OS-299 (8-72)

TRANSMITTAL LETTER

Publication 72
March 1994 Edition

DATE
March 25, 1994

SUBJECT:

STANDARDS FOR ROADWAY CONSTRUCTION, RC 0-100

INFORMATION AND SPECIAL INSTRUCTIONS:

The attached March 1994 Edition of the Standards for Roadway Construction represents a completely revised publication. This Edition supersedes the May 1983 Edition and associated Changes #1 through #21.

The Standard Drawings cancelled by this change should be maintained for reference on projects now under construction. The new Standard Drawings should be adopted as soon as practical on all new and existing designs without affecting any letting schedules. P.S.&E. submissions to Central Office after July 1, 1994 shall include these revisions.

RCs-100 to 104 have been deleted since we did not receive approval from the Washington Office of the Federal Highway Administration. However, appropriate details may be submitted for approval on a case by case basis.

Any comments or questions on the new Edition relative to revisions, new details and standards may be directed to the Highway Design Quality Control Division.

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

Index Sheet	(1 of 1)	-	Revised to indicate new dates, title changes and additional sheets.
RC-10	(1 of 1)	-	No major changes.
RC-11	(1 of 2)	-	Notes 1 and 2 and Detail A were added.
	(2 of 2)	-	Revised Notes 1, 2 and 3 relative to trench width and class of excavation.
RC-12	(1 of 1)	-	Revised Note 2.
RC-13	(1 of 1)	-	No changes.
RC-20	(1 of 4)	-	Revised the Type P Joint.
	(2 of 4)	-	Revised Note 4.
	(3 of 4)	-	This is a new sheet developed and added to RC-20 to show Non-Skewed Load Transfer Assemblies.
	(4 of 4)	-	This is a new sheet developed to show 6:1 Skewed Load Transfer Assemblies.
RC-21	(1 of 1)	-	No major changes.
RC-23	(1&2 of 2)	-	No changes.
RC-24	(1 of 1)	-	No major changes.
RC-25	(1 of 3)	-	Revised Note 4.
	(2 of 3)	-	No major changes.
	(3 of 3)	-	Revised Section B-B (Shoulder Relief Joints) and Note 4.
RC-26	(1 of 5)	-	Moved Note 4 to sheet 2 of 5.
	(2 of 5)	-	Revised slab lengths for "Multi-Lane Pavement Patching" to : 6'-0" min. to 20'-0" max. (typ. PCC) or 30'-0" max. (typ. RCC) and added Note 8.
	(3 of 5)	-	Added Note 5.
	(4&5 of 5)	-	No major changes.
RC-27	(1 of 1)	-	No major changes.
RC-28	(1 of 1)	-	No major changes.
RC-30	(1, 2 &3 of 3)	-	No major changes.
RC-31	(1 of 2)	-	No changes.
	(2 of 2)	-	Corrected dimension in Section E-E from 20" to 24".

RC-32	(1 of 1)	-	No major changes.
RC-33	(1 of 1)	-	Revised Note 1.
RC-34		-	The major changes to RC-34 are the reinforcement for inlet boxes and the increase in bar sizes for inlet grates to provide HS25 Loading.
	(1 of 9)	-	Deleted Note 4 and added Notes 1, 6 and 7.
	(2 of 9)	-	Revised the reinforcement.
	(3 of 9)	-	Revised grate bar sizes and added Note 7.
	(4 of 9)	-	Added Note 6.
	(5 of 9)	-	No changes.
	(6 of 9)	-	Revised the reinforcement and relative notes 8 through 10 and added new Note 11. Also added detail B.
	(7 of 9)	-	Revised the reinforcement. Deleted detail B-B and reordered old details. Also deleted Note 7.
	(8 & 9 of 9)	-	No major changes.
RC-35	(1 of 1)	-	No changes.
RC-36	(1 of 1)	-	No changes.
RC-39	(1 of 5)	-	Revised Note 1.C. and Note 4.
	(2 of 5)	-	Revised Note 2.
	(3,4&5 of 5)	-	No changes.
RC-40	(1 of 1)	-	No major changes.
RC-43	(1 of 1)	-	No major changes.
RC-50	(1 of 1)	-	Numbers were added to the posts in both elevation views.
RC-52	(1,2,3&4 of 5)	-	No major changes.
	(5 of 5)	-	Revised Note 5.
RC-53	(1&2 of 2)	-	No major changes.
RC-54	(1,2&3 of 3)	-	No major changes.
RC-55	(1 of 1)	-	No major changes.
RC-57	(1,2&3 of 3)	-	No major changes.
RC-58	(1,2,3,4 & 5 of 5)	-	No major changes.
RC-59	(1&2 of 2)	-	No major changes.
RC-60	(1&2 of 2)	-	No major changes.
RC-61	(1 of 1)	-	No major changes.
RC-63	(1&2 of 2)	-	No major changes.
RC-64	(1 of 1)	-	No major changes.
RC-65	(1 of 1)	-	No major changes.
RC-66	(1 of 1)	-	No major changes.
RC-67	(1&2 of 2)	-	RC-67 was updated to incorporate accessibility guidelines for disabled persons required by the 1990 Americans with Disabilities Act. New details and notes complement the revisions made to Chapter 6 of DM-2 in Change #4. The basic design of curb ramps has not changed. However, additional options are provided including state-of-the-art details, especially for existing curbs and sidewalk.
RC-70	(1,2,3&4 of 4)	-	No major changes.
RC-80	(1 of 2)	-	Changed ground rod from 5' minimum to 8' minimum in Note 4.
	(2 of 2)	-	No major changes.

RC-81	(1 of 1)	-	Revised Notes 4, 6 and 7. Added Note 10.
RC-82	(1 of 1)	-	Revised Notes 4, 7 and 8. Added Note 11.
RC-83	(1 of 2)	-	Reworded Notes 5, 6 and 7 and the Note in detail C.
	(2 of 2)	-	Revised Notes 3 and 5.
RC-84	(1 of 1)	-	Added galvanized steel conduit to power supply pole. Added marking tape to trench. Changed 5' ground rod to 8' minimum.
RC-91	(1 of 1)	-	No major changes.

ANCEL THE FOLLOWING:

- o Publication 72, May 1983 Edition and Changes #1 to #21.
- o Strike-off Letter 430-93-86.
- o RC-100 to 104.

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BY: William R. Moyer, P.E.
Deputy Secretary for
Highway Administration

OS-299 (8-72)

TRANSMITTAL LETTER

Change #1
Publication 72
March 1994 Edition

DATE
October 24, 1995

SUBJECT:

Revisions to Standards for Roadway Construction Change #1
RC-30

INFORMATION AND SPECIAL INSTRUCTIONS:

Incorporate the attached revisions into the March 1994 Edition of the Standards for Roadway Construction. The revisions to RC-30 were adopted on June 19, 1995 and issued with SOL 430-95-43 "Policy on Design, Fabrication and Installation of Pipes".

This formal revision to the March, 1994 Edition of the RC-Standards is made to be used and referenced on projects under design in English units. For Metric projects, use RC-30M dated September 25, 1995.

CANCEL THE FOLLOWING:

RC-30 dated March 25, 1994

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Michael M. Ryan, P.E.
Deputy Secretary for
Highway Administration

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DESIGN

STANDARDS FOR ROADWAY CONSTRUCTION
SERIES RC–0 TO 100

MARCH 1994 EDITION
JUNE 1996 PRINTING
(includes change 1)

PDT Pub #72

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INDEX OF STANDARDS FOR ROADWAY CONSTRUCTION

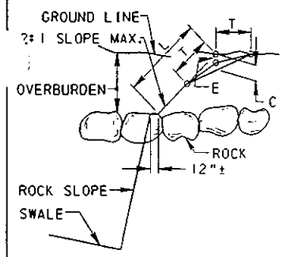
STANDARD DRAWING NUMBER	DRAWING DATE	DESCRIPTION
EARTHWORK		
RC-10	MAR. 25, 1994	CLASSIFICATION OF EARTHWORK
RC-11 (2 Sheets)	MAR. 25, 1994	CLASSIFICATION OF EARTHWORK FOR STRUCTURES
RC-12	MAR. 25, 1994	BACKFILL AT STRUCTURES
RC-13	MAR. 25, 1994	PAY LIMIT OF SUBBASE
PAVEMENTS		
RC-20 (4 Sheets)	MAR. 25, 1994	CONCRETE PAVEMENT JOINTS
RC-21	MAR. 25, 1994	REINFORCED CONCRETE PAVEMENT
RC-23 (2 Sheets)	MAR. 25, 1994	BRIDGE APPROACH SLAB
RC-24	MAR. 25, 1994	PAVEMENT RELIEF JOINT
RC-25 (3 Sheets)	MAR. 25, 1994	SHOULDERS
RC-26 (5 Sheets)	MAR. 25, 1994	CONCRETE PAVEMENT REHABILITATION
RC-27	MAR. 25, 1994	PLAIN CONCRETE PAVEMENT
RC-28	MAR. 25, 1994	OVERLAY TRANSITIONS AND PAVING NOTCHES
DRAINAGE		
* RC-30 (4 Sheets)	OCT. 24, 1995	SUBSURFACE DRAINS
RC-31 (2 Sheets)	MAR. 25, 1994	ENDWALLS
RC-32	MAR. 25, 1994	SLOPE PIPE FITTINGS, PIPE CONNECTORS AND CONCRETE COLLAR FOR PIPE EXTENSION
RC-33	MAR. 25, 1994	END SECTIONS FOR PIPE CULVERTS
RC-34 (9 Sheets)	MAR. 25, 1994	INLETS, INLET ASSEMBLIES
RC-35	MAR. 25, 1994	DRAINAGE DIKE
RC-36	MAR. 25, 1994	SPRING BOXES
RC-39 (5 Sheets)	MAR. 25, 1994	STANDARD MANHOLES
RC-40	MAR. 25, 1994	SLOPE PROTECTION
RC-43	MAR. 25, 1994	GABIONS
GUIDE RAIL AND MEDIAN BARRIER		
RC-50	MAR. 25, 1994	GUIDE RAIL TRANSITION AT END OF STRUCTURES
RC-52 (5 Sheets)	MAR. 25, 1994	TYPE 2-S AND TYPE 2-SC GUIDE RAIL
RC-53 (2 Sheets)	MAR. 25, 1994	TYPE 2 WEAK POST GUIDE RAIL
RC-54 (3 Sheets)	MAR. 25, 1994	BARRIER PLACEMENT AT OBSTRUCTIONS
RC-55	MAR. 25, 1994	TYPE 2 WEAK POST MEDIAN BARRIER
RC-57 (3 Sheets)	MAR. 25, 1994	CONCRETE MEDIAN BARRIER
RC-58 (5 Sheets)	MAR. 25, 1994	SINGLE FACE CONCRETE BARRIER
RC-59 (2 Sheets)	MAR. 25, 1994	CONCRETE GLARE SCREEN
FENCES AND CURBS		
RC-60 (2 Sheets)	MAR. 25, 1994	RIGHT-OF-WAY FENCE
RC-61	MAR. 25, 1994	RIGHT-OF-WAY GATE AND REMOVEABLE FENCE SECTIONS
RC-63 (2 Sheets)	MAR. 25, 1994	PERMANENT BARRICADES
RC-64	MAR. 25, 1994	CURBS AND GUTTERS
RC-65	MAR. 25, 1994	CONCRETE MOUNTABLE CURBS
RC-66	MAR. 25, 1994	CONCRETE TRAFFIC SEPARATOR
RC-67 (2 Sheets)	MAR. 25, 1994	CURB RAMPS
POLLUTION CONTROL		
RC-70 (4 Sheets)	MAR. 25, 1994	EROSION AND SEDIMENT POLLUTION CONTROL
HIGHWAY LIGHTING		
RC-80 (2 Sheets)	MAR. 25, 1994	HIGHWAY LIGHTING-FOUNDATIONS
RC-81	MAR. 25, 1994	HIGHWAY LIGHTING-JUNCTION BOXES-LIGHT DUTY
RC-82	MAR. 25, 1994	HIGHWAY LIGHTING-JUNCTION BOXES-HEAVY DUTY
RC-83 (2 Sheets)	MAR. 25, 1994	HIGHWAY LIGHTING-LIGHTING POLE DETAILS
RC-84	MAR. 25, 1994	HIGHWAY LIGHTING-LIGHTING AND ELECTRICAL DETAILS
ROADSIDE DEVELOPMENT AND PLANTING		
RC-91	MAR. 25, 1994	BRACING AND PLANTING DETAILS

March 1994 Edition
* Change #1, Effective Oct. 24, 1995
10-24-95

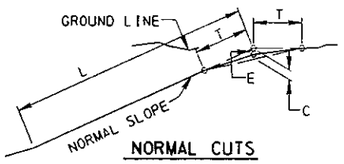
L=LENGTH OF SLOPE
•T=10 FEET, WHERE L IS 10 FEET OR GREATER
•T=L, WHEN L IS LESS THAN 10 FEET
E=C/2

APPLY ABOVE VALUES FOR ROUNDING THE TOP OF SLOPES OF DRAINAGE SWALES, CHANNELS, DITCHES AND PARALLEL DITCHES.

•EXCEPT IN HARD ROCK WITHOUT OVERBURDEN, AND EXCEPT AS INDICATED ON CONTOUR GRADING AND DRAINAGE PLANS, OR CROSS SECTIONS.

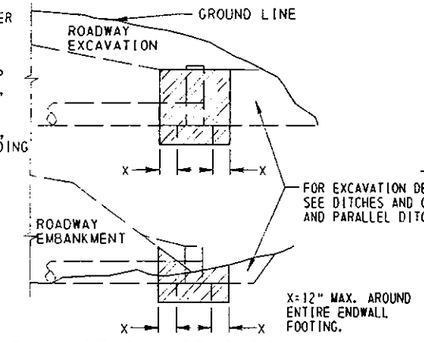


ROCK CUTS



NORMAL CUTS

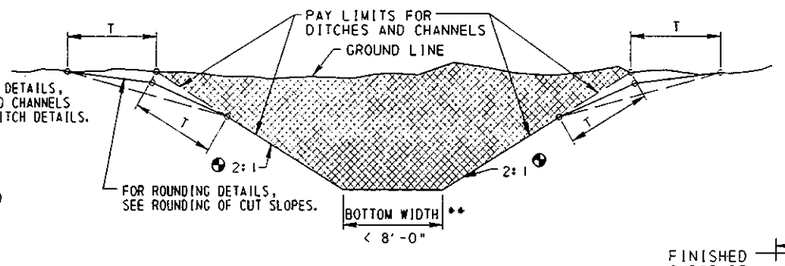
ROUNDING OF CUT SLOPES



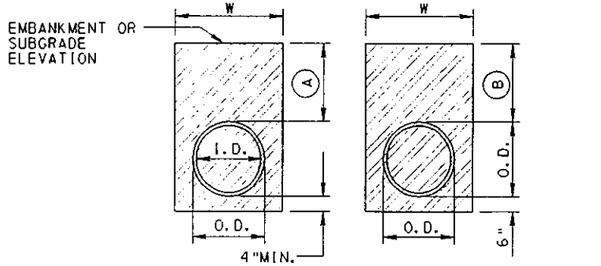
EXCAVATION FOR ENDWALLS

◐ SLOPE AS INDICATED ON THE CROSS-SECTIONS.

◐◐ FOR BOTTOM WIDTHS ≥ 8'-0", EXCAVATION IS CLASS 1. PAYMENT FOR THIS AREA OF EXCAVATION IS INCIDENTAL TO EXCAVATION OF DITCH OR CHANNEL.

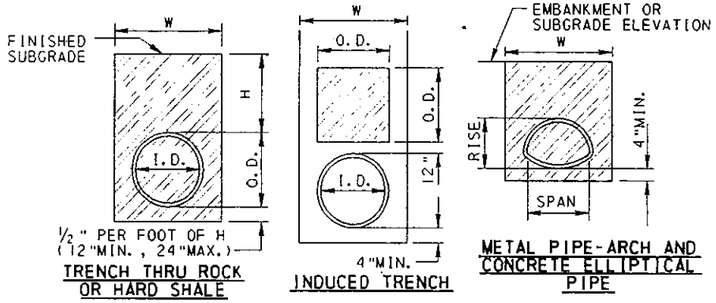


DITCHES AND CHANNELS



CIRCULAR CONRETE AND METAL PIPES

POLYETHYLENE (PE) CORRUGATED PIPE

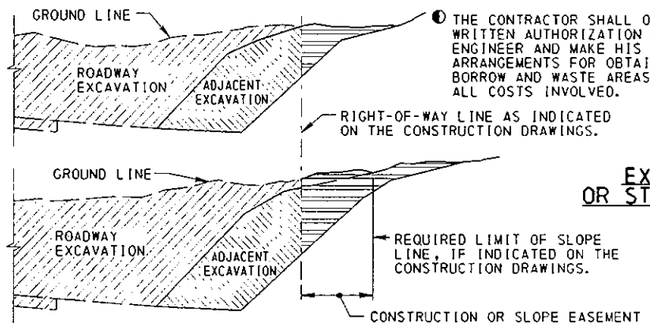


TRENCH THRU ROCK OR HARD SHALE

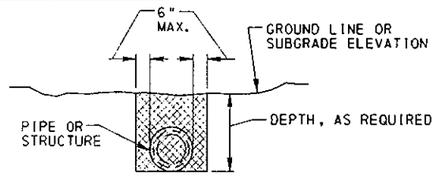
INDUCED TRENCH

METAL PIPE-ARCH AND CONCRETE ELLIPTICAL PIPE

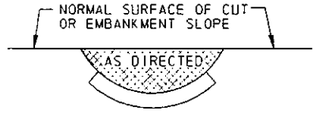
◐ THE CONTRACTOR SHALL OBTAIN WRITTEN AUTHORIZATION FROM THE ENGINEER AND MAKE HIS OWN ARRANGEMENTS FOR OBTAINING ALL BORROW AND WASTE AREAS AND PAY ALL COSTS INVOLVED.



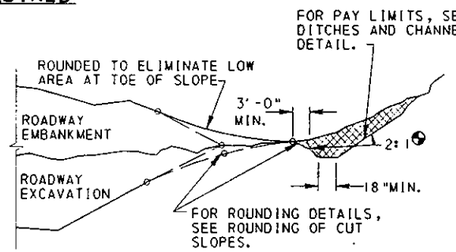
◐ EXCAVATION ADJACENT TO ROADWAY IN LIEU OF COMMON BORROW EXCAVATION



EXCAVATION FOR REMOVAL OF EXISTING PIPE OR STRUCTURE WHERE NO REPLACEMENT IS REQUIRED



SPILLWAYS

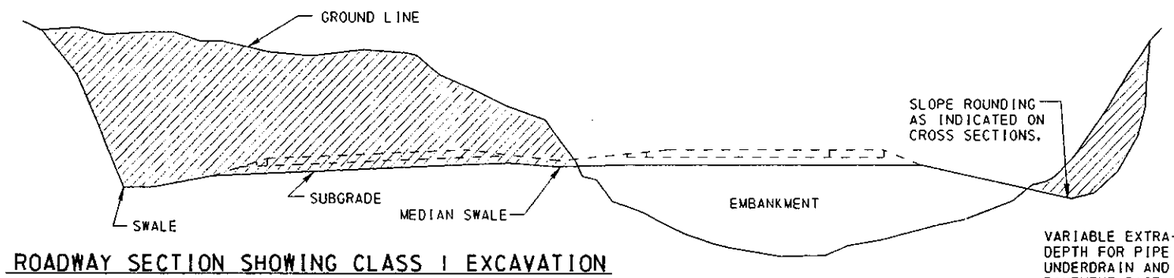


PARALLEL DITCH

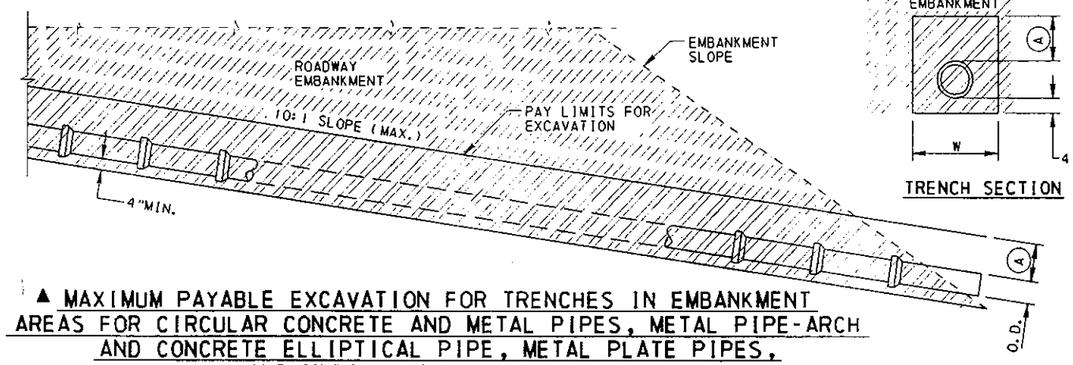
▲ EXCAVATION FOR PIPE BEDDING AND TRENCH DETAILS FOR CIRCULAR CONCRETE AND METAL PIPES, METAL PIPE ARCH AND CONCRETE ELLIPTICAL PIPE AND POLYETHYLENE (PE) CORRUGATED PIPE

LEGEND

- CLASS 1 EXCAVATION
- CLASS 2 EXCAVATION
- CLASS 4 EXCAVATION
- COMMON BORROW EXCAVATION
- CLASS 1 OR COMMOM BORROW EXCAVATION

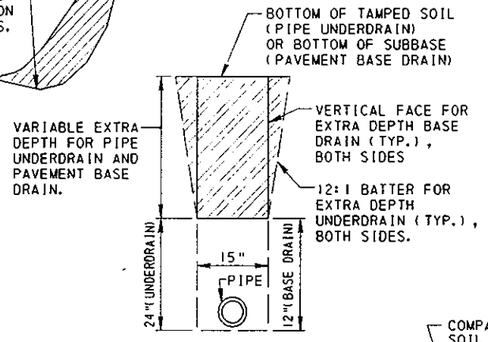


ROADWAY SECTION SHOWING CLASS 1 EXCAVATION



▲ MAXIMUM PAYABLE EXCAVATION FOR TRENCHES IN EMBANKMENT AREAS FOR CIRCULAR CONCRETE AND METAL PIPES, METAL PIPE-ARCH AND CONCRETE ELLIPTICAL PIPE, METAL PLATE PIPES, AND METAL PLATE PIPE-ARCHES

TRENCH SECTION



EXTRA DEPTH FOR PIPE UNDERDRAIN AND PAVEMENT BASE DRAIN

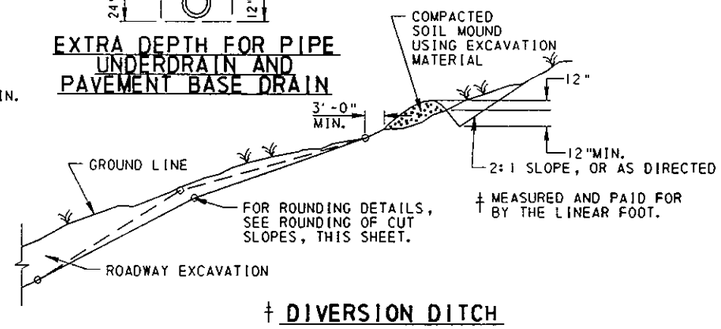
I.D. = NOMINAL INSIDE DIAMETER OF PIPE.
O.D. = OUTSIDE DIAMETER OF PIPE BARREL OR SHELL.
H.D. = HUB DIAMETER, OUTSIDE DIAMETER OF PIPE AT BELL OR BAND.
H = HEIGHT OF FILL OVER TOP OF PIPE.
W = TRENCH WIDTH — 1.0 FT. + H.D. FOR COMBINATION STORM SEWER AND UNDERDRAIN.
2.0 FT. + H.D. FOR PIPES OR PIPE-ARCHES 48" AND LESS I.D. OR SPAN.
2.5 FT. + H.D. FOR PIPES OR PIPE-ARCHES GREATER THAN 48" I.D. OR SPAN.
1.0 TO 2.0 FT. + O.D. FOR 18" AND 24" POLYETHYLENE PIPE.

Ⓐ = 4 FT. MINIMUM, WHERE PRACTICAL, IN EMBANKMENT AREAS.

Ⓑ = 1 FT. MINIMUM.

NO PAYMENT WILL BE ALLOWED FOR EXCAVATION IN EXCESS OF SPECIFIED TRENCH WIDTH AND FOR ADDITIONAL BACKFILL MATERIAL REQUIRED.

▲ EXCAVATION FOR PIPE AND PIPE-ARCH WITH 6'-0" AND GREATER INSIDE DIAMETER OR SPAN IS CLASS 1 EXCAVATION.



‡ MEASURED AND PAID FOR BY THE LINEAR FOOT.

‡ DIVERSION DITCH

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CLASSIFICATION OF EARTHWORK

RECOMMENDED MAR. 25, 1994
Fredw Bowser
DIRECTOR, BUREAU OF DESIGN

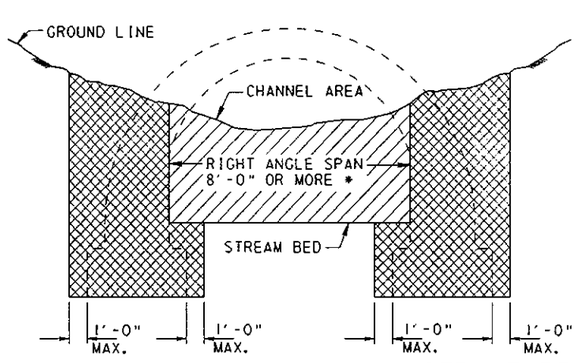
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

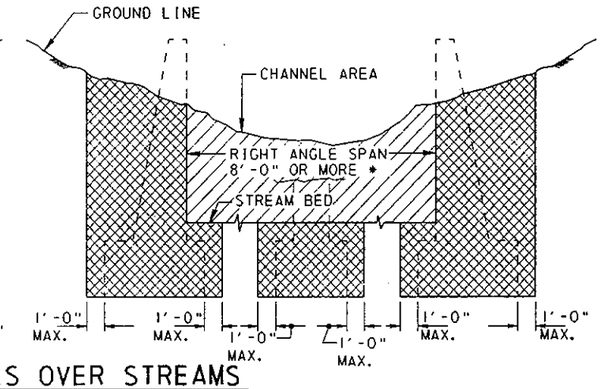
SHT. 1 OF 1

RC-10

NOTES

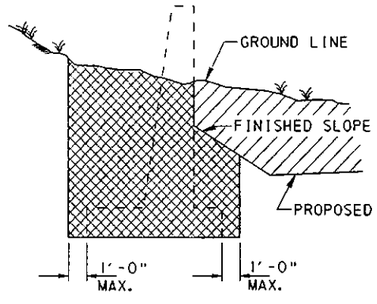
1. FOLLOW OSHA SAFETY REQUIREMENTS IN ALL UNSHORED EXCAVATION AREAS: 5 FEET MAXIMUM FOR VERTICAL CUT, OTHERWISE 4 FEET MAXIMUM FROM BOTTOM OF EXCAVATION TO START OF 1½:1 LAYBACK SLOPE. SEE DETAIL A.
2. NO PAYMENT WILL BE ALLOWED FOR EXCAVATION IN EXCESS OF SPECIFIED LIMITS AND FOR ADDITIONAL BACKFILL MATERIAL REQUIRED.

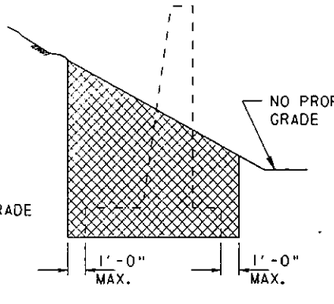




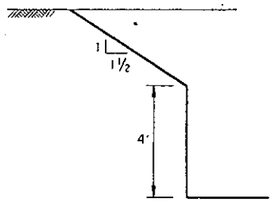
STRUCTURES OVER STREAMS
INCLUDING METAL PLATE ARCH WITH FOOTING

* WHEN RIGHT ANGLE SPAN IS LESS THAN 8'-0", ALL EXCAVATION IS CLASS 3.

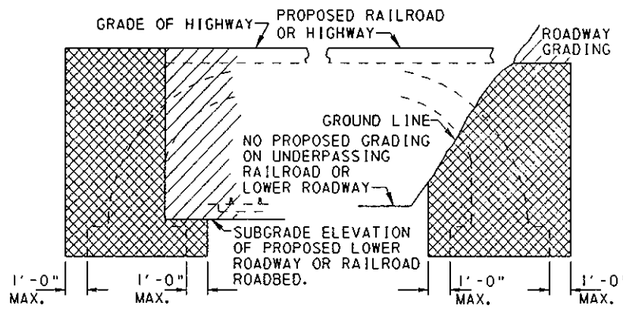


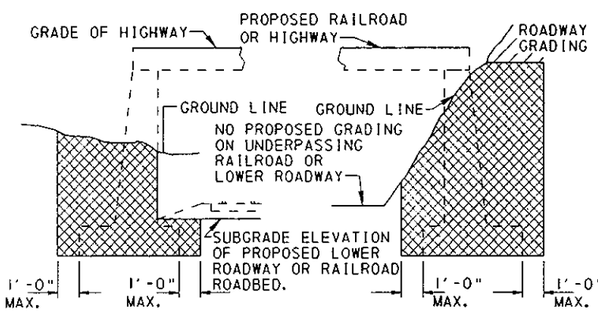


WING WALLS & RETAINING WALLS

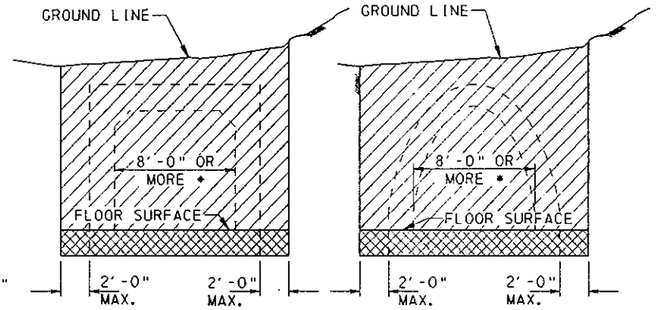


DETAIL A





GRADE SEPARATION STRUCTURES



R.C. BOX CULVERTS

R.C. TIED ARCH CULVERTS

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

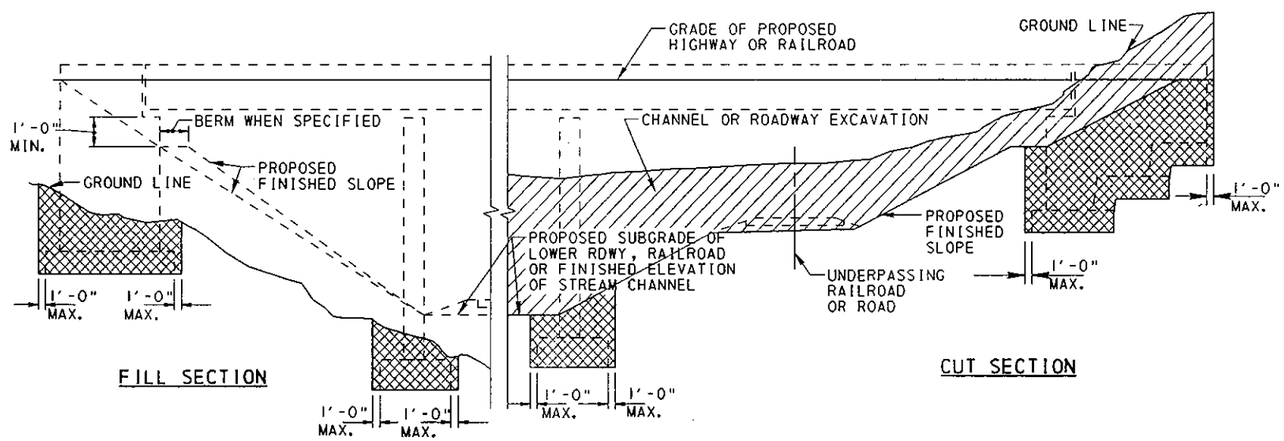
LEGEND

CLASS 1 EXCAVATION

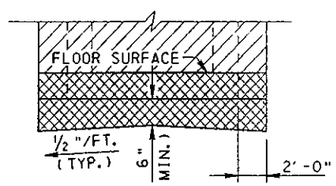
ROADWAY ITEM
(TO BE INCLUDED IN ROADWAY QUANTITIES)

CLASS 3 EXCAVATION

STRUCTURE ITEM
(TO BE INCLUDED IN STRUCTURE QUANTITIES)



TYPICAL STRUCTURE ELEVATION



EXTRA DEPTH EXCAVATION FOR R.C. BOX AND ARCH CULVERTS ON FINE GRAIN SOIL

NOTE:

DEFINE SPECIAL SITUATIONS, INVOLVING EXCAVATION NOT ENTIRELY COVERED BY THIS STANDARD, ON THE DESIGN DRAWING BY SKETCHES AND/OR DESCRIBE IN THE SPECIAL PROVISIONS.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

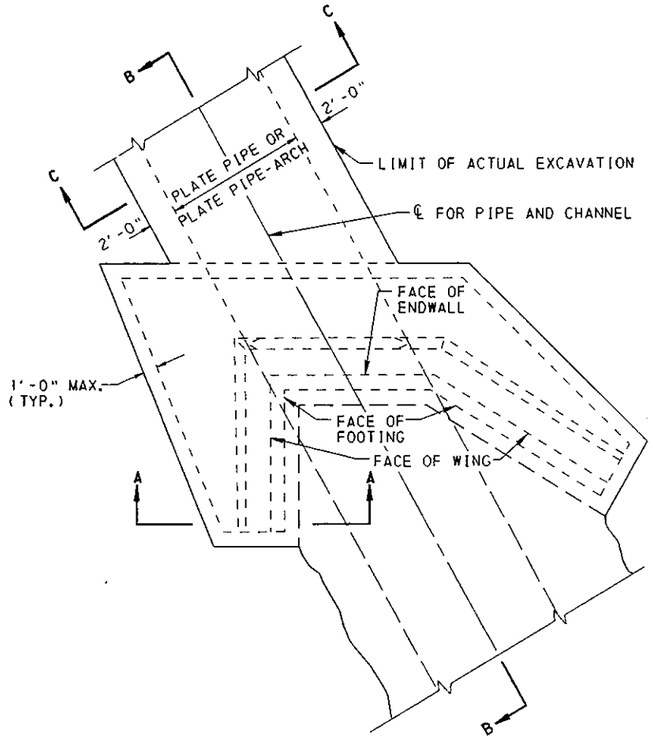
CLASSIFICATION OF EARTHWORK FOR STRUCTURES

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

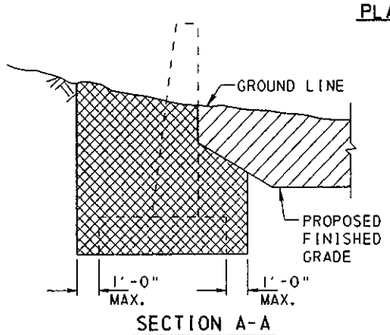
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 1 OF 2

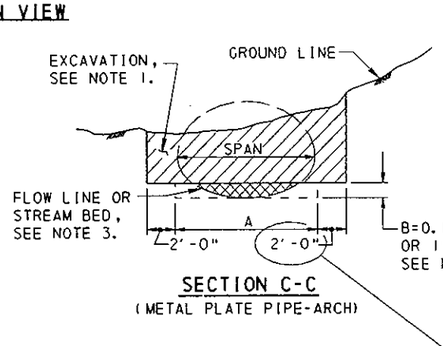
RC-11



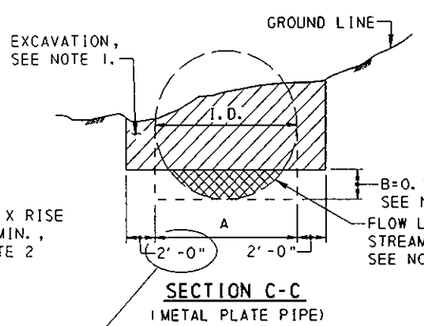
PLAN VIEW



SECTION A-A

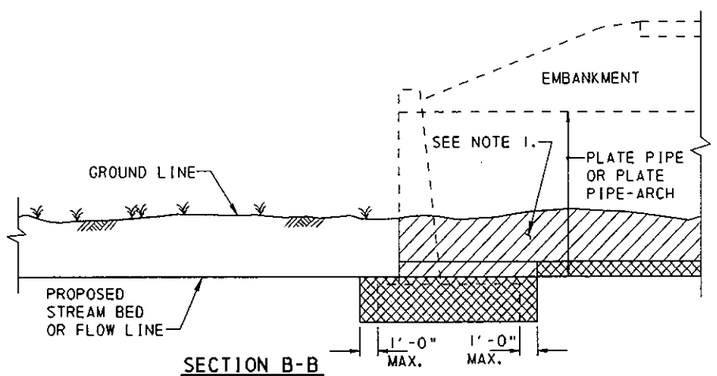


SECTION C-C
(METAL PLATE PIPE-ARCH)



SECTION C-C
(METAL PLATE PIPE)

SEE DM4, SECTION 12.1.6.1 P (b)



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 4'-0" ABOVE THE TOP OF THE PIPE OR PIPE-ARCH, AS CLASS 4 EXCAVATION FOR PIPE OR PIPE-ARCH LESS THAN 4'-0" INSIDE DIAMETER OR SPAN, RESPECTIVELY, AND CLASS 1 EXCAVATION FOR PIPE OR PIPE-ARCH 4'-0" OR GREATER INSIDE DIAMETER OR SPAN, RESPECTIVELY.
2. FOR PLATE PIPE OR PLATE PIPE-ARCH WITH 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. MEASURE AND PAY CLASS 3 EXCAVATION QUANTITY TO THE RECTANGULAR LIMITS SHOWN AS A AND B IN SECTION C-C.
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 4'-0" OR GREATER INSIDE DIAMETER OR SPAN, RESPECTIVELY, AND AS CLASS 4 EXCAVATION FOR PLATE PIPE OR PLATE PIPE-ARCH LESS THAN 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.

LEGEND

CLASS 1 OR 4 EXCAVATION

ROADWAY ITEM
(TO BE INCLUDED IN ROADWAY QUANTITIES)

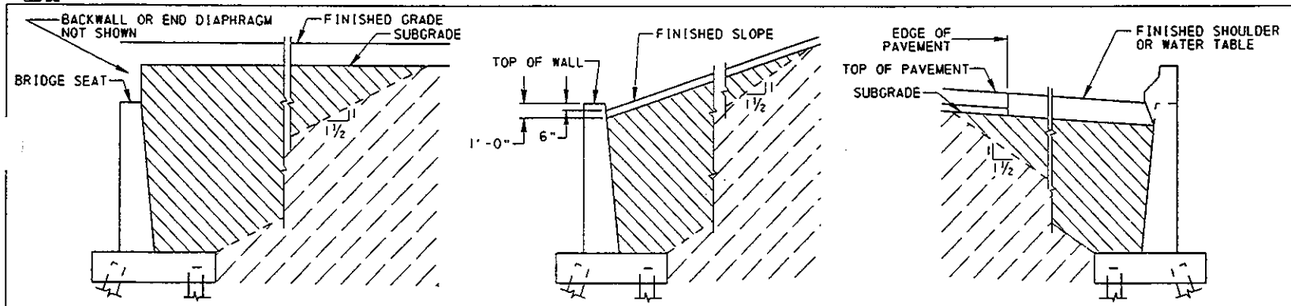
CLASS 3 EXCAVATION

STRUCTURE ITEM
(TO BE INCLUDED IN STRUCTURE QUANTITIES)

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

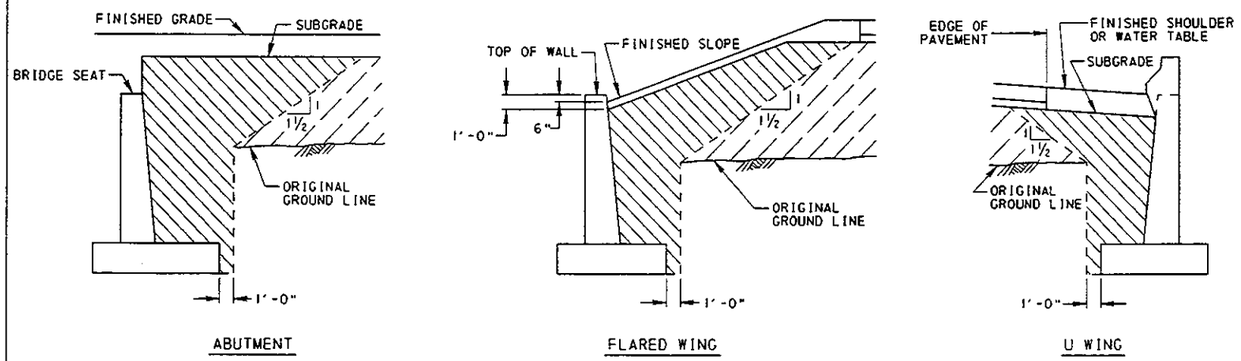
CLASSIFICATION OF EARTHWORK FOR STRUCTURES

RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHT. 2 OF 2
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	RC-11



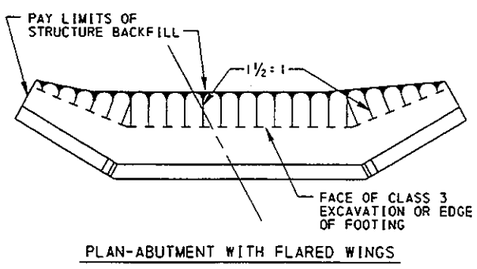
ABUTMENT | FLARED WING | U WING

TYPICAL CROSS SECTIONS - ABUTMENTS ON FILL

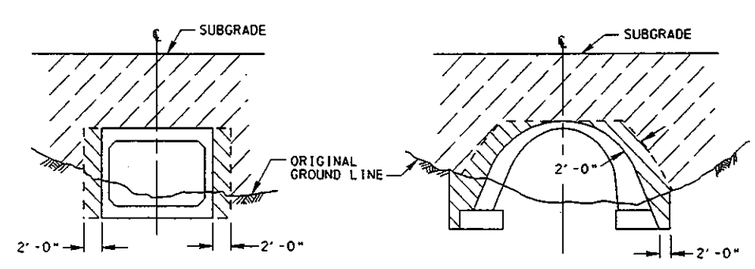


ABUTMENT | FLARED WING | U WING

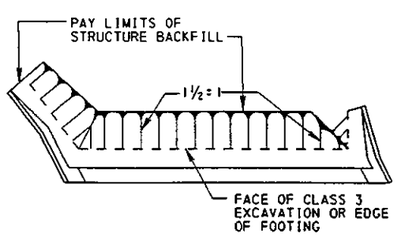
TYPICAL CROSS SECTIONS - ABUTMENTS IN CUT



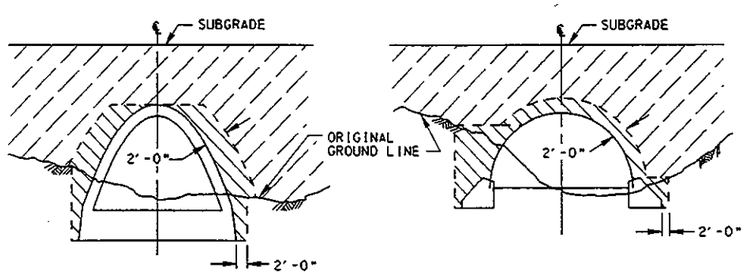
PLAN-ABUTMENT WITH FLARED WINGS



R.C. BOX CULVERT | R.C. ARCH CULVERT



PLAN-ABUTMENT WITH U WINGS

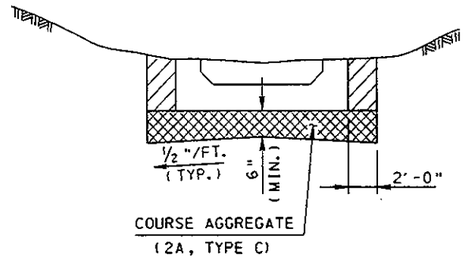


R.C. TIED ARCH CULVERT | METAL PLATE ARCH CULVERT

BACKFILL & EMBANKMENT CONSTRUCTION AT STRUCTURES

NOTES

1. 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 SECTION 850.2(a); AASHTO No. 1, 2, 5, OR 57 COARSE AGGREGATES, MEETING AT LEAST THE THE TYPE C QUALITY REQUIREMENTS IN SECTION 703.1, TABLE B; OR TYPE OGS COARSE AGGREGATE, MEETING AT LEAST THE TYPE C QUALITY REQUIREMENTS IN 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 R.C. 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 R.C. 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.



FOUNDATION PREPARATION FOR R.C. BOX AND ARCH CULVERTS ON FINE GRAIN SOIL ONLY

NOTE: EXCAVATE THE LAST 2' WITH BUCKET WITHOUT TEETH TO KEEP THE FOUNDATION FIRM. FOR CULVERTS WITH SPANS LESS THAN 8', BOTTOM MAY BE SLOPED IN ONE DIRECTION.

LEGEND

STRUCTURE BACKFILL

EMBANKMENT MATERIAL

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

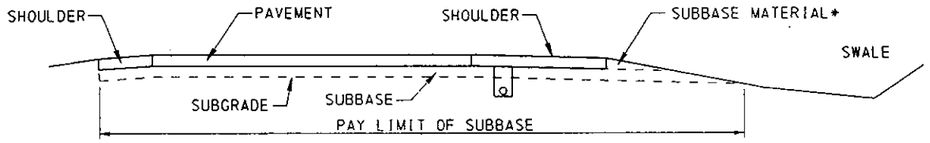
BACKFILL AT STRUCTURES

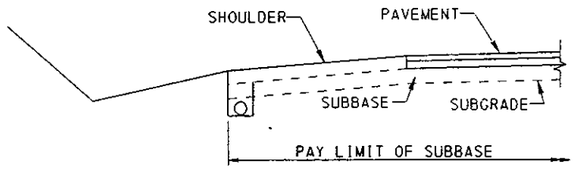
RECOMMENDED MAR. 25, 1994
Frederick Bowser
DIRECTOR, BUREAU OF DESIGN

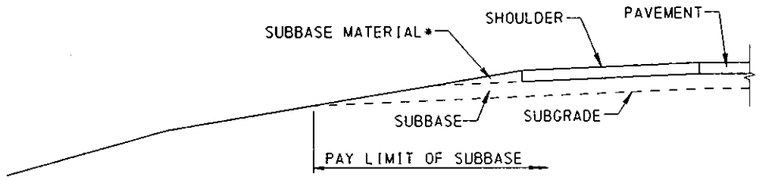
RECOMMENDED MAR. 25, 1994
M. M. Ryan
CHIEF ENGINEER

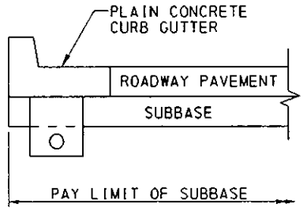
SHT. 1 OF 1

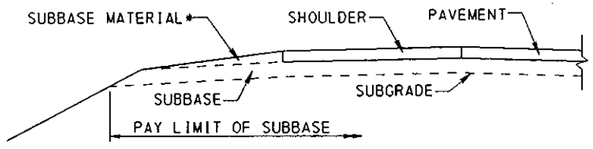
RC-12



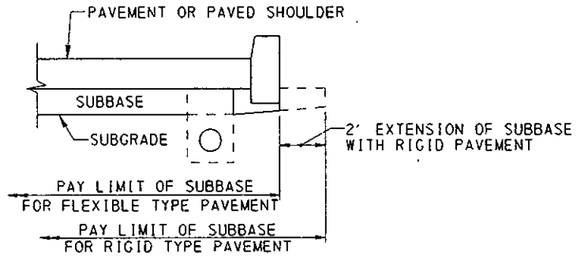








*THE PAYMENT FOR THIS AREA OF SUBBASE WILL BE CONSIDERED INCIDENTAL TO THE SHOULDER.



NOTES

1. PAYMENT FOR SUBGRADE WILL BE CONSIDERED INCIDENTAL TO THE ITEMS OF SUBBASE.

COMMONWEALTH OF PENNSYLVANIA
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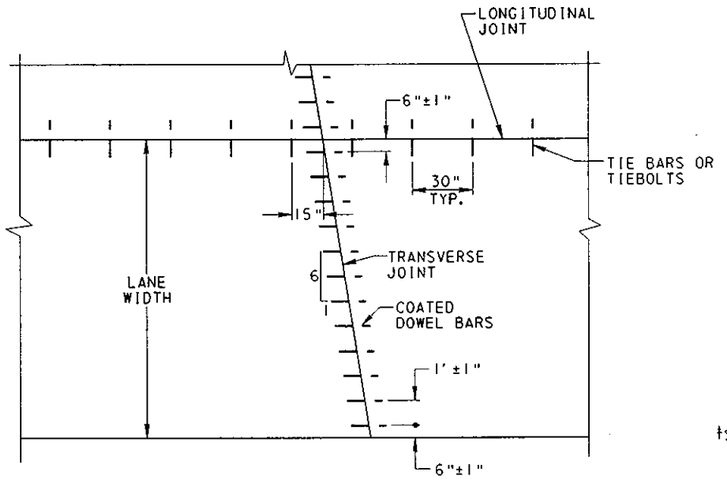
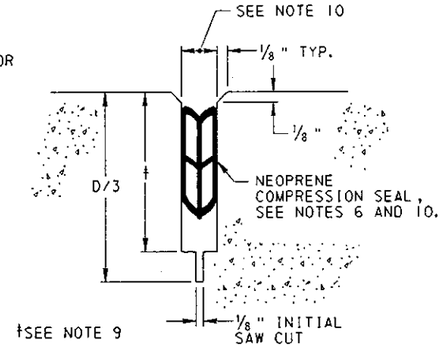
BUREAU OF DESIGN

PAY LIMIT OF SUBBASE

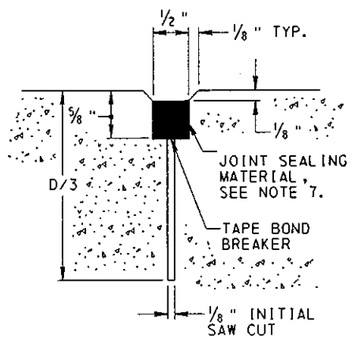
RECOMMENDED MAR. 25, 1994 DIRECTOR, BUREAU OF DESIGN	RECOMMENDED MAR. 25, 1994 CHIEF ENGINEER	SHT. 1 OF 1 RC-13



TYPICAL LAYOUT



DETAIL A



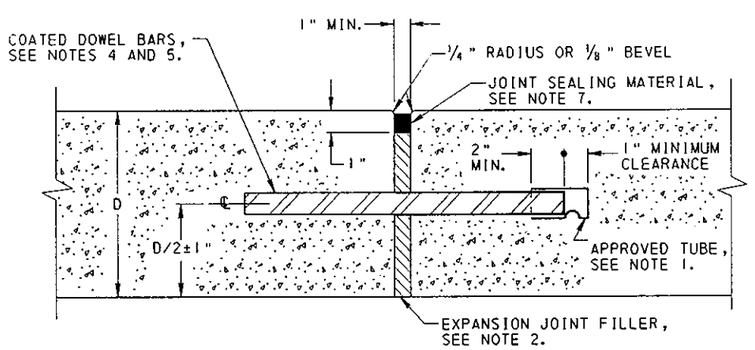
DETAIL B

NOTES

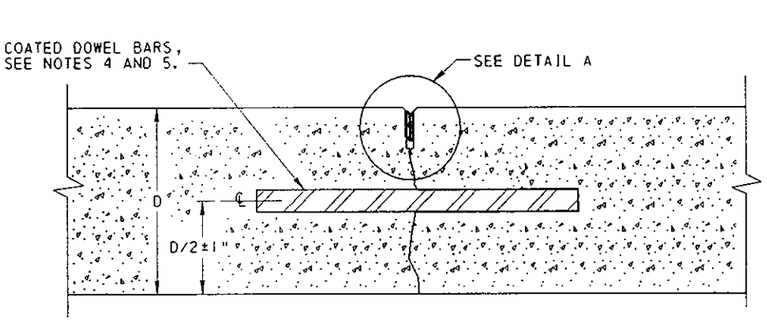
1. PLACE AN APPROVED TUBE OVER THE LUBRICATED END OF ALL DOWEL BARS USED IN TYPE E JOINTS AND PROVIDE A MINIMUM 1" CLEARANCE POCKET ASSURED BY MEANS OF A POSITIVE SPACING DEVICE.
2. CUT EXPANSION JOINT FILLER MATERIAL TO CONFORM TO THE CROSS SECTION OF THE PAVEMENT AND FURNISH IN STRIPS EQUAL TO THE WIDTH OF THE PAVEMENT SLAB. THE TOP SURFACE SHALL BE SMOOTH AND HOLES PUNCHED FOR THE DOWEL BARS SHALL PROVIDE A SNUG FIT WITHOUT LOSS IN THICKNESS OF THE MATERIAL.
3. CONSTRUCT ALL TRANSVERSE JOINTS ON A 6:1 COUNTERCLOCKWISE SKEW. ON CURVES, MEASURE THE SKEW FROM A PERPENDICULAR TO A TANGENT ON THE LONG RADIUS SIDE OF THE CURVE.
4. USE MINIMUM 1 1/4" Ø x 18" LONG DOWEL BARS FOR PAVEMENT DEPTHS 10" OR LESS AND MINIMUM 1 1/2" Ø x 18" LONG DOWEL BARS FOR PAVEMENT DEPTHS GREATER THAN 10". APPROVED ALTERNATE DOWEL BARS HAVING EQUIVALENT PROPERTIES TO CONVENTIONAL ROUND DOWEL BARS MAY BE USED.
5. PLACE DOWEL BARS PARALLEL TO THE CENTERLINE AND SURFACE OF THE SLAB. THE VERTICAL OR HORIZONTAL SKEW FROM ONE END OF THE DOWEL BAR TO THE OTHER END SHALL NOT EXCEED 1/4".
6. INSTALL NEOPRENE SEALS TO A UNIFORM DEPTH WITH THE TOP OF THE SEAL NOT LESS THAN 1/4" NOR MORE THAN 3/8" BELOW THE LEVEL OF THE PAVEMENT SURFACE. THE TOP EDGES OF THE CONTACT SURFACES ON BOTH SIDES OF THE SEAL SHALL BE AT THE SAME ELEVATION.
7. THE TOP OF THE JOINT SEALING MATERIAL SHALL NOT BE LESS THAN 1/16" NOR MORE THAN 3/16" BELOW THE SURFACE OF THE PAVEMENT.
8. THE INITIAL SAW CUT FOR TYPE D AND TYPE G JOINTS IS NOT REQUIRED FOR CONSTRUCTION JOINTS.
9. DETERMINE SAW DEPTH BY ADDING 3/8" TO THE MAXIMUM COMPRESSED HEIGHT OF THE NEOPRENE COMPRESSION SEAL (SEE MANUFACTURER'S INFORMATION).
10. 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		
		<60*	60 TO 80*	>80*
15' & 20'	1"	5/8"	9/16"	1/2"
30'	1 1/4"	3/4"	5/8"	1/2"

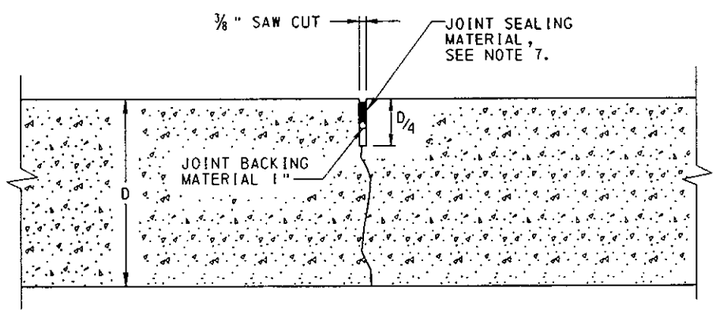
* PAVEMENT SURFACE TEMPERATURE, °F.



