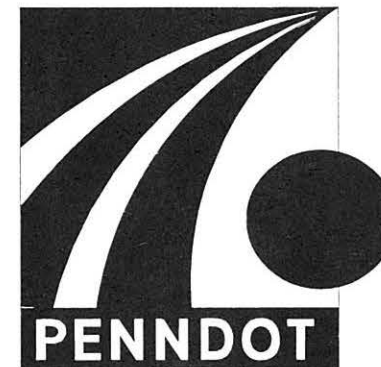


COMMONWEALTH OF PENNSYLVANIA




DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN

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

APRIL 2004 EDITION

PDT Pub #72M

 OS-299 (8-72)	TRANSMITTAL LETTER	Publication 72M April 2004 Edition
		DATE: April 15, 2004

SUBJECT:
**STANDARDS FOR ROADWAY CONSTRUCTION, RC 0M-100M
 APRIL 2004 EDITION**

INFORMATION AND SPECIAL INSTRUCTIONS:

The enclosed April 2004 Edition of the Standards for Roadway Construction represents a complete Metric and English combined publication. This Edition supersedes the April 2000 Edition and all subsequent changes.

The new standard drawings should be adopted as soon as possible on all new and existing designs without affecting any Letting schedules and in conjunction with the current Publication 408 Specifications and Bridge Standards. PS&E submissions to Central Office after July 15, 2004, should use these new standards.

Any comments or questions on the new Edition relative to revisions, Metric or English numbers, should be directed to the Highway Quality Assurance Division.

The major revisions for each Standard Drawing are presented below. Since minor changes are not indicated, it is strongly advised that all recipients thoroughly examine the changes and revisions incorporated in this new edition.

<u>STANDARD</u>	<u>SHEET</u>	<u>DESCRIPTION OF CHANGES</u>
RC-11M	(1 of 2)	"Elevation" was changed to "Section" in the Typical Structure Elevation.
RC-20M	(1 of 3)	The depth dimension on Detail D was revised From 32(1 1/4") to 35(1 3/8") to the bottom of the reservoir.
RC-28M	(1 of 1)	Details were added to this standard for a "Longitudinal Notched Wedge Joint" including Table B.


RC-30M	(4 of 5)	Revised details to indicate that concrete pipes installed with 14.9M(49') of cover or more to have a minimum bedding of 300(12") and 400(16") when rock is present. Also added Note 8.
	(5 of 5)	Revised Note 1.
RC-39M	(4 of 6)	A "Precast Manhole With Flat Top" title was added to this sheet.
	(6 of 6)	Item E: The design formula MPa was changed to KN/M ³ . It was an incorrect metric conversion.
RC-50M	(All sheets)	RC-50M was revised extensively to provide new bridge barrier transitions as per Strike-off-Letter 431-05-03 issued April 10, 2003, Change No. 1 to the January 2003 Edition of the BD-600M Series (Pub. #218M), Change No. 2 to the BC-700M Series (Pub. #219M), and the addition of the PA Bridge Barrier. The changes to the BD-600M series and the BC-700M series standards are being released simultaneously with strike-off-letter 431-04-06. RC-50M now contains 18 sheets.
		RC-50M now features three new bridge barrier transitions for four new Bridge Barriers and the widening of the F-shape barriers to a 12" top width.
RC-52M	(1 of 6)	The backing plate was removed in the "W-Beam Rail Element" detail.
RC-57M	(All sheets)	The dimensions in the barrier typical sections were revised slightly to be consistent between Metric and English values and the Bridge Standards. These minor revisions have no effect on the shape of the barrier.
		Revised bridge to highway transitions to meet minimum 20:1 taper recommended in the Roadside Design Guide. Transition section length is now 4500 (15' - 0") minimum and may also be constructed using two 2250 (7' - 6") sections or two 3600 (12' - 0") sections.
RC-58M	(All sheets)	Same as RC-57M
RC-59M	(All sheets)	Same as RC-57M

RC-67M (All sheets)

New details and typical sections were added to RC-67M to provide detectable warning truncated domes. These domes are used to alert people with vision impairments of their approach to streets and hazardous drop-offs. The ADA Accessibility Guidelines require these warnings on the surface of curb ramps. The requirements were temporarily suspended in 1994. However, the suspension expired on July 26, 2001. Consequently, the requirements are again part of ADA Accessibility Guidelines. Also, the number of sheets was increased from two (2) to three (3) for RC-67M.

RC-70M (6 of 6)

Revised Note 5.

CANCEL THE FOLLOWING: April 2000 Edition of Pub. 72M plus Changes 1-4.	REQUEST ADDITIONAL COPIES FROM: Bureau of Office Services Publications Sales Office P.O. Box 2028 Middletown, PA 17120
	APPROVED FOR ISSUANCE BY: Allen D. Biehler, P.E. Secretary of Transportation by:  Gary L. Hoffman, P.E. Deputy Secretary for Highway Administration

INDEX OF STANDARDS FOR ROADWAY CONSTRUCTION

STANDARD DRAWING NUMBER	DRAWING DATE	DESCRIPTION
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EARTHWORK

RC-10M _____	APR 15, 2004	CLASSIFICATION OF EARTHWORK
RC-11M (2 Sheets) _____	APR 15, 2004	CLASSIFICATION OF EARTHWORK FOR STRUCTURES
RC-12M (2 Sheets) _____	APR 15, 2004	BACKFILL AT STRUCTURES
RC-13M _____	APR 15, 2004	PAY LIMIT OF SUBBASE

PAVEMENTS

RC-20M (3 Sheets) _____	APR 15, 2004	CONCRETE PAVEMENT JOINTS
RC-21M _____	APR 15, 2004	REINFORCED CONCRETE PAVEMENT
RC-23M (3 Sheets) _____	APR 15, 2004	BRIDGE APPROACH SLAB
RC-24M _____	APR 15, 2004	PAVEMENT RELIEF JOINT
RC-25M (6 Sheets) _____	APR 15, 2004	SHOULDERS
RC-26M (5 Sheets) _____	APR 15, 2004	CONCRETE PAVEMENT REHABILITATION
RC-27M _____	APR 15, 2004	PLAIN CONCRETE PAVEMENT
RC-28M _____	APR 15, 2004	OVERLAY TRANSITIONS AND PAVING NOTCHES

DRAINAGE

RC-30M (5 Sheets) _____	APR 15, 2004	SUBSURFACE DRAINS
RC-31M (2 Sheets) _____	APR 15, 2004	ENDWALLS
RC-32M _____	APR 15, 2004	SLOPE PIPE FITTINGS, PIPE CONNECTORS AND CONCRETE COLLAR FOR PIPE EXTENSION
RC-33M (2 Sheets) _____	APR 15, 2004	END SECTIONS FOR PIPE CULVERTS
RC-34M (10 Sheets) _____	APR 15, 2004	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 _____	APR 15, 2004	SLOPE PROTECTION
RC-43M _____	APR 15, 2004	GABIONS

STANDARD DRAWING NUMBER	DRAWING DATE	DESCRIPTION
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GUIDE RAIL AND MEDIAN BARRIER

RC-50M (16 Sheets) _____	APR 15, 2004	GUIDE RAIL TRANSITION AT END OF STRUCTURE
RC-52M (6 Sheets) _____	APR 15, 2004	TYPE 2 STRONG POST GUIDE RAIL
RC-53M (2 Sheets) _____	APR 15, 2004	TYPE 2 WEAK POST GUIDE RAIL
RC-54M (7 Sheets) _____	APR 15, 2004	BARRIER PLACEMENT AT OBSTRUCTIONS
RC-55M _____	APR 15, 2004	TYPE 2 WEAK POST MEDIAN BARRIER
RC-57M (8 Sheets) _____	APR 15, 2004	CONCRETE MEDIAN BARRIER
RC-58M (5 Sheets) _____	APR 15, 2004	SINGLE FACE CONCRETE BARRIER
RC-59M (2 Sheets) _____	APR 15, 2004	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) _____	APR 15, 2004	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

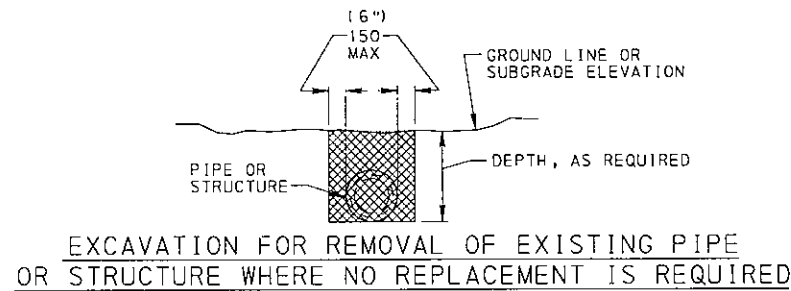
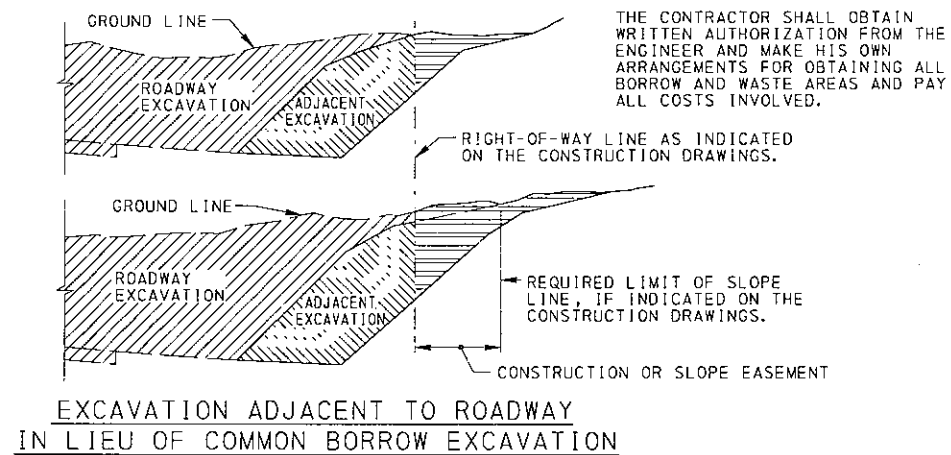
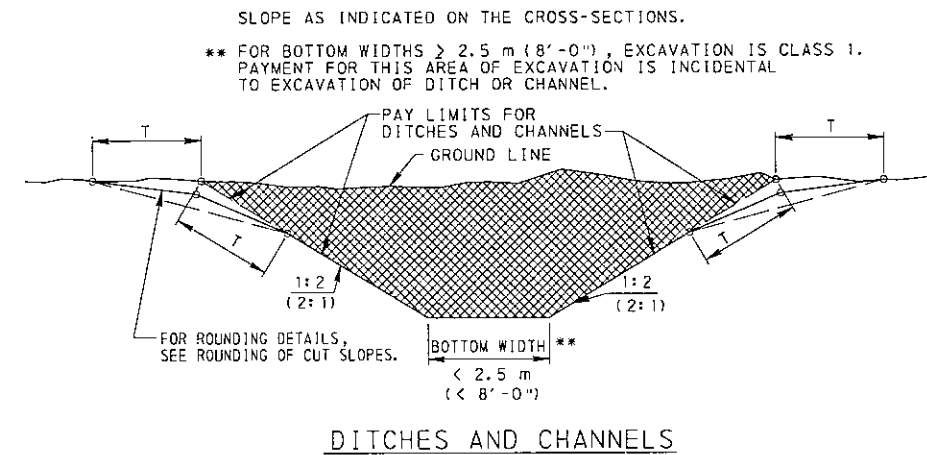
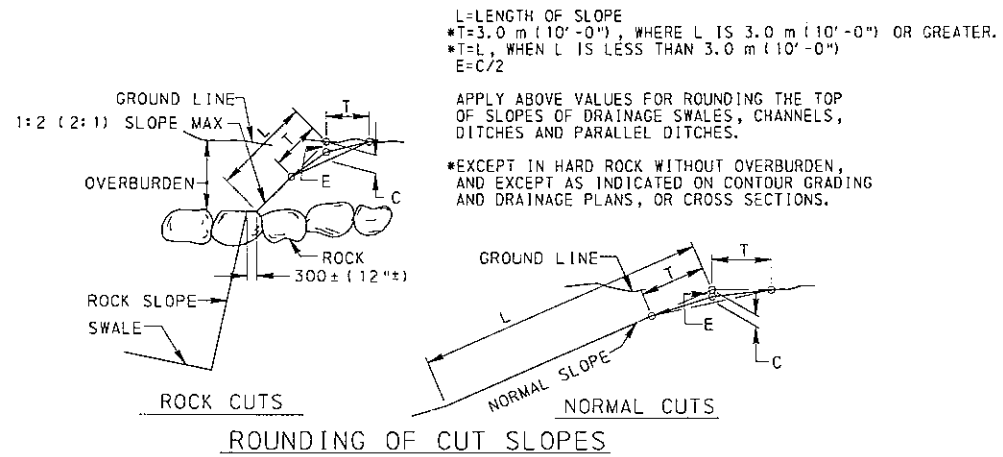
RC-70M (6 Sheets) _____	APR 15, 2004	EROSION AND SEDIMENT POLLUTION CONTROL
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HIGHWAY LIGHTING

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

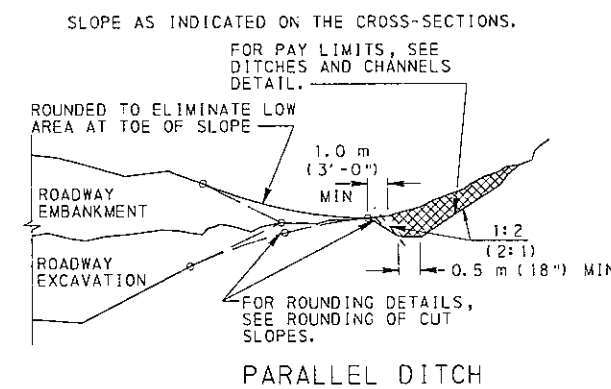
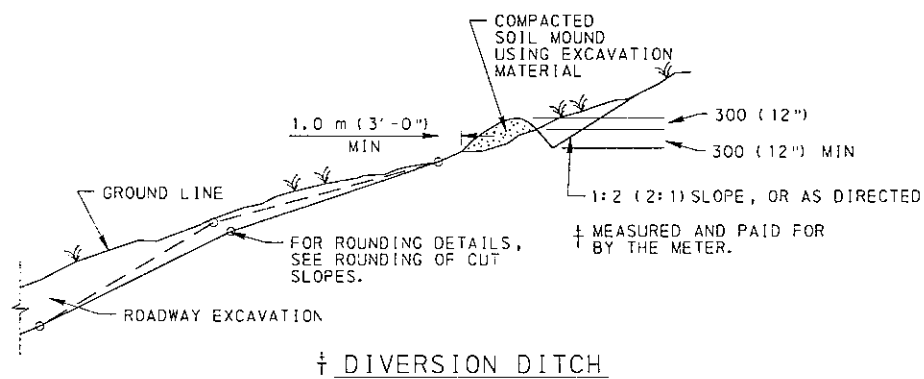
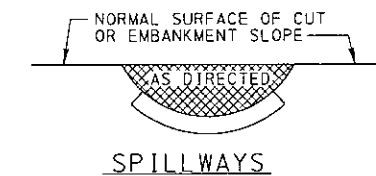
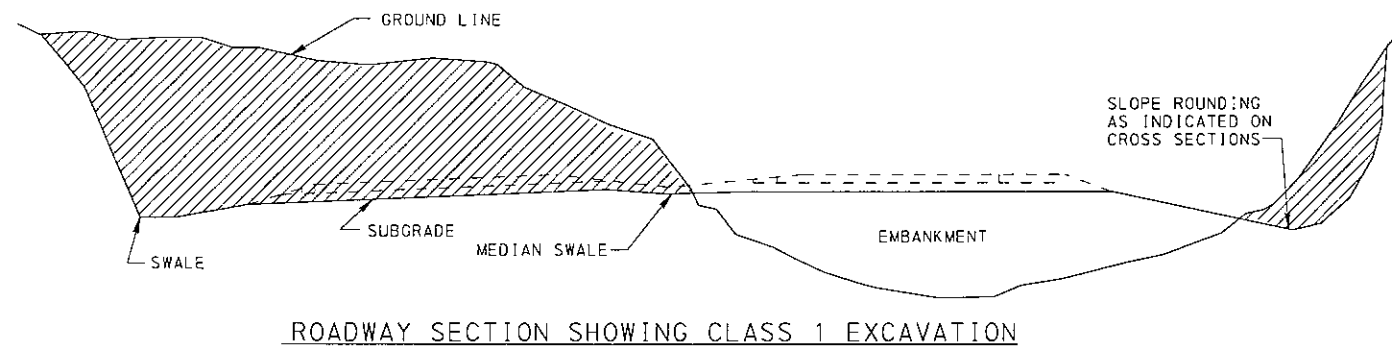
RC-91M (2 Sheets) _____	APR 15, 2004	BRACING AND PLANTING DETAILS
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- NOTES
1. ALLOW NO PAYMENT FOR EXCAVATION IN EXCESS OF SPECIFIED LIMITS AND FOR ADDITIONAL BACKFILL MATERIAL REQUIRED.
 2. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.
 3. EXCAVATION FOR PIPE AND PIPE-ARCH WITH 1800 (6'-0") AND GREATER INSIDE DIAMETER OR SPAN IS CLASS 1 EXCAVATION.

LEGEND

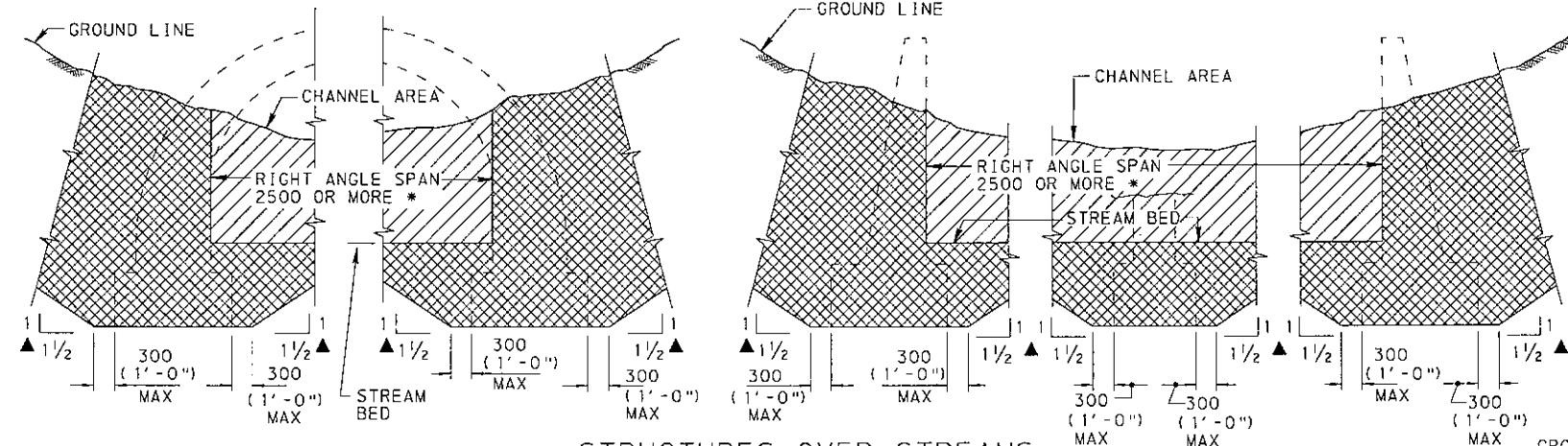
	CLASS 1 EXCAVATION
	CLASS 2 EXCAVATION
	COMMON BORROW EXCAVATION
	CLASS 1 OR COMMON BORROW EXCAVATION



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

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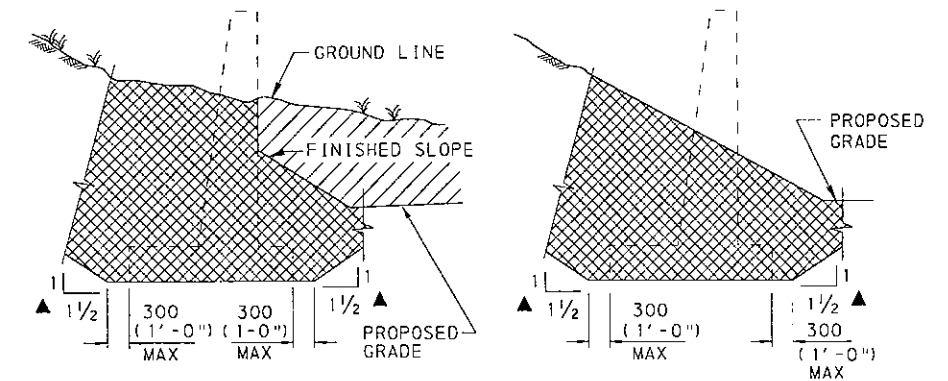
CLASSIFICATION OF EARTHWORK



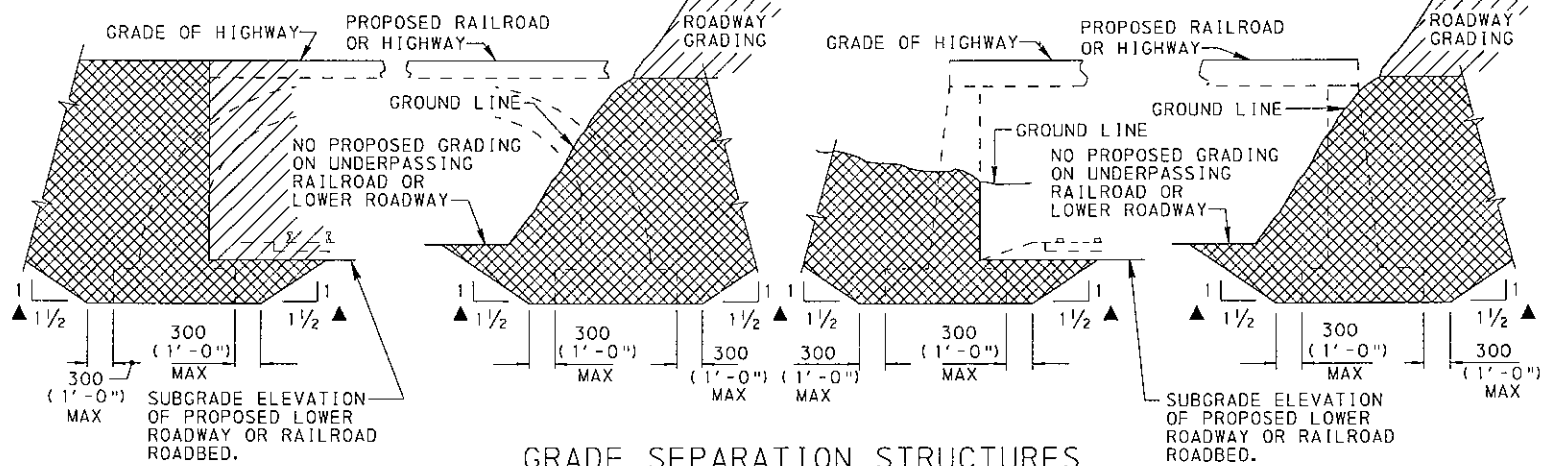
STRUCTURES OVER STREAMS

INCLUDING METAL PLATE ARCH WITH FOOTING

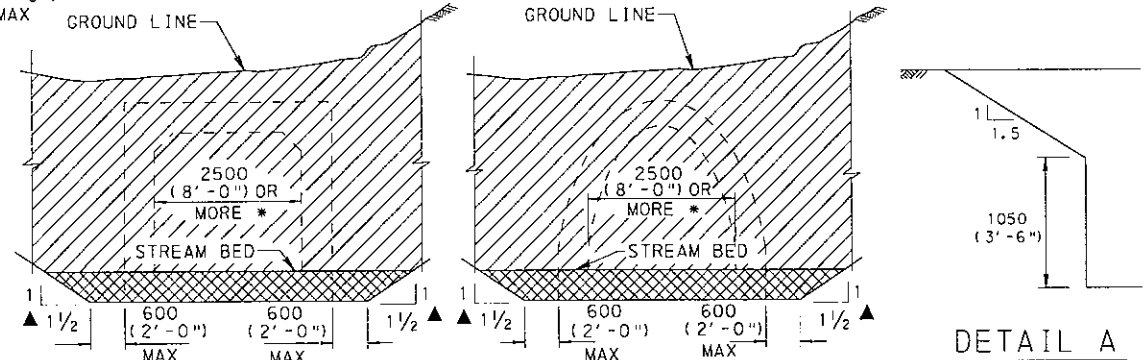
* WHEN RIGHT ANGLE SPAN IS LESS THAN 2500, ALL EXCAVATION IS CLASS 3.



WING WALLS & RETAINING WALLS



GRADE SEPARATION STRUCTURES



RC BOX CULVERTS

RC TIED ARCH CULVERTS

* WHEN LESS THAN 2500 (8'-0"), ALL EXCAVATION IS CLASS 3.

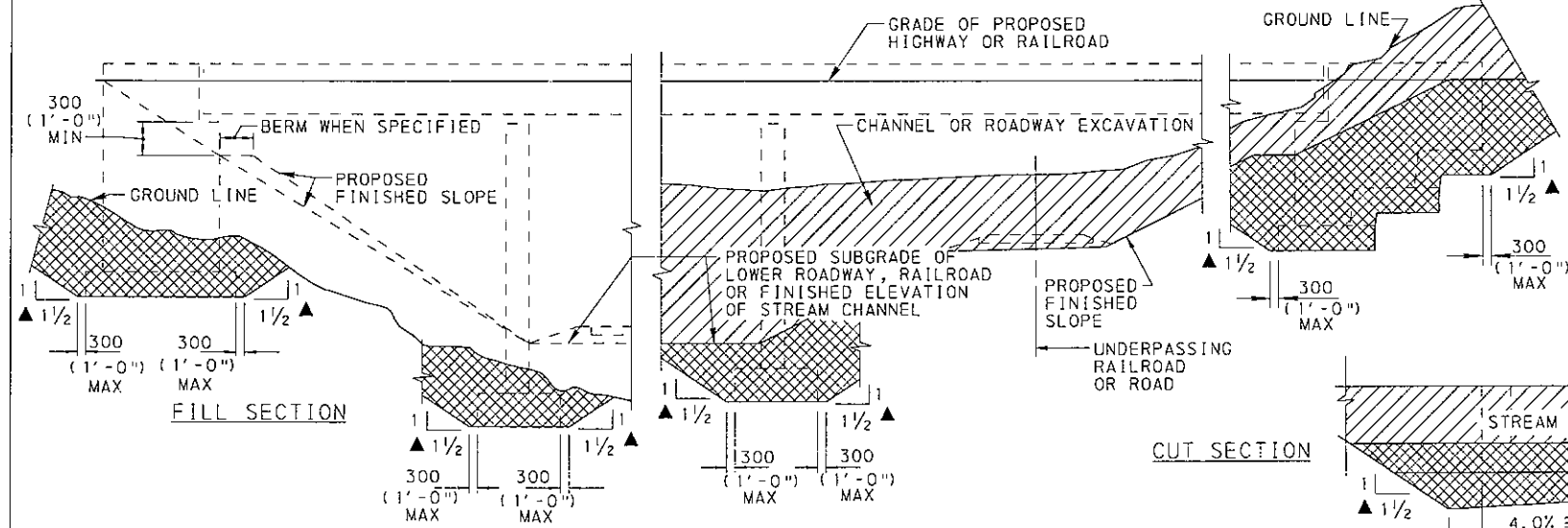
NOTES

1. FOLLOW OSHA SAFETY REQUIREMENTS IN ALL UNSHORED EXCAVATION AREAS, USE DETAIL 'A' FOR COHESIVE SOILS ONLY AS DEFINED IN OSHA 29 CFR SECTION 1926.652 AND DETERMINED BY APPROPRIATE SOILS REPORT: 1500 (5'-0") MAXIMUM FOR VERTICAL CUT, OTHERWISE 1050 (3'-6") MAXIMUM FROM BOTTOM OF EXCAVATION TO START OF 1:1.5 (1 1/2:1) LAYBACK SLOPE. IF THE TOTAL EXCAVATION DEPTH EXCEEDS 4 m (12'-0"), DO NOT USE DETAIL 'A'.
2. NO PAYMENT WILL BE ALLOWED FOR EXCAVATION IN EXCESS OF SPECIFIED LIMITS AND FOR ADDITIONAL BACKFILL MATERIAL REQUIRED.
3. DEFINE SPECIAL SITUATIONS (SUCH AS ROCK EXCAVATION, SHORED CONSTRUCTION, ETC.) INVOLVING EXCAVATION NOT ENTIRELY COVERED BY THIS STANDARD, ON THE DESIGN DRAWING BY SKETCHES AND/OR DESCRIBE IN THE SPECIAL PROVISIONS.
4. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.

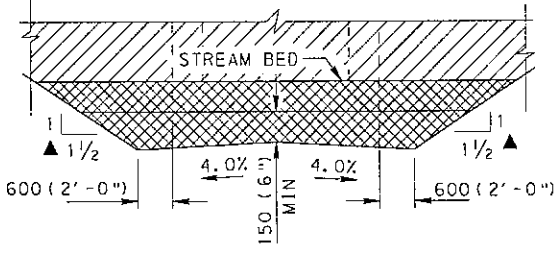
LEGEND

- CLASS 1 EXCAVATION (diagonal hatching) ROADWAY ITEM (TO BE INCLUDED IN ROADWAY QUANTITIES)
- CLASS 3 EXCAVATION (cross-hatching) STRUCTURE ITEM (TO BE INCLUDED IN STRUCTURE QUANTITIES)
- ▲ CONTINUE 1 1/2:1 SLOPE FOR THE APPROPRIATE CLASS OF EXCAVATION TO FINISHED GRADE OR GROUND LINE, WHICHEVER COMES FIRST.

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



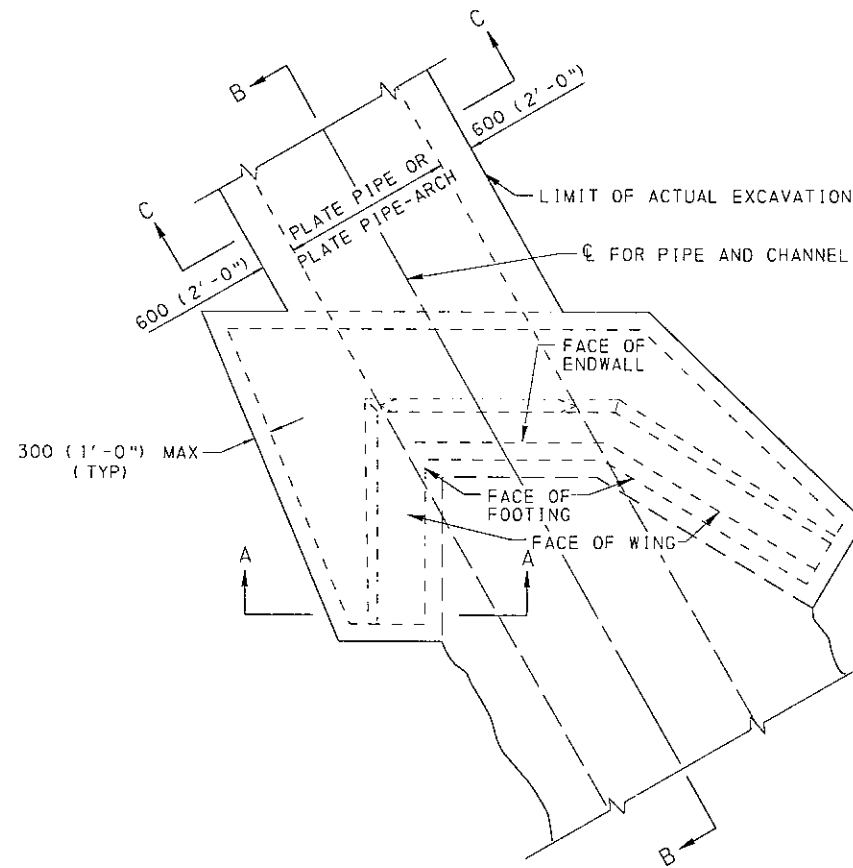
TYPICAL STRUCTURE SECTION



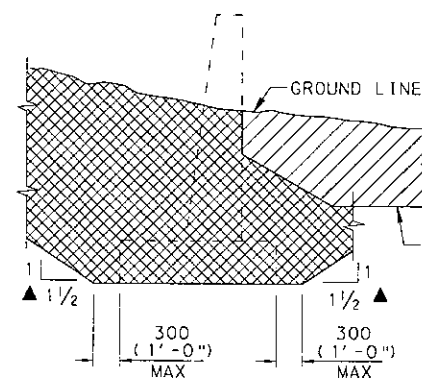
EXTRA DEPTH EXCAVATION FOR RC BOX AND ARCH CULVERTS ON FINE GRAIN SOIL

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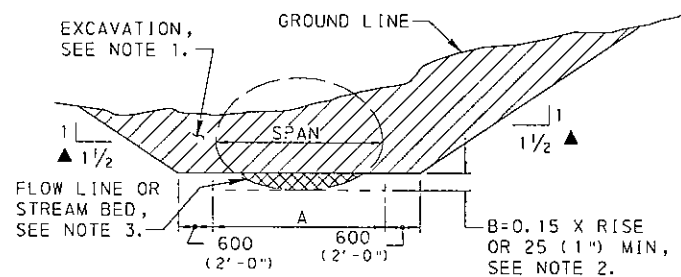
CLASSIFICATION OF EARTHWORK FOR STRUCTURES



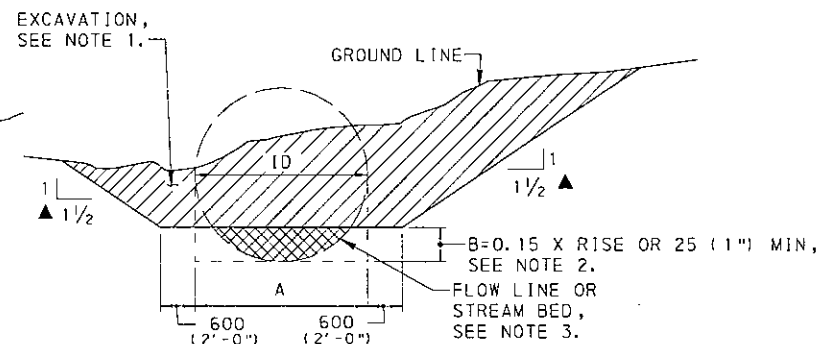
PLAN VIEW



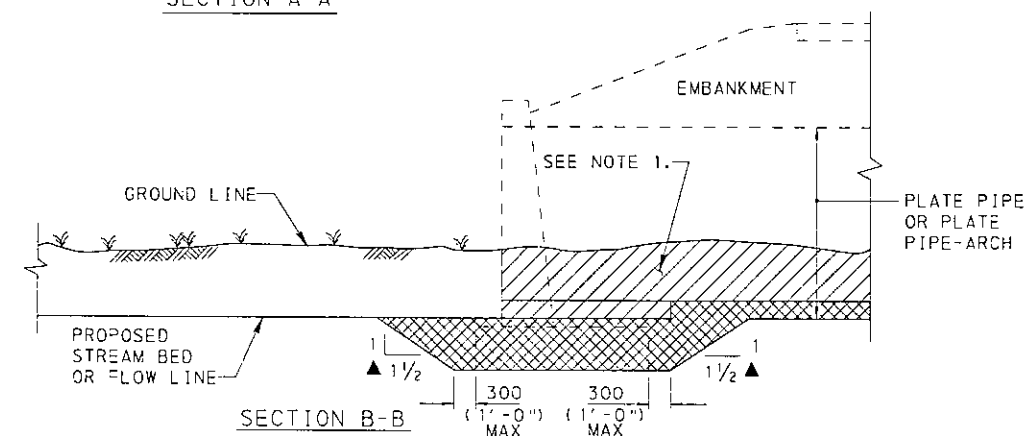
SECTION A-A



SECTION C-C
(METAL PLATE PIPE-ARCH)



SECTION C-C
(METAL PLATE PIPE)



SECTION B-B

METAL PLATE PIPE AND METAL PLATE PIPE-ARCH CULVERTS WITH ENDWALL

NOTES

1. PROVIDE EXCAVATION, INCLUDING THE PORTIONS OF ENDWALLS ABOVE THE FLOW LINE AND TO A MAXIMUM OF 1200 (4'-0") ABOVE THE TOP OF THE PIPE OR PIPE-ARCH, AS CLASS 4 EXCAVATION FOR PIPE OR PIPE-ARCH LESS THAN 1200 (4'-0") INSIDE DIAMETER OR SPAN, RESPECTIVELY, AND CLASS 1 EXCAVATION FOR PIPE OR PIPE-ARCH 1200 (4'-0") OR GREATER INSIDE DIAMETER OR SPAN, RESPECTIVELY.
2. FOR PLATE PIPE OR PLATE PIPE-ARCH WITH 1200 (4'-0") OR GREATER INSIDE DIAMETER OR SPAN, RESPECTIVELY, PROVIDE EXCAVATION BETWEEN THE FLOW LINE AND THE LOWER LIMIT OF CLASS 1 EXCAVATION CONFORMING TO THE AREA SHOWN WITH THE CLASS 3 EXCAVATION SYMBOL.
3. WHEN DEEMED NECESSARY TO EXCAVATE BELOW THE BOTTOM OF THE FLOW LINE, PAY ALL EXCAVATION WITHIN THE LIMITS OF THE BOTTOM OF THE EXCAVATED TRENCH AND THE TOP OF THE EXISTING GROUND AS CLASS 1 EXCAVATION FOR PLATE PIPE OR PLATE PIPE-ARCH WITH 1200 (4'-0") OR GREATER INSIDE DIAMETER OR SPAN, RESPECTIVELY, AND AS CLASS 4 EXCAVATION FOR PLATE PIPE OR PLATE PIPE-ARCH LESS THAN 1200 (4'-0") INSIDE DIAMETER OR SPAN, RESPECTIVELY. PLACE AND SHAPE BACKFILL MATERIAL FOR THE UNDERCUT AREA CONFORMING TO THE BOTTOM OF THE CULVERT AND CONSIDER INCIDENTAL TO THE CLASS SPECIFIED.
4. MEASURE AND PAY EXCAVATION AS SHOWN IN SECTION A-A, SECTION B-B AND SECTION C-C.
5. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS EXCEPT AS NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.

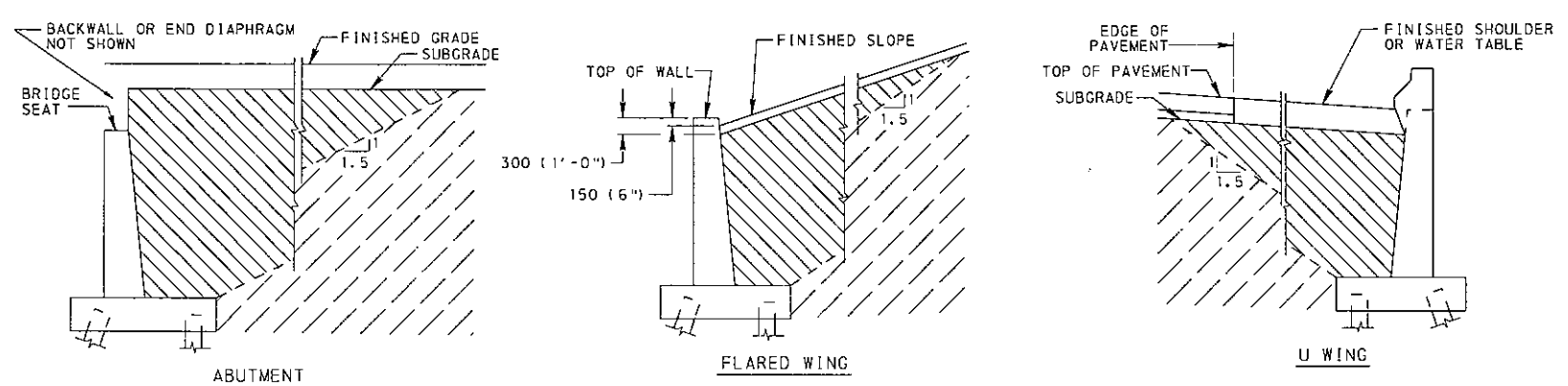
LEGEND

- CLASS 1 OR 4 EXCAVATION (TO BE INCLUDED IN ROADWAY QUANTITIES)
- ROADWAY ITEM
- CLASS 3 EXCAVATION (TO BE INCLUDED IN STRUCTURE QUANTITIES)
- STRUCTURE ITEM
- ▲ CONTINUE 1/2:1 SLOPE FOR CLASS 3 EXCAVATION TO FINISH GRADE OR GROUND LINE, WHICHEVER COMES FIRST.

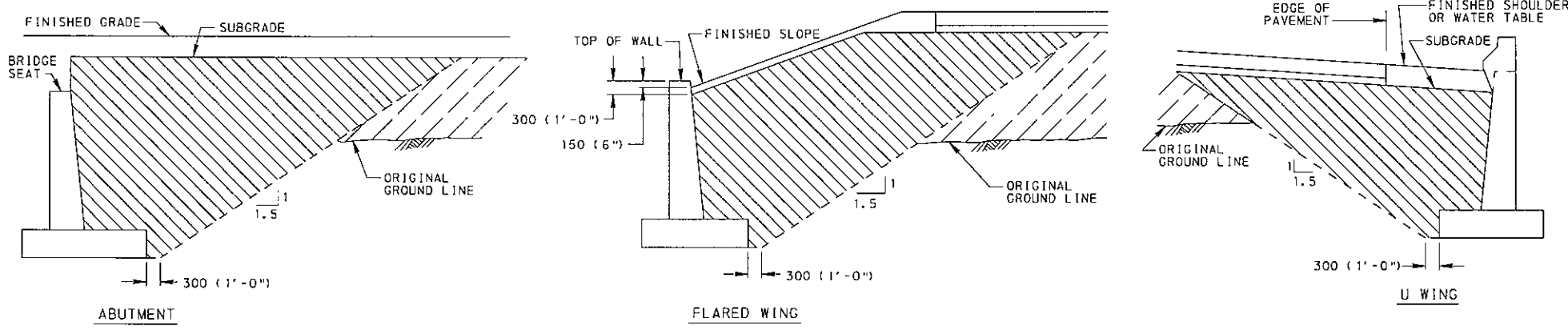
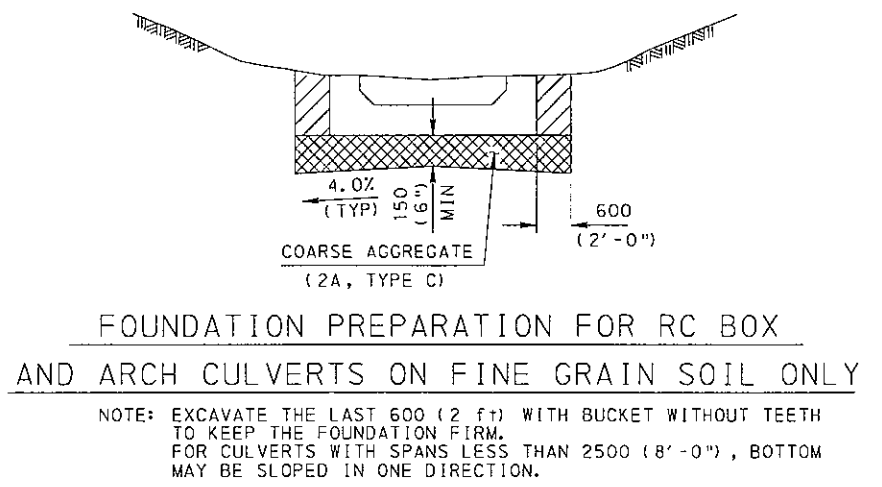
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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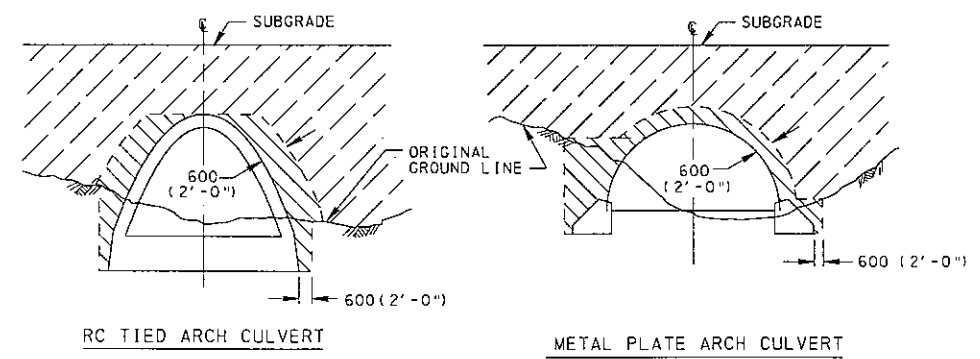
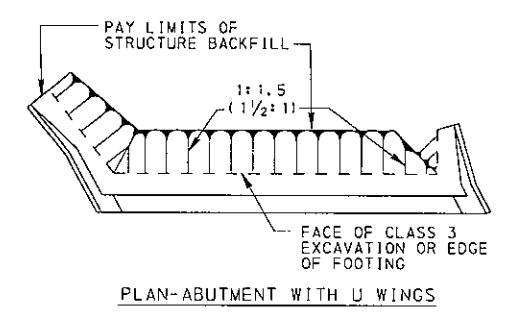
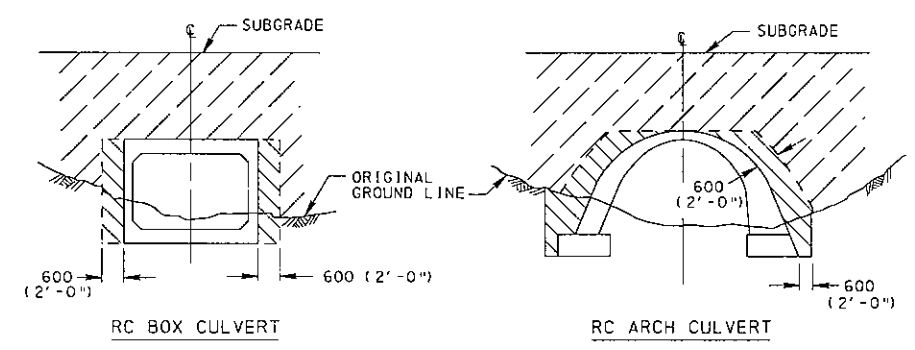
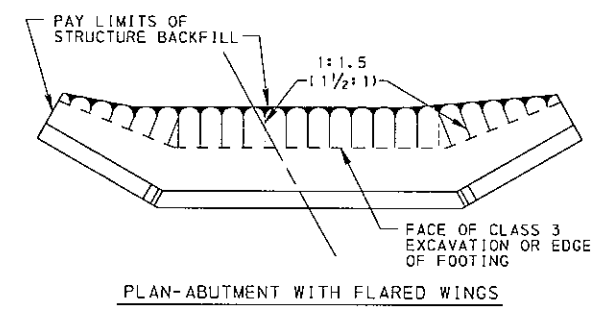
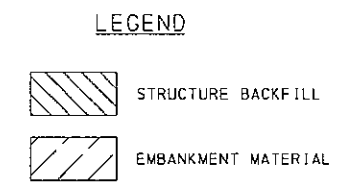
CLASSIFICATION OF EARTHWORK
FOR STRUCTURES



TYPICAL CROSS SECTIONS - ABUTMENTS ON FILL



TYPICAL CROSS SECTIONS - ABUTMENTS IN CUT



BACKFILL & EMBANKMENT CONSTRUCTION AT STRUCTURES

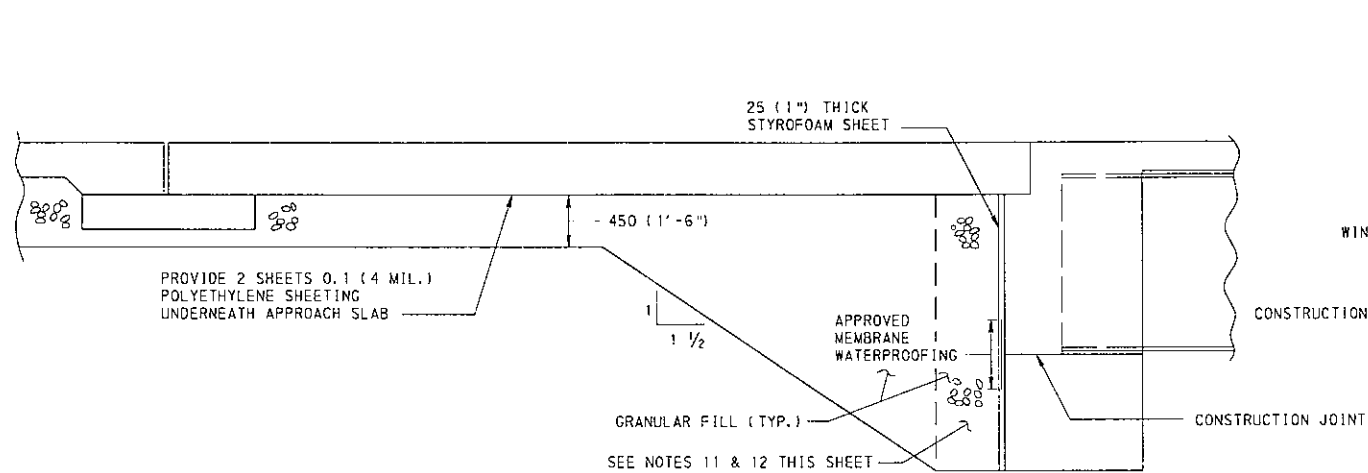
NOTE: SEE SHEET 2 FOR GENERAL NOTES.

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

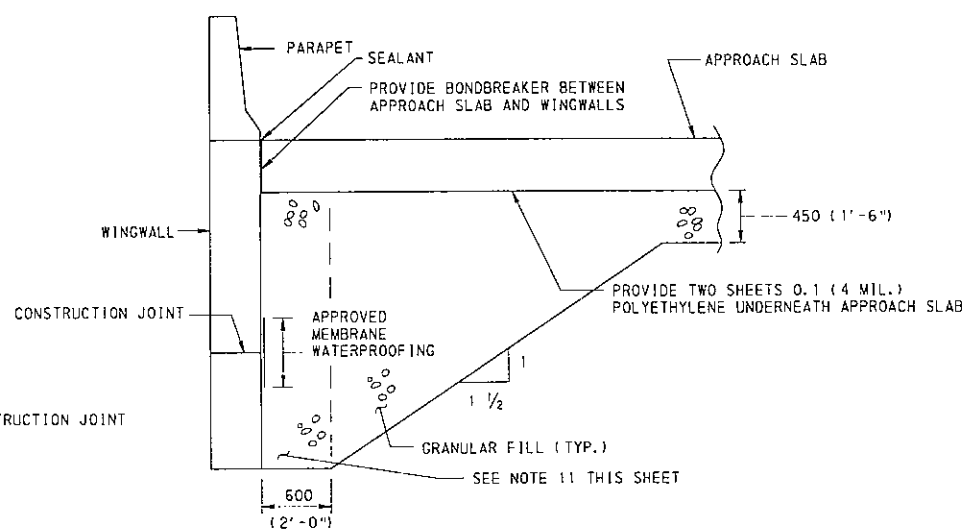
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DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

BACKFILL AT STRUCTURES

RECOMMENDED APR. 15, 2004 <i>Dean A. Schindler</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. P. Patel</i> CHIEF ENGINEER	SHT. 1 OF 2 RC-12M
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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 S7 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 mm (24") FROM THE REAR FACE OF THE ABUTMENT AND THE WINGWALL IN LIFTS OF 100 mm (4") 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

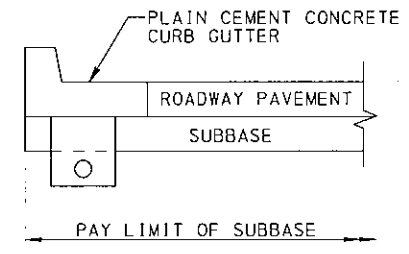
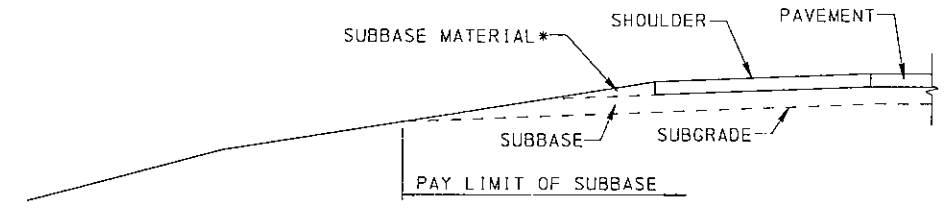
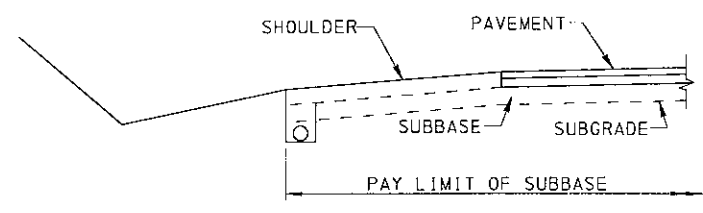
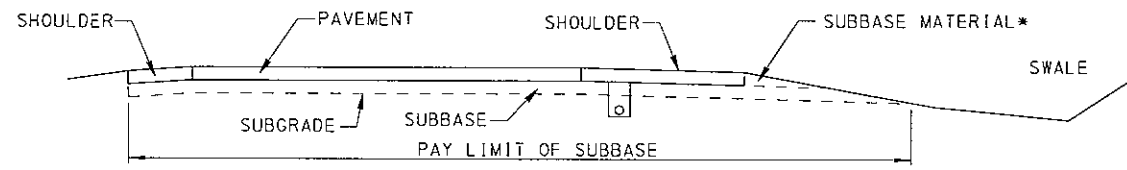
* IDENTIFIES NOTES THAT APPLY ONLY TO INTEGRAL ABUTMENTS.

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
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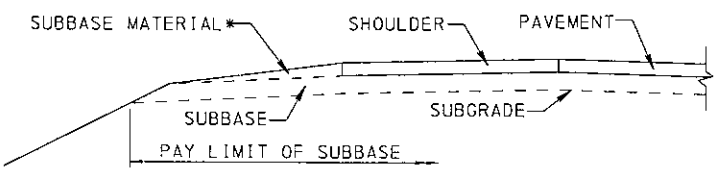
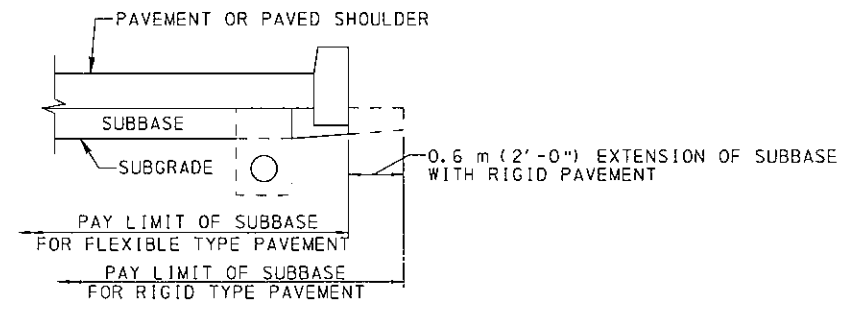
BACKFILL AT STRUCTURES

RECOMMENDED APR. 15, 2004 <i>Dean A. Schindler</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. P. Patel</i> CHIEF ENGINEER	SHEET 2 OF 2 RC-12M
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NOTE

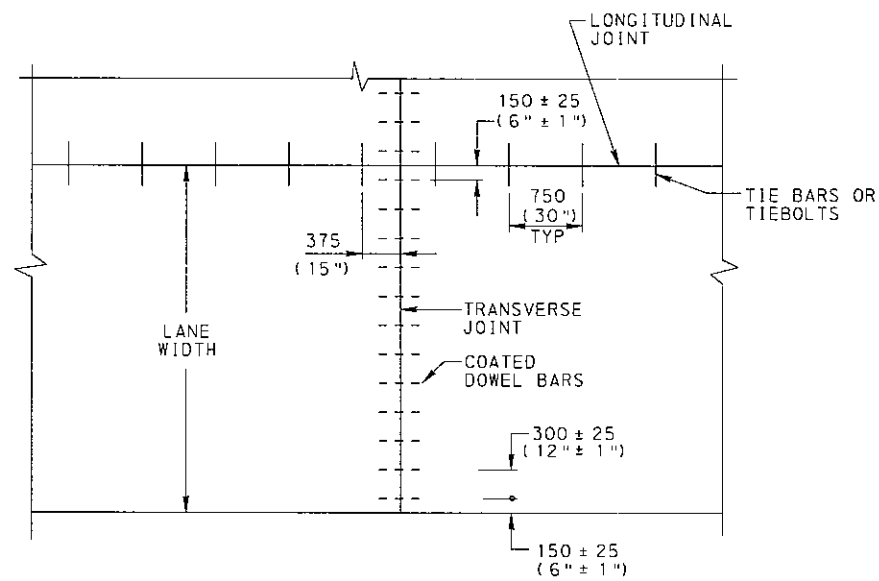
1. CONSIDER PAYMENT FOR SUBGRADE INCIDENTAL TO THE ITEMS OF SUBBASE.
2. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.



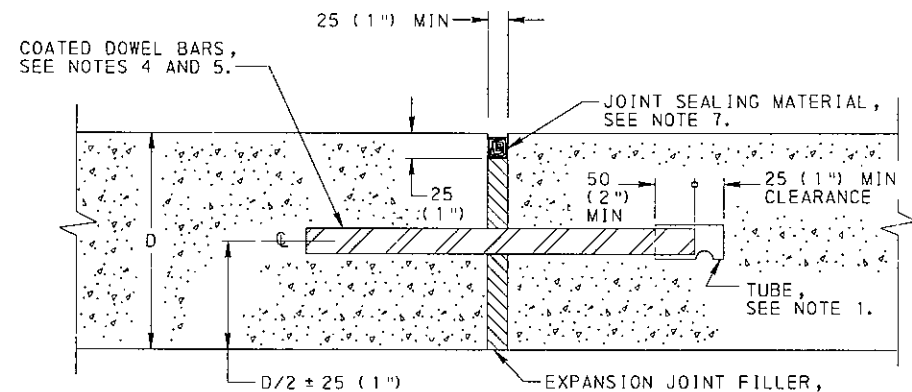
*CONSIDER THE PAYMENT FOR THIS AREA OF SUBBASE INCIDENTAL TO THE SHOULDER.

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

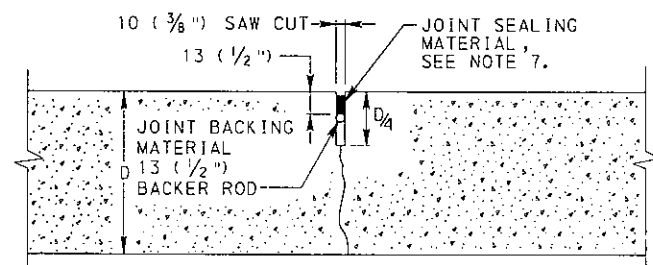
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN		
PAY LIMIT OF SUBBASE		
RECOMMENDED APR. 15, 2004 <i>Dean A. Schank</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. L. Patel</i> CHIEF ENGINEER	SHT 1 OF 1 RC-13M



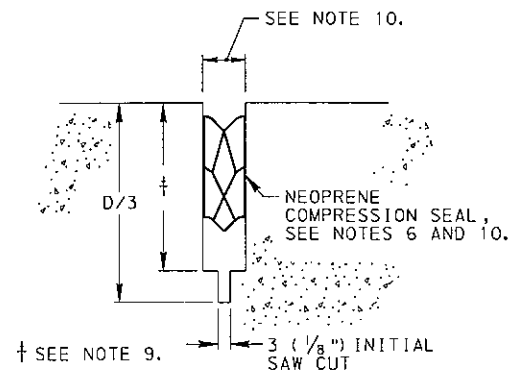
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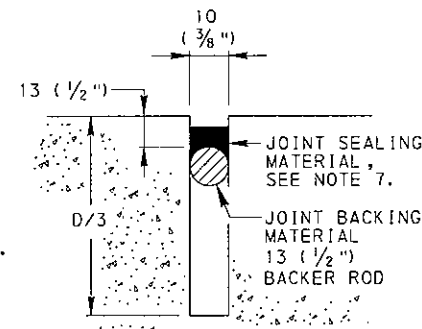
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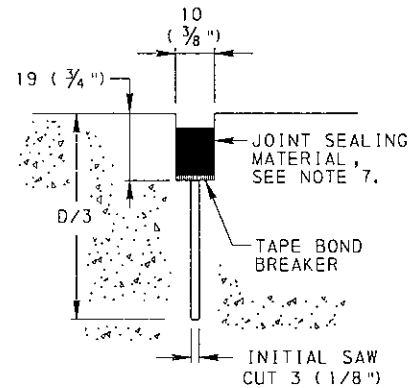
TYPE P
SEE RC-27M



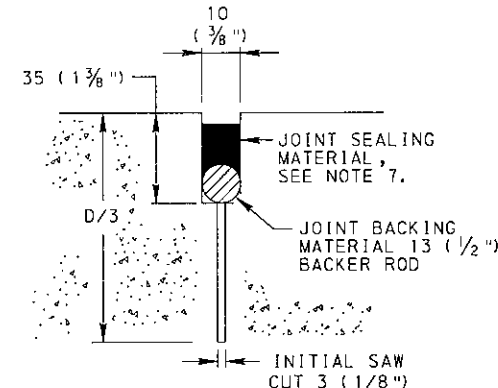
DETAIL A



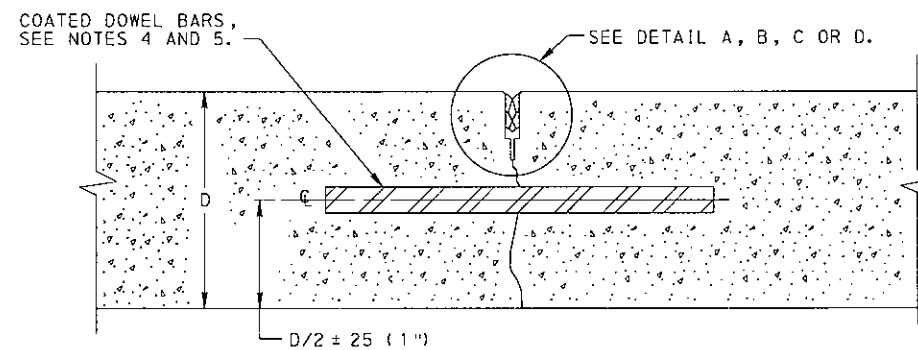
DETAIL B



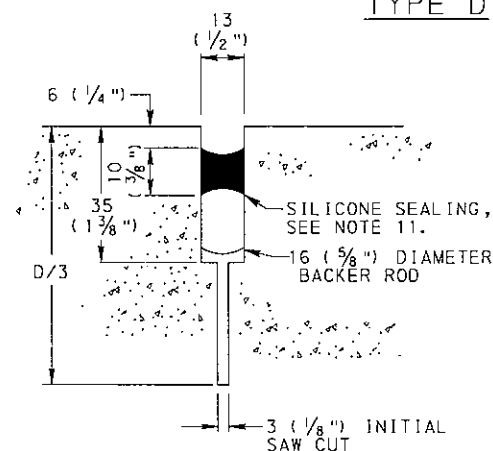
DETAIL C



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.
- 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

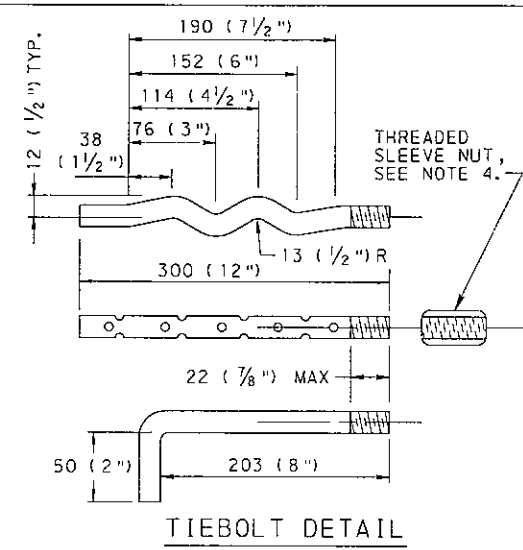
JOINT SPACING	SEAL SIZE	WIDTH OF SAW CUT		
		<60°F	60°F TO 80°F	>80°F
(15' & 20')	(1")	(9/8")	(9/16")	(1/2")
(30')	(1 1/4")	(3/4")	(5/8")	(1/2")

- WHEN SILICONE JOINT SEALING MATERIAL, AS SPECIFIED IN PUBLICATION 408, SECTION 705.4 (d), 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.

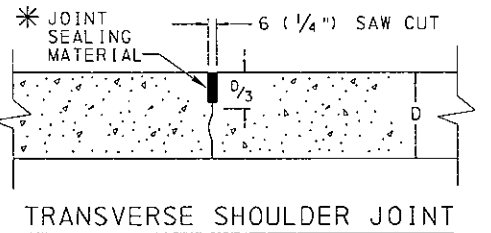
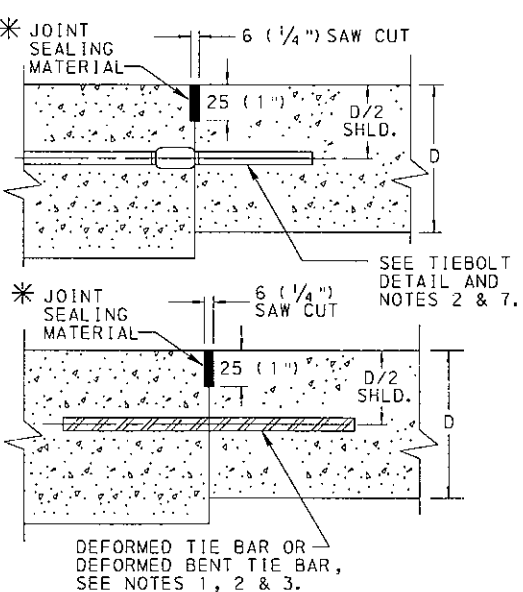
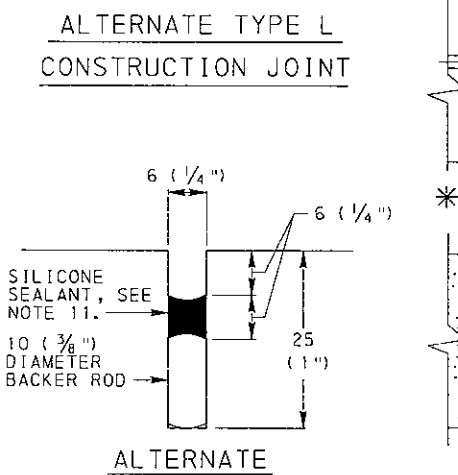
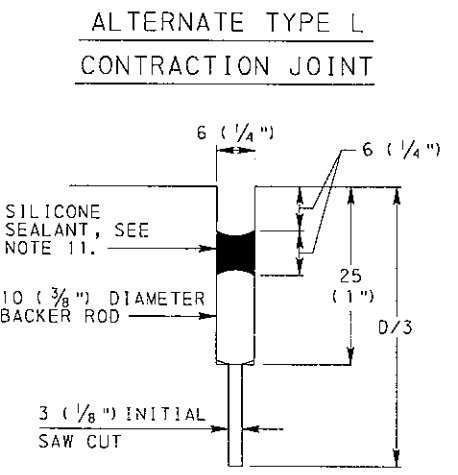
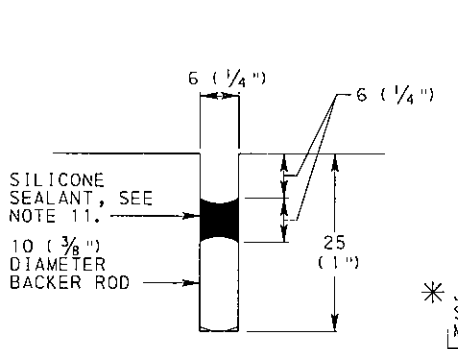
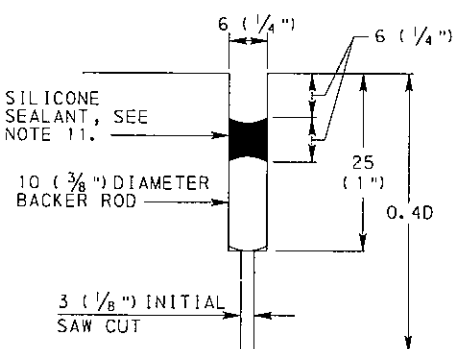
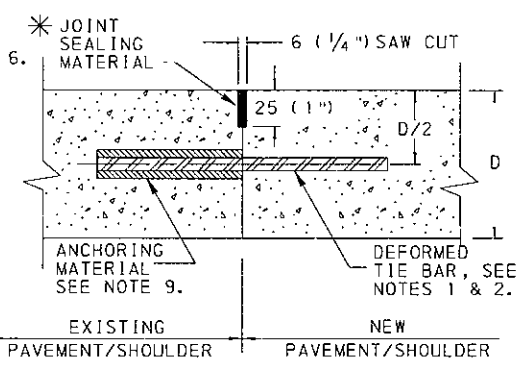
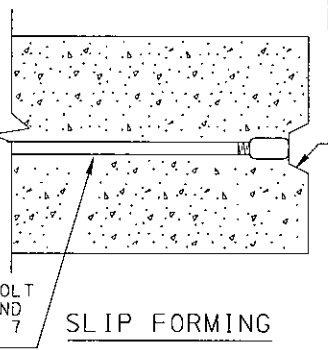
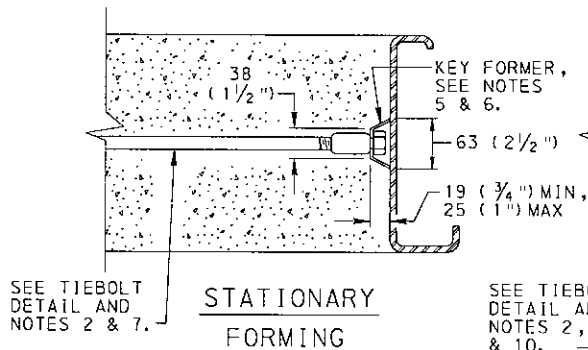
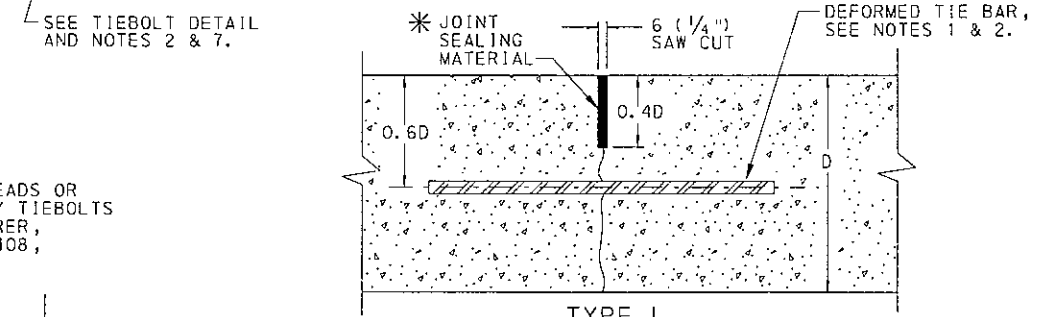
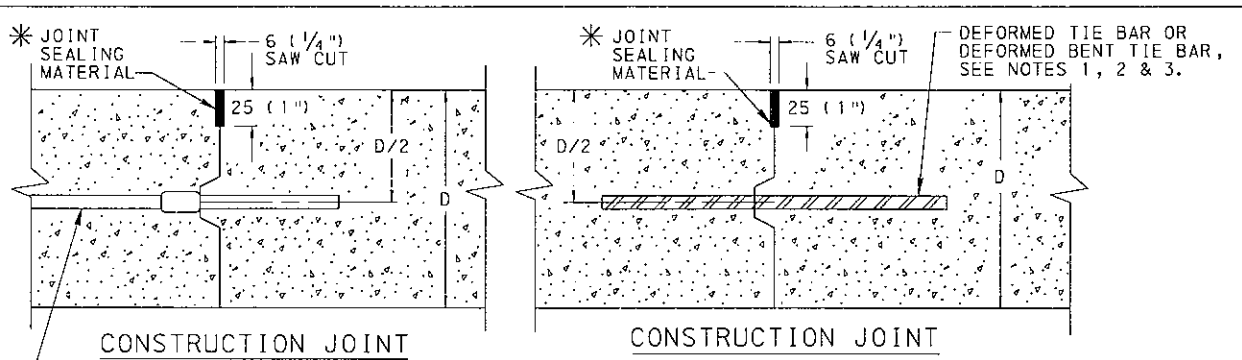
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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE PAVEMENT JOINTS



MAKE TIEBOLTS 14 (3/16) Ø BAR WITH ROLLED THREADS OR 16 (3/8) 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 TIE BOLTS AND THREADED SLEEVE NUTS, EXCLUDING THREADS, AS SPECIFIED IN PUBLICATION 408, SECTION 709.1(c) OR SECTION 1105.02(s) RESPECTIVELY.
- 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 1/8"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.
- ONLY FORM KEYWAYS FOR PAVEMENT DEPTHS GREATER THAN 250 (10") FORM ONLY FEMALE KEYWAYS.
- PLACE TIEBOLTS AT 750 (30") CENTER TO CENTER MAXIMUM WHICH 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). 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(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).
- MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (1/8") TO 6 (1/4") BELOW THE PAVEMENT SURFACE.

(*) DENOTES, SEE NOTE 12.

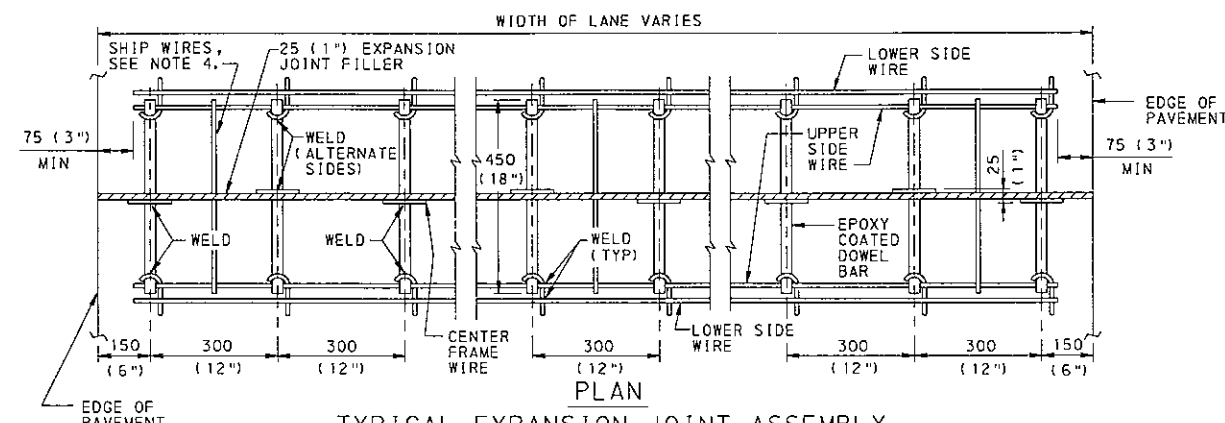
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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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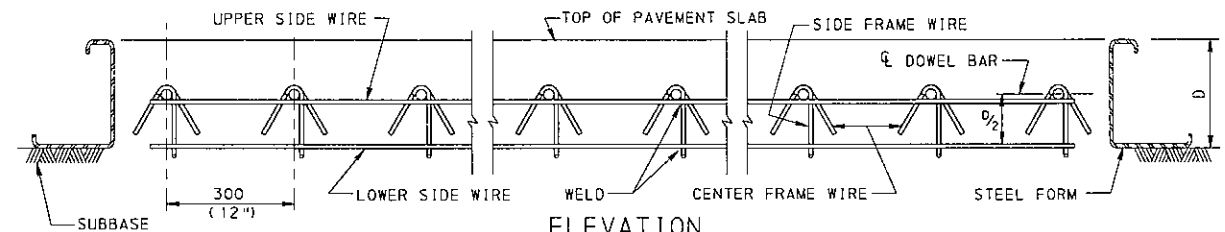
CONCRETE PAVEMENT JOINTS

RECOMMENDED APR. 15, 2004 <i>Dean A. Schuch</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>m. L. Patel</i> CHIEF ENGINEER	SHT 2 OF 3 RC-20M
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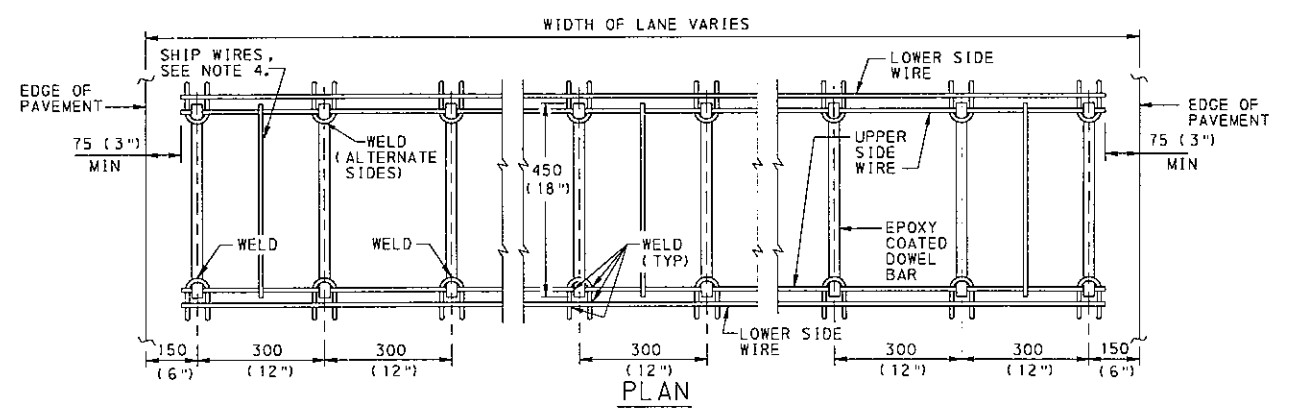
SEE NOTE 8



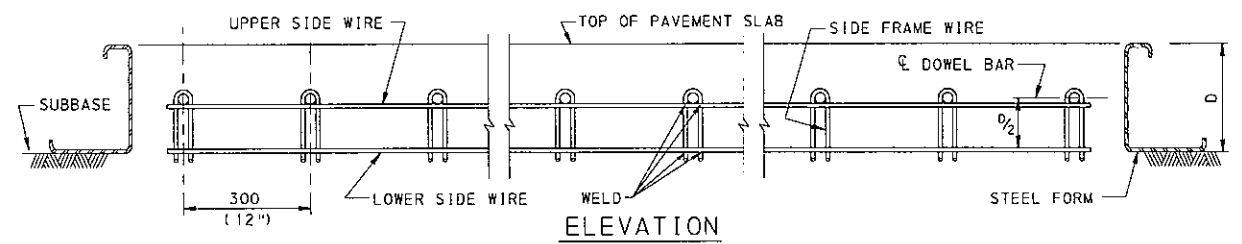
TYPICAL EXPANSION JOINT ASSEMBLY



EXPANSION JOINT ASSEMBLY



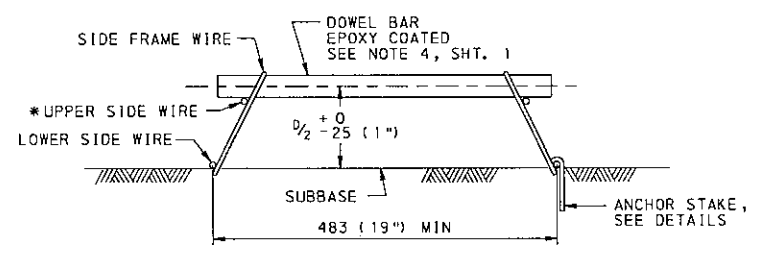
TYPICAL CONTRACTION JOINT ASSEMBLY



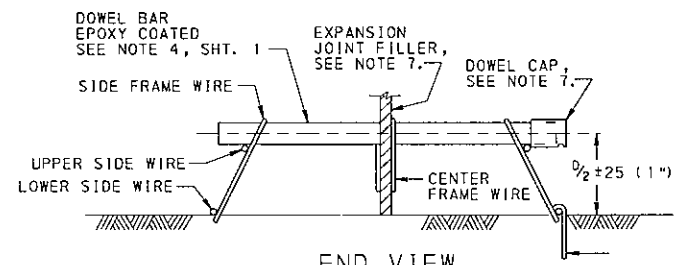
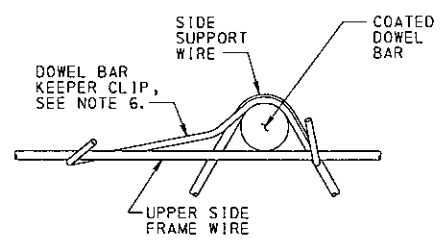
CONTRACTION JOINT ASSEMBLY

NOTES

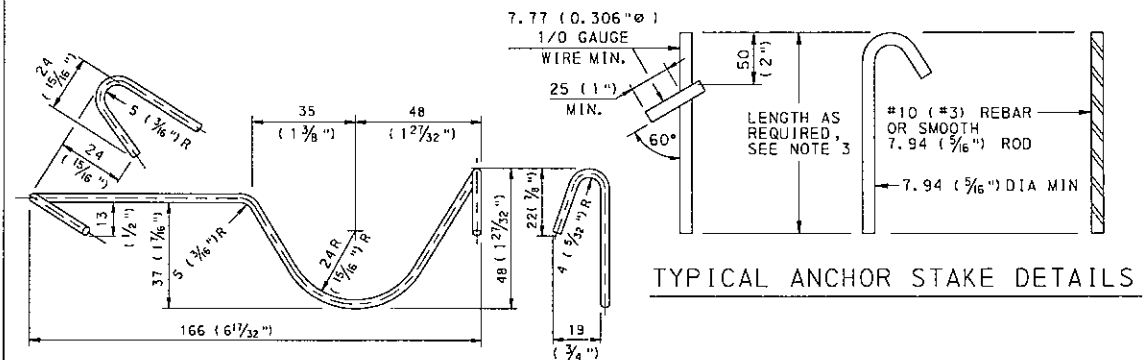
1. THIS STANDARD DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND COMPATIBILITY. IT DOES NOT INCLUDE ALL THE DETAILS REQUIRED FOR FABRICATION. ONLY ITEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED.
2. PROVIDE ANCHOR STAKES TO SECURE UNIT FROM MOVEMENT INCLUDING UPLIFT. A MINIMUM OF EIGHT STAKES ARE TO BE USED. FOR SLIP FORM PAVING, ANCHOR STAKES SHALL ENGAGE THE UPPER SIDE WIRE. FOR FIXED FORM PAVING, ANCHOR STAKES SHALL ENGAGE THE LOWER SIDE WIRE.
3. PROVIDE STAKES OF SUFFICIENT LENGTH SUCH THAT 400 (16") WILL BE EMBEDDED IF THE TOP COURSE IS 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.
4. AFTER EACH LOAD TRANSFER ASSEMBLY IS SECURED IN PLACE, REMOVE AND PROPERLY DISPOSE OF ALL TIE WIRES OR SHIPPING WIRES PRIOR TO INSTALLING EXPANSION FIBRE.
5. PROVIDE SIDE SUPPORT ASSEMBLY WIRES CONFORMING TO THE CURRENT ASTM DESIGNATION A-510 SPECIFICATIONS FOR WIRE RODS AND COARSE ROUND WIRE, CARBON STEEL AND OF A MINIMUM ALLOWABLE SIZE AS FOLLOWS:



CONTRACTION JOINT ASSEMBLY



EXPANSION JOINT ASSEMBLY

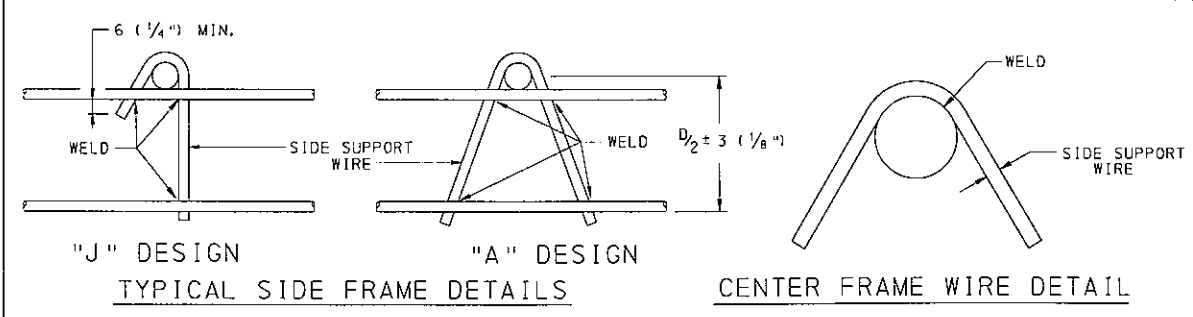


DOWEL BAR KEEPER CLIP

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)	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)	9.19 (0.362" Ø MIN) 3/0 GAUGE

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

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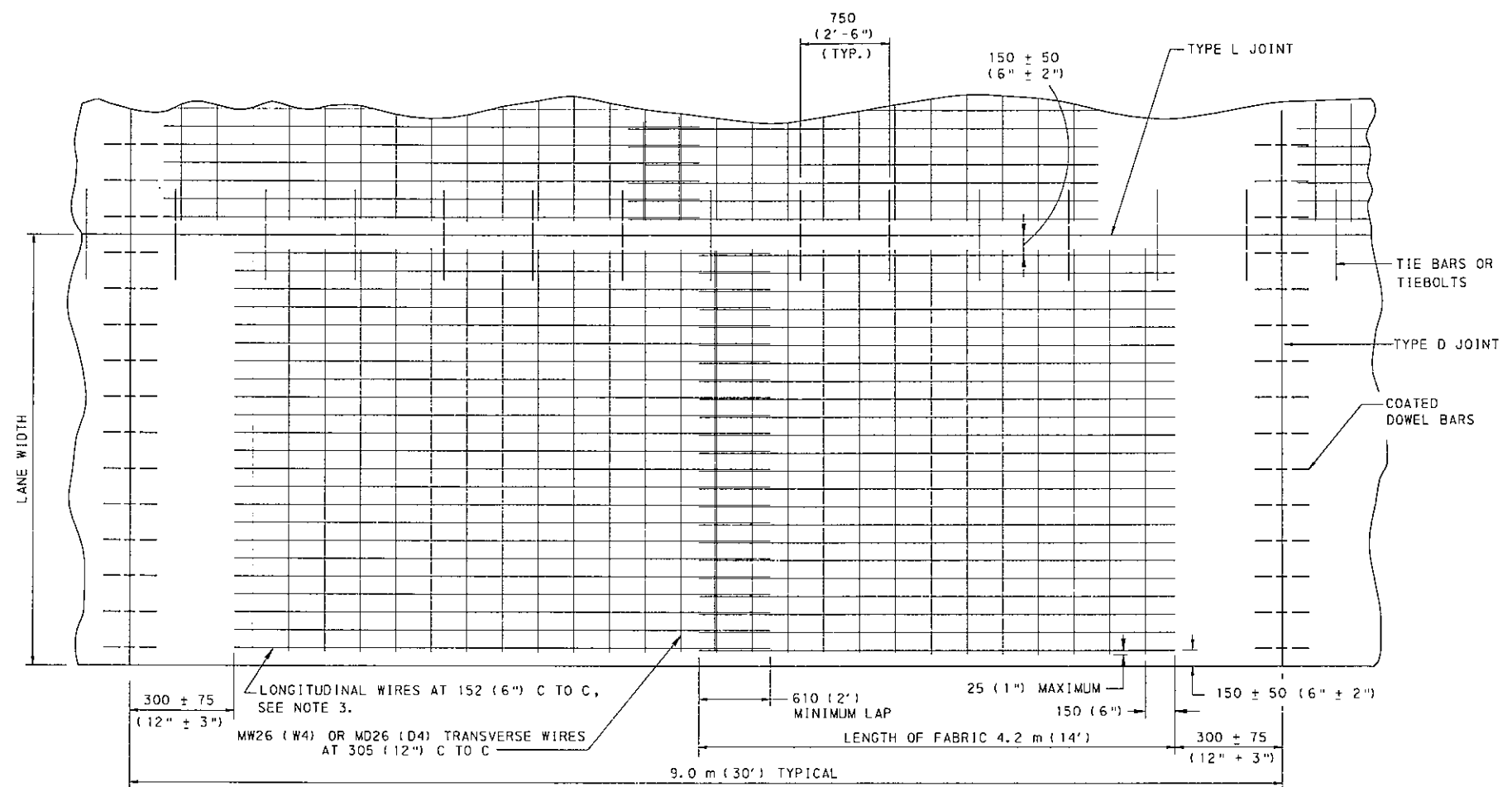


6. DOWEL BAR KEEPER CLIPS MAY BE USED IN LIEU OF TIE WIRES OR SHIPPING WIRES FOR CONSTRUCTION AND EXPANSION JOINT ASSEMBLIES.
7. FABRICATE AND SHIP NEST ALL DOWEL, SIDE SUPPORT AND CENTER SUPPORT ASSEMBLIES. ASSEMBLE EXPANSION JOINT FILLER, ANCHOR STAKES AND DOWEL CAPS IN THE FIELD.
8. PROVIDE DOWEL BARS PARALLEL TO THE CENTERLINE AND TO THE PAVEMENT SURFACE. MAKE TOLERANCE OF THIS PLACEMENT WITHIN ± 6 (± 1/4") PER DOWEL BAR.
9. PROVIDE DOWELS AND ASSEMBLY DETAILS THAT CONFORM TO PUBLICATION 408.
10. WELD REQUIREMENTS AS LISTED BELOW AND TESTED PER MANUFACTURER'S QUALITY CONTROL PLAN FOR WELD SHEAR.
11. WIRE TOLERANCES PER ASTM 510M IS 0.05 mm (0.003 in.)

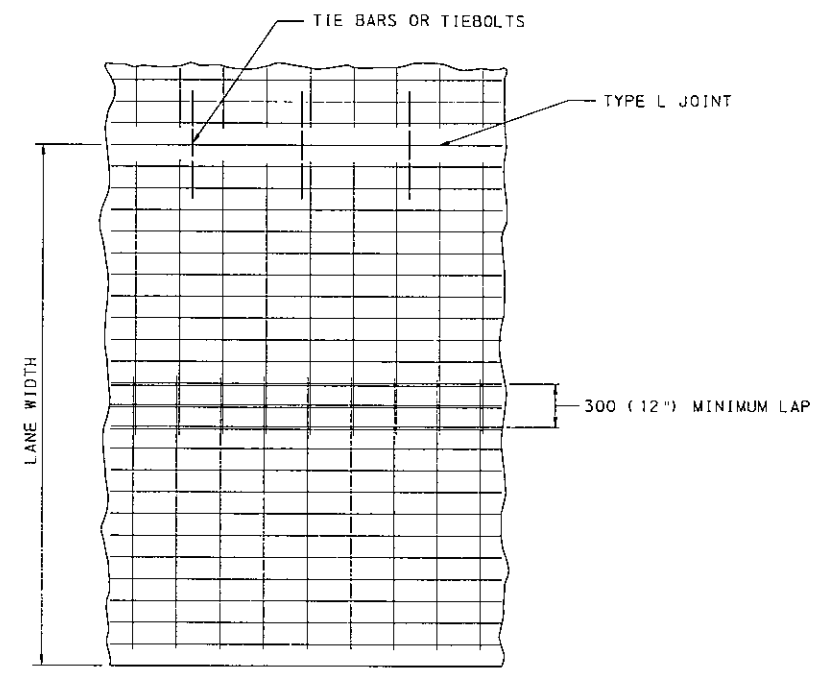
PAVEMENT THICKNESS	UPPER & LOWER WIRE TO "A" & "J" SIDE SUPPORT	DOWEL TO SUPPORT ASSEMBLY
250 (10") OR LESS	360 kg (794 lbs)	540 kg (1190 lbs)
GREATER THAN 250 (10")	540 kg (1190 lbs)	900 kg (1984 lbs)

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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CONCRETE PAVEMENT JOINTS
NON-SKEWED
LOAD TRANSFER ASSEMBLIES



WIRE FABRIC REINFORCEMENT



ALTERNATE LAPPED FABRIC

NOTES

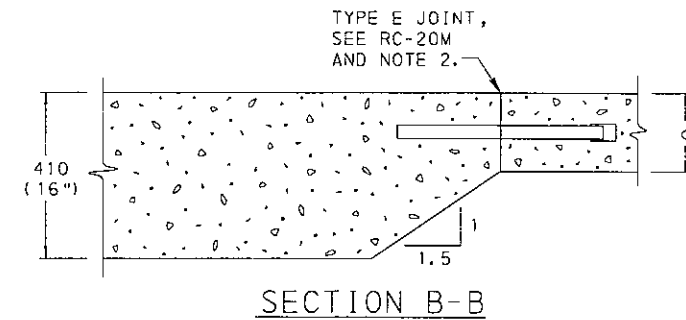
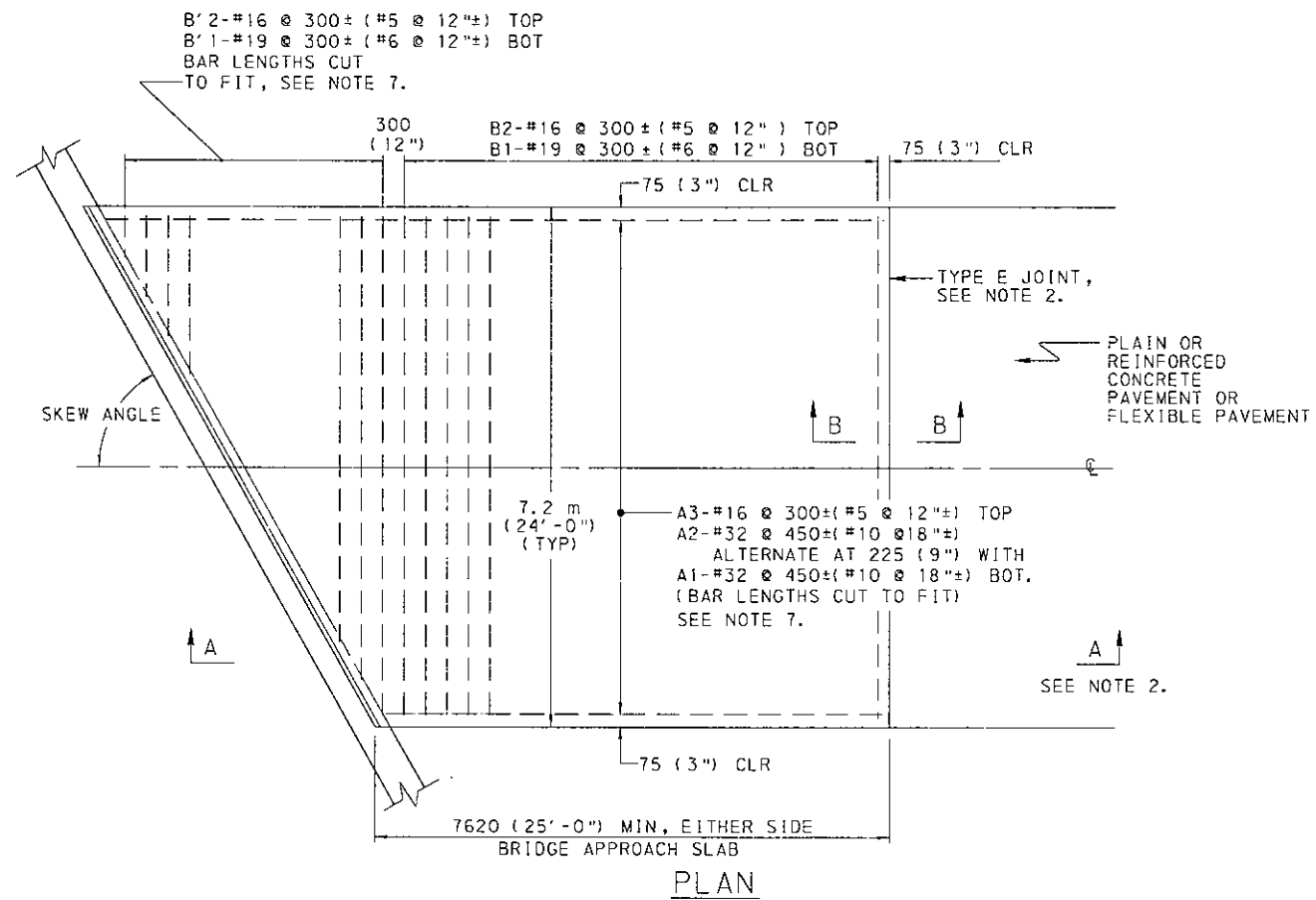
- FOR VARIABLE WIDTH PAVEMENT CUT THE REINFORCEMENT AS REQUIRED.
- WIRE FABRIC REINFORCEMENT MAY BE PLACED WITH TRANSVERSE WIRES ABOVE OR BELOW LONGITUDINAL WIRES.
- PROVIDE LONGITUDINAL WIRES FOR WIRE FABRIC REINFORCEMENT OF THE FOLLOWING MINIMUM SIZES:

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 (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.

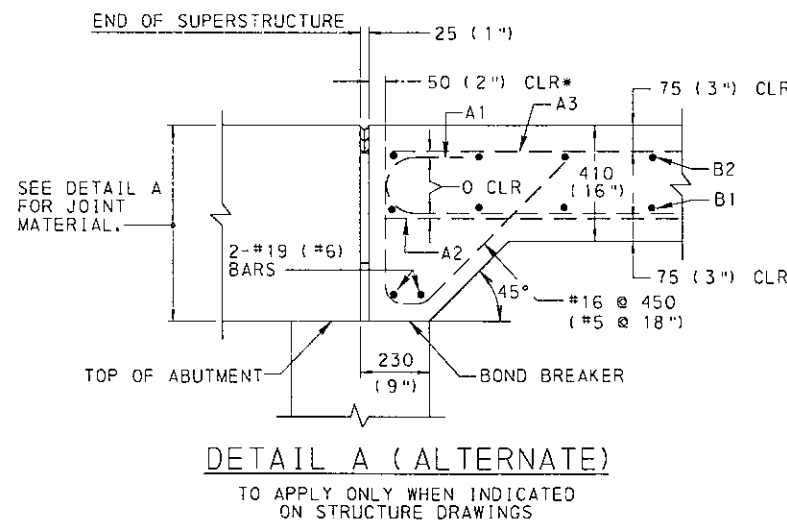
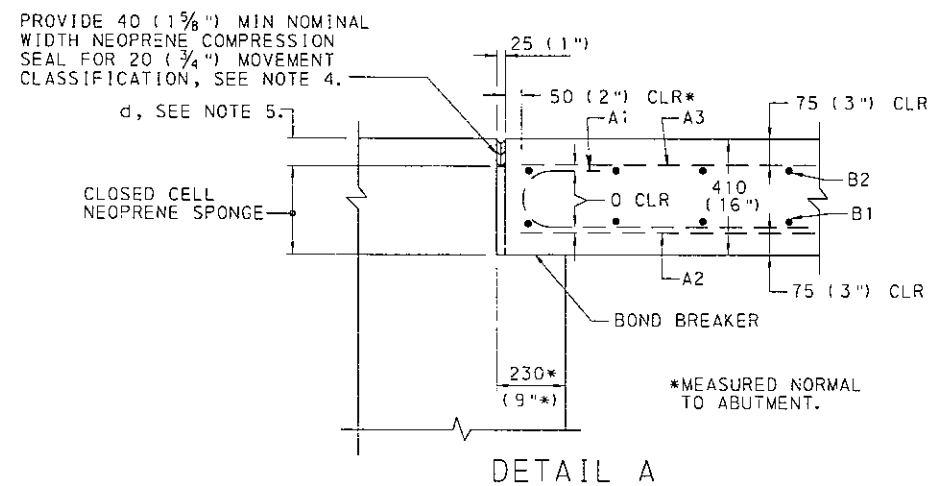
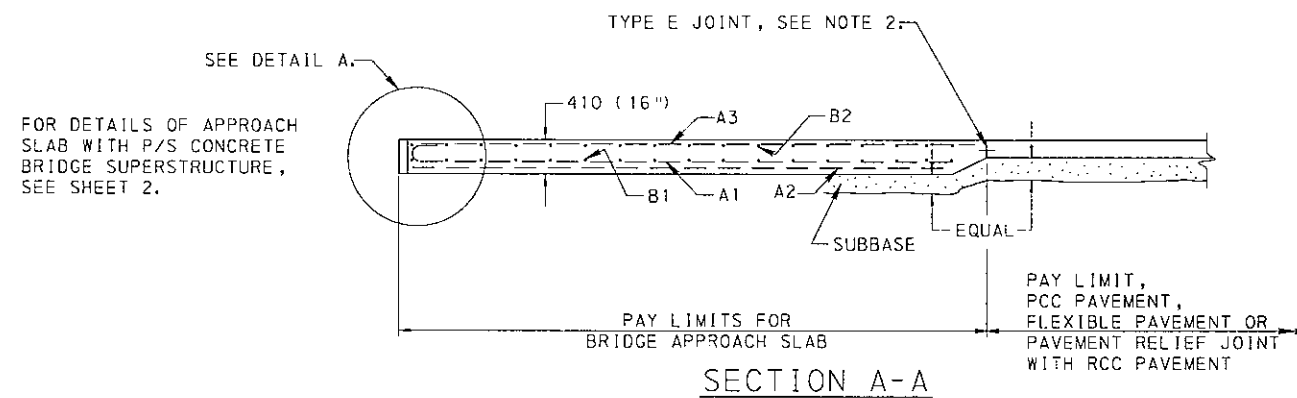
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

REINFORCED
CONCRETE PAVEMENT



NOTES

1. CONSTRUCT IN ACCORDANCE WITH THIS STANDARD DRAWING OR AS INDICATED ON THE STRUCTURE DRAWINGS.
2. 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.
3. 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.
4. 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.
5. DETERMINE "d" BY ADDING 20 (3/4") TO THE MAXIMUM COMPRESSED HEIGHT OF THE NEOPRENE COMPRESSION SEAL. (SEE MANUFACTURER'S INFORMATION.)
6. CONSTRUCT THE BRIDGE APPROACH SLAB AFTER THE BRIDGE DECK IS CONSTRUCTED.
7. PROVIDE REINFORCEMENT BARS, EPOXY COATED IN ACCORDANCE WITH PUBLICATION 408, SECTION 709.1 (c).
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.

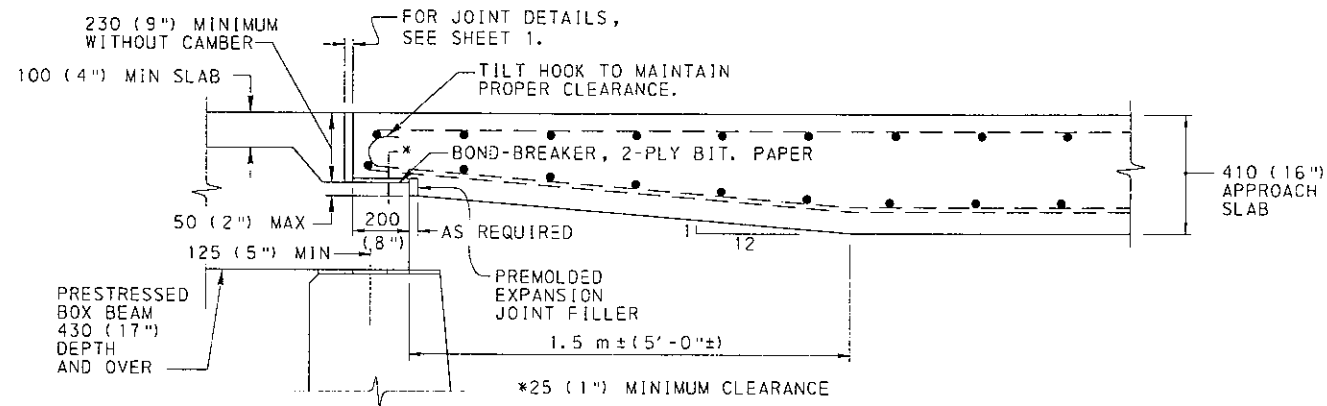
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

BRIDGE APPROACH SLAB

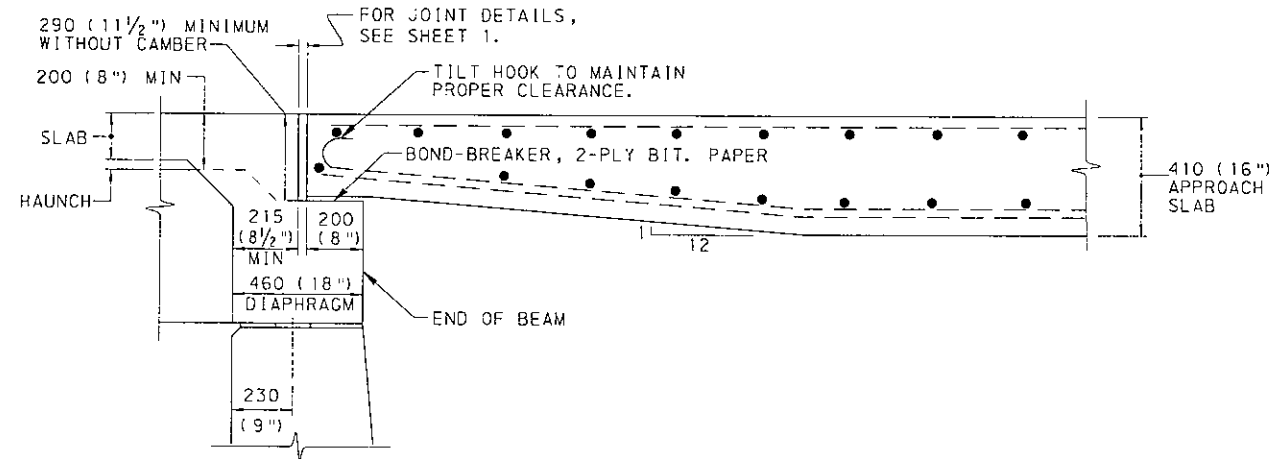
RECOMMENDED APR. 15, 2004
Don A. Stahl
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED APR. 15, 2004
M. Patel
CHIEF ENGINEER

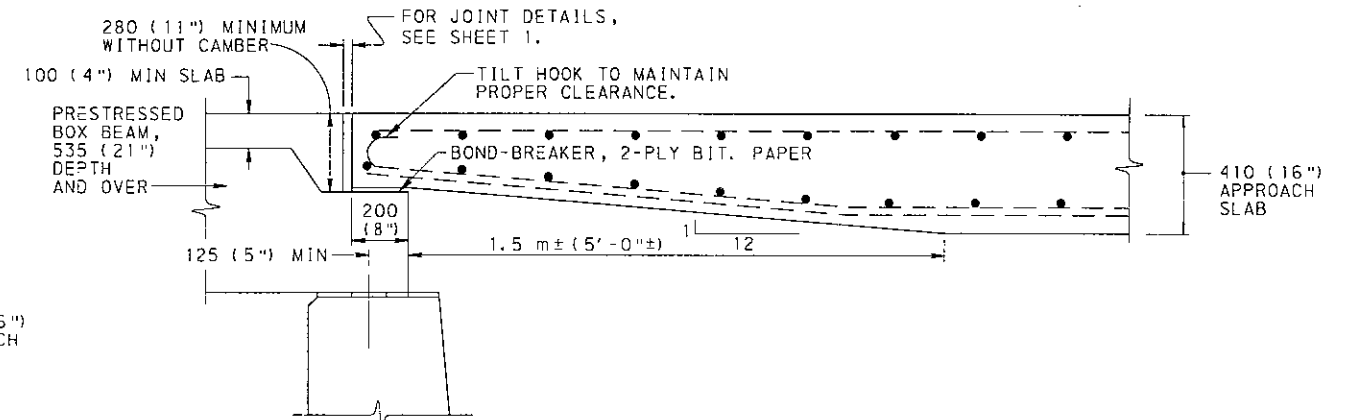
SHT 1 OF 3
RC-23M



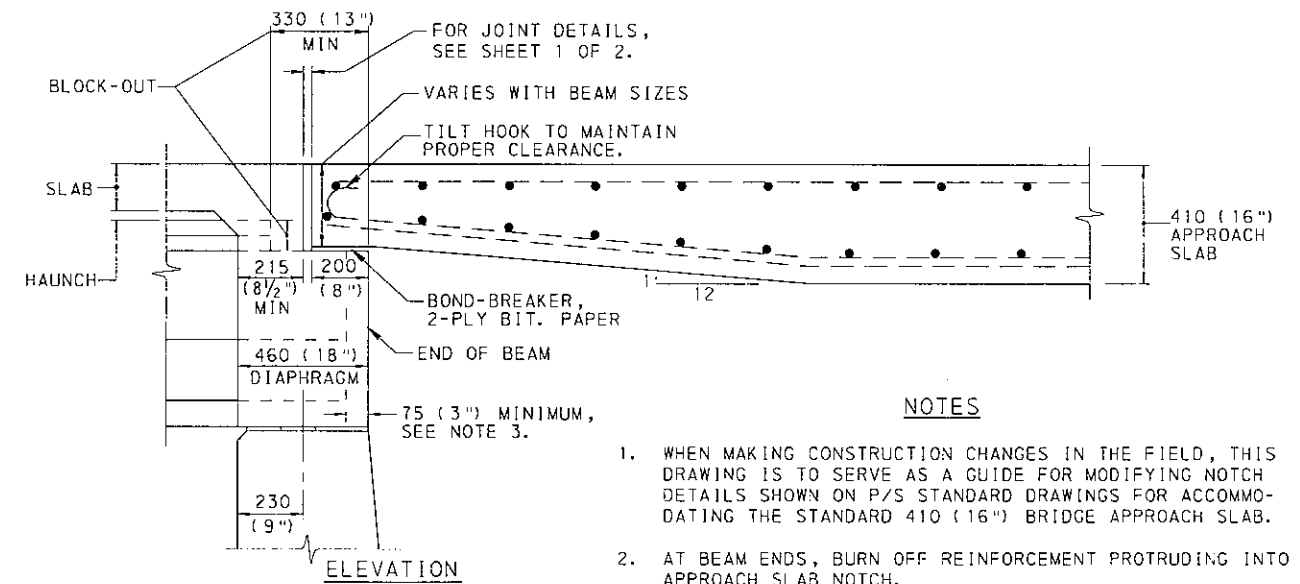
430 (17") DEEP ADJACENT COMPOSITE BOX BEAMS WITH 230 (9") DEEP APPROACH SLAB NOTCH



SPREAD BOX BEAMS WITH APPROACH SLAB NOTCH 290 (1 1/2") OR DEEPER



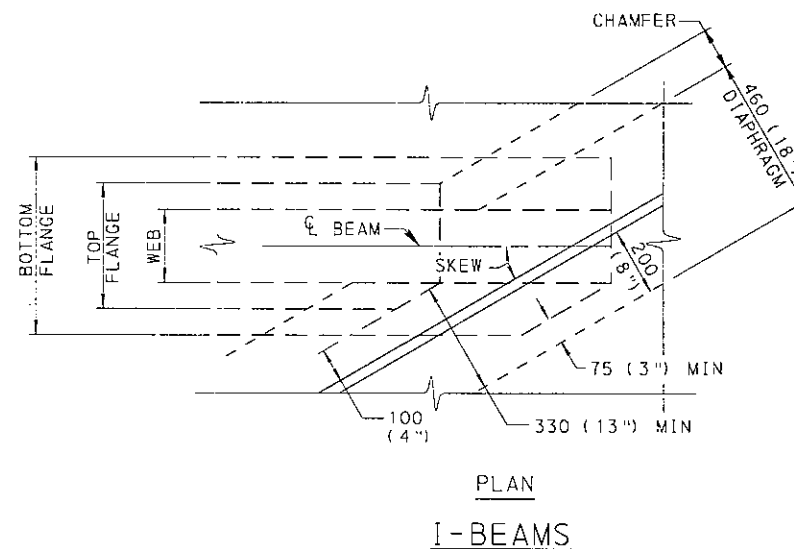
535 (21") TO 1220 (4'-0") DEEP ADJACENT COMPOSITE BOX BEAMS WITH 280 (11") DEEP APPROACH SLAB NOTCH



NOTES

1. WHEN MAKING CONSTRUCTION CHANGES IN THE FIELD, THIS DRAWING IS TO SERVE AS A GUIDE FOR MODIFYING NOTCH DETAILS SHOWN ON P/S STANDARD DRAWINGS FOR ACCOMMODATING THE STANDARD 410 (16") BRIDGE APPROACH SLAB.
2. AT BEAM ENDS, BURN OFF REINFORCEMENT PROTRUDING INTO APPROACH SLAB NOTCH.
3. INCREASE IN FIELD, PROVIDING OVERHANG, IF REQUIRED.
4. PROVIDE REINFORCEMENT BARS, EPOXY COATED, IN ACCORDANCE WITH PUBLICATION 408, SECTION 709.1 (c).

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



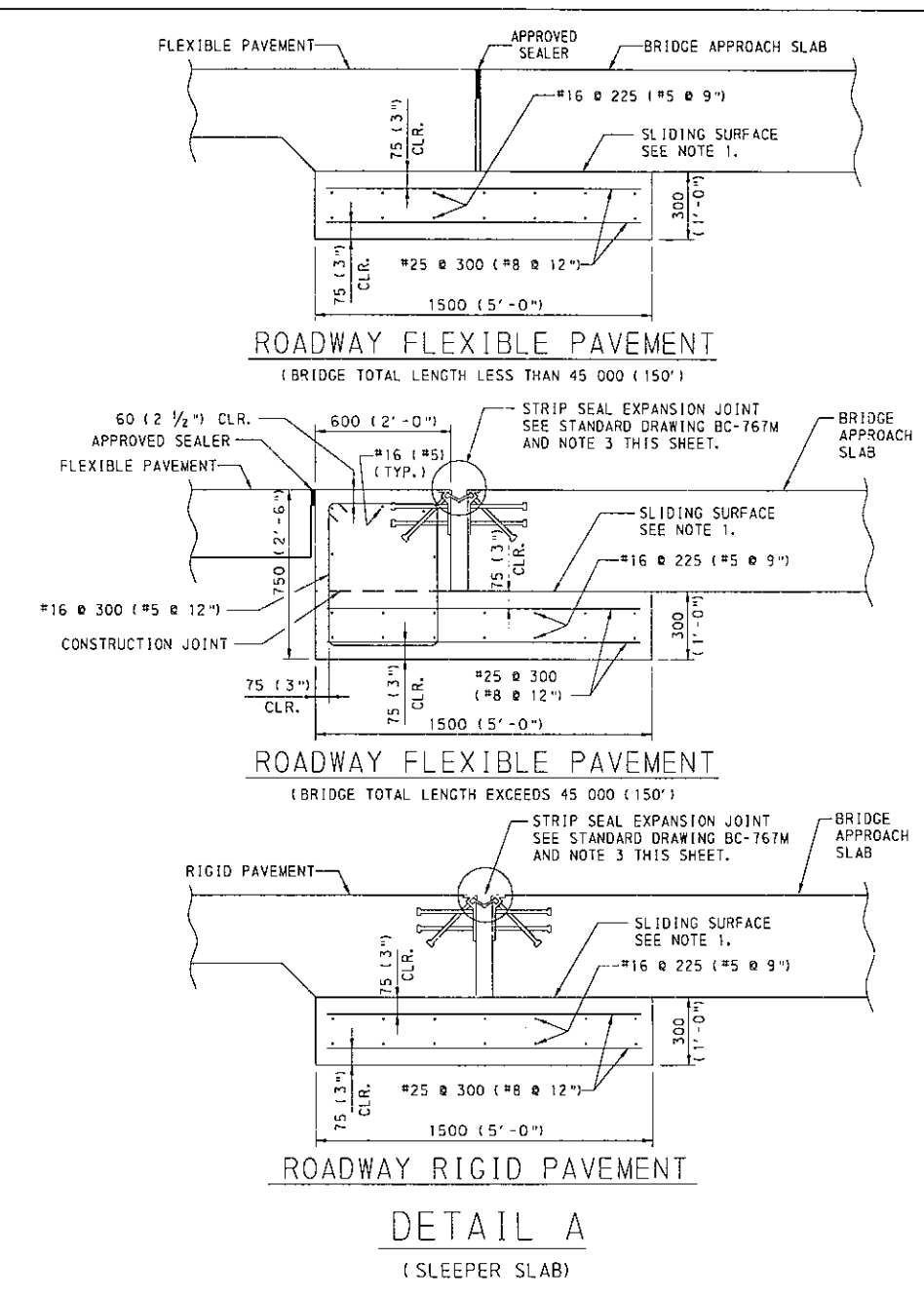
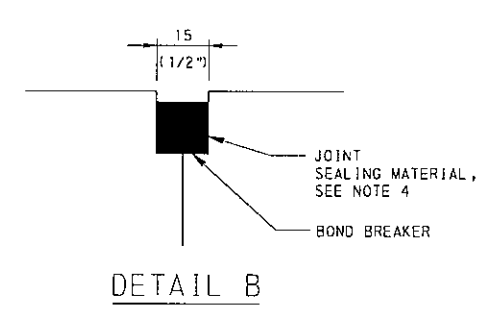
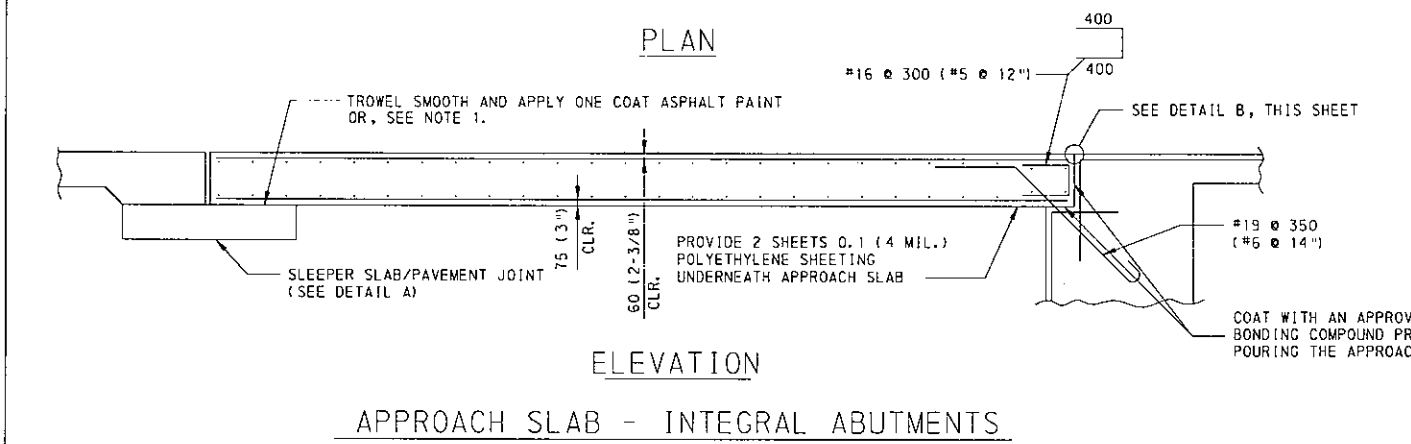
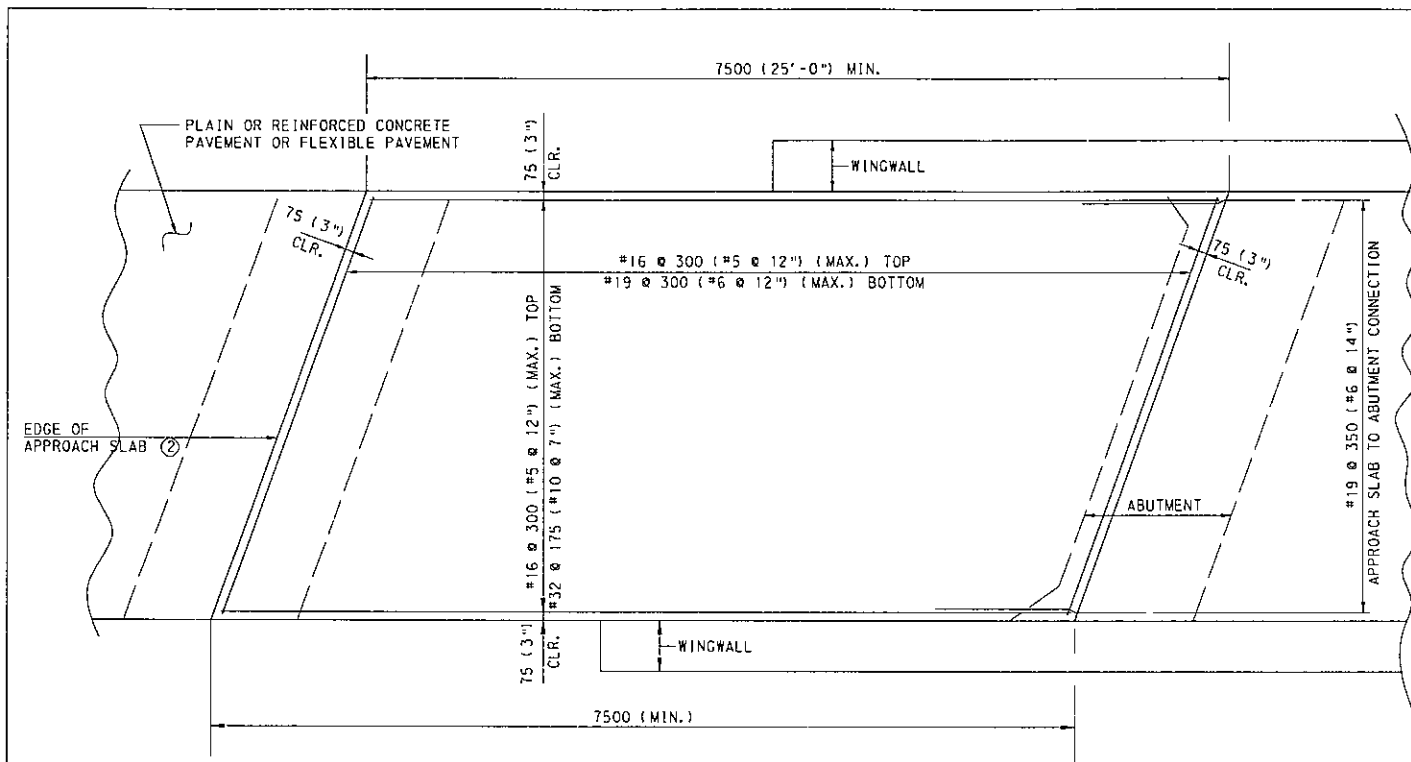
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

BRIDGE APPROACH SLAB

RECOMMENDED APR. 15, 2004
Dean A. Shank
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED APR. 15, 2004
M. Patel
CHIEF ENGINEER

SHT 2 OF 3
RC-23M



- NOTES:**
1. TROWEL SMOOTH AND PLACE 2 LAYERS OF 0.1 mm (4 MIL.) POLYETHYLENE SHEETING AS BOND BREAKER.
 2. 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.
 3. 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.
 4. 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.

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DEPARTMENT OF TRANSPORTATION
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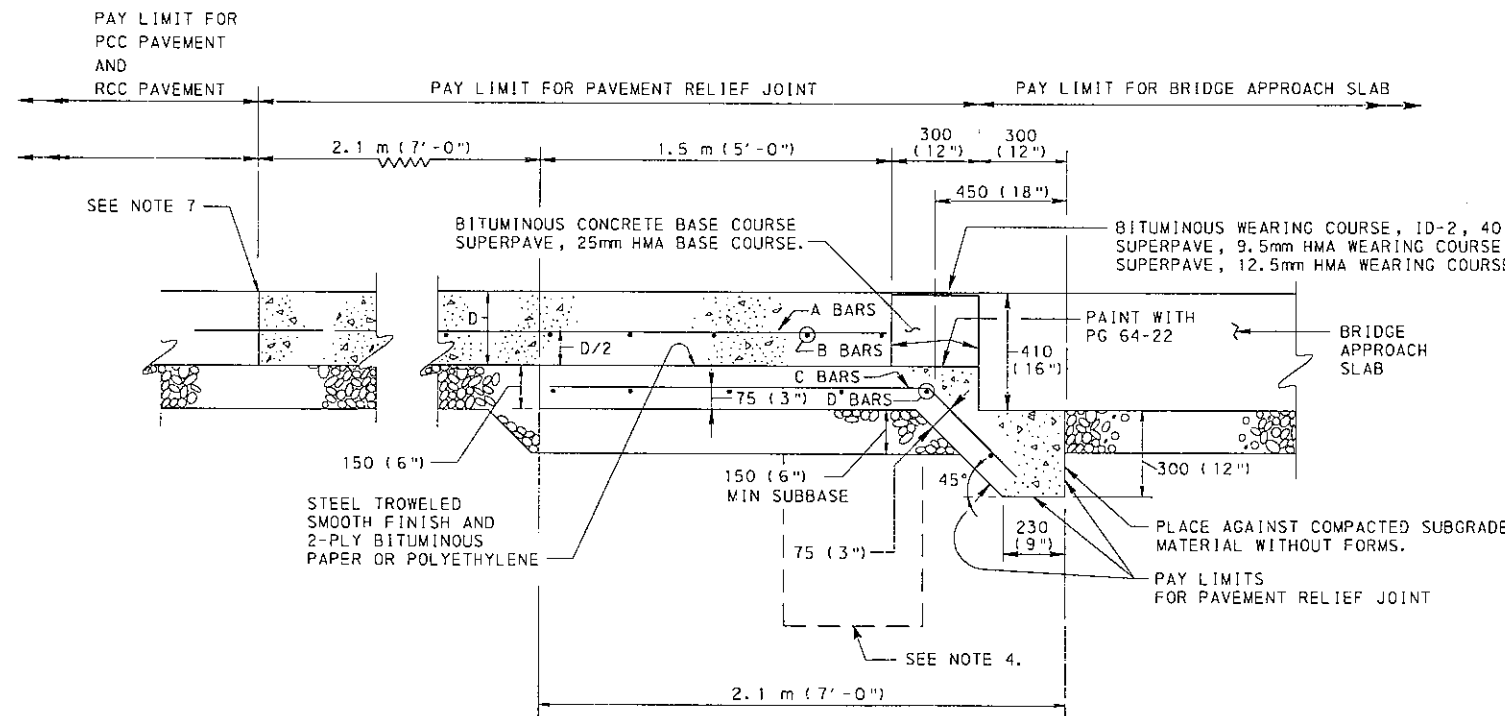
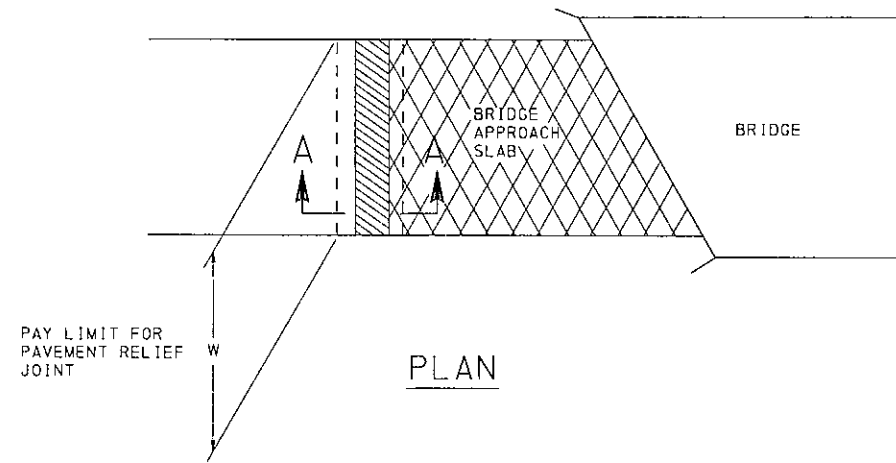
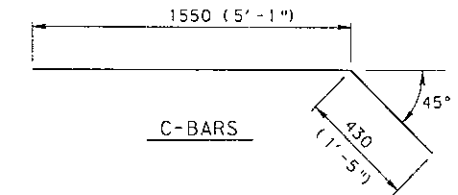
BRIDGE APPROACH SLAB

RECOMMENDED APR. 15, 2004 <i>Dean A. Schank</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. J. Patel</i> CHIEF ENGINEER	SHEET 3 OF 3 RC-23M
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BC-767M	NEOPRENE STRIP SEAL FOR PRESTRESSED CONCRETE AND STEEL I-BEAM BRIDGES	REFERENCE DRAWINGS
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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



SECTION A-A

NOTES

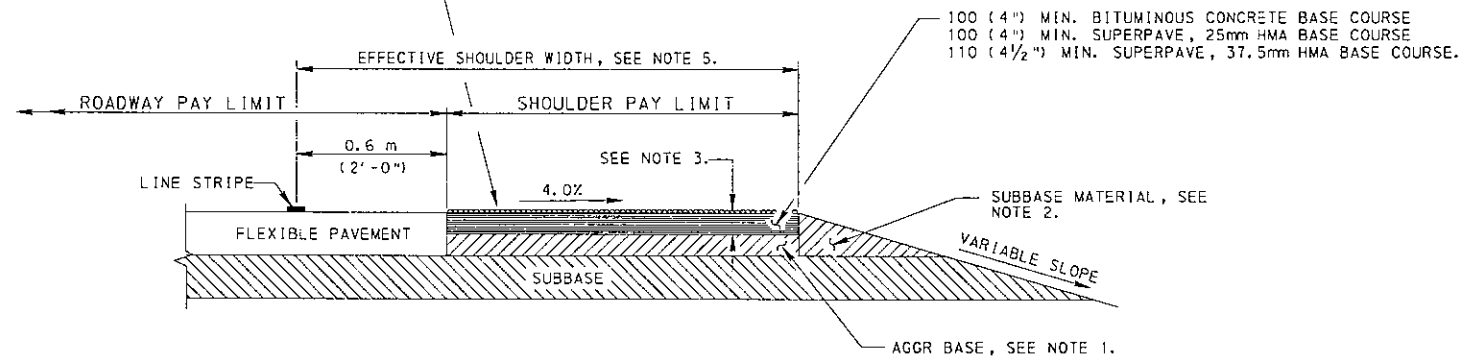
- PAVEMENT RELIEF JOINTS ARE APPLICABLE FOR ALL CEMENT CONCRETE PAVEMENTS.
- USE CLASS AA CONCRETE IN SUBSLAB. (AT CONTRACTOR'S OPTION, SUBSLAB CONCRETE MAY BE HES.)
- INCLUDE PORTIONS OF REINFORCING BARS WHICH ARE LOCATED OUTSIDE THE INDICATED PAY LINES IN BID PRICE FOR PAVEMENT RELIEF JOINT.
- WHEN 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

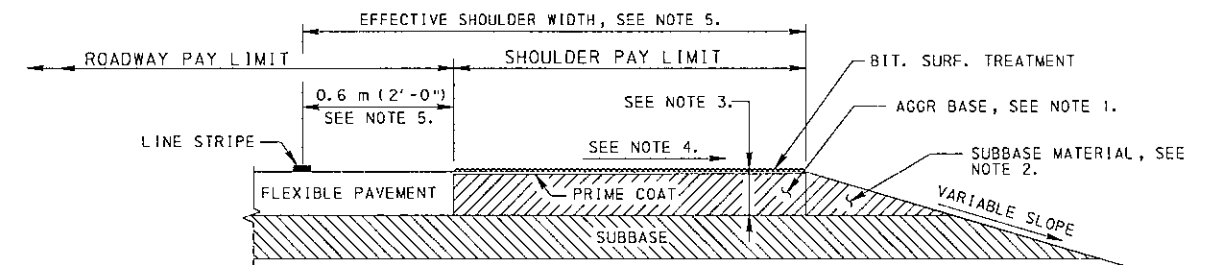
BIT. SURF. TREATMENT-INCIDENTAL TO TYPE 1 SHOULDERS, 20 (3/4") DEPTH
 BIT. SURF. CRSE, FJ-1-INCIDENTAL TO TYPE 1-F SHOULDERS, 25 (1") DEPTH
 BIT. WEAR. CRSE, 1D-2-INCIDENTAL TO TYPE 1-I SHOULDERS, 40 (1 1/2") DEPTH
 DOUBLE SLURRY SEAL-INCIDENTAL TO TYPE 1-S SHOULDERS, 20 (3/4") DEPTH
 SUPERPAVE, 9.5mm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



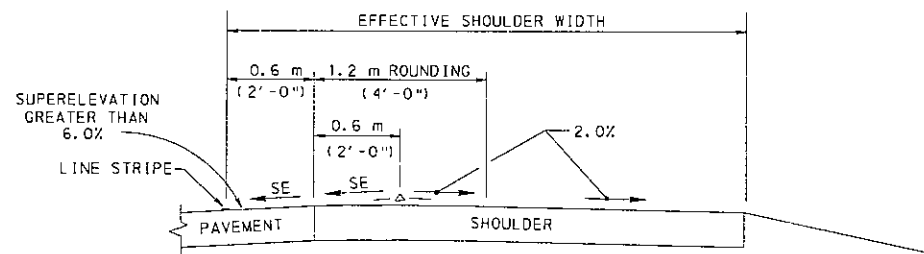
TYPE 1 SHOULDER
 TYPE 1-F SHOULDER
 TYPE 1-I SHOULDER
 TYPE 1-S SHOULDER
 TYPE 1-SP SHOULDER

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, 1D-2 OR 1D-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.

