

**TRANSMITTAL
LETTER**

Change #2
 Pub. 72M
 April 2000 Edition
 DATE: November 1, 2001

SUBJECT:

Revisions to Standards for Roadway Construction RC's 20M, 23M, 24M, 25M, 26M, 27M, 30M, 34M, 39M, 50M, 53M, 54M, 57M, 58M, 59M, 65M, 70M, 83M


INFORMATION AND SPECIAL INSTRUCTIONS:

Incorporate the attached revisions into the April 2000 Edition of the Standards for Roadway Construction. These revisions should be adopted as soon as practical on all new and existing designs without affecting any letting schedules. PS & E submissions to Central Office after February 1, 2002, should include these revisions.

The following represents a listing of the major changes or addition to each standard drawing. Only revised sheets are listed. Remaining sheets of the same standard show new dates only.

<u>RC</u>	<u>Sheet #</u>	<u>Change Description</u>
RC - 20M	(1 of 3)	Revised Details A, B, Type E Joint, Alternate Type P Joint to eliminate the 3 (1/8) or 6 (1/4) radius. Eliminated the Type G Joint Details. Revised Notes 7 and 11.
	(2 of 3)	Revised Note 11 and added Note 12.
	(3 of 3)	Revised Note 3.
RC - 23M	(1 of 3)	Eliminated tooled edges in Detail A and Detail A (Alternate).
	(3 of 3)	Added Note 4.
RC - 24M	(1 of 1)	Modified to add Superpave, Binder course, and Wearing course.
RC - 25M	(1 of 5)	Added 'Type 1-SP Shoulder' to drawing Caption. Modified to add Superpave, Binder course, Wearing course, and Base course. Changed Note 6 and 7.
	(2 of 5)	Added 'Type 6-SP Shoulder' to drawing Caption. Modified to add Superpave, Binder course, Wearing course, and Base course. Changed Note 8.
	(3 of 5)	Modified to add Superpave, Binder course, Wearing course, and Base course. Changed Note 7.
	(4 of 5)	Revised Note 2 and added Note 4. Changed MSRS to rumble strips.
	(5 of 5)	Revised Notes 1, 2, 3, and 4 and added Notes 5 and 6.

RC - 26M	(1 of 5)	Added Note 5 and eliminated saw cut width in Detail B.
	(3 of 5)	Added Note 6 and modified Detail B.
	(5 of 5)	Added Note 4.
RC - 27M	(1 of 1)	Revised Notes 2 and 5.
RC - 30M	(5 of 5)	Sheet 5 was added to RC - 30M to provide details and guidelines when flowable backfill is specified as pipe trench backfill.
RC - 34M	(1 of 10)	Added Note 10.
	(9 of 10)	Revised Note 2.
RC - 39M	(3 of 5)	Changed Table B; Bottom Steel Requirements from No. 4 Bars at 6" to No.4 Bars at 12" C to C or 0.16 in ² /m WWF 6" maximum spacing. Corrected the metric dimension in Section B-B from 170 mm to 250 mm (0.12 in ² /ft).
	(1 & 2 of 2)	Revised the spacing in plan view, elevation view and elevation view (W/O Inlet Placement) same as BC-739M.
RC - 50M	(1 & 2 of 2)	Revised the spacing in plan view, elevation view and elevation view (W/O Inlet Placement) same as BC-739M.
RC - 53M	(1 of 2)	Revised Note 4.
RC - 54M	(1 of 7)	In the 2 top left guide rail treatment details, See Note 4 was changed to See Note 5.
RC - 57M	(1 of 6)	Revised Notes 1 and 11.
RC - 58M	(3 of 5)	Added Note 4.
RC - 59M	(1 of 2)	Revised Note 1.
RC - 65M	(1 of 1)	Revised Note 4.
RC - 70M	(6 of 6)	Added a new sheet with details for sediment filter bag.
RC - 83M	(1 of 2)	Revised table 4.

CANCEL THE FOLLOWING:	REQUEST ADDITIONAL COPIES FROM: Bureau of Office Services Publications Sales Office P.O. Box 2028 Middletown, PA 17120
	APPROVED FOR ISSUANCE BY: Bradley L. Mallory Secretary of Transportation By:  Michael M. Ryan, P.E. Deputy Secretary for Highway Administration

INDEX OF STANDARDS FOR ROADWAY CONSTRUCTION

STANDARD DRAWING NUMBER	DRAWING DATE	DESCRIPTION
<u>EARTHWORK</u>		
RC-10M _____	APR 28, 2000	CLASSIFICATION OF EARTHWORK
RC-11M (2 Sheets) _____	APR 28, 2000	CLASSIFICATION OF EARTHWORK FOR STRUCTURES
RC-12M (2 Sheets) _____	APR 28, 2000	BACKFILL AT STRUCTURES
RC-13M _____	APR 28, 2000	PAY LIMIT OF SUBBASE

PAVEMENTS

* RC-20M (3 Sheets) _____	NOV. 1, 2001	CONCRETE PAVEMENT JOINTS
RC-21M _____	APR 28, 2000	REINFORCED CONCRETE PAVEMENT
* RC-23M (3 Sheets) _____	NOV. 1, 2001	BRIDGE APPROACH SLAB
* RC-24M _____	NOV. 1, 2001	PAVEMENT RELIEF JOINT
* RC-25M (5 Sheets) _____	NOV. 1, 2001	SHOULDERS
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* RC-27M _____	NOV. 1, 2001	PLAIN CONCRETE PAVEMENT
RC-28M _____	APR 16, 2001	OVERLAY TRANSITIONS AND PAVING NOTCHES

DRAINAGE

* RC-30M (4 Sheets) _____	NOV. 1, 2001	SUBSURFACE DRAINS
RC-31M (2 Sheets) _____	APR 16, 2001	ENDWALLS
RC-32M _____	APR 28, 2000	SLOPE PIPE FITTINGS, PIPE CONNECTORS AND CONCRETE COLLAR FOR PIPE EXTENSION
RC-33M (2 Sheets) _____	APR 28, 2000	END SECTIONS FOR PIPE CULVERTS
* RC-34M (10 Sheets) _____	NOV. 1, 2001	INLETS
RC-35M _____	APR 28, 2000	DRAINAGE DIKE
RC-36M _____	APR 28, 2000	SPRING BOXES
* RC-39M (5 Sheets) _____	NOV. 1, 2001	STANDARD MANHOLES
RC-40M _____	APR 28, 2000	SLOPE PROTECTION
RC-43M _____	APR 28, 2000	GABIONS

STANDARD DRAWING NUMBER	DRAWING DATE	DESCRIPTION
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GUIDE RAIL AND MEDIAN BARRIER

* RC-50M (2 Sheets) _____	NOV. 1, 2001	GUIDE RAIL TRANSITION AT END OF STRUCTURE
RC-52M (6 Sheets) _____	APR 16, 2001	TYPE 2 STRONG POST GUIDE RAIL
* RC-53M (2 Sheets) _____	NOV. 1, 2001	TYPE 2 WEAK POST GUIDE RAIL
* RC-54M (7 Sheets) _____	NOV. 1, 2001	BARRIER PLACEMENT AT OBSTRUCTIONS
RC-55M _____	APR 28, 2000	TYPE 2 WEAK POST MEDIAN BARRIER
* RC-57M (6 Sheets) _____	NOV. 1, 2001	CONCRETE MEDIAN BARRIER
* RC-58M (5 Sheets) _____	NOV. 1, 2001	SINGLE FACE CONCRETE BARRIER
* RC-59M (2 Sheets) _____	NOV. 1, 2001	CONCRETE GLARE SCREEN

FENCES AND CURBS

RC-60M (3 Sheets) _____	APR 28, 2000	RIGHT-OF-WAY FENCE
RC-61M _____	APR 28, 2000	RIGHT-OF-WAY GATES AND REMOVABLE FENCE SECTIONS
RC-63M (2 Sheets) _____	APR 28, 2000	PERMANENT BARRICADES
RC-64M _____	APR 28, 2000	CURBS AND GUTTERS
* RC-65M _____	NOV. 1, 2001	CONCRETE MOUNTABLE CURBS
RC-66M _____	APR 16, 2001	CONCRETE TRAFFIC SEPARATOR
RC-67M (2 Sheets) _____	APR 28, 2000	CURB RAMPS

POLLUTION CONTROL

* RC-70M (6 Sheets) _____	NOV. 1, 2001	EROSION AND SEDIMENT POLLUTION CONTROL
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HIGHWAY LIGHTING

RC-80M (2 Sheets) _____	APR 28, 2000	HIGHWAY LIGHTING-FOUNDATIONS
RC-81M _____	APR 16, 2001	HIGHWAY LIGHTING-JUNCTION BOXES-LIGHT DUTY
RC-82M _____	APR 16, 2001	HIGHWAY LIGHTING-JUNCTION BOXES-HEAVY DUTY
* RC-83M (2 Sheets) _____	NOV. 1, 2001	HIGHWAY LIGHTING-LIGHTING POLE DETAILS
RC-84M _____	APR 28, 2000	HIGHWAY LIGHTING-LIGHTING AND ELECTRICAL DETAILS

ROADSIDE DEVELOPMENT AND PLANTING

RC-91M (2 Sheets) _____	APR 28, 2000	BRACING AND PLANTING DETAILS
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NOTES

- PLACE AN APPROVED TUBE 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 NOT LESS THAN 6 (1/4") NOR MORE THAN 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 NO LESS THAN 3 (7/8") NOR MORE THAN 6 (1/4") BELOW THE SURFACE OF THE PAVEMENT.
- THE INITIAL SAW CUT FOR TYPE D JOINT IS NOT REQUIRED FOR CONSTRUCTION JOINTS.
- SAW DEPTHS OF NEOPRENE SEALS:

SEAL SIZE	SAW CUT DEPTHS
25 (1")	47-50 (1 1/8"-2")
32 (1 1/4")	50-53 (2"-2 1/8")
- ADJUST THE WIDTH OF THE SECOND SAW CUT ACCORDING TO THE SEAL SIZE AND PAVEMENT SURFACE TEMPERATURE AT THE TIME OF SAWING, AS FOLLOWS:

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

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

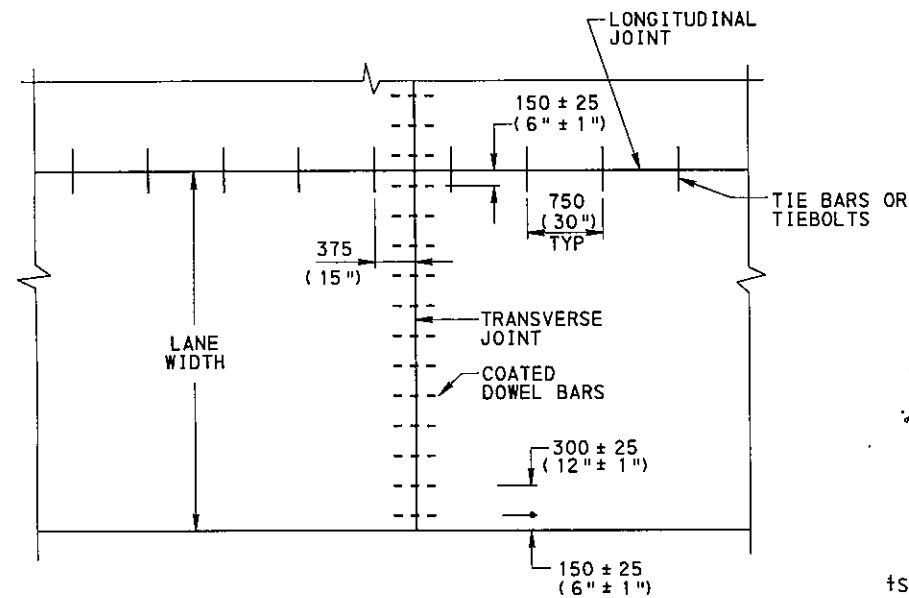
- WHEN SILICONE JOINT SEALING MATERIAL, AS SPECIFIED IN PUBLICATION 408, SECTION 705.4 (c), IS SELECTED FOR USE IN TRANSVERSE JOINTS (TYPE P ONLY) OR TRANSVERSE SHOULDER JOINTS, USE THE SAME JOINT SEALING MATERIAL IN THE LONGITUDINAL JOINTS (ALTERNATE TYPE L AND ALTERNATE LONGITUDINAL SHOULDER JOINTS).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

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

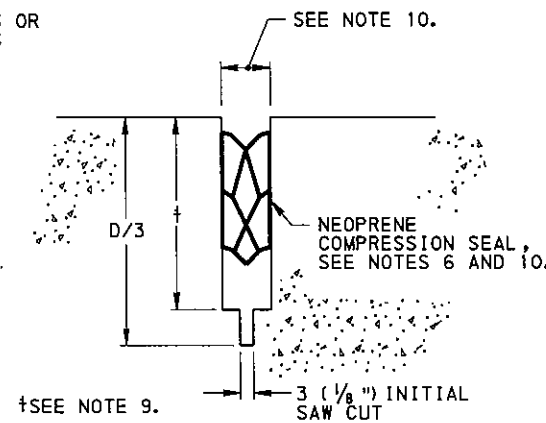
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CONCRETE PAVEMENT JOINTS

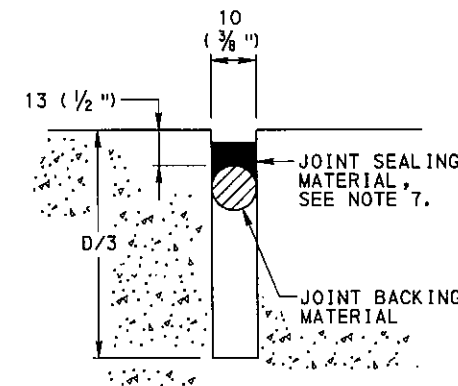
RECOMMENDED NOV. 1, 2001 <i>Dean A. Schaefer</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Gregory J. Hoffman</i> CHIEF ENGINEER	SHT. 1 OF 3 RC-20M
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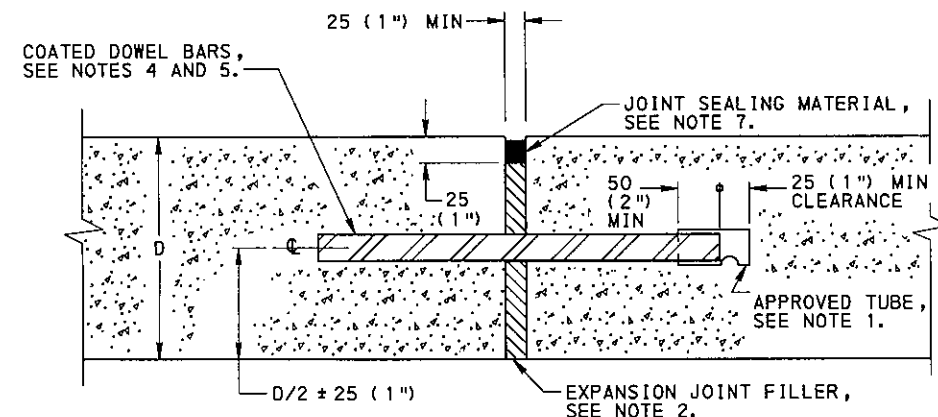
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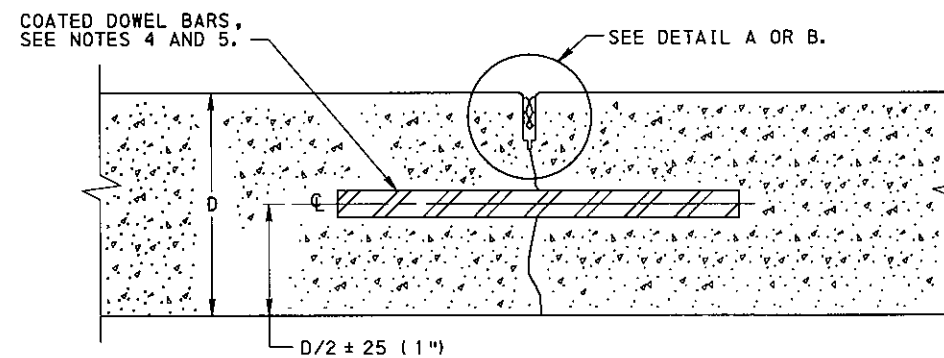
DETAIL A



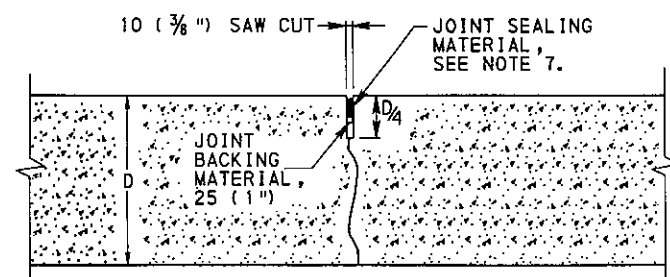
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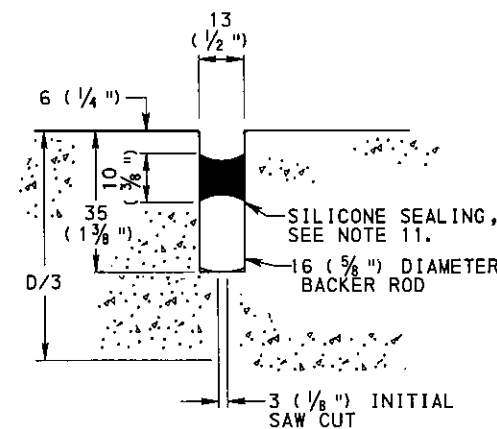
TYPE E



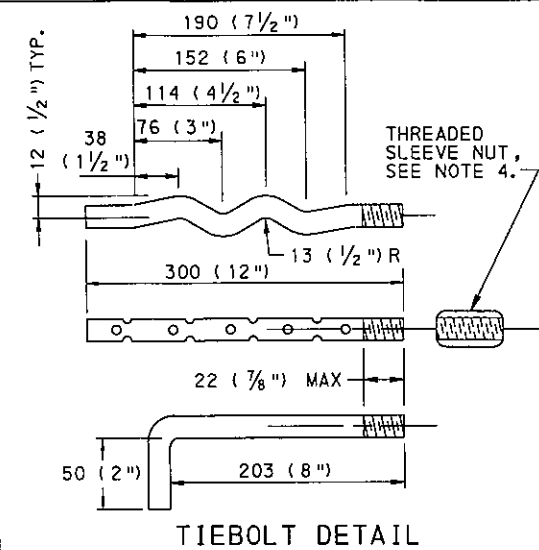
TYPE D



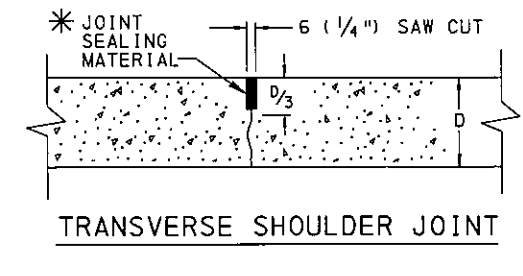
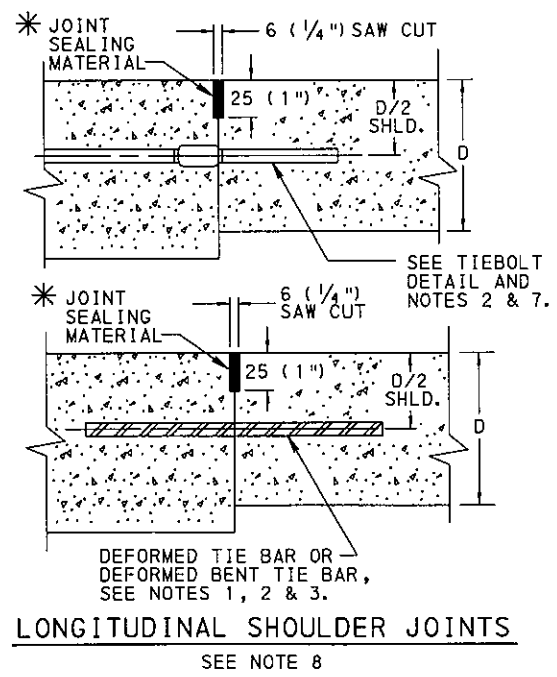
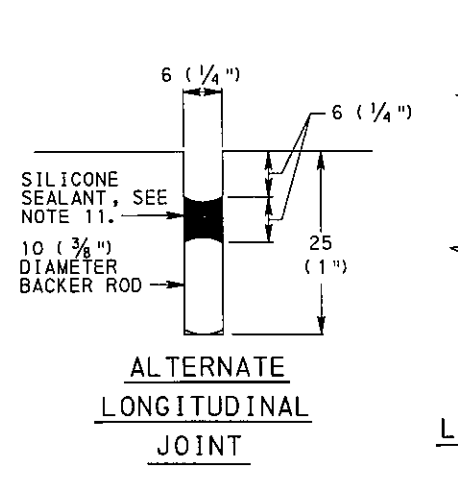
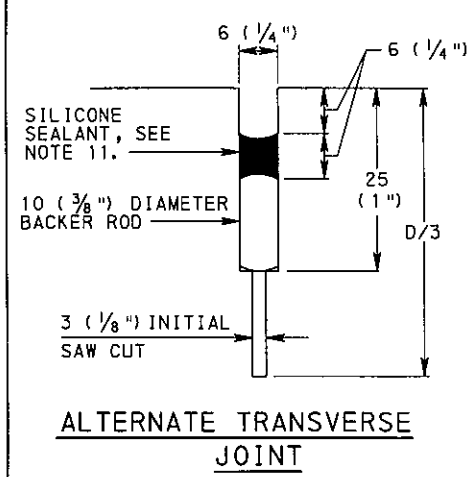
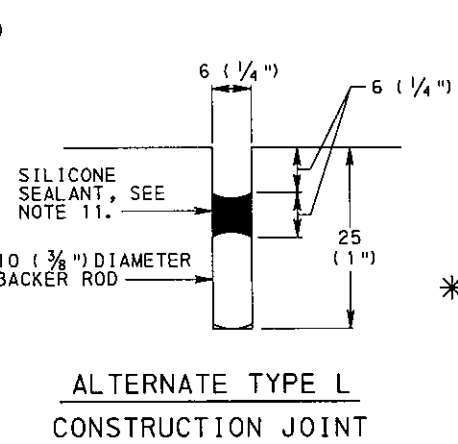
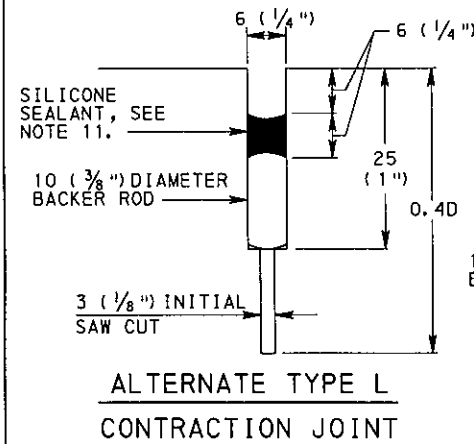
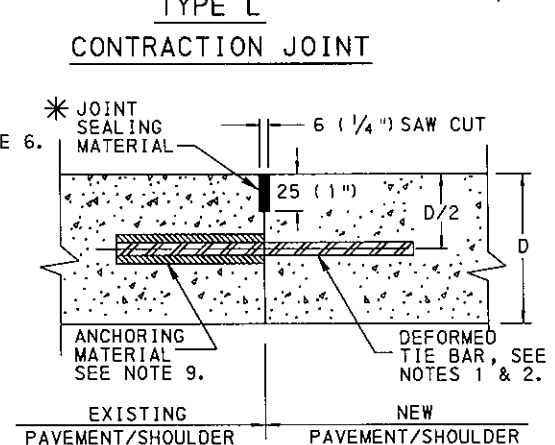
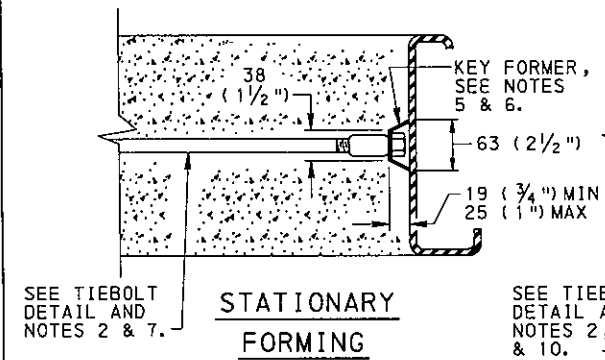
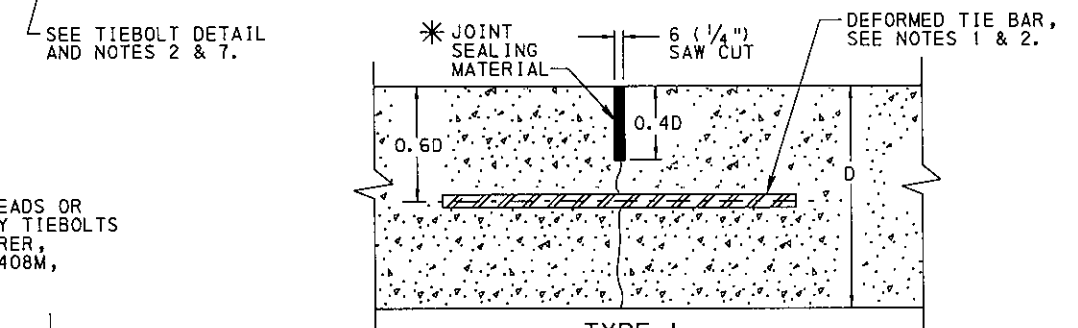
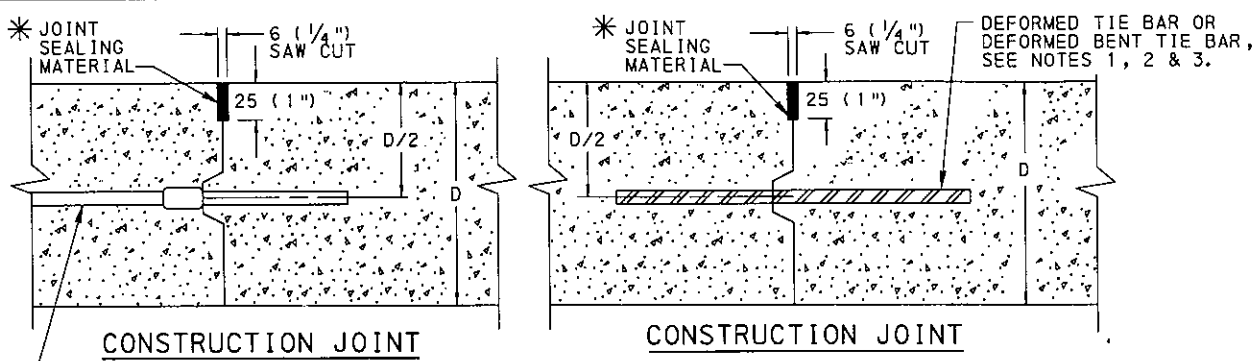
TYPE P
SEE RC-27M



ALTERNATE TYPE P
JOINT DETAIL



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 408M, 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(i)1.
- EPOXY COAT TIE BARS AS SPECIFIED IN PUBLICATION 408, SECTION 709.1(d). EPOXY COAT OR GALVANIZE TIEBOLTS AND THREADED SLEEVE NUTS, EXCLUDING THREADS, AS SPECIFIED IN PUBLICATION 408, SECTION 709.1(d) 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 1/6"Ø x 1 7/8") LONG OR HIGH STRENGTH STEEL BAR 22Ø x 50 (2 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 SPACING EMBED TIEBOLTS D/2 ±20 (±3/4") OR 100 ±13 (4" ±1/2"), WHICHEVER IS GREATER. WHEN ADJOINING TO AN UNEQUAL PAVEMENT OR SHOULDER DEPTH, D IS THE DEPTH OF THE THINNER SECTION. SCREW TIEBOLTS UNTIL SNUG. FOR 150, 180, AND 200 (6", 7" AND 8") PAVEMENTS AND/OR SHOULDERS, MAKE THE WIGGLE OR HOOK PORTION OF THE TIEBOLT PARALLEL TO THE GRADE. IF NECESSARY, LOOSEN TIEBOLTS SO THAT THE HOOK OR WIGGLE IS PARALLEL TO THE GRADE.
- AT THE CONTRACTOR'S OPTION, THE CONCRETE SHOULDER MAY BE CONSTRUCTED AT THE SAME TIME AS THE PAVEMENT. IN THIS CASE, USE A TYPE L CONTRACTION JOINT.
- USE AN APPROVED EPOXY ANCHORING MATERIAL TO WITHSTAND THE NECESSARY MINIMUM PULL-OUT RESISTANCE SPECIFIED IN PUBLICATION 408, SECTION 501.3(i)1. TIE BAR HOLE DIAMETER IN EXISTING PAVEMENT SHOULD BE AS PER MANUFACTURER'S RECOMMENDATION. USE ROTARY IMPACT DRILL TO AVOID IMPACTING FINES INTO HOLE.
- DO NOT USE THE HOOK COMPONENT OF THE TIEBOLT ASSEMBLY WHEN SLIP FORMING.
- WHEN SILICONE JOINT SEALING MATERIAL, AS SPECIFIED IN PUBLICATION 408, SECTION 705.4(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).
- MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (3/8") TO 6 (1/4") BELOW THE PAVEMENT SURFACE.

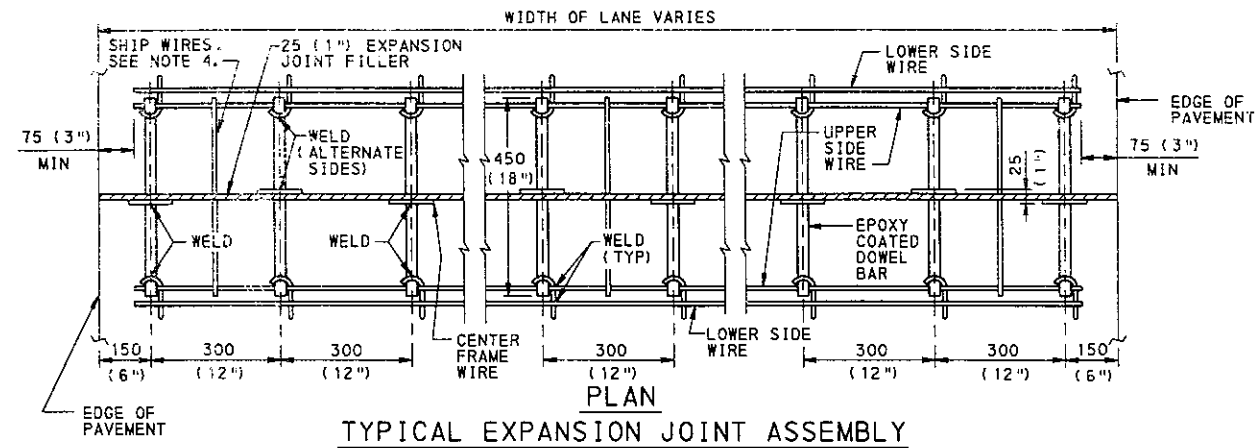
(*) DENOTES, SEE NOTE 12.

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

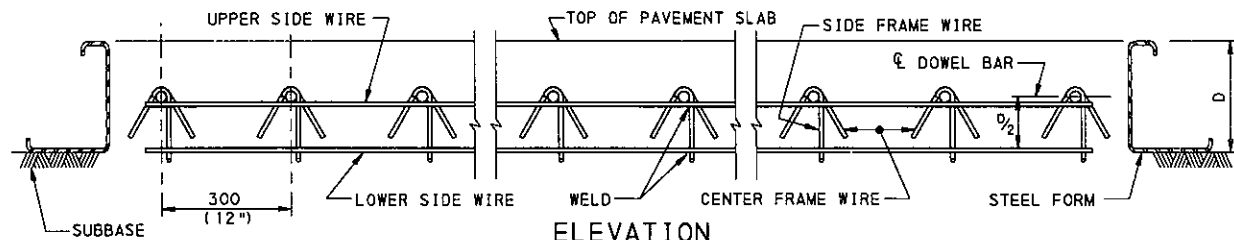
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CONCRETE PAVEMENT JOINTS

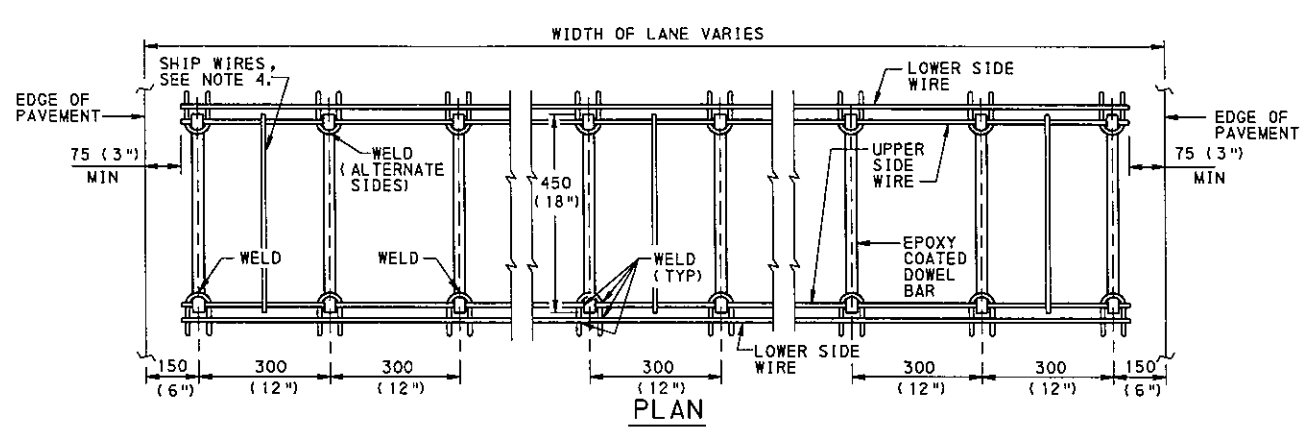
RECOMMENDED NOV. 1, 2001 <i>Dean A. Schurr</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Henry L. Hoffman</i> CHIEF ENGINEER	SHT 2 OF 3 RC-20M
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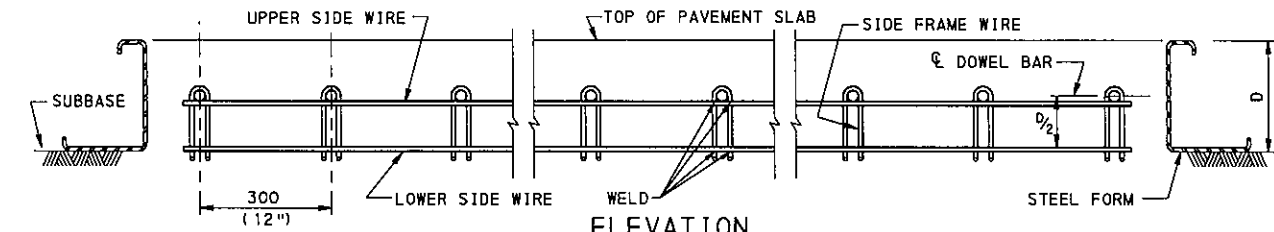
TYPICAL EXPANSION JOINT ASSEMBLY



EXPANSION JOINT ASSEMBLY



TYPICAL CONTRACTION JOINT ASSEMBLY



CONTRACTION JOINT ASSEMBLY

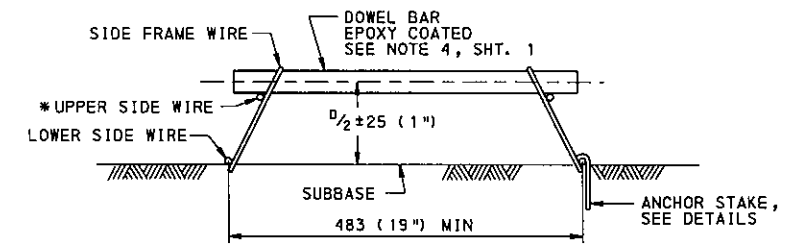
NOTES

- THIS STANDARD DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND COMPATIBILITY. IT DOES NOT INCLUDE ALL THE DETAILS REQUIRED FOR FABRICATION. ONLY ITEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED.
- 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.
- 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, HILT NAILS, TIE STRAPS TIED TO THE TOP SIDE OF THE BASKET, OR OTHER ACCEPTABLE MEANS TO HOLD THE ASSEMBLY STATIONARY DURING THE PAVING OPERATION AS DIRECTED BY THE ENGINEER.
- AFTER EACH LOAD TRANSFER ASSEMBLY IS SECURED IN PLACE, REMOVE AND PROPERLY DISPOSE OF ALL TIE WIRES OR SHIPPING WIRES PRIOR TO INSTALLING EXPANSION FIBRE.
- PROVIDE SIDE SUPPORT ASSEMBLY WIRES CONFORMING TO THE CURRENT ASTM DESIGNATION A-510 SPECIFICATIONS FOR WIRE RODS AND COURSE ROUND WIRE, CARBON STEEL AND OF A MINIMUM ALLOWABLE SIZE AS FOLLOWS:

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

- DOWEL BAR KEEPER CLIPS MAY BE USED IN LIEU OF TIE WIRES OR SHIPPING WIRES FOR CONSTRUCTION AND EXPANSION JOINT ASSEMBLIES.
- FABRICATE AND SHIP NEST ALL DOWEL, SIDE SUPPORT AND CENTER SUPPORT ASSEMBLIES. ASSEMBLE EXPANSION JOINT FILLER, ANCHOR STAKES AND DOWEL CAPS IN THE FIELD.
- PROVIDE DOWEL BARS PARALLEL TO THE CENTERLINE AND TO THE PAVEMENT SURFACE. MAKE TOLERANCE OF THIS PLACEMENT WITHIN ± 6 (± 1/4") PER DOWEL BAR.
- PROVIDE DOWELS AND ASSEMBLY DETAILS THAT CONFORM TO PUBLICATION 408.
- WELD REQUIREMENTS AS LISTED BELOW AND TESTED PER MANUFACTURER'S QUALITY CONTROL PLAN FOR WELD SHEAR.
- WIRE TOLERANCES PER ASTM 510M IS 0.05 mm (0.0031in.)

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)



CONTRACTION JOINT ASSEMBLY

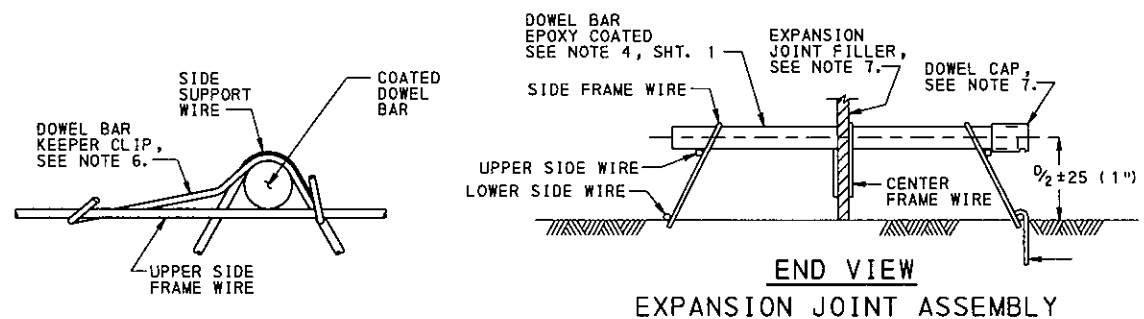
TYPICAL LOAD TRANSFER ASSEMBLY

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

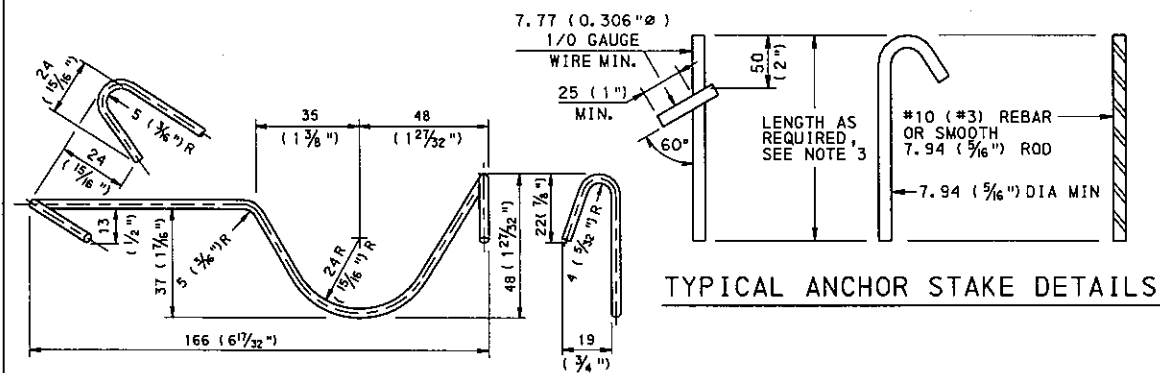
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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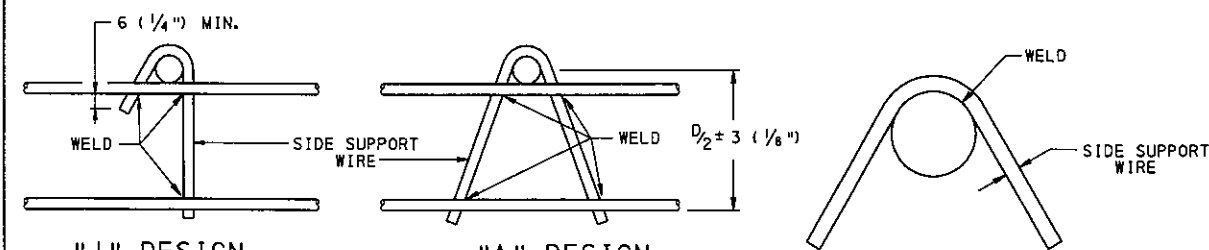
CONCRETE PAVEMENT JOINTS
NON-SKEWED
LOAD TRANSFER ASSEMBLIES



EXPANSION JOINT ASSEMBLY

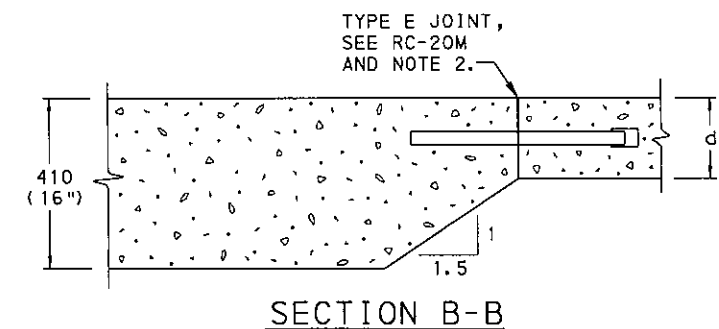
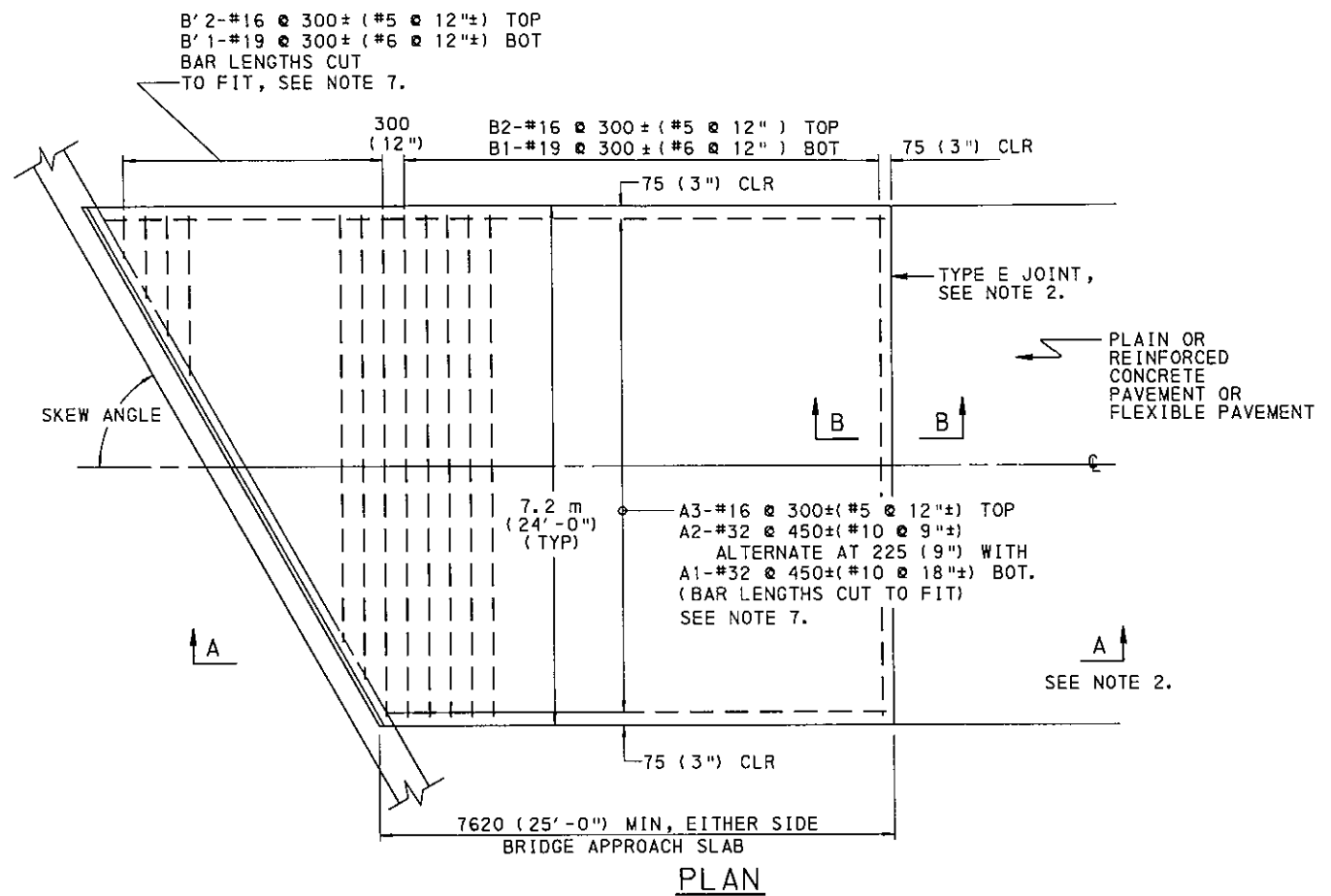


DOWEL BAR KEEPER CLIP

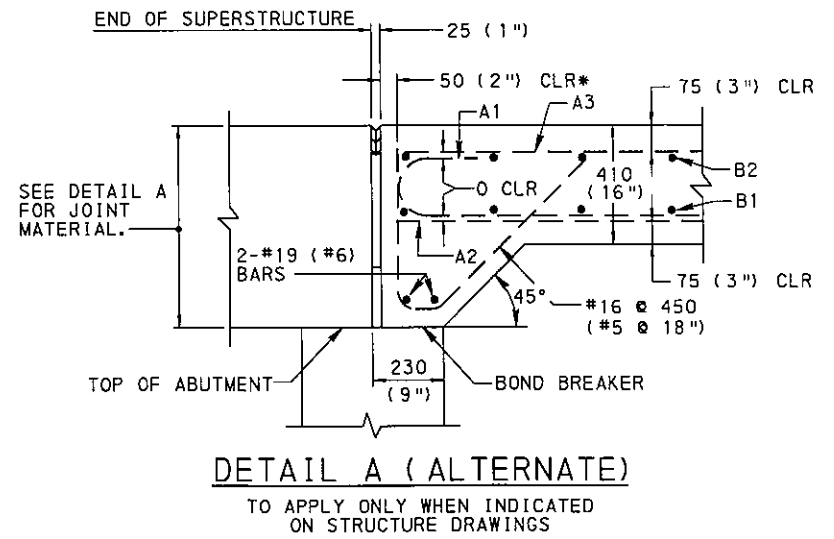
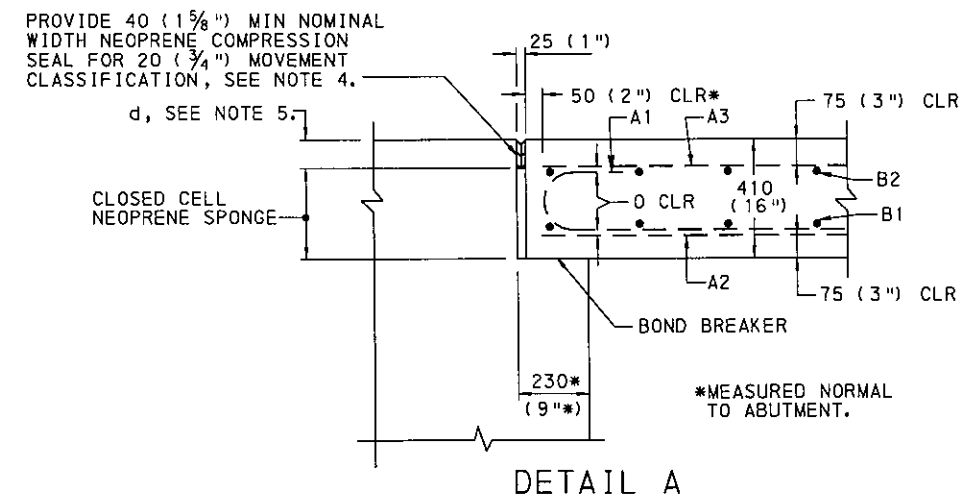
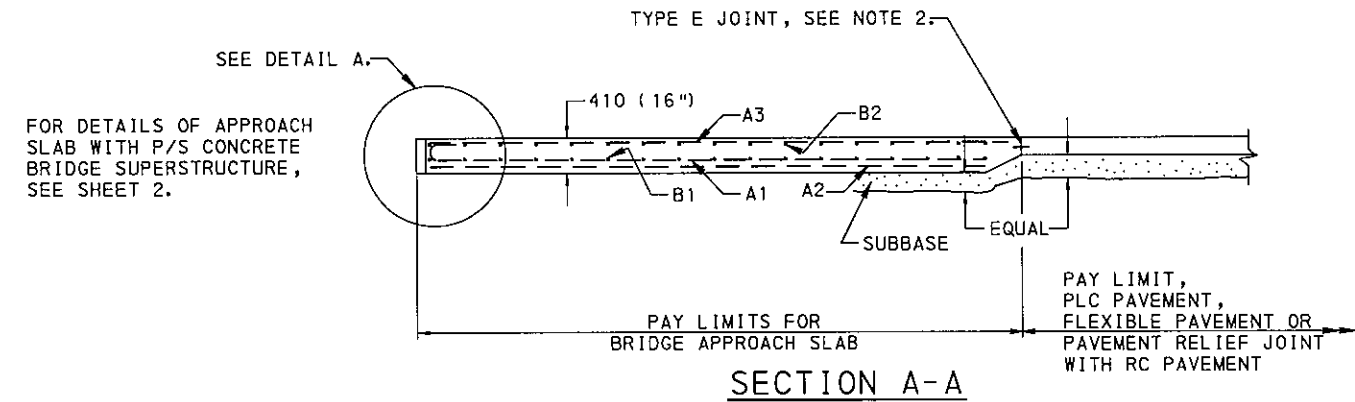


TYPICAL SIDE FRAME DETAILS

CENTER FRAME WIRE DETAIL



- NOTES**
- CONSTRUCT IN ACCORDANCE WITH THIS STANDARD DRAWING OR AS INDICATED ON THE STRUCTURE DRAWINGS.
 - THE TYPE E JOINT DOES NOT APPLY WHEN APPROACH SLAB IS CONSTRUCTED IN CONJUNCTION WITH A PAVEMENT RELIEF JOINT OR WITH A FLEXIBLE PAVEMENT. SEE RC-24M.
 - WHEN CONSTRUCTION INVOLVES MORE THAN 2 LANES, CONNECT ADDITIONAL LANES REQUIRED TO STANDARD 2 LANE BRIDGE APPROACH SLAB USING TYPE L CONSTRUCTION JOINTS, AS SHOWN ON RC-20M, SHEET 2.
 - INSTALL NEOPRENE COMPRESSION SEALS TO A UNIFORM DEPTH WITH TOP OF THE SEAL NOT LESS THAN 6 (1/4") NOR MORE THAN 10 (3/8") BELOW THE LEVEL OF THE PAVEMENT SURFACE. MAKE THE TOP EDGES OF THE CONTACT SURFACES ON BOTH SIDE OF THE SEAL AT THE SAME ELEVATION.
 - DETERMINE "d" BY ADDING 20 (3/4") TO THE MAXIMUM COMPRESSED HEIGHT OF THE NEOPRENE COMPRESSION SEAL. (SEE MANUFACTURER'S INFORMATION.)
 - CONSTRUCT THE BRIDGE APPROACH SLAB AFTER THE BRIDGE DECK IS CONSTRUCTED.
 - PROVIDE REINFORCEMENT BARS, EPOXY COATED IN ACCORDANCE WITH PUBLICATION 408, SECTION 709.
 - ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.

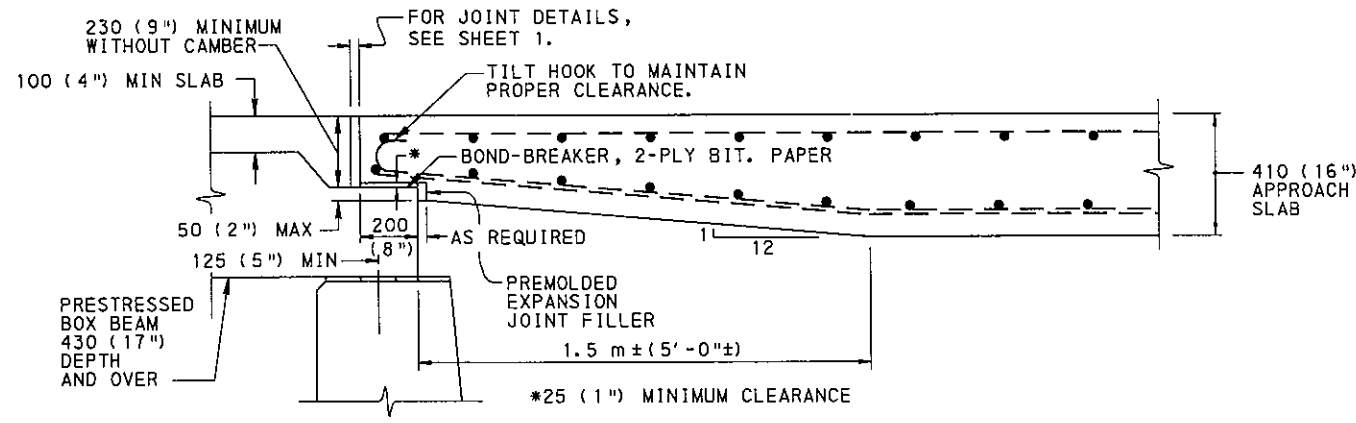


NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

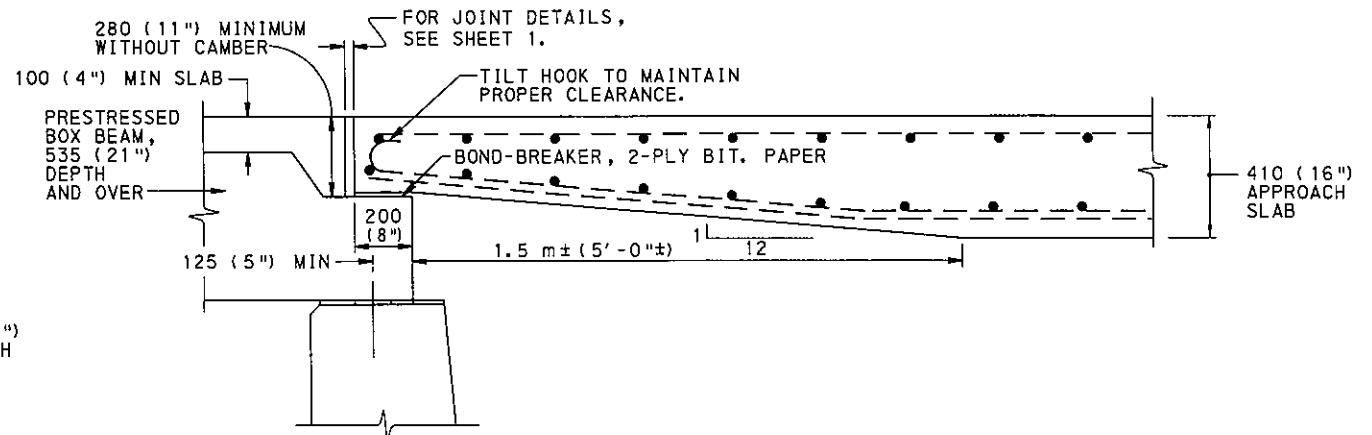
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BRIDGE APPROACH SLAB

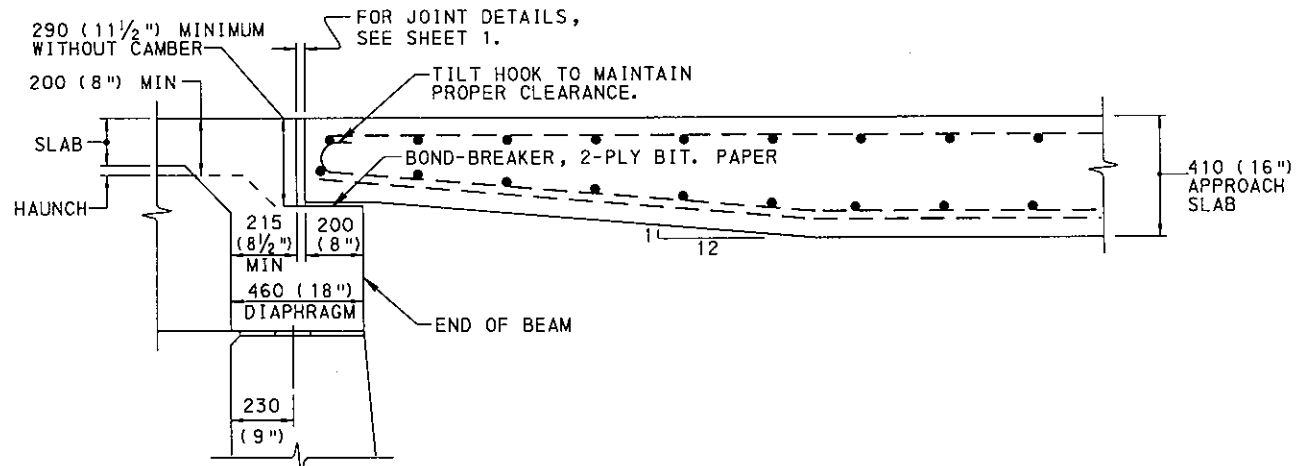
RECOMMENDED NOV. 1, 2001 <i>Kenneth P. Schuler</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Henry J. Hoffman</i> CHIEF ENGINEER	SH1 1 OF 3 RC-23M
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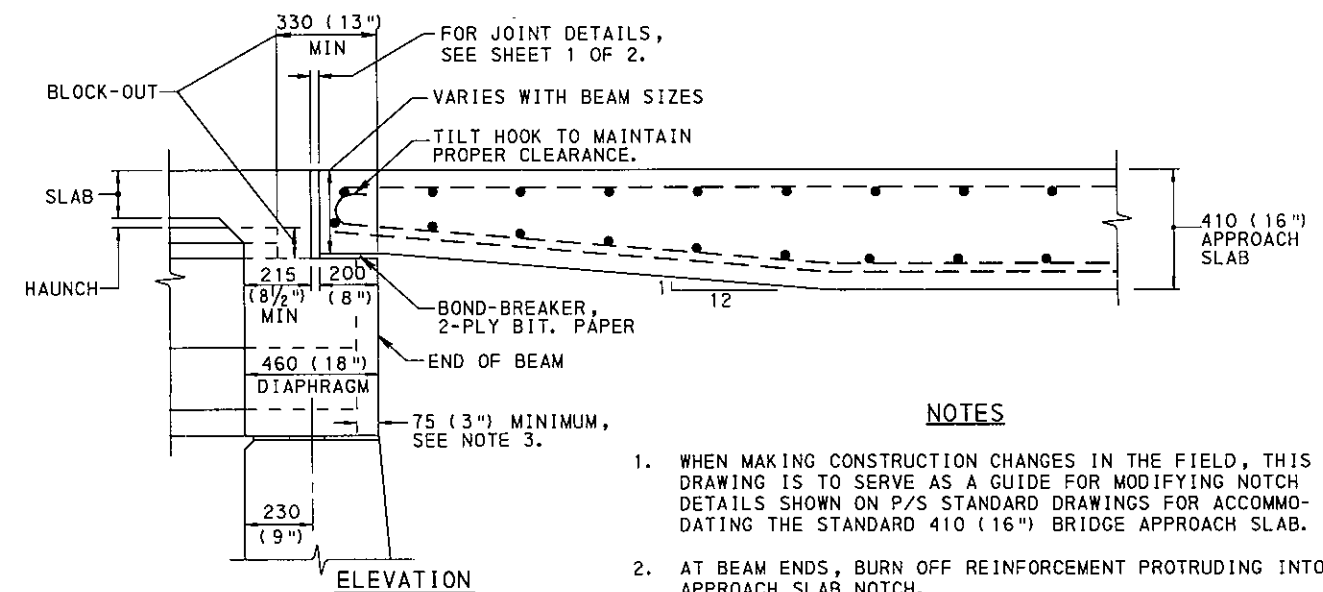
**430 (17") DEEP ADJACENT COMPOSITE BOX BEAMS
WITH 230 (9") DEEP APPROACH SLAB NOTCH**



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



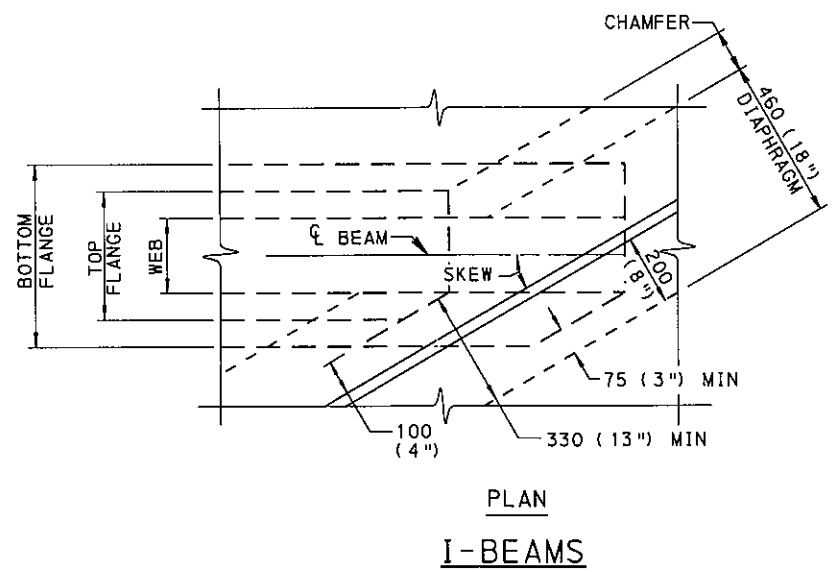
**SPREAD BOX BEAMS WITH APPROACH
SLAB NOTCH 290 (1 1/2") OR DEEPER**



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.

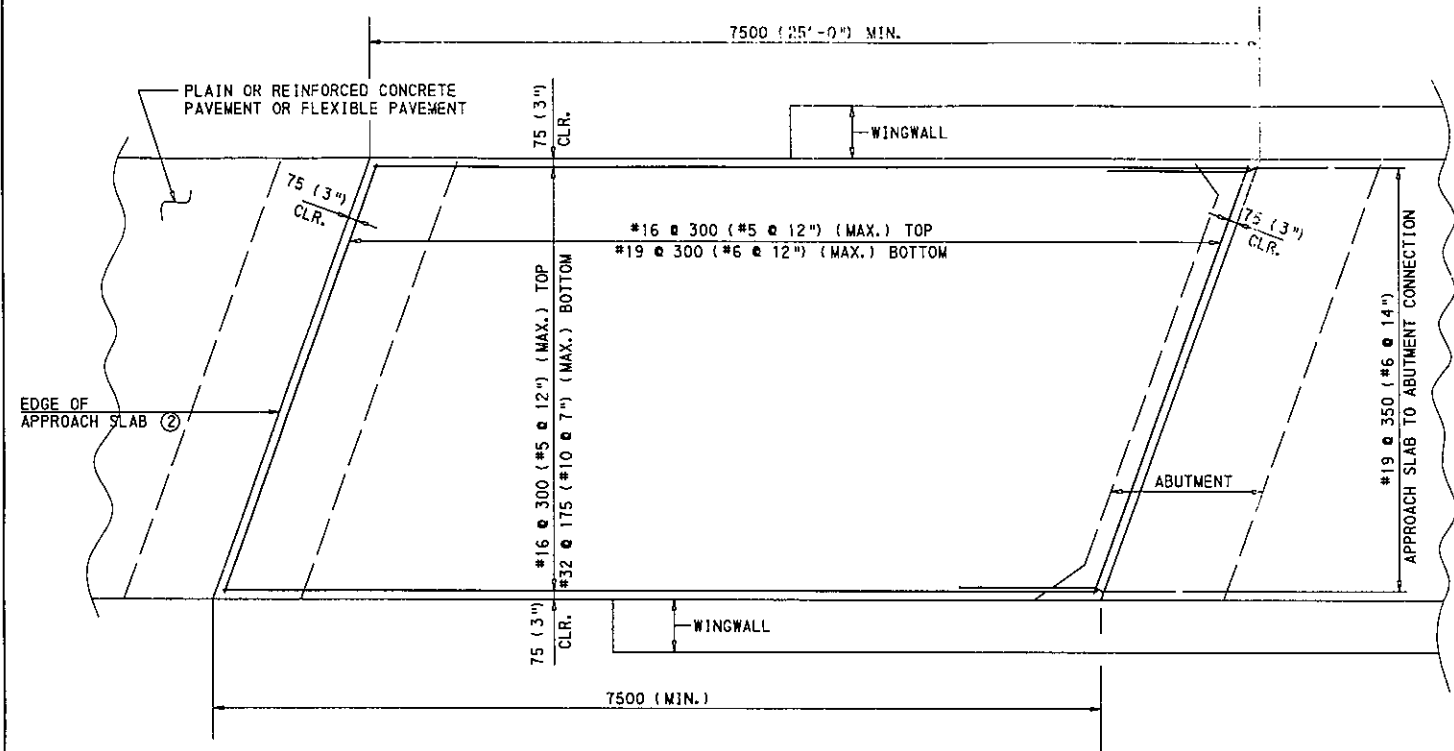
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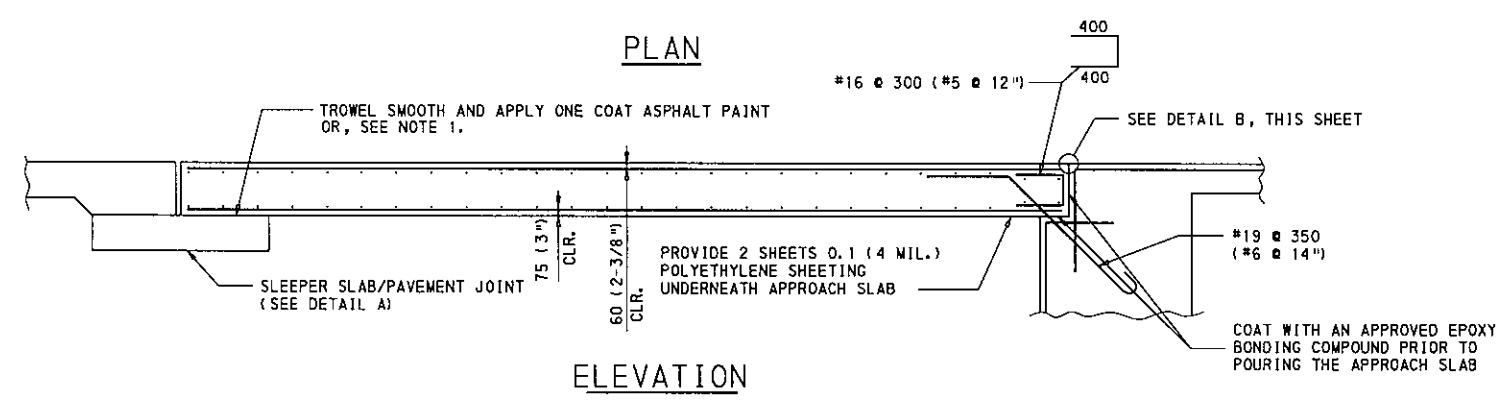
**PLAN
I-BEAMS**

**COMMONWEALTH OF PENNSYLVANIA
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BRIDGE APPROACH SLAB

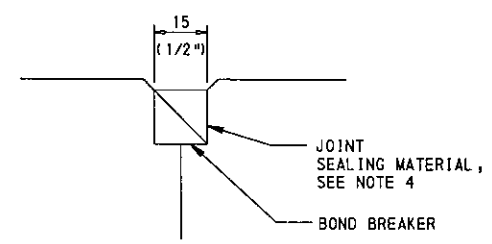


PLAN

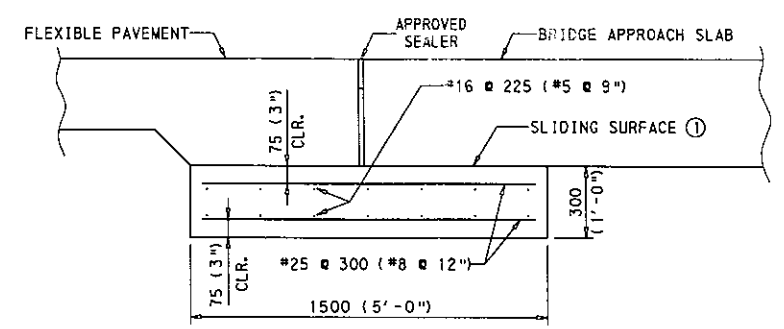


ELEVATION

APPROACH SLAB - INTEGRAL ABUTMENTS

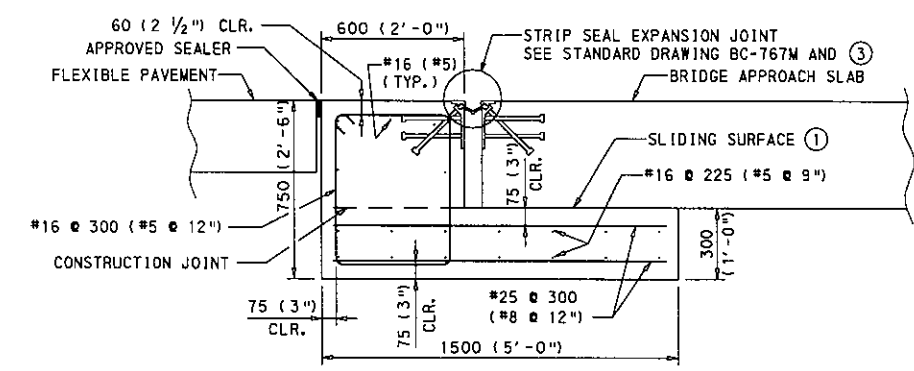


DETAIL B



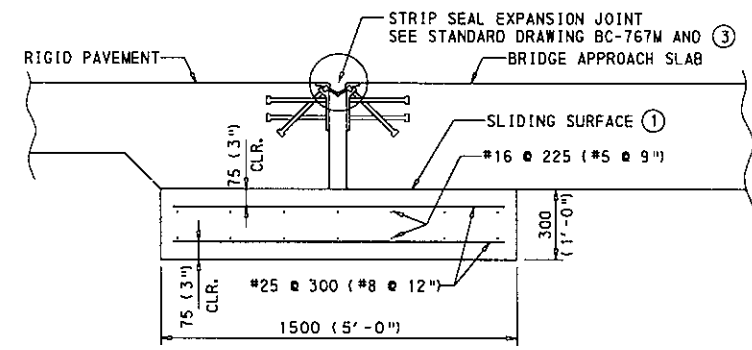
ROADWAY FLEXIBLE PAVEMENT

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



ROADWAY FLEXIBLE PAVEMENT

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



ROADWAY RIGID PAVEMENT

DETAIL A

(SLEEPER SLAB)

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 AP.G. 1, 6.
- ④ MAKE THE TOP OF THE JOINT SEALING MATERIAL NO LESS THAN 3 (1/8") OR MORE THAN 6 (1/4") BELOW THE SURFACE OF THE PAVEMENT.

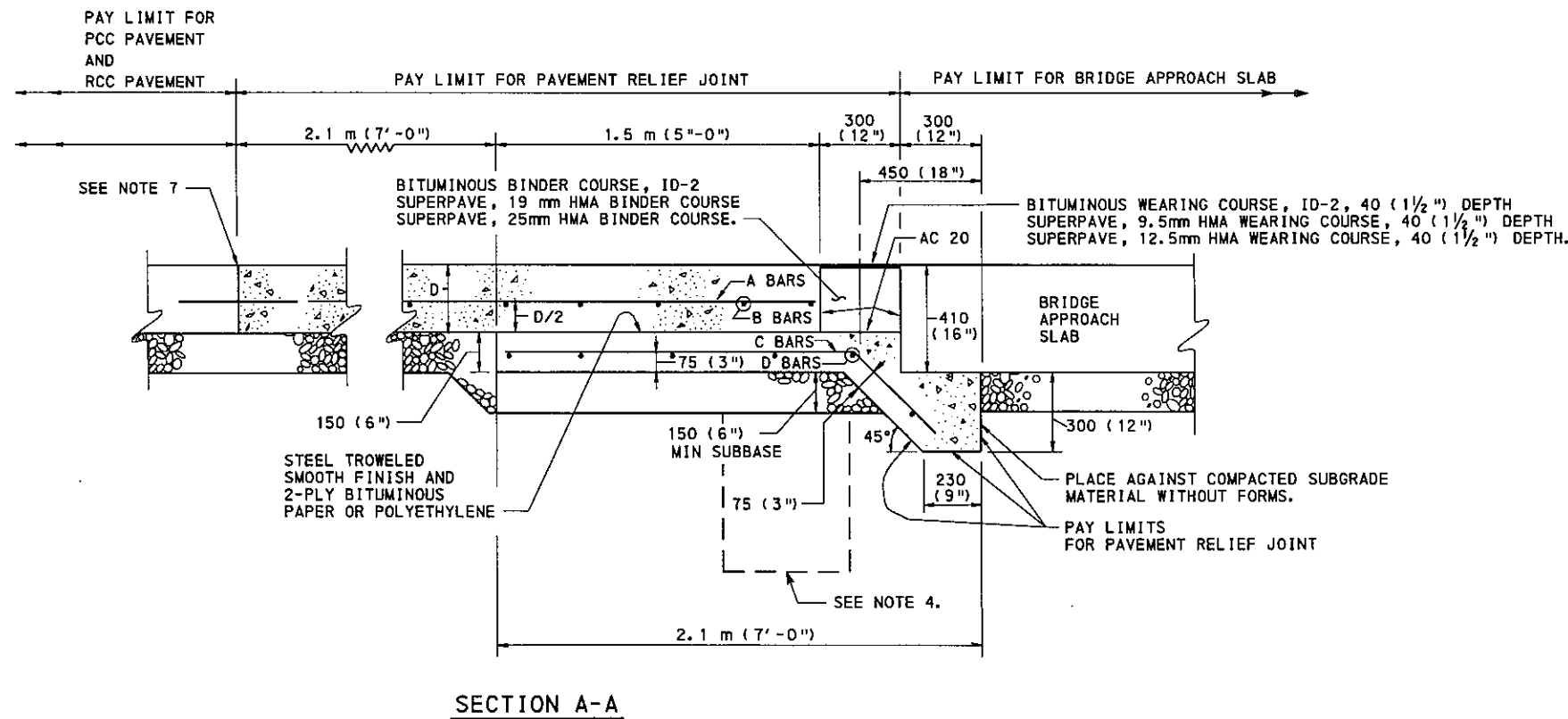
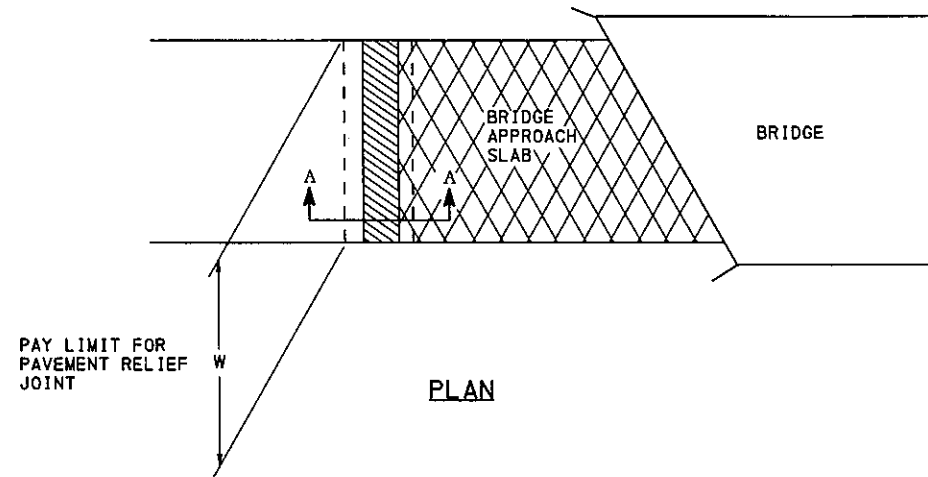
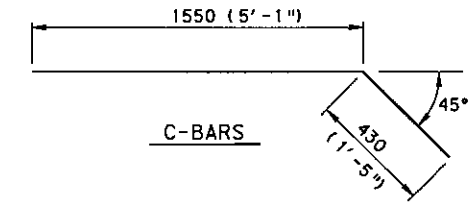
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BRIDGE APPROACH SLAB

SCHEDULE OF REINFORCEMENT STEEL

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



NOTES

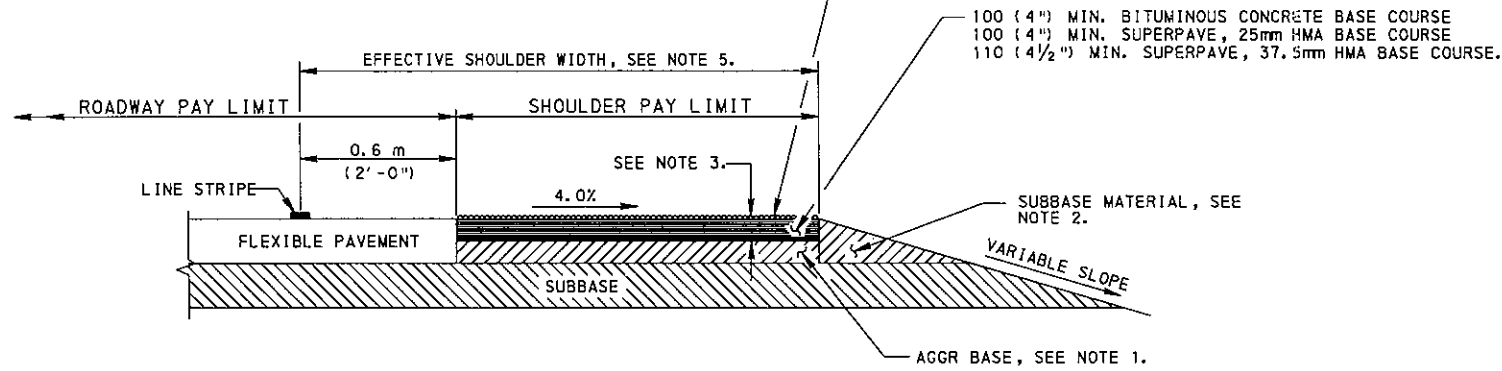
- PAVEMENT RELIEF JOINTS ARE APPLICABLE FOR ALL CEMENT CONCRETE PAVEMENTS.
- USE CLASS AA CONCRETE IN SUBSLAB. (AT CONTRACTOR'S OPTION, SUBSLAB CONCRETE MAY BE HES.)
- INCLUDE PORTIONS OF REINFORCING BARS WHICH ARE LOCATED OUTSIDE THE INDICATED PAY LINES IN BID PRICE FOR PAVEMENT RELIEF JOINT.
- WHEN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

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PAVEMENT RELIEF JOINT

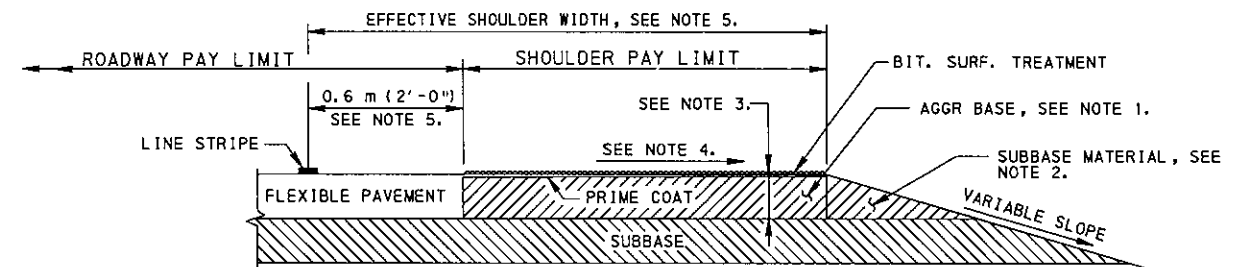
BIT. SURF. TREATMENT-INCIDENTAL TO TYPE 1 SHOULDERS, 20 (3/4") DEPTH
 BIT. SURF. CRSE, FJ-1-INCIDENTAL TO TYPE 1-F SHOULDERS, 25 (1") DEPTH
 BIT. WEAR. CRSE, ID-2-INCIDENTAL TO TYPE 1-I SHOULDERS, 40 (1 1/2") DEPTH
 DOUBLE SLURRY SEAL-INCIDENTAL TO TYPE 1-S SHOULDERS, 20 (3/4") DEPTH
 SUPERPAVE, 9.5mm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



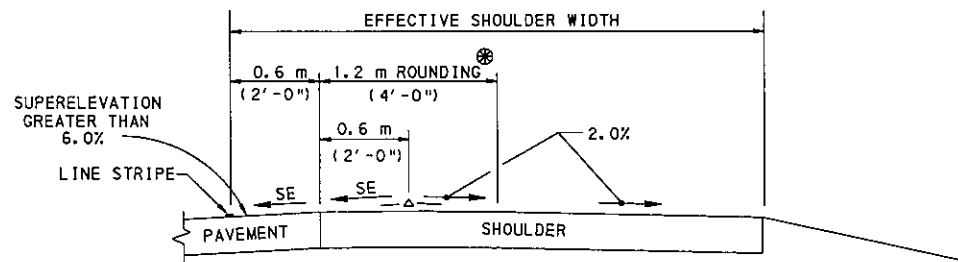
TYPE 1 SHOULDER
 TYPE 1-F SHOULDER
 TYPE 1-I SHOULDER
 TYPE 1-S SHOULDER
 TYPE 1-SP SHOULDER

NOTES

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



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.