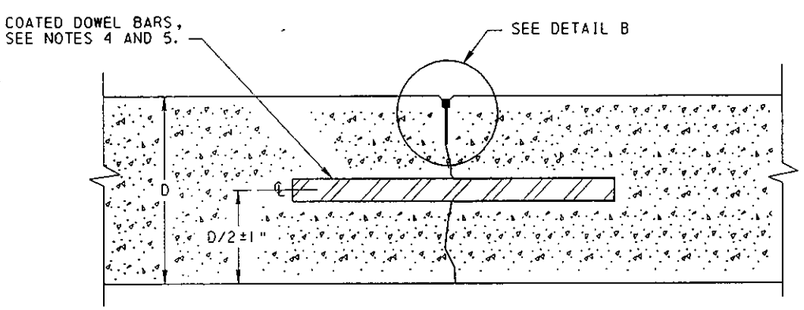
TYPE E



TYPE D



TYPE P
SEE RC-27



TYPE G
SEE RC-27

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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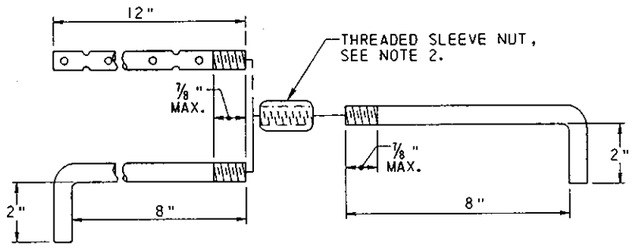
CONCRETE PAVEMENT JOINTS

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

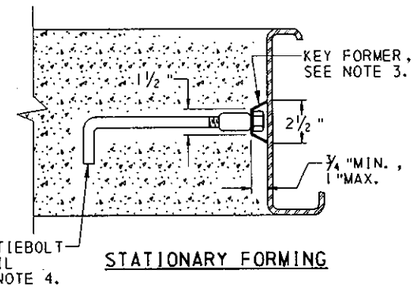
SHT. 1 OF 4

RC-20

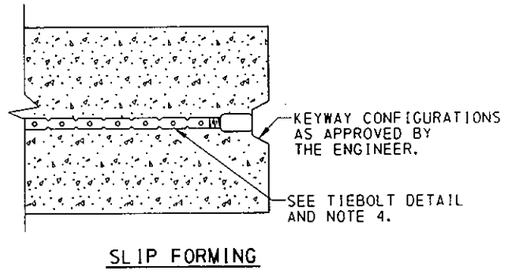


TIEBOLT DETAIL

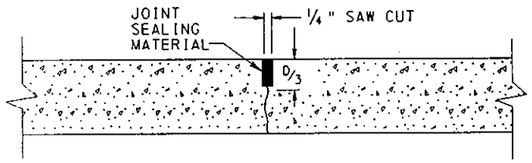
TIEBOLTS SHALL BE 5/16"ø BAR WITH ROLLED THREADS OR ⅝"ø BAR WITH CUT THREADS. THE ASSEMBLED TIEBOLTS SHALL WITHSTAND A MINIMUM PULL-OUT OR YEILDING LOAD OF 15,000 POUNDS. ONLY TIEBOLTS WHICH ARE SUPPLIED BY AN APPROVED MANUFACTURER, AS LISTED IN BULLETIN 15, WILL BE PERMITTED. SEE SECTION 709.1 OF PUBLICATION 408.



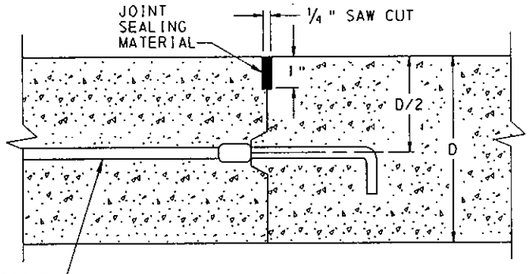
STATIONARY FORMING



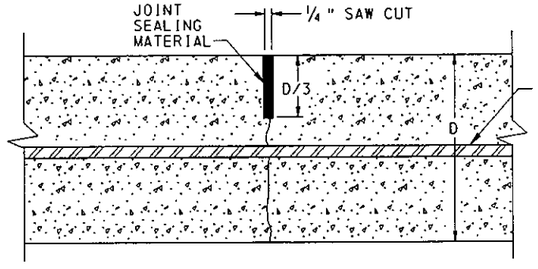
SLIP FORMING



TRANSVERSE JOINT

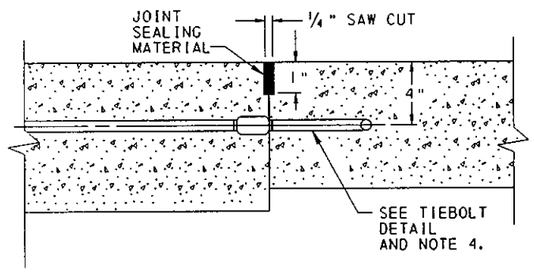


CONSTRUCTION JOINT



CONTRACTION JOINT

TYPE L



LONGITUDINAL JOINT
SEE NOTE 5

SHOULDER JOINTS

NOTES

1. TIE BARS SHALL BE 30" LONG AND SPACED AT 30" INTERVALS. MEASURE TIE BAR DEPTH FROM THE TOP OF PAVEMENT TO THE TOP OF THE BAR.

PAVEMENT DEPTH	BAR SIZE	BAR DEPTH	TOLERANCE
6"	4	3"	±½"
7"	4	3¼"	±½"
8"	4	3¾"	±¾"
9"	4	4¼"	±¾"
10"	5	4½"	±¾"
11"	5	5"	±¾"
12"	5	5½"	±¾"
13"	5	6"	±¾"

2. MAKE THREADED SLEEVE NUT FROM STEEL PIPE OR HEXAGONAL STEEL BAR 1 1/16" ø x 1⅛" LONG OR HIGH STRENGTH STEEL BAR 27/32" ø x 2" LONG.
3. 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.
4. SCREW TIEBOLTS UNTIL SNUG. FOR 6", 7" AND 8" PAVEMENTS AND SHOULDERS THE HOOK SHALL BE PARALLEL TO THE GRADE. IF NECESSARY, LOOSEN TIE BOLTS SO THAT THE HOOK IS PARALLEL TO THE GRADE.
5. AT THE CONTRACTORS OPTION, THE CONCRETE SHOULDER MAY BE CONSTRUCTED AT THE SAME TIME AS THE PAVEMENT. IN THIS CASE, A TYPE L CONTRACTION JOINT SHALL BE USED. SEE DETAILS, THIS SHEET.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

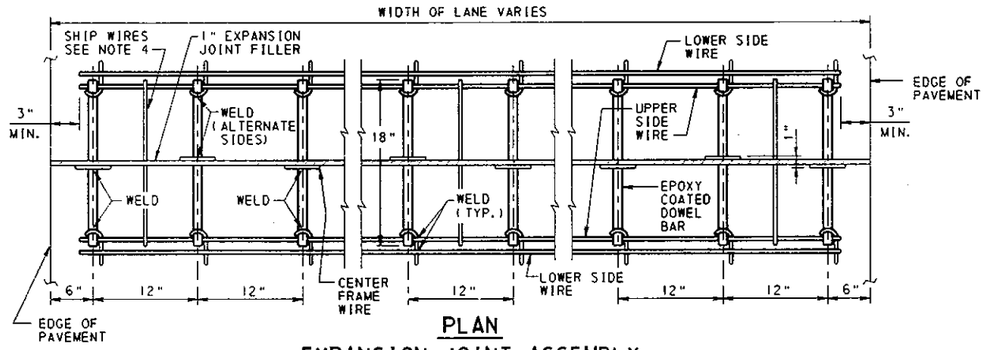
CONCRETE PAVEMENT JOINTS

RECOMMENDED MAR. 25, 1994
Fredric Bowser
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
M. M. Ryan
CHIEF ENGINEER

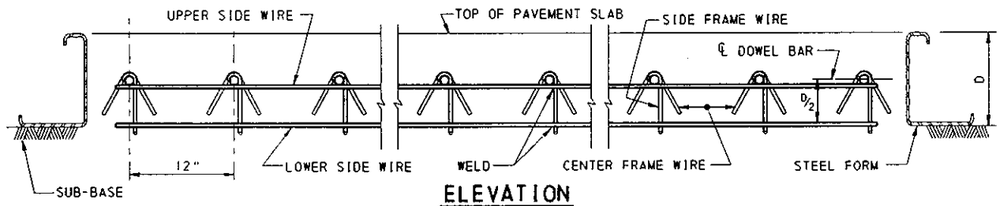
SHT. 2 OF 4

RC-20



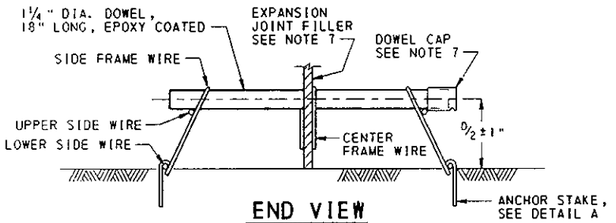
PLAN

EXPANSION JOINT ASSEMBLY



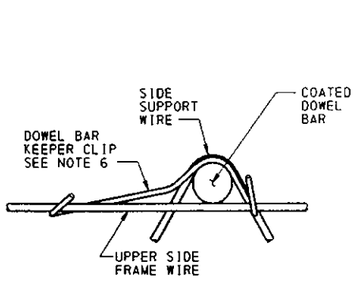
ELEVATION

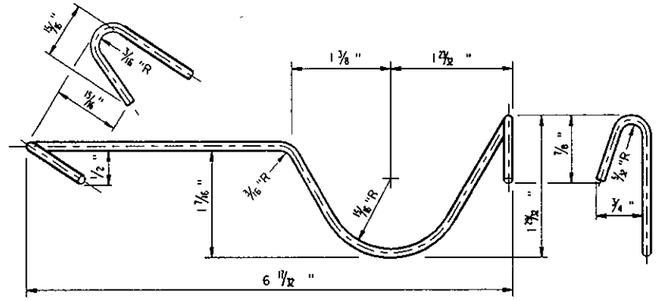
EXPANSION JOINT ASSEMBLY



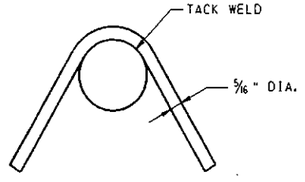
END VIEW

EXPANSION JOINT ASSEMBLY

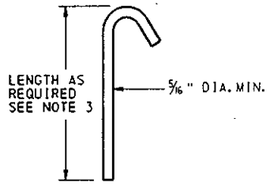




DOWEL BAR KEEPER CLIP

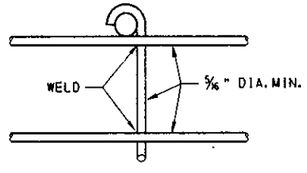


CENTER FRAME WIRE DETAIL

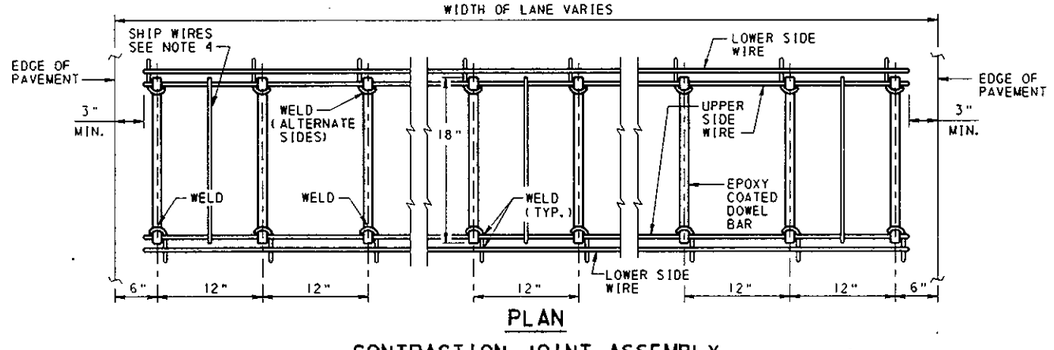


DETAIL A

ANCHOR STAKE

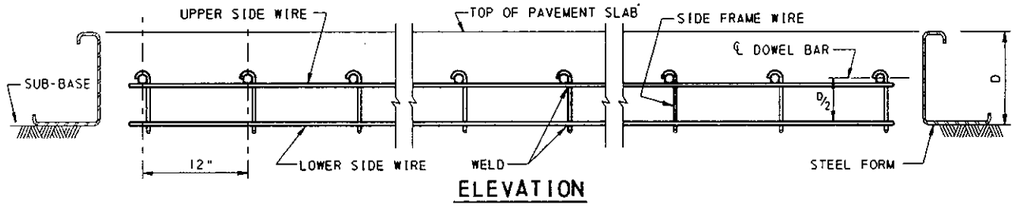


SIDE FRAME DETAIL



PLAN

CONTRACTION JOINT ASSEMBLY



ELEVATION

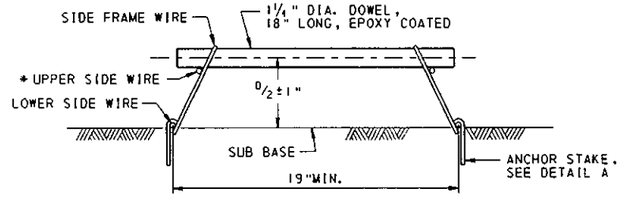
CONTRACTION JOINT ASSEMBLY

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 A MINIMUM OF EIGHT ANCHOR STAKES (FOUR PER SIDE). ANCHOR STAKES SHALL ENGAGE LOWER SIDE FRAME WIRES. USE ADDITIONAL STAKES AS NECESSARY, TO SECURE ASSEMBLIES, AS DIRECTED BY THE ENGINEER.
3. PROVIDE 12" MINIMUM ANCHOR STAKES TO SECURE ASSEMBLIES WHEN A NO. 2A SUBBASE COURSE IS USED AND 18" MINIMUM ANCHOR STAKES WHEN A NO. 0GS SUBBASE COURSE IS USED. WHEN A 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-82 SPECIFICATIONS FOR COLD-DRAWN STEEL WIRE FOR CONCRETE REINFORCEMENT AND OF A MINIMUM ALLOWABLE SIZE AS FOLLOWS:

PAVEMENT DEPTHS	UPPER AND LOWER SIDE FRAME WIRES	SIDE SUPPORT WIRES
10" OR LESS	5/16"ø (0.3175") MIN.	5/16"ø (0.3175") MIN.
GREATER THAN 10"	7/16"ø (0.4375") MIN.	½"ø (0.5000") MIN.

6. DOWEL BAR KEEPER CLIPS MAY BE USED IN LIEU OF TIE WIRES OR SHIPPING WIRES FOR CONSTRUCTION AND EXPANSION JOINT ASSEMBLIES.
7. ALL DOWEL ASSEMBLIES, SIDE SUPPORT AND CENTER SUPPORT ASSEMBLIES SHALL BE FABRICATED AND SHIPPED NESTED. EXPANSION JOINT FILLER, ANCHOR STAKES AND DOWEL CAPS SHALL BE ASSEMBLED IN THE FIELD.
8. PROVIDE DOWEL BARS PARALLEL TO THE CENTERLINE AND TO THE PAVEMENT SURFACE. TOLERANCE OF THIS PLACEMENT SHALL BE WITHIN ±¼ INCH PER DOWEL BAR.
9. PROVIDE DOWELS AND ASSEMBLY DETAILS THAT CONFORM TO PUBLICATION 408 SPECIFICATIONS.



END VIEW

CONTRACTION JOINT ASSEMBLY

* FOR SLIP FORM PAVING, SUPPORT THE UPPER SIDE WIRE BY PLACING THE ANCHOR HOOK OVER THE TOP WIRE.

TYPICAL LOAD TRANSFER ASSEMBLY		
LANE WIDTH	OVERALL UNIT LENGTH	NO. OF DOWELS
9'-0"	8'-6"	9
10'-0"	9'-6"	10
11'-0"	10'-6"	11
12'-0"	11'-6"	12

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

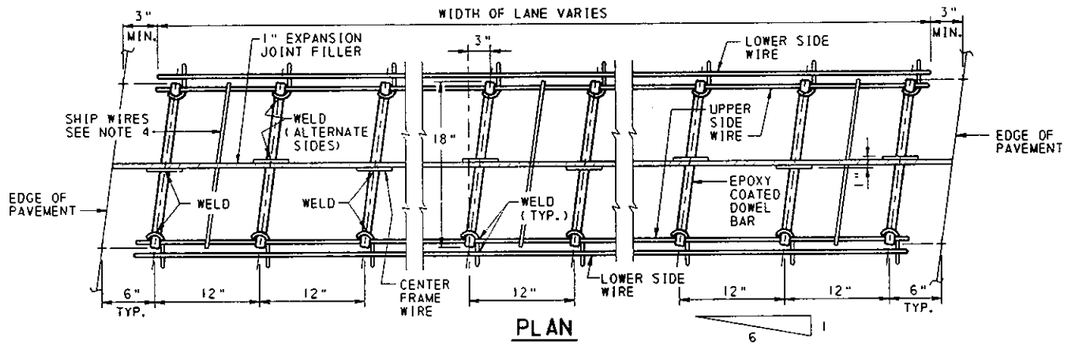
CONCRETE PAVEMENT JOINTS
NON-SKEWED
LOAD TRANSFER ASSEMBLIES

RECOMMENDED MAR. 25, 1994
Bradley Bowser
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
M. M. Ryan
CHIEF ENGINEER

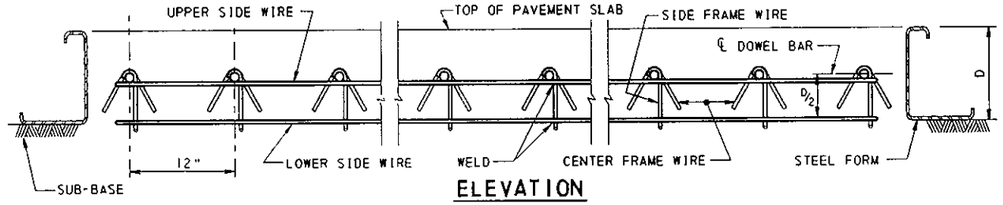
SHT. 3 OF 4

RC-20



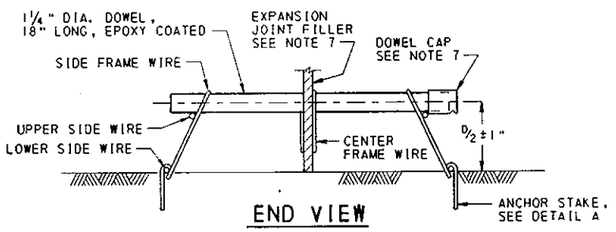
PLAN

EXPANSION JOINT ASSEMBLY



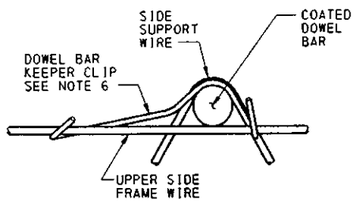
ELEVATION

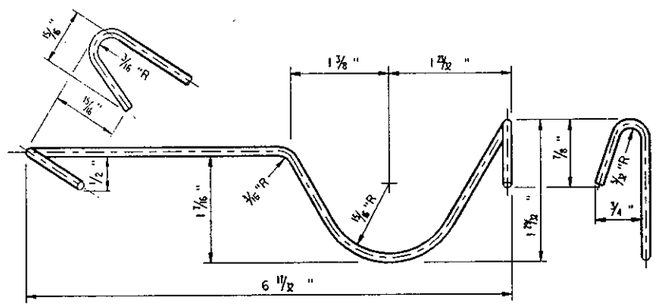
EXPANSION JOINT ASSEMBLY



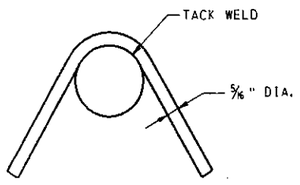
END VIEW

EXPANSION JOINT ASSEMBLY

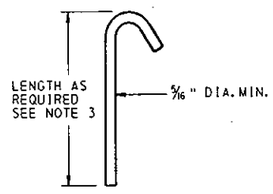




DOWEL BAR KEEPER CLIP

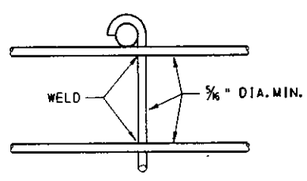


CENTER FRAME WIRE DETAIL

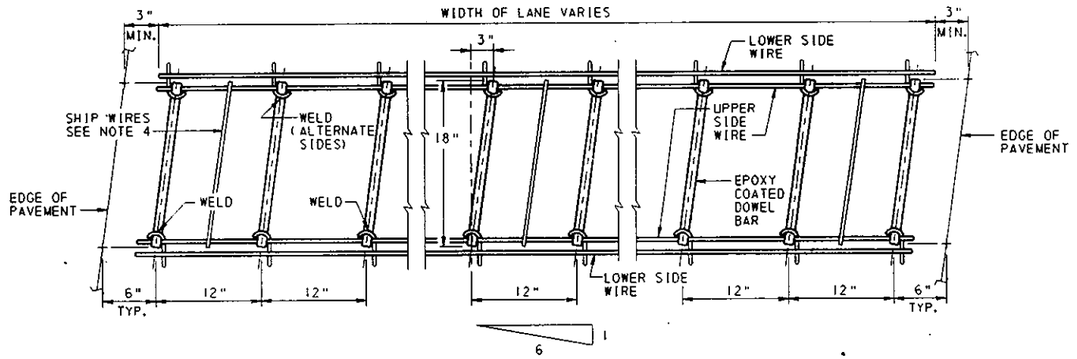


DETAIL A

ANCHOR STAKE

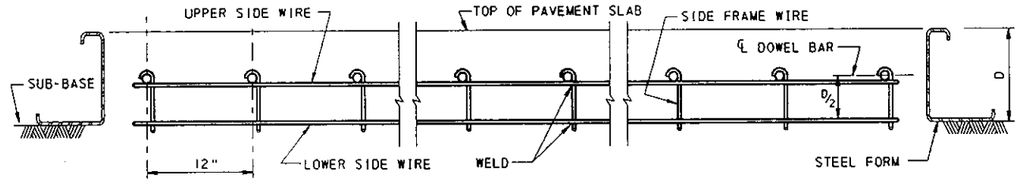


SIDE FRAME DETAIL



PLAN

CONTRACTION JOINT ASSEMBLY



ELEVATION

CONTRACTION JOINT ASSEMBLY

NOTES

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6. DOWEL BAR KEEPER CLIPS MAY BE USED IN LIEU OF TIE WIRES OR SHIPPING WIRES FOR CONSTRUCTION AND EXPANSION JOINT ASSEMBLIES.
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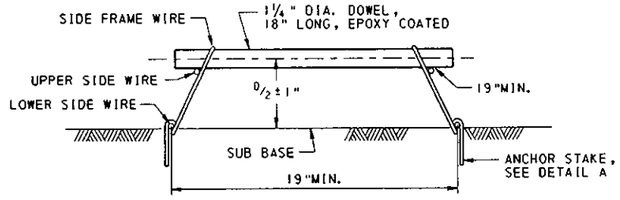
9. PROVIDE DOWELS AND ASSEMBLY DETAILS THAT CONFORM TO PUBLICATION 408 SPECIFICATIONS.

TYPICAL LOAD TRANSFER ASSEMBLY		
LANE WIDTH	OVERALL UNIT LENGTH	NO. OF DOWELS
9'-0"	8'-6"	9
10'-0"	9'-6"	10
11'-0"	10'-6"	11
12'-0"	11'-6"	12



END VIEW

CONTRACTION JOINT ASSEMBLY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

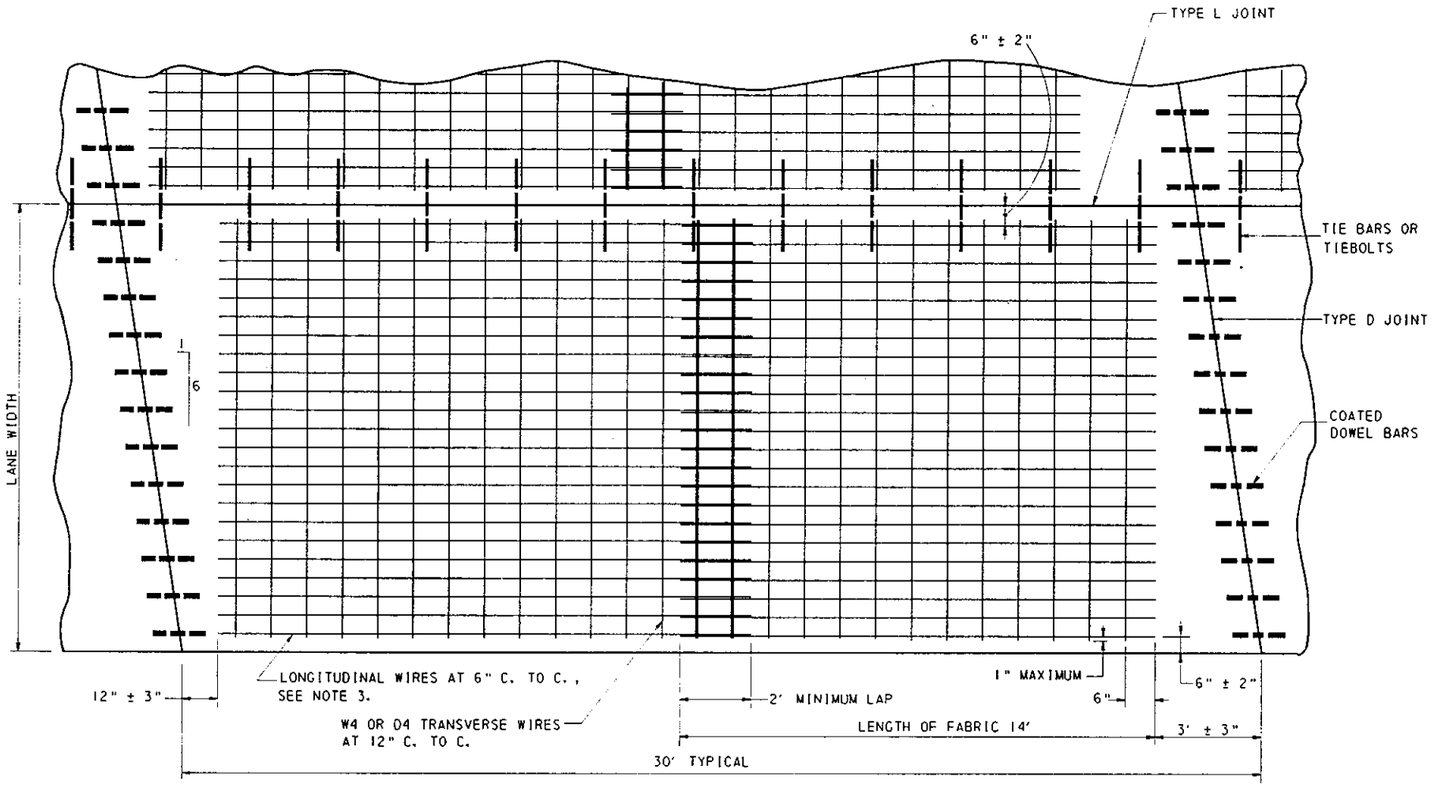
CONCRETE PAVEMENT JOINTS
6:1 SKEWED
LOAD TRANSFER ASSEMBLIES

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

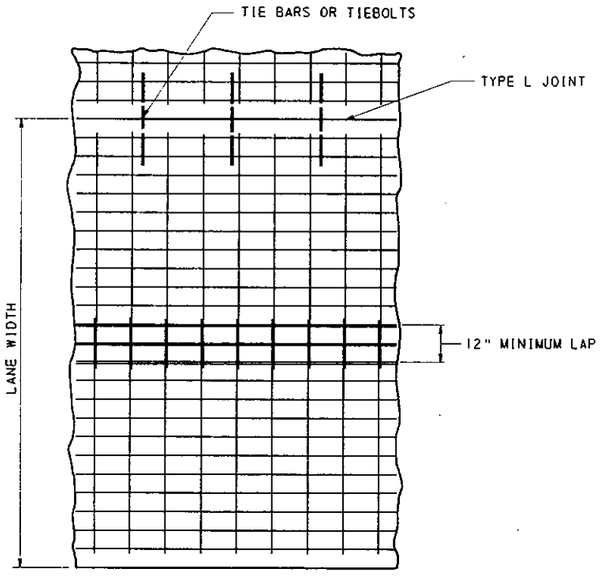
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 4 OF 4

RC-20



WIRE FABRIC REINFORCEMENT



ALTERNATE LAPPED FABRIC

NOTES

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

PAV'T. DEPTH	MIN. LONG. WIRE SIZE
8"	W5.5 OR D5
9"	W6 OR D5.5
10"	W7 OR D6.5
11"	W7.5 OR D7
12"	W8 OR D7.5
13"	W9 OR D8

4. HINGED FABRIC REINFORCEMENT MAY BE USED. HAVE HINGE DETAIL APPROVED BY THE ENGINEER.
5. SECURELY TIE ALL LONGITUDINAL AND TRANSVERSE LAPS OF WIRE FABRIC REINFORCEMENT.
6. ON PROJECTS WHERE ADDITIONAL LANES ARE BEING ADDED TO EXISTING CEMENT CONCRETE PAVEMENTS AND THE EXISTING JOINT SPACING IS MORE THAN 46.5', USE A MINIMUM LONGITUDINAL WIRE SIZE OF W9.5 OR D9.
7. WIRE FABRIC REINFORCEMENT MAY BE CONSTRUCTED OF SMOOTH WIRE (SIZES DESIGNATED BY W) OR DEFORMED WIRE (SIZES DESIGNATED BY D) OR A COMBINATION OF BOTH.
8. SEE RC-20 FOR JOINT DETAILS.
9. PROVIDE A MINIMUM DEPTH FOR PLACEMENT OF WIRE FABRIC REINFORCEMENT, MEASURED FROM TOP OF PAVEMENT TO TOP OF FABRIC OF 2½" TO A MAXIMUM OF ONE HALF THE PAVEMENT DEPTH MINUS ½".
10. WHEN THE RAMP OR LANE WIDTH EXCEEDS 14 FEET, A TYPE L JOINT IS REQUIRED AT THE MID-POINT.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

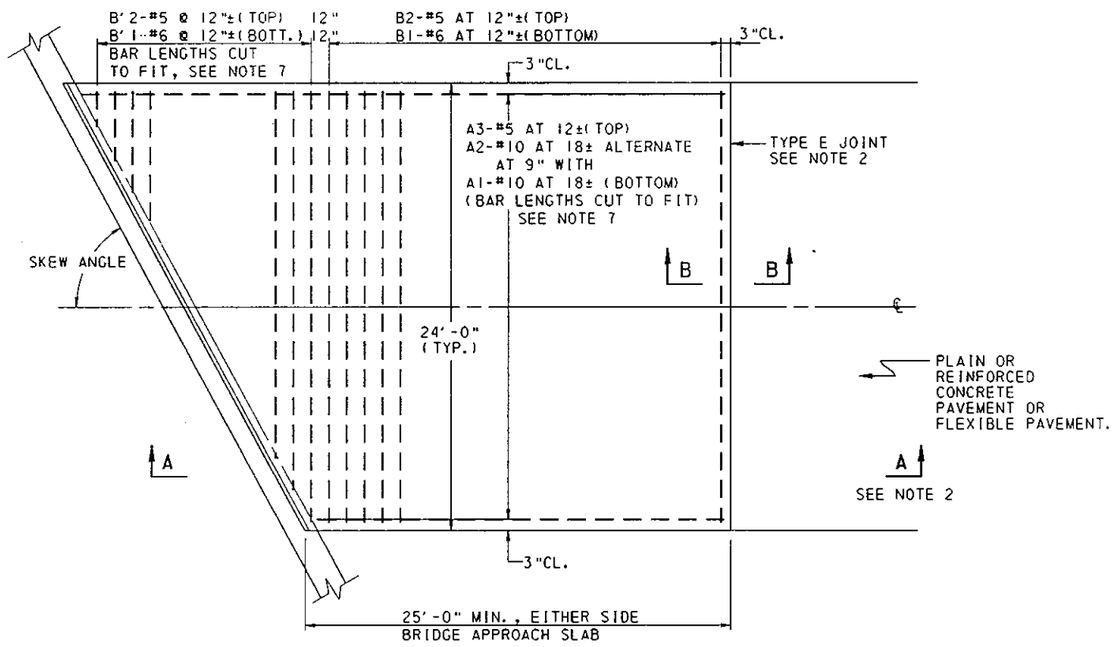
REINFORCED CONCRETE PAVEMENT

RECOMMENDED MAR. 25, 1994
Freddie Boerger
DIRECTOR, BUREAU OF DESIGN

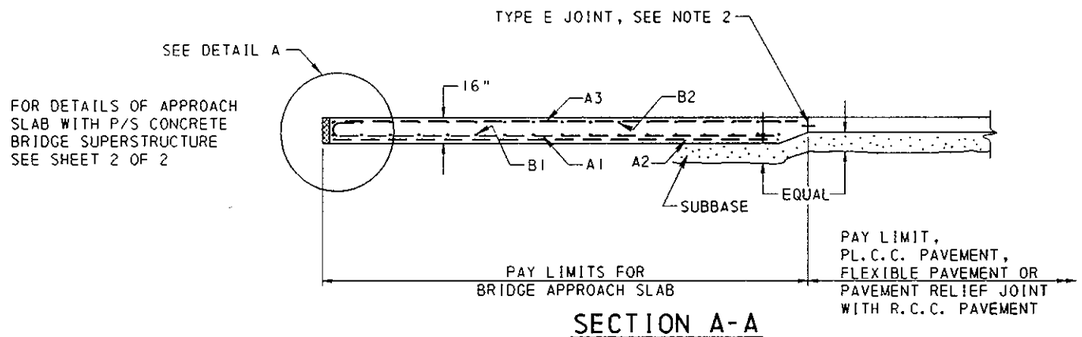
RECOMMENDED MAR. 25, 1994
M. M. Patton
CHIEF ENGINEER

SHT. 1 OF 1

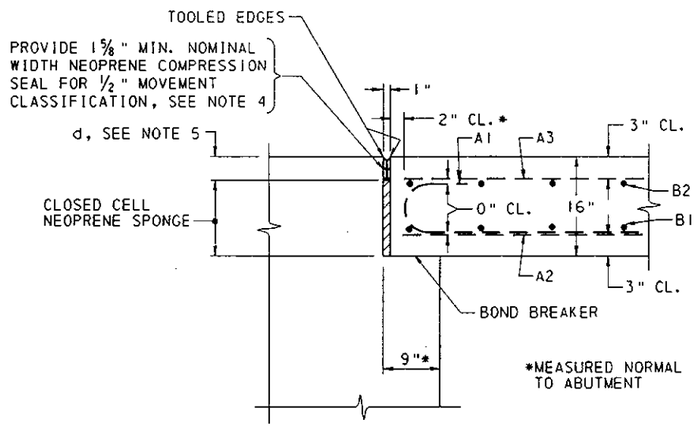
RC-21



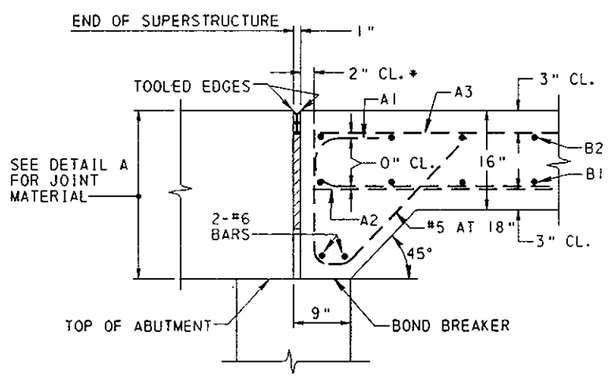
PLAN



SECTION A-A

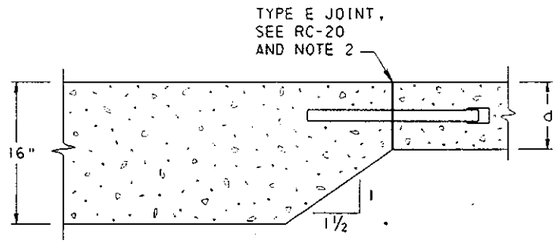


DETAIL A



DETAIL A (ALTERNATE)

TO APPLY ONLY WHEN INDICATED ON STRUCTURE DRAWINGS



SECTION B-B

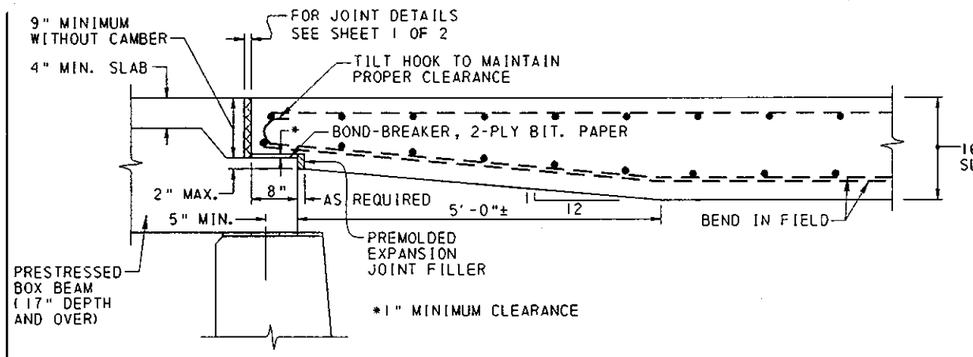
NOTES

1. CONSTRUCT IN ACCORDANCE WITH THIS STANDARD DRAWING OR AS INDICATED ON THE STRUCTURE DRAWINGS.
2. THE TYPE E JOINT DOES NOT APPLY WHEN APPROACH SLAB IS BEING CONSTRUCTED IN CONJUNCTION WITH A PAVEMENT RELIEF JOINT OR WITH A FLEXIBLE PAVEMENT, SEE RC-24.
3. WHEN CONSTRUCTION INVOLVES MORE THAN 2 LANES, CONNECT ADDITIONAL LANES REQUIRED TO STANDARD 2 LANE BRIDGE APPROACH SLAB USING TYPE L CONSTRUCTION JOINTS, AS SHOWN ON RC-20, SHEET 2 OF 2.
4. INSTALL NEOPRENE COMPRESSION SEALS TO A UNIFORM DEPTH WITH TOP OF THE SEAL NOT LESS THAN ¼" NOR MORE THAN ⅜" BELOW THE LEVEL OF THE PAVEMENT SURFACE. THE TOP EDGES OF THE CONTACT SURFACES ON BOTH SIDES OF THE SEAL SHALL BE AT THE SAME ELEVATION.
5. DETERMINE "d" BY ADDING ½" TO THE MAXIMUM COMPRESSED HEIGHT OF THE NEOPRENE COMPRESSION SEAL (SEE MANUFACTURER'S INFORMATION).
6. CONSTRUCT THE BRIDGE APPROACH SLAB AFTER THE BRIDGE DECK IS CONSTRUCTED.
7. PROVIDE REINFORCEMENT BARS, EPOXY COATED IN ACCORDANCE WITH PUBLICATION 408, SECTION 709.

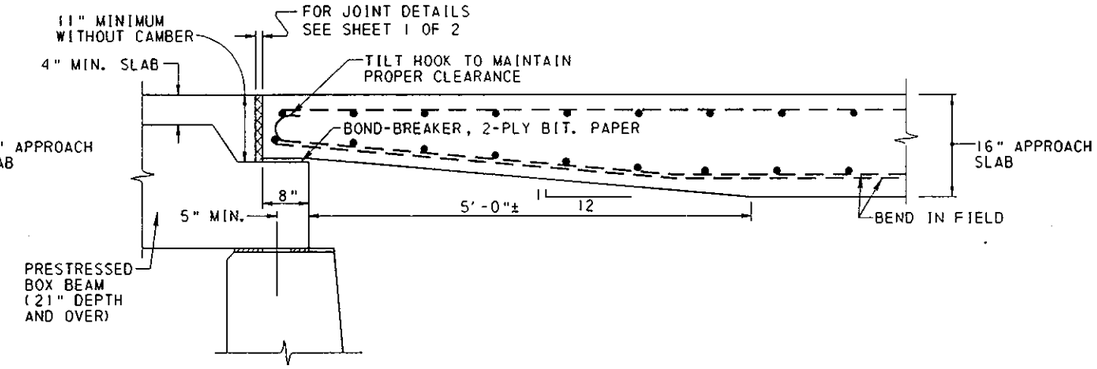
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

BRIDGE APPROACH SLAB

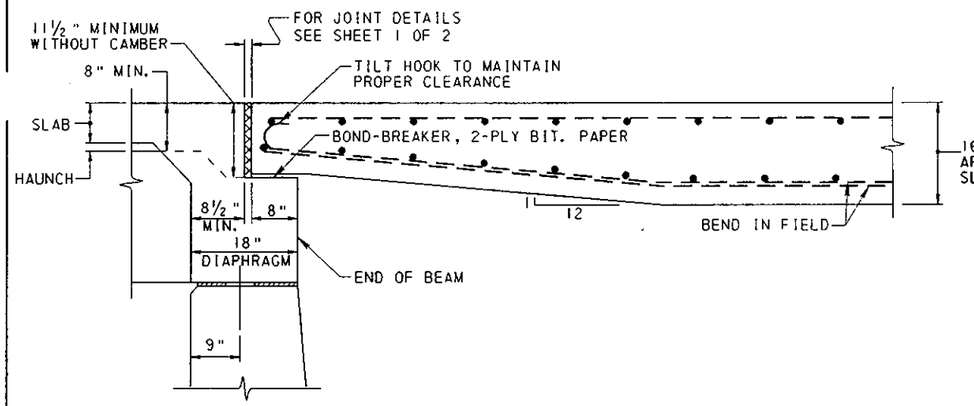
RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHT. 1 OF 2
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	RC-23



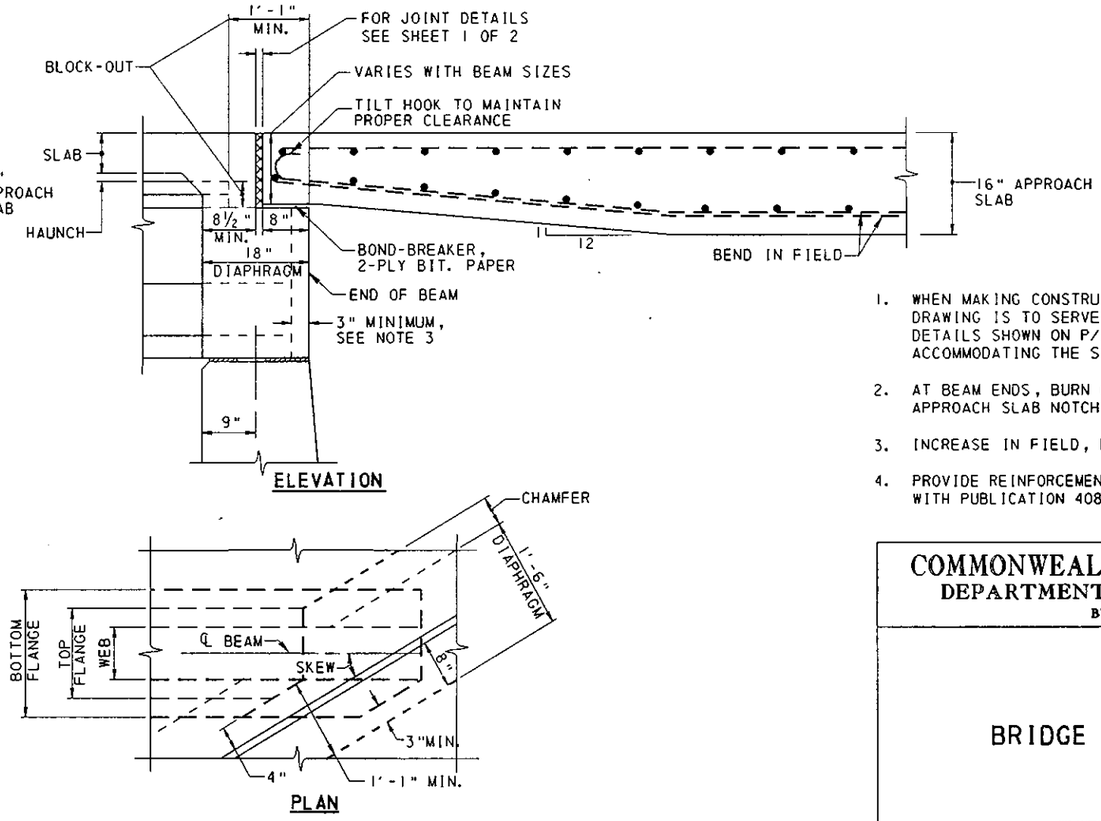
17" DEEP ADJACENT COMPOSITE BOX BEAMS WITH 9" DEEP APPROACH SLAB NOTCH



21" TO 48" DEEP ADJACENT COMPOSITE BOX BEAMS WITH 11" DEEP APPROACH SLAB NOTCH



SPREAD BOX BEAMS WITH APPROACH SLAB NOTCH 11½" OR DEEPER



I-BEAMS

NOTES

1. WHEN MAKING CONSTRUCTION CHANGES IN THE FIELD, THIS DRAWING IS TO SERVE AS A GUIDE FOR MODIFYING NOTCH DETAILS SHOWN ON P/S STANDARD DRAWINGS FOR ACCOMMODATING THE STANDARD 16" BRIDGE APPROACH SLAB.
2. AT BEAM ENDS, BURN OFF REINFORCEMENT PROTRUDING INTO APPROACH SLAB NOTCH.
3. INCREASE IN FIELD, PROVIDING OVERHANG, IF REQUIRED.
4. PROVIDE REINFORCEMENT BARS, EPOXY COATED, IN ACCORDANCE WITH PUBLICATION 408, SECTION 709.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

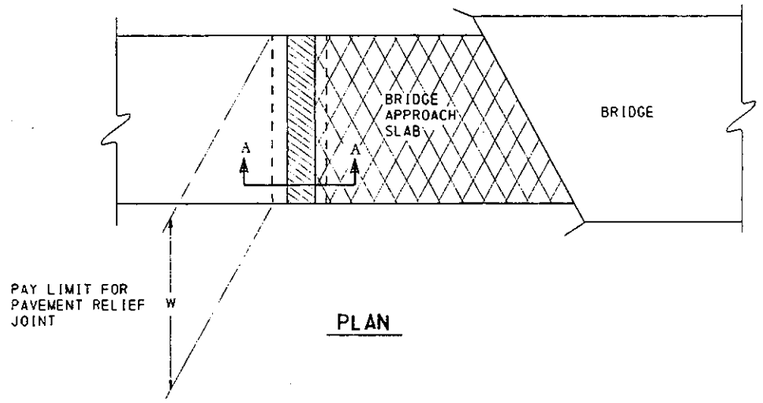
BRIDGE APPROACH SLAB

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

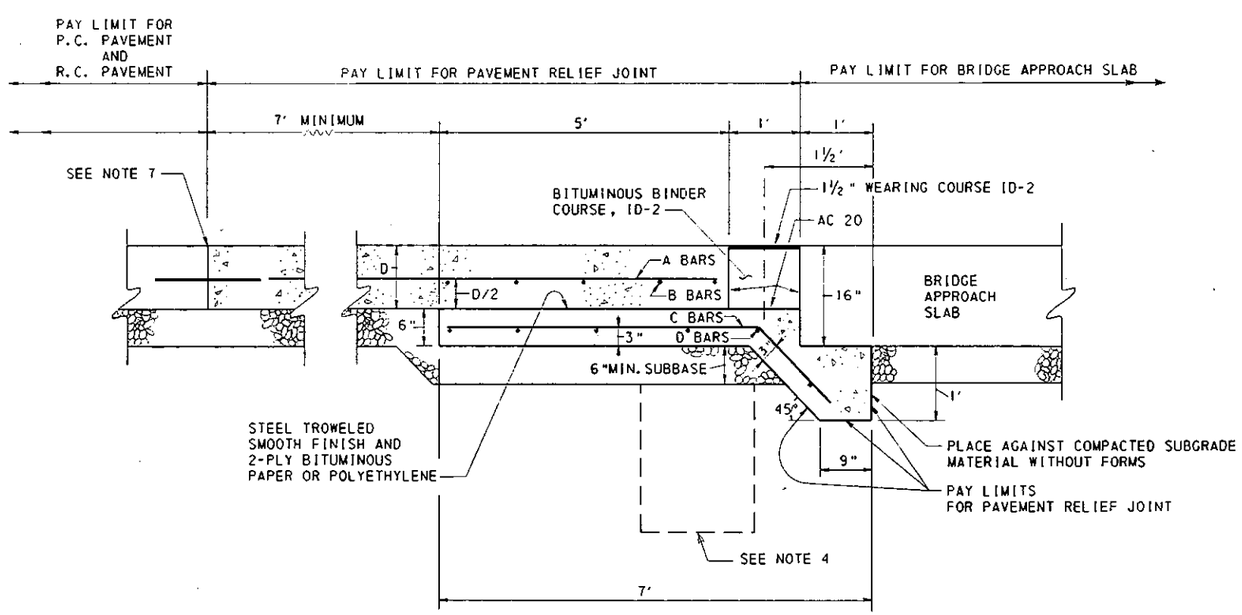
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 2 OF 2

RC-23



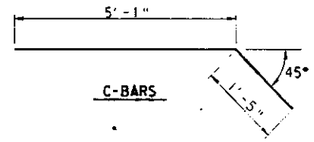
PLAN



SECTION A-A

SCHEDULE OF REINFORCEMENT STEEL

MARK	SIZE	SPACING C - C	LENGTH	NUMBER REQUIRED
A	#4	12"	10'-6"	W
B	#4	12"	W minus 4"	5
C	#4	6"	6'-6"	W x 2
D	#4	12"	W minus 4"	7



C-BARS

NOTES

1. PAVEMENT RELIEF JOINTS ARE APPLICABLE FOR ALL CEMENT CONCRETE PAVEMENTS.
2. CONCRETE IN SUBSLAB SHALL BE CLASS AA (AT CONTRACTORS OPTION, SUBSLAB CONCRETE MAY BE H.E.S.).
3. PORTIONS OF REINFORCING BARS WHICH ARE LOCATED OUTSIDE THE INDICATED PAY LINES SHALL BE INCLUDED IN BID PRICE FOR PAVEMENT RELIEF JOINT.
4. WHEN THE PAVEMENT GRADE CAUSES DRAINAGE TOWARDS THE BRIDGE, A SUBGRADE DRAIN (SEE RC-30) SHALL BE PLACED UNDER THE 6" PORTION OF THE SUBSLAB AND WILL BE MEASURED AND PAID FOR AS SPECIFIED IN SECTION 612, PUBLICATION 408.
5. WHERE BRIDGES ARE LOCATED LESS THAN 1,000 FT. APART, AS MEASURED FROM THE FACE OF THE NEAREST ABUTMENTS, NO RELIEF JOINT WILL BE USED BETWEEN THE BRIDGES.
6. WHERE BRIDGES ARE LOCATED BETWEEN 1,000 FT. AND 1,500 FT. APART, AND THE PAVEMENT STRUCTURE IS CEMENT CONCRETE, ONE RELIEF JOINT SHALL BE PLACED MIDWAY BETWEEN THE BRIDGES. IN THESE CASES, THE SUBSLAB SHALL BE A UNIFORM 6 IN. THICK AND 7 FT. WIDE.
7. FOR JOINT DETAILS ON NEW CONSTRUCTION, SEE RC-20. FOR JOINT DETAILS ON RECONSTRUCTION, SEE RC-26. IF THE DISTANCE TO THE NEAREST JOINT IS LESS THAN 10', REMOVE THE EXISTING PAVEMENT TO THE JOINT.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

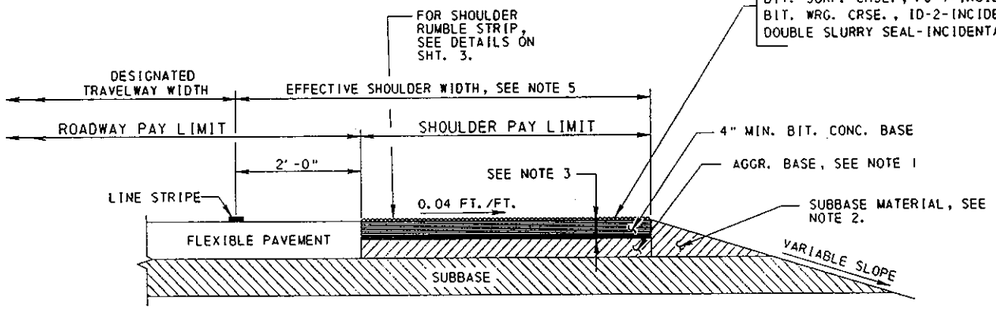
PAVEMENT RELIEF JOINT

RECOMMENDED MAR. 25, 1994
Fredric Bowser
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
M. M. Reh
CHIEF ENGINEER

SHT. 1 OF 1

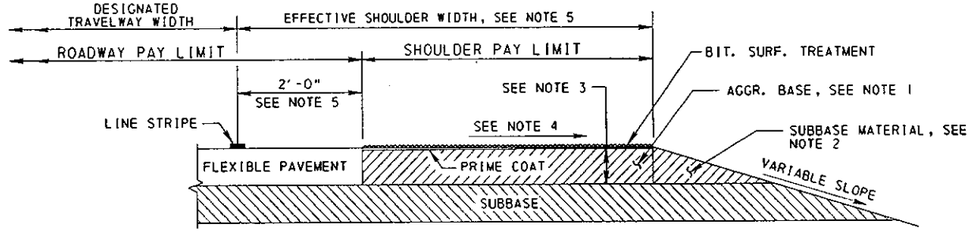
RC-24



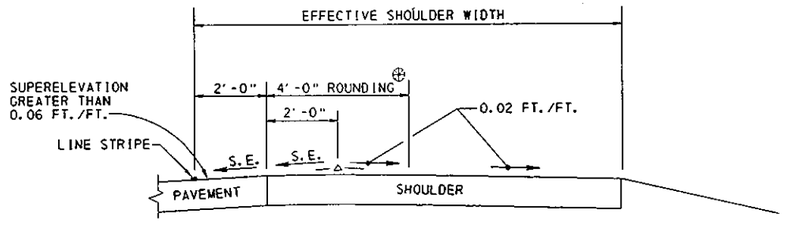
TYPE I SHOULDER
TYPE I-F SHOULDER
TYPE I-I SHOULDER
TYPE I-S SHOULDER

NOTES

1. CONSTRUCT AGGREGATE BASE AS SPECIFIED IN SECTION 350.3, PUBLICATION 408 AND CONSIDER AS PART OF THE SHOULDER.
2. CONSIDER THE PAYMENT FOR THIS AREA OF SUBBASE MATERIAL INCIDENTAL TO THE SHOULDER.
3. DEPTH OF SHOULDER TO BE THE COMBINED DEPTH OF SURFACE AND BASE COURSES.
4. SLOPE SHOULDER AT 0.06 FT./FT. FOR EFFECTIVE SHOULDER WIDTHS $\leq$ 8 FT.
   SLOPE SHOULDER AT 0.04 FT./FT. FOR EFFECTIVE SHOULDER WIDTHS > 8 FT.
5. FOR EFFECTIVE SHOULDER WIDTHS 6 FT. AND LESS, PAVE OUT-TO-OUT OF SHOULDERS WITH FULL DEPTH ROADWAY PAVEMENT.
6. FOR SHOULDERS WITH MSRS INSTALLATIONS USE ONLY BIT. WRG. CRSE. ID-2, 1½" DEPTH MINIMUM.



TYPE 3 SHOULDER



⊕ FOR SUPERELEVATION UNDER 0.06 FT./FT., ELIMINATE THE 4'-0" ROUNDING AND USE THE 0.02 FT./FT. SHOULDER SLOPE BEGINNING FROM THE EDGE OF PAVEMENT.

SHOULDER ROUNDING ON HIGH SIDE OF SUPERELEVATED CURVES

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

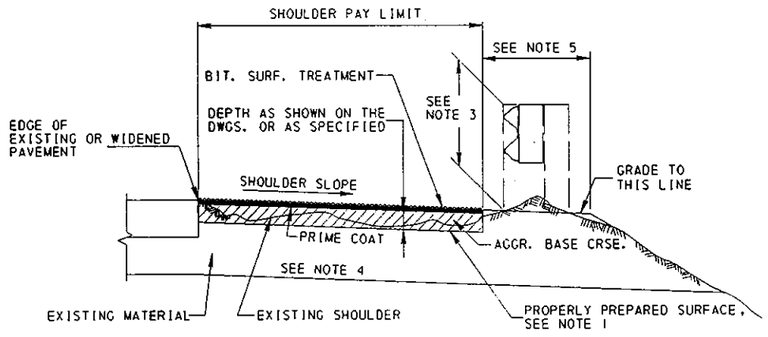
SHOULDERS

RECOMMENDED MAR. 25, 1994
Fredric Bowser
DIRECTOR, BUREAU OF DESIGN

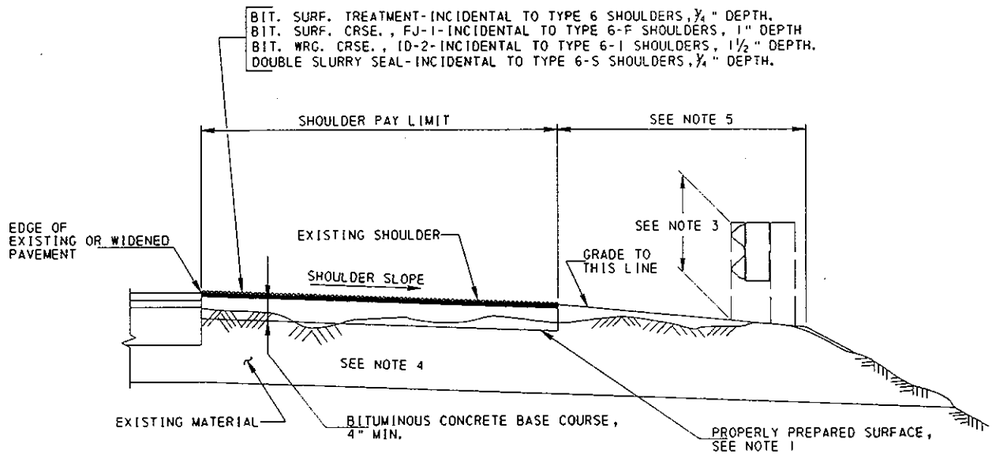
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 1 OF 3

RC-25



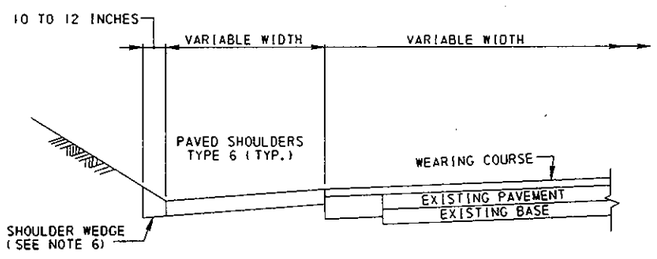
TYPE 4 SHOULDER



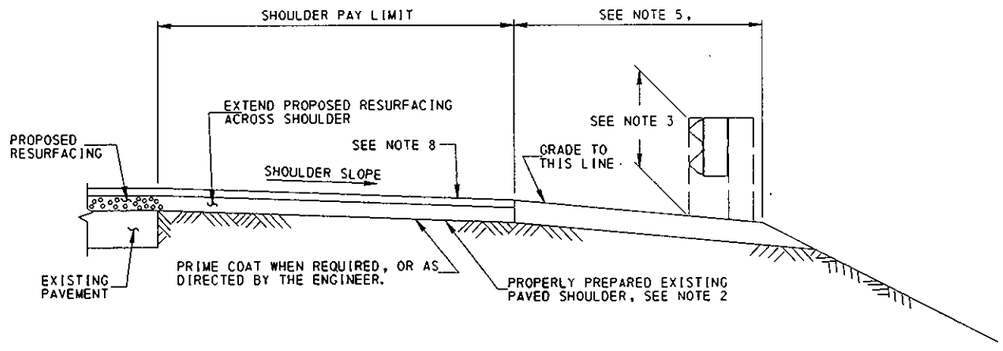
TYPE 6 SHOULDER
TYPE 6-F SHOULDER
TYPE 6-I SHOULDER
TYPE 6-S SHOULDER

NOTES

1. 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 SEC. 350, PUB 408 OR MILLED BITUMINOUS MATERIAL. THE ADDITIONAL MATERIAL IS INCIDENTAL TO THE SHOULDER ITEM.
2. FOR TYPE 7 SHOULDERS PROPERLY PREPARE EXISTING PAVED SHOULDER BY CLEANING AND PATCHING.
3. 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 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 27".
4. REMOVE UNSUITABLE MATERIAL AS DIRECTED, EXCAVATE, AND BACKFILL WITH MATERIAL MEETING THE REQUIREMENTS OF SECTION 350, PUBLICATION 408. SHOULDER EXCAVATION AND BACKFILL WILL BE MEASURED AND PAID FOR IN ACCORDANCE WITH SECTIONS 654 AND 656, PUBLICATION 408. (CROSS SECTIONS NOT REQUIRED.)
5. GRADING WILL BE CONSIDERED 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 SECT. 350, PUBLICATION 408, WHICH WILL BE PAID FOR AS TONS 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.
6. PROVIDE BITUMINOUS TAPER SHOULDER WEDGE 10 TO 12 INCHES UP CUT SLOPE WHEN INDICATED ON THE PLANS AND CONSIDER AS INCIDENTAL TO THE SHOULDER PAY ITEM.
7. "LUMP SUM" ITEMS INCLUDE ALL MATERIAL OR OPERATION OF WORK NECESSARY TO COMPLETE THAT ENTIRE ITEM WHETHER TABULATED OR NOT.



