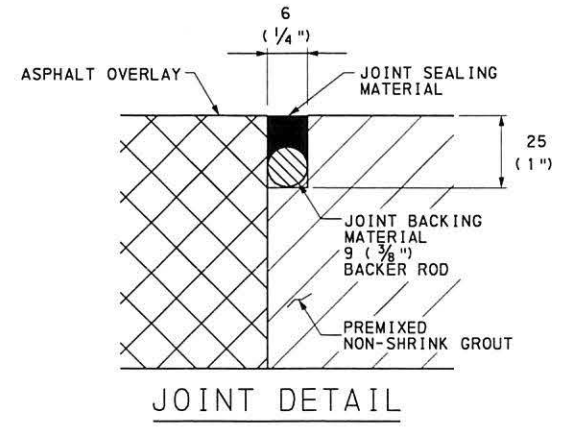




SPRAY DISK ADJUSTMENT TO ACCOMMODATE BITUMINOUS OVERLAY  
(ORIGINAL SPRAY DISK INSTALLED AFTER CONSTRUCTION OF APPROACH SLAB)

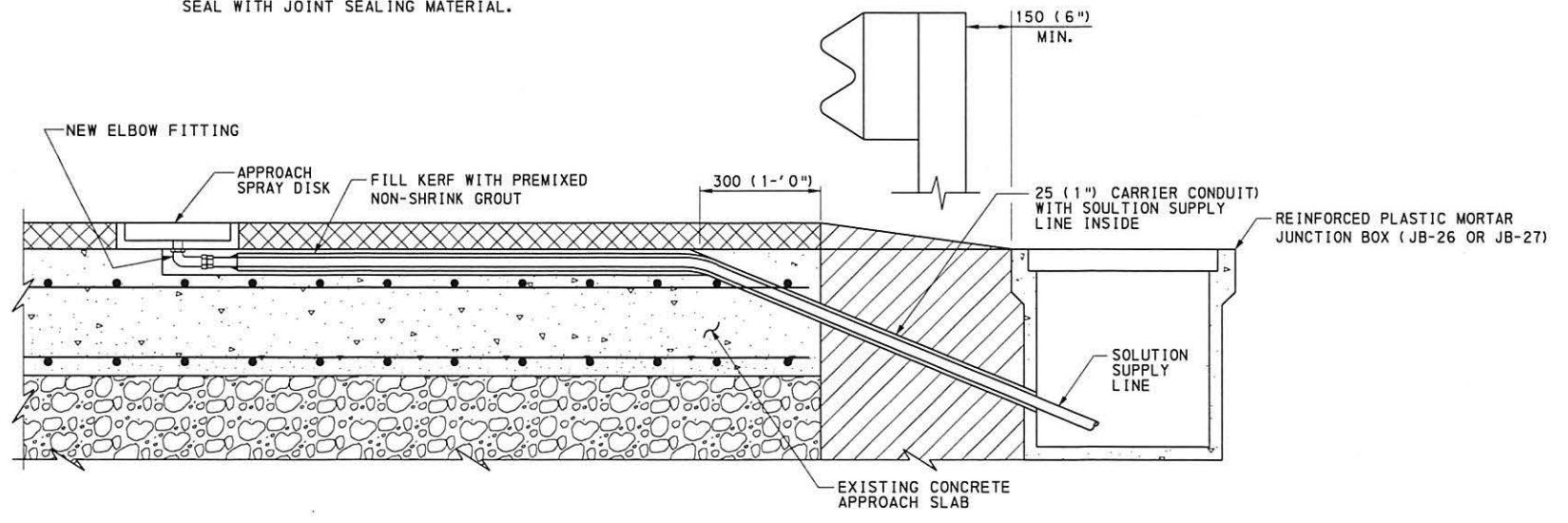


SPRAY DISK ADJUSTMENT TO ACCOMMODATE BITUMINOUS OVERLAY  
(ORIGINAL SPRAY DISK INSTALLED CONCURRENTLY WITH APPROACH SLAB)



JOINT DETAIL




NOTE: INSTALL JOINT MATERIAL GROUT WITH 6 (1/4 inch) NEOPRENE SPONGE AROUND PERIMETER OF BLOCKOUT/CUTOUT IN THE OVERLAY LAYER ONLY. AFTER GROUT HARDENS, REMOVE SPONGE AND INSTALL 9 (3/8 inch) BACKER ROD AND SEAL WITH JOINT SEALING MATERIAL.



INSTALLATION OF SPRAY DISK FOR ANTI-ICING SYSTEM  
(SPRAY DISK INSTALLED CONCURRENTLY WITH NEW BITUMINOUS OVERLAY)

NOTE: DETAIL SIMILAR FOR SPRAY DISK INSTALLED WITH EXISTING OVERLAY. EMBED CARRIER CONDUIT IN CONCRETE.

LEGEND:

-  CONCRETE ROADWAY
-  ROADWAY SUBBASE
-  EMBANKMENT MATERIAL

NOTES:

1. FOR GENERAL NOTES, SEE SHEET 1.
2. FOR KERF DETAILS, SEE SHEET 2.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

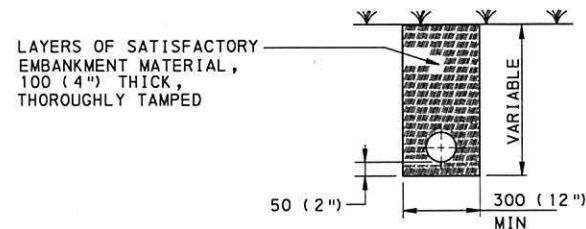
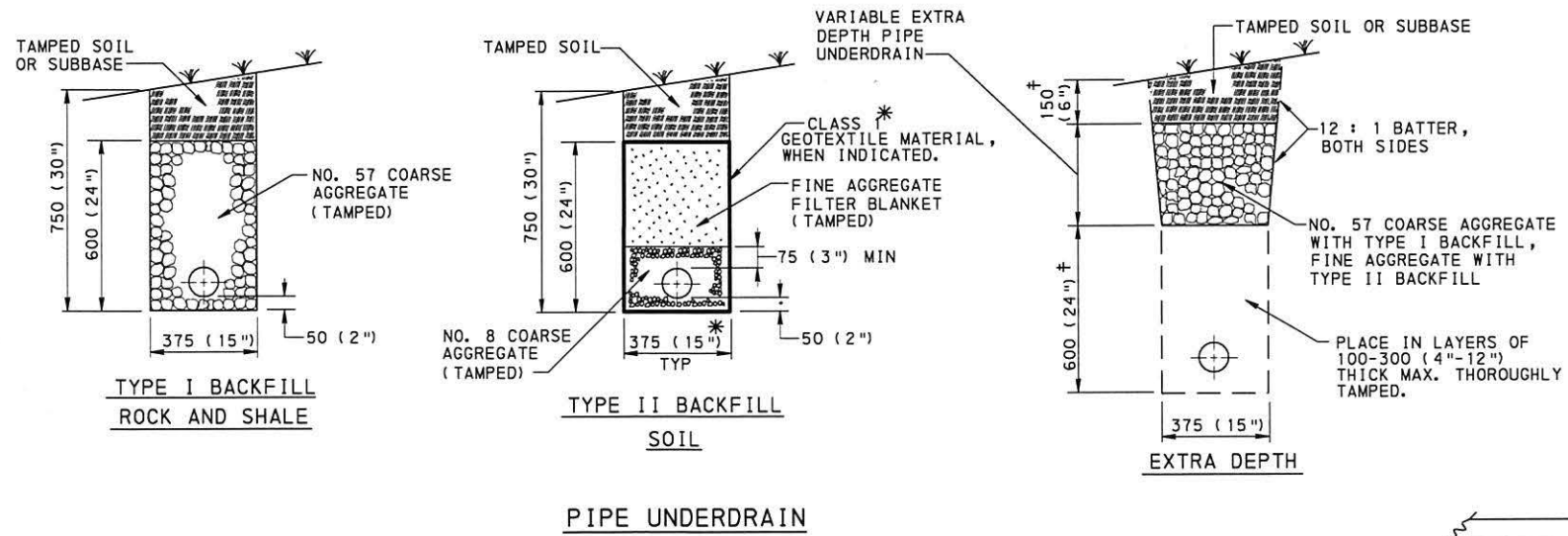
STANDARD  
BRIDGE ANTI-ICING SYSTEM  
SPRAY DISK ADJUSTMENT  
FOR APPROACH OVERLAY

RC-23M	BRIDGE APPROACH SLAB
RC-81M	JUNCTION BOXES - LIGHT DUTY
REFERENCE DRAWINGS	

RECOMMENDED MAR. 30, 2006  
*Scott Christie*  
DIRECTOR, BUREAU OF DESIGN

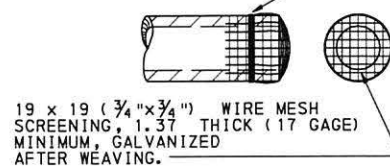
RECOMMENDED MAR. 30, 2006  
*M. Ghel*  
CHIEF ENGINEER

SHEET 3 OF 3  
RC-29M



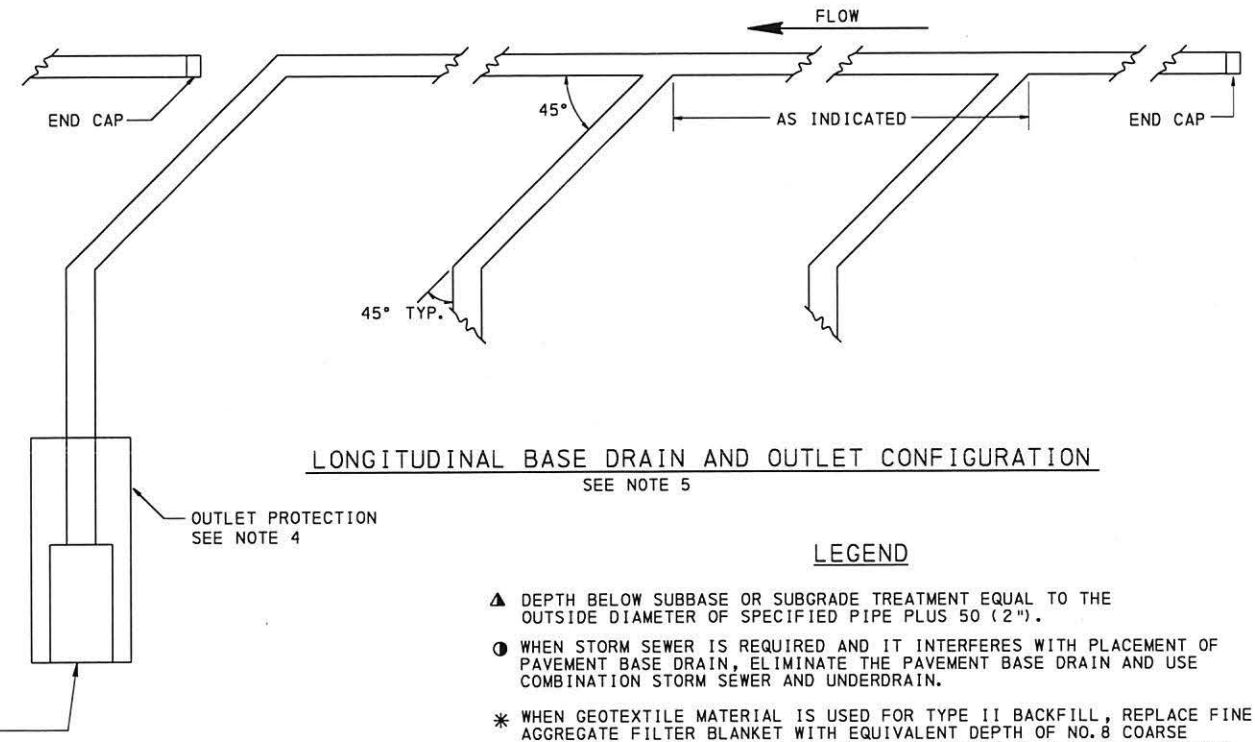
EXCAVATION OVER 900 (36") IN DEPTH AND FOR A MAXIMUM WIDTH OF 600 (24") IS PAYABLE AS CLASS 4 EXCAVATION. USE SUBSURFACE DRAIN OUTLETS FOR ALL PIPE UNDERDRAIN AND PAVEMENT BASE DRAINS.

CRIMP AROUND OUTLET END OF PIPE AND SECURE TO PIPE WITH GALVANIZED STEEL WIRE OR OTHER ACCEPTABLE FASTENING METHODS. SEE NOTE 4



**DETAIL A WIRE MESH SHIELD**

CONSTRUCT THE OUTLET INVERT 100 (3") (MINIMUM) HIGHER THAN THE SWALE LINE ELEVATION.



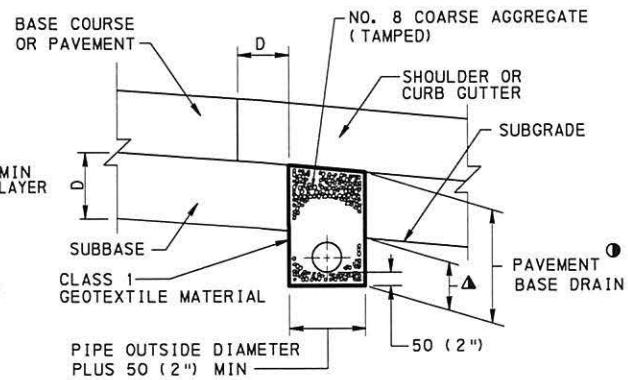
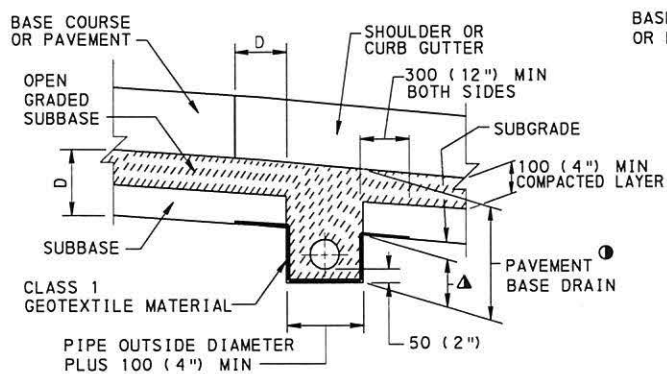
**NOTES**

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTION 610 FOR PIPE UNDERDRAIN AND PAVEMENT BASE DRAIN.
2. PROVIDE BITUMINOUS PAPER WHEN GEOTEXTILE MATERIAL IS NOT INDICATED.
3. FOR THE SUBSURFACE DRAIN OUTLET PROVIDE MATERIALS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 615. A MINIMUM OF 600 (24") OF COVER OVER THE PIPE IS REQUIRED FOR OUTLETS CONSTRUCTED WITH THE SAME MATERIAL AS THE UNDERDRAIN OR PAVEMENT BASE DRAIN.
4. USE THE WIRE MESH SHIELD IN AREAS NOT SUBJECT TO MOWING OR DAMAGE BY EQUIPMENT OR VEHICLES. REFER TO RC-31M FOR CONSTRUCTION OF ENDWALLS FOR OUTLET PROTECTION.
5. LONGITUDINAL BASE DRAINS MAY RUN CONTINUOUSLY THROUGH TWO (2) OUTLETS. USE A 45° ELBOW ON THE THIRD OUTLET OF A SERIES. BEGIN THE DRAIN FOLLOWING THE THIRD OUTLET WITH AN END CAP.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.

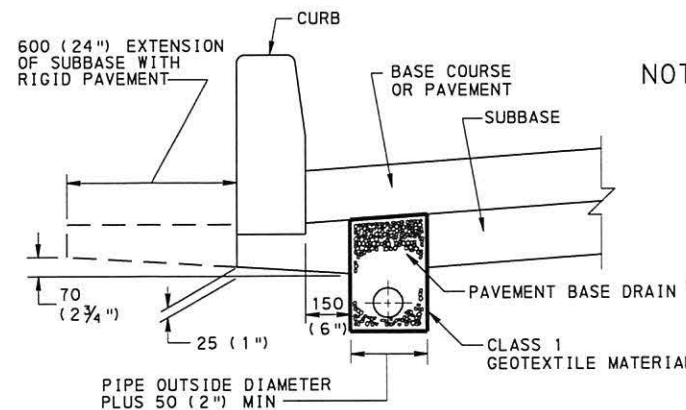
**LEGEND**

- ▲ DEPTH BELOW SUBBASE OR SUBGRADE TREATMENT EQUAL TO THE OUTSIDE DIAMETER OF SPECIFIED PIPE PLUS 50 (2").
- WHEN STORM SEWER IS REQUIRED AND IT INTERFERES WITH PLACEMENT OF PAVEMENT BASE DRAIN, ELIMINATE THE PAVEMENT BASE DRAIN AND USE COMBINATION STORM SEWER AND UNDERDRAIN.
- \* WHEN GEOTEXTILE MATERIAL IS USED FOR TYPE II BACKFILL, REPLACE FINE AGGREGATE FILTER BLANKET WITH EQUIVALENT DEPTH OF NO. 8 COARSE AGGREGATE. WHERE ACCESS BY TRENCH EQUIPMENT IS FEASIBLE, PROVIDE TRENCH WIDTH EQUAL TO PIPE OUTSIDE DIAMETER PLUS 50 (2"), BUT NOT LESS THAN 150 (6"), WHEN GEOTEXTILE MATERIAL IS INDICATED.
- ‡ TYPE I OR TYPE II BACKFILL
- D= SUBBASE DEPTH

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



**TYPICAL PLACEMENT (STANDARD SUBBASE)**  
**PAVEMENT BASE DRAIN**



COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

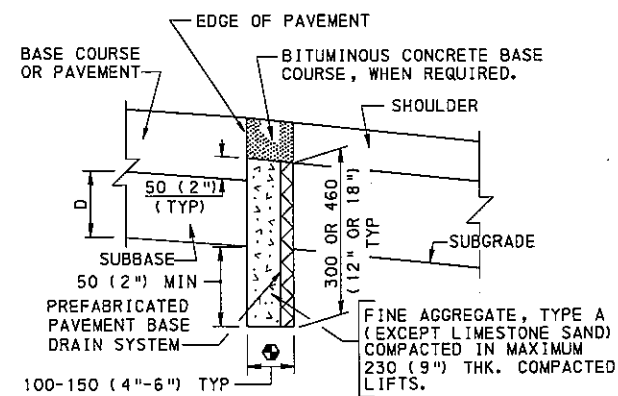
**SUBSURFACE DRAINS**

NOTES

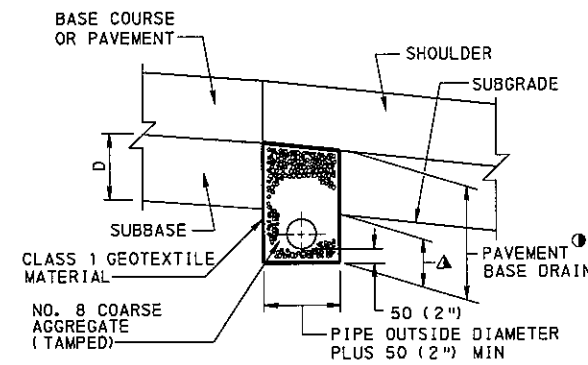
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 610 FOR PAVEMENT BASE DRAIN, SECTION 612 FOR SUBGRADE DRAINS AND SECTION 604 FOR COMBINATION STORM SEWER AND UNDERDRAIN.
2. PROVIDE BITUMINOUS PAPER WHEN GEOTEXTILE MATERIAL IS NOT INDICATED.
3. PREFABRICATED PAVEMENT BASE DRAIN IS NOT RECOMMENDED UNDER CURBED SECTIONS AND ADJACENT TO WIDENED PAVEMENT.
4. PLACE 2A AGGREGATE MATERIAL, IN A LIFT 75 (3") THICK, COMPACT TO 95% SPD.

LEGEND

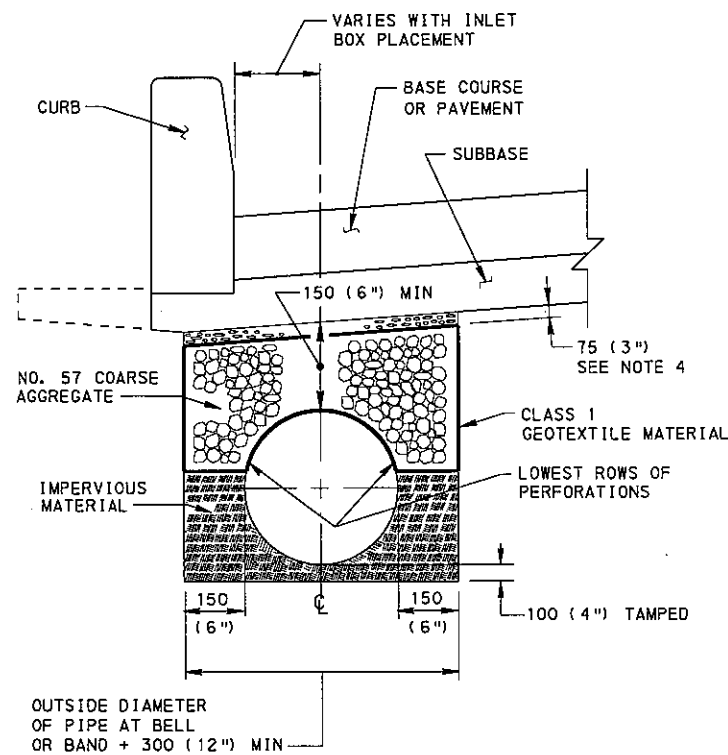
- ▲ DEPTH BELOW SUBBASE EQUAL TO THE OUTSIDE DIAMETER OF SPECIFIED PIPE PLUS 50 (2").
- WHEN STORM SEWER IS REQUIRED AND IT INTERFERES WITH PLACEMENT OF PAVEMENT BASE DRAIN, ELIMINATE THE PAVEMENT BASE DRAIN AND USE COMBINATION STORM SEWER AND UNDERDRAIN.
- D= SUBBASE DEPTH.
- IF SLOUGHING OF THE SUBBASE MATERIAL FROM UNDER THE PAVEMENT IS OBSERVED DURING TRENCH EXCAVATION, COMPACT BACKFILL HYDRAULICALLY, AS DIRECTED BY THE ENGINEER.
- WIDTH IS EQUAL TO 75-125 (3"-5") OF BACKFILL AGGREGATE PLUS 25 (1") FOR THE PREFABRICATED BASE DRAIN.
- \* VARY TO MAINTAIN THE NECESSARY SUBGRADE SLOPE. CONSIDER ADDITIONAL AGGREGATE INCIDENTAL TO THE SUBGRADE DRAIN PAY ITEM.



PREFABRICATED PAVEMENT BASE DRAIN (REHABILITATION)  
SEE NOTE 3.

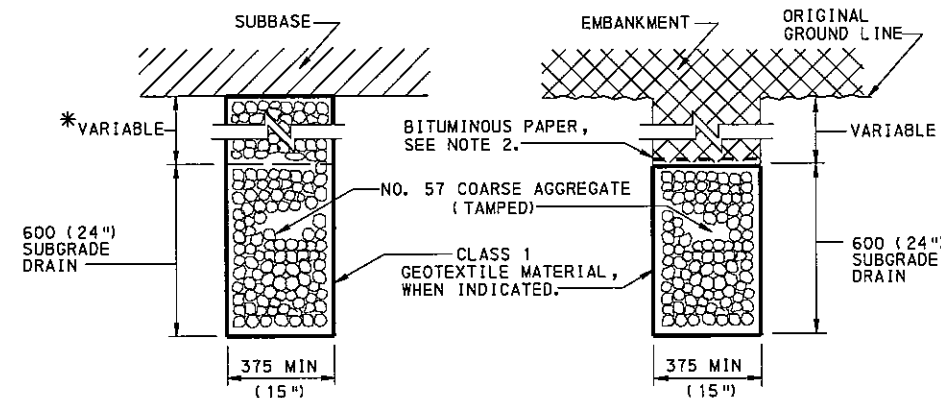


PAVEMENT BASE DRAIN (REHABILITATION)



COMBINATION STORM SEWER AND UNDERDRAIN

NOTE: PLACE NO. 57 COARSE AGGREGATE, TAMPED IN LAYERS 150 (6") THICK, STARTING AT THE LOWEST ROWS OF PERFORATIONS OR THE START OF THE OPEN JOINT. PLACE GROUPS OF PERFORATIONS OR THE OPEN JOINT (1/3 PIPE CIRCUMFERENCE) SYMMETRICALLY ABOUT THE VERTICAL CENTER LINE.

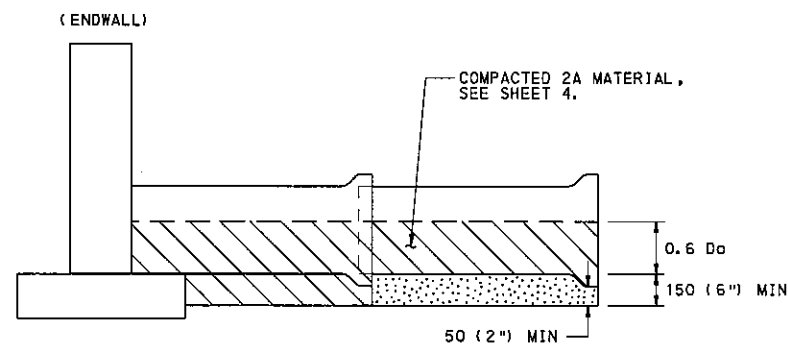


TREATMENT UNDER SUBBASE TREATMENT UNDER EMBANKMENT  
SUBGRADE DRAIN

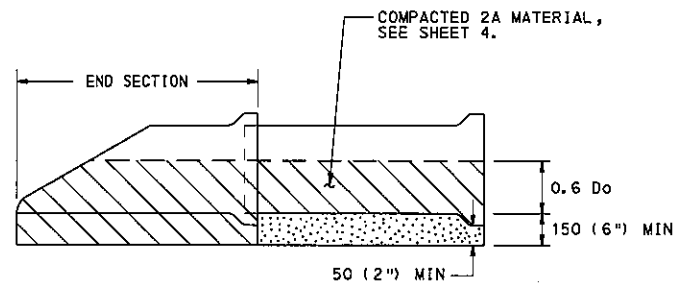
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

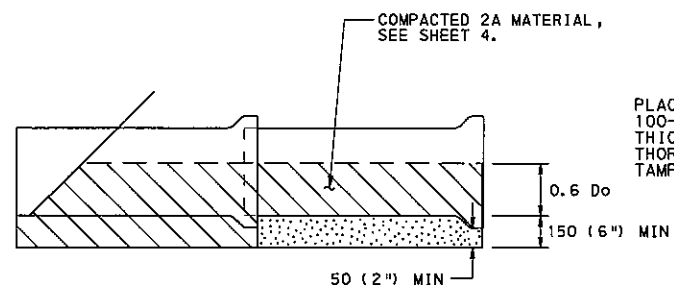
SUBSURFACE DRAINS



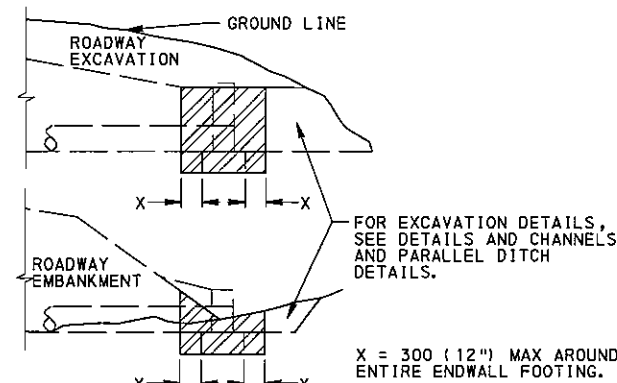
**BACKFILL DETAIL AT ENDWALL**  
(FOR CONCRETE PIPE)



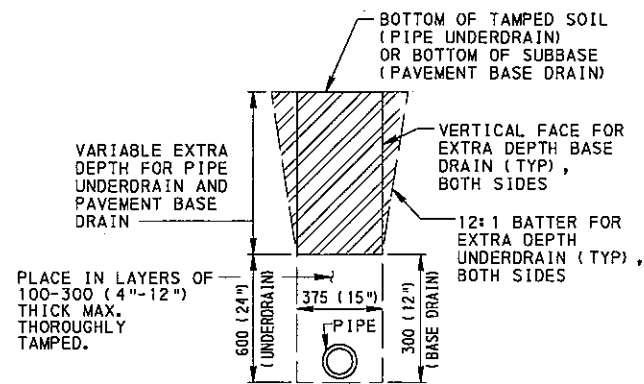
**BACKFILL DETAIL AT END SECTION**  
(FOR CONCRETE PIPE)



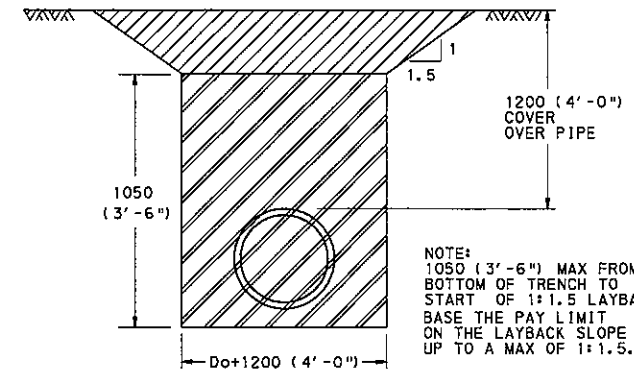
**BACKFILL DETAIL AT LAST SECTION OF PIPE**  
(FOR CONCRETE PIPE)



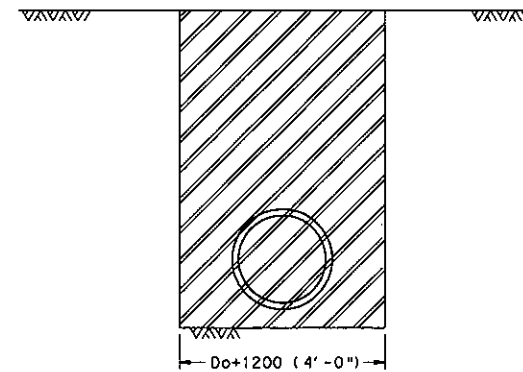
**EXCAVATION FOR ENDWALLS**



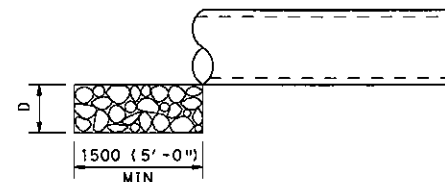
**EXTRA DEPTH FOR PIPE UNDERDRAIN AND PAVEMENT BASE DRAIN**



ABOVE DRAWING SHOWS EXCAVATION FOR PIPE IN CUT OR FILL WHERE SUBGRADE IS 1050 (3'-6") OR MORE ABOVE THE BOTTOM OF THE TRENCH.



**PAY LIMITS FOR PIPE EXCAVATION**



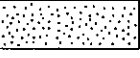



**DETAIL A - PIPE INLET OR OUTLET PROTECTION**

**NOTES**

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTION 601 FOR PIPE CULVERTS, SECTION 602 FOR CORRUGATED METAL PIPE-ARCH CULVERTS AND SECTION 603 FOR METAL PLATE CULVERTS.
2. SHORING OR TRENCH BOX INSTALLATION FOR FLEXIBLE PIPE IS NOT NORMALLY USED. IF SHORING OR TRENCH BOX INSTALLATION IS PERMITTED IN SPECIAL CIRCUMSTANCES, REFER TO PUBLICATION 408, SECTION 601.3 (f).
3. IN ALL EXCAVATION AREAS FOLLOW OSHA SAFETY REQUIREMENTS.
4. DO NOT COMPACT NO. 8 MATERIAL USED FOR BEDDING UNDER CONCRETE PIPES.
5. ALLOW NO PAYMENT FOR EXCAVATION IN EXCESS OF SPECIFIED LIMITS AND FOR ADDITIONAL BACKFILL MATERIAL REQUIRED.
6. PAYMENT FOR THE BACKFILL ENVELOPE, INCLUDING BEDDING, COARSE AGGREGATE AND SUITABLE MATERIAL UP TO 300 (12") ABOVE THE PIPE IS INCIDENTAL TO THE PIPE.
7. FOR BOTTOM TRENCH WIDTHS  $\geq 2.5$  m (8'-0"), ALL EXCAVATION IS CLASS 1.
8. FOR INLET OR OUTLET PROTECTION SEE DETAIL A.

**LEGEND**

-  CLASS 4 EXCAVATION
-  CLASS 1 EXCAVATION
-  AGGREGATE FOR BEDDING (AASHTO NO. 8)
-  COARSE AGGREGATE (2A)

Do = OUTSIDE DIAMETER OF PIPE.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

D = 450 (18"), R-4 ROCK, FOR PIPES LESS THAN 900 (36") INSIDE DIAMETER OR SPAN.  
D = 600 (24"), R-5 ROCK, FOR PIPES 900 (36") AND GREATER INSIDE DIAMETER OR SPAN.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

**SUBSURFACE DRAINS**  
**PIPE PLACEMENT**  
**EXCAVATION - BEDDING - BACKFILL**



# PIPE INSTALLATION PROCEDURES

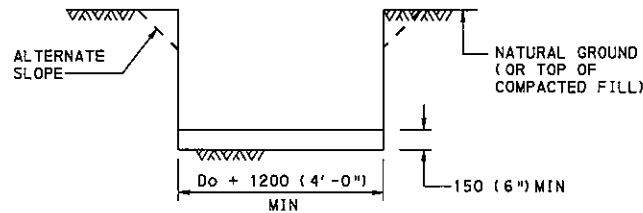
CONSTRUCTION DETAILS BELOW COVER THE FOLLOWING CONDITIONS:

- (A) PIPE LYING ON TOP OF THE NATURAL GROUND, ROCK OR COMPACTED (97% SPD) FILL.
- (B) THE EXISTING GROUND IS BETWEEN THE TOP AND THE BOTTOM OF THE PROPOSED PIPE AND THE PIPE IS TO BE COVERED WITH EARTH FILL.
- (C) THE TOP OF PIPE IS BELOW THE LEVEL OF THE NATURAL GROUND OR COMPACTED FILL (TO MINIMUM 97% SPD) AND TO BE COVERED WITH EARTH FILL TO HEIGHTS ABOVE THE NATURAL GROUND.

**STEP 1:** REMOVE TOPSOIL (COMPRESSIBLE LAYER OF ORGANIC MATERIAL) TO A WIDTH EQUAL TO 5 OUTSIDE DIAMETERS OF THE PIPE IN ALL FILL CONDITIONS ABOVE (A), (B) & (C). ALSO IF SPECIFIED ON THE CONTRACT DRAWING, UNDERCUT FOR THE DEPTH BELOW THE BEDDING AS SHOWN BY DESIGN (MAKE MIN WIDTH 5 DIAMETERS OF PIPE). PAY AS CLASS 1 EXCAVATION.

**STEP 2:** CONSTRUCT THE EMBANKMENT TO 1200 (4'-0") ABOVE THE TOP OF PIPE OR TO THE SUBGRADE ELEVATION, WHICHEVER IS LESS. FOR PIPES 1800 (72") OR GREATER SEE NOTE 1.

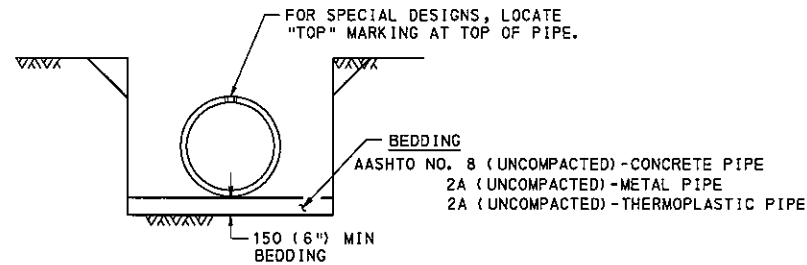
**STEP 3:** EXCAVATE THE TRENCH TO THE WIDTH OF THE OUTSIDE DIAMETER OF THE PIPE BARREL PLUS 1200 (4'-0") AND CREATE AN APPROPRIATE BEDDING 150 (6") DEEP.



**STEP 4:** FOR CONCRETE PIPE, IF THIS EXCAVATION IS THROUGH ROCK, OR HARD SHALE, OR IN AREAS OF UNDERCUT, PROVIDE 150+40 mm/m (6"+1/2" INCH/FT) OF, Do+1200 (4'-0"), BELOW THE INTENDED BOTTOM ELEVATION OF THE PIPE, 400 (16") MAX.

**NOTE:** IF UNSUITABLE MATERIAL IS FOUND, UNDERCUT AS DIRECTED AND BACKFILL WITH SUITABLE MATERIAL TO BOTTOM OF BEDDING ELEVATION. (UNLESS OTHERWISE SPECIFIED.)

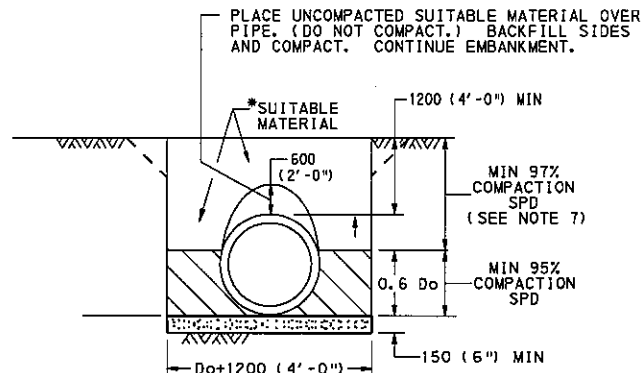
**STEP 5:** LAY PIPE ON APPROPRIATE BEDDING. SEE STEP 6D FOR METAL PIPE ARCH AND METAL PLATE PIPE ARCH.



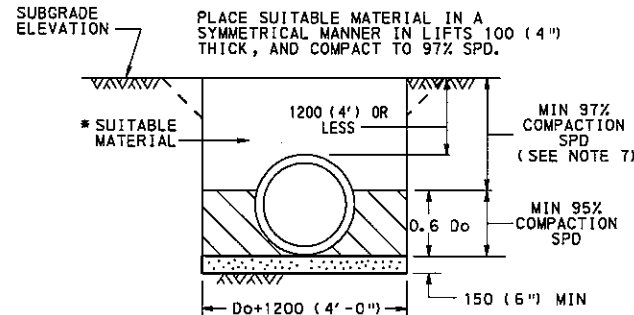
**STEP 6:** FOR CONCRETE PIPE, SEE STEP 6A.  
 FOR METAL PIPE AND METAL PLATE PIPE, SEE STEP 6B.  
 FOR THERMOPLASTIC PIPE, SEE STEP 6C.  
 FOR METAL PIPE ARCH AND METAL PLATE PIPE ARCH, SEE STEP 6D.

## STEP 6A: CONCRETE PIPE

PLACE 2A COARSE AGGREGATE MATERIAL, IN LIFTS 100 (4") THICK, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 0.6 Do. COMPACT TO 95% SPD. TEST THE SIDE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.



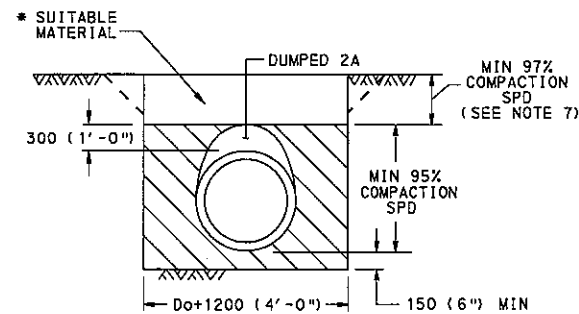
**FILLS 1.5 m TO 14.6 m (5' TO 48')**  
 FOR FILLS OVER 14.6 m (48'), SEE NOTE 8.



**SHALLOW FILLS 1200 (4'-0") AND LESS**

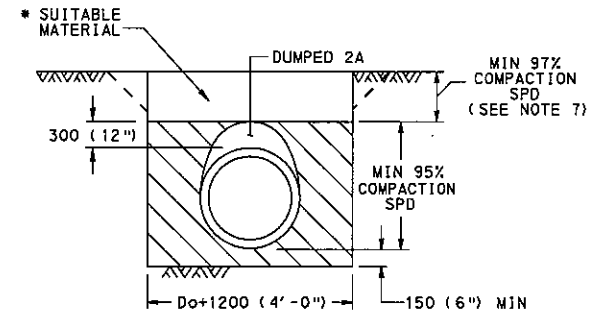
## STEP 6B: METAL PIPE AND METAL PLATE PIPE

PLACE 2A COARSE AGGREGATE MATERIAL, IN LIFTS 100 (4") THICK, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 300 (12") ABOVE TOP OF PIPE. COMPACT TO 95% SPD. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.



## STEP 6C: THERMOPLASTIC PIPE

PLACE 2A COARSE AGGREGATE MATERIAL, IN LIFTS 100 (4") THICK, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 300 (12") ABOVE TOP OF PIPE. COMPACT TO 95% SPD. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.

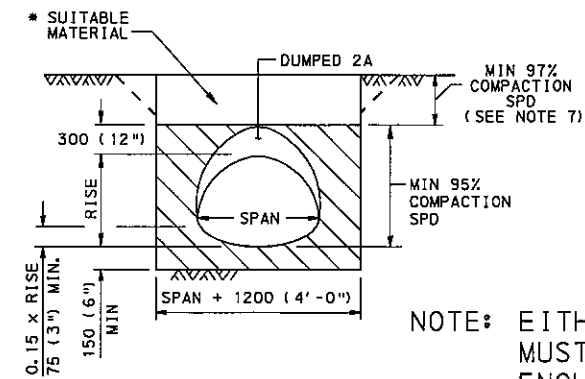


## STEP 6D: METAL PIPE ARCH AND METAL PLATE PIPE ARCH

(1) PLACE 2A COARSE AGGREGATE MATERIAL (0.15 x RISE) ON TOP OF THE BEDDING AND FORM THE CRADLE.

(2) LAY THE PIPE ON THE PREPARED CRADLE.

(3) PLACE 2A COARSE AGGREGATE MATERIAL, IN LIFTS 100 (4") THICK, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 300 (12") ABOVE TOP OF PIPE. COMPACT TO 95% SPD. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.



**NOTE:** EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

## NOTES

1. THE INSTALLATION OF PIPES 1800 (72") OR GREATER INSIDE DIAMETER OR SPAN IS PERMITTED WITHOUT PLACING EMBANKMENT FIRST. MAKE THE BACKFILL ENVELOPE AS SHOWN ON THIS DRAWING EXCEPT PROVIDE 2A MATERIAL ON EACH SIDE OF THE PIPE EQUAL TO ONE OUTSIDE DIAMETER OR SPAN OF THE PIPE. FOR CONCRETE PIPE, THE WIDTH OF UNCOMPACTED AGGREGATE FOR BEDDING (AASHTO NO. 8) REMAINS AT Do + 1200 (4'-0"). PAYMENT FOR THE 2A MATERIAL IS AS PER NOTE 3.
2. A HIGHER STRENGTH PIPE THAN SPECIFIED MAY BE SUPPLIED AT NO ADDITIONAL COST TO THE DEPARTMENT.
3. PAYMENT FOR THE BACKFILL ENVELOPE INCLUDING BEDDING, COARSE AGGREGATE AND SUITABLE MATERIAL UP TO 300 (12") ABOVE THE PIPE IS INCIDENTAL TO THE PIPE.
4. TO PRECLUDE POINT LOADING ON RELATIVELY RIGID CONCRETE PIPE, DO NOT COMPACT AASHTO NO. 8 BEDDING MATERIAL.
5. FOR TRENCH BOX/SHORING INSTALLATION REQUIREMENTS REFER TO PUBLICATION 408, SECTION 601.
6. PERMIT PLACEMENT OF BACKFILL MATERIAL IN LAYERS, LIFTS, 200 (8") THICK WHEN USING VIBRATORY COMPACTION EQUIPMENT.
7. COMPACT TOP 1000 (3'-0") OF SUBGRADE TO 100% IN ACCORDANCE WITH PUBLICATION 408, SECTION 206.3.
8. FOR REINFORCED CONCRETE PIPES INSTALLED WITH 14.9 m (49') OF COVER OR MORE, PROVIDE 300 (12") BEDDING MINIMUM AND 400 (16") WHEN ROCK IS PRESENT.

## LEGEND

- AGGREGATE FOR BEDDING (AASHTO NO. 8), UNCOMPACTED
- COARSE AGGREGATE (2A)

Do = OUTSIDE DIAMETER OF PIPE, MILLIMETERS  
 SPD = STANDARD PROCTOR DENSITY  
 ID = INSIDE DIAMETER

\* SUITABLE = MATERIAL CONTAINING NO DEBRIS, ORGANIC MATTER, FROZEN MATERIAL OR LARGE STONES WITH A DIAMETER GREATER THAN ONE-HALF THE THICKNESS OF THE COMPACTED LAYERS BEING PLACED.

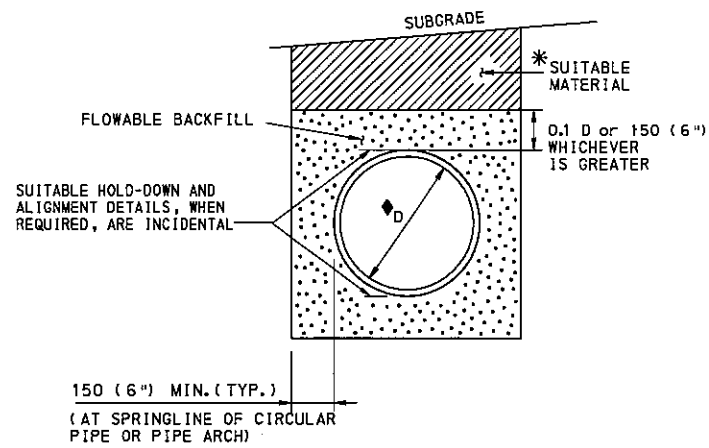
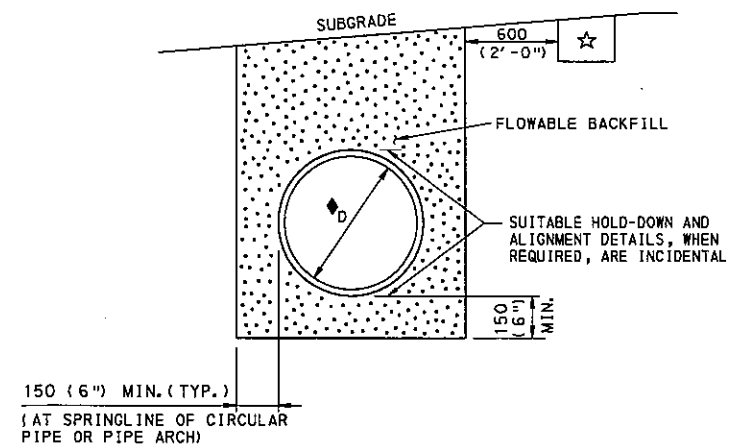
COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF TRANSPORTATION  
 BUREAU OF DESIGN

SUBSURFACE DRAINS  
 PIPE PLACEMENT  
 EXCAVATION - BEDDING - BACKFILL

RECOMMENDED MAR. 30, 2006  
  
 DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006  
  
 CHIEF ENGINEER

SHT 4 OF 5  
 RC-30M



◆ D = NOMINAL DIAMETER OR RISE IN DESCRIPTION OF PIPE ITEM. 900 mm (3'-0") MAXIMUM DIAMETER OR RISE.

**FLOWABLE BACKFILL DETAIL**  
(SEE NOTE 4)

**NOTES:**

1. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 601 AND 220.
2. FLOWABLE BACKFILL WILL ENVELOP THE LAST SECTION OF PIPE OR END SECTION. CONSTRUCT DIKE OF FLOWABLE BACKFILL MATERIAL AS SPECIFIED IN SPECIAL PROVISION OR PROVIDE FORMWORK TO CONTAIN FLOWABLE BACKFILL.
3. PAYMENT FOR THE BACKFILL ENVELOP (AGGREGATE, BEDDING AND BACKFILL OR FLOWABLE BACKFILL MATERIAL) AND SUITABLE MATERIAL UP TO 300 (12") ABOVE THE PIPE IS INCIDENTAL TO THE PIPE.
4. THE FLOWABLE BACKFILL DETAIL REPLACES STEPS 6A, 6B, 6C AND 6D ON SHEET 4 WHEN FLOWABLE BACK FILL IS SPECIFIED.

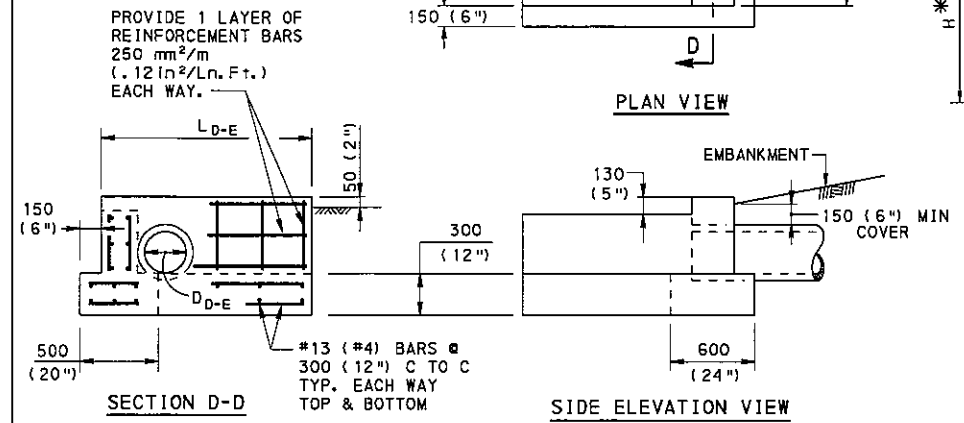
☆ IF DRAINAGE IS REQUIRED TO MAINTAIN POSITIVE FLOW OF WATER AWAY FROM THE TRENCH, IT MUST BE PROVIDED BY USE OF PROPERLY DESIGNED GRANULAR OR SYNTHETIC DRAINS.

\* SUITABLE= MATERIAL CONTAINING NO DEBRIS, ORGANIC MATERIAL MATTER, FROZEN MATERIAL OR LARGE STONES WITH A DIAMETER GREATER THAN ONE-HALF THE THICKNESS OF THE COMPACTED LAYERS BEING PLACED.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

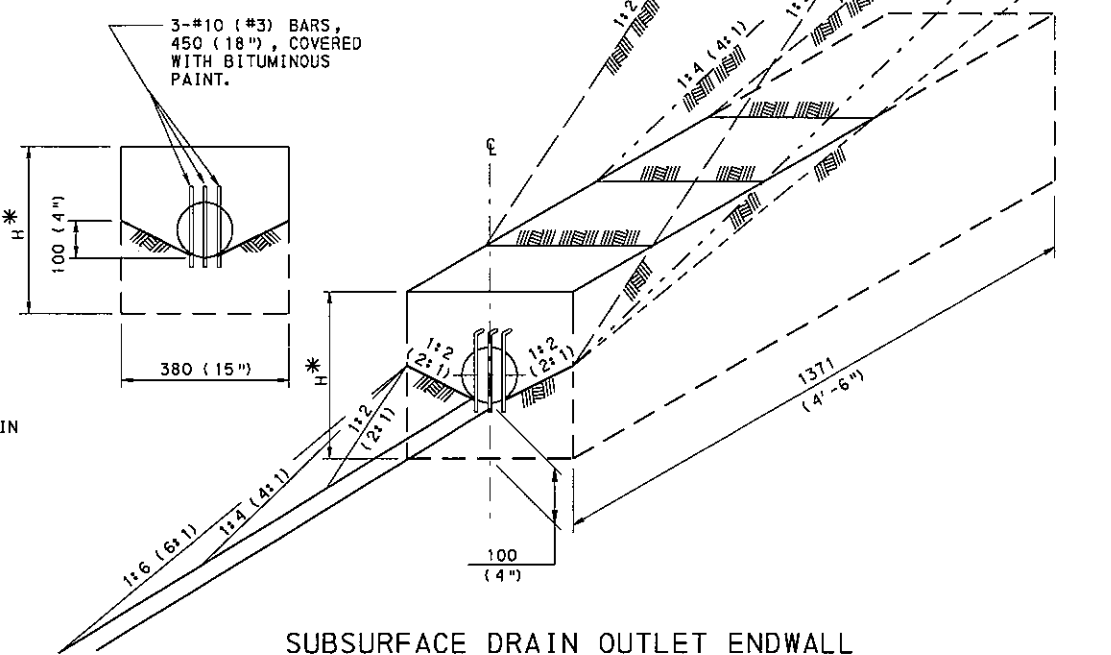
<b>COMMONWEALTH OF PENNSYLVANIA</b> <b>DEPARTMENT OF TRANSPORTATION</b> BUREAU OF DESIGN		
SUBSURFACE DRAINS FLOWABLE BACKFILL		
RECOMMENDED MAR. 30, 2006 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Chitel</i> CHIEF ENGINEER	SHT 5 OF 5 <b>RC-30M</b>

- NOTES:
- LOCAL CONDITIONS WILL GOVERN DIMENSION  $A_{D-E}$ .
  - $L_{D-E} = 2.5D_{D-E} + 300$  (12")



TYPE D-E ENDWALL

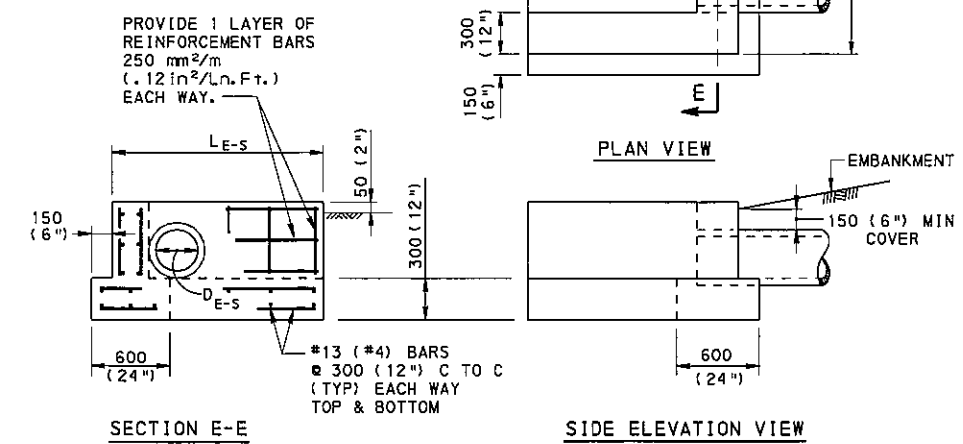
- \*H = 300 (12") FOR 100 (4") Ø PIPE
- 380 (15") FOR 150 (6") Ø PIPE
- 400 (16") FOR 200 (8") Ø PIPE
- 450 (18") FOR 250 (10") Ø PIPE



SUBSURFACE DRAIN OUTLET ENDWALL  
FOR SLOPED SUBSURFACE DRAIN OUTLET ENDWALL SEE SHT. 2.

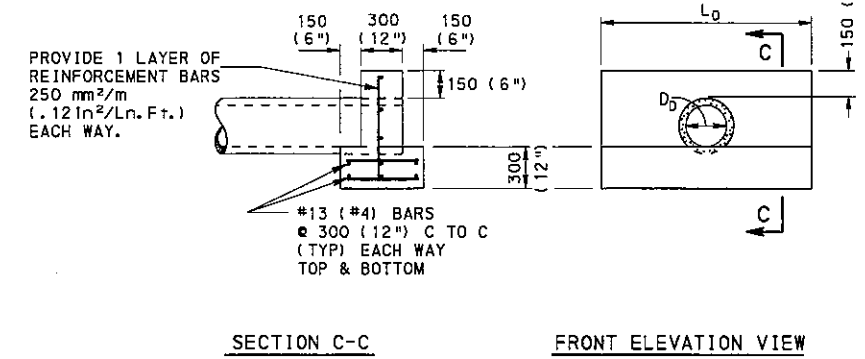
- NOTES
1. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605 AND SECTION 714.
  2. THIS STANDARD DEPICTS THE SHAPE AND DIMENSIONS REQUIRED FOR UNIFORMITY AND COMPATIBILITY. PERMIT ONLY ITEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS TO THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
  3. USE CLASS A CONCRETE OR BETTER & CHAMFER EXPOSED EDGES AT 25 (1").
  4. PROVIDE PIPE OPENING SIZE IN PRECAST UNITS AT LEAST 50 (2") BUT NOT MORE THAN 100 (4") LARGER THAN THE OUTSIDE DIAMETER OF THE PIPE. FOR TYPE D-E AND E-S ENDWALLS PROVIDE MIN. 200 (8") WALL HEIGHT OVER THE PIPE.
  5. PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING AND INSTALLATION OF PRECAST ENDWALLS. GALVANIZE METAL DEVICES AS SPECIFIED IN PUB 408, SECTION 1105.
  6. PROVIDE NON-SHRINK EPOXY GROUT THROUGHOUT THE CONTACT SURFACE WHEN CONNECTING WING AND HEADWALL SECTION TO BASE SECTION. PROVIDE JOINT SEALANT MATERIAL ALONG INTERFACE BETWEEN WING AND HEADWALL SECTION AND BASE SECTION.
  7. PROVIDE MORTAR BED OF 25 (1") PLACED ON TOP OF THE SUBBASE MATERIAL FOR LEVELING PURPOSES, WHEN REQUIRED.
  8. PROVIDE REINFORCEMENT, 250 mm<sup>2</sup>/m, (.12 in<sup>2</sup>/Ln. Ft.) IN ACCORDANCE WITH PUBLICATION 408, SECTION 709.
  9. THE SLOPED SUBSURFACE DRAIN OUTLET ENDWALL IS DESIGNATED FOR INSTALLATION ALONG INTERSTATES AND EXPRESSWAYS WHERE THE SUBSURFACE DRAIN WILL OUTLET ON MEDIAN AND/OR OUTSIDE SLOPES THAT ARE SUBJECT TO MOWING.
  10. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.

- NOTES:
- THE WALL WHICH THE PIPE IS CONNECTED TO SHOULD BE PARALLEL TO THE ROADWAY.
  - $L_{E-S} = 2.5D_{E-S} + 300$  (12")

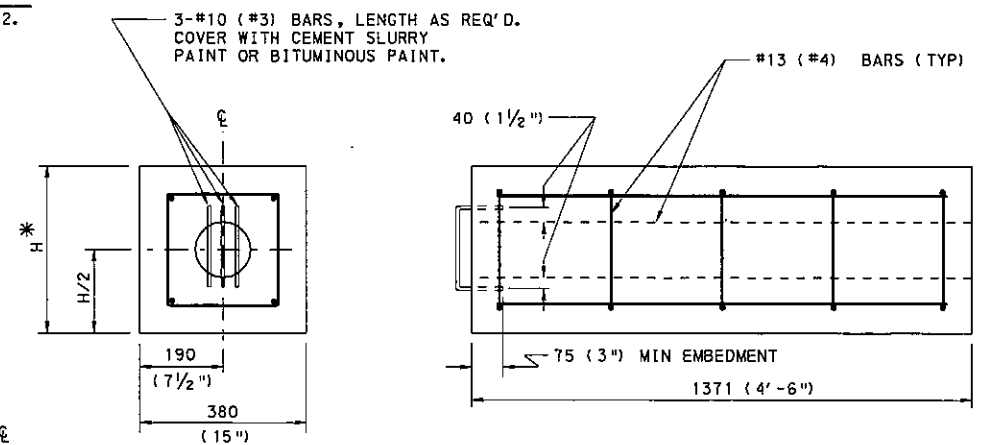


TYPE E-S ENDWALL

PIPE DIAMETER	$L_D$
450 AND 525 (18" AND 21")	1500 (5')
600 AND 675 (24" AND 27")	2100 (7')
750 AND 825 (30" AND 33")	2700 (9')
900 AND 975 (36" AND 39")	3000 (10')
1050 AND 1125 (42" AND 45")	3300 (11')
1200 AND 1275 (48" AND 51")	3600 (12')



TYPE D ENDWALL



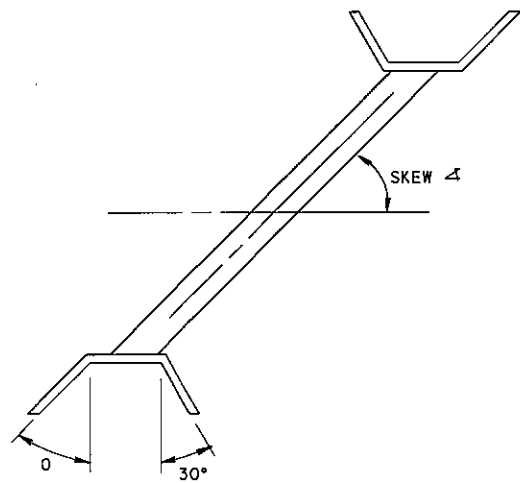
(PRECAST) SUBSURFACE DRAIN OUTLET ENDWALL

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

**ENDWALLS**  
**CAST-IN-PLACE & PRECAST**

RECOMMENDED MAR. 30, 2006 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Chitel</i> CHIEF ENGINEER	SHT. 1 OF 2 <b>RC-31M</b>
--	---	------------------------------



**METRIC EQUATION**

$$**SD = \frac{D_{D-W}}{\cos \theta} = \frac{D_{D-W}}{\sin \text{SKEW } \theta}$$

$$L_{D-W} = SD + 0.70 \text{ m}$$

$$W_1 = \frac{2D_{D-W} - 0.60 \text{ m}}{\cos \theta} \text{ FOR 1:2 SLOPE}$$

$$W_1 = \frac{X}{\cos \theta} (D_{D-W} - 0.5 - \frac{1.0}{X}) \text{ (FOR VARIABLE SLOPE WHEN X EQUALS HORIZONTAL DIMENSION OF THE SLOPE DESIGNATION.)}$$

**ENGLISH EQUATION**

$$**SD = \frac{D_{D-W}}{\cos \theta} = \frac{D_{D-W}}{\sin \text{SKEW } \theta}$$

$$L_{D-W} = SD + 2.3'$$

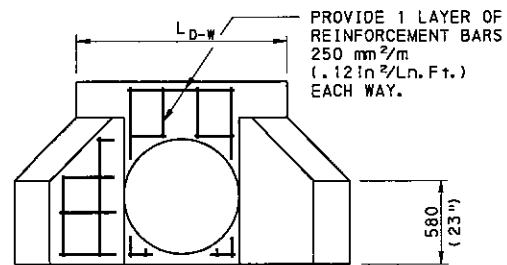
$$W_1 = \frac{2D_{D-W} - 2.0'}{\cos \theta} \text{ FOR 2:1 SLOPE}$$

$$W_1 = \frac{X}{\cos \theta} (D_{D-W} - 0.5 - \frac{1.0}{X}) \text{ (FOR VARIABLE SLOPE WHEN X EQUALS HORIZONTAL DIMENSION OF THE SLOPE DESIGNATION.)}$$

#13 (#4) BARS @ 300 (12") C TO C TYP. EACH WAY TOP & BOT.

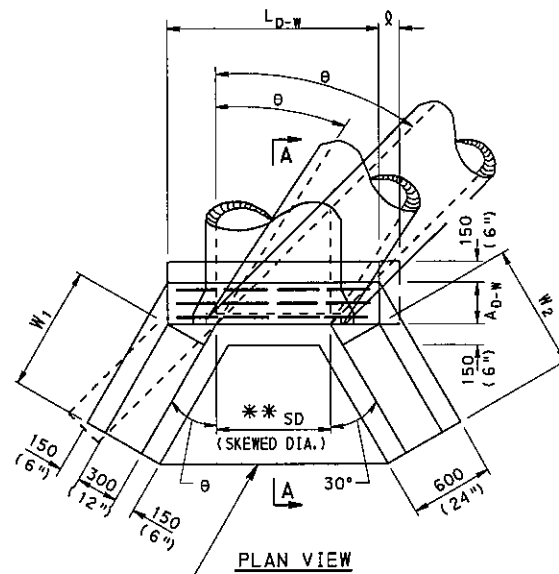


FRONT ELEVATION VIEW  
BASE SECTION FOR TYPE D-W



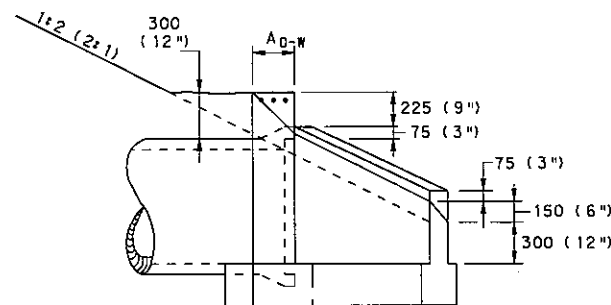
FRONT ELEVATION VIEW  
HEAD & WINGWALL SECTION FOR TYPE D-W

PROVIDE 1 LAYER OF REINFORCEMENT BARS 250 mm<sup>3</sup>/m (.12 in<sup>3</sup>/Ln. Ft.) EACH WAY.

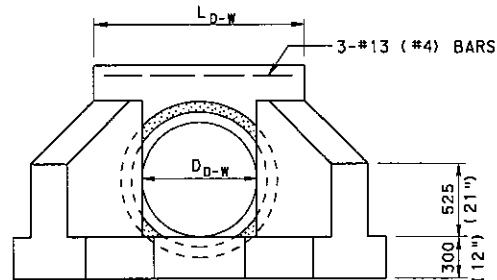


PLAN VIEW

ALLOW FOR OPTIONAL APRON ON PRECAST UNITS.



SECTION A-A



FRONT ELEVATION VIEW

**TYPE D-W ENDWALL**  
(SEE TABLE A FOR DIMENSIONS NOT INDICATED.)

**TABLE A (mm)**

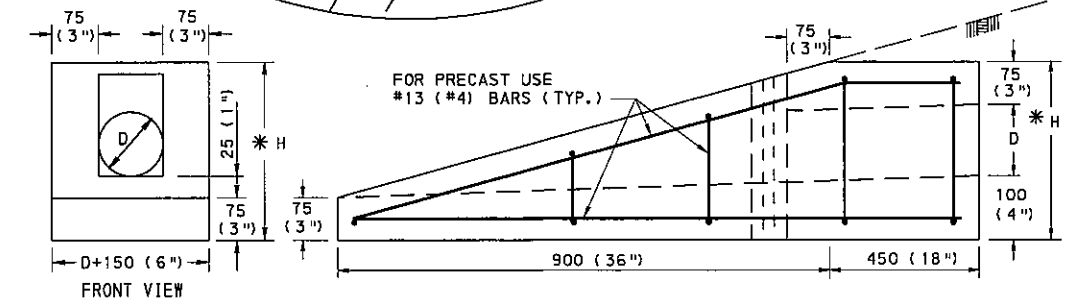
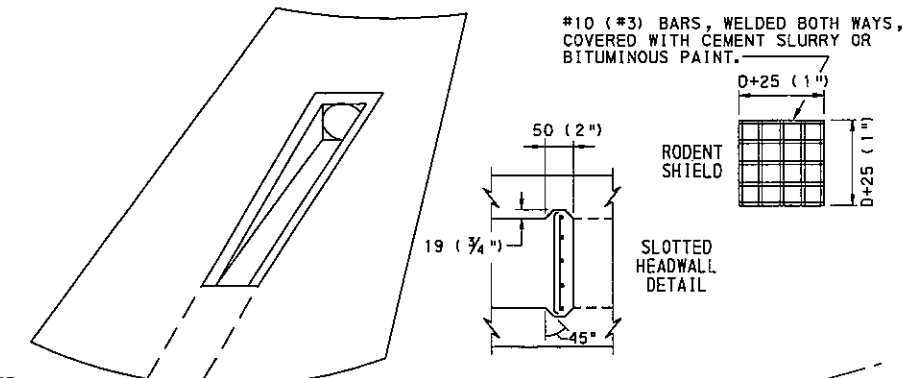
1 : 2 EMBANKMENT SLOPES

PIPE DIAMETER	SKEW $\theta = 90^\circ$ TO $60^\circ$ $\theta = 30^\circ$			SKEW $\theta = 55^\circ$ $\theta = 35^\circ$			SKEW $\theta = 50^\circ$ $\theta = 40^\circ$			SKEW $\theta = 45^\circ$ $\theta = 45^\circ$			SKEW $\theta = 40^\circ$ $\theta = 50^\circ$			SKEW $\theta = 30^\circ$ $\theta = 60^\circ$			SKEW $\theta = 20^\circ$ $\theta = 70^\circ$			SKEW $\theta = 10^\circ$ $\theta = 80^\circ$			W <sub>2</sub>	A <sub>D-W</sub>
	D <sub>D-W</sub>	L <sub>D-W</sub>	W <sub>1</sub>	D <sub>D-W</sub>	L <sub>D-W</sub>	W <sub>1</sub>	D <sub>D-W</sub>	L <sub>D-W</sub>	W <sub>1</sub>	D <sub>D-W</sub>	L <sub>D-W</sub>	W <sub>1</sub>	D <sub>D-W</sub>	L <sub>D-W</sub>	W <sub>1</sub>	D <sub>D-W</sub>	L <sub>D-W</sub>	W <sub>1</sub>	D <sub>D-W</sub>	L <sub>D-W</sub>	W <sub>1</sub>	D <sub>D-W</sub>	L <sub>D-W</sub>	W <sub>1</sub>		
900	1.74	0	1.39	1.80	0.10	1.46	1.87	0.15	1.57	1.97	0.20	1.70	2.10	0.23	1.87	2.50	0.41	2.40	3.33	0.53	3.51	5.88	1.52	6.91	1.39	300
1050	1.91	0	1.73	1.98	0.10	1.83	2.07	0.15	1.96	2.18	0.20	2.12	2.33	0.23	2.33	2.80	0.41	3.00	3.77	0.53	4.39	6.75	1.52	8.64	1.73	300
1200	2.09	0	2.08	2.16	0.10	2.20	2.27	0.15	2.35	2.40	0.20	2.55	2.57	0.23	2.80	3.10	0.41	3.60	4.21	0.53	5.26	7.61	1.52	10.37	2.08	300
1350	2.26	0	2.42	2.35	0.10	2.56	2.46	0.15	2.74	2.61	0.20	2.97	2.80	0.23	3.27	3.40	0.41	4.20	4.65	0.53	6.14	8.47	1.52	12.09	2.42	300
1500	2.43	0	2.77	2.53	0.10	2.93	2.66	0.15	3.13	2.82	0.20	3.39	3.03	0.23	3.73	3.70	0.41	4.80	5.09	0.53	7.02	9.34	1.52	13.82	2.77	375
1800	2.78	0	3.46	2.90	0.10	3.66	3.05	0.15	3.92	3.25	0.20	4.24	3.50	0.23	4.67	4.30	0.41	6.00	5.96	0.53	8.77	11.07	1.52	17.28	3.46	375

**TABLE A (inches)**

2 : 1 EMBANKMENT SLOPES

PIPE DIAMETER	SKEW $\theta = 90^\circ$ TO $60^\circ$ $\theta = 30^\circ$			SKEW $\theta = 55^\circ$ $\theta = 35^\circ$			SKEW $\theta = 50^\circ$ $\theta = 40^\circ$			SKEW $\theta = 45^\circ$ $\theta = 45^\circ$			SKEW $\theta = 40^\circ$ $\theta = 50^\circ$			SKEW $\theta = 30^\circ$ $\theta = 60^\circ$			SKEW $\theta = 20^\circ$ $\theta = 70^\circ$			SKEW $\theta = 10^\circ$ $\theta = 80^\circ$			W <sub>2</sub>	A <sub>D-W</sub>
	D <sub>D-W</sub>	L <sub>D-W</sub>	W <sub>1</sub>	D <sub>D-W</sub>	L <sub>D-W</sub>	W <sub>1</sub>	D <sub>D-W</sub>	L <sub>D-W</sub>	W <sub>1</sub>	D <sub>D-W</sub>	L <sub>D-W</sub>	W <sub>1</sub>	D <sub>D-W</sub>	L <sub>D-W</sub>	W <sub>1</sub>	D <sub>D-W</sub>	L <sub>D-W</sub>	W <sub>1</sub>	D <sub>D-W</sub>	L <sub>D-W</sub>	W <sub>1</sub>	D <sub>D-W</sub>	L <sub>D-W</sub>	W <sub>1</sub>		
36	5.8	0	4.6	6.0	.33	4.9	6.2	.5	5.2	6.5	.67	5.7	7.0	.75	6.2	8.3	1.33	8.0	11.1	1.75	11.7	19.6	5.0	23.0	4.6	12
42	6.3	0	5.8	6.6	.33	6.1	6.9	.5	6.5	7.3	.67	7.1	7.8	.75	7.8	9.3	1.33	10.0	12.5	1.75	14.6	22.5	5.0	28.8	5.8	12
48	6.9	0	6.9	7.2	.33	7.3	7.5	.5	7.8	8.0	.67	8.5	8.5	.75	9.4	10.3	1.33	12.0	14.0	1.75	17.5	25.3	5.0	34.6	6.9	12
54	7.5	0	8.0	7.8	.33	8.5	8.2	.5	9.1	8.7	.67	9.9	9.3	.75	10.9	11.3	1.33	14.0	15.5	1.75	20.5	28.2	5.0	40.3	8.0	12
60	8.1	0	9.2	8.4	.33	9.8	8.8	.5	10.4	9.4	.67	11.3	10.1	.75	12.5	12.3	1.33	16.0	16.9	1.75	23.4	31.1	5.0	46.0	9.2	15
72	9.2	0	11.5	9.6	.33	12.2	10.1	.5	13.0	10.8	.67	14.1	11.7	.75	15.6	14.3	1.33	20.0	19.8	1.75	29.2	36.9	5.0	57.6	11.5	15



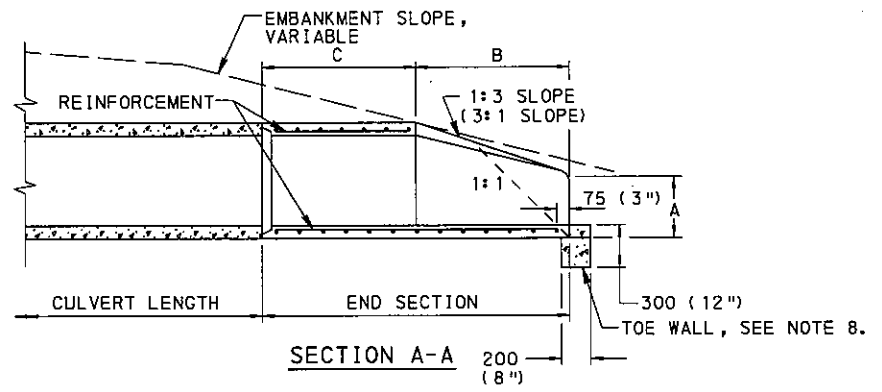
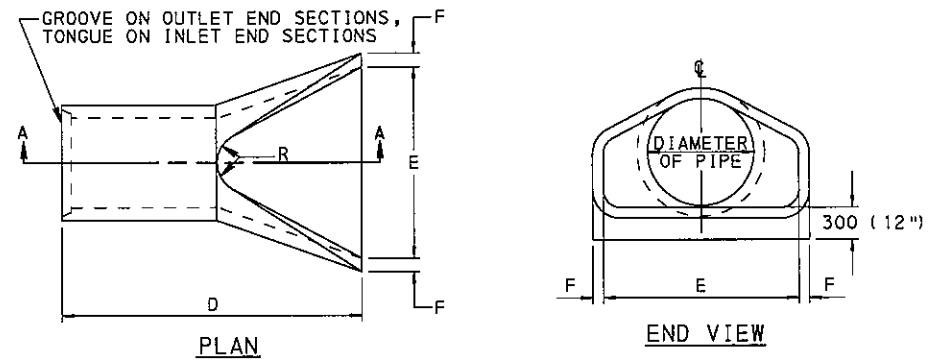
SUBSURFACE DRAIN OUTLET ENDWALL (SLOPED)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

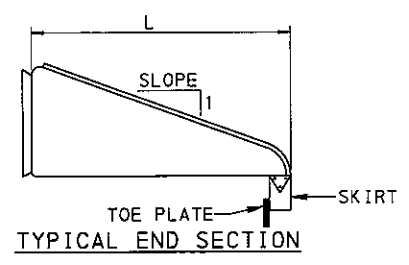
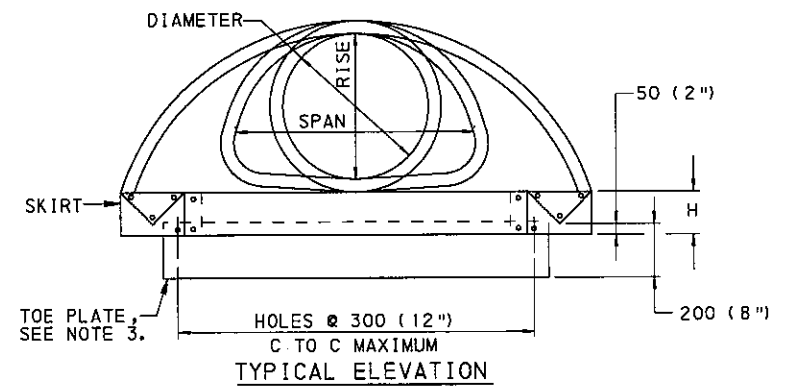
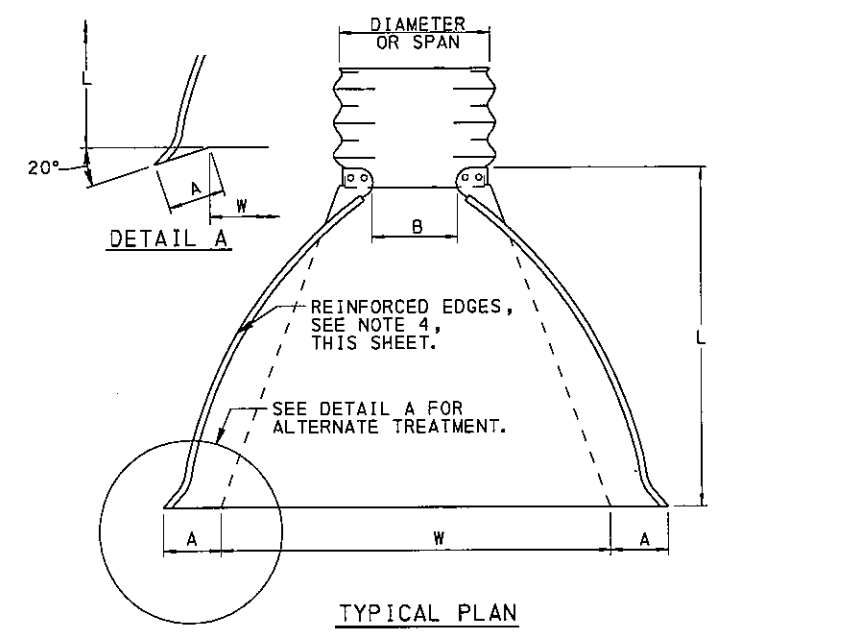
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

ENDWALLS  
CAST-IN-PLACE & PRECAST





**SLOPE DETAIL  
CONCRETE END SECTIONS**



**CORRUGATED METAL PIPE  
END SECTIONS**

**GENERAL NOTES**

1. PROVIDE END SECTIONS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 616. PROVIDE GALVANIZED STEEL END SECTIONS WHEN SECTIONS ARE REQUIRED WITH ALUMINIZED STEEL PIPE OR PRECOATED GALVANIZED STEEL PIPE.
2. PROVIDE 2.77 THICK (12 GAGE) SIDES AND 3.50 THICK (10 GAGE) CENTER PANELS FOR 3 PIECE UNITS. PROVIDE CENTER PANEL WIDTH GREATER THAN 20% OF PIPE PERIPHERY. PROVIDE 50 LAP JOINT TIGHTLY FASTENED BY 10 (3/8") Ø GALVANIZED OR ALUMINIZED RIVETS OR BOLTS FOR STEEL UNITS AND ALUMINUM ALLOY RIVETS OR BOLTS FOR ALUMINUM UNITS, ON CENTERLINE, SPACED 150 (6") C TO C FOR MULTIPLE PANEL UNITS. CONSTRUCT SKIRTS OF THE SAME THICKNESS AND PIECES AS THE END SECTION.
3. PROVIDE TOE PLATES OF THE SAME MATERIAL AS THE END SECTION. LOCATE PUNCHED HOLES IN PLATE TO MATCH HOLES IN SKIRT. PROVIDE 10 (3/8") Ø GALVANIZED OR ALUMINIZED BOLTS AND NUTS FOR STEEL UNITS AND ALUMINUM ALLOY BOLTS AND NUTS FOR ALUMINUM UNITS. PROVIDE TOE PLATE LENGTHS AS FOLLOWS:  
 PIPE-ARCH CULVERT 1060 x 740, 1010 x 790 (42"x 29", 40"x 31") OR SMALLER-W+250 (+10")  
 PIPE-ARCH CULVERT 1240 x 840, 1160 x 920 (49"x 33", 46"x 36") OR LARGER-W+450 (+10")  
 PIPE 750 (30") DIAMETER OR SMALLER-W+250 (+10")  
 PIPE 900 (36") DIAMETER OR LARGER-W+550 (+22")
4. SUPPLEMENT REINFORCED EDGES WITH GALVANIZED STEEL STIFFENER ANGLES WITH GALVANIZED OR ALUMINIZED BOLTS AND NUTS OR ALUMINUM ALLOY STIFFENER ANGLES WITH ALUMINUM ALLOY NUTS AND BOLTS OF THE FOLLOWING SIZES:  
 • 50 (2") x 50 (2") x 6 (1/4") FOR, 1500 (60") TO 1800 (72") DIAMETER PIPE, 1950 x 1320, 1850 x 1400 (77"x 52", 73"x 53") AND 2100 x 1450, 2050 x 1500 (83"x 57", 81"x 59") PIPE-ARCH CULVERT.  
 • 63 (2 1/2") x 63 (2 1/2") x 6 (1/4") FOR, 1950 TO 2100 (78" TO 84") DIAMETER PIPE.  
 PLACE ANGLE REINFORCEMENT UNDER THE CENTER PANEL SEAMS FOR, 1950 x 1320, 1850 x 1400 (77"x 52", 73"x 53") AND 2100 x 1450, 2050 x 1500 (83"x 57", 82"x 60") PIPE-ARCH CULVERTS.
5. ANCHOR ALUMINUM OR STEEL END SECTIONS, THAT ARE USED ON THE INLET END OF PIPE LARGER THAN 1350 (54") DIAMETER, AS INDICATED ON THE DRAWING.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.
7. FOR DIMENSION TABLES SEE SHEET 2.
8. PROVIDE TOE WALL OF CLASS A CONCRETE.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN**

**END SECTIONS FOR  
PIPE CULVERTS**

**TABLE A-DIMENSIONS FOR END SECTION FOR CONCRETE PIPE**

DIA	A	B	C	D	E	F	R
450	230	685	1170	1855	900	65	190
525	230	915	940	1855	1050	70	205
600	240	1105	760	1865	1200	75	205
675	265	1220	650	1865	1350	85	230
750	305	1370	500	1875	1500	90	205
825	345	1485	955	2440	1650	95	230
900	380	1600	840	2440	1800	100	255
1050	535	1600	840	2440	1950	115	280
1200	610	1830	610	2440	2100	125	305

**TABLE B-DIMENSIONS, FOR END SECTIONS FOR CIRCULAR CORRUGATED METAL PIPE**

DIA	THICKNESS	A (±25)	B (MAX)	H (±25)	L (±40)	W (±50)	BODY	SLOPE
450	1.63	205	255	150	785	900	1 PC	2.5
525	1.63	230	305	150	915	1050	1 PC	2.5
600	1.63	255	330	150	1040	1200	1 PC	2.5
750	2.01	305	405	205	1295	1500	1 PC	2.5
900	2.01	355	485	230	1525	1800	2 PC	2.5
1050	2.77	405	560	280	1755	2100	2 PC	2.5
1200	2.77	450	685	305	1980	2300	2 PC	2.25
1350	2.77	450	760	305	2135	2600	2 PC	2
1500	2.77	450	840	305	2210	2900	3 PC	1.75
1650	2.77	450	915	305	2210	3050	3 PC	1.5
1800	2.77	450	990	305	2210	3200	3 PC	1.33
1950	2.77	450	1070	305	2210	3350	3 PC	1.25
2100	2.77	450	1145	305	2210	3500	3 PC	1.17

**TABLE C-DIMENSIONS FOR END SECTIONS FOR CORRUGATED METAL PIPE-ARCH**

75x25 AND 125x25 CORRUGATIONS		68x13 CORRUGATIONS		THICKNESS	A (±25)	B (MAX)	H (±25)	L (±40)	W (±50)	M	BODY	SLOPE
SPAN	RISE	SPAN	RISE									
---	---	430	330	1.63	180 [115]	230	150	485	750	305	1 PC	2.5
---	---	530	380	1.63	180 [135]	255	150	585	900	305	1 PC	2.5
---	---	610	460	1.63	205 [160]	305 [290]	150	710	1050	305	1 PC	2.5
---	---	710	510	1.63	230 [180]	355	150	815	1200	305	1 PC	2.5
---	---	885	610	2.01	255 [220]	405	150	990	1500	305	1 PC	2.5
1010	790	1060	740	2.01	305	455	205	1170	1900	305	1 PC	2.5
1160	920	1240	840	2.77	330	535	230	1345	2150	305	2 PC	2.5
1340	1050	1440	970	2.77	450	660	305	1600	2300	305	2 PC	2.5
1520	1170	1620	1100	2.77	450	760	305	1780	2600	610	2 PC	2.25
1670	1300	1800	1200	2.77	450	840	305	1955	2900	610	3 PC	2.25
1850	1400	1950	1320	2.77	450	915	305	1955	3200	610	3 PC	2
2050	1500	2100	1450	2.77	450	990	305	1955	3500	610	3 PC	2

[ ] ACCEPTABLE ALTERNATE DIMENSIONS FOR PIPE-ARCH.

**TABLE A-DIMENSIONS FOR END SECTION FOR CONCRETE PIPE**

DIAM.	A	B	C	D	E	F	R
18"	9"	2'-3"	3'-10"	6'-1"	3'-0"	2 1/2"	7 1/2"
21"	9"	3'-0"	3'-1"	6'-1"	3'-6"	2 3/4"	8"
24"	9 1/2"	3'-7 1/2"	2'-6"	6'-1 1/2"	4'-0"	3"	8"
27"	10 1/2"	4'-0"	2'-1 1/2"	6'-1 1/2"	4'-6"	3 1/4"	9"
30"	12"	4'-6"	1'-7 3/4"	6'-1 3/4"	5'-0"	3 1/2"	8"
33"	13 1/2"	4'-10 1/2"	3'-1 1/2"	8'-0"	5'-6"	3 3/4"	9"
36"	15"	5'-3"	2'-9"	8'-0"	6'-0"	4"	10"
42"	21"	5'-3"	2'-9"	8'-0"	6'-6"	4 1/2"	11"
48"	24"	6'-0"	2'-0"	8'-0"	7'-0"	5"	12"

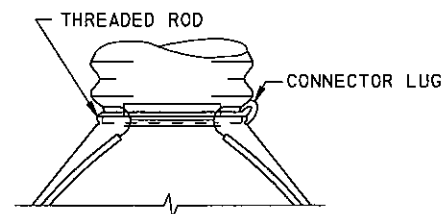
**TABLE B-DIMENSIONS, FOR END SECTIONS FOR CIRCULAR CORRUGATED METAL PIPE**

DIAM.	GAGE	A (±1")	B (MAX.)	H (±1")	L (±1 1/2")	W (±2")	BODY	SLOPE
18"	16	8"	10"	6"	31"	36"	1 PC.	2 1/2
21"	16	9"	12"	6"	36"	42"	1 PC.	2 1/2
24"	16	10"	13"	6"	41"	48"	1 PC.	2 1/2
30"	14	12"	16"	8"	51"	60"	1 PC.	2 1/2
36"	14	14"	19"	9"	60"	72"	2 PC.	2 1/2
42"	12	16"	22"	11"	69"	84"	2 PC.	2 1/2
48"	12	18"	27"	12"	78"	90"	2 PC.	2 1/4
54"	12	18"	30"	12"	84"	102"	2 PC.	2
60"	12	18"	33"	12"	87"	114"	3 PC.	1 3/4
66"	12	18"	36"	12"	87"	120"	3 PC.	1 1/2
72"	12	18"	39"	12"	87"	126"	3 PC.	1 1/3
78"	12	18"	42"	12"	87"	132"	3 PC.	1 1/4
84"	12	18"	45"	12"	87"	138"	3 PC.	1 1/6

**TABLE C-DIMENSIONS FOR END SECTIONS FOR CORRUGATED METAL PIPE-ARCH**

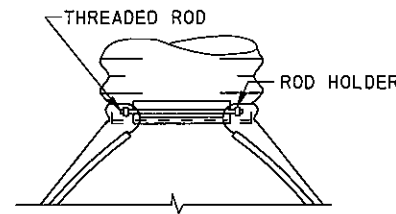
3"x1" AND 5"x1" CORRUGATIONS		2 2/3"x1/2" CORRUGATIONS		GAGE	A (±1")	B (MAX.)	H (±1")	L (±1 1/2")	W (±2")	M	BODY	SLOPE
SPAN	RISE	SPAN	RISE									
---	---	17"	13"	16	7"[4.5"]	9"	6"	19"	30"	12"	1 PC.	2 1/2
---	---	21"	15"	16	7"[5.25"]	10"	6"	23"	36"	12"	1 PC.	2 1/2
---	---	24"	18"	16	8"[6.25"]	12"[11.5"]	6"	28"	42"	12"	1 PC.	2 1/2
---	---	28"	20"	16	9"[7"]	14"	6"	32"[31.5"]	48"	12"	1 PC.	2 1/2
---	---	35"	24"	14	10"[8.75"]	16"	6"	39"[38.5"]	60"	12"	1 PC.	2 1/2
40"	31"	42"	29"	14	12"	18"	8"	46"	75"	12"	1 PC.	2 1/2
46"	36"	49"	33"	12	13"	21"	9"	53"	85"	12"	2 PC.	2 1/2
53"	41"	57"	38"	12	18"	26"	12"	63"	90"	12"	2 PC.	2 1/2
60"	46"	64"	43"	12	18"	30"	12"	70"	102"	24"	2 PC.	2 1/4
66"	51"	71"	47"	12	18"	33"	12"	77"	114"	24"	3 PC.	2 1/4
73"	55"	77"	52"	12	18"	36"	12"	77"	126"	24"	3 PC.	2
81"	59"	83"	57"	12	18"	39"	12"	77"	138"	24"	3 PC.	2

[ ] ACCEPTABLE ALTERNATE DIMENSIONS FOR PIPE-ARCH.