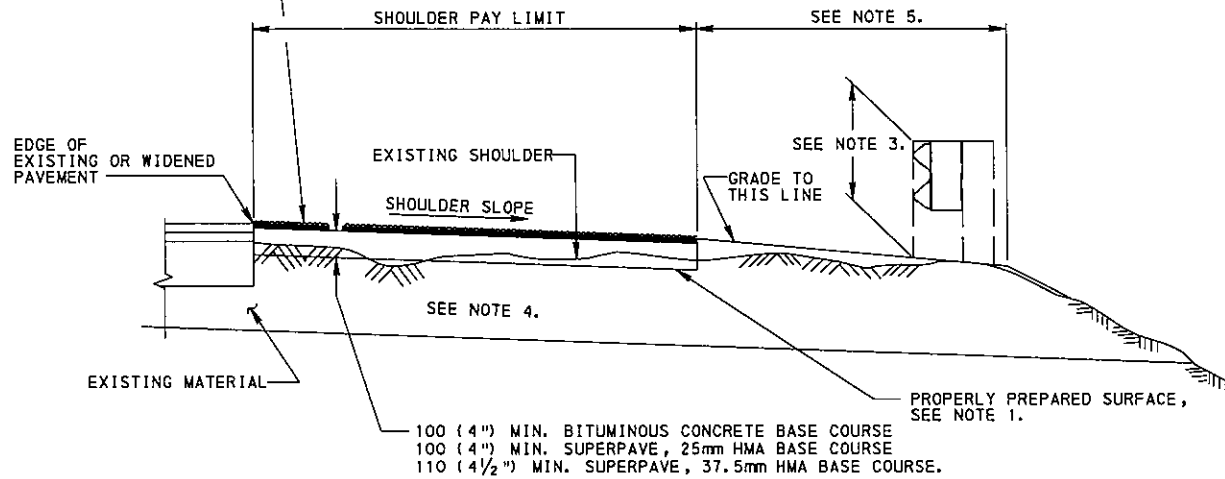
SHOULDER ROUNDING ON HIGH SIDE OF SUPERELEVATED CURVES

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

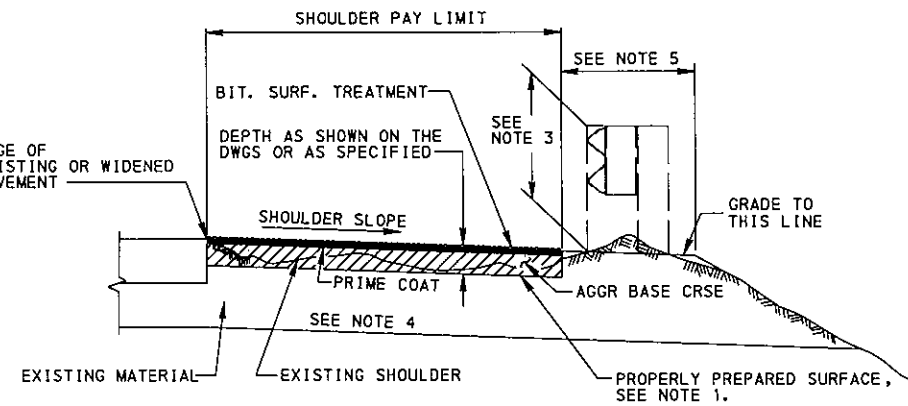
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SHOULDERS

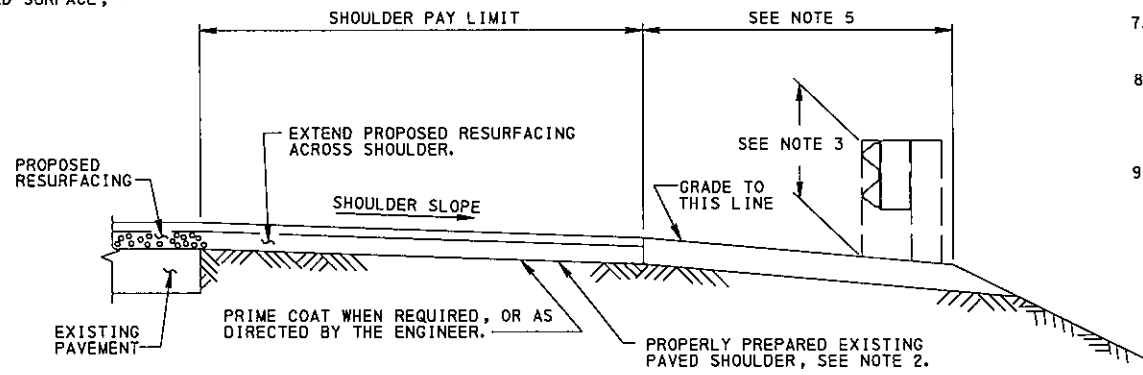
BIT. SURF. TREATMENT-INCIDENTAL TO TYPE 6 SHOULDERS, 20 (3/4") DEPTH
 BIT. SURF. CRSE, FJ-1-INCIDENTAL TO TYPE 6-F SHOULDERS, 25 (1") DEPTH
 BIT. WEAR. CRSE, ID-2-INCIDENTAL TO TYPE 6-I SHOULDERS, 40 (1 1/2") DEPTH
 DOUBLE SLURRY SEAL-INCIDENTAL TO TYPE 6-S SHOULDERS, 20 (3/4") DEPTH
 SUPERPAVE, 9.5mm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



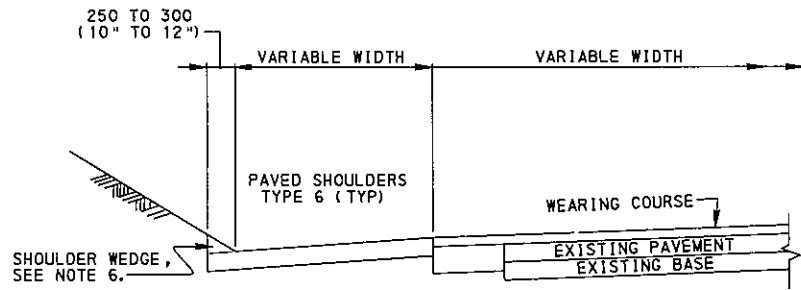
TYPE 6 SHOULDER
 TYPE 6-F SHOULDER
 TYPE 6-I SHOULDER
 TYPE 6-S SHOULDER
 TYPE 6-SP SHOULDER



TYPE 4 SHOULDER



TYPE 7 SHOULDER



TYPICAL SHOULDER DETAIL
 WITH BITUMINOUS TAPER SHOULDER WEDGE

NOTES

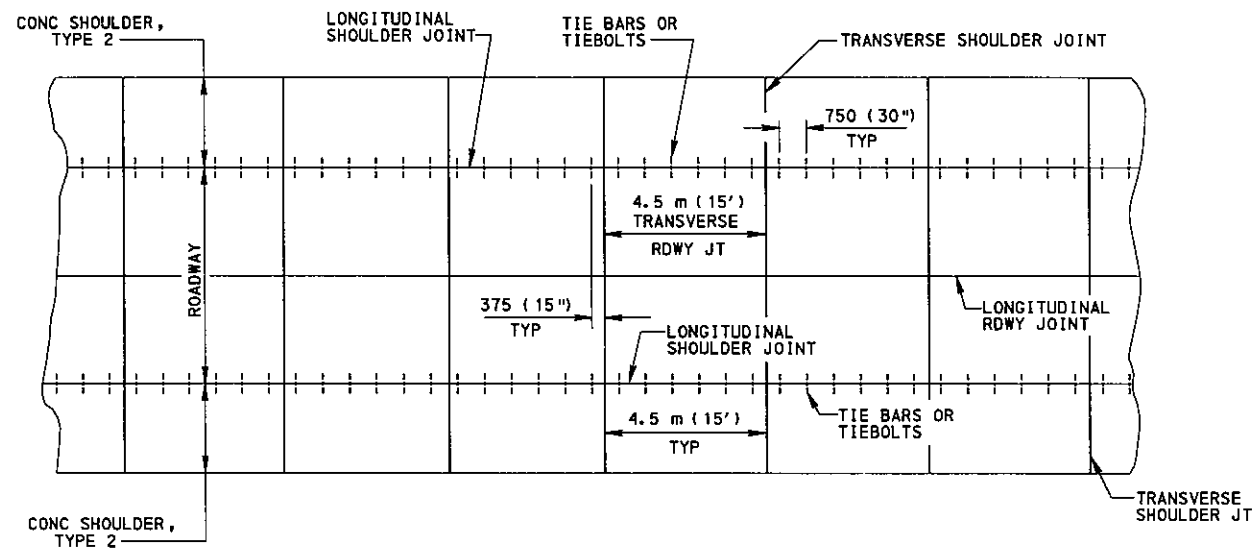
- FOR TYPE 4 AND TYPE 6 SHOULDERS PROPERLY PREPARE SURFACE BY EITHER SHAPING AND/OR SCARIFYING AND/OR COMPACTING. SHAPING INCLUDES REMOVAL OF EXISTING SHOULDER MATERIAL AND THE PLACEMENT OF GRADED MATERIAL FROM THE SHAPING OPERATION INTO THE LOW AREAS. WHERE THERE IS INSUFFICIENT GRADED MATERIAL FROM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

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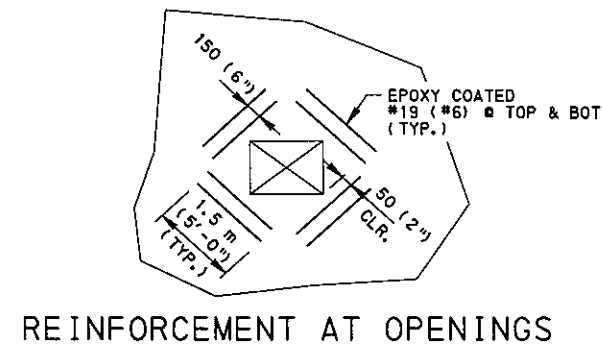
COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

SHOULDERS
 (RECONSTRUCTED)

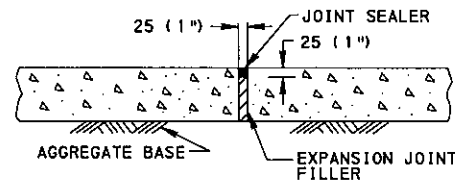
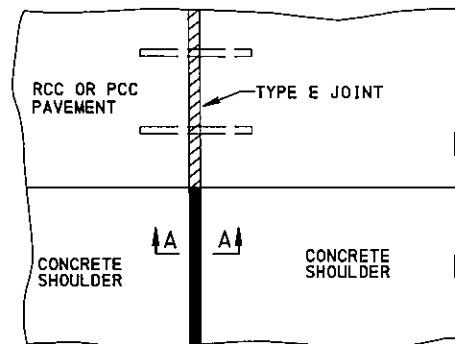
RECOMMENDED NOV. 1, 2001 <i>Dean A. Schme</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Barry S. Hoffman</i> CHIEF ENGINEER	SHT 2 OF 5 RC-25M
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**CONCRETE SHOULDERS ADJACENT TO PLAIN
CONCRETE PAVEMENT FOR COLLECTORS AND LOCAL ROADS**

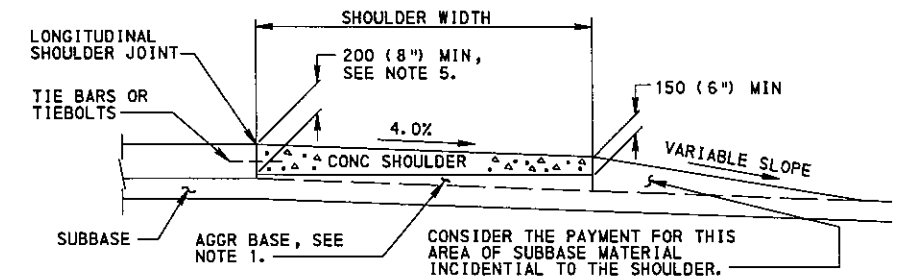


REINFORCEMENT AT OPENINGS

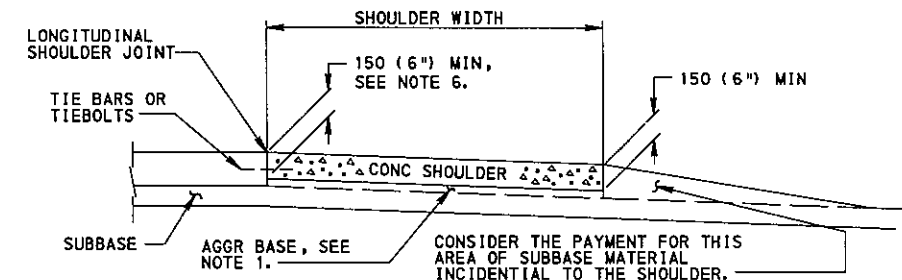


SECTION A-A

**CONCRETE SHOULDER
EXPANSION JOINTS**



CONCRETE SHOULDER - TYPE 1



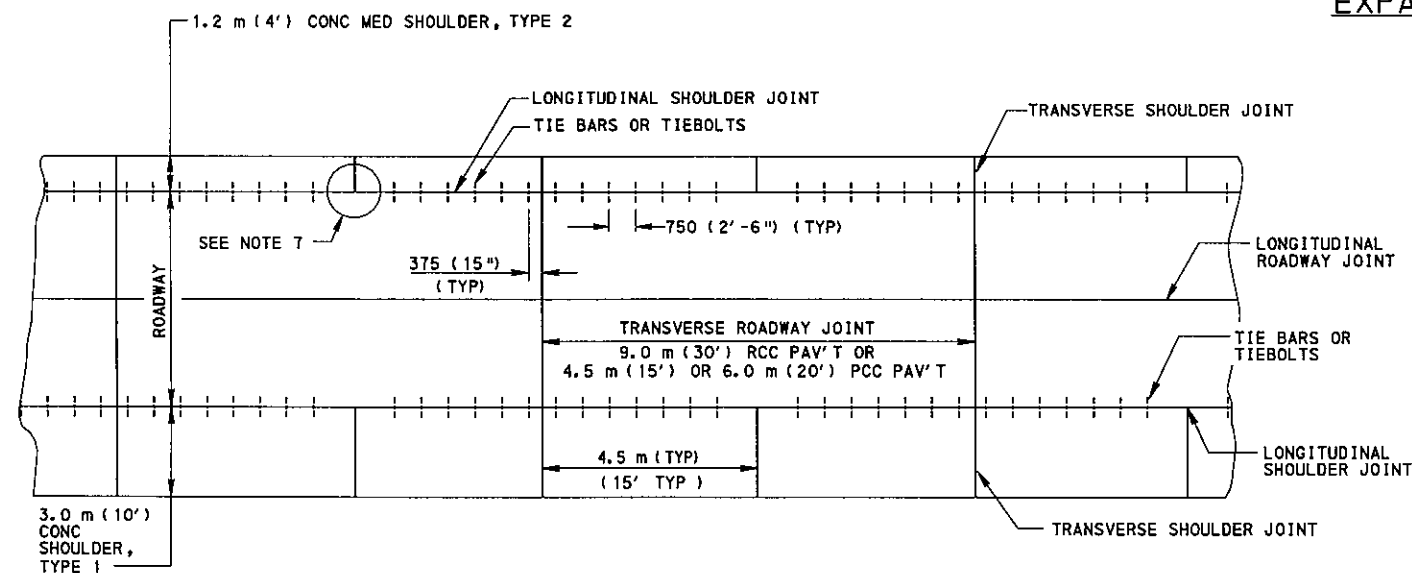
CONCRETE SHOULDER - TYPE 2

TYPICAL SECTIONS

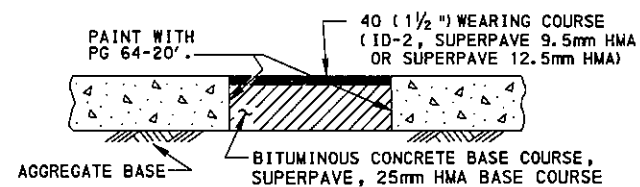
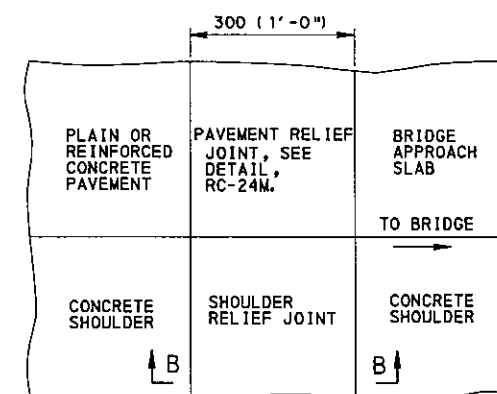
NOTES:

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.

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

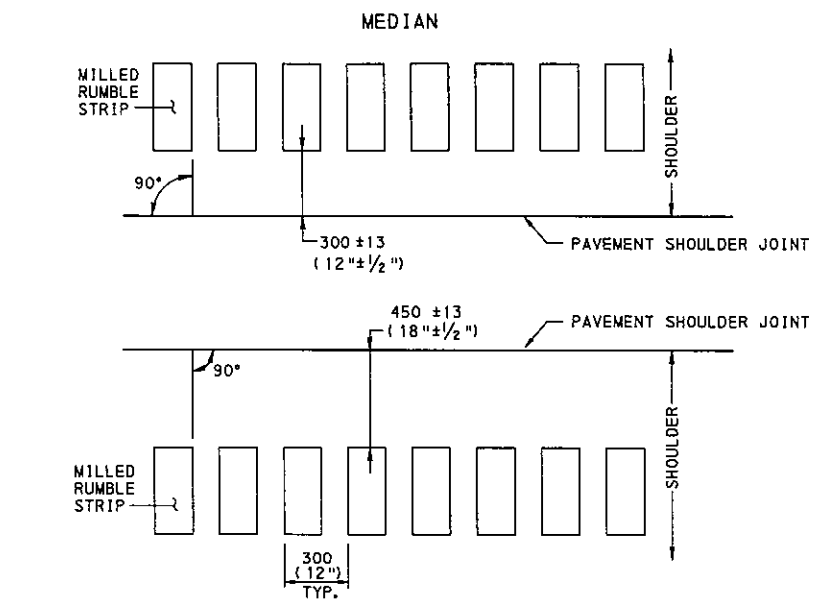


SECTION B-B

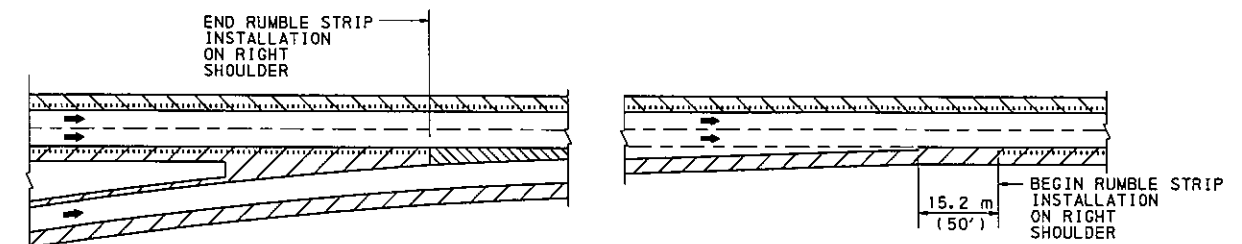
**SHOULDER
RELIEF JOINTS**

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

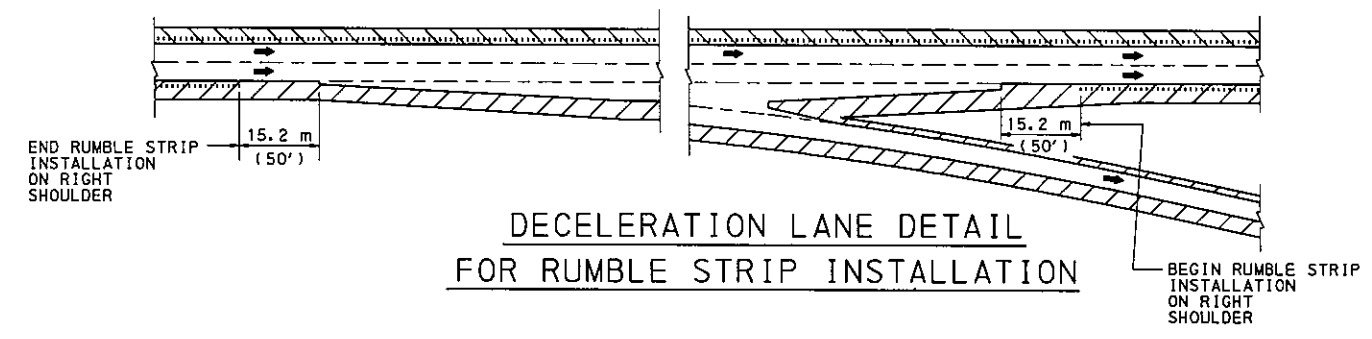
**SHOULDERS
(CONCRETE)**



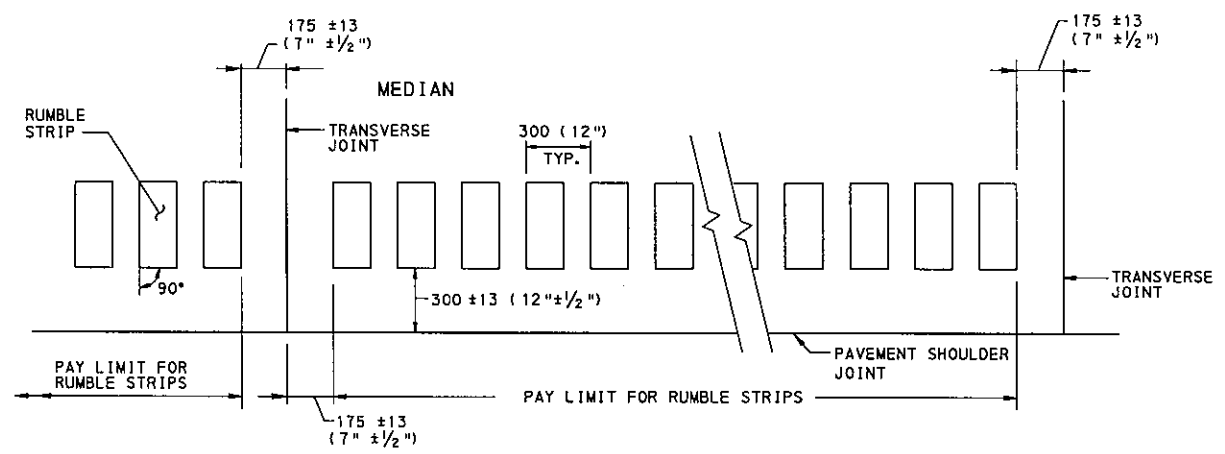
TYPICAL PLAN VIEW FOR MILLED RUMBLE STRIPS ON BITUMINOUS SHOULDERS



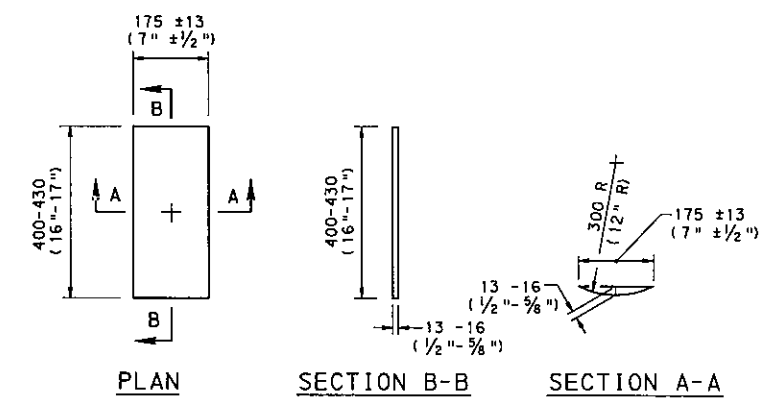
ACCELERATION LANE DETAIL FOR RUMBLE STRIP INSTALLATION



DECELERATION LANE DETAIL FOR RUMBLE STRIP INSTALLATION



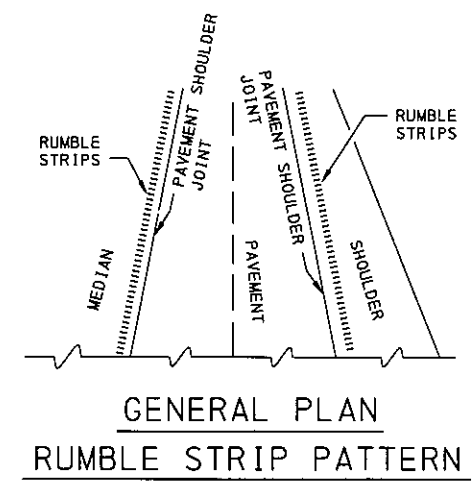
TYPICAL PLAN VIEW FOR MILLED OR FORMED RUMBLE STRIPS ON CONCRETE SHOULDERS



SECTION DETAILS OF RUMBLE STRIP PATTERN

NOTES

1. IF THERE IS NO ACTUAL PAVEMENT SHOULDER JOINT, MEASURE FROM THE PAVEMENT SHOULDER TRAFFIC LINE.
2. DO NOT MILL OR FORM SHOULDER RUMBLE STRIPS ACROSS A JOINT.
3. CONSTRUCT RUMBLE STRIPS IN ACCORDANCE WITH PUBLICATION 408 SECTION 660.
4. RUMBLE STRIPS ON CONCRETE SHOULDERS MAY BE MILLED OR FORMED.

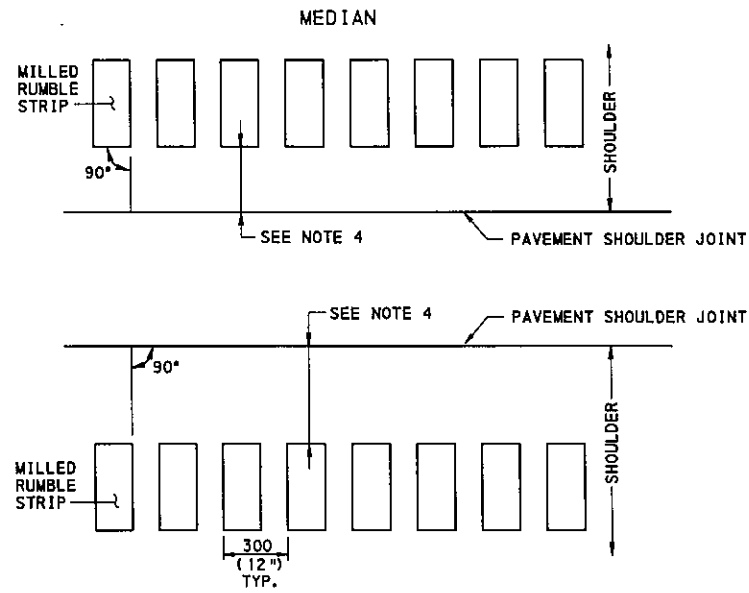


GENERAL PLAN RUMBLE STRIP PATTERN

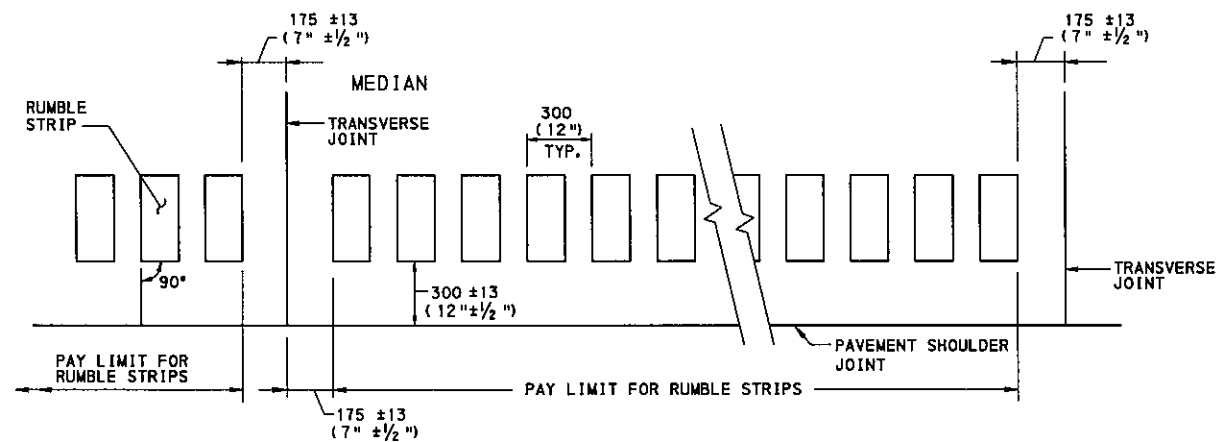
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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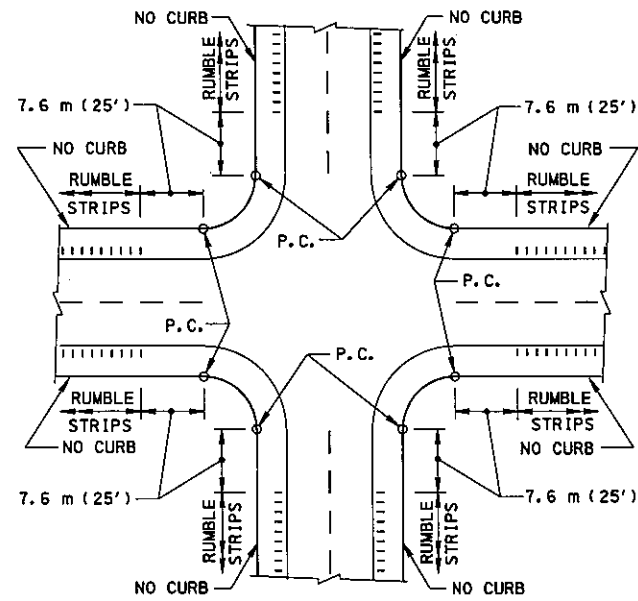
SHOULDERS
RUMBLE STRIPS
(LIMITED ACCESS HIGHWAYS)



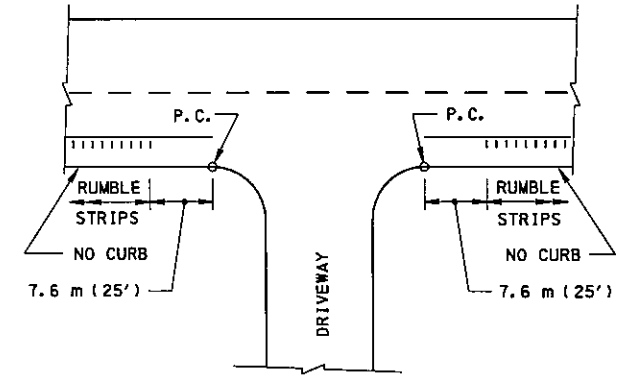
TYPICAL PLAN VIEW FOR MILLED RUMBLE STRIP ON BITUMINOUS SHOULDERS



TYPICAL PLAN VIEW FOR MILLED OR FORMED RUMBLE STRIPS ON CONCRETE SHOULDERS



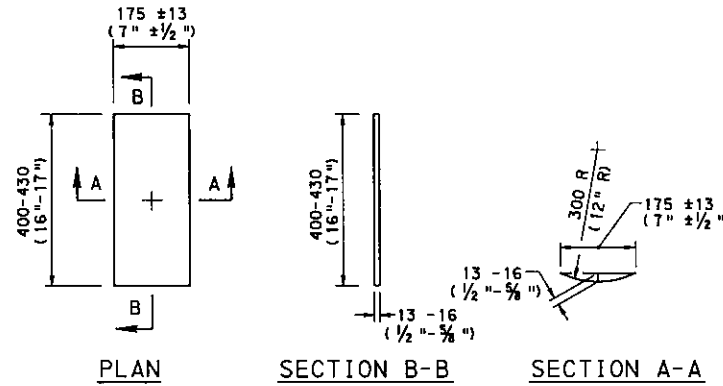
TYPICAL INTERSECTION DETAIL FOR RUMBLE STRIP INSTALLATION



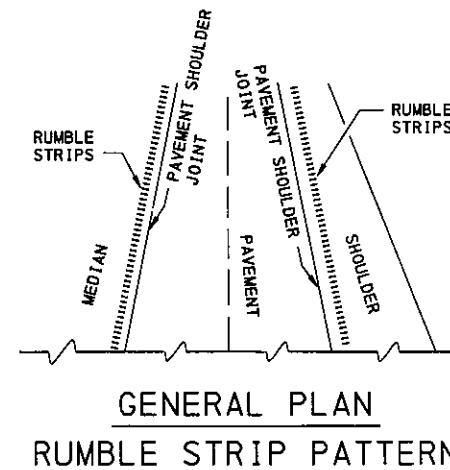
TYPICAL DRIVEWAY DETAIL FOR RUMBLE STRIP INSTALLATION

NOTES

1. MILLED OR FORMED 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 MILL OR FORM 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.
6. RUMBLE STRIPS ON CONCRETE SHOULDERS MAY BE MILLED OR FORMED.



SECTION DETAILS OF RUMBLE STRIP PATTERN

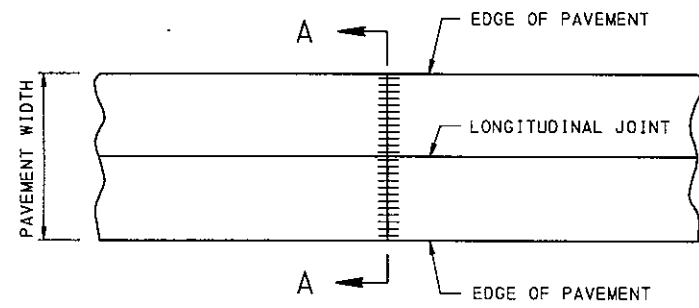


GENERAL PLAN RUMBLE STRIP PATTERN

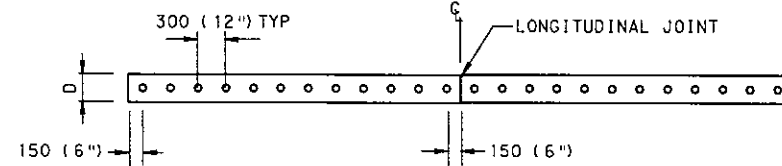
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SHOULDERS
RUMBLE STRIPS
(FREE ACCESS HIGHWAYS)

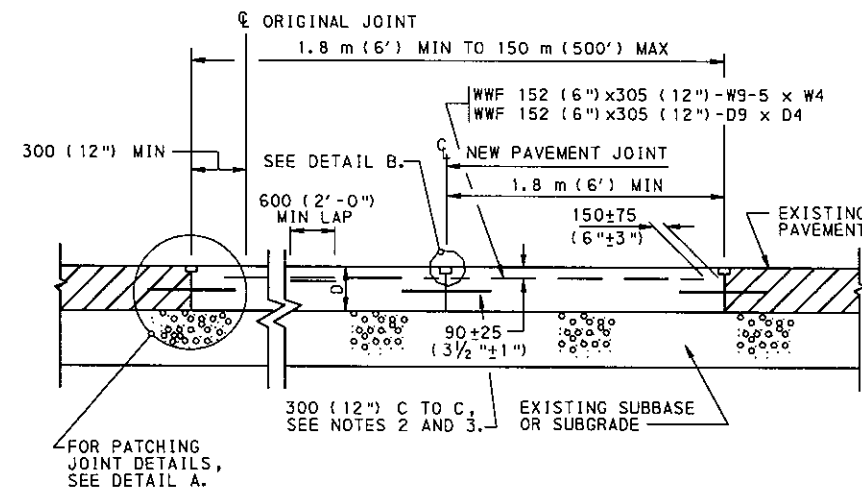


PLAN VIEW



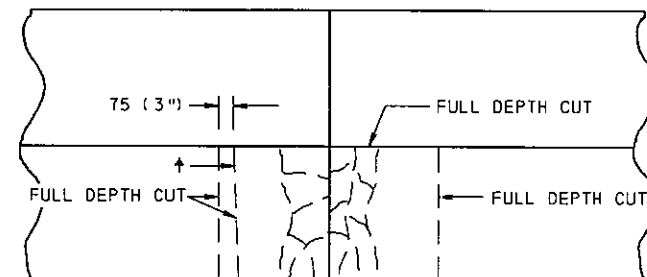
SECTION A-A

TYPICAL PAVEMENT PATCHING JOINT



TYPICAL SECTION
CONCRETE PAVEMENT PATCHING

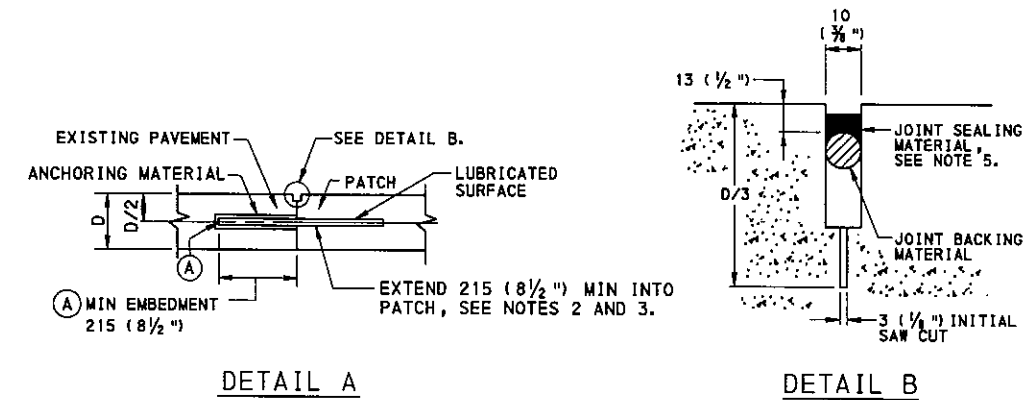
SEE NOTE 1.



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



DETAIL A

DETAIL B

PATCHING JOINT DETAILS

LEGEND

- Ⓐ 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").
- Ⓑ 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.
- Ⓓ WHEN THE JOINT SPACING IS LESS THAN 15 m (50'), W = 19 (3/4"). WHEN JOINT SPACING IS 15 m (50') OR MORE, W = 25 (1").

NOTES

1. WHEN ANY PAVEMENT PATCH REPLACES AN EXISTING EXPANSION JOINT AND THE EXISTING EXPANSION JOINT IN AN ADJACENT LANE REMAINS IN PLACE, INSTALL EXPANSION JOINT MATERIAL 19 (3/4") 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.
2. 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").
3. PLACE DOWEL BARS PARALLEL TO THE CENTERLINE AND SURFACE OF THE SLAB. THE VERTICAL OR HORIZONTAL SKEW FROM ONE END OF THE DOWEL BAR TO THE OTHER END IS NOT TO EXCEED 6 (1/4").
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.
5. MAKE THE TOP OF THE JOINT SEALING MATERIAL NO LESS THAN 3 (1/8") OR MORE THAN 6 (1/4") BELOW THE SURFACE OF THE PAVEMENT.

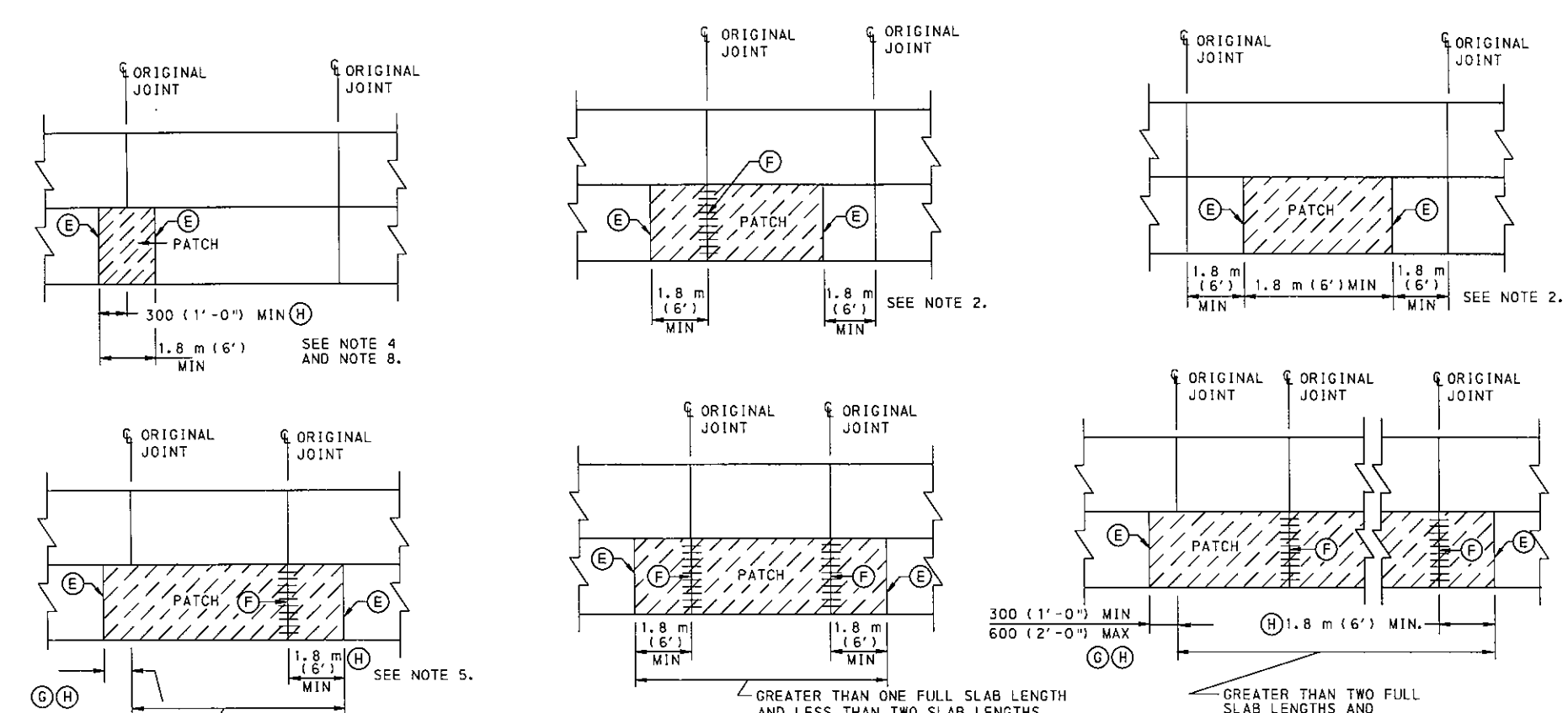
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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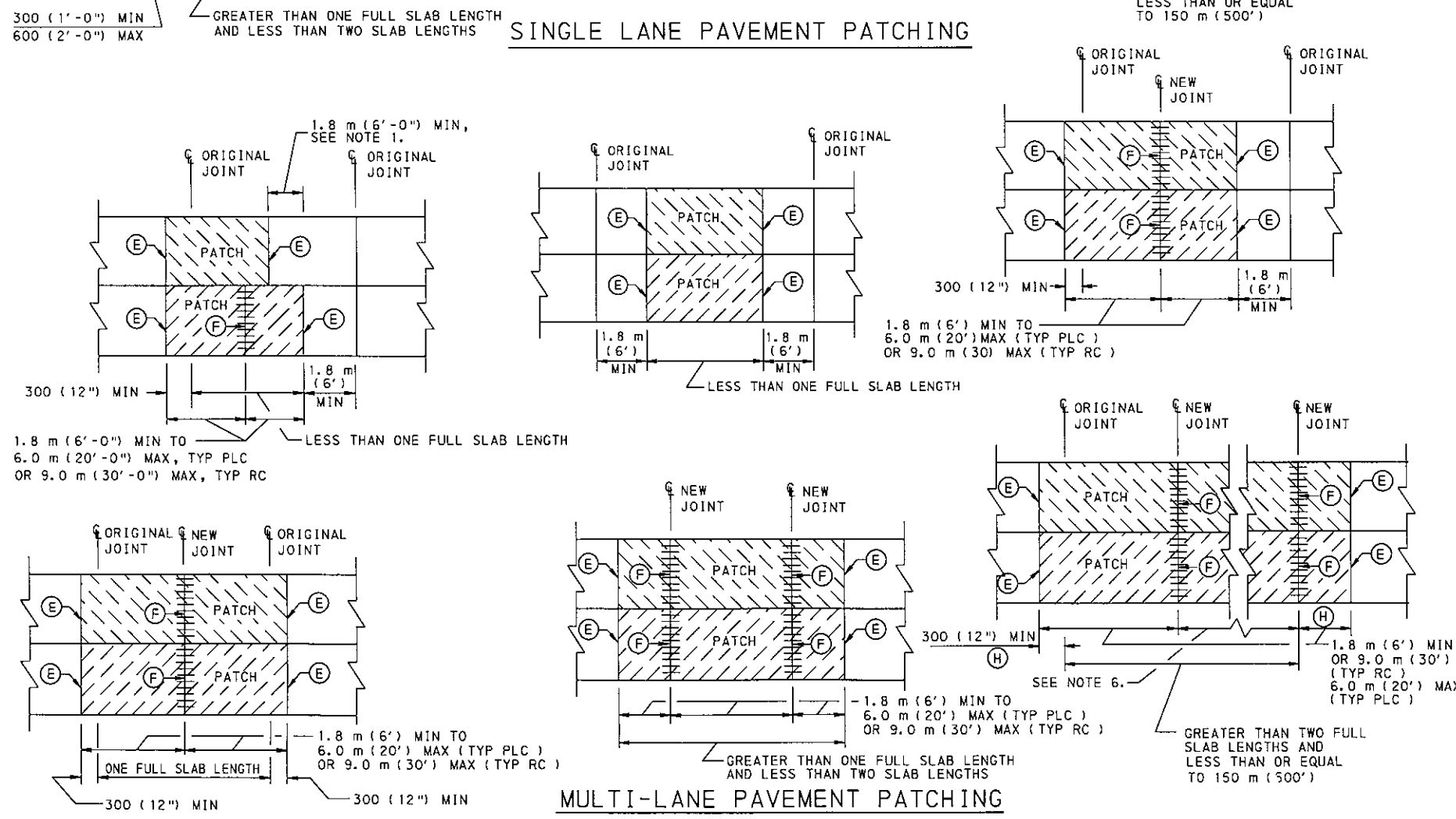
CONCRETE PAVEMENT
REHABILITATION

(PATCHING)

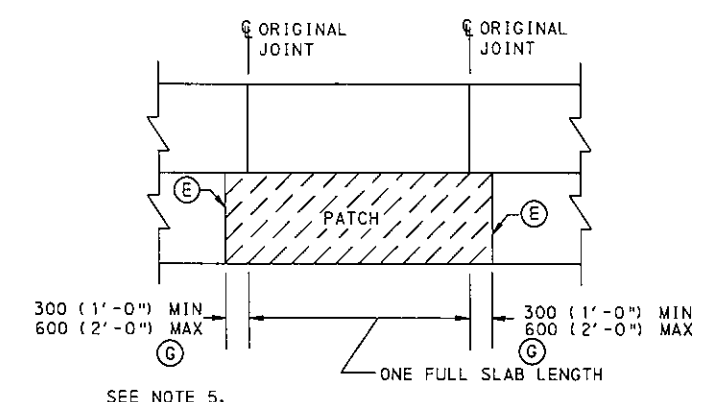
RECOMMENDED NOV. 1, 2001 <i>Stan A. Schuch</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Harry J. Hoffman</i> CHIEF ENGINEER	SHT 1 OF 5 RC-26M
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SINGLE LANE PAVEMENT PATCHING



MULTI-LANE PAVEMENT PATCHING



- 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**

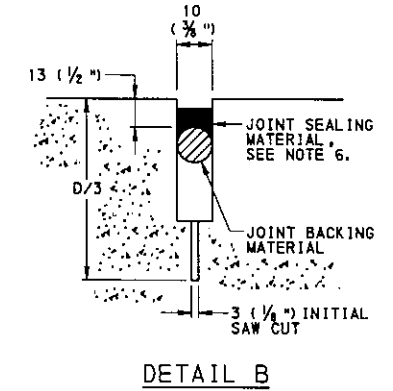
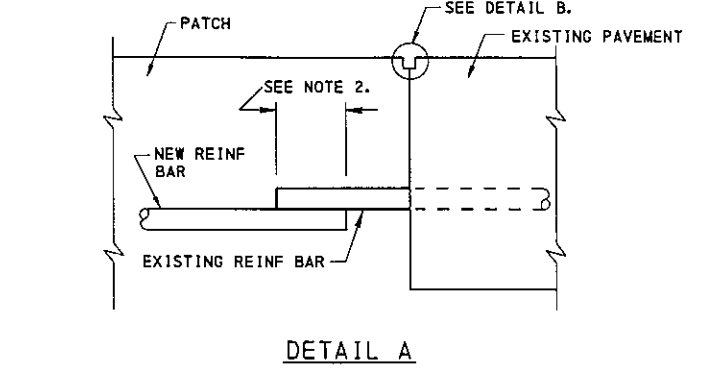
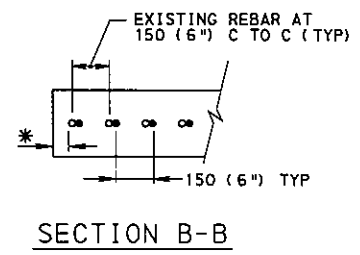
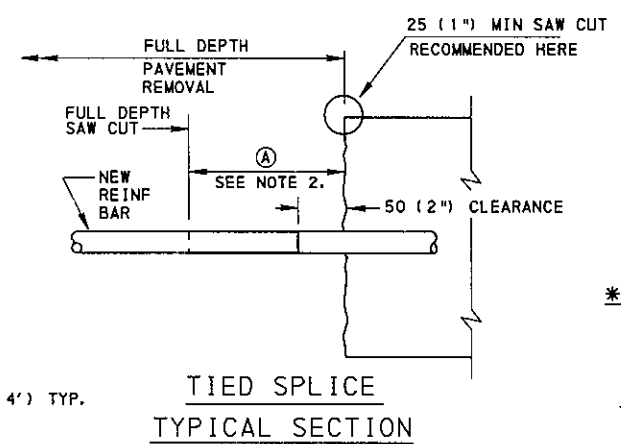
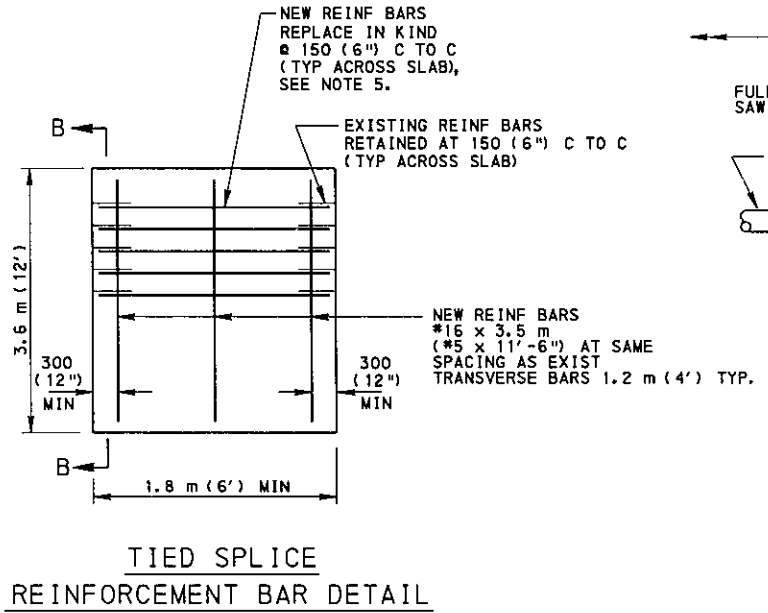
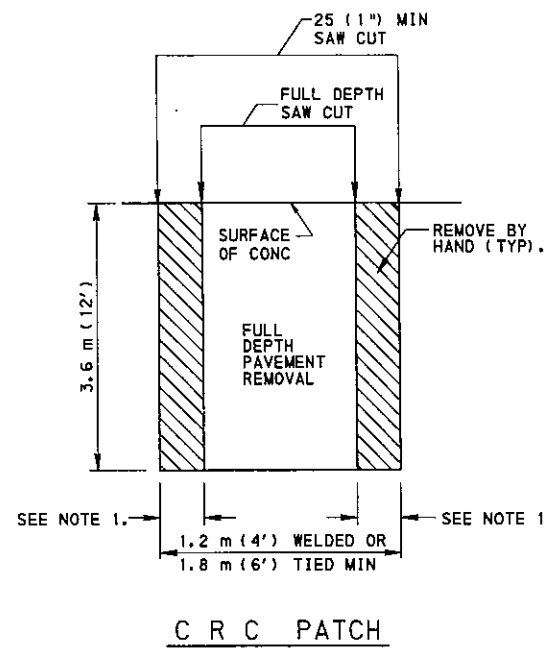
1. CONSTRUCT PAVEMENT PATCHES IN ADJACENT LANES, WITH LENGTHS THAT ARE WITHIN 1.8 m (6') OF EACH OTHER, TO THE SAME LENGTH. THIS LENGTH IS THE LENGTH OF THE LARGER PAVEMENT PATCH. IF THE PATCH LENGTHS DIFFER BY MORE THAN 1.8 m (6'), THEN CONSTRUCT TO THE REQUIRED LENGTHS.
2. DO NOT LEAVE LESS THAN 1.8 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., RC OR PLC).
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).

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 NOV. 1, 2001 <i>Dean A. Schaefer</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Gary S. Hoffman</i> CHIEF ENGINEER	SHT 2 OF 5 RC-26M
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PATCHING JOINT DETAILS

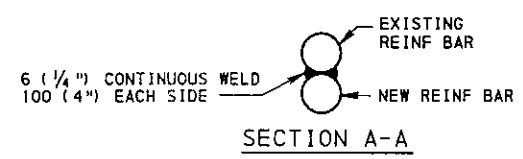
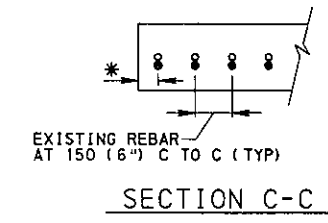
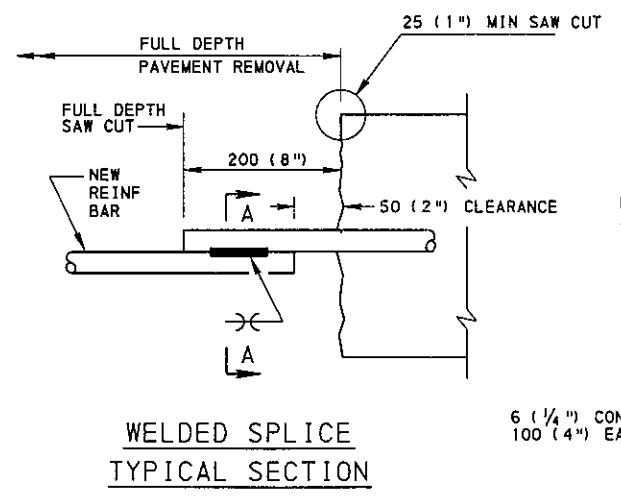
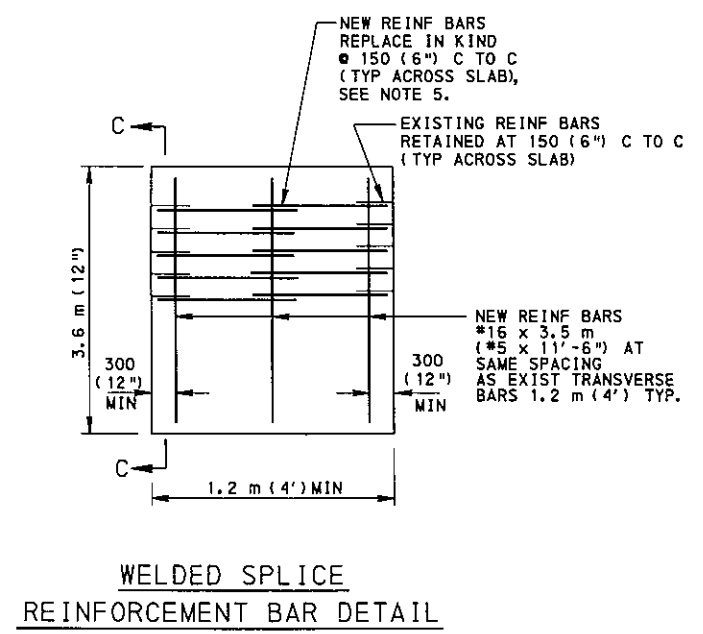
LEGEND

- * MAINTAIN EXISTING EDGE CLEARANCE.
 - EXISTING REBARS
 - NEW REBARS
 - Ⓐ USE THE FOLLOWING TABLE TO DETERMINE DEVELOPMENT LENGTH:
- | BAR SIZE | DEVELOPMENT LENGTH |
|----------|--------------------|
| #16 (#5) | 480 (20") |
| #19 (#6) | 585 (23") |
| #22 (#7) | 755 (27") |
- Ⓑ WHEN THE JOINT SPACING IS LESS THAN 15 m (50'), W = 19 (3/4"). WHEN JOINT SPACING IS 15 m (50') OR MORE, W = 25 (1").

NOTES

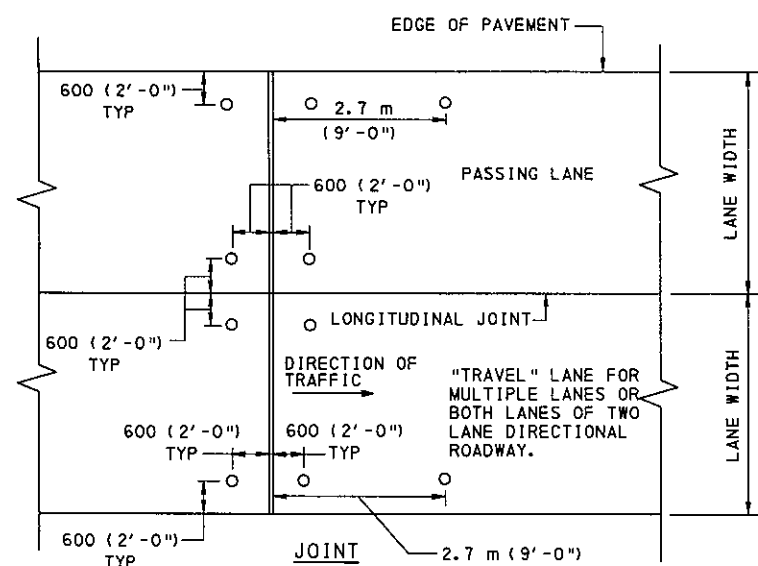
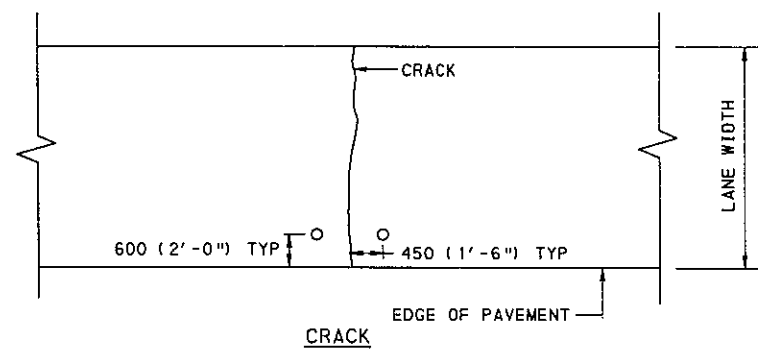
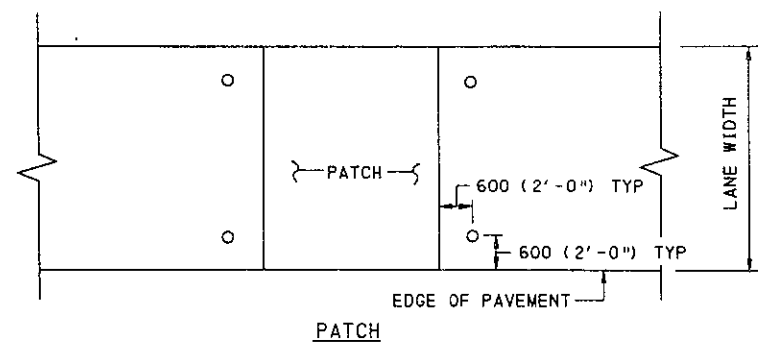
1. REMOVE 510 (20") MIN BY HAND FOR TIED SPLICES. REMOVE 200 (8") BY HAND FOR WELDED SPLICES.
2. OVERLAP TIED SPLICES BY AT LEAST 30 BAR DIAMETERS. OVERLAP WELDED SPLICES BY 150 (6").
3. REMOVE PAVEMENT FULL DEPTH UNDER RETAINED REINFORCEMENT BARS.
4. MINIMUM DISTANCE FROM PATCH EDGE TO EXISTING CRACK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

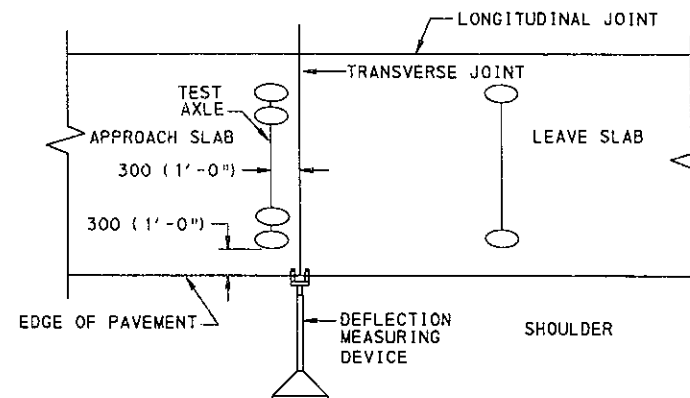


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DEPARTMENT OF TRANSPORTATION
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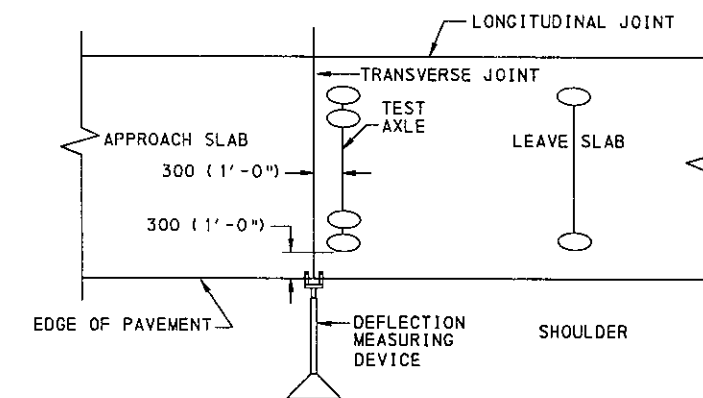
CONCRETE PAVEMENT
REHABILITATION
(C R C PATCHING)



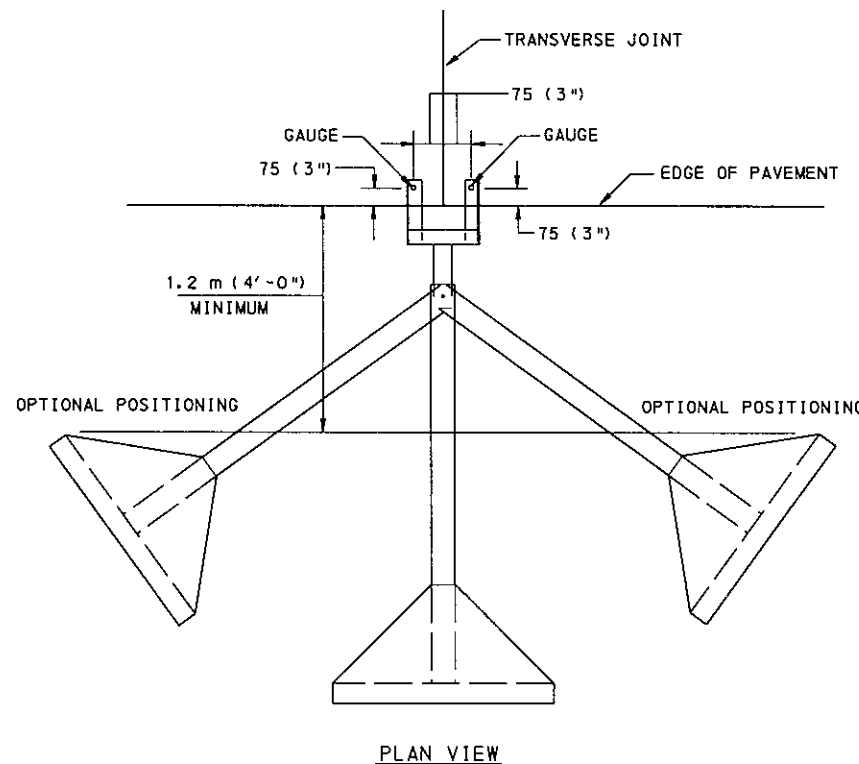
HOLE PATTERNS FOR PAVEMENT SLAB STABILIZATION



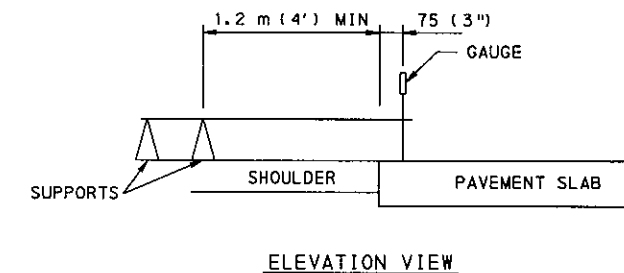
POSITION OF TEST AXLE FOR TAKING DEFLECTIONS WITH LOADED APPROACH SLAB



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.

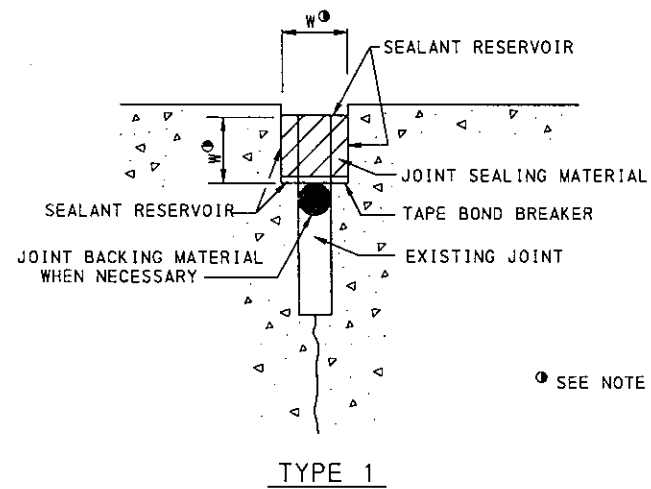
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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE PAVEMENT
REHABILITATION

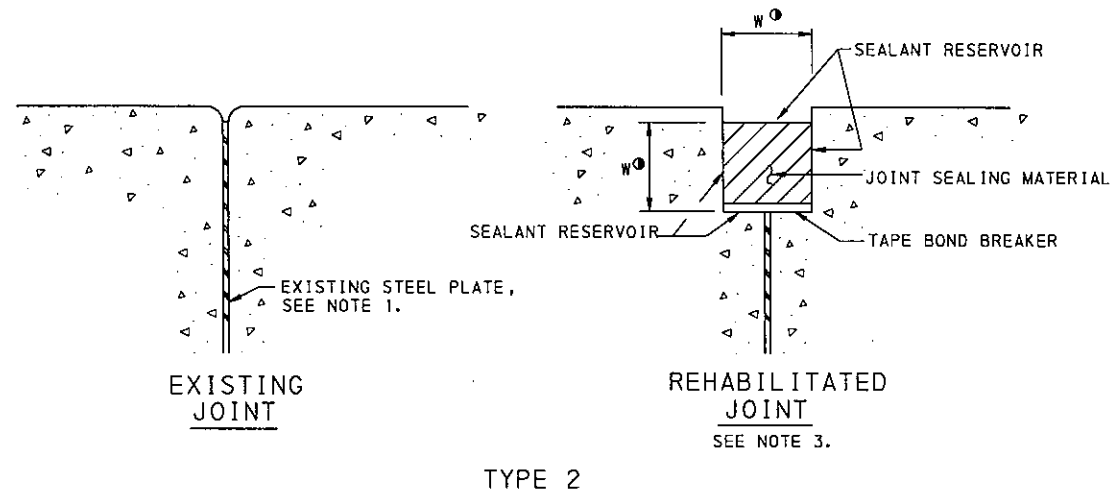
(PATCHING)

RECOMMENDED NOV. 1, 2001 <i>Dean A. Schurr</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Harry R. Hoffman</i> CHIEF ENGINEER	SHT 4 OF 5 RC-26M
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1 SEE NOTE 2.

TYPE 1



REHABILITATED JOINT
SEE NOTE 3.

TYPE 2

JOINT REHABILITATION

NOTES

1. EXISTING STEEL PLATE IS EITHER 2.01 THICK (14 GAUGE) WITH LAPPED TOP OR FLAT PLATE 3 (1/8") THICK.
2. WHEN EXISTING JOINT SPACING IS LESS THAN 15 m (50'), W = 19 (3/4"). WHEN EXISTING JOINT SPACING IS 15 m (50') OR MORE, W = 25 (1").
3. REMOVE THE STEEL PLATE WITHIN THE SEALANT RESERVOIR.
4. MAKE THE TOP OF THE JOINT SEALING MATERIAL NO LESS THAN 3 (1/8") OR MORE THAN 6 (1/4") BELOW THE SURFACE OF THE PAVEMENT.

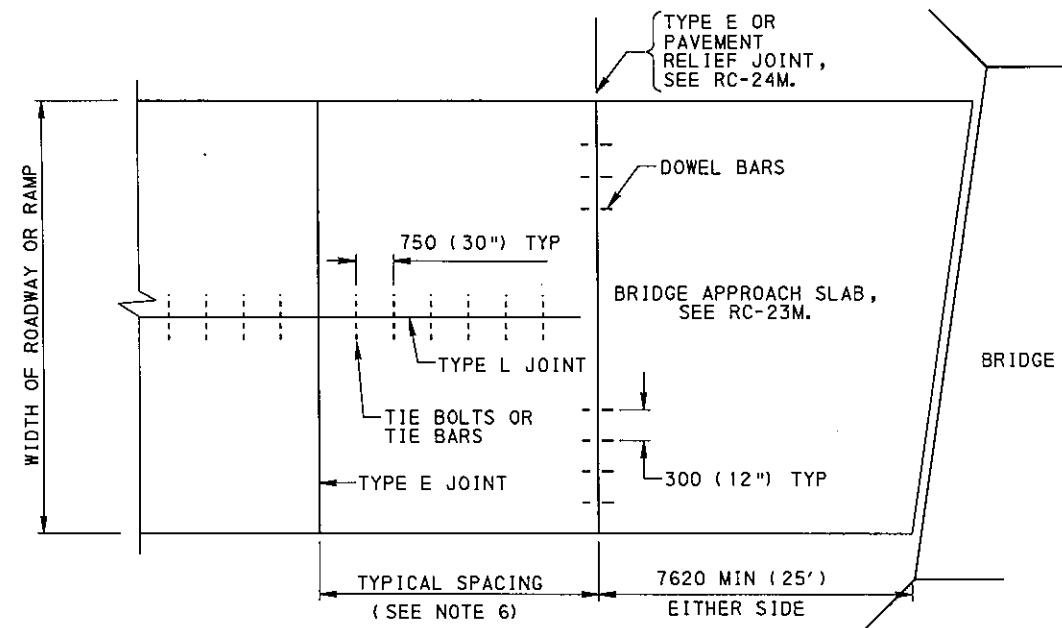
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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

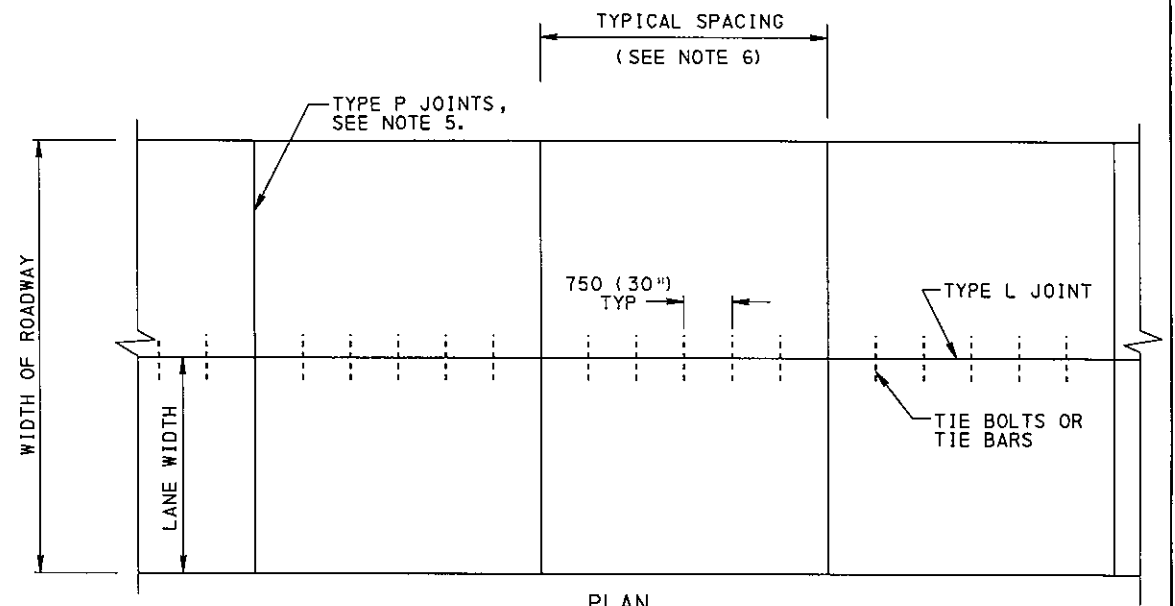
CONCRETE PAVEMENT
REHABILITATION

(PATCHING)

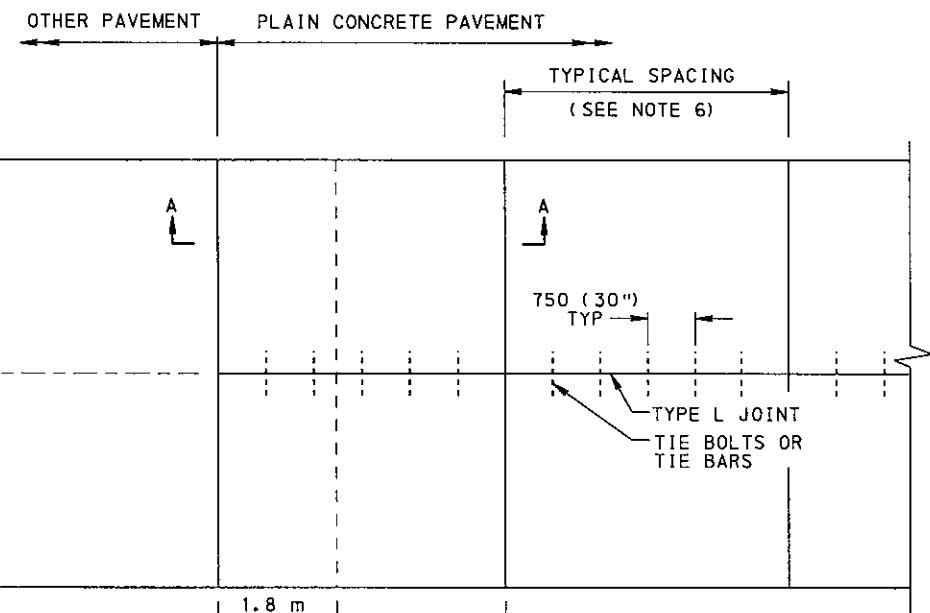
RECOMMENDED NOV. 1, 2001 <i>Walter H. Schuch</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Gary S. Hoffman</i> CHIEF ENGINEER	SHT 5 OF 5 RC-26M
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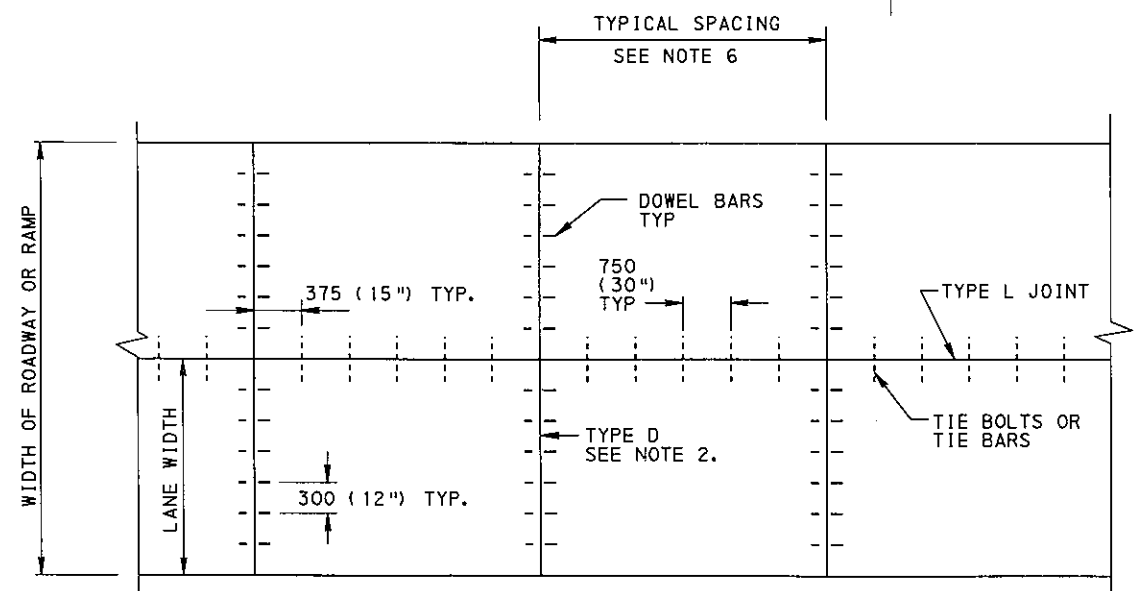
PLAN
BRIDGE APPROACHES



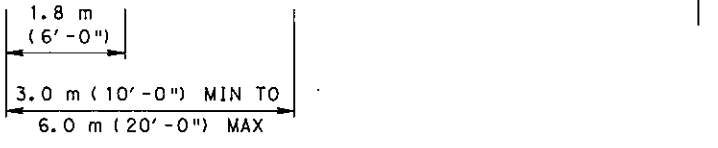
PLAN
COLLECTORS AND LOCAL ROADS



PLAN
TERMINAL SLAB



PLAN
INTERSTATE AND OTHER LIMITED ACCESS
FREEWAYS, ARTERIALS AND RAMPS



SECTION A-A

NOTES

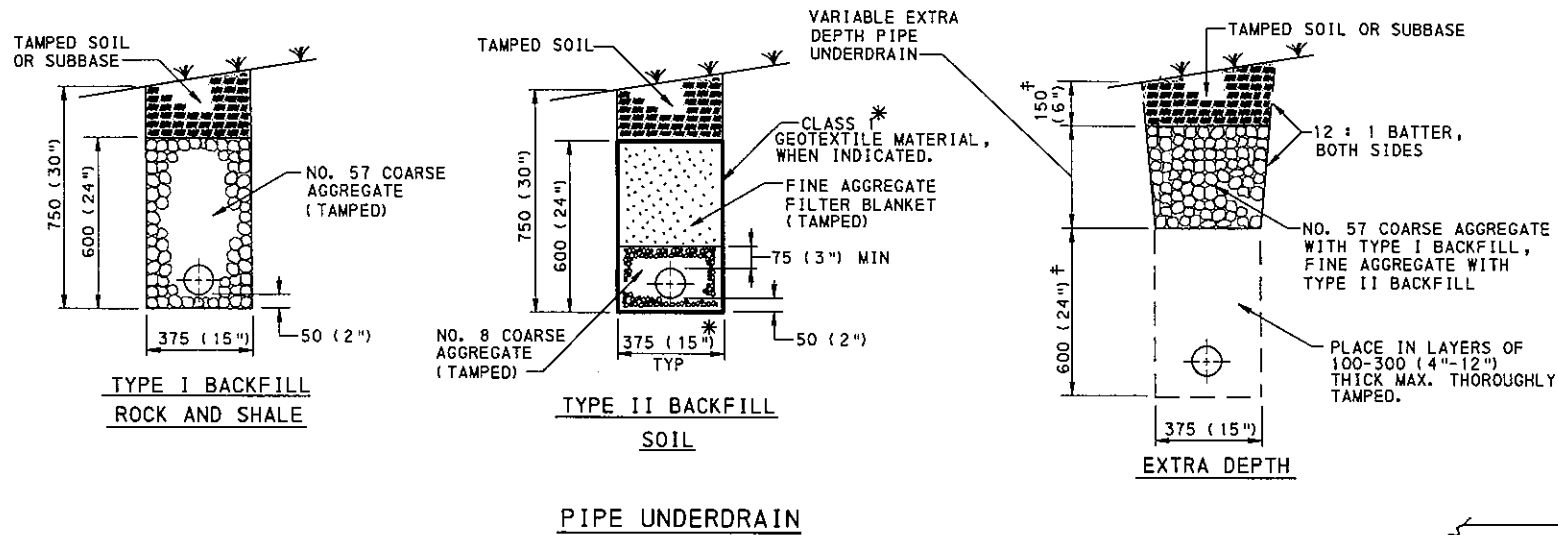
1. FOR JOINT DETAILS, SEE RC-20M.
2. CONSTRUCT TYPE D JOINTS ON INTERSTATE EXPRESSWAY, ARTERIAL AND RAMP PAVEMENTS.
3. WHEN RAMP OR LANE WIDTH EXCEEDS 4.2 m (14'), A TYPE L JOINT IS REQUIRED AT THE MIDPOINT.
4. CONSTRUCT ACCELERATION AND DECELERATION PORTION OF RAMPS WITH THE SAME PAVEMENT STRUCTURE AS THE MAINLINE PAVEMENT TO THE FIRST TRANSVERSE JOINT BEYOND THE SHOULDER GORE.
5. ON COLLECTORS AND LOCAL ROADS, CONSTRUCT TYPE P JOINTS, AS INDICATED.
6. A 4.5 m (15') JOINT SPACING IS TO BE USED ON ALL PAVEMENTS LESS THAN 250 (10") THICK. A 6.0 m (20') JOINT SPACING IS TO BE USED ON ALL PAVEMENTS EQUAL TO OR GREATER THAN 250 (10") THICK.
7. FOR ALTERNATE JOINTS, SEE RC-20M, SHEETS 1 AND 2.
8. ON CURVES, THE JOINT SHALL BE CONSTRUCTED PERPENDICULAR TO THE TANGENT ON THE LONG RADIUS SIDE OF THE CURVE.
9. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.