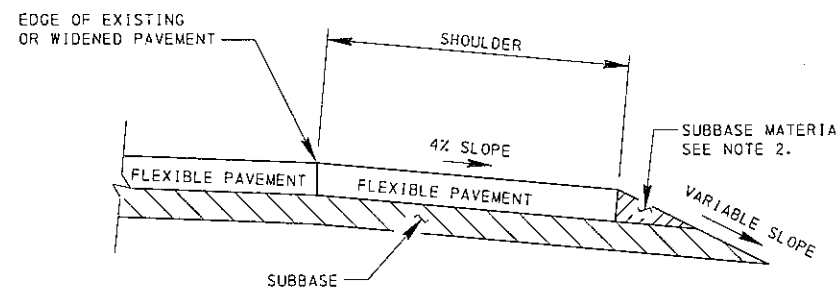


TYPE 3 SHOULDER



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

SHOULDER ROUNDING ON HIGH SIDE
 OF SUPERELEVATED CURVES



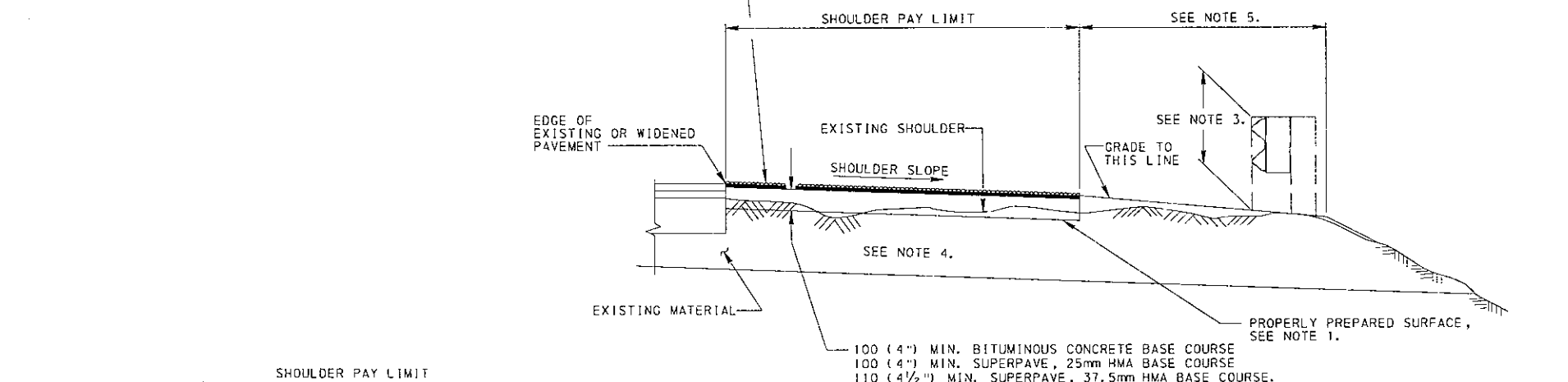
FULL DEPTH FLEXIBLE
 PAVEMENT SHOULDERS

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

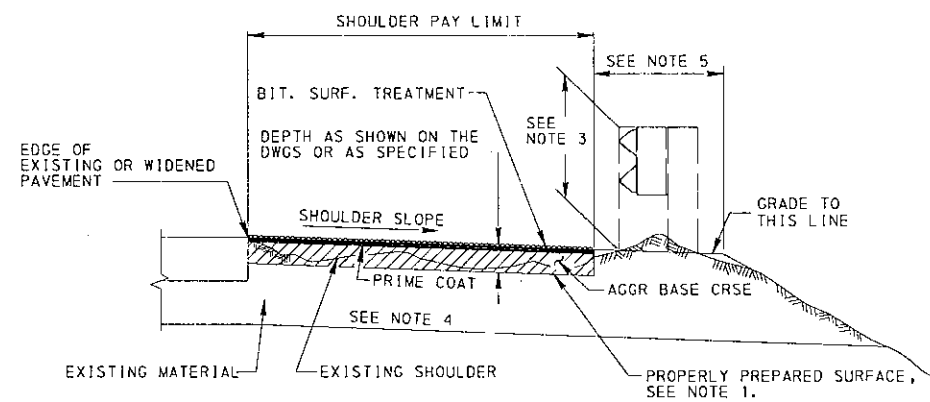
COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

SHOULDERS

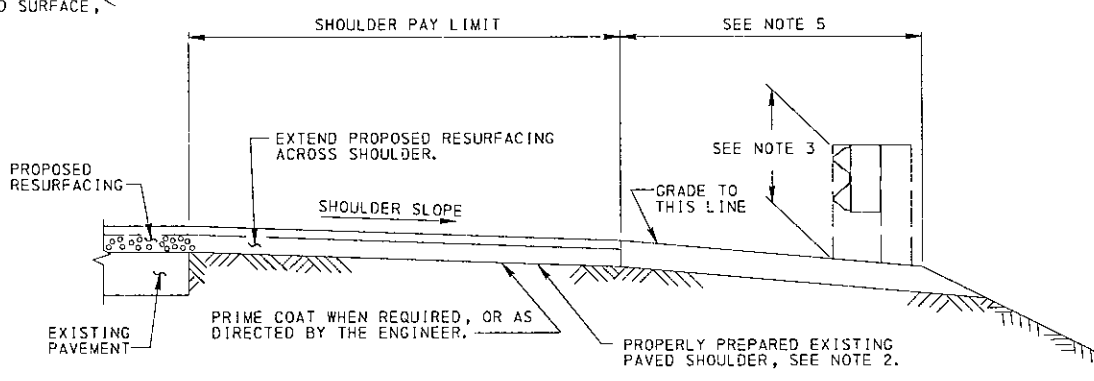
BIT. SURF. TREATMENT-INCIDENTAL TO TYPE 6 SHOULDERS, 20 (3/4") DEPTH
 BIT. SURF. CRSE, FJ-1-INCIDENTAL TO TYPE 6-F SHOULDERS, 25 (1") DEPTH
 BIT. WEAR. CRSE, 1D-2-INCIDENTAL TO TYPE 6-I SHOULDERS, 40 (1 1/2") DEPTH
 DOUBLE SLURRY SEAL-INCIDENTAL TO TYPE 6-S SHOULDERS, 20 (3/4") DEPTH
 SUPERPAVE, 9.5mm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



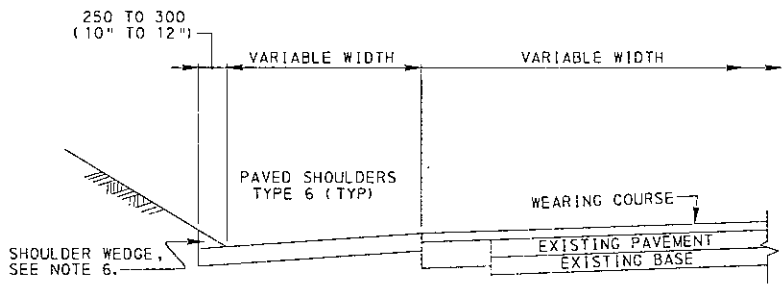
TYPE 6 SHOULDER
 TYPE 6-F SHOULDER
 TYPE 6-I SHOULDER
 TYPE 6-S SHOULDER
 TYPE 6-SP SHOULDER



TYPE 4 SHOULDER



TYPE 7 SHOULDER



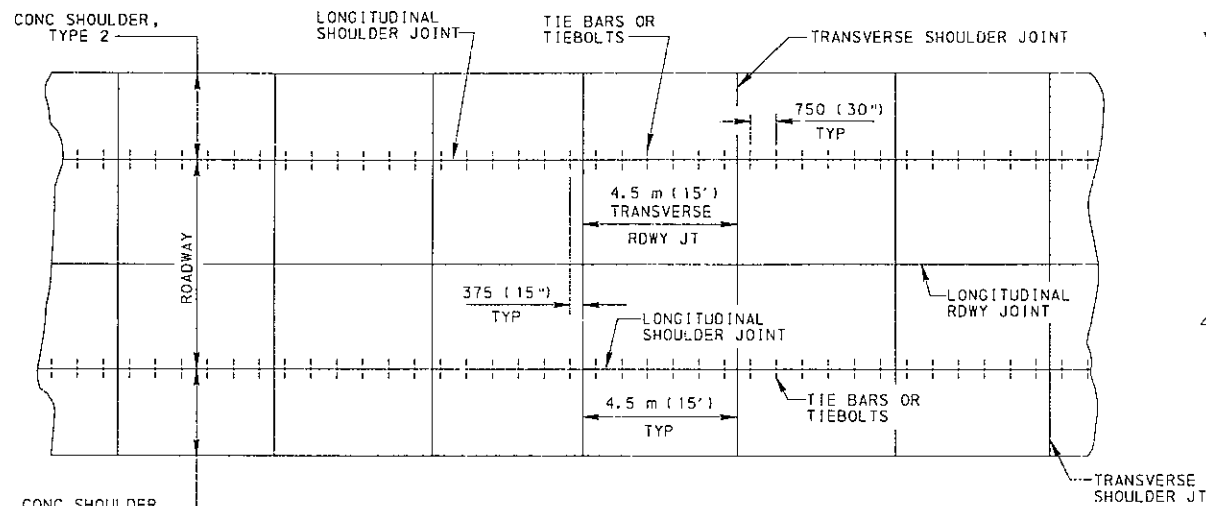
TYPICAL SHOULDER DETAIL
 WITH BITUMINOUS TAPER SHOULDER WEDGE

NOTES

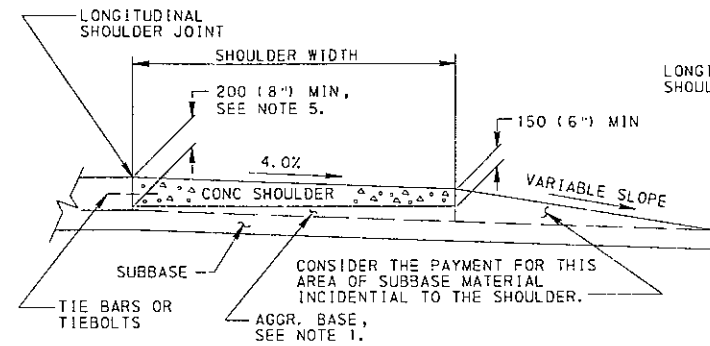
- FOR TYPE 4 AND TYPE 6 SHOULDERS PROPERLY PREPARE SURFACE BY EITHER SHAPING AND/OR SCARIFYING AND/OR COMPACTING. SHAPING INCLUDES REMOVAL OF EXISTING SHOULDER MATERIAL AND THE PLACEMENT OF GRADED MATERIAL FROM THE SHAPING OPERATION INTO THE LOW AREAS. WHERE THERE IS INSUFFICIENT GRADED MATERIAL FROM 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 250 (10") TO 300 (12") UP CUT SLOPE WHEN INDICATED ON THE PLANS 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, 1D-2 OR 1D-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.

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

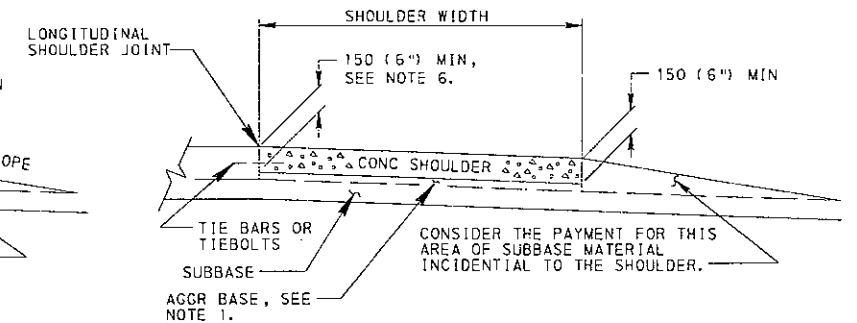
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN		
SHOULDERS (RECONSTRUCTED)		
RECOMMENDED APR. 15, 2004 <i>Dean A. Schach</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. J. Patel</i> CHIEF ENGINEER	SHT 2 OF 6 RC-25M



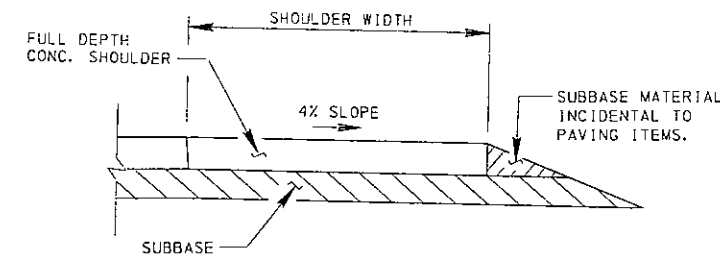
CONCRETE SHOULDERS ADJACENT TO PLAIN CONCRETE PAVEMENT FOR COLLECTORS AND LOCAL ROADS



CONCRETE SHOULDER - TYPE 1

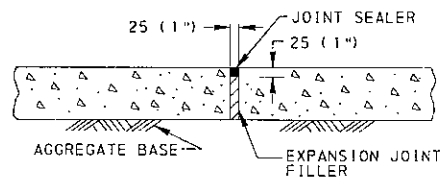
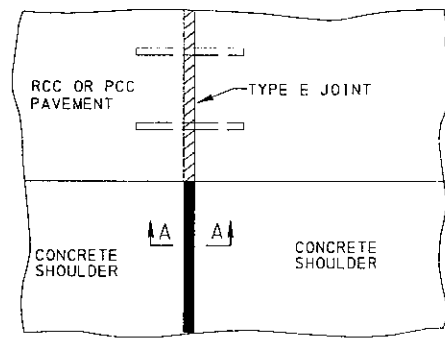


CONCRETE SHOULDER - TYPE 2



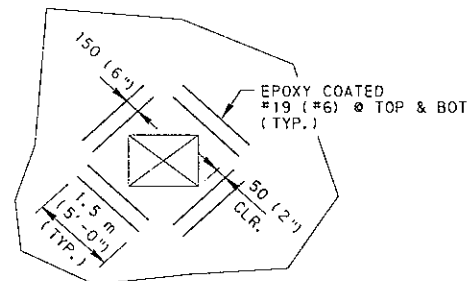
FULL DEPTH CONCRETE SHOULDER

TYPICAL SECTIONS

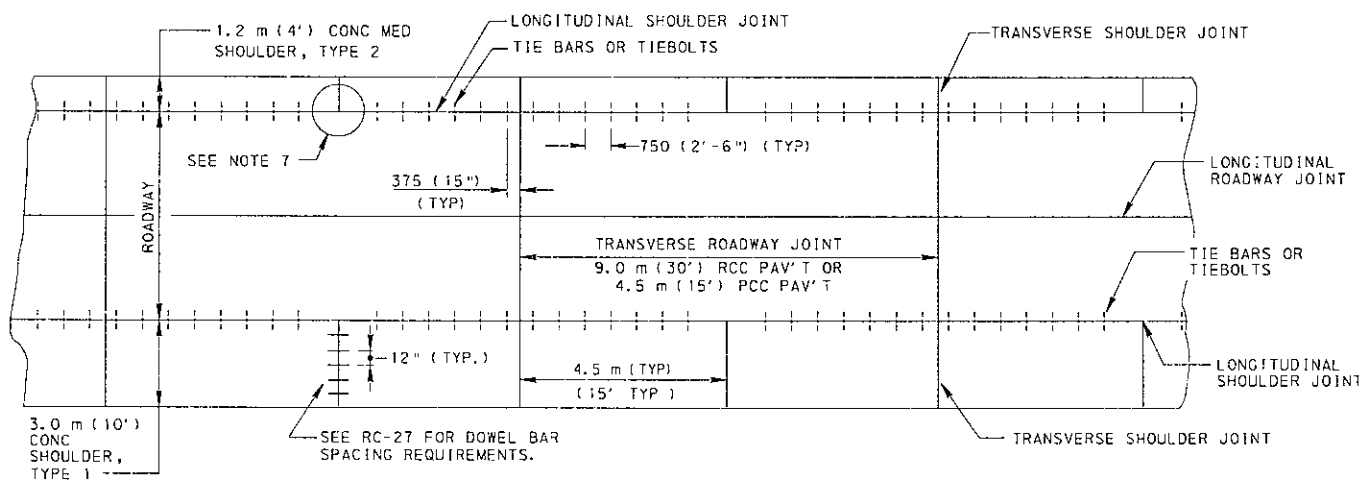


SECTION A-A

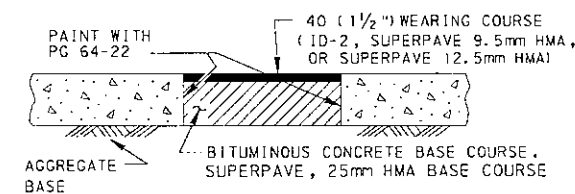
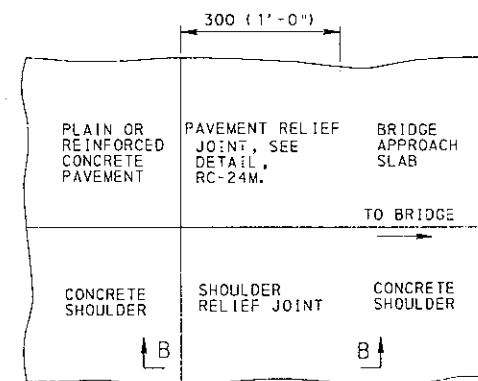
CONCRETE SHOULDER EXPANSION JOINTS



REINFORCEMENT AT OPENINGS



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



SECTION B-B

SHOULDER RELIEF JOINTS

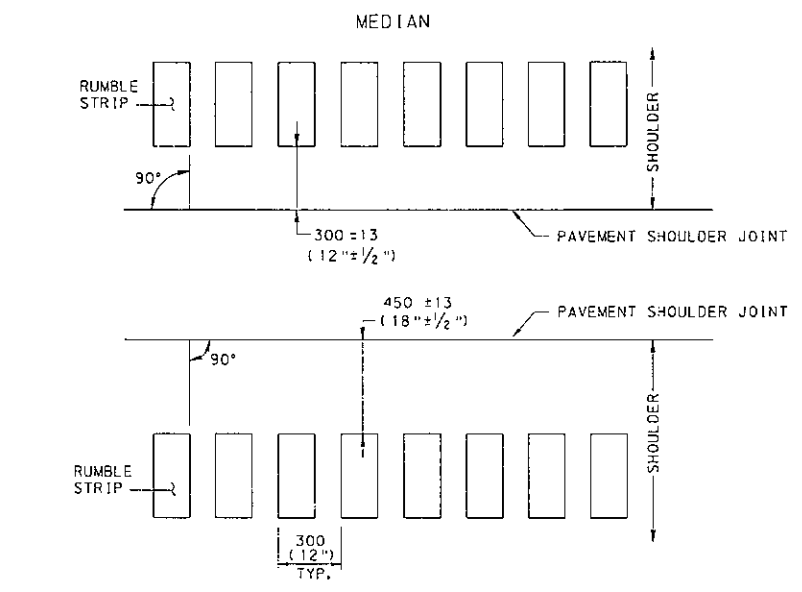
NOTES:

1. SPECIFY THE AGGREGATE BASE AS IN PUBLICATION 408 SECTION 350.3 AND CONSIDER INCIDENTAL TO THE SHOULDER.
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 TIE BOLTS ON EITHER SIDE OF INTERMEDIATE SHOULDER JOINTS ADJACENT TO RCC PAVEMENTS.
8. WHEN THE SHOULDER IS STRUCTURALLY PART OF A PARAPET MOMENT RESISTANCE SLAB (I.E. PARAPET/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.

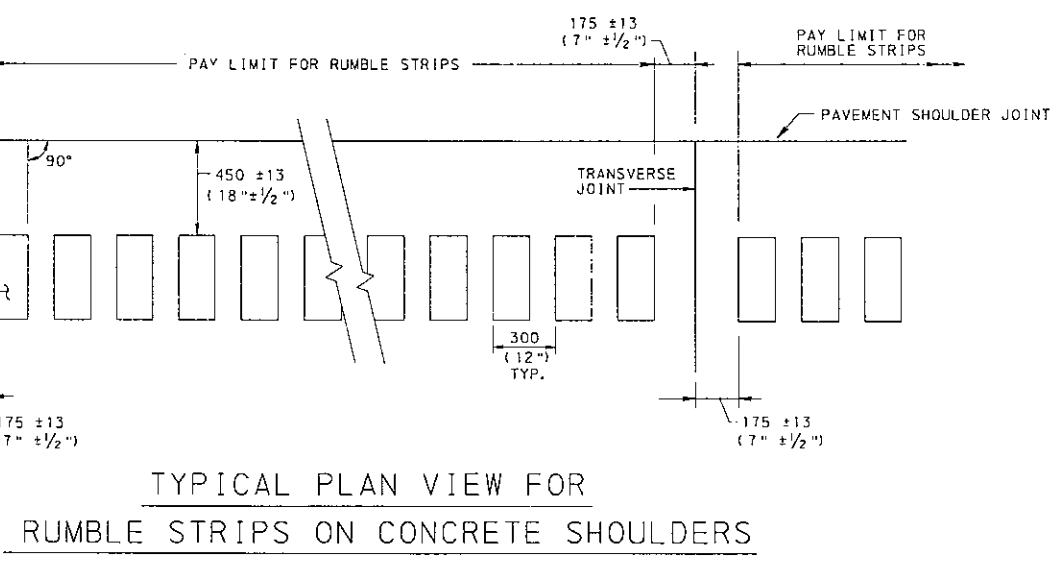
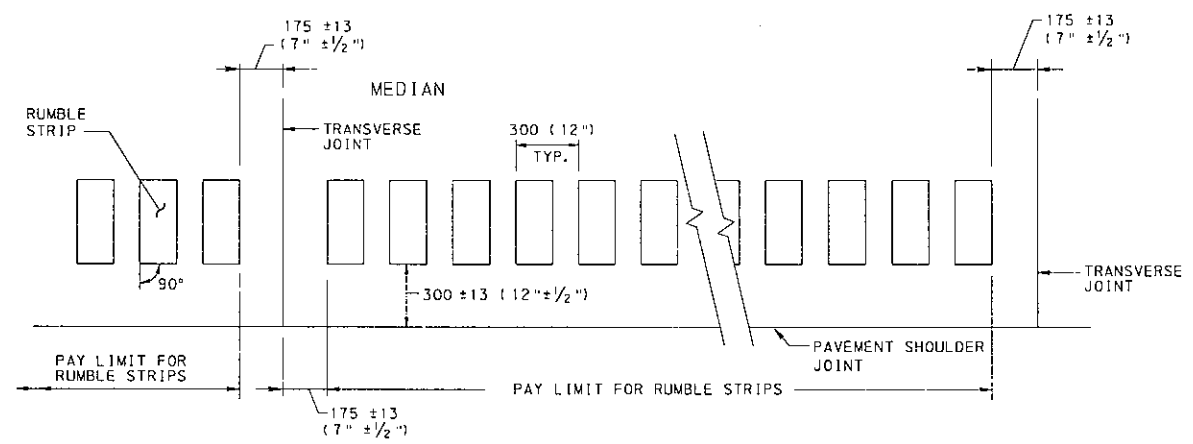
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

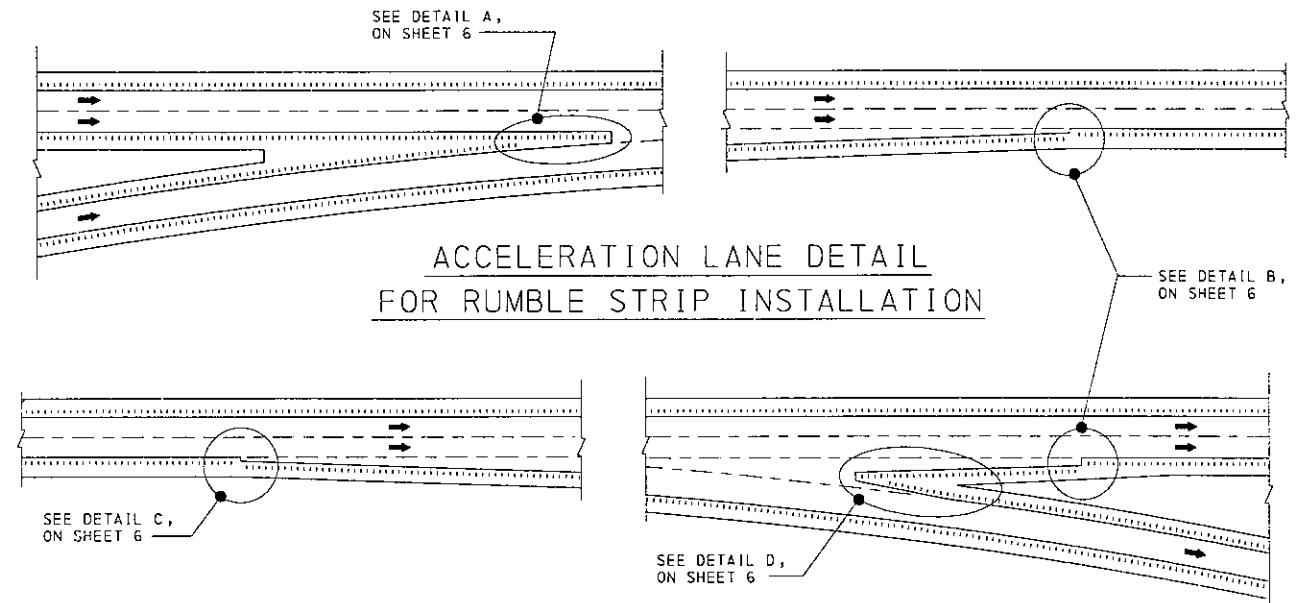
SHOULDERS
(CONCRETE)



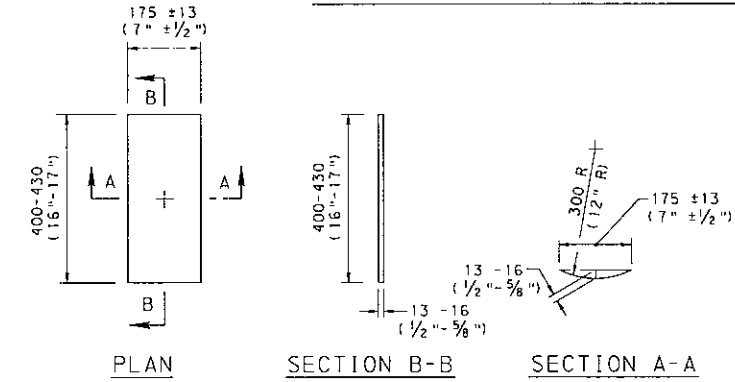
TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON BITUMINOUS SHOULDERS



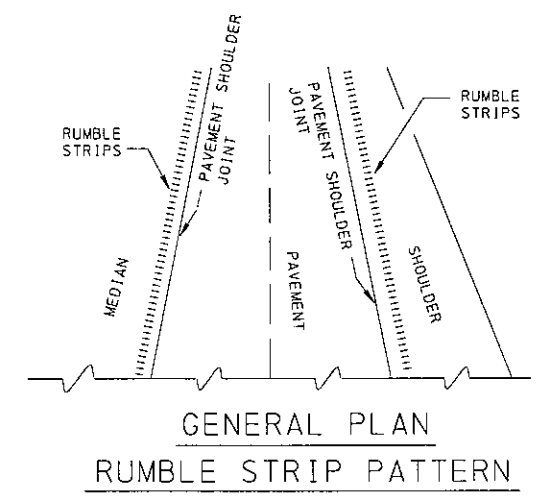
TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON CONCRETE SHOULDERS



ACCELERATION LANE DETAIL FOR RUMBLE STRIP INSTALLATION



SECTION DETAILS OF RUMBLE STRIP PATTERN



GENERAL PLAN RUMBLE STRIP PATTERN

NOTE: SEE SHEET 5, FOR INTERSECTION DETAILS.

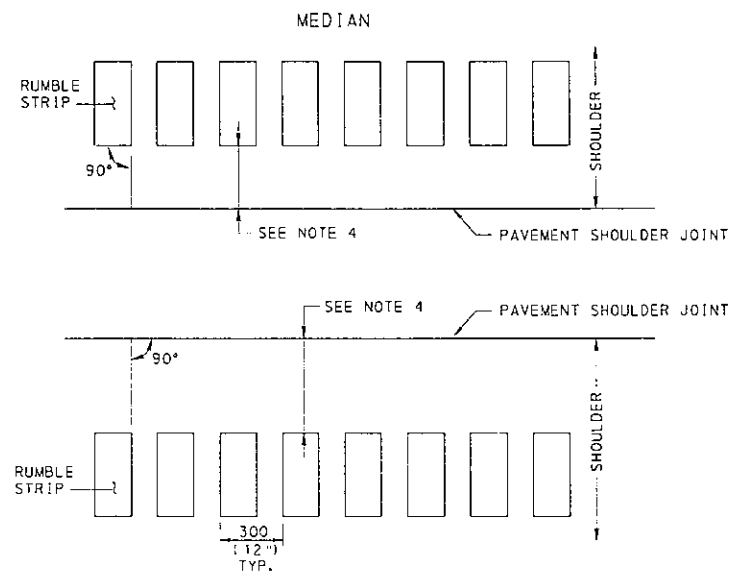
NOTES

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.

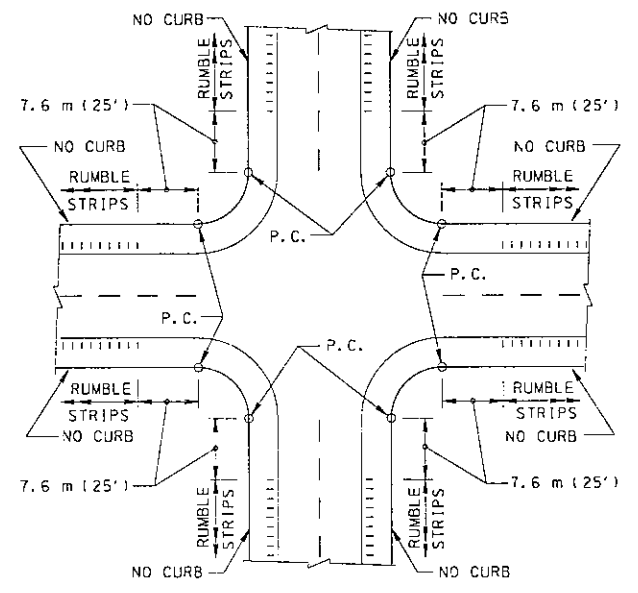
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

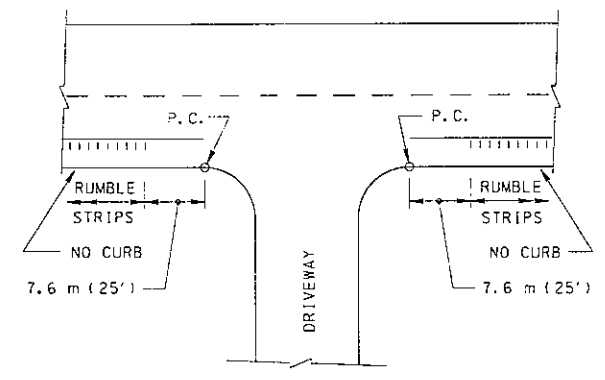
SHOULDERS
RUMBLE STRIPS
(LIMITED ACCESS HIGHWAYS)



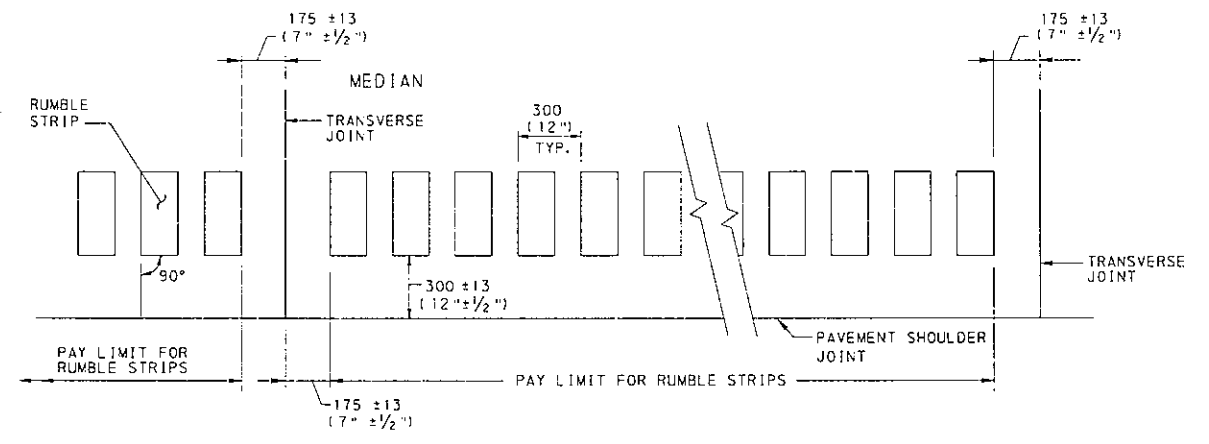
TYPICAL PLAN VIEW FOR RUMBLE STRIP ON BITUMINOUS SHOULDERS



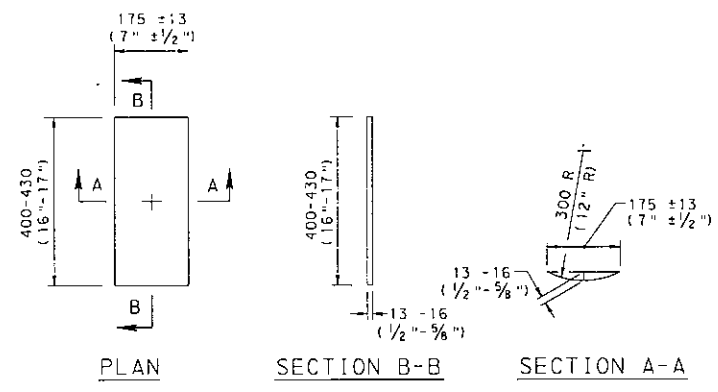
TYPICAL INTERSECTION DETAIL FOR RUMBLE STRIP INSTALLATION



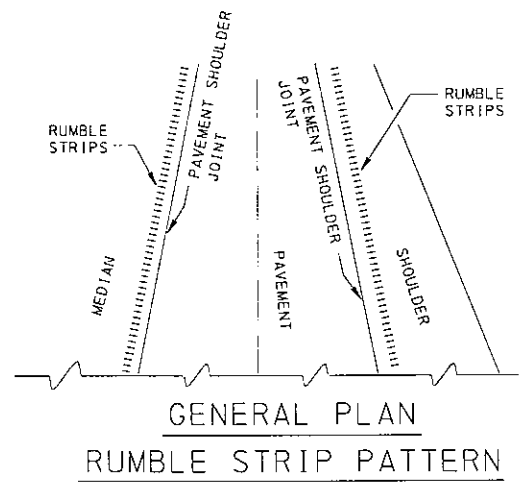
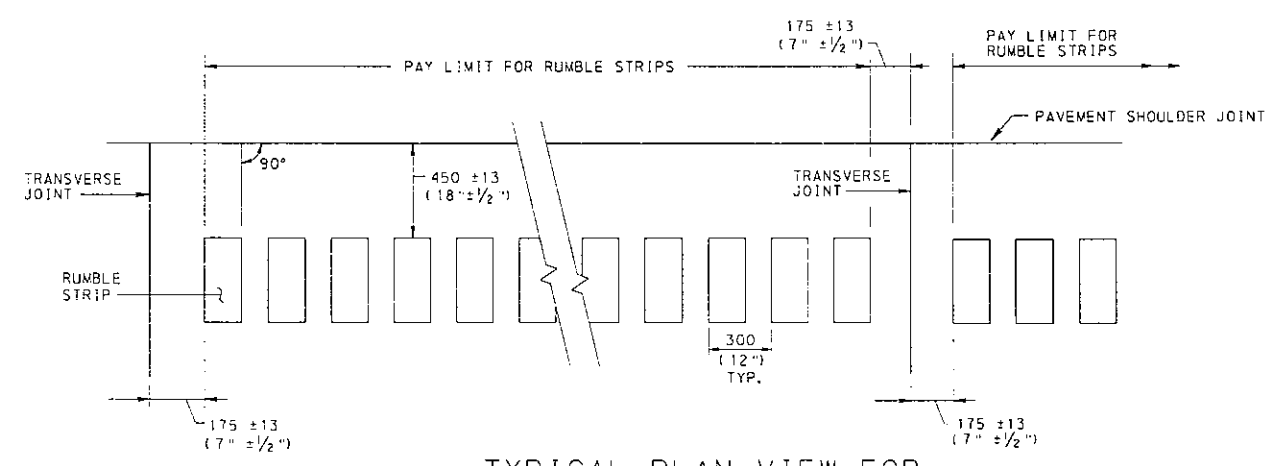
TYPICAL DRIVEWAY DETAIL FOR RUMBLE STRIP INSTALLATION



TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON CONCRETE SHOULDERS



SECTION DETAILS OF RUMBLE STRIP PATTERN

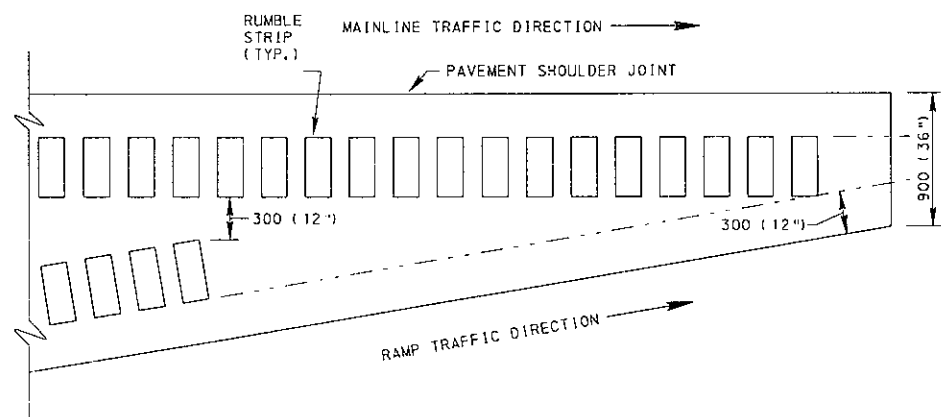


NOTES

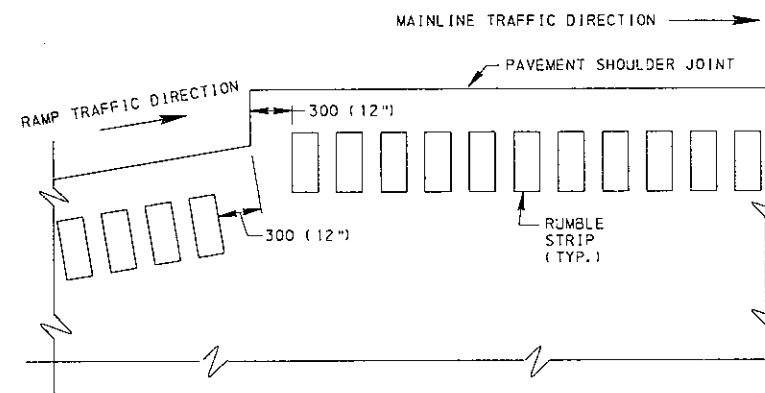
1. SHOULDER RUMBLE STRIPS FOR FREE ACCESS HIGHWAYS ARE CONSIDERED ON A PROJECT BY PROJECT BASIS AS INDICATED ON THE CONSTRUCTION PLANS.
2. CONSTRUCT RUMBLE STRIP IN ACCORDANCE WITH PUBLICATION 408, SECTION 660.
3. DO NOT CONSTRUCT SHOULDER RUMBLE STRIPS ACROSS A JOINT.
4. 300 ± 13 (12" ± 1/2") FOR LEFT (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.

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

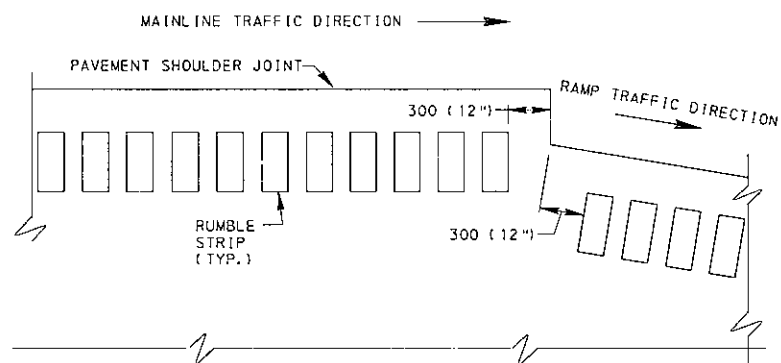
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN		
SHOULDERS RUMBLE STRIPS (FREE ACCESS HIGHWAYS)		
RECOMMENDED APR. 15, 2004 <i>Don A. Schindler</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. Patel</i> CHIEF ENGINEER	SHT. 5 OF 6 RC-25M



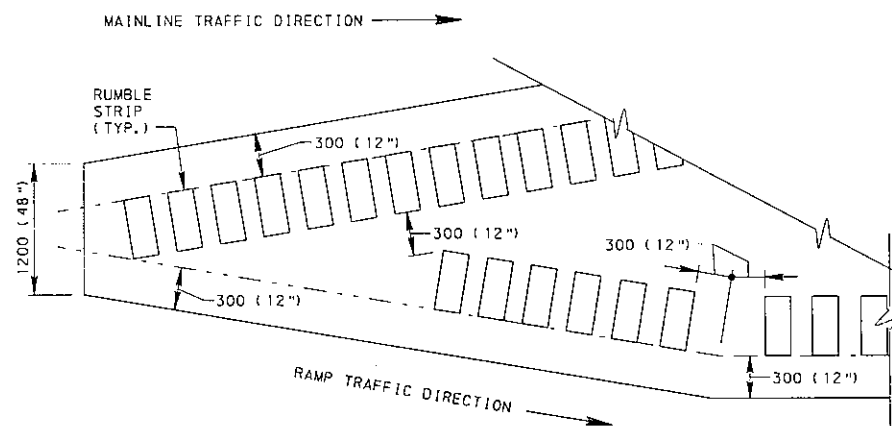
DETAIL A
ACCELERATION LANE
CORE AREA RUMBLE STRIPS



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

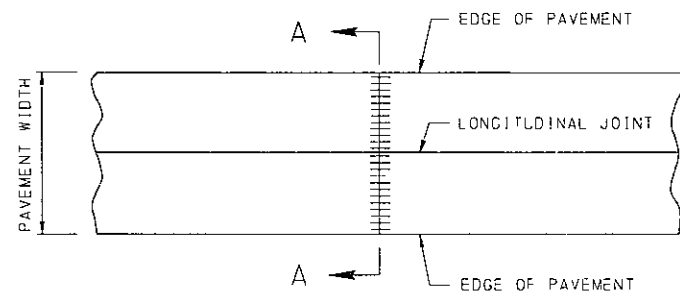
1. IF THERE IS NO ACTUAL PAVEMENT SHOULDER JOINT, MEASURE FROM THE PAVEMENT SHOULDER TRAFFIC LINE.
2. DO NOT CONSTRUCT SHOULDER RUMBLE STRIPS ACROSS A JOINT.
3. CONSTRUCT RUMBLE STRIPS IN ACCORDANCE WITH PUBLICATION 408 SECTION 660.
4. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS SUCH THAT 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.

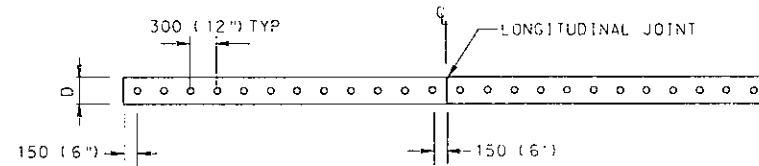
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SHOULDERS
RUMBLE STRIPS
(GORE AREA)

RECOMMENDED APR. 15, 2004 <i>Dean A. Schaub</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. L. Patel</i> CHIEF ENGINEER	SHT. 6 OF 6 RC-25M
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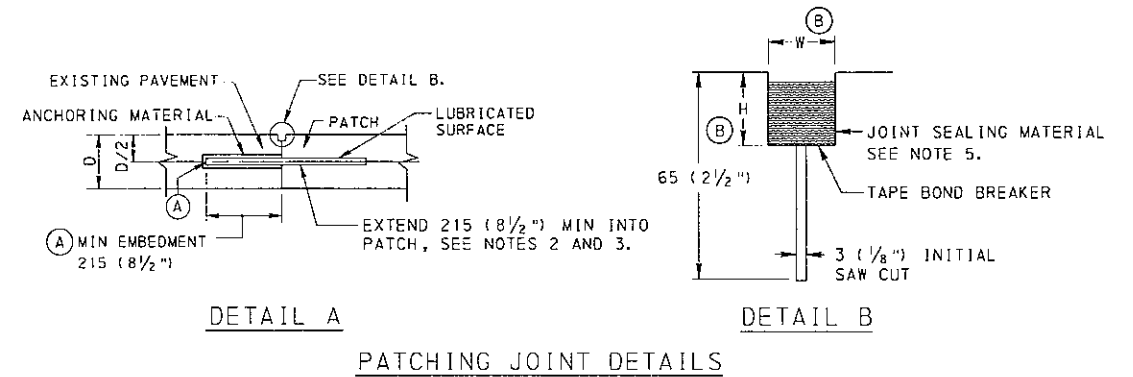


PLAN VIEW



SECTION A-A

TYPICAL PAVEMENT PATCHING JOINT



DETAIL A

DETAIL B

PATCHING JOINT DETAILS

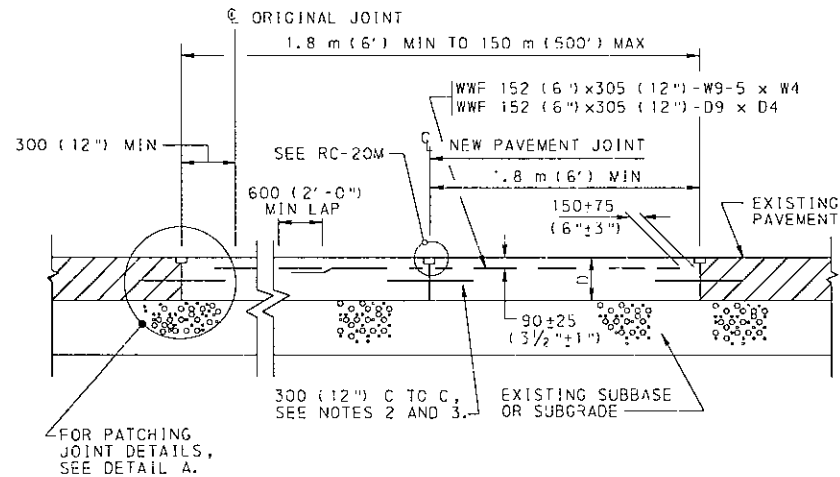
LEGEND

(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").

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

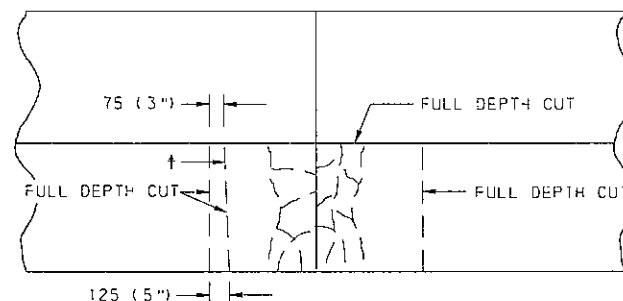
NOTES

- 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") THICK IN THE PATCHING JOINT OR NEW PAVEMENT JOINT NEAREST TO THE REMAINING EXPANSION JOINT. PLACE AN APPROVED TUBE HAVING A MINIMUM 25 (1") CLEARANCE POCKET OVER THE LUBRICATED END OF ALL DOWEL BARS IN THE NEW EXPANSION JOINT.
- USE 32 (1 1/4") Ø x 450 (18") LONG DOWEL BARS FOR PAVEMENT DEPTHS 250 (10") OR LESS AND 38 (1 1/2") Ø x 450 (18") LONG DOWEL BARS FOR PAVEMENT DEPTHS GREATER THAN 250 (10").
- 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").
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.
- MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (1/8") TO 6 (1/4") BELOW THE SURFACE OF THE PAVEMENT.
- INITIAL SAW CUT IS NOT REQUIRED AT PATCH JOINT OR WHEN EXPANSION JOINT MATERIAL IS REQUIRED.
- WHEN PAVEMENT IS TO BE OVERLAID, ONLY THE INITIAL SAW CUT IS REQUIRED.



TYPICAL SECTION
CONCRETE PAVEMENT PATCHING

SEE NOTE 1.



PLAN VIEW

† 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.

SAW CUTS FOR LIFT OUT METHOD

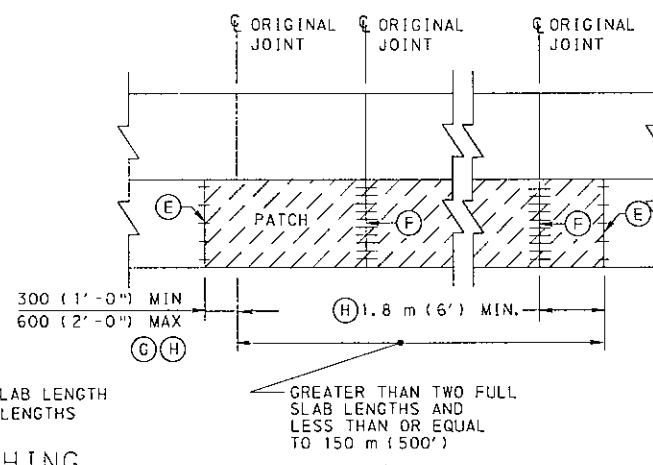
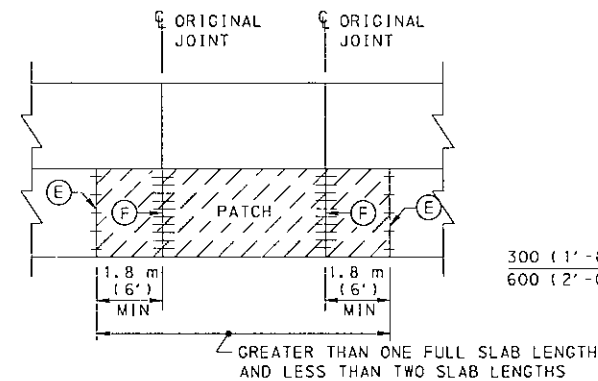
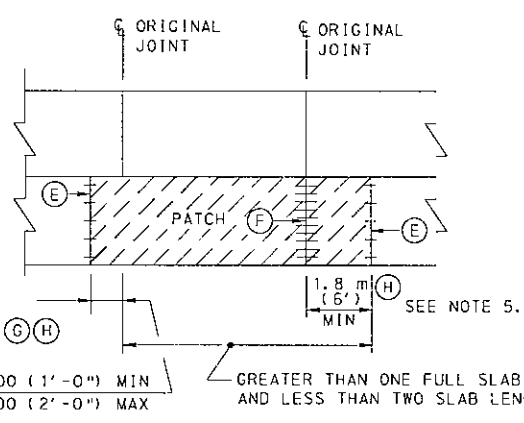
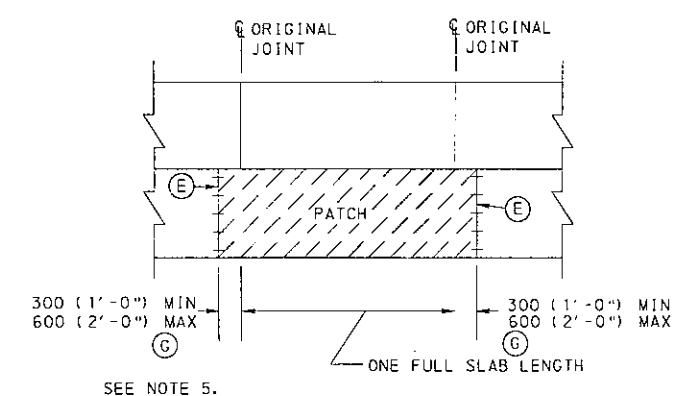
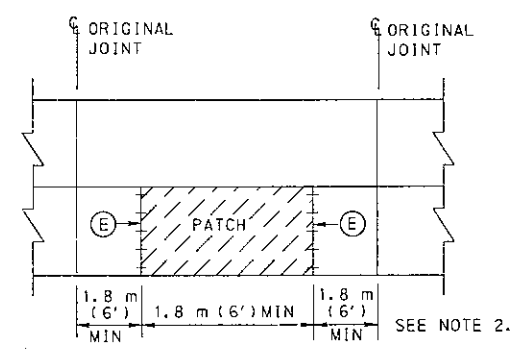
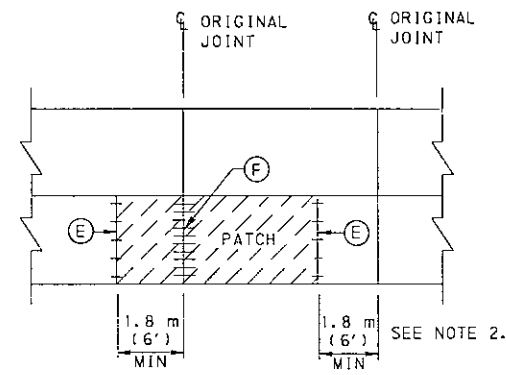
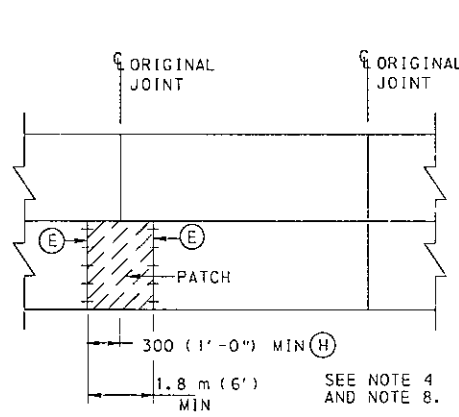
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE PAVEMENT
REHABILITATION

(PATCHING)

RECOMMENDED APR. 15, 2004 <i>Dean A. Schuch</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. J. Patel</i> CHIEF ENGINEER	SHT 1 OF 5 RC-26M
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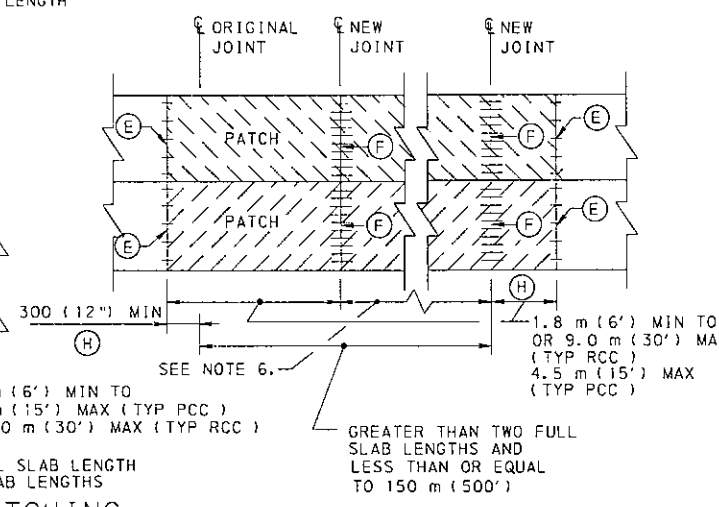
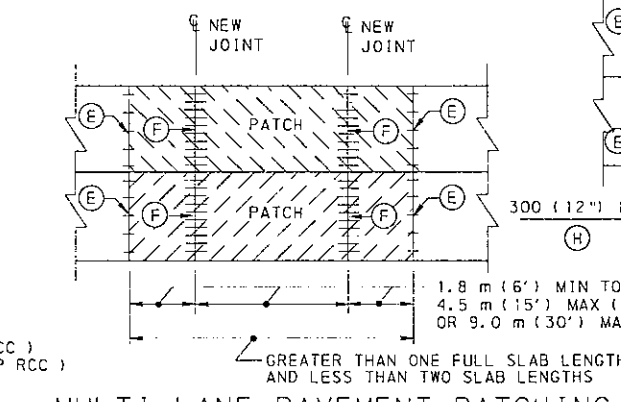
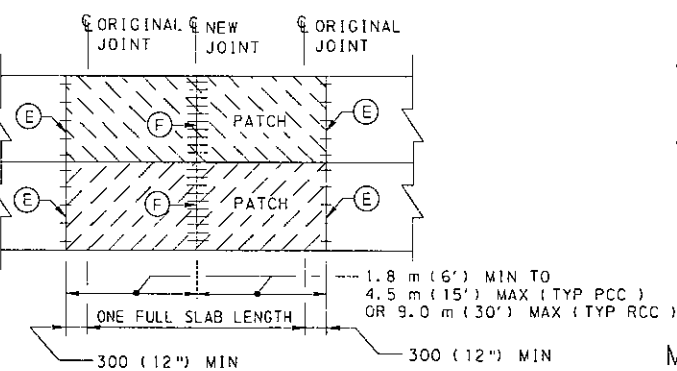
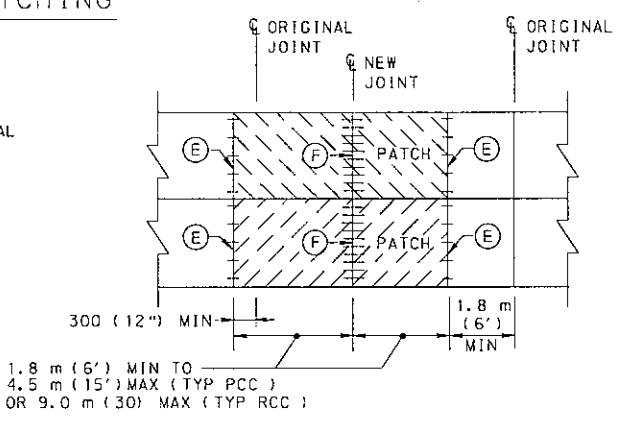
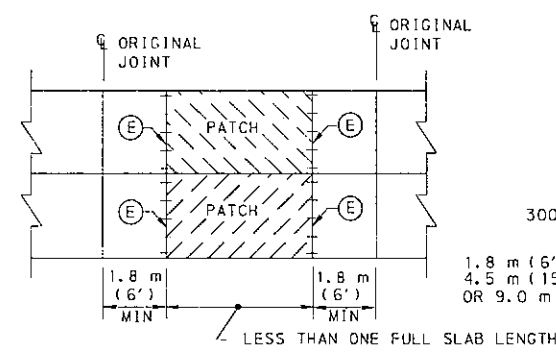
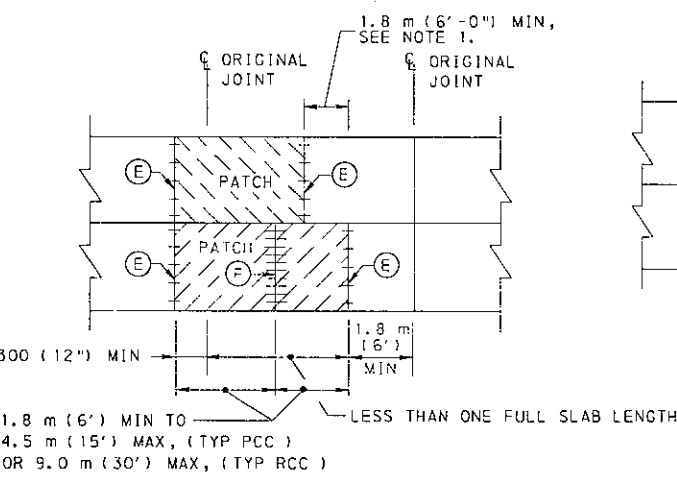


- LEGEND**
- (E) PAVEMENT PATCHING JOINT, SEE SHEET 1.
 - (F) NEW PAVEMENT JOINT, SEE RC-20M.
 - (G) EXCEPTION TO 1.5 m (5') MAXIMUM REMOVAL.
 - (H) DETAILS APPLY TO EITHER END OF PATCH.

NOTES

1. CONSTRUCT PAVEMENT PATCHES IN ADJACENT LANES, WITH LENGTHS THAT ARE WITHIN 1.8 m (6') 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'), THEN CONSTRUCT TO THE REQUIRED LENGTHS.
2. DO NOT LEAVE LESS THAN 1.8 m (6') 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') IN LENGTH, PRIOR TO PLACING THE NEW CONCRETE IN THE PATCH AREA.
4. WHEN PATCHING ADJACENT TO AN EXISTING JOINT, REMOVE A MINIMUM OF 300 (12") 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 (24") INTO THE NEXT SLAB, REMOVE A MINIMUM OF 1.8 m (6') 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'), 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 ONLY ONE LANE IS BEING PATCHED, DO NOT REMOVE MORE THAN 1.5 m (5') INTO NEXT SLAB. IF MORE THAN 1.5 m (5') IS REQUIRED, REMOVE A MINIMUM OF 1.8 m (6') AND PROVIDE NEW PAVEMENT JOINT AT ORIGINAL JOINT LOCATION. FOR EXCEPTION, SEE NOTE (G).

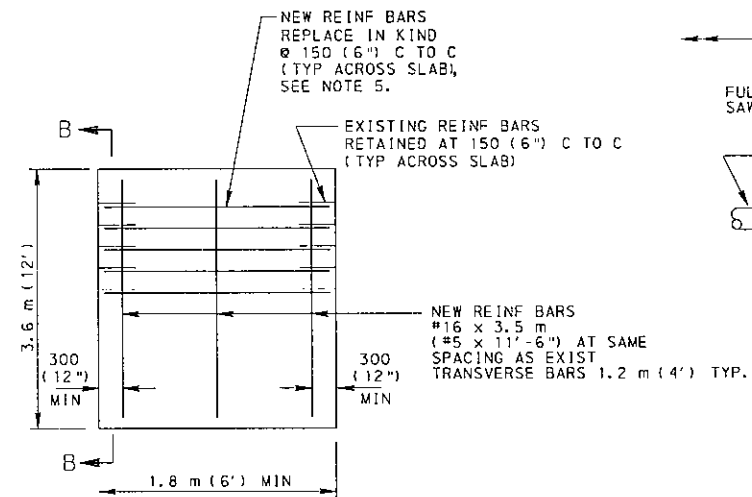
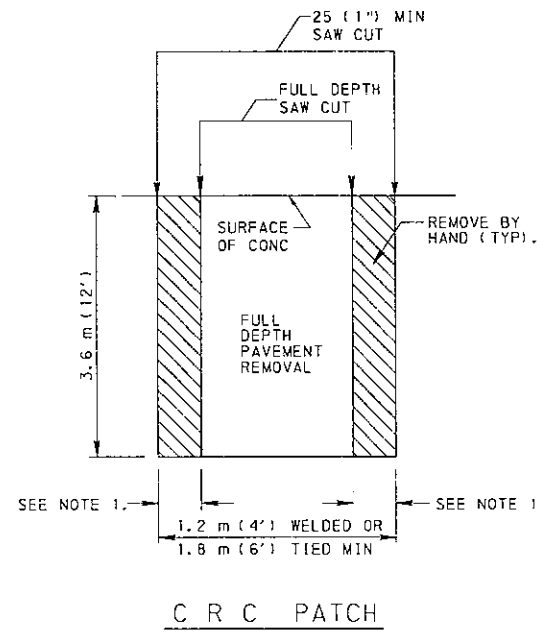
SINGLE LANE PAVEMENT PATCHING



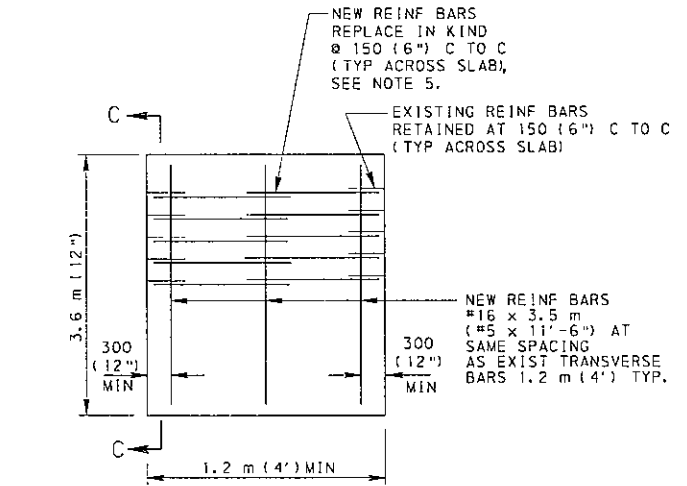
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

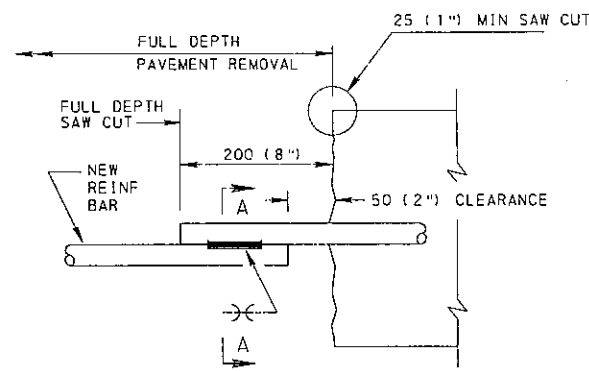
CONCRETE PAVEMENT REHABILITATION (PATCHING)



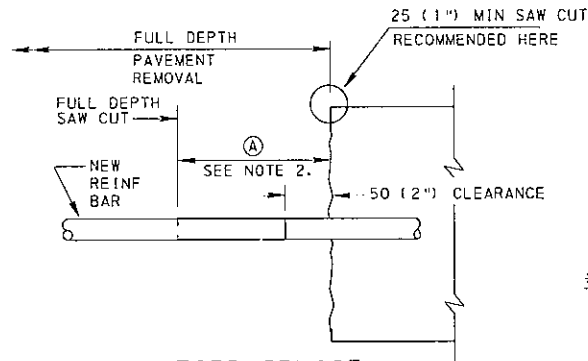
TIED SPLICE REINFORCEMENT BAR DETAIL



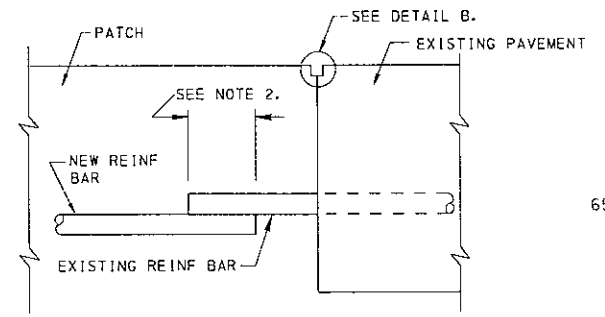
WELDED SPLICE REINFORCEMENT BAR DETAIL



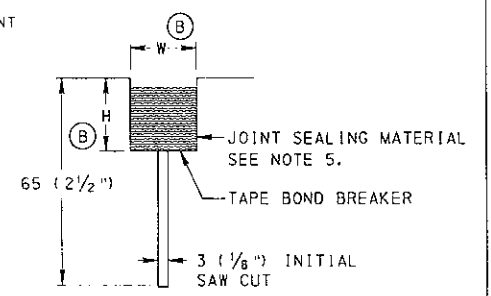
WELDED SPLICE TYPICAL SECTION



TIED SPLICE TYPICAL SECTION



DETAIL A



DETAIL B

PATCHING JOINT DETAILS

LEGEND

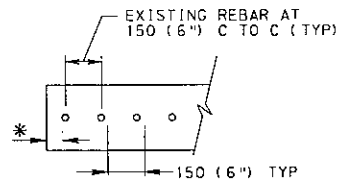
- * MAINTAIN EXISTING EDGE CLEARANCE.
- o EXISTING REBARS
- o NEW REBARS

A USE THE FOLLOWING TABLE TO DETERMINE DEVELOPMENT LENGTH:

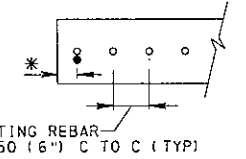
BAR SIZE	DEVELOPMENT LENGTH
#16 (#5)	480 (20")
#19 (#6)	585 (23")
#22 (#7)	755 (27")

B

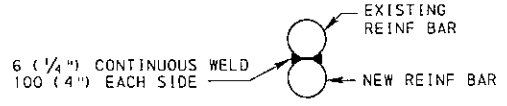
PATCH LENGTH	W	H
≥ 15 M (50')	25 (1")	32 (1 1/4")
≥ 6 M (20') AND < 15 M (50')	19 (3/4")	25 (1")
< 6 M (20')	10 (3/8")	19 (3/4")



SECTION B-B



SECTION C-C



SECTION A-A

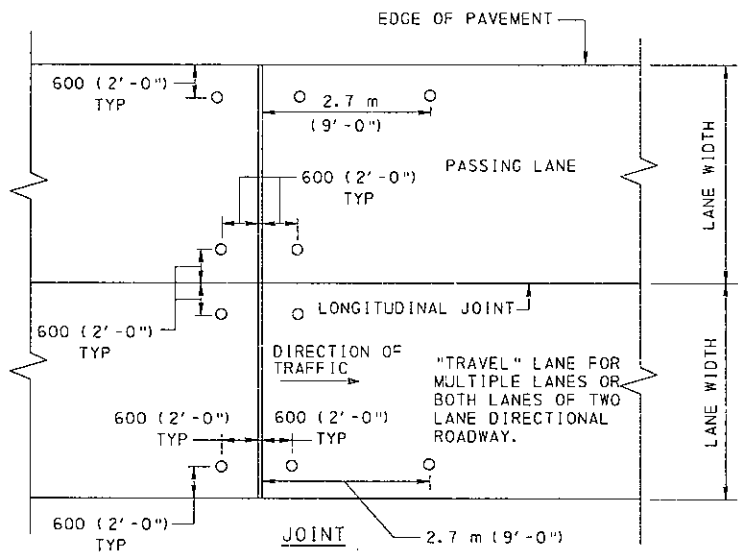
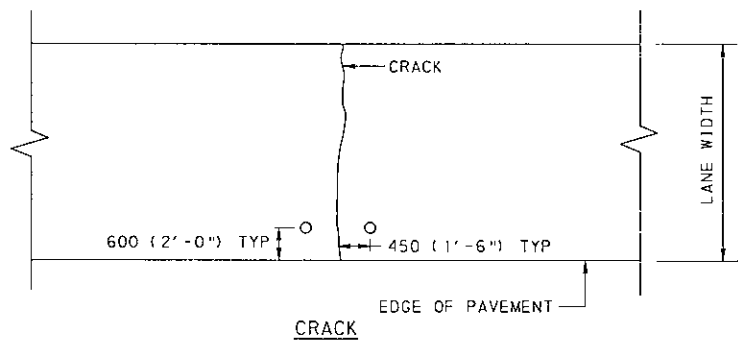
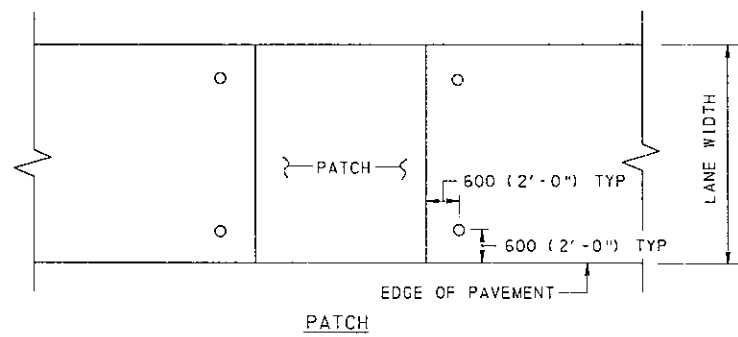
- NOTES
1. REMOVE 510 (20") MIN BY HAND FOR TIED SPLICES. REMOVE 200 (8") BY HAND FOR WELDED SPLICES.
 2. OVERLAP TIED SPLICES BY AT LEAST 30 BAR DIAMETERS. OVERLAP WELDED SPLICES BY 150 (6").
 3. REMOVE PAVEMENT FULL DEPTH UNDER RETAINED REINFORCEMENT BARS.
 4. MINIMUM DISTANCE FROM PATCH EDGE TO EXISTING CRACK IN CRC PAVEMENT IS 600 (24").
 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.

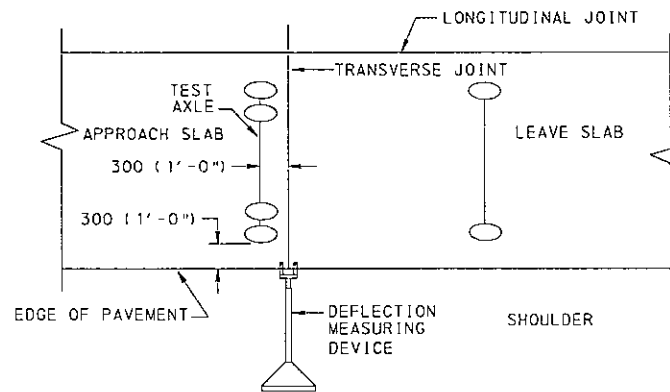
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE PAVEMENT
REHABILITATION

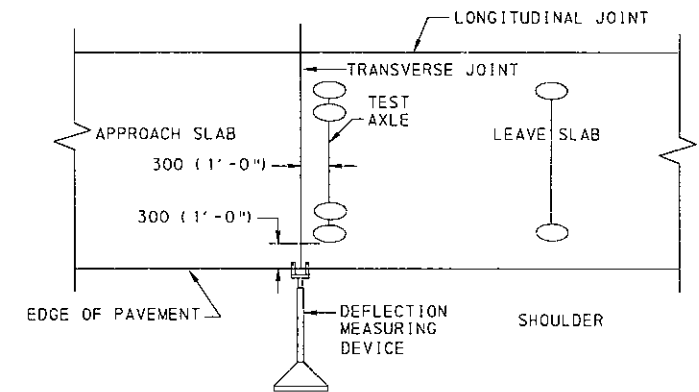
(C R C PATCHING)



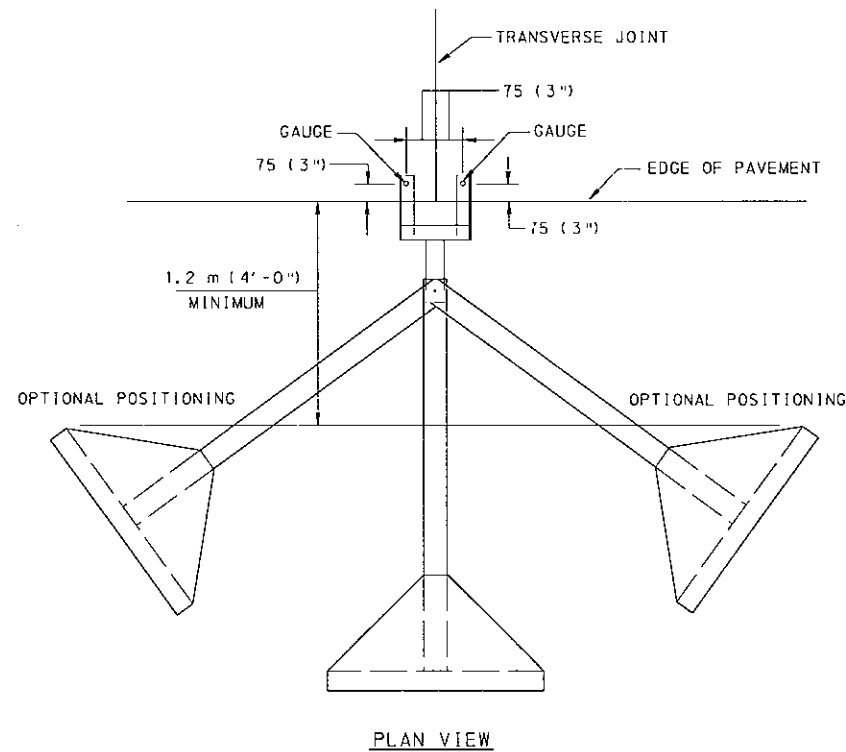
HOLE PATTERNS FOR PAVEMENT SLAB STABILIZATION



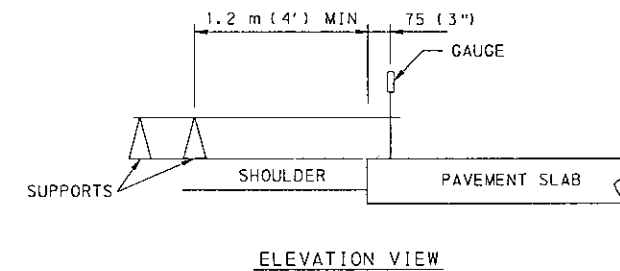
POSITION OF TEST AXLE FOR TAKING DEFLECTIONS WITH LOADED APPROACH SLAB



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.

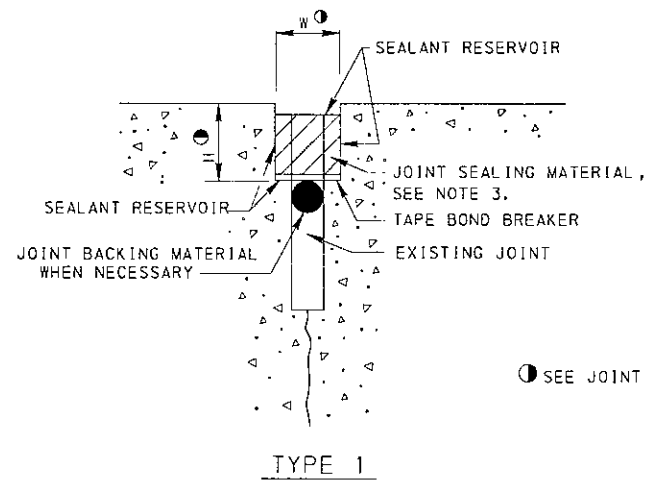
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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CONCRETE PAVEMENT
REHABILITATION

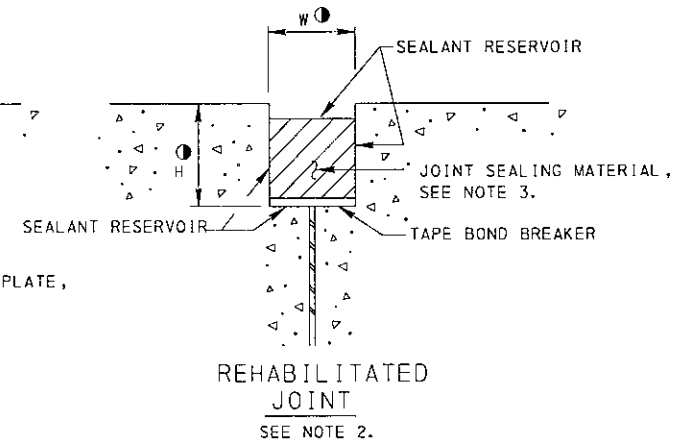
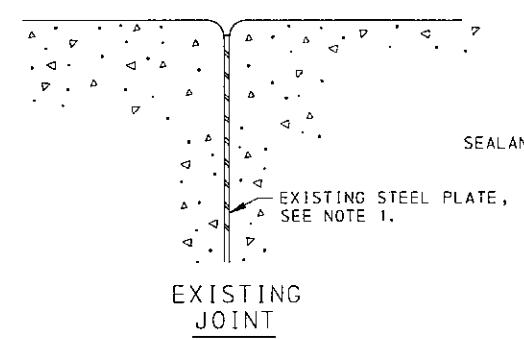
(PATCHING)

RECOMMENDED APR. 15, 2004 <i>Dean A. Schaefer</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. Patel</i> CHIEF ENGINEER	SHT 4 OF 5 RC-26M
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SEE JOINT SPACING TABLE.

TYPE 1



TYPE 2

JOINT REHABILITATION

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

NOTES

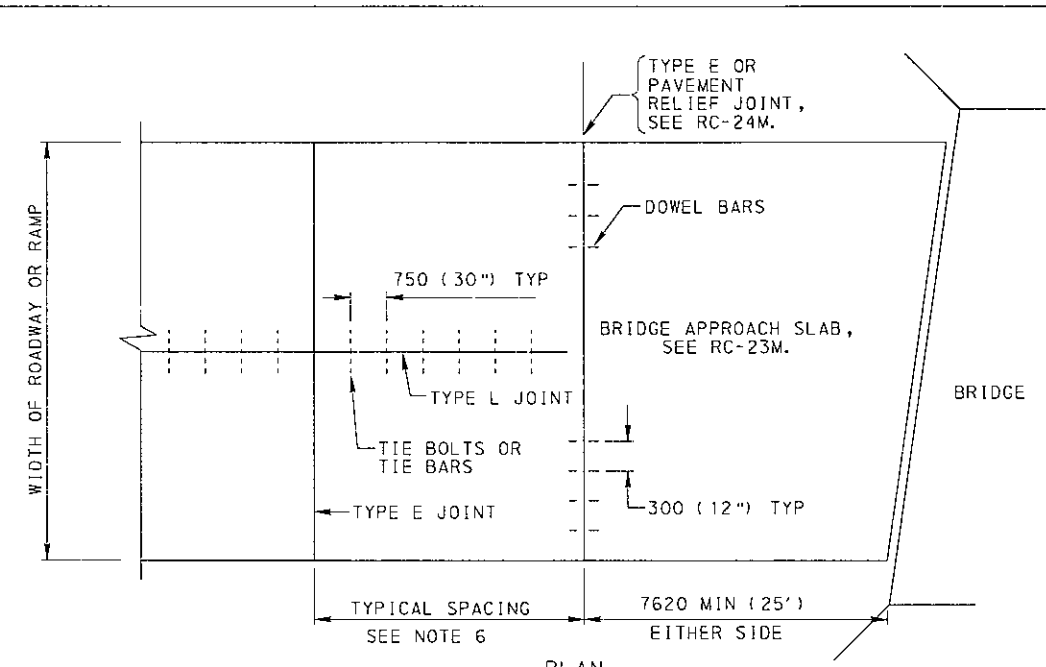
- EXISTING STEEL PLATE IS EITHER 2.01 THICK (14 GAUGE) WITH LAPPED TOP OR FLAT PLATE 3 (1/8") THICK.
- REMOVE THE STEEL PLATE WITHIN THE SEALANT RESERVOIR.
- MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (1/8") TO 6 (1/4") BELOW THE SURFACE OF THE PAVEMENT.

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

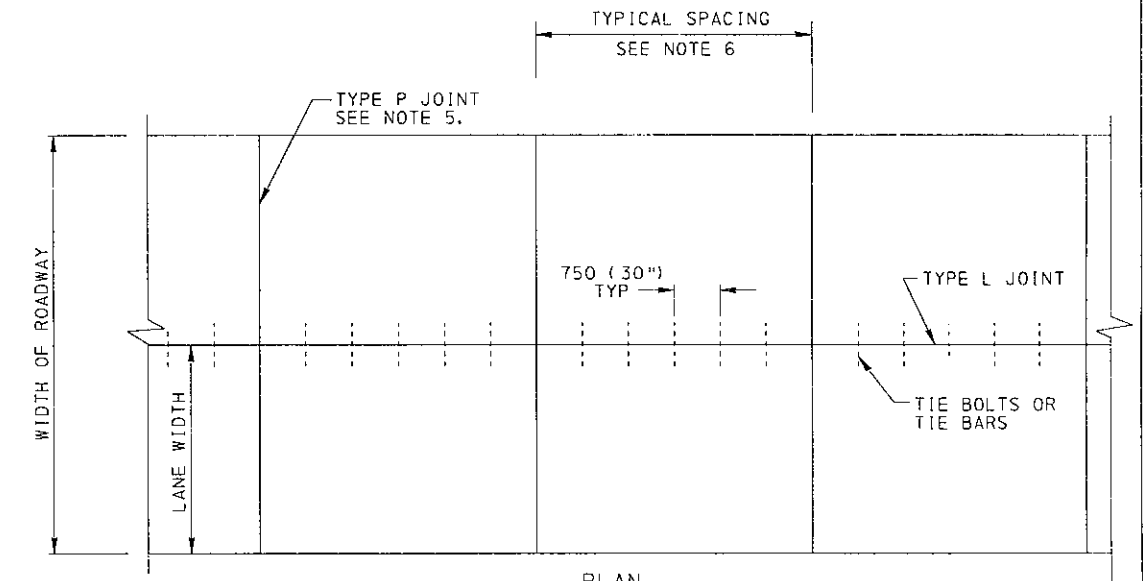
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CONCRETE PAVEMENT
REHABILITATION
(JOINTS)

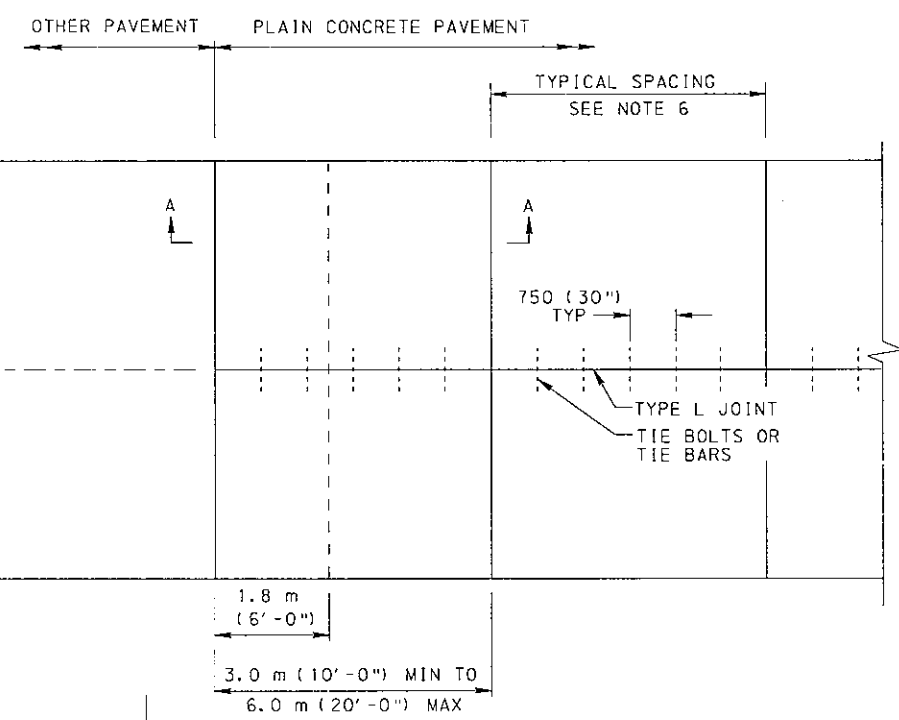
RECOMMENDED APR. 15, 2004 <i>Dean A. Stankovic</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. Patel</i> CHIEF ENGINEER	SHT 5 OF 5 RC-26M
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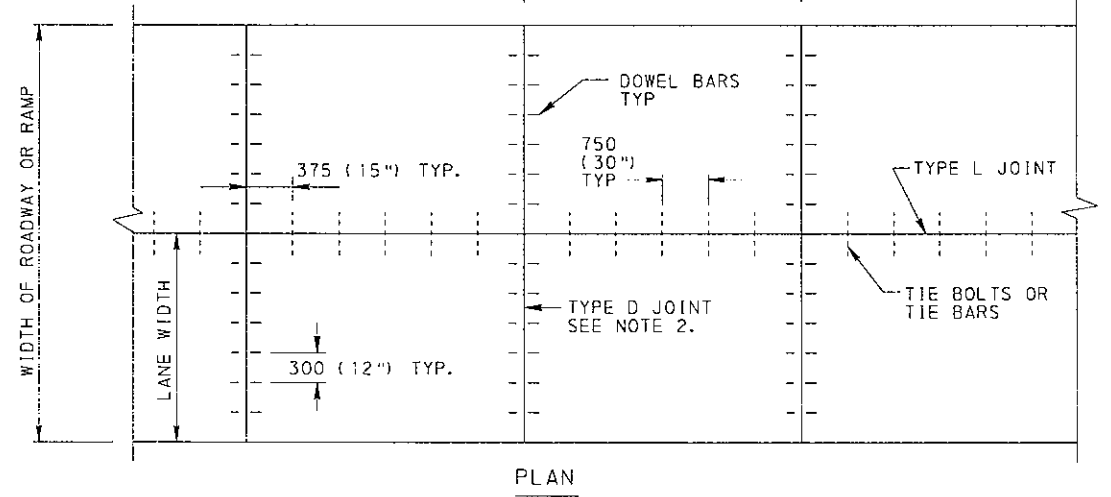
PLAN
 BRIDGE APPROACHES



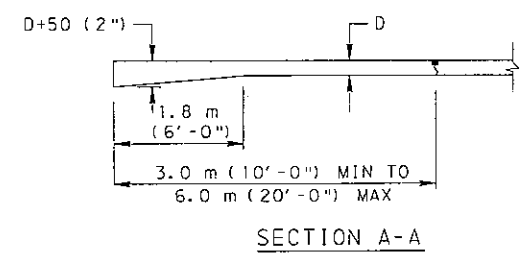
PLAN
 COLLECTORS AND LOCAL ROADS



PLAN
 TERMINAL SLAB



PLAN
 INTERSTATE AND OTHER LIMITED ACCESS
 FREEWAYS, ARTERIALS AND RAMPS



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 CORE.
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.

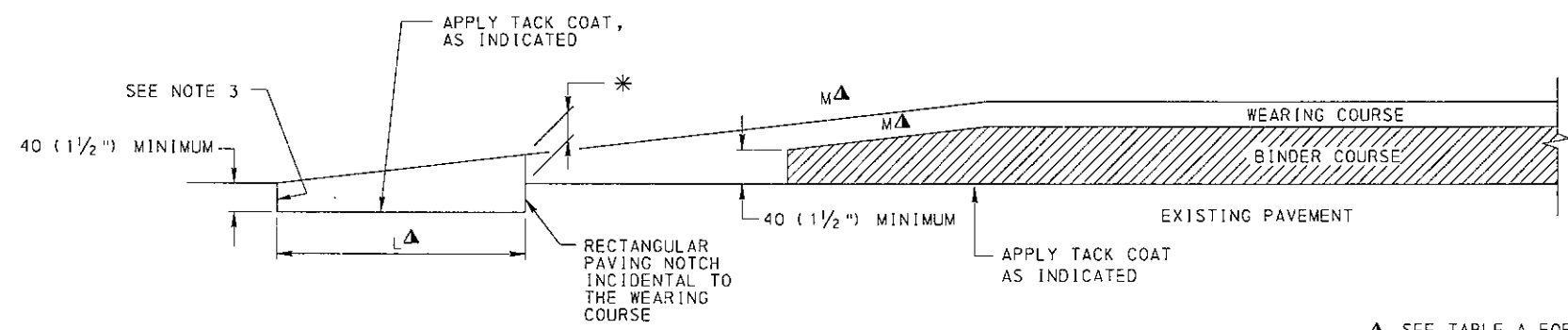
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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PLAIN CONCRETE PAVEMENT

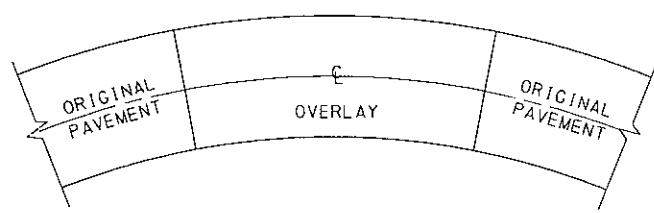
RECOMMENDED APR. 15, 2004 <i>Dean A. Schaub</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. Chitel</i> CHIEF ENGINEER	SHT 1 OF 1 RC-27M
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10-MAY-2004

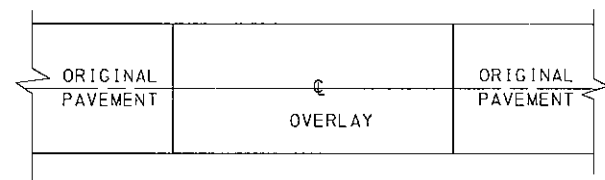


OVERLAY TRANSITION WITH PAVING NOTCH ON CONCRETE AND BITUMINOUS PAVEMENTS

▲ SEE TABLE A FOR DIMENSIONAL REQUIREMENTS
 * SHOULD EQUAL THE THICKNESS OF THE WEARING COURSE.

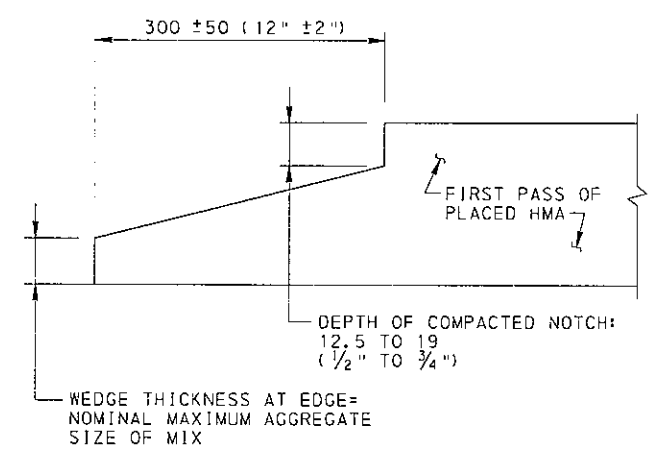


**PLAN VIEW
 SUPERELEVATION SECTION**



**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 (10-2W, 10-2W H.D.)	9.5	3/8"
SP12.5	12.5	1/2"
SP19 (10-3B, 10-2B, 10-2B H.D.)	19	3/4"

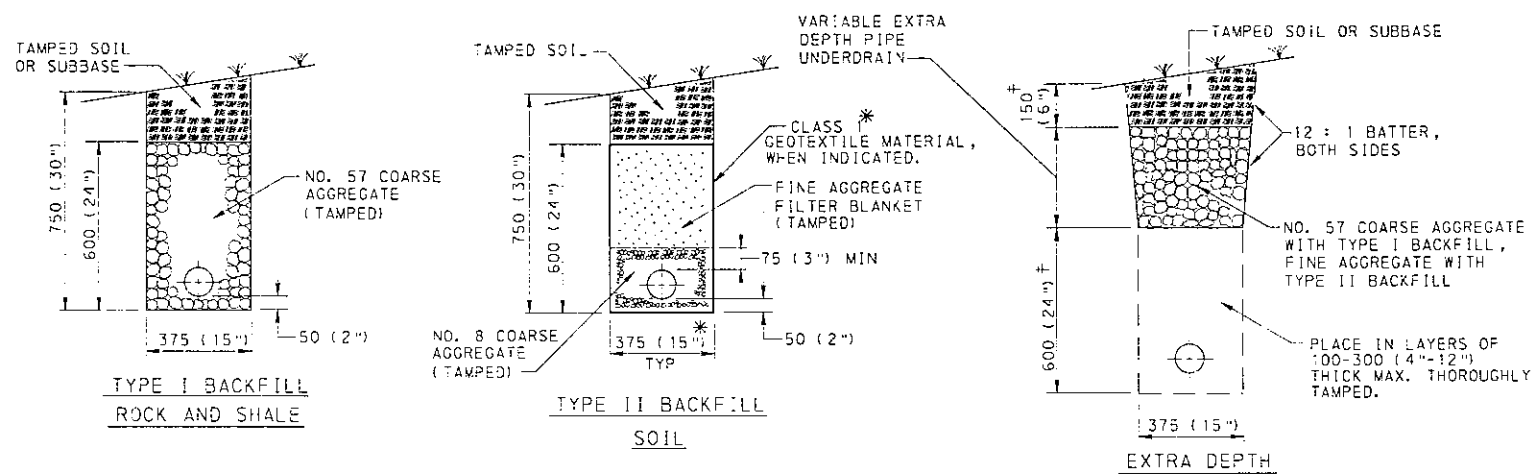
NOTES:

- 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.

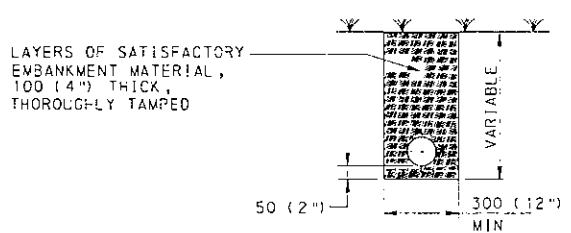
**COMMONWEALTH OF PENNSYLVANIA
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**OVERLAY TRANSITIONS
 AND
 PAVING NOTCHES**



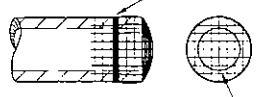
NOTES

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 () PARENTHESES.

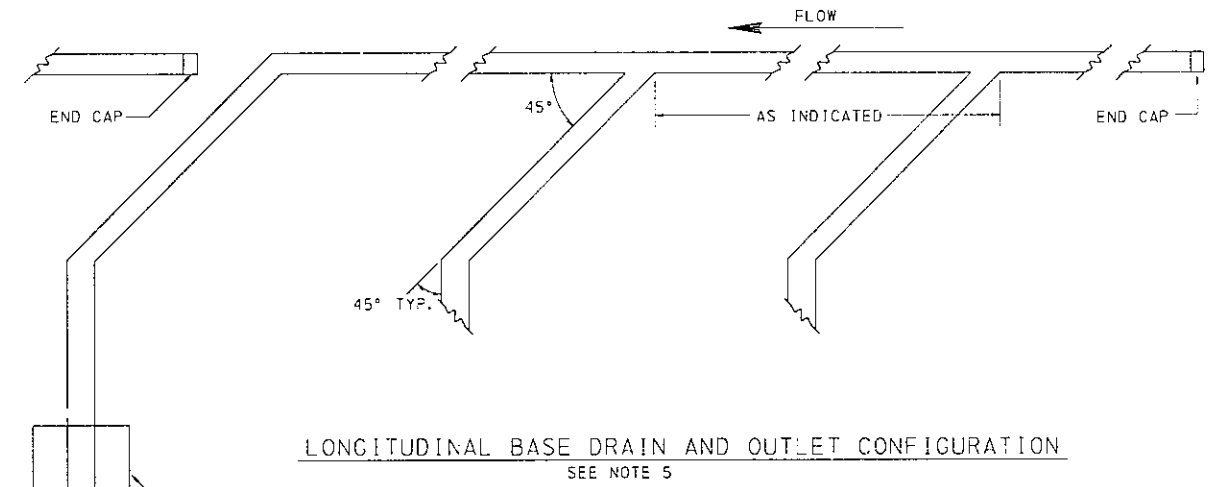


EXCAVATION OVER 900 (36") IN DEPTH AND FOR A MAXIMUM WIDTH OF 600 (24") IS PAYABLE AS CLASS 4 EXCAVATION. USE SUBSURFACE DRAIN OUTLETS FOR ALL PIPE UNDERDRAIN AND PAVEMENT BASE DRAINS.

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



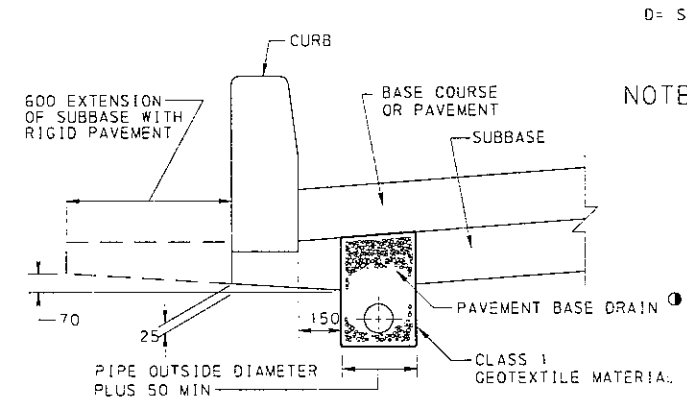
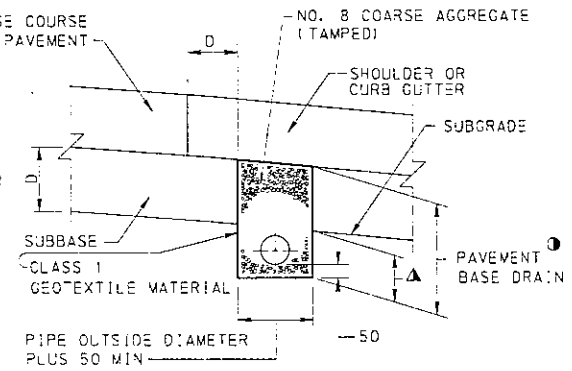
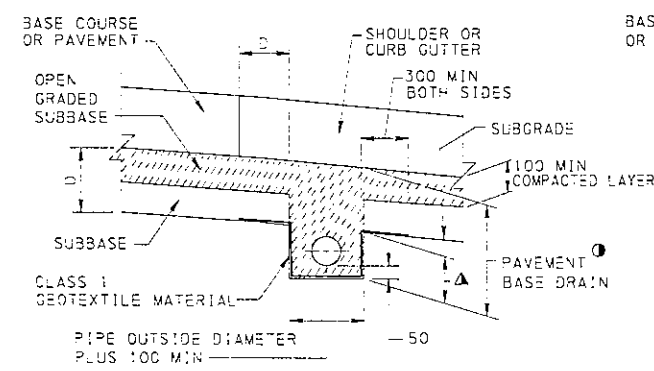
CONSTRUCT THE OUTLET INVERT 100 (3") (MINIMUM) HIGHER THAN THE SWALE LINE ELEVATION.



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.
- * 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

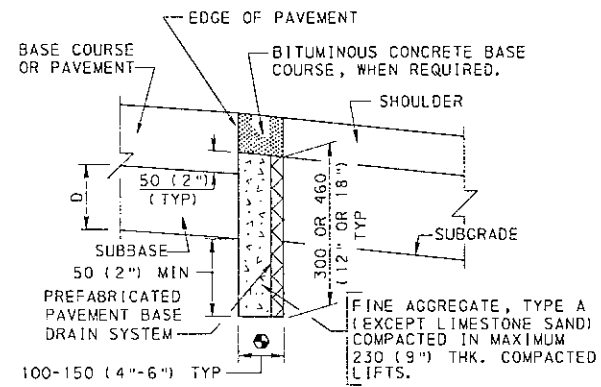
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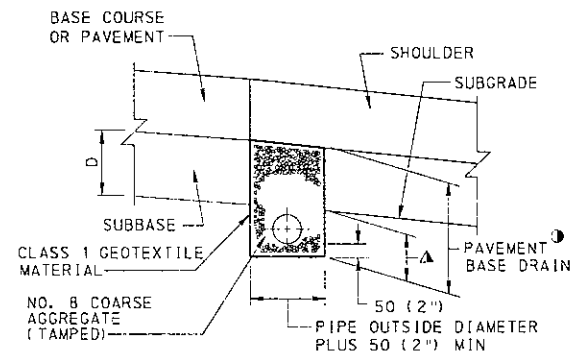
PAVEMENT BASE DRAIN

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SUBSURFACE DRAINS



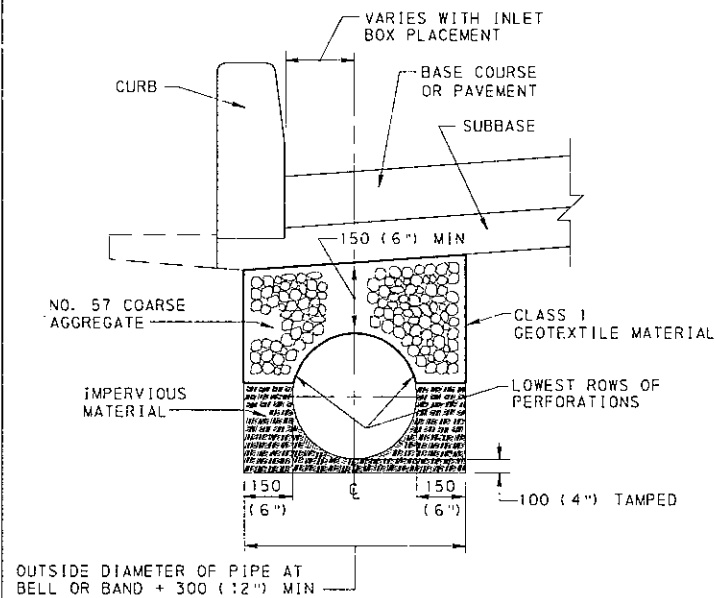
**PREFABRICATED
PAVEMENT BASE DRAIN
(REHABILITATION)**
SEE NOTE 3.



**PAVEMENT BASE DRAIN
(REHABILITATION)**

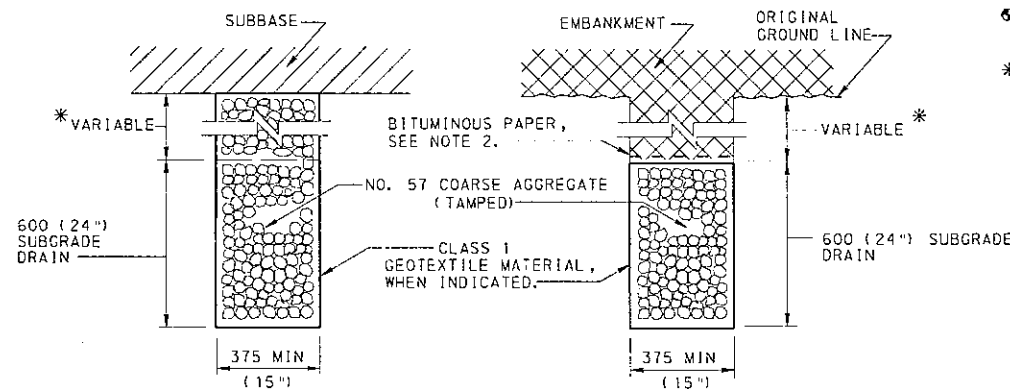
NOTES

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.



**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

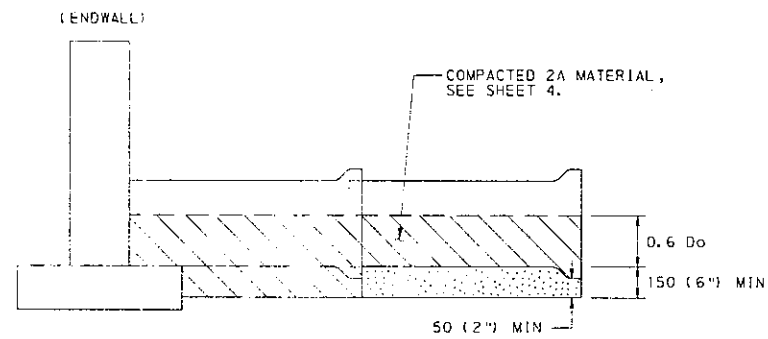
LEGEND

- ▲ 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.

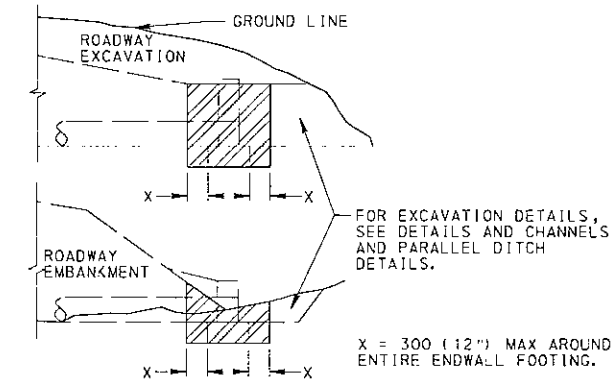
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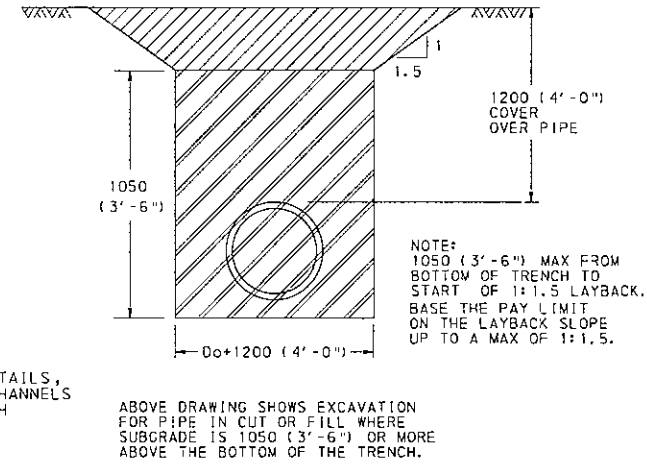
SUBSURFACE DRAINS



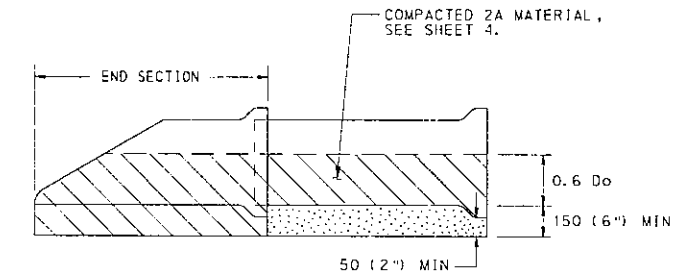
BACKFILL DETAIL AT ENDWALL
(FOR CONCRETE PIPE)



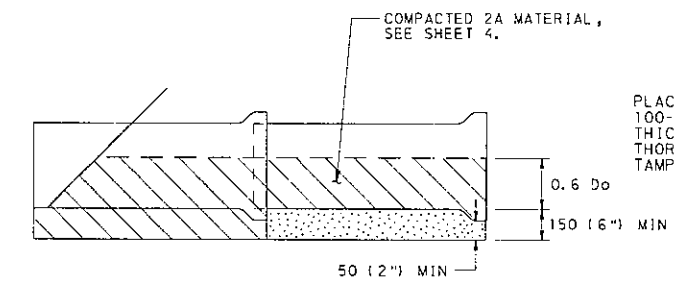
EXCAVATION FOR ENDWALLS



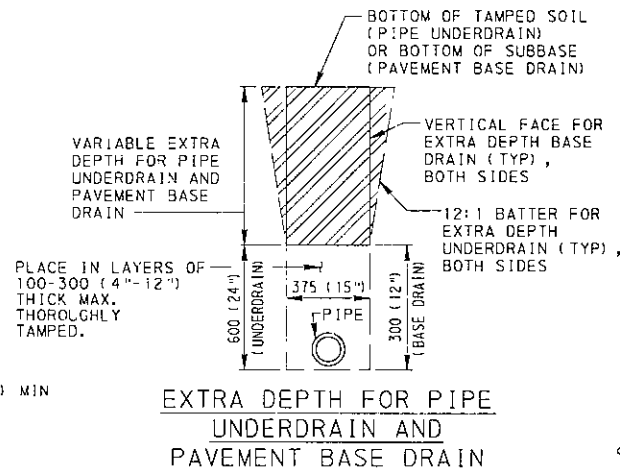
PAY LIMITS FOR PIPE EXCAVATION



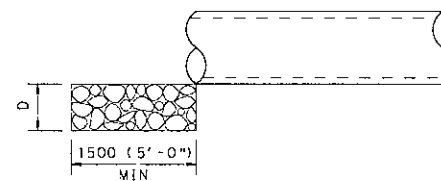
BACKFILL DETAIL AT END SECTION
(FOR CONCRETE PIPE)



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



EXTRA DEPTH FOR PIPE UNDERDRAIN AND PAVEMENT BASE DRAIN



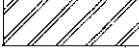

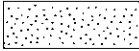

DETAIL A - PIPE INLET OR OUTLET PROTECTION

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

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 inches) ABOVE THE PIPE IS INCIDENTAL TO THE PIPE.
7. FOR BOTTOM TRENCH WIDTHS ≥ 2.5 m (8 feet - 0 inches), 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.

COMMONWEALTH OF PENNSYLVANIA
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SUBSURFACE DRAINS
PIPE PLACEMENT
EXCAVATION - BEDDING - BACKFILL

PIPE INSTALLATION PROCEDURES

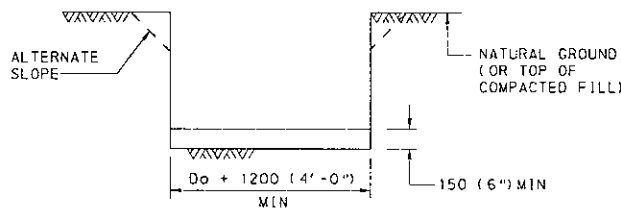
CONSTRUCTION DETAILS BELOW COVER THE FOLLOWING CONDITIONS:

- (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 DRAWINGS, 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.

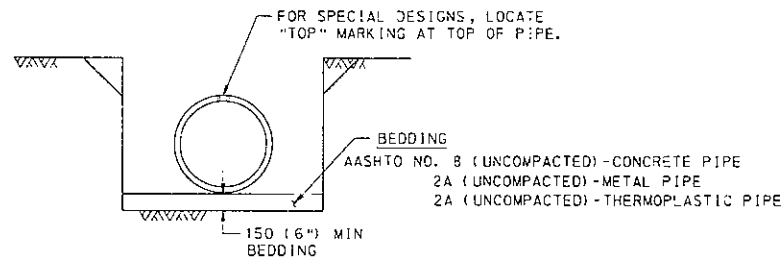
STEP 3: EXCAVATE THE TRENCH TO THE WIDTH OF THE OUTSIDE DIAMETER OF THE PIPE PLUS 1200 (4'-0") AND CREATE AN APPROPRIATE BEDDING 150 (6") DEEP.



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.)

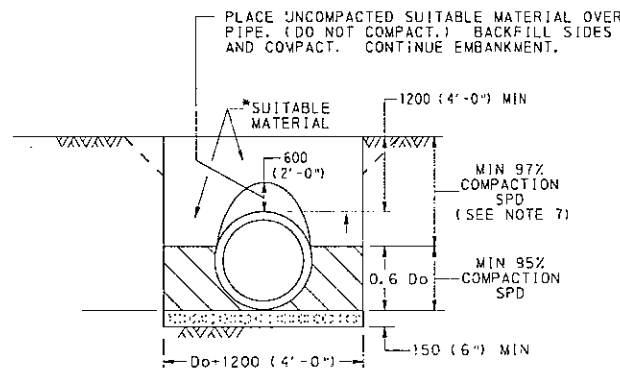
STEP 5: LAY PIPE ON APPROPRIATE BEDDING. SEE STEP 6D FOR METAL PIPE ARCH AND METAL PLATE PIPE ARCH.



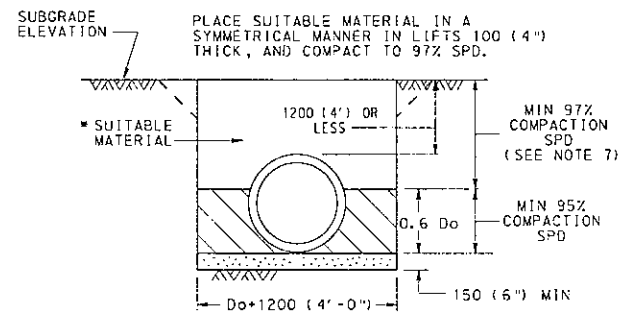
STEP 6: FOR CONCRETE PIPE, SEE STEP 6A.
 FOR METAL PIPE AND METAL PLATE PIPE, SEE STEP 6B.
 FOR THERMOPLASTIC PIPE, SEE STEP 6C.
 FOR METAL PIPE ARCH AND METAL PLATE PIPE ARCH, SEE STEP 6D.

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.



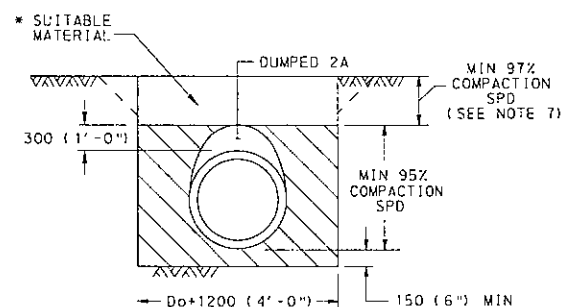
FILLS 1.5 m TO 14.6 m (5' TO 48')
 FOR FILLS OVER 14.6 m (48'), SEE NOTE 8.



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

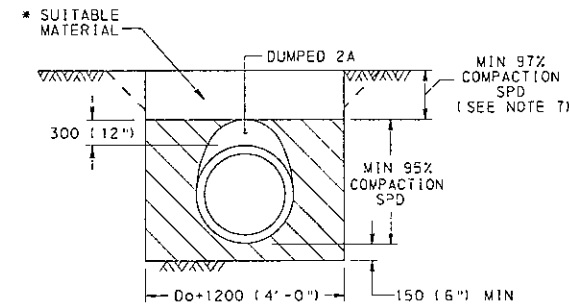
STEP 6B: METAL PIPE AND METAL PLATE PIPE

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.

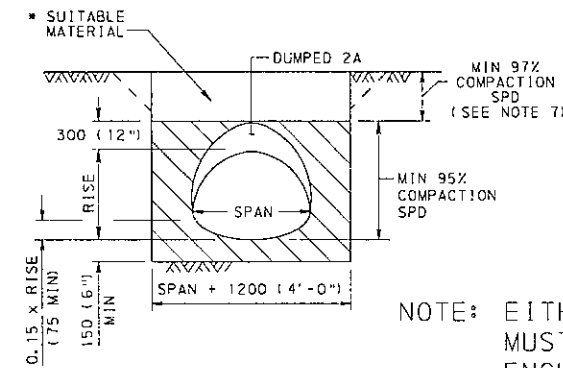


STEP 6D: METAL PIPE ARCH AND METAL PLATE PIPE ARCH

(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.

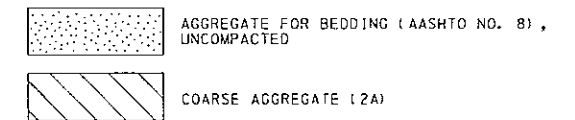


NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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 COMPACTON 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



Do = OUTSIDE DIAMETER OF PIPE, MILLIMETERS

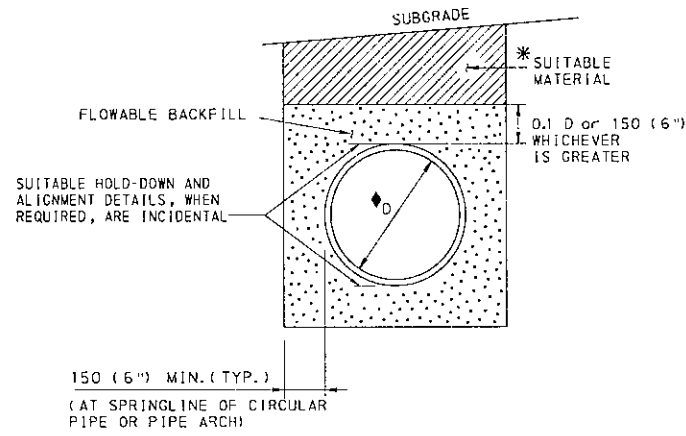
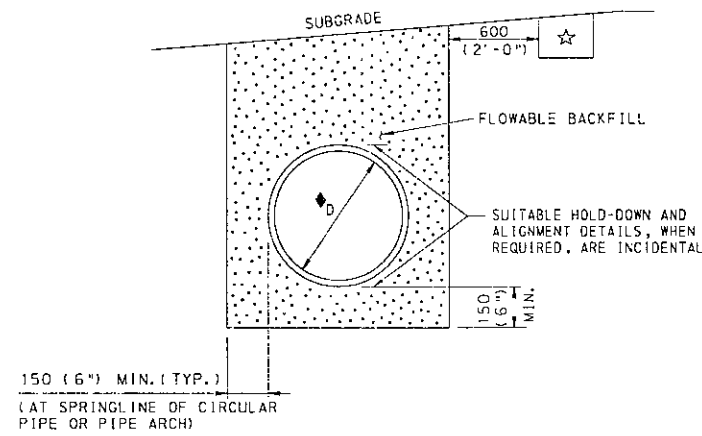
SPD = STANDARD PROCTOR DENSITY

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
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SUBSURFACE DRAINS
 PIPE PLACEMENT
 EXCAVATION - BEDDING - BACKFILL



◆ 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.

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DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SUBSURFACE DRAINS

FLOWABLE BACKFILL

RECOMMENDED APR. 15, 2004

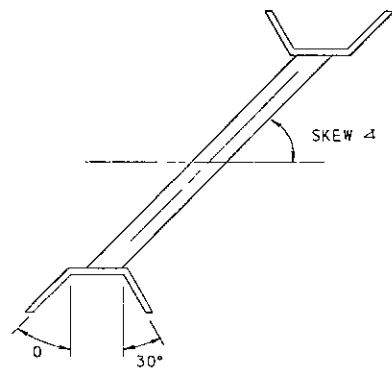
Dean A. Shahan
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED APR. 15, 2004

M. Patel
CHIEF ENGINEER

SHT 5 OF 5

RC-30M



METRIC EQUATION

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

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

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

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

ENGLISH EQUATION

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

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

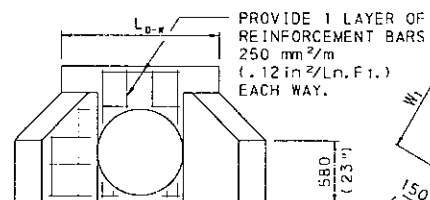
$$W_1 = \frac{2D_{D-W} - 2.0'}{\cos \theta} \text{ FOR 2:1 SLOPE}$$

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

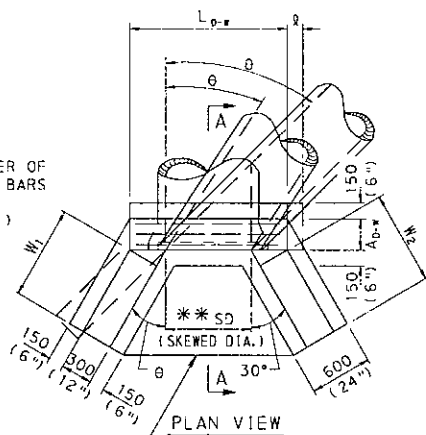
#13 (#4) BARS @ 300 (12") C TO C TYP. EACH WAY TOP & BOTT.



FRONT ELEVATION VIEW
BASE SECTION FOR TYPE D-W

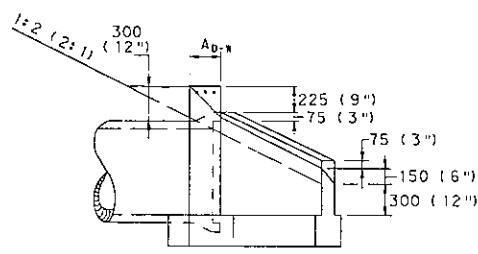


FRONT ELEVATION VIEW
HEAD & WINGWALL SECTION
FOR TYPE D-W

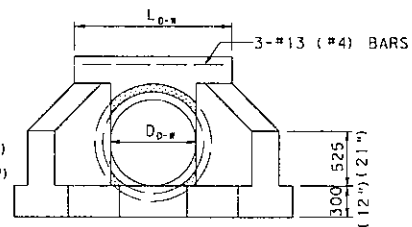


PLAN VIEW

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 Δ = 30° TO 60° θ = 30°			SKEW Δ = 55° θ = 35°			SKEW Δ = 50° θ = 40°			SKEW Δ = 45° θ = 45°			SKEW Δ = 40° θ = 50°			SKEW Δ = 30° θ = 60°			SKEW Δ = 20° θ = 70°			SKEW Δ = 10° θ = 80°			W ₂	A _{D-W}
	D _{D-W} (mm)	L _{D-W} (m)	W ₁ (m)	L _{D-W} (m)	W ₁ (m)	L _{D-W} (m)	W ₁ (m)	L _{D-W} (m)	W ₁ (m)	L _{D-W} (m)	W ₁ (m)	L _{D-W} (m)	W ₁ (m)	L _{D-W} (m)	W ₁ (m)	L _{D-W} (m)	W ₁ (m)	L _{D-W} (m)	W ₁ (m)	L _{D-W} (m)	W ₁ (m)	L _{D-W} (m)	W ₁ (m)	L _{D-W} (m)		
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

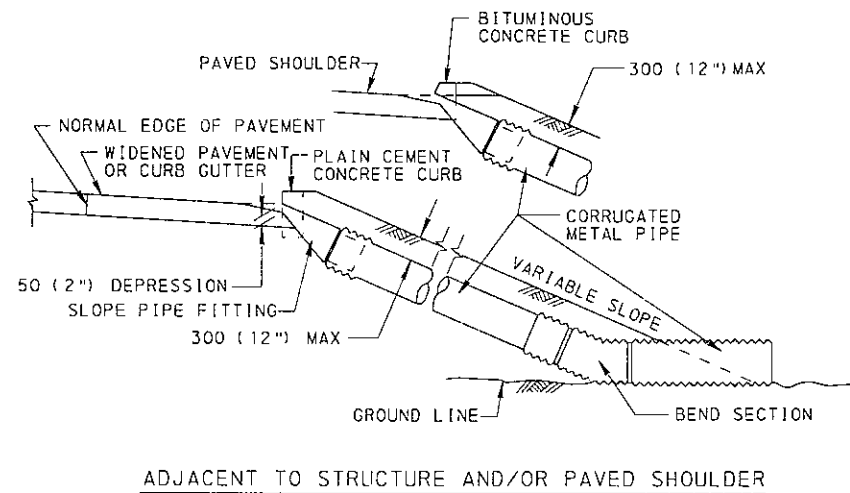
PIPE DIAMETER	SKEW Δ = 30° TO 60° θ = 30°			SKEW Δ = 55° θ = 35°			SKEW Δ = 50° θ = 40°			SKEW Δ = 45° θ = 45°			SKEW Δ = 40° θ = 50°			SKEW Δ = 30° θ = 60°			SKEW Δ = 20° θ = 70°			SKEW Δ = 10° θ = 80°			W ₂	A _{D-W}
	D _{D-W} (IN.)	L _{D-W} (FT.)	W ₁ (FT.)	L _{D-W} (FT.)	W ₁ (FT.)	L _{D-W} (FT.)	W ₁ (FT.)	L _{D-W} (FT.)	W ₁ (FT.)	L _{D-W} (FT.)	W ₁ (FT.)	L _{D-W} (FT.)	W ₁ (FT.)	L _{D-W} (FT.)	W ₁ (FT.)	L _{D-W} (FT.)	W ₁ (FT.)	L _{D-W} (FT.)	W ₁ (FT.)	L _{D-W} (FT.)	W ₁ (FT.)	L _{D-W} (FT.)	W ₁ (FT.)	L _{D-W} (FT.)		
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

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

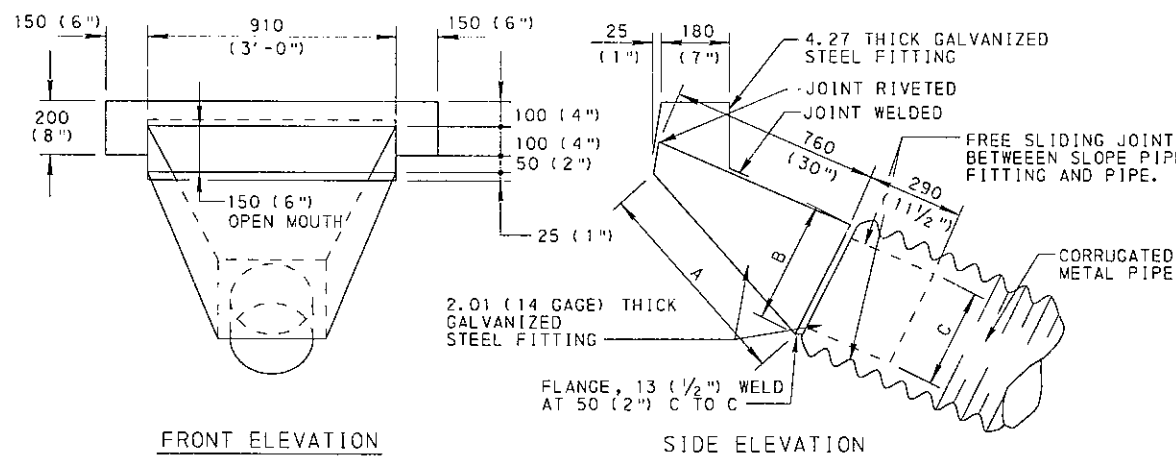
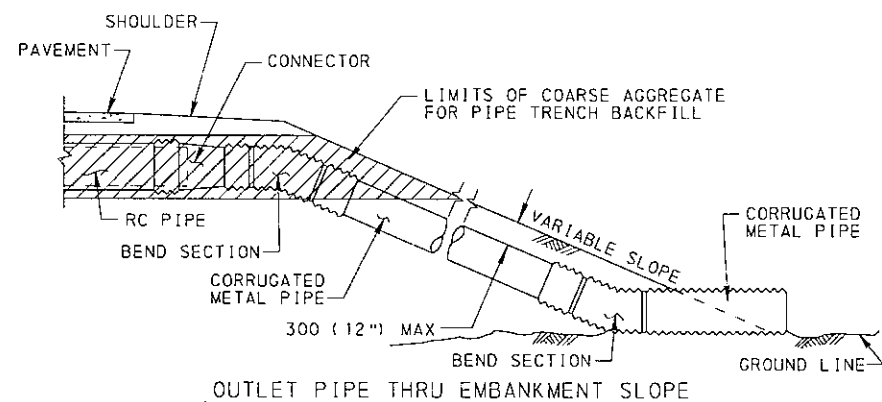
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BUREAU OF DESIGN

ENDWALLS
CAST-IN-PLACE & PRECAST

RECOMMENDED APR. 15, 2004
RECOMMENDED APR. 15, 2004
SHT 2 OF 2
RC-31M

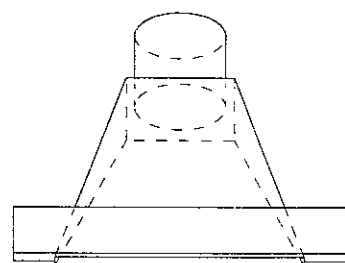


ADJACENT TO STRUCTURE AND/OR PAVED SHOULDER



FRONT ELEVATION

SIDE ELEVATION

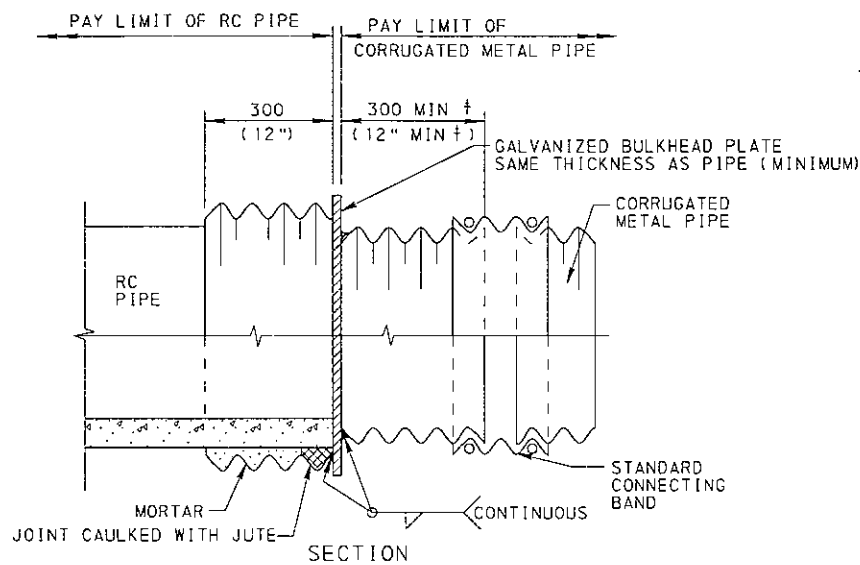


PLAN

SLOPE PIPE FITTING

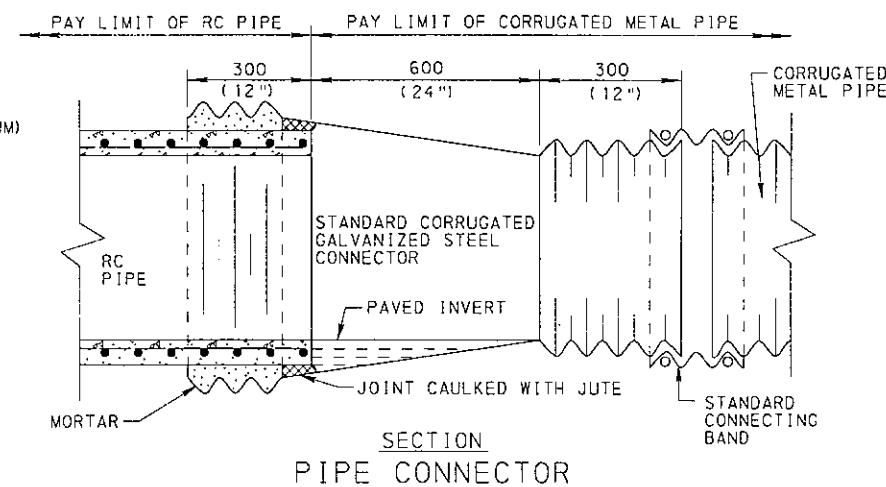
NOMINAL DIAMETER OF PIPE	DIMENSIONS FOR 1:2 (2:1) SLOPES		
	A	B	C
300 (12")	735 (28 15/16")	325 (13")	275 (11")
375 (15")	760 (29 13/16")	400 (16")	350 (14")
450 (18")	795 (31 15/16")	475 (19")	425 (17")

* RESTRICT SLOPE PIPES DRAINING ONLY SHOULDER AREAS IN EMBANKMENTS, OTHER THAN THOSE ADJACENT TO STRUCTURES, TO 300 (12") MINIMUM DIAMETER.

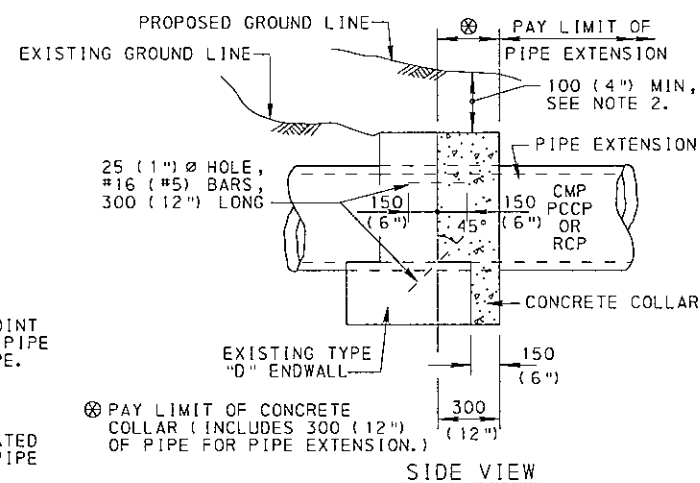


ALTERNATE PIPE CONNECTOR

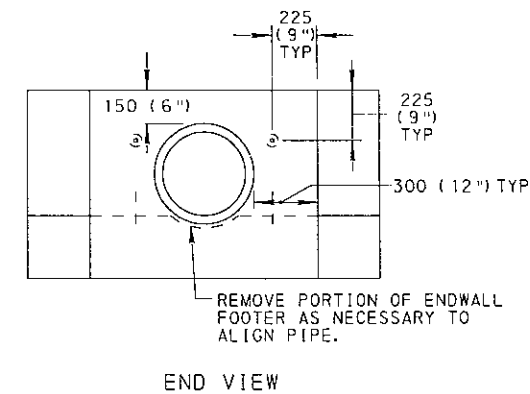
† ADJUST LENGTH TO OBTAIN EVEN LENGTHS OF 600 (24") OF CONNECTING PIPE.



SECTION PIPE CONNECTOR



CONCRETE COLLAR FOR PIPE EXTENSION
FOR PIPES UP TO AND INCLUDING 825 (33") Ø, SEE NOTE 1.