TYPICAL SHOULDER DETAIL
WITH BITUMINOUS TAPER SHOULDER WEDGE



TYPE 7 SHOULDER

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

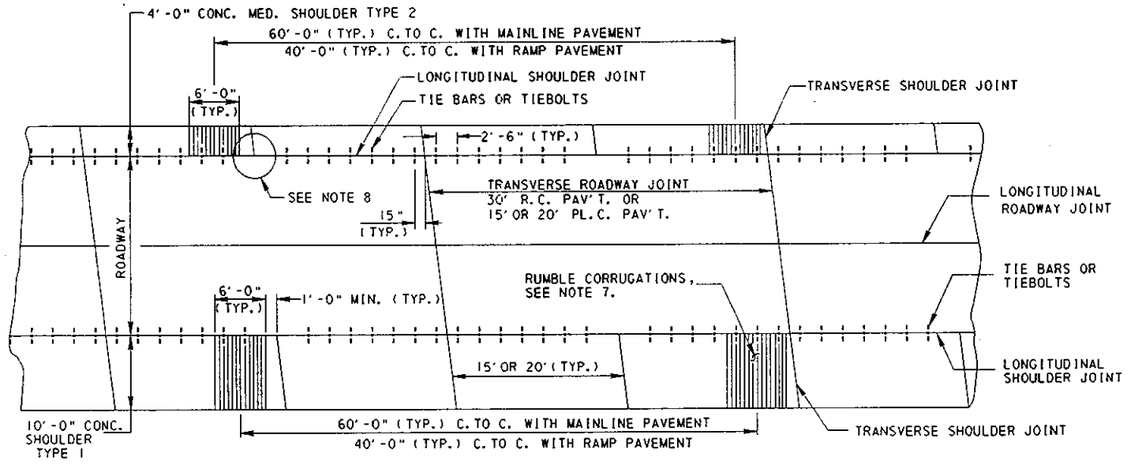
RECONSTRUCTED SHOULDERS

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

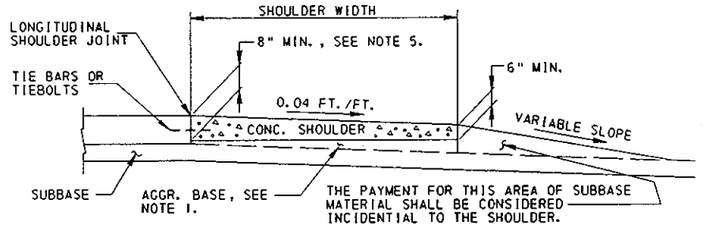
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 2 OF 3

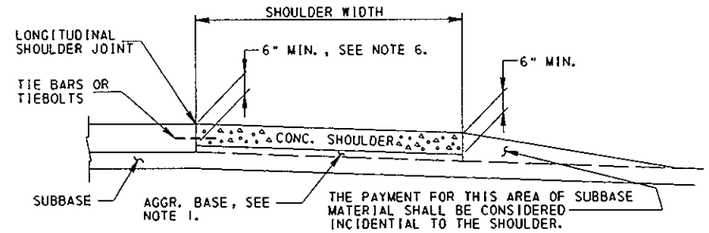
RC-25



CONCRETE SHOULDERS ADJACENT TO R.C. PAVEMENT AND PL.C. PAVEMENT FOR INTERSTATE AND OTHER LIMITED ACCESS FREEWAYS, ARTERIALS AND RAMPS



CONCRETE SHOULDER - TYPE 1

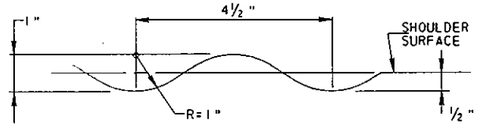


CONCRETE SHOULDER - TYPE 2

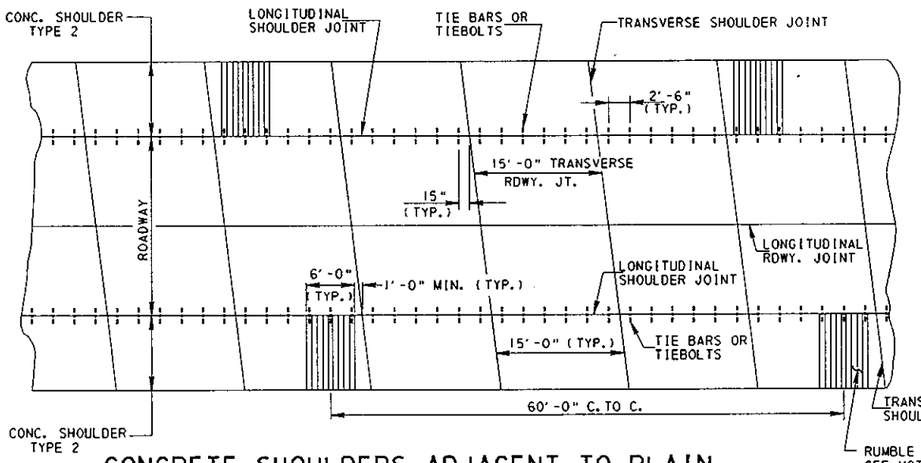
TYPICAL SECTIONS

NOTES

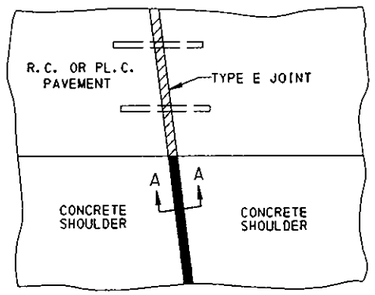
1. THE AGGREGATE BASE SHALL BE AS SPECIFIED IN SECTION 350.3, PUBLICATION 408, AND SHALL BE CONSIDERED INCIDENTAL TO THE SHOULDER.
2. SEAL ALL SHOULDER JOINTS IN ACCORDANCE WITH SECTION 501.3(N), PUBLICATION 408.
3. FOR JOINT DETAILS, SEE RC-20.
4. SEE RC-25, SHEET 1, FOR SHOULDER ROUNDING DETAIL ON HIGH SIDE OF SUPERELEVATION.
5. AT THE CONTRACTORS OPTION, TYPE 1 CONCRETE SHOULDERS MAY BE CONSTRUCTED AS SHOWN OR AT A UNIFORM 8" DEPTH AND/OR CONSTRUCTED AT THE SAME DEPTH AS THE PAVEMENT, AT NO ADDITIONAL EXPENSE TO THE DEPARTMENT.
6. AT THE CONTRACTORS OPTION, TYPE 2 CONCRETE SHOULDERS MAY BE CONSTRUCTED ON A TAPER, WITH A 6" MINIMUM DEPTH, OR AT THE SAME DEPTH AS THE PAVEMENT, AT NO ADDITIONAL EXPENSE TO THE DEPARTMENT.
7. START RUMBLE CORRUGATIONS 2" FROM THE EDGE OF THE ROADWAY PAVEMENT. WHERE A CURB IS USED AT THE OUTSIDE EDGE OF THE SHOULDER, THE CORRUGATIONS SHOULD BE TERMINATED AT THE GUTTER OR A MINIMUM OF 1'-0" FROM THE CURB.
8. TYPICALLY, DO NOT PLACE TIE BARS OR TIEBOLTS ON EITHER SIDE OF INTERMEDIATE SHOULDER JOINTS ADJACENT TO R.C. PAVEMENTS.



CORRUGATION DETAIL

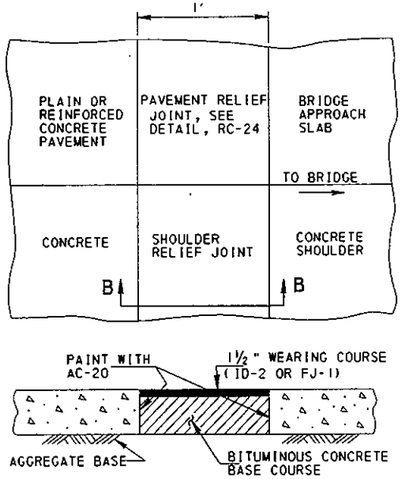


CONCRETE SHOULDERS ADJACENT TO PLAIN CONCRETE PAVEMENT FOR COLLECTORS AND LOCAL ROADS



SECTION A-A

CONCRETE SHOULDER EXPANSION JOINTS



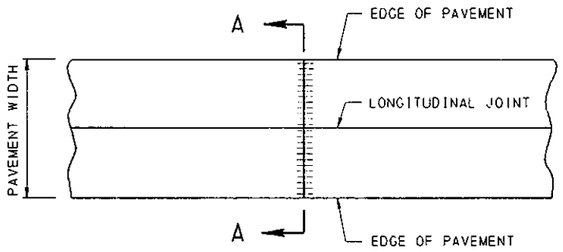
SECTION B-B

SHOULDER RELIEF JOINTS

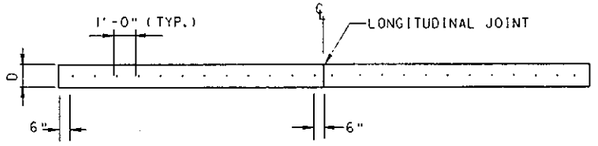
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SHOULDERS
(CONCRETE)

RECOMMENDED: MAR. 25, 1994 Fredric Bowser DIRECTOR, BUREAU OF DESIGN	RECOMMENDED: MAR. 25, 1994 M.M. Ryan CHIEF ENGINEER	SHT. 3 OF 3 RC-25

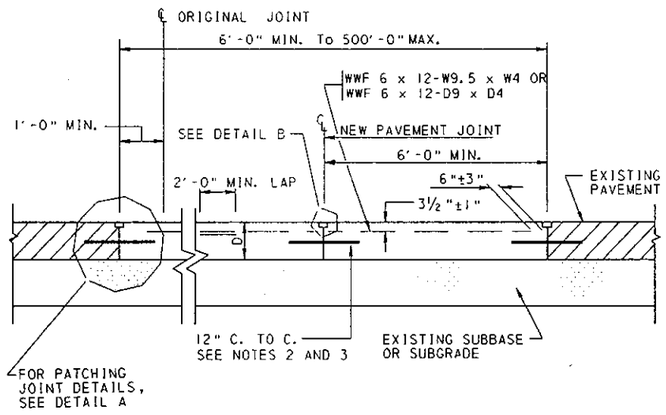


PLAN VIEW



SECTION A-A

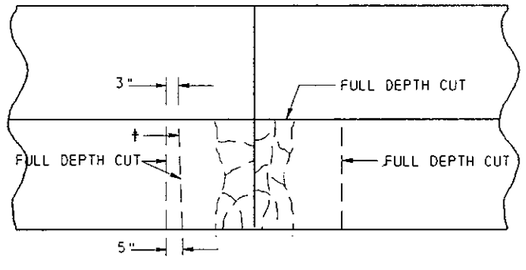
TYPICAL PAVEMENT PATCHING JOINT



TYPICAL SECTION

CONCRETE PAVEMENT PATCHING

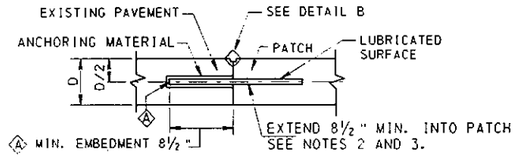
SEE NOTE 1



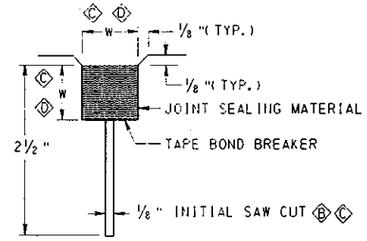
PLAN VIEW

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

SAW CUTS FOR LIFT OUT METHOD



DETAIL A



DETAIL B

PATCHING JOINT DETAILS

LEGEND

Ⓐ EMBEDDED END OF DOWEL BAR NEED NOT BE SQUARE. IF A CHISEL POINT IS NEEDED FOR EMBEDDING METHOD, INCREASE LENGTH OF DOWEL AND EMBEDMENT BY 1 INCH.

Ⓑ INITIAL SAW CUT IS NOT REQUIRED AT PATCH JOINT OR WHEN EXPANSION JOINT MATERIAL IS REQUIRED.

Ⓒ WHEN PAVEMENT IS TO BE OVER-LAID, ONLY THE INITIAL SAW CUT IS REQUIRED.

Ⓓ WHEN THE JOINT SPACING IS LESS THAN 50'-0", W = 3/4". WHEN JOINT SPACING IS 50'-0" OR MORE, W = 1".

NOTES

1. WHEN ANY PAVEMENT PATCH REPLACES AN EXISTING EXPANSION JOINT AND THE EXISTING EXPANSION JOINT IN AN ADJACENT LANE REMAINS IN PLACE, INSTALL ¾" EXPANSION JOINT MATERIAL IN THE PATCHING JOINT OR NEW PAVEMENT JOINT NEAREST TO THE REMAINING EXPANSION JOINT. PLACE AN APPROVED TUBE HAVING A MINIMUM ONE (1) INCH CLEARANCE POCKET OVER THE LUBRICATED END OF ALL DOWEL BARS IN THE NEW EXPANSION JOINT.
2. USE 1¼"Ø x 18" LONG DOWEL BARS FOR PAVEMENT DEPTHS 10" OR LESS AND 1½"Ø x 18" LONG DOWEL BARS FOR PAVEMENT DEPTHS GREATER THAN 10".
3. PLACE DOWEL BARS PARALLEL TO THE CENTERLINE AND SURFACE OF THE SLAB. THE VERTICAL OR HORIZONTAL SKEW FROM ONE END OF THE DOWEL BAR TO THE OTHER END IS NOT TO EXCEED ¼".

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE PAVEMENT REHABILITATION

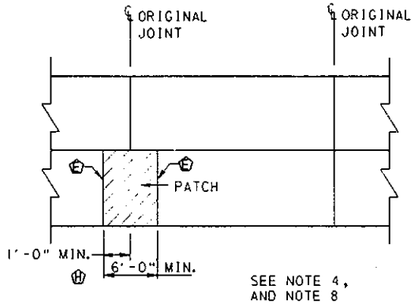
(PATCHING)

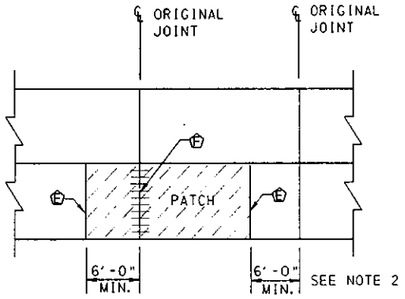
RECOMMENDED MAR. 25, 1994
Frederick Bowser
DIRECTOR, BUREAU OF DESIGN

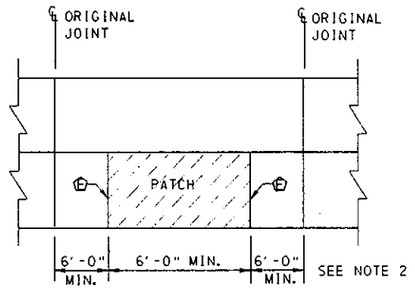
RECOMMENDED MAR. 25, 1994
M. M. Ryan
CHIEF ENGINEER

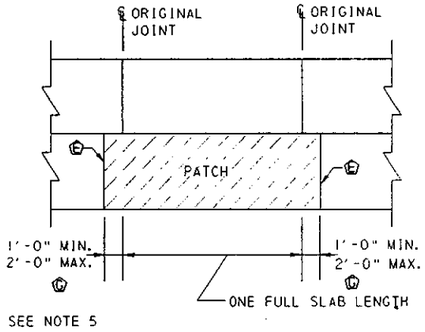
SHT. 1 OF 5

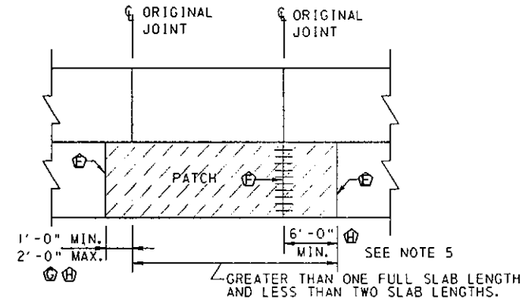
RC-26

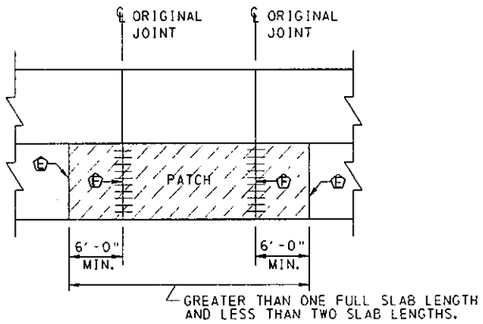


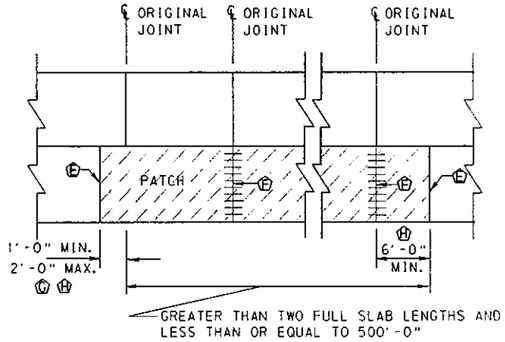




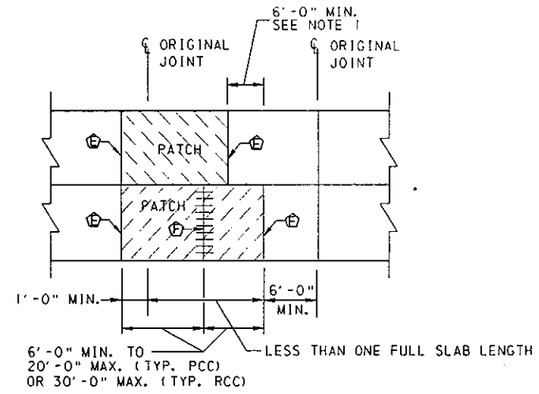


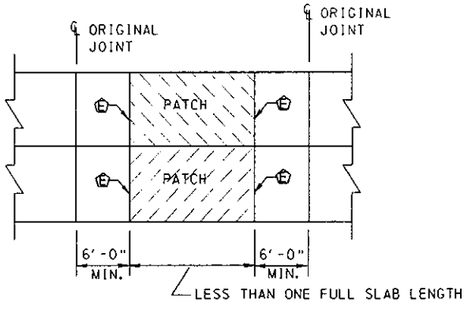


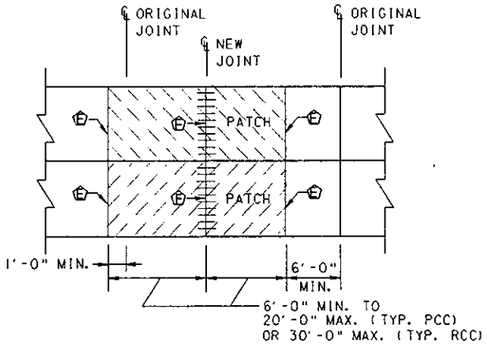


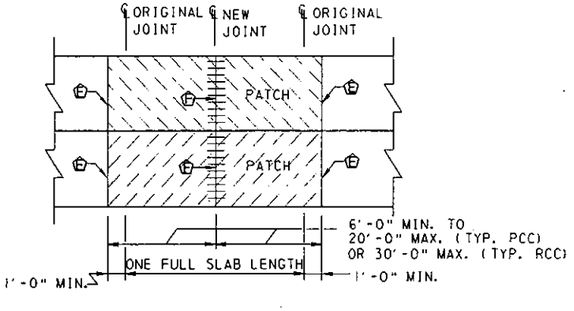


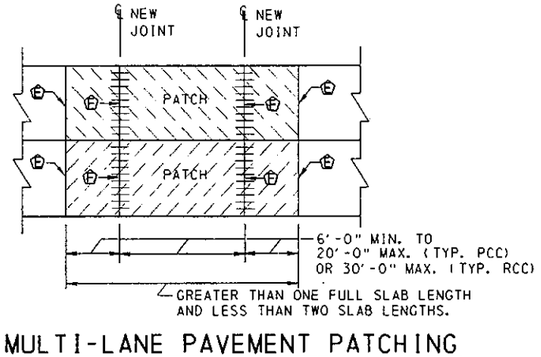
SINGLE LANE PAVEMENT PATCHING

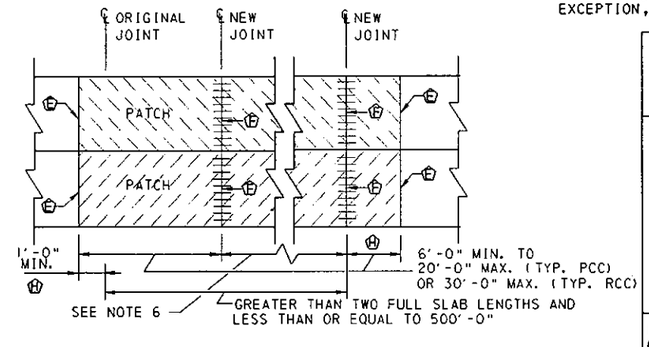












MULTI-LANE PAVEMENT PATCHING

LEGEND

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

NOTES

1. CONSTRUCT PAVEMENT PATCHES IN ADJACENT LANES, WITH LENGTHS THAT ARE WITHIN 6'-0" OF EACH OTHER, TO THE SAME LENGTH. THIS LENGTH WILL BE THE LENGTH OF THE LARGER PAVEMENT PATCH. IF THE PATCH LENGTHS DIFFER BY MORE THAN 6'-0", THEN CONSTRUCT TO THE REQUIRED LENGTHS.
2. DO NOT LEAVE LESS THAN 6'-0" OF ORIGINAL PAVEMENT IN PLACE BETWEEN PATCHES OR BETWEEN JOINTS.
3. WHEN PERFORMING SINGLE LANE PAVEMENT PATCHING, OR PATCHING ONE LANE AT A TIME, PLACE A ¼ INCH, FULL DEPTH, POLYSTYRENE BOARD BOND BREAKER IN THE LONGITUDINAL JOINT OF ALL PATCHES UNDER 65'-0" IN LENGTH, PRIOR TO PLACING THE NEW CONCRETE IN THE PATCH AREA.
4. WHEN PATCHING ADJACENT TO AN EXISTING JOINT, REMOVE A MINIMUM OF 1'-0" OF PAVEMENT IN THE NEXT SLAB TO AVOID THE EXISTING DOWEL BARS.
5. WHEN REPLACING ONE FULL SLAB LENGTH AND THE DETERIORATION EXTENDS MORE THAN 2'-0" INTO THE NEXT SLAB, REMOVE A MINIMUM OF 6'-0" AND INSTALL A NEW PAVEMENT JOINT IN THE SAME POSITION AS THE ORIGINAL JOINT.
6. WHEN PERFORMING MULTILANE PATCHING, AND THE PATCHES ARE GREATER THAN TWO SLAB LENGTHS AND LESS THAN OR EQUAL TO 500'-0", THE JOINT SPACING OF THE AREA BEING PATCHED IS TO CONFORM TO RC-21 OR RC-27 FOR THE SPECIFIC TYPE OF PAVEMENT BEING PLACED (I.E. RCC OR PCC).
7. THESE DRAWINGS ARE PROVIDED AS EXAMPLES TO SHOW CERTAIN PATCHING CRITERIA. THEY MAY NOT COVER EVERY FIELD SITUATION.
8. WHEN ONLY ONE LANE IS BEING PATCHED, DO NOT REMOVE MORE THAN 5'-0" INTO NEXT SLAB. IF MORE THAN 5'-0" IS REQUIRED, REMOVE A MINIMUM OF 6'-0" AND PROVIDE NEW PAVEMENT JOINT AT ORIGINAL JOINT LOCATION. FOR EXCEPTION, SEE NOTE Ⓖ.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE PAVEMENT REHABILITATION

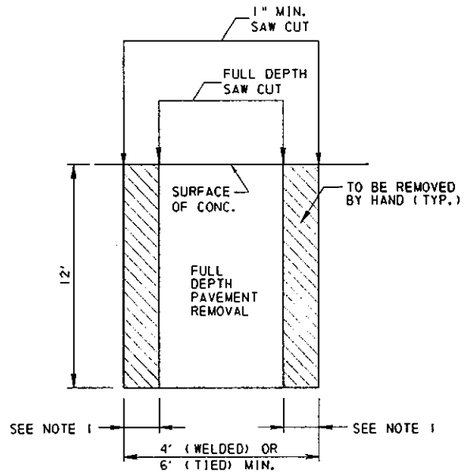
(PATCHING)

RECOMMENDED MAR. 25, 1994
Frederick Bowser
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
M. M. Ryan
CHIEF ENGINEER

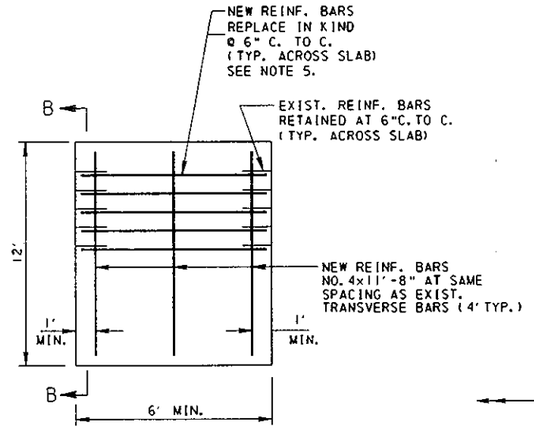
SHT. 2 OF 5

RC-26



C R C PATCH

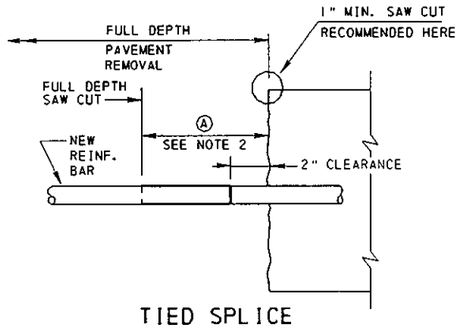
NO SCALE



TIED SPLICE

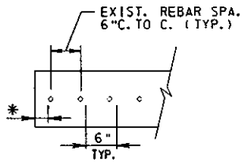
REINFORCEMENT BAR DETAIL

NO SCALE

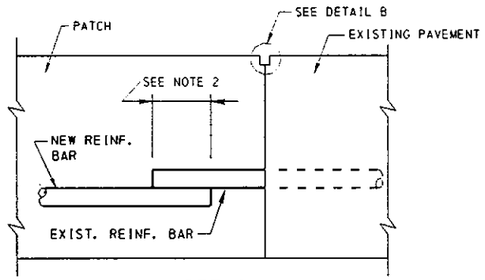


TIED SPLICE

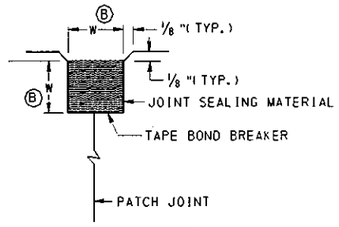
TYPICAL SECTION



SECTION B-B



DETAIL A



DETAIL B

PATCHING JOINT DETAILS

LEGEND:

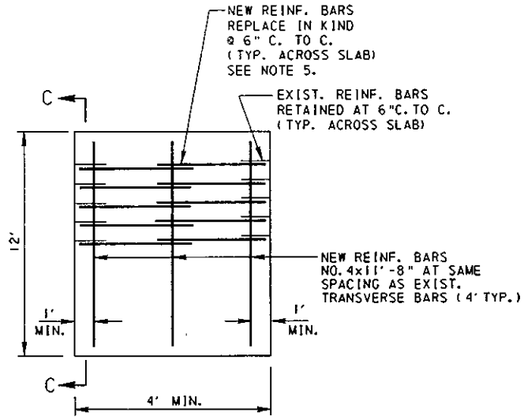
* MAINTAIN EXIST. EDGE CLR.

◦ EXIST. REBARS
NEW REBARS

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

BAR SIZE	DEVELOPMENT LENGTH
5	20"
6	23"
7	27"

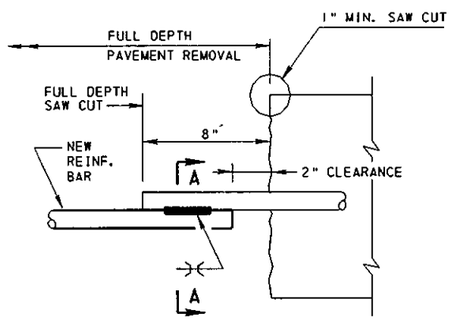
(B) WHEN THE JOINT SPACING IS LESS THAN 50'-0", W = ¾".
WHEN JOINT SPACING IS 50'-0" OR MORE, W = 1".



WELDED SPLICE

REINFORCEMENT BAR DETAIL

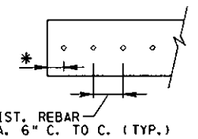
NO SCALE



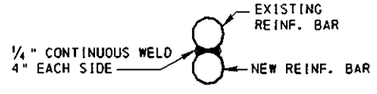
WELDED SPLICE

TYPICAL SECTION

NO SCALE



SECTION C-C



SECTION A-A

NOTES:

1. REMOVE 20" MIN. BY HAND FOR TIED SPLICES. REMOVE 8" BY HAND FOR WELDED SPLICES.
2. OVERLAP TIED SPLICES BY AT LEAST 30 BAR DIAMETERS. OVERLAP WELDED SPLICES BY 6".
3. REMOVE PAVEMENT FULL DEPTH UNDER RETAINED REINFORCEMENT BARS.
4. MINIMUM DISTANCE FROM PATCH EDGE TO EXISTING CRACK IN CRC PAVEMENT IS 24".
5. WHEN TRANSVERSE SPACING OF LONGITUDINAL REINFORCING BARS IS OTHER THAN 6" C. TO C., MATCH EXISTING REINFORCING.

COMMONWEALTH OF PENNSYLVANIA
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BUREAU OF DESIGN

CONCRETE PAVEMENT REHABILITATION

(C R C PATCHING)

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Frederick Bowser
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
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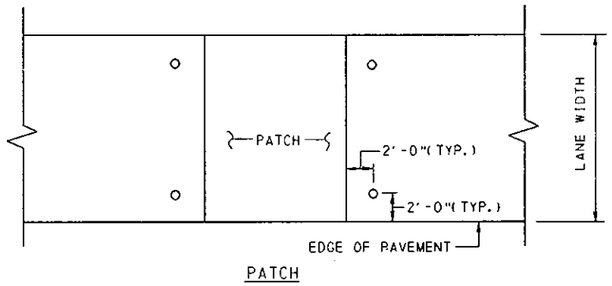
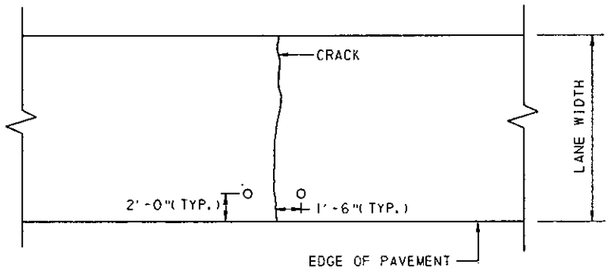
CHIEF ENGINEER

SHT. 3 OF 5

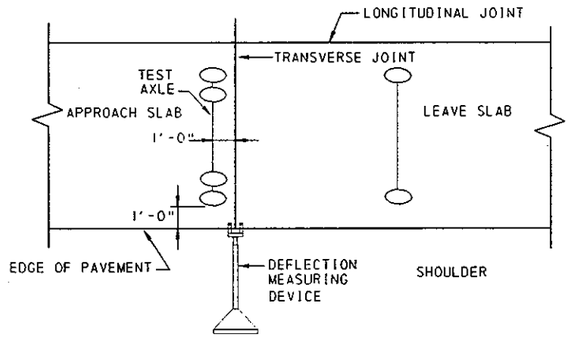
RC-26



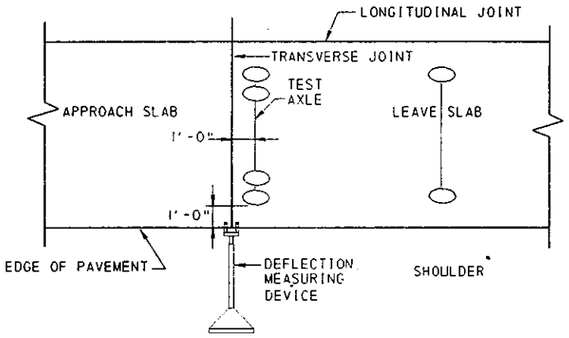
PATCH



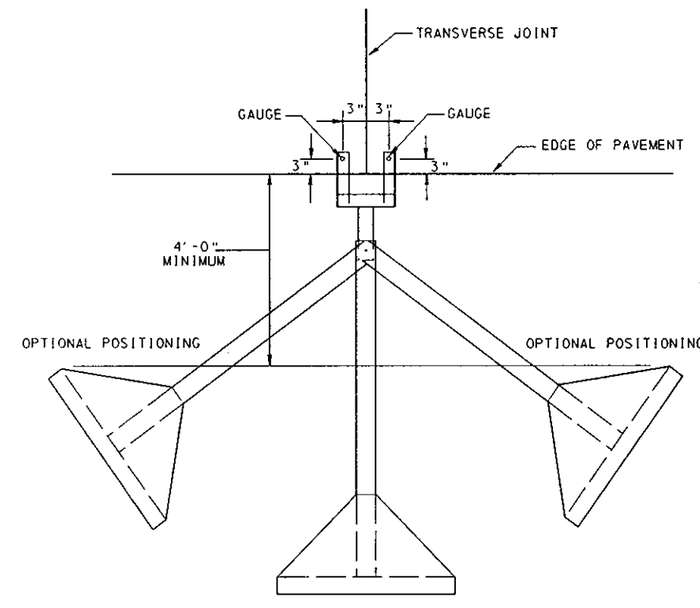
CRACK



POSITION OF TEST AXLE FOR TAKING DEFLECTIONS WITH LOADED APPROACH SLAB

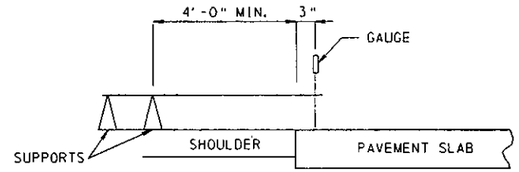


POSITION OF TEST AXLE FOR TAKING DEFLECTIONS WITH LOADED LEAVE SLAB

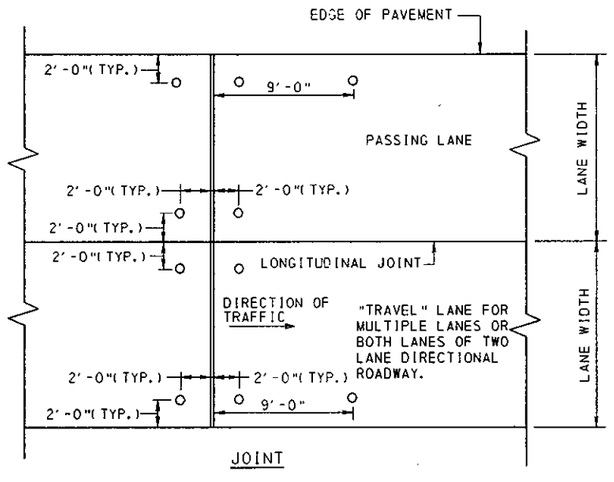


PLAN VIEW

TYPICAL PLACEMENT OF APPROVED DEFLECTION MEASURING DEVICE AT JOINT



ELEVATION VIEW



JOINT

HOLE PATTERNS FOR PAVEMENT SLAB STABILIZATION

NOTES

1. DRILL NEW HOLES FOR REGROUTING 6 INCHES CLOSER TO JOINT OR CRACK.

COMMONWEALTH OF PENNSYLVANIA
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CONCRETE PAVEMENT REHABILITATION

(PATCHING)

RECOMMENDED MAR. 25, 1994
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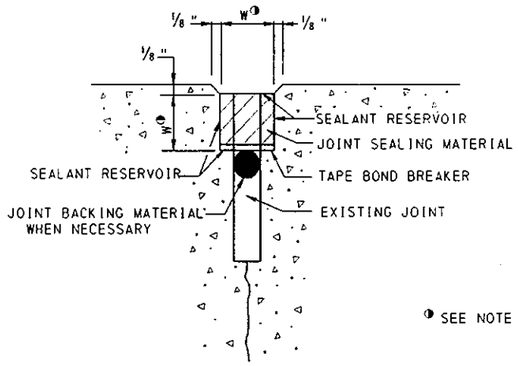
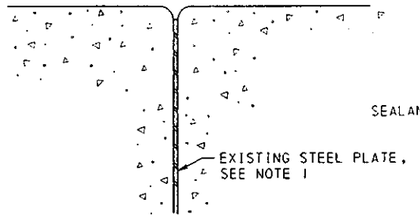
SHT. 4 OF 5

RC-26

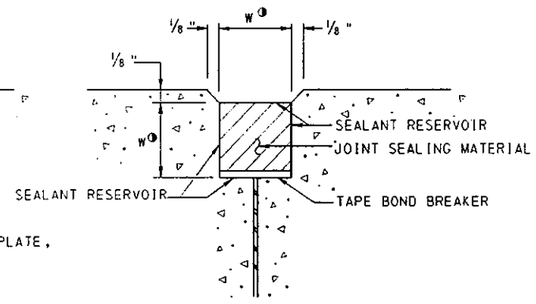


◑ SEE NOTE 2

TYPE 1



EXISTING JOINT



REHABILITATED JOINT

SEE NOTE 3

TYPE 2

JOINT REHABILITATION

NOTES

1. EXISTING STEEL PLATE IS EITHER 14 GAUGE WITH LAPPED TOP OR FLAT PLATE 1/8 " THICK.
2. WHEN EXISTING JOINT SPACING IS LESS THAN 50'-0", W = 3/4 ". WHEN EXISTING JOINT SPACING IS 50'-0" OR MORE, W = 1 ".
3. REMOVE THE STEEL PLATE WITHIN THE SEALANT RESERVOIR.

COMMONWEALTH OF PENNSYLVANIA
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CONCRETE PAVEMENT REHABILITATION

(PATCHING)

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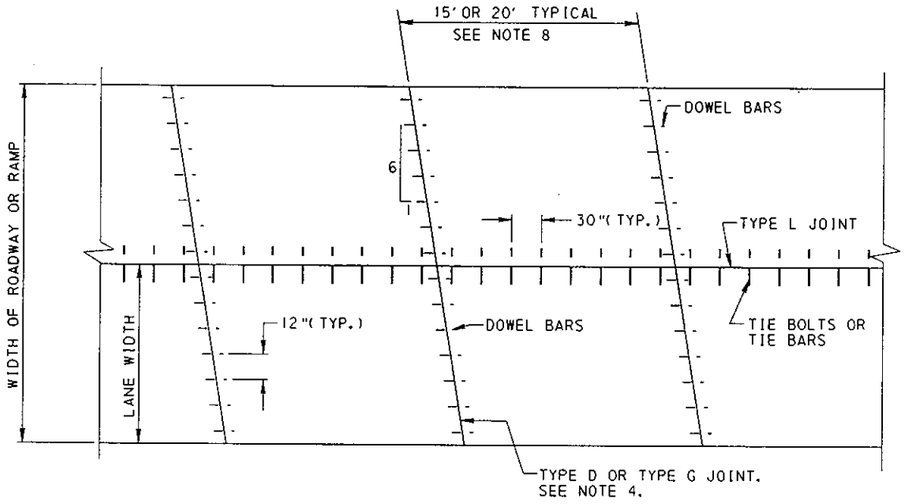
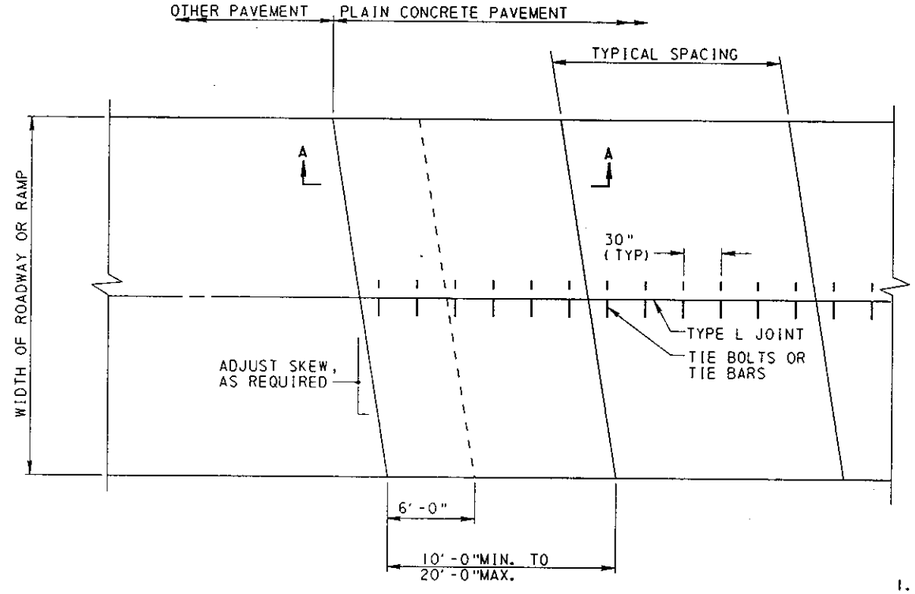
		RC-26



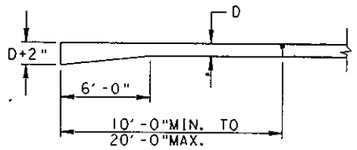
PLAN

INTERSTATE AND OTHER LIMITED ACCESS FREEWAYS, ARTERIALS AND RAMPS

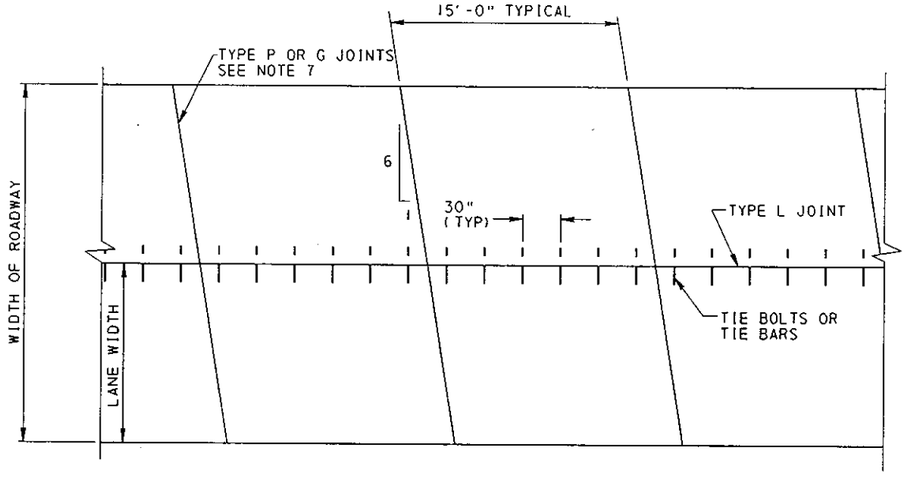


PLAN

TERMINAL SLAB

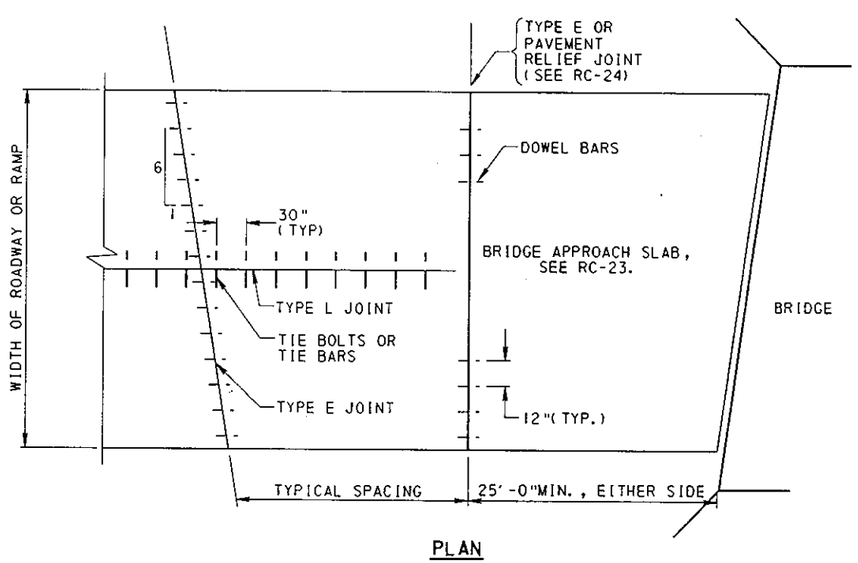


SECTION A-A



PLAN

COLLECTORS AND LOCAL ROADS



PLAN

BRIDGE APPROACHES

NOTES

1. SKEW THE CONSTRUCTION JOINTS FOR PLAIN CEMENT CONCRETE PAVEMENTS AND MAKE EITHER UNIFORM DEPTH WITH LOAD TRANSFER DOWEL BARS OR UNDOWELLED PAVEMENT BUTTED WITH THICKENED SLABS AS SHOWN IN THE TERMINAL SLAB DETAIL.
2. FOR JOINT DETAILS, SEE RC-20.
3. CONSTRUCT ALL TRANSVERSE JOINTS ON A 6:1 COUNTERCLOCKWISE SKEW. ON CURVES, MEASURE THE SKEW FROM A PERPENDICULAR TO A TANGENT ON THE LONG RADIUS SIDE OF THE CURVE.
4. CONSTRUCT TYPE D JOINTS ON INTERSTATE AND OTHER LIMITED ACCESS FREEWAYS AND RAMP PAVEMENTS. CONSTRUCT TYPE G JOINTS ON ARTERIAL PAVEMENTS. REFER TO THE TYPICAL SECTIONS TO DETERMINE WHICH TYPE OF JOINT APPLIES.
5. WHEN RAMP WIDTH EXCEEDS 14 FEET, A TYPE L JOINT IS REQUIRED AT THE MID-POINT.
6. CONSTRUCT ACCELERATION AND DECELERATION PORTION OF RAMPS WITH THE SAME PAVEMENT STRUCTURE AS THE MAINLINE PAVEMENT TO THE FIRST TRANSVERSE JOINT BEYOND THE SHOULDER GORE. CONSTRUCT THE REMAINDER OF THE RAMP WITH PLAIN CEMENT CONCRETE PAVEMENT.
7. ON COLLECTORS AND LOCAL ROADS, CONSTRUCT TYPE G OR P JOINTS, AS INDICATED.
8. 15-FOOT JOINT SPACING IS TO BE USED ON ALL PAVEMENTS LESS THAN 10-INCHES THICK. 20-FOOT JOINT SPACING IS TO BE USED ON ALL PAVEMENTS EQUAL TO OR GREATER THAN 10-INCHES THICK.

COMMONWEALTH OF PENNSYLVANIA
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PLAIN CONCRETE PAVEMENT

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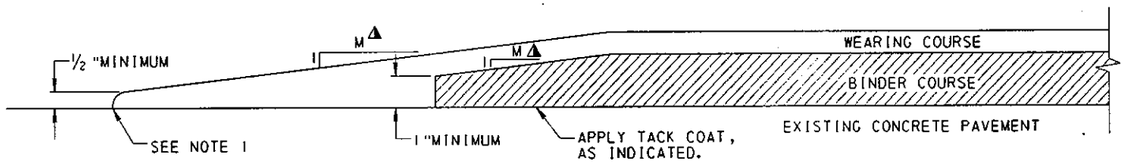
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

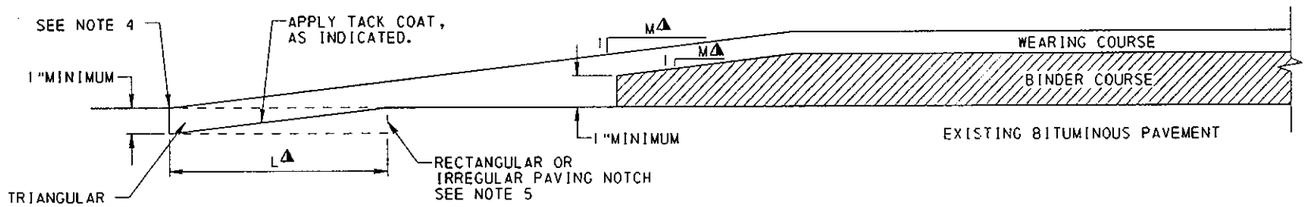
SHT. 1 OF 1

RC-27

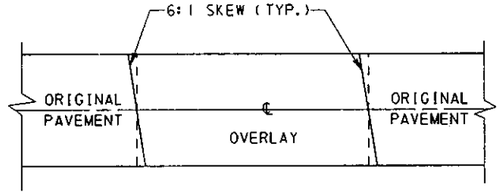


OVERLAY TRANSITION ON CONCRETE PAVEMENT

▲ SEE TABLE A FOR DIMENSIONAL REQUIREMENTS.

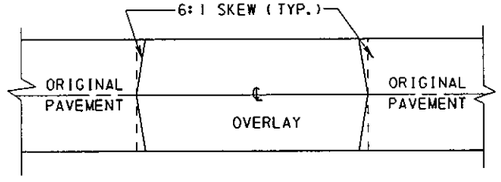


OVERLAY TRANSITION WITH PAVING NOTCH ON BITUMINOUS PAVEMENT



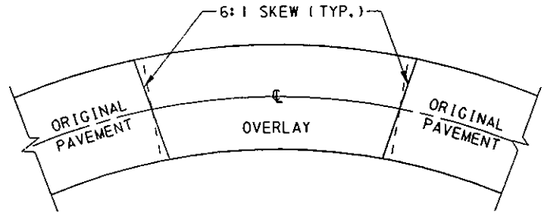
PLAN VIEW

TANGENT SECTION
TWO-LANE DIRECTIONAL



PLAN VIEW

TANGENT SECTION
TWO-LANE, TWO-WAY TRAFFIC



PLAN VIEW

SUPERELEVATION SECTION

OVERLAY TRANSITIONS

TABLE A

FUNCTIONAL CLASSIFICATION	SLOPE M (MAXIMUM)	PAVING NOTCH L (MINIMUM)
INTERSTATE AND OTHER LIMITED ACCESS FREEWAYS	1" IN 15'	15'
ARTERIALS > 45 MPH SEE NOTE 3	1" IN 10'	10'
ARTERIALS ≤ 45 MPH SEE NOTE 3	1" IN 5'	5'
COLLECTORS AND LOCAL ROADS	1" IN 5'	5'
CROSS STREETS SEE NOTE 2	1" IN 1'	1'
DRIVEWAYS	1" IN 1'	NO NOTCH

NOTES

1. SEAL EDGE AS SPECIFIED IN PUBLICATION 408, SECTION 401.3(j)3.
2. USE HIGHER APPROPRIATE CRITERIA IF A CROSS STREET HAS A FUNCTIONAL CLASSIFICATION OF COLLECTORS AND LOCAL ROADS OR HIGHER.
3. USE 85TH PERCENTILE SPEED, IF AVAILABLE. OTHERWISE, USE THE POSTED SPEED.
4. PLACE EDGE FLUSH WITH EXISTING PAVEMENT AND SEAL AS SPECIFIED IN PUBLICATION 408, SECTION 401.3(j)3.
5. USE OF A TRIANGULAR PAVING NOTCH, AS SHOWN, IS PREFERRED. HOWEVER, THE NOTCH MAY BE RECTANGULAR OR IRREGULAR AS LONG AS THE MINIMUM DIMENSIONAL REQUIREMENTS ARE MET.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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OVERLAY TRANSITIONS AND PAVING NOTCHES

RECOMMENDED MAR. 25, 1994
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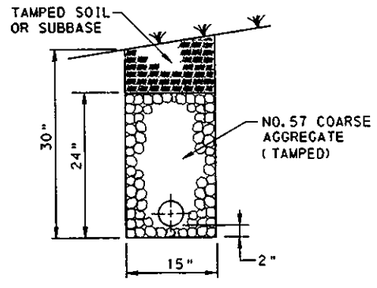
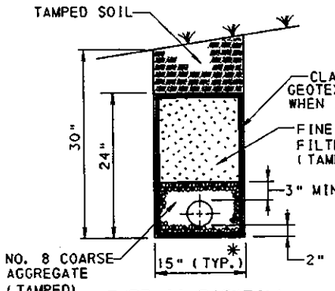
SHT. 1 OF 1

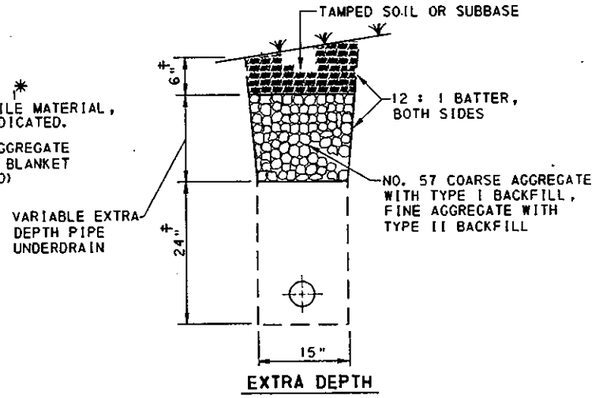
RC-28



TYPE I BACKFILL
ROCK AND SHALE

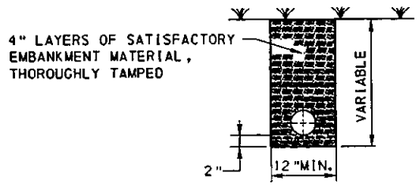


TYPE II BACKFILL
SOIL



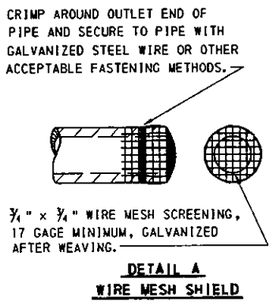
EXTRA DEPTH

PIPE UNDERDRAIN

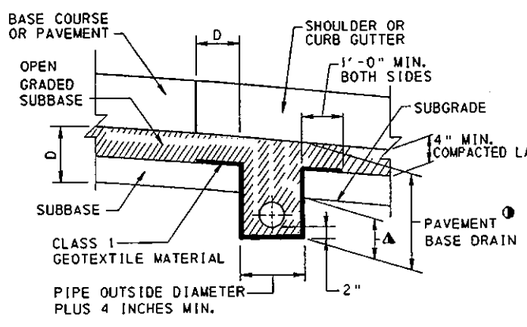


EXCAVATION OVER 36 INCHES IN DEPTH AND FOR A MAXIMUM WIDTH OF 24 INCHES IS PAYABLE AS CLASS 4 EXCAVATION. USE SUBSURFACE DRAIN OUTLETS FOR ALL PIPE UNDERDRAIN AND PAVEMENT BASE DRAINS.