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

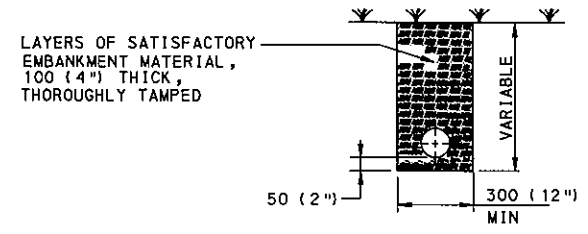
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

PLAIN CONCRETE PAVEMENT

09-061-2001

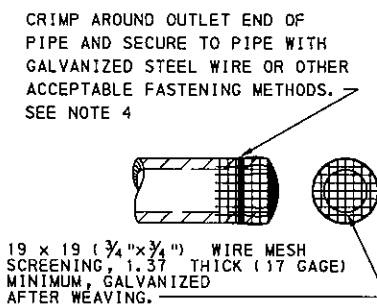


- NOTES**
1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408M (408/2000), SECTION 610 FOR PIPE UNDERDRAIN AND PAVEMENT BASE DRAIN.
 2. PROVIDE BITUMINOUS PAPER WHEN GEOTEXTILE MATERIAL IS NOT INDICATED.
 3. FOR THE SUBSURFACE DRAIN OUTLET PROVIDE MATERIALS MEETING THE REQUIREMENTS OF PUBLICATION 408/2000, SECTION 615. A MINIMUM OF 600 (24") OF COVER OVER THE PIPE IS REQUIRED FOR OUTLETS CONSTRUCTED WITH THE SAME MATERIAL AS THE UNDERDRAIN OR PAVEMENT BASE DRAIN.
 4. USE THE WIRE MESH SHIELD IN AREAS NOT SUBJECT TO MOWING OR DAMAGE BY EQUIPMENT OR VEHICLES. REFER TO RC-31M FOR CONSTRUCTION OF ENDWALLS FOR OUTLET PROTECTION.
 5. LONGITUDINAL BASE DRAINS MAY RUN CONTINUOUSLY THROUGH TWO (2) OUTLETS. USE A 45° ELBOW ON THE THIRD OUTLET OF A SERIES. BEGIN THE DRAIN FOLLOWING THE THIRD OUTLET WITH AN END CAP.
 6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.



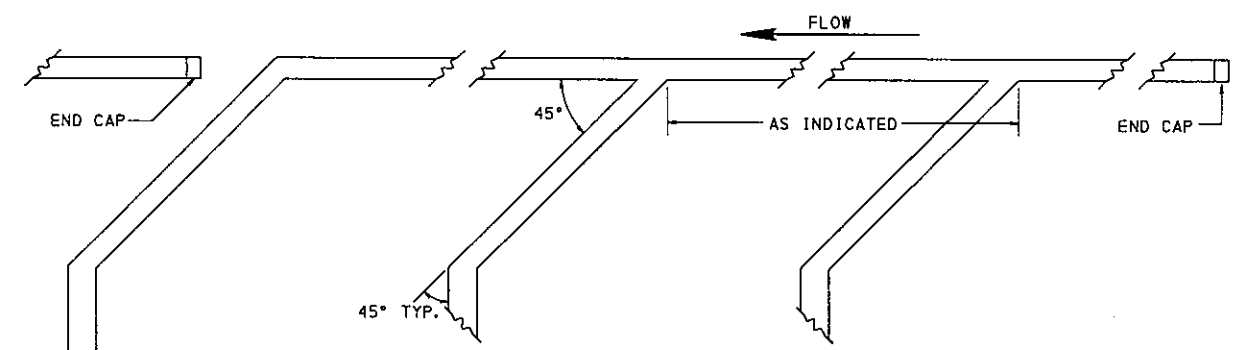
EXCAVATION OVER 900 (36") IN DEPTH AND FOR A MAXIMUM WIDTH OF 600 (24") IS PAYABLE AS CLASS 4 EXCAVATION. USE SUBSURFACE DRAIN OUTLETS FOR ALL PIPE UNDERDRAIN AND PAVEMENT BASE DRAINS.

SUBSURFACE DRAIN OUTLETS
(SEE DETAIL A.)



DETAIL A
WIRE MESH SHIELD

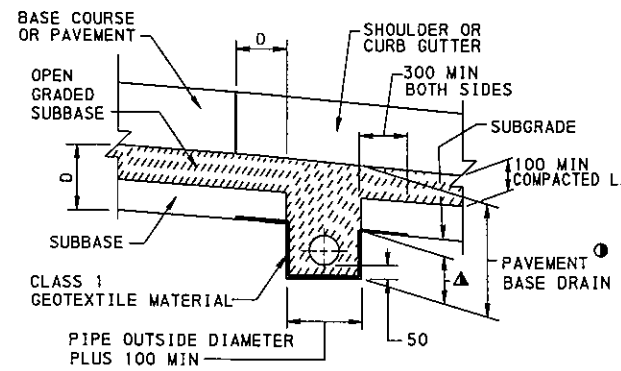
CONSTRUCT THE OUTLET INVERT 100 (3") (MINIMUM) HIGHER THAN THE SWALE LINE ELEVATION.



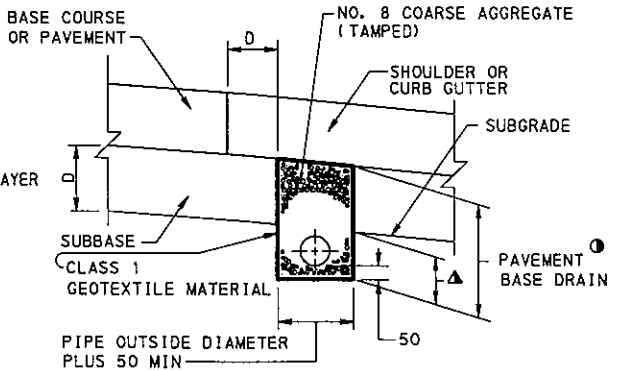
LONGITUDINAL BASE DRAIN AND OUTLET CONFIGURATION
SEE NOTE 5

- 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

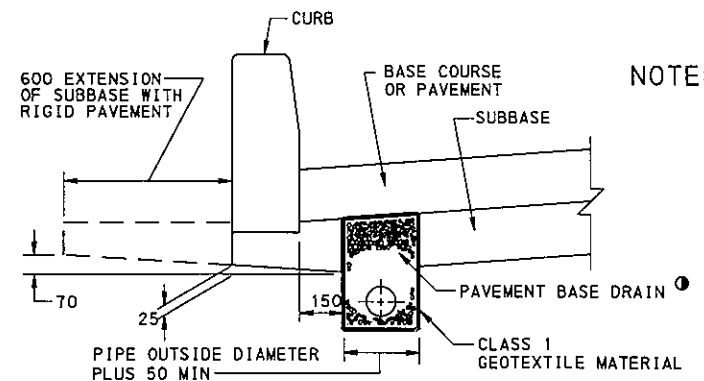
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



TYPICAL PLACEMENT
(OPEN GRADED SUBBASE)



TYPICAL PLACEMENT
(STANDARD SUBBASE)



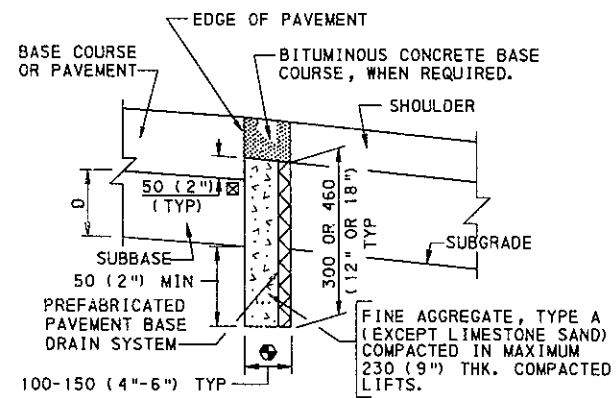
PLACEMENT AT CURB SECTION

PAVEMENT BASE DRAIN

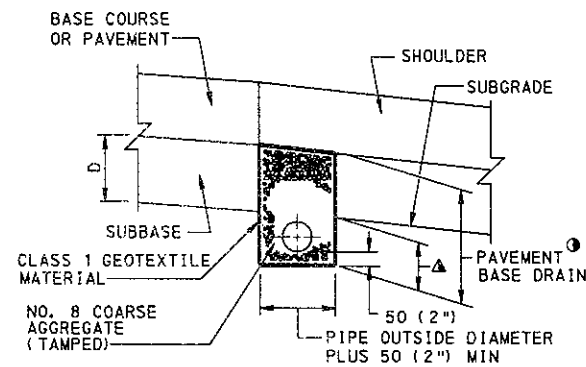
COMMONWEALTH OF PENNSYLVANIA
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BUREAU OF DESIGN

SUBSURFACE DRAINS

RECOMMENDED NOV. 1, 2001 <i>Don A. Schae</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Gary R. Hoffman</i> CHIEF ENGINEER	SHT 1 OF 5 RC-30M
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**PREFABRICATED
PAVEMENT BASE DRAIN
(REHABILITATION)**
SEE NOTE 3.



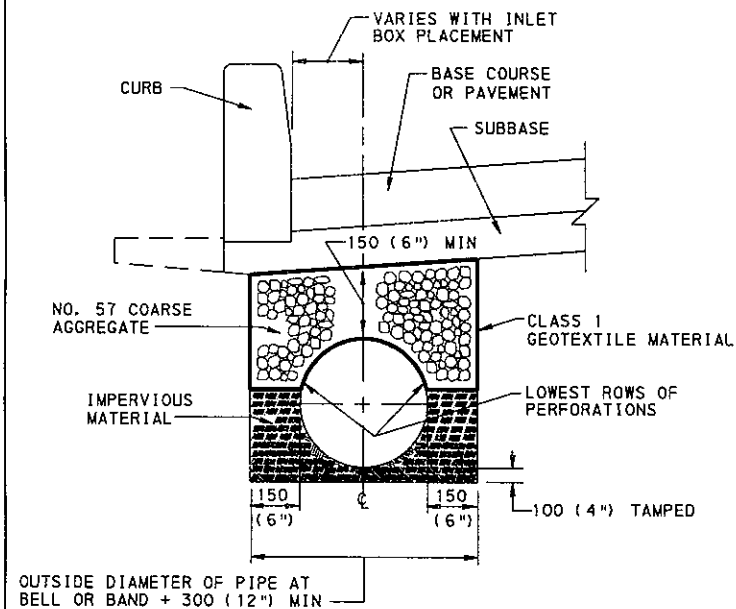
**PAVEMENT BASE DRAIN
(REHABILITATION)**

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408/2000, 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.

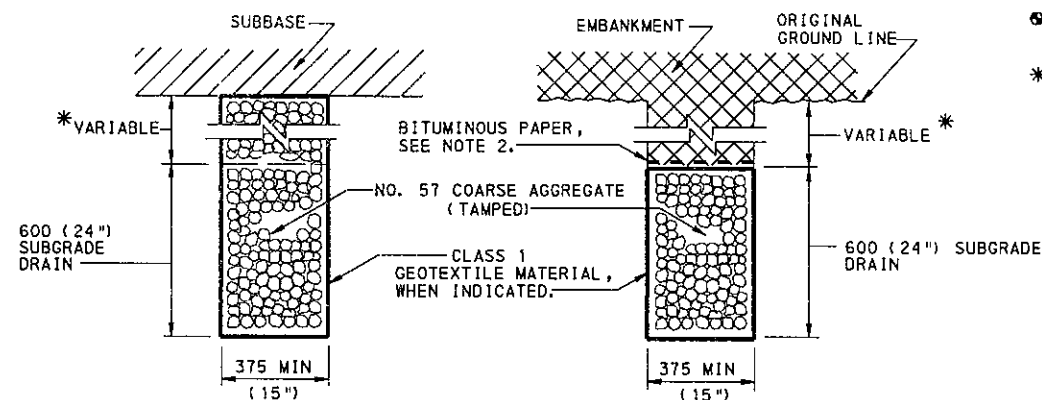
LEGEND

- ▲ 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.



**COMBINATION
STORM SEWER AND UNDERDRAIN**

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

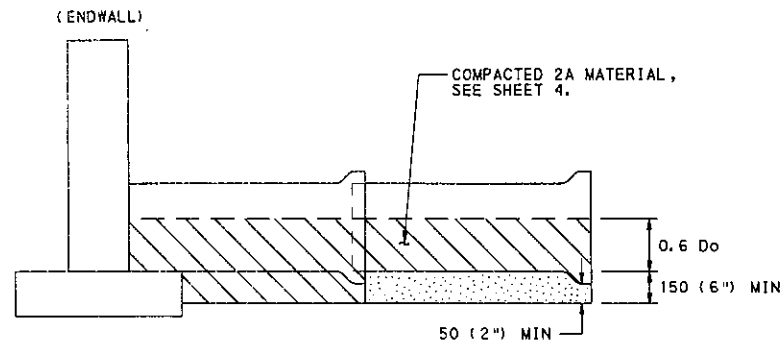


**TREATMENT UNDER SUBBASE TREATMENT UNDER EMBANKMENT
SUBGRADE DRAIN**

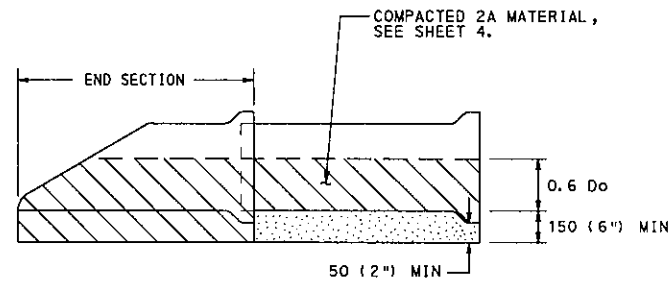
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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DEPARTMENT OF TRANSPORTATION
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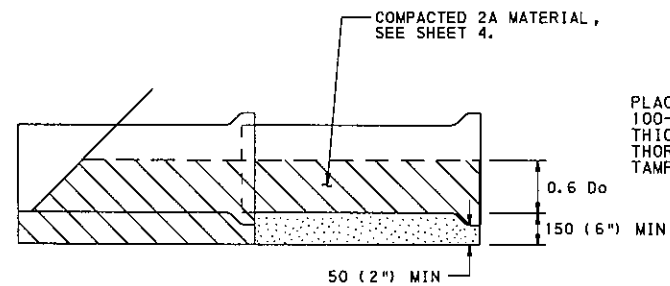
SUBSURFACE DRAINS



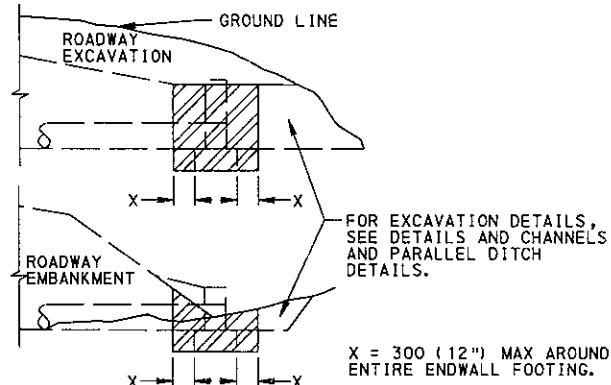
BACKFILL DETAIL AT ENDWALL
(FOR CONCRETE PIPE)



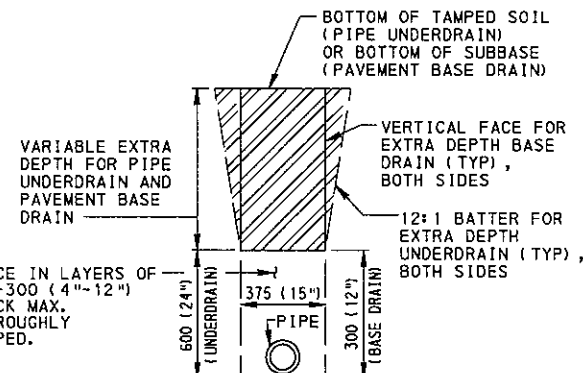
BACKFILL DETAIL AT END SECTION
(FOR CONCRETE PIPE)



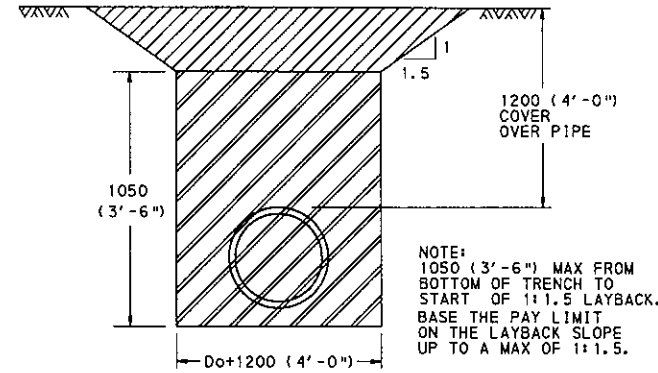
BACKFILL DETAIL AT LAST SECTION OF PIPE
(FOR CONCRETE PIPE)



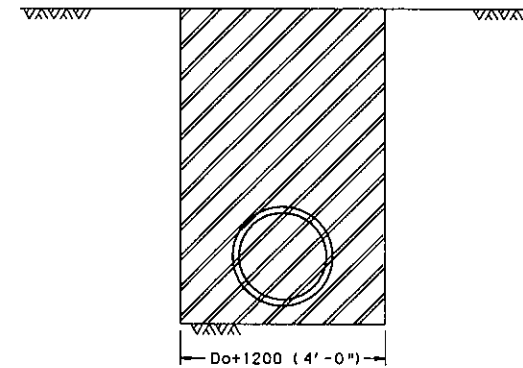
EXCAVATION FOR ENDWALLS



EXTRA DEPTH FOR PIPE UNDERDRAIN AND PAVEMENT BASE DRAIN

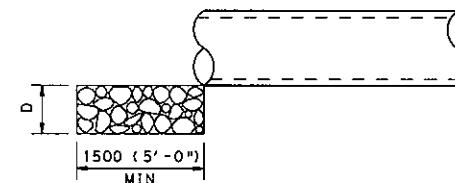


ABOVE DRAWING SHOWS EXCAVATION FOR PIPE IN CUT OR FILL WHERE SUBGRADE IS 1050 (3'-6'') OR MORE ABOVE THE BOTTOM OF THE TRENCH.



ABOVE DRAWING SHOWS EXCAVATION FOR PIPE IN CUT OR FILL WHERE SHORING OR A TRENCH BOX IS USED.

PAY LIMITS FOR PIPE EXCAVATION






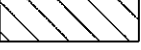
DETAIL A - PIPE INLET OR OUTLET PROTECTION

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

NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408/2000, 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 408/2000, SECTION 601.
3. IN ALL EXCAVATION AREAS FOLLOW OSHA SAFETY REQUIREMENTS.
4. DO NOT COMPACT NO. 8 MATERIAL USED FOR BEDDING UNDER CONCRETE PIPES.
5. ALLOW NO PAYMENT FOR EXCAVATION IN EXCESS OF SPECIFIED LIMITS AND FOR ADDITIONAL BACKFILL MATERIAL REQUIRED.
6. PAYMENT FOR THE BACKFILL ENVELOPE, INCLUDING BEDDING, COARSE AGGREGATE AND SUITABLE MATERIAL UP TO 300 (12'') ABOVE THE PIPE IS INCIDENTAL TO THE PIPE.
7. FOR BOTTOM TRENCH WIDTHS ≥ 2.5 m (8'-0''), ALL EXCAVATION IS CLASS 1.
8. FOR INLET OR OUTLET PROTECTION SEE DETAIL A.

LEGEND

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

Do = OUTSIDE DIAMETER OF PIPE.

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

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

PIPE INSTALLATION PROCEDURES

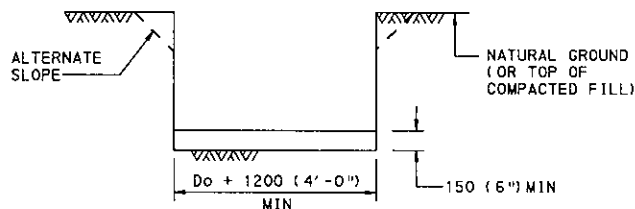
CONSTRUCTION DETAILS BELOW COVER THE FOLLOWING CONDITIONS:

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

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

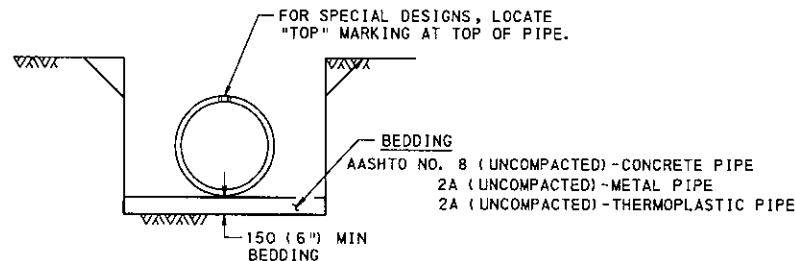
STEP 3: EXCAVATE THE TRENCH TO THE WIDTH OF THE OUTSIDE DIAMETER OF THE PIPE PLUS 1200 (4'-0") AND CREATE AN APPROPRIATE BEDDING 150 (6") DEEP.



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, 300 (12") MAX.

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

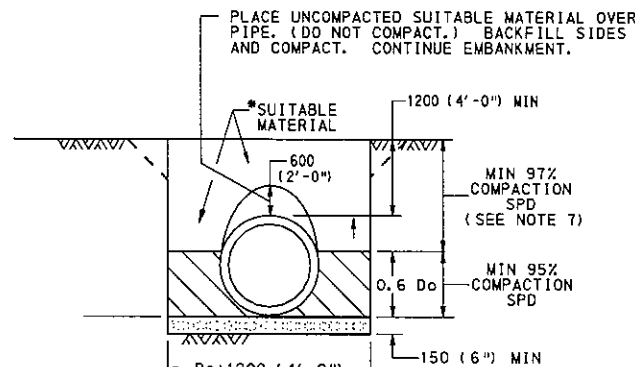
STEP 5: LAY PIPE ON APPROPRIATE BEDDING. SEE STEP 6D FOR METAL PIPE ARCH AND METAL PLATE PIPE ARCH.



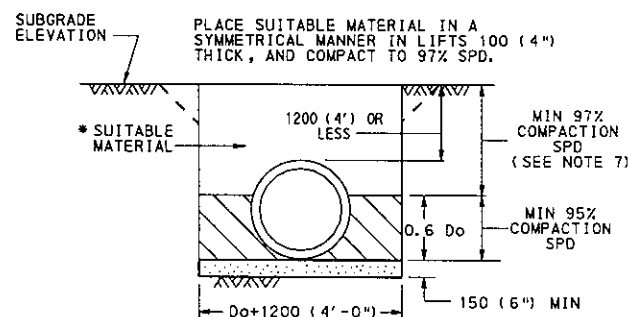
STEP 6: FOR CONCRETE PIPE, SEE STEP 6A.
 FOR METAL PIPE AND METAL PLATE PIPE, SEE STEP 6B.
 FOR THERMOPLASTIC PIPE, SEE STEP 6C.
 FOR METAL PIPE ARCH AND METAL PLATE PIPE ARCH, SEE STEP 6D.

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 SECTION 601.



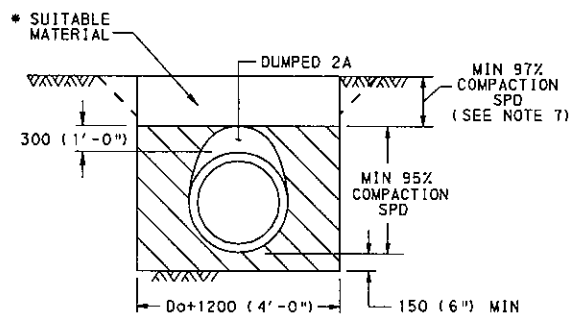
DEEP FILLS OVER 1200
CONCRETE PIPE



SHALLOW FILLS 1200 AND LESS
CONCRETE PIPE

STEP 6B: METAL PIPE AND METAL PLATE PIPE

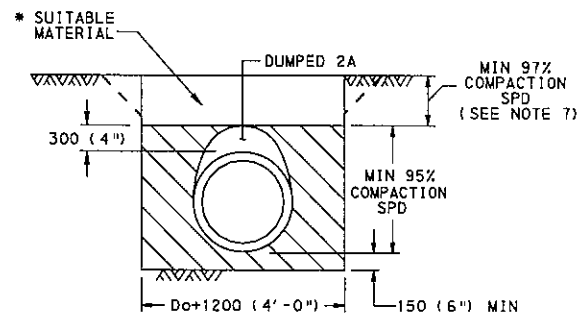
PLACE 2A COARSE AGGREGATE MATERIAL, IN LIFTS 100 (4") THICK, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 300 (12") ABOVE TOP OF PIPE. COMPACT TO 95% SPD. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH SECTION 601.



METAL PIPE AND METAL PLATE PIPE

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 SECTION 601.



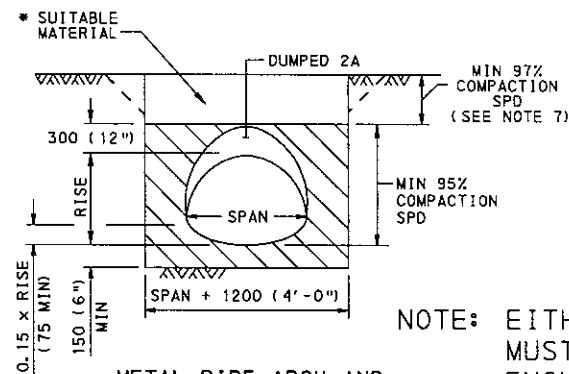
THERMOPLASTIC PIPE

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 SECTION 601.



METAL PIPE ARCH AND METAL PLATE PIPE ARCH

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 IN DIAMETER OR SPAN IS PERMITTED WITHOUT PLACING EMBANKMENT FIRST. MAKE THE BACKFILL ENVELOPE AS SHOWN ON THIS DRAWING EXCEPT PROVIDE THAT 2A MATERIAL ON EACH SIDE OF THE PIPE EQUAL TO ONE DIAMETER OR SPAN. 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 408/2000, SECTION 601.
6. PERMIT PLACEMENT OF BACKFILL MATERIAL IN LAYERS, LIFTS, 200 (8") THICK WHEN USING VIBRATORY COMPACTION EQUIPMENT.
7. COMPACT TOP 1.0m (3'-0") OF SUBGRADE TO 100% IN ACCORDANCE WITH SECTION 206.3.

LEGEND

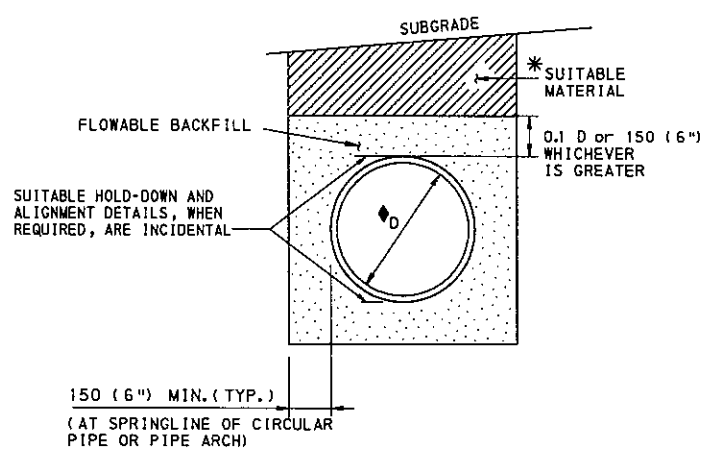
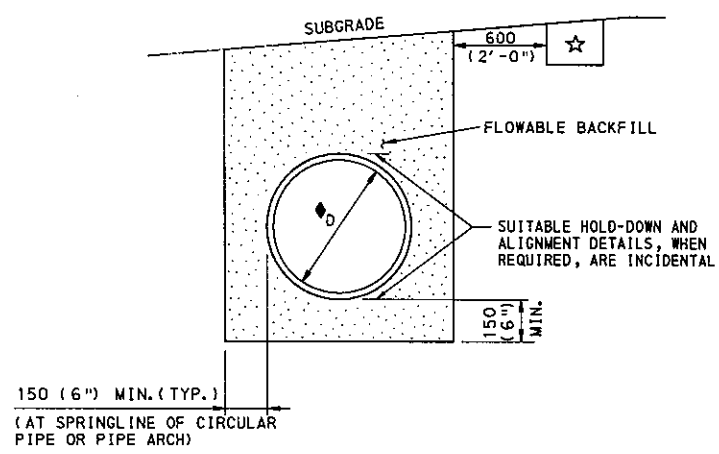
- AGGREGATE FOR BEDDING (AASHTO NO. 8), UNCOMPACTED
- COARSE AGGREGATE (2A)

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

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

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

SUBSURFACE DRAINS
 PIPE PLACEMENT
 EXCAVATION - BEDDING - BACKFILL



◆ 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 620.
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.

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN		
SUBSURFACE DRAINS FLOWABLE BACKFILL		
RECOMMENDED NOV. 1, 2001 <i>Alan A. Schum</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Gary R. Hoffman</i> CHIEF ENGINEER	SHT 5 OF 5 RC-30M

NOTES

1. CONSTRUCTION REQUIREMENTS:

- A. CONSTRUCT IN ACCORDANCE WITH PUBLICATION 408, SECTIONS 605, 606 AND 714; AND AS MODIFIED HEREIN.
- B. MINIMUM CONCRETE CLASS:
 CAST-IN-PLACE CLASS A
 PRECAST CLASS AA
- C. PROVIDE STEEL REINFORCEMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 709, PROVIDE MINIMUM YIELD STRENGTH OF 400 MPa (60,000 PSI).
- D. CLEAR COVER FOR STEEL:
- | | | |
|-----------|---------------|---------------------------|
| WALLS: | CAST-IN PLACE | 50 (2") |
| | PRECAST | 40 (1 1/2") |
| FOOTINGS: | CAST-IN PLACE | 60 (2 1/2") TOP BARS |
| | | 80 (3") BOTTOM BARS |
| | PRECAST | 50 (2") SIDE COVER |
| | | 40 (1 1/2") BOTTOM BARS |
| SLABS: | CAST-IN PLACE | 40 (1 1/2") SIDE COVER |
| | | 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.

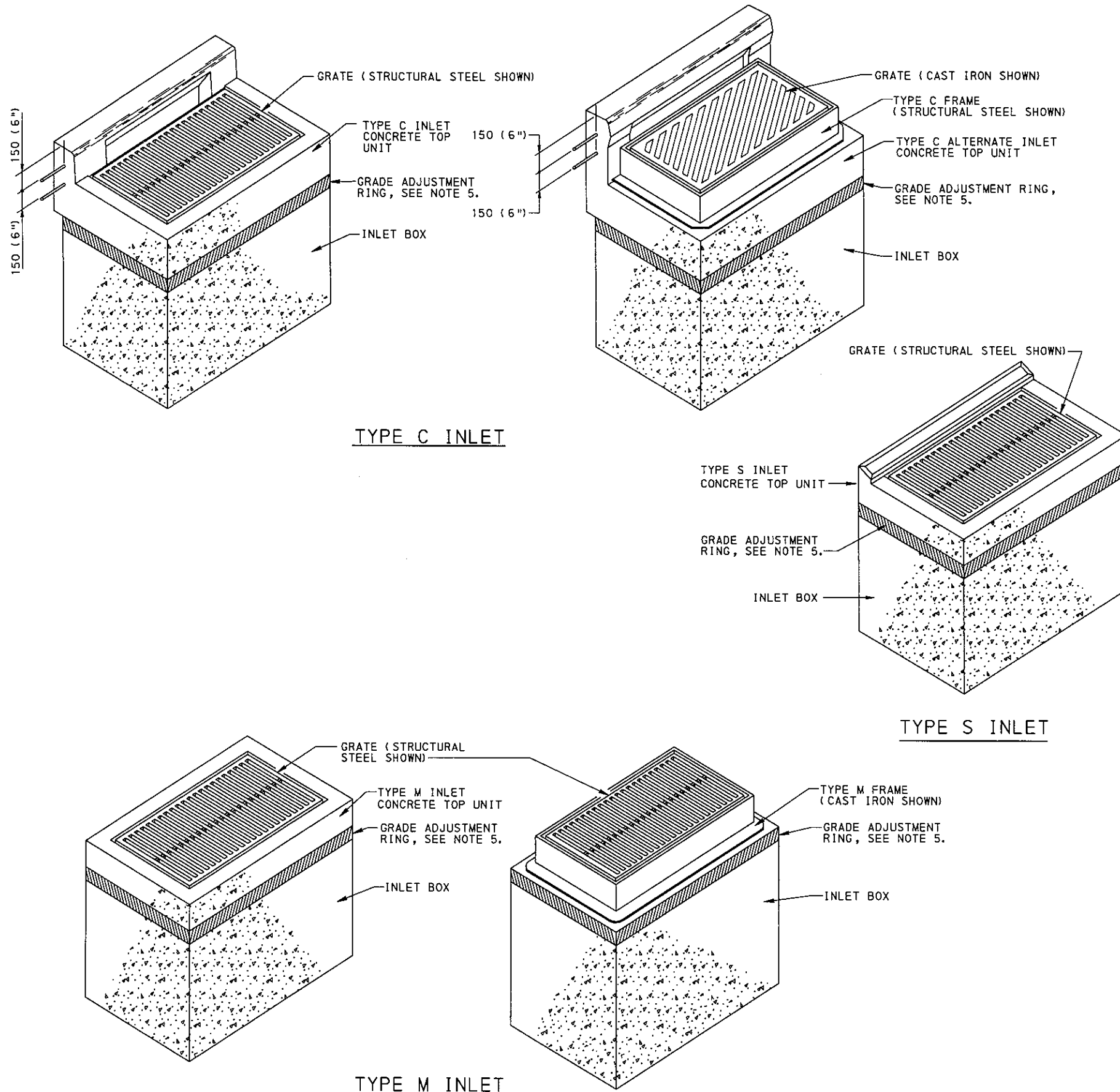
10. PIPES MAY BE CONNECTED TO DRAINAGE STRUCTURES (PRECAST INLETS, ETC.) WITH MORTAR OR WATERTIGHT RUBBER FLEXIBLE CONNECTORS.

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

COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

INLETS INLET ASSEMBLIES

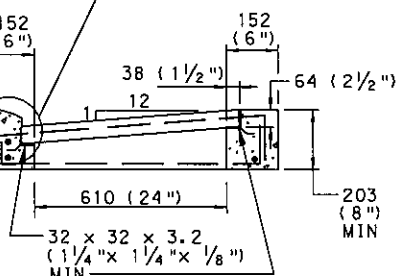
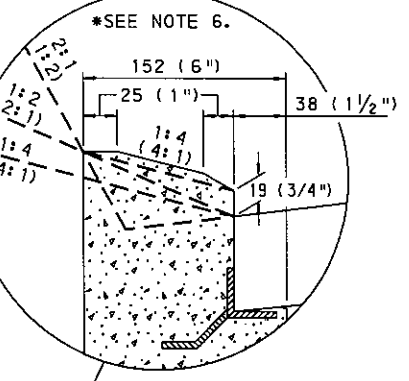
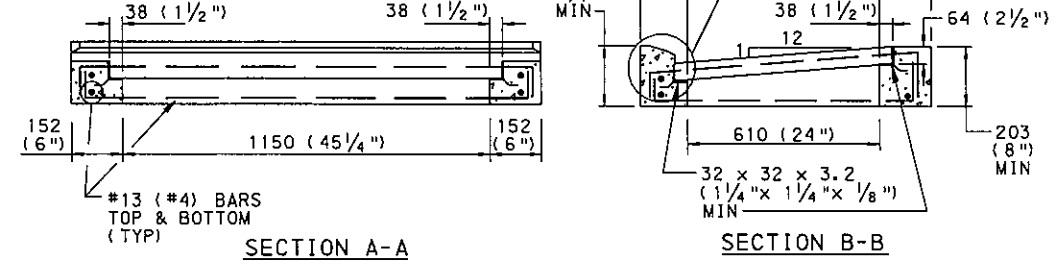
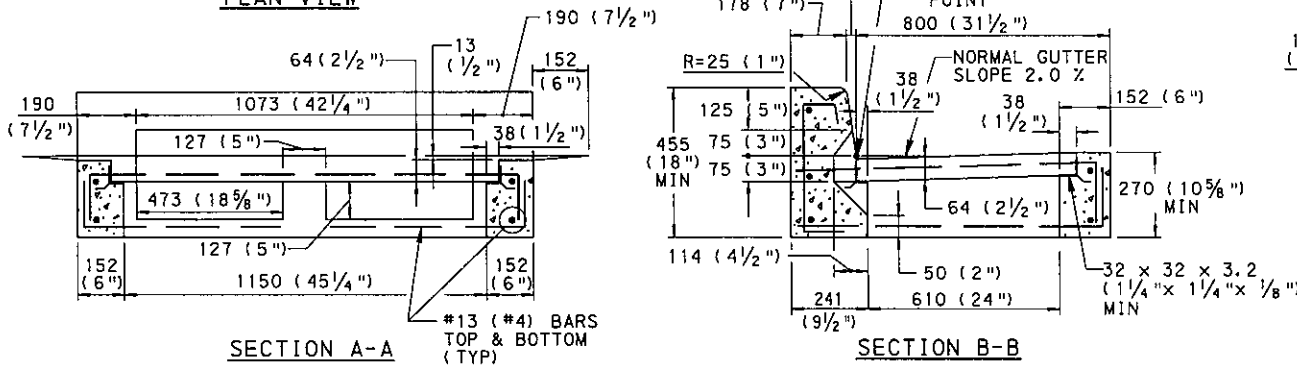
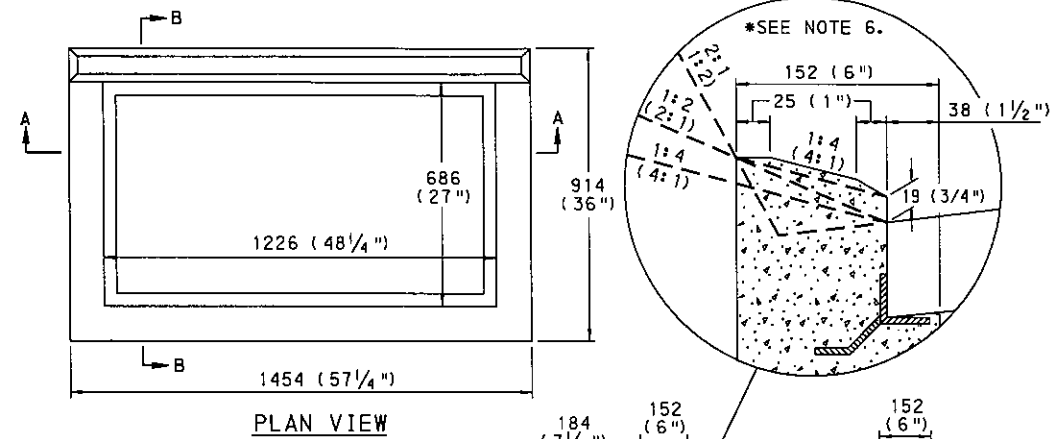
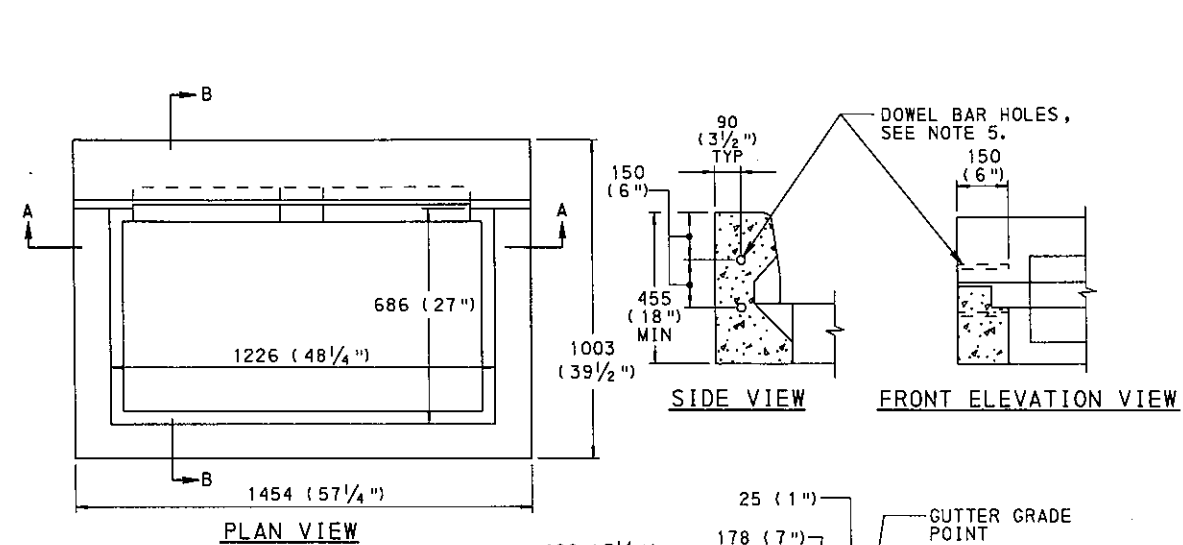
RECOMMENDED NOV. 1, 2001
 RECOMMENDED NOV. 1, 2001
 SHT 1 OF 10
 DIRECTOR, BUREAU OF DESIGN
 CHIEF ENGINEER
 RC-34M



TYPE C INLET

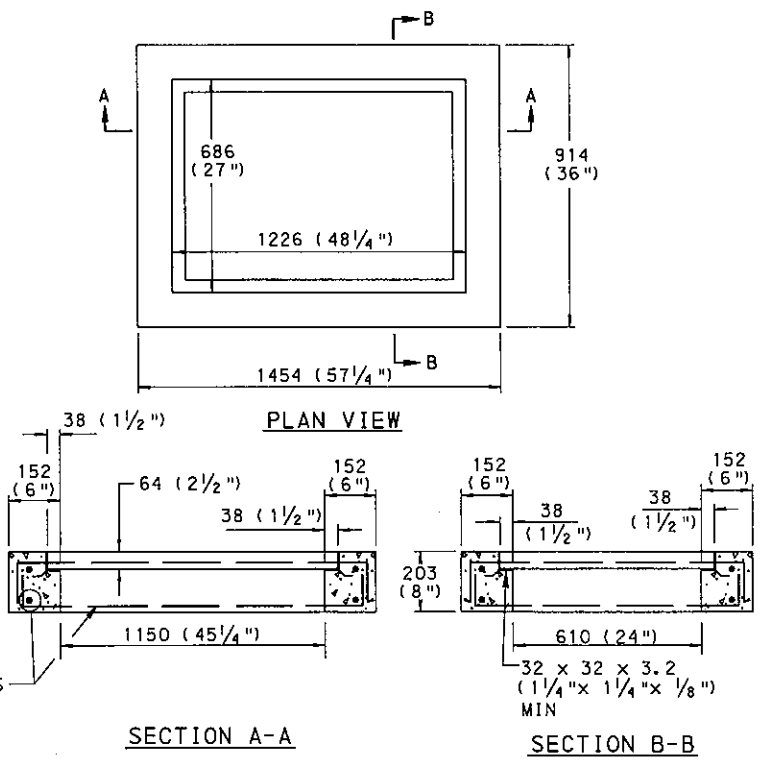
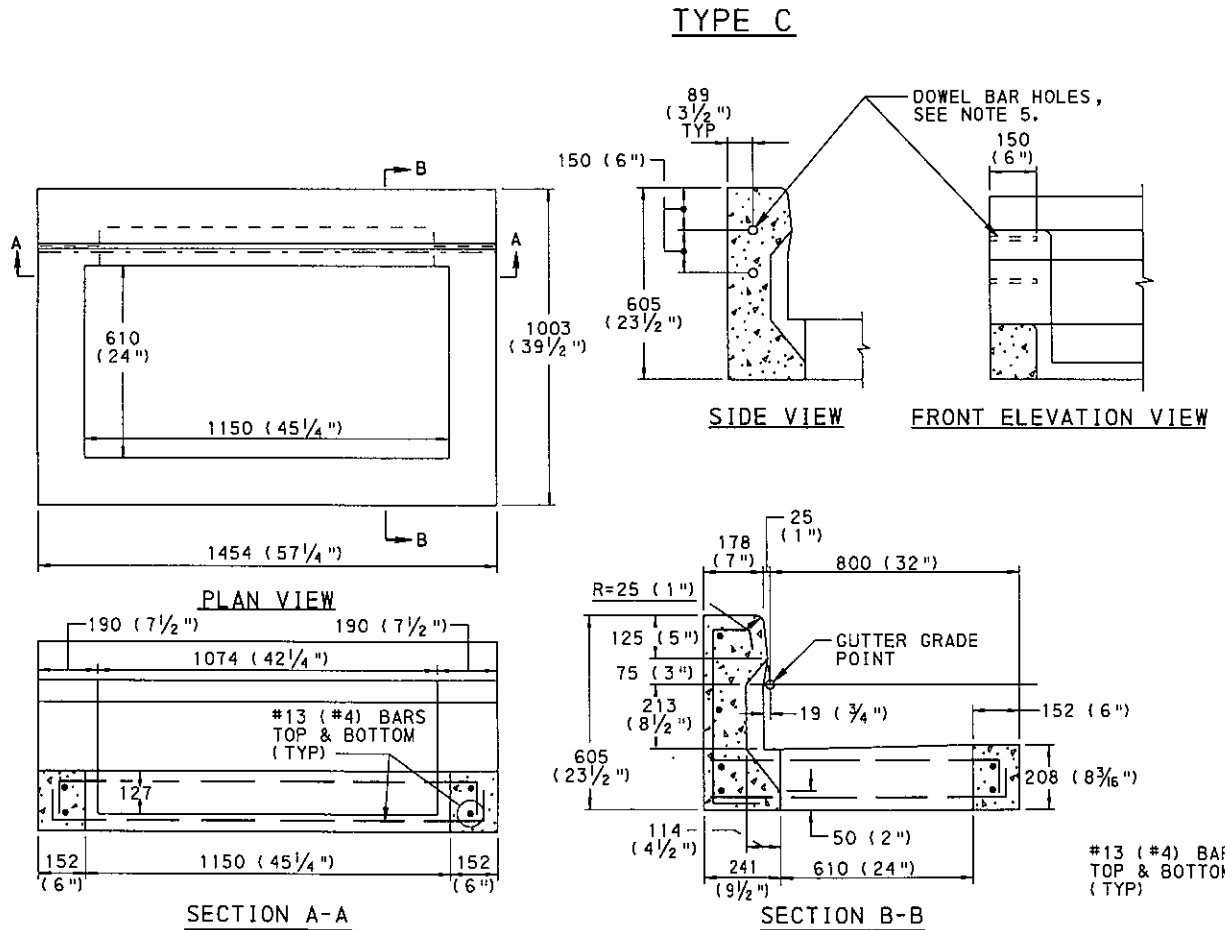
TYPE S INLET

TYPE M INLET



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

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



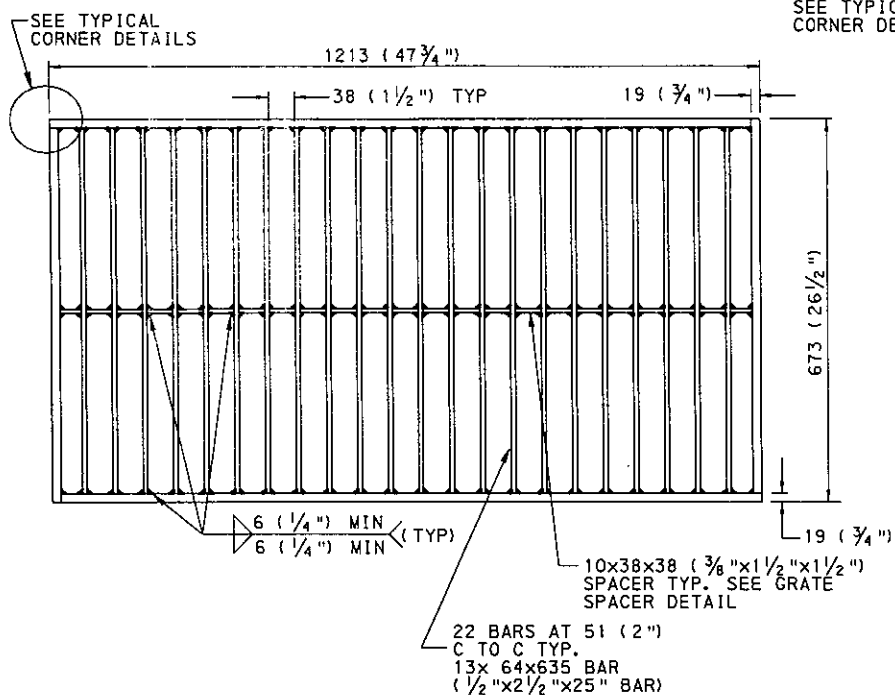
TYPE C ALTERNATE

TYPE M

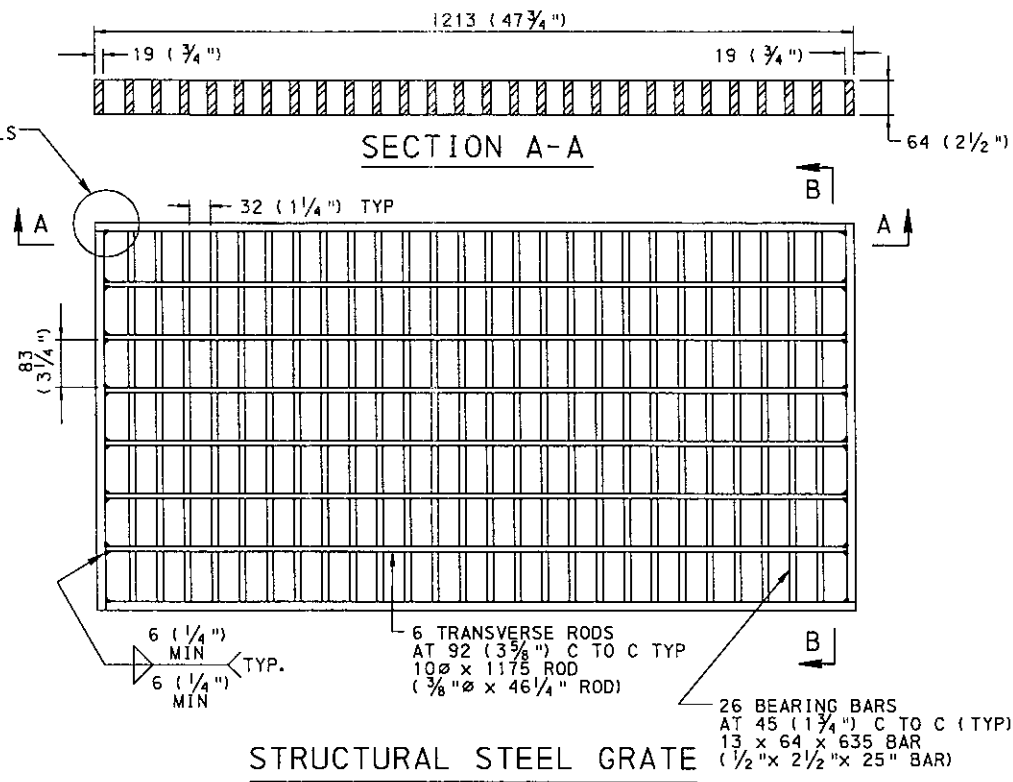
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

INLETS
CONCRETE TOP UNITS
CAST-IN-PLACE AND PRECAST

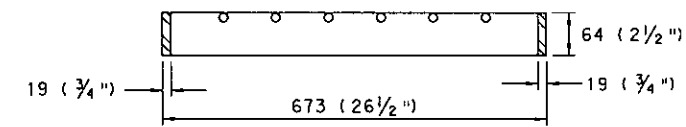
RECOMMENDED APR. 16, 2001 <i>Alan A. Schmitt</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 16, 2001 <i>Gary L. Hoffman</i> CHIEF ENGINEER	SHT 2 OF 10 RC-34M
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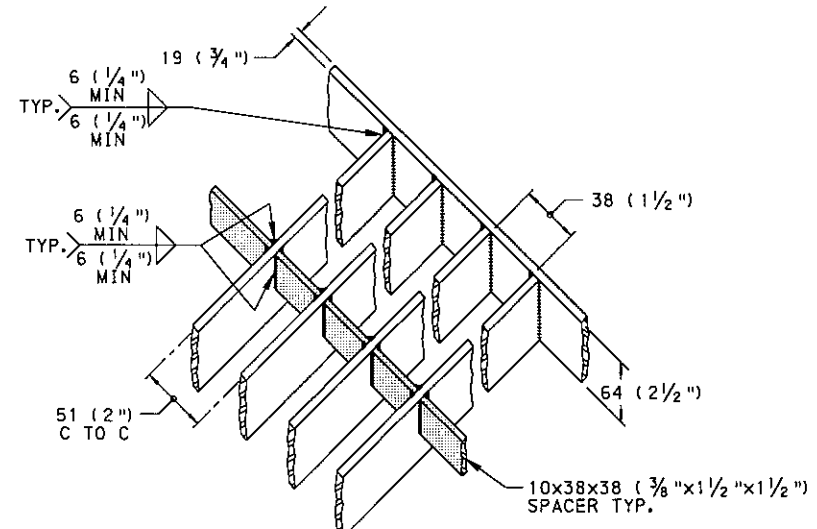
STRUCTURAL STEEL GRATE



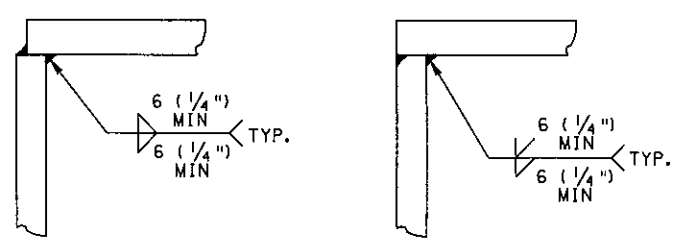
**STRUCTURAL STEEL GRATE
BICYCLE SAFE**



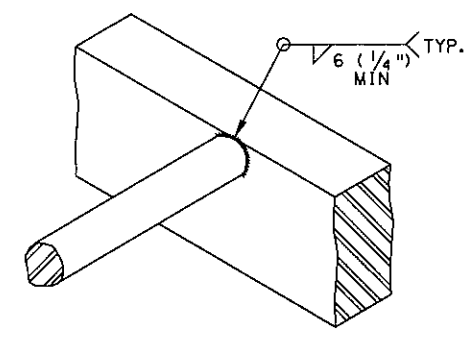
SECTION B-B



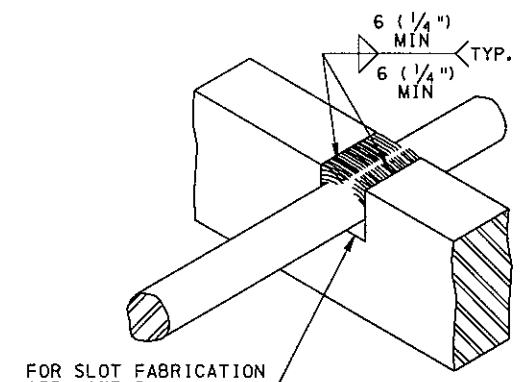
GRATE SPACER DETAIL



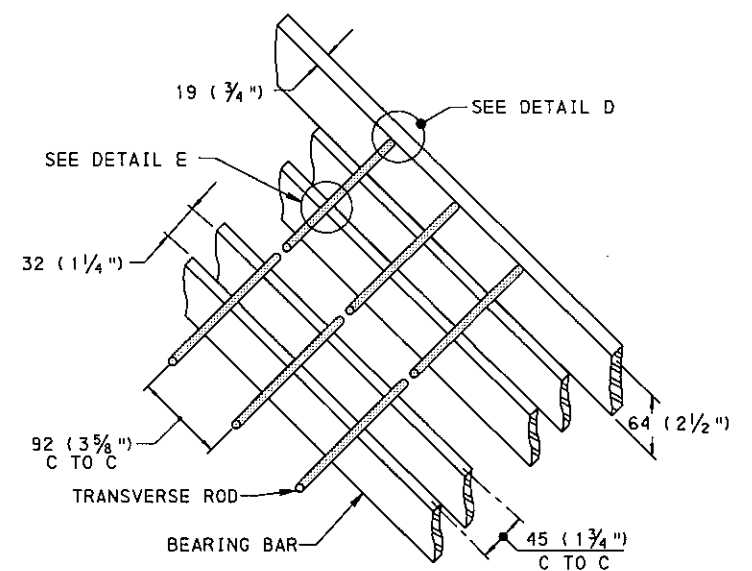
TYPICAL CORNER DETAILS



DETAIL D



DETAIL E



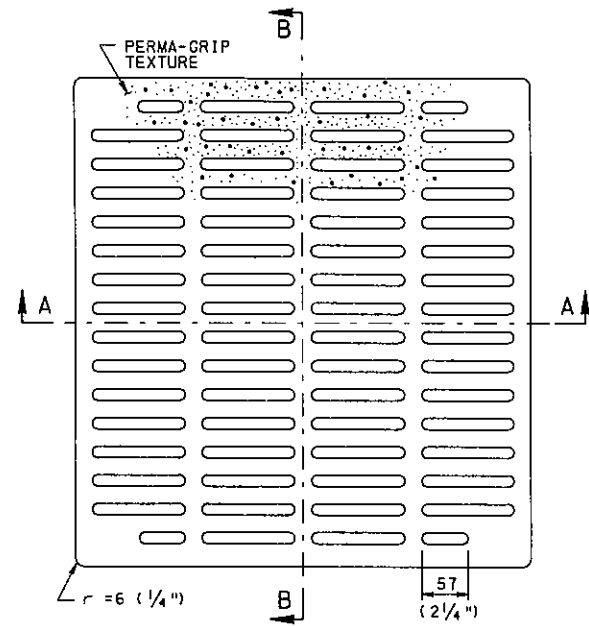
BAR & ROD SPACING DETAIL

NOTES

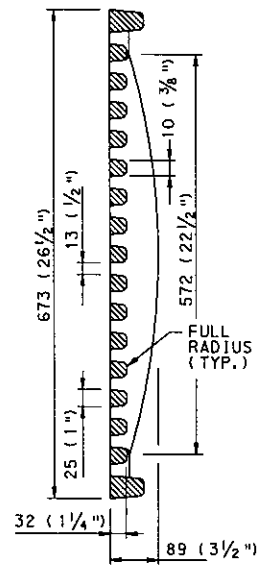
1. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. PERMIT ONLY GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS SUBMIT SHOP DRAWING FOR APPROVAL.
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.

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

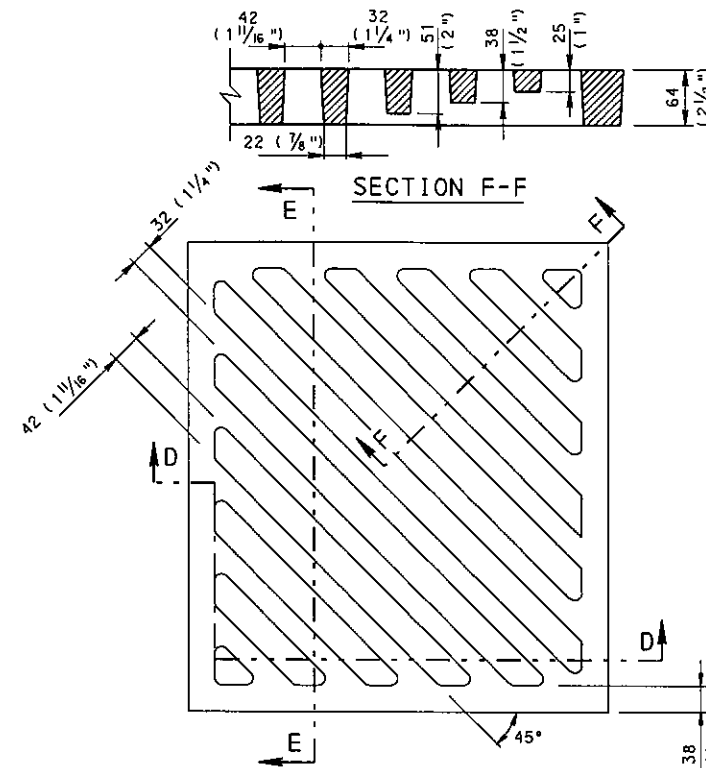
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN		
INLET GRATES		
RECOMMENDED NOV. 1, 2001 <i>Dean A. Schuch</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Henry R. Hoffman</i> CHIEF ENGINEER	SHT 3 OF 10 RC-34M



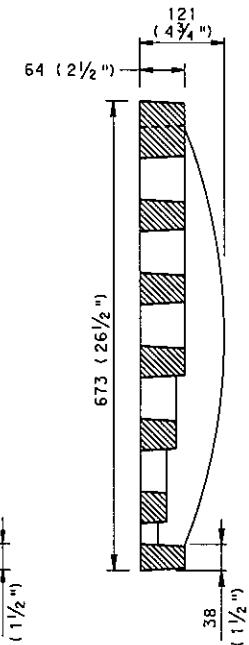
PLAN - BICYCLE-SAFE GRATE



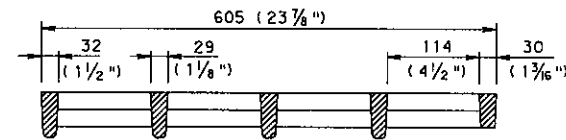
SECTION B-B



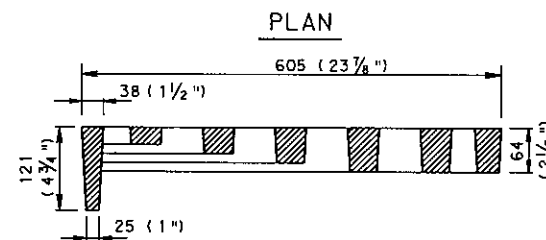
SECTION F-F



SECTION E-E

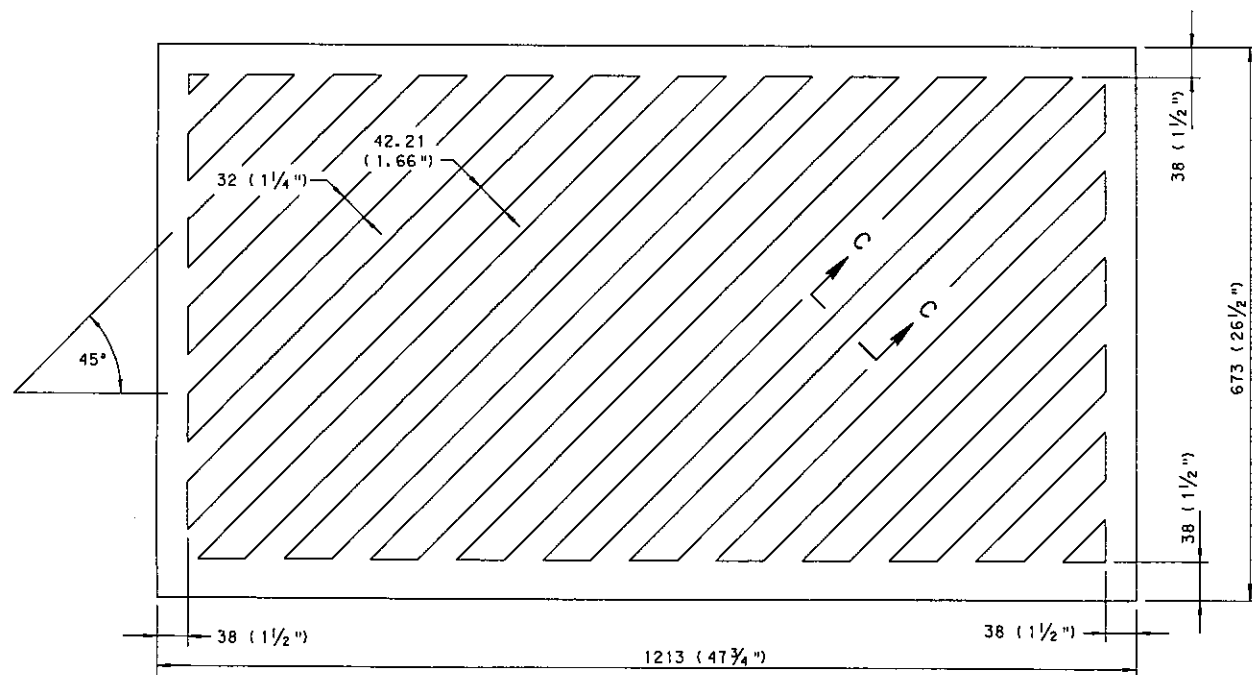


SECTION A-A

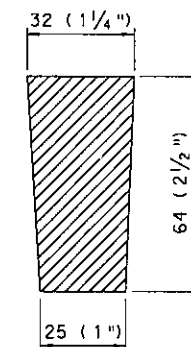


SECTION D-D

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.

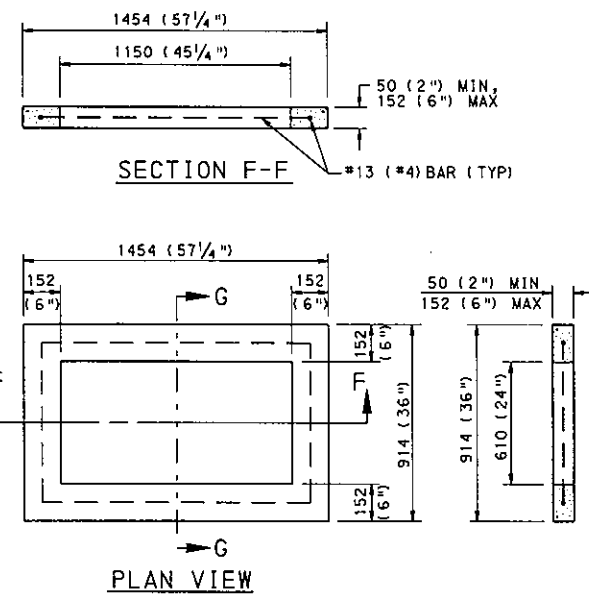
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET
GRATES

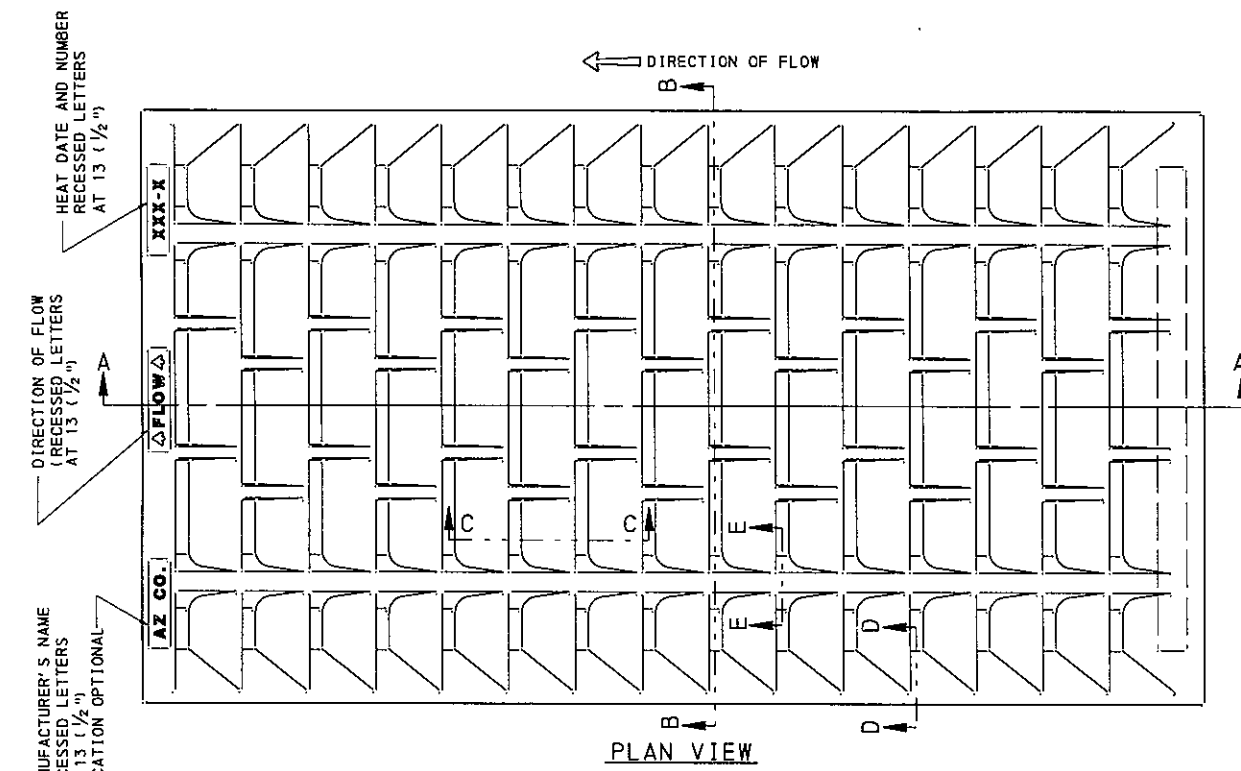
RECOMMENDED NOV. 1, 2001 <i>Dean A. Schuss</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Gary L. Hoffman</i> CHIEF ENGINEER	SHT 4 OF 10 RC-34M
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NOTES

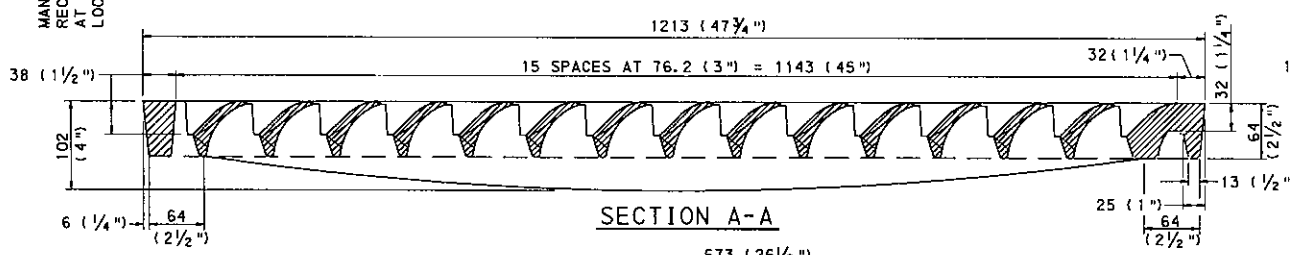
1. PROVIDE MATERIALS AND CONSTRUCTION IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 605, 606 AND 714. PERMIT ONLY GRATES AND GRADE ADJUSTMENT SYSTEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS SUBMIT SHOP DRAWINGS FOR APPROVAL.
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 GRATE 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") TYPICAL FOR ALL FILLETS AND ROUNDS, UNLESS NOTED.
5. ATTACH STEEL GRADE ADJUSTMENT RINGS RIGIDLY TO THE FRAME AND SET PRECAST CONCRETE GRADE ADJUSTMENT RINGS ON A MORTAR BED.
6. CAST IRON GRATES MAY BE USED AS ALTERNATES TO STRUCTURAL STEEL GRATES PROVIDED THEY ARE SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 AND APPROVED FOR HS25 LOADING. CAST IRON GRATES NOT APPROVED FOR HS25 LOADING MAY BE USED OUTSIDE OF THE TRAVEL LANES; AT THE EDGE OF OUTSIDE SHOULDERS, SWALES, WIDE MEDIAN SWALES AND INFIELD AREAS.