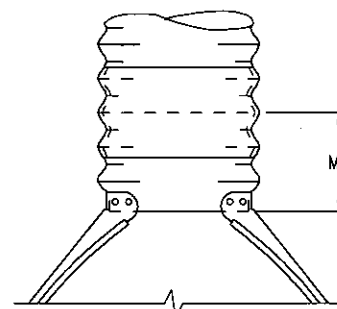
**TYPE-1 CONNECTION**

450Ø TO 600Ø  
(18"Øx 24"Ø)  
CIRCULAR PIPE



**TYPE-2 CONNECTION**

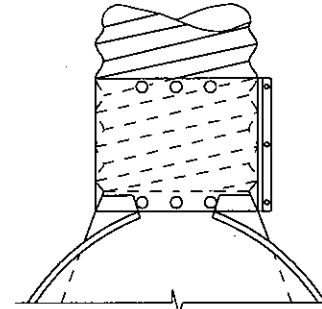
750Ø TO 900Ø (30"Ø TO 36"Ø)  
CIRCULAR PIPE AND  
1440 x 970, 1340 x 1050  
(57"x 38", 53"x 41") OR  
SMALLER PIPE-ARCH.



**TYPE-3 CONNECTION**

1050 (42")Ø OR  
LARGER CIRCULAR PIPE  
AND 1620 x 1100, 1520 x 1170  
(64"x 43", 60"x 46")  
OR LARGER PIPE-ARCH.

\* USE 300 (12") FOR CIRCULAR PIPE AND  
TABLE C DIMENSIONS FOR PIPE-ARCH.



**† TYPE-D CONNECTION**

450Ø TO 900Ø (18"Ø TO 36"Ø)  
CIRCULAR PIPE AND  
1440 x 970, 1340 x 1050  
(57"x 38", 53"x 41") OR  
SMALLER PIPE-ARCH.

† FOR CONNECTING END  
SECTIONS TO PIPE OR  
PIPE-ARCH HAVING  
OTHER THAN ANNULAR  
CORRUGATIONS. ACCEPT  
ALTERNATE DESIGNS  
PROVIDED NO LEAKAGE  
RESULTS.

NOTE:  
FOR GENERAL NOTES SEE SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES  
MUST BE USED ON PLANS. METRIC AND  
ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

**END SECTIONS FOR  
PIPE CULVERTS**

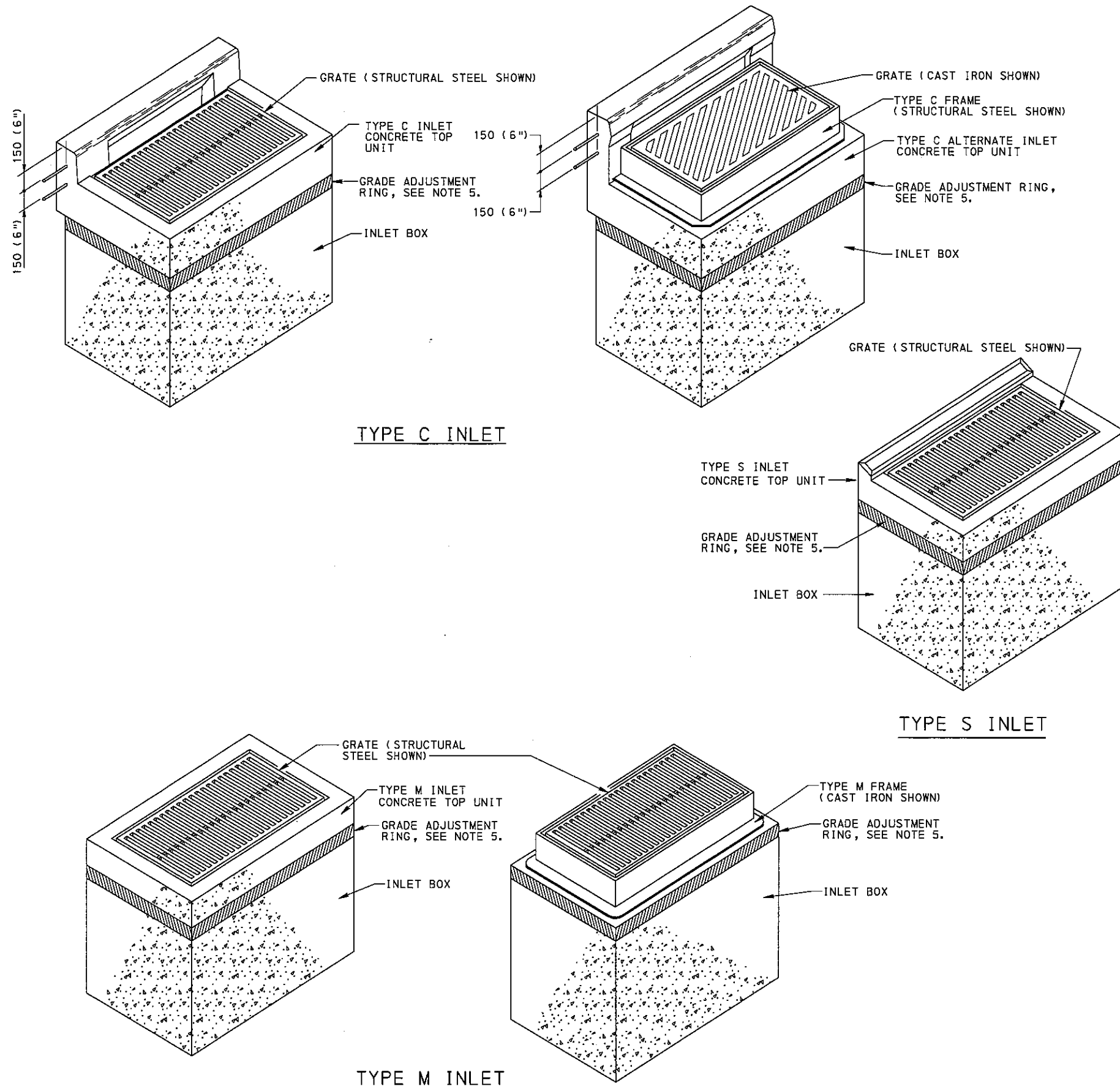
**ALTERNATE TYPE CONNECTIONS FOR  
CORRUGATED METAL PIPE END SECTIONS**

**NOTES**

1. CONSTRUCTION REQUIREMENTS:
  - A. CONSTRUCT IN ACCORDANCE WITH PUBLICATION 408, SECTIONS 605, 606 AND 714; AND AS MODIFIED HEREIN.
  - B. MINIMUM CONCRETE CLASS:  
 CAST-IN-PLACE CLASS A  
 PRECAST CLASS AA
  - C. PROVIDE STEEL REINFORCEMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 709. PROVIDE MINIMUM YIELD STRENGTH OF 400 MPa (60,000 PSI).
  - D. CLEAR COVER FOR STEEL:
 

WALLS:	CAST-IN PLACE	50 (2")
	PRECAST	40 (1 1/2")
FOOTINGS:	CAST-IN PLACE	60 (2 1/2") TOP BARS
		80 (3") BOTTOM BARS
	PRECAST	50 (2") SIDE COVER
		50 (2") TOP BARS
		40 (1 1/2") BOTTOM BARS
		40 (1 1/2") SIDE COVER
SLABS:	CAST-IN PLACE	50 (2") TOP & BOTTOM BARS
2. THIS SHEET DEPICTS THE VARIOUS COMPONENTS REQUIRED FOR COMPLETE INLET ASSEMBLIES. FOR INDIVIDUAL COMPONENTS AND OTHER SPECIAL DETAILS, SEE THE FOLLOWING:
  - SHEET 2 OF 10 FOR CONCRETE TOP UNITS.
  - SHEET 3, 4 & 5 OF 10 FOR GRATES AND GRADE ADJUSTMENT RINGS.
  - SHEET 6 OF 10 FOR FRAMES.
  - SHEET 7 OF 10 FOR STANDARD INLET BOXES (CAST-IN-PLACE).
  - SHEET 8 OF 10 FOR STANDARD INLET BOXES (PRECAST).
  - SHEET 9 OF 10 FOR MODIFIED INLET BOXES (CAST-IN-PLACE AND PRECAST).
  - SHEET 10 OF 10 FOR TYPE D-H INLET.
3. EACH TYPE OF INLET SHOWN IS SUITED FOR A PARTICULAR SITUATION AS FOLLOWS:
  - TYPE C INLET IS DESIGNATED FOR INSTALLATION WITH NON-MOUNTABLE CURBS.
  - TYPE M INLET IS DESIGNATED FOR INSTALLATION IN MEDIAN AREAS AND MOUNTABLE CURBS.
  - TYPE S INLET IS DESIGNATED FOR INSTALLATION IN SHOULDER SWALE AREAS.
4. THE SELECTION OF COMPONENTS TO ACHIEVE A SPECIFIED INLET ASSEMBLY IS THE CONTRACTOR'S RESPONSIBILITY.
5. USE PRECAST CONCRETE OR STEEL GRADE ADJUSTMENT RINGS WHEN REQUIRED. (REHABILITATION PROJECTS)
6. FOR WALL REINFORCEMENT, BOTH DIRECTIONS, USE 250 (10") 2/m MIN EACH WAY, EACH FACE 152 (6") MAX. SPACING.
7. FOR FOOTING REINFORCEMENT, TOP AND BOTTOM, USE #13 (#4) BARS AT 300 (12") CENTERS EACH WAY OR 420 (17") 2/m WWF 152 (6") MAX. SPACING.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.
9. PROVIDE WEEP HOLES ON INLET BOXES WHEN REQUIRED.
10. PIPES MAY BE CONNECTED TO DRAINAGE STRUCTURES ( PRECAST INLETS, ETC.) WITH MORTAR OR WATERTIGHT RUBBER FLEXIBLE CONNECTORS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



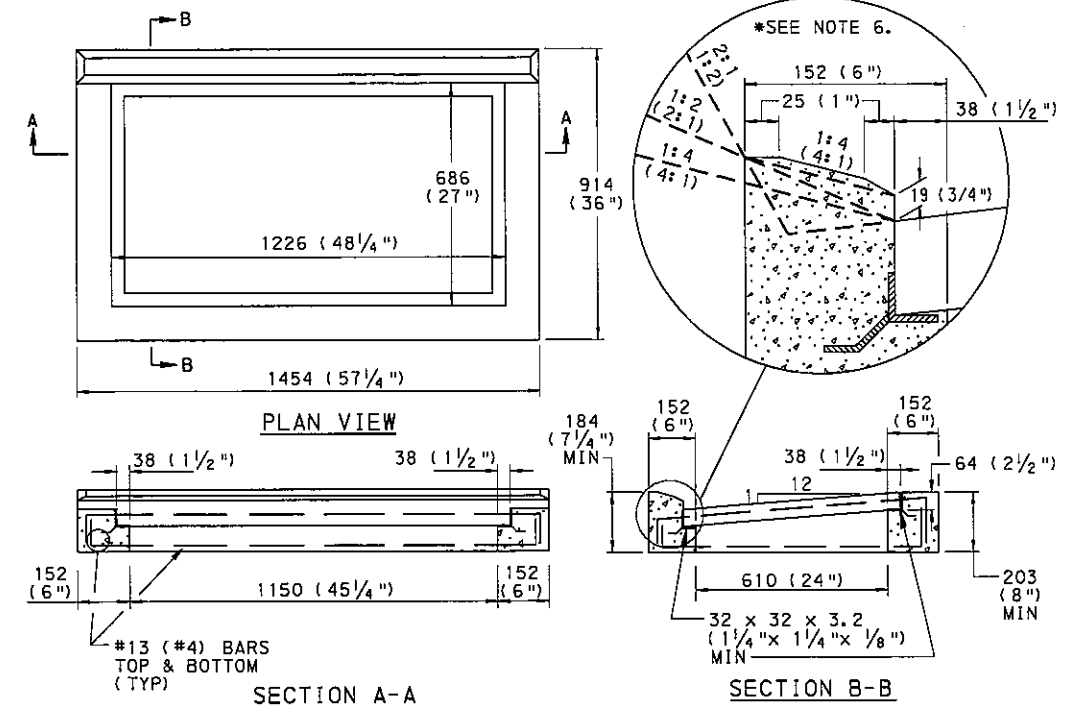
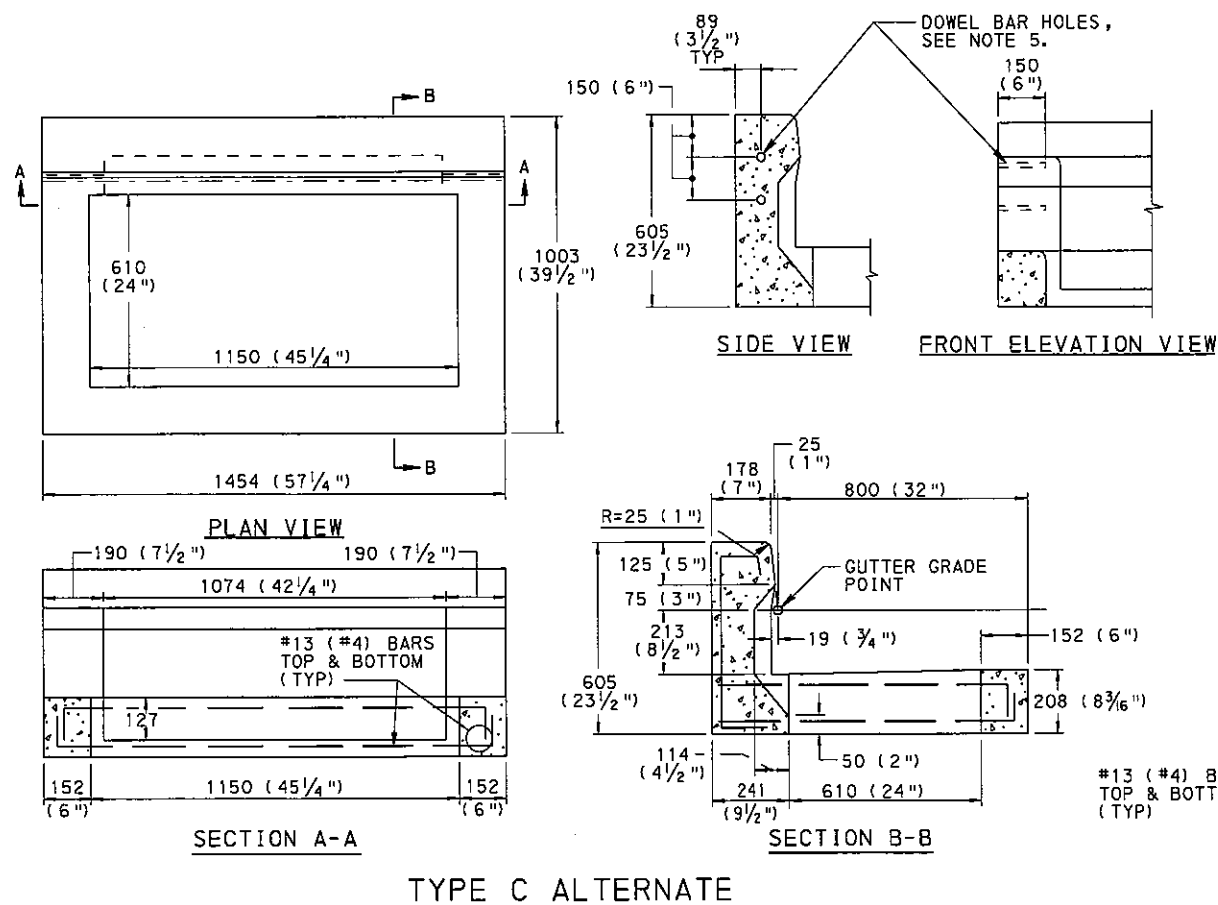
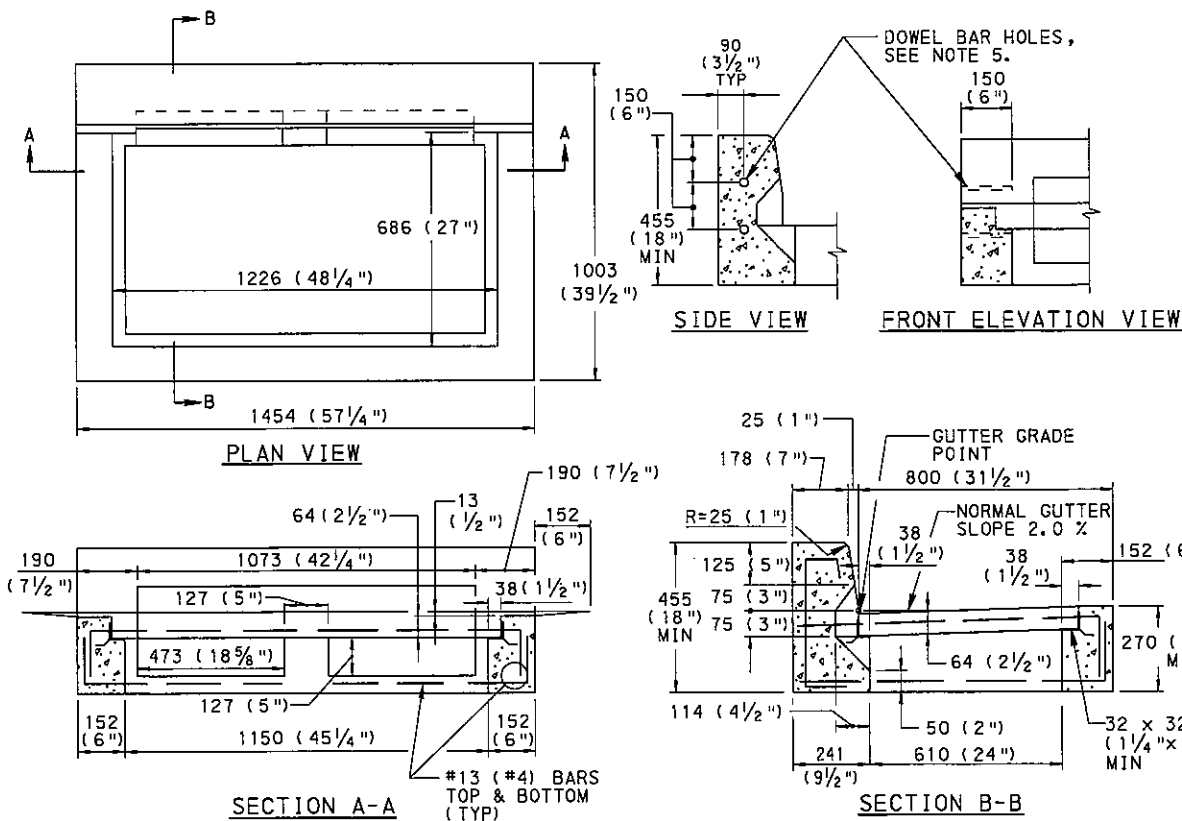
**TYPE C INLET**

**TYPE S INLET**

**TYPE M INLET**

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
 BUREAU OF DESIGN

**INLETS**  
**INLET ASSEMBLIES**



**NOTES**

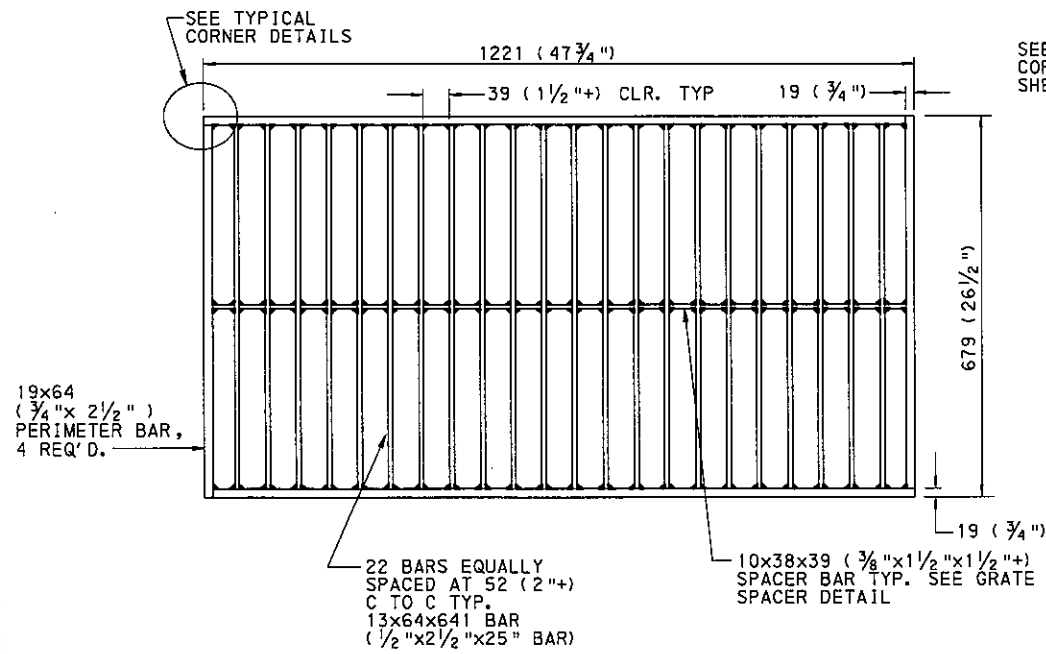
1. THIS SHEET DEPICTS THE SHAPE AND DIMENSIONS REQUIRED FOR UNIFORMITY AND COMPATIBILITY. PERMIT ONLY TOP UNITS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS SUBMIT SHOP DRAWINGS FOR APPROVAL.
2. CAST-IN-PLACE TOP UNITS MAY BE MONOLITHIC WITH THE INLET BOX.
3. PROVIDE ANGLES EMBEDDED IN THE CONCRETE AS A BEARING AREA FOR THE GRATE FOR ALL TOP UNITS WHICH SEAT THE GRATE DIRECTLY WITHIN THE UNIT.
4. PLACE A TYPE M INLET ADJACENT TO THE BACK EDGE OF THE CURB, FLUSH WITH THE PAVEMENT SURFACE, WHEN REQUIRED WITHIN A CONCRETE MOUNTABLE CURB SECTION.
5. DOWEL TYPE C INLET TOP UNITS WITH 2-#25 x 300 (2-#8 x 1'-0") DOWEL BARS AND PLACE PREMOLED EXPANSION JOINT FILLER 6 (1/4") WIDE WHEN CONNECTING TO ADJACENT CURB SECTIONS.
6. THE PLACEMENT OF THE TYPE S INLET RELATIVE TO THE GUTTER INVERT IS DEPENDENT ON THE RATE OF BACK SLOPE. FOR BACK SLOPES GREATER THAN 1:2 (2:1), LOCATE THE INLET WHERE THE BACK SLOPE LINE INTERSECTS THE BACK, TOP, OUTSIDE CORNER OF THE INLET. FOR BACK SLOPES LESS THAN 1:2 (2:1), LOCATE THE INLET WHERE THE BACK SLOPE LINE INTERSECTS THE EDGE OF THE INLET GRATE.
7. TAPERS MAY BE PROVIDED ON INSIDE VERTICAL FACES OF PRECAST INLET TOPS TO FACILITATE FORM STRIPPING. TAPERS WILL RESULT IN INTERNAL BOTTOM DIMENSIONS THAT VARY TO A MAXIMUM OF 25 mm (1").

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

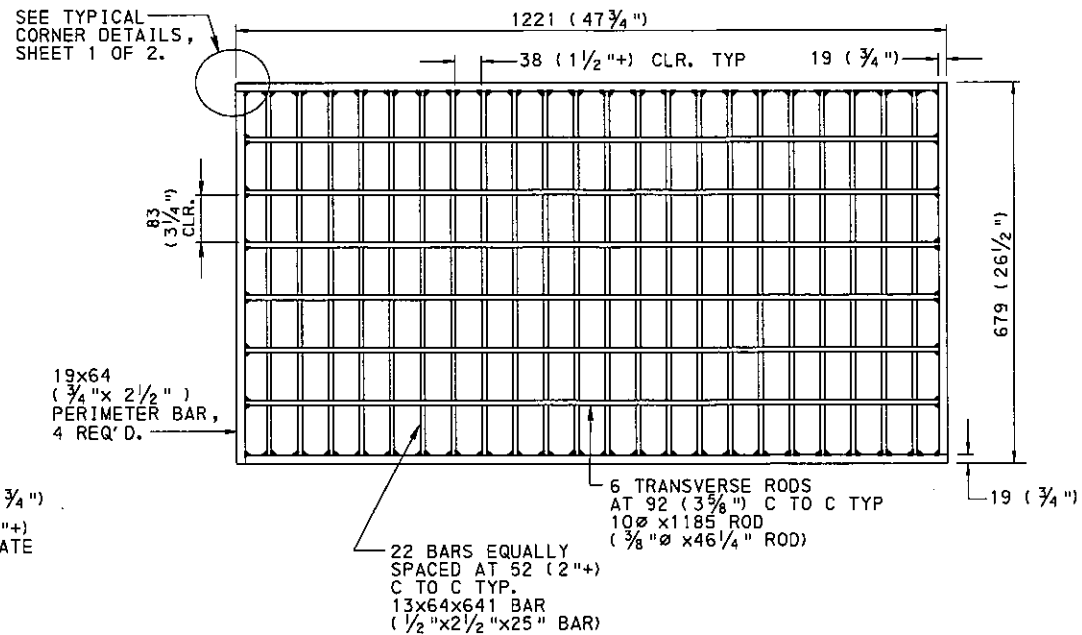
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
 BUREAU OF DESIGN

**INLETS**  
**CONCRETE TOP UNITS**  
**CAST-IN-PLACE AND PRECAST**

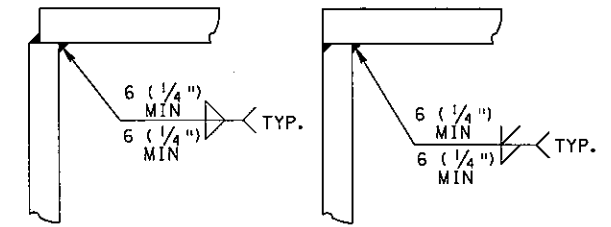




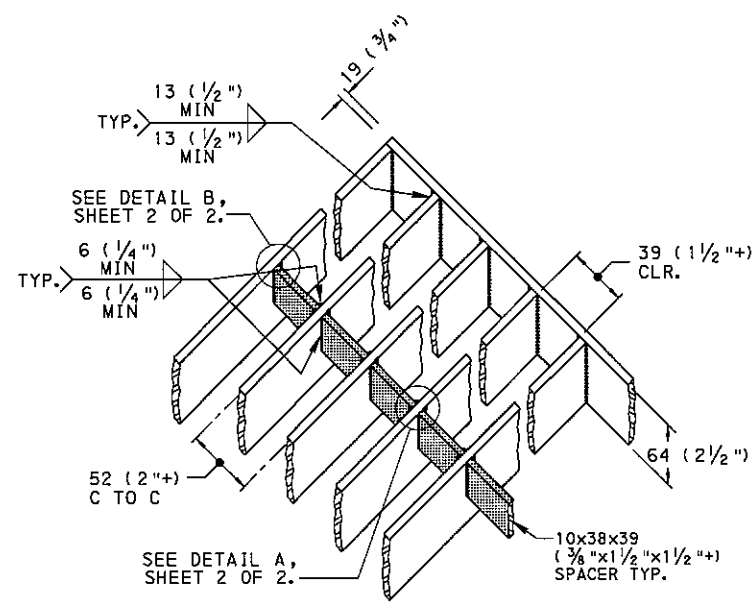
**STRUCTURAL STEEL GRATE**



**STRUCTURAL STEEL GRATE  
BICYCLE SAFE**

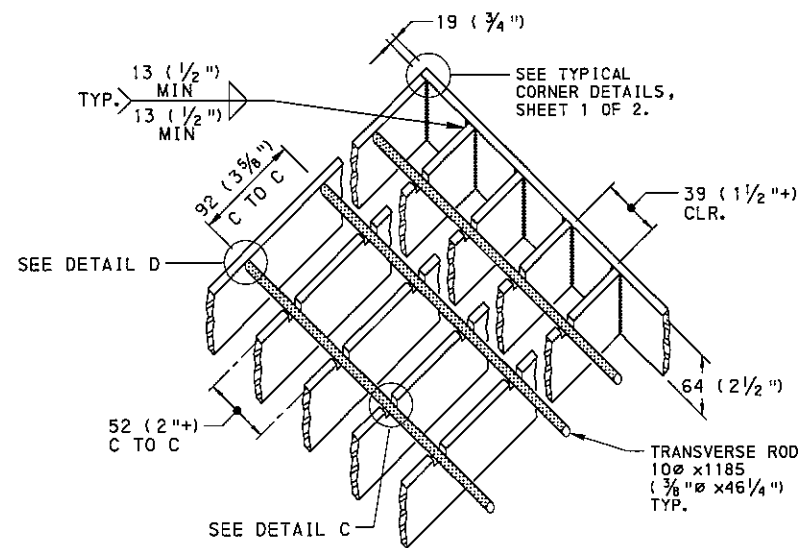


**TYPICAL CORNER DETAILS**

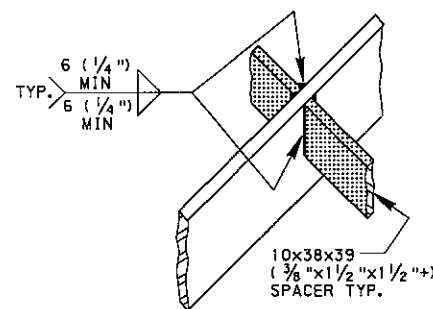


**GRATE SPACER DETAIL**

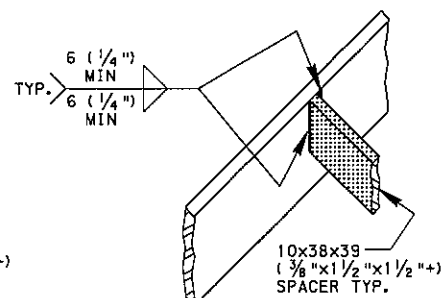
NOTE: PLACE SPACER BARS AT LONGITUDINAL C OF GRATE.



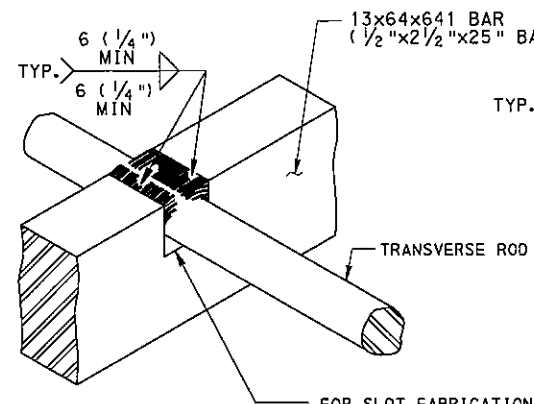
**BAR AND ROD SPACER DETAIL**



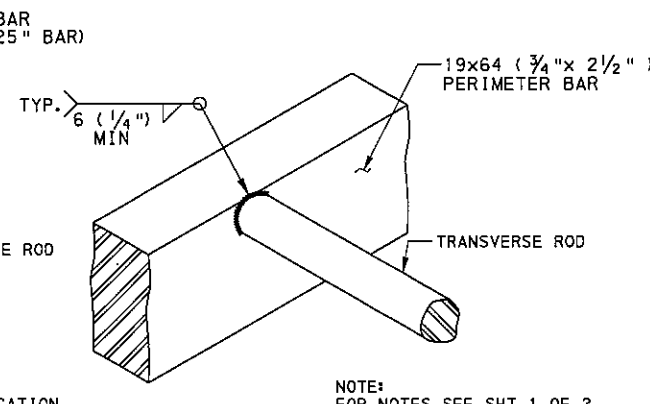
**DETAIL A**



**DETAIL B**



**DETAIL C**



**DETAIL D**

- NOTES**
1. THESE DETAILS DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS SUBMIT SHOP DRAWING FOR APPROVAL.
  2. WELD STRUCTURAL STEEL GRATES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.
  3. PROVIDE TRANSVERSE BARS MEETING THE REQUIREMENTS OF PUBLICATION 408. PROVIDE GRADE 345 (GRADE 50) STRUCTURAL STEEL FOR ALL PERIMETER AND BEARING BARS.
  4. PROVIDE BICYCLE-SAFE, STRUCTURAL STEEL OR CAST IRON VANE GRATES FOR INSTALLATION WHERE BICYCLE TRAFFIC IS ANTICIPATED, SUCH AS CURBED ROADWAYS IN URBAN AREAS OR ROADWAYS SPECIFICALLY ESTABLISHED AND SIGNED AS BIKEWAYS OR HAVING BIKE LANES. ALTERNATE BICYCLE-SAFE GRATE DESIGNS REQUIRE A SHOP DRAWING SUBMISSION, AS SPECIFIED IN NOTE 1, AND MUST CONFORM TO THE DIMENSIONAL REQUIREMENTS FOR PROPER INSTALLATION WITH THE CURRENT CONCRETE TOP UNITS.
  5. FABRICATE SLOTS BY BURNING, DRILLING, SHEARING OR PUNCHING. HAVE THE BOTTOM OF ALL BURNED OR DRILLED SLOTS CONFORM TO THE SHAPE OF THE ROD.
  6. PROVIDE STRUCTURAL STEEL GRATES WITH THE GRATE SPACERS LOCATED FLUSH ALONG THE TOP SURFACE OF THE GRATE.
  7. PROVIDE A 25 (1") WIDE YELLOW PAINT STRIP LENGTHWISE ALONG THE TOP OF THE INLET GRATE AS A FIELD IDENTIFIER OF CONFORMANCE TO THESE DETAILS. FOR PERMANENT IDENTIFICATION PLACE TWO RAISED WELD BEADS, EACH TWO INCHES LONG, ON THE CENTER TOP OF ONE LONGITUDINAL PERIMETER BAR.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

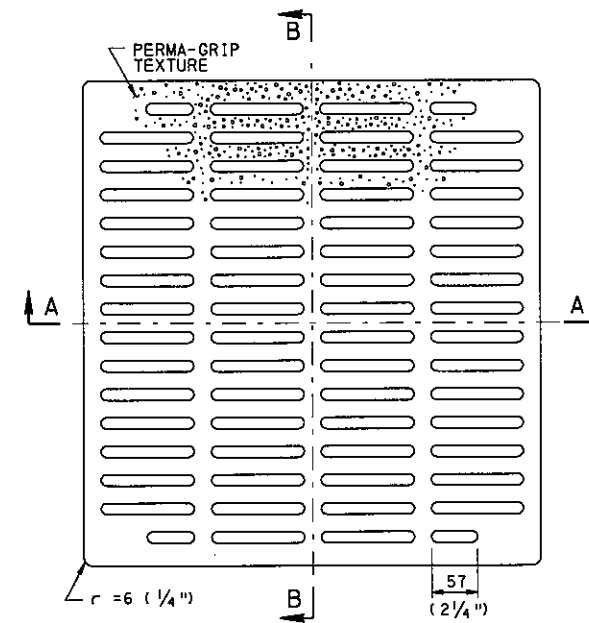
**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN**

**INLET  
GRATES**

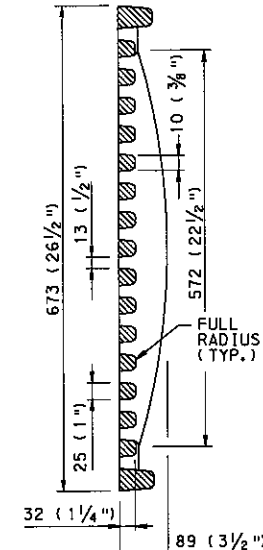
RECOMMENDED MAR. 30, 2006  
*Scott Christie*  
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006  
*M. A. Hatal*  
CHIEF ENGINEER

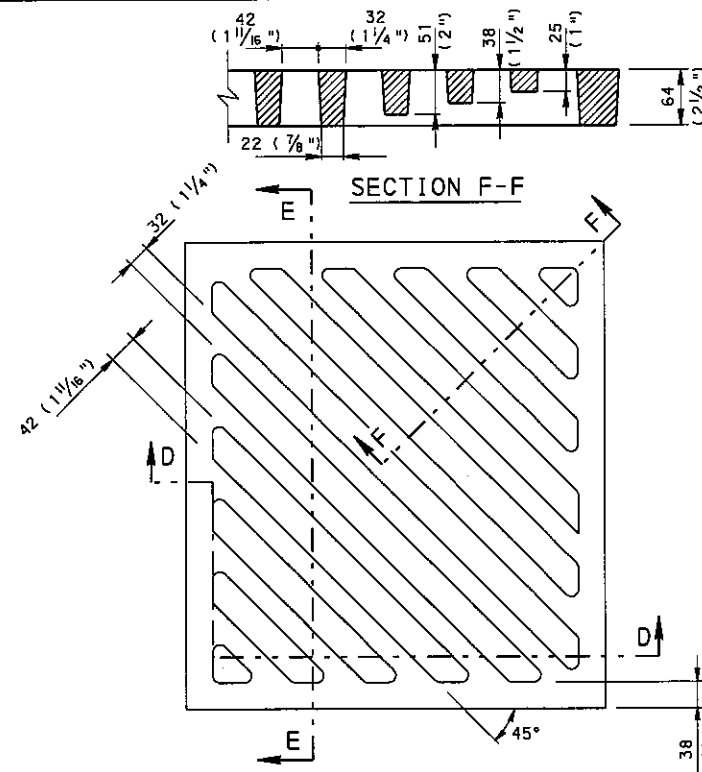
SHT 3 OF 10  
**RC-34M**



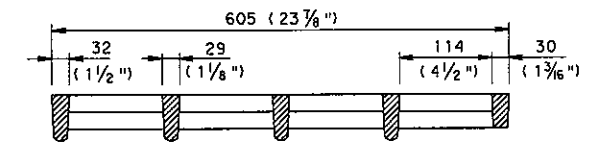
PLAN - BICYCLE-SAFE GRATE



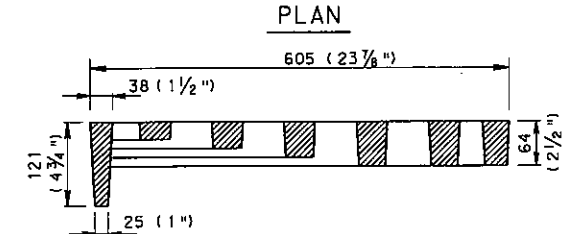
SECTION B-B



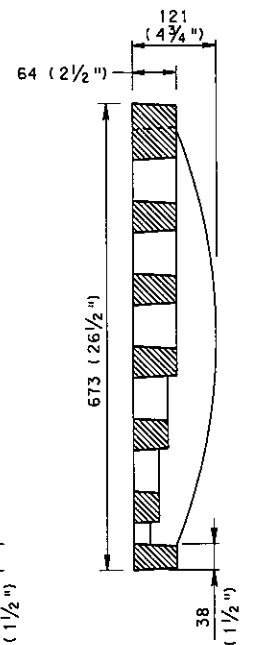
SECTION F-F



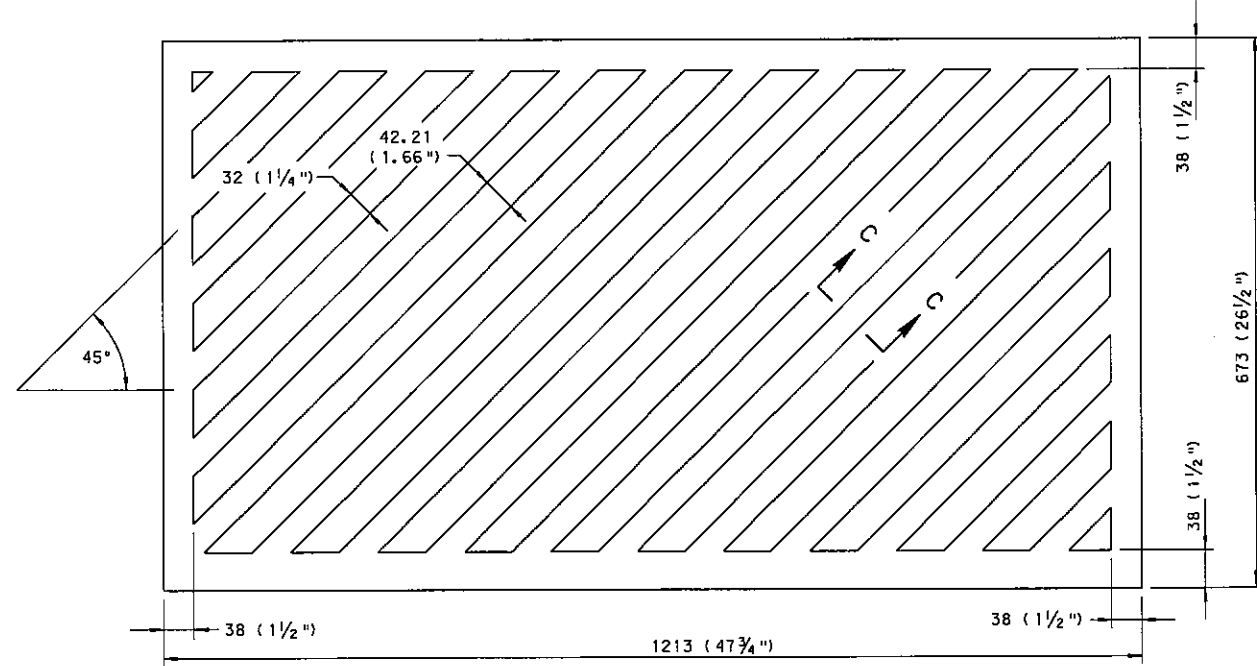
SECTION A-A



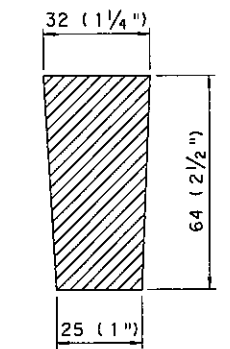
SECTION D-D



SECTION E-E



PLAN - ONE PIECE GRATE



SECTION C-C

TWO PIECE GRATES

CAST GRAY IRON GRATES

ASTM A-48, CLASS 35B  
(SEE NOTE 3)

NOTES

1. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. PERMIT ONLY GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS SUBMIT SHOP DRAWINGS FOR APPROVAL.
2. PROVIDE BICYCLE-SAFE, STRUCTURAL STEEL OR CAST IRON VANE GRATES FOR INSTALLATION WHERE BICYCLE TRAFFIC IS ANTICIPATED, SUCH AS CURBED ROADWAYS IN URBAN AREAS OR ROADWAYS SPECIFICALLY ESTABLISHED AND SIGNED AS BIKEWAYS OR HAVING BIKE LANES. ALTERNATE BICYCLE-SAFE GRATE DESIGNS SHALL REQUIRE A SHOP DRAWING SUBMISSION, AS SPECIFIED IN NOTE 1, AND SHALL CONFORM TO THE DIMENSIONAL REQUIREMENTS FOR PROPER INSTALLATION WITH THE CURRENT CONCRETE TOP UNITS.
3. CAST IRON GRATES MAY BE USED AS ALTERNATES TO STRUCTURAL STEEL GRATES PROVIDED THEY ARE SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 AND APPROVED FOR HS25 LOADING. CAST IRON GRATES NOT APPROVED FOR HS25 LOADING MAY BE USED OUTSIDE OF THE TRAVEL LANES; AT THE EDGE OF OUTSIDE SHOULDERS, SWALES, WIDE MEDIAN SWALES AND INFIELD AREAS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

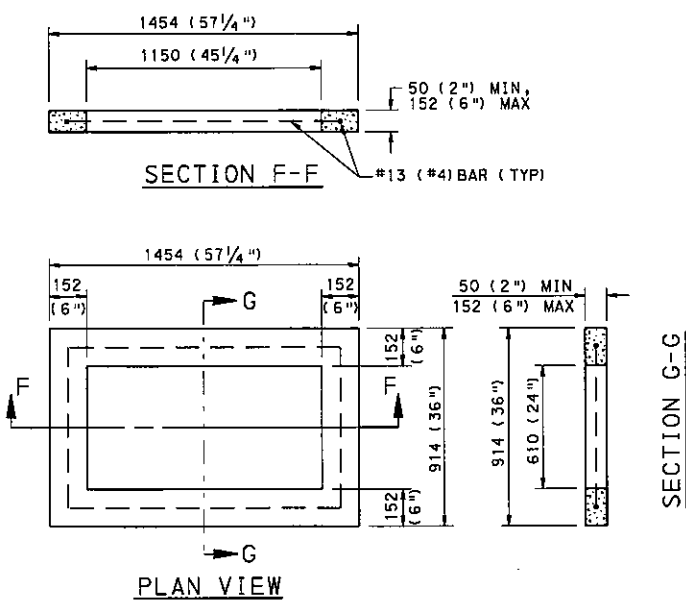
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

INLET GRATES

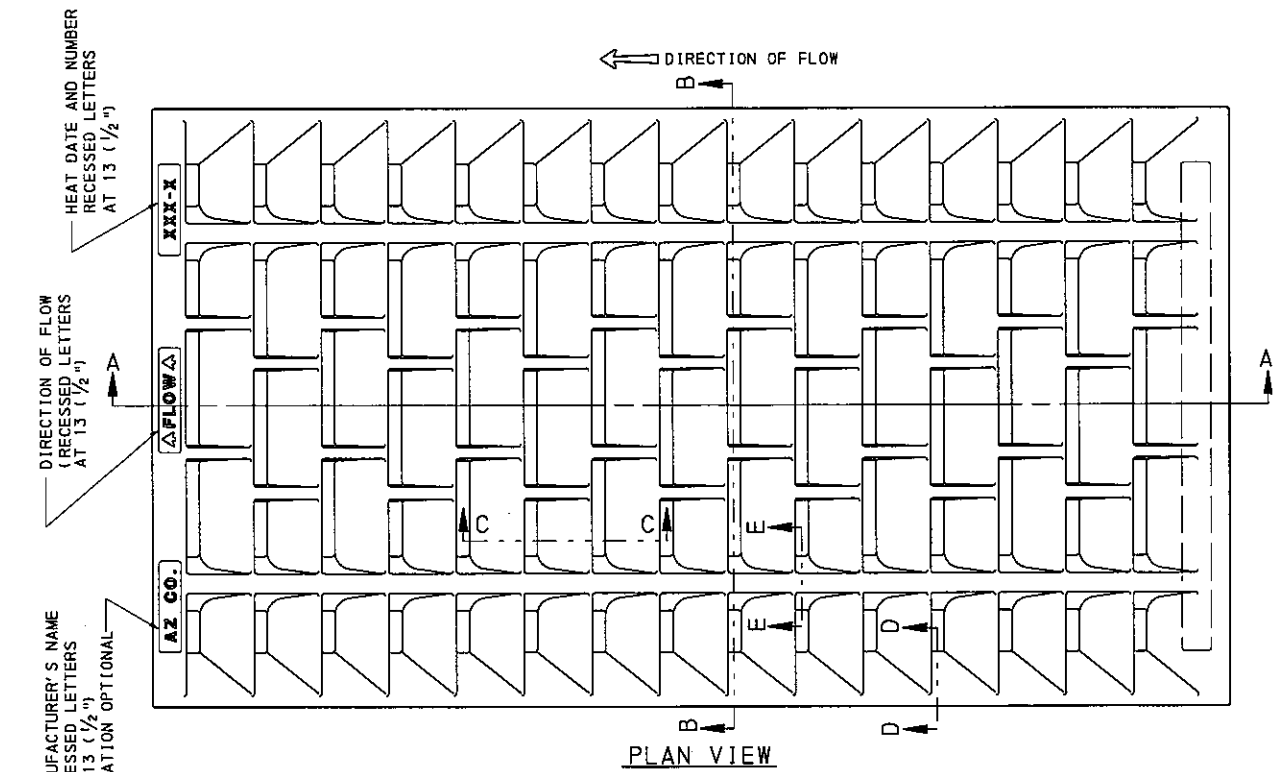
RECOMMENDED MAR. 30, 2006 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Patel</i> CHIEF ENGINEER	SHT 4 OF 10 RC-34M
--	--	-----------------------

**NOTES**

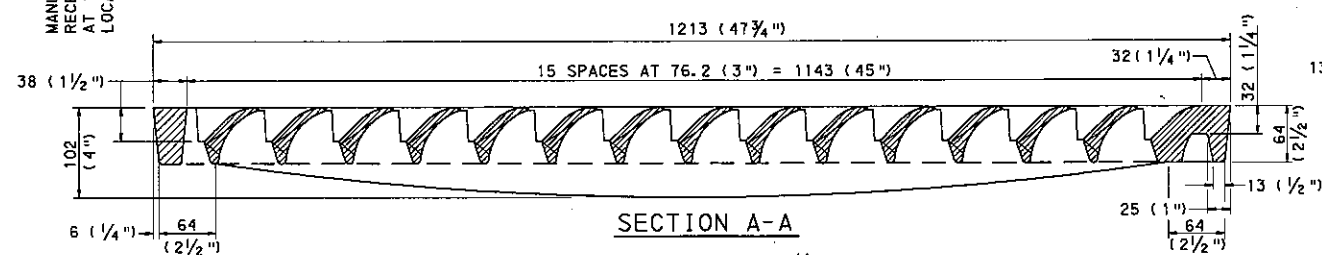
1. PROVIDE MATERIALS AND CONSTRUCTION IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 605, 606 AND 714. PERMIT ONLY GRATES AND GRADE ADJUSTMENT SYSTEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS SUBMIT SHOP DRAWINGS FOR APPROVAL.
2. INSTALL VANE GRATES WITH CURVE VANES FACING THE DIRECTION OF FLOW.
3. GRADE ADJUSTMENT RINGS :
  - A. CUSTOM FABRICATE EACH ADJUSTMENT RING FROM MEASUREMENTS PROVIDED WITH EACH ORDER.
  - B. MANUFACTURE BAR STOCK AND RETAINER CLIP FROM U.S. MADE CARBON STEEL MEETING OR EXCEEDING THE MINIMUM REQUIREMENTS OF ASTM A-36M AND AASHTO TABLE 10.32.1A.
  - C. REQUIRE FULL CIRCUMFERENTIAL WELDS ON BOTH TOP AND BOTTOM RINGS. MAKE THE INNER WELD A BEVEL GROOVE WELD (FLUSH FINISH) FOR PROPER SEATING OF GRADE AND MAKE THE OUTER WELD A FILLET WELD.
  - D. PROVIDE AN ADJUSTMENT RING WHICH IS FLUSH WITH COVER AND DOES NOT ALLOW EXCESSIVE MOVEMENT. PROVIDE AN ADJUSTMENT RING WHICH CONFORMS TO THE SHAPE OF THE ORIGINAL FRAME.
4. PROVIDE RADIUS OF  $3 \frac{1}{8}$ " TYPICAL FOR ALL FILLETS AND ROUNDS, UNLESS NOTED.
5. ATTACH STEEL GRADE ADJUSTMENT RINGS RIGIDLY TO THE FRAME AND SET PRECAST CONCRETE GRADE ADJUSTMENT RINGS ON A MORTAR BED.
6. CAST IRON GRATES MAY BE USED AS ALTERNATES TO STRUCTURAL STEEL GRATES PROVIDED THEY ARE SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 AND APPROVED FOR HS25 LOADING. CAST IRON GRATES NOT APPROVED FOR HS25 LOADING MAY BE USED OUTSIDE OF THE TRAVEL LANES; AT THE EDGE OF OUTSIDE SHOULDERS, SWALES, WIDE MEDIAN SWALES AND INFIELD AREAS.



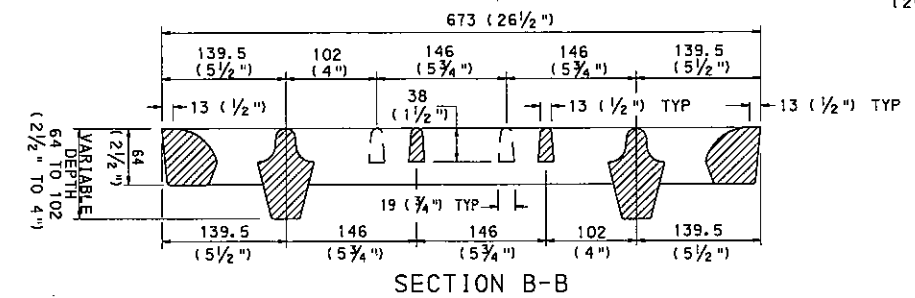
**PRECAST CONCRETE GRADE ADJUSTMENT RINGS**



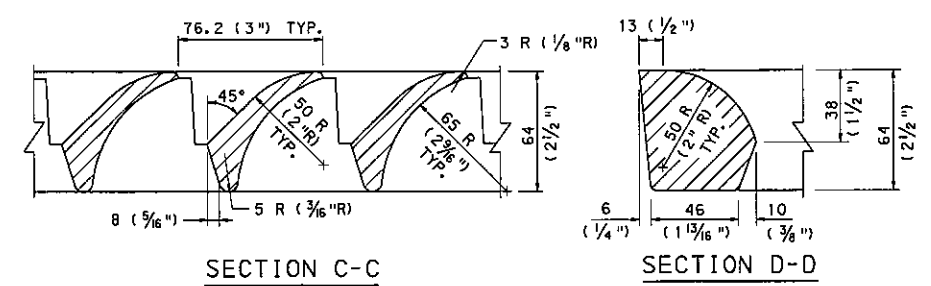
**PLAN VIEW**



**SECTION A-A**



**SECTION B-B**

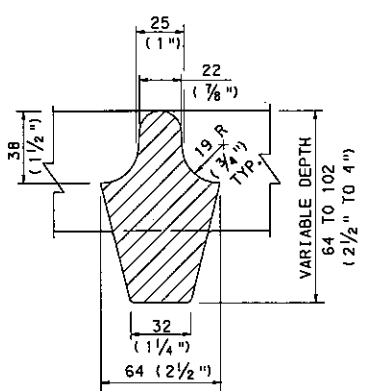


**SECTION C-C**

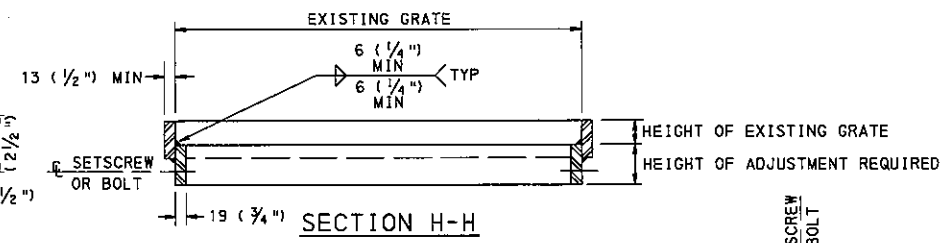
**SECTION D-D**

**CAST IRON VANE GRATE**

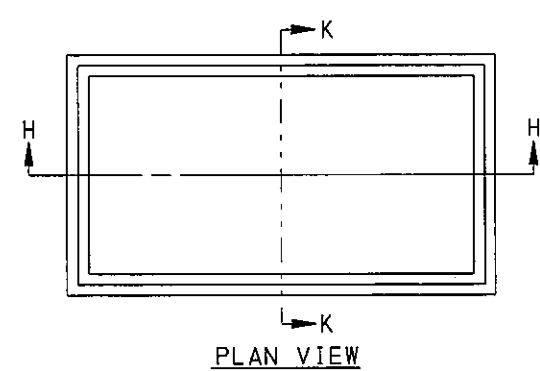
SEE NOTE 7



**SECTION E-E**

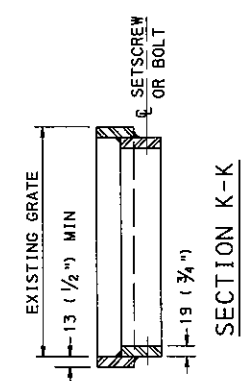


**SECTION H-H**



**PLAN VIEW**

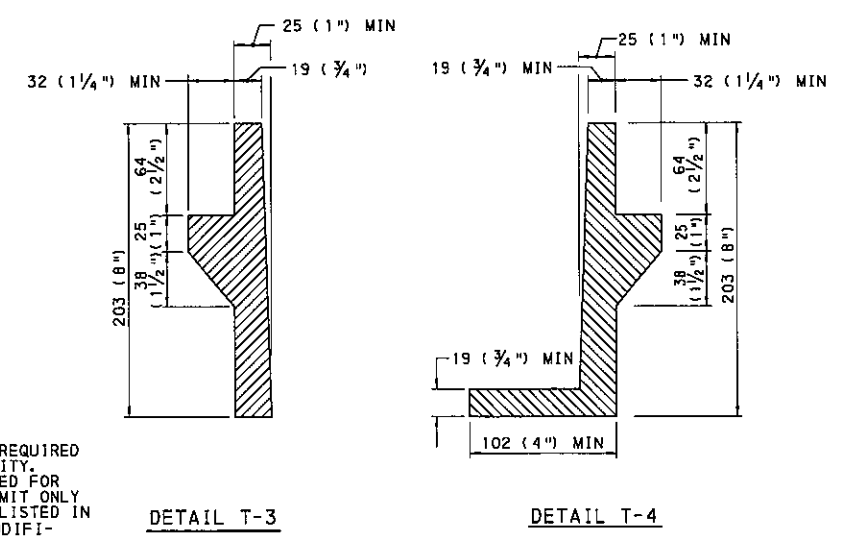
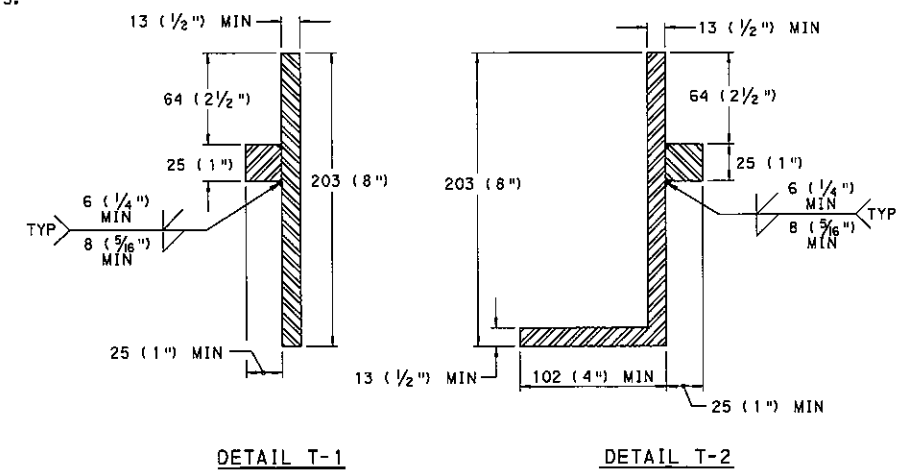
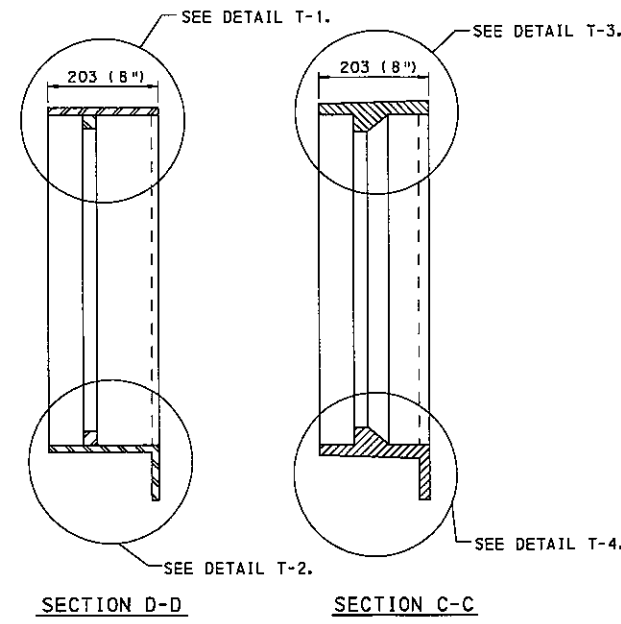
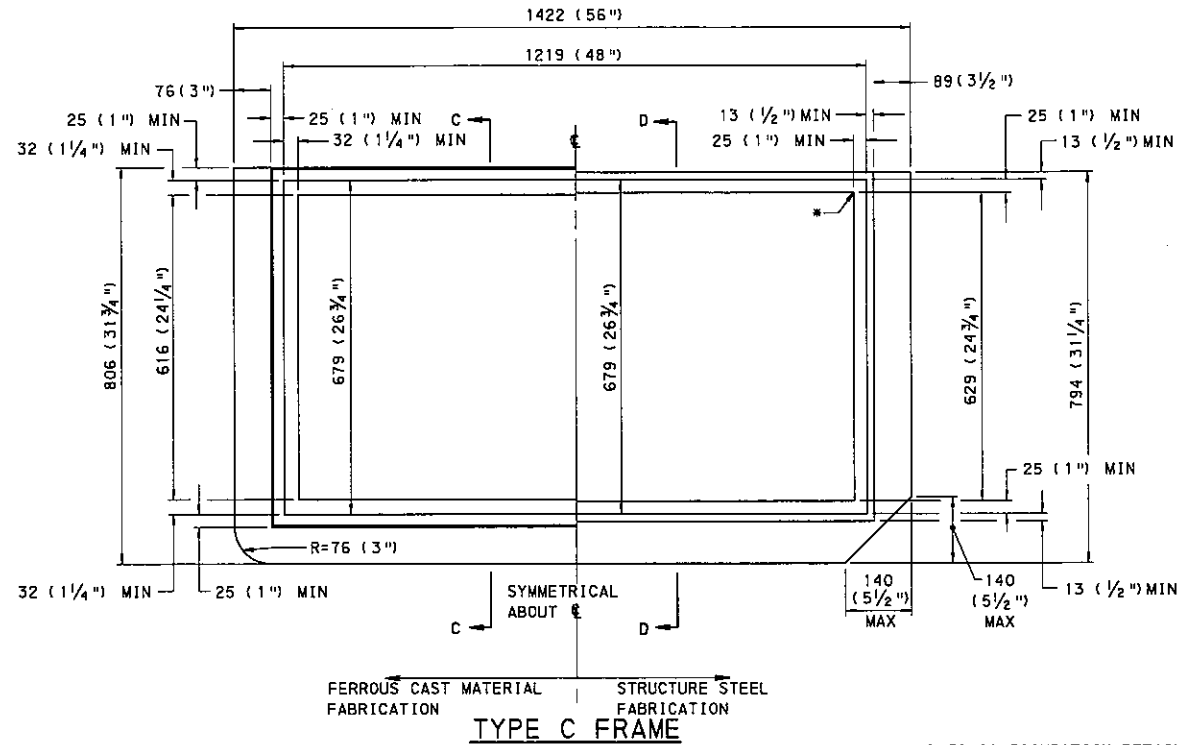
**STRUCTURAL STEEL GRADE ADJUSTMENT RINGS**



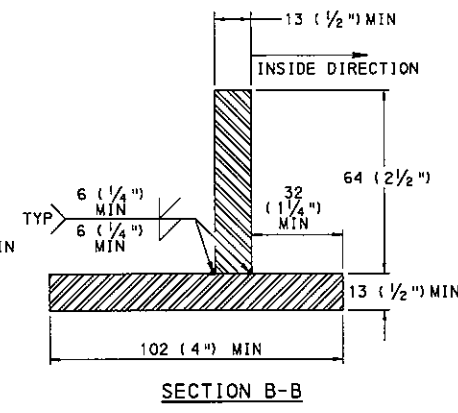
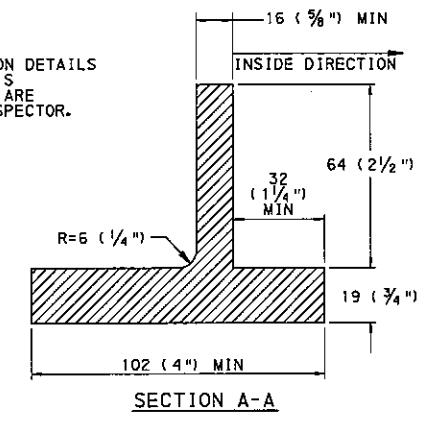
**SECTION K-K**

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

<b>COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN</b>		
<b>INLET GRATES &amp; GRADE ADJUSTMENT RINGS</b>		
RECOMMENDED MAR. 30, 2006 <i>Scott Christian</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Chitel</i> CHIEF ENGINEER	SHT 5 OF 10 RC-34M



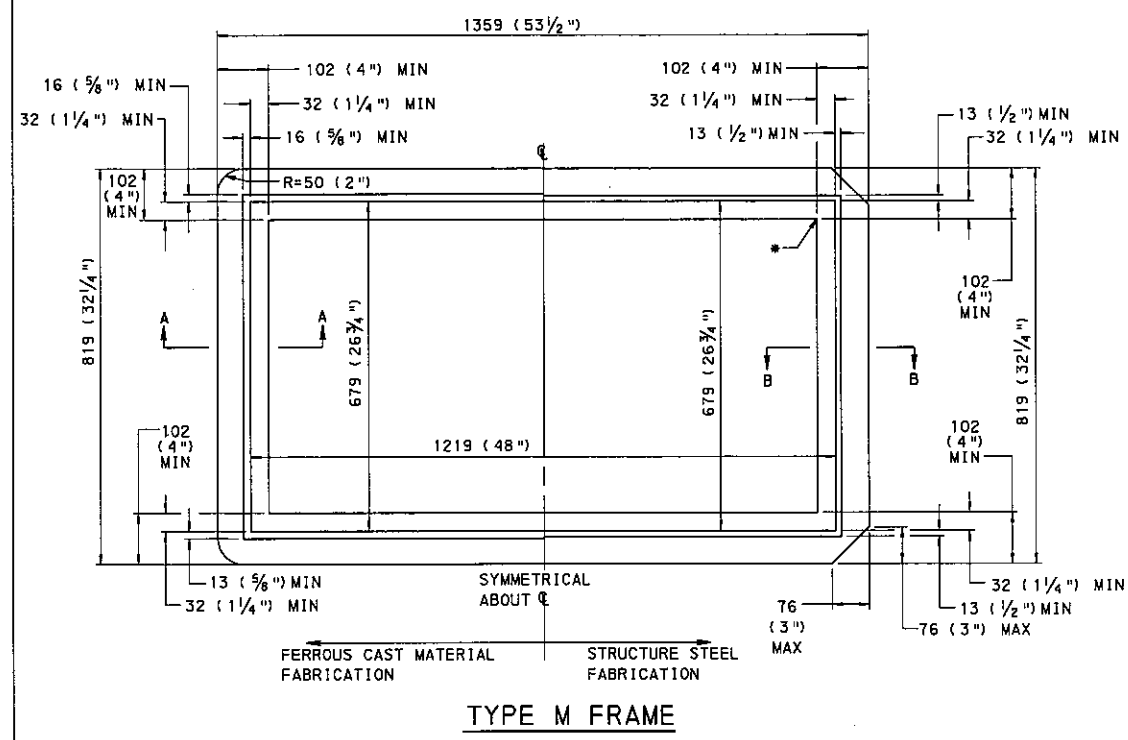
\*CORNER CONFIGURATION DETAILS ARE THE FABRICATOR'S RESPONSIBILITY AND ARE APPROVED BY THE INSPECTOR.



**NOTES**

1. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. PERMIT ONLY FRAMES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS SUBMIT SHOP DRAWINGS FOR APPROVAL.
2. PROVIDE EITHER GRAY, MALLEABLE OR DUCTILE IRON CASTINGS OR STRUCTURAL STEEL FRAMES.
3. WELD STRUCTURAL STEEL FRAMES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.03(r).

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

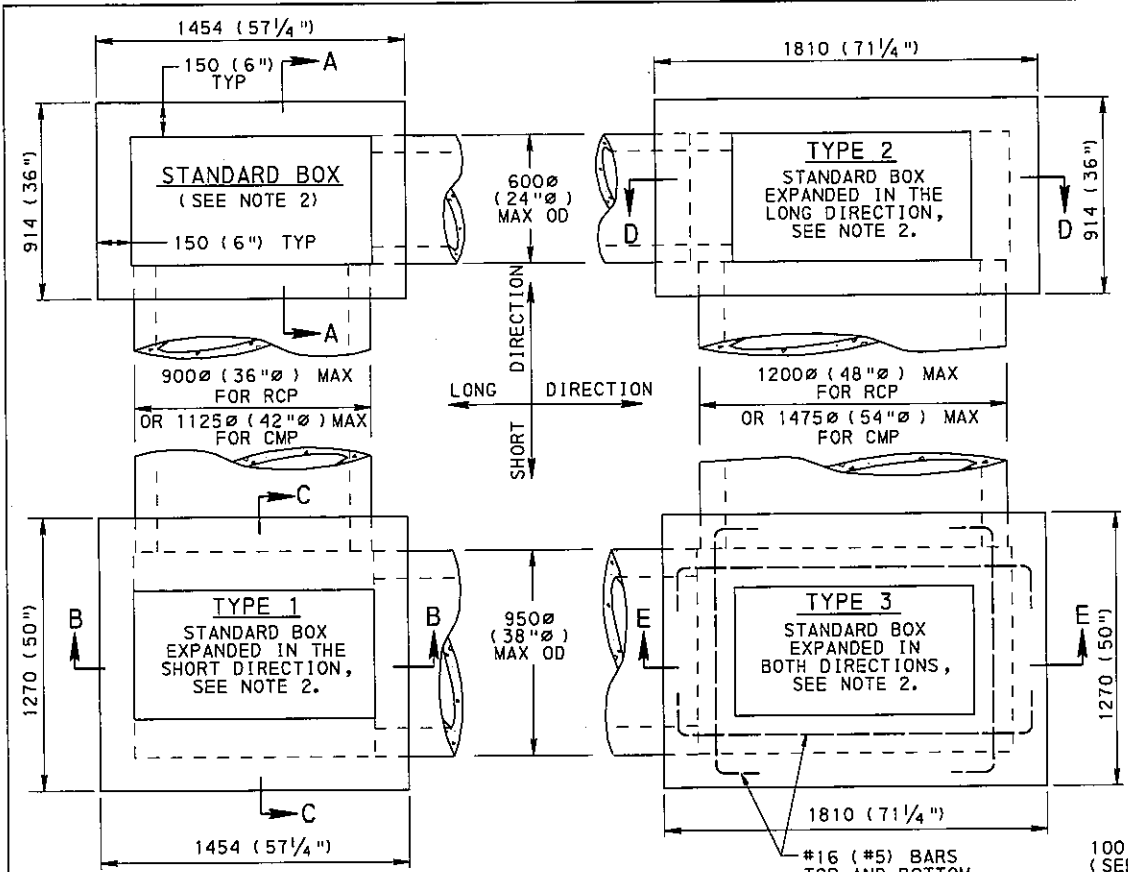


COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

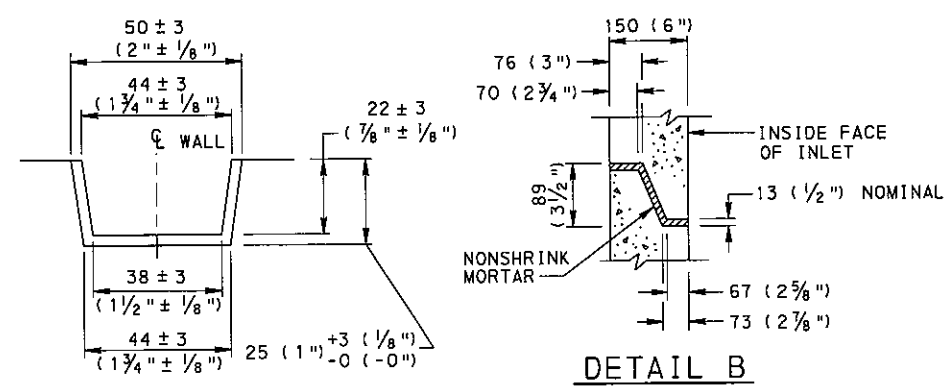
INLET  
FRAMES

RECOMMENDED MAR. 30, 2006 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Ahtel</i> CHIEF ENGINEER	SHT 6 OF 10 RC-34M
--	--	-----------------------





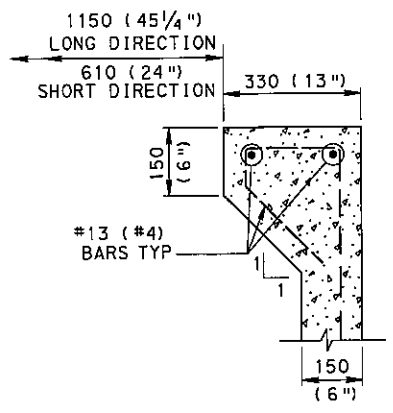
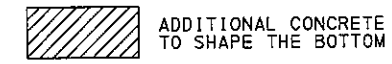
PLAN - INLET BOXES



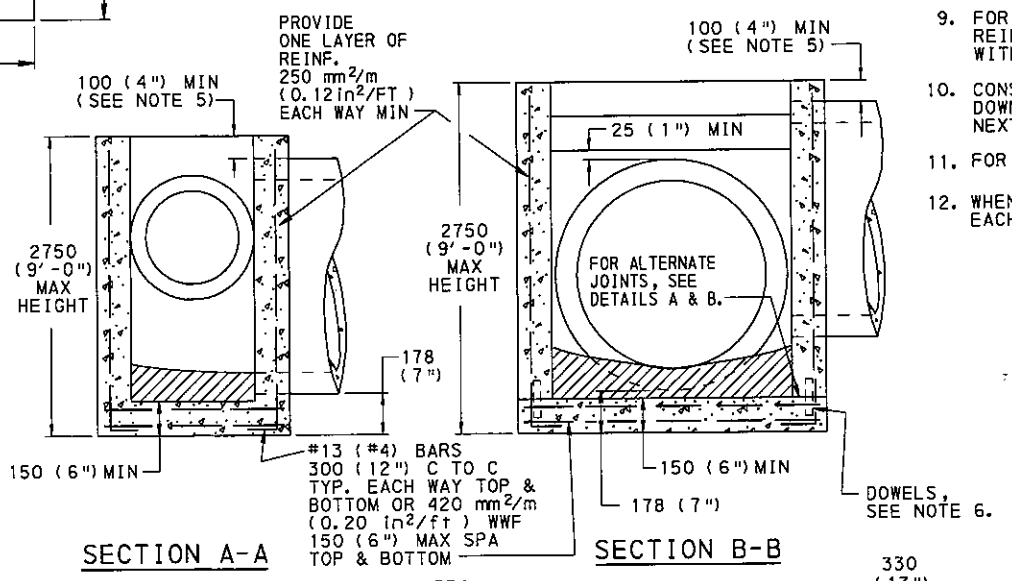
DETAIL A

DETAIL B

LEGEND

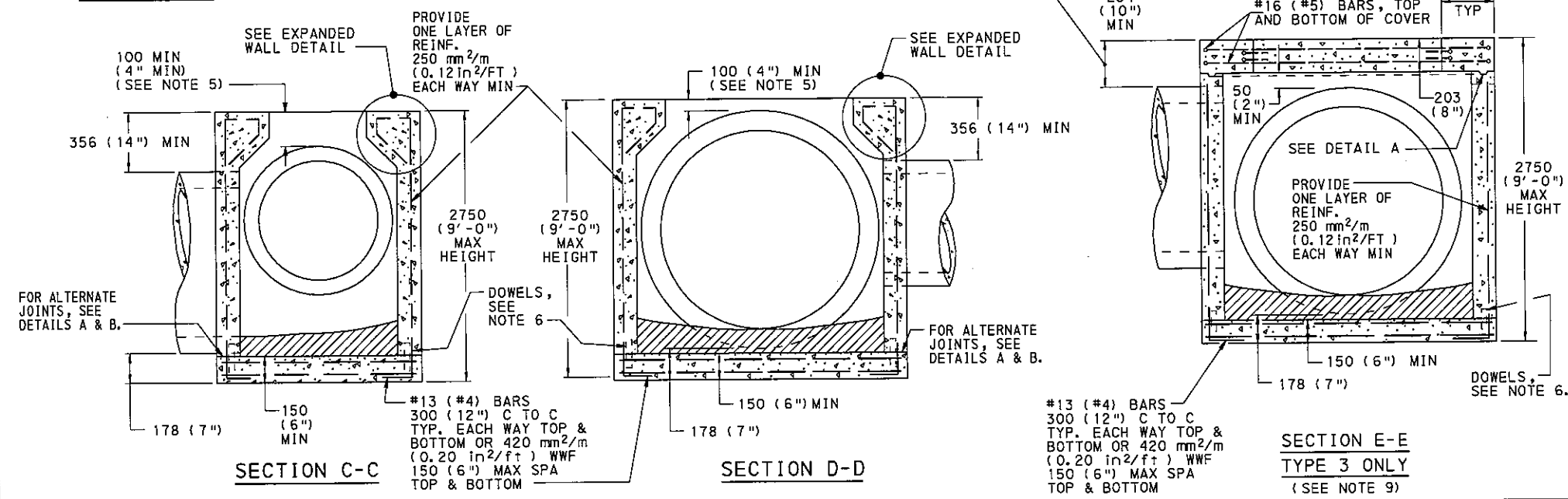


EXPANDED WALL DETAIL



SECTION A-A

SECTION B-B



SECTION C-C

SECTION D-D

SECTION E-E  
TYPE 3 ONLY  
(SEE NOTE 9)

NOTES

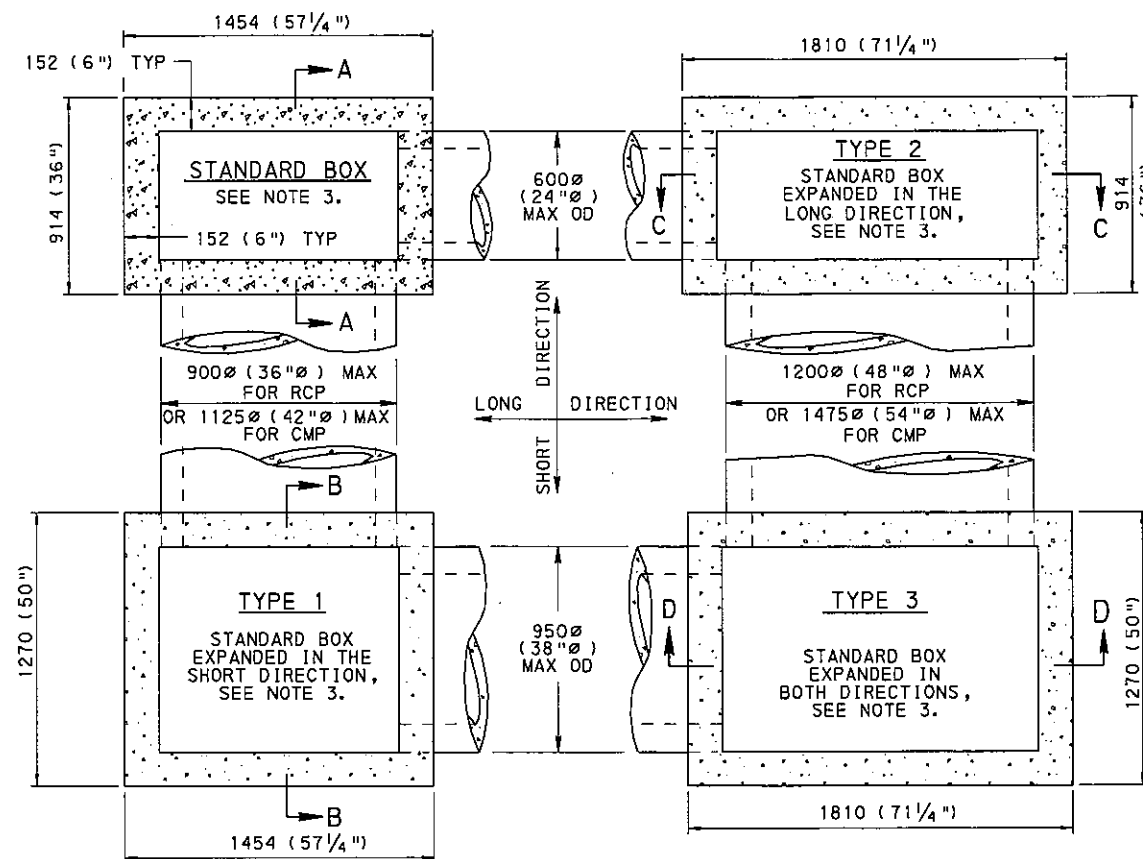
1. CONSTRUCT INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.
2. PROVIDE INLET BOXES WITH 610 x 1150 (24"x 45 1/4") STANDARD OPENING TO ACCOMMODATE THE STANDARD TOP COMPONENTS.
3. FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION, PROVIDE INLET WALLS 150 (6") THICK, UNLESS OTHERWISE INDICATED.
4. INLETS THAT EXCEED THE MAXIMUM HEIGHT SHOWN SHALL REQUIRE SPECIAL DETAILS AND DESIGN FOR THE INLET WALLS AND BASE. CONSTRUCT INLETS THAT EXCEED 1500 (5') IN HEIGHT WITH STEPS SIMILAR TO MANHOLES. SEE RC-39M.
5. LOCATE PIPE OR PIPES, AS INDICATED, WITH THE INLET BOTTOM SHAPED TO CHANNEL THE FLOW TOWARD THE OUTLET PIPE. WHEN PROJECT CONDITIONS REQUIRE PIPES TO BE LOCATED WITHIN 100 (4") FROM THE TOP OF THE INLET BOX, PROVIDE AN ADDITIONAL #10 (#3) REINFORCEMENT BAR LOCATED 40 (1 1/2") FROM THE TOP OF THE INLET BASE, FULL WIDTH ALONG THE INLET FACE. IF REINFORCED CONCRETE PIPE IS USED, THE PIPE BLOCKOUT MAY BE FORMED 'FLUSH' WITH THE INLET BASE. LIMIT PIPE BLOCKOUT OF WALL TO 25 mm (1").
6. PLACE #13 (#4) REINFORCEMENT BARS, MINIMUM 300 (12") LONG, SPACED AT 300 (12") C TO C, AS DOWELS BETWEEN THE INLET BASE AND WALLS WHEN THE CONCRETE WALLS AND INLET BASE ARE NOT CONSTRUCTED MONOLITHICALLY. THE DOWELS MAY BE ELIMINATED IF AN ALTERNATE JOINT IS CONSTRUCTED AS SHOWN IN DETAILS A & B.
7. FOR CAST-IN-PLACE CONSTRUCTION, WHEN THE BASE IS CONSTRUCTED MONOLITHICALLY WITH THE VERTICAL WALLS, PROVIDE 75 (3") MINIMUM FROM THE BOTTOM OF THE PIPE TO THE BOTTOM OF THE INLET BOX.
8. FOR PIPE DIAMETERS LARGER THAN 1200 (48") RCP OR 1350 (54") CMP USE A MODIFIED INLET BOX. SEE SHEET 9.
9. FOR INLETS OTHER THAN AS SHOWN ON THE STANDARDS, PROVIDE REINFORCEMENT BASED ON PHL 93 AND P-82 LOADING AND IN ACCORDANCE WITH PUBLICATION 408.
10. CONSTRUCTION JOINTS AND KEYS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. CLEAN JOINTS AND KEYS THOROUGHLY BEFORE PLACING NEXT CONCRETE SEGMENT.
11. FOR SUBBASE, SEE NOTE 6 ON SHEET 8.
12. WHEN NECESSARY, THE BLOCKOUT MAY REMOVE UP TO 25 mm (1") OF EACH WALL AT 3:00/9:00 LOCATIONS FOR RC PIPE CONNECTIONS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

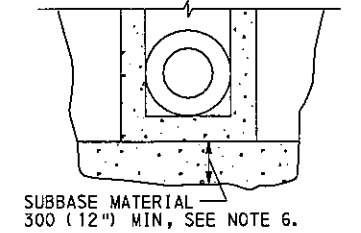
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

**INLETS**  
**STANDARD INLET BOXES**  
**(CAST-IN-PLACE)**

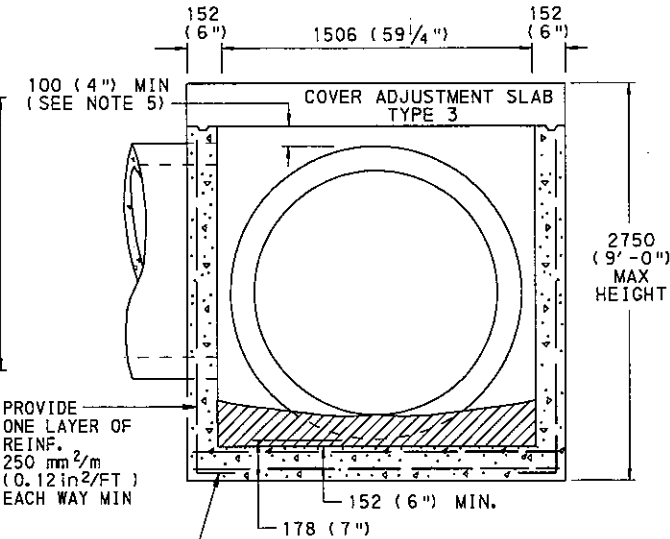
RECOMMENDED MAR. 30, 2006	RECOMMENDED MAR. 30, 2006	SHT 7 OF 10
<i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	<i>M. Patel</i> CHIEF ENGINEER	RC-34M



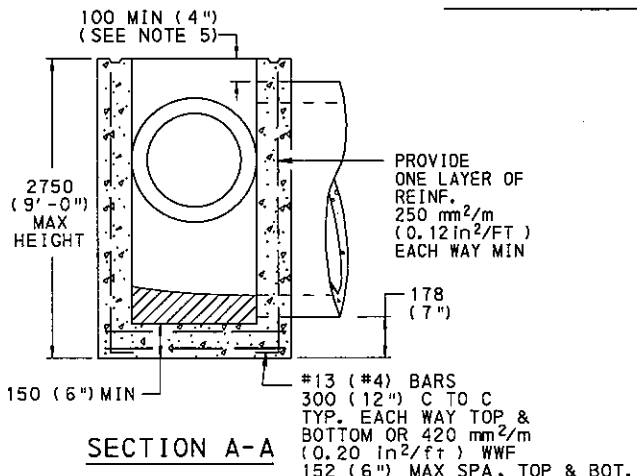
PLAN - INLET BOXES



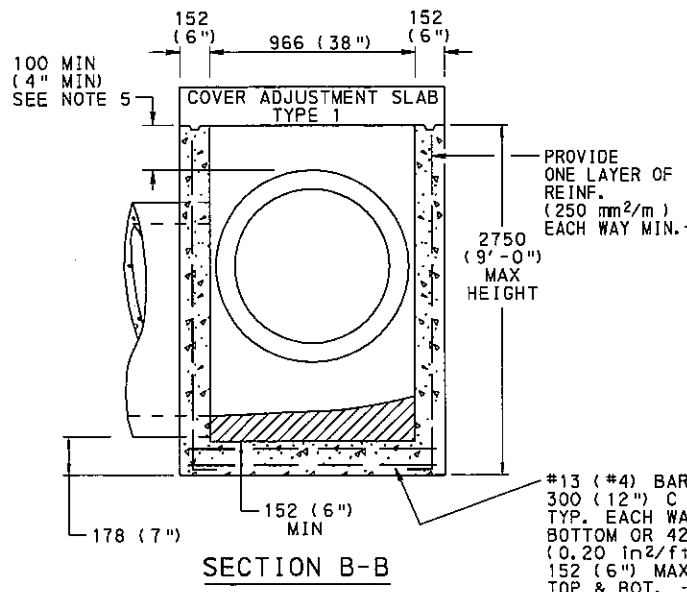
DETAIL A  
PRECAST CONCRETE INLET BOX  
BASE PREPARATION



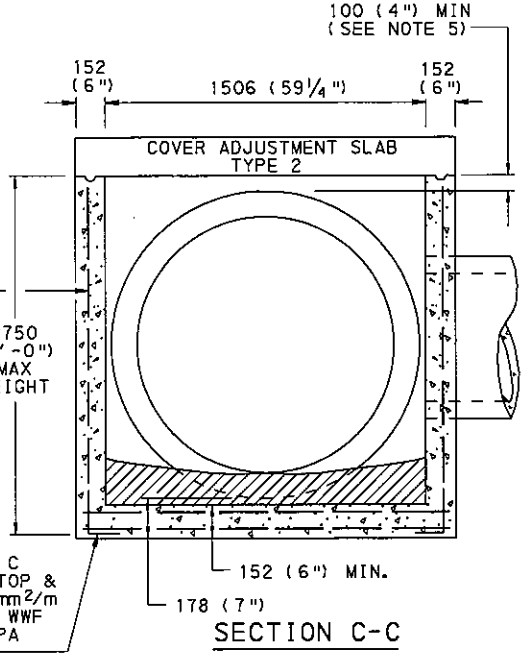
SECTION D-D  
TYPE 3 ONLY



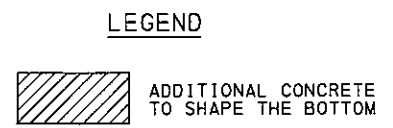
SECTION A-A



SECTION B-B

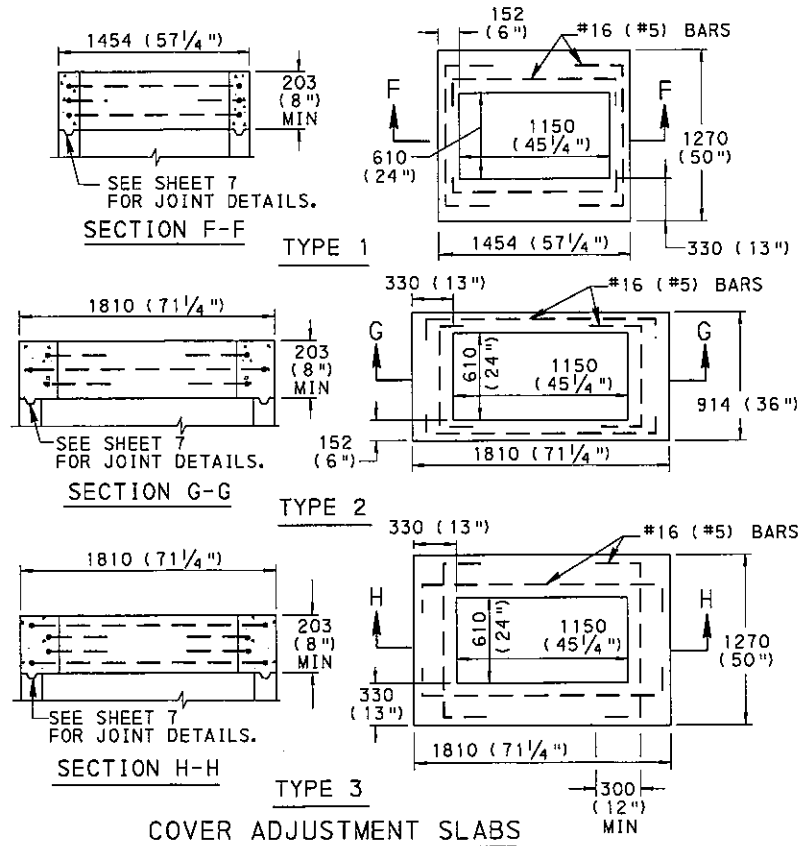


SECTION C-C



LEGEND

#13 (#4) BARS  
300 (12") C TO C  
TYP. EACH WAY TOP &  
BOTTOM OR 420 mm<sup>2</sup>/m  
(0.20 in<sup>2</sup>/ft) WWF  
152 (6") MAX SPA  
TOP & BOTTOM



COVER ADJUSTMENT SLABS

NOTES

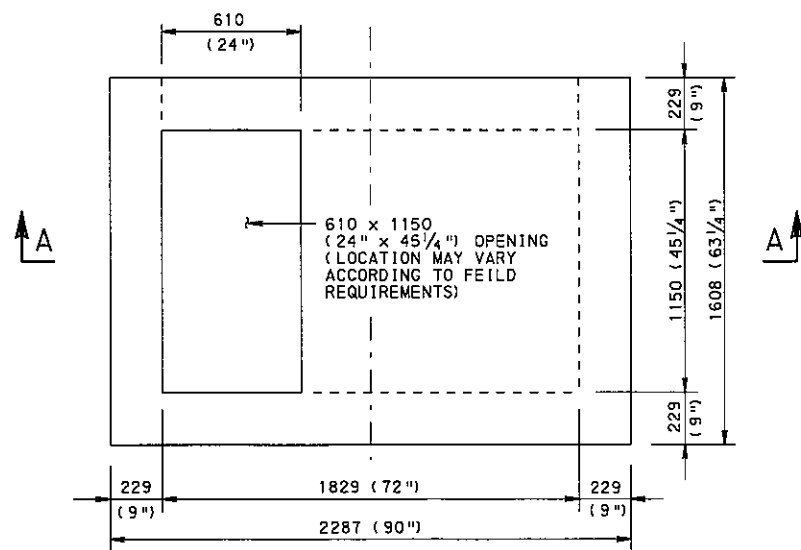
1. CONSTRUCT INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 714.
2. PERMIT ONLY PRECAST INLET BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. USE CLASS AA CEMENT CONC FOR PRECAST BOXES. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
3. PROVIDE STANDARD INLET BOXES AND COVER ADJUSTMENT SLABS WITH A 610 x 1150 (24"x 46") OPENING TO ACCOMMODATE STANDARD TOP COMPONENTS.
4. FOR INLETS THAT DEVIATE FROM THE STANDARD SUBMIT SPECIAL DETAILS AND DESIGN FOR THE INLET WALLS AND BASE TO THE BUREAU OF CONSTRUCTION FOR REVIEW AND APPROVAL. CONSTRUCT INLETS THAT EXCEED 1500 (5') IN HEIGHT WITH STEPS SIMILAR TO MANHOLES (SEE RC-39M). FOR INLETS OTHER THAN AS SHOWN ON THE STANDARDS, PROVIDE REINFORCEMENT BASED ON PHL 93 (HS 25) LOADING AND IN ACCORDANCE WITH PUBLICATION 408.
5. LOCATE PIPE OR PIPES, AS INDICATED, WITH THE INLET BOTTOM SHAPED TO CHANNEL THE FLOW TOWARD THE OUTLET PIPE. WHEN PROJECT CONDITIONS REQUIRE PIPE BLOCKOUTS TO BE FORMED WITHIN 100 (4") FROM THE TOP OF THE INLET BOX, PROVIDE AN ADDITIONAL #10 (#3) REINFORCEMENT BAR LOCATED 40 (1 1/2") FROM THE TOP OF THE INLET BASE, FULL WIDTH ALONG THE INLET FACE. REMOVE ANY VISIBLE PORTION OF THE BAR, IF REQUIRED DURING INSTALLATION AND PRIOR TO JOINING THE PIPE TO THE INLET. IF REINFORCED CONCRETE PIPE IS USED, THE PIPE BLOCKOUT MAY BE FORMED 'FLUSH' WITH THE INLET BASE. LIMIT PIPE BLOCKOUT OF WALL TO 25 mm (1").
6. PLACE SUBBASE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350.2, IN LAYERS 100 (4") THICK, COMPACTED TO A DENSITY SATISFACTORY TO THE ENGINEER AND INCIDENTAL TO THE INLET PAY ITEM.
7. FOR PIPE DIAMETERS LARGER THAN 1200 (48") RCP OR 1350 (54") CMP, USE A MODIFIED INLET BOX, SHEET 9.
8. PROVIDE CONSTRUCTION JOINTS AS REQUIRED FOR INLET BOXES THAT ARE NOT MONOLITHIC. SEE DETAILS A & B SHEET 7.
9. TAPERS MAY BE PROVIDED ON VERTICAL FACES OF PRECAST INLET BOX BASE UNITS TO FACILITATE FORM STRIPPING. TAPERS WILL RESULT IN INTERNAL BOTTOM DIMENSIONS THAT VARY TO A MAXIMUM OF 25 mm (1").
10. PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING AND INSTALLATION. GALVANIZE METAL DEVICES AS SPECIFIED IN PUB. 408 SECTION 1105. TAPERS MAY BE PROVIDED ON INSIDE VERTICAL FACES OF PRECAST INLET TOPS TO FACILITATE FORM STRIPPING. TAPERS WILL RESULT IN INTERNAL BOTTOM DIMENSIONS THAT VARY TO A MAXIMUM OF 25 mm (1").

