



TRANSMITTAL
LETTER

Change #4
Pub. 72M
April, 2000 Edition

DATE: April 30, 2003

Transmittal Letter
Change#4, Pub. 72M
April, 2000 Edition
Page 2

SUBJECT:
Revisions to Standards for Roadway Construction RC's 11M, 12M, 20M, 25M,
30M, 39M, 57M, 58M, 59M, 64M, 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 July 30, 2003 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.

RC	Sheet#	Change Description
11M	(1 of 2)	Revised the delta note to clarify the intent of 1½:1 slope and class 3 excavation.
12M	(2 of 2)	Revised notes 11 and 12.
20M	(3 of 3)	Revised end view of contraction joint assembly to clarify the tolerance.
25M	(4,5,&6 of 6)	Removed the word milled from the description of rumble strips.
30M	(4 of 5)	Revised notes 1 and 7.
39M	(All sheets)	Added sheet #4 and changed sheet numbers. Developed details for a precast manhole with a flat top section to be used for shallow fill pipes.
57M	(All sheets)	Provided additional dimensions for some barrier sections to clarify the embedment, height and width of barrier.
58M	(2 of 5)	Added details for an end transition section for single-face barrier.
59M	(1 of 2)	Revised sections A-A and C-C.
64M	(1 of 1)	Added note 6.
70M	(6 of 6)	Added notes 1 and 5 and renumbered all other notes.
83M	(2 of 2)	Revised pole identification detail.

CANCEL THE FOLLOWING:

RC - 11M	April 28, 2000
RC - 12M	April 28, 2000
RC - 20M	August 21, 2002
RC - 25M	August 21, 2002
RC - 30M	November 1, 2001
RC - 39M	August 21, 2002
RC - 57M	August 21, 2002
RC - 58M	August 21, 2002
RC - 59M	August 21, 2002
RC - 64M	April 28, 2000
RC - 70M	November 1, 2001
RC - 83M	November 1, 2001

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APPROVED FOR ISSUANCE BY:

Allen D. Biehler
Secretary of Transportation

By: *Dean A. Sch...*

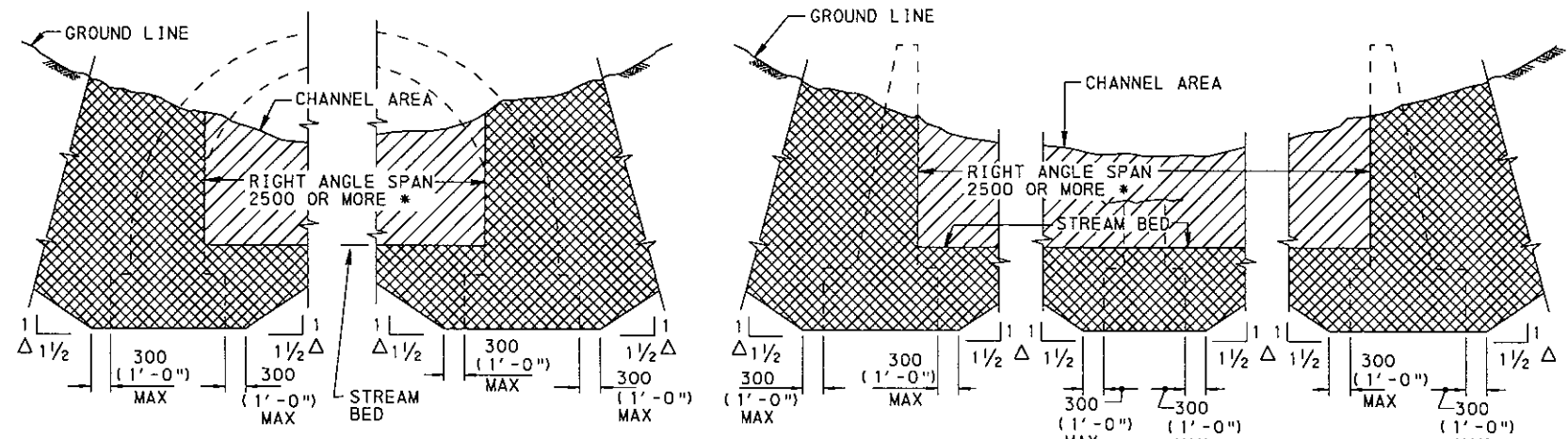
Gary L. Hoffman, P.E.
Acting Deputy Secretary
for Highway Administration

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 30, 2003	CLASSIFICATION OF EARTHWORK FOR STRUCTURES
* RC-12M (2 Sheets) _____	APR 30, 2003	BACKFILL AT STRUCTURES
RC-13M _____	APR 28, 2000	PAY LIMIT OF SUBBASE
<u>PAVEMENTS</u>		
* RC-20M (3 Sheets) _____	APR 30, 2003	CONCRETE PAVEMENT JOINTS
RC-21M _____	APR 28, 2000	REINFORCED CONCRETE PAVEMENT
RC-23M (3 Sheets) _____	AUG. 21, 2002	BRIDGE APPROACH SLAB
RC-24M _____	AUG. 21, 2002	PAVEMENT RELIEF JOINT
* RC-25M (6 Sheets) _____	APR 30, 2003	SHOULDERS
RC-26M (5 Sheets) _____	AUG. 21, 2002	CONCRETE PAVEMENT REHABILITATION
RC-27M _____	AUG. 21, 2002	PLAIN CONCRETE PAVEMENT
RC-28M _____	APR 16, 2001	OVERLAY TRANSITIONS AND PAVING NOTCHES
<u>DRAINAGE</u>		
* RC-30M (5 Sheets) _____	APR 30, 2003	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 (6 Sheets) _____	APR 30, 2003	STANDARD MANHOLES
RC-40M _____	APR 28, 2000	SLOPE PROTECTION
RC-43M _____	APR 28, 2000	GABIONS

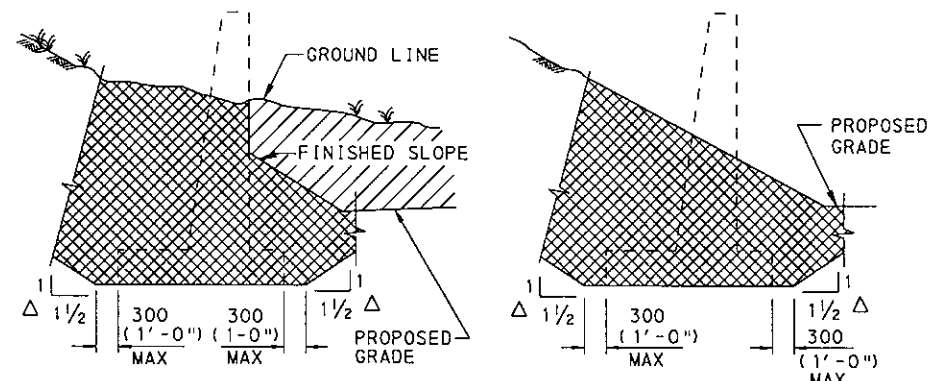
STANDARD DRAWING NUMBER	DRAWING DATE	DESCRIPTION
<u>GUIDE RAIL AND MEDIAN BARRIER</u>		
RC-50M (2 Sheets) _____	NOV. 1, 2001	GUIDE RAIL TRANSITION AT END OF STRUCTURE
RC-52M (6 Sheets) _____	AUG. 21, 2002	TYPE 2 STRONG POST GUIDE RAIL
RC-53M (2 Sheets) _____	NOV. 1, 2001	TYPE 2 WEAK POST GUIDE RAIL
RC-54M (7 Sheets) _____	AUG. 21, 2002	BARRIER PLACEMENT AT OBSTRUCTIONS
RC-55M _____	APR 28, 2000	TYPE 2 WEAK POST MEDIAN BARRIER
* RC-57M (8 Sheets) _____	APR. 30, 2003	CONCRETE MEDIAN BARRIER
* RC-58M (5 Sheets) _____	APR. 30, 2003	SINGLE FACE CONCRETE BARRIER
* RC-59M (2 Sheets) _____	APR. 30, 2003	CONCRETE GLARE SCREEN
<u>FENCES AND CURBS</u>		
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. 30, 2003	CURBS AND GUTTERS
RC-65M _____	NOV. 1, 2001	CONCRETE MOUNTABLE CURBS
RC-67M (2 Sheets) _____	APR 28, 2000	CURB RAMPS
<u>POLLUTION CONTROL</u>		
* RC-70M (6 Sheets) _____	APR. 30, 2003	EROSION AND SEDIMENT POLLUTION CONTROL
<u>HIGHWAY LIGHTING</u>		
RC-80M (2 Sheets) _____	APR 28, 2000	HIGHWAY LIGHTING-FOUNDATIONS
RC-81M _____	APR 16, 2001	HIGHWAY LIGHTING-JUNCTION BOXES-LIGHT DUTY
RC-82M (2 Sheets) _____	AUG. 21, 2002	HIGHWAY LIGHTING-JUNCTION BOXES-HEAVY DUTY
* RC-83M (2 Sheets) _____	APR. 30, 2003	HIGHWAY LIGHTING-LIGHTING POLE DETAILS
RC-84M _____	APR 28, 2000	HIGHWAY LIGHTING-LIGHTING AND ELECTRICAL DETAILS
<u>ROADSIDE DEVELOPMENT AND PLANTING</u>		
RC-91M (2 Sheets) _____	APR. 30, 2003	BRACING AND PLANTING DETAILS

April, 2000 Edition
 Change #1 April 16, 2001
 Change #2 November 1, 2001
 Change #3 August 21, 2002
 * Change #4 April 30, 2003

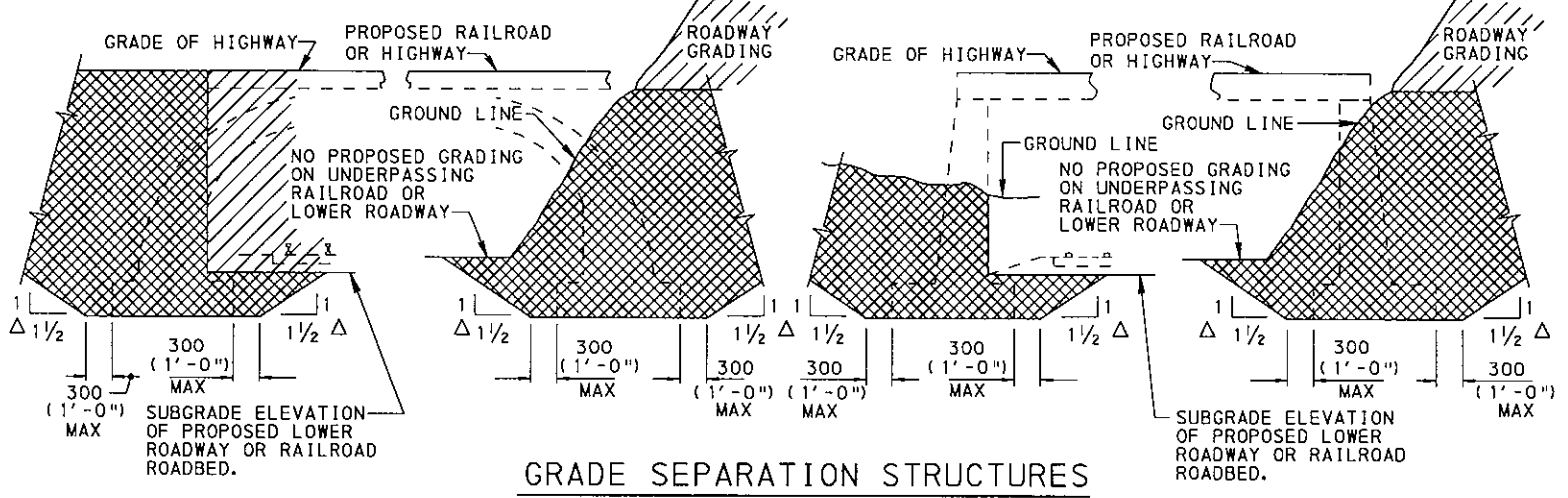


STRUCTURES OVER STREAMS

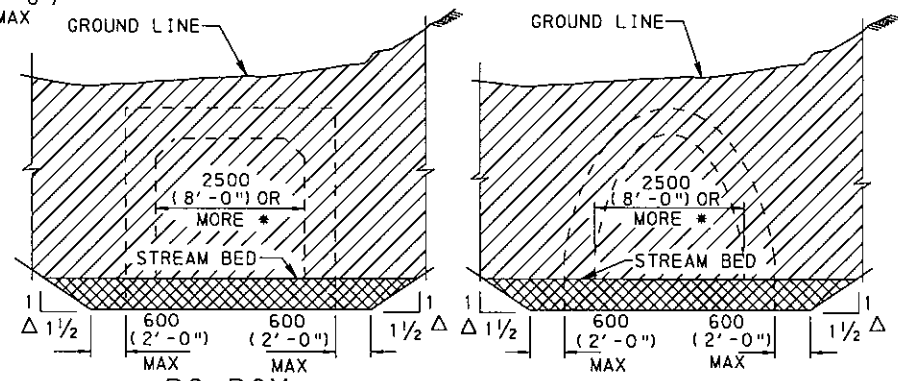
INCLUDING METAL PLATE ARCH WITH FOOTING
 * WHEN RIGHT ANGLE SPAN IS LESS THAN 2500, ALL EXCAVATION IS CLASS 3.



WING WALLS & RETAINING WALLS

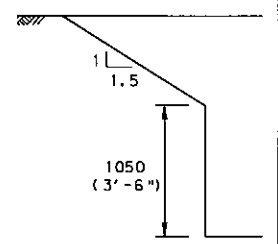


GRADE SEPARATION STRUCTURES



RC BOX CULVERTS
RC TIED ARCH CULVERTS

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



DETAIL A

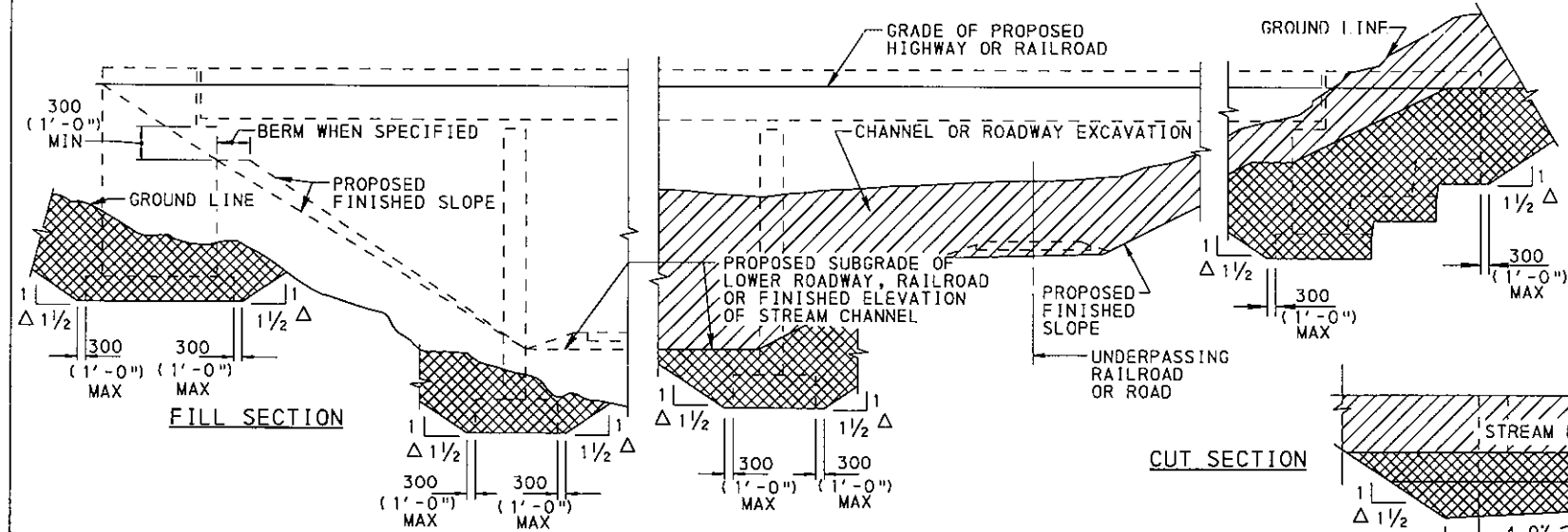
NOTES

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

LEGEND

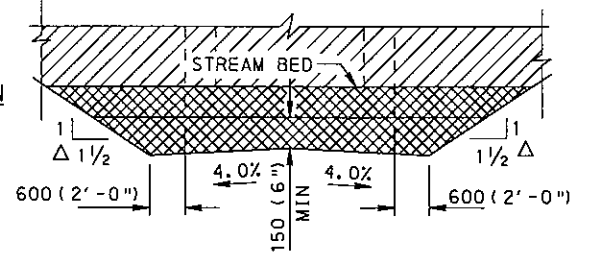
- CLASS 1 EXCAVATION ROADWAY ITEM (TO BE INCLUDED IN ROADWAY QUANTITIES)
- CLASS 3 EXCAVATION STRUCTURE ITEM (TO BE INCLUDED IN STRUCTURE QUANTITIES)
- Δ CONTINUE 1 1/2:1 SLOPE FOR THE APPROPRIATE CLASS OF EXCAVATION TO FINISHED GRADE OR GROUND LINE, WHICHEVER COMES FIRST.

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



TYPICAL STRUCTURE ELEVATION

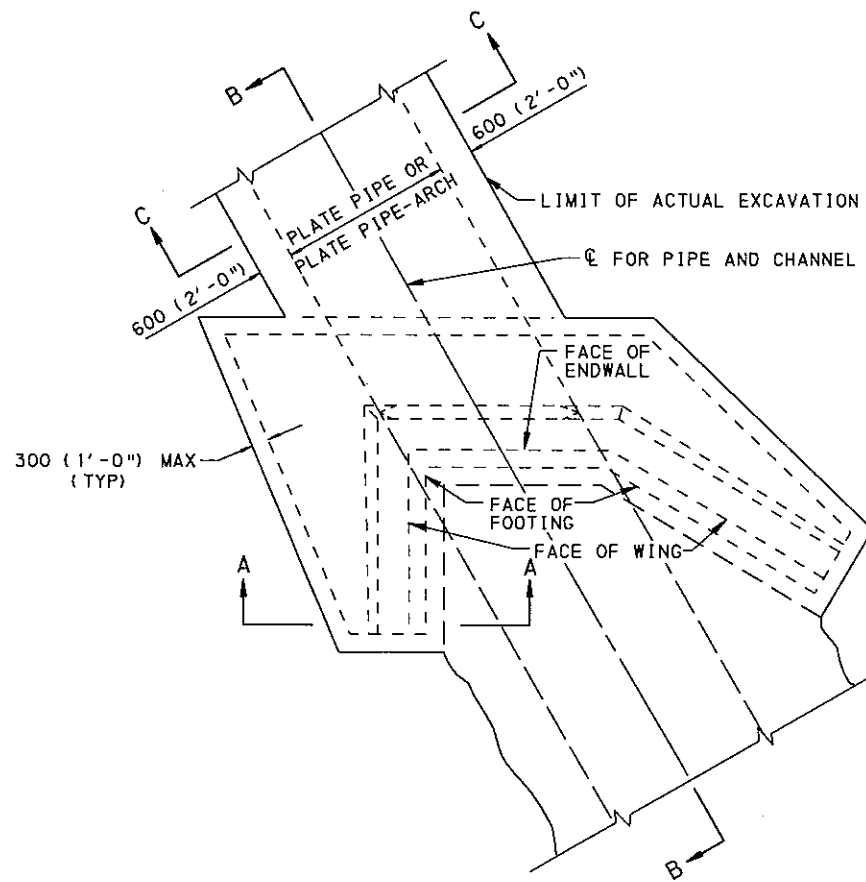
CUT SECTION



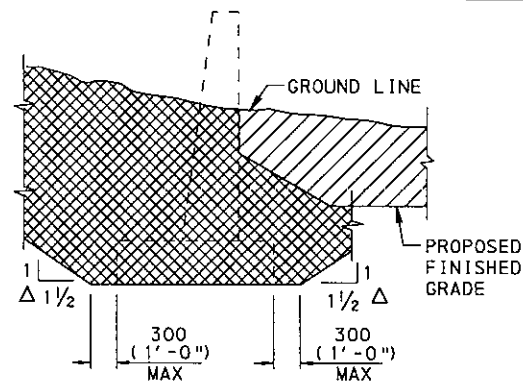
EXTRA DEPTH EXCAVATION FOR RC BOX AND ARCH CULVERTS ON FINE GRAIN SOIL

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

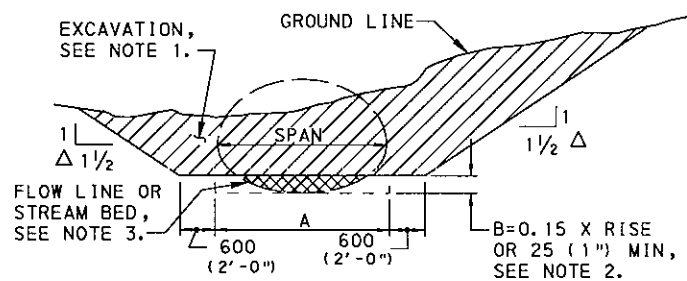
CLASSIFICATION OF EARTHWORK FOR STRUCTURES



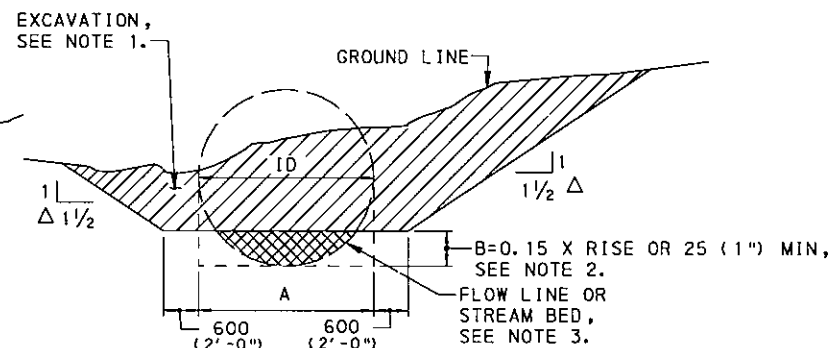
PLAN VIEW



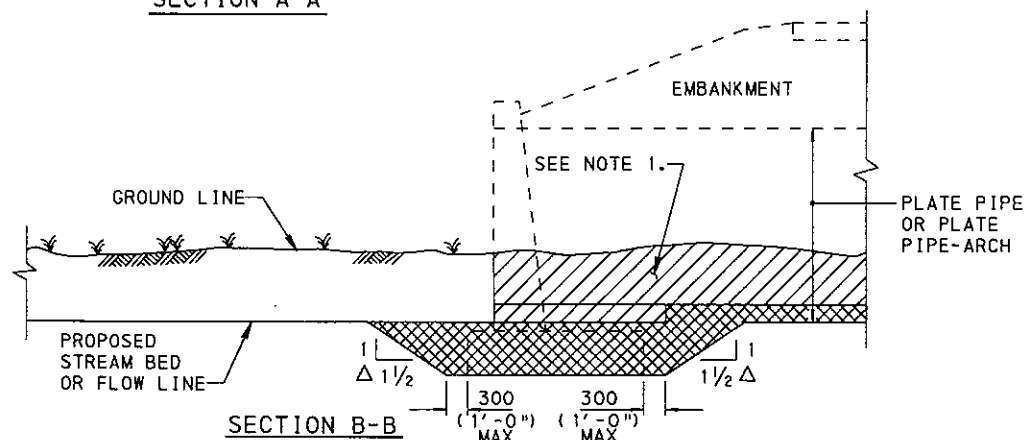
SECTION A-A



SECTION C-C
(METAL PLATE PIPE-ARCH)



SECTION C-C
(METAL PLATE PIPE)



SECTION B-B

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

NOTES

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

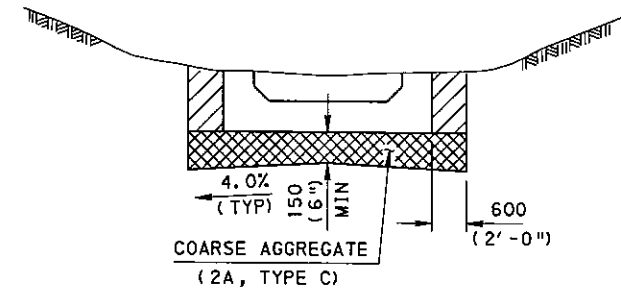
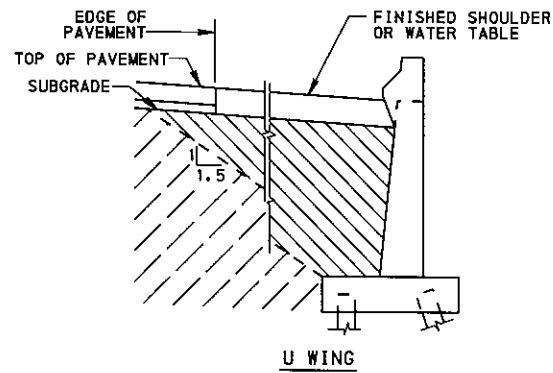
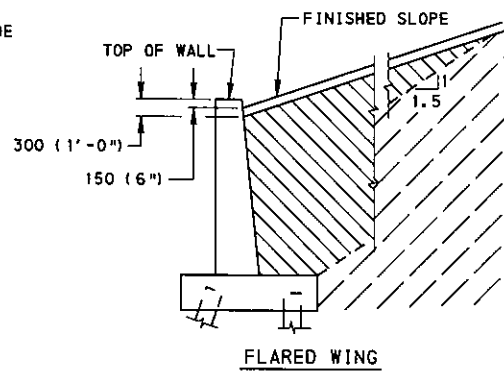
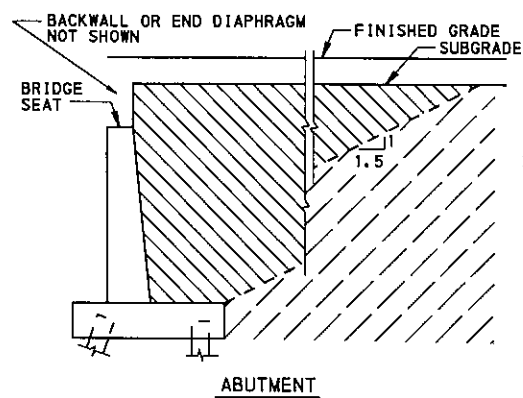
LEGEND

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

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

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

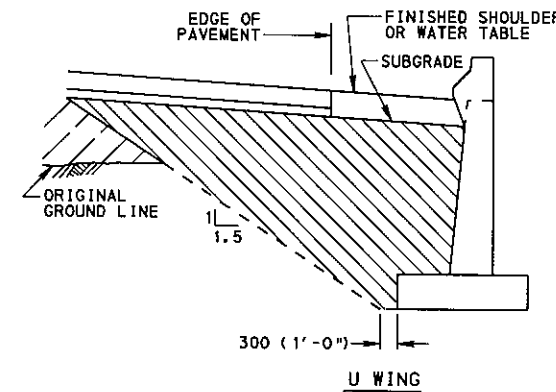
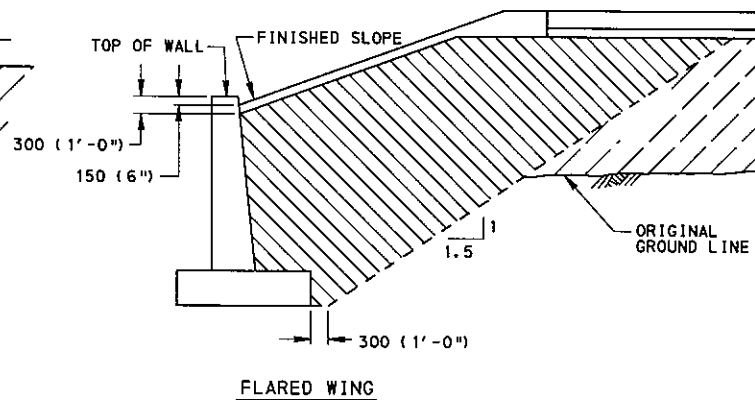
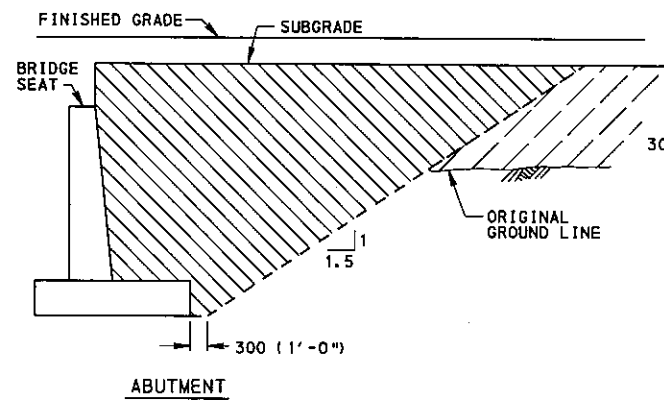
**CLASSIFICATION OF EARTHWORK
FOR STRUCTURES**



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

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

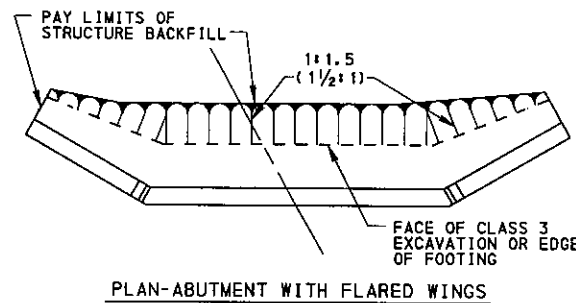
TYPICAL CROSS SECTIONS - ABUTMENTS ON FILL



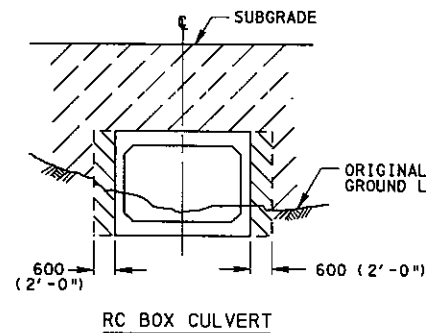
LEGEND

- STRUCTURE BACKFILL
- EMBANKMENT MATERIAL

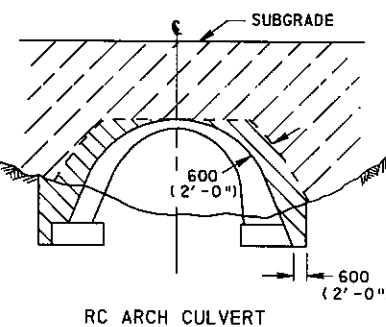
TYPICAL CROSS SECTIONS - ABUTMENTS IN CUT



PLAN-ABUTMENT WITH FLARED WINGS

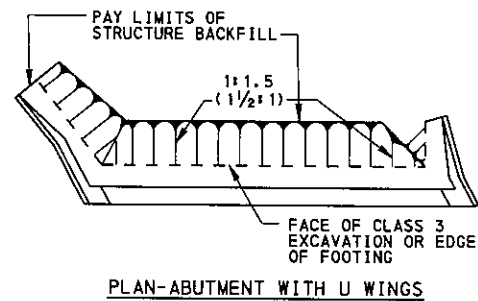


RC BOX CULVERT

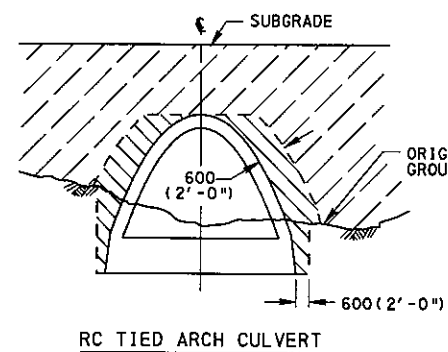


RC ARCH CULVERT

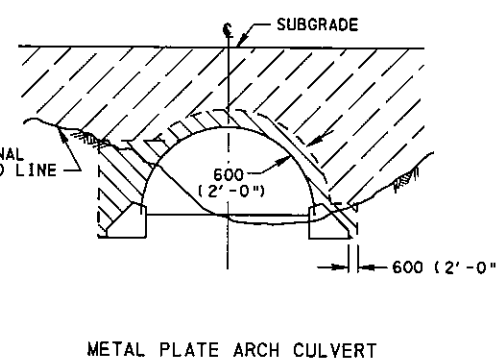
NOTE: SEE SHEET 2 FOR GENERAL NOTES.



PLAN-ABUTMENT WITH U WINGS



RC TIED ARCH CULVERT



METAL PLATE ARCH CULVERT

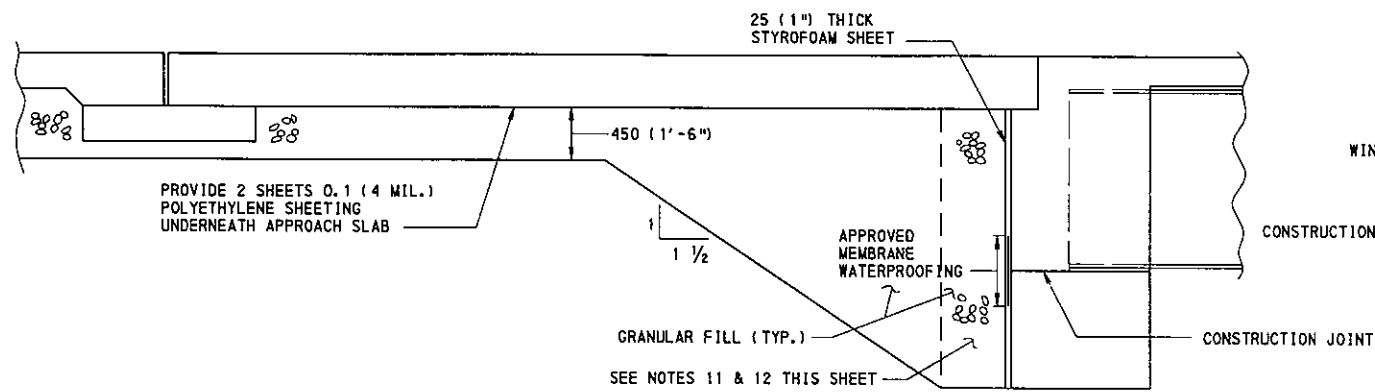
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

BACKFILL & EMBANKMENT CONSTRUCTION AT STRUCTURES

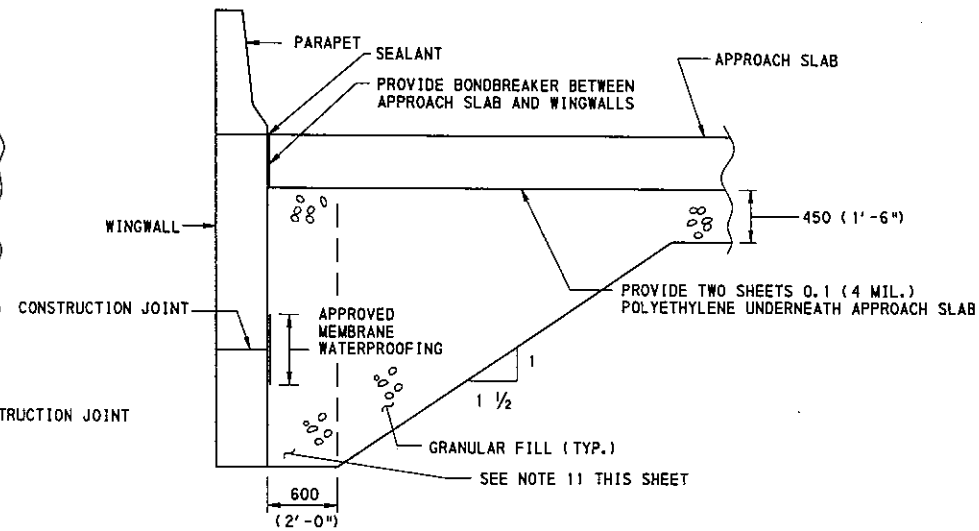
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

BACKFILL AT STRUCTURES

RECOMMENDED APR. 30, 2003 <i>Scott Christen</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 30, 2003 <i>Dean A. Ehm</i> CHIEF ENGINEER	SHT. 1 OF 2 RC-12M
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LIMITS OF BACKFILL
INTEGRAL ABUTMENT



LIMITS OF BACKFILL
WINGWALLS OF INTEGRAL ABUTMENTS

GENERAL NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUB 408/2000. PLACE BACKFILL AND EMBANKMENT IN ACCORDANCE WITH THIS STANDARD DRAWING UNLESS OTHERWISE SHOWN ON THE STRUCTURE DRAWINGS.
2. USE ONLY R-3 ROCK LINING, MEETING THE REQUIREMENTS OF PUBLICATION 408M, SECTION 850.21 (a); AASHTO NO. 1, 3, 5 OR 57 COARSE AGGREGATES, MEETING AT LEAST THE TYPE C QUALITY REQUIREMENTS IN PUBLICATION 408M, SECTION 703.2, TABLE B; OR TYPE OGS COARSE AGGREGATE, MEETING AT LEAST THE TYPE C QUALITY REQUIREMENTS IN PUBLICATION 408M, SECTION 703.2, TABLE B. MEASURE AND PAY STRUCTURE BACKFILL AS SELECTED BORROW EXCAVATION-STRUCTURE BACKFILL. DO NOT USE R-3 FOR STRUCTURE BACKFILL FOR ANY TYPE RC OR METAL PLATE CULVERT. PLACE A CLASS 2, TYPE B GEOTEXTILE BLANKET AS A BARRIER BETWEEN THE STRUCTURE BACKFILL AND EXCAVATION/EMBANKMENT MATERIAL. PLACE A CLASS 2, TYPE B GEOTEXTILE BLANKET ON ENTIRE TOP OF THE COMPLETED STRUCTURE BACKFILL PRIOR TO PLACING ANY SUBBASE MATERIAL FOR THE ROADWAY. THE GEOTEXTILE IS CONSIDERED INCIDENTAL TO THE SELECTED BORROW EXCAVATION STRUCTURE BACKFILL AND WILL NOT BE PAID FOR SEPARATELY.
3. TREAT BACKFILL LIMITS AT RETAINING WALLS AND WINGWALLS FOR CULVERTS THE SAME AS FLARED ABUTMENT WINGWALLS.
4. TREAT BACKFILL CONSTRUCTION AT RC BOX CULVERTS WITH THE TOP SLAB AT ROADWAY GRADE THE SAME AS ABUTMENTS.
5. TREAT BACKFILL CONSTRUCTION AT CULVERTS, WHERE THE TOP OF THE CULVERT IS NEAR SUBGRADE, AS SHOWN ON THE STRUCTURE DRAWINGS OR AS DIRECTED BY THE ENGINEER.
6. PLACE STRUCTURE BACKFILL AND ADJOINING EMBANKMENT SIMULTANEOUSLY UNLESS OTHERWISE PERMITTED BY THE ENGINEER.
7. REPLACE MATERIAL REMOVED BEYOND THE SPECIFIED LIMITS OF CLASS 1, 2 OR 3 EXCAVATION WITH STRUCTURE BACKFILL. CONSIDER MATERIAL REMOVED OR STRUCTURE BACKFILL PLACED BEYOND THE SPECIFIED LIMITS OF CLASS 1, 2 OR 3 EXCAVATION AS INCIDENTAL TO THE CLASS OF EXCAVATION SPECIFIED.
8. REFER TO STRUCTURE DRAWINGS FOR DRAINAGE DETAILS, WEEP HOLES, ETC.
9. INDICATE STRUCTURE BACKFILL QUANTITIES ON THE STRUCTURE DRAWINGS.
10. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.
- * 11. PLACE BACKFILL WITHIN 600 mm (24") FROM THE REAR FACE OF THE ABUTMENT AND THE WINGWALL IN LIFTS OF 100 mm (4") COMPACT EACH LAYER WITH TWO PASSES OF A WALK-BEHIND VIBRATORY PLATE SOIL COMPACTOR.
- * 12. BACKFILL SIMULTANEOUSLY BEHIND BOTH ABUTMENTS. KEEP THE DIFFERENCE BETWEEN THE FILL HEIGHT AT BOTH ENDS OF THE BRIDGE BELOW 300 mm (12") AT ALL TIMES DURING BACKFILLING.

LEGEND

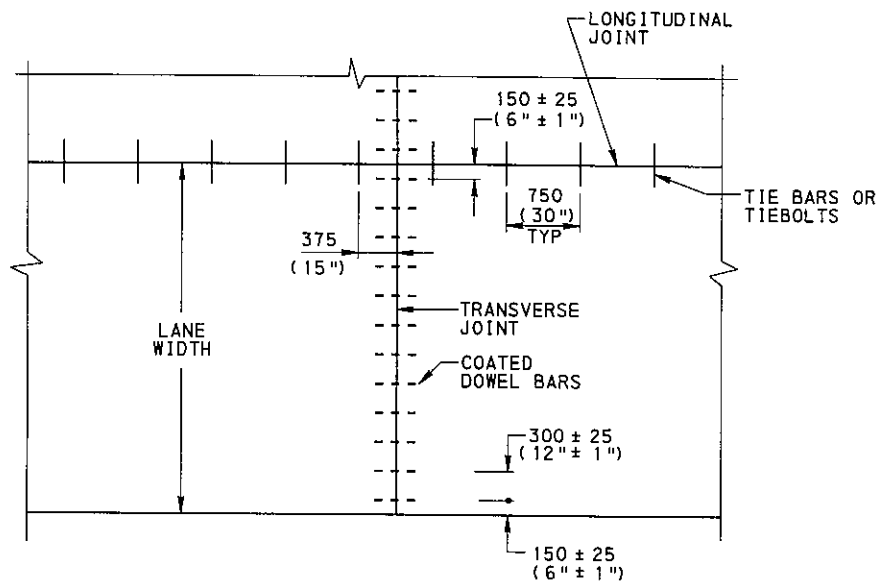
- * IDENTIFIES NOTES THAT APPLY ONLY TO INTEGRAL ABUTMENTS.

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

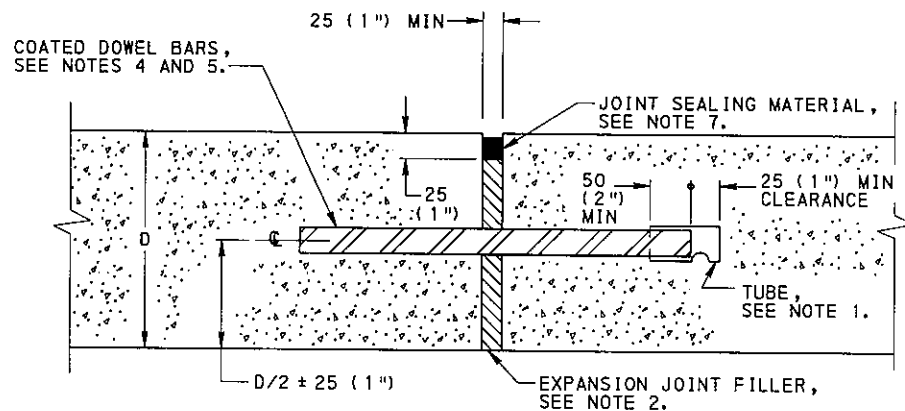
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

BACKFILL AT STRUCTURES

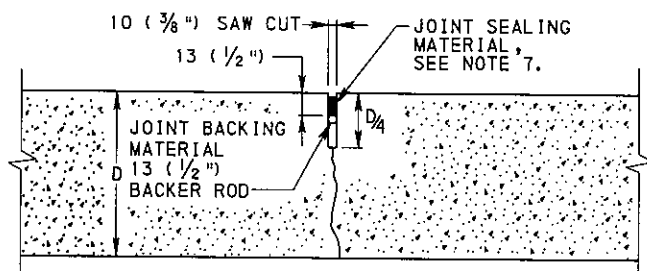
RECOMMENDED APR. 30, 2003 <i>Scott Christe</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 30, 2003 <i>Dean A. Schmitt</i> CHIEF ENGINEER	SHEET 2 OF 2 RC-12M
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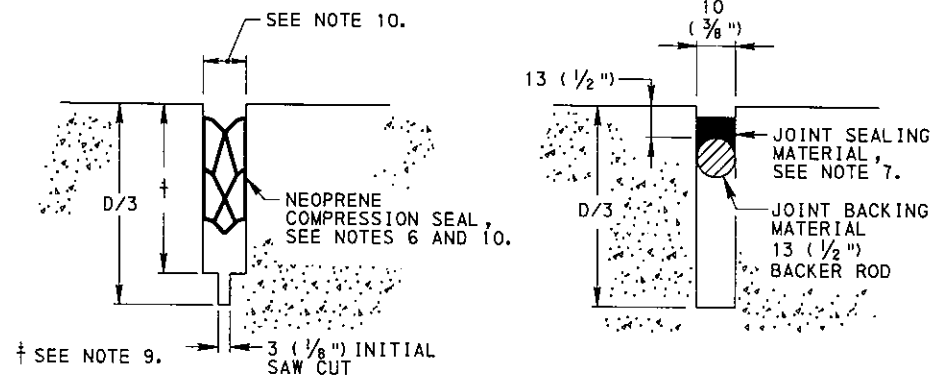
TYPICAL LAYOUT



TYPE E

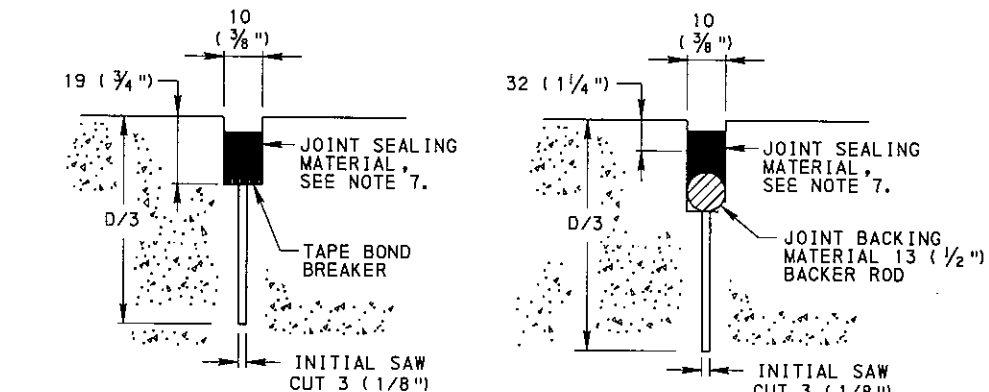


TYPE P
SEE RC-27M



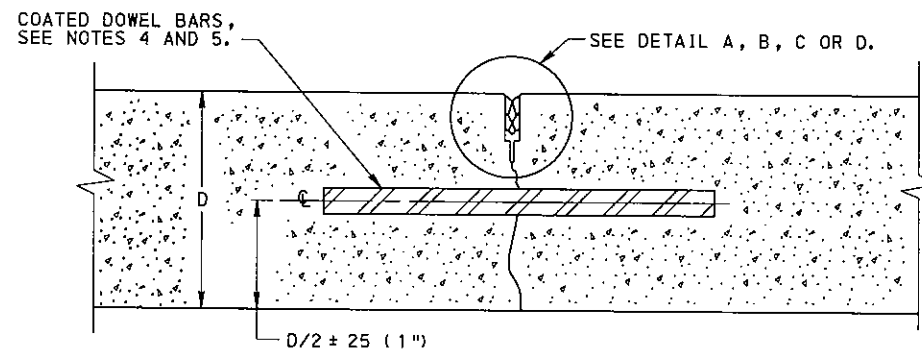
DETAIL A

DETAIL B

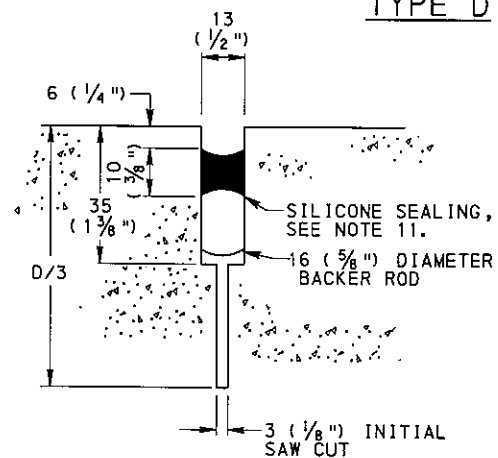


DETAIL C

DETAIL D



TYPE D



ALTERNATE TYPE P
JOINT DETAIL

NOTES

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

SEAL SIZE	SAW CUT DEPTHS
25 (1")	47-50 (1 7/8"-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

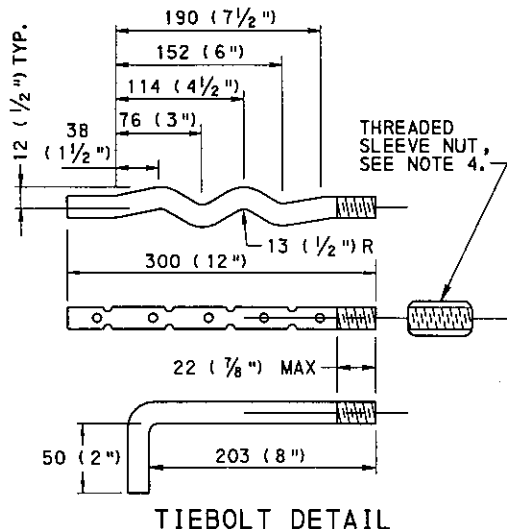
JOINT SPACING	SEAL SIZE	WIDTH OF SAW CUT		
		<60°F	60°F TO 80°F	>80°F
(15' & 20')	(1")	(5/8")	(9/16")	(1/2")
(30')	(1 1/4")	(3/4")	(5/8")	(1/2")

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

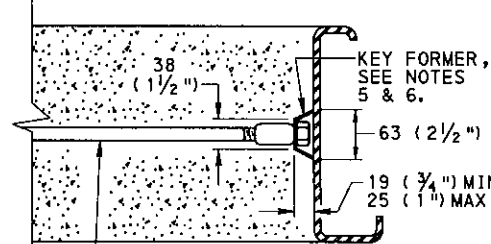
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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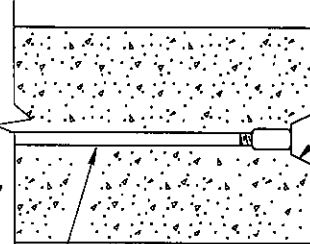
CONCRETE PAVEMENT JOINTS



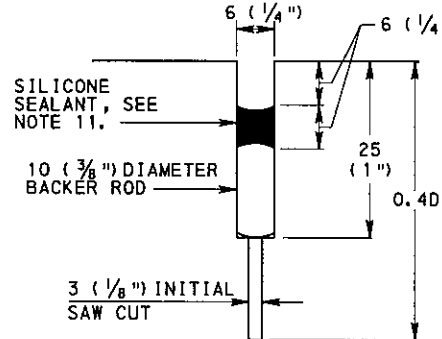
MAKE TIEBOLTS 14 (3/8") Ø BAR WITH ROLLED THREADS OR 16 (5/8") Ø BAR WITH CUT THREADS. PERMIT ONLY TIEBOLTS WHICH ARE SUPPLIED BY AN APPROVED MANUFACTURER, AS LISTED IN BULLETIN 15. SEE PUBLICATION 408, SECTIONS 709.1 AND 705.2(b).