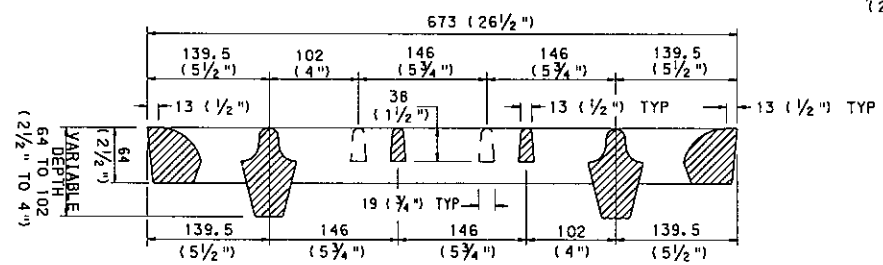
PRECAST CONCRETE GRADE ADJUSTMENT RINGS



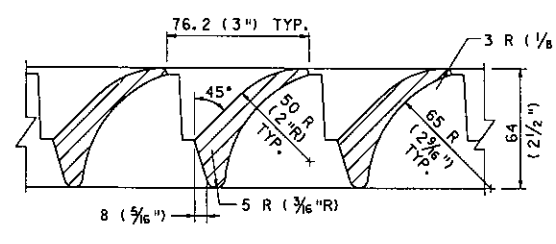
PLAN VIEW



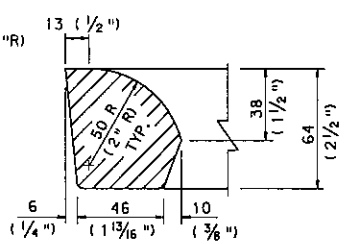
SECTION A-A



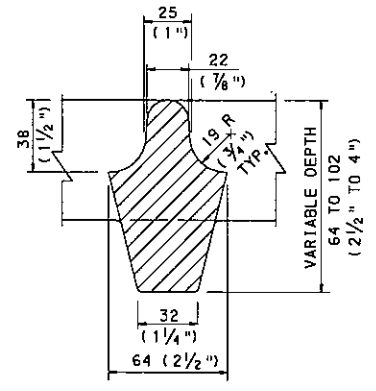
SECTION B-B



SECTION C-C



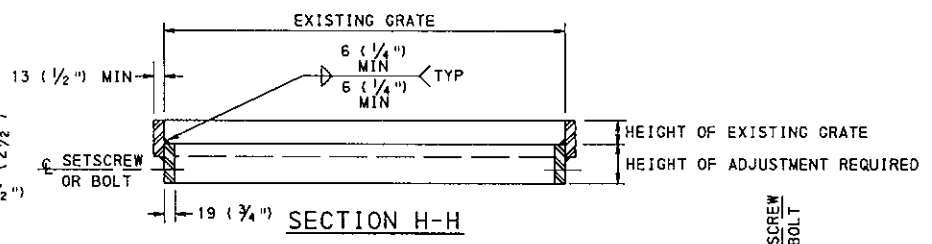
SECTION D-D



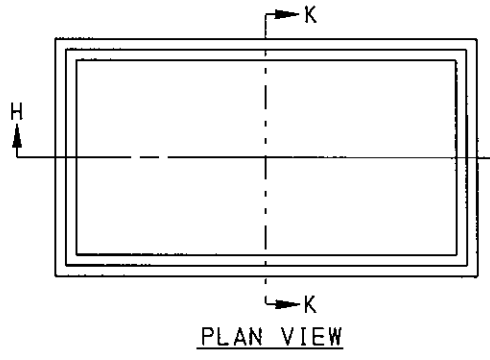
SECTION E-E

CAST IRON VANE GRATE

SEE NOTE 7

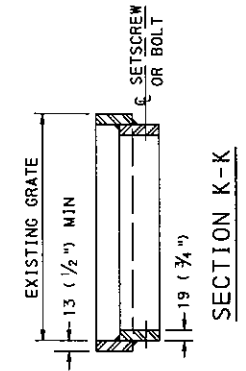


SECTION H-H



PLAN VIEW

STRUCTURAL STEEL GRADE ADJUSTMENT RINGS

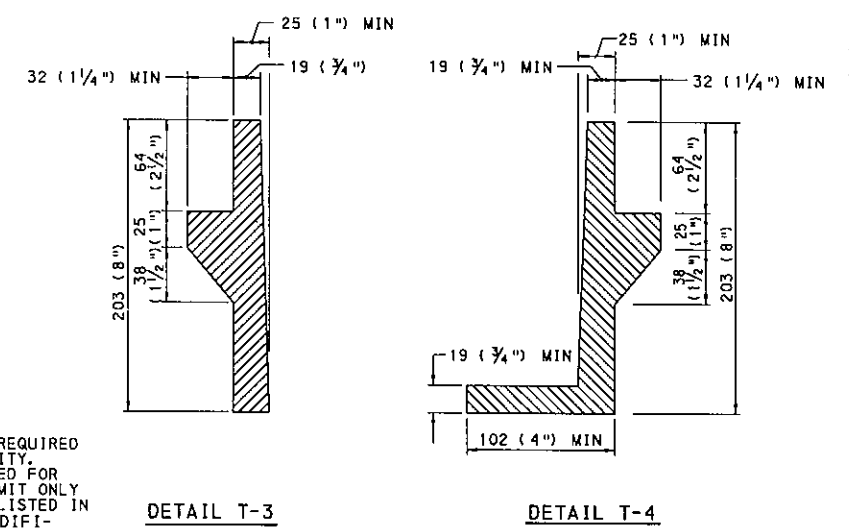
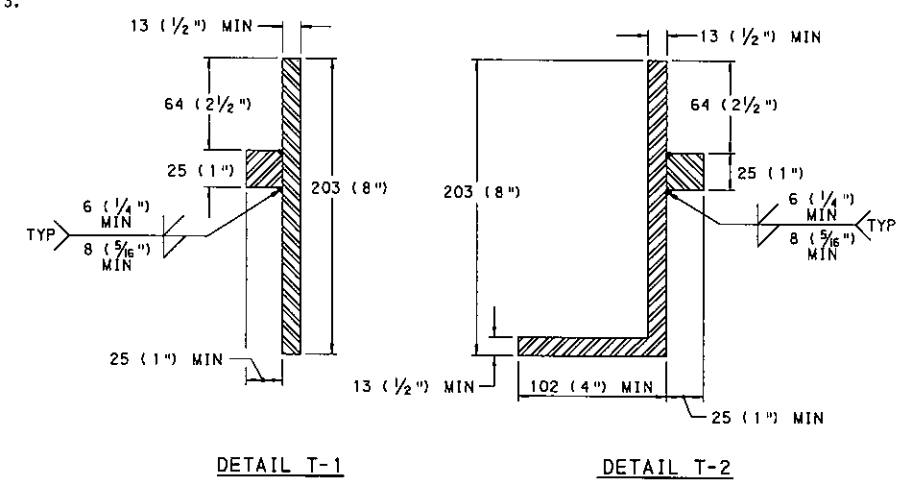
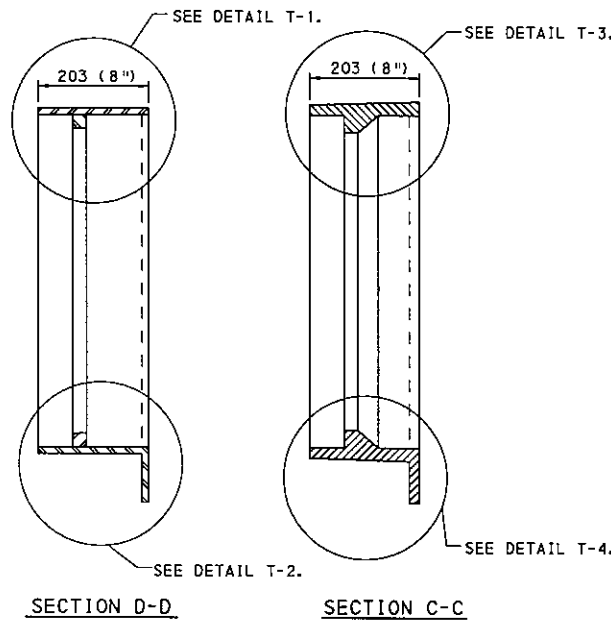
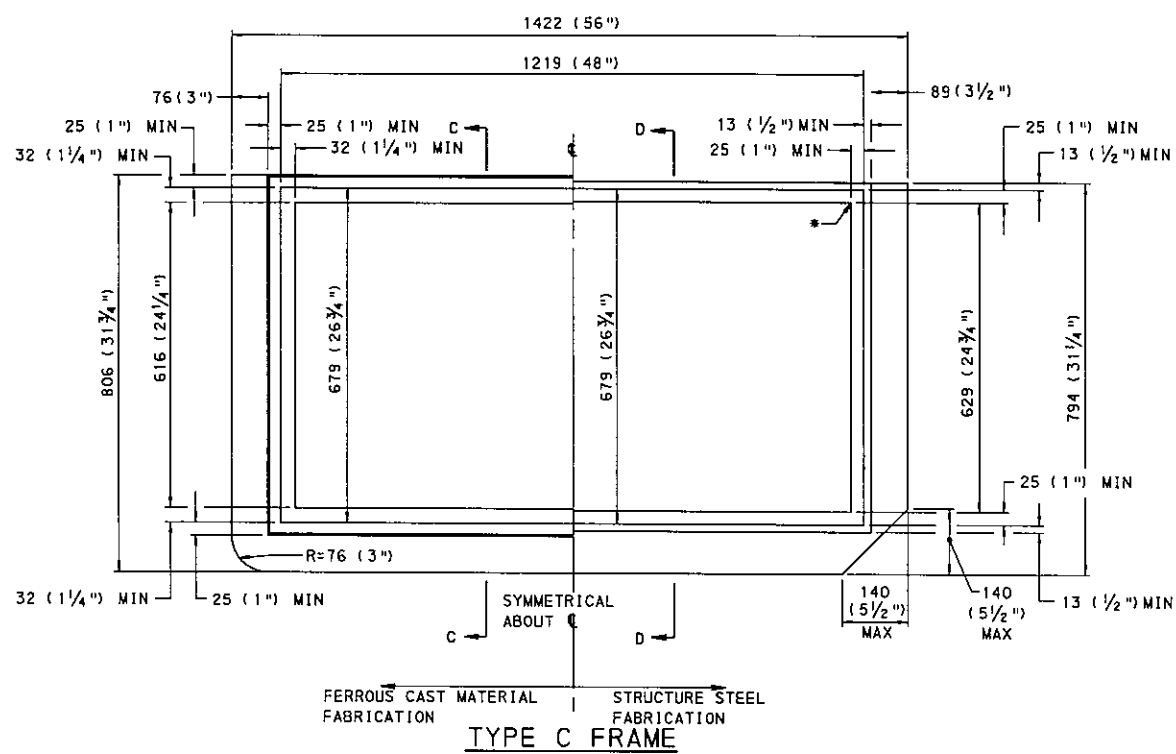


SECTION K-K

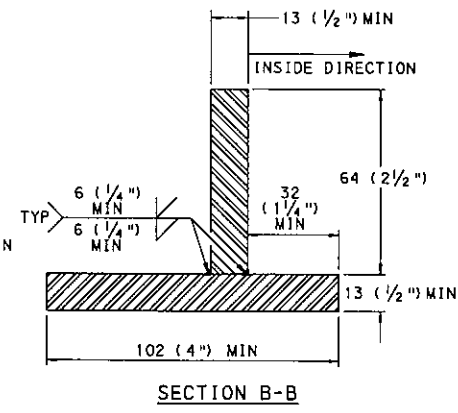
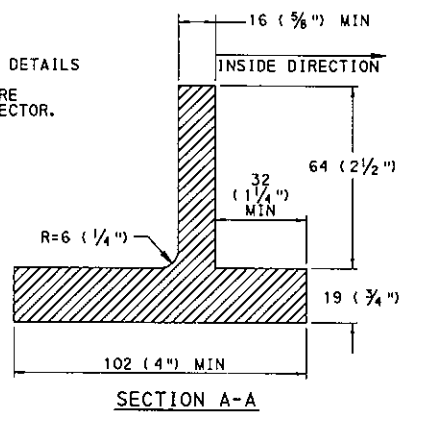
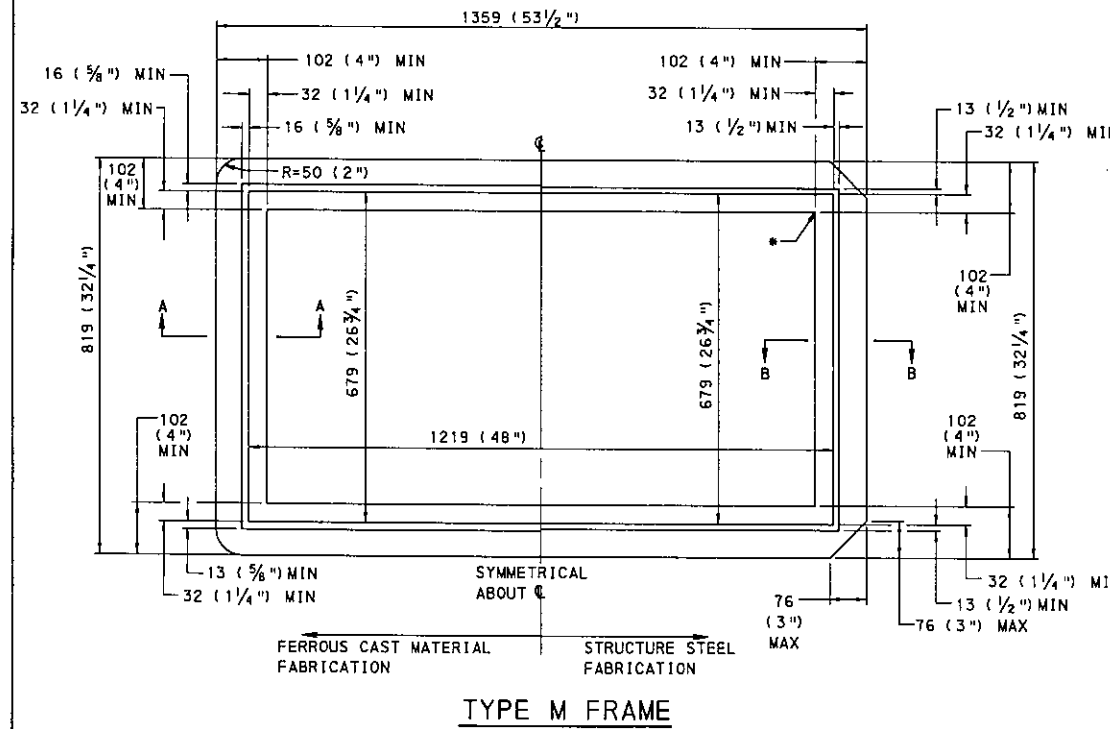
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLET GRATES & GRADE ADJUSTMENT RINGS



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



NOTES

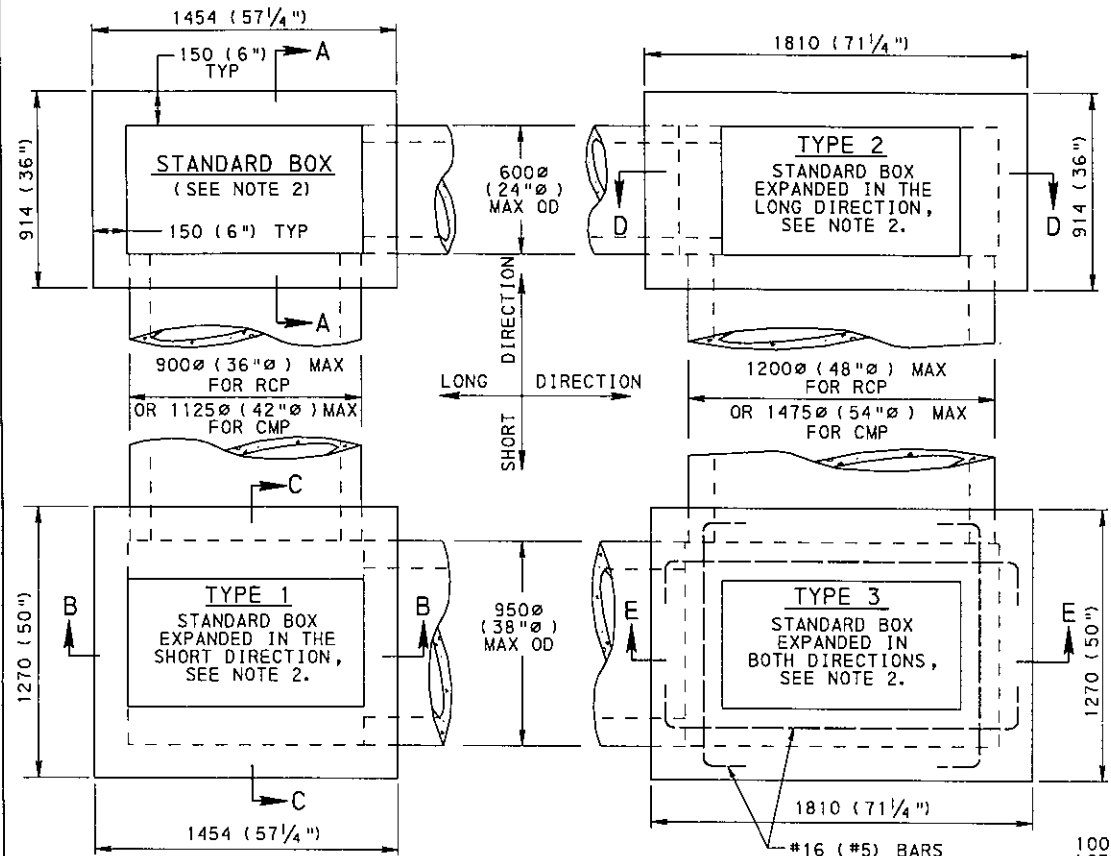
1. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. PERMIT ONLY FRAMES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS SUBMIT SHOP DRAWINGS FOR APPROVAL.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

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

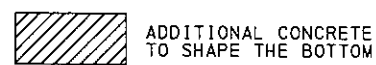
**INLET
FRAMES**

RECOMMENDED NOV. 1, 2001 <i>Dean A. Schmitt</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Harold S. Hoffman</i> CHIEF ENGINEER	SHT 6 OF 10 RC-34M
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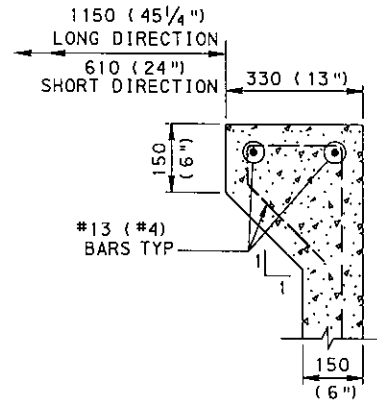
PLAN - INLET BOXES

LEGEND

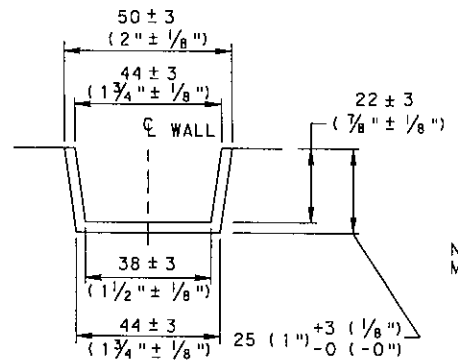


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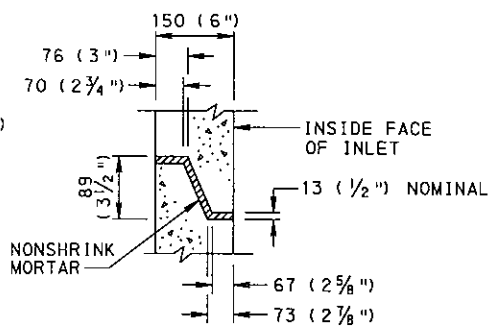
1. CONSTRUCT INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.
2. PROVIDE INLET BOXES WITH 610 x 1150 (24" x 45 1/4") STANDARD OPENING TO ACCOMMODATE THE STANDARD TOP COMPONENTS.
3. FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION, PROVIDE INLET WALLS 150 (6") THICK, UNLESS OTHERWISE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



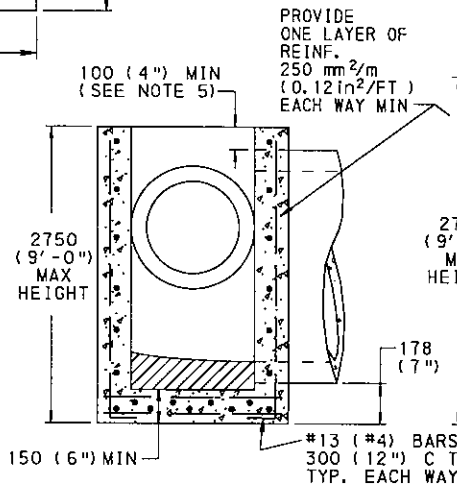
EXPANDED WALL DETAIL



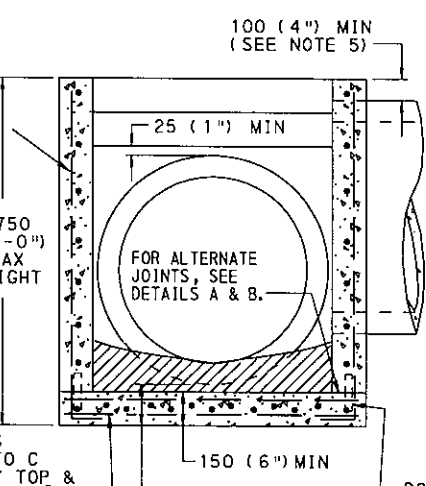
DETAIL A



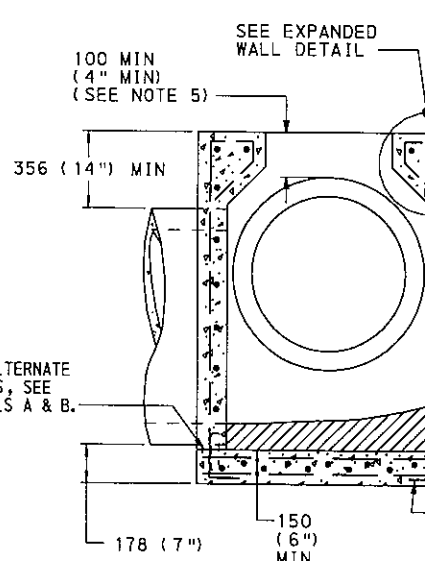
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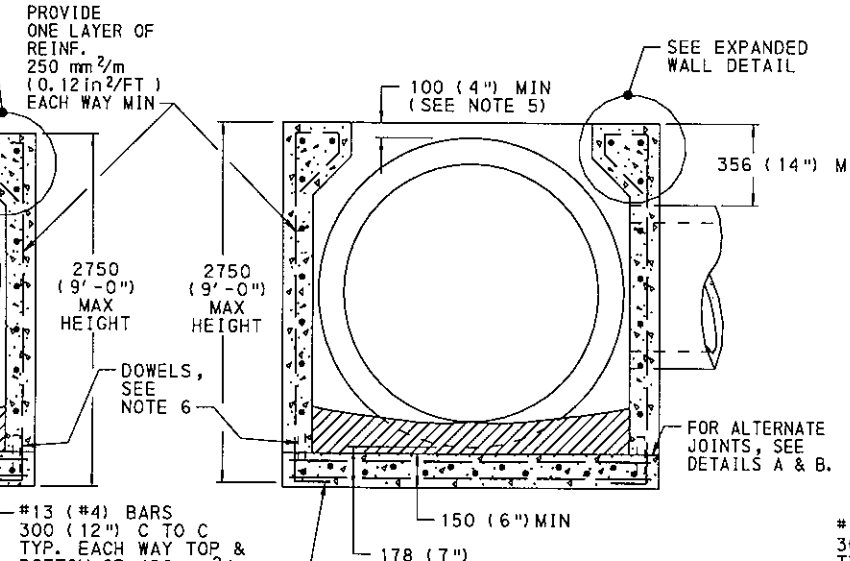
SECTION A-A



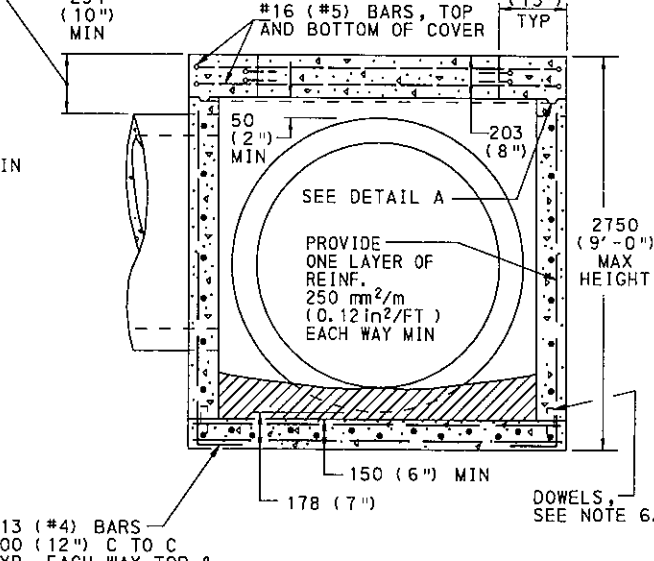
SECTION B-B



SECTION C-C



SECTION D-D

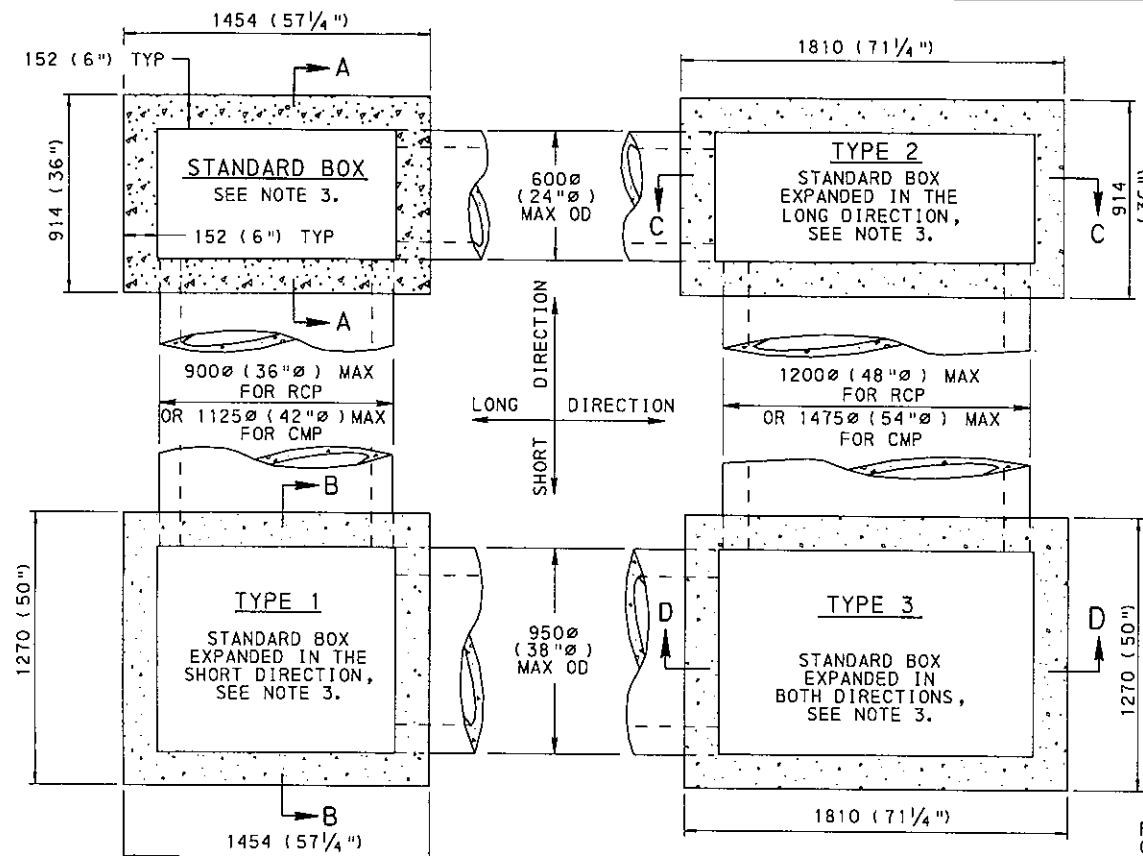


SECTION E-E TYPE 3 ONLY (SEE NOTE 9)

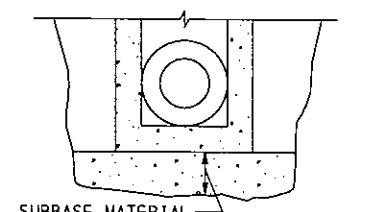
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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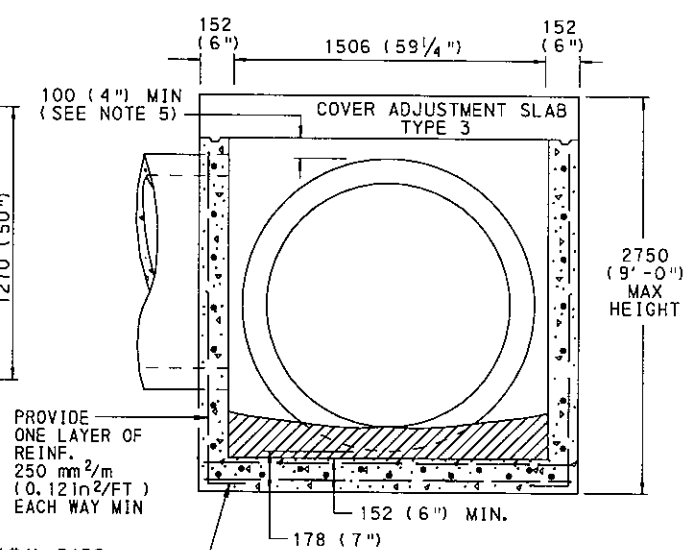
INLETS
STANDARD INLET BOXES
(CAST-IN-PLACE)



PLAN - INLET BOXES



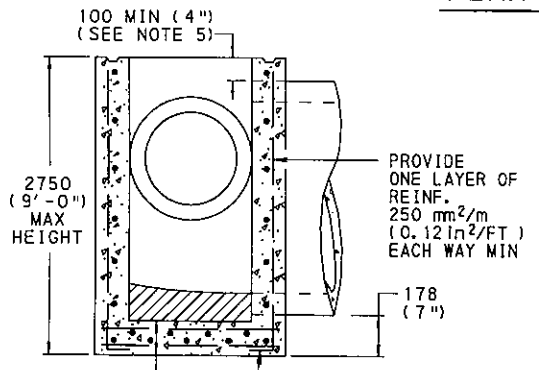
DETAIL A
PRECAST CONCRETE INLET BOX
BASE PREPARATION



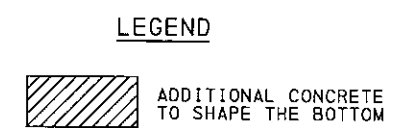
SECTION D-D
TYPE 3 ONLY

NOTES

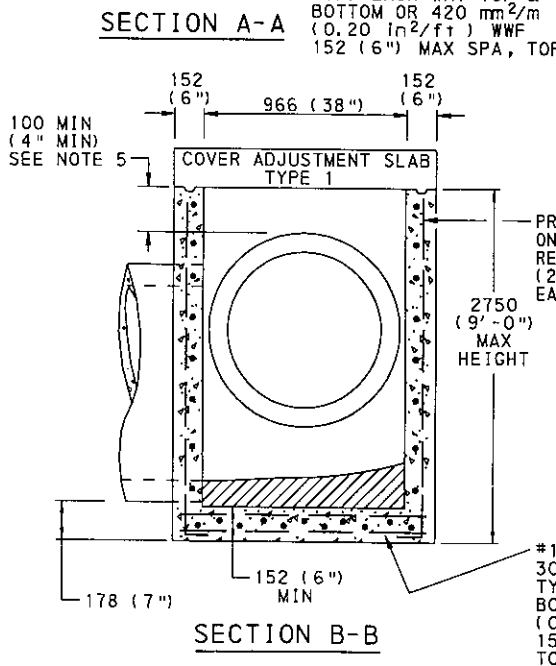
1. CONSTRUCT INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 714.
2. PERMIT ONLY PRECAST INLET BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. USE CLASS AA CEMENT CONC FOR PRECAST BOXES. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.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



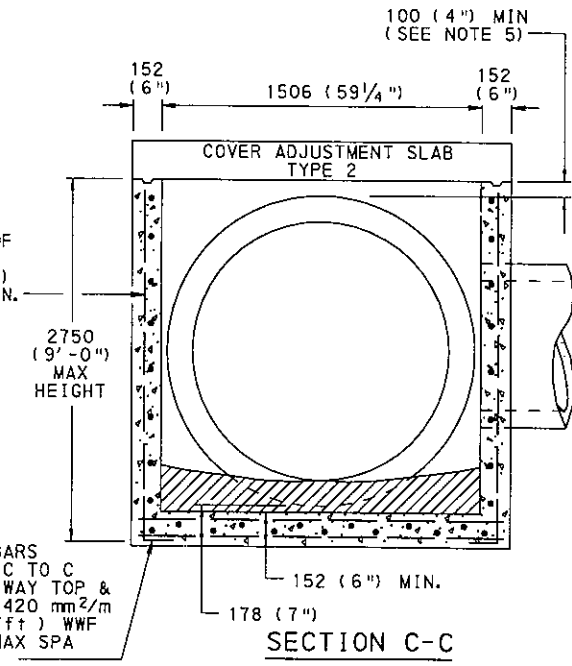
SECTION A-A



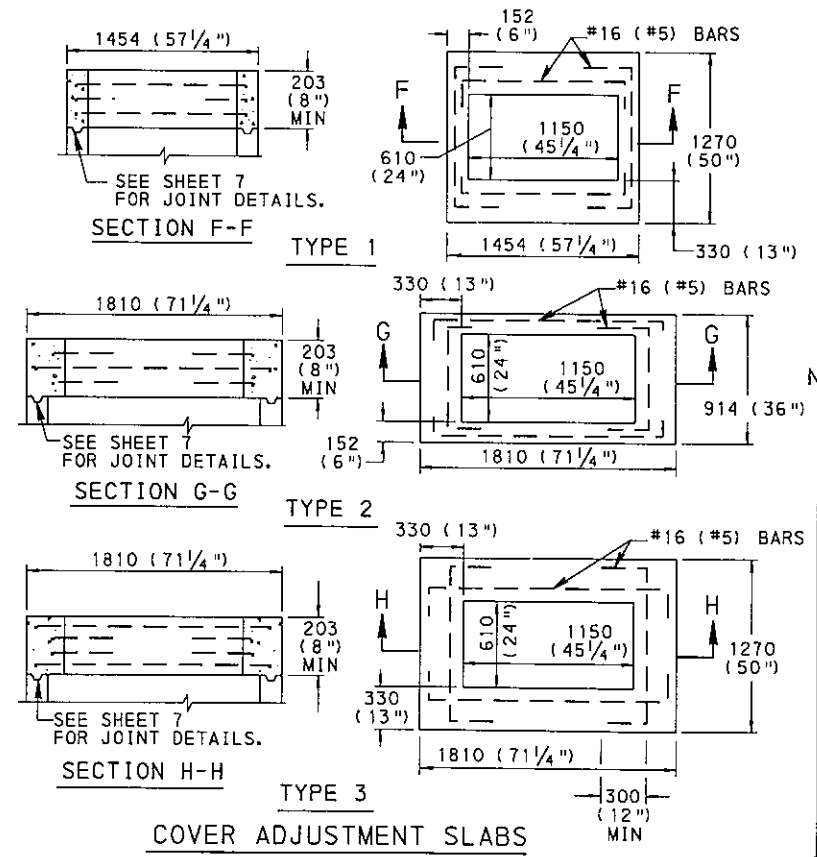
LEGEND



SECTION B-B



SECTION C-C



COVER ADJUSTMENT SLABS

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

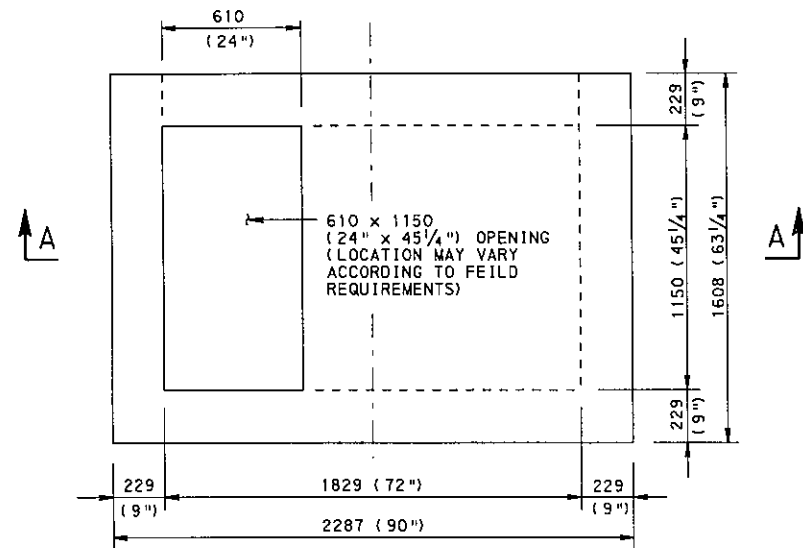
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DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLETS
STANDARD INLET BOXES
(PRECAST)

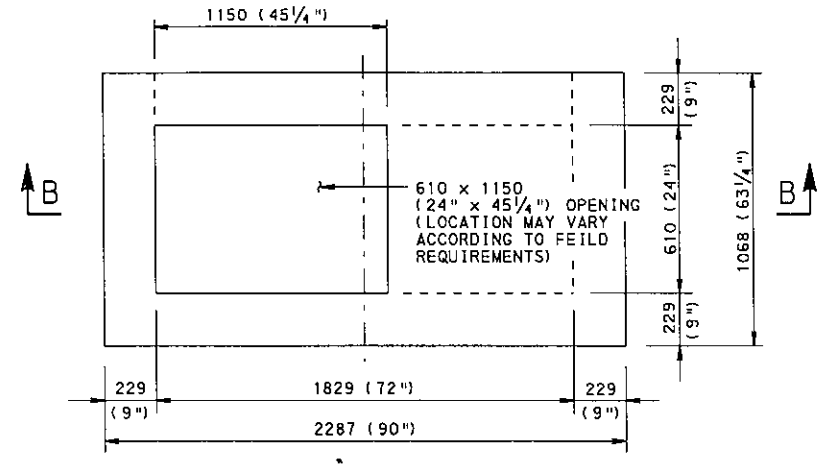
RECOMMENDED NOV. 1, 2001
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED NOV. 1, 2001
CHIEF ENGINEER

SHT. _B_ OF _10_
RC-34M



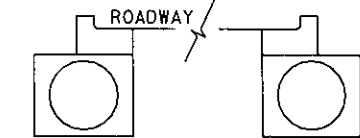
PLAN



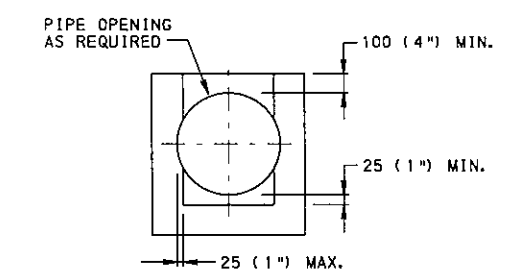
PLAN

NOTES

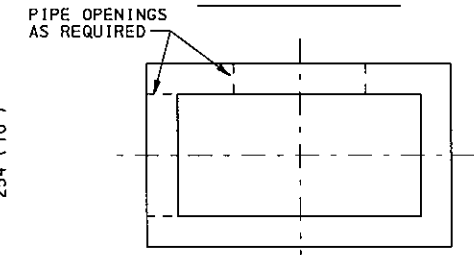
1. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605 AND SECTION 714.
2. PROVIDE INLETS WITH A MAXIMUM HEIGHT TO BE THE GRADE ELEVATION. WHEN THE REQUIRED HEIGHT EXCEEDS THE MAXIMUM SHOWN, SHOW SPECIAL DETAILS AND DESIGN FOR THE INLET WALLS AND BASE. CONSTRUCT INLETS THAT EXCEED 1500 (5') IN HEIGHT WITH STEPS SIMILAR TO MANHOLES (SEE RC-39M)
3. WHEN A SITUATION CAN NOT BE SATISFIED BY THE MODIFIED INLET BOXES SHOWN, PROVIDE SPECIAL DETAILS AND DESIGNS.
4. FOR ORIENTATION OF THE TYPE C INLET TOP WITH MODIFIED TYPE I INLET BOX, THE TYPICAL INSTALLATION DETAILS ARE SHOWN BELOW. SHOW ANY VARIATION ON THE CONSTRUCTION DRAWINGS BY SPECIAL DETAILS.



5. PROVIDE A MINIMUM HEIGHT OF 508 (20") MEASURED FROM THE TOP SURFACE OF THE TOP UNIT TO THE INSIDE TOP OF THE PIPE WHEN THE TOP UNIT AND EITHER A MODIFIED TYPE I OR A MODIFIED TYPE II INLET BOX ARE CONSTRUCTED MONOLITHICALLY.
6. FOR THAT PORTION OF THE INLET ASSEMBLY WHERE THE DEPTH MEASURED FROM GRADE IS LESS THAN 2759 (9'-0") A COVER REDUCTION SLAB AND STANDARD 610 x 1150 (24"x 45 1/4") RISER SECTION MAY BE UTILIZED.
7. PERMIT ONLY PRECAST MODIFIED INLET BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.



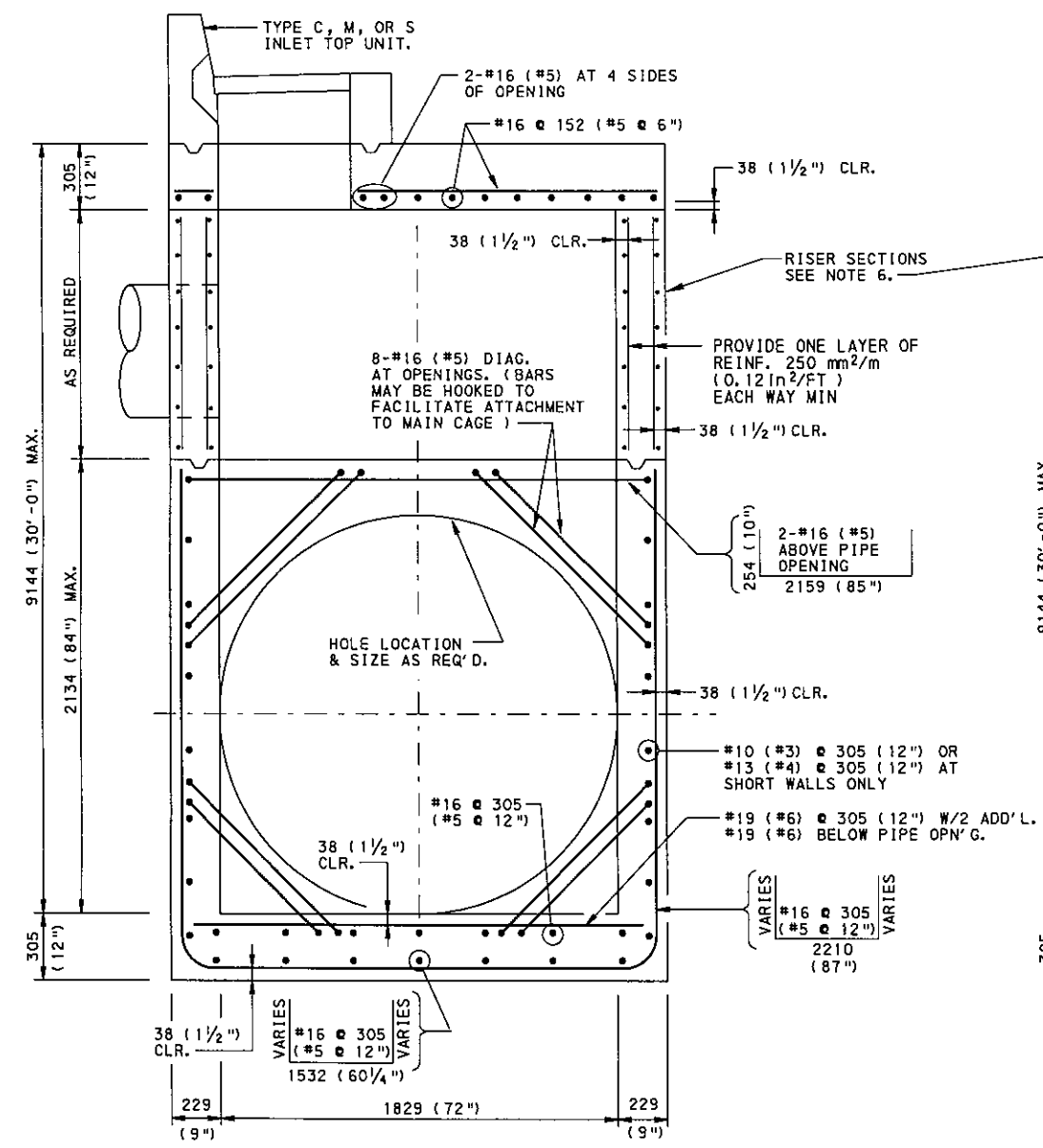
HOLE CLEARANCES



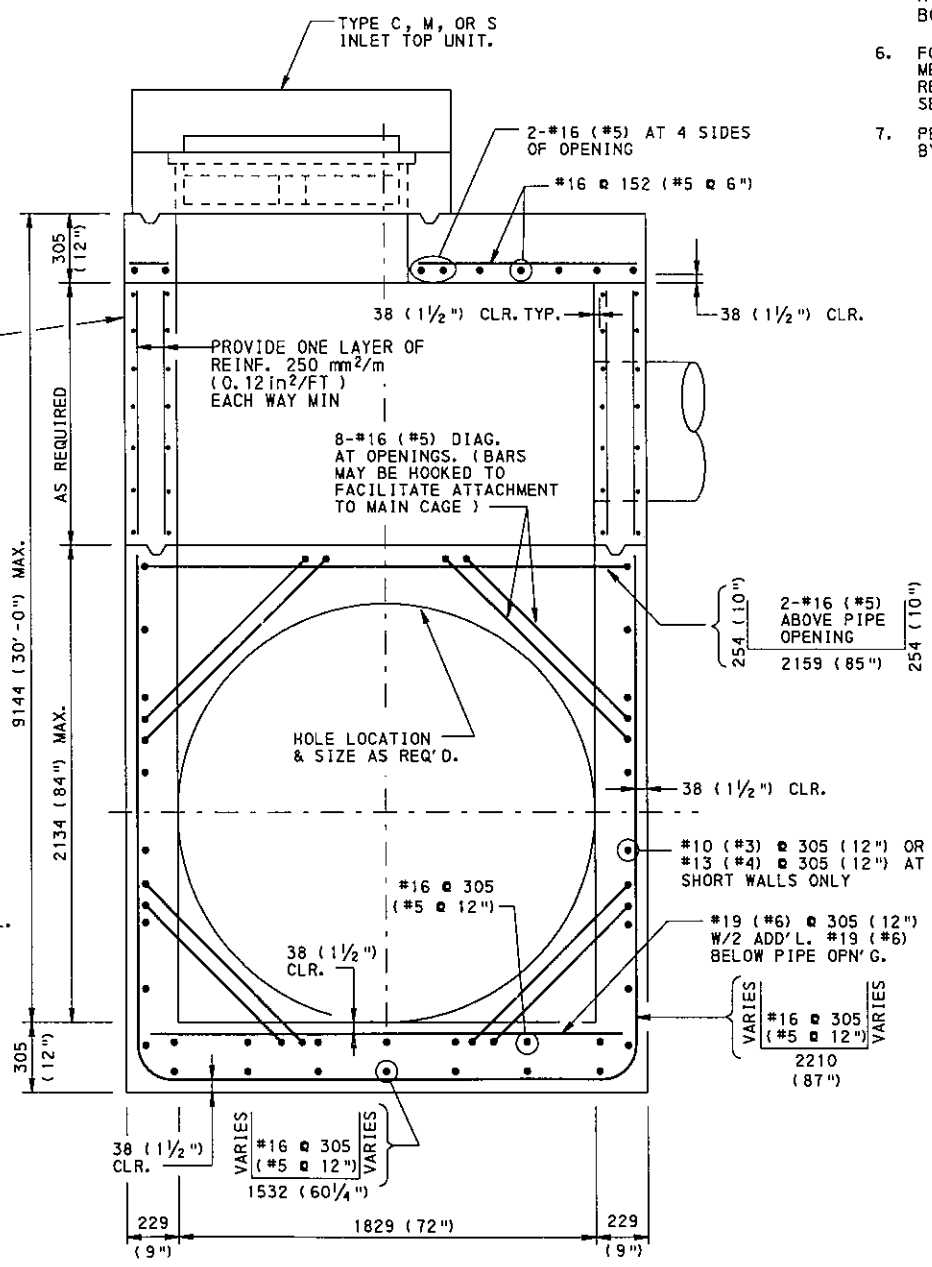
STANDARD HOLES

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.



SECTION A-A



SECTION B-B

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

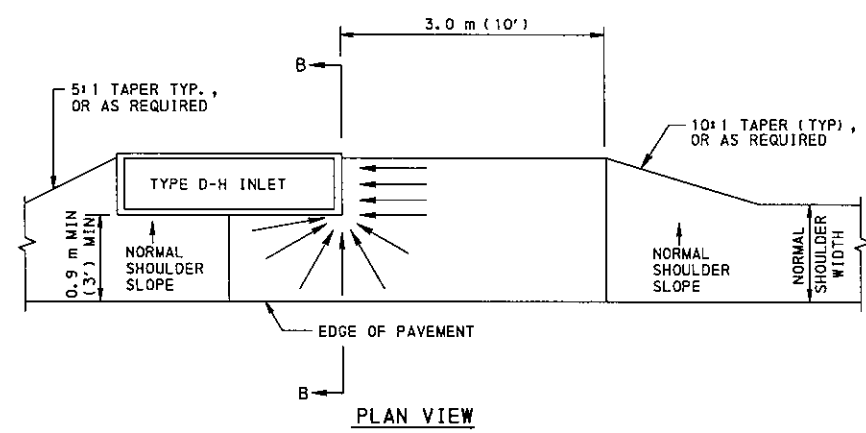
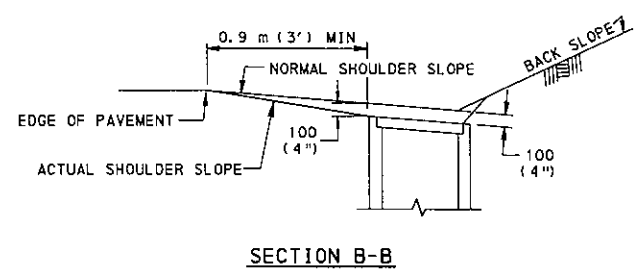
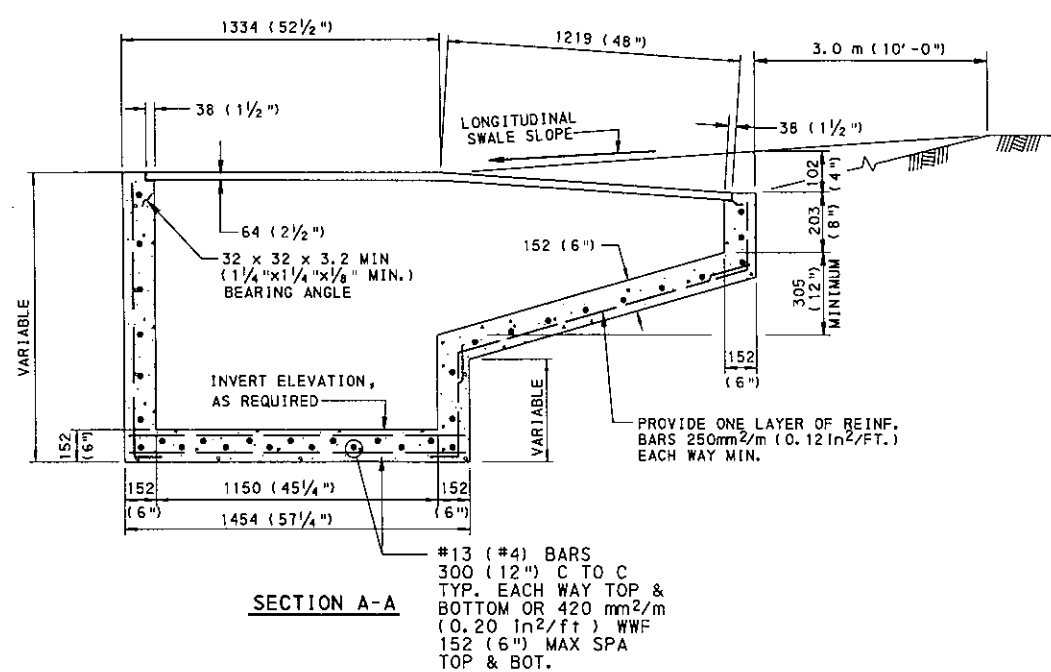
MODIFIED TYPE II INLET 610 (24") x 1829 (72")

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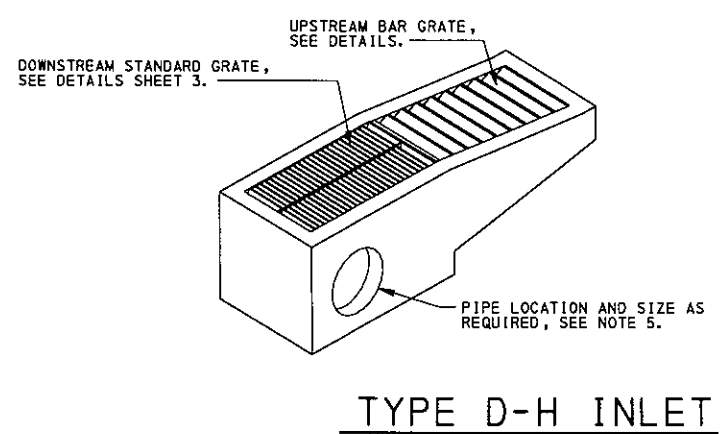
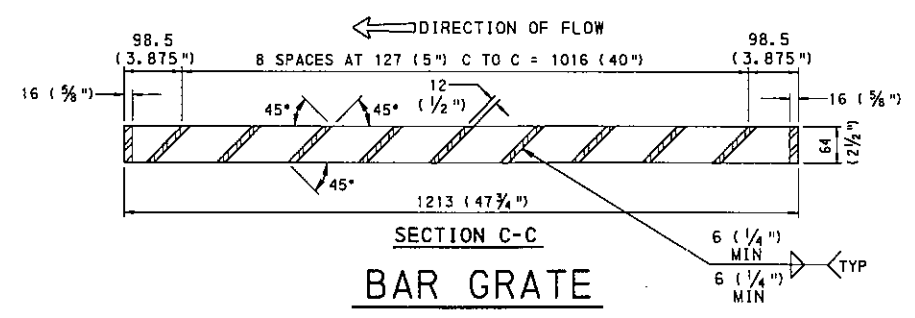
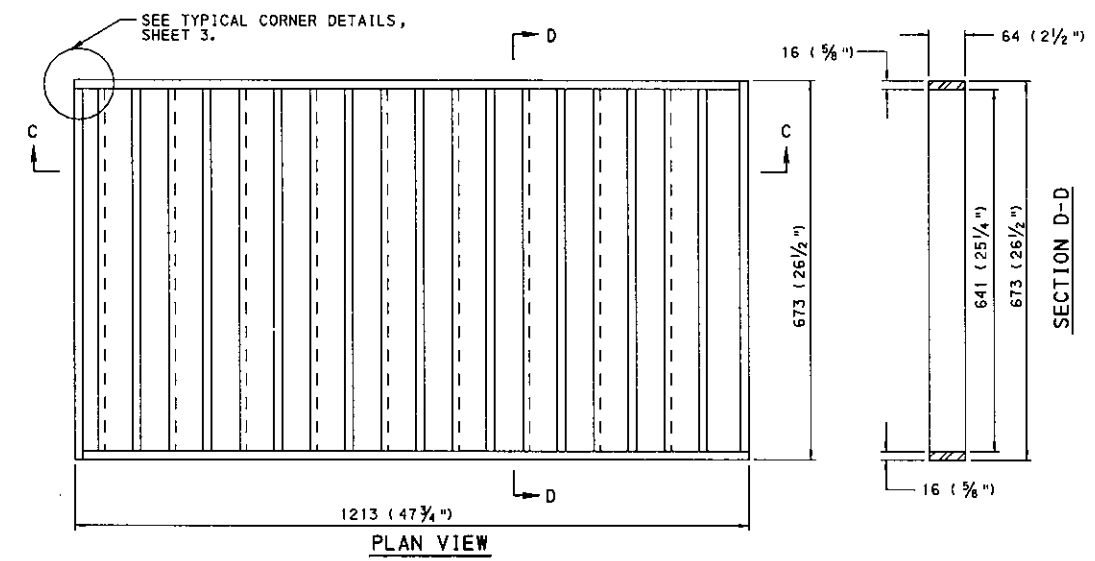
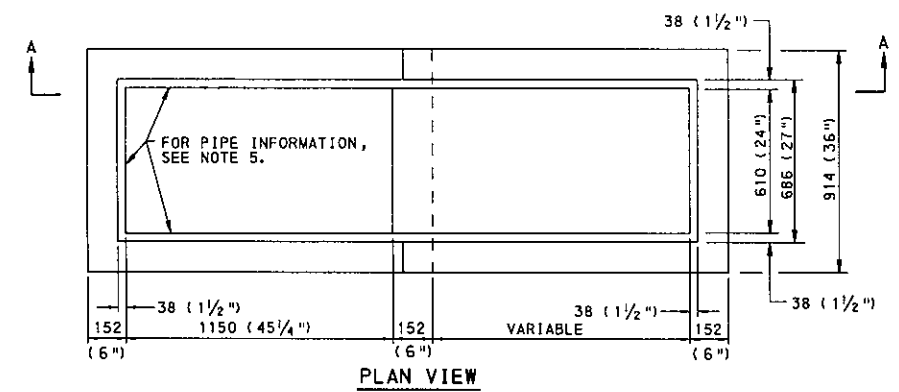
INLETS
MODIFIED INLET BOXES
(CAST-IN-PLACE AND PRECAST)

NOTES

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



TYPICAL D-H INLET LOCATION

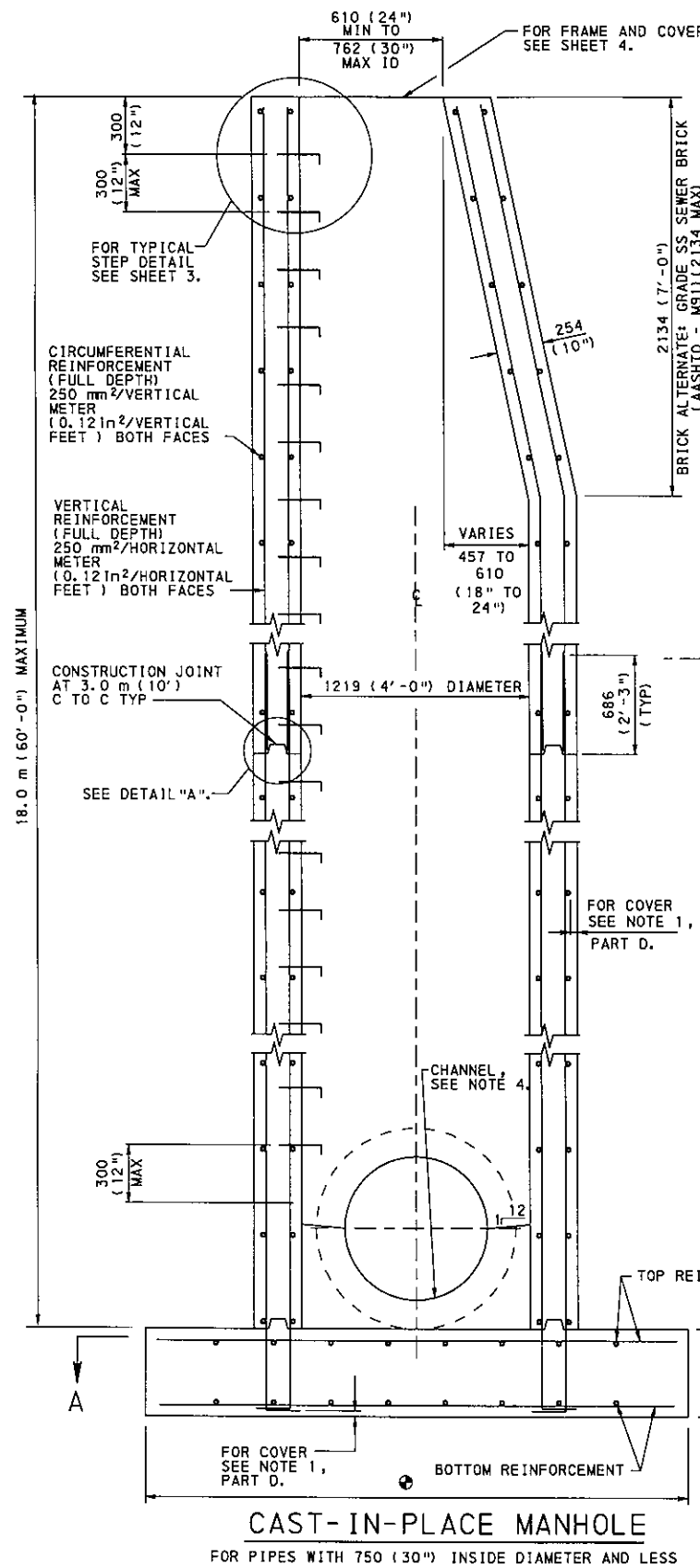


NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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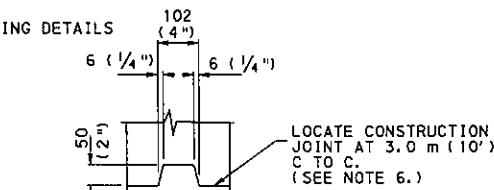
INLETS
TYPE D-H INLET
(CAST-IN-PLACE AND PRECAST)

RECOMMENDED NOV. 1, 2001 <i>Don A. Schaefer</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Gary R. Hoffman</i> CHIEF ENGINEER	SHT 10 OF 10 RC-34M
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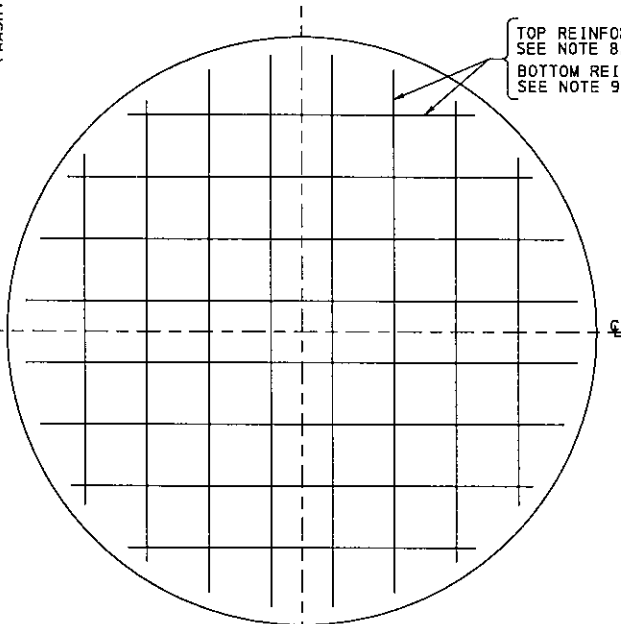


CAST-IN-PLACE MANHOLE
FOR PIPES WITH 750 (30") INSIDE DIAMETER AND LESS

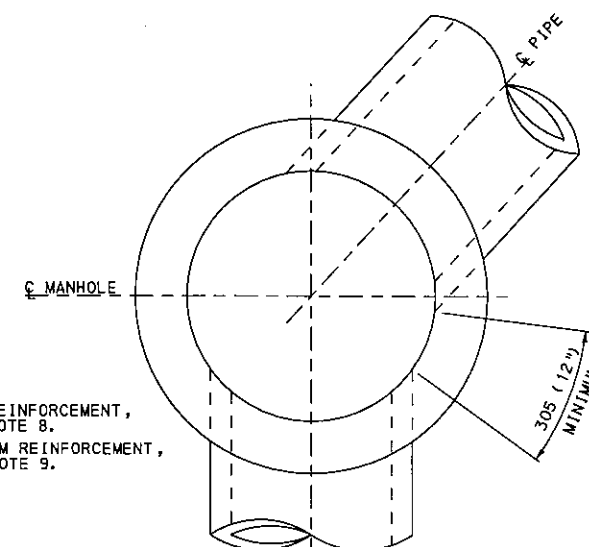
FOR BASE SLAB DIMENSIONS SEE TABLE A.



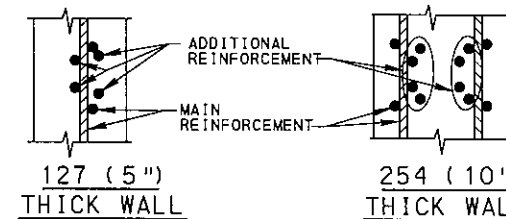
DETAIL "A"
CONSTRUCTION JOINT



SECTION A-A



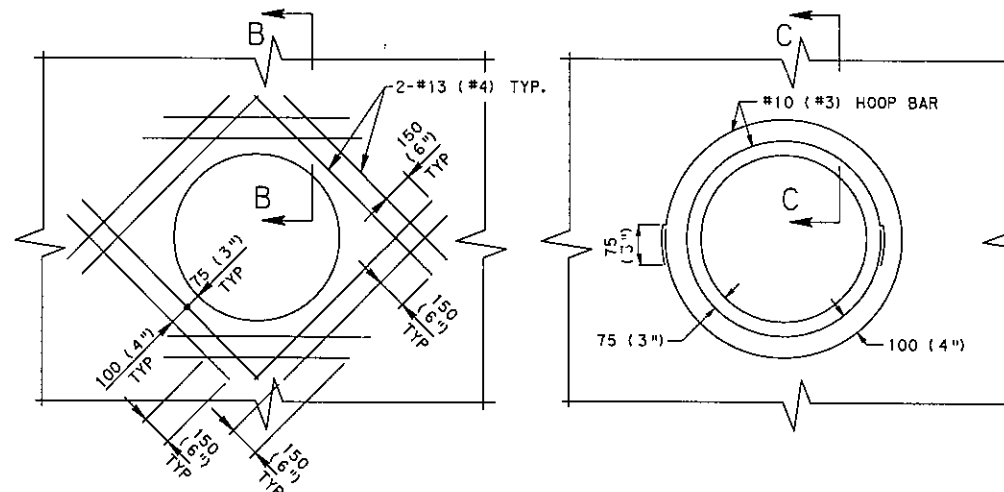
PLAN VIEW
SEE NOTE 3.



SECTION B-B OR C-C

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")



REINFORCEMENT DETAILS AT OPENINGS

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 REQUIRED COVER.

NOTES

- CONSTRUCTION REQUIREMENTS:
 - CONSTRUCT IN ACCORDANCE WITH PUBLICATION 408, SECTIONS 605, 606 AND 714; 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:

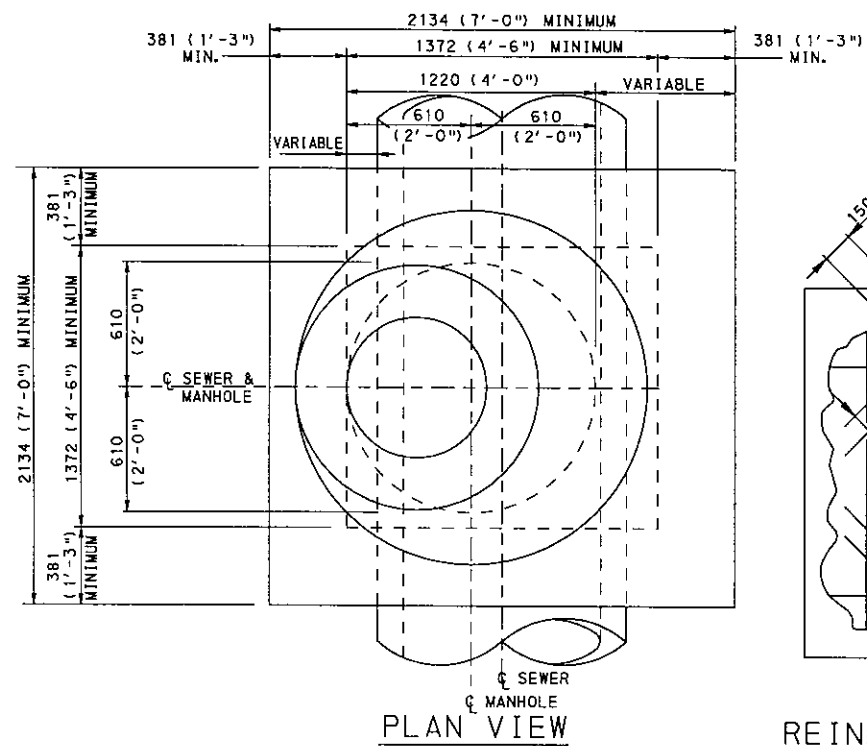
WALLS: CAST-IN-PLACE	50 (2")
PRECAST	40 (1 1/2")
FOOTINGS: CAST-IN-PLACE	60 (2 1/2") TOP BARS
	80 (3") BOTTOM BARS
PRECAST	50 (2") SIDE COVER
	50 (2") TOP BARS
	40 (1 1/2") BOTTOM BARS
	40 (1 1/2") SIDE COVER
SLABS: CAST-IN-PLACE	50 (2") TOP & BOTTOM BARS
- FOR PIPES WITH INSIDE DIAMETERS GREATER THAN 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 mm²/m (0.30 in²/FT) WWF FOR DEPTHS TO 9.0 m (30') AND 680 mm²/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 mm²/m (0.15 in²/FT) WWF FOR DEPTHS TO 9.0 m (30') AND 340 mm²/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.

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

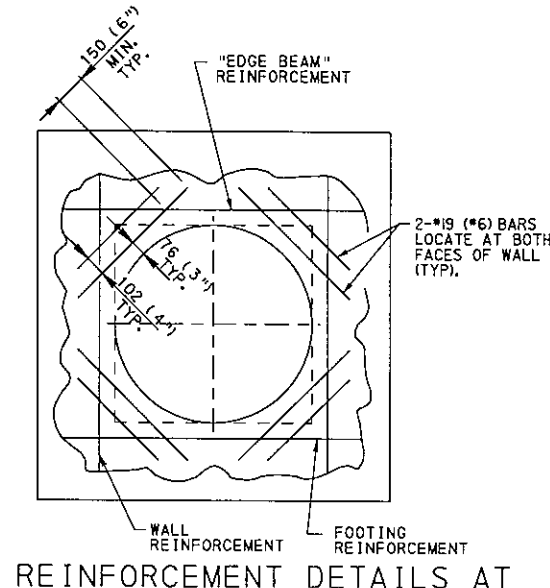
COMMONWEALTH OF PENNSYLVANIA
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BUREAU OF DESIGN

STANDARD MANHOLES
CAST-IN-PLACE MANHOLES

RECOMMENDED NOV. 1, 2001
 DIRECTOR, BUREAU OF DESIGN
 CHIEF ENGINEER
 SHT 1 OF 5
RC-39M



PLAN VIEW



REINFORCEMENT DETAILS AT VERTICAL OPENINGS

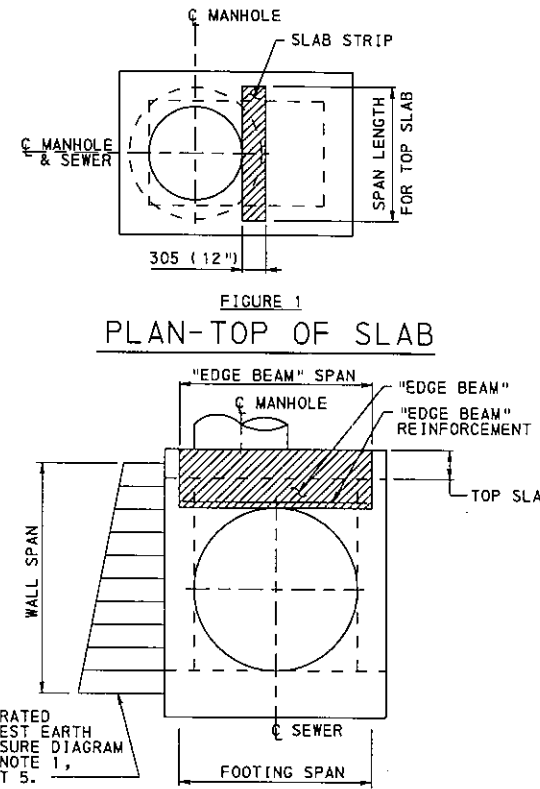
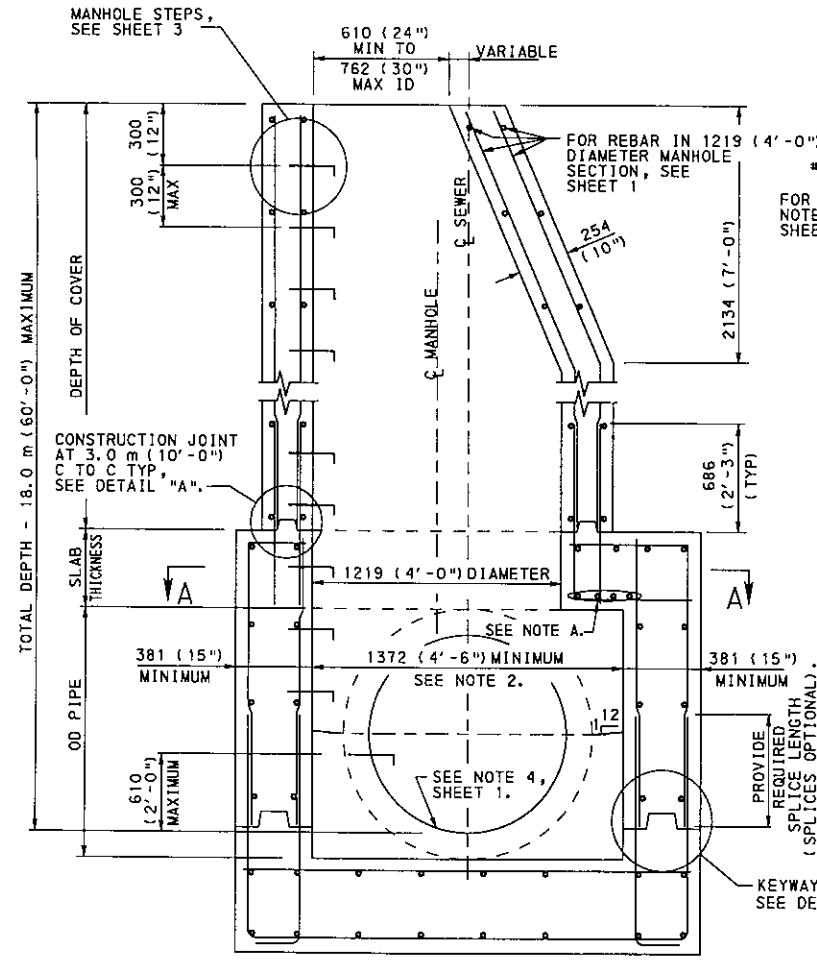


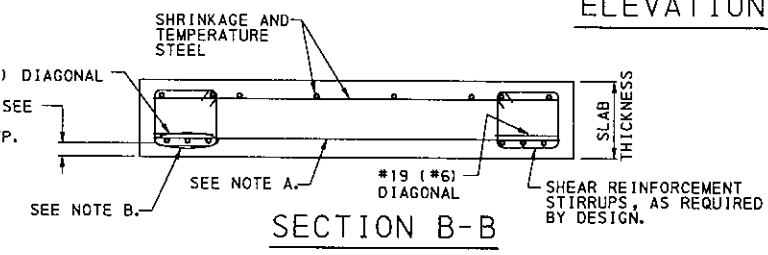
FIGURE 1
PLAN-TOP OF SLAB

FIGURE 2
ELEVATION-OPENING

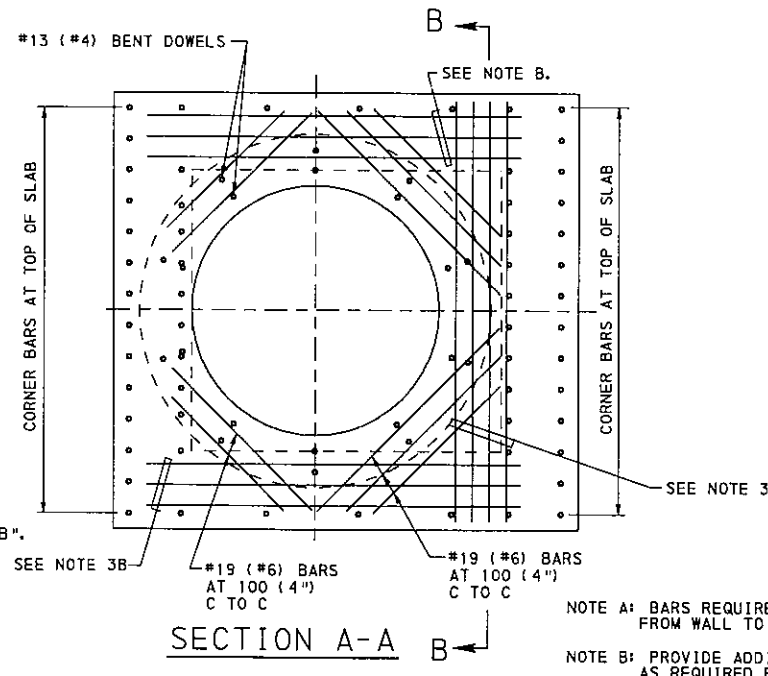
- NOTES**
- FOR CONSTRUCTION REQUIREMENTS SEE NOTE 1, SHEET 1. FOR DESIGN REQUIREMENTS SEE NOTE 1, SHEET 5.
 - INCREASE BOX SIZE WHEN REQUIRED TO KEEP WALLS OF MANHOLE BOX SECTION FLUSH WITH THE OPENING FOR PIPES LARGER THAN 1050 (42") ID. INDICATE THE BOX SIZE ON THE CONSTRUCTION PLANS OR SHOP DRAWINGS 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.



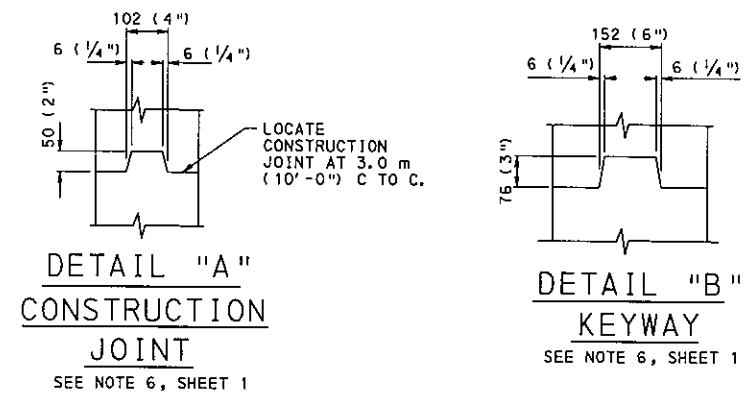
SECTION VIEW MODIFIED MANHOLE
FOR PIPES GREATER THAN 750 (30") TO 2100 (84") INSIDE DIAMETER



SECTION B-B



SECTION A-A



DETAIL "A"
CONSTRUCTION JOINT
SEE NOTE 6, SHEET 1

DETAIL "B"
KEYWAY
SEE NOTE 6, 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
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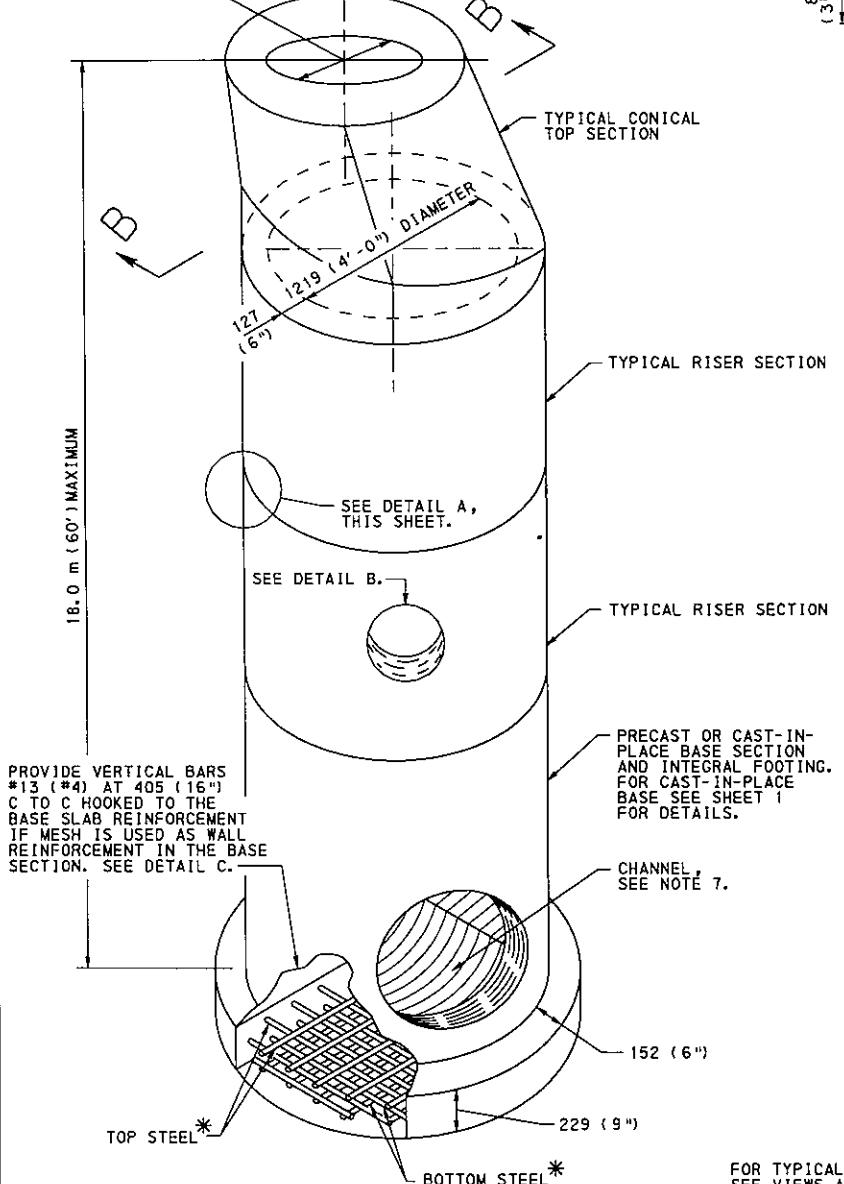
STANDARD MANHOLES
MODIFIED
CAST-IN-PLACE MANHOLES

RECOMMENDED NOV. 1, 2001 <i>Don A. Schae</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Darryl R. Hoffman</i> CHIEF ENGINEER	SHT 2 OF 5
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RC-39M

ADJUST TO FINAL GRADE WITH PRECAST CONCRETE GRADE RINGS OR BRICK AND CEMENT MORTAR. MAXIMUM 305 (12") TOTAL THICKNESS.