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

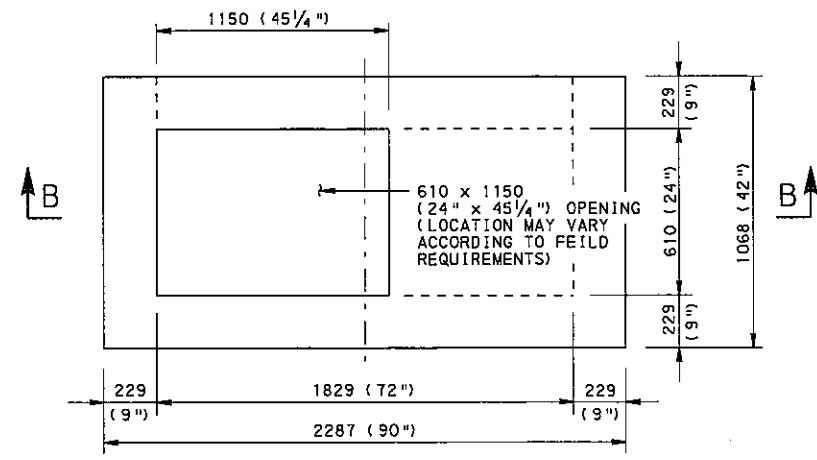
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

**INLETS**  
**STANDARD INLET BOXES**  
**(PRECAST)**

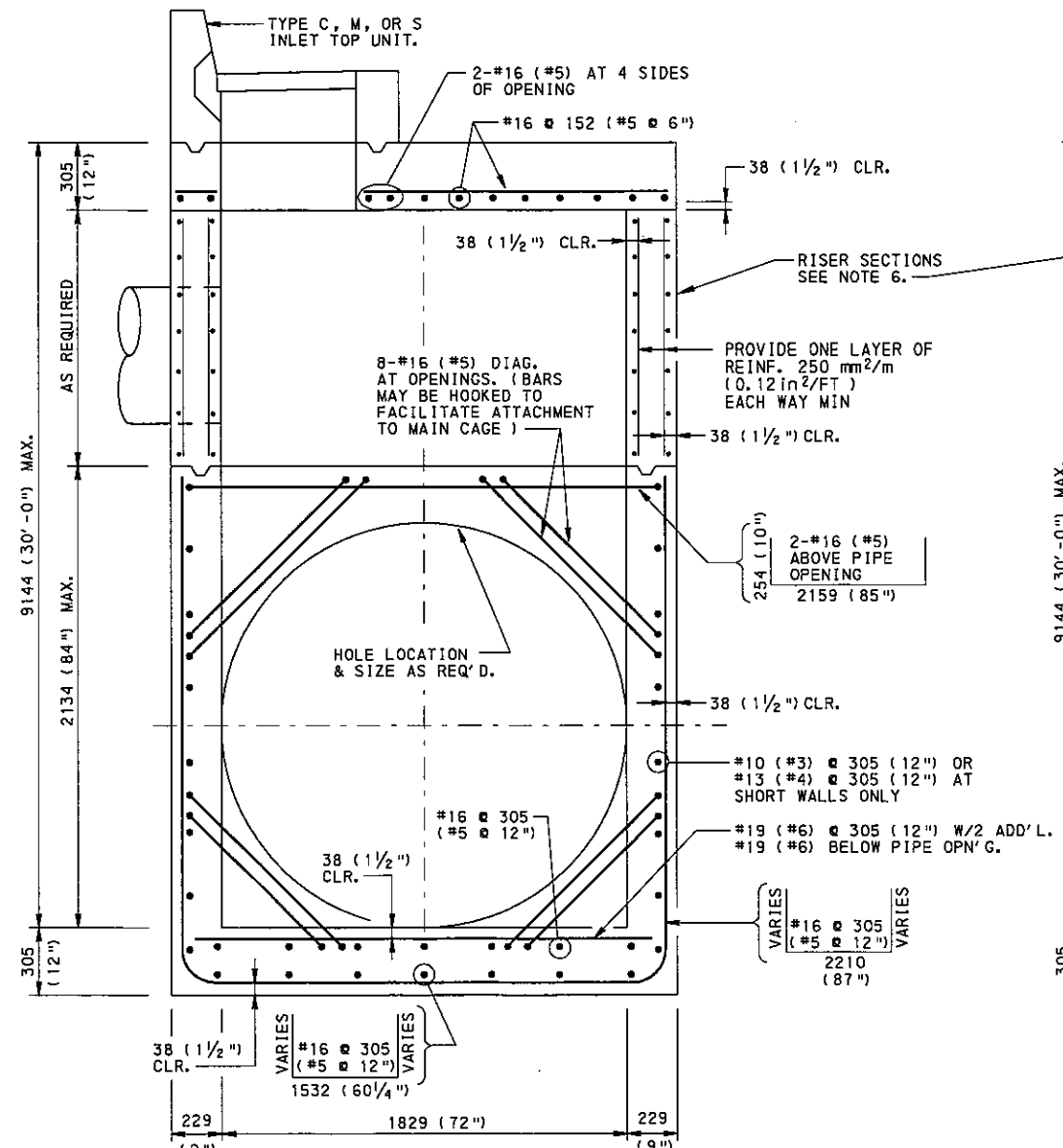
RECOMMENDED MAR. 30, 2006 <i>Scott Christian</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Latel</i> CHIEF ENGINEER	SHT 8 OF 10 RC-34M
---	--	-----------------------



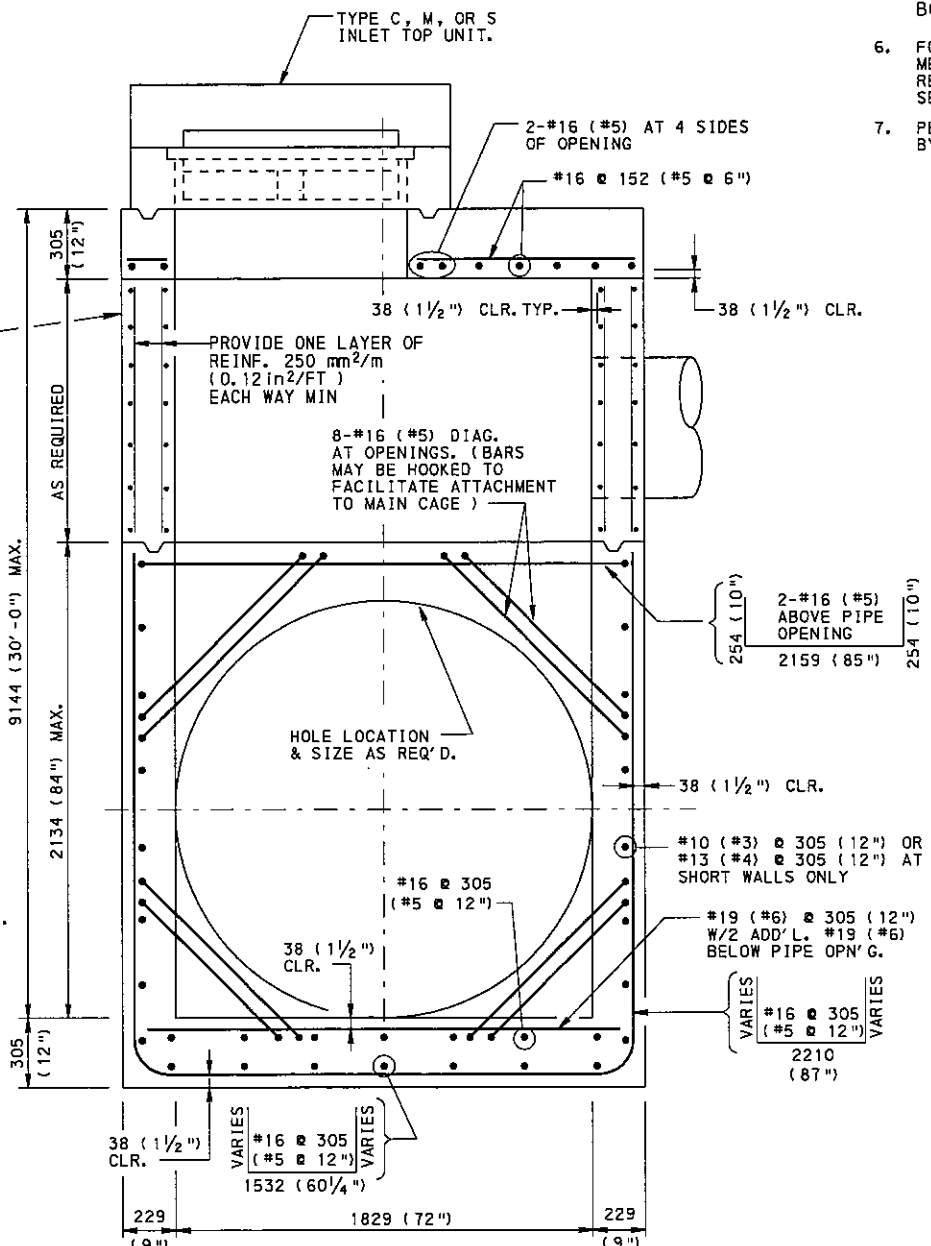
PLAN



PLAN



SECTION A-A



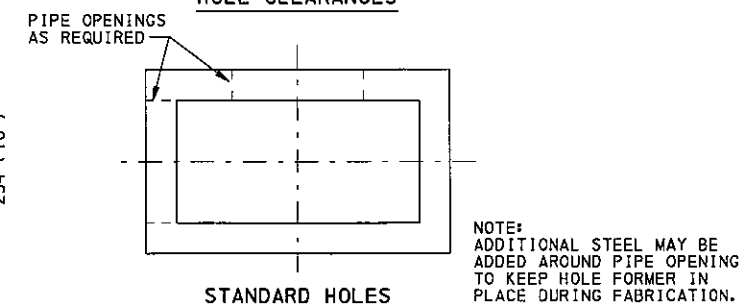
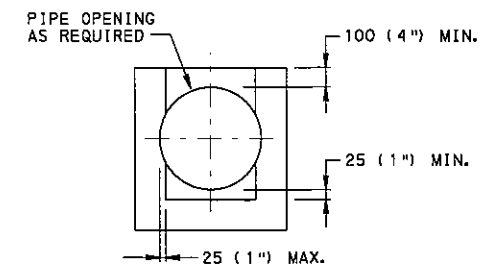
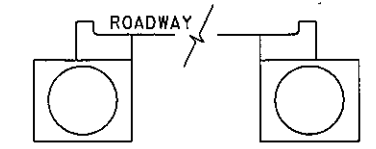
SECTION B-B

MODIFIED TYPE I INLET 1829 (72") x 1150 (45 1/4")

MODIFIED TYPE II INLET 610 (24") x 1829 (72")

NOTES

1. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605 AND SECTION 714.
2. PROVIDE INLETS WITH A MAXIMUM HEIGHT TO BE THE GRADE ELEVATION. WHEN THE REQUIRED HEIGHT EXCEEDS THE MAXIMUM SHOWN, SHOW SPECIAL DETAILS AND DESIGN FOR THE INLET WALLS AND BASE. CONSTRUCT INLETS THAT EXCEED 1500 (5') IN HEIGHT WITH STEPS SIMILAR TO MANHOLES (SEE RC-39M).
3. WHEN A SITUATION CAN NOT BE SATISFIED BY THE MODIFIED INLET BOXES SHOWN, PROVIDE SPECIAL DETAILS AND DESIGNS.
4. FOR ORIENTATION OF THE TYPE C INLET TOP WITH MODIFIED TYPE I INLET BOX, THE TYPICAL INSTALLATION DETAILS ARE SHOWN BELOW. SHOW ANY VARIATION ON THE CONSTRUCTION DRAWINGS BY SPECIAL DETAILS.
5. PROVIDE A MINIMUM HEIGHT OF 508 (20") MEASURED FROM THE TOP SURFACE OF THE TOP UNIT TO THE INSIDE TOP OF THE PIPE WHEN THE TOP UNIT AND EITHER A MODIFIED TYPE I OR A MODIFIED TYPE II INLET BOX ARE CONSTRUCTED MONOLITHICALLY.
6. FOR THAT PORTION OF THE INLET ASSEMBLY WHERE THE DEPTH MEASURED FROM GRADE IS LESS THAN 2759 (9'-0") A COVER REDUCTION SLAB AND STANDARD 610 x 1150 (24"x 45 1/4") RISER SECTION MAY BE UTILIZED.
7. PERMIT ONLY PRECAST MODIFIED INLET BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.



PIPE OPENING DETAILS

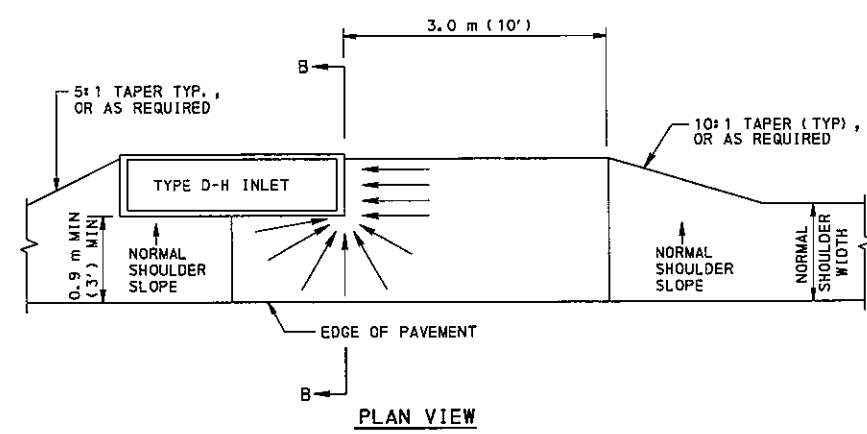
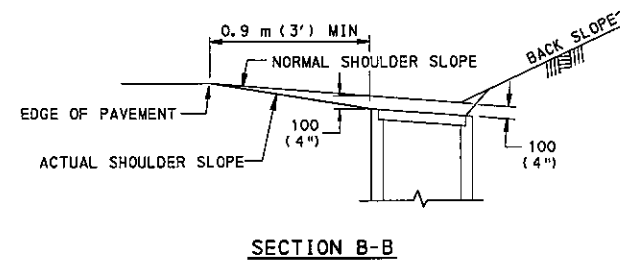
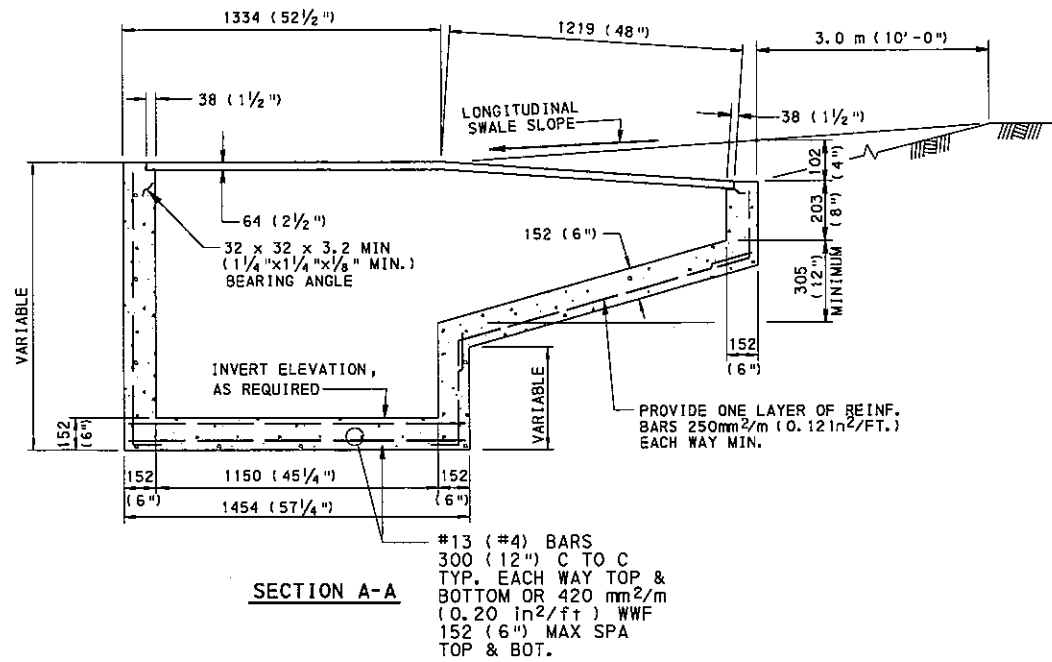
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

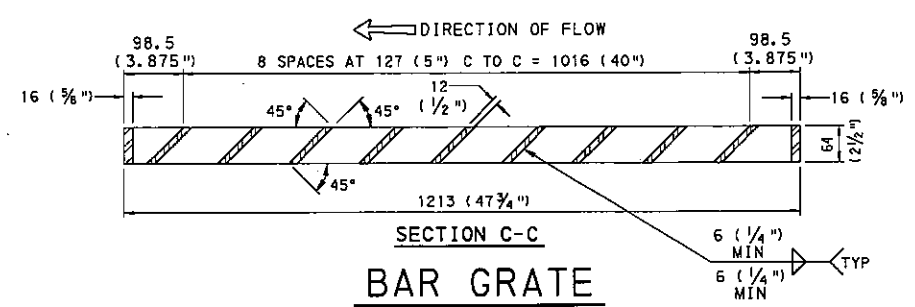
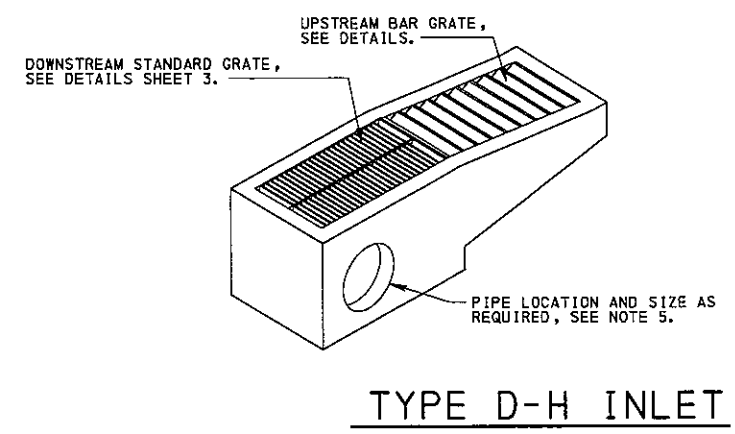
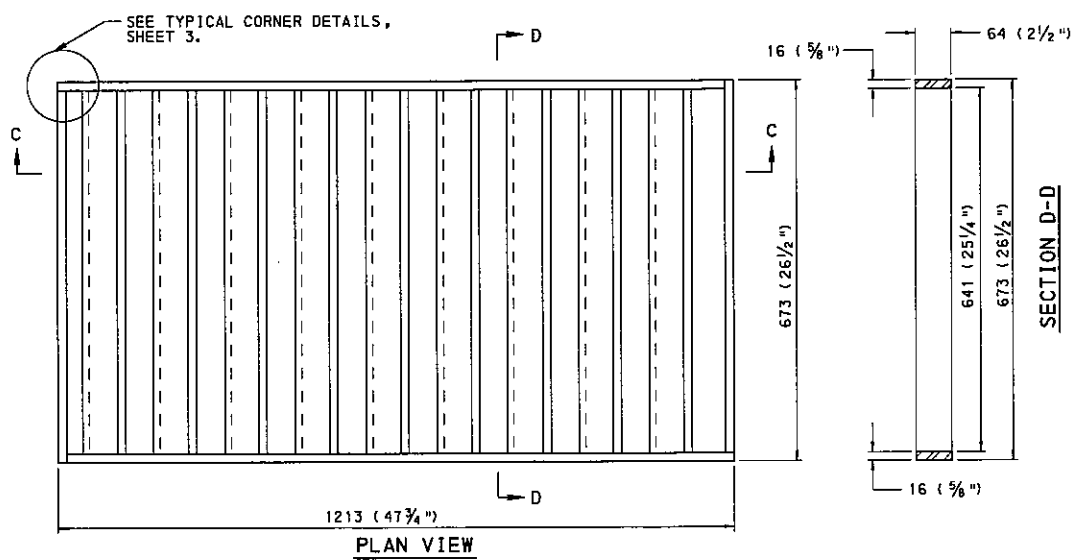
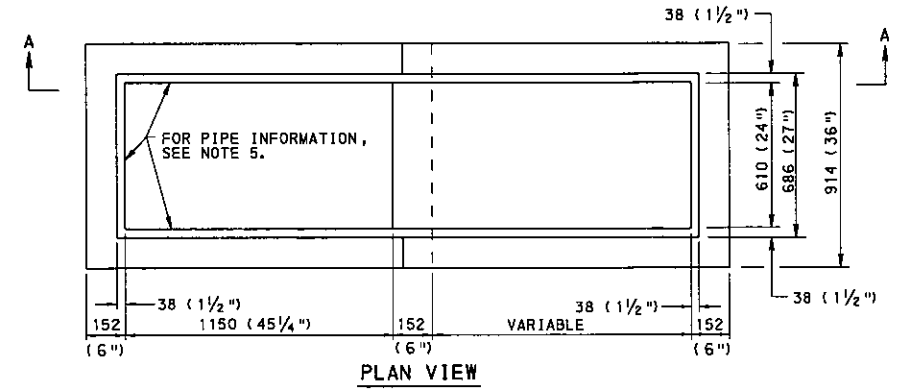
INLETS  
MODIFIED INLET BOXES  
(CAST-IN-PLACE AND PRECAST)

**NOTES**

1. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408 SECTION 605.
2. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. PERMIT ONLY GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. WELD STRUCTURAL STEEL GRATES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.03(r).
4. PROVIDE ANGLES EMBEDDED IN THE CONCRETE AS A BEARING AREA FOR THE GRATES FOR TYPE D-H INLETS WHICH SEAT THE GRATES DIRECTLY WITHIN THE UNIT.
5. FOR PIPE LOCATION AND MAXIMUM ALLOWABLE SIZES, SEE SHEET 8.



**TYPICAL D-H INLET LOCATION**

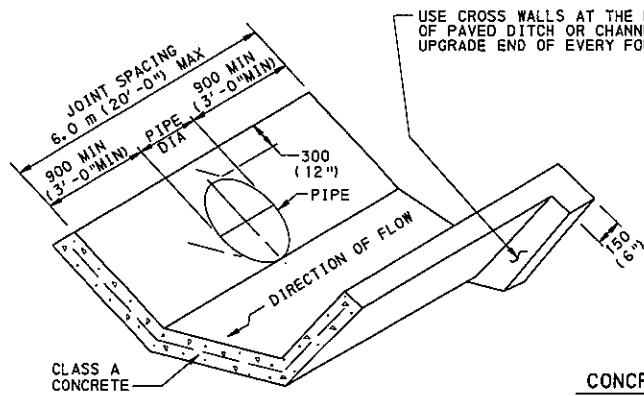


NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

**INLETS**  
TYPE D-H INLET  
(CAST-IN-PLACE AND PRECAST)

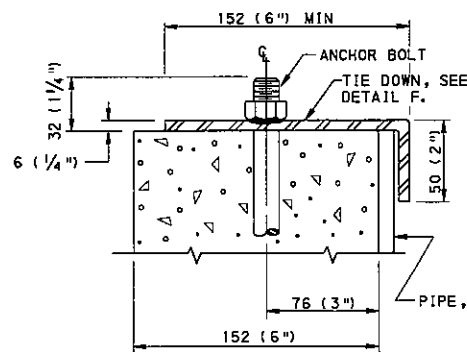
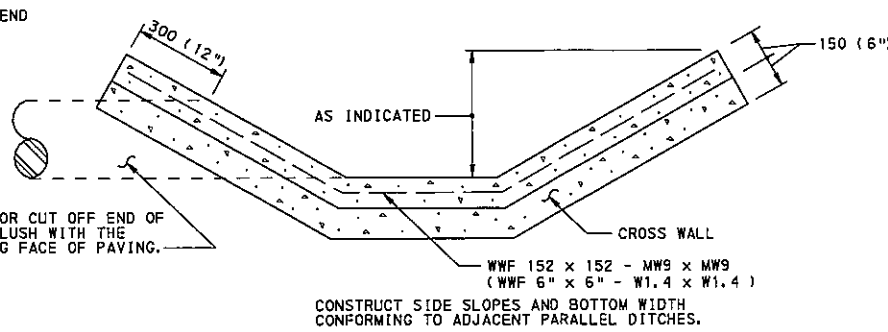
RECOMMENDED MAR. 30, 2006 <i>Scott Christian</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Ahtel</i> CHIEF ENGINEER	SHT 10 OF 10 RC-34M
---	--	------------------------



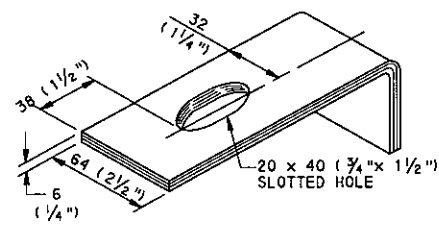
USE CROSS WALLS AT THE BEGINNING AND END OF PAVED DITCH OR CHANNEL AND AT THE UPGRADE END OF EVERY FOURTH SECTION.

PLACE OR CUT OFF END OF PIPE FLUSH WITH THE SLOPING FACE OF PAVING.

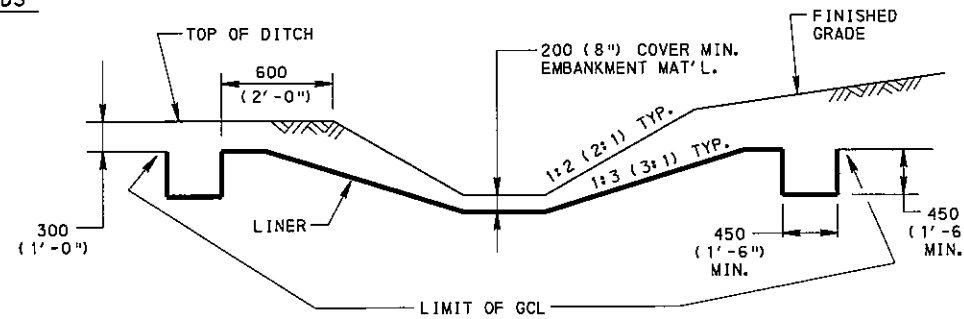
CONCRETE PAVING FOR STREAM BEDS



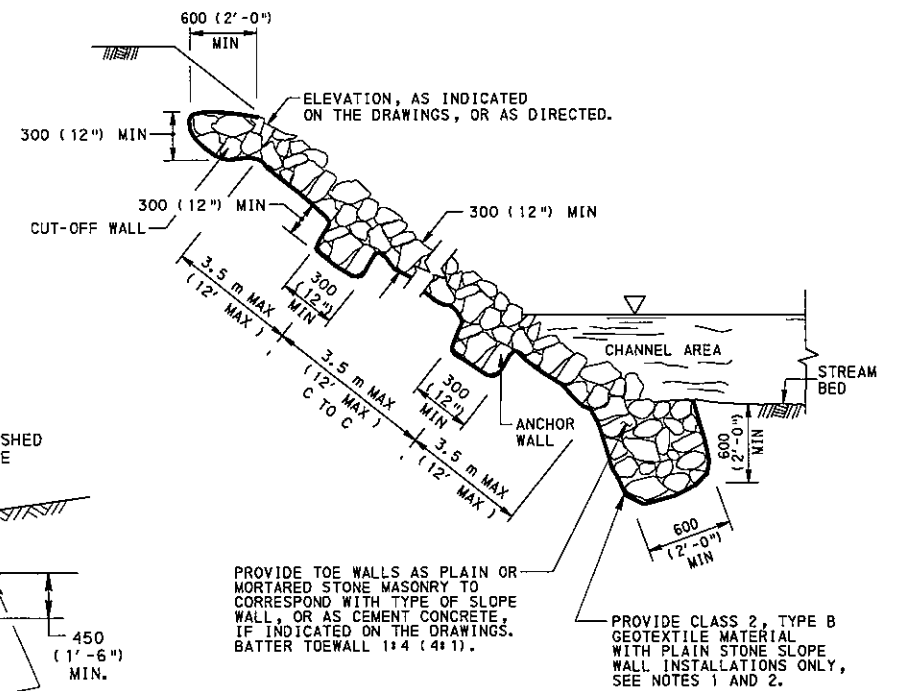
DETAIL E



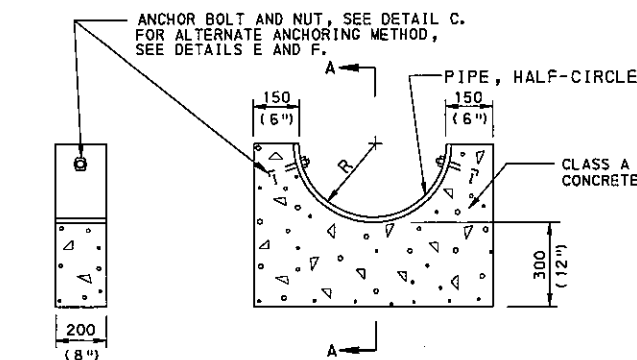
DETAIL F



GEOSYNTHETIC CLAY LINER  
 SEE NOTE 5

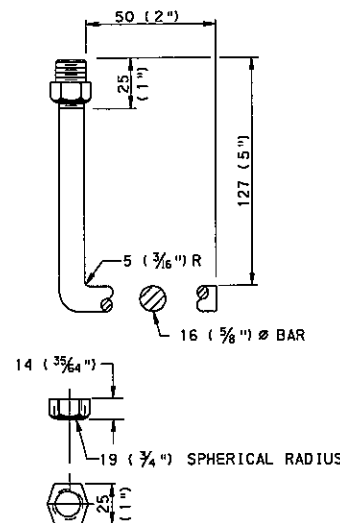


PLAIN AND MORTARED STONE SLOPE WALL

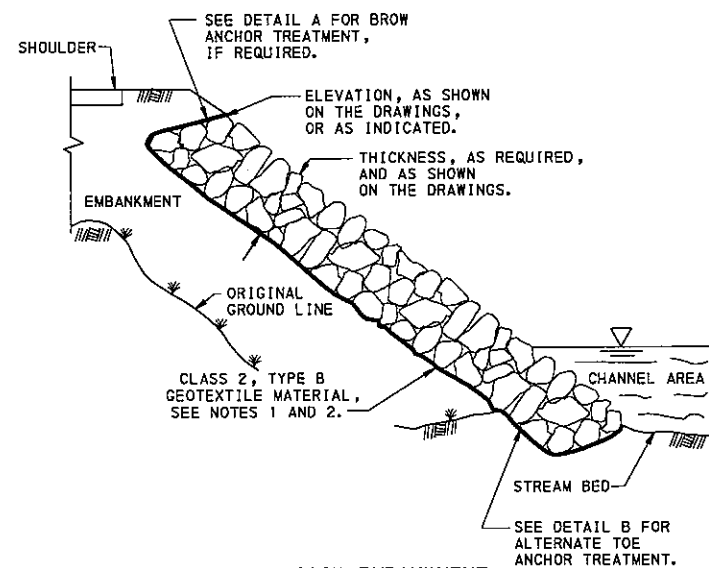


SECTION A-A

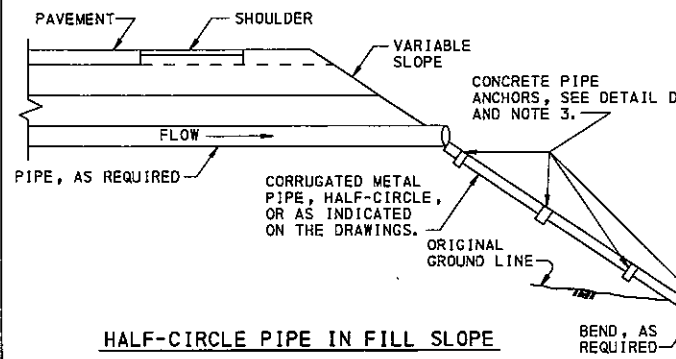
CEMENT CONCRETE PIPE ANCHOR  
 DETAIL D



ANCHOR BOLT AND NUT  
 DETAIL C

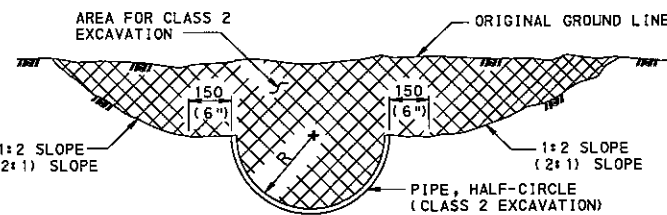


ROCK EMBANKMENT

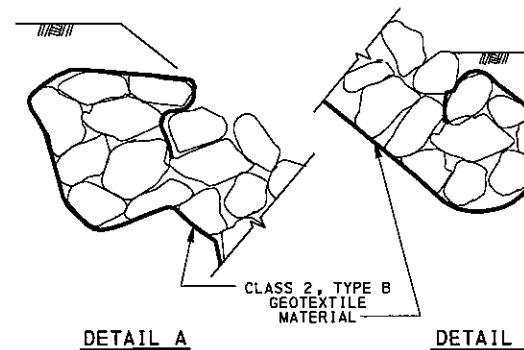


HALF-CIRCLE PIPE IN FILL SLOPE

INSTALLATION DETAILS FOR HALF-CIRCLE PIPE



TYPICAL CROSS SECTION



NOTES

1. PROVIDE GEOTEXTILE MATERIAL MEETING THE CONSTRUCTION REQUIREMENTS OF PUBLICATION 408, SECTION 212 AND MATERIAL REQUIREMENTS OF SECTION 735.
2. INSTALL GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.
3. PLACE CONCRETE PIPE ANCHORS AT THE ENDS OF PIPE, UNDER ALL JOINTS AND AT INTERMEDIATE LOCATIONS AS REQUIRED. PROVIDE 3.0 m (10'-0") MAXIMUM SPACING BETWEEN ANCHORS.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.
5. DO NOT LINE ANY DITCHES OR SWALES WHERE GCL HAS BEEN INSTALLED WITH LIMESTONE OR CARBONATE ROCK RIPROCK USED FOR EROSION CONTROL.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF TRANSPORTATION  
 BUREAU OF DESIGN

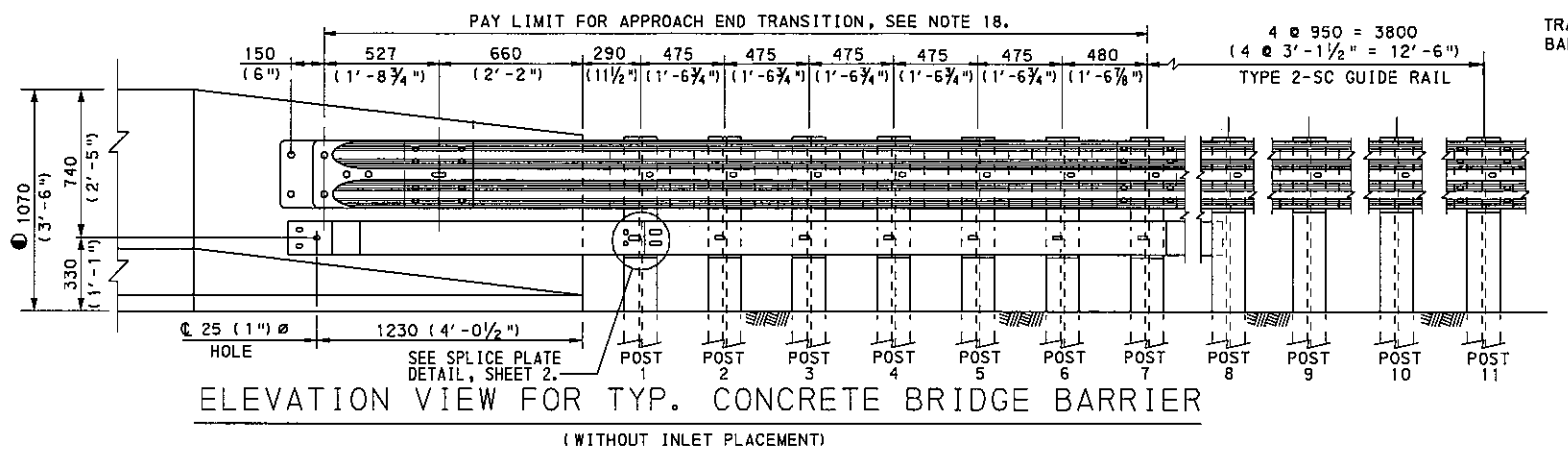
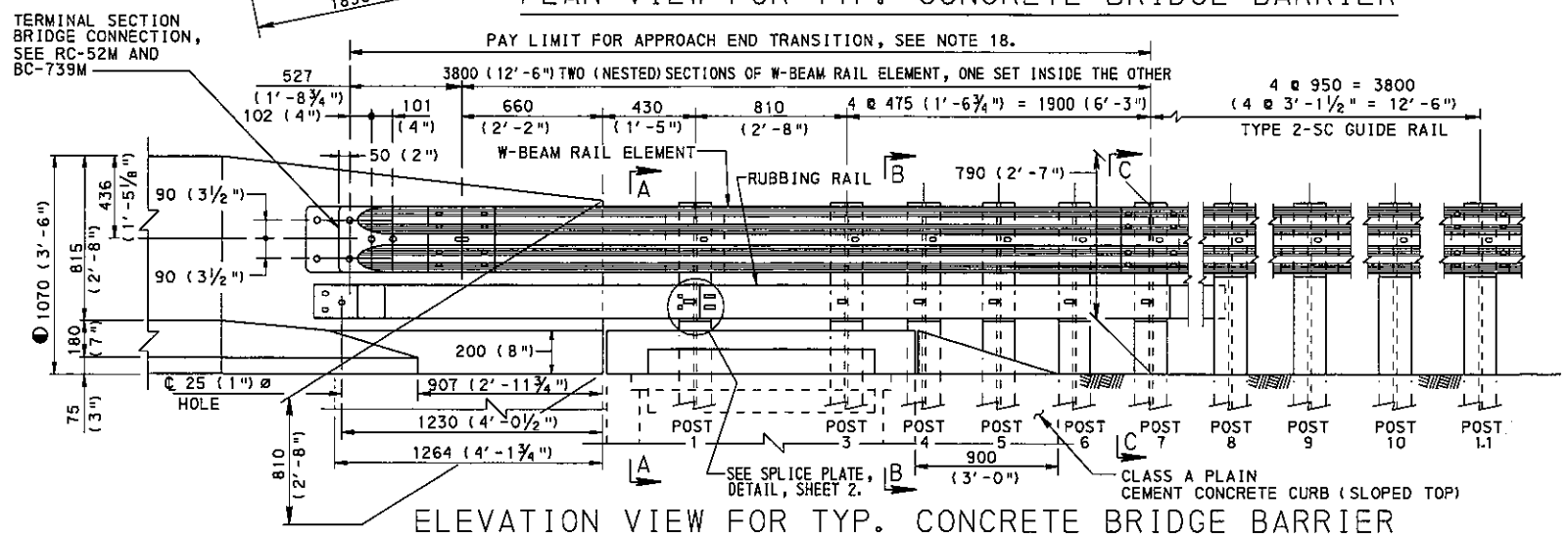
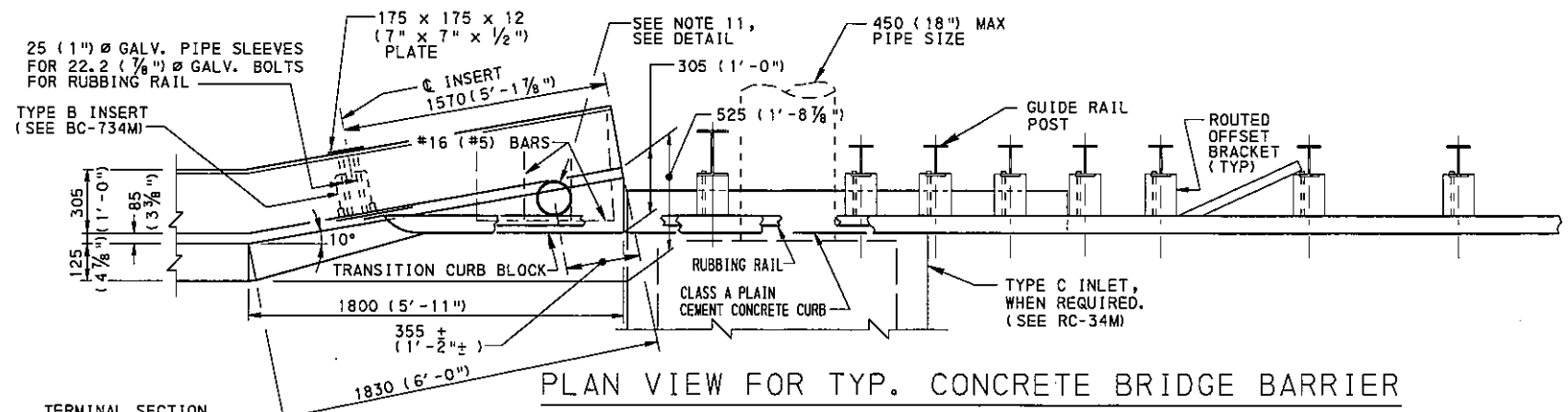
SLOPE PROTECTION

RECOMMENDED MAR. 30, 2006  
*Scott Christie*  
 DIRECTOR, BUREAU OF DESIGN

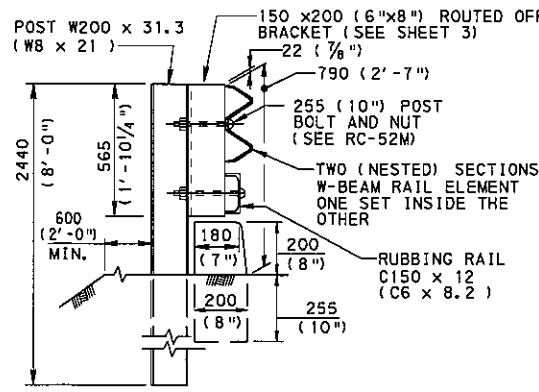
RECOMMENDED MAR. 30, 2006  
*M. L. Hotel*  
 CHIEF ENGINEER

SHT 1 OF 1  
 RC-40M

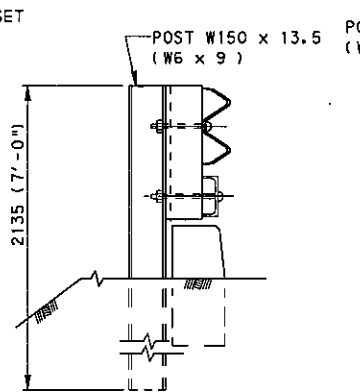




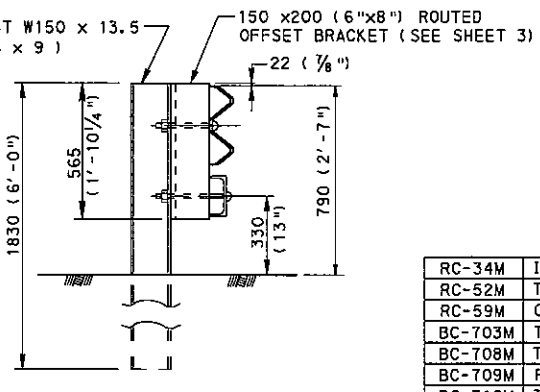
NOTE:  
TYPICAL TO ELEVATION VIEW WITH  
INLET PLACEMENT EXCEPT AS NOTED.



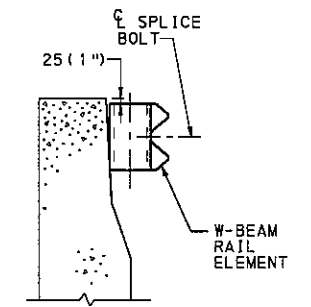
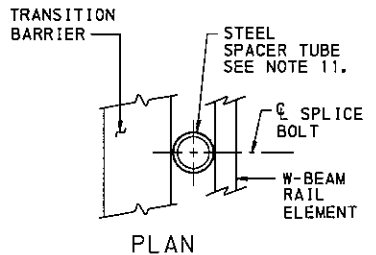
SECTION A-A



SECTION B-B  
(SECTION B-B IS TYPICAL TO SECTION A-A  
EXCEPT AS SHOWN OTHERWISE)



SECTION C-C



SECTION  
STEEL SPACER  
TUBE DETAIL

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.
2. ALL REINFORCEMENT STEEL BARS SHOWN ARE SOFT CONVERTED METRIC SIZES THAT MEET THE REQUIREMENTS OF ASTM A 615M, A 616M AND A 706M.
3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH PUB. 408.
4. W-BEAM RAIL ELEMENT IS BOLTED TO ALL POSTS.
5. USE PLAN DIMENSIONS WHEN DIFFERENT FROM THOSE SHOWN ON THIS STANDARD.
6. REINFORCED CONCRETE BARRIER AND EMBEDDED INSERTS ARE BRIDGE ITEMS.
7. WHEN CONNECTING TO TYPE 2-S GUIDE RAIL (705 (2'-3 3/4")) OR TYPE 2-W GUIDE RAIL (815 (2'-8")), TRANSITION UP OR DOWN 25 (1") PER 7620 (25'-0").
8. BOLT RUBBING RAIL TO POST WITHOUT WASHER.
9. POSTS WITH RUBBING RAIL ATTACHMENT REQUIRE AN ADDITIONAL HOLE.
10. TERMINAL SECTION AND RUBBING RAIL END MUST BE ATTACHED FLUSH WITH BRIDGE BARRIER. INSTALLATION CAN BE GREATLY SIMPLIFIED BY FABRICATING OR SHOP TWISTING TO BE CONSISTENT WITH THE SLOPE OF THE BARRIER.
11. STEEL SPACER TUBE, SCHEDULE 40 GALVANIZED PIPE, 152 (6") I.D. x 305 (12"). CONNECT TO THE W-BEAM RAIL ELEMENTS USING SPLICE BOLT.
12. GALVANIZE ALL HARDWARE, W-BEAM RAIL ELEMENTS, THRIE-BEAM RAIL ELEMENTS, RUBBING RAIL, W-BEAM TO THRIE-BEAM TRANSITION SECTION, TERMINAL SECTION BRIDGE CONNECTIONS, ANGLES, PLATES, BOLTS AND ANY OTHER FABRICATED STEEL COMPONENTS.
13. REINFORCEMENT BAR SIZES ARE SHOWN FOR CLARITY ONLY. USE ACTUAL BAR DESIGNATION INDICATED IN THE CONTRACT DRAWINGS.
14. SEE BC-739M AND RC-52M FOR DETAILS AND HARDWARE NOT SHOWN.
15. 50 (2") CL. ON ALL REINFORCEMENT EXCEPT AS NOTED.
16. PROVIDE APPROACH END GUIDE RAIL TREATMENT AT BOTH THE APPROACH AND TRAILING ENDS OF STRUCTURE BARRIERS ON TWO LANE FACILITIES WITH TWO-WAY TRAFFIC. ON FOUR LANE DIVIDED HIGHWAYS, GUIDE RAIL TRANSITION IS NOT REQUIRED ON TRAILING ENDS OF BARRIERS UNLESS WARRANTED BY OTHER OBSTRUCTIONS.
17. PROVIDE STEEL POST SIZE, AND LENGTH AS SHOWN IN TABLES A, B, C, AND D AS APPROPRIATE.
18. PAYMENT FOR THE APPROACH END TRANSITION, EITHER WITH OR WITHOUT INLET PLACEMENT, INCLUDES TWO 3810 (12'-6") SECTIONS OF EITHER W-BEAM OR THRIE-BEAM RAIL ELEMENTS, W-BEAM TO THRIE-BEAM TRANSITION SECTION FABRICATED STEEL ITEMS, TERMINAL SECTION BRIDGE CONNECTIONS TUBE, RUBBING RAIL, RUBBING RAIL CONNECTIONS, BOLTS, POSTS, OFFSET BRACKETS, STEEL SPACER AND ASSOCIATED HARDWARE. END TRANSITIONS ARE ROADWAY ITEMS.
19. FOR THE PA BRIDGE BARRIER TRANSITION CONNECTION, CONNECTION PLATES SHALL MEET THE REQUIREMENTS OF ASTM A 709/A 709M GRADE 250 MPA (GRADE 36 KSI) STEEL. BOLTS, NUTS, AND WASHERS SHALL MEET THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.02 (C).

TABLE A		
POST	LENGTH	SIZE
1 THRU 3	2440 (8'-0")	W200x31.3 (W8x21)
4 THRU 6	2135 (7'-0")	W150x13.5 (W6x9)
7 THRU 11	1830 (6'-0")	W150x13.5 (W6x9)

LEGEND

● SEE STRUCTURE DRAWINGS FOR BRIDGE BARRIER HEIGHT.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES  
MUST BE USED ON PLANS. METRIC AND  
ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE  
BARRIER TRANSITIONS  
TYPICAL CONCRETE BRIDGE BARRIER

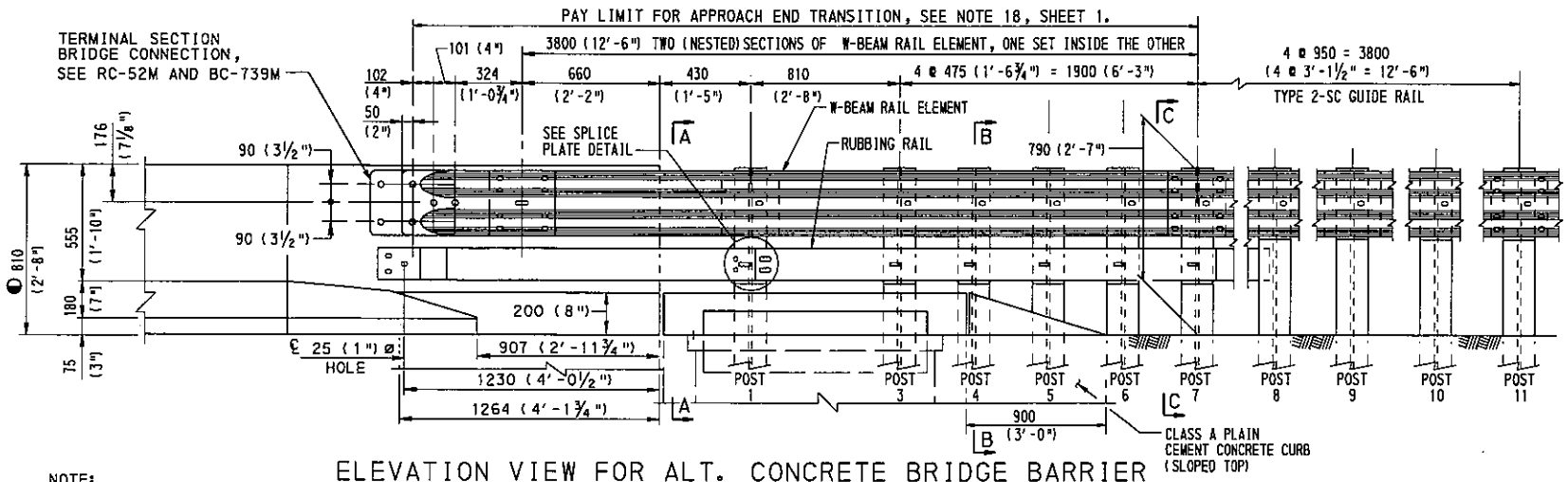
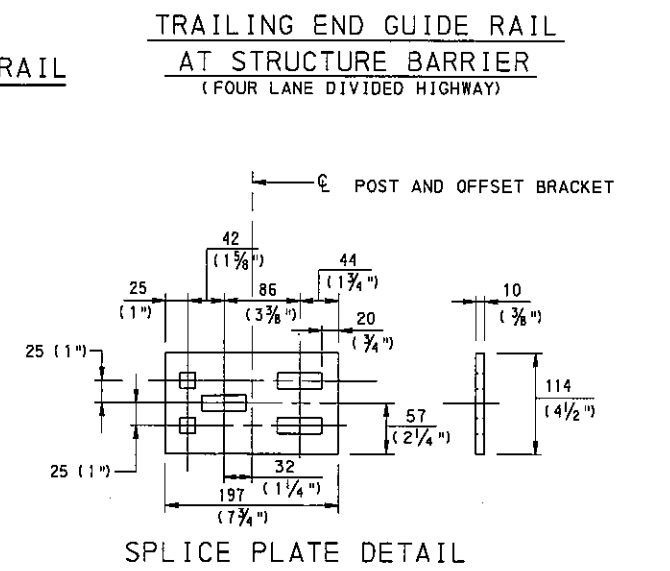
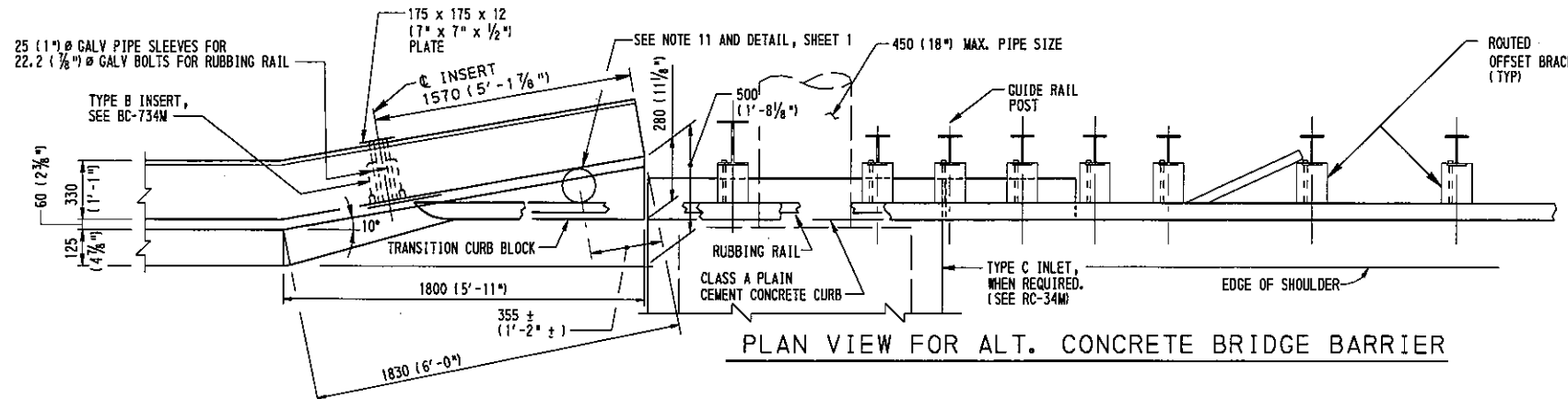
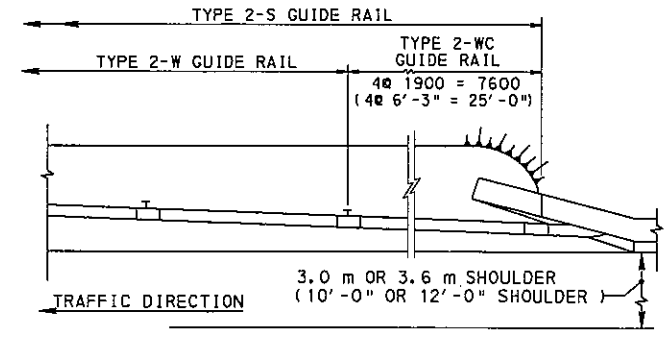
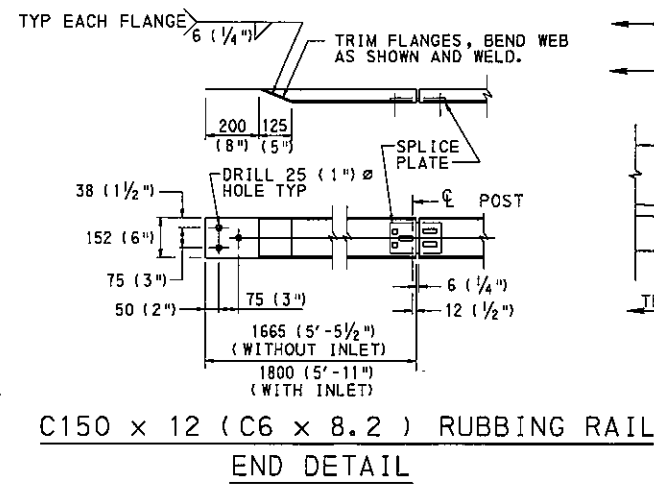
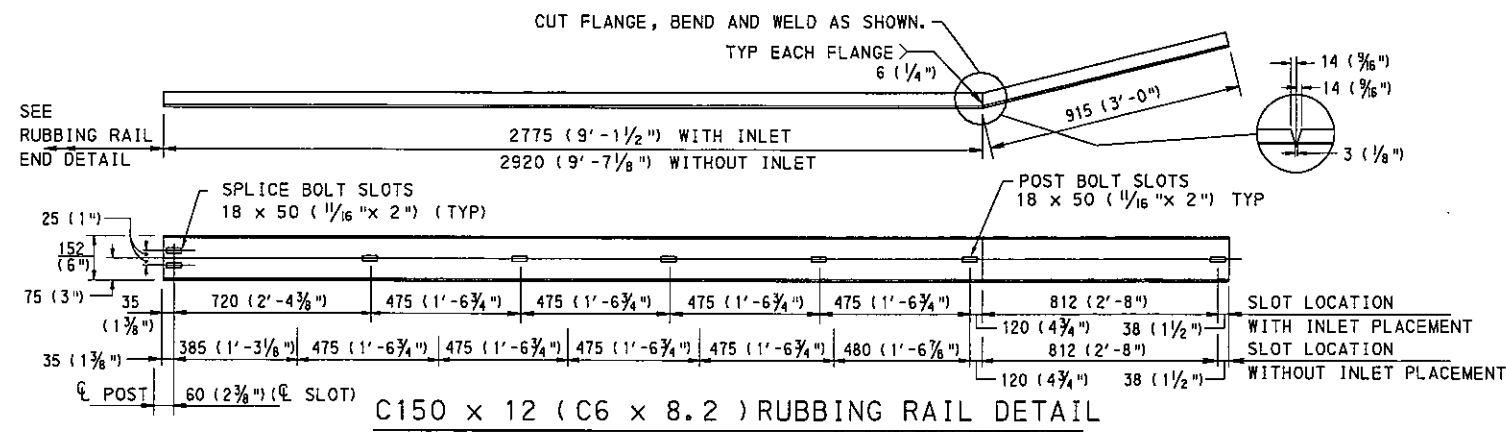
RC-34M	INLET ASSEMBLIES
RC-52M	TYPE 2 STRONG POST GUIDE RAIL
RC-59M	CONCRETE GLARE SCREEN
BC-703M	THRIE-BEAM TO VERTICAL WALL TRANSITION CONNECTION
BC-708M	THRIE-BEAM TO PA TYPE 10M BRIDGE TRANSITION CONNECTION
BC-709M	PA TYPE 10M BRIDGE BARRIER
BC-712M	THRIE-BEAM TO PA BRIDGE BARRIER TRANSITION CONNECTION
BC-713M	PA BRIDGE BARRIER
BC-734M	STANDARD ANCHOR SYSTEMS
BC-739M	BRIDGE BARRIER TO GUIDE RAIL TRANSITION

REFERENCE DRAWINGS

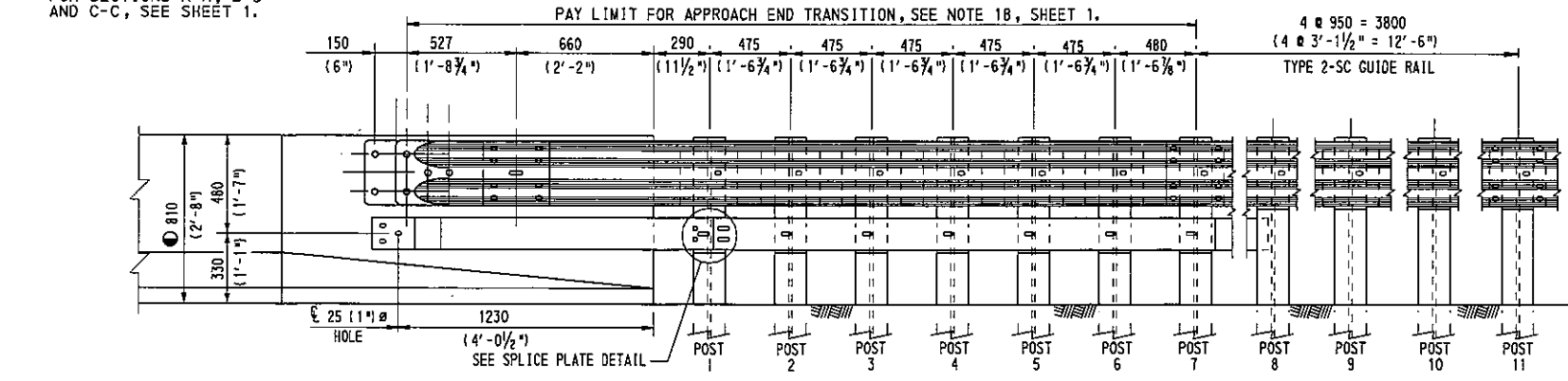
RECOMMENDED MAR. 30, 2006  
*Scott Christe*  
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006  
*M. Eitel*  
CHIEF ENGINEER

SHT 1 OF 16  
RC-50M



NOTE:  
FOR SECTIONS A-A, B-B  
AND C-C, SEE SHEET 1.



NOTE:  
TYPICAL TO ELEVATION VIEW WITH INLET  
PLACEMENT EXCEPT AS NOTED.

ELEVATION VIEW FOR ALT. CONCRETE BRIDGE BARRIER  
(WITHOUT INLET PLACEMENT)

- NOTES:
1. THE GUIDE RAIL TRANSITION DETAILS ON THIS SHEET ARE ALSO TO BE USED FOR TRANSITIONS TO THE PA HT BRIDGE BARRIERS.
  2. FOR APPROACH TRANSITION POST SIZE AND LENGTH SEE TABLE A, SHEET 1.
  3. FOR ADDITIONAL NOTES AND LEGEND, SEE SHEET 1.

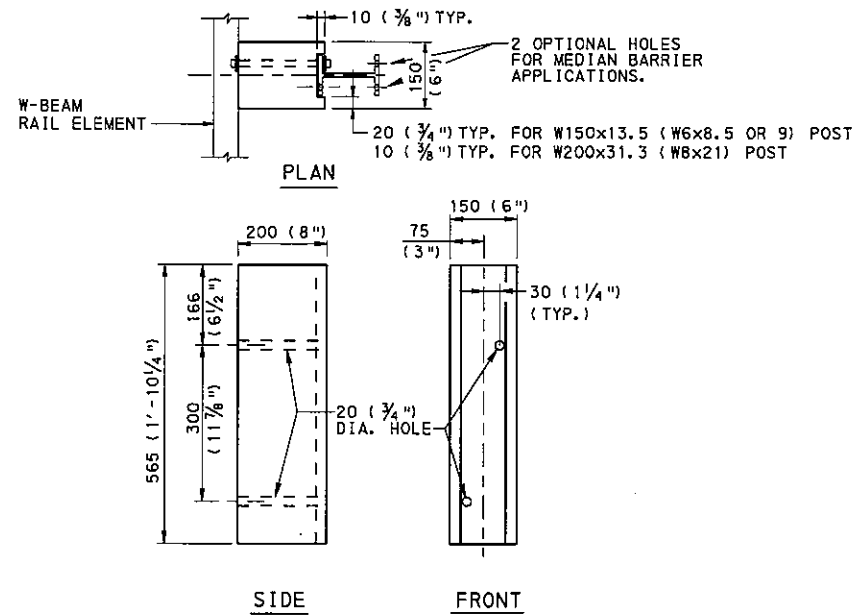
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

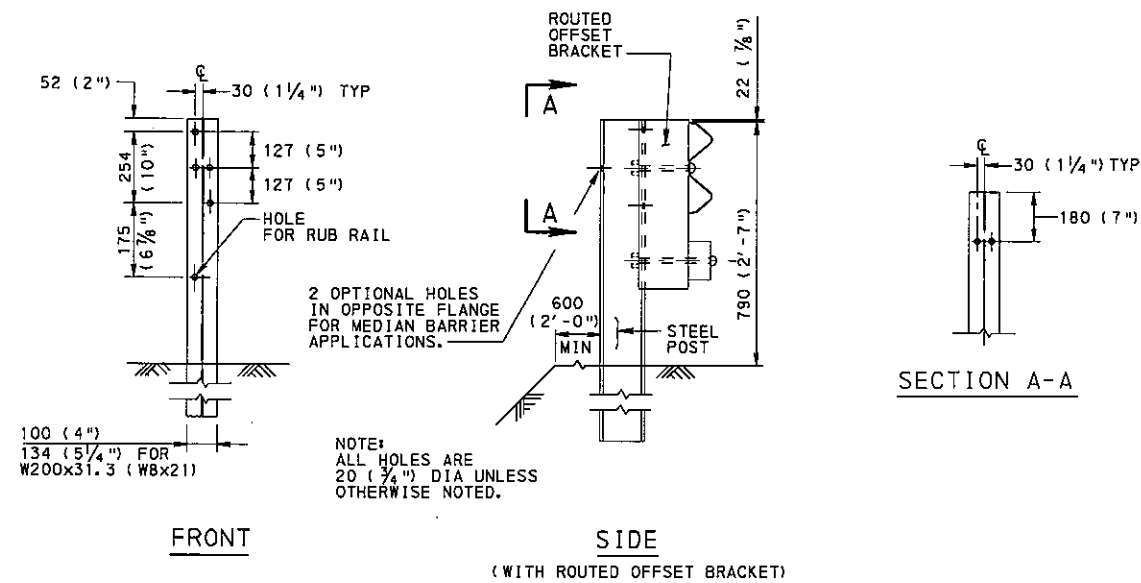
**GUIDE RAIL TO BRIDGE  
BARRIER TRANSITIONS**

**ALTERNATE CONCRETE BRIDGE BARRIER**

RECOMMENDED MAR. 30, 2006 <i>Scott Christen</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Chitel</i> CHIEF ENGINEER	SHT 2 OF 16 <b>RC-50M</b>
--	---	------------------------------



**ROUTED OFFSET BRACKET**  
TYPICAL AND ALTERNATE CONCRETE BRIDGE BARRIER TRANSITION POSTS 1 THRU 7, SEE SHEETS 1 AND 2.



**W150 x 13.5 (W6 x 8.5 or 9) POST DETAILS**

TYPICAL AND ALTERNATE CONCRETE BRIDGE BARRIER TRANSITION POSTS 4 THRU 7.

NOTE: W200x31.3 (W8x21) POSTS 1 THRU 3 SIMILAR, SEE DETAILS ON SHEETS 1 AND 2.

**NOTES**

1. FOR APPROACH TRANSITION POST HEIGHTS, SEE SHEETS 1 AND 2.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.
3. FOR APPROACH TRANSITION POST SIZE AND LENGTH, SEE TABLE A, ON SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS  
TYPICAL AND ALTERNATE CONCRETE BRIDGE BARRIER POST AND OFFSET BRACKET DETAILS

RECOMMENDED MAR. 30, 2006

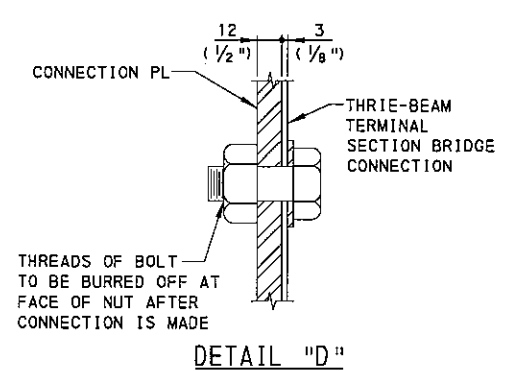
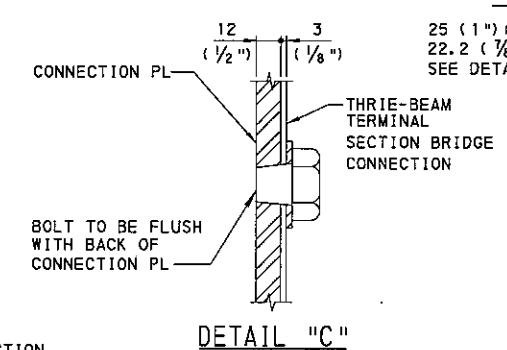
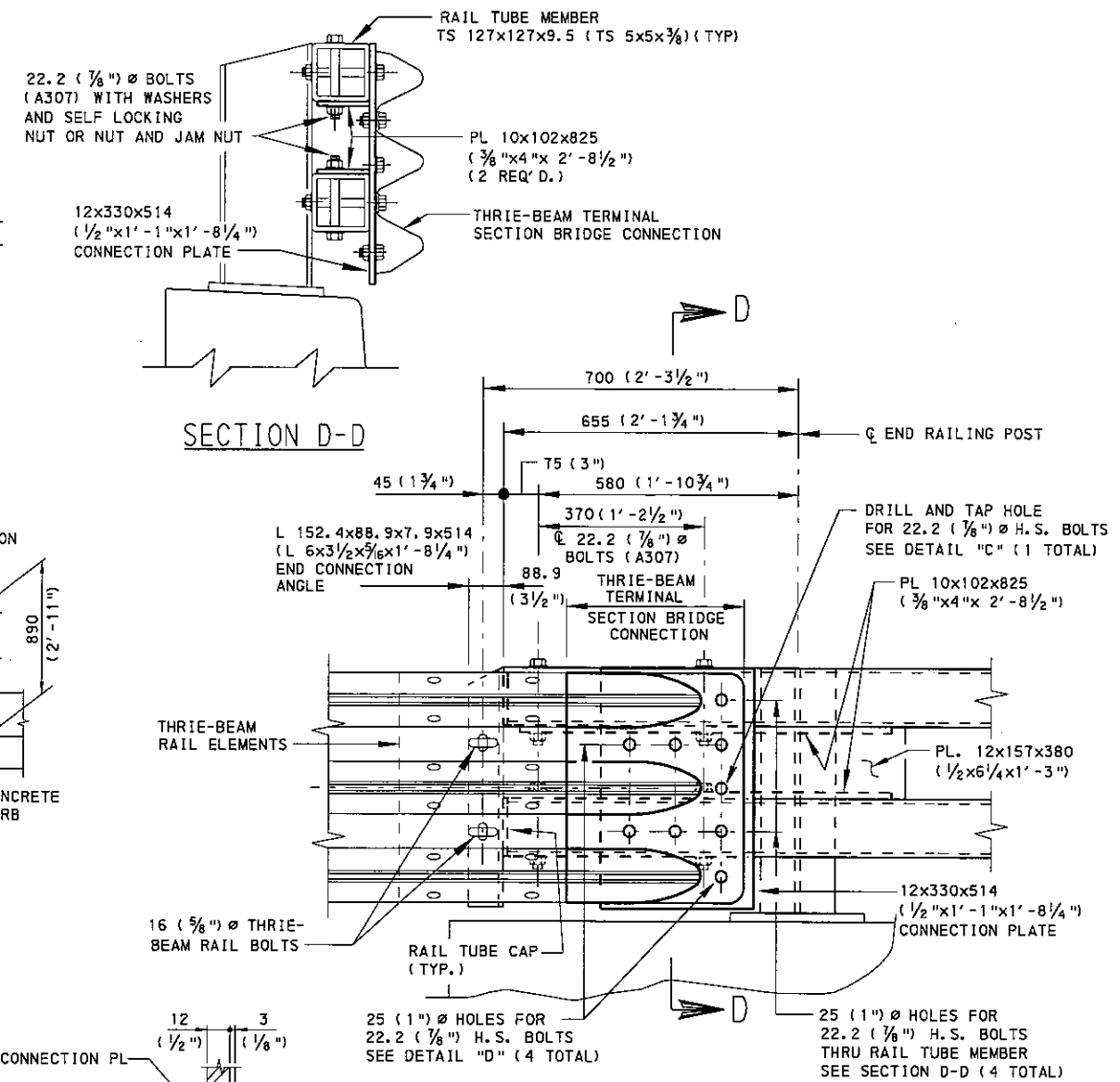
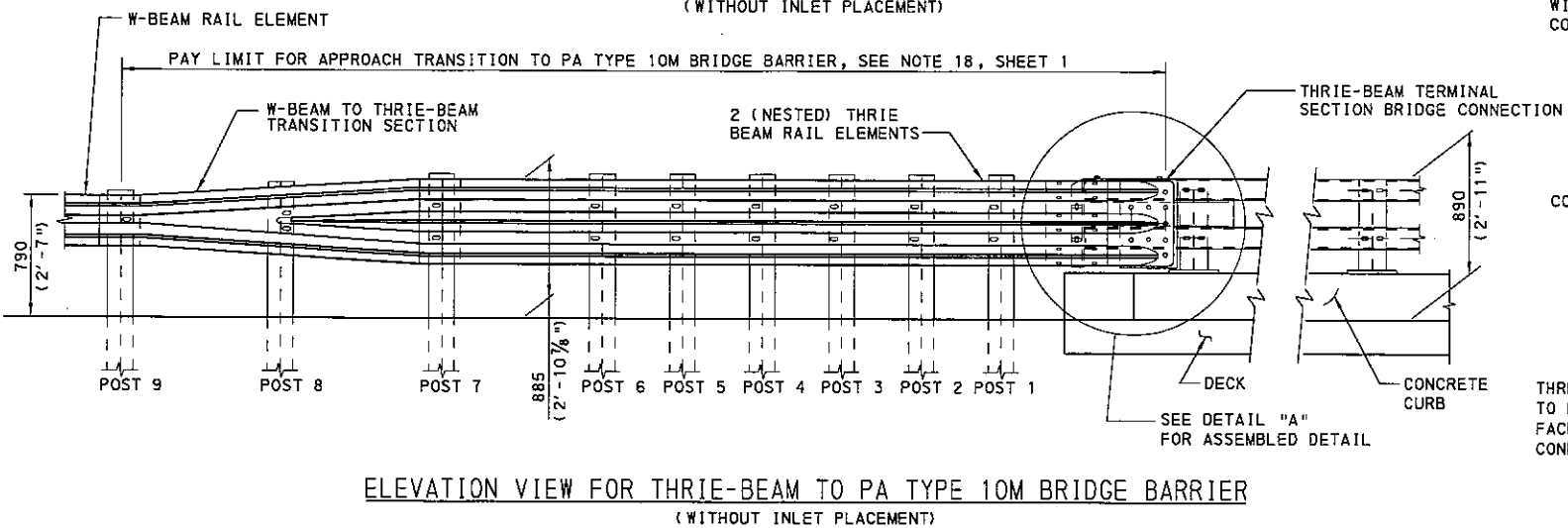
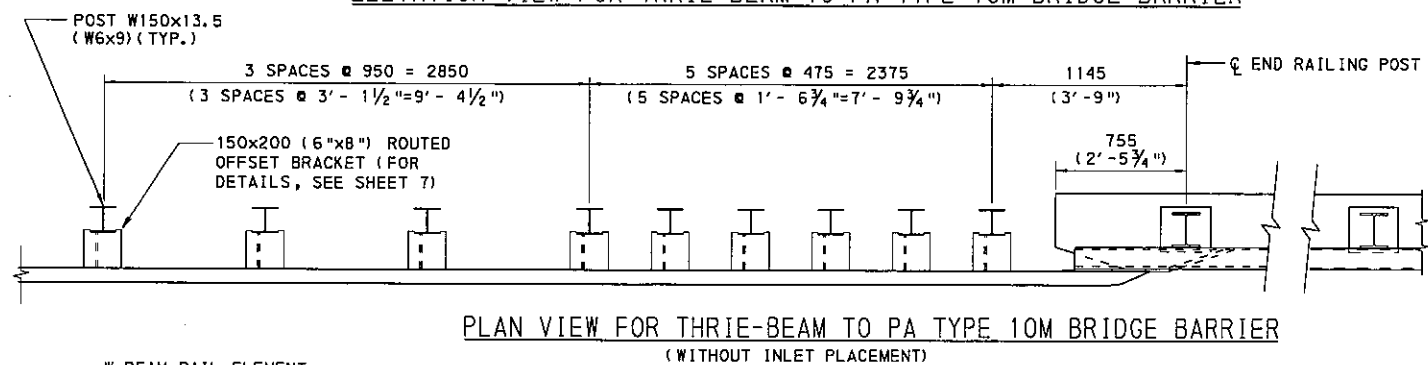
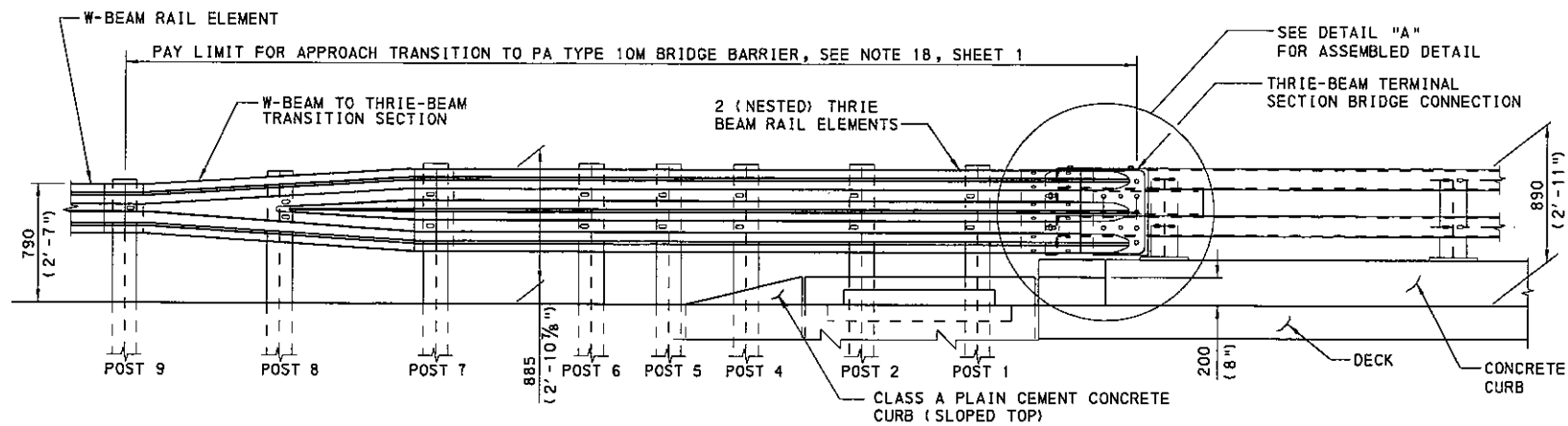
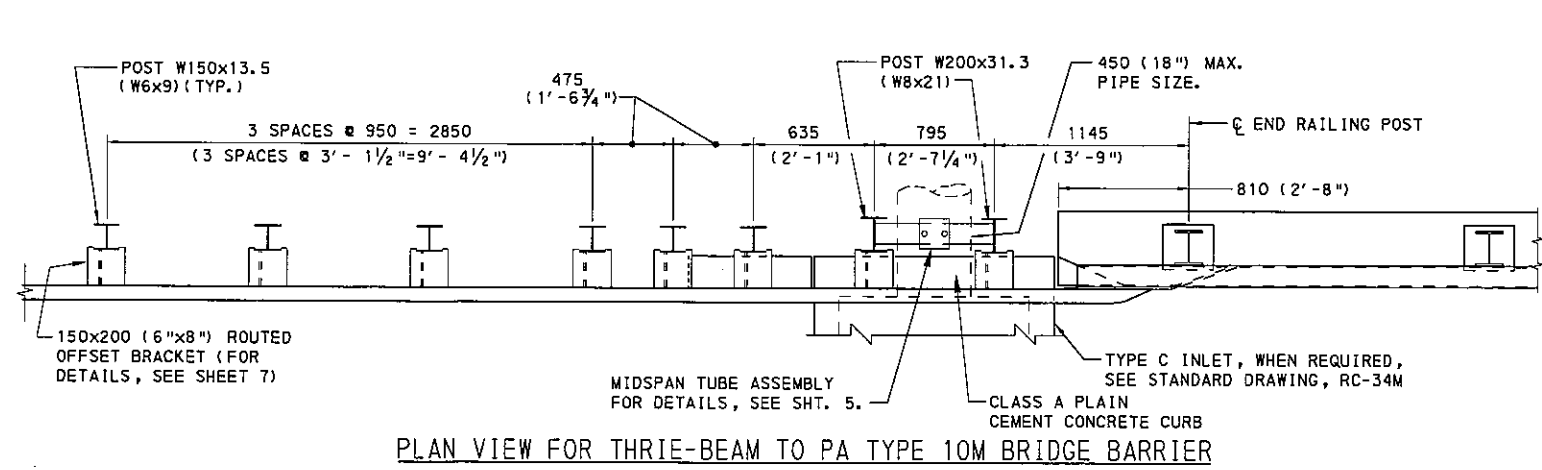
*Scott Christie*  
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006

*M. Chalek*  
CHIEF ENGINEER

SHT 3 OF 16

RC-50M



**NOTES:**

1. W-BEAM RAIL ELEMENT, TRANSITION SECTION AND THRIE BEAM RAIL ELEMENT ARE BOLTED TO ALL POSTS.
2. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 7.
3. FOR LOCATION WITH INLET PLACEMENT POST 3 IS OMITTED.
4. FOR ADDITIONAL NOTES, SEE SHEET 1.