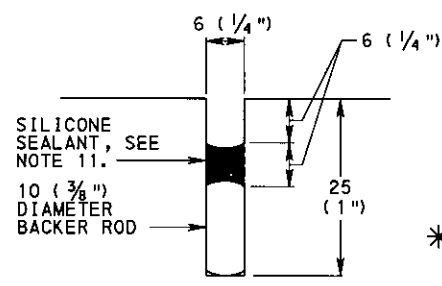
STATIONARY FORMING



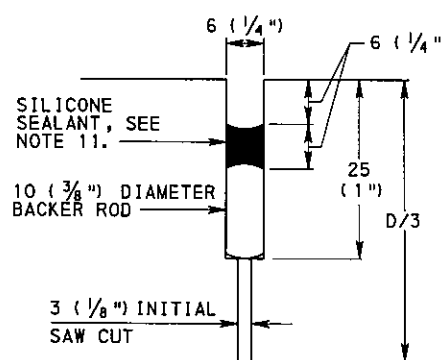
SLIP FORMING



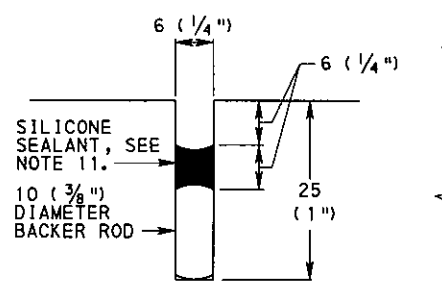
ALTERNATE TYPE L CONTRACTION JOINT



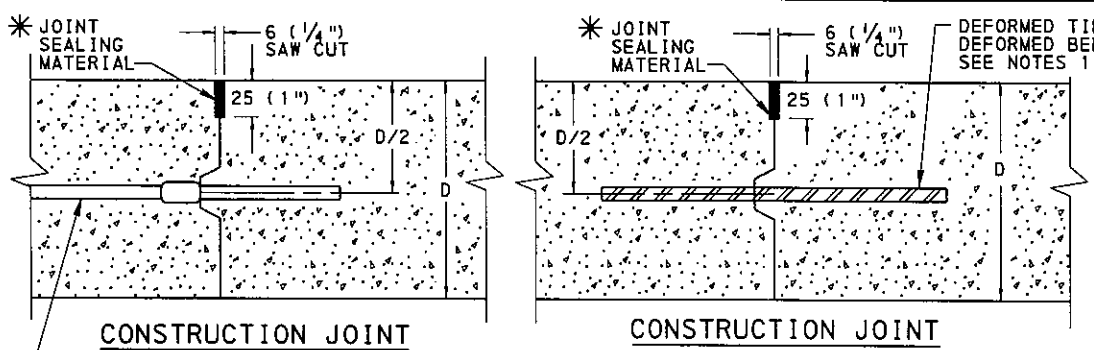
ALTERNATE TYPE L CONSTRUCTION JOINT



ALTERNATE TRANSVERSE SHOULDER JOINT

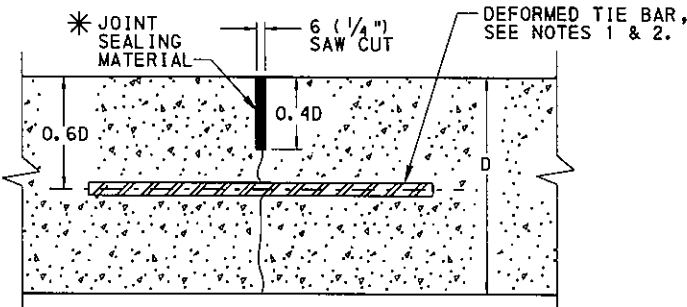


ALTERNATE LONGITUDINAL SHOULDER JOINT

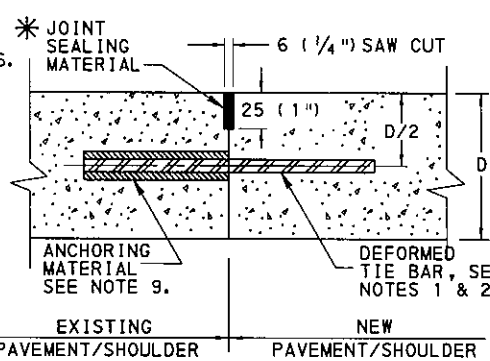


CONSTRUCTION JOINT

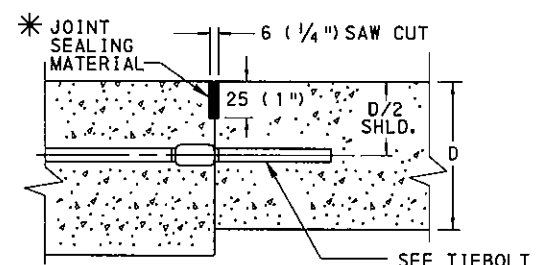
CONSTRUCTION JOINT



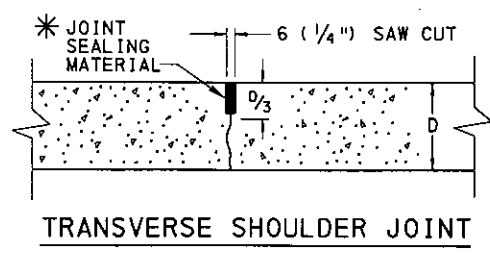
TYPE L CONTRACTION JOINT



LONGITUDINAL JOINT WHEN TYING INTO EXISTING CONCRETE PAVEMENT/SHOULDER



LONGITUDINAL SHOULDER JOINTS SEE NOTE 8



TRANSVERSE SHOULDER JOINT

NOTES

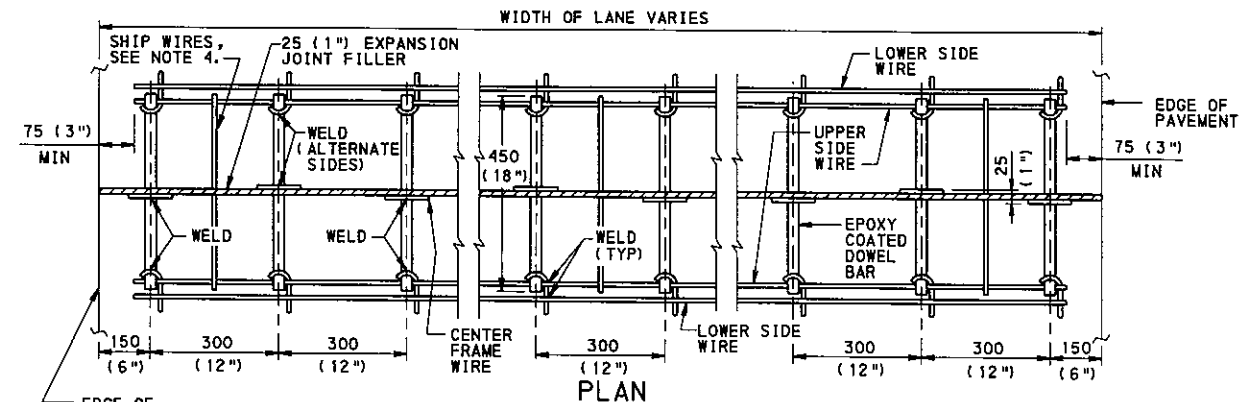
1. SPECIFY #16 (#5) TIE BARS 750 ± 6 (30" ± 1/4") LONG, SPACED 750 (30") CENTER TO CENTER MAXIMUM. PLACE PERPENDICULAR TO AND CENTERED OVER THE LONGITUDINAL JOINT ± 25 (± 1"). EMBED TIE BARS D/2 ± 20 (± 3/4") OR 100 ± 13 (4" ± 1/2"), WHICHEVER IS GREATER, EXCEPT FOR TYPE L CONTRACTION JOINTS. FOR TYPE 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(1)1.
2. 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.
3. STRAIGHTEN DEFORMED BENT TIE BARS SO THAT THE ANGLE MADE WITH THE LONGITUDINAL JOINT IS AT LEAST 60 DEGREES.
4. MAKE THREADED SLEEVE NUT FROM STEEL PIPE OR HEXAGONAL STEEL BAR 27Ø x 48 (1 1/8"Ø x 1 7/8") LONG OR HIGH STRENGTH STEEL BAR 22Ø x 50 (2 7/32"Ø x 2") LONG.
5. 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.
6. ONLY FORM KEYWAYS FOR PAVEMENT DEPTHS GREATER THAN 250 (10") FORM ONLY FEMALE KEYWAYS.
7. 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.
8. 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.
9. USE AN APPROVED EPOXY ANCHORING MATERIAL TO WITHSTAND THE NECESSARY MINIMUM PULL-OUT RESISTANCE SPECIFIED IN PUBLICATION 408, SECTION 501.3(1)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.
10. DO NOT USE THE HOOK COMPONENT OF THE TIEBOLT ASSEMBLY WHEN SLIP FORMING.
11. 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).
12. MAKE THE TOP OF THE JOINT SEALING MATERIAL FROM 3 (1/8") TO 6 (1/4") BELOW THE PAVEMENT SURFACE. USE HEAT RESISTANT JOINT BACKING MATERIAL FOR HOT POURED SEALS.

(*) DENOTES, SEE NOTE 12.

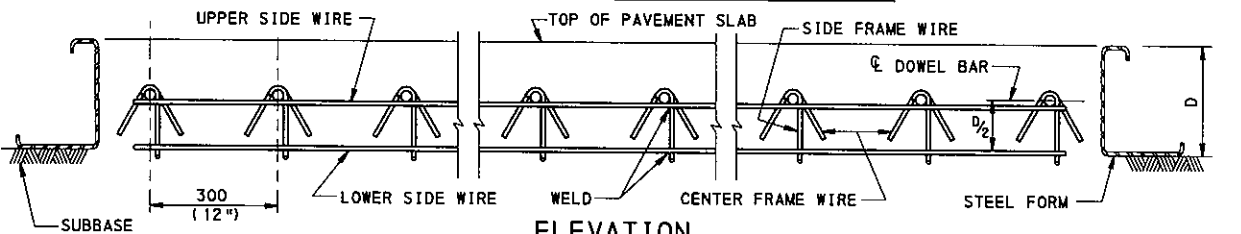
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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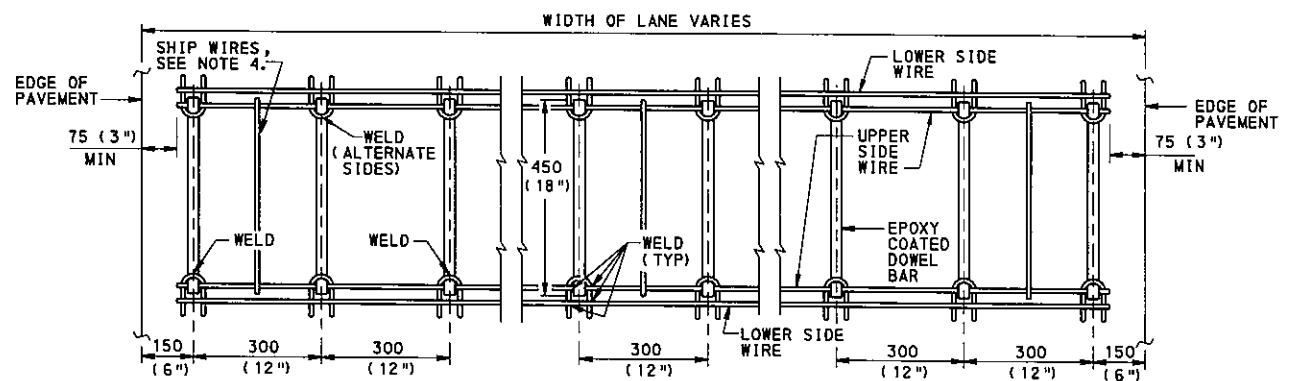
CONCRETE PAVEMENT JOINTS



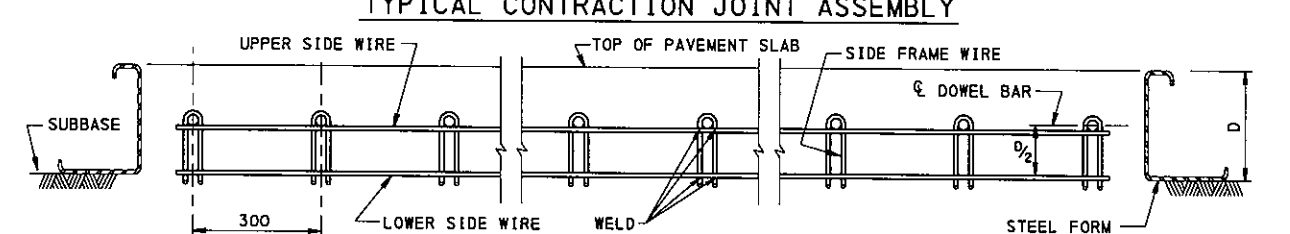
TYPICAL EXPANSION JOINT ASSEMBLY



ELEVATION EXPANSION JOINT ASSEMBLY



TYPICAL CONTRACTION JOINT ASSEMBLY



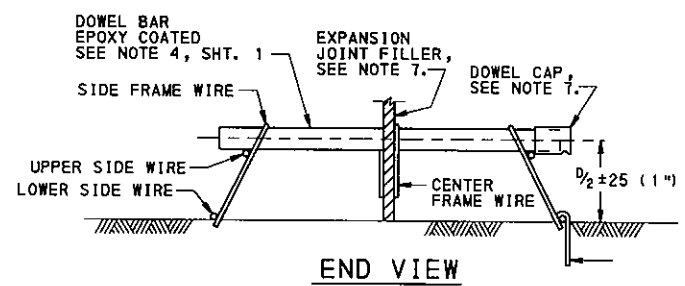
ELEVATION CONTRACTION JOINT ASSEMBLY

NOTES

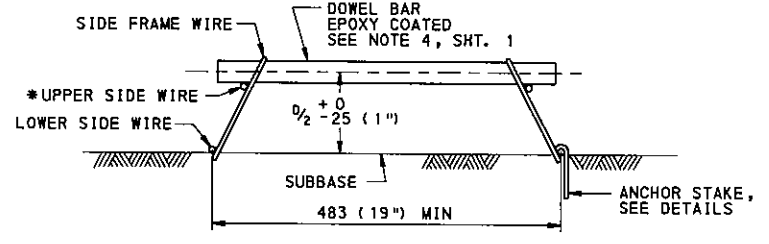
1. THIS STANDARD DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND COMPATIBILITY. IT DOES NOT INCLUDE ALL THE DETAILS REQUIRED FOR FABRICATION. ONLY ITEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED.
2. PROVIDE ANCHOR STAKES TO SECURE UNIT FROM MOVEMENT INCLUDING UPLIFT. A MINIMUM OF EIGHT STAKES ARE TO BE USED. FOR SLIP FORM PAVING, ANCHOR STAKES SHALL ENGAGE THE UPPER SIDE WIRE. FOR FIXED FORM PAVING, ANCHOR STAKES SHALL ENGAGE THE LOWER SIDE WIRE.
3. PROVIDE STAKES OF SUFFICIENT LENGTH SUCH THAT 400 (16") WILL BE EMBEDDED IF THE TOP COURSE IS OCS, ASPHALT TREATED PERMEABLE BASE COURSE, CEMENT TREATED PERMEABLE BASE COURSE OR 2A. WHEN LEAN CONCRETE BASE COURSE OR UNBONDED CONCRETE OVERLAY IS DESIGNED PROVIDE SUFFICIENT ANCHORAGE TO PREVENT MOVEMENT OF THE BASKET ASSEMBLY. THIS MAY INCLUDE ANCHOR PINS, HILTI NAILS, TIE STRAPS TIED TO THE TOP SIDE OF THE BASKET, OR OTHER ACCEPTABLE MEANS TO HOLD THE ASSEMBLY STATIONARY DURING THE PAVING OPERATION AS DIRECTED BY THE ENGINEER.
4. AFTER EACH LOAD TRANSFER ASSEMBLY IS SECURED IN PLACE, REMOVE AND PROPERLY DISPOSE OF ALL TIE WIRES OR SHIPPING WIRES PRIOR TO INSTALLING EXPANSION FIBRE.
5. PROVIDE SIDE SUPPORT ASSEMBLY WIRES CONFORMING TO THE CURRENT ASTM DESIGNATION A-510 SPECIFICATIONS FOR WIRE RODS AND 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

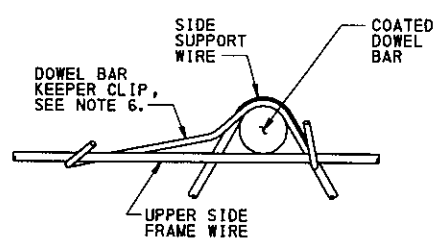
6. DOWEL BAR KEEPER CLIPS MAY BE USED IN LIEU OF TIE WIRES OR SHIPPING WIRES FOR CONSTRUCTION AND EXPANSION JOINT ASSEMBLIES.
7. FABRICATE AND SHIP NEST ALL DOWEL, SIDE SUPPORT AND CENTER SUPPORT ASSEMBLIES. ASSEMBLE EXPANSION JOINT FILLER, ANCHOR STAKES AND DOWEL CAPS IN THE FIELD.
8. PROVIDE DOWEL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



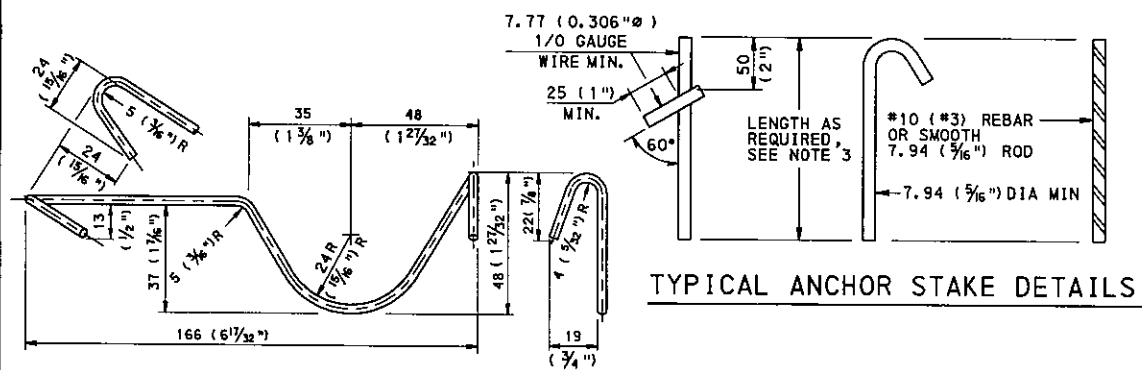
END VIEW EXPANSION JOINT ASSEMBLY



END VIEW CONTRACTION JOINT ASSEMBLY



DOWEL BAR KEEPER CLIP

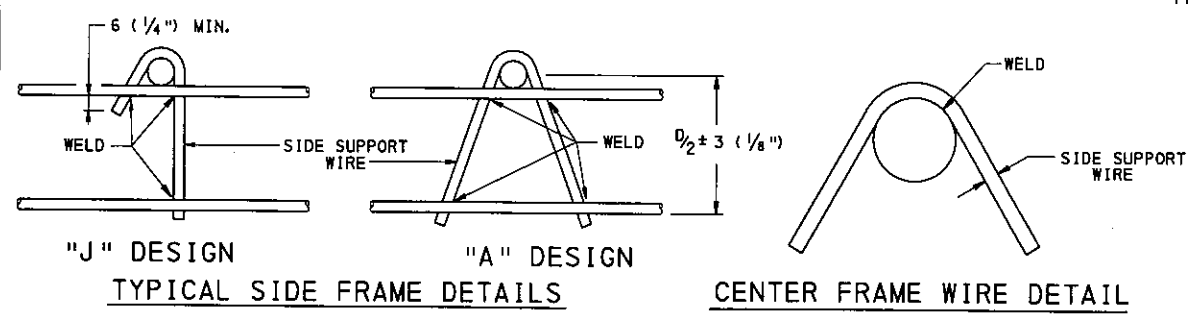


TYPICAL ANCHOR STAKE DETAILS

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.



"J" DESIGN TYPICAL SIDE FRAME DETAILS

"A" DESIGN

CENTER FRAME WIRE DETAIL

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)

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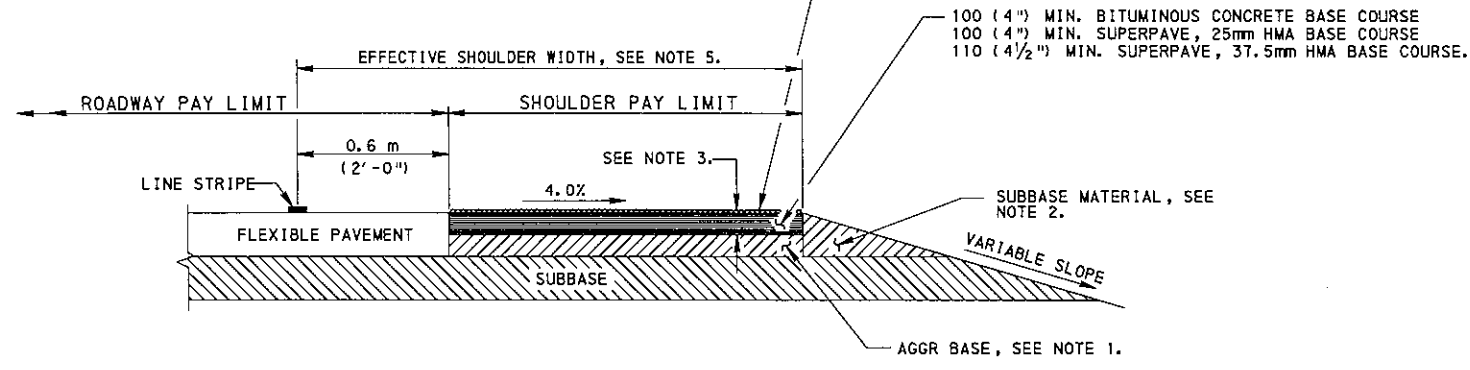
CONCRETE PAVEMENT JOINTS
NON-SKEWED
LOAD TRANSFER ASSEMBLIES

RECOMMENDED APR. 30, 2003
Scott Christy
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED APR. 30, 2003
Alan A. Schmitt
CHIEF ENGINEER

SHT 3 OF 3
RC-20M

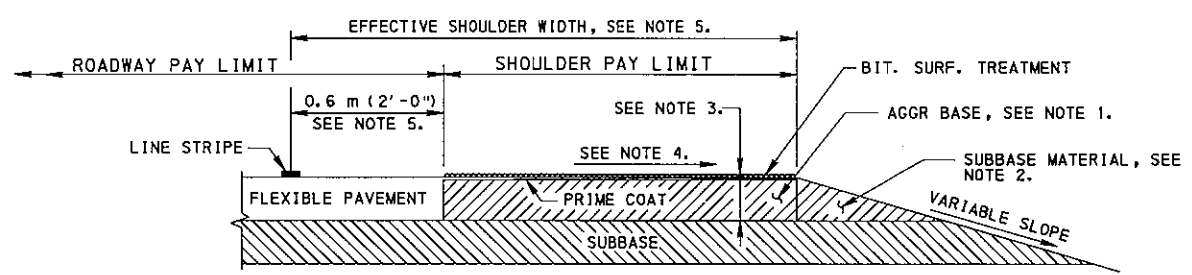
BIT. SURF. TREATMENT-INCIDENTAL TO TYPE 1 SHOULDERS, 20 (3/4") DEPTH
 BIT. SURF. CRSE, FJ-1-INCIDENTAL TO TYPE 1-F SHOULDERS, 25 (1") DEPTH
 BIT. WEAR. CRSE, ID-2-INCIDENTAL TO TYPE 1-I SHOULDERS, 40 (1 1/2") DEPTH
 DOUBLE SLURRY SEAL-INCIDENTAL TO TYPE 1-S SHOULDERS, 20 (3/4") DEPTH
 SUPERPAVE, 9.5mm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



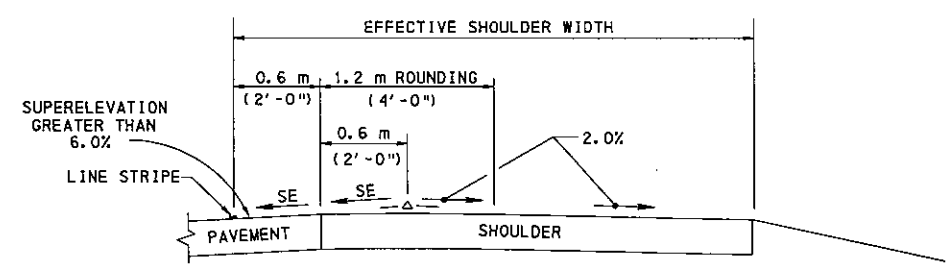
TYPE 1 SHOULDER
 TYPE 1-F SHOULDER
 TYPE 1-I SHOULDER
 TYPE 1-S SHOULDER
 TYPE 1-SP SHOULDER

NOTES

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



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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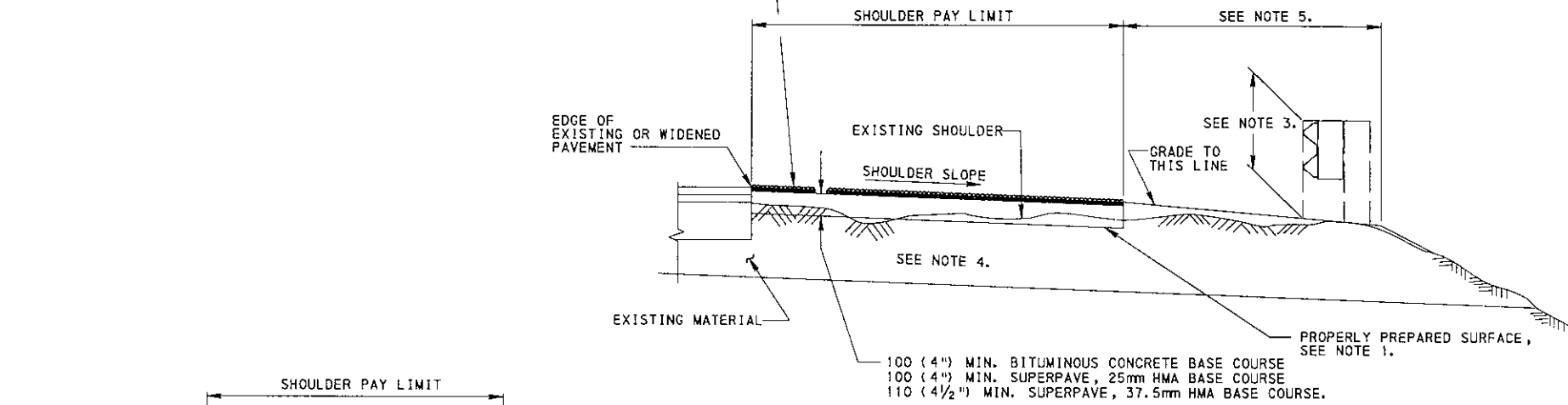
SHOULDERS

RECOMMENDED APR. 30, 2003	RECOMMENDED APR. 30, 2003	SHT. 1 OF 6
<i>Scott Christa</i> DIRECTOR, BUREAU OF DESIGN	<i>Alan A. Schmitt</i> CHIEF ENGINEER	RC-25M

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

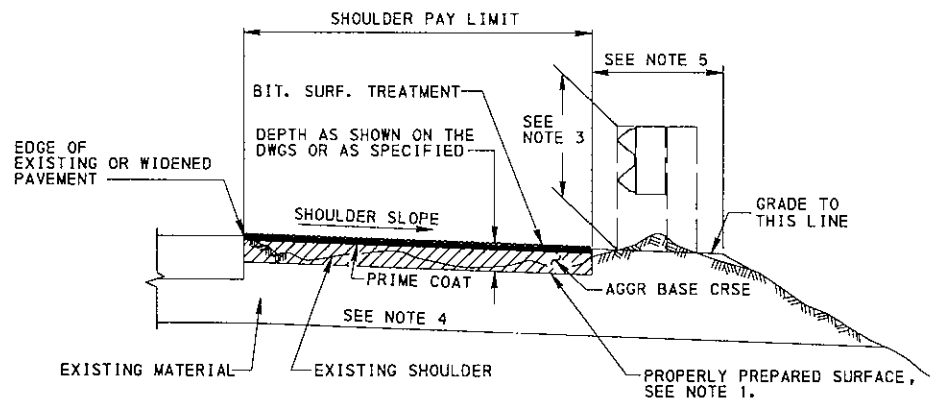
NOTES

- 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.

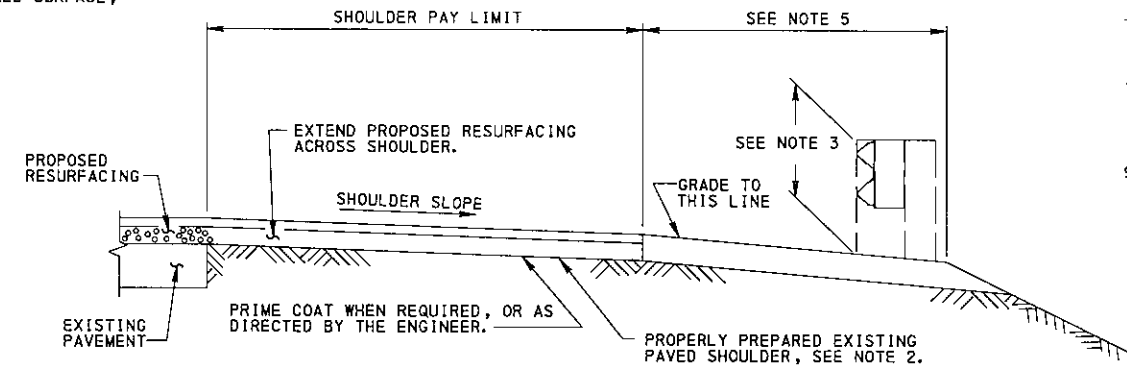


100 (4") MIN. BITUMINOUS CONCRETE BASE COURSE
 100 (4") MIN. SUPERPAVE, 25mm HMA BASE COURSE
 110 (4 1/2") MIN. SUPERPAVE, 37.5mm HMA BASE COURSE.

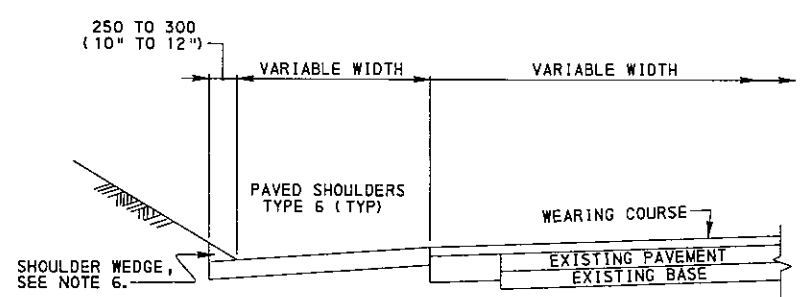
TYPE 6 SHOULDER
TYPE 6-F SHOULDER
TYPE 6-I SHOULDER
TYPE 6-S SHOULDER
TYPE 6-SP SHOULDER



TYPE 4 SHOULDER



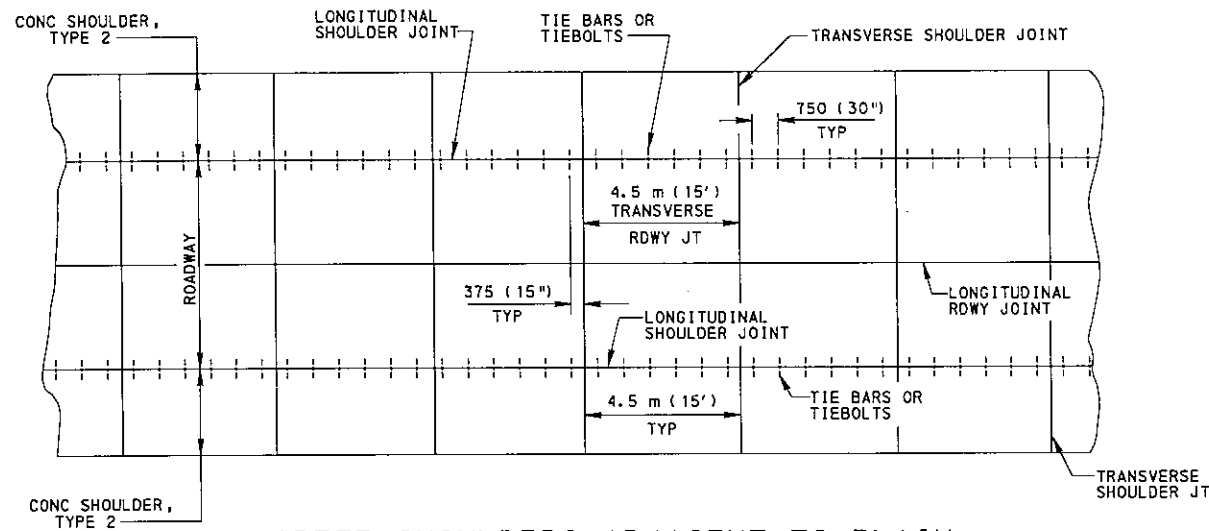
TYPE 7 SHOULDER



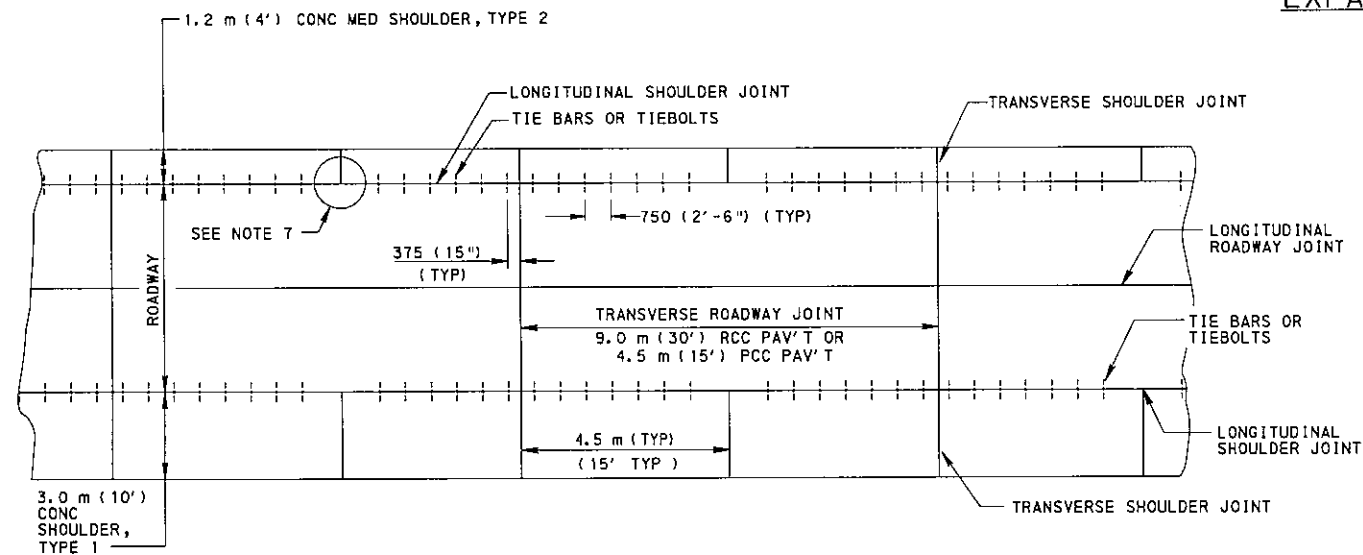
TYPICAL SHOULDER DETAIL
WITH BITUMINOUS TAPER SHOULDER WEDGE

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

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN		
SHOULDERS (RECONSTRUCTED)		
RECOMMENDED APR. 30, 2003 <i>Scott Christen</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 30, 2003 <i>Alan P. Schir</i> CHIEF ENGINEER	SHT 2 OF 6 RC-25M

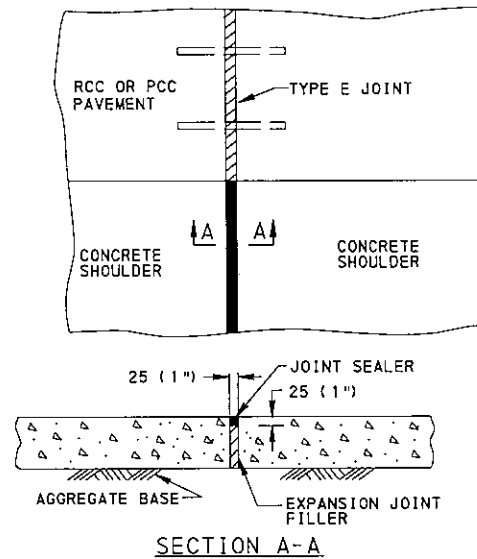


CONCRETE SHOULDERS ADJACENT TO PLAIN CONCRETE PAVEMENT FOR COLLECTORS AND LOCAL ROADS

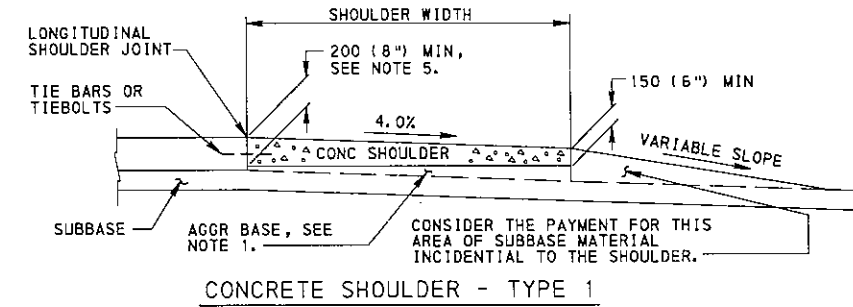
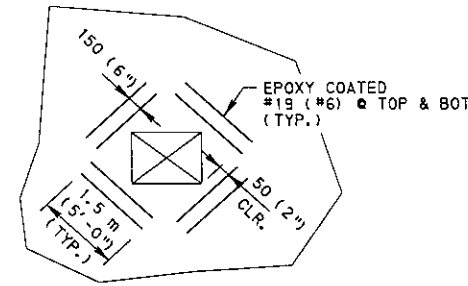


CONCRETE SHOULDERS ADJACENT TO RCC PAVEMENT AND PCC PAVEMENT FOR INTERSTATE AND OTHER LIMITED ACCESS FREEWAYS, ARTERIALS AND RAMPS

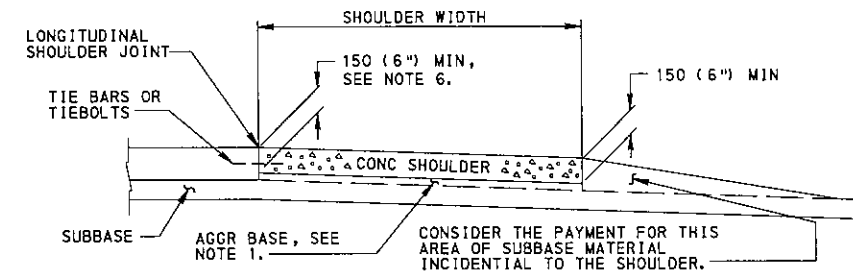
REINFORCEMENT AT OPENINGS



SECTION A-A CONCRETE SHOULDER EXPANSION JOINTS



CONCRETE SHOULDER - TYPE 1



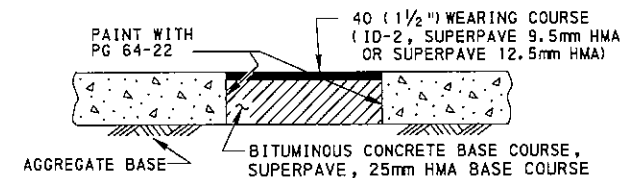
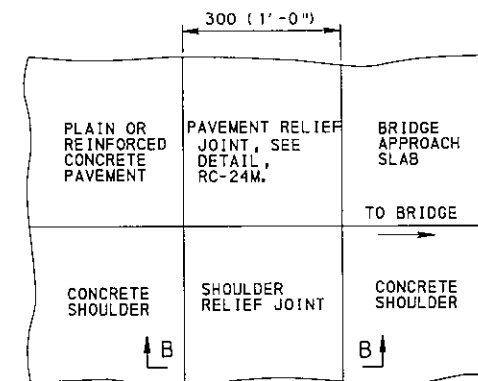
CONCRETE SHOULDER - TYPE 2

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 TIEBOLTS 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.

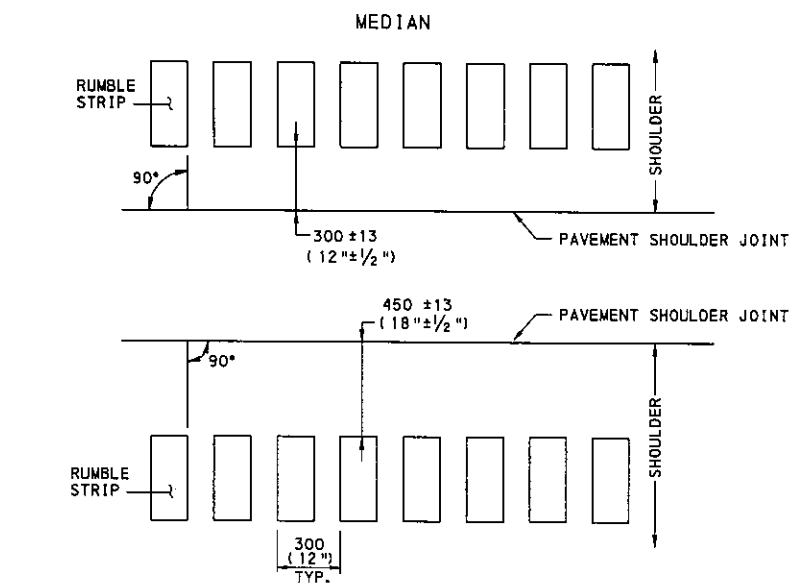
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



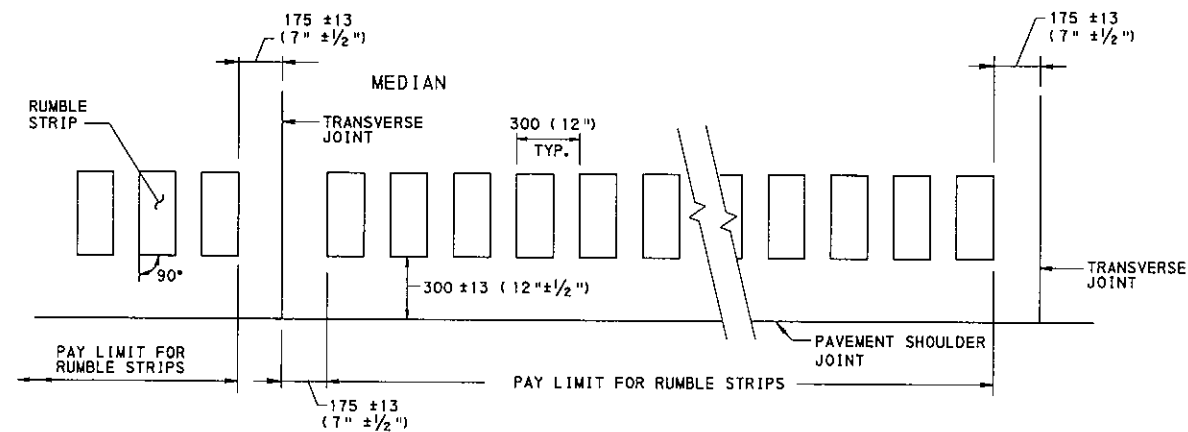
SECTION B-B SHOULDER RELIEF JOINTS

COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN

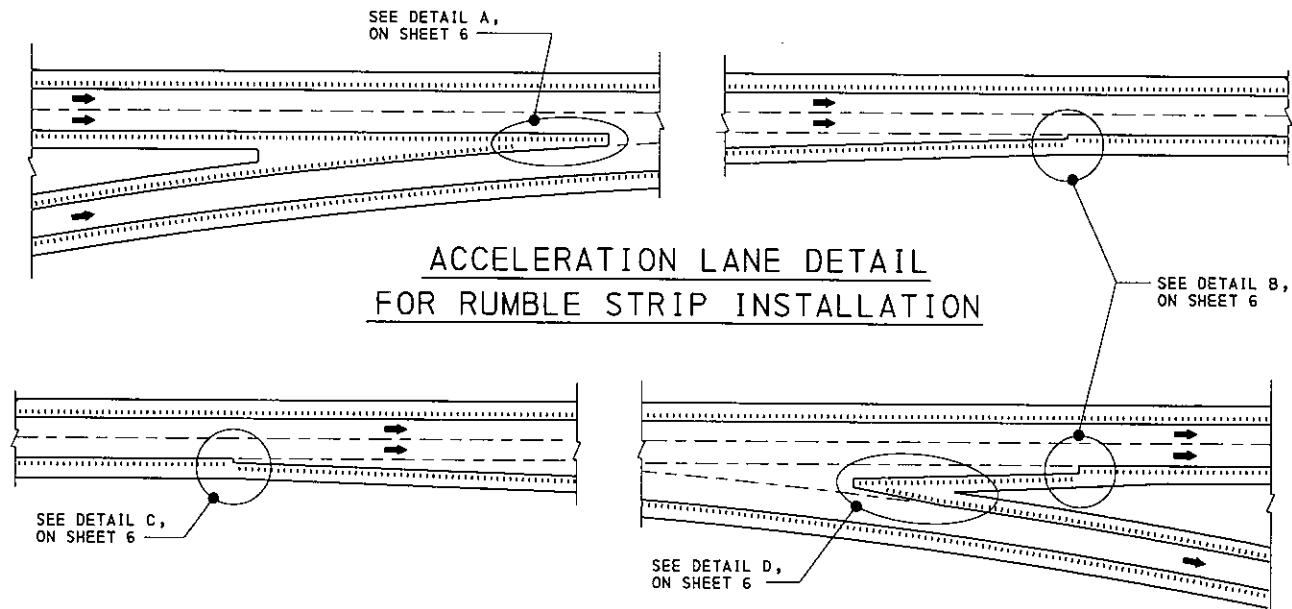
SHOULDERS (CONCRETE)



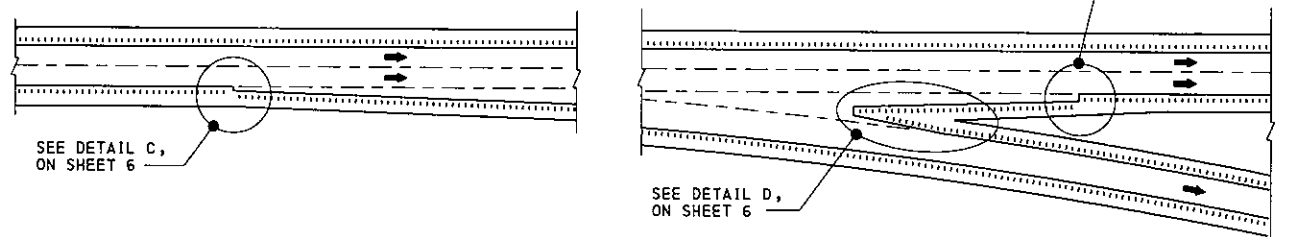
TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON BITUMINOUS SHOULDERS



TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON CONCRETE SHOULDERS

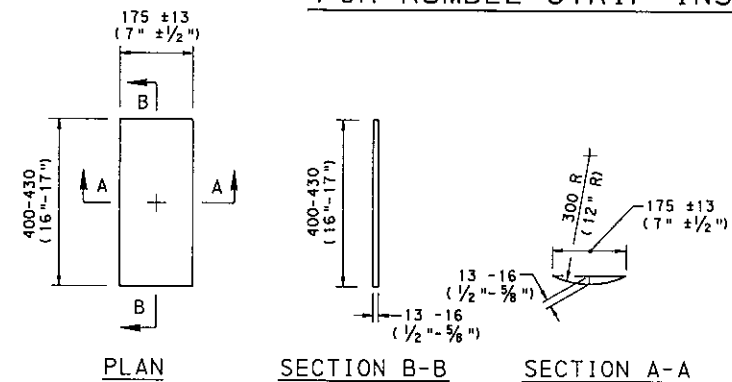


ACCELERATION LANE DETAIL FOR RUMBLE STRIP INSTALLATION



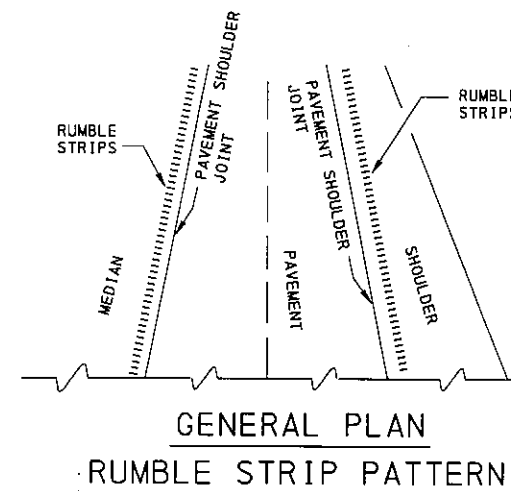
DECELERATION LANE DETAIL FOR RUMBLE STRIP INSTALLATION

NOTE: SEE SHEET 5, FOR INTERSECTION DETAILS.