610 (24") MIN TO 762 (30") MAX ID



PROVIDE VERTICAL BARS #13 (#4) AT 405 (16") C TO C HOOKED TO THE BASE SLAB REINFORCEMENT IF MESH IS USED AS WALL REINFORCEMENT IN THE BASE SECTION. SEE DETAIL C.

PRECAST OR CAST-IN-PLACE BASE SECTION AND INTEGRAL FOOTING. FOR CAST-IN-PLACE BASE SEE SHEET 1 FOR DETAILS.

CHANNEL, SEE NOTE 7.

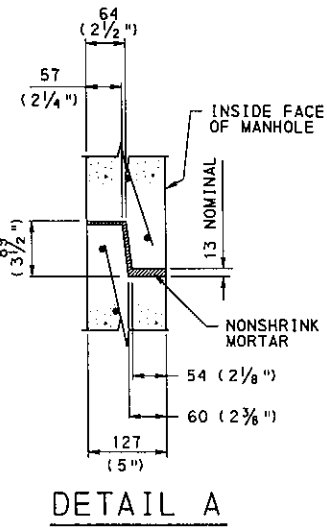
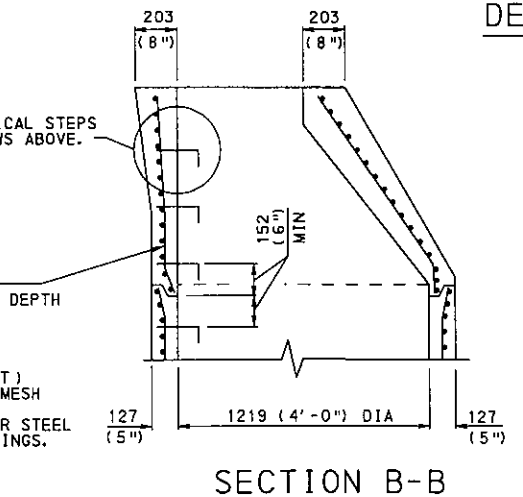
PRECAST MANHOLE

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.

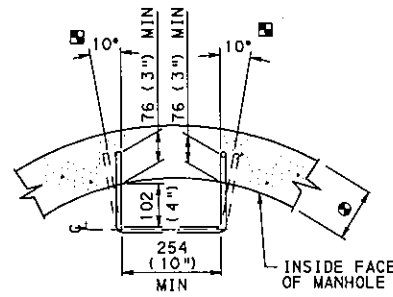
WALL REINFORCEMENT CIRCUMFERENTIAL FULL DEPTH 250 mm²/VERTICAL m (0.12 in²/VERTICAL FT.) VERTICAL FULL DEPTH 250 mm²/HORIZONTAL m (0.12 in²/HORIZONTAL FT.) PLACE REINFORCEMENT MESH CENTRALLY IN WALL. SEE NOTES 5 AND 6 FOR STEEL REQUIREMENTS AT OPENINGS.

FOR TYPICAL STEPS SEE VIEWS ABOVE.

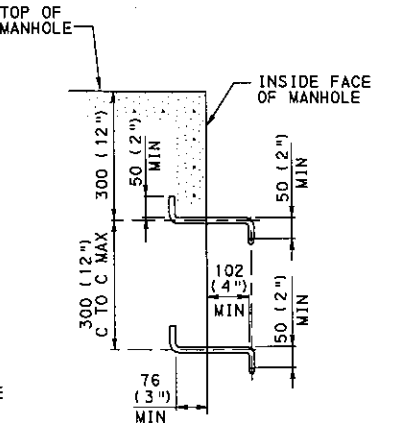


DETAIL A

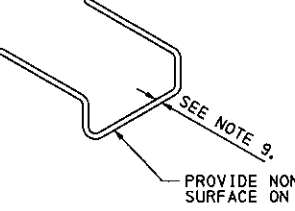
- ALTERNATE ACCEPTABLE CONFIGURATION
- 254 (10") FOR CAST-IN-PLACE 127 (5") FOR PRECAST



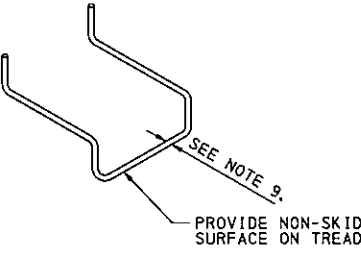
PLAN VIEW



SIDE VIEW



STEP WITHOUT HOOKS

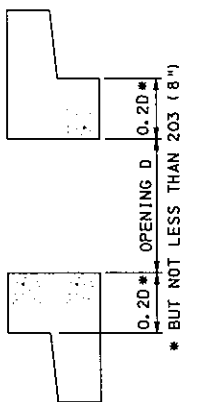


STEP WITH HOOKS

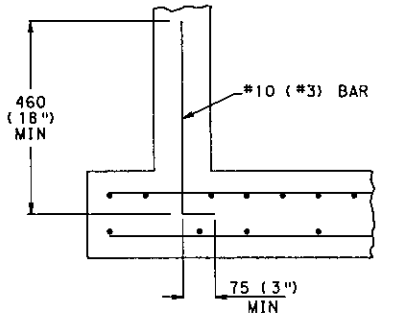
SEE NOTE 9. PROVIDE NON-SKID SURFACE ON TREAD.

SEE NOTE 9. PROVIDE NON-SKID SURFACE ON TREAD.

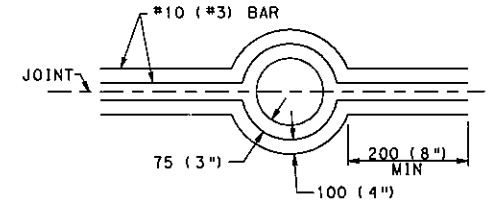
TYPICAL STEP CONFIGURATION MANHOLE STEPS



DETAIL B



DETAIL C



ALTERNATE DETAIL AT OPENINGS

SEE NOTE 11.

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 /m 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

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.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

**STANDARD MANHOLES
PRECAST MANHOLES &
MANHOLE STEPS**

RECOMMENDED NOV. 1, 2001
Director, Bureau of Design
RECOMMENDED NOV. 1, 2001
Chief Engineer
SHT 3 OF 5
RC-39M

NOTES

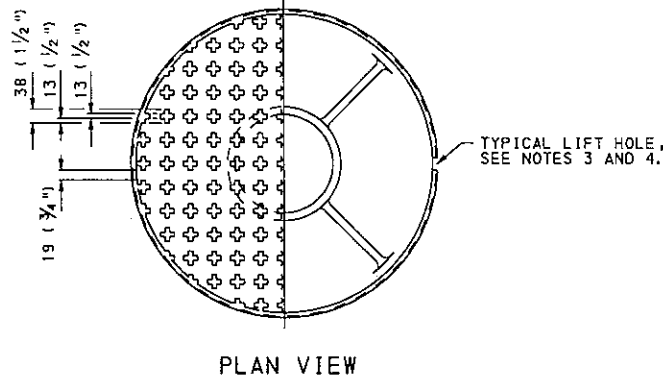
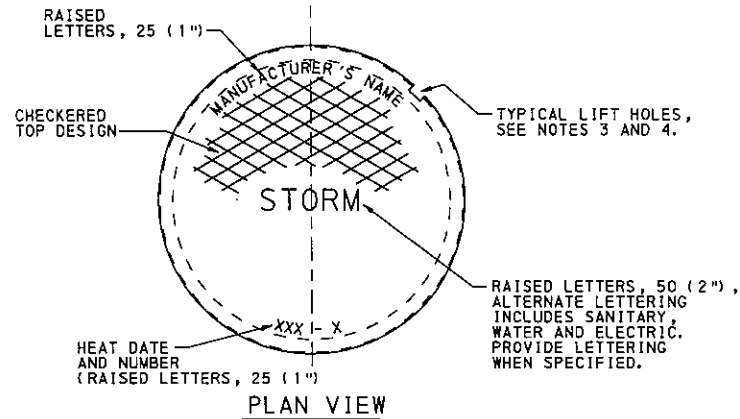
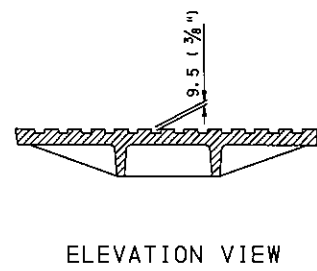
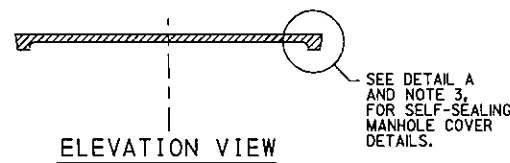
1. PROVIDE MANHOLE FRAMES AND COVERS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.2(b). DESIGN MANHOLE FRAME, COVER AND GRADE ADJUSTMENT RINGS FOR PHL 93 (HS25) LIVE LOAD. IF MANHOLES ARE NOT IN OR ADJACENT TO ROADWAY, DESIGN FOR ALL POSSIBLE LIVE LOADS AS APPROVED BY THE DEPARTMENT.
2. PROVIDE 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 (1/4") 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-36W.
 - 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 (5/8") 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
DEPARTMENT OF TRANSPORTATION
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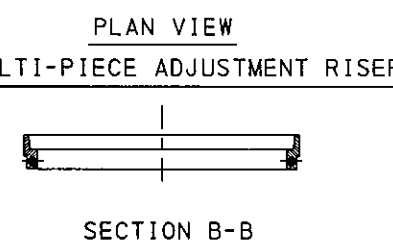
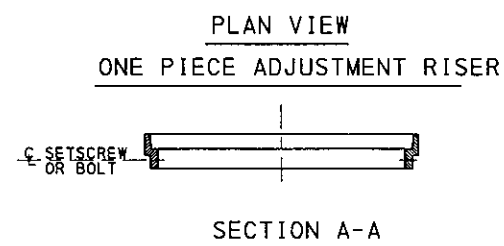
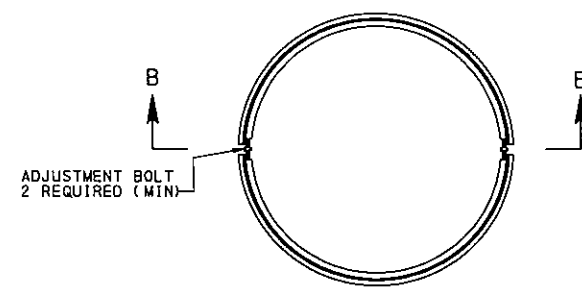
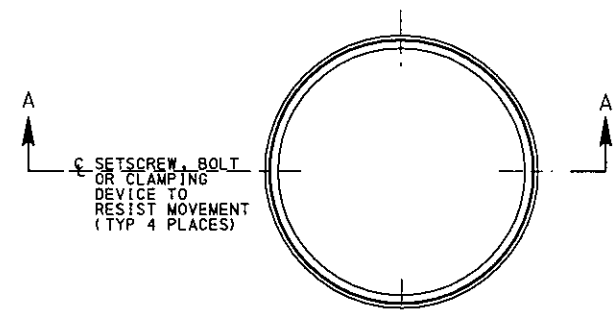
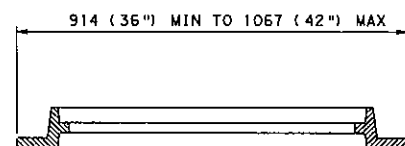
STANDARD MANHOLES
COVERS, FRAMES AND
ADJUSTMENT RISERS

RECOMMENDED NOV. 1, 2001 <i>Dean A. Schuch</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Charles J. Hoffman</i> CHIEF ENGINEER	SHT 4 OF 5
		RC-39M

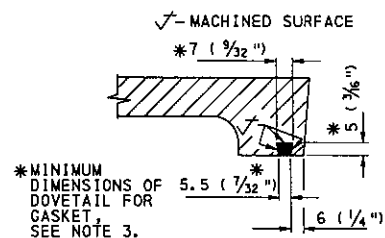


CAST IRON MANHOLE COVER
(PLATEN COVER)

CAST IRON MANHOLE COVER
(STANDARD COVER)



ADJUSTMENT RISERS



1. DESIGN REQUIREMENTS:

- A. DESIGN SPECIFICATIONS: DESIGN DIVISION 1 OF AASHTO, STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 1992, INCLUDING THE LATEST INTERIM SPECIFICATIONS AND AS SUPPLEMENTED BY THE DESIGN MANUAL, PART 4, AUGUST 1993 EDITION (INCLUDING LATEST REVISIONS), 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) 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)
 $\phi = \text{ANGLE OF INTERNAL FRICTION} = 33^\circ$
 DRY AT REST EARTH PRESSURE = $K_0 \gamma_e = 0.001(1 - \sin \phi) \gamma_e$
 $= 0.001 \times 0.46 \times 1920 \times 9.81 = 8.7 \text{ MPa}$
 SATURATED AT REST EARTH PRESSURE = $K_0 [\gamma_e - \gamma_w] + \gamma_w$
 $= 0.46 [(0.001)(1920)(9.81) - 9.81] + 9.81$
 $= 14.0 \text{ MPa}$
 (SATURATED AT REST EARTH PRESSURE = $0.46 \times 120 = 55 \text{ P.C.F.}$)
 (SATURATED AT REST EARTH PRESSURE = $K_0 (\gamma_e - \gamma_w) + \gamma_w$)
 $= 0.46 \times (120 - 62.4) + 62.4$
 $= 89 \text{ P.C.F.}$

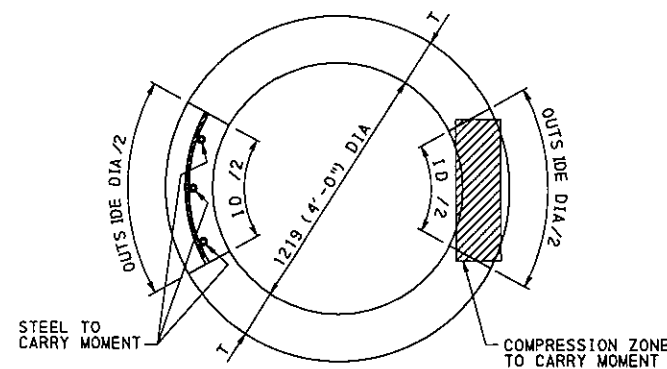
- F. PROVIDE AT LEAST MINIMUM REINFORCEMENT FOR SHRINKAGE AND TEMPERATURE AT ALL CONCRETE FACES WHERE REINFORCEMENT IS NOT REQUIRED BY DESIGN.
 - G. FOR CONSTRUCTION REQUIREMENTS SEE NOTE 1, SHEET 1.
2. VERTICAL STEEL:
- A. THIS PROCEDURE IS REQUIRED ONLY WHEN A SIGNIFICANT LOADING EXISTS ON ONE SIDE 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.

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

(98 kips/FT)



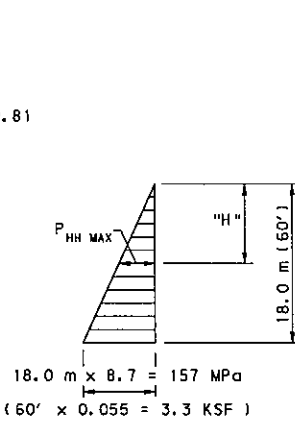
DESIGN SECTION TO CARRY MOMENT
 FIGURE 1

3. HOOP STEEL:

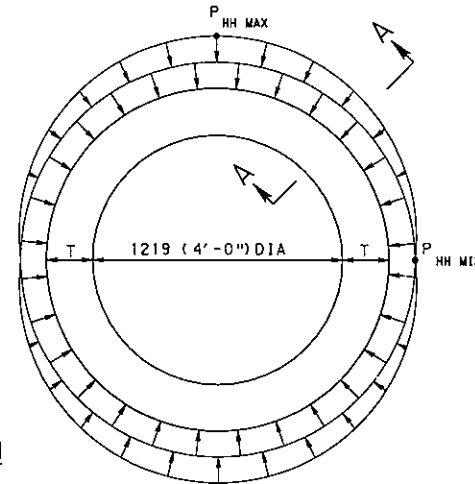
- A. DETERMINE SERVICE MOMENTS AND AXIAL THRUSTS USING FIGURE 2 AND FIGURE 3. $P_{HH \text{ MIN}}$ NOT TO BE GREATER THAN ONE-HALF OF $P_{HH \text{ MAX}}$.
- B. DESIGN HOOP REINFORCEMENT SHOWN IN SECTION A-A, TO CARRY THE MOMENT AND AXIAL THRUST.
- C. CHECK CRACK CONTROL UNDER SERVICE LOAD.

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

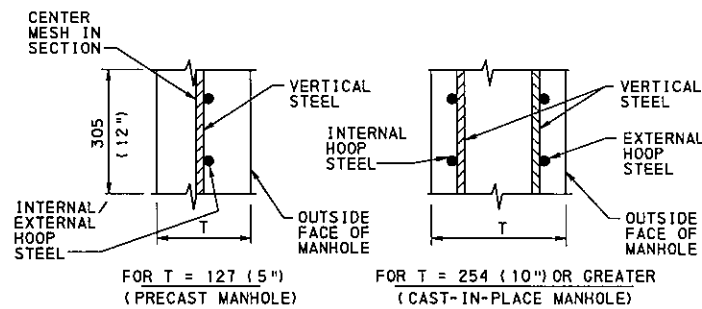
(98 kips/FT)



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)

$$\frac{P + M}{A} \leq \frac{290 \text{ kPa} (3.0 \text{ KSF}) \text{ OR MAXIMUM}}{S} \text{ ALLOWABLE BEARING PRESSURE}$$

$$P = DL + LL + EP$$

DL = DEAD LOAD OF MANHOLE

LL = PHL 93 (HS25) 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

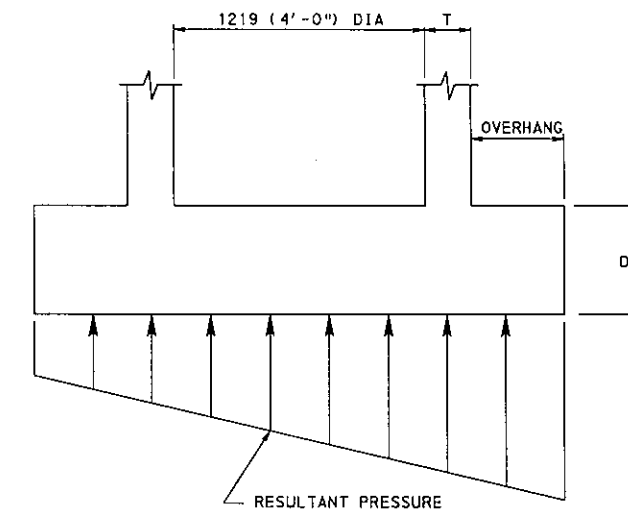
SEPARATION BETWEEN THE FOOTING AND SOIL IS NOT PERMISSIBLE.

- 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.

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

(98 kips/FT)

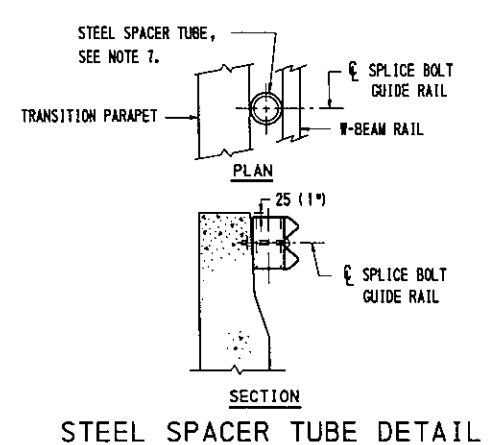
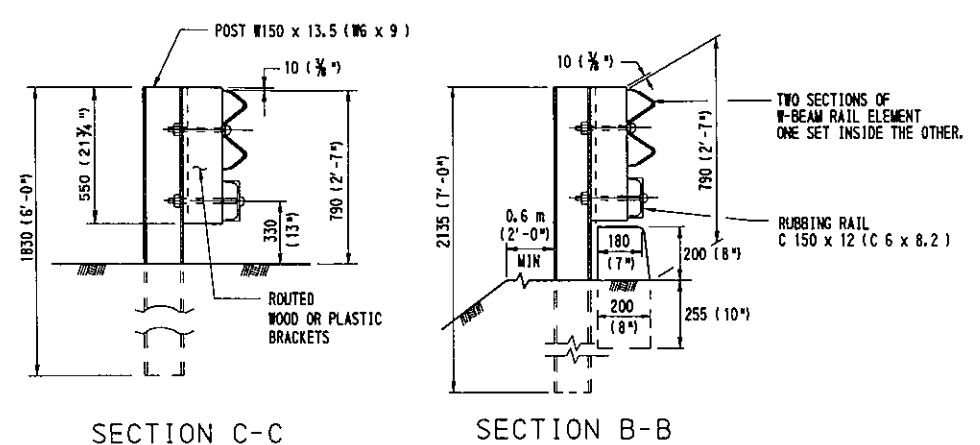


DIAMETRICAL SECTION THROUGH FOOTING
 FIGURE 4

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

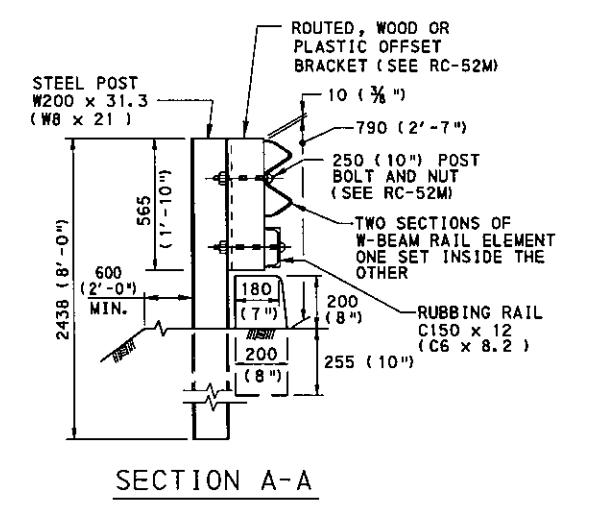
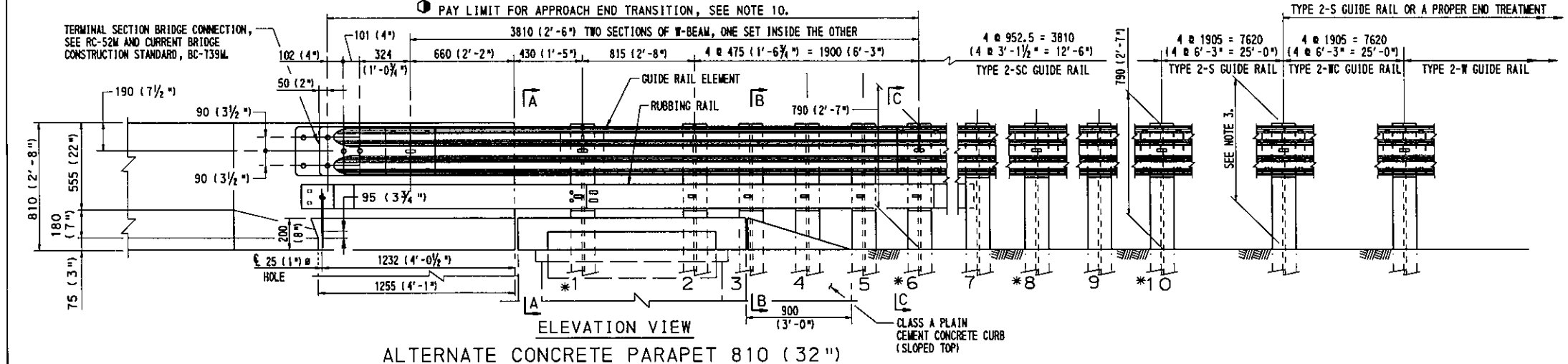
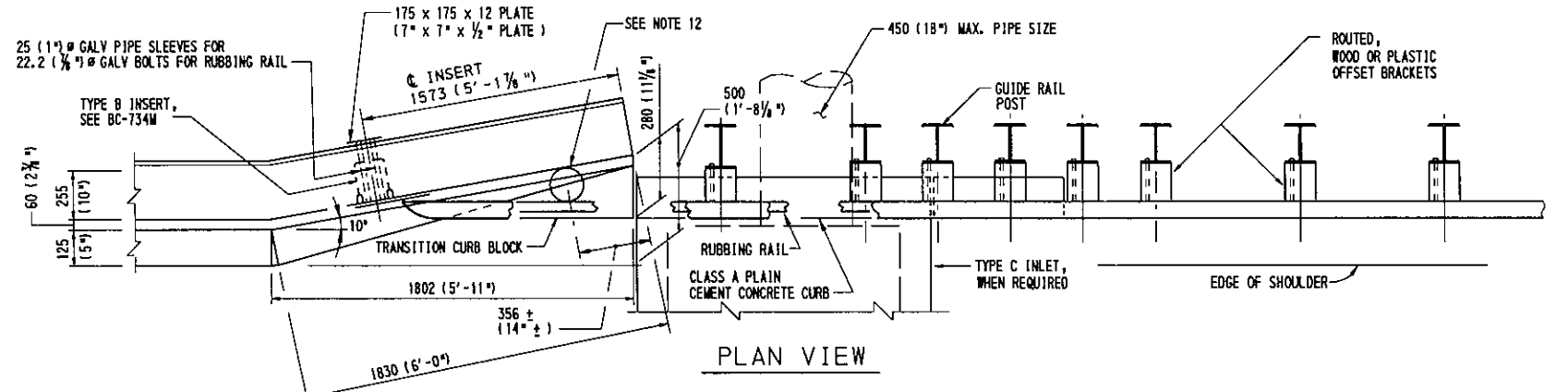


NOTES

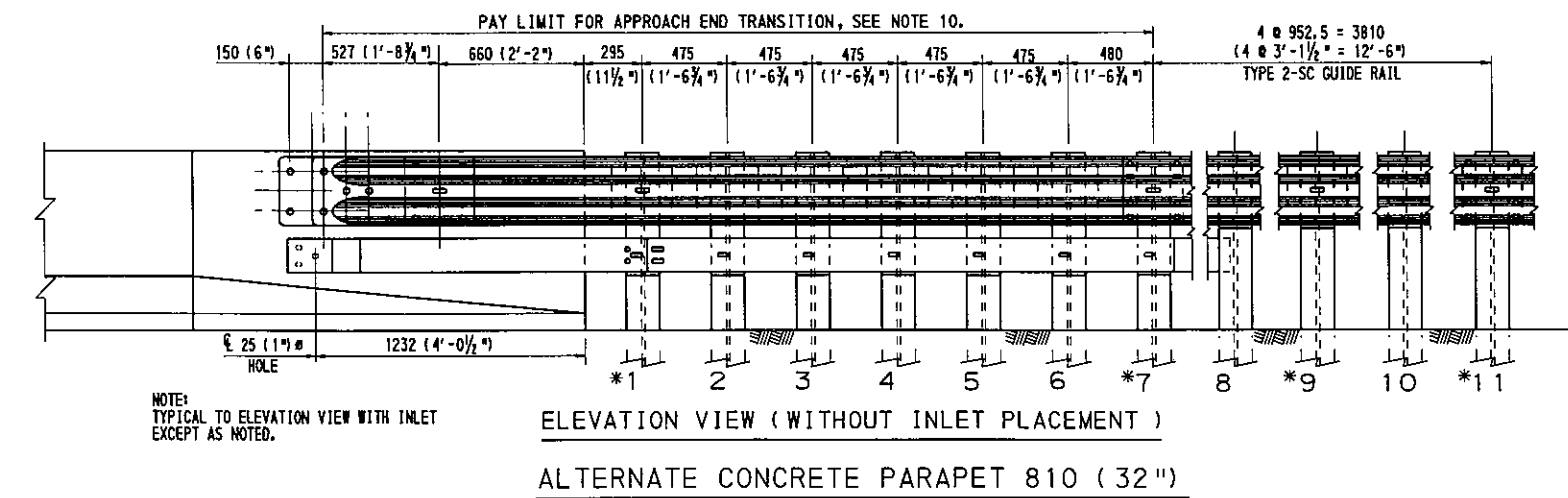
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESES.
2. ALL REINFORCEMENT STEEL BARS SHOWN ARE SOFT CONVERTED METRIC SIZES THAT MEET THE REQUIREMENTS OF ASTM A 615M, A 616M AND A 706M.
3. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH PUB. 408.
4. W-BEAM IS BOLTED TO ALL GUIDE RAIL POSTS.
5. USE PLAN DIMENSIONS WHEN DIFFERENT FROM THOSE SHOWN ON THIS STANDARD.
6. REINFORCED CONCRETE PARAPET AND EMBEDDED INSERTS ARE BRIDGE ITEMS.
7. ON STRUCTURES WHERE STRUCTURE MOUNTED (TYPE 2-SC) GUIDE RAIL IS USED, THE APPROACH END TRANSITION IS NOT REQUIRED.
8. BOLT RUBBING RAIL TO POST WITHOUT WASHER.
9. POSTS WITH RUBBING RAIL ATTACHEMENT REQUIRE AN ADDITIONAL HOLE.
10. TERMINAL SECTION AND RUBBING RAIL END MUST BE ATTACHED FLUSH WITH SLOPED TOE OF SAFETY SHAPE. INSTALLATION CAN BE GREATLY SIMPLIFIED BY FABRICATING OR SHOP TWISTING TO BE CONSISTENT WITH THE SLOPE OF SAFETY SHAPE.
11. PROVIDE #3, 4 AND 5 POSTS 2135 (7'-0") LONG AND EMBED THEM 305 (1'-0") DEEPER THAN POSTS, 6 THROUGH 10.
12. STEEL SPACER TUBE, SCHEDULE 40 GALVANIZED PIPE, 152 (6") I.D. x 305 (12"). CONNECT TO THE RAIL ELEMENTS USING SPLICE BOLT.
13. GALVANIZE ALL HARDWARE, GUIDE RAIL MATERIAL POSTS AND RUBBING RAIL IN ACCORDANCE WITH PUB. 408M, SECTION 1109.
14. REINFORCEMENT BAR SIZES ARE SHOWN FOR CLARITY ONLY. USE ACTUAL BAR DESIGNATION INDICATED IN THE CONTRACT DRAWINGS.
15. SEE BC-739M FOR DETAILS AND HARDWARE NOT SHOWN.
16. 40 (1 1/2") CL. ON ALL REINFORCEMENT EXCEPT AS NOTED.
17. PROVIDE APPROACH END GUIDE RAIL TREATMENT AT BOTH THE APPROACH AND TRAILING ENDS OF STRUCTURE PARAPETS ON TWO LANE FACILITIES WITH TWO-WAY TRAFFIC. ON FOUR LANE DIVIDED HIGHWAYS, GUIDE RAIL TRANSITION IS NOT REQUIRED ON TRAILING ENDS OF PARAPETS UNLESS WARRANTED BY OTHER OBSTRUCTIONS.
18. PAYMENT FOR THE APPROACH END TRANSITION, EITHER WITH OR WITHOUT INLET PLACEMENT, INCLUDES THE TYPE C INLET AND CURB IF REQUIRED, TWO 3810 (12'-6") SECTIONS OF W-BEAM, POSTS, OFFSET BRACKETS, STEEL SPACER TUBE, RUBBING RAIL, RUBBING RAIL CONNECTIONS, TERMINAL SECTION BRIDGE CONNECTION AND ASSOCIATED HARDWARE AND ARE ROADWAY ITEMS.

LEGEND

- ① ON STRUCTURES WHERE STRUCTURE MOUNTED (TYPE 2-SC) GUIDE RAIL IS USED, THE APPROACH END TRANSITION IS NOT REQUIRED.
- * POSTS THAT ARE DENOTED WITH (*) ARE BOLTED TO THE W-BEAM.



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



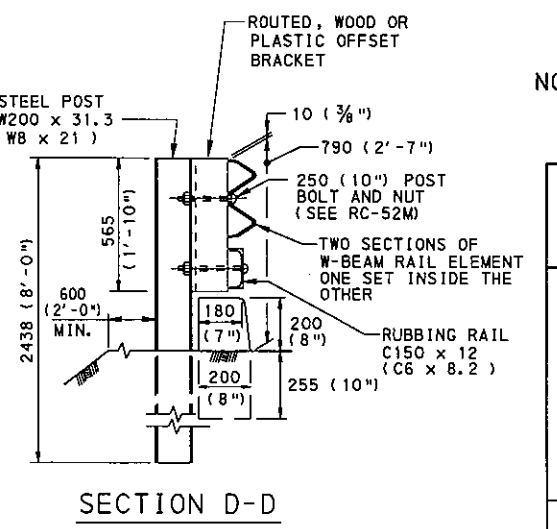
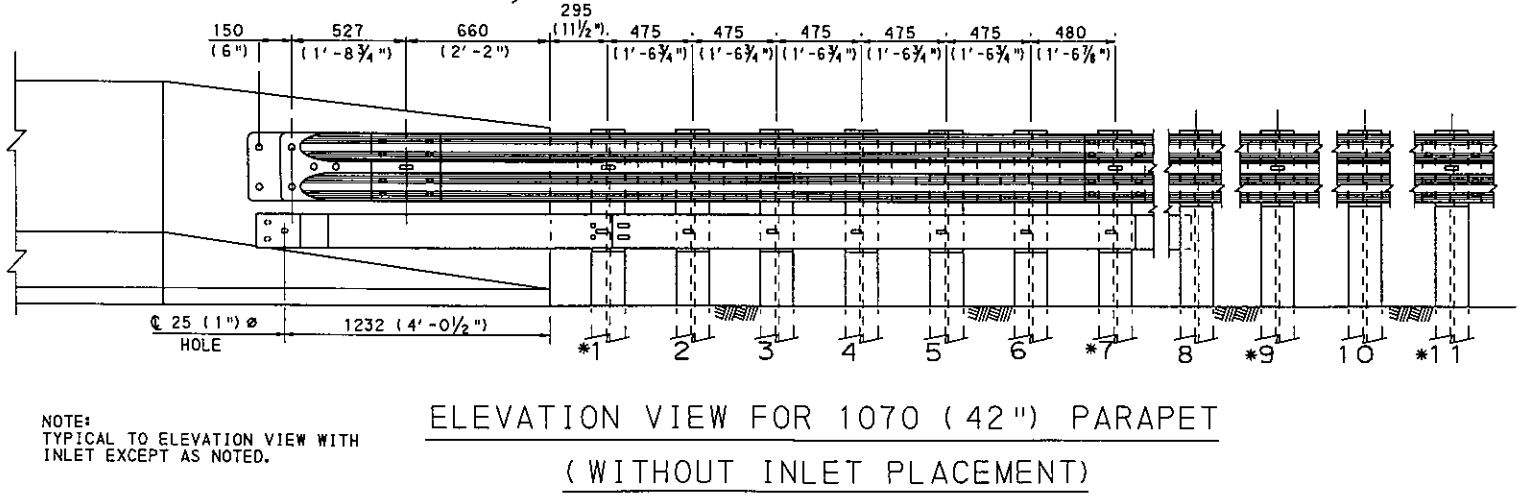
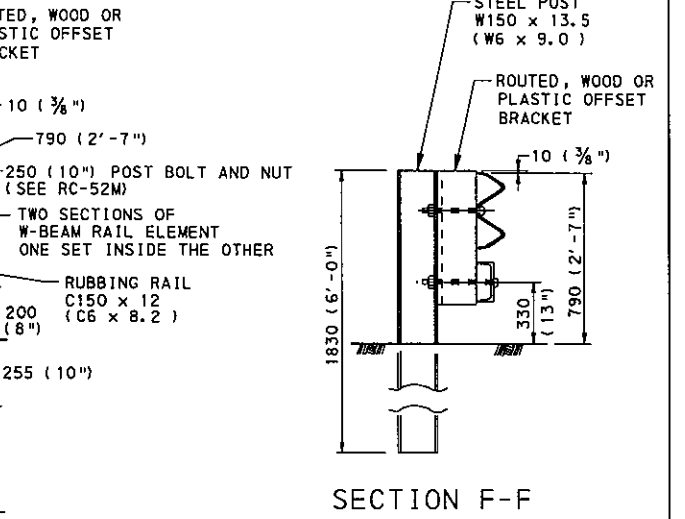
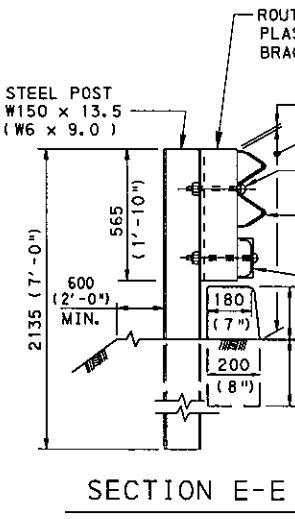
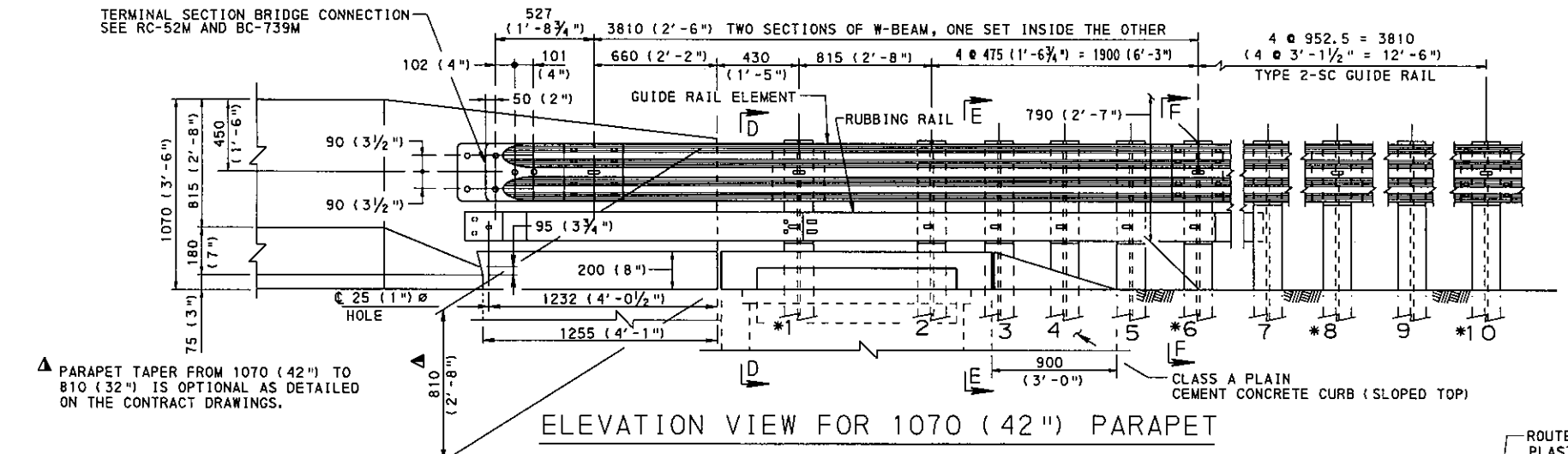
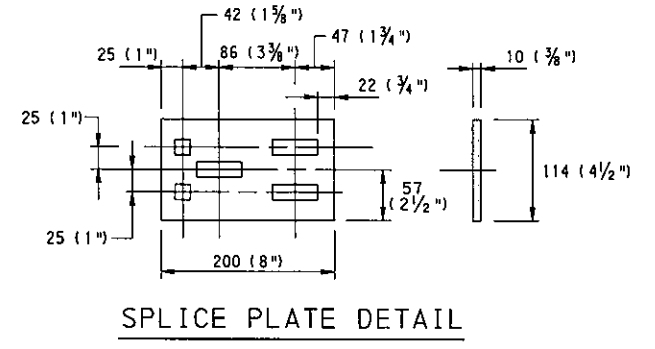
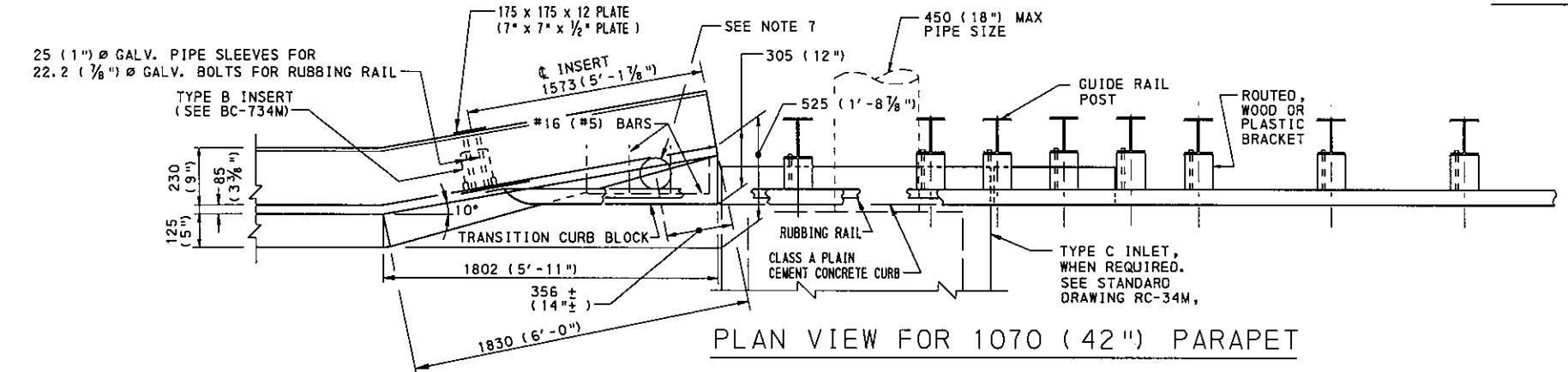
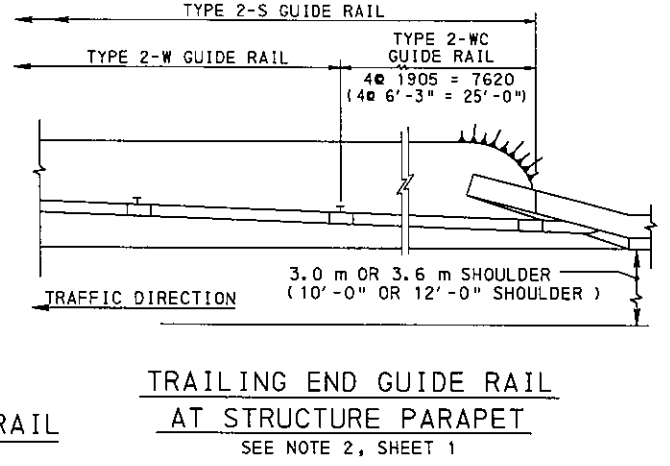
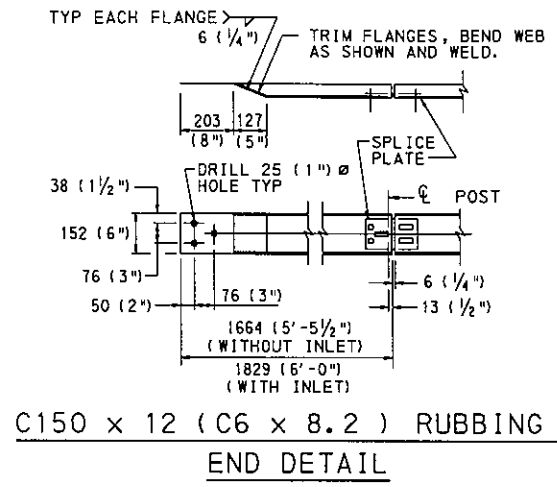
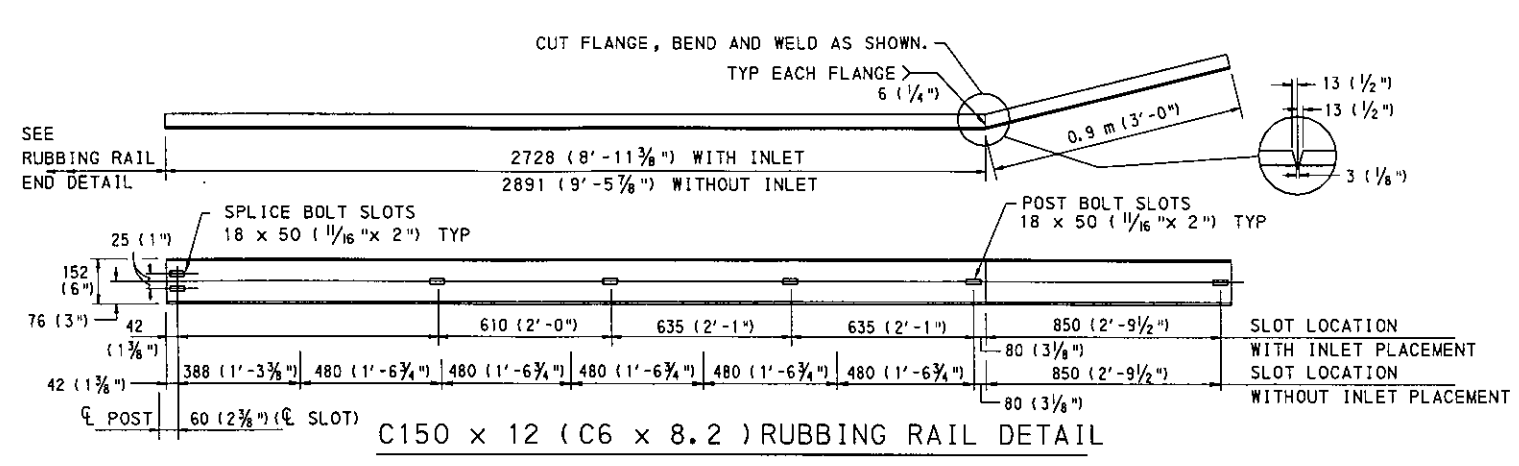
NOTE: TYPICAL TO ELEVATION VIEW WITH INLET EXCEPT AS NOTED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

GUIDE RAIL TRANSITION AT
END OF STRUCTURE

RECOMMENDED NOV. 1, 2001 <i>Dean A. Schurr</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Charles Hoffman</i> CHIEF ENGINEER	SHT 1 OF 2 RC-50M
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BC-8004-2001



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

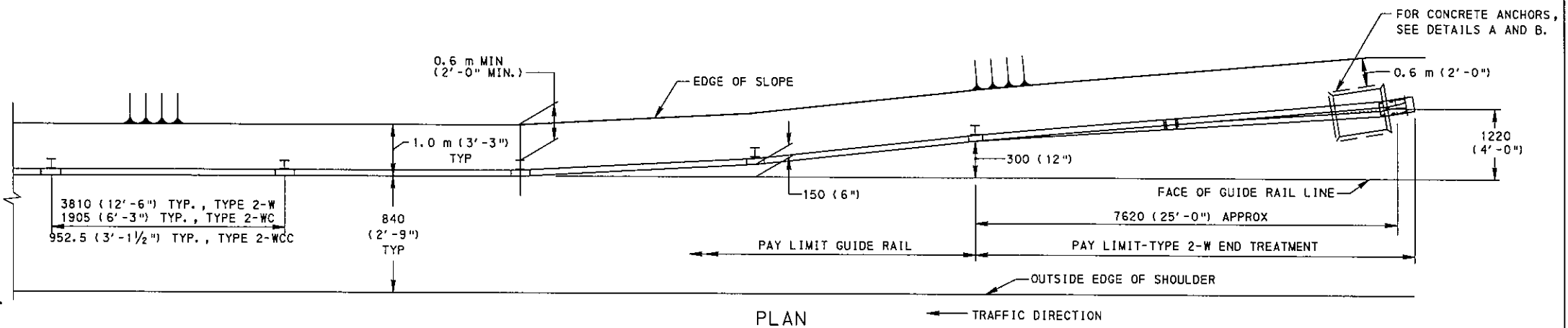
GUIDE RAIL TRANSITION AT END OF STRUCTURE

RECOMMENDED NOV. 1, 2001 <i>Dean A. Schuler</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Gary S. Holman</i> CHIEF ENGINEER	SHT 2 OF 2 RC-50M
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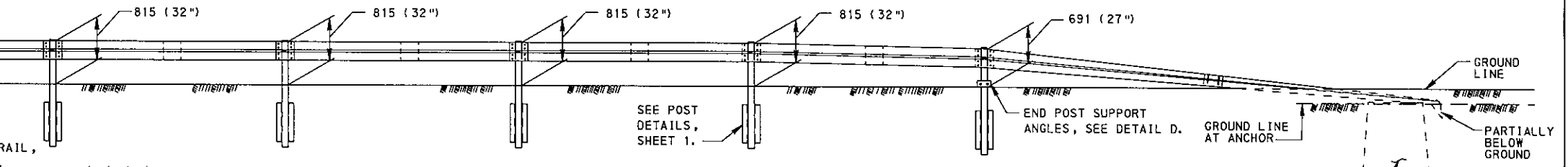
FOR NOTES, SEE SHEET 1.

NOTES

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

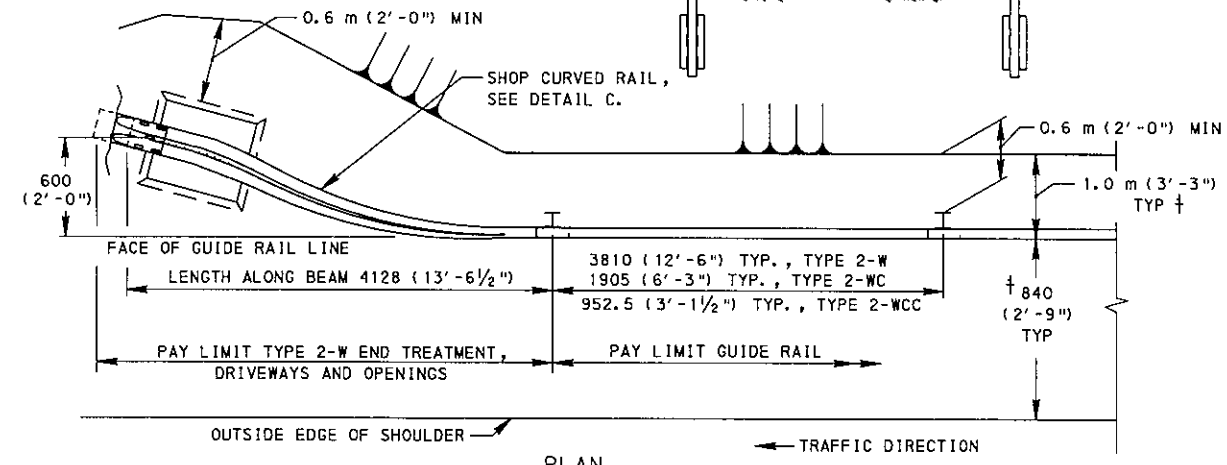


PLAN

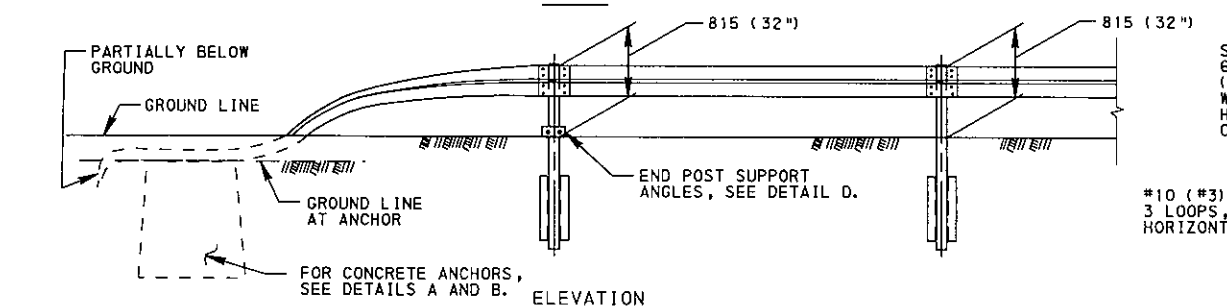


ELEVATION

TYPE 2-WEAK POST END TREATMENT
(SEE NOTE 1)

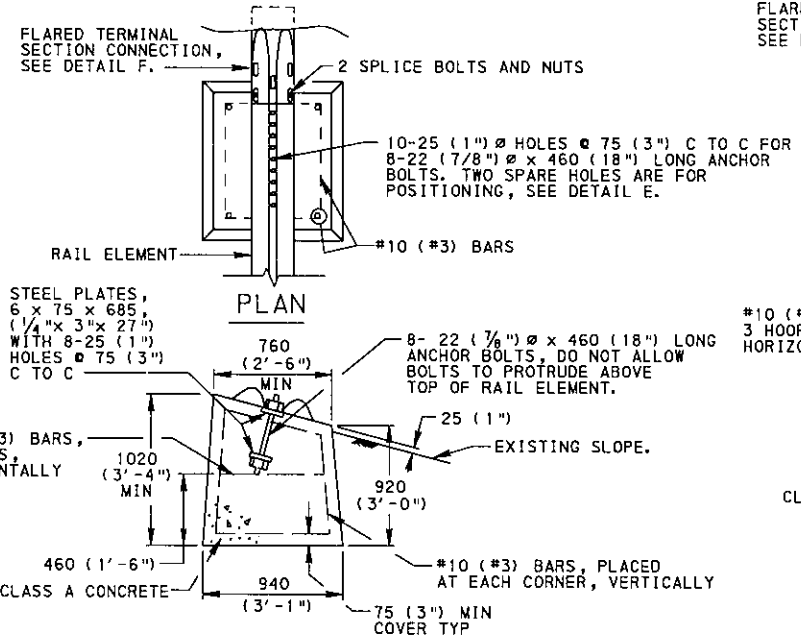


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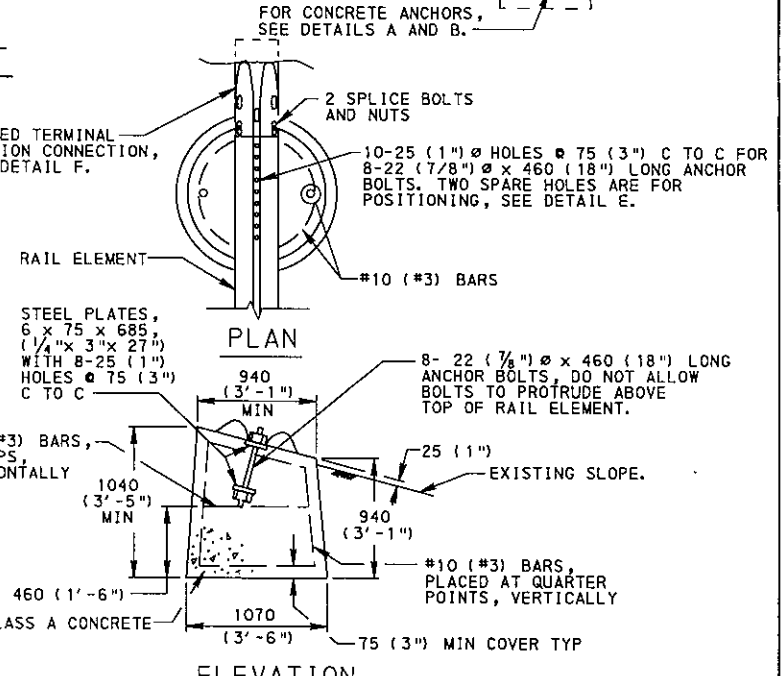
ELEVATION

TYPE 2-W END TREATMENT AT DRIVEWAYS & OPENINGS
(USE ON BOTH SIDES OF DRIVEWAYS & OPENINGS)



ELEVATION

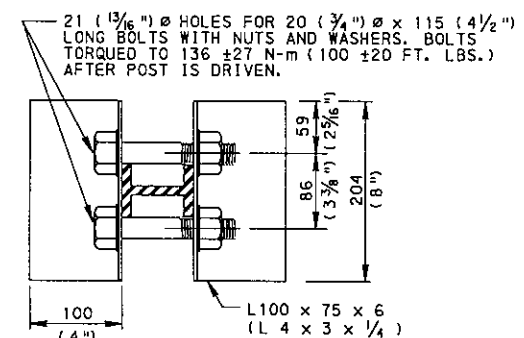
DETAIL A



ELEVATION

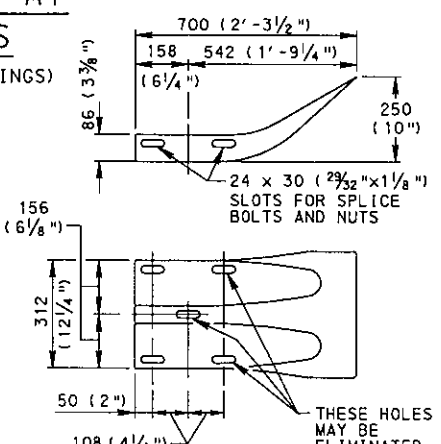
DETAIL B (ALTERNATE)

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



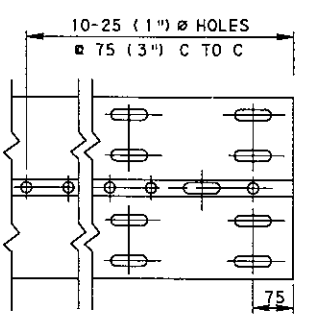
DETAIL D

END POST SUPPORT ANGLES

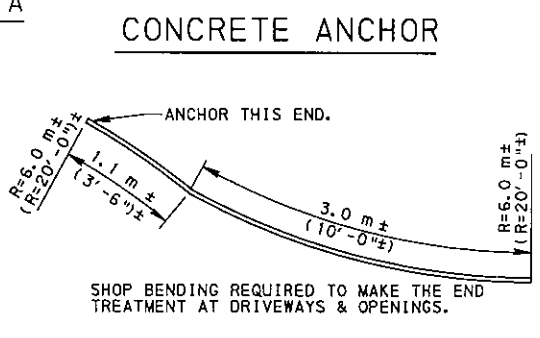


DETAIL F

FLARED TERMINAL SECTION



DETAIL E



DETAIL C

SHOP CURVED RAIL

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

TYPE 2 WEAK POST
GUIDE RAIL
END TREATMENTS

NOTES

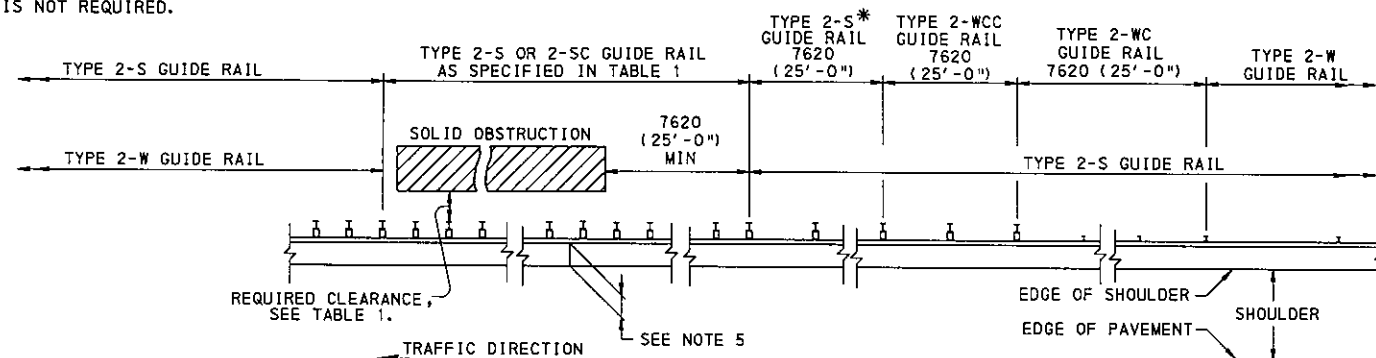
1. THE TREATMENTS SHOWN ARE FOR FOUR LANE DIVIDED HIGHWAYS. USE THE APPROACH END TREATMENT AT BOTH SIDES OF THE OBSTRUCTION ON TWO-LANE FACILITIES WITH TWO-WAY TRAFFIC.
2. THIS STANDARD HAS BEEN PREPARED AS A GUIDE FOR THE PLACEMENT OF GUIDE RAIL AND MEDIAN BARRIER. IT IS IMPRACTICAL TO PROVIDE A STANDARD FOR ALL POSSIBLE CONDITIONS. MODIFICATIONS OF TREATMENTS CAN BE MADE TO FIT EXISTING CONDITIONS; HOWEVER, FOLLOW THE RECOMMENDED GUIDELINES IN PUBLICATION 13M, DM-2, CHAPTER 12.
3. THIS DISTANCE VARIES. DETERMINE THE REQUIRED LENGTH USING THE GUIDELINES FOUND IN PUBLICATION 13M, DM-2, CHAPTER 12, AND SHOW ON THE TABULATIONS. WHERE CALCULATIONS SHOW A DISTANCE LESS THAN 15 m (50'-0"), USE 15 m (50'-0") AS A MINIMUM DISTANCE.
4. WHERE THE 0.6 m (2'-0") REQUIRED CLEARANCE TO OBSTRUCTION IS NOT AVAILABLE, USE 2-SCC GUIDE RAIL AND 2-SCC DOUBLE NESTED RAIL WHEN THE DEFLECTION IS LESS THAN 0.3 m (1'-0").
5. THE TYPICAL DISTANCE FROM THE EDGE OF SHOULDER TO THE FRONT FACE OF THE W-BEAM RAIL ELEMENT IS 840 (2'-9"). THIS MAY VARY; BASE THE ACTUAL PLACEMENT OF THE GUIDE RAIL SYSTEM SELECTED ON FIELD CONDITIONS. LOCATE THE SYSTEM SELECTED AS FAR FROM THE EDGE OF SHOULDER AS POSSIBLE AND STILL MAINTAIN REQUIRED CLEARANCES DETERMINED FROM TABLE 1.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.

TABLE 1

TYPE OF GUIDE RAIL	REQUIRED † CLEARANCES
2-SCC	0.3 m (1'-0")
2-SC	0.6 m (2'-0")
2-S	0.9 m (3'-0")
2-WCC	1.2 m (4'-0")
2-WC	1.5 m (5'-0")
2-W	2.1 m (7'-0")

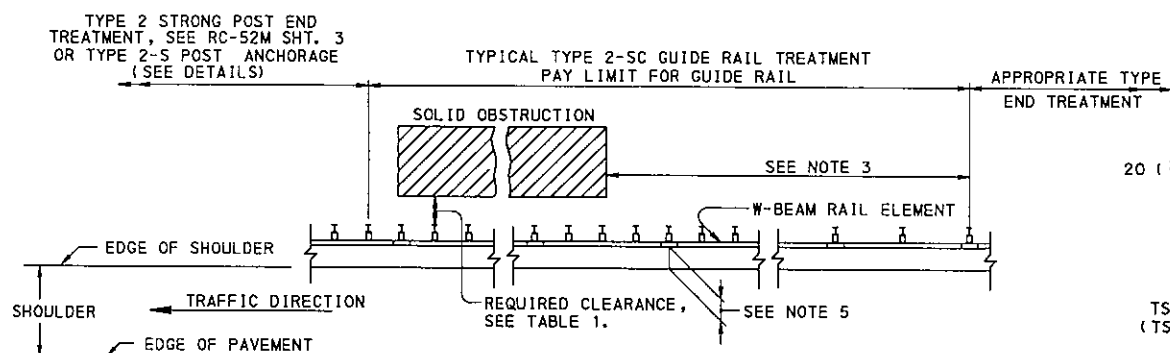
† THE MINIMUM UNOBSTRUCTED DISTANCE FROM BACK OF GUIDE RAIL POST TO FACE OF OBSTRUCTION.

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



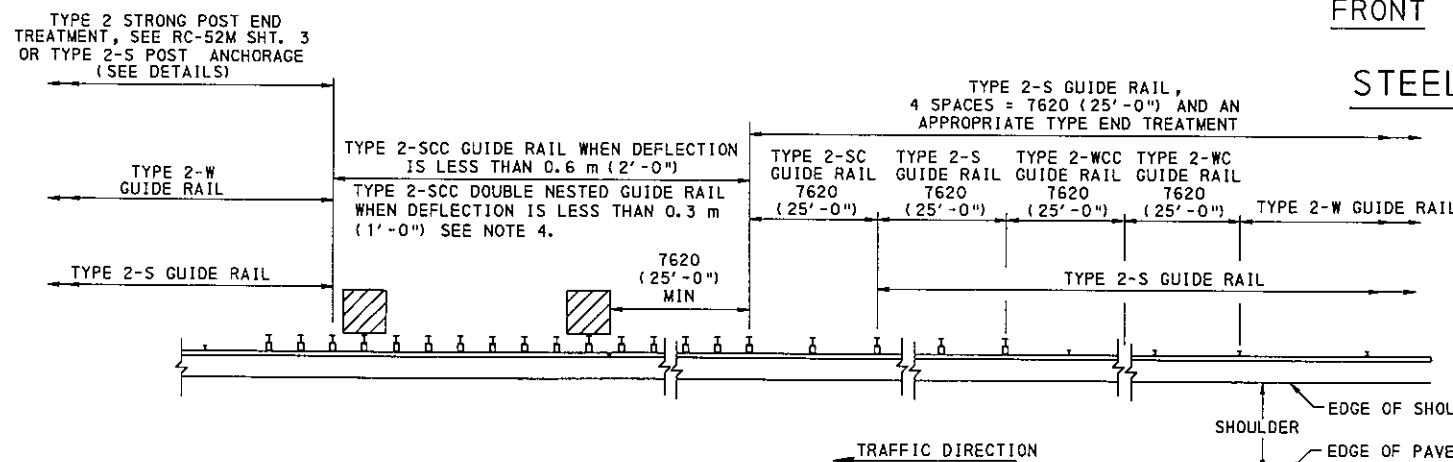
TYPICAL GUIDE RAIL TREATMENT

WHEN THE REQUIRED CLEARANCE TO OBSTRUCTION IS AVAILABLE

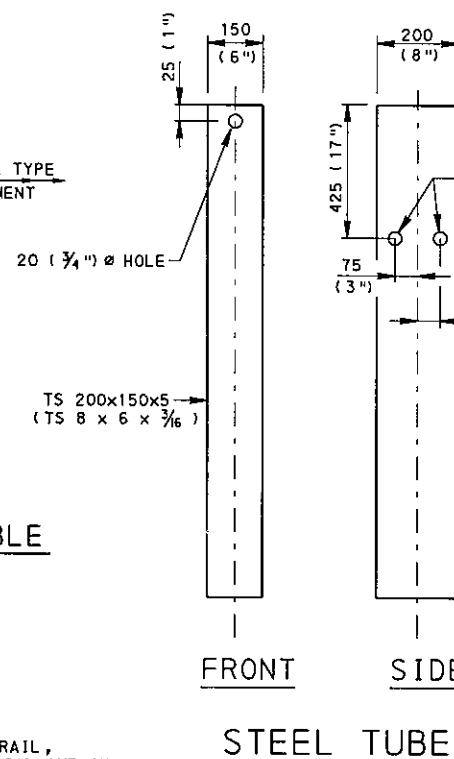


TYPICAL GUIDE RAIL TREATMENT

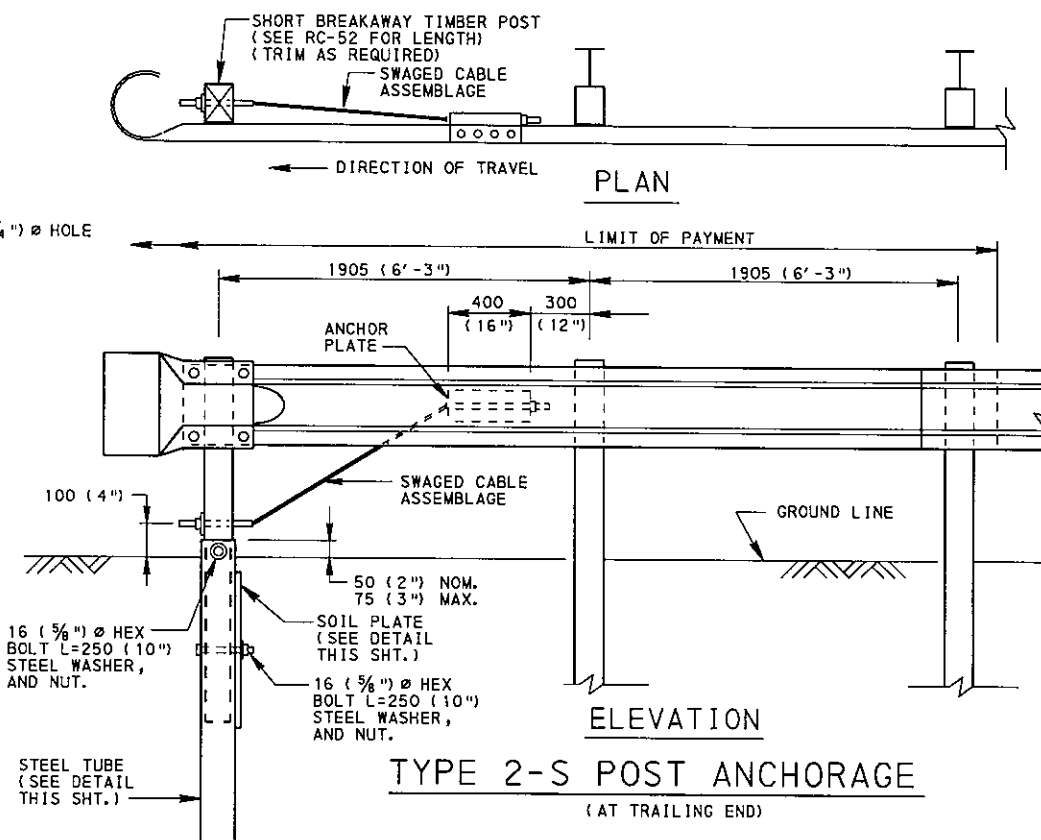
WHEN THE REQUIRED CLEARANCE TO OBSTRUCTION IS AVAILABLE



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



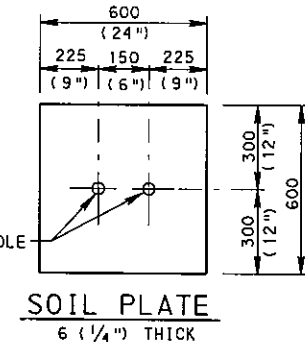
STEEL TUBE



TYPE 2-S POST ANCHORAGE

(AT TRAILING END)

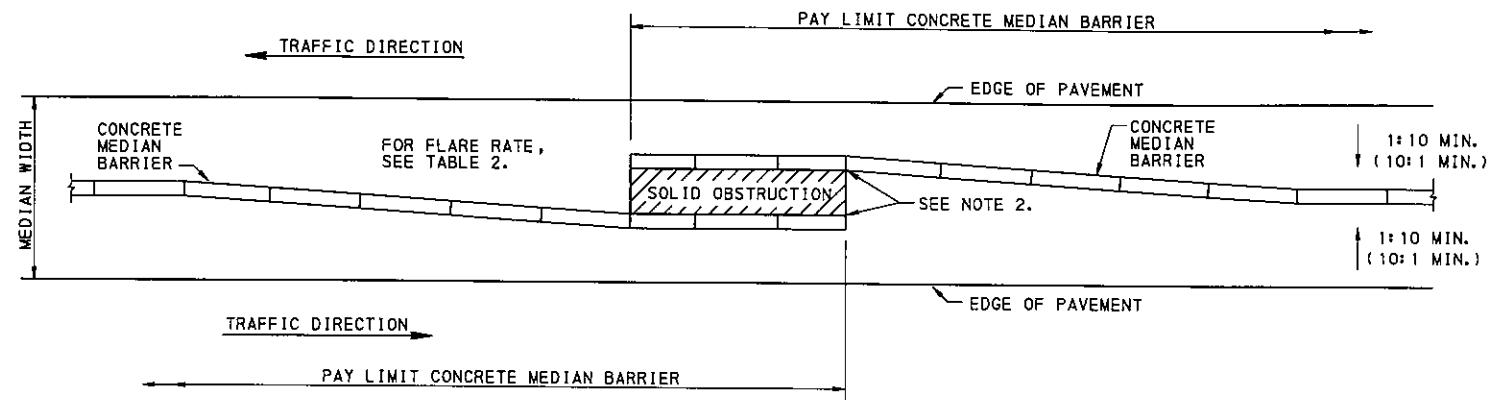
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



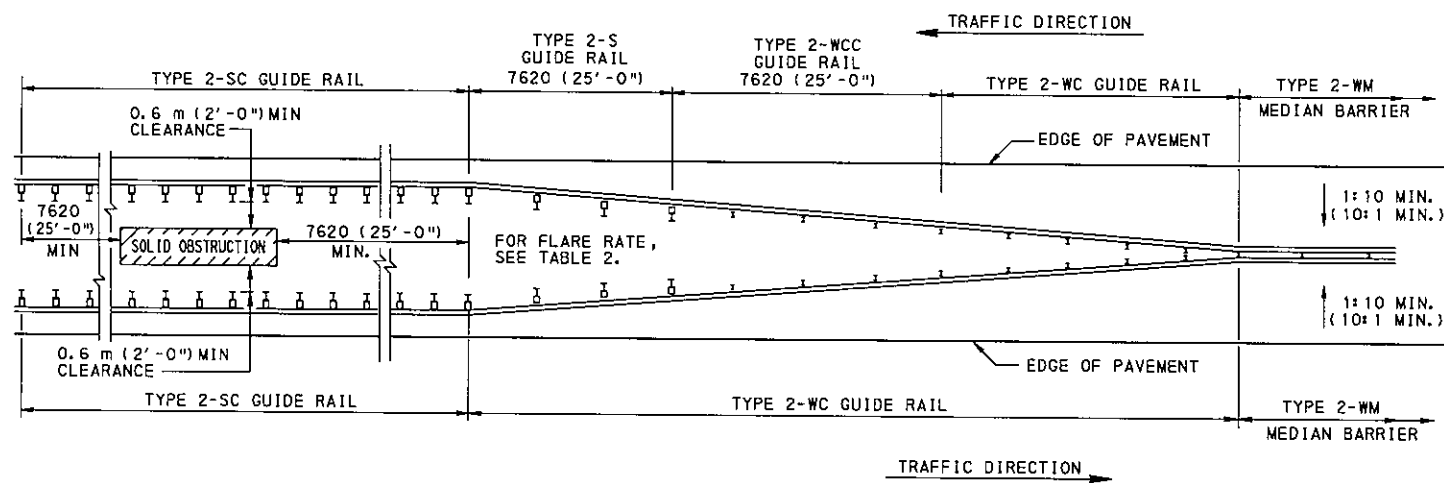
SOIL PLATE

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

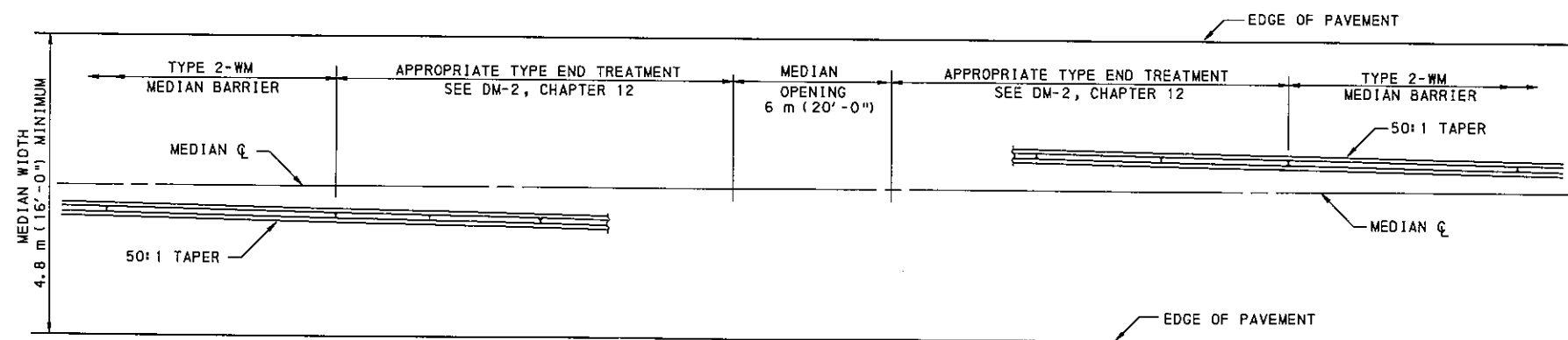
BARRIER PLACEMENT
AT OBSTRUCTIONS



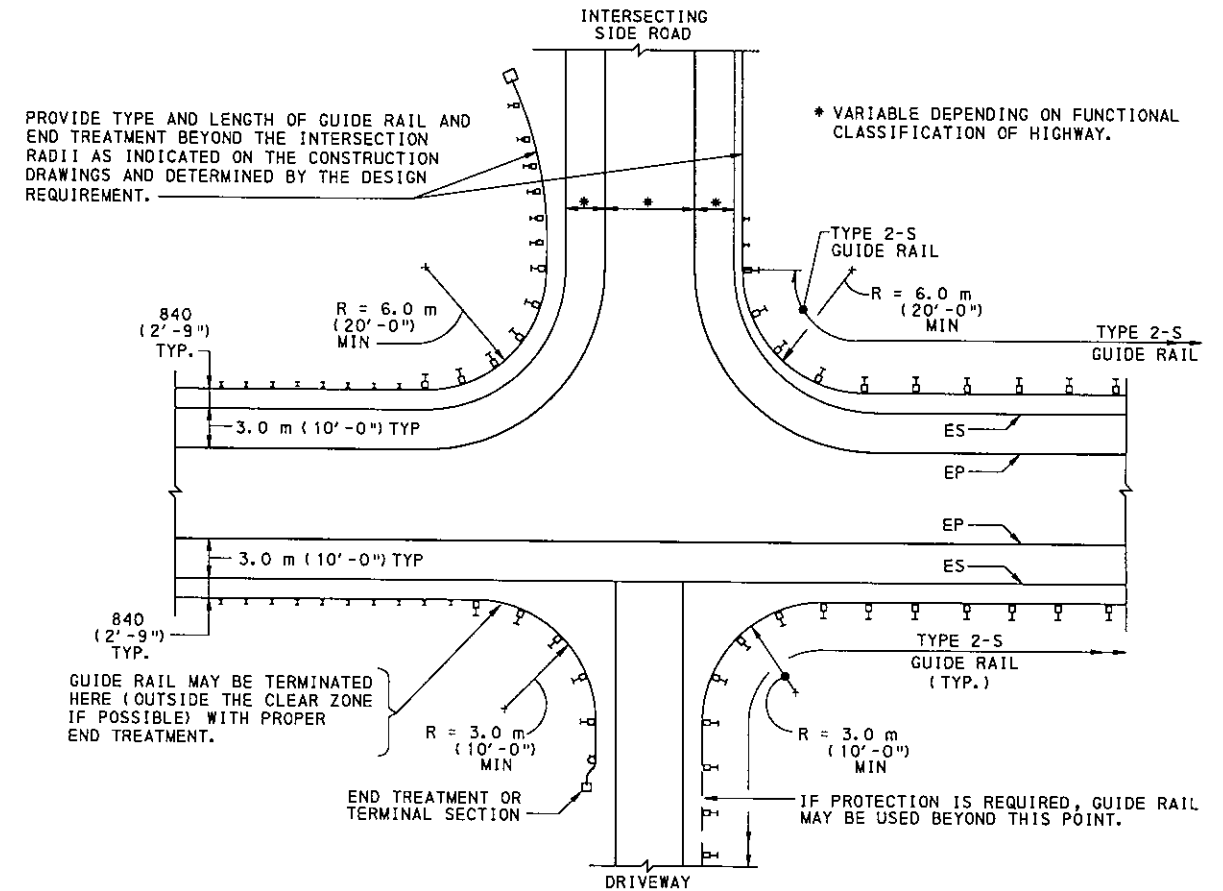
TREATMENT AT OBSTRUCTION FOR MEDIAN WIDTHS 6.0 m (20') OR LESS WHERE CONTINUOUS BARRIER IS REQUIRED



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



TREATMENT FOR TYPE 2-WM MEDIAN BARRIER CROSS-OVER



TREATMENT AT INTERSECTIONS AND DRIVEWAYS

TABLE 2
FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED	MAXIMUM FLARE RATES	
	CONCRETE BARRIER	GUIDE RAIL
120	20 : 1	15 : 1
110	20 : 1	15 : 1
100	18 : 1	14 : 1
90	16 : 1	12 : 1
80	14 : 1	11 : 1
70	12 : 1	10 : 1
60	10 : 1	8 : 1
50	8 : 1	7 : 1

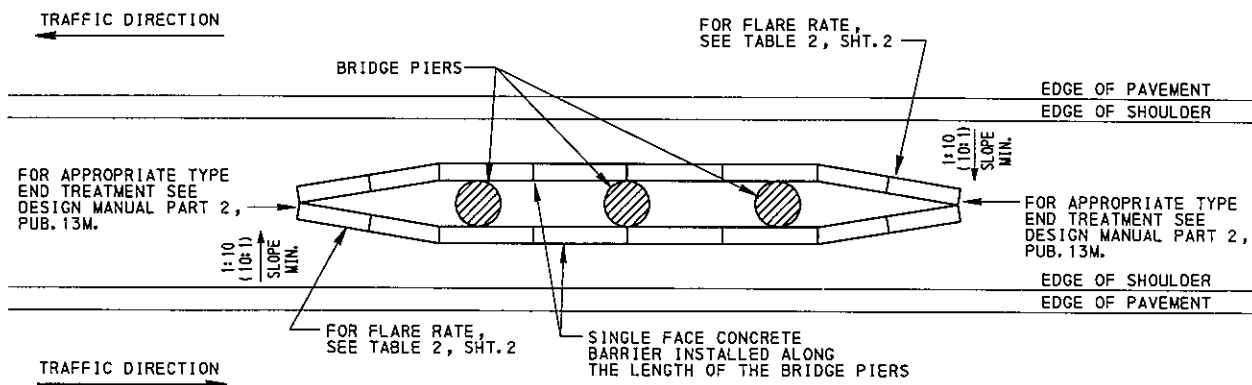
NOTES

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.