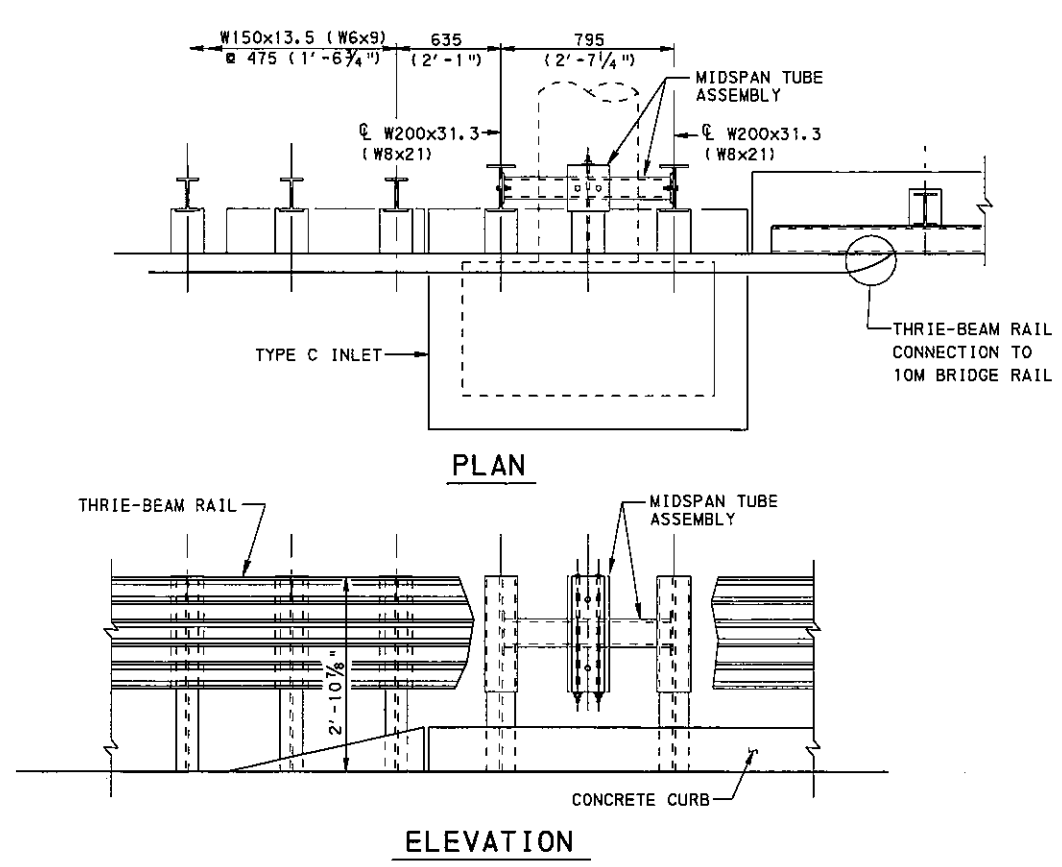
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

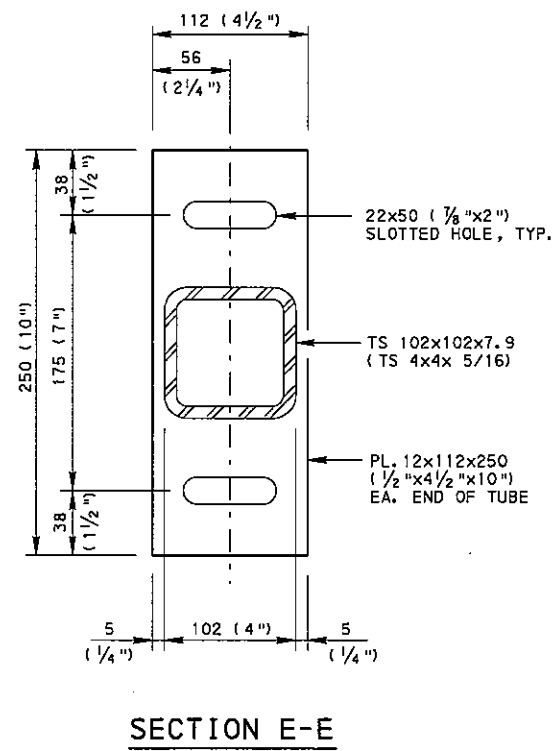
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS  
THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER

BC-708M THRIE-BEAM TO PA TYPE 10M BRIDGE TRANSITION CONNECTION	RECOMMENDED MAR. 30, 2006	RECOMMENDED MAR. 30, 2006	SHT 4 OF 16
BC-709M PA TYPE 10M BRIDGE BARRIER	<i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	<i>M. Eitel</i> CHIEF ENGINEER	RC-50M

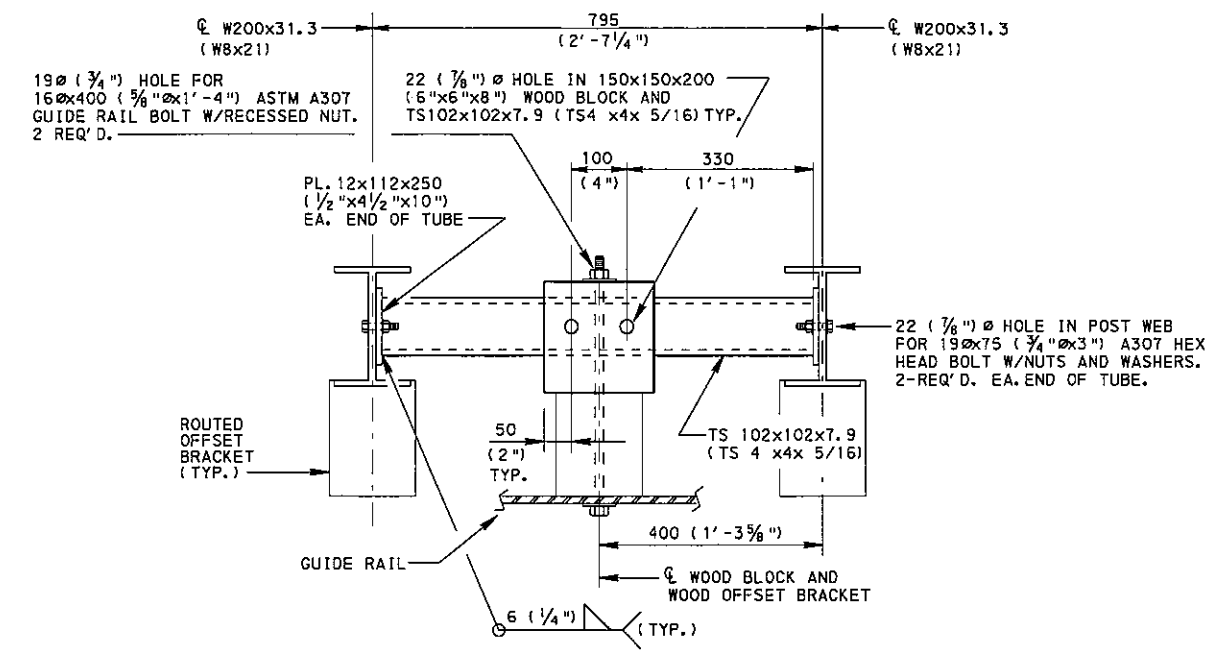
BC-708M	THRIE-BEAM TO PA TYPE 10M BRIDGE TRANSITION CONNECTION
BC-709M	PA TYPE 10M BRIDGE BARRIER
REFERENCE DRAWINGS	



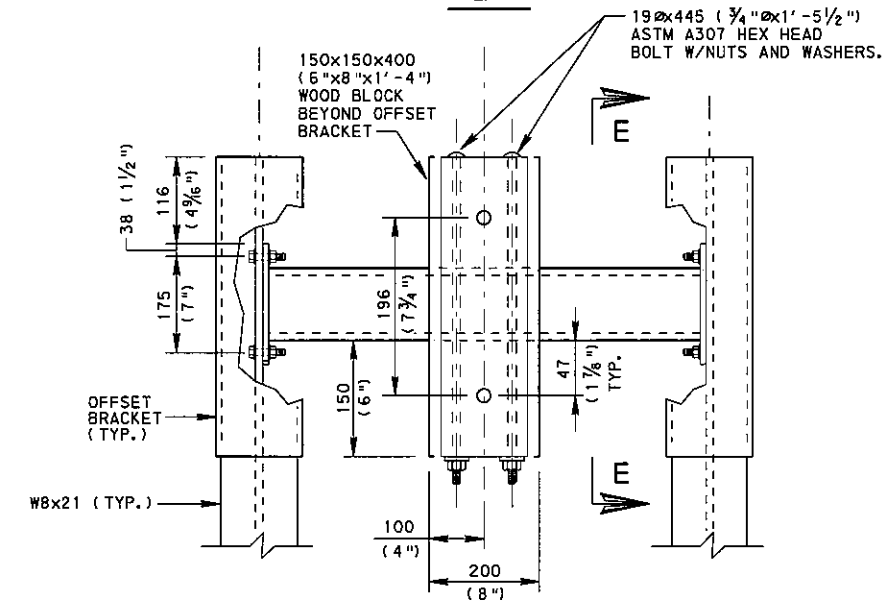
**THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER CONNECTION DETAILS**



**SECTION E-E**



**PLAN**



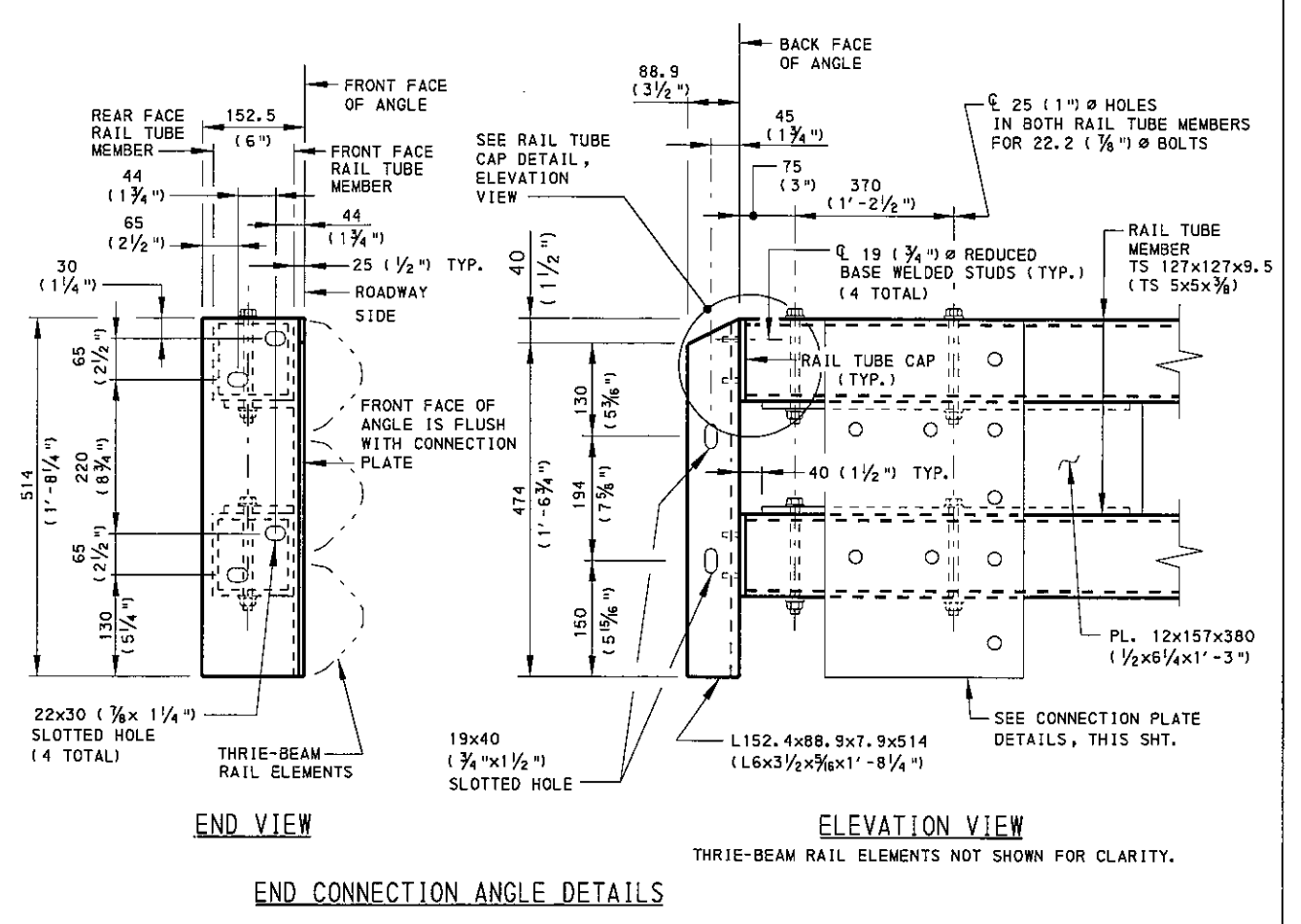
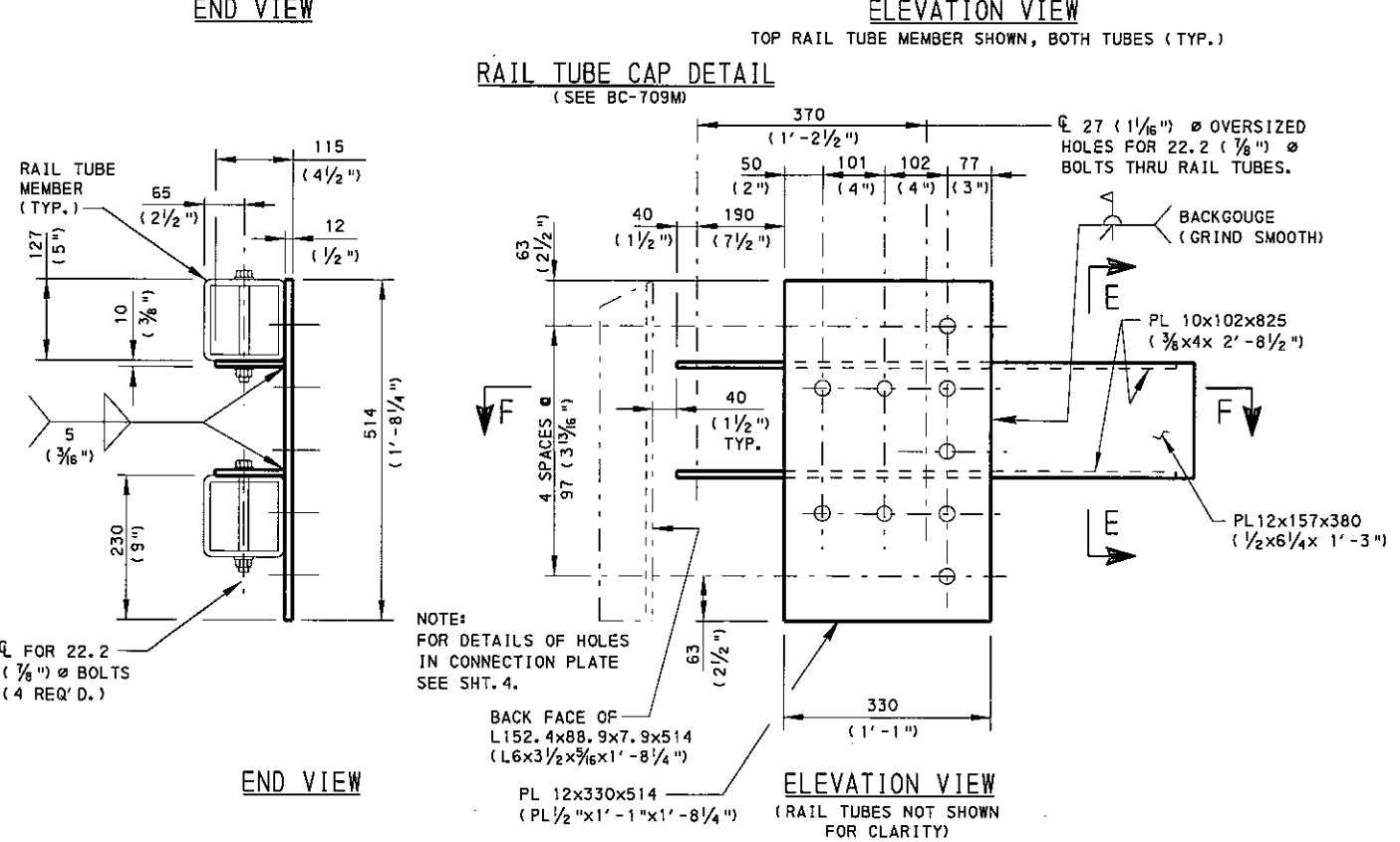
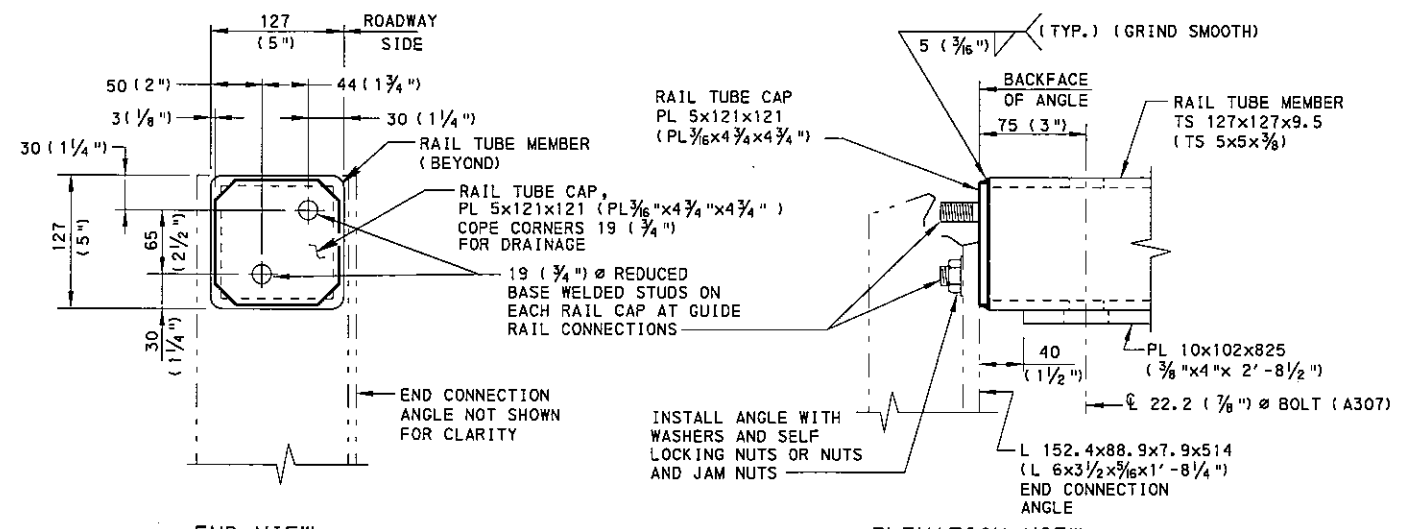
**ELEVATION**

**MIDSPAN TUBE ASSEMBLY DETAILS**

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

<b>COMMONWEALTH OF PENNSYLVANIA</b> <b>DEPARTMENT OF TRANSPORTATION</b> BUREAU OF DESIGN		
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER MIDSPAN TUBE ASSEMBLY DETAILS		
RECOMMENDED MAR. 30, 2006 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Chel</i> CHIEF ENGINEER	SHT 5 OF 16 <b>RC-50M</b>





- NOTES:**
1. USE THIS SHEET WITH SHEET 4.
  2. FOR ADDITIONAL NOTES, SEE SHEET 1 AND SHEET 4.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

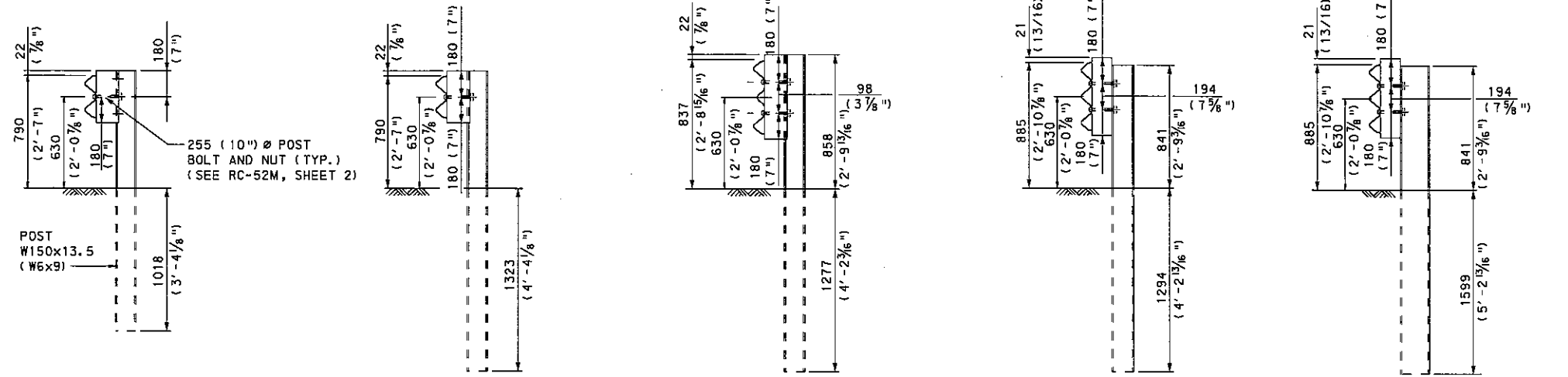
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE  
BARRIER TRANSITIONS

THRIE-BEAM TO PA TYPE 10M  
BRIDGE BARRIER  
CONNECTION PLATE DETAILS

BC-708M	THRIE-BEAM TO PA TYPE 10M BRIDGE TRANSITION CONNECTION	RECOMMENDED MAR. 30, 2006	RECOMMENDED MAR. 30, 2006	SHT 6 OF 16
BC-709M	PA TYPE 10M BRIDGE BARRIER	<i>Scott Christie</i>	<i>M. Chitel</i>	RC-50M
REFERENCE DRAWINGS		DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	

TABLE B		
WITHOUT INLET PLACEMENT		
POSTS	LENGTH	SIZE
1 THRU 9	2135 (7'-0")	W150x13.5 (W6x9)
BEYOND 9	1830 (6'-0")	W150x13.5 (W6x9)
WITH INLET PLACEMENT		
POSTS	LENGTH	SIZE
1 THRU 2	2440 (8'-0")	W200x31.3 (W8x21)
4 THRU 9	2135 (7'-0")	W150x13.5 (W6x9)
BEYOND 9	1830 (6'-0")	W150x13.5 (W6x9)



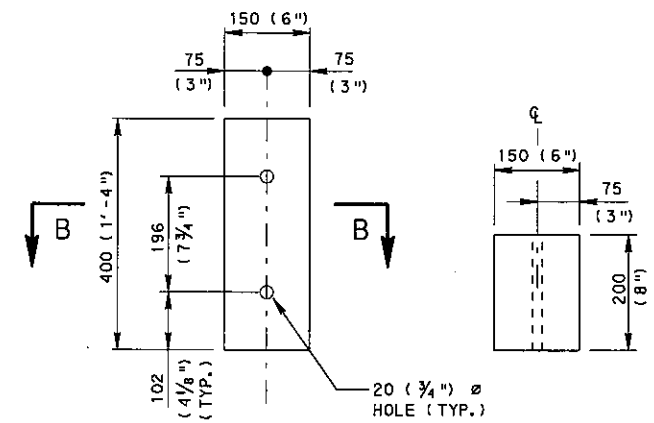
**BEYOND POST 9**  
(AT W-BEAM RAIL ELEMENT)  
SEE NOTE 7, SHEET 1.  
FOR POST DETAILS SEE RC-52M, SHEET 1.

**POST 9**  
W150x13.5 (W6x9) STEEL POST  
2135 (7'-0") LONG w/150x200x360 (6"x8"x1'-2") ROUTED OFFSET BRACKET

**POST 8**  
W150x13.5 (W6x9) STEEL POST  
2135 (7'-0") LONG w/ 150x200x458 (6"x8"x1'-5 1/2") ROUTED OFFSET BRACKET

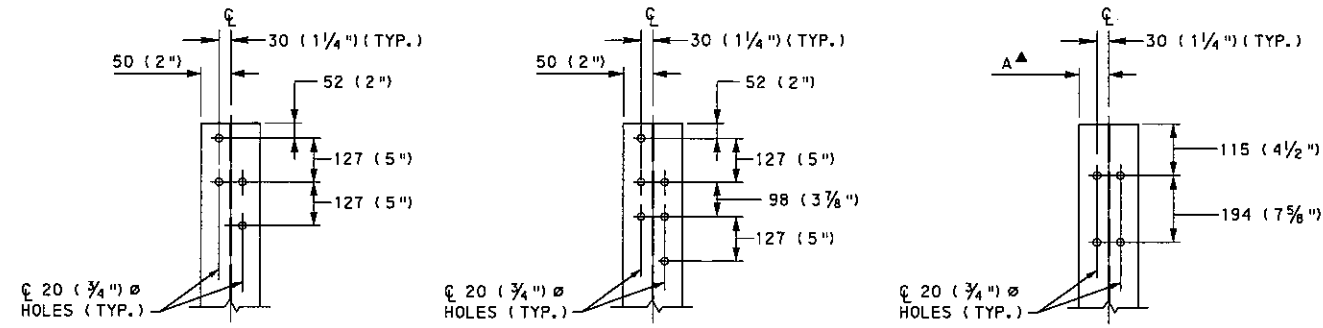
**POSTS 1 THRU 7**  
(WITHOUT INLET PLACEMENT)  
W150x13.5 (W6x9) STEEL POST  
2135 (7'-0") LONG w/ROUTED OFFSET BRACKET (SEE DETAIL)

**POSTS 1 AND 2**  
(WITH INLET PLACEMENT)  
W200x31.3 (W8x21) STEEL POSTS  
2440 (8'-0") LONG w/ROUTED OFFSET BRACKET (SEE DETAIL)



**ELEVATION**      **SECTION B-B**

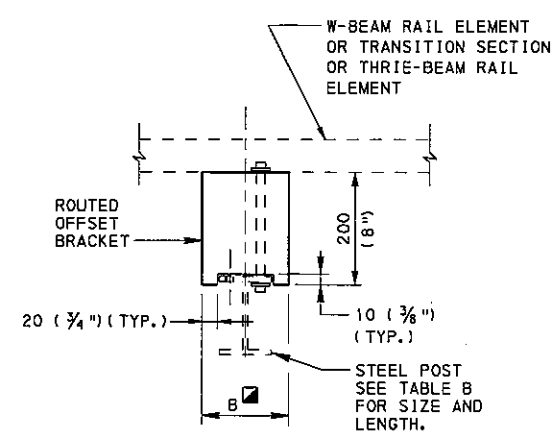
**MIDSPAN TUBE**  
**WOOD OFFSET BRACKET**



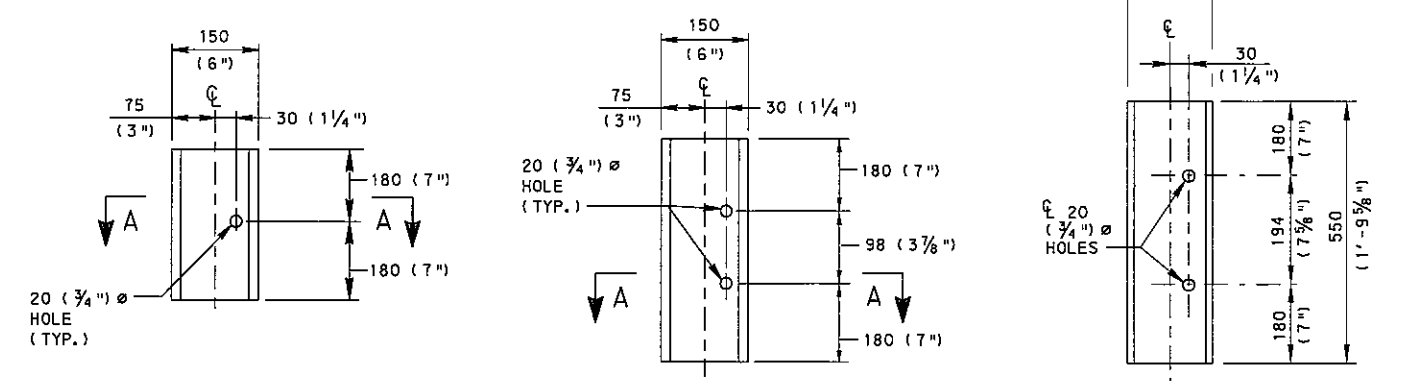
**POST 9**      **POST 8**      **POSTS 1 THRU 7\***

**POST DETAILS**

- \* AT LOCATIONS WITH INLET PLACEMENT POST 3 IS OMITTED AND POSTS 1 AND 2 ARE W200x31.3 (W8x21) (SEE TABLE B).
- ▲ A = 50 (2") FOR W150x13.5 (W6x9)  
A = 67 (2 5/8") FOR W200x31.3 (W8x21)
- B = 150 (6") FOR W150x13.5 (W6x9)  
B = 180 (7 1/4") FOR W200x31.3 (W8x21)



**SECTION A-A**



**POST 9**      **POST 8**      **POSTS 1 THRU 7\***

**ROUTED OFFSET BRACKET DETAILS**

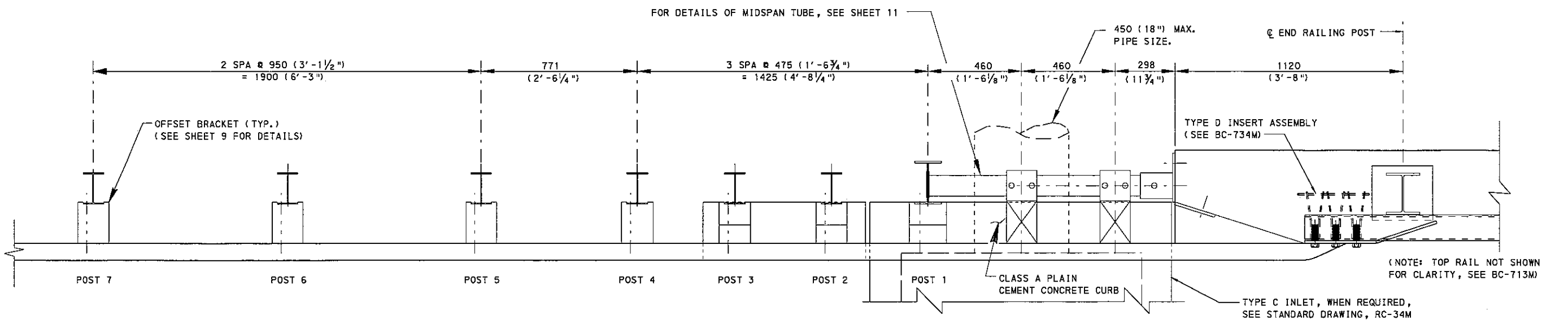
- NOTES:**
- FOR LOCATION OF POSTS, SEE SHEET 4.
  - FOR ADDITIONAL NOTES, SEE SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

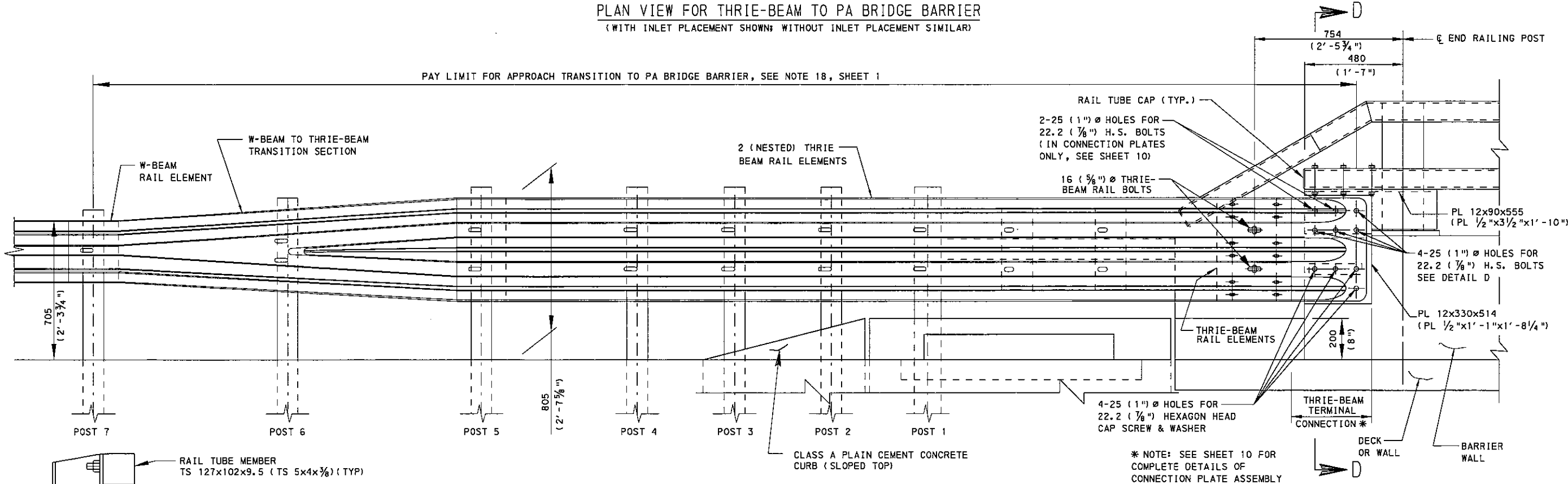
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE  
BARRIER TRANSITIONS  
THRIE-BEAM TO PA TYPE 10M  
BRIDGE BARRIER  
POST AND OFFSET BRACKET DETAILS

RECOMMENDED MAR. 30, 2006 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Chitel</i> CHIEF ENGINEER	SHT 7 OF 16 <b>RC-50M</b>
--	---	------------------------------

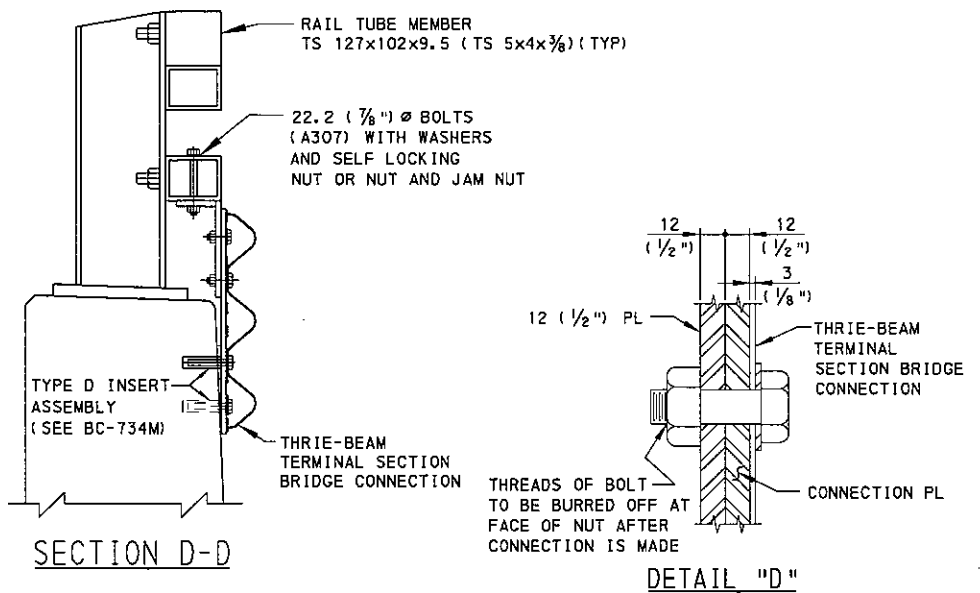


PLAN VIEW FOR THRIE-BEAM TO PA BRIDGE BARRIER  
(WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)



ELEVATION VIEW FOR THRIE-BEAM TO PA BRIDGE BARRIER  
(WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



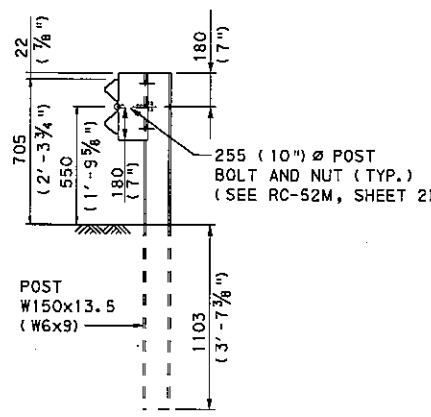
- NOTES:
1. W-BEAM RAIL ELEMENT, TRANSITION SECTION AND THRIE BEAM RAIL ELEMENT ARE BOLTED TO ALL POSTS.
  2. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 9.
  3. FOR ADDITIONAL PA BRIDGE BARRIER NOTES, SEE SHEET 1.
  4. SEE BC-712M FOR PA BRIDGE BARRIER DETAILS AND HARDWARE NOT SHOWN.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

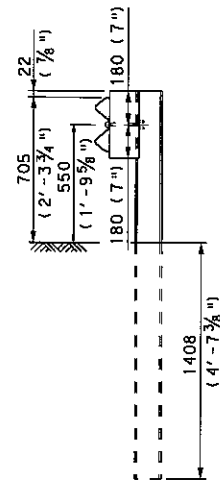
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

THRIE-BEAM TO PA BRIDGE BARRIER

RECOMMENDED MAR. 30, 2006 <i>Scott Christian</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Chel</i> CHIEF ENGINEER	SHT 8 OF 16 RC-50M
---	---	-----------------------

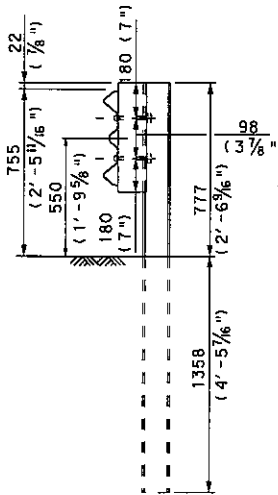


**BEYOND POST 7**  
(AT W-BEAM RAIL ELEMENT)  
SEE NOTE 7, SHEET 1.  
FOR POST DETAILS SEE  
RC-52M, SHEET 1.



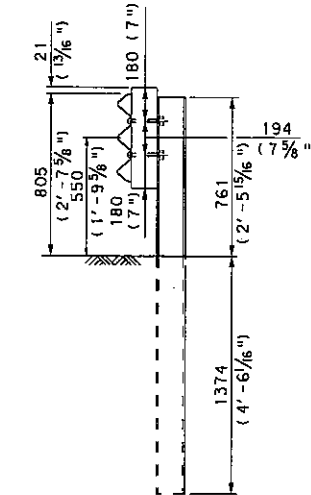
W150x13.5 (W6x9) STEEL POST  
2135 (7'-0") LONG w/150x200x360  
(6"x8"x1'-2") ROUTED OFFSET BRACKET

**POST 7**



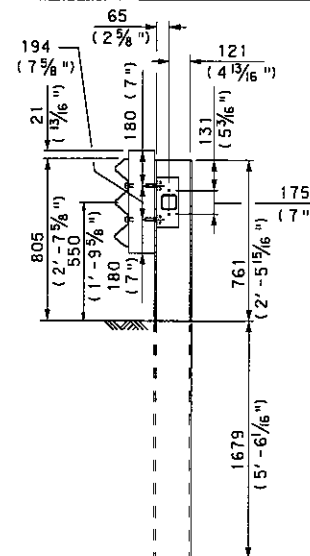
W150x13.5 (W6x9) STEEL POST  
2135 (7'-0") LONG w/ 150x200x458  
(6"x8"x1'-5 7/8") ROUTED OFFSET BRACKET

**POST 6**



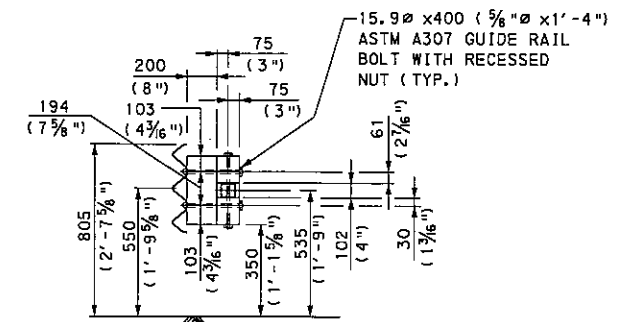
W150x13.5 (W6x9) STEEL POST  
2135 (7'-0") LONG w/ROUTED OFFSET  
BRACKET (SEE DETAIL)

**POSTS 2 THRU 5**

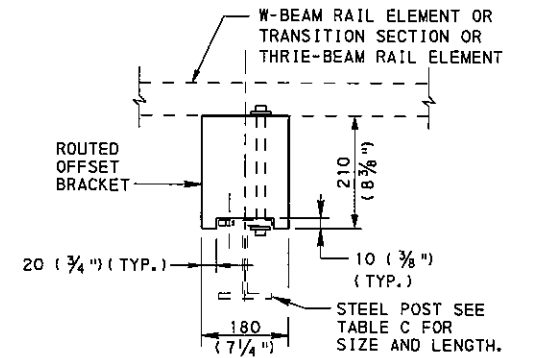


W200x31.3 (W8x21) STEEL POSTS  
2440 (8'-0") LONG w/ROUTED OFFSET  
BRACKET (SEE DETAIL)

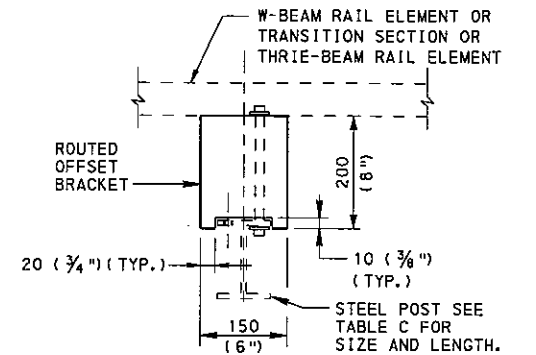
**POST 1**



**MIDSPAN  
TUBE SUPPORT**  
TWO 150x150x200 (6"x6"x0'-8") WOOD BLOCKS  
ATTACHED TO 100x100x8 (4"x4"x5/8") SQUARE TUBE  
w/150x200x400 (6"x8"x1'-4") WOOD BRACKET

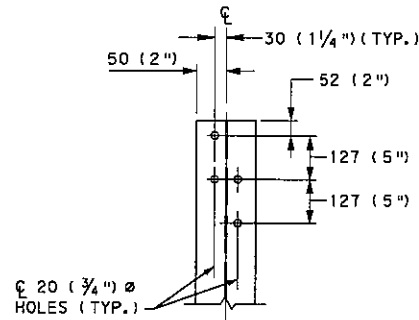


**SECTION A-A**

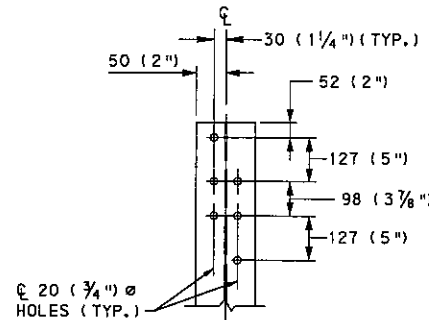


**SECTION B-B**

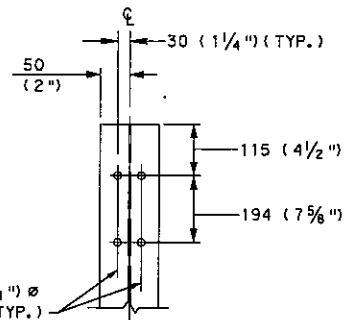
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES  
MUST BE USED ON PLANS. METRIC AND  
ENGLISH VALUES SHOWN MAY NOT BE MIXED.



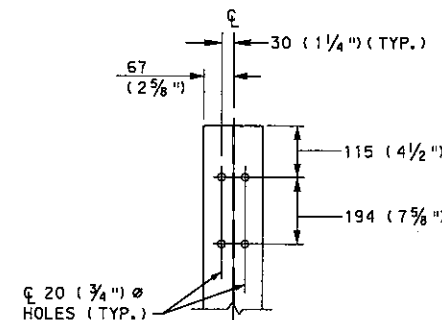
**POST 7**



**POST 6**



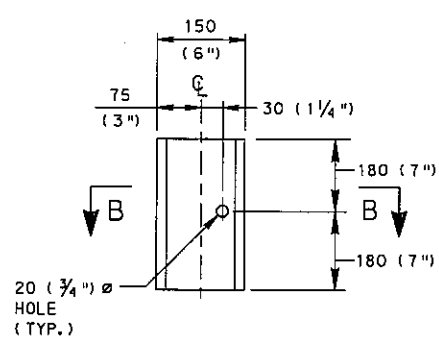
**POSTS 2 THRU 5**



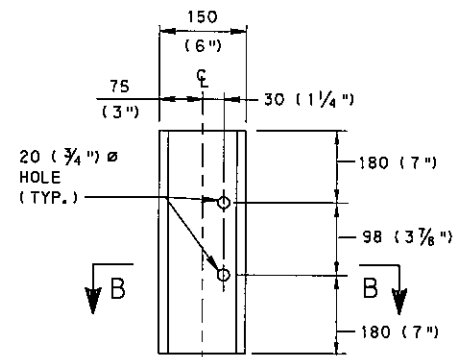
**POST 1**

TABLE C		
POSTS	LENGTH	SIZE
1	2440 (8'-0")	W200x31.3 (W8x21)
2 THRU 7	2135 (7'-0")	W150x13.5 (W6x9)
BEYOND 7	1830 (6'-0")	W150x13.5 (W6x9)

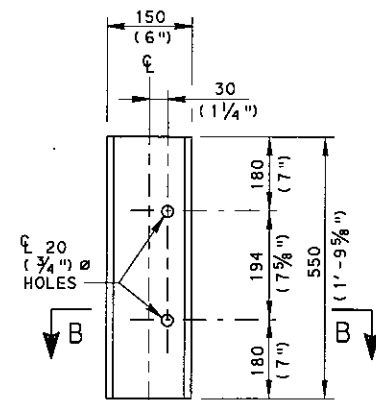
**POST DETAILS**



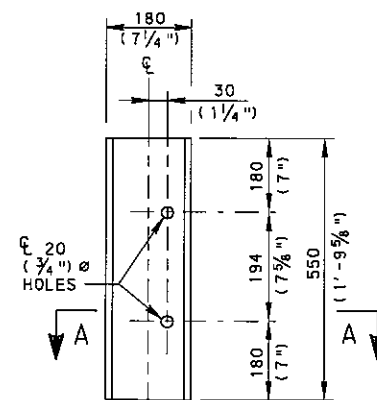
**POST 7**



**POST 6**



**POSTS 2 THRU 5**



**POST 1**

**ROUTED OFFSET BRACKET DETAILS**

**NOTES:**

- FOR LOCATION OF POSTS, SEE SHEET 8.
- FOR ADDITIONAL NOTES, SEE SHEET 1.

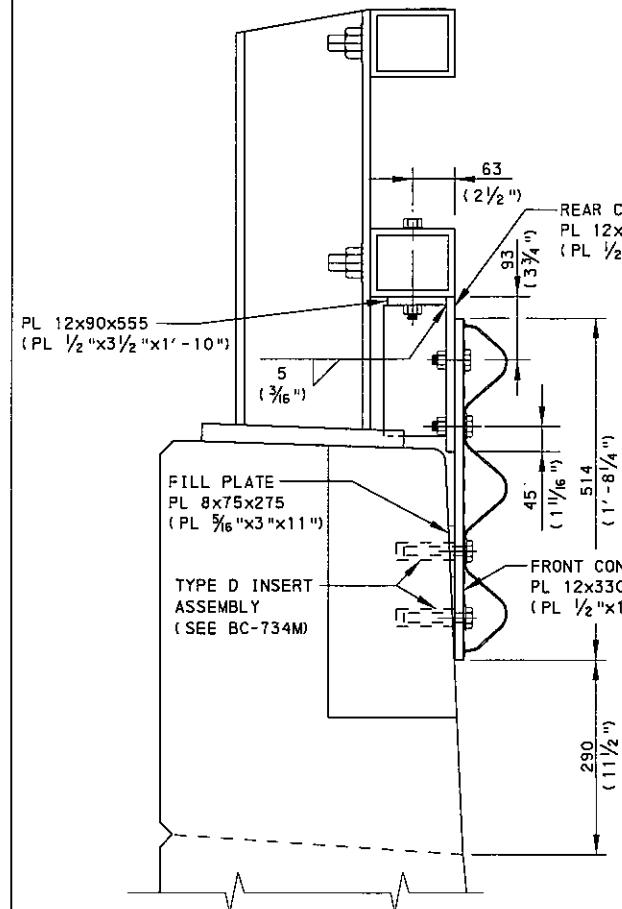
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE  
BARRIER TRANSITIONS  
THRIE-BEAM TO PA  
BRIDGE BARRIER  
POST AND OFFSET BRACKET DETAILS

RECOMMENDED MAR. 30, 2006  
*Scott Christa*  
DIRECTOR, BUREAU OF DESIGN

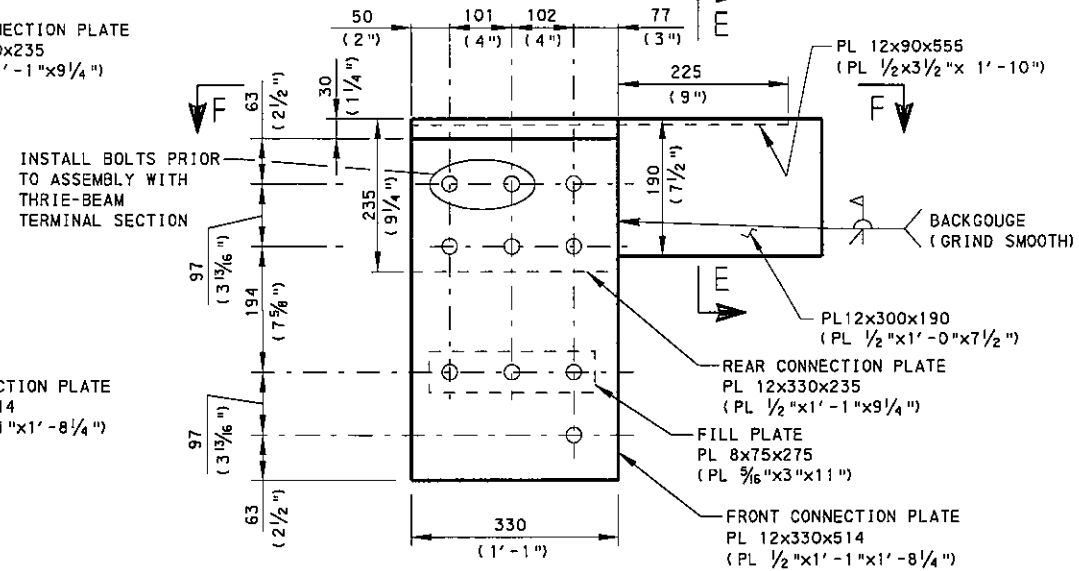
RECOMMENDED MAR. 30, 2006  
*M. L. Hibel*  
CHIEF ENGINEER

SHT 9 OF 16  
RC-50M



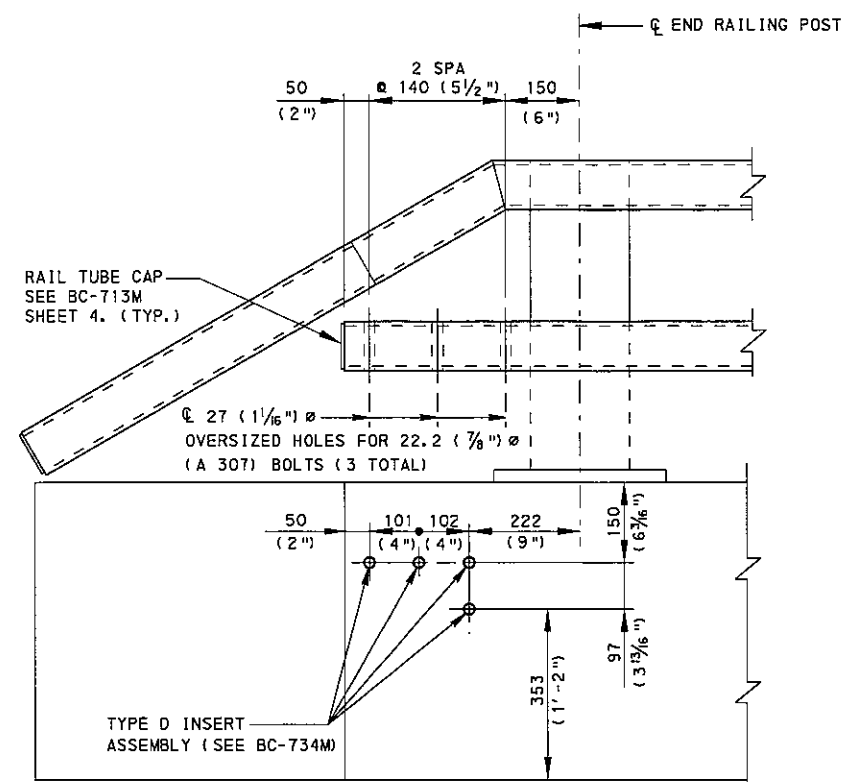
**END VIEW**

(DELINEATOR NOT SHOWN FOR CLARITY)



**ELEVATION VIEW**

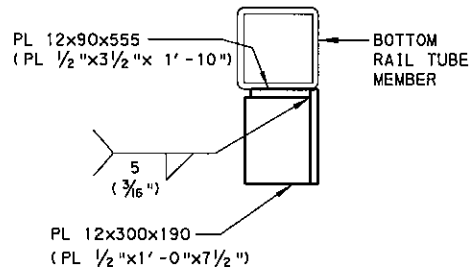
(RAIL TUBES NOT SHOWN FOR CLARITY)



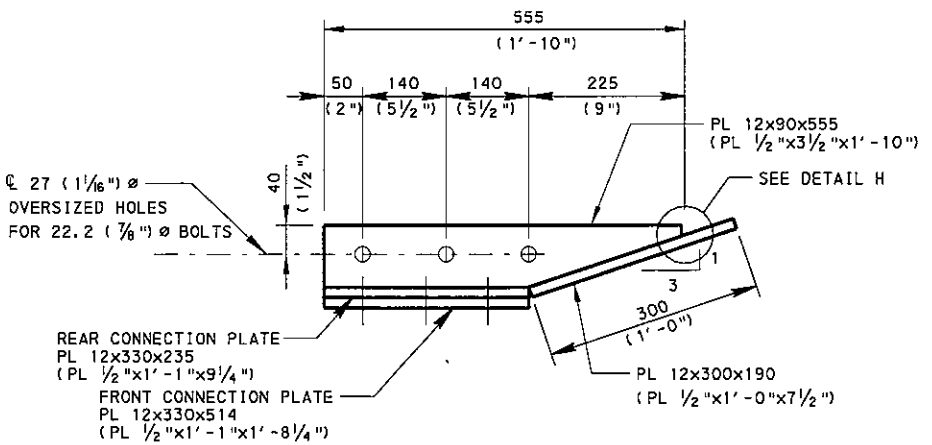
**END OF RAIL DETAIL**

(CONNECTION PLATES NOT SHOWN)

**CONNECTION PLATE ASSEMBLY DETAILS**

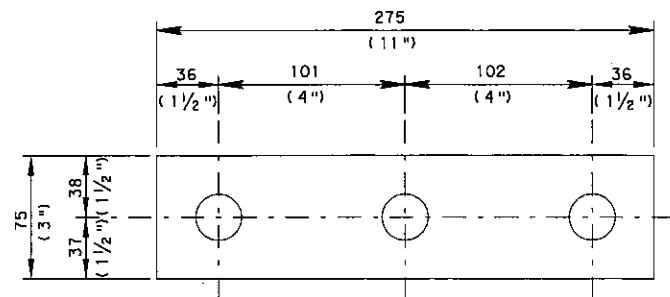


**SECTION E-E**

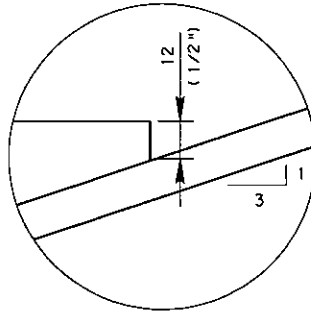


**SECTION F-F**

(RAIL TUBES NOT SHOWN FOR CLARITY)



**FILL PLATE DETAIL**



**DETAIL H**

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

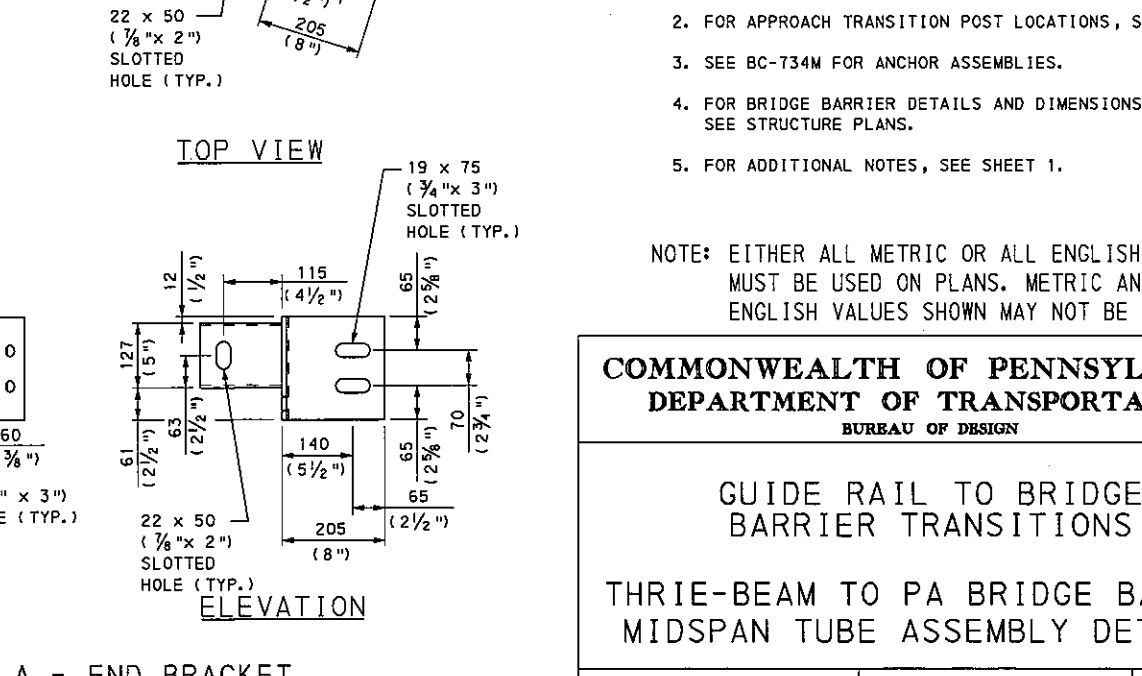
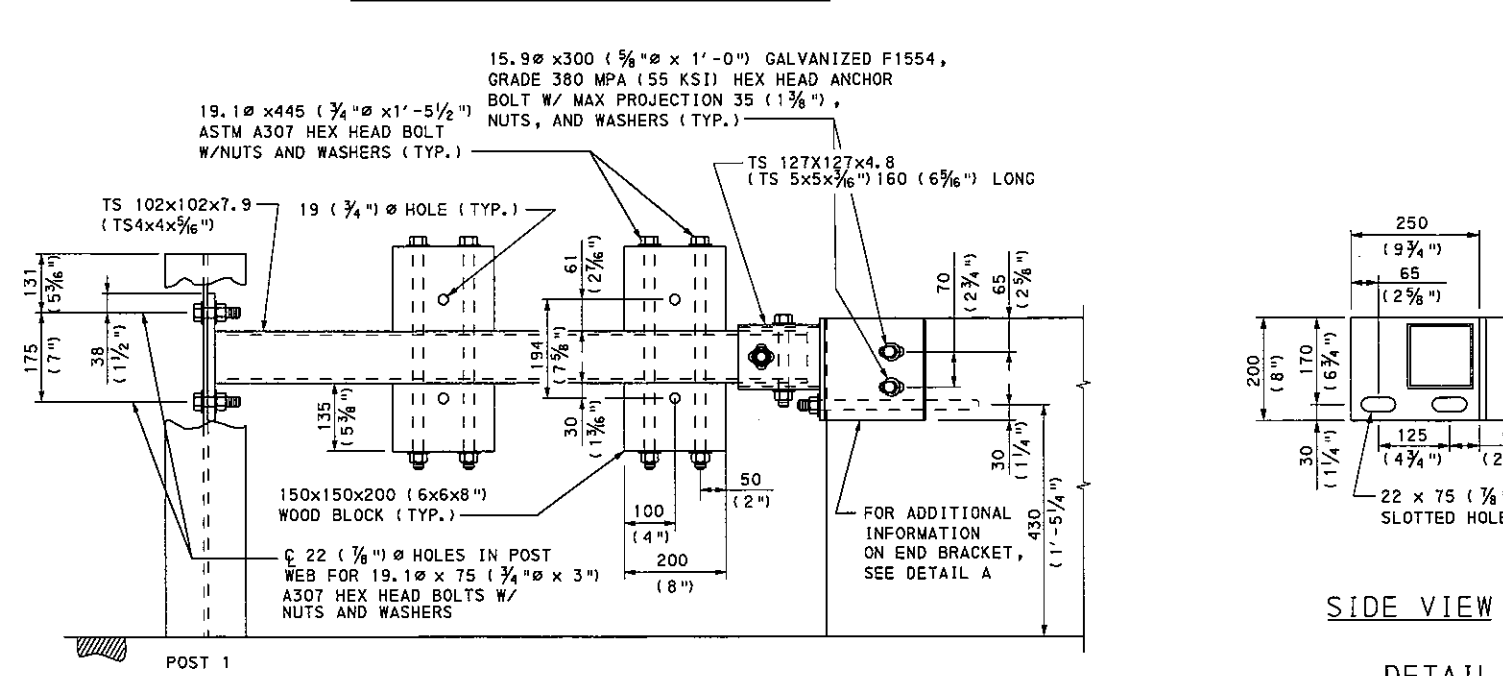
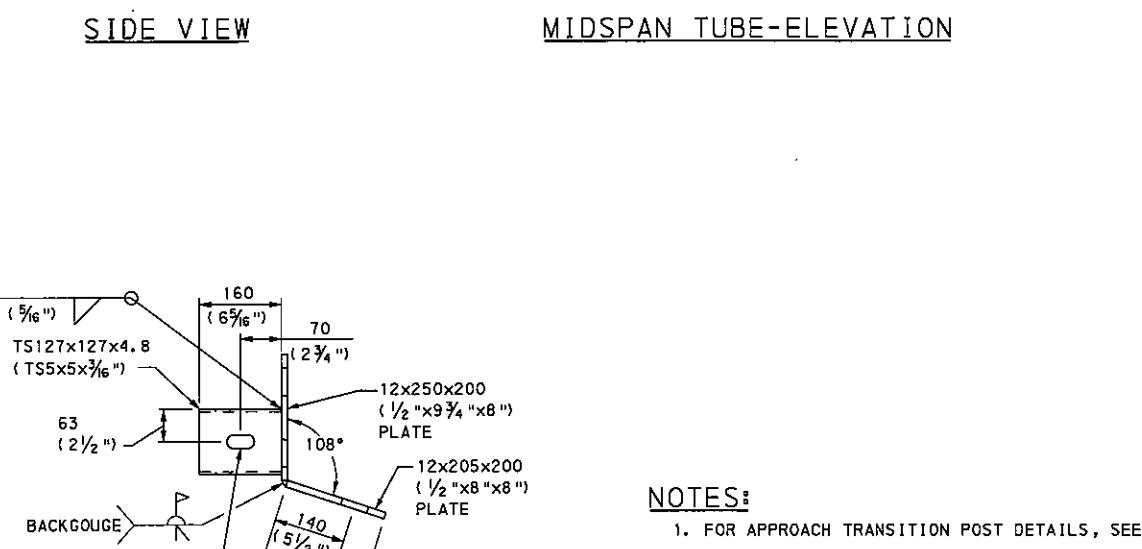
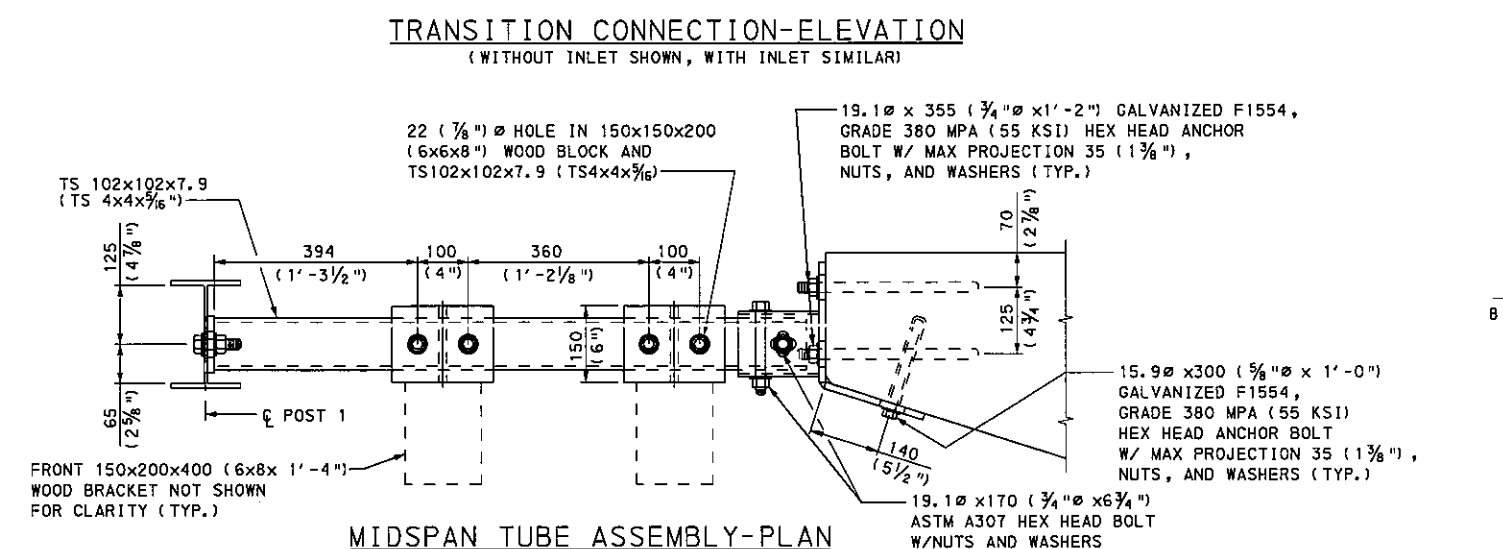
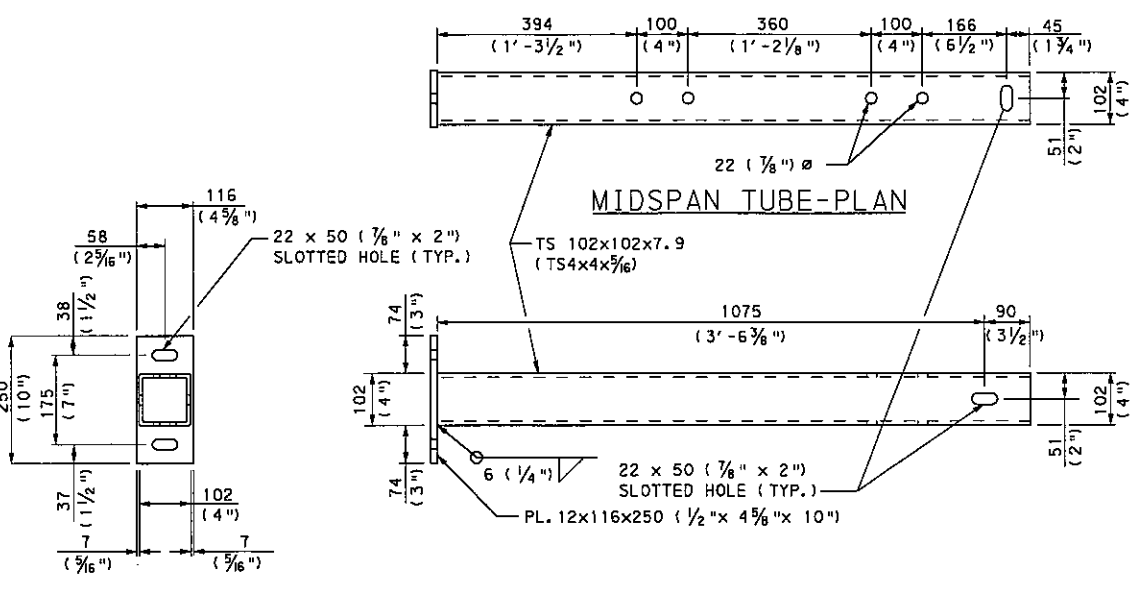
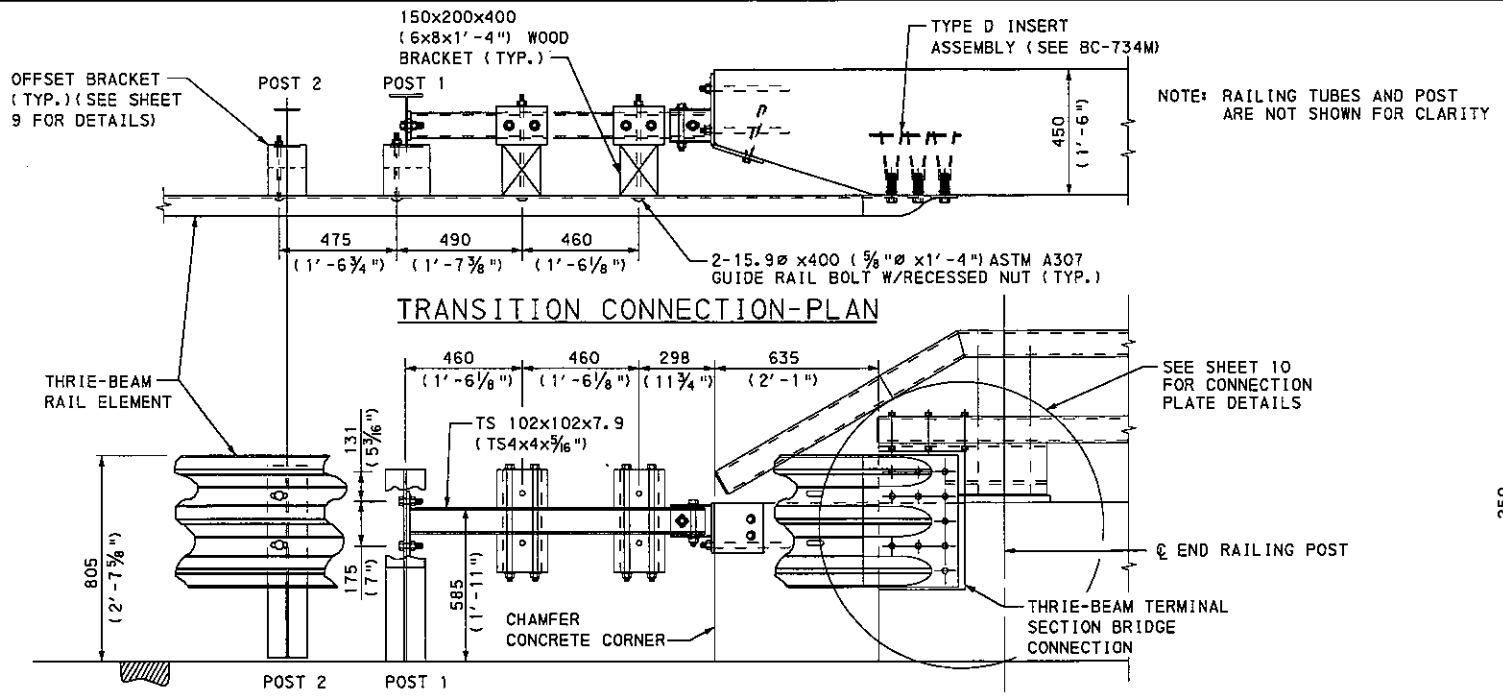
GUIDE RAIL TO BRIDGE  
BARRIER TRANSITIONS

THRIE-BEAM TO PA BRIDGE BARRIER  
CONNECTION PLATE DETAILS

**NOTES:**

1. USE THIS SHEET WITH SHEET 8.
2. FOR ADDITIONAL NOTES, SEE SHEET 1 AND SHEET 8.
3. FOR BRIDGE BARRIER DETAILS AND DIMENSIONS, SEE BC-713M.



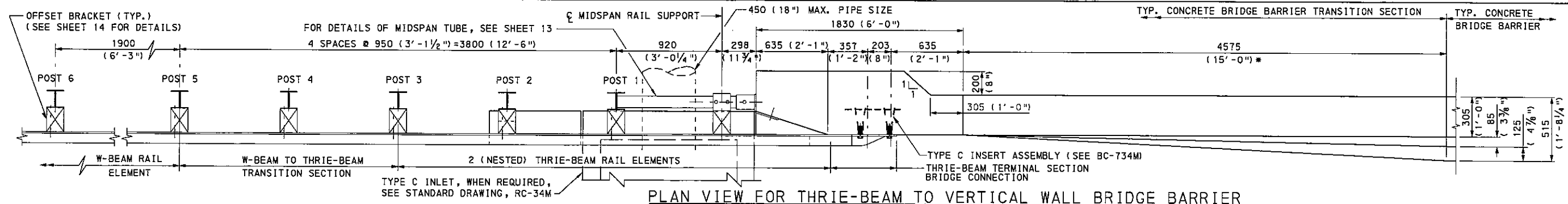


**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
 BUREAU OF DESIGN

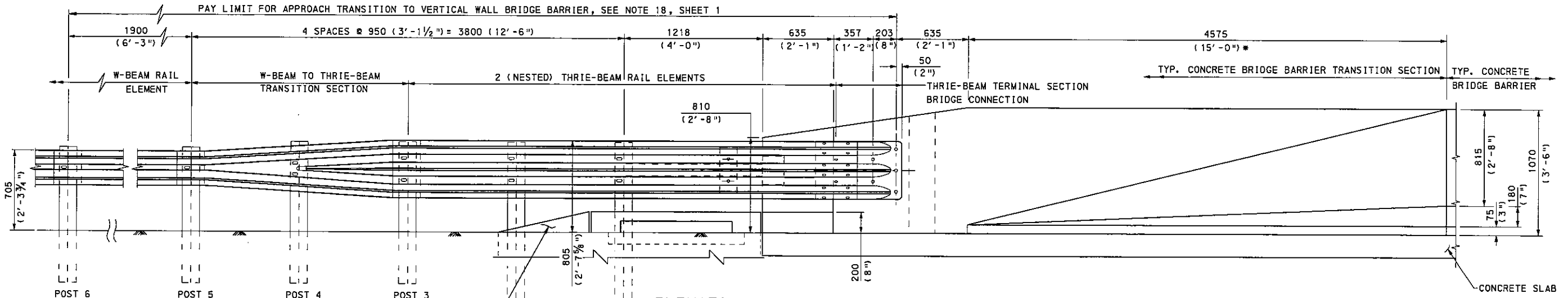
GUIDE RAIL TO BRIDGE  
 BARRIER TRANSITIONS

THRIE-BEAM TO PA BRIDGE BARRIER  
 MIDSPAN TUBE ASSEMBLY DETAILS

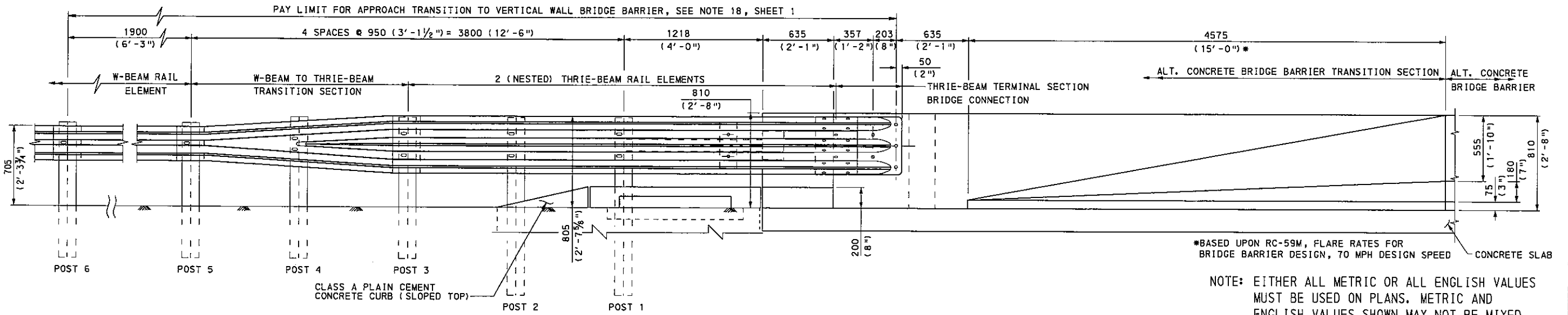
RECOMMENDED MAR. 30, 2006 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. L. Hibel</i> CHIEF ENGINEER	SHT 11 OF 16 RC-50M
--	---	------------------------



**PLAN VIEW FOR THRIE-BEAM TO VERTICAL WALL BRIDGE BARRIER**  
 (PLAN VIEW FOR TYP. CONCRETE BRIDGE BARRIER SHOWN; PLAN VIEW FOR ALT. CONCRETE BRIDGE BARRIER SIMILAR)  
 (WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)



**ELEVATION VIEW FOR THRIE-BEAM TO TYP. VERTICAL WALL BRIDGE BARRIER**  
 (WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)



**ELEVATION VIEW FOR THRIE-BEAM TO ALT. VERTICAL WALL BRIDGE BARRIER**  
 (WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)

\*BASED UPON RC-59M, FLARE RATES FOR BRIDGE BARRIER DESIGN, 70 MPH DESIGN SPEED  
 CONCRETE SLAB

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**NOTES:**

1. W-BEAM RAIL ELEMENT, TRANSITION SECTION AND THRIE-BEAM RAIL ELEMENT ARE BOLTED TO ALL POSTS.
2. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 14.
3. SEE BC-703M FOR BRIDGE BARRIER DETAILS AND HARDWARE NOT SHOWN.
4. SEE STRUCTURE DRAWINGS FOR OTHER BRIDGE BARRIER DETAILS AND DIMENSIONS.
5. FOR ADDITIONAL NOTES, SEE SHEET 1.

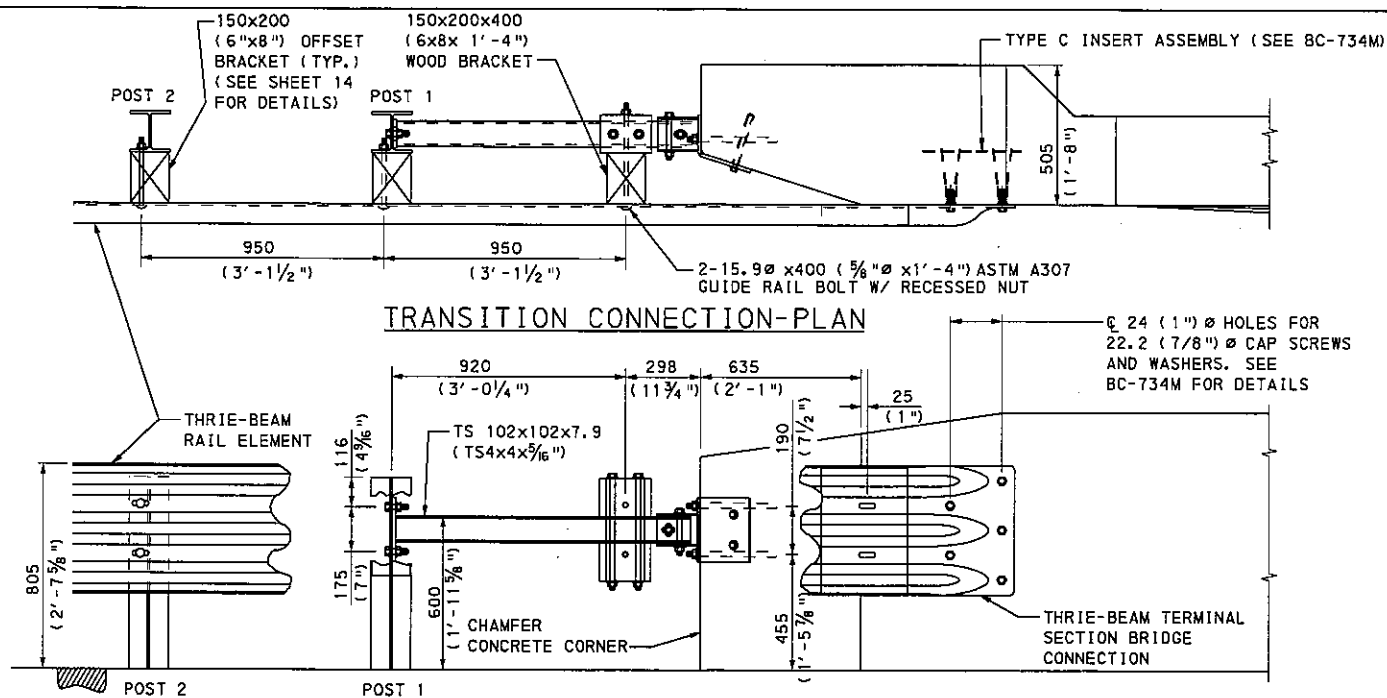
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
 BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS  
 THRIE-BEAM TO VERTICAL WALL BRIDGE BARRIER

RECOMMENDED MAR. 30, 2006  
*Scott Christie*  
 DIRECTOR, BUREAU OF DESIGN

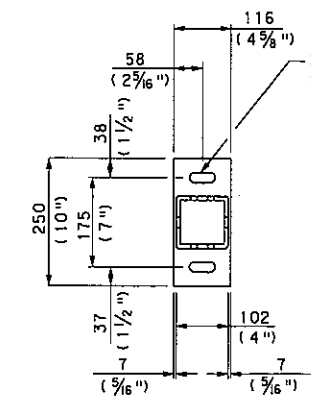
RECOMMENDED MAR. 30, 2006  
*M. Akel*  
 CHIEF ENGINEER

SHT 12 OF 16  
 RC-50M

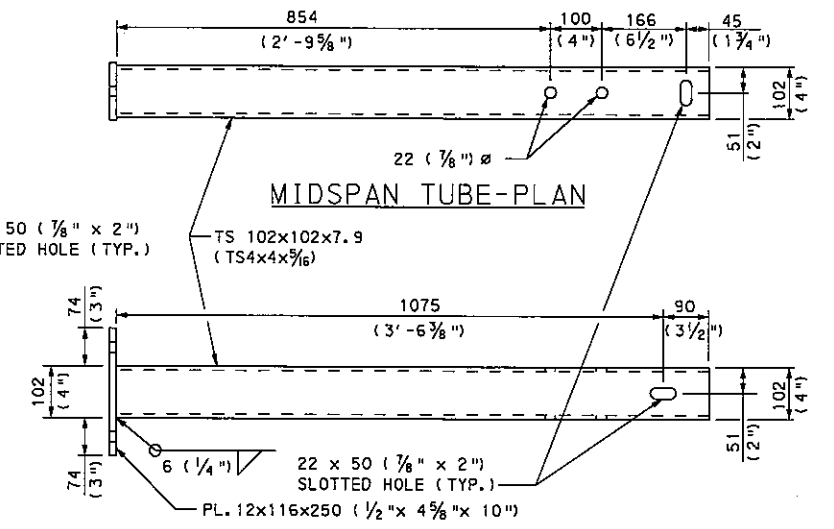


TRANSITION CONNECTION-PLAN

TRANSITION CONNECTION-ELEVATION

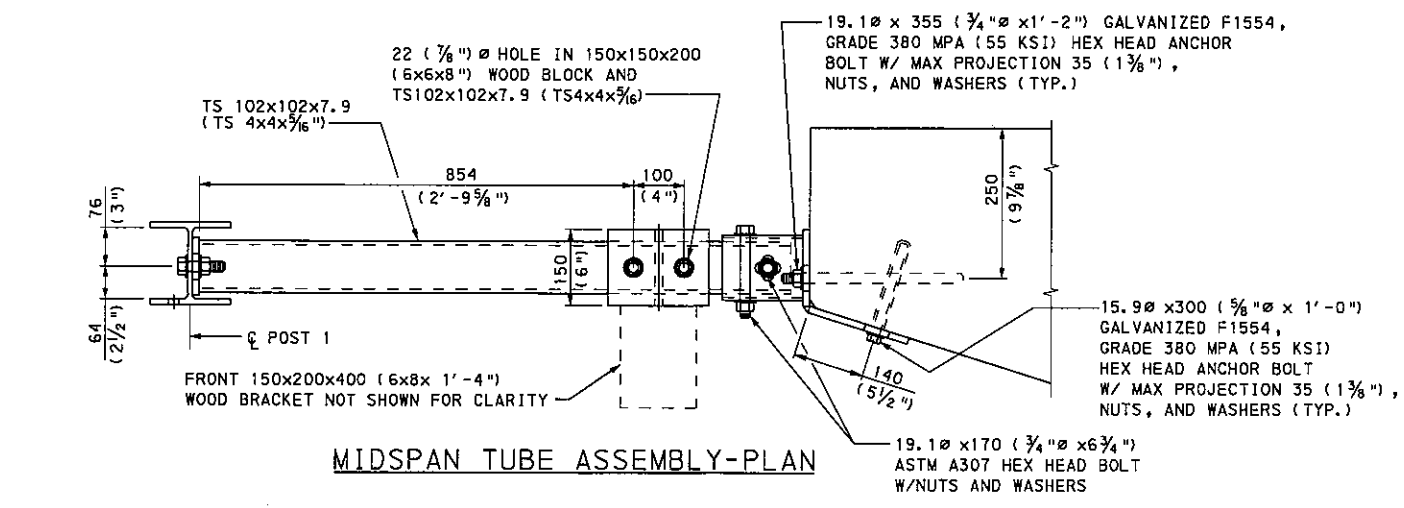


SIDE VIEW

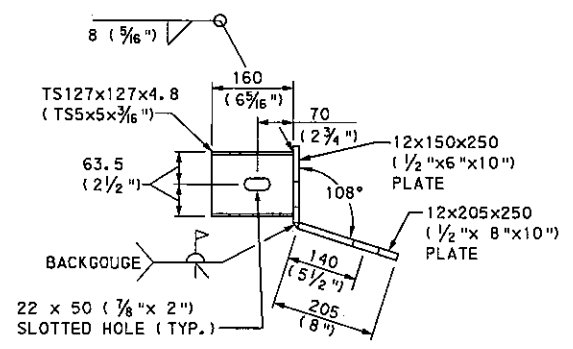


MIDSPAN TUBE-PLAN

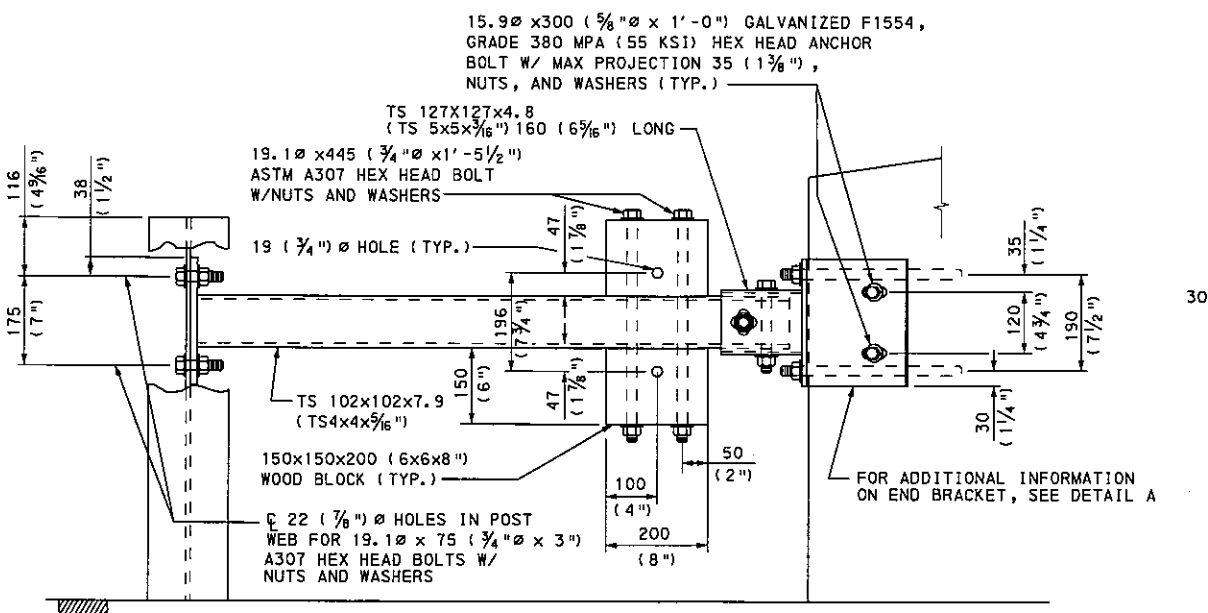
MIDSPAN TUBE-ELEVATION



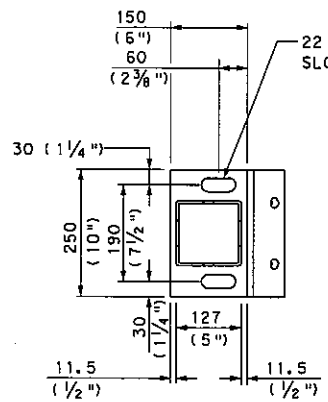
MIDSPAN TUBE ASSEMBLY-PLAN



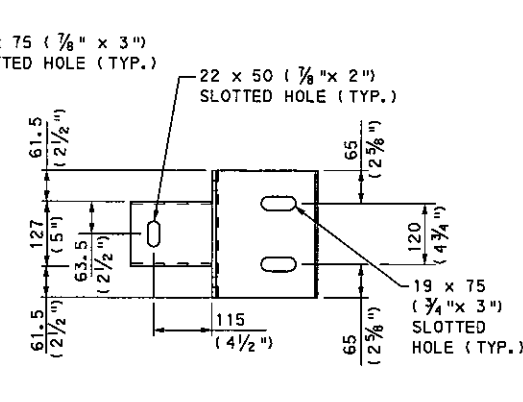
TOP VIEW



MIDSPAN TUBE ASSEMBLY-ELEVATION



SIDE VIEW



ELEVATION

DETAIL A - END BRACKET

NOTES:

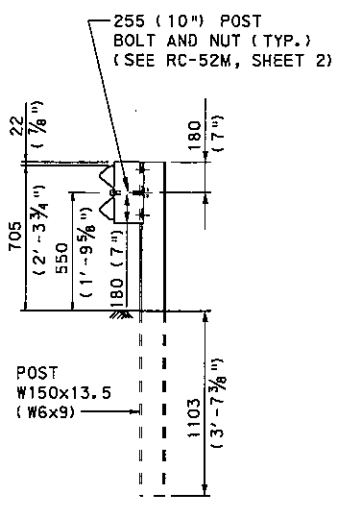
1. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 14.
2. FOR APPROACH TRANSITION POST LOCATIONS, SEE SHEET 12.
3. SEE BC-734M FOR ANCHOR ASSEMBLIES.
4. FOR BRIDGE BARRIER DETAILS AND DIMENSIONS, SEE STRUCTURE PLANS.
5. FOR ADDITIONAL NOTES, SEE SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

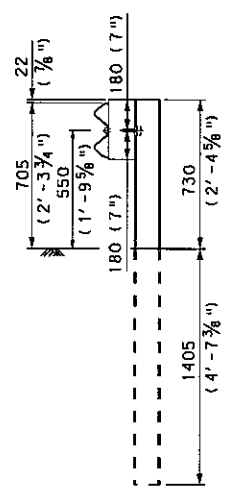
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
 BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE  
 BARRIER TRANSITIONS  
 THRIE-BEAM TO VERTICAL WALL  
 BRIDGE BARRIER  
 MIDSPAN TUBE ASSEMBLY DETAILS

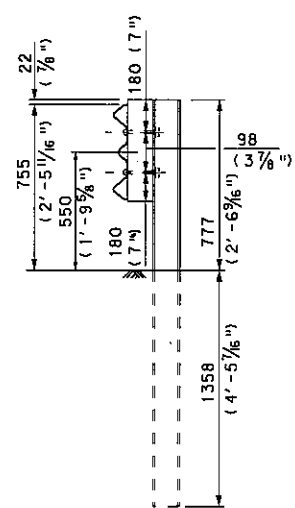
RECOMMENDED MAR. 30, 2006 <i>Scott Christen</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. L. Hotel</i> CHIEF ENGINEER	SHT 13 OF 16 <b>RC-50M</b>
--	---	-------------------------------



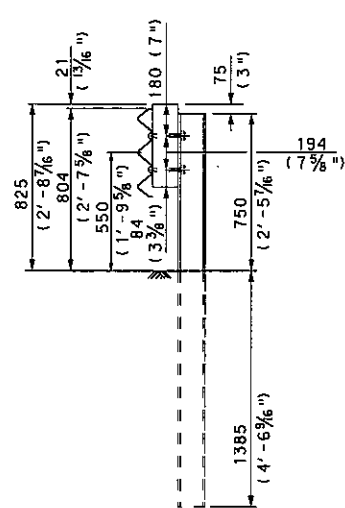
**BEYOND POST 6**  
(AT W-BEAM RAIL ELEMENT)  
SEE NOTE 7, SHEET 1  
(FOR POST DETAILS, SEE RC-52M, SHEET 1)



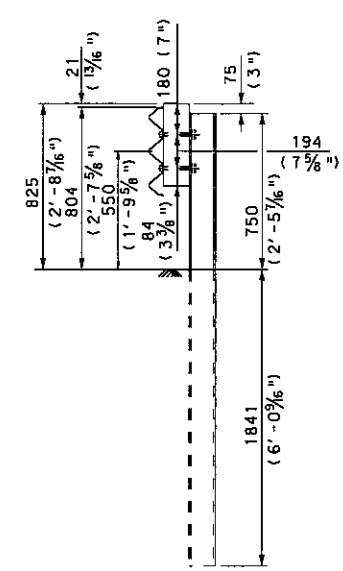
**POSTS 5 AND 6**  
W150x22 (W6x15) STEEL POSTS 2135 (7'-0") LONG  
W/ 150x200x336 (6"x8"x1'-2") OFFSET BRACKET



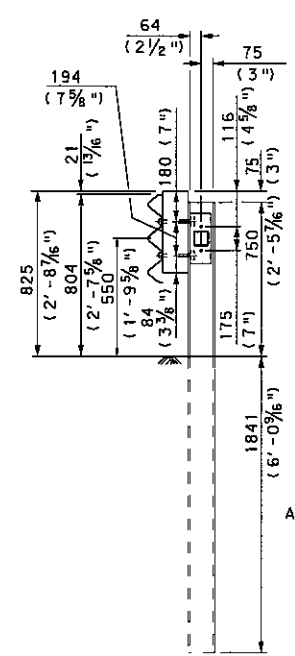
**POST 4**  
W150x22 (W6x15) STEEL POST 2135 (7'-0") LONG  
W/ 150x200x458 (6"x8"x1'-6") OFFSET BRACKET



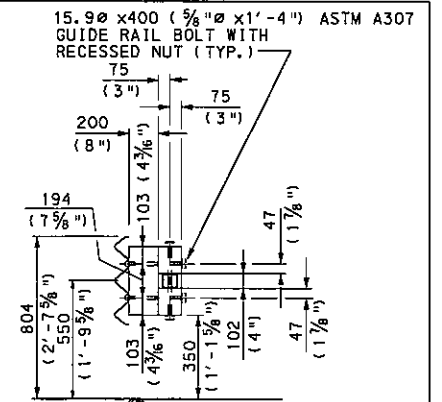
**POST 3**  
W150x22 (W6x15) STEEL POST 2135 (7'-0") LONG  
W/ 150x200x458 (6"x8"x1'-6") OFFSET BRACKET



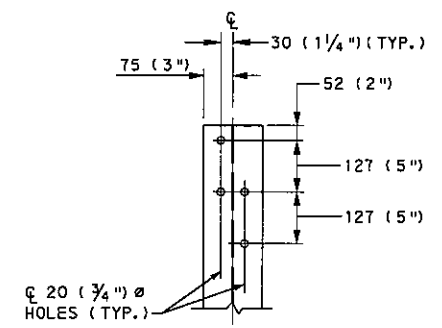
**POST 2**  
W150x37 (W6x25) STEEL POST 2591 (8'-6") LONG  
W/ 150x200x458 (6"x8"x1'-6") OFFSET BRACKET



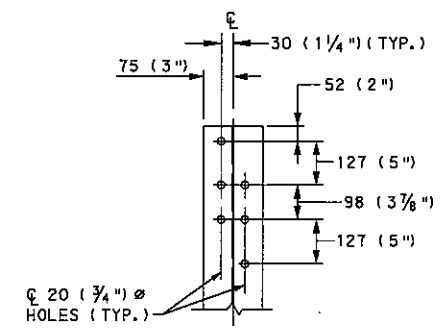
**POST 1**  
W150x37 (W6x25) STEEL POST 2591 (8'-6") LONG  
W/ 150x200x458 (6"x8"x1'-6") OFFSET BRACKET



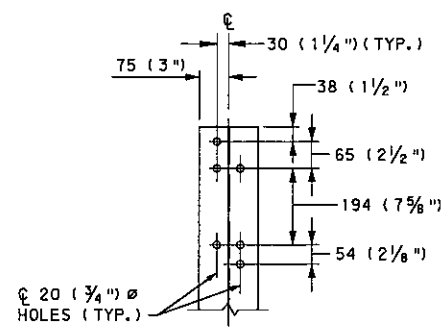
**MIDSPAN TUBE SUPPORT**  
TWO 150x150x200 (6"x6"x0'-8") WOOD BLOCKS  
ATTACHED TO 100x100x8 (4"x4"x5/8") SQUARE TUBE  
W/ 150x200x400 (6"x8"x1'-4") WOOD BRACKET



**POSTS 5 AND 6**



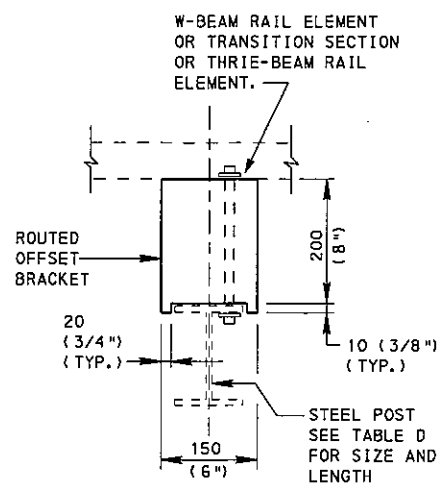
**POST 4**



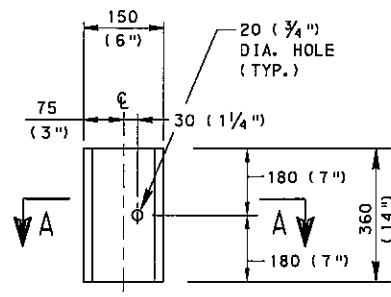
**POSTS 1 THRU 3**

TABLE D		
POST	LENGTH	SIZE
1 THRU 2	2591 (8'-6")	W150x37 (W6x25)
3 THRU 6	2135 (7'-0")	W150x22 (W6x15)
BEYOND 6	1830 (6'-0")	W150x13.5 (W6x9)

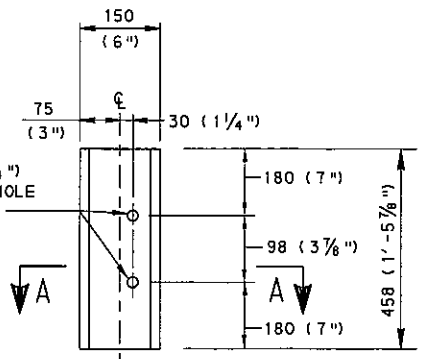
**POST DETAILS**



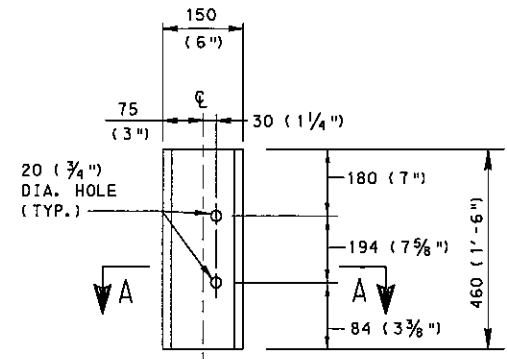
**SECTION A-A**



**POSTS 5 AND 6**



**POST 4**



**POSTS 1 THRU 3**

**OFFSET BRACKET DETAILS**

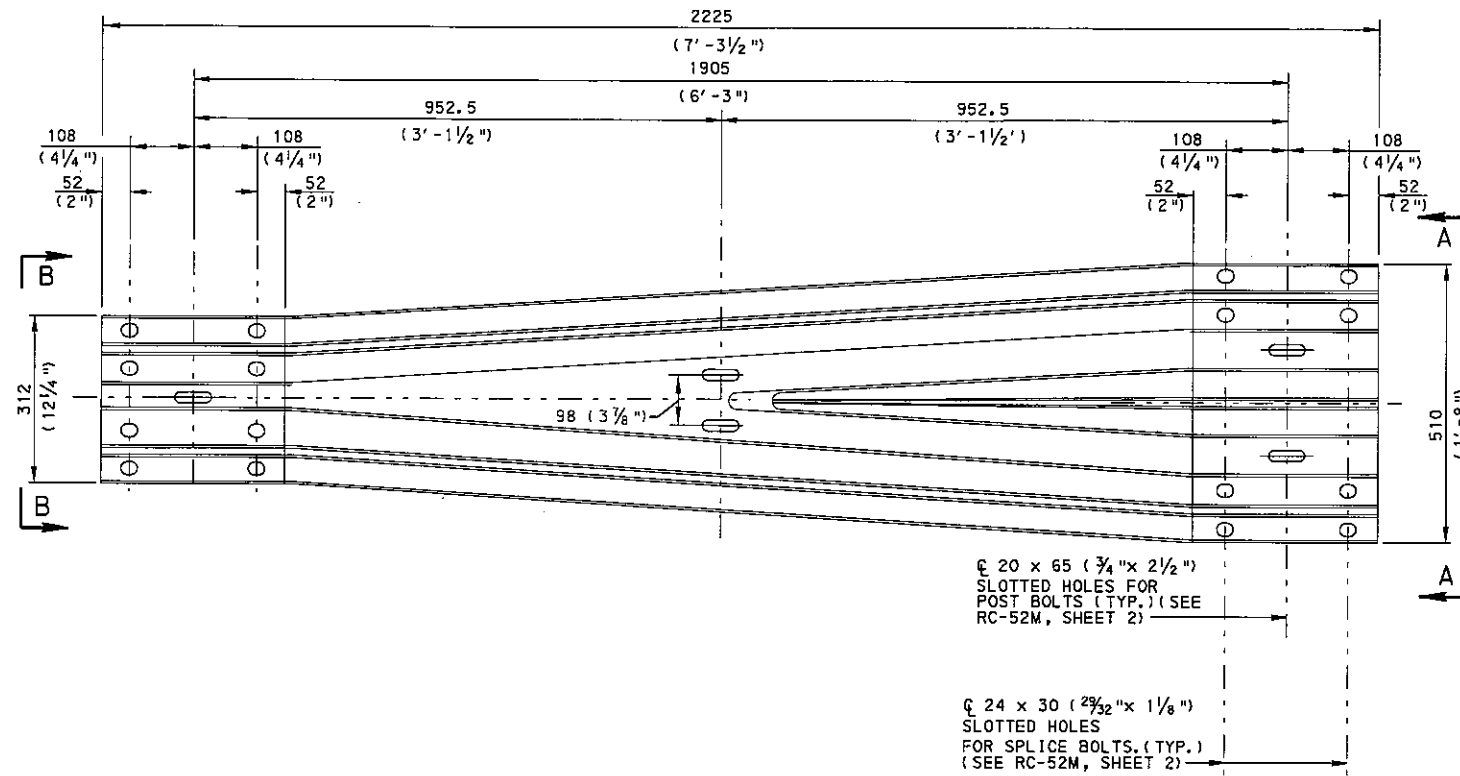
**NOTES:**

- FOR LOCATION OF POSTS, SEE SHEET 12.
- FOR ADDITIONAL NOTES, SEE SHEET 1.