SECTION DETAILS OF RUMBLE STRIP PATTERN

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

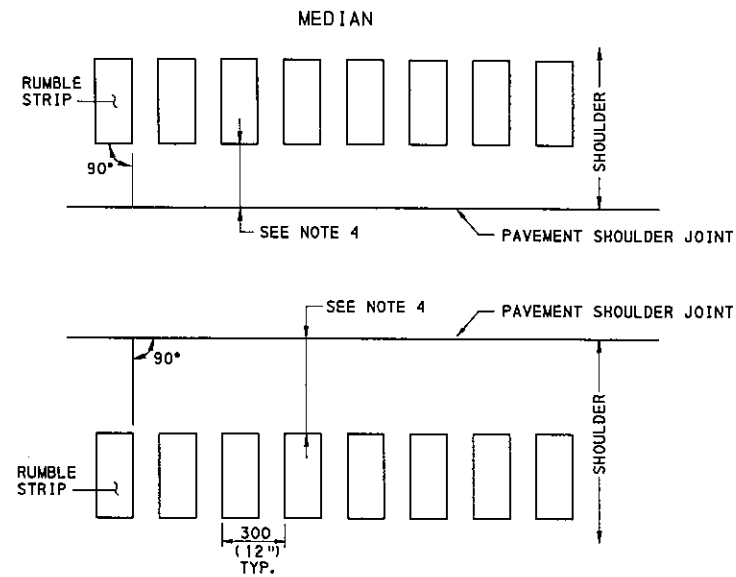


GENERAL PLAN RUMBLE STRIP PATTERN

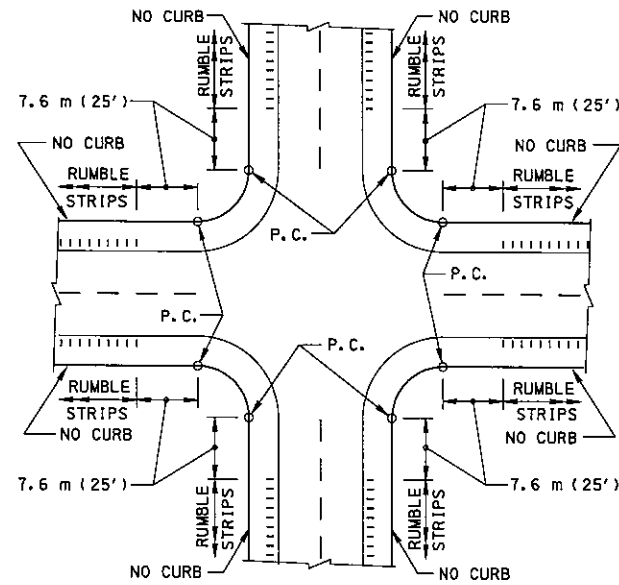
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

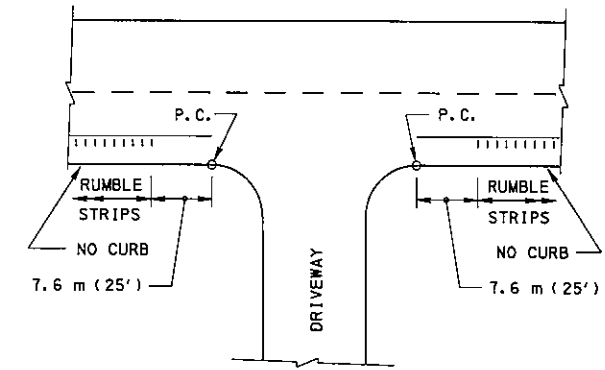
SHOULDERS
RUMBLE STRIPS
(LIMITED ACCESS HIGHWAYS)



TYPICAL PLAN VIEW FOR RUMBLE STRIP ON BITUMINOUS SHOULDERS



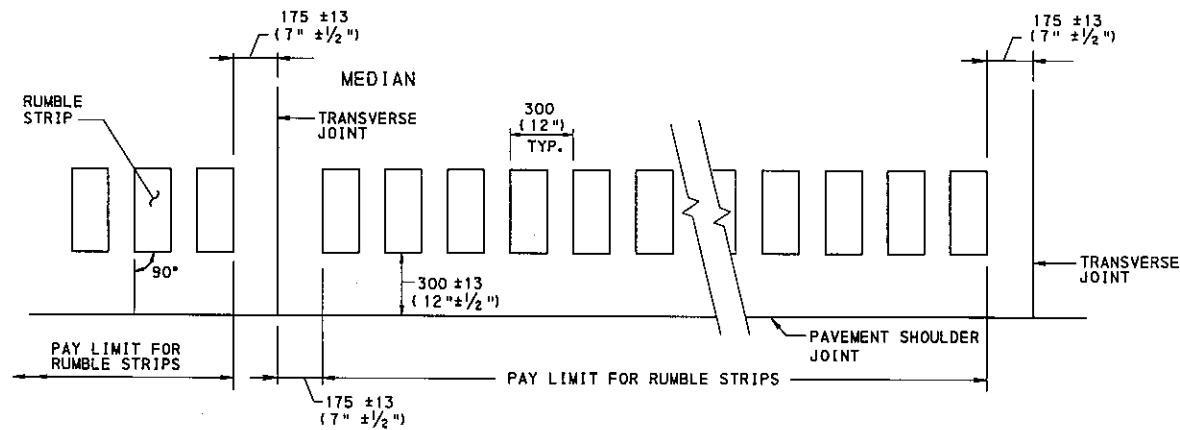
TYPICAL INTERSECTION DETAIL FOR RUMBLE STRIP INSTALLATION



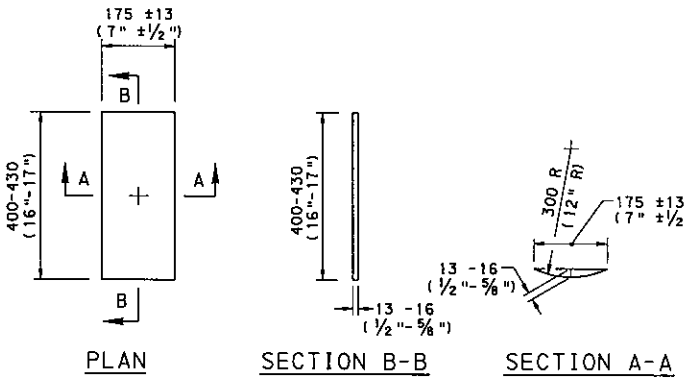
TYPICAL DRIVEWAY DETAIL FOR RUMBLE STRIP INSTALLATION

NOTES

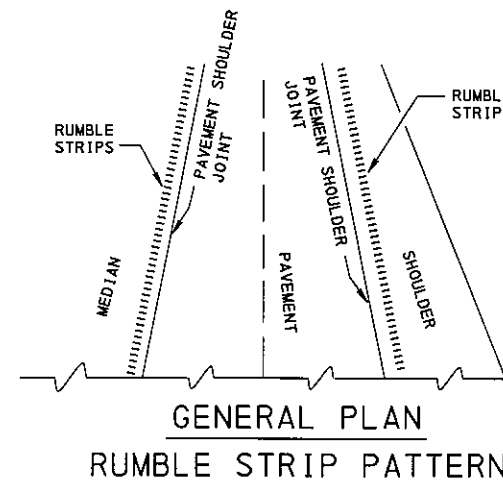
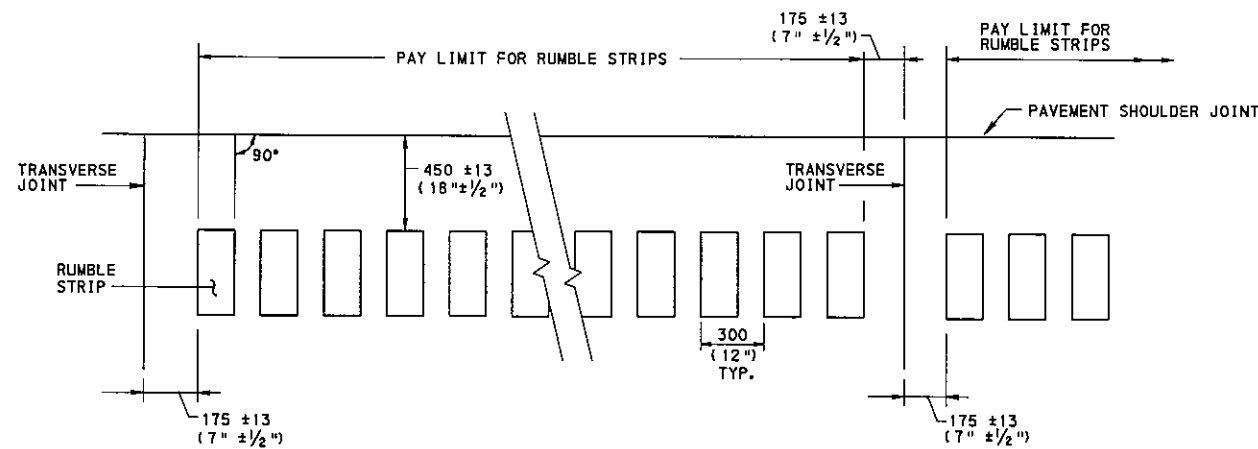
1. SHOULDER RUMBLE STRIPS FOR FREE ACCESS HIGHWAYS ARE CONSIDERED ON A PROJECT BY PROJECT BASIS AS INDICATED ON THE CONSTRUCTION PLANS.
2. CONSTRUCT RUMBLE STRIP IN ACCORDANCE WITH PUBLICATION 408, SECTION 660.
3. DO NOT CONSTRUCT SHOULDER RUMBLE STRIPS ACROSS A JOINT.
4. 300 ± 13 (12" ± 1/2") FOR LEFT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



TYPICAL PLAN VIEW FOR RUMBLE STRIPS ON CONCRETE SHOULDERS



SECTION DETAILS OF RUMBLE STRIP PATTERN

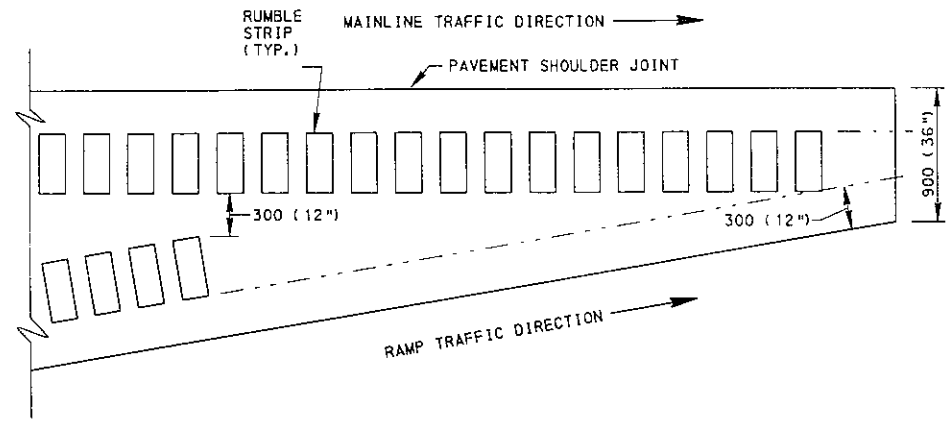


GENERAL PLAN RUMBLE STRIP PATTERN

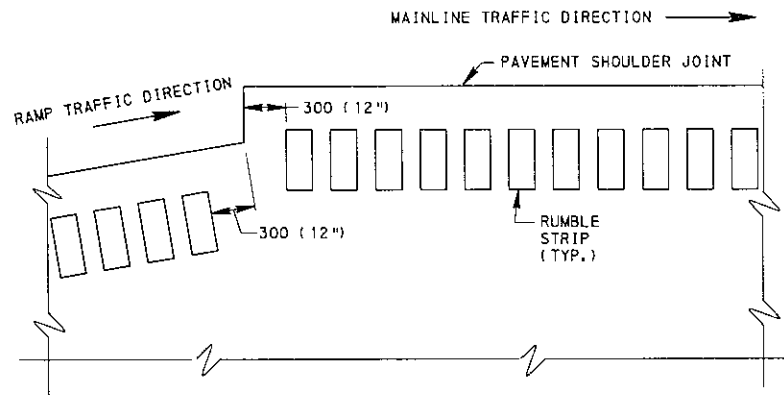
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

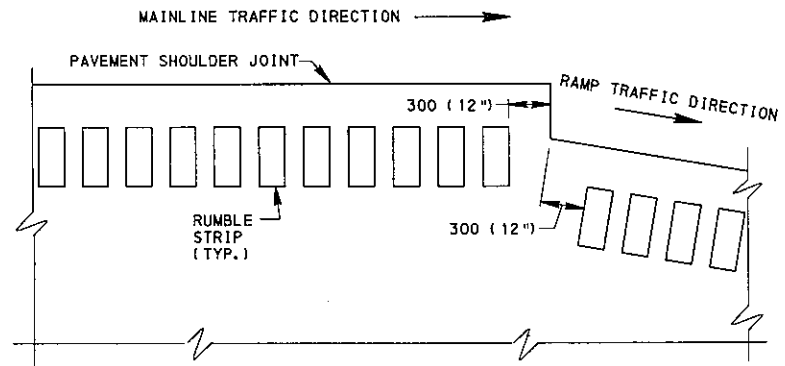
SHOULDERS
RUMBLE STRIPS
(FREE ACCESS HIGHWAYS)



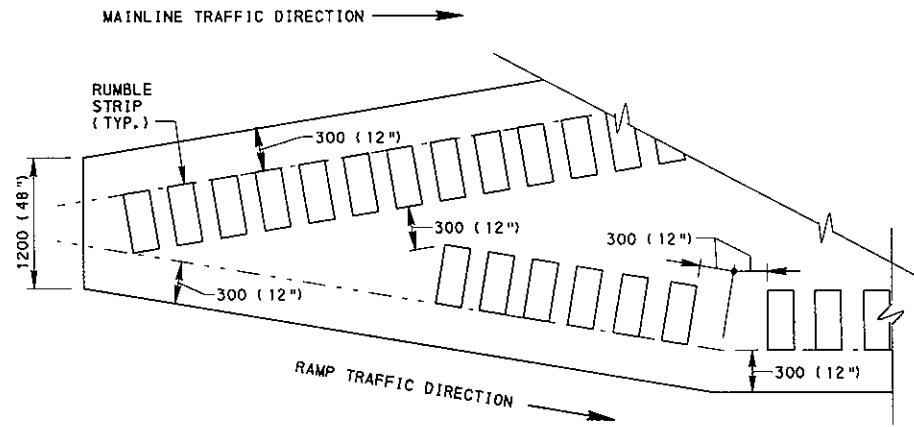
DETAIL A
ACCELERATION LANE
GORE AREA RUMBLE STRIPS



DETAIL B
ACCELERATION LANE
OUTSIDE SHOULDER RUMBLE STRIPS



DETAIL C
DECELERATION LANE
OUTSIDE SHOULDER RUMBLE STRIPS



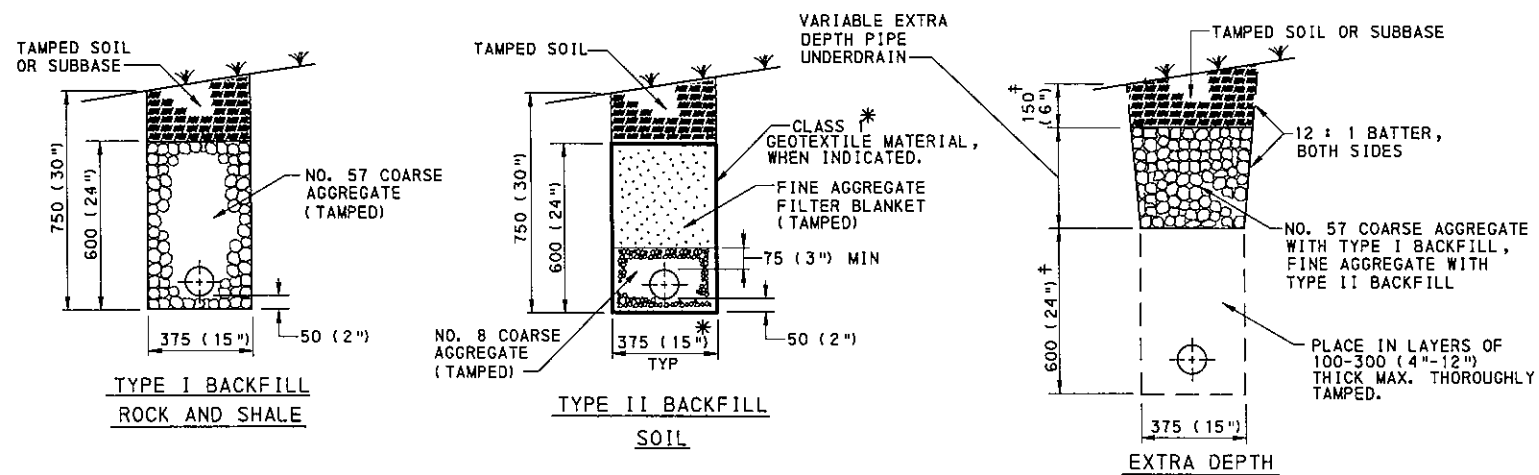
DETAIL D
DECELERATION LANE
GORE AREA RUMBLE STRIPS

NOTES

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

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

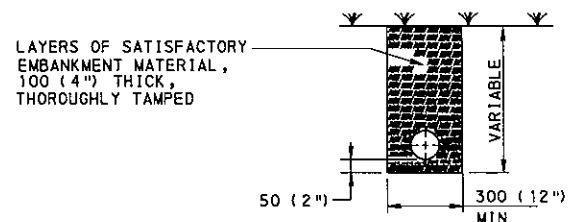
<p>COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION BUREAU OF DESIGN</p>		
<p>SHOULDERS RUMBLE STRIPS (GORE AREA)</p>		
<p>RECOMMENDED APR. 30, 2003 <i>Scott Christy</i> DIRECTOR, BUREAU OF DESIGN</p>	<p>RECOMMENDED APR. 30, 2003 <i>Alan P. Scher</i> CHIEF ENGINEER</p>	<p>SHT. 6 OF 6 RC-25M</p>



PIPE UNDERDRAIN

NOTES

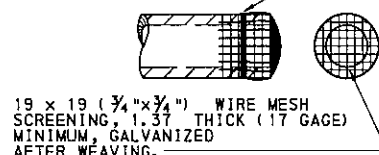
1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408M (408/2000), SECTION 610 FOR PIPE UNDERDRAIN AND PAVEMENT BASE DRAIN.
2. PROVIDE BITUMINOUS PAPER WHEN GEOTEXTILE MATERIAL IS NOT INDICATED.
3. FOR THE SUBSURFACE DRAIN OUTLET PROVIDE MATERIALS MEETING THE REQUIREMENTS OF PUBLICATION 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.

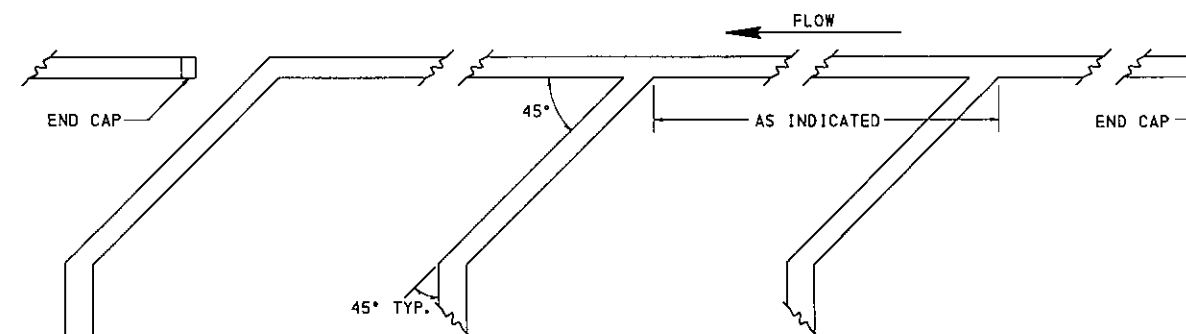
SUBSURFACE DRAIN OUTLETS
(SEE DETAIL A.)

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



DETAIL A
WIRE MESH SHIELD

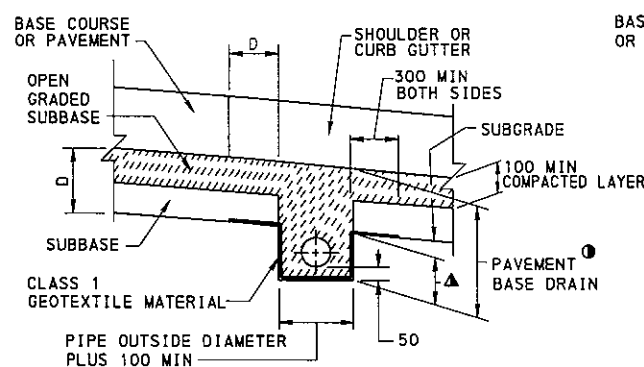
CONSTRUCT THE OUTLET INVERT 100 (3") (MINIMUM) HIGHER THAN THE SWALE LINE ELEVATION.



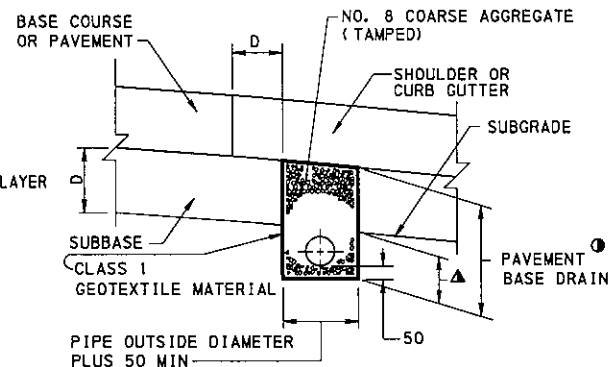
LONGITUDINAL BASE DRAIN AND OUTLET CONFIGURATION
SEE NOTE 5

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

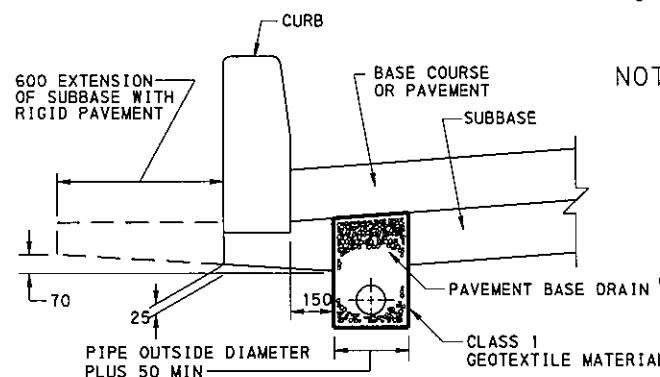


TYPICAL PLACEMENT
(OPEN GRADED SUBBASE)



TYPICAL PLACEMENT
(STANDARD SUBBASE)

PAVEMENT BASE DRAIN

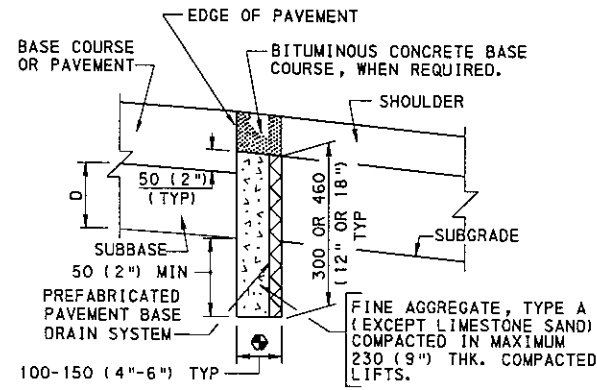


PLACEMENT AT CURB SECTION

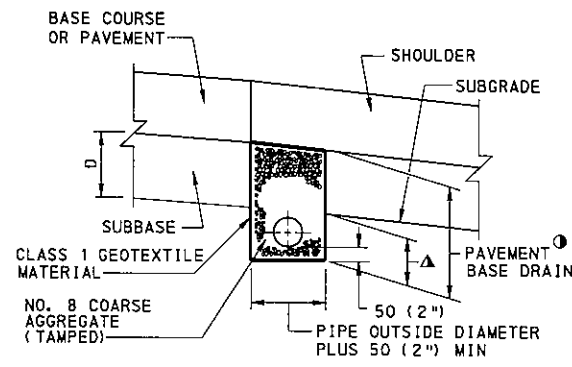
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SUBSURFACE DRAINS



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



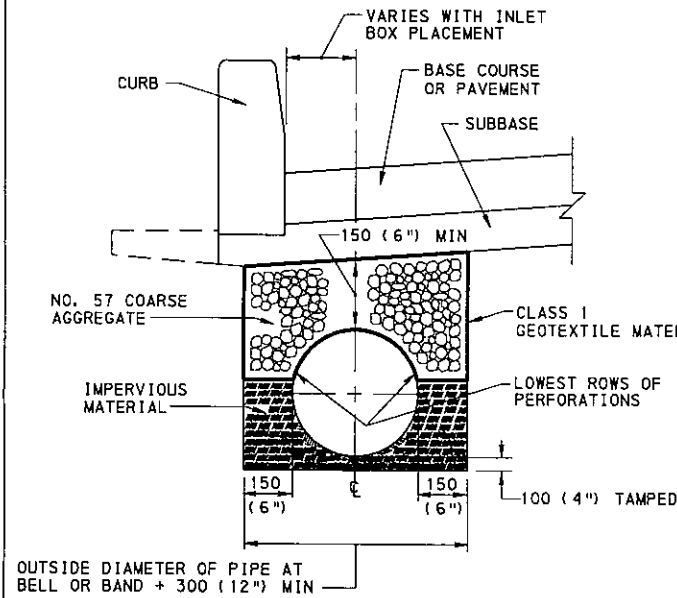
**PAVEMENT BASE DRAIN
(REHABILITATION)**

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.

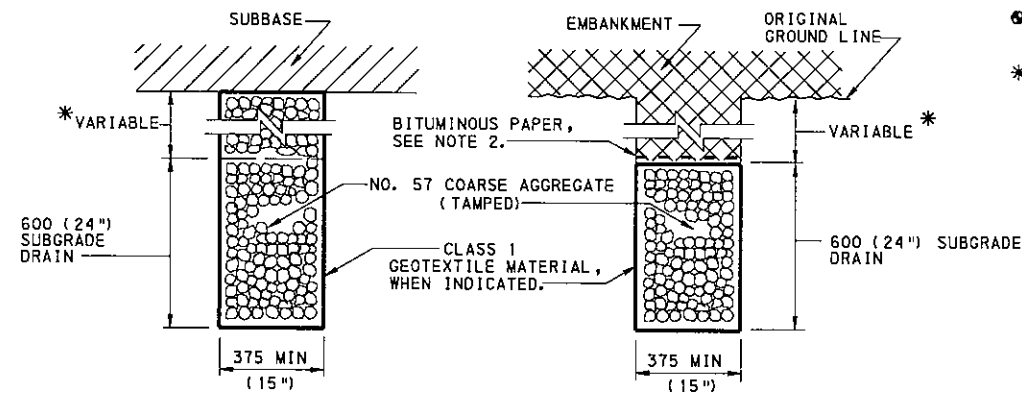
LEGEND

- ▲ 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.

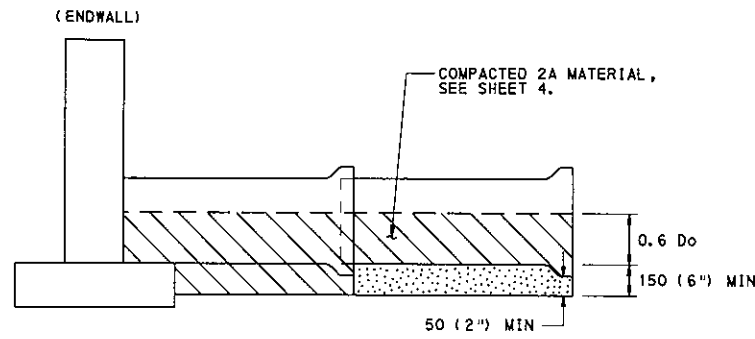


TREATMENT UNDER SUBBASE TREATMENT UNDER EMBANKMENT
SUBGRADE DRAIN

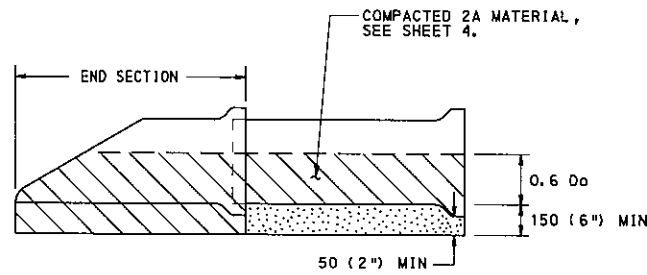
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**COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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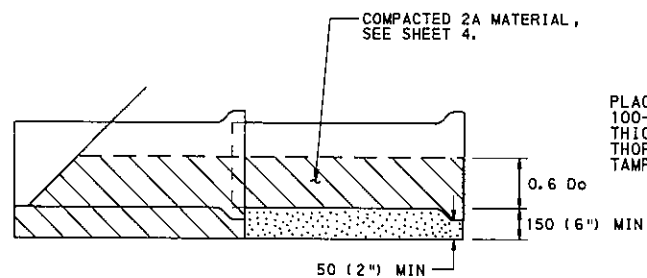
SUBSURFACE DRAINS



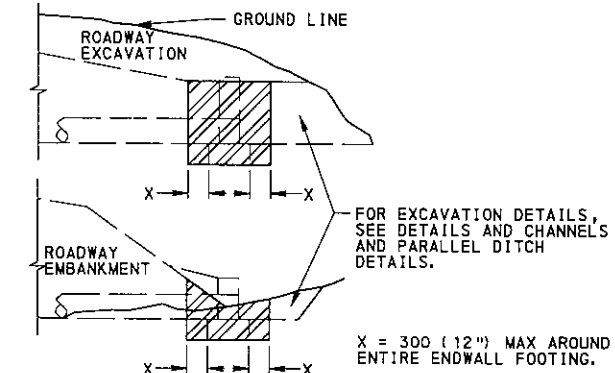
BACKFILL DETAIL AT ENDWALL
(FOR CONCRETE PIPE)



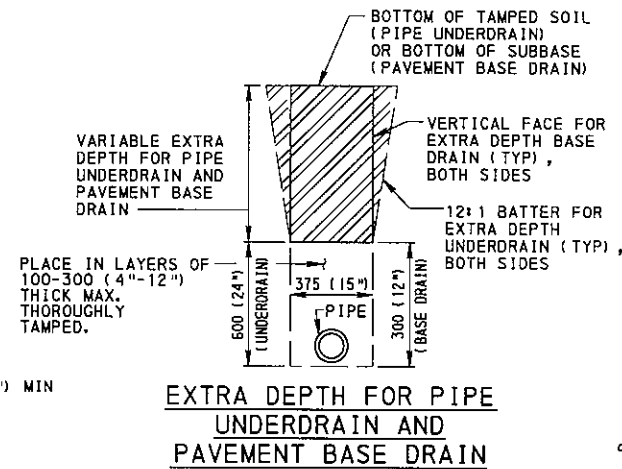
BACKFILL DETAIL AT END SECTION
(FOR CONCRETE PIPE)



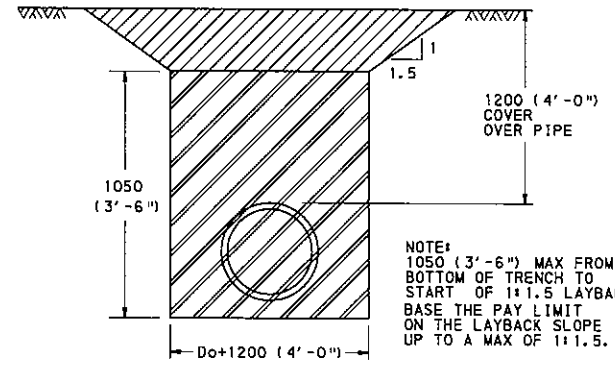
BACKFILL DETAIL AT LAST SECTION OF PIPE
(FOR CONCRETE PIPE)



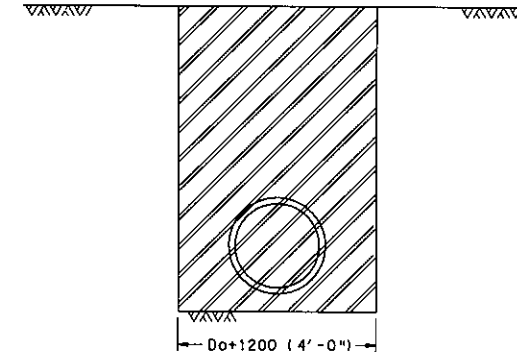
EXCAVATION FOR ENDWALLS



EXTRA DEPTH FOR PIPE UNDERDRAIN AND PAVEMENT BASE DRAIN

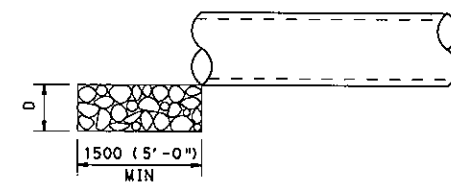


ABOVE DRAWING SHOWS EXCAVATION FOR PIPE IN CUT OR FILL WHERE SUBGRADE IS 1050 (3'-6'') OR MORE ABOVE THE BOTTOM OF THE TRENCH.



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

RECOMMENDED APR. 30, 2003 <i>Scott Christa</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 30, 2003 <i>Alan A. Schaefer</i> CHIEF ENGINEER	SHT 3 OF 5 RC-30M
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PIPE INSTALLATION PROCEDURES

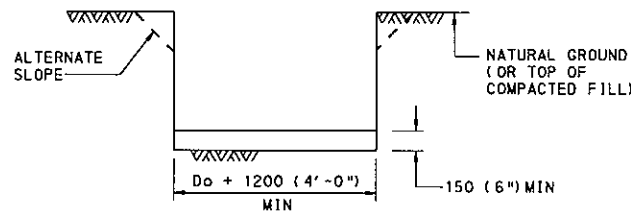
CONSTRUCTION DETAILS BELOW COVER THE FOLLOWING CONDITIONS:

- (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.

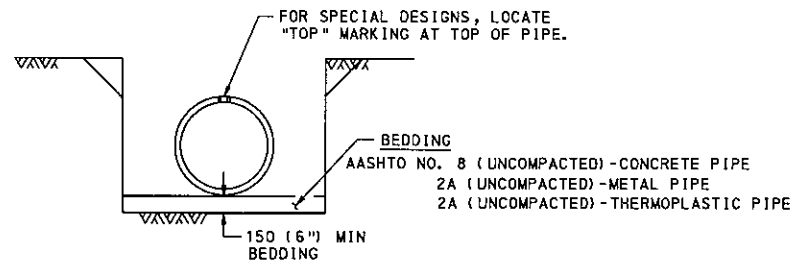
STEP 3: EXCAVATE THE TRENCH TO THE WIDTH OF THE OUTSIDE DIAMETER OF THE PIPE PLUS 1200 (4'-0") AND CREATE AN APPROPRIATE BEDDING 150 (6") DEEP.



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.)

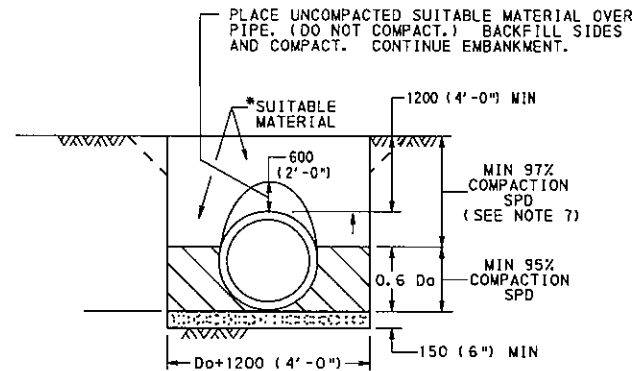
STEP 5: LAY PIPE ON APPROPRIATE BEDDING. SEE STEP 6D FOR METAL PIPE ARCH AND METAL PLATE PIPE ARCH.



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.

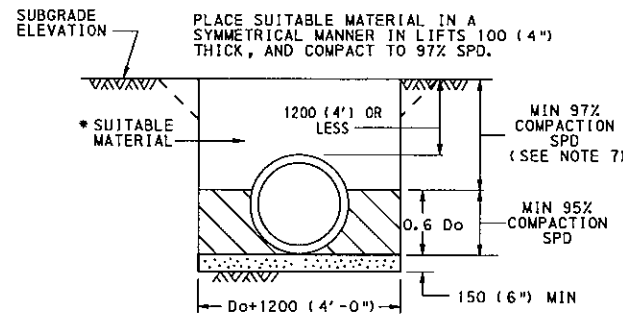
STEP 6A: CONCRETE PIPE

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 (4'-0")

CONCRETE PIPE

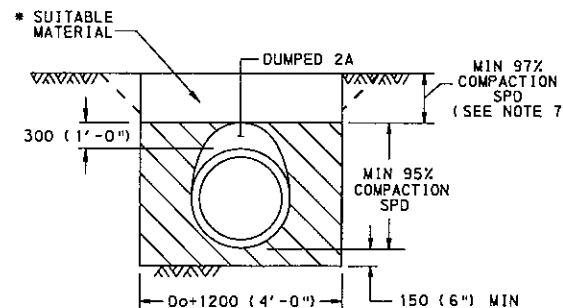


SHALLOW FILLS 1200 (4'-0") AND LESS

CONCRETE PIPE

STEP 6B: METAL PIPE AND METAL PLATE PIPE

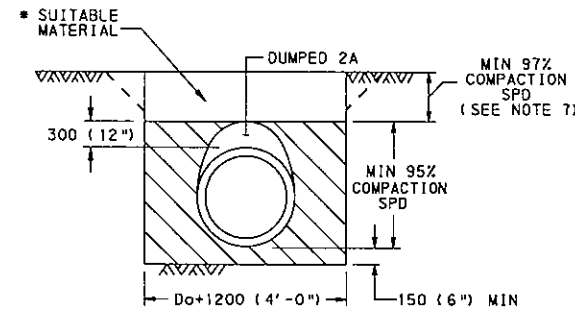
PLACE 2A COARSE AGGREGATE MATERIAL, IN LIFTS 100 (4") THICK, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 300 (12") ABOVE TOP OF PIPE. COMPACT TO 95% SPD. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH SECTION 601.



METAL PIPE AND METAL PLATE PIPE

STEP 6C: THERMOPLASTIC PIPE

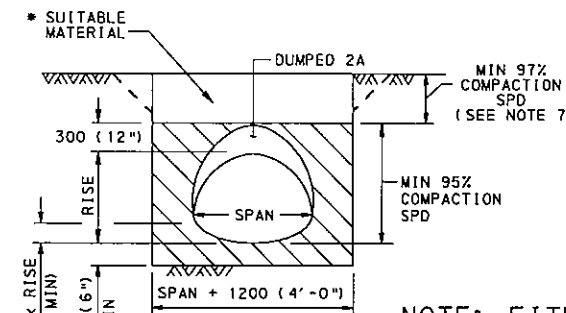
PLACE 2A COARSE AGGREGATE MATERIAL, IN LIFTS 100 (4") THICK, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 300 (12") ABOVE TOP OF PIPE. COMPACT TO 95% SPD. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH SECTION 601.



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 INSIDE DIAMETER OR SPAN IS PERMITTED WITHOUT PLACING EMBANKMENT FIRST. MAKE THE BACKFILL ENVELOPE AS SHOWN ON THIS DRAWING EXCEPT PROVIDE 2A MATERIAL ON EACH SIDE OF THE PIPE EQUAL TO ONE OUTSIDE DIAMETER OR SPAN OF THE PIPE. FOR CONCRETE PIPE, THE WIDTH OF UNCOMPACTED AGGREGATE FOR BEDDING (AASHTO NO. 8) REMAINS AT Do + 1200 (4'-0"). PAYMENT FOR THE 2A MATERIAL IS AS PER NOTE 3.
2. A HIGHER STRENGTH PIPE THAN SPECIFIED MAY BE SUPPLIED AT NO ADDITIONAL COST TO THE DEPARTMENT.
3. PAYMENT FOR THE BACKFILL ENVELOPE INCLUDING BEDDING, COARSE AGGREGATE AND SUITABLE MATERIAL UP TO 300 (12") ABOVE THE PIPE IS INCIDENTAL TO THE PIPE.
4. TO PRECLUDE POINT LOADING ON RELATIVELY RIGID CONCRETE PIPE, DO NOT COMPACT AASHTO NO. 8 BEDDING MATERIAL.
5. FOR TRENCH BOX/SHORING INSTALLATION REQUIREMENTS REFER TO PUBLICATION 408/2000, SECTION 601.
6. PERMIT PLACEMENT OF BACKFILL MATERIAL IN LAYERS, LIFTS, 200 (8") THICK WHEN USING VIBRATORY COMPACTION EQUIPMENT.
7. COMPACT TOP 1000 (3'-0") OF SUBGRADE TO 100% IN ACCORDANCE WITH SECTION 206.3.

LEGEND

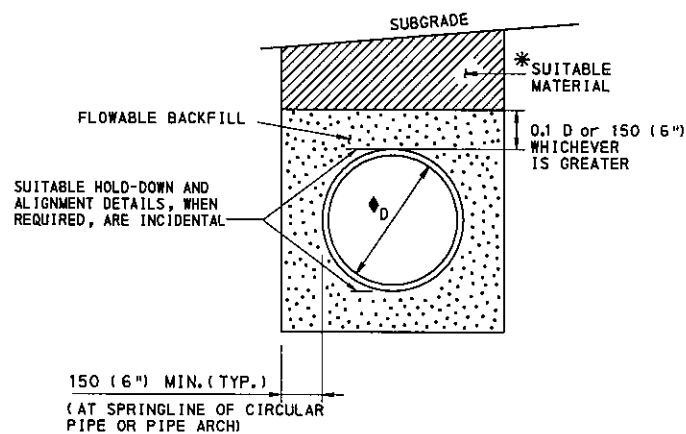
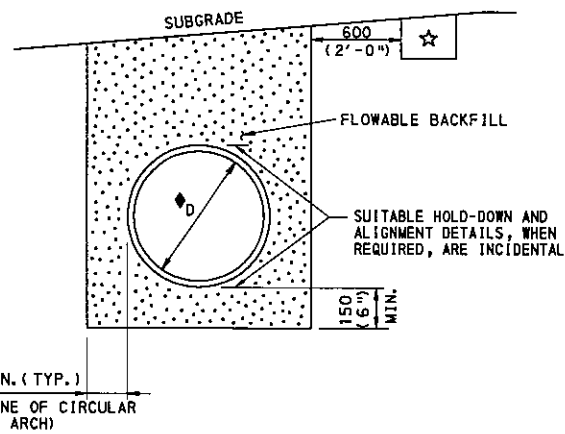
- AGGREGATE FOR BEDDING (AASHTO NO. 8), UNCOMPACTED
- COARSE AGGREGATE (2A)

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 APR. 30, 2003 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 30, 2003 <i>Alan A. Schmitt</i> CHIEF ENGINEER	SHT 5 OF 5 RC-30M

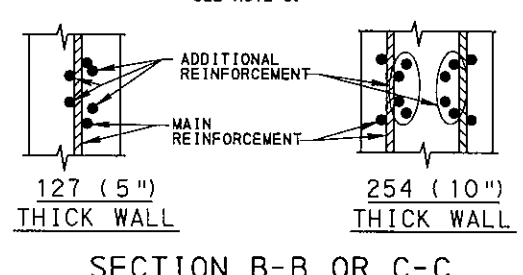
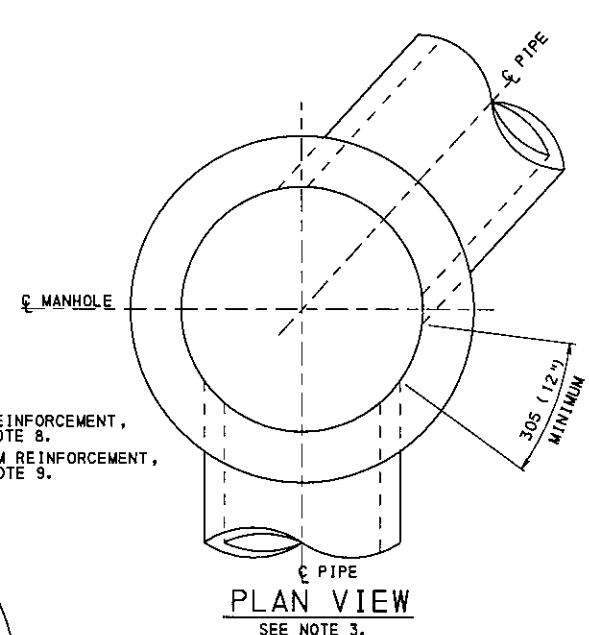
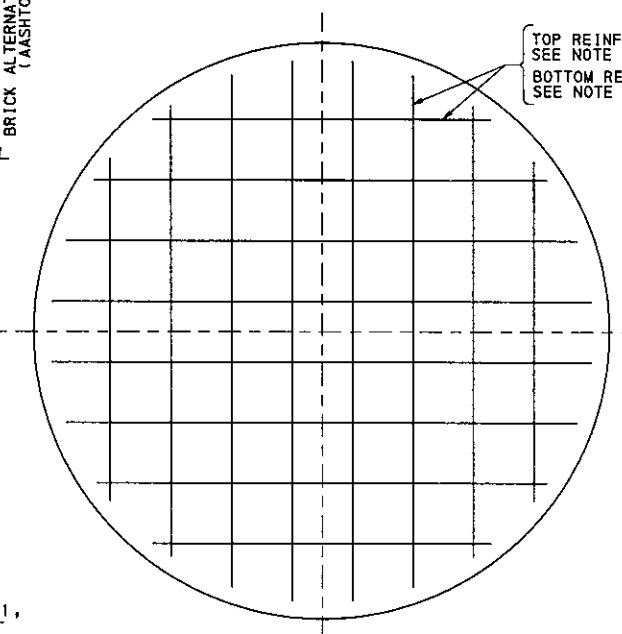
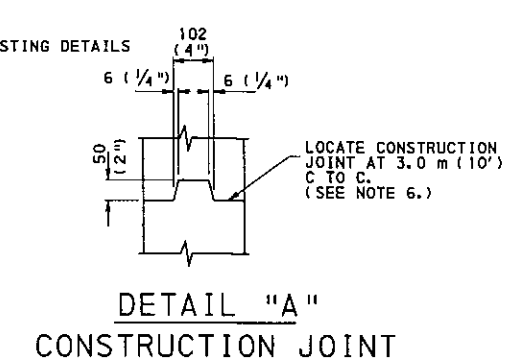
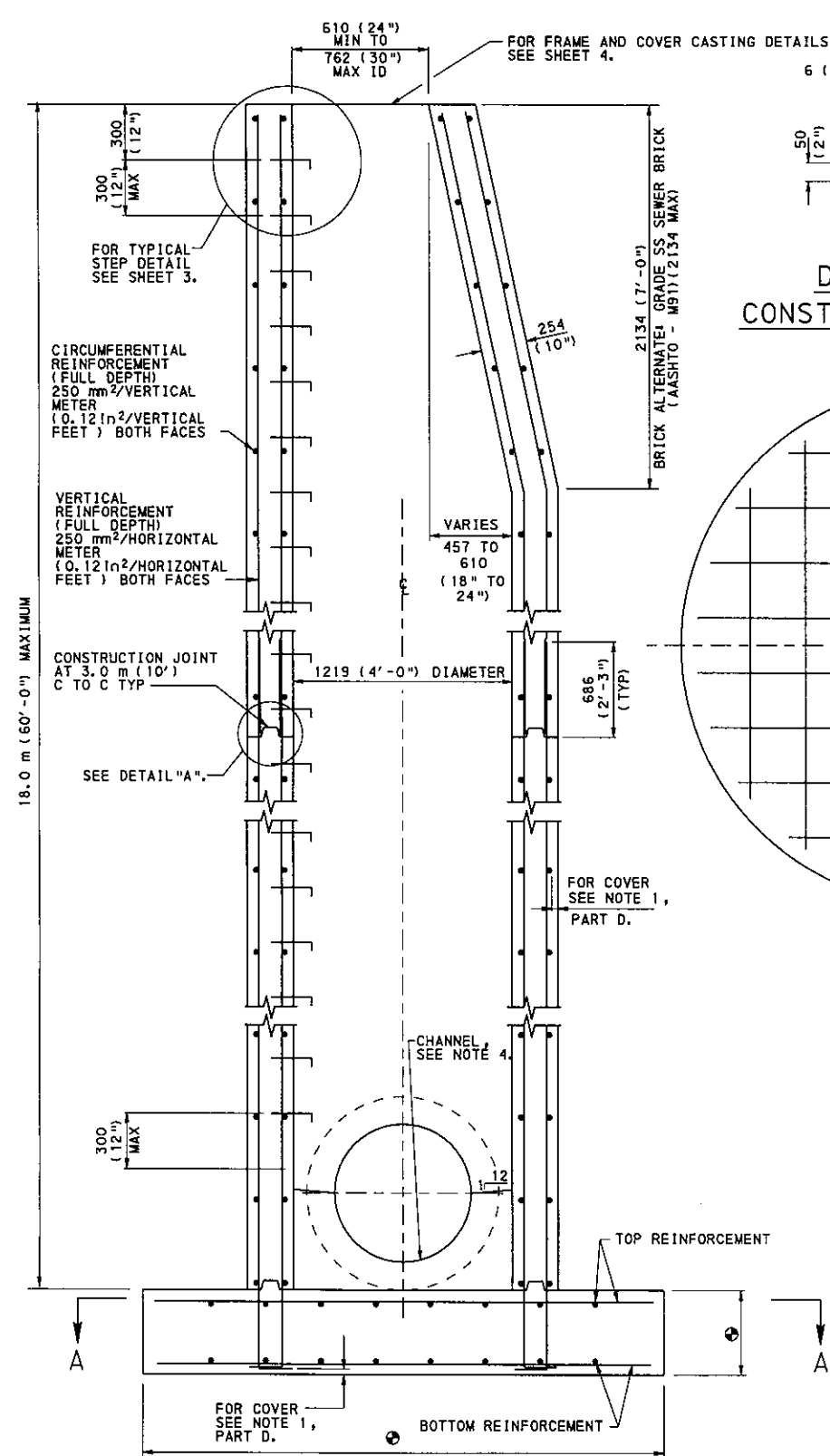
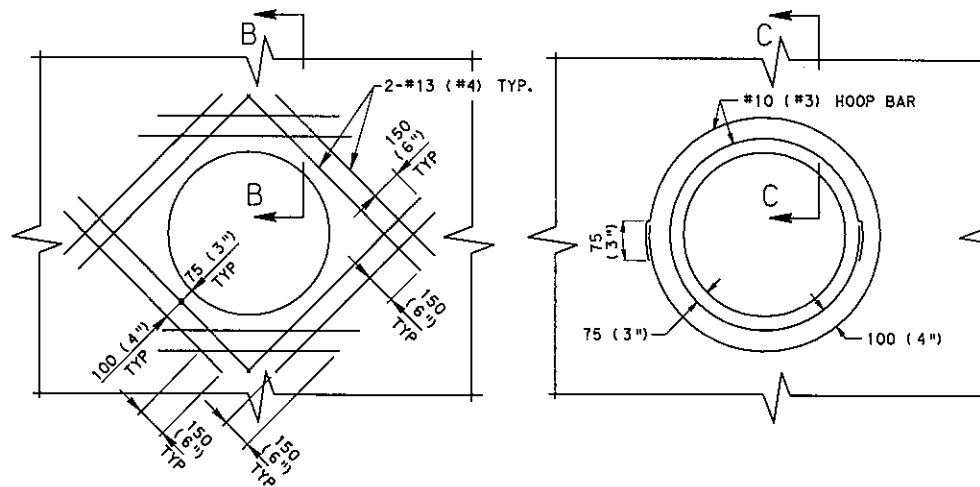


TABLE A
BASE SLAB DIMENSIONS

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")



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

FOR BASE SLAB DIMENSIONS SEE TABLE A.