END VIEW

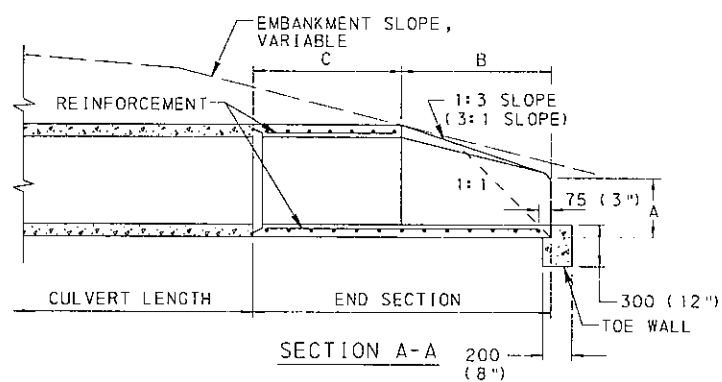
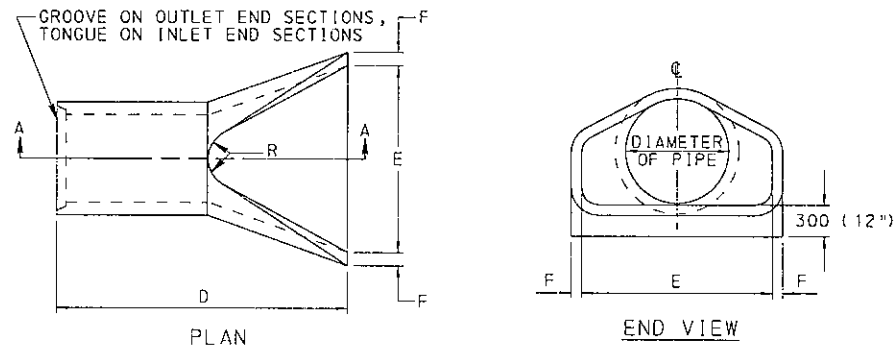
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

NOTES

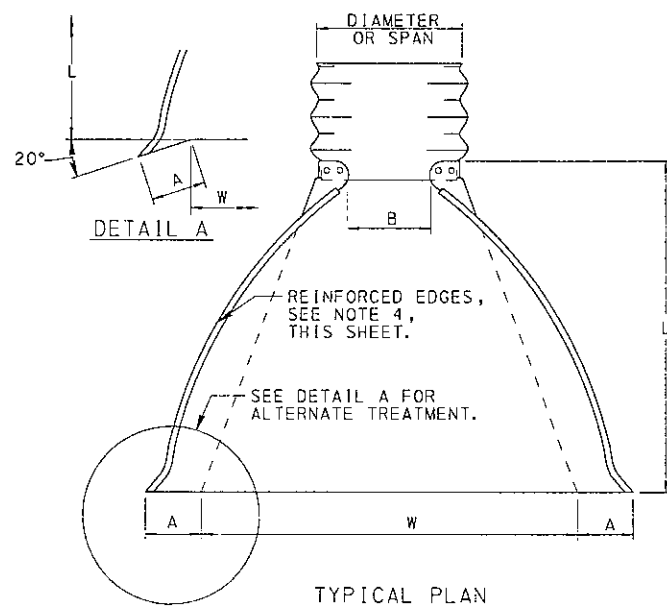
1. FOR OTHER TYPES OF ENDWALLS AND FOR PIPES LARGER THAN 825 (33") Ø, A SPECIAL COLLAR DESIGN IS REQUIRED.
2. REMOVE PORTIONS OF EXISTING ENDWALL IF REQUIRED TO MAINTAIN 100 (4") GROUND COVER.
3. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 616 FOR SLOPE PIPE FITTINGS AND SECTION 618 FOR CONCRETE COLLAR FOR PIPE EXTENSION.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

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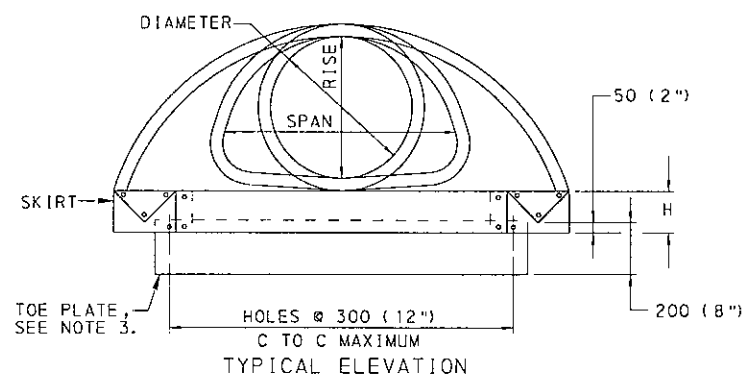
SLOPE PIPE FITTINGS,
PIPE CONNECTORS AND CONCRETE
COLLAR FOR PIPE EXTENSION



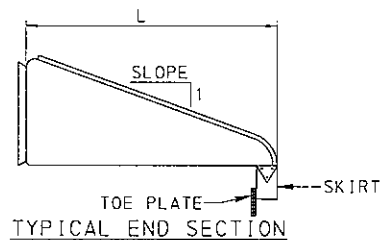
SLOPE DETAIL
CONCRETE END SECTIONS



TYPICAL PLAN



TYPICAL ELEVATION



TYPICAL END SECTION

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 (1/8") 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 (1/8") 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 () PARENTHESES.
7. FOR DIMENSION TABLES 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.

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END SECTIONS FOR
PIPE CULVERTS

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

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

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

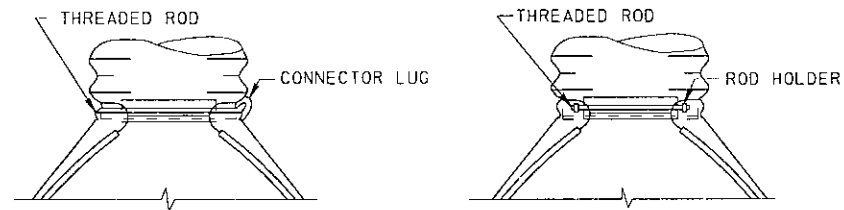
[] ACCEPTABLE ALTERNATE DIMENSIONS FOR PIPE-ARCH.

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 1/4"	6'-1 1/4"	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"

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

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.

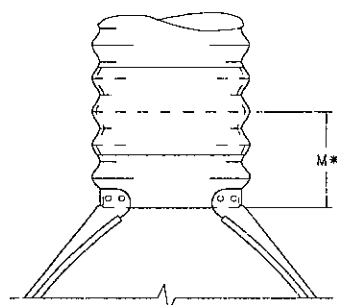


TYPE-1 CONNECTION

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

TYPE-2 CONNECTION

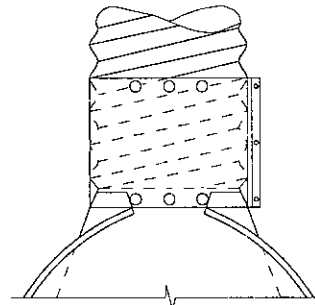
750Ø TO 900Ø (30"Ø TO 36"Ø)
CIRCULAR PIPE AND
1440 x 970, 1340 x 1050
(57" x 38", 53" x 41") OR
SMALLER PIPE-ARCH.



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.

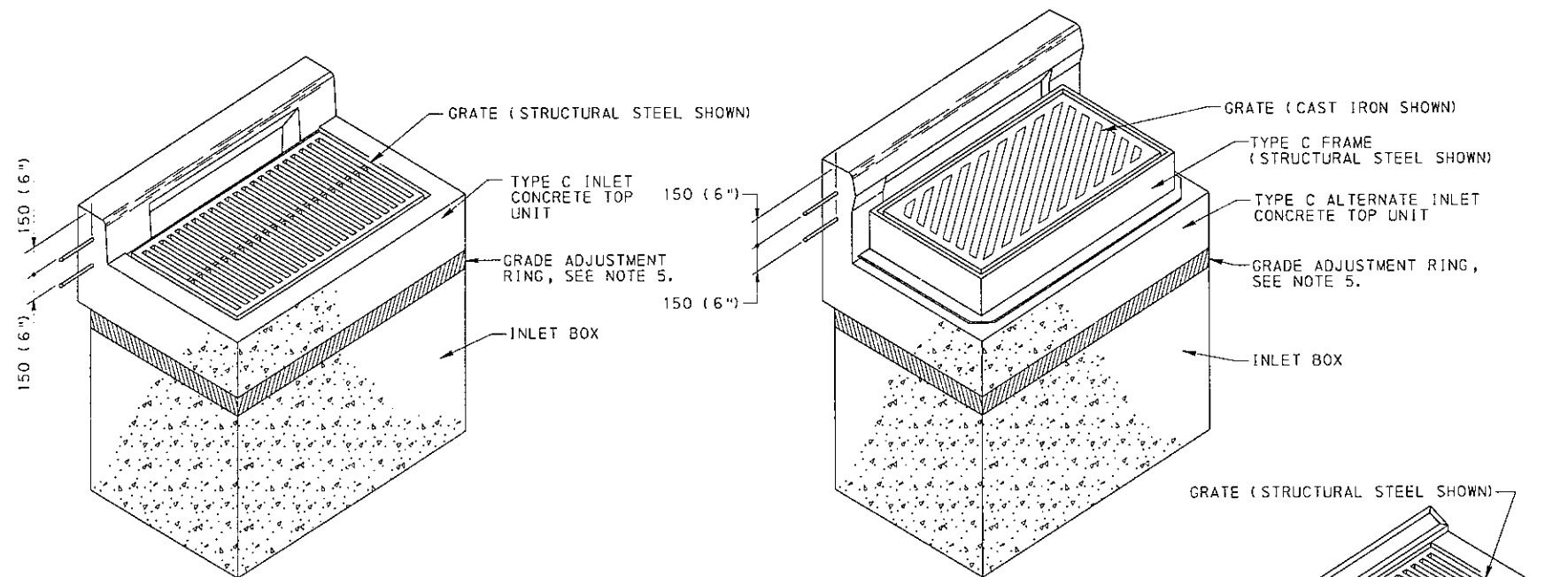
NOTE:
FOR GENERAL NOTES SEE SHEET 1.

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

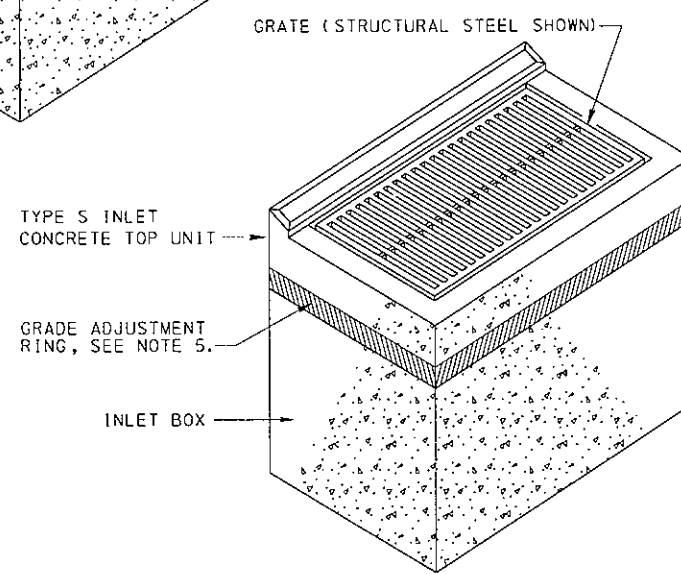
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END SECTIONS FOR
PIPE CULVERTS

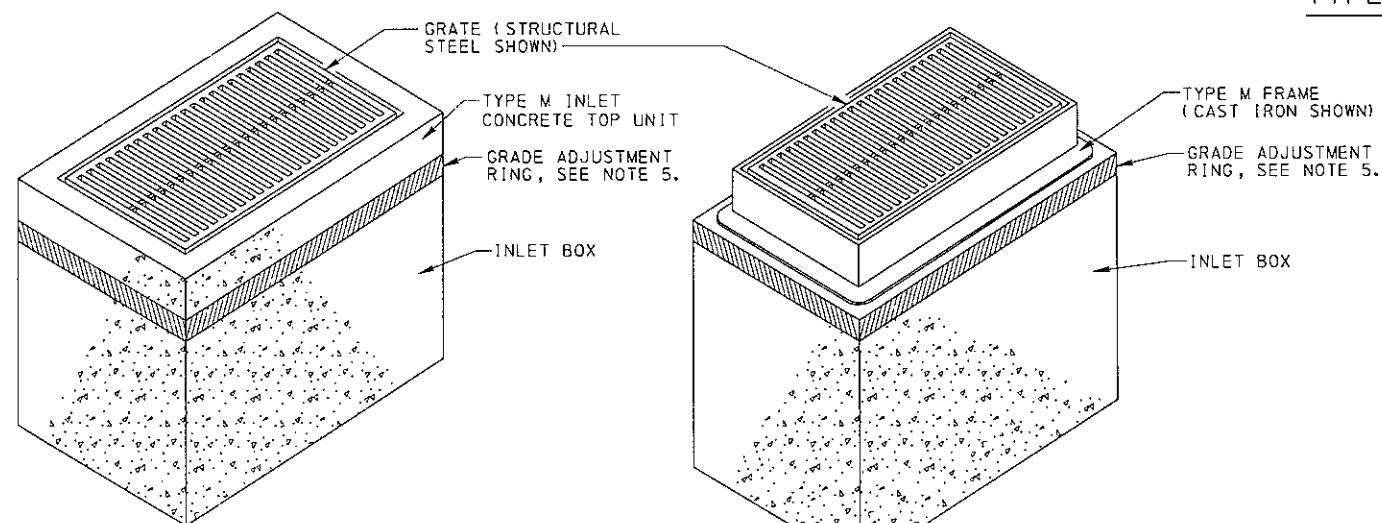
ALTERNATE TYPE CONNECTIONS FOR
CORRUGATED METAL PIPE END SECTIONS



TYPE C INLET



TYPE S INLET



TYPE M INLET

NOTES

1. CONSTRUCTION REQUIREMENTS:
 - A. CONSTRUCT IN ACCORDANCE WITH PUBLICATION 408, SECTIONS 605, 606 AND 714; AND AS MODIFIED HEREIN.
 - B. MINIMUM CONCRETE CLASS:

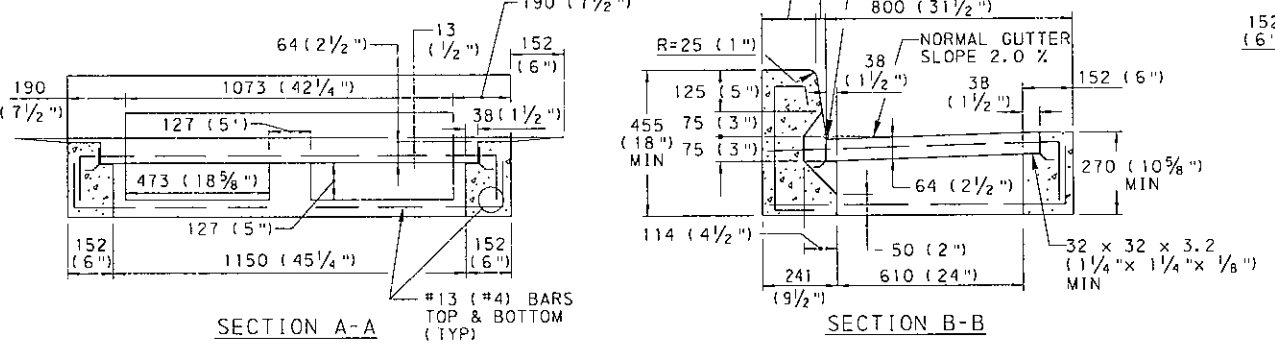
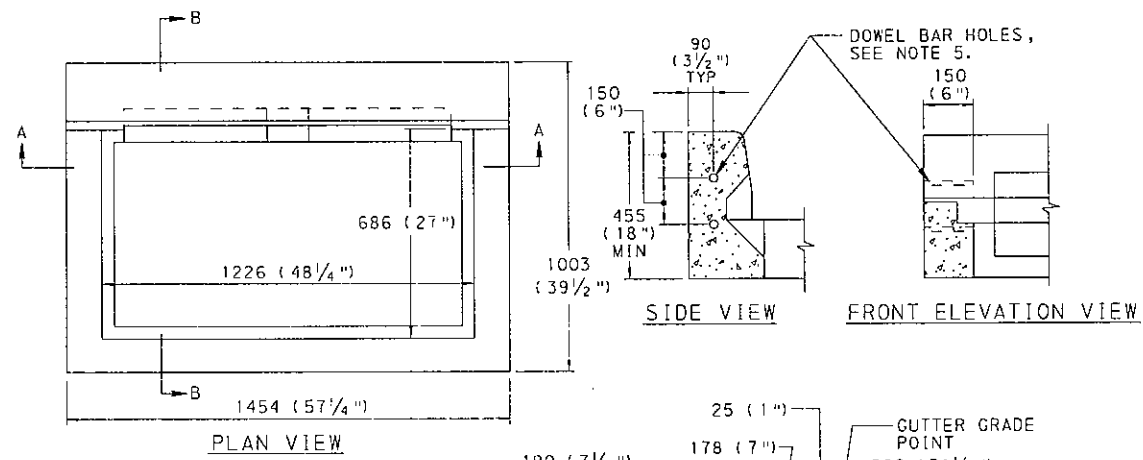
CAST-IN-PLACE	CLASS A
PRECAST	CLASS AA
 - C. PROVIDE STEEL REINFORCEMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 709. PROVIDE MINIMUM YIELD STRENGTH OF 400 MPa (60,000 PSI).
 - D. CLEAR COVER FOR STEEL:

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
		50 (2") SIDE COVER
	PRECAST	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.

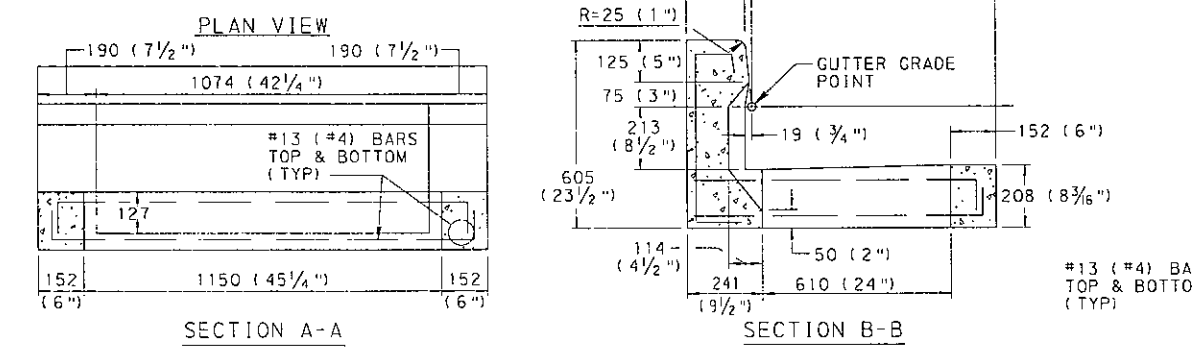
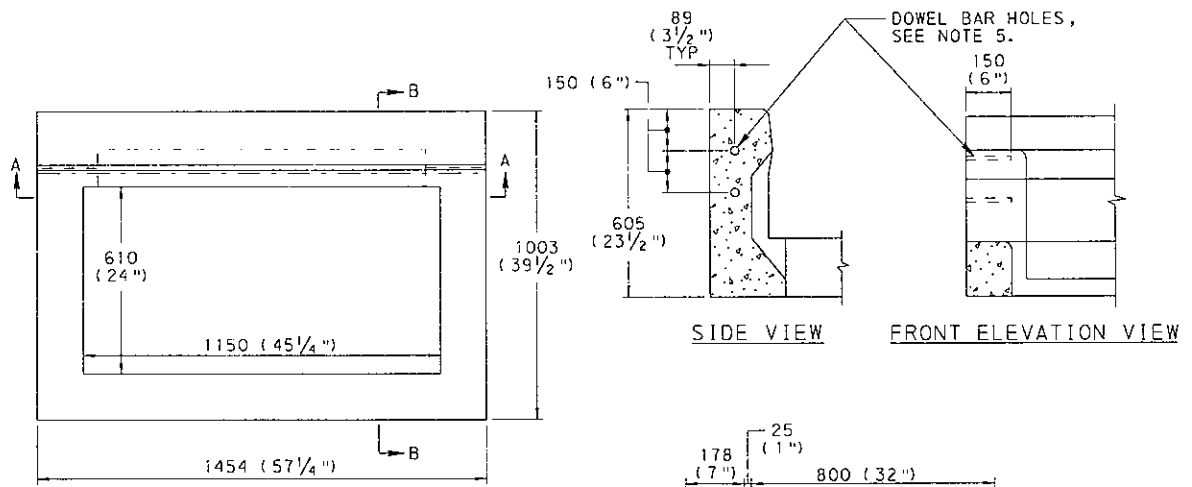
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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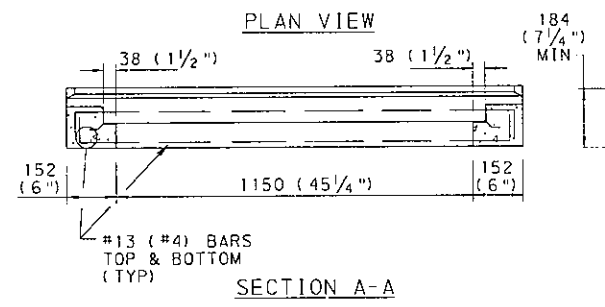
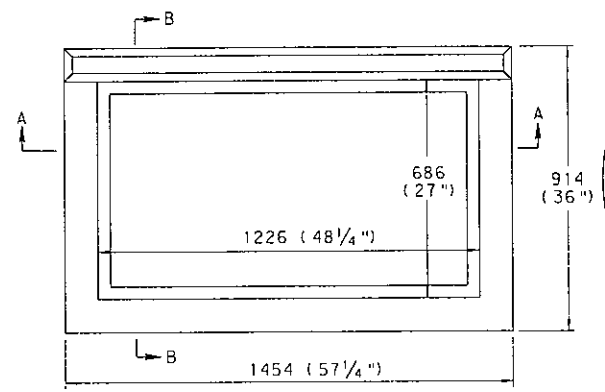
INLETS
INLET ASSEMBLIES



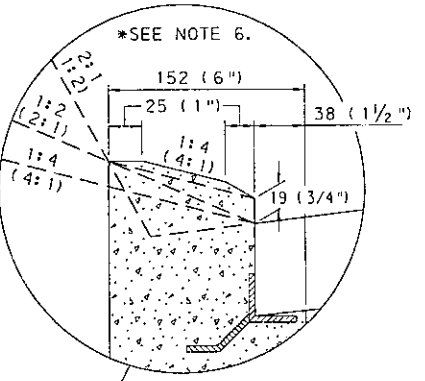
TYPE C



TYPE C ALTERNATE



TYPE M

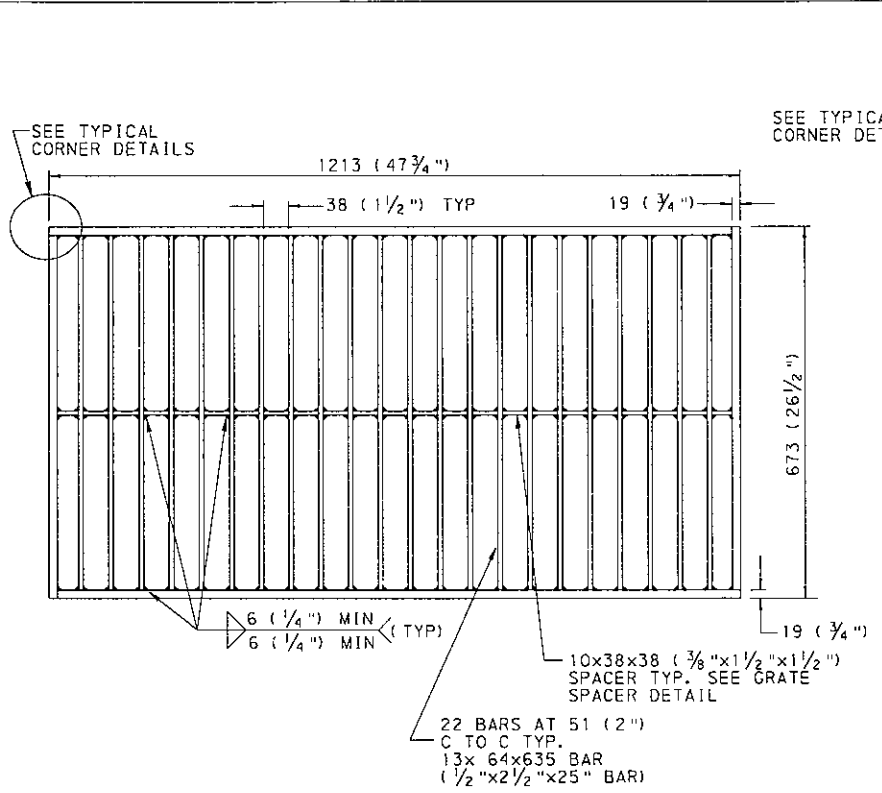


- NOTES**
- THIS SHEET DEPICTS THE SHAPE AND DIMENSIONS REQUIRED FOR UNIFORMITY AND COMPATIBILITY. PERMIT ONLY TOP UNITS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS SUBMIT SHOP DRAWINGS FOR APPROVAL.
 - CAST-IN-PLACE TOP UNITS MAY BE MONOLITHIC WITH THE INLET BOX.
 - 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.
 - 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.
 - 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.
 - 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.
 - 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").

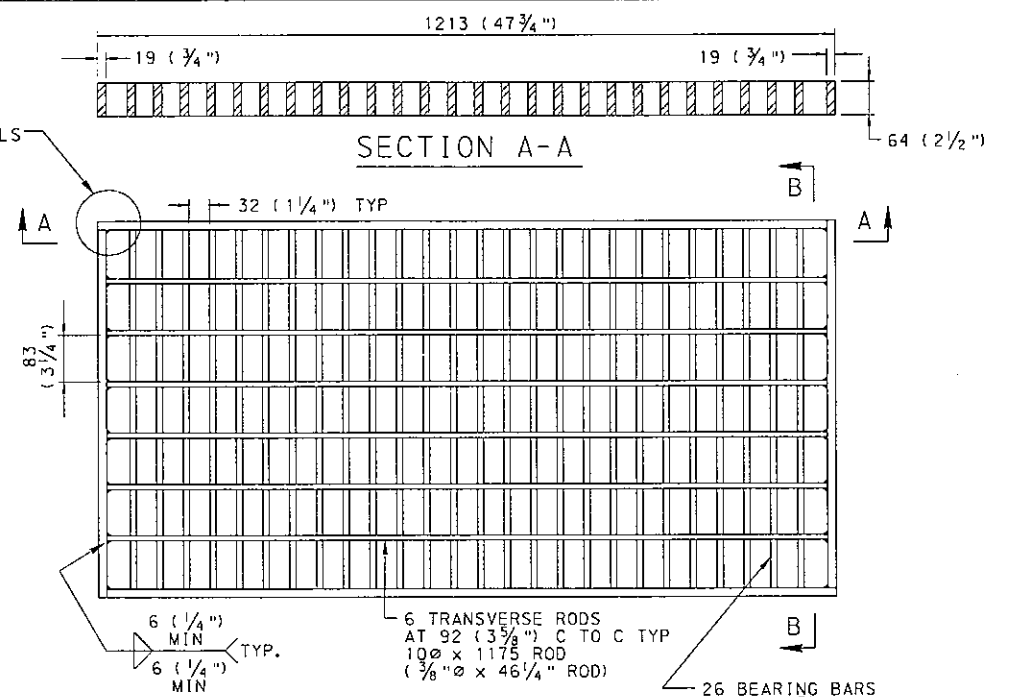
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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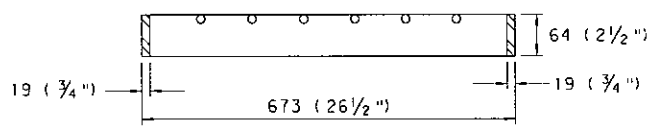
INLETS
CONCRETE TOP UNITS
CAST-IN-PLACE AND PRECAST



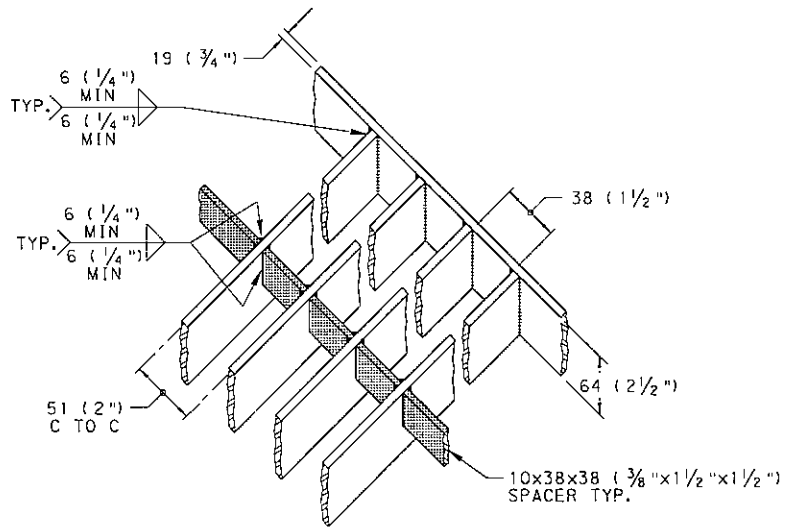
STRUCTURAL STEEL GRATE



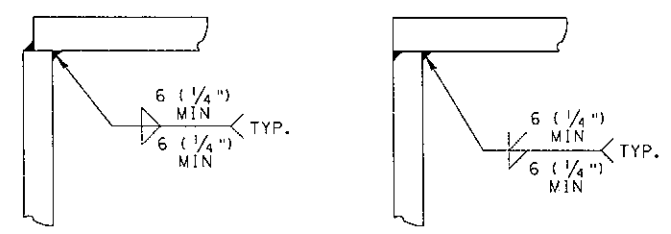
**STRUCTURAL STEEL GRATE
BICYCLE SAFE**



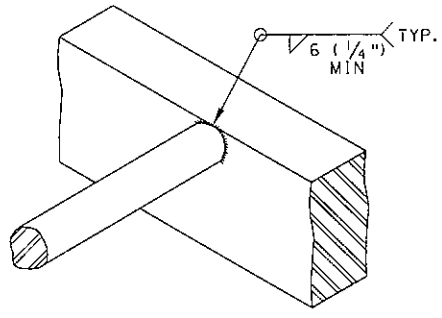
SECTION B-B



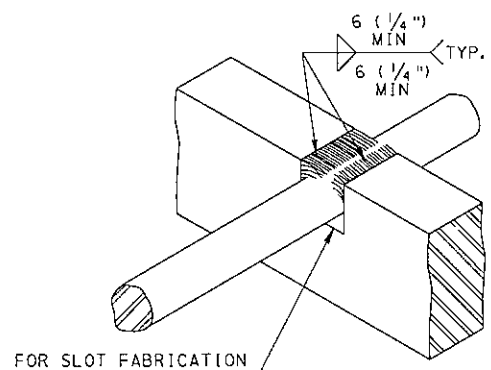
GRATE SPACER DETAIL



TYPICAL CORNER DETAILS



DETAIL D

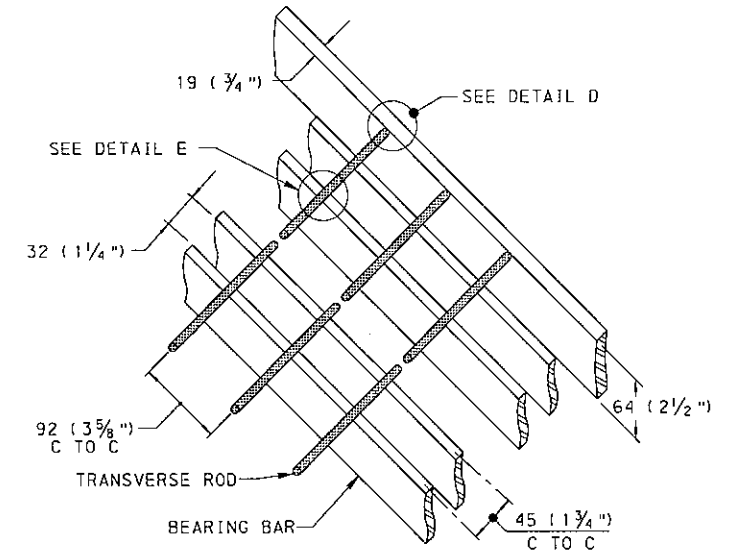


DETAIL E

FOR SLOT FABRICATION
SEE NOTE 5

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 DRAWING FOR APPROVAL.
2. WELD STRUCTURAL STEEL GRATES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.03(r).
3. PROVIDE TRANSVERSE BARS MEETING THE REQUIREMENTS OF PUBLICATION 408.
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 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.
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.

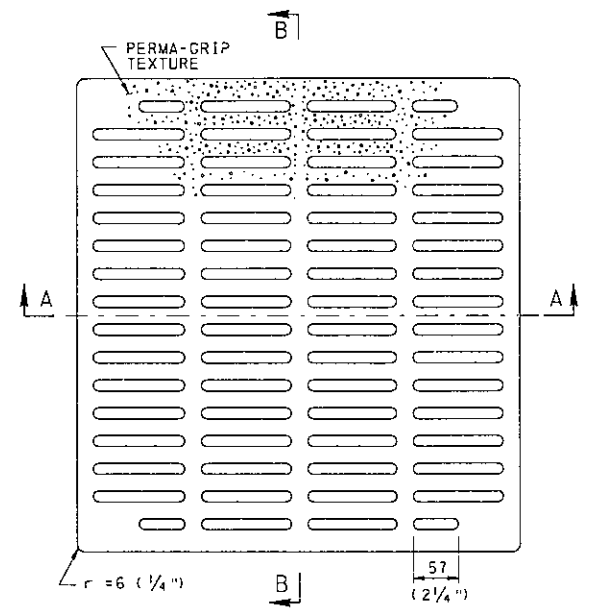


BAR & ROD SPACING DETAIL

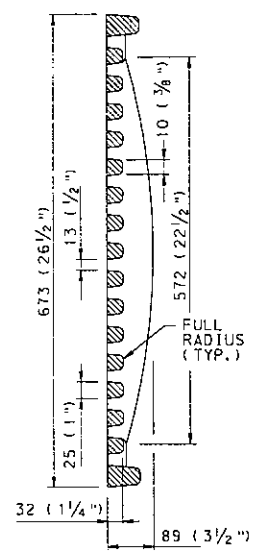
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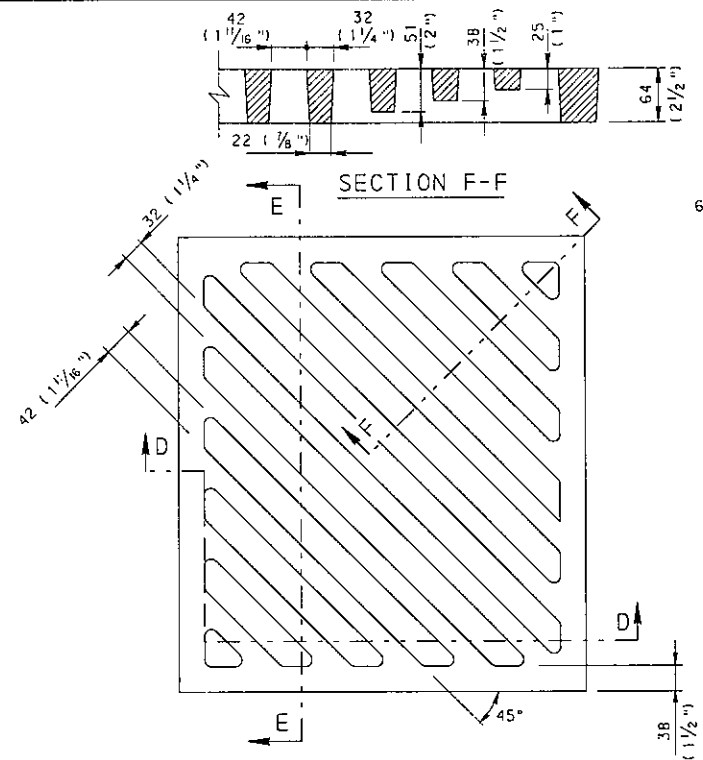
**INLET
GRATES**



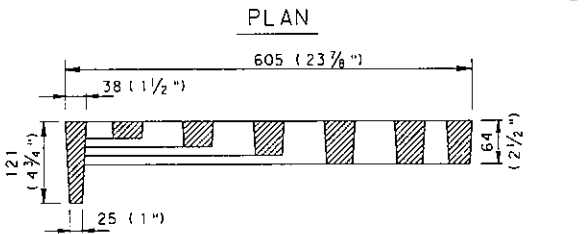
PLAN - BICYCLE-SAFE GRATE



SECTION B-B

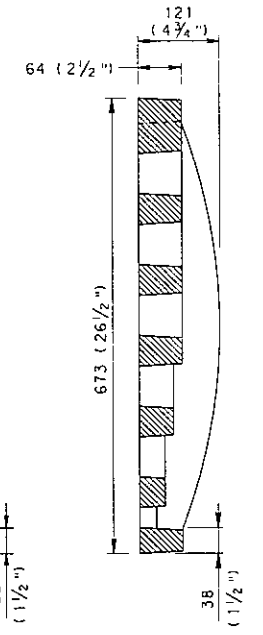


SECTION F-F

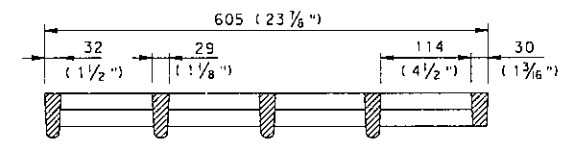


PLAN

SECTION D-D

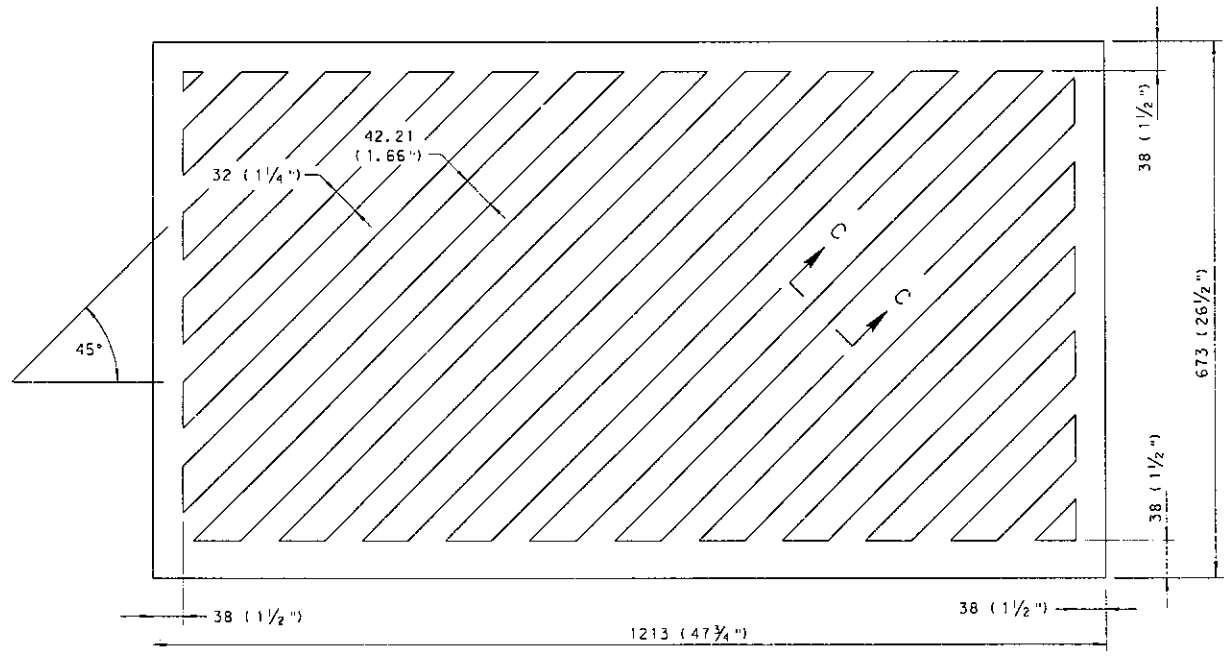


SECTION E-E

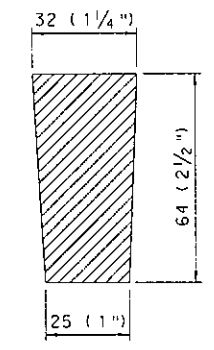


SECTION A-A

TWO PIECE GRATES



PLAN - ONE PIECE GRATE



SECTION C-C

CAST GRAY IRON GRATES

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

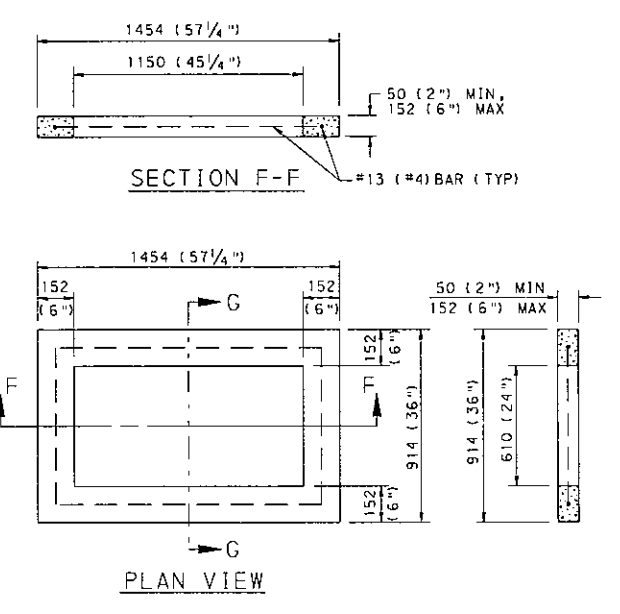
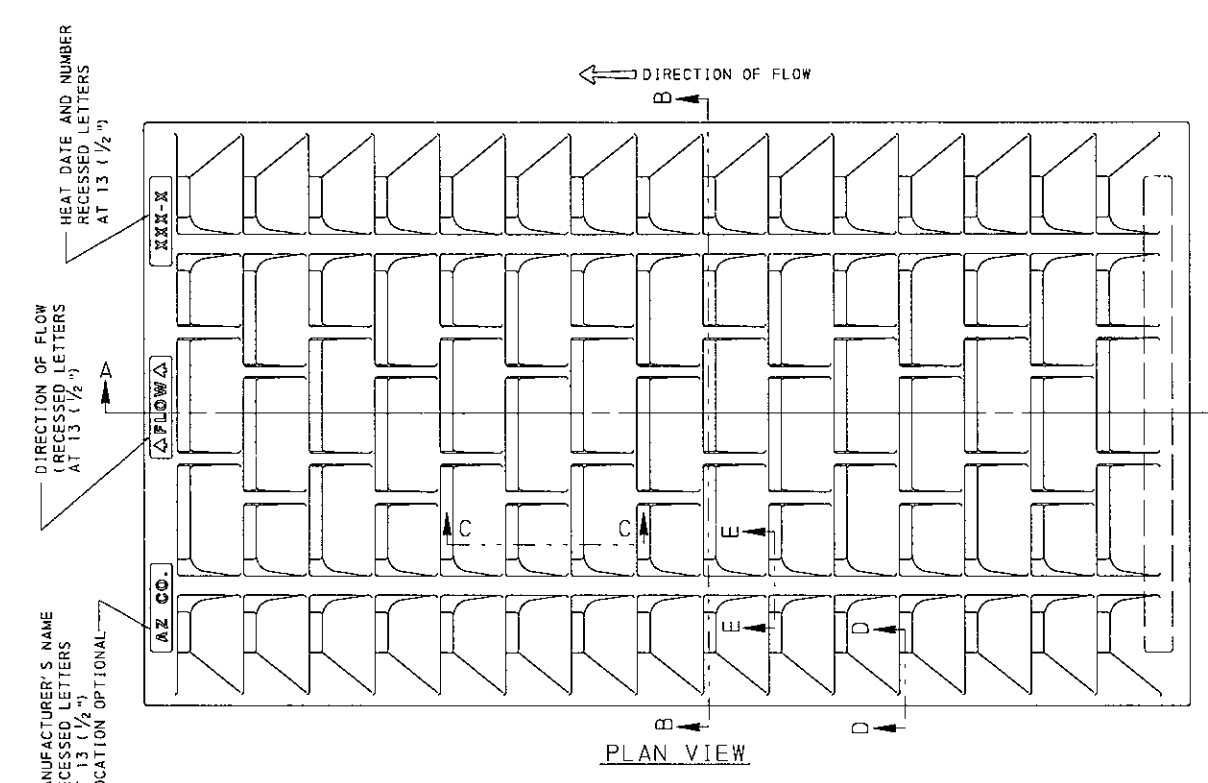
NOTES

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.

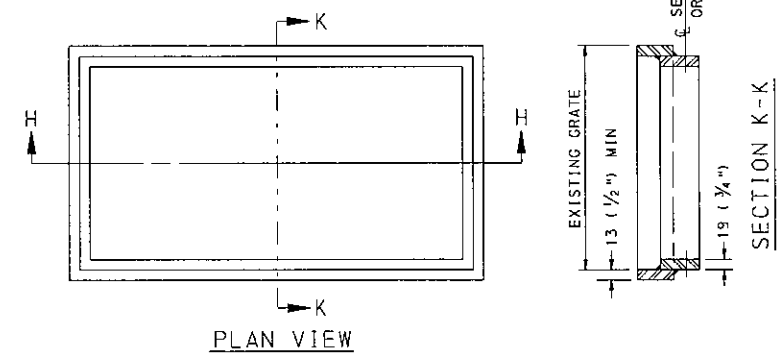
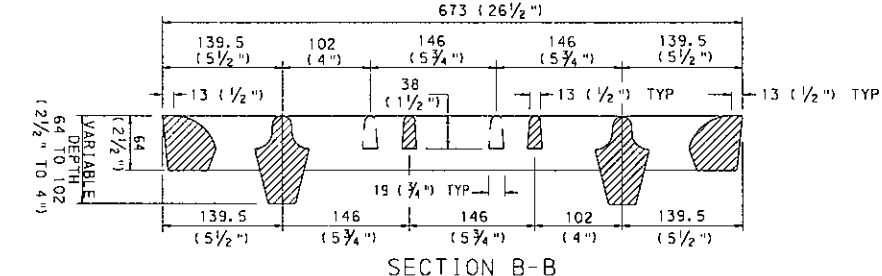
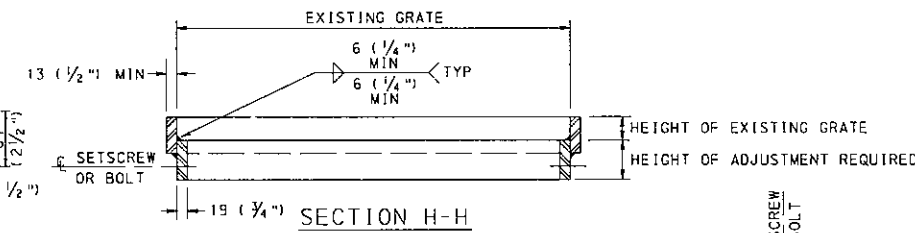
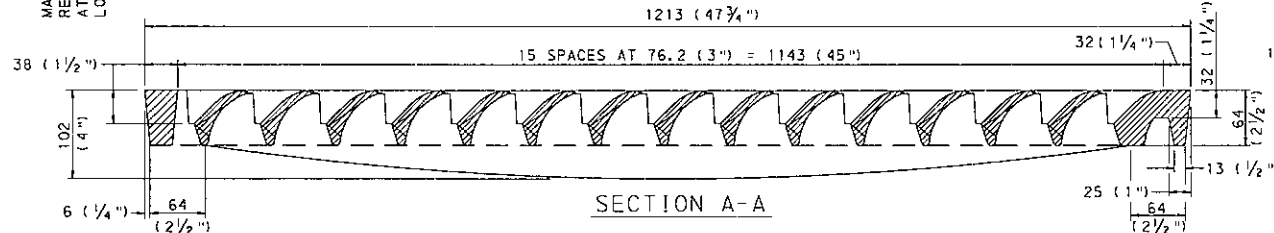
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET GRATES



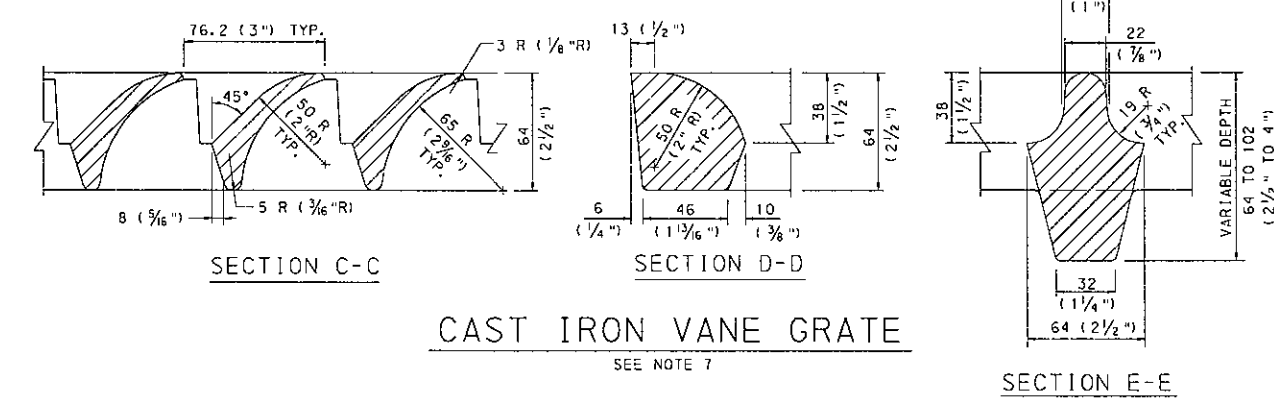
PRECAST CONCRETE
GRADE ADJUSTMENT RINGS

- 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 (1/8)\"/>



STRUCTURAL STEEL
GRADE ADJUSTMENT RINGS

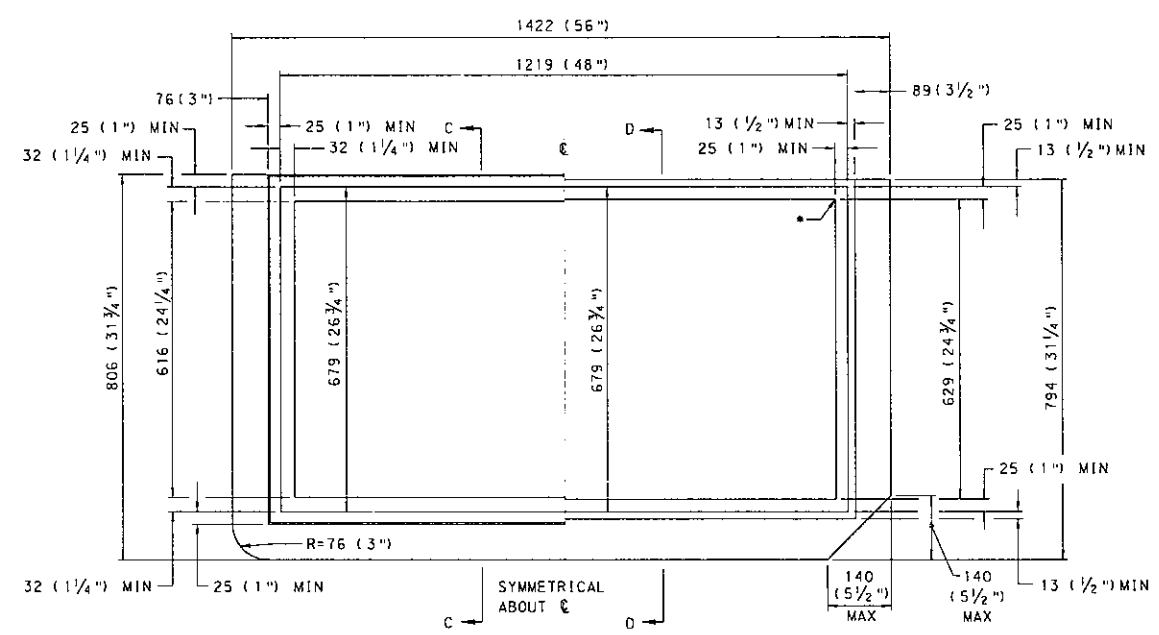
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



CAST IRON VANE GRATE
SEE NOTE 7

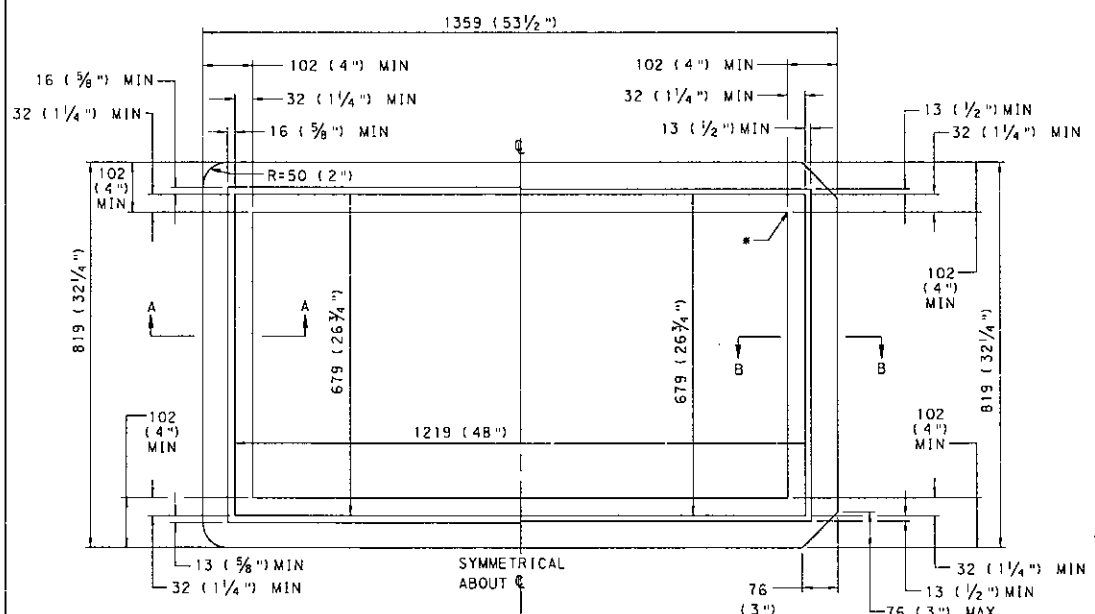
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET
GRATES
&
GRADE ADJUSTMENT RINGS

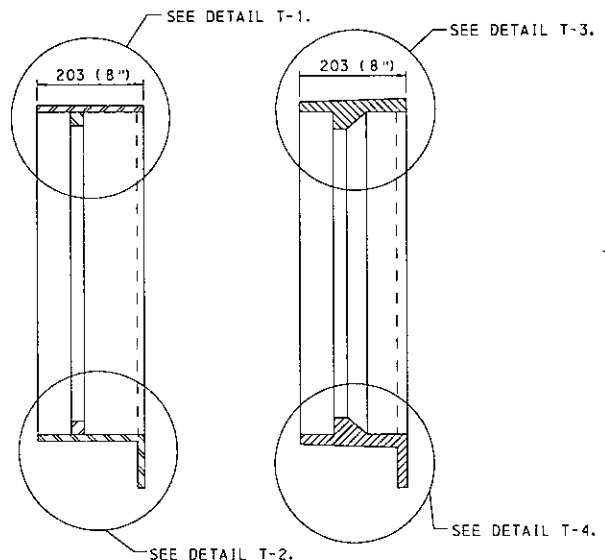


TYPE C FRAME

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

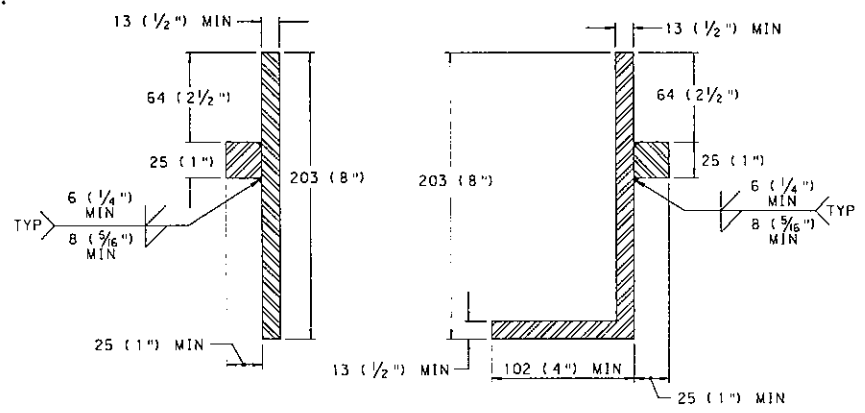


TYPE M FRAME



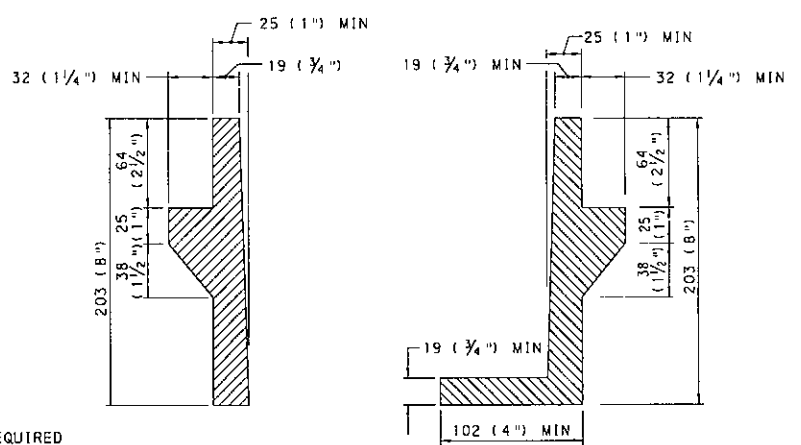
SECTION D-D

SECTION C-C



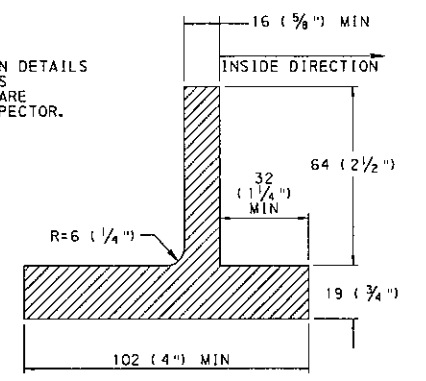
DETAIL T-1

DETAIL T-2

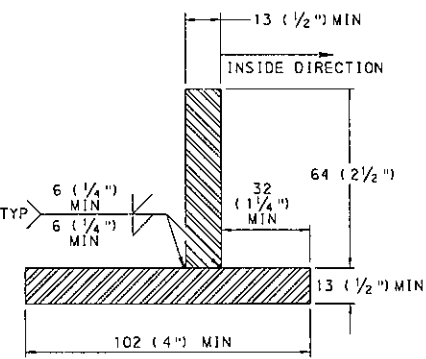


DETAIL T-3

DETAIL T-4



SECTION A-A



SECTION B-B

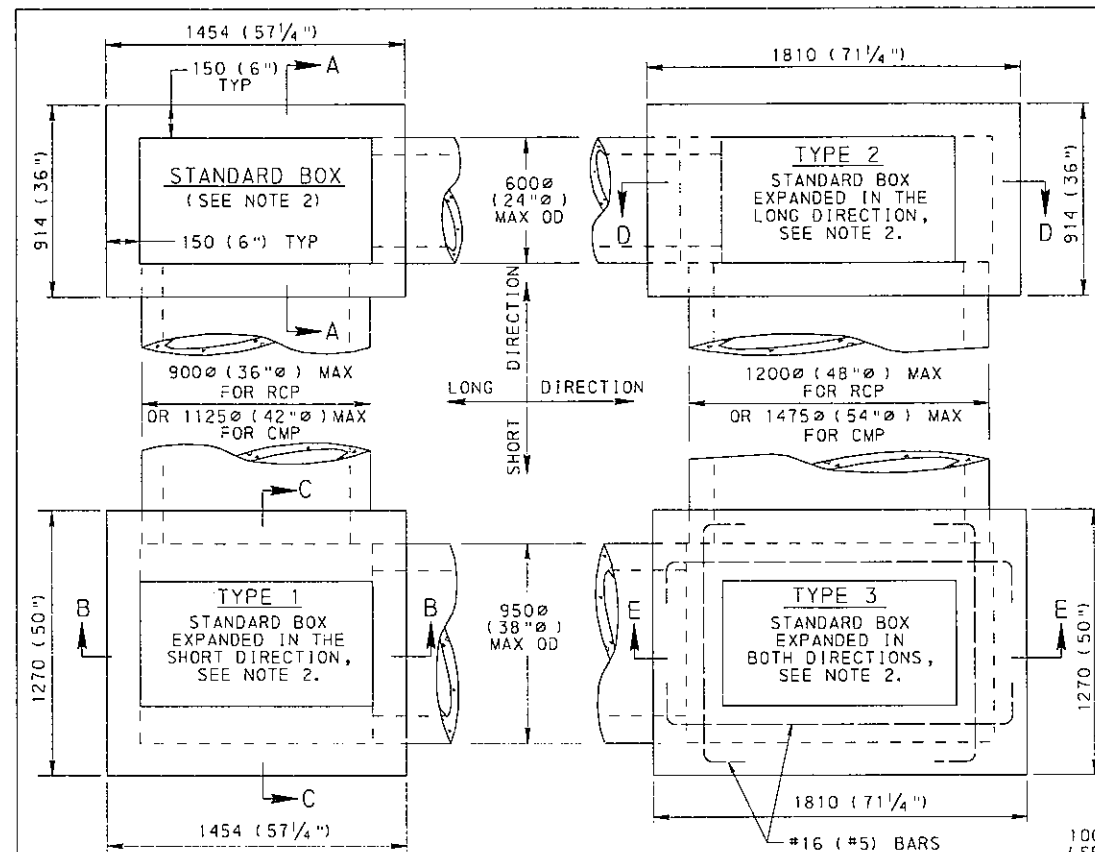
NOTES

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).

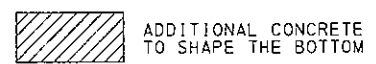
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET
FRAMES

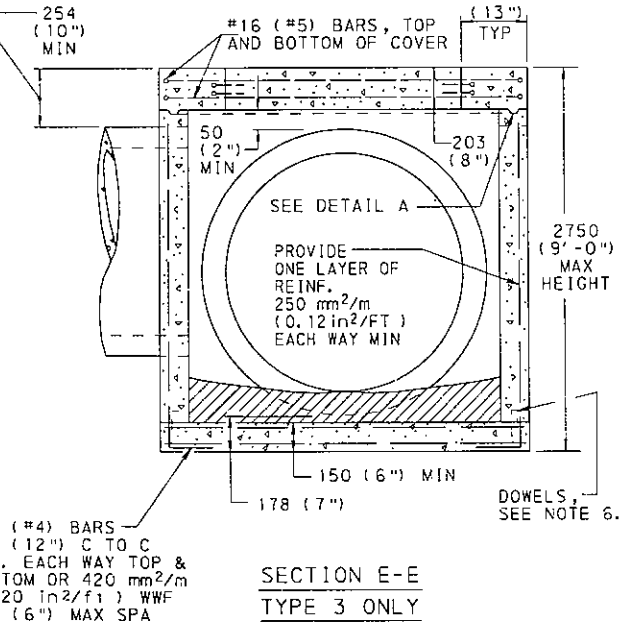
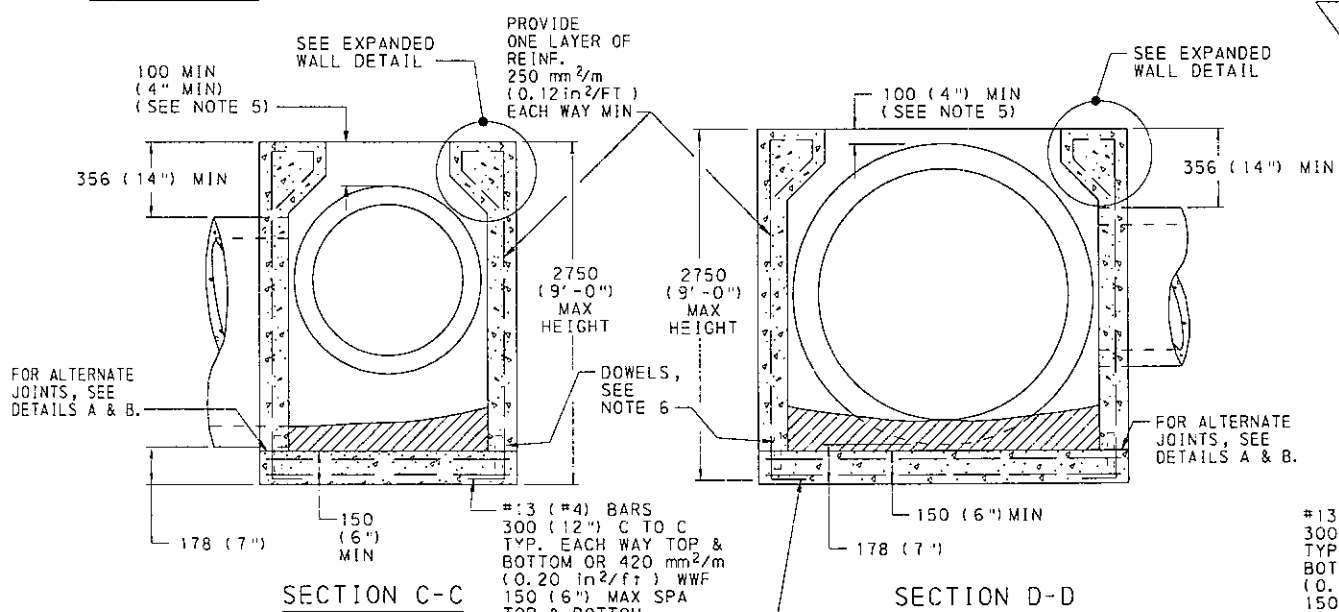
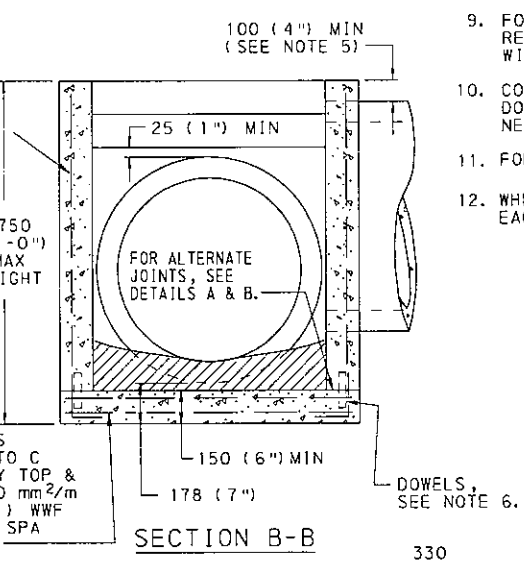
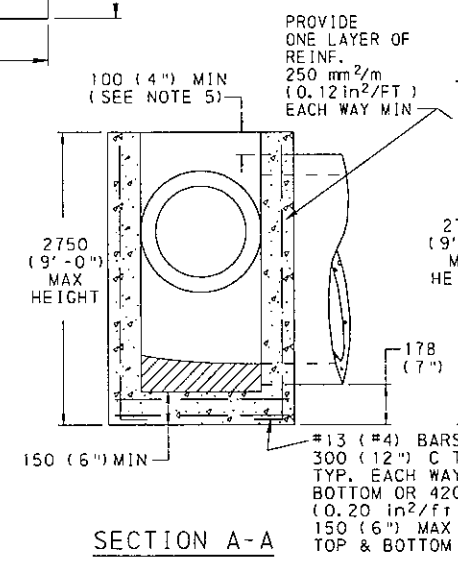
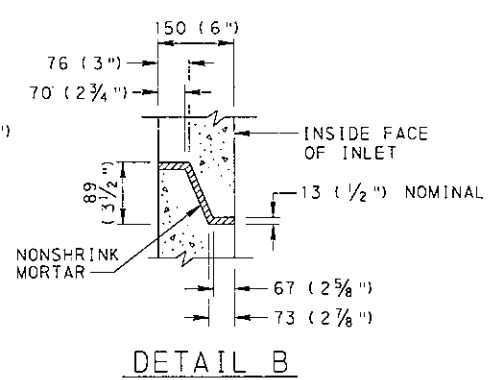
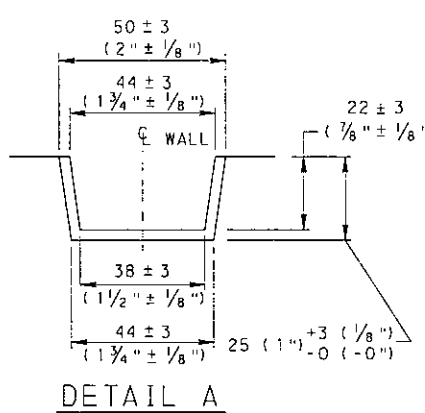
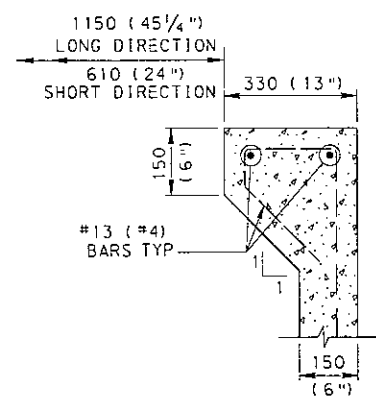


LEGEND



NOTES

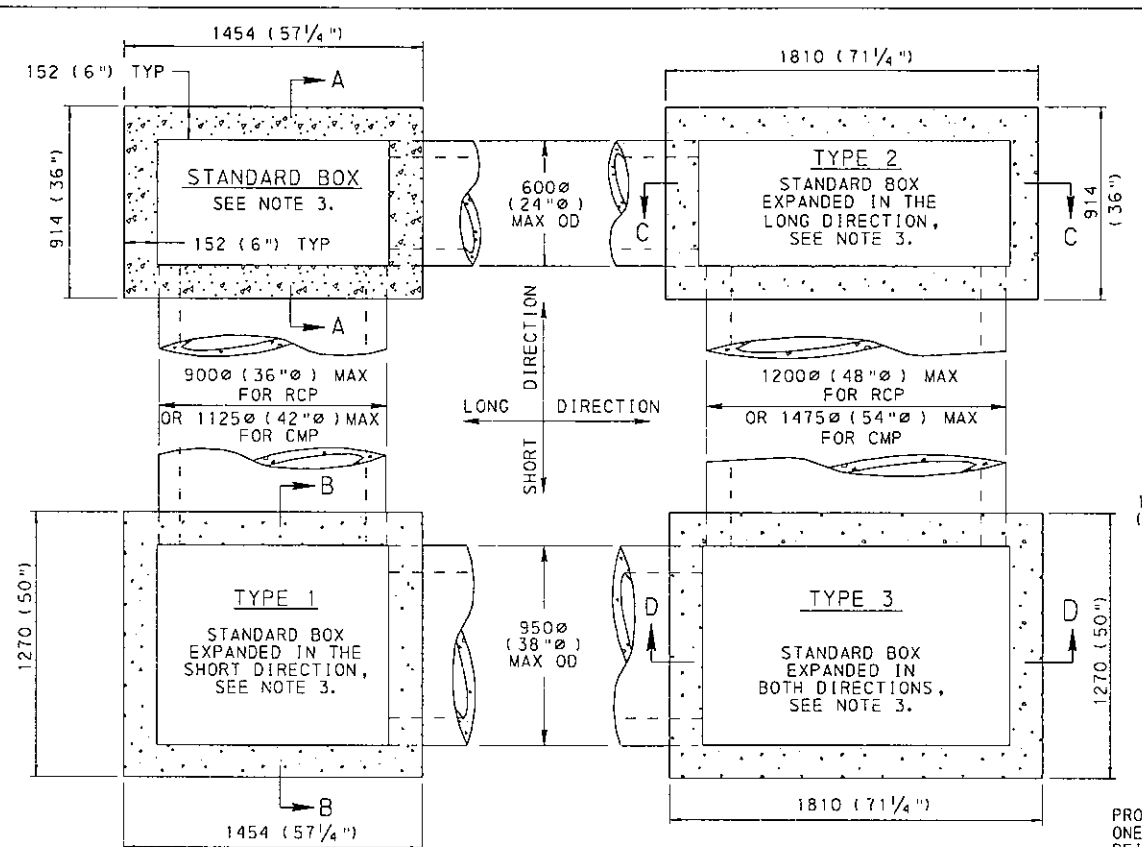
1. CONSTRUCT INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.
2. PROVIDE INLET BOXES WITH 610 x 1150 (24" x 45 1/4") STANDARD OPENING TO ACCOMMODATE THE STANDARD TOP COMPONENTS.
3. FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION, PROVIDE INLET WALLS 150 (6") THICK, UNLESS OTHERWISE 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.



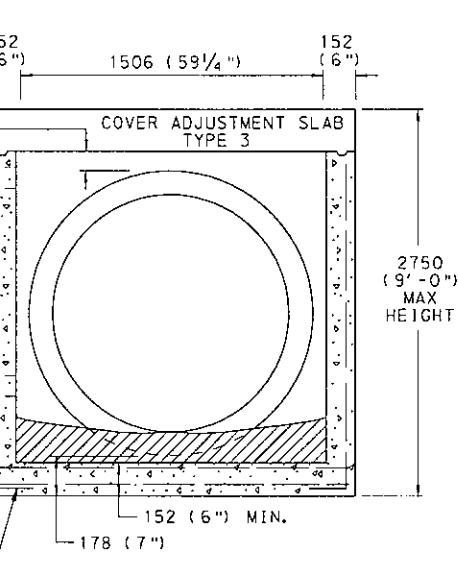
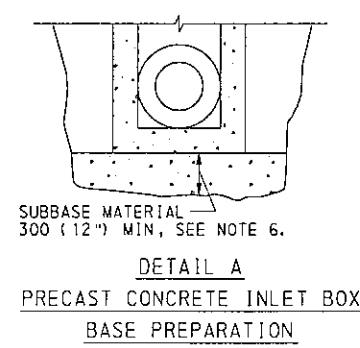
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COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

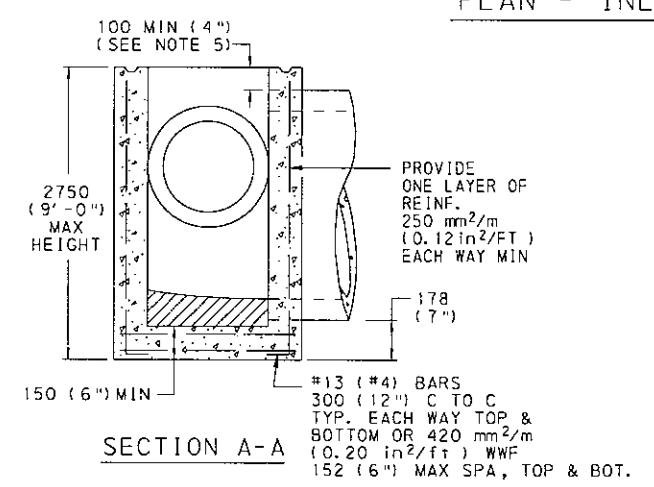
INLETS
 STANDARD INLET BOXES
 (CAST-IN-PLACE)



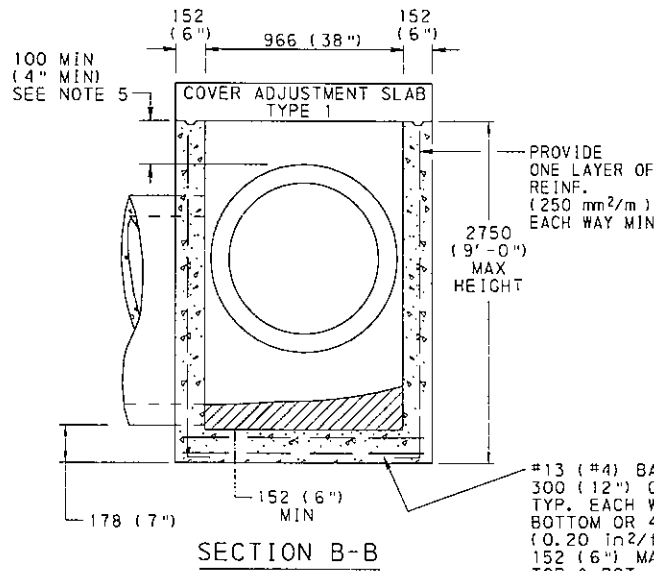
PLAN - INLET BOXES



SECTION D-D
TYPE 3 ONLY



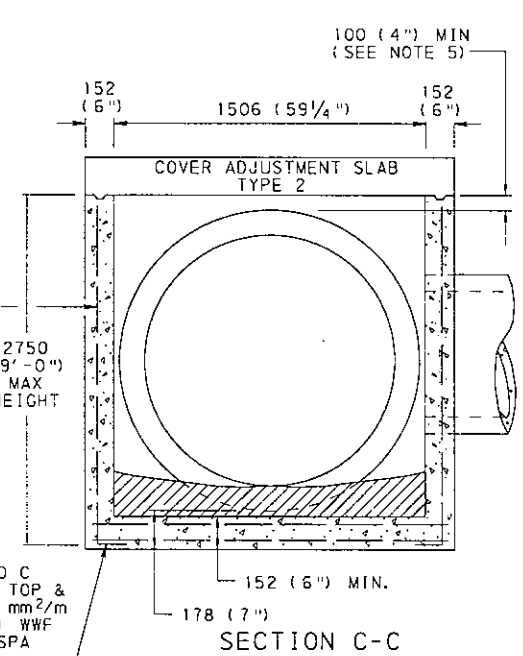
SECTION A-A



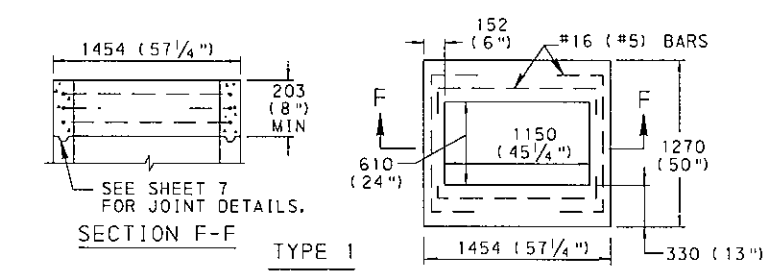
SECTION B-B



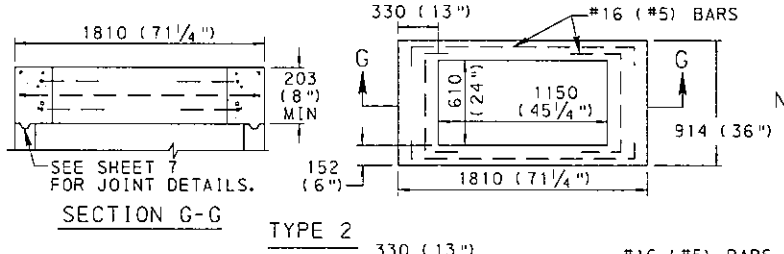
LEGEND



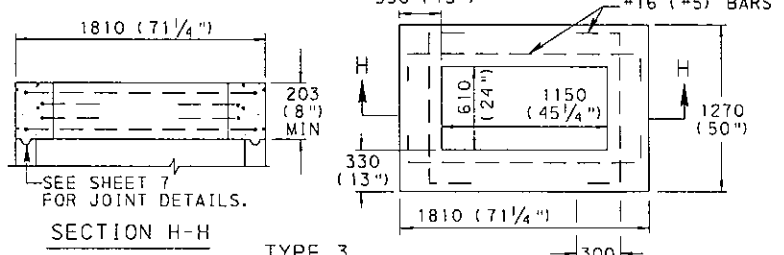
SECTION C-C



SECTION F-F
TYPE 1



SECTION G-G
TYPE 2



SECTION H-H
TYPE 3

COVER ADJUSTMENT SLABS

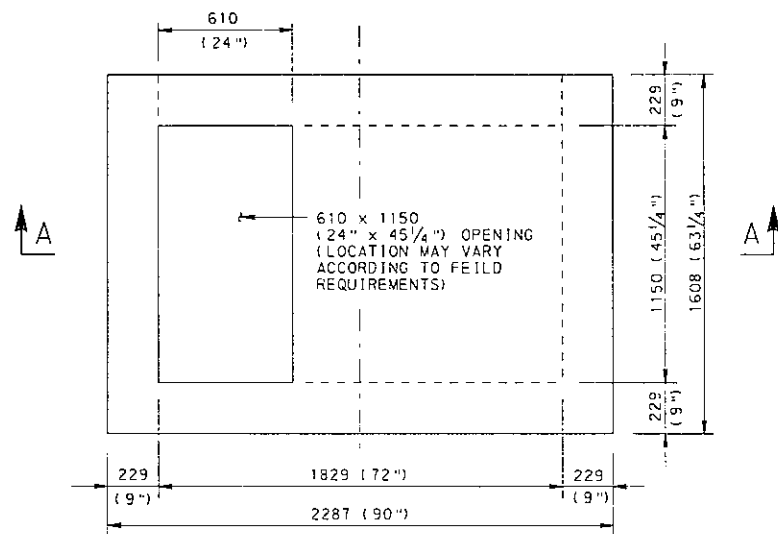
NOTES

- CONSTRUCT INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 714.
- PERMIT ONLY PRECAST INLET BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. USE CLASS AA CEMENT CONG FOR PRECAST BOXES. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
- PROVIDE STANDARD INLET BOXES AND COVER ADJUSTMENT SLABS WITH A 610 x 1150 (24"x 46") OPENING TO ACCOMMODATE STANDARD TOP COMPONENTS.
- 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.
- 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").
- 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.
- FOR PIPE DIAMETERS LARGER THAN 1200 (48") RCP OR 1350 (54") CMP, USE A MODIFIED INLET BOX, SHEET 9.
- PROVIDE CONSTRUCTION JOINTS AS REQUIRED FOR INLET BOXES THAT ARE NOT MONOLITHIC. SEE DETAILS A & B SHEET 7.
- 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").
- 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").

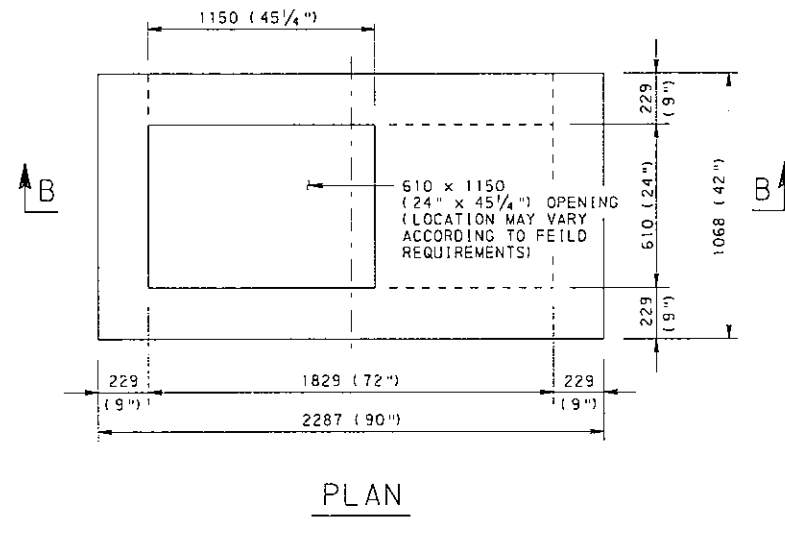
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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLETS
STANDARD INLET BOXES
(PRECAST)

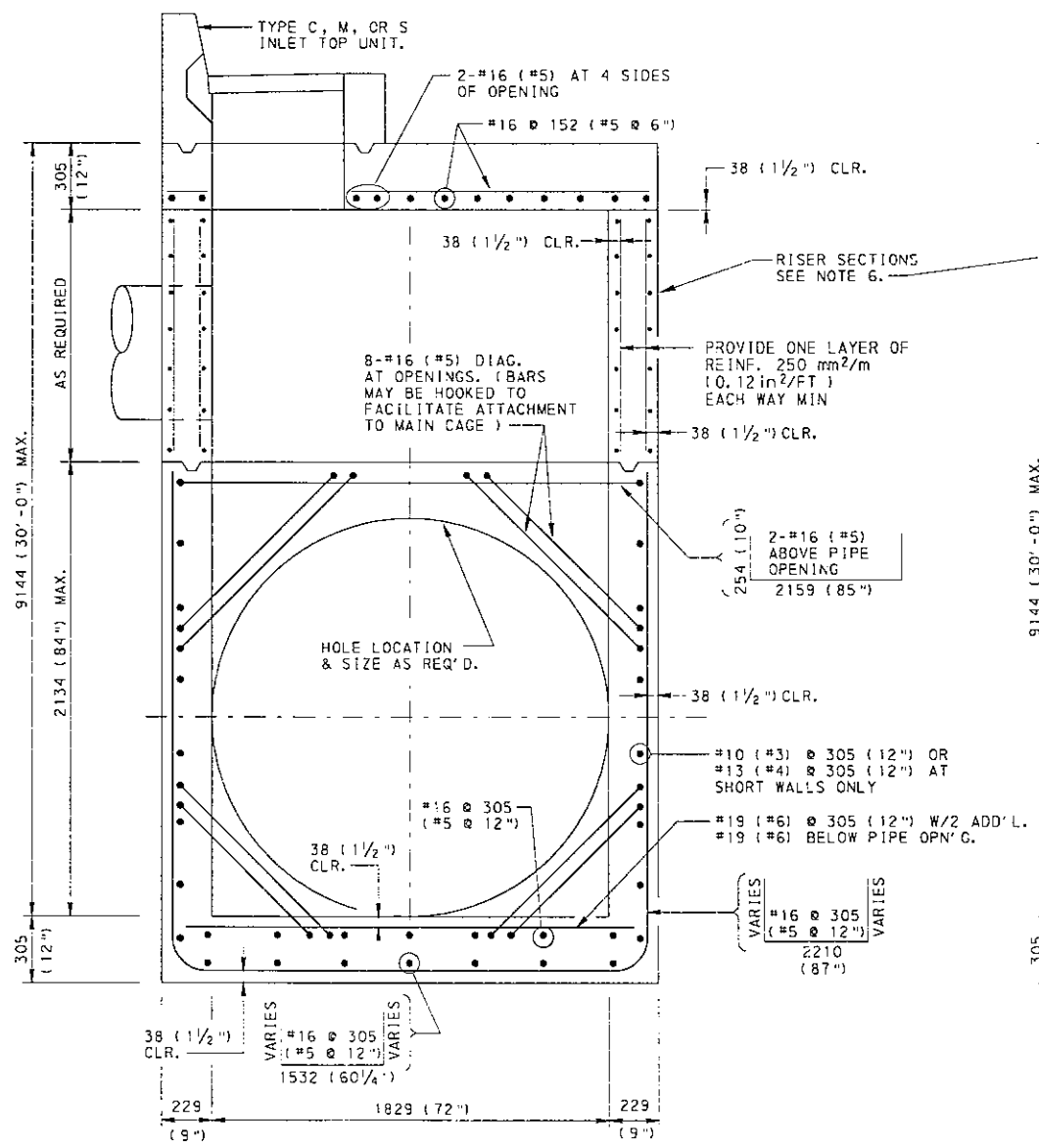
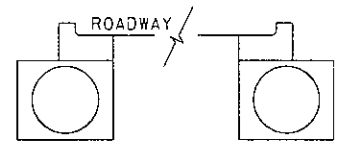


PLAN

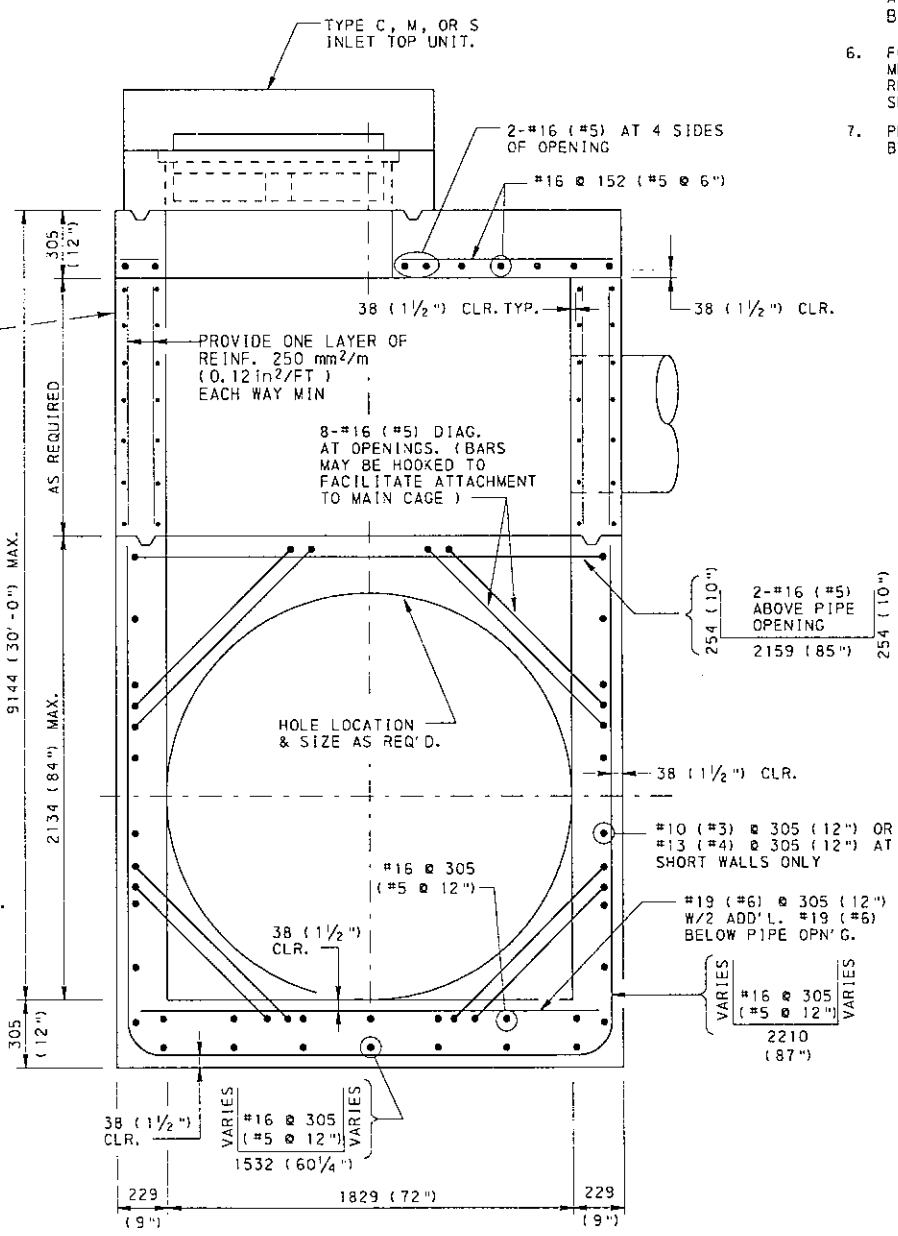


PLAN

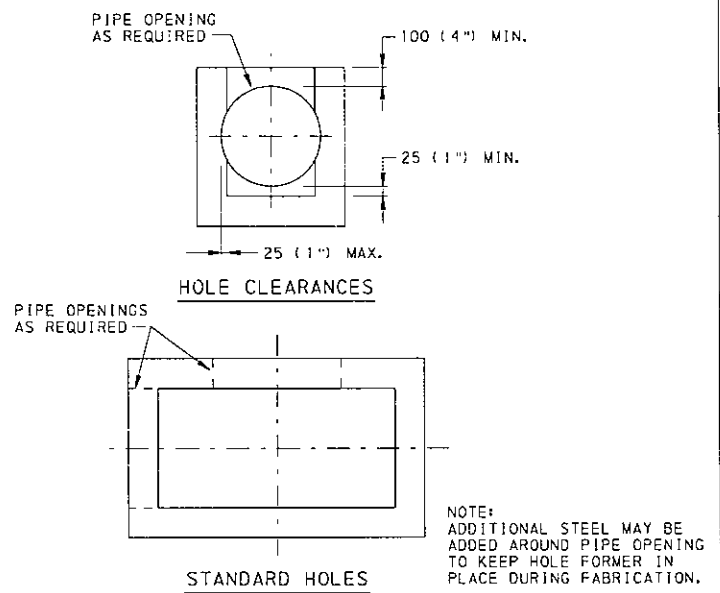
- NOTES**
- CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605 AND SECTION 714.
 - PROVIDE INLETS WITH A MAXIMUM HEIGHT TO BE THE GRADE ELEVATION. WHEN THE REQUIRED HEIGHT EXCEEDS THE MAXIMUM SHOWN, SHOW SPECIAL DETAILS AND DESIGN FOR THE INLET WALLS AND BASE. CONSTRUCT INLETS THAT EXCEED 1500 (5') IN HEIGHT WITH STEPS SIMILAR TO MANHOLES (SEE RC-39M).
 - WHEN A SITUATION CAN NOT BE SATISFIED BY THE MODIFIED INLET BOXES SHOWN, PROVIDE SPECIAL DETAILS AND DESIGNS.
 - 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.



SECTION A-A



SECTION B-B



PIPE OPENING DETAILS

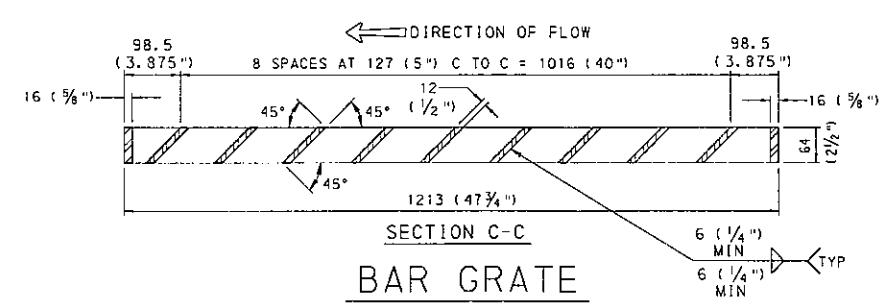
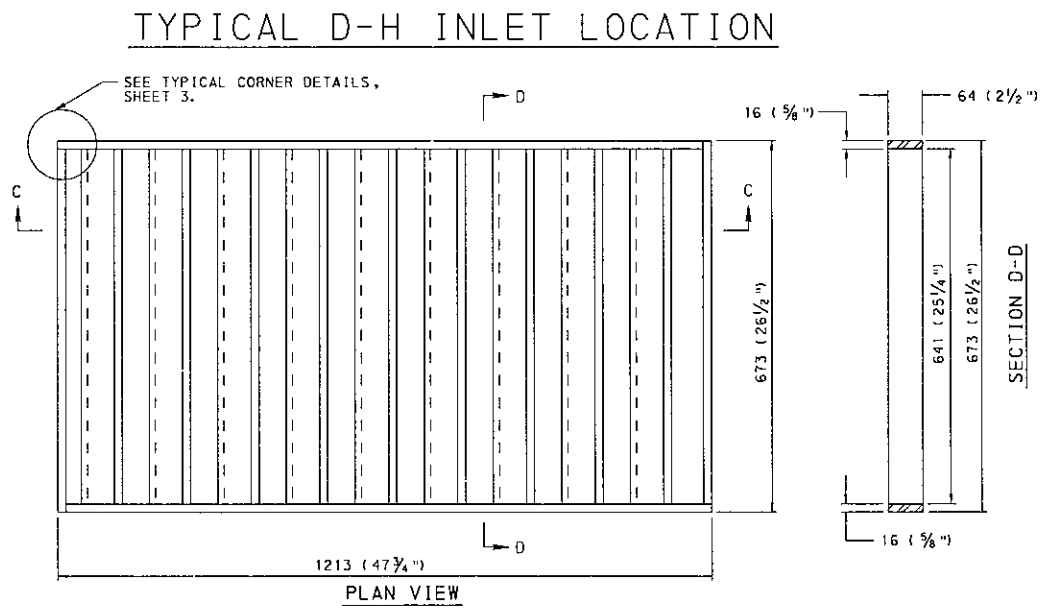
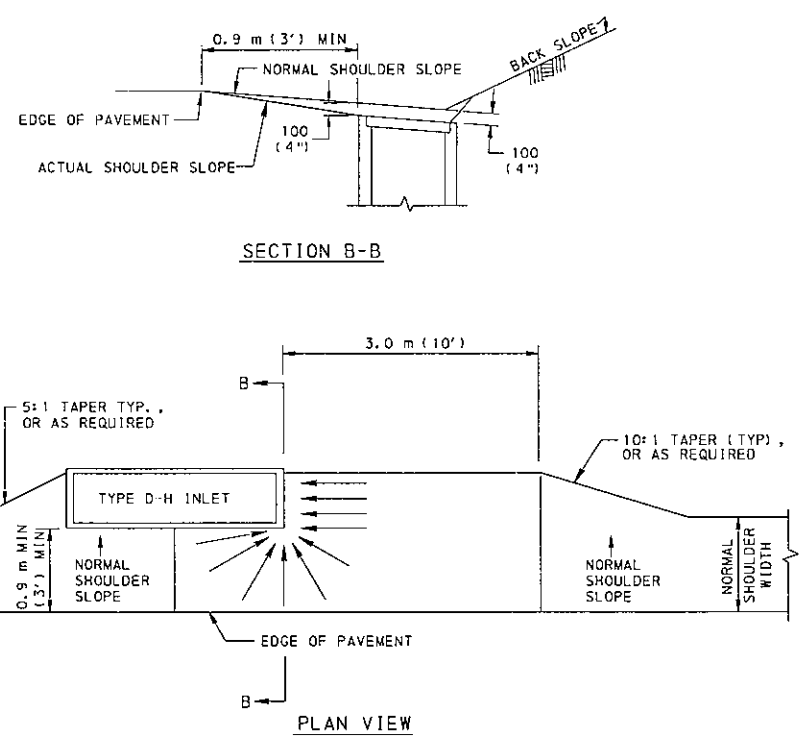
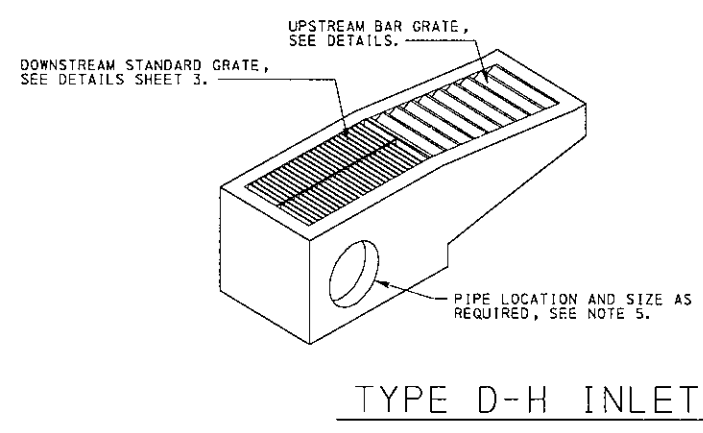
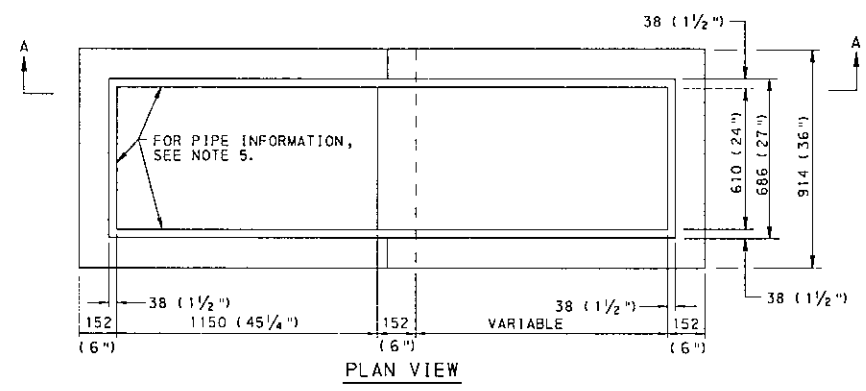
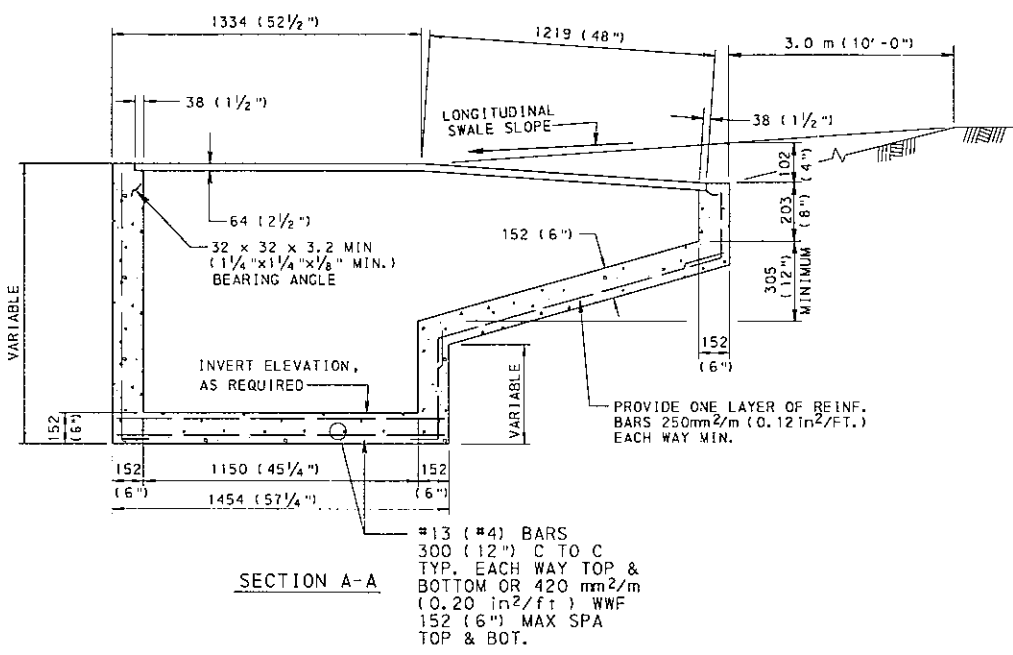
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

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

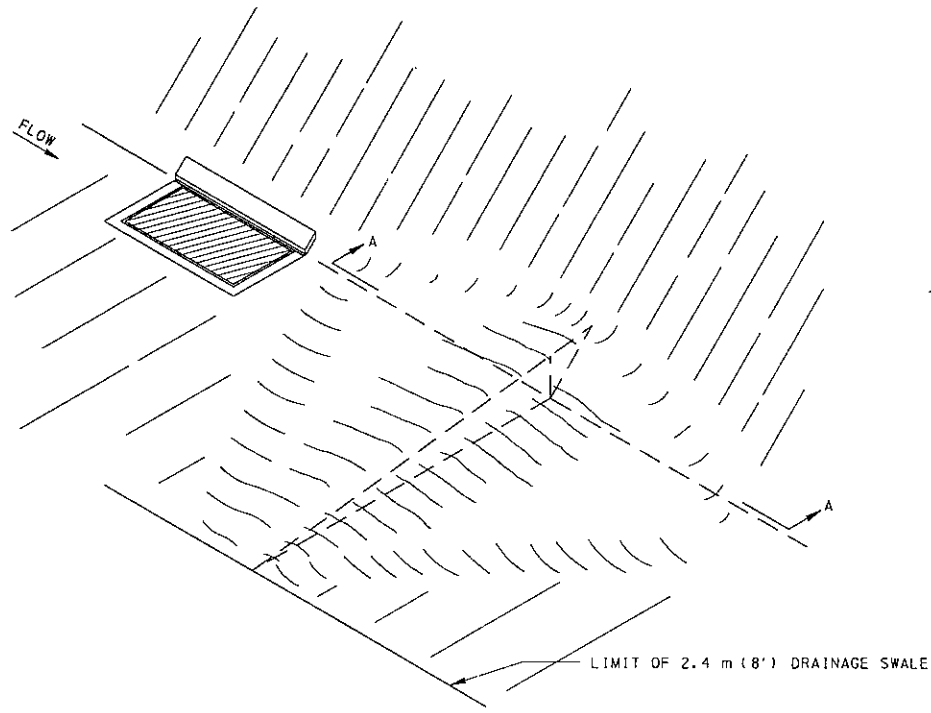


- NOTES
1. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408 SECTION 605.
 2. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. PERMIT ONLY GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
 3. WELD STRUCTURAL STEEL GRATES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.031(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.

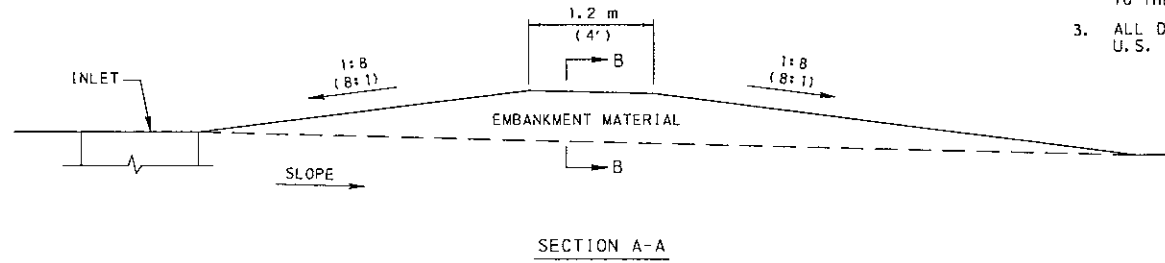
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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

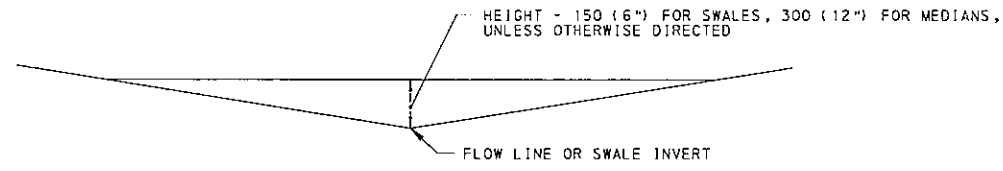
INLETS
TYPE D-H INLET
(CAST-IN-PLACE AND PRECAST)



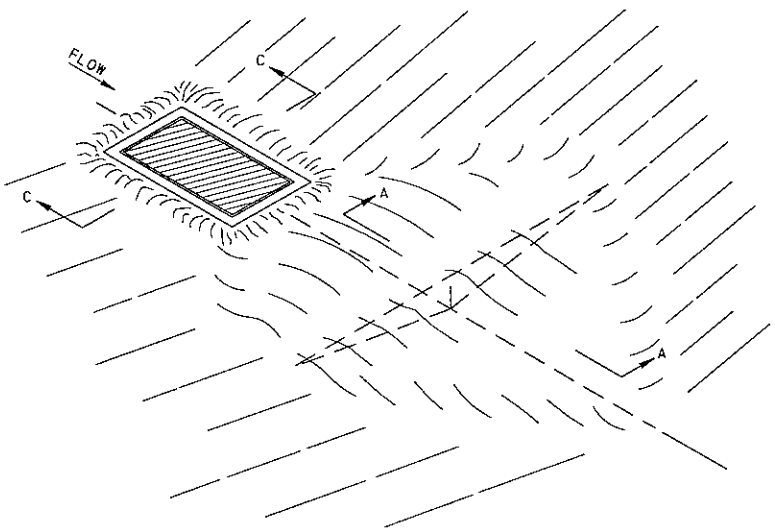
SWALE INSTALLATION
DRAINAGE DIKE



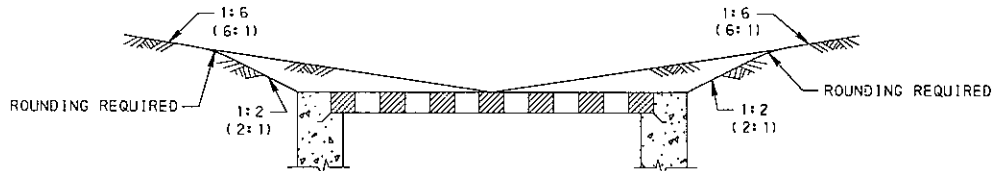
SECTION A-A



SECTION B-B



MEDIAN INSTALLATION
DRAINAGE DIKE



SECTION C-C

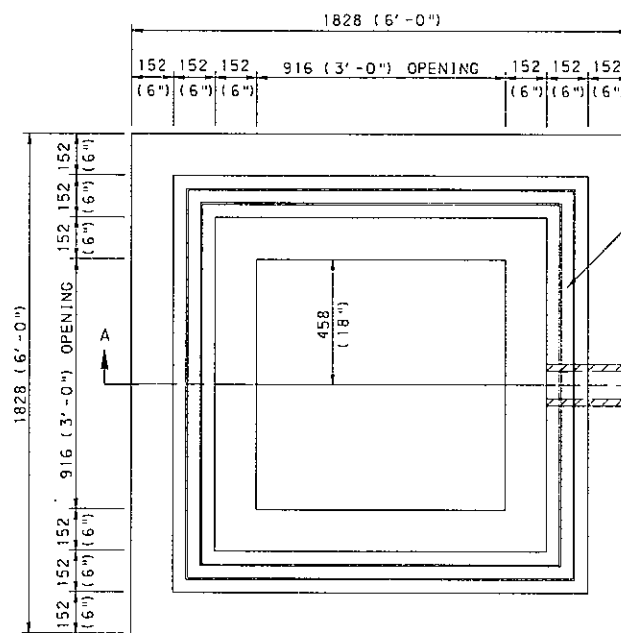
NOTES

1. DO NOT CONSTRUCT DRAINAGE DIKE TO A HEIGHT WHICH CAUSES FLOODING OF THE SUBBASE.
2. CONSIDER CONSTRUCTION OF THE DRAINAGE DIKE INCIDENTAL TO THE CLASS 1 EXCAVATION.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.

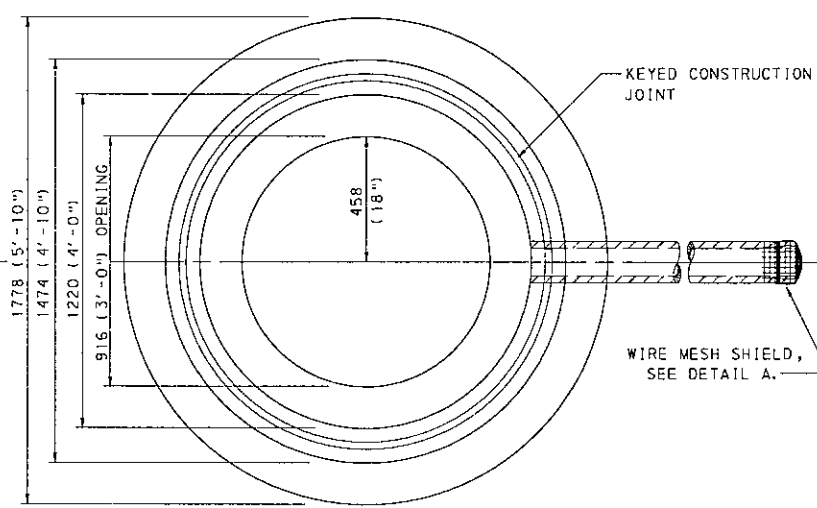
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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DEPARTMENT OF TRANSPORTATION
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DRAINAGE DIKE



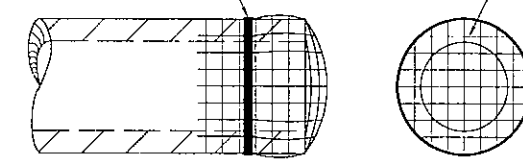
PLAN VIEW
(WITHOUT COVER)



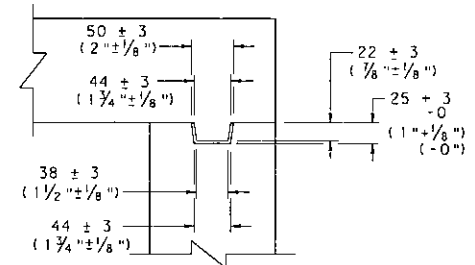
PLAN VIEW
(WITHOUT COVER)

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

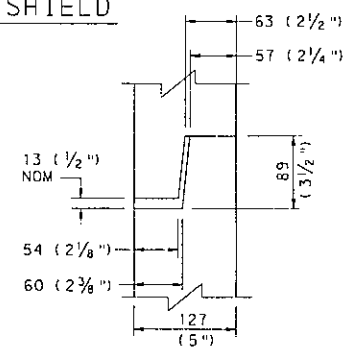
19 x 19 (3/4" x 3/4") WIRE MESH SCREENING, 1.37 (17 GAGE) THICK MINIMUM, GALVANIZED AFTER WEAVING.



DETAIL A
WIRE MESH SHIELD

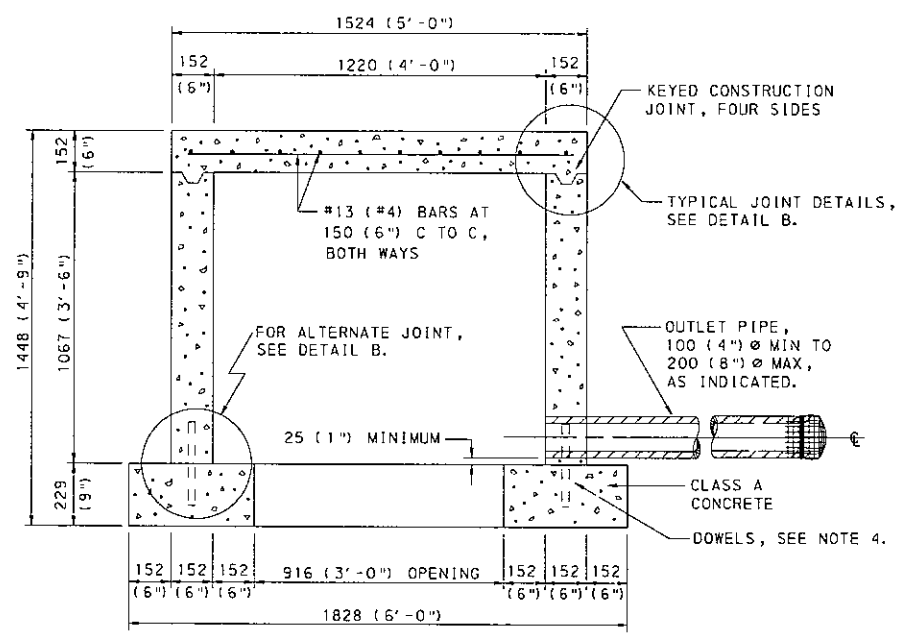


DETAIL B

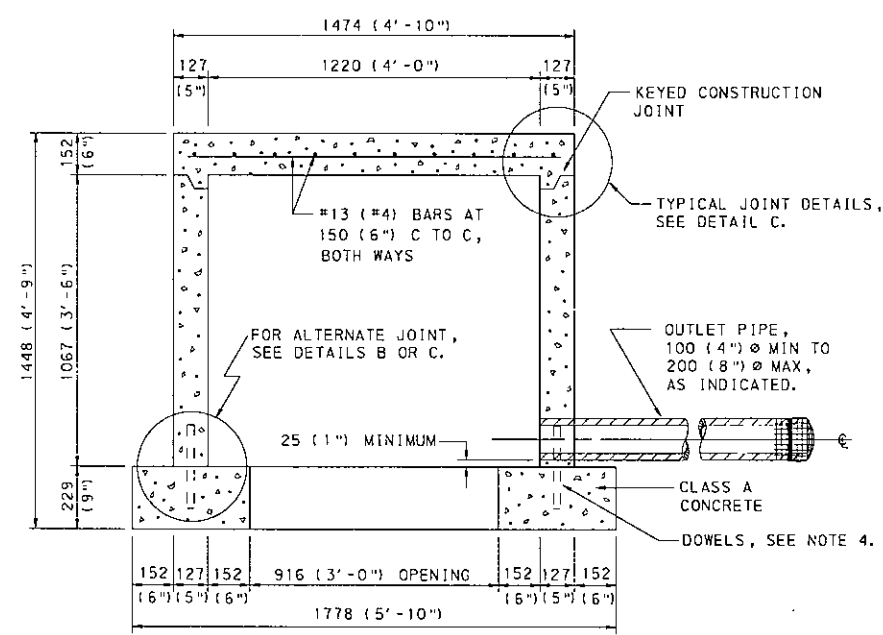


DETAIL C

TYPICAL JOINT DETAILS



SECTION A-A
SQUARE SPRING BOX
TYPE A



SECTION B-B
CIRCULAR SPRING BOX
TYPE B

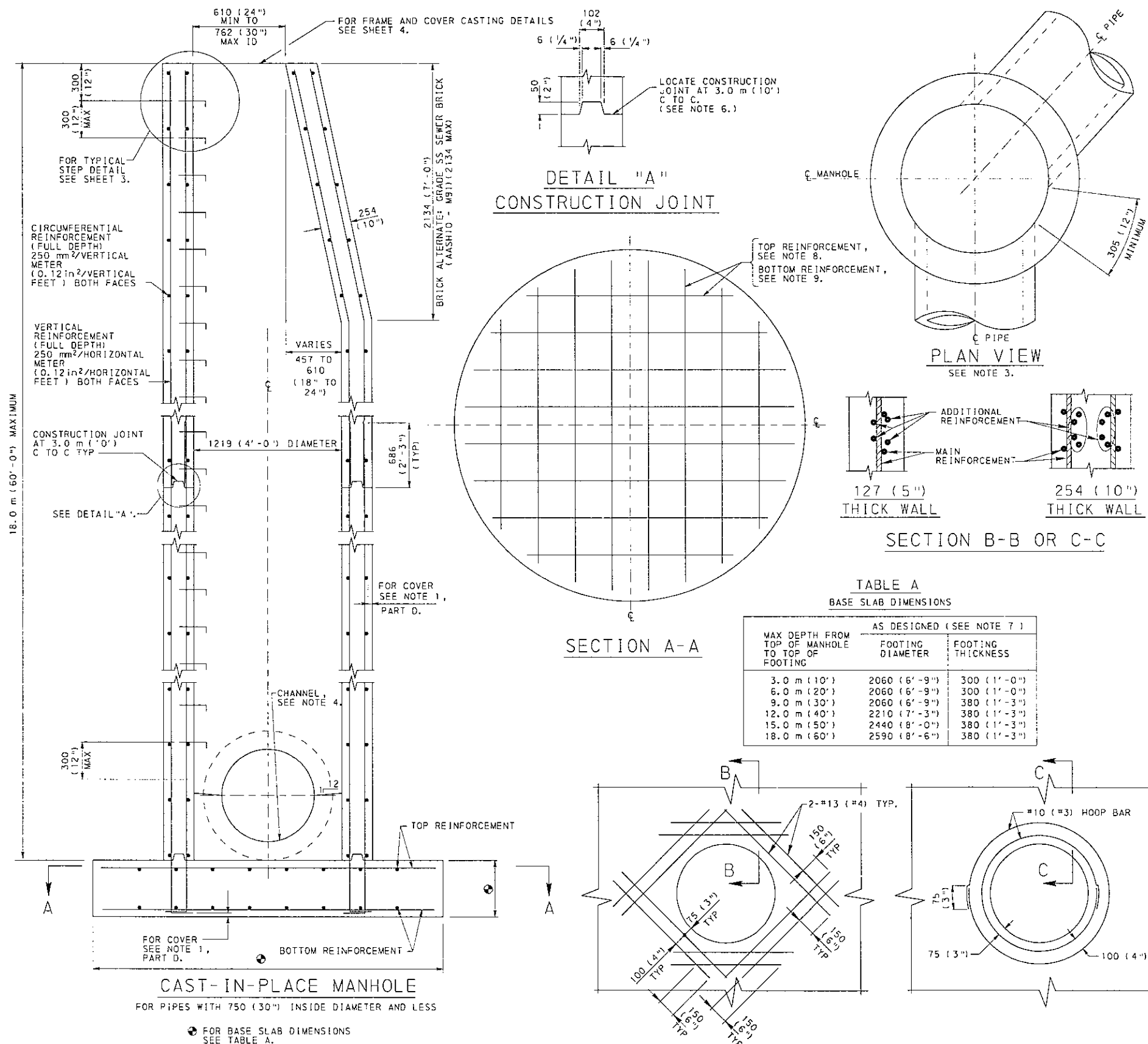
NOTES

1. PROVIDE SPRING BOXES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.
2. PRECAST SPRING BOXES MAY BE USED IN LIEU OF CAST-IN-PLACE SPRING BOXES. PERMIT ONLY PRECAST BOXES SUPPLIED BY AN APPROVED MANUFACTURER LISTED IN BULLETIN 15.
3. LOCATE OUTLET PIPE AS REQUIRED TO SUIT FIELD CONDITIONS.
4. PLACE NO. 13 (NO. 4) REINFORCEMENT BARS, MINIMUM 305 (12") LONG, SPACED AT 300 (12") C TO C, AS DOWELS BETWEEN THE FOUNDATION AND WALLS WHEN THE CONSTRUCTION, EXCLUDING COVER, IS NOT MONOLITHIC. THE DOWELS MAY BE ELIMINATED IF THE ALTERNATE JOINTS SHOWN IN DETAILS B OR C ARE CONSTRUCTED.
5. PROVIDE REINFORCEMENT FOR WALLS AND FOUNDATIONS OF PRECAST BOXES MEETING THE REQUIREMENTS OF AASHTO-M199M.
6. WHEN FILL HEIGHT OVER TOP OF BOX EXCEEDS 3.0 m (10'), REQUIRE A SPECIAL DESIGN.
7. 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

SPRING BOXES



NOTES

- CONSTRUCTION REQUIREMENTS:
 - CONSTRUCT IN ACCORDANCE WITH PUBLICATION 408, SECTIONS 605, 606 AND 7.4; AND ASTM C-478M-90, STANDARD SPECIFICATION FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS, AS MODIFIED HEREIN.
 - MINIMUM CONCRETE CLASS:
 CAST-IN-PLACE CLASS A
 PRECAST CLASS AA
 - PROVIDE STEEL REINFORCEMENT IN ACCORDANCE WITH ASTM A185, STEEL WELDED WIRE FABRIC ASTM A663/A663M & A675/A675M, PLAIN BILLET STEEL BARS OR ASTM A615/A615M, DEFORMED BILLET STEEL BARS. PROVIDE MINIMUM YIELD STRENGTH OF 400 MPa (60,000 PSI).
 - 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
- FOR PIPES WITH INSIDE DIAMETERS GREATER THAN 750 (30') SEE MODIFIED CAST-IN-PLACE MANHOLES, SHEET 2.
- PROVIDE 300 (12") MINIMUM HORIZONTAL CLEARANCE BETWEEN OPENINGS LOCATED AT THE SAME DEPTH. LOCATE PIPES NOT AT THE SAME DEPTH VERTICALLY AT LEAST ONE HALF THE MAXIMUM OPENING DIAMETER APART.
- FORM A CONCRETE CHANNEL AT THE BOTTOM OF THE MANHOLE CONFORMING TO THE SHAPE OF THE LOWER HALF OF THE INCOMING AND/OR OUTGOING PIPES. PROVIDE A FULL DEPTH U-SHAPED CHANNEL WHEN NECESSARY TO REDUCE ENERGY LOSSES.
- USE 127 (5") THICK WALLS WITH ONE (1) ROW OF REINFORCING, OR USE 254 (10") THICK OR GREATER WALLS WITH TWO (2) ROWS OF REINFORCING.
- CONSTRUCTION JOINTS AND KEYS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. CLEAN JOINTS AND KEYS THOROUGHLY BEFORE PLACING NEXT CONCRETE SEGMENT.
- A SAFE BEARING CAPACITY OF 0.15 MPa (1.5 Tons Per S.F.) UNDER THE ENTIRE BASE SLAB IS ASSUMED TO DETERMINE THE BASE SIZE. WHEN THE SUBSOIL IS EXTREMELY POOR, PROCEED WITH CONSTRUCTION ONLY AFTER THE ENGINEER SPECIFIES AN ADEQUATE BASE DESIGN.
- FOR FOOTING TOP REINFORCEMENT, BOTH DIRECTIONS, USE NO. 19 (6) BARS AT 300 (12") FOR DEPTHS TO 18.0 m (60') OR 635 mm/m (0.32 in²/FT) WWF FOR DEPTHS TO 9.0 m (30') AND 680 mm/m (0.32 in²/FT) WWF FOR DEPTHS GREATER THAN 9.0 m (30') 152 (6") MAXIMUM SPACING FOR WWF.
- FOR FOOTING BOTTOM REINFORCEMENT, BOTH DIRECTIONS, USE NO. 13 (4) BARS AT 480 (18") FOR DEPTHS TO 18.0 m (60') OR 320 mm/m (0.15 in²/FT) WWF FOR DEPTHS TO 9.0 m (30') AND 340 mm/m (0.16 in²/FT) WWF FOR DEPTHS GREATER THAN 9.0 m (30') 152 (6") MAXIMUM SPACING FOR WWF.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.

TABLE A
BASE SLAB DIMENSIONS

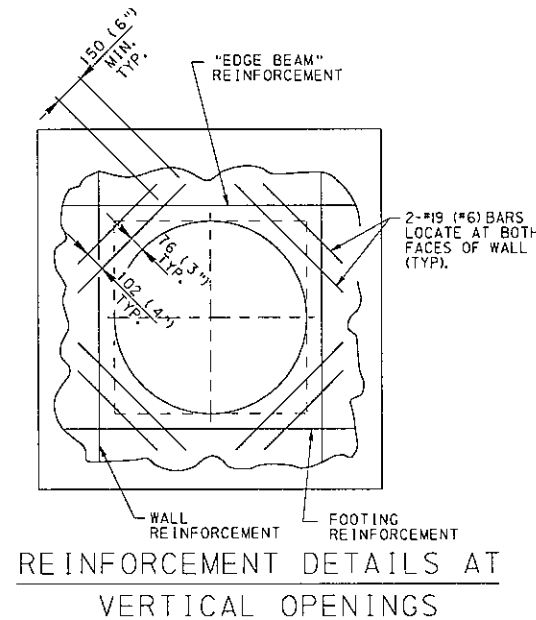
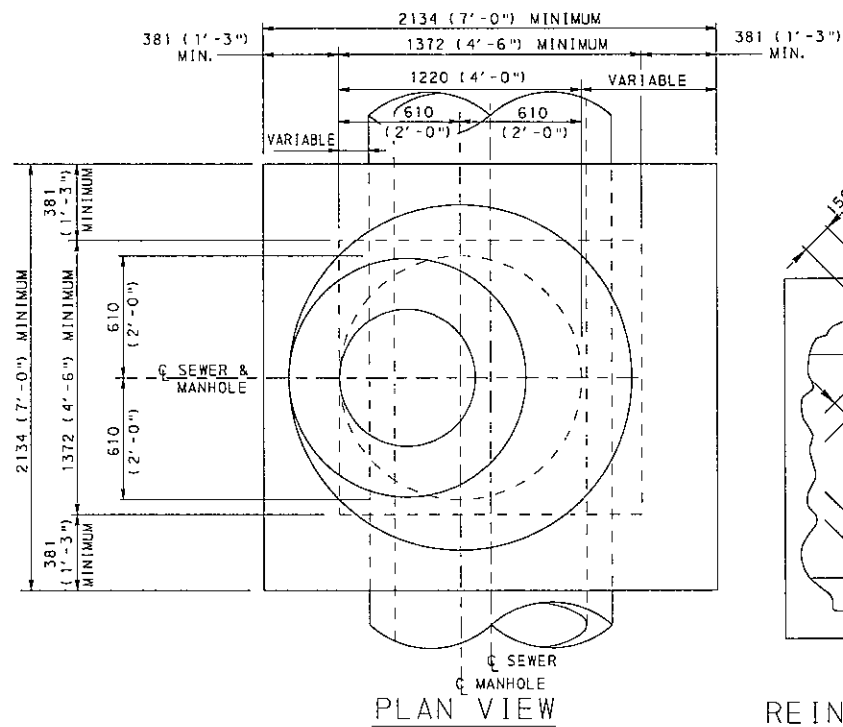
MAX DEPTH FROM TOP OF MANHOLE TO TOP OF FOOTING	AS DESIGNED (SEE NOTE 7)	
	FOOTING DIAMETER	FOOTING THICKNESS
3.0 m (10')	2060 (6'-9")	300 (1'-0")
6.0 m (20')	2060 (6'-9")	300 (1'-0")
9.0 m (30')	2060 (6'-9")	380 (1'-3")
12.0 m (40')	2210 (7'-3")	380 (1'-3")
15.0 m (50')	2440 (8'-0")	380 (1'-3")
18.0 m (60')	2590 (8'-6")	380 (1'-3")

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

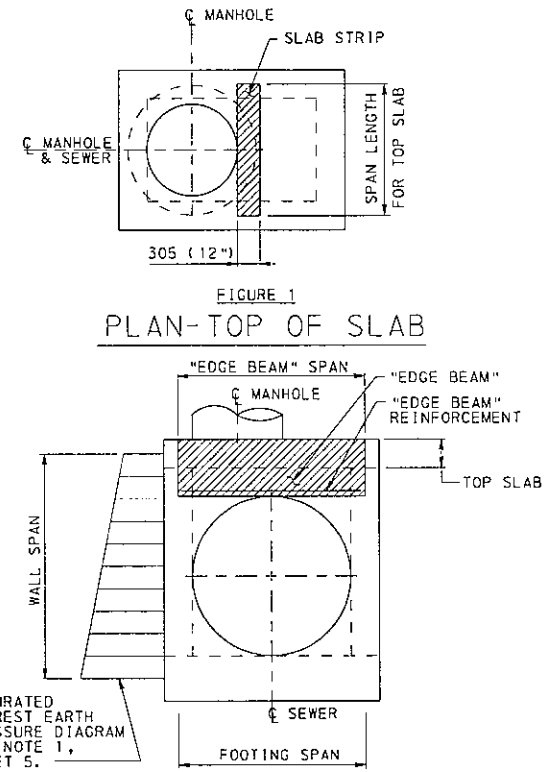
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD MANHOLES
CAST-IN-PLACE MANHOLES

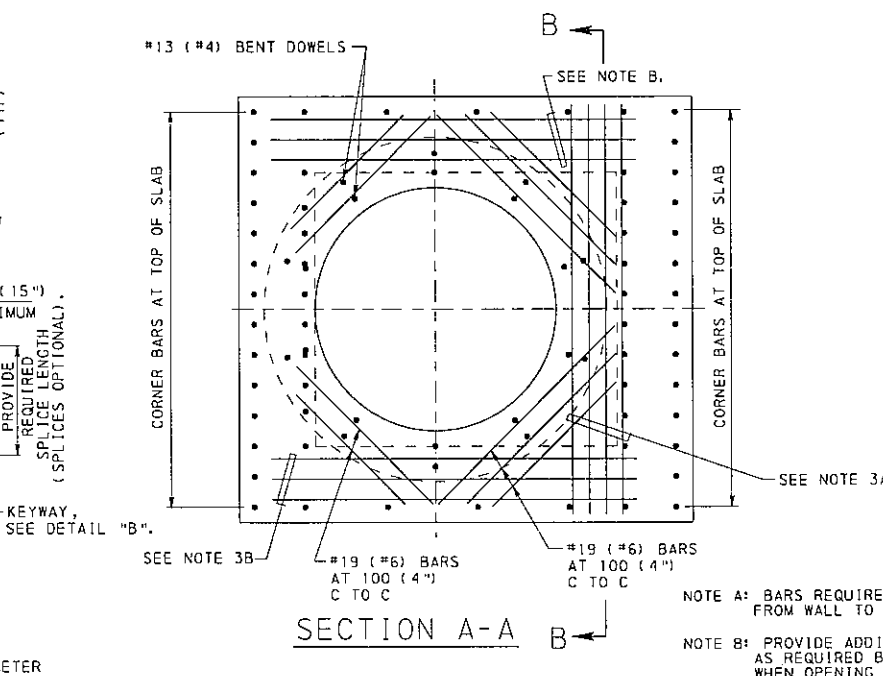
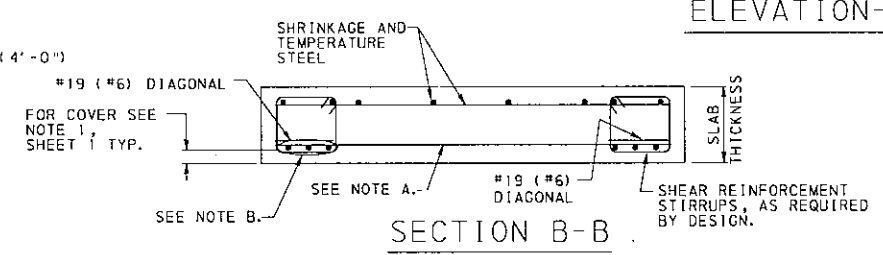
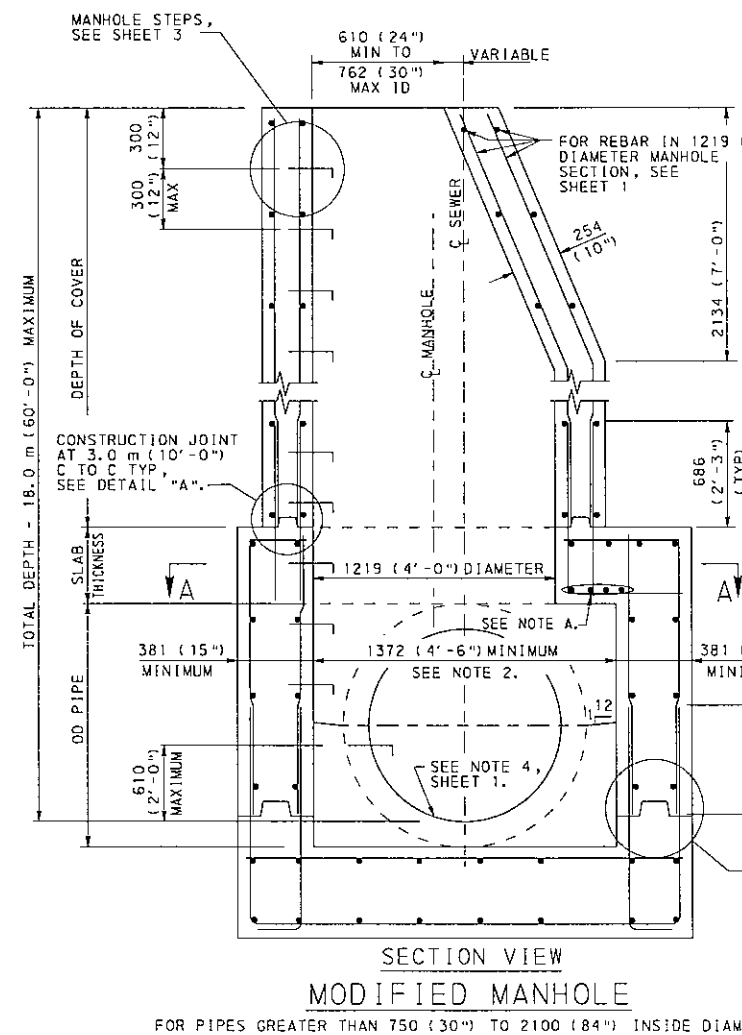
NOTE: FOR WALL THICKNESSES 254 (10") OR GREATER PLACE ADDITIONAL REINFORCEMENT AS SHOWN ABOVE AT EACH FACE OF THE WALL INSIDE MAIN REINFORCEMENT. FOR WALLS 127 (5") THICK KEEP MAIN REINFORCEMENT CENTERED IN WALL. PROVIDE ADDITIONAL REINFORCEMENT AS SHOWN ABOVE MAINTAINING BEAUTIFUL COVER.



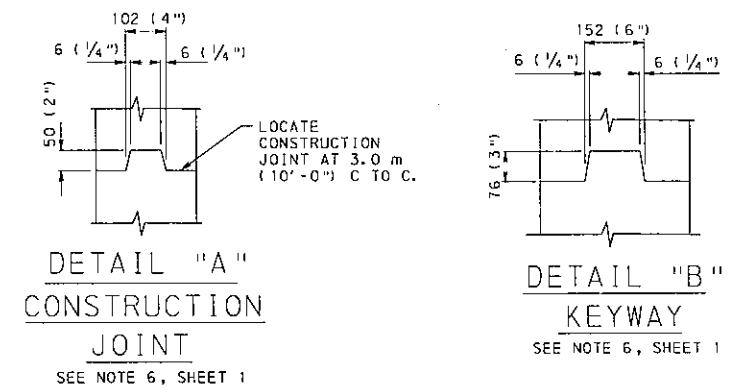
NOTE: ONLY BOX WITH MAIN REINFORCEMENT SHOWN FOR CLARITY.