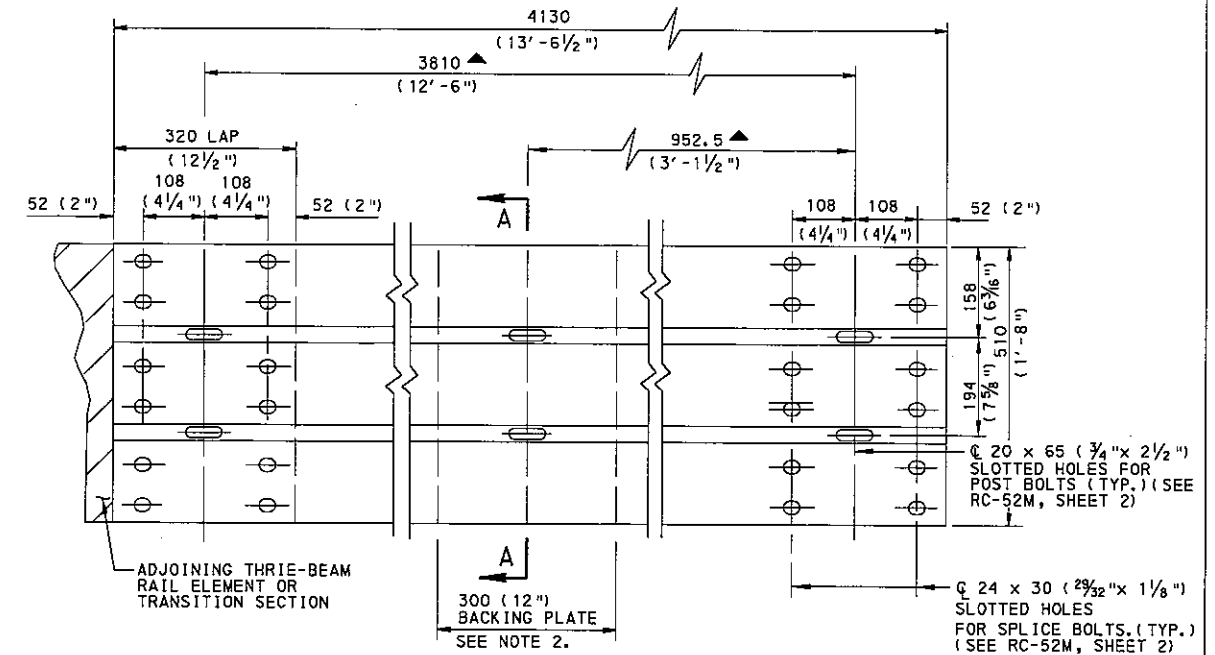
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

**GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS**  
**THRIE-BEAM TO VERTICAL WALL BRIDGE BARRIER**  
**POST AND OFFSET BRACKET DETAILS**

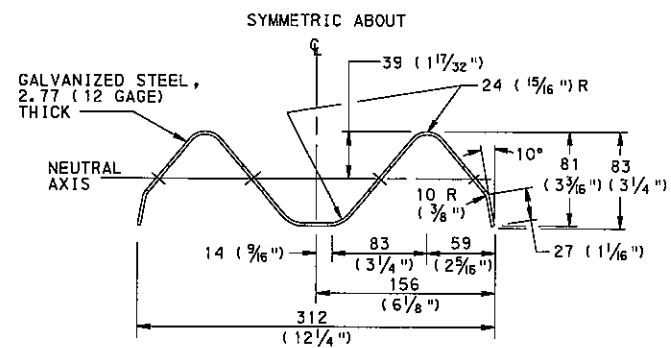


TRANSITION SECTION

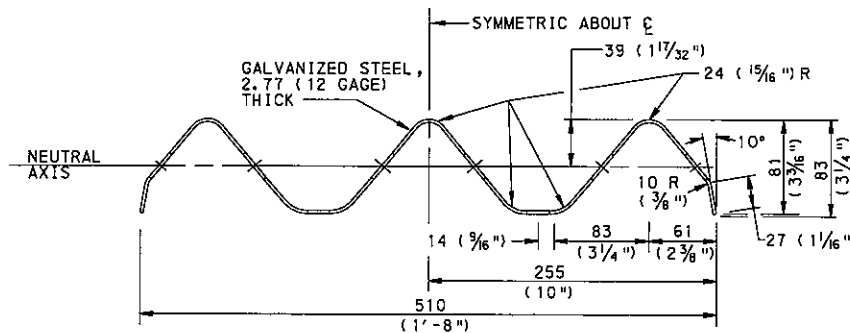


THRIE-BEAM RAIL ELEMENT

▲ AT TYPICAL THRIE-BEAM RAIL ELEMENT SHOWN:  
AT THRIE-BEAM TO VERTICAL WALL TRANSITION, SEE BC-703M, AT THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER TRANSITION, SEE BC-708M, AT THRIE BEAM TO PA BRIDGE BARRIER TRANSITION, SEE BC-712M.



RAIL ELEMENT SECTION B-B



THRIE BEAM RAIL ELEMENT SECTION A-A  
(BACKING PLATE NOT SHOWN FOR CLARITY)

NOTES:

1. THE THRIE-BEAM RAIL ELEMENTS AND TRANSITION SECTIONS ARE ONLY USED IN THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER, THRIE BEAM TO PA BRIDGE BARRIER, AND THRIE-BEAM TO VERTICAL WALL TRANSITION CONNECTIONS.
2. USE 300 mm (12") BACKING PLATE FOR THE THRIE-BEAM RAIL ELEMENTS AT ALL INTERMEDIATE POSTS WITH THE SAME SECTION AS ON THE THRIE-BEAM RAIL ELEMENT.
3. FOR ADDITIONAL NOTES, SEE SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

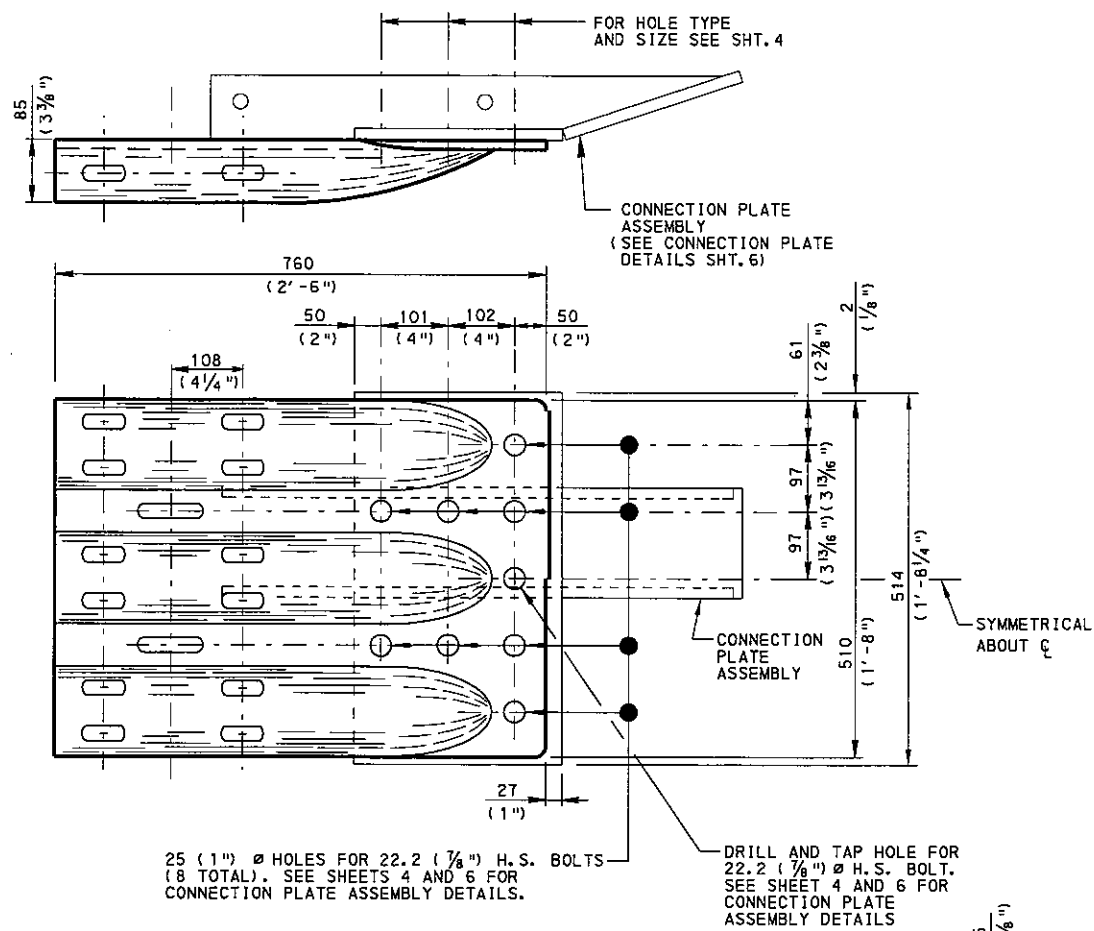
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS  
THRIE-BEAM TRANSITION SECTION AND RAIL ELEMENT DETAILS

RECOMMENDED MAR. 30, 2006  
*Scott Christie*  
DIRECTOR, BUREAU OF DESIGN

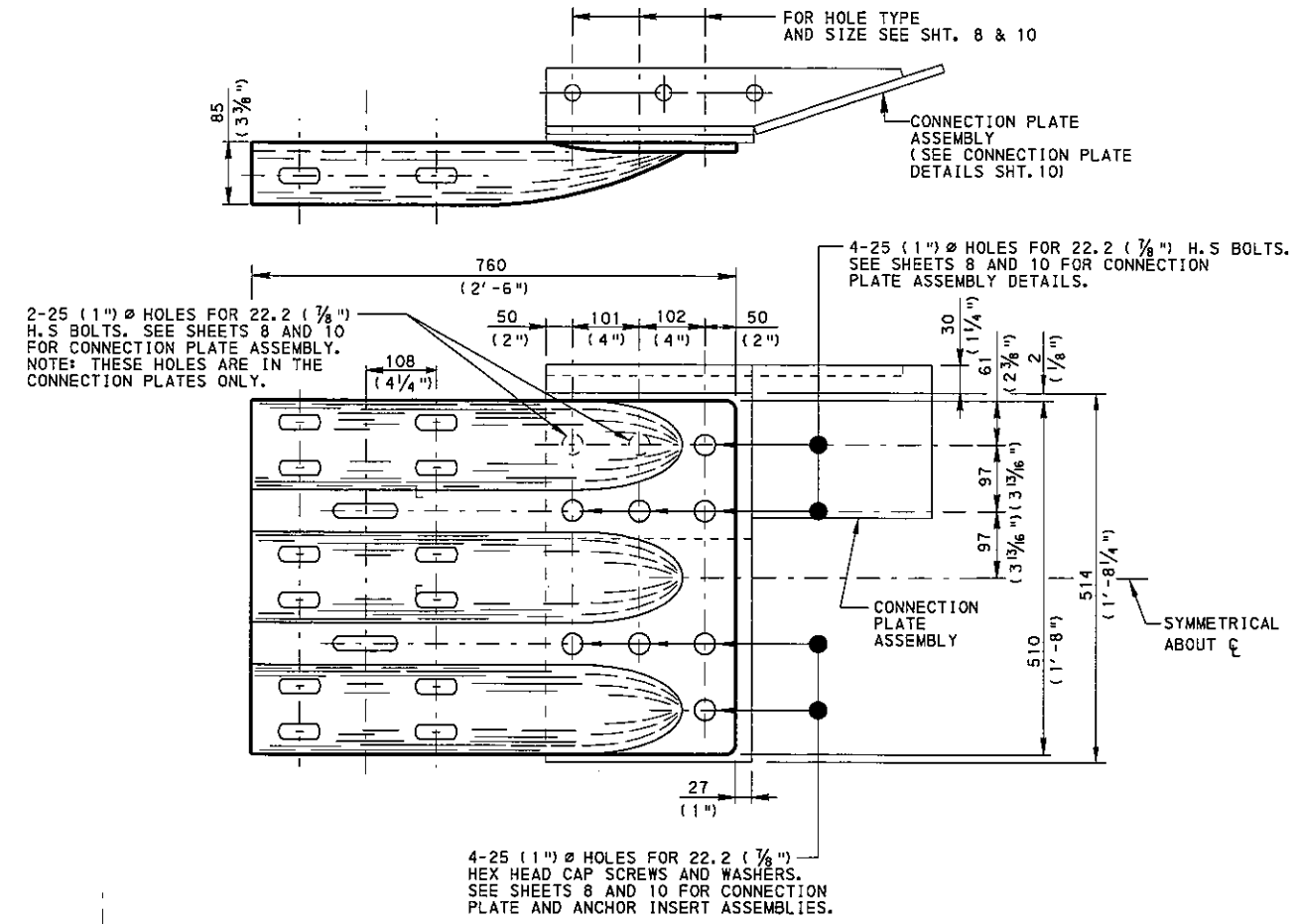
RECOMMENDED MAR. 30, 2006  
*M. Eitel*  
CHIEF ENGINEER

SHT 15 OF 16  
RC-50M

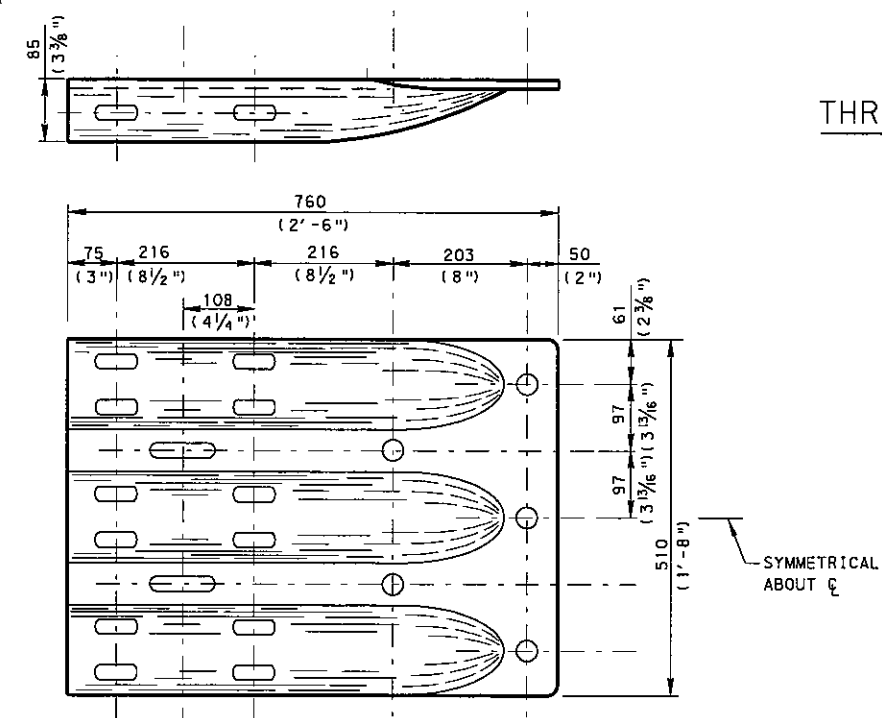




THRIE-BEAM TERMINAL SECTION  
AT PA TYPE 10M BRIDGE BARRIER  
SHOWN WITH CONNECTION PLATE ASSEMBLY



THRIE-BEAM TERMINAL SECTION  
AT PA BRIDGE BARRIER  
SHOWN WITH CONNECTION PLATE ASSEMBLY



THRIE-BEAM TERMINAL SECTION  
AT VERTICAL WALL BRIDGE BARRIER

NOTES

1. USE THIS SHEET WITH SHEETS 4-15.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.

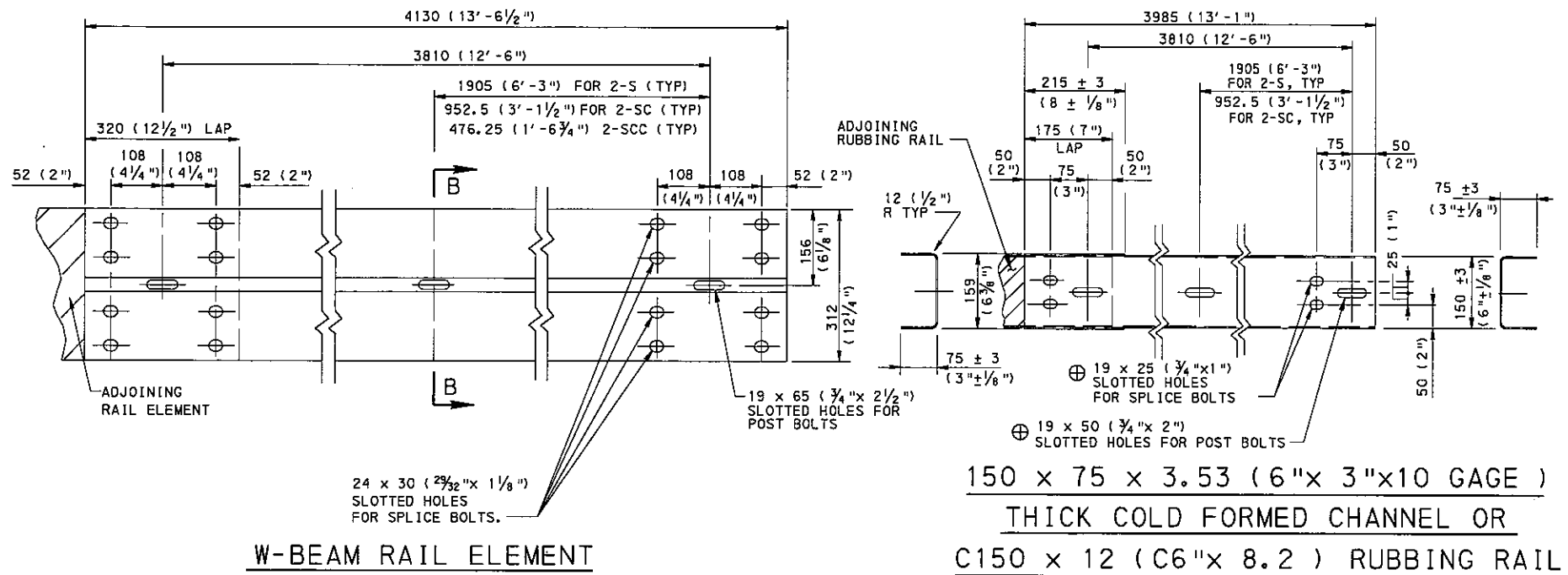
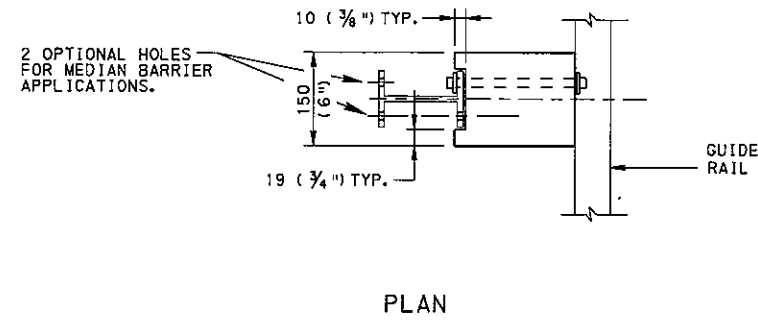
\*\* PROVIDE SPLICE BOLTS WITH A LOCK NUT OR DOUBLE NUT AND TIGHTEN ONLY TO A POINT THAT ALLOWS GUIDE RAIL TO BE FREE TO MOVE. CENTER SPLICE BOLTS IN THE SLOTTED HOLES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

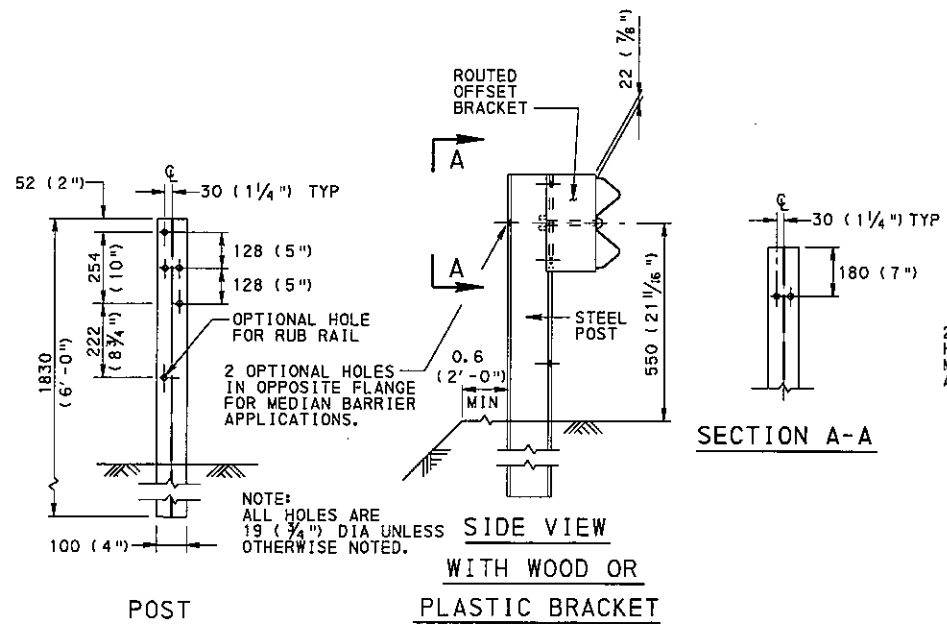
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE  
BARRIER TRANSITIONS

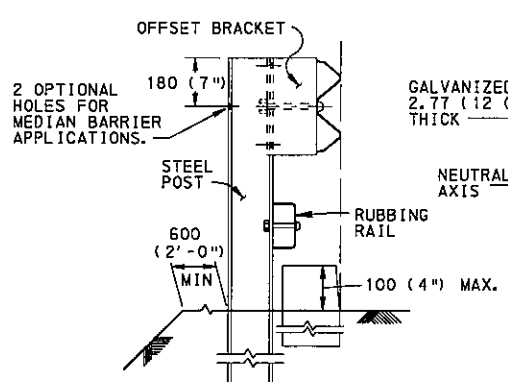
THRIE-BEAM TERMINAL SECTION  
BRIDGE CONNECTION DETAILS



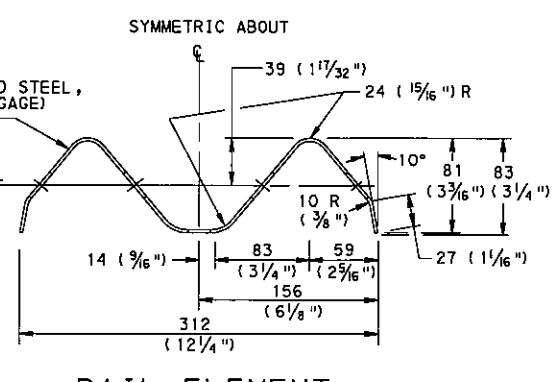
150 x 75 x 3.53 (6"x 3"x10 GAGE)  
THICK COLD FORMED CHANNEL OR  
C150 x 12 (C6"x 8.2) RUBBING RAIL  
(SEE NOTE 4)



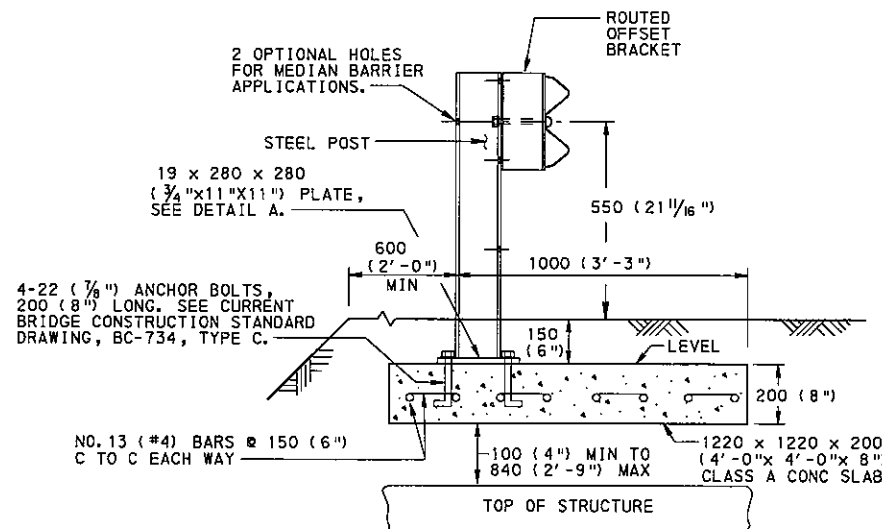
W150 x 13.5 (W6 x 8.5 or 9.0) POST DETAILS



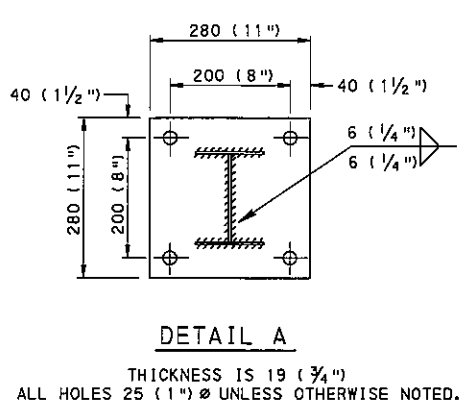
GUIDE RAIL WITH CURB OR RUBBING RAIL  
(SEE NOTE 4)



RAIL ELEMENT SECTION B-B



STEEL POSTS OVER UNDERGROUND STRUCTURES  
(SEE NOTE 3)



DETAIL A  
THICKNESS IS 19 (3/4")  
ALL HOLES 25 (1") Ø UNLESS OTHERWISE NOTED.

⊕ FOR SPLICE BOLT AND POST BOLT DETAILS, SEE SHEET 2.

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 620.
2. PROVIDE STEEL I-BEAM W150x13.5 (W6"x 8.5) POSTS WITH ROUTED WOOD, PLASTIC OR COMPOSITE OFFSET BRACKETS LISTED IN BULLETIN 15.
3. FOR INSTALLATION OF GUIDE RAIL OVER UNDERGROUND STRUCTURES, THE CONCRETE, REINFORCEMENT BARS AND HARDWARE ARE INCIDENTAL TO THE GUIDE RAIL PAY ITEM.
4. PROVIDE RUBBING RAIL WHEN THE HEIGHT OF STRONG POST GUIDE RAIL IS OVER 710 (28") IN TRANSITION AREAS TO EXISTING GUIDE RAIL.
5. ATTACH W-BEAM RAIL ELEMENTS TO EACH POST. SPLICE RAIL ELEMENTS ONLY AT POSTS AND LAP IN THE DIRECTION OF TRAFFIC.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.
7. INSTALL GUIDE RAIL DELINEATORS IN ACCORDANCE WITH TC-7604.
8. FOR STRONG POST MEDIAN BARRIER APPLICATIONS, THE INSTALLATION IS A MIRROR IMAGE ON EACH SIDE OF THE POST.
9. BURNING OF POSTS OR RAIL ELEMENT FOR HOLES IS NOT PERMITTED.

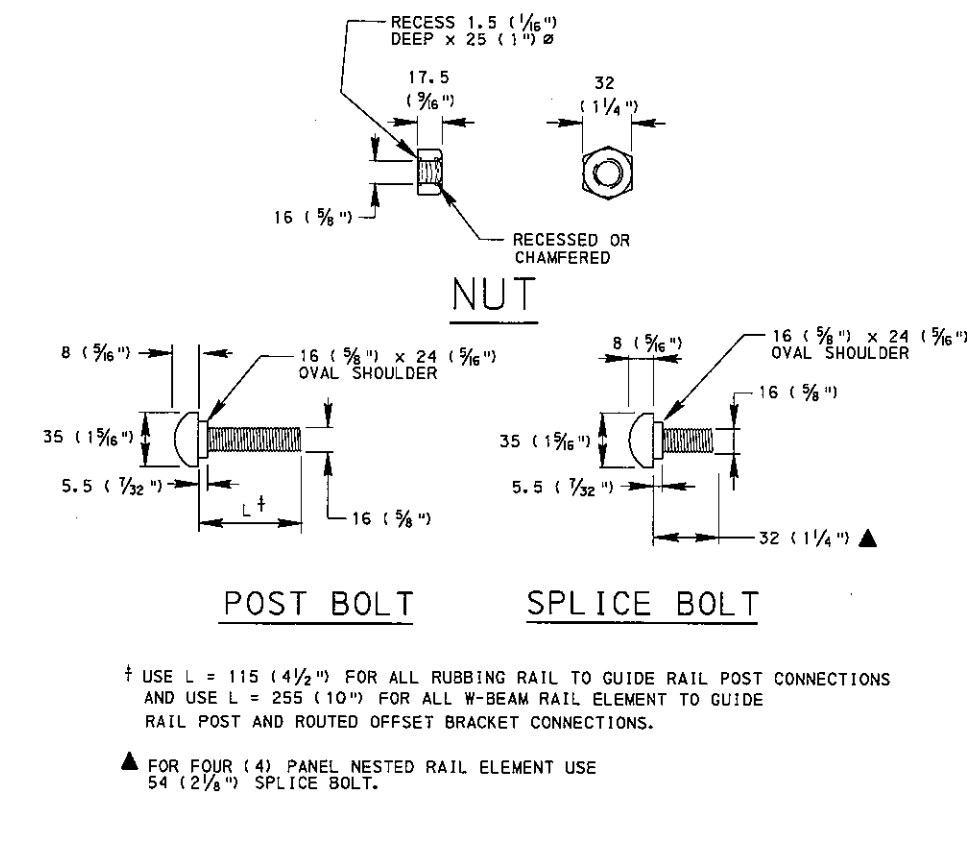
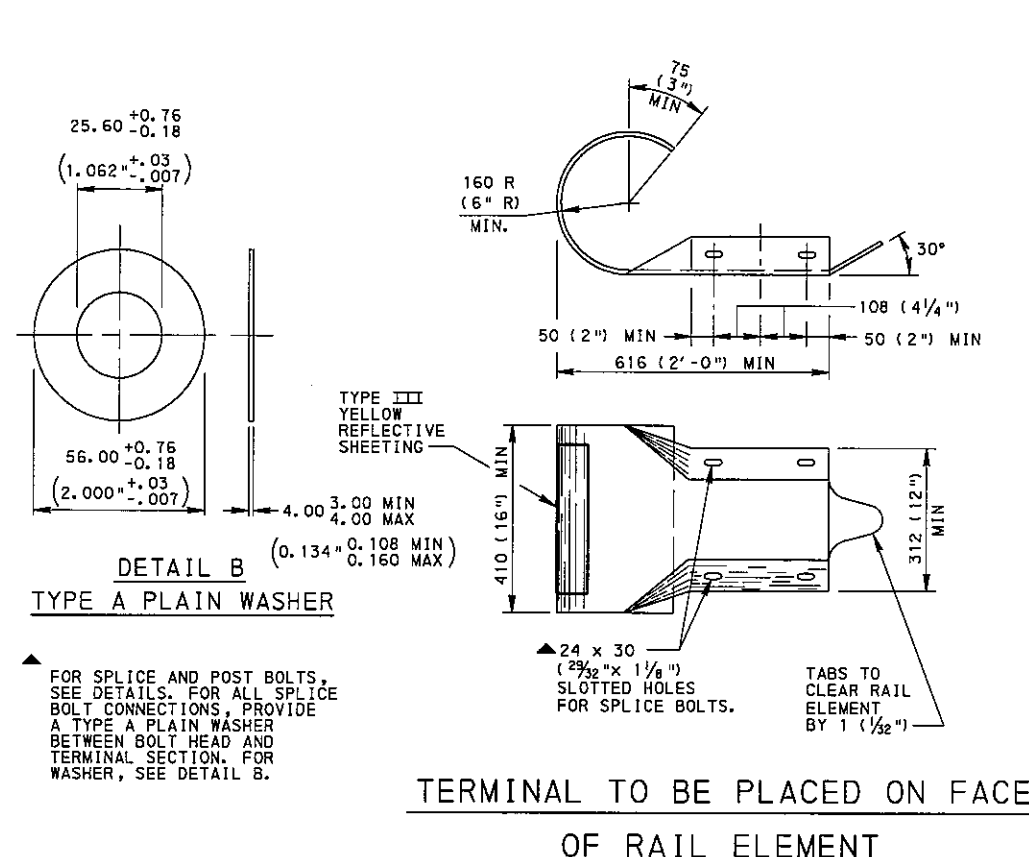
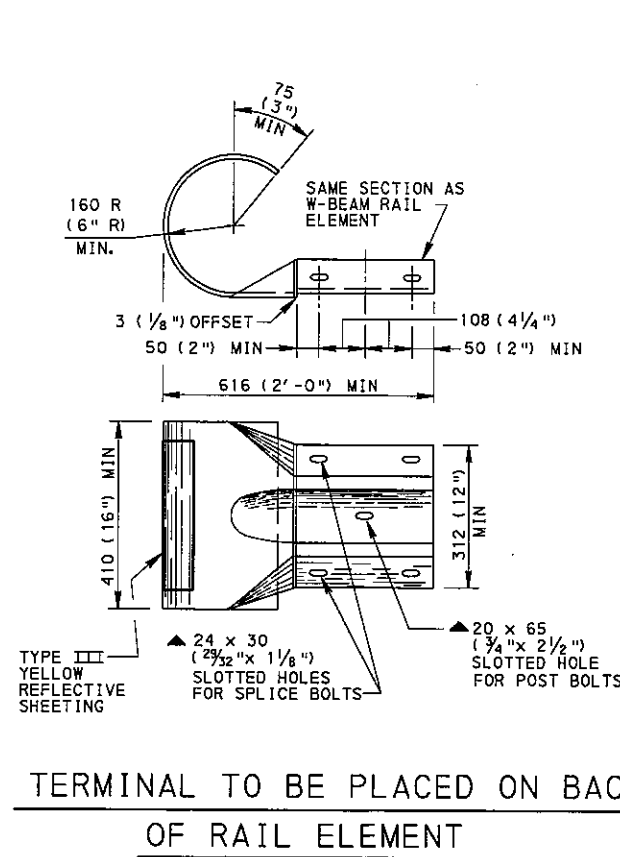
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

TYPE 2 STRONG POST  
GUIDE RAIL

RC-50M	GUIDE RAIL TRANSITION AT END OF STRUCTURE
BC-734M	STANDARD ANCHOR SYSTEMS
BC-739M	BRIDGE BARRIER TO GUIDE RAIL TRANSITION
REFERENCE DRAWINGS	

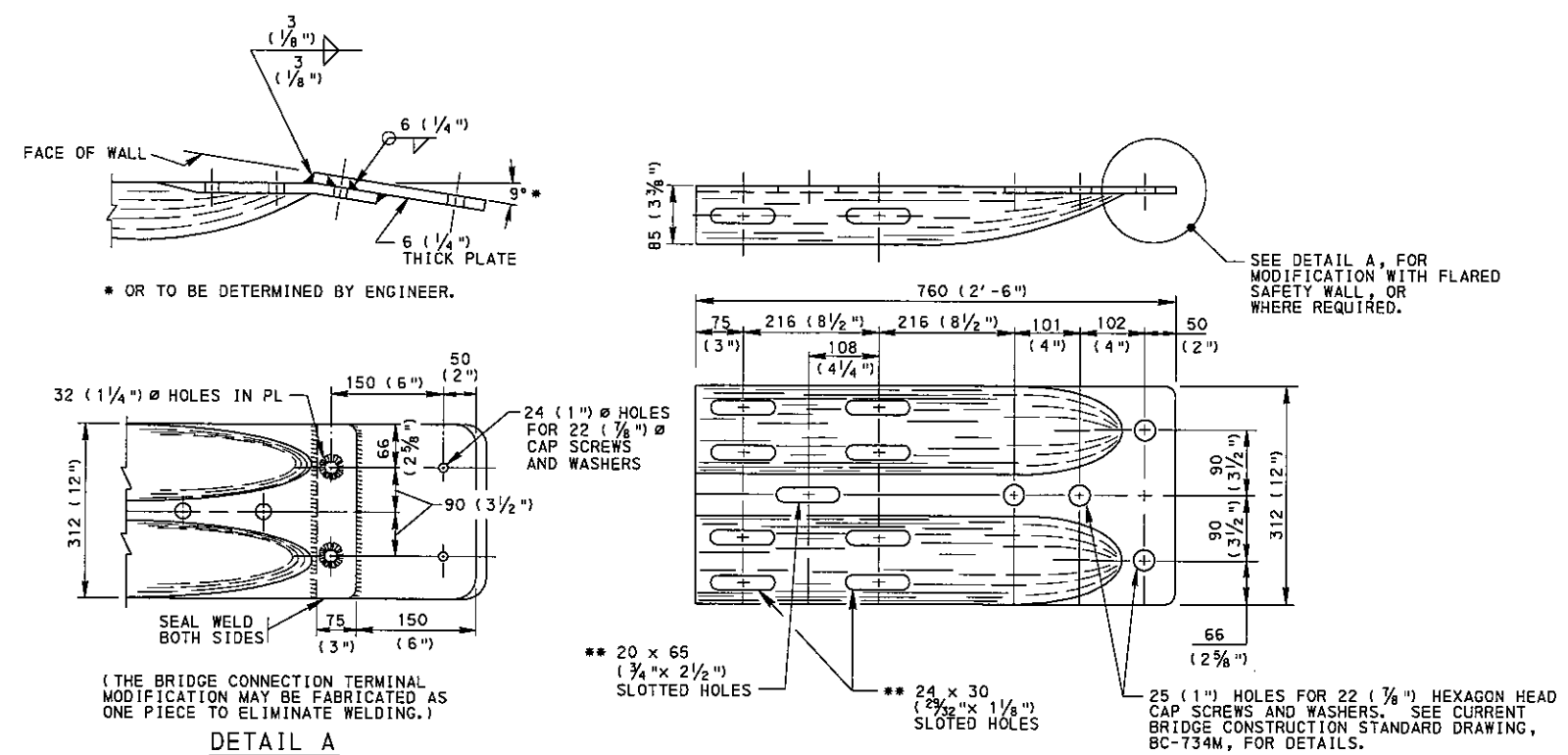
RECOMMENDED MAR. 30, 2006  
DIRECTOR, BUREAU OF DESIGN  
RECOMMENDED MAR. 30, 2006  
CHIEF ENGINEER  
SHT. 1 OF 8  
RC-52M



TERMINAL TO BE PLACED ON BACK OF RAIL ELEMENT

TERMINAL TO BE PLACED ON FACE OF RAIL ELEMENT

ALTERNATE TERMINAL SECTIONS



DETAIL A

\*\* PROVIDE SPLICE BOLTS WITH A LOCK NUT OR DOUBLE NUT AND TIGHTEN ONLY TO A POINT THAT ALLOWS GUIDE RAIL TO BE FREE TO MOVE. CENTER SPLICE BOLTS IN THE SLOTTED HOLES.

TERMINAL SECTION BRIDGE CONNECTION

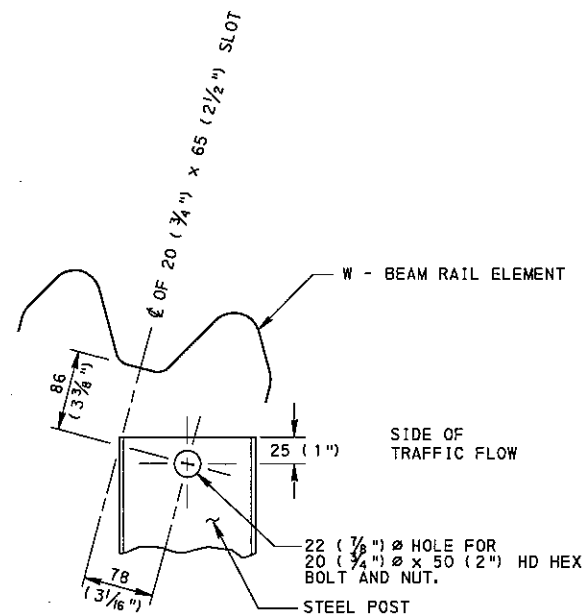
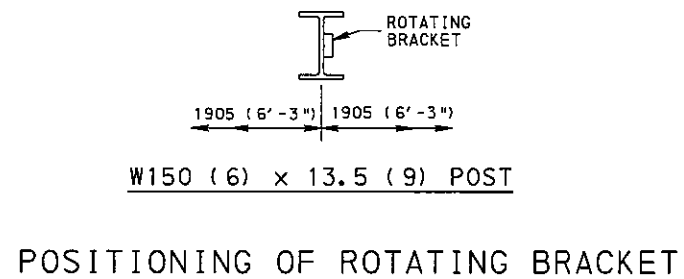
- NOTES
1. USE SPLICE BOLTS TO DEVELOP THE DESIGN STRENGTH OF THE RAIL ELEMENT.
  2. PROVIDE TERMINAL SECTION BRIDGE CONNECTION, WITH WELDED PLATE FOR SAFETY, AS AN INCIDENTAL ITEM.
  3. USE SLOTTED ROUND-HEADED BOLTS TO PROVIDE FOR WRENCH OR SCREWDRIVER.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

TYPE 2 STRONG POST  
GUIDE RAIL

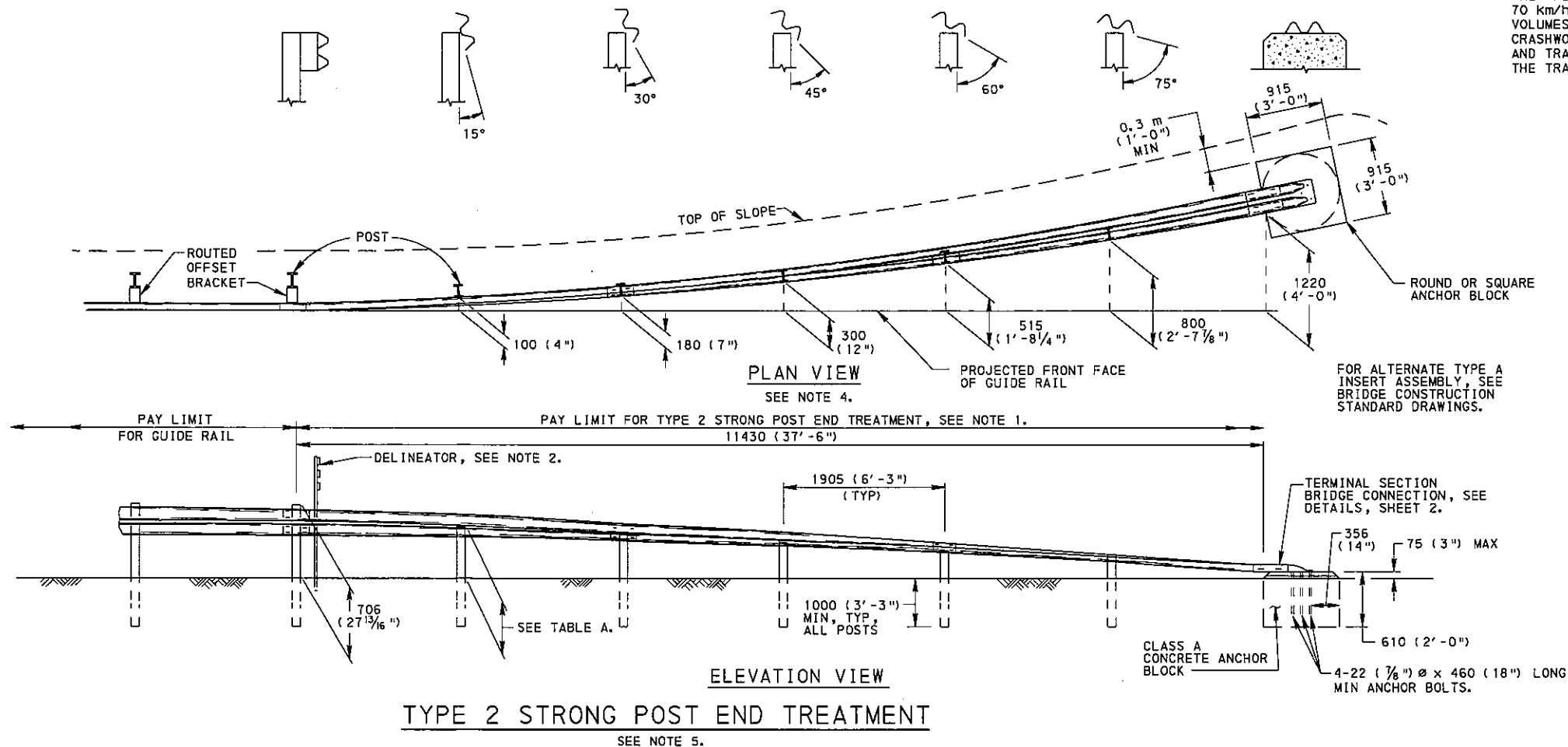
RECOMMENDED MAR. 30, 2006 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. L. Kotel</i> CHIEF ENGINEER	SHT. 2 OF 8 RC-52M
--	---	-----------------------



**TABLE A**

HEIGHT OF POST	430 (17")	370 (14 1/2")	300 (11 3/4")	215 (8 1/2")	115 (4 1/2")
ROTATION ANGLES	15°	30°	45°	60°	75°

- NOTES**
1. PAYMENT FOR TYPE 2 STRONG POST END TREATMENT INCLUDES 11430 (37'-6") OF SLOPING RAIL, TERMINAL SECTION, HARDWARE, EXCAVATION AND CONCRETE.
  2. INSTALL DELINEATOR ASSEMBLIES UNDER SEPARATE PAY ITEM OR CONTRACT. FOR ADDITIONAL DETAILS, SEE TRAFFIC STANDARD TC-7604.
  3. ONLY THE NECESSARY DIMENSIONS, FOR UNIFORMITY AND INTERCHANGEABILITY OF ROTATING BRACKETS, ARE INDICATED. PROVIDE ROTATING BRACKETS SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15.
  4. MEASURE OFFSETS FROM THE PROJECTED FRONT FACE OF THE GUIDE RAIL TO THE FRONT FACE OF THE POST.
  5. TYPE 2 STRONG POST END TREATMENTS CAN NOT BE USED TO TERMINATE THE APPROACH END OF a) ANY GUIDE RAIL ON THE NHS, or b) ANY GUIDE RAIL ON NON-NHS HIGH-SPEED, HIGH-VOLUME ROUTES. USE CRASHWORTHY END TREATMENTS ON ALL NHS ROUTES AND ON NON-NHS ROADWAYS WITH 70 km/h (45 mph) POSTED SPEED LIMIT & ABOVE AND WITH CURRENT TRAFFIC VOLUMES 4000 VEHICLES PER DAY & ABOVE. ON 2-LANE ROADWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, USE ON BOTH THE APPROACH AND TRAILING ENDS. TYPE 2 STRONG POST END TREATMENTS MAY BE USED ON THE TRAILING END OF GUIDE RAIL FOR HIGH SPEED NHS DIVIDED ROADWAYS.



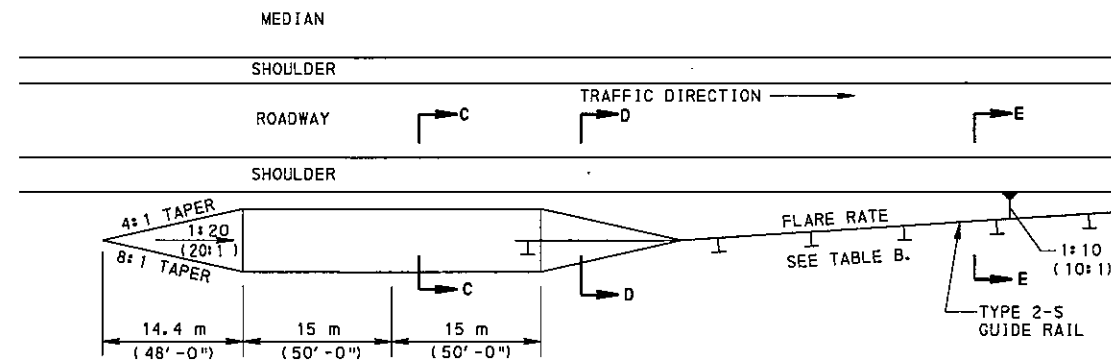
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN**

**TYPE 2 STRONG POST  
GUIDE RAIL  
END TREATMENTS**

TABLE B  
FLARE RATES  
FOR BARRIER DESIGN

DESIGN SPEED		MAXIMUM FLARE RATES	
km/h	mph	CONCRETE BARRIER	GUIDE RAIL
120	75	20 : 1	15 : 1
110	70	20 : 1	15 : 1
105	65	19 : 1	15 : 1
100	60	18 : 1	14 : 1
90	55	16 : 1	12 : 1
80	50	14 : 1	11 : 1
70	45	12 : 1	10 : 1
65	40	11 : 1	9 : 1
60	35	10 : 1	8 : 1
50	30	8 : 1	7 : 1

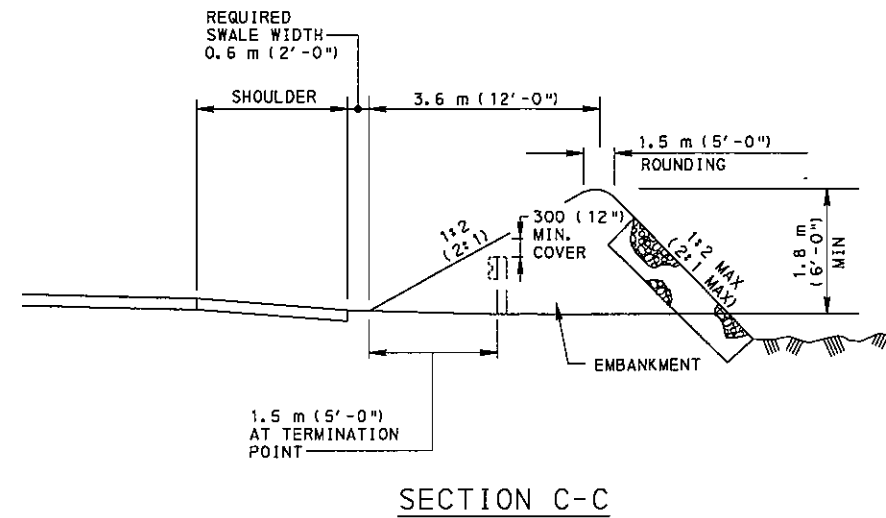


TYPICAL EARTH MOUND FOR BURYING GUIDE RAIL

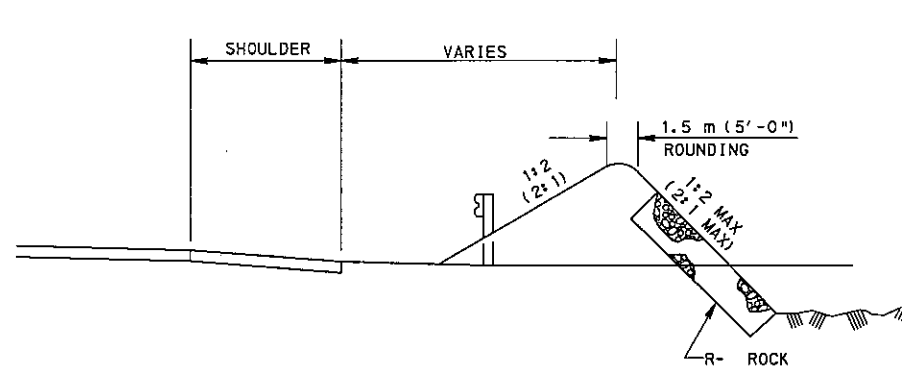
SEE NOTE 2.

NOTES

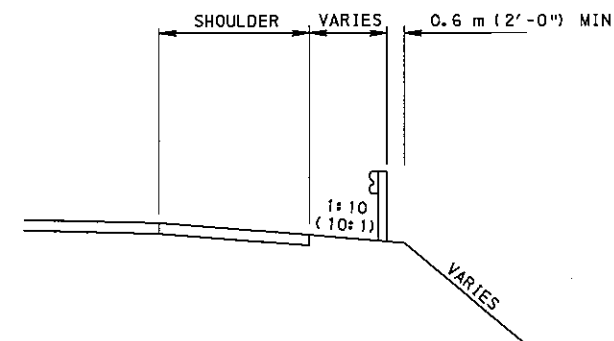
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408.
2. ALL MATERIAL NECESSARY TO CONSTRUCT EARTH MOUNDS ARE IN ACCORDANCE WITH APPLICABLE SECTIONS OF PUBLICATION 408.
3. EARTHMONDS MAY BE USED TO BURY GUIDE RAIL ON HIGHWAYS WITH POSTED SPEEDS LESS THAN 70 km/h (45 mph) AND WITH CURRENT TRAFFIC VOLUME LESS THAN 4000 VEHICLES PER DAY OR WHEN THEY ARE CONSTRUCTED OUTSIDE THE CLEAR ZONE AS DETERMINED IN PUB. 13M, DESIGN MANUAL PART 2, CHAPTER 12.



SECTION C-C



SECTION D-D



SECTION E-E

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

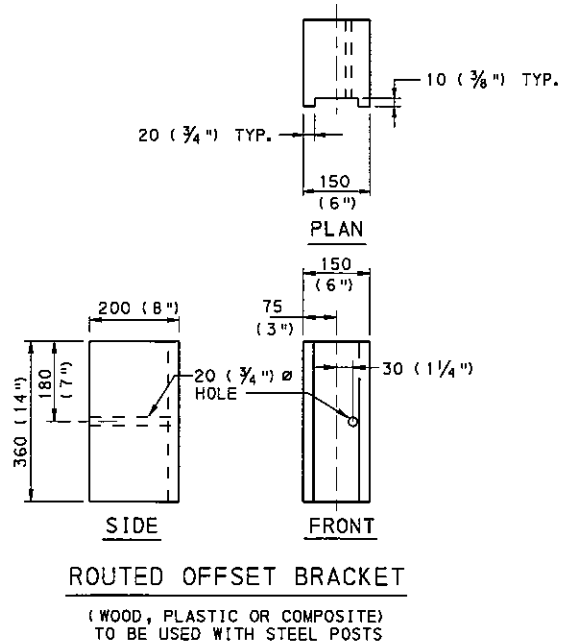
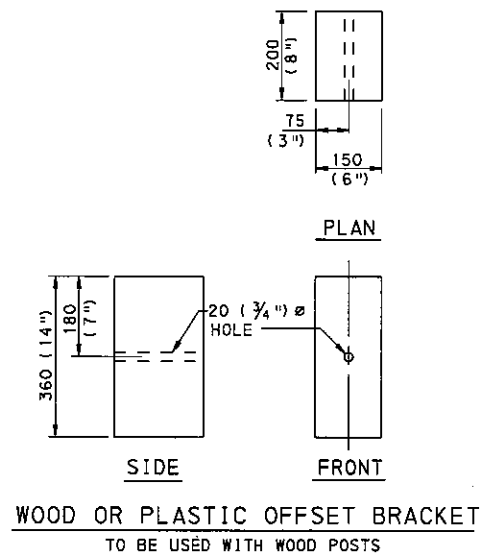
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

TYPE 2 STRONG POST  
GUIDE RAIL  
END TREATMENTS

RECOMMENDED MAR. 30, 2006  
*Scott Christy*  
DIRECTOR, BUREAU OF DESIGN

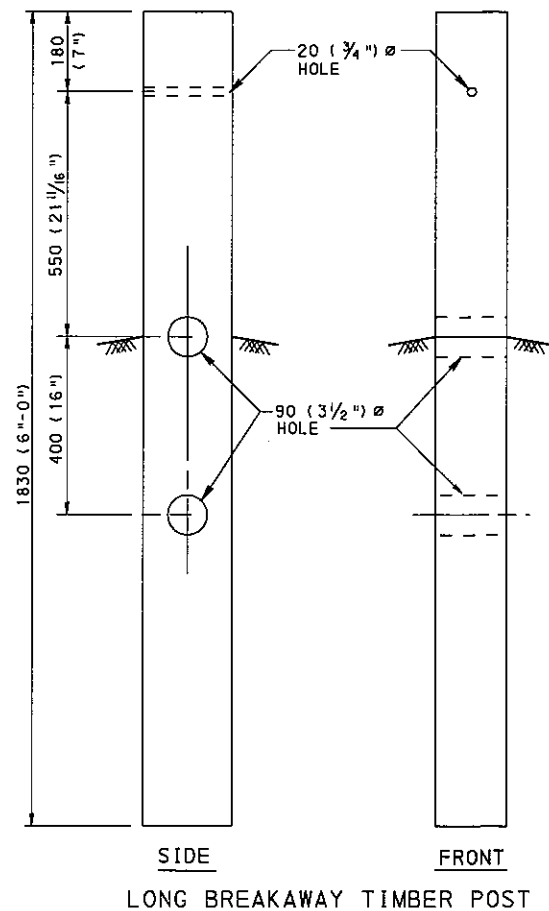
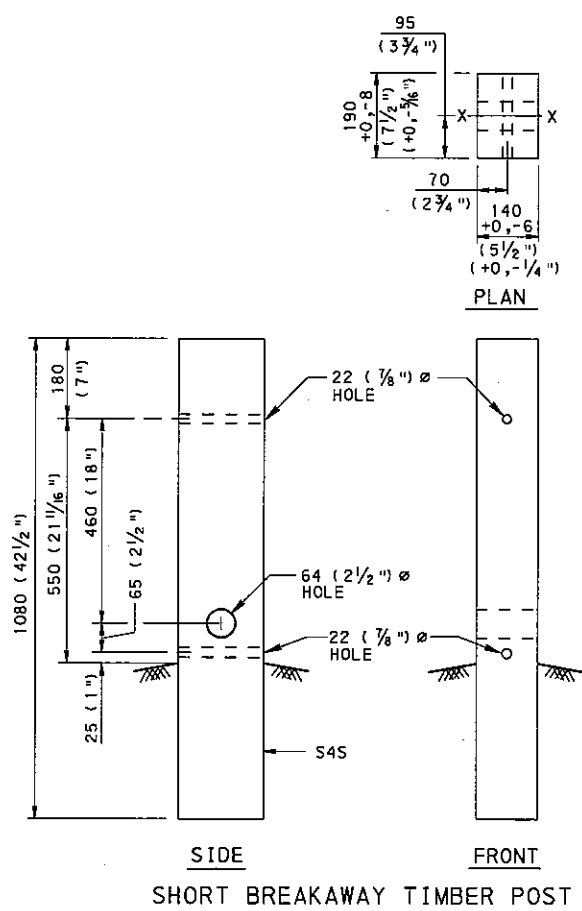
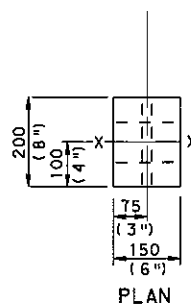
RECOMMENDED MAR. 30, 2006  
*M. Chitel*  
CHIEF ENGINEER

SHT. 4 OF 8  
RC-52M



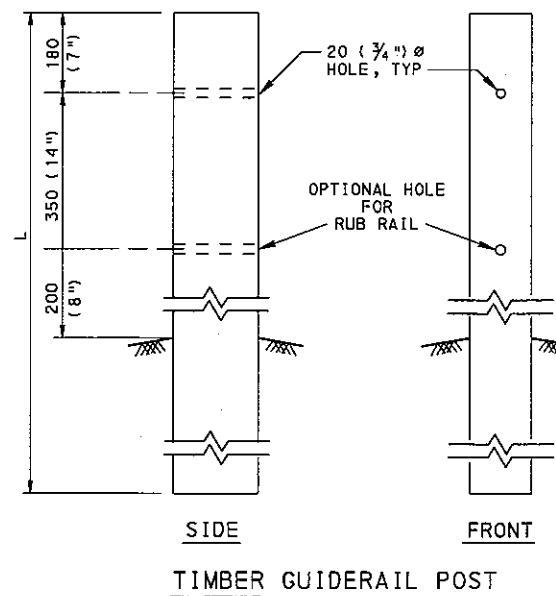
**NOTES**

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408.
2. WOOD POSTS ARE TO BE USED FOR END TREATMENTS AND SPECIAL CONDITIONS ON A CASE BY CASE BASIS. THEY ARE NOT TO BE USED AS ALTERNATES TO STEEL POSTS FOR GUIDE RAIL.



L	W	D
1625 (5'-4")	150 (6")	200 (8")
1830 (6'-0")	150 (6")	200 (8")
1980 (6'-6")	150 (6")	200 (8")
2060 (6'-9")	150 (6")	200 (8")

**PLAN**



NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

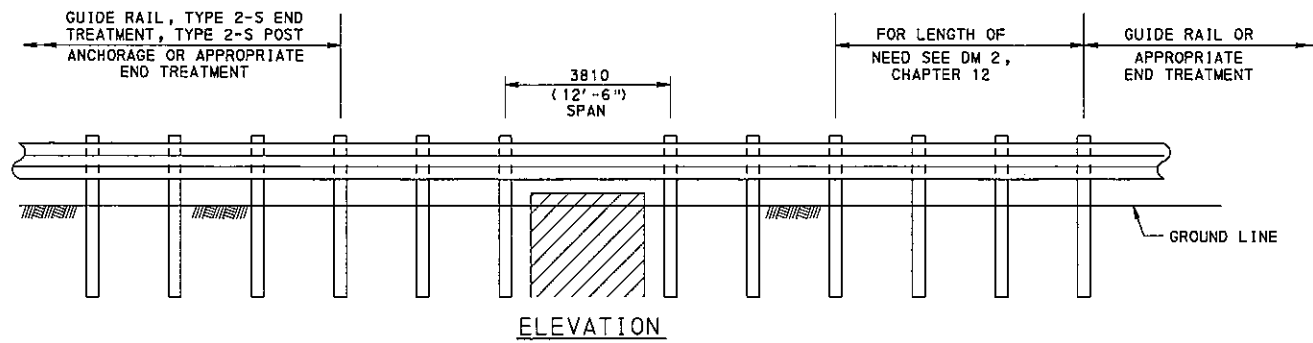
**TYPE 2 STRONG POST**  
**GUIDE RAIL**  
**POSTS AND OFFSET BRACKETS**

RECOMMENDED MAR. 30, 2006  
*Scott Christie*  
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006  
*M. Eitel*  
CHIEF ENGINEER

SHT. 5 OF 8  
RC-52M

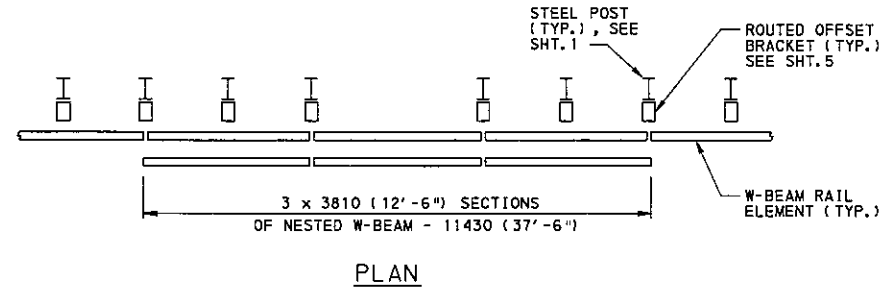




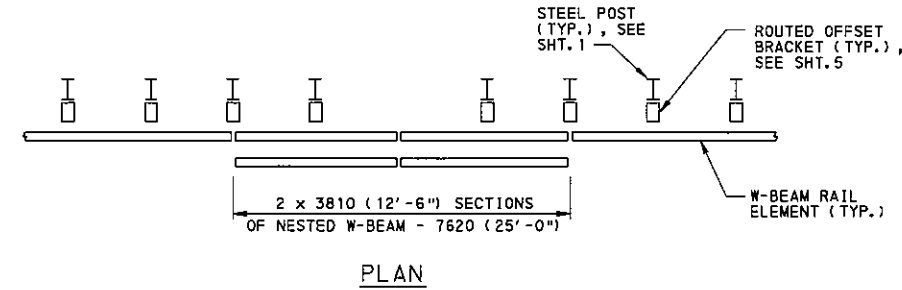
**3810 (12'-6") SPAN NESTED W-BEAM (TYPE 2-S) GUIDERAIL  
ACROSS LOW-FILL CULVERTS AND SMALL STRUCTURES**

**NOTES:**

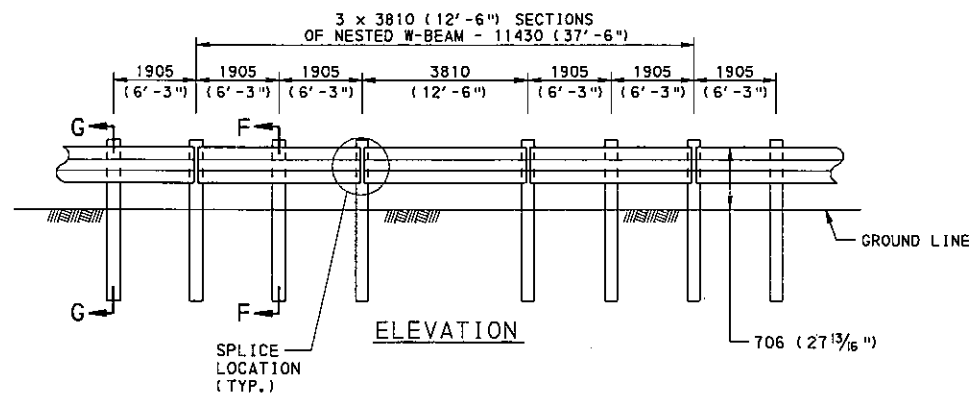
1. PLACE TOP W-BEAM RAIL ELEMENT IN NESTED SECTION SO THAT SPLICE LOCATIONS ARE ALIGNED.
2. CUTTING OF W-BEAM RAIL ELEMENT IS NOT PERMITTED.
3. FOR THE 3810 (12'-6") SPAN, A MINIMUM UNOBSTRUCTED DISTANCE OF 900 (3'-0") BEHIND THE REAR FACE OF THE GUIDE RAIL POST MUST BE CLEAR OF HAZARDS.
4. FOR NESTED RAIL ELEMENT SPLICES (FOUR PANELS THICK), USE 5/8 (2 1/8") SPLICE BOLT. FOR SPLICE BOLT DETAILS, SEE SHT. 2.
5. NESTED SECTIONS, INCLUDING ALL RAIL ELEMENT AND ANCILLARY HARDWARE, ARE PAID FOR AT THE CONTRACT UNIT PRICE PER LINEAR FOOT OF TYPE 2-S GUIDE RAIL.
6. PROVIDE A MINIMUM OF 60.9 m (200 FT.) OF STRONG POST GUIDE RAIL (1 SECTION OF W-BEAM RAIL ELEMENT) BETWEEN NESTED (2 SECTIONS OF W-BEAM RAIL ELEMENT) RUNS.



PLAN

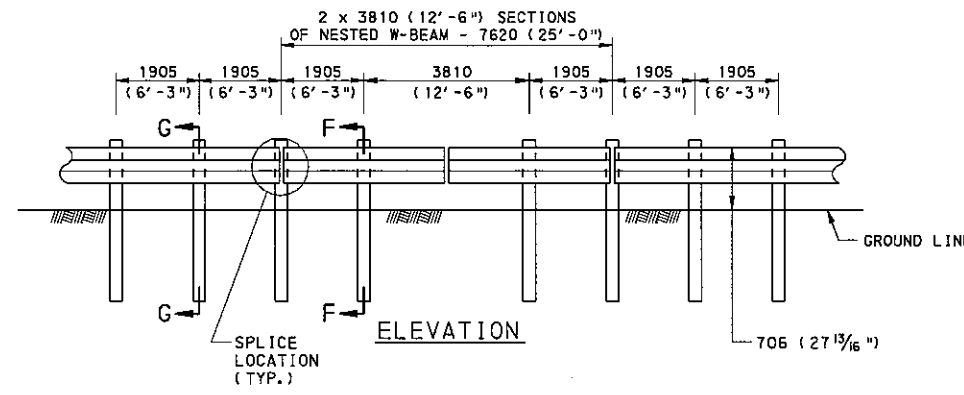


PLAN



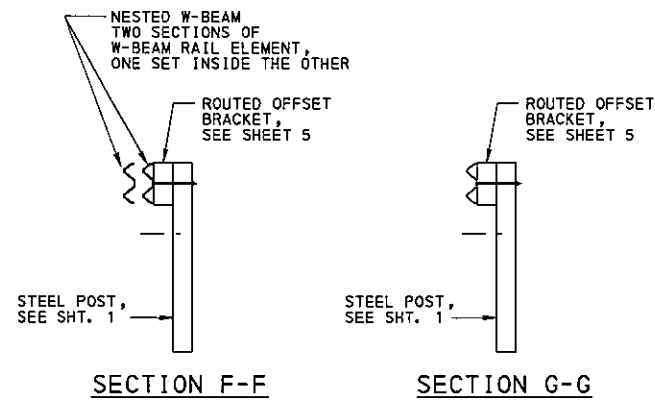
ELEVATION

**CASE 1  
3 NESTED PANELS**



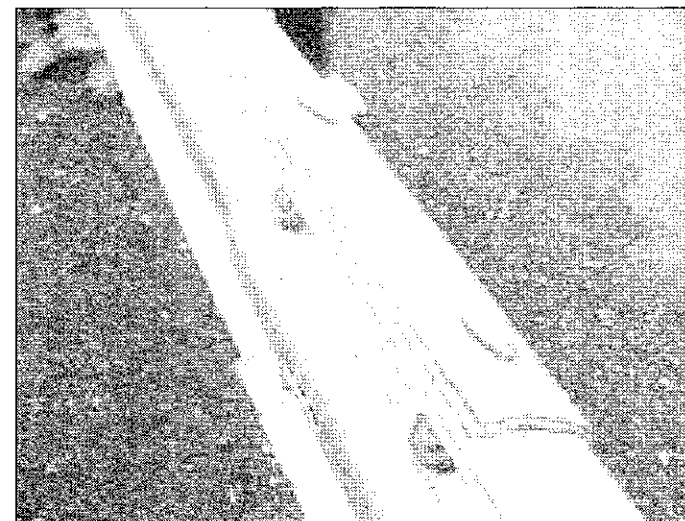
ELEVATION

**CASE 2  
2 NESTED PANELS**



SECTION F-F

SECTION G-G



**TYPICAL NESTED PANEL  
MID-SPAN SPLICE**

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

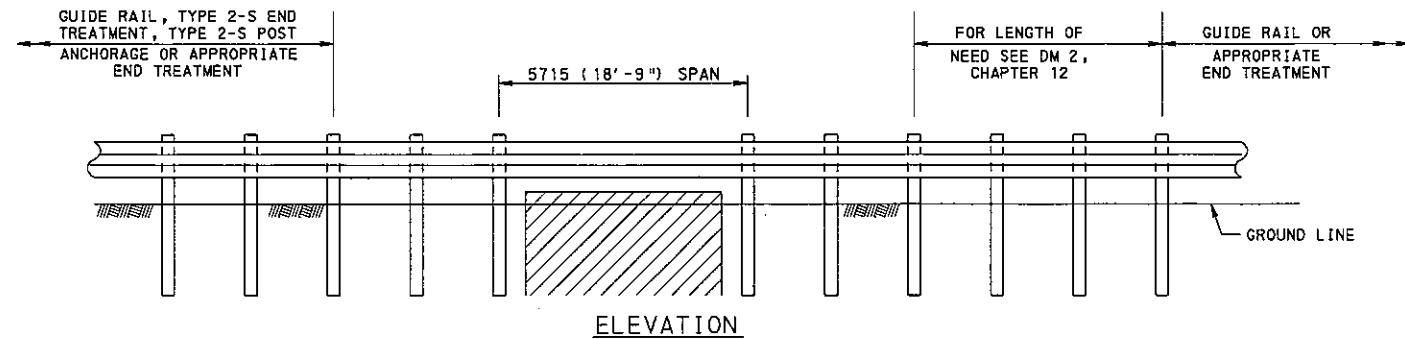
**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN**

**TYPE 2 STRONG POST  
GUIDERAIL  
ACROSS CULVERTS AND SMALL STRUCTURES  
3810 (12'-6") SPAN**

RECOMMENDED MAR. 30, 2006  
*Scott Christa*  
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006  
*M. Kotel*  
CHIEF ENGINEER

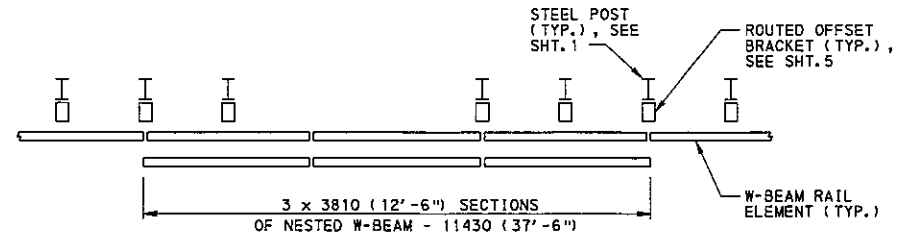
SHT. 6 OF 8  
**RC-52M**



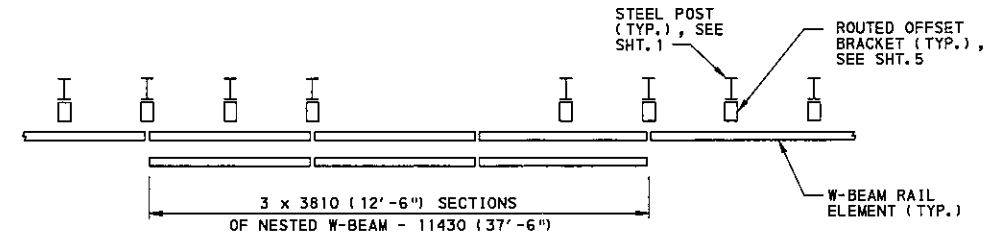
**5715 (18'-9") SPAN NESTED W-BEAM (TYPE 2-S) GUIDERAIL  
ACROSS LOW-FILL CULVERTS AND SMALL STRUCTURES**

**NOTES:**

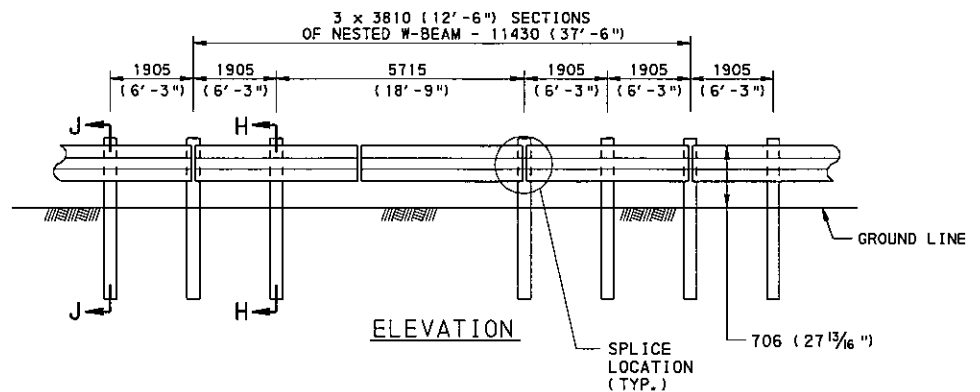
1. PLACE TOP W-BEAM RAIL ELEMENT IN NESTED SECTION SO THAT SPLICE LOCATIONS ARE ALIGNED.
2. CUTTING OF W-BEAM RAIL ELEMENT IS NOT PERMITTED.
3. FOR THE 5715 (18'-9") SPAN, A MINIMUM UNOBSTRUCTED DISTANCE OF 1050 (3'-6") BEHIND THE REAR FACE OF THE GUIDE RAIL POST MUST BE CLEAR OF HAZARDS.
4. FOR NESTED RAIL ELEMENT SPLICES (FOUR PANELS THICK), USE 5/8 (2 1/8") SPLICE BOLT. FOR SPLICE BOLT DETAILS, SEE SHT. 2.
5. NESTED SECTIONS, INCLUDING ALL RAIL ELEMENT AND ANCILLARY HARDWARE, ARE PAID FOR AT THE CONTRACT UNIT PRICE PER LINEAR FOOT OF TYPE 2-S GUIDE RAIL.
6. PROVIDE A MINIMUM OF 60.9 m (200 FT.) OF STRONG POST GUIDE RAIL (1 SECTION OF W-BEAM RAIL ELEMENT) BETWEEN NESTED (2 SECTIONS OF W-BEAM RAIL ELEMENT) RUNS.