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:

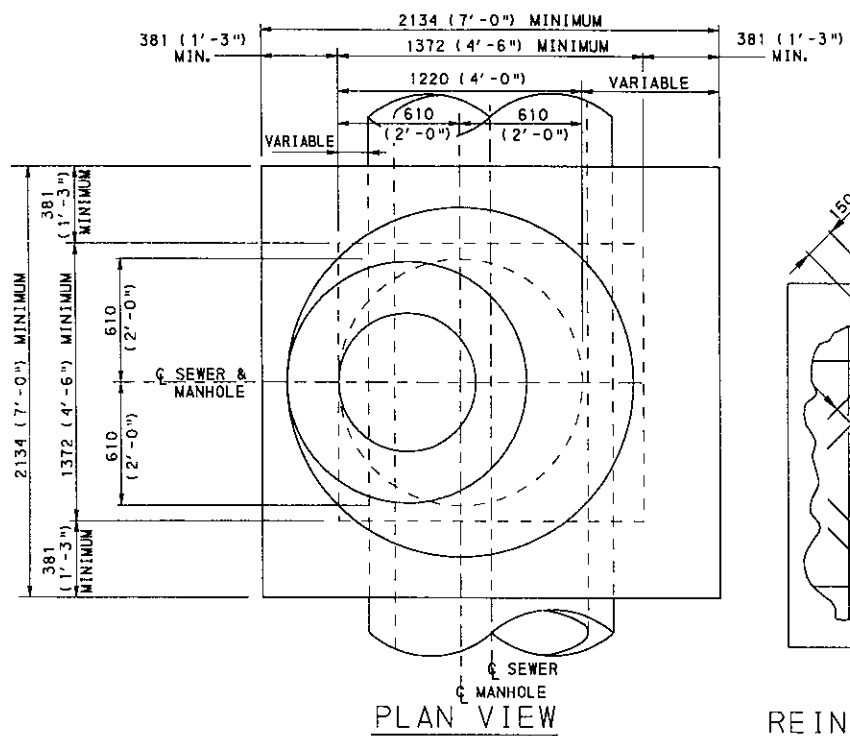
CAST-IN-PLACE	CLASS A
PRECAST	CLASS AA
 - PROVIDE STEEL REINFORCEMENT IN ACCORDANCE WITH ASTM A185, STEEL WELDED WIRE FABRIC ASTM A663/A663M & A675/A675M, PLAIN BILLET STEEL BARS OR ASTM A615/A615M, DEFORMED BILLET STEEL BARS. PROVIDE MINIMUM YIELD STRENGTH OF 400 MPa (60,000 PSI).
 - CLEAR COVER FOR 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 mm/m (0.30 in/ft) WWF FOR DEPTHS TO 9.0 m (30') AND 680 mm/m (0.32 in/ft) WWF FOR DEPTHS GREATER THAN 9.0 m (30') 152 (6") MAXIMUM SPACING FOR WWF.
- FOR FOOTING BOTTOM REINFORCEMENT, BOTH DIRECTIONS, USE NO. 13 (4) BARS AT 480 (18") FOR DEPTHS TO 18.0 m (60') OR 320 mm/m (0.15 in/ft) WWF FOR DEPTHS TO 9.0 m (30') AND 340 mm/m (0.16 in/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.

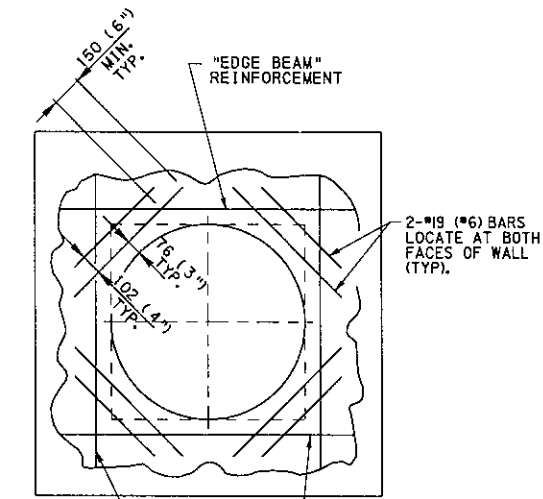
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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STANDARD MANHOLES
CAST-IN-PLACE MANHOLES



PLAN VIEW



REINFORCEMENT DETAILS AT VERTICAL OPENINGS

NOTE: ONLY BOX WITH MAIN REINFORCEMENT SHOWN FOR CLARITY.

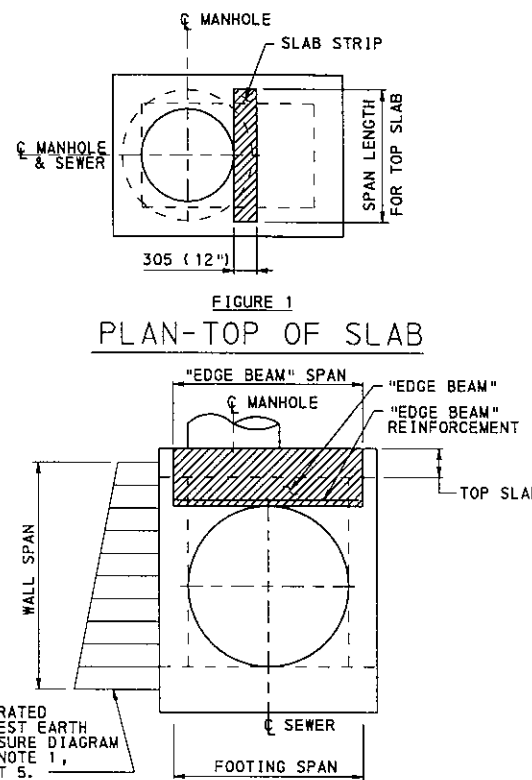


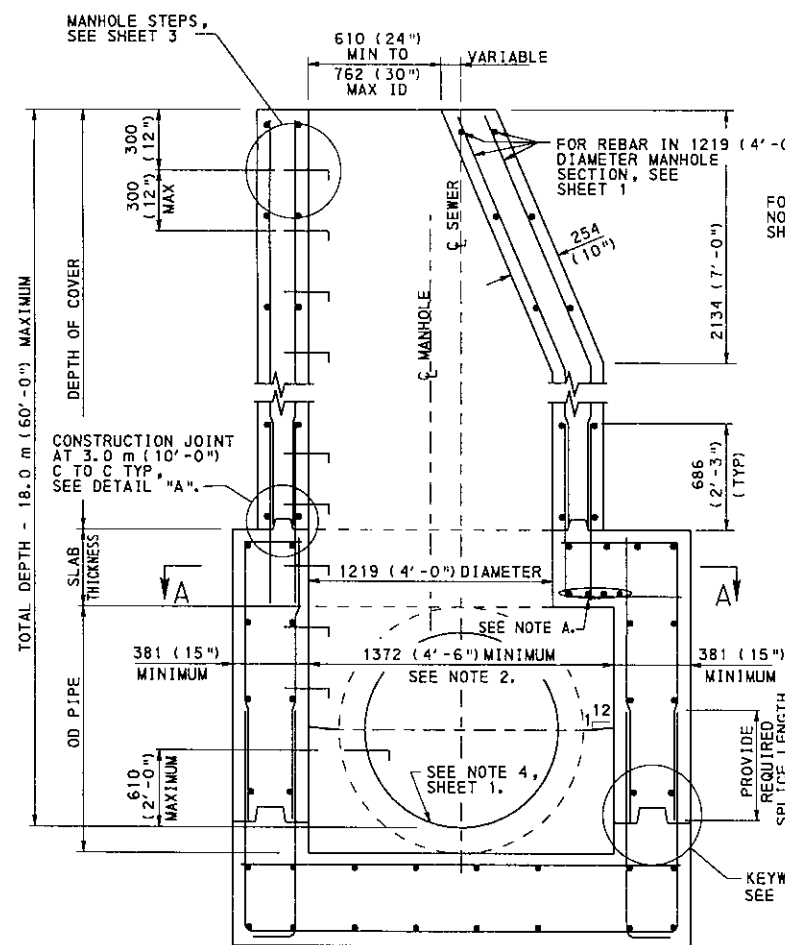
FIGURE 1
PLAN-TOP OF SLAB

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.
 - 3A. 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.
 - 3B. "EDGE BEAM"

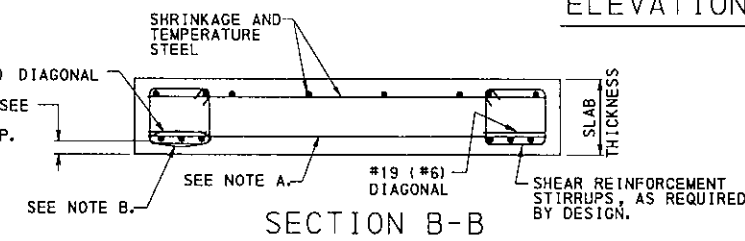
VIEWS SHOWING THE CONFIGURATION OF MANHOLE BOX SECTION ILLUSTRATE "EDGE BEAMS" TO BE THE SAME DEPTH AS THE TOP SLAB. TO ACHIEVE REQUIRED CAPACITY WHERE NECESSARY, INCREASE DEPTH OF "EDGE BEAM" BY PROVIDING ADDITIONAL CLEARANCE BETWEEN THE SLAB AND TOP OF OPENING. LOCATE HORIZONTAL STEEL FOR BEAM ABOVE 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.
 - 3C. 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.
 - 3D. 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.

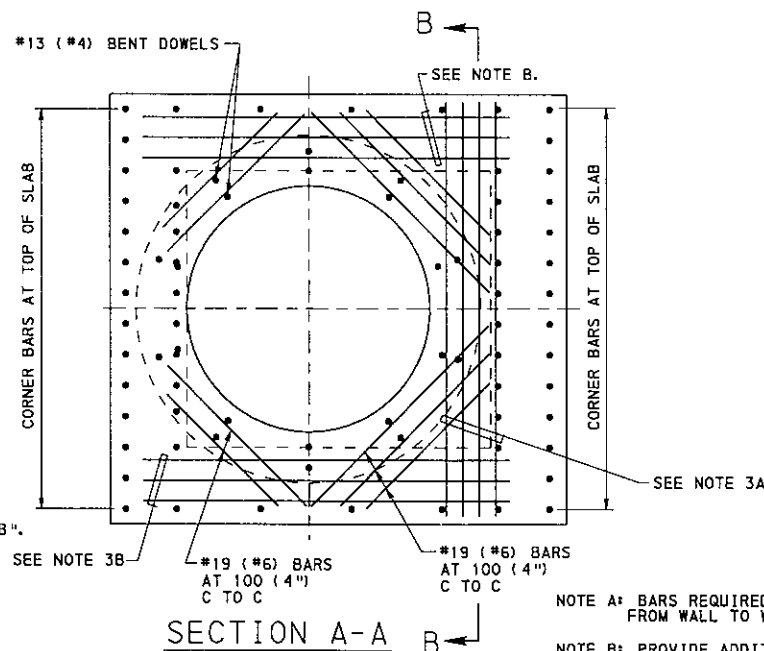


SECTION VIEW
MODIFIED MANHOLE

FOR PIPES GREATER THAN 750 (30") TO 2100 (84") INSIDE DIAMETER

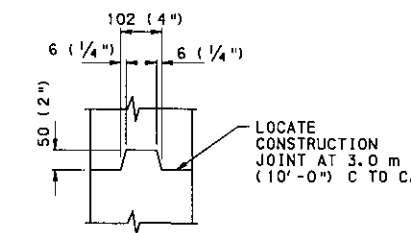


SECTION B-B

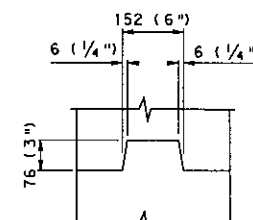


SECTION A-A

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



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.

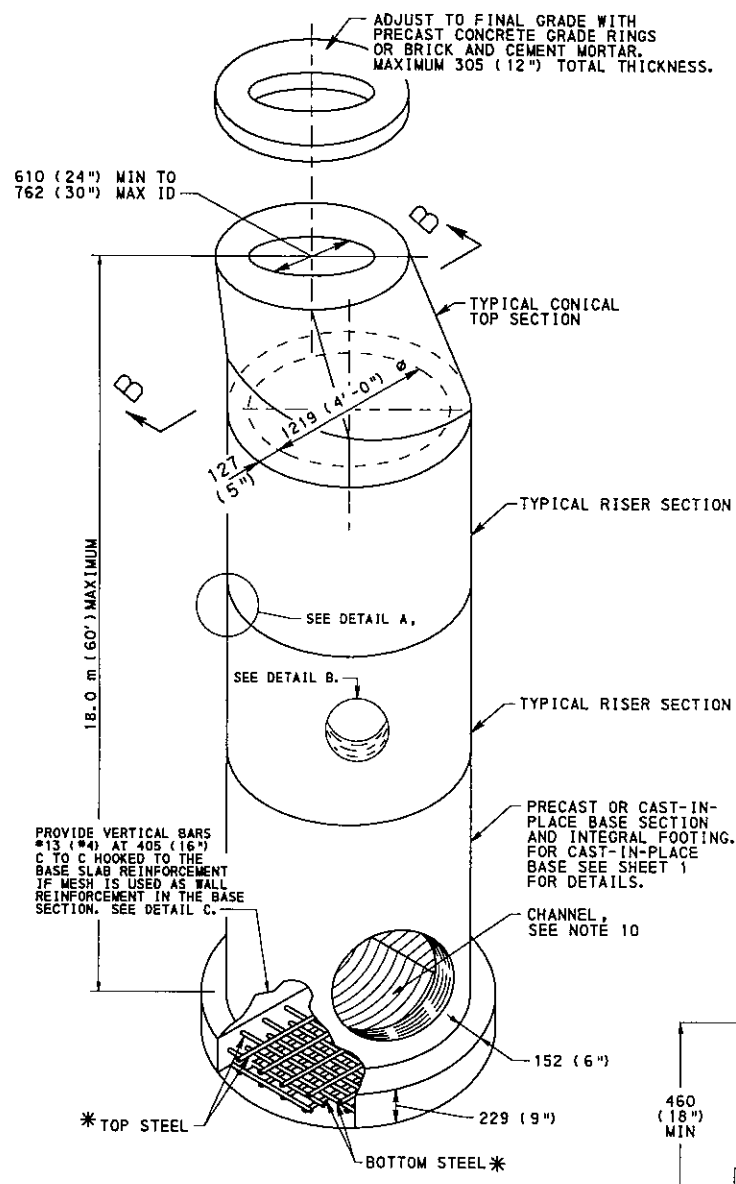
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BUREAU OF DESIGN

STANDARD MANHOLES
MODIFIED
CAST-IN-PLACE MANHOLES

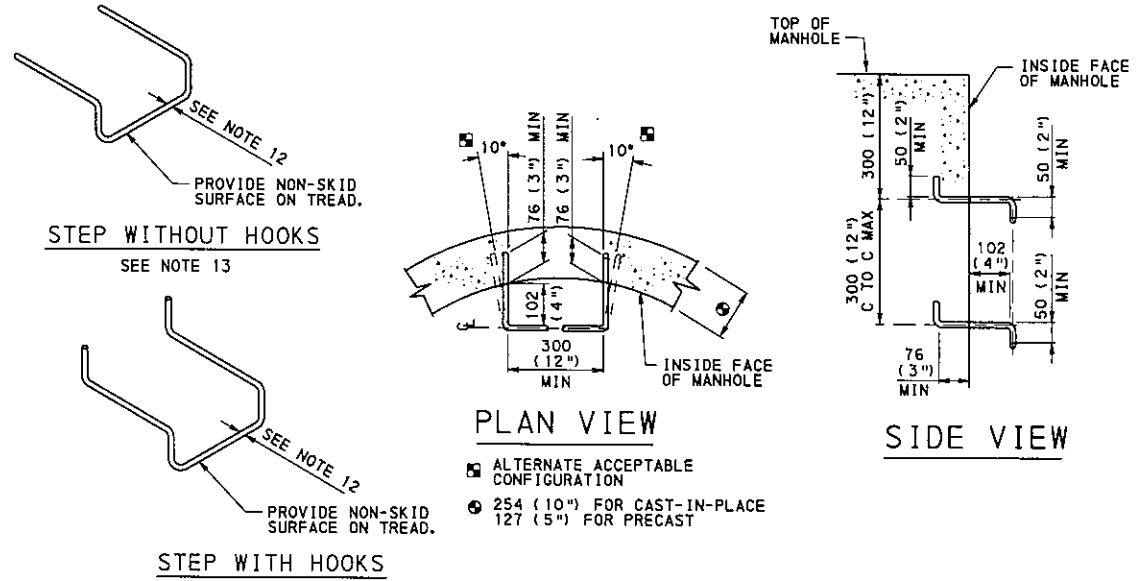
RECOMMENDED APR. 30, 2003
Scott Christen
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED APR. 30, 2003
David A. Schmitt
CHIEF ENGINEER

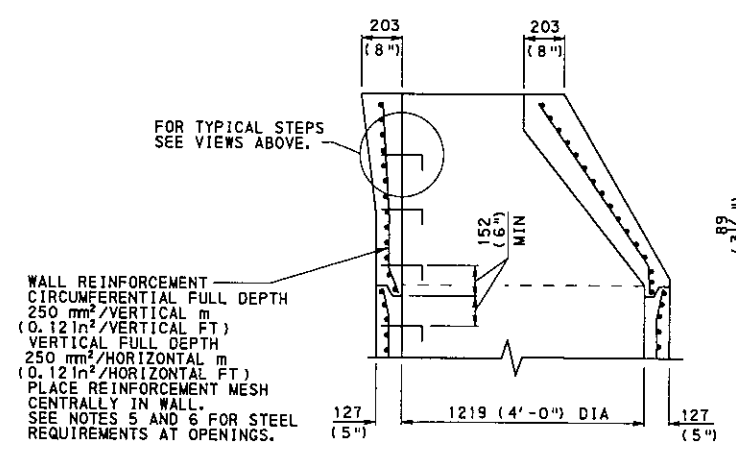
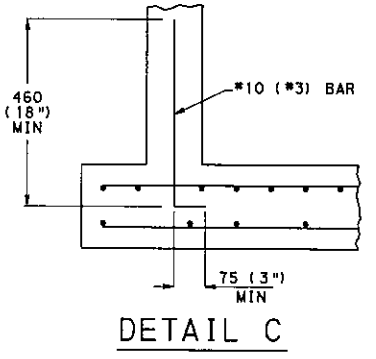
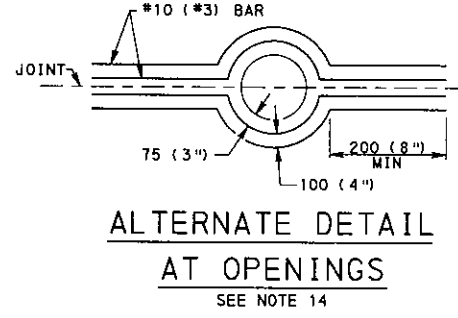
SHT 2 OF 6
RC-39M



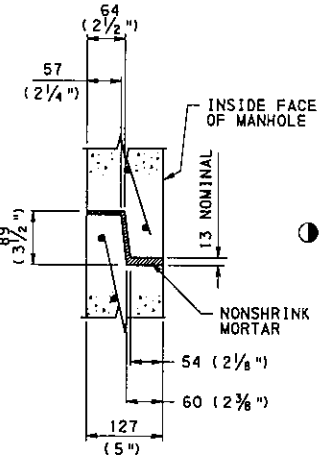
PRECAST MANHOLE
 FOR PIPES 750 (30") INSIDE DIAMETER AND LESS
 *SEE TABLE B FOR BASE SLAB STEEL REQUIREMENTS. PROVIDE WALL REINFORCEMENT DETAILS AT BASE SLAB TYPICAL OF CAST-IN-PLACE MANHOLE. SEE SHEET 1.



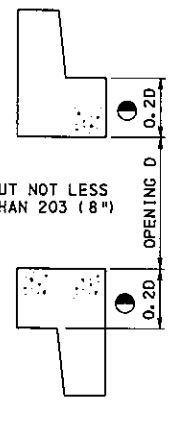
TYPICAL STEP CONFIGURATION
MANHOLE STEPS
 SEE NOTE 11



SECTION B-B



DETAIL A



DETAIL B

TABLE B

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

SEE NOTE 7, SHEET 1

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

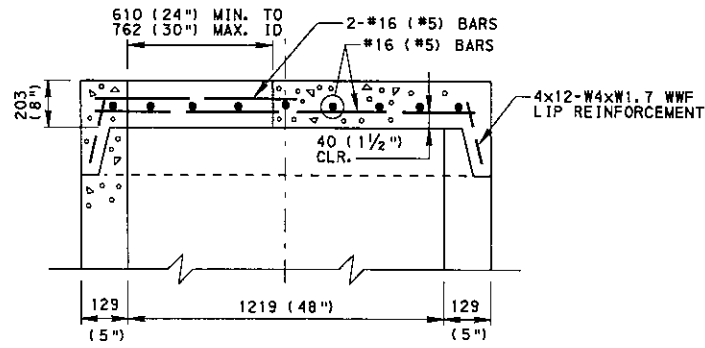
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

STANDARD MANHOLES
PRECAST MANHOLES &
MANHOLE STEPS

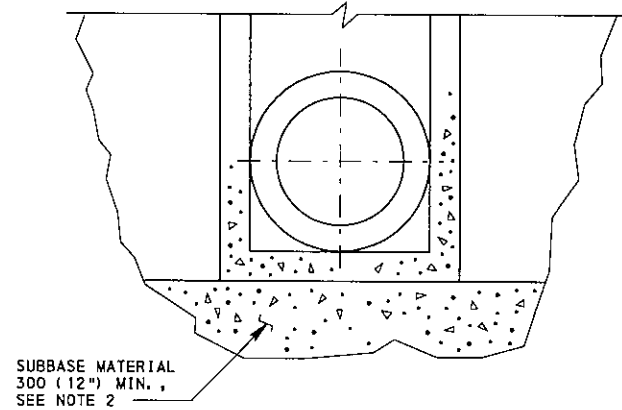
RECOMMENDED APR. 30, 2003
[Signature]
 DIRECTOR, BUREAU OF DESIGN

RECOMMENDED APR. 30, 2003
[Signature]
 CHIEF ENGINEER

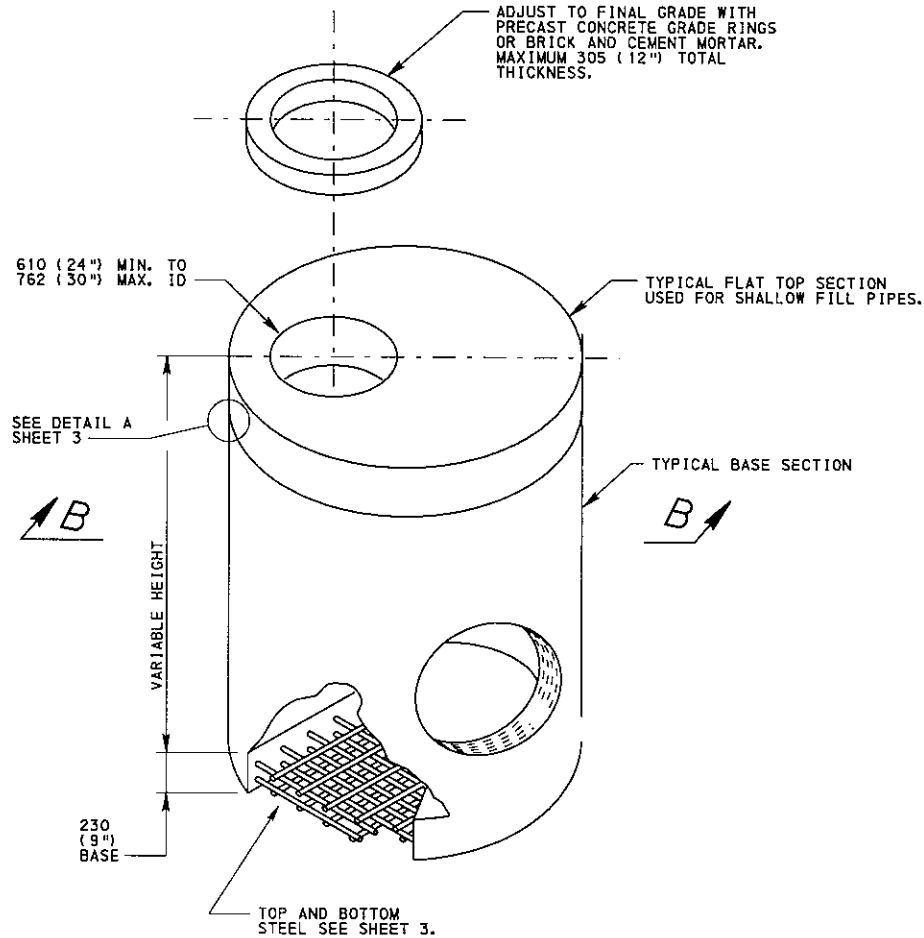
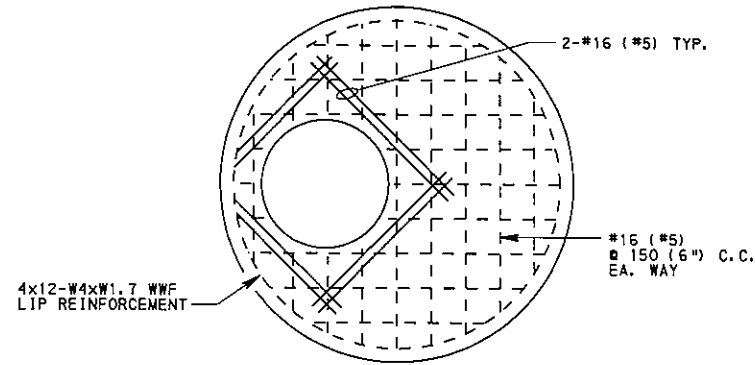
SHT 3 OF 6
 RC-39M



SECTION B-B



PRECAST MANHOLE
BASE PREPARATION



NOTES:

1. PRECAST MANHOLES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 714, MAY BE SUBSTITUTED FOR THE STANDARD CAST-IN-PLACE MANHOLE. FOR DEVIATION OR MODIFICATION OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR APPROVAL.
2. PLACE SUBBASE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350.2, IN LAYERS 100 (4") THICK, COMPACTED TO A DENSITY SATISFACTORY TO THE ENGINEER AND INCIDENTAL TO THE MANHOLE PAY ITEM.
3. FOR ALL OTHER DESIGN REQUIREMENTS AND APPLICABLE NOTES, SEE SHEET 3.

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

COMMONWEALTH OF PENNSYLVANIA
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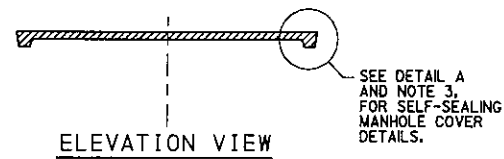
STANDARD MANHOLES
COVERS, FRAMES AND
ADJUSTMENT RISERS

RECOMMENDED APR. 30, 2003	RECOMMENDED APR. 30, 2003	SHT 4 OF 6
<i>Scott Christman</i> DIRECTOR, BUREAU OF DESIGN	<i>Sean A. Schum</i> CHIEF ENGINEER	RC-39M

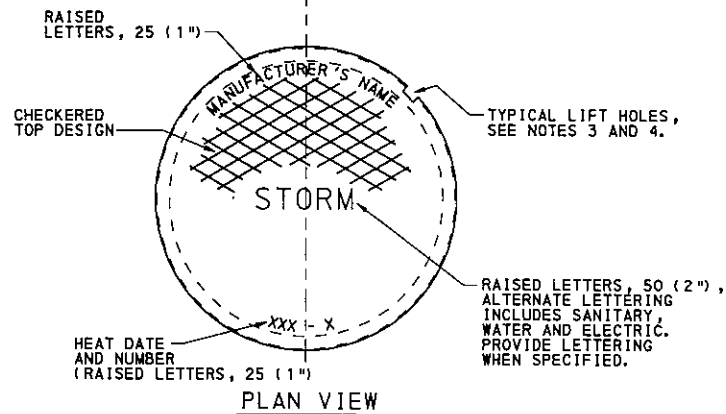
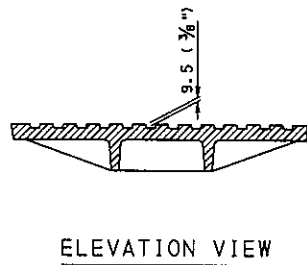
NOTES

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-36M.
 - C. REQUIRE FULL CIRCUMFERENTIAL WELDS ON BOTH TOP AND BOTTOM RINGS. MAKE THE INNER WELD A BEVEL GROOVE WELD (FLUSH FINISH) FOR PROPER SEATING OF MANHOLE LID AND MAKE THE OUTER WELD A FILLET WELD.
 - D. MAKE THE MINIMUM WIDTH OF BOTTOM AND TOP BAR STOCK 25 (1") AND 10 (3/4"), 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.

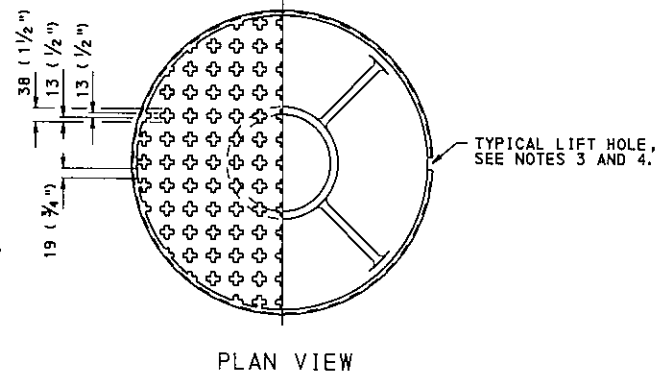
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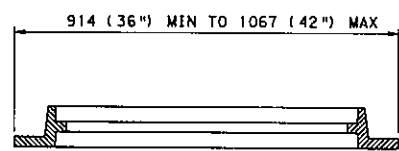
SEE DETAIL A AND NOTE 3, FOR SELF-SEALING MANHOLE COVER DETAILS.



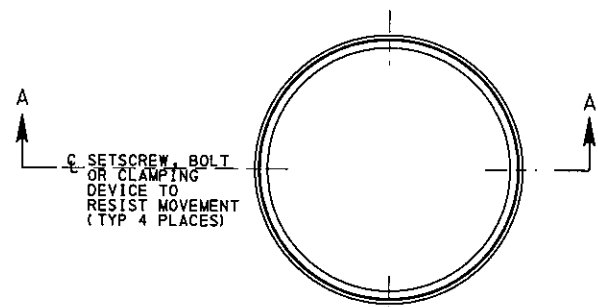
CAST IRON MANHOLE COVER
(PLATEN COVER)



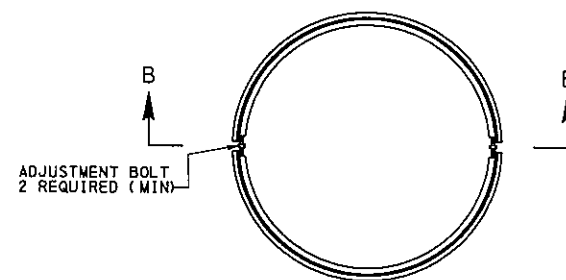
CAST IRON MANHOLE COVER
(STANDARD COVER)



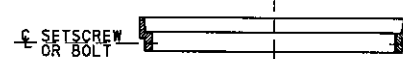
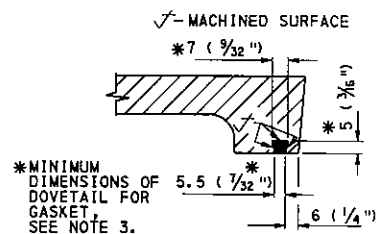
ELEVATION VIEW OF MANHOLE FRAME



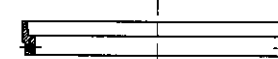
ONE PIECE ADJUSTMENT RISER



MULTI-PIECE ADJUSTMENT RISER



SECTION A-A



SECTION B-B

ADJUSTMENT RISERS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD MANHOLES
COVERS, FRAMES AND
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)
 - $\beta =$ ANGLE OF INTERNAL FRICTION = 33°
 - DRY AT REST EARTH PRESSURE = $K_0 \gamma_E = 0.001(1 - \sin \beta) \gamma_E$
 $= 0.001 \times 0.46 \times 1920 \times 9.81 = 8.7 \text{ MPa}$
 - SATURATED AT REST EARTH PRESSURE = $K_0 [\gamma_E - \gamma_W] + \gamma_W$
 $= 0.46 [(1920)(9.81) - 9.81] + 9.81 = 14.0 \text{ MPa}$
 - (SATURATED AT REST EARTH PRESSURE = $0.46 \times 120 = 55 \text{ P.C.F.}$)
 $= 0.46 (\gamma_E - \gamma_W) + \gamma_W = 0.46 \times (120 - 62.4) + 62.4 = 89 \text{ P.C.F.}$

- 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:

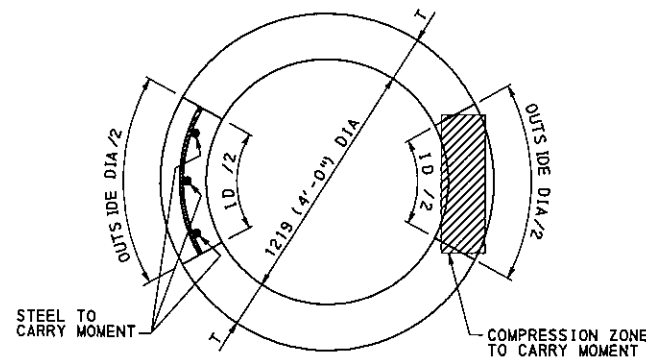
- A. THIS PROCEDURE IS REQUIRED ONLY WHEN A SIGNIFICANT LOADING EXISTS ON ONE SIDE OF THE MANHOLE AND LIMITED SUPPORT IS PROVIDED ON THE OTHER.
- B. DETERMINE MINIMUM AND MAXIMUM VERTICAL LOAD APPLIED TO MANHOLE AT DEPTH "H".
- C. DETERMINE OVERTURNING MOMENT FROM UNBALANCED EARTH PRESSURE.
- D. DETERMINE DIMENSIONS OF DESIGN SECTION TO CARRY MOMENT AS SHOWN IN FIGURE 1.

EQUIVALENT RECTANGULAR COMPRESSION ZONE DIMENSIONS TO CARRY MOMENT:
 T MILLIMETERS BY $\frac{1}{4}$ 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.

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

(98 kips/FT)



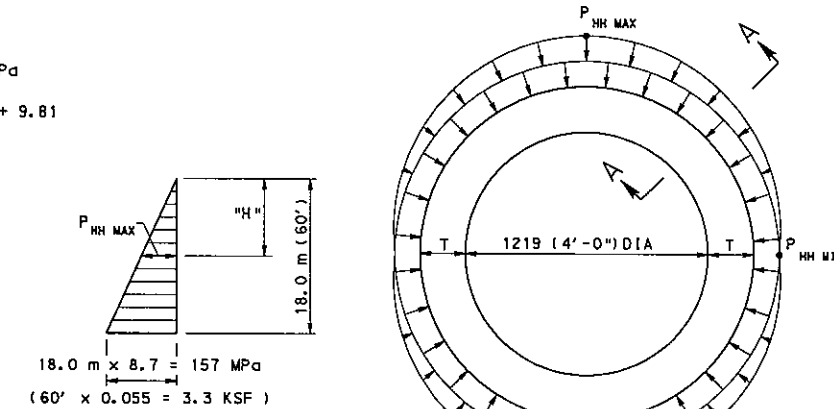
DESIGN SECTION TO CARRY MOMENT
 FIGURE 1

3. HOOP STEEL:

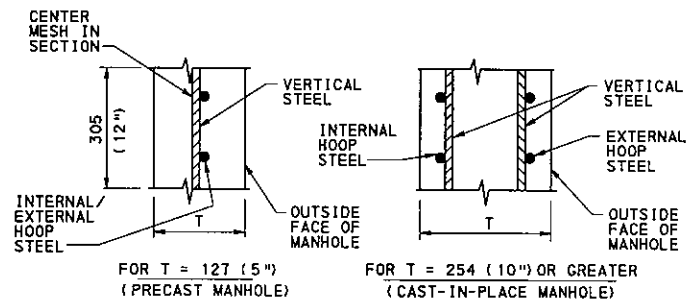
- A. DETERMINE SERVICE MOMENTS AND AXIAL THRUSTS USING FIGURE 2 AND FIGURE 3. $P_{HH \text{ MIN}}$ NOT TO BE GREATER THAN ONE-HALF OF $P_{HH \text{ MAX}}$.
- B. DESIGN HOOP REINFORCEMENT SHOWN IN SECTION A-A, TO CARRY THE MOMENT AND AXIAL THRUST.
- C. CHECK CRACK CONTROL UNDER SERVICE LOAD.

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

(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)

SECTION A-A - DESIGN SECTION

4. FOOTING DESIGN:

- A. DETERMINE FOOTING SIZE (USE AN EQUIVALENT CIRCULAR FOOTING FOR DESIGN)

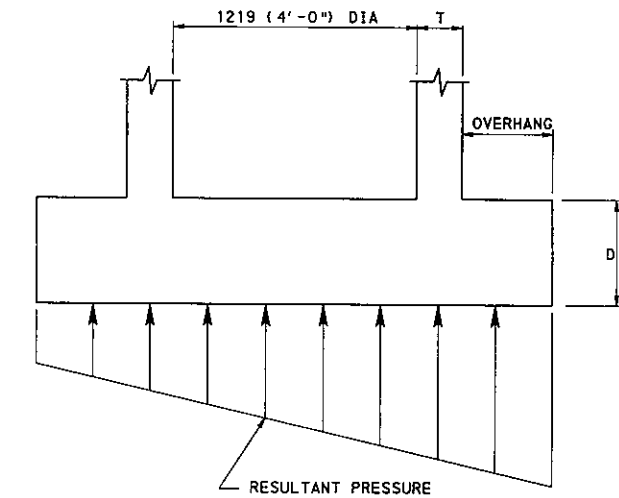
$$\frac{P + M}{A S} < 290 \text{ KPa (3.0 KSF) OR MAXIMUM ALLOWABLE BEARING PRESSURE}$$

$$P = DL + LL + EP$$
 - DL = DEAD LOAD OF MANHOLE
 - LL = PHL 93 (HS25) 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.

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

(98 kips/FT)



DIAMETRICAL SECTION THROUGH FOOTING
 FIGURE 4

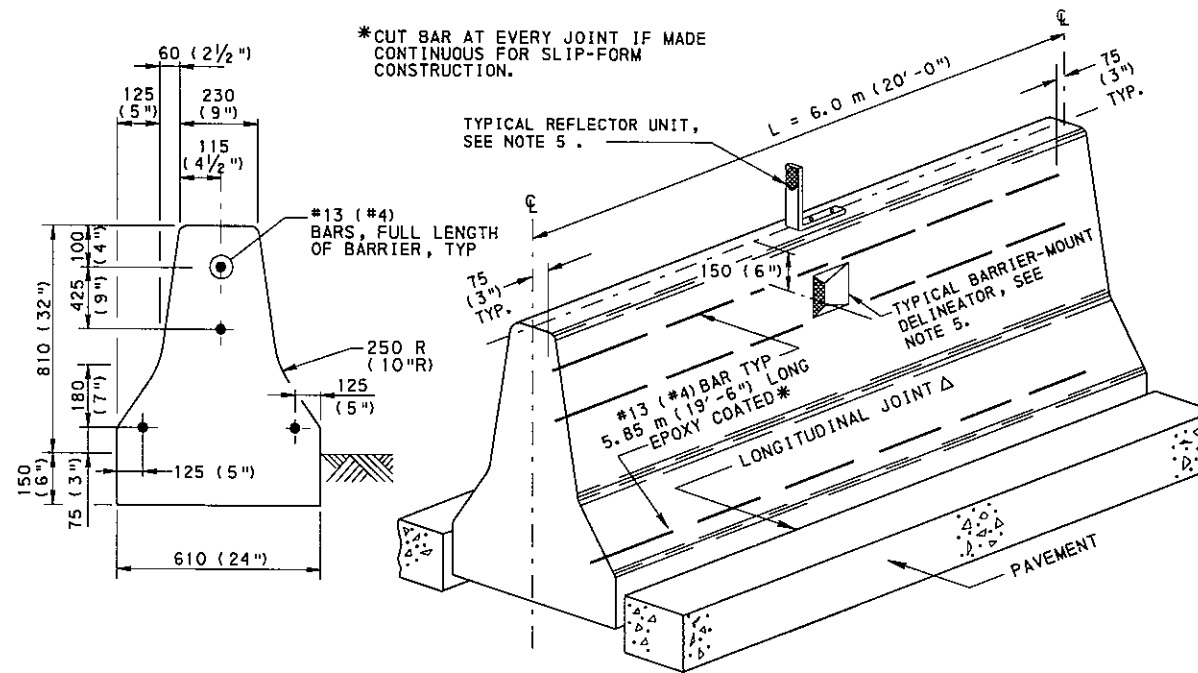
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COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

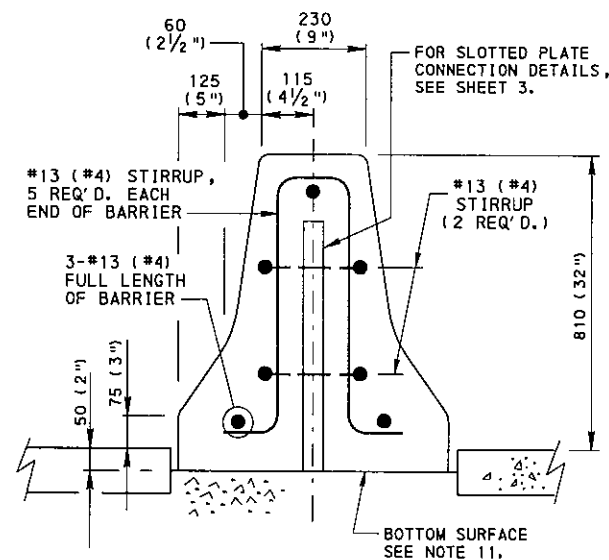
STANDARD MANHOLES
 DESIGN PROCEDURE

NOTES

- PROVIDE CONCRETE MEDIAN BARRIER MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 623.
 - MINIMUM CONCRETE CLASS: AA, EXCEPT USE CLASS AAA CONCRETE FOR PRECAST BARRIER.
- PROVIDE PRECAST CONCRETE BARRIER SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. FOR DEVIATIONS OR MODIFICATIONS OF THE STANDARDS, SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL.
- FOR CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION, USE PREMOLDED JOINT MATERIAL AT ALL CONSTRUCTION JOINTS.
- CONCRETE MEDIAN BARRIER CONSTRUCTION ON EXISTING PAVEMENT REQUIRES SPECIAL DETAILS TO BE SHOWN ON THE CONSTRUCTION DRAWINGS.
- FOR PERMANENT AND TEMPORARY BARRIER INSTALLATIONS, USE SIDE-MOUNT (BARRIER-MOUNT DELINEATOR) OR TOP-MOUNT DELINEATORS (BARRIER-MOUNT DELINEATOR OR REFLECTOR UNIT) AS DETERMINED ON A PROJECT BY PROJECT BASIS. LOCATE SIDE-MOUNT DELINEATORS 660 (26") FROM THE PAVEMENT TO THE CENTER OF THE DELINEATOR. INSTALL TOP-MOUNT DELINEATORS AS FOLLOWS:
 - CENTER BARRIER-MOUNT DELINEATOR ALONG LONGITUDINAL CENTERLINE OF MEDIAN BARRIER.
 - LOCATE REFLECTOR UNITS AS SHOWN ON TRAFFIC STANDARD TC-7604.
 FOR PERMANENT INSTALLATIONS, PLACE DELINEATORS AT A MAXIMUM LONGITUDINAL SPACING OF 25 m (80'-0") FOR TANGENT SECTIONS AND 12 m (40'-0") FOR CURVE SECTIONS WITH A HORIZONTAL RADIUS LESS THAN 305 m (1000').
- COMPACT NO. 2A OR NO. OGS MATERIAL IN ACCORDANCE WITH PUBLICATION 408, SECTION 350. A LAYER 25 (1") THICK OF NON-SHRINK MORTAR MAY BE USED ON TOP OF THE SUBBASE MATERIAL FOR LEVELING PURPOSES. A RIGID BASE MAY BE USED INSTEAD OF SUBBASE.
- PROVIDE PRECAST CONCRETE MEDIAN BARRIER FOR USE AS TEMPORARY (MPT) AND IN PERMANENT INSTALLATIONS. FOR TEMPORARY INSTALLATIONS, EMBEDMENT IS NOT REQUIRED.
- ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.
- FABRICATE REINFORCEMENT BARS ACCORDING TO PENNDOT BRIDGE CONSTRUCTION STANDARD, BC-736M.
- TO LIMIT LATERAL DISPLACEMENT OF PORTABLE BARRIER WHEN USED IN WORK ZONES, PROVIDE A ROUGH FINISH AT THE BOTTOM SURFACE. BEFORE THE CONCRETE HAS INITIALLY SET, FINISH THE BOTTOM SURFACE WITH STIFF, WIRE BRUSH OR SPECIAL TEMPLATE IN A LONGITUDINAL DIRECTION TO PRODUCE SCORES APPROXIMATELY 4 (1/8") IN DEPTH.

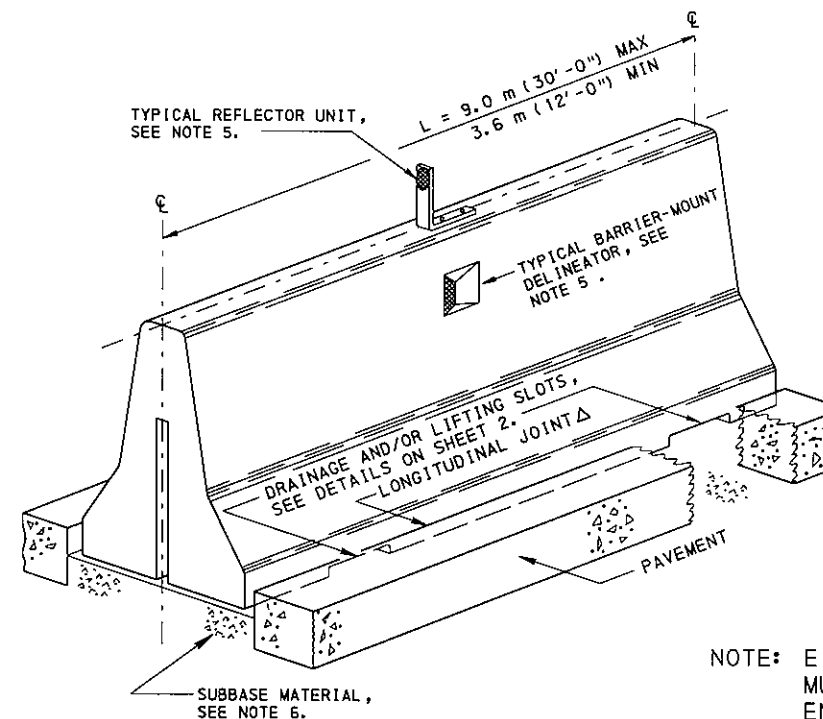


TYPICAL CAST-IN-PLACE BARRIER



TYPICAL PRECAST BARRIER

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



△ SEAL JOINTS WITH AN APPROVED JOINT SEALER.