- NOTES**
- FOR CONSTRUCTION REQUIREMENTS SEE NOTE 1, SHEET 1. FOR DESIGN REQUIREMENTS SEE NOTE 1, SHEET 5.
 - INCREASE BOX SIZE WHEN REQUIRED TO KEEP WALLS OF MANHOLE BOX SECTION FLUSH WITH THE OPENING FOR PIPES LARGER THAN 1050 (42") ID. INDICATE THE BOX SIZE ON THE CONSTRUCTION PLANS OR SHOP DRAWINGS BASED ON THE DESIGN PROCEDURES PROVIDED BELOW.
 - DESIGN PROCEDURE FOR MANHOLE BOX SECTION:
DESIGN ALL MEMBERS FOR MOMENT, CRACK CONTROL & SHEAR AT DISTANCE d (EFFECTIVE DEPTH OF MEMBER) FROM FACE OF SUPPORT. CALCULATE ALL SPAN LENGTHS FROM THE CENTER OF THE SUPPORTS.
 - TOP SLAB
 - DESIGN A 305 (12") WIDE SLAB STRIP FOR ONE-WAY ACTION TO CARRY DEAD LOAD, LIVE LOAD, AND WEIGHT OF EARTH. SPAN THE STRIP, SIMPLY SUPPORTED, ACROSS THE WIDTH OF THE BOX OR IN THE SHORT DIRECTION, SEE FIGURE 1 FOR DETAILS.
 - PLACE ADDITIONAL BARS IN THE SLAB AT 45° AROUND THE MANHOLE OPENING. SEE SECTION A-A FOR DETAILS.
 - "EDGE BEAM"
 - VIEWS SHOWING THE CONFIGURATION OF MANHOLE BOX SECTION ILLUSTRATE "EDGE BEAMS" TO BE THE SAME DEPTH AS THE TOP SLAB. TO ACHIEVE REQUIRED CAPACITY WHERE NECESSARY, INCREASE DEPTH OF "EDGE BEAM" BY PROVIDING ADDITIONAL CLEARANCE BETWEEN THE SLAB AND TOP OF OPENING. LOCATE HORIZONTAL STEEL FOR BEAM ABOVE THE SOFFIT OF THE OPENING. SEE FIGURE 2 FOR DETAILS.
 - DESIGN THE "EDGE BEAMS", SPANNING THE LENGTH OF THE BOX, TO CARRY A UNIFORMLY DISTRIBUTED LOAD EQUAL TO THE REACTION FROM THE SLAB.
 - WALLS
 - DESIGN THE WALLS TO CARRY THE AXIAL LOAD, DUE TO EARTH LOAD, LIVE LOAD, AND DEAD LOAD APPLIED DIRECTLY TO THE WALL, IN ADDITION TO REACTIONS FROM THE "EDGE BEAMS", AND THE VERTICAL MOMENT CAUSED BY SATURATED AT REST EARTH PRESSURE. SEE FIGURE 2 FOR PRESSURE DIAGRAM. CONSIDER THE WALL SIMPLY SUPPORTED BETWEEN TOP SLAB AND FOOTING. PROVIDE THE SAME REINFORCEMENT ON THE OUTSIDE FACE.
 - FOOTING
 - DESIGN SPAN NORMAL TO PIPE TO CARRY POSITIVE MOMENT OF $1/10 WL^2$ AND NEGATIVE MOMENT OF $1/12 WL^2$ WHERE W IS THE UNIFORM BEARING PRESSURE. DO NOT TAKE INTO ACCOUNT THE CONCRETE IN THE CHANNEL WHEN CALCULATING CAPACITY OF THE FOOTING.
 - AS A MINIMUM, PROVIDE NO. 13 (NO. 4) BARS AT 300 (12") CENTERS, TOP AND BOTTOM OF SLAB IN THE OPPOSITE DIRECTION.



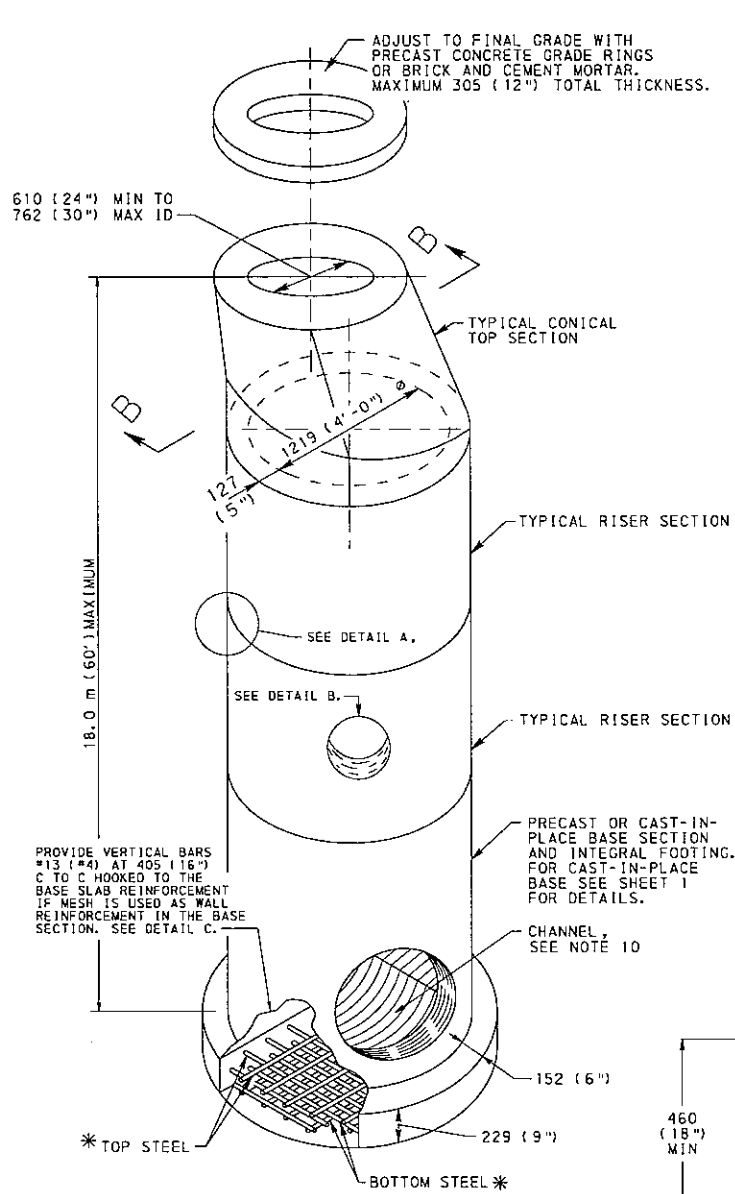
NOTE A: BARS REQUIRED TO SPAN FROM WALL TO WALL.
NOTE B: PROVIDE ADDITIONAL BARS AS REQUIRED BY DESIGN WHEN OPENING IN WALL IS PRESENT (TYP).



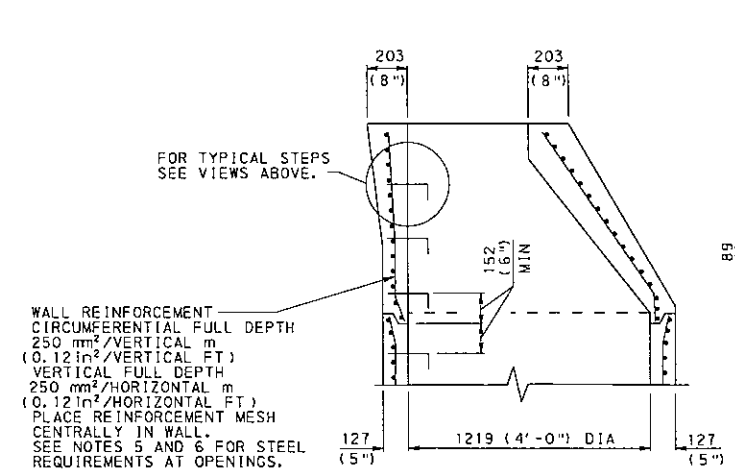
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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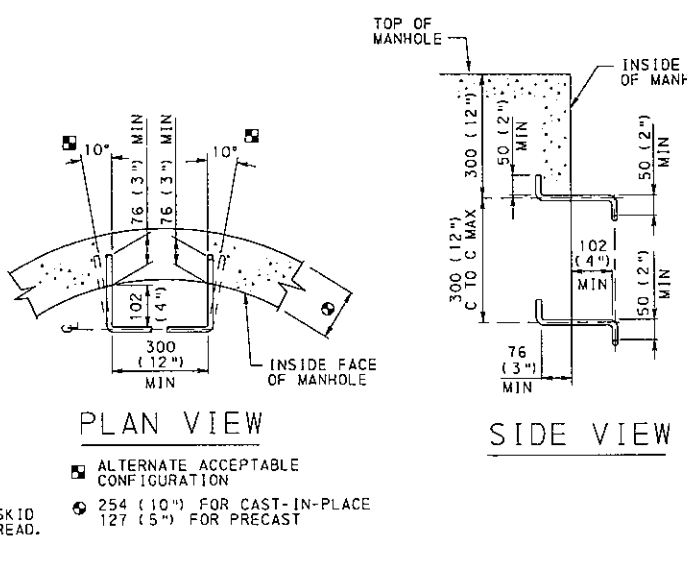
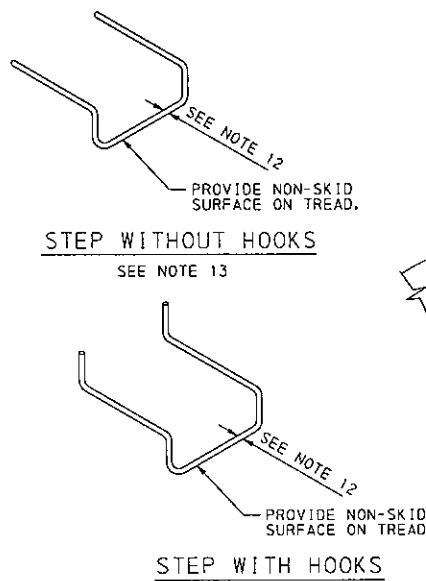
STANDARD MANHOLES
MODIFIED
CAST-IN-PLACE MANHOLES



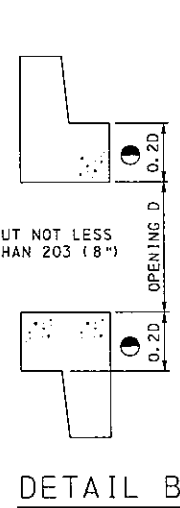
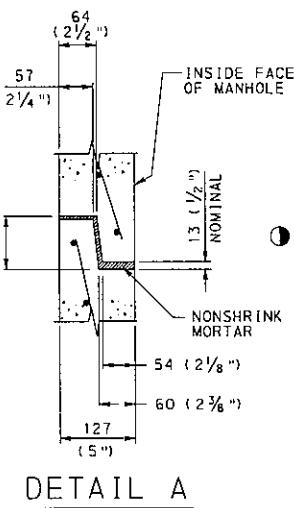
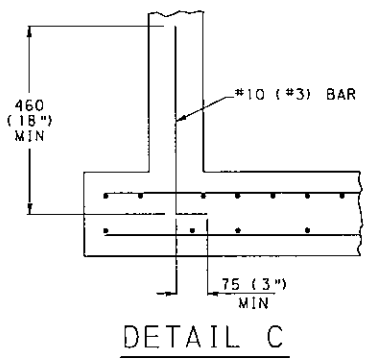
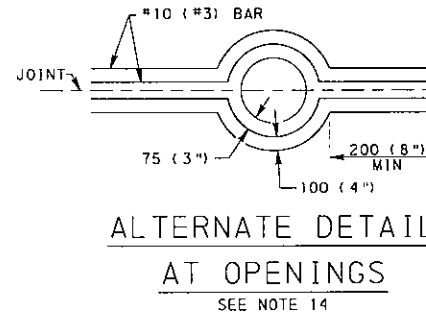
PRECAST MANHOLE
 FOR PIPES 750 (30") INSIDE DIAMETER AND LESS
 *SEE TABLE B FOR BASE SLAB STEEL REQUIREMENTS. PROVIDE WALL REINFORCEMENT DETAILS AT BASE SLAB TYPICAL OF CAST-IN-PLACE MANHOLE. SEE SHEET 1.



SECTION B-B



TYPICAL STEP CONFIGURATION
 MANHOLE STEPS
 SEE NOTE 11



- NOTES**
1. PRECAST MANHOLES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 714, MAY BE SUBSTITUTED FOR THE STANDARD CAST-IN-PLACE MANHOLE. FOR DEVIATION OR MODIFICATION OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
 2. FOR CONSTRUCTION REQUIREMENTS SEE NOTE 1, SHEET 1. FOR DESIGN REQUIREMENTS SEE NOTE 1, SHEET 5.
 3. FOR PERMISSIBLE LOCATION OF PIPES SEE PLAN VIEW AND NOTE 3, SHEET 1.
 4. FOR RISERS OR BASE SECTIONS WITH OPENINGS, PROVIDE A MINIMUM HEIGHT OF SECTION SO AS TO PROVIDE AN UN CUT WALL EQUAL TO 20% OF THE OPENING, BUT NO LESS THAN 203 (8"), BETWEEN THE OPENING AND THE CLOSEST JOINT BETWEEN RISERS - SEE DETAIL B.
 5. FOR PRECAST RISER OR BASE SECTIONS WITH ONE OPENING LOCATED AT DEPTHS TO 18.0 m (60'), PROVIDE CIRCUMFERENTIAL REINFORCEMENT IN ACCORDANCE WITH SECTION B-B. FOR SECTIONS WITH TWO OR MORE OPENINGS, LOCATED AT DEPTH OF 3.0 m (10') AND LESS, PROVIDE CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 340 mm²/VERTICAL m (0.16 in²/VERTICAL FT.) FOR THE HEIGHT OF RISER OR BASE SECTION.
 6. FOR RISERS OR BASE SECTIONS WITH TWO OR MORE OPENINGS, LOCATED AT DEPTHS GREATER THAN 3.0 m (10'), BUT LESS THAN OR EQUAL TO 7.6 m (25'), PROVIDE CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 930 mm²/VERTICAL m (0.44 in²/VERTICAL FT.) FOR THE HEIGHT OF THE RISER OR BASE SECTION.
 7. FOR RISERS OR BASE SECTIONS WITH TWO OR MORE OPENINGS, LOCATED AT DEPTHS GREATER THAN 7.6 m (25'), USE A 254 (10") THICK WALL RISER OR BASE SECTION WITH CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 470 mm²/VERTICAL m (0.22 in²/VERTICAL FT.) EACH FACE.
 8. MARK RISERS OR BASE SECTIONS WITH HOLES CLEARLY WITH MAXIMUM ALLOWABLE DEPTH.
 9. PROVIDE ADDITIONAL REINFORCEMENT BARS AROUND OPENINGS AS SHOWN ON REINFORCEMENT DETAILS AT OPENINGS SHEET 1.
 10. FOR CHANNEL DETAILS IN PRECAST MANHOLE SEE CAST-IN-PLACE MANHOLE SHEET 1.
 11. PROVIDE MANHOLE STEPS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.2(c). ALTERNATE CONFIGURATIONS AND DIMENSIONS, AS APPROVED BY THE ENGINEER, MAY BE USED.
 12. PROVIDE MINIMUM 25 (1") SECTION DIMENSION FOR METAL STEPS. PROVIDE MINIMUM 19 (3/4") SECTION DIMENSION FOR NON-DETERIORATING MATERIAL STEPS.
 13. MECHANICAL ANCHOR REQUIRED FOR INSTALLATION OF STEPS WITHOUT HOOKS.
 14. THE ALTERNATE OPENING REINFORCEMENT DETAIL IS NOT DESIRABLE BY DESIGN. USE IT TO MEET EXISTING PIPE ELEVATIONS.

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

TABLE B

PRECAST MANHOLE HEIGHT	TOP STEEL REQUIREMENTS	BOTTOM STEEL REQUIREMENTS
0.0 m TO 9.0 m (0'-0" TO 30'-0")	NO. 13 BARS AT 150 C TO C OR 700 mm ² /m WWF 152 MAXIMUM SPACING (NO. 4 BARS AT 6" C TO C) OR 0.33 in ² /FT WWF 6" MAXIMUM SPACING	NO. 13 BARS AT 300 C TO C OR 340 mm ² /m WWF 152 MAXIMUM SPACING (NO. 4 BARS AT 12" C TO C) OR 0.16 in ² /FT WWF 6" MAXIMUM SPACING
> 9.0 m TO 18.0 m (> 30'-0" TO 60'-0")	NO. 16 BARS AT 150 C TO C OR 1190 mm ² /m WWF 152 MAXIMUM SPACING (NO. 5 BARS AT 6" C TO C) OR 0.56 in ² /FT WWF 6" MAXIMUM SPACING	NO. 13 BARS AT 150 C TO C OR 575 mm ² /m WWF 152 MAXIMUM SPACING (NO. 4 BARS AT 6" C TO C) OR 0.27 in ² /FT WWF 6" MAXIMUM SPACING

SEE NOTE 7, SHEET 1

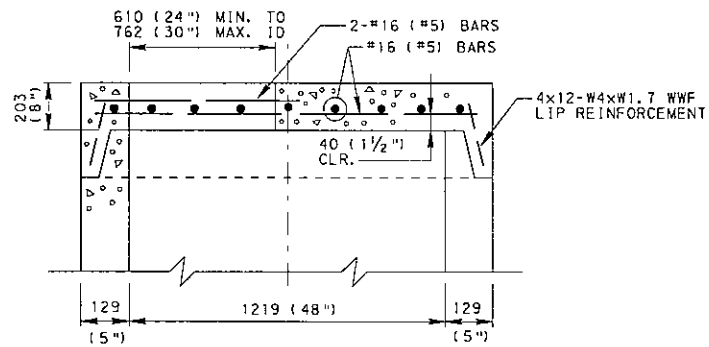
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

STANDARD MANHOLES
PRECAST MANHOLES &
MANHOLE STEPS

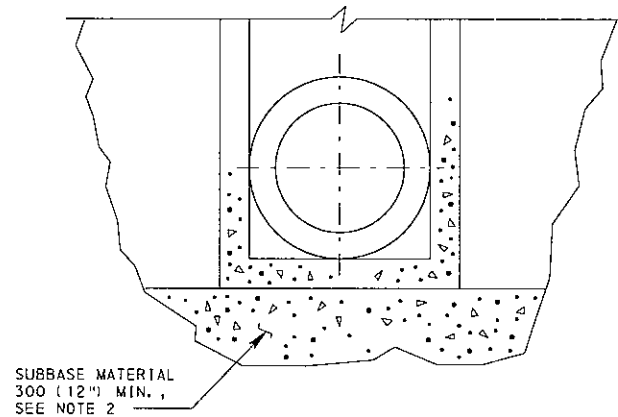
RECOMMENDED APR. 15, 2004
Don A. Schuch
 DIRECTOR, BUREAU OF DESIGN

RECOMMENDED APR. 15, 2004
M. Patel
 CHIEF ENGINEER

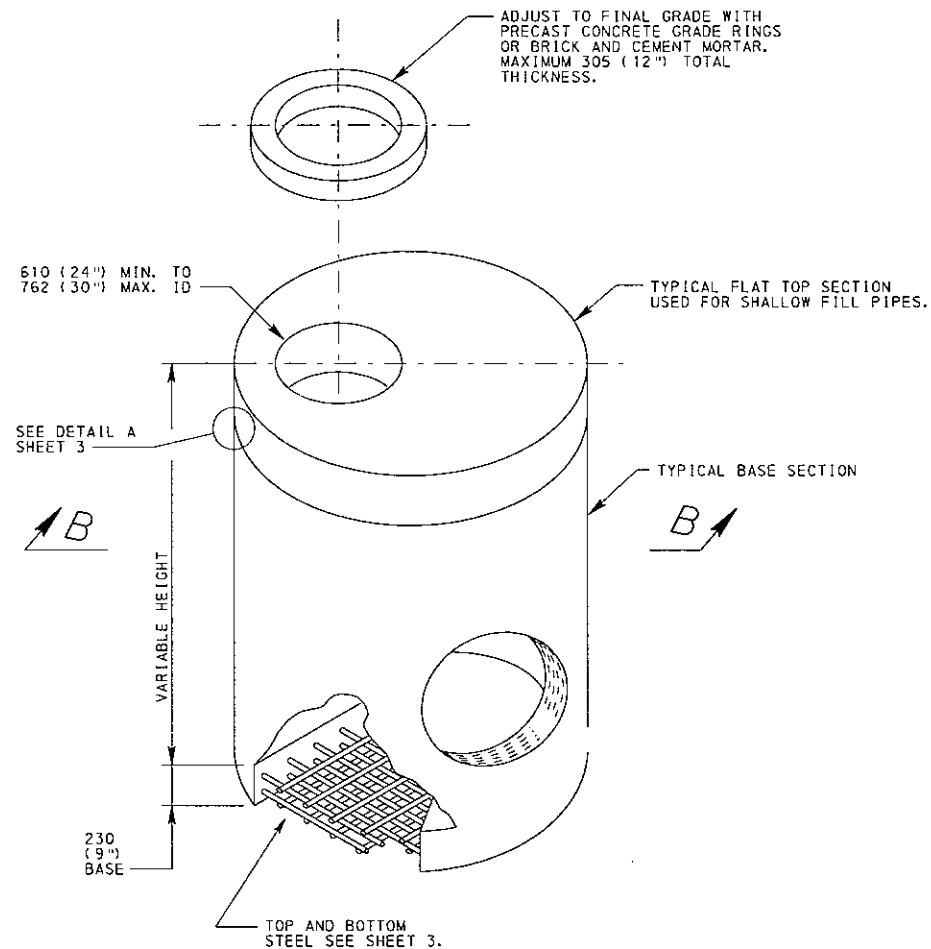
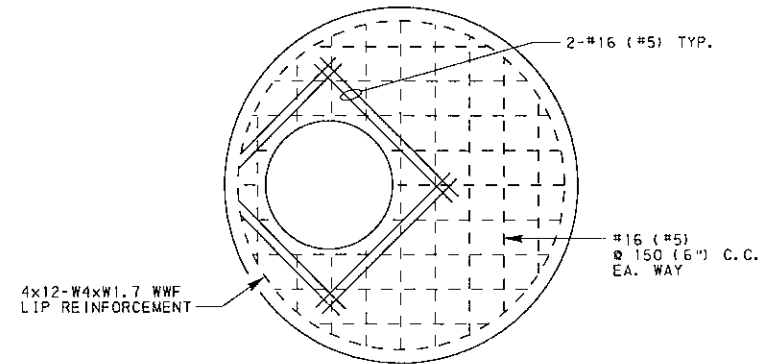
SHT 3 OF 6
 RC-39M



SECTION B-B



PRECAST MANHOLE
BASE PREPARATION



PRECAST MANHOLE
WITH FLAT TOP

NOTES:

1. PRECAST MANHOLES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 714, MAY BE SUBSTITUTED FOR THE STANDARD CAST-IN-PLACE MANHOLE. FOR DEVIATION OR MODIFICATION OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
2. 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 MANHOLE PAY ITEM.
3. FOR ALL OTHER DESIGN REQUIREMENTS AND APPLICABLE NOTES, SEE SHEET 3.

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 MANHOLES
COVERS, FRAMES AND
ADJUSTMENT RISERS

RECOMMENDED APR. 15, 2004

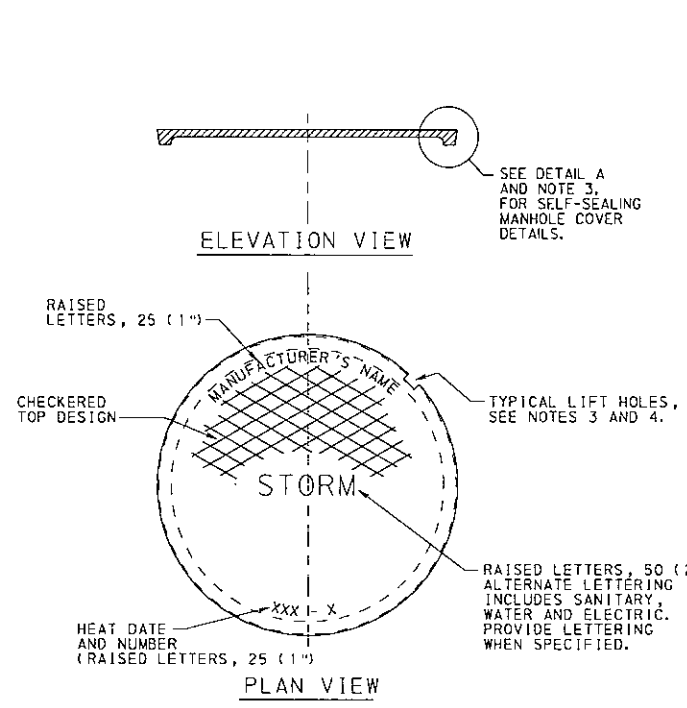
RECOMMENDED APR. 15, 2004

SHT 4 OF 6

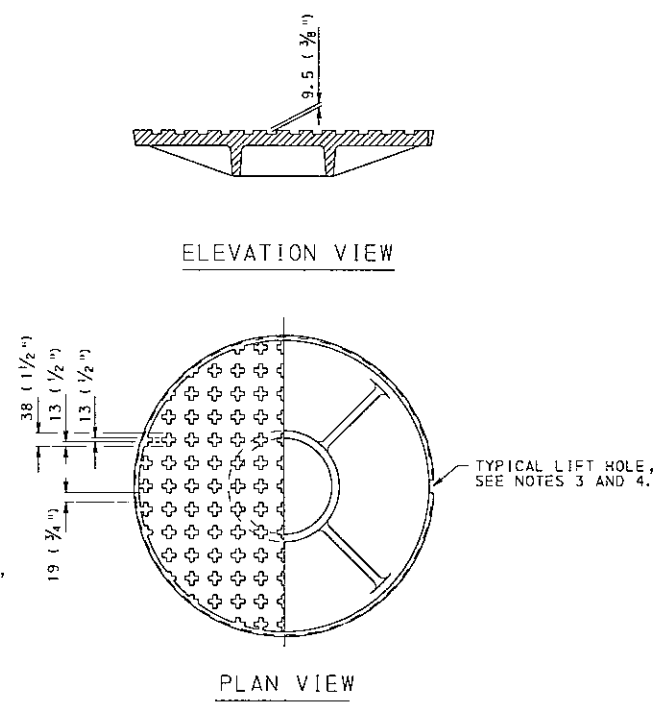
Alan A. Shuman

M. J. Patel

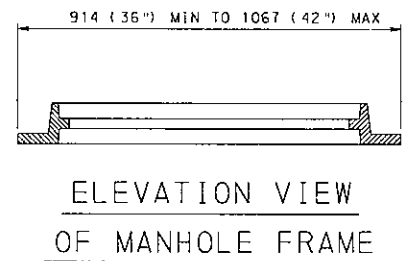
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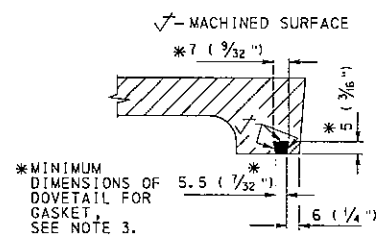
CAST IRON MANHOLE COVER
(PLATEN COVER)



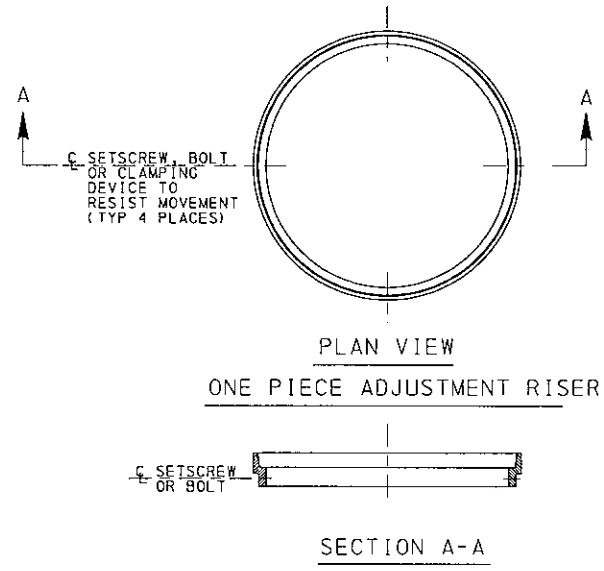
CAST IRON MANHOLE COVER
(STANDARD COVER)



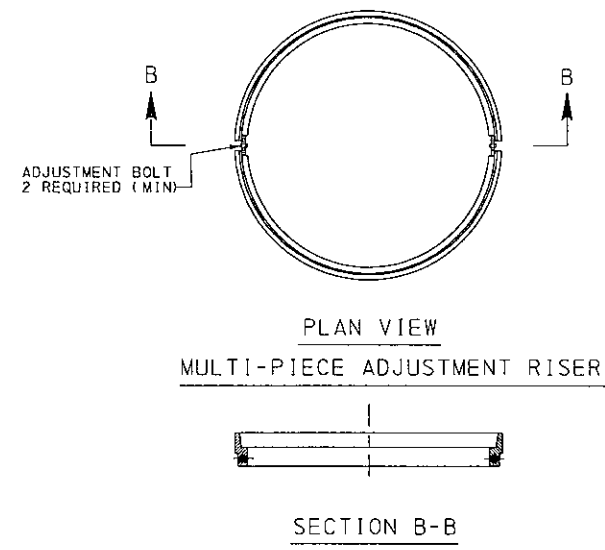
ELEVATION VIEW
OF MANHOLE FRAME



DETAIL A
GASKET SEALING SYSTEM



ADJUSTMENT RISERS



NOTES

1. PROVIDE MANHOLE FRAMES AND COVERS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.2(b). DESIGN MANHOLE FRAME, COVER AND GRADE ADJUSTMENT RINGS FOR PHL 93 (HS25) LIVE LOAD. IF MANHOLES ARE NOT IN OR ADJACENT TO ROADWAY, DESIGN FOR ALL POSSIBLE LIVE LOADS AS APPROVED BY THE DEPARTMENT.
2. PROVIDE MANHOLE FRAMES, COVERS AND GRADE ADJUSTMENT RISERS SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. FOR DEVIATION OR MODIFICATION TO THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
3. PROVIDE A GASKET SEALING SYSTEM, DOVETAIL GROOVE AND CONTINUOUS GASKET, AS INDICATED IN DETAIL A, TO PREVENT INFLOW THROUGH THE BEARING SURFACES, OF SURFACE RUNOFF WATER INTO THE MANHOLE SYSTEM, WHEN SPECIFIED. PROVIDE 6 (3/4") DIA ONE PIECE SELF-SEAL POLYISOPRENE ROUND GASKET, 40 DUROMETER GLUED IN PLACE. PROVIDE TWO (2) LIFT HOLES AT 180° TO FACILITATE COVER REMOVAL FOR SELF-SEALING MANHOLE COVER.
4. PROVIDE ONE LIFT HOLE TO FACILITATE COVER REMOVAL FOR NON-SEALING MANHOLE COVER.
5. FRAME AND GRADE ADJUSTMENT RISER TO HAVE A MINIMUM BEARING SEAT OF 25 (1") FOR COVER.
6. LOCATE TOP OF FRAME OR ADJUSTMENT RISER 3 (1/8") BELOW THE TOP OF ROADWAY SURFACE.
7. PROVIDE GRADE ADJUSTMENT RISERS MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 606, AND AS MODIFIED HEREIN:
 - A. CUSTOM FABRICATE EACH ADJUSTMENT RISER 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.
 - 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 MANHOLE LID AND MAKE THE OUTER WELD A FILLET WELD.
 - D. MAKE THE MINIMUM WIDTH OF BOTTOM AND TOP BAR STOCK 25 (1") AND 10 (3/8"), RESPECTIVELY.
 - E. TAP THE BOTTOM BAR STOCK FOR MULTI-PIECE ADJUSTMENT RISER FOR M14 ADJUSTMENT BOLT.
 - F. REINFORCE THE ADJUSTMENT RISER ADEQUATELY TO PREVENT BENDING.
 - G. PROVIDE AN ADJUSTMENT RISER WHICH IS FLUSH WITH COVER AND DOES NOT ALLOW EXCESSIVE MOVEMENT. PROVIDE AN ADJUSTMENT RISER WHICH CONFORMS TO THE SHAPE OF THE ORIGINAL FRAME.
8. ATTACH FRAME AND/OR PRECAST CONCRETE GRADE RINGS RIGIDLY TO TOP OF MANHOLE. USE 3-M14 THREADED STUDS WITH HEX HEAD NUTS AND WASHERS, INSERTED THROUGH AT 16 (3/4") DIA HOLES THROUGH FRAME AND/OR RINGS. SPACE HOLES AT 120° AND 50 (2") FROM OUTSIDE EDGE OF FRAME. EMBED STUDS 102 (4") MINIMUM INTO MANHOLE. GROUT STUDS INTO MANHOLE.
9. SET THE BASE OF THE FRAME AND/OR PRECAST CONCRETE GRADE RINGS IN A BED OF CEMENT MORTAR.

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
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STANDARD MANHOLES
COVERS, FRAMES AND
ADJUSTMENT RISERS

1. DESIGN REQUIREMENTS:

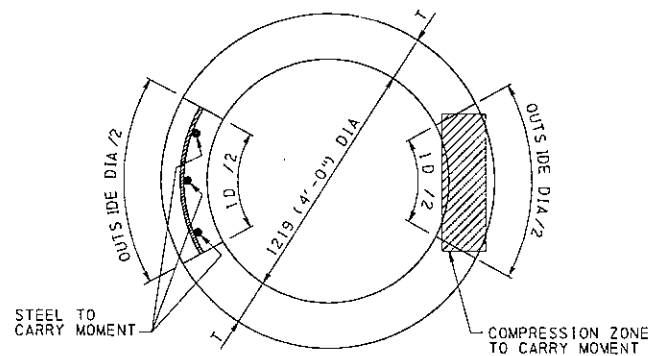
- A. DESIGN SPECIFICATIONS: 1998 AASHTO LRFD BRIDGE DESIGN SPECIFICATION, DESIGN MANUAL PART 4 AND ASTM C 478M-90, STANDARD SPECIFICATIONS FOR PRECAST CONCRETE MANHOLE SECTIONS.
- B. CALCULATE FOUNDATION BEARING PRESSURES BY SERVICE LOAD METHODS. DESIGN ALL OTHER PORTIONS OF THE MANHOLES BY LOAD FACTOR METHODS.
- C. THE SAFE BEARING PRESSURE IS NOT TO EXCEED THE EXISTING STATE OF STRESS OR 0.15 MPa (1.5 TONS PER SQ.FT.), WHICHEVER IS GREATER.
- D. DESIGN THE MANHOLE FOR A LIVE LOAD OF PHL 93 (HS25.1) AND WITH 30% IMPACT, EXCEPT DO NOT USE IMPACT IN THE DESIGN OF THE FOOTING. IF MANHOLES ARE NOT IN OR ADJACENT TO A ROADWAY, DESIGN FOR ALL POSSIBLE LIVE LOADS AS APPROVED BY THE DEPARTMENT.
- E. DESIGN THE MANHOLE FOR:
- ACCELERATION DUE TO GRAVITY, $g = 9.81 \text{ m/s}^2$
 - DENSITY OF EARTH, $\gamma_e = 1920 \text{ kg/m}^3$ (120#/CF)
 - $\phi =$ ANGLE OF INTERNAL FRICTION = 33°
 - DRY AT REST EARTH PRESSURE = $K_0 \gamma_e = 0.001(1 - \sin \phi) \gamma_e$
 $= 0.001 \times 0.46 \times 1920 \times 9.81 = 8.7 \text{ KN/m}^3$
 - SATURATED AT REST EARTH PRESSURE = $K_0 [0.001 \gamma_{eq} - \gamma_w] + \gamma_w$
 $= 0.46 [(0.001)(1920)(9.81) - 9.81] + 9.81$
 $= 14.0 \text{ KN/m}^3$
 - (SATURATED AT REST EARTH PRESSURE = $K_0 (\gamma_e - \gamma_w) + \gamma_w$)
 $= 0.46 \times 120 = 55 \text{ P.C.F.}$
 $= 0.46 \times (120 - 62.4) + 62.4$
 $= 89 \text{ P.C.F.}$
- F. PROVIDE AT LEAST MINIMUM REINFORCEMENT FOR SHRINKAGE AND TEMPERATURE AT ALL CONCRETE FACES WHERE REINFORCEMENT IS NOT REQUIRED BY DESIGN.
- G. FOR CONSTRUCTION REQUIREMENTS SEE NOTE 1, SHEET 1.

2. VERTICAL STEEL:

- A. THIS PROCEDURE IS REQUIRED ONLY WHEN A SIGNIFICANT LOADING EXISTS ON ONE SIDE OF THE MANHOLE AND LIMITED SUPPORT IS PROVIDED ON THE OTHER.
- B. DETERMINE MINIMUM AND MAXIMUM VERTICAL LOAD APPLIED TO MANHOLE AT DEPTH "H".
- C. DETERMINE OVERTURNING MOMENT FROM UNBALANCED EARTH PRESSURE.
- D. DETERMINE DIMENSIONS OF DESIGN SECTION TO CARRY MOMENT AS SHOWN IN FIGURE 1.
- EQUIVALENT RECTANGULAR COMPRESSION ZONE DIMENSIONS TO CARRY MOMENT:
 T MILLIMETERS BY $1/4$ INSIDE DIA + OUTSIDE DIA
 CENTROID OF RECTANGULAR SECTION IS AT CENTROID OF ARC SECTION.
- E. DESIGN REINFORCEMENT IN "COLUMN" TO CARRY AXIAL LOAD AND MOMENT. (USE TOTAL CROSS-SECTION TO CARRY AXIAL LOAD.)
- F. CHECK CRACK CONTROL UNDER SERVICE LOAD CONDITIONS.

$$Z = F_s \sqrt{\frac{dc \times 2dsf \times b}{\text{NO. OF BARS}}} < 17.2 \text{ N/m} \quad \text{DM4-8-16-8-4}$$

(98 kips/FT)



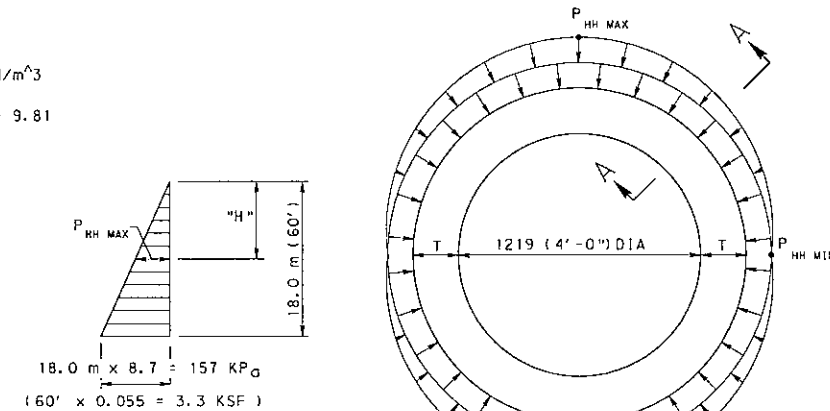
DESIGN SECTION TO CARRY MOMENT
FIGURE 1

3. HOOP STEEL:

- A. DETERMINE SERVICE MOMENTS AND AXIAL THRUSTS USING FIGURE 2 AND FIGURE 3.
 $P_{HH \text{ MIN}}$ NOT TO BE GREATER THAN ONE-HALF OF $P_{HH \text{ MAX}}$.
- B. DESIGN HOOP REINFORCEMENT SHOWN IN SECTION A-A, TO CARRY THE MOMENT AND AXIAL THRUST.
- C. CHECK CRACK CONTROL UNDER SERVICE LOAD.

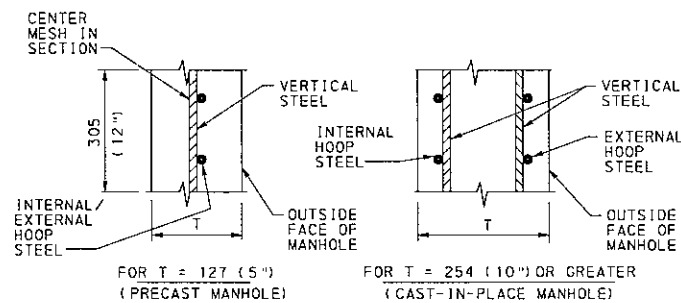
$$Z = F_s \sqrt{\frac{dc \times 2dsf \times b}{\text{NO. OF BARS}}} < 17.2 \text{ N/m}$$

(98 kips/FT)



AT REST PRESSURE DIAGRAM
TO DETERMINE $P_{HH \text{ MAX}}$
FIGURE 2

DIFFERENTIAL PRESSURE LOADING
TO DETERMINE HOOP MOMENTS
FIGURE 3



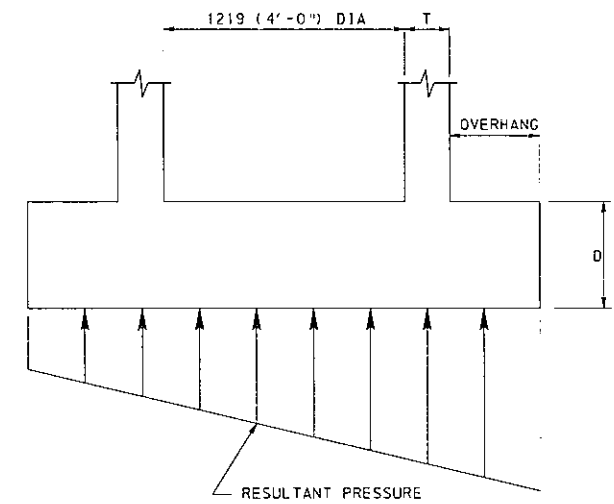
FOR $T = 127$ (5") (PRECAST MANHOLE)
 FOR $T = 254$ (10") OR GREATER (CAST-IN-PLACE MANHOLE)

USE WALLS AT 127 (5") THICK WITH ONE (1) ROW OF REINFORCING,
 OR USE WALLS AT 254 (10") OR GREATER WITH TWO (2) ROWS OF REINFORCING.

SECTION A-A - DESIGN SECTION

4. FOOTING DESIGN:

- A. DETERMINE FOOTING SIZE (USE AN EQUIVALENT CIRCULAR FOOTING FOR DESIGN)
- $$\frac{P + M}{A \cdot S} < 290 \text{ kPa (3.0 KSF) OR MAXIMUM ALLOWABLE BEARING PRESSURE}$$
- $P = DL + LL + EP$
- DL = DEAD LOAD OF MANHOLE
 - LL = PHL 93 (HS25.1) WHEEL LOAD (NO IMPACT)
 - EP = EARTH LOAD ON OVERHANG
 - A = BEARING AREA OF FOOTING
 - M = MOMENT DUE TO DIFFERENTIAL LOADING (WHEN APPLICABLE)
 - S = SECTION MODULUS OF FOOTING
- SEPARATION BETWEEN THE FOOTING AND SOIL IS NOT PERMISSIBLE.
- B. DESIGN FOOTING TO CARRY MOMENT (BOTH MAXIMUM NEGATIVE AND POSITIVE) AND SHEAR DUE TO RESULTANT PRESSURE AS SHOWN IN FIGURE 4 AND APPLIED LOADS.
- C. CHECK CRACK CONTROL UNDER SERVICE LOAD.
- $$Z = F_s \sqrt{\frac{dc \times 2dsf \times b}{\text{NO. OF BARS}}} < 17.2 \text{ N/m}$$
- (98 kips/FT)

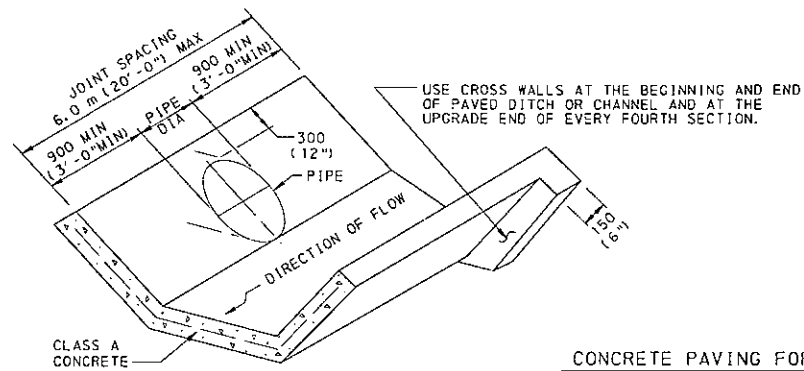


DIAMETRICAL SECTION THROUGH FOOTING
FIGURE 4

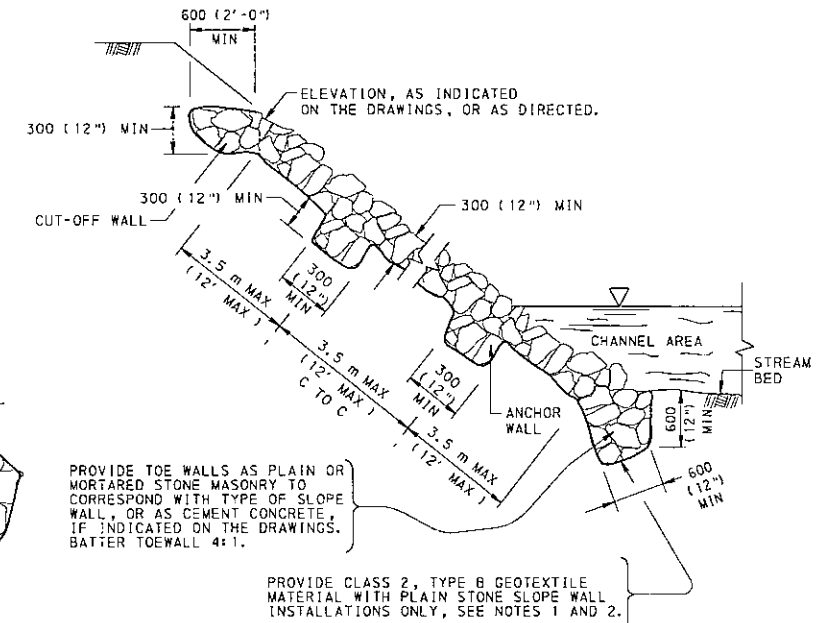
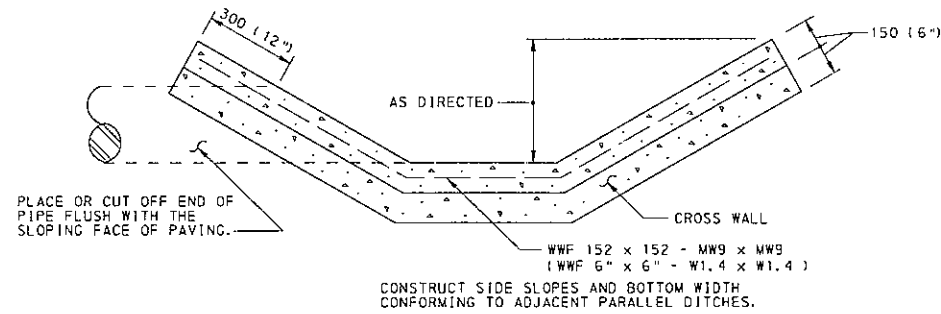
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

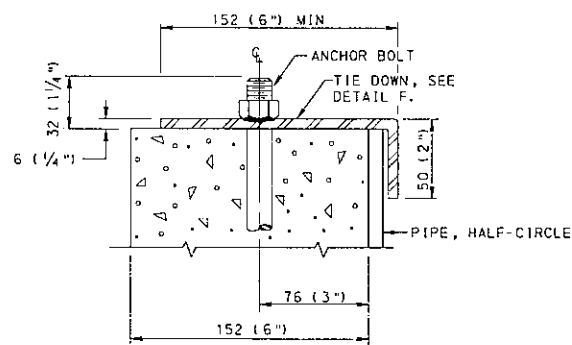
STANDARD MANHOLES
DESIGN PROCEDURE



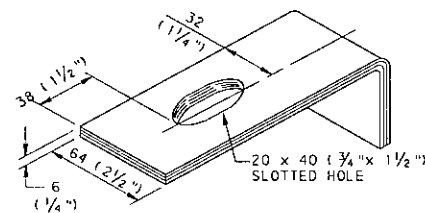
CONCRETE PAVING FOR STREAM BEDS



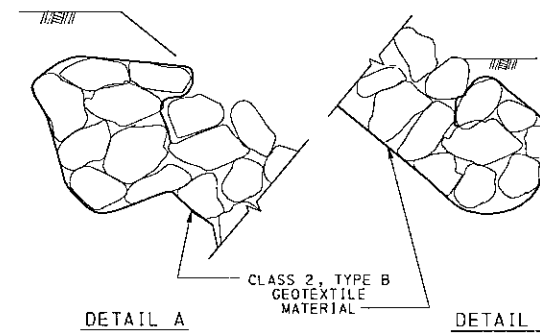
PLAIN AND MORTARED STONE SLOPE WALL



DETAIL E

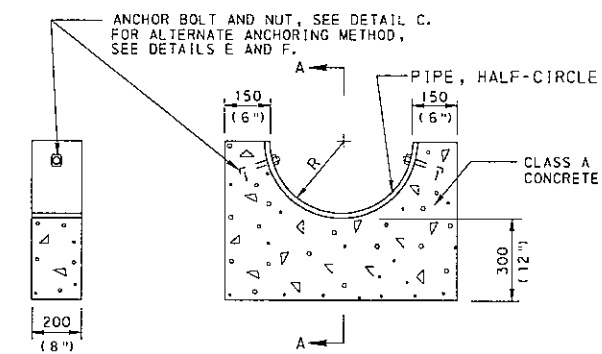


DETAIL F



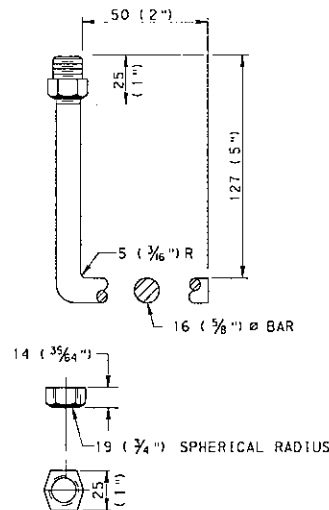
DETAIL A

DETAIL B

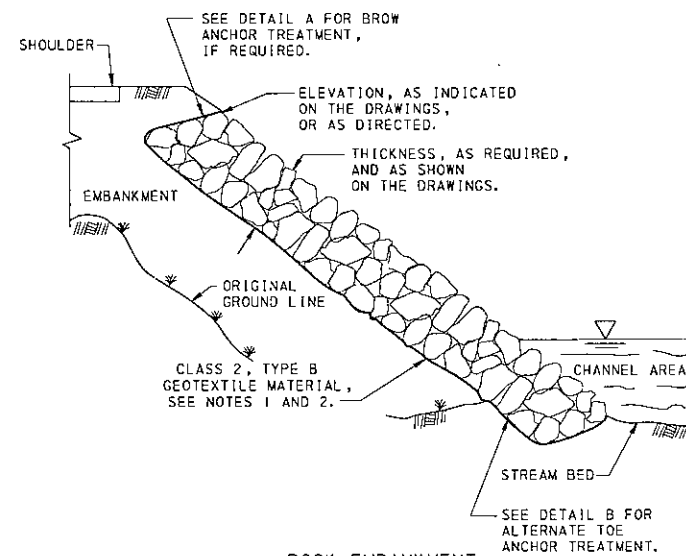


SECTION A-A

CEMENT CONCRETE PIPE ANCHOR
DETAIL D



ANCHOR BOLT AND NUT
DETAIL C

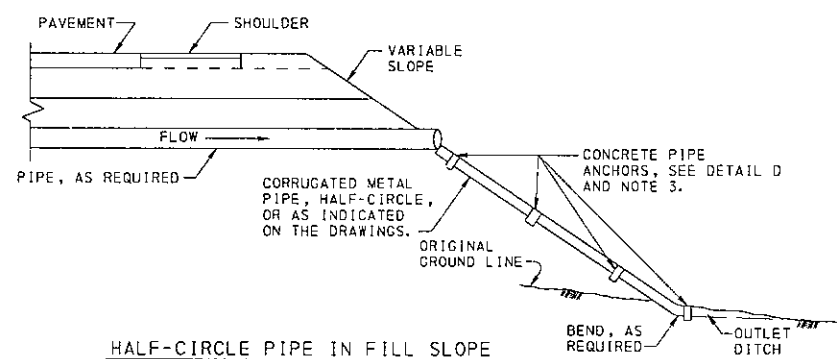


ROCK EMBANKMENT

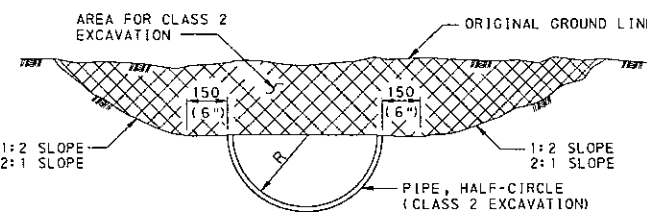
NOTES

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.

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



HALF-CIRCLE PIPE IN FILL SLOPE

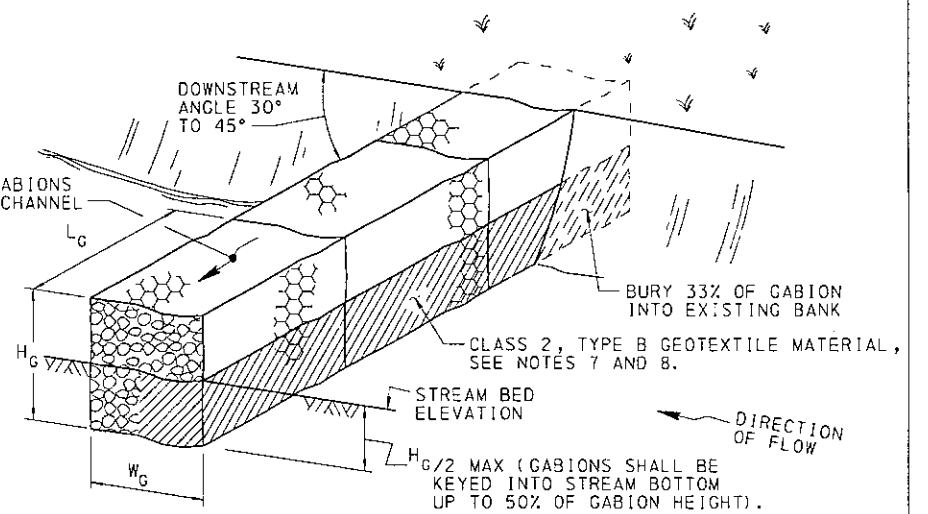
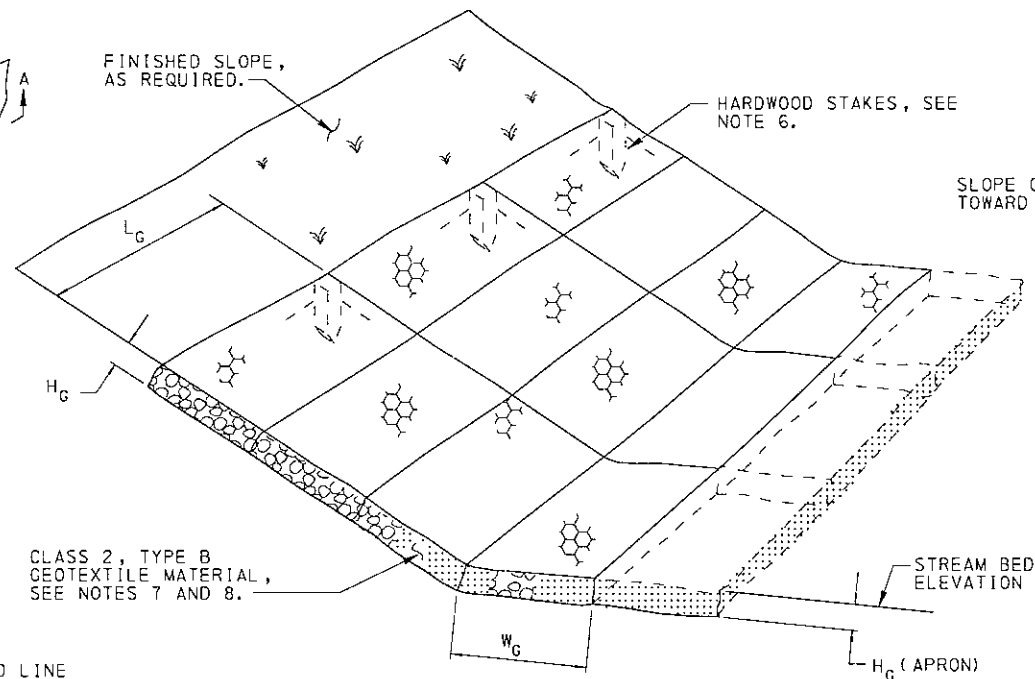
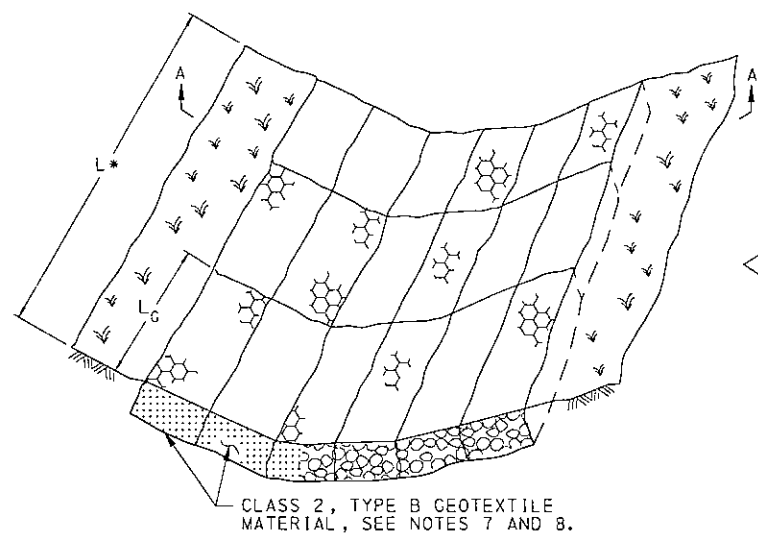


TYPICAL CROSS SECTION

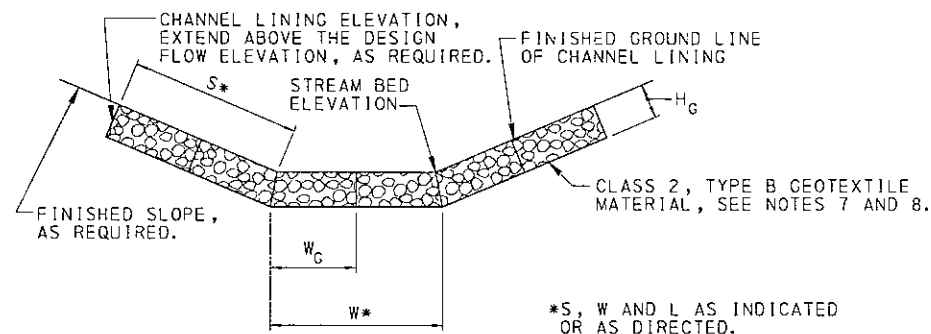
INSTALLATION DETAILS FOR HALF-CIRCLE PIPE

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DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SLOPE PROTECTION

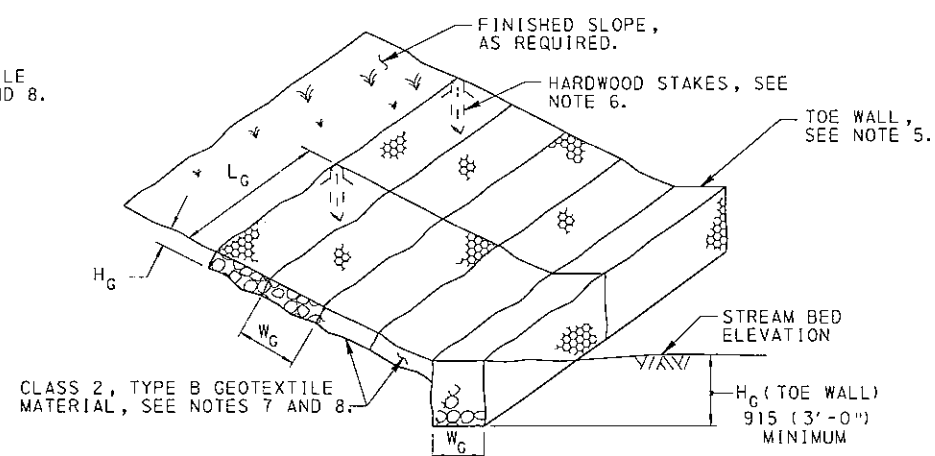


CHANNEL DEFLECTOR

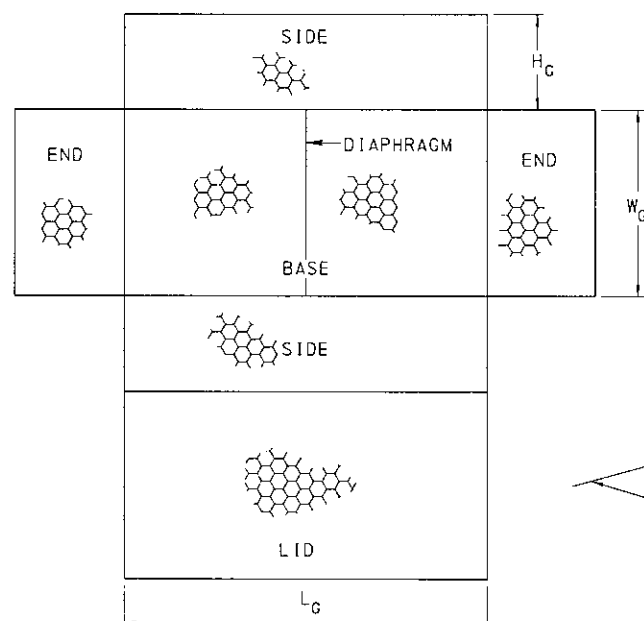


SECTION A-A
CHANNEL LINING

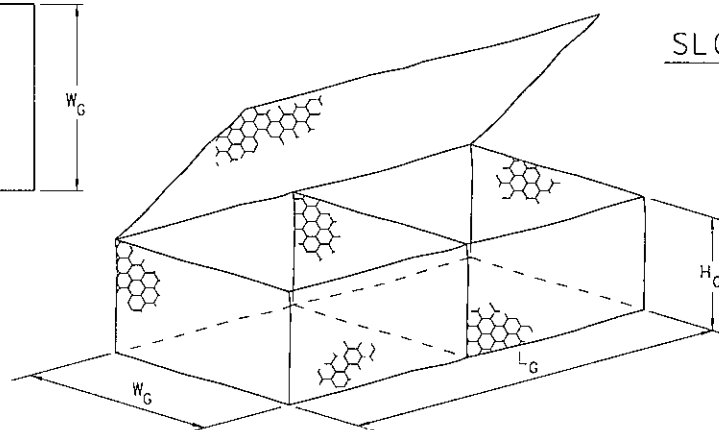
*S, W AND L AS INDICATED OR AS DIRECTED.



SLOPE WALLS



WIRE MESH BASKETS



GABIONS SIZES

MATTRESS TYPE		
W_G	L_G	H_G
1829 (6'-0")	2743 (9'-0")	229 (0'-9")
1829 (6'-0")	3658 (12'-0")	229 (0'-9")

STANDARD		
W_G	L_G	H_G
914 (3'-0")	1829 (6'-0")	305 (1'-0")
914 (3'-0")	3658 (12'-0")	305 (1'-0")
914 (3'-0")	2743 (9'-0")	457 (1'-6")
914 (3'-0")	1829 (6'-0")	914 (3'-0")
914 (3'-0")	2743 (9'-0")	914 (3'-0")
914 (3'-0")	3658 (12'-0")	914 (3'-0")

ADDITIONAL SIZES MAY BE AVAILABLE ON A SPECIAL ORDER BASIS.

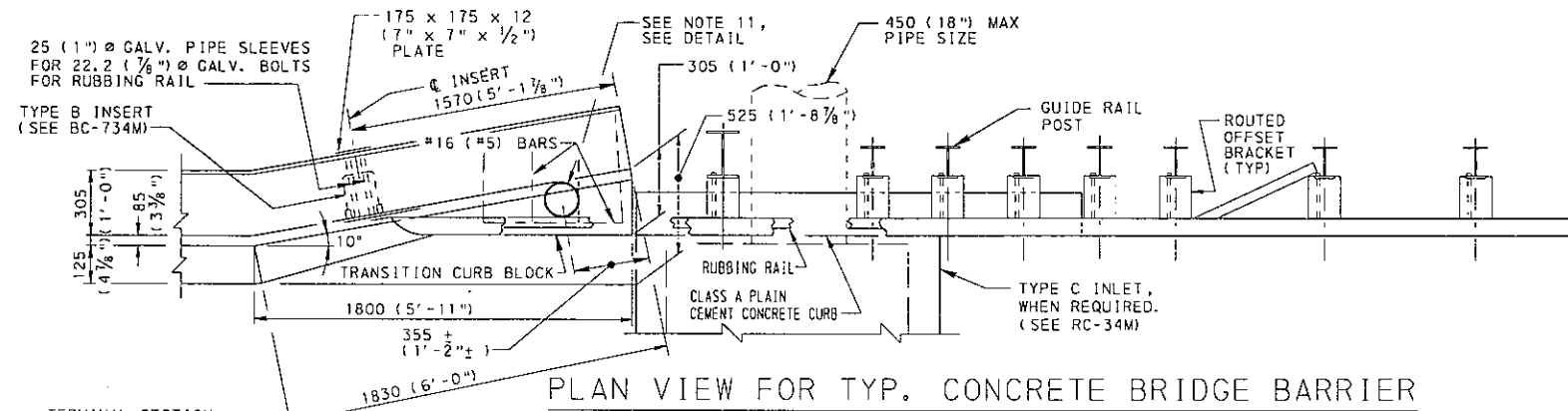
NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 626.
2. TYPE A GABIONS SHALL CONSIST OF WIRE-MESH BASKETS FILLED BY HAND PLACEMENT OF COARSE AGGREGATE, AT LEAST ALONG THE EXPOSED FACES, FOR A UNIFORM APPEARANCE.
3. SPECIFY TYPE B GABIONS OF WIRE-MESH BASKETS FILLED BY HAND PLACEMENT OR SMALL POWER EQUIPMENT PLACEMENT OF COARSE AGGREGATE.
4. MAKE CORROSION RESISTANT TYPE A AND TYPE B GABIONS THE SAME AS TYPE A AND TYPE B GABIONS EXCEPT SHEATH THE WIRE-MESH IN POLYVINYL CHLORIDE PLASTIC.
5. THE APRON OR TOE WALL IS REQUIRED WHERE THE SLOPE WALL IS INSTALLED ADJACENT TO WATER. MAKE THE APRON APPROXIMATELY TWO TIMES AS WIDE AS THE ANTICIPATED DEPTH OF SCOUR AND THE TOE WALL HEIGHT AT LEAST EQUAL TO THE ANTICIPATED DEPTH OF SCOUR.
6. WHEN GABIONS ARE PLACED ON A 1:1.5 (1.5:1) SIDE SLOPE OR STEEPER, DRIVE HARDWOOD STAKES THROUGH THE GABIONS, ALONG THE TOP EDGE, TO ANCHOR THE INSTALLATION. EMBED STAKES 450 (18") MINIMUM BELOW GABION BOTTOM.
7. PROVIDE GEOTEXTILE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 212 AND SECTION 735.
8. INSTALL GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.
9. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

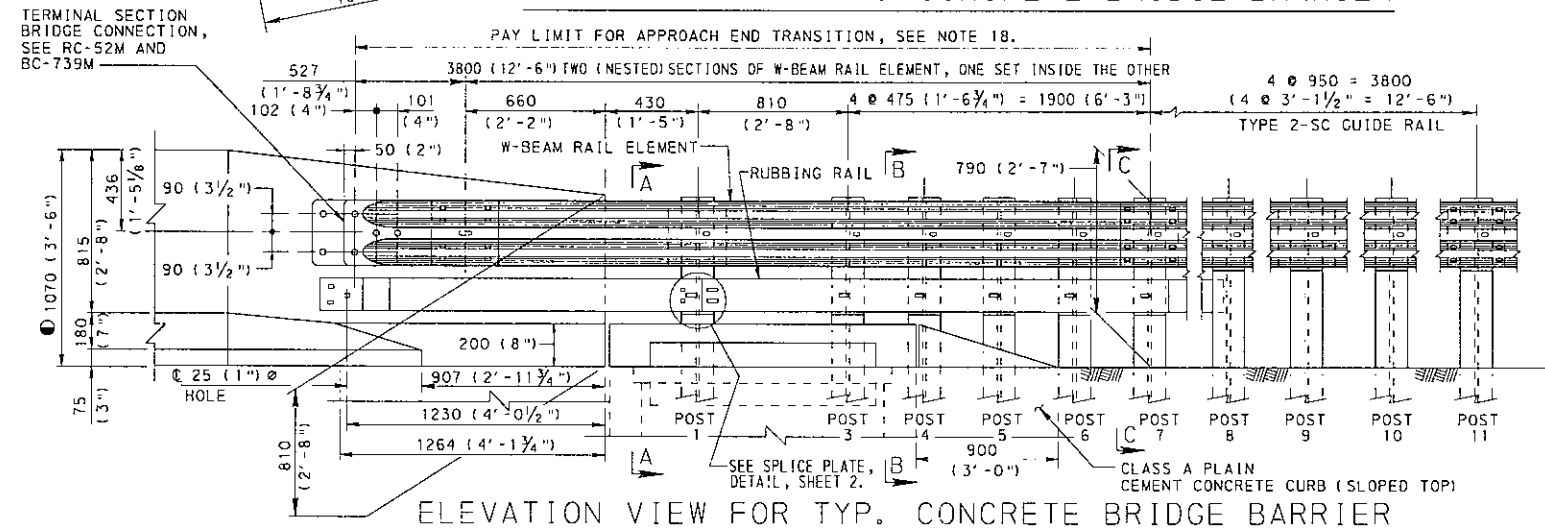
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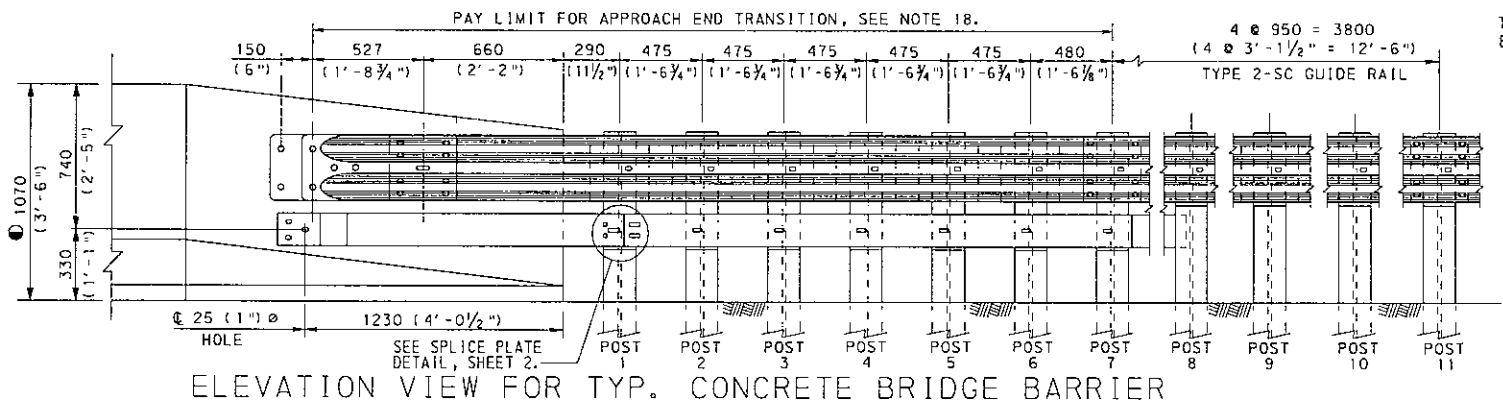
GABIONS



PLAN VIEW FOR TYP. CONCRETE BRIDGE BARRIER

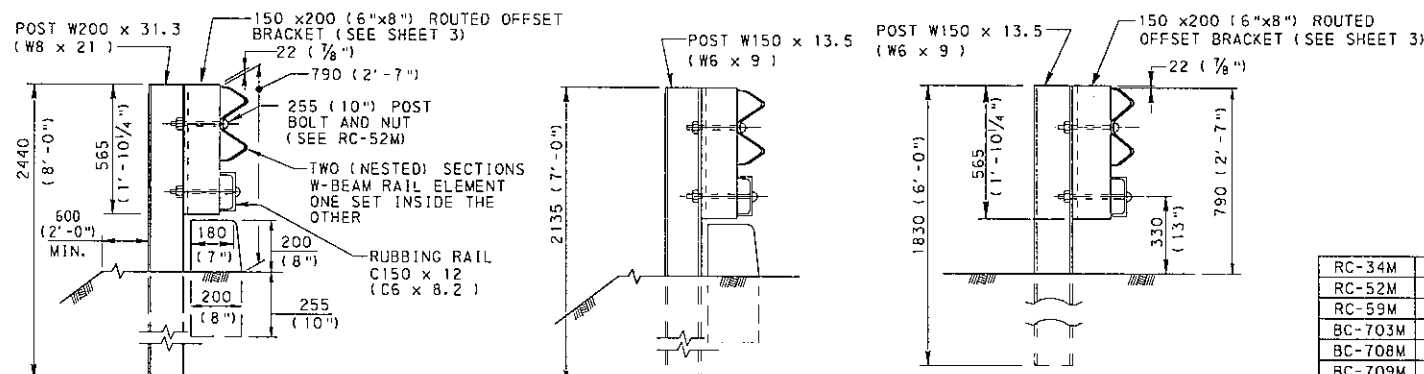


ELEVATION VIEW FOR TYP. CONCRETE BRIDGE BARRIER



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

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

NOTES:

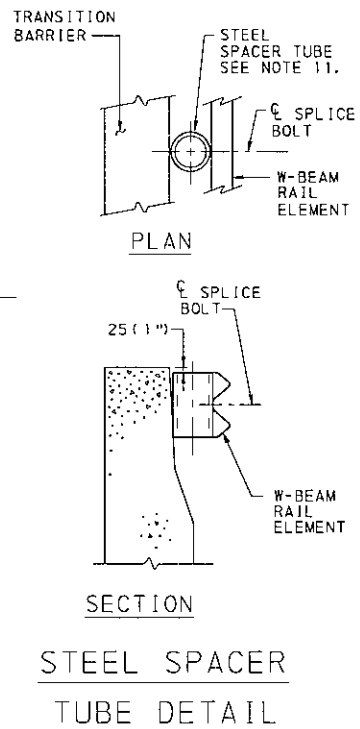
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.
- ALL REINFORCEMENT STEEL BARS SHOWN ARE SOFT CONVERTED METRIC SIZES THAT MEET THE REQUIREMENTS OF ASTM A 615M, A 616M AND A 706M.
- PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH PUB. 408.
- W-BEAM RAIL ELEMENT IS BOLTED TO ALL POSTS.
- USE PLAN DIMENSIONS WHEN DIFFERENT FROM THOSE SHOWN ON THIS STANDARD.
- REINFORCED CONCRETE BARRIER AND EMBEDDED INSERTS ARE BRIDGE ITEMS.
- 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").
- BOLT RUBBING RAIL TO POST WITHOUT WASHER.
- POSTS WITH RUBBING RAIL ATTACHMENT REQUIRE AN ADDITIONAL HOLE.
- 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.
- STEEL SPACER TUBE, SCHEDULE 40 GALVANIZED PIPE, 152 (6") I.D. x 305 (12") . CONNECT TO THE W-BEAM RAIL ELEMENTS USING SPLICE BOLT.
- 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.
- REINFORCEMENT BAR SIZES ARE SHOWN FOR CLARITY ONLY. USE ACTUAL BAR DESIGNATION INDICATED IN THE CONTRACT DRAWINGS.
- SEE BC-739M AND RC-52M FOR DETAILS AND HARDWARE NOT SHOWN.
- 50 (2") CL. ON ALL REINFORCEMENT EXCEPT AS NOTED.
- 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.
- PROVIDE STEEL POST SIZE, AND LENGTH AS SHOWN IN TABLES A, B, C, AND D AS APPROPRIATE.
- 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.
- 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.



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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

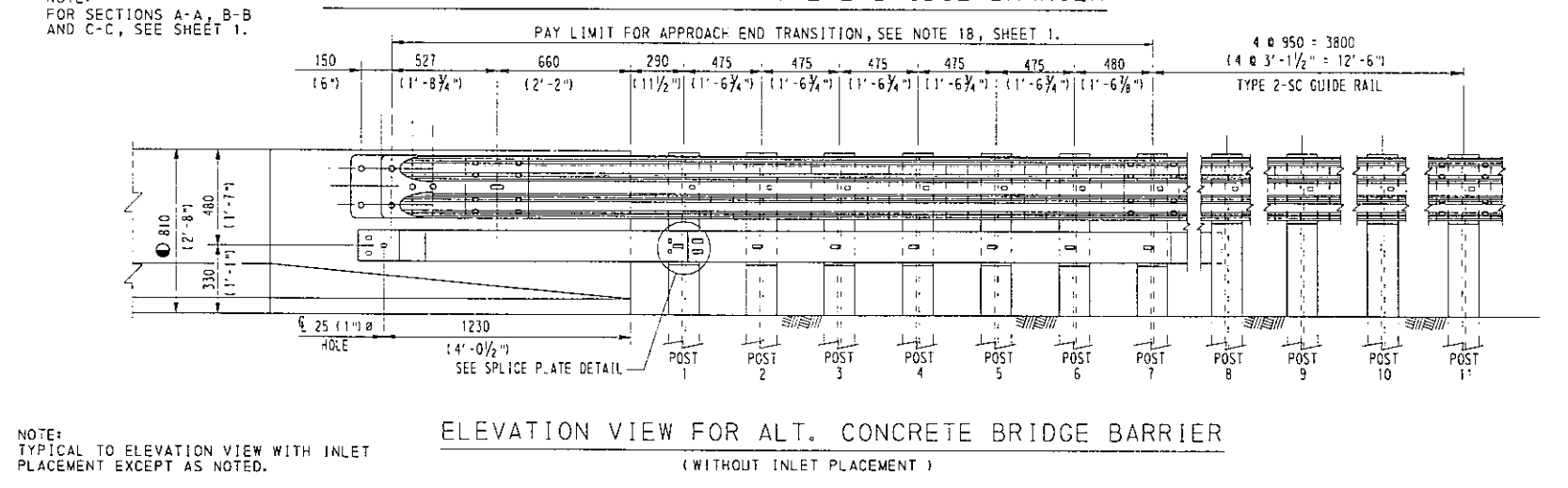
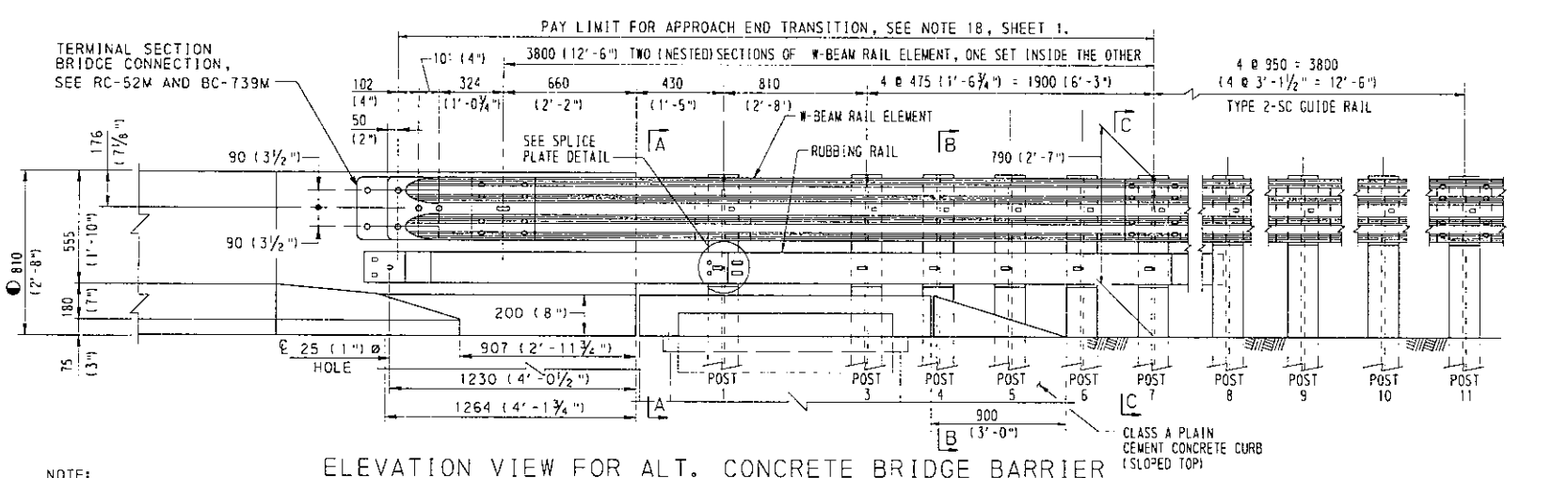
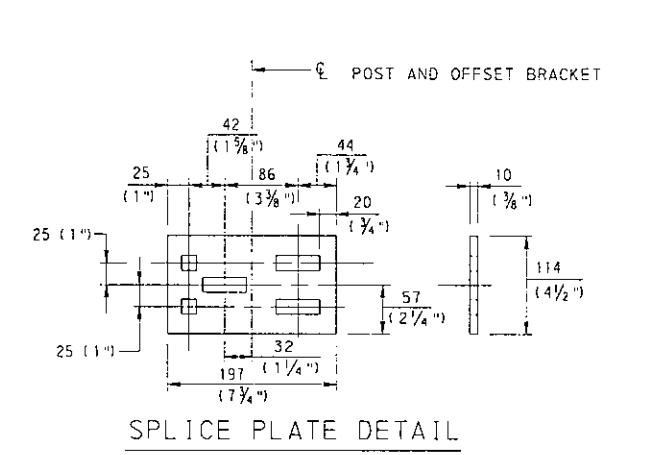
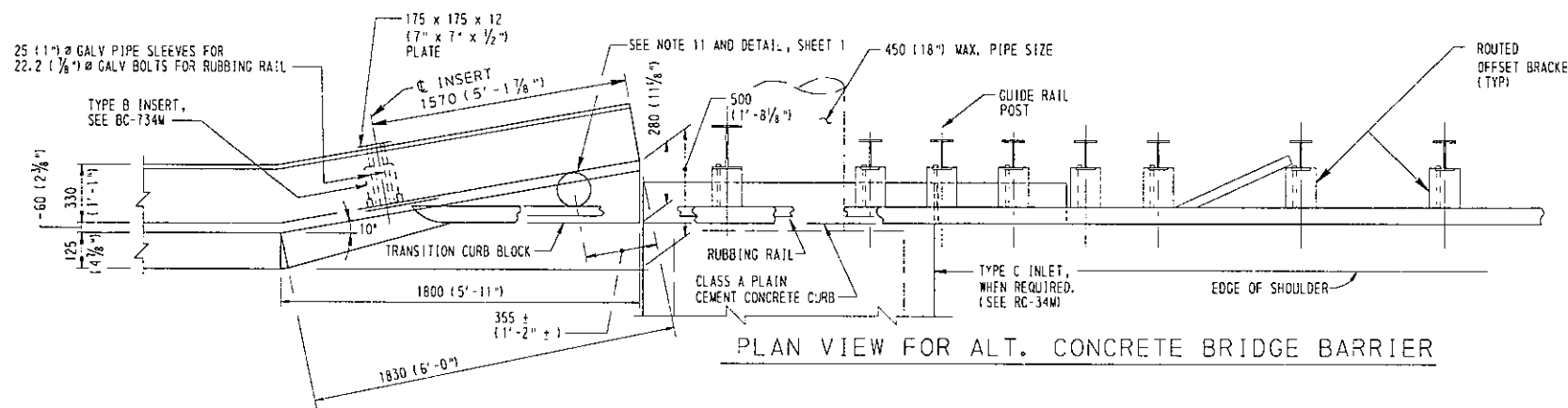
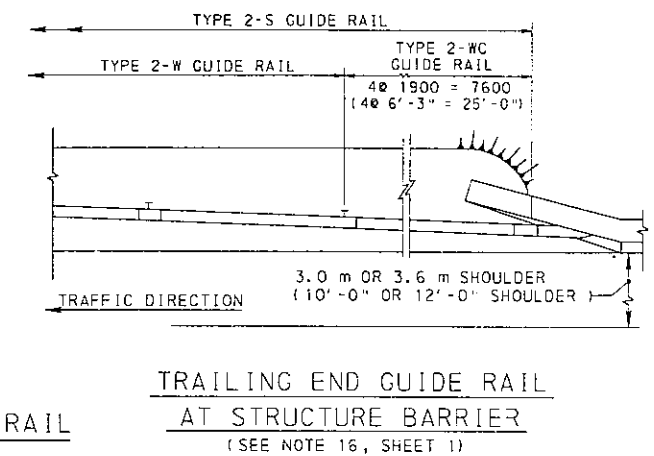
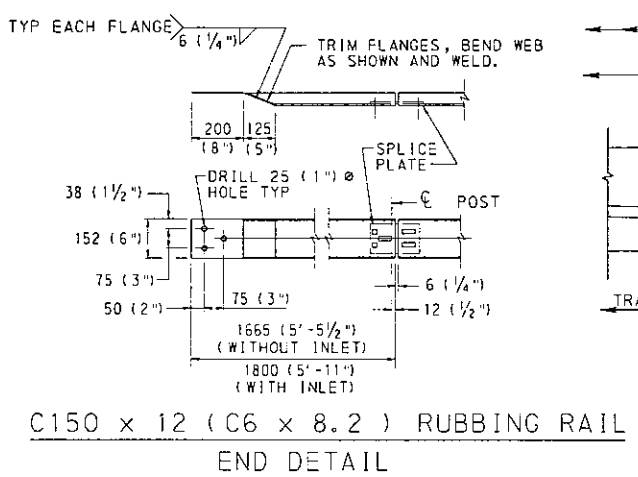
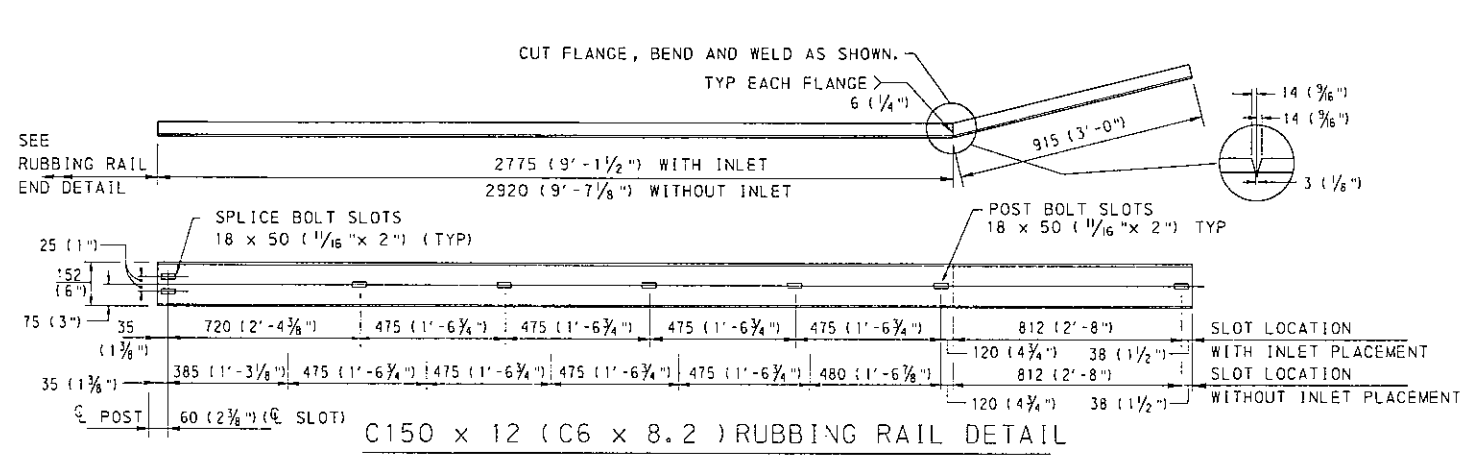
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

TYPICAL CONCRETE BRIDGE BARRIER

RECOMMENDED APR. 15, 2004
Dean A. Schindler
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED APR. 15, 2004
M. Patel
CHIEF ENGINEER

SHT 1 OF 16
RC-50M



- 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.

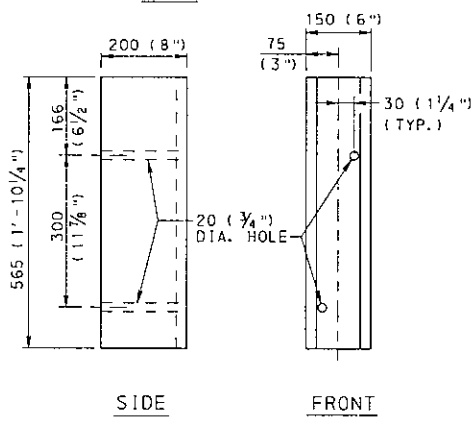
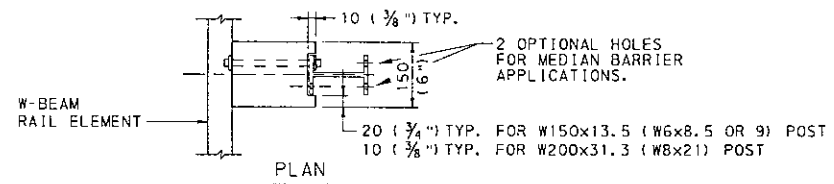
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

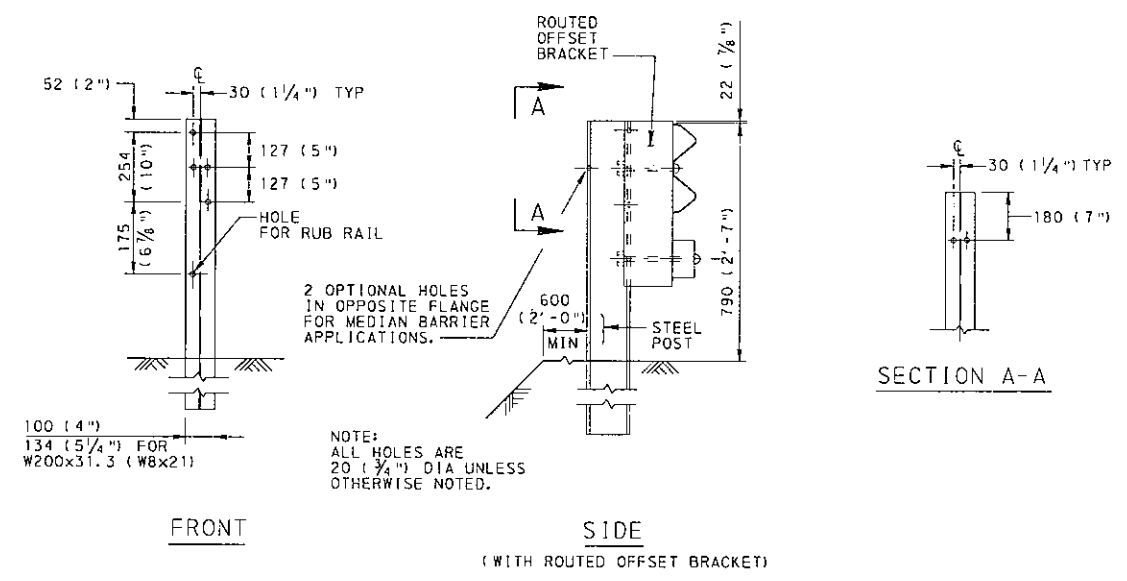
ALTERNATE CONCRETE BRIDGE BARRIER

RECOMMENDED APR. 15, 2004 <i>Dean A. Schindler</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. J. Patel</i> CHIEF ENGINEER	SHT 2 OF 16 RC-50M
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NOTE: TYPICAL TO ELEVATION VIEW WITH INLET PLACEMENT EXCEPT AS NOTED.



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

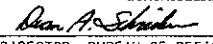
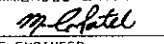
TYPICAL AND ALTERNATE CONCRETE BRIDGE BARRIER TRANSITION POSTS 4 THRU 7.

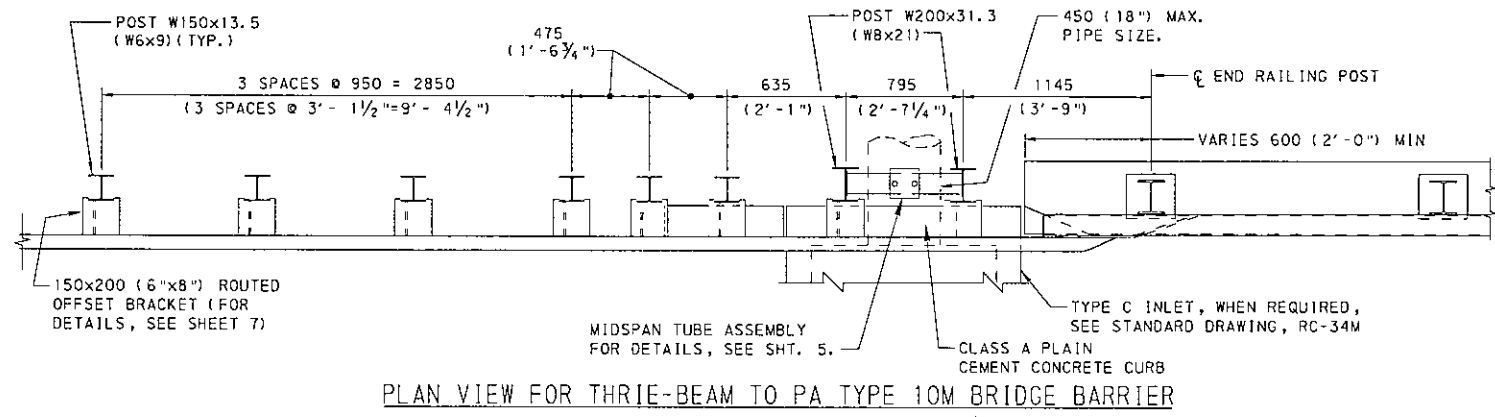
NOTE: W200x31.3 (W8x21) POSTS 1 THRU 3 SIMILAR, SEE DETAILS ON SHEETS 1 AND 2.

NOTES

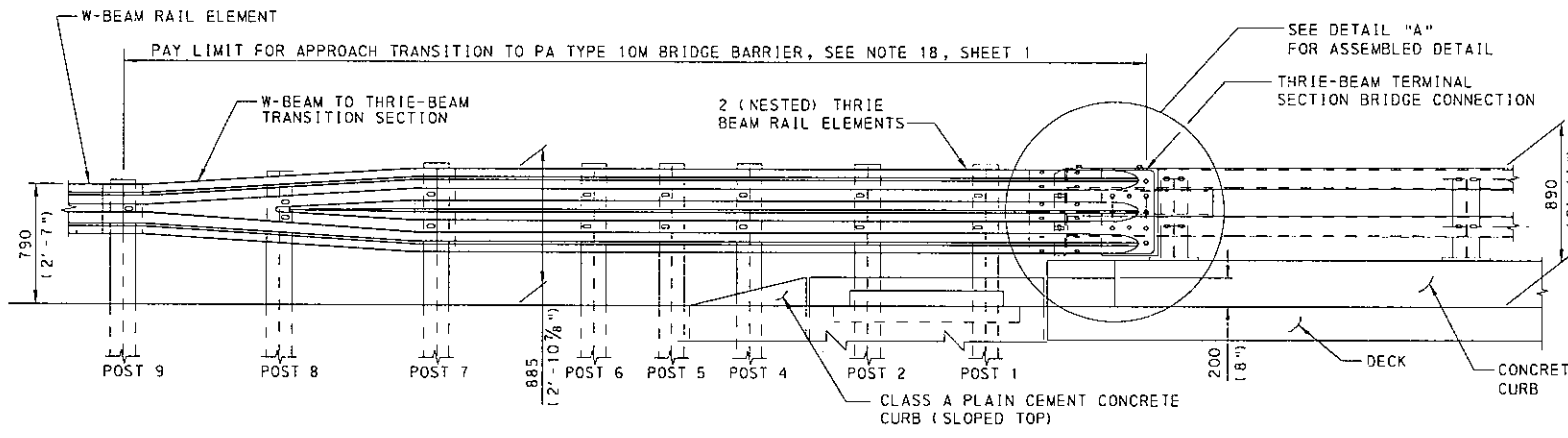
1. FOR APPROACH TRANSITION POST HEIGHTS, SEE SHEETS 1 AND 2.
2. FOR ADDITIONAL NOTES, SEE SHEET 1.
3. FOR APPROACH TRANSITION POST SIZE AND LENGTH, SEE TABLE A, ON SHEET 1.

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

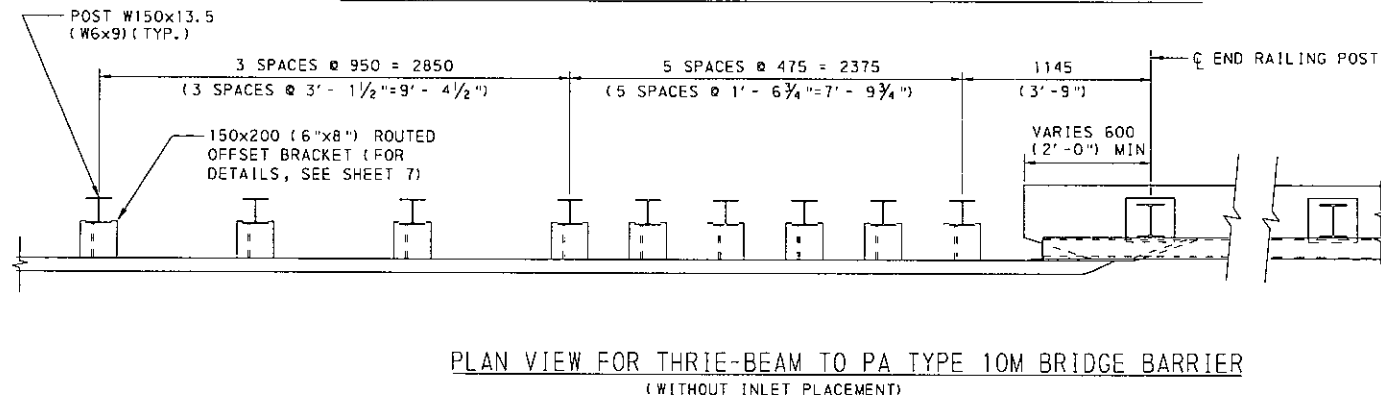
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN		
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS TYPICAL AND ALTERNATE CONCRETE BRIDGE BARRIER POST AND OFFSET BRACKET DETAILS		
RECOMMENDED APR. 15, 2004  DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004  CHIEF ENGINEER	SHT 3 OF 16 RC-50M



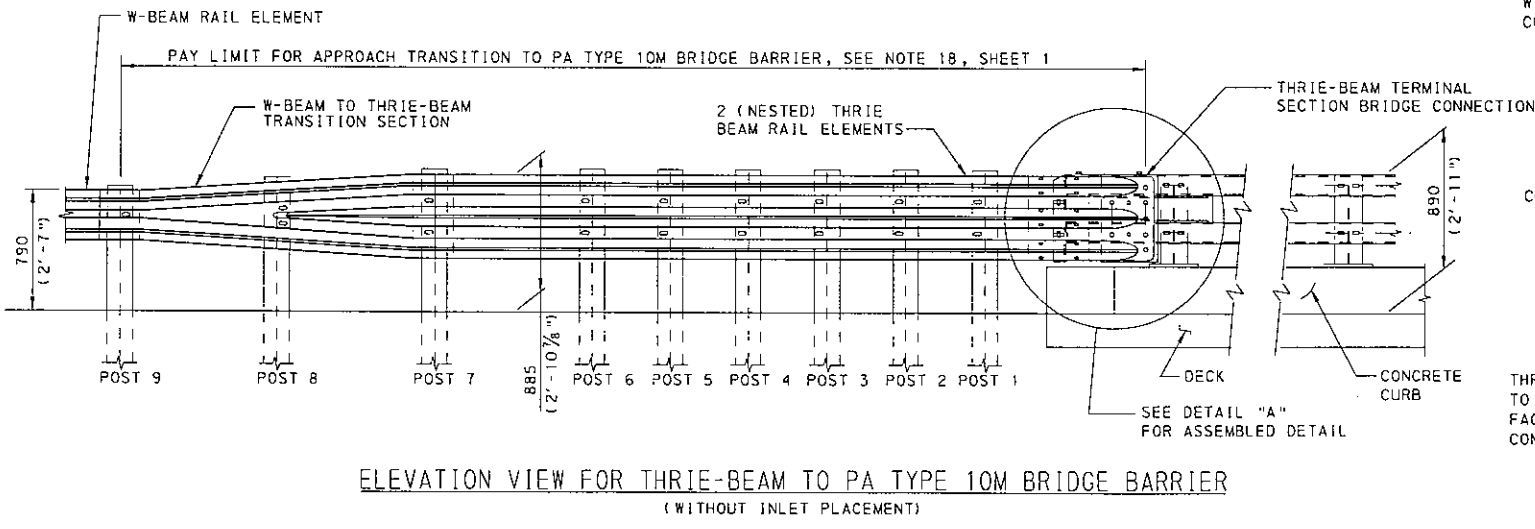
PLAN VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER



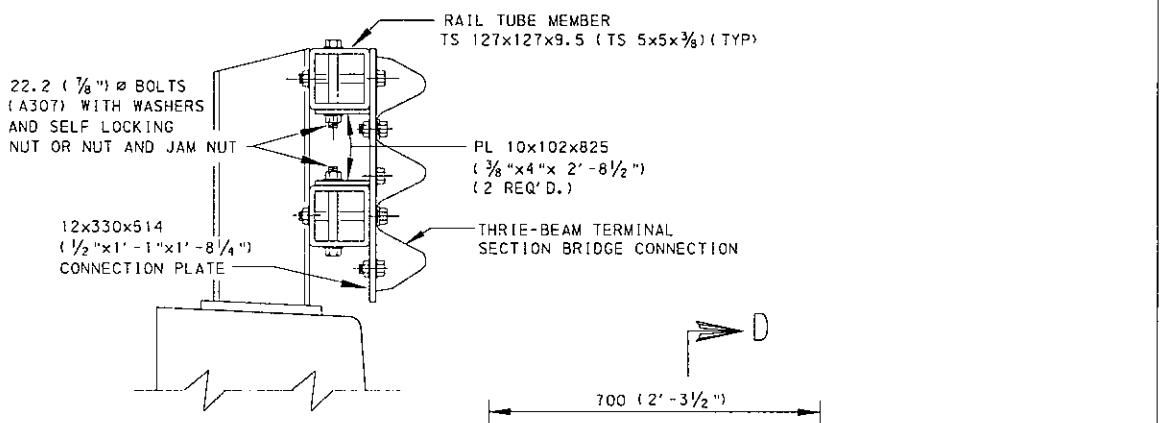
ELEVATION VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER



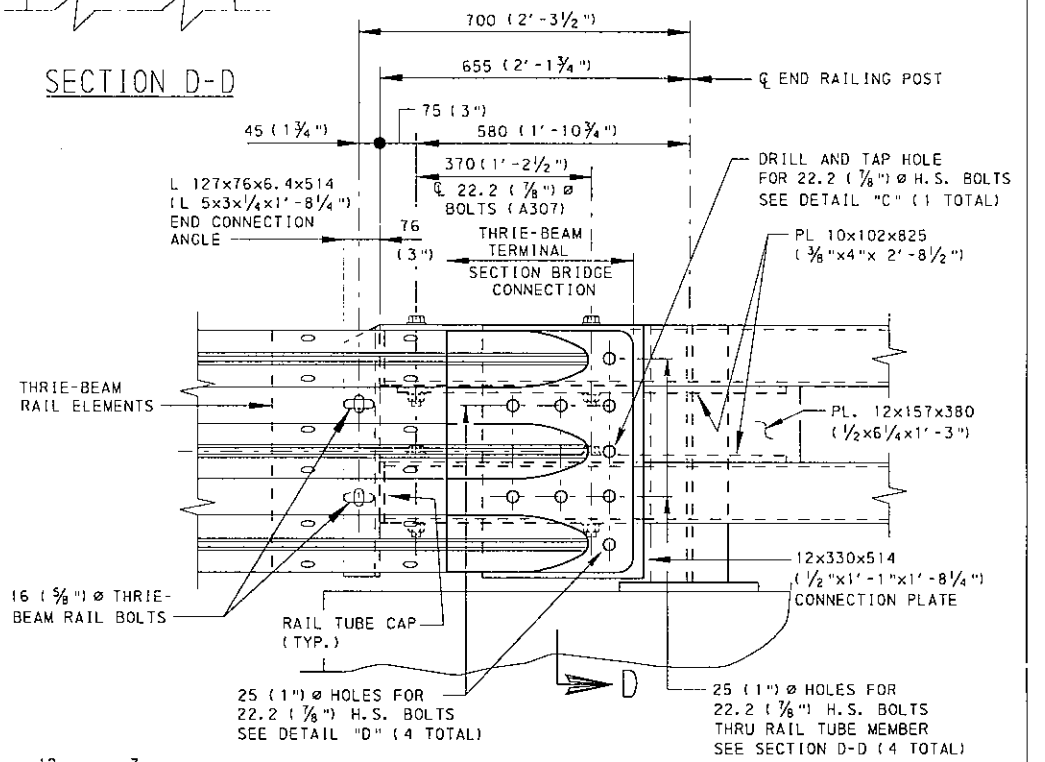
PLAN VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER (WITHOUT INLET PLACEMENT)



ELEVATION VIEW FOR THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER (WITHOUT INLET PLACEMENT)

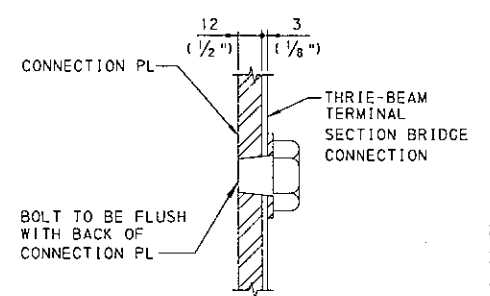


SECTION D-D

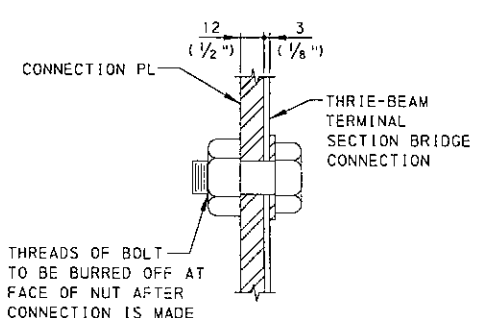


DETAIL A

(FOR UNASSEMBLED DETAILS, SEE SHEET 6)



DETAIL "C"



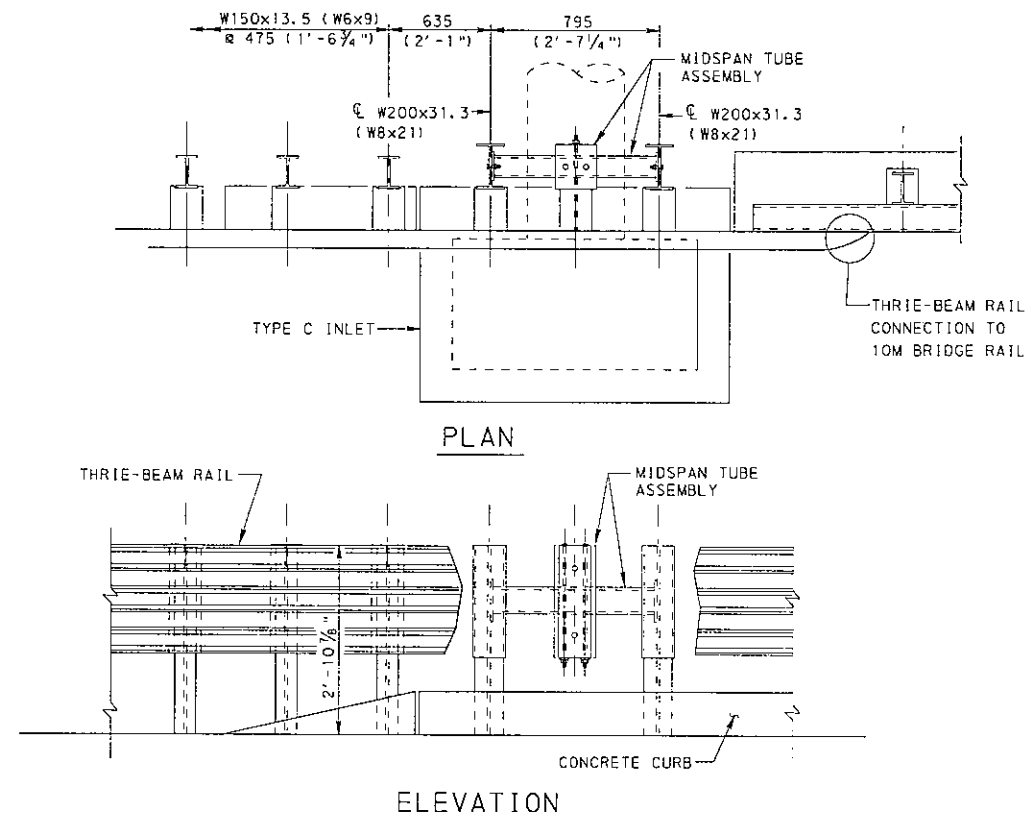
DETAIL "D"

NOTES:

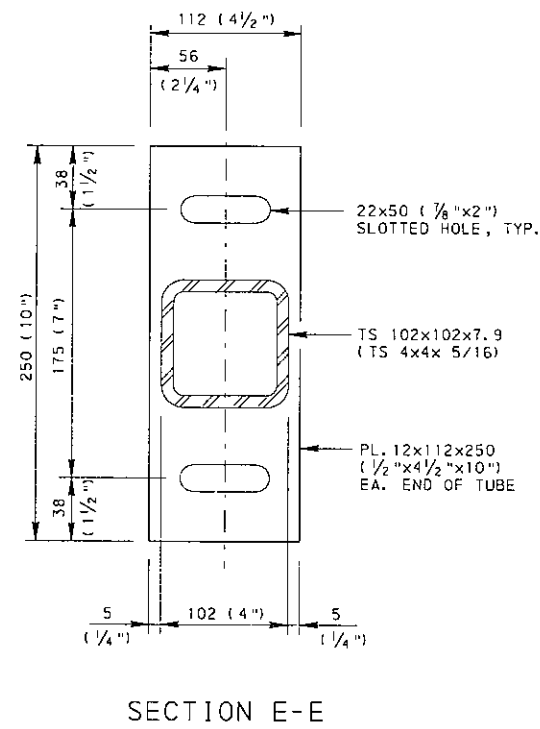
1. W-BEAM RAIL ELEMENT, TRANSITION SECTION AND THRIE BEAM RAIL ELEMENT ARE BOLTED TO ALL POSTS.
2. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 7.
3. FOR LOCATION WITH INLET PLACEMENT POST 3 IS OMITTED.
4. FOR ADDITIONAL NOTES, SEE SHEET 1.

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

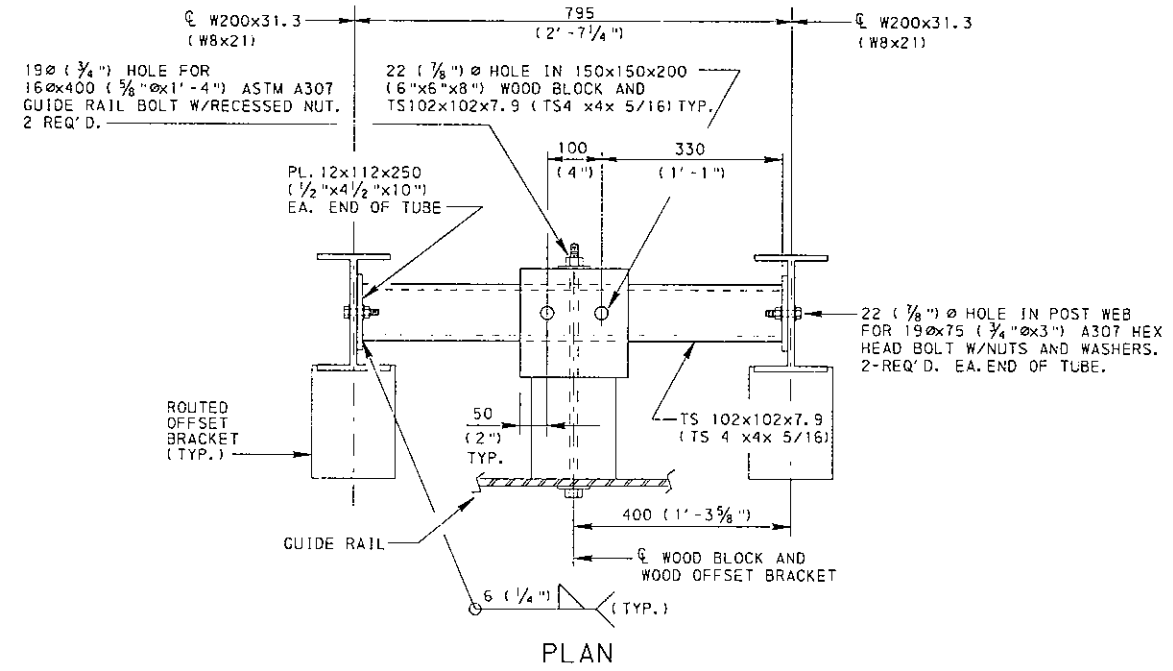
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN		
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER		
RECOMMENDED APR. 15, 2004 <i>Don A. Schaub</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. Patel</i> CHIEF ENGINEER	SHT 4 OF 16 RC-50M



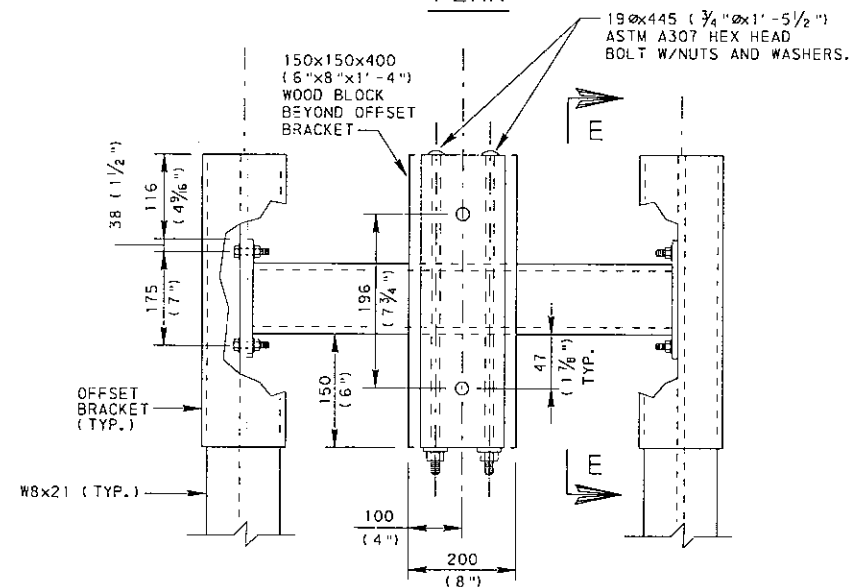
THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER CONNECTION DETAILS



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.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

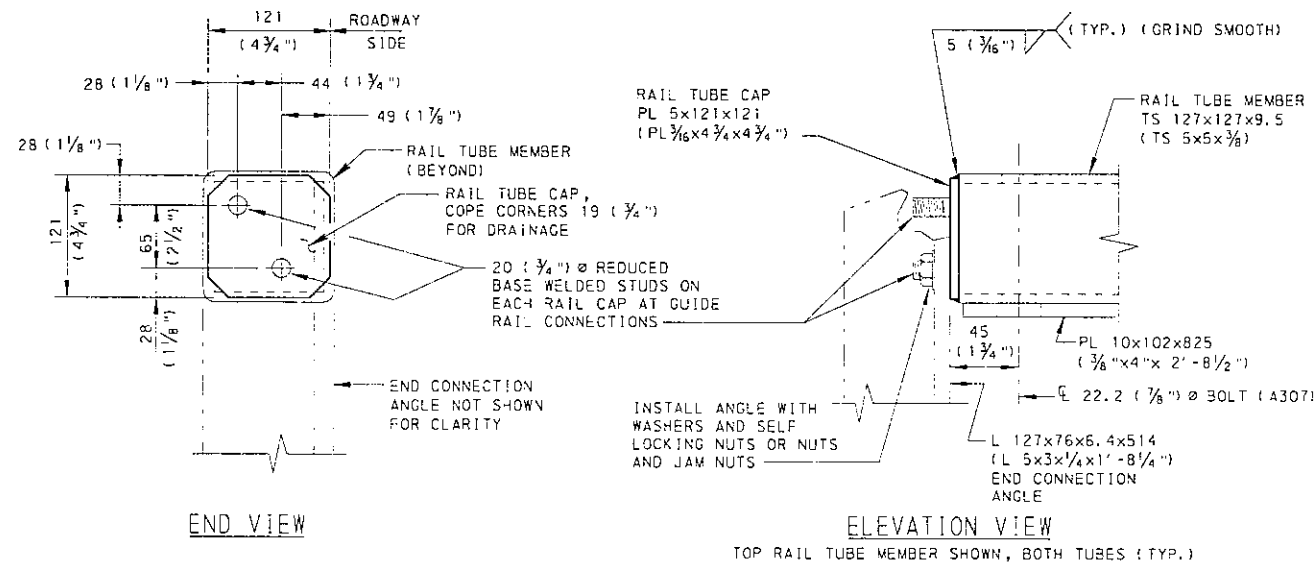
GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS
THRIE-BEAM TO PA TYPE 10M BRIDGE BARRIER
MIDSPAN TUBE ASSEMBLY DETAILS

RECOMMENDED APR. 15, 2004
Dean A. Schaub
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED APR. 15, 2004
M. Latel
CHIEF ENGINEER

SHT 5 OF 16

RC-50M

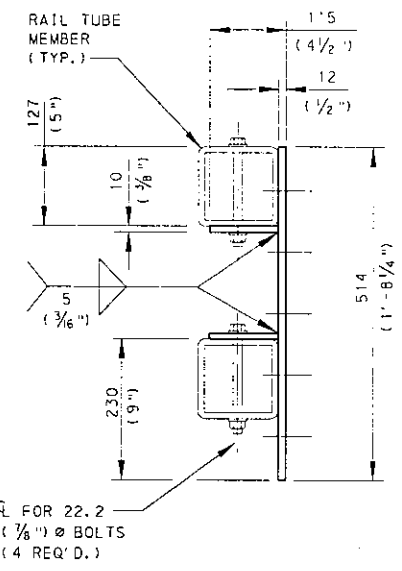


END VIEW

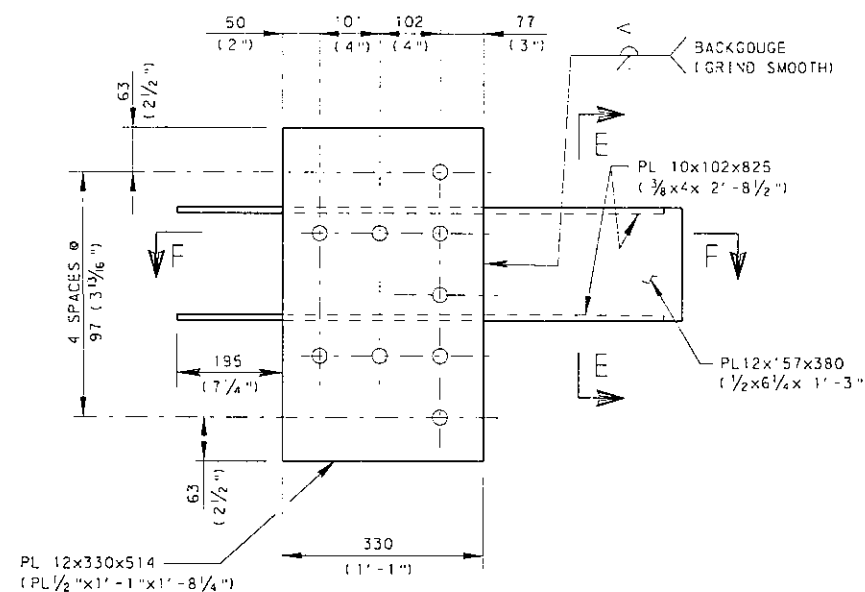
ELEVATION VIEW

TOP RAIL TUBE MEMBER SHOWN, BOTH TUBES (TYP.)

RAIL TUBE CAP DETAIL



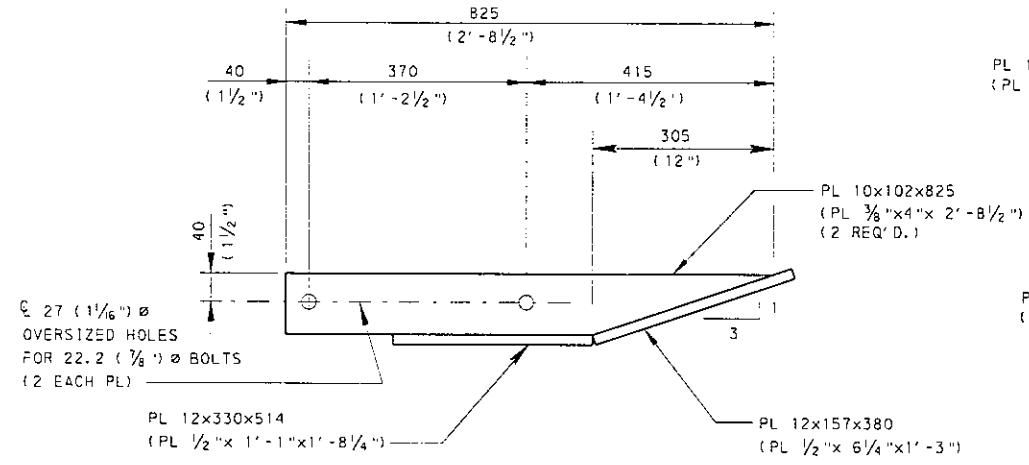
END VIEW



ELEVATION VIEW

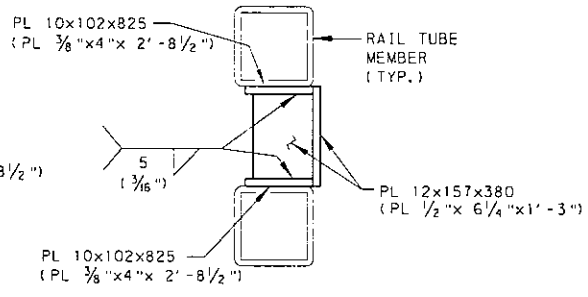
(RAIL TUBES NOT SHOWN FOR CLARITY)

CONNECTION PLATE ASSEMBLY DETAILS

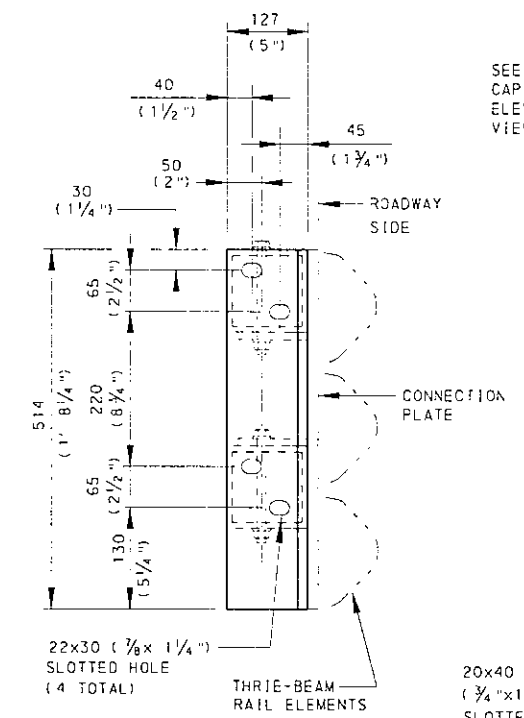


SECTION F-F

(RAIL TUBES NOT SHOWN FOR CLARITY)

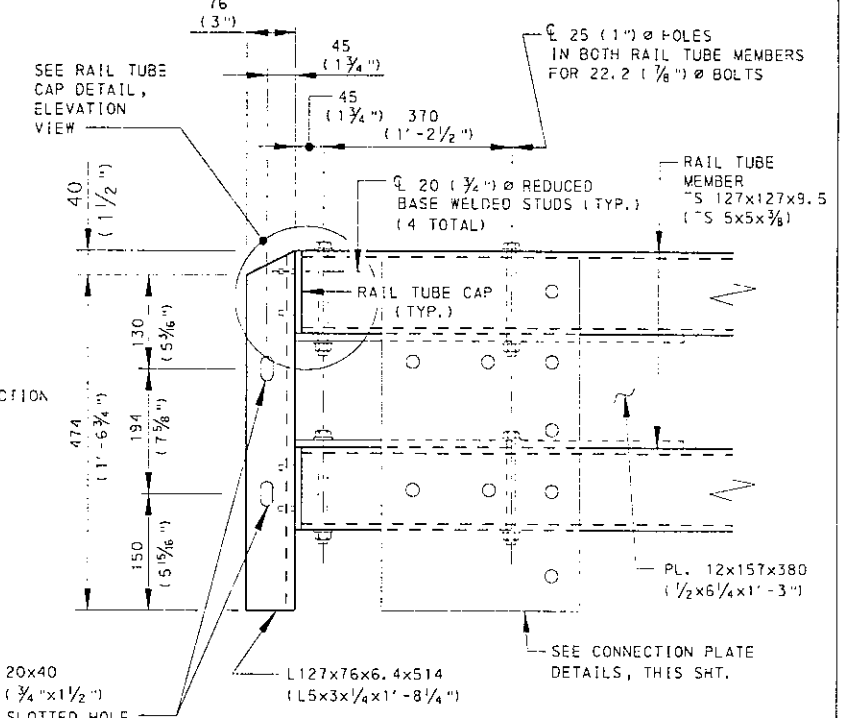


SECTION E-E



END VIEW

END CONNECTION ANGLE DETAILS



ELEVATION VIEW

THRIE-BEAM RAIL ELEMENTS NOT SHOWN FOR CLARITY.

NOTES:

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

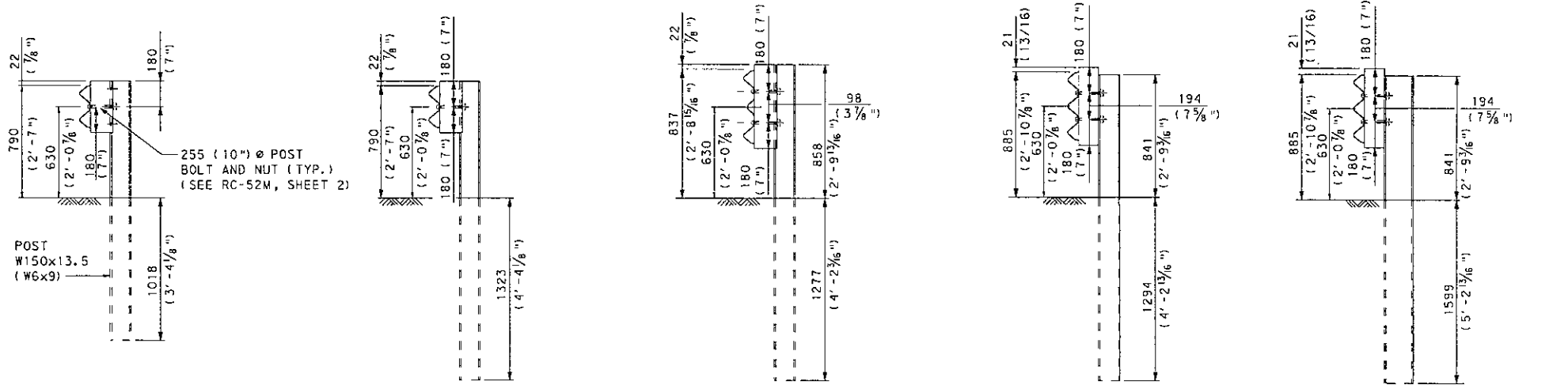
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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

RECOMMENDED APR. 15, 2004 <i>Don A. Schindler</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. J. Patel</i> CHIEF ENGINEER	SHT 6 OF 16 RC-50M
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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)



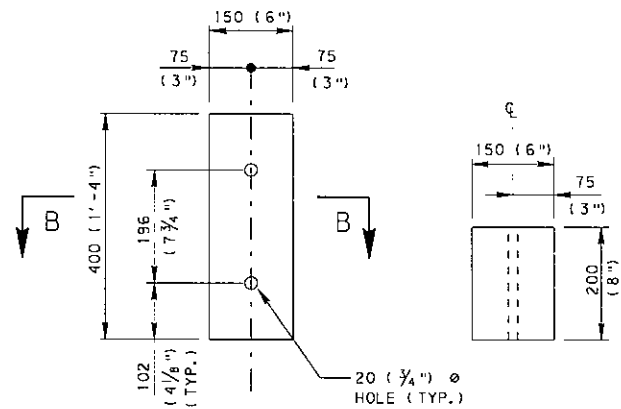
BEYOND POST 9 (AT W-BEAM RAIL ELEMENT)
SEE NOTE 7, SHEET 1. FOR POST DETAILS SEE RC-52M, SHEET 1.

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

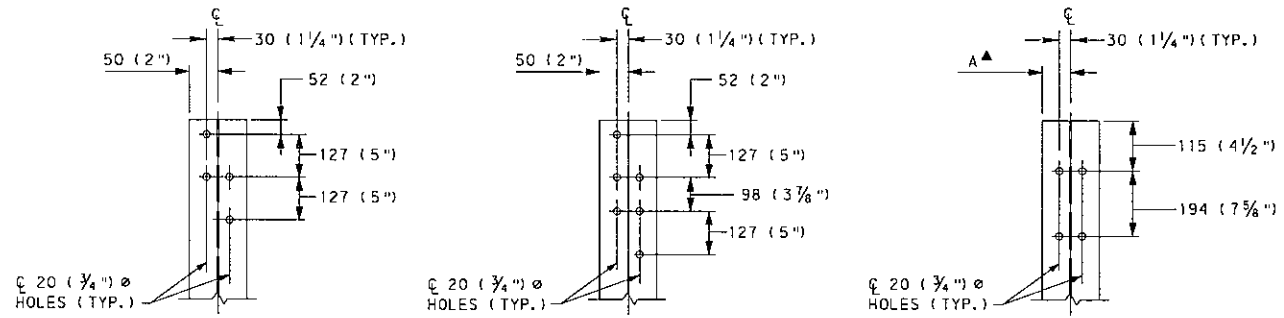
W150x13.5 (W6x9) STEEL POST
2135 (7'-0") LONG w/150x200x458 (6"x8"x1'-5 1/8") ROUTED OFFSET BRACKET

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

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

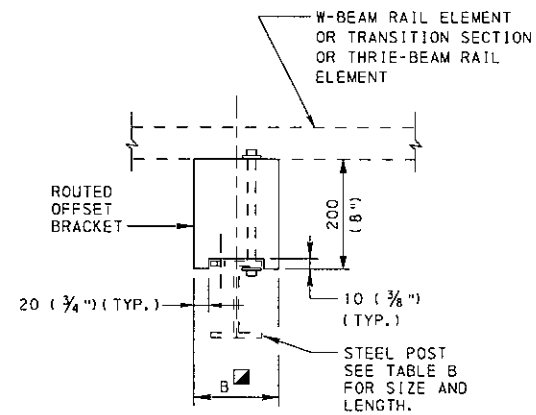


ELEVATION SECTION B-B
MIDSPAN TUBE
WOOD OFFSET BRACKET

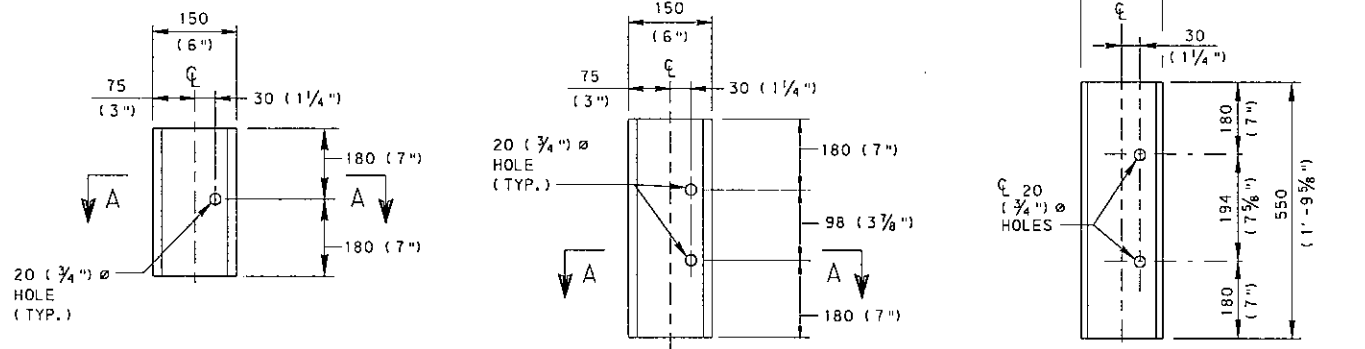


POST 9 POST 8 POSTS 1 THRU 7*

- * 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 3/8") FOR W200x31.3 (W8x21)
- B= 150 (6") FOR W150x13.5 (W6x9)
B= 180 (7 1/4") FOR W200x31.3 (W8x21)



SECTION A-A



ROUTED OFFSET BRACKET DETAILS

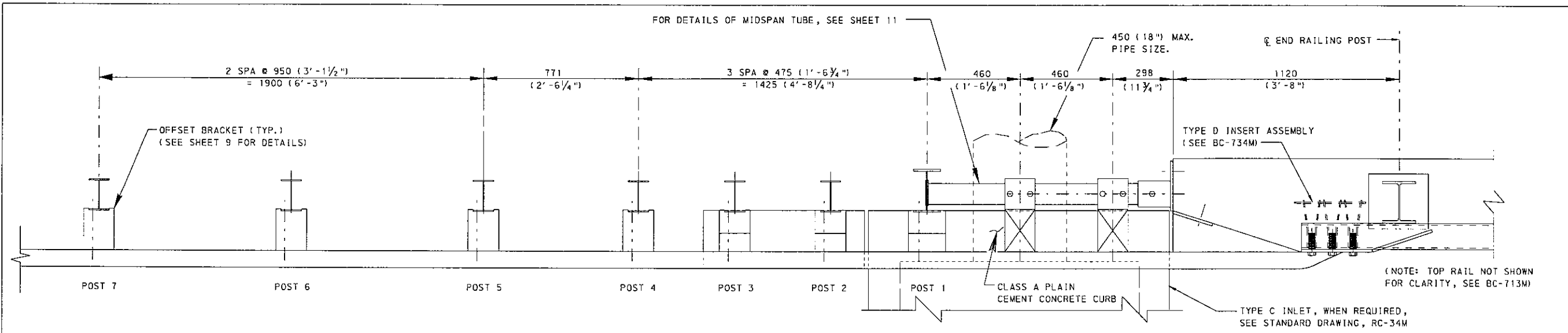
- NOTES:
- FOR LOCATION OF POSTS, SEE SHEET 4.
 - FOR ADDITIONAL NOTES, SEE SHEET 1.