**PLAN**



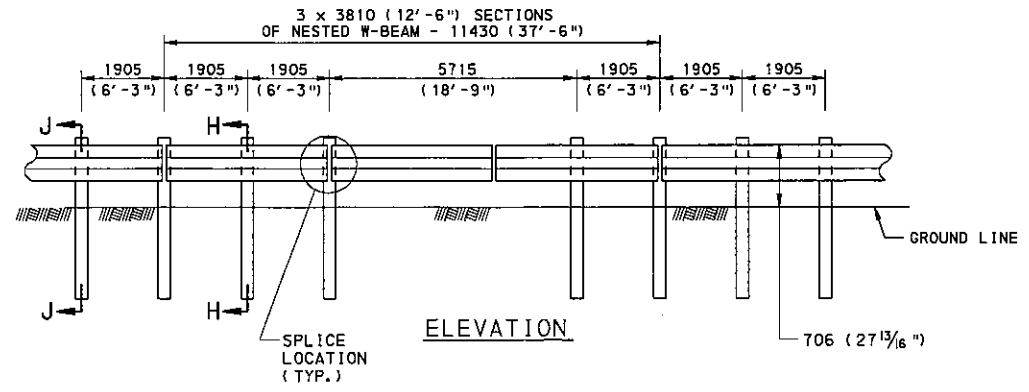
**PLAN**



**ELEVATION**

**CASE 1**

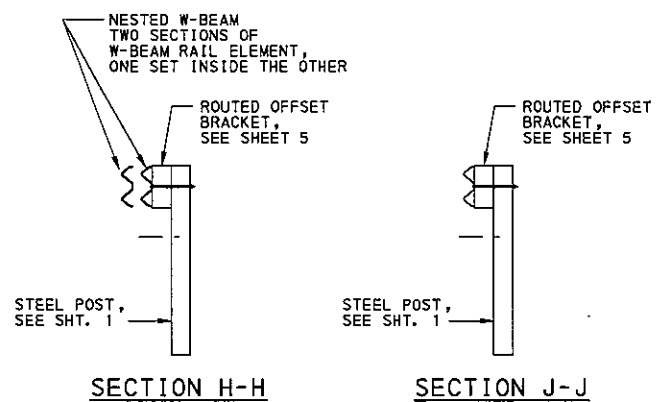
**SPLICE LOCATIONS**



**ELEVATION**

**CASE 2**

**SPLICE LOCATIONS**



**SECTION H-H**

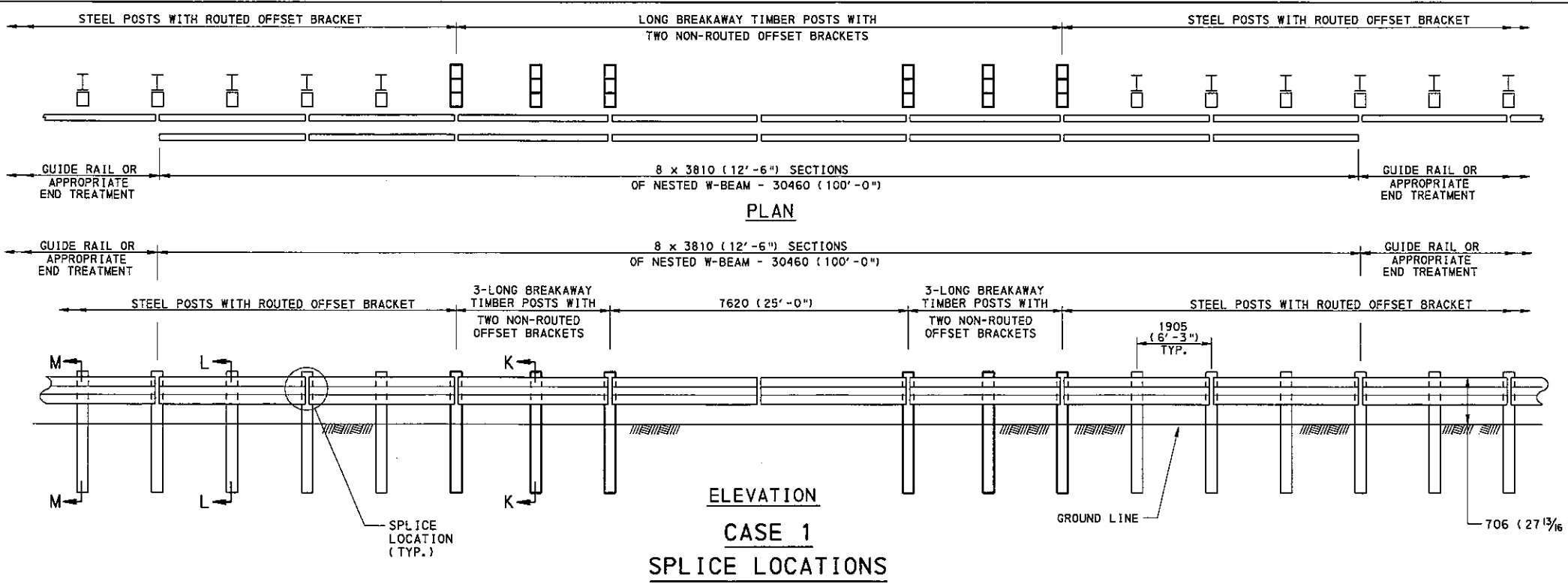
**SECTION J-J**

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

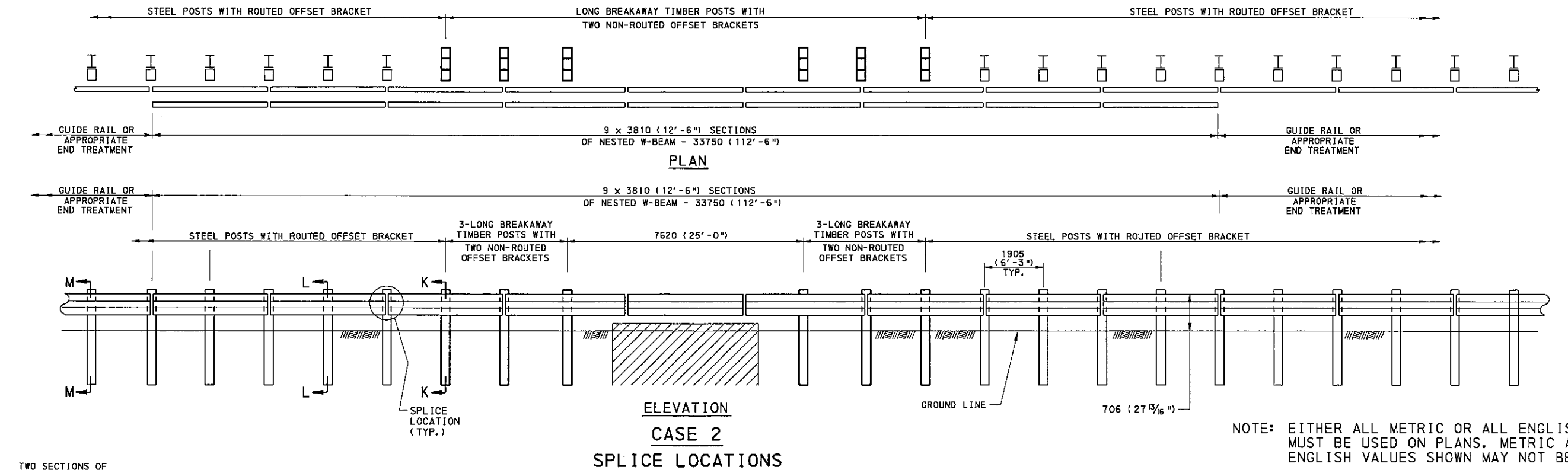
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

**TYPE 2 STRONG POST**  
**GUIDE RAIL**  
**ACROSS CULVERTS AND SMALL STRUCTURES**  
**5715 (18'-9") SPAN**

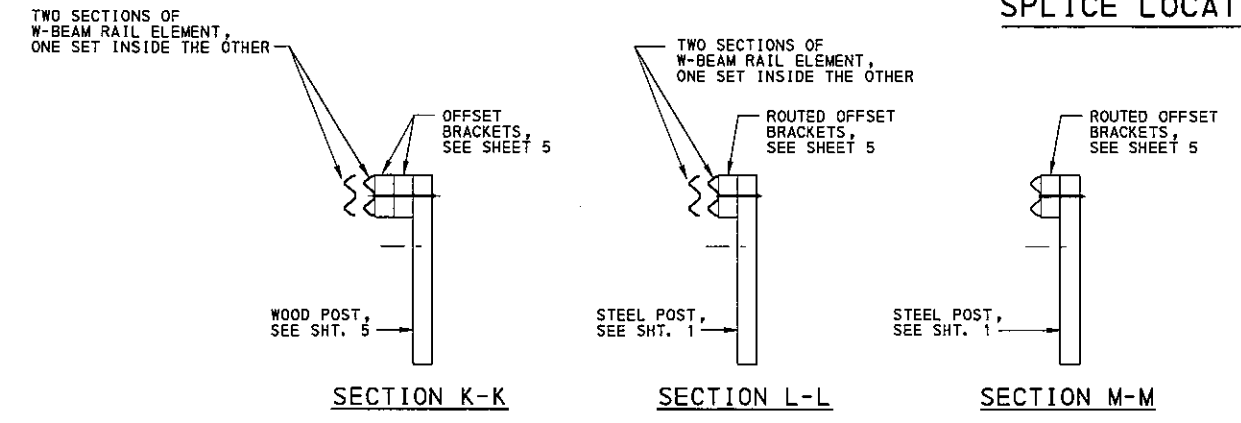
RECOMMENDED MAR. 30, 2006 <i>Scott Christen</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Chitel</i> CHIEF ENGINEER	SHT. 7 OF 8 <b>RC-52M</b>
--	---	------------------------------



- NOTES:**
1. PLACE TOP W-BEAM RAIL ELEMENT IN NESTED SECTION SO THAT SPLICE LOCATIONS ARE ALIGNED.
  2. CUTTING OF W-BEAM RAIL ELEMENT IS NOT PERMITTED.
  3. FOR THE 7620 (25'-0") SPAN, A MINIMUM UNOBSTRUCTED DISTANCE OF 1500 (5'-0") BEHIND THE REAR FACE OF THE GUIDE RAIL POST MUST BE CLEAR OF HAZARDS.
  4. FOR NESTED RAIL ELEMENT SPLICES (FOUR PANELS THICK), USE 54 (2 1/8") SPLICE BOLT. FOR SPLICE BOLT DETAILS, SEE SHT. 2.
  5. NESTED SECTIONS, INCLUDING ALL RAIL ELEMENT AND ANCILLARY HARDWARE, ARE PAID FOR AT THE CONTRACT UNIT PRICE PER LINEAR FOOT OF TYPE 2-S GUIDE RAIL.
  6. PROVIDE A MINIMUM OF 60.9 m (200 FT.) OF STRONG POST GUIDE RAIL (1 SECTION OF W-BEAM RAIL ELEMENT) BETWEEN NESTED (2 SECTIONS OF W-BEAM RAIL ELEMENT) RUNS.
  7. ONE 7620 (25'-0") W-BEAM PANEL SECTION IS AN EQUIVALENT FOR TWO 3810 (12'-6") W-BEAM PANEL SECTIONS.



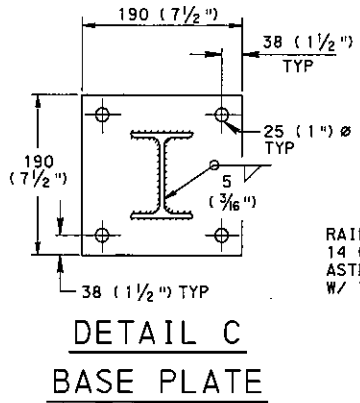
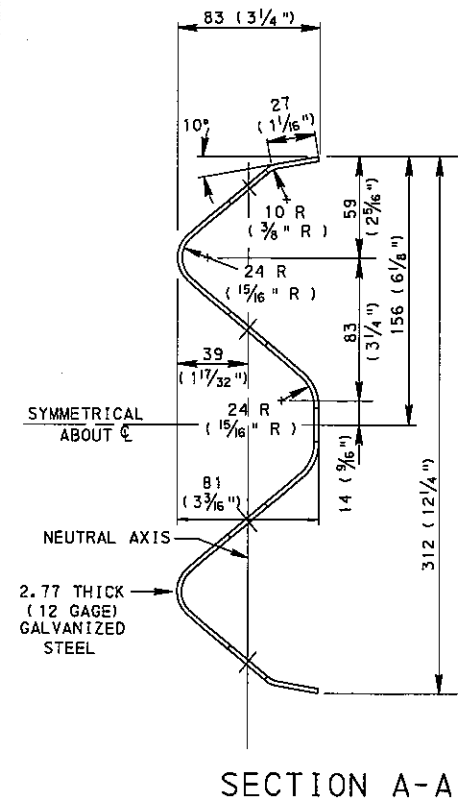
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



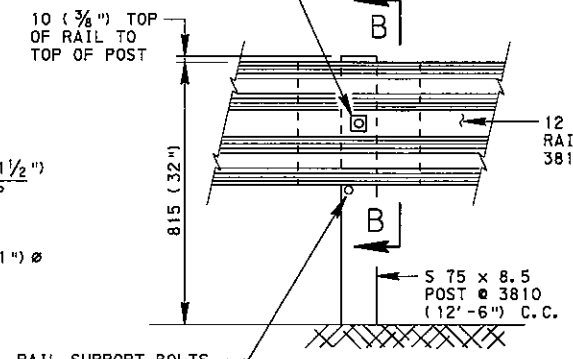
**COMMONWEALTH OF PENNSYLVANIA**  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

**TYPE 2 STRONG POST**  
GUIDE RAIL  
ACROSS CULVERTS AND SMALL STRUCTURES  
7620 (25'-0") SPAN

RECOMMENDED MAR. 30, 2006 <i>Scott Christe</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. L. Kotel</i> CHIEF ENGINEER	SHT. <u>8</u> OF <u>8</u> <b>RC-52M</b>
---	---	--

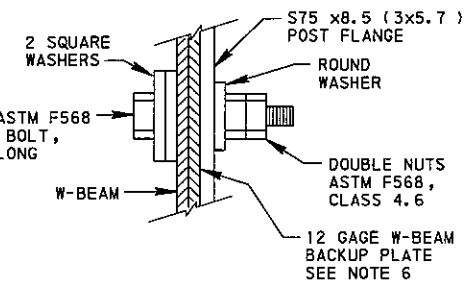


8 (5/16") Ø POST BOLT AND NUT, ASTM F 568, CLASS 4.6. 60 (2 3/8") LONG FULLY THREADED DOUBLE NUTS, TWO SQ. WASHERS AND ONE ROUND WASHER. NUTS SHALL BE PUT ON FINGER TIGHT. ENGAGE TOP AND BOTTOM EDGES OF BACKUP PLATE WITH THE POST AND THEN TIGHTENED AT LEAST ONE FULL TURN WITH A WRENCH, THEN SECURE WITH SECOND NUT.



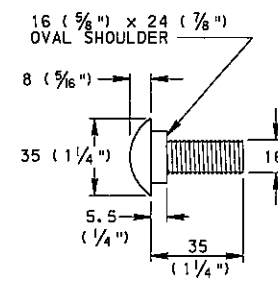
RAIL SUPPORT BOLTS  
14 (1/2") Ø x 40 (1 1/2") LONG  
ASTM F 568, CLASS 4.6 BOLT  
W/ TWO ASTM A563M HEX NUTS

ELEVATION



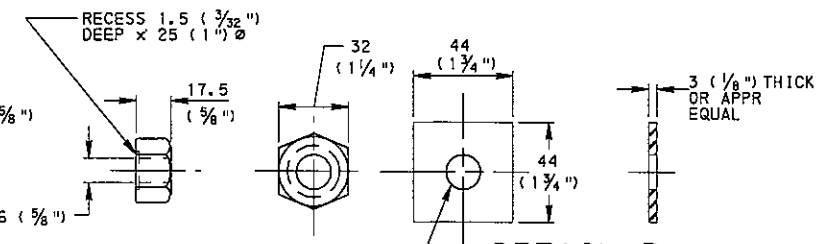
SECTION B-B

TYPICAL INSTALLATION

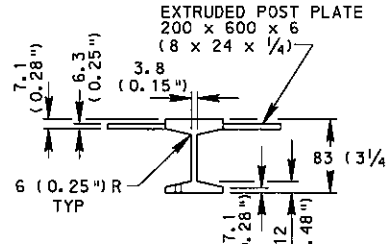


SPlice Bolt

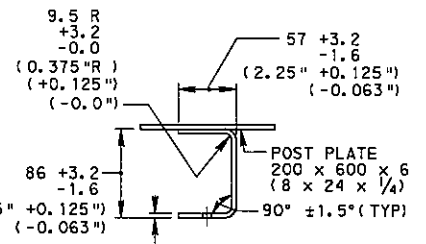
DETAIL A



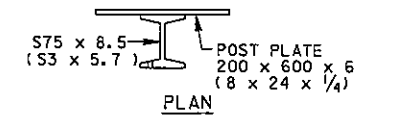
DETAIL B  
SQUARE WASHER



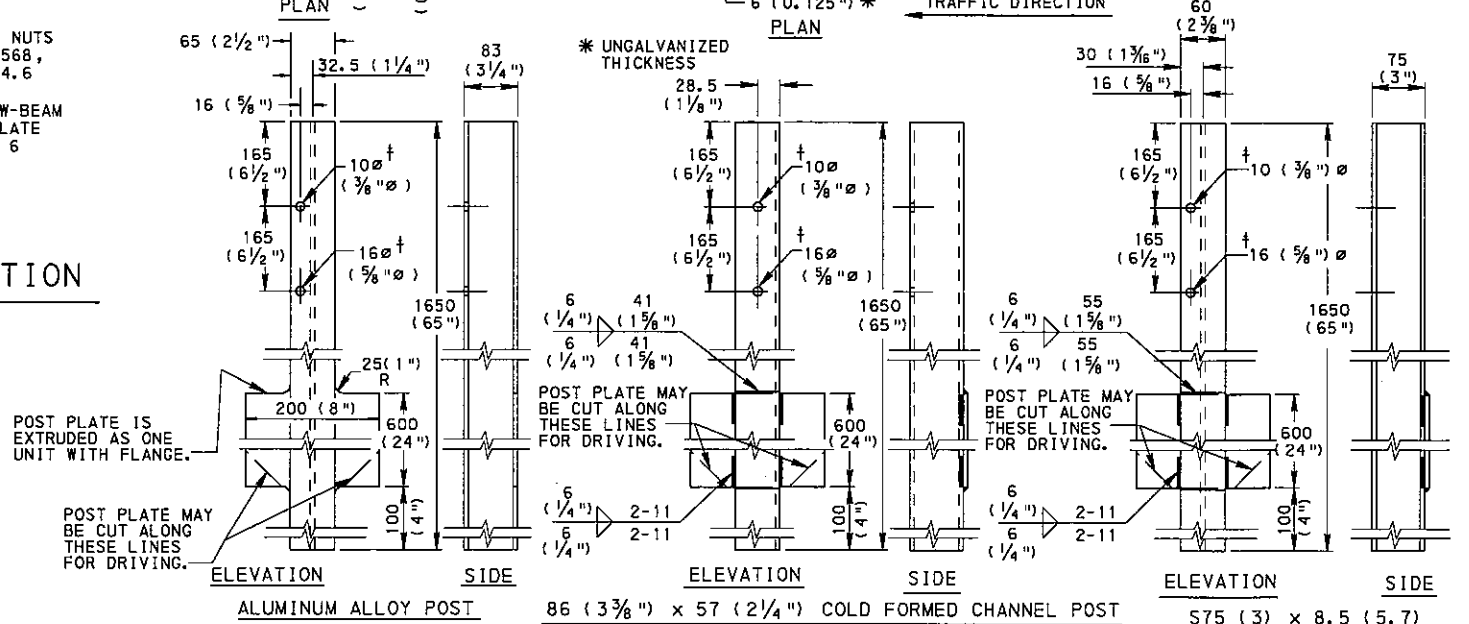
PLAN



PLAN



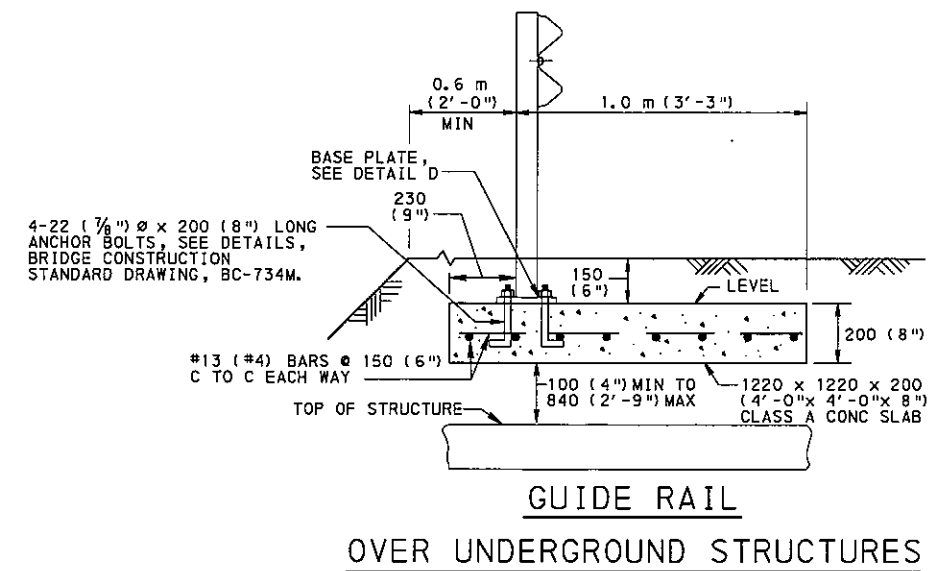
PLAN



TYPE 2-W GUIDE RAIL POSTS

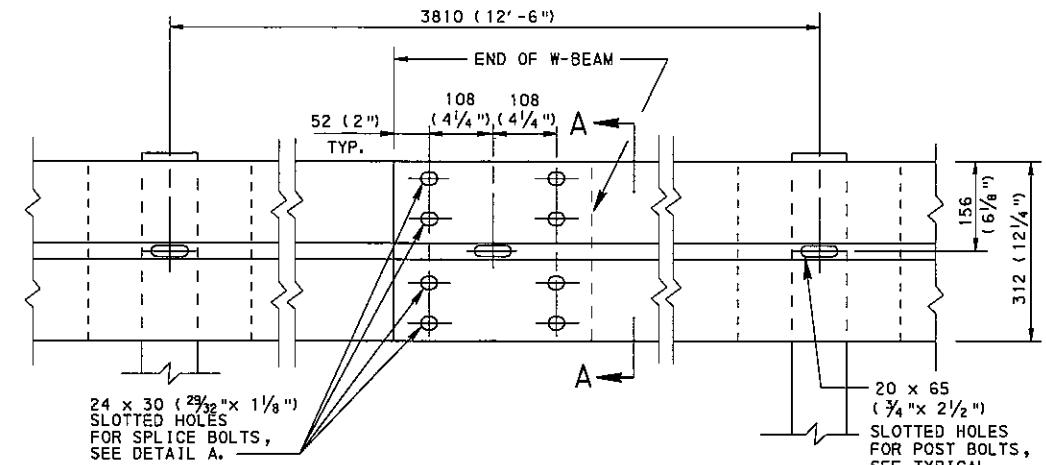
† CONFORM POST DETAILS FOR TYPE 2-WM MEDIUM BARRIER TO THE DETAILS AS SHOWN, EXCEPT LOCATE THE POST BOLT AND SUPPORT BOLT HOLES ON THE FRONT AND REAR FLANGES.

- NOTES**
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 620.
  2. THE 86x57 (3 3/8" x 2 1/4") COLD FORMED CHANNEL POST, S75x8.5 (3x5.7) POST AND ALUMINUM ALLOY POST MAY BE BID AS ALTERNATES FOR TYPE 2 WEAK POST GUIDE RAIL SYSTEM; HOWEVER, MIXING OF DIFFERENT POSTS IS NOT ACCEPTABLE WITHIN A PROJECT.
  3. DURING ERECTION, USE SUPPORT BOLTS TO SUPPORT THE RAIL ELEMENT UNTIL THE 8 (5/16") Ø POST BOLTS ARE PROPERLY TORQUED, LEAVE SUPPORT BOLTS IN PLACE AFTER CONSTRUCTION.
  4. ATTACH W-BEAM RAIL ELEMENT TO EACH POST. SPLICE ONLY AT MID-SPAN AND LAP IN THE DIRECTION OF TRAFFIC. TO ACHIEVE A MID-SPAN SPLICE, THE PREFERRED METHOD IS TO OVERLAP HALF RAIL ELEMENT INSIDE THE OTHER AT THE BEGINNING OF A GUIDE RAIL RUN.
  5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESES.
  6. USE 12" BACKING PLATES FOR THE W-BEAM RAIL ELEMENTS AT ALL POSTS WITH THE SAME SECTION AS THE W-BEAM RAIL ELEMENT.



GUIDE RAIL OVER UNDERGROUND STRUCTURES

MAKE NO SEPARATE PAYMENT FOR INSTALLATION OF GUIDE RAIL OVER UNDERGROUND STRUCTURES. CONSIDER CONCRETE, REINFORCEMENT BARS AND HARDWARE INCIDENTAL TO THE GUIDE RAIL PAY ITEM.



W-BEAM RAIL ELEMENT AT MID-SPAN SPLICE

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

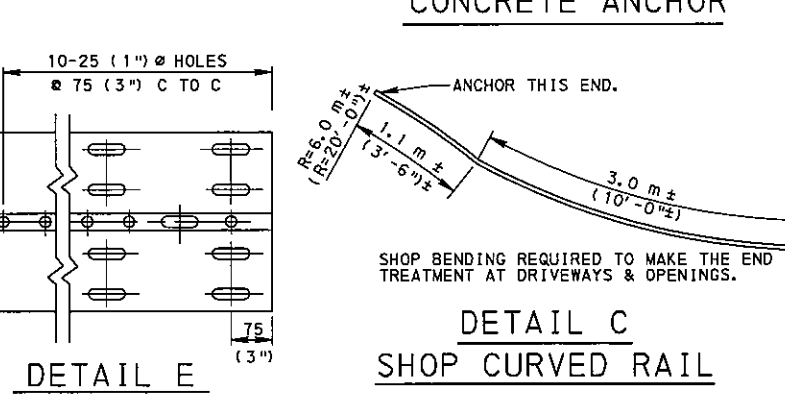
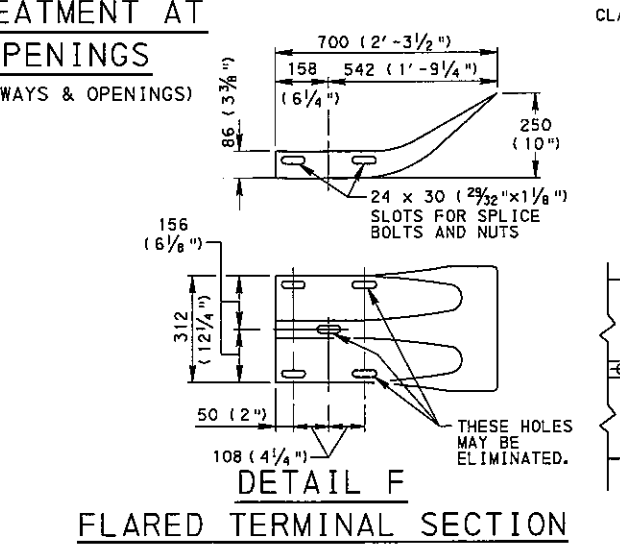
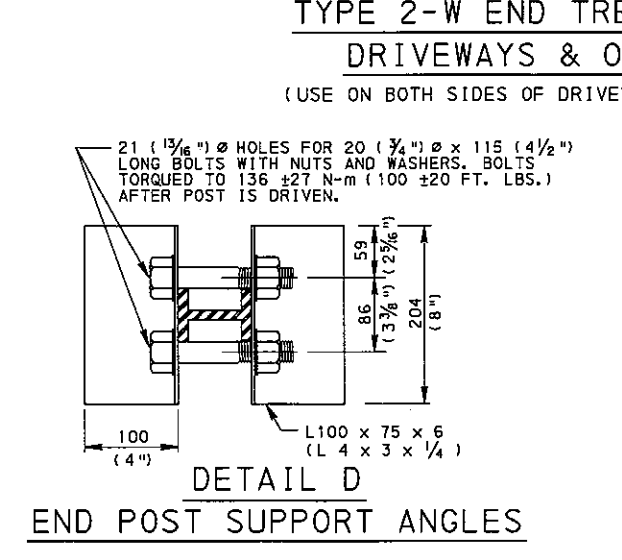
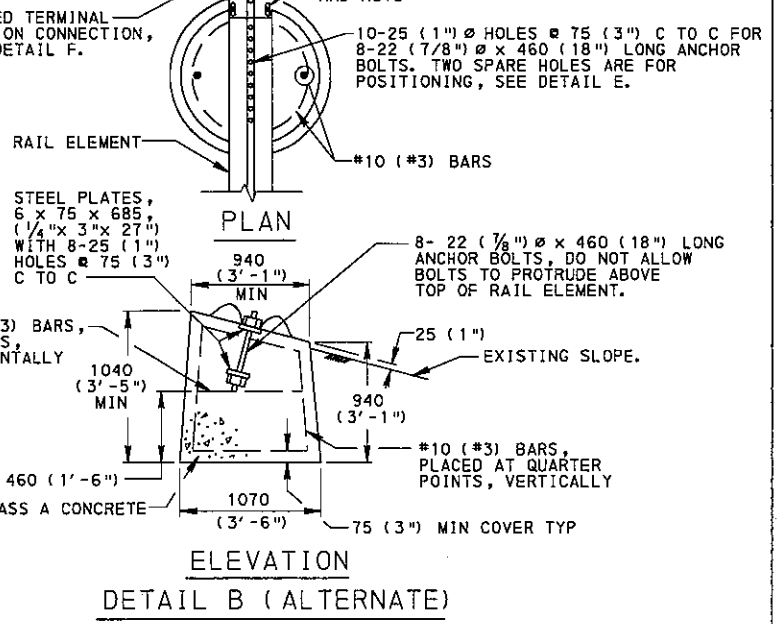
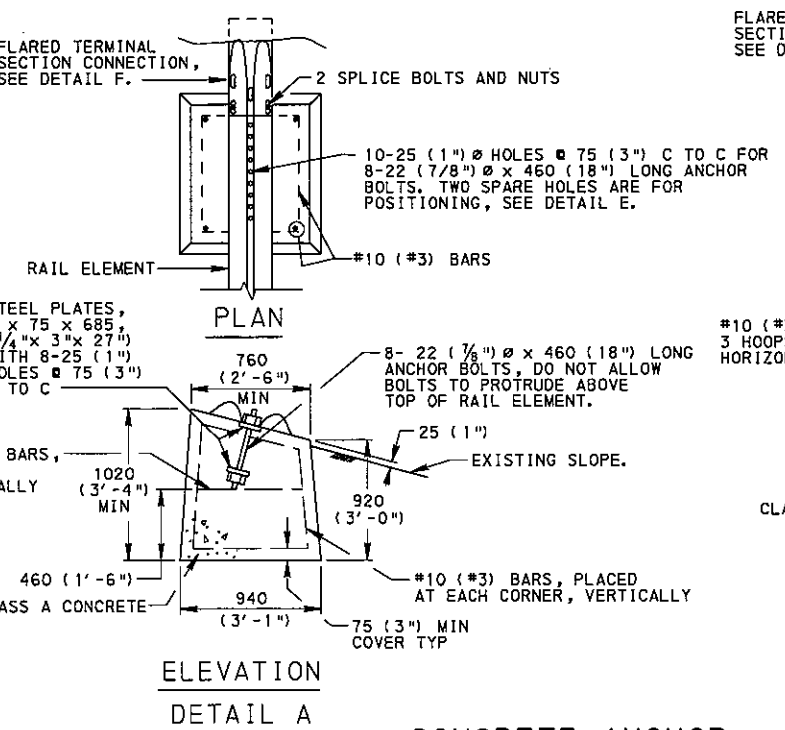
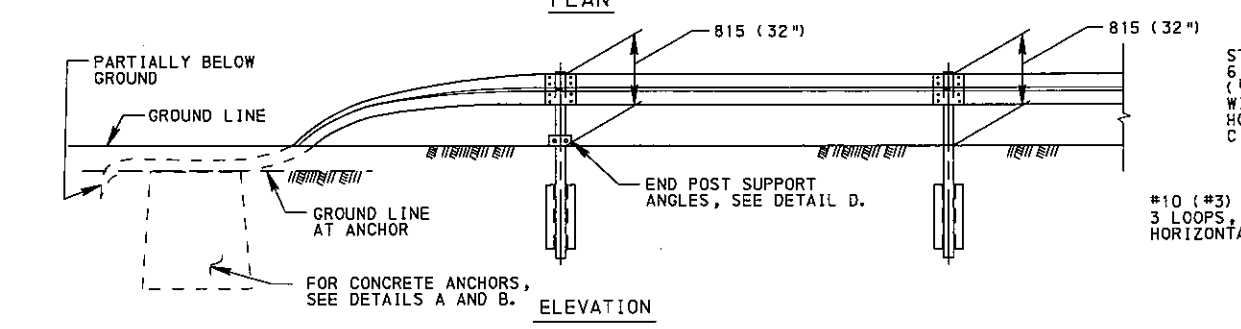
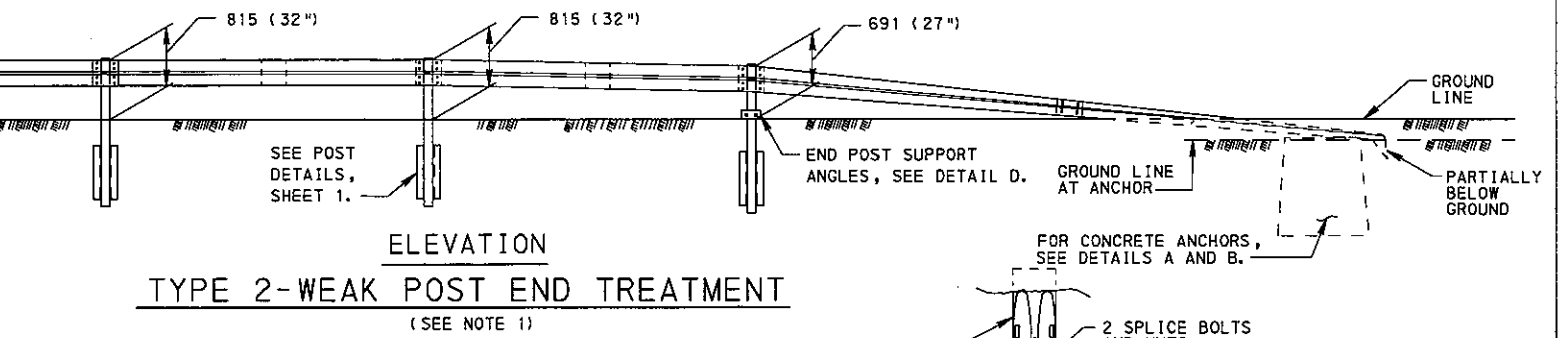
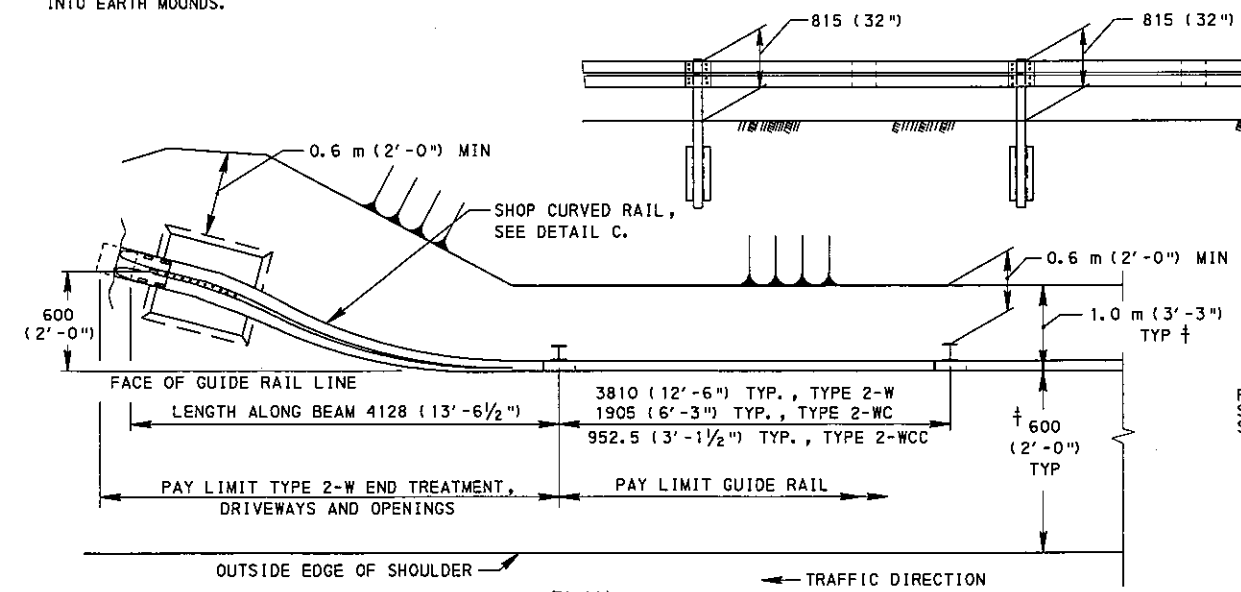
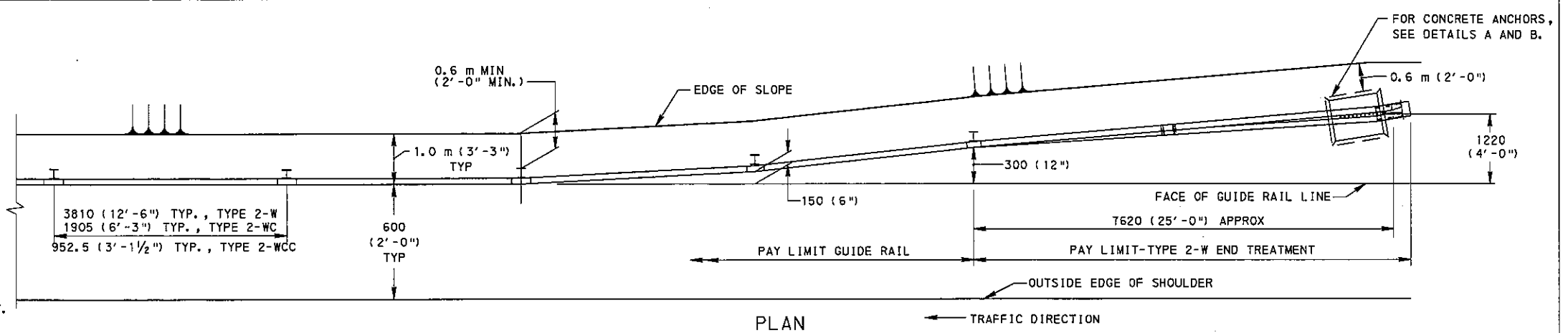
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

**TYPE 2 WEAK POST GUIDE RAIL**

RECOMMENDED MAR. 30, 2006 <i>Scott Christen</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Chitel</i> CHIEF ENGINEER	SHT 1 OF 2 RC-53M
--	---	----------------------

**NOTES**

- TYPE 2 WEAK POST END TREATMENTS CAN NOT BE USED TO TERMINATE THE APPROACH END OF a) ANY GUIDE RAIL ON THE NHS, or b) ANY GUIDE RAIL ON NON-NHS HIGH-SPEED, HIGH-VOLUME ROUTES. USE CRASHWORTHY END TREATMENTS ON ALL NHS ROUTES AND ON NON-NHS HIGH-SPEED, HIGH-VOLUME ROADWAYS WITH 70 km/h (45 mph) POSTED SPEED LIMIT & ABOVE AND WITH CURRENT TRAFFIC VOLUMES 4000 VEHICLES PER DAY & ABOVE. ON 2-LANE ROADWAYS WHERE CRASHWORTHY END TREATMENTS ARE REQUIRED, USE ON BOTH THE APPROACH AND TRAILING ENDS. IF CRASHWORTHY END TREATMENTS ARE REQUIRED, WEAK POST GUIDERAIL MUST BE TRANSITIONED WITH A 15.2 m (50'-0") TYPE 2S GUIDERAIL SECTION TO ANCHOR THE 2-W GUIDERAIL PRIOR TO THE ATTACHMENT OF A CRASHWORTHY END TREATMENT.
- SEE RC-52M, FOR END TREATMENTS BURIED INTO EARTH MOUNDS.



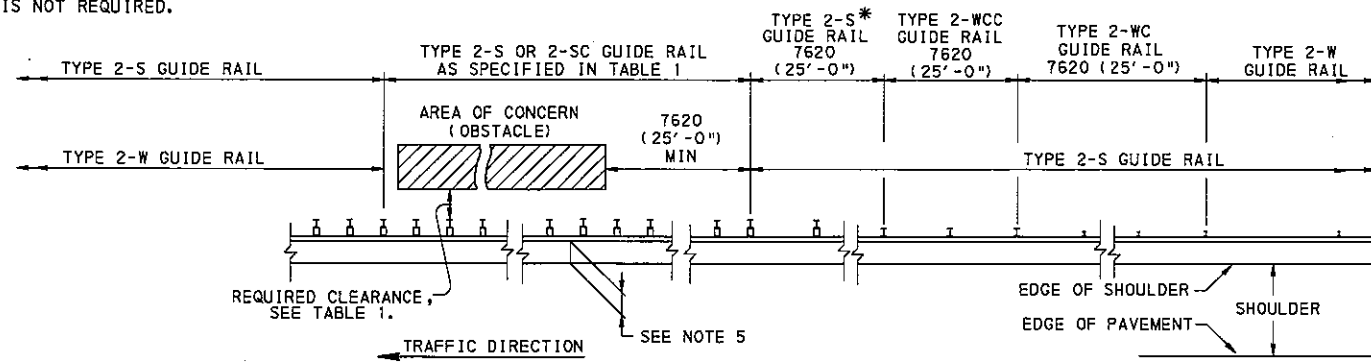
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA**  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

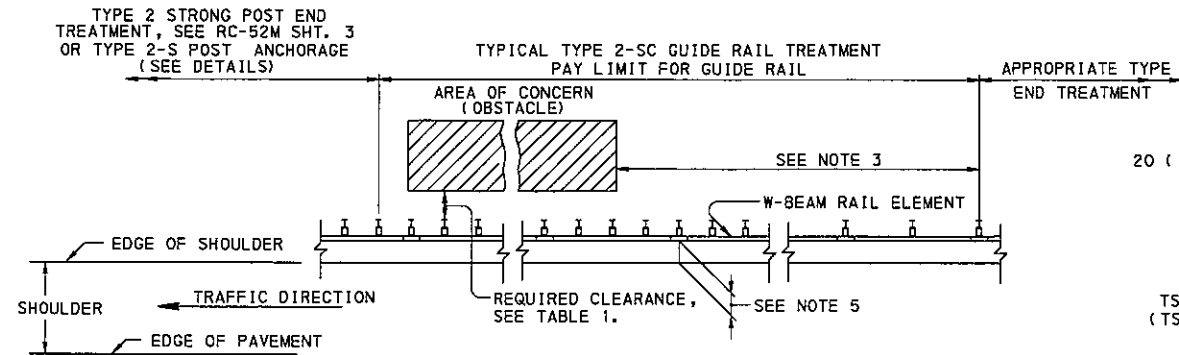
TYPE 2 WEAK POST  
GUIDE RAIL  
END TREATMENTS

RECOMMENDED MAR. 30, 2006 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Chel</i> CHIEF ENGINEER	SHT 2 OF 2 RC-53M
--	---	----------------------

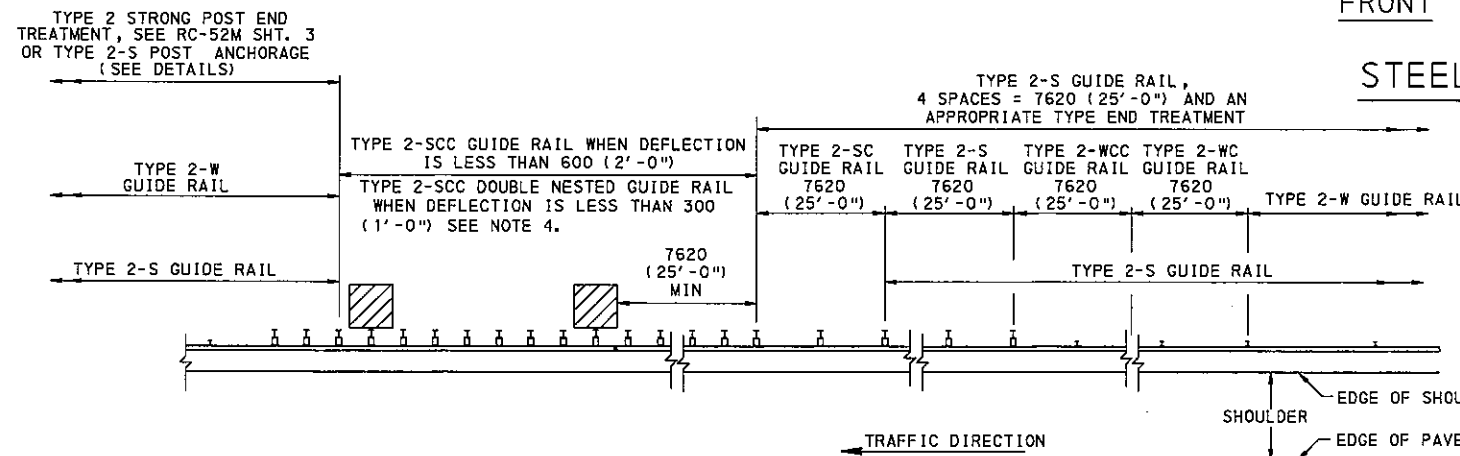
\* IF TYPE 2-S GUIDE RAIL IS USED AT THE OBSTRUCTION, THIS SECTION OF GUIDE RAIL IS NOT REQUIRED.



TYPICAL GUIDE RAIL TREATMENT WHEN THE REQUIRED CLEARANCE TO OBSTRUCTION IS AVAILABLE



TYPICAL GUIDE RAIL TREATMENT WHEN THE REQUIRED CLEARANCE TO OBSTRUCTION IS AVAILABLE



TYPICAL GUIDE RAIL TREATMENT WHEN THE REQUIRED CLEARANCE TO OBSTRUCTION IS NOT AVAILABLE

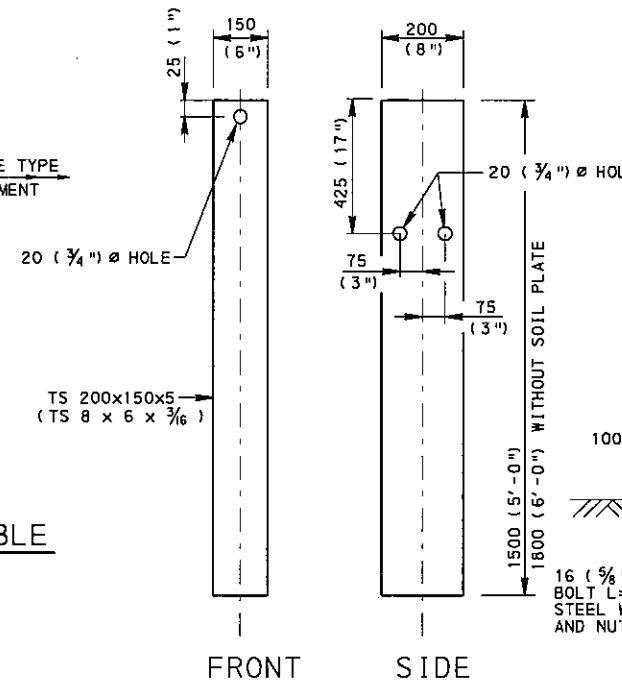
TABLE 1

TYPE OF GUIDE RAIL	REQUIRED † CLEARANCES
2-SCC	300 (1'-0")
2-SC	600 (2'-0")
2-S	900 (3'-0")
2-WCC	1200 (4'-0")
2-WC	1500 (5'-0")
2-W	2100 (7'-0")

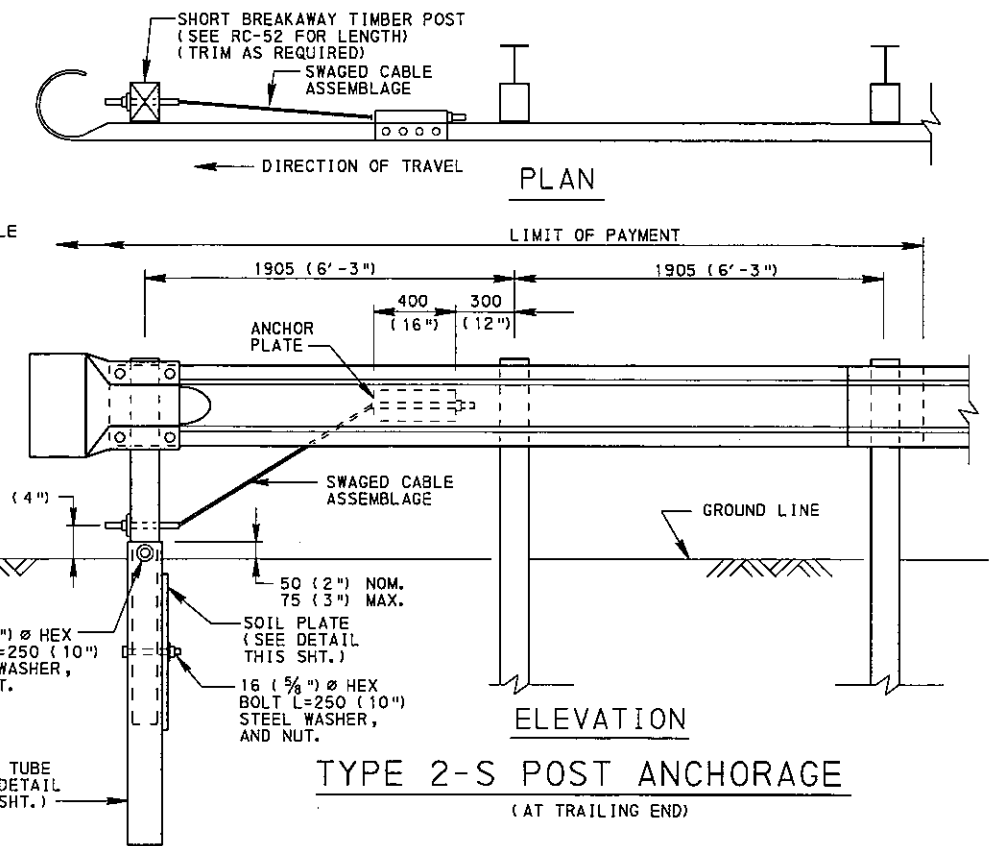
† THE MINIMUM UNOBSTRUCTED DISTANCE FROM BACK OF GUIDE RAIL POST TO AREA OF CONCERN (FACE OF OBSTRUCTION).

NOTES

1. THE TREATMENTS SHOWN ARE FOR FOUR LANE DIVIDED HIGHWAYS. USE THE APPROACH END TREATMENT AT BOTH SIDES OF THE OBSTRUCTION ON TWO-LANE FACILITIES WITH TWO-WAY TRAFFIC.
2. THIS STANDARD HAS BEEN PREPARED AS A GUIDE FOR THE PLACEMENT OF GUIDE RAIL AND MEDIAN BARRIER. IT IS IMPRACTICAL TO PROVIDE A STANDARD FOR ALL POSSIBLE CONDITIONS. MODIFICATIONS OF TREATMENTS CAN BE MADE TO FIT EXISTING CONDITIONS; HOWEVER, FOLLOW THE RECOMMENDED GUIDELINES IN PUBLICATION 13M, DM-2, CHAPTER 12.
3. THIS DISTANCE VARIES. DETERMINE THE REQUIRED LENGTH USING THE GUIDELINES FOUND IN PUBLICATION 13M, DM-2, CHAPTER 12, AND SHOW ON THE TABULATIONS. WHERE CALCULATIONS SHOW A DISTANCE LESS THAN 15 m (50'-0"), USE 15 m (50'-0") AS A MINIMUM DISTANCE.
4. WHEN THE MINIMUM UNOBSTRUCTED DISTANCE FROM BACK OF GUIDE RAIL POST TO FACE OF OBSTRUCTION IS LESS THAN 300 (1'-0"), USE 2-SCC DOUBLE NESTED RAIL.
5. THE TYPICAL DISTANCE FROM THE EDGE OF SHOULDER TO THE FRONT FACE OF THE W-BEAM RAIL ELEMENT IS 600 (2'-0"). THIS MAY VARY; BASE THE ACTUAL PLACEMENT OF THE GUIDE RAIL SYSTEM SELECTED ON FIELD CONDITIONS. LOCATE THE SYSTEM SELECTED AS FAR FROM THE EDGE OF SHOULDER AS POSSIBLE AND STILL MAINTAIN REQUIRED CLEARANCES DETERMINED FROM TABLE 1.
6. 1800 (6'-0") STEEL TUBE MAY BE USED WITHOUT SOIL PLATE.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.

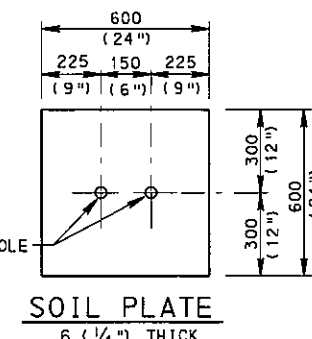


FRONT SIDE STEEL TUBE



ELEVATION TYPE 2-S POST ANCHORAGE (AT TRAILING END)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

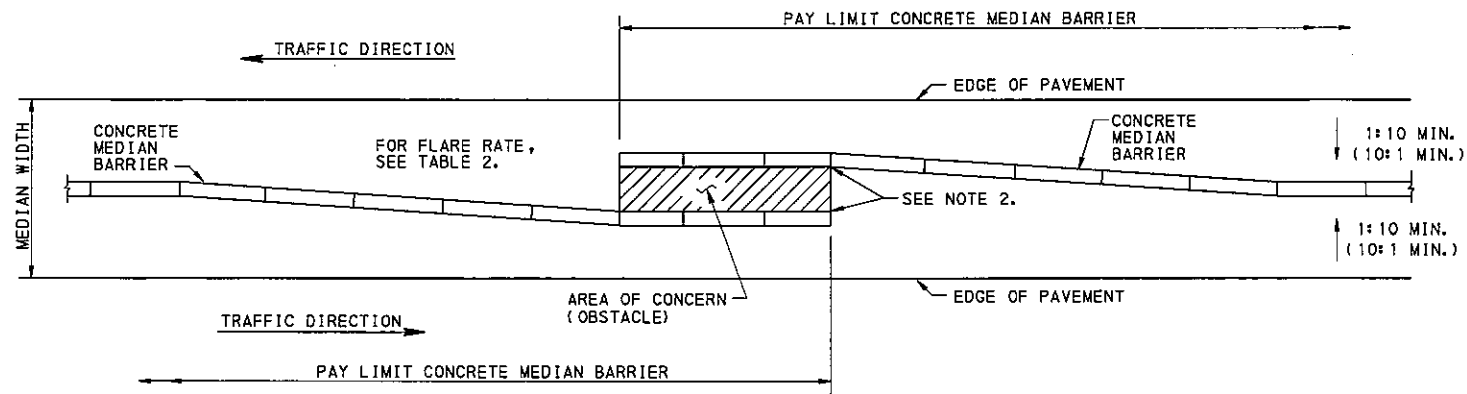


SOIL PLATE 6 (1/4") THICK

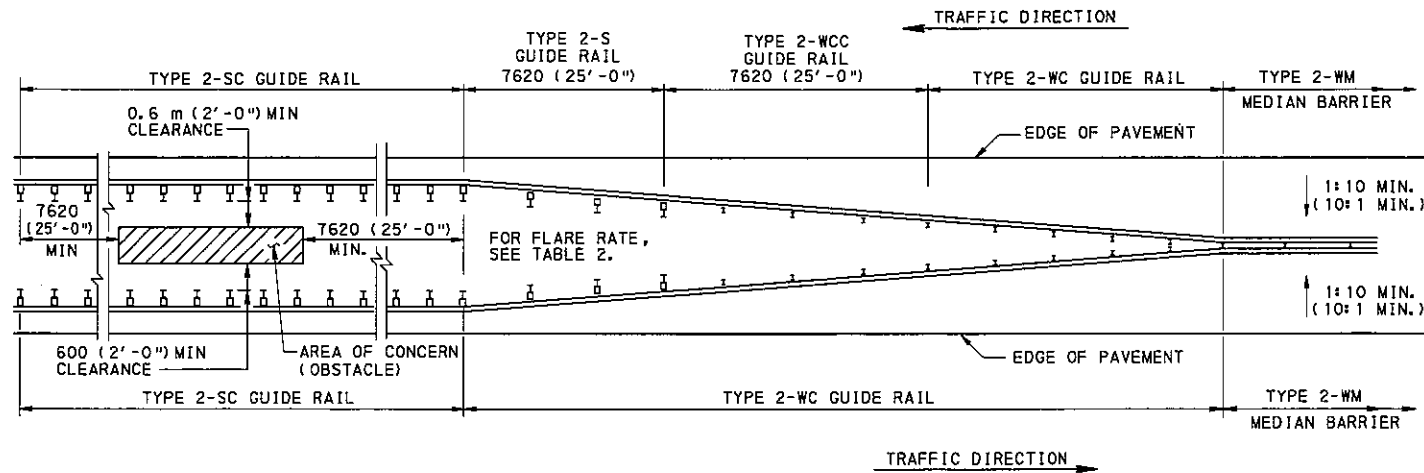
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

BARRIER PLACEMENT AT OBSTRUCTIONS

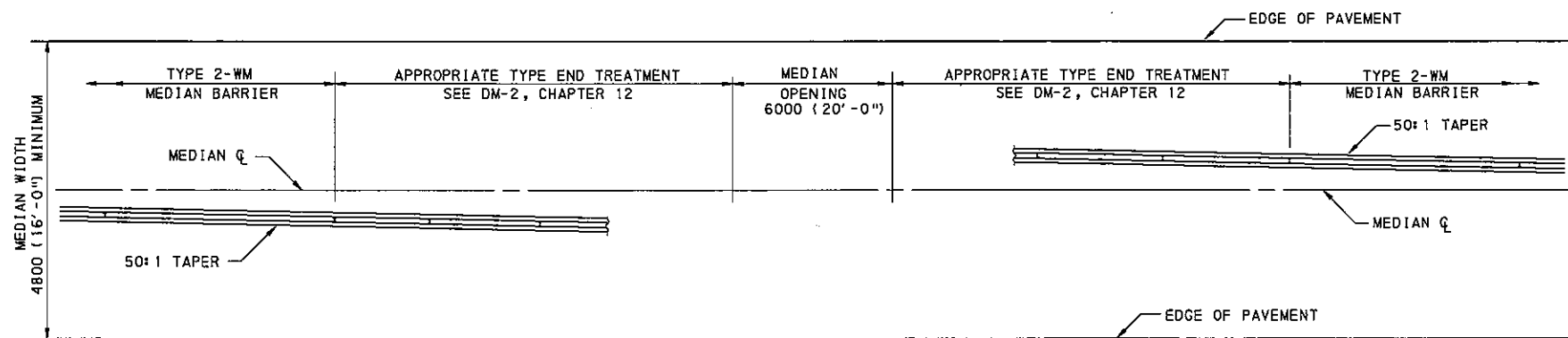




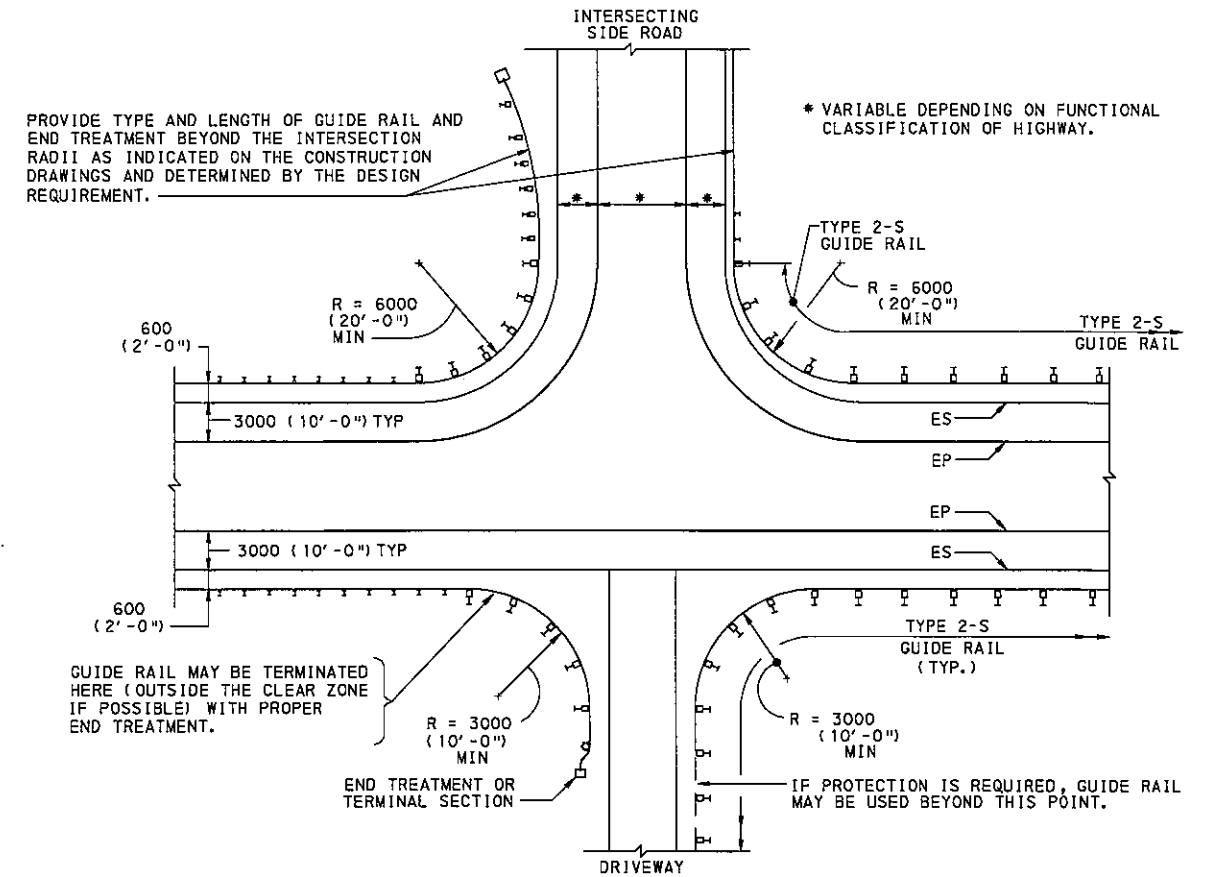
**TREATMENT AT OBSTRUCTION FOR MEDIAN WIDTHS 6.0 m (20') OR LESS WHERE CONTINUOUS BARRIER IS REQUIRED**



**TREATMENT AT OBSTRUCTION FOR MEDIAN WIDTHS OF 6.0 m (20') TO 10.0 m (30') WHERE CONTINUOUS BARRIER IS REQUIRED**



**TREATMENT FOR TYPE 2-WM MEDIAN BARRIER CROSS-OVER**



**TREATMENT AT INTERSECTIONS AND DRIVEWAYS**

**TABLE 2  
FLARE RATES FOR BARRIER DESIGN**

DESIGN SPEED	MAXIMUM FLARE RATES		
	Km/h	mph	
			CONCRETE BARRIER
			GUIDE RAIL
120	75		20 : 1
110	70		20 : 1
105	65		19 : 1
100	60		18 : 1
90	55		16 : 1
80	50		14 : 1
70	45		12 : 1
65	40		11 : 1
60	35		10 : 1
50	30		8 : 1

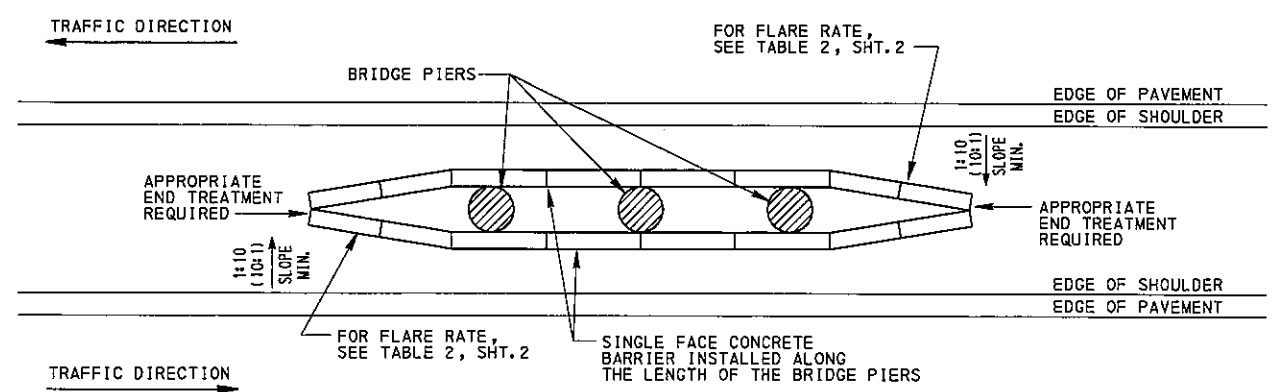
**NOTES**

1. THIS STANDARD HAS BEEN PREPARED AS A GUIDE FOR THE PLACEMENT OF GUIDE RAIL AND MEDIAN BARRIER. IT IS IMPRACTICAL TO PROVIDE A STANDARD FOR ALL POSSIBLE CONDITIONS. MODIFICATIONS OF TREATMENTS CAN BE MADE TO FIT EXISTING CONDITIONS; HOWEVER, FOLLOW RECOMMENDED GUIDELINES IN DESIGN MANUAL, PART 2.
2. PROVIDE SINGLE FACE CONCRETE BARRIER THROUGH THE AREA OF THE OBSTRUCTION. NO MINIMUM BARRIER-TO-OBSTRUCTION DISTANCE IS REQUIRED. FOR DETAILS, SEE RC-58M.

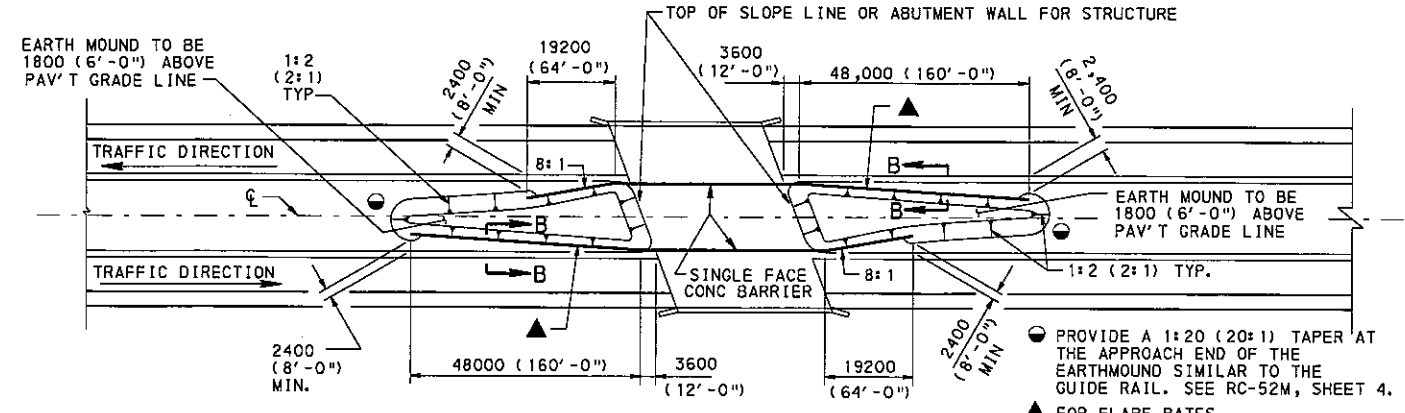
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN**

**BARRIER PLACEMENT  
AT OBSTRUCTIONS**

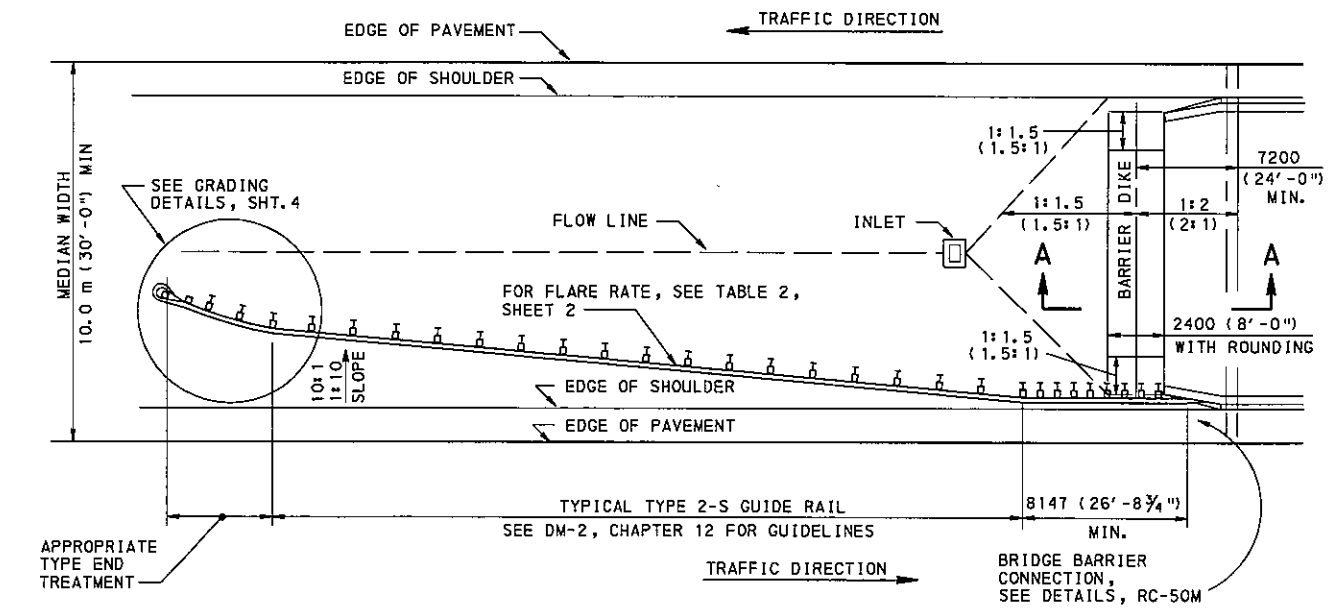


**TREATMENT AT OBSTRUCTIONS FOR  
MEDIAN WIDTHS GREATER THAN 6.0 m (20'-0")  
WHERE CONTINUOUS BARRIER IS NOT REQUIRED**

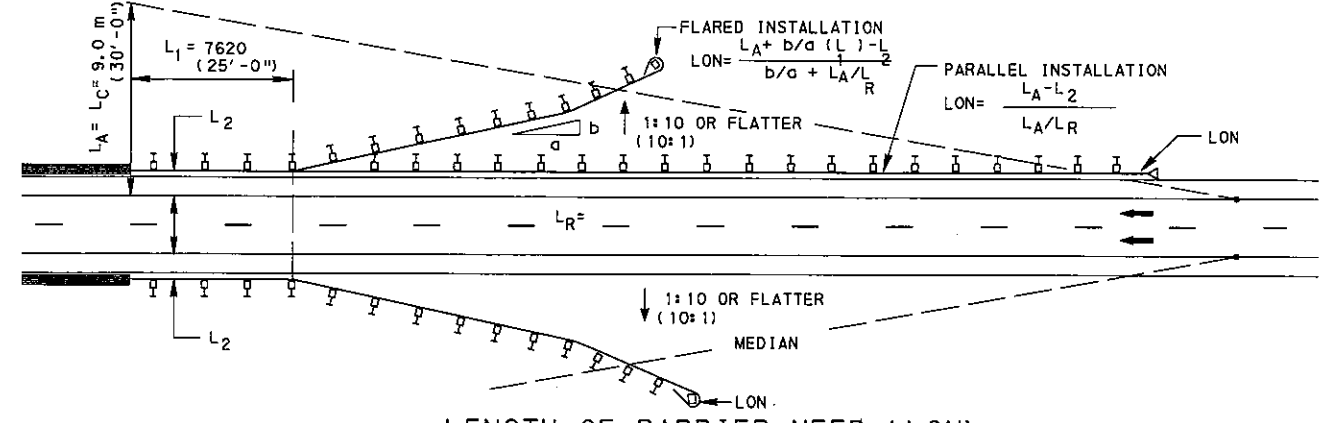


**TYPICAL MEDIAN EARTH MOUND DETAIL FOR AT-GRADE DUAL BRIDGES**

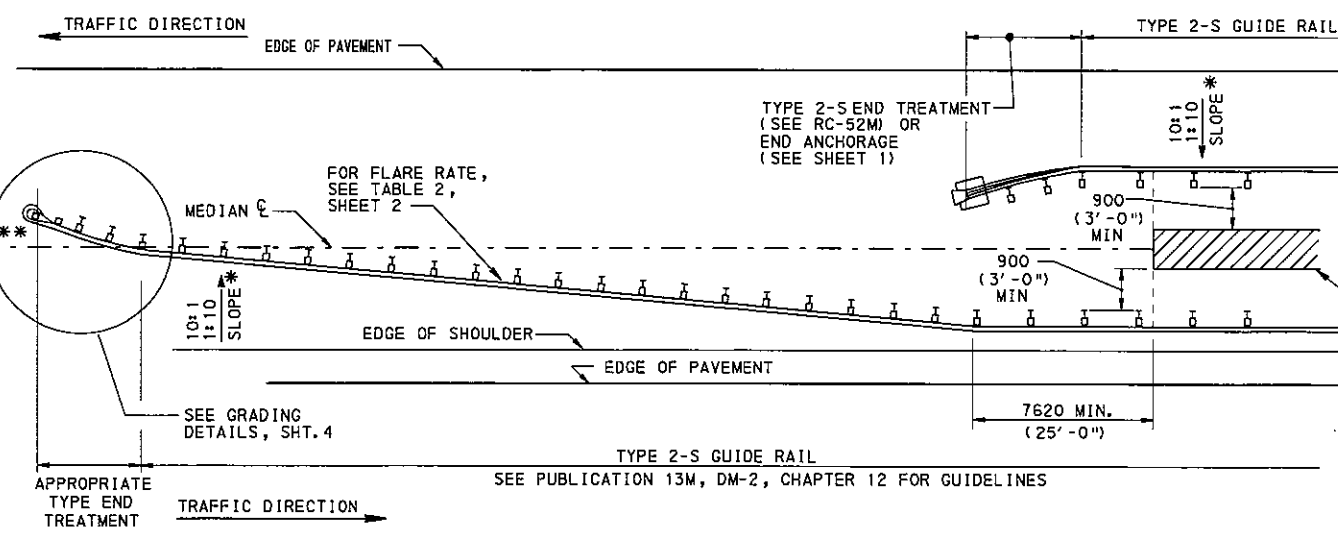
NOTES: ● ALL MATERIALS NECESSARY TO CONSTRUCT EARTH MOUNDS ARE IN ACCORDANCE WITH APPLICABLE SECTIONS OF PUBLICATION 408.  
● THIS STANDARD HAS BEEN PREPARED AS A GUIDE FOR THE PLACEMENT OF EARTH MOUNDS IN THE MEDIAN. IT IS IMPRACTICAL TO PROVIDE A STANDARD FOR ALL POSSIBLE CONDITIONS. MODIFICATIONS OF TREATMENTS CAN BE MADE TO FIT EXISTING CONDITIONS.



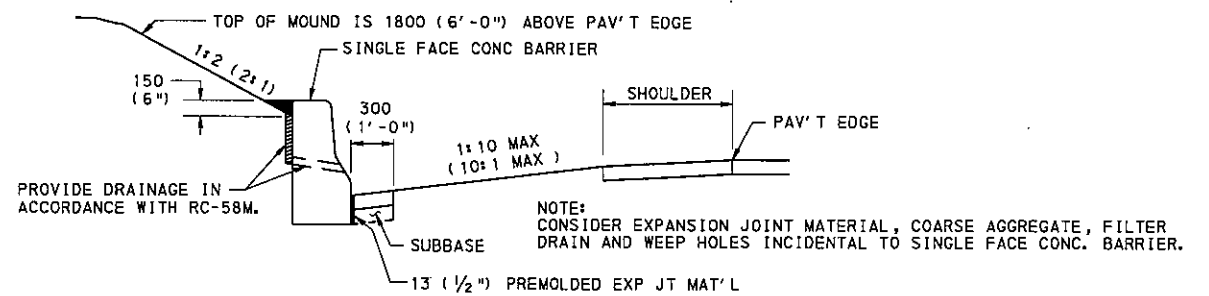
**MEDIAN TREATMENT AT DUAL STRUCTURES**



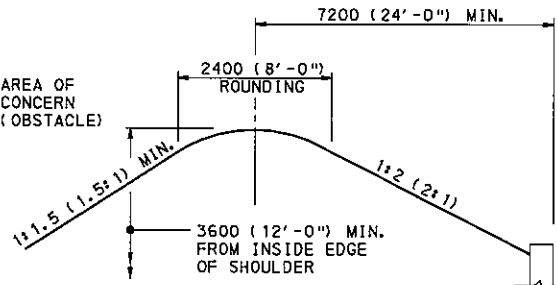
**LENGTH OF BARRIER NEED (LON)**  
SEE PUBLICATION 13M, DM-2, CHAPTER 12 FOR GUIDELINES



**TREATMENT AT OBSTRUCTION FOR  
MEDIAN WIDTHS GREATER THAN 10.0 m (30'-0")  
WHERE CONTINUOUS BARRIER IS NOT REQUIRED**



**SECTION B-B**  
TYP. MEDIAN EARTH MOUND



**SECTION A-A**  
MEDIAN TREATMENT AT DUAL STRUCTURE

\* A 1:10 (10:1) SLOPE MINIMUM IS REQUIRED IN FRONT OF THE BARRIER, IF ANY PORTION OF THE BARRIER IS LOCATED WITHIN 3.6 m (12'-0") FROM THE EDGE OF SHOULDER (HINGE POINT). BARRIER MUST NOT BE PLACED ON SLOPES STEEPER THAN 1:6 (6:1).

\*\* DO NOT INSTALL END TREATMENT WITHIN 900 (3'-0") FROM MEDIAN C.

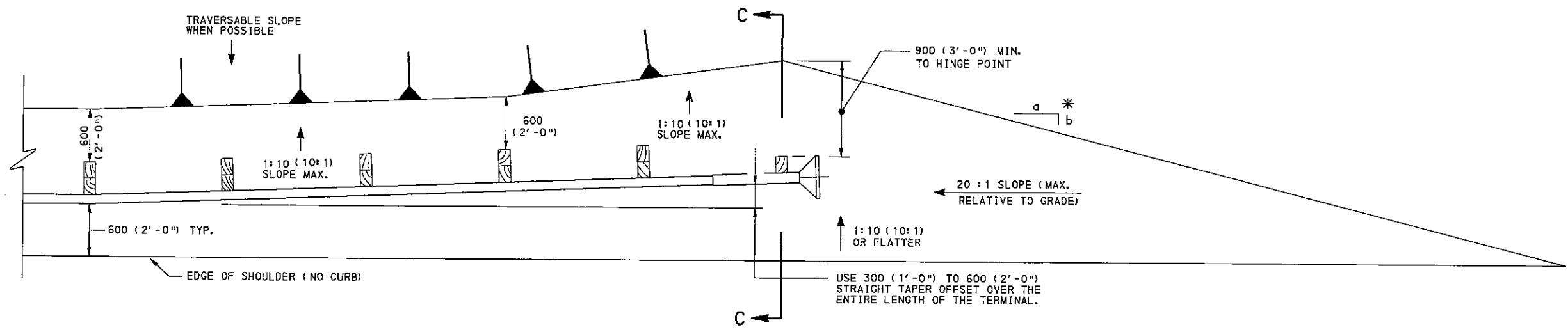
NOTE: FOR FURTHER END TREATMENT DETAILS SEE DM-2, CHAPTER 12 FOR GUIDELINES.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

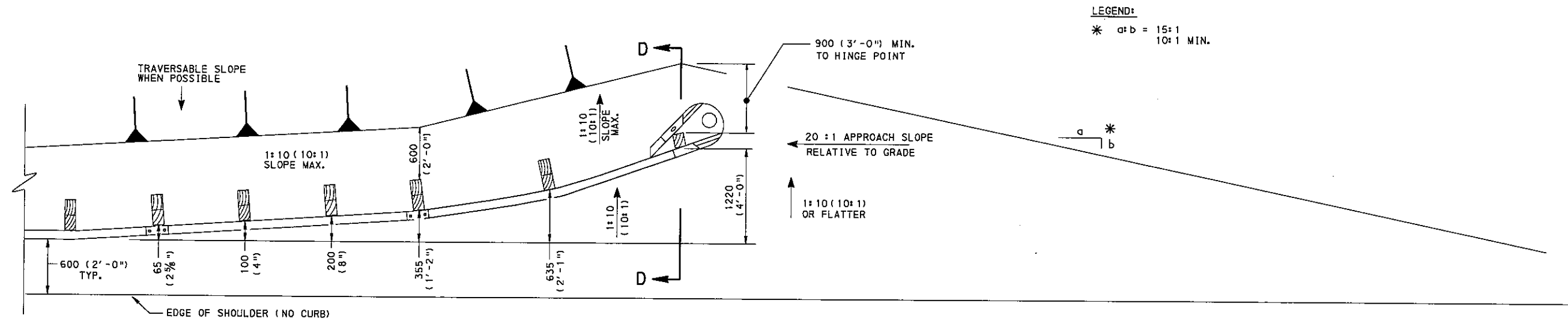
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

**BARRIER PLACEMENT  
AT OBSTRUCTIONS**

RECOMMENDED MAR. 30, 2006 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. L. Kotel</i> CHIEF ENGINEER	SHT 3 OF 1 RC-54M
--	---	----------------------

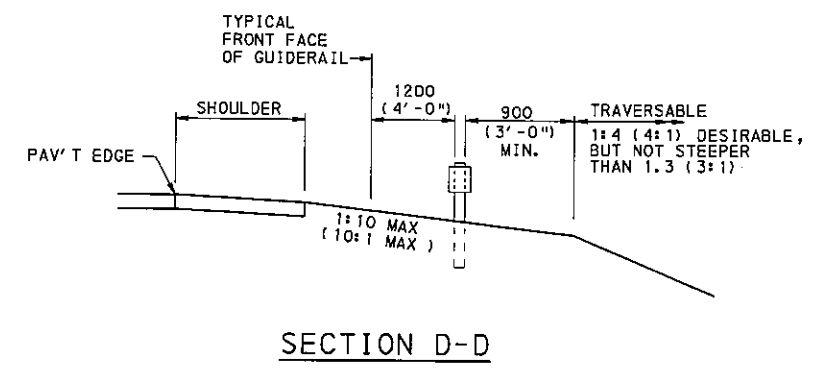


GRADING DETAIL FOR PARALLEL TERMINALS

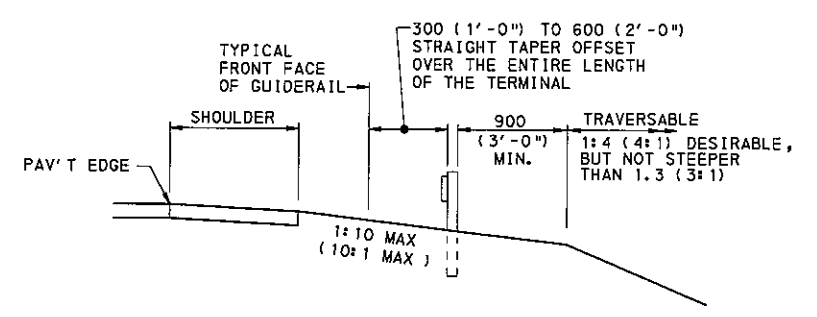


GRADING DETAIL FOR FLARED TERMINALS

LEGEND:  
 \* a:b = 15:1  
 10:1 MIN.



SECTION D-D

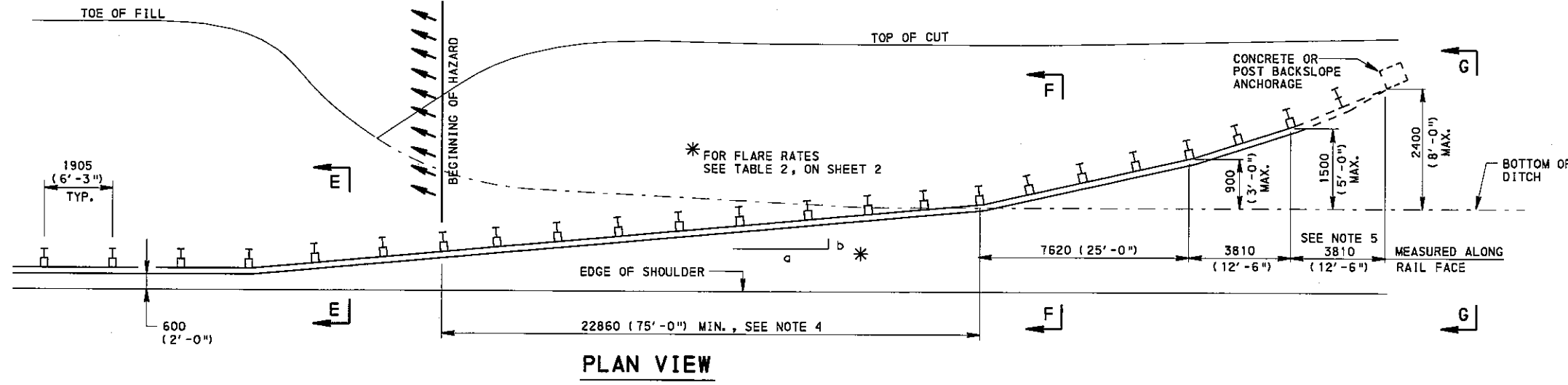


SECTION C-C

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

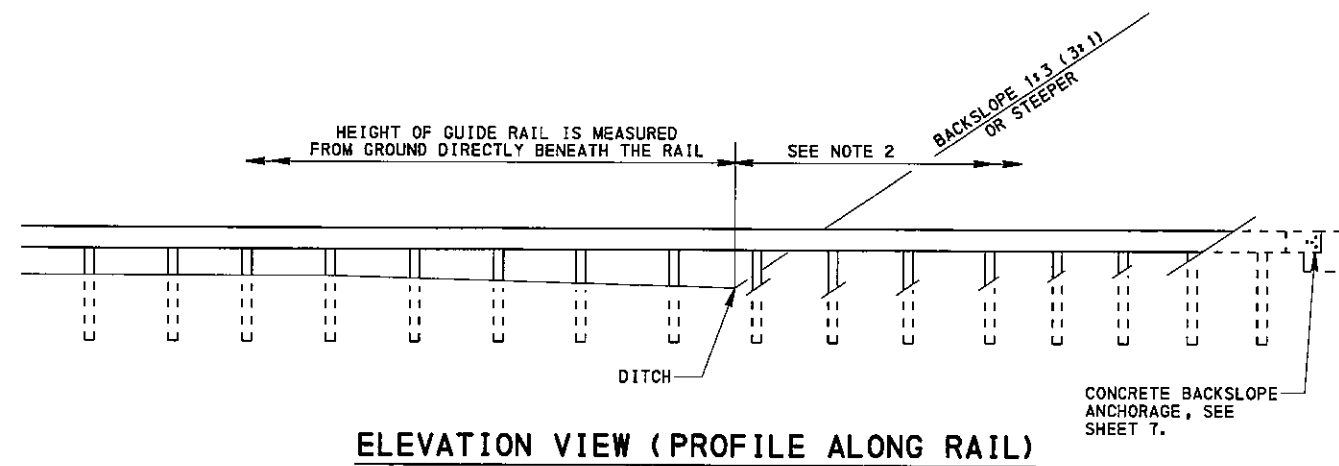
COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF TRANSPORTATION  
 BUREAU OF DESIGN

BARRIER PLACEMENT  
 AT OBSTRUCTIONS  
 GRADING DETAILS

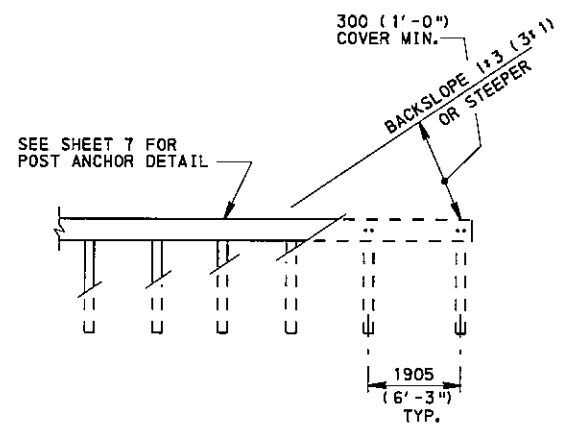


**PLAN VIEW**

- GENERAL NOTES:**
1. THE HEIGHT OF TOP OF THE W-BEAM RAIL IS HELD CONSTANT RELATIVE TO THE ROADWAY PROFILE GRADE.
  2. HEIGHT OF GUIDE RAIL MAY BE TAPERED DOWN AFTER CROSSING DITCH BOTTOM TO ACHIEVE ONE FOOT OF COVER OVER THE ANCHOR TERMINAL.
  3. WHEN THE GUIDE RAIL LENGTH OF NEED FALLS NEAR A CUT TO FILL SLOPE, THE PREFERRED TREATMENT IS TO ANCHOR THE GUIDE RAIL TO THE CUT SLOPE.
  4. PROVIDE 22860 (75'-0") MINIMUM FROM WHERE THE GUIDE RAIL CROSSES THE SWALE LINE TO THE BEGINNING OF THE HAZARD.
  5. BACKSLOPE ANCHOR TERMINAL PAY LIMIT INCLUDES THE CONCRETE OR POST ANCHORAGE, 3810 (12'-6") OF RAIL ELEMENT AND HARDWARE.

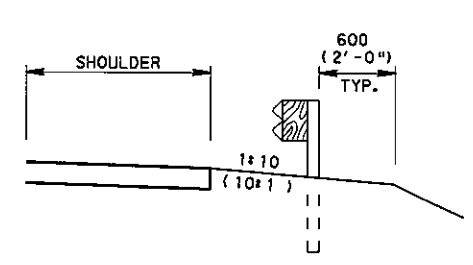


**ELEVATION VIEW (PROFILE ALONG RAIL)**

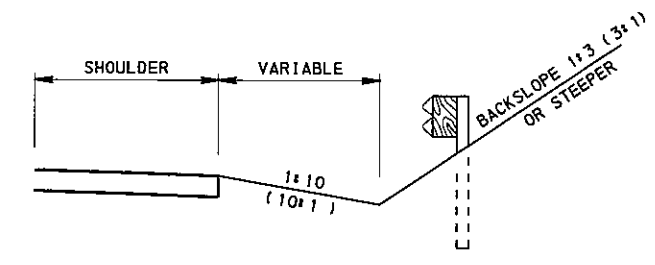


**POST BACKSLOPE ANCHORAGE**

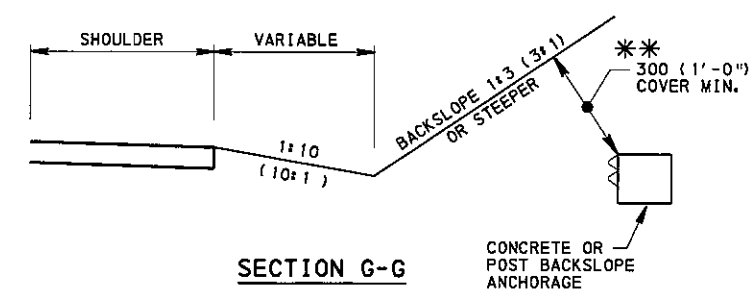
**TYPICAL BACKSLOPE ANCHOR  
SINGLE RAIL**



**SECTION E-E**



**SECTION F-F**



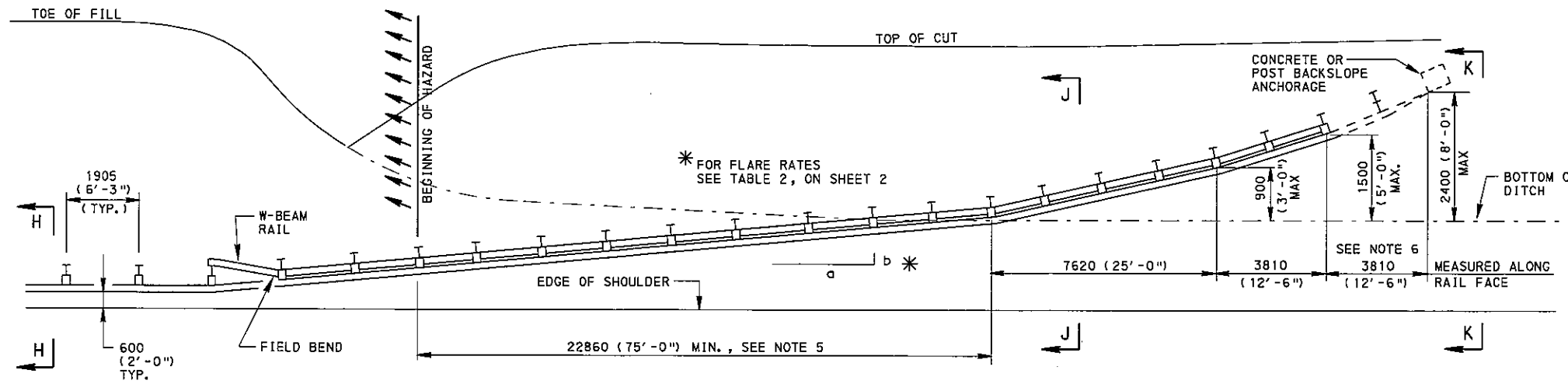
**SECTION G-G**

\*\* ROCK ANCHORAGE DOES NOT REQUIRE THE 300 (1'-0") BURIAL.