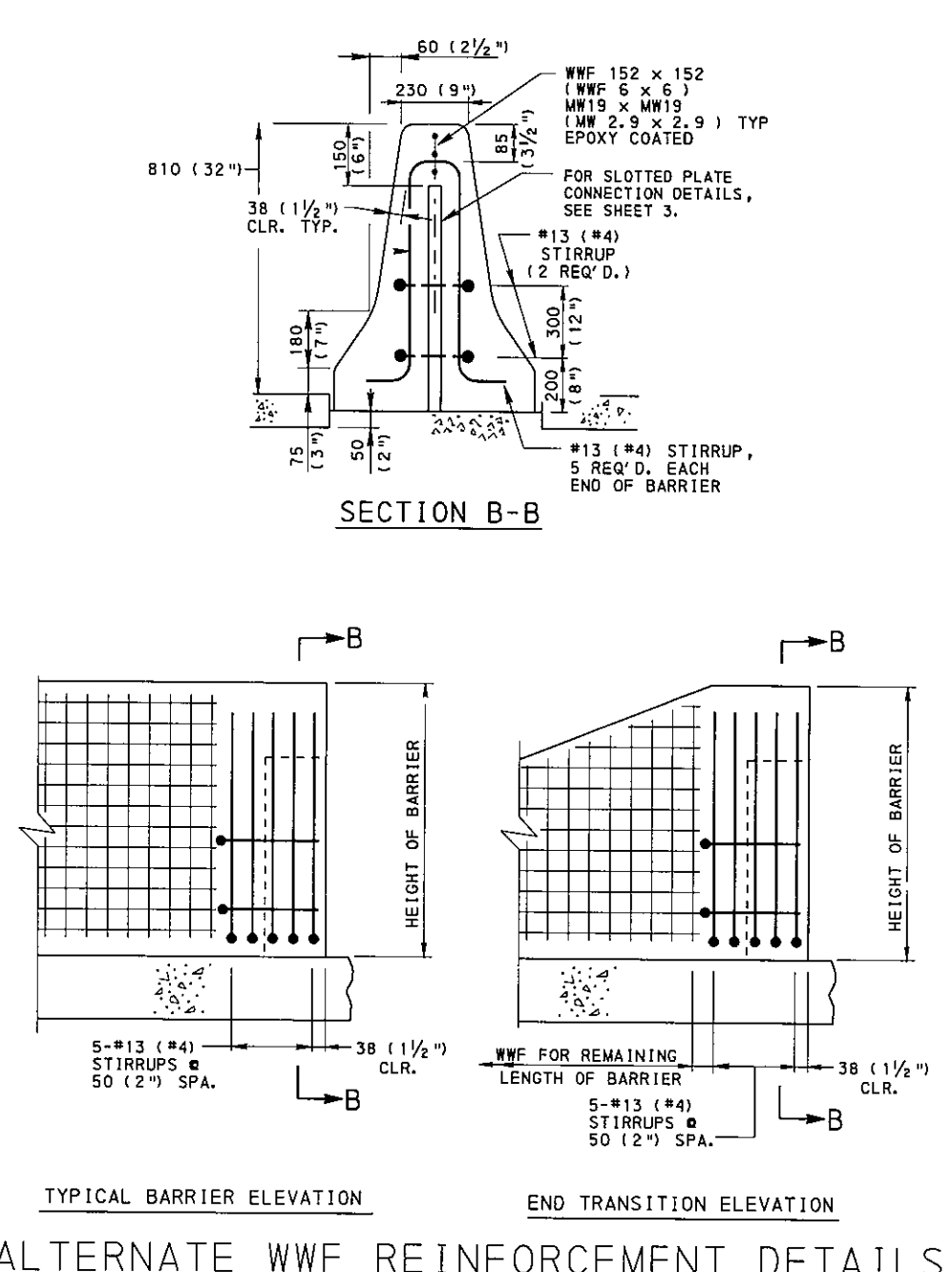
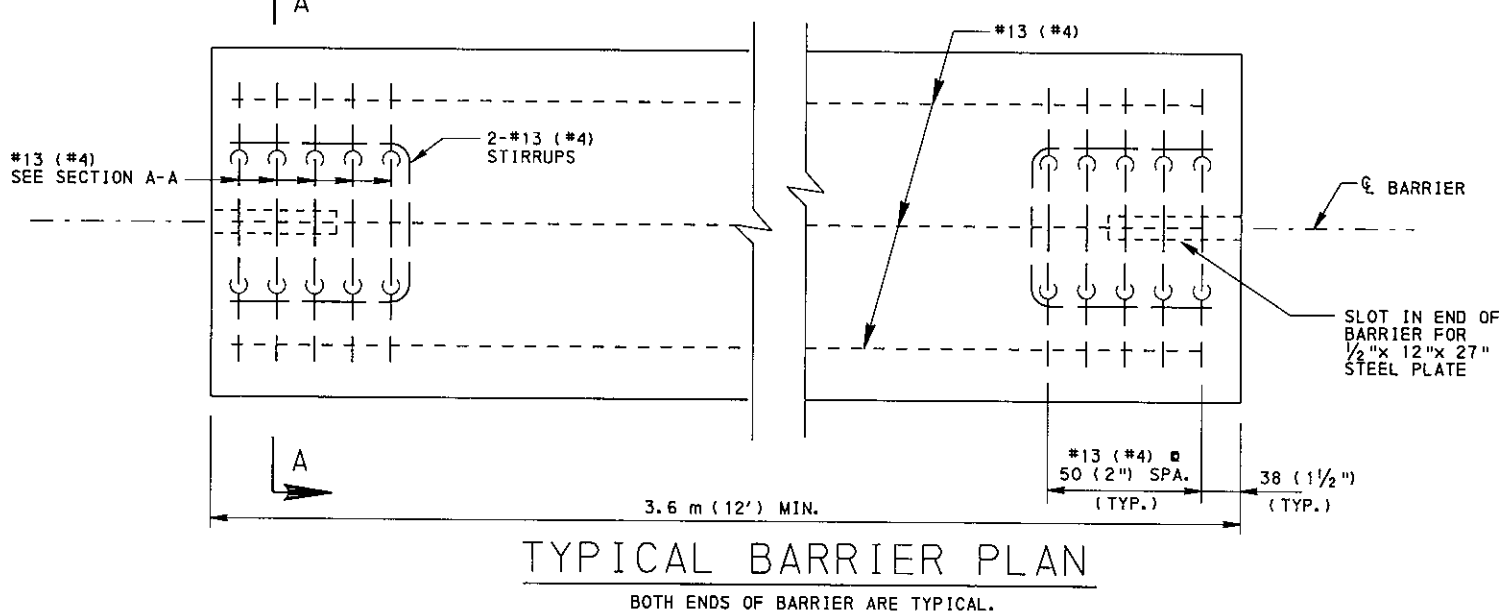
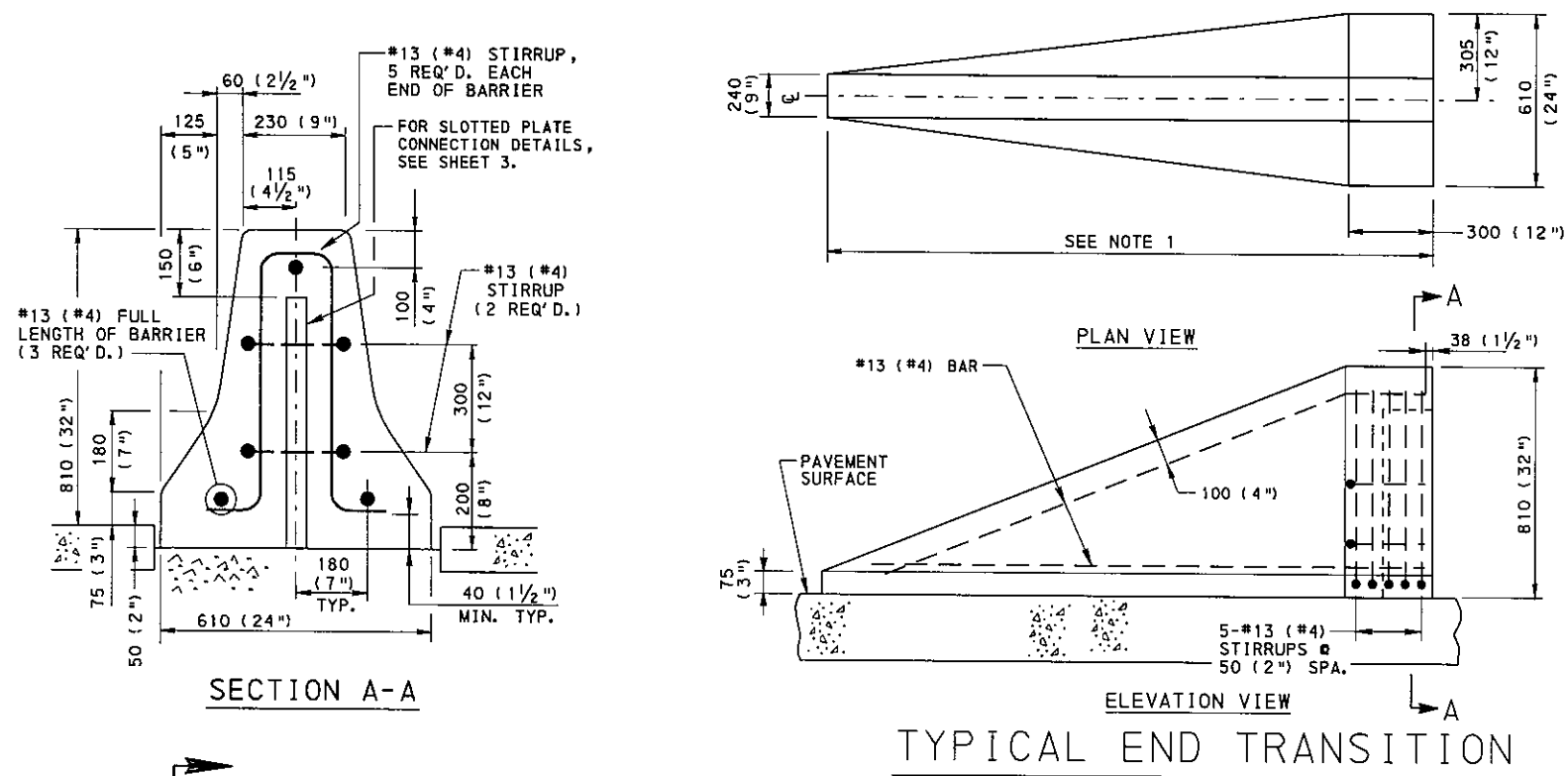
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COMMONWEALTH OF PENNSYLVANIA
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CONCRETE MEDIAN BARRIER
F-SHAPE

BC-736M	REINFORCEMENT BAR FABRICATION DETAILS
REFERENCE DRAWINGS	

RECOMMENDED APR. 30, 2003	RECOMMENDED APR. 30, 2003	SHT 1 OF 8
<i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	<i>Dean A. Schaefer</i> CHIEF ENGINEER	RC-57M



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

NOTES

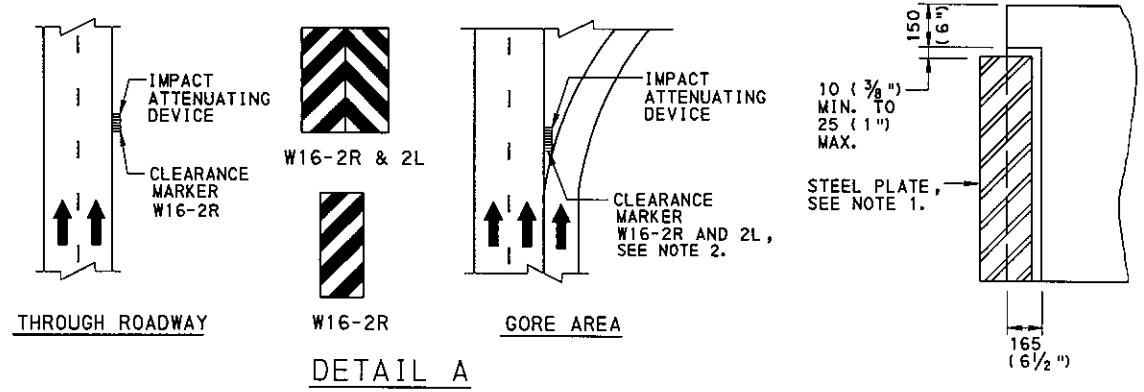
- A TYPICAL END TRANSITION MAY BE USED FOR PERMANENT BARRIER INSTALLATIONS ONLY WHEN THE LAST BARRIER SECTION IS LOCATED OUTSIDE THE REQUIRED CLEAR ZONE, AS DETERMINED IN PUBLICATION 13M, DESIGN MANUAL, PART 2, CHAPTER 12. A 20:1 SLOPED END TRANSITION IS ACCEPTABLE FOR PERMANENT INSTALLATIONS WHERE THE 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.
- PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING, INSTALLING AND REMOVING PRECAST CONCRETE BARRIER. GALVANIZE METAL DEVICES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(a).
- PROVIDE REINFORCEMENT STEEL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709 WITH A MINIMUM CONCRETE COVER OF 40 (1 1/2").
- 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(a).
- 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.

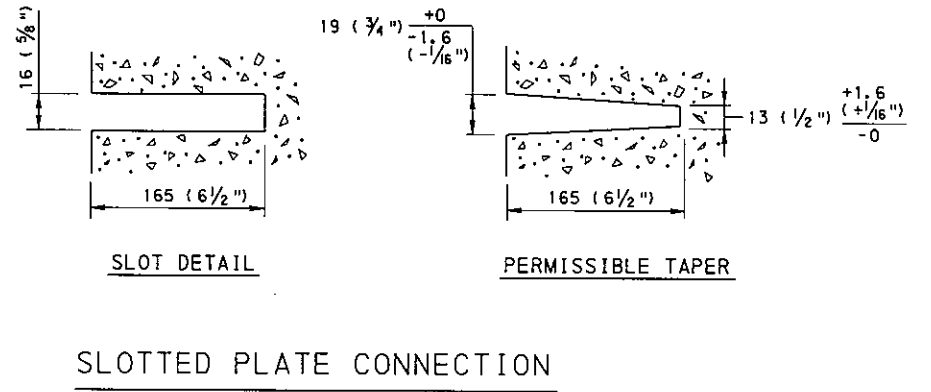
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED APR. 30, 2003 <i>Scott Christian</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 30, 2003 <i>Alan P. Schmitt</i> CHIEF ENGINEER	SHT 2 OF 8 RC-57M
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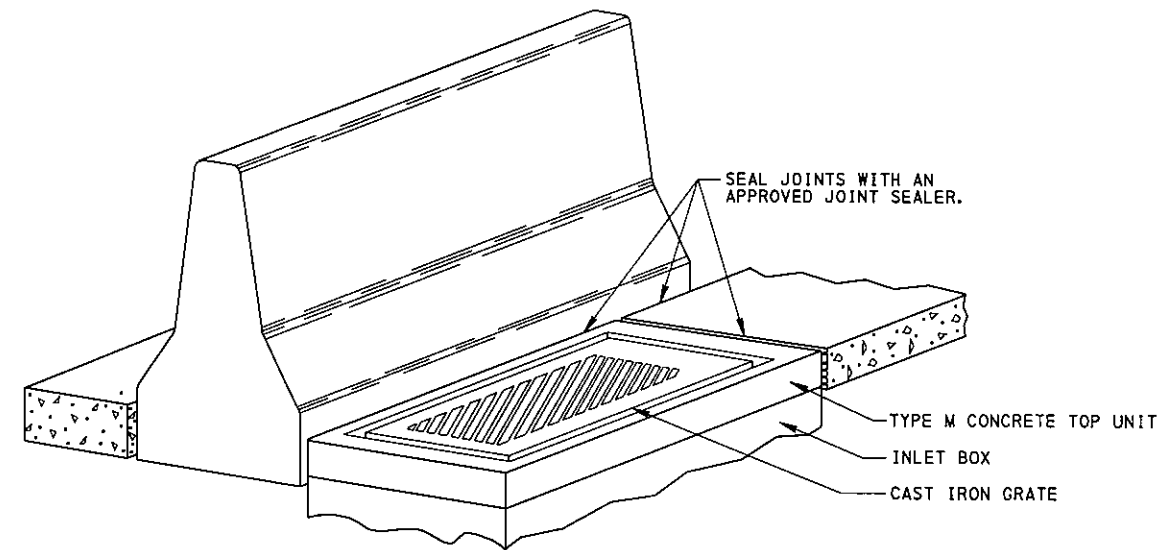
DETAIL A
 DELINEATION OF IMPACT ATTENUATING DEVICES



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(a). GALVANIZE PLATES AS SPECIFIED IN PUBLICATION 408, SECTION 1105.02(b).
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

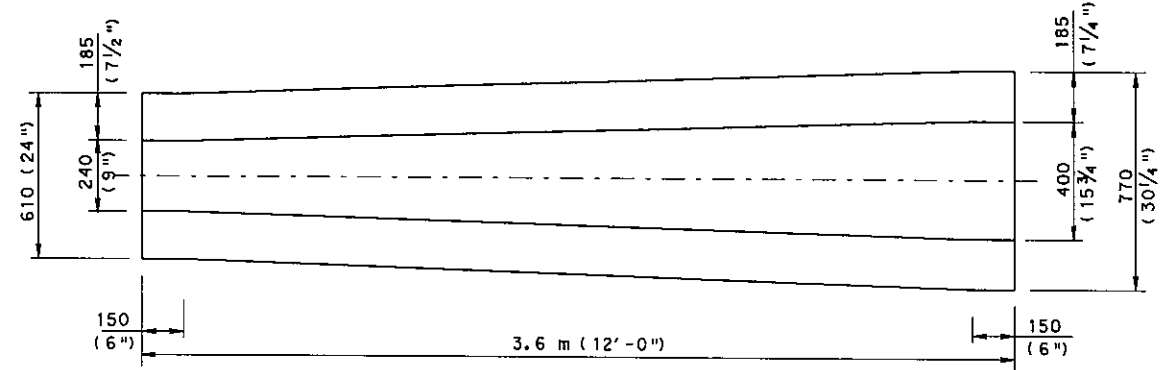
DESIGN SPEED	MAXIMUM FLARE RATES	
	CONCRETE BARRIER	GUIDE RAIL
120	20 : 1	15 : 1
110	20 : 1	15 : 1
105	19 : 1	15 : 1
100	18 : 1	14 : 1
90	16 : 1	12 : 1
80	14 : 1	11 : 1
70	12 : 1	10 : 1
65	11 : 1	9 : 1
60	10 : 1	8 : 1
50	8 : 1	7 : 1

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

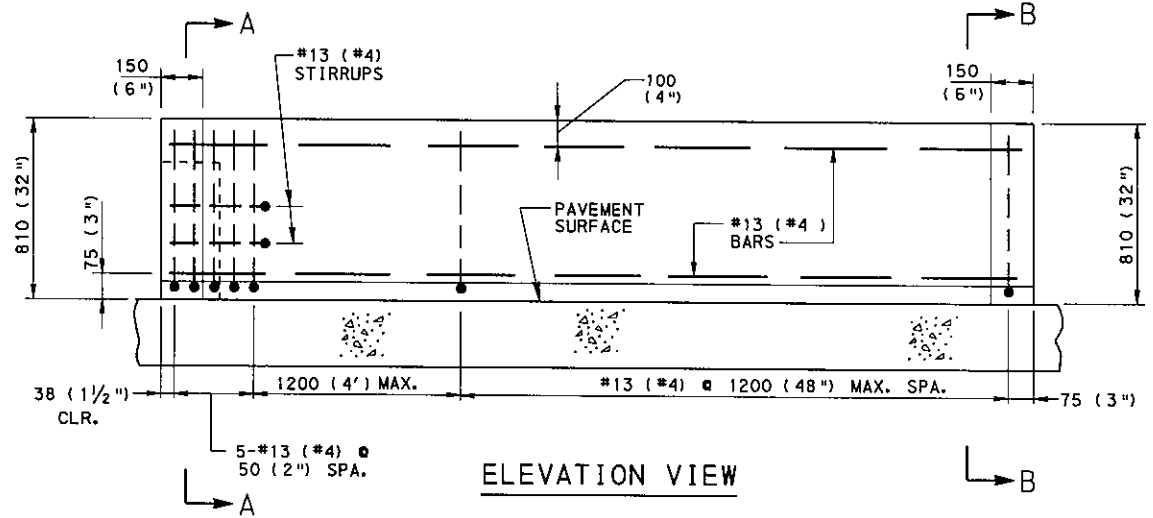
COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
 F-SHAPE

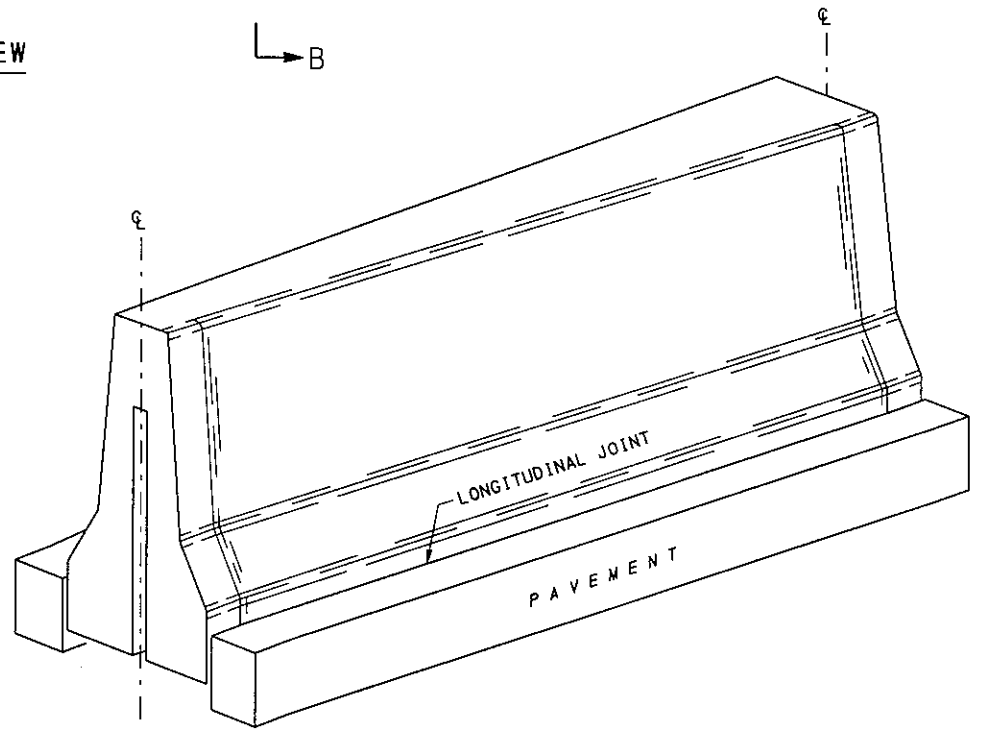
RECOMMENDED APR. 30, 2003 <i>Scott Christy</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 30, 2003 <i>Dean A. Schmitt</i> CHIEF ENGINEER	SHT 3 OF 8 RC-57M
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PLAN VIEW



ELEVATION VIEW

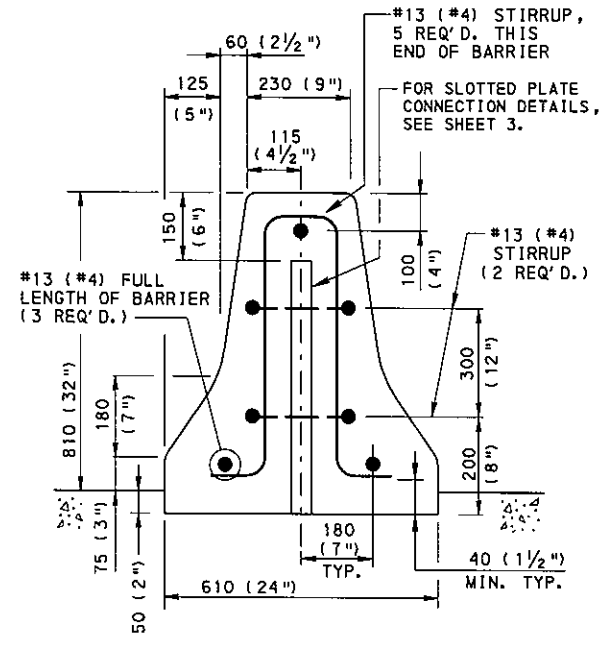


ORTHOGRAPHIC VIEW

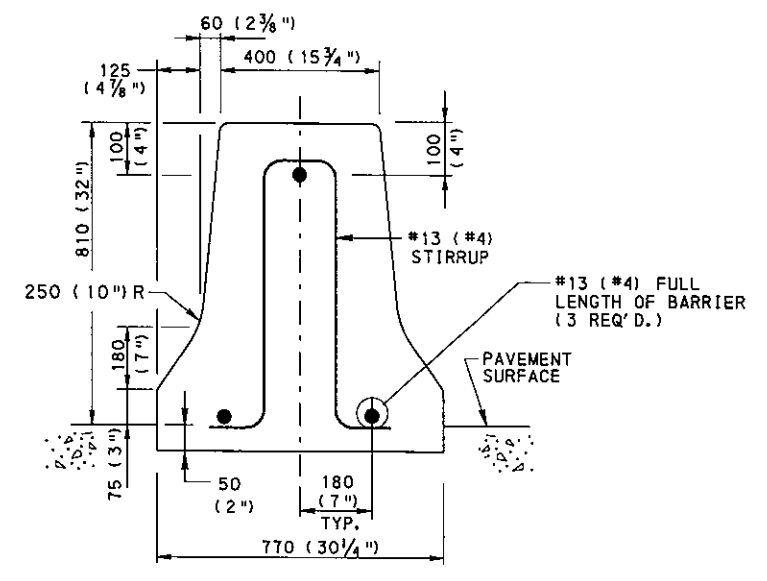
TYPICAL 810 TO 810 (32" TO 32")

BRIDGE TO HIGHWAY TRANSITION

(THE BRIDGE BARRIER IS A CONCRETE MEDIAN BARRIER)



SECTION A-A



SECTION B-B

(ADJACENT TO BRIDGE WITH CONCRETE MEDIAN BARRIER)

NOTES

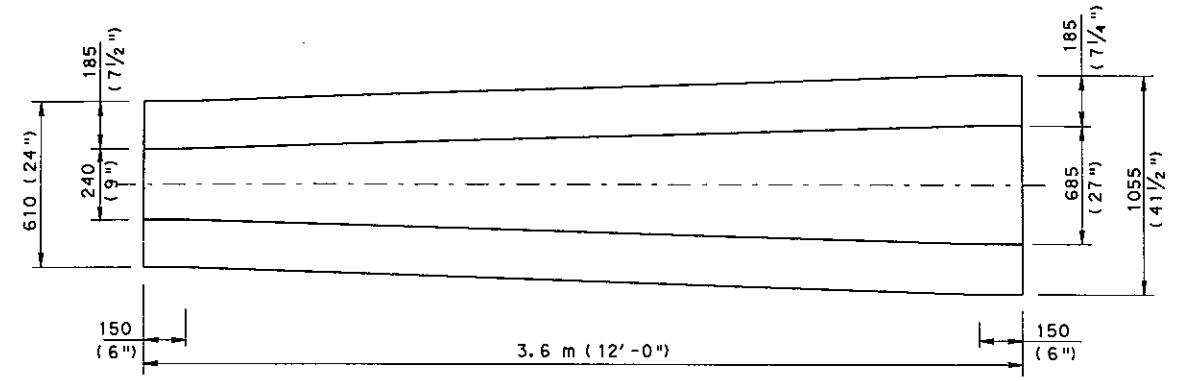
1. PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709.
2. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
3. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.

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

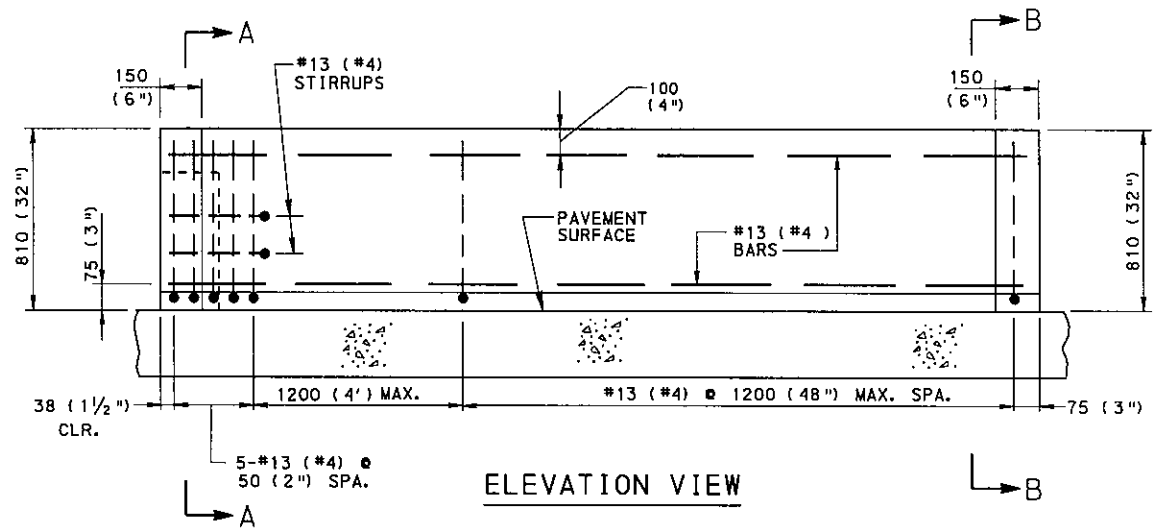
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

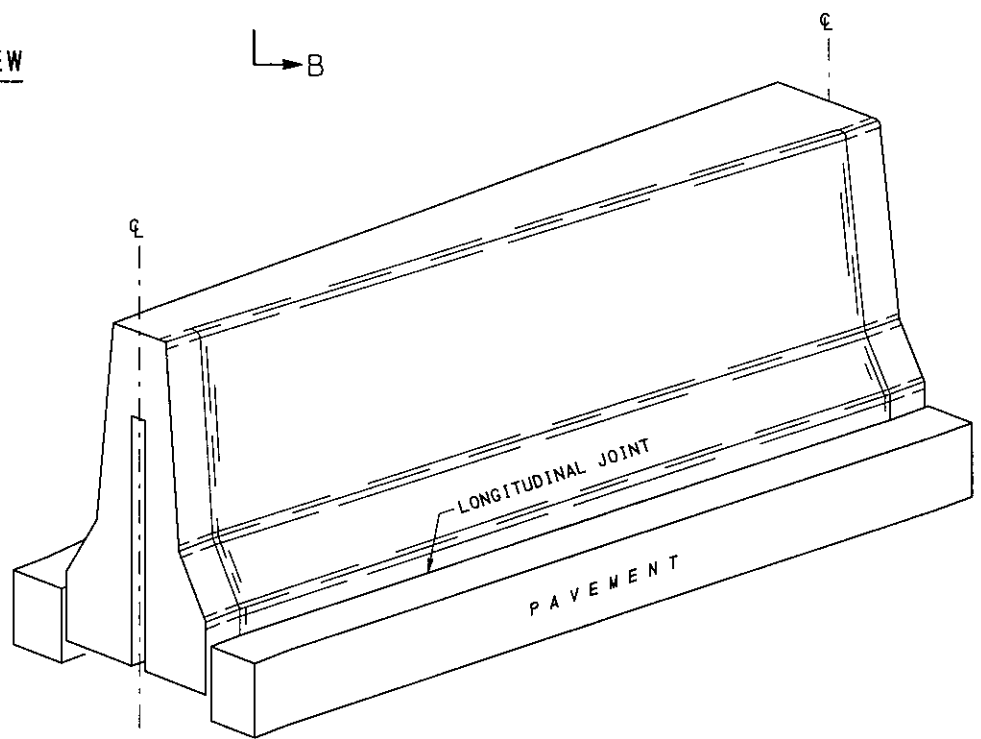
RECOMMENDED APR. 30, 2003	RECOMMENDED APR. 30, 2003	SHT 4 OF 8
<i>Scott Christ</i> DIRECTOR, BUREAU OF DESIGN	<i>Dean A. Schir</i> CHIEF ENGINEER	RC-57M



PLAN VIEW

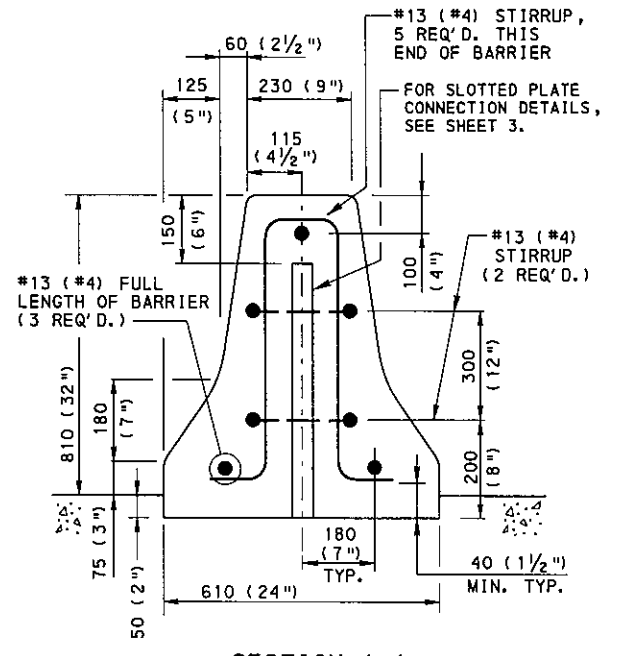


ELEVATION VIEW

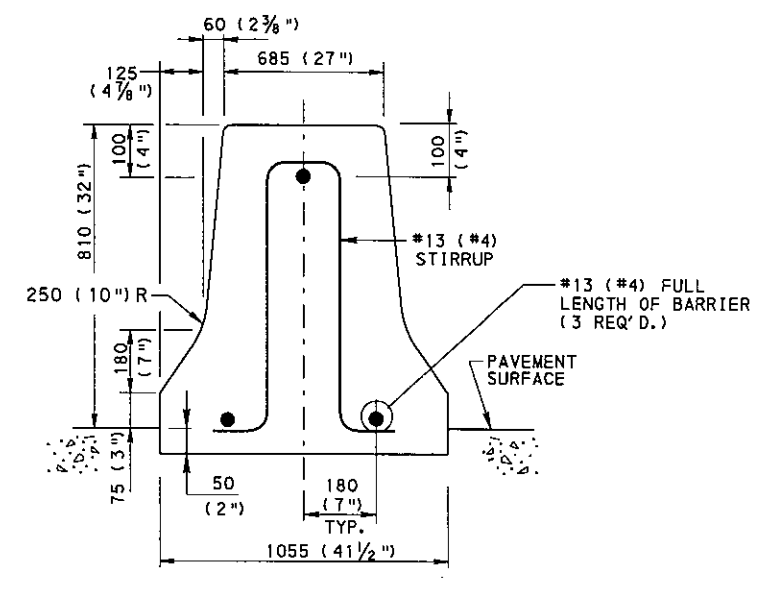


ORTHOGRAPHIC VIEW

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



SECTION A-A



SECTION B-B

(ADJACENT TO BRIDGE WITH SPLIT CONCRETE MEDIAN BARRIER)

NOTES

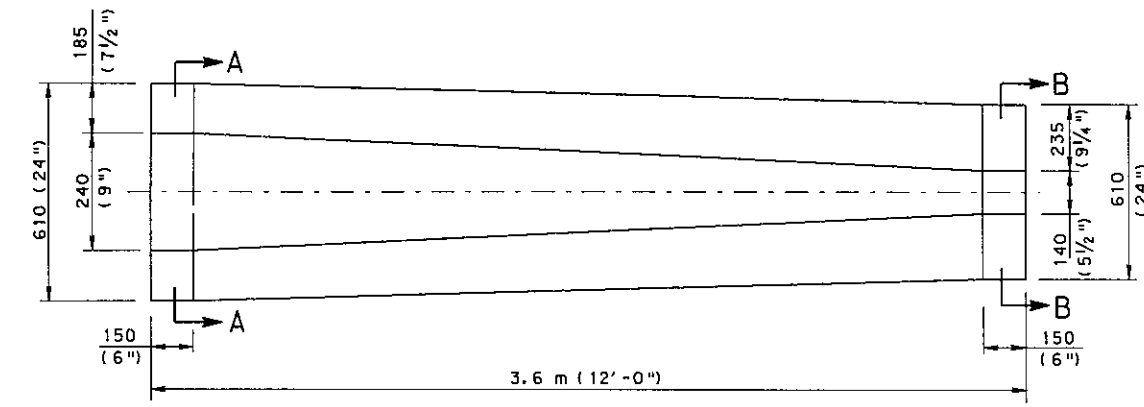
1. PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709.
2. ROUND OR CHAMFER ALL EDGES WITH A RADIUS OF 25 (1") EXCEPT AS SHOWN.
3. FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.

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

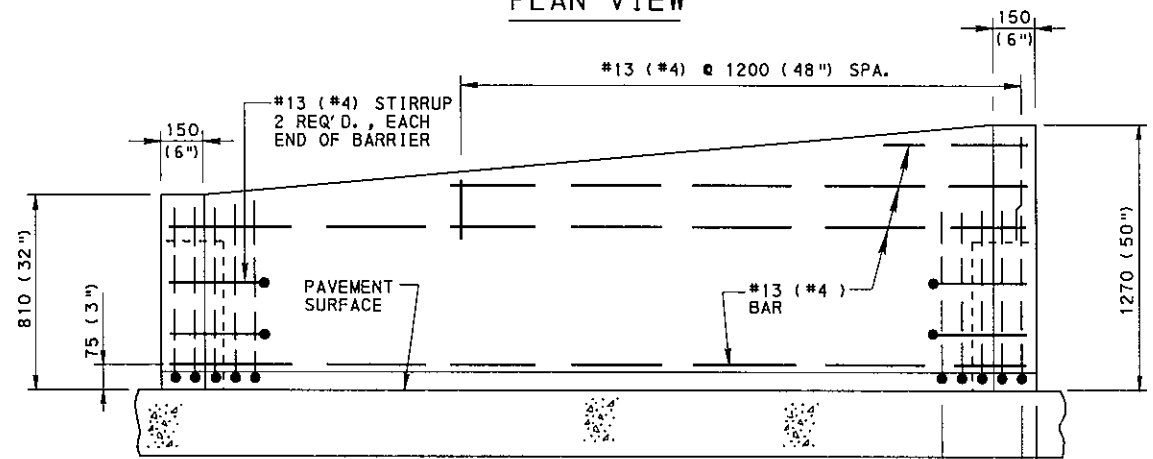
COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
 F-SHAPE

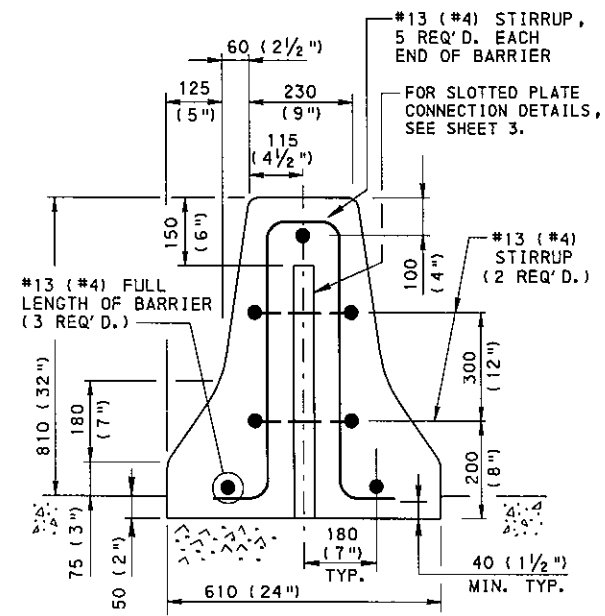
RECOMMENDED APR. 30, 2003	RECOMMENDED APR. 30, 2003	SHT 5 OF 8
<i>Scott Christen</i> DIRECTOR, BUREAU OF DESIGN	<i>Alan A. Schmitt</i> CHIEF ENGINEER	RC-57M



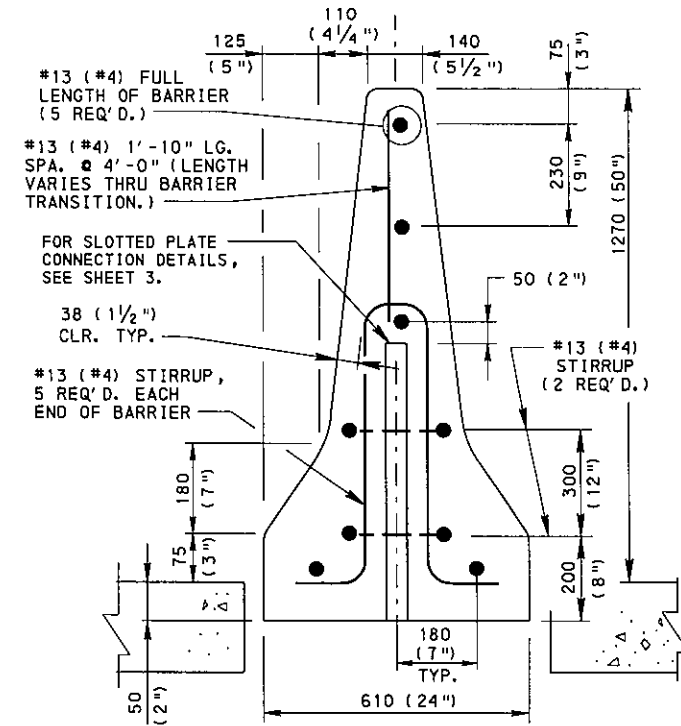
PLAN VIEW



ELEVATION VIEW



SECTION A-A

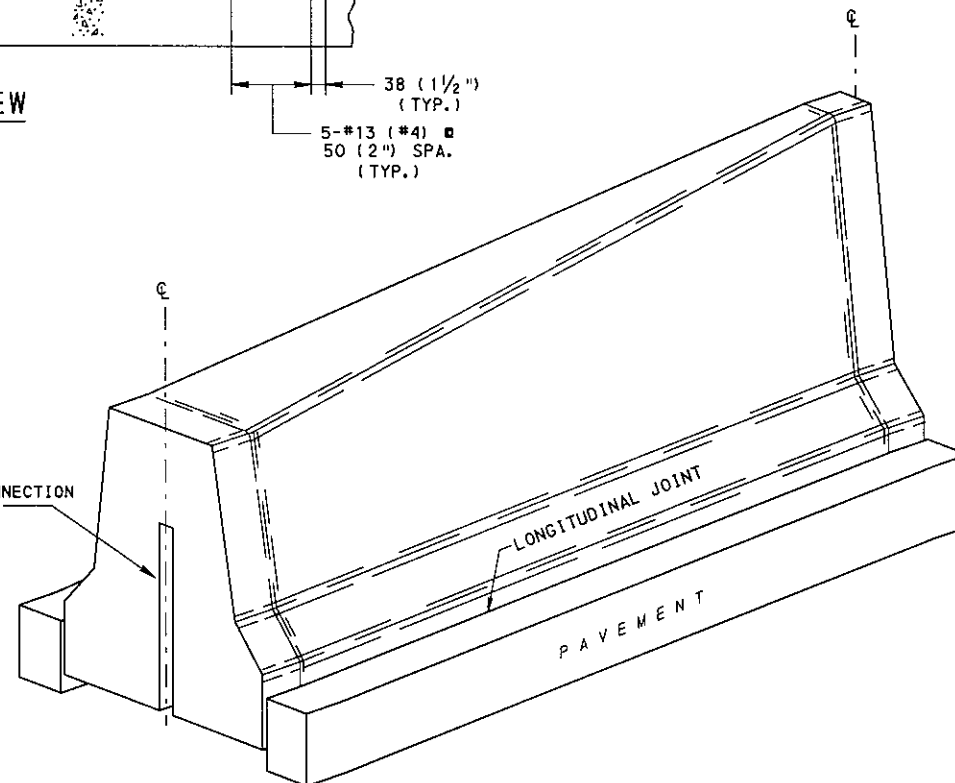


SECTION B-B

NOTES

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

FOR SLOTTED PLATE CONNECTION
DETAILS, SEE SHEET 3.