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

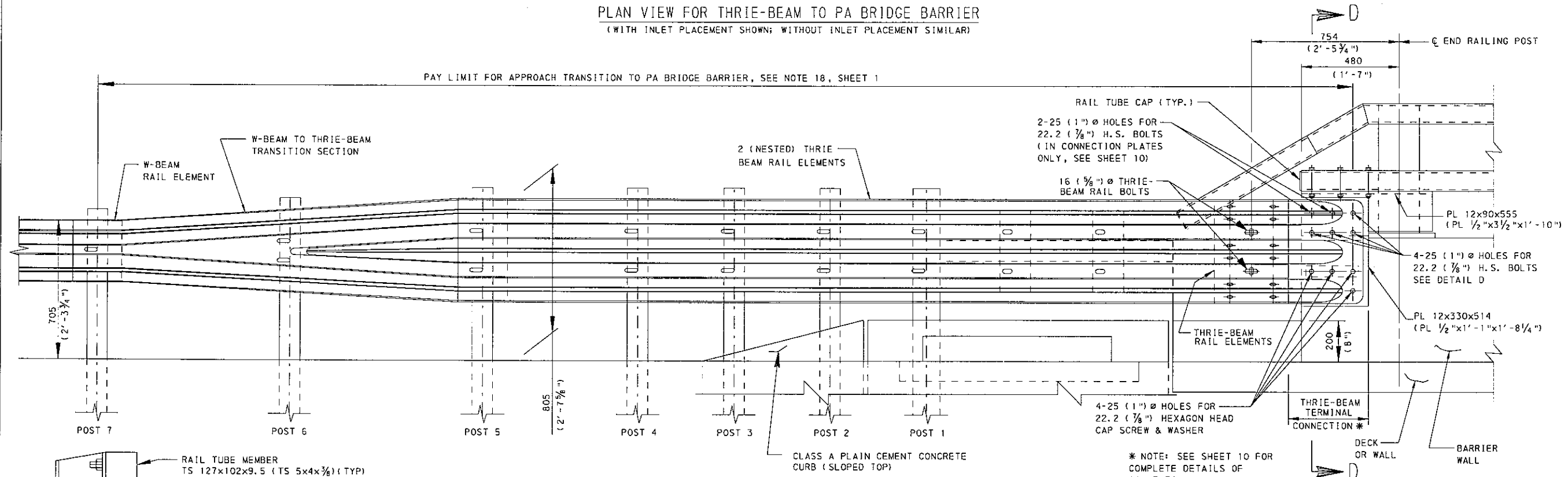
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

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

RECOMMENDED APR. 15, 2004 <i>Don A. Schindler</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. L. Patel</i> CHIEF ENGINEER	SHT 7 OF 16 RC-50M
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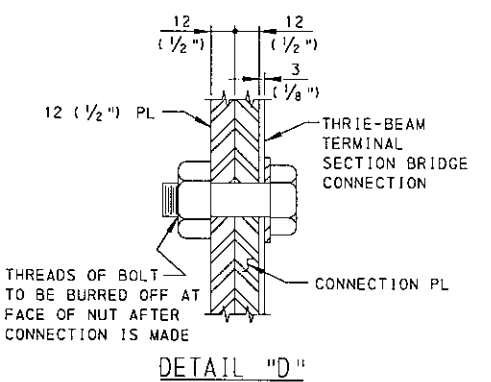
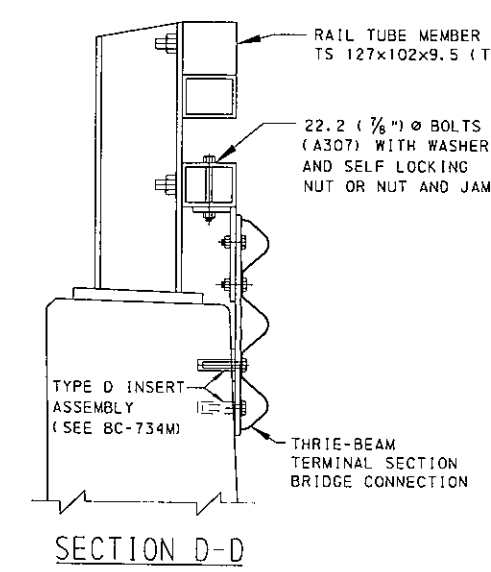


PLAN VIEW FOR THRIE-BEAM TO PA BRIDGE BARRIER
(WITH INLET PLACEMENT SHOWN; WITHOUT INLET PLACEMENT SIMILAR)



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.



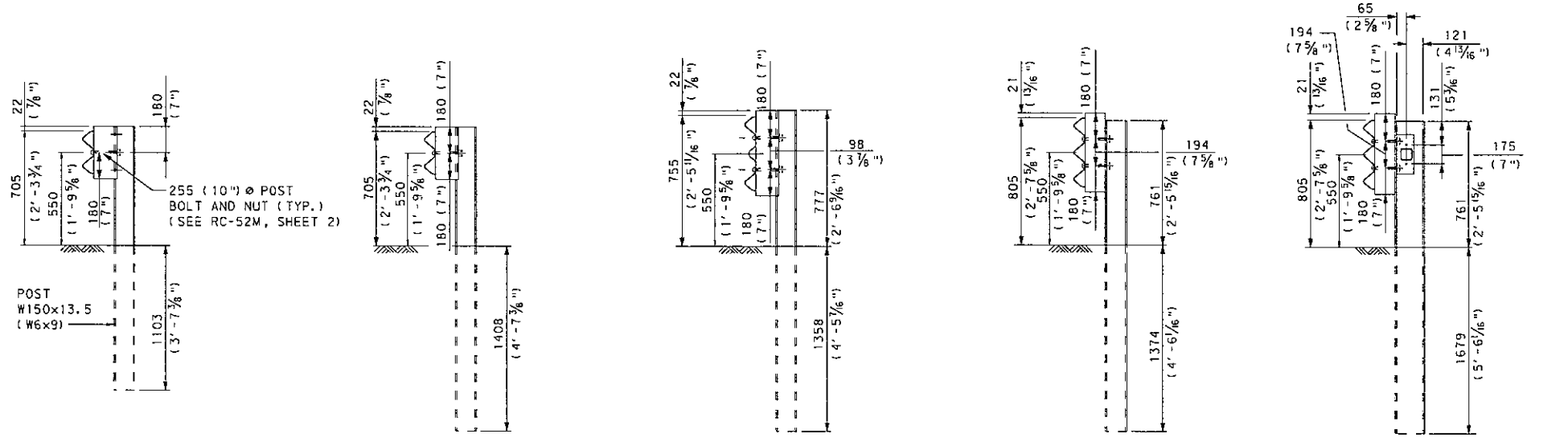
- NOTES:
1. W-BEAM RAIL ELEMENT, TRANSITION SECTION AND THRIE BEAM RAIL ELEMENT ARE BOLTED TO ALL POSTS.
 2. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 9.
 3. FOR ADDITIONAL PA BRIDGE BARRIER NOTES, SEE SHEET 1.
 4. SEE BC-712M FOR PA BRIDGE BARRIER DETAILS AND HARDWARE NOT SHOWN.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GUIDE RAIL TO BRIDGE BARRIER TRANSITIONS

THRIE-BEAM TO PA BRIDGE BARRIER

RECOMMENDED APR. 15, 2004 <i>Don A. Schindler</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. J. Patel</i> CHIEF ENGINEER	SHT 8 OF 16 RC-50M
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BEYOND POST 7
(AT W-BEAM RAIL ELEMENT)
SEE NOTE 7, SHEET 1.
FOR POST DETAILS SEE RC-52M, SHEET 1.

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

POST 6
W150x13.5 (W6x9) STEEL POST
2135 (7'-0") LONG w/150x200x458 (6"x8"x1'-5 3/8") ROUTED OFFSET BRACKET

POSTS 2 THRU 5
W150x13.5 (W6x9) STEEL POST
2135 (7'-0") LONG w/ROUTED OFFSET BRACKET (SEE DETAIL)

POST 1
W200x31.3 (W8x21) STEEL POSTS
2440 (8'-0") LONG w/ROUTED OFFSET BRACKET (SEE DETAIL)

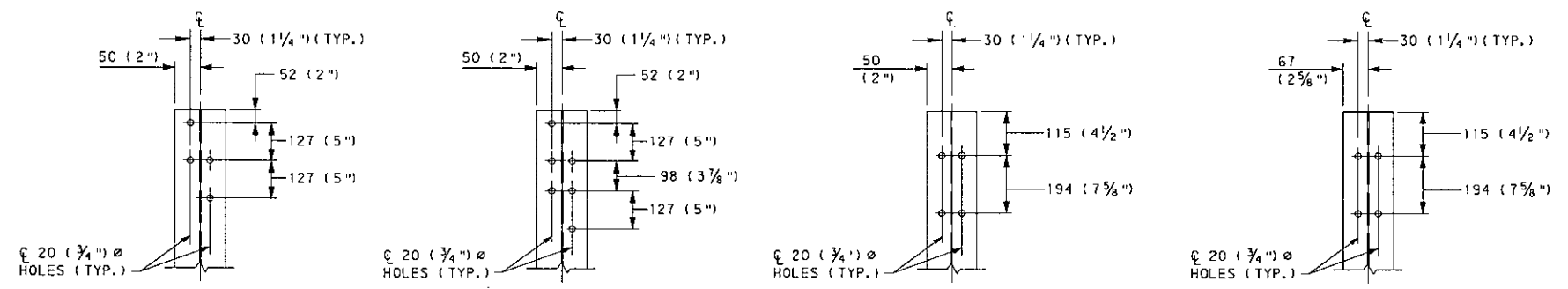
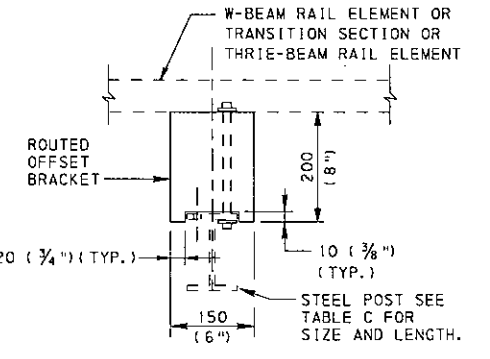
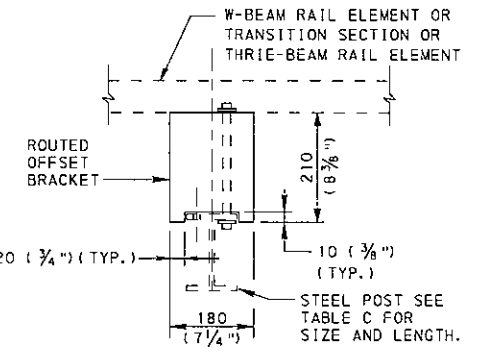
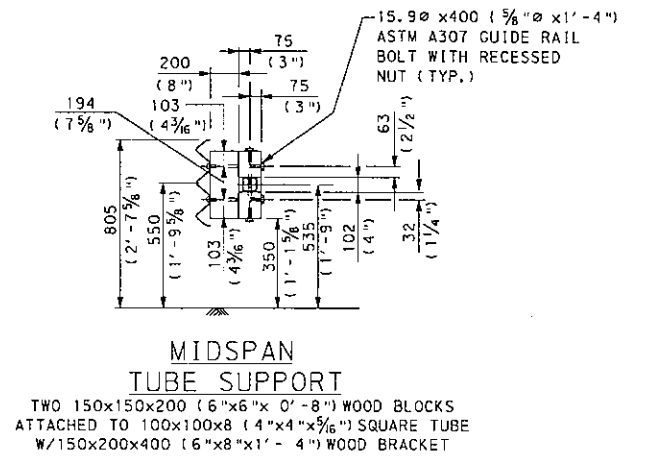
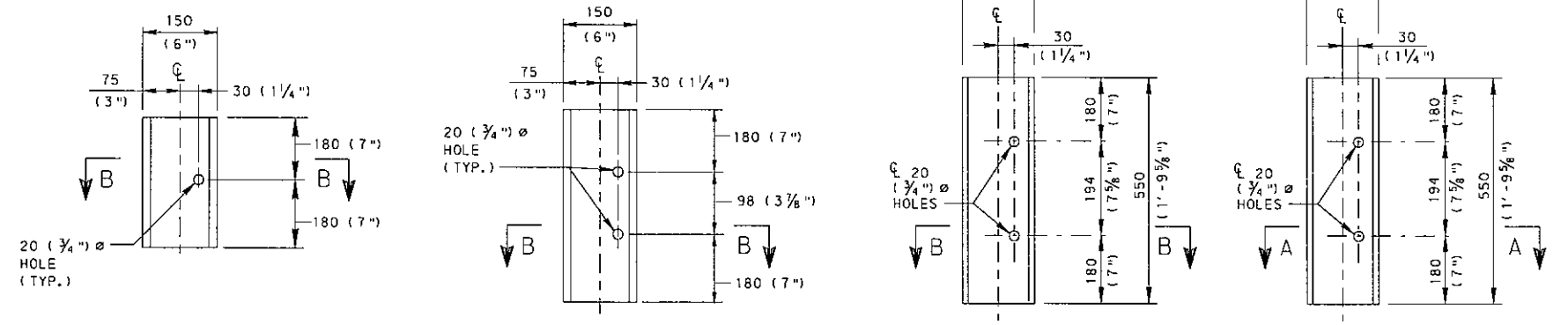


TABLE C		
POSTS	LENGTH	SIZE
1	2440 (8'-0")	W200x31.3 (W8x21)
2 THRU 7	2135 (7'-0")	W150x13.5 (W6x9)
BEYOND 7	1830 (6'-0")	W150x13.5 (W6x9)

POST DETAILS



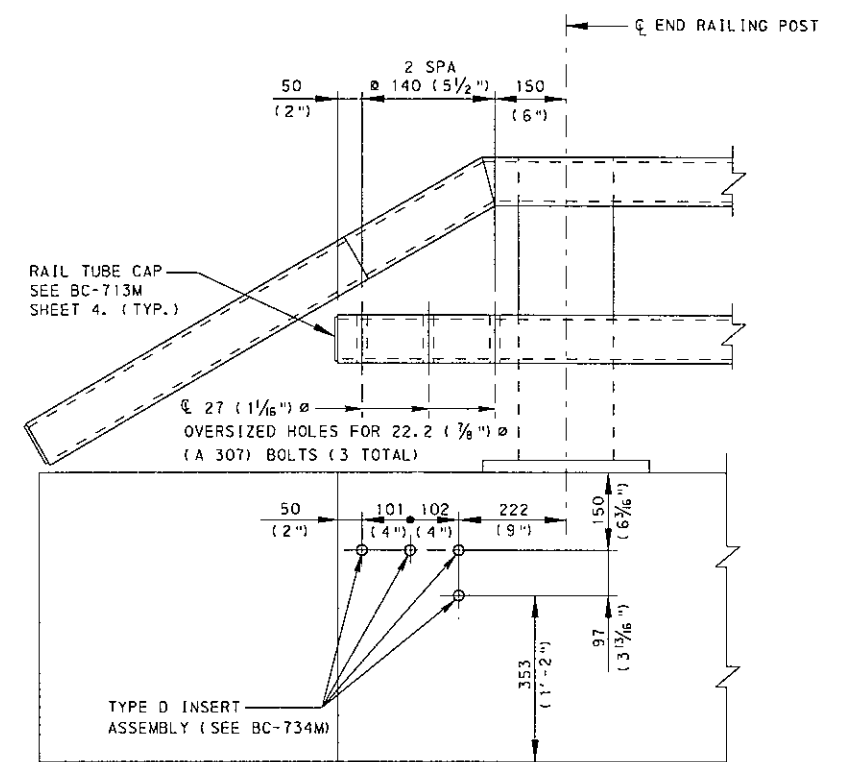
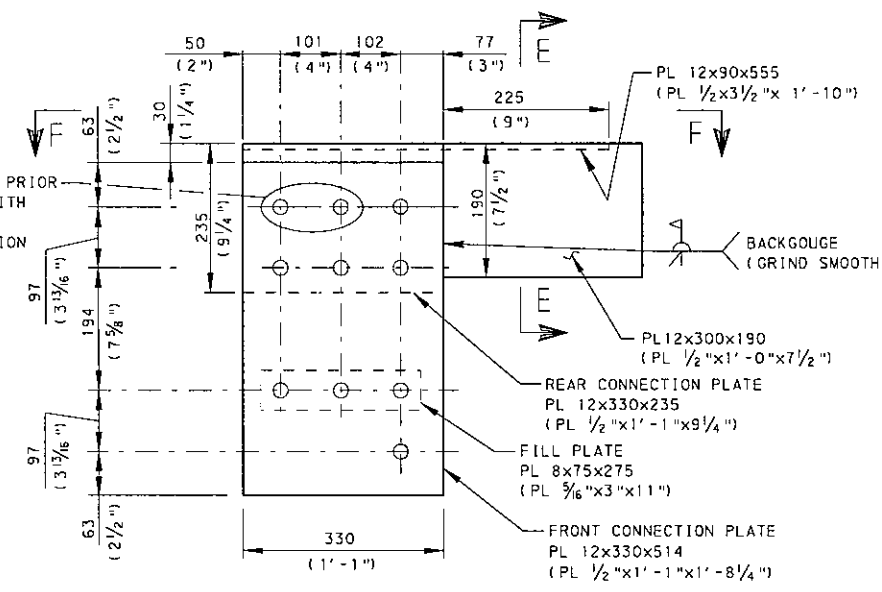
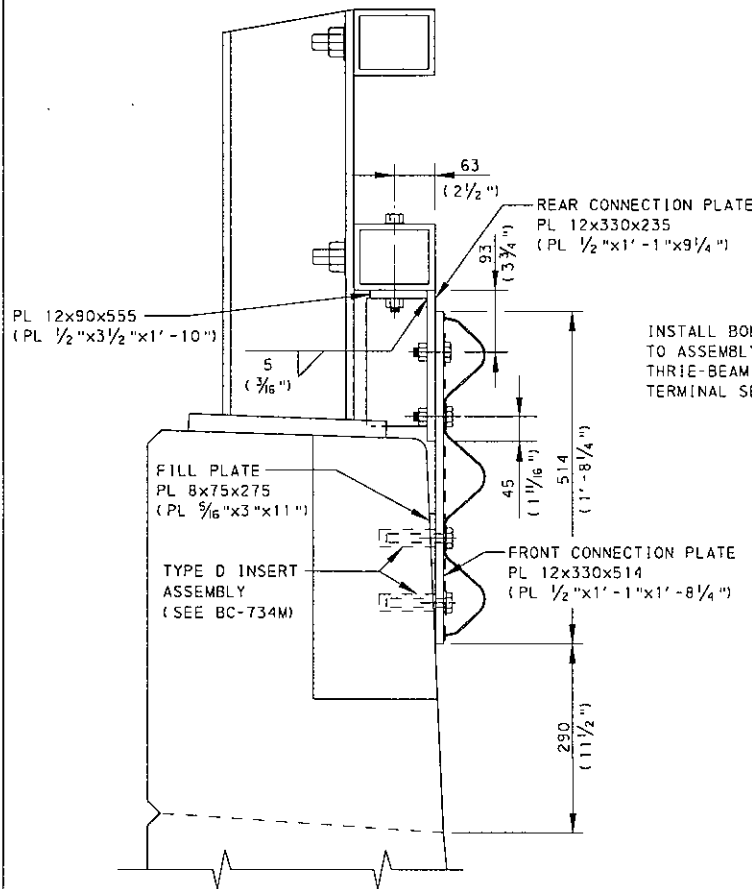
ROUTED OFFSET BRACKET DETAILS

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

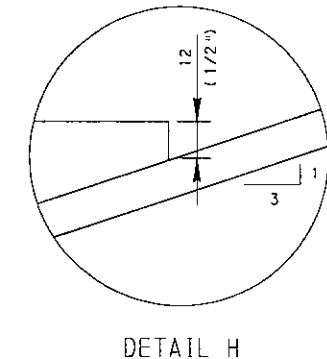
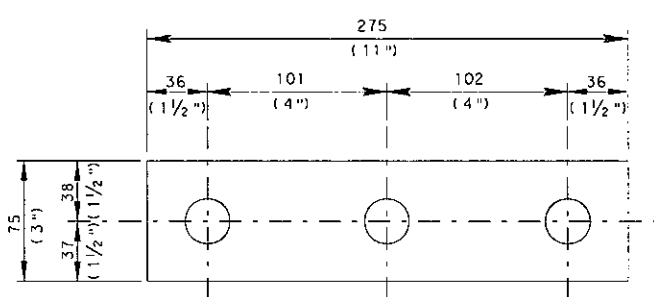
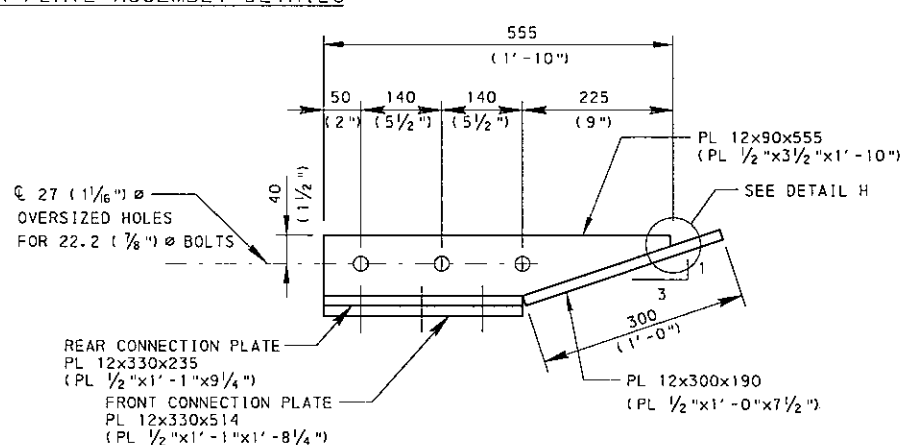
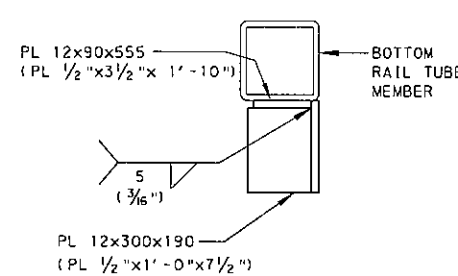
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

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

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



CONNECTION PLATE ASSEMBLY DETAILS



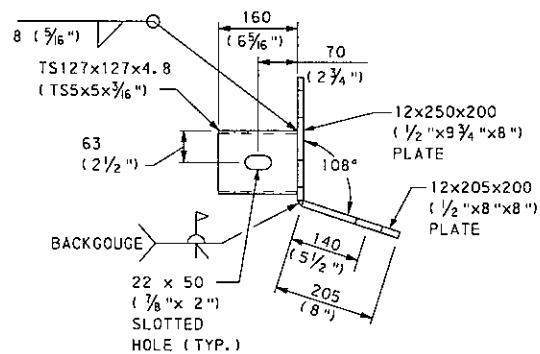
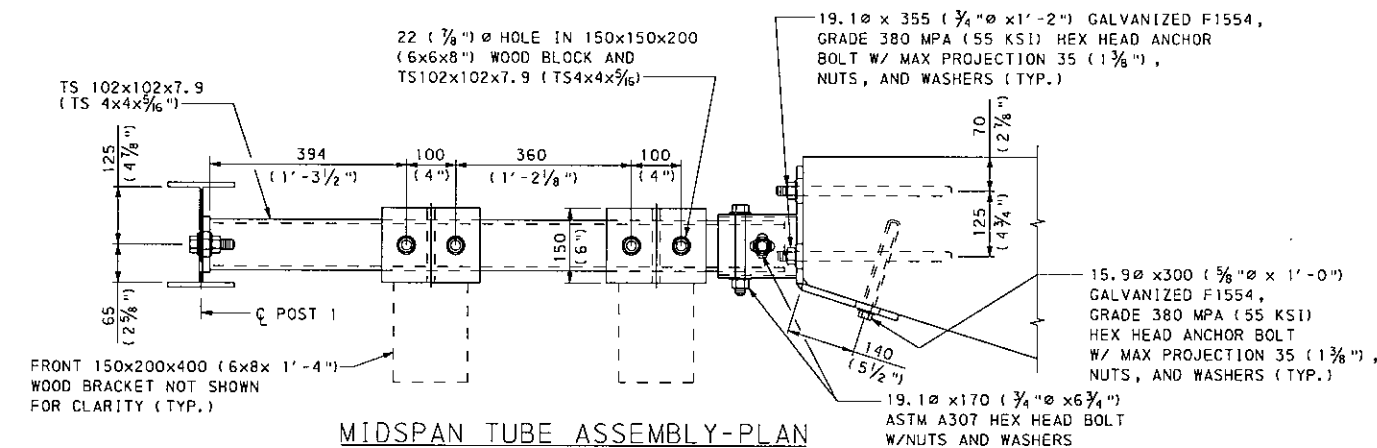
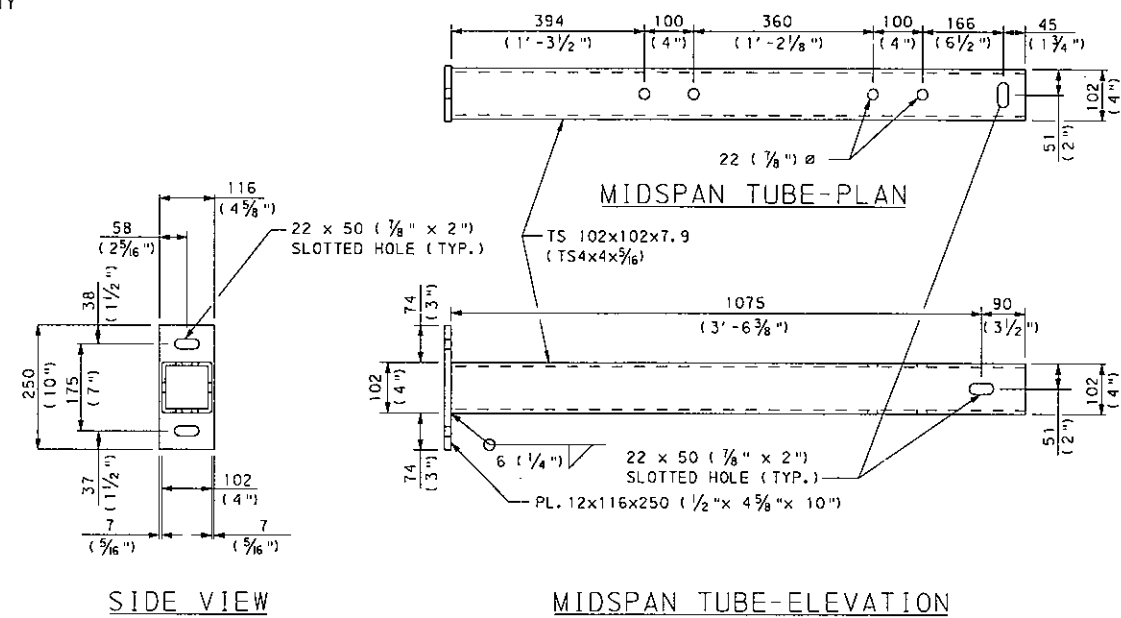
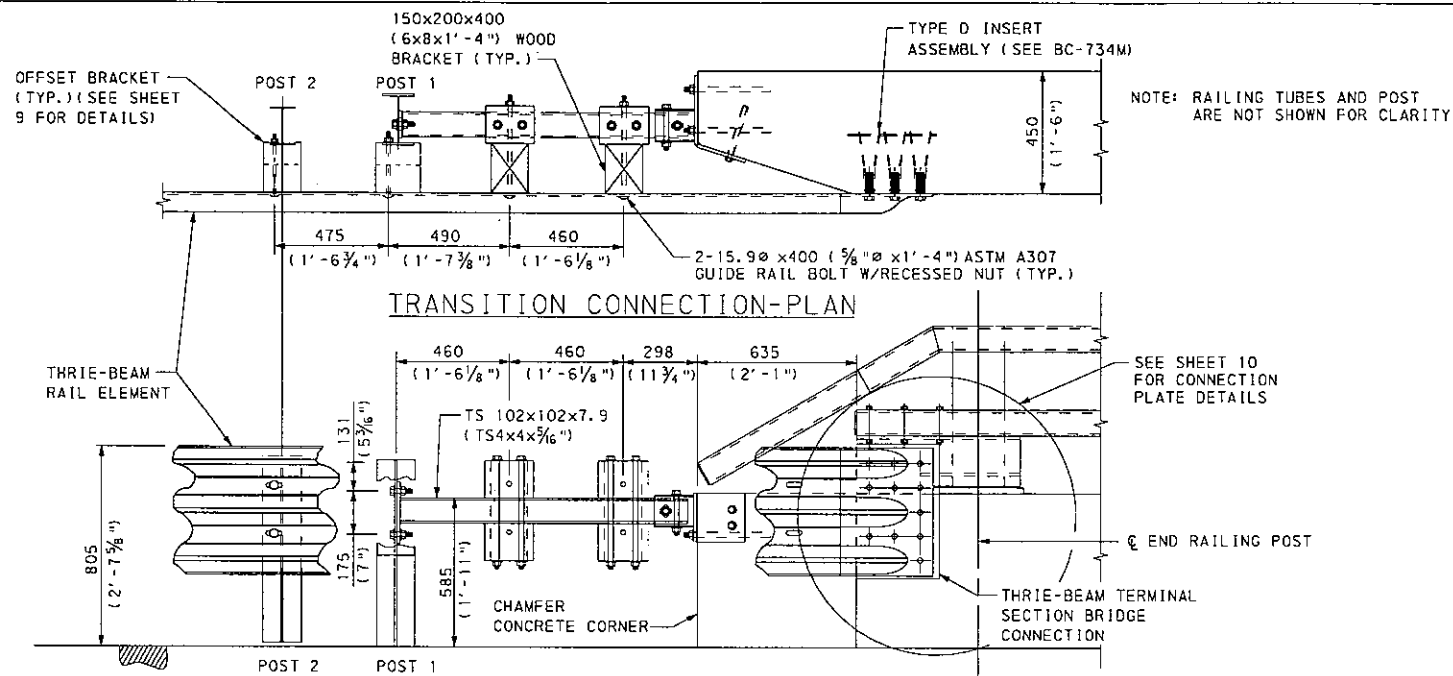
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

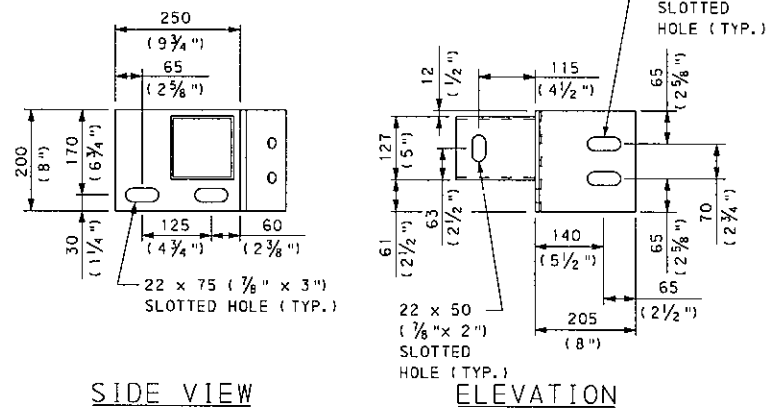
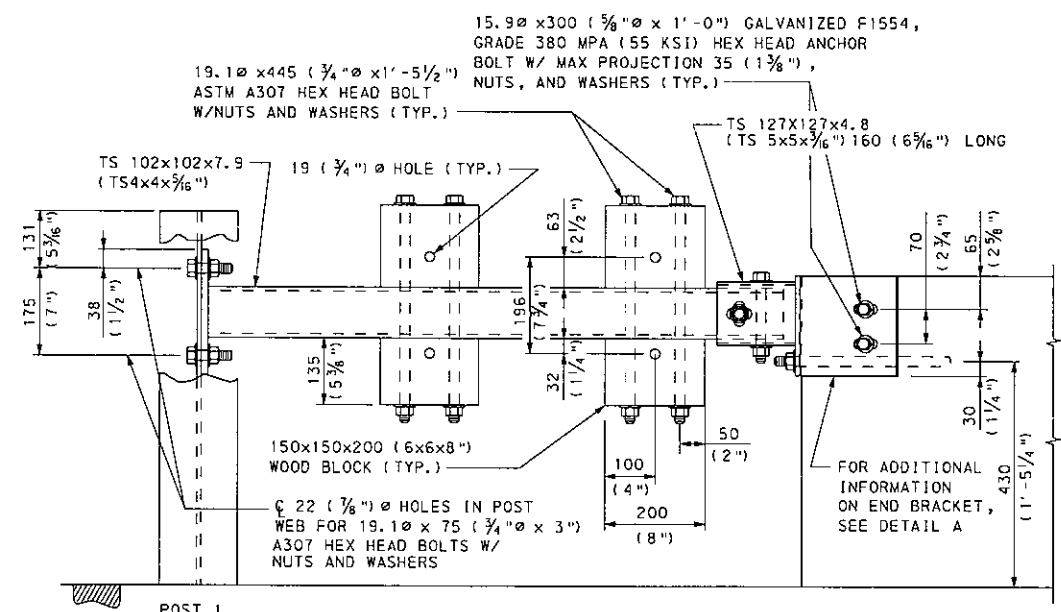
GUIDE RAIL TO BRIDGE
BARRIER TRANSITIONS

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.



- NOTES:
1. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 9.
 2. FOR APPROACH TRANSITION POST LOCATIONS, SEE SHEET 8.
 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

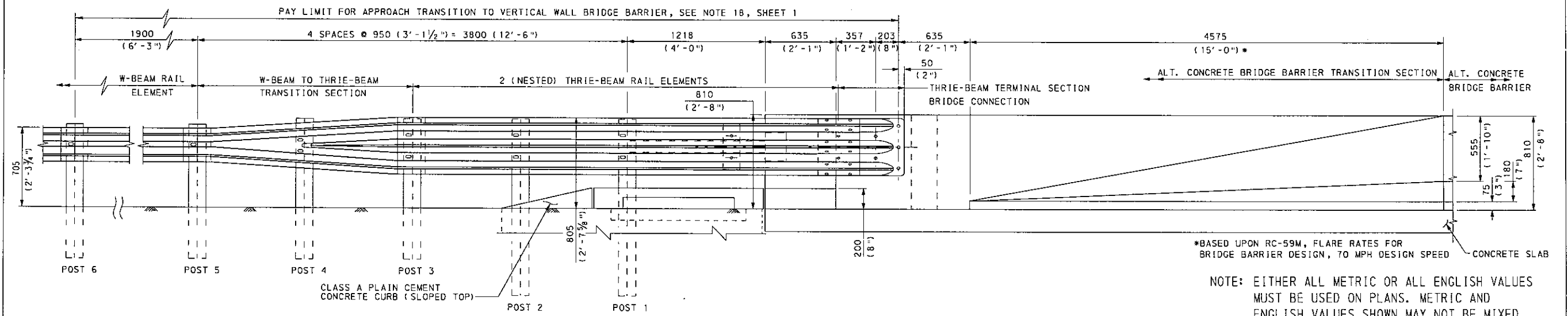
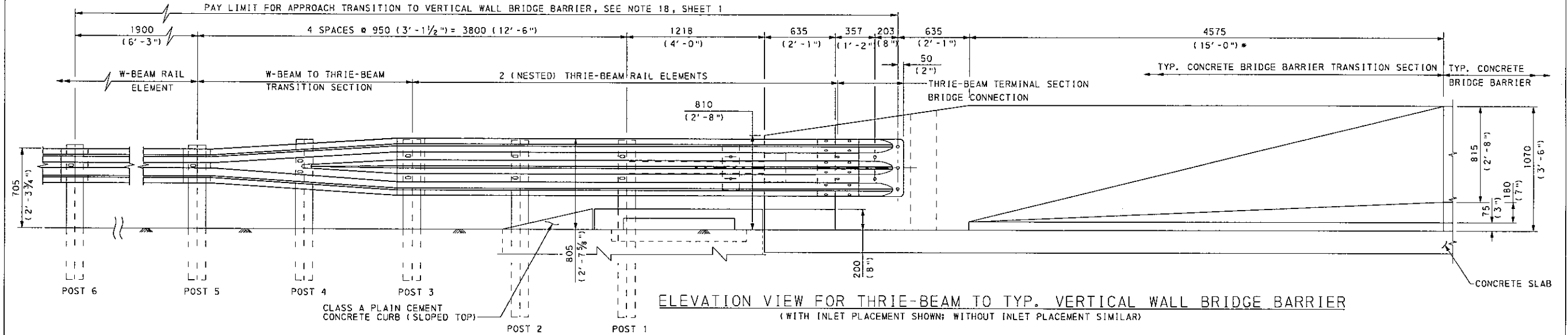
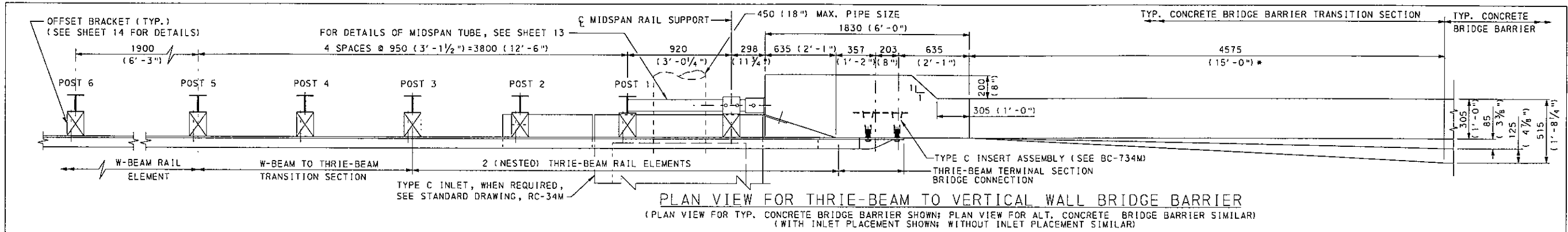
GUIDE RAIL TO BRIDGE
BARRIER TRANSITIONS

THRIE-BEAM TO PA BRIDGE BARRIER
MIDSPAN TUBE ASSEMBLY DETAILS

RECOMMENDED APR. 15, 2004 RECOMMENDED APR. 15, 2004 SHT 11 OF 16

Dean A. Schindler m. J. Patel
DIRECTOR, BUREAU OF DESIGN CHIEF ENGINEER

RC-50M



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

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

NOTES:

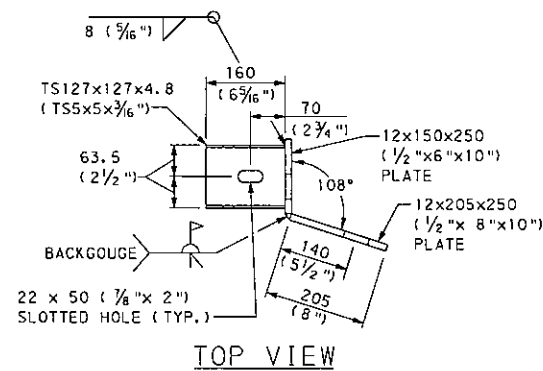
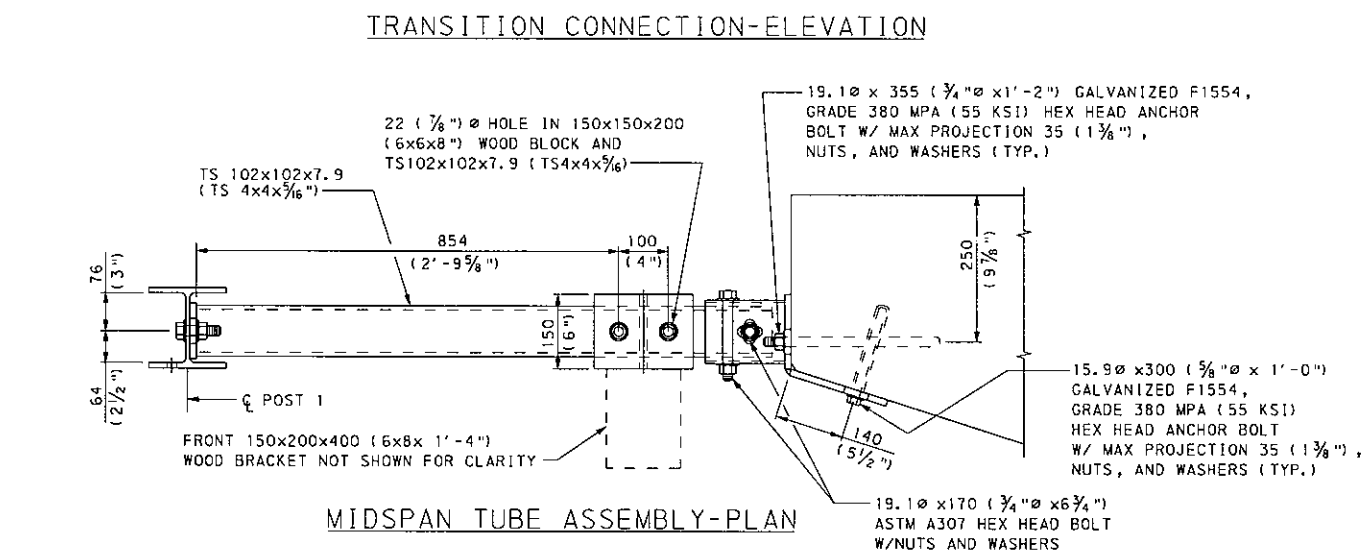
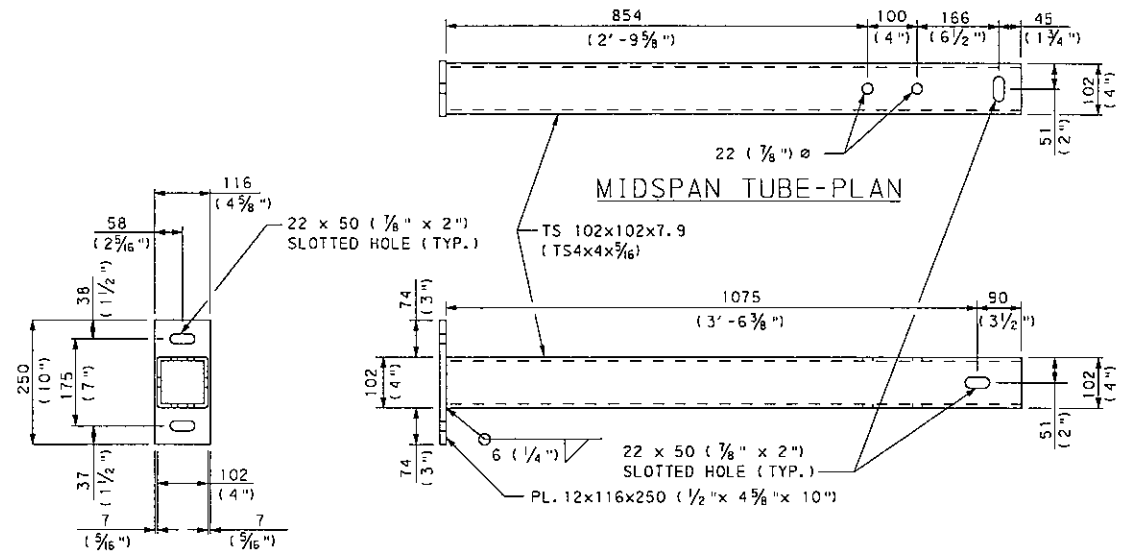
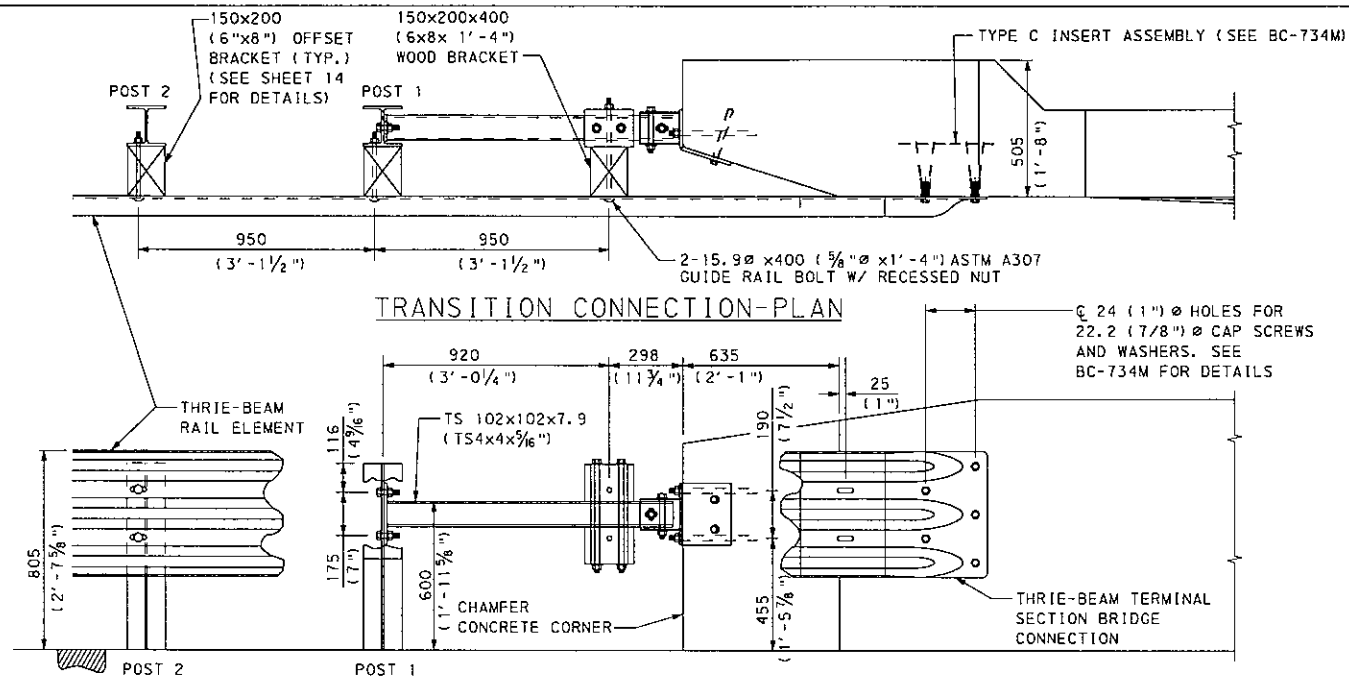
1. W-BEAM RAIL ELEMENT, TRANSITION SECTION AND THRIE-BEAM RAIL ELEMENT ARE BOLTED TO ALL POSTS.
2. FOR APPROACH TRANSITION POST DETAILS, SEE SHEET 14.
3. SEE BC-703M FOR BRIDGE BARRIER DETAILS AND HARDWARE NOT SHOWN.
4. SEE STRUCTURE DRAWINGS FOR OTHER BRIDGE BARRIER DETAILS AND DIMENSIONS.
5. FOR ADDITIONAL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

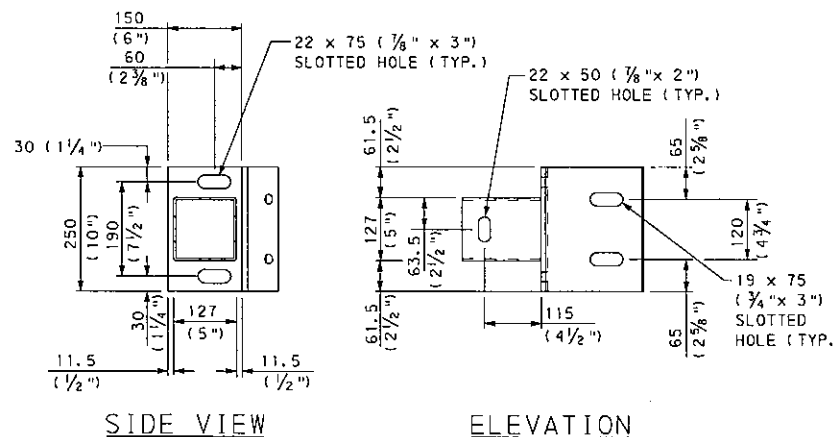
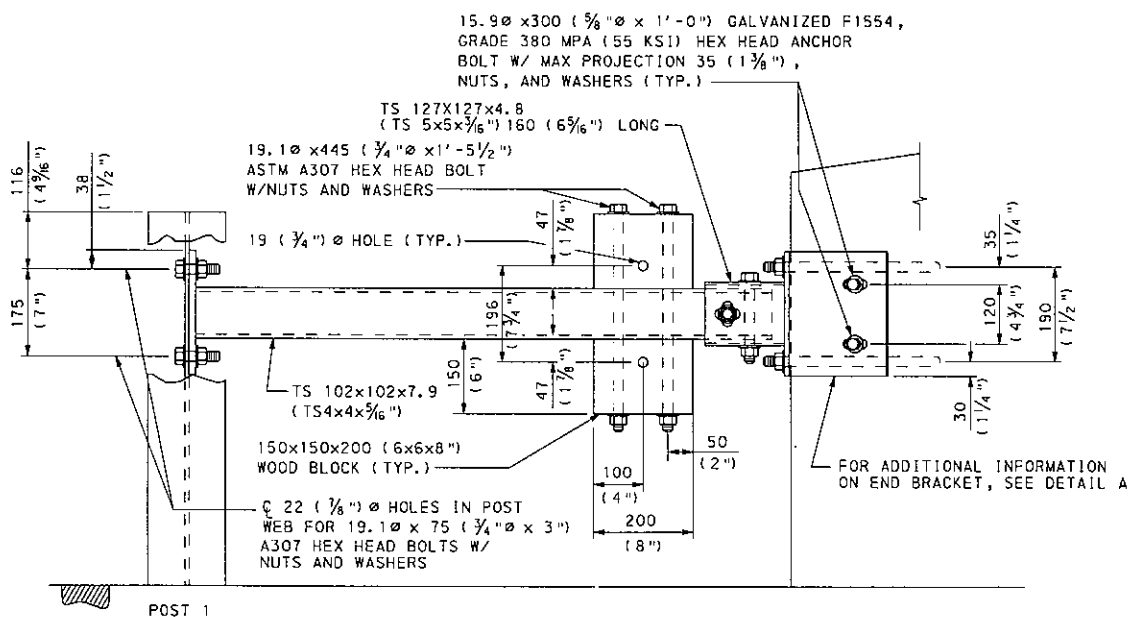
RECOMMENDED APR. 15, 2004 <i>Dean A. Schaefer</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. J. Patel</i> CHIEF ENGINEER	SHT 12 OF 16 RC-50M
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NOTES:

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.

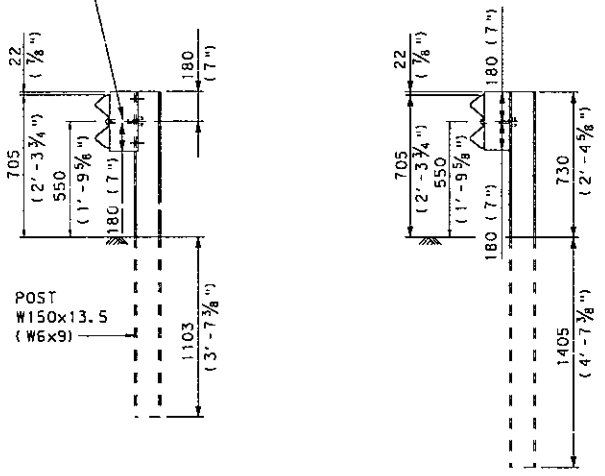
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



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

255 (10") POST BOLT AND NUT (TYP.) (SEE RC-52M, SHEET 2)



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

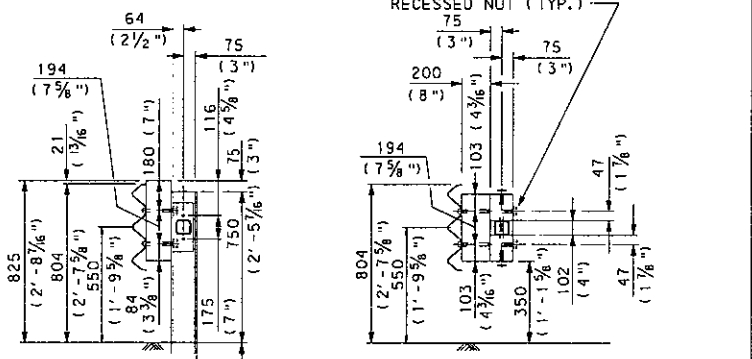
W150x22 (W6x15) STEEL POST 2135 (7'-0") LONG w/ 150x200x458 (6"x8"x1'-6") OFFSET BRACKET

POST 2

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

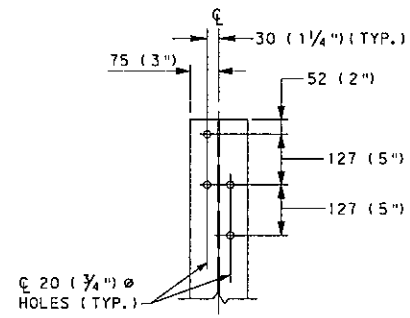
POST 1

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

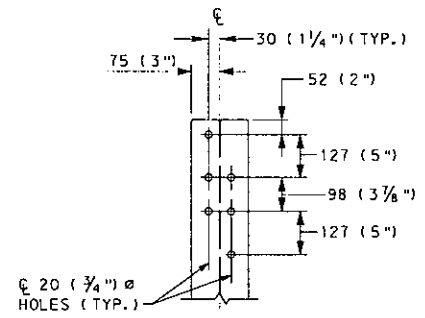


MIDSPAN TUBE SUPPORT

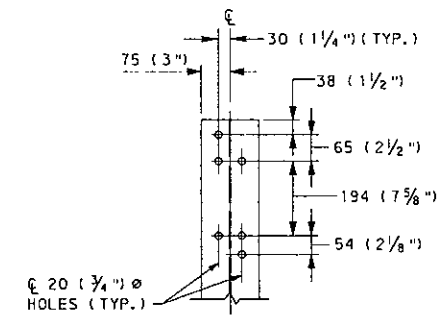
TWO 150x150x200 (6"x6"x0'-8") WOOD BLOCKS ATTACHED TO 100x100x8 (4"x4"x3/8") SQUARE TUBE w/ 150x200x400 (6"x8"x1'-4") WOOD BRACKET



POSTS 5 AND 6



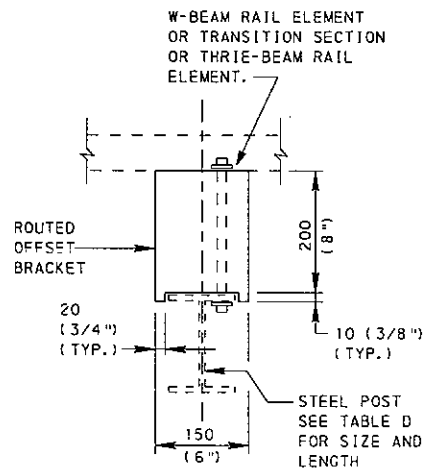
POST 4



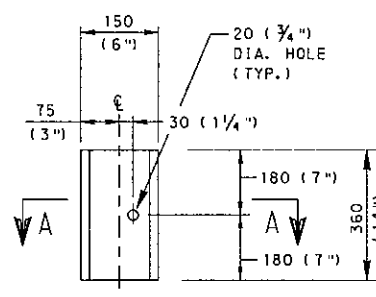
POSTS 1 THRU 3

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)

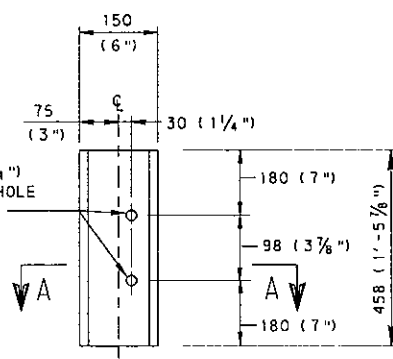
POST DETAILS



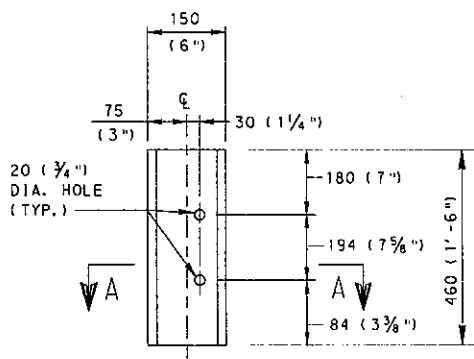
SECTION A-A



POSTS 5 AND 6



POST 4



POSTS 1 THRU 3

OFFSET BRACKET DETAILS

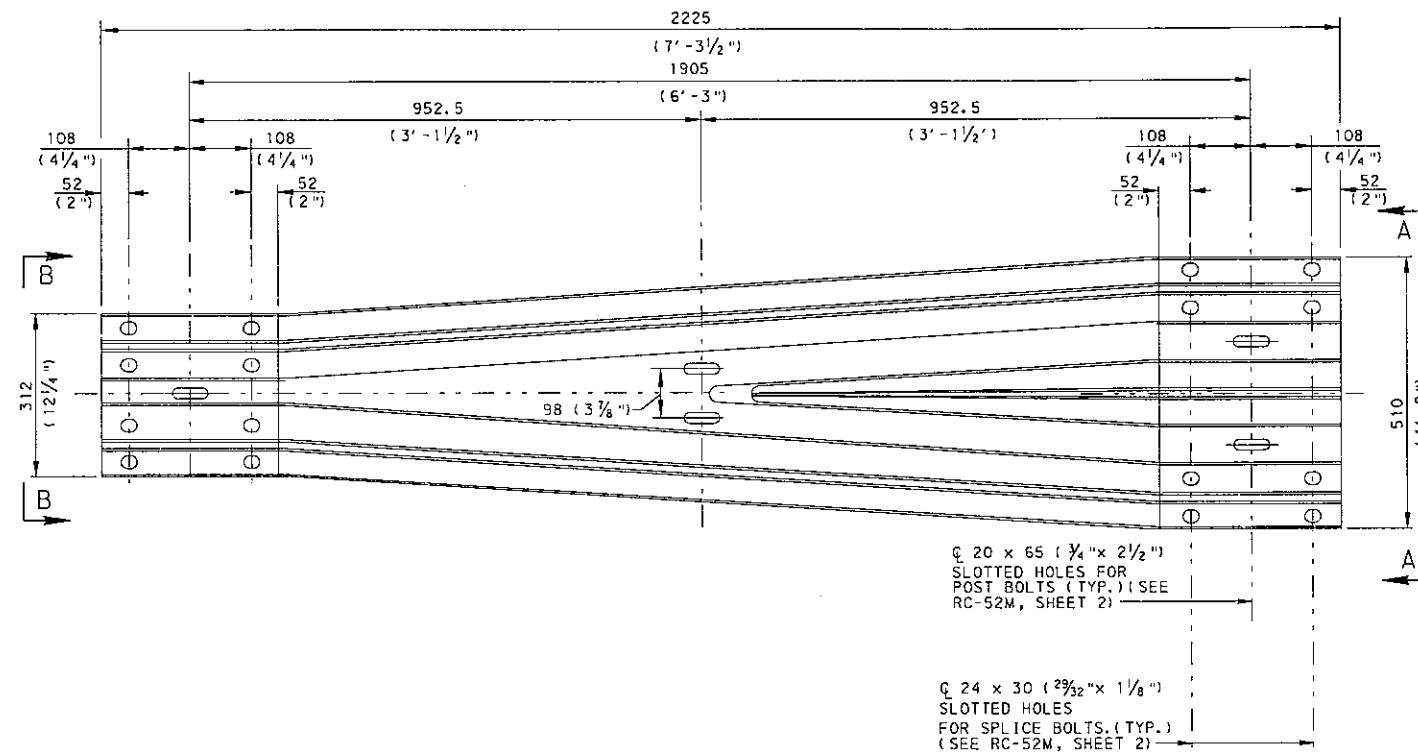
NOTES:

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

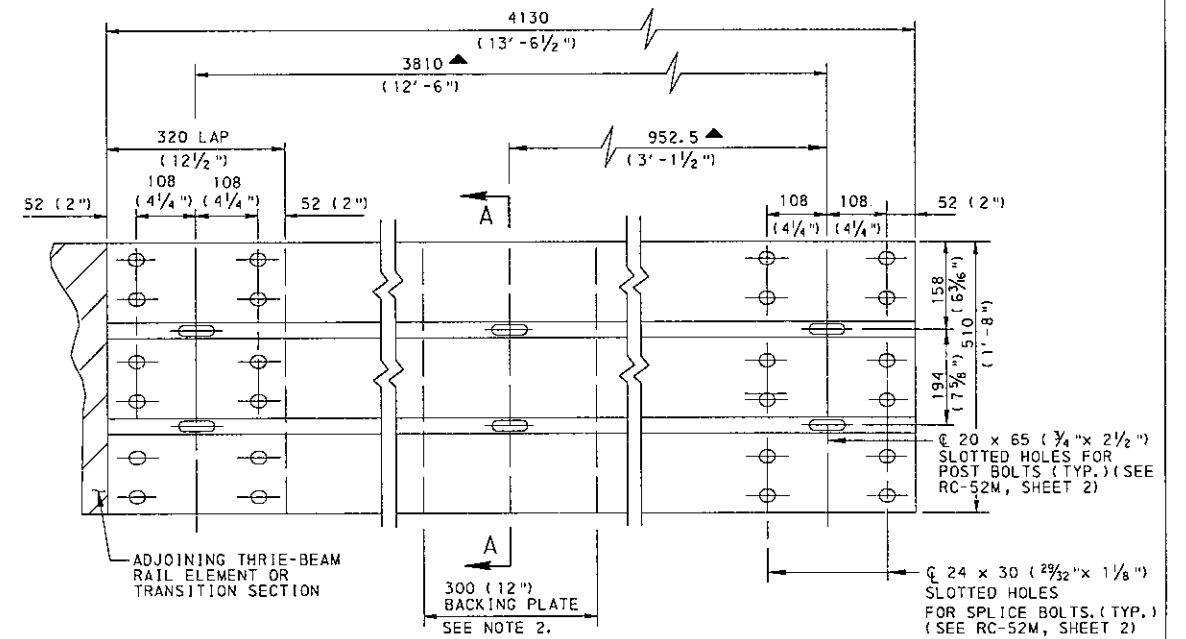
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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



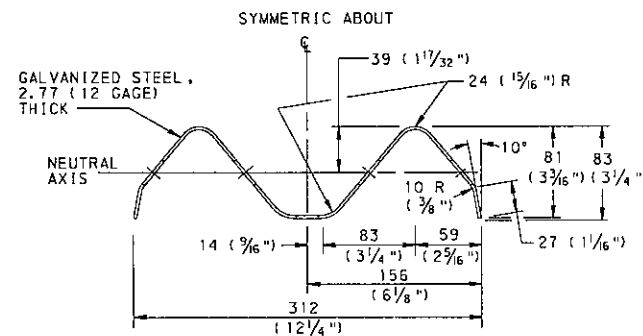
THRIE-BEAM RAIL ELEMENT

▲ 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.

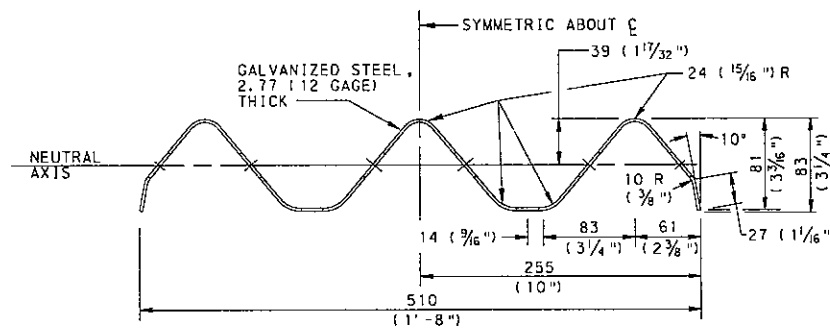
NOTES:

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.



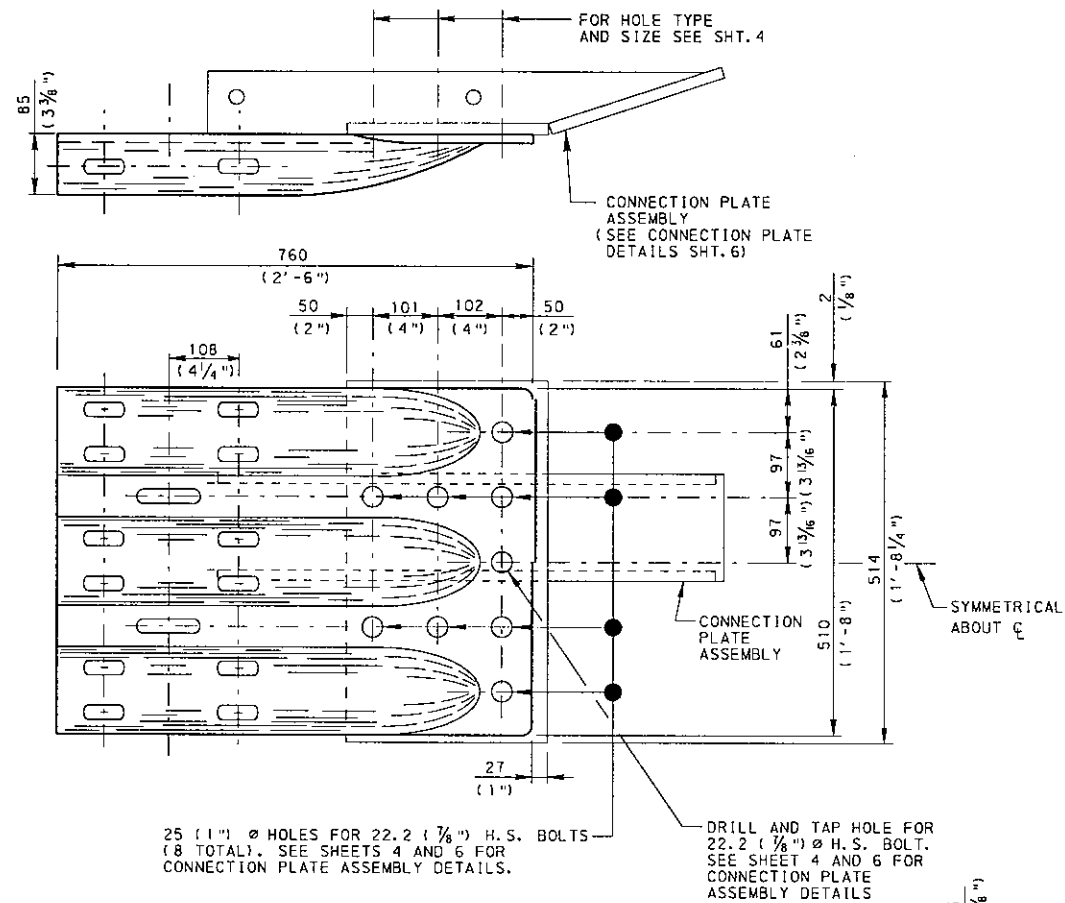
RAIL ELEMENT
SECTION B-B



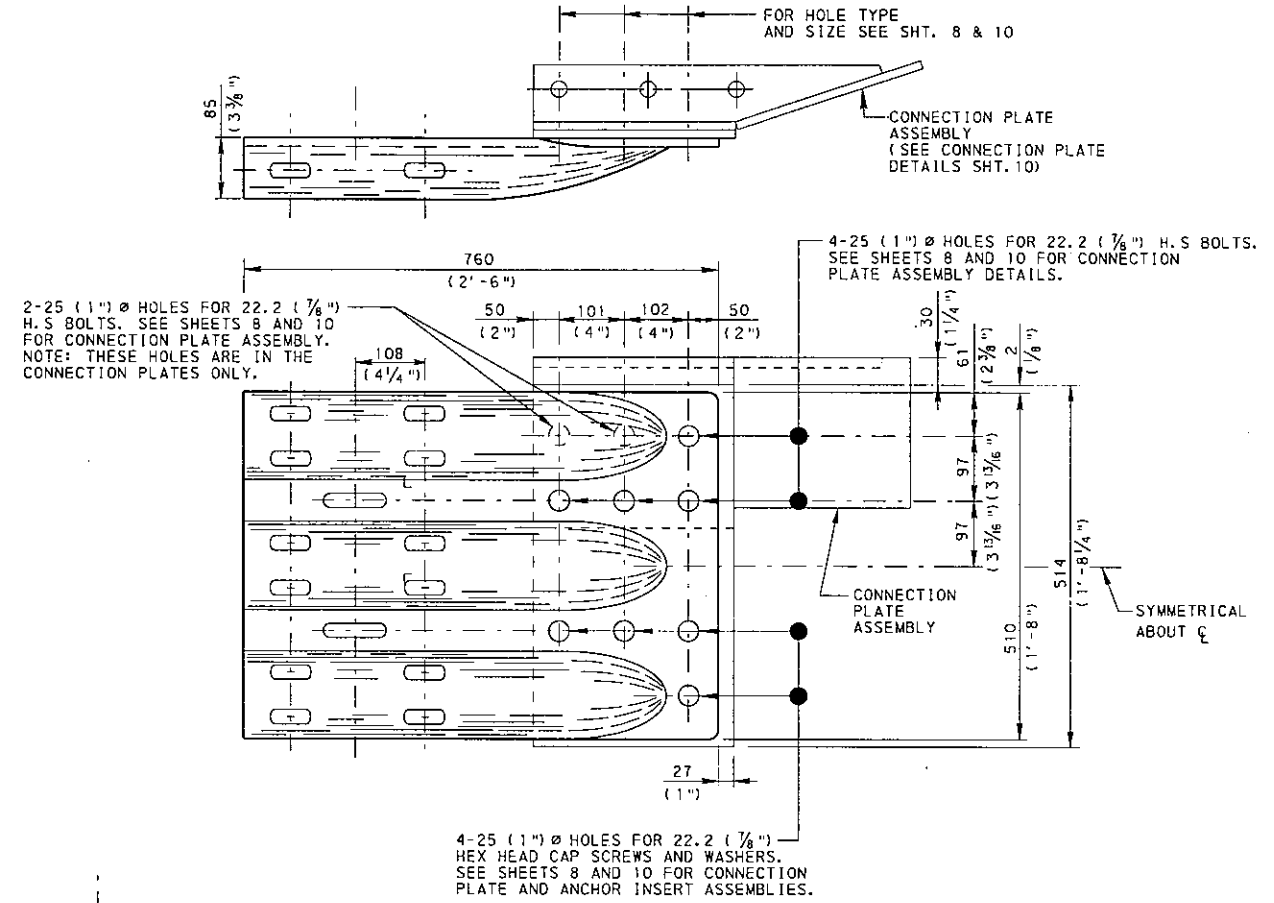
THRIE BEAM RAIL ELEMENT
SECTION A-A
(BACKING PLATE NOT SHOWN FOR CLARITY)

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

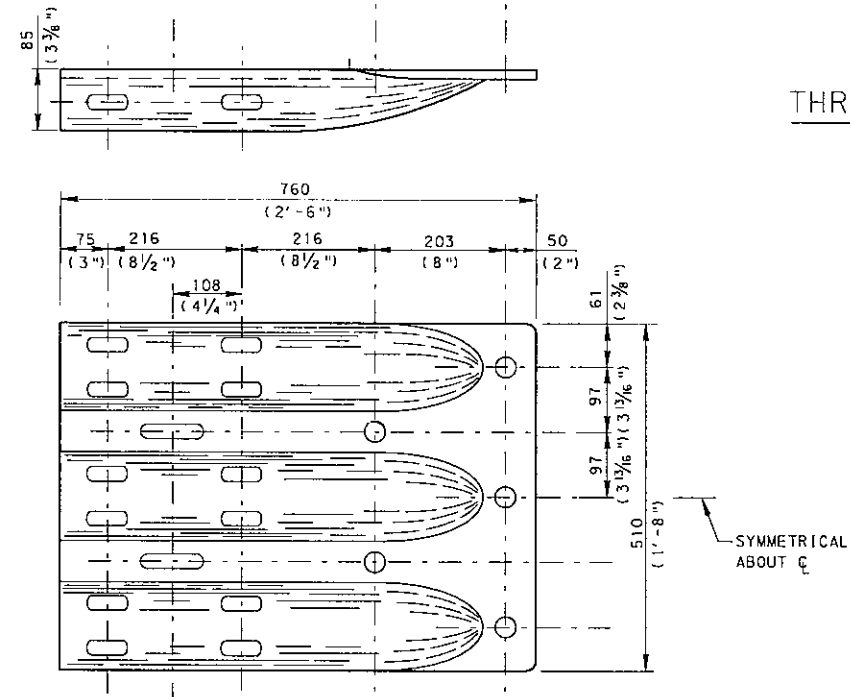
GUIDE RAIL TO BRIDGE
BARRIER TRANSITIONS
THRIE-BEAM TRANSITION SECTION
AND
RAIL ELEMENT DETAILS



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



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



THREE-BEAM TERMINAL SECTION
AT VERTICAL WALL BRIDGE BARRIER

NOTES

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

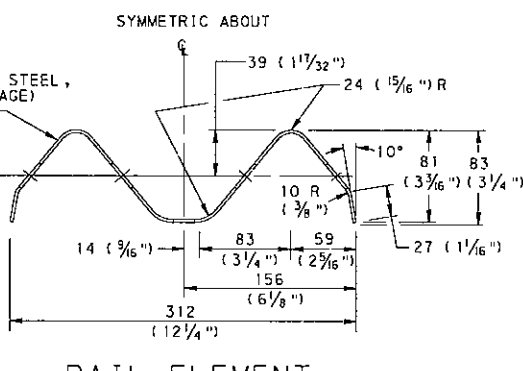
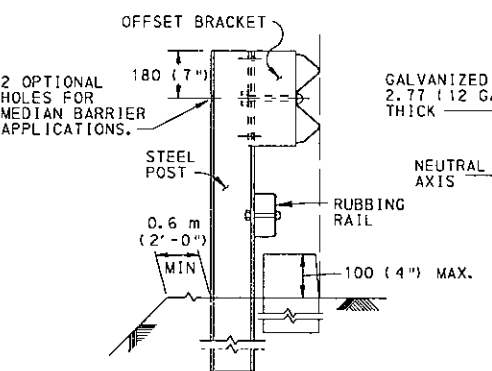
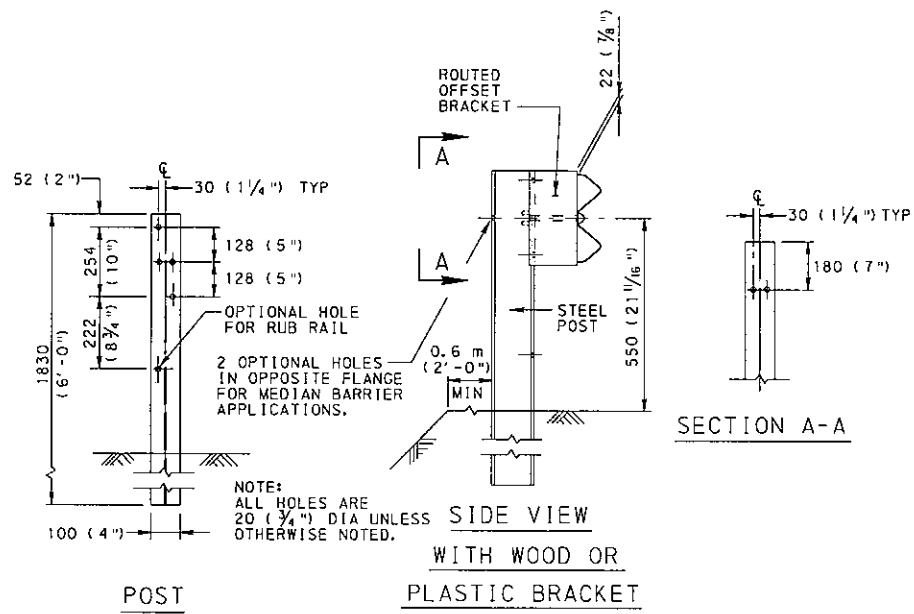
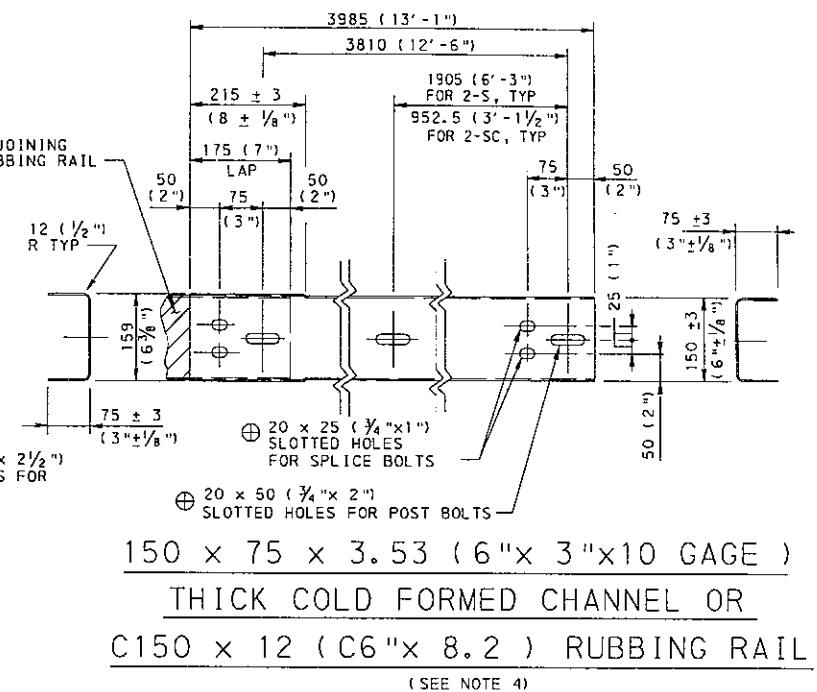
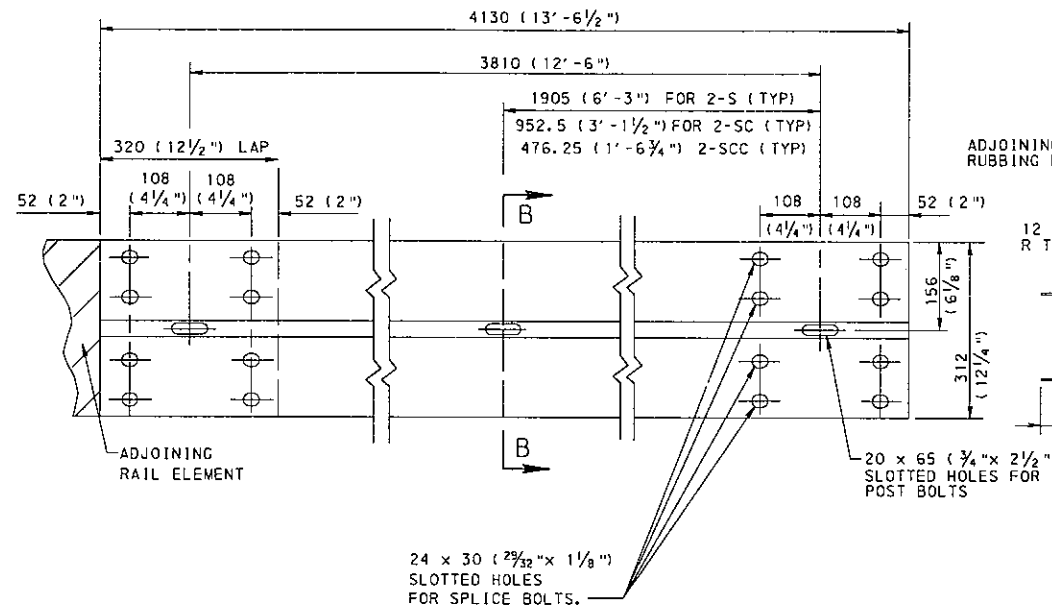
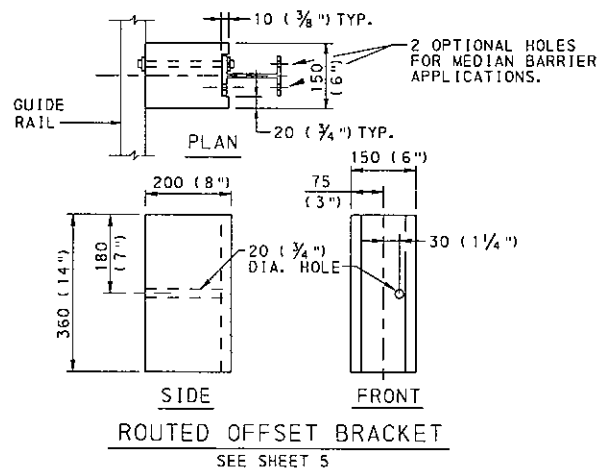
** PROVIDE SPLICE BOLTS WITH A LOCK NUT OR DOUBLE NUT AND TIGHTEN ONLY TO A POINT THAT ALLOWS GUIDE RAIL TO BE FREE TO MOVE. CENTER SPLICE BOLTS IN THE SLOTTED HOLES.

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

THREE-BEAM TERMINAL SECTION
BRIDGE CONNECTION DETAILS

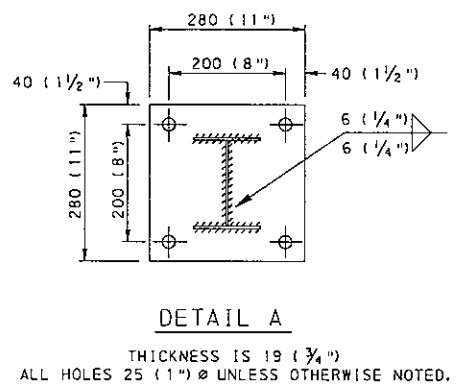
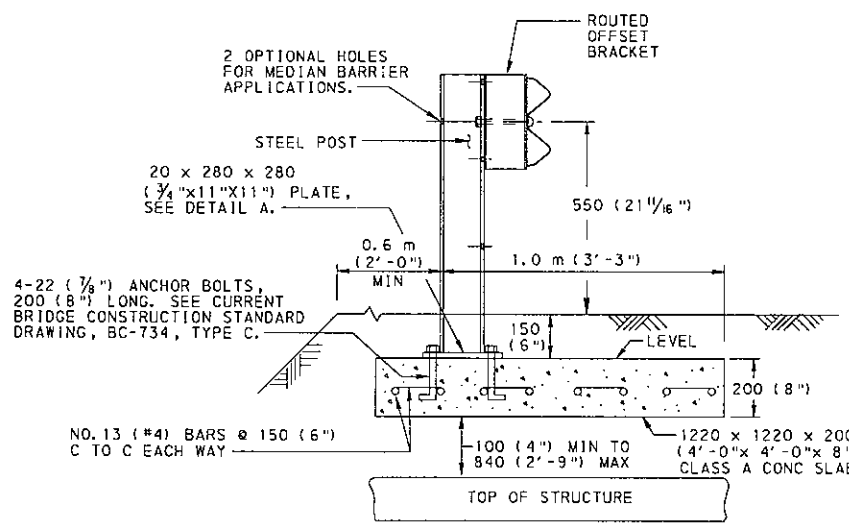


W150 x 13.5 (W6 x 8.5 or 9.0) POST DETAILS

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

RAIL ELEMENT SECTION B-B

- NOTES
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 620.
 2. PROVIDE STEEL I-BEAM #150x13.5 (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.

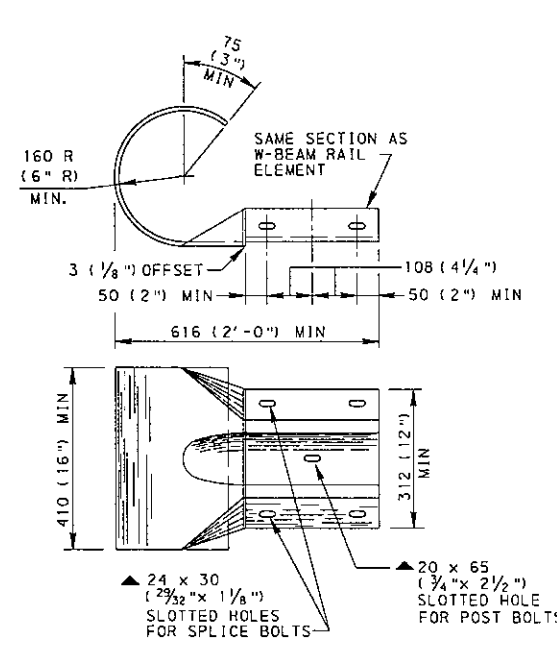


STEEL POSTS OVER UNDERGROUND STRUCTURES (SEE NOTE 3)

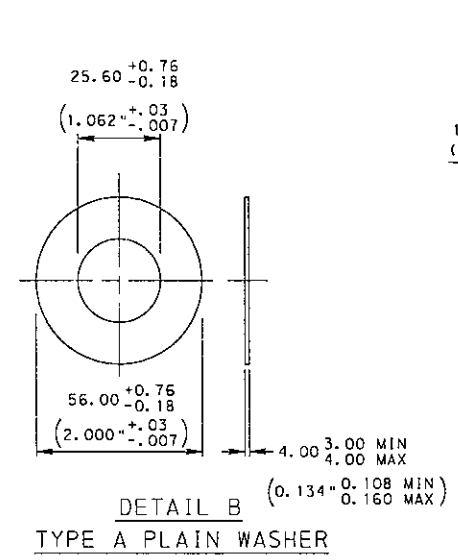
REFERENCE DRAWINGS	RECOMMENDED APR. 15, 2004	RECOMMENDED APR. 15, 2004	SHT. 1 OF 6
RC-50M	GUIDE RAIL TRANSITION AT END OF STRUCTURE		
BC-734M	STANDARD ANCHOR SYSTEMS		
BC-739M	BRIDGE BARRIER TO GUIDE RAIL TRANSITION		
	Dean A. Schank DIRECTOR, BUREAU OF DESIGN	m. C. Patel CHIEF ENGINEER	RC-52M

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

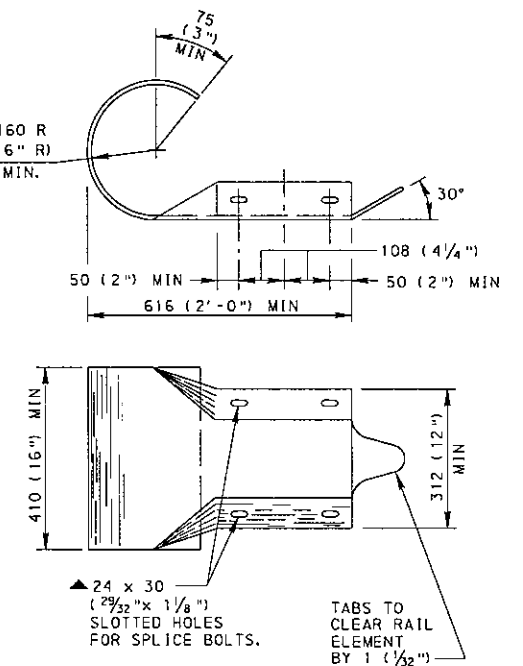
TYPE 2 STRONG POST
GUIDE RAIL



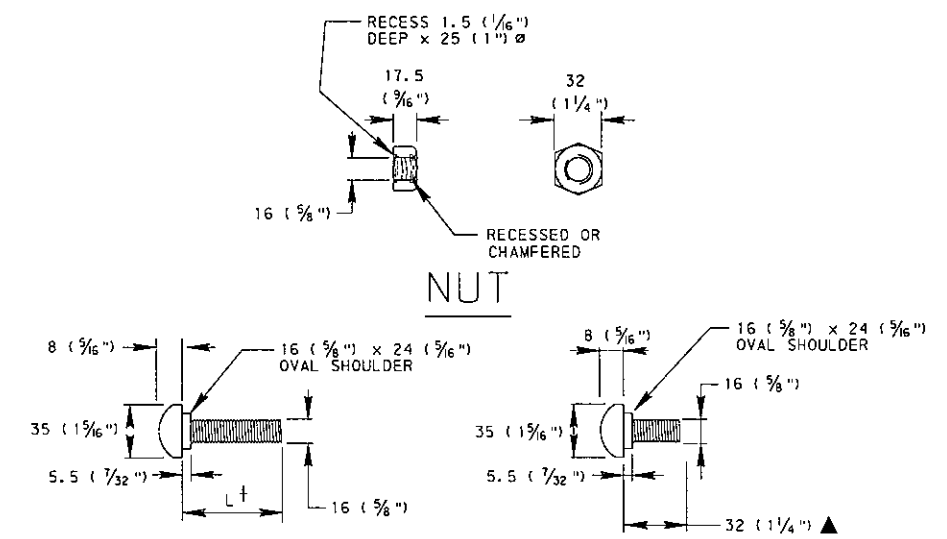
TERMINAL TO BE PLACED ON BACK OF RAIL ELEMENT



DETAIL B
TYPE A PLAIN WASHER
FOR SPLICE AND POST BOLTS, SEE DETAILS. FOR ALL SPLICE BOLT CONNECTIONS, PROVIDE A TYPE A PLAIN WASHER BETWEEN BOLT HEAD AND TERMINAL SECTION. FOR WASHER, SEE DETAIL B.

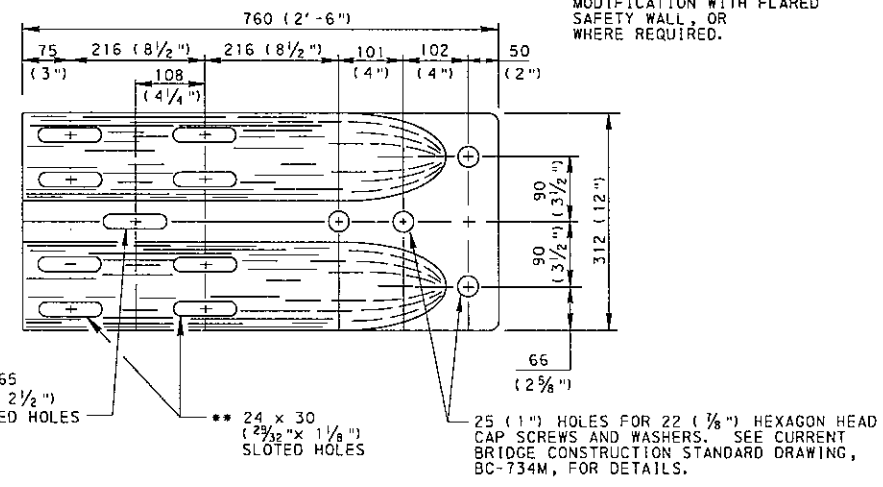
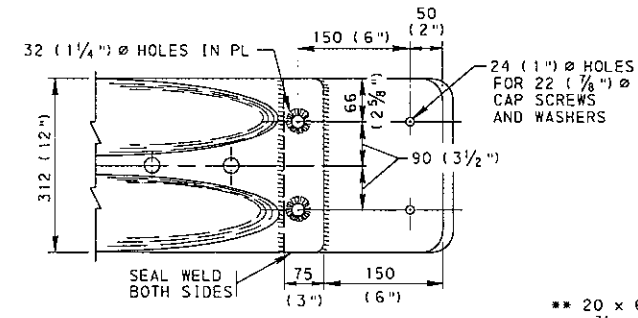
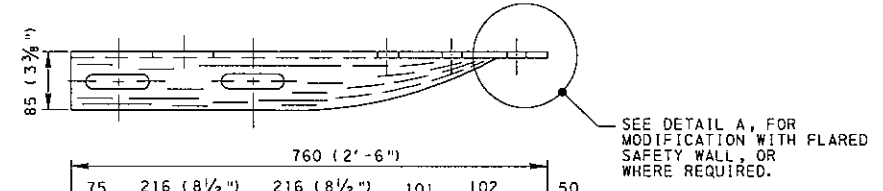
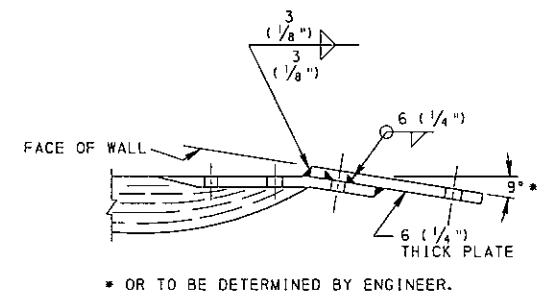


TERMINAL TO BE PLACED ON FACE OF RAIL ELEMENT



POST BOLT SPLICE BOLT
† USE L = 115 (4 1/2\") FOR ALL RUBBING RAIL TO GUIDE RAIL POST CONNECTIONS AND USE L = 255 (10\") FOR ALL W-BEAM RAIL ELEMENT TO GUIDE RAIL POST AND ROUTED OFFSET BRACKET CONNECTIONS.
▲ FOR FOUR (4) PANEL NESTED RAIL ELEMENT USE 54 (2 1/8\") SPLICE BOLT.

ALTERNATE TERMINAL SECTIONS



DETAIL A
(THE BRIDGE CONNECTION TERMINAL MODIFICATION MAY BE FABRICATED AS ONE PIECE TO ELIMINATE WELDING.)

** 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
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TYPE 2 STRONG POST
GUIDE RAIL

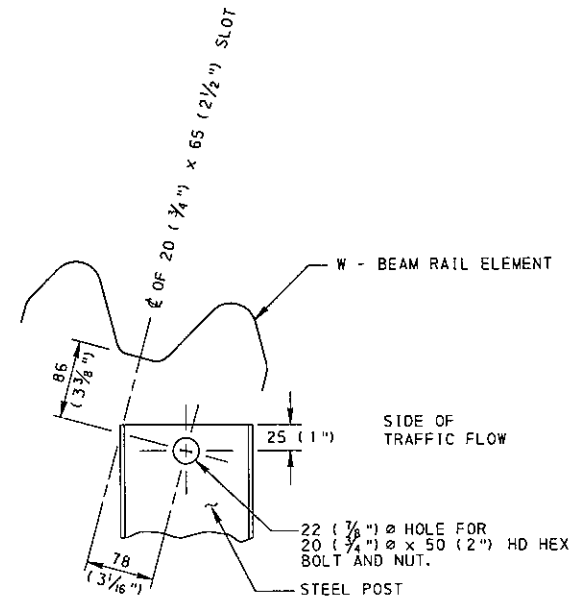
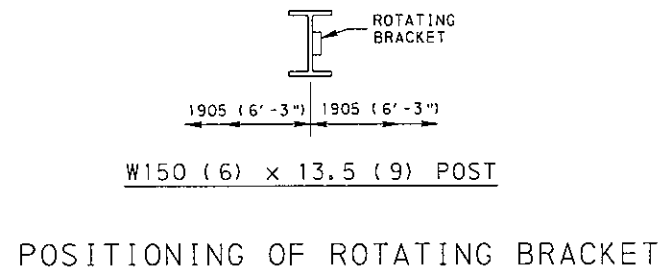
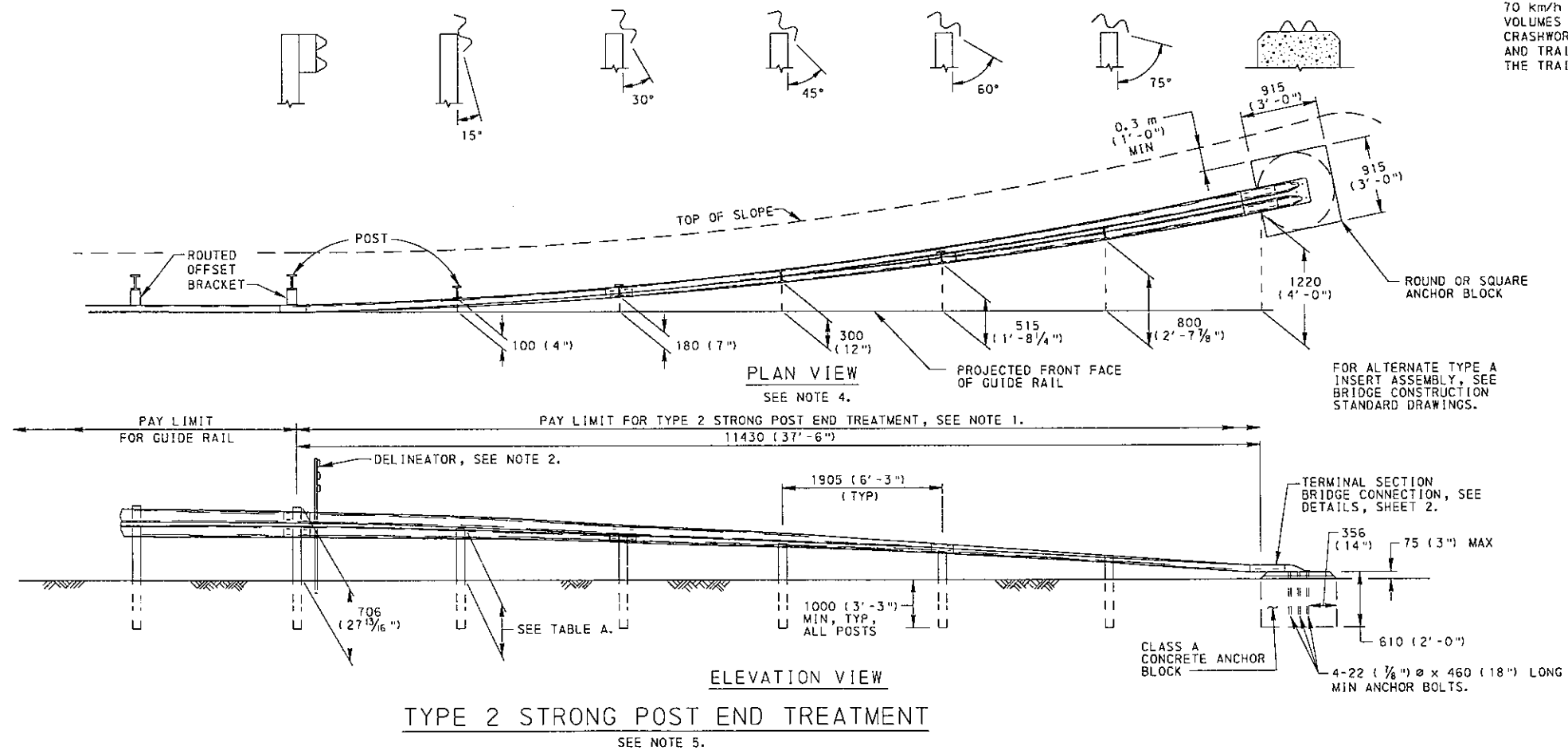


TABLE A

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
- PAYMENT FOR TYPE 2 STRONG POST END TREATMENT INCLUDES 11430 (37'-6") OF SLOPING RAIL, TERMINAL SECTION, HARDWARE, EXCAVATION AND CONCRETE.
 - INSTALL DELINEATOR ASSEMBLIES UNDER SEPARATE PAY ITEM OR CONTRACT. FOR ADDITIONAL DETAILS, SEE TRAFFIC STANDARD TC-7604.
 - 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.
 - MEASURE OFFSETS FROM THE PROJECTED FRONT FACE OF THE GUIDE RAIL TO THE FRONT FACE OF THE POST.
 - 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

RECOMMENDED APR. 15, 2004 <i>Dean A. Schindler</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. J. Patel</i> CHIEF ENGINEER	SHT. 3 OF 6 RC-52M
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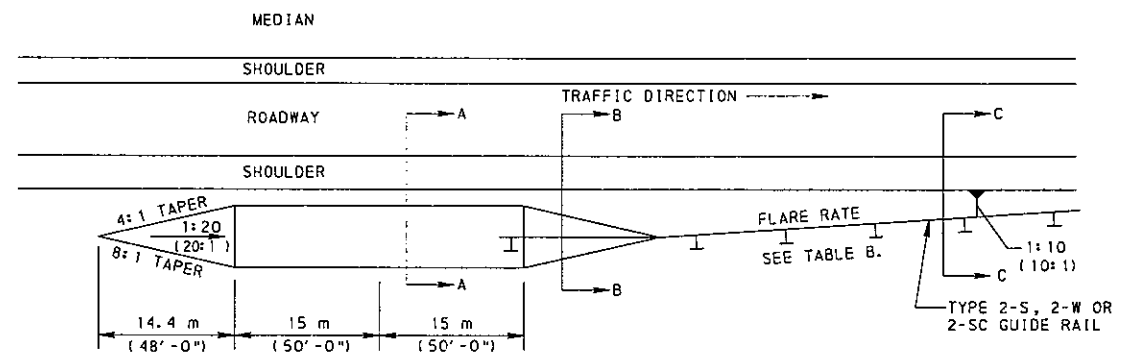


TABLE B
FLARE RATES
FOR BARRIER DESIGN

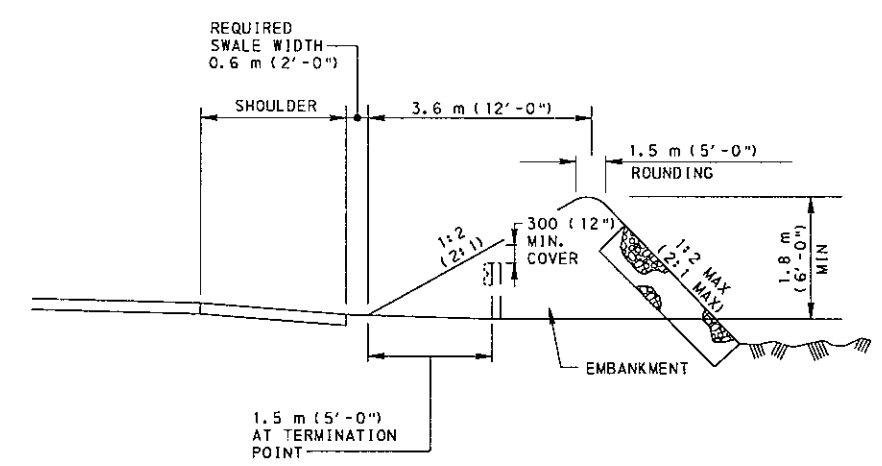
DESIGN SPEED		MAXIMUM FLARE RATES	
km/h	mph	CONCRETE BARRIER	GUIDE RAIL
120	75	20 : 1	15 : 1
110	70	20 : 1	15 : 1
105	65	19 : 1	15 : 1
100	60	18 : 1	14 : 1
90	55	16 : 1	12 : 1
80	50	14 : 1	11 : 1
70	45	12 : 1	10 : 1
65	40	11 : 1	9 : 1
60	35	10 : 1	8 : 1
50	30	8 : 1	7 : 1

TYPICAL EARTH MOUND FOR BURYING GUIDE RAIL

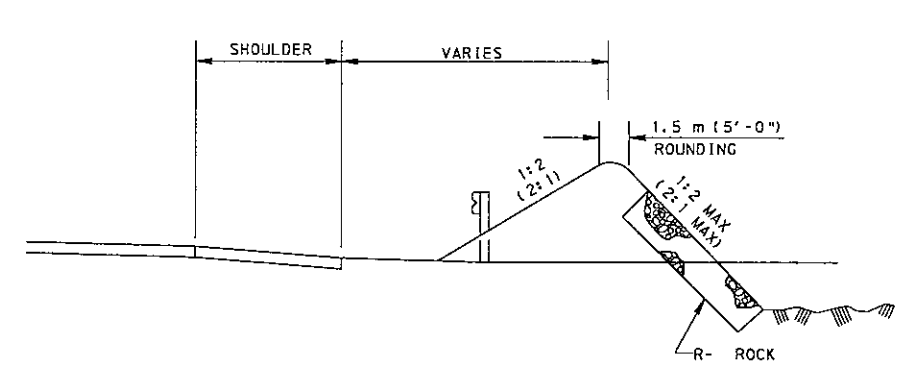
SEE NOTE 2.

NOTES

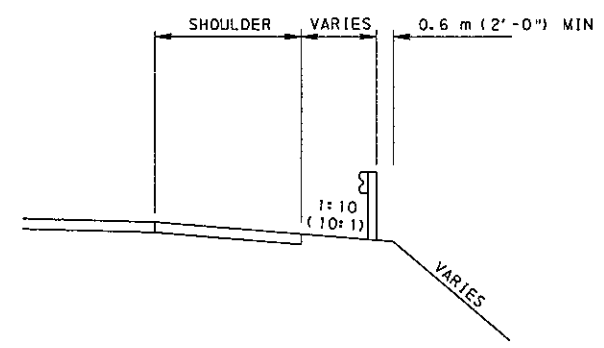
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408.
2. ALL MATERIAL NECESSARY TO CONSTRUCT EARTH MOUNDS ARE IN ACCORDANCE WITH APPLICABLE SECTIONS OF PUBLICATION 408.
3. EARTHMONDS MAY BE USED TO BURY GUIDE RAIL ON HIGHWAYS WITH POSTED SPEEDS LESS THAN 70 km/h (45 mph) 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 A-A



SECTION B-B



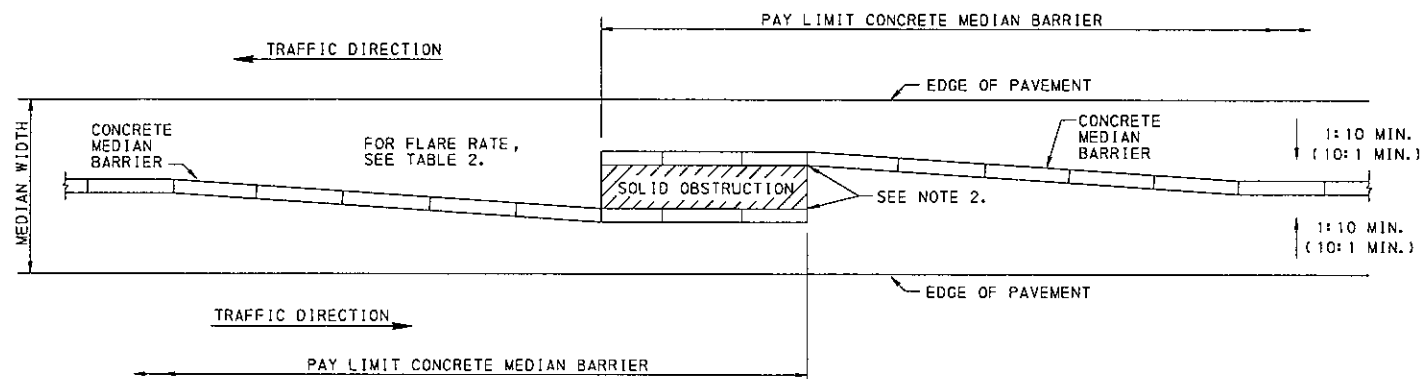
SECTION C-C

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

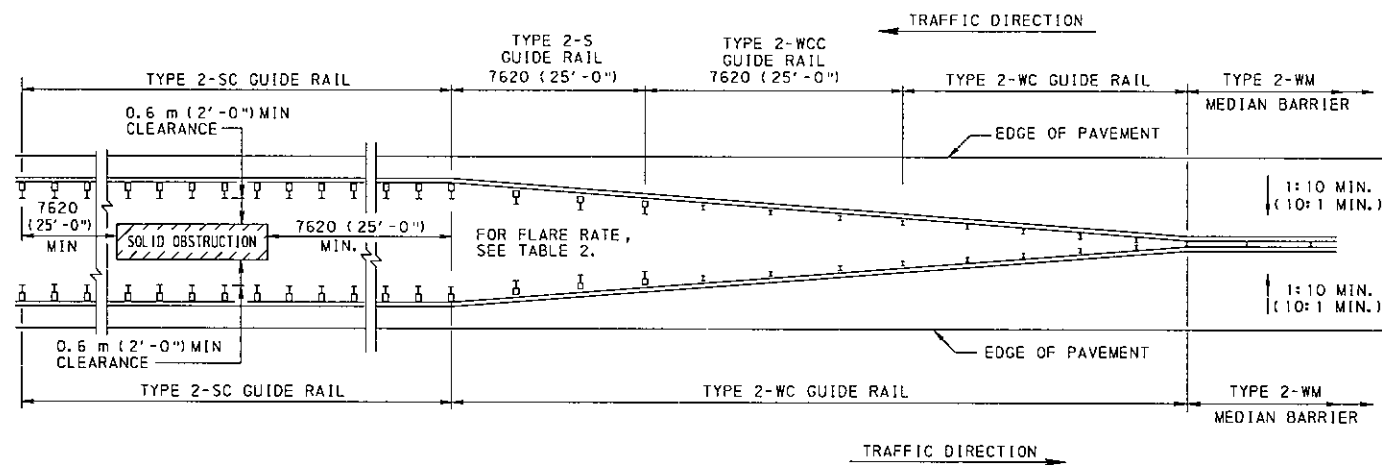
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

TYPE 2 STRONG POST
GUIDE RAIL
END TREATMENTS

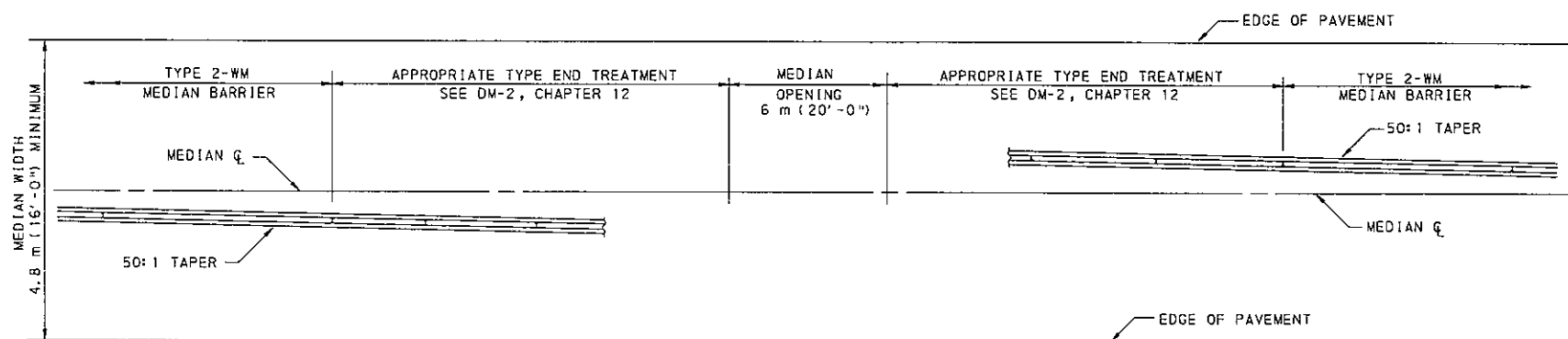
RECOMMENDED APR. 15, 2004 <i>Dean A. Schick</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. Aptel</i> CHIEF ENGINEER	SHT. 4 OF 6 RC-52M
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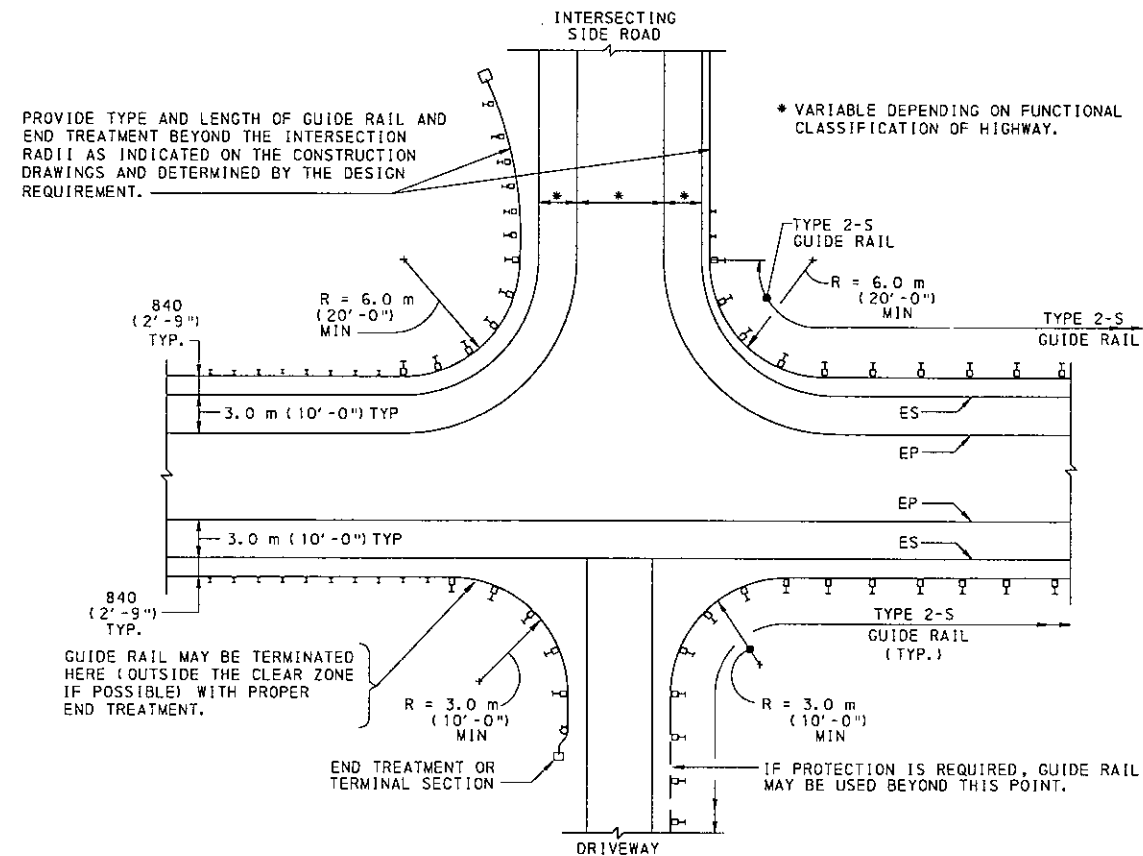
TREATMENT AT OBSTRUCTION FOR MEDIAN WIDTHS 6.0 m (20') OR LESS WHERE CONTINUOUS BARRIER IS REQUIRED



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	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

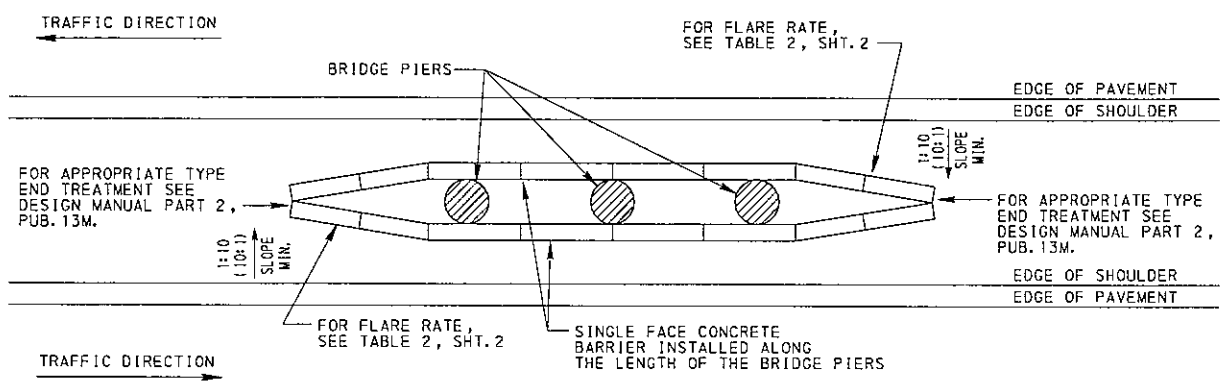
NOTES

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.

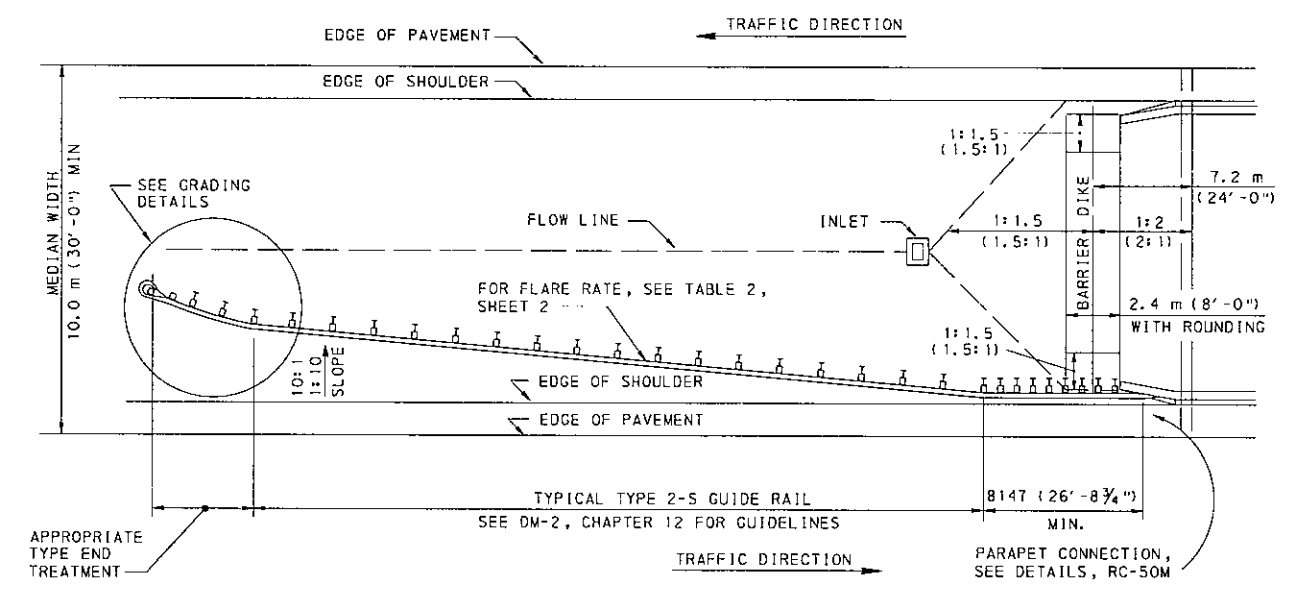
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

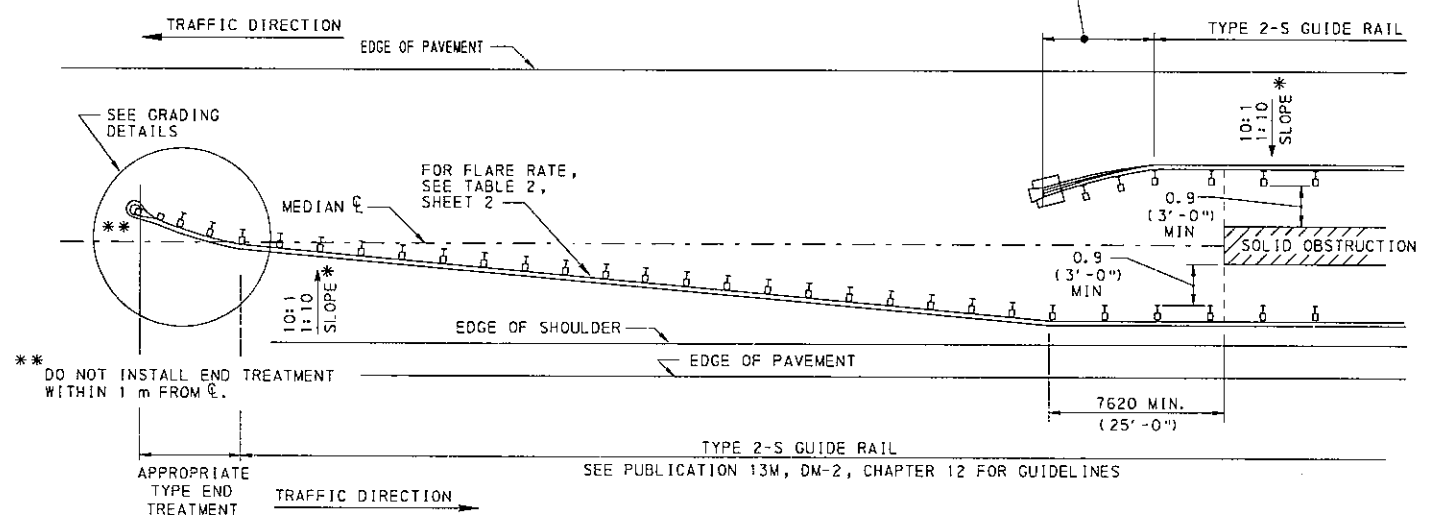
BARRIER PLACEMENT
AT OBSTRUCTIONS



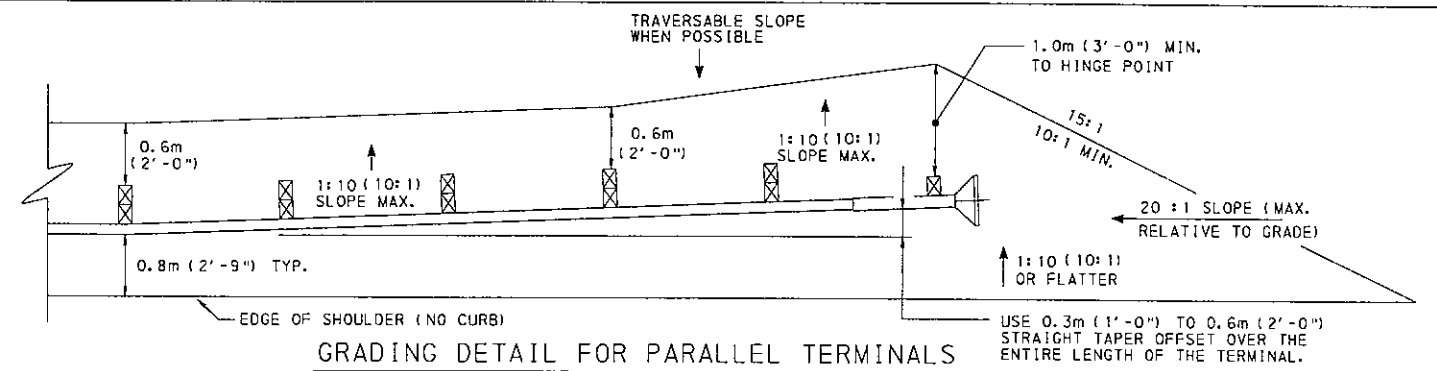
TREATMENT AT OBSTRUCTIONS FOR
MEDIAN WIDTHS GREATER THAN 6.0 m (20'-0")
WHERE CONTINUOUS BARRIER IS NOT REQUIRED



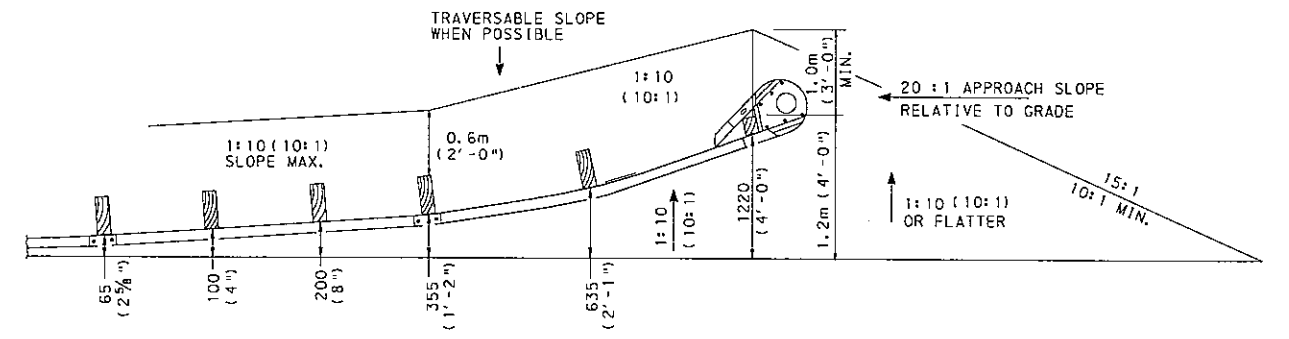
MEDIAN TREATMENT AT DUAL STRUCTURES



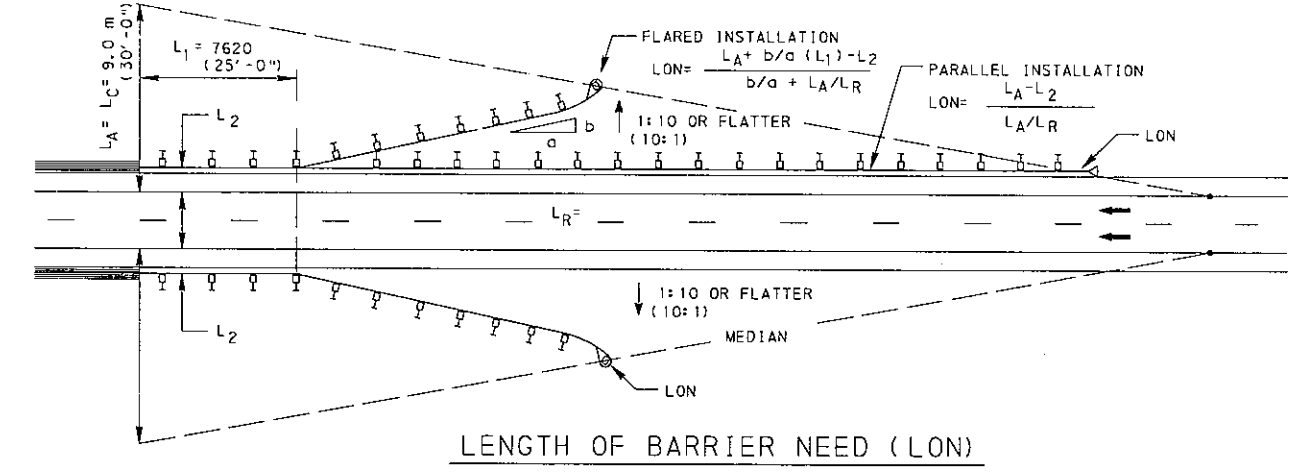
TREATMENT AT OBSTRUCTION FOR
MEDIAN WIDTHS GREATER THAN 10.0 m (30'-0")
WHERE CONTINUOUS BARRIER IS NOT REQUIRED



GRADING DETAIL FOR PARALLEL TERMINALS



GRADING DETAIL FOR FLARED TERMINALS



LENGTH OF BARRIER NEED (LON)

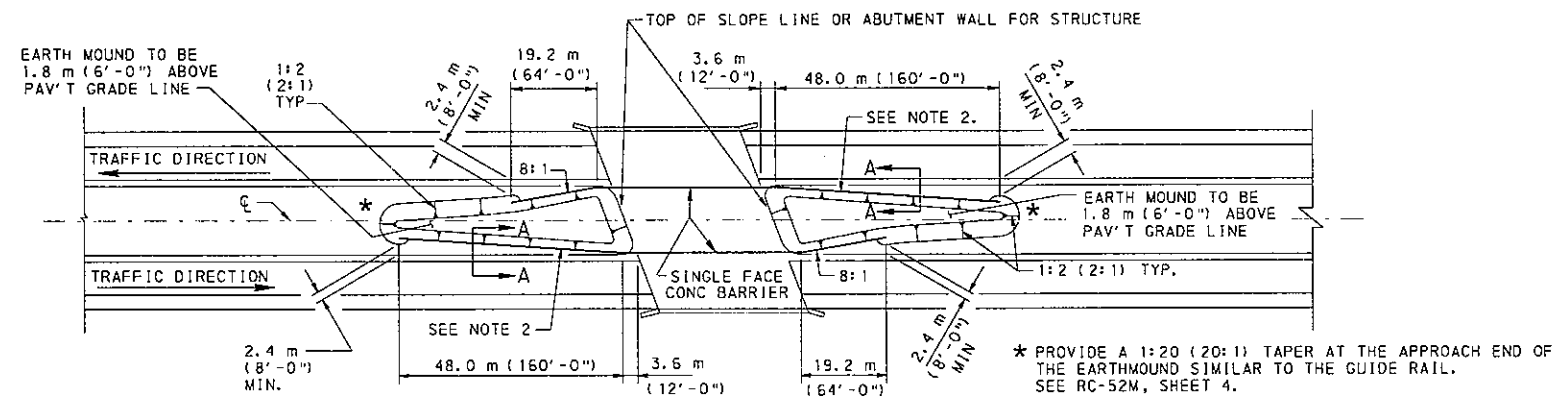
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES
MUST BE USED ON PLANS. METRIC AND
ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

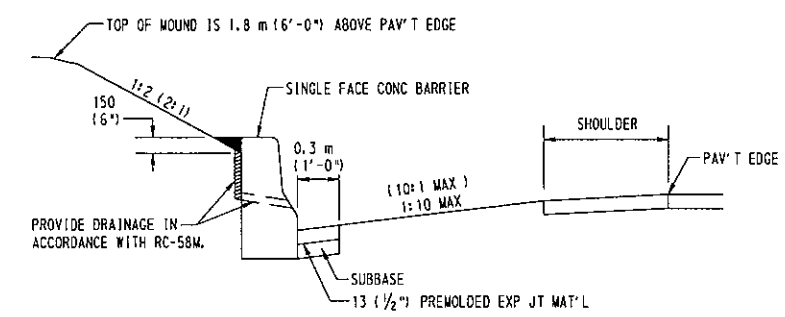
BARRIER PLACEMENT
AT OBSTRUCTIONS

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

* 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).



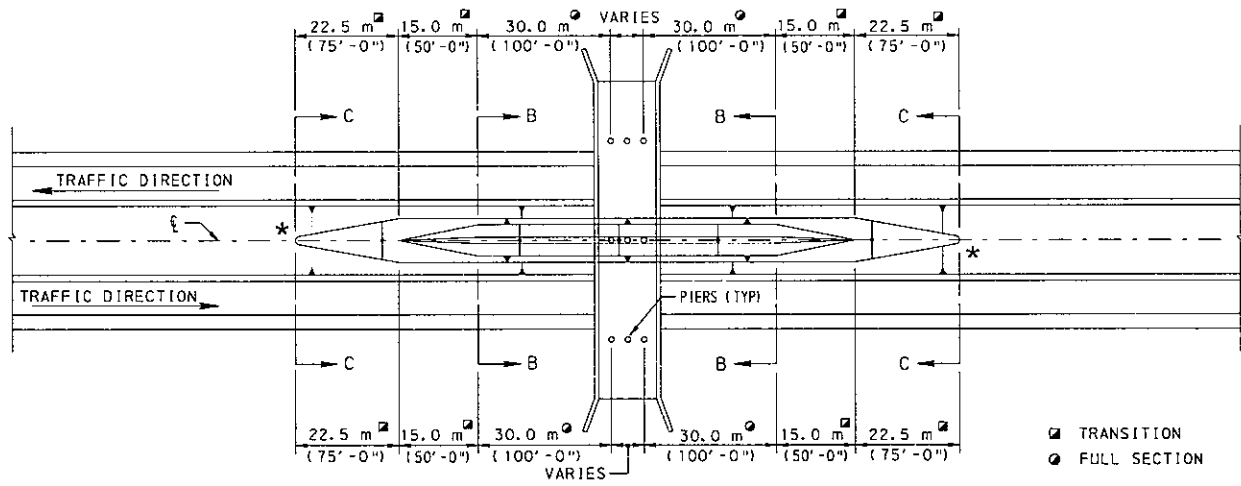
TYPICAL MEDIAN EARTH MOUND DETAIL FOR AT-GRADE DUAL BRIDGES
SEE NOTE 4



SECTION A-A

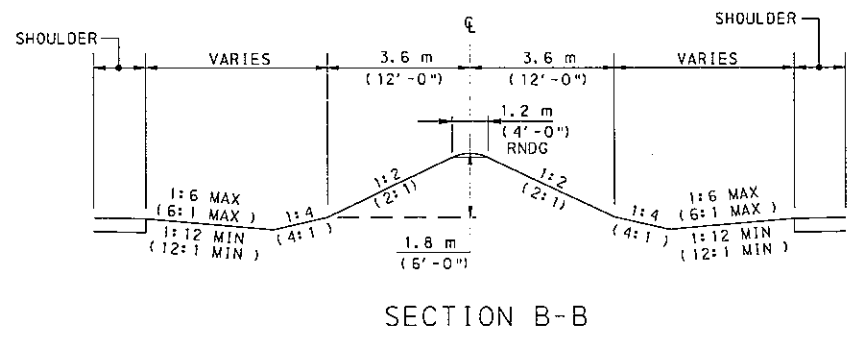
NOTES

1. 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.
2. FOR FLARE RATES, SEE TABLE 2, SHEET 2.
3. CONSIDER EXPANSION JOINT MATERIAL, COARSE AGGREGATE, FILTER DRAIN AND WEEP HOLES INCIDENTAL TO SINGLE FACE CONC. BARRIER.
4. ALL MATERIALS NECESSARY TO CONSTRUCT EARTH MOUNDS ARE IN ACCORDANCE WITH APPLICABLE SECTIONS OF PUBLICATION 408.

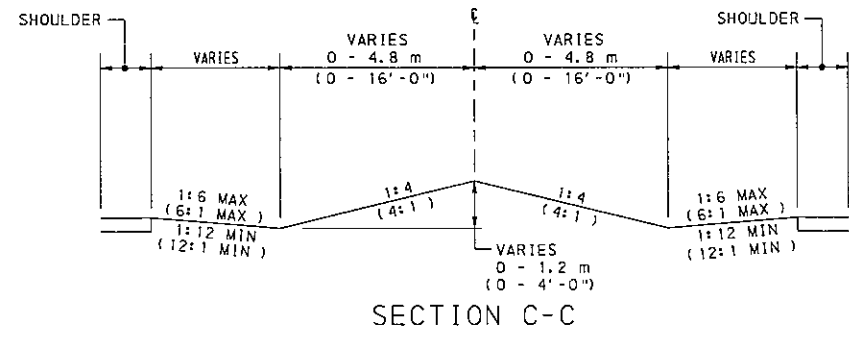


TYPICAL MEDIAN EARTH MOUND DETAIL FOR OVERHEAD STRUCTURES
FOR MEDIAN WIDTHS OF 18.0 M (60'-0") OR GREATER
SEE NOTE 4

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



SECTION B-B



SECTION C-C

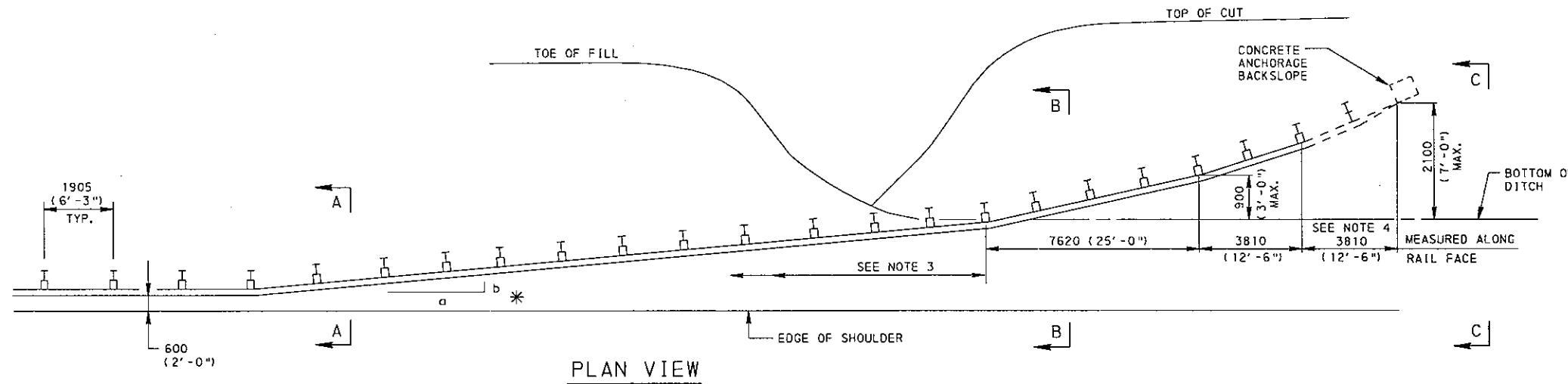
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

BARRIER PLACEMENT
AT OBSTRUCTIONS
EARTH MOUNDS

RECOMMENDED APR. 15, 2004 <i>Dean A. Schindler</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. L. Patel</i> CHIEF ENGINEER	SHT 4 OF 7 RC-54M
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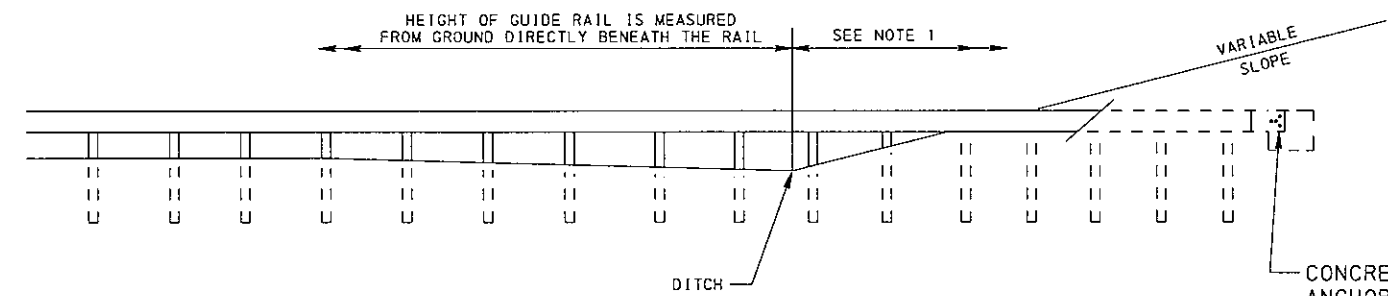
GENERAL NOTES:

1. HEIGHT OF GUIDE RAIL MAY BE TAPERED DOWN AFTER CROSSING DITCH BOTTOM TO ACHIEVE ONE FOOT OF COVER.
2. 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.
3. PROVIDE 23.0 m (75'-0") MINIMUM FROM WHERE THE GUIDE RAIL CROSSES THE SWALE LINE TO THE BEGINING OF THE HAZARD.
4. BACKSLOPE ANCHOR TERMINAL PAY LIMIT INCLUDES THE CONCRETE OR POST ANCHORAGE, 3810 (12'-6") OF RAIL ELEMENT AND HARDWARE.