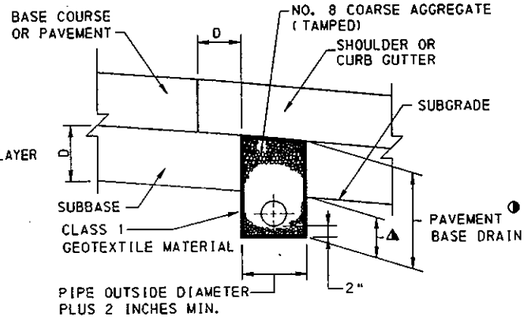
SUBSURFACE DRAIN OUTLETS
(SEE DETAIL A)



DETAIL A
WIRE MESH SHIELD

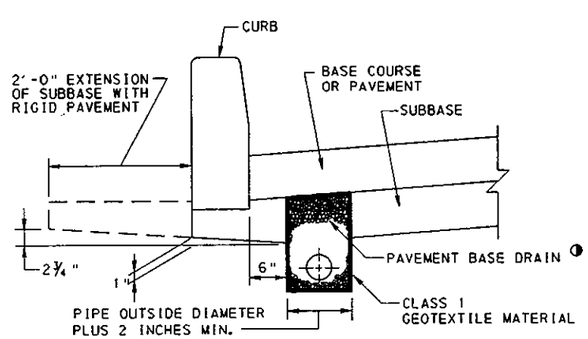


TYPICAL PLACEMENT
(OPEN GRADED SUBBASE)



TYPICAL PLACEMENT
(STANDARD SUBBASE)

PAVEMENT BASE DRAIN



PLACEMENT AT CURB SECTION

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 610 FOR PIPE UNDERDRAIN AND PAVEMENT BASE DRAIN, AND SECTION 615 FOR SUBSURFACE DRAIN OUTLETS.
2. PROVIDE BITUMINOUS PAPER WHEN GEOTEXTILE MATERIAL IS NOT INDICATED.

LEGEND

▲ DEPTH BELOW SUBBASE EQUAL TO THE OUTSIDE DIAMETER OF SPECIFIED PIPE PLUS 2 INCHES.

◑ 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 2 INCHES, BUT NOT LESS THAN 6 INCHES, WHEN GEOTEXTILE MATERIAL IS INDICATED.

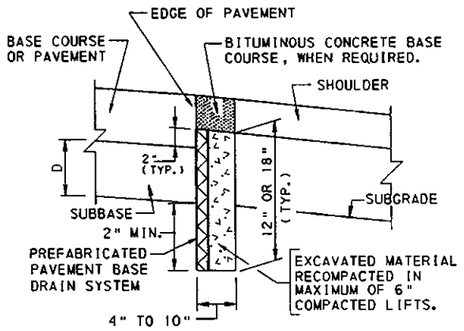
‡ TYPE I OR TYPE II BACKFILL

D= SUBBASE DEPTH

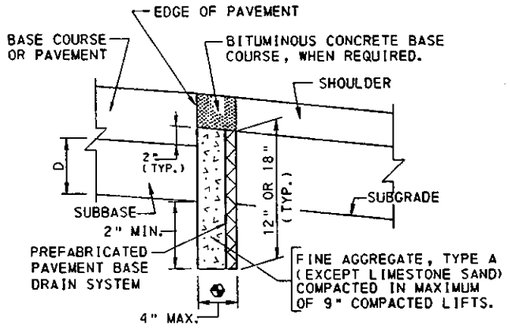
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SUBSURFACE DRAINS

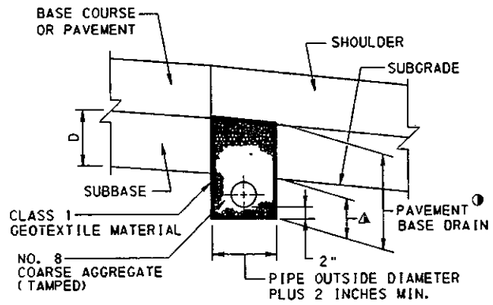
RECOMMENDED OCT. 24, 1995	RECOMMENDED OCT. 24, 1995	SHT. 1 OF 4
M. C. Patel DIRECTOR, BUREAU OF DESIGN	Gary L. Hoffman CHIEF ENGINEER	RC-30



PREFABRICATED PAVEMENT BASE DRAIN INSTALLATION METHOD A (REHABILITATION)
SEE NOTE 3 THIS SHEET.



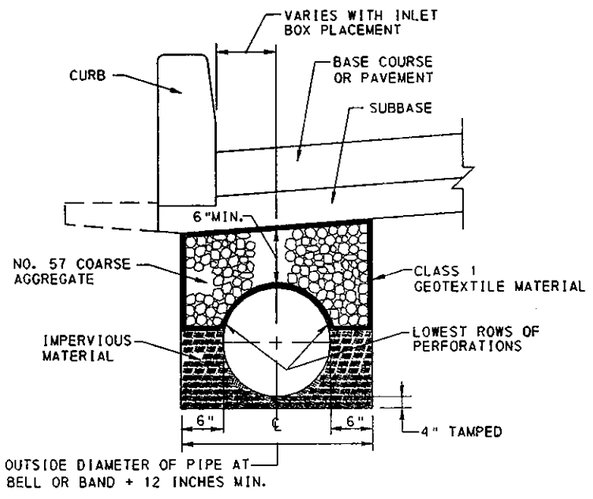
PREFABRICATED PAVEMENT BASE DRAIN INSTALLATION METHOD B (REHABILITATION)
SEE NOTES 3 AND 4 THIS SHEET.



PAVEMENT BASE DRAIN (REHABILITATION)

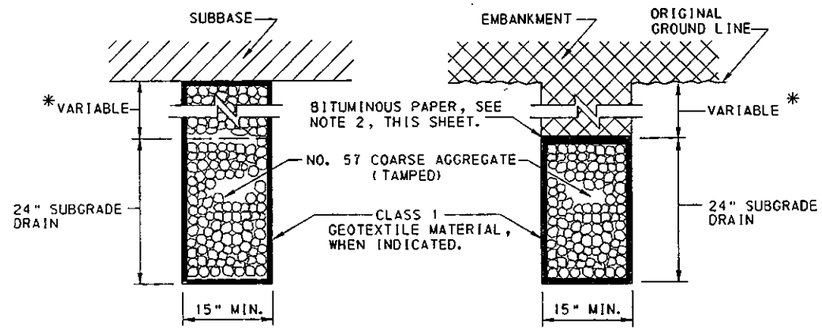
NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 610 FOR PAVEMENT BASE DRAIN, SECTION 612 FOR SUBGRADE DRAINS AND SECTION 604 FOR COMBINATION STORM SEWER AND UNDERDRAIN.
2. PROVIDE BITUMINOUS PAPER WHEN GEOTEXTILE MATERIAL IS NOT INDICATED.
3. PREFABRICATED PAVEMENT BASE DRAIN IS NOT RECOMMENDED UNDER CURBED SECTIONS AND ADJACENT TO WIDENED PAVEMENT.
4. USE METHOD "B" WHEN THE PERCENTAGE OF FINES IN THE SUBBASE (PASSING U.S. SIEVE No. 200) EXCEEDS 15%. SEE THE CONSTRUCTION PLANS AND SPECIFICATIONS.



COMBINATION STORM SEWER AND UNDERDRAIN

NOTE: PLACE NO. 57 COARSE AGGREGATE, TAMPED IN 6" LAYERS, 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) SYMMETICALLY ABOUT THE VERTICAL CENTER LINE.



TREATMENT UNDER SUBBASE TREATMENT UNDER EMBANKMENT

SUBGRADE DRAIN

LEGEND

▲ DEPTH BELOW SUBBASE EQUAL TO THE OUTSIDE DIAMETER OF SPECIFIED PIPE PLUS 2 INCHES.

◑ 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.

◓ MINIMUM WIDTH IS EQUAL TO THE THICKNESS OF THE PAVEMENT BASE DRAIN PLUS 1".

* VARY TO MAINTAIN THE NECESSARY SUBGRADE SLOPE. ADDITIONAL AGGREGATE WILL BE CONSIDERED INCIDENTAL TO THE SUBGRADE DRAIN PAY ITEM.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SUBSURFACE DRAINS

RECOMMENDED OCT. 24, 1995
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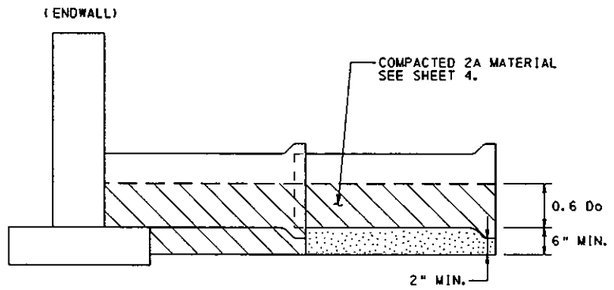
RECOMMENDED OCT. 24, 1995
Gary L. Hoffman
CHIEF ENGINEER

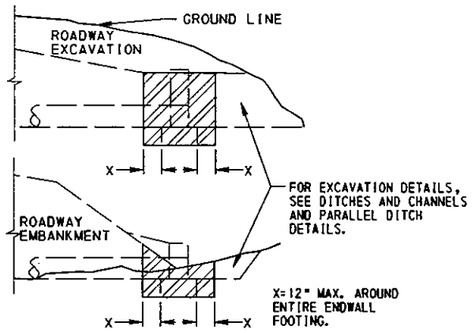
SHT. 2 OF 4
RC-30



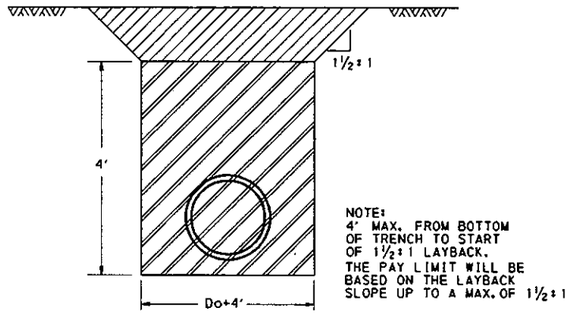
NOTE: DO NOT PLACE #8 MATERIAL UNDER LAST SECTION. USE COMPACTED 2A MATERIAL.

BACKFILL DETAIL AT ENDWALL

(FOR CONCRETE PIPE)



EXCAVATION FOR ENDWALLS

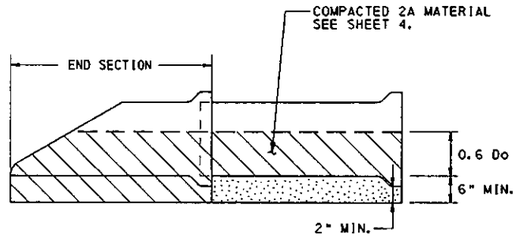


NOTE:
4' MAX. FROM BOTTOM OF TRENCH TO START OF 1½:1 LAYBACK. THE PAY LIMIT WILL BE BASED ON THE LAYBACK SLOPE UP TO A MAX. OF 1½:1

ABOVE DRAWING SHOWS EXCAVATION FOR PIPE IN CUT OR FILL WHERE SUBGRADE IS 4' OR MORE ABOVE THE BOTTOM OF THE TRENCH.

NOTES

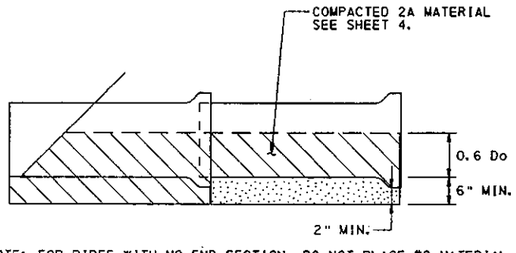
1. PROVIDE MATERIALS & CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 601 FOR PIPE CULVERTS, SECTION 602 CORRUGATED METAL PIPE-ARCH CULVERTS, AND SECTION 603 METAL PLATE CULVERTS.
2. SHORING OR TRENCH BOX INSTALLATION FOR FLEXIBLE PIPE IS NOT NORMALLY USED. IF SHORING OR TRENCH BOX INSTALLATION IS PERMITTED IN SPECIAL CIRCUMSTANCES, REFER TO PUBLICATION 408, SECTION 601.
3. IN ALL EXCAVATION AREAS OSHA SAFETY REQUIREMENTS WILL BE FOLLOWED.
4. DO NOT COMPACT #8 MATERIAL USED FOR BEDDING UNDER CONCRETE PIPES.
5. NO PAYMENT WILL BE ALLOWED 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 1 FOOT ABOVE THE PIPE WILL BE INCIDENTAL TO THE PIPE.
7. FOR BOTTOM TRENCH WIDTHS ≥8'-0", ALL EXCAVATION IS CLASS 1.
8. FOR INLET OR OUTLET PROTECTION SEE DETAIL A.



NOTE: DO NOT PLACE #8 MATERIAL UNDER END SECTION. USE COMPACTED 2A MATERIAL.

BACKFILL DETAIL AT END SECTION

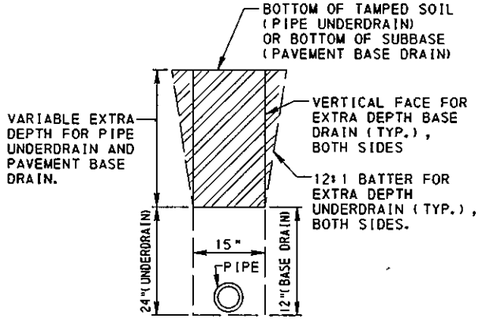
(FOR CONCRETE PIPE)



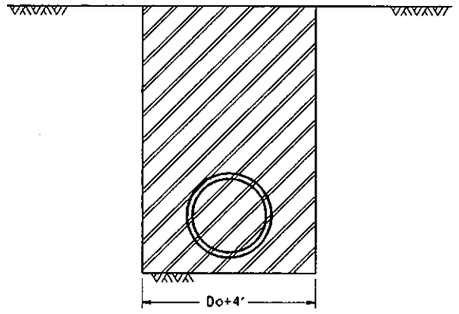
NOTE: FOR PIPES WITH NO END SECTION, DO NOT PLACE #8 MATERIAL UNDER THE LAST SECTION OF PIPE. USE COMPACTED 2A MATERIAL.

BACKFILL DETAIL AT LAST SECTION OF PIPE

(FOR CONCRETE PIPE)

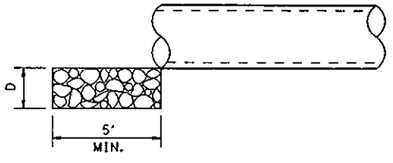


EXTRA DEPTH FOR PIPE UNDERDRAIN AND PAVEMENT BASE DRAIN



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 = 18"(R-4 ROCK) FOR PIPES LESS THAN 36" INSIDE DIAMETER OR SPAN
= 24"(R-5 ROCK) FOR PIPES 36" AND GREATER INSIDE DIAMETER OR SPAN

LEGEND

- CLASS 4 EXCAVATION
- CLASS 1 EXCAVATION
- AGGREGATE FOR BEDDING (AASHTO #8)
- COARSE AGGREGATE (2A)

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SUBSURFACE DRAINS

PIPE PLACEMENT

EXCAVATION - BEDDING - BACKFILL

RECOMMENDED OCT. 24, 1995	RECOMMENDED OCT. 24, 1995	SHT. 3 OF 4
M. E. Patel	Gary K. Hoffman	RC-30
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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.

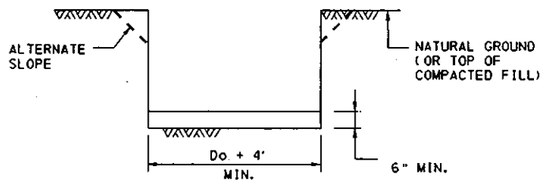
(B) THE EXISTING GROUND IS BETWEEN THE TOP AND THE BOTTOM OF THE PROPOSED PIPE AND THE PIPE IS TO BE COVERED WITH EARTH FILL.

(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 TO A WIDTH EQUAL TO 5 DIAMETERS OF THE PIPE IN ALL FILL CONDITIONS. IF SPECIFIED ON THE CONTRACT DRAWING, UNDERCUT FOR THE DEPTH BELOW THE BEDDING AS SHOWN BY DESIGN (MIN. WIDTH SHOULD BE 5 DIAMETERS OF PIPE). THIS WILL BE PAID AS CLASS I EXCAVATION.

STEP 2 : CONSTRUCT THE EMBANKMENT TO FOUR (4) FEET ABOVE THE TOP OF PIPE OR TO THE SUBGRADE ELEVATION WHICHEVER IS LESS. FOR PIPES 72" OR GREATER SEE NOTE 2.

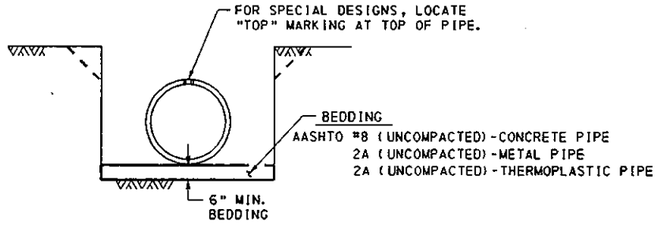
STEP 3 : EXCAVATE THE TRENCH TO THE WIDTH OF THE OUTSIDE DIAMETER OF THE PIPE PLUS 4 FEET AND CREATE AN APPROPRIATE BEDDING 6 INCHES DEEP.



STEP 4 : FOR CONCRETE PIPE, IF THIS EXCAVATION IS THROUGH ROCK, OR HARD SHALE, OR IN AREAS OF UNDERCUT, PROVIDE 6"+½ INCH PER FOOT OF (Do+4') BELOW THE INTENDED BOTTOM ELEVATION OF THE PIPE. (12" MAX.)

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

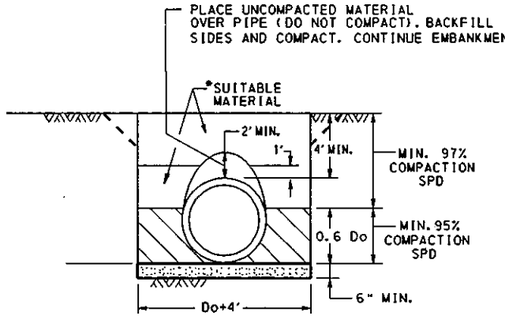
STEP 5 : LAY PIPE ON APPROPRIATE BEDDING. SEE STEP 6D FOR METAL PIPE ARCH AND METAL PLATE PIPE ARCH.



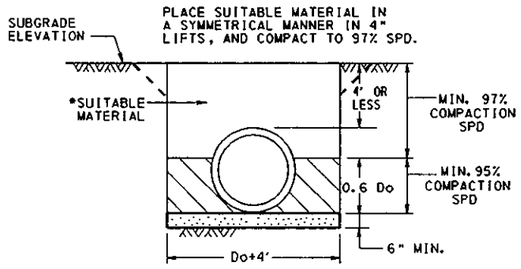
? 6 : FOR CONCRETE PIPE, SEE STEP 6A
: FOR METAL PIPE AND METAL PLATE PIPE, SEE STEP 6B
: FOR THERMOPLASTIC PIPE, SEE STEP 6C
: FOR METAL PIPE ARCH AND METAL PLATE PIPE ARCH, SEE STEP 6D.

STEP 6A : CONCRETE PIPE

PLACE 2A COARSE AGGREGATE MATERIAL (IN 4" LIFTS) 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.



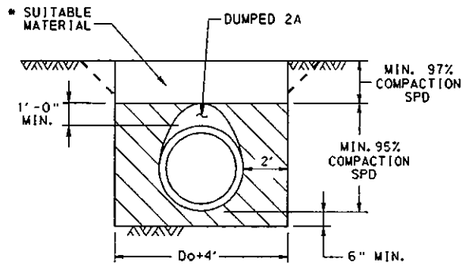
DEEP FILLS OVER 4' CONCRETE PIPE



SHALLOW FILLS 4' AND LESS CONCRETE PIPE

STEP 6B : METAL PIPE AND METAL PLATE PIPE

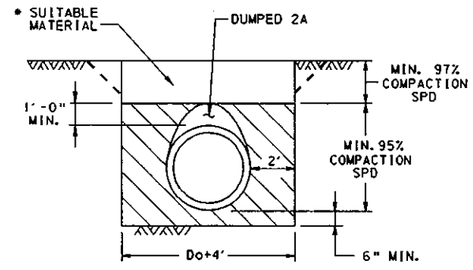
PLACE 2A COARSE AGGREGATE MATERIAL. (IN 4" LIFTS) ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 1' ABOVE TOP OF PIPE. COMPACT TO 95% SPD. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH SECTION 601.



METAL PIPE AND METAL PLATE PIPE

STEP 6C: THERMOPLASTIC PIPE

PLACE 2A COARSE AGGREGATE MATERIAL (IN 4" LIFTS) ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 1' ABOVE TOP OF PIPE. COMPACT TO 95% SPD. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH SECTION 601.



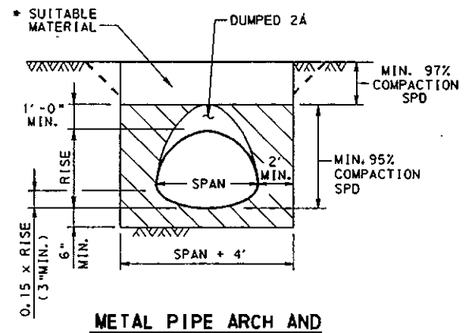
THERMOPLASTIC PIPE

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 4" LIFTS) ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 1' 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

NOTES

1. THE INSTALLATION OF PIPES 72" OR GREATER IN DIAMETER OR SPAN IS PERMITTED WITHOUT PLACING EMBANKMENT FIRST. THE BACKFILL ENVELOPE SHALL BE AS SHOWN ON THIS DRAWING EXCEPT THAT 2A MATERIAL BE PROVIDED ON EACH SIDE OF THE PIPE EQUAL TO ONE DIAMETER OR SPAN. FOR CONCRETE PIPE, THE WIDTH OF UNCOMPACTED AGGREGATE FOR BEDDING (AASHTO#8) SHALL REMAIN AT Do + 4'. "SEE NOTE 3 FOR PAYMENT FOR THE 2A MATERIAL."
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 1 FOOT ABOVE THE PIPE WILL BE INCIDENTAL TO THE PIPE.
4. TO PRECLUDE POINT LOADING ON RELATIVELY RIGID CONCRETE PIPE, DO NOT COMPACT AASHTO #8 BEDDING MATERIAL.
5. FOR TRENCH BOX/SHORING INSTALLATION REQUIREMENTS REFER TO PUBLICATION 408, SECTION 601.
6. PLACEMENT OF BACKFILL MATERIAL IN 8 INCH LAYERS (LIFTS) SHALL BE PERMITTED WHEN USING VIBRATORY COMPACTION EQUIPMENT.

LEGEND

AGGREGATE FOR BEDDING (AASHTO #8), UNCOMPACTED

COARSE AGGREGATE (2A)

Do = OUTSIDE DIAMETER OF PIPE, FEET

SPD = STANDARD PROCTOR DENSITY

I.D. = INSIDE DIAMETER

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SUBSURFACE DRAINS

PIPE PLACEMENT

EXCAVATION - BEDDING - BACKFILL

RECOMMENDED OCT. 24, 1995	RECOMMENDED OCT. 24, 1995	SHT. 4 OF 4
M. L. Patel	Gary L. Hoffman	RC-30
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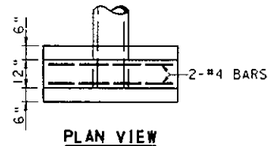
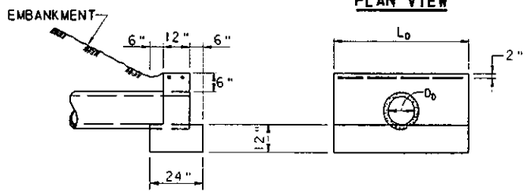
PIPE DIAMETER	L_D
18" AND 21"	5'
24" AND 27"	7'
30" AND 33"	9'



PLAN VIEW

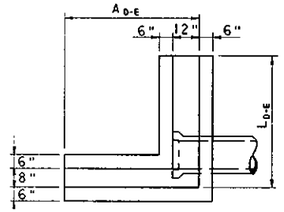


SIDE ELEVATION VIEW FRONT ELEVATION VIEW

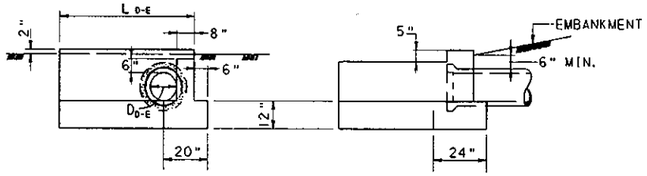
TYPE D ENDWALL

LOCAL CONDITIONS WILL GOVERN DIMENSION A_{D-E}

$L_{D-E} = 2.5_{D-E} + 12"$



PLAN VIEW

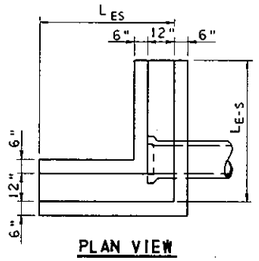


FRONT ELEVATION VIEW SIDE ELEVATION VIEW

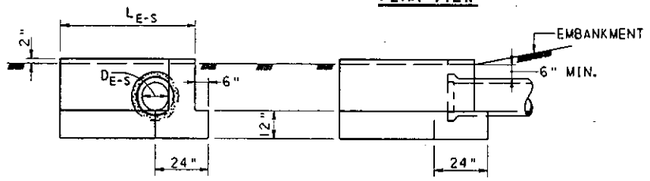
TYPE D-E ENDWALL

SIDE ROAD WALL TO BE PARALLEL TO SIDE ROAD

$L_{E-S} = 2.5D_{E-S} + 12"$



PLAN VIEW



FRONT ELEVATION VIEW SIDE ELEVATION VIEW

TYPE E-S ENDWALL

TABLE A

2 : 1 EMBANKMENT SLOPES

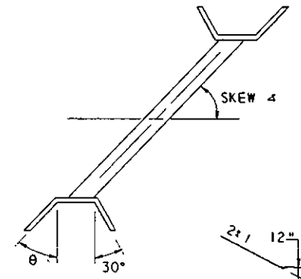
PIPE DIAMETER	SKEW ∠ = 90° TO 60° θ = 30°			SKEW ∠ = 55° θ = 35°			SKEW ∠ = 50° θ = 40°			SKEW ∠ = 45° θ = 45°			SKEW ∠ = 40° θ = 50°			SKEW ∠ = 30° θ = 60°			SKEW ∠ = 20° θ = 70°			SKEW ∠ = 10° θ = 80°				
D_{D-W}	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	L_{D-W}	ℓ	W_1	W_2	A_{D-W}
(IN.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(FT.)	(IN.)
36	5.8	0	4.6	6.0	.33	4.9	6.2	.5	5.2	6.5	.67	5.7	7.0	.75	6.2	8.3	1.33	8.0	11.1	1.75	11.7	19.6	5.0	23.0	4.6	12
42	6.3	0	5.8	6.6	.33	6.1	6.9	.5	6.5	7.3	.67	7.1	7.8	.75	7.8	9.3	1.33	10.0	12.5	1.75	14.6	22.5	5.0	28.8	5.8	12
48	6.9	0	6.9	7.2	.33	7.3	7.5	.5	7.8	8.0	.67	8.5	8.5	.75	9.4	10.3	1.33	12.0	14.0	1.75	17.5	25.3	5.0	34.6	6.9	12
54	7.5	0	8.0	7.8	.33	8.5	8.2	.5	9.1	8.7	.67	9.9	9.3	.75	10.9	11.3	1.33	14.0	15.5	1.75	20.5	28.2	5.0	40.3	8.0	12
60	8.1	0	9.2	8.4	.33	9.8	8.8	.5	10.4	9.4	.67	11.3	10.1	.75	12.5	12.3	1.33	16.0	16.9	1.75	23.4	31.1	5.0	46.0	9.2	15
72	9.2	0	11.5	9.6	.33	12.2	10.1	.5	13.0	10.8	.67	14.1	11.7	.75	15.6	14.3	1.33	20.0	19.8	1.75	29.2	36.9	5.0	57.6	11.5	15

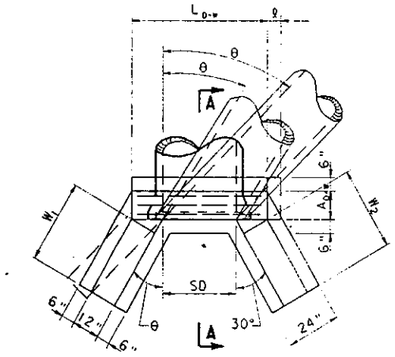
$$SD = \frac{D_{D-W}}{\cos\theta} = \frac{D_{D-W}}{\sin \text{SKEW } \angle}$$

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

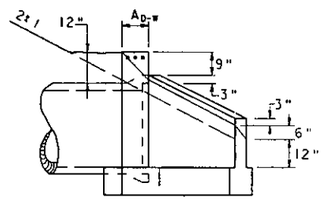
$$W_1 = \frac{2_{D-W} - 2'}{\cos\theta} \text{ (FOR 2 : 1 SLOPE)}$$

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

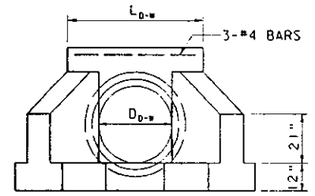




PLAN VIEW



SECTION A-A



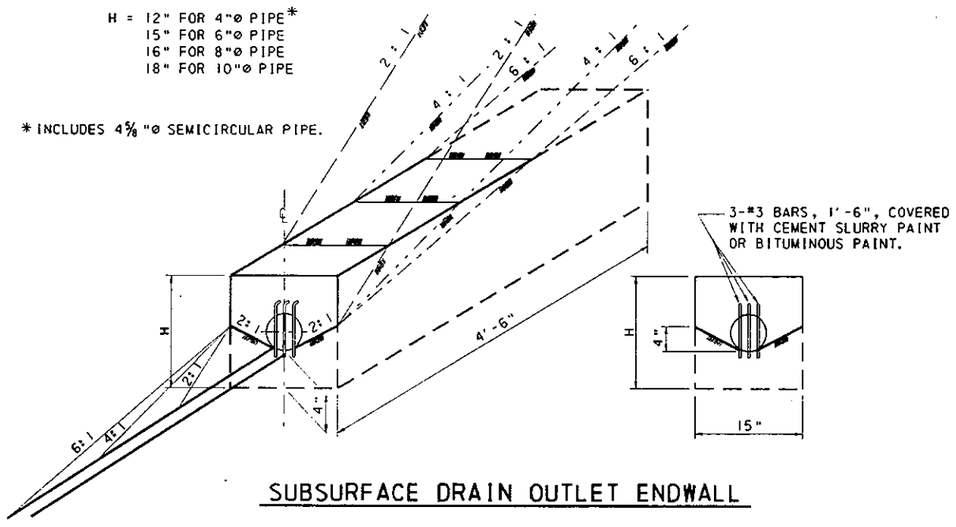
FRONT ELEVATION VIEW

TYPE D-W ENDWALL

(SEE TABLE A, FOR DIMENSIONS NOT INDICATED.)

H = 12" FOR 4"ø PIPE*
15" FOR 6"ø PIPE
16" FOR 8"ø PIPE
18" FOR 10"ø PIPE

* INCLUDES 4⅝ "ø SEMICIRCULAR PIPE.



SUBSURFACE DRAIN OUTLET ENDWALL

NOTES

1. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE APPROPRIATE SPECIFICATIONS AS OUTLINED IN PUBLICATION 408, SECTION 605.
2. USE CLASS A CONCRETE OR BETTER.
3. CHAMFER EXPOSED EDGES ONE INCH.
4. PROVIDE REINFORCEMENT (.12 in^2/Ln.Ft.) IN ACCORDANCE WITH PUBLICATION 408, SECTION 709. SEE SHEET 2 OF 2.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

ENDWALLS

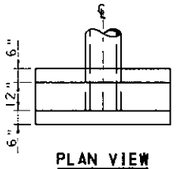
RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

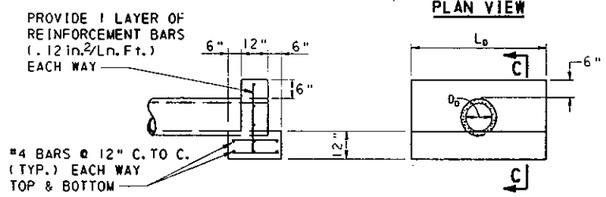
SHT. 1 OF 2

RC-31

PIPE DIAMETER	L_D
18" AND 21"	5'-0"
24" AND 27"	7'-0"
30" AND 33"	9'-0"

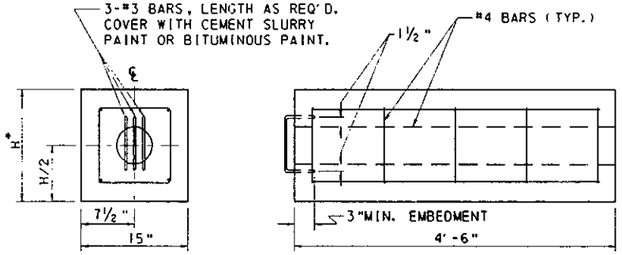


PLAN VIEW



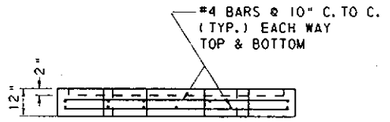
SECTION C-C FRONT ELEVATION VIEW

TYPE D ENDWALL

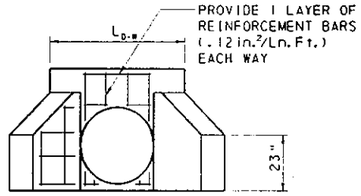


* SEE SHEET 1 OF 2

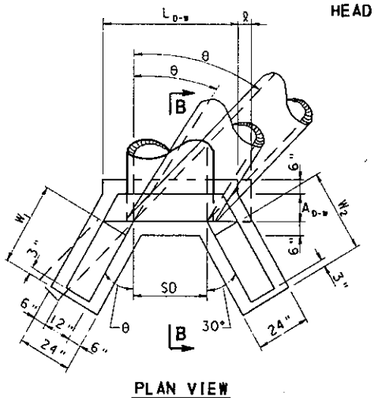
SUBSURFACE DRAIN OUTLET ENDWALL



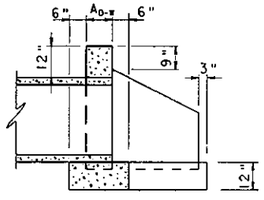
FRONT ELEVATION VIEW
BASE SECTION FOR TYPE D-W



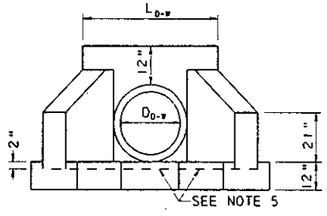
FRONT ELEVATION VIEW
HEAD & WINGWALL SEC. FOR TYPE D-W



PLAN VIEW



SECTION B-B



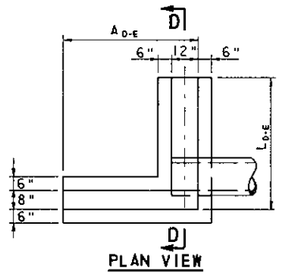
FRONT ELEVATION VIEW

TYPE D-W ENDWALL

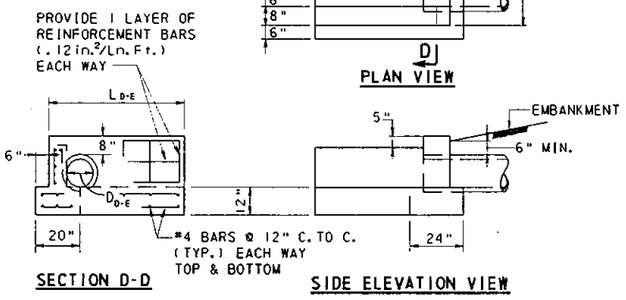
(SEE TABLE A, SHT. 1 OF 2, FOR DIMENSIONS NOT INDICATED.)

LOCAL CONDITIONS WILL GOVERN DIMENSION A_{D-E}

$L_{D-E} = 2.5_{D-E} + 12"$



PLAN VIEW

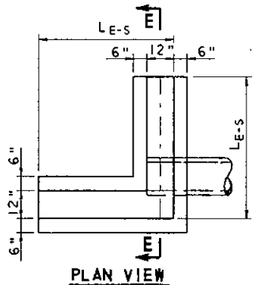


SECTION D-D SIDE ELEVATION VIEW

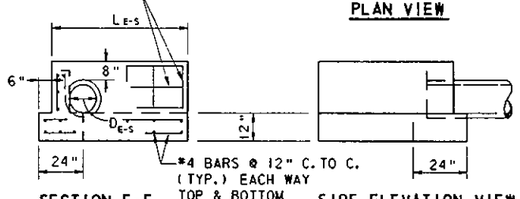
TYPE D-E ENDWALL

SIDE ROAD WALL TO BE PARALLEL TO SIDE ROAD

$L_{E-S} = 2.5D_{E-S} + 12"$



PLAN VIEW



SECTION E-E SIDE ELEVATION VIEW

TYPE E-S ENDWALL

NOTES

1. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 605 AND SECTION 714.
2. THIS STANDARD DEPICTS THE SHAPE AND DEMINSIONS REQUIRED FOR UNIFORMITY AND COMPATABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR MANUFACTURING AND HANDLING PRECAST UNITS. ONLY ITEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 WILL BE PERMITTED. ANY MANUFACTURER DESIRING TO BE LISTED IN BULLETIN 15 SHALL SUBMIT A 22" x 36" REPRODUCIBLE SHOP DRAWING TO THE MATERIALS AND TESTING DIVISION, BUREAU OF CONSTRUCTION AND MATERIALS FOR APPROVAL. THE SHOP DRAWINGS SHALL SHOW ALL DETAILS INCLUDING DIMENSIONS, TOLERANCES, REINFORCEMENT AND ANY MANUFACTURING DRAFTS.
3. CHAMFER EXPOSED EDGES ONE INCH.
4. PROVIDE PIPE OPENING SIZE IN PRECAST UNITS AT LEAST TWO (2) INCHES BUT NOT MORE THAN FOUR (4) INCHES LARGER THAN THE OUTSIDE DIAMETER OF THE PIPE.
5. PROVIDE NON-SHRINK EPOXY GROUT THROUGHOUT THE CONTACT SURFACE WHEN CONNECTING WING AND HEADWALL SECTION TO BASE SECTION. PROVIDE JOINT SEALANT MATERIAL ALONG INTERFACE BETWEEN WING AND HEADWALL SECTION AND BASE SECTION.
6. PROVIDE A 1-INCH MORTAR BED PLACED ON TOP OF THE SUBBASE MATERIAL FOR LEVELING PURPOSES, WHEN REQUIRED.
7. PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 709.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

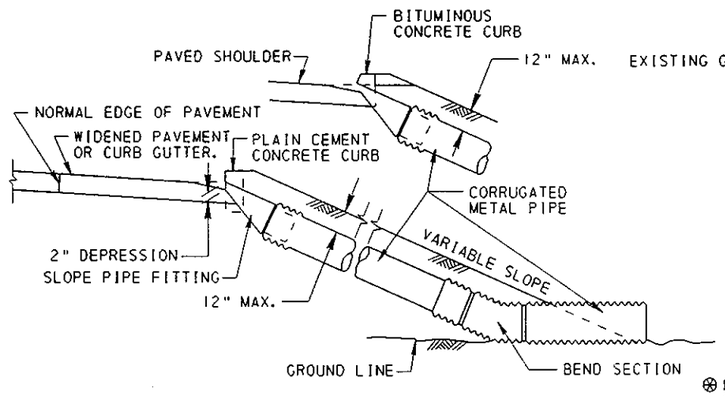
PRECAST ENDWALLS

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

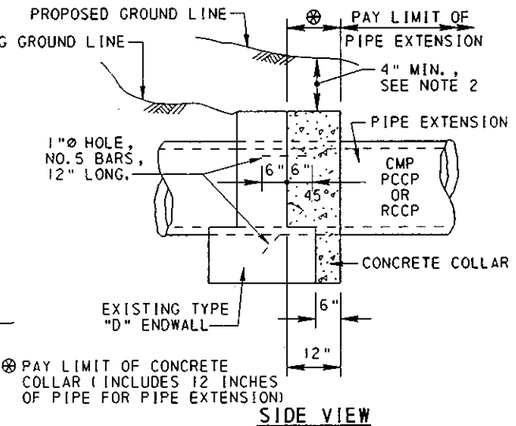
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 2 OF 2

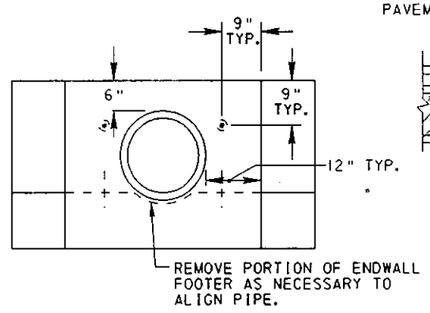
RC-31



ADJACENT TO STRUCTURE AND/OR PAVED SHOULDER



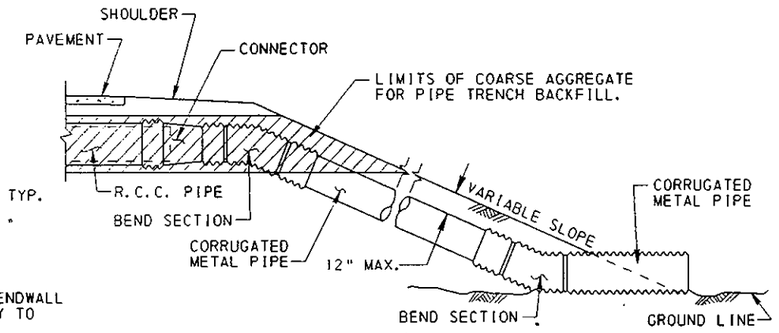
SIDE VIEW



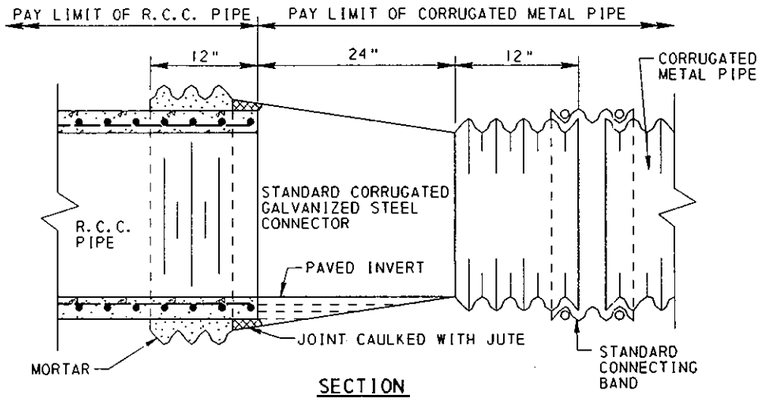
END VIEW

CONCRETE COLLAR FOR PIPE EXTENSION

FOR PIPES UP TO AND INCLUDING 33" ø, SEE NOTE 1



OUTLET PIPE THRU EMBANKMENT SLOPE

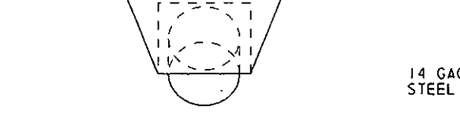


SECTION

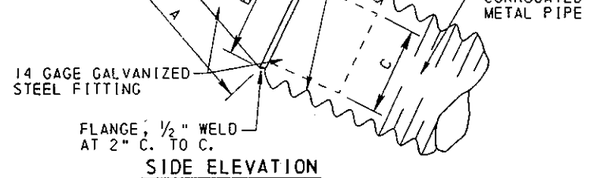
PIPE CONNECTOR

NOTES

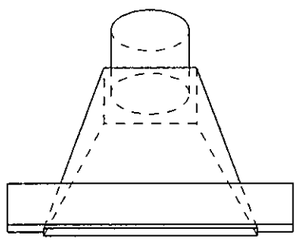
1. FOR OTHER TYPES OF ENDWALLS AND FOR PIPES LARGER THAN 33" ø, A SPECIAL COLLAR DESIGN IS REQUIRED.
2. REMOVE PORTIONS OF EXISTING ENDWALL IF REQUIRED TO MAINTAIN 4" GROUND COVER.
3. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 616 FOR SLOPE PIPE FITTINGS AND SECTION 618 FOR CONCRETE COLLAR FOR PIPE EXTENSION.



FRONT ELEVATION



SIDE ELEVATION

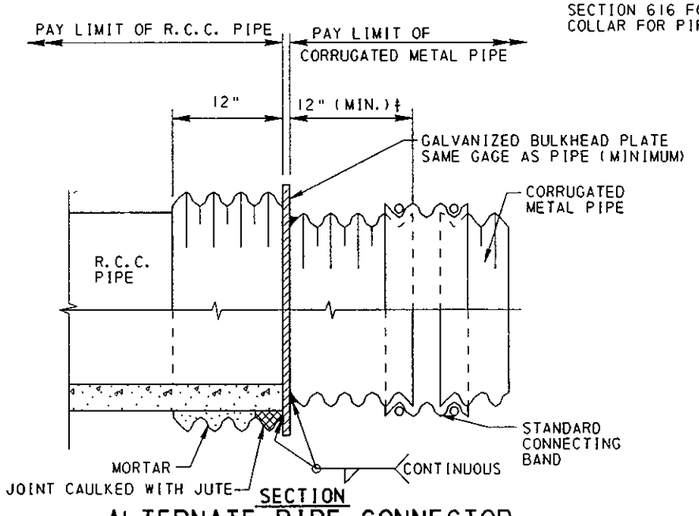


PLAN

NOMINAL DIAMETER OF PIPE	DIMENSIONS FOR 2:1 SLOPES		
	A	B	C
12"	28 15/16"	13"	11"
15"	29 13/16"	16"	14"
18"	31 5/16"	19"	17"

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

SLOPE PIPE FITTING



SECTION

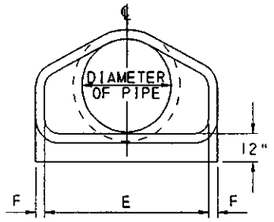
ALTERNATE PIPE CONNECTOR

†ADJUST LENGTH TO OBTAIN EVEN 2 FOOT LENGTHS OF CONNECTING PIPE.

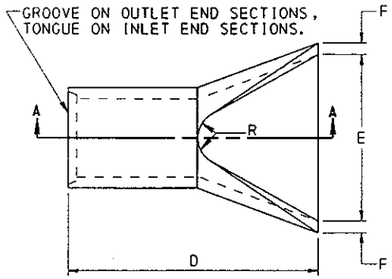
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

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

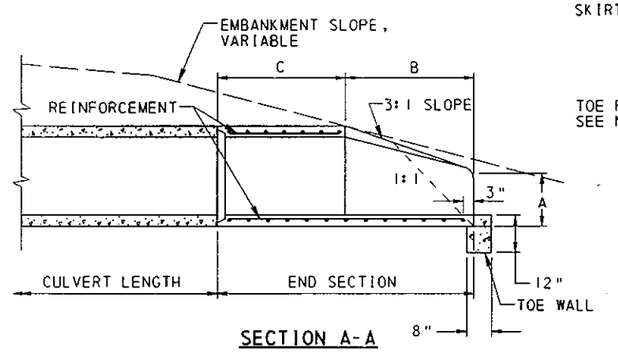
RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHT. 1 OF 1
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	RC-32



END VIEW



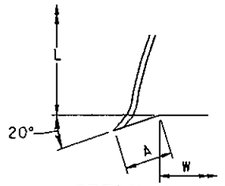
PLAN



SECTION A-A

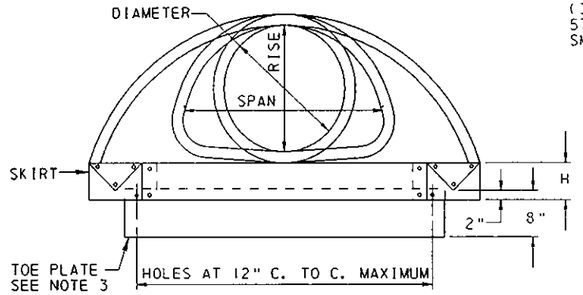
SLOPE DETAIL

CONCRETE END SECTIONS

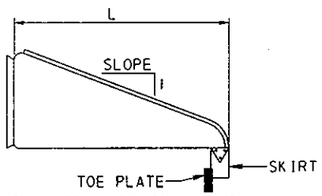


DETAIL A

TYPICAL PLAN

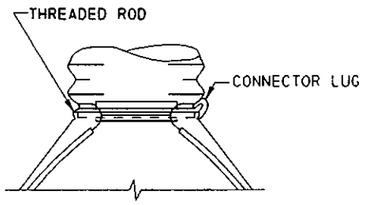


TYPICAL ELEVATION



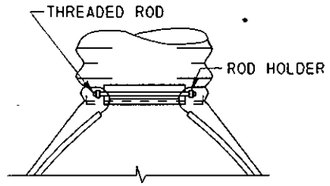
TYPICAL END SECTION

CORRUGATED METAL PIPE END SECTIONS



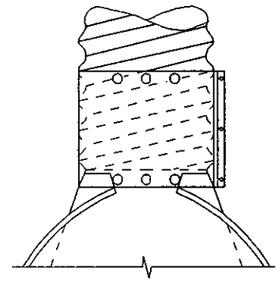
TYPE-1 CONNECTION

(18" TO 24"ø CIRCULAR PIPE)



TYPE-2 CONNECTION

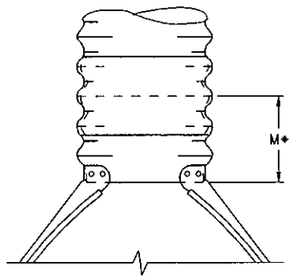
(30" TO 36"ø CIRCULAR PIPE AND 57" X 38" (53" X 41") AND SMALLER PIPE-ARCH).



†TYPE-D CONNECTION

(18" TO 36"ø CIRCULAR PIPE AND 57" X 38" (53" X 41") AND SMALLER PIPE-ARCH).

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



TYPE-3 CONNECTION

(42"ø AND LARGER CIRCULAR PIPE AND 64" X 43" (60" X 46") AND LARGER PIPE-ARCH).

* USE 12" FOR CIRCULAR PIPE AND TABLE C DIMENSIONS FOR PIPE-ARCH.

ALTERNATE TYPE CONNECTIONS FOR CORRUGATED METAL PIPE END SECTIONS

NOTES

1. PROVIDE END SECTIONS, MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 616. PROVIDE GALVANIZED STEEL END SECTIONS WHEN SECTIONS ARE REQUIRED WITH ALUMINIZED STEEL PIPE OR PRECOATED GALVANIZED STEEL PIPE.

2. PROVIDE 12 GAGE SIDES AND 10 GAGE CENTER PANELS FOR 3 PIECE UNITS. PROVIDE CENTER PANEL WIDTH GREATER THAN 20% OF PIPE PERIPHERY. PROVIDE 2" LAP JOINT TIGHTLY FASTENED BY ⅛"ø GALVANIZED OR ALUMINIZED RIVETS OR BOLTS FOR STEEL UNITS AND ALUMINUM ALLOY RIVETS OR BOLTS FOR ALUMINUM UNITS, ON CENTERLINE, SPACED 6" C. TO C. FOR MULTIPLE PANEL UNITS. CONSTRUCT SKIRTS OF THE SAME GAGE AND PIECES AS THE END SECTION.

3. PROVIDE TOE PLATES OF THE SAME MATERIAL AS THE END SECTION. LOCATE PUNCHED HOLES IN PLATE TO MATCH HOLES IN SKIRT. PROVIDE ⅜"ø GALVANIZED OR ALUMINIZED BOLTS AND NUTS FOR STEEL UNITS AND ALUMINUM ALLOY BOLTS AND NUTS FOR ALUMINUM UNITS. PROVIDE TOE PLATE LENGTHS AS FOLLOWS:
   PIPE-ARCH CULVERT 42" X 29" (40" X 31") OR SMALLER-W+10"
   PIPE-ARCH CULVERT 49" X 33" (46" X 36") OR LARGER-W+18"
   PIPE 30" DIAMETER OR SMALLER-W+10"
   PIPE 36" DIAMETER OR LARGER-W+22"

4. SUPPLEMENT REINFORCED EDGES WITH GALVANIZED STEEL STIFFENER ANGLES WITH GALVANIZED OR ALUMINIZED BOLTS AND NUTS OR ALUMINUM ALLOY STIFFENER ANGLES WITH ALUMINUM ALLOY NUTS AND BOLTS OF THE FOLLOWING SIZES:
   2" X 2" X ¼" FOR 60" TO 72" DIAMETER PIPE, FOR 77" X 52" (73" X 53") PIPE-ARCH CULVERT AND FOR 83" X 57" (81" X 59") PIPE-ARCH CULVERT.
   2½" X 2½" X ¼" FOR 78" TO 84" DIAMETER PIPE.
   PLACE ANGLE REINFORCEMENT UNDER THE CENTER PANEL SEAMS FOR 77" X 52" (73" X 53") AND 83" X 57" (81" X 59") PIPE-ARCH CULVERTS.

5. ANCHOR ALUMINUM OR STEEL END SECTIONS, THAT ARE USED ON THE INLET END OF PIPE LARGER THAN 54" DIAMETER, AS INDICATED ON THE DRAWING.