ORTHOGRAPHIC VIEW

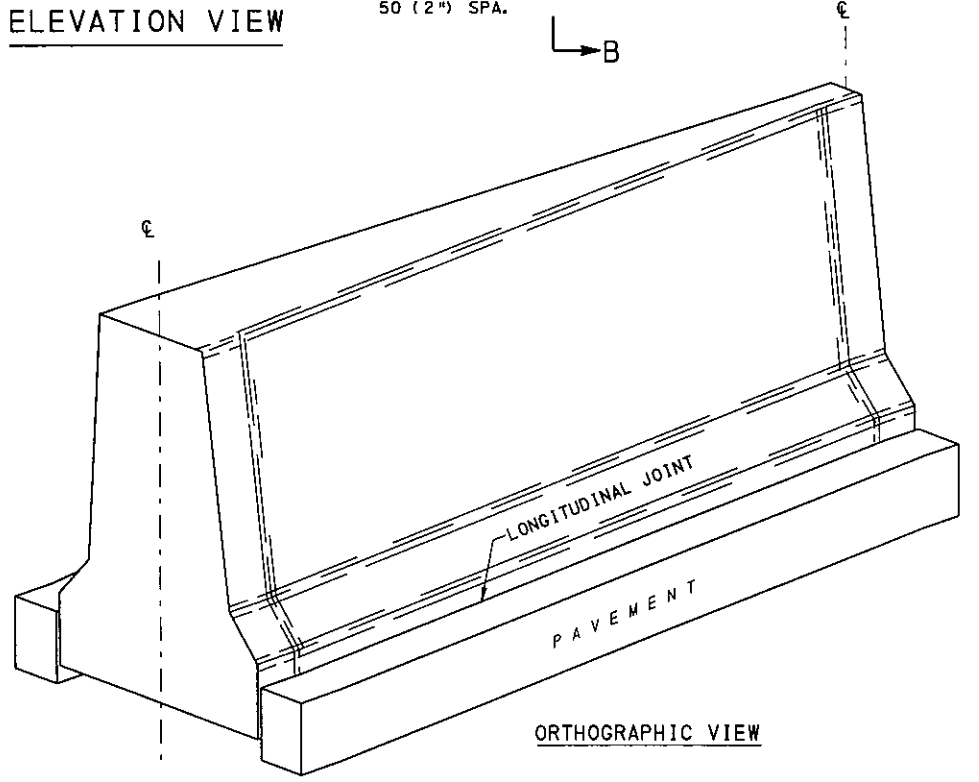
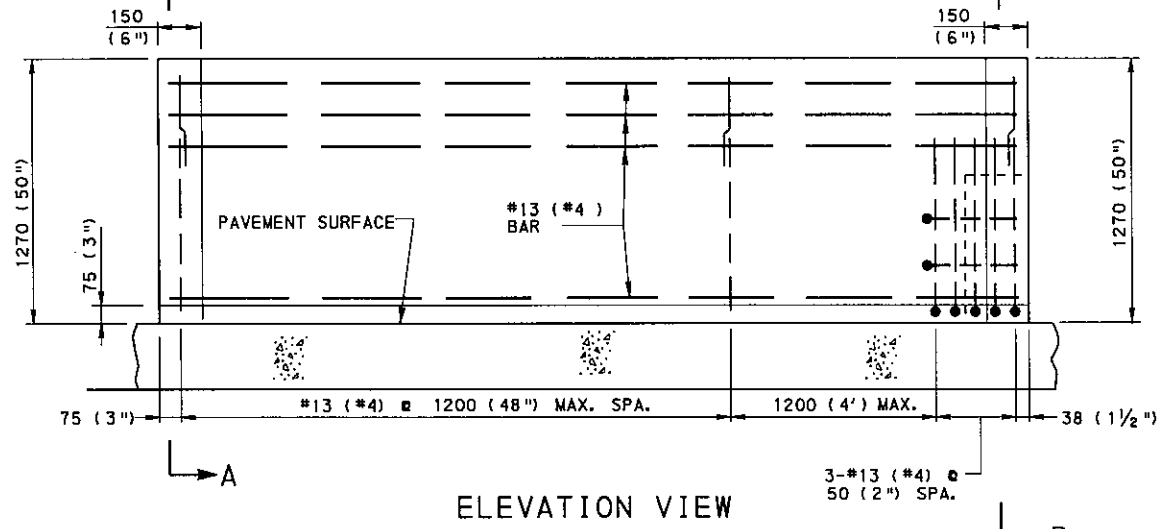
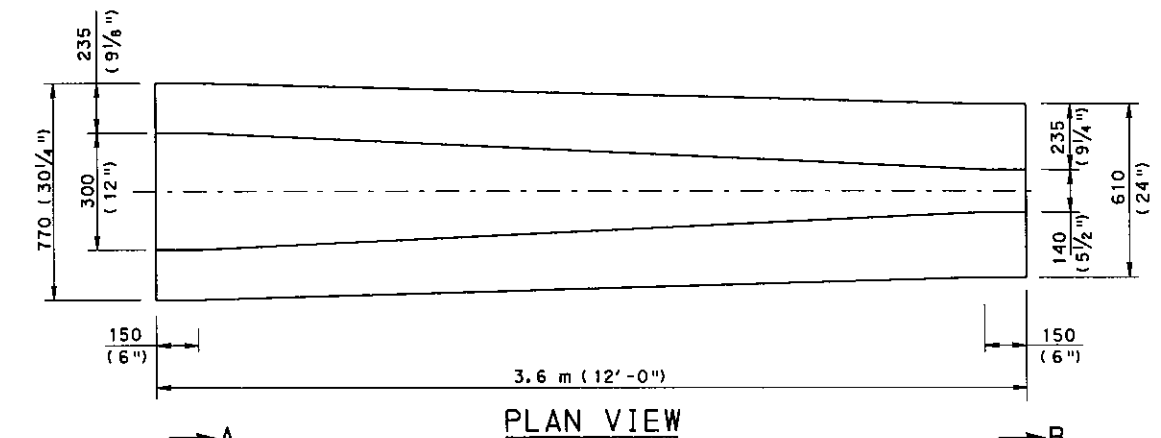
TYPICAL 810 TO 1270 (32" TO 50") HIGHWAY TRANSITION

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

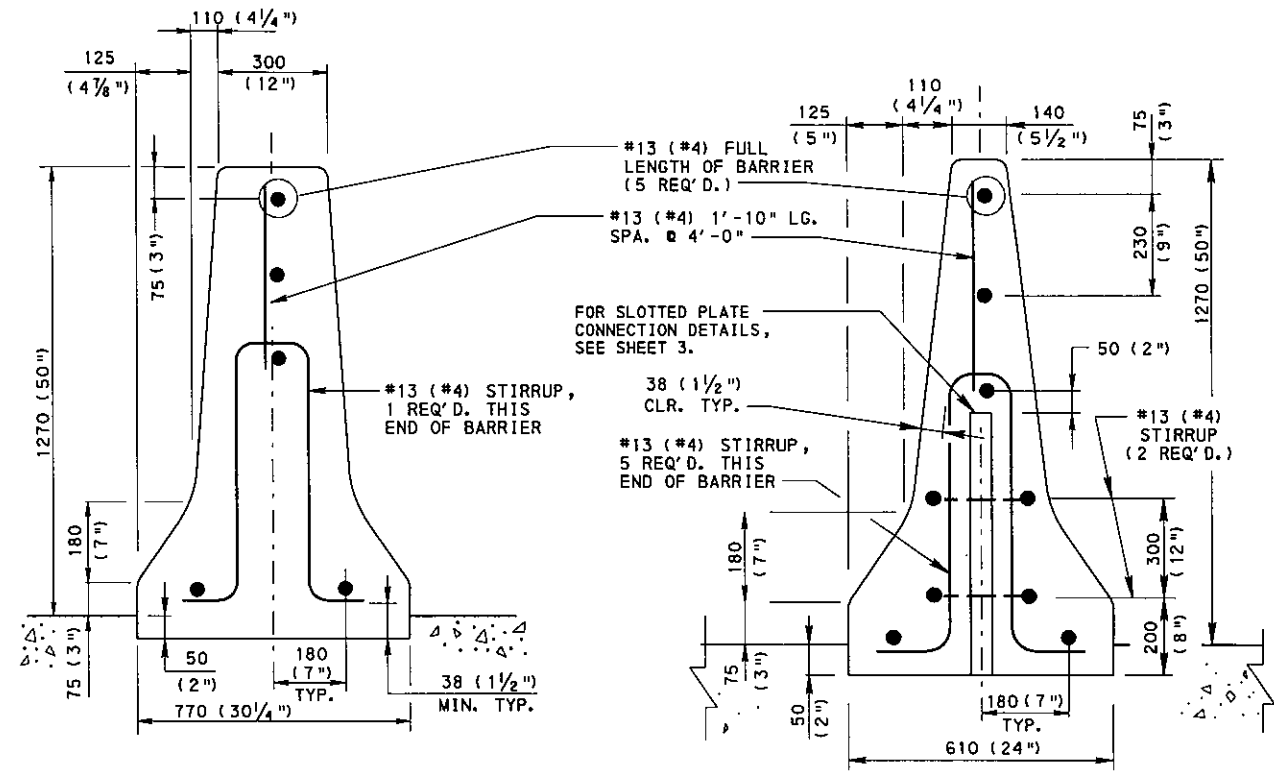
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED APR. 30, 2003	RECOMMENDED APR. 30, 2003	SHT 6 OF 8
<i>Scott Christy</i> DIRECTOR, BUREAU OF DESIGN	<i>Dean A. Eskin</i> CHIEF ENGINEER	RC-57M



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



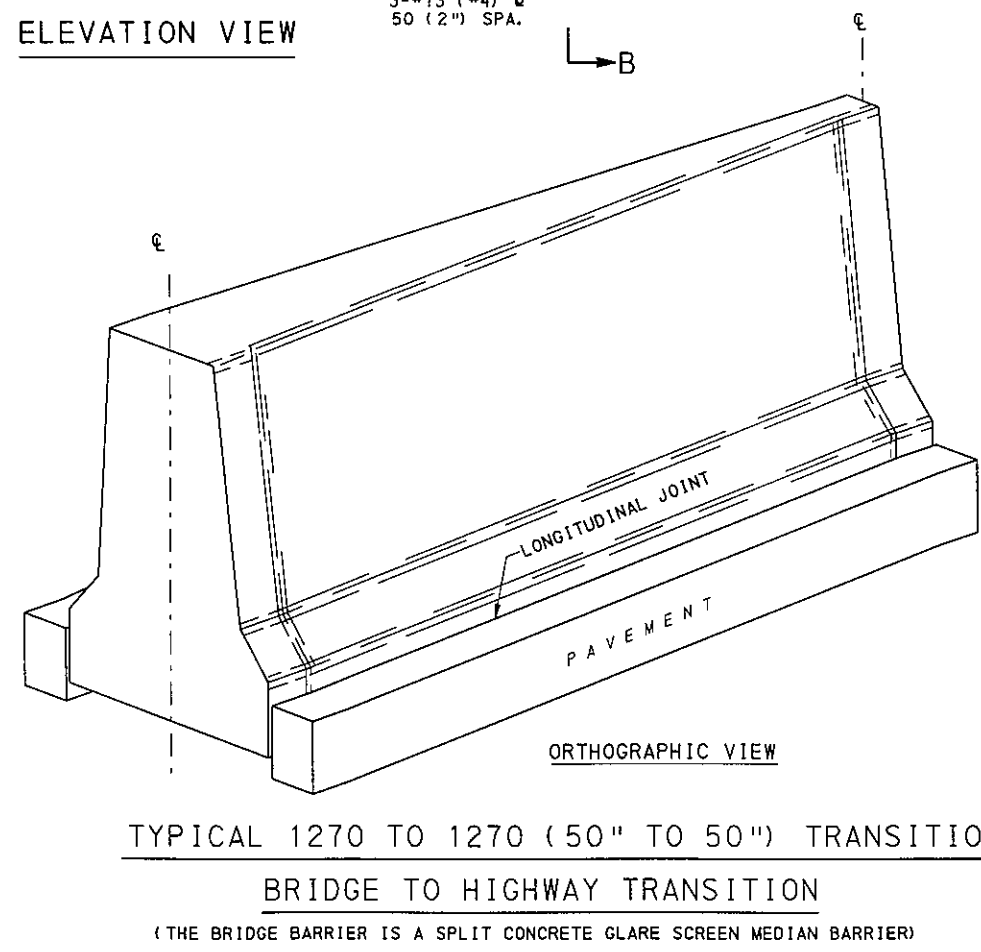
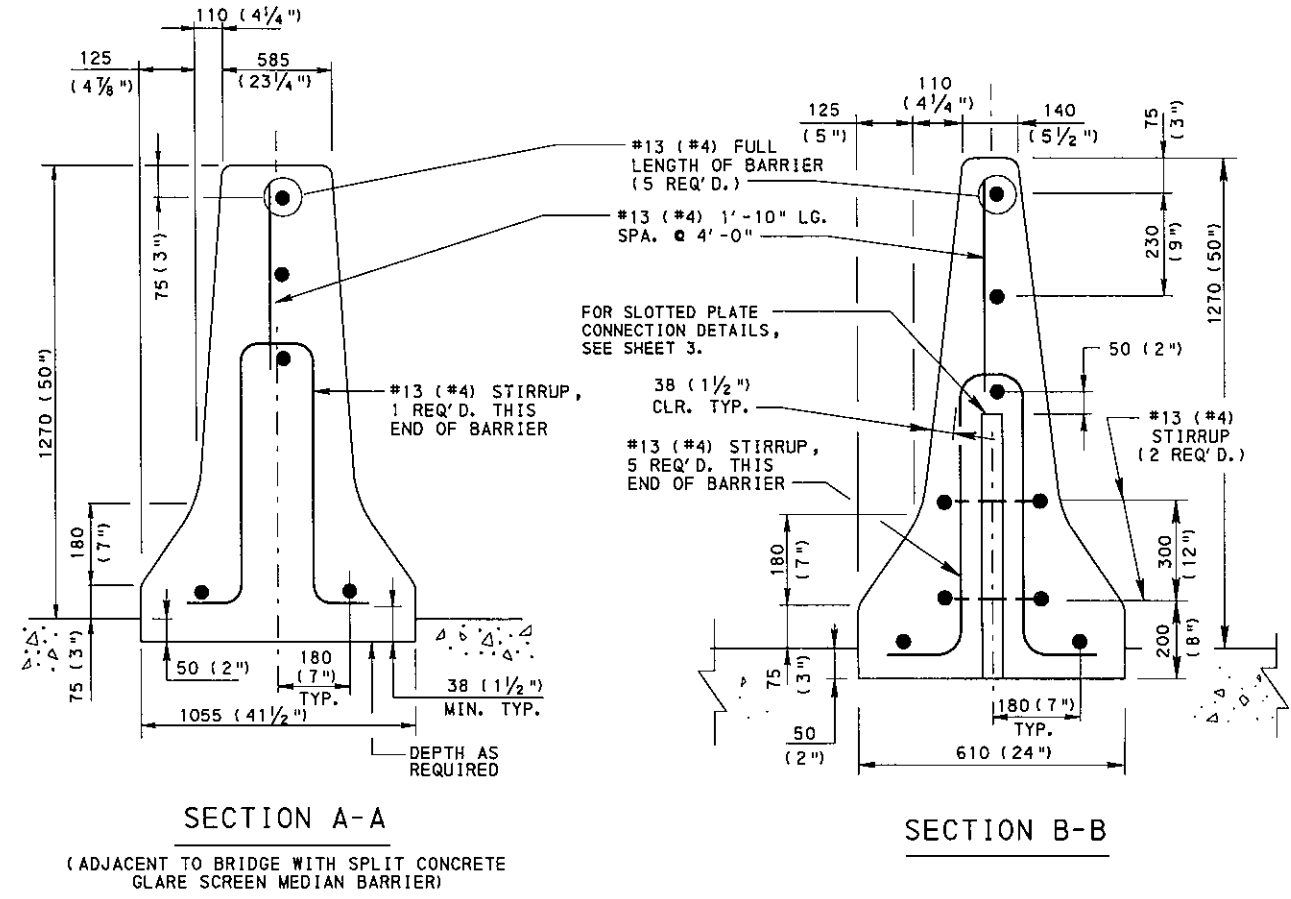
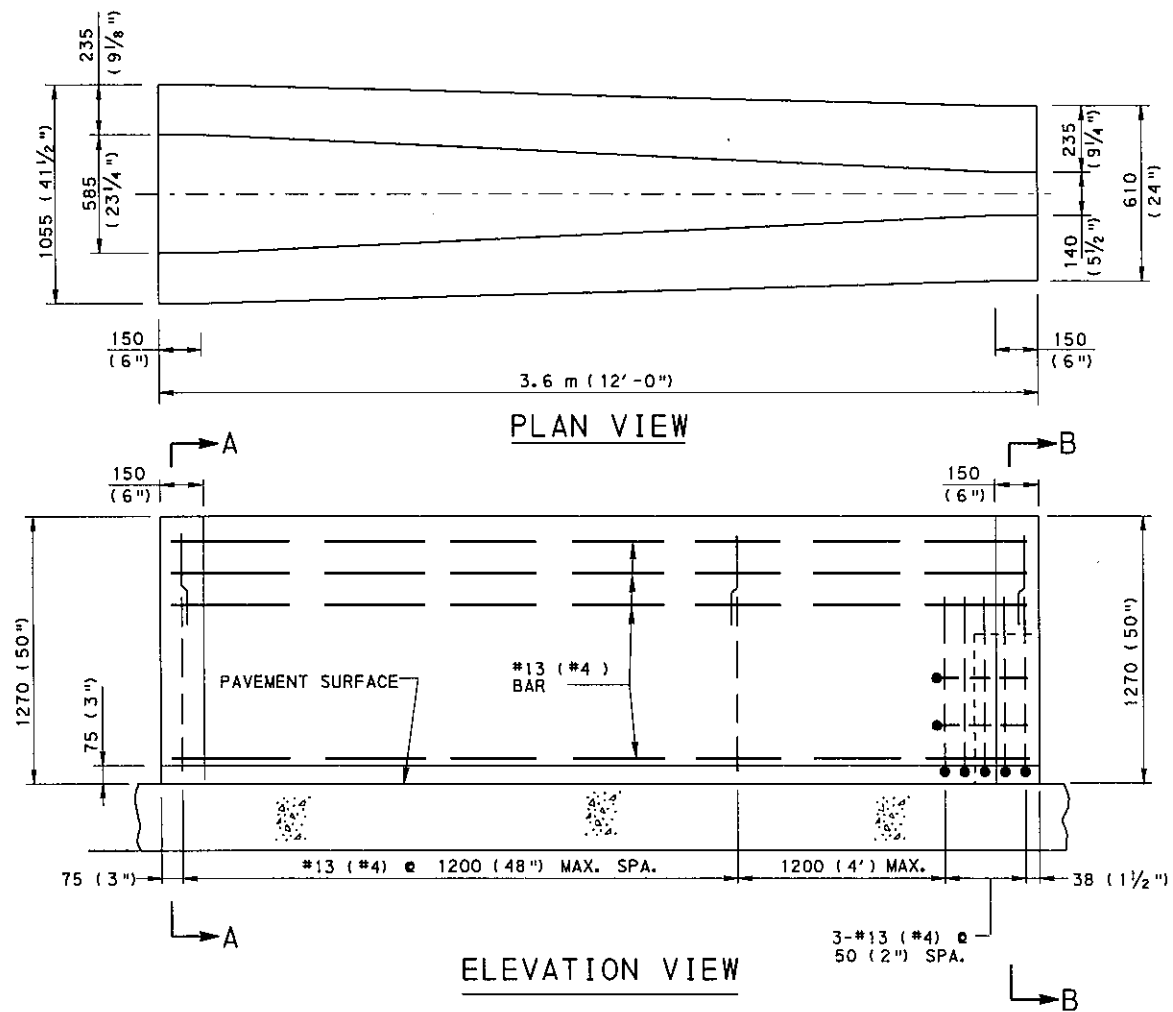
NOTE
 FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.

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 APR. 30, 2003 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 30, 2003 <i>Alan A. Schir</i> CHIEF ENGINEER	SHT 1 OF 8 RC-57M
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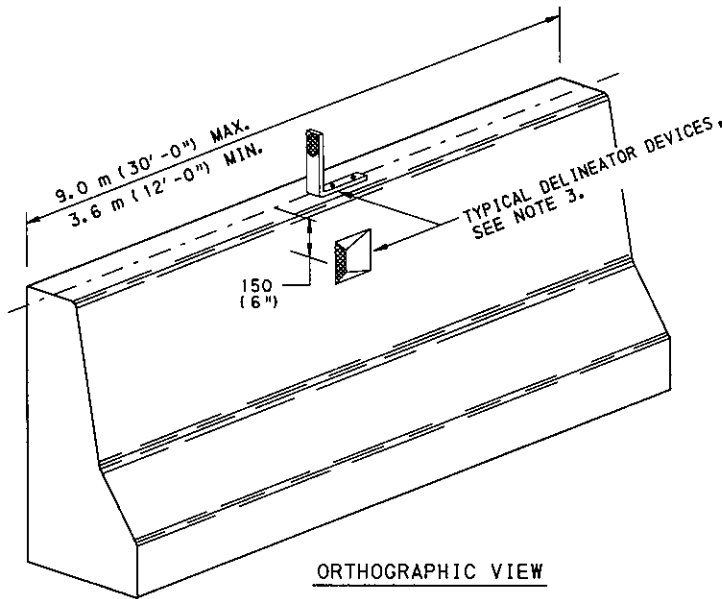
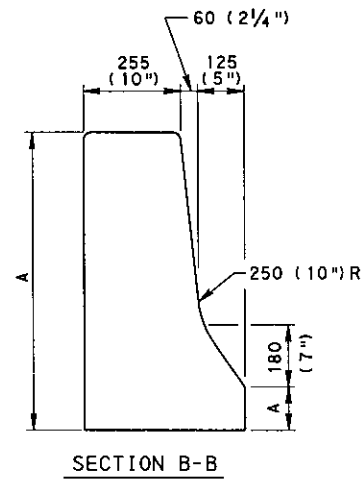
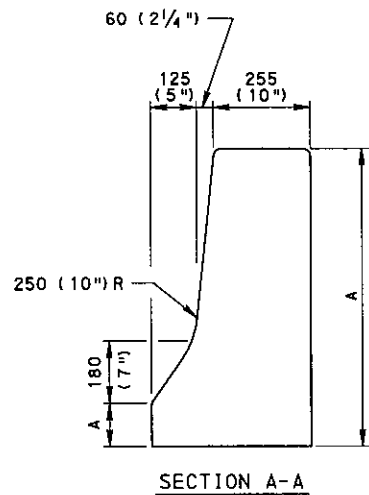
NOTE
FOR ALTERNATE WWF REINFORCED BARRIERS, SEE SHEET 2.

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

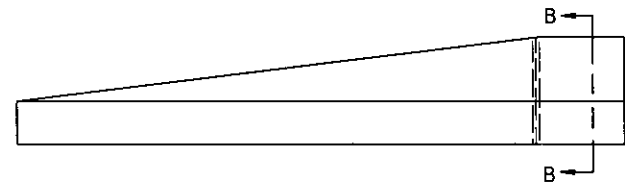
CONCRETE MEDIAN BARRIER
F-SHAPE

RECOMMENDED APR. 30, 2003	RECOMMENDED APR. 30, 2003	SHT 8 OF 8
<i>Scott Christman</i> DIRECTOR, BUREAU OF DESIGN	<i>Alan P. Scher</i> CHIEF ENGINEER	RC-57M

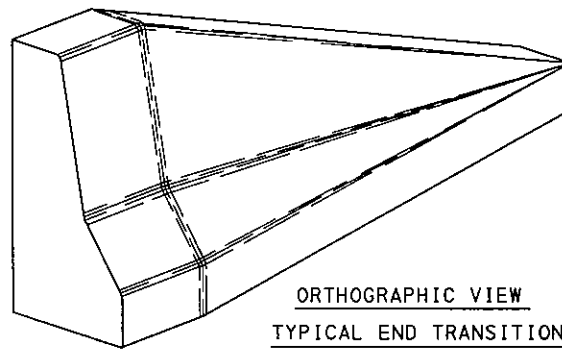


ORTHOGRAPHIC VIEW
TYPICAL BARRIER SECTION

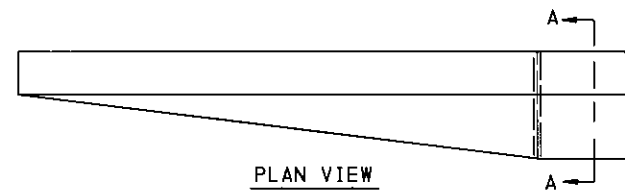
NOTE:
A = SEE TYPICAL SECTIONS,
SHEET 2.



PLAN VIEW
RIGHT END TRANSITION



ORTHOGRAPHIC VIEW
TYPICAL END TRANSITION
SEE NOTE 5.



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.
A. MINIMUM CONCRETE CLASS: AA, EXCEPT USE CLASS AAA CONCRETE FOR PRECAST BARRIER.
2. PROVIDE PRECAST SINGLE FACE CONCRETE BARRIER SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. MODIFICATIONS OR DEVIATIONS FROM THE STANDARD REQUIRE THE SUBMISSION OF SHOP DRAWINGS FOR REVIEW.
3. PROVIDE BARRIER-MOUNT OR REFLECTOR UNIT DELINEATORS, AS INDICATED ON 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.
9. TO LIMIT LATERAL DISPLACEMENT OF PORTABLE BARRIER WHEN USED IN WORK ZONES, PROVIDE A ROUGH FINISH AT THE BOTTOM SURFACE. BEFORE THE CONCRETE HAS INITIALLY SET, FINISH THE BOTTOM SURFACE WITH STIFF, WIRE BROOM OR SPECIAL TEMPLATE IN A LONGITUDINAL DIRECTION TO PRODUCE SCORES APPROXIMATELY 4 (1/8") IN DEPTH.

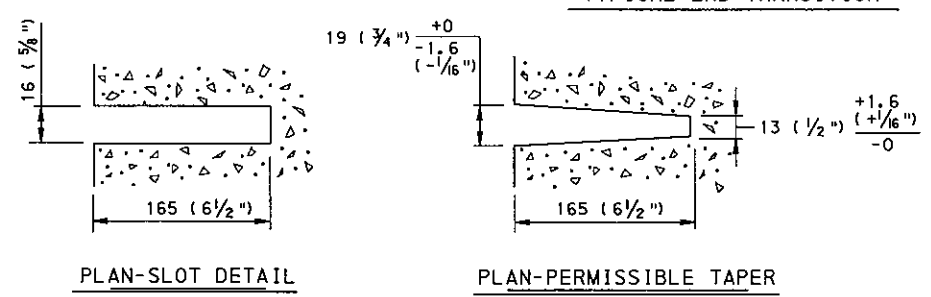
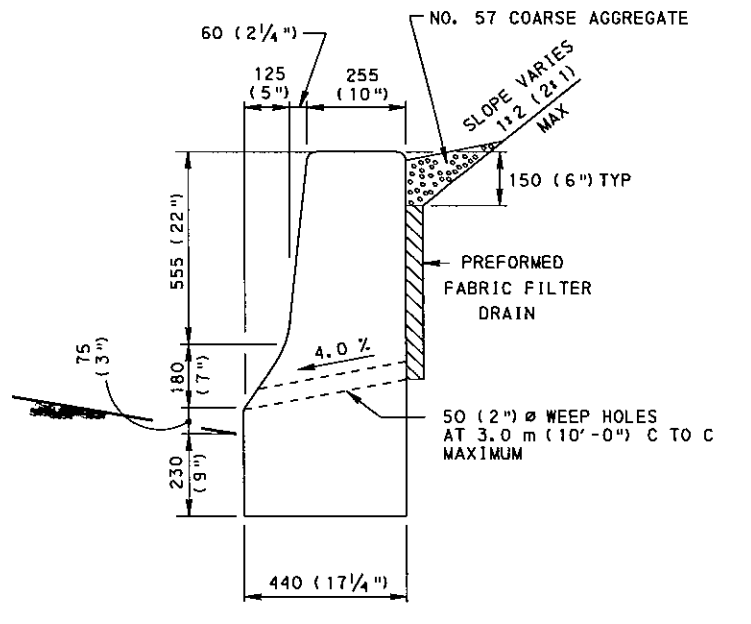
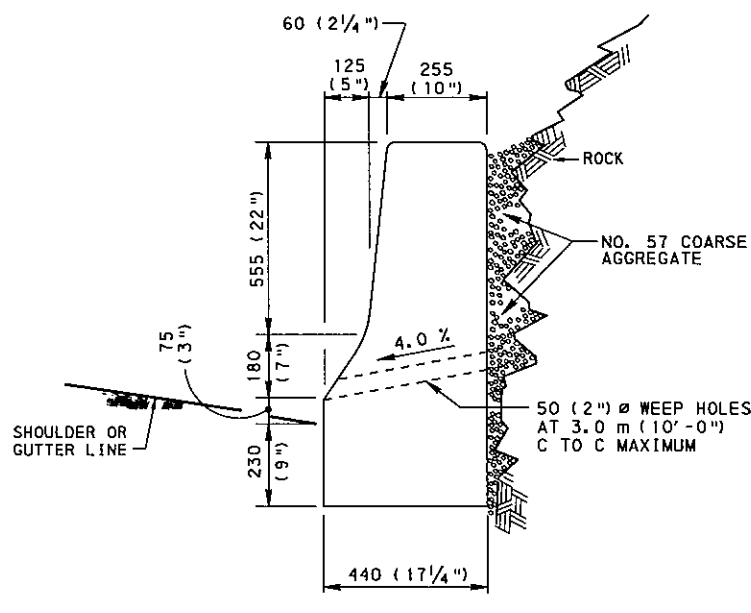
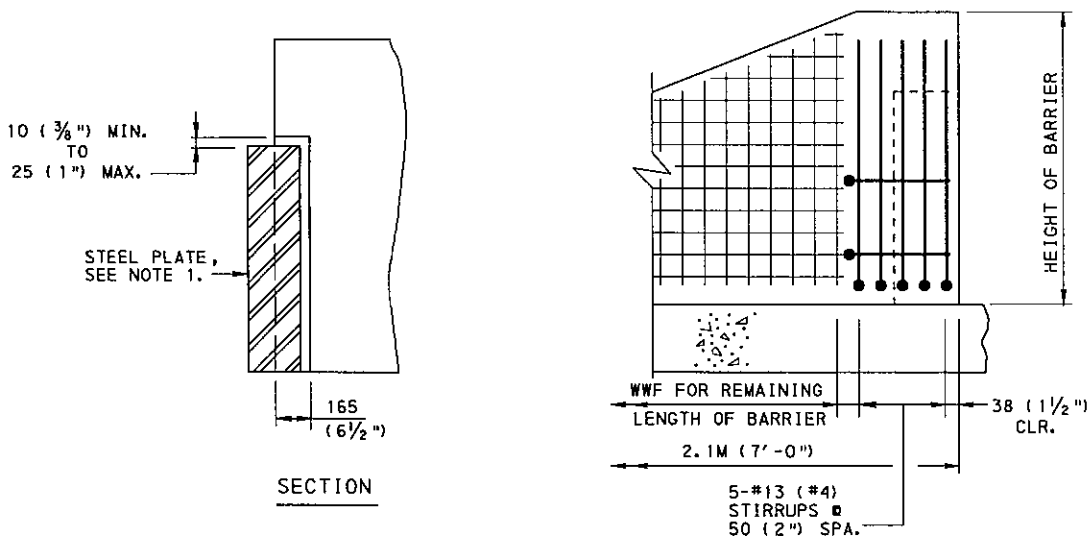
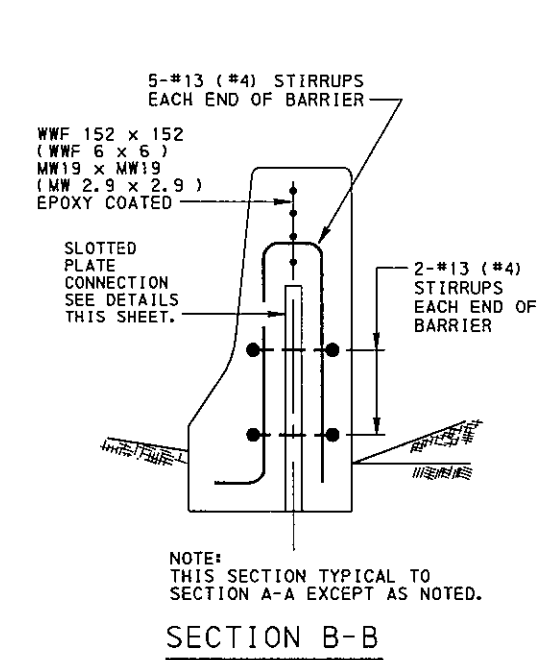
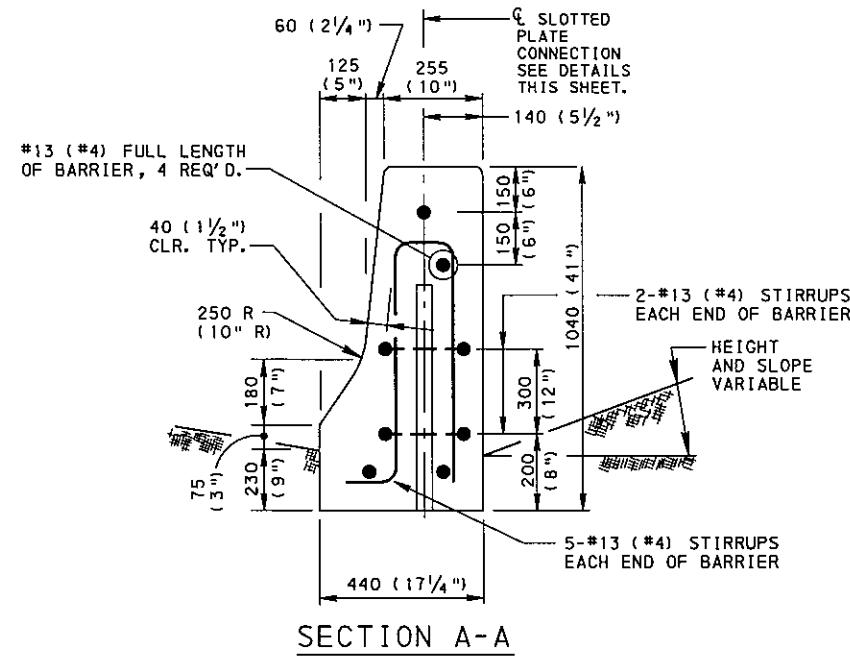
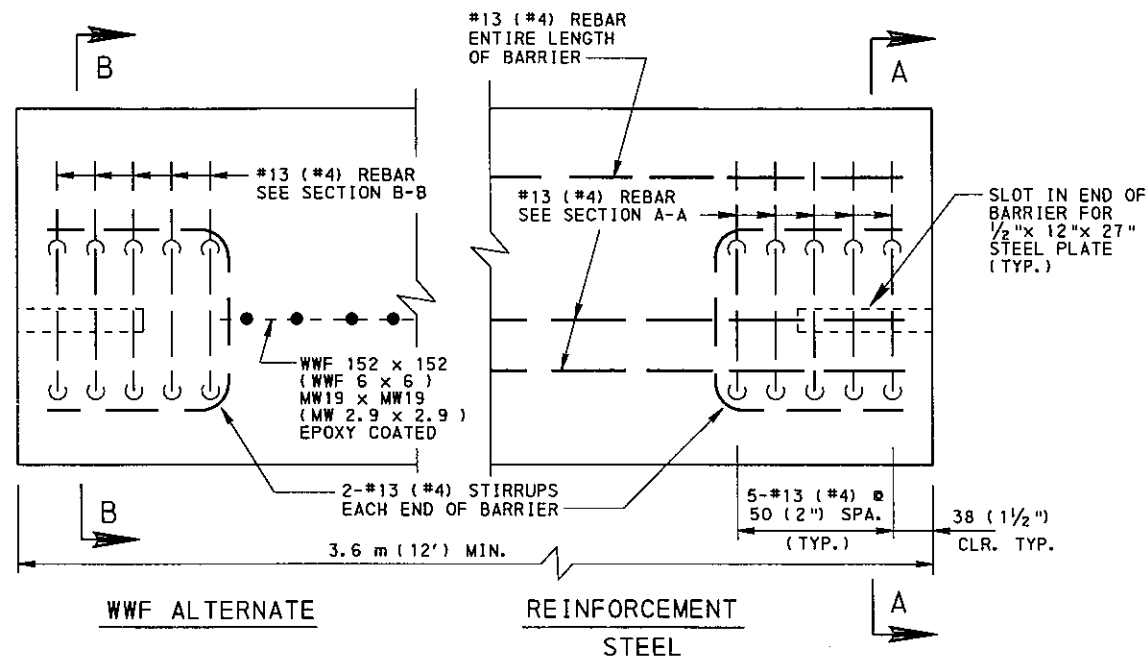
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER

BC-736M	REINFORCEMENT BAR FABRICATION DETAILS
REFERENCE DRAWINGS	

RECOMMENDED APR. 30, 2003 <i>[Signature]</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 30, 2003 <i>[Signature]</i> CHIEF ENGINEER	SHT 1 OF 5 RC-58M
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SLOTTED PLATE CONNECTION

TYPICAL SINGLE FACE BARRIER SECTIONS

TYPICAL ROUGH ROCK TREATMENT

TYPICAL DRAINAGE TREATMENT

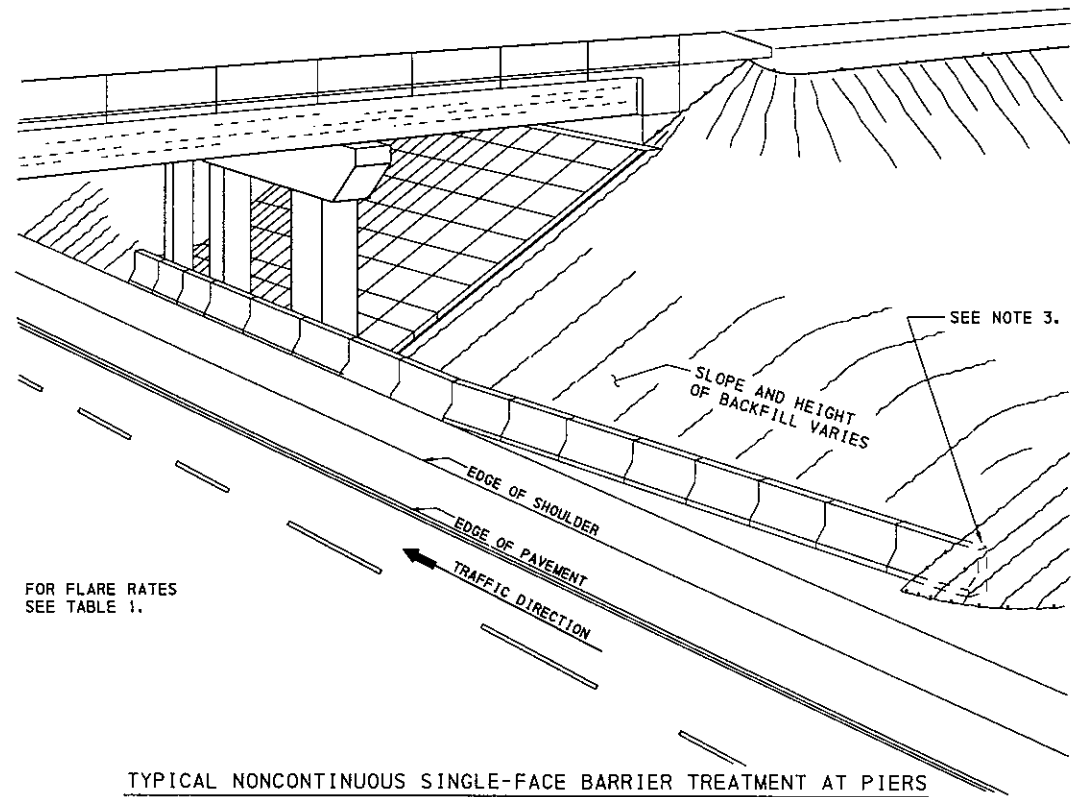
- NOTES**
1. PROVIDE PLATES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105. GALVANIZE PLATES AS SPECIFIED IN PUBLICATION 408, SECTION 1105 ALTERNATE CONNECTIONS MAY BE USED AS APPROVED BY THE BUREAU OF DESIGN.
 2. WHERE SINGLE FACE CONCRETE BARRIER IS SPECIFIED FOR USE AS A RETAINING WALL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

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
 BUREAU OF DESIGN

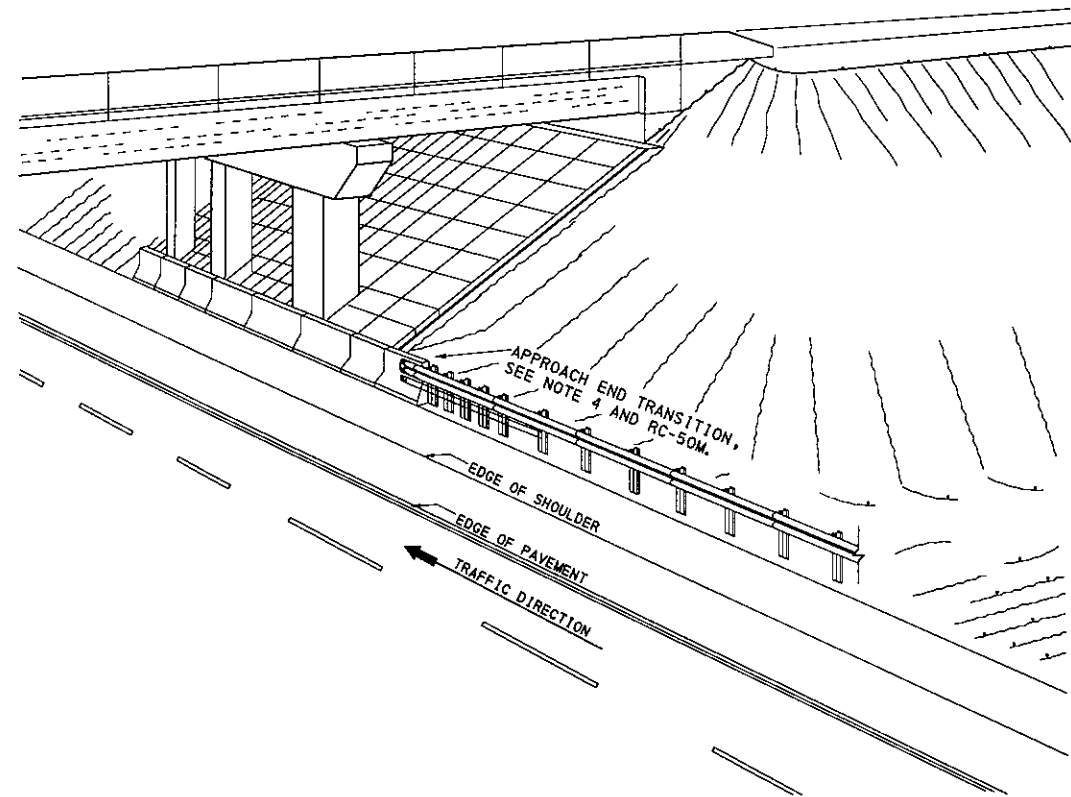
SINGLE FACE CONCRETE BARRIER
F-SHAPE

RECOMMENDED APR. 30, 2003 RECOMMENDED APR. 30, 2003 SHT 2 OF 5
 DIRECTOR, BUREAU OF DESIGN CHIEF ENGINEER RC-58M



FOR FLARE RATES
SEE TABLE 1.

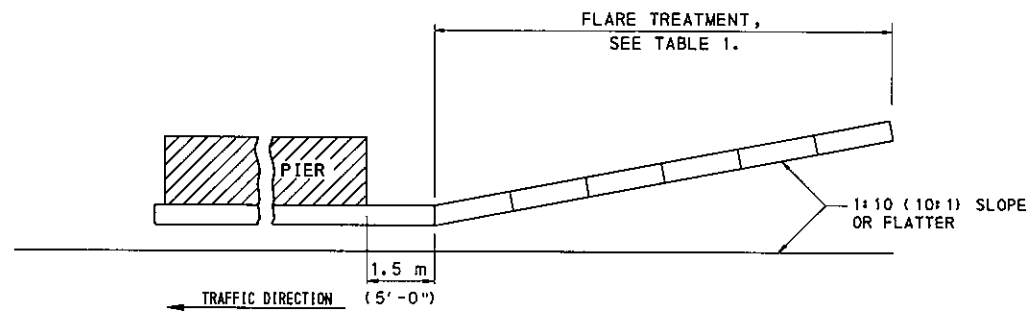
TYPICAL NONCONTINUOUS SINGLE-FACE BARRIER TREATMENT AT PIERS



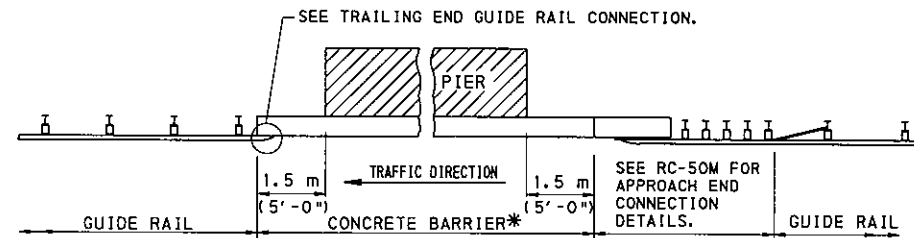
TYPICAL TREATMENT WHEN CONTINUOUS GUIDE RAIL IS REQUIRED

NOTES

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



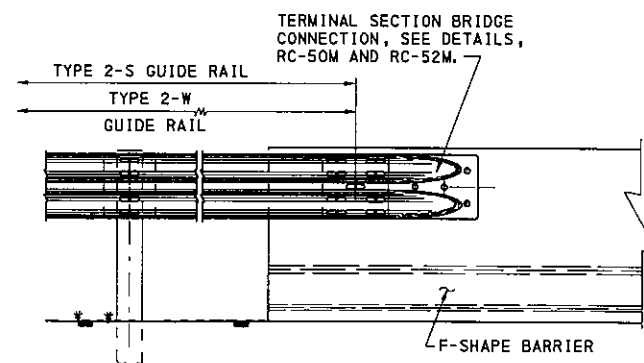
PLAN VIEW



CONTINUOUS GUIDE RAIL WITH SINGLE FACE BARRIER AT PIER

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

PLAN VIEW



TRAILING END GUIDE RAIL CONNECTION TO F-SHAPE BARRIER

TABLE 1
FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED	MAXIMUM FLARE RATES	
	CONCRETE BARRIER	GUIDE RAIL
120	20:1	15:1
110	20:1	15:1
105	19:1	15:1
100	18:1	14:1
90	16:1	12:1
80	14:1	11:1
70	12:1	10:1
65	11:1	9:1
60	10:1	8:1
50	8:1	7:1

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

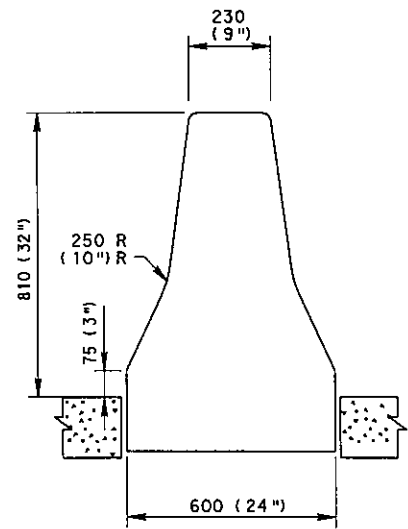
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER
F-SHAPE
PLACEMENT AT SHOULDER PIERS

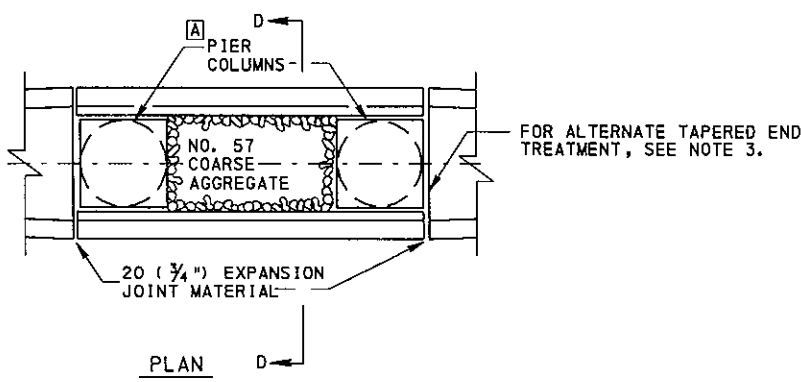
RECOMMENDED APR. 30, 2003
Scott Crute
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED APR. 30, 2003
Alan H. Schum
CHIEF ENGINEER

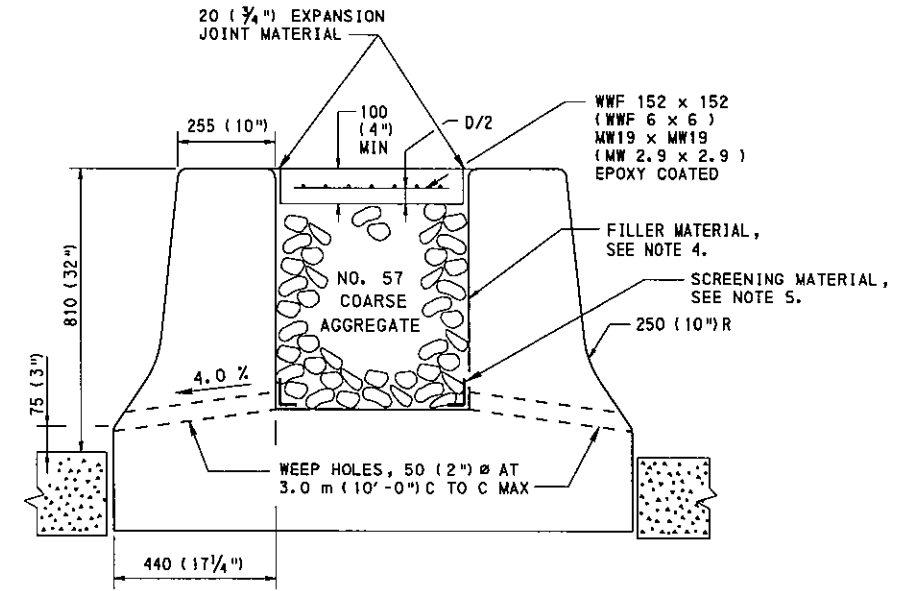
SHT 3 OF 5
RC-58M



SECTION A-A

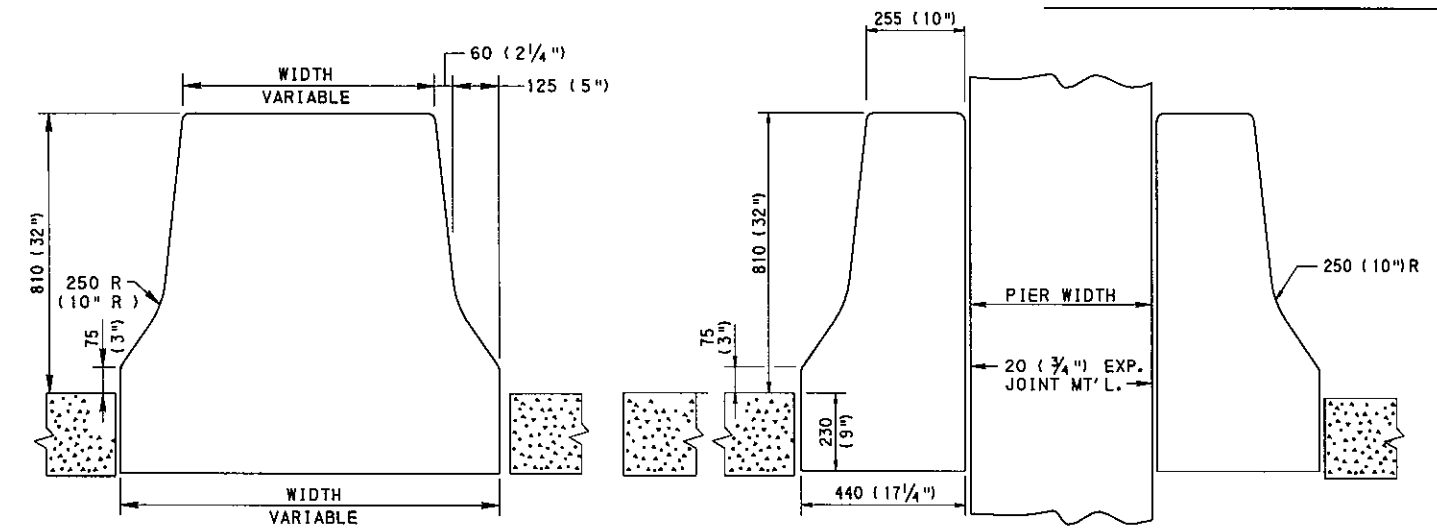


PLAN



SECTION D-D

TYPICAL ALTERNATE BARRIER TREATMENT AT PIERS



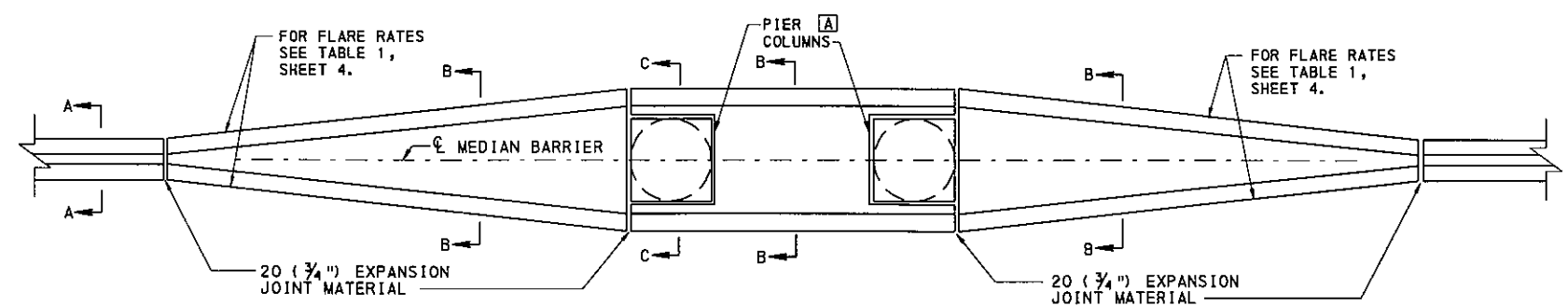
SECTION B-B

SECTION C-C

NOTES

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

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



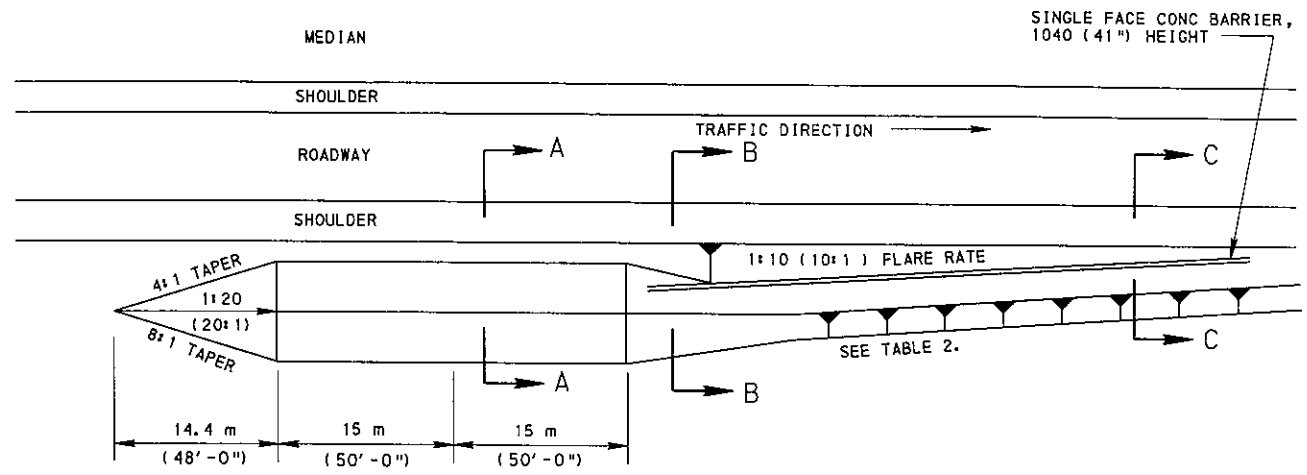
TYPICAL BARRIER TREATMENT AT PIERS

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER
F-SHAPE
PLACEMENT AT MEDIAN PIERS