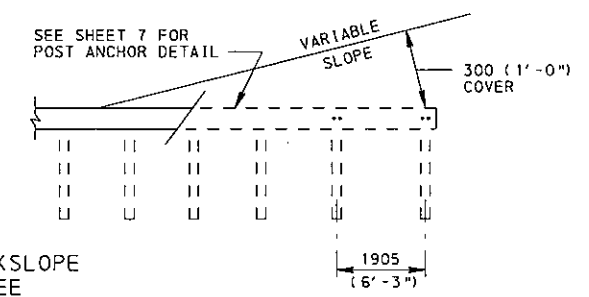


PLAN VIEW

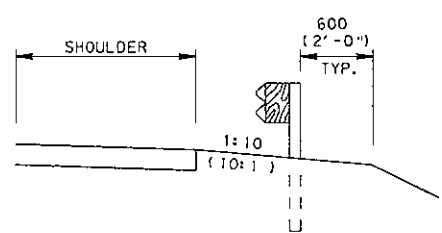
* a:b = 12.5 : 1
9 : 1 LOWSPEED
(LESS THAN 45 mph)



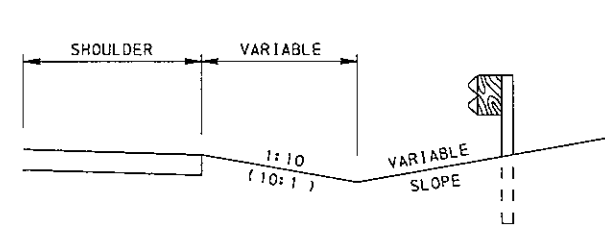
ELEVATION VIEW (PROFILE ALONG RAIL)



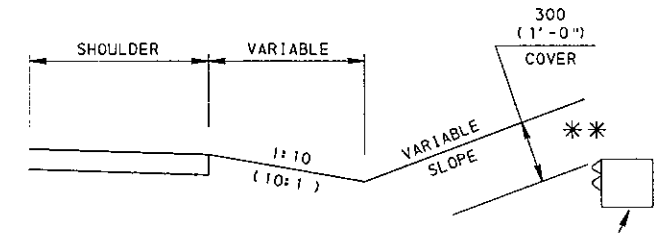
POST BACKSLOPE ANCHORAGE



SECTION A-A



SECTION B-B

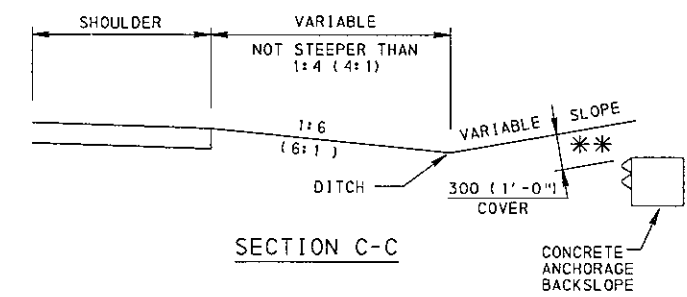
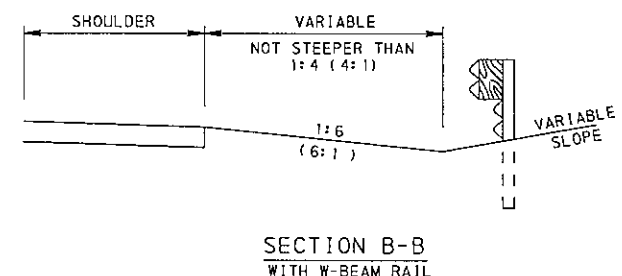
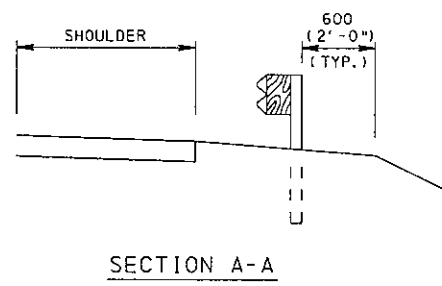
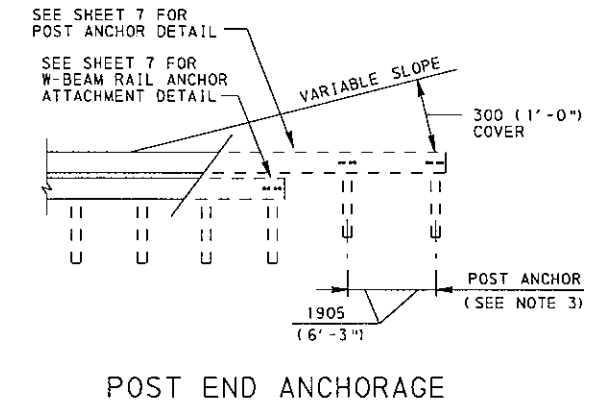
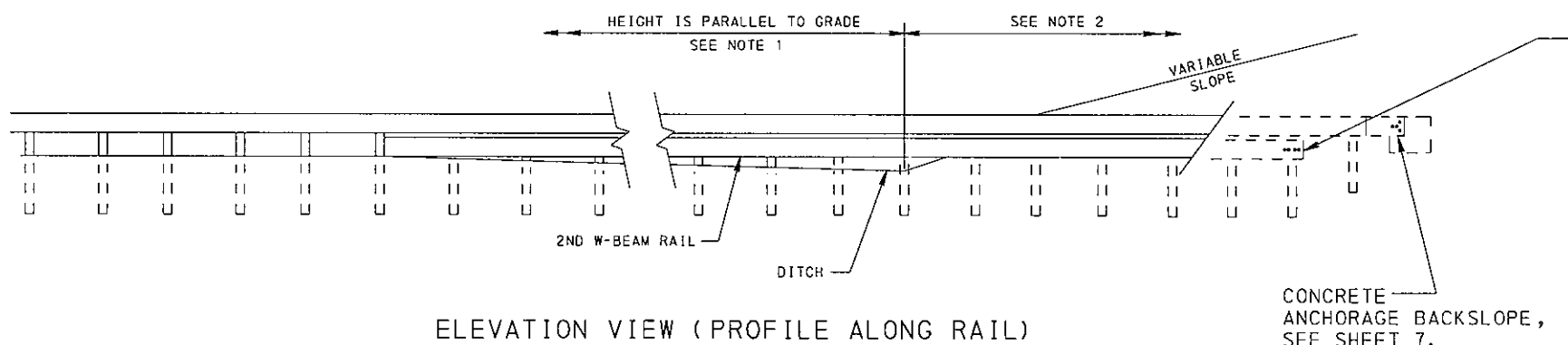
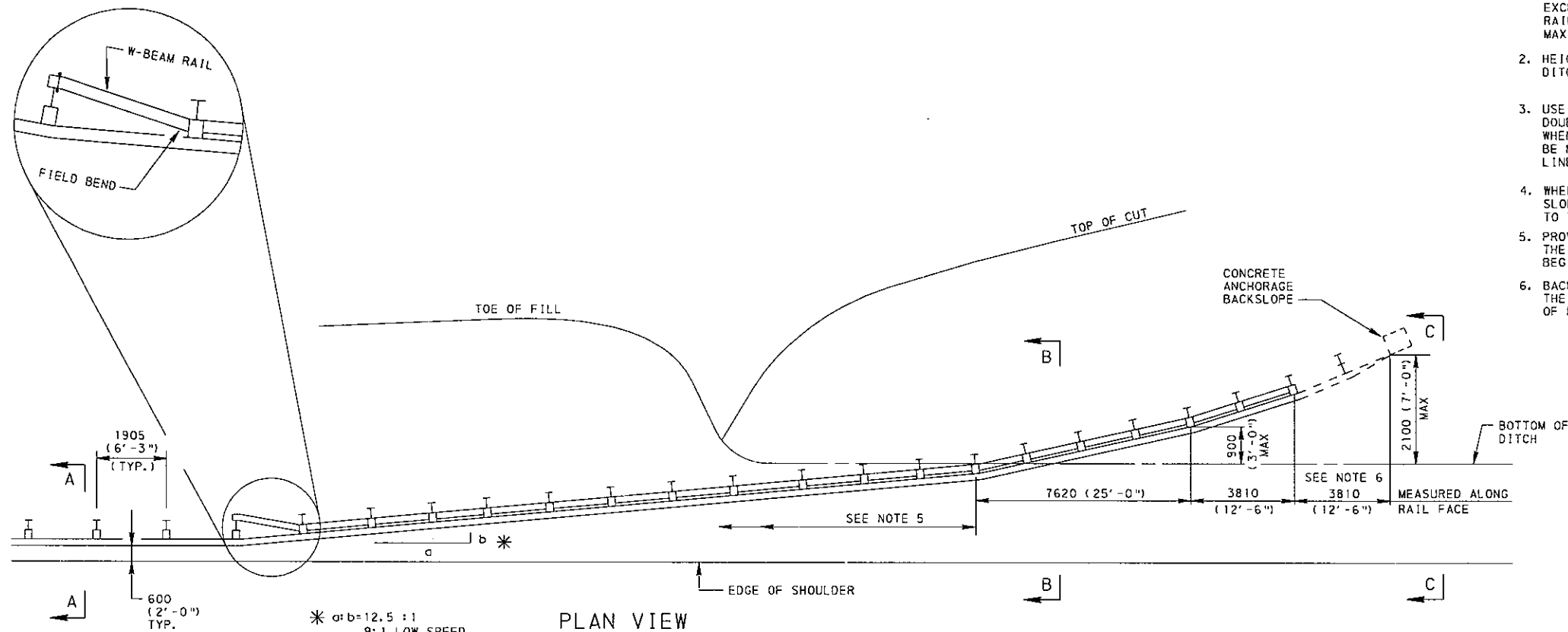


SECTION C-C

** 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 BACKSLOPE ANCHOR TERMINAL SINGLE RAIL 10:1 FRONT SLOPE		
RECOMMENDED APR. 15, 2004 <i>Dean A. Schaub</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. Latel</i> CHIEF ENGINEER	SHT 5 OF 7 RC-54M



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

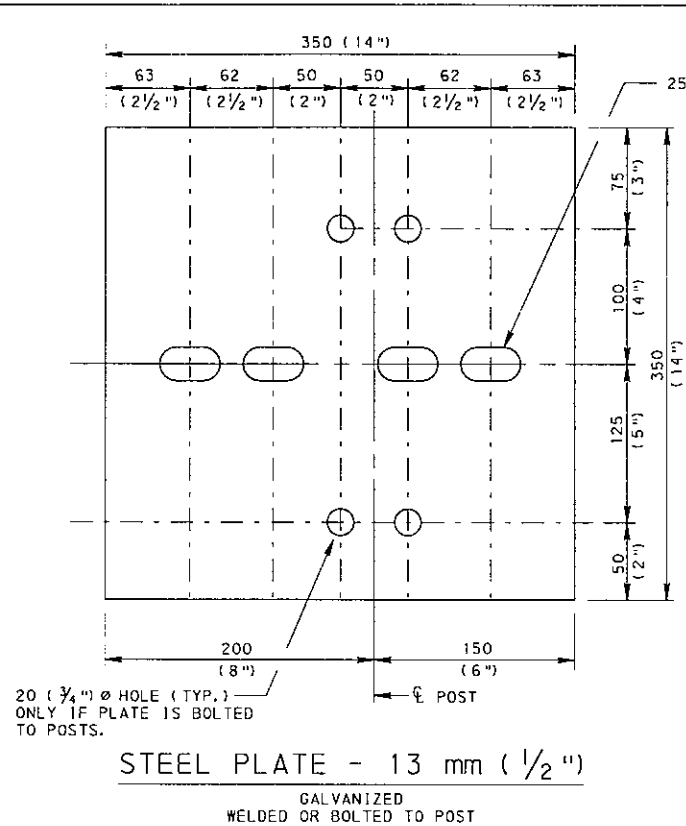
- GENERAL NOTES:**
1. THE TOP OF THE W-BEAM RAIL IS HELD CONSTANT RELATIVE TO ROADWAY PROFILE GRADE. A SECOND W-BEAM RAIL IS REQUIRED WHERE THE DISTANCE BETWEEN THE GROUND AND BOTTOM OF THE TOP RAIL EXCEEDS 450 (18") AND IS INCREASING. MAXIMUM HEIGHT OF DOUBLE RAIL SYSTEM IS 1140 (45"), TAPER BOTH RAILS TO MAINTAIN MAXIMUM HEIGHT. FLARE RATE FOR THE RAIL IS 12 1/2:1.
 2. HEIGHT OF GUIDE RAIL MAY BE TAPERED DOWN AFTER CROSSING DITCH BOTTOM TO ACHIEVE ONE FOOT OF COVER.
 3. USE 2449 (8'-0") LONG POSTS FOR ALL POST LOCATIONS WITH A DOUBLE RAIL. POSTS FOR THE POST ANCHOR ARE 1830 (6'-0") LONG. WHEN A DOUBLE RAIL INSTALLATION IS REQUIRED, EACH RAIL WILL BE MEASURED AND PAID FOR AT THE CONTRACT UNIT PRICE PER LINEAR FOOT OF GUIDE RAIL.
 4. 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.
 5. PROVIDE 23.0 m (75'-0") MINIMUM FROM WHERE THE GUIDE RAIL CROSSES THE SWALE LINE TO THE BEGINNING OF THE HAZARD.
 6. BACKSLOPE ANCHOR TERMINAL PAY LIMIT INCLUDES THE CONCRETE OR POST ANCHORAGE, 3810 (12'-6") OF RAIL ELEMENT POSTS AND HARDWARE.

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

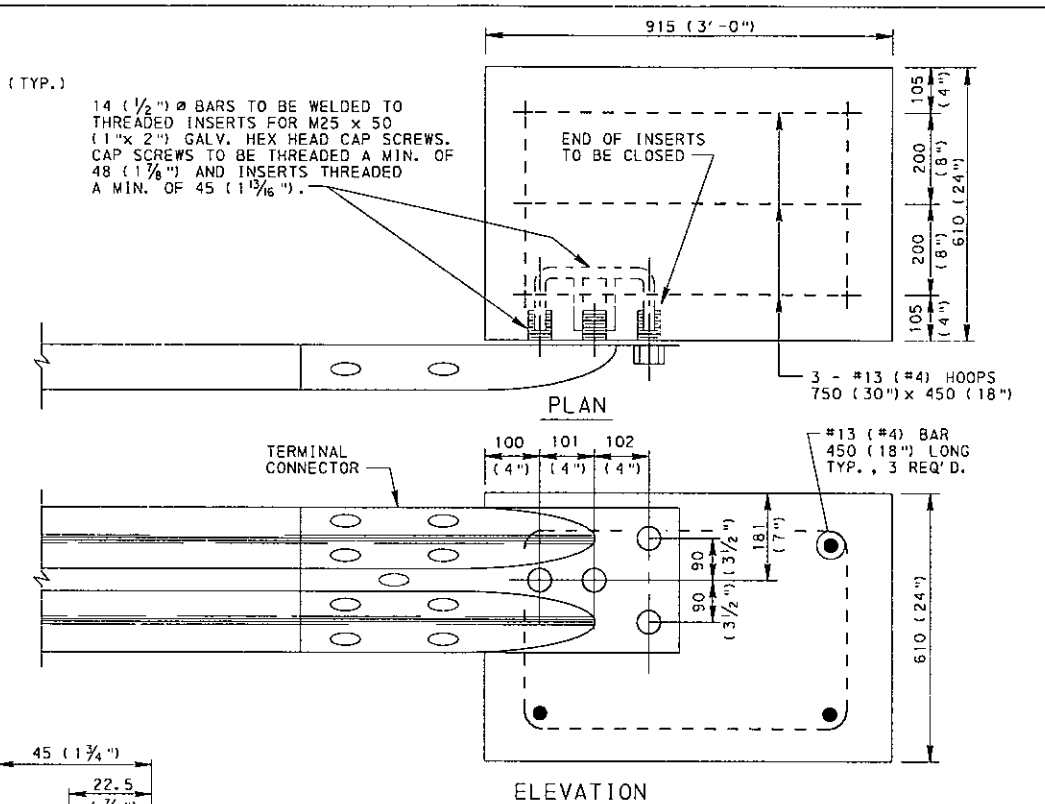
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

GUIDE RAIL
BACKSLOPE
ANCHOR TERMINAL
6:1 FRONT SLOPE

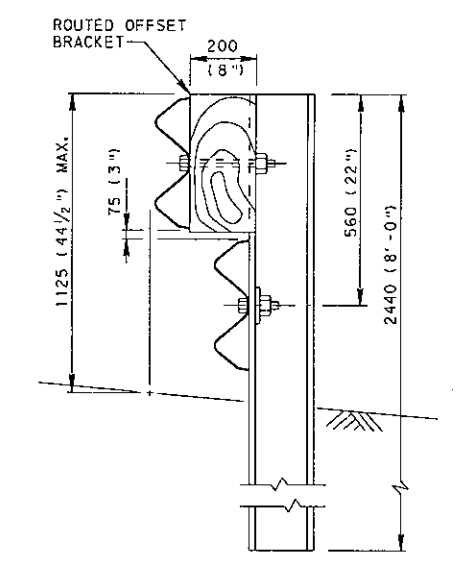
RECOMMENDED APR. 15, 2004 <i>Dean A. Schick</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. P. Patel</i> CHIEF ENGINEER	SHT 6 OF 7 RC-54M
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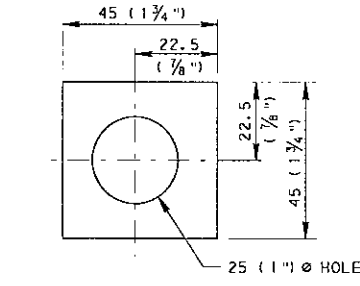
STEEL PLATE - 13 mm (1/2")
GALVANIZED
WELDED OR BOLTED TO POST



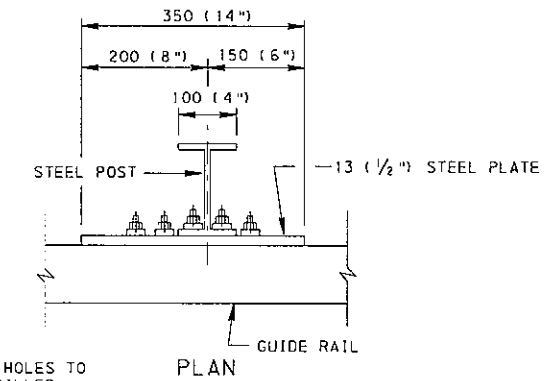
CONCRETE BLOCK ANCHOR



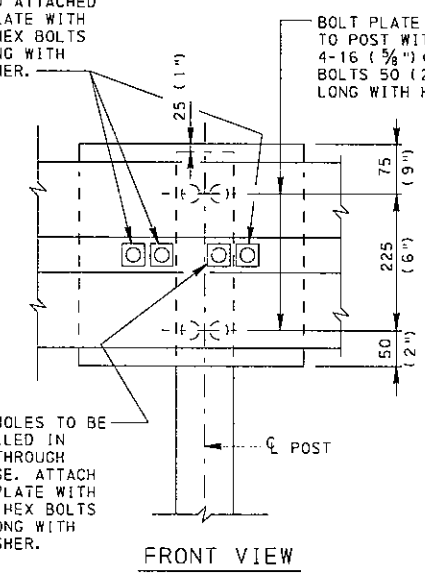
**TYPICAL ELEVATION
STEEL POST
W150x13.5 (W6x8.5)**



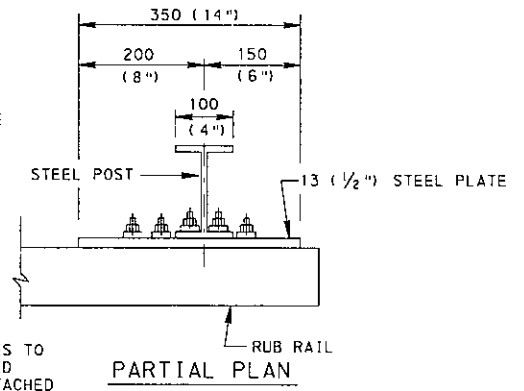
SQUARE WASHER
5 (1/4") THICK - GALVANIZED



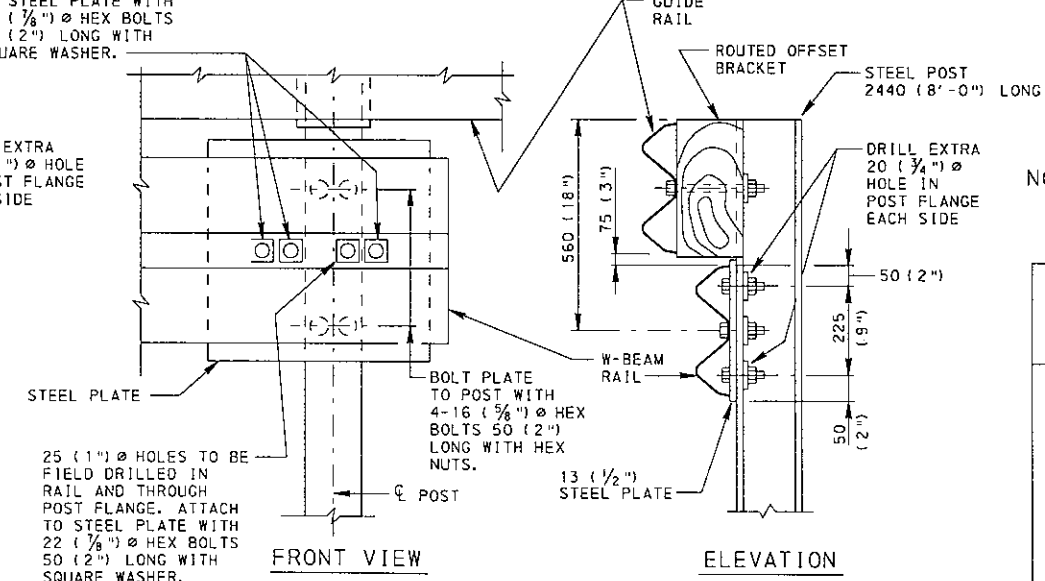
3-25 (1") Holes to be field drilled in rail and attached to steel plate with 22 (7/8") hex bolts 50 (2") long with square washer.



POST ANCHOR DETAIL
DIMENSIONS ARE TYPICAL



3-25 (1") Holes to be field drilled in rail and attached to steel plate with 22 (7/8") hex bolts 50 (2") long with square washer.



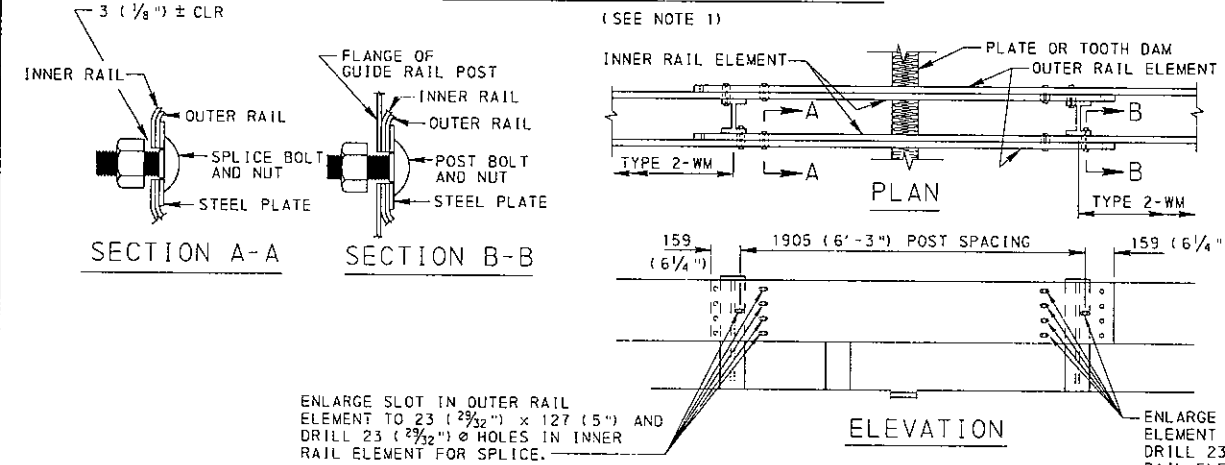
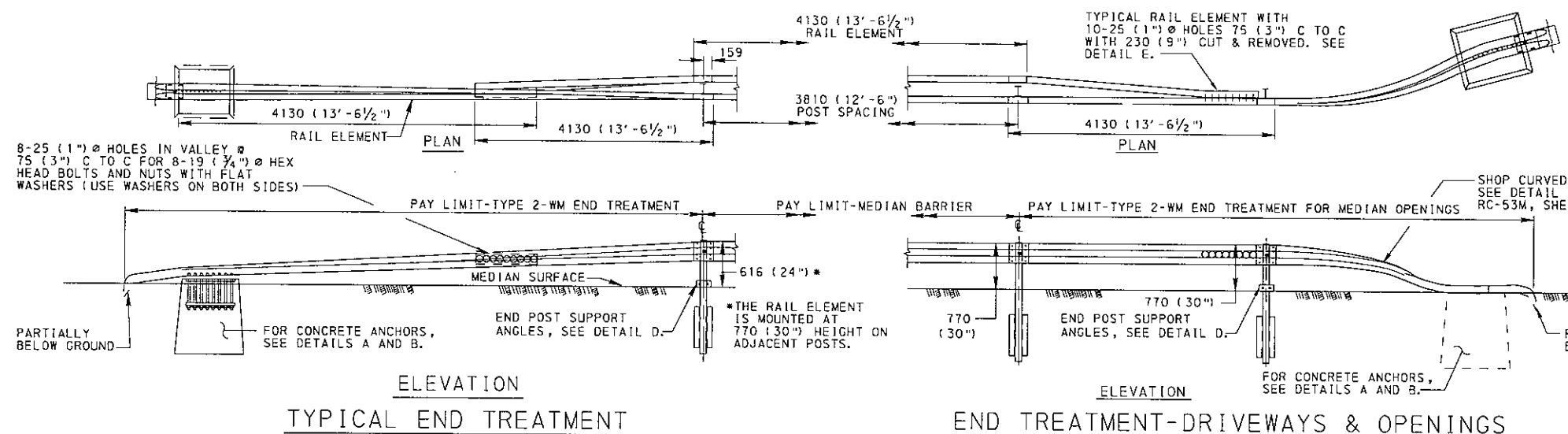
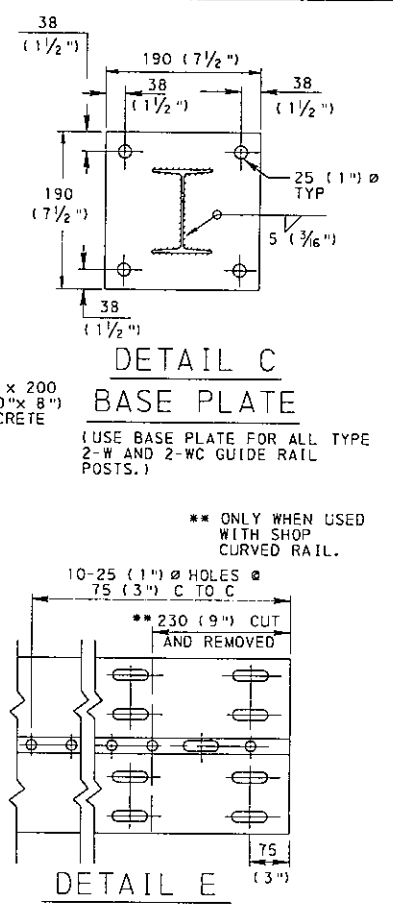
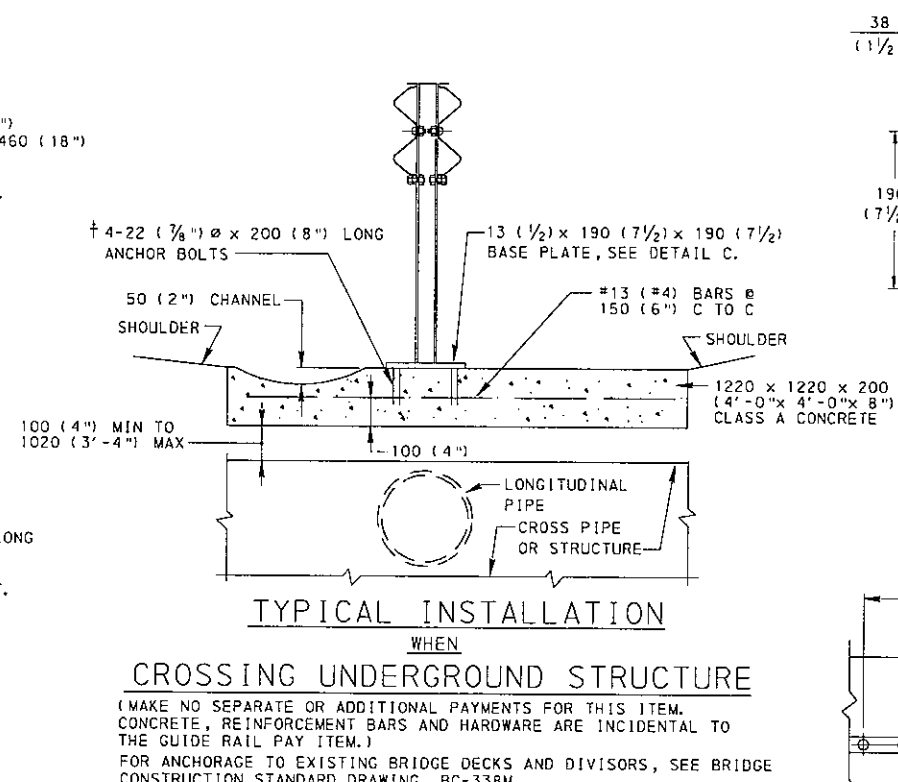
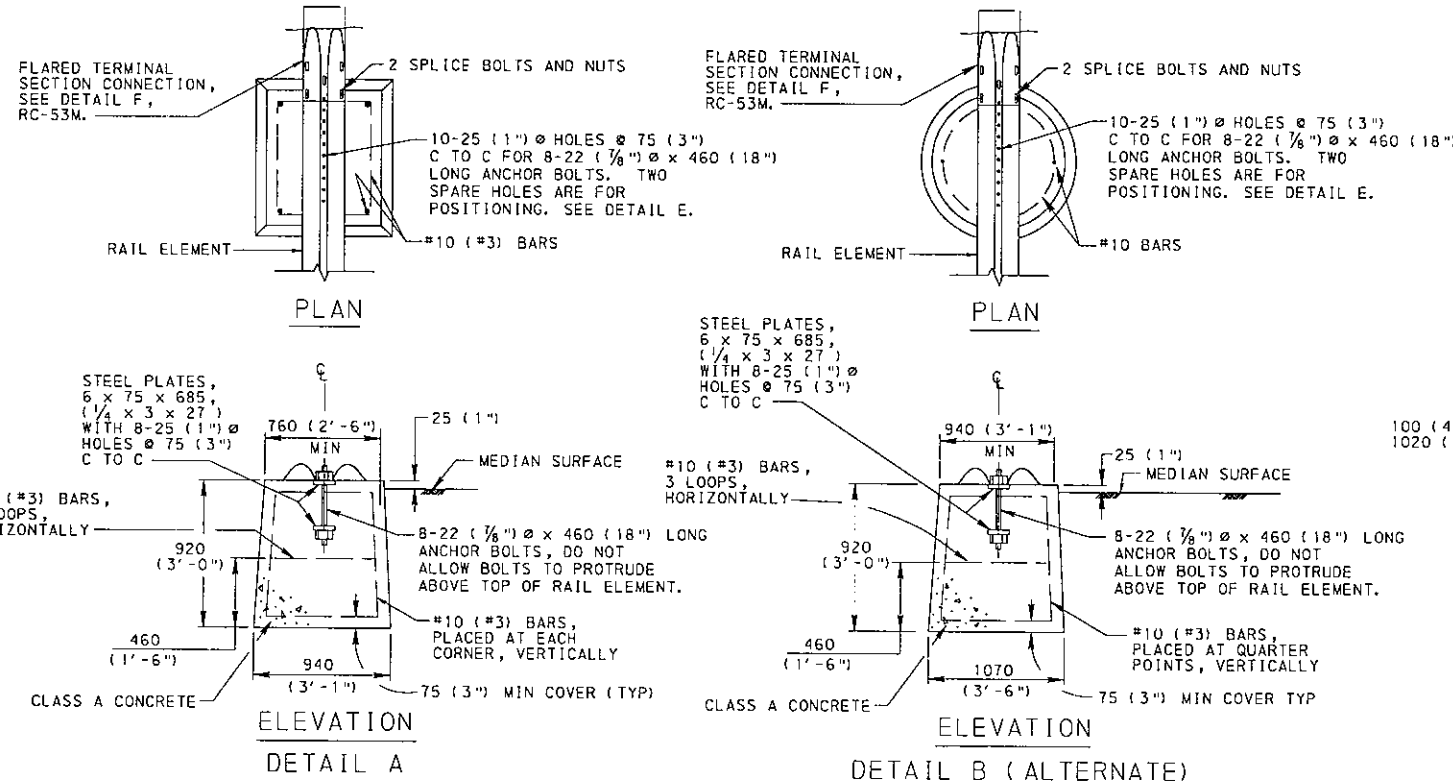
W-BEAM RAIL ATTACHMENT

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. USE CRASH-WORTHY END TREATMENTS FOR HIGH-SPEED, HIGH-VOLUME HIGHWAYS, SEE NOTE 1, RC-53M, SHEET 2.
 2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.

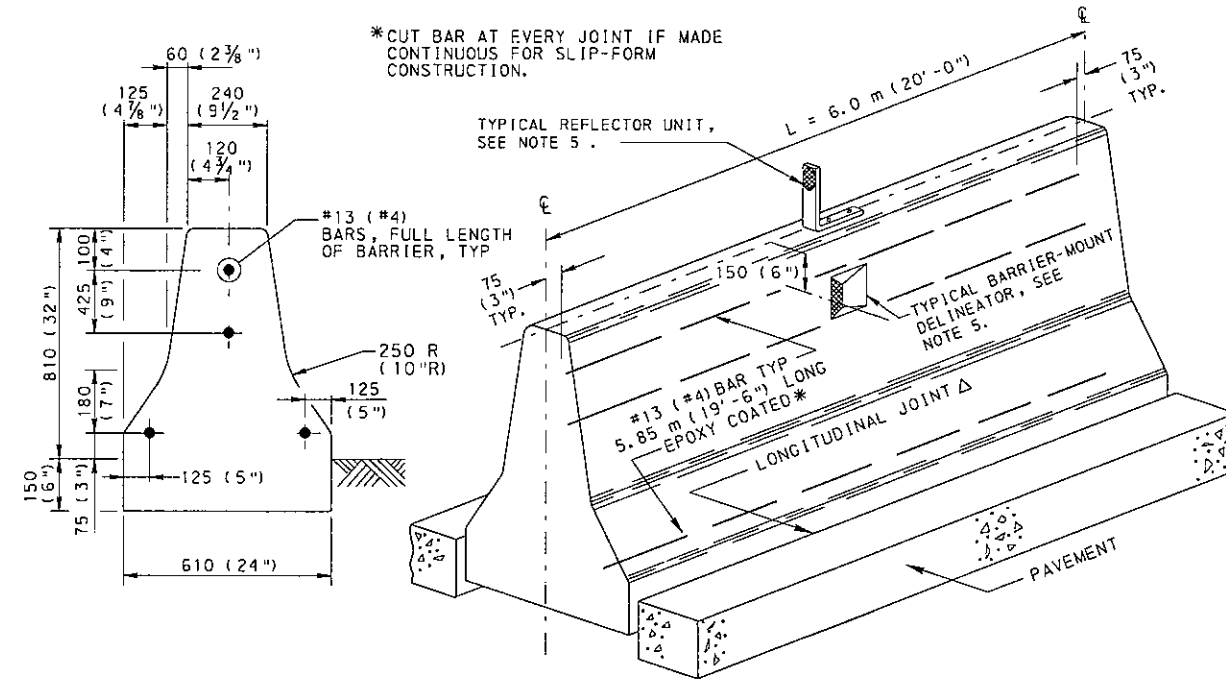
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

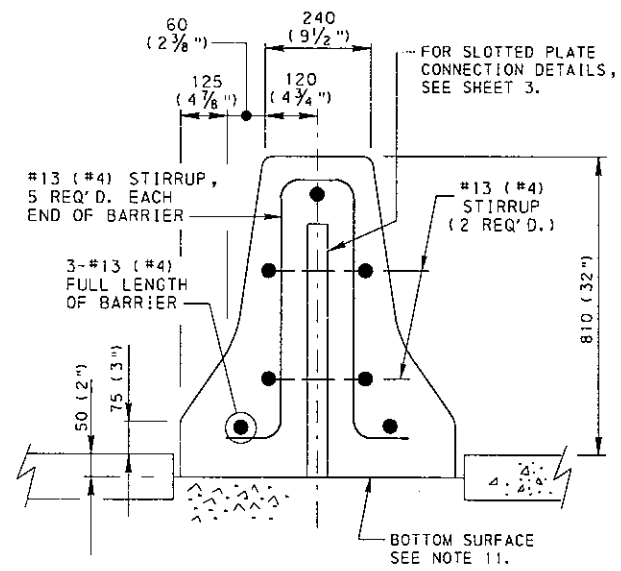
TYPE 2 WEAK POST
MEDIAN BARRIER

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 PERMANENT AND TEMPORARY BARRIER INSTALLATIONS, USE SIDE-MOUNT (BARRIER-MOUNT DELINEATOR) OR TOP-MOUNT DELINEATORS (BARRIER-MOUNT DELINEATOR OR REFLECTOR UNIT) AS DETERMINED ON A PROJECT BY PROJECT BASIS. LOCATE SIDE-MOUNT DELINEATORS 660 (26") FROM THE PAVEMENT TO THE CENTER OF THE DELINEATOR. INSTALL TOP-MOUNT DELINEATORS AS FOLLOWS:
 - (1) CENTER BARRIER-MOUNT DELINEATOR ALONG LONGITUDINAL CENTERLINE OF MEDIAN BARRIER.
 - (2) LOCATE REFLECTOR UNITS AS SHOWN ON TRAFFIC STANDARD TC-7604.
 FOR PERMANENT INSTALLATIONS, PLACE DELINEATORS AT A MAXIMUM LONGITUDINAL SPACING OF 25 m (80'-0") FOR TANGENT SECTIONS AND 12 m (40'-0") FOR CURVE SECTIONS WITH A HORIZONTAL RADIUS LESS THAN 305 m (1000').
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 BROOM OR SPECIAL TEMPLATE IN A LONGITUDINAL DIRECTION TO PRODUCE SCORES APPROXIMATELY 4 (1/8") IN DEPTH.

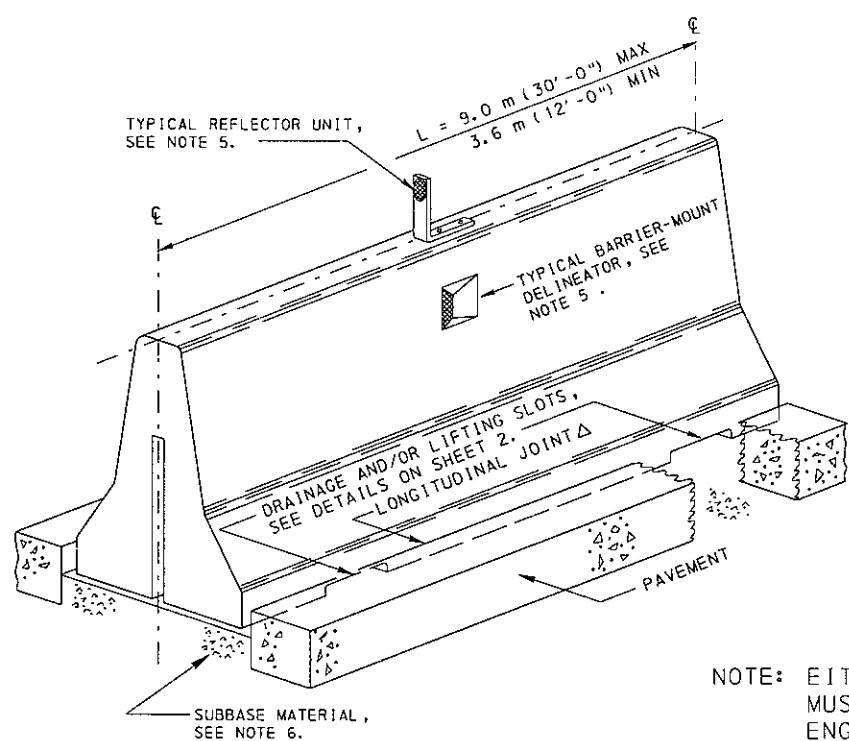


TYPICAL CAST-IN-PLACE BARRIER



TYPICAL PRECAST BARRIER

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

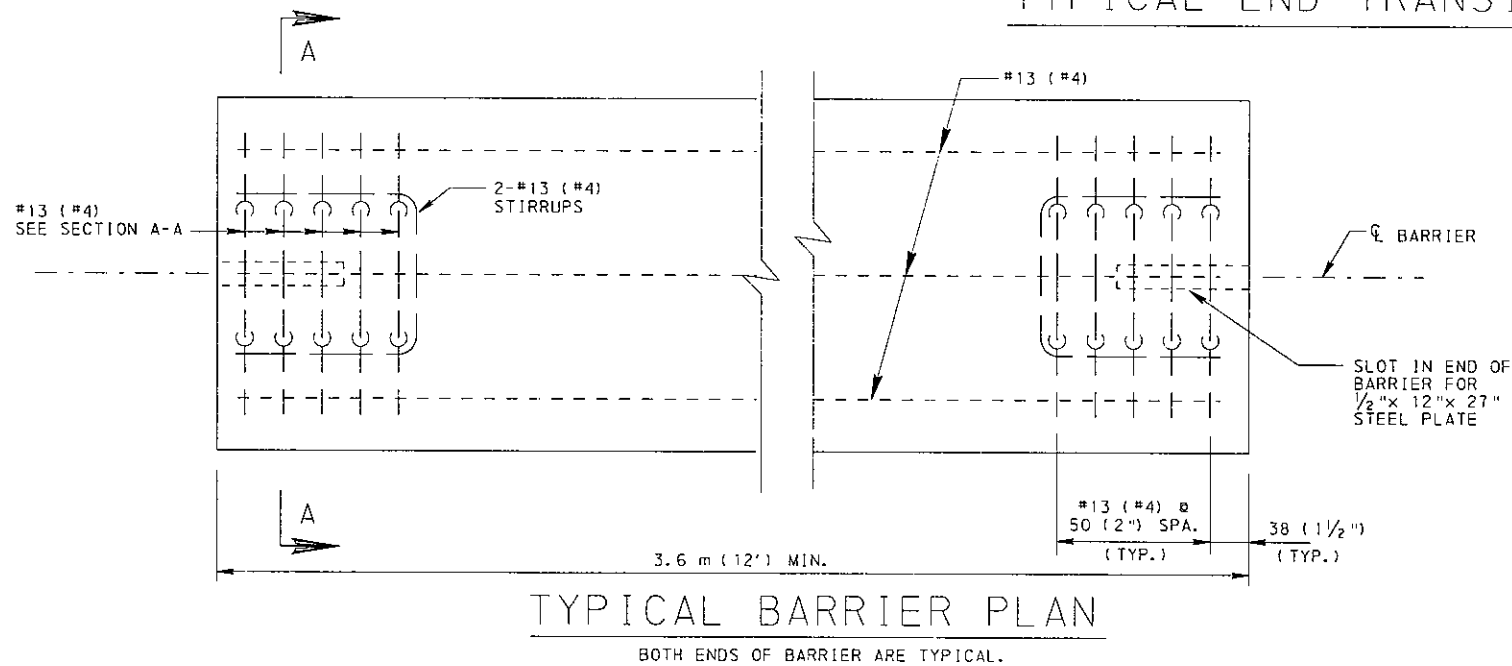
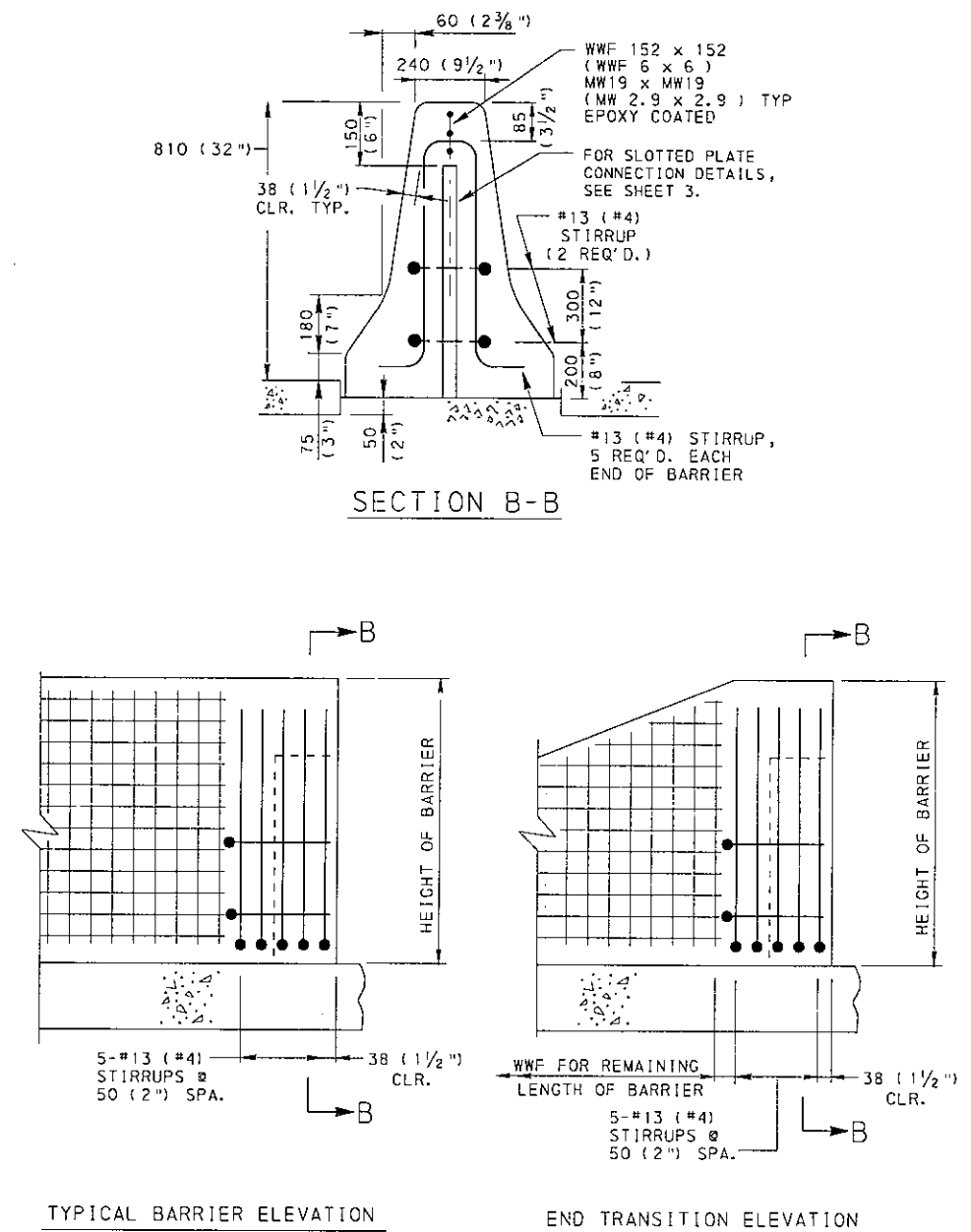
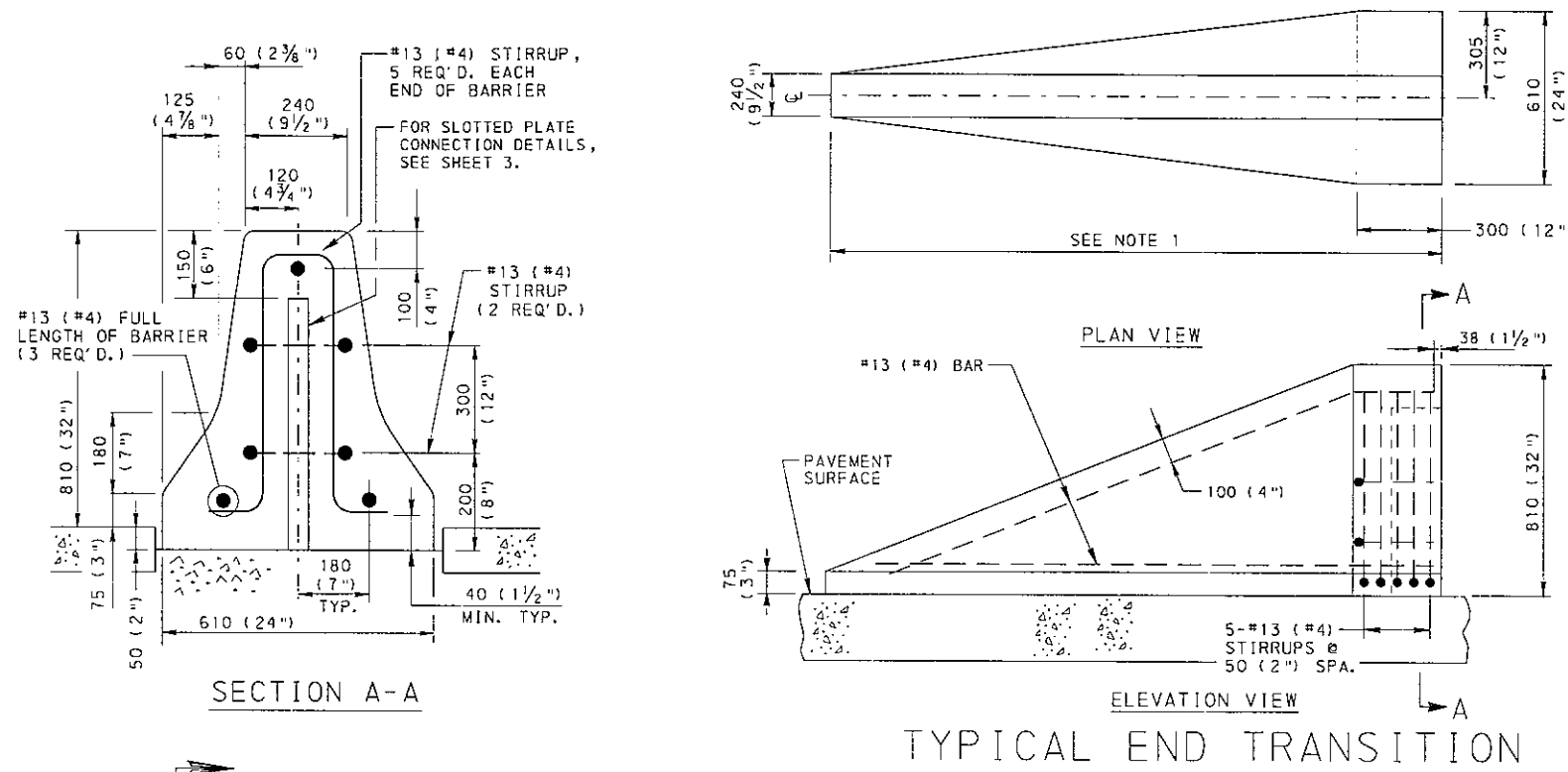


NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

BC-736M	REINFORCEMENT BAR FABRICATION DETAILS	RECOMMENDED APR. 15, 2004 <i>Dean A. Schick</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. G. Patel</i> CHIEF ENGINEER	SHT 1 OF 8 RC-57M
REFERENCE DRAWINGS				



ALTERNATE WWF REINFORCEMENT DETAILS

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

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(g).
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.

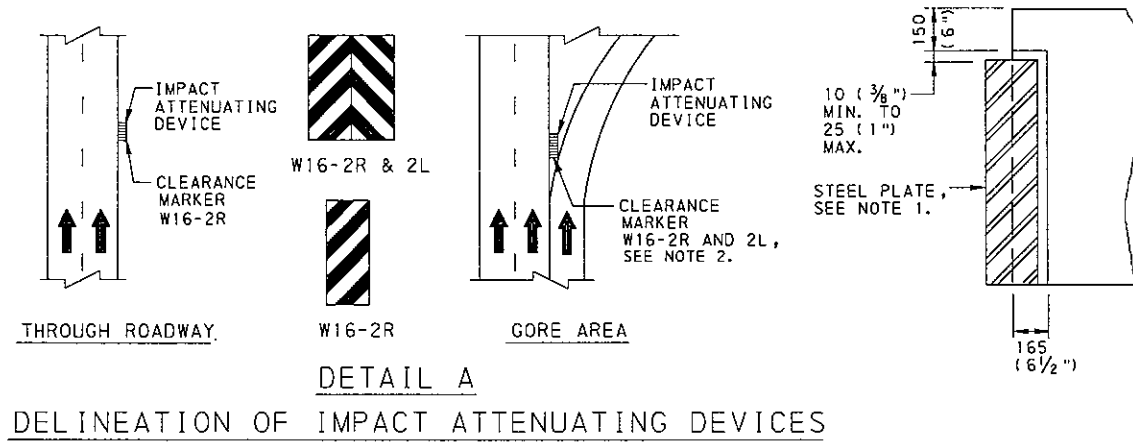
REFER TO TABLE 1, SHEET 3, FOR FLARE RATE REQUIREMENTS.

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

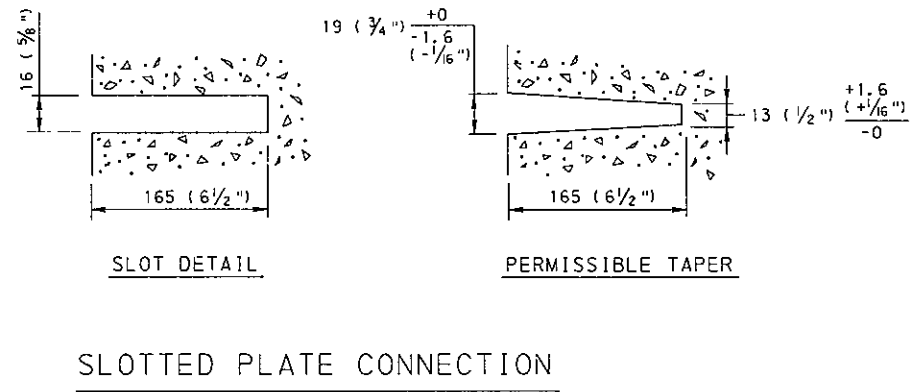
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED APR. 15, 2004 <i>Dean A. Schach</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>m. Chel</i> CHIEF ENGINEER	SHT 2 OF 8 RC-57M
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DELINEATION OF IMPACT ATTENUATING DEVICES

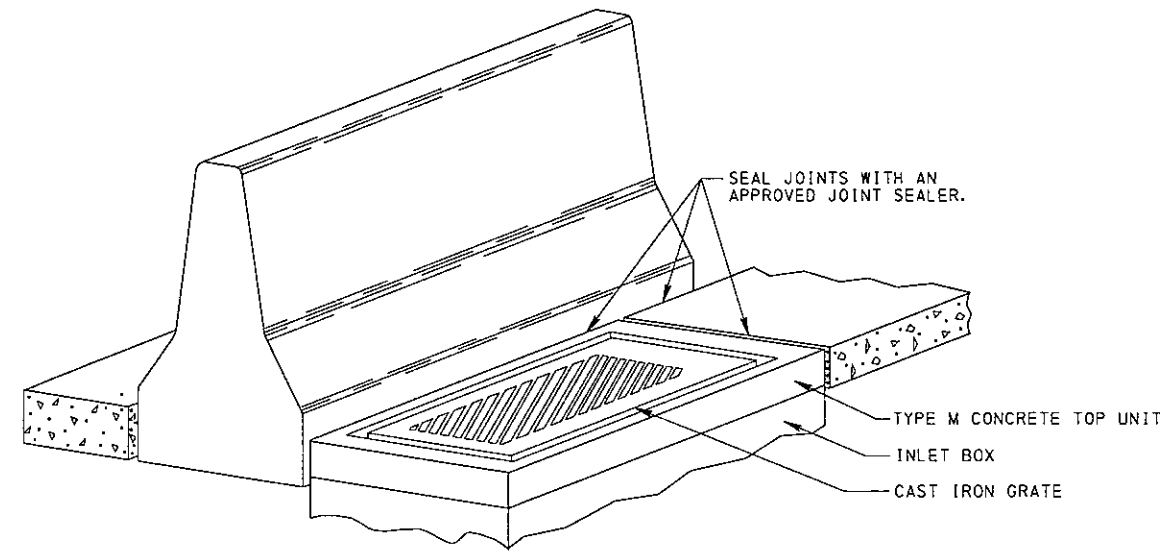


SLOTTED PLATE CONNECTION

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

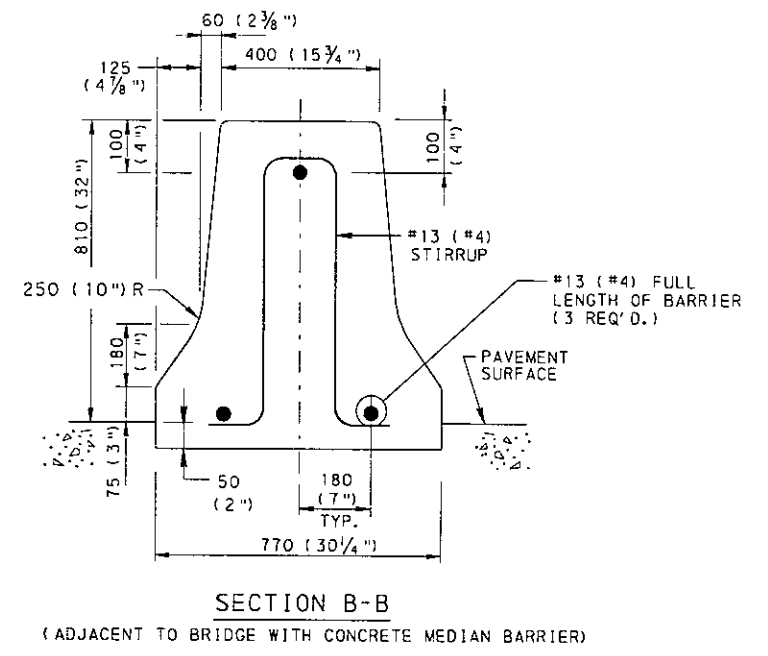
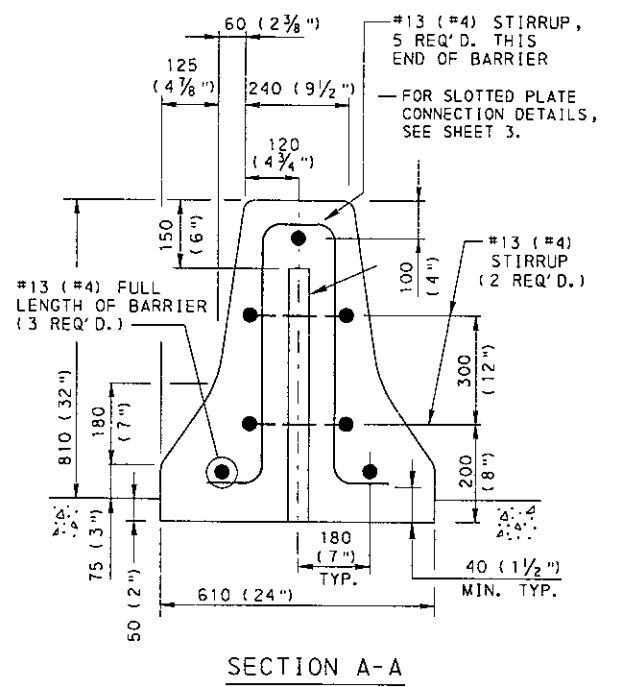
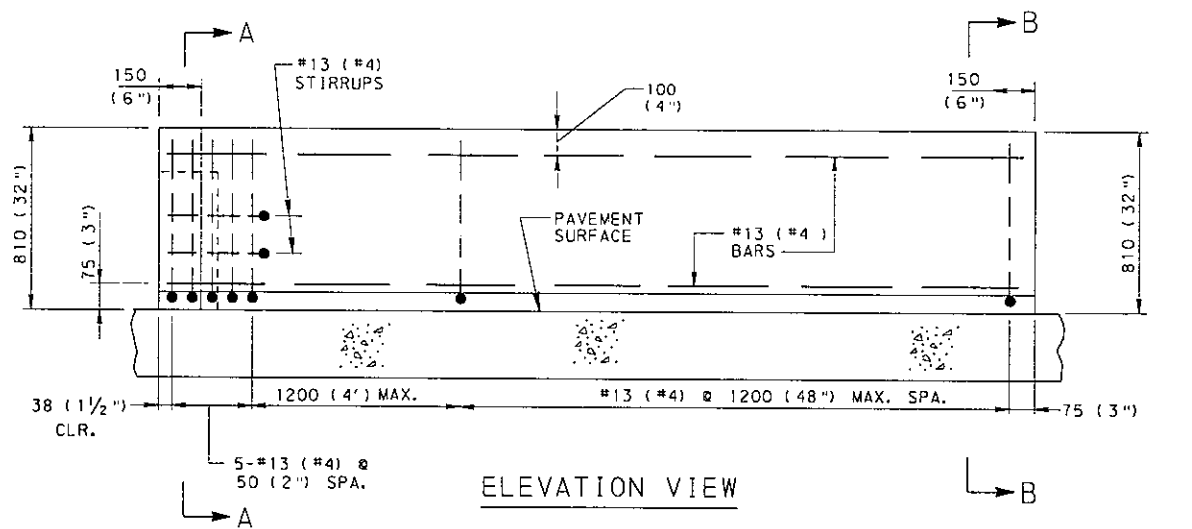
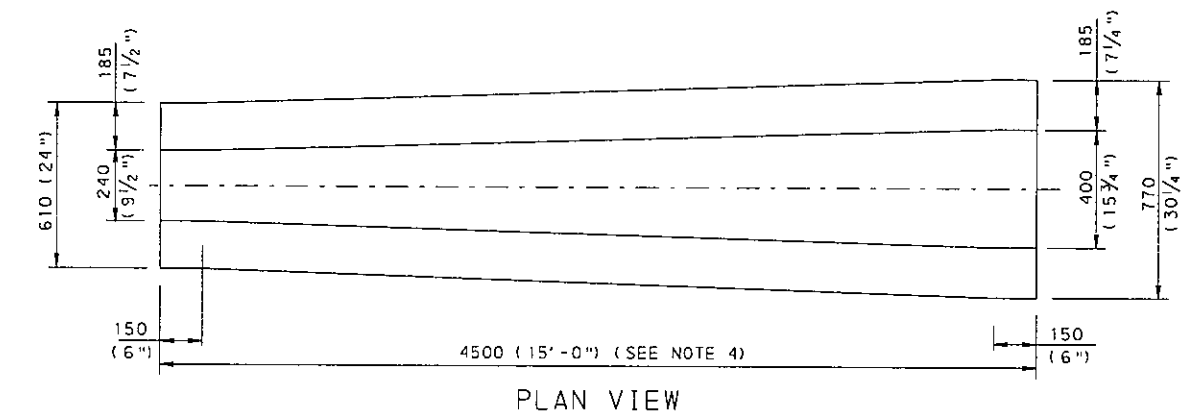
DESIGN SPEED		MAXIMUM FLARE RATES	
km/h	mph	CONCRETE BARRIER	GUIDE RAIL
120	75	20 : 1	15 : 1
110	70	20 : 1	15 : 1
105	65	19 : 1	15 : 1
100	60	18 : 1	14 : 1
90	55	16 : 1	12 : 1
80	50	14 : 1	11 : 1
70	45	12 : 1	10 : 1
65	40	11 : 1	9 : 1
60	35	10 : 1	8 : 1
50	30	8 : 1	7 : 1

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

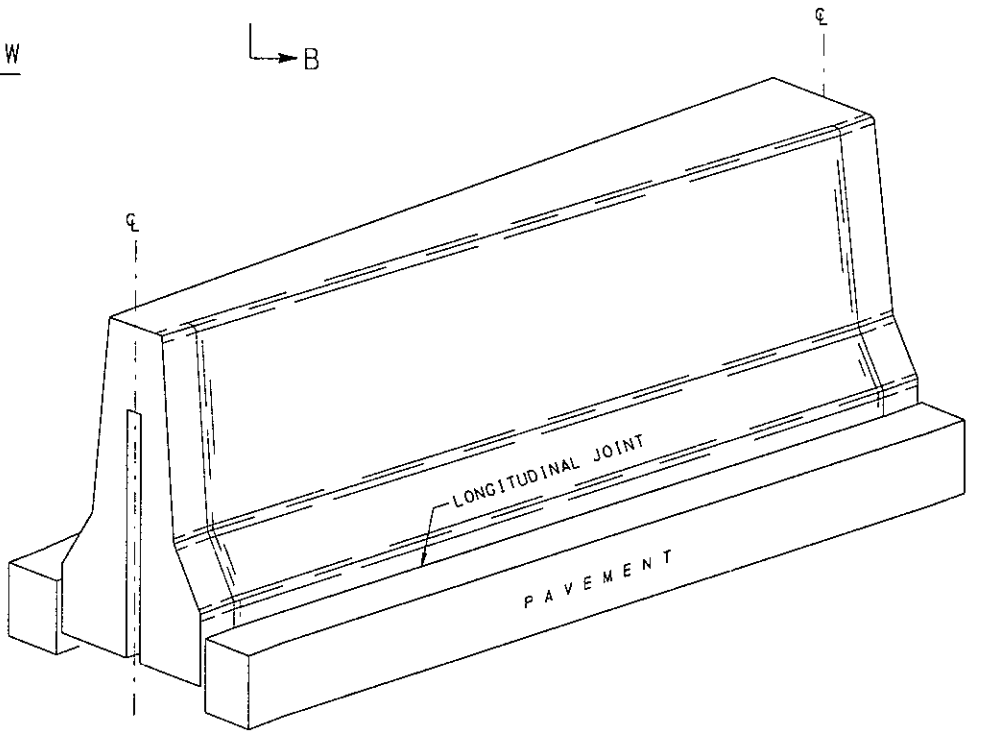
RECOMMENDED APR. 15, 2004 <i>Dean A. Schaefer</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. P. Patel</i> CHIEF ENGINEER	SHT 3 OF 8 RC-57M
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NOTES

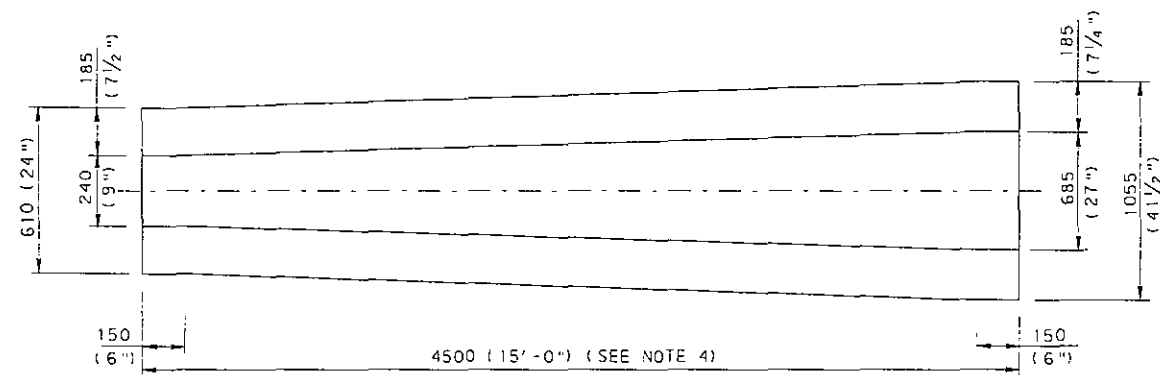
1. PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709.
2. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
3. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.
4. BRIDGE TO HIGHWAY TRANSITIONS MAY BE FORMED BY USING TWO 2250 (7'-6") OR TWO 3600 (12'-0")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

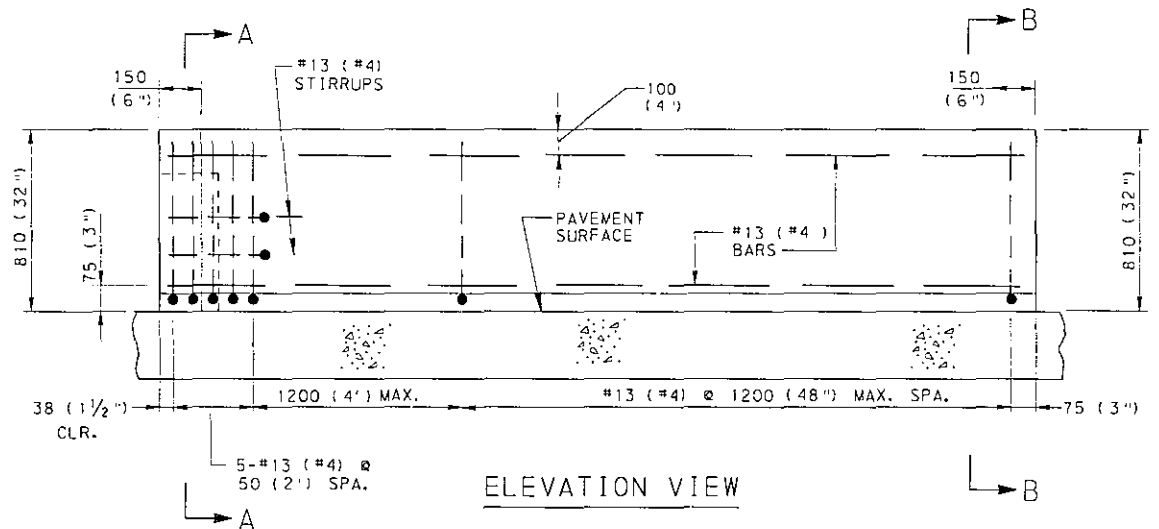


ORTHOGRAPHIC VIEW
TYPICAL 810 TO 810 (32" TO 32")
BRIDGE TO HIGHWAY TRANSITION
(THE BRIDGE BARRIER IS A CONCRETE MEDIAN BARRIER)

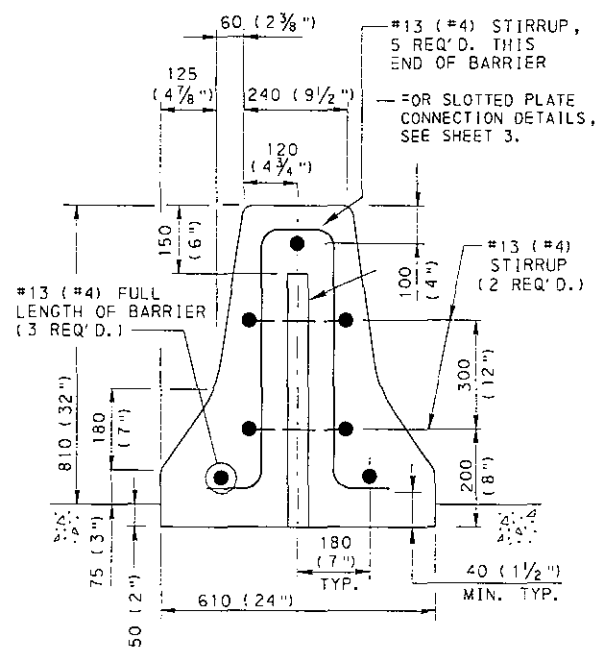
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN		
CONCRETE MEDIAN BARRIER F-SHAPE		
RECOMMENDED APR. 15, 2004 <i>Dean A. Shindler</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. P. Hite</i> CHIEF ENGINEER	SHT 4 OF 8 RC-57M



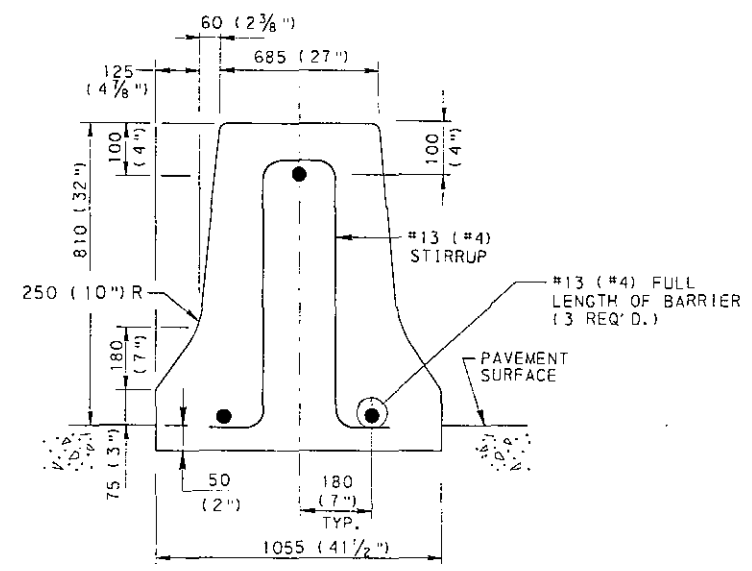
PLAN VIEW



ELEVATION VIEW



SECTION A-A



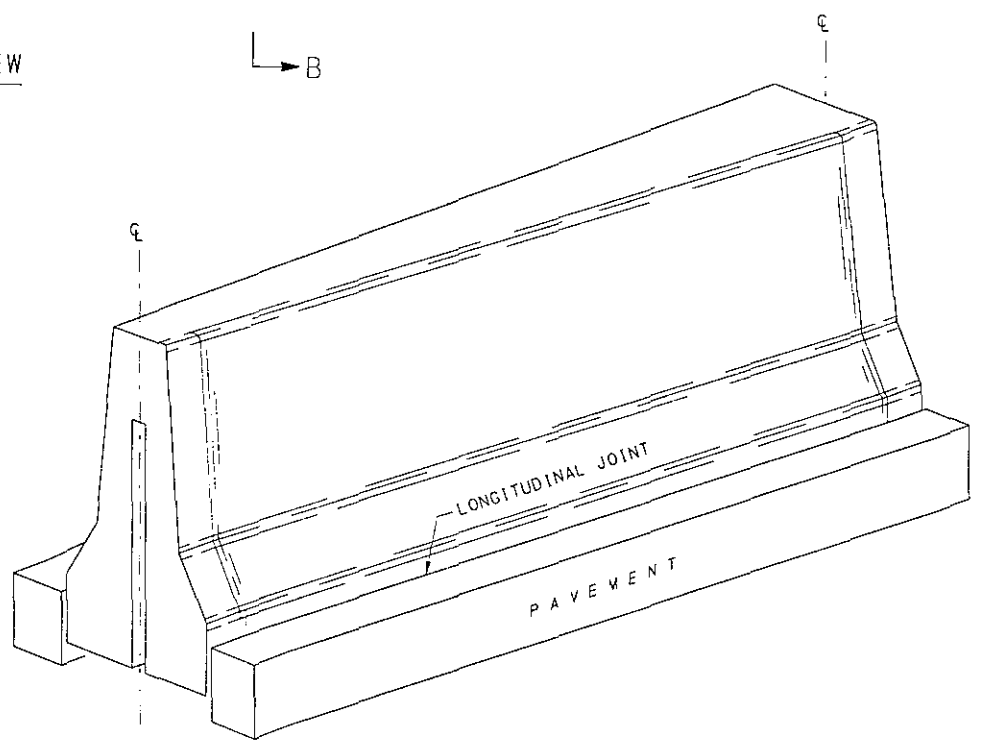
SECTION B-B

(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.



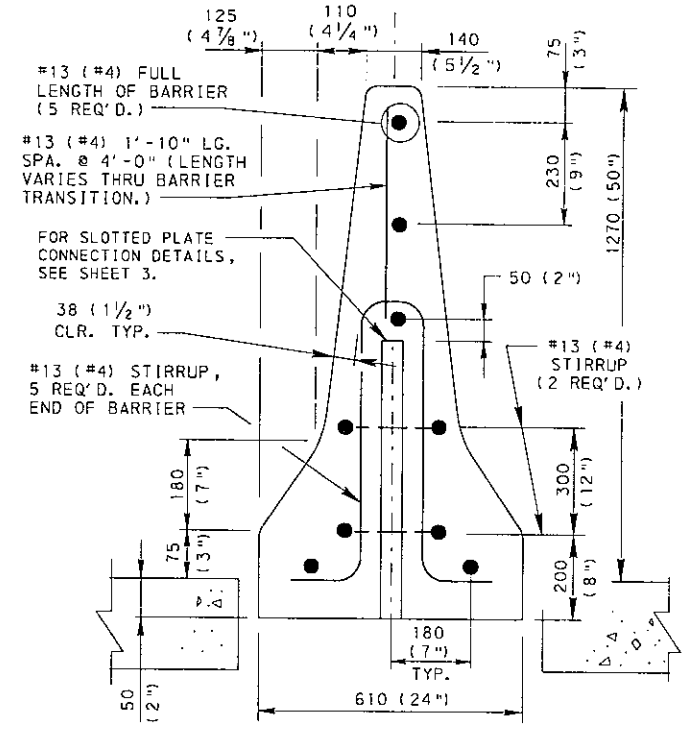
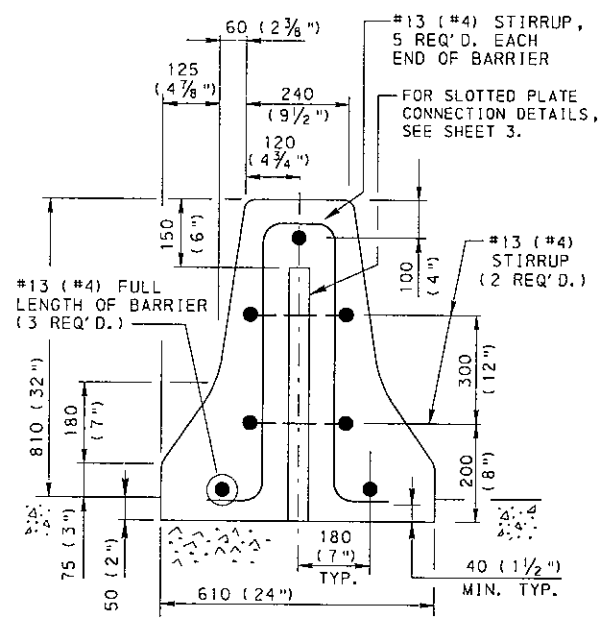
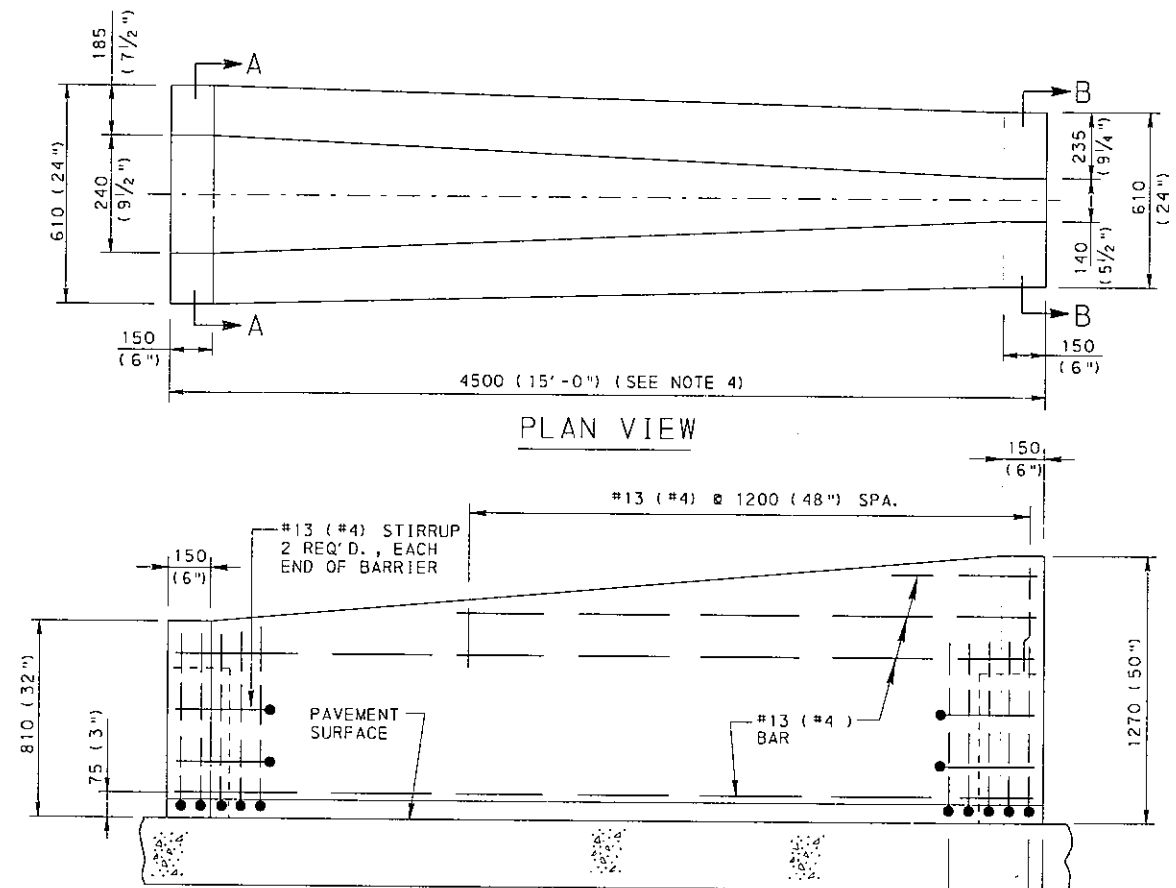
ORTHOGRAPHIC VIEW

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 APR. 15, 2004 <i>Don A. Schick</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. Patel</i> CHIEF ENGINEER	SHT 5 OF 8 RC-57M
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ELEVATION VIEW

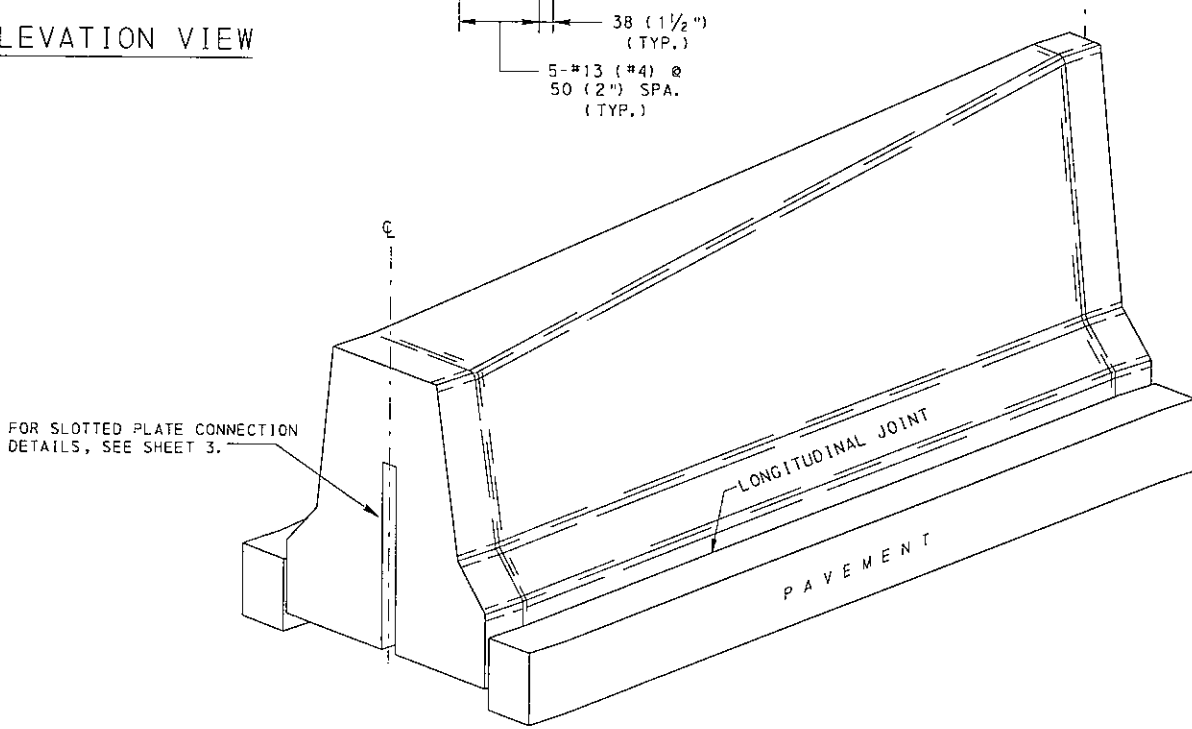
SECTION A-A

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.

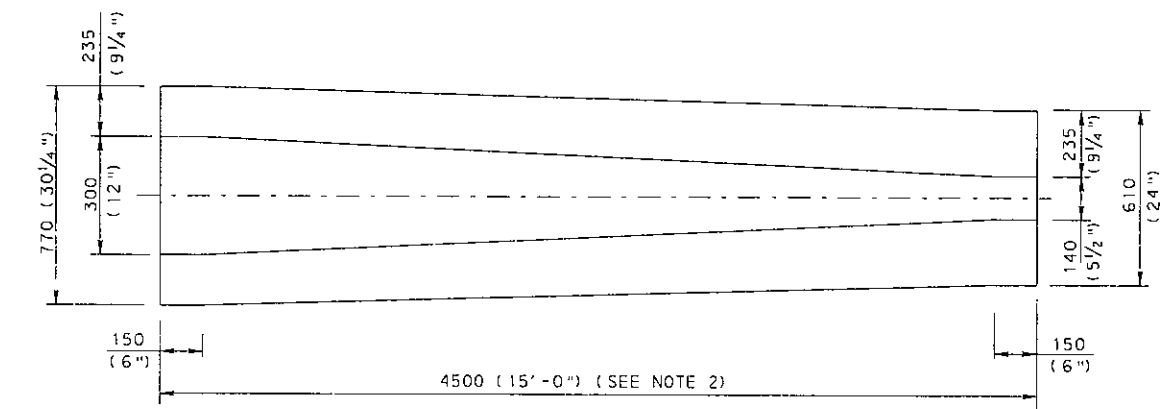
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



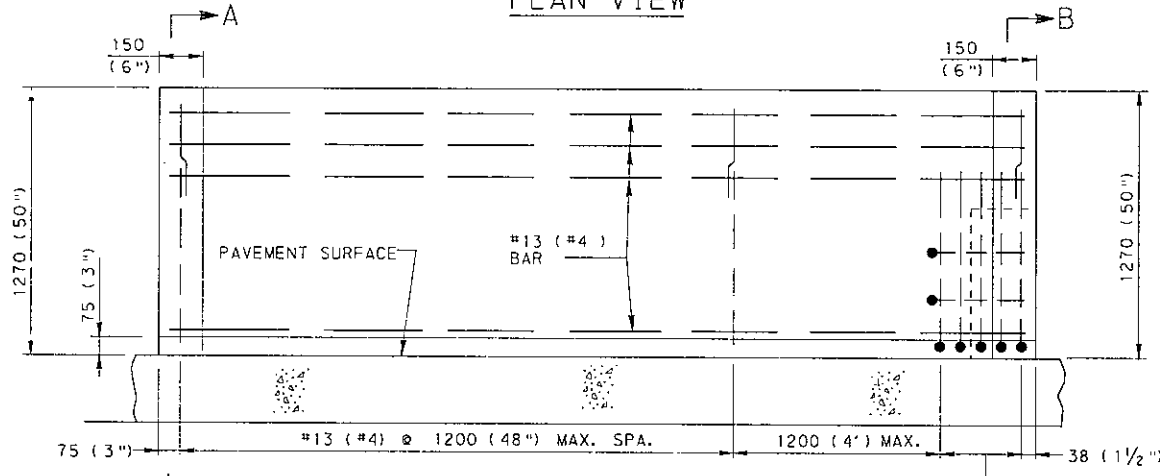
ORTHOGRAPHIC VIEW

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

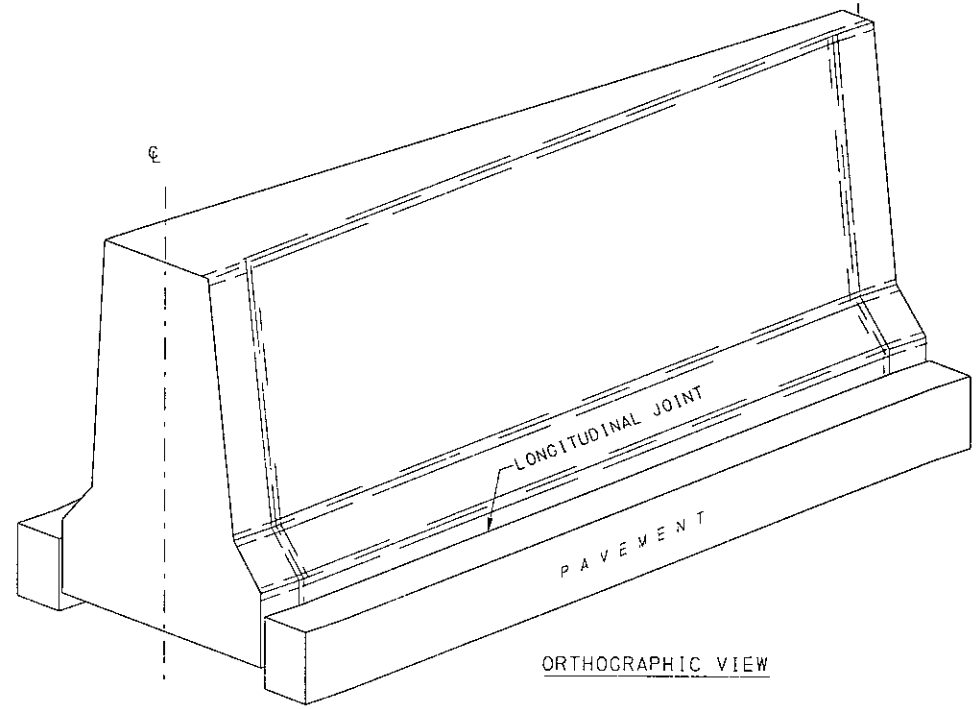
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN		
CONCRETE MEDIAN BARRIER F-SHAPE		
RECOMMENDED APR. 15, 2004 <i>Dean A. Schick</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>m. L. Patel</i> CHIEF ENGINEER	SHT 6 OF 8 RC-57M



PLAN VIEW

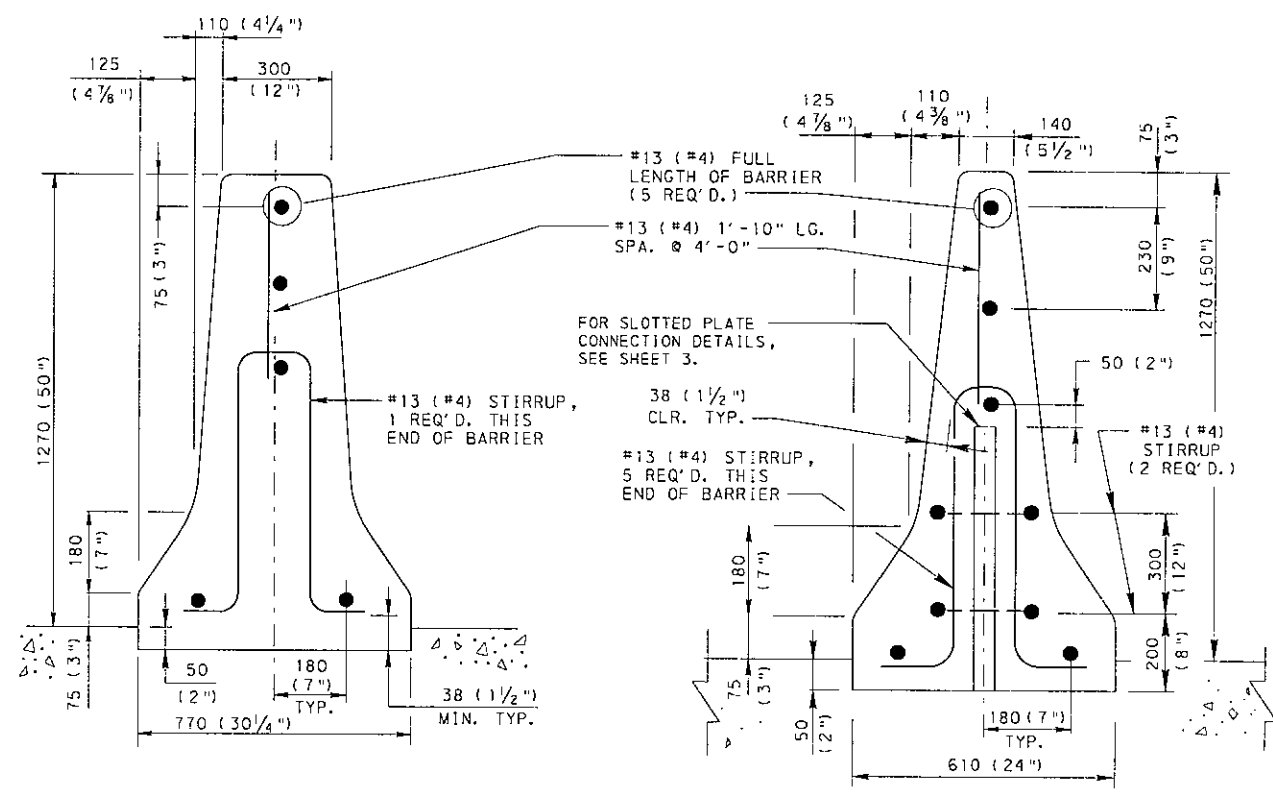


ELEVATION VIEW



ORTHOGRAPHIC VIEW

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



SECTION A-A

SECTION B-B

(ADJACENT TO BRIDGE WITH CONCRETE GLARE SCREEN MEDIAN BARRIER)

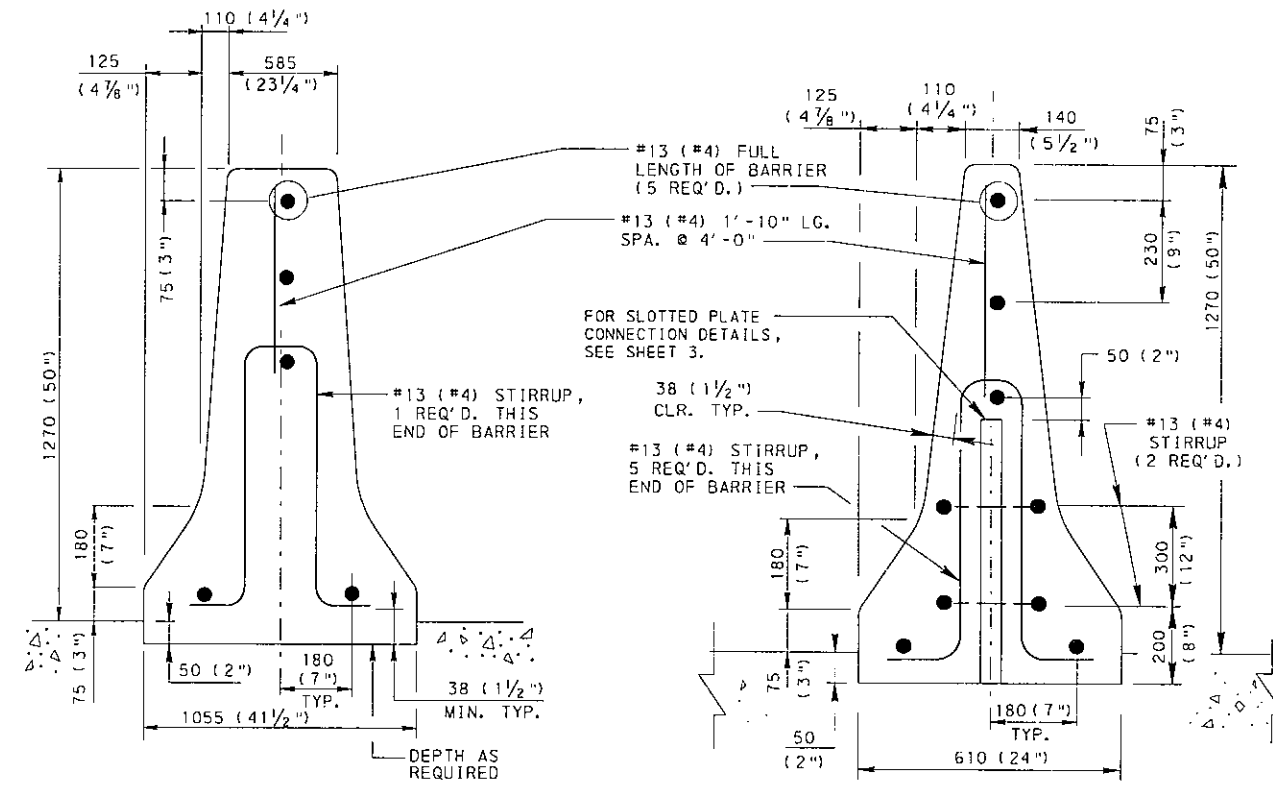
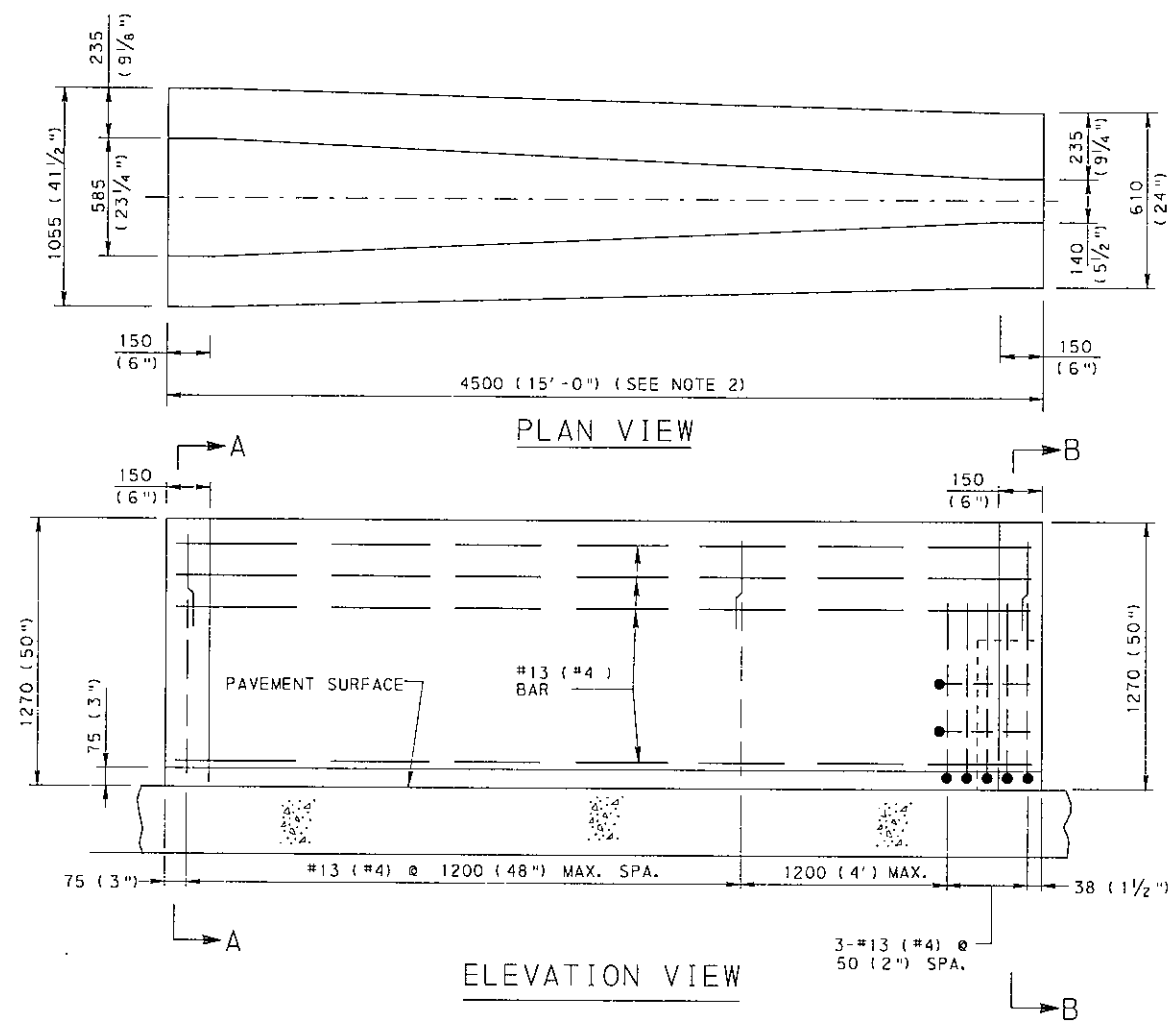
NOTE

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.

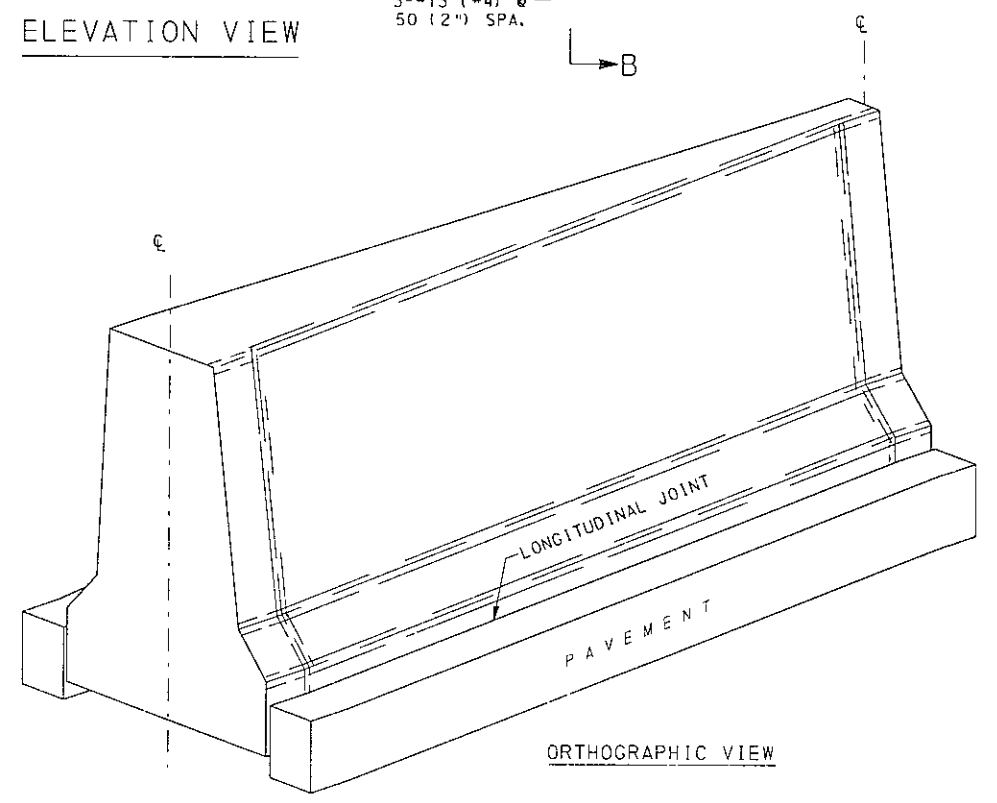
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE



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

SECTION B-B



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

NOTE

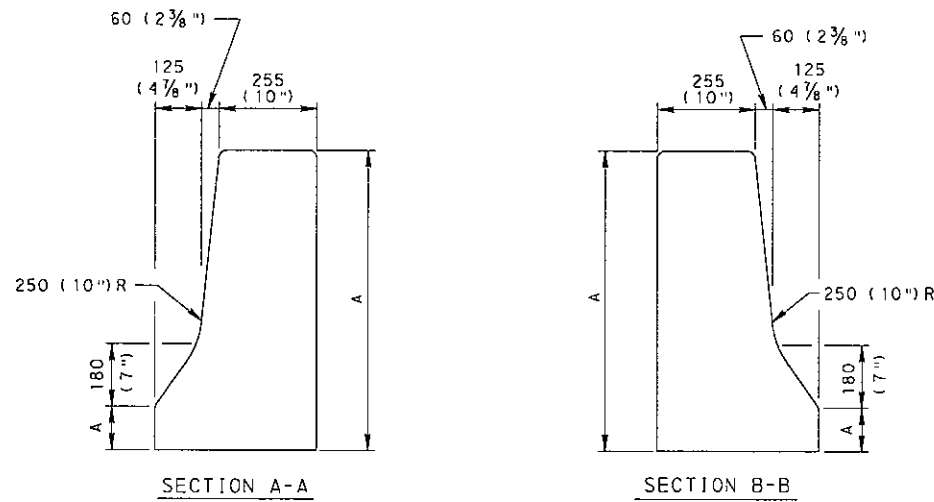
1. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.
2. BRIDGE TO HIGHWAY TRANSITIONS MAY BE FORMED BY USING TWO 2250 (7'-6") OR TWO 3600 (12'-0") SECTIONS WITH SLOTTED PLATE CONNECTIONS.

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

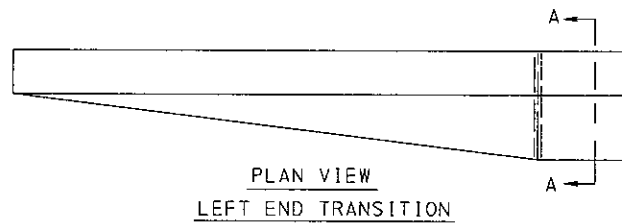
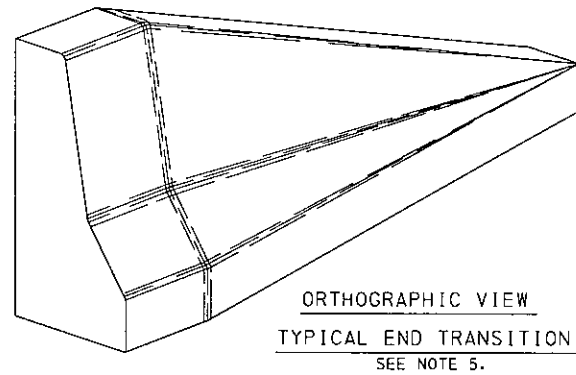
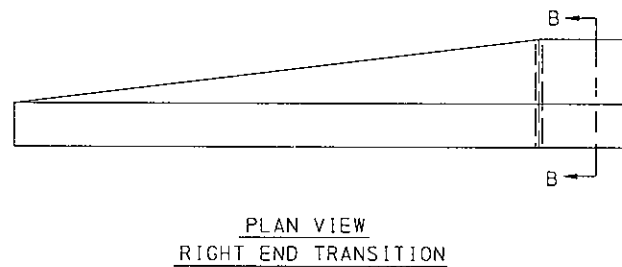
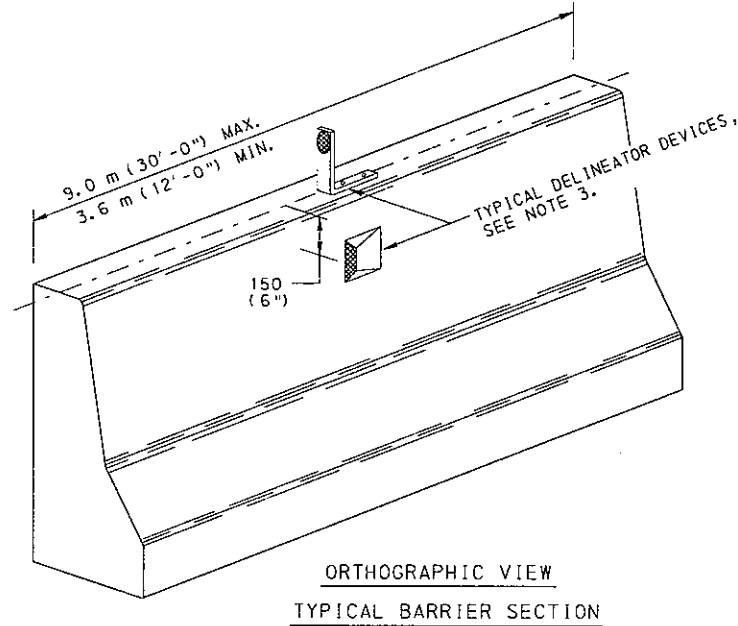
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED APR. 15, 2004 <i>Dean A. Schick</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. Patel</i> CHIEF ENGINEER	SHT 8 OF 8 RC-57M
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NOTE:
A = SEE TYPICAL SECTIONS,
SHEET 2.



- NOTES**
- 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.
 - 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.
 - PROVIDE BARRIER-MOUNT OR REFLECTOR UNIT DELINEATORS, AS INDICATED ON RC-57M.
 - PROVIDE REINFORCEMENT FOR SINGLE FACE CONCRETE BARRIER AS INDICATED ON SHEET 2.
 - PROVIDE END TRANSITIONS OR IMPACT ATTENUATING DEVICES AS INDICATED ON RC-57M.
 - 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.

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

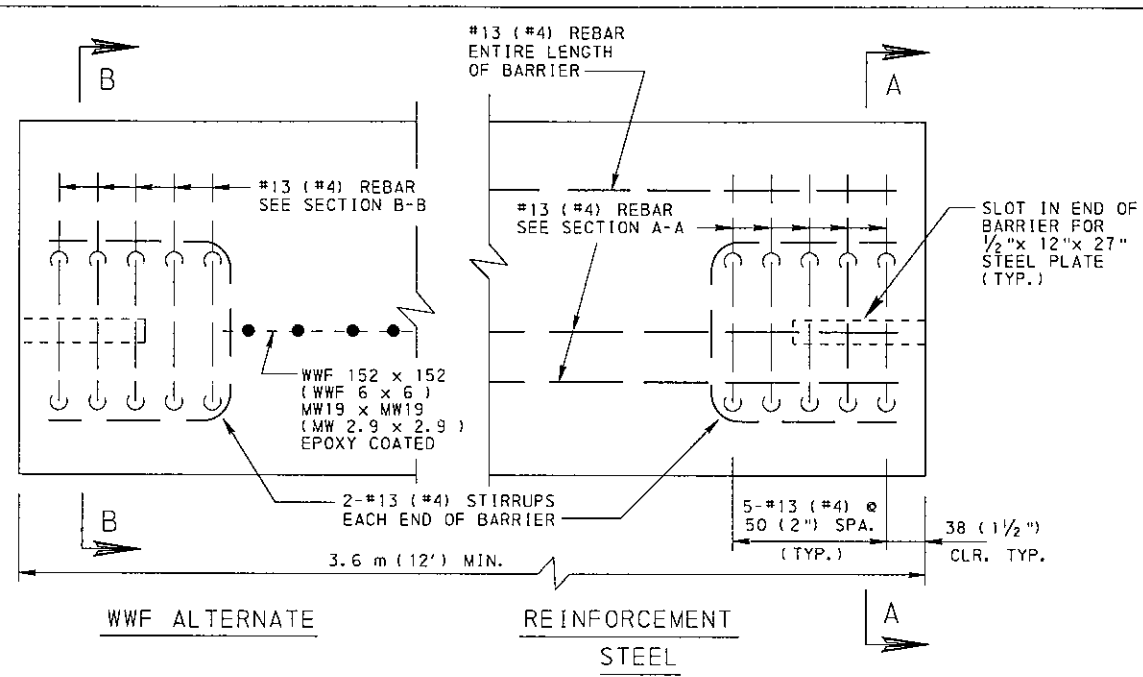
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER

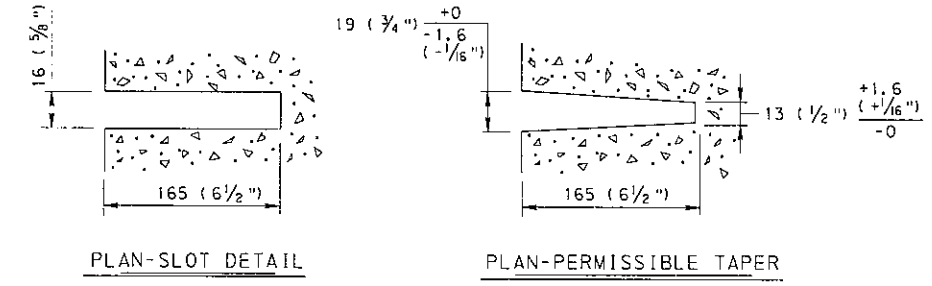
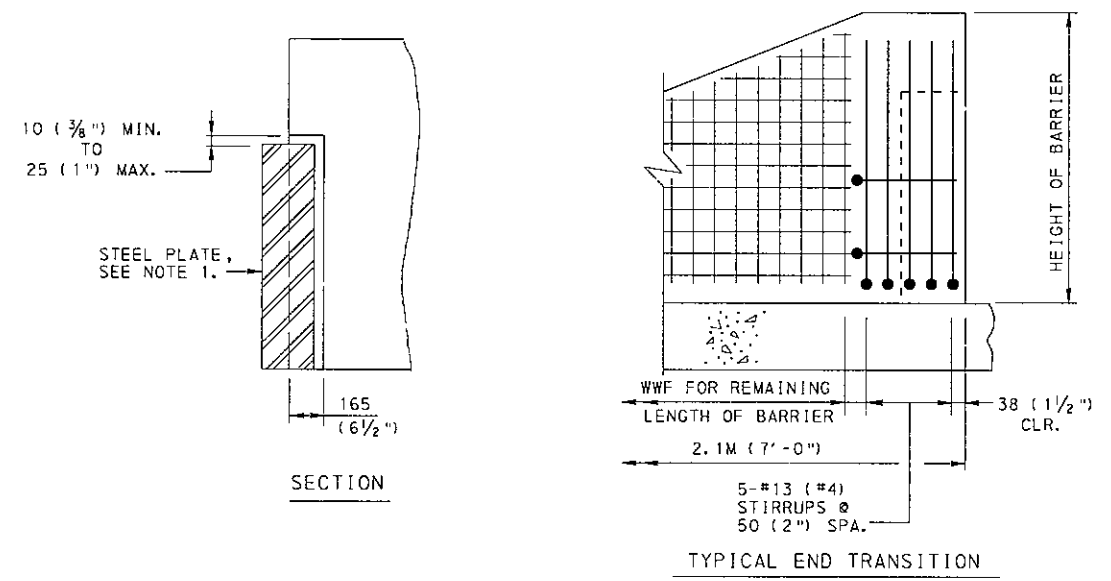
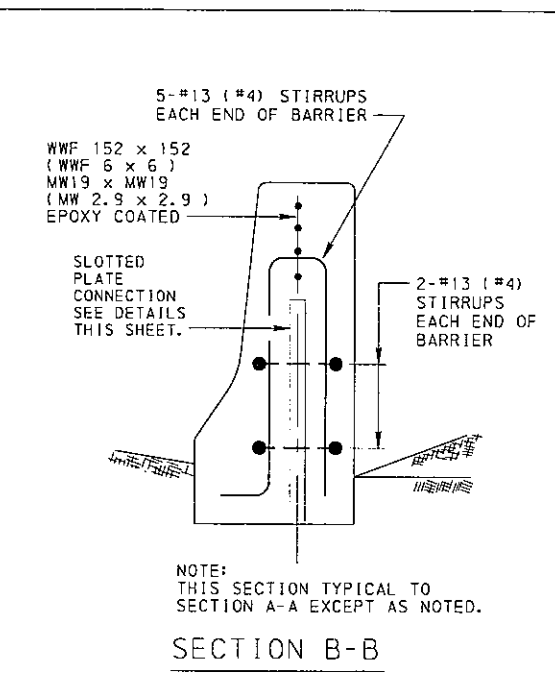
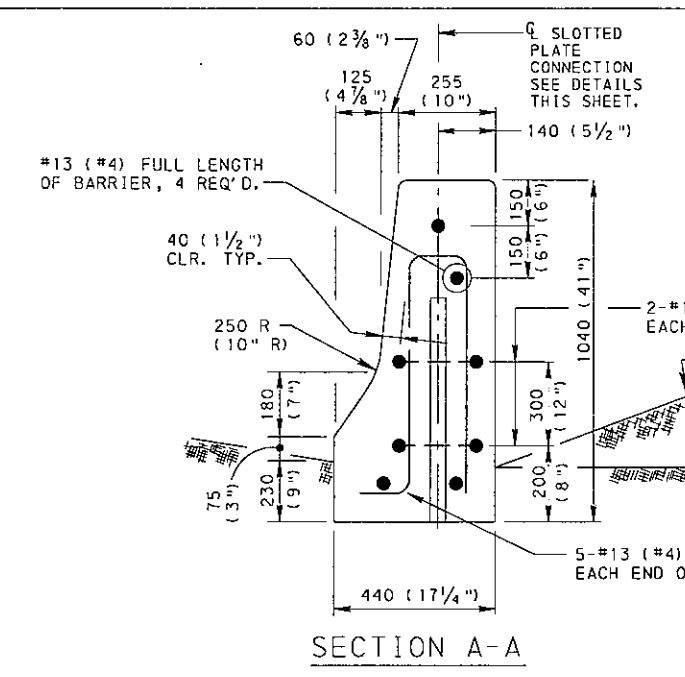
BC-736M	REINFORCEMENT BAR FABRICATION DETAILS
REFERENCE DRAWINGS	

RECOMMENDED APR. 15, 2004 <i>Don A. Shank</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. Kotel</i> CHIEF ENGINEER	SHT 1 OF 5 RC-58M
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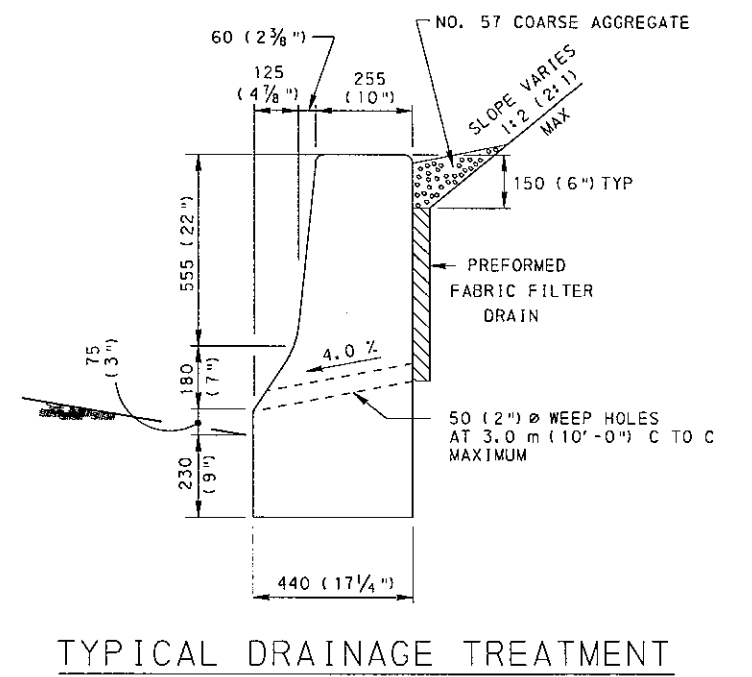
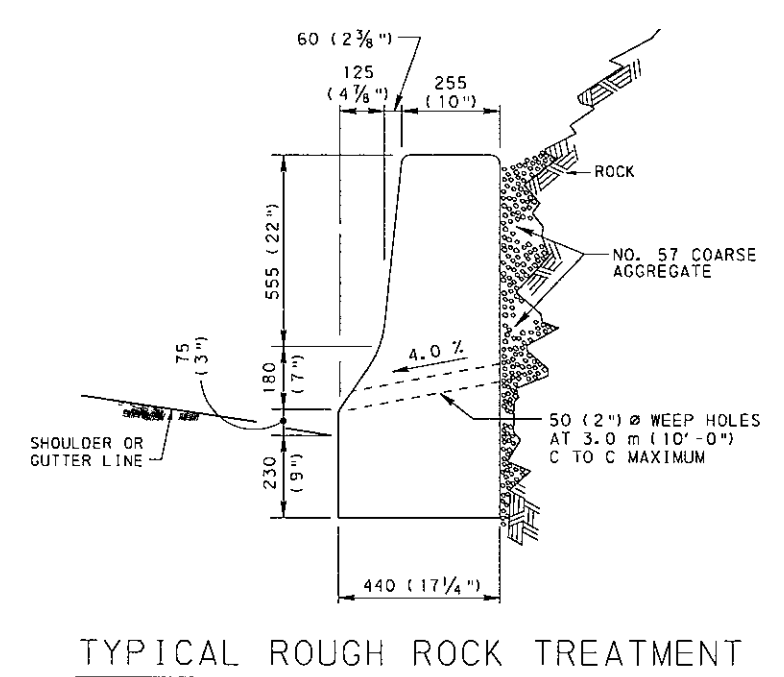
BARRIER PLAN

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



SLOTTED PLATE CONNECTION

TYPICAL SINGLE FACE BARRIER SECTIONS



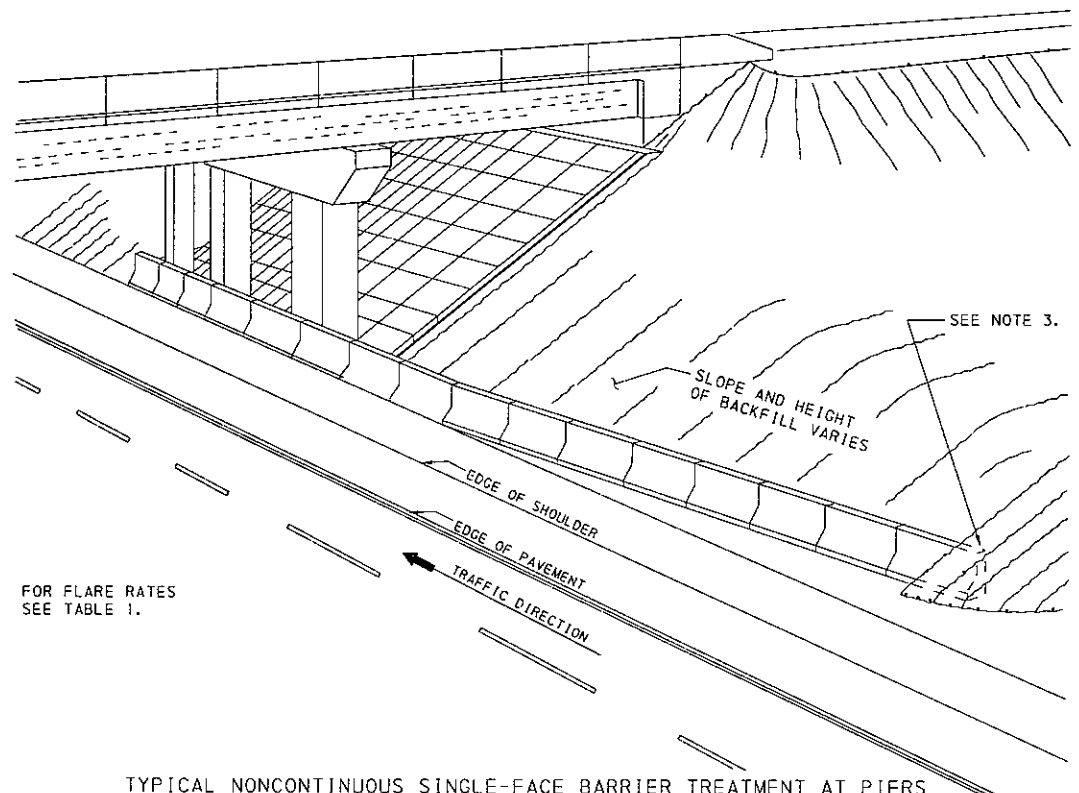
NOTES

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.

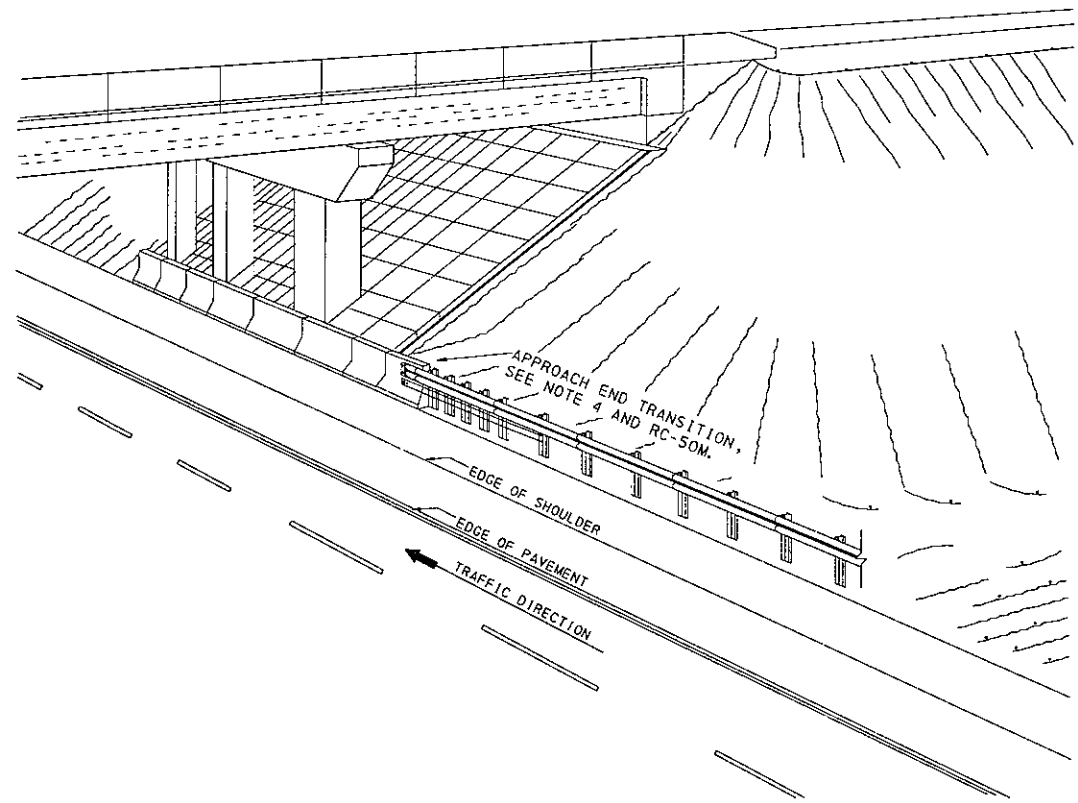
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER
F-SHAPE



FOR FLARE RATES
SEE TABLE 1.

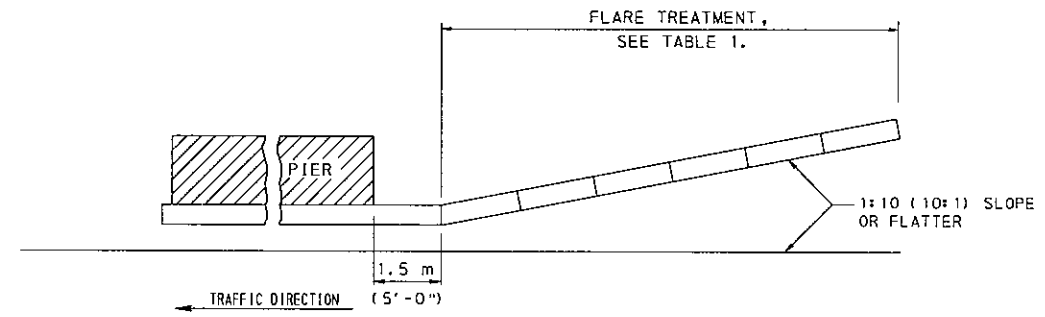
TYPICAL NONCONTINUOUS SINGLE-FACE BARRIER TREATMENT AT PIERS



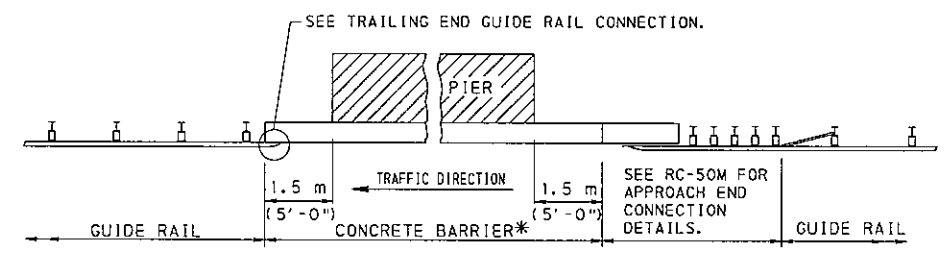
TYPICAL TREATMENT WHEN CONTINUOUS GUIDE RAIL IS REQUIRED

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 PREFERRED TREATMENT IS TO TERMINATE THE CONCRETE BARRIER 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.



PLAN VIEW



CONTINUOUS GUIDE RAIL WITH SINGLE FACE BARRIER AT PIER

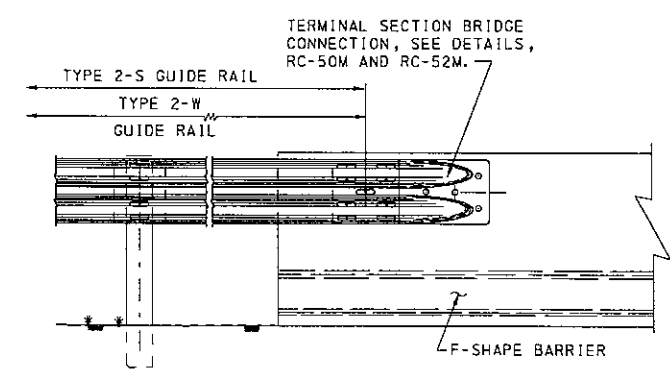
* IF ADEQUATE DEFLECTION DISTANCE IS PROVIDED (TABLE, RC-54M) BETWEEN THE BACK OF THE GUIDE RAIL POST AND FRONT OF OBSTRUCTION, DO NOT USE CONCRETE BARRIER; CONTINUE THE GUIDE RAIL.