TABLE A-DIMENSIONS FOR END SECTION FOR CONCRETE PIPE

DIAM.	A	B	C	D	E	F	R
18"	9"	2'-3"	3'-10"	6'-1"	3'-0"	2½"	7½"
21"	9"	3'-0"	3'-1"	6'-1"	3'-6"	2¾"	8"
24"	9½"	3'-7½"	2'-6"	6'-1½"	4'-0"	3"	8"
27"	10½"	4'-0"	2'-1½"	6'-1½"	4'-6"	3¼"	9"
30"	12"	4'-6"	1'-7¾"	6'-1¾"	5'-0"	3½"	8"
33"	13½"	4'-10½"	3'-1½"	8'-0"	5'-6"	3¾"	9"
36"	15"	5'-3"	2'-9"	8'-0"	6'-0"	4"	10"
42"	21"	5'-3"	2'-9"	8'-0"	6'-6"	4½"	11"
48"	24"	6'-0"	2'-0"	8'-0"	7'-0"	5"	12"

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

DIAM.	GAGE	A (±1")	B (MAX.)	H (±1")	L (±1½")	W (±2")	BODY	SLOPE
18"	16	8"	10"	6"	31"	36"	1 PC.	2½
21"	16	9"	12"	6"	36"	42"	1 PC.	2½
24"	16	10"	13"	6"	41"	48"	1 PC.	2½
30"	14	12"	16"	8"	51"	60"	1 PC.	2½
36"	14	14"	19"	9"	60"	72"	2 PC.	2½
42"	12	16"	22"	11"	69"	84"	2 PC.	2½
48"	12	18"	27"	12"	78"	90"	2 PC.	2¼
54"	12	18"	30"	12"	84"	102"	2 PC.	2
60"	12	18"	33"	12"	87"	114"	3 PC.	1¾
66"	12	18"	36"	12"	87"	120"	3 PC.	1½
72"	12	18"	39"	12"	87"	126"	3 PC.	1 1/3
78"	12	18"	42"	12"	87"	132"	3 PC.	1 1/4
84"	12	18"	45"	12"	87"	138"	3 PC.	1 1/6

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

3"X1" AND 5"X1" CORRUGATIONS SPAN	3"X1" AND 5"X1" CORRUGATIONS RISE	2 2/3"X1/2" CORRUGATIONS SPAN	2 2/3"X1/2" CORRUGATIONS RISE	GAGE	A (±1")	B (MAX.)	H (±1")	L (±1½")	W (±2")	M	BODY	SLOPE
---	---	17"	13"	16	7"[4.5"]	9"	6"	19"	30"	12"	1 PC.	2½
---	---	21"	15"	16	7"[5.25"]	10"	6"	23"	36"	12"	1 PC.	2½
---	---	24"	18"	16	8"[6.25"]	12"[11.5"]	6"	28"	42"	12"	1 PC.	2½
---	---	28"	20"	16	9"[7"]	14"	6"	32"[31.5"]	48"	12"	1 PC.	2½
---	---	35"	24"	14	10"[8.75"]	16"	6"	39"[38.5"]	60"	12"	1 PC.	2½
40"	31"	42"	29"	14	12"	18"	8"	46"	75"	12"	1 PC.	2½
46"	36"	49"	33"	12	13"	21"	9"	53"	85"	12"	2 PC.	2½
53"	41"	57"	38"	12	18"	26"	12"	63"	90"	12"	2 PC.	2½
60"	46"	64"	43"	12	18"	30"	12"	70"	102"	24"	2 PC.	2¼
66"	51"	71"	47"	12	18"	33"	12"	77"	114"	24"	3 PC.	2¼
73"	55"	77"	52"	12	18"	36"	12"	77"	126"	24"	3 PC.	2
81"	59"	83"	57"	12	18"	39"	12"	77"	138"	24"	3 PC.	2

[] ACCEPTABLE ALTERNATE DIMENSIONS FOR PIPE-ARCH.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

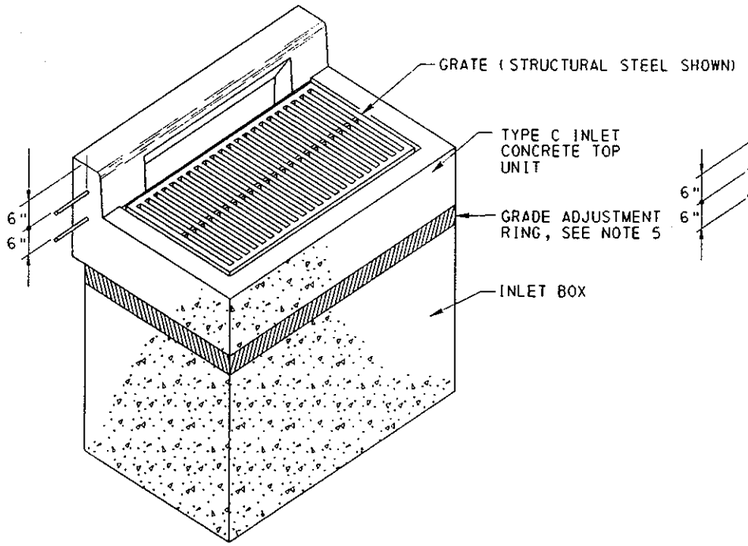
END SECTIONS FOR PIPE CULVERTS

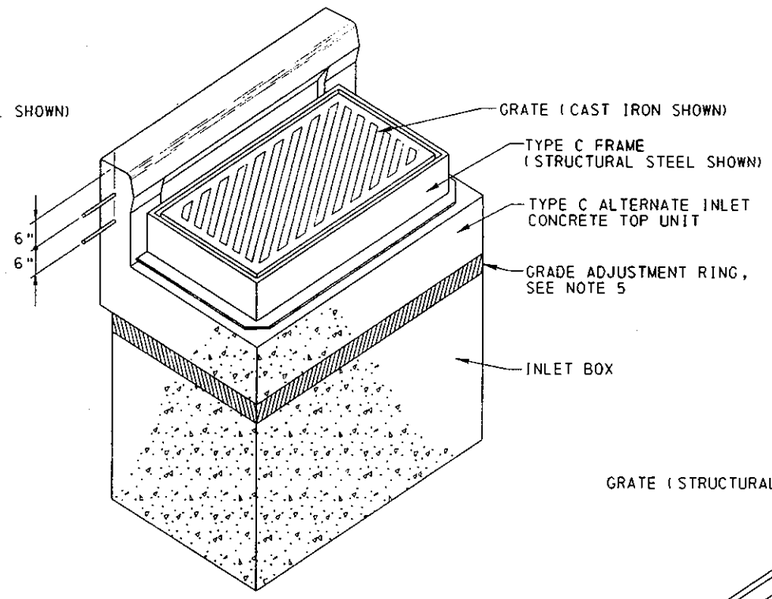
RECOMMENDED MAR. 25, 1994
Fredric Bowers
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
M. M. Ryan
CHIEF ENGINEER

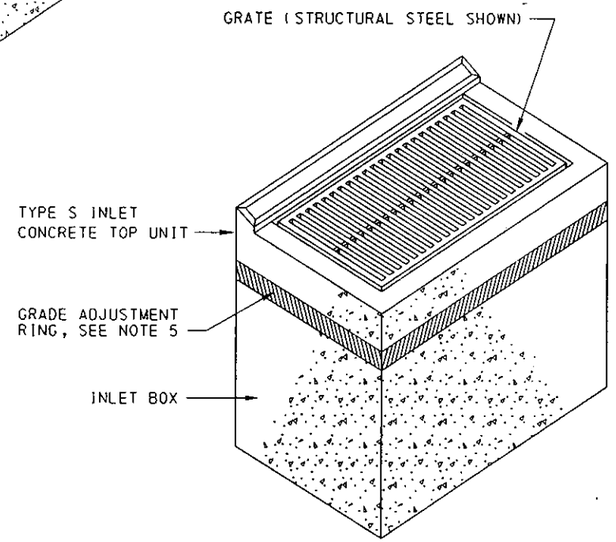
SHT. 1 OF 1

RC-33





TYPE C INLET



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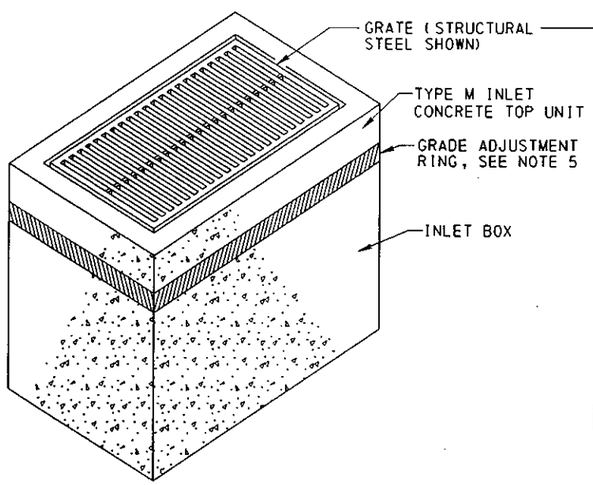
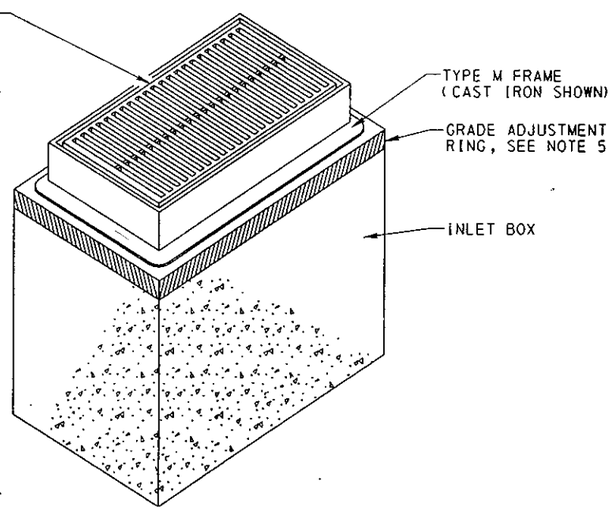




TYPE M INLET

NOTES

1. CONSTRUCTION REQUIREMENTS
   - A. CONSTRUCT IN ACCORDANCE WITH: PENNDOT PUBLICATION 408 SPECIFICATIONS, SECTIONS 605, 606, 714; AND AS MODIFIED HEREIN.
   - B. MINIMUM CONCRETE CLASS:
     CAST-IN-PLACE CLASS A
     PRECAST CLASS AA
   - C. PROVIDE STEEL REINFORCEMENT IN ACCORDANCE WITH SEC. 709. PROVIDE MINIMUM YIELD STRENGTH OF 60,000 P.S.I.
   - D. CLEAR COVER FOR STEEL:

WALLS:	CAST-IN PLACE	2"	
	PRECAST	1½"	
FOOTINGS:	CAST-IN PLACE	2½"	(TOP BARS)
		3"	(BOTTOM BARS)
		2"	(SIDE COVER)
	PRECAST	2"	(TOP BARS)
		1½"	(BOTTOM BARS)
		1½"	(SIDE COVER)
SLABS:	CAST-IN PLACE	2"	(TOP & BOTTOM BARS)

2. THIS SHEET DEPICTS THE VARIOUS COMPONENTS REQUIRED FOR COMPLETE INLET ASSEMBLIES. FOR INDIVIDUAL COMPONENTS AND OTHER SPECIAL DETAILS, SEE THE FOLLOWING:
   - SHEET 2 OF 9 FOR CONCRETE TOP UNITS.
   - SHEET 3 OF 9 AND SHEET 4 OF 9 FOR GRATES AND GRADE ADJUSTMENT RINGS
   - SHEET 5 OF 9 FOR FRAMES.
   - SHEET 6 OF 9 FOR STANDARD INLET BOXES (CAST-IN-PLACE)
   - SHEET 7 OF 9 FOR STANDARD INLET BOXES (PRECAST)
   - SHEET 8 OF 9 FOR MODIFIED INLET BOXES (CAST-IN-PLACE AND PRECAST).
   - SHEET 9 OF 9 FOR TYPE D-H INLET.
3. EACH TYPE OF INLET SHOWN IS SUITED FOR A PARTICULAR SITUATION AS FOLLOWS:
   - TYPE C INLET IS DESIGNATED FOR INSTALLATION WITH NON-MOUNTABLE CURBS.
   - TYPE M INLET IS DESIGNATED FOR INSTALLATION IN MEDIAN AREAS AND MOUNTABLE CURBS.
   - TYPE S INLET IS DESIGNATED FOR INSTALLATION IN SHOULDER SWALE AREAS.
4. THE SELECTION OF COMPONENTS TO ACHIEVE A SPECIFIED INLET ASSEMBLY IS THE CONTRACTOR'S RESPONSIBILITY.
5. USE PRECAST CONCRETE OR STEEL GRADE ADJUSTMENT RINGS WHEN REQUIRED. (REHABILITATION PROJECTS)
6. FOR WALL REINFORCEMENT, BOTH DIRECTIONS, USE 0.12 $IN.^2/FT.$ MIN. EACH WAY, EACH FACE.
7. FOR FOOTING REINFORCEMENT, TOP AND BOTTOM, USE #4 BARS AT 12" CENTERS EACH WAY OR 0.20 $IN.^2/FT.$ W.W.F.(6" MAX. SPACING).

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

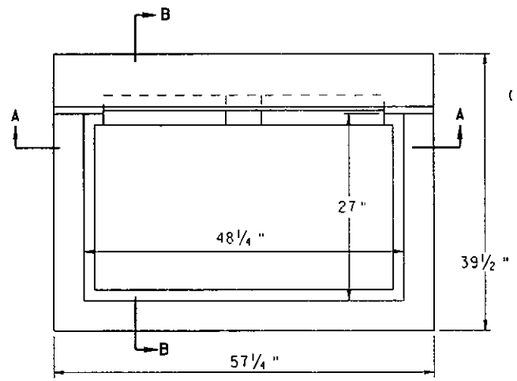
INLETS
INLET ASSEMBLIES

RECOMMENDED MAR. 25, 1994
Fred E. Bowser
DIRECTOR, BUREAU OF DESIGN

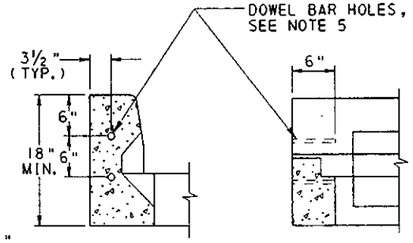
RECOMMENDED MAR. 25, 1994
M. M. Ryan
CHIEF ENGINEER

SHT. 1 OF 9

RC-34

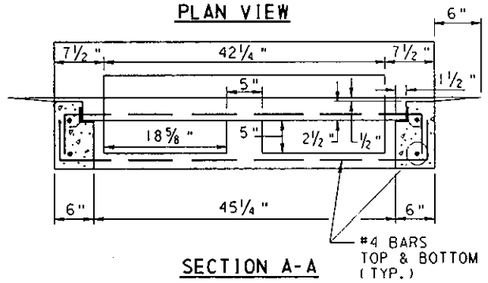


PLAN VIEW

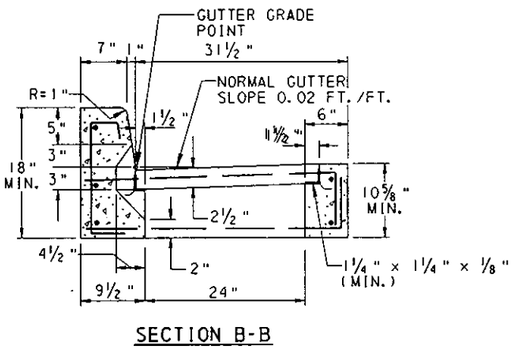


SIDE VIEW

FRONT ELEVATION VIEW

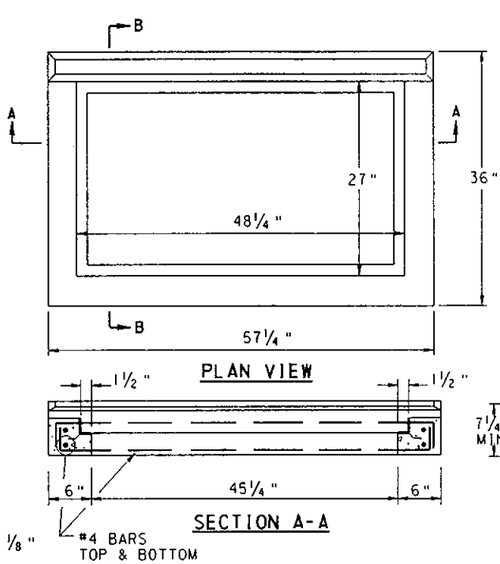


SECTION A-A



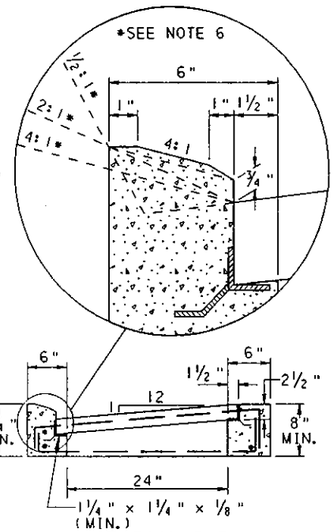
SECTION B-B

TYPE C



PLAN VIEW

SECTION A-A

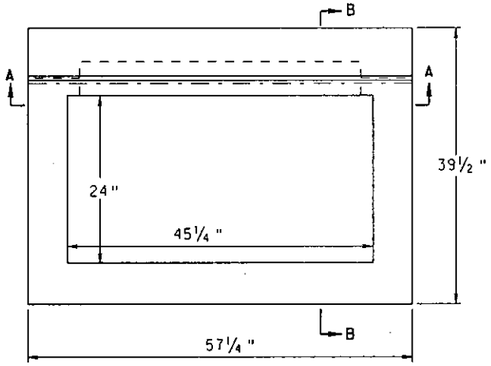


SECTION B-B

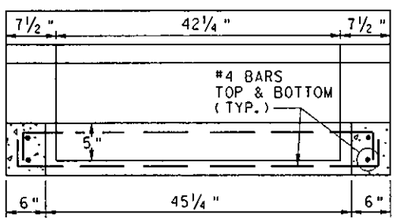
TYPE S

NOTES

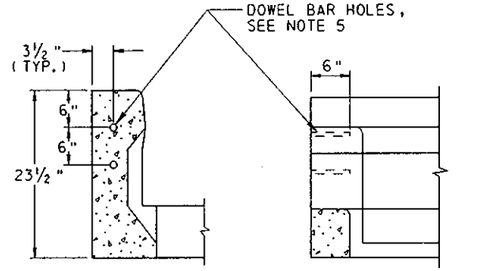
1. THIS SHEET DEPICTS THE SHAPE AND DIMENSIONS REQUIRED FOR UNIFORMITY AND COMPATIBILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR MANUFACTURING AND HANDLING PRECAST TOP UNITS. ONLY TOP UNITS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED. FOR A BULLETIN 15 LISTING, SUBMIT A 22" x 36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF CONSTRUCTION AND MATERIALS, MATERIALS AND TESTING DIVISION FOR REVIEW AND APPROVAL.
2. CAST-IN-PLACE TOP UNITS MAY BE MONOLITHIC WITH THE INLET BOX.
3. PROVIDE ANGLES EMBEDDED IN THE CONCRETE AS A BEARING AREA FOR THE GRATE FOR ALL TOP UNITS WHICH SEAT THE GRATE DIRECTLY WITHIN THE UNIT.
4. PLACE A TYPE M INLET ADJACENT TO THE BACK EDGE OF THE CURB, FLUSH WITH THE PAVEMENT SURFACE, WHEN REQUIRED WITHIN A CONCRETE MOUNTABLE CURB SECTION.
5. DOWEL TYPE C INLET TOP UNITS WITH 2-#8 x 1'-0" DOWEL BARS AND PLACE ¼" PREMOLDED EXPANSION JOINT FILLER WHEN CONNECTING TO ADJACENT CURB SECTIONS.
6. THE PLACEMENT OF THE TYPE S INLET RELATIVE TO THE GUTTER INVERT IS DEPENDENT ON THE RATE OF BACK SLOPE. FOR BACK SLOPES GREATER THAN 2:1, LOCATE THE INLET WHERE THE BACK SLOPE LINE INTERSECTS THE BACK, TOP, OUTSIDE CORNER OF THE INLET. FOR BACK SLOPES LESS THAN 2:1, LOCATE THE INLET WHERE THE BACK SLOPE LINE INTERSECTS THE EDGE OF THE INLET GRATE.



PLAN VIEW

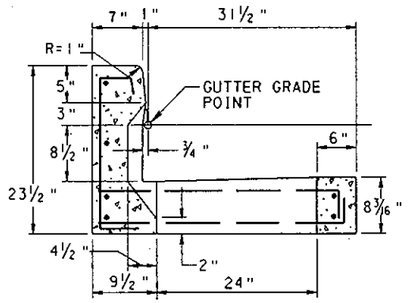


SECTION A-A



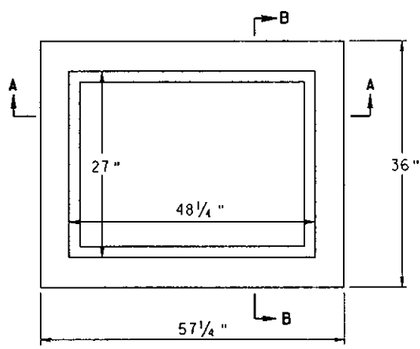
SIDE VIEW

FRONT ELEVATION VIEW

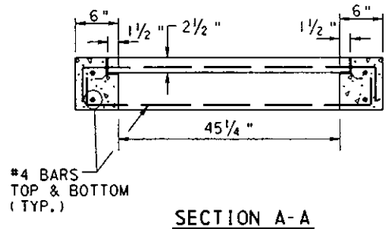


SECTION B-B

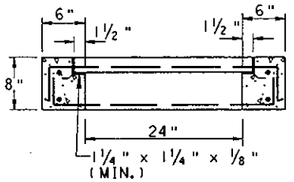
TYPE C ALTERNATE



PLAN VIEW



SECTION A-A



SECTION B-B

TYPE M

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLETS

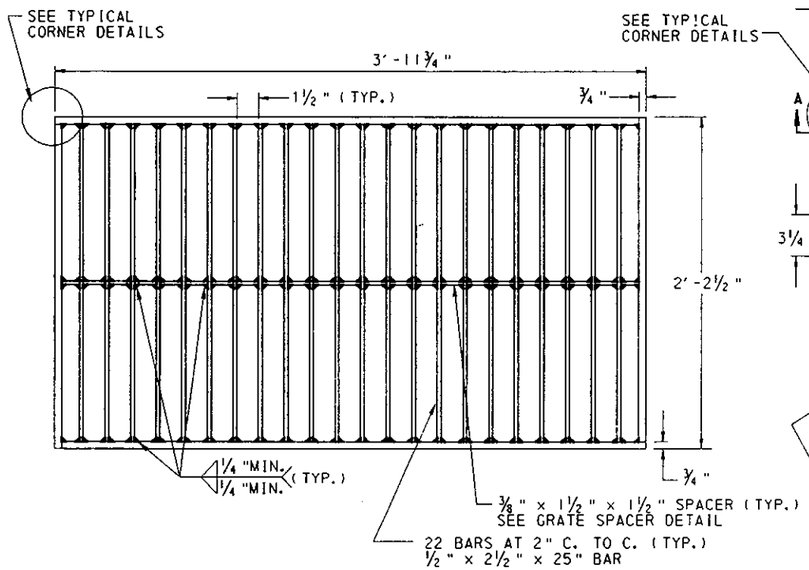
CONCRETE TOP UNITS

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

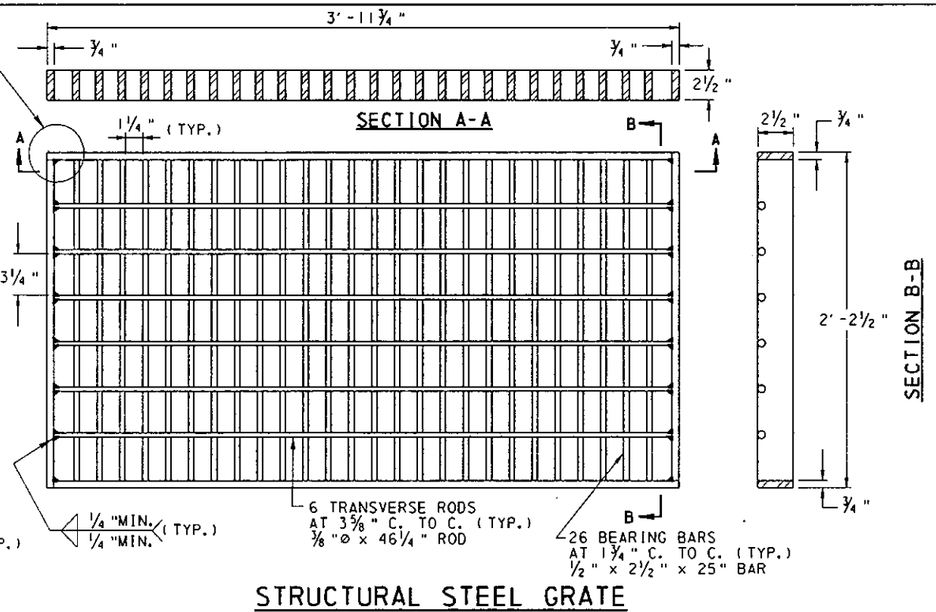
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 2 OF 9

RC-34



STRUCTURAL STEEL GRATE

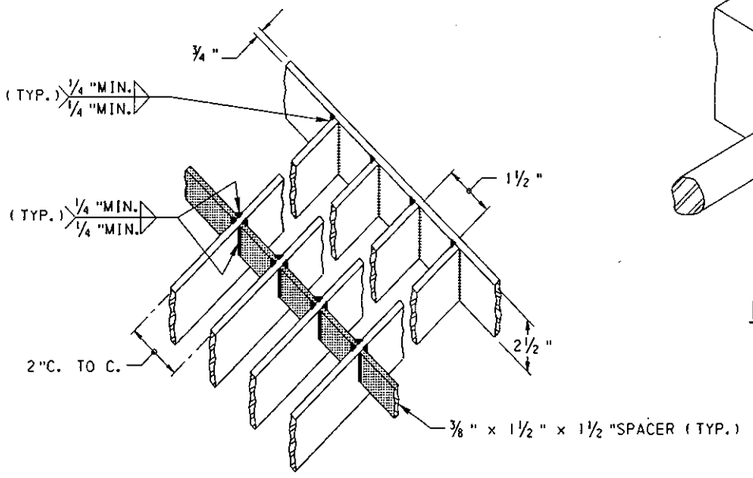


SECTION B-B

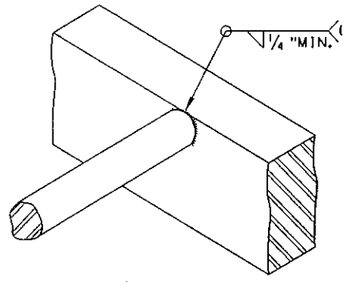
STRUCTURAL STEEL GRATE BICYCLE SAFE

NOTES

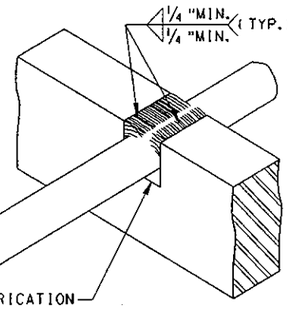
1. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. ONLY GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED. FOR A BULLETIN 15 LISTING, SUBMIT A 22" x 36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF CONSTRUCTION AND MATERIALS, MATERIALS AND TESTING DIVISION FOR REVIEW AND APPROVAL.
2. WELD STRUCTURAL STEEL GRATES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.03(R).
3. PROVIDE TRANSVERSE BARS, MEETING THE REQUIREMENTS OF PUB. 408.
4. PROVIDE BICYCLE-SAFE, STRUCTURAL STEEL OR CAST IRON VANE GRATES FOR INSTALLATION ONLY WHERE BICYCLE TRAFFIC IS ANTICIPATED, SUCH AS CURBED ROADWAYS IN URBAN AREAS OR ROADWAYS SPECIFICALLY ESTABLISHED AND SIGNED AS BIKEWAYS OR HAVING BIKE LANES. ALTERNATE BICYCLE-SAFE GRATE DESIGNS SHALL REQUIRE A SHOP DRAWING SUBMISSION, AS SPECIFIED IN NOTE 1, AND SHALL CONFORM TO THE DIMENSIONAL REQUIREMENTS FOR PROPER INSTALLATION WITH THE CURRENT CONCRETE TOP UNITS.
5. FABRICATE SLOTS BY BURNING, DRILLING, SHEARING OR PUNCHING. HAVE THE BOTTOM OF ALL BURNED OR DRILLED SLOTS CONFORM TO THE SHAPE OF THE ROD.
6. PROVIDE STRUCTURAL STEEL GRATES WITH THE GRATE SPACERS LOCATED FLUSH ALONG THE TOP SURFACE OF THE GRATE.
7. DO NOT USE CAST IRON GRATES WITHIN THE TRAVEL LANES. THESE GRATES ARE PERMITTED AT THE EDGE OF OUTSIDE SHOULDERS, SWALES, WIDE MEDIAN SWALES AND INFIELD AREAS THAT ARE OUTSIDE THE TRAVEL LANES OR CURB TO CURB ROADWAYS.



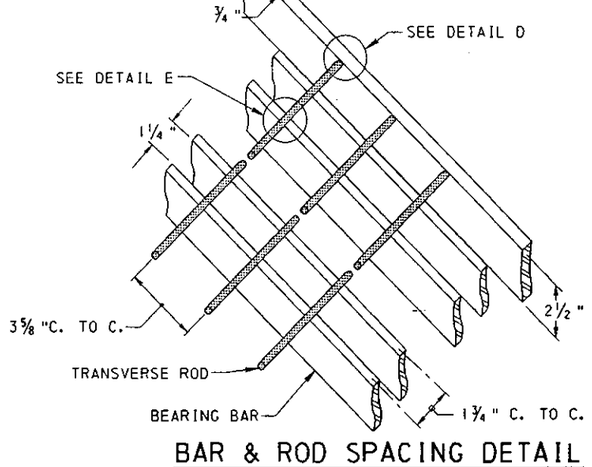
GRATE SPACER DETAIL



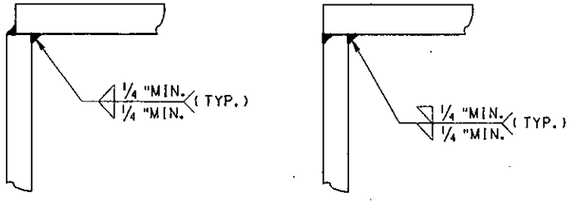
DETAIL D



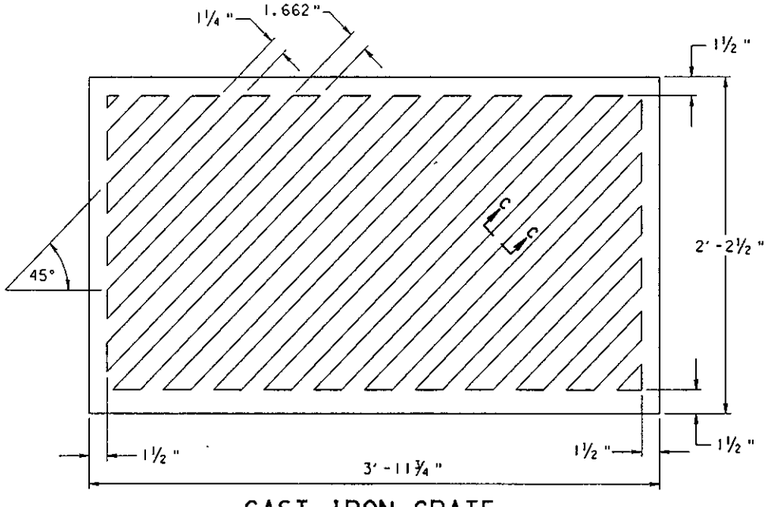
DETAIL E



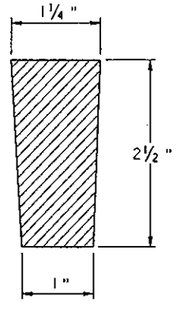
BAR & ROD SPACING DETAIL



TYPICAL CORNER DETAILS



CAST IRON GRATE



SECTION C-C

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

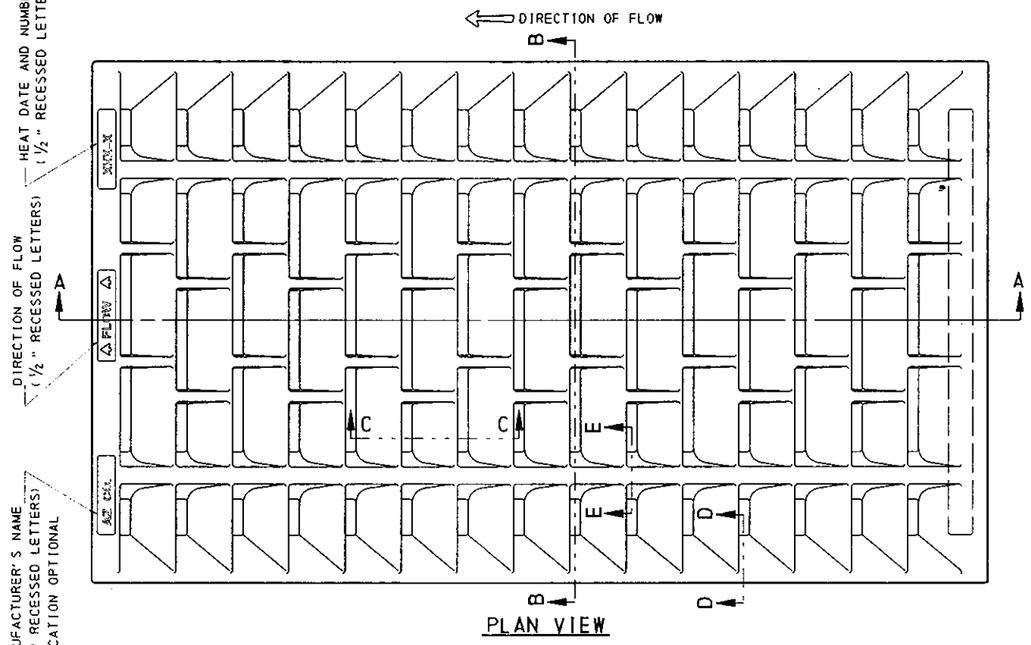
INLETS
GRATES

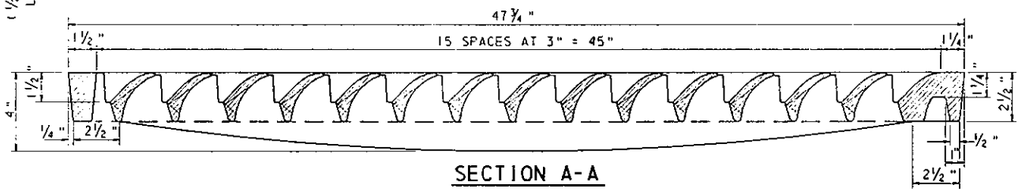
RECOMMENDED MAR. 25, 1994
Fredl Bauser
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

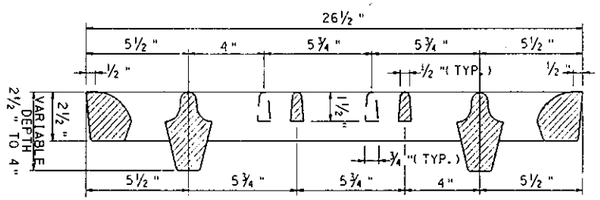
SHT. 3 OF 9

RC-34

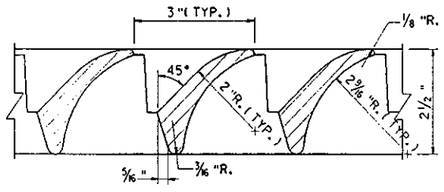




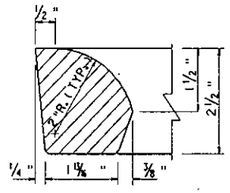
SECTION A-A



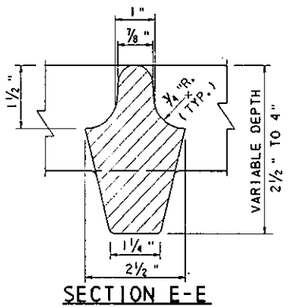
SECTION B-B



SECTION C-C

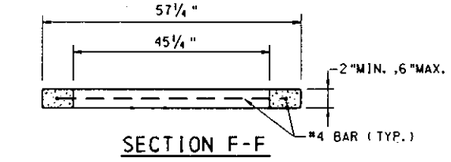


SECTION D-D

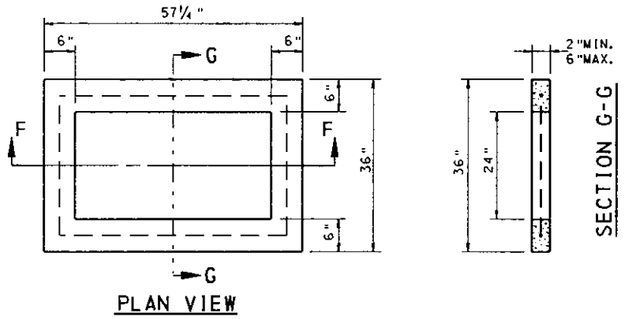


SECTION E-E

CAST IRON VANE GRATE



SECTION F-F



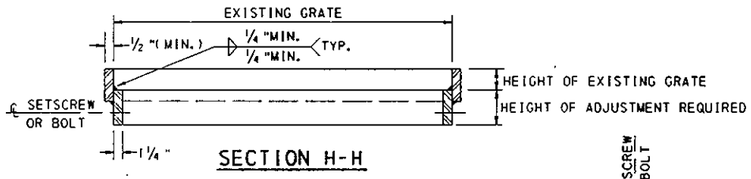
PLAN VIEW

SECTION G-G

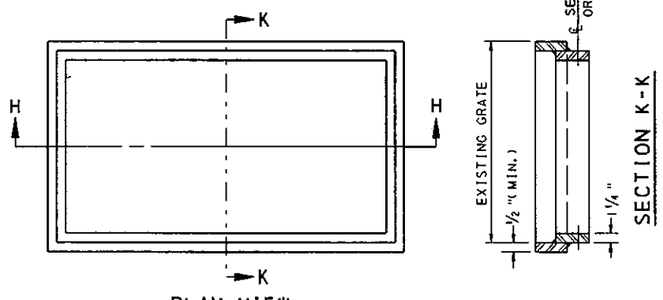
PRECAST CONCRETE GRADE ADJUSTMENT RINGS

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 605, 606 AND 714. ONLY GRATES AND GRADE ADJUSTMENT SYSTEMS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED. FOR A BULLETIN 15 LISTING, SUBMIT A 22"x 36" REPRODUCIBLE SHOP DRAWING TO THE MATERIALS AND TESTING DIVISION, BUREAU OF CONSTRUCTION AND MATERIALS FOR REVIEW AND APPROVAL.
2. INSTALL VANE GRATES WITH CURVE VANES FACING THE DIRECTION OF FLOW.
3. GRADE ADJUSTMENT RINGS :
   A. EACH ADJUSTMENT RING TO BE CUSTOM FABRICATED FROM MEASUREMENTS PROVIDED WITH EACH ORDER.
   B. BAR STOCK AND RETAINER CLIP TO BE MANUFACTURED FROM U.S. MADE CARBON STEEL MEETING OR EXCEEDING THE MINIMUM REQUIREMENTS OF A.S.T.M. A-36.
   C. FULL CIRCUMFERENTIAL WELDS ARE REQUIRED ON BOTH TOP AND BOTTOM RINGS. THE INNER WELD TO BE A BEVEL GROOVE WELD (FLUSH FINISH) FOR PROPER SEATING OF GRATE AND THE OUTER WELD TO BE FILLET WELD,
   D. PROVIDE AN ADJUSTMENT RING WHICH IS FLUSH WITH COVER AND DOES NOT ALLOW EXCESSIVE MOVEMENT. PROVIDE AN ADJUSTMENT RING WHICH CONFORMS TO THE SHAPE OF THE ORIGINAL FRAME.
4. PROVIDE ⅛" RADIUS (TYPICAL) FOR ALL FILLETS AND ROUNDS, UNLESS NOTED.
5. STEEL GRADE ADJUSTMENT RINGS TO BE ATTACHED RIGIDLY TO THE FRAME AND PRECAST CONCRETE GRADE ADJUSTMENT RINGS TO BE SET ON A MORTAR BED.
6. DO NOT USE CAST IRON VANE GRATES WITHIN THE TRAVEL LANES. THESE GRATES ARE PERMITTED AT THE EDGE OF OUTSIDE SHOULDERS, SWALES WIDE MEDIAN SWALES AND INFIELD AREAS THAT ARE OUTSIDE THE TRAVEL LANES OR CURB TO CURB ROADWAYS.



SECTION H-H



PLAN VIEW

SECTION K-K

STRUCTURAL STEEL GRADE ADJUSTMENT RINGS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

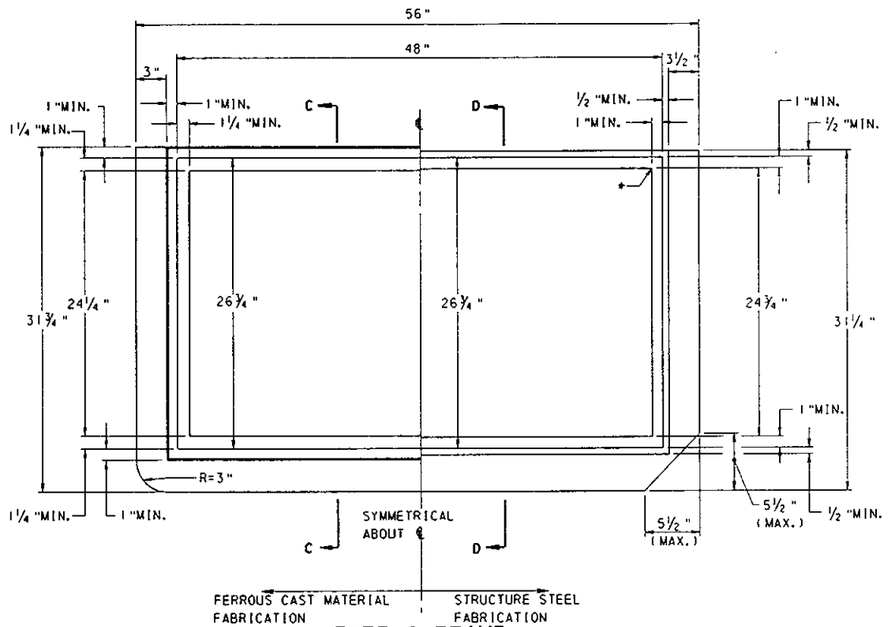
INLETS GRATES & GRADE ADJUSTMENT SYSTEMS

RECOMMENDED MAR. 25, 1994
Fredrick Bowser
DIRECTOR, BUREAU OF DESIGN

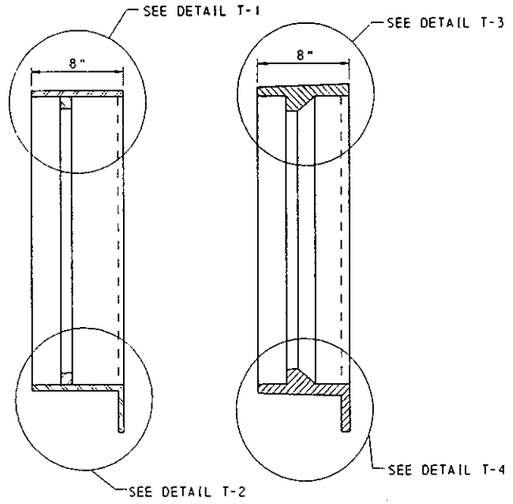
RECOMMENDED MAR. 25, 1994
M.M. Ryan
CHIEF ENGINEER

SHT. 4 OF 9

RC-34

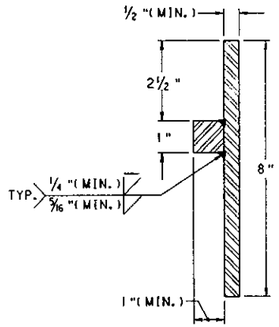


TYPE C FRAME

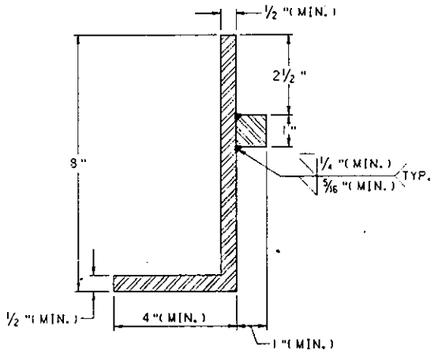


SECTION D-D

SECTION C-C

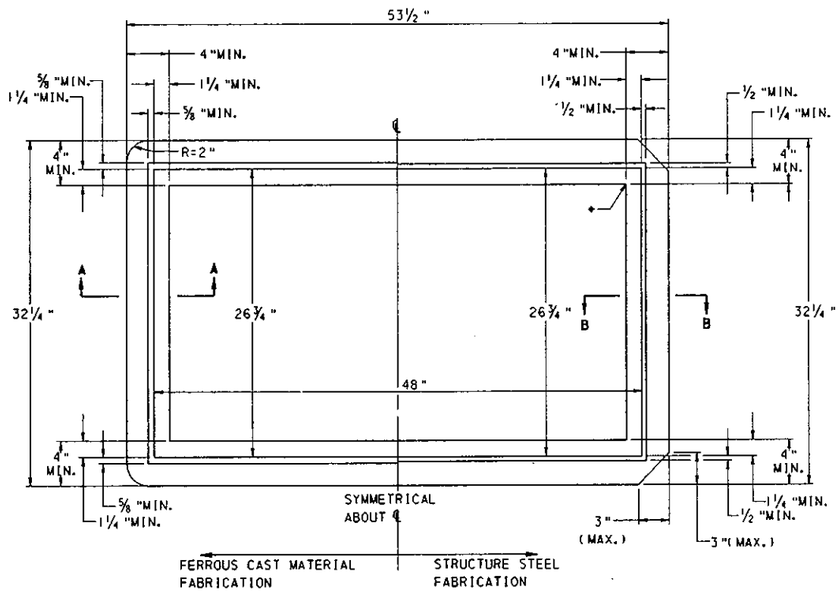


DETAIL T-1

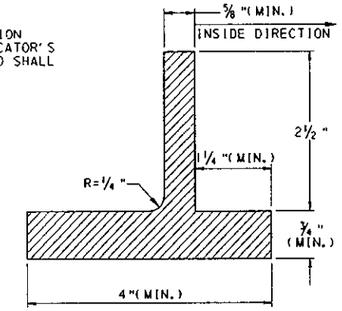


DETAIL T-2

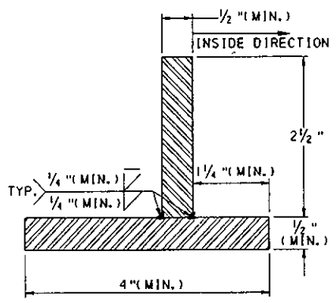
*CORNER CONFIGURATION DETAILS ARE FABRICATOR'S RESPONSIBILITY AND SHALL BE APPROVED.



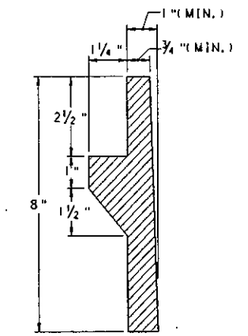
TYPE M FRAME



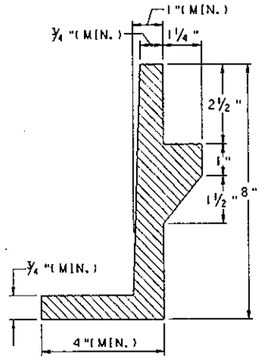
SECTION A-A



SECTION B-B



DETAIL T-3



DETAIL T-4

NOTES

1. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. ONLY FRAMES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED. FOR A BULLETIN 15 LISTING, SUBMIT A 22" x 36" REPRODUCIBLE SHOP DRAWING TO THE MATERIALS AND TESTING DIVISION, BUREAU OF CONSTRUCTION AND MATERIALS FOR REVIEW AND APPROVAL.
2. PROVIDE EITHER GRAY, MALLEABLE OR DUCTILE IRON CASTINGS OR STRUCTURAL STEEL FRAMES.
3. WELD STRUCTURAL STEEL GRATES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.03(R).

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

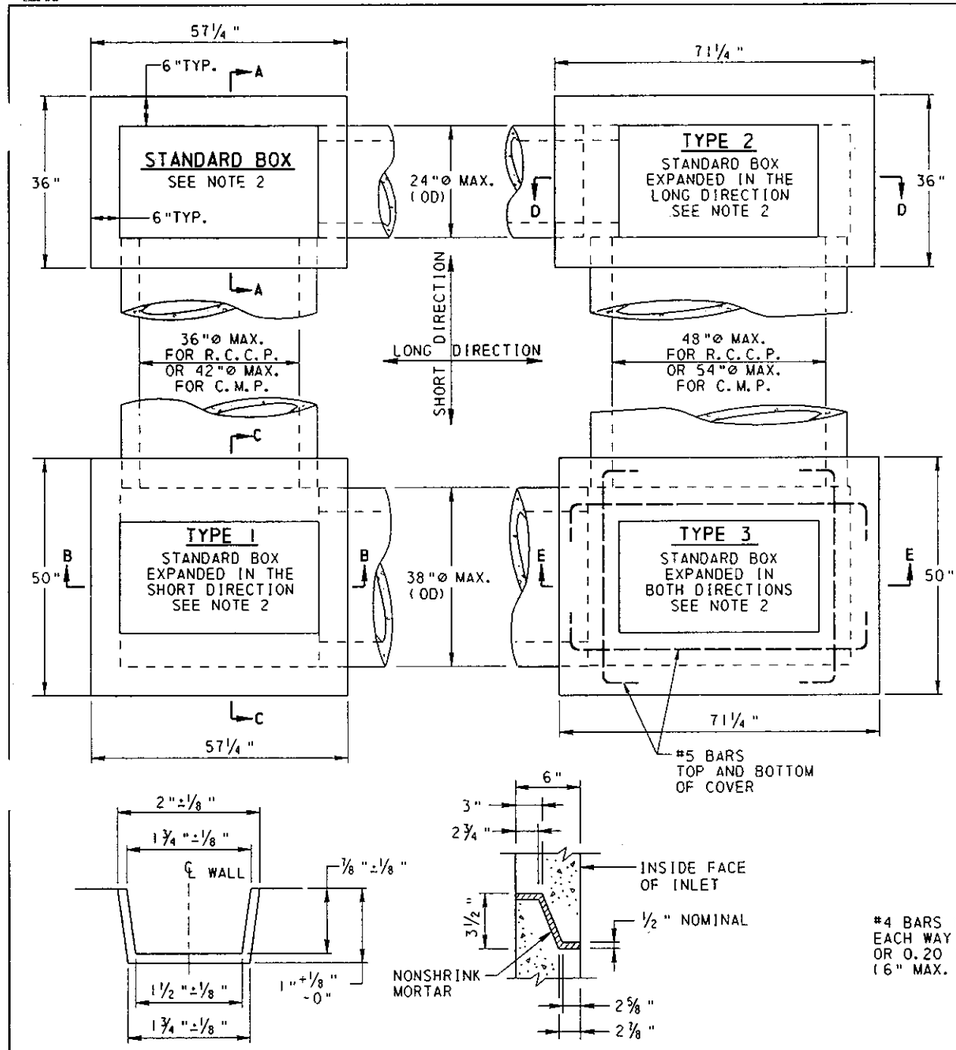
INLETS
FRAMES

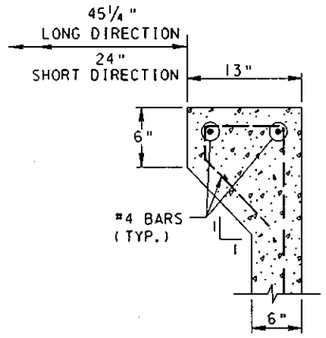
RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

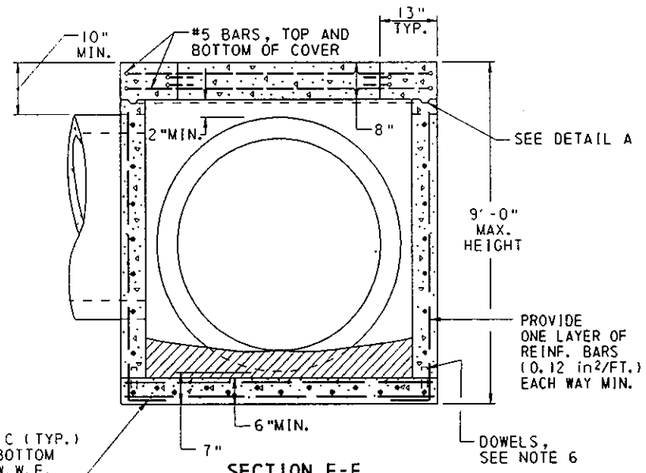
SHT. 5 OF 9

RC-34





EXPANDED
WALL DETAIL



SECTION E-E
TYPE 3 ONLY
SEE NOTE 10

NOTES

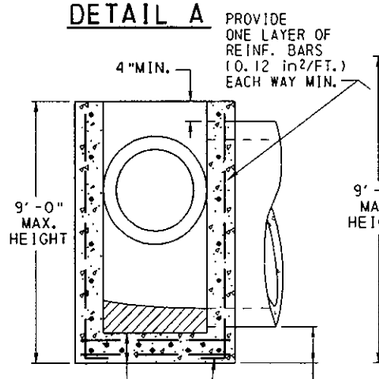
1. CONSTRUCT INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.
2. PROVIDE INLET BOXES WITH 24" x 45¼" STANDARD OPENING TO ACCOMMODATE THE STANDARD TOP COMPONENTS.
3. FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION, PROVIDE 6" INLET WALLS UNLESS, OTHERWISE INDICATED.
4. INLETS THAT EXCEED THE MAXIMUM HEIGHT SHOWN SHALL REQUIRE SPECIAL DETAILS AND DESIGN FOR THE INLET WALLS AND BASE. CONSTRUCT INLETS THAT EXCEED 5 FEET IN HEIGHT WITH STEPS SIMILAR TO MANHOLES. SEE RC-39.
5. LOCATE PIPE OR PIPES, AS INDICATED, WITH THE INLET BOTTOM SHAPED TO CHANNEL THE FLOW TOWARD THE OUTLET PIPE.
6. PLACE #4 REINFORCEMENT BARS, MINIMUM 12 INCHES LONG, SPACED AT 12 INCHES C. TO C., AS DOWELS BETWEEN THE INLET BASE AND WALLS WHEN THE CONCRETE WALLS AND INLET BASE ARE NOT CONSTRUCTED MONOLITHICALLY. THE DOWELS MAY BE ELIMINATED IF AN ALTERNATE JOINT IS CONSTRUCTED AS SHOWN IN DETAILS A & B.
7. FOR CAST-IN-PLACE CONSTRUCTION, WHEN THE BASE IS CONSTRUCTED MONOLITHICALLY WITH THE VERTICAL WALLS, PROVIDE 3 INCH MINIMUM FROM THE BOTTOM OF THE PIPE TO THE BOTTOM OF THE INLET BOX
8. FOR PIPE DIAMETERS LARGER THAN 48" R.C.C.P. OR 54" C.M.P. USE A MODIFIED INLET BOX, SEE SHEET 8 OF 9.
9. FOR PIPE DIAMETERS LARGER THAN 48" R.C.C.P. OR 54" C.M.P. IN THE LONG DIRECTION OR LARGER THAN 36" IN THE SHORT DIRECTION, A SPECIAL DETAIL AND DESIGN IS REQUIRED.
10. FOR INLETS OTHER THAN AS SHOWN ON THE STANDARDS, PROVIDE REINFORCEMENT BASED ON HS25 LOADING AND IN ACCORDANCE WITH 408 SPECIFICATIONS.
11. CONSTRUCTION JOINTS AND KEYS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. JOINTS AND KEYS ARE TO BE THOROUGHLY CLEANED BEFORE PLACING NEXT CONCRETE SEGMENT.