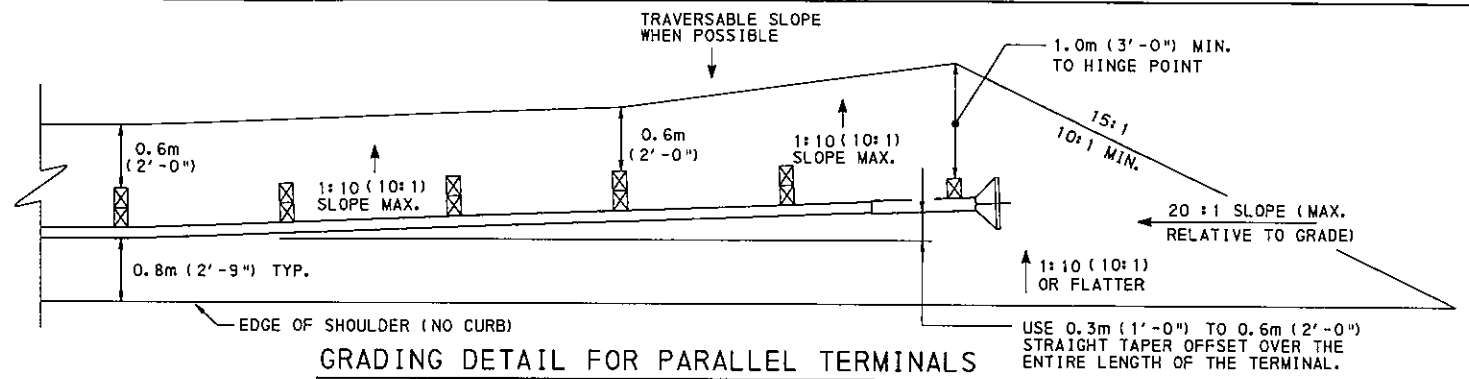
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

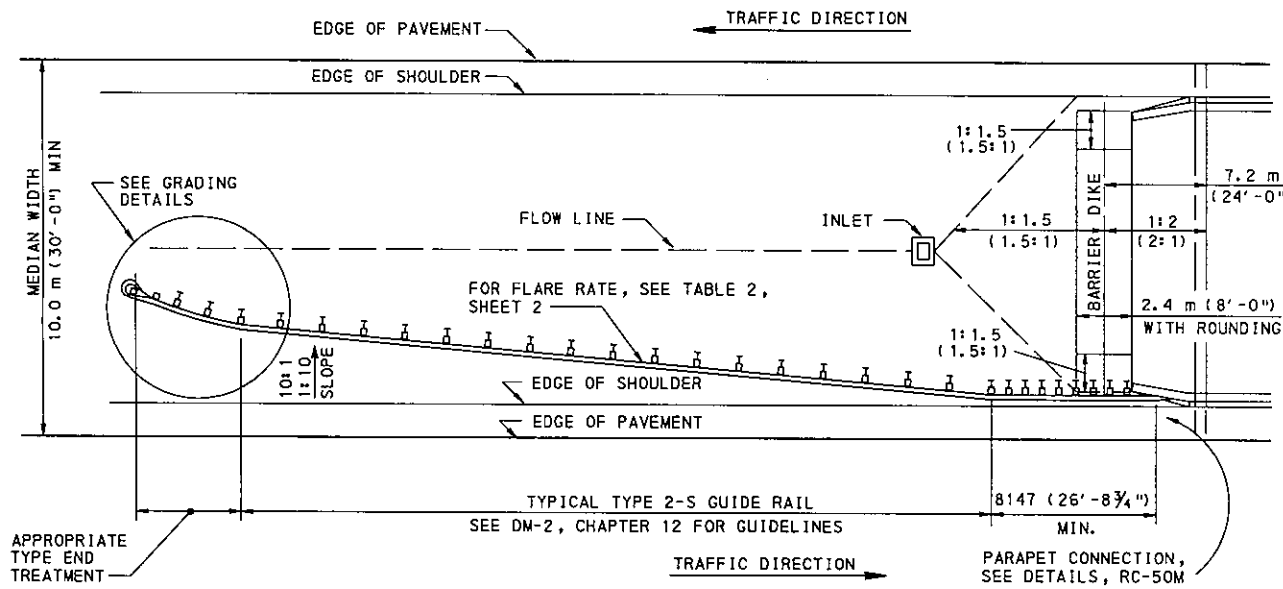
BARRIER PLACEMENT
AT OBSTRUCTIONS



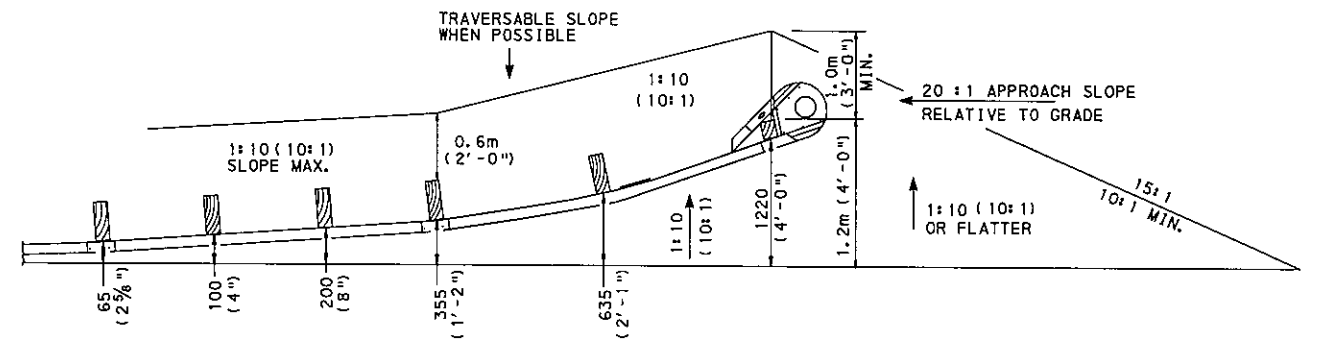
**TREATMENT AT OBSTRUCTIONS FOR
MEDIAN WIDTHS GREATER THAN 6.0 m (20'-0")
WHERE CONTINUOUS BARRIER IS NOT REQUIRED**



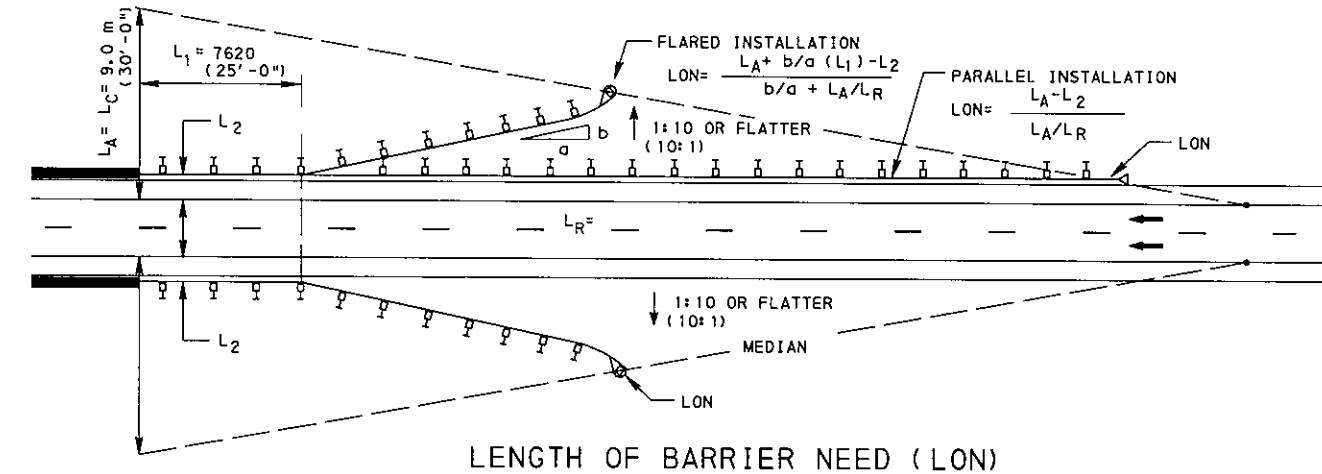
GRADING DETAIL FOR PARALLEL TERMINALS



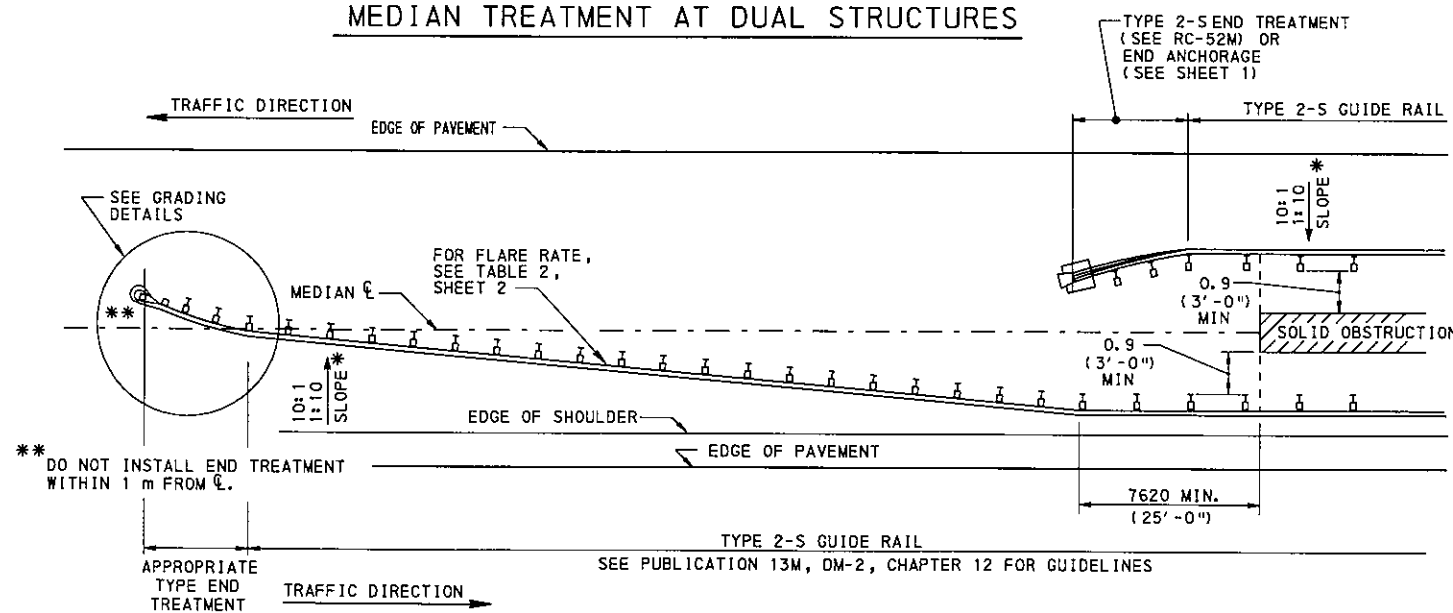
MEDIAN TREATMENT AT DUAL STRUCTURES



GRADING DETAIL FOR FLARED TERMINALS



LENGTH OF BARRIER NEED (LON)



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

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

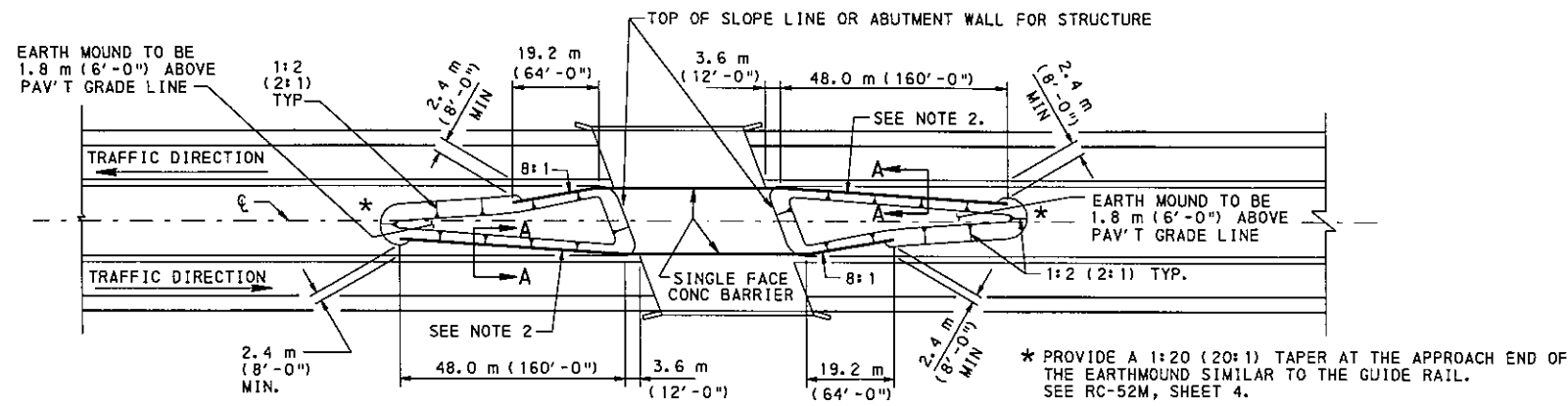
NOTE: FOR FURTHER END TREATMENT DETAILS SEE DM-2, CHAPTER 12 FOR GUIDELINES.

* 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).

**COMMONWEALTH OF PENNSYLVANIA
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BUREAU OF DESIGN**

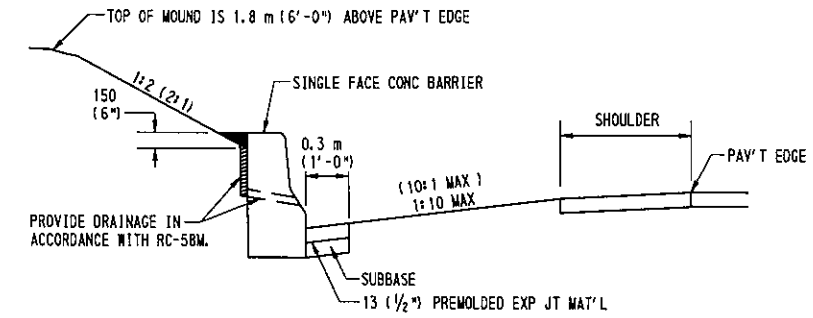
**BARRIER PLACEMENT
AT OBSTRUCTIONS**

RECOMMENDED NOV. 1, 2001
Alan A. Schuch DIRECTOR, BUREAU OF DESIGN
RECOMMENDED NOV. 1, 2001
Gary J. Hoffman CHIEF ENGINEER
SHT 3 OF 7
RC-54M



TYPICAL MEDIAN EARTH MOUND DETAIL FOR AT-GRADE DUAL BRIDGES

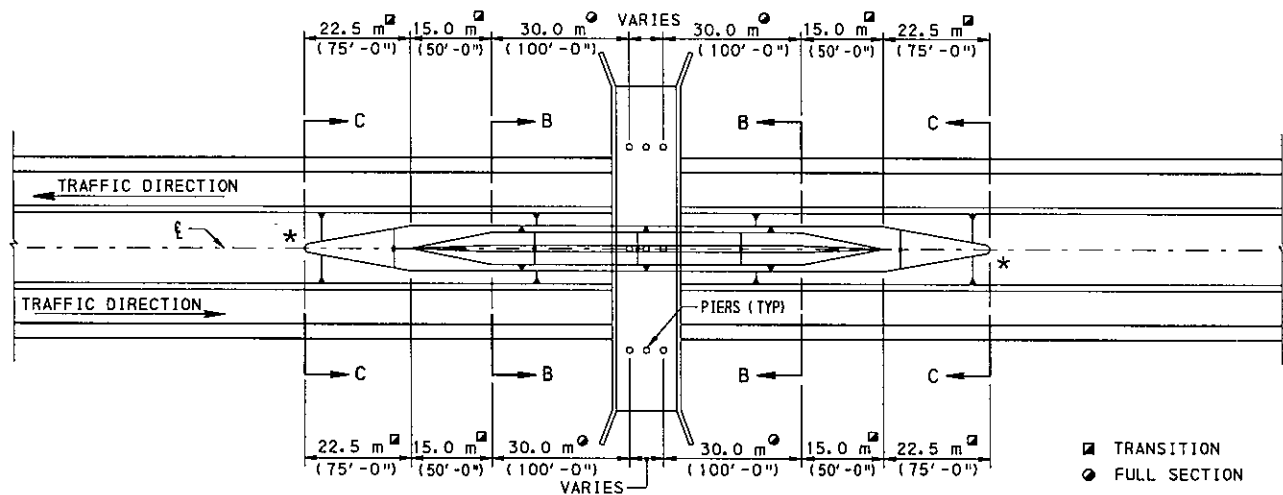
SEE NOTE 4



SECTION A-A

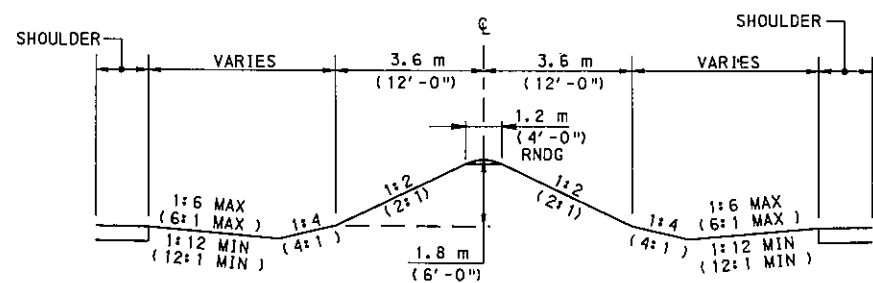
NOTES

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.

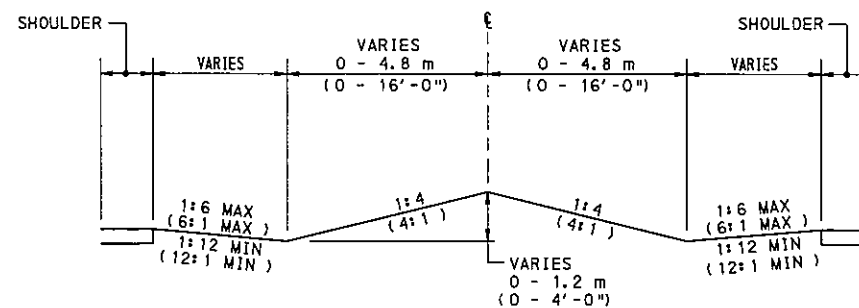


TYPICAL MEDIAN EARTH MOUND DETAIL FOR OVERHEAD STRUCTURES FOR MEDIAN WIDTHS OF 18.0 M (60'-0") OR GREATER

SEE NOTE 4



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

BARRIER PLACEMENT
AT OBSTRUCTIONS

EARTH MOUNDS

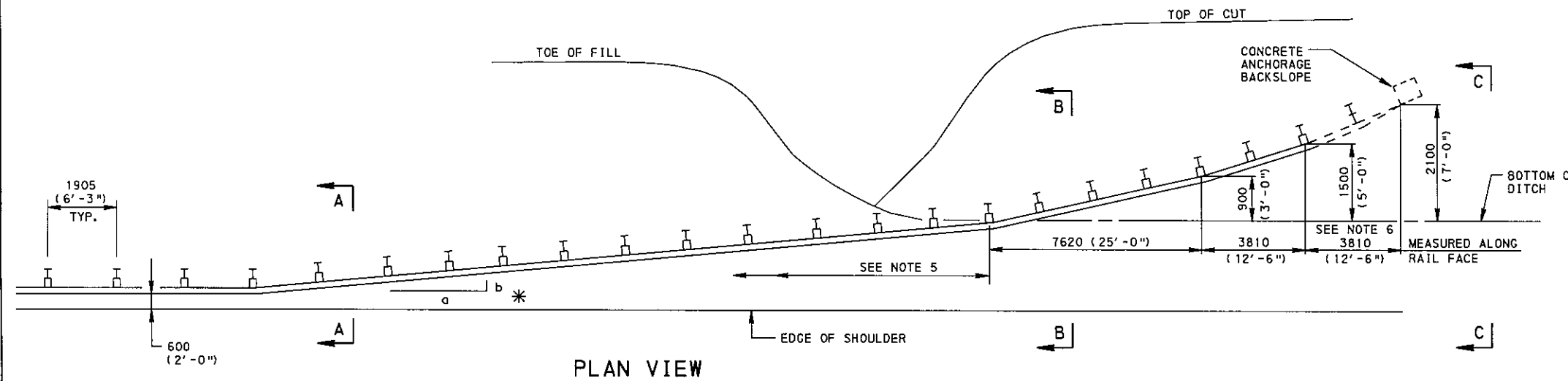
RECOMMENDED NOV. 1, 2001
Alan A. Schmitt
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED NOV. 1, 2001
David S. Hoffman
CHIEF ENGINEER

SHT 4 OF 7
RC-54M

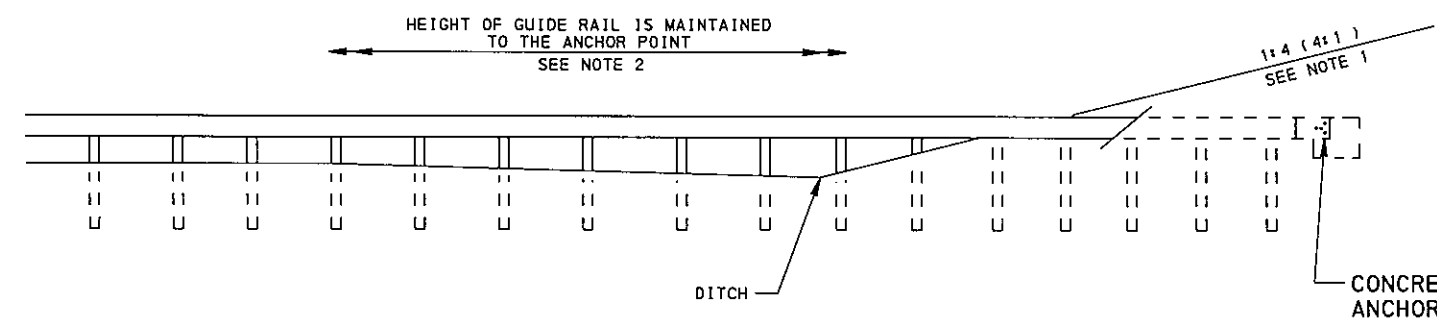
GENERAL NOTES:

1. A 1:4 (4:1) BACK SLOPE IS DESIRABLE. HOWEVER, STEEPER SLOPES MAY BE USED.
2. HEIGHT OF GUIDE RAIL MAY BE TAPERED DOWN TO MAINTAIN 450 (18") MAXIMUM HEIGHT FROM GROUND ELEVATION TO BOTTOM OF THE RAIL ELEMENT.
3. WHEN THE GUIDE RAIL LENGTH OF NEED FALLS NEAR A CUT TO FILL SLOPE, THE PREFERRED TREATMENT IS TO ANCHOR THE GUIDE RAIL TO THE CUT SLOPE.
4. THE BACKSLOPE ANCHOR TERMINAL HAS BEEN CRASH TESTED TO NCHRP 350 CRITERIA FOR A 1:6 (6:1) SLOPE [rehab.] AND A 10:1 (1:10) SLOPE [new construction]. IT CAN BE ANCHORED WITH A CONCRETE BLOCK OR A POST ANCHOR.
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 AND HARDWARE.

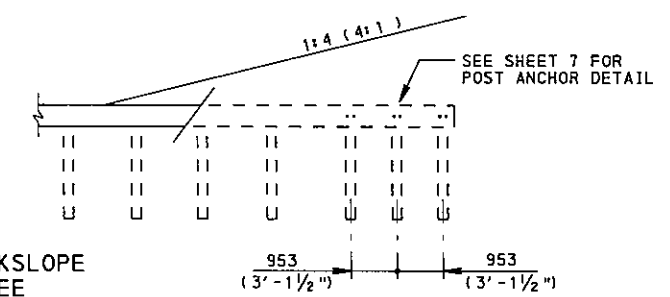


* a:b = 12.5 : 1
 9 : 1 LOWSPEED
 (LESS THAN 45 mph)

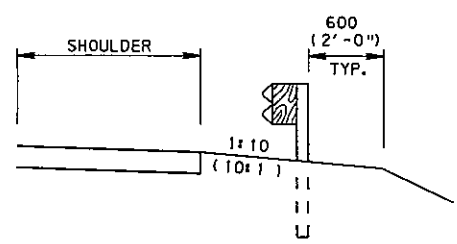
PLAN VIEW



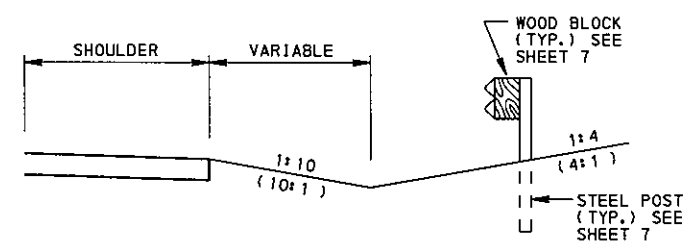
ELEVATION VIEW (PROFILE ALONG RAIL)



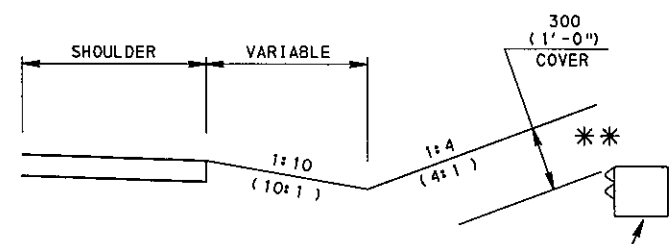
POST BACKSLOPE ANCHORAGE



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.

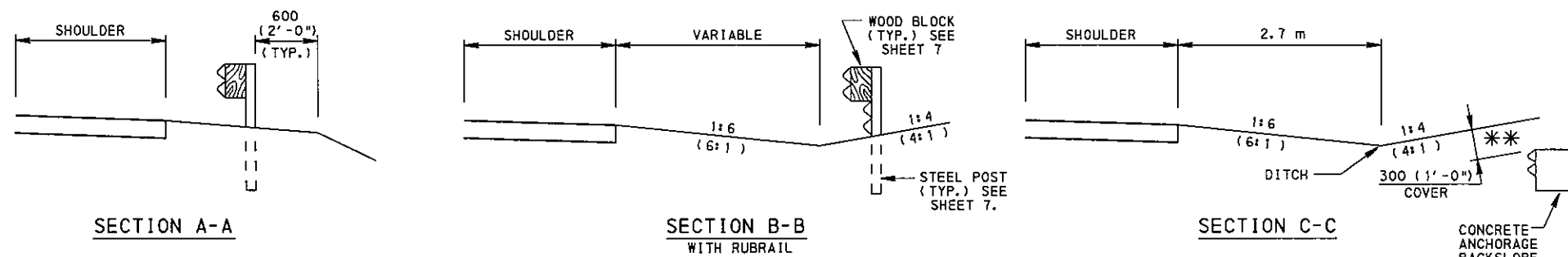
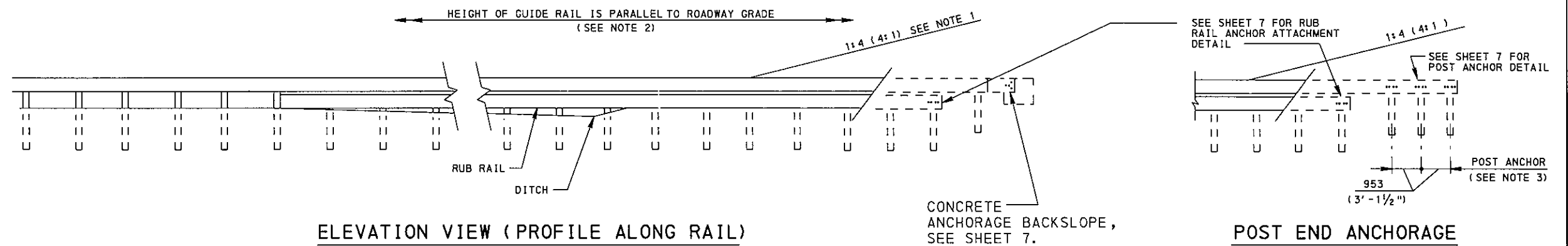
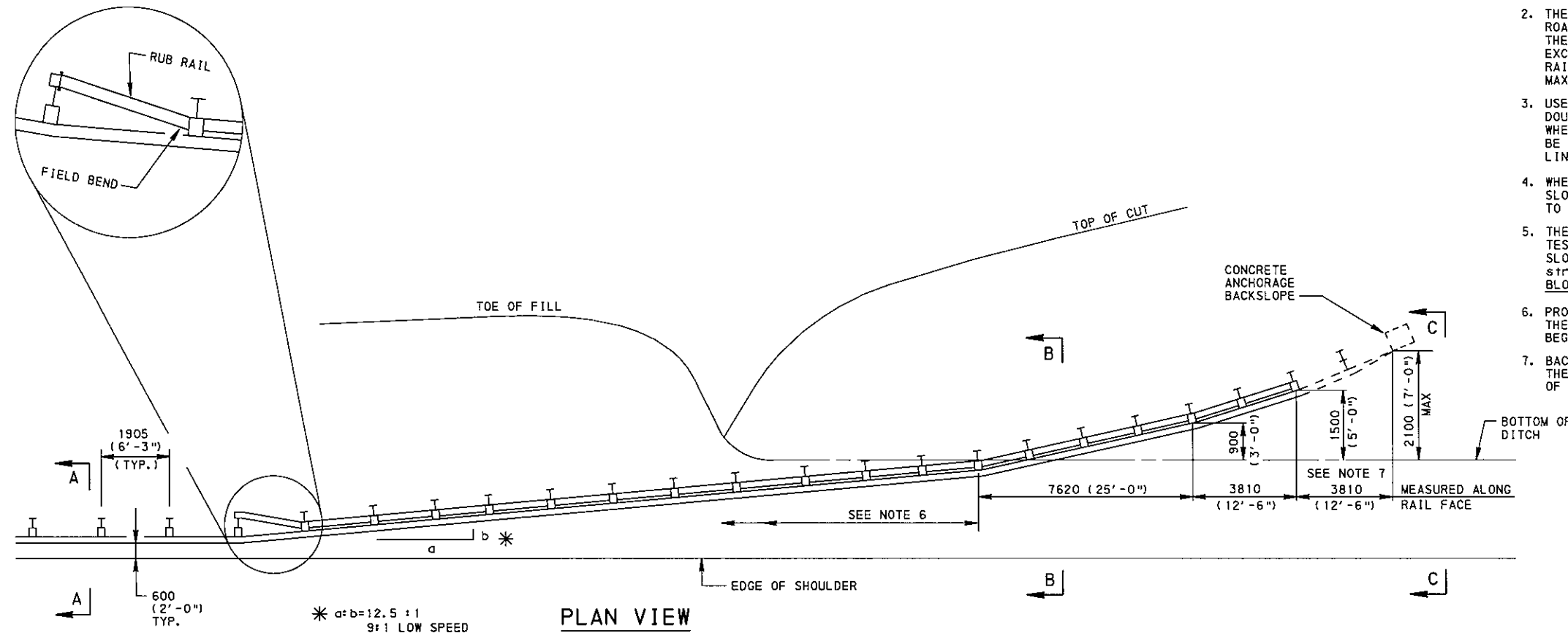
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

GUIDE RAIL
BACKSLOPE
ANCHOR TERMINAL
 (NEW CONSTRUCTION OR RECONSTRUCTION)

RECOMMENDED NOV. 1, 2001
 [Signature] DIRECTOR, BUREAU OF DESIGN
 RECOMMENDED NOV. 1, 2001
 [Signature] CHIEF ENGINEER
 SHT 5 OF 7
 RC-54M

GENERAL NOTES:

1. A 1:4 (4:1) BACK SLOPE IS DESIRABLE. HOWEVER, STEEPER SLOPES MAY BE USED.
2. 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 430 (17") 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.
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. THE BACKSLOPE ANCHOR TERMINAL HAS BEEN CRASH TESTED TO NCHRP 350 CRITERIA FOR A 1:6 (6:1) SLOPE [rehab.] AND A 1:10 (10:1) SLOPE [new construction]. IT CAN BE ANCHORED WITH A CONCRETE BLOCK OR A POST ANCHOR.
6. PROVIDE 23.0 m (75'-0") MINIMUM FROM WHERE THE GUIDE RAIL CROSSES THE SWALE LINE TO THE BEGINNING OF THE HAZARD.
7. BACKSLOPE ANCHOR TERMINAL PAY LIMIT INCLUDES THE CONCRETE OR POST ANCHORAGE, 3810 (12'-6") OF RAIL ELEMENT POSTS AND HARDWARE.



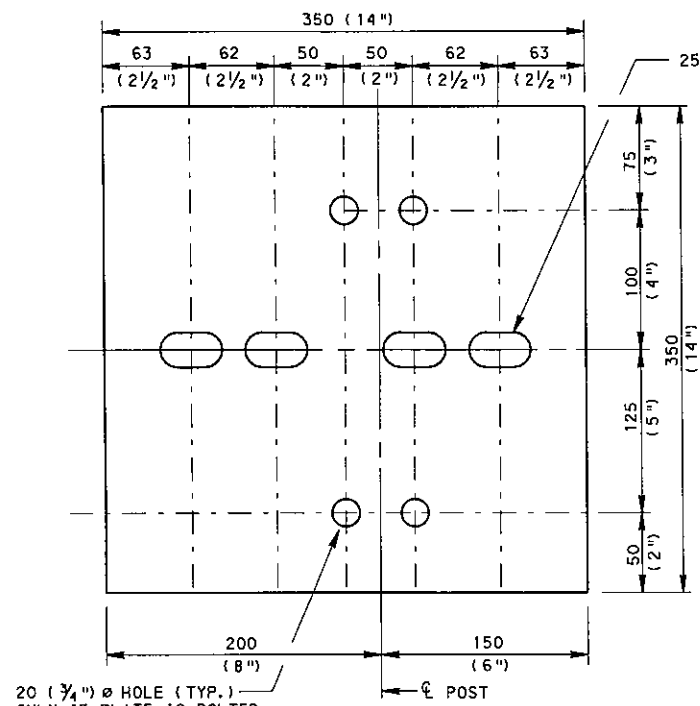
** ROCK ANCHORAGE DOES NOT REQUIRE THE 300 (1'-0") BURIAL.

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
(REHAB. PROJECTS)

RECOMMENDED NOV. 1, 2001	RECOMMENDED NOV. 1, 2001	SHT 5 OF 7
 DIRECTOR, BUREAU OF DESIGN	 CHIEF ENGINEER	RC-54M

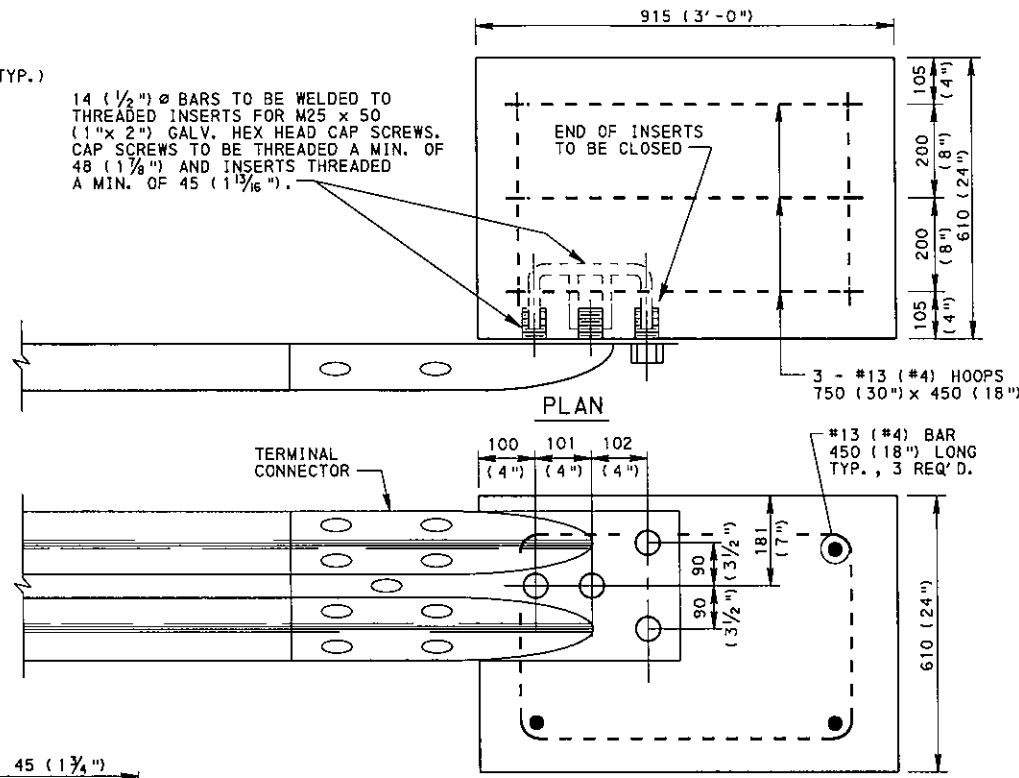


20 (3/4'') Ø HOLE (TYP.) ONLY IF PLATE IS BOLTED TO POSTS.

STEEL PLATE - 13 mm (1/2'')

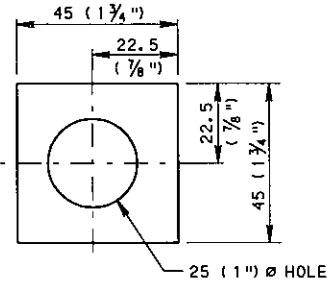
GALVANIZED WELDED OR BOLTED TO POST

14 (1/2'') Ø BARS TO BE WELDED TO THREADED INSERTS FOR M25 x 50 (1'') x 2'') GALV. HEX HEAD CAP SCREWS. CAP SCREWS TO BE THREADED A MIN. OF 48 (1 7/8'') AND INSERTS THREADED A MIN. OF 45 (1 13/16'').



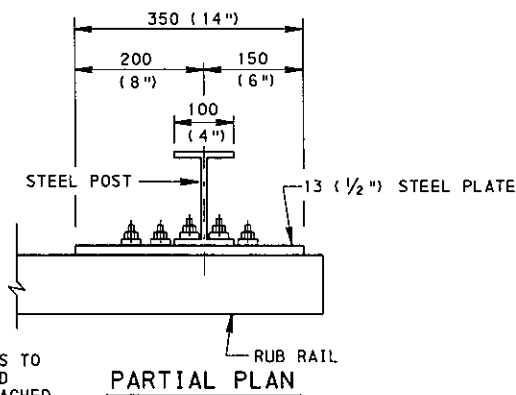
ELEVATION

CONCRETE BLOCK ANCHOR

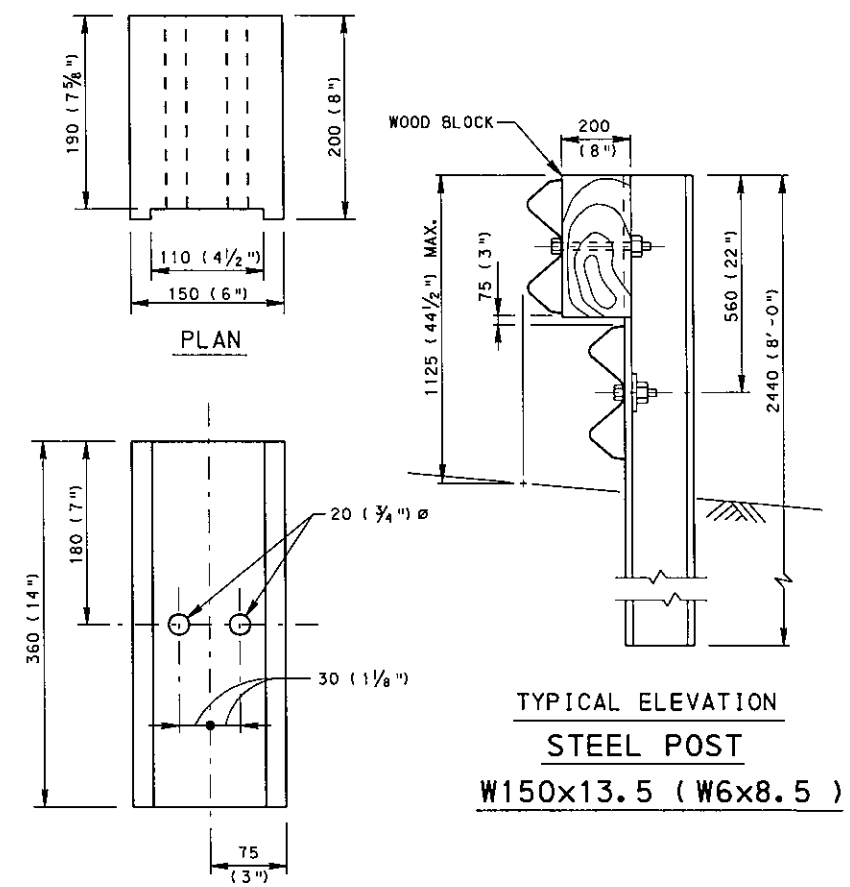


SQUARE WASHER

5 (1/4'') THICK - GALVANIZED



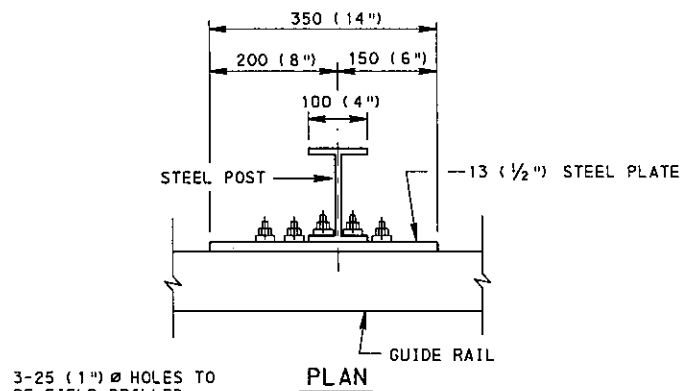
PARTIAL PLAN



ELEVATION

WOOD BLOCK

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



PLAN

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

BOLT PLATE TO POST WITH 4-16 (5/8'') Ø HEX BOLTS 50 (2'') LONG WITH HEX NUTS.

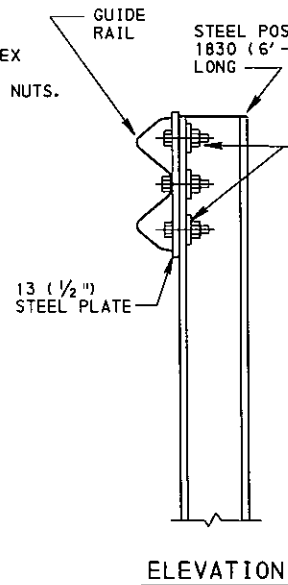
25 (1'') Ø HOLES TO BE FIELD DRILLED IN RAIL AND THROUGH POST FLANGE. ATTACH TO STEEL PLATE WITH 22 (7/8'') Ø HEX BOLTS 50 (2'') LONG WITH SQUARE WASHER.

FRONT VIEW

POST ANCHOR DETAIL

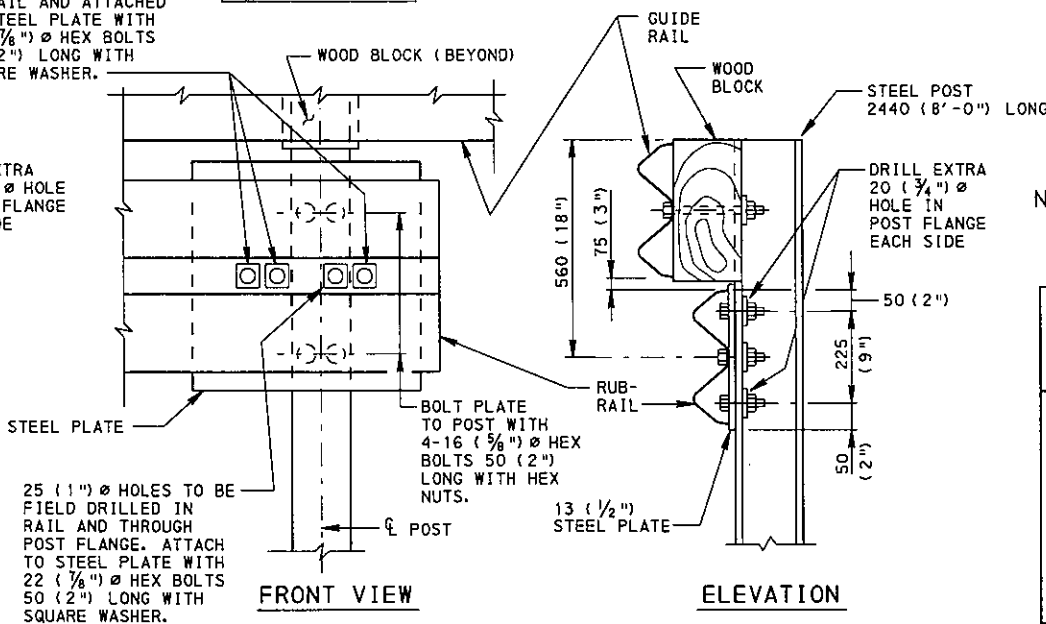
DIMENSIONS ARE TYPICAL

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



ELEVATION

DRILL EXTRA 20 (3/4'') Ø HOLE IN POST FLANGE EACH SIDE



FRONT VIEW

RUBRAIL ANCHOR ATTACHMENT

25 (1'') Ø HOLES TO BE FIELD DRILLED IN RAIL AND THROUGH POST FLANGE. ATTACH TO STEEL PLATE WITH 22 (7/8'') Ø HEX BOLTS 50 (2'') LONG WITH SQUARE WASHER.

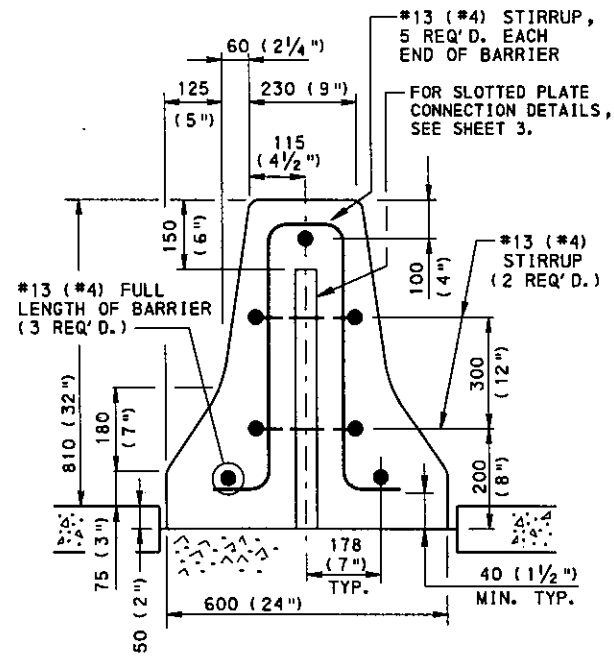
BOLT PLATE TO POST WITH 4-16 (5/8'') Ø HEX BOLTS 50 (2'') LONG WITH HEX NUTS.

ELEVATION

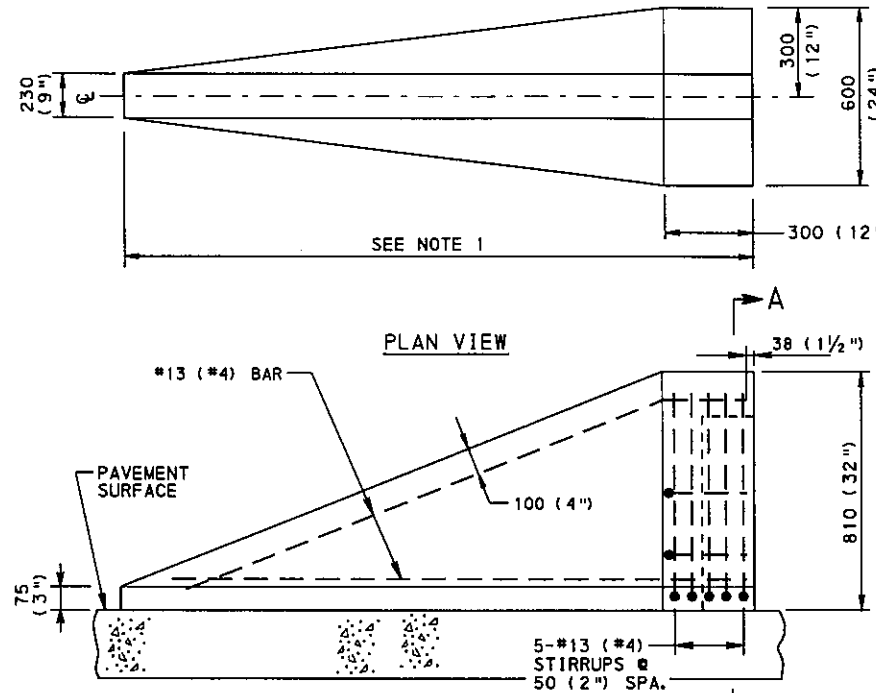
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

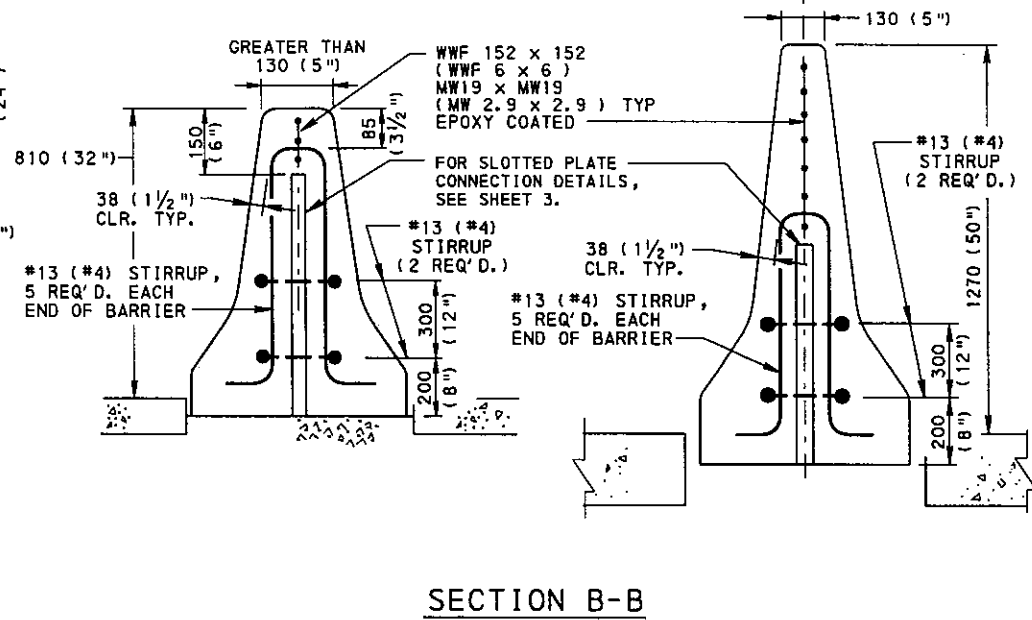
BACKSLOPE ANCHOR TERMINAL END ANCHORAGE DETAILS



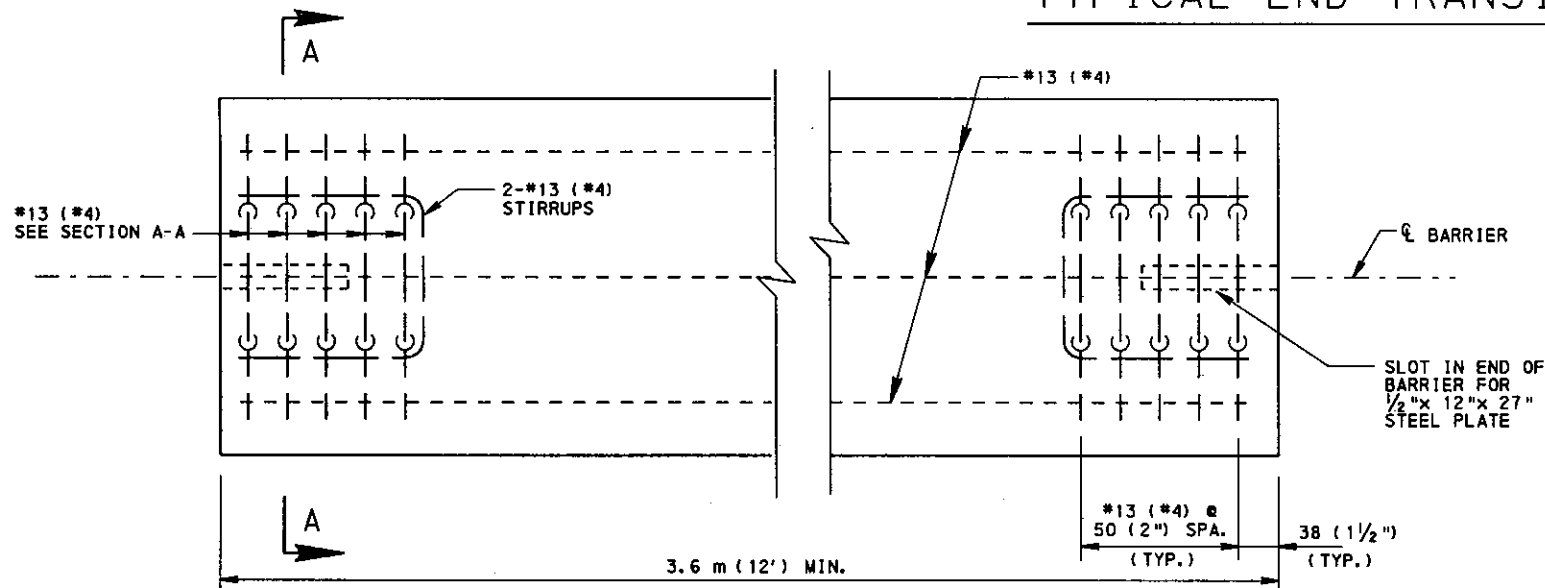
SECTION A-A



TYPICAL END TRANSITION

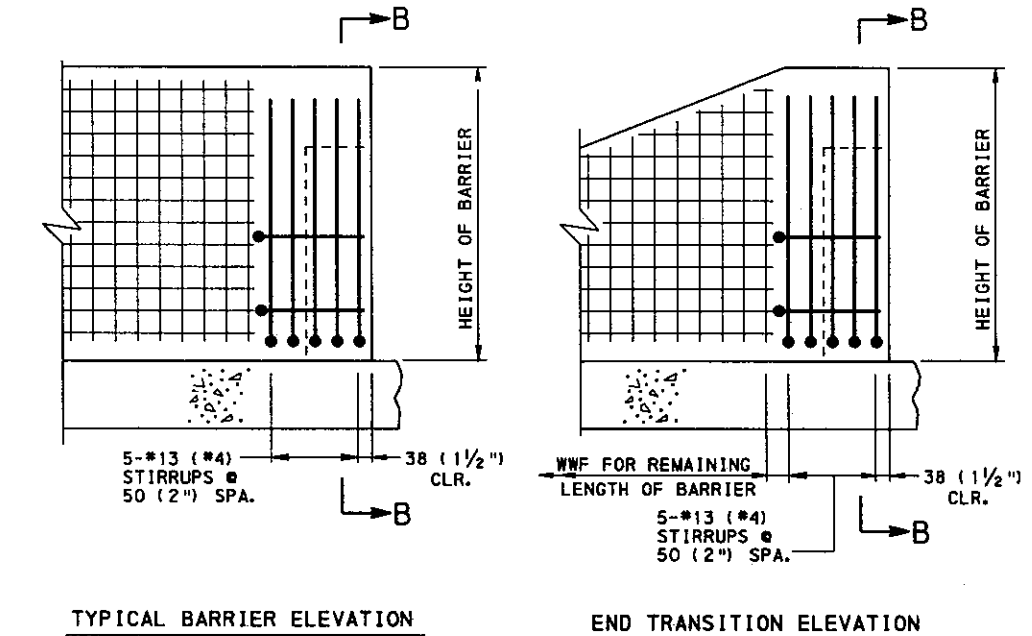


SECTION B-B



TYPICAL BARRIER PLAN

BOTH ENDS OF BARRIER ARE TYPICAL.



TYPICAL BARRIER ELEVATION

END TRANSITION ELEVATION

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.

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

- 2. PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING, INSTALLING AND REMOVING PRECAST CONCRETE BARRIER. GALVANIZE METAL DEVICES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(c).
- 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.

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

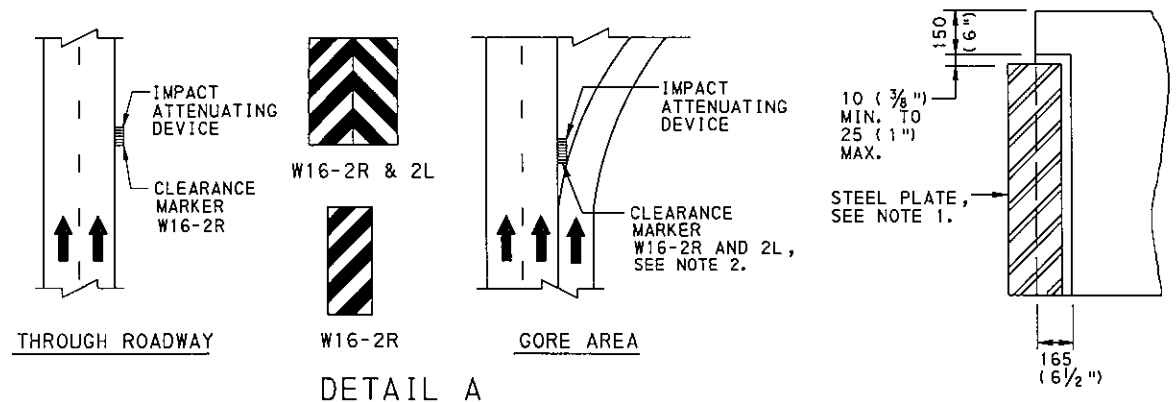
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

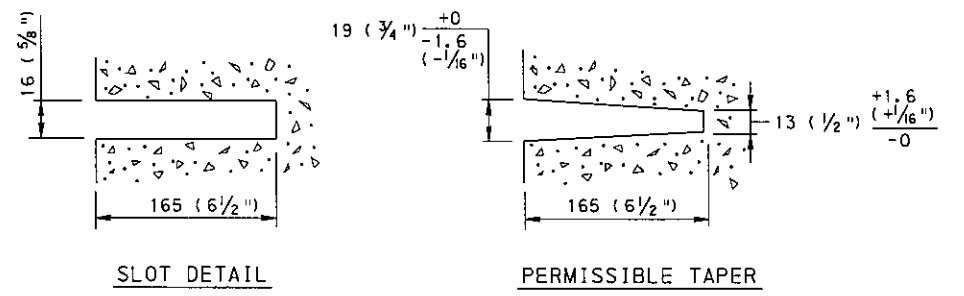
RECOMMENDED NOV. 1, 2001
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED NOV. 1, 2001
CHIEF ENGINEER

SHT 2 OF 6
RC-57M



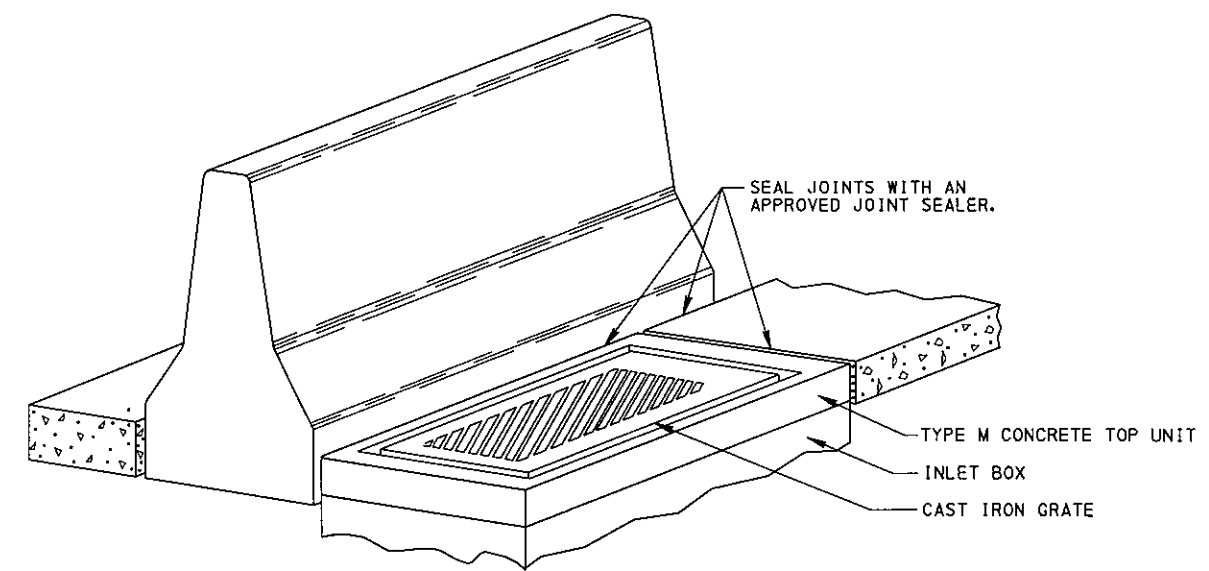
DETAIL A
DELINEATION OF IMPACT ATTENUATING DEVICES



SLOTTED PLATE CONNECTION

NOTES

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



TYPICAL INLET PLACEMENT AT
CONCRETE MEDIAN BARRIER

TABLE 1
FLARE RATES FOR BARRIER DESIGN

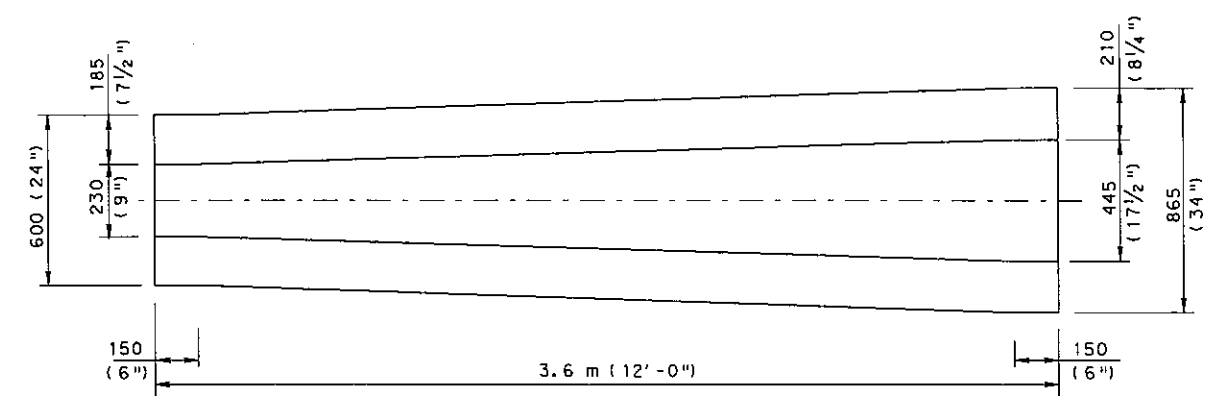
DESIGN SPEED	MAXIMUM FLARE RATES	
	CONCRETE BARRIER	GUIDE RAIL
120 (75)	20 : 1	15 : 1
110 (70)	20 : 1	15 : 1
100 (60)	18 : 1	14 : 1
90 (55)	16 : 1	12 : 1
80 (50)	14 : 1	11 : 1
70 (45)	12 : 1	10 : 1
60 (35)	10 : 1	8 : 1
50 (30)	8 : 1	7 : 1

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

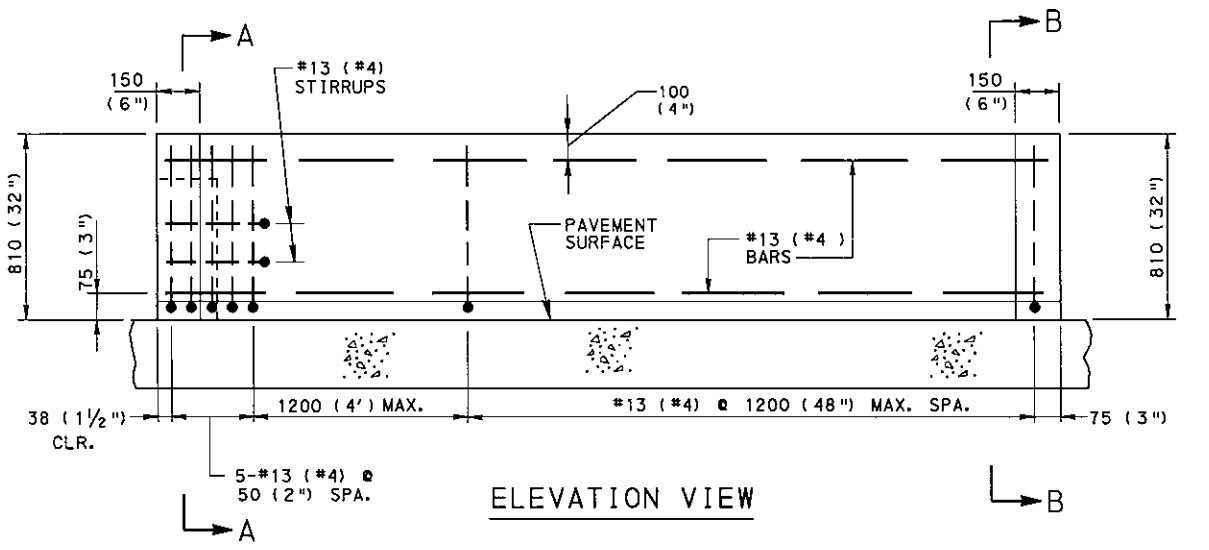
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

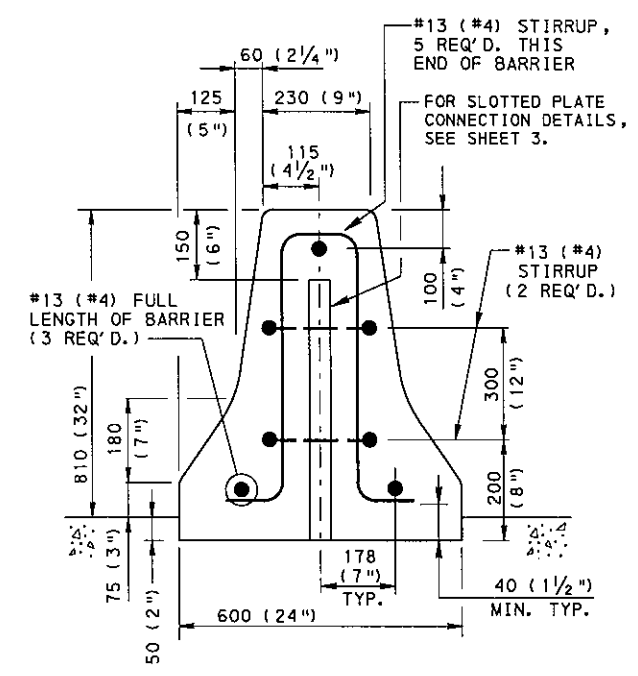
RECOMMENDED NOV. 1, 2001 <i>Alan A. Schmit</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Gary D. Hoffman</i> CHIEF ENGINEER	SHT 3 OF 6 RC-57M
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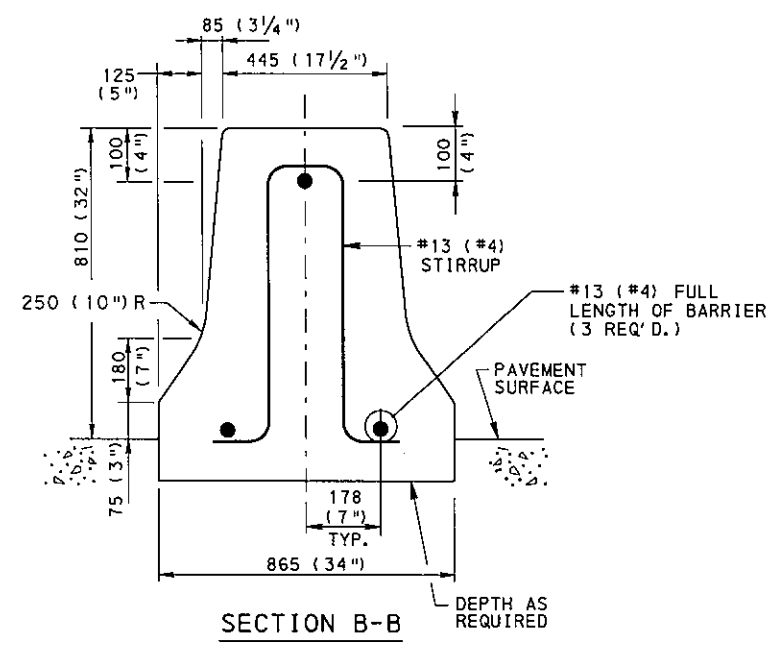
PLAN VIEW



ELEVATION VIEW



SECTION A-A

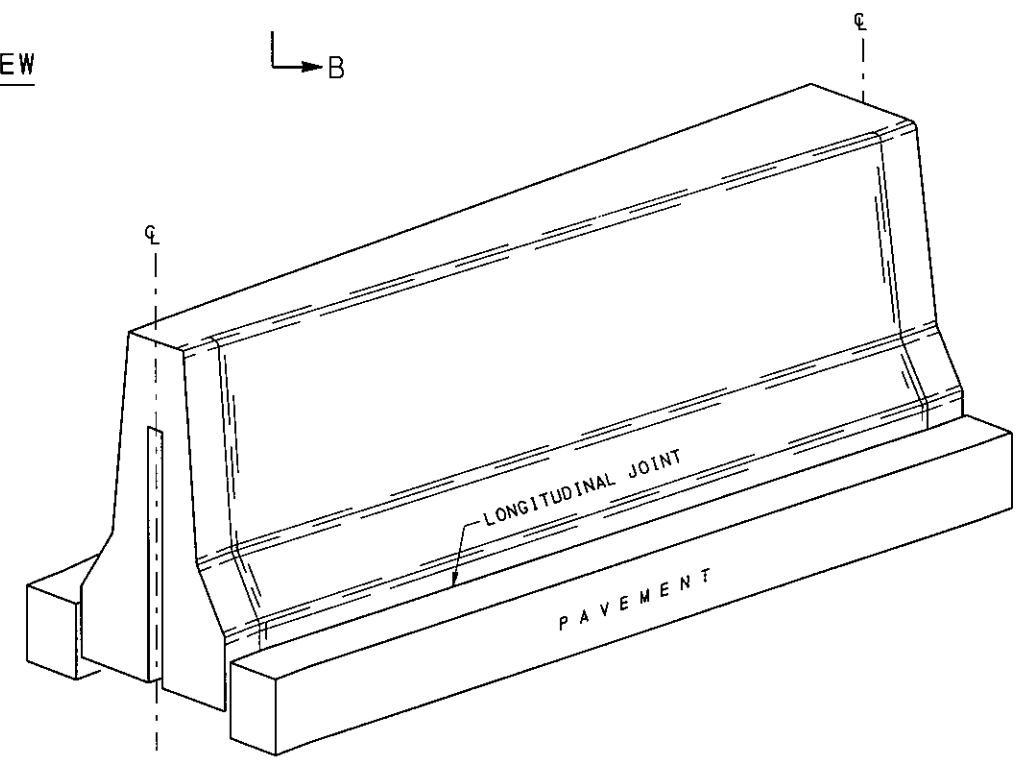


SECTION B-B

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.