PLAN VIEW

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

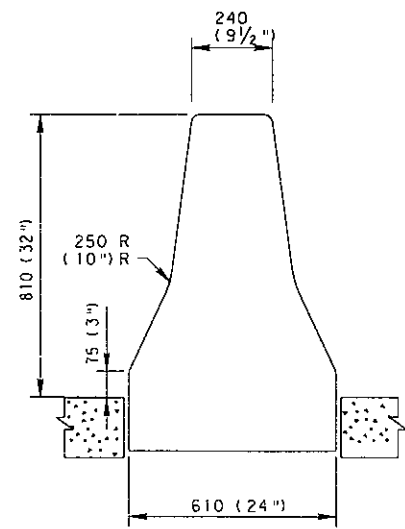
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



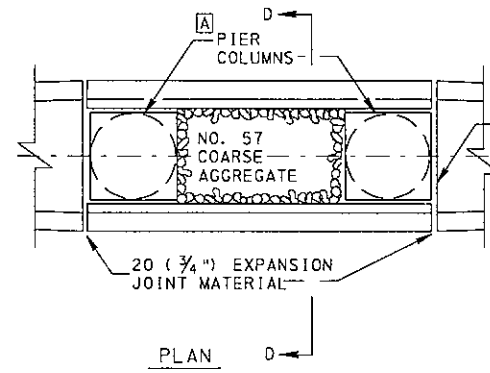
TRAILING END GUIDE RAIL CONNECTION TO F-SHAPE BARRIER

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

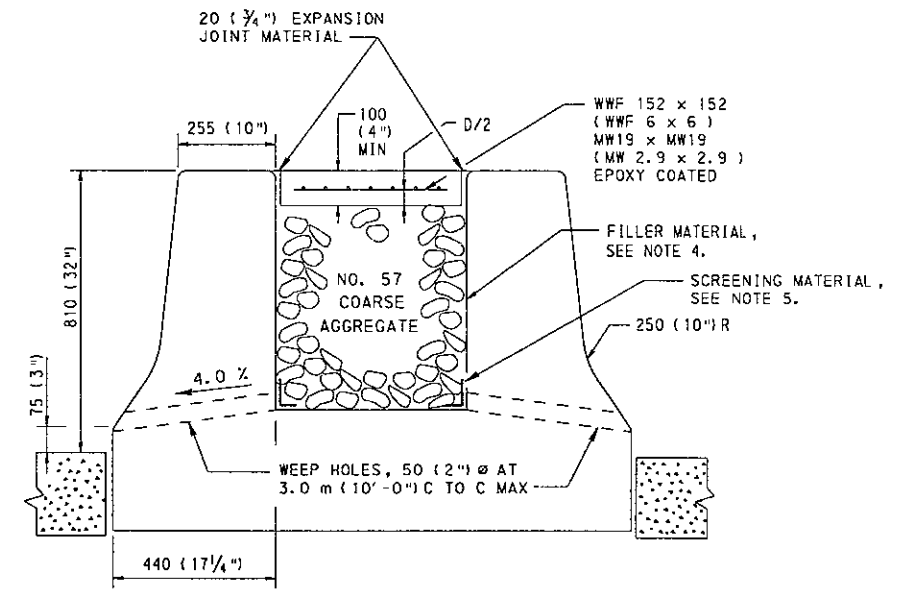
SINGLE FACE CONCRETE BARRIER
F-SHAPE
PLACEMENT AT SHOULDER PIERS



SECTION A-A

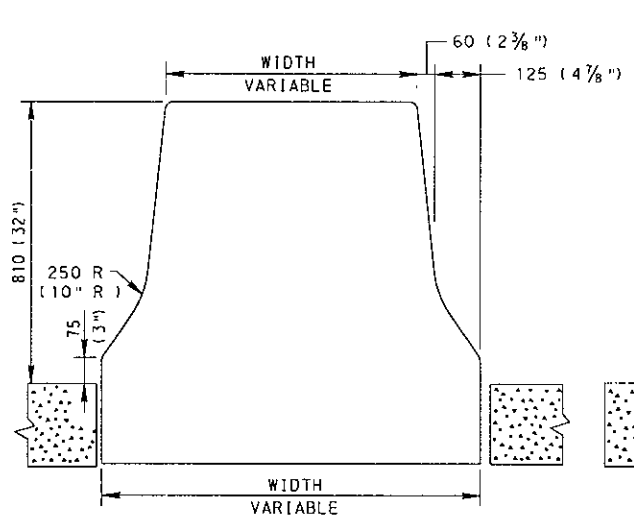


PLAN

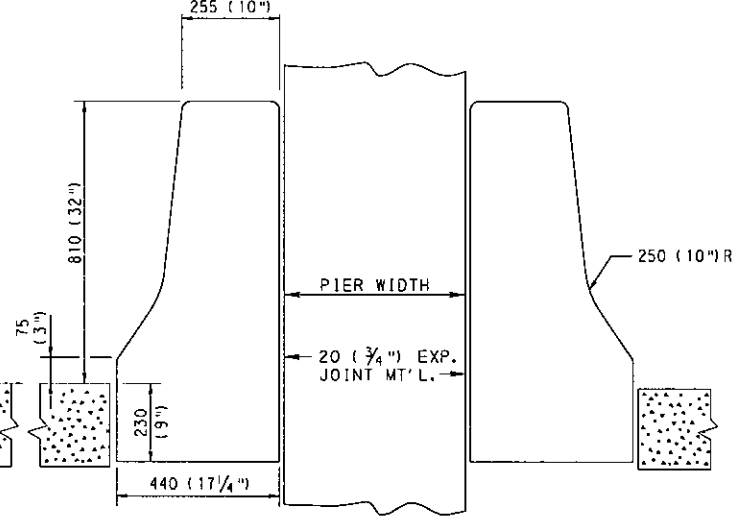


SECTION D-D

TYPICAL ALTERNATE BARRIER TREATMENT AT PIERS



SECTION B-B

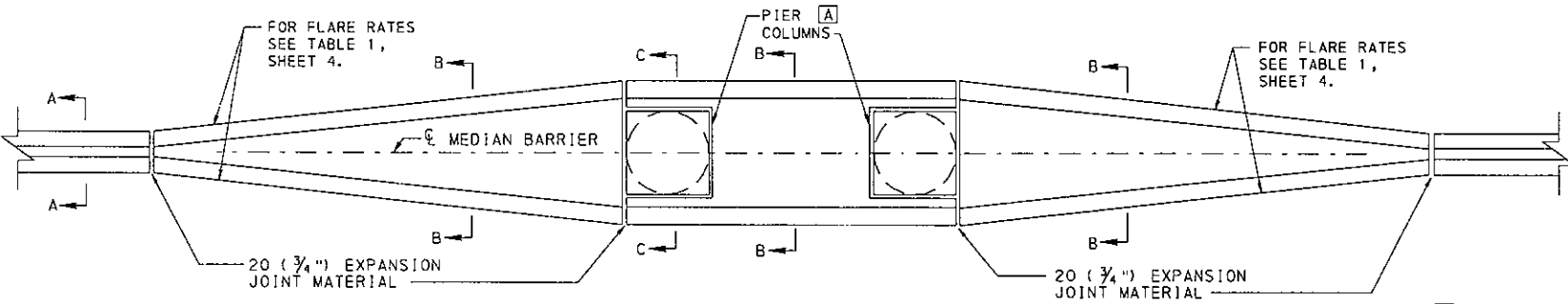


SECTION C-C

NOTES

1. REFER TO BRIDGE STANDARD DRAWINGS (BD-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

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 APR. 15, 2004 <i>Don A. Stank</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>m. Patel</i> CHIEF ENGINEER	SHT 4 OF 5 RC-58M
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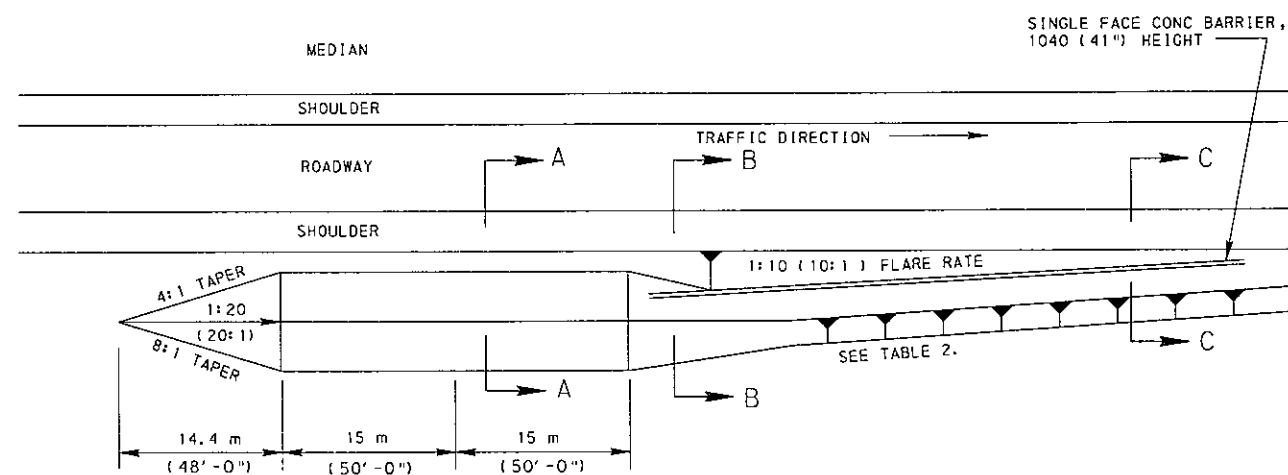


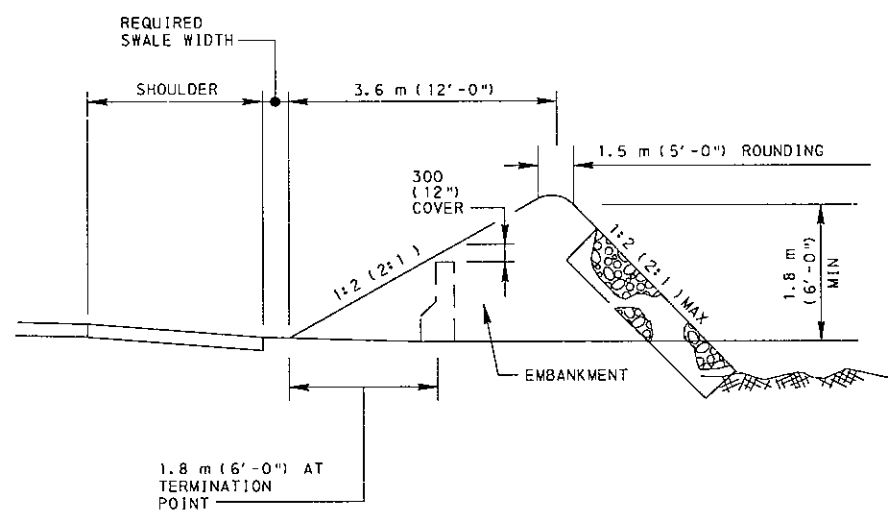
TABLE 2
FLARE RATES
FOR BARRIER DESIGN

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

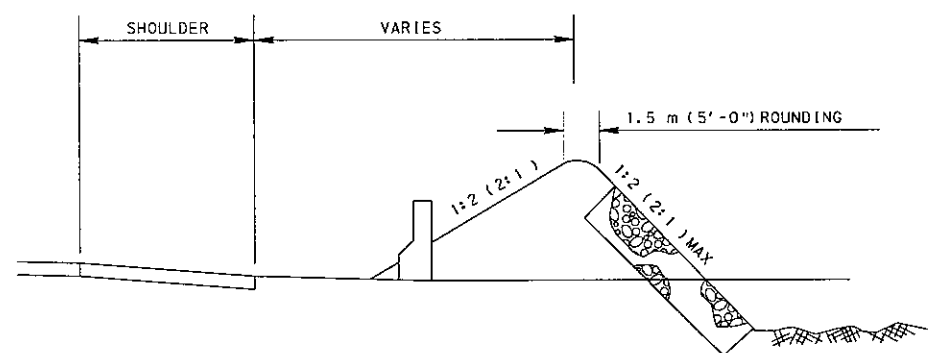
NOTES

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.

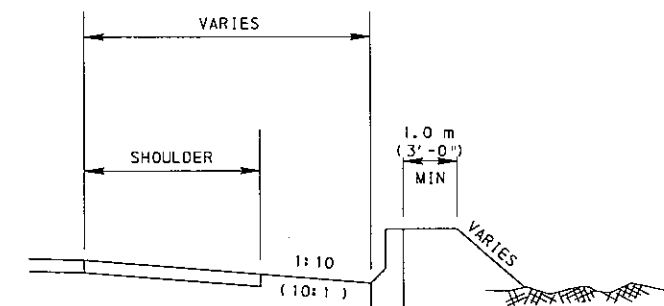
TYPICAL EARTH MOUND FOR BURYING CONCRETE BARRIER



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.

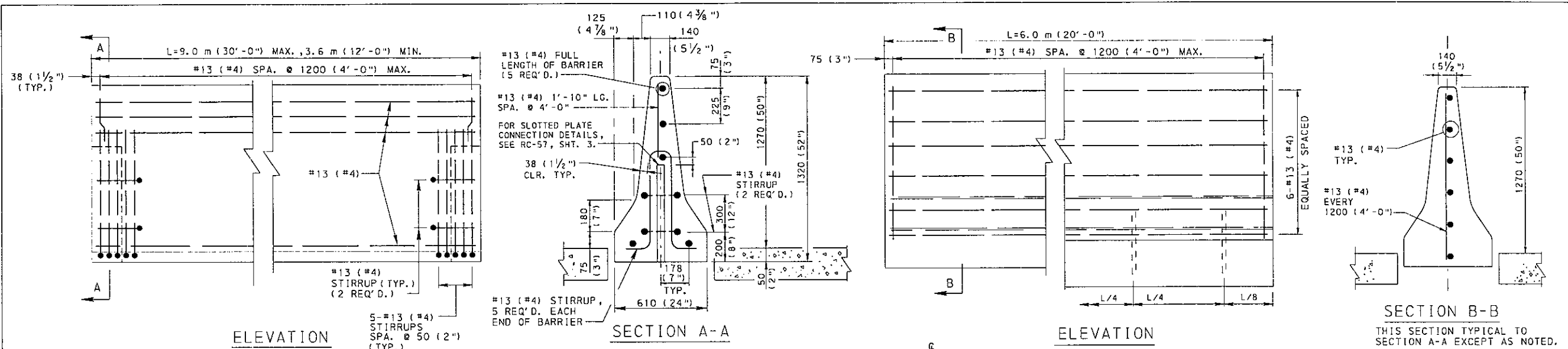
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

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

RECOMMENDED APR. 15, 2004
Dean A. Schuch
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED APR. 15, 2004
M. P. Hibel
CHIEF ENGINEER

SHT 5 OF 5
RC-58M



ELEVATION

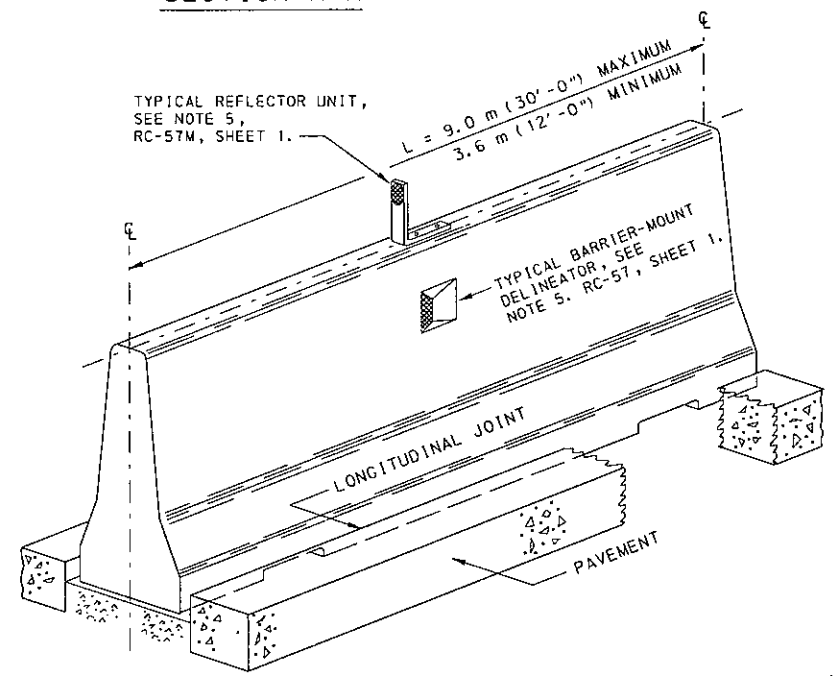
SECTION A-A

ELEVATION

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

TYPICAL PRECAST

TYPICAL CAST-IN-PLACE

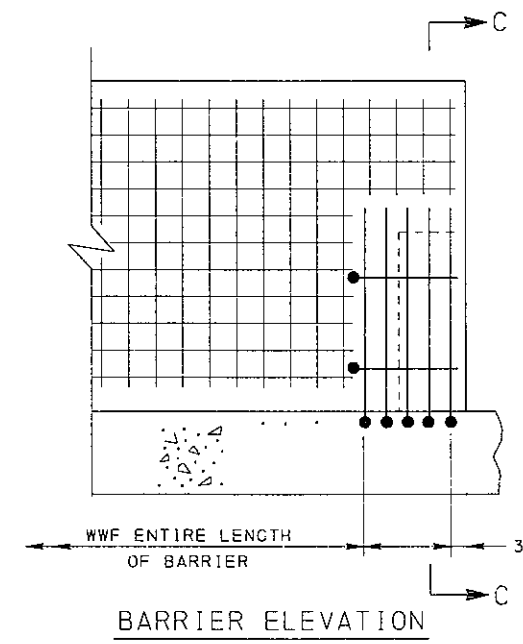


TYPICAL CAST-IN PLACE AND PRECAST BARRIER

NOTES

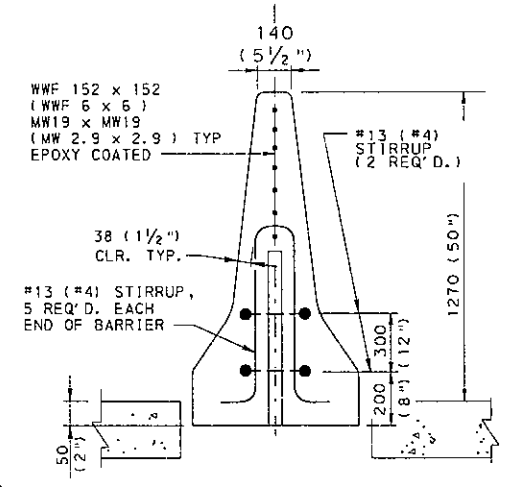
1. PROVIDE CONCRETE GLARE SCREEN MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 622 AND 714.
A. MINIMUM CONCRETE CLASS: AA, EXCEPT USE CLASS AAA CONCRETE FOR PRECAST BARRIER.
2. FOR INSTALLATION OF GLARE SCREEN ON TOP OF EXISTING CONCRETE MEDIAN BARRIER, PROVIDE PLASTIC PADDLES OR MODULAR SYSTEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
3. FOR PRECAST BARRIERS, PROVIDE SLOTTED PLATE CONNECTIONS AS INDICATED ON RC-57M, SHEET 3.
4. 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.
5. PROVIDE PRECAST CONCRETE GLARE SCREEN FOR USE AS TEMPORARY (MPT) OR IN PERMANENT INSTALLATIONS. FOR TEMPORARY INSTALLATIONS, EMBEDMENT IS NOT REQUIRED.
6. 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).
7. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.
9. FABRICATE REINFORCEMENT BARS ACCORDING TO PENNDOT BRIDGE CONSTRUCTION STANDARD, BC-736M.
10. 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.

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



BARRIER ELEVATION

WWF ALTERNATE



SECTION C-C

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

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE GLARE SCREEN
F-SHAPE

RECOMMENDED APR. 15, 2004

 DIRECTOR, BUREAU OF DESIGN
 RECOMMENDED APR. 15, 2004

 CHIEF ENGINEER
 SHT 1 OF 2
 RC-59M

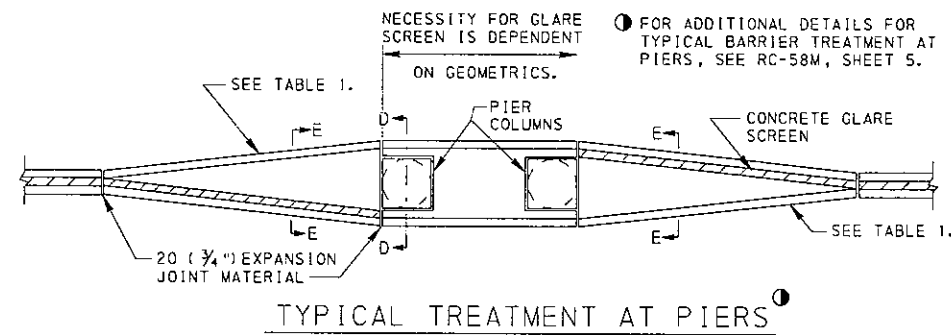
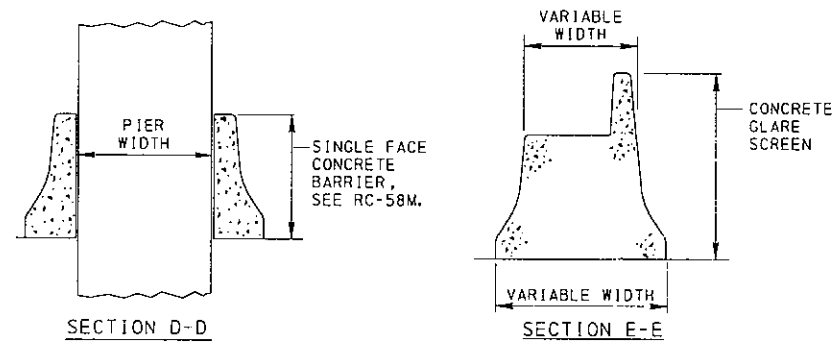


TABLE 1
FLARE RATES FOR BARRIER DESIGN

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.

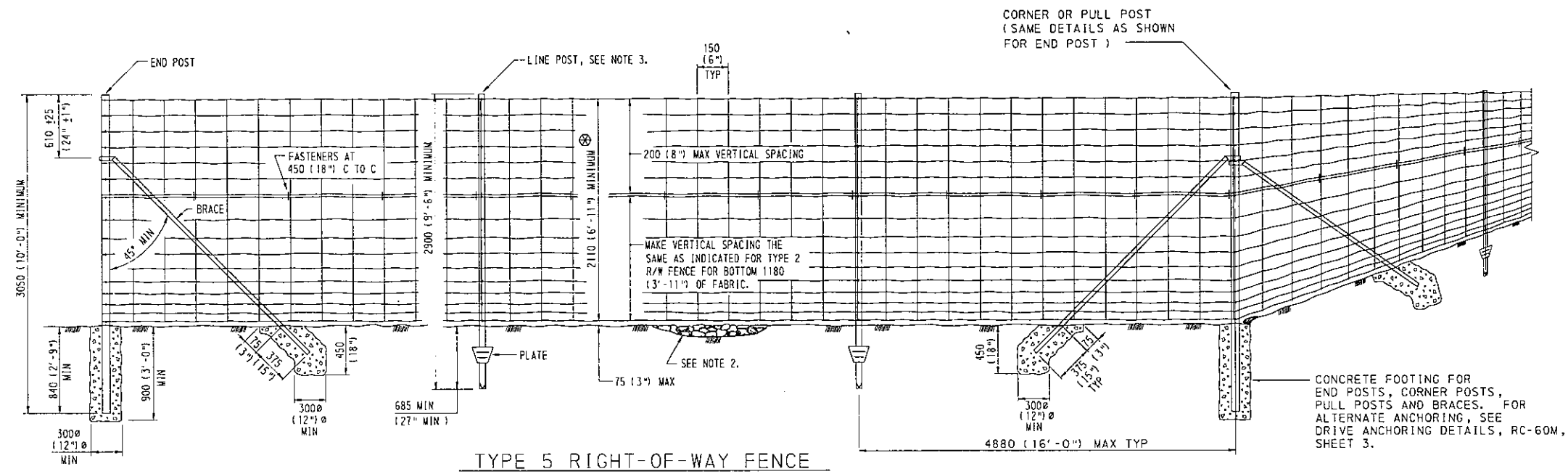
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE GLARE SCREEN
F-SHAPE

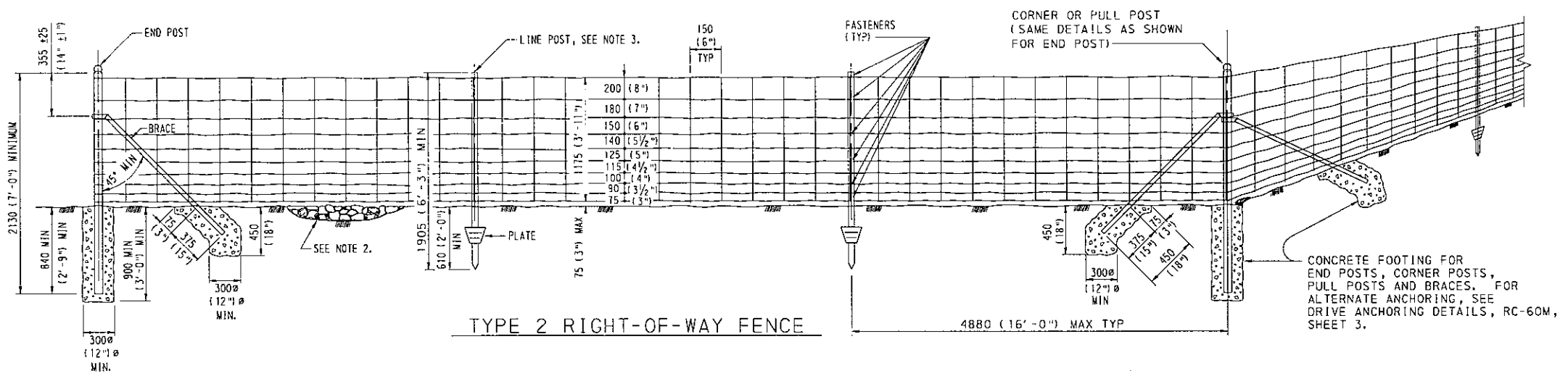
RECOMMENDED APR. 15, 2004
Don A. Schuch
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED APR. 15, 2004
M. G. Patel
CHIEF ENGINEER

SHT 2 OF 2
RC-59M



TYPE 5 RIGHT-OF-WAY FENCE



TYPE 2 RIGHT-OF-WAY FENCE

GENERAL NOTES

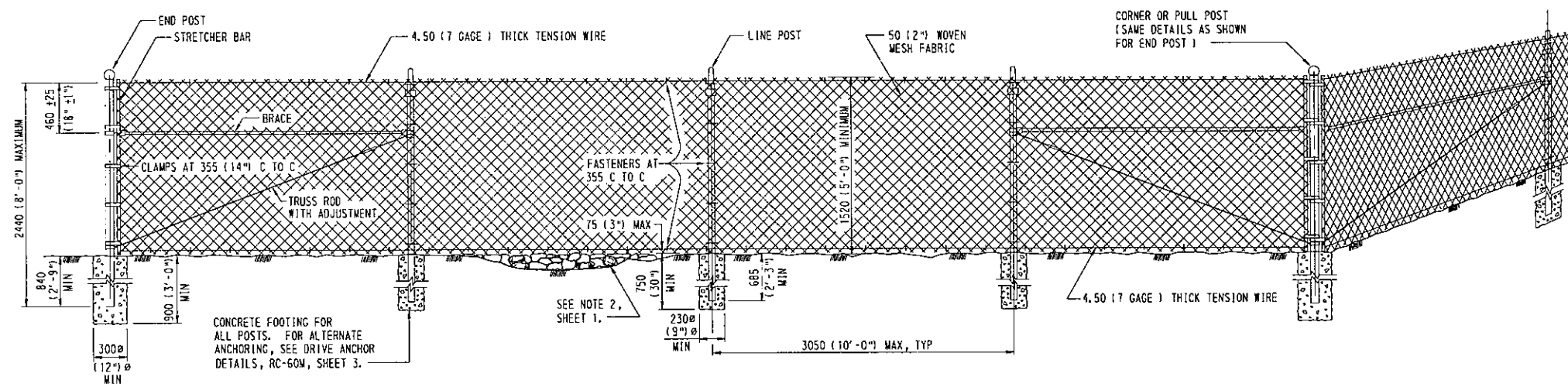
- ⊗ FABRIC SHALL BE AS FOLLOWS:
- (1.) TYPE 2 R/W FENCE FABRIC AND A 915 (36'') WIDE FABRIC CONNECTED AS SHOWN; OR
 - (2.) A SINGLE FABRIC HAVING A MINIMUM WIDTH OF 2110 (83''); OR
 - (3.) A COMBINATION OF TWO FABRICS TO ACHIEVE A MINIMUM WIDTH OF 2110 (83''). IF THE FABRICS ARE OVERLAPPED, CONNECT BY FASTENERS SPACED AT 450 (18'') C TO C AND STAGGERED ON EACH EDGE OF FABRIC ALONG THE JOINT.

1. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 624.
2. FILL ALL DEPRESSIONS GREATER THAN 75 (3'') AND LESS THAN 300 (12'') WITH ROCKS OR COMPACTED EARTH TO PREVENT ANIMALS FROM GOING UNDER THE RIGHT-OF-WAY FENCE.
3. INSTALL CONCRETE FOOTING OR DRIVE ANCHORS AT MAXIMUM INTERVALS OF 50 m (160') FOR ALL LINE POSTS.
4. PLACE PULL POSTS AT ANGLE POINTS IN VERTICAL ALIGNMENT AT MAXIMUM INTERVALS OF 150 m (500') BETWEEN END AND/OR CORNER POSTS IN LEVEL TERRAIN AND/OR WHERE DIRECTED.
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.

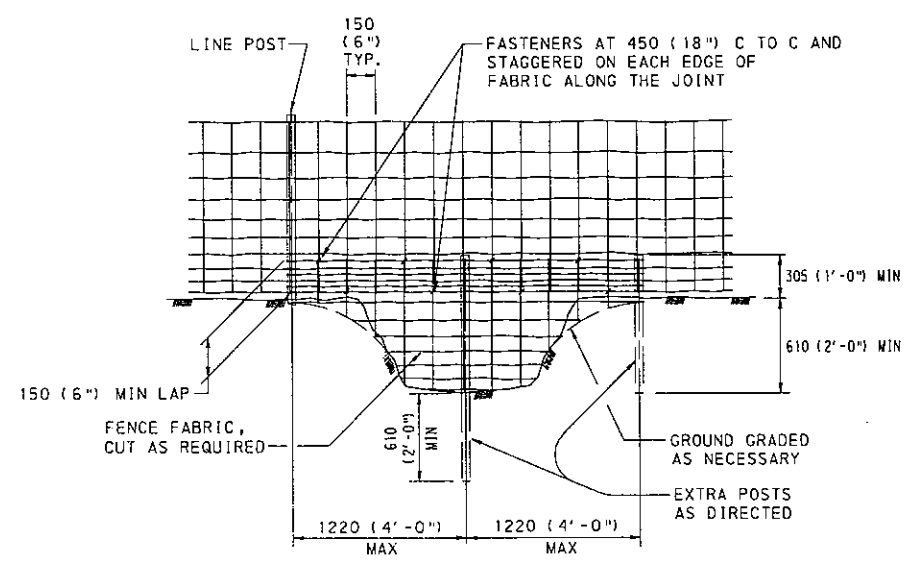
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

RIGHT-OF-WAY FENCE



TYPE 1 RIGHT-OF-WAY FENCE



TREATMENT AT GROUND DEPRESSIONS

GREATER THAN 300 (1'-0")

FOR TYPES 2 AND 5 RIGHT-OF-WAY FENCE
SEE SHEET 1

NOTE

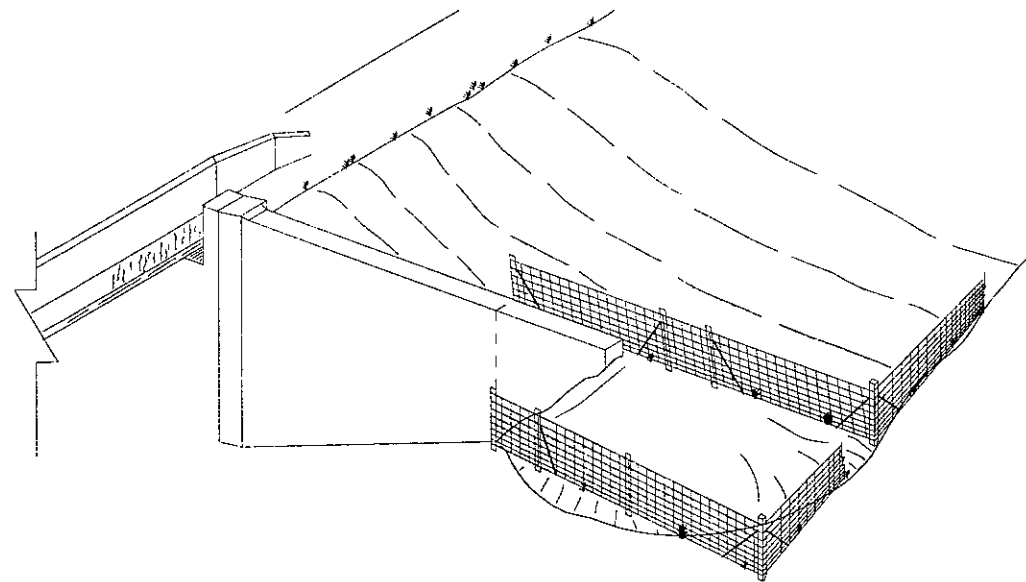
1. FOR GENERAL NOTES SEE SHEET 1.

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

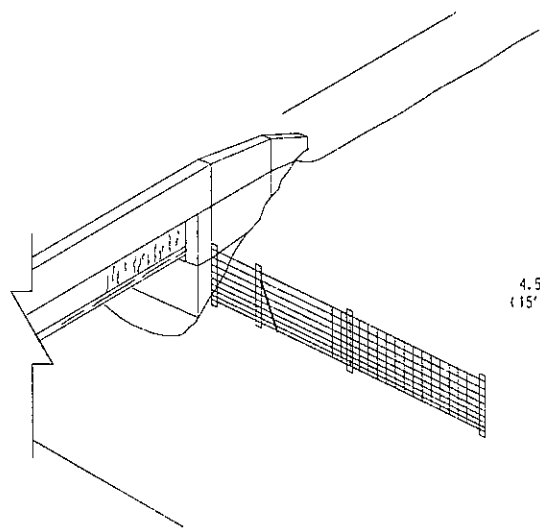
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

RIGHT-OF-WAY FENCE

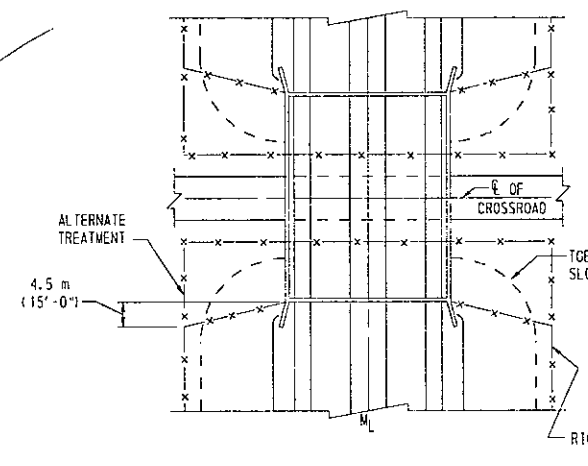
RECOMMENDED APR. 15, 2004 <i>Dean A. Schick</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>mp. C. Hibel</i> CHIEF ENGINEER	SHT 2 OF 3 RC-60M
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R/W FENCE TREATMENT AT HIGH WALLED ABUTMENT

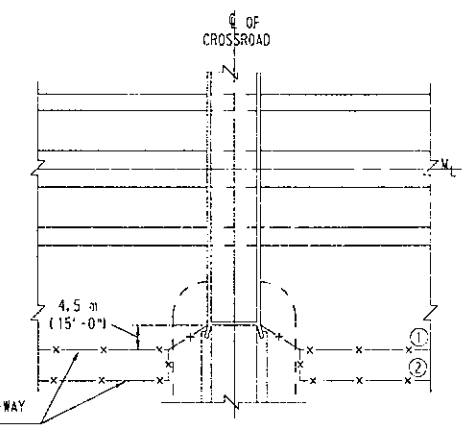


R/W FENCE TREATMENT AT STUB ABUTMENTS



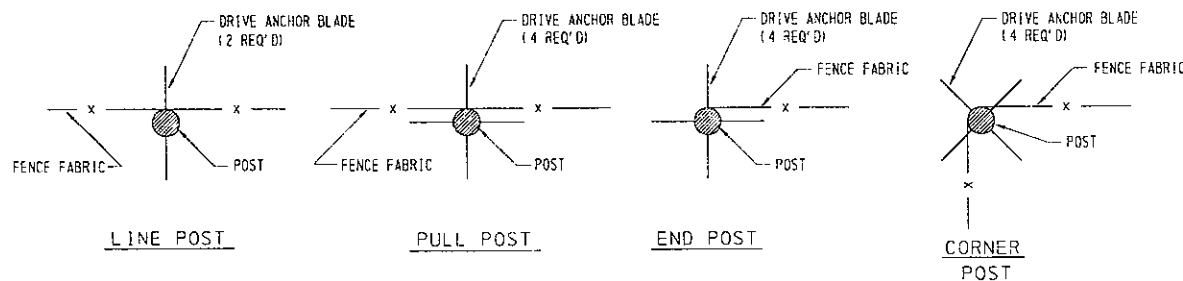
HIGHWAY OVER CROSSROAD

IF THE ROADWAY HAS DUAL STRUCTURES, ERECT THE RIGHT-OF-WAY FENCE TO CLOSE OFF THE MEDIAN AREA.

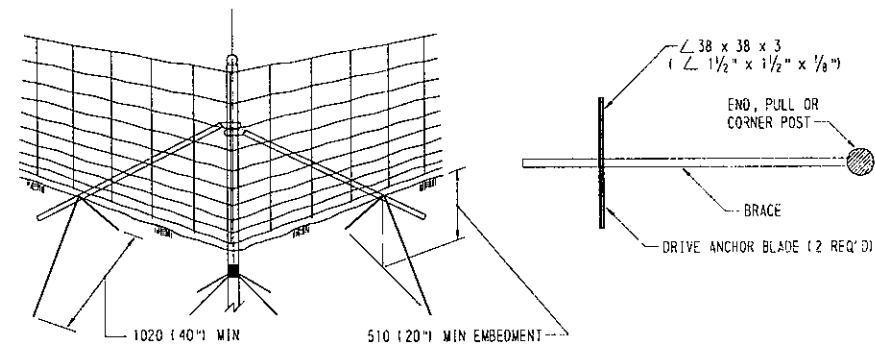


HIGHWAY UNDER CROSSROAD

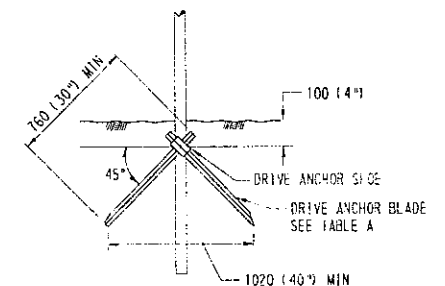
1. IF RIGHT-OF-WAY FENCE IS WITHIN 4.5 m (15'-0") OR LESS OF THE PROJECTED FACE OF THE BACKWALL, ANGLE THE FENCE INTO THE ABUTMENT AS SHOWN.
2. IF RIGHT-OF-WAY FENCE IS GREATER THAN 4.5 m (15'-0") FROM THE PROJECTED FACE OF THE BACKWALL, PLACE FENCE PARALLEL TO CROSSROAD AND ANGLE INTO ABUTMENT AS SHOWN.



DRIVE ANCHOR ORIENTATION

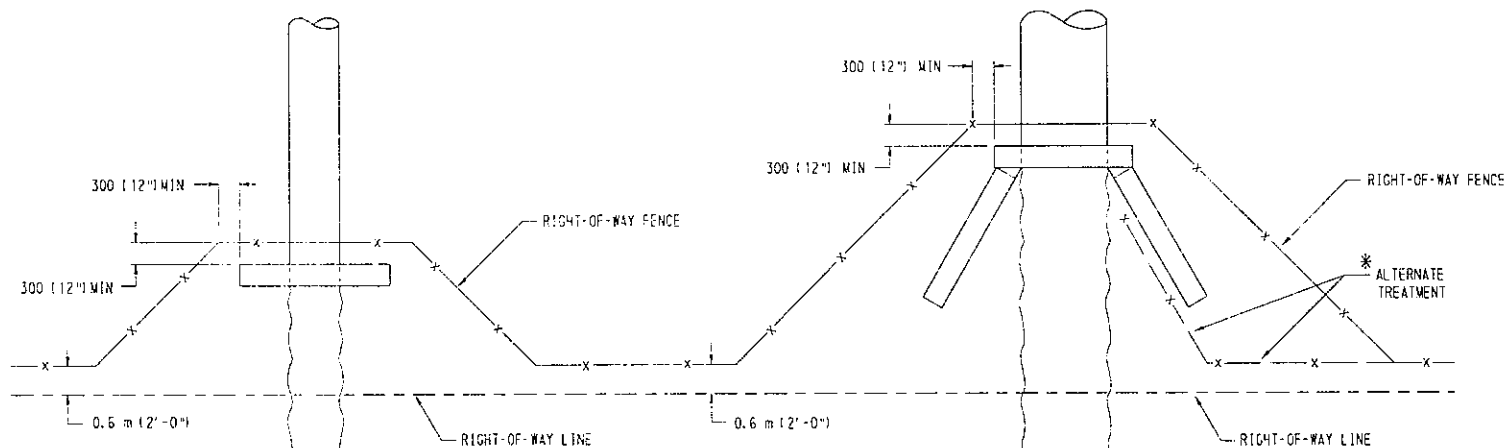


DRIVE ANCHOR DETAILS FOR POST BRACES ON TYPE 2 AND TYPE 5 R/W FENCE



DRIVE ANCHOR

(USE AS ALTERNATE TO CEMENT CONCRETE FOOTING FOR ALL TYPES OF RIGHT-OF-WAY FENCE.)



R/W FENCE TREATMENT AT CULVERTS

(EXERCISE CAUTION WHEN LOCATING POSTS NEAR THE CULVERT. ANY DAMAGE IS AT CONTRACTOR'S EXPENSE.)

* PLACE THE LAST POST WITHIN 150 (6") OF THE WALL AND AT A POINT WHERE THE WALL HEIGHT IS NOT LESS THAN 3.0 m (10'-0").

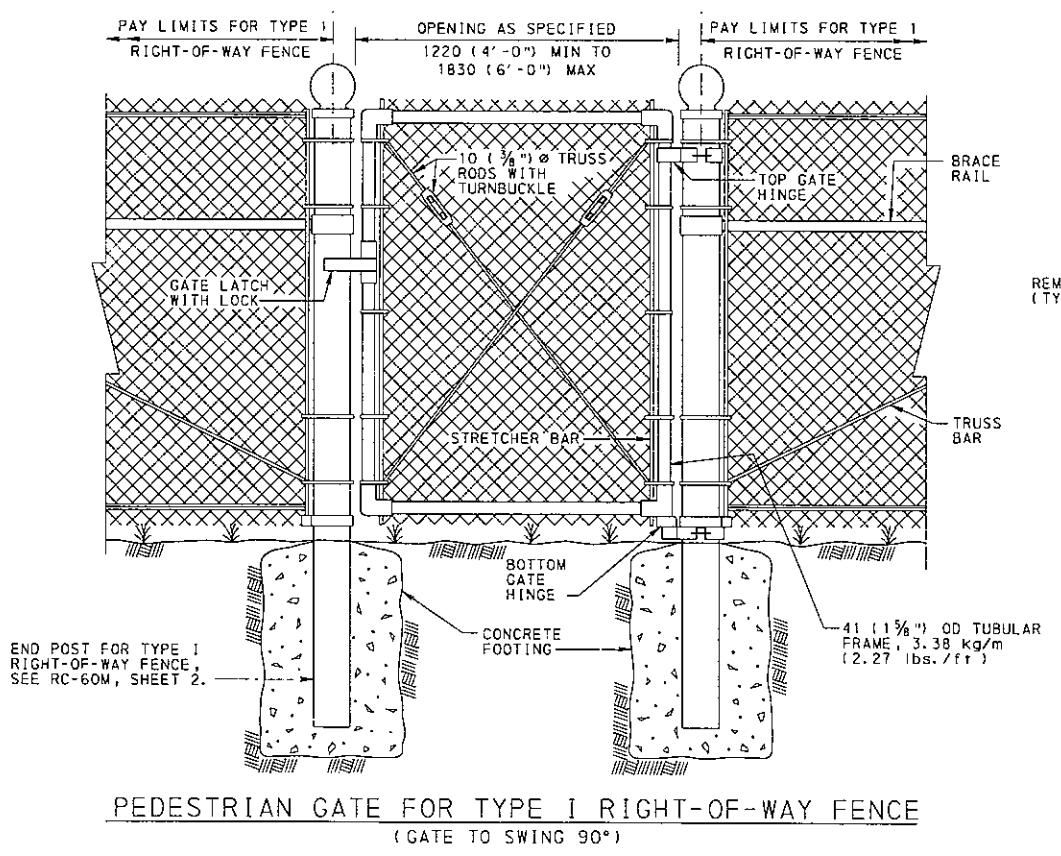
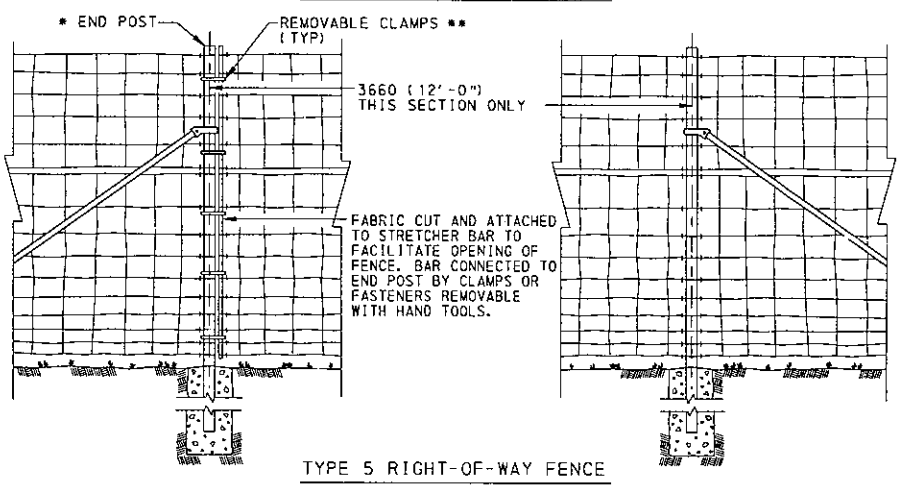
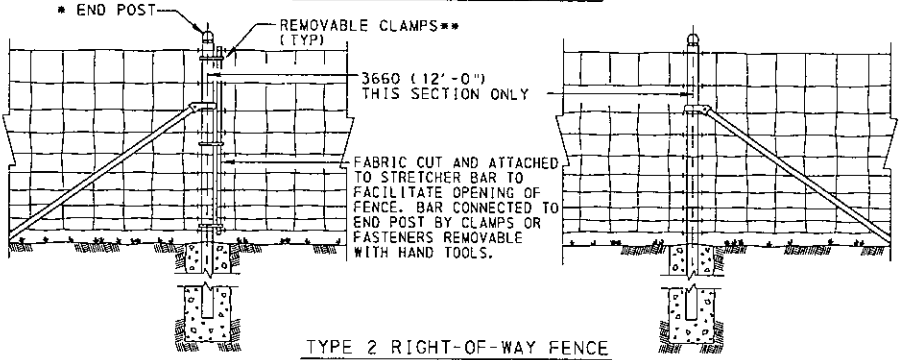
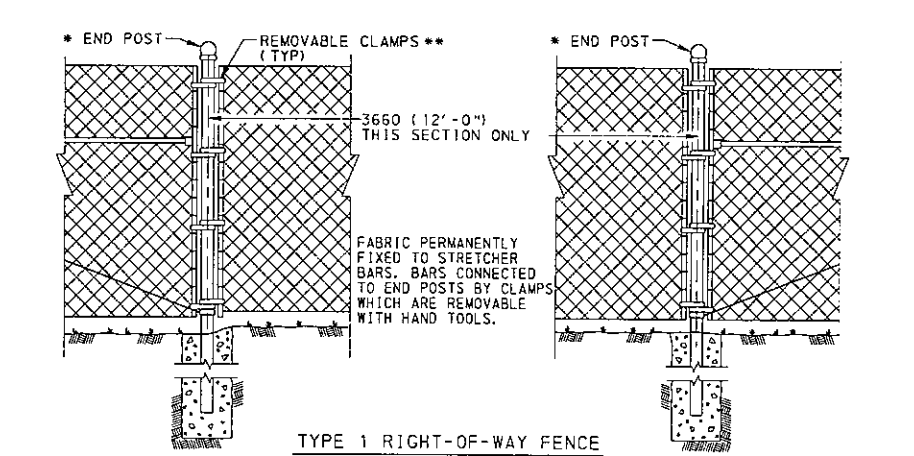
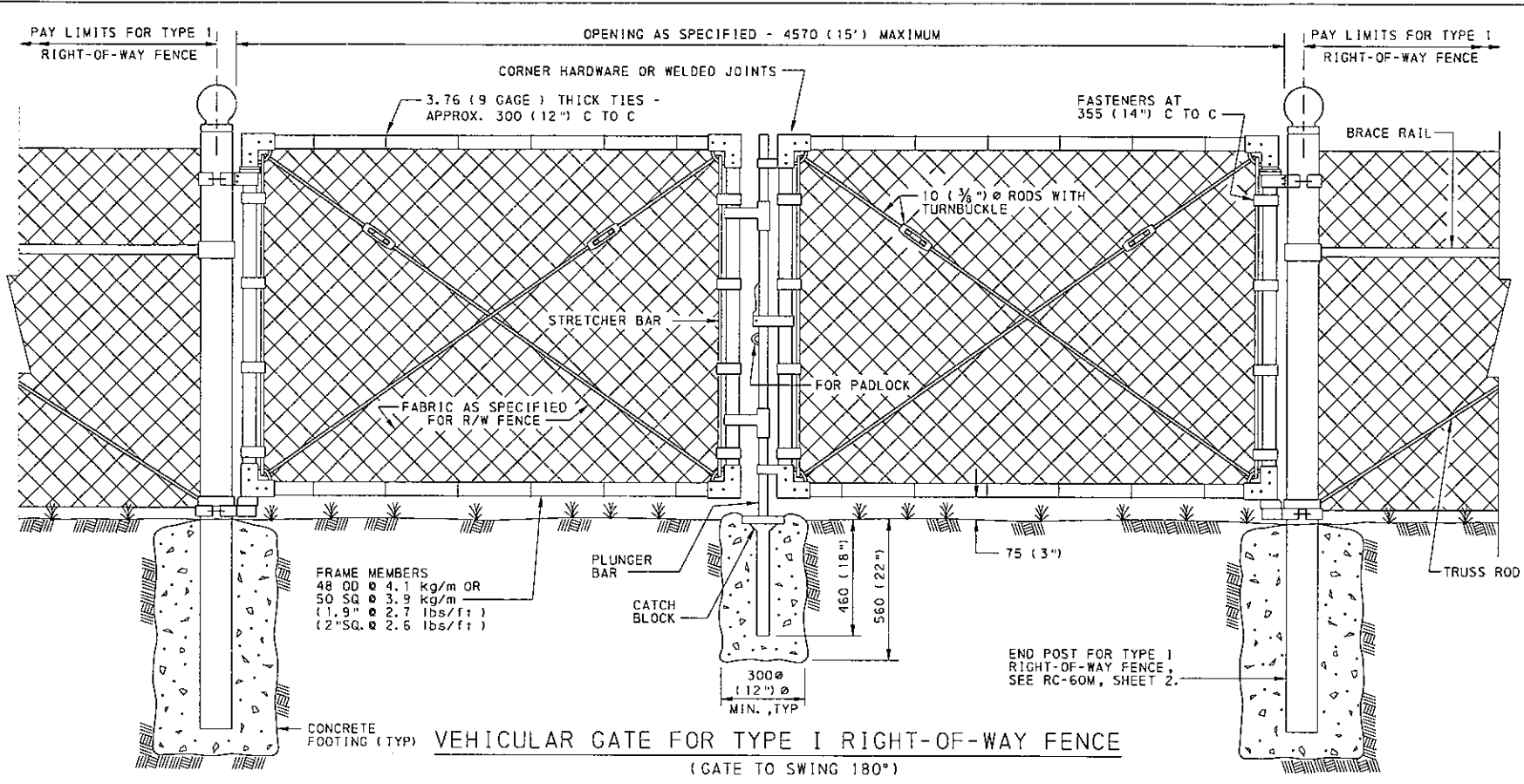
FENCE HEIGHT	MINIMUM BLADE SIZE
1520 (5'-0") OR LESS	25 x 25 x 3 (1" x 1" x 1/8")
GREATER THAN 1520 (5'-0") BUT LESS THAN 2130 (7'-0")	32 x 32 x 3 (1 1/4" x 1 1/4" x 1/8")
2130 (7'-0") OR GREATER	38 x 38 x 3 (1 1/2" x 1 1/2" x 1/8")

TABLE A

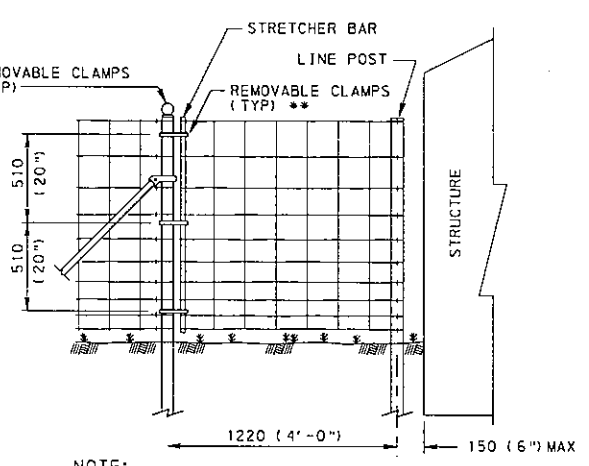
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

RIGHT-OF-WAY FENCE



- * INCLUDES STRETCHER BAR, BRACE AND REMOVABLE CLAMPS OR FASTENERS. SEE RC-60M, SHEET 2, FOR END POST DETAILS.
- ** FOR TYPE 2 R/W FENCE USE 3 CLAMPS AS SHOWN. FOR TYPE 1 R/W FENCE USE 4 CLAMPS EQUALLY SPACED. FOR TYPE 5 R/W FENCE USE 5 CLAMPS EQUALLY SPACED.
- *** CONSIDER THE PAYMENT FOR REMOVABLE FENCE SECTIONS INCIDENTAL TO THE R/W FENCE.



NOTE:
TWO END POSTS ARE REQUIRED IF REMOVABLE FENCE SECTIONS AT STRUCTURES ARE PLACED ANYWHERE IN THE RUN OF FENCE OTHER THAN THE END.

*****REMOVABLE FENCE SECTIONS AT STRUCTURES**

NOTE

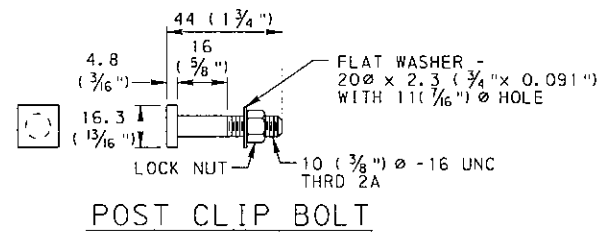
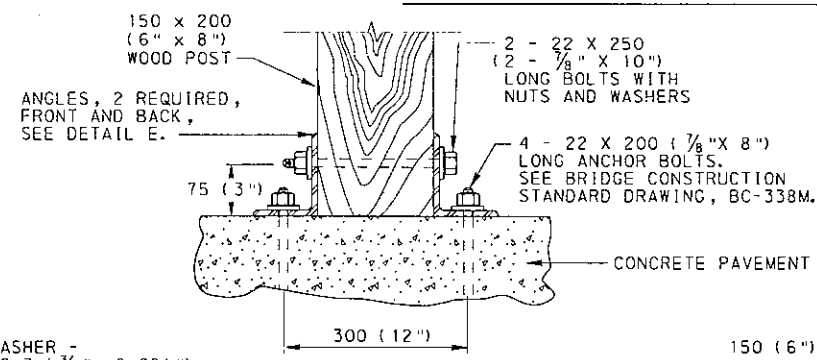
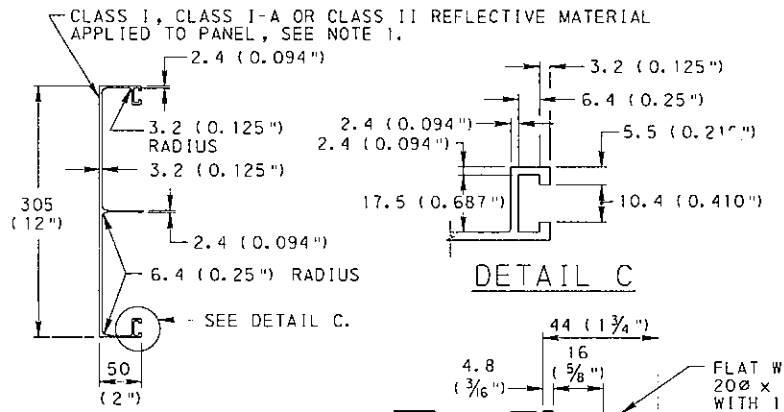
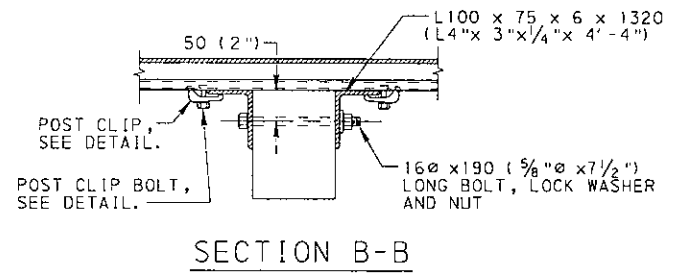
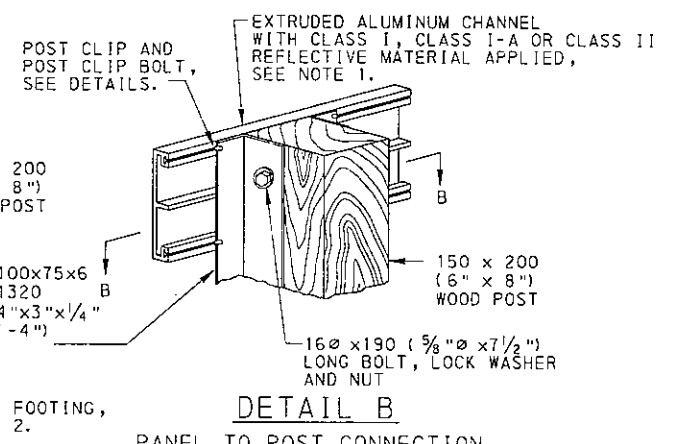
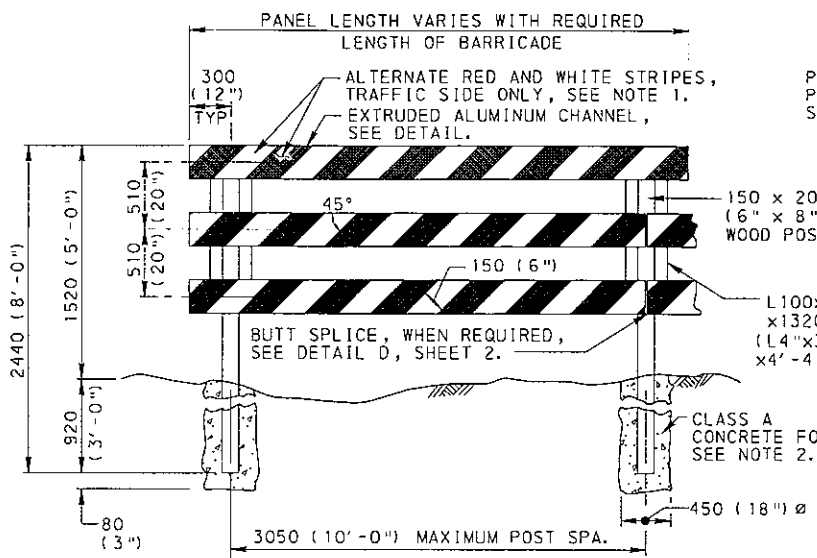
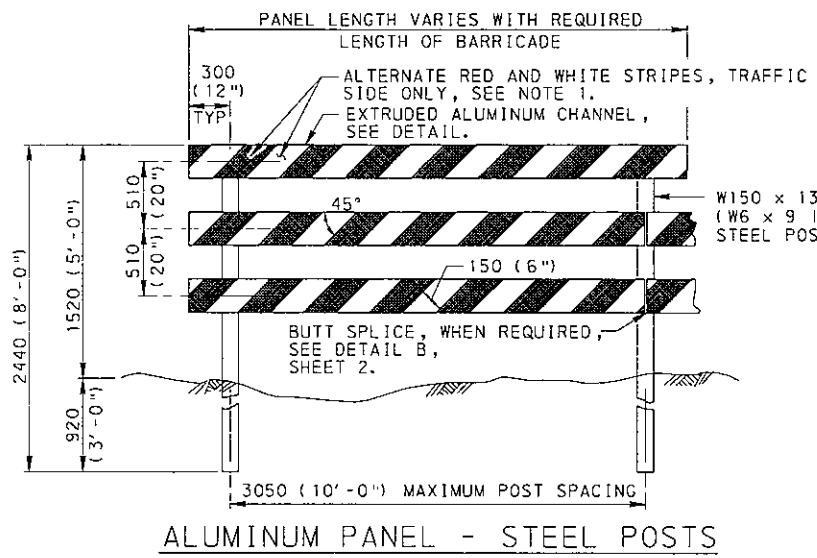
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.

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

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DEPARTMENT OF TRANSPORTATION
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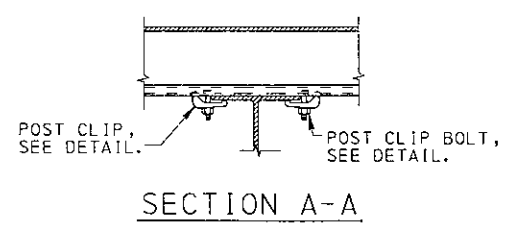
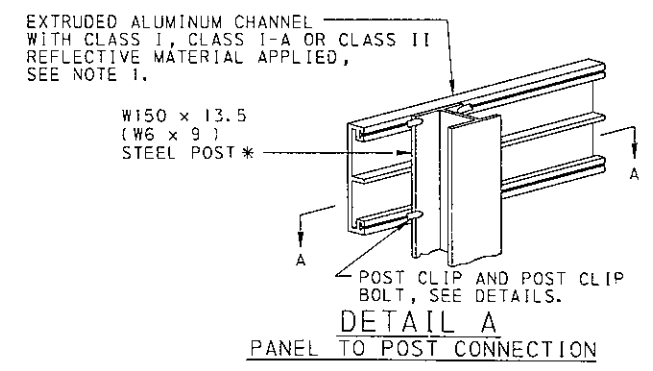
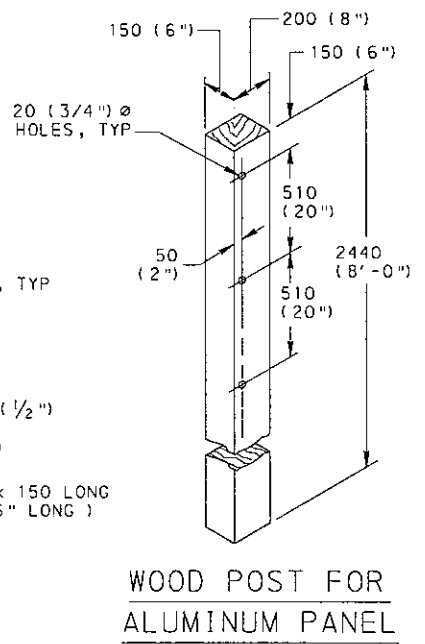
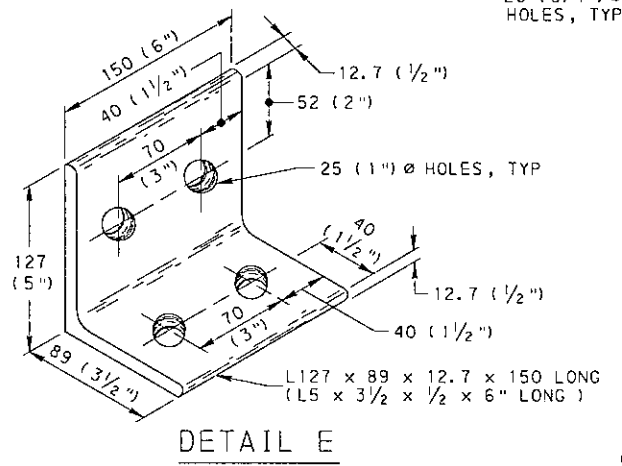
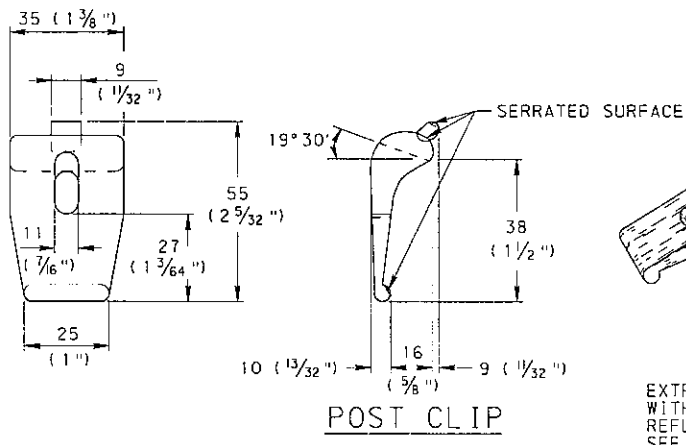
RIGHT-OF-WAY GATES
AND
REMOVABLE FENCE SECTIONS

RECOMMENDED APR. 15, 2004 <i>Dean A. Schindler</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. C. Patel</i> CHIEF ENGINEER	SHT 1 OF 1 RC-61M
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EXTRUDED ALUMINUM CHANNEL

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



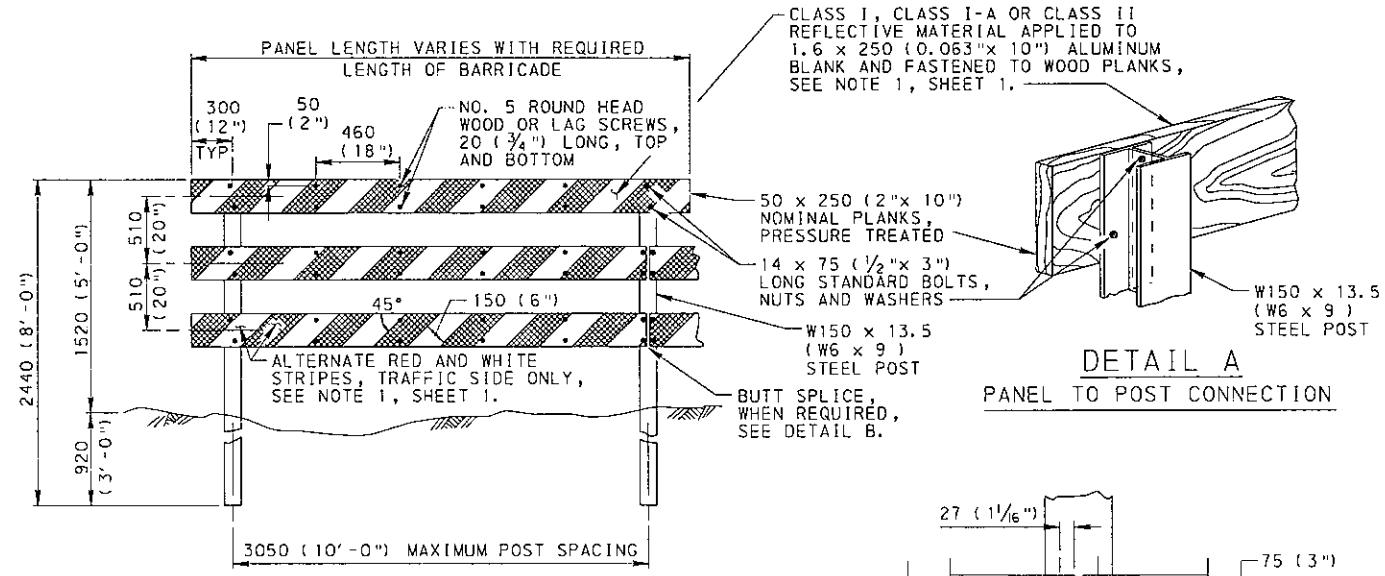
- NOTES**
1. PERMIT ONLY CLASS I, CLASS I-A OR CLASS II REFLECTIVE SHEETING MATERIAL SUPPLIED BY A MANUFACTURER, AS LISTED IN BULLETIN 15.
 2. DRIVE POSTS MECHANICALLY OR ERECT IN CONCRETE FOOTING.
 3. SEE RC-52M, SHEET 1, FOR MOUNTING OF STEEL POSTS ON CONCRETE PAVEMENT. SEE DETAIL D FOR MOUNTING OF 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.

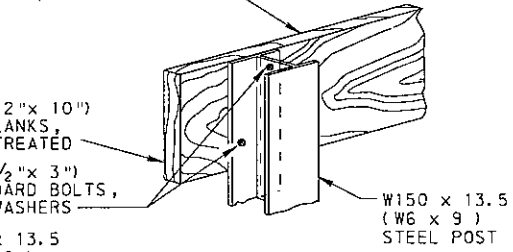
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

PERMANENT BARRICADES
ALUMINUM PANEL

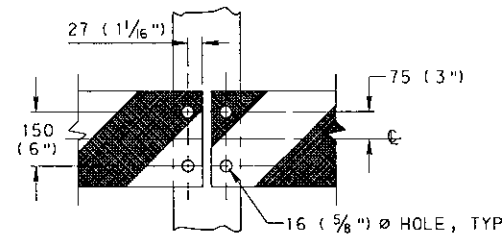
RECOMMENDED APR. 15, 2004 <i>Dean A. Schaefer</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. J. Patel</i> CHIEF ENGINEER	SHT 1 OF 2 RC-63M
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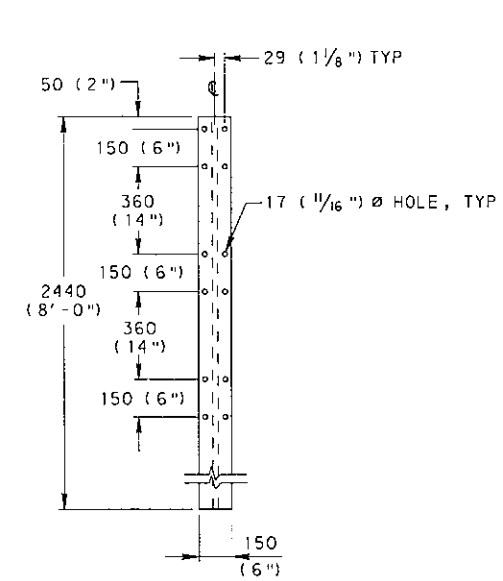
WOOD PANEL - STEEL POSTS



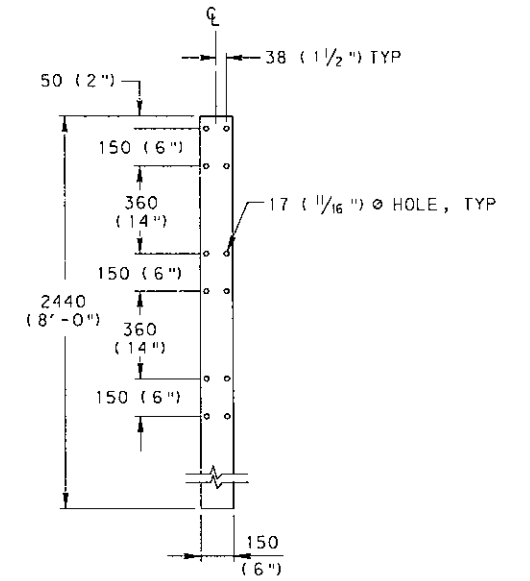
DETAIL A
PANEL TO POST CONNECTION



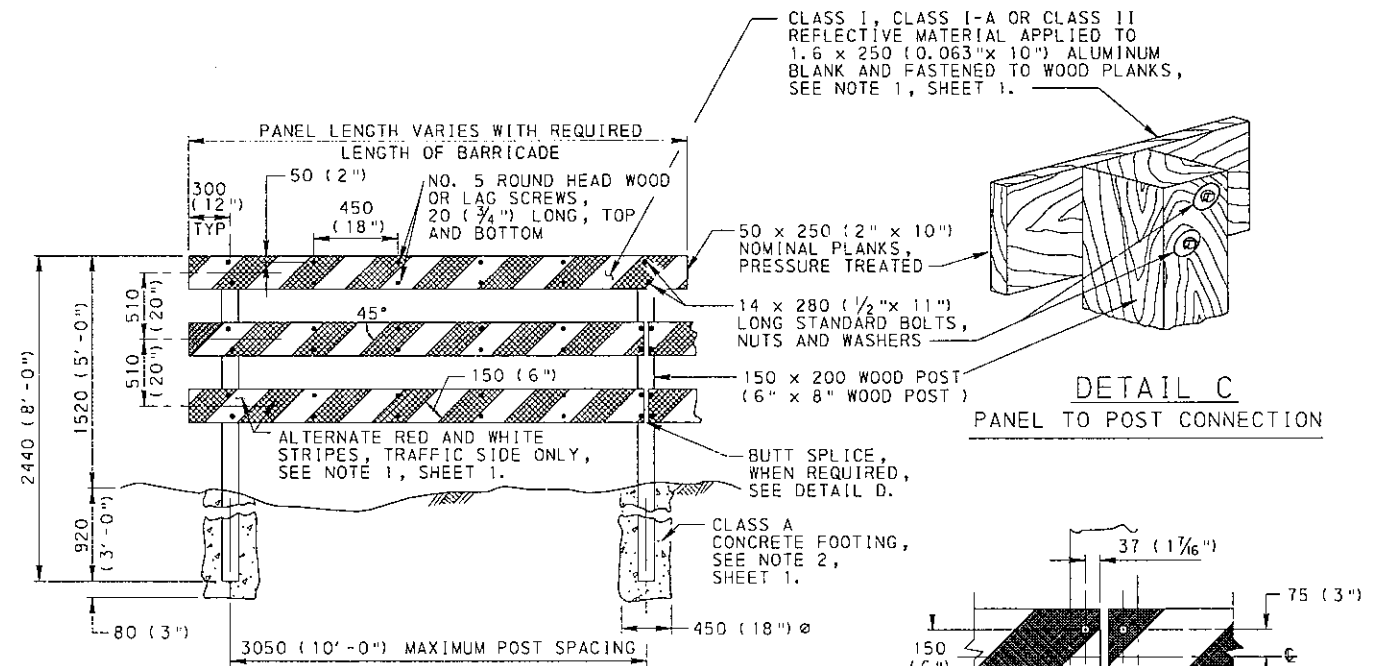
DETAIL B
BUTT SPLICE



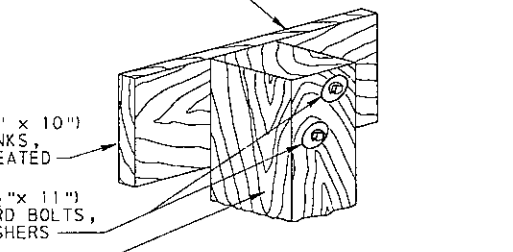
STEEL POST FOR WOOD PANEL



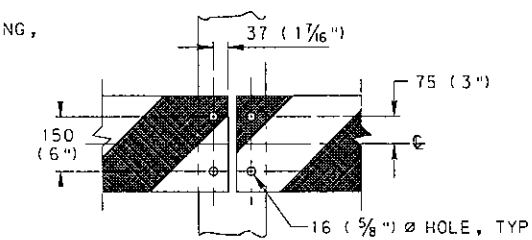
WOOD POST FOR WOOD PANEL



WOOD PANEL - WOOD POSTS



DETAIL C
PANEL TO POST CONNECTION



DETAIL D

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

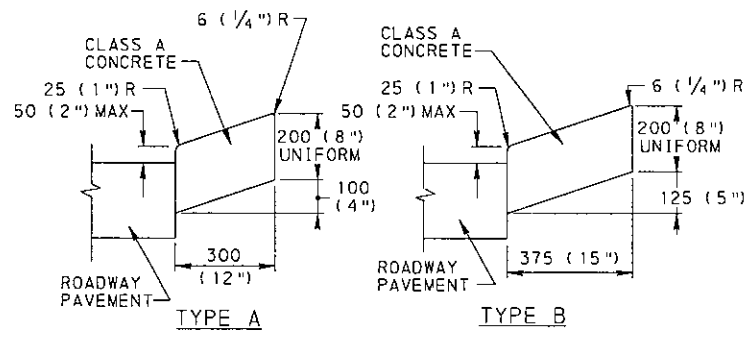
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

PERMANENT BARRICADES
WOOD PANEL

RECOMMENDED APR. 15, 2004
Dean A. Schaefer
DIRECTOR, BUREAU OF DESIGN

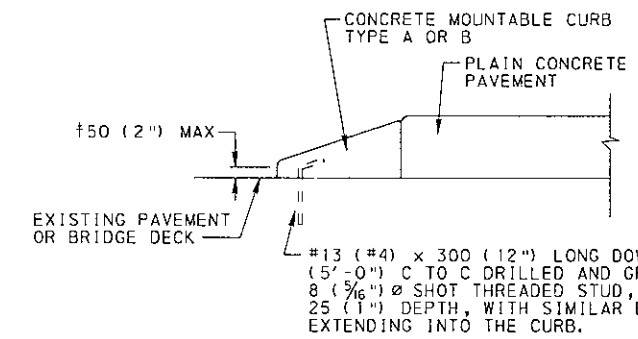
RECOMMENDED APR. 15, 2004
M. Patel
CHIEF ENGINEER

SHT 2 OF 2
RC-63M



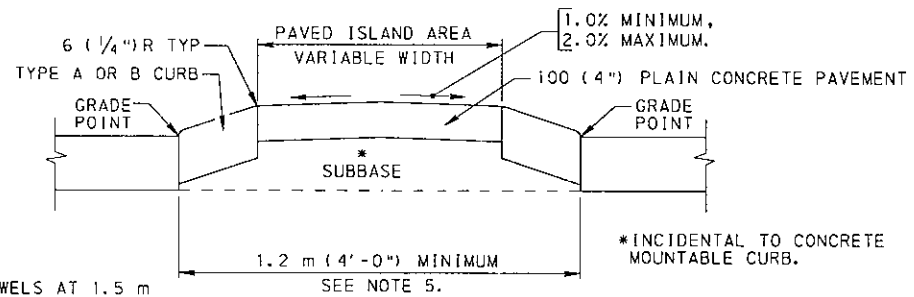
CONCRETE MOUNTABLE CURBS

- NOTES**
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 633.
 2. INSTALL TYPE M INLET WITH CONCRETE MOUNTABLE CURBS AND LOCATE INLET AS SHOWN ON THE DRAWINGS. MAKE THE BACKSLOPE TRAVERSABLE IN THE AREA OF THE INLET AS INDICATED.
 3. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS AND SEAL AS SPECIFIED IN PUBLICATION 408, SECTION 501.3().
 4. PLACE PREMOLDED EXPANSION JOINT FILLER MATERIAL 20 (3/4 inch) THICK ADJACENT TO CURBS AND OTHER STRUCTURES AND AT THE END OF THE WORK DAY. CUT MATERIAL TO CONFORM TO AREA ADJACENT TO CURB OR TO CONFORM TO CROSS SECTIONAL AREA OF CURB.
 5. PROVIDE ELONGATED ISLANDS NOT LESS THAN 1.2 m (4'-0") WIDE AND 6.0 m (20'-0") LONG, EXCEPT IN SPECIAL CASES WHERE SPACE IS SEVERELY LIMITED.
 6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.



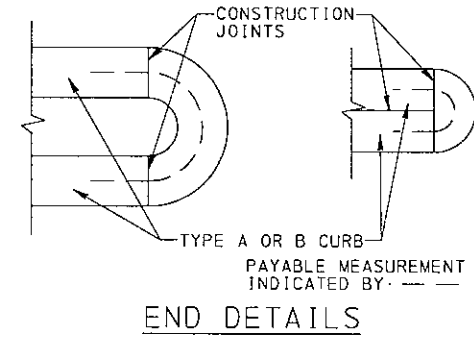
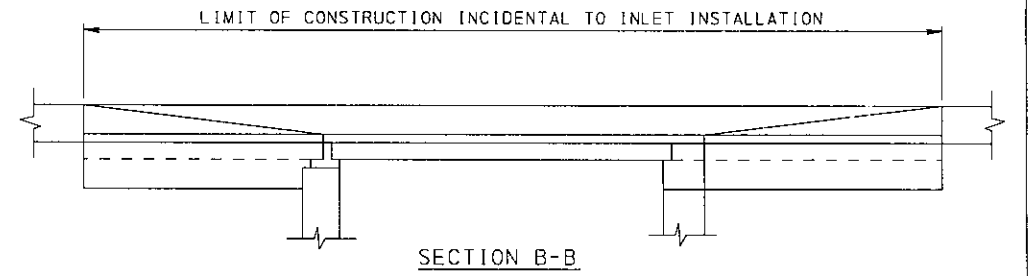
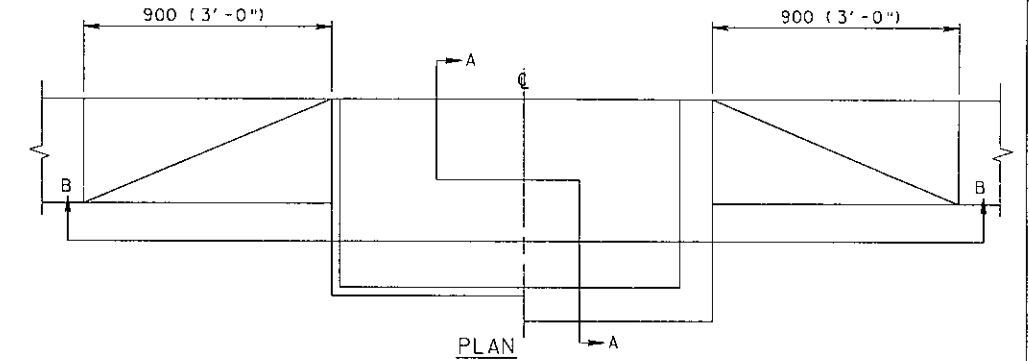
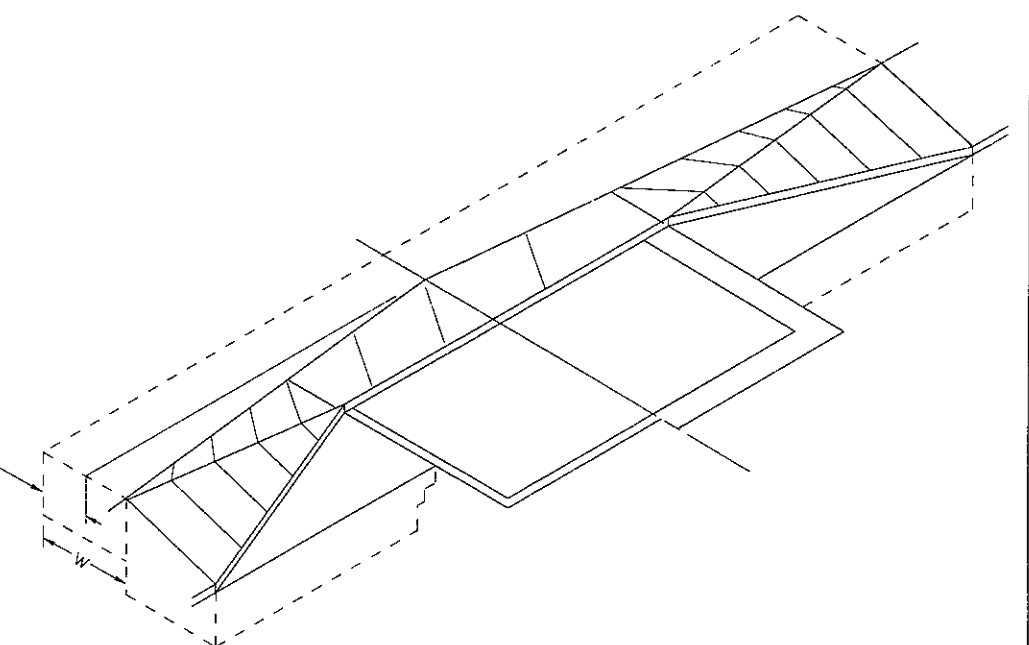
CONCRETE MOUNTABLE CURB ON EXISTING CONCRETE PAVEMENT AND BRIDGE DECKS

† PLANS MAY PROVIDE FOR A DEEPER FACE AT CURB WHEN AN OVERLAY IS PLACED ON THE EXISTING PAVEMENT. HOWEVER, BUILD EXPOSED FINAL FACE OF CURB AT 50 (2 inch) MAXIMUM.

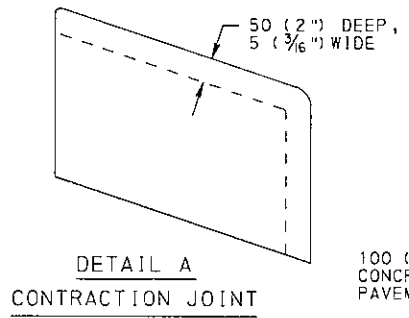


TYPICAL CONSTRUCTION

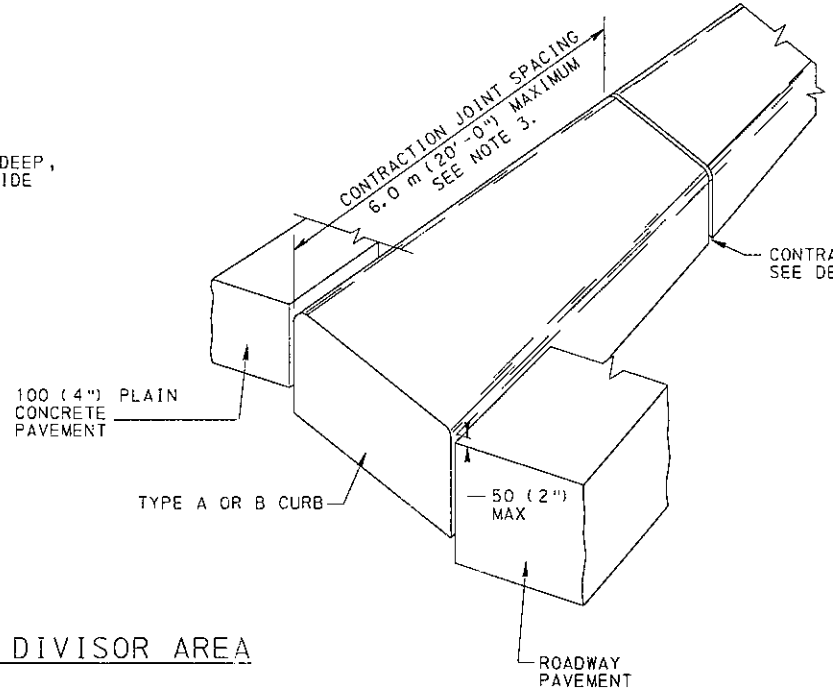
0.5W (W/2) OR 150 (6 inch) MIN



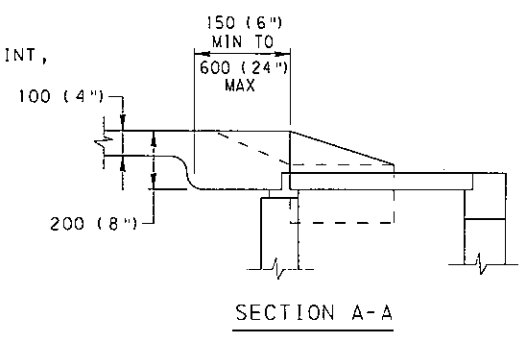
END DETAILS



DETAIL A CONTRACTION JOINT



TYPICAL DIVISOR AREA



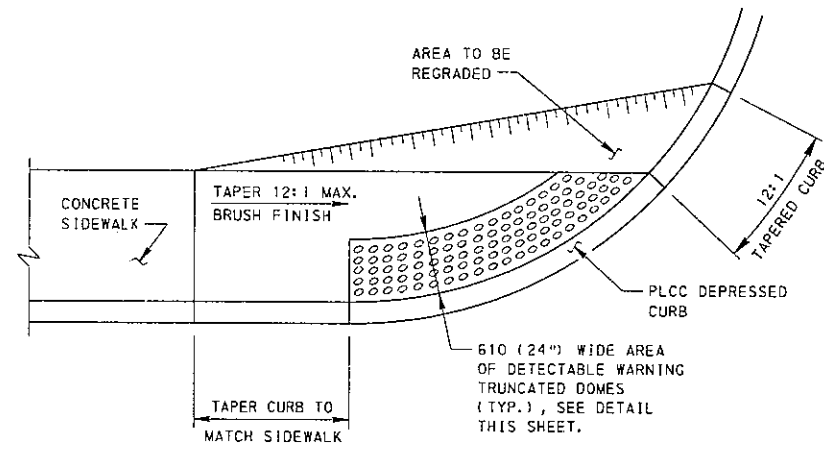
TREATMENT FOR CONCRETE MOUNTABLE CURBS AT INLETS

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

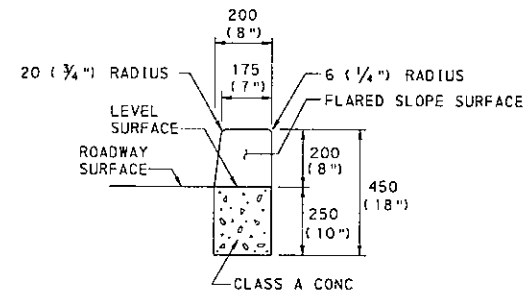
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MOUNTABLE CURBS

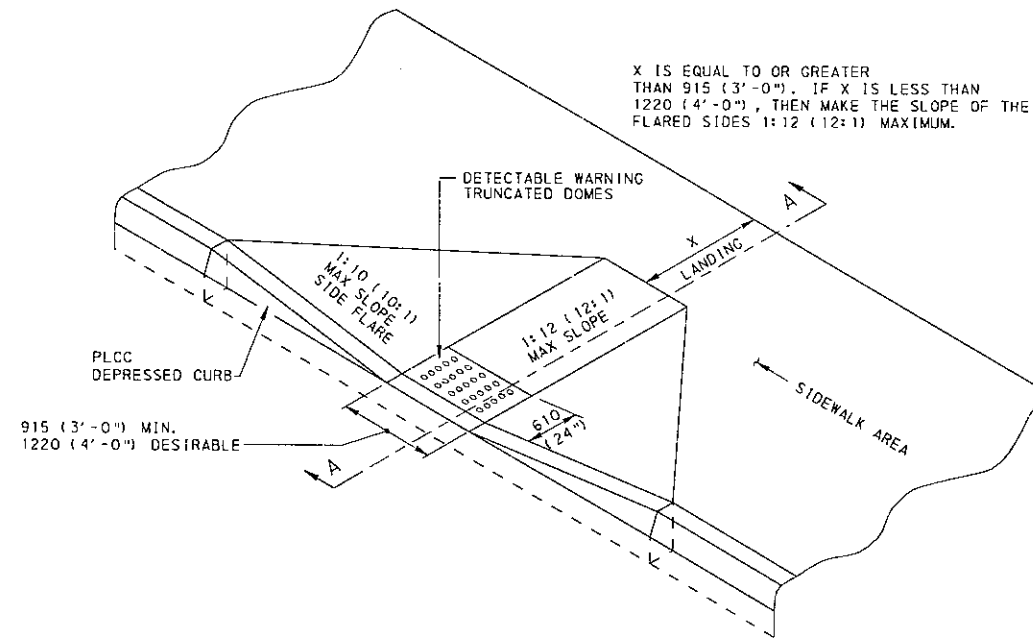
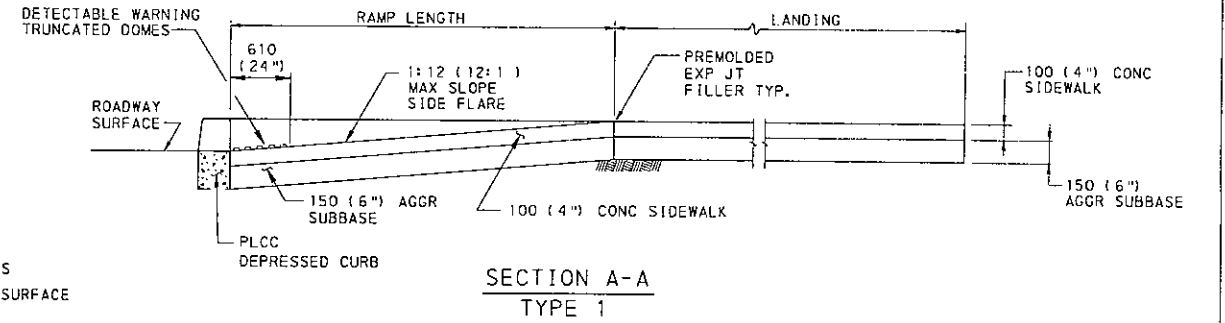
RECOMMENDED APR. 15, 2004 <i>Dean A. Schuch</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. Patel</i> CHIEF ENGINEER	SHT 1 OF 1 RC-65M
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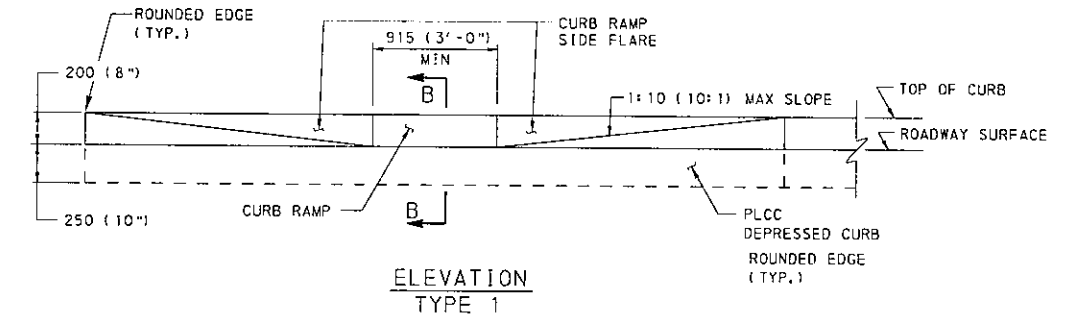
TYPE 1A CURB RAMPS



DEPRESSED CURB SECTION B-B



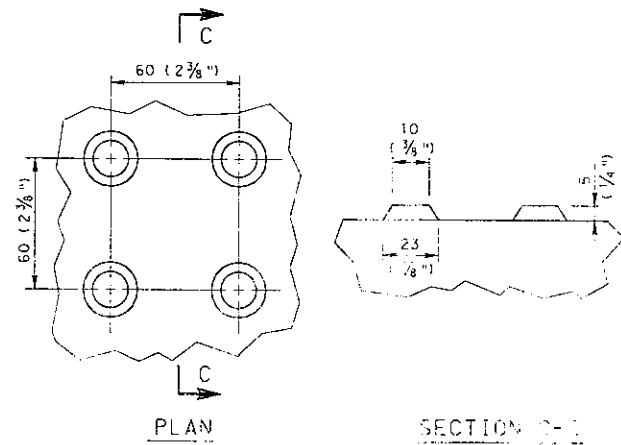
TYPE 1 CURB RAMP



NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 350, 420, 630 AND 676.
2. PROVIDE EXPANSION JOINT MATERIAL 13 (1/2") THICK WHERE CURB RAMP ADJOINS ANY RIGID PAVEMENT, SIDEWALK OR STRUCTURE WITH THE TOP OF JOINT FILLER FLUSH WITH ADJACENT CONCRETE SURFACE.
3. IF PEDESTRIAN CROSSWALKS ARE NOT WIDE ENOUGH TO PROVIDE MINIMUM 1220 (4'-0") WIDE WHEELCHAIR OVERRUN ZONE AT THE BOTTOM OF THE RAMP, POSITION CROSSWALKS AS INDICATED IN DETAIL A, ON SHEET 2.
4. SEAL JOINTS WITH AN APPROVED SEALING MATERIAL.
5. PROVIDE SLIP RESISTANT TEXTURE ON CURB RAMP BY COARSE BROOMING TRANSVERSE TO THE SLOPE OF THE RAMP. EXTEND TEXTURE THE FULL WIDTH AND LENGTH OF THE CURB RAMP INCLUDING FLARED SIDE RAMPS.
6. MODIFY CONSTRUCTION DETAILS TO ADAPT DIMENSIONS TO EXISTING CURB ALTERATIONS WHERE THE CURB IS LESS THAN THE STANDARD 200 (8") HEIGHT.
7. CURB RAMP AND SIDE FLARE LENGTHS ARE VARIABLE AND BASED ON CURB HEIGHT AND THE SIDEWALK PITCH.
8. MEASURE AND PAY FOR DEPRESSED CURB IN ACCORDANCE WITH PUBLICATION 408, SECTION 630.4.
9. WHENEVER POSSIBLE, CONSTRUCT THE TRANSITION SLOPE FROM THE CURB RAMP AND FLARE SIDES TO ADJOINING SURFACES WITH A GRADUAL CURVE RATHER THAN AN ABRUPT ANGLE.
10. CONSTRUCT BUILT-UP CURB RAMP OF BITUMINOUS MATERIAL AS INDICATED, INCLUDING SURFACE PREPARATION AND TACK COAT, AS REQUIRED.
11. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.
12. ALIGN DETECTABLE WARNING DOMES ON A SQUARE GRID IN THE PREDOMINANT DIRECTION OF TRAVEL TO PERMIT WHEELS TO ROLL BETWEEN THE DOMES.
13. PROVIDE DETECTABLE WARNING SURFACES THAT CONTRAST (70%) IN LIGHT REFLECTANCE WITH ADJOINING SURFACES, EITHER LIGHT-ON-DARK OR DARK-ON-LIGHT OR SAFETY YELLOW.

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



DETECTABLE WARNING TRUNCATED DOME DETAIL

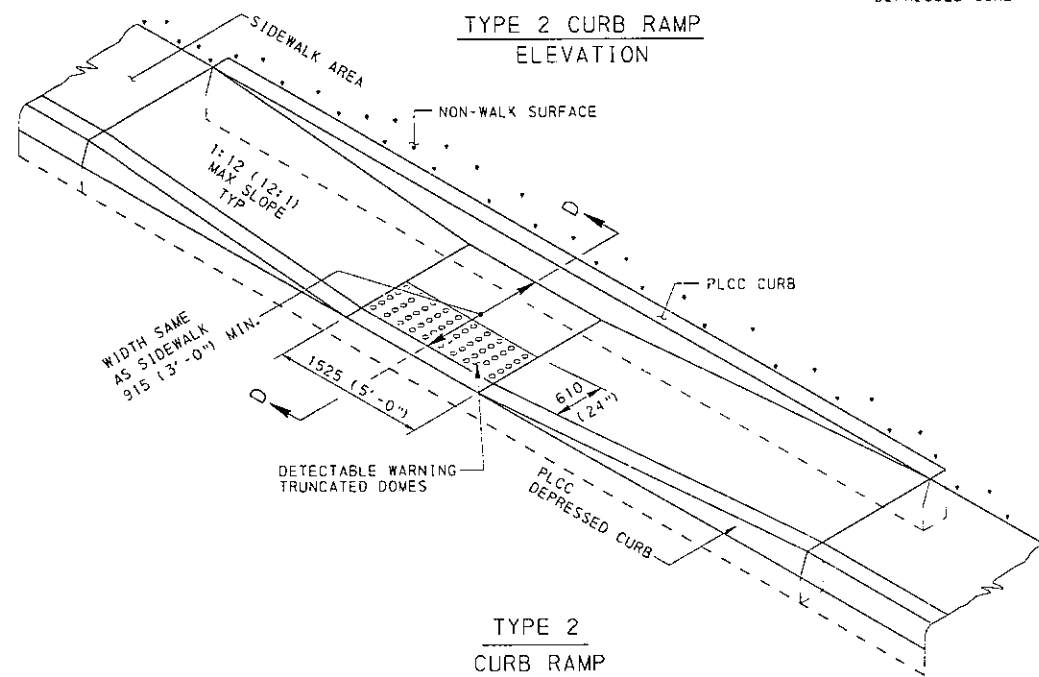
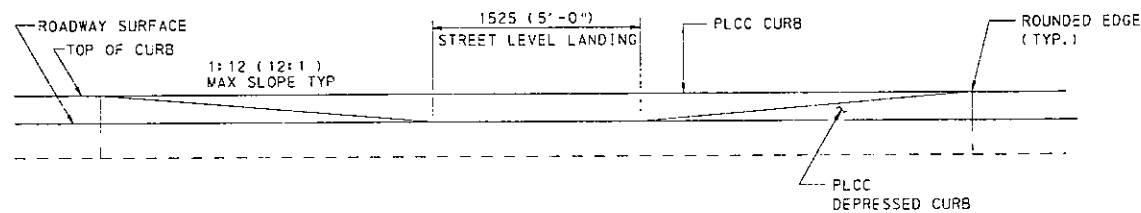
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CURB RAMPS
NEW CONSTRUCTION OR
RECONSTRUCTION

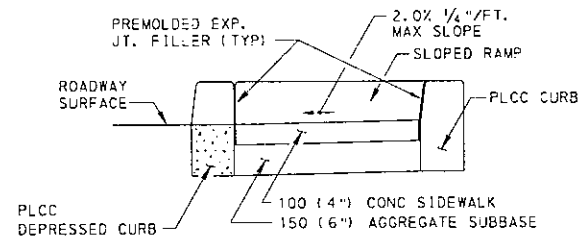
RECOMMENDED APR. 15, 2004
Don A. Schuch
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED APR. 15, 2004
M. Chitel
CHIEF ENGINEER

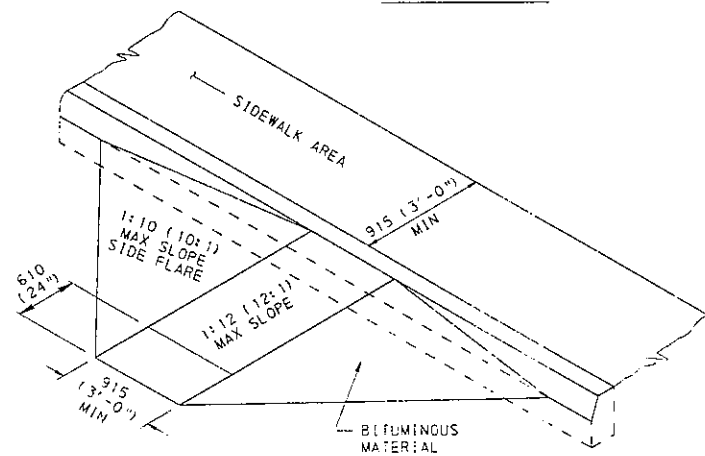
SHT 1 OF 3
RC-67M



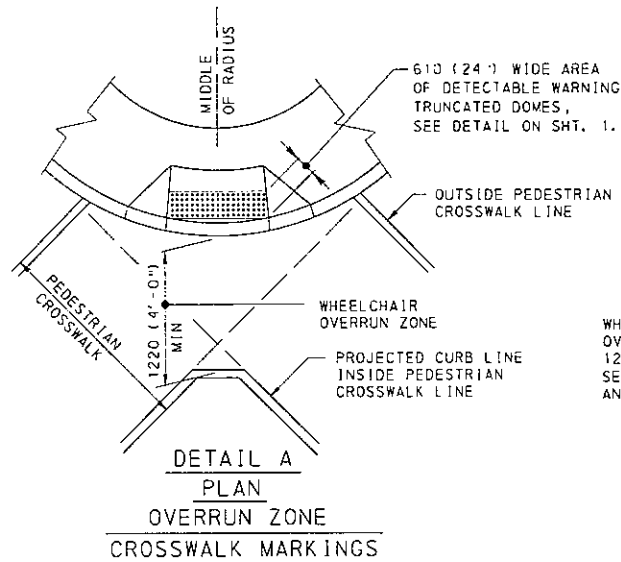
TYPE 2 CURB RAMP



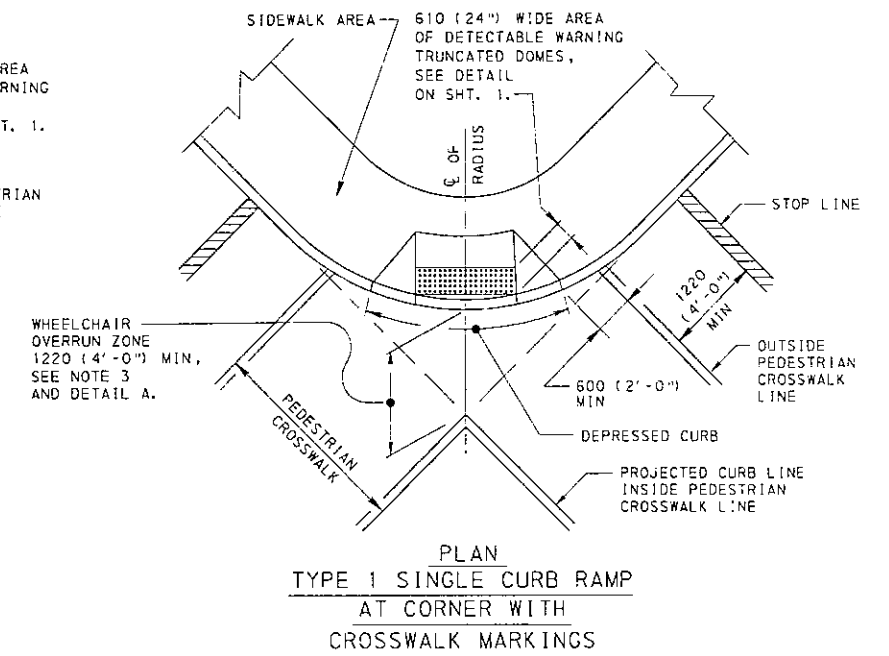
TYPE 2 CURB RAMP AND TYPE 5 CURB RAMP SECTION D-D



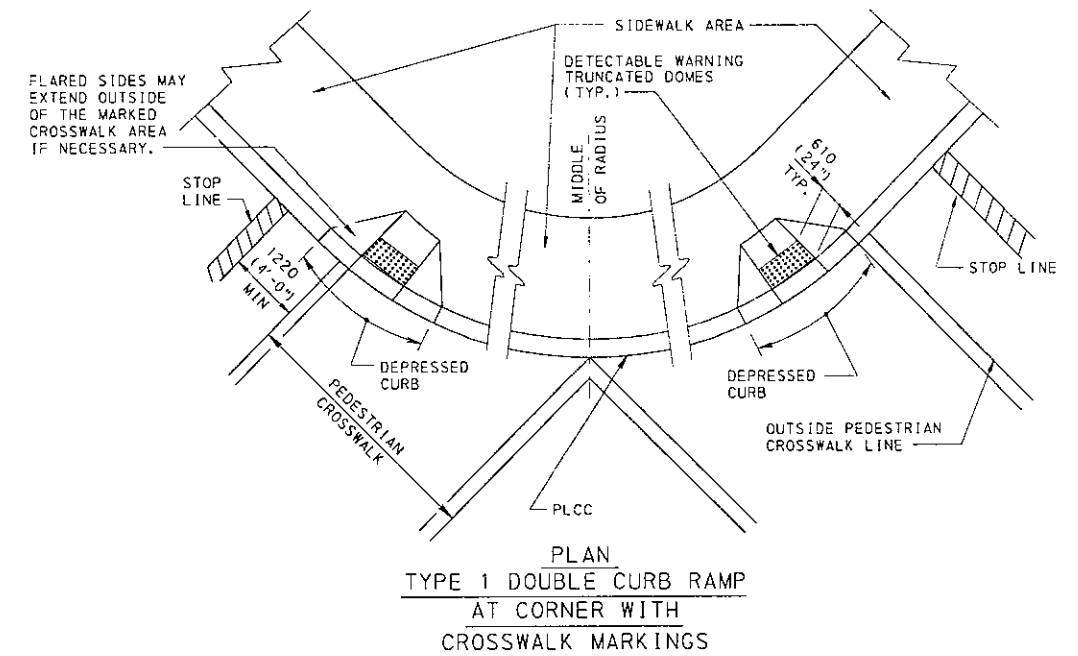
TYPE 3 BUILT-UP CURB RAMP



DETAIL A PLAN
OVERRUN ZONE
CROSSWALK MARKINGS



PLAN
TYPE 1 SINGLE CURB RAMP
AT CORNER WITH
CROSSWALK MARKINGS



PLAN
TYPE 1 DOUBLE CURB RAMP
AT CORNER WITH
CROSSWALK MARKINGS

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

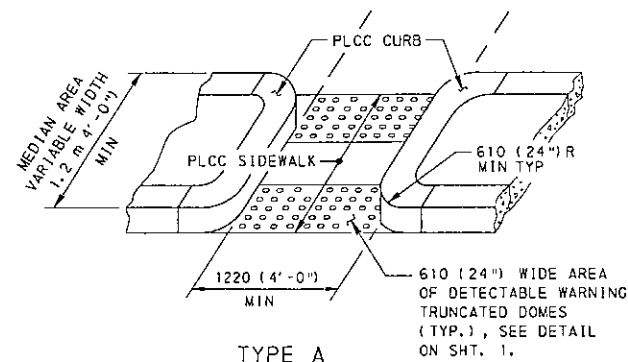
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CURB RAMP
NEW CONSTRUCTION OR
RECONSTRUCTION

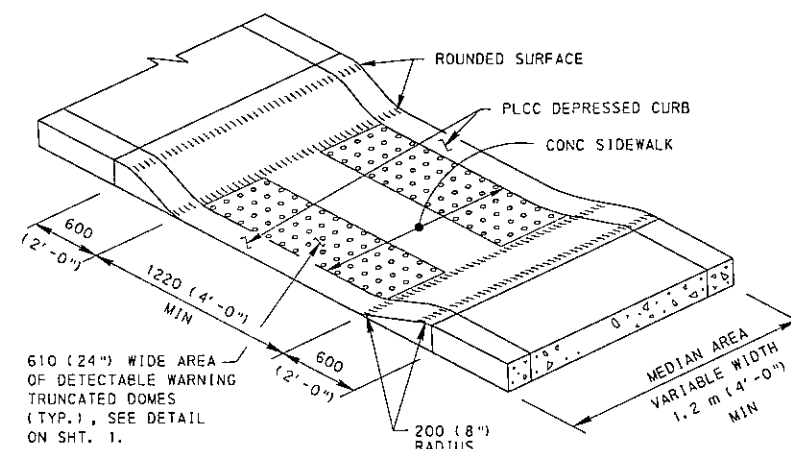
RECOMMENDED APR. 15, 2004
Dean A. Schindler
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED APR. 15, 2004
M. Patel
CHIEF ENGINEER

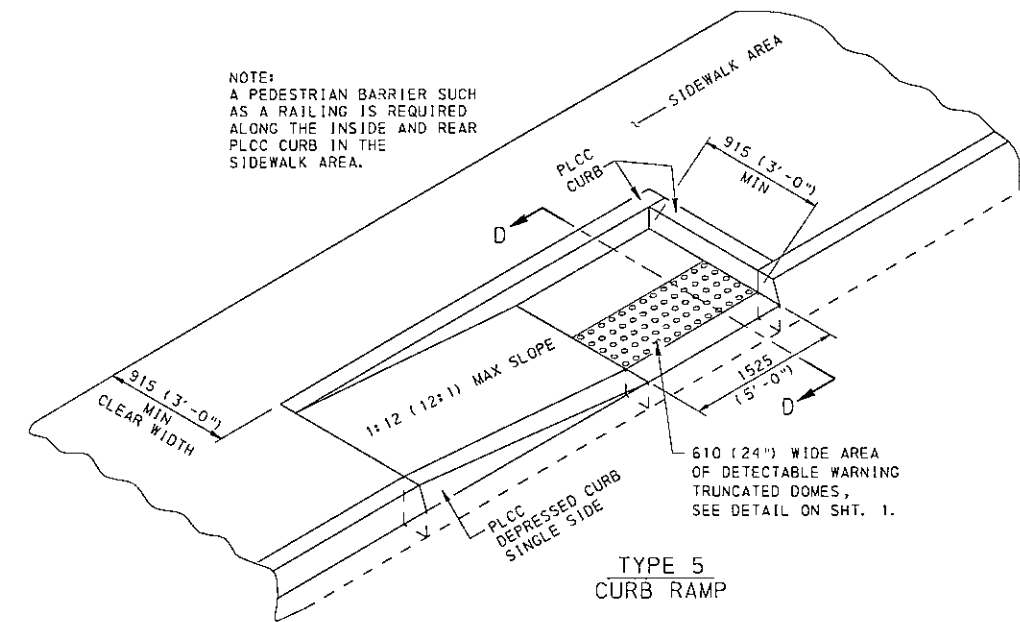
SHT 2 OF 3
RC-67M



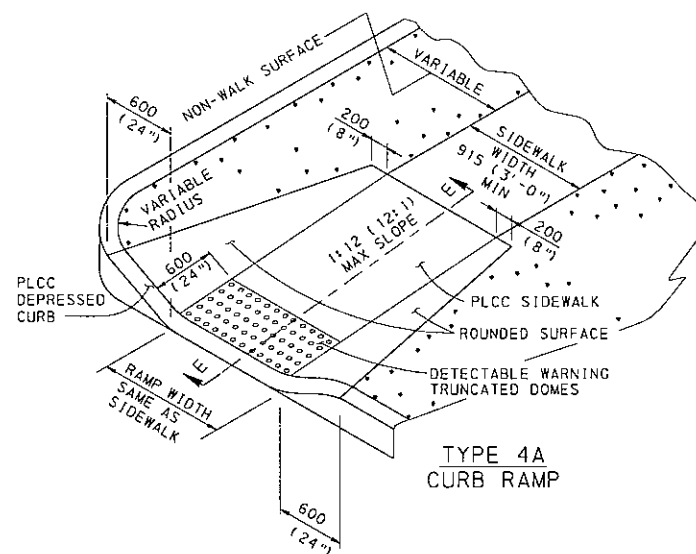
TYPE A
TYPICAL MEDIAN OR ISLAND
ACCESS OPENING
WITH CURB SIDES



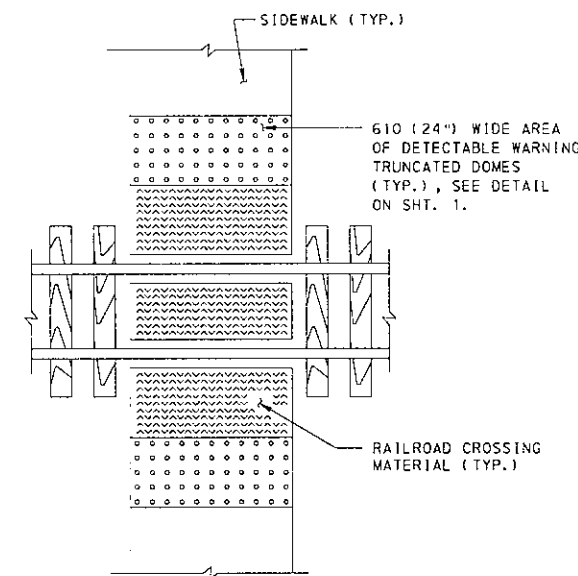
TYPE B
TYPICAL MEDIAN OR ISLAND
ACCESS OPENING WITH
FLARED SIDES



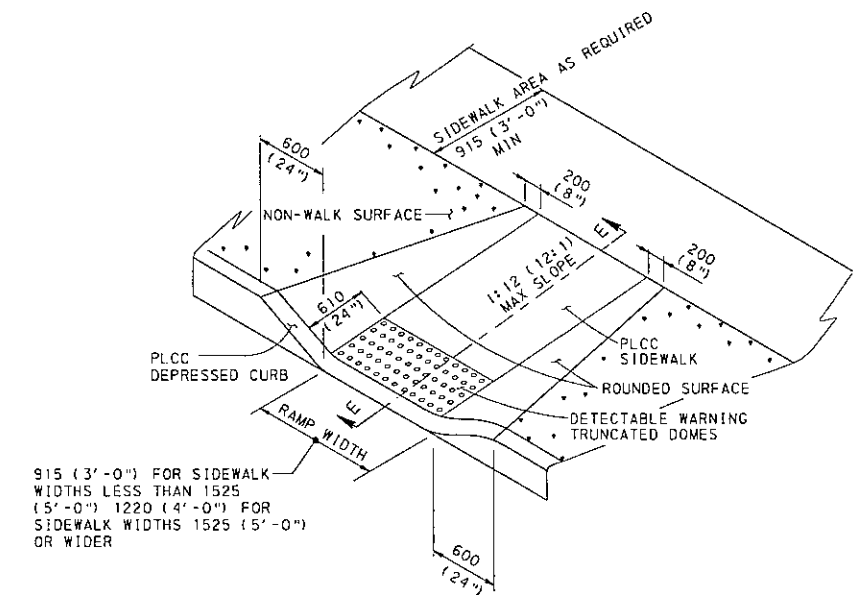
TYPE 5
CURB RAMP



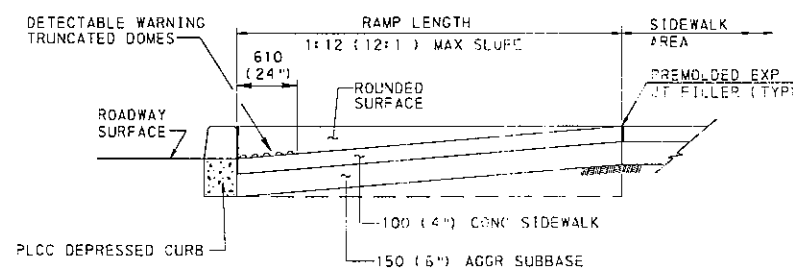
TYPE 4A
CURB RAMP



TYPICAL DETECTABLE WARNINGS
AT RAILROAD CROSSING



TYPE 4
CURB RAMP



TYPE 4 AND 4A
SECTION E-E

NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES
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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CURB RAMPS
NEW CONSTRUCTION OR
RECONSTRUCTION

RECOMMENDED APR. 15, 2004
Dean A. Schaefer
DIRECTOR, BUREAU OF DESIGN

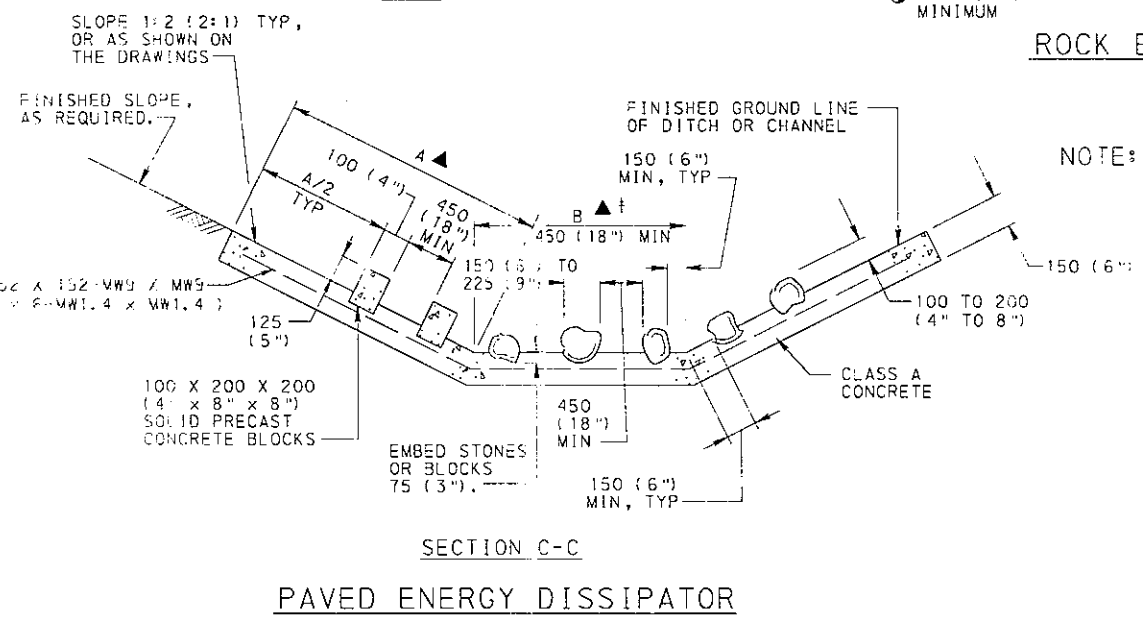
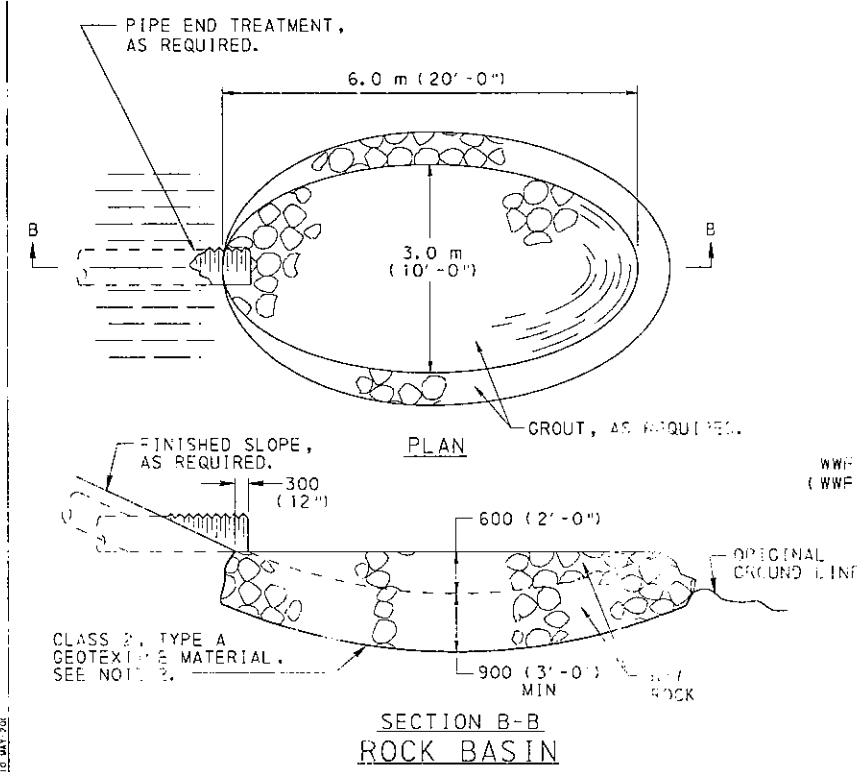
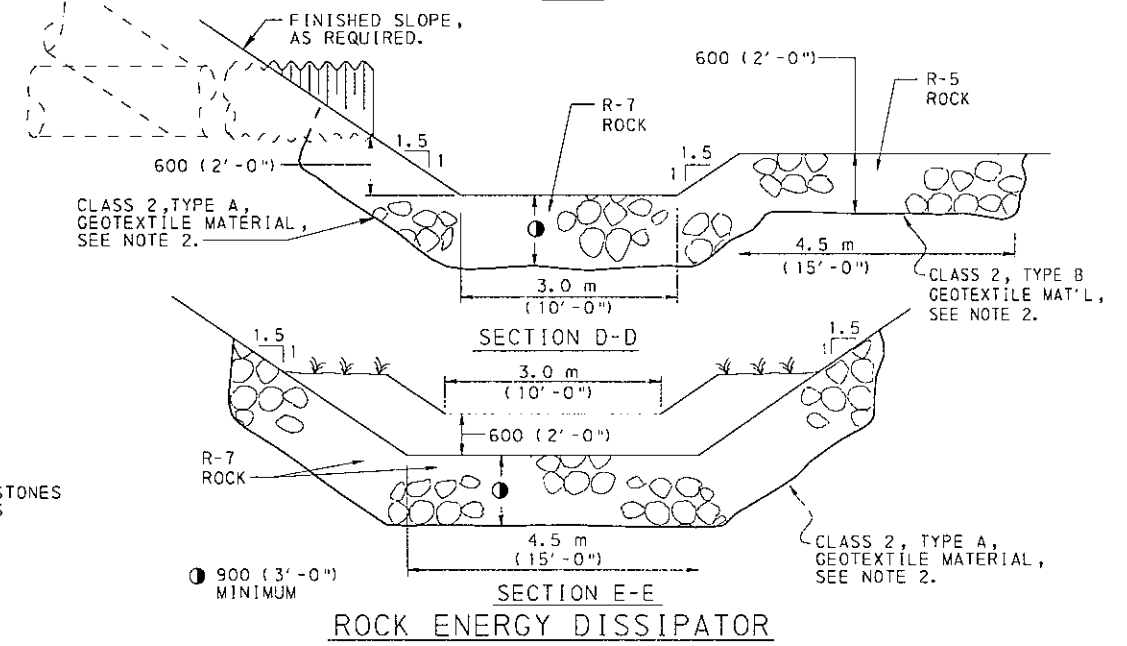
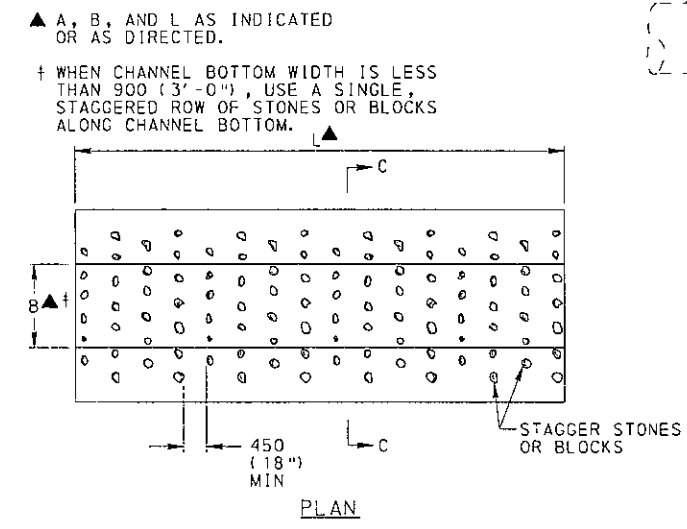
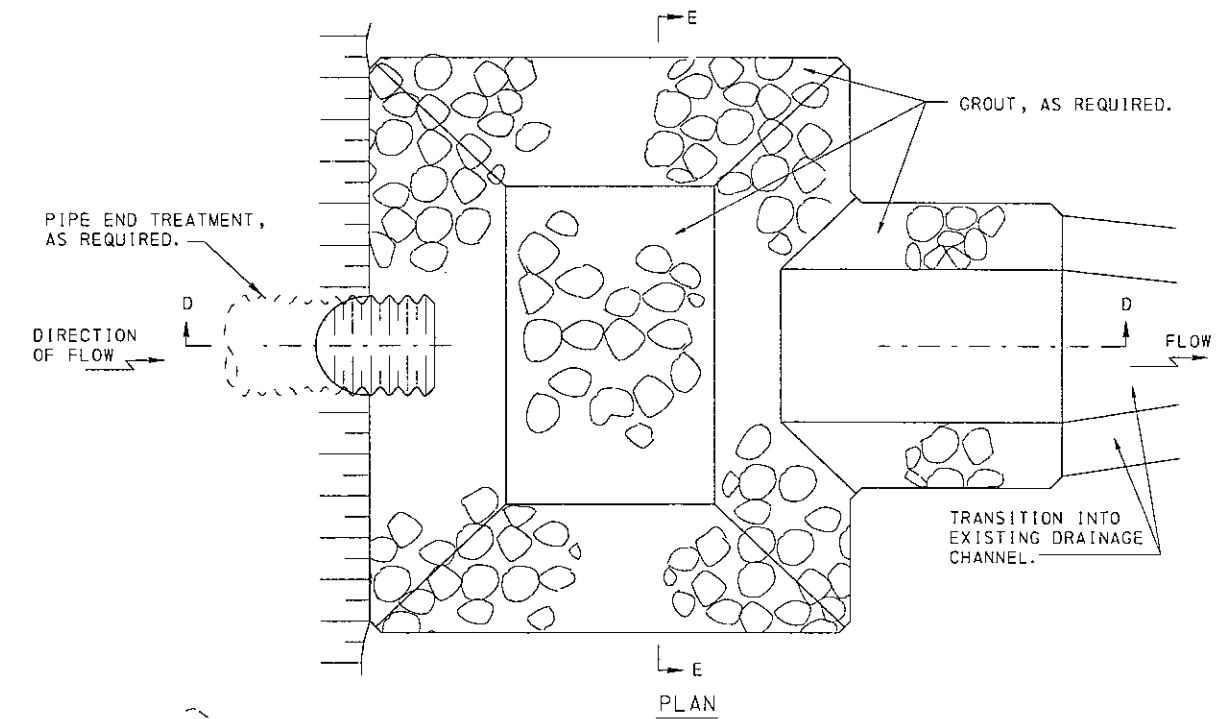
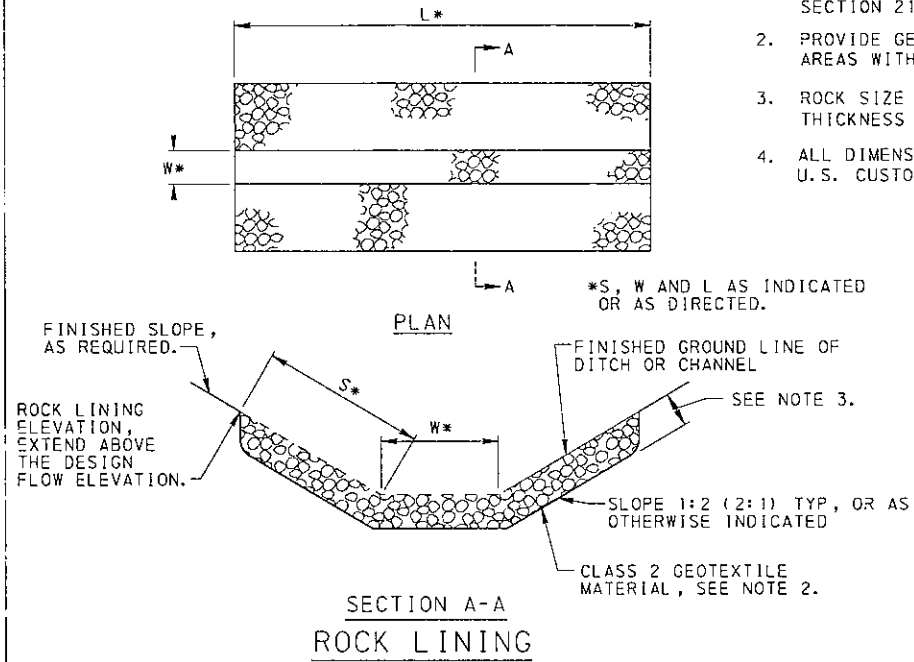
RECOMMENDED APR. 15, 2004
M. Patel
CHIEF ENGINEER

SHT 3 OF 3

RC-67M

NOTES

1. PROVIDE GEOTEXTILE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 735 AND FURNISH AND INSTALL IN ACCORDANCE WITH SECTION 212.
2. PROVIDE GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.
3. ROCK SIZE AS PER DESIGN DRAWINGS, NOMINAL PLACEMENT THICKNESS AS PER PUBLICATION 408, SECTION 850.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.

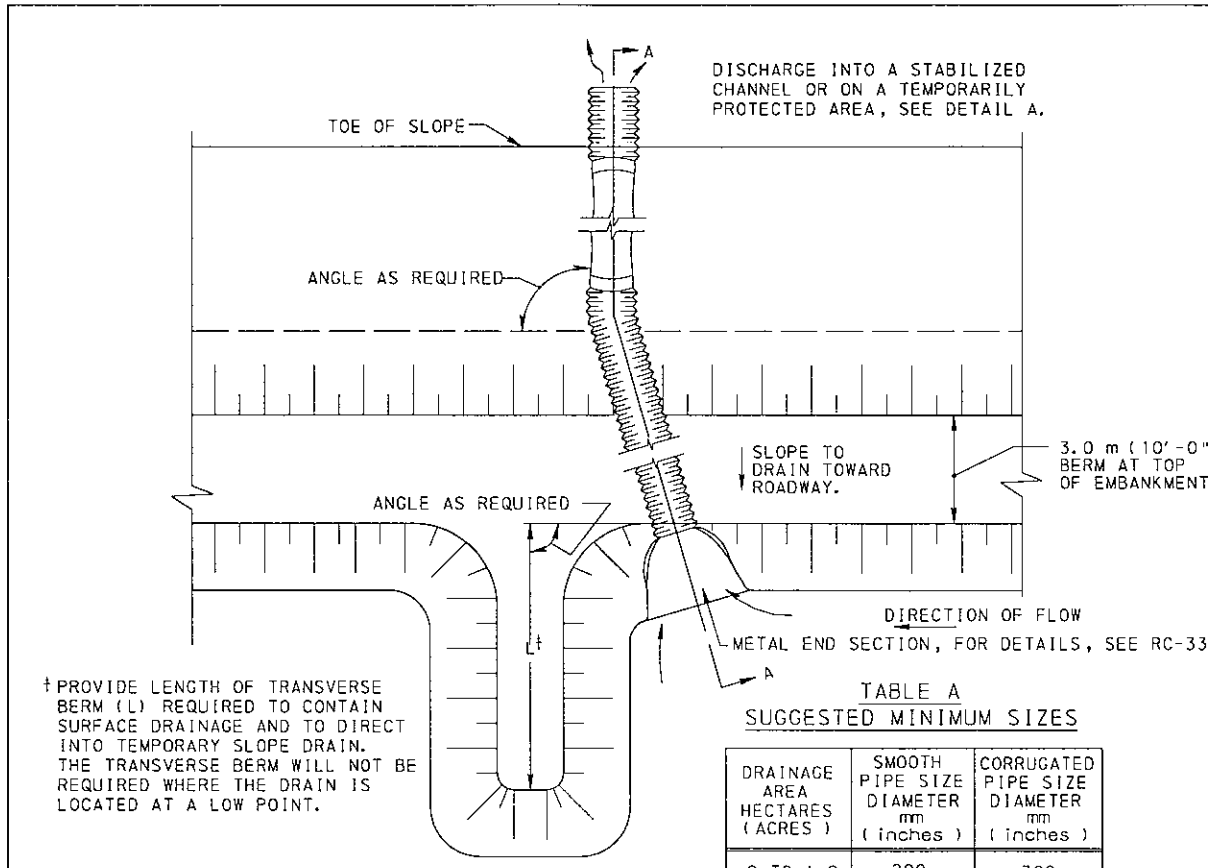


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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

EROSION AND SEDIMENT POLLUTION CONTROL

RECOMMENDED APR. 15, 2004 <i>Dean A. Schindler</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. Patel</i> CHIEF ENGINEER	SHT 1 OF 6 RC-70M
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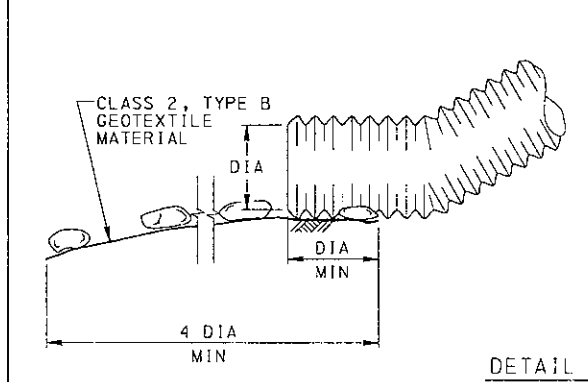


† PROVIDE LENGTH OF TRANSVERSE BERM (L) REQUIRED TO CONTAIN SURFACE DRAINAGE AND TO DIRECT INTO TEMPORARY SLOPE DRAIN. THE TRANSVERSE BERM WILL NOT BE REQUIRED WHERE THE DRAIN IS LOCATED AT A LOW POINT.