LEGEND

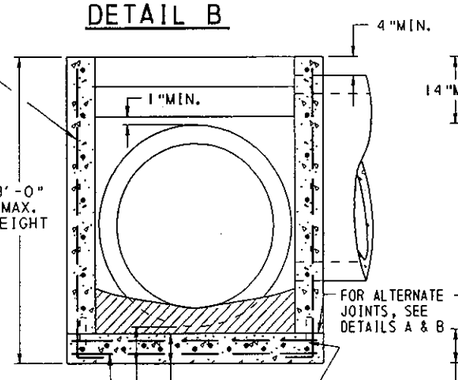
ADDITIONAL CONCRETE TO SHAPE THE BOTTOM

DETAIL A

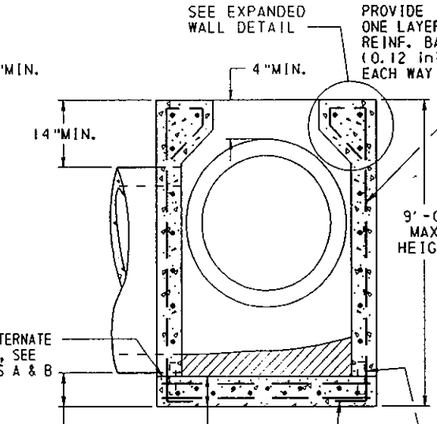
DETAIL B



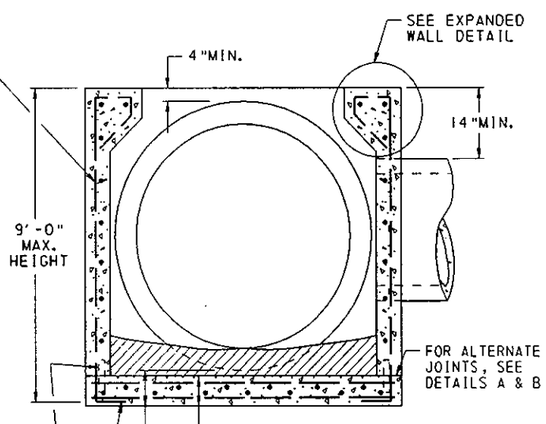
SECTION A-A



SECTION B-B



SECTION C-C
SEE NOTE 8



SECTION D-D
SEE NOTE 9

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

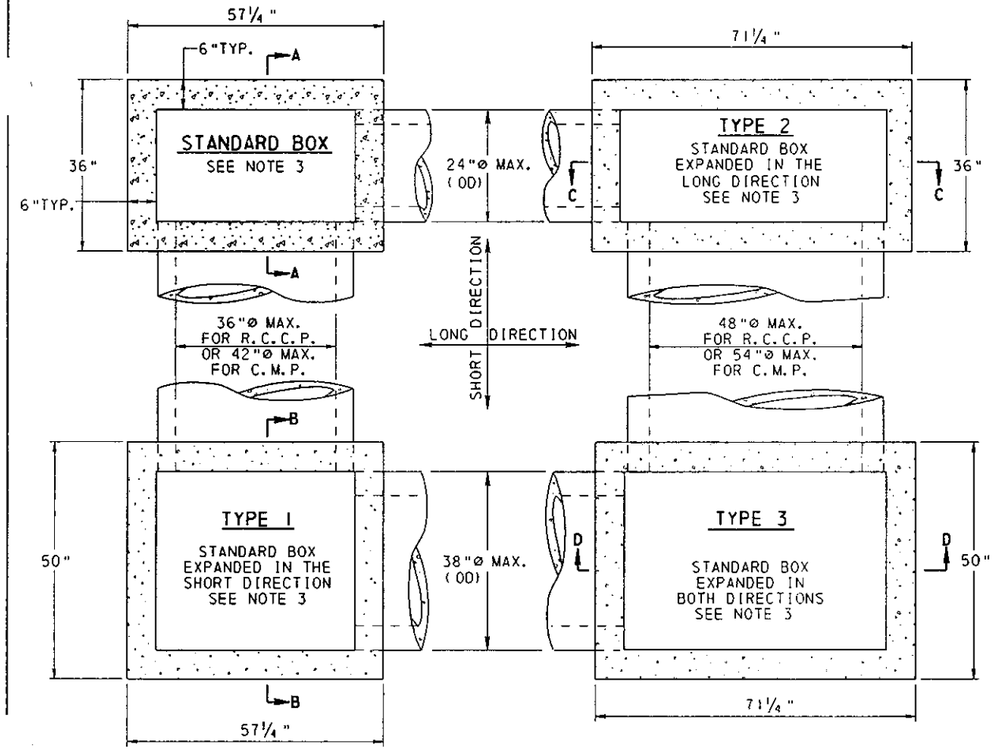
INLETS
STANDARD INLET BOXES
(CAST-IN-PLACE)

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

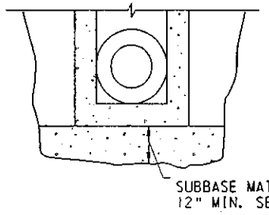
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 6 OF 9

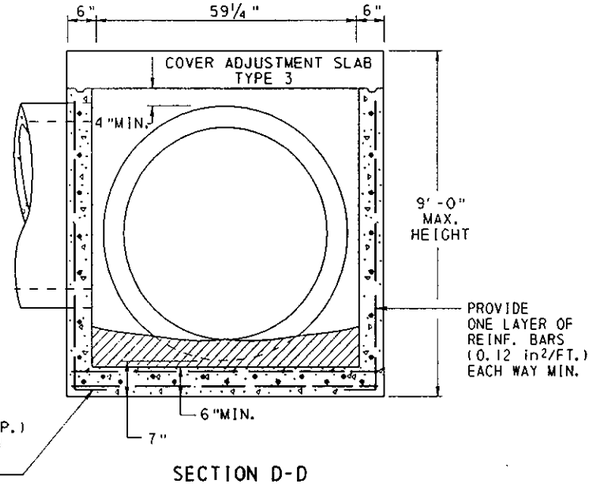
RC-34



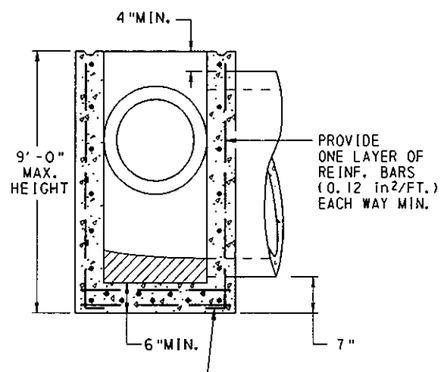
PRECAST CONCRETE INLET BOXES



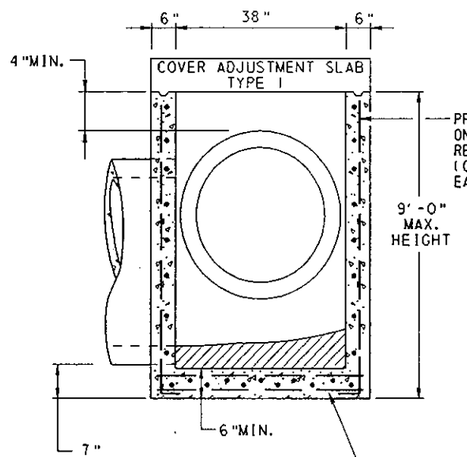
DETAIL A
PRECAST CONCRETE INLET BOX
BASE PREPARATION



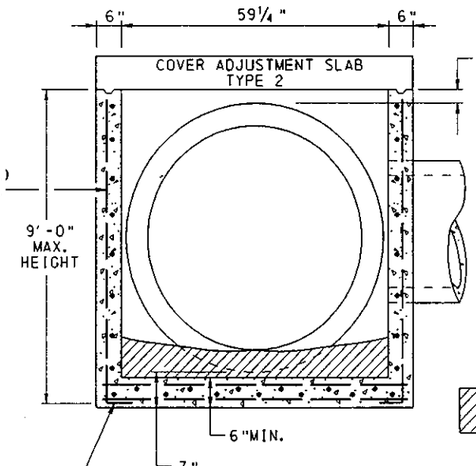
SECTION D-D
TYPE 3 ONLY
SEE NOTE 9



SECTION A-A



SECTION B-B
SEE NOTE 8



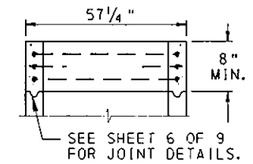
SECTION C-C
SEE NOTE 8

LEGEND

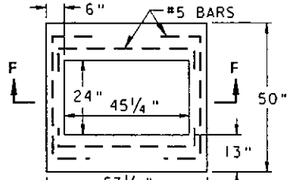
ADDITIONAL CONCRETE TO SHAPE THE BOTTOM

NOTES

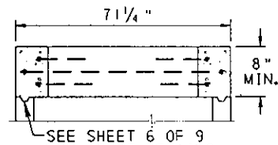
1. CONSTRUCT INLET BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 714.
2. ONLY PRECAST INLET BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED. FOR A BULLETIN 15 LISTING, SUBMIT A 22" x 36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF CONSTRUCTION AND MATERIALS, MATERIALS AND TESTING DIVISION FOR REVIEW AND APPROVAL. USE CLASS AA CEMENT CONC. FOR PRECAST BOXES.
3. PROVIDE STANDARD INLET BOXES AND COVER ADJUSTMENT SLABS WITH A 24" x 45¼" OPENING TO ACCOMMODATE STANDARD TOP COMPONENTS.
4. INLETS THAT EXCEED THE MAXIMUM HEIGHT SHOWN SHALL REQUIRE SPECIAL DETAILS AND DESIGN FOR THE INLET WALLS AND BASE. CONSTRUCT INLETS THAT EXCEED 5 FEET IN HEIGHT WITH STEPS SIMILAR TO MANHOLES. SEE RC-39.
5. LOCATE PIPE OR PIPES, AS INDICATED, WITH THE INLET BOTTOM SHAPED TO CHANNEL THE FLOW TOWARD THE OUTLET PIPE.
6. PLACE SUBBASE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 350.2, IN 4 INCH LAYERS, COMPACTED TO A DENSITY SATISFACTORY TO THE ENGINEER AND INCIDENTAL TO THE INLET PAY ITEM.
7. FOR PIPE DIAMETERS LARGER THAN 48" R.C.C.P. OR 54" C.M.P., USE A MODIFIED INLET BOX, SHEET 8 OF 9.
8. FOR PIPE DIAMETERS LARGER THAN 48" R.C.C.P. OR 54" C.M.P. IN THE LONG DIRECTION OR LARGER THAN 30" IN THE SHORT DIRECTION, A SPECIAL DETAIL AND DESIGN IS REQUIRED.
9. INLET BOXES THAT ARE NOT MONOLITHIC SHALL HAVE CONSTRUCTION JOINTS AS REQUIRED. SEE SHEET 6 OF 9.
10. FOR INLETS OTHER THAN AS SHOWN ON THE STANDARDS, PROVIDE REINFORCEMENT BASED ON HS25 LOADING AND IN ACCORDANCE WITH 408 SPECIFICATIONS.



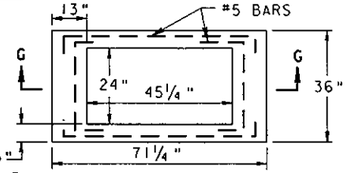
SECTION F-F



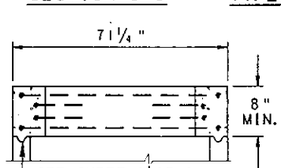
TYPE 1



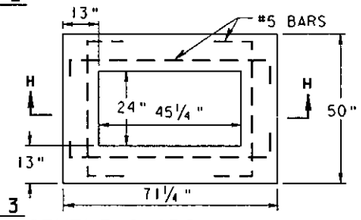
SECTION G-G



TYPE 2



SECTION H-H



TYPE 3

COVER ADJUSTMENT SLABS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

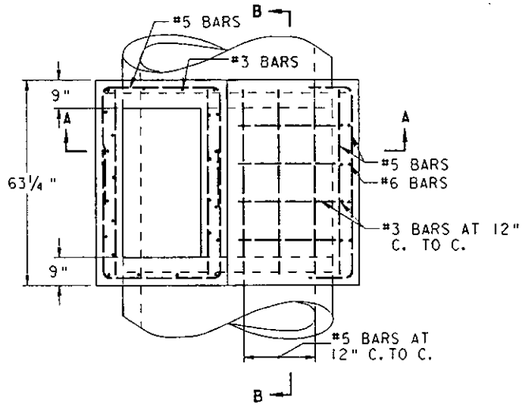
INLETS
STANDARD INLET BOXES
(PRECAST)

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

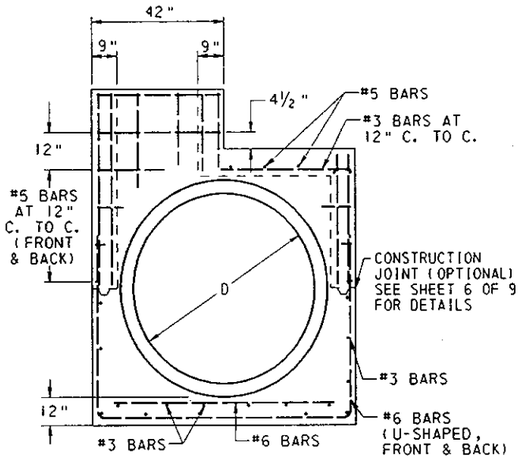
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 7 OF 9

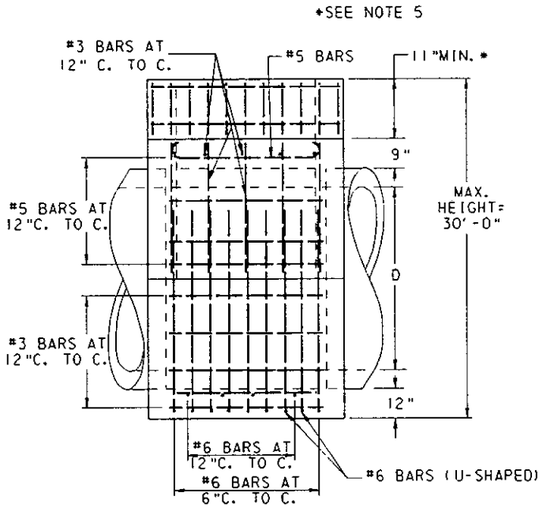
RC-34



PLAN VIEW



SECTION A-A

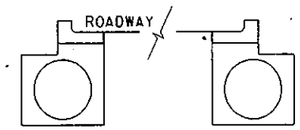


SECTION B-B

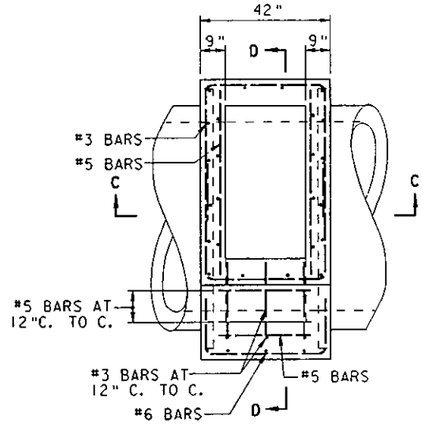
INLET BOX MODIFIED TYPE I

NOTES

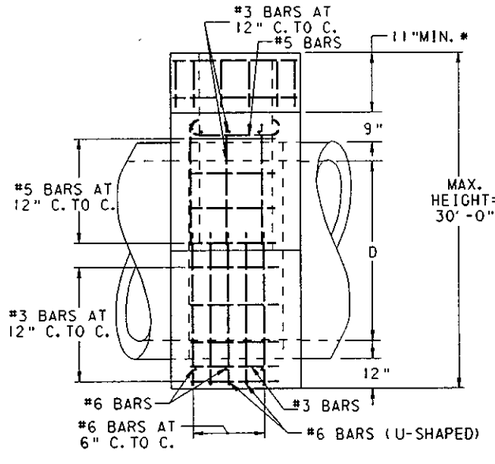
1. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605 AND SECTION 714.
2. INLETS THAT EXCEED THE MAXIMUM HEIGHT SHOWN SHALL REQUIRE SPECIAL DETAILS AND DESIGN FOR THE INLET WALLS AND BASE. CONSTRUCT INLETS THAT EXCEED 5 FEET IN HEIGHT WITH STEPS SIMILAR TO MANHOLES. SEE RC-39.
3. WHEN A SITUATION CAN NOT BE SATISFIED BY THE MODIFIED INLET BOXES SHOWN, SPECIAL DETAILS AND DESIGN SHALL BE PROVIDED.
4. FOR ORIENTATION OF THE TYPE C INLET WITH MODIFIED TYPE I INLET BOX, THE TYPICAL INSTALLATION DETAILS ARE SHOWN BELOW. ANY VARIATION SHALL BE SHOWN ON THE CONSTRUCTION DRAWINGS BY SPECIAL DETAILS.



5. PROVIDE A MINIMUM HEIGHT OF 20 INCHES MEASURED FROM THE TOP SURFACE OF THE TOP UNIT TO THE INSIDE TOP OF THE PIPE WHEN THE TOP UNIT AND EITHER A MODIFIED TYPE I OR A MODIFIED TYPE II INLET BOX ARE CONSTRUCTED MONOLITHICALLY.
6. ONLY PRECAST MODIFIED INLET BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED. FOR A BULLETIN 15 LISTING, SUBMIT A 22" x 36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF CONSTRUCTION AND MATERIALS, MATERIALS AND TESTING DIVISION FOR REVIEW AND APPROVAL.

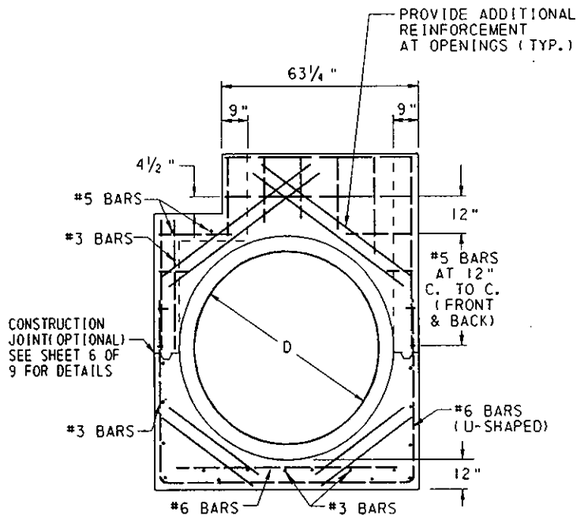


PLAN VIEW



SECTION C-C

INLET BOX MODIFIED TYPE II



SECTION D-D

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

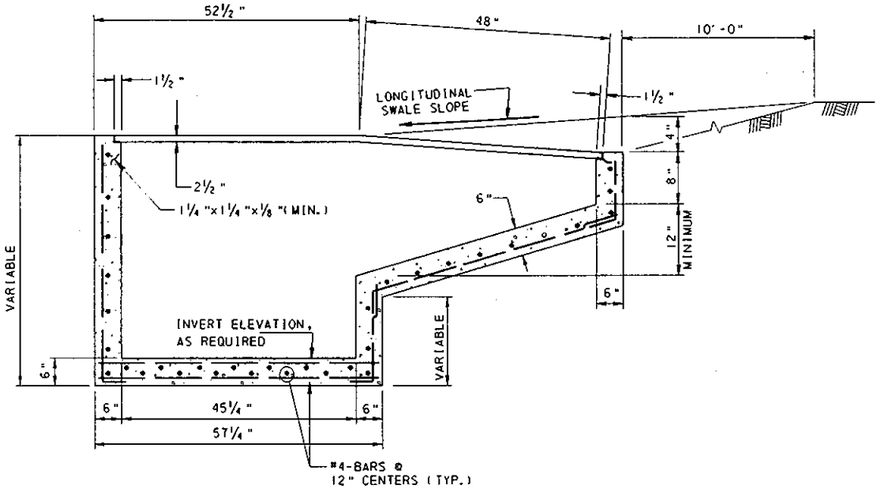
INLETS
MODIFIED INLET BOXES
(CAST-IN-PLACE AND PRECAST)

RECOMMENDED MAR. 25, 1994
Fredee J. Bowser
DIRECTOR, BUREAU OF DESIGN

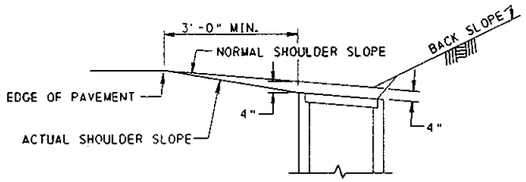
RECOMMENDED MAR. 25, 1994
M. M. Ryan
CHIEF ENGINEER

SHT. 8 OF 9

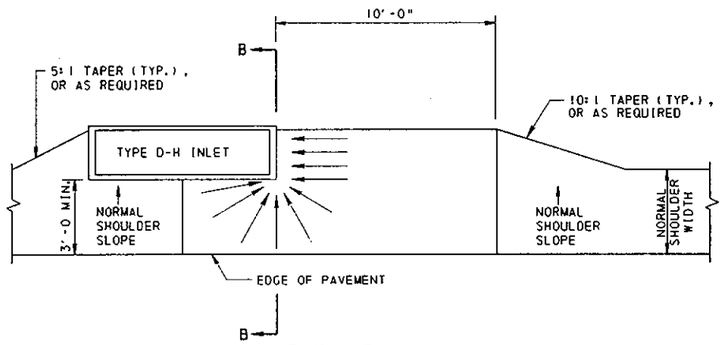
RC-34



SECTION A-A



SECTION B-B

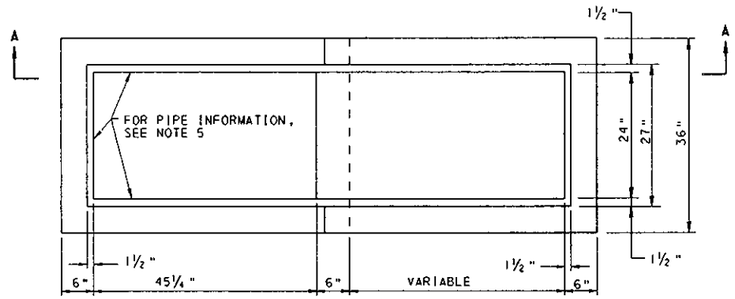


PLAN VIEW

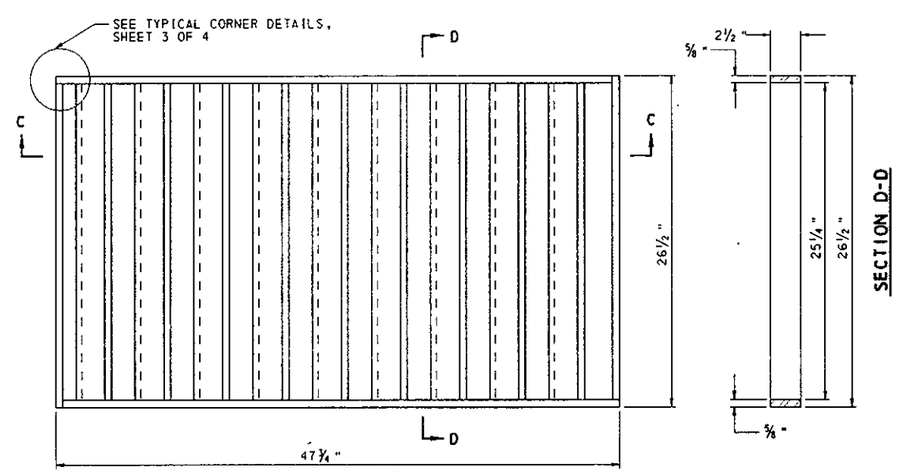
TYPICAL D-H INLET LOCATION

NOTES

1. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.
2. THIS SHEET DEPICTS THE DIMENSIONS REQUIRED FOR UNIFORMITY AND INTERCHANGEABILITY. IT DOES NOT INCLUDE DETAILS REQUIRED FOR FABRICATION OR MANUFACTURING. ONLY GRATES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15 SHALL BE PERMITTED. FOR A BULLETIN LISTING, SUBMIT A 22"x36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF CONSTRUCTION AND MATERIALS, MATERIALS AND TESTING DIVISION FOR REVIEW AND APPROVAL.
3. WELD STRUCTURAL STEEL GRATES IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 1105.03(R).
4. PROVIDE ANGLES EMBEDDED IN THE CONCRETE AS A BEARING AREA FOR THE GRATES FOR TYPE D-H INLETS WHICH SEAT THE GRATES DIRECTLY WITHIN THE UNIT.
5. FOR PIPE LOCATION AND MAXIMUM ALLOWABLE SIZES, SEE SHEET 7 OF 9.

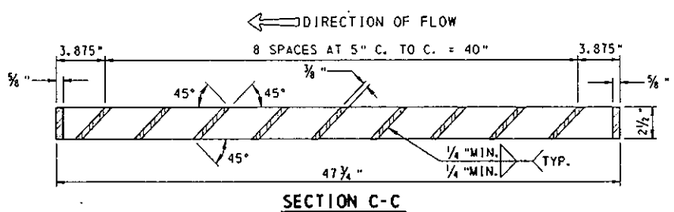


PLAN VIEW

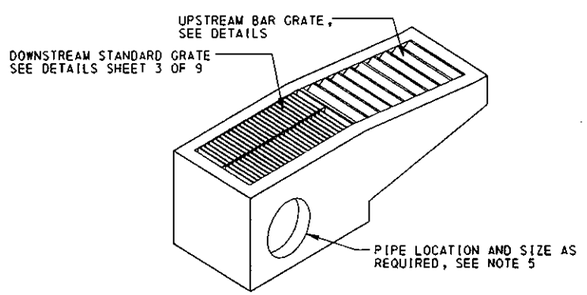


PLAN VIEW

SECTION D-D



SECTION C-C



TYPE D-H INLET

BAR GRATE

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

INLETS

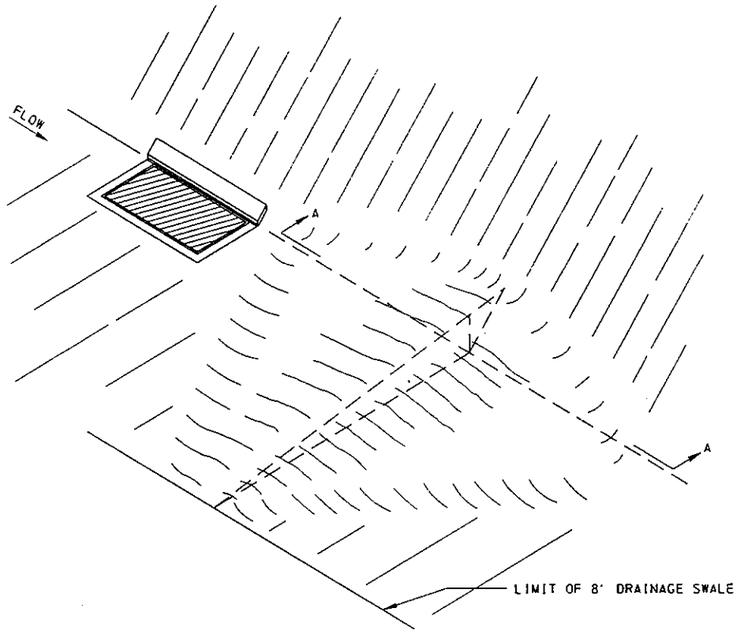
TYPE D-H INLET

RECOMMENDED MAR. 25, 1994
Fredrick Bowser
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

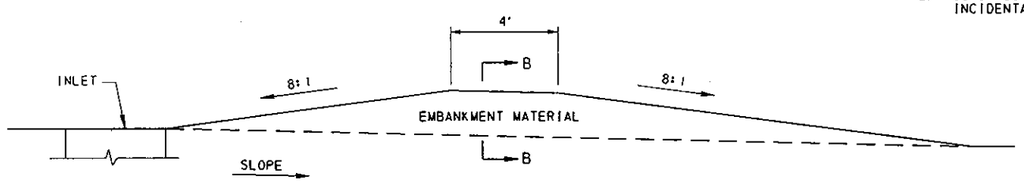
SHT. 9 OF 9

RC-34

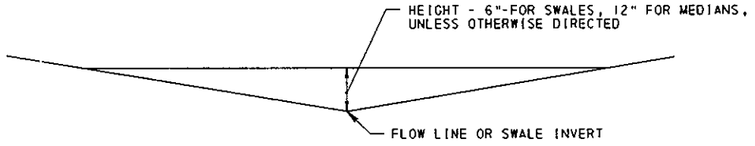


SWALE INSTALLATION

DRAINAGE DIKE



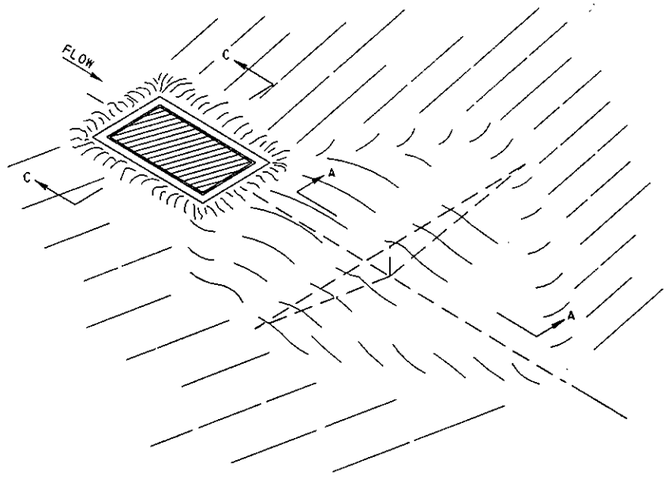
SECTION A-A



SECTION B-B

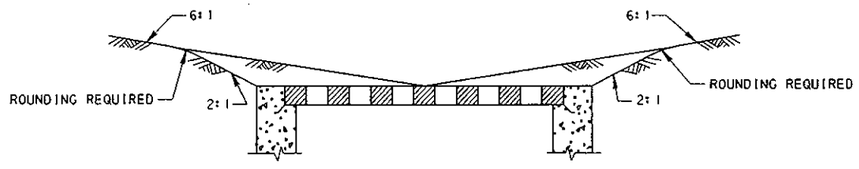
NOTES

1. DO NOT CONSTRUCT DRAINAGE DIKE TO A HEIGHT WHICH CAUSES FLOODING OF THE SUBBASE.
2. CONSTRUCTION OF THE DRAINAGE DIKE SHALL BE CONSIDERED INCIDENTAL TO THE CLASS I EXCAVATION.



MEDIAN INSTALLATION

DRAINAGE DIKE

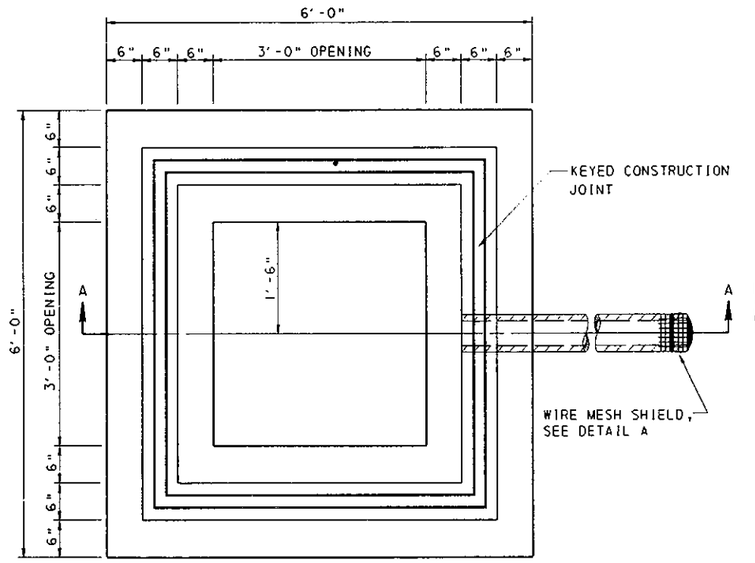


SECTION C-C

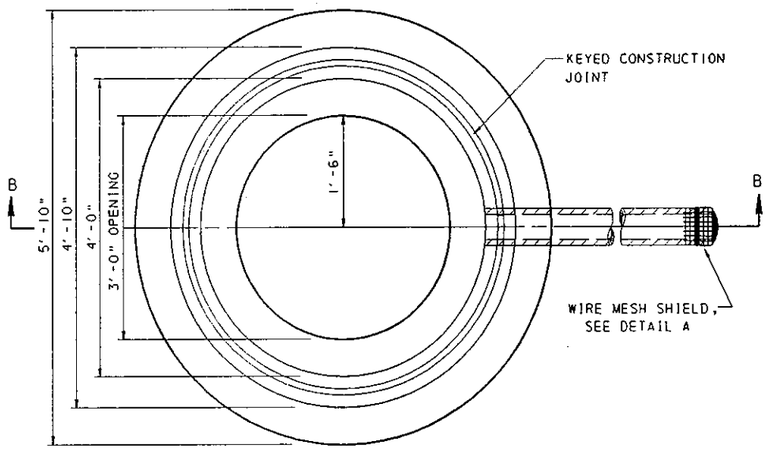
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

DRAINAGE DIKE

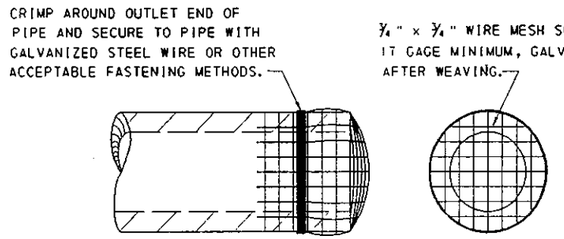
RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHT. 1 OF 1
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	RC-35



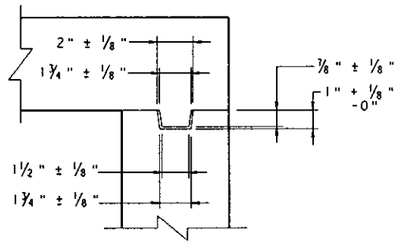
PLAN VIEW
(WITHOUT COVER)



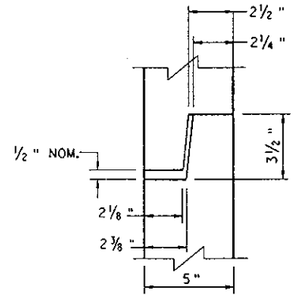
PLAN VIEW
(WITHOUT COVER)



DETAIL A
WIRE MESH SHIELD

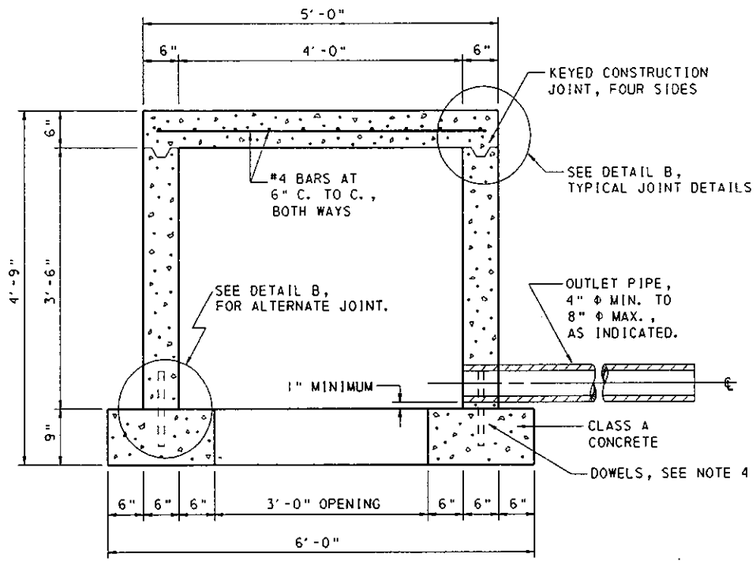


DETAIL B



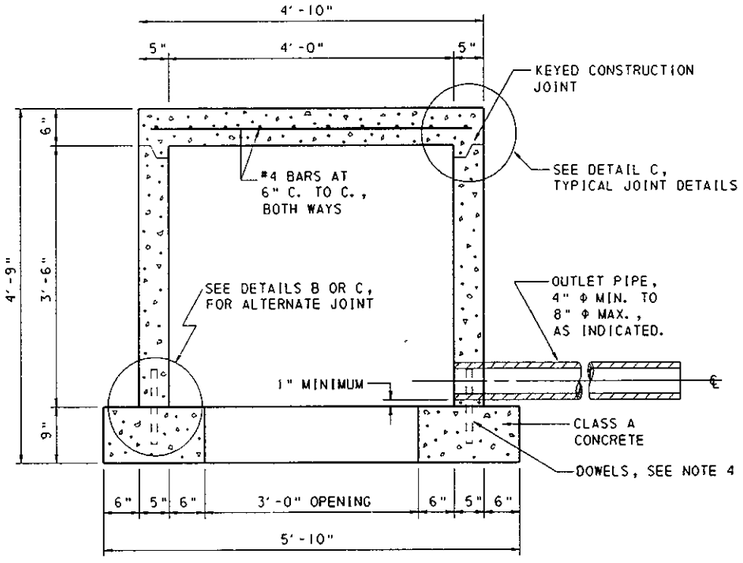
DETAIL C

TYPICAL JOINT DETAILS



SECTION A-A

SQUARE SPRING BOX
TYPE A



SECTION B-B

CIRCULAR SPRING BOX
TYPE B

NOTES:

1. PROVIDE SPRING BOXES MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 605.
2. PRECAST SPRING BOXES MAY BE USED IN LIEU OF CAST-IN-PLACE SPRING BOXES. ONLY PRECAST BOXES SUPPLIED BY AN APPROVED MANUFACTURER LISTED IN BULLETIN 15 WILL BE PERMITTED.
3. LOCATE OUTLET PIPE AS REQUIRED TO SUIT FIELD CONDITIONS.
4. PLACE #4 REINFORCEMENT BARS, MINIMUM 12 INCHES LONG, SPACED AT 12" C. TO C., AS DOWELS BETWEEN THE FOUNDATION AND WALLS WHEN THE CONSTRUCTION, EXCLUDING COVER, IS NOT MONOLITHIC. THE DOWELS MAY BE ELIMINATED IF THE ALTERNATE JOINTS SHOWN IN DETAILS B OR C ARE CONSTRUCTED.
5. PROVIDE REINFORCEMENT FOR WALLS AND FOUNDATIONS OF PRECAST BOXES MEETING THE REQUIREMENTS OF AASHTO-M199.
6. WHEN FILL HEIGHT OVER TOP OF BOX EXCEEDS 10 FEET, A SPECIAL DESIGN WILL BE REQUIRED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

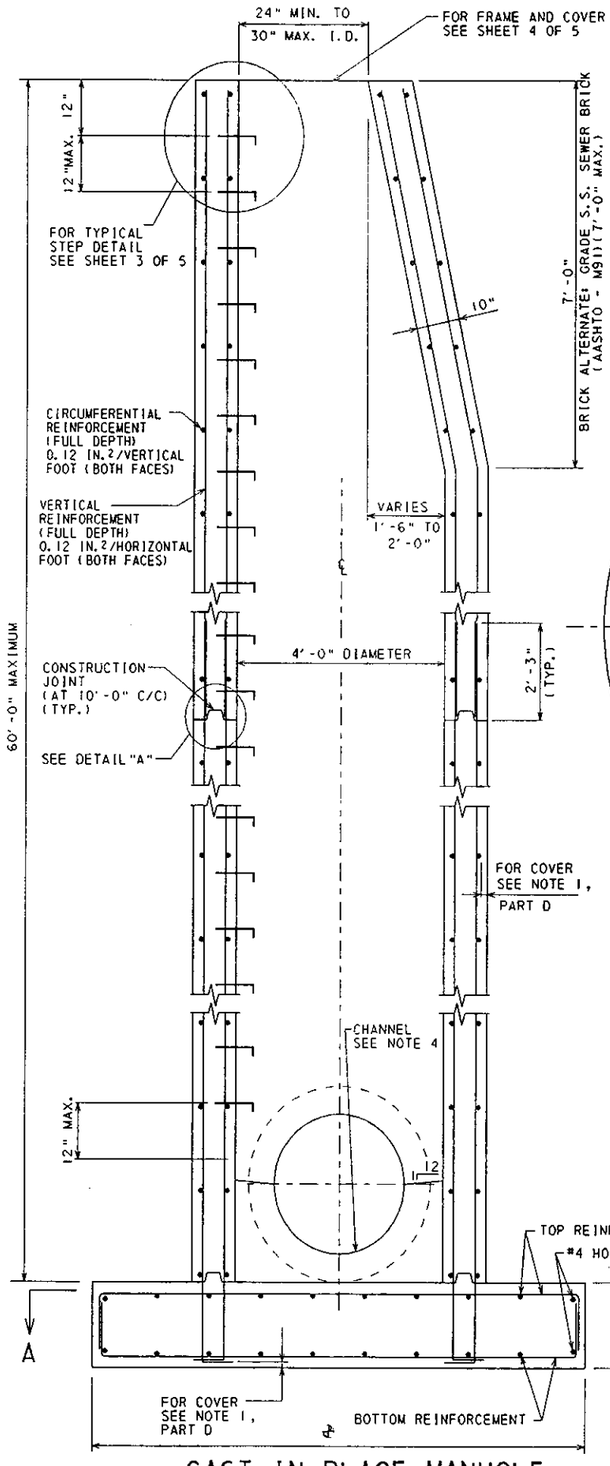
SPRING BOXES

RECOMMENDED MAR. 25, 1994
Fredric Bowser
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
M. M. Ryan
CHIEF ENGINEER

SHT. 1 OF 1

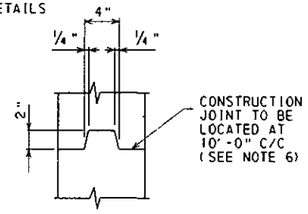
RC-36



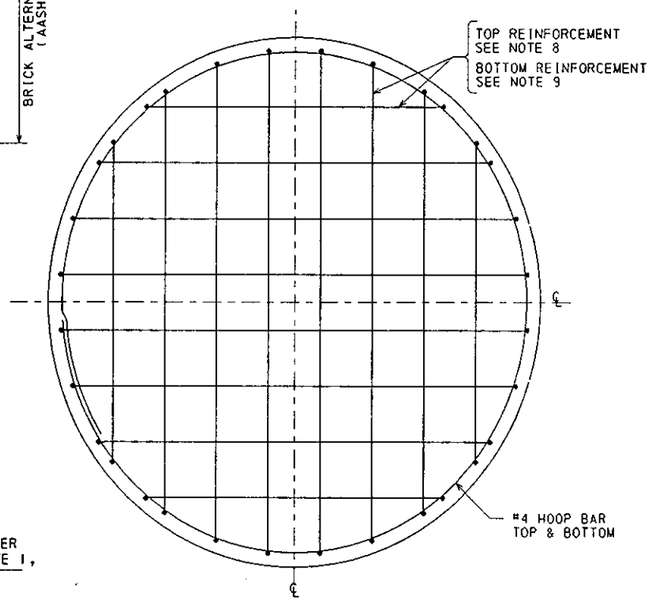
CAST-IN-PLACE MANHOLE

FOR PIPES 30 INCHES INSIDE DIAMETER AND LESS

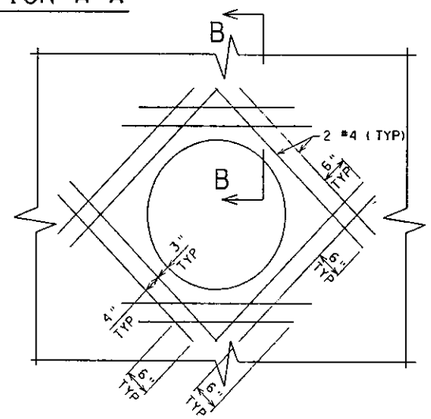
◈ FOR BASE SLAB DIMENSIONS SEE TABLE A



DETAIL "A"
CONSTRUCTION JOINT

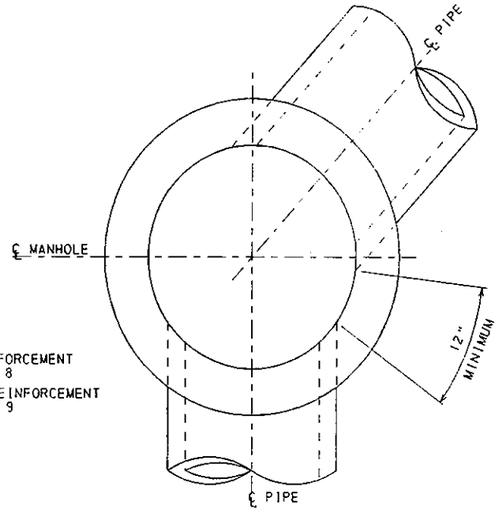


SECTION A-A



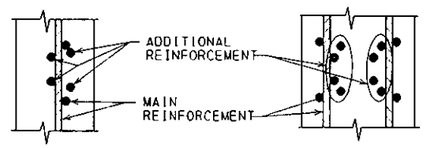
REINFORCEMENT DETAILS AT OPENINGS

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



PLAN VIEW

SEE NOTE 3



5" THICK WALL

10" THICK WALL

SECTION B-B

NOTES:

1. CONSTRUCTION REQUIREMENTS
   A. CONSTRUCT IN ACCORDANCE WITH: PENNDOT PUBLICATION 408 SPECIFICATIONS, SECTIONS 605, 606, 714; AND ASTM C-478-90, STANDARD SPECIFICATION FOR PRECAST REINFORCED CONCRETE MANHOLE SECTIONS, AS MODIFIED HEREIN.
   B. MINIMUM CONCRETE CLASS:
      CAST-IN-PLACE CLASS A
      PRECAST CLASS AA
   C. PROVIDE STEEL REINFORCEMENT IN ACCORDANCE WITH ASTM A185, STEEL WELDED WIRE FABRIC ASTM A663 & A675, PLAIN BILLET STEEL BARS OR ASTM A615, DEFORMED BILLET STEEL BARS PROVIDE MINIMUM YIELD STRENGTH OF 60,000 P.S.I.
   D. CLEAR COVER FOR STEEL:

WALLS:	CAST-IN-PLACE	2"
	PRECAST	1½"
FOOTINGS:	CAST-IN-PLACE	2½" (TOP BARS)
		3" (BOTTOM BARS)
		2" (SIDE COVER)
	PRECAST	2" (TOP BARS)
		1½" (BOTTOM BARS)
		1½" (SIDE COVER)
SLABS:	CAST-IN-PLACE	2" (TOP & BOTTOM BARS)

2. FOR PIPES WITH INSIDE DIAMETERS GREATER THAN 30" SEE MODIFIED CAST-IN-PLACE MANHOLES, SHEET 2 OF 5.
3. PROVIDE 12" MINIMUM HORIZONTAL CLEARANCE BETWEEN OPENINGS LOCATED AT THE SAME DEPTH. PIPES NOT LOCATED AT THE SAME DEPTH MUST BE LOCATED VERTICALLY AT LEAST ONE TIMES MAXIMUM OPENING DIAMETER APART.
4. 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. A FULL DEPTH U-SHAPED CHANNEL SHOULD BE PROVIDED WHEN NECESSARY TO REDUCE ENERGY LOSES.
5. USE 5" THICK WALLS WITH ONE (1) ROW OF REINFORCING, OR USE 10" THICK OR GREATER WALLS WITH TWO (2) ROWS OF REINFORCING.
6. CONSTRUCTION JOINTS AND KEYS MAY BE CONSTRUCTED UPWARDS OR DOWNWARDS. JOINTS AND KEYS ARE TO BE THOROUGHLY CLEANED BEFORE PLACING NEXT CONCRETE SEGMENT.
7. A SAFE BEARING CAPACITY OF 1.5 TONS PER SQUARE FOOT 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.
8. FOR FOOTING TOP REINFORCEMENT, BOTH DIRECTIONS, USE # 6 BARS AT 12" FOR DEPTHS TO 60 FEET OR 0.30 IN²/FT WWF FOR DEPTHS TO 30 FEET AND 0.32 IN²/FT WWF FOR DEPTHS GREATER THAN 30 FEET (6" MAXIMUM SPACING)
9. FOR FOOTING BOTTOM REINFORCEMENT, BOTH DIRECTIONS, USE # 4 BARS AT 12" FOR DEPTHS TO 60 FEET OR 0.15 IN²/FT WWF FOR DEPTHS TO 30 FEET AND 0.16 IN²/FT WWF FOR DEPTHS GREATER THAN 30 FEET. (6" MAXIMUM SPACING)

TABLE A
BASE SLAB DIMENSIONS

MAX. DEPTH FROM TOP OF MANHOLE TO TOP OF FOOTING	AS DESIGNED (SEE NOTE 7)	
	FOOTING DIAMETER	FOOTING THICKNESS
10'-0"	6'-9"	1'-0"
20'-0"	6'-9"	1'-0"
30'-0"	6'-9"	1'-3"
40'-0"	7'-3"	1'-3"
50'-0"	8'-0"	1'-3"
60'-0"	8'-6"	1'-3"

REINF. BAR FAB. DETAILS	BC-736	6-01-91
DESCRIPTION	DWG. NO.	DATE
REFERENCE DRAWINGS		

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

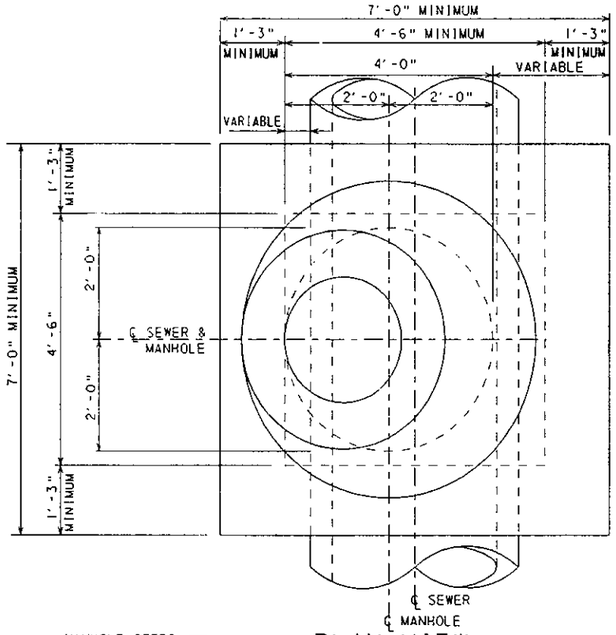
STANDARD MANHOLES
CAST-IN-PLACE MANHOLES

RECOMMENDED MAR. 25, 1994
DIR., BUREAU OF DESIGN

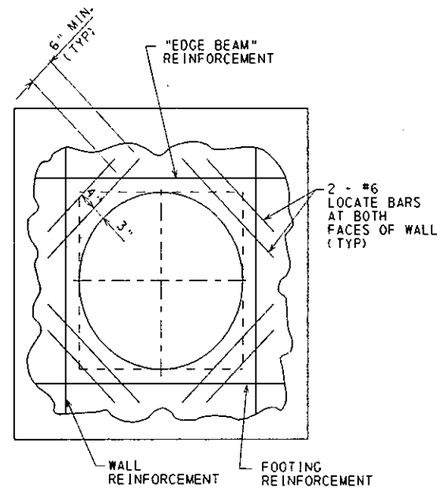
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 1 OF 5

RC-39



PLAN VIEW



REINFORCEMENT DETAILS AT VERTICAL OPENINGS

NOTE: ONLY BOX WITH MAIN REINFORCEMENT SHOWN FOR CLARITY

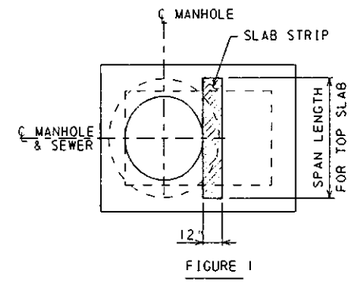


FIGURE 1

PLAN-TOP OF SLAB

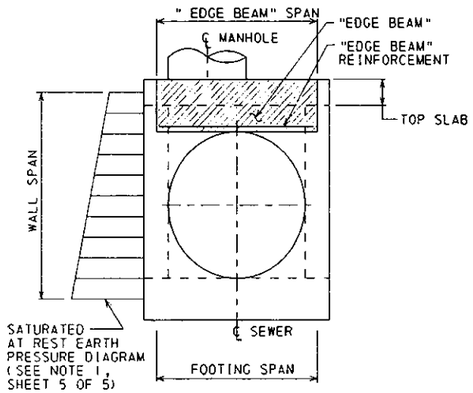
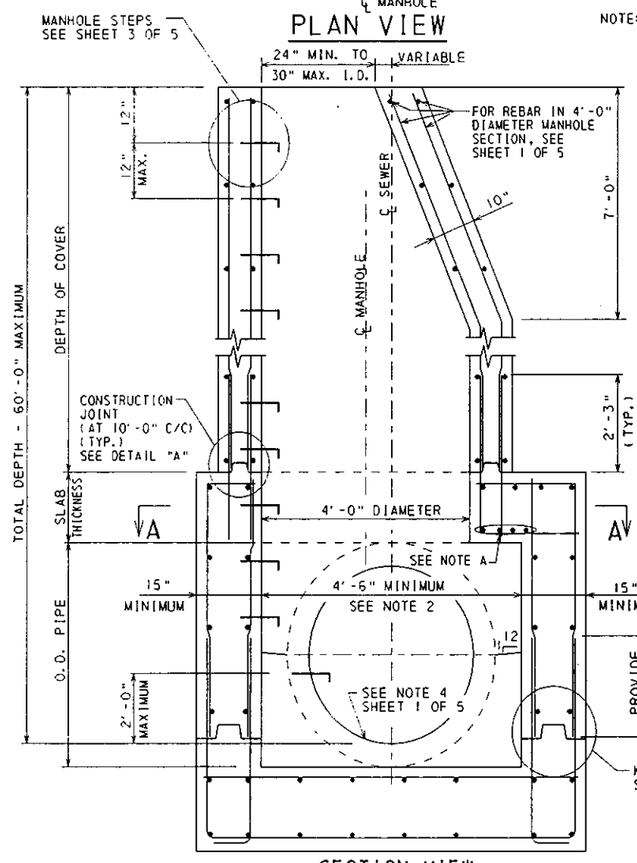


FIGURE 2

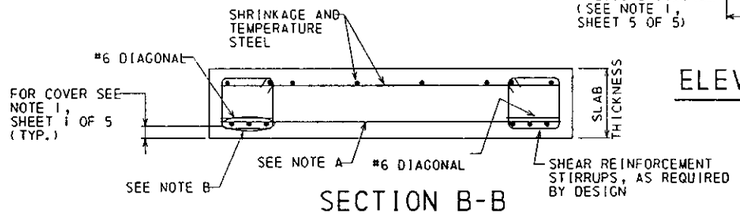
ELEVATION-OPENING



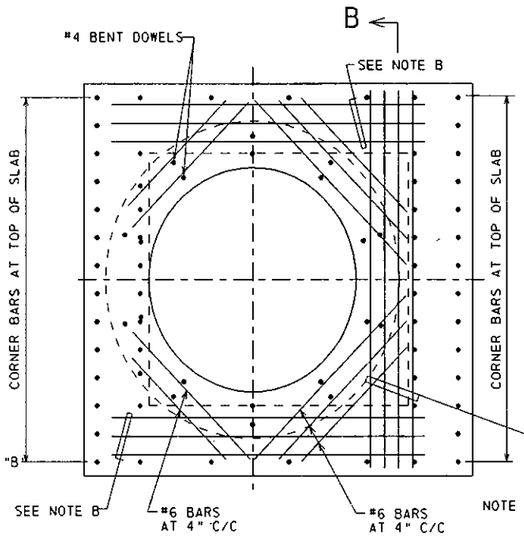
SECTION VIEW

MODIFIED MANHOLE

FOR PIPES GREATER THAN 30 INCHES TO 84 INCHES INSIDE DIAMETER



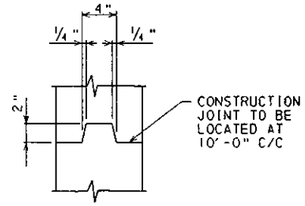
SECTION B-B



SECTION A-A

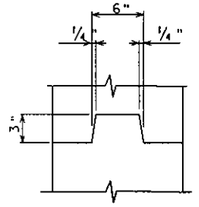
NOTE A: BARS REQUIRED TO SPAN FROM WALL TO WALL

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 OF 5



DETAIL "B" KEYWAY

SEE NOTE 6, SHEET 1 OF 5

NOTES:

1. FOR CONSTRUCTION REQUIREMENTS SEE NOTE 1, SHEET 1 OF 5. FOR DESIGN REQUIREMENTS SEE NOTE 1, SHEET 5 OF 5.
2. INCREASE BOX SIZE WHEN REQUIRED TO KEEP WALLS OF MANHOLE BOX SECTION FLUSH WITH THE OPENING FOR PIPES LARGER THAN 42 INCHES I.D. INDICATE THE BOX SIZE ON THE CONSTRUCTION PLANS OR SHOP DRAWINGS BASED ON THE DESIGN PROCEDURES PROVIDED BELOW.
3. 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. ALL SPAN LENGTHS ARE CALCULATED FROM THE CENTER OF THE SUPPORTS.

   A. TOP SLAB
   - DESIGN A 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 DEGREES AROUND THE MANHOLE OPENING. SEE SECTION A-A THIS SHEET FOR DETAILS.

   B. "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.

   C. 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.

   D. 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. 4 BARS AT 12" CENTERS, TOP AND BOTTOM OF SLAB IN THE OPPOSITE DIRECTION.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD MANHOLES MODIFIED CAST-IN-PLACE MANHOLES

RECOMMENDED MAR. 25, 1994 Fredric Bowser DIR., BUREAU OF DESIGN	RECOMMENDED MAR. 25, 1994 M. M. Ryan CHIEF ENGINEER	SHT. 2 OF 5 RC-39

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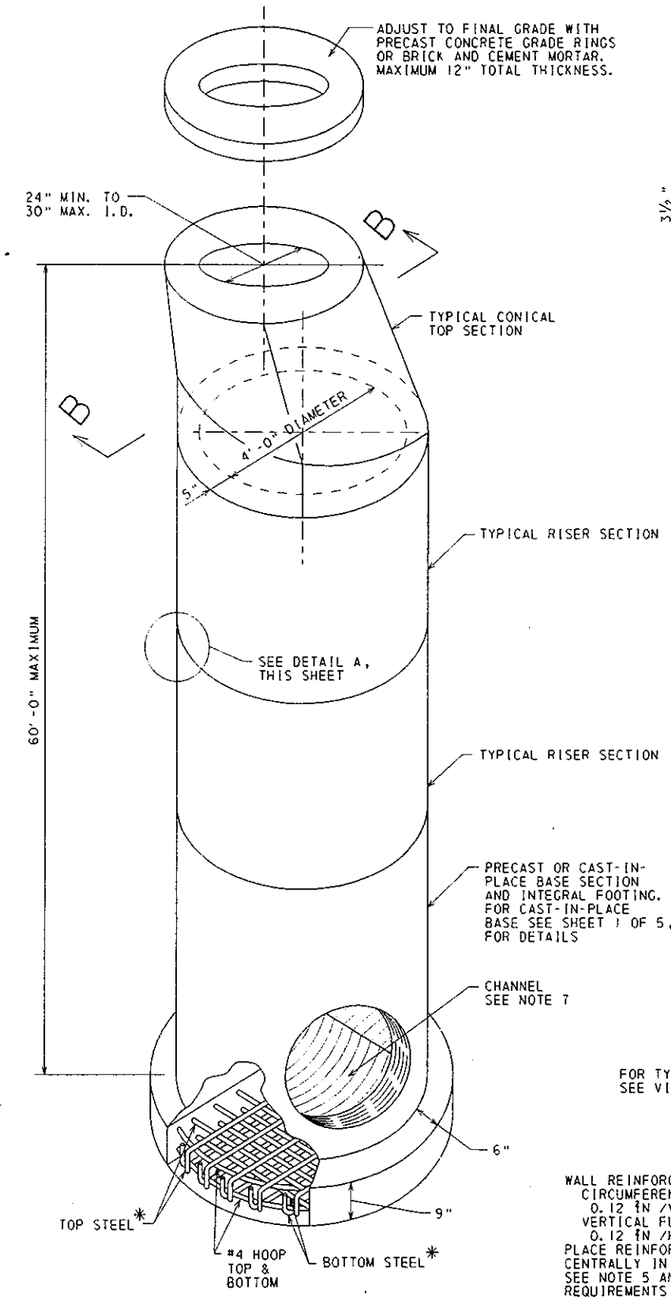
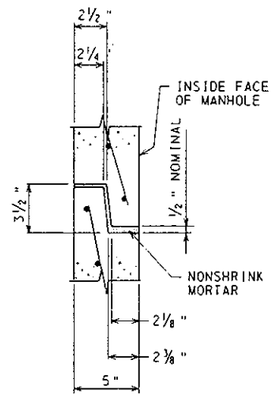


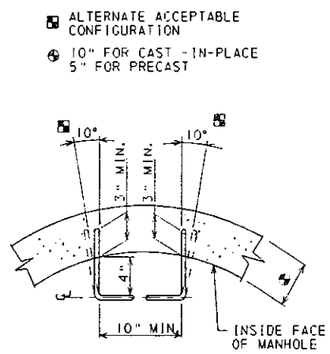
PRECAST MANHOLE

FOR PIPES 30 INCHES INSIDE DIAMETER AND LESS

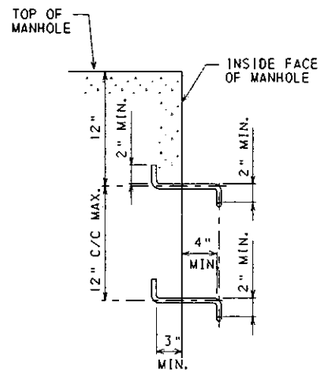
*SEE TABLE B FOR BASE SLAB STEEL REQUIREMENTS. PROVIDE WALL REINFORCEMENT DETAILS AT BASE SLAB TYPICAL OF CAST-IN-PLACE MANHOLE, SEE SHEET 1 OF 5.