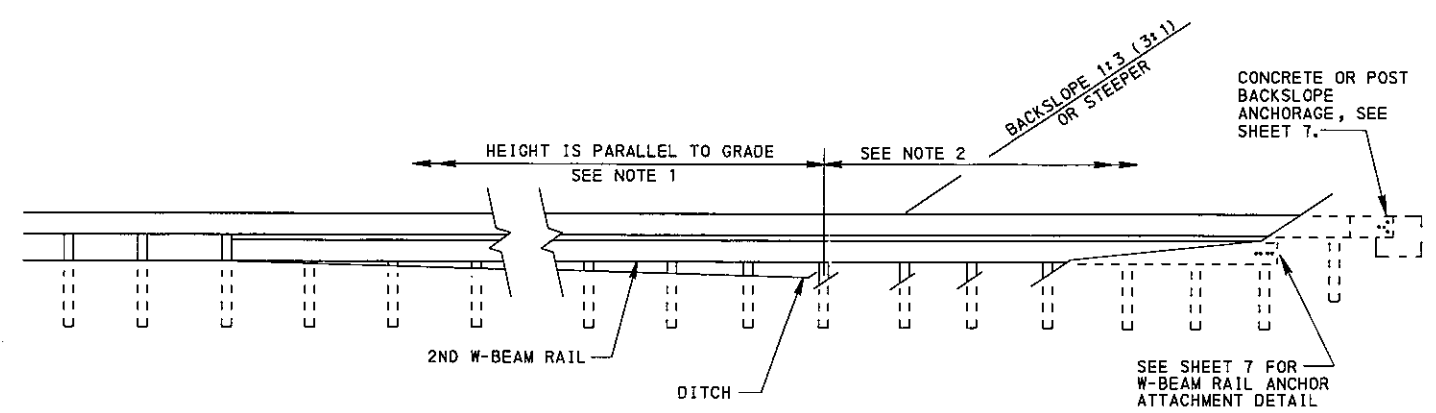
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

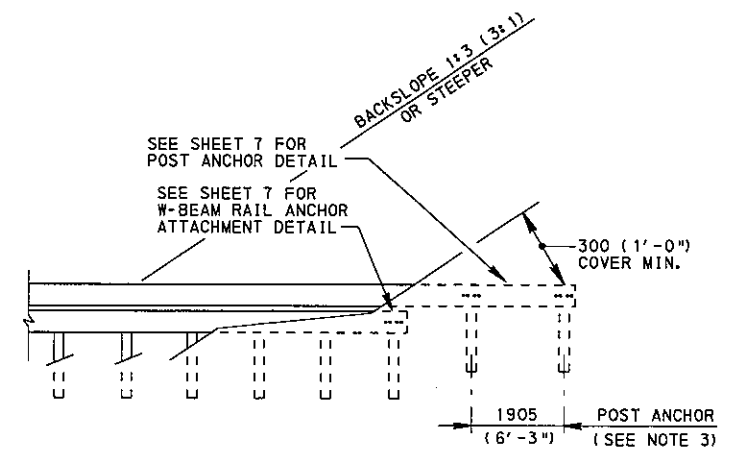
**GUIDE RAIL  
TYPE 1  
ANCHORED BACKSLOPE TERMINAL  
SINGLE RAIL  
10:1 FRONT SLOPE**



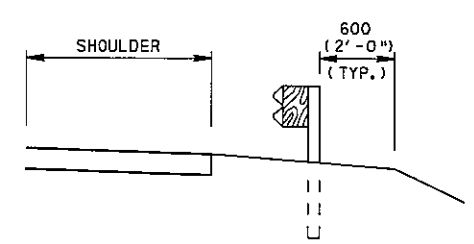
PLAN VIEW



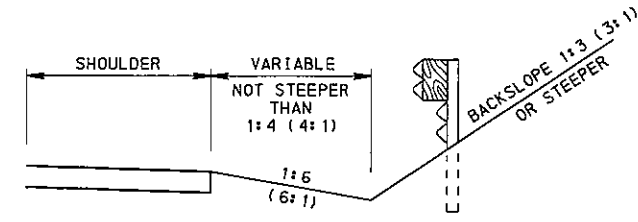
ELEVATION VIEW (PROFILE ALONG RAIL)



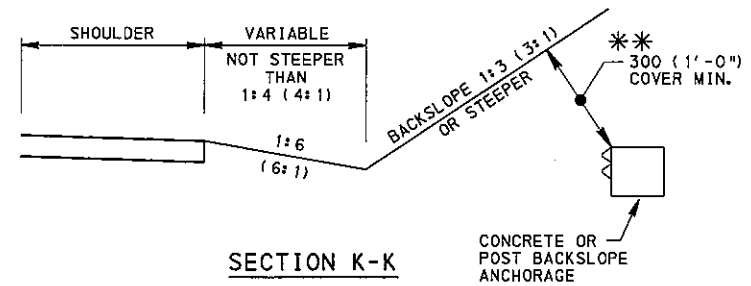
POST BACKSLOPE ANCHORAGE



SECTION H-H



SECTION J-J



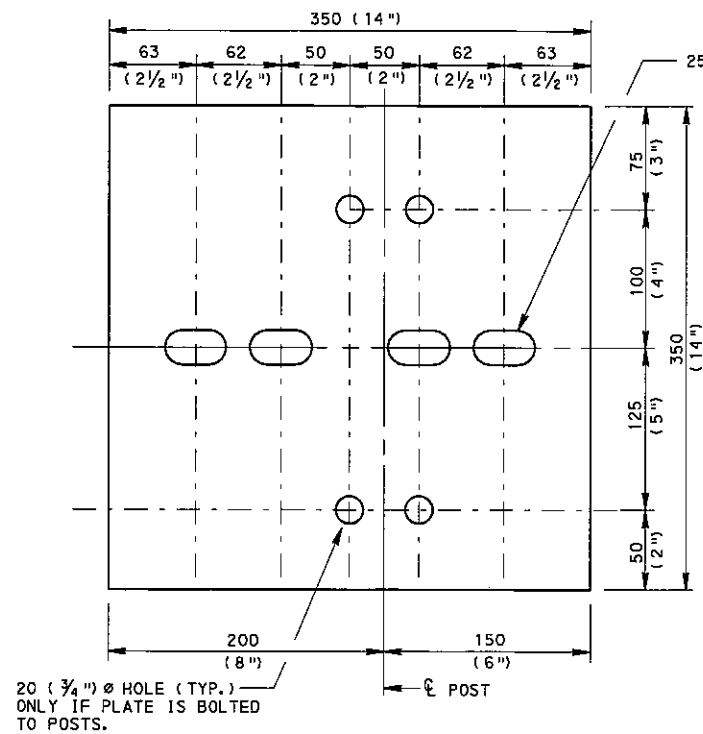
SECTION K-K

\*\* ROCK ANCHORAGE DOES NOT REQUIRE THE 300 (1'-0") BURIAL.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

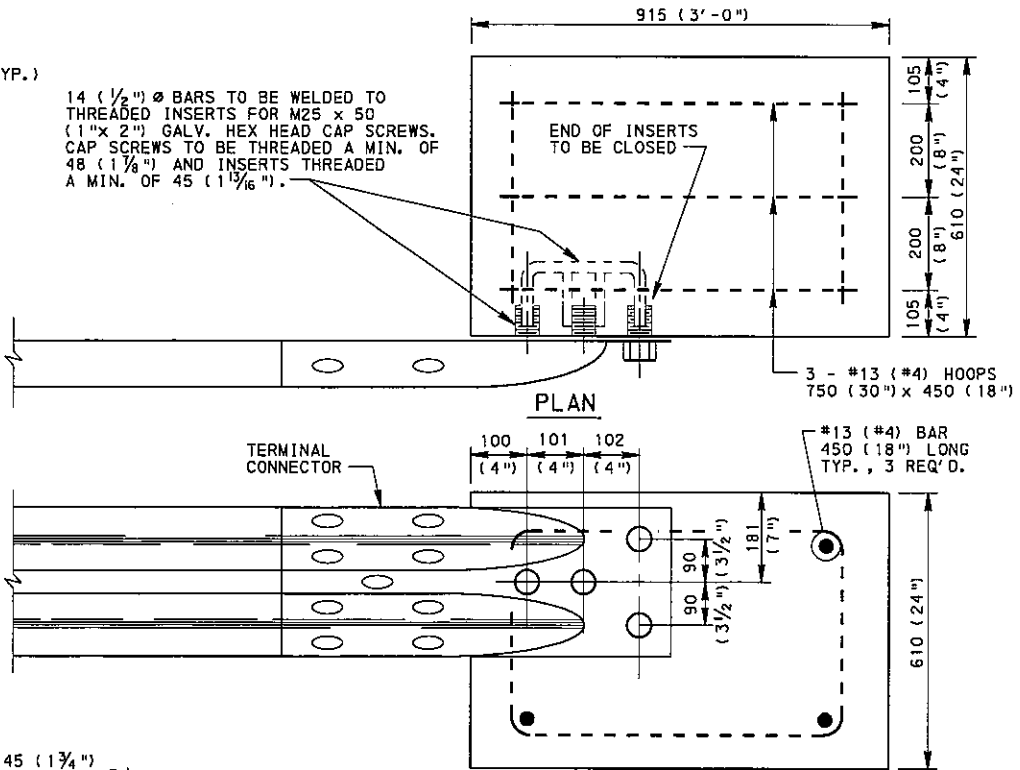
GUIDE RAIL  
TYPE 1  
ANCHORED BACKSLOPE TERMINAL  
DOUBLE RAIL  
6:1 FRONT SLOPE



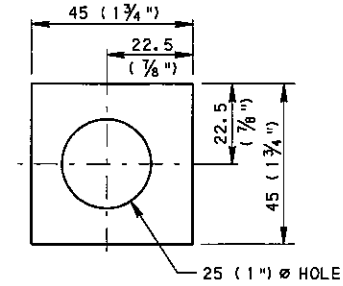
20 (3/4") Ø HOLE (TYP.) ONLY IF PLATE IS BOLTED TO POSTS.

**STEEL PLATE - 13 mm (1/2")**

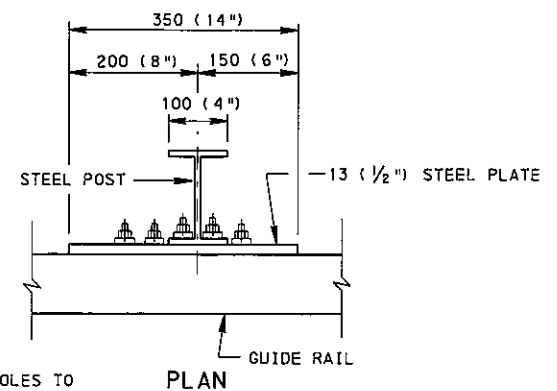
GALVANIZED  
WELDED OR BOLTED TO POST



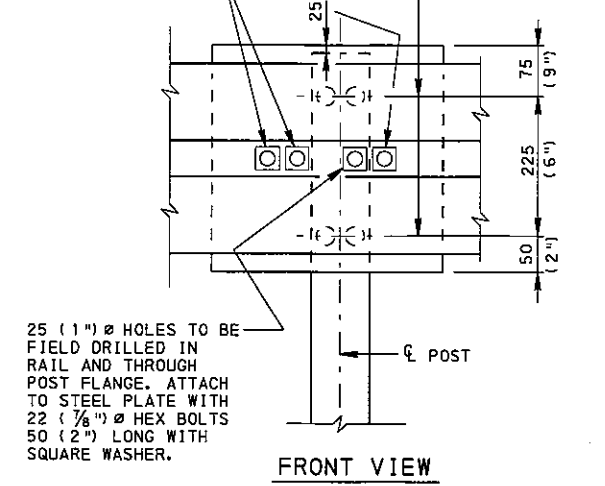
**CONCRETE BLOCK ANCHOR**



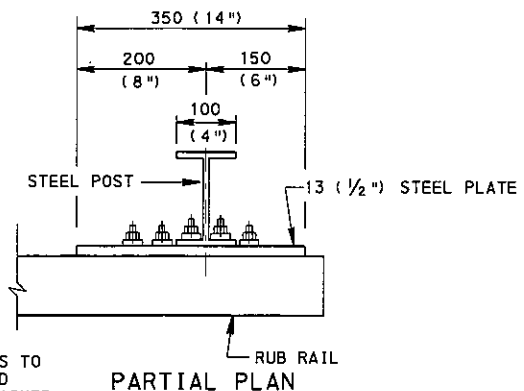
**SQUARE WASHER**  
5 (1/4") THICK - GALVANIZED



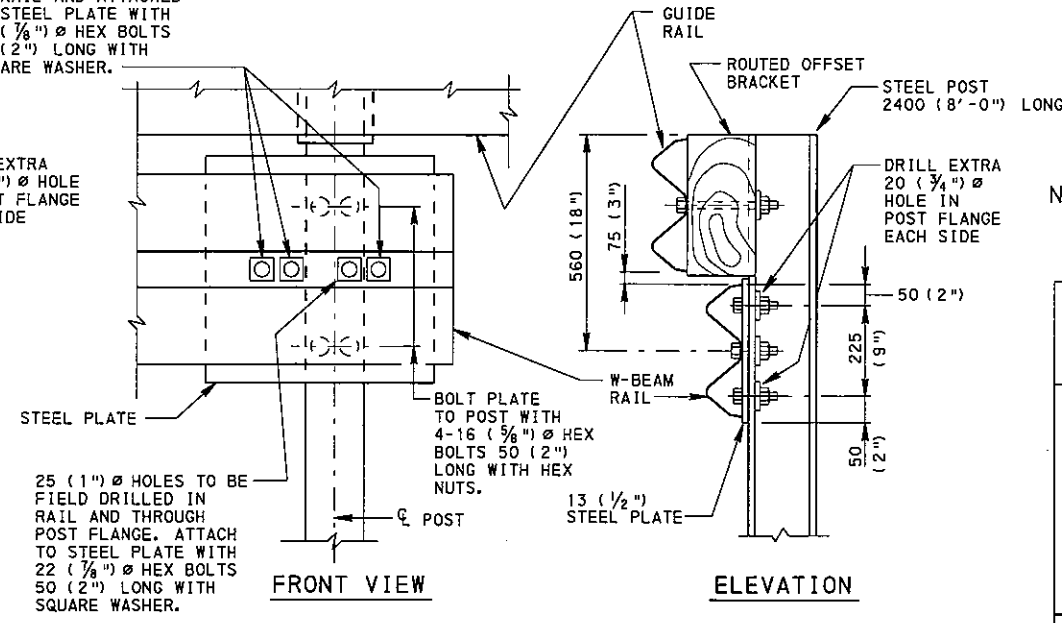
3-25 (1") Ø HOLES TO BE FIELD DRILLED IN RAIL AND ATTACHED TO STEEL PLATE WITH 22 (7/8") Ø HEX BOLTS 50 (2") LONG WITH SQUARE WASHER.



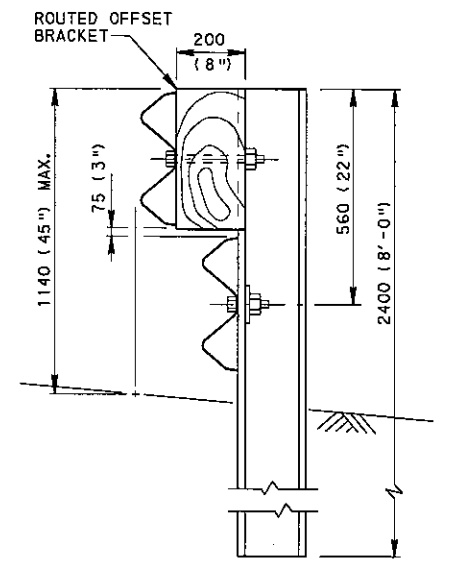
**POST ANCHOR DETAIL**  
DIMENSIONS ARE TYPICAL



3-25 (1") Ø HOLES TO BE FIELD DRILLED IN RAIL AND ATTACHED TO STEEL PLATE WITH 22 (7/8") Ø HEX BOLTS 50 (2") LONG WITH SQUARE WASHER.



**W-BEAM RAIL ATTACHMENT**



**NOTE**  
FOR ROUTED OFFSET BRACKET  
DETAIL SEE RC-52M.

**NOTE:** EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

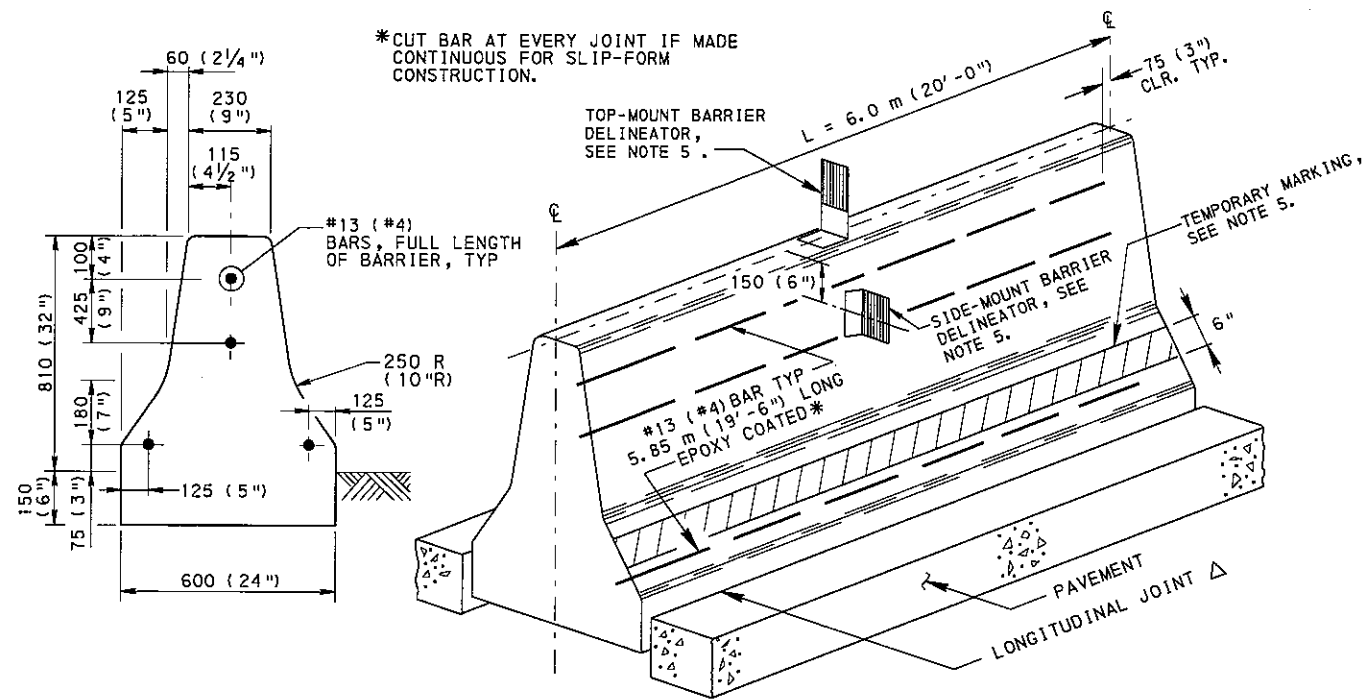
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

**BACKSLOPE  
ANCHOR TERMINAL  
END ANCHORAGE DETAILS**

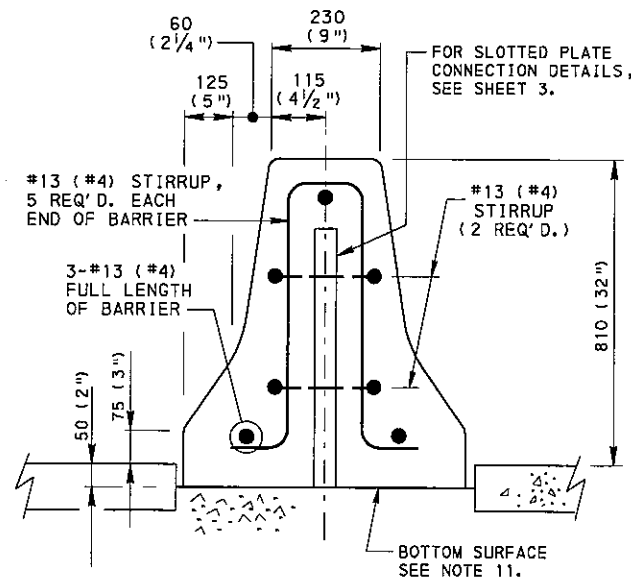


**NOTES**

1. PROVIDE CONCRETE MEDIAN BARRIER MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 623.  
A. MINIMUM CONCRETE CLASS: AA, EXCEPT USE CLASS AAA CONCRETE FOR PRECAST BARRIER.
2. PROVIDE PRECAST CONCRETE BARRIER SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL.
3. FOR CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION, USE PREMOLDED JOINT MATERIAL AT ALL CONSTRUCTION JOINTS.
4. CONCRETE MEDIAN BARRIER CONSTRUCTION ON EXISTING PAVEMENT REQUIRES SPECIAL DETAILS TO BE SHOWN ON THE CONSTRUCTION DRAWINGS.
5. FOR DELINEATOR PLACEMENT, SEE TC-8604.
6. COMPACT NO. 2A OR NO. OGS MATERIAL IN ACCORDANCE WITH PUBLICATION 408, SECTION 350. A LAYER 25 (1") THICK OF NON-SHRINK MORTAR MAY BE USED ON TOP OF THE SUBBASE MATERIAL FOR LEVELING PURPOSES. A RIGID BASE MAY BE USED INSTEAD OF SUBBASE.
7. PROVIDE PRECAST CONCRETE MEDIAN BARRIER FOR USE AS TEMPORARY (MPT) AND IN PERMANENT INSTALLATIONS. FOR TEMPORARY INSTALLATIONS, EMBEDMENT IS NOT REQUIRED.
8. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
9. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.
10. FABRICATE REINFORCEMENT BARS ACCORDING TO PENNDOT BRIDGE CONSTRUCTION STANDARD, BC-736M.
11. TO LIMIT LATERAL DISPLACEMENT OF PORTABLE BARRIER WHEN USED IN WORK ZONES, PROVIDE A ROUGH FINISH AT THE BOTTOM SURFACE. BEFORE THE CONCRETE HAS INITIALLY SET, FINISH THE BOTTOM SURFACE WITH STIFF, WIRE BRUSH OR SPECIAL TEMPLATE IN A LONGITUDINAL DIRECTION TO PRODUCE SCORES APPROXIMATELY 4 (1/8") IN DEPTH.

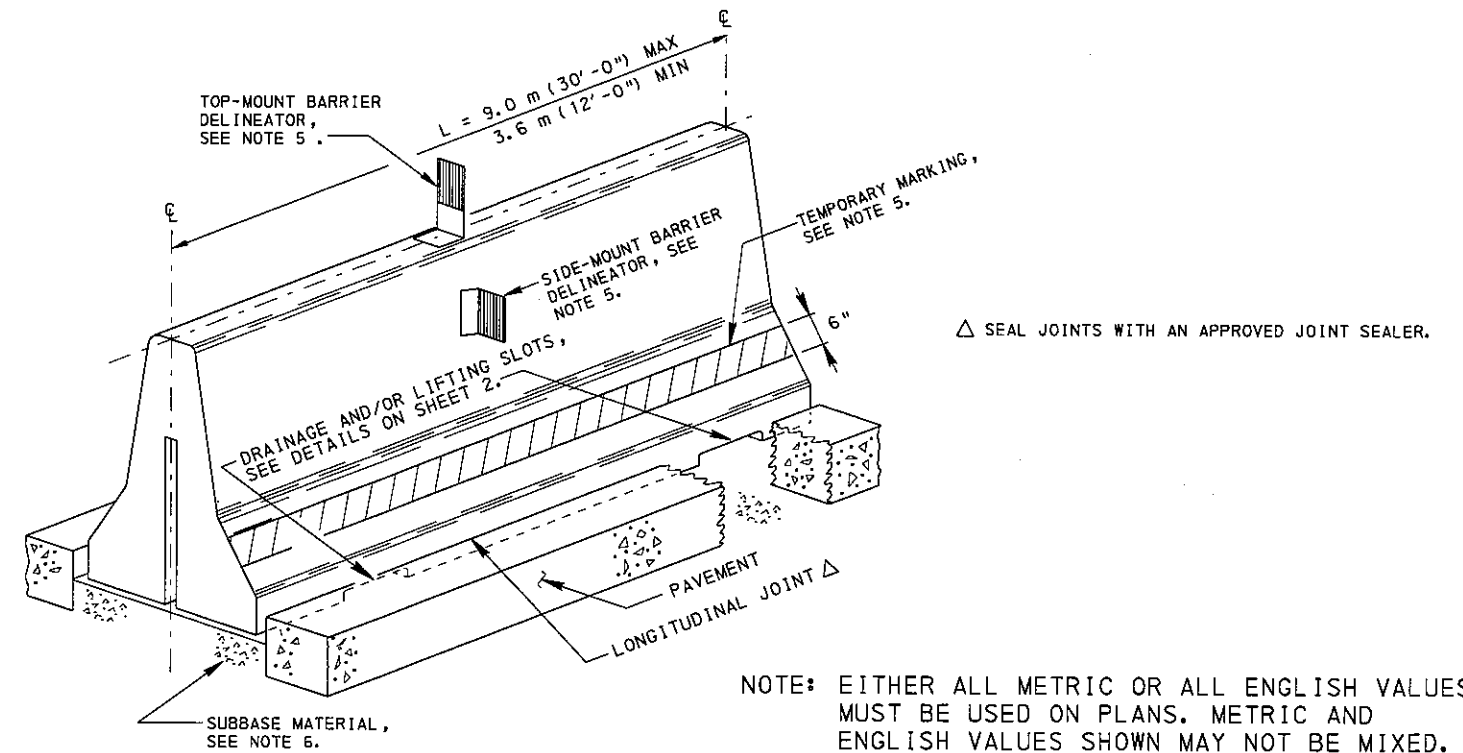


**TYPICAL CAST-IN-PLACE BARRIER**



**TYPICAL PRECAST BARRIER**

FOR DIMENSIONS AND DETAILS, SEE REMAINING SHEETS OF THIS STANDARD.

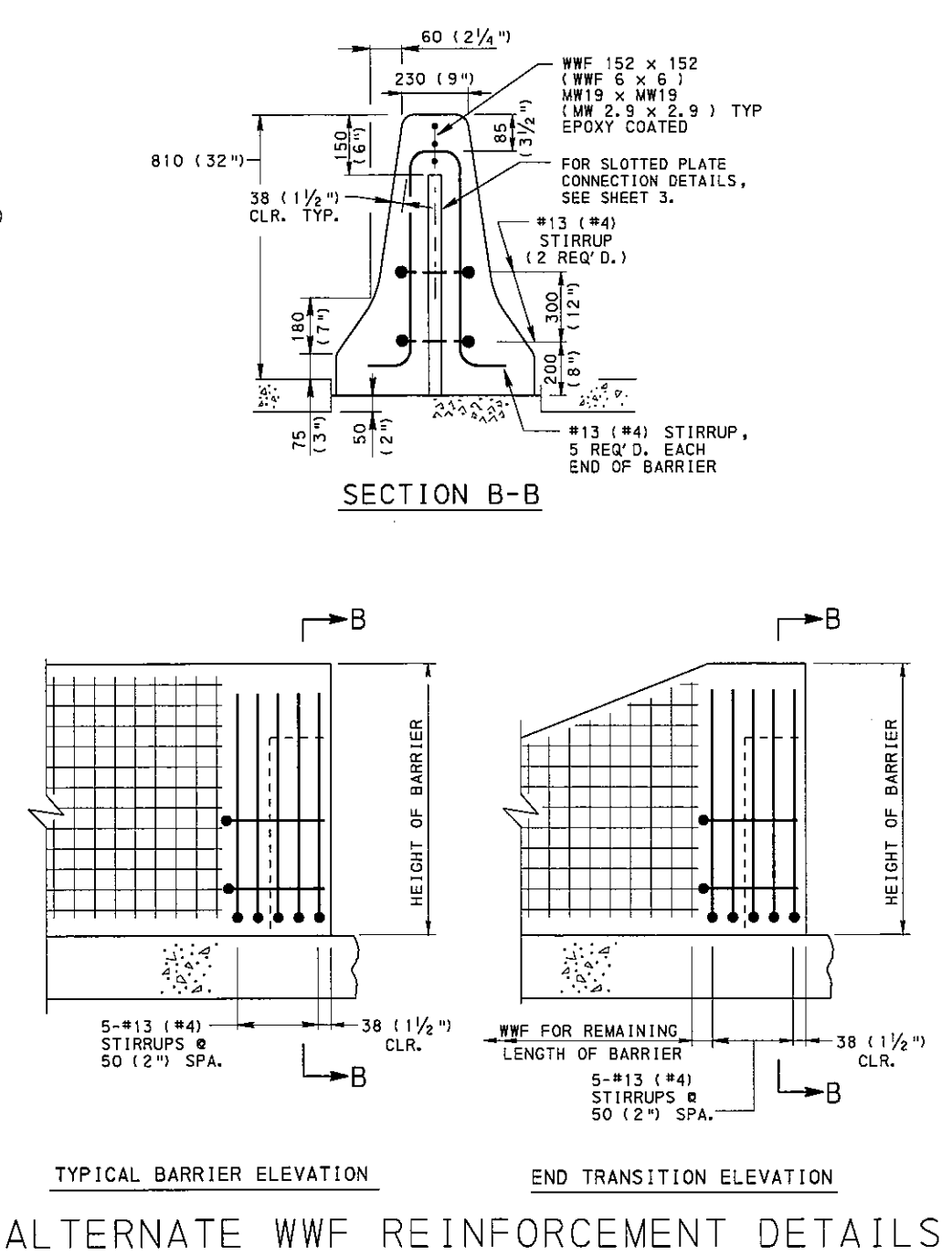
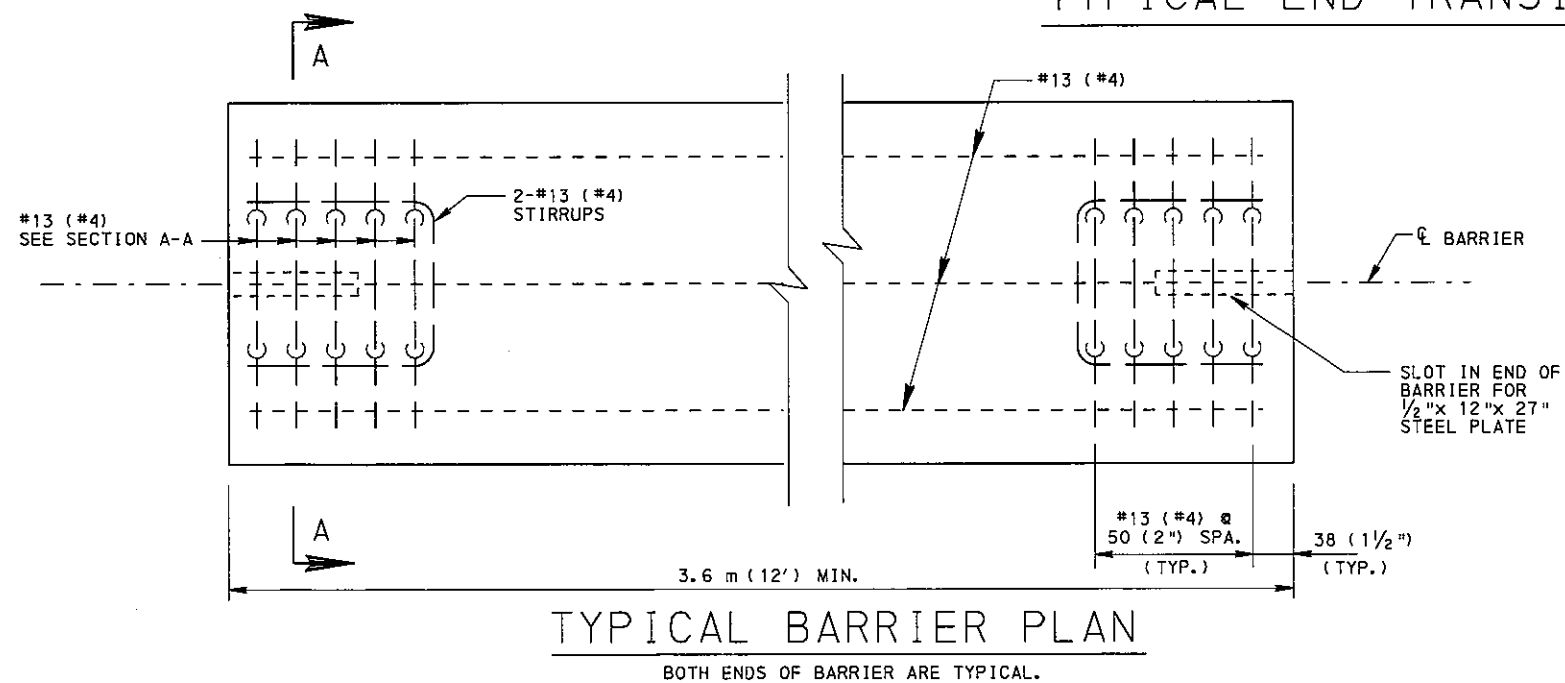
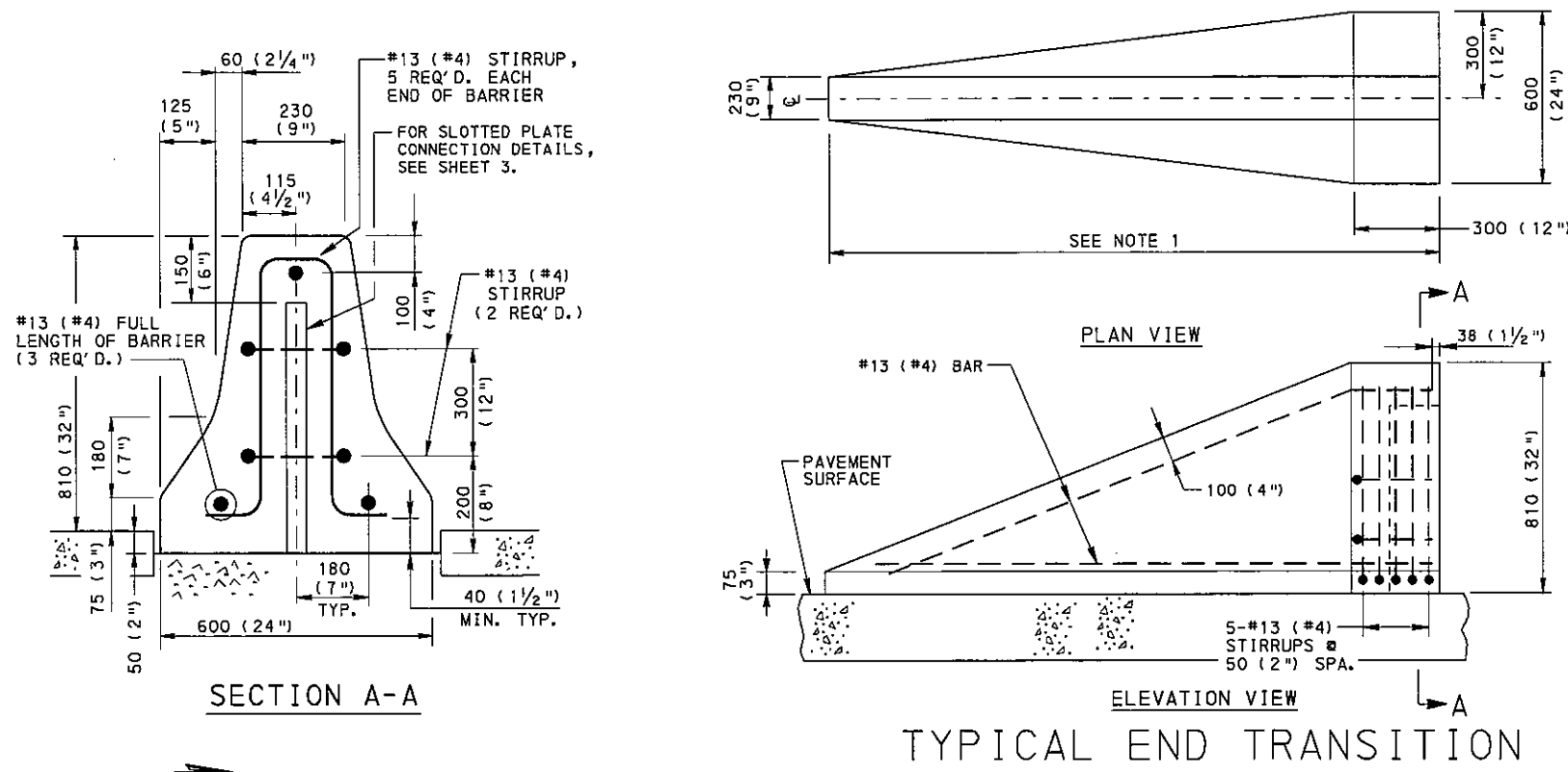


NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

**CONCRETE MEDIAN BARRIER**  
**F-SHAPE**

BC-736M	REINFORCEMENT BAR FABRICATION DETAILS	RECOMMENDED MAR. 30, 2006	RECOMMENDED MAR. 30, 2006	SHT 1 OF 8
REFERENCE DRAWINGS		<i>Scott Christen</i> DIRECTOR, BUREAU OF DESIGN	<i>M. Hotel</i> CHIEF ENGINEER	RC-57M



WWF REPLACES THE #13 (#4) FULL LENGTH REBARS USED IN THE REBAR ALTERNATE. ALL OTHER DIMENSIONS ARE TYPICAL TO THE REBAR ALTERNATE.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**NOTES**

1. A TYPICAL END TRANSITION MAY BE USED FOR PERMANENT BARRIER INSTALLATIONS ONLY WHEN THE LAST BARRIER SECTION IS LOCATED OUTSIDE THE REQUIRED CLEAR ZONE, AS DETERMINED IN PUBLICATION 13M, DESIGN MANUAL, PART 2, CHAPTER 12. A 20:1 SLOPED END TRANSITION IS ACCEPTABLE FOR PERMANENT INSTALLATIONS WHERE THE LEGAL SPEED LIMIT IS 60 km/h (35 mph) OR LESS; OTHERWISE, USE AN IMPACT ATTENUATING DEVICE. WHEN CONCRETE BARRIER IS TERMINATED AT THE END OF PARALLEL RAMP OR T INTERSECTIONS, A 2.1 m (7'-0") END TRANSITION MAY BE USED WHERE THE LEGAL SPEED IS 60 km/h (35 mph) OR LESS. FOR BARRIER INSTALLATIONS, AN IMPACT ATTENUATING DEVICE IS NOT REQUIRED IF ANY OF THE FOLLOWING CONDITIONS ARE SATISFIED:
  - (A) THE BARRIER IS EXTENDED AT THE PROPER FLARE RATE UNTIL THE END OF THE BARRIER SYSTEM IS LOCATED OUTSIDE THE REQUIRED CLEAR ZONE AS DETERMINED IN PUBLICATION 13M, DESIGN MANUAL, PART 2, CHAPTER 12.
  - (B) THE BARRIER IS EXTENDED AT THE PROPER FLARE RATE UNTIL THE END OF THE BARRIER SYSTEM CAN BE BURIED IN A CUT SECTION.
  - (C) THE BARRIER IS EXTENDED AT THE PROPER FLARE RATE UNTIL THE END OF THE BARRIER SYSTEM IS PROPERLY CONNECTED OR OVERLAPPED WITH EXISTING GUIDE RAIL.
2. PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING, INSTALLING AND REMOVING PRECAST CONCRETE BARRIER. GALVANIZE METAL DEVICES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(s).
3. PROVIDE REINFORCEMENT STEEL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709 WITH A MINIMUM CONCRETE COVER OF 40 (1 1/2").
4. EPOXY COATED REINFORCEMENT IS NOT REQUIRED WHEN PRECAST CONCRETE MEDIAN BARRIER IS TO BE USED IN TEMPORARY INSTALLATION ONLY, IN ACCORDANCE WITH SECTION 627, AND IDENTIFIED AS SUCH, AS SPECIFIED IN SECTION 714.6(c).
5. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.

REFER TO TABLE 1, SHEET 3, FOR FLARE RATE REQUIREMENTS.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER  
F-SHAPE

RECOMMENDED MAR. 30, 2006

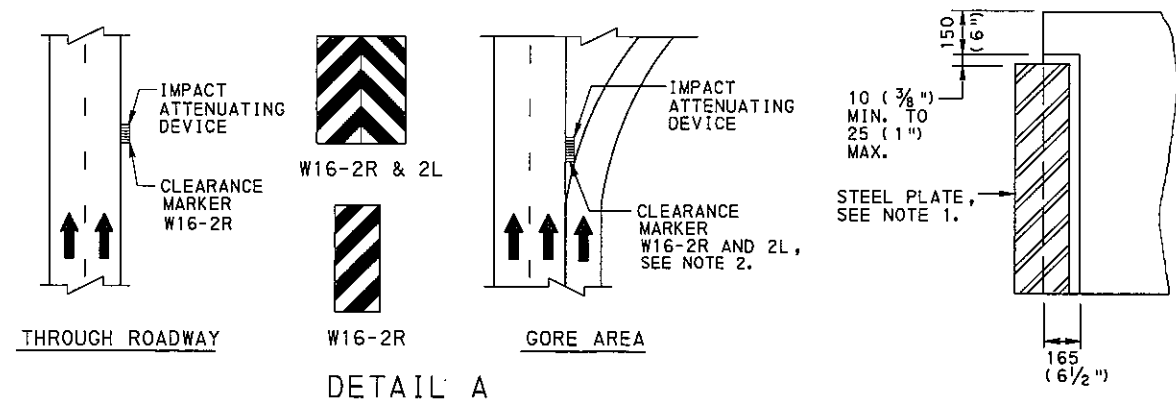
*Scott Christie*  
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006

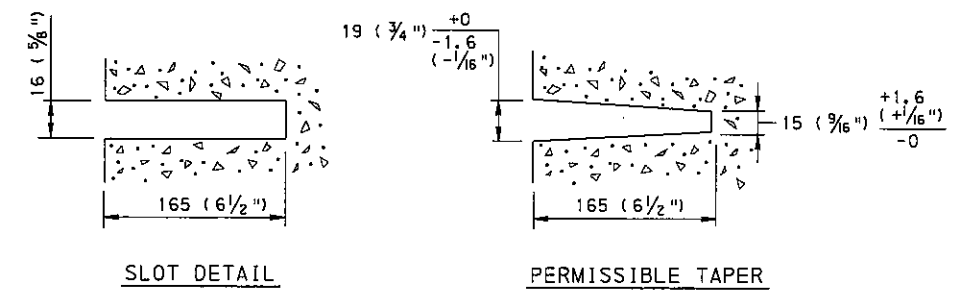
*M. Chel*  
CHIEF ENGINEER

SHT 2 OF 8

RC-57M



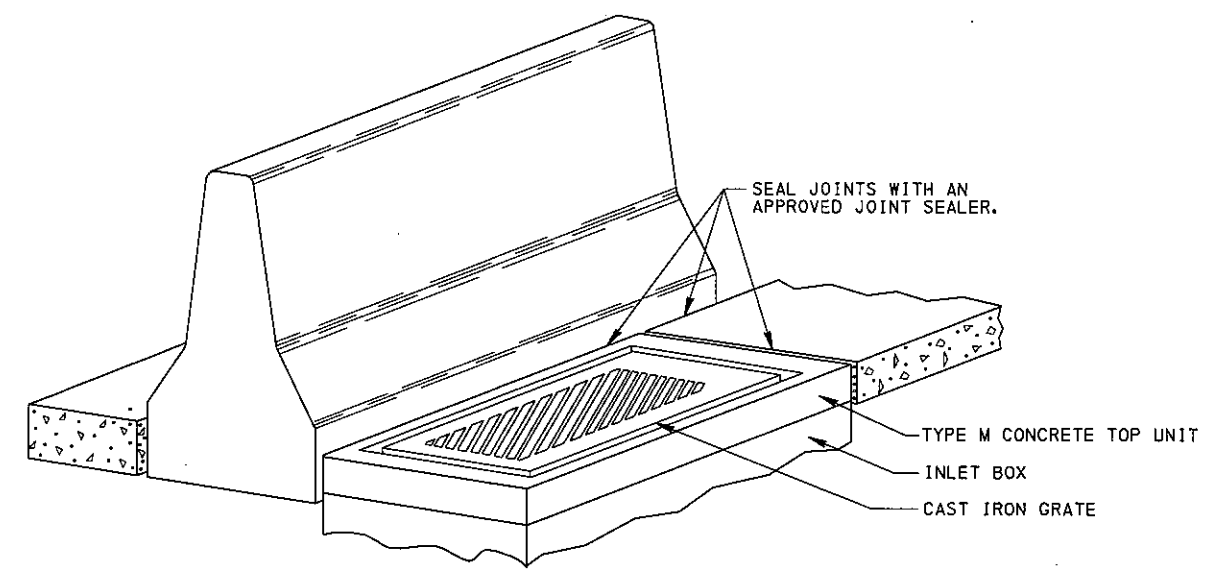
DETAIL A  
DELINEATION OF IMPACT ATTENUATING DEVICES



SLOTTED PLATE CONNECTION

NOTES

1. PROVIDE PLATES, 13 x 305 x 685 (1/2" x 12" x 27"), MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.02(s). GALVANIZE PLATES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(s).
2. PROVIDE VERTICAL RECTANGLE, STANDARD ALUMINUM, PRESSURE SENSITIVE CLEARANCE MARKERS, W16-2R AND/OR W16-2L, FABRICATED FROM CLASS II SHEETING MATERIAL, FOR DELINEATION OF IMPACT ATTENUATING DEVICES AS PRESENTED IN DETAIL A. ATTACH MARKERS DIRECTLY TO THE LEADING END OF IMPACT ATTENUATING DEVICES. ON INERTIAL BARRIERS (SAND BARRELS), PROVIDE SENSITIVE SHEETING, WITHOUT RIGID BACKING, DIRECTLY TO BARRIER FRONT OR NOSE SECTION. DO NOT POST-MOUNT MARKERS IN FRONT OF IMPACT ATTENUATING DEVICES. MARKERS ARE PROVIDED IN TWO SIZES: 305 x 914 (12" x 36") AND 457 x 914 (18" x 36"). WHEN ONE MARKER IS REQUIRED, USE 457 x 914 (18" x 36"). WHEN TWO MARKERS ARE REQUIRED SIDE BY SIDE, USE 305 x 914 (12" x 36"). PROVIDE COLOR FOR CLEARANCE MARKERS AS FOLLOWS:  
 (A) MESSAGE : BLACK STRIPES (NON-REFLECTORIZED)  
 (B) FIELD : YELLOW (REFLECTORIZED)  
 ORANGE (REFLECTORIZED), CONSTRUCTION ZONES



TYPICAL INLET PLACEMENT AT  
CONCRETE MEDIAN BARRIER

TABLE 1  
FLARE RATES FOR BARRIER DESIGN

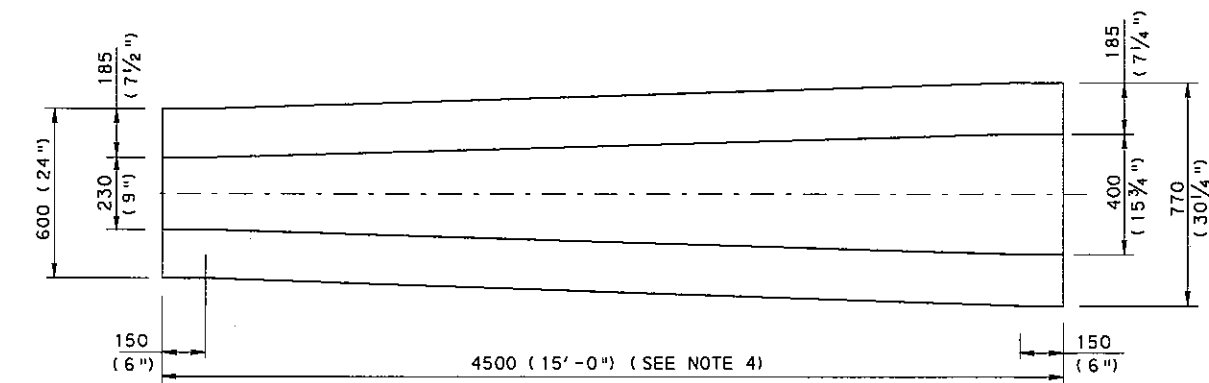
DESIGN SPEED		MAXIMUM FLARE RATES	
km/h	mph	CONCRETE BARRIER	GUIDE RAIL
120	75	20 : 1	15 : 1
110	70	20 : 1	15 : 1
105	65	19 : 1	15 : 1
100	60	18 : 1	14 : 1
90	55	16 : 1	12 : 1
80	50	14 : 1	11 : 1
70	45	12 : 1	10 : 1
65	40	11 : 1	9 : 1
60	35	10 : 1	8 : 1
50	30	8 : 1	7 : 1

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

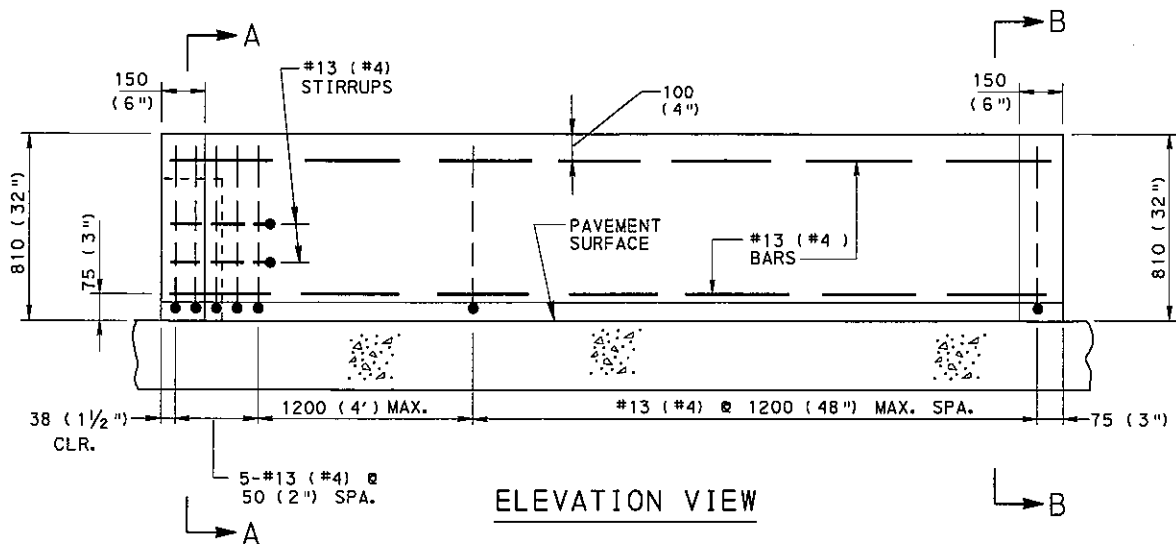
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
 BUREAU OF DESIGN

**CONCRETE MEDIAN BARRIER**  
**F-SHAPE**

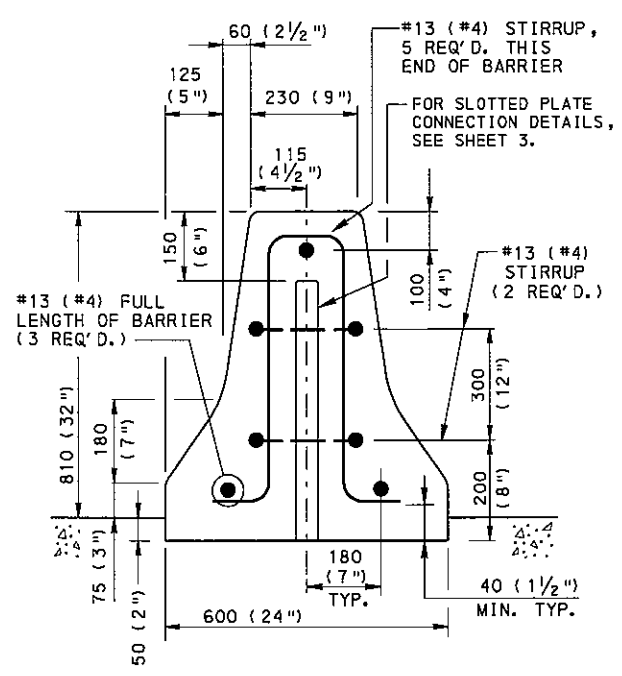
RECOMMENDED MAR. 30, 2006 <i>Scott Christian</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Skelton</i> CHIEF ENGINEER	SHT 3 OF 8 RC-57M
---	--	----------------------



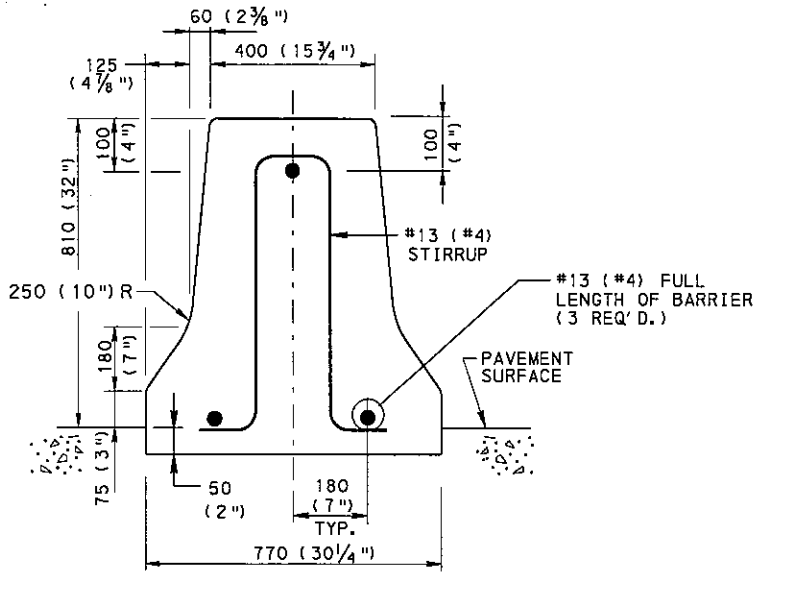
PLAN VIEW



ELEVATION VIEW



SECTION A-A

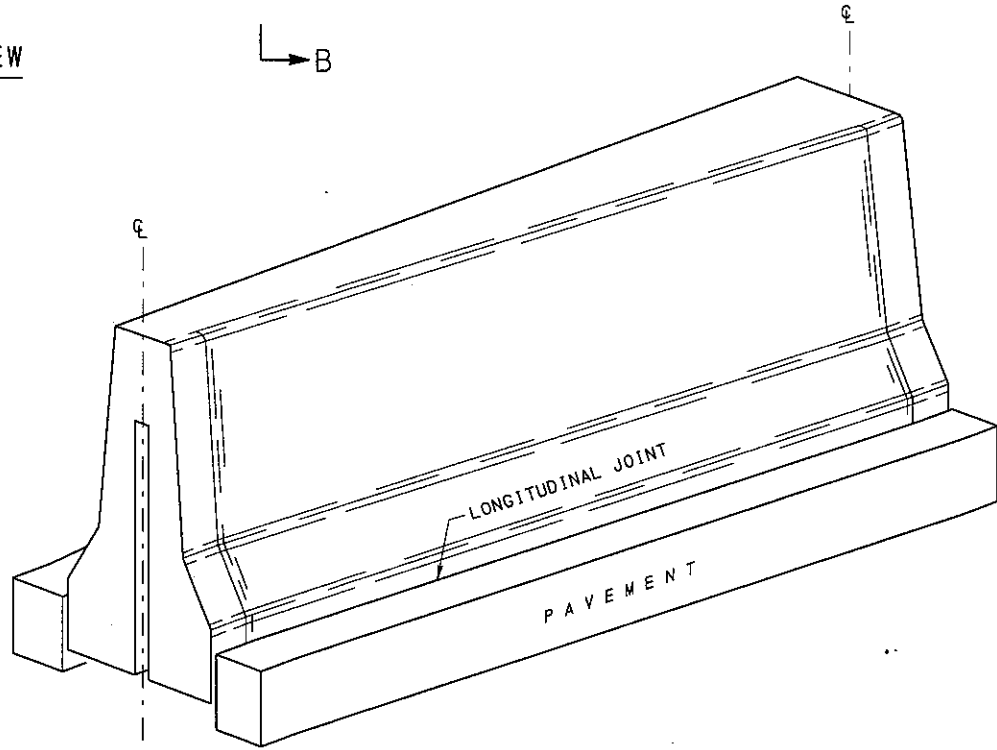


SECTION B-B

(ADJACENT TO BRIDGE WITH CONCRETE MEDIAN BARRIER)

NOTES

1. PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709.
2. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
3. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.
4. BRIDGE TO HIGHWAY TRANSITIONS MAY BE FORMED BY USING TWO 2250 (7'-6") OR TWO 3600 (12'-0") SECTIONS WITH SLOTTED PLATE CONNECTIONS.



ORTHOGRAPHIC VIEW

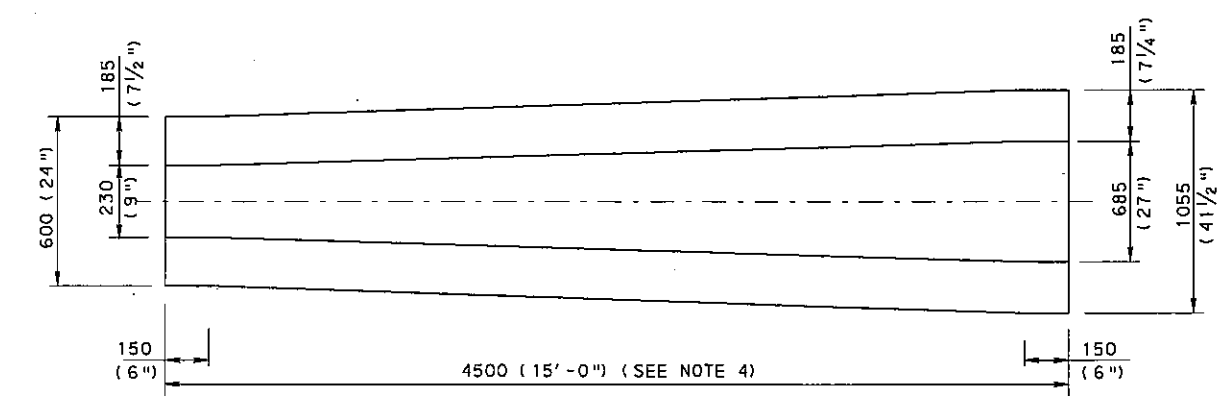
TYPICAL 810 TO 810 (32" TO 32")

BRIDGE TO HIGHWAY TRANSITION

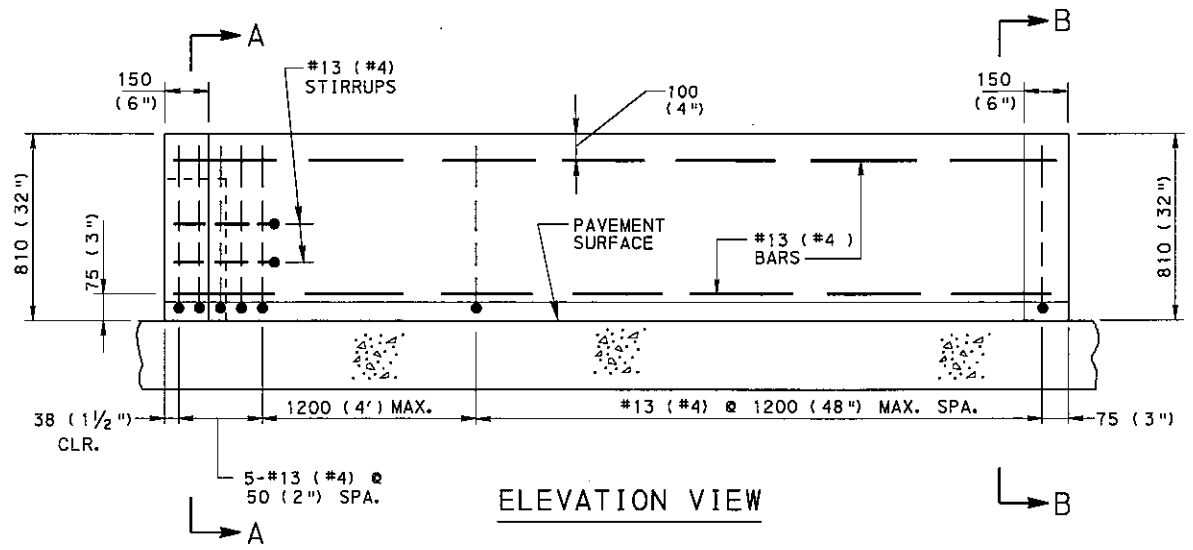
(THE BRIDGE BARRIER IS A CONCRETE MEDIAN BARRIER)

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

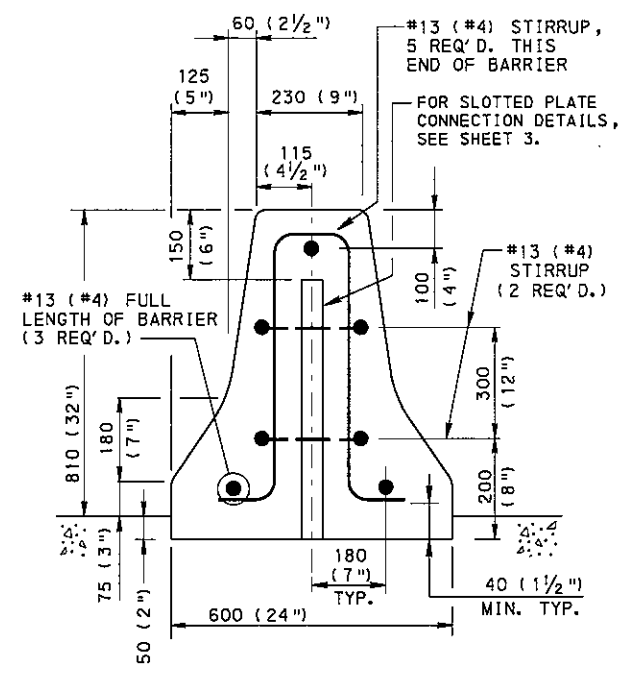
<b>COMMONWEALTH OF PENNSYLVANIA</b> <b>DEPARTMENT OF TRANSPORTATION</b> BUREAU OF DESIGN		
<b>CONCRETE MEDIAN BARRIER</b> <b>F-SHAPE</b>		
RECOMMENDED MAR. 30, 2006 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Chitel</i> CHIEF ENGINEER	SHT 4 OF 8 <b>RC-57M</b>



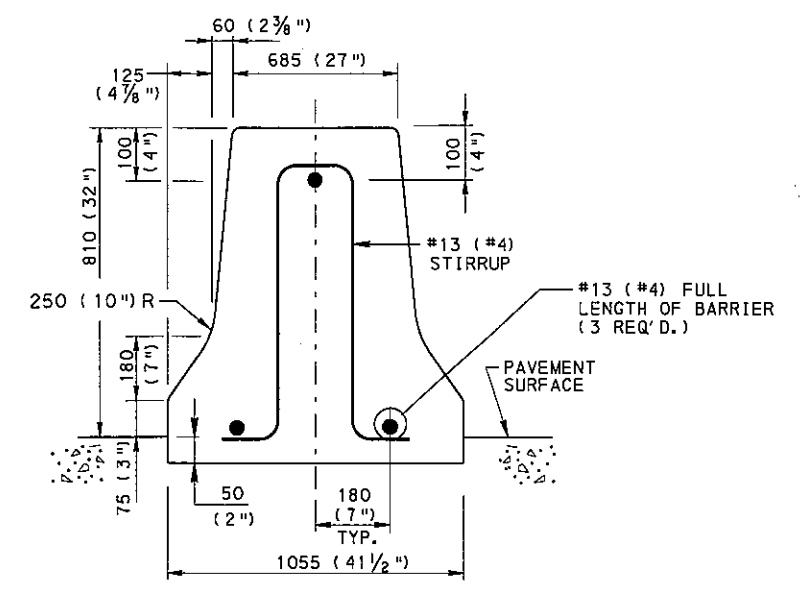
PLAN VIEW



ELEVATION VIEW



SECTION A-A



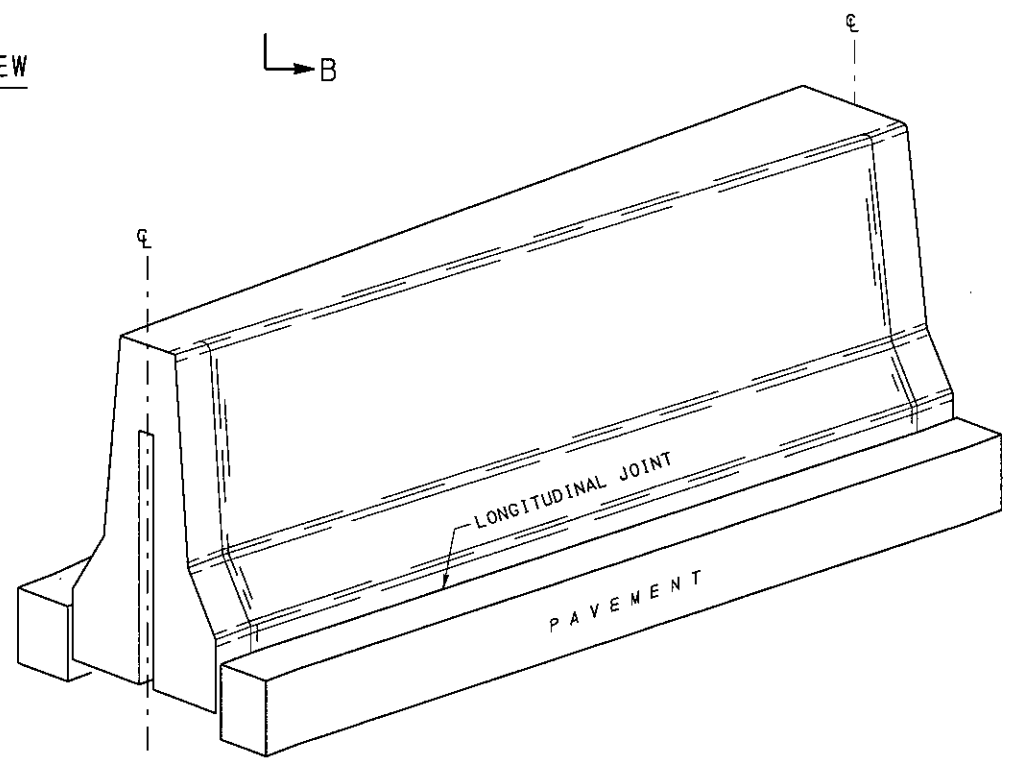
SECTION B-B

(ADJACENT TO BRIDGE WITH SPLIT CONCRETE MEDIAN BARRIER)

NOTES

1. PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709.
2. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
3. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.
4. BRIDGE TO HIGHWAY TRANSITIONS MAY BE FORMED BY USING TWO 2250 (7'-6") OR TWO 3600 (12'-0") SECTIONS WITH SLOTTED PLATE CONNECTIONS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



ORTHOGRAPHIC VIEW

TYPICAL 810 TO 810 (32" TO 32")

BRIDGE TO HIGHWAY TRANSITION

(THE BRIDGE BARRIER IS A SPLIT CONCRETE MEDIAN BARRIER)

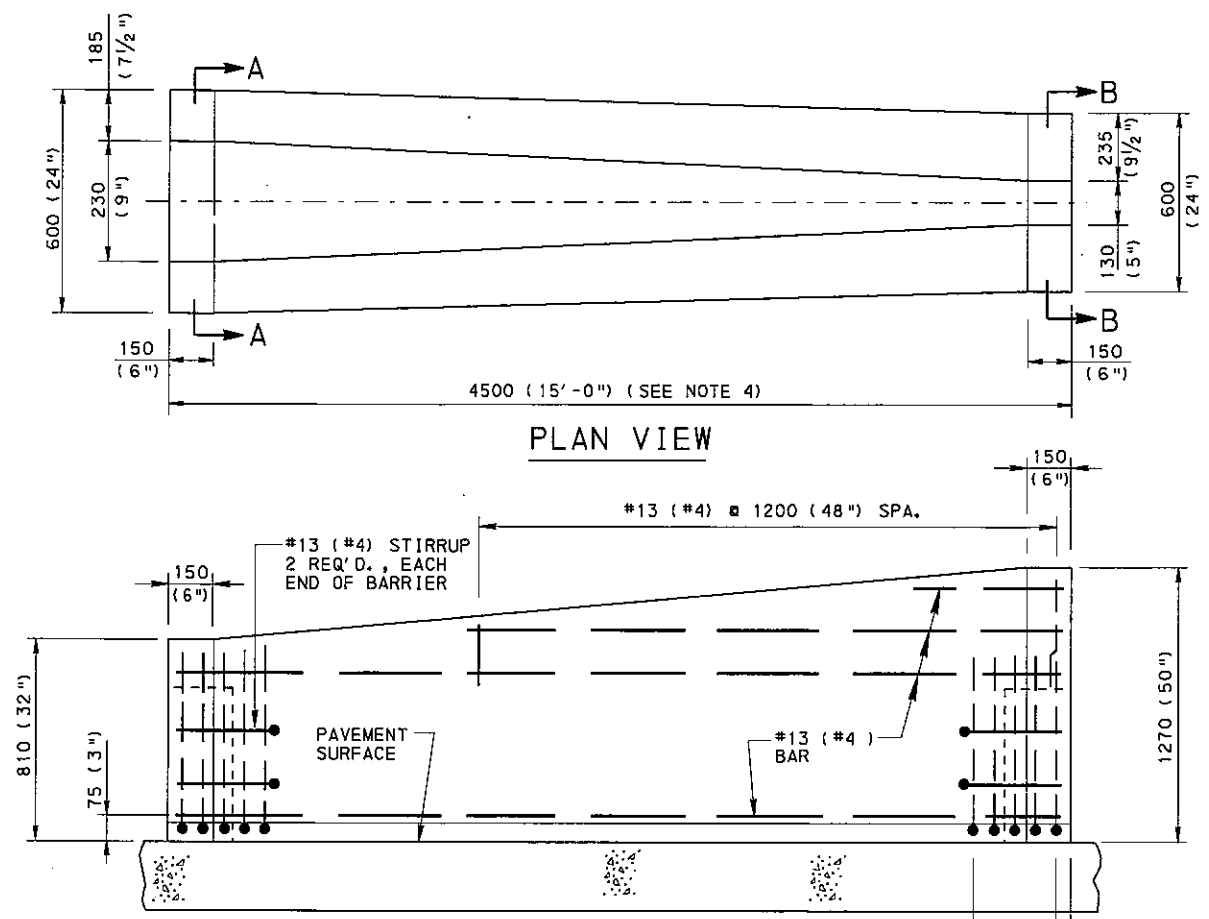
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER  
F-SHAPE

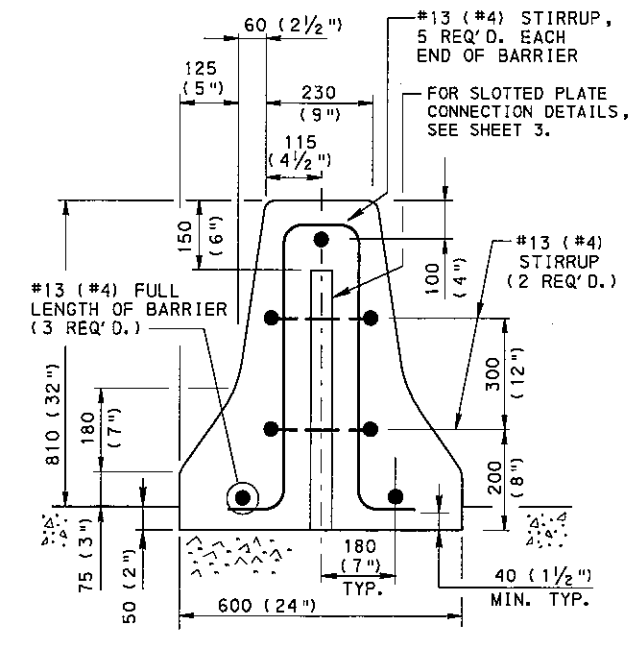
RECOMMENDED MAR. 30, 2006  
*Scott Christen*  
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006  
*M. Chell*  
CHIEF ENGINEER

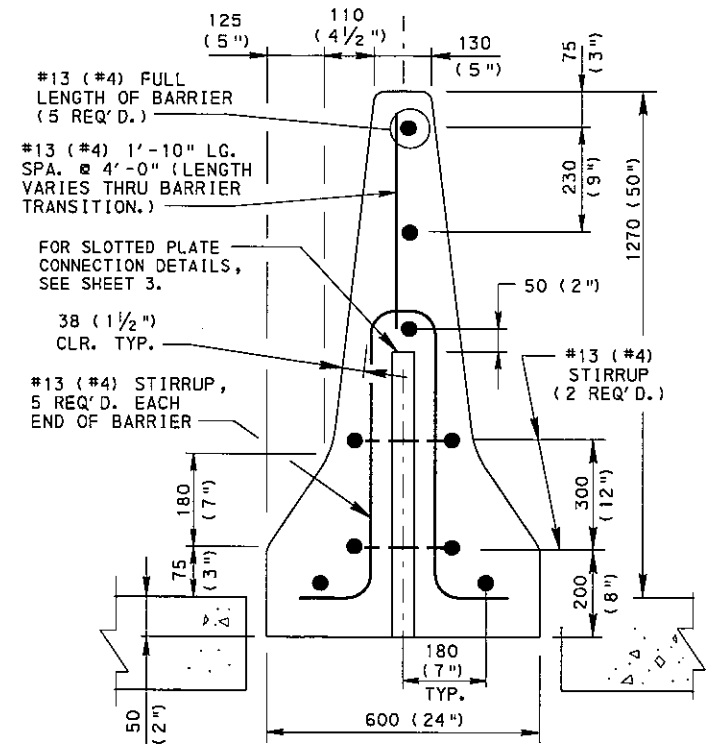
SHT 5 OF 8  
RC-57M



ELEVATION VIEW



SECTION A-A

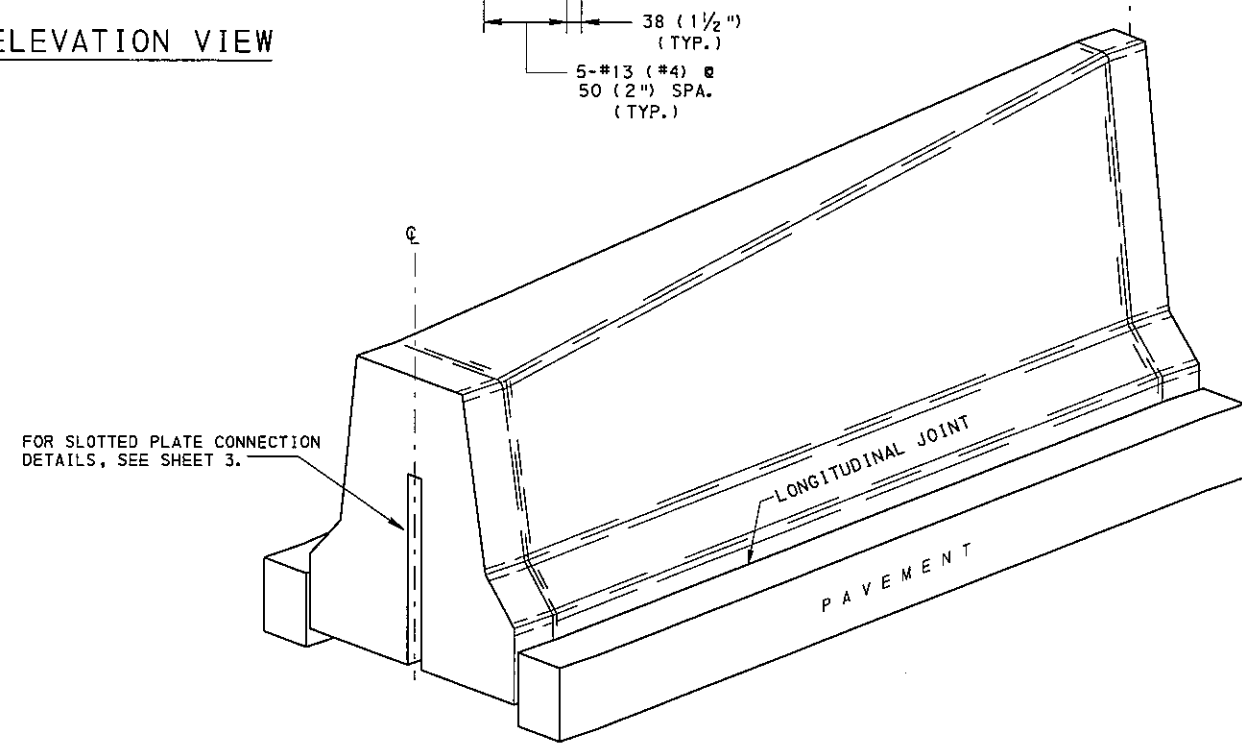


SECTION B-B

NOTES

1. PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709 WITH A MINIMUM CONCRETE COVER OF 40 (1 1/2").
2. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
3. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.
4. BRIDGE TO HIGHWAY TRANSITIONS MAY BE FORMED BY USING TWO 2250 (7'-6") OR TWO 3600 (12'-0") SECTIONS WITH SLOTTED PLATE CONNECTIONS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



ORTHOGRAHIC VIEW

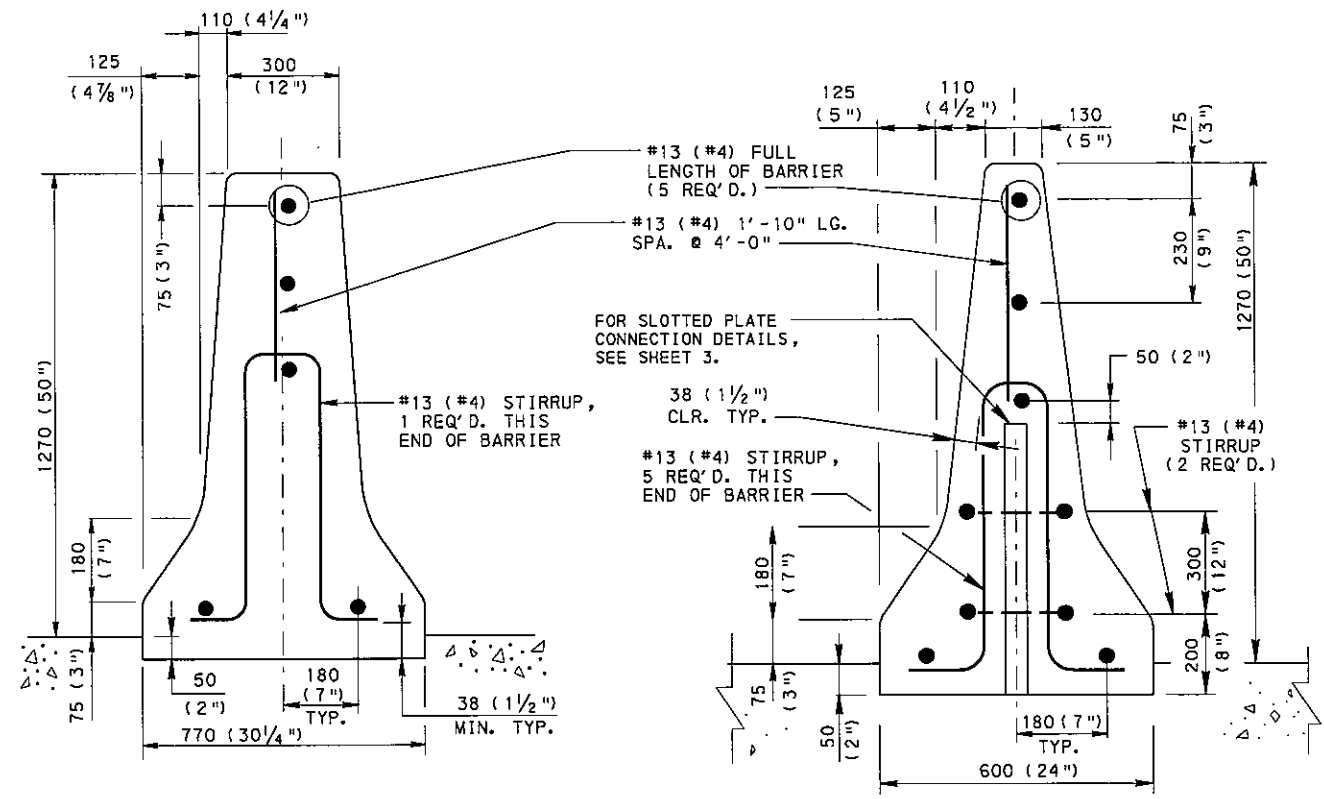
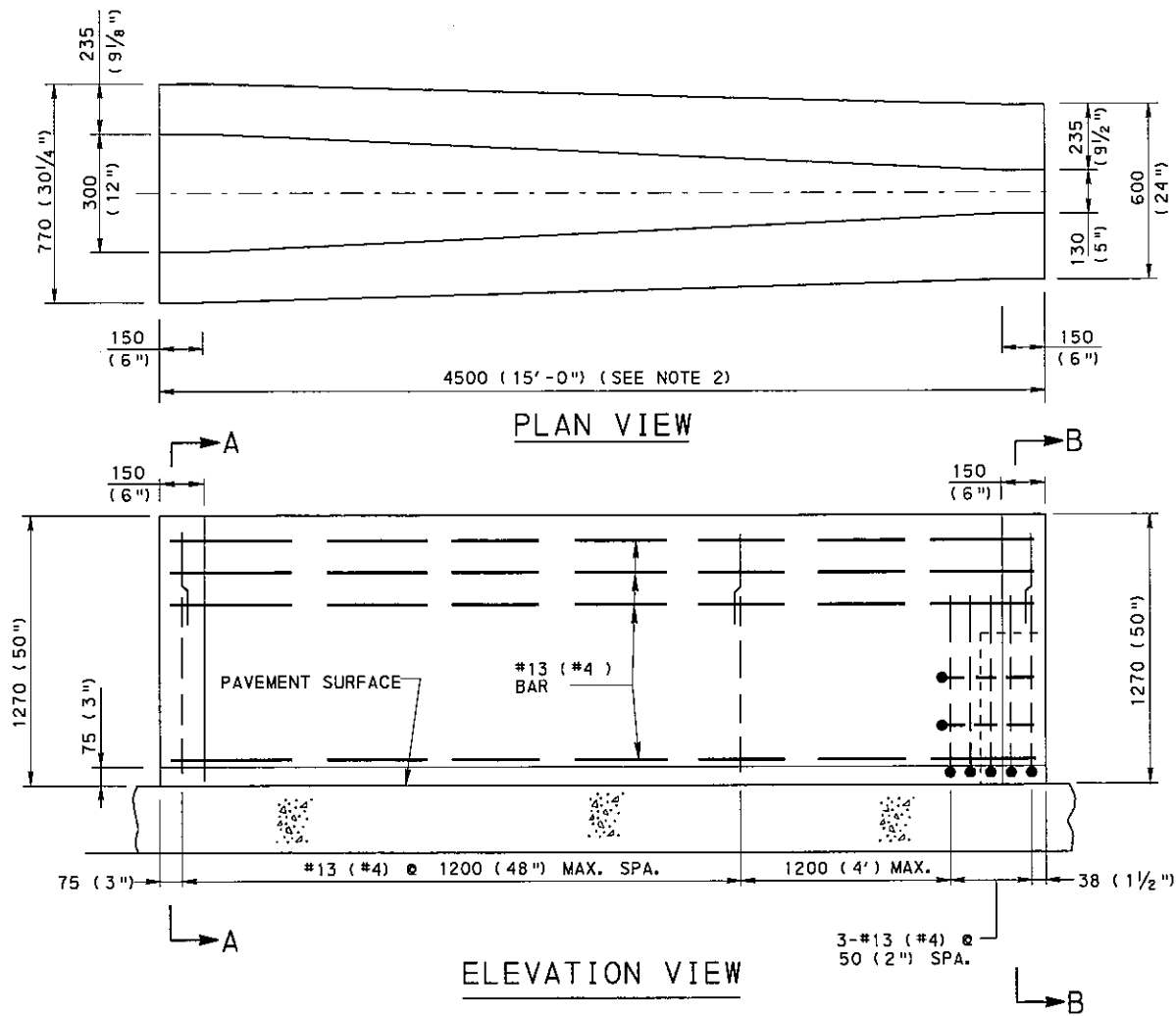
TYPICAL 810 TO 1270 (32" TO 50") HIGHWAY TRANSITION

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER  
F-SHAPE

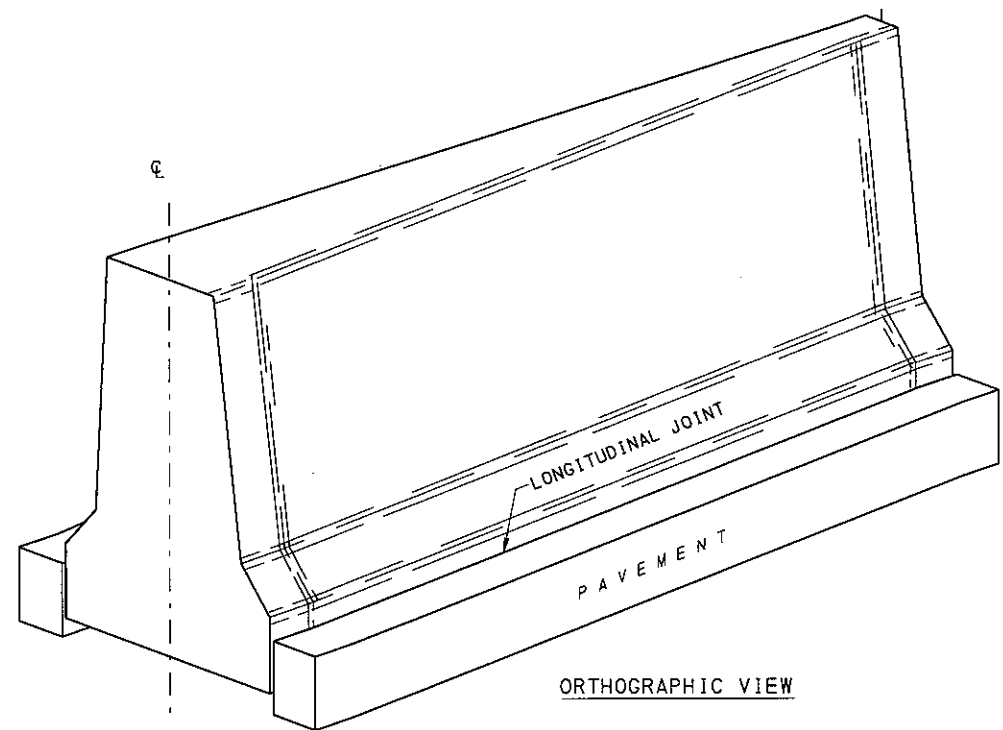
RECOMMENDED MAR. 30, 2006 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Chel</i> CHIEF ENGINEER	SHT 6 OF 8 RC-57M
--	---	----------------------





SECTION A-A  
(ADJACENT TO BRIDGE WITH CONCRETE GLARE SCREEN MEDIAN BARRIER)

ELEVATION VIEW



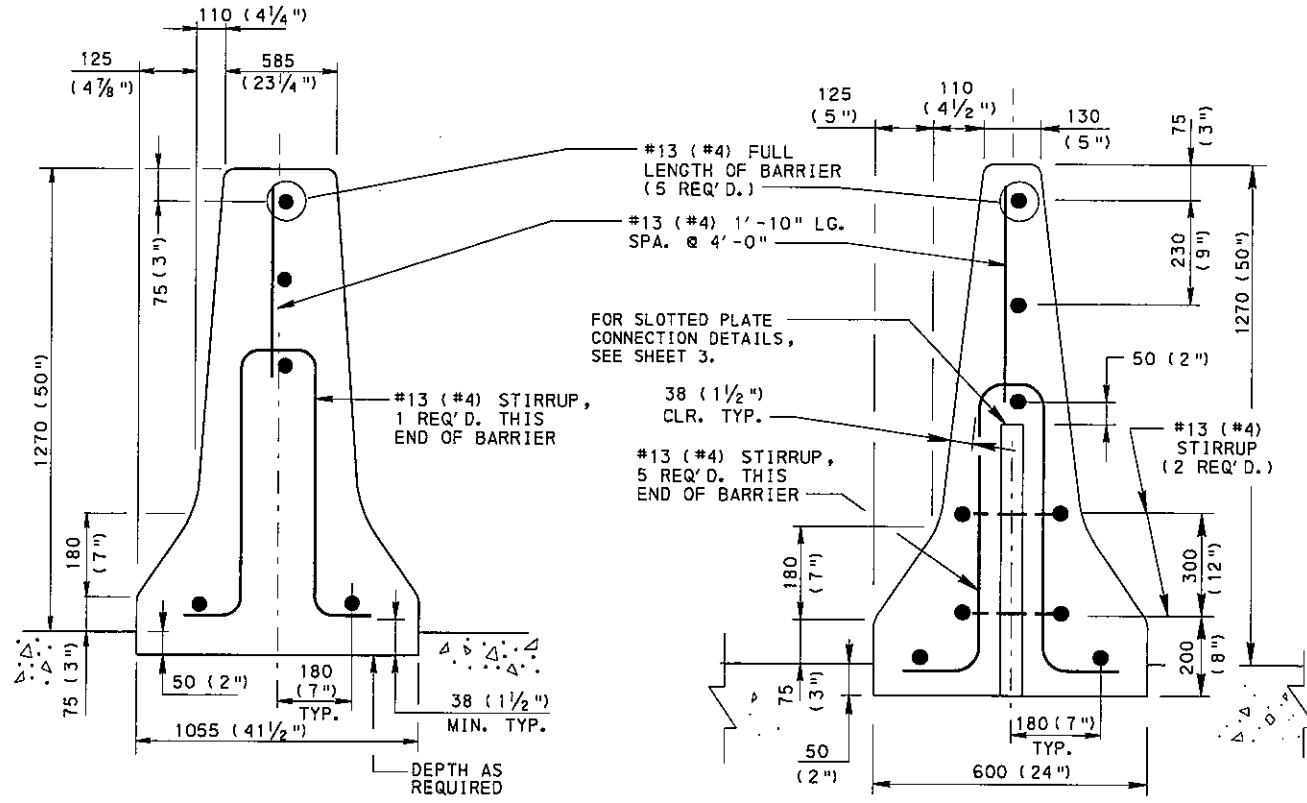
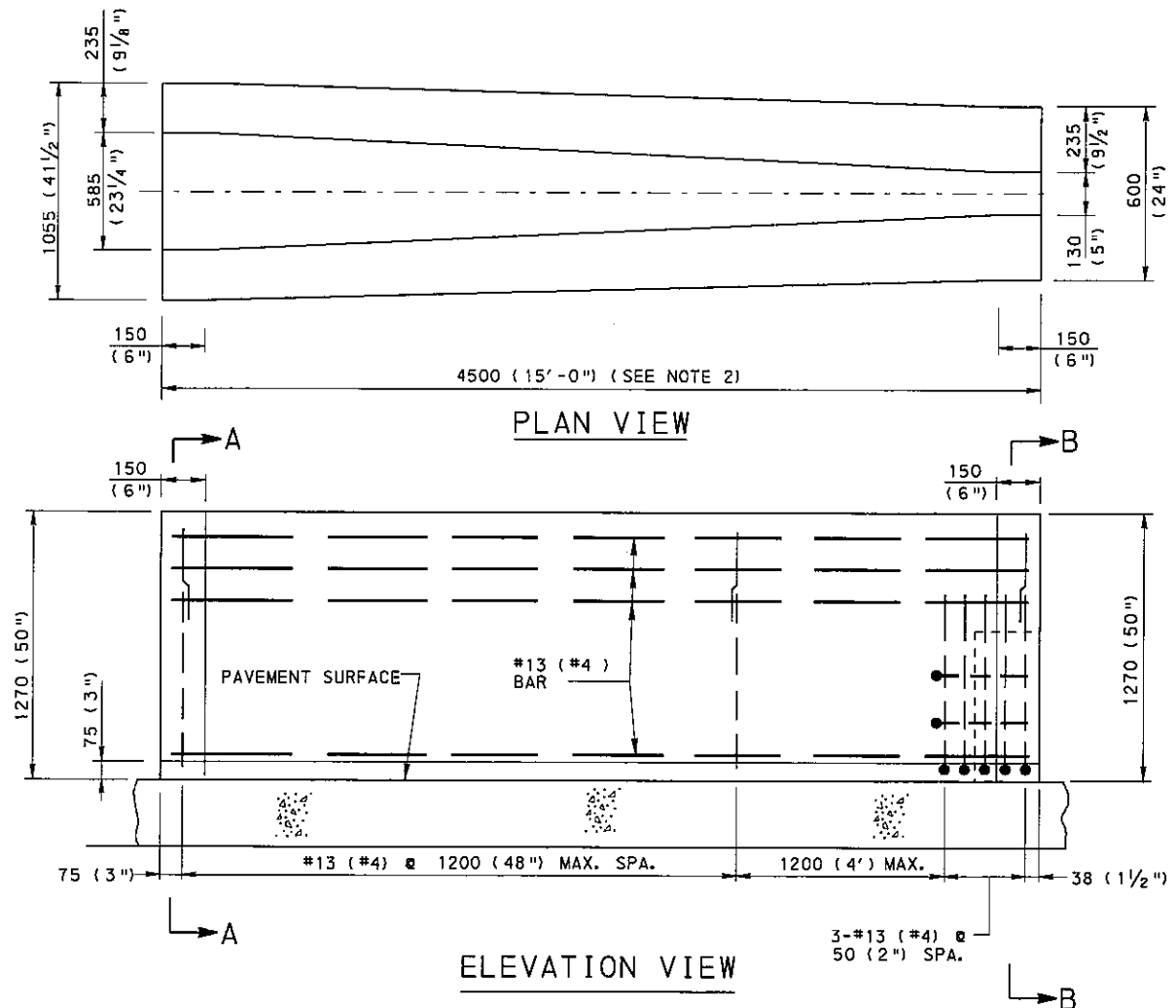
TYPICAL 1270 TO 1270 (50" TO 50") TRANSITION  
BRIDGE TO HIGHWAY TRANSITION  
(THE BRIDGE BARRIER IS A CONCRETE GLARE SCREEN MEDIAN BARRIER)

**NOTE**

1. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.
2. BRIDGE TO HIGHWAY TRANSITIONS MAY BE FORMED BY USING TWO 2250 (7'-6") OR TWO 3600 (12'-0") SECTIONS WITH SLOTTED PLATE CONNECTIONS.