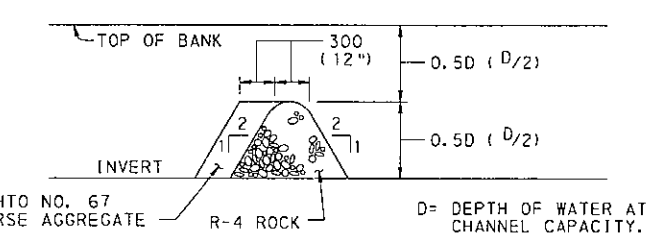
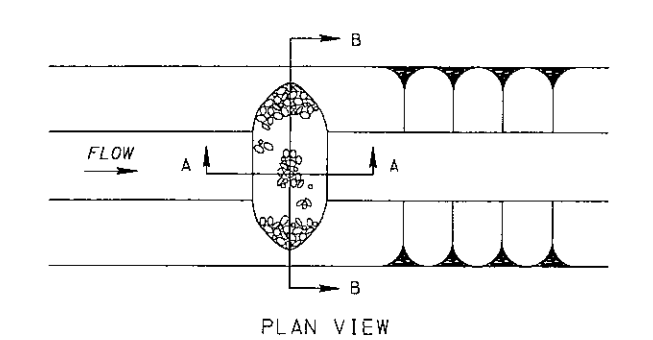
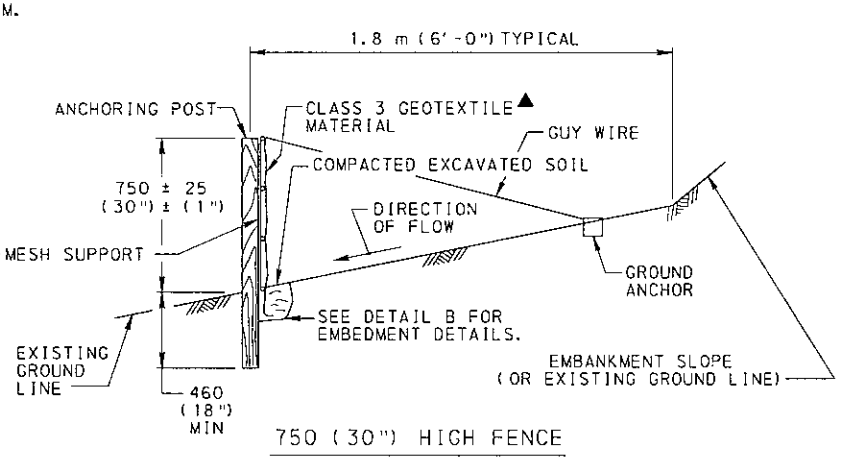
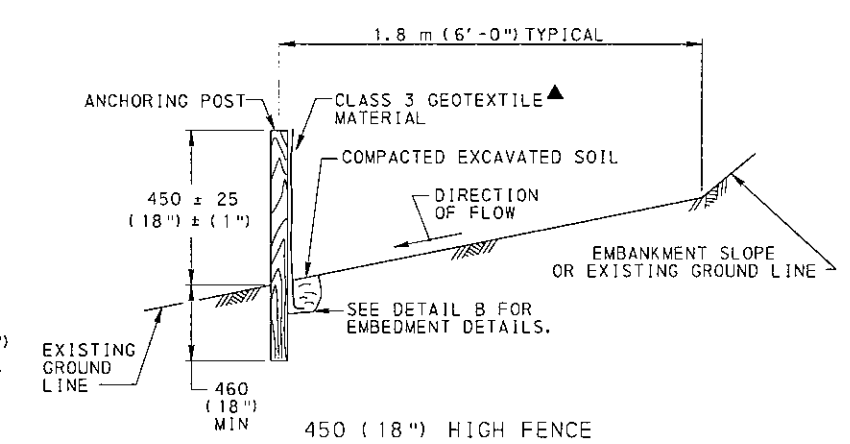
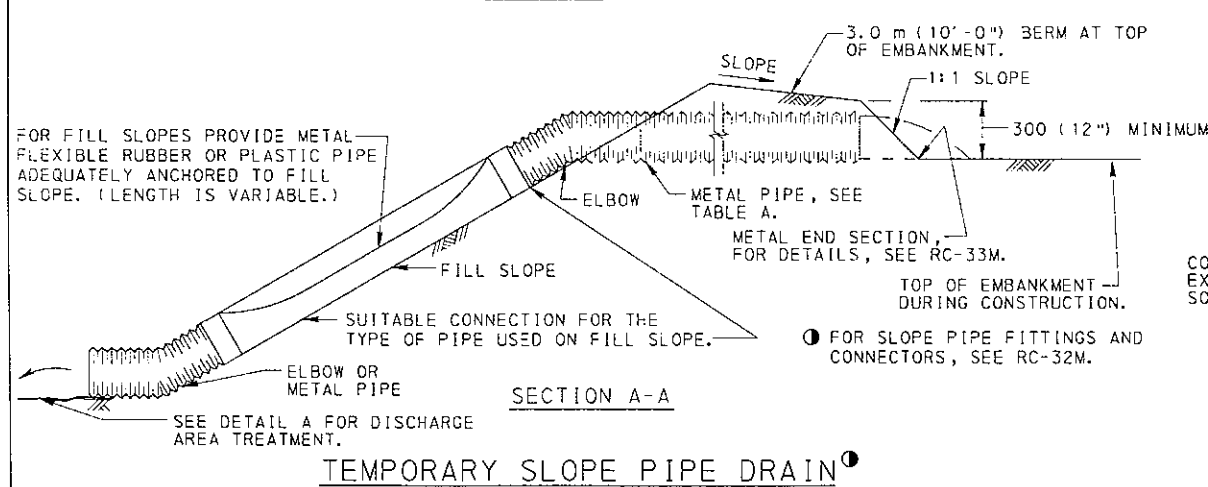
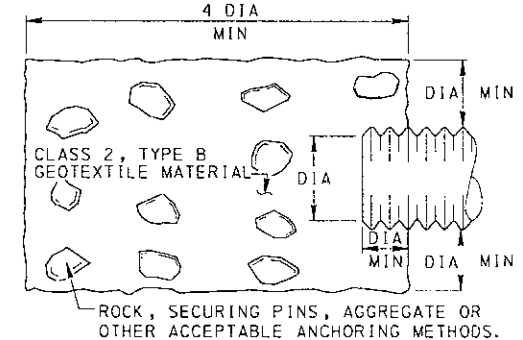
PLAN

TABLE A
SUGGESTED MINIMUM SIZES

DRAINAGE AREA HECTARES (ACRES)	SMOOTH PIPE SIZE DIAMETER mm (inches)	CORRUGATED PIPE SIZE DIAMETER mm (inches)
0 TO 1.2 (0 TO 3)	200 (8")	300 (12")
1.2 TO 2.4 (3 TO 6)	250 (10")	375 (15")
2.4 TO 4.0 (6 TO 10)	300 (12")	450 (18")



DETAIL A



TYPICAL SECTION A-A

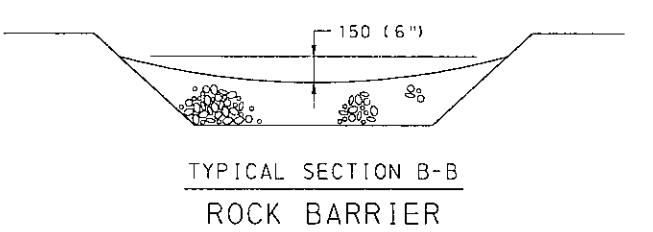
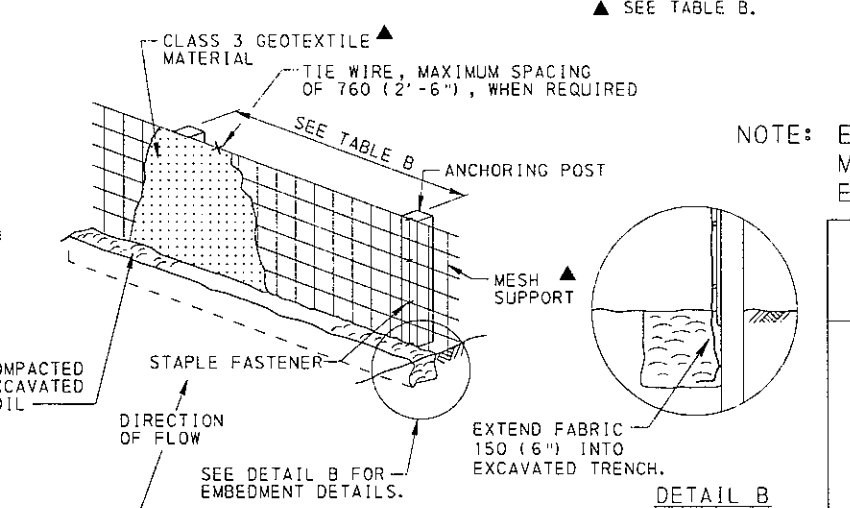


TABLE B
SILT BARRIER FENCE
GEOTEXTILE SELECTION

TYPE OF CLASS 3 GEOTEXTILE MATERIAL	NOMINAL FABRIC HEIGHT	MAX POST SPACING WITHOUT MESH SUPPORT	MAX POST SPACING WITH MESH SUPPORT
3A	450 (18")	2.4 m (8'-0")	NA
3A	750 (30")	NA	2.4 m (8'-0")
3B	450 (18")	1.2 m (4'-0")	NA
3B	750 (30")	NA	1.2 m (4'-0")

NA = NOT APPLICABLE

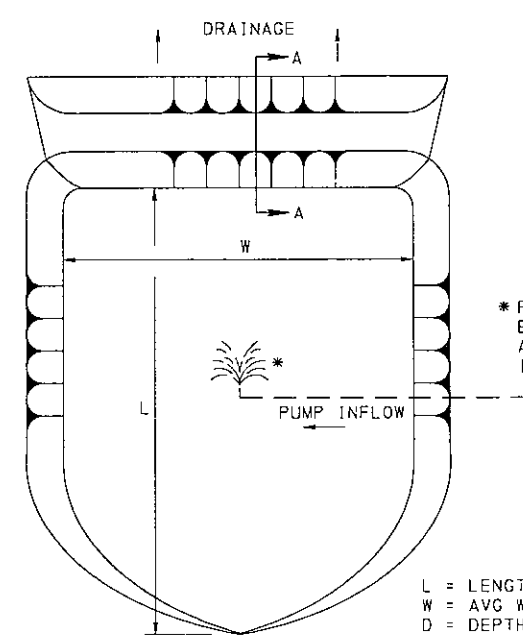
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



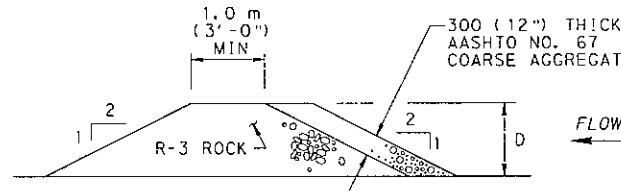
SILT BARRIER FENCE

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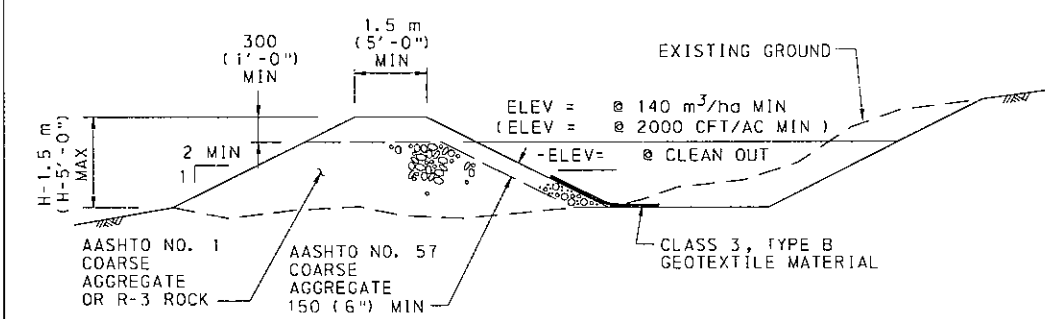
EROSION AND SEDIMENT
POLLUTION CONTROL



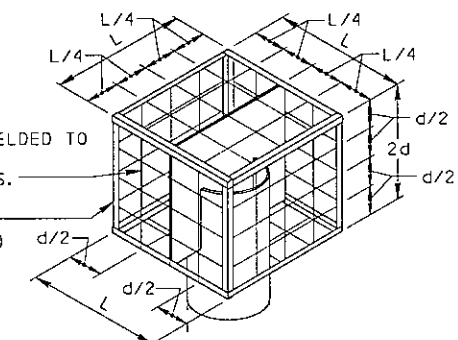
L = LENGTH
 W = AVG WIDTH
 D = DEPTH
 WHERE $L \times W \times D = 450 \text{ m}^3 \text{ per } 1 \text{ m}^3/\text{s}$
 (100cf/100gpm INFLOW)



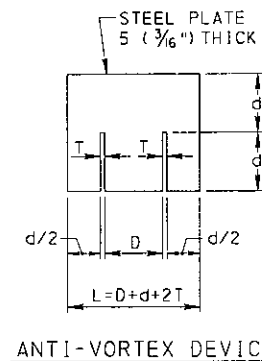
DEWATERING BASIN



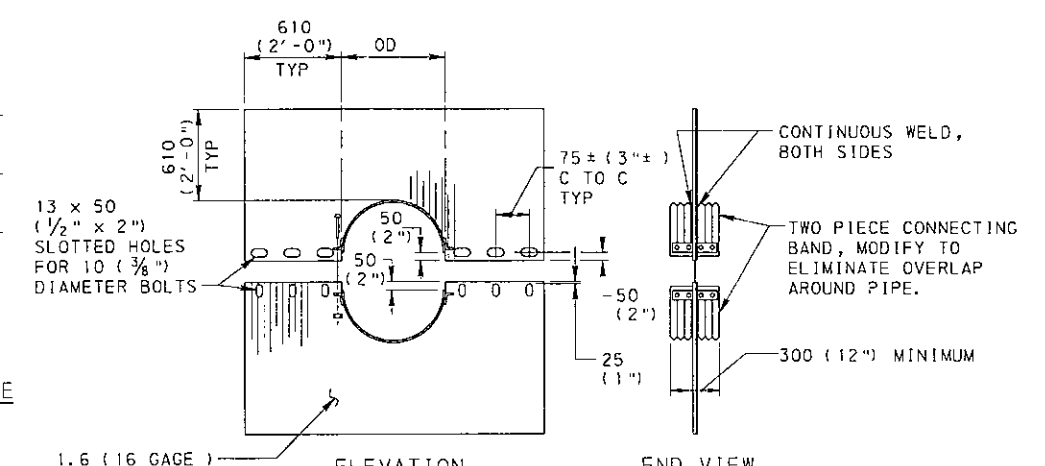
SEDIMENT TRAP



TRASH RACK AND ANTI-VORTEX DEVICE

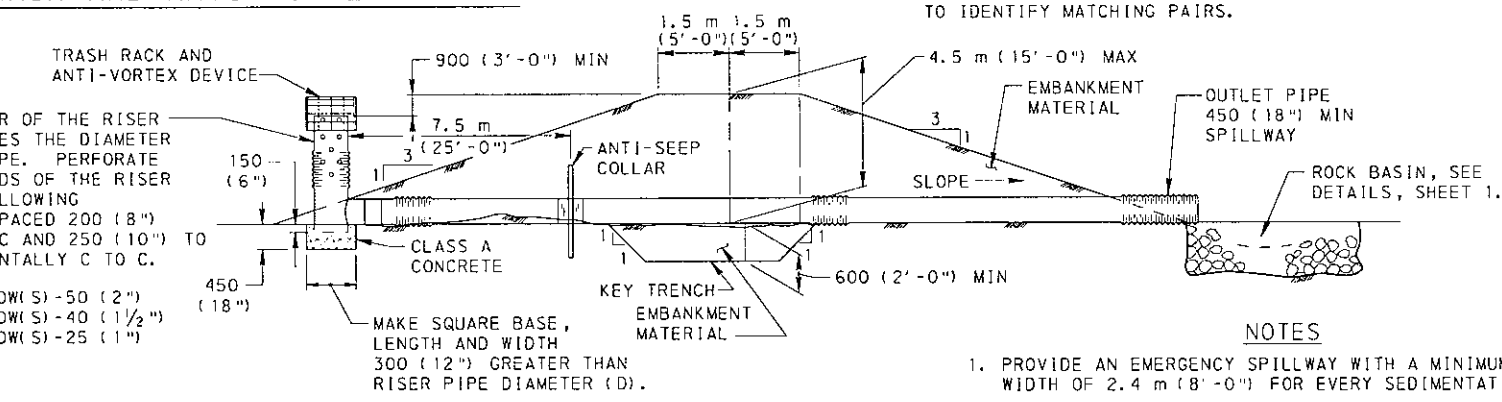


T = THICKNESS OF RISER PIPE.
 D = DIAMETER OF RISER PIPE.
 d = DIAMETER OF OUTLET PIPE.



DETAIL OF ANTI-SEEP COLLAR

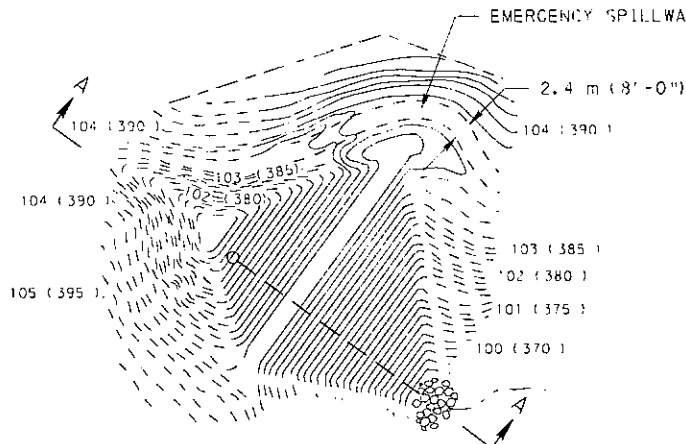
CAULK THE LAP BETWEEN THE TWO HALF-SECTIONS WITH BITUMINOUS MASTIC AT THE TIME OF INSTALLATION. MARK UNASSEMBLED COLLARS BY PAINTING OR TAGGING TO IDENTIFY MATCHING PAIRS.



NOTES

1. PROVIDE AN EMERGENCY SPILLWAY WITH A MINIMUM BOTTOM WIDTH OF 2.4 m (8'-0") FOR EVERY SEDIMENTATION POND.
2. PLACE THE EMERGENCY SPILLWAY IN UNDISTURBED GROUND NOT IN EMBANKMENT AREAS. THE EMERGENCY SPILLWAY CAN GO OVER THE EMBANKMENT IF ROCK LINING IS USED.
3. MAKE THE ELEVATION OF THE EMERGENCY SPILLWAY SUCH THAT THE DAM IS AT LEAST 600 (2'-0") ABOVE THE MAXIMUM DESIGN FLOW OF THE SPILLWAY. MAKE THE COMBINED CAPACITY OF THE RISER AND EMERGENCY SPILLWAY AT LEAST 0.14 m³/s/ha (2 CFS/AC) FROM THE ENTIRE WATERSHED OF THE BASIN.
4. CONSTRUCT THE CREST OF THE EMERGENCY SPILLWAY 300 (1'-0") ABOVE THE TOP OF THE RISER.
5. WHERE THERE IS LIMITED ROOM FOR STORAGE AT THE BOTTOM PORTION OF THE POND, PERFORATE THE LOWEST HOLES IN THE RISER PIPE AT THE LEVEL OF TWO SEVENTHS OF THE TOTAL POND CAPACITY, TO PROVIDE ADEQUATE SEDIMENT STORAGE.

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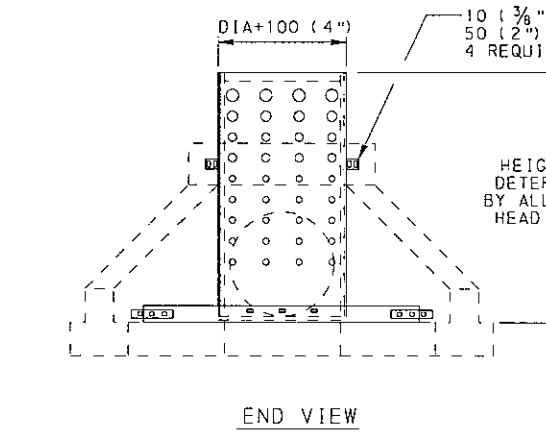
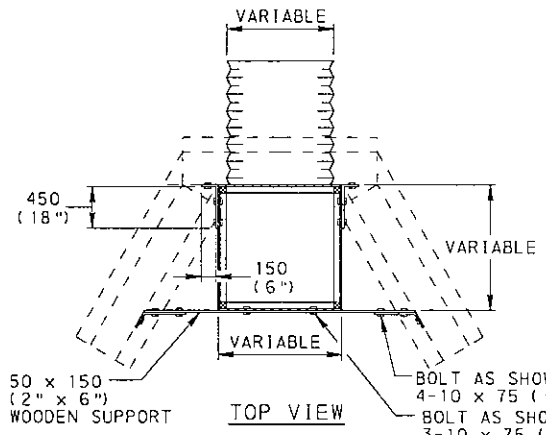


PLAN VIEW OF SEDIMENTATION POND WITH EMERGENCY SPILLWAY CUT INTO EXISTING GROUND

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 DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

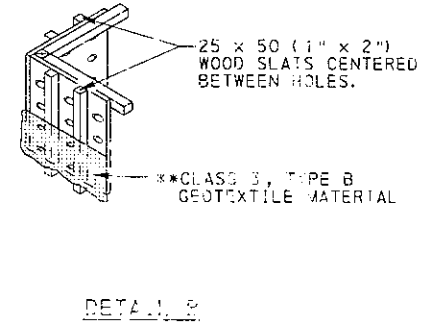
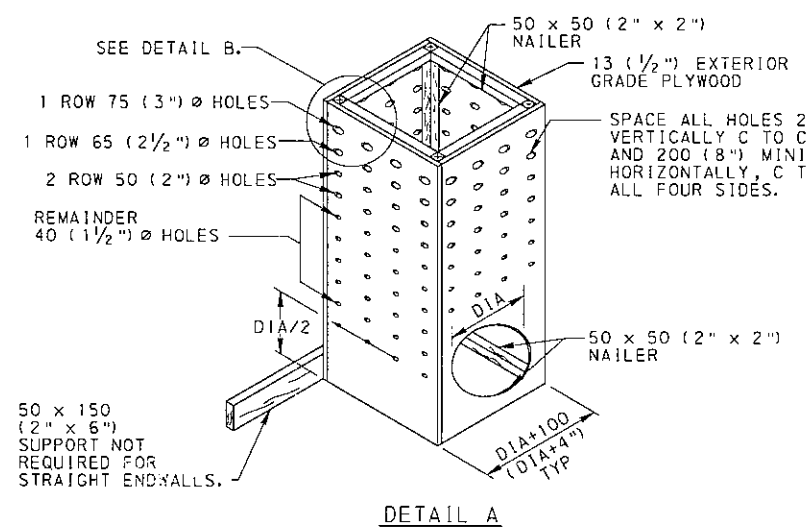
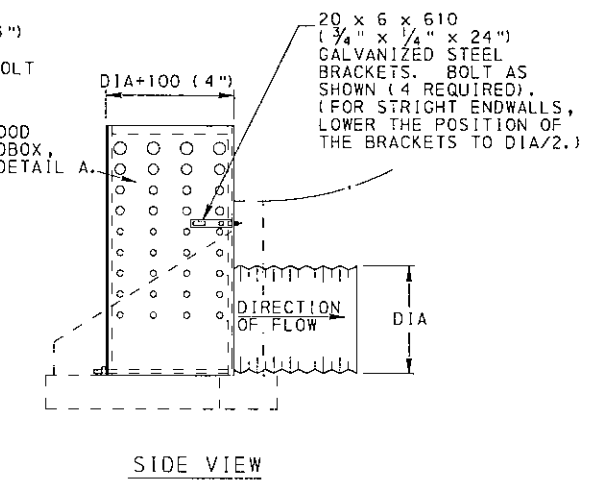
EROSION AND SEDIMENT POLLUTION CONTROL

RECOMMENDED APR. 15, 2004 <i>Dean A. Schuch</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>m. Patel</i> CHIEF ENGINEER	SHT 3 OF 6 RC-70M
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NOTES
 DRILL HOLES 50 (2") DEEP IN CONCRETE ENDWALL AND INSERT LEAD EXPANDER TO RECEIVE M10 Ø LAG BOLT. UPON REMOVAL OF STANDBOX, FILL HOLES IN THE ENDWALL WITH MORTAR MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 705.7.

** COVER 50% OF THE HEIGHT OF WIDTH AT THE BOTTOM OF THE STANDBOX. USE THE "EMBEDMENT DETAILS" SHOWN ON SHEET 2 IF BOTTOM IS NOT PAVED. USE ASPHALT MATERIAL FOR FASTENING IF PAVED APRON IS PROVIDED.

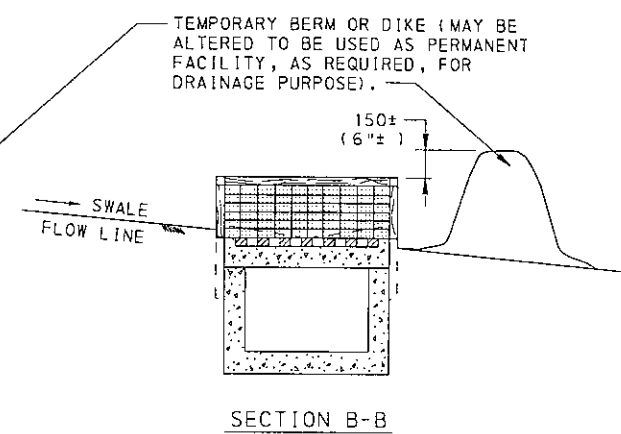
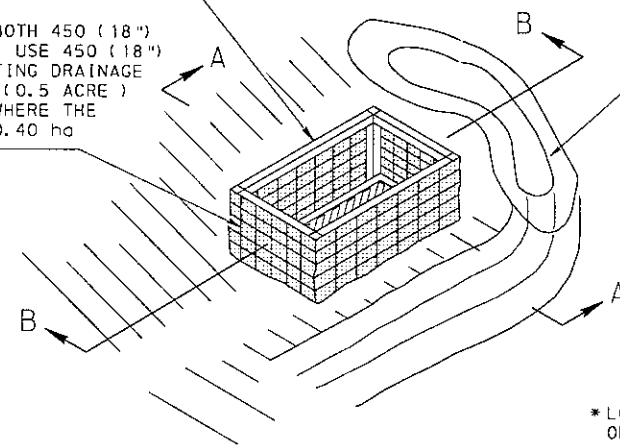


ENDWALL STANDBOX

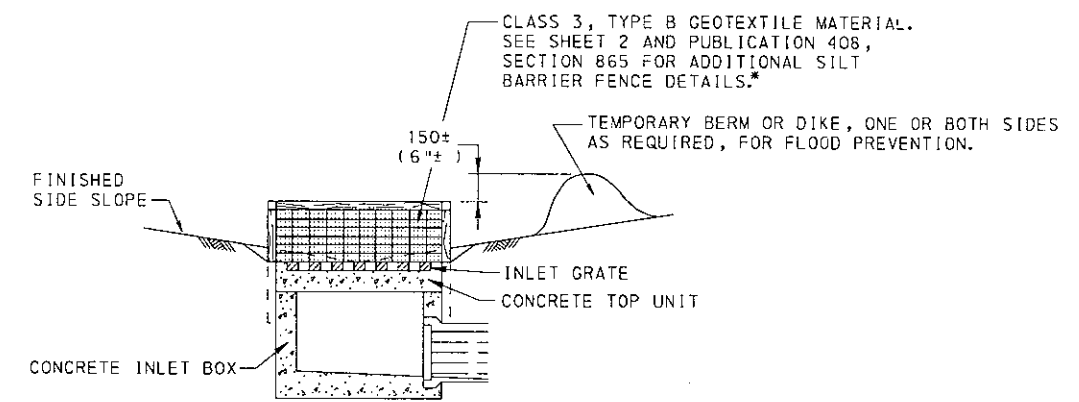
† SUPPLY ALL ENDWALL STANDBOXES WITH CLASS 3 GEOTEXTILE MATERIAL AS SHOWN IN DETAIL B.

PLACE 50 x 50 (2" x 2") WOOD STRIPS AROUND THE TOP NAILED TO THE POSTS AND WITH THE GEOTEXTILE STAPLED TO THESE WOODEN PIECES.

PROVIDE MESH SUPPORT FOR BOTH 450 (18") AND 750 (30") HIGH FENCES. USE 450 (18") HIGH FENCE WHERE CONTRIBUTING DRAINAGE AREA IS LESS THAN 0.20 ha (0.5 ACRE) AND 750 (30") HIGH FENCE WHERE THE AREA IS BETWEEN 0.20 AND 0.40 ha (0.5 AND 1.0 ACRE).



* LOCATE SILT BARRIER FENCE TO PREVENT THE INFILTRATION OF FINES OR SEDIMENTS INTO THE INLET BOX. IF NO BACKFILL OPERATIONS ARE PERFORMED, LOCATE THE SILT BARRIER FENCE OUTSIDE THE AREA EXCAVATED FOR THE INLET BOX.



SILT BARRIER FENCE FOR INLET PROTECTION

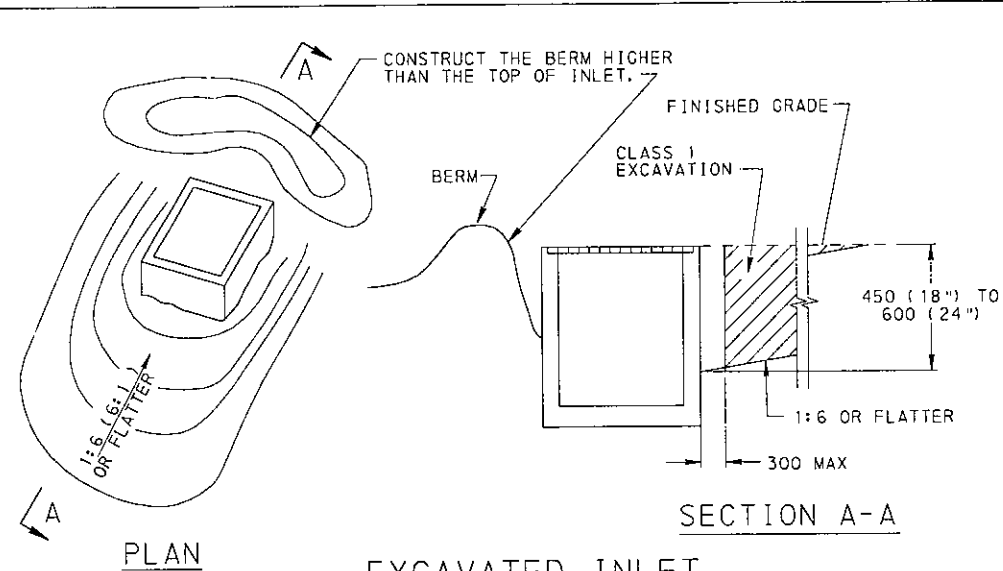
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NOTES

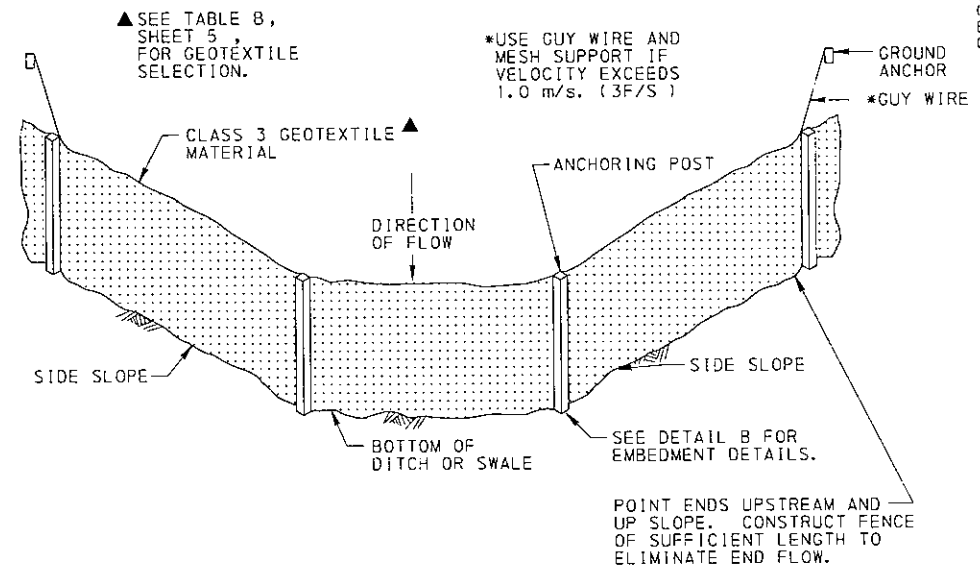
- UPON ESTABLISHMENT OF SUITABLE SOIL STABILIZATION AND AT THE DIRECTION OF THE ENGINEER, REMOVE THE ENDWALL STANDBOXES. STANDBOXES BECOME THE PROPERTY OF THE CONTRACTOR.
- CLEAN THE BASIN AND/OR AREA UPSTREAM FROM THE STANDBOX PERIODICALLY AND DEPOSIT THE SEDIMENT AND DEBRIS IN AN AREA APPROVED BY THE ENGINEER.

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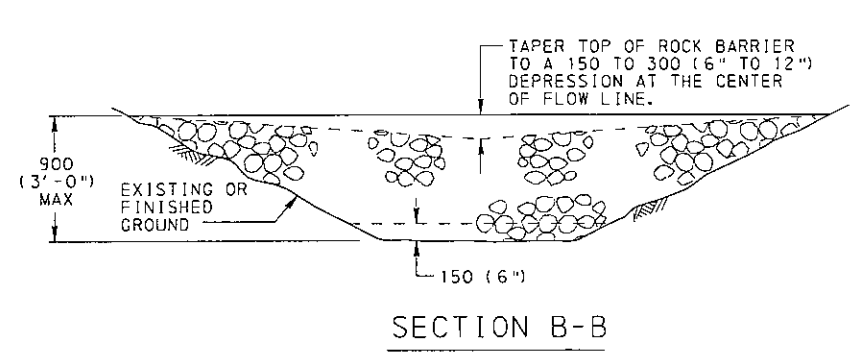
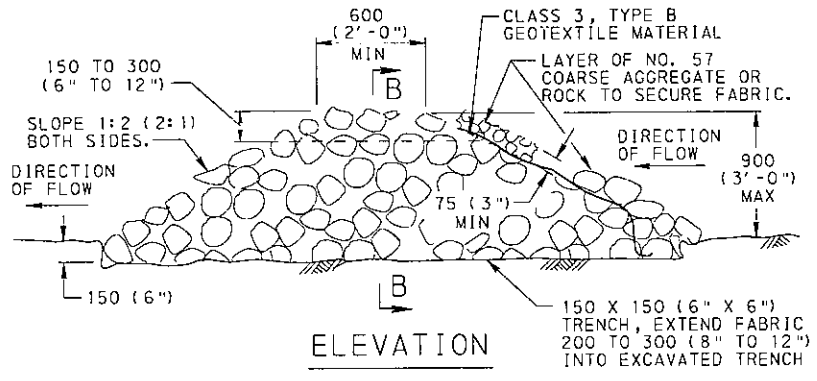
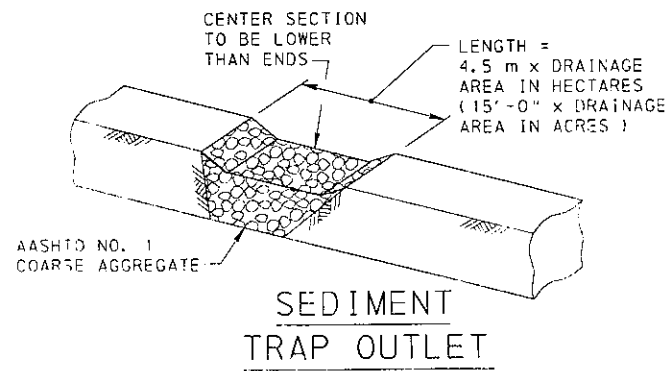
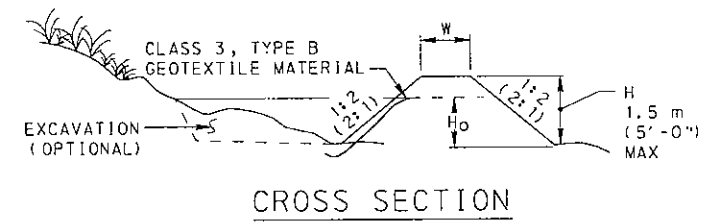
EROSION AND SEDIMENT
 POLLUTION CONTROL



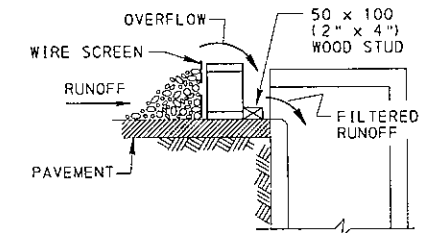
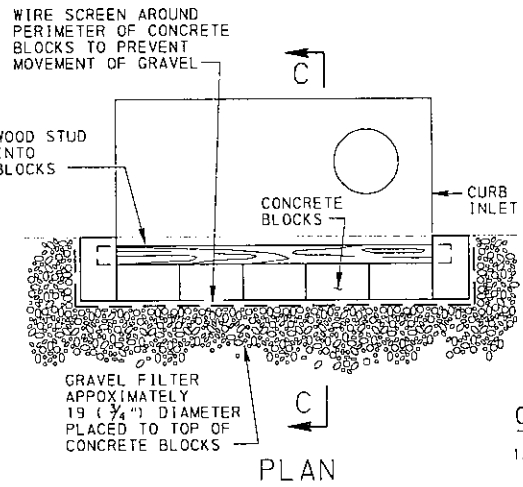
EXCAVATED INLET
SEDIMENT TRAP



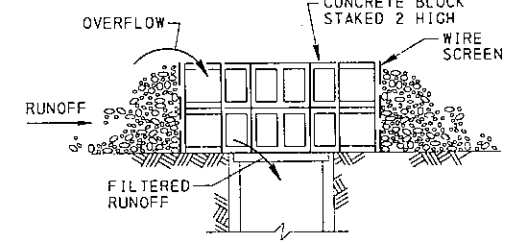
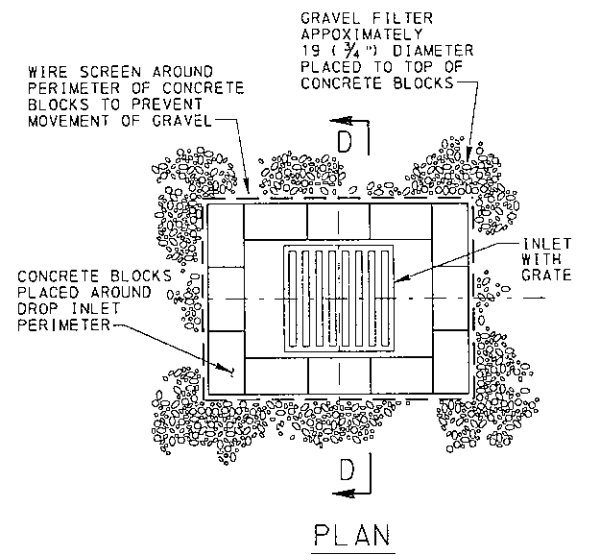
DITCH OR SWALE CONDITION



ROCK BARRIER



GRAVEL FILTER FOR CURB INLET



GRAVEL FILTER FOR AREA INLET

GRAVEL FILTER NOTES:

- GRAVEL FILTERS MAY BE USED ON PAVEMENT OR BARE GROUND.
- ALL GRAVEL FILTERS INSTALLED AROUND AREA DRAINS SHOULD BE INSPECTED AND REPAIRED AFTER EACH RUNOFF EVENT. SEDIMENT SHOULD BE REMOVED WHEN MATERIAL IS WITHIN 25 (4'') OF THE TOP OF THE CONCRETE BLOCKS. PERIODICALLY, THE GRAVEL SHOULD BE RAKED TO INCREASE INFILTRATION AND FILTERING OF RUNOFF WATERS.
- SEDIMENT SHOULD BE REMOVED IMMEDIATELY FROM ANY TRAVELED WAY OF ROADS AND STREETS.

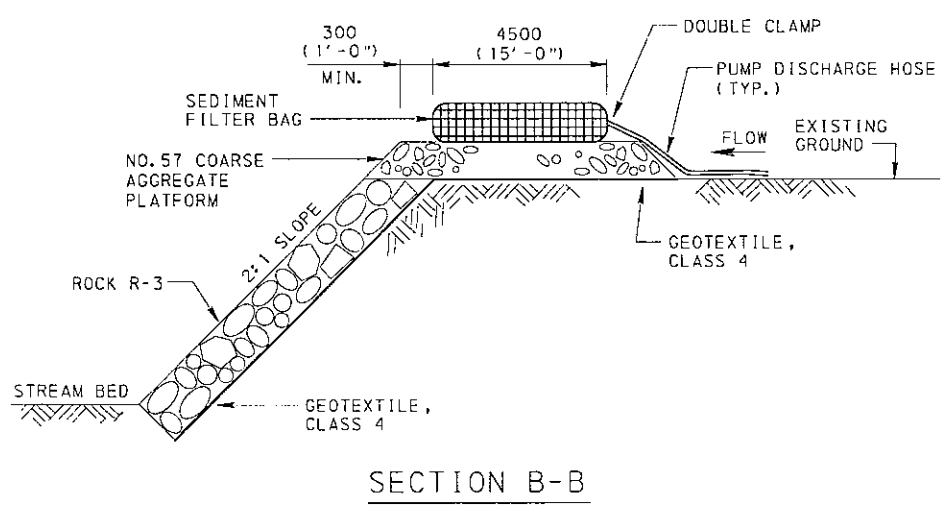
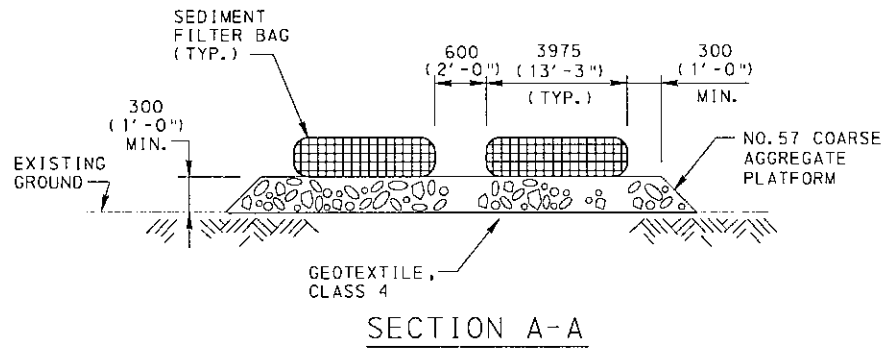
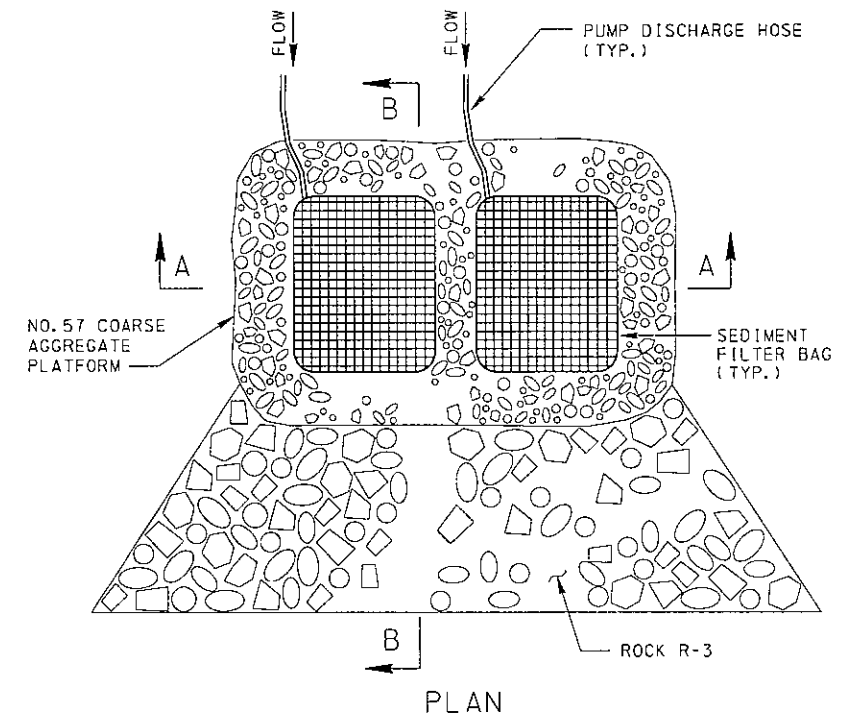
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SIZING SEDIMENT TRAP EMBANKMENTS

meters (feet)		
H	H ₀	W
0.5 (1'-6")	0.2 (8")	0.6 (2'-0")
0.6 (2'-0")	0.3 (1'-0")	0.6 (2'-0")
0.8 (2'-6")	0.5 (1'-6")	0.8 (2'-6")
0.9 (3'-0")	0.6 (2'-0")	0.8 (2'-6")
1.0 (3'-3")	0.8 (2'-6")	0.9 (3'-0")
1.2 (4'-0")	0.9 (3'-0")	0.9 (3'-0")
1.4 (4'-6")	1.0 (3'-6")	1.2 (4'-0")
1.5 (5'-0")	1.2 (4'-0")	1.4 (4'-6")

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

EROSION AND SEDIMENT POLLUTION CONTROL



NOTES

1. FILTER BAGS MAY BE USED ON LOW VOLUME DEWATERING OPERATIONS NOT TO EXCEED 3785 LITERS (1000 GALLONS) PER MINUTE.
2. CLEAR SITE BUT DO NOT GRUB.
3. INSPECT AREA TO DETERMINE PATH DISCHARGE WATER WILL TAKE. STABILIZE ANY POTENTIALLY ERODABLE AREAS (STEEP SLOPES).
4. CONSTRUCT COARSE AGGREGATE PLATFORM SURFACE LEVEL. PLACE SEDIMENT FILTER BAG ON STABILIZED AREA.
5. IF THE EXISTING AREA IS STABILIZED, STRAW MAY BE USED INSTEAD OF #57 COARSE AGGREGATE. PLACE BAG OVER STRAW DISTRIBUTED AT THE RATE OF 1 BALE PER 3m² (30 SQ. FT.).
6. USE PUMP WITH A RATING IN GALLONS PER MINUTE NOT TO EXCEED 50% OF THE MAXIMUM FLOW RATE LISTED ON THE BAG LABEL. DOUBLE CLAMP THE PUMP DISCHARGE HOSE FIRMLY TO THE BAG.
7. MONITOR AND EVALUATE THE ENTIRE PUMPING OPERATION TO ASSURE THAT THE BAG CONTINUES TO FUNCTION PROPERLY. REPLACE THE BAG WHEN THE CONTAINED SILT REDUCES THE BAGS FLOW TO APPROXIMATELY 50% OF THE RATE OF INITIAL DISCHARGE, OR WHEN DIRECTED BY INSPECTOR-IN-CHARGE. DISPOSE OF SEDIMENT IN A MANNER SATISFACTORY TO THE ENGINEER. RESTORE THE AREA AS SPECIFIED IN SECTION 105.14.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS ARE IN () PARENTHESES.

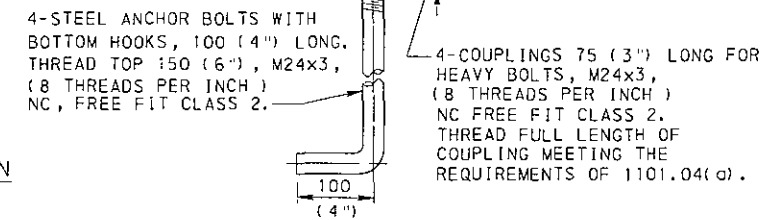
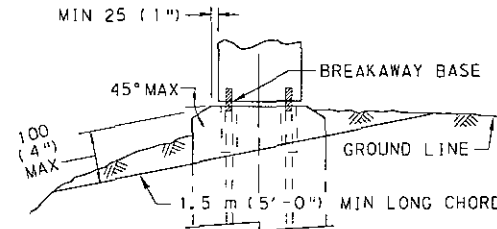
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<p>COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN</p>		
<p>SEDIMENT FILTER BAG</p>		
RECOMMENDED APR. 15, 2004 DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 CHIEF ENGINEER	SHT 6 OF 6 RC-70M

NOTES

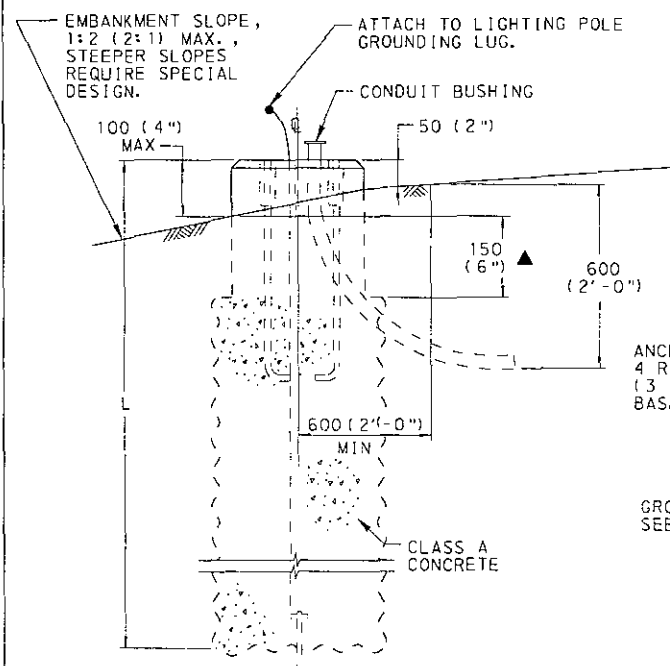
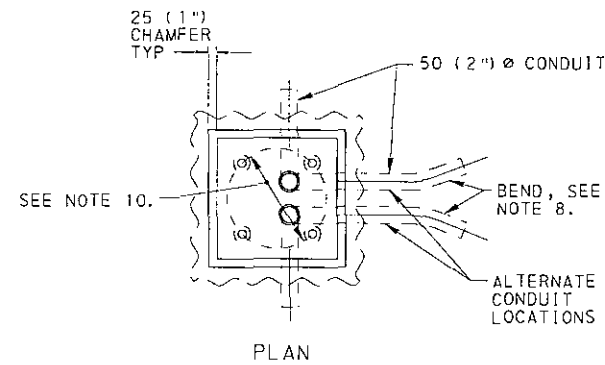
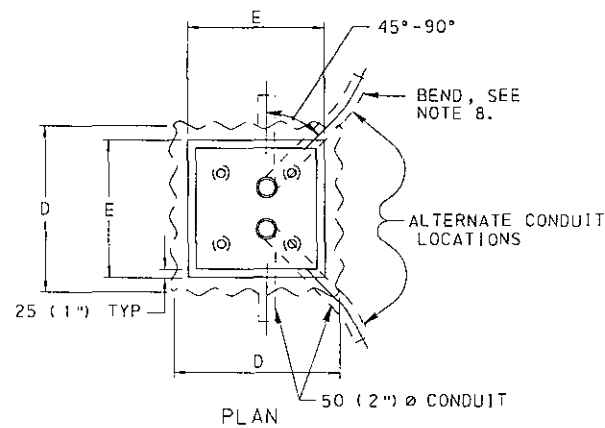
1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 910 AND 1101.
2. LEVEL TOP OF FORMS IN BOTH DIRECTIONS.
3. GALVANIZE ALL ANCHORAGE HARDWARE, STEEL FLAT OR SPRING LOCK WASHERS AND TOP 300 (12") OF ANCHOR BOLTS.
4. GROUND ROD 13 (1/2") ϕ x 2.4 m (8'-0") MINIMUM, COPPER CLAD STEEL WITH 25 (1") \hookrightarrow MAXIMUM RESISTANCE TO EARTH GROUND.
5. SEE RC-83M FOR POLE DETAILS.
6. FOR LIGHTING POLE ANCHORAGES ON BRIDGES, SEE BRIDGE CONSTRUCTION STANDARD DRAWINGS, BC-722M.
7. PROVIDE 750 (30") OF 21.15 m² (#4) GROUND WIRE COILED ABOVE FOUNDATION, WIRE EXTENDS THROUGH CENTER OF FOUNDATION.
8. MINIMUM BEND RADIUS TO BE TWELVE TIMES CONDUIT DIAMETER, UNLESS OTHERWISE SPECIFIED.
9. TOP OF CONDUIT BUSHING NOT TO BE HIGHER THAN 25 (1") FROM THE TOP OF THE FOUNDATION.
10. THE LIGHTING POLE MANUFACTURER PROVIDES TEMPLATE FOR SETTING ANCHOR BOLTS FOR TYPE "A" OR TYPE "S" LIGHTING POLES, AND ALL HARDWARE, INCLUDING GALVANIZED HEX HEAD CAP BOLT OR STUD AND NUT OF APPROPRIATE LENGTH.
11. USE 3-CONDUIT ACCESS WHERE PLAN CIRCUITS INDICATE BRANCH TAP INSIDE POLE BASE. POSITION CONDUITS IN FOUNDATION TO AVOID UNNECESSARY BENDS. PROVIDE ONE, TWO OR THREE CONDUITS AS REQUIRED.
12. FOR TYPE S POLES - PROVIDE A MAXIMUM OF 100 (4") TO THE TOP OF THE FOUNDATION, ANCHOR BOLT, OR STUB OF BREAK-AWAY DEVICE, WHICHEVER IS HIGHER, MEASURED FROM AN IMAGINARY 1.5 m (5'-0") LONG CHORD, ALIGNED RADIIALLY PERPENDICULAR TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE CHORD EXTENDING TO THE GROUND SURFACE ON BOTH SIDES OF THE SUPPORT. PROVIDE A MAXIMUM TAPER OF 45° TO THE EDGE OF THE FOUNDATION AS REQUIRED TO SATISFY THE ABOVE REQUIREMENT. BEGIN THE TAPER NOT LESS THAN 25 (1") FROM THE OUTSIDE OF THE BREAKAWAY BASE DIMENSION. MOUNTING SURFACE OF FOUNDATION IS TO EXTEND ABOVE THE GROUND LINE.
13. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

▲ FORM 150 (6") BELOW GROUND LEVEL. BELOW THIS POINT, PLACE CONCRETE AGAINST NATURAL GROUND.
 † DESIGNED FOR 9.1 m (30'-0") MAXIMUM ARM LENGTH. SEE TABLE A FOR FOUNDATION DIMENSIONS.
 SEE TYPE A POLE BASE FOUNDATION DETAILS FOR ADDITIONAL TYPE S POLE BASE FOUNDATION REQUIREMENTS.

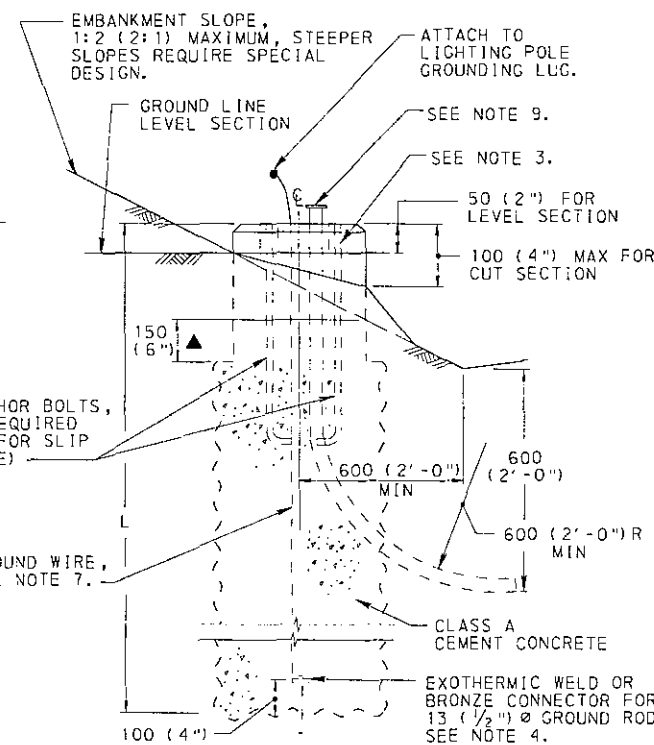


DETAIL FOR TYPE S POLE BASE FOUNDATION
 (SEE NOTE 12.)
 THE MAXIMUM NEGATIVE SLOPE FOR TYPE S POLE BASE FOUNDATION LOCATION IS 1:6 (6:1).

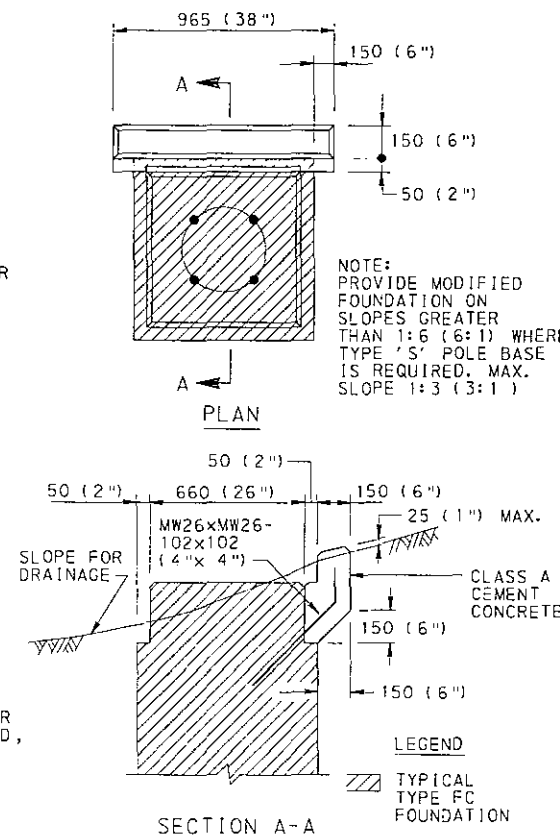
DETAIL OF ANCHOR BOLT



DETAIL FOR TYPE A POLE BASE FOR FILL SECTION



DETAIL FOR TYPE A POLE BASE FOR CUT OR LEVEL SECTION



TYPE FC MODIFIED FOUNDATION

TABLE A
 FOUNDATION DIMENSIONS

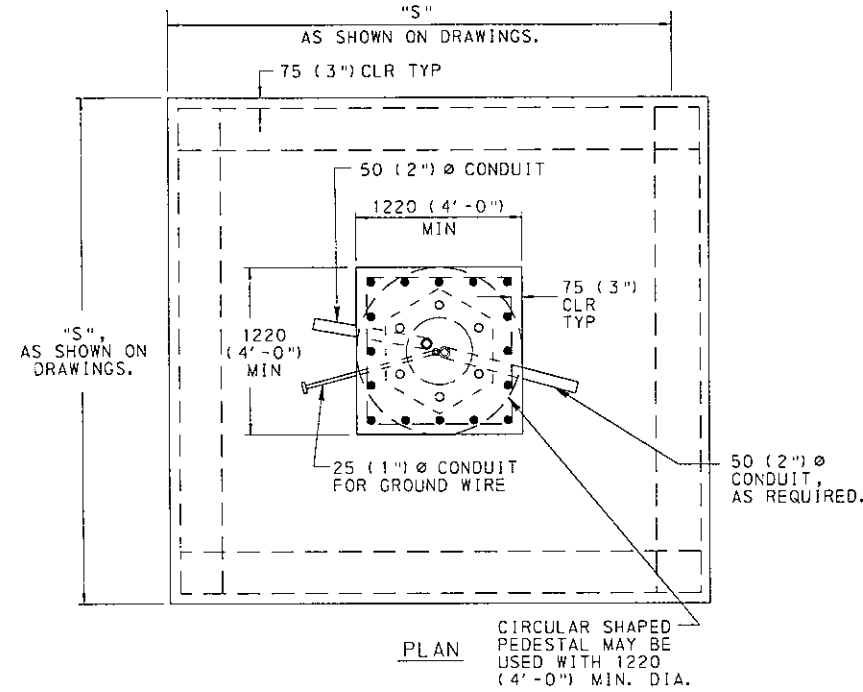
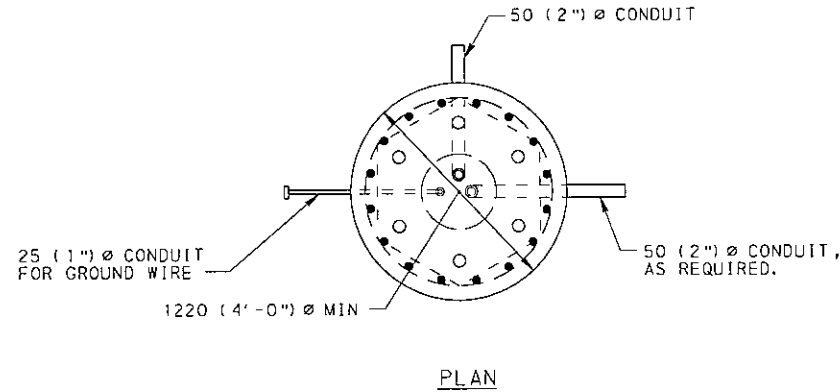
MOUNTING HEIGHT	D x D	E x E	AUGER DIAMETER	L
UP TO 9.1 m (UP TO 30')	610 x 610 (2'-0" x 2'-0")	510 x 510 (1'-8" x 1'-8")	710 (2'-4")	1800 (6'-0")
10.7 m (35')	760 x 760 (2'-6" x 2'-6")	660 x 660 (2'-2" x 2'-2")	865 (2'-10")	1800 (6'-0")
12.2 m (40')	760 x 760 (2'-6" x 2'-6")	660 x 660 (2'-2" x 2'-2")	865 (2'-10")	2000 (6'-6")
13.7 m (45')	760 x 760 (2'-6" x 2'-6")	660 x 660 (2'-2" x 2'-2")	865 (2'-10")	2100 (7'-0")
15.2 m (50')	760 x 760 (2'-6" x 2'-6")	660 x 660 (2'-2" x 2'-2")	865 (2'-10")	2300 (7'-6")

NOTE: PROVIDE MODIFIED FOUNDATION ON SLOPES GREATER THAN 1:6 (6:1) WHERE TYPE 'S' POLE BASE IS REQUIRED. MAX. SLOPE 1:3 (3:1)

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

HIGHWAY LIGHTING FOUNDATIONS
 CONVENTIONAL LIGHTING POLE



- NOTES**
1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 910 AND 1101.
 2. PROVIDE A 750 (30") LENGTH OF 21.15 mm² (#4) GROUND WIRE COILED ABOVE FOUNDATION. EXTEND WIRE THROUGH THE 25 (1") Ø CONDUIT IN THE CENTER OF THE FOUNDATION.
 3. THE SIZE OF PEDESTAL OR DRILLED CAISSON SHOWN ACCOMMODATES THE PREASSEMBLED ANCHOR BOLT ASSEMBLY SUPPLIED BY THE MANUFACTURER FOR BOLT CIRCLE DIAMETERS 865 (34") OR LESS. FOR BOLT CIRCLE DIAMETERS GREATER THAN 865 (34"), MODIFY PEDESTAL OR DRILLED CAISSONS ACCORDINGLY.
 4. FOR REINFORCEMENT BAR FABRICATION DETAILS, SEE BRIDGE CONSTRUCTION STANDARD DRAWING, BC-736M. DEVELOPMENT AND LAP SPLICE LENGTHS ARE AS PER AASHTO ONLY.
 5. SEAL WITH GALVANIZED SCREEN, 6 (1/4") TO 10 (3/8") OPENING, TO PREVENT ENTRY OF RODENTS. SCREEN IS TO BE REMOVABLE AND ATTACHED TO BASE PLATE WITH SS HARDWARE. SCREEN IS TO BE OF SUFFICIENT STIFFNESS TO PREVENT ENTRY BETWEEN SCREEN AND FOUNDATION WHILE PERMITTING DRAINAGE.
 6. VERIFY THE GROUND ELEVATION AT THE FOUNDATION LOCATION FOR ALL HIGH MAST POLE FOUNDATIONS. NOTIFY THE DEPARTMENT OF ANY DISCREPANCY OF MORE THAN 1.5 m (5'-0") BEFORE PROCEEDING WITH CONSTRUCTION. THE POLE LENGTH MAY BE AFFECTED.

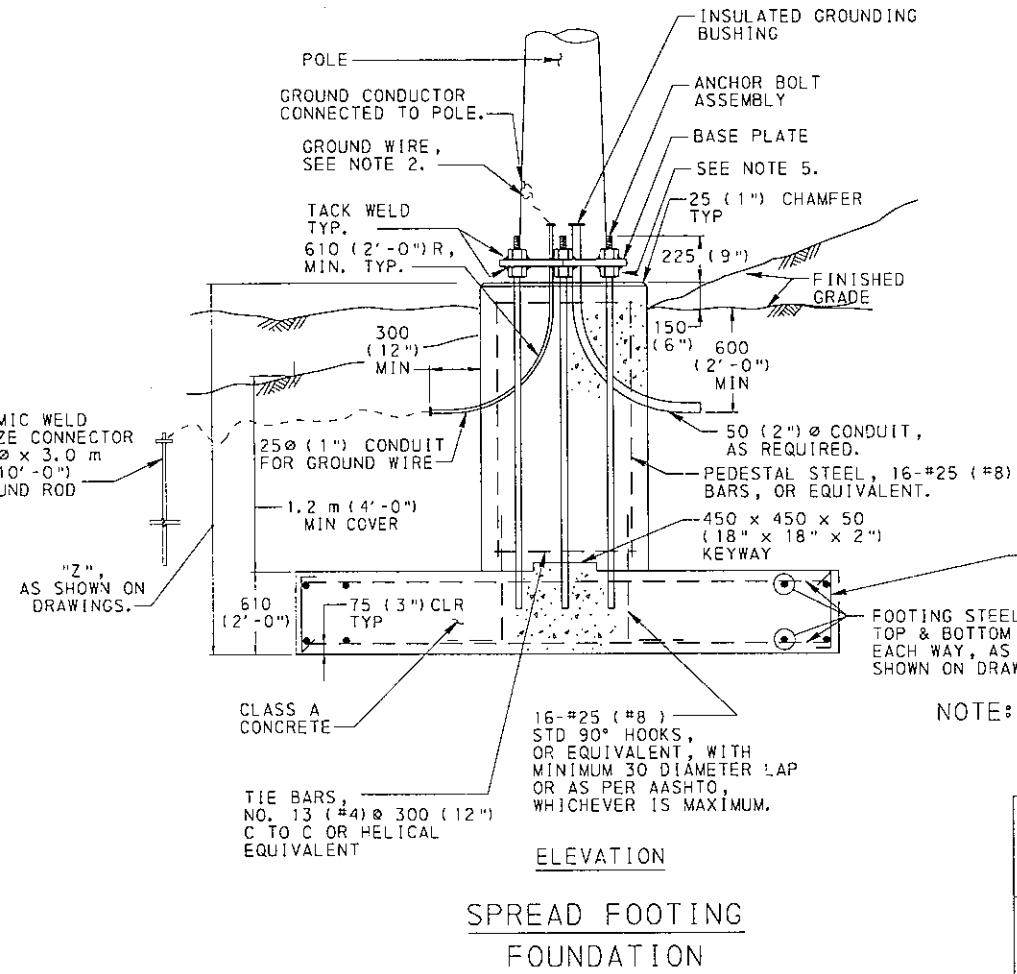
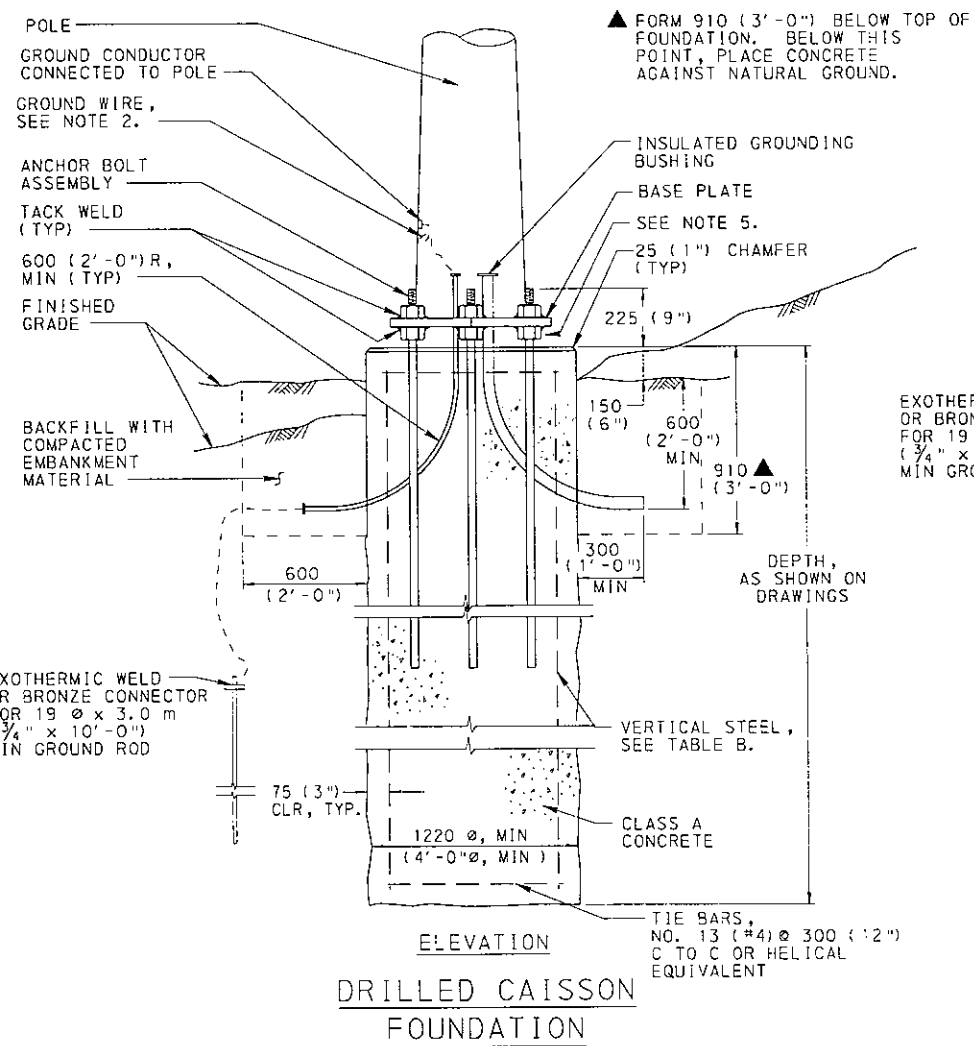


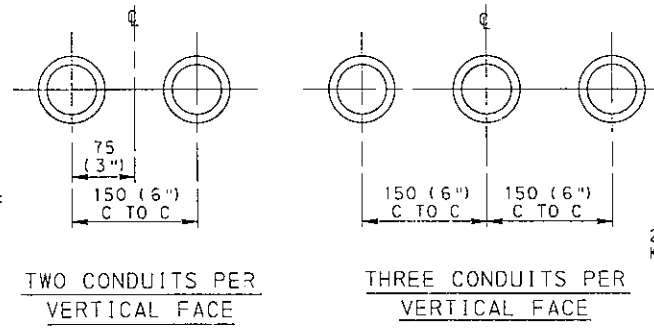
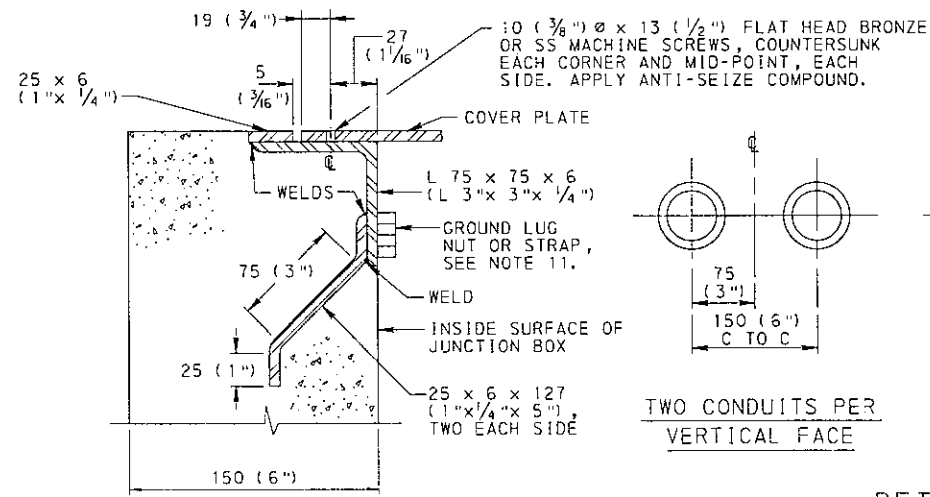
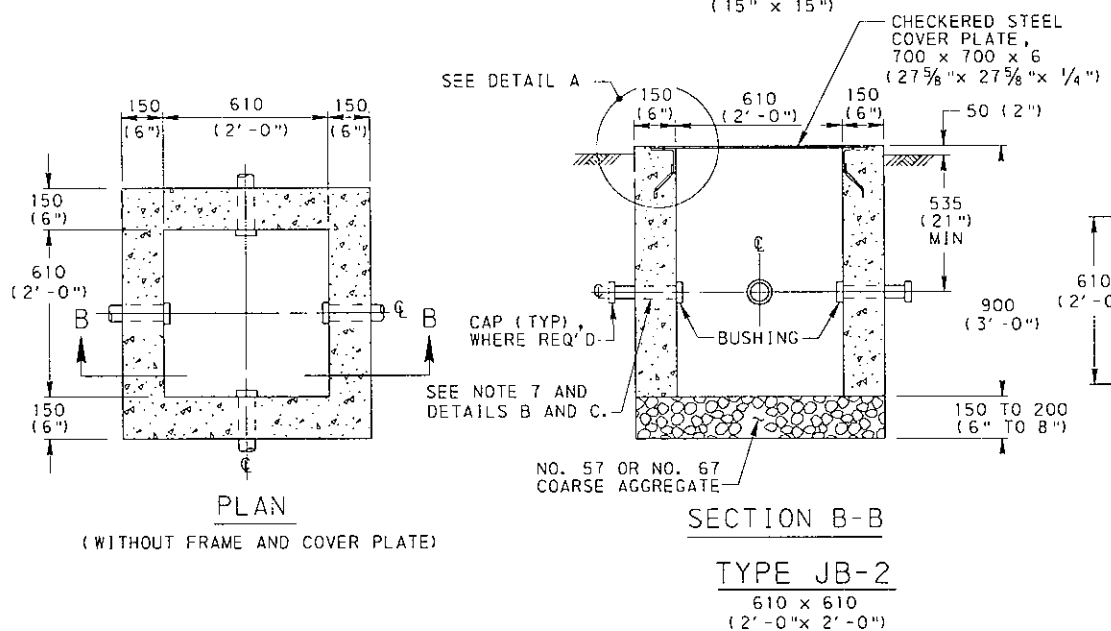
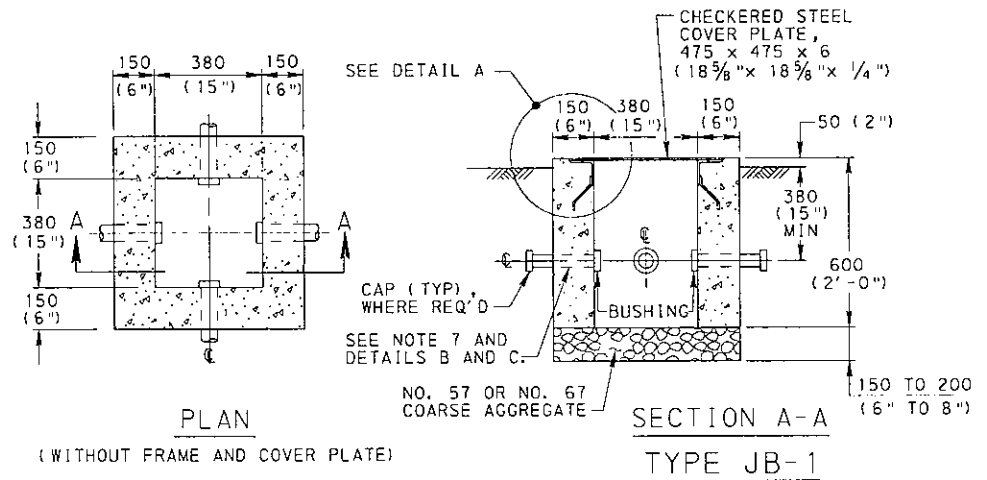
TABLE B

POLE HEIGHTS	VERTICAL STEEL
18.3 m (60'-0")	16-#29 (#9)
21.3 m (70'-0")	16-#29 (#9)
24.4 m (80'-0")	16-#29 (#9)
27.4 m (90'-0")	16-#29 (#9)
30.5 m (100'-0")	16-#29 (#9)
33.5 m (110'-0")	16-#29 (#9)
36.6 m (120'-0")	16-#36 (#11)

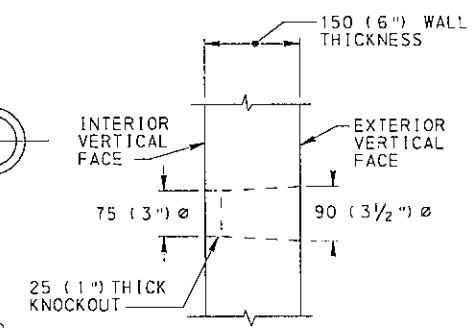
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

HIGHWAY LIGHTING
FOUNDATIONS
HIGH MAST LIGHTING POLE



DETAIL B
MULTIPLE CONDUITS IN PLACE
(CAST-IN-PLACE OR PRECAST UNITS)



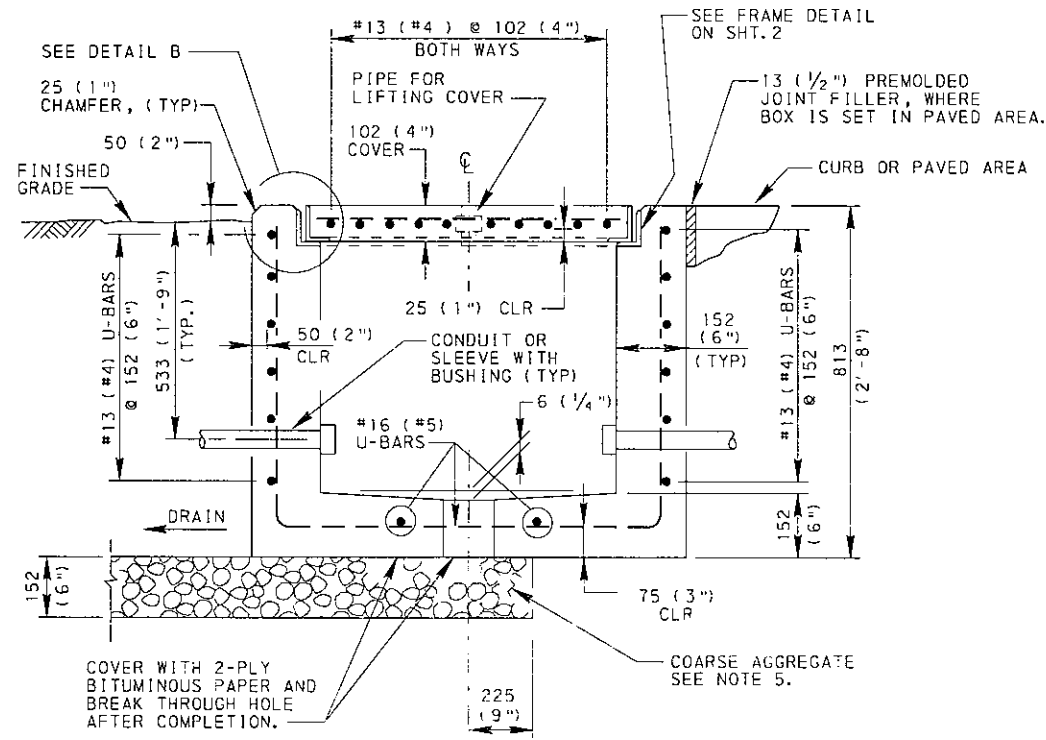
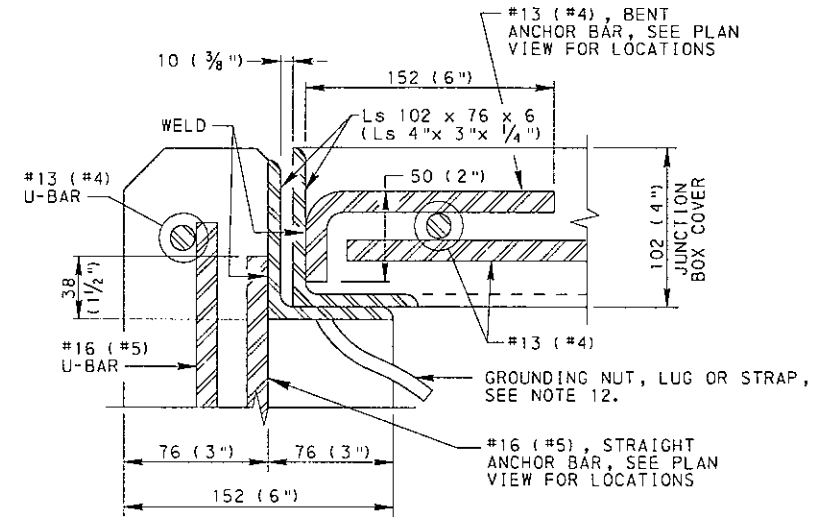
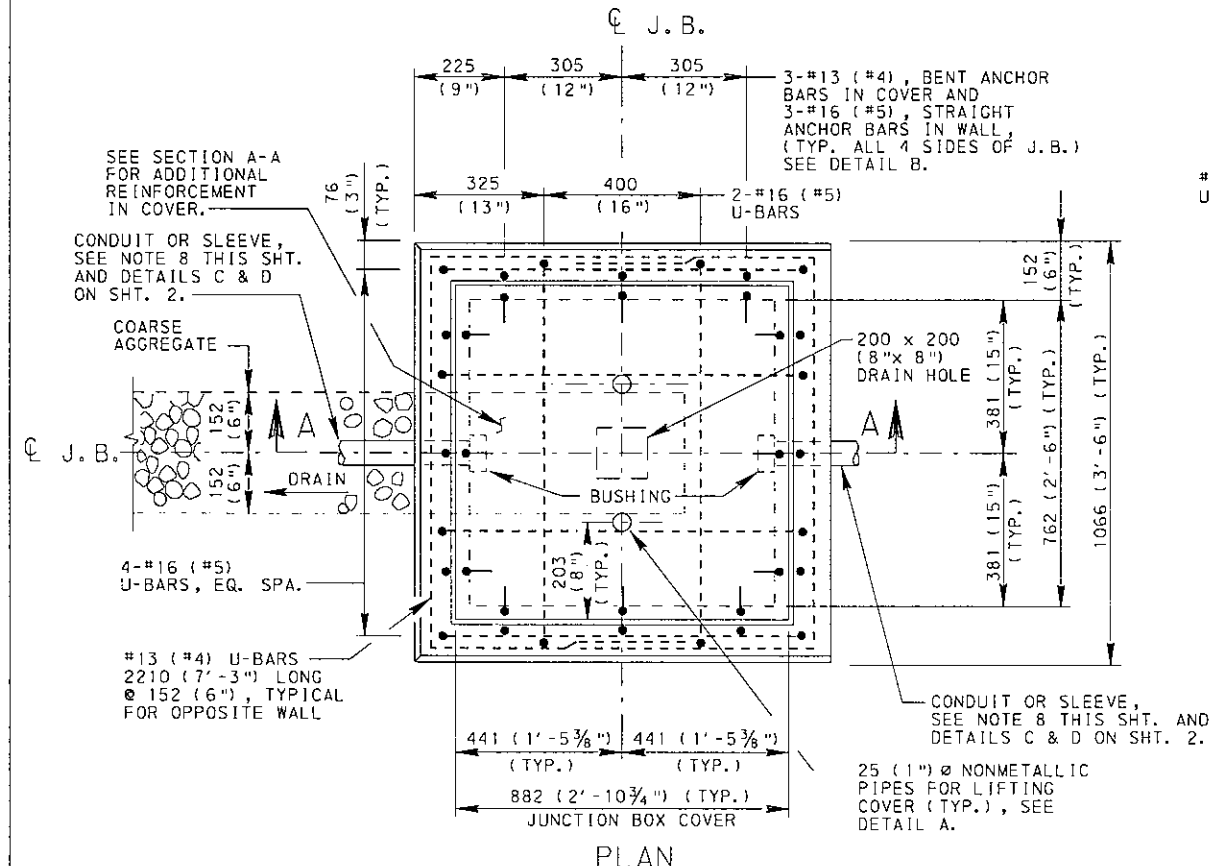
NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTION 910, AND 1101.
2. USE JB-1 AND JB-2 JUNCTION BOXES IN LOCATIONS SUBJECT TO LOADS NO HEAVIER THAN PEDESTRIAN TRAFFIC. USE JB-11 AND JB-12 JUNCTION BOXES IN OTHER LOCATIONS AS SHOWN ON RC-82M.
3. PROVIDE PRECAST CONCRETE JUNCTION BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATION OR MODIFICATION OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
4. PROTECTIVE COATING - STEEL FRAME AND STEEL COVER PLATE. HOT DIP GALVANIZE IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.02(s).
5. FOR THE LOCATION, SIZE AND NUMBER OF CONDUITS REQUIRED FOR EACH JUNCTION BOX, SEE THE LIGHTING PLANS.
6. IN SIDEWALK AREAS, CONSTRUCT TOP OF JUNCTION BOX TO CONFORM TO SIDEWALK SLOPE. WHEN INSTALLED IN THE RECOVERY AREA, PROVIDE A MAXIMUM OF 100 (4") TO THE TOP OF THE JUNCTION BOX, MEASURED FROM AN IMAGINARY 1.5 m (5'-0") CHORD ALIGNED RADIALLY (PERPENDICULAR) TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE CHORD EXTENDING TO THE GROUND SURFACE ON BOTH SIDES OF THE JUNCTION BOX.
7. THE CONDUIT LOCATIONS SHOWN REPRESENT NORMAL POSITIONS. FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION, WHEN TWO OR THREE CONDUITS ARE INDICATED ON THE SAME VERTICAL FACE, SPACE CONDUITS AT 150 (6") C TO C AND SYMMETRICAL ABOUT THE CENTERLINE OF THE BOX, AS INDICATED IN DETAIL B, WITH FULL WALL THICKNESS BETWEEN OPENINGS. PROVIDE KNOCKOUTS FOR PRECAST UNITS AS INDICATED IN DETAIL C AND LOCATE AS INDICATED IN DETAIL B. GROUT THE CONDUIT OR SLEEVE IN ACCORDANCE WITH PUBLICATION 408, SECTION 910.3(p).
8. PROVIDE POSITIVE DRAINAGE 38 - 50 (1 1/2" - 2") NONMETALLIC CONDUIT FOR JUNCTION BOXES WHEN FEASIBLE. PROVIDE RODENT PROOF DRAIN. SEE NOTE 5, RC-82M.
9. PROVIDE STRUCTURAL STEEL CONFORMING TO ASTM - A36M/A36M.
10. PROVIDE AS A MINIMUM :
CLASS A CONCRETE FOR CAST-IN-PLACE BOXES AND CLASS AA CONCRETE FOR PRECAST BOXES.
11. GROUND EXPOSED METAL PARTS OF JUNCTION BOXES. DO NOT CONNECT GROUND WIRE DIRECTLY TO LID.
13. 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

HIGHWAY LIGHTING
JUNCTION BOXES-LIGHT DUTY
CAST-IN-PLACE OR PRECAST



SECTION A-A
JUNCTION BOX JB-11

NOTES

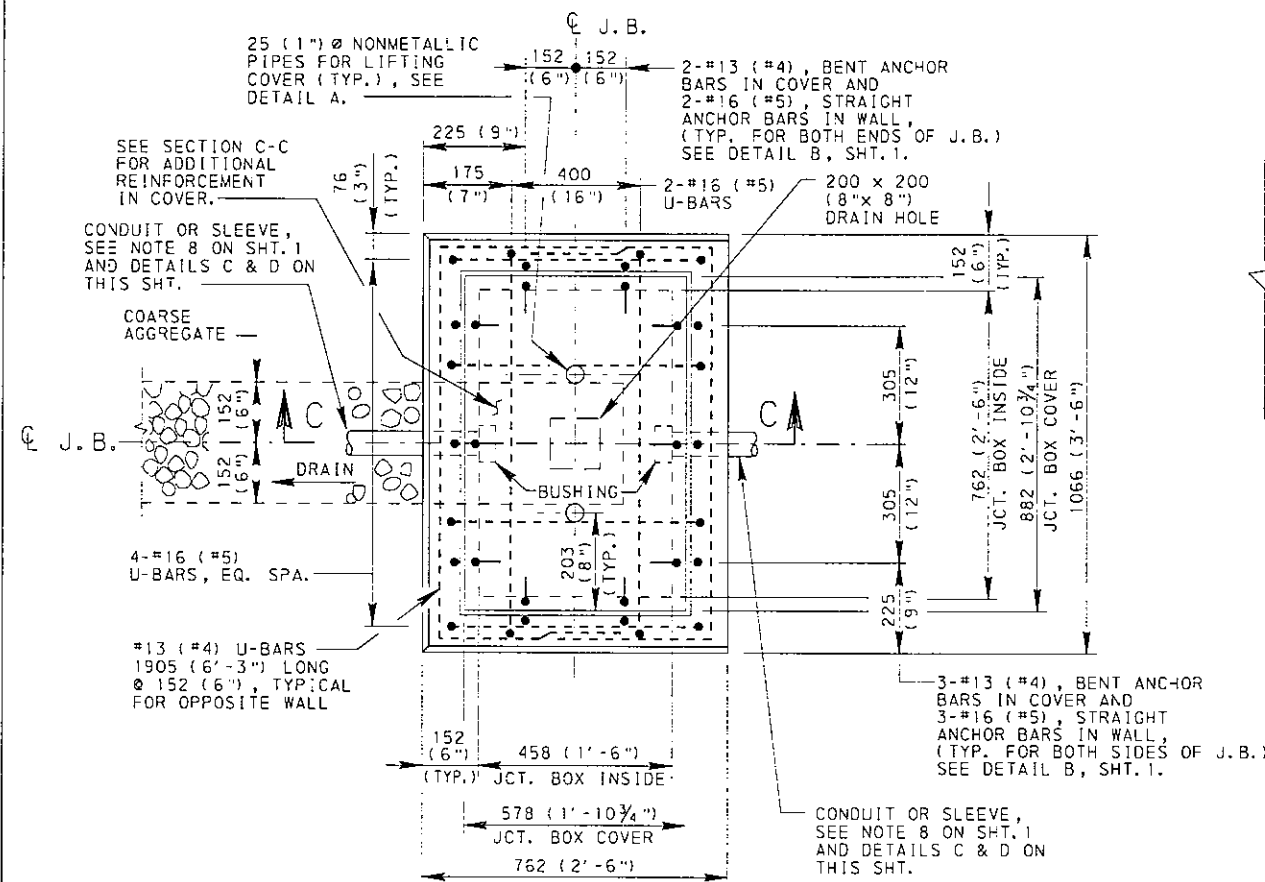
1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 910 AND 1101.
2. USE JB-11 AND JB-12 JUNCTION IN SHOULDERS OR OTHER LOCATIONS SUBJECT TO VEHICULAR LOADS. USE JB-1 AND JB-2 JUNCTION BOXES IN LOCATIONS WITH PEDESTRIAN TYPE LOADINGS. SEE DETAILS ON RC-81M.
3. PROVIDE PRECAST CONCRETE JUNCTION BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATION OR MODIFICATION OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
4. PROTECTIVE COATING - STEEL FRAME. HOT DIP GALVANIZE IN ACCORDANCE WITH PUBLICATION 408, SECTION 1105.02(s).
5. PROVIDE 0.06 m³ (2 FT.³) OF NO. 57 OR NO. 67 COARSE AGGREGATE.
6. FOR THE LOCATION, SIZE AND NUMBER OF CONDUITS REQUIRED FOR EACH JUNCTION BOX, SEE THE LIGHTING PLANS.
7. IN SIDEWALK AREAS, CONSTRUCT TOP OF JUNCTION BOX TO CONFORM TO SIDEWALK SLOPE. WHEN INSTALLED IN THE RECOVERY AREA, PROVIDE A MAXIMUM OF 100 (4") TO THE TOP OF THE JUNCTION BOX, MEASURED FROM AN IMAGINARY 1.5 M (5'-0") CHORD ALIGNED RADially, PERPENDICULAR, TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE CHORD EXTENDING TO THE GROUND SURFACE ON BOTH SIDES OF THE JUNCTION BOX.
8. THE CONDUIT LOCATIONS SHOWN REPRESENT NORMAL POSITIONS. FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION, WHEN TWO OR THREE CONDUITS ARE INDICATED ON THE SAME VERTICAL FACE, SPACE CONDUITS AT 150 C TO C AND SYMMETRICAL ABOUT THE CENTERLINE OF THE BOX, AS INDICATED IN DETAIL C, WITH FULL WALL THICKNESS BETWEEN OPENINGS. PROVIDE KNOCKOUTS FOR PRECAST UNITS AS INDICATED IN DETAIL D AND LOCATE AS INDICATED IN DETAIL C. GROUT THE CONDUIT OR SLEEVE IN ACCORDANCE WITH PUBLICATION 408, SECTION 910.3(p).
9. PROVIDE POSITIVE DRAINAGE, 38-50 (1 1/2"-2") NONMETALLIC CONDUIT, FOR JUNCTION BOXES WHEN FEASIBLE. PROVIDE RODENT PROOF DRAIN.
10. PROVIDE STRUCTURAL STEEL CONFORMING TO ASTM-A36/A36M. PROVIDE ALUMINUM CONFORMING TO ASTM-B221 ALLOY 6061 - T6.
11. PROVIDE AS A MINIMUM :
CLASS A CONCRETE FOR CAST-IN-PLACE BOXES AND CLASS AA CONCRETE FOR PRECAST BOXES.
12. GROUND EXPOSED METAL PARTS OF JUNCTION BOXES. DO NOT CONNECT GROUND WIRE DIRECTLY TO LID.
13. ALL REINFORCEMENT STEEL BARS SHOWN TO MEET ASTM A 615M, A 616M AND A 706M.
14. 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.

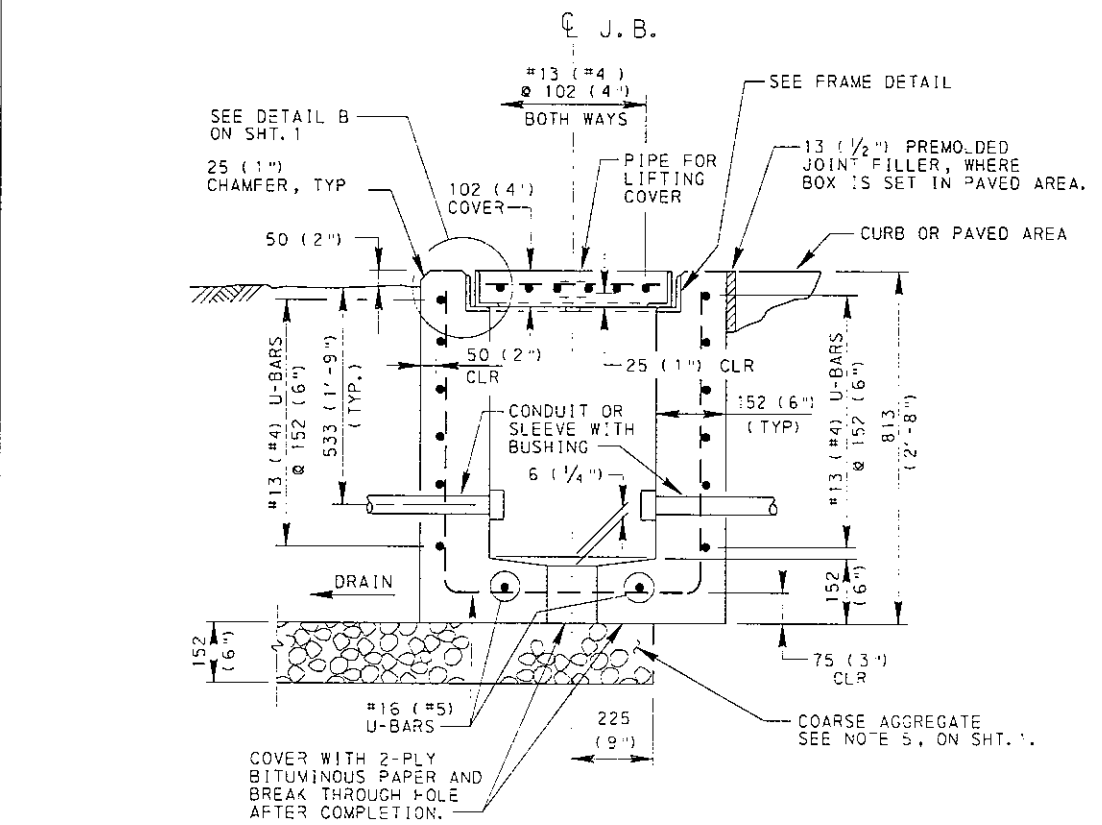
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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HIGHWAY LIGHTING
JUNCTION BOXES-HEAVY DUTY
CAST-IN-PLACE OR PRECAST

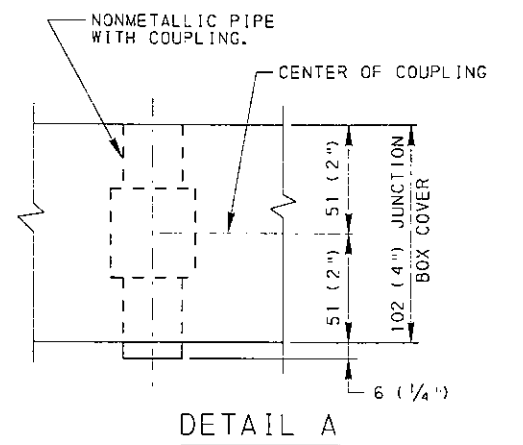
RECOMMENDED APR. 15, 2004 <i>Dean A. Schank</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. J. Patel</i> CHIEF ENGINEER	SHT 1 OF 2 RC-82M
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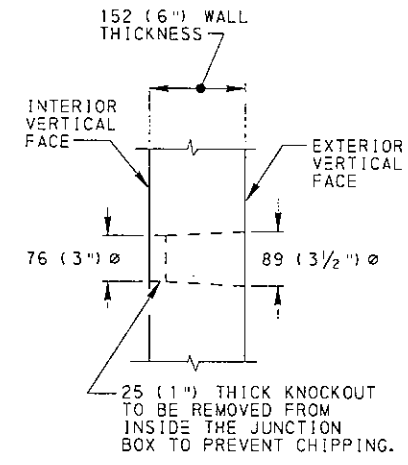
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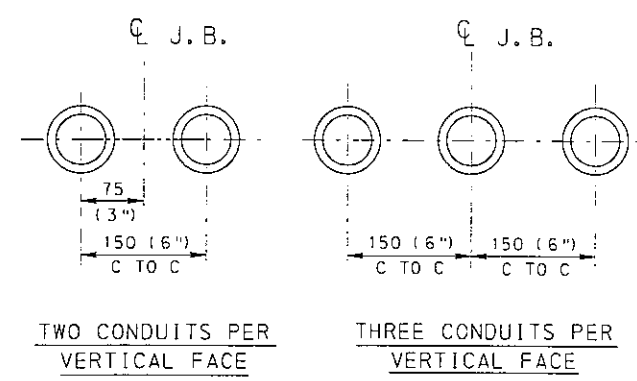
SECTION C-C
JUNCTION BOX JB-12



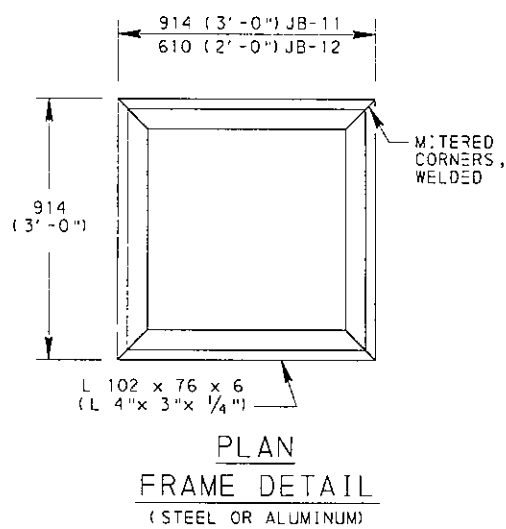
DETAIL A



DETAIL D
TYPICAL KNOCKOUT
(PRECAST UNITS ONLY)



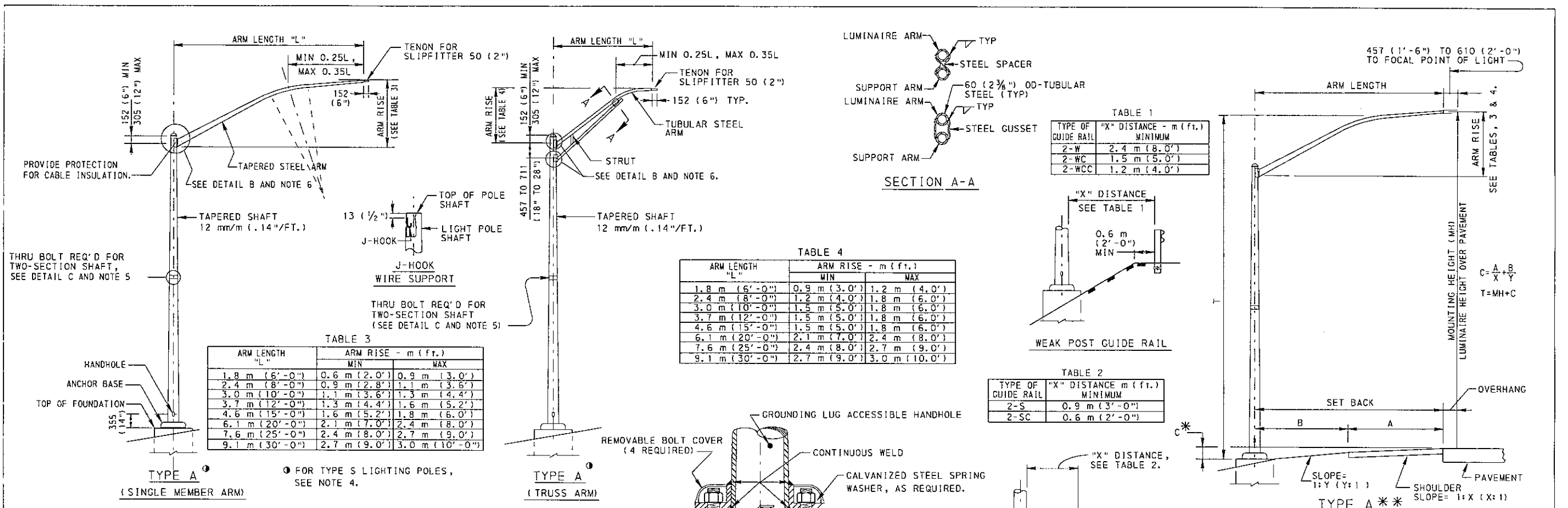
DETAIL C
MULTIPLE CONDUITS IN PLACE
CAST-IN-PLACE OR PRECAST UNITS



PLAN
FRAME DETAIL
(STEEL OR ALUMINUM)

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

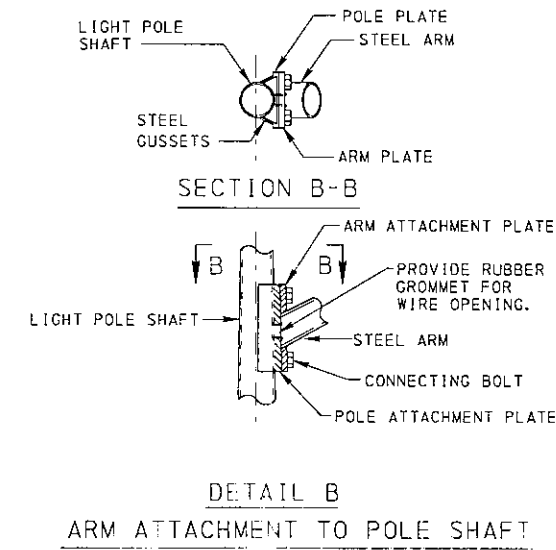
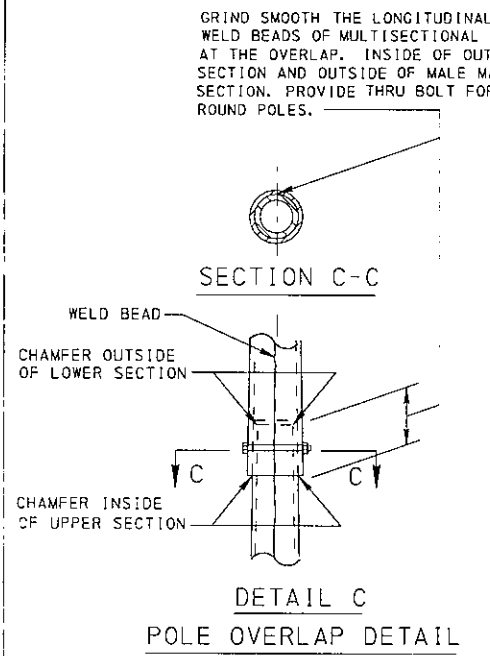
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN		
HIGHWAY LIGHTING JUNCTION BOXES-HEAVY DUTY CAST-IN-PLACE OR PRECAST		
RECOMMENDED APR. 15, 2004 DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 CHIEF ENGINEER	SHT 2 OF 2 RC-82M



ROUND STEEL POLES

POLE MOUNTING DETAILS

GUIDE RAIL CLEARANCES



- NOTES**
1. PROVIDE MATERIALS, CONSTRUCTION AND MANUFACTURER'S CERTIFICATION OF COMPLIANCE WITH LOAD TESTS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 910 AND 1101.
 2. SEE RC-80M FOR POLE FOUNDATION DETAILS.
 3. PROVIDE IDENTIFICATION & DATE TAGS, AS SHOWN ON SHEET 2, FOR ALL POLES. DESIGNATE ID AS ON PROJECT PLANS.
 4. PROVIDE FHWA CERTIFIED BREAKAWAY BASES FOR TYPE S POLES MEETING THE LATEST AASHTO REQUIREMENTS FOR BREAKAWAY SUPPORTS. MOUNT TYPE S POLES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. PLACE WASHERS, FLAT OR SPRING TYPE, WHEN REQUIRED, AS RECOMMENDED, AND THREADED PARTS, TORQUED AS SPECIFIED.
 5. CONSTRUCT POLE SHAFTS 9.1 m (30'-0") OR LESS IN LENGTH OF ONE PIECE. POLE SHAFTS OVER 9.1 m (30'-0") IN LENGTH MAY BE TWO SECTIONS. MINIMUM SECTION LENGTH FOR TWO SECTION POLE SHAFT IS 4.6 m (15'-0").
 6. PROVIDE POLE ARM ATTACHMENT TO POLE SHAFT AS SHOWN IN DETAIL "B", WITH TWO, THREE OR FOUR ATTACHMENT BOLTS, AS REQUIRED FOR DIFFERENT ARM LENGTHS.
 7. USE GALVANIZED OR STAINLESS STEEL FLAT WASHERS TO PROVIDE A 3 (1/8") TO 6 (1/4") DRAINAGE GAP ABOVE CONVENTIONAL POLE FOUNDATIONS. THIS ELIMINATES THE NEED FOR DRAIN GROOVES, DRAIN PIPES AND CAULKING. USE SHIMS AS REQUIRED.
 8. FURNISH CONVENTIONAL STEEL LIGHTING POLES WITH SINGLE MEMBER BRACKET TYPE ARMS UNLESS OTHERWISE INDICATED OR SPECIFIED ON THE PLANS OR SPECIAL PROVISIONS.
 9. THE MOUNTING HEIGHT IS DEFINED AS THE HEIGHT OF THE LUMINAIRE ABOVE THE ROADWAY AND IS TO BE WITHIN 0.3 m (1'-0") OF THE MOUNTING HEIGHT SPECIFIED.
 10. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.
 11. PROVIDE ALUMINUM POLES WITH TRUSS ARMS MEETING THE GENERAL SILHOUETTE REQUIREMENTS OF STEEL POLES.

TERMINOLOGY

* C-DIMENSIONS, APPLICABLE TO CONVENTIONAL LIGHTING POLES, ARE FOR ESTIMATING PURPOSES ONLY AND SHOULD NOT BE USED FOR DETERMINING LIGHTING POLE DIMENSIONS WITHOUT VERIFICATION. THE CONTRACTOR IS RESPONSIBLE FOR FURNISHING LIGHTING POLES OF PROPER DIMENSIONS TO PROVIDE THE MOUNTING HEIGHT SPECIFIED. THE C-DIMENSIONS ARE BASED ON INFORMATION FROM CROSS SECTION PLANS. CHANGES OF ROADSIDE FIELD CONDITIONS MAY AFFECT THE C-DIMENSION. NEGATIVE C-DIMENSION MEANS ELEVATION OF TOP OF FOUNDATION IS HIGHER THAN ELEVATION OF EDGE OF PAVEMENT.

** FOR TYPE S LIGHTING POLES, TAKE INTO CONSIDERATION THE BREAKAWAY DEVICE HEIGHT.

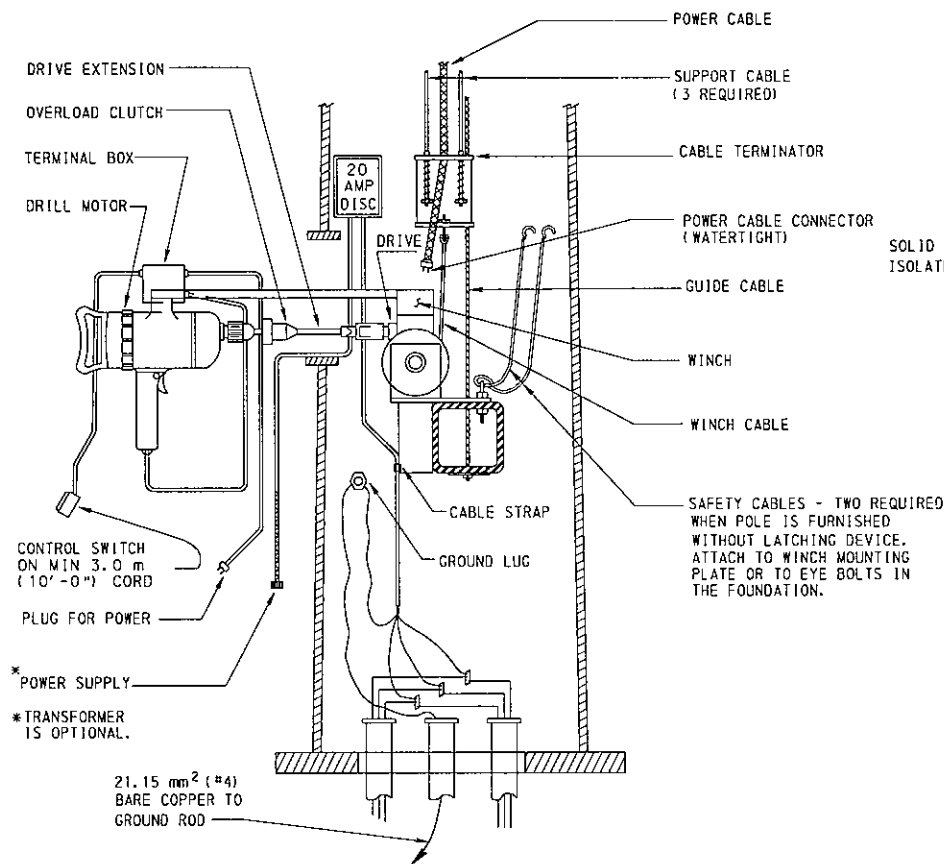
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HIGHWAY LIGHTING
CONVENTIONAL LIGHTING
POLE DETAILS

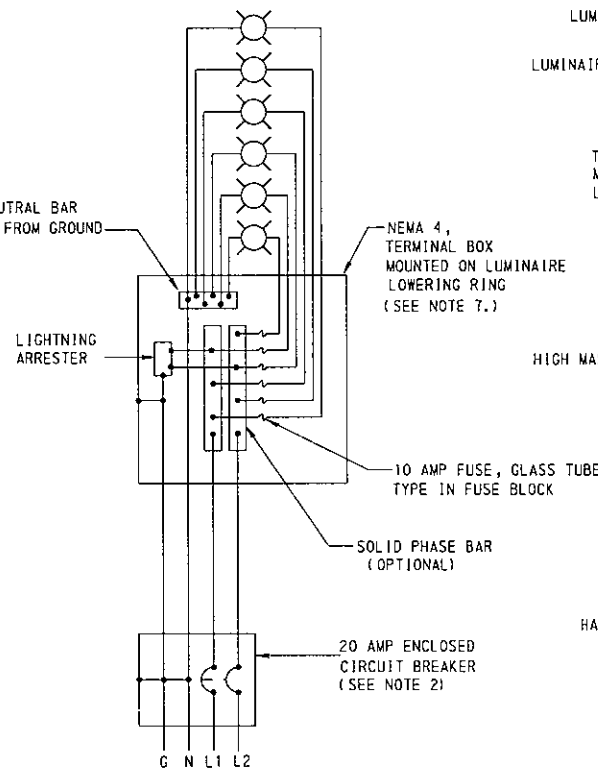
RECOMMENDED APR. 15, 2004
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED APR. 15, 2004
CHIEF ENGINEER

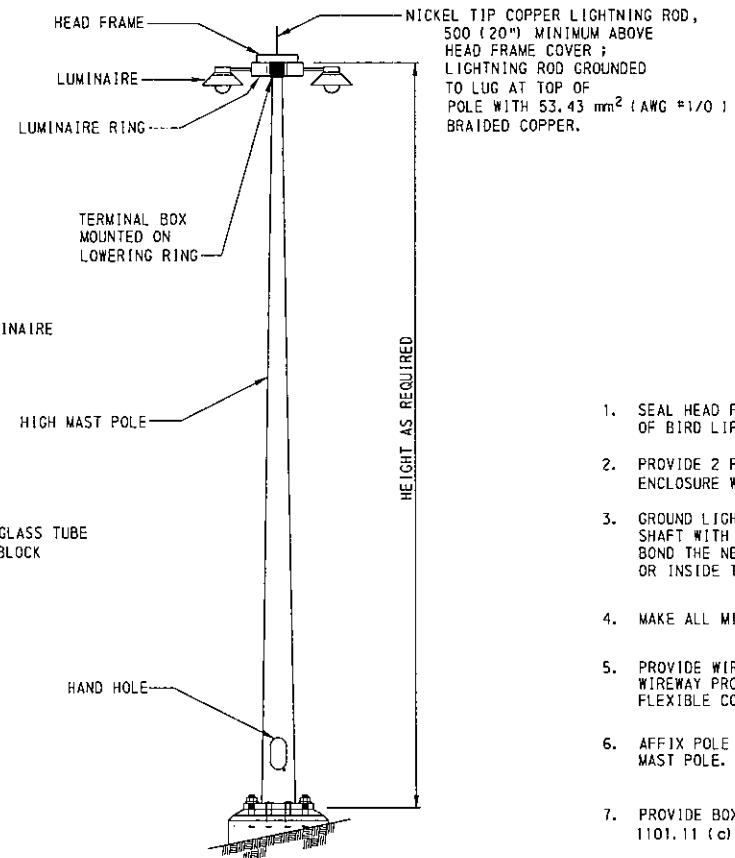
SHT 1 OF 2
RC-83M



TYPICAL LOWER SECTION MECHANISM



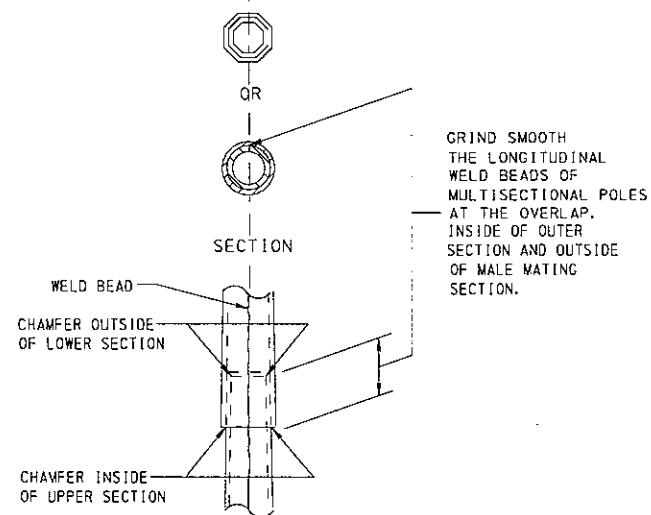
TYPICAL CIRCUIT SCHEMATIC



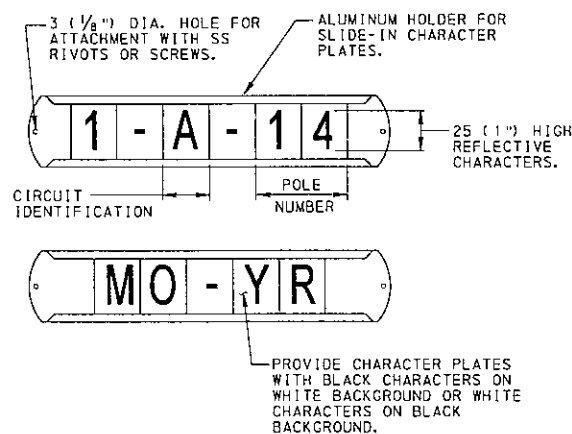
TYPICAL HIGH MAST POLE

NOTES

1. SEAL HEAD FRAME AND LUMINAIRE ASSEMBLIES TO PREVENT INTRUSION OF BIRD LIFE.
2. PROVIDE 2 POLE, CIRCUIT BREAKER DISCONNECT, IN NEMA 1 ENCLOSURE WITH EXTERNAL OPERATION.
3. GROUND LIGHTNING ROD GROUNDING CONDUCTOR DIRECTLY ON THE POLE SHAFT WITH LUGS PROVIDED BY THE MANUFACTURER OF LIGHTNING ROD. BOND THE NEUTRAL WIRE TO THE GROUND EITHER AT THE GROUND LUG OR INSIDE THE ENCLOSURE AT THE POLE BASE.
4. MAKE ALL MISCELLANEOUS HARDWARE STAINLESS STEEL.
5. PROVIDE WIRING, FROM TERMINAL BOX TO LUMINAIRE, IN WIREWAY PROVIDED IN LUMINAIRE RING OR IN SEALTITE FLEXIBLE CONDUIT.
6. AFFIX POLE IDENTIFICATION & DATE TAG TO EACH HIGH MAST POLE.
7. PROVIDE BOXES AS PER PUBLICATION 408/2000, SECTION 1101.11 (c). PADLOCKS ARE NOT REQUIRED FOR THE BOXES.



POLE OVERLAP DETAIL



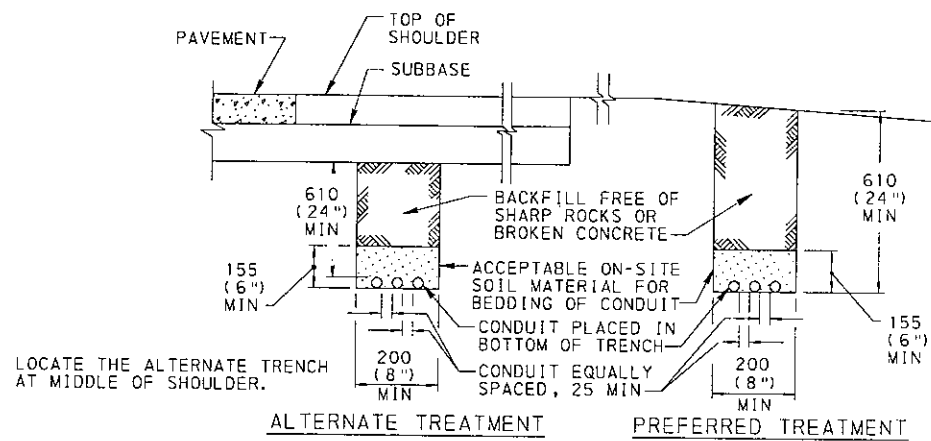
POLE IDENTIFICATION AND DATE TAG DETAIL
FOR CONVENTIONAL AND HIGH MAST POLES

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

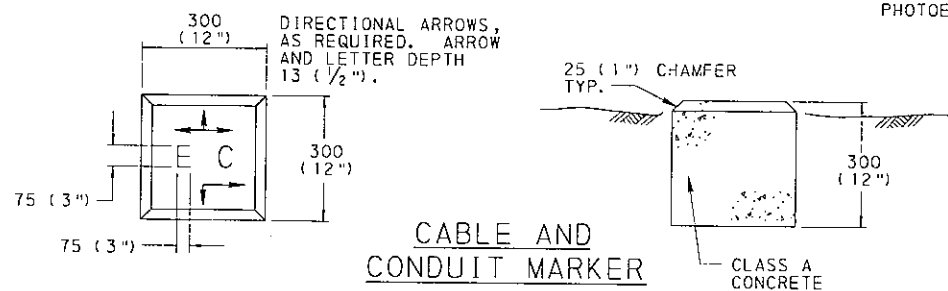
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HIGHWAY LIGHTING
HIGH MAST LIGHTING
POLE DETAILS

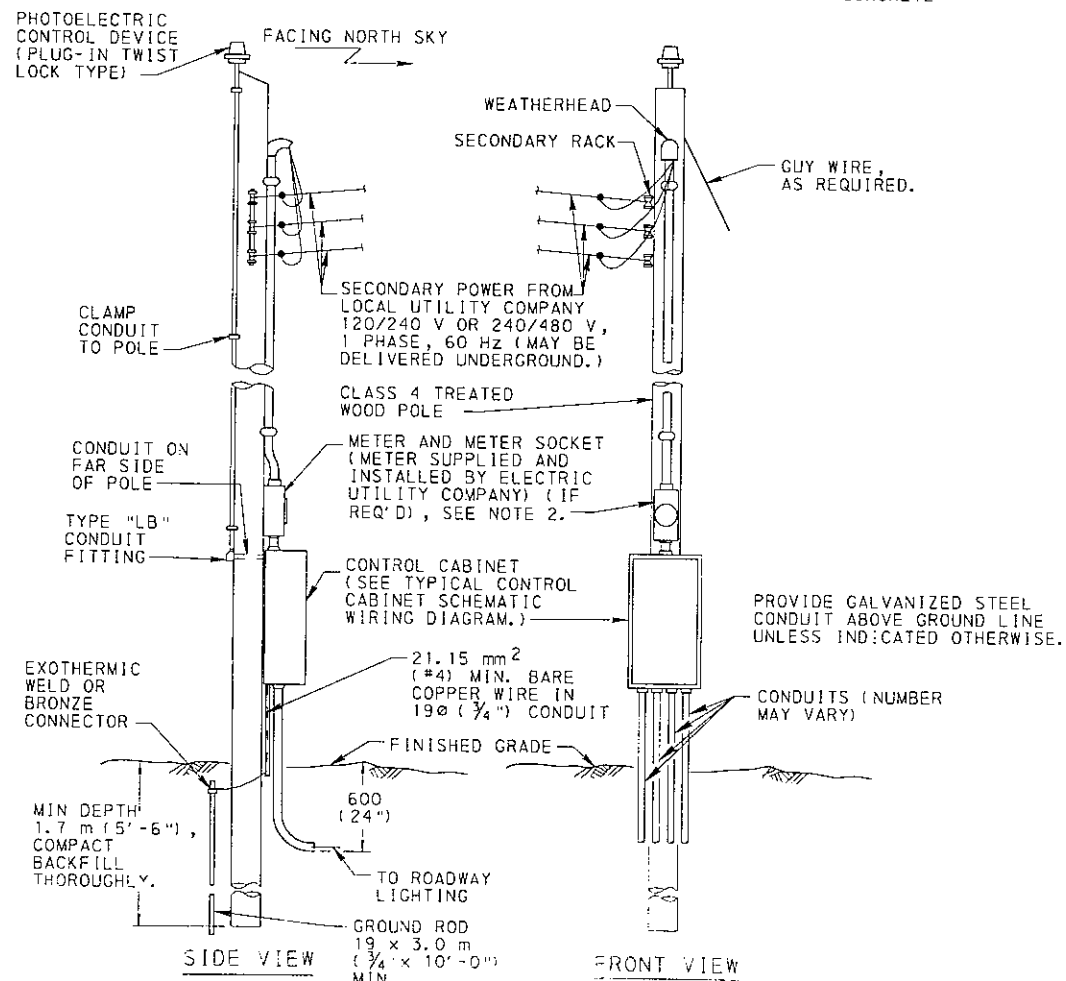
RECOMMENDED APR. 15, 2004 <i>Dean A. Schaub</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 15, 2004 <i>M. Patel</i> CHIEF ENGINEER	SHT 2 OF 2 RC-83M
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DIRECT-BURIED CABLE AND CONDUIT



CABLE AND CONDUIT MARKER



TYPICAL TERMINAL POLE EQUIPMENT ARRANGEMENT FOR POWER SUPPLY

ITEMS

- N - NEUTRAL
- L₁ - LINE 1
- L₂ - LINE 2
- M - MANUAL
- A - AUTOMATIC
- ① - MAIN CIRCUIT BREAKER
- ② - CONTROL CONTACTOR
- ③ - PHOTOELECTRIC CELL (PLUG-IN TYPE)
- ④ - SELECTOR SWITCH
- ⑤ - DISTRIBUTION BREAKERS (10 000 AIC)
- ⑥ - CONTROL CABINET
- ⑦ - 15 A, SP BREAKER
- ⑧ - LIGHTNING ARRESTER
- SP - SINGLE POLE
- DP - DOUBLE POLE

ITEMS ②, ③ AND ④ ARE NOT REQUIRED IF EACH LUMINAIRE HAS A PHOTOELECTRIC CONTROL ELEMENT.

NOTES FOR DIRECT-BURIED CABLE AND CONDUIT

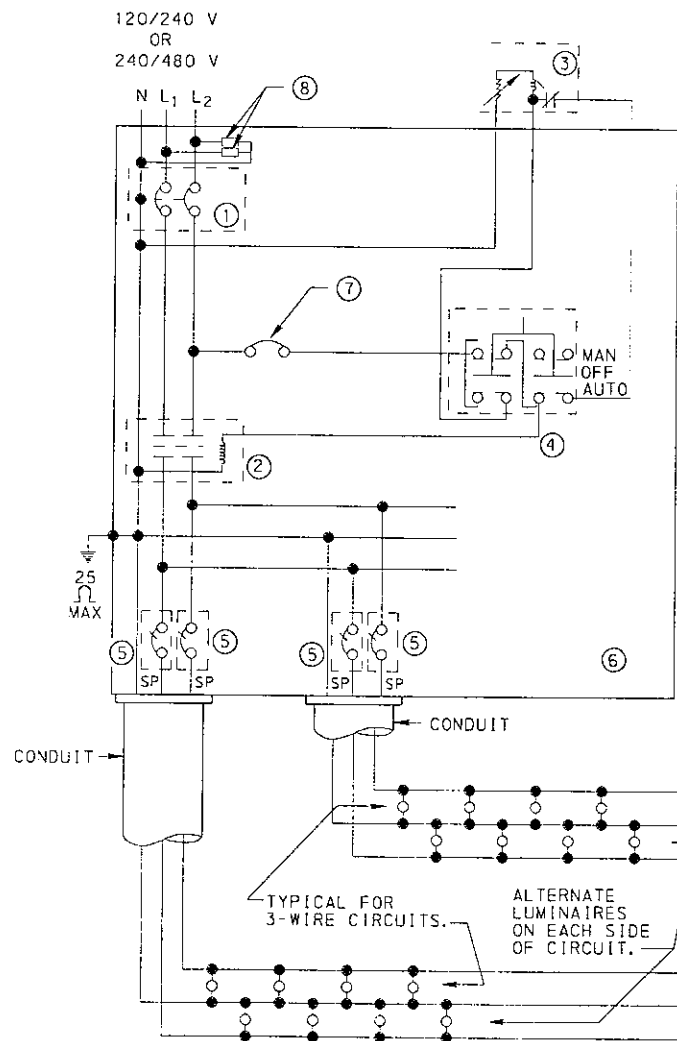
TRENCH ALONG THE GENERAL LINE SHOWN ON THE PLANS.
DO NOT TRENCH IN GUIDE RAIL LINE.

LOCATE DIRECT-BURIAL CONDUIT WITH TEMPORARY PLASTIC MARKERS OR OTHER APPROVED METHODS WHERE THERE IS A POSSIBILITY OF DISTURBANCE BY GUIDE RAIL ERECTION OR SIMILAR CONSTRUCTION. VERIFY GUIDE RAIL LOCATIONS SHOWN ON THE LIGHTING PLANS.

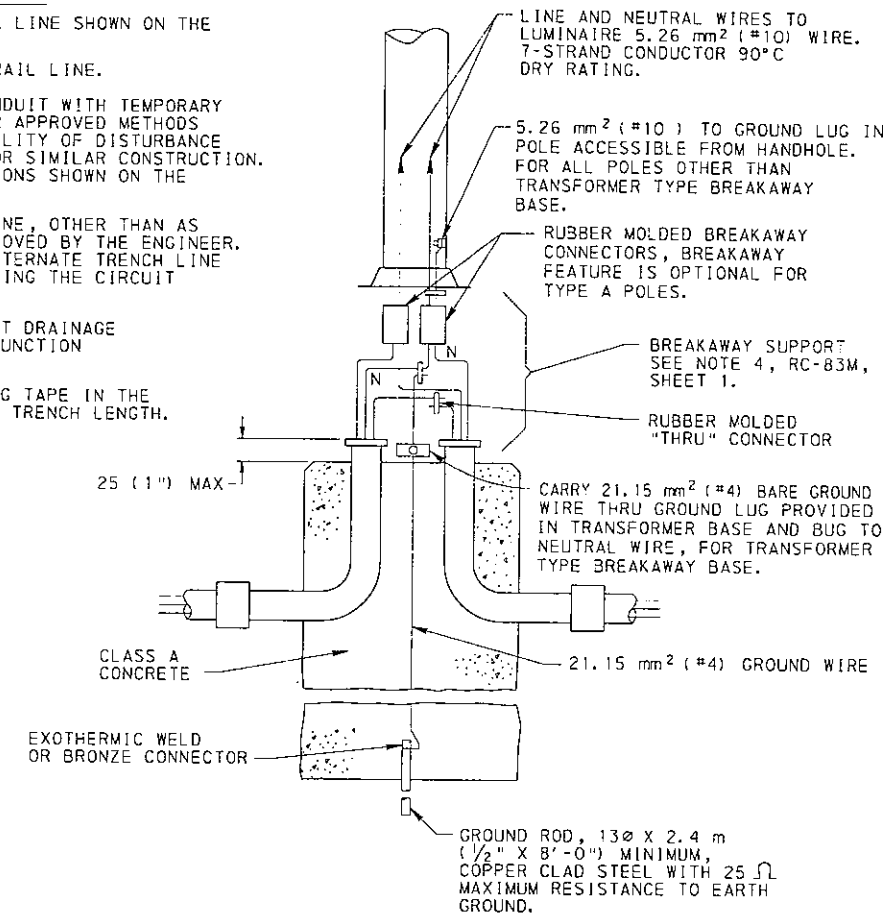
HAVE ALTERNATE TRENCH LINE, OTHER THAN AS SHOWN ON THE PLANS, APPROVED BY THE ENGINEER. IN NO CASE APPROVE AN ALTERNATE TRENCH LINE WHICH RESULTS IN INCREASING THE CIRCUIT LENGTH MORE THAN 5%.

INSTALL CONDUIT TO PERMIT DRAINAGE TOWARDS NEAREST EARTH JUNCTION BOX AS APPLICABLE.

PROVIDE PERMANENT MARKING TAPE IN THE LAST LIFT FOR THE ENTIRE TRENCH LENGTH.



TYPICAL CONTROL CABINET SCHEMATIC WIRING DIAGRAM



WIRING DETAIL

NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTIONS 910 AND 1101.
2. PROVIDE METERED ELECTRIC SERVICE EXCEPT WHERE DEPARTMENT APPROVED SPECIAL UNMETERED ENERGY ONLY RATE IS AVAILABLE.
3. MAKE SPLICES WITH PRE-MOLDED, DISCONNECTABLE CONNECTOR KITS. PROVIDE SPLICES WITH FUSES FOR TAPS TO LUMINAIRES FOR CONVENTIONAL LIGHTING. CONNECT THE GROUND TO THE NEUTRAL WITH A SPLIT BOLT CONNECTOR AND COAT WITH CORROSION PROHIBITOR.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.

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

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HIGHWAY LIGHTING
LIGHTING AND ELECTRICAL DETAILS

TABLE A
BRACING REQUIREMENTS

BRACING TYPE	TREE SIZE		MINIMUM POST LENGTH	STAKE BRACE TYPE	REQUIRED POST SIZES†
	DECIDUOUS	EVERGREEN			
2	----	1.2 m TO 1.8 m HT (4'-0" TO 6'-0" HT)	2.0 m (6'-6")	CHANNEL BAR	0.57 kg (1¼ LB) POST H2-1
				WOOD	50 (2") X 50 (2") FULL DIM
2	40 TO 60 CAL (1½" TO 2½" CAL)	1.8 m TO 2.4 m HT (6'-0" TO 8'-0" HT)	2.4 m (8'-0")	CHANNEL BAR	1.36 kg (3 LB) POST H2-2
				WOOD	50 (2") X 50 (2") FULL DIM
2	60 TO 90 CAL (2½" TO 3½" CAL)	----	3.4 m (11'-0")	CHANNEL BAR	1.36 kg (3 LB) POST H2-2
				WOOD	75 (3") X 75 (3") FULL DIM
2	OVER 90 CAL (OVER 3½" CAL)	----	3.8 m (12'-6")	CHANNEL BAR	1.36 kg (3 LB) POST H2-3
				WOOD	75 (3") X 75 (3") FULL DIM
3	1.5 m HT TO 40 CAL (5'-0" HT TO 1½" CAL)	----	2.4 m (8'-0")	WOOD	50 (2") X 50 (2") FULL DIM

† ROUND WOOD STAKES MAY BE SUBSTITUTED AS FOLLOWS:
50 (2") X 50 (2") = 50 (2") DIAMETER ROUND STAKE AND
75 (3") X 75 (3") = 75 (3") DIAMETER ROUND STAKE.

TABLE B
110 g, 16-8-16 ROOT CONTACT
FERTILIZER PACKET SCHEDULE

TREE SIZE		NUMBER OF PACKETS
DECIDUOUS	EVERGREEN	
UNDER 25 (1") CALIPER	450 (18") TO 900 (36") HEIGHT	1
25 (1") TO 50 (2") CALIPER	900 (3'-0") TO 1.8 m (6'-0") HEIGHT	2
50 (2") TO 60 (2½") CALIPER	1.8 m (6'-0") TO 2.4 m (8'-0") HEIGHT	3
60 (2½") TO 90 (3½") CALIPER	----	4
90 (3½") TO 100 (4") CALIPER	----	5
100 (4") TO 125 (5") CALIPER	----	6
FLOWERING TREES		NUMBER OF PACKETS
1.5 m (5'-0") TO 3.0 m (10'-0") HEIGHT		3
SHRUBS		NUMBER OF PACKETS
300 (12") TO 600 (24") SPREAD OR HEIGHT		1
600 (24") TO 900 (36") SPREAD OR HEIGHT		2
900 (3'-0") TO 1.5 m (5'-0") HEIGHT		3

TABLE C
10 g, 20-10-5
FERTILIZER TABLET SCHEDULE

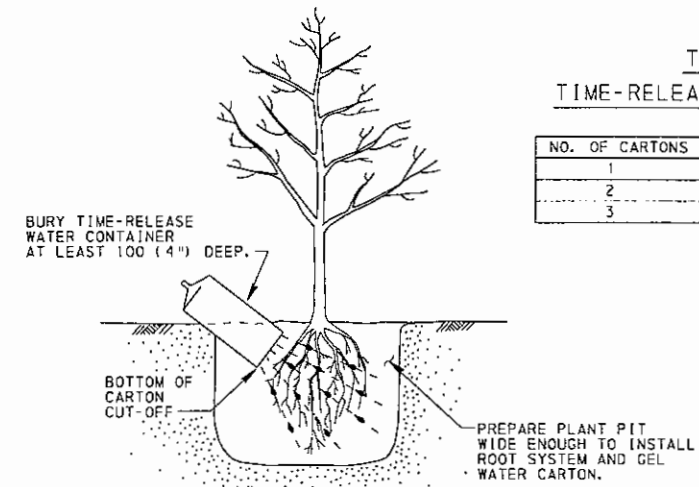
ALL EVERGREEN/DECIDUOUS SEEDLINGS	1 TABLET
ALL GROUND COVER MATERIAL	1 TABLET

TABLE D
COLLAR STRAP BRACING SCHEDULE

BRACING - RUBBER COLLAR STRAP SCHEDULE	
TREE SIZE	STRAP SIZE
TREES UNDER 50 (2") CALIPER	MIN. 38 (1½") WIDE X 335 (14") LENGTH
TREES 50 (2") CALIPER OR LARGER	MIN. 75 (3") WIDE X 480 (19") LENGTH
BRACING - FIBER COLLAR STRAP SCHEDULE	
ALL TREES-100 (4") CALIPER AND SMALLER	MIN. 20 (¾") WIDE X APPROPRIATE LENGTH-WITHOUT GROMMETS
TREES 75 (3") CALIPER AND SMALLER	MIN. 25 (1") WIDE X 450 (18") LENGTH-WITH GROMMETS
TREES LARGER THAN 75 (3") CALIPER	MIN. 25 (1") WIDE X 600 (24") LENGTH-WITH GROMMETS
TREES 100 (4") CALIPER AND SMALLER	MIN. 25 (1") WIDE X 850 (34") LENGTH-WITH NAIL TACK

TABLE E
TIME-RELEASE WATER CARTON

NO. OF CARTONS	PLANT HEIGHT
1	UP TO 300 (12")
2	300 (12") TO 600 (24")
3	600 (24") TO 900 (36")



PLANTING METHOD B
SEEDLING MATERIAL &
SEEDLING TRANSPLANTS

TABLE F
TREE PLANTING PIT SIZE CRITERIA

DECIDUOUS TREES					EVERGREEN TREES	
B&B, AND WIRE ROOT PROTECTION DEVICES			CONTAINER GROWN		TREE HEIGHT	MIN. TOP DIAMETER OF PLANTING PIT
CALIPER	HEIGHT	MIN. TOP DIAMETER OF PLANTING PIT	HEIGHT	MIN. TOP DIAMETER OF PLANTING PIT		
25 (1")	----	1.5M (5')	#2 CONTAINER	900 (3')	900-1.5M (3'-5')	1.5M (5')
40 (1½")	----	1.5M (5')				
50 (2")	----	1.8M (6')	#5 CONTAINER	1.2M (4')	1.8M-2.4M (6'-8')	1.8M (6')
60 (2½")	----	1.8M (6')	1.8M (6')	1.2M (4')		
80 (3")	----	2.0M (7')	#5 CONTAINER	1.2M (4')		
90 (3½")	----	2.0M (7')	30 (1¼") #10 CONTAINER	1.5M (5')		
100 (4")	----	2.5M (8')	40M (1½") #15 CONTAINER	1.5M (5')		
----	1.2M-2.4M (4'-8')	1.5M (5')				
BARE ROOT						
----	1.2M-2.4M (4'-8')	1.5M (5')				

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BRACING AND PLANTING
DETAILS