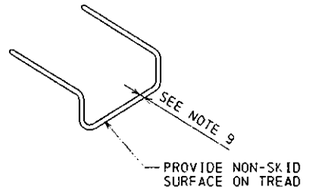
DETAIL A



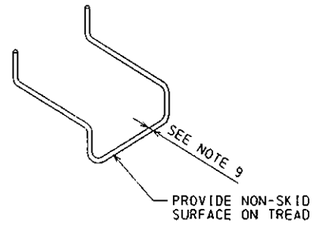
PLAN VIEW



SIDE VIEW



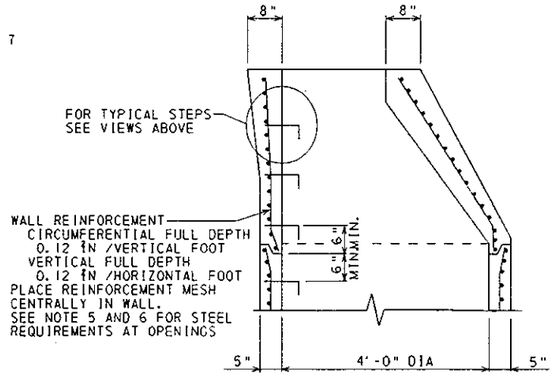
STEP WITHOUT HOOKS
SEE NOTE 10



STEP WITH HOOKS

TYPICAL STEP CONFIGURATION

MANHOLE STEPS



SECTION B-B

TABLE B

PRECAST MANHOLE HEIGHT	TOP STEEL REQUIREMENTS	BOTTOM STEEL REQUIREMENTS
0'-0" TO 30'-0"	# 4 BARS AT 6" C. TO C. OR 0.33 IN²/FT WWF (6" MAXIMUM SPACING)	# 4 BARS AT 12" C. TO C. OR 0.16 IN²/FT WWF (6" MAXIMUM SPACING)
> 30'-0" TO 60'-0"	# 5 BARS AT 6" C. TO C. OR 0.56 IN²/FT WWF (6" MAXIMUM SPACING)	# 4 BARS AT 6" C. TO C. OR 0.27 IN²/FT WWF (6" MAXIMUM SPACING)

SEE NOTE 7, SHEET 1 OF 5.

NOTES:

1. PRECAST MANHOLES, MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 714, MAY BE SUBSTITUTED FOR THE STANDARD CAST-IN-PLACE MANHOLE.
2. FOR CONSTRUCTION REQUIREMENTS SEE NOTE 1, SHEET 1 OF 5. FOR DESIGN REQUIREMENTS SEE NOTE 1, SHEET 5 OF 5.
3. FOR PERMISSIBLE LOCATION OF PIPES SEE PLAN VIEW AND NOTE 3, SHEET 1 OF 5.
4. FOR RISERS OR BASE SECTIONS WITH OPENINGS, PROVIDE A MINIMUM HEIGHT OF SECTION EQUAL TO TWO TIMES THE LARGEST OPENING. CENTER OF OPENING TO BE LOCATED AT LEAST ONE TIMES THE OPENING FROM THE CLOSEST JOINT BETWEEN RISERS.
5. FOR PRECAST RISER OR BASE SECTIONS WITH ONE OPENING LOCATED AT DEPTHS TO 60', OR FOR SECTIONS WITH TWO OR MORE OPENINGS, LOCATED AT A DEPTH 15 FEET AND LESS, PROVIDE CIRCUMFERENTIAL REINFORCEMENT IN ACCORDANCE WITH SECTION B-B.

   FOR RISERS OR BASE SECTIONS WITH TWO OR MORE OPENINGS, LOCATED AT A DEPTH GREATER THAN 15 FEET, BUT LESS THAN OR EQUAL TO 30 FEET, PROVIDE CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 0.44 IN²/VERTICAL FOOT FOR THE DEPTH OF THE RISER OR BASE SECTION.

   FOR RISERS OR BASE SECTIONS WITH TWO OR MORE OPENINGS, LOCATED AT DEPTHS GREATER THAN 30 FEET, USE A 10 INCH THICK WALL RISER OR BASE SECTION WITH CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 0.12 IN²/VERTICAL FOOT EACH FACE.

   RISERS OR BASE SECTIONS WITH HOLES TO BE CLEARLY MARKED WITH MAXIMUM ALLOWABLE DEPTH.
6. PROVIDE ADDITIONAL REINFORCEMENT BARS AROUND OPENINGS AS SHOWN ON REINFORCEMENT DETAILS AT OPENINGS SHEET 1 OF 5.
7. FOR CHANNEL DETAILS IN PRECAST MANHOLE SEE CAST-IN-PLACE MANHOLE SHEET 1 OF 5.
8. PROVIDE MANHOLE STEPS MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 605.2(c). ALTERNATE CONFIGURATIONS AND DIMENSIONS, AS APPROVED BY THE ENGINEER, MAY BE USED.
9. PROVIDE MINIMUM 1" SECTION DIMENSION FOR METAL STEPS. PROVIDE MINIMUM ¾" SECTION DIMENSION FOR NON-DETERIORATING MATERIAL STEPS.
10. MECHANICAL ANCHOR REQUIRED FOR INSTALLATION OF STEPS WITHOUT HOOKS.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD MANHOLES PRECAST MANHOLES & MANHOLE STEPS

RECOMMENDED MAR. 25, 1994
Fred W. Bowser
DIR., BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
M. M. Ryan
CHIEF ENGINEER

SHT. 1 OF 5
RC-39

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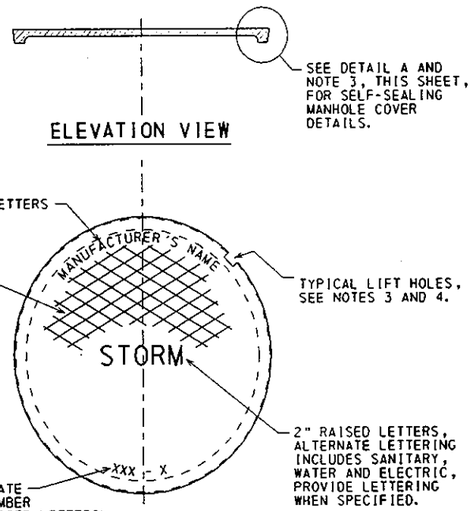
$$$$DATE$$$$

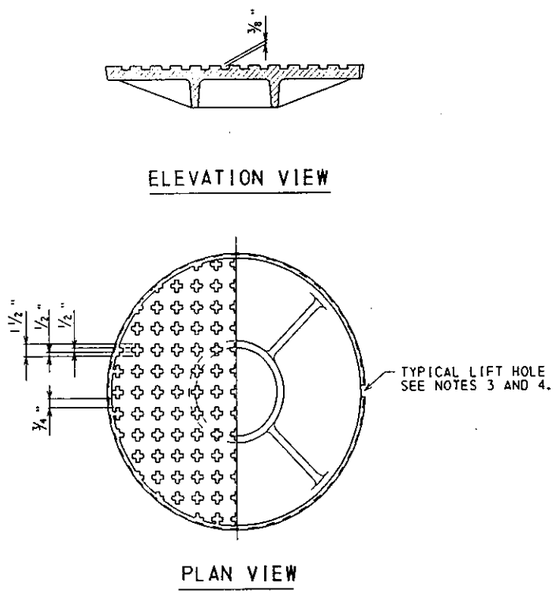


ELEVATION VIEW

PLAN VIEW

CAST IRON MANHOLE COVER

(PLATEN COVER)



ELEVATION VIEW

PLAN VIEW

CAST IRON MANHOLE COVER

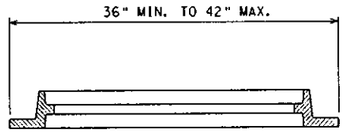
(STANDARD COVER)

NOTES:

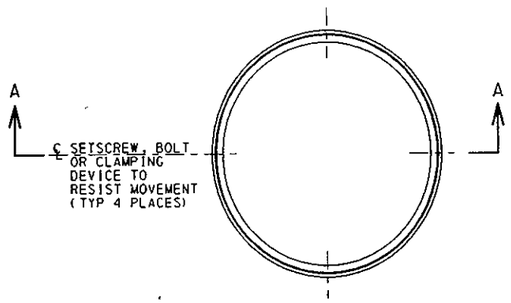
1. PROVIDE MANHOLE FRAMES AND COVERS MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 605.2(B). DESIGN MANHOLE FRAME, COVER AND GRADE ADJUSTMENT RINGS FOR HS25 LIVE LOAD. IF MANHOLES ARE NOT IN OR ADJACENT TO ROADWAY, DESIGN FOR ALL POSSIBLE LIVE LOADS AS APPROVED BY THE DEPARTMENT.
2. PROVIDE MANHOLE FRAMES, COVERS AND GRADE ADJUSTMENT RISERS SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. FOR A BULLETIN 15 LISTING, SUBMIT A 22" x 36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF CONSTRUCTION AND MATERIALS, MATERIALS AND TESTING DIVISION FOR REVIEW.
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 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 MINUMUM 1" BEARING SEAT FOR COVER.
6. LOCATE TOP OF FRAME OR ADJUSTMENT RISER 1/8" BELOW THE TOP OF ROADWAY SURFACE.
7. GRADE ADJUSTMENT RISERS

   PROVIDE GRADE ADJUSTMENT RISERS MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 606, AND AS MODIFIED HEREIN:

   A. EACH ADJUSTMENT RISER TO BE CUSTOM FABRICATED FROM MEASUREMENTS PROVIDED WITH EACH ORDER.
   B. BAR STOCK AND RETAINER CLIP TO BE MANUFACTURED FROM US MADE CARBON STEEL MEETING OR EXCEEDING THE MINIMUM REQUIREMENTS OF A.S.T.M A-36.
   C. FULL CIRCUMFERENTIAL WELDS ARE REQUIRED ON BOTH TOP AND BOTTOM RINGS. THE INNER WELD TO BE BEVEL GROOVE WELD (FLUSH FINISH) FOR PROPER SEATING OF MANHOLE LID AND THE OUTER WELD TO BE FILLET WELD.
   D. MINIMUM WIDTH OF BOTTOM AND TOP BAR STOCK TO BE 1" AND 3/8", RESPECTIVELY.
   E. BOTTOM BAR STOCK FOR MULTI-PIECE ADJUSTMENT RISER TO BE TAPPED FOR 1/2" DIAMETER ADJUSTMENT BOLT.
   F. ADJUSTMENT RISER TO BE ADEQUATELY REINFORCED 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. FRAME AND/OR PRECAST CONCRETE GRADE RINGS TO BE ATTACHED RIGIDLY TO TOP OF MANHOLE. USE 3 - 1/2" DIA. THREADED STUDS WITH HEX HEAD NUTS AND WASHERS, INSERTED THROUGH 5/8" DIA. HOLES THROUGH FRAME AND/OR RINGS. HOLES TO BE SPACED AT 120° AND 2" FROM OUTSIDE EDGE OF FRAME. EMBED STUDS 4" (MINIMUM) INTO MANHOLE. GROUT STUDS INTO MANHOLE.
9. THE BASE OF THE FRAME AND/OR PRECAST CONCRETE GRADE RINGS TO BE SET IN A BED OF CEMENT MORTAR.

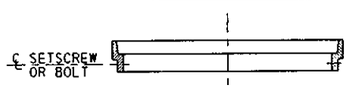


ELEVATION VIEW OF MANHOLE FRAME

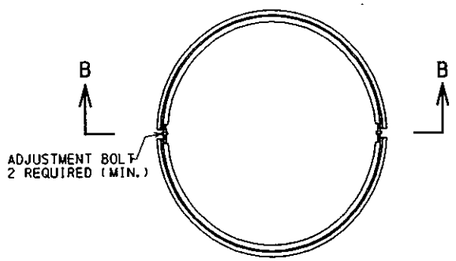


PLAN VIEW

ONE PIECE ADJUSTMENT RISER

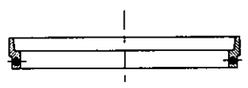


SECTION A-A

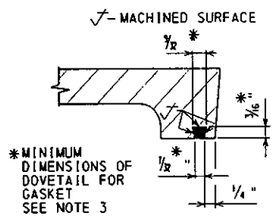


PLAN VIEW

MULTI-PIECE ADJUSTMENT RISER



SECTION B-B



DETAIL A

GASKET SEALING SYSTEM

ADJUSTMENT RISERS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD MANHOLES COVERS, FRAMES AND ADJUSTMENT RISERS

RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHT. 4 OF 5
DIR., BUREAU OF DESIGN	CHIEF ENGINEER	RC-39

1. DESIGN REQUIREMENTS

A. DESIGN SPECIFICATIONS: DESIGN DIVISION I OF AASHTO, STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 1989, (INCLUDING THE 1990 INTERIM SPECIFICATIONS AS SUPPLEMENTED BY THE DESIGN MANUAL, PART 4, NOVEMBER 1988 INCLUDING SEPTEMBER 1991 REVISIONS (CHANGES 1 TO 8). ASTM C478-90, 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 1.50 TONS PER SQUARE FOOT, WHICHEVER IS GREATER.

D. DESIGN THE MANHOLE FOR A LIVE LOAD OF HS25 AND 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 DEPARMENT.

E. DESIGN THE MANHOLE FOR:
WEIGHT OF EARTH, γ_E = 120#/C.F.
ϕ = ANGLE OF INTERNAL FRICTION = 33°
DRY AT REST EARTH PRESSURE = $K_o\gamma_{DE} = (1-\sin\phi)\gamma_E$
$= 0.46 \times 120 = 55$ P.C.F.
SATURATED AT REST EARTH PRESSURE = $K_o(\gamma_E - \gamma_w) + \gamma_w$
$= 0.46 \times (120-62.4) + 62.4$
$= 89$ 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 OF 5.

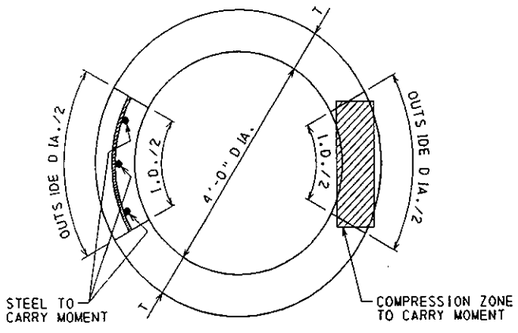
2. VERTICAL STEEL

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.



DESIGN SECTION TO CARRY MOMENT
FIGURE 1

EQUIVALENT RECTANGULAR COMPRESSION ZONE DIMENSIONS TO CARRY MOMENT:
T (INCHES) BY 1/4 (INSIDE DIA. + OUTSIDE DIA.) (INCHES)
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.

$$Z = F_S \sqrt[3]{\frac{dc \times 2dst \times b}{NO.\ OF\ BARS}} < 98 \quad (DM4\text{-}8\text{-}16\text{-}8\text{-}4P)$$

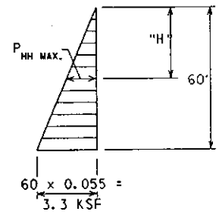
3. HOOP STEEL

A. DETERMINE SERVICE MOMENTS AND AXIAL THRUSTS USING FIGURE 2 AND FIGURE 3.
$P_{HH\ MIN.}$ NOT TO BE GREATER THAN ONE-HALF OF $P_{HH\ MAX.}$

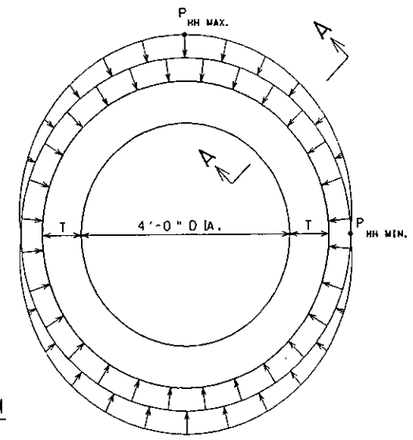
B. DESIGN HOOP REINFORCEMENT SHOWN IN SECTION A-A, TO CARRY THE MOMENT AND AXIAL THRUST.

C. CHECK CRACK CONTROL UNDER SERVICE LOAD.

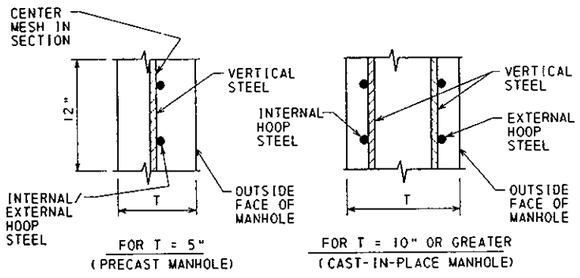
$$Z = F_S \sqrt[3]{\frac{dc \times 2dst \times b}{NO.\ OF\ BARS}} < 98$$



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



DIFFERENTIAL PRESSURE LOADING
TO DETERMINE HOOP MOMENTS
FIGURE 3



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

SECTION A-A - DESIGN SECTION

4. FOOTING DESIGN

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

$\frac{P}{A} + \frac{M}{S} \leq$ 3.0 KSF OR MAXIMUM ALLOWABLE BEARING PRESSURE

P = D.L. + L.L. + E.P.

D.L. = DEAD LOAD OF MANHOLE

L.L. = HS25 WHEEL LOAD (NO IMPACT)

E.P. = EARTH LOAD ON OVERHANG

A = BEARING AREA OF FOOTING

M = MOMENT DUE TO DIFFERENTIAL LOADING (WHEN APPLICABLE)

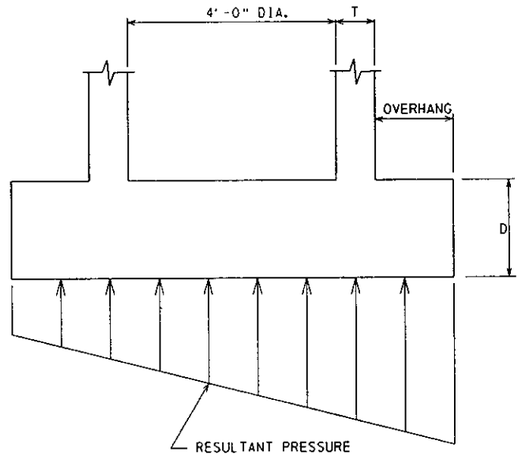
S = SECTION MODULUS OF FOOTING

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.

$$Z = F_S \sqrt[3]{\frac{dc \times 2dst \times b}{NO.\ OF\ BARS}} < 98$$



DIAMETRICAL SECTION THROUGH FOOTING
FIGURE 4

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

STANDARD MANHOLES DESIGN PROCEDURE

RECOMMENDED MAR. 25, 1994
DIR., BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 5 OF 5

RC-39

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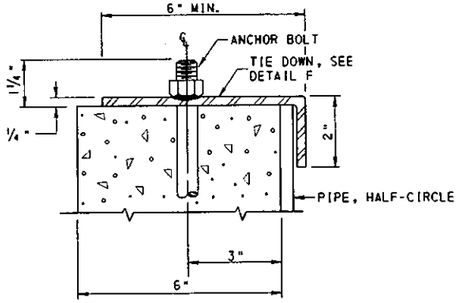
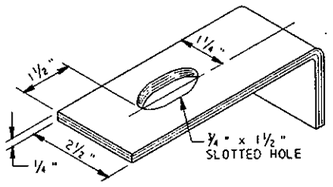
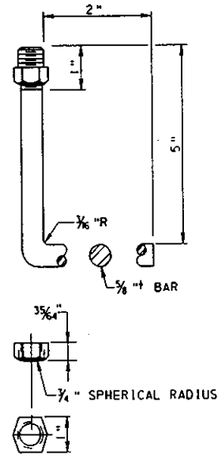


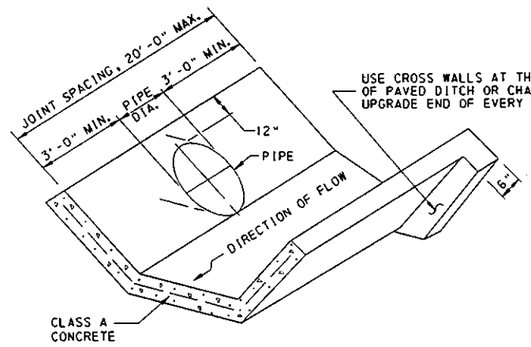
DETAIL E

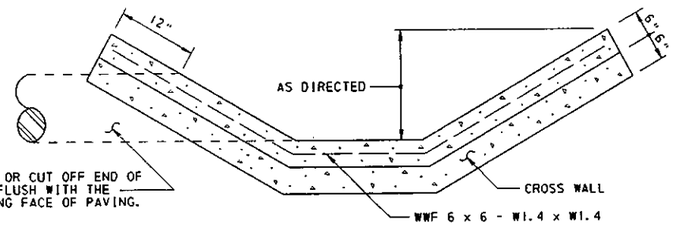


DETAIL F



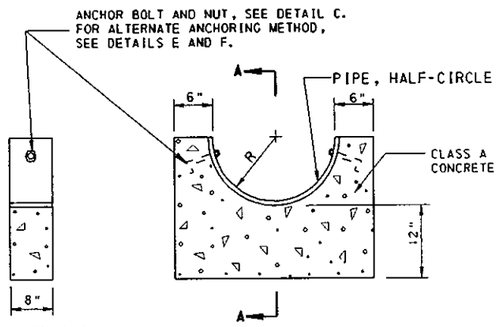
ANCHOR BOLT AND NUT
DETAIL C





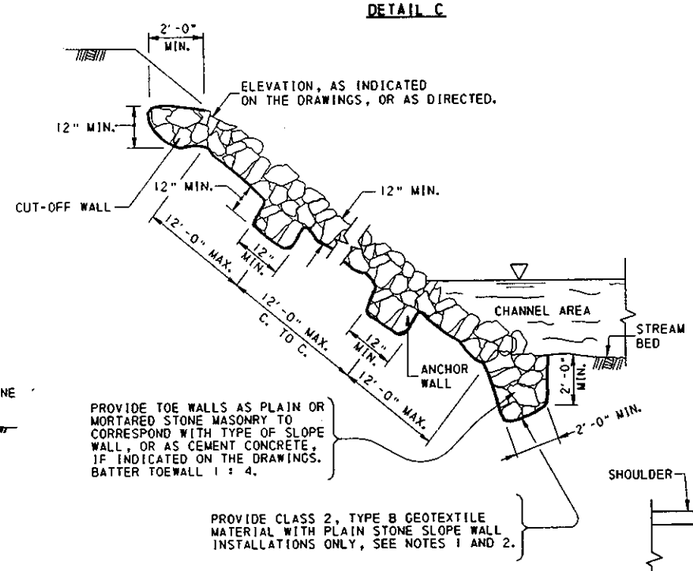
CONSTRUCT SIDE SLOPES AND BOTTOM WIDTH CONFORMING TO ADJACENT PARALLEL DITCHES.

CONCRETE PAVING FOR STREAM BEDS

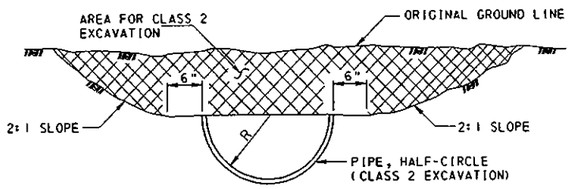


SECTION A-A

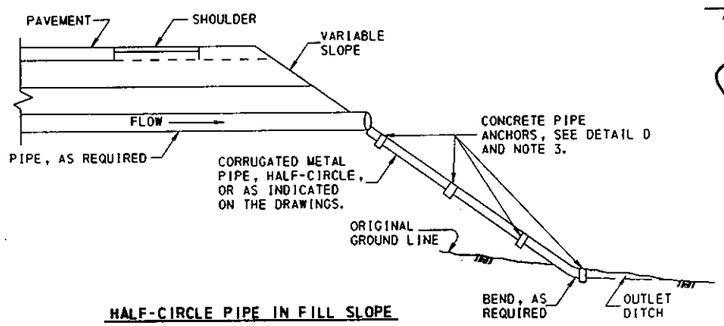
CEMENT CONCRETE PIPE ANCHOR
DETAIL D



PLAIN AND MORTARED STONE SLOPE WALL

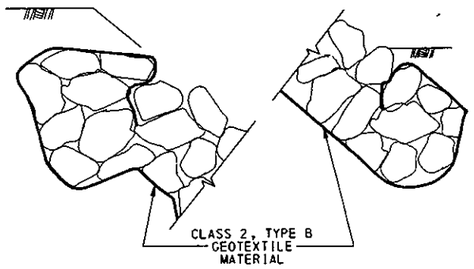


TYPICAL CROSS SECTION

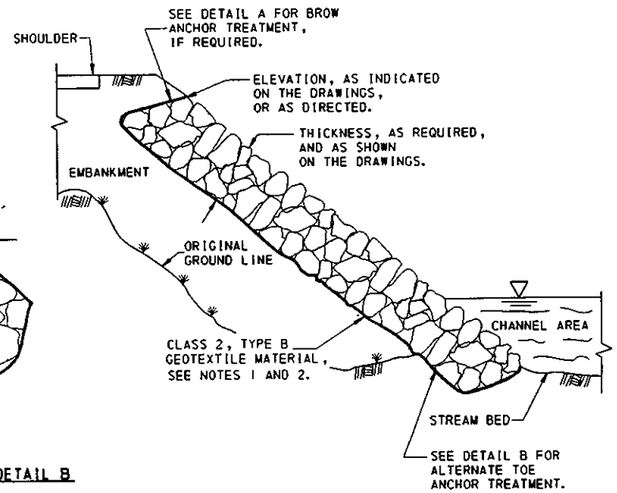


HALF-CIRCLE PIPE IN FILL SLOPE

INSTALLATION DETAILS FOR HALF-CIRCLE PIPE



DETAIL A



DETAIL B

ROCK EMBANKMENT

NOTES

1. PROVIDE GEOTEXTILE MATERIAL MEETING THE CONSTRUCTION REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 212 AND MATERIAL REQUIREMENTS OF SECTION 735.
2. INSTALL GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.
3. PLACE CONCRETE PIPE ANCHORS AT THE ENDS OF PIPE, UNDER ALL JOINTS AND AT INTERMEDIATE LOCATIONS AS REQUIRED. PROVIDE TEN (10) FOOT MAXIMUM SPACING BETWEEN ANCHORS.

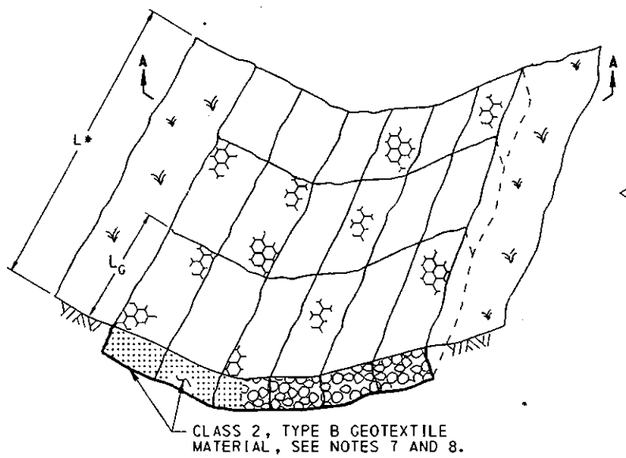
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

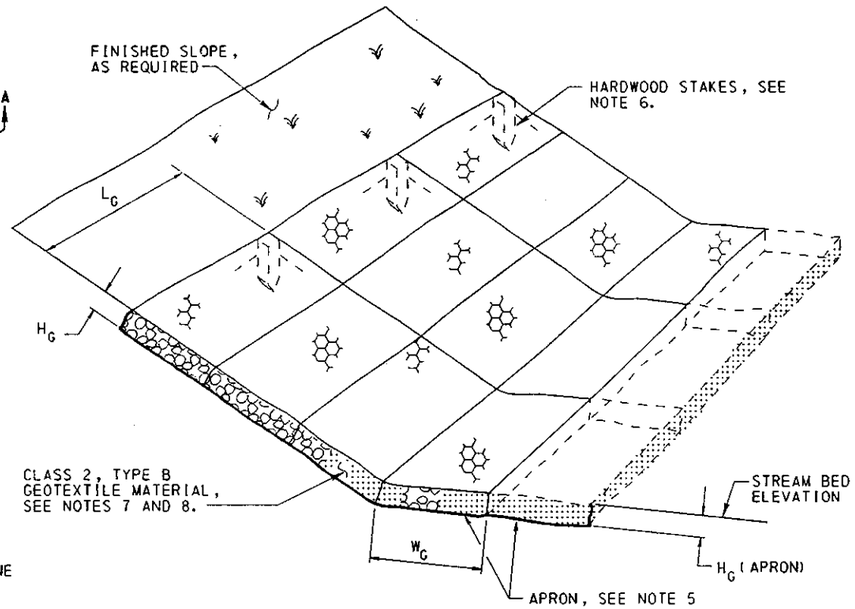
SLOPE PROTECTION

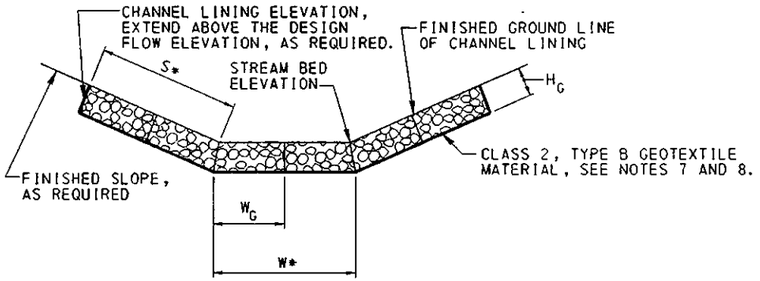
RECOMMENDED MAR. 25, 1994
Fredric J. Bowser
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
M. M. Ruby
CHIEF ENGINEER

SHT. 1 OF 1
RC-40

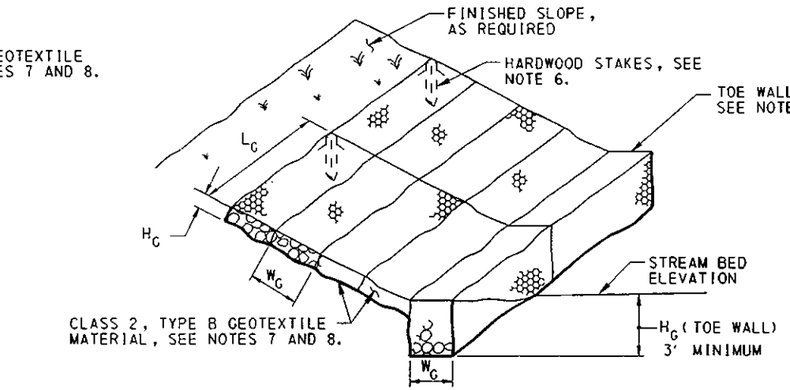




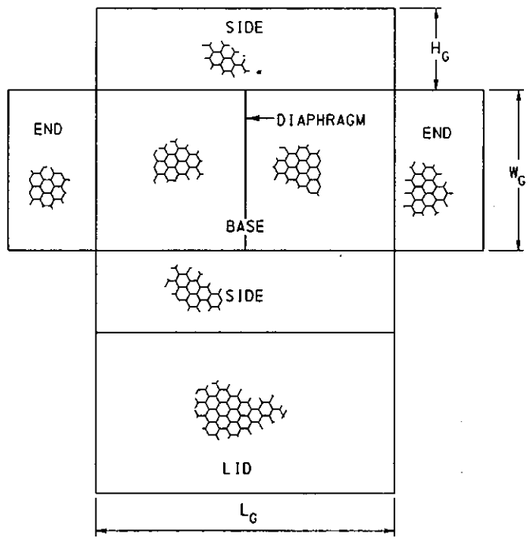


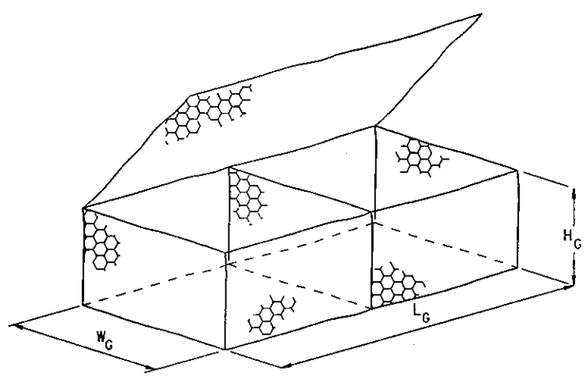
SECTION A-A

CHANNEL LINING

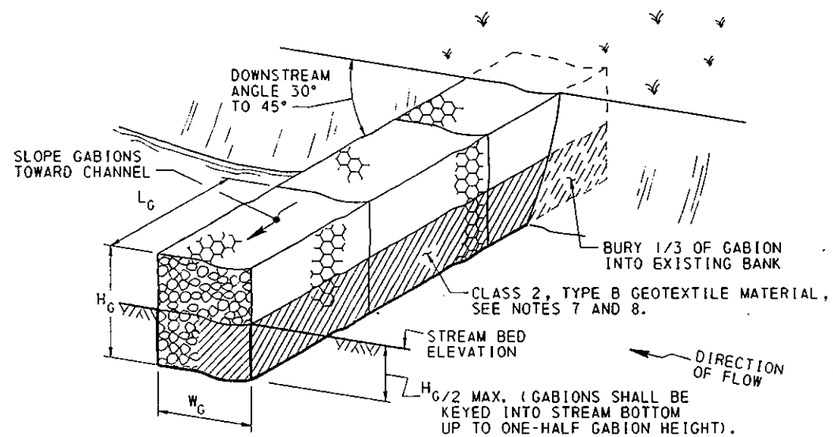


SLOPE WALLS





WIRE MESH BASKETS



CHANNEL DEFLECTOR

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SPECIFICATIONS FOR HIGHWAY CONSTRUCION, SECTION 626, GABIONS.
2. TYPE A GABIONS SHALL CONSIST OF WIRE-MESH BASKETS FILLED BY HAND PLACEMENT OF COARSE AGGREGATE, AT LEAST ALONG THE EXPOSED FACES, FOR A UNIFORM APPEARANCE.
3. TYPE B GABIONS SHALL CONSIST OF WIRE-MESH BASKETS FILLED BY HAND PLACEMENT OR SMALL POWER EQUIPMENT PLACEMENT OF COARSE AGGREGATE.
4. CORROSION RESISTANT TYPE A AND TYPE B GABIONS SHALL BE THE SAME AS TYPE A AND TYPE B GABIONS EXCEPT THAT THE WIRE-MESH SHALL BE SHEATHED IN POLYVINYL CHLORIDE PLASTIC.
5. THE APRON OR TOE WALL IS REQUIRED WHERE THE SLOPE WALL IS INSTALLED ADJACENT TO WATER. THE APRON SHOULD BE APPROXIMATELY TWO TIMES AS WIDE AS THE ANTICIPATED DEPTH OF SCOUR AND THE TOE WALL HEIGHT SHOULD BE AT LEAST EQUAL TO THE ANTICIPATED DEPTH OF SCOUR.
6. WHEN GABIONS ARE PLACED ON A 1½:1 SIDE SLOPE OR STEEPER, DRIVE HARDWOOD STAKES THROUGH THE GABIONS, ALONG THE TOP EDGE, TO ANCHOR THE INSTALLATION. MINIMUM EMBEDMENT OF STAKES BELOW GABION BOTTOM SHALL BE 18 INCHES.
7. PROVIDE GEOTEXTILE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 212 AND SECTION 735.
8. INSTALL GEOTEXTILE MATERIAL ALONG ALL INTERFACE AREAS WITH GROUND CONTACT.

GABIONS SIZES

MATTRESS TYPE		
W_G	L_G	H_G
6'-0"	9'-0"	0'-9"
6'-0"	12'-0"	0'-9"

ADDITIONAL SIZES MAY BE AVAILABLE ON A SPECIAL ORDER BASIS.

STANDARD		
W_G	L_G	H_G
3'-0"	6'-0"	1'-0"
3'-0"	12'-0"	1'-0"
3'-0"	9'-0"	1'-6"
3'-0"	6'-0"	3'-0"
3'-0"	9'-0"	3'-0"
3'-0"	12'-0"	3'-0"

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

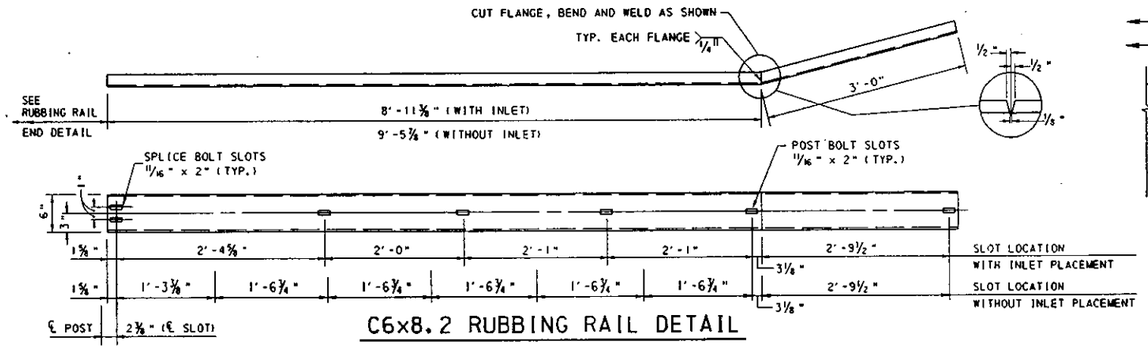
GABIONS

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

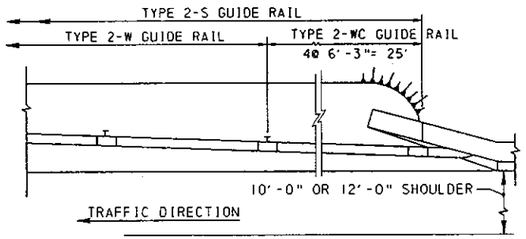
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 1 OF 1

RC-43

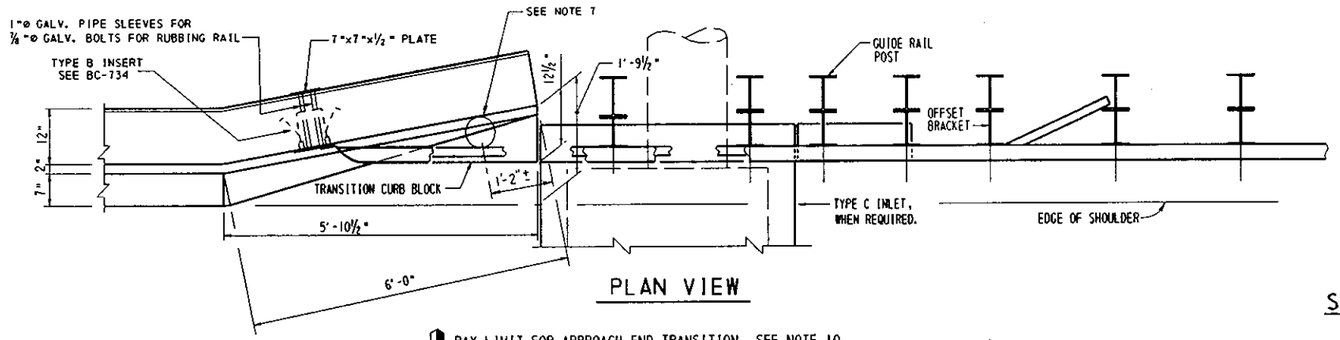


C6x8.2 RUBBING RAIL DETAIL

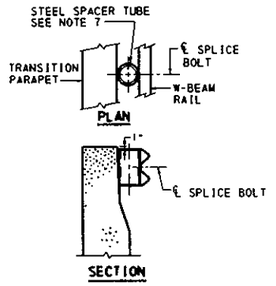


TRAILING END GUIDE RAIL AT STRUCTURE PARAPET

SEE NOTE 2



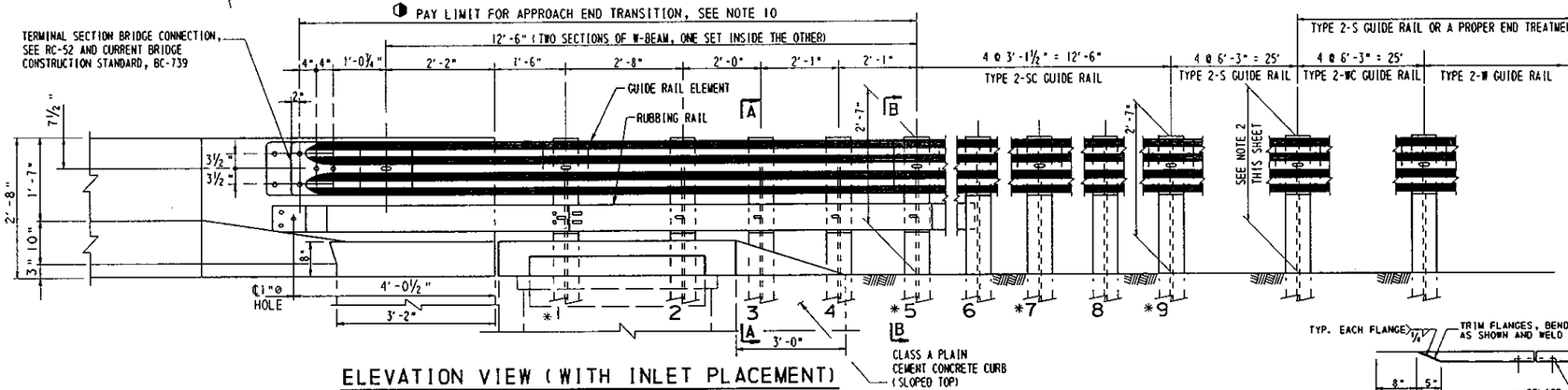
PLAN VIEW



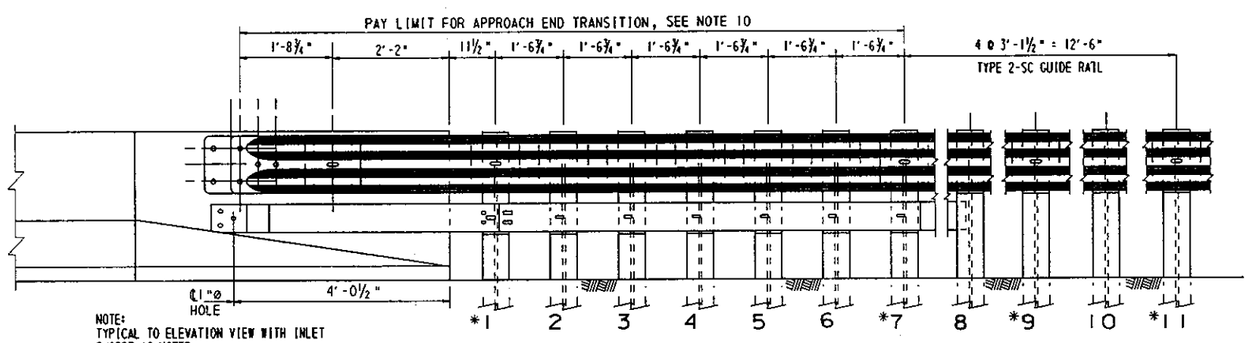
STEEL SPACER TUBE DETAIL

NOTES

1. PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH PUBLICATION 408.
2. PROVIDE APPROACH END GUIDE RAIL TREATMENT AT BOTH THE APPROACH AND TRAILING ENDS OF STRUCTURE PARAPETS ON TWO LANE FACILITIES WITH TWO-WAY TRAFFIC. ON FOUR LANE DIVIDED HIGHWAYS, GUIDE RAIL IS NOT REQUIRED ON TRAILING ENDS OF PARAPETS UNLESS WARRANTED BY OTHER OBSTRUCTIONS.
3. WHEN CONNECTING TO TYPE 2S GUIDE RAIL (OLD 33", NEW 27") OR TYPE 2-W GUIDE RAIL (30"), TRANSITION UP OR DOWN 1" PER 25'.
4. BOLT RUBBING RAIL TO POST WITHOUT WASHER.
5. TERMINAL SECTION AND RUBBING RAIL END MUST BE ATTACHED FLUSH WITH SLOPED TOE OF SAFETY SHAPE. INSTALLATION CAN BE GREATLY SIMPLIFIED BY FABRICATING OR SHOP TWISTING TO BE CONSISTENT WITH THE SLOPE OF SAFETY SHAPE.
6. PROVIDE #1, 2 & 3 POSTS 7'-0" LONG AND EMBED THEM 1'-0" DEEPER THAN THE OTHER POSTS.
7. STEEL SPACER TUBE, SCHEDULE 40 GALVANIZED PIPE, 6"(I.D.)x12". CONNECT TO THE RAIL ELEMENTS USING SPLICE BOLT.
8. GALVANIZE ALL HARDWARE, GUIDE RAIL MATERIAL POSTS AND RUBBING RAIL IN ACCORDANCE WITH PUB. 408, SECTION 1109.
9. CONCRETE PARAPET AND EMBEDED COMPONENTS ARE BRIDGE ITEMS.
10. PAYMENT FOR THE APPROACH END TRANSITION, EITHER WITH OR WITHOUT INLET PLACEMENT, INCLUDES THE TWO 12'-6" SECTIONS OF W-BEAM, POSTS, OFFSET BRACKETS, STEEL SPACER TUBE, RUBBING RAIL, RUBBING RAIL CONNECTIONS, TERMINAL SECTION BRIDGE CONNECTION AND ASSOCIATED HARDWARE.

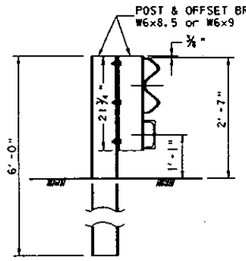


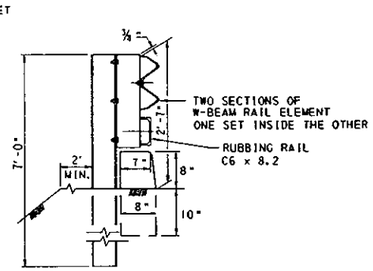
ELEVATION VIEW (WITH INLET PLACEMENT)



ELEVATION VIEW (WITHOUT INLET PLACEMENT)

APPROACH END GUIDE RAIL TRANSITION AT STRUCTURE PARAPET

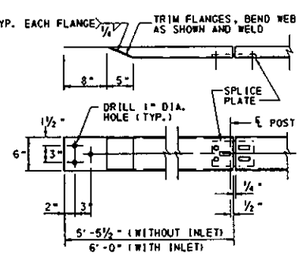




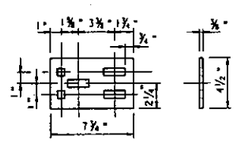
LEGEND

◑ ON STRUCTURES WHERE STRUCTURE MOUNTED (TYPE 2-SC) GUIDE RAIL IS USED, THE APPROACH END TRANSITION IS NOT REQUIRED.

* POSTS THAT ARE DENOTED WITH (*) ARE BOLTED TO THE W-BEAM.



C6x8.2 RUBBING RAIL END DETAIL

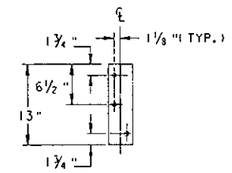


SPLICE PLATE DETAIL

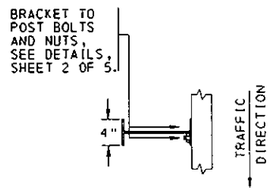
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

GUIDE RAIL TRANSITION AT END OF STRUCTURE

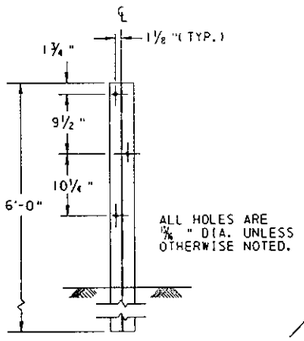
RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHEET 1 OF 1
Fredric Bowser	M. M. Ryan	RC-50
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	



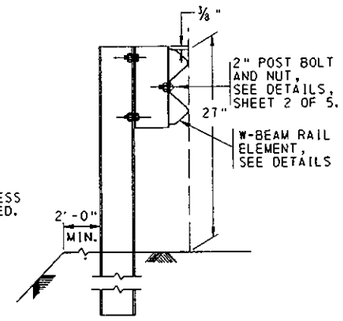
OFFSET BRACKET



PLAN VIEW

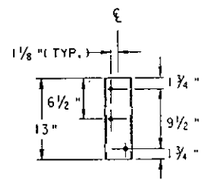


POST

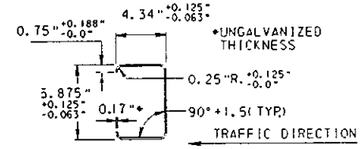


SIDE VIEW

W6 x 8.5 OR W6 x 9 POST DETAILS

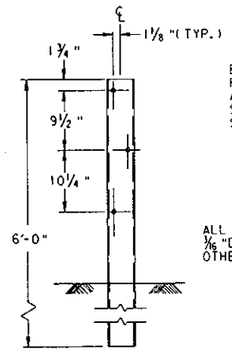


OFFSET BRACKET

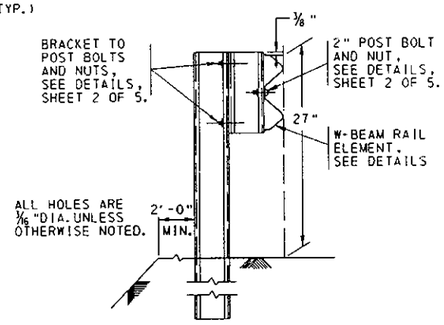


TYPICAL SECTION

POST & OFFSET BRACKET

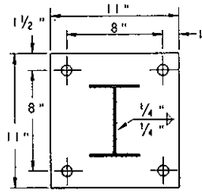


POST



SIDE VIEW

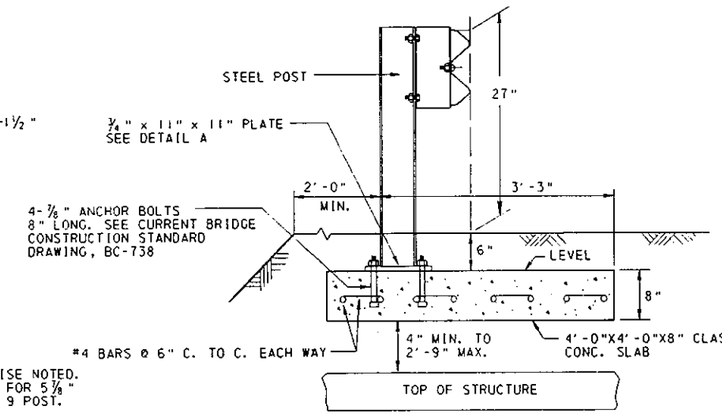
5⅞ " COLD FORMED C-POST DETAILS



DETAIL A

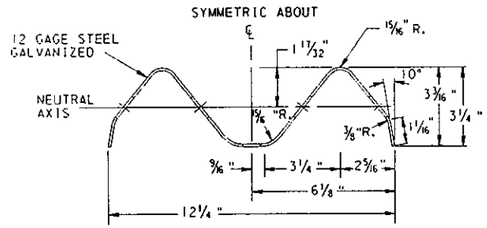
THICKNESS IS ¾ "

ALL HOLES 1"ø UNLESS OTHERWISE NOTED.
USE SAME BASE PLATE DETAILS FOR 5⅞ " COLD FORMED C-POST AND W6 X 9 POST.

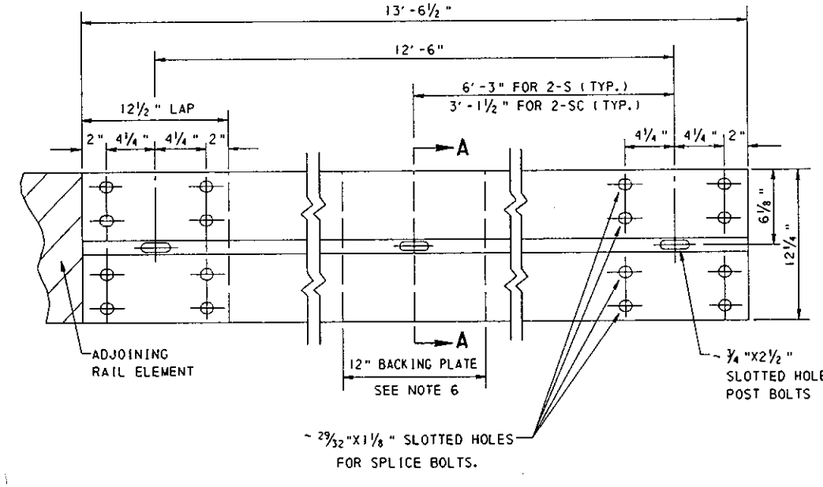


STEEL POSTS OVER UNDERGROUND STRUCTURES

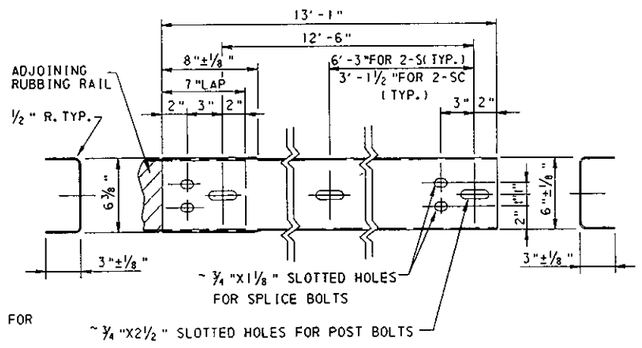
SEE NOTE 3



RAIL ELEMENT SECTION A - A



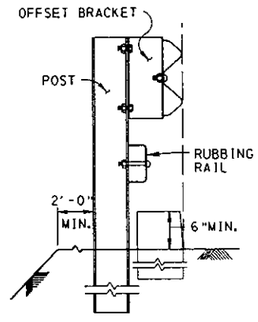
W-BEAM RAIL ELEMENT



6"x3"x10 GA. COLD FORMED CHANNEL OR C6x8.2 RUBBING RAIL

SEE NOTE 4

~ FOR SPLICE BOLT AND POST BOLT DETAILS, SEE SHEET 2 OF 5.



GUIDE RAIL WITH CURB OR RUBBING RAIL

SEE NOTE 4

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 620.
2. PROVIDE EITHER 5⅞ " C-POST OR W6 x 8.5 OR W6 x 9 POSTS WITH MATCHING OFFSET BRACKETS FOR THE STRONG POST GUIDE RAIL SYSTEM. MIXING OF DIFFERENT POSTS AND OFFSET BRACKETS WILL NOT BE ACCEPTABLE WITHIN A PROJECT.
3. NO SEPARATE PAYMENT WILL BE MADE FOR INSTALLATION OF GUIDE RAIL OVER UNDERGROUND STRUCTURES. CONCRETE, REINFORCEMENT BARS AND HARDWARE ARE INCIDENTAL TO THE GUIDE RAIL PAY ITEM.
4. PROVIDE RUBBING RAIL WHEN THE HEIGHT OF STRONG POST GUIDE RAIL IS OVER 28" IN TRANSITION AREAS TO EXISTING GUIDE RAIL.
5. ATTACH W-BEAM RAIL ELEMENTS TO EACH POST. SPLICE RAIL ELEMENTS ONLY AT POSTS AND LAP IN THE DIRECTION OF TRAFFIC.
6. USE 12" BACKING PLATES FOR THE W-BEAM RAIL ELEMENTS AT ALL INTERMEDIATE POSTS WITH THE SAME SECTION AS THE W-BEAM RAIL ELEMENT.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

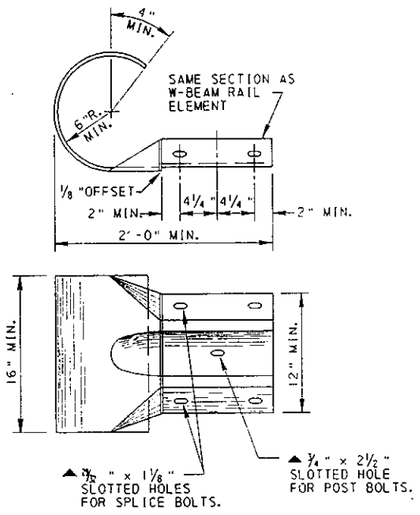
TYPE 2 STRONG POST GUIDE RAIL

RECOMMENDED MAR. 25, 1994
Fredric Bowers
DIRECTOR, BUREAU OF DESIGN

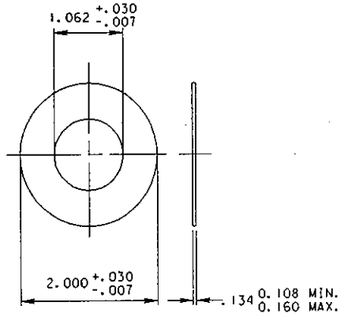
RECOMMENDED MAR. 25, 1994
M. M. Ryan
CHIEF ENGINEER

SHT. 1 OF 5

RC-52

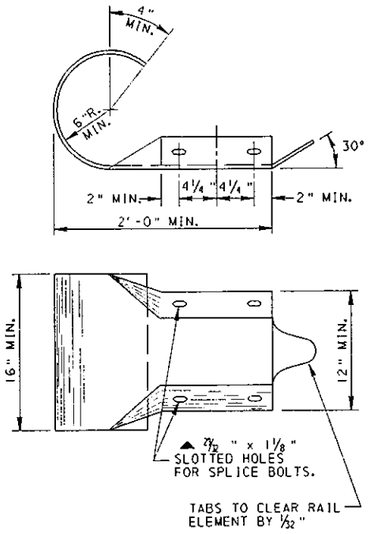


TERMINAL TO BE PLACED ON BACK OF RAIL ELEMENT

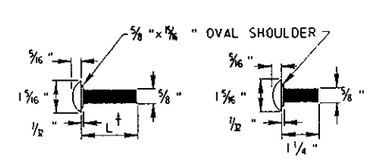


DETAIL B
TYPE A PLAIN WASHER

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

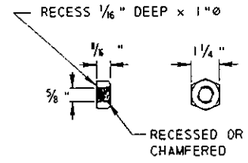


TERMINAL TO BE PLACED ON FACE OF RAIL ELEMENT



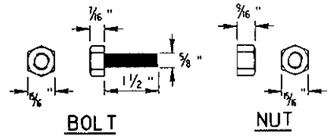
POST BOLT

SPLICE BOLT



NUT

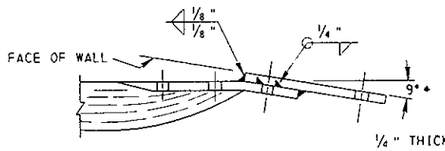
† USE L=4 1/2 " FOR ALL RUBBING RAIL TO GUIDE RAIL POST CONNECTIONS AND USE L=2" FOR ALL W-BEAM RAIL ELEMENT TO GUIDE RAIL POST CONNECTIONS AND OFFSET BRACKET CONNECTIONS.