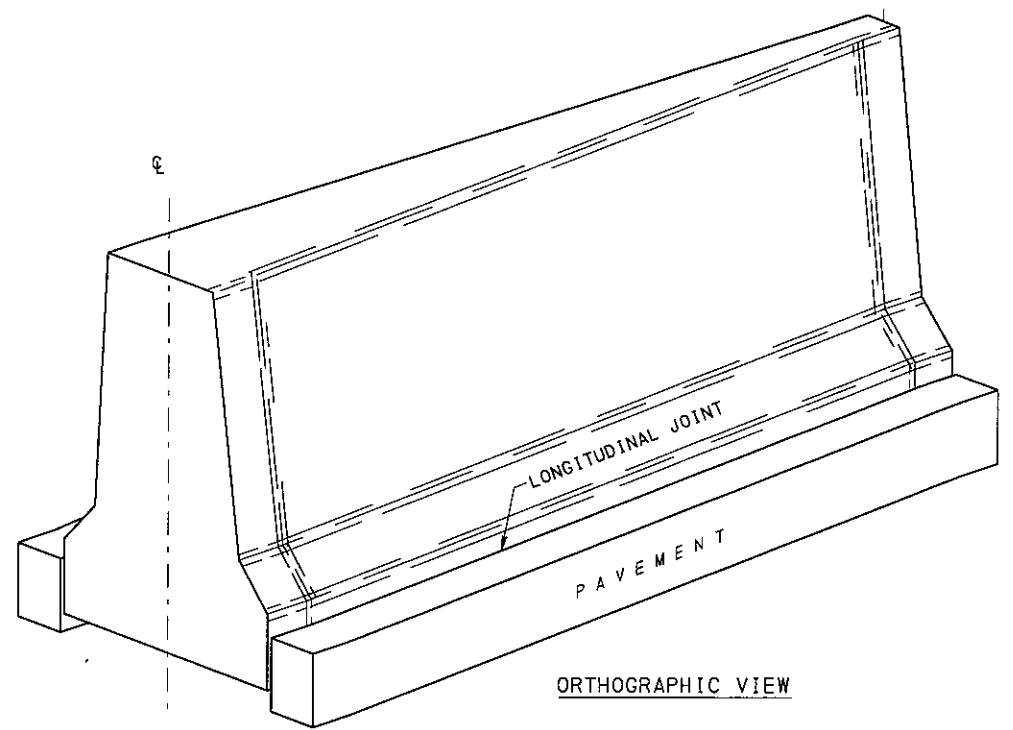
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

<b>COMMONWEALTH OF PENNSYLVANIA</b> <b>DEPARTMENT OF TRANSPORTATION</b> BUREAU OF DESIGN		
<b>CONCRETE MEDIAN BARRIER</b> <b>F-SHAPE</b>		
RECOMMENDED MAR. 30, 2006 <i>Scott Christian</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Chate</i> CHIEF ENGINEER	SHT 7 OF 8 <b>RC-57M</b>



SECTION A-A  
(ADJACENT TO BRIDGE WITH SPLIT CONCRETE GLARE SCREEN MEDIAN BARRIER)

SECTION B-B



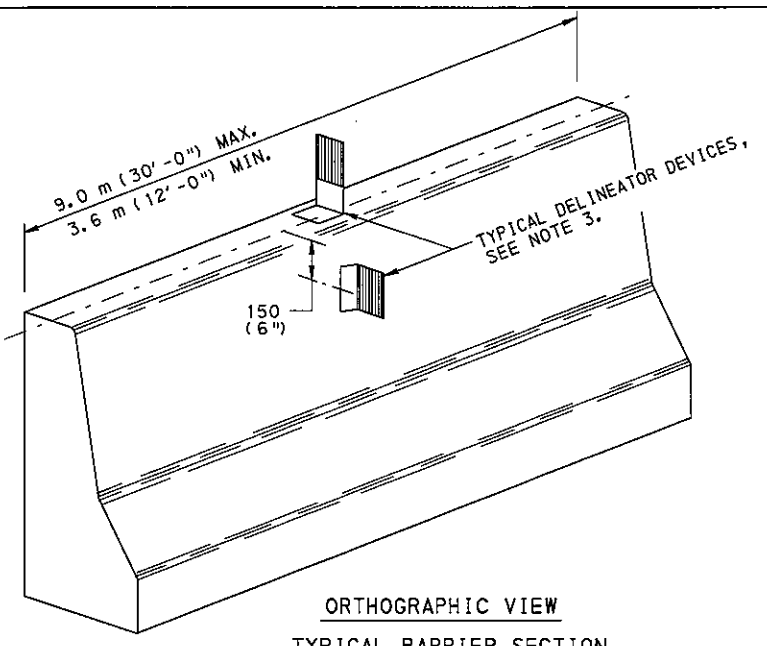
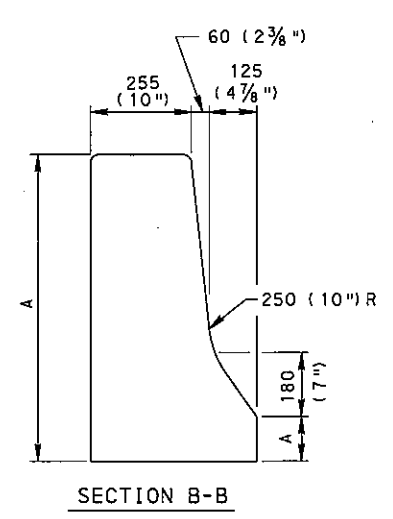
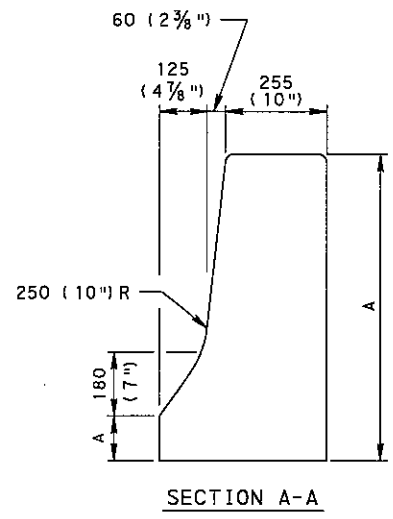
ORTHOGRAPHIC VIEW  
TYPICAL 1270 TO 1270 (50" TO 50") TRANSITION  
BRIDGE TO HIGHWAY TRANSITION  
(THE BRIDGE BARRIER IS A SPLIT CONCRETE GLARE SCREEN MEDIAN BARRIER)

NOTE

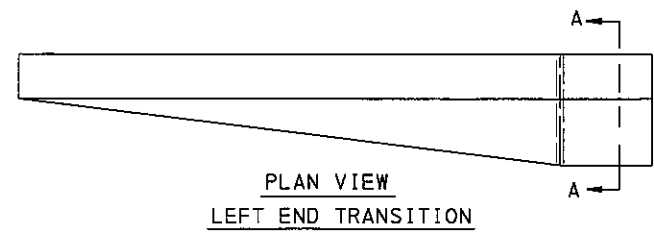
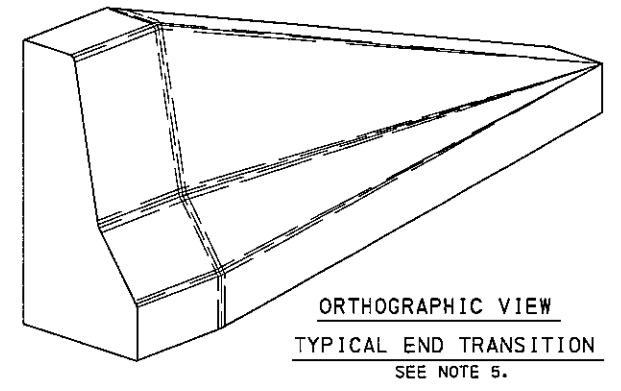
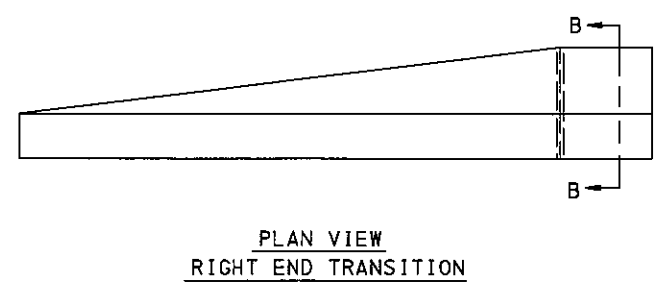
1. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.
2. BRIDGE TO HIGHWAY TRANSITIONS MAY BE FORMED BY USING TWO 2250 (7'-6") OR TWO 3600 (12'-0") SECTIONS WITH SLOTTED PLATE CONNECTIONS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN		
CONCRETE MEDIAN BARRIER F-SHAPE		
RECOMMENDED MAR. 30, 2006 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Chitel</i> CHIEF ENGINEER	SHT 8 OF 8 RC-57M



NOTE:  
A = SEE TYPICAL SECTIONS,  
SHEET 2.



- NOTES**
1. PROVIDE SINGLE FACE CONCRETE BARRIER MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 623.  
A. MINIMUM CONCRETE CLASS: AA, EXCEPT USE CLASS AAA CONCRETE FOR PRECAST BARRIER.
  2. PROVIDE PRECAST SINGLE FACE CONCRETE BARRIER SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. MODIFICATIONS OR DEVIATIONS FROM THE STANDARD REQUIRE THE SUBMISSION OF SHOP DRAWINGS FOR REVIEW.
  3. PROVIDE BARRIER-MOUNT OR REFLECTOR UNIT DELINEATORS, AS INDICATED ON TC-8604.
  4. PROVIDE REINFORCEMENT FOR SINGLE FACE CONCRETE BARRIER AS INDICATED ON SHEET 2.
  5. PROVIDE END TRANSITIONS OR IMPACT ATTENUATING DEVICES AS INDICATED ON RC-57M.
  6. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
  7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.
  8. FABRICATE REINFORCEMENT BARS ACCORDING TO PENNDOT BRIDGE CONSTRUCTION STANDARD, BC-736M.
  9. TO LIMIT LATERAL DISPLACEMENT OF PORTABLE BARRIER WHEN USED IN WORK ZONES, PROVIDE A ROUGH FINISH AT THE BOTTOM SURFACE. BEFORE THE CONCRETE HAS INITIALLY SET, FINISH THE BOTTOM SURFACE WITH STIFF, WIRE BRUSH OR SPECIAL TEMPLATE IN A LONGITUDINAL DIRECTION TO PRODUCE SCORES APPROXIMATELY 4 (1/8") IN DEPTH.
  10. PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING, INSTALLING AND REMOVING PRECAST CONCRETE BARRIER. GALVANIZE METAL DEVICES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(g).

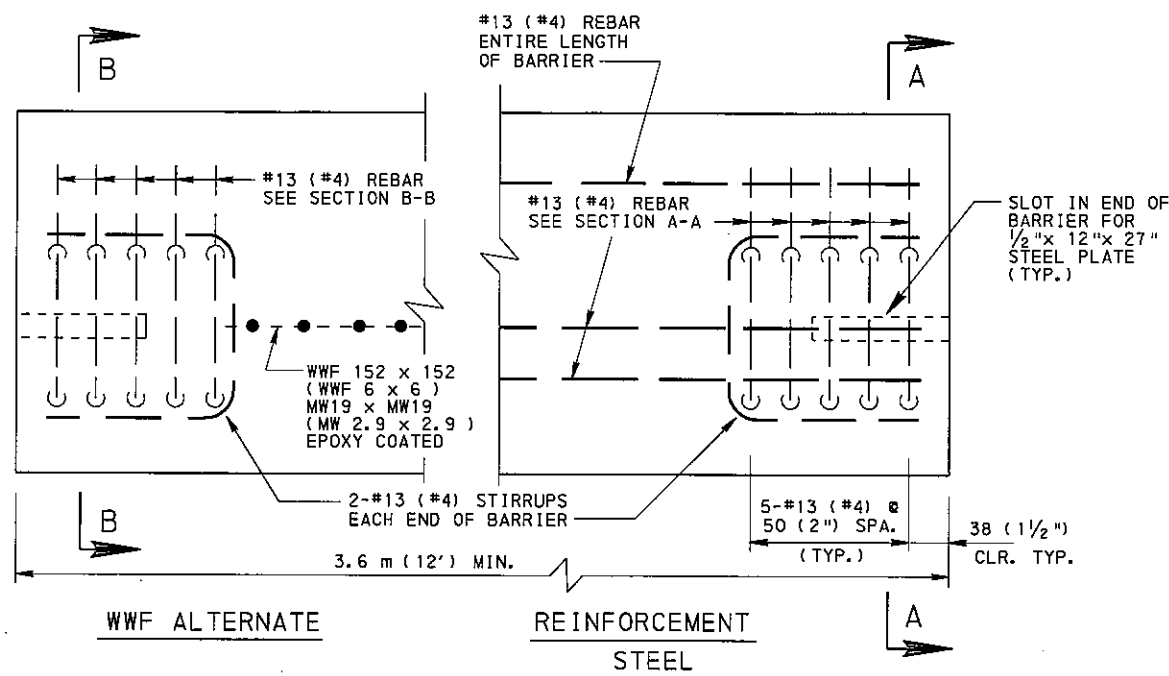
TYPICAL PRECAST OR CAST-IN-PLACE SINGLE FACE CONCRETE BARRIER

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

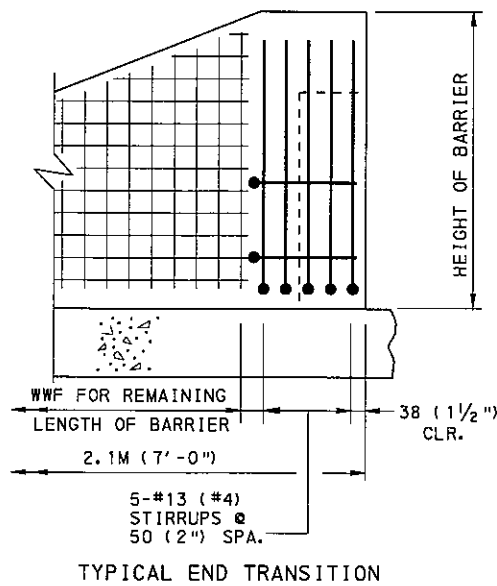
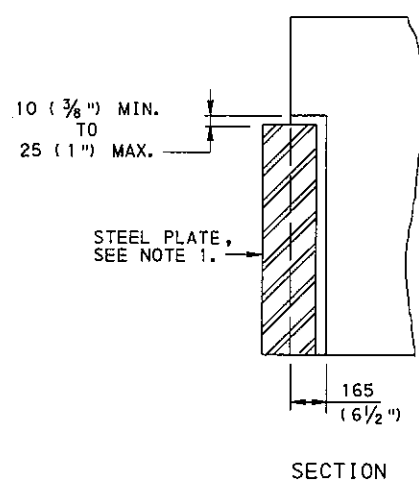
SINGLE FACE CONCRETE BARRIER

BC-736M	REINFORCEMENT BAR FABRICATION DETAILS	RECOMMENDED MAR. 30, 2006	RECOMMENDED MAR. 30, 2006	SHT 1 OF 5
REFERENCE DRAWINGS		<i>Scott Christian</i> DIRECTOR, BUREAU OF DESIGN	<i>M. Chitel</i> CHIEF ENGINEER	RC-58M

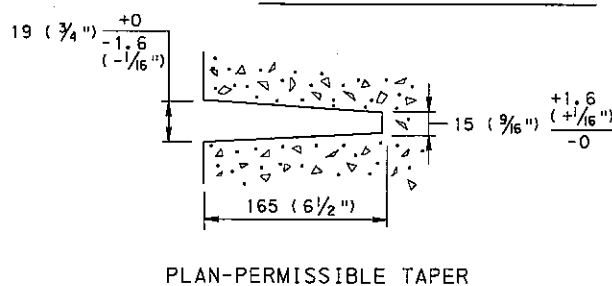
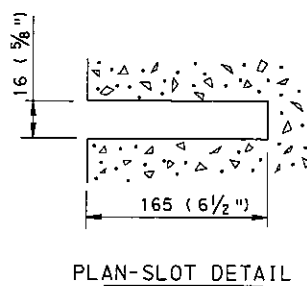


**BARRIER PLAN**

SHOWN WITH WWF ALTERNATE ON LEFT END OF BARRIER FOR DETAILING PURPOSES. BOTH ENDS OF BARRIER ARE TYPICAL.

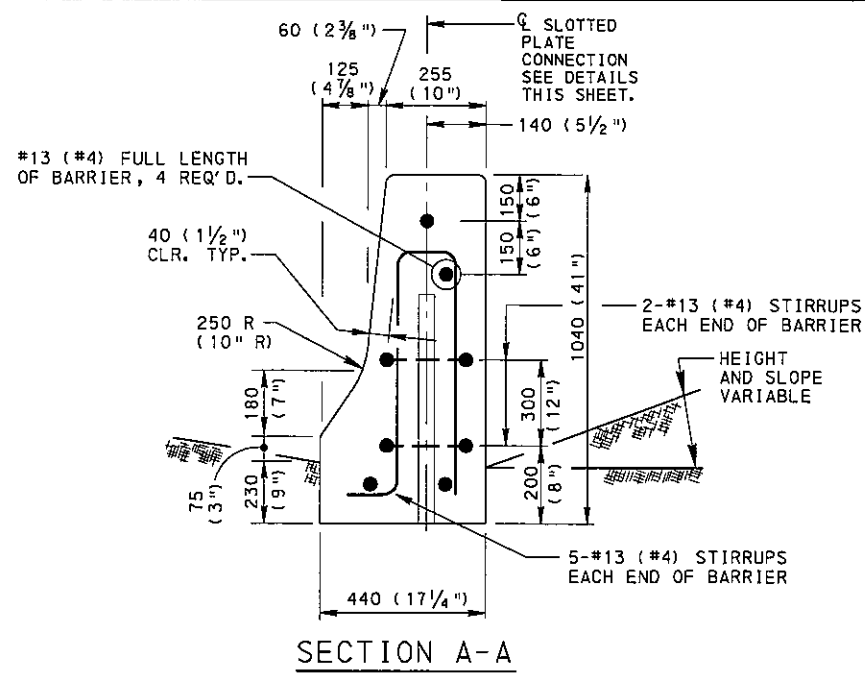


**TYPICAL END TRANSITION**

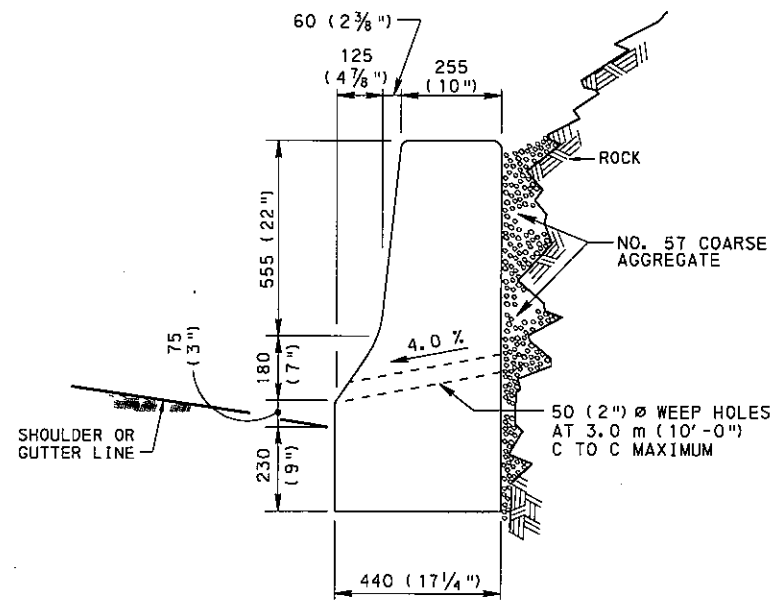
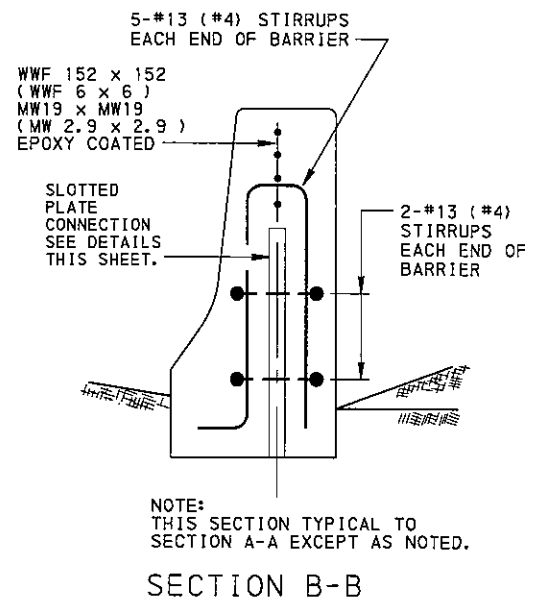


**SLOTTED PLATE CONNECTION**

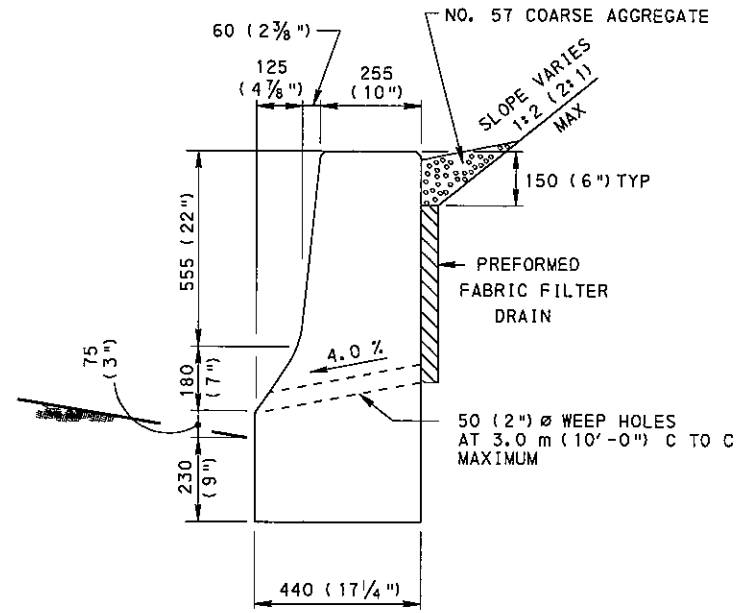
**TYPICAL SINGLE FACE BARRIER SECTIONS**



**SECTION A-A**



**TYPICAL ROUGH ROCK TREATMENT**



**TYPICAL DRAINAGE TREATMENT**

SEE NOTE 2.

**NOTES**

1. PROVIDE PLATES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105. GALVANIZE PLATES AS SPECIFIED IN PUBLICATION 408, SECTION 1105 ALTERNATE CONNECTIONS MAY BE USED AS APPROVED BY THE BUREAU OF DESIGN.
2. WHERE SINGLE FACE CONCRETE BARRIER IS SPECIFIED FOR USE AS A RETAINING WALL AND DRAINAGE TREATMENT IS NECESSARY, CONSTRUCT A PREFORMED FABRIC FILTER DRAIN AS INDICATED AND IN ACCORDANCE WITH PUBLICATION 408, SECTION 610. CHECK STABILITY OF BARRIER USED AS A RETAINING WALL AND PROVIDE COMPUTATION WITH THE CONSTRUCTION PLANS.
3. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.

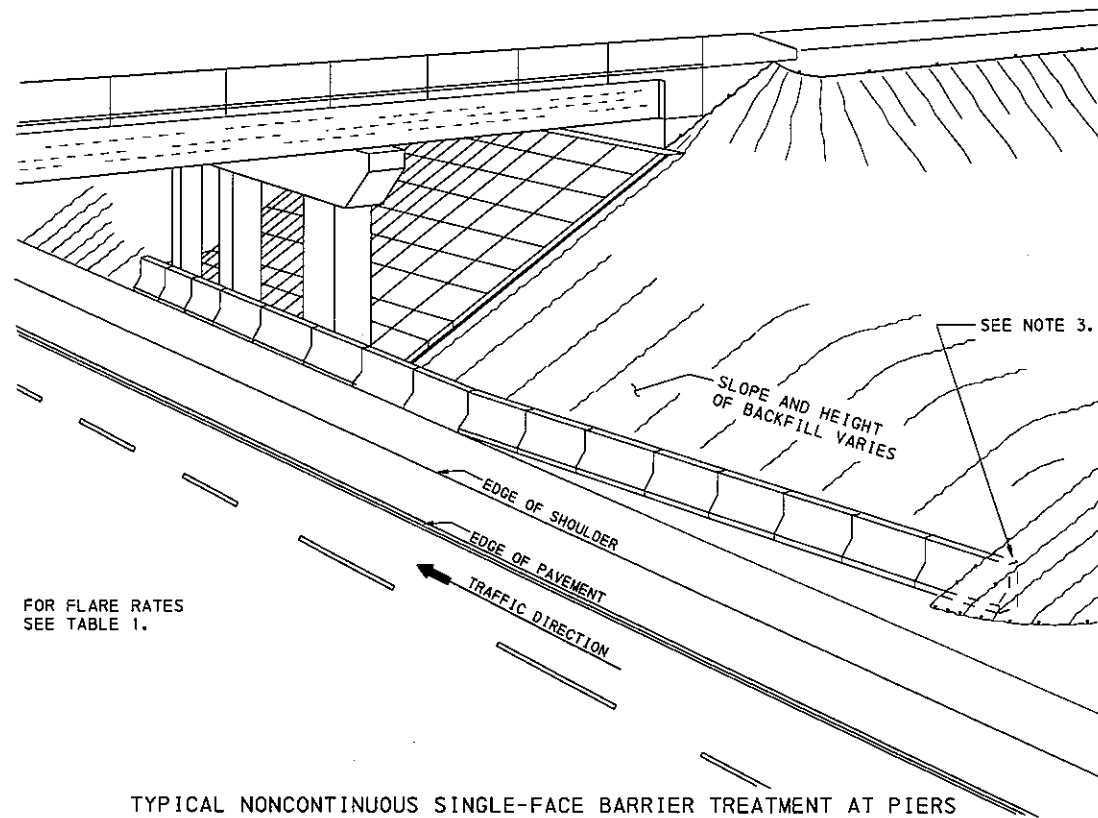
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
 BUREAU OF DESIGN

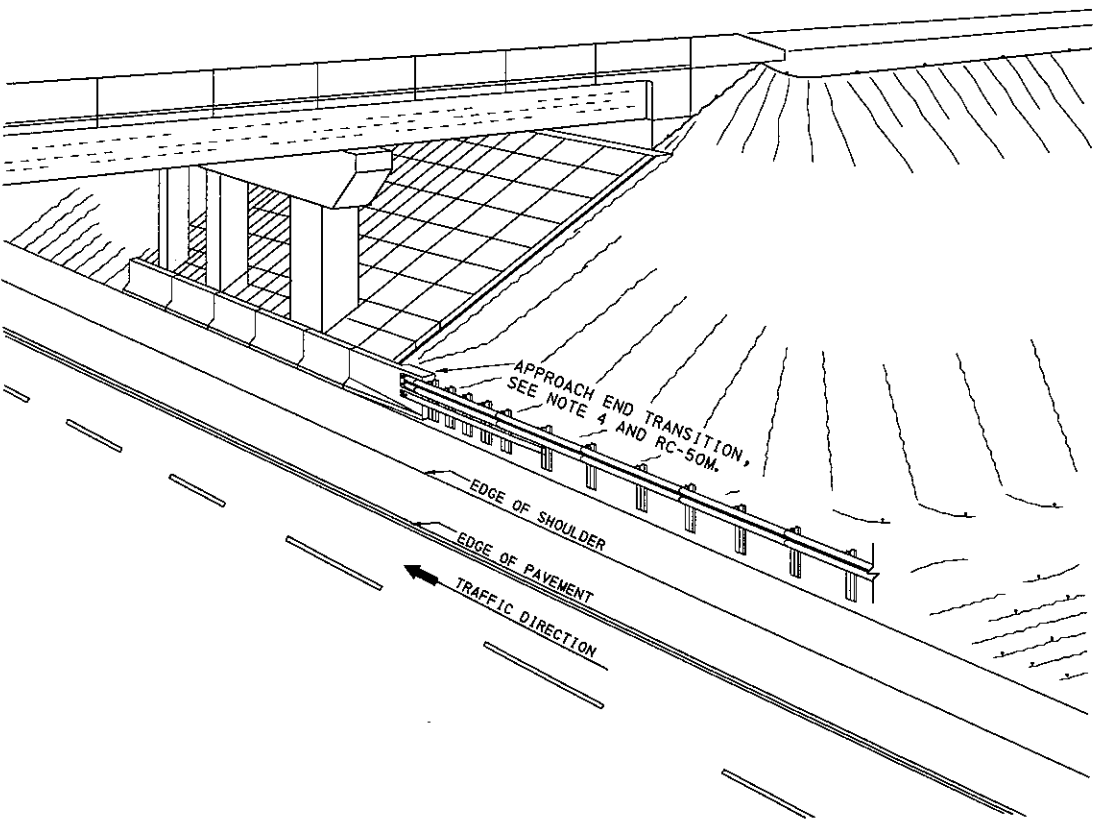
**SINGLE FACE CONCRETE BARRIER**  
**F-SHAPE**

**NOTES**

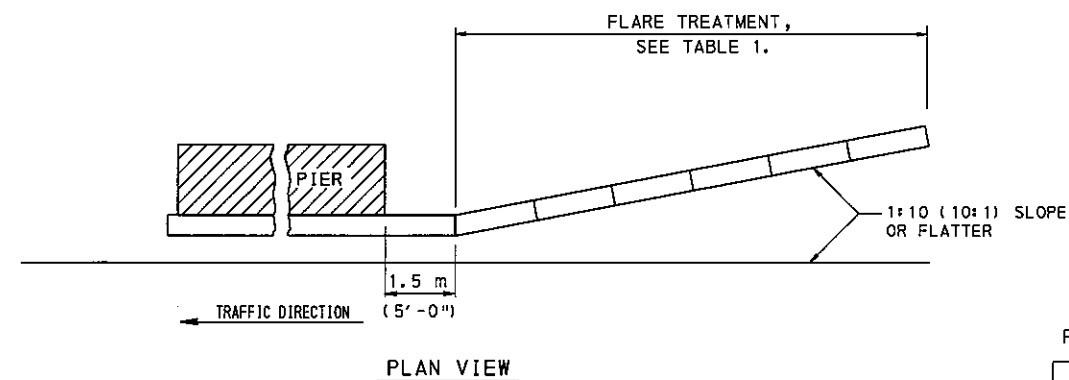
1. PROVIDE SINGLE FACE CONCRETE BARRIER AND GUIDE RAIL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 620 AND 623.
2. THE TREATMENTS SHOWN ARE FOR FOUR-LANE DIVIDED HIGHWAYS. USE THE APPROACH END TREATMENT ON BOTH SIDES OF THE OBSTRUCTION ON TWO-LANE FACILITIES WITH TWO-WAY TRAFFIC.
3. IF THE CONCRETE BARRIER IS TERMINATED WITHIN THE CLEAR ZONE, BURY IT INTO THE EXISTING SLOPE, PREFERABLY 1:2 (2:1), ONE FOOT DEEP OTHERWISE, USE AN IMPACT ATTENUATING DEVICE.
4. THIS TRANSITION IS APPROPRIATE FOR CONNECTION TO A VERTICAL CONCRETE SHAPE AND SHOULD NOT BE CONNECTED DIRECTLY TO A CONCRETE SAFETY SHAPE. CONCRETE SAFETY SHAPES SHOULD BE TRANSITIONED TO A VERTICAL SHAPE AT THE GUIDE RAIL CONNECTION.
5. THE VIEWS ON THIS SHEET ARE ONLY PICTORIAL REPRESENTATIONS OF GUIDE RAIL TO CONCRETE BARRIER TRANSITIONS. RC-50M MUST BE USED FOR ALL GUIDERAIL TO BARRIER CONNECTION DETAILS AND HARDWARE.



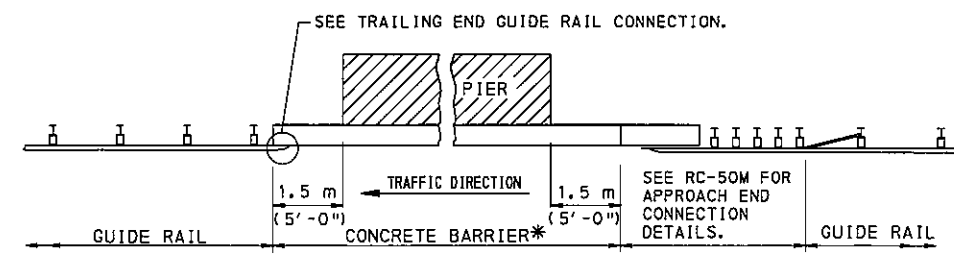
TYPICAL NONCONTINUOUS SINGLE-FACE BARRIER TREATMENT AT PIERS



TYPICAL TREATMENT WHEN CONTINUOUS GUIDE RAIL IS REQUIRED



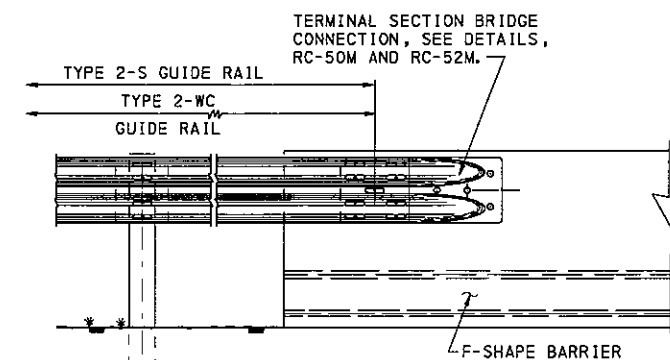
PLAN VIEW



CONTINUOUS GUIDE RAIL WITH SINGLE FACE BARRIER AT PIER

\* IF ADEQUATE DEFLECTION DISTANCE IS PROVIDED (TABLE, RC-54M) BETWEEN THE BACK OF THE GUIDE RAIL POST AND FRONT OF OBSTRUCTION, DO NOT USE CONCRETE BARRIER; CONTINUE THE GUIDE RAIL.

PLAN VIEW



TRAILING END GUIDE RAIL CONNECTION TO F-SHAPE BARRIER

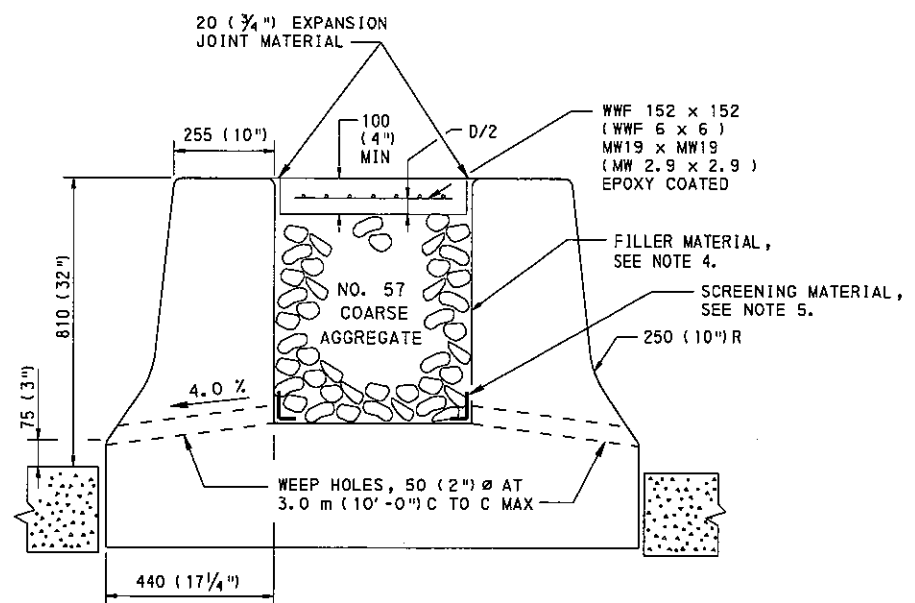
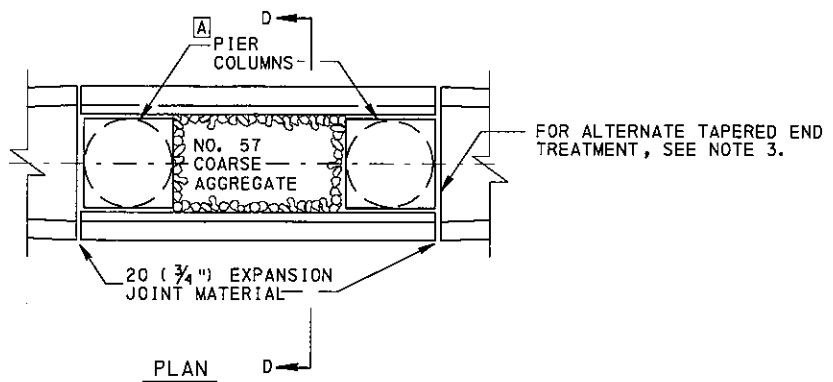
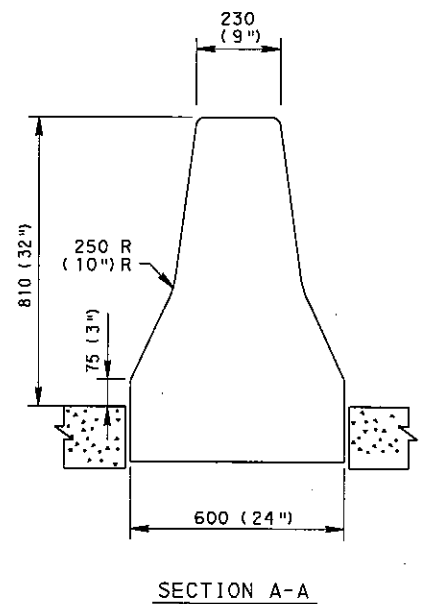
TABLE 1  
FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED	MAXIMUM FLARE RATES			
	Km/h	mph	CONCRETE BARRIER	GUIDE RAIL
120	75		20:1	15:1
110	70		20:1	15:1
105	65		19:1	15:1
100	60		18:1	14:1
90	55		16:1	12:1
80	50		14:1	11:1
70	45		12:1	10:1
65	40		11:1	9:1
60	35		10:1	8:1
50	30		8:1	7:1

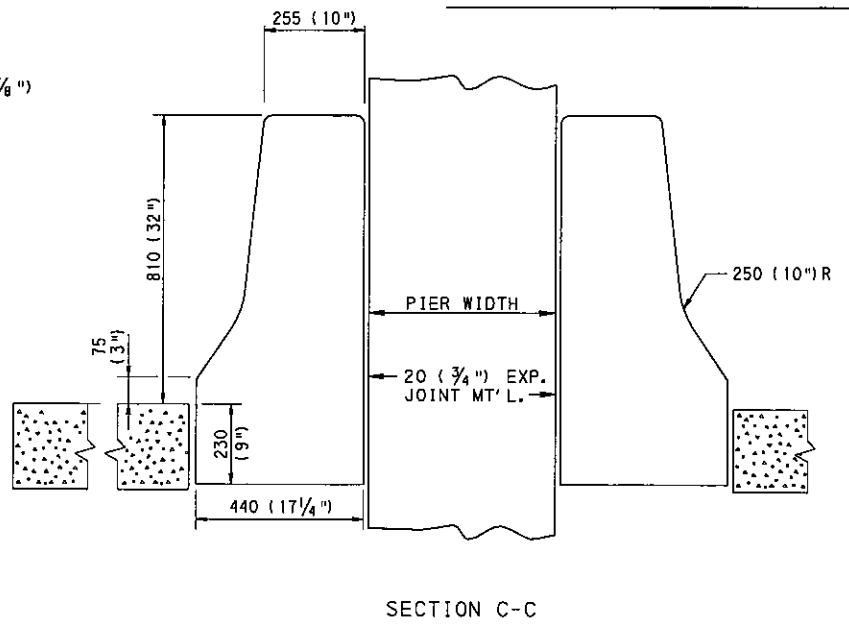
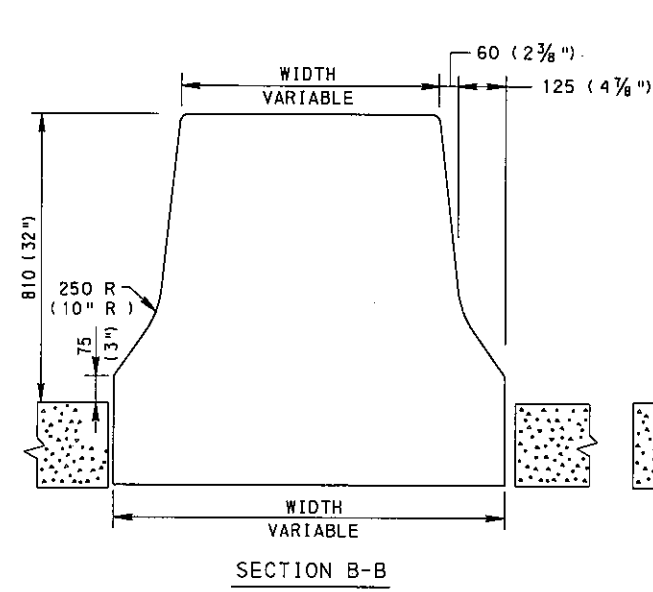
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER  
F-SHAPE  
PLACEMENT AT SHOULDER PIERS



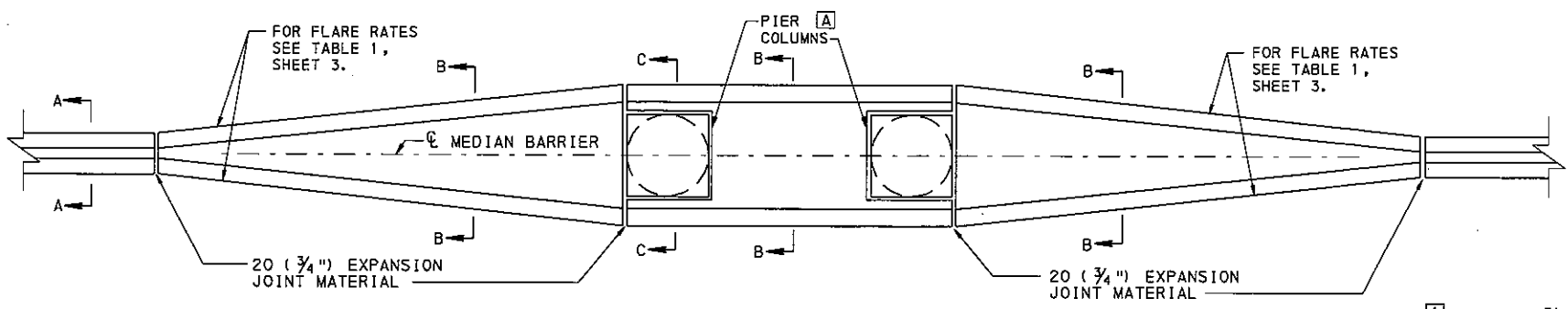
TYPICAL ALTERNATE BARRIER TREATMENT AT PIERS



NOTES

1. REFER TO BRIDGE STANDARD DRAWINGS (8D-601M) FOR DETAILS OF CONCRETE MEDIAN BARRIER ACROSS STRUCTURES.
2. THE CONCRETE TRANSITIONS AND BARRIER TAPERS AT PIERS ARE INCIDENTAL TO THE MEDIAN BARRIER.
3. CAST ADDITIONAL VOIDS IN THE TAPERED END SECTIONS MEETING THE REQUIREMENTS PRESENTED IN SECTION D-D.
4. PROVIDE NO. 57 COARSE AGGREGATE THAT MEETS THE REQUIREMENTS OF PUBLICATION 408, SECTION 703.2. ALTERNATE SUITABLE GRANULAR MATERIAL MAY BE USED AS FILLER MATERIAL.
5. TO PREVENT INTRUSION OF COARSE AGGREGATE INTO WEEP HOLES, USE WIRE MESH SCREENING, GEOTEXTILES OR OTHER SUITABLE MATERIAL.
6. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1 inch) EXCEPT AS SHOWN.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



TYPICAL BARRIER TREATMENT AT PIERS

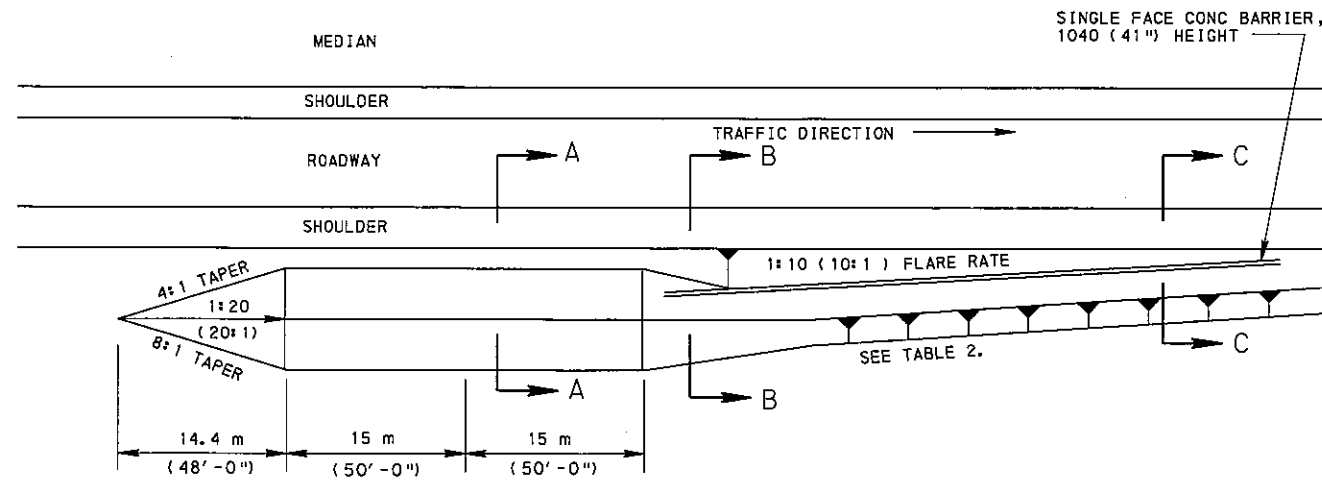
[A] USE 20 (3/4 inch) EXPANSION JOINT MATERIAL AROUND ALL PIERS.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER  
F-SHAPE  
PLACEMENT AT MEDIAN PIERS

RECOMMENDED MAR. 30, 2006 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Chitel</i> CHIEF ENGINEER	SHT 4 OF 5 RC-58M
--	---	----------------------





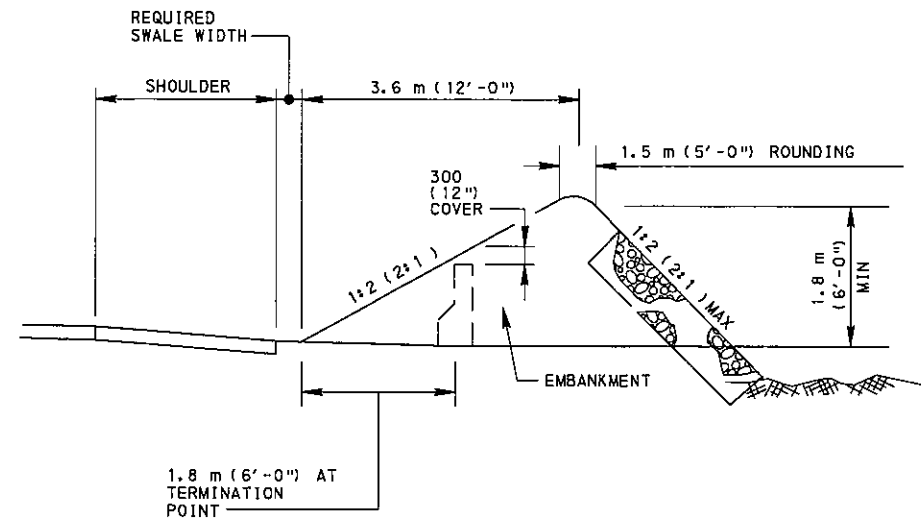
**TABLE 2**  
**FLARE RATES**  
**FOR BARRIER DESIGN**

DESIGN SPEED		MAXIMUM FLARE RATES
Km/h	mph	CONCRETE BARRIER
120	75	20 : 1
110	70	20 : 1
105	65	19 : 1
100	60	18 : 1
90	55	16 : 1
80	50	14 : 1
70	45	12 : 1
65	40	11 : 1
60	35	10 : 1
50	30	8 : 1

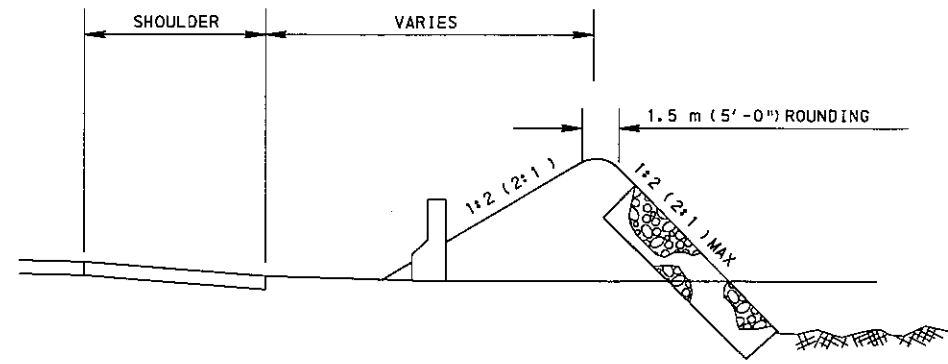
**NOTES**

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408.
2. ALL MATERIALS NECESSARY TO CONSTRUCT EARTH MOUNDS ARE IN ACCORDANCE WITH APPLICABLE SECTIONS OF PUBLICATION 408.
3. EARTHMOUNDS MAY BE USED TO BURY CONCRETE BARRIER ON HIGHWAYS WITH POSTED SPEEDS LESS THAN 70 km/h (45 mph) AND WITH CURRENT TRAFFIC VOLUME LESS THAN 4000 VEHICLES PER DAY OR WHEN THEY ARE CONSTRUCTED OUTSIDE THE CLEAR ZONE AS DETERMINED IN PUB. 13M, DESIGN MANUAL PART 2, CHAPTER 12.

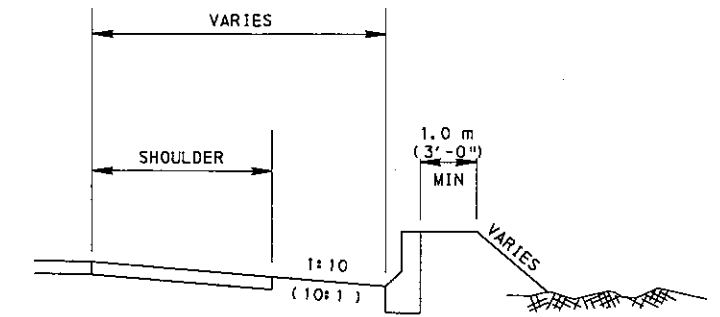
**TYPICAL EARTH MOUND FOR BURYING CONCRETE BARRIER**



**SECTION A-A**



**SECTION B-B**



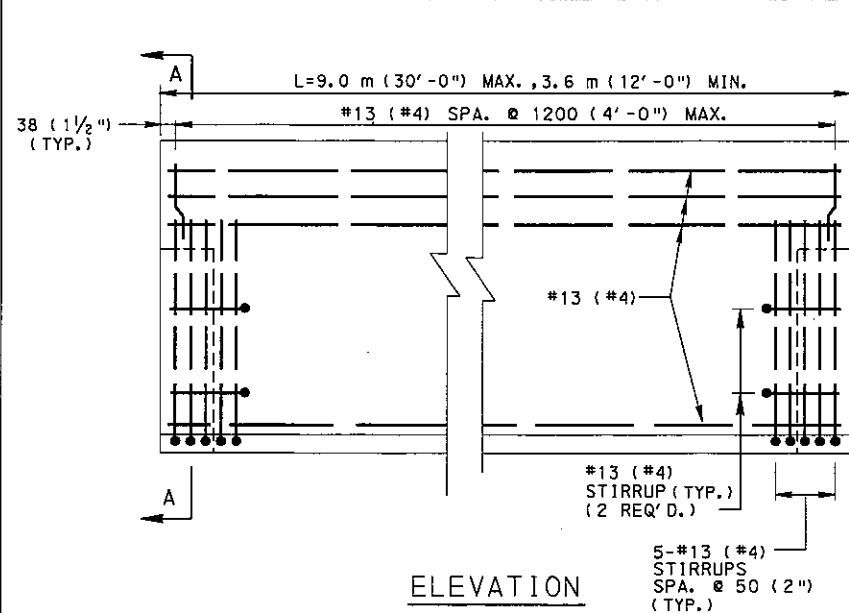
**SECTION C-C**

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

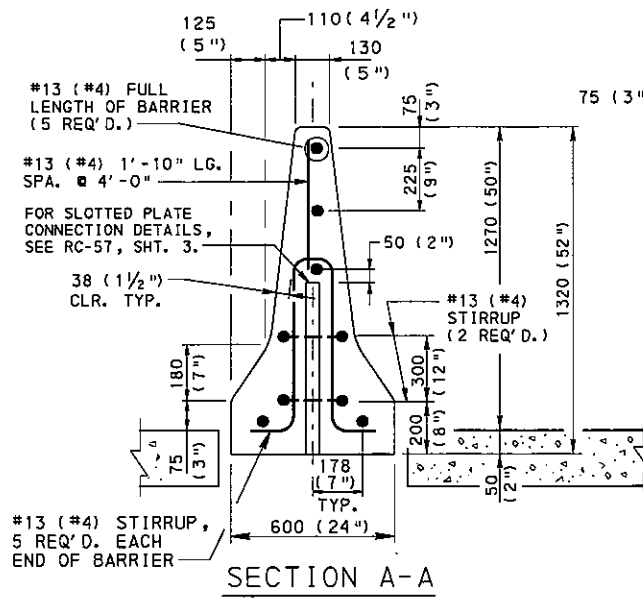
**COMMONWEALTH OF PENNSYLVANIA**  
**DEPARTMENT OF TRANSPORTATION**  
BUREAU OF DESIGN

**SINGLE FACE CONCRETE BARRIER**  
**F-SHAPE**  
**END TREATMENT**  
**BURYING INTO EARTH MOUND**

RECOMMENDED MAR. 30, 2006 <i>Scott Christy</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Kotel</i> CHIEF ENGINEER	SHT 5 OF 5 <b>RC-58M</b>
---	--	-----------------------------

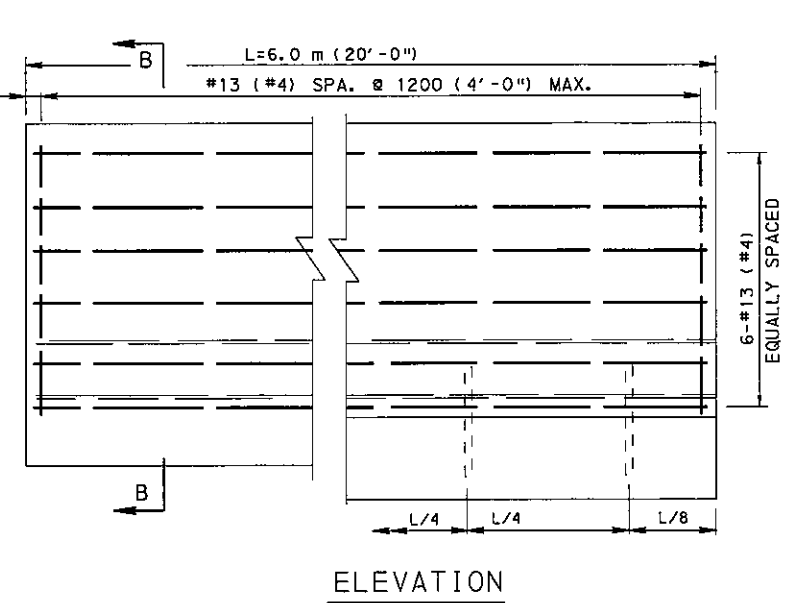


ELEVATION



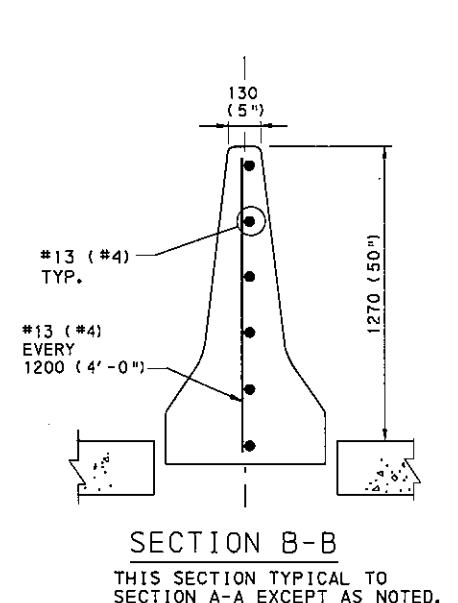
SECTION A-A

TYPICAL PRECAST

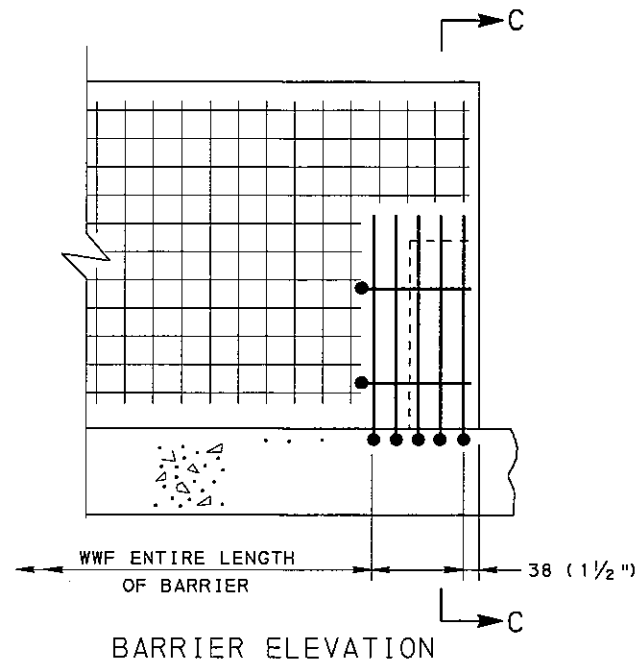


ELEVATION

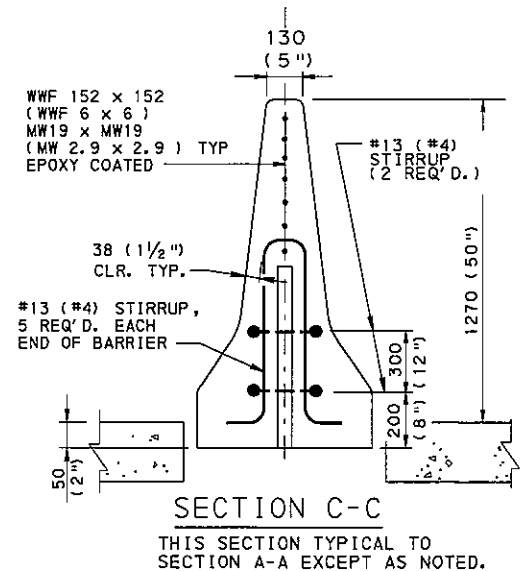
TYPICAL CAST-IN-PLACE



SECTION B-B  
THIS SECTION TYPICAL TO SECTION A-A EXCEPT AS NOTED.



BARRIER ELEVATION



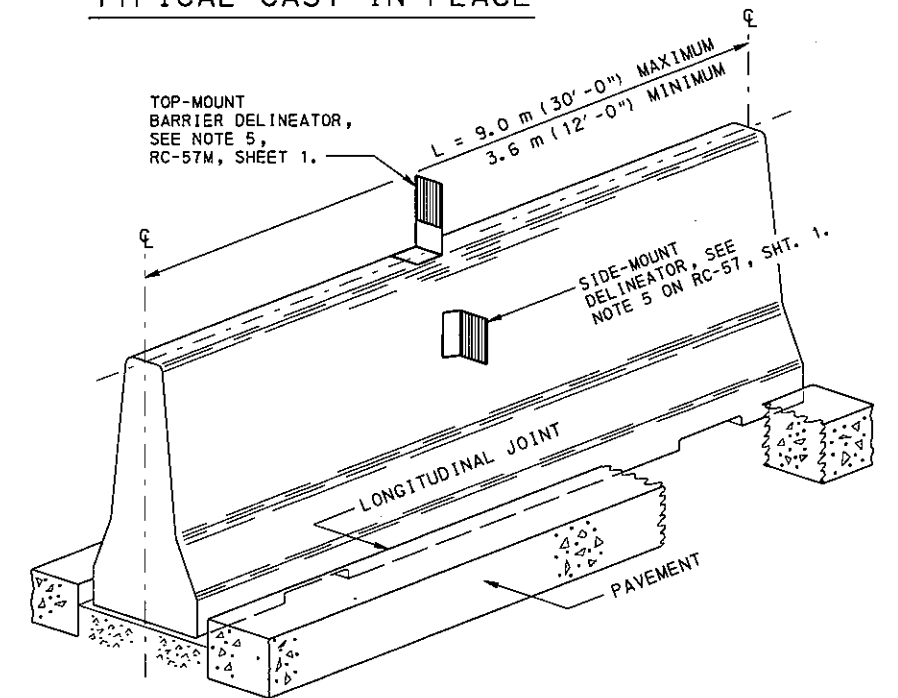
SECTION C-C

THIS SECTION TYPICAL TO SECTION A-A EXCEPT AS NOTED.

WWF ALTERNATE

NOTES

- PROVIDE CONCRETE GLARE SCREEN MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 622 AND 714.  
A. MINIMUM CONCRETE CLASS: AA, EXCEPT USE CLASS AAA CONCRETE FOR PRECAST BARRIER.
- FOR INSTALLATION OF GLARE SCREEN ON TOP OF EXISTING CONCRETE MEDIAN BARRIER, PROVIDE PLASTIC PADDLES OR MODULAR SYSTEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
- FOR PRECAST BARRIERS, PROVIDE SLOTTED PLATE CONNECTIONS AS INDICATED ON RC-57M, SHEET 3.
- PROVIDE PRECAST CONCRETE GLARE SCREEN SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. FOR MODIFICATION OR DEVIATION OF THE STANDARDS SUBMIT SHOP DRAWINGS FOR APPROVAL.
- PROVIDE PRECAST CONCRETE GLARE SCREEN FOR USE AS TEMPORARY (MPT) OR IN PERMANENT INSTALLATIONS. FOR TEMPORARY INSTALLATIONS, EMBEDMENT IS NOT REQUIRED.
- EPOXY COATED REINFORCEMENT IS NOT REQUIRED WHEN PRECAST CONCRETE GLARE SCREEN IS TO BE USED IN TEMPORARY INSTALLATIONS ONLY, IN ACCORDANCE WITH SECTION 627, AND IDENTIFIED AS SUCH, AS SPECIFIED IN SECTION 714.6(c).
- ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.
- FABRICATE REINFORCEMENT BARS ACCORDING TO PENNDOT BRIDGE CONSTRUCTION STANDARD, BC-736M.
- TO LIMIT LATERAL DISPLACEMENT OF PORTABLE BARRIER WHEN USED IN WORK ZONES, PROVIDE A ROUGH FINISH AT THE BOTTOM SURFACE. BEFORE THE CONCRETE HAS INITIALLY SET, FINISH THE BOTTOM SURFACE WITH STIFF, WIRE BROOM OR SPECIAL TEMPLATE IN A LONGITUDINAL DIRECTION TO PRODUCE SCORES APPROXIMATELY 4 (1/8") IN DEPTH.
- PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING, INSTALLING AND REMOVING PRECAST CONCRETE BARRIER. GALVANIZE METAL DEVICES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(s).



TYPICAL CAST-IN PLACE AND PRECAST BARRIER

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

CONCRETE GLARE SCREEN  
F-SHAPE

RC-57M	CONCRETE MEDIAN BARRIER, F-SHAPE
BC-736M	REINFORCEMENT BAR FABRICATION DETAILS
REFERENCE DRAWINGS	

RECOMMENDED MAR. 30, 2006 <i>Scott Christen</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 30, 2006 <i>M. Eitel</i> CHIEF ENGINEER	SHT 1 OF 2 RC-59M
--	--	----------------------

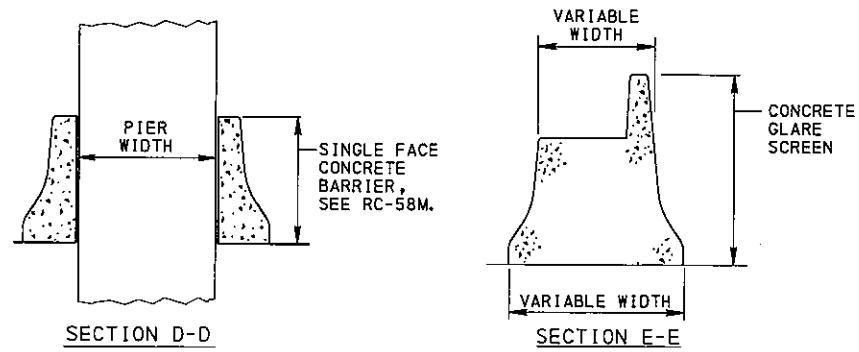
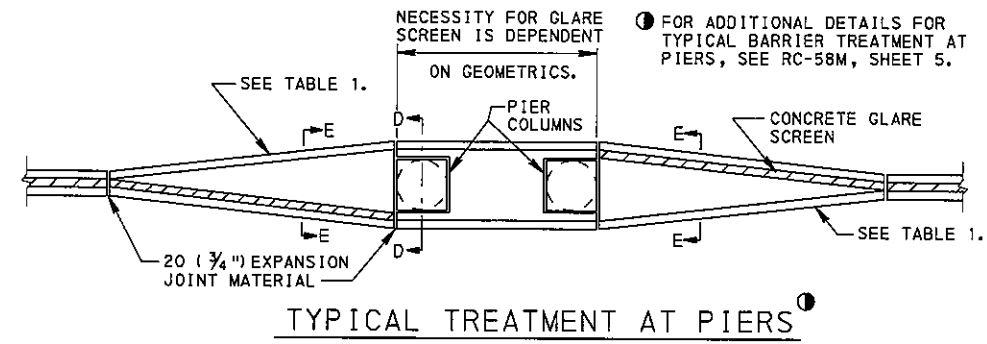


TABLE 1  
FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED		MAXIMUM FLARE RATES	
km/h	mph	CONCRETE BARRIER	GUIDE RAIL
120	75	20 : 1	15 : 1
110	70	20 : 1	15 : 1
105	65	19 : 1	15 : 1
100	60	18 : 1	14 : 1
90	55	16 : 1	12 : 1
80	50	14 : 1	11 : 1
70	45	12 : 1	10 : 1
65	40	11 : 1	9 : 1
60	35	10 : 1	8 : 1
50	30	8 : 1	7 : 1

NOTE

1. PROVIDE BARRIER-MOUNT DELINEATORS, WHEN INDICATED, AS SPECIFIED ON RC-57M, SHEET 1.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

CONCRETE GLARE SCREEN  
F-SHAPE

RECOMMENDED MAR. 30, 2006

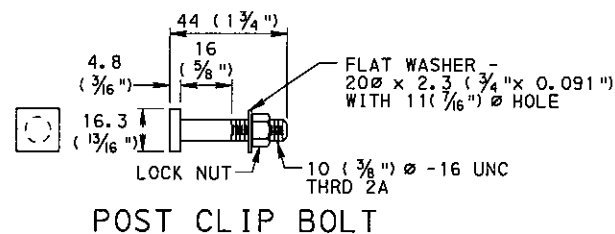
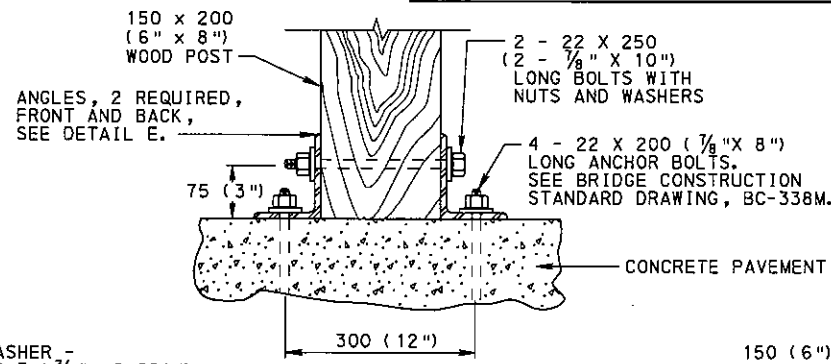
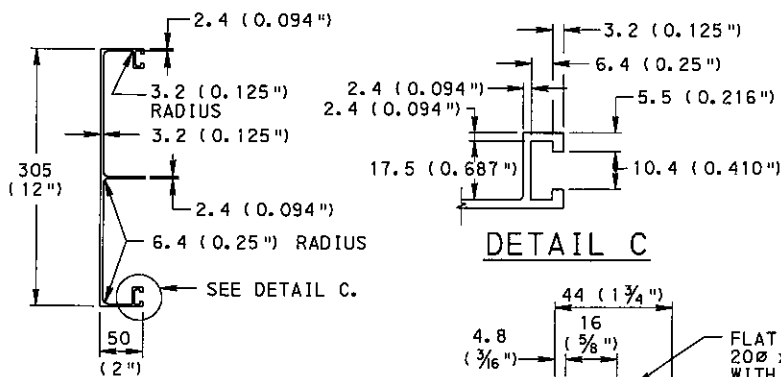
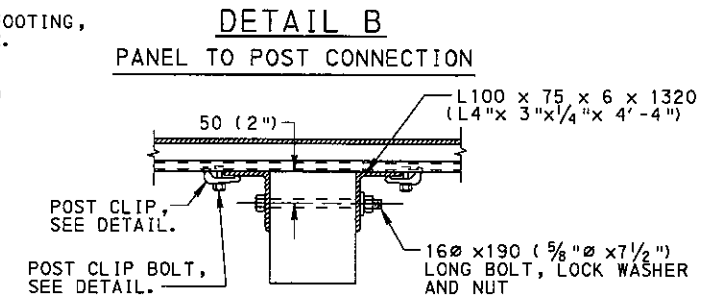
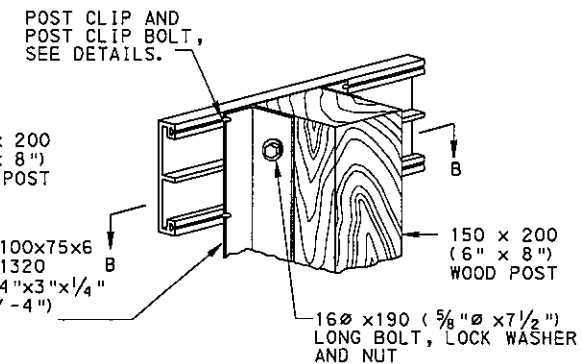
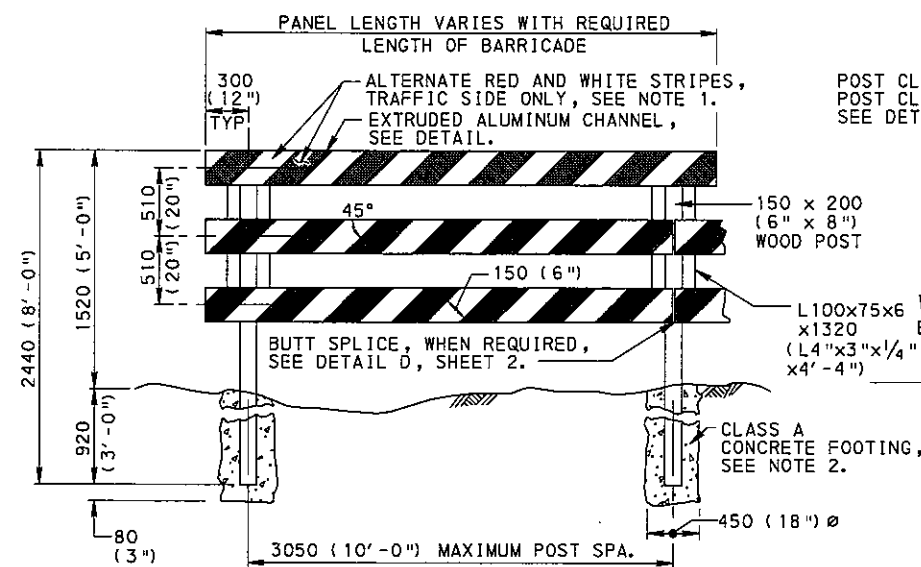
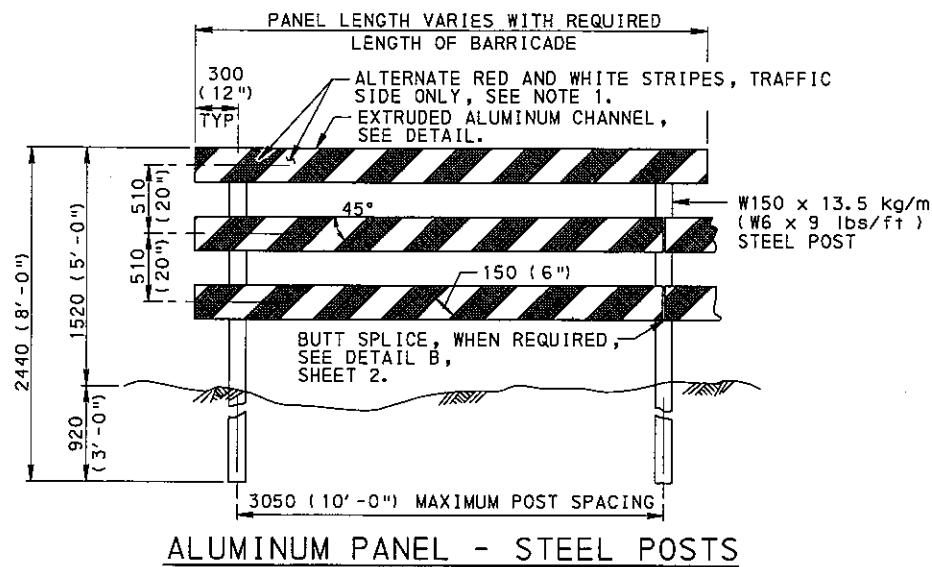
*Scott Christie*  
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 30, 2006

*M. L. Kattel*  
CHIEF ENGINEER

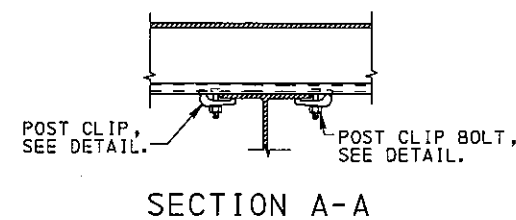
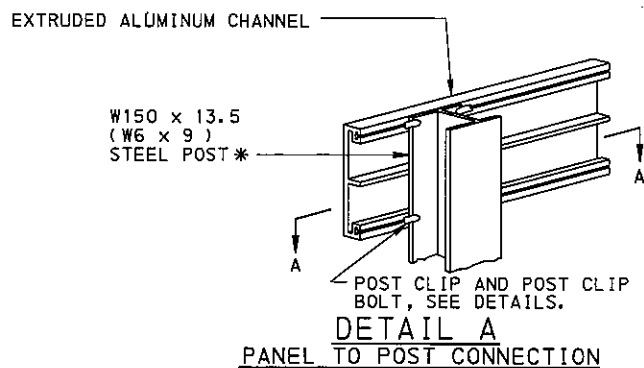
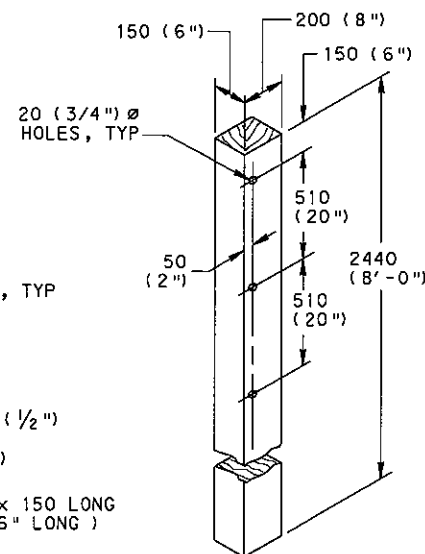
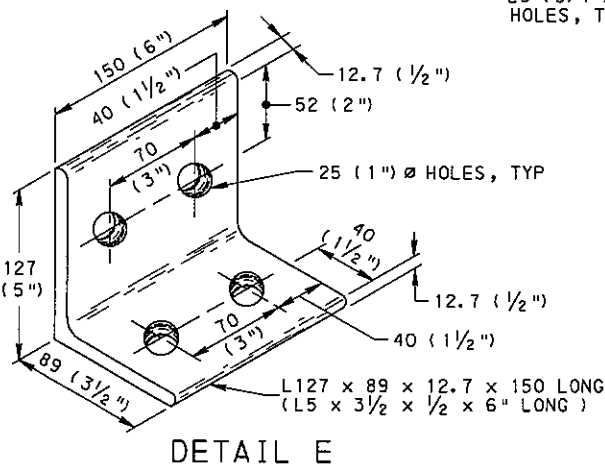
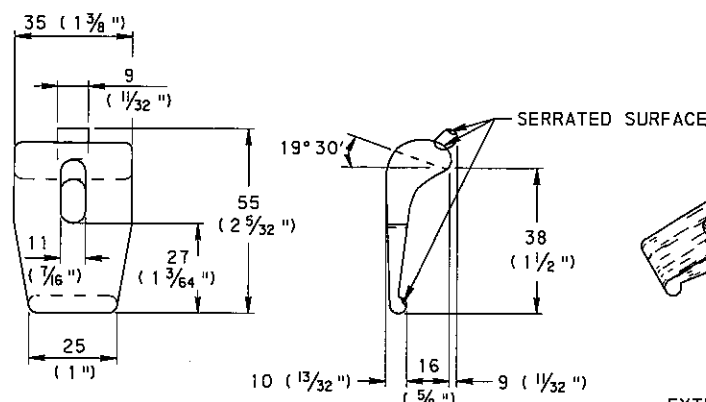
SHT 2 OF 2

RC-59M



**EXTRUDED ALUMINUM CHANNEL**

(DIMENSIONS FOR PANELS MAY VARY DEPENDING UPON MANUFACTURING COMPANY'S DESIGN.)

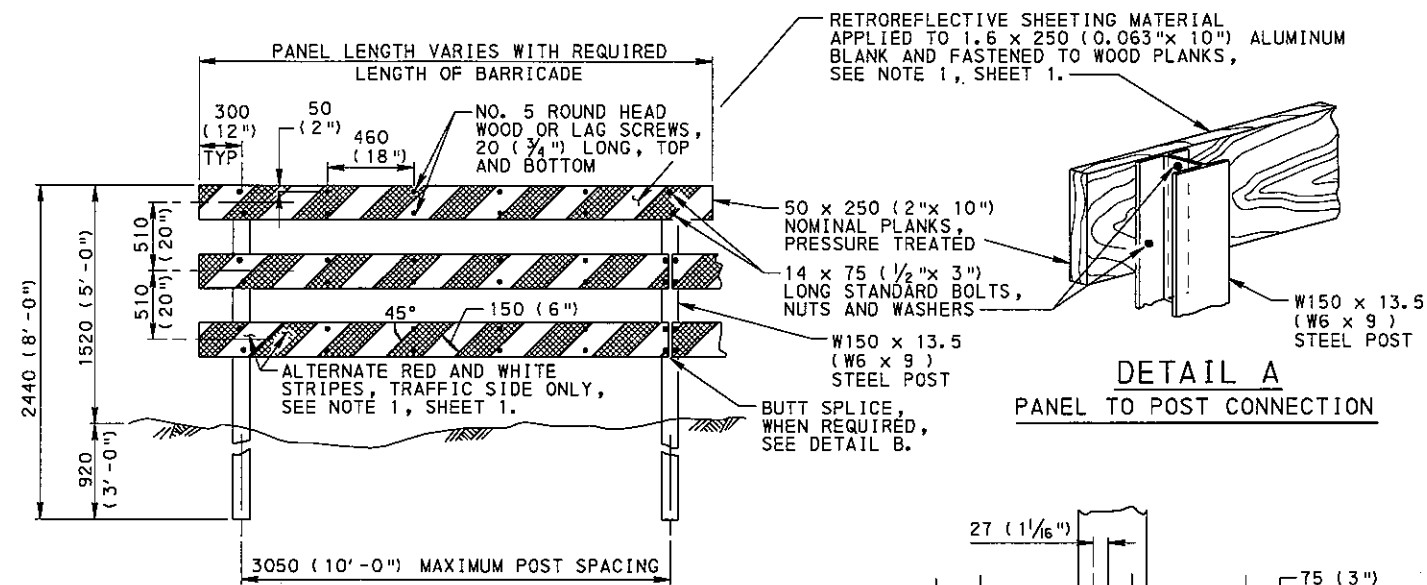


- NOTES**
1. PERMIT ONLY TYPE III, IV, VII, VIII OR IX RETROREFLECTIVE SHEETING MATERIAL SUPPLIED BY A MANUFACTURER, AS LISTED IN BULLETIN 15.
  2. DRIVE POSTS MECHANICALLY OR ERECT IN CONCRETE FOOTING.
  3. SEE RC-52M, SHEET 1, FOR MOUNTING OF STEEL POSTS ON CONCRETE PAVEMENT. SEE DETAIL D FOR MOUNTING OF WOOD POSTS ON CONCRETE PAVEMENT.
  4. USE MATERIALS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 678.
  5. ALL WOOD METRIC DIMENSIONS ARE NOMINAL.
  6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN ( ) PARENTHESIS.

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

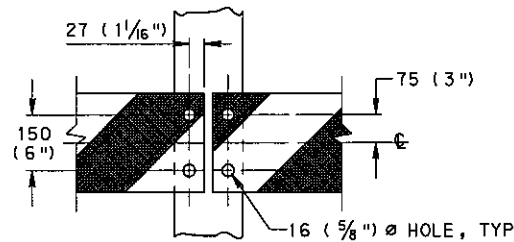
COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

PERMANENT BARRICADES  
ALUMINUM PANEL

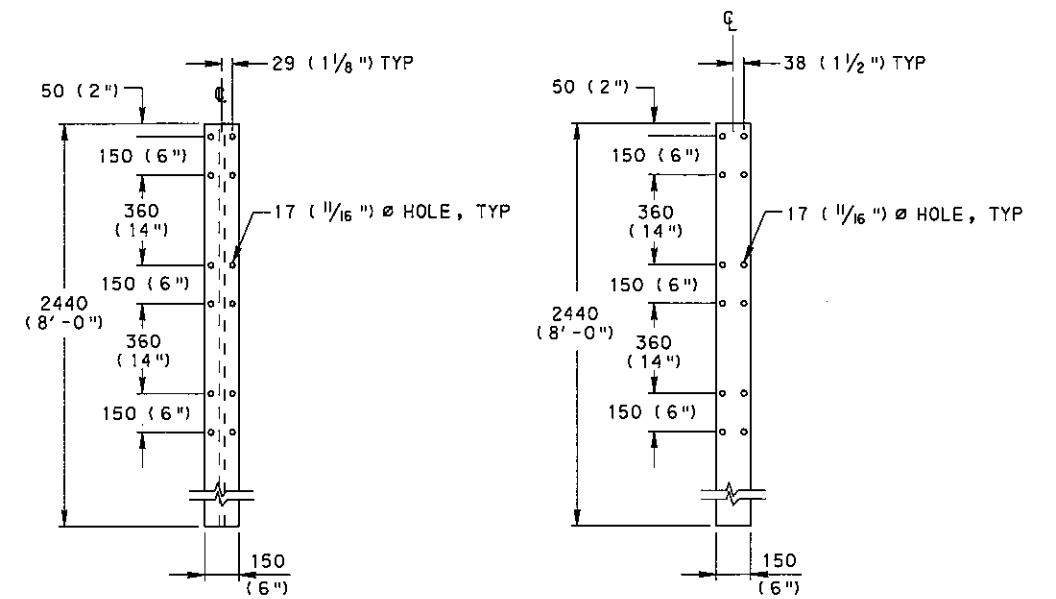


**DETAIL A**  
PANEL TO POST CONNECTION

**WOOD PANEL - STEEL POSTS**

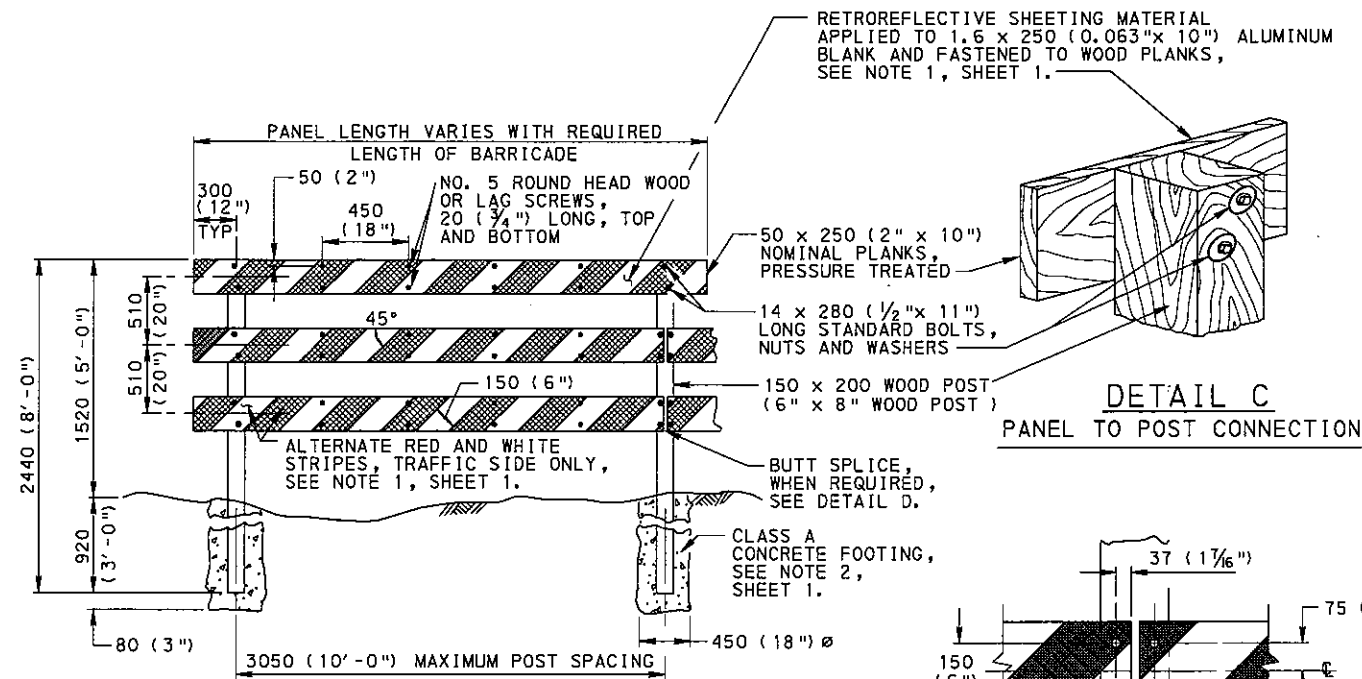


**DETAIL B**  
BUTT SPLICE



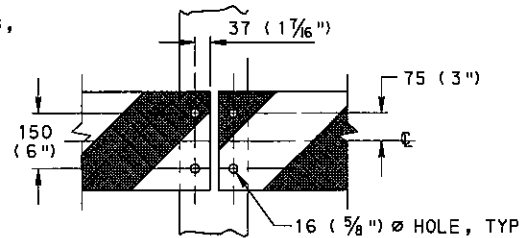
**STEEL POST FOR WOOD PANEL**

**WOOD POST FOR WOOD PANEL**



**DETAIL C**  
PANEL TO POST CONNECTION

**WOOD PANEL - WOOD POSTS**



**DETAIL D**

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION  
BUREAU OF DESIGN

PERMANENT BARRICADES  
WOOD PANEL