RECOMMENDED APR. 30, 2003 <i>Scott Christy</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 30, 2003 <i>Alan P. Schmitt</i> CHIEF ENGINEER	SHT 4 OF 5 RC-58M
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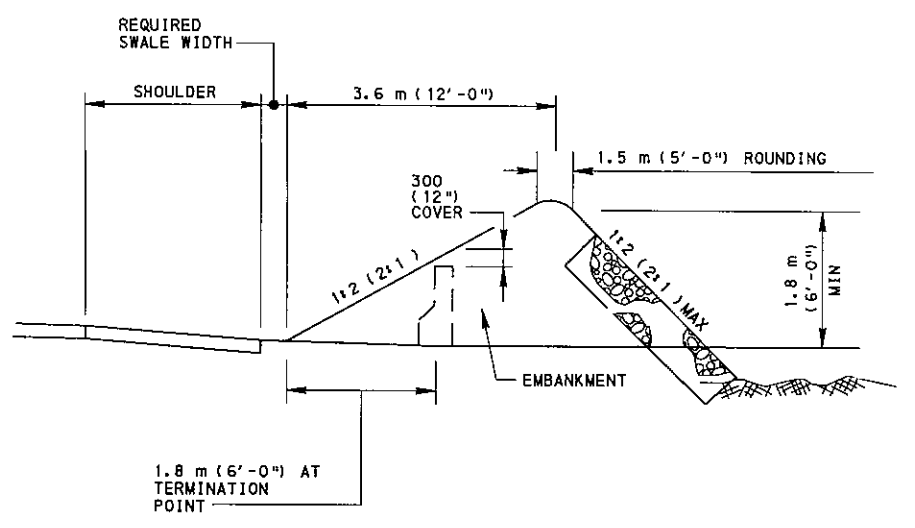
**TABLE 2
FLARE RATES
FOR BARRIER DESIGN**

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

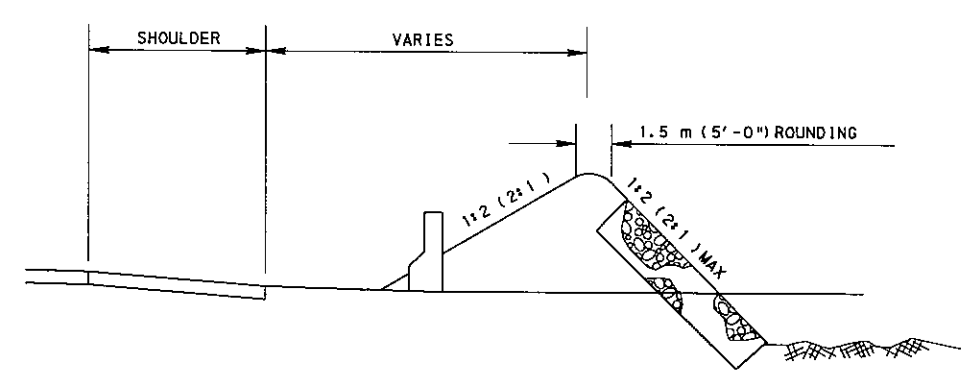
NOTES

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

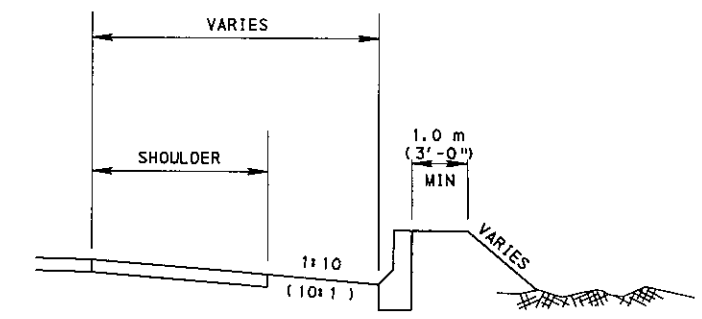
TYPICAL EARTH MOUND FOR BURYING CONCRETE BARRIER



SECTION A-A



SECTION B-B



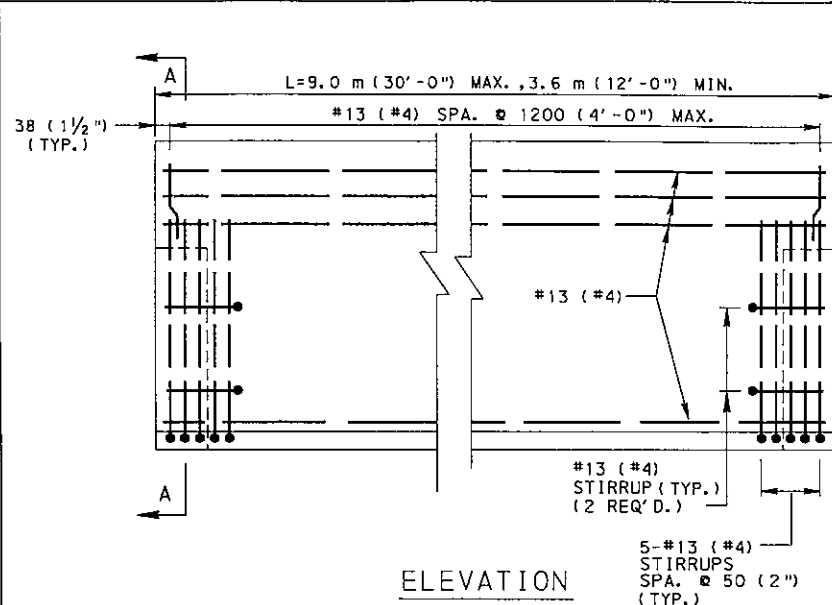
SECTION C-C

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

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

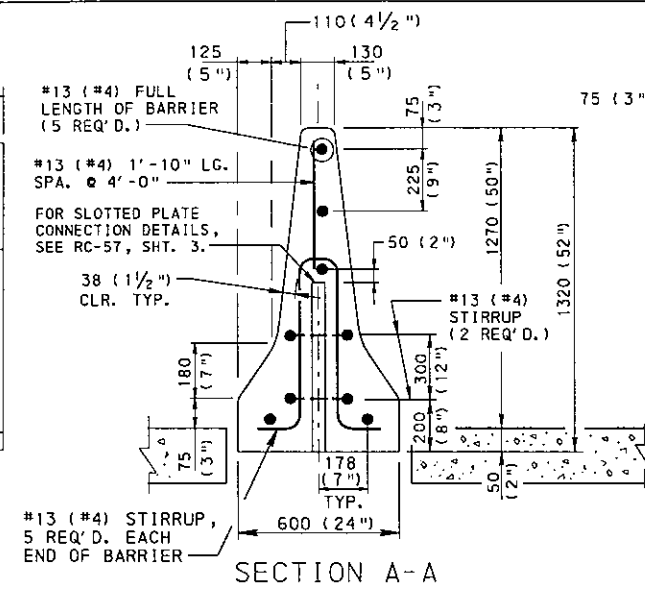
**SINGLE FACE CONCRETE BARRIER
F-SHAPE
END TREATMENT
BURYING INTO EARTH MOUND**

RECOMMENDED APR. 30, 2003 <i>Scott Christen</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 30, 2003 <i>Alan P. Schmitt</i> CHIEF ENGINEER	SHT 5 OF 5 RC-58M
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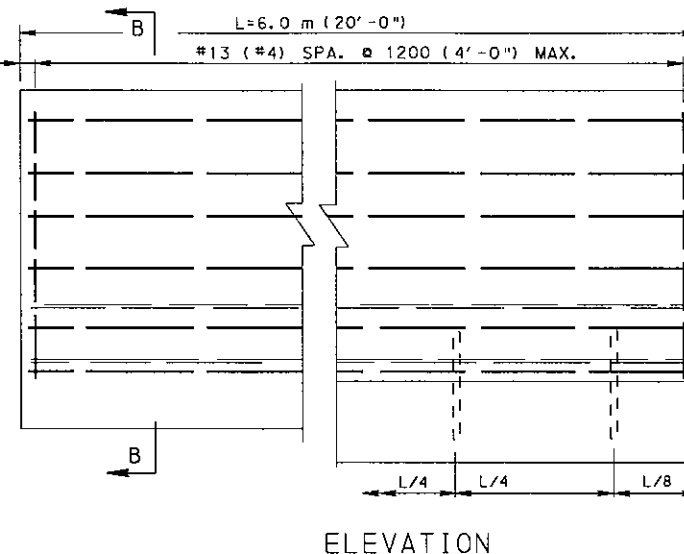


ELEVATION

TYPICAL PRECAST

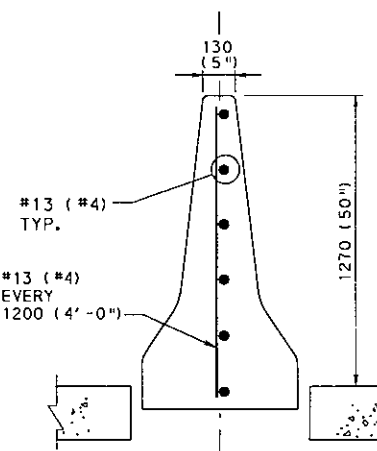


SECTION A-A



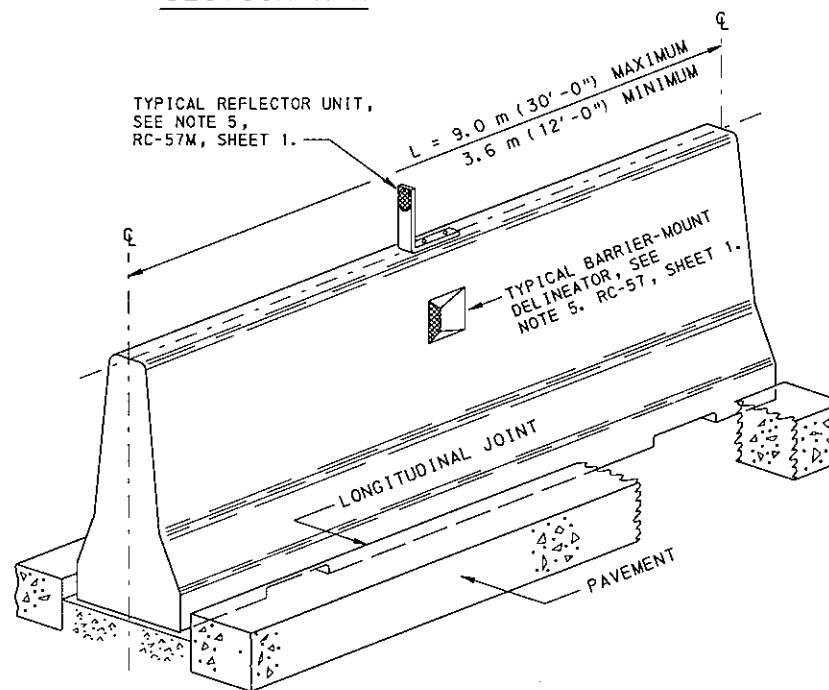
ELEVATION

TYPICAL CAST-IN-PLACE



SECTION B-B

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



TYPICAL CAST-IN PLACE AND PRECAST BARRIER

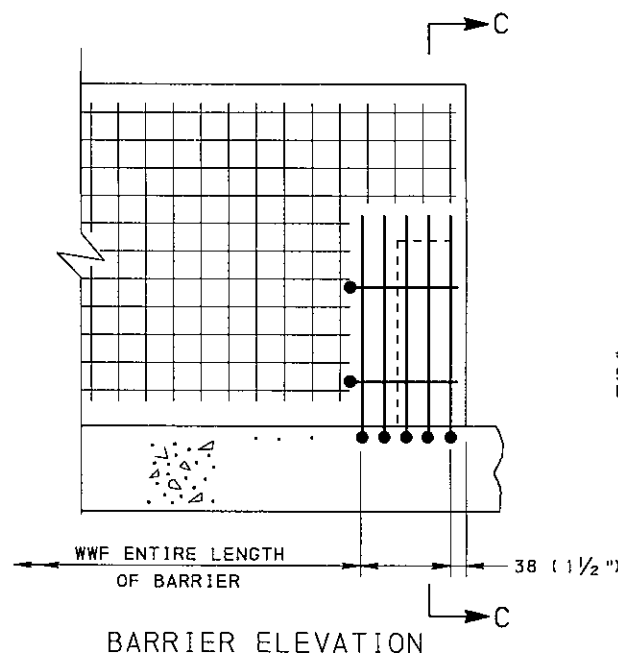
NOTES

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

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

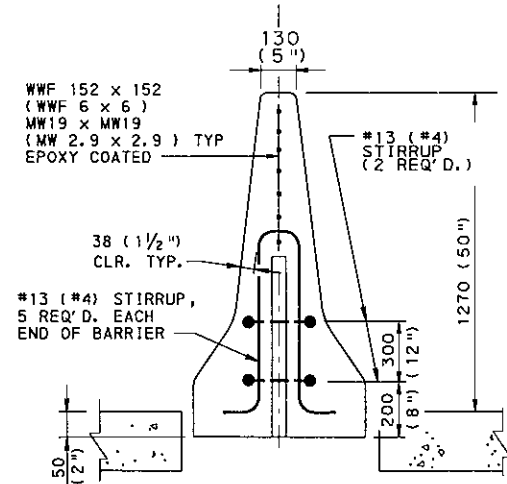
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

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 APR. 30, 2003
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED APR. 30, 2003
CHIEF ENGINEER

SHT 1 OF 2
RC-59M

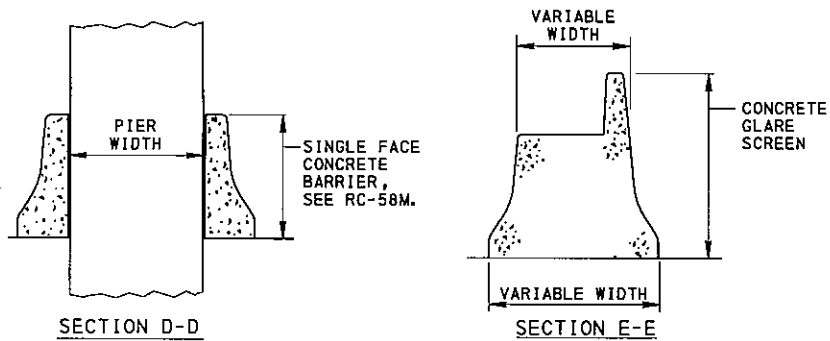
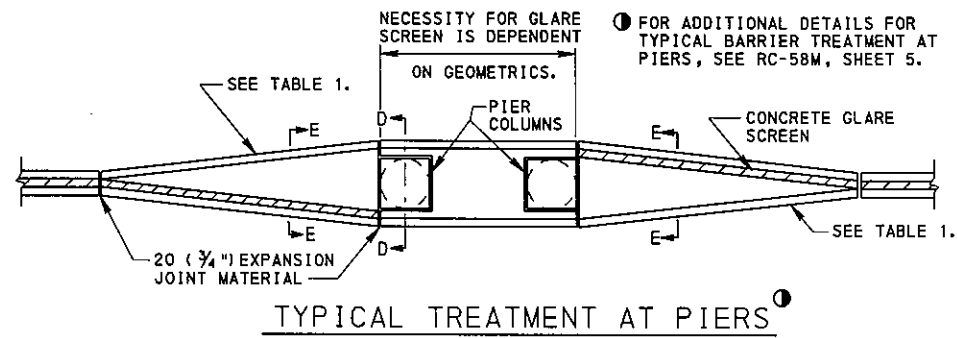


TABLE 1
FLARE RATES FOR BARRIER DESIGN

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

NOTE

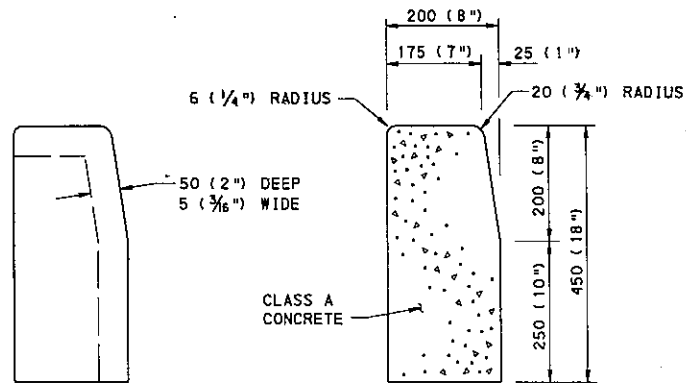
1. PROVIDE BARRIER-MOUNT DELINEATORS, WHEN INDICATED, AS SPECIFIED ON RC-57M, SHEET 1.

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

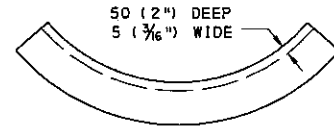
CONCRETE GLARE SCREEN
F-SHAPE

RECOMMENDED APR. 30, 2003 <i>Scott Christy</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 30, 2003 <i>Alan A. Schi</i> CHIEF ENGINEER	SHT 2 OF 2 RC-59M
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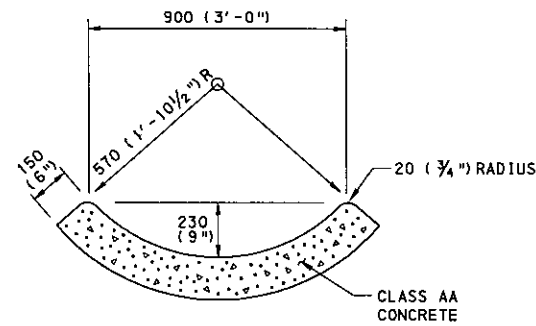


**DETAIL A
CONTRACTION JOINT**

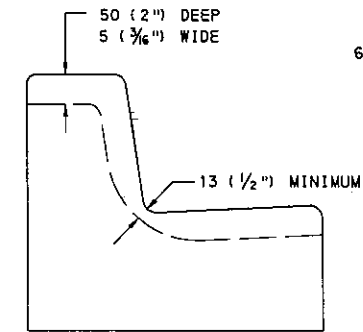
**TYPICAL
CROSS SECTION**



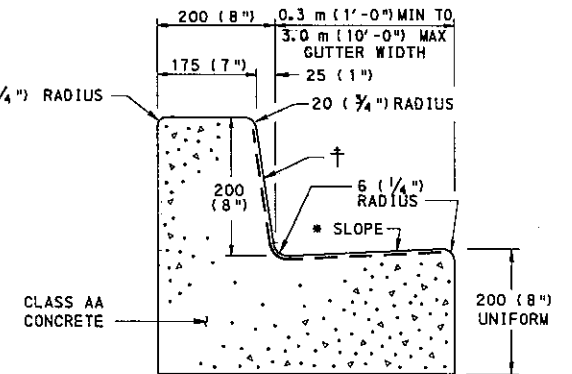
**DETAIL B
CONTRACTION JOINT**



**TYPICAL
CROSS SECTION**

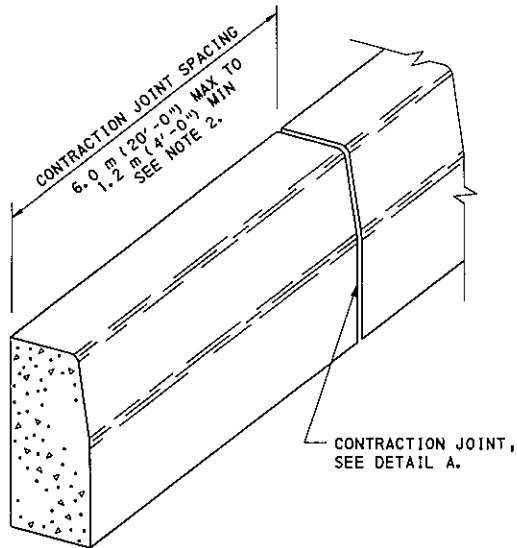


**DETAIL C
CONTRACTION JOINT**

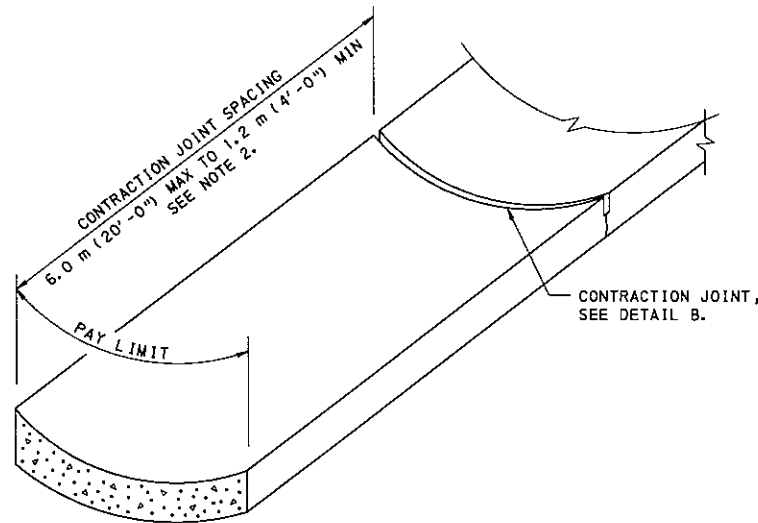


**TYPICAL
CROSS SECTION**

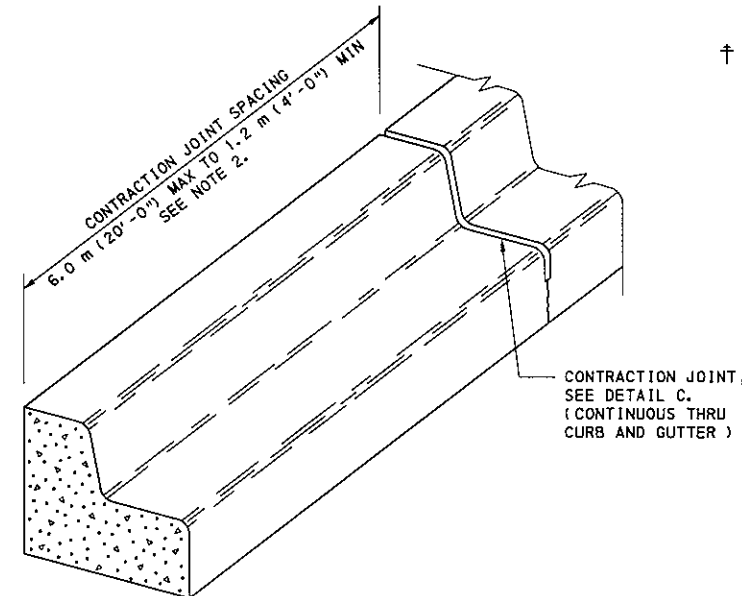
* UNDER 1.5 m (5'-0") GUTTER WIDTH = 8.0% (1"/FT) MIN.
1.5 m (5'-0") AND GREATER GUTTER WIDTH = 4.0% (1/2"/FT) MIN.
† --- REPRESENTS WIDTH OF GUTTER FOR COMPUTING PAY AREA.



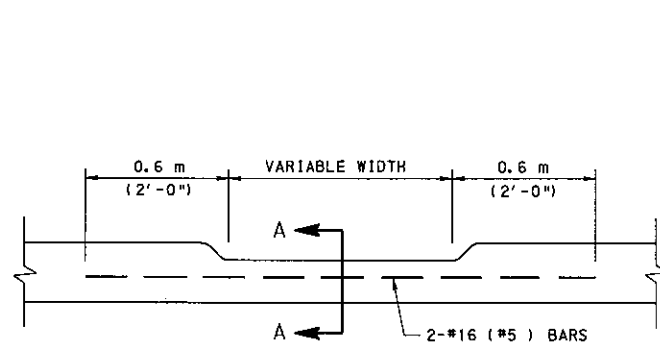
PLAIN CEMENT CONCRETE CURB



PLAIN CEMENT CONCRETE GUTTER

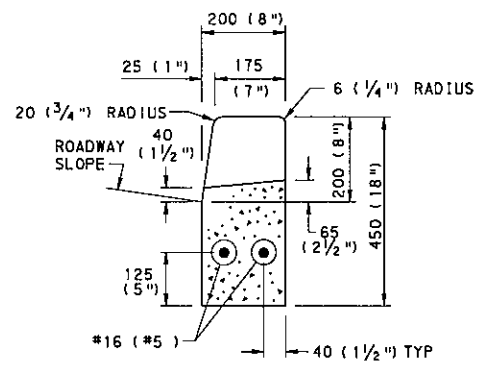


PLAIN CEMENT CONCRETE CURB GUTTER



PLAN VIEW

DEPRESSED CURB FOR DRIVES



SECTION A-A

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 630 FOR PLAIN CEMENT CONCRETE CURB AND DEPRESSED CURB, SECTION 640 FOR PLAIN CEMENT CONCRETE GUTTER AND SECTION 641 FOR PLAIN CEMENT CONCRETE CURB GUTTER.
2. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS.
3. PLACE 20 (3/4") THICK PREMOULDED EXPANSION JOINT FILLER MATERIAL AT STRUCTURES AND AT THE END OF THE WORK DAY. CUT MATERIAL TO CONFORM TO AREA ADJACENT TO CURB OR TO CONFORM TO CROSS SECTIONAL AREA OF CURB.
4. SEE RC-50N FOR PLAIN CEMENT CONCRETE CURB SLOPED TOP TREATMENT AT END OF STRUCTURES.
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.
6. WHERE CURBS ARE INSTALLED ADJACENT TO PARKING LANES A 6" HIGH CURB CAN BE UTILIZED WITH APPROVAL FROM THE LOCAL MUNICIPALITY.

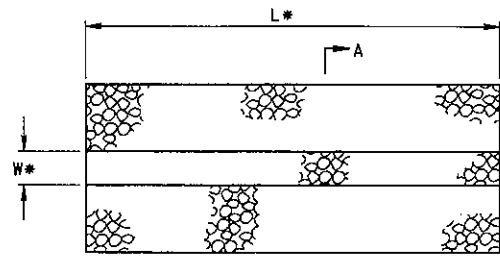
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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

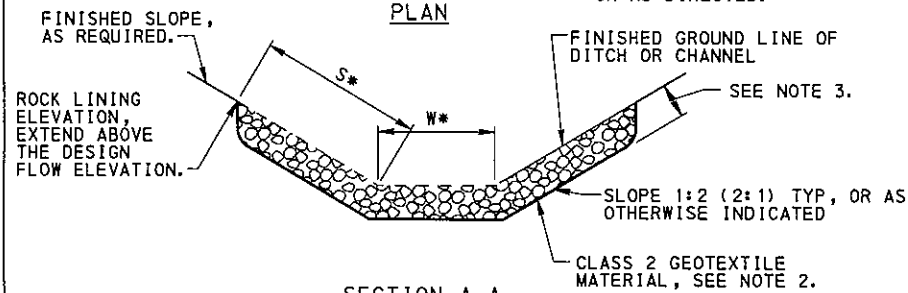
CURBS AND GUTTERS

NOTES

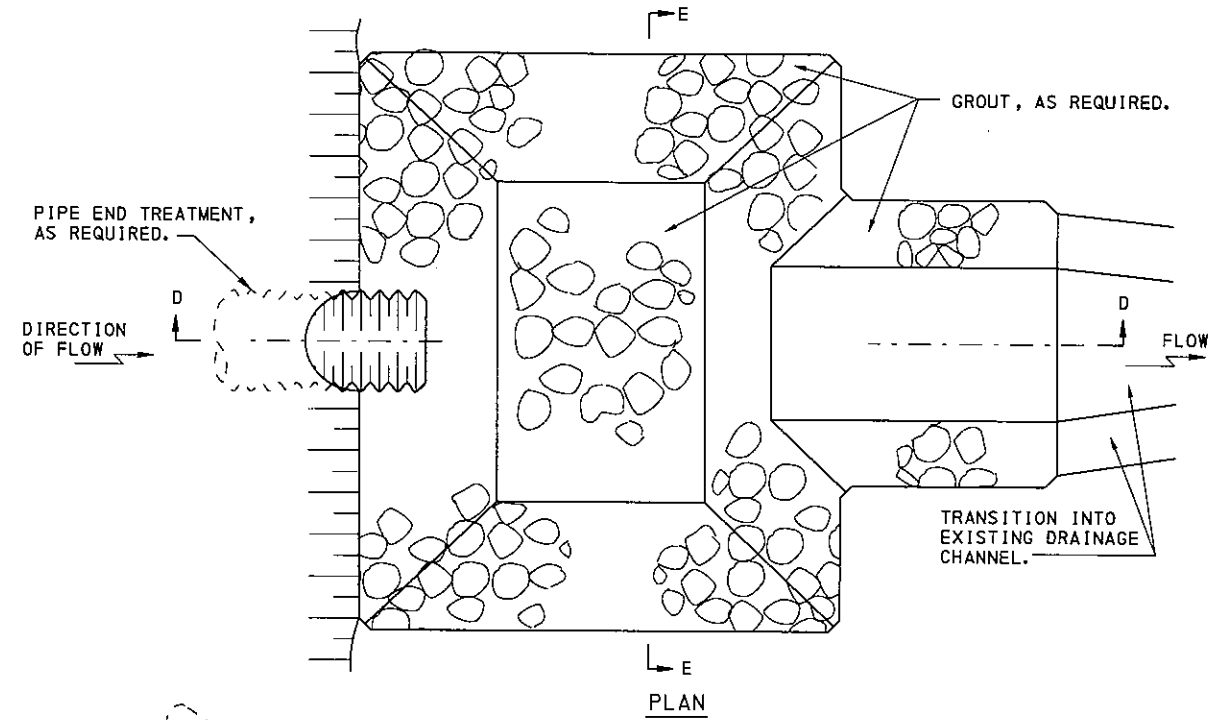
1. PROVIDE GEOTEXTILE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408/2000, SECTION 735 AND FURNISH AND INSTALL IN ACCORDANCE WITH SECTION 212.
2. PROVIDE GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.
3. ROCK SIZE AS PER DESIGN DRAWINGS. NOMINAL PLACEMENT THICKNESS AS PER PUBLICATION 408/2000, SECTION 850.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED. U.S. CUSTOMARY UNITS IN () PARENTHESIS.



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

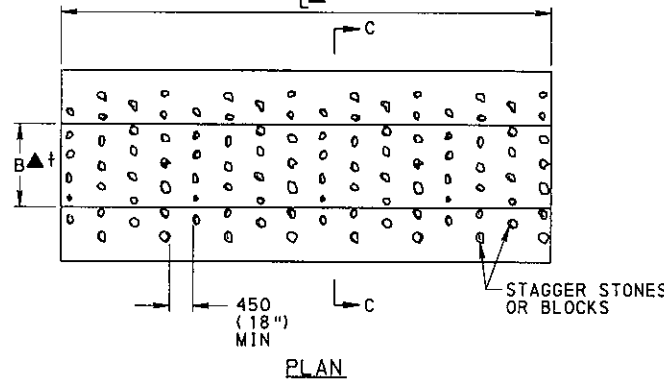


**SECTION A-A
ROCK LINING**

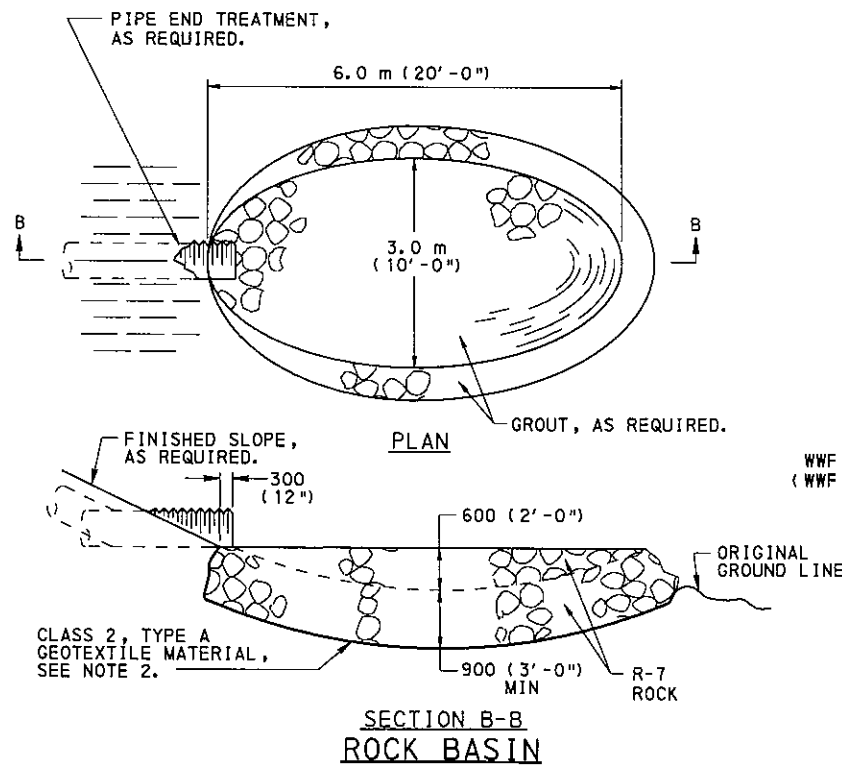
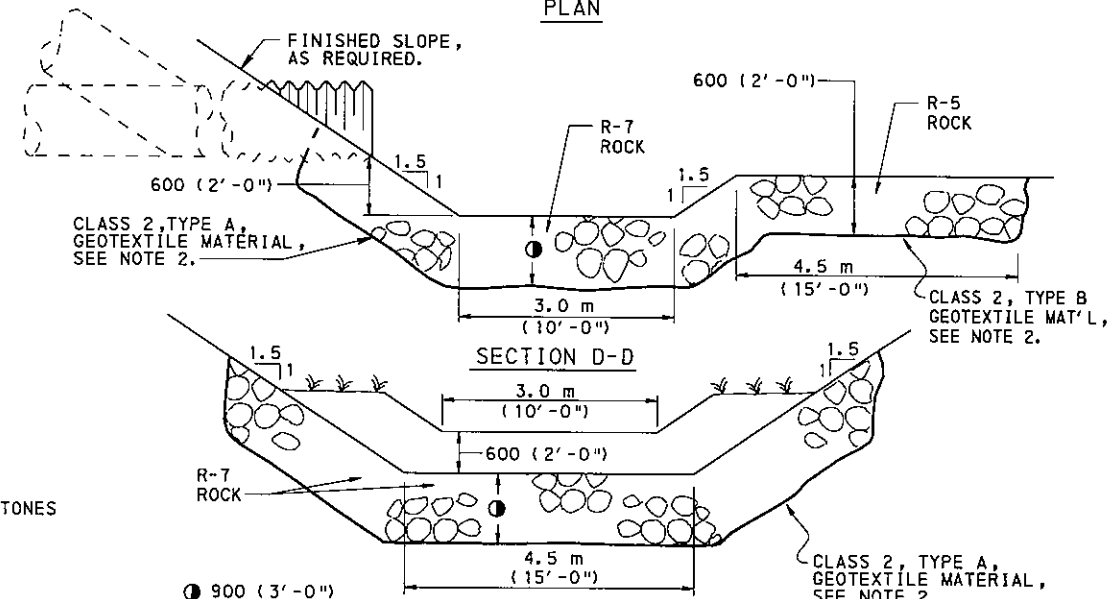


**SECTION E-E
ROCK ENERGY DISSIPATOR**

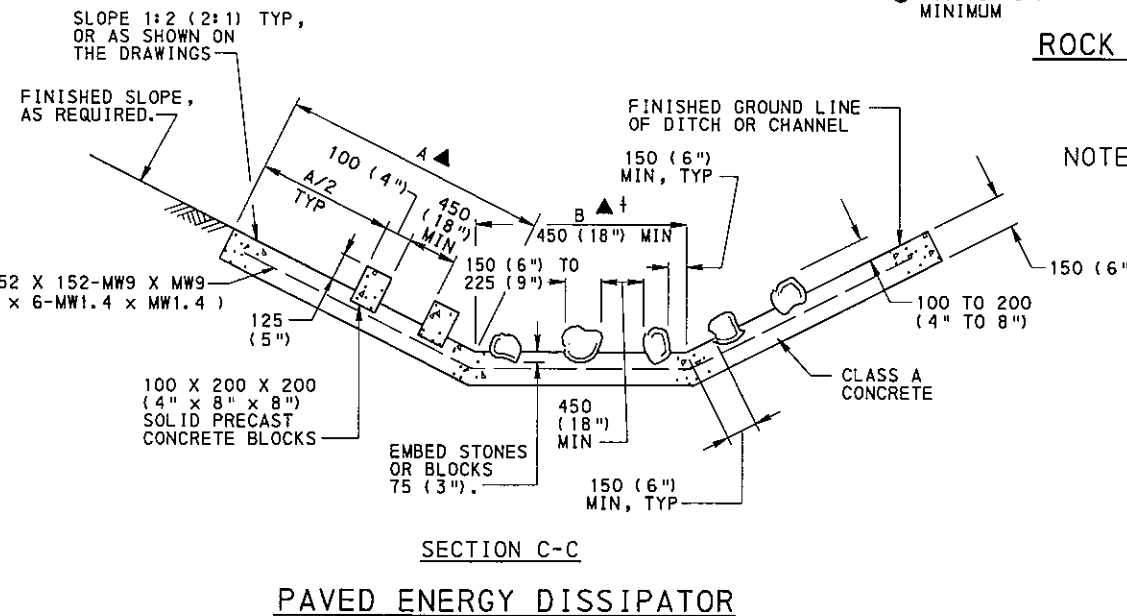
▲ A, B, AND L AS INDICATED OR AS DIRECTED.
 † WHEN CHANNEL BOTTOM WIDTH IS LESS THAN 900 (3'-0"), USE A SINGLE, STAGGERED ROW OF STONES OR BLOCKS ALONG CHANNEL BOTTOM.



PLAN



**SECTION B-B
ROCK BASIN**



**SECTION C-C
PAVED ENERGY DISSIPATOR**

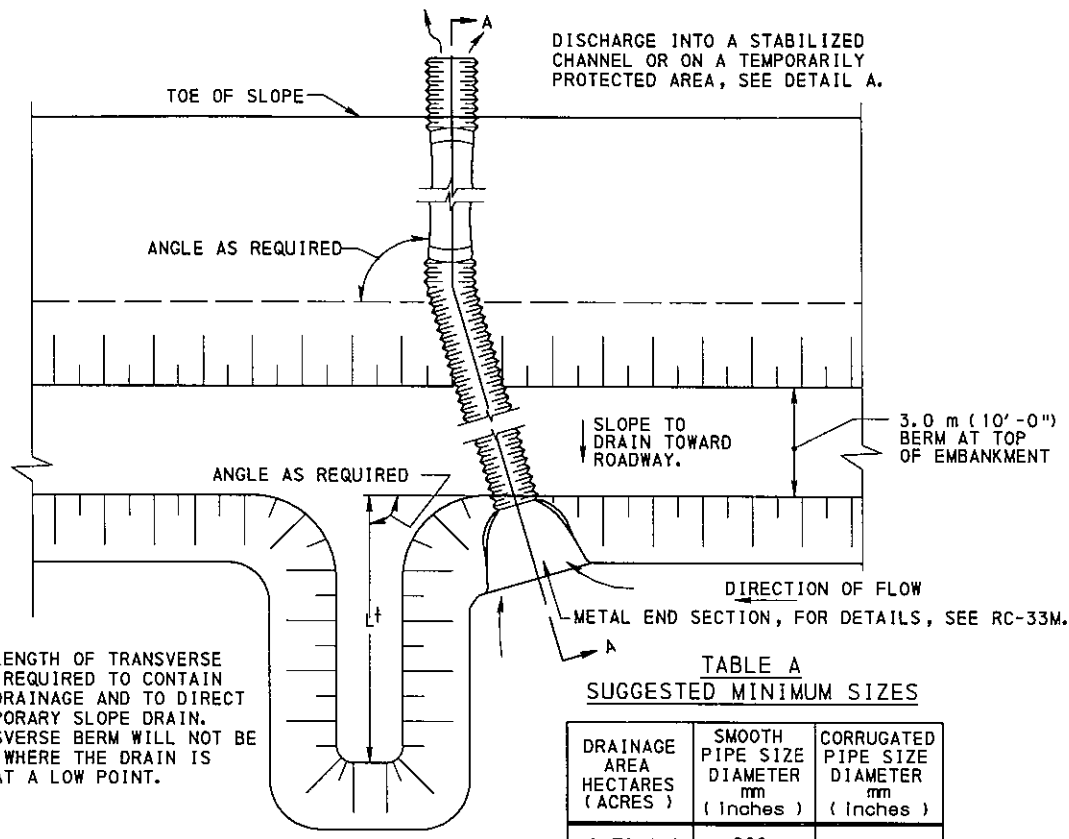
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.

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

**EROSION AND SEDIMENT
POLLUTION CONTROL**

RECOMMENDED APR. 30, 2003
 DIRECTOR, BUREAU OF DESIGN
 RECOMMENDED APR. 30, 2003
 CHIEF ENGINEER
 SHT 1 OF 6
 RC-70M

06-MAY-2003

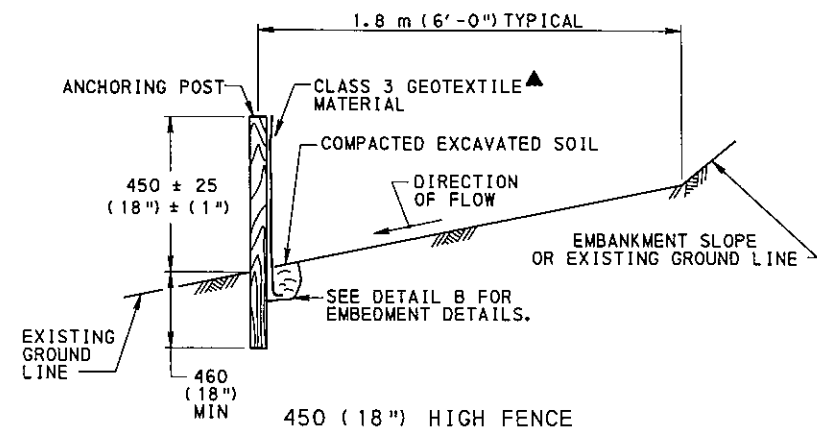


† PROVIDE LENGTH OF TRANSVERSE BERM (L) REQUIRED TO CONTAIN SURFACE DRAINAGE AND TO DIRECT INTO TEMPORARY SLOPE DRAIN. THE TRANSVERSE BERM WILL NOT BE REQUIRED WHERE THE DRAIN IS LOCATED AT A LOW POINT.

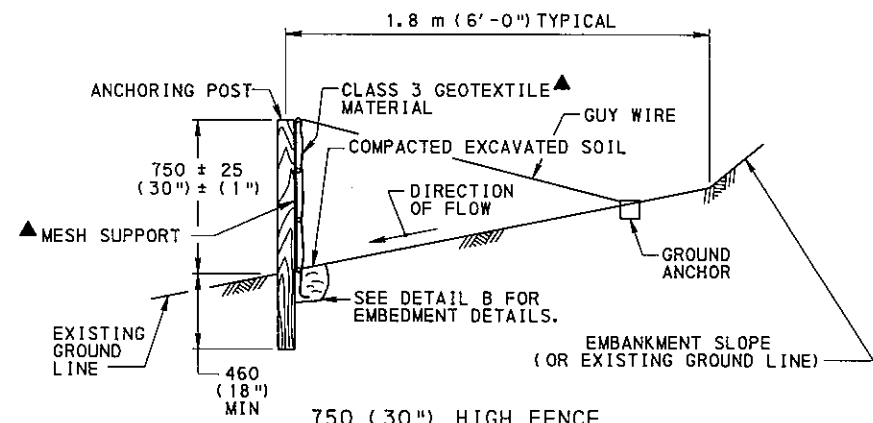
PLAN

TABLE A
SUGGESTED MINIMUM SIZES

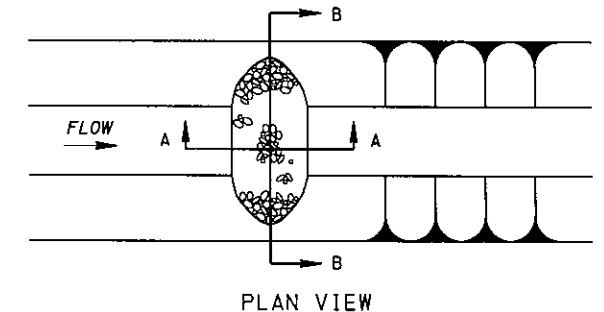
DRAINAGE AREA HECTARES (ACRES)	SMOOTH PIPE SIZE DIAMETER mm (Inches)	CORRUGATED PIPE SIZE DIAMETER mm (Inches)
0 TO 1.2 (0 TO 3)	200 (8")	300 (12")
1.2 TO 2.4 (3 TO 6)	250 (10")	375 (15")
2.4 TO 4.0 (6 TO 10)	300 (12")	450 (18")



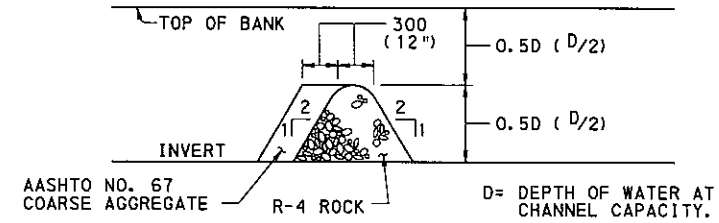
450 (18") HIGH FENCE



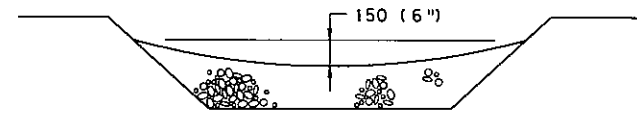
750 (30") HIGH FENCE



PLAN VIEW



TYPICAL SECTION A-A



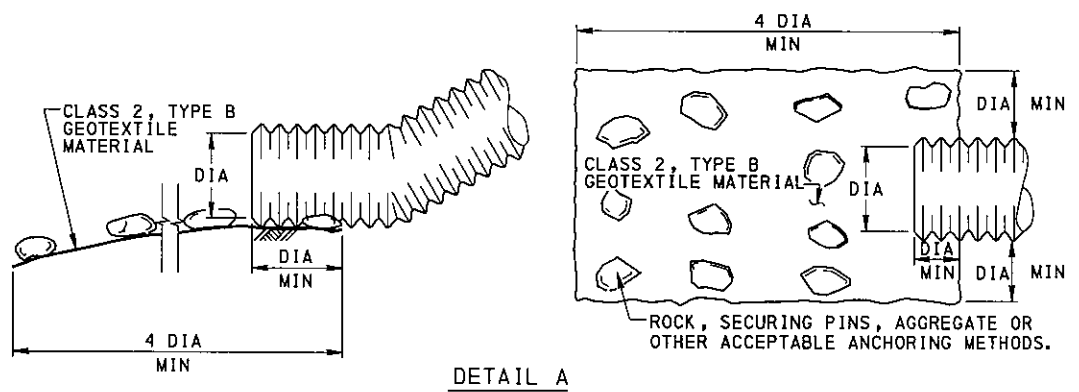
TYPICAL SECTION B-B
ROCK BARRIER

TABLE B
SILT BARRIER FENCE
GEOTEXTILE SELECTION

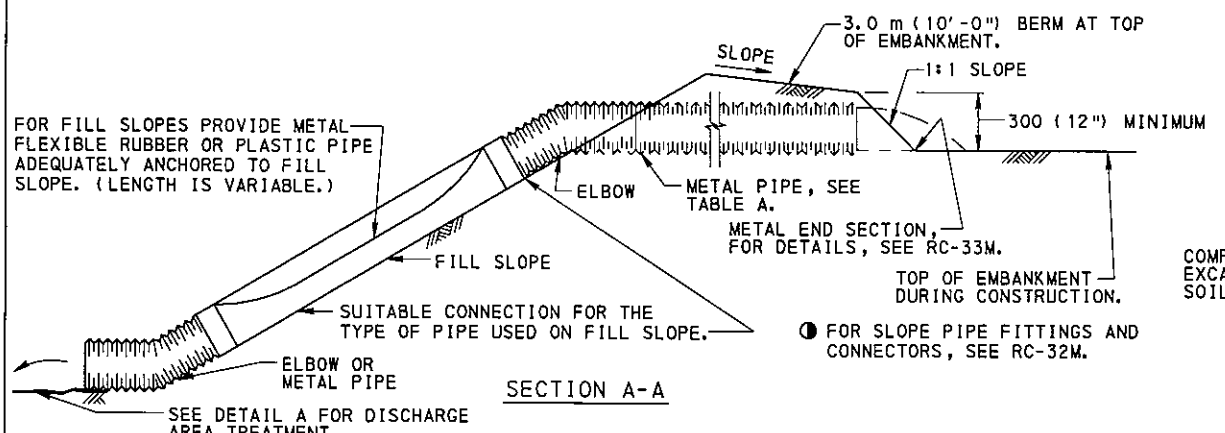
TYPE OF CLASS 3 GEOTEXTILE MATERIAL	NOMINAL FABRIC HEIGHT	MAX POST SPACING WITHOUT MESH SUPPORT	MAX POST SPACING WITH MESH SUPPORT
3A	450 (18")	2.4 m (8'-0")	NA
3A	750 (30")	NA	2.4 m (8'-0")
3B	450 (18")	1.2 m (4'-0")	NA
3B	750 (30")	NA	1.2 m (4'-0")

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.