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



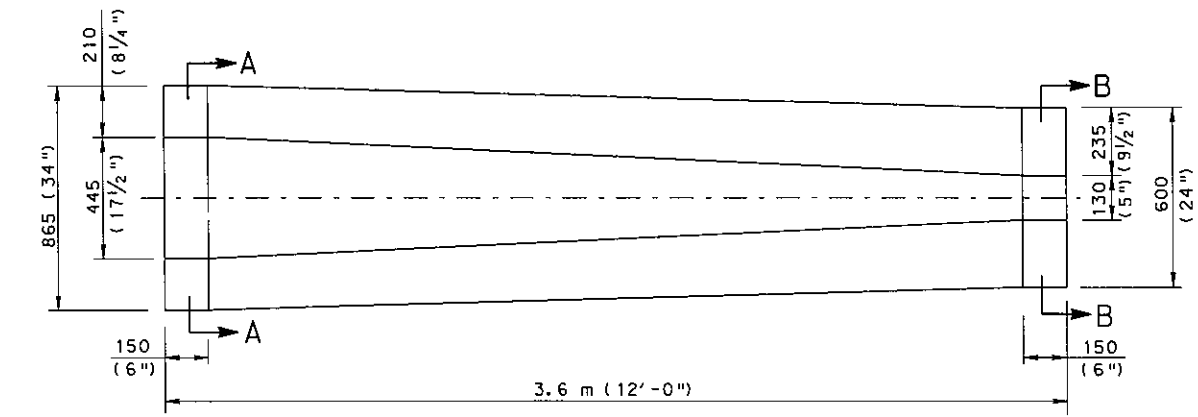
ORTHOGRAPHIC VIEW

TYPICAL 810 TO 810 (32" TO 32")
BRIDGE TO HIGHWAY TRANSITION

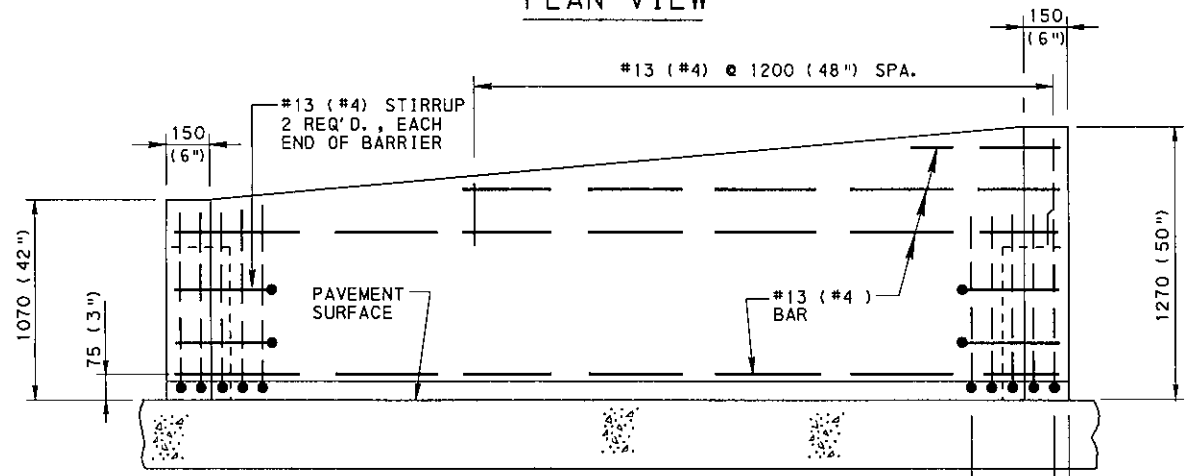
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

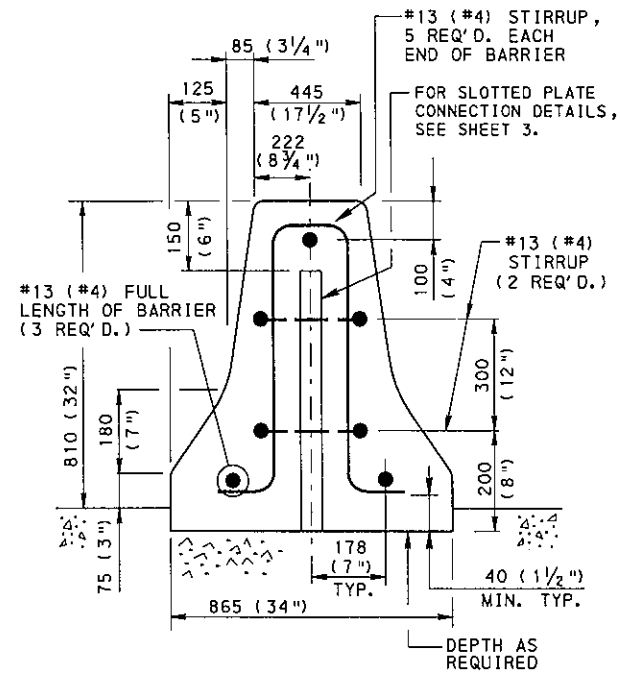
RECOMMENDED NOV. 1, 2001 <i>Dean A. Schmitt</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Ray L. Hoffman</i> CHIEF ENGINEER	SHT 4 OF 6 RC-57M
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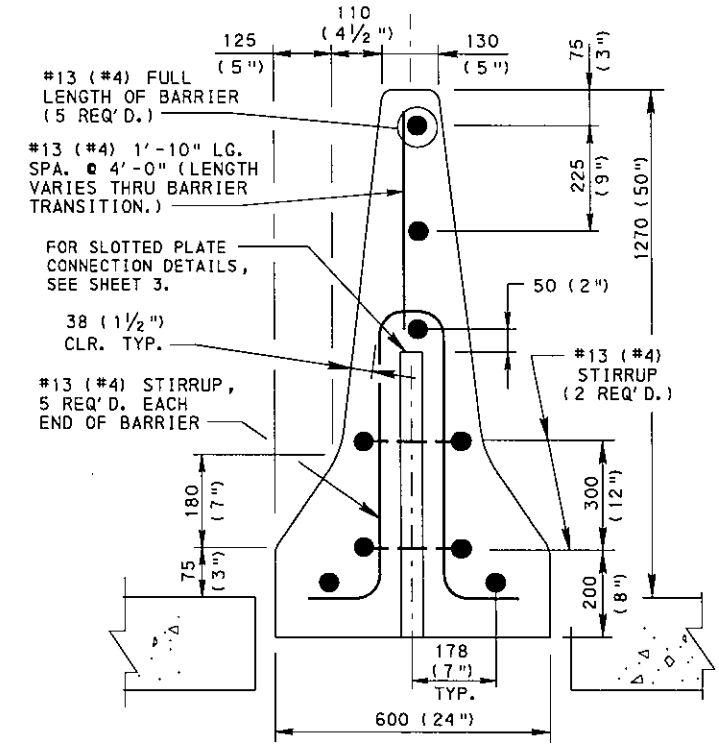
PLAN VIEW



ELEVATION VIEW



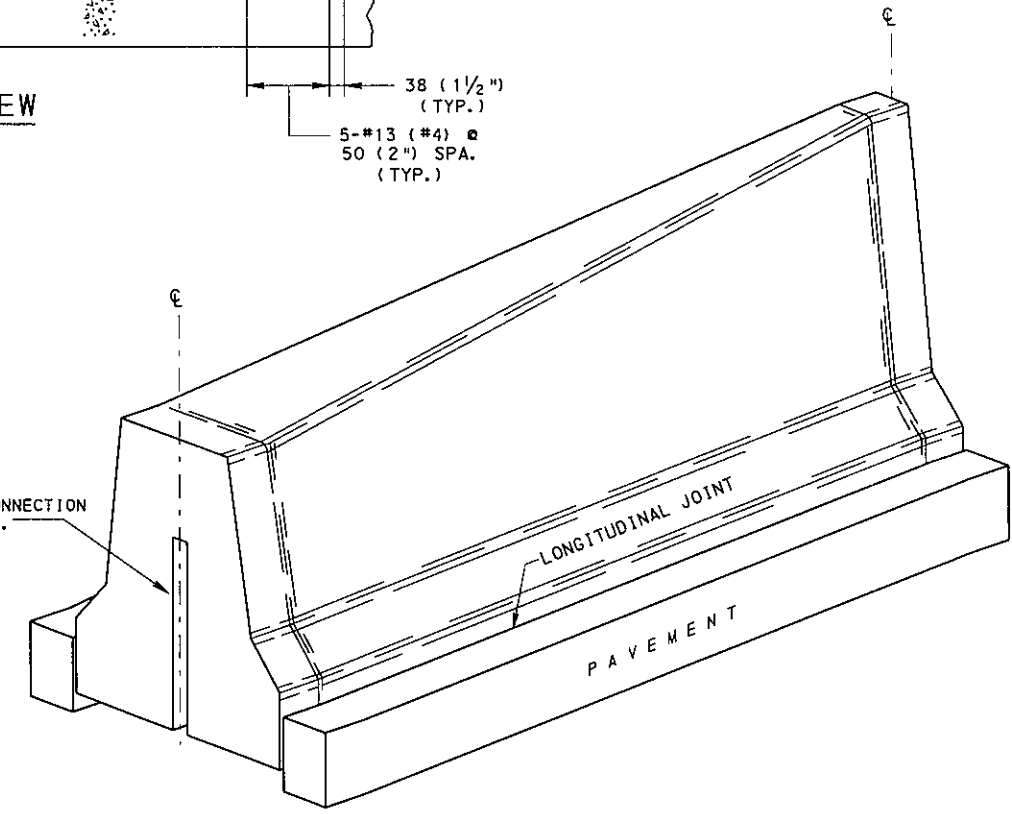
SECTION A-A



SECTION B-B

38 (1 1/2) (TYP.)
5-#13 (#4) @ 50 (2) SPA. (TYP.)

FOR SLOTTED PLATE CONNECTION DETAILS, SEE SHEET 3.



ORTHOGRAPHIC VIEW

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

NOTES

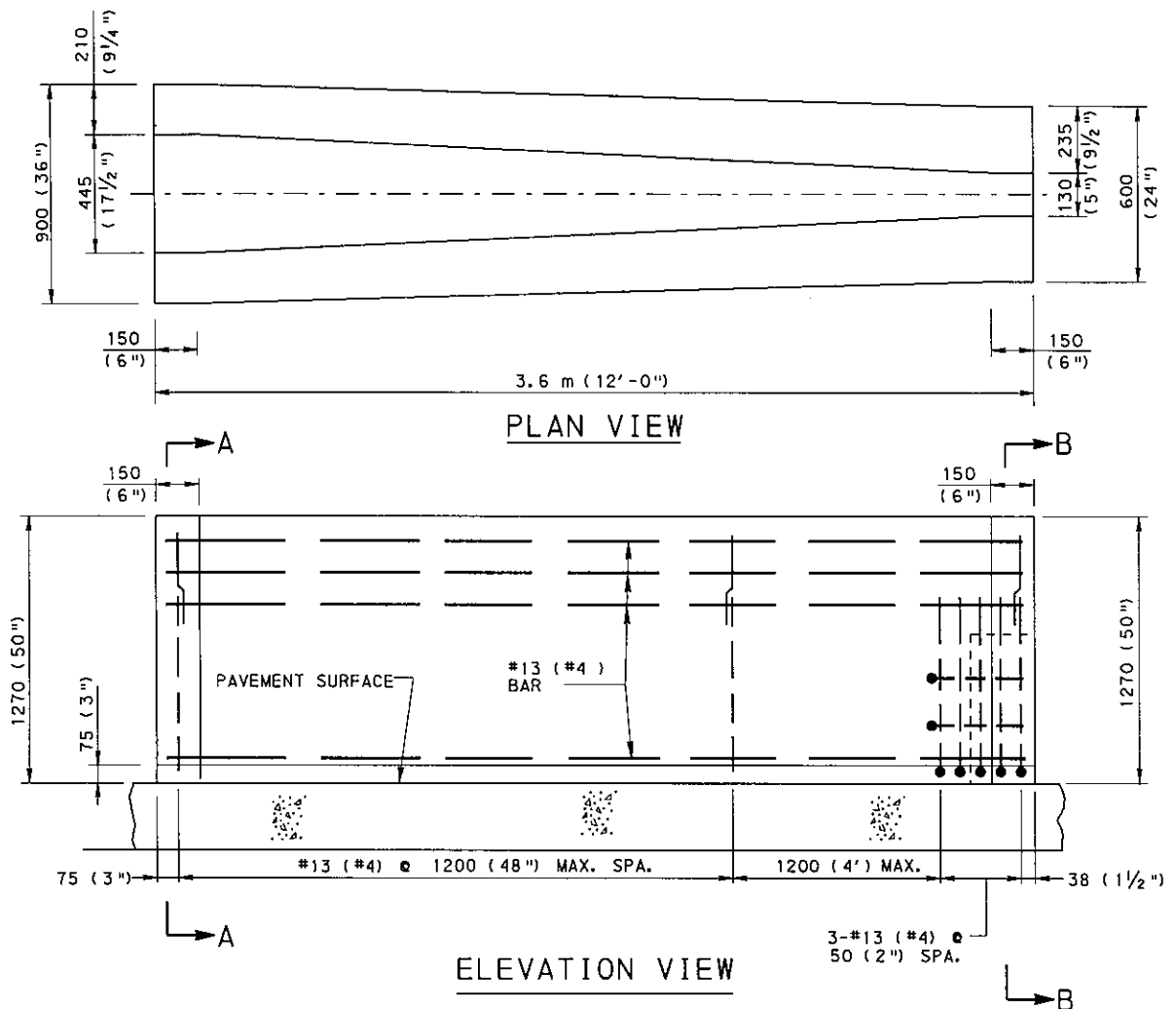
1. PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709 WITH A MINIMUM CONCRETE COVER OF 40 (1 1/2").
2. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
3. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.

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 NOV. 1, 2001 <i>Don A. Schaefer</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Harold J. Hoffman</i> CHIEF ENGINEER	SHT 5 OF 6 RC-57M
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ELEVATION VIEW

PLAN VIEW

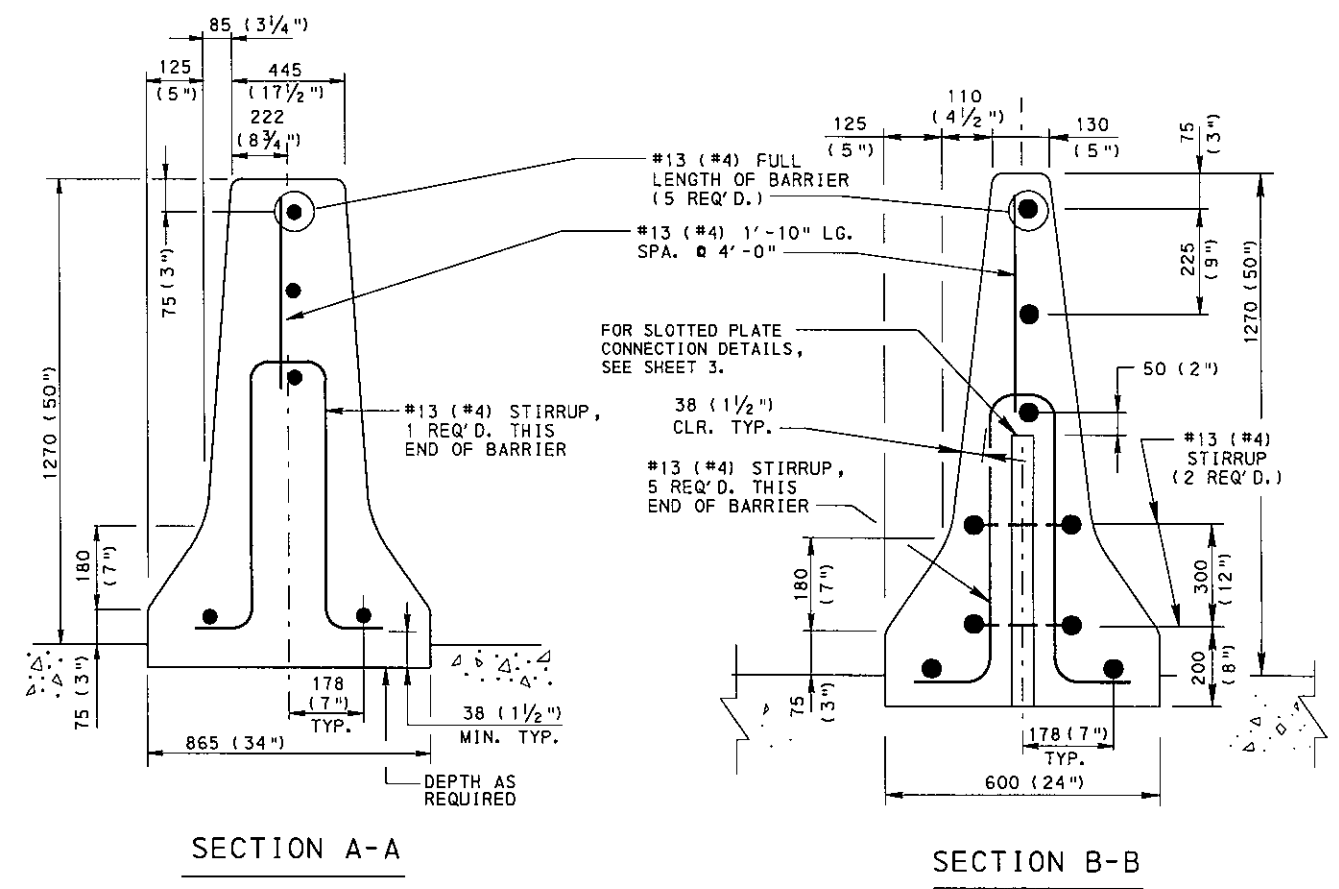
ORTHOGRAHIC VIEW

LONGITUDINAL JOINT

PAVEMENT

TYPICAL 1270 TO 1270 (50" TO 50") TRANSITION

BRIDGE TO HIGHWAY TRANSITION



SECTION A-A

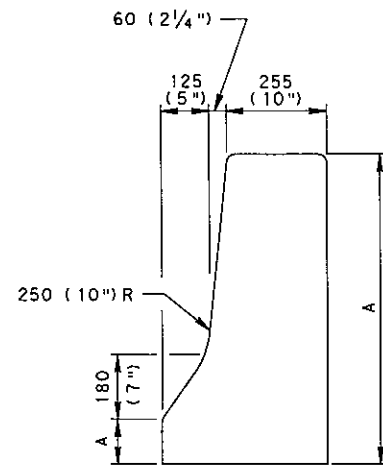
SECTION B-B

NOTE

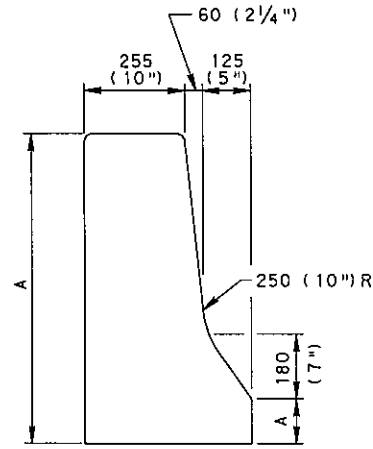
FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.

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

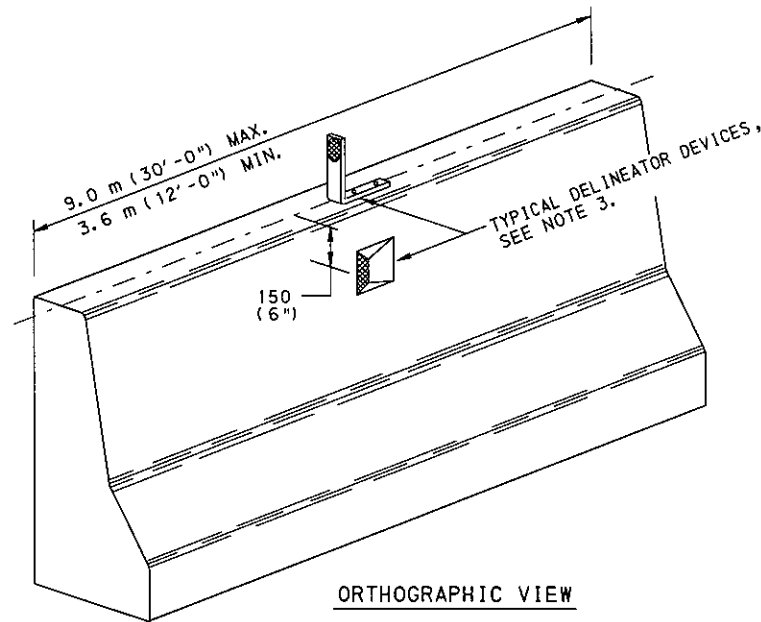
COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN		
CONCRETE MEDIAN BARRIER F-SHAPE		
RECOMMENDED NOV. 1, 2001 <i>Alan A. Schuler</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Gary J. Hoffman</i> CHIEF ENGINEER	SHT 6 OF 6 RC-57M



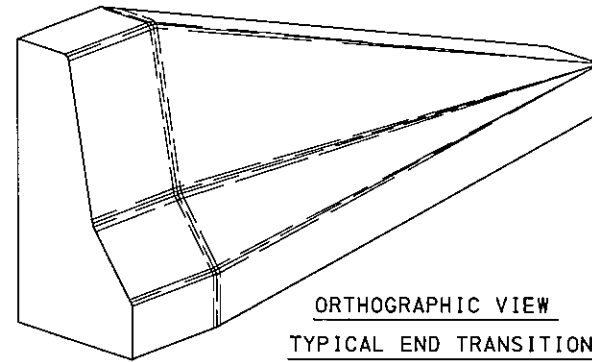
SECTION A-A



SECTION B-B

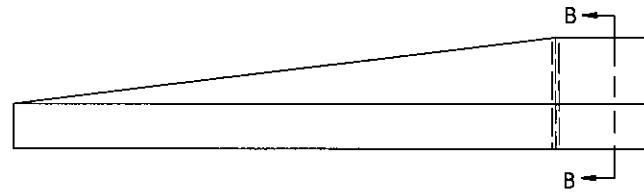


ORTHOGRAHIC VIEW
TYPICAL BARRIER SECTION

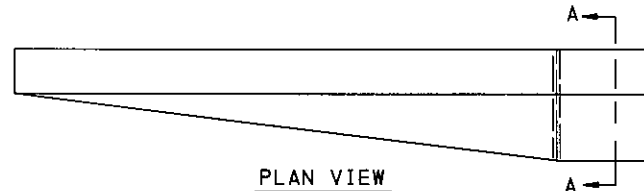


ORTHOGRAHIC VIEW
TYPICAL END TRANSITION
SEE NOTE 5.

NOTE:
A = SEE TYPICAL SECTIONS,
SHEET 2.



PLAN VIEW
RIGHT END TRANSITION



PLAN VIEW
LEFT END TRANSITION

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

NOTES

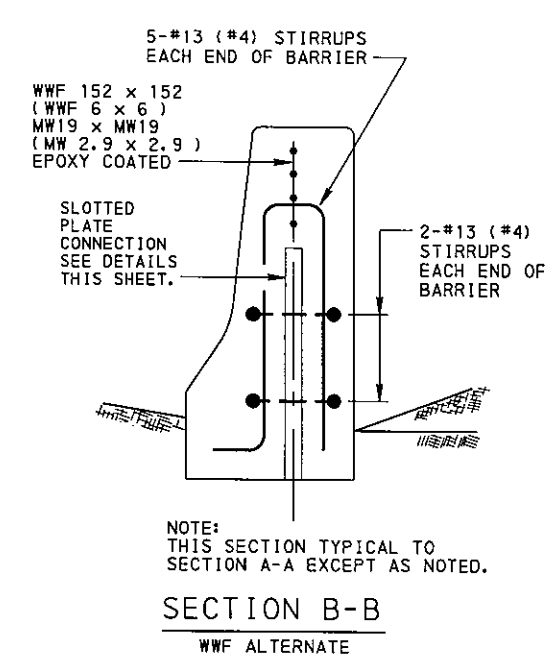
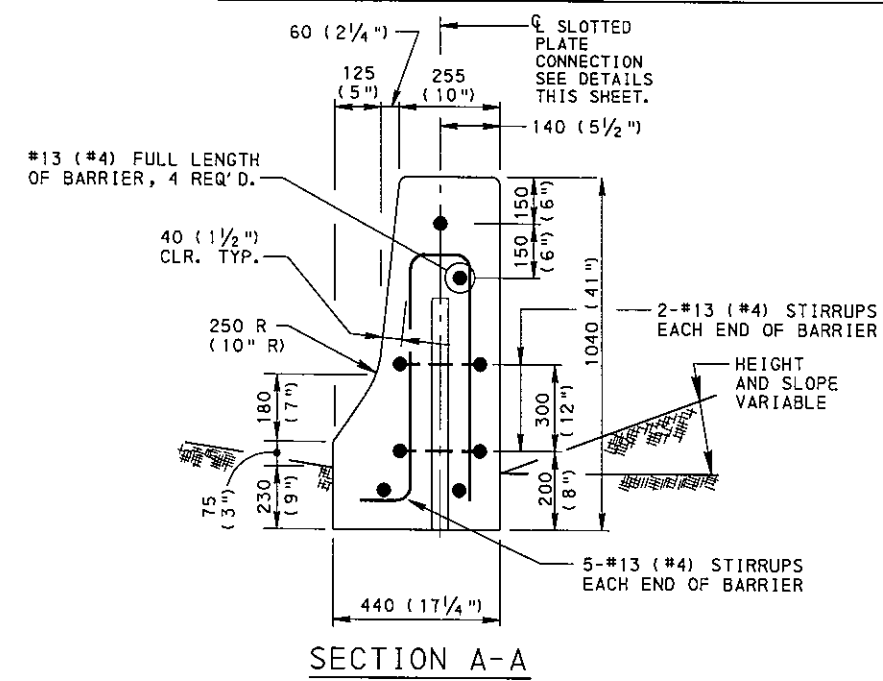
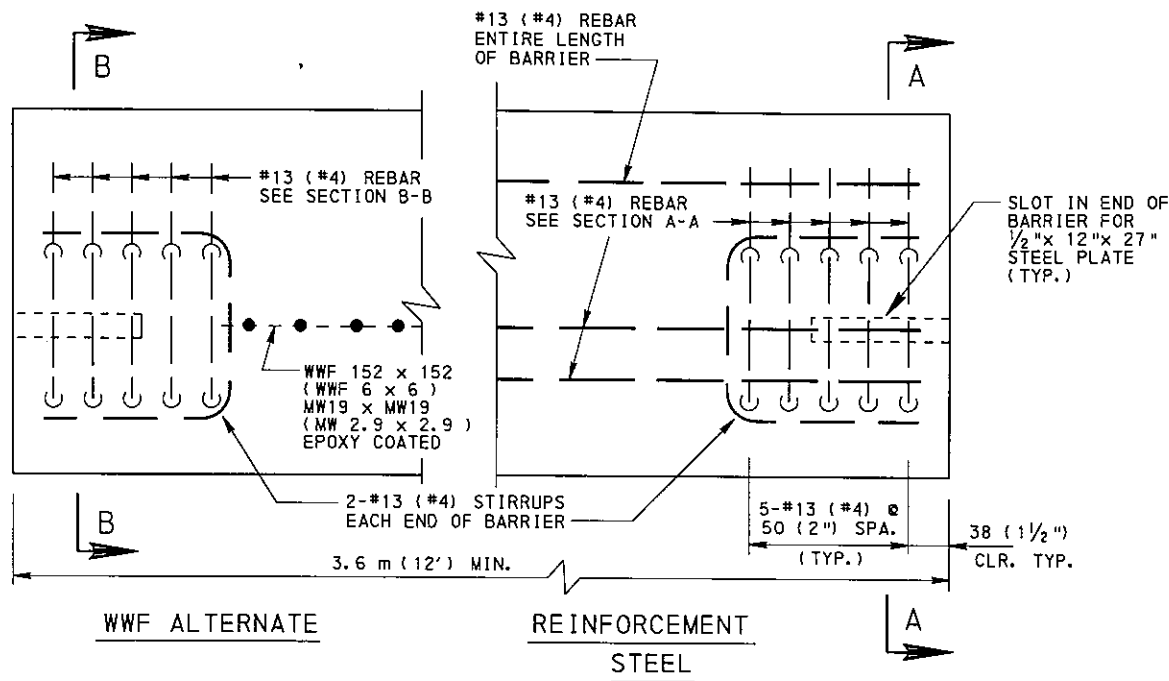
1. PROVIDE SINGLE FACE CONCRETE BARRIER MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 623.
2. PROVIDE PRECAST SINGLE FACE CONCRETE BARRIER SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. MODIFICATIONS OR DEVIATIONS FROM THE STANDARD REQUIRE THE SUBMISSION OF SHOP DRAWINGS FOR REVIEW.
3. PROVIDE BARRIER-MOUNT OR REFLECTOR UNIT DELINEATORS, AS INDICATED ON RC-57M.
4. PROVIDE REINFORCEMENT FOR SINGLE FACE CONCRETE BARRIER AS INDICATED ON SHEET 2.
5. PROVIDE END TRANSITIONS OR IMPACT ATTENUATING DEVICES AS INDICATED ON RC-57M.
6. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.
8. FABRICATE REINFORCEMENT BARS ACCORDING TO PENNDOT BRIDGE CONSTRUCTION STANDARD, BC-736M.

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

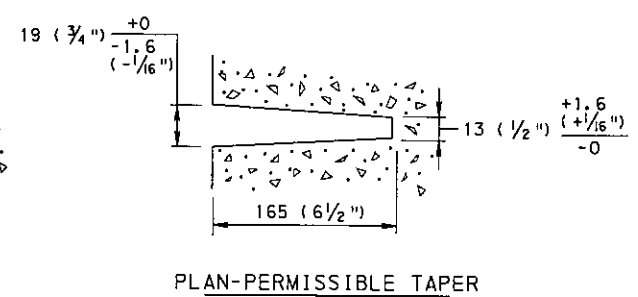
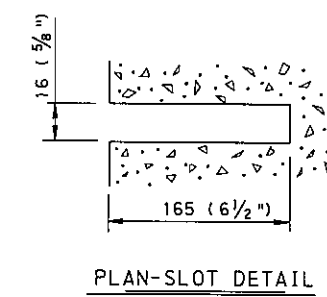
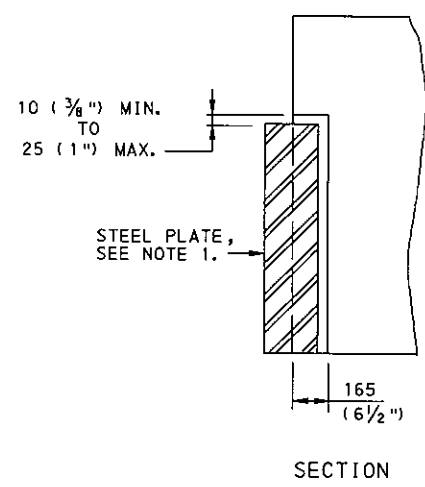
SINGLE FACE CONCRETE BARRIER

BC-736M	REINFORCEMENT BAR FABRICATION DETAILS	RECOMMENDED NOV. 1, 2001	RECOMMENDED NOV. 1, 2001	SHT 1 OF 5
REFERENCE DRAWINGS		<i>Dean A. Silva</i> DIRECTOR, BUREAU OF DESIGN	<i>Stanley D. Hoffman</i> CHIEF ENGINEER	RC-58M



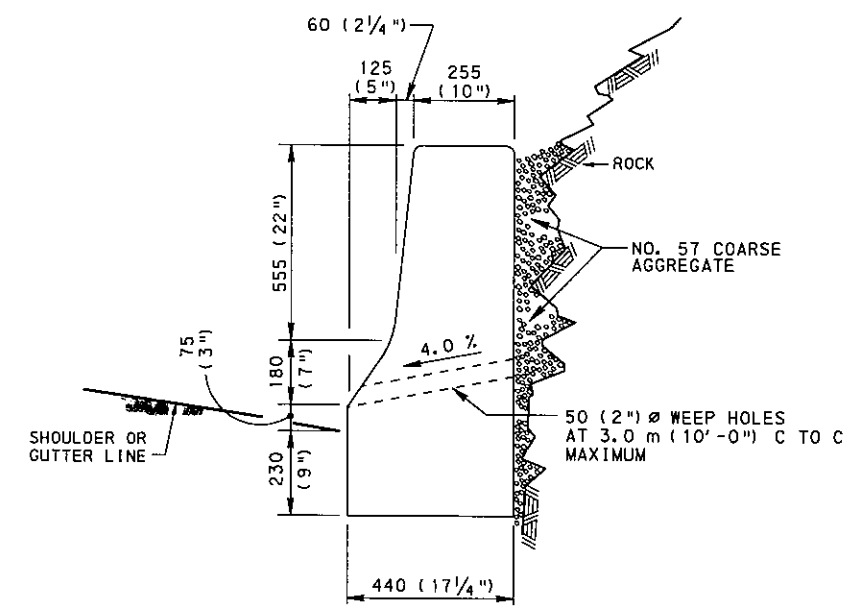
BARRIER PLAN

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



SLOTTED PLATE CONNECTION

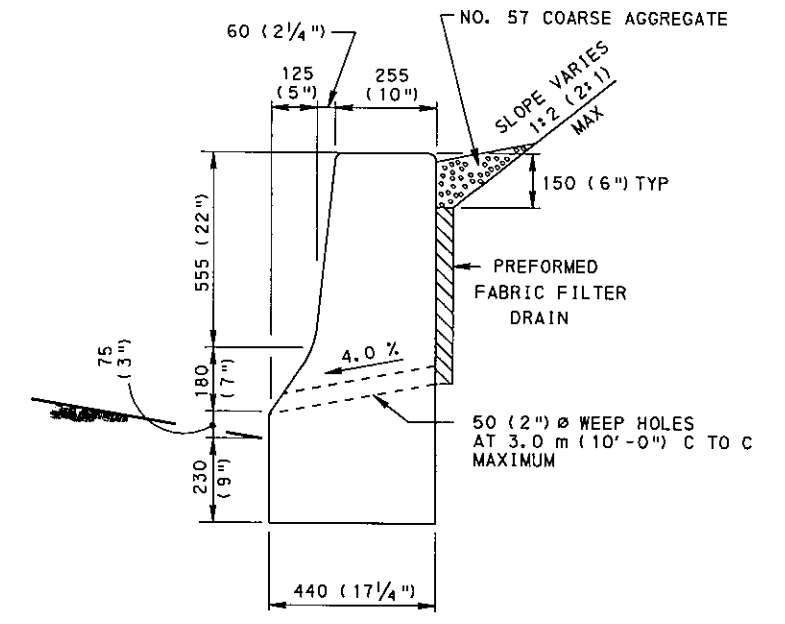
TYPICAL SINGLE FACE BARRIER SECTIONS



TYPICAL ROUGH ROCK TREATMENT

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. IF THE HEIGHT OR SLOPE IS INCREASED, PROVIDE OVERTURNING MOMENT COMPUTATIONS WITH THE CONSTRUCTION PLANS.
3. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1) EXCEPT AS SHOWN.



TYPICAL DRAINAGE TREATMENT

SEE NOTE 2.

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER
F-SHAPE

RECOMMENDED NOV. 1, 2001	RECOMMENDED NOV. 1, 2001	SHT 2 OF 5
<i>Alan A. Schaefer</i>	<i>Ray J. Hoffman</i>	
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	RC-58M

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.

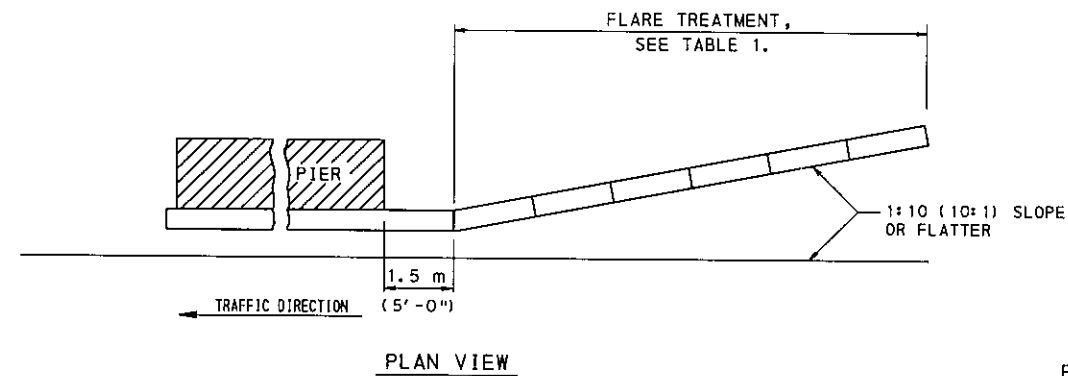
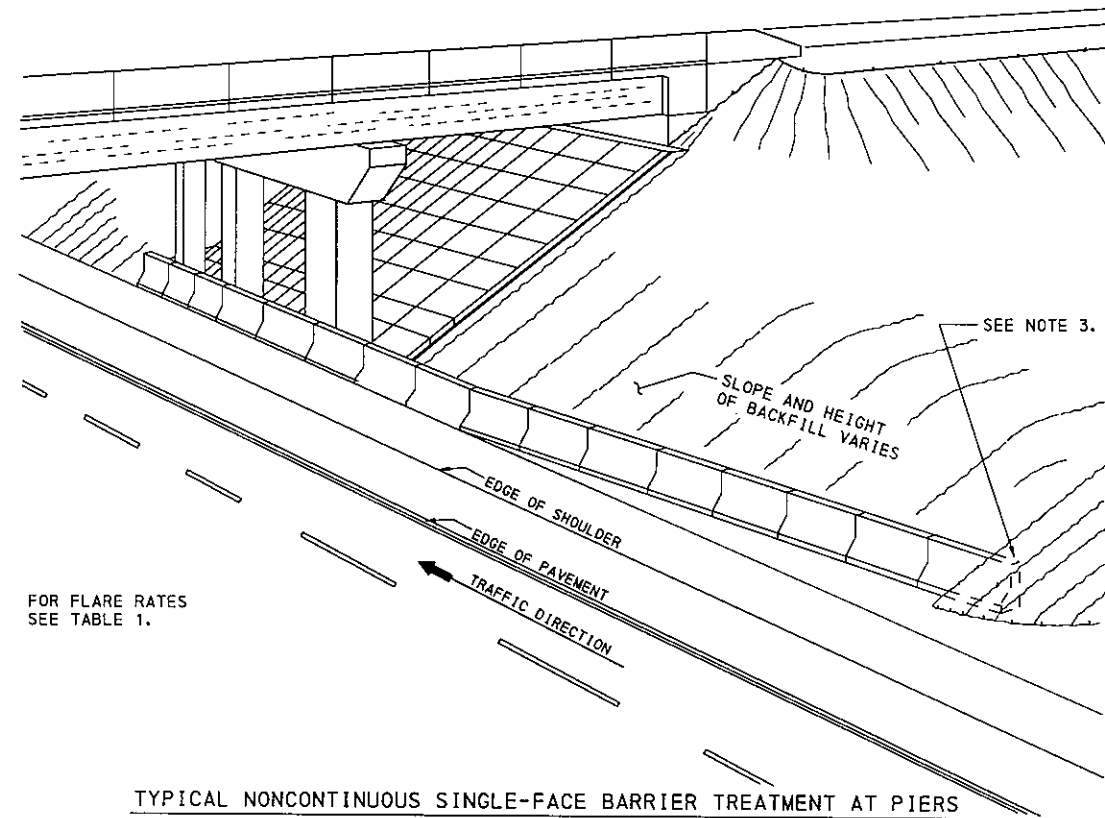
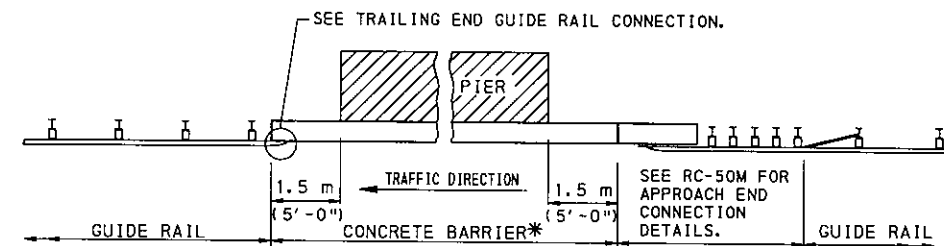
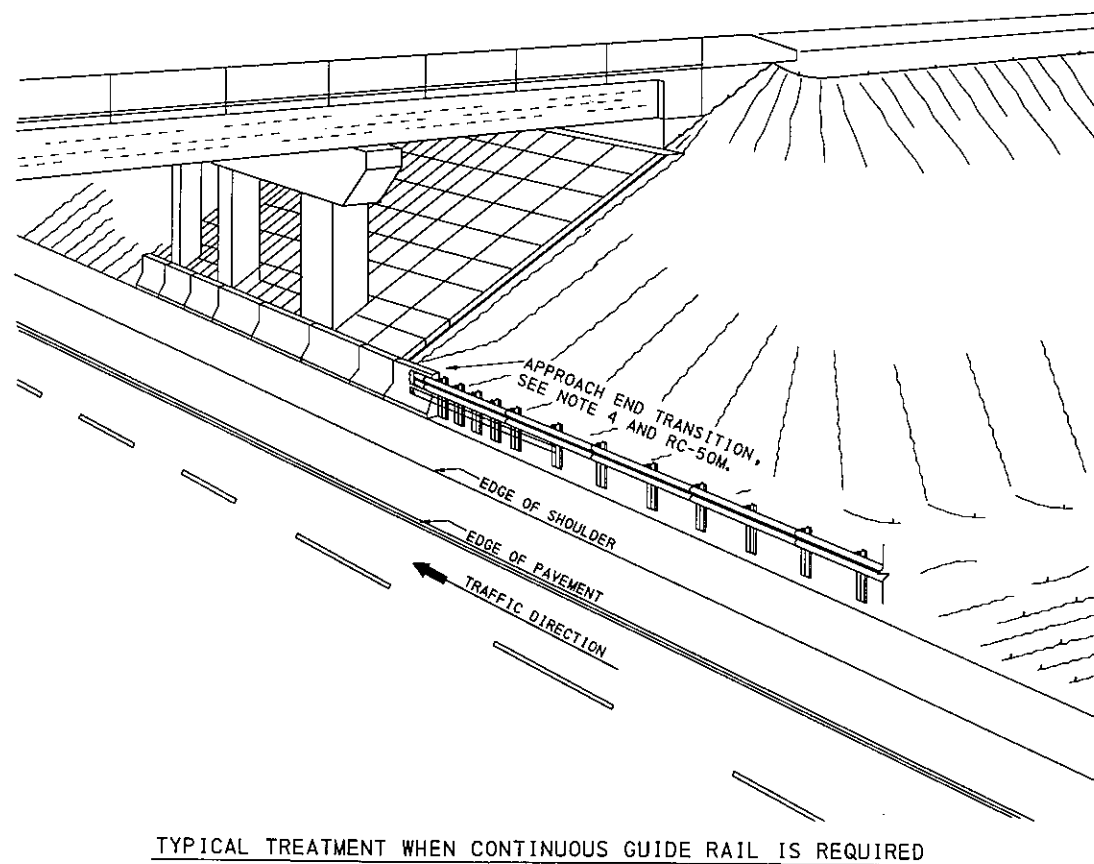


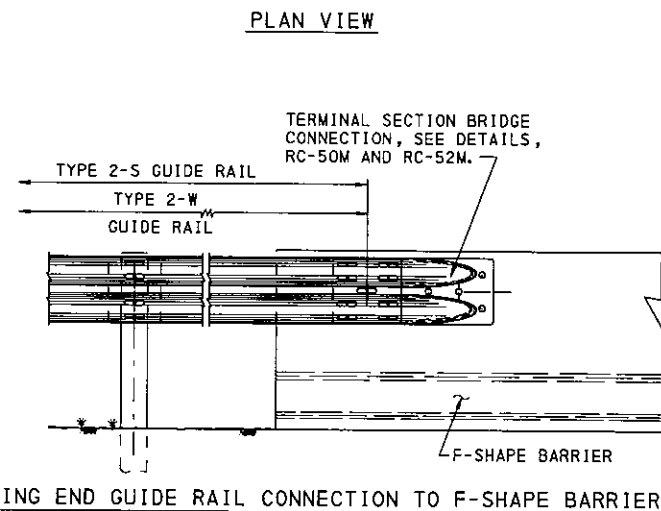
TABLE 1
FLARE RATES FOR BARRIER DESIGN

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



CONTINUOUS GUIDE RAIL WITH SINGLE FACE BARRIER AT PIER

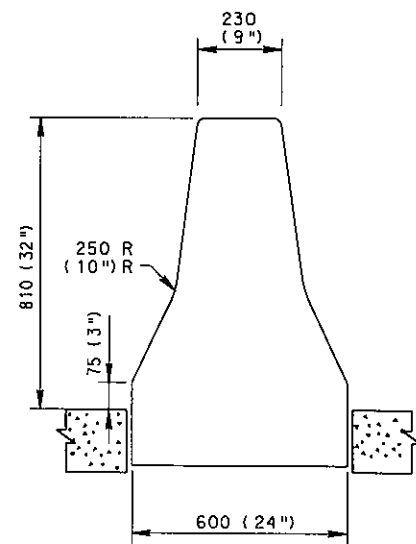
* IF ADEQUATE DEFLECTION DISTANCE IS PROVIDED (TABLE, RC-54M) BETWEEN THE BACK OF THE GUIDE RAIL POST AND FRONT OF OBSTRUCTION, DO NOT USE CONCRETE BARRIER; CONTINUE THE GUIDE RAIL.



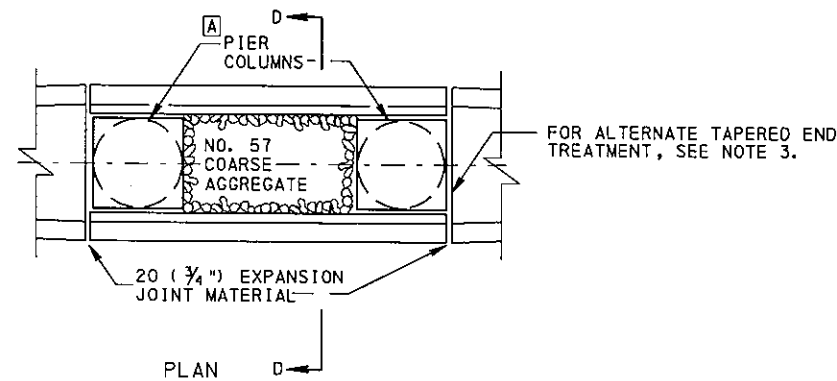
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

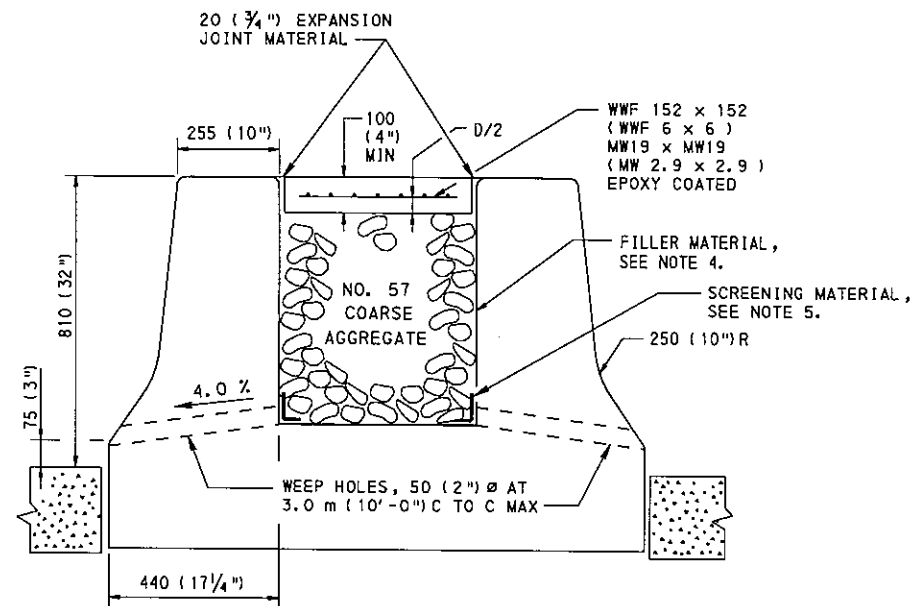
SINGLE FACE CONCRETE BARRIER
F-SHAPE
PLACEMENT AT SHOULDER PIERS



SECTION A-A

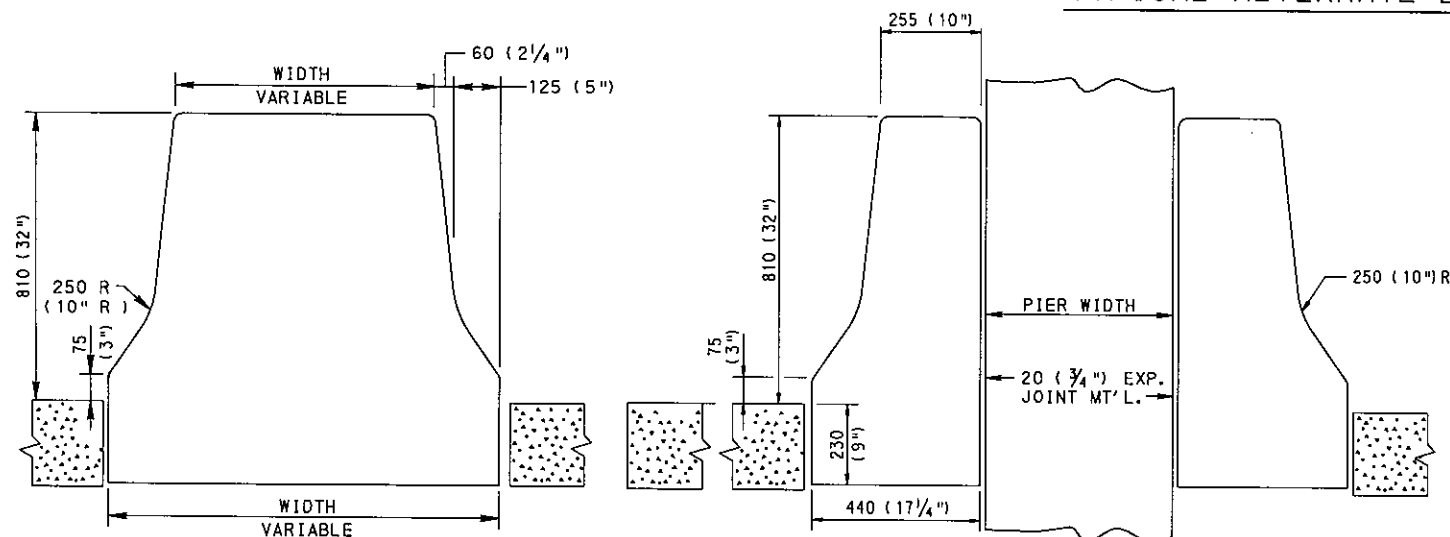


PLAN



SECTION D-D

TYPICAL ALTERNATE BARRIER TREATMENT AT PIERS



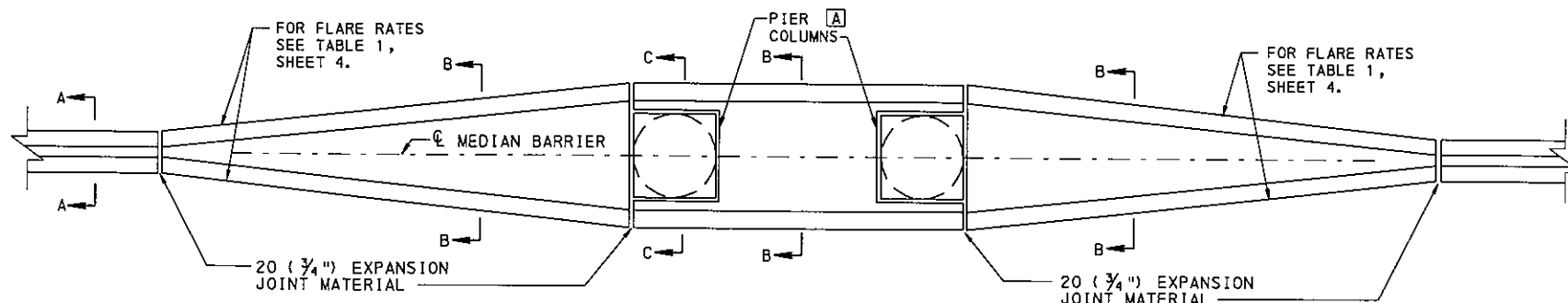
SECTION B-B

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 T03.2. 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 NOV. 1, 2001 <i>Alan P. Schmitz</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Barry D. Hoffman</i> CHIEF ENGINEER	SHT 4 OF 5 RC-58M
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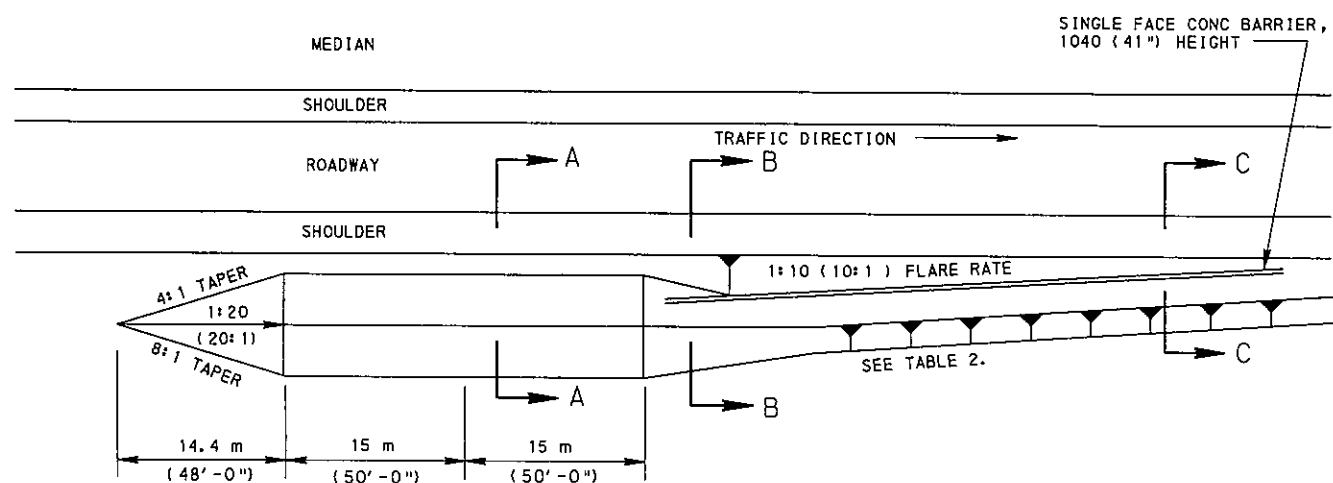


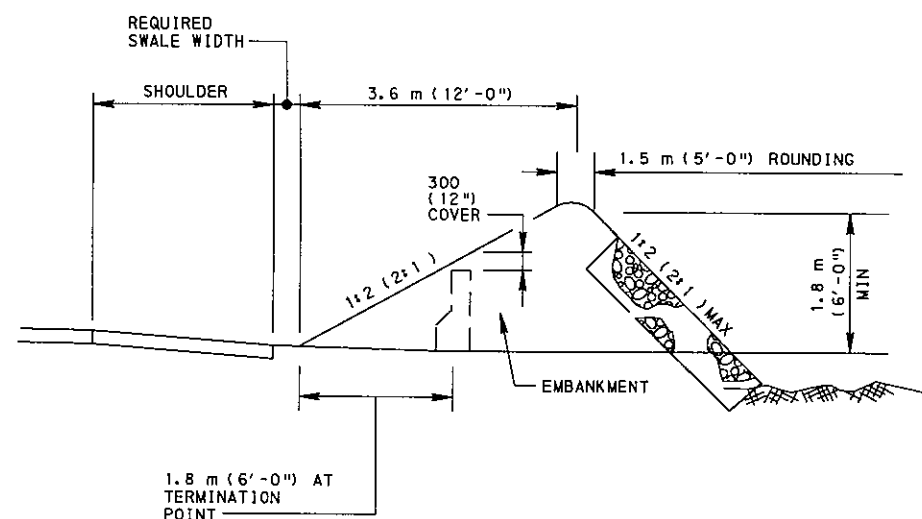
TABLE 2
FLARE RATES
FOR BARRIER DESIGN

DESIGN SPEED		MAXIMUM FLARE RATES CONCRETE BARRIER
km/h	(mph)	
120	(75)	20 : 1
110	(70)	20 : 1
100	(60)	18 : 1
90	(55)	16 : 1
80	(50)	14 : 1
70	(45)	12 : 1
60	(35)	10 : 1
50	(30)	8 : 1

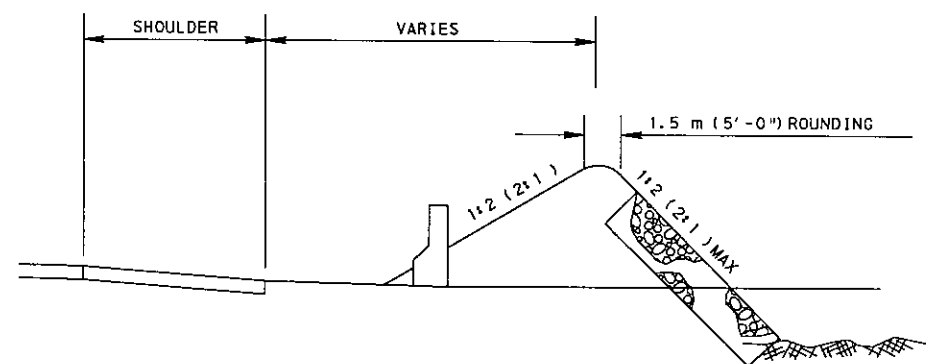
NOTES

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.

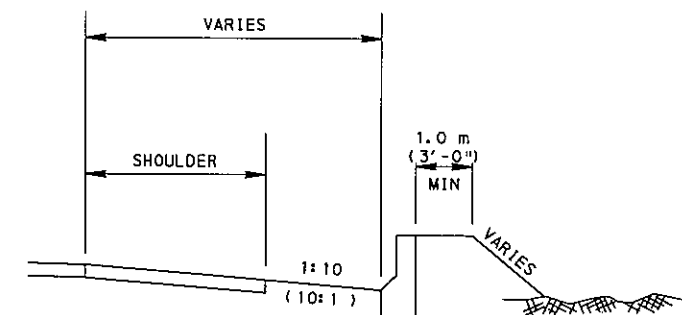
TYPICAL EARTH MOUND FOR BURYING CONCRETE BARRIER



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.

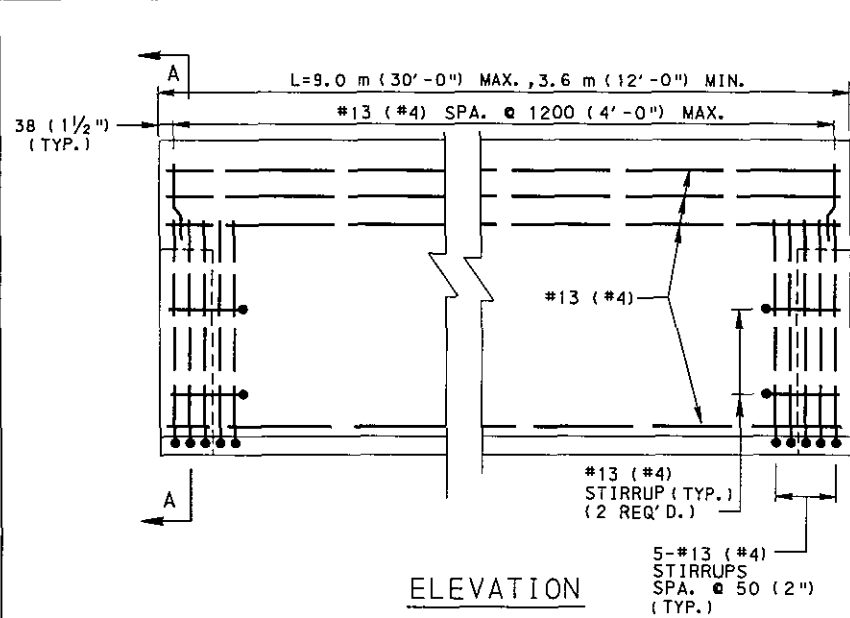
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

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

RECOMMENDED NOV. 1, 2001
Dean A. Schaefer
DIRECTOR, BUREAU OF DESIGN

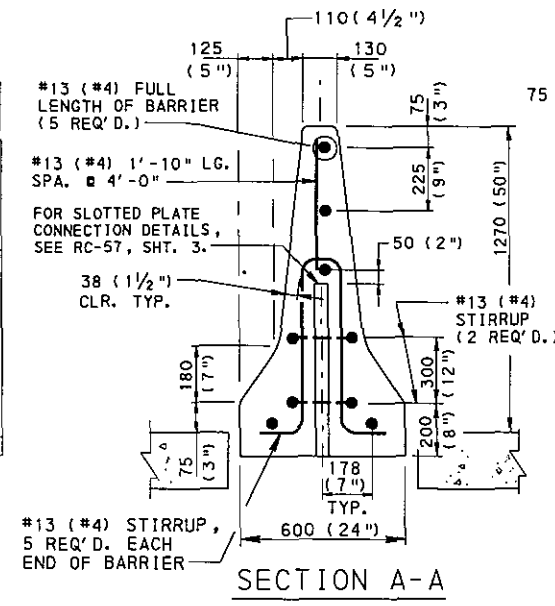
RECOMMENDED NOV. 1, 2001
Barry K. Hoffman
CHIEF ENGINEER

SHT 5 OF 5
RC-58M

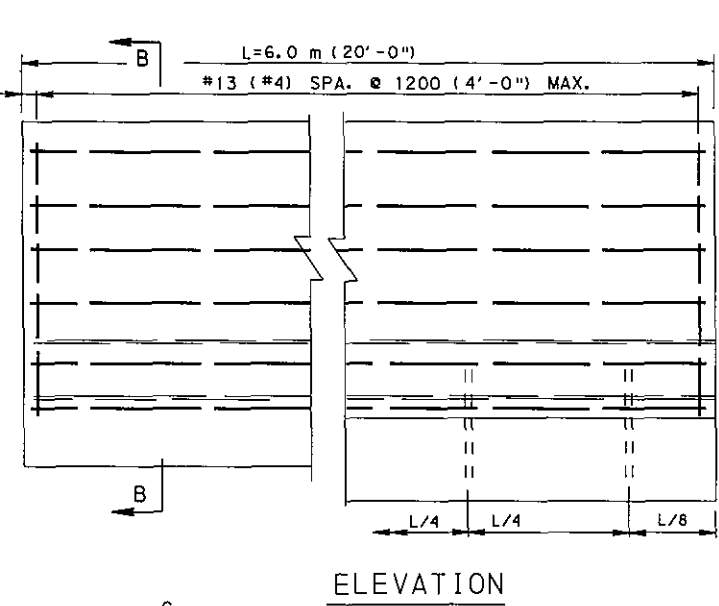


ELEVATION

TYPICAL PRECAST

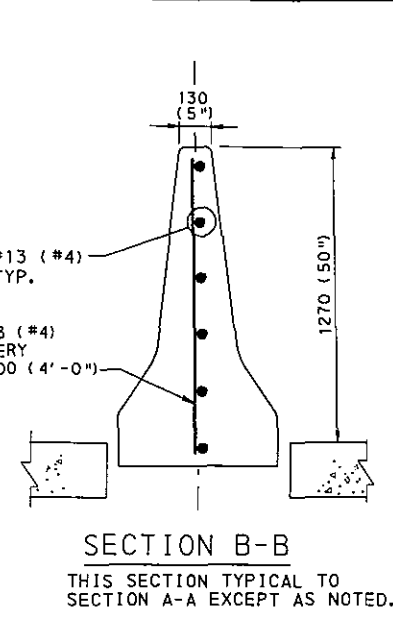


SECTION A-A



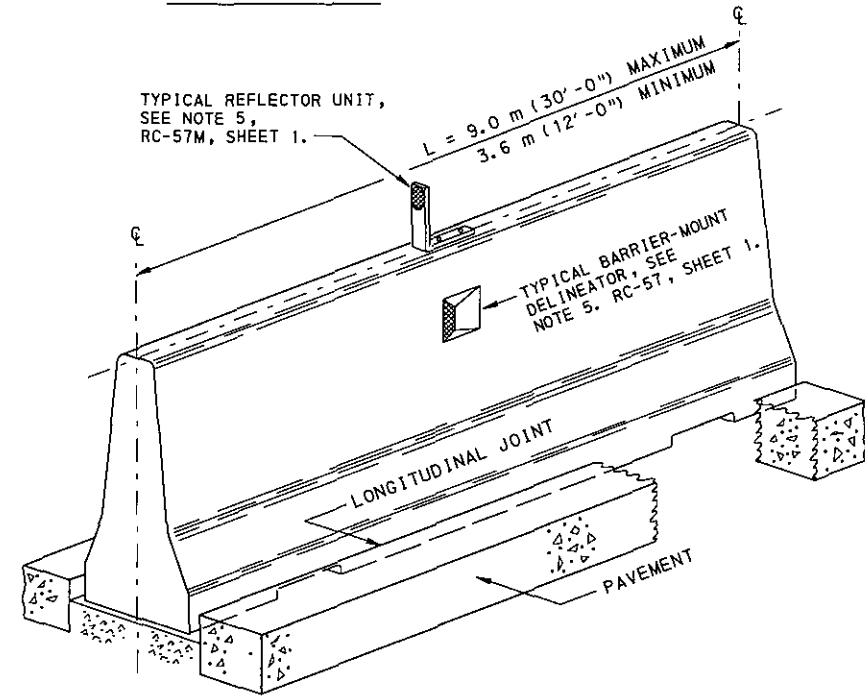
ELEVATION

TYPICAL CAST-IN-PLACE



SECTION B-B

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



TYPICAL CAST-IN PLACE AND PRECAST BARRIER

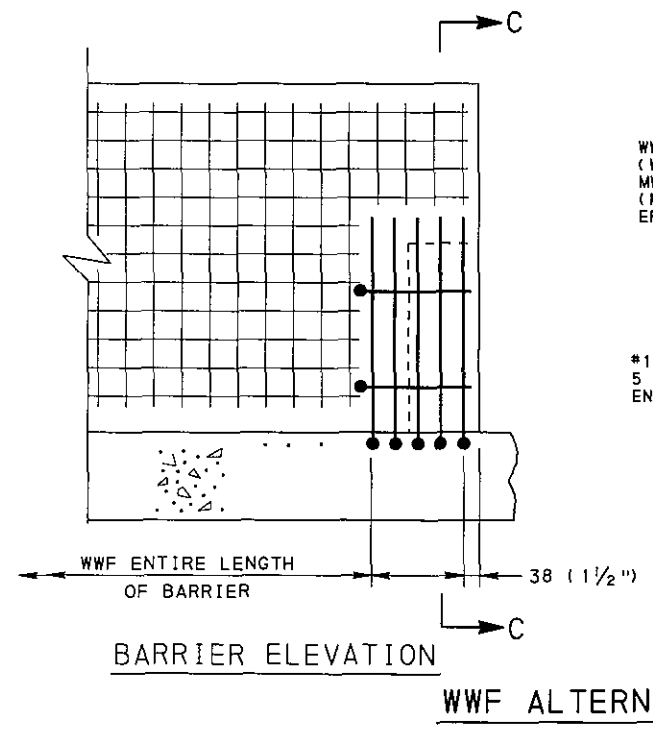
NOTES

1. PROVIDE CONCRETE GLARE SCREEN MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 622 AND 714.
A. MINIMUM CONCRETE CLASS: AAA
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 PENNOCOT BRIDGE CONSTRUCTION STANDARD, BC-736M.

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

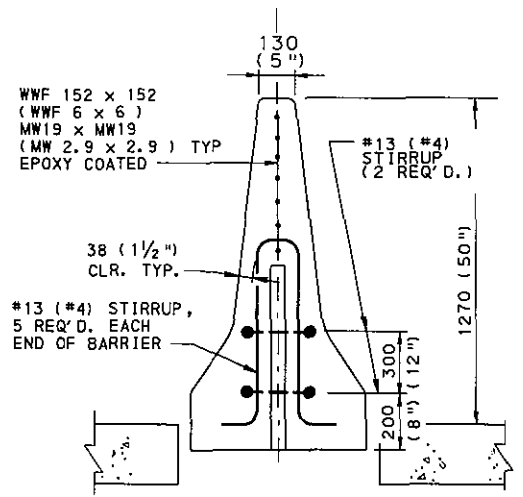
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CONCRETE GLARE SCREEN
F-SHAPE



BARRIER ELEVATION

WWF ALTERNATE



SECTION C-C

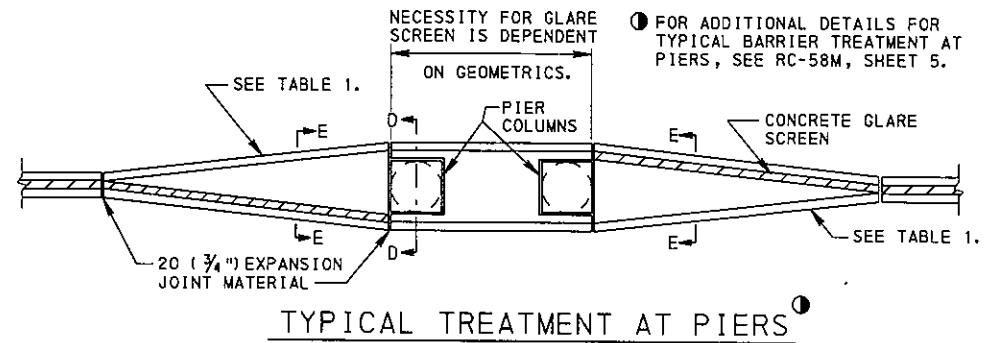
THIS SECTION TYPICAL TO SECTION A-A EXCEPT AS NOTED.

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

RECOMMENDED NOV. 1, 2001
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED NOV. 1, 2001
CHIEF ENGINEER

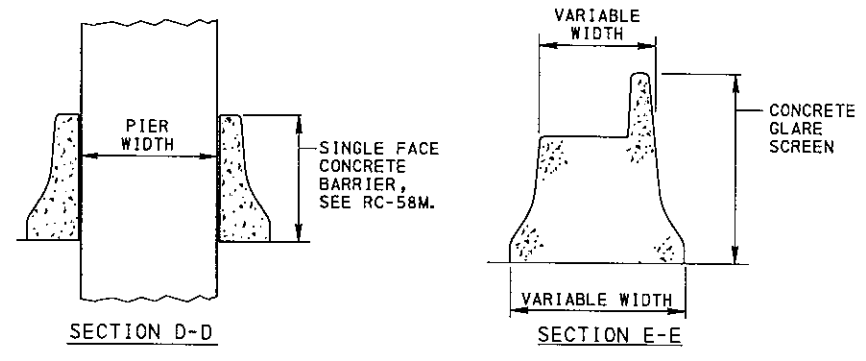
SHT 1 OF 2
RC-59M



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

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
100	(60)	18 : 1	14 : 1
90	(55)	16 : 1	12 : 1
80	(50)	14 : 1	11 : 1
70	(45)	12 : 1	10 : 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.

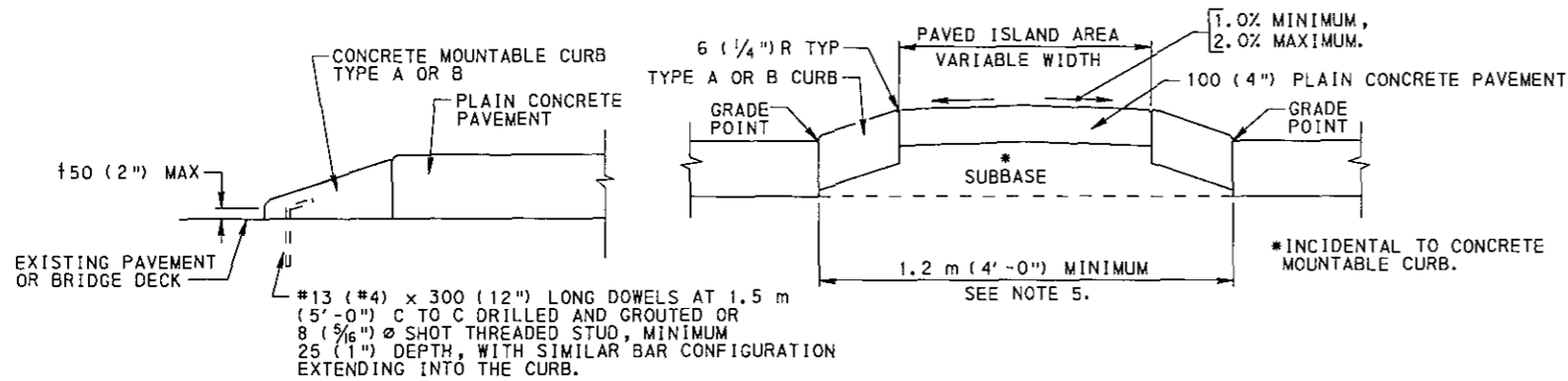
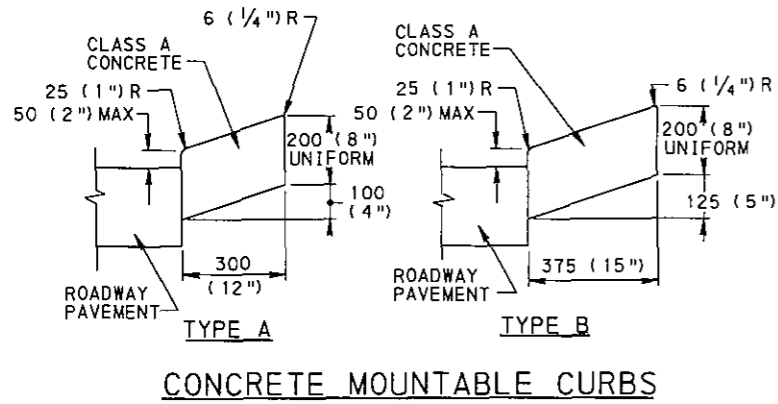
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

CONCRETE GLARE SCREEN
F-SHAPE

RECOMMENDED NOV. 1, 2001 <i>Dean A. Schwan</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>Larry L. Hoffman</i> CHIEF ENGINEER	SHT 2 OF 2 RC-59M
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NOTES

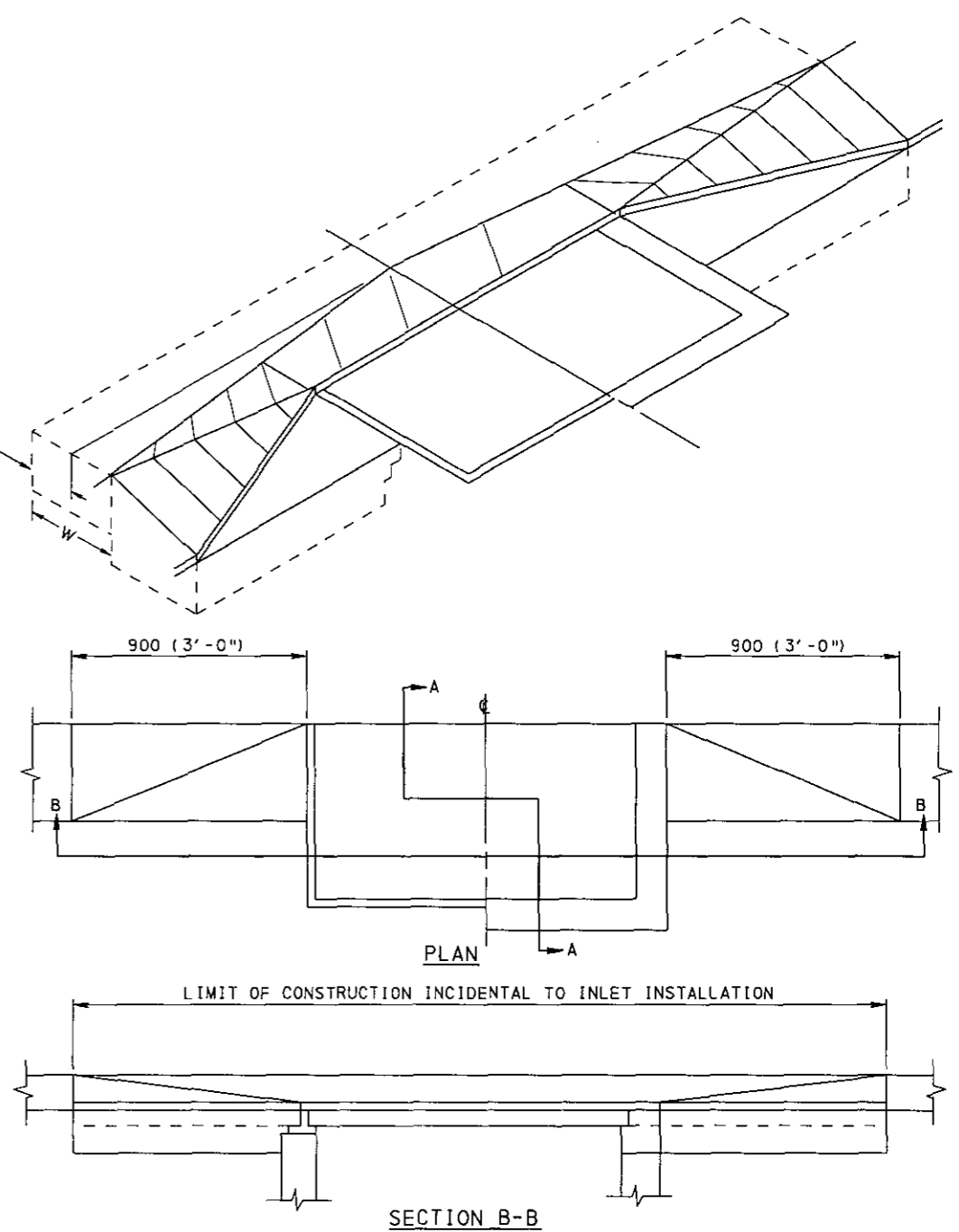
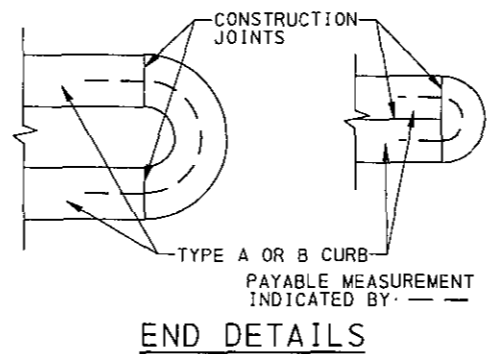
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408/2000, SECTION 633.
2. INSTALL TYPE M INLET WITH CONCRETE MOUNTABLE CURBS AND LOCATE INLET AS SHOWN ON THE DRAWINGS. MAKE THE BACKSLOPE TRAVERSABLE IN THE AREA OF THE INLET AS INDICATED.
3. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS AND SEAL AS SPECIFIED IN PUBLICATION 408/2000, SECTION 501.3(n).
4. PLACE PREMOLDED EXPANSION JOINT FILLER MATERIAL 20 (3/4") 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") MAXIMUM.

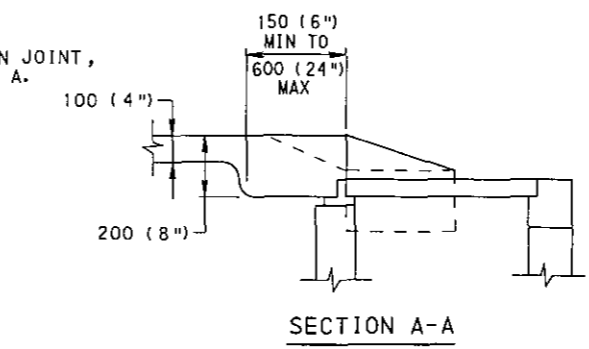
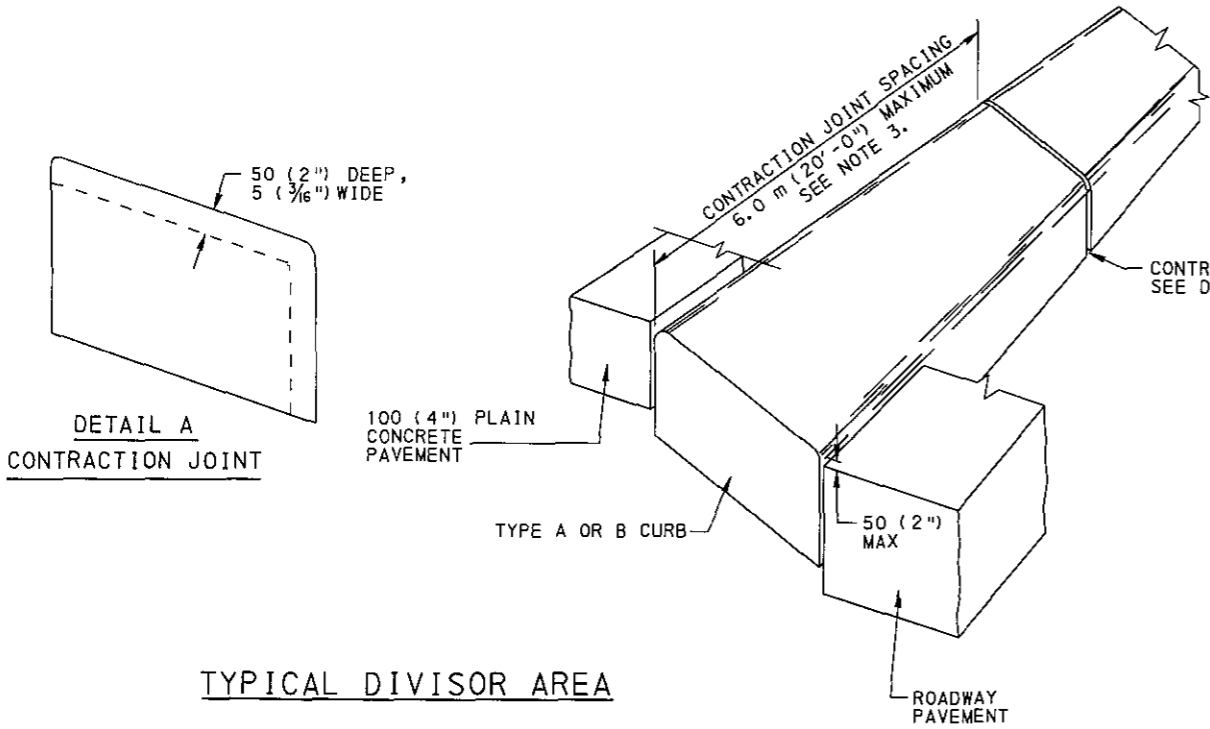
#13 (#4) x 300 (12") LONG DOWELS AT 1.5 m (5'-0") C TO C DRILLED AND GROUTED OR 8 (3/16") Ø SHOT THREADED STUD, MINIMUM 25 (1") DEPTH, WITH SIMILAR BAR CONFIGURATION EXTENDING INTO THE CURB.