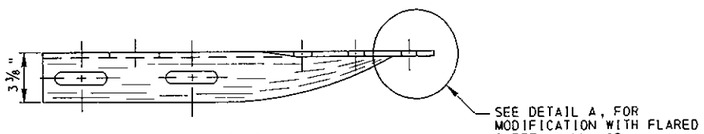
BOLT NUT

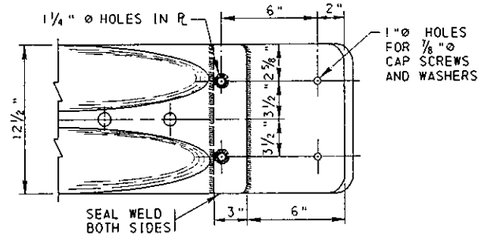
BRACKET TO POST BOLT AND NUT

ALTERNATE TERMINAL SECTIONS



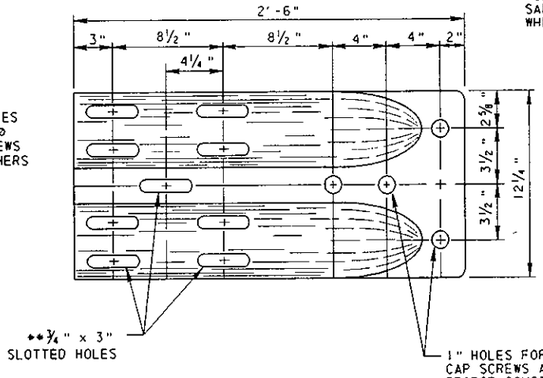
◆ OR TO BE DETERMINED BY ENGINEER.





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

DETAIL A



◆◆ PROVIDE SPLICE BOLTS WITH A LOCK NUT OR DOUBLE NUT AND TIGHTEN ONLY TO A POINT THAT WILL ALLOW GUIDE RAIL TO BE FREE TO MOVE. CENTER SPLICE BOLTS IN THE SLOTTED HOLES. SEE CURRENT BRIDGE CONSTRUCTION DRAWINGS, BC-739, FOR ATTACHMENT DETAILS.

TERMINAL SECTION BRIDGE CONNECTION

NOTES

1. USE SPLICE BOLTS TO DEVELOP THE DESIGN STRENGTH OF THE RAIL ELEMENT.
2. PROVIDE TERMINAL SECTION BRIDGE CONNECTION, WITH WELDED PLATE FOR SAFETY, AS AN INCIDENTAL ITEM.
3. SLIGHTLY NOTCH ROUND HEADS OF POST AND SPLICE BOLTS TO PROVIDE FOR WRENCH, WHEN REQUIRED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

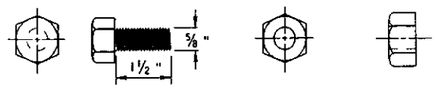
TYPE 2 STRONG POST GUIDE RAIL

RECOMMENDED MAR. 25, 1994
Fredric Bowser
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
M. M. Ryan
CHIEF ENGINEER

SHT. 2 OF 5

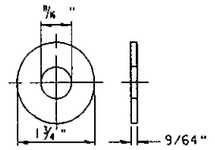
RC-52



5/8 "Ø HEX BOLT 5/8 "Ø HEX NUT

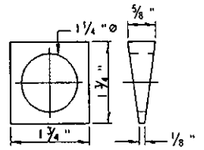
DETAIL A

HEX BOLT AND NUT



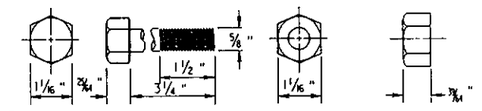
DETAIL B

STEEL WASHER



DETAIL C

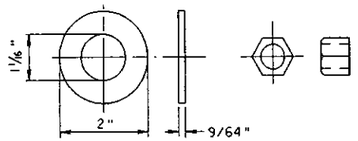
TAPERED WASHER



5/8 "Ø HS BOLT 5/8 "Ø HS NUT

DETAIL D

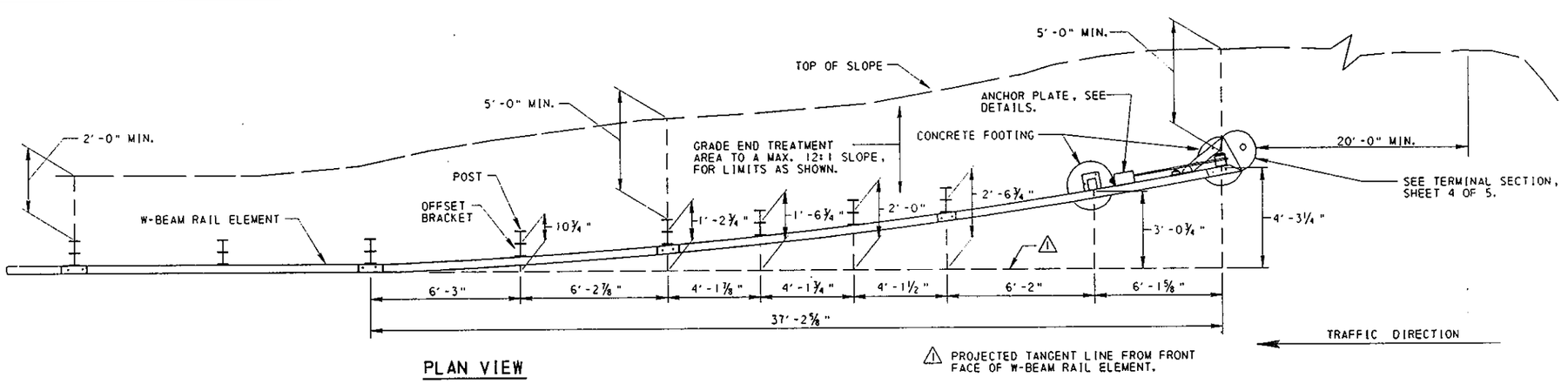
HIGH STRENGTH HEX BOLT AND NUT



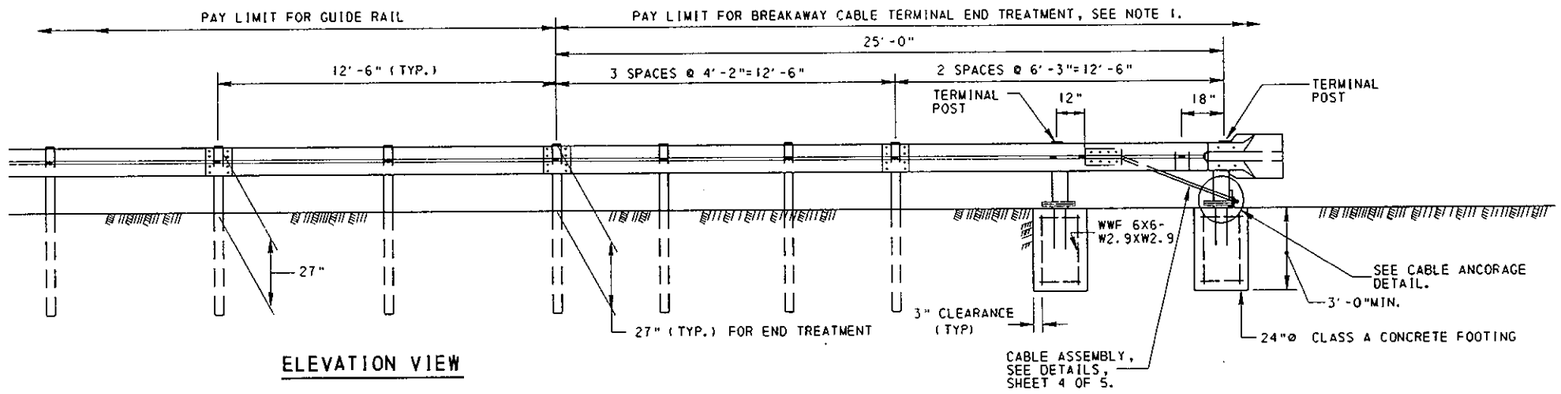
STEEL WASHER 1"Ø HEX NUT

DETAIL E

HEX NUT AND STEEL WASHER



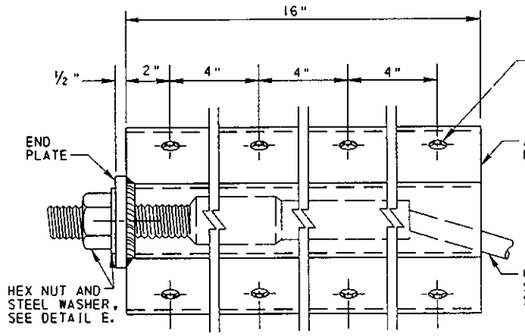
PLAN VIEW



ELEVATION VIEW

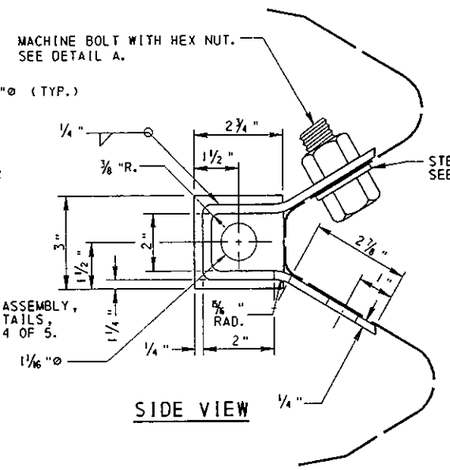
BREAKAWAY CABLE TERMINAL END TREATMENT

BREAKAWAY CABLE TERMINAL END TREATMENT FASTNERS



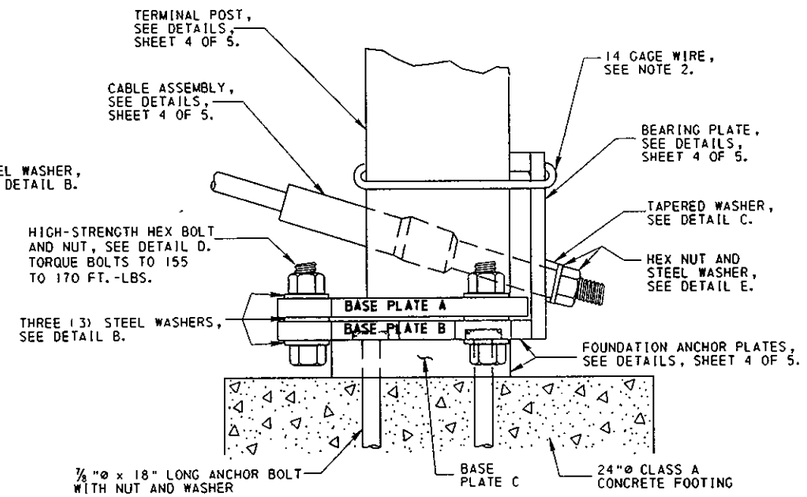
FRONT VIEW

(WITH CABLE ASSEMBLY)



SIDE VIEW

ANCHOR PLATE



CABLE ANCHORAGE DETAIL

FOR FOUNDATION DETAILS, SEE SHEET 4 OF 5.

NOTES

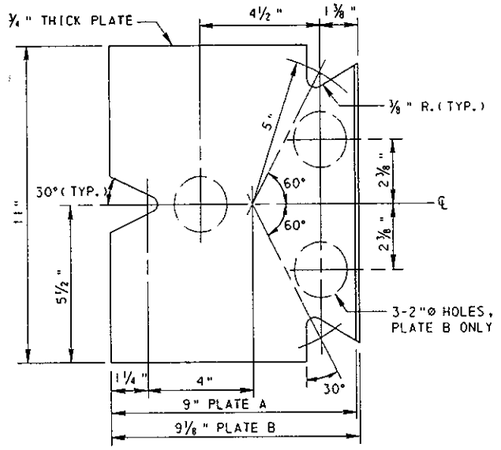
1. PAYMENT FOR THE BREAKAWAY CABLE TERMINAL END TREATMENT INCLUDES THE LAST 25'-0" OF RAIL ELEMENT, POSTS, TERMINAL SECTION-B.C.T., CABLE ASSEMBLY, HARDWARE, ANCHOR AND BEARING PLATES, EXCAVATION AND CLASS A CEMENT CONCRETE.
2. TO RETAIN BEARING PLATE POSITION AFTER INSTALLATION, WRAP A SINGLE 14 GAGE GALVANIZED WIRE AROUND TERMINAL POST AND PLATE NEAR TOP OF PLATE.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

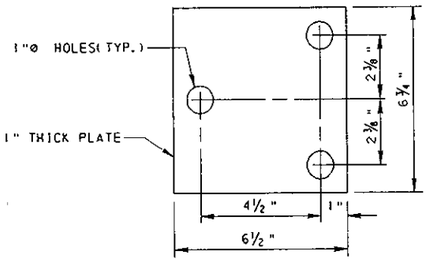
TYPE 2 STRONG POST GUIDE RAIL

BREAKAWAY CABLE TERMINAL (B.C.T.) END TREATMENT

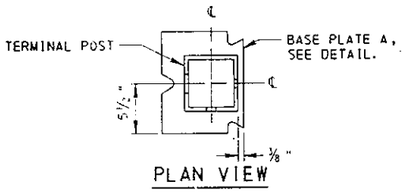
RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHT. 3 OF 5
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	RC-52



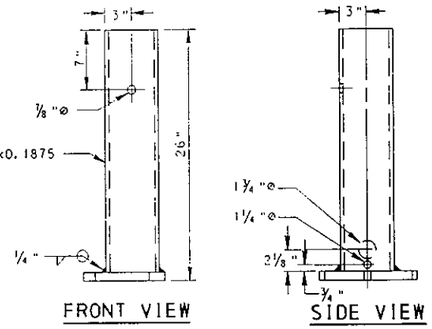
BASE PLATES A & B



BASE PLATE C

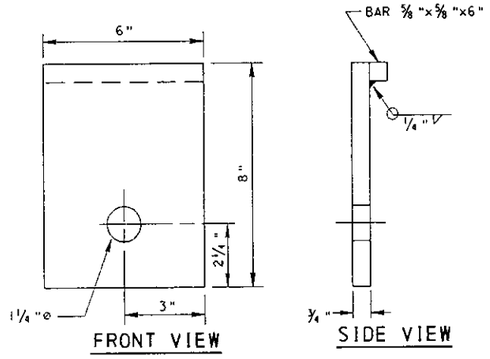


PLAN VIEW



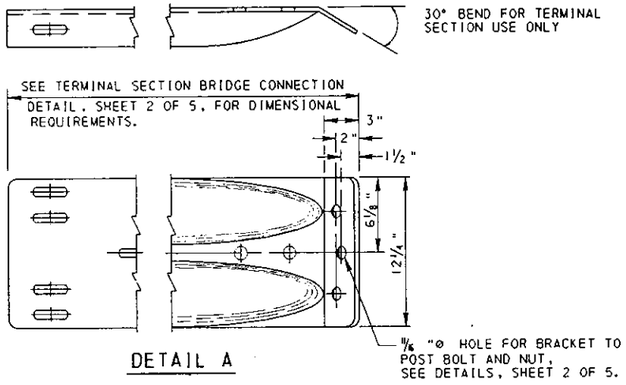
FRONT VIEW SIDE VIEW

TERMINAL POST



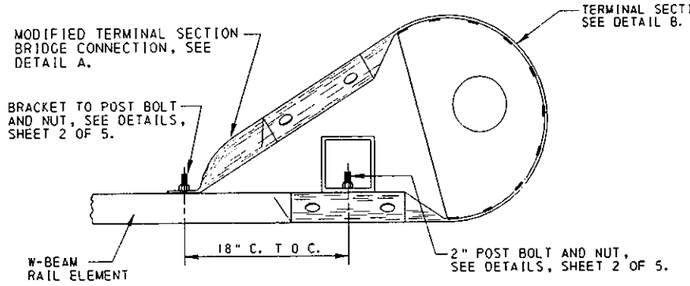
FRONT VIEW SIDE VIEW

BEARING PLATE

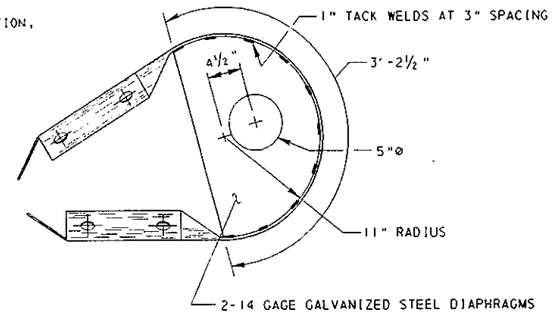


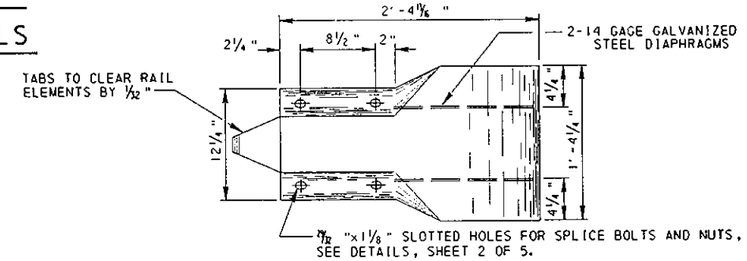
DETAIL A

MODIFIED TERMINAL SECTION BRIDGE CONNECTION



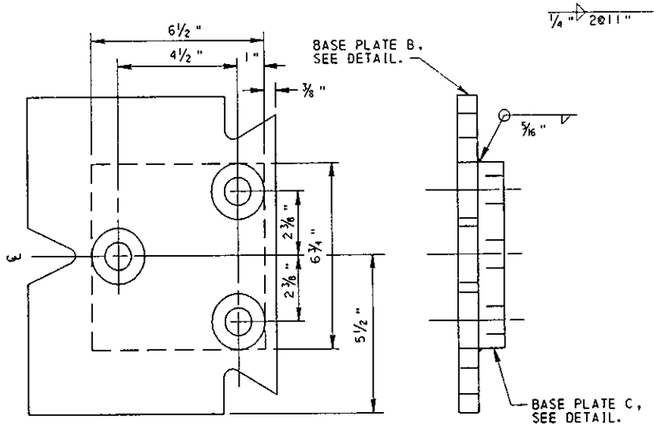
TERMINAL SECTION ASSEMBLY DETAILS





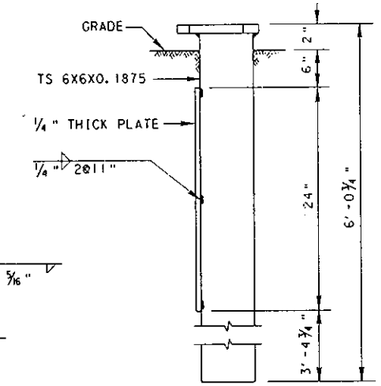
DETAIL B

TERMINAL SECTION

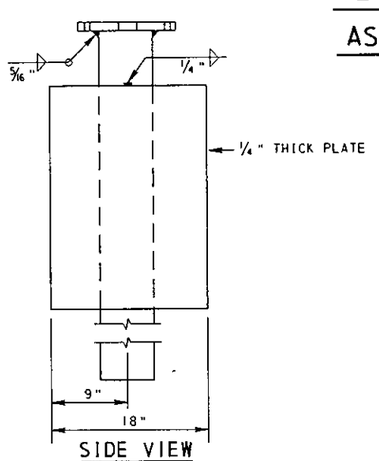


PLAN VIEW SIDE VIEW

FOUNDATION ANCHOR PLATE



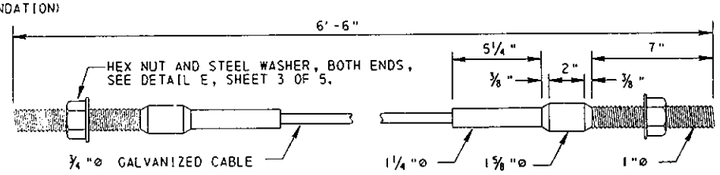
FRONT VIEW



SIDE VIEW

FOUNDATION POST

(USE AS ALTERNATE FOUNDATION TO ANCHOR PLATE AND CONCRETE FOUNDATION)



CABLE ASSEMBLY

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

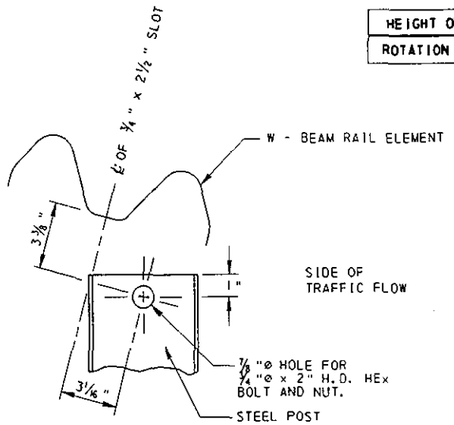
TYPE 2 STRONG POST GUIDE RAIL

BREAKAWAY CABLE TERMINAL (B.C.T.) END TREATMENT

RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHT. 4 OF 5
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	RC-52

TABLE A

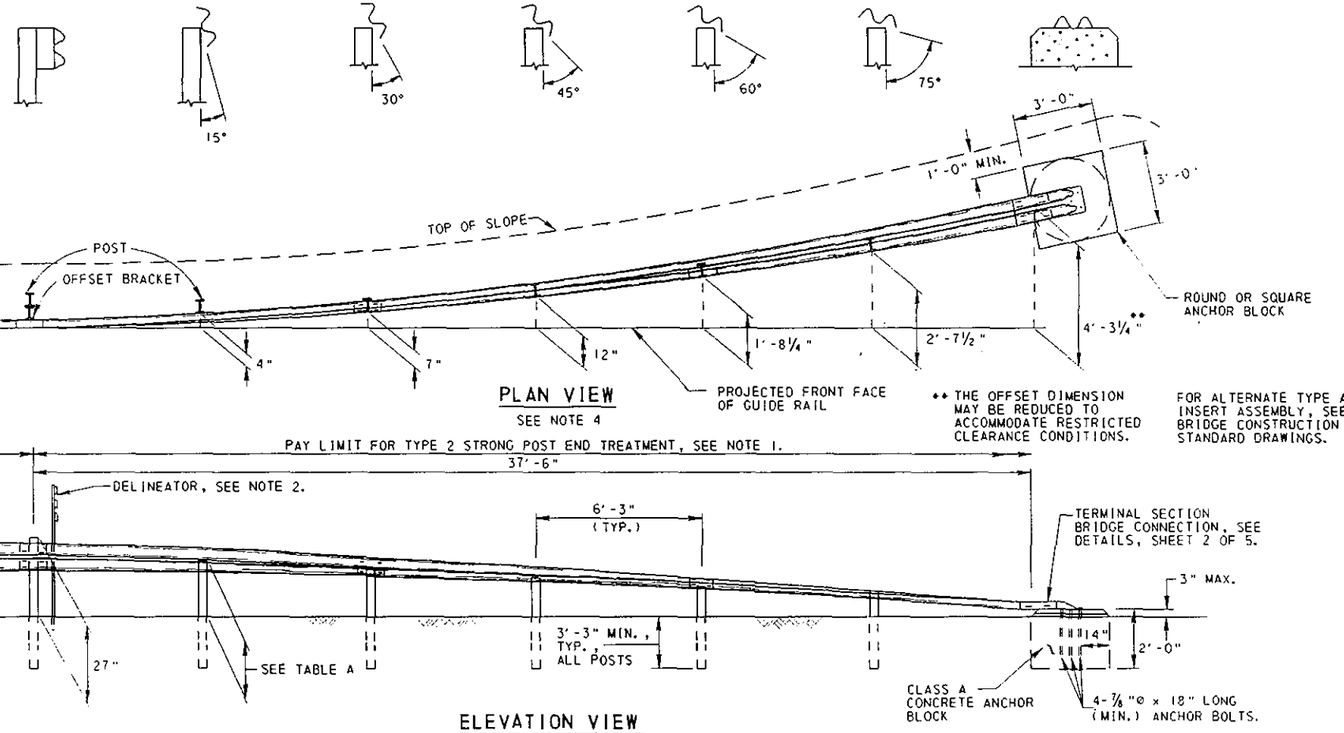
HEIGHT OF POST	17"	14½"	11¾"	8½"	4½"
ROTATION ANGLES	15°	30°	45°	60°	75°



TYPICAL FOR
15° THRU 75° POSITIONS
ROTATING BRACKET

W6X9 POST — 5⅞" C-POST

POSITIONING OF ROTATING BRACKET



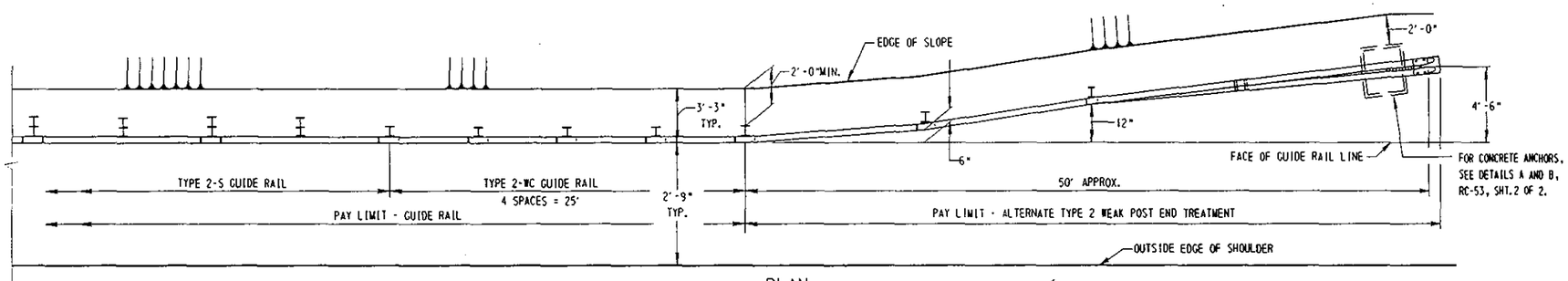
PLAN VIEW
SEE NOTE 4

** THE OFFSET DIMENSION MAY BE REDUCED TO ACCOMMODATE RESTRICTED CLEARANCE CONDITIONS.

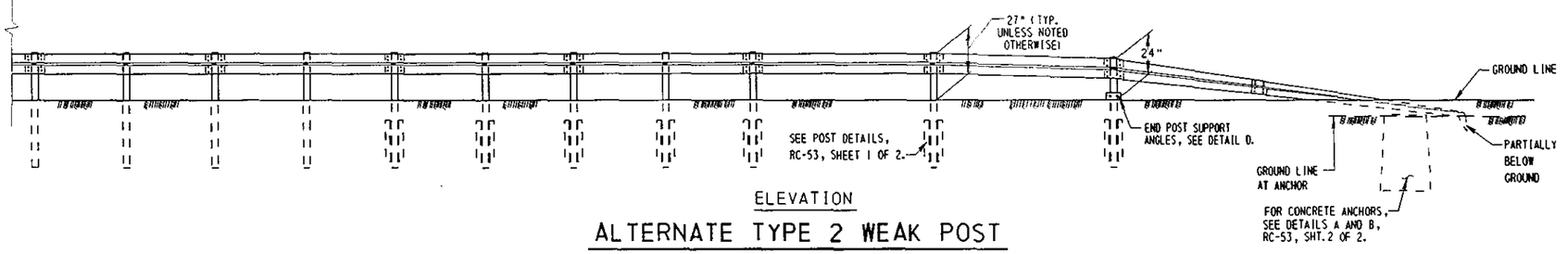
FOR ALTERNATE TYPE A INSERT ASSEMBLY, SEE BRIDGE CONSTRUCTION STANDARD DRAWINGS.

ELEVATION VIEW

TYPE 2 STRONG POST END TREATMENT
SEE NOTE 5



PLAN



ELEVATION

ALTERNATE TYPE 2 WEAK POST END TREATMENT
SEE NOTE 5

NOTES

1. PAYMENT FOR TYPE 2 STRONG POST END TREATMENT INCLUDES 37'-6" OF SLOPING RAIL, TERMINAL SECTION, HARDWARE, EXCAVATION AND CONCRETE.
2. INSTALL DELINEATOR ASSEMBLIES UNDER SEPARATE PAY ITEM OR CONTRACT. FOR ADDITIONAL DETAILS, SEE TRAFFIC STANDARD TC7709.
3. ONLY THE NECESSARY DIMENSIONS, FOR UNIFORMITY AND INTERCHANGEABILITY OF ROTATING BRACKETS, ARE INDICATED. PROVIDE ROTATING BRACKETS SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15.
4. MEASURE OFFSETS FROM THE PROJECTED FRONT FACE OF THE GUIDE RAIL TO THE FRONT FACE OF THE POST.
5. TYPE 2 STRONG POST AND ALTERNATE TYPE 2 WEAK POST END TREATMENTS MAY BE USED TO TERMINATE STRONG POST GUIDE RAIL EXCEPT ON THE INTERIM N.H.S. HIGHWAYS WITH POSTED SPEEDS OF 50 MPH AND ABOVE AND WITH CURRENT TRAFFIC VOLUMES IN EXCESS OF 6,000 VEHICLES PER DAY.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

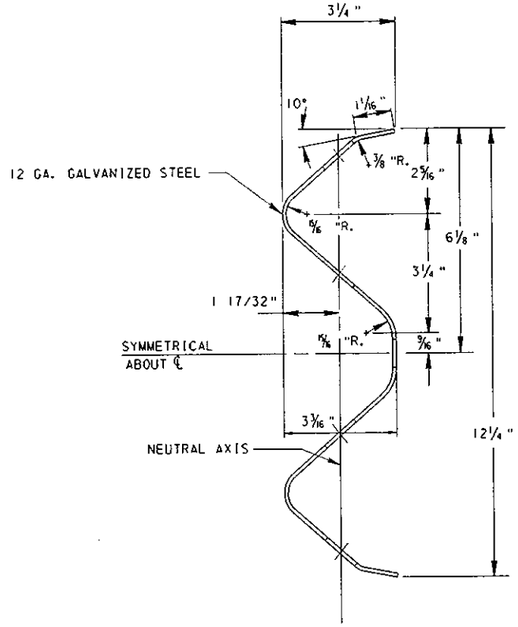
TYPE 2 STRONG POST GUIDE RAIL END TREATMENTS

RECOMMENDED MAR. 25, 1994
Fredric Bowser
DIRECTOR, BUREAU OF DESIGN

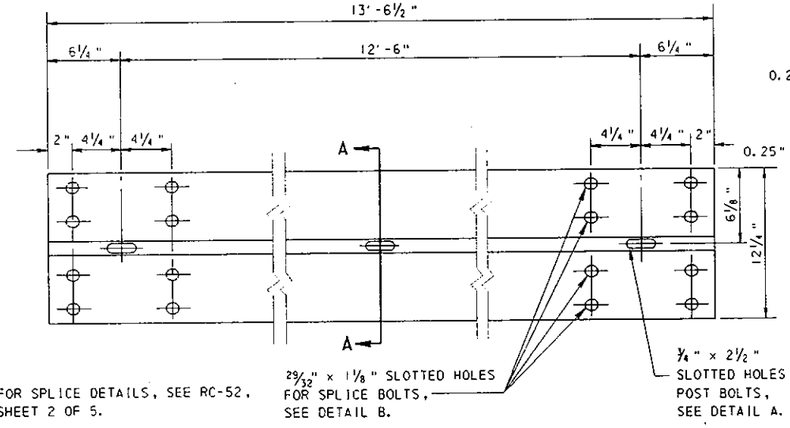
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 5 OF 5

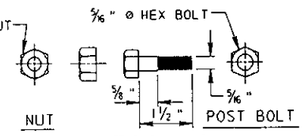
RC-52



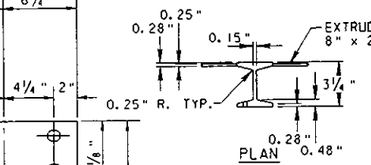
SECTION A-A



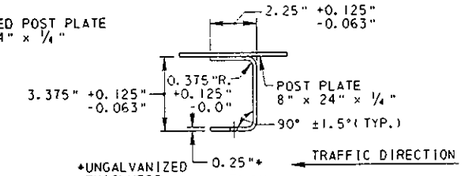
* W-BEAM RAIL ELEMENT



DETAIL A

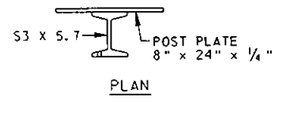


PLAN

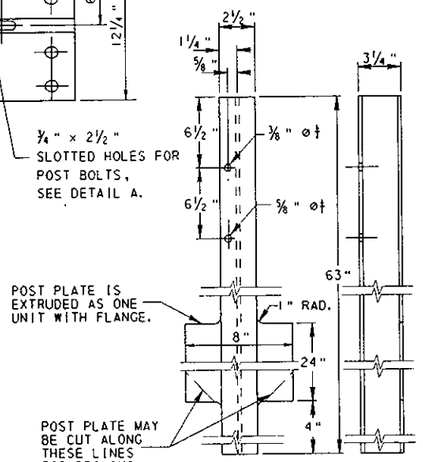


PLAN

TRAFFIC DIRECTION

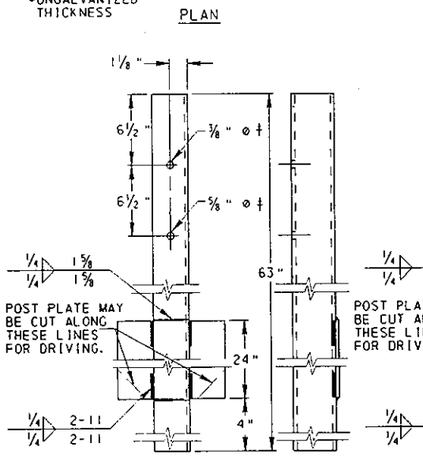


PLAN



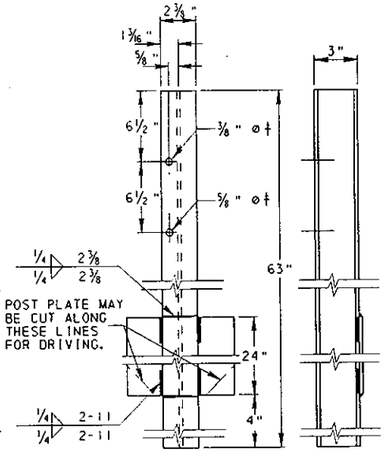
ELEVATION SIDE

ALUMINUM ALLOY POST



ELEVATION SIDE

3⅜ " x 2¼ " COLD FORMED CHANNEL POST



ELEVATION SIDE

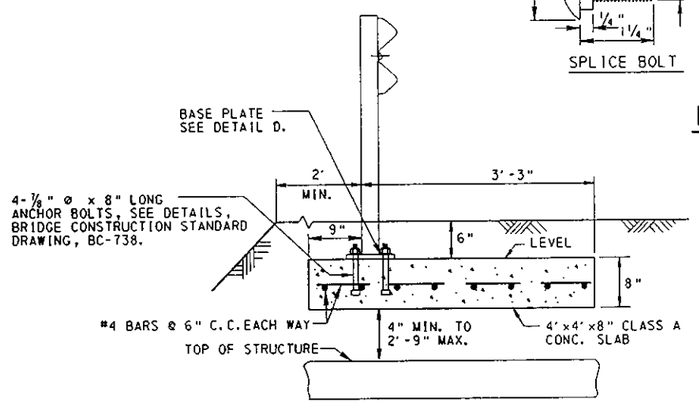
S3 x 5.7

TYPE 2-W GUIDE RAIL POSTS

† POST DETAILS FOR TYPE 2-WM MEDIAN BARRIER SHALL CONFORM TO THE DETAILS AS SHOWN, EXCEPT THAT THE POST BOLT AND SUPPORT BOLT HOLES SHALL BE LOCATED ON THE FRONT AND REAR FLANGES.

NOTES

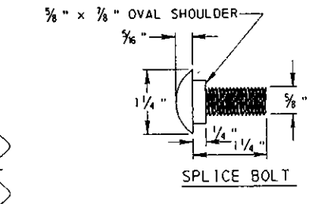
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 620.
2. THE 3⅜ " x 2¼ " COLD FORMED CHANNEL POST, S3 x 5.7 POST AND ALUMINUM ALLOY POST MAY BE BID AS ALTERNATES FOR TYPE 2 WEAK POST GUIDE RAIL SYSTEM; HOWEVER, MIXING OF DIFFERENT POSTS WILL NOT BE ACCEPTABLE WITHIN A PROJECT.
3. DURING ERECTION, USE TEMPORARY SUPPORT BOLTS OR TEMPORARY DRIFT PINS TO SUPPORT THE RAIL ELEMENT UNTIL THE 5/16 " POST BOLTS ARE PROPERLY TORQUED.
4. ATTACH W-BEAM RAIL ELEMENT TO EACH POST. SPLICE ONLY AT POSTS AND LAP IN THE DIRECTION OF TRAFFIC.



GUIDE RAIL

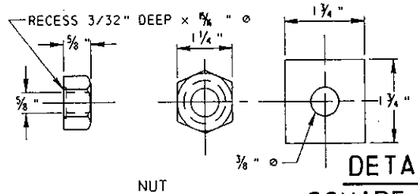
OVER UNDERGROUND STRUCTURES

NO SEPARATE PAYMENT WILL BE MADE FOR INSTALLATION OF GUIDE RAIL OVER UNDERGROUND STRUCTURES. CONCRETE, REINFORCEMENT BARS, AND HARDWARE WILL BE CONSIDERED INCIDENTAL TO THE GUIDE RAIL PAY ITEM.



SPLICE BOLT

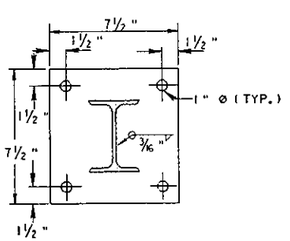
DETAIL B



NUT

DETAIL C

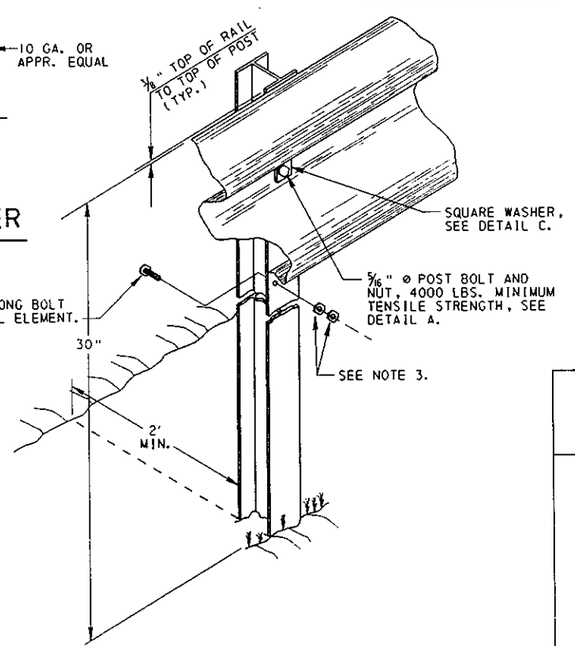
SQUARE WASHER



DETAIL D

BASE PLATE

(USE BASE PLATE FOR 3⅜ " x 2¼ " COLD FORMED CHANNEL POST, ALUMINUM ALLOY POST AND S3 x 5.7 POST.)



TYPICAL INSTALLATION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

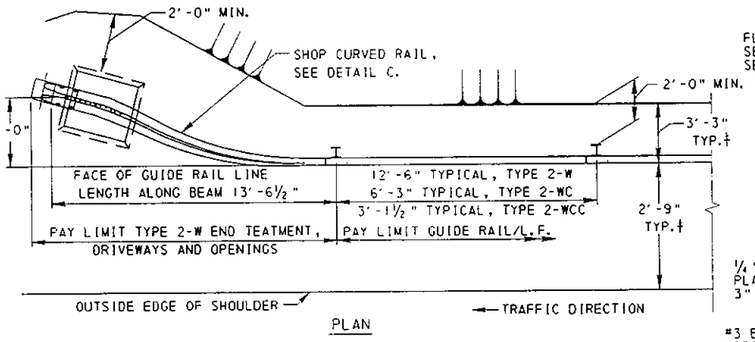
TYPE 2 WEAK POST GUIDE RAIL

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

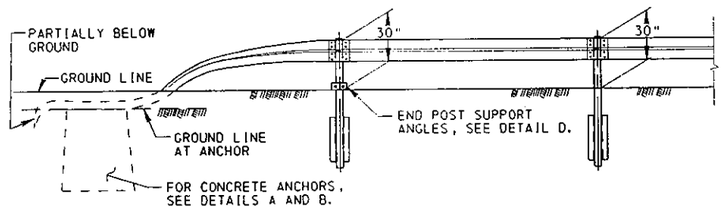
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 1 OF 2

RC-53



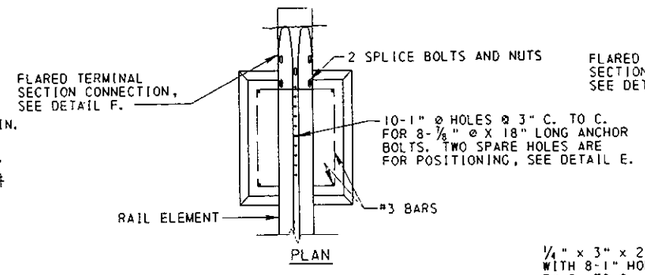
PLAN



ELEVATION

TYPE 2-W END TREATMENT AT DRIVEWAYS & OPENINGS

(USE ON BOTH SIDES OF DRIVEWAYS & OPENINGS)



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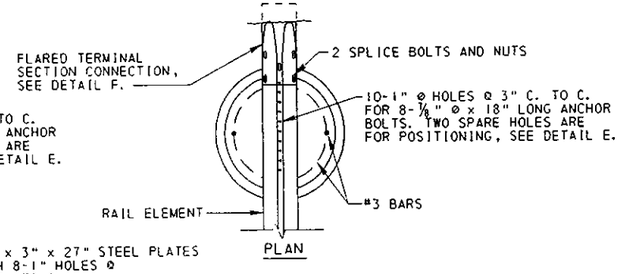
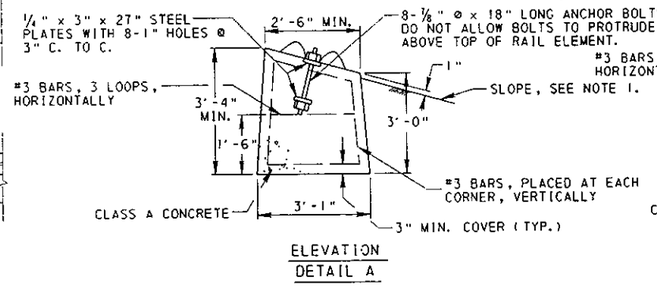
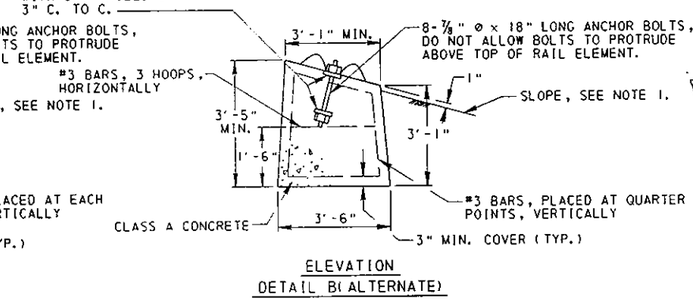


PLAN

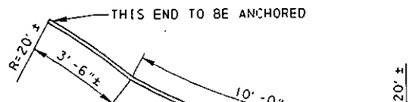


ELEVATION
DETAIL A



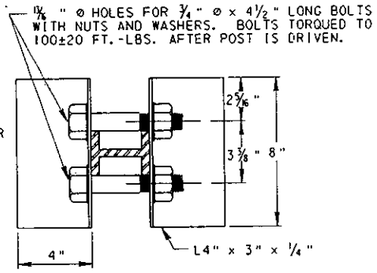
ELEVATION
DETAIL B (ALTERNATE)

CONCRETE ANCHOR



SHOP BENDING REQUIRED TO MAKE THE END TREATMENT AT DRIVEWAYS & OPENINGS.

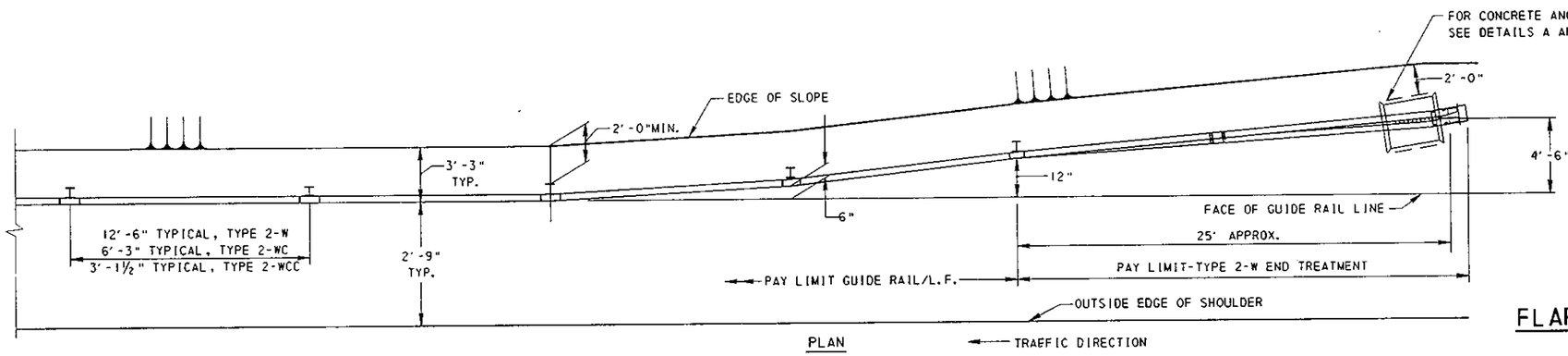
DETAIL C
SHOP CURVED RAIL



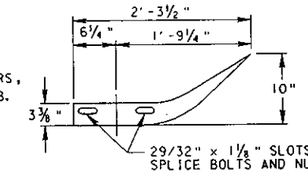
DETAIL D
END POST SUPPORT ANGLES

NOTE:

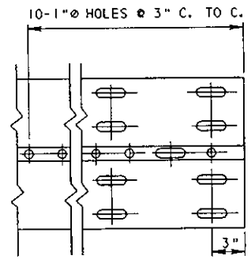
1. USE TYPE 2-W END TREATMENT AT APPROACH AND TRAILING ENDS OF TYPE 2-W GUIDE RAIL UNLESS THE END IS BURIED IN A CUT SLOPE. SEE RC-54, SHEET 3 OF 3, TREATMENT-CUT TO FILL CONDITIONS DETAILS.



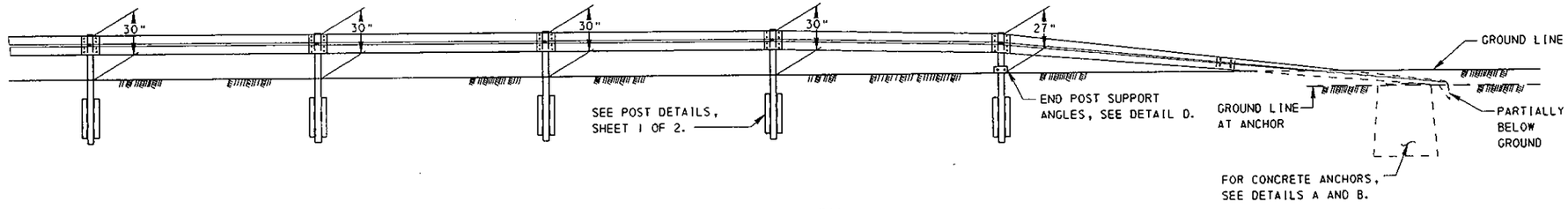
PLAN



DETAIL F
FLARED TERMINAL SECTION



DETAIL E



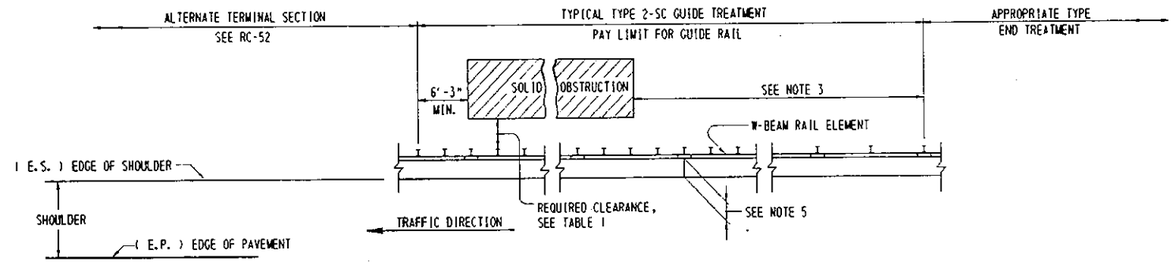
ELEVATION

TYPE 2-WEAK POST END TREATMENT

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

TYPE 2 WEAK POST GUIDE RAIL END TREATMENTS

RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHT. 2 OF 2
Fredes Bowser	M.M. Ryan	RC-53
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	



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

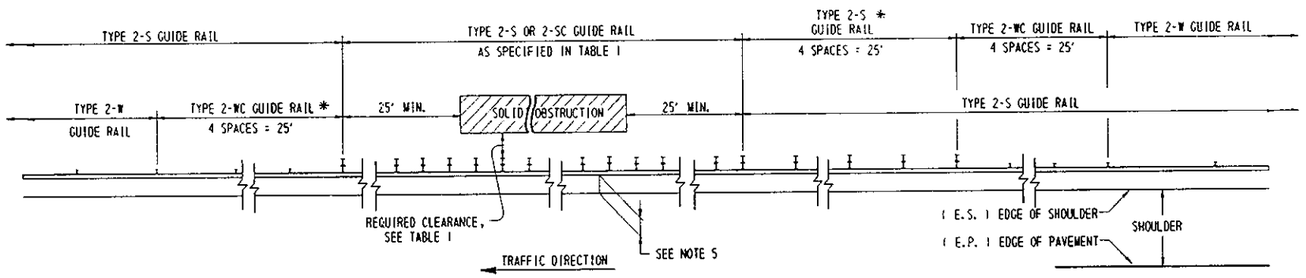
TABLE I

TYPE OF GUIDE RAIL	REQUIRED † CLEARANCES
2-SC	2'
2-S	4'
2-WCC	4'
2-WC	5'
2-W	8'

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

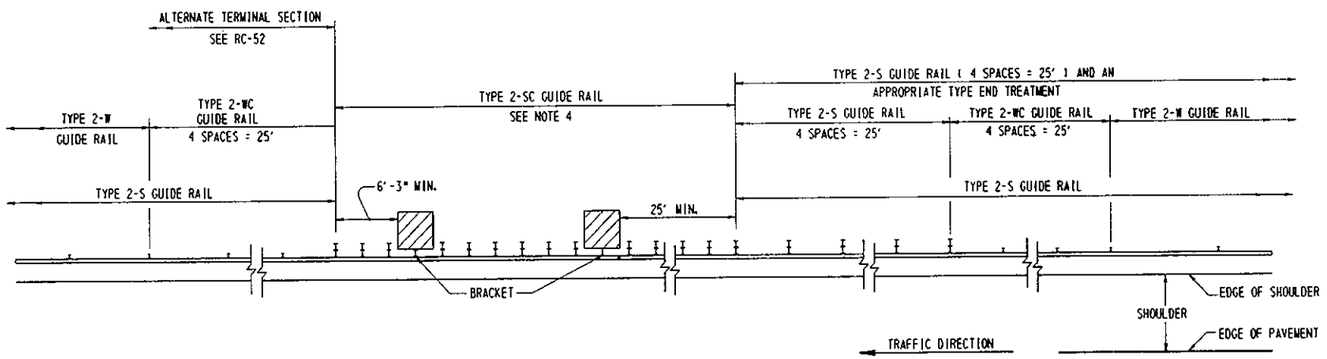
NOTES:

1. THE TREATMENTS SHOWN ARE FOR FOUR LANE DIVIDED HIGHWAYS. USE THE APPROACH END TREATMENT AT BOTH SIDES OF THE OBSTRUCTION ON TWO-LANE FACILITIES WITH TWO-WAY TRAFFIC.
2. THIS STANDARD HAS BEEN PREPARED AS A GUIDE FOR THE PLACEMENT OF GUIDE RAIL AND MEDIAN BARRIER. IT IS IMPRACTICAL TO PROVIDE A STANDARD FOR ALL POSSIBLE CONDITIONS. MODIFICATIONS OF TREATMENTS CAN BE MADE TO FIT EXISTING CONDITIONS: HOWEVER, FOLLOW THE RECOMMENDED GUIDELINES IN DM-2, CHAPTER 12.
3. THIS DISTANCE VARIES AND THE REQUIRED LENGTH WILL BE DETERMINED BY THE DESIGNER USING THE GUIDELINES FOUND IN DM-2, CHAPTER 12, AND WILL BE SHOWN ON THE TABULATIONS. WHERE CALCULATIONS SHOW A DISTANCE LESS THAN 50', USE 50' AS A MINIMUM DISTANCE.
4. WHERE THE 2' REQUIRED CLEARANCE TO OBSTRUCTION IS NOT AVAILABLE, SINGLE FACE CONCRETE BARRIER MAY BE USED WITH APPROACH GUIDE RAIL TRANSITION IN ACCORDANCE WITH RC-50.
5. THE TYPICAL DISTANCE FROM THE EDGE OF SHOULDER TO THE FRONT FACE OF THE W-BEAM RAIL ELEMENT IS 2'-9". THIS DISTANCE MAY VARY AND ACTUAL PLACEMENT OF THE GUIDE RAIL SYSTEM SELECTED SHOULD BE DETERMINED BASED ON FIELD CONDITIONS. THE SYSTEM SELECTED SHOULD BE LOCATED AS FAR FROM THE EDGE OF SHOULDER AS POSSIBLE AND STILL MAINTAIN REQUIRED CLEARANCES DETERMINED FROM TABLE I.



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

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



TREATMENT WHEN THE REQUIRED CLEARANCE TO OBSTRUCTION IS NOT AVAILABLE

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

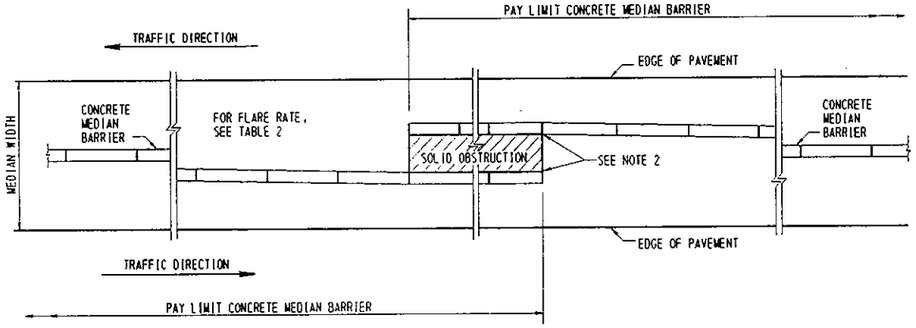
BARRIER PLACEMENT AT OBSTRUCTIONS

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

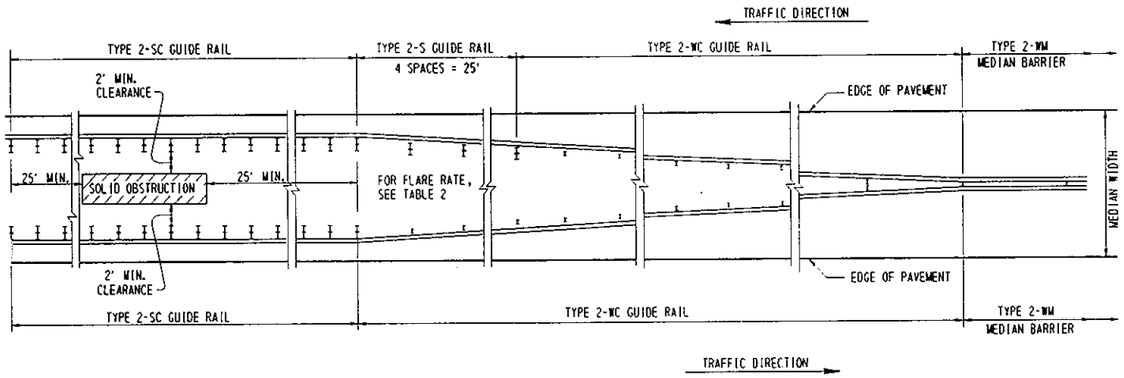
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 1 OF 3