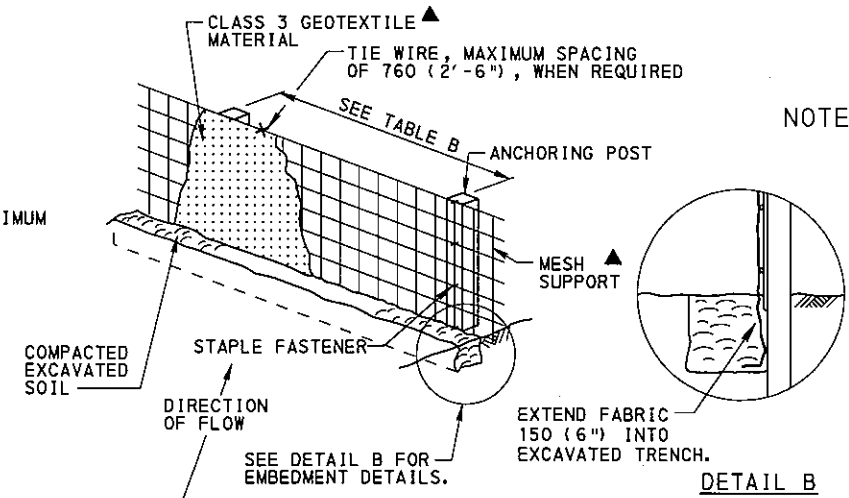


DETAIL A



SECTION A-A

TEMPORARY SLOPE PIPE DRAIN

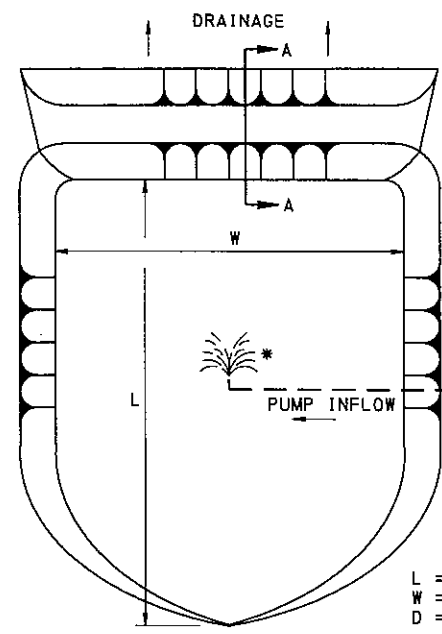


DETAIL B

SILT BARRIER FENCE

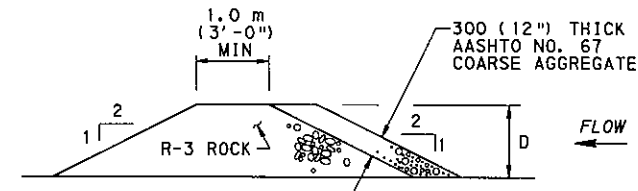
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

EROSION AND SEDIMENT
POLLUTION CONTROL



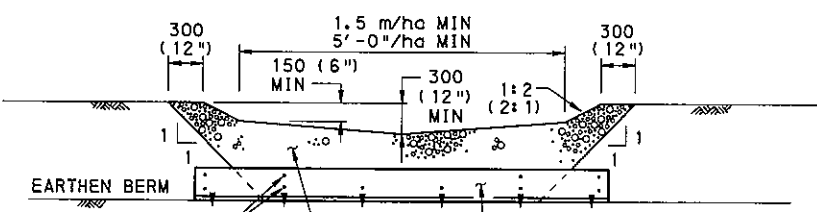
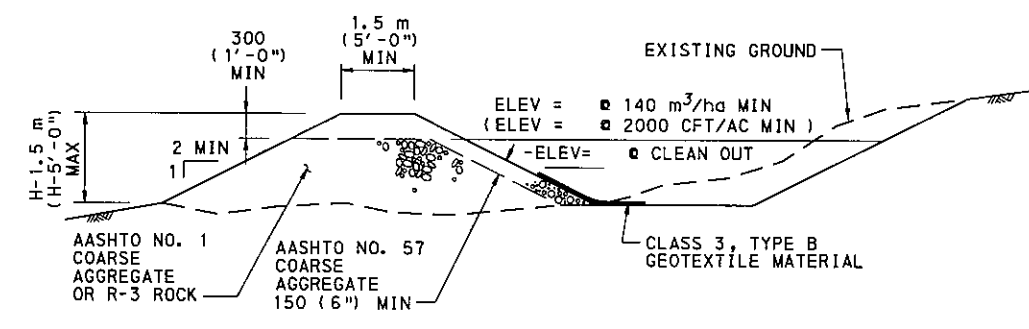
PLAN VIEW

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)

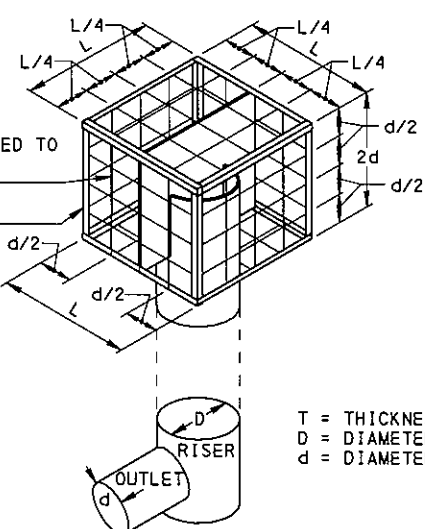


TYPICAL SECTION A-A

DEWATERING BASIN



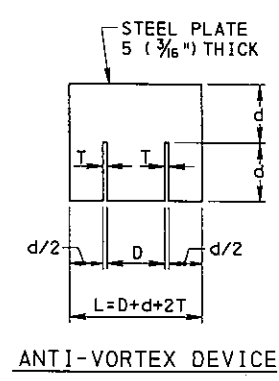
SEDIMENT TRAP



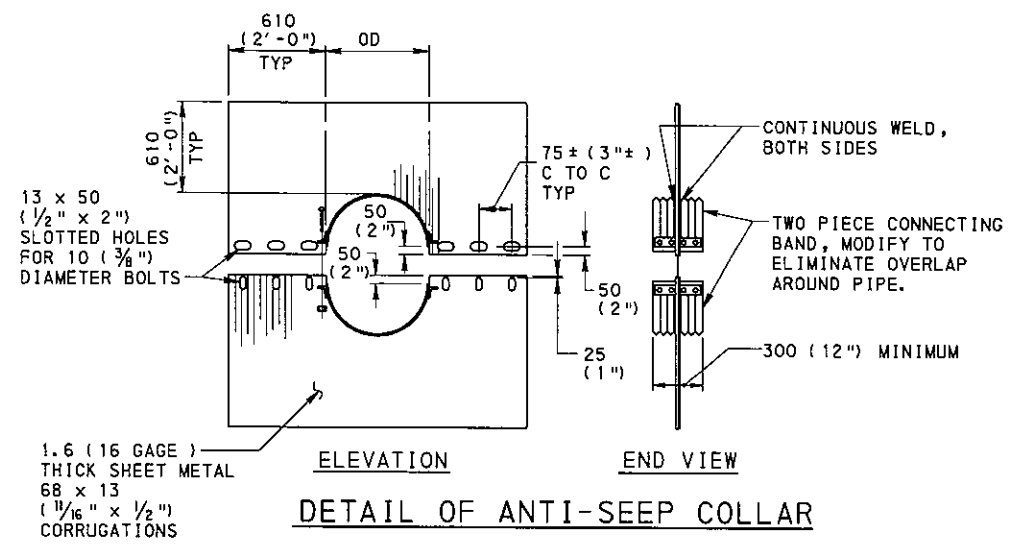
TRASH RACK AND ANTI-VORTEX DEVICE

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.

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



ANTI-VORTEX DEVICE



ELEVATION

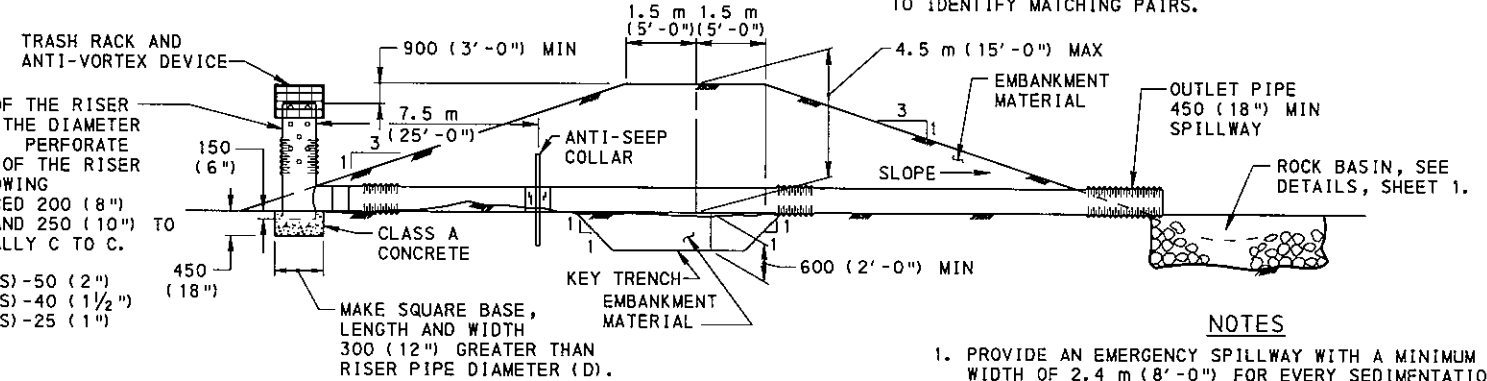
END VIEW

DETAIL OF ANTI-SEEP COLLAR

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

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")

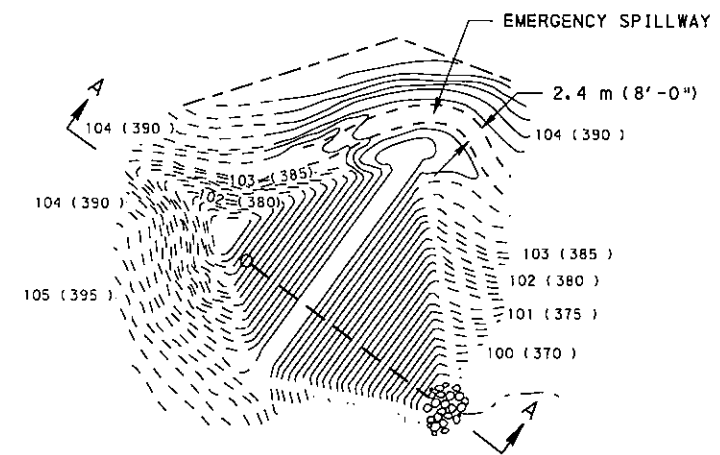


SECTION A-A
SEDIMENTATION POND

NOTES

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

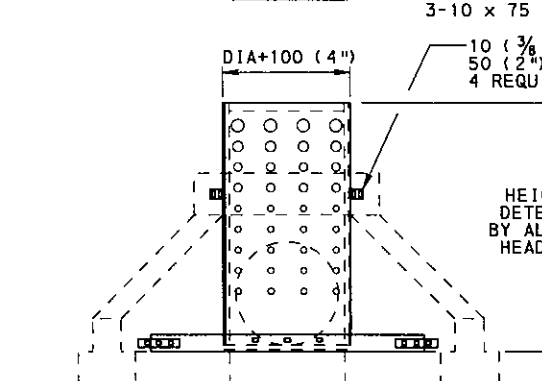
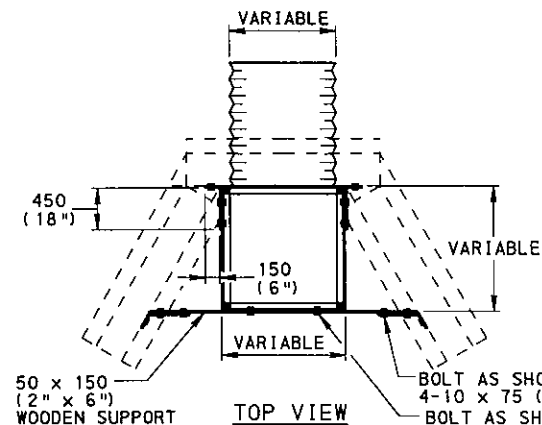
NOTE: EITHER ALL METRIC OR ALL ENGLISH VALUES MUST BE USED ON PLANS. METRIC AND ENGLISH VALUES SHOWN MAY NOT BE MIXED.



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

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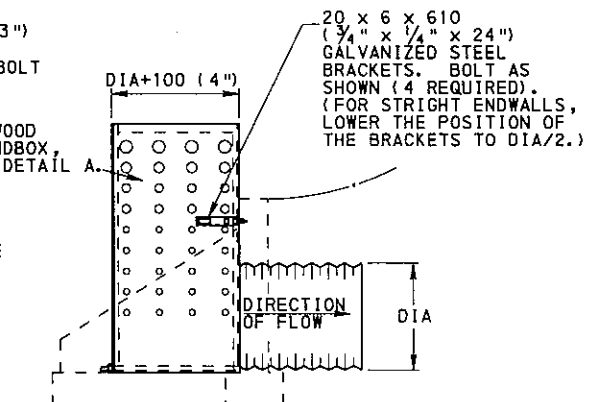
EROSION AND SEDIMENT POLLUTION CONTROL



END VIEW

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.

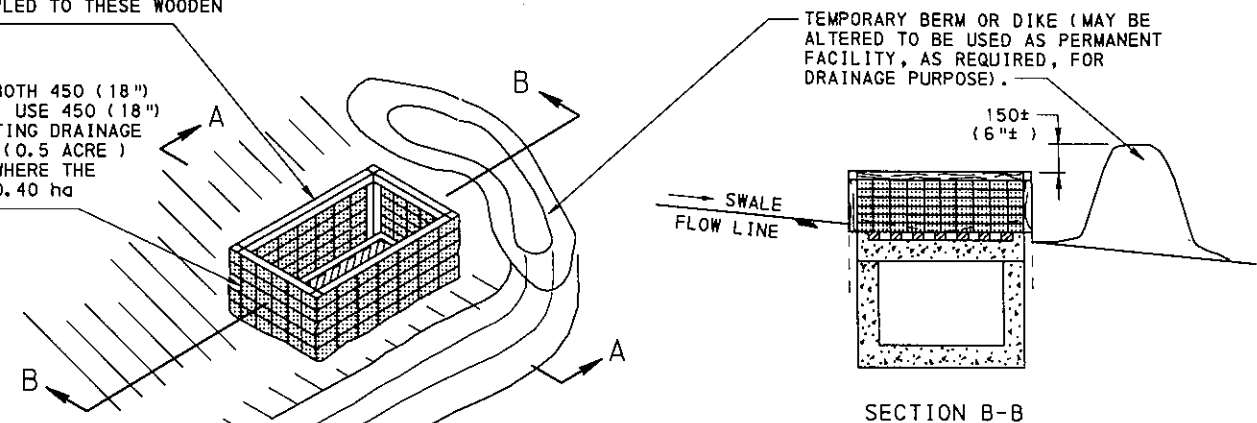
** COVER 50% OF THE HEIGHT OF WIDTH AT THE BOTTOM OF THE STANDBOX. USE THE "EMBEDMENT DETAILS" SHOWN ON SHEET 2 IF BOTTOM IS NOT PAVED. USE ASPHALT MATERIAL FOR FASTENING IF PAVED APRON IS PROVIDED.



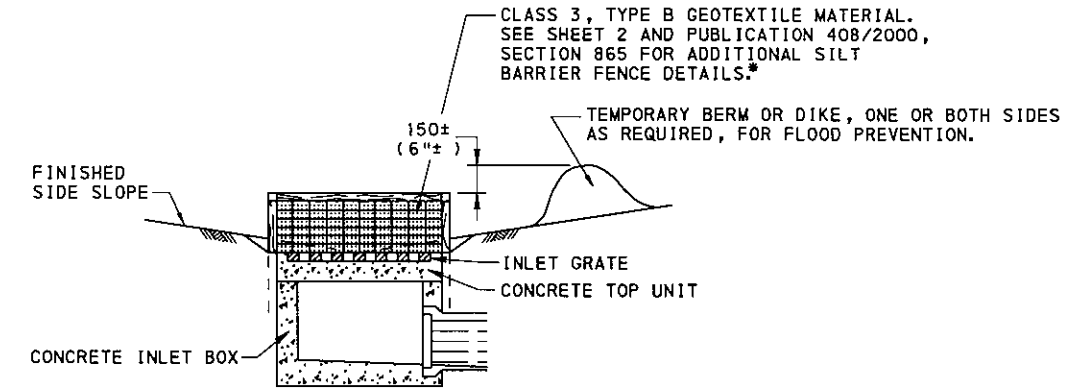
SIDE VIEW

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).

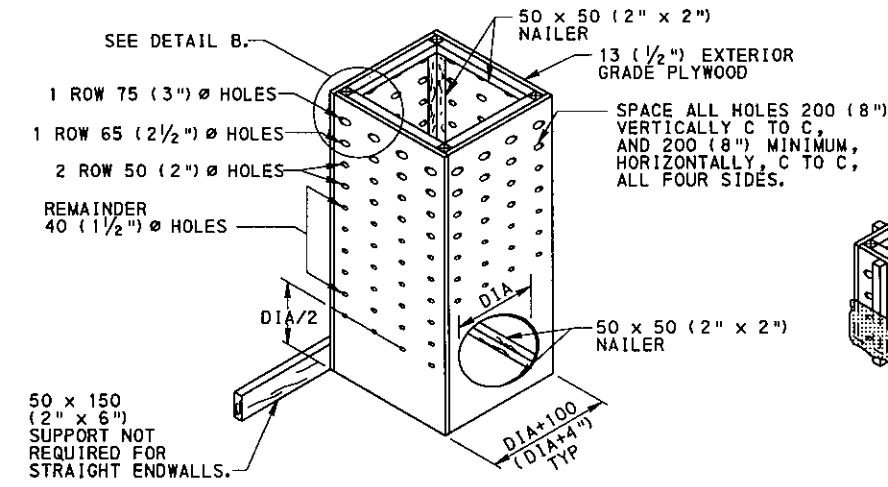


* LOCATE SILT BARRIER FENCE TO PREVENT THE INFILTRATION OF FINES OR SEDIMENTS INTO THE INLET BOX. IF NO BACKFILL OPERATIONS ARE PERFORMED, LOCATE THE SILT BARRIER FENCE OUTSIDE THE AREA EXCAVATED FOR THE INLET BOX.

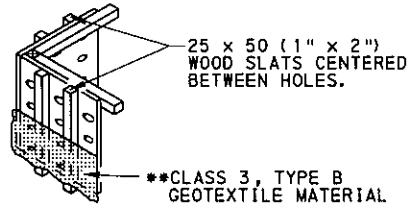


SECTION A-A

SILT BARRIER FENCE FOR INLET PROTECTION



DETAIL A



DETAIL B

ENDWALL STANDBOX†

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

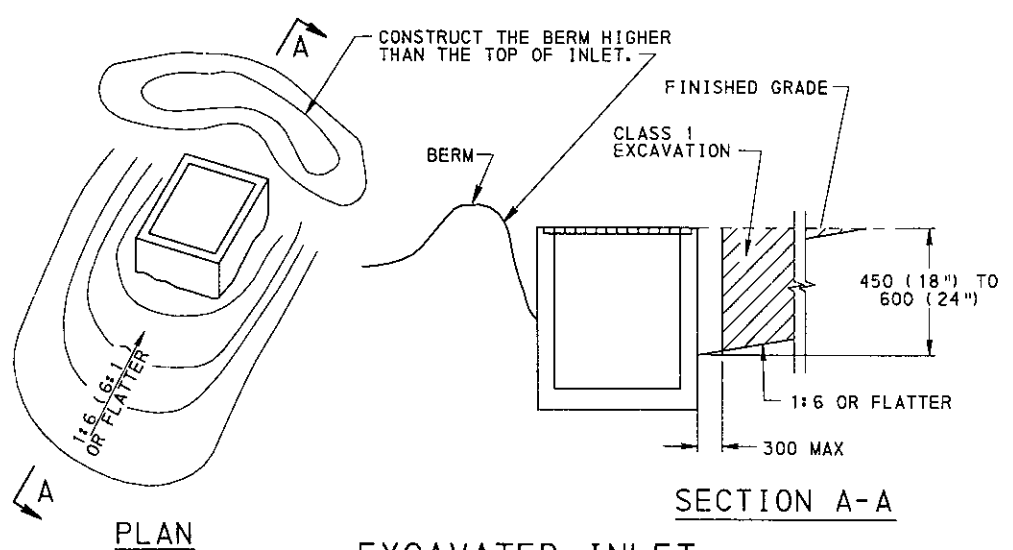
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EROSION AND SEDIMENT
 POLLUTION CONTROL

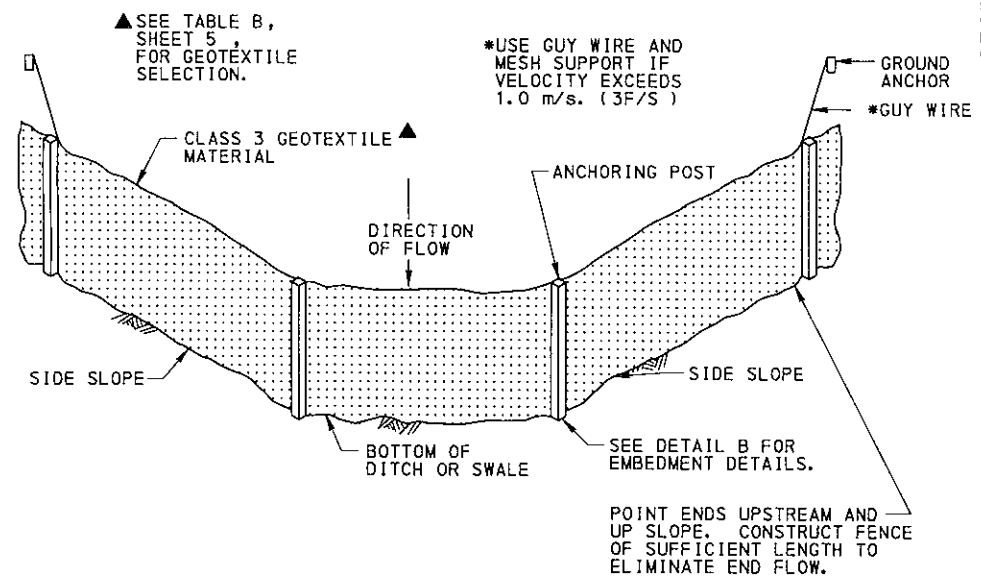
RECOMMENDED APR. 30, 2003
 DIRECTOR, BUREAU OF DESIGN

RECOMMENDED APR. 30, 2003
 CHIEF ENGINEER

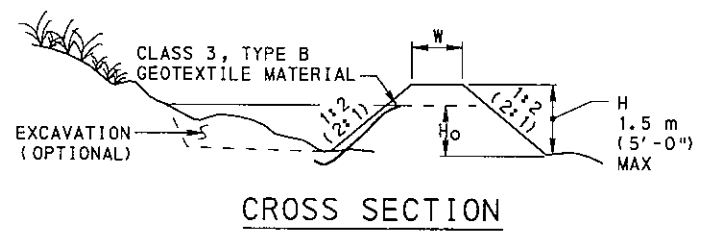
SHT 4 OF 6
 RC-70M



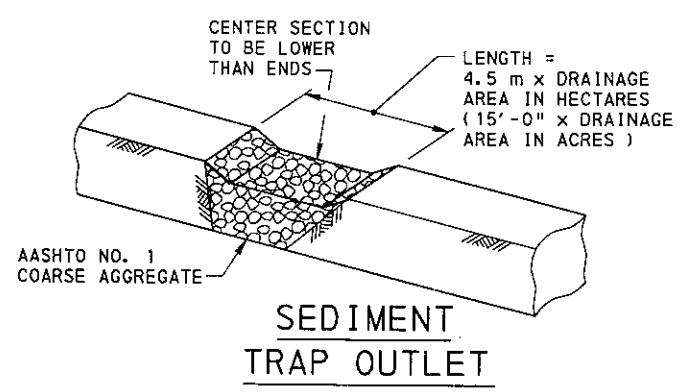
**EXCAVATED INLET
SEDIMENT TRAP**



DITCH OR SWALE CONDITION



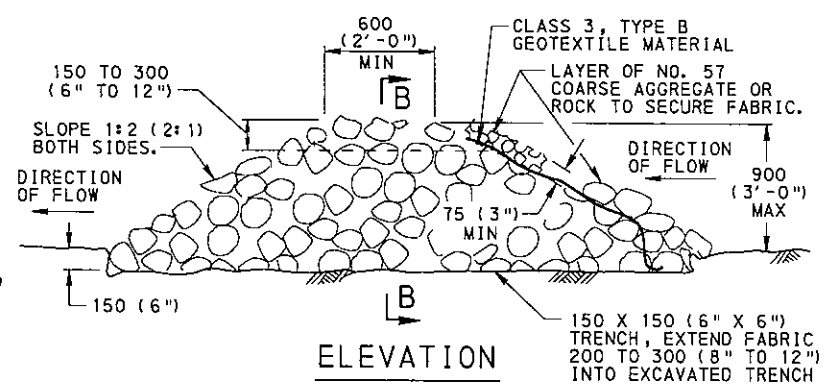
CROSS SECTION



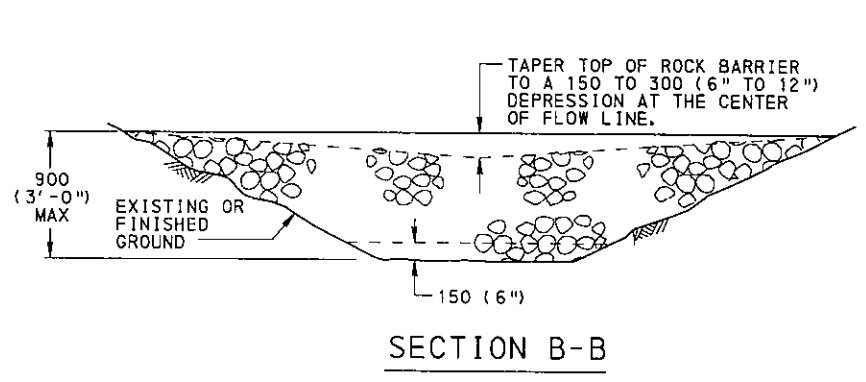
**SEDIMENT
TRAP OUTLET**

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")

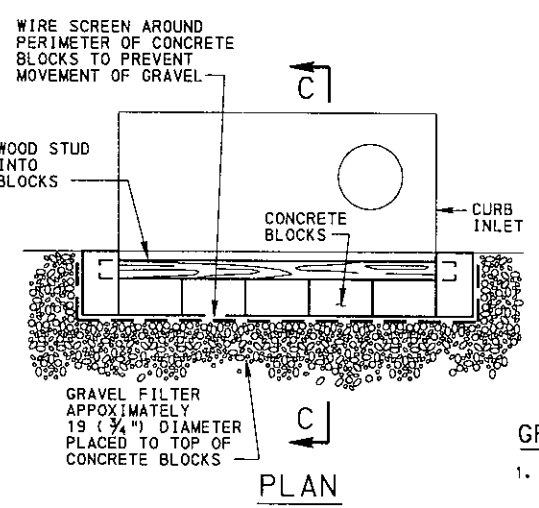


ELEVATION

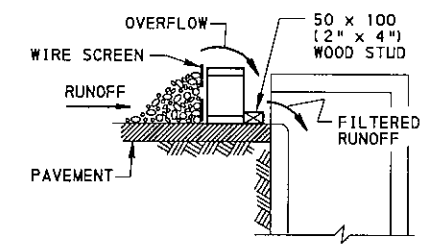


SECTION B-B

ROCK BARRIER

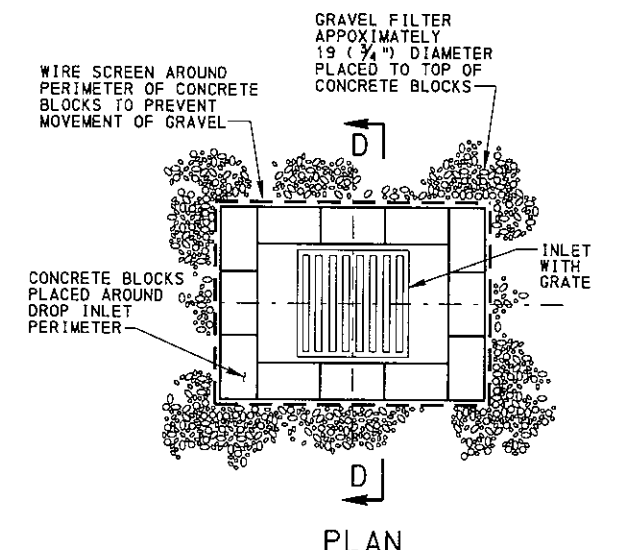


PLAN

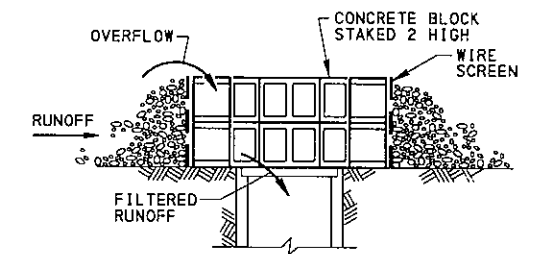


SECTION C-C

**GRAVEL FILTER FOR
CURB INLET**



PLAN



SECTION D-D

**GRAVEL FILTER FOR
AREA INLET**

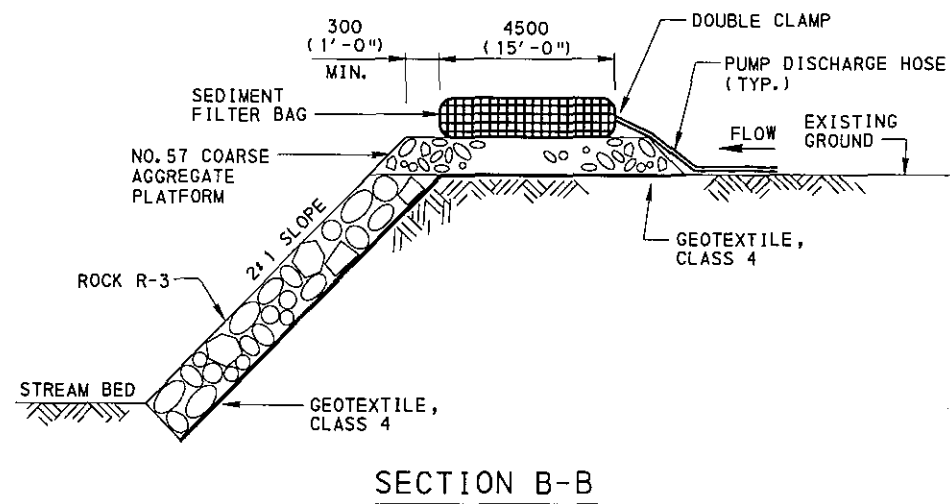
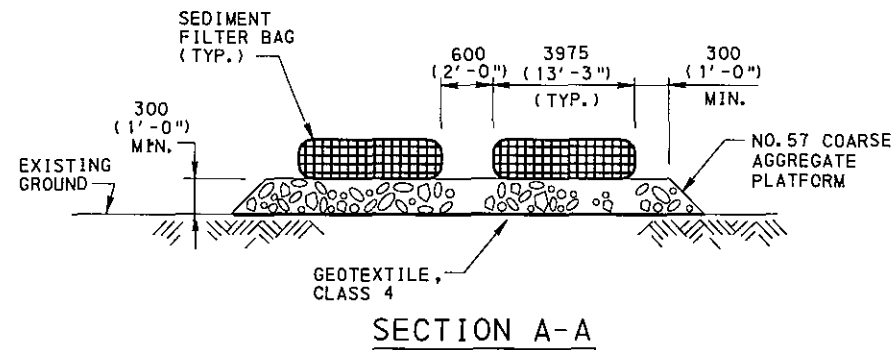
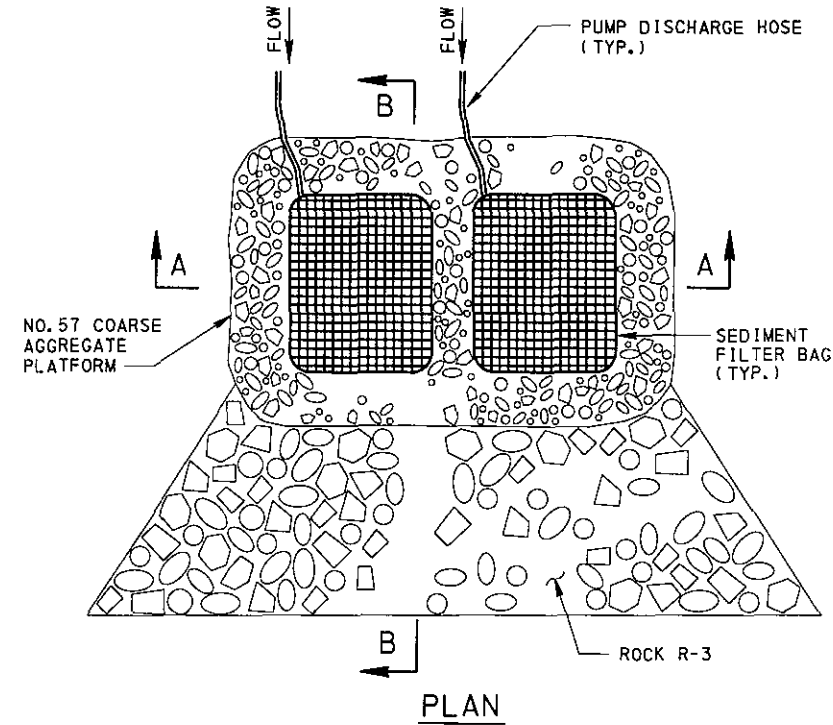
GRAVEL FILTER NOTES:

1. GRAVEL FILTERS MAY BE USED ON PAVEMENT OR BARE GROUND.
2. 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.
3. 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**



NOTES

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

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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SEDIMENT FILTER BAG

RECOMMENDED APR. 30, 2003 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 30, 2003 <i>Alan A. Schmitt</i> CHIEF ENGINEER	SHT 6 OF 6 RC-70M
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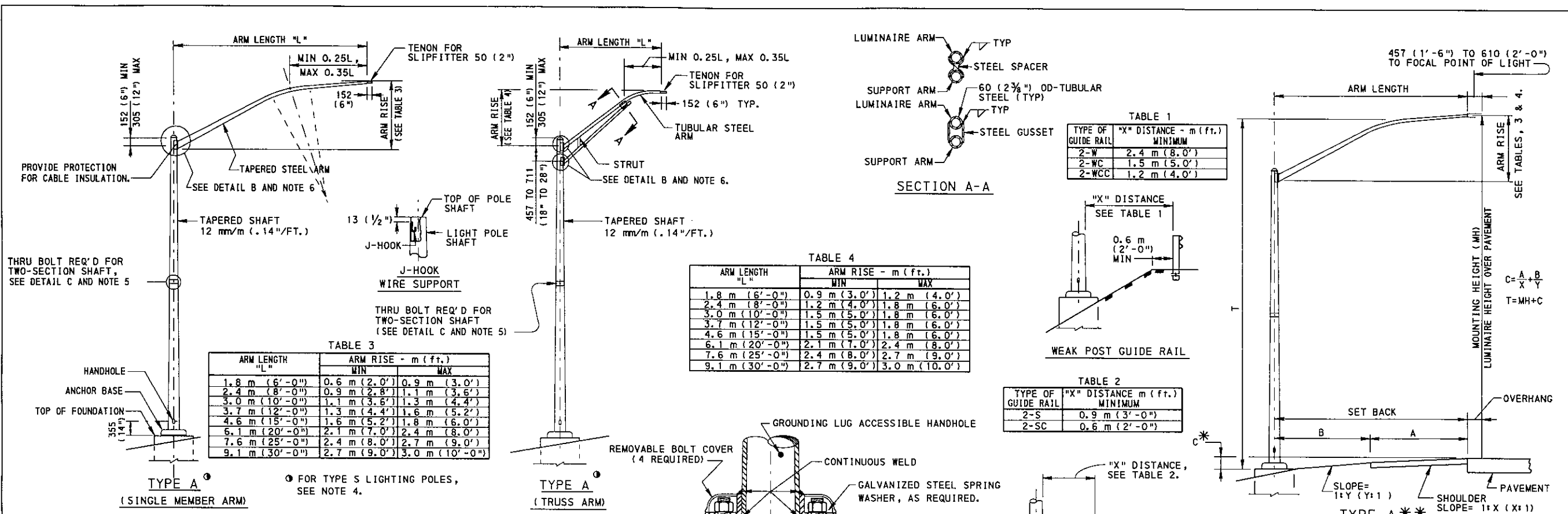


TABLE 3

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

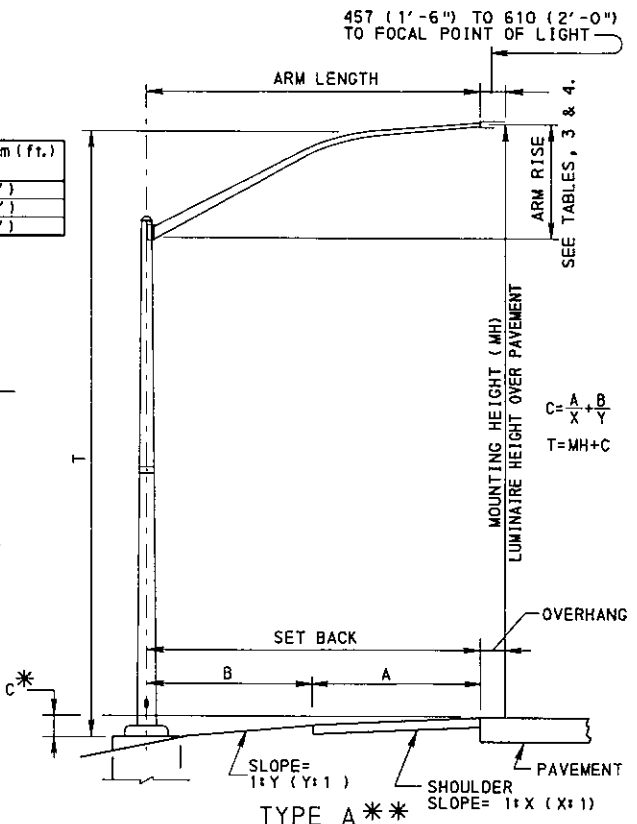
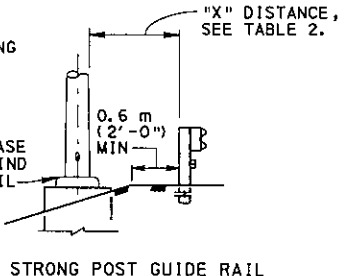
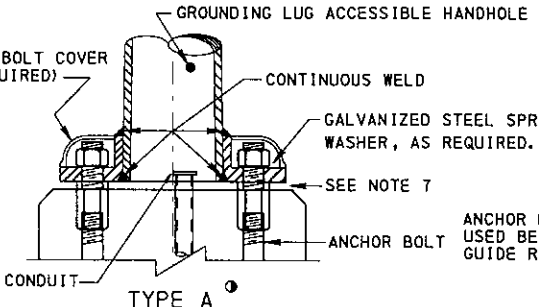
ARM LENGTH "L"	ARM RISE - m (ft.)	
	MIN	MAX
1.8 m (6'-0")	0.9 m (3.0')	1.2 m (4.0')
2.4 m (8'-0")	1.2 m (4.0')	1.8 m (6.0')
3.0 m (10'-0")	1.5 m (5.0')	1.8 m (6.0')
3.7 m (12'-0")	1.5 m (5.0')	1.8 m (6.0')
4.6 m (15'-0")	1.5 m (5.0')	1.8 m (6.0')
6.1 m (20'-0")	2.1 m (7.0')	2.4 m (8.0')
7.6 m (25'-0")	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.) MINIMUM
2-W	2.4 m (8.0')
2-WC	1.5 m (5.0')
2-WCC	1.2 m (4.0')

TABLE 2

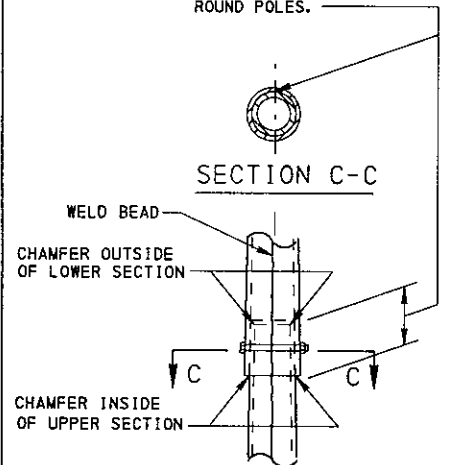
TYPE OF GUIDE RAIL	"X" DISTANCE m (ft.) MINIMUM
2-S	0.9 m (3'-0")
2-SC	0.6 m (2'-0")



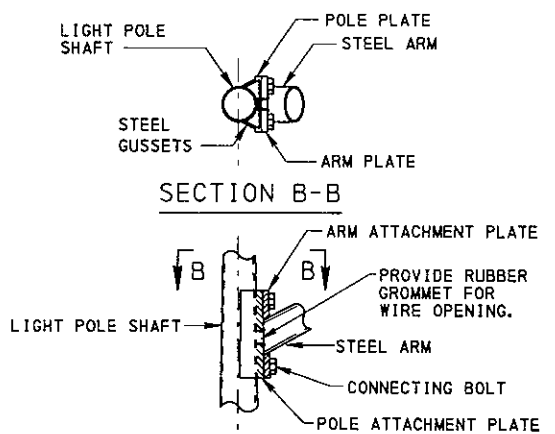
* C-DIMENSIONS, APPLICABLE TO CONVENTIONAL LIGHTING POLES, ARE FOR ESTIMATING PURPOSES ONLY AND SHOULD NOT BE USED FOR DETERMINING LIGHTING POLE DIMENSIONS WITHOUT VERIFICATION. THE CONTRACTOR IS RESPONSIBLE FOR FURNISHING LIGHTING POLES OF PROPER DIMENSIONS TO PROVIDE THE MOUNTING HEIGHT SPECIFIED. 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.

GRIND SMOOTH THE LONGITUDINAL WELD BEADS OF MULTISECTIONAL POLES AT THE OVERLAP. INSIDE OF OUTER SECTION AND OUTSIDE OF MALE MATING SECTION. PROVIDE THRU BOLT FOR ROUND POLES.



DETAIL C
POLE OVERLAP DETAIL



DETAIL B
ARM ATTACHMENT TO POLE SHAFT

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.

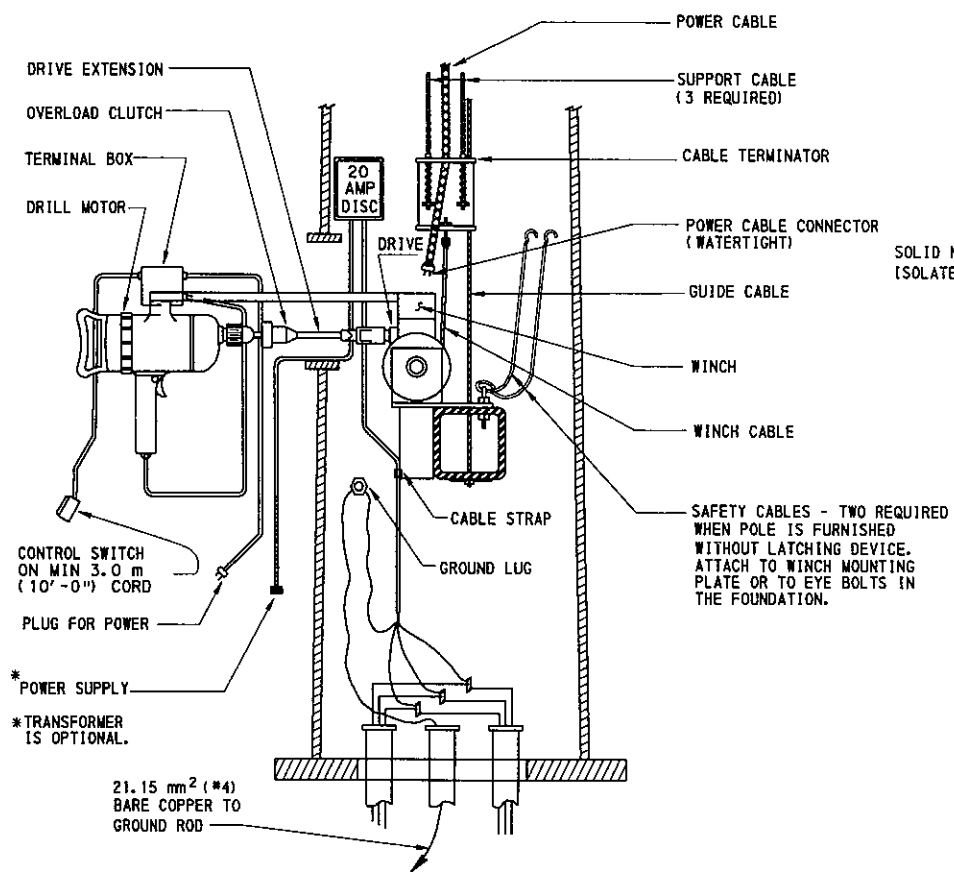
TERMINOLOGY

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

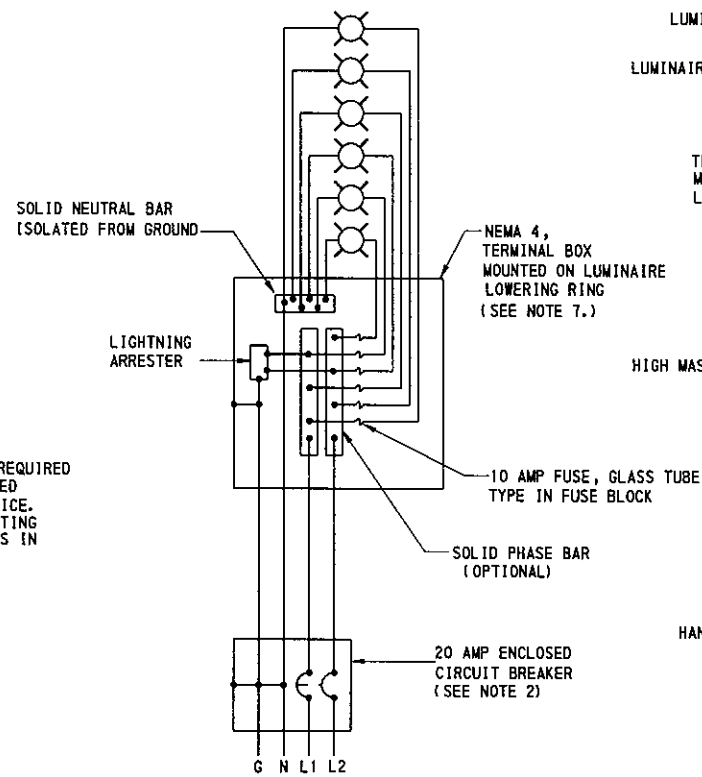
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HIGHWAY LIGHTING
CONVENTIONAL LIGHTING
POLE DETAILS

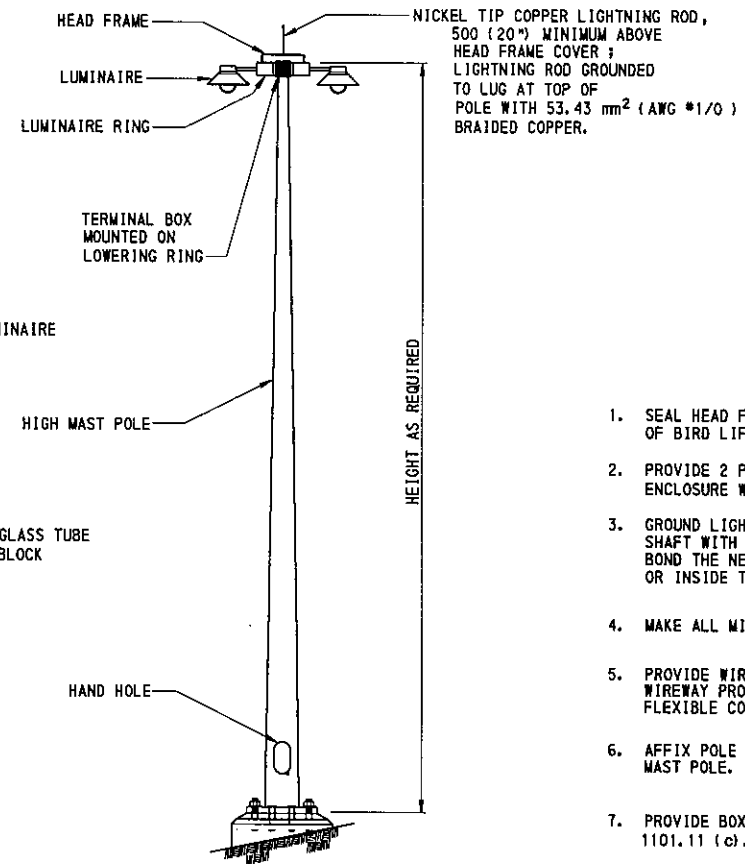
RECOMMENDED APR. 30, 2003 <i>Scott Christie</i> DIRECTOR, BUREAU OF DESIGN	RECOMMENDED APR. 30, 2003 <i>Alan H. Schmitt</i> CHIEF ENGINEER	SHT 1 OF 2 RC-83M
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TYPICAL LOWER SECTION MECHANISM



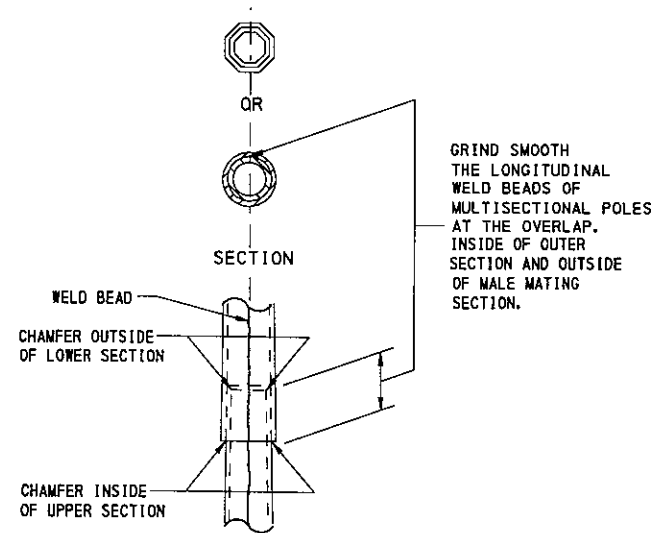
TYPICAL CIRCUIT SCHEMATIC



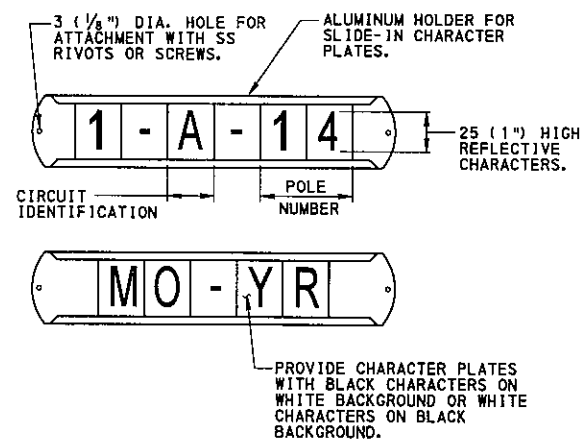
TYPICAL HIGH MAST POLE

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