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**

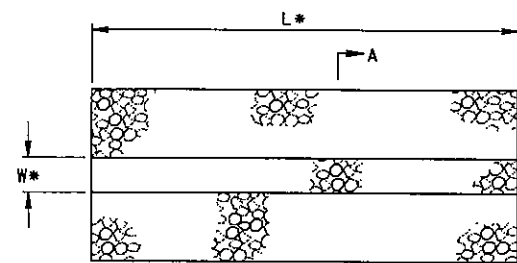
CONCRETE MOUNTABLE CURBS



TREATMENT FOR CONCRETE MOUNTABLE CURBS AT INLETS

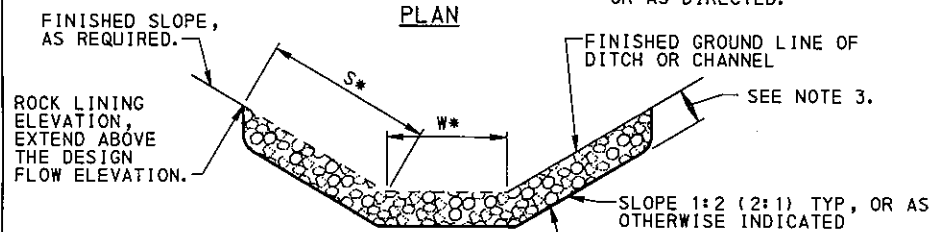
NOTES

1. PROVIDE GEOTEXTILE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408/2000, 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 408/2000, SECTION 850.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.



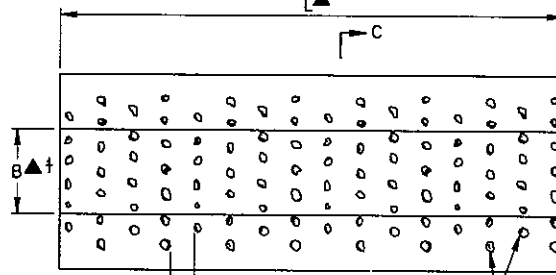
PLAN

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

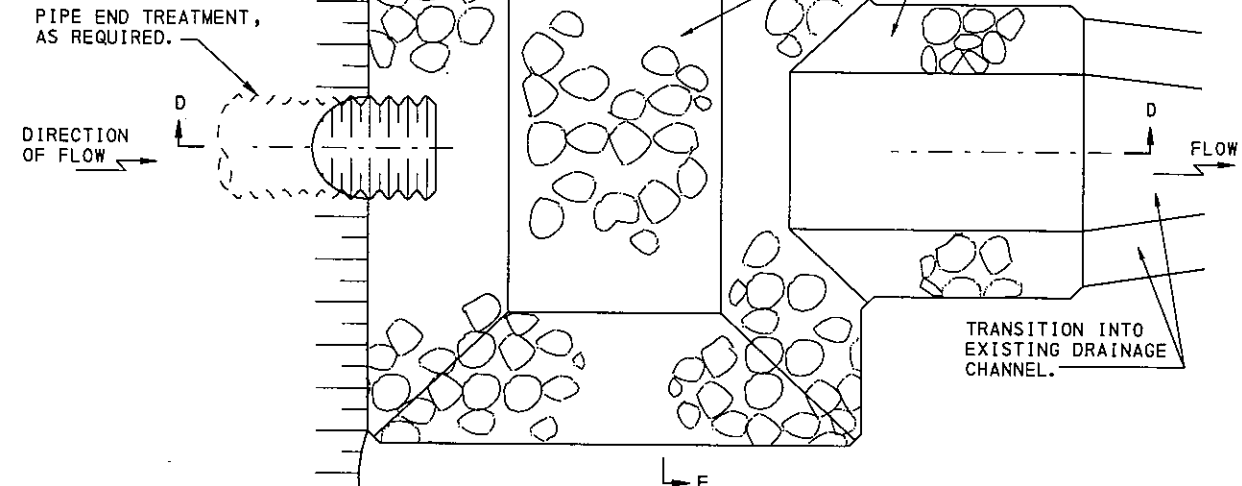


**SECTION A-A
ROCK LINING**

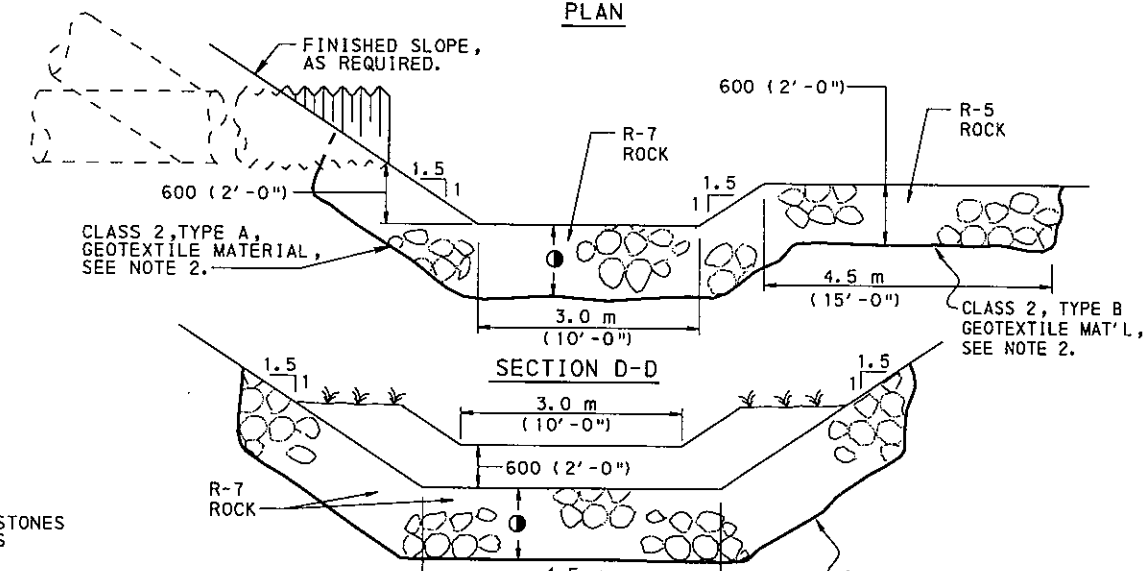
▲ A, B, AND L AS INDICATED OR AS DIRECTED.
 † WHEN CHANNEL BOTTOM WIDTH IS LESS THAN 900 (3'-0"), USE A SINGLE, STAGGERED ROW OF STONES OR BLOCKS ALONG CHANNEL BOTTOM.



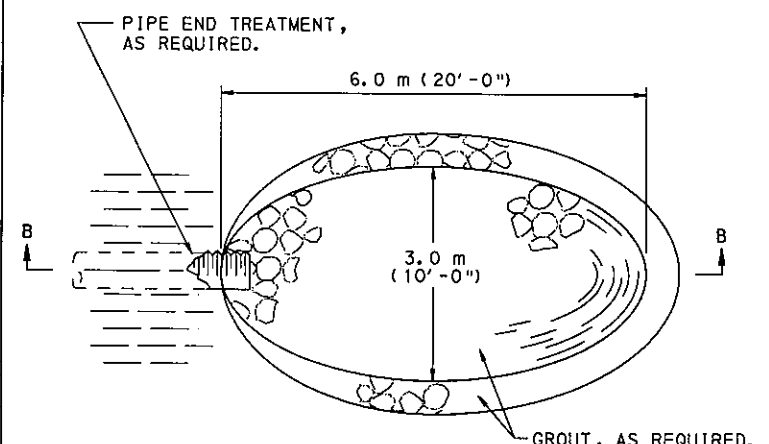
PLAN



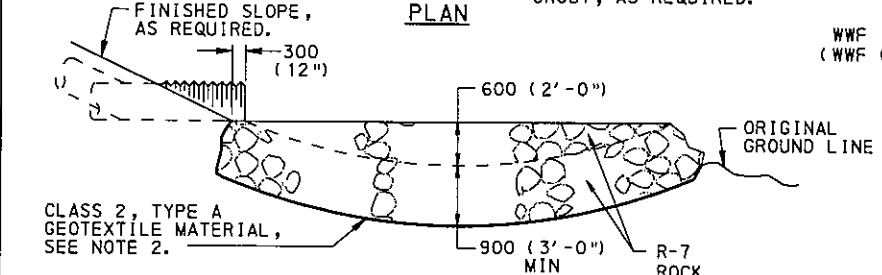
PLAN



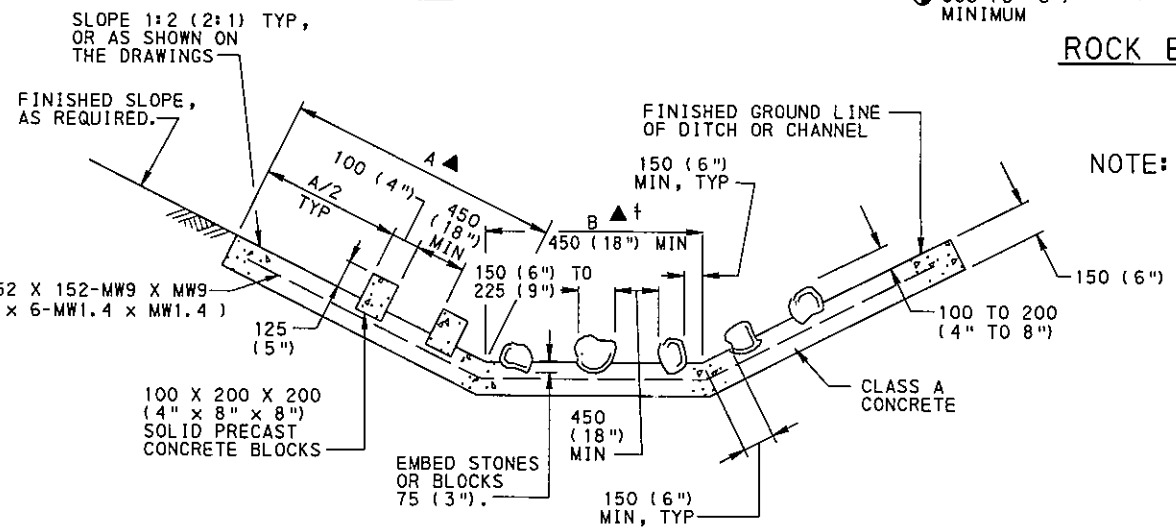
**SECTION E-E
ROCK ENERGY DISSIPATOR**



PLAN



**SECTION B-B
ROCK BASIN**



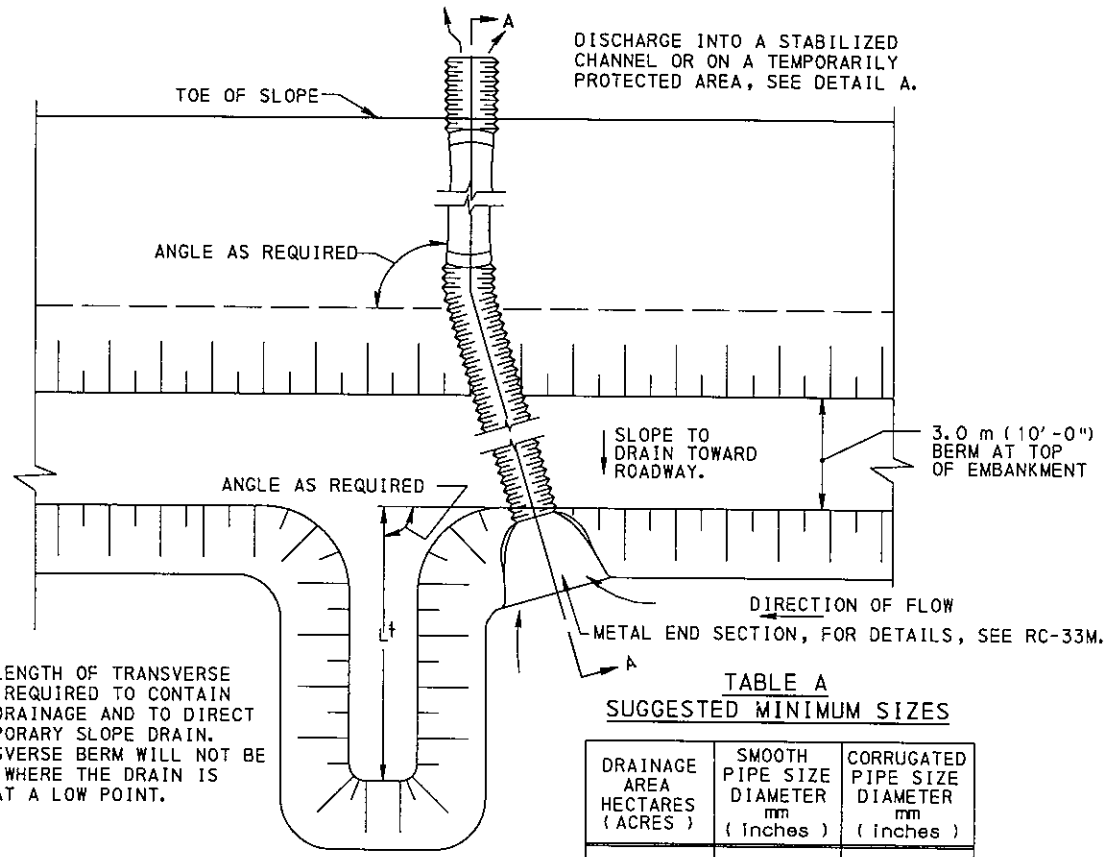
SECTION C-C

PAVED ENERGY DISSIPATOR

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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BUREAU OF DESIGN**

**EROSION AND SEDIMENT
POLLUTION CONTROL**

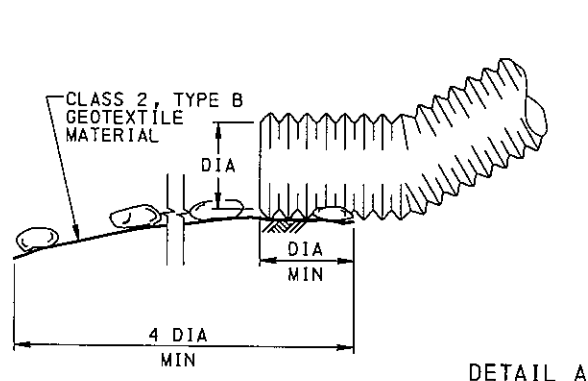


† PROVIDE LENGTH OF TRANSVERSE BERM (L) REQUIRED TO CONTAIN SURFACE DRAINAGE AND TO DIRECT INTO TEMPORARY SLOPE DRAIN. THE TRANSVERSE BERM WILL NOT BE REQUIRED WHERE THE DRAIN IS LOCATED AT A LOW POINT.

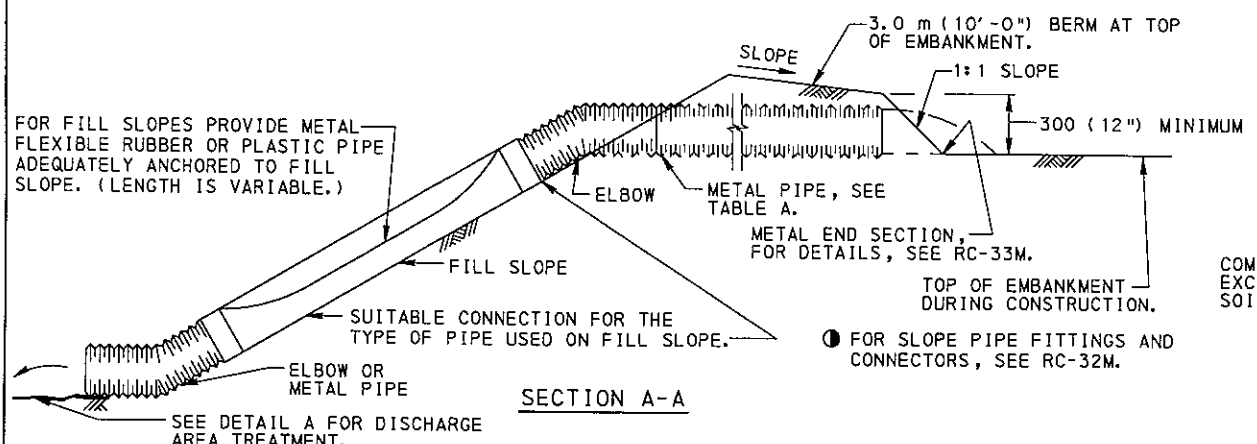
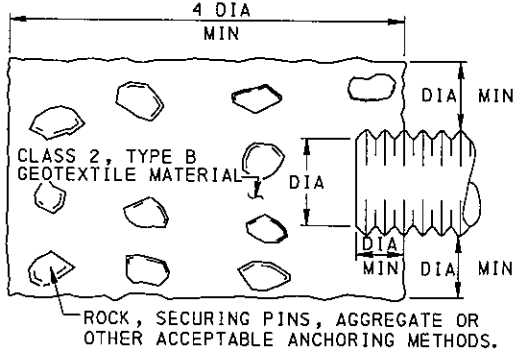
PLAN

TABLE A
SUGGESTED MINIMUM SIZES

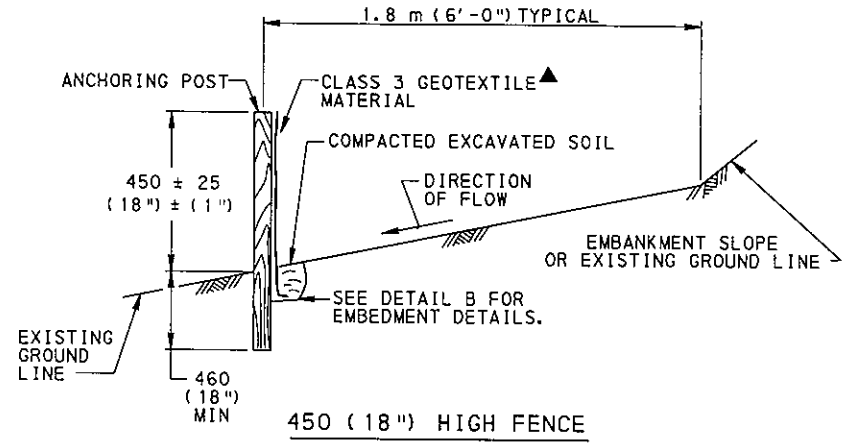
DRAINAGE AREA HECTARES (ACRES)	SMOOTH PIPE SIZE DIAMETER mm (inches)	CORRUGATED PIPE SIZE DIAMETER mm (inches)
0 TO 1.2 (0 TO 3)	200 (8")	300 (12")
1.2 TO 2.4 (3 TO 6)	250 (10")	375 (15")
2.4 TO 4.0 (6 TO 10)	300 (12")	450 (18")



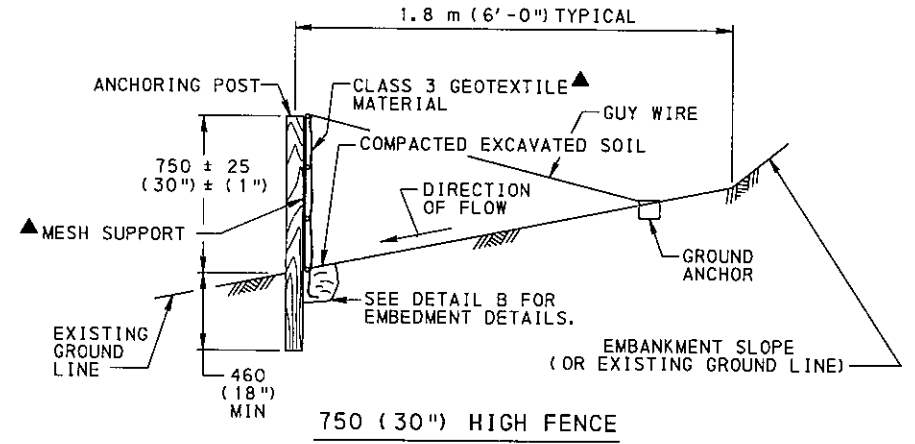
DETAIL A



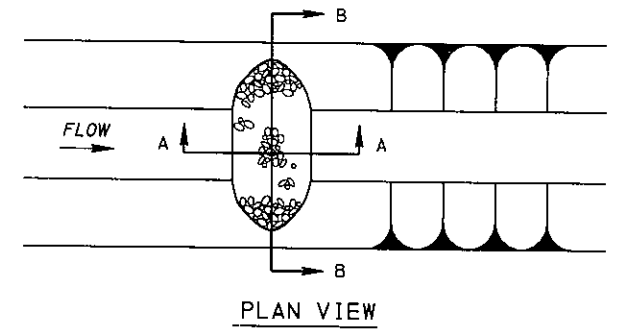
TEMPORARY SLOPE PIPE DRAIN



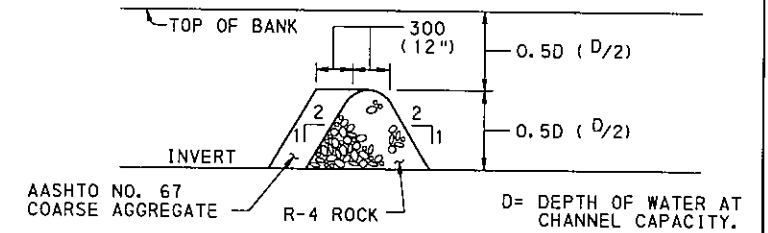
450 (18") HIGH FENCE



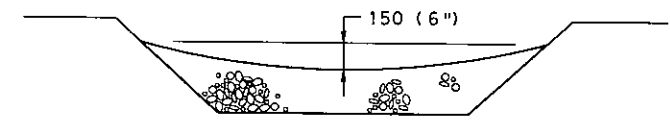
750 (30") HIGH FENCE



PLAN VIEW



TYPICAL SECTION A-A



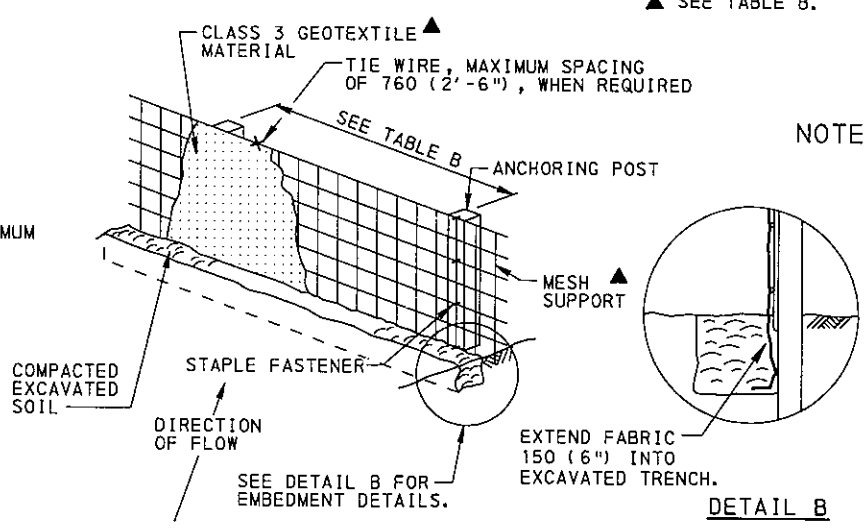
TYPICAL SECTION B-B
ROCK BARRIER

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.

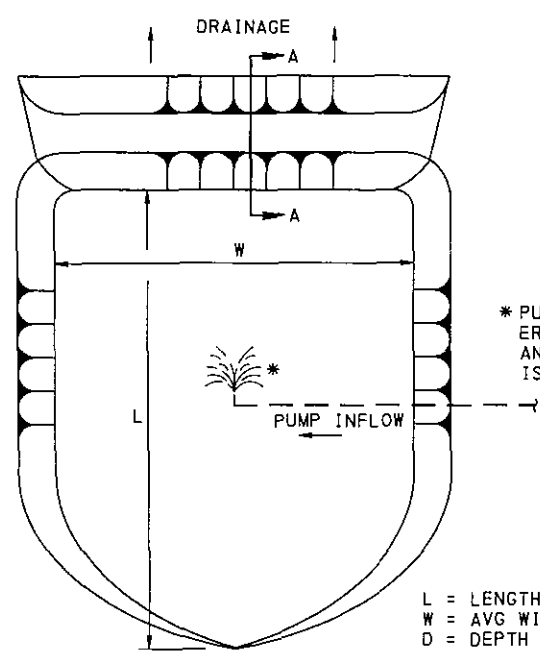


SILT BARRIER FENCE

DETAIL B

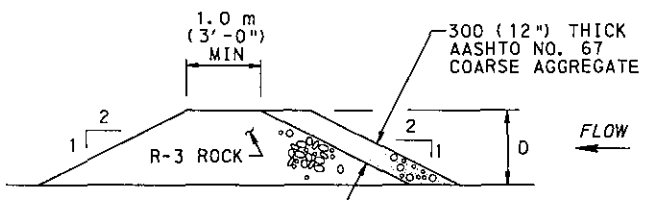
COMMONWEALTH OF PENNSYLVANIA
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EROSION AND SEDIMENT
POLLUTION CONTROL



PLAN VIEW

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)



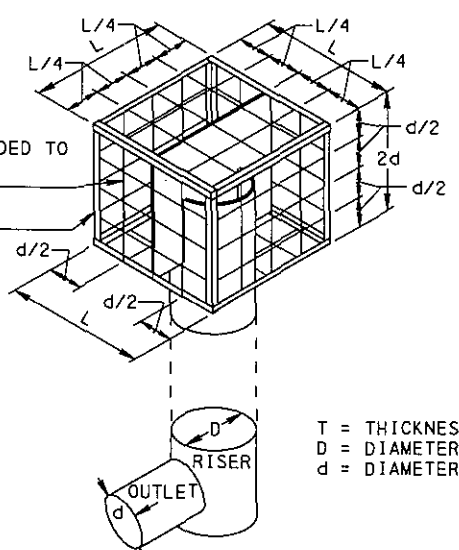
TYPICAL SECTION A-A

DEWATERING BASIN

NO. 13 (#4) BARS TYP WELDED TO THE ANGLES AND AT EACH INTERSECTION OF THE BARS.

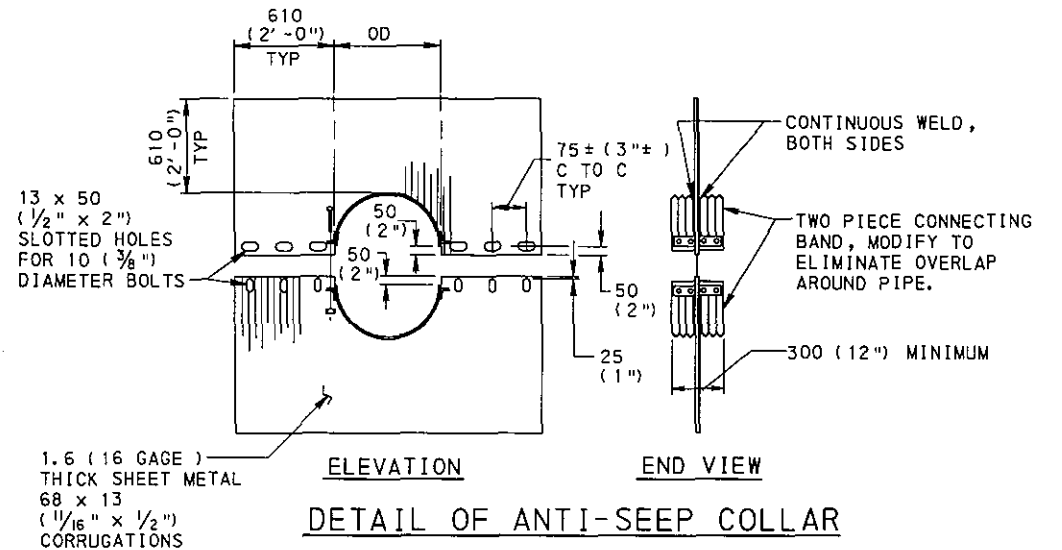
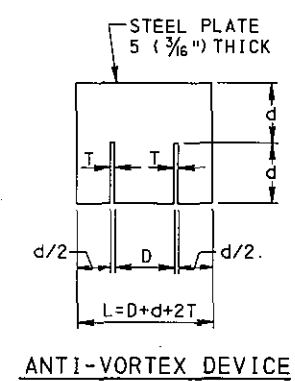
L25 x 25 x 3 (L1" x 1" x 1/8") TYP.

* PUMP DISCHARGE SHALL NOT CAUSE EROSION OR SCOUR AT OUTLET. AN ANCHORED VERTICAL DISCHARGE IS RECOMMENDED.



TRASH RACK AND ANTI-VORTEX DEVICE

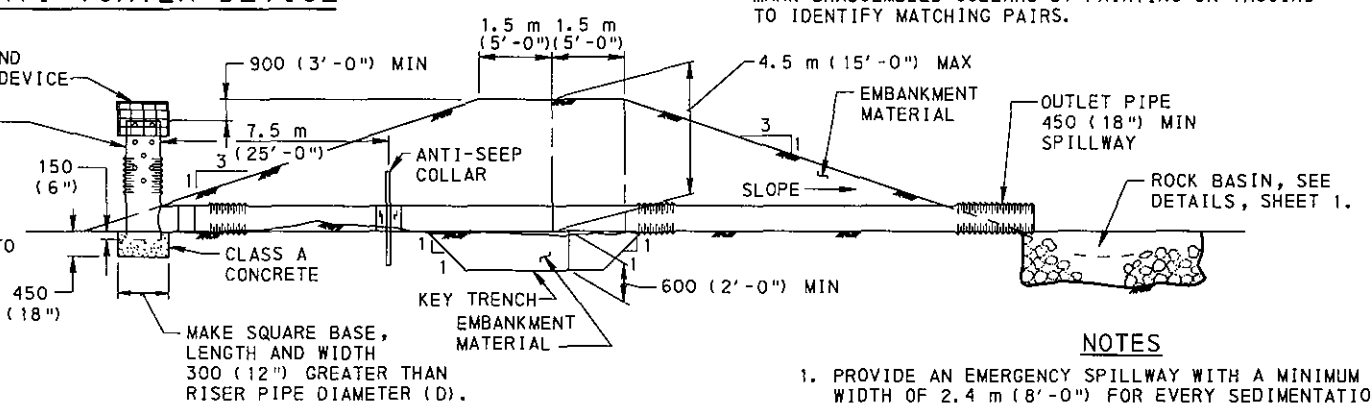
T = THICKNESS OF RISER PIPE.
D = DIAMETER OF RISER PIPE.
d = DIAMETER OF OUTLET PIPE.



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.

MAKE THE DIAMETER OF THE RISER AT LEAST 1.5 TIMES THE DIAMETER OF THE OUTLET PIPE. PERFORATE THE TOP TWO-THIRDS OF THE RISER PIPE WITH THE FOLLOWING DIAMETER HOLES SPACED 200 (8") VERTICALLY C TO C AND 250 (10") 300 (12") HORIZONTALLY C TO C.

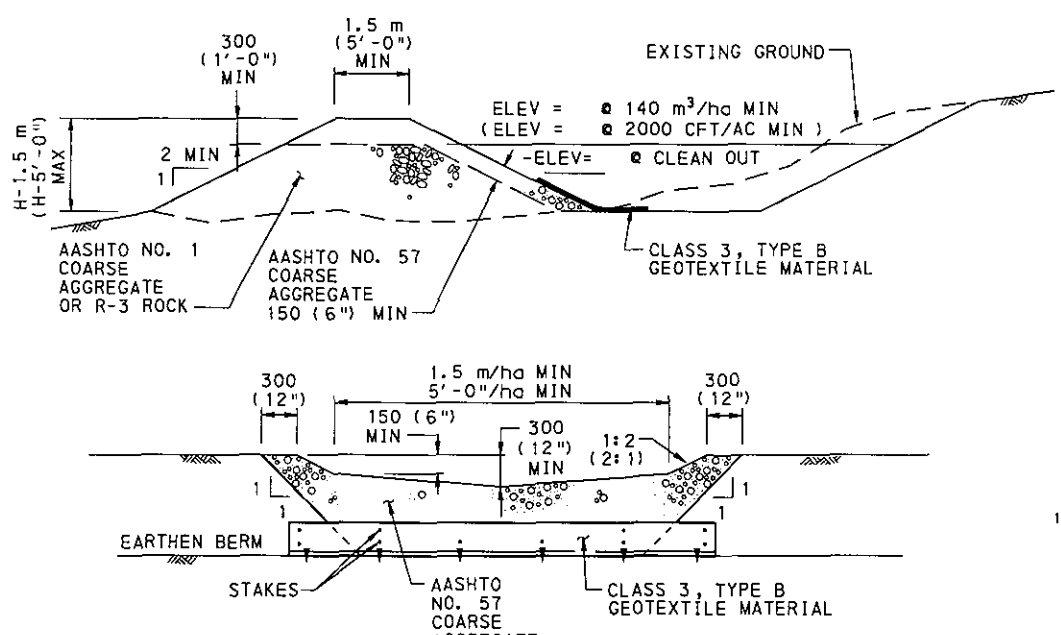
TOP ROW(S) - 50 (2")
MIDDLE ROW(S) - 40 (1 1/2")
BOTTOM ROW(S) - 25 (1")



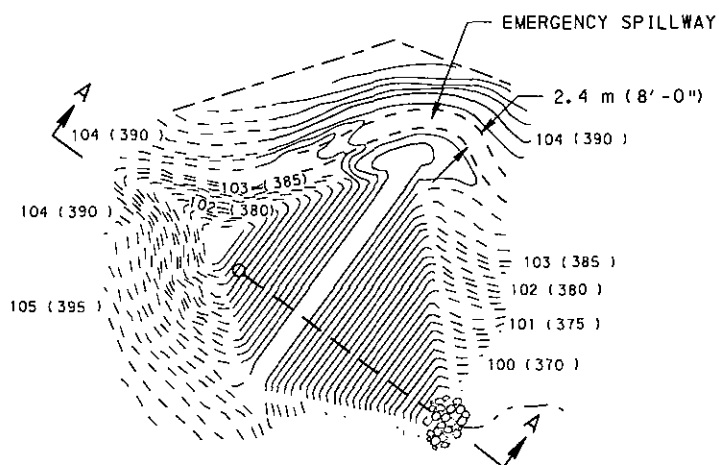
NOTES

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 EMBAKMENT AREAS. THE EMERGENCY SPILLWAY CAN GO OVER THE EMBAKMENT 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.

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



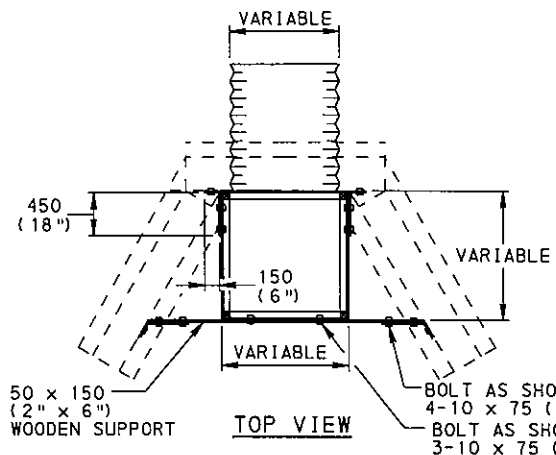
SEDIMENT TRAP



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

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DEPARTMENT OF TRANSPORTATION
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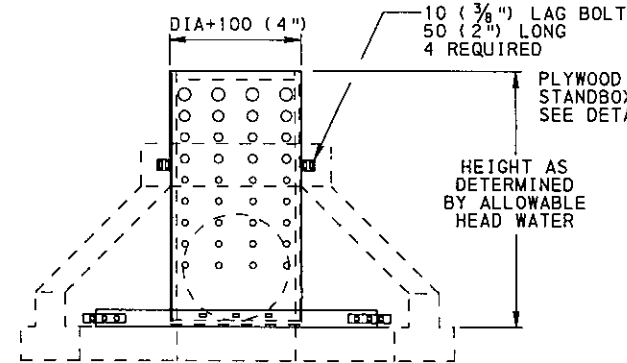
EROSION AND SEDIMENT POLLUTION CONTROL



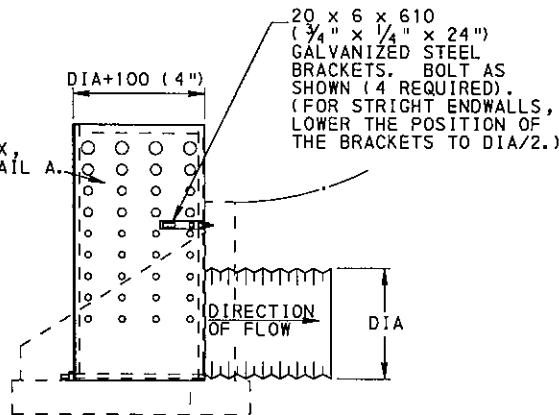
NOTES
 DRILL HOLES 50 (2") DEEP IN CONCRETE ENDWALL AND INSERT LEAD EXPANDER TO RECEIVE M10 Ø LAG BOLT. UPON REMOVAL OF STANDBOX, FILL HOLES IN THE ENDWALL WITH MORTAR MEETING THE REQUIREMENTS OF PUBLICATION 408/2000, SECTION 705.7.

** 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.

50 x 150 (2" x 6") WOODEN SUPPORT
 BOLT AS SHOWN 4-10 x 75 (3/8" x 3")
 BOLT AS SHOWN 3-10 x 75 (3/8" x 3")



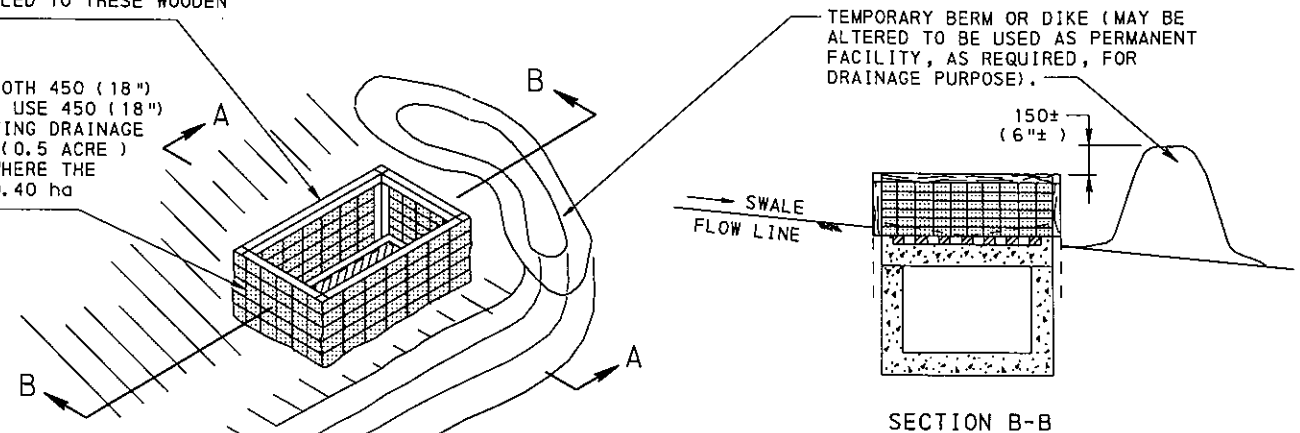
END VIEW



SIDE VIEW

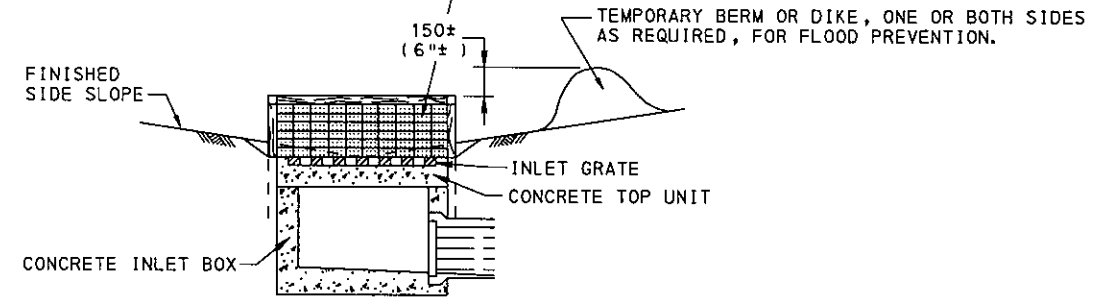
PLACE 50 x 50 (2" x 2") WOOD STRIPS AROUND THE TOP NAILED TO THE POSTS AND WITH THE GEOTEXTILE STAPLED TO THESE WOODEN PIECES.

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).



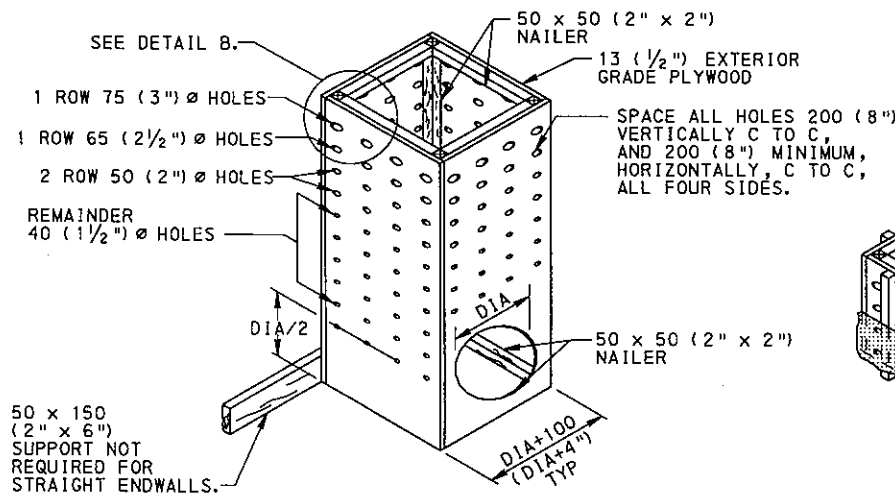
* LOCATE SILT BARRIER FENCE TO PREVENT THE INFILTRATION OF FINES OR SEDIMENTS INTO THE INLET BOX. IF NO BACKFILL OPERATIONS ARE PERFORMED, LOCATE THE SILT BARRIER FENCE OUTSIDE THE AREA EXCAVATED FOR THE INLET BOX.

CLASS 3, TYPE B GEOTEXTILE MATERIAL. SEE SHEET 2 AND PUBLICATION 408/2000, SECTION 865 FOR ADDITIONAL SILT BARRIER FENCE DETAILS.*



SECTION A-A

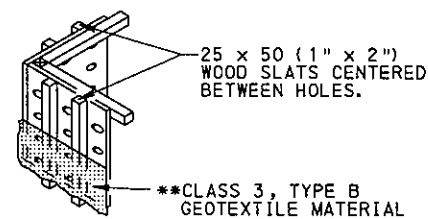
SILT BARRIER FENCE FOR INLET PROTECTION



DETAIL A

ENDWALL STANDBOX†

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



DETAIL B

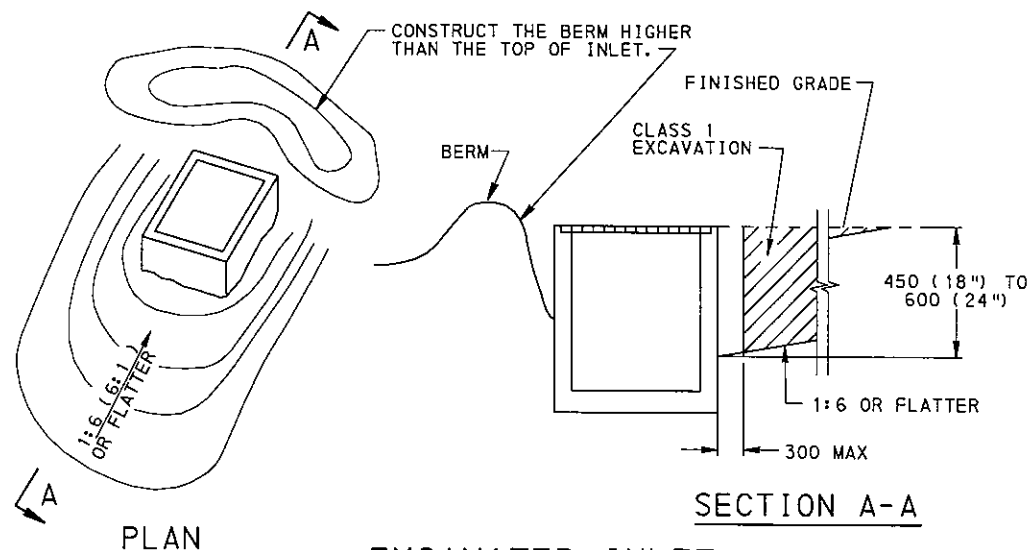
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

NOTES

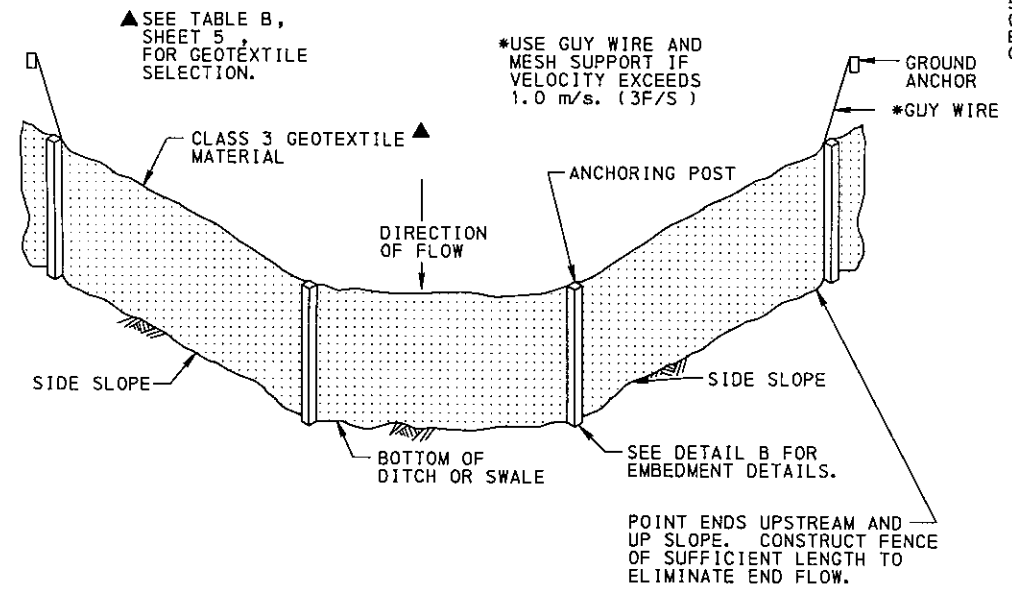
- UPON ESTABLISHMENT OF SUITABLE SOIL STABILIZATION AND AT THE DIRECTION OF THE ENGINEER, REMOVE THE ENDWALL STANDBOXES. STANDBOXES BECOME THE PROPERTY OF THE CONTRACTOR.
- CLEAN THE BASIN AND/OR AREA UPSTREAM FROM THE STANDBOX PERIODICALLY AND DEPOSIT THE SEDIMENT AND DEBRIS IN AN AREA APPROVED BY THE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

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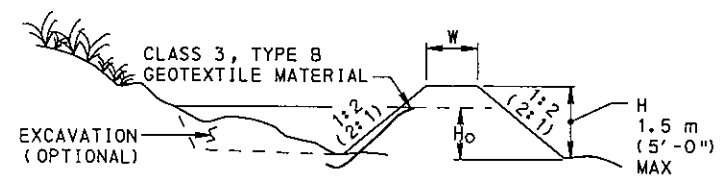
EROSION AND SEDIMENT POLLUTION CONTROL



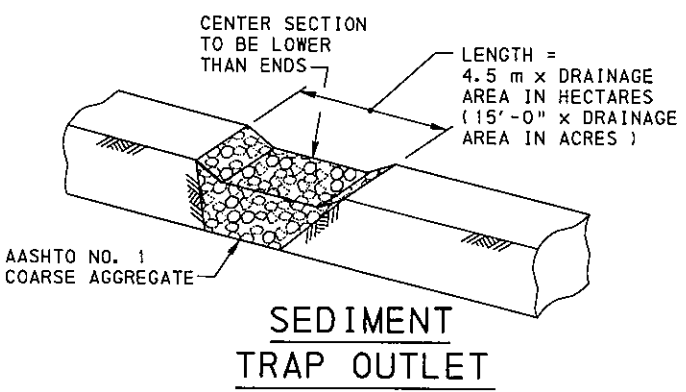
**EXCAVATED INLET
SEDIMENT TRAP**



DITCH OR SWALE CONDITION



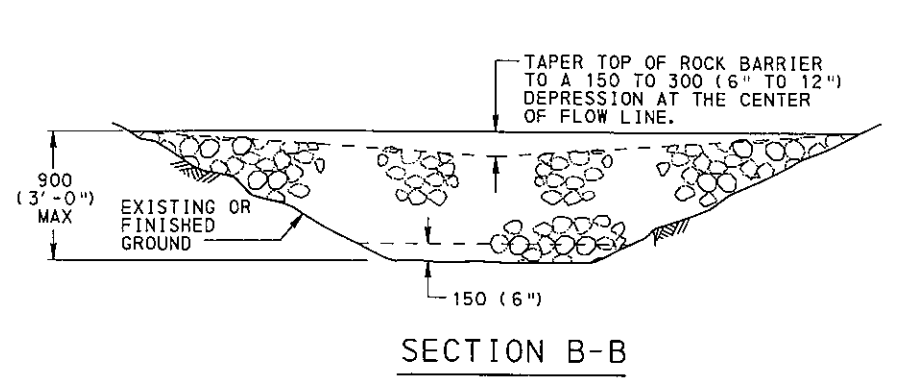
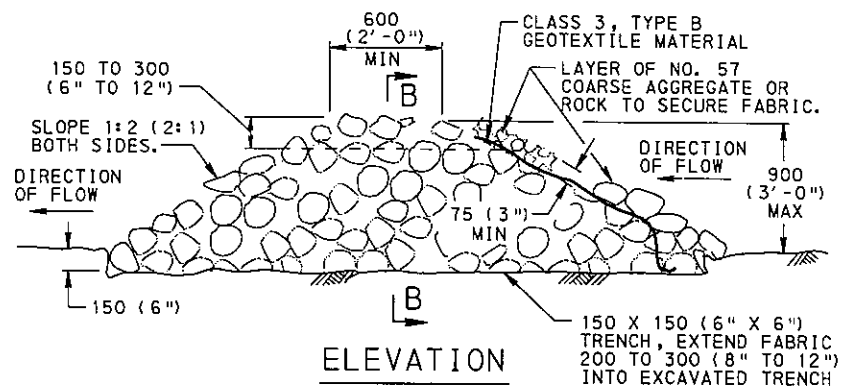
CROSS SECTION



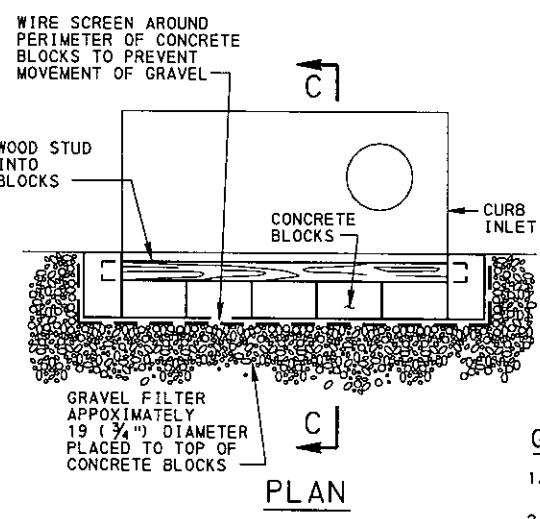
**SEDIMENT
TRAP OUTLET**

**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")

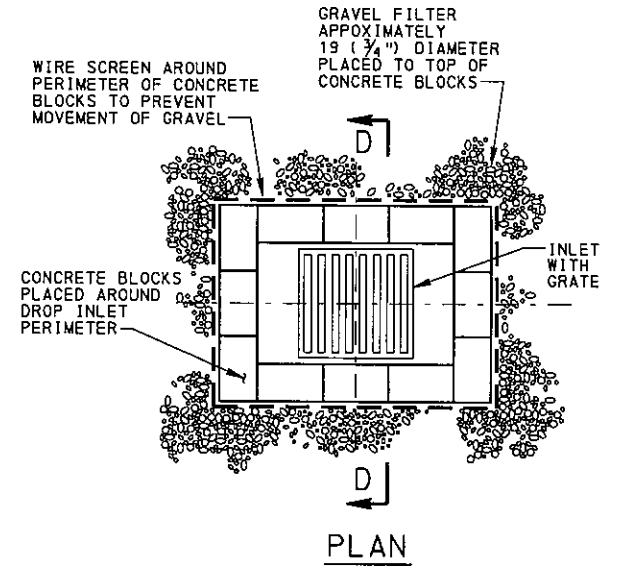


ROCK BARRIER



SECTION C-C

**GRAVEL FILTER FOR
CURB INLET**



SECTION D-D

**GRAVEL FILTER FOR
AREA INLET**

GRAVEL FILTER NOTES:

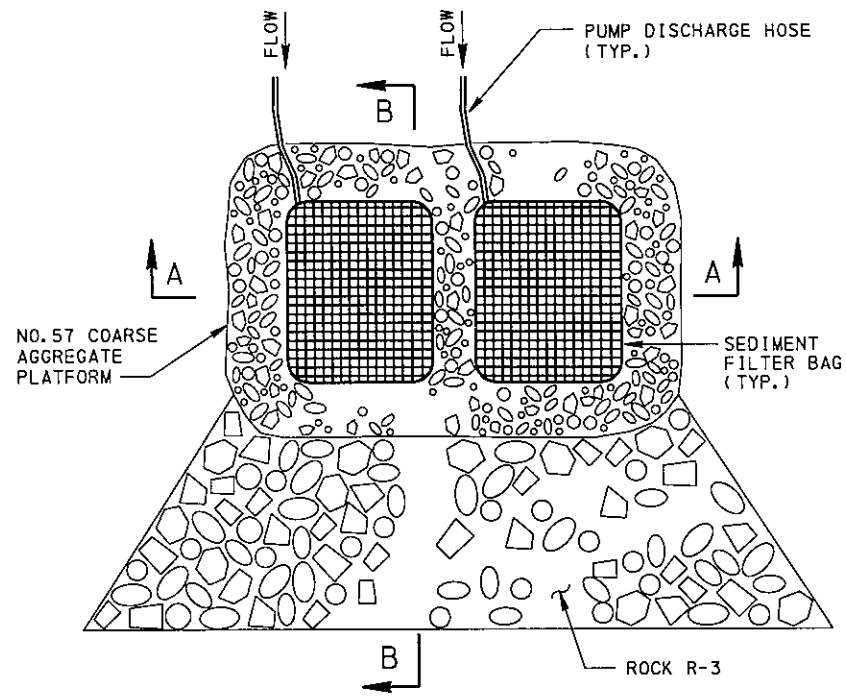
- GRAVEL FILTERS MAY BE USED ON PAVEMENT OR BARE GROUND.
- ALL GRAVEL FILTERS INSTALLED AROUND AREA DRAINS SHOULD BE INSPECTED AND REPAIRED AFTER EACH RUNOFF EVENT. SEDIMENT SHOULD BE REMOVED WHEN MATERIAL IS WITHIN 25 (4") OF THE TOP OF THE CONCRETE BLOCKS. PERIODICALLY, THE GRAVEL SHOULD BE RAKED TO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

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

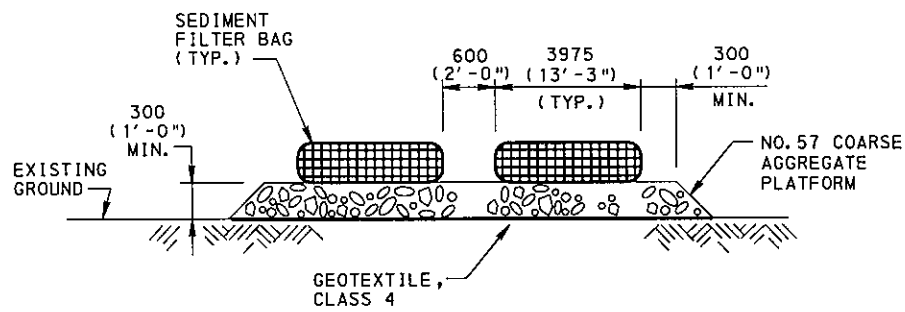
**COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN**

**EROSION AND SEDIMENT
POLLUTION CONTROL**

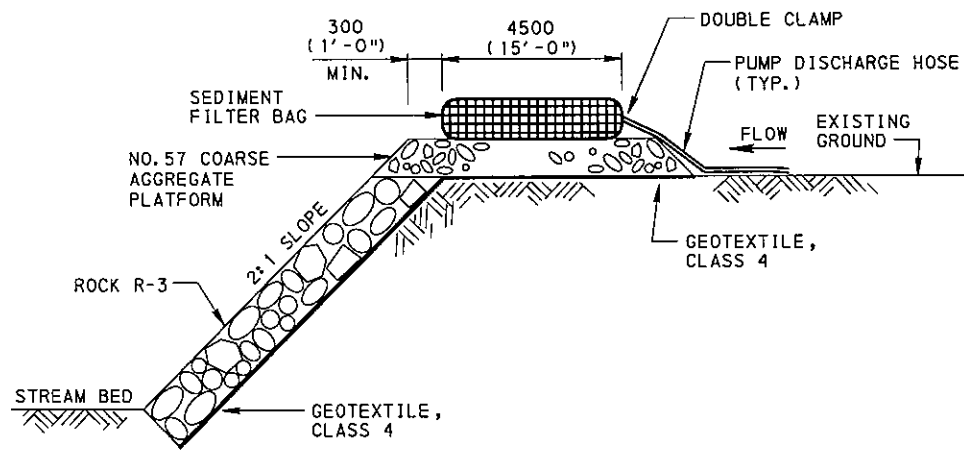
RECOMMENDED NOV. 1, 2001
 DIRECTOR, BUREAU OF DESIGN
 CHIEF ENGINEER
 SHT 5 OF 6
 RC-70M



PLAN



SECTION A-A



SECTION B-B

NOTES

1. CLEAR SITE BUT DO NOT GRUB.
2. INSPECT AREA TO DETERMINE PATH DISCHARGE WATER WILL TAKE. STABILIZE ANY POTENTIALLY ERODABLE AREAS (STEEP SLOPES).
3. CONSTRUCT COURSE AGGREGATE PLATFORM SURFACE LEVEL. PLACE SEDIMENT FILTER BAG ON STABILIZED AREA.
4. 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.
5. 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.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U. S. CUSTOMARY UNITS ARE IN () PARENTHESES.

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SEDIMENT FILTER BAG

RECOMMENDED NOV. 1, 2001 <i>Alan P. Schue</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED NOV. 1, 2001 <i>R. J. Hoffman</i> CHIEF ENGINEER	SHT 6 OF 6 RC-70M
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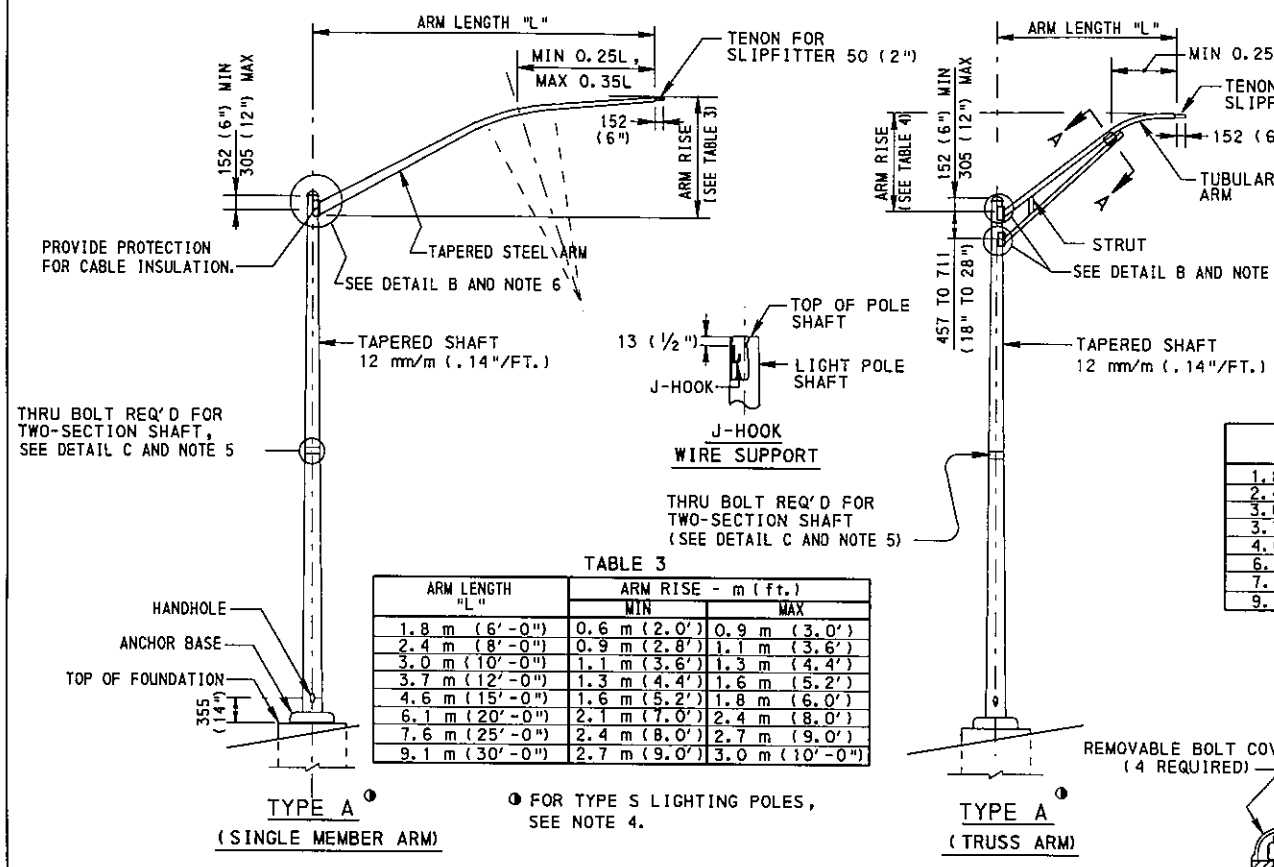


TABLE 3

ARM LENGTH "L"	ARM RISE - m (ft.)	
	MIN	MAX
1.8 m (6'-0")	0.6 m (2.0')	0.9 m (3.0')
2.4 m (8'-0")	0.9 m (2.8')	1.1 m (3.6')
3.0 m (10'-0")	1.1 m (3.6')	1.3 m (4.4')
3.7 m (12'-0")	1.3 m (4.4')	1.6 m (5.2')
4.6 m (15'-0")	1.6 m (5.2')	1.8 m (6.0')
6.1 m (20'-0")	2.1 m (7.0')	2.4 m (8.0')
7.6 m (25'-0")	2.4 m (8.0')	2.7 m (9.0')
9.1 m (30'-0")	2.7 m (9.0')	3.0 m (10'-0")

TABLE 4

ARM LENGTH "L"	ARM RISE - m (ft.)	
	MIN	MAX
1.8 m (6'-0")	0.9 m (3.0')	1.2 m (4.0')
2.4 m (8'-0")	1.2 m (4.0')	1.8 m (6.0')
3.0 m (10'-0")	1.5 m (5.0')	1.8 m (6.0')
3.7 m (12'-0")	1.5 m (5.0')	1.8 m (6.0')
4.6 m (15'-0")	1.5 m (5.0')	1.8 m (6.0')
6.1 m (20'-0")	2.1 m (7.0')	2.4 m (8.0')
7.6 m (25'-0")	2.4 m (8.0')	2.7 m (9.0')
9.1 m (30'-0")	2.7 m (9.0')	3.0 m (10.0')

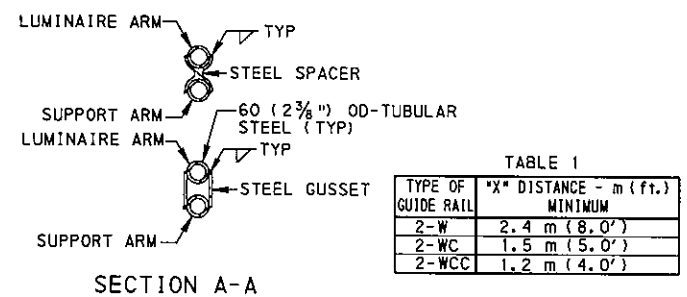


TABLE 1

TYPE OF GUIDE RAIL	"X" DISTANCE - m (ft.)
2-W	2.4 m (8.0')
2-WC	1.5 m (5.0')
2-WCC	1.2 m (4.0')

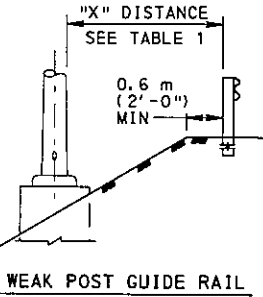
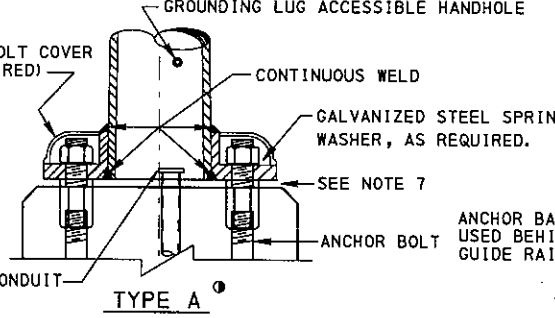
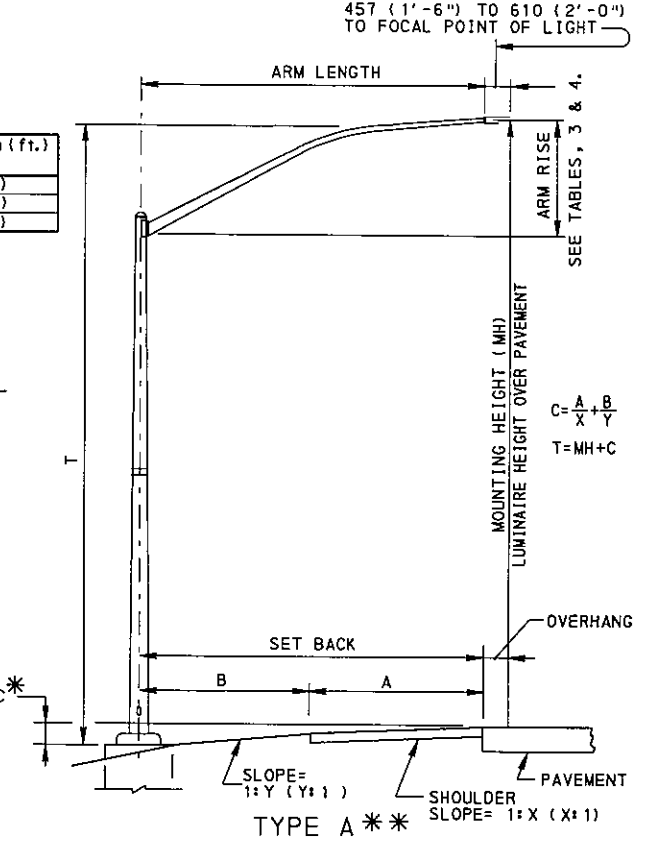
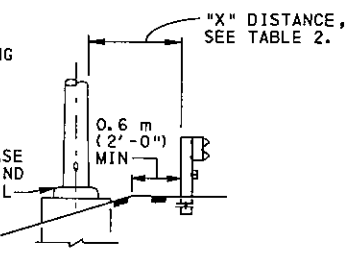


TABLE 2

TYPE OF GUIDE RAIL	"X" DISTANCE m (ft.)
2-S	0.9 m (3'-0")
2-SC	0.6 m (2'-0")

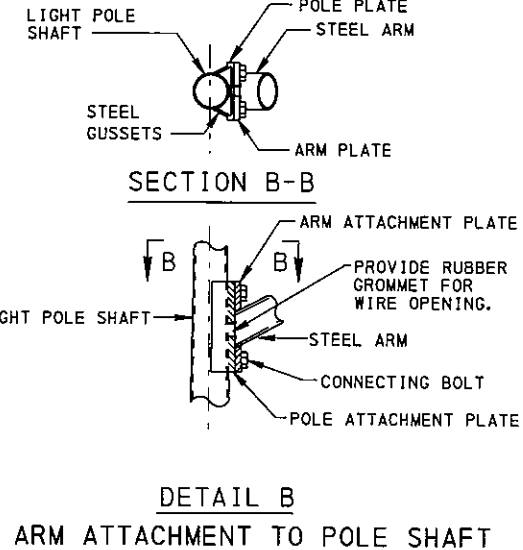
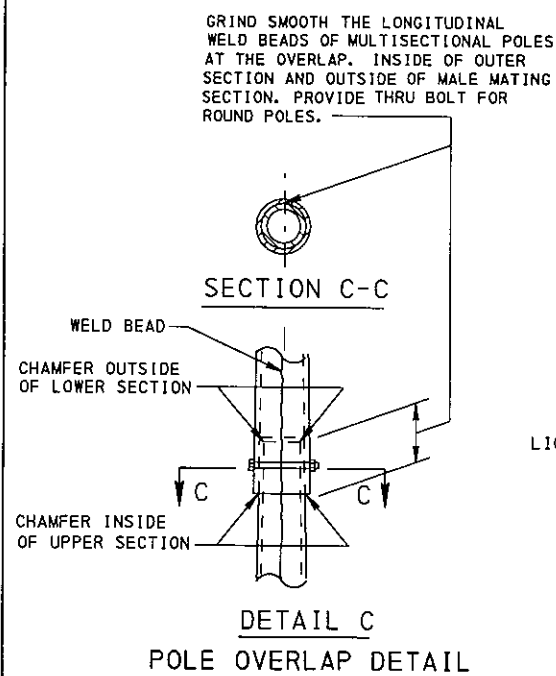


POLE MOUNTING DETAILS
 FOR TYPE S LIGHTING POLES, SEE NOTE 5.

GUIDE RAIL CLEARANCES

* 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.



- 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

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

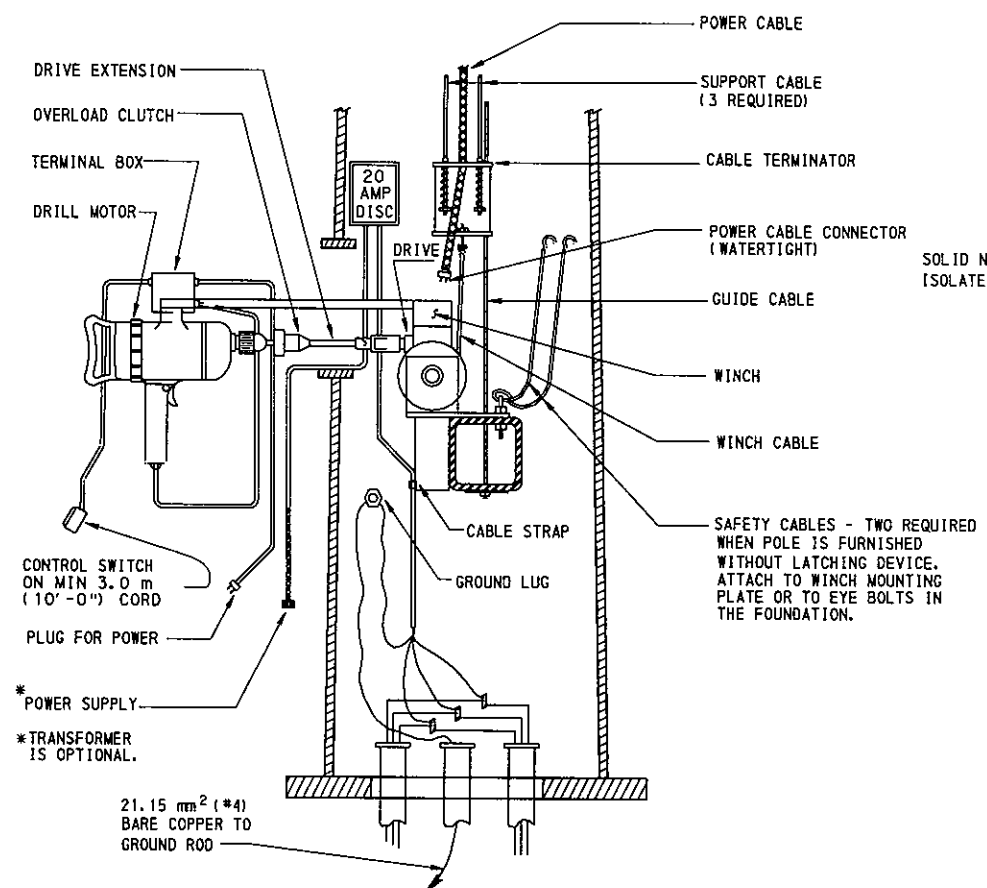
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HIGHWAY LIGHTING
CONVENTIONAL LIGHTING
POLE DETAILS

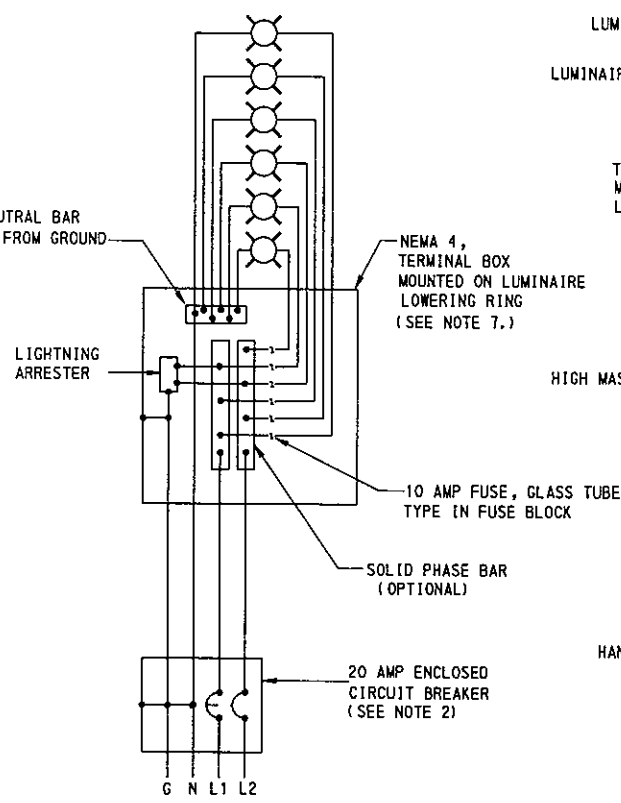
RECOMMENDED NOV. 1, 2001
 DIRECTOR, BUREAU OF DESIGN

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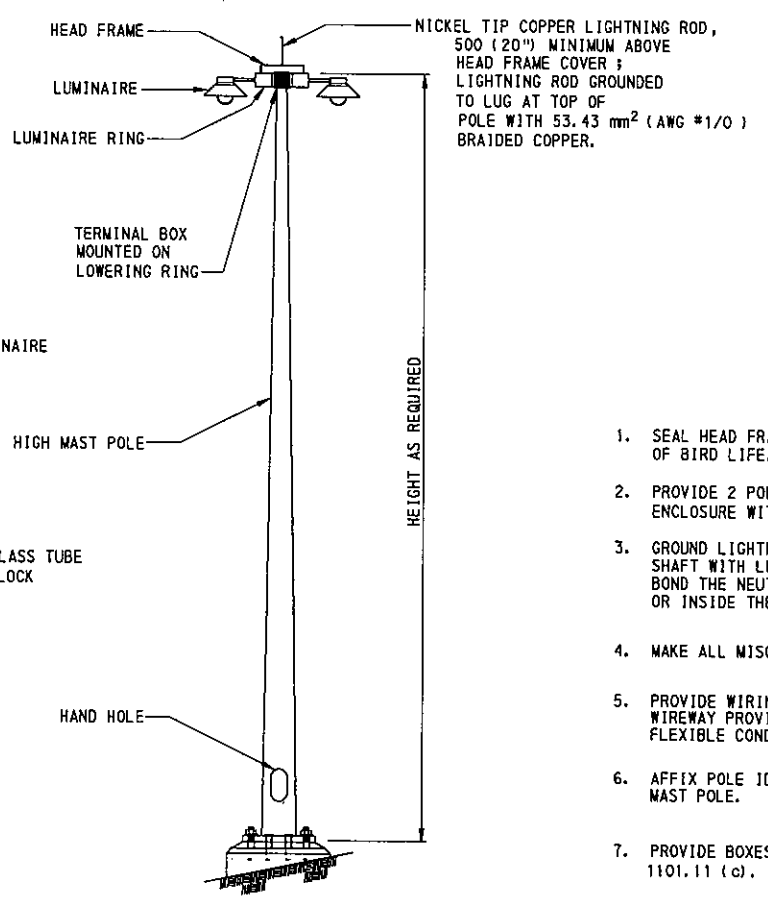
SHT 1 OF 2
 RC-83M



TYPICAL LOWER SECTION MECHANISM



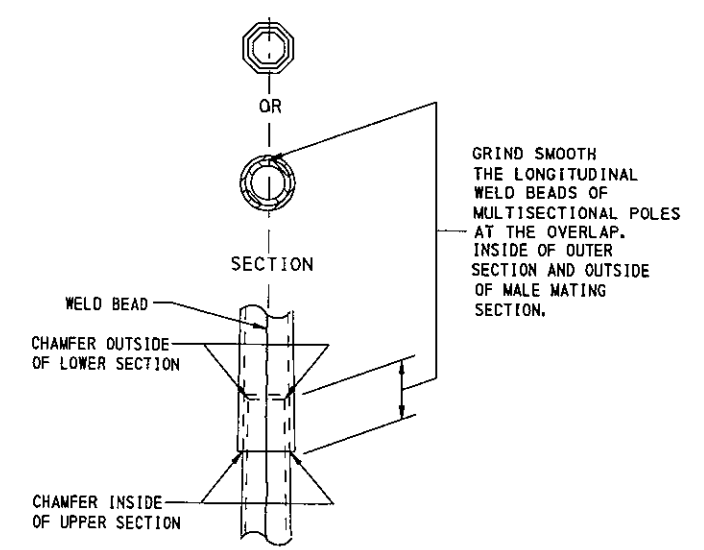
TYPICAL CIRCUIT SCHEMATIC



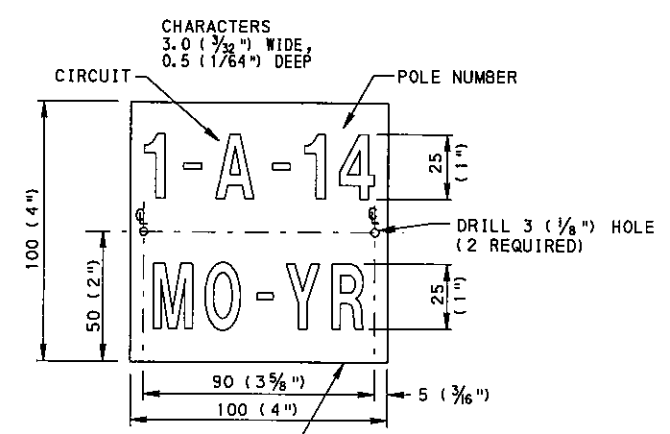
TYPICAL HIGH MAST POLE

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

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SHT 2 OF 2
RC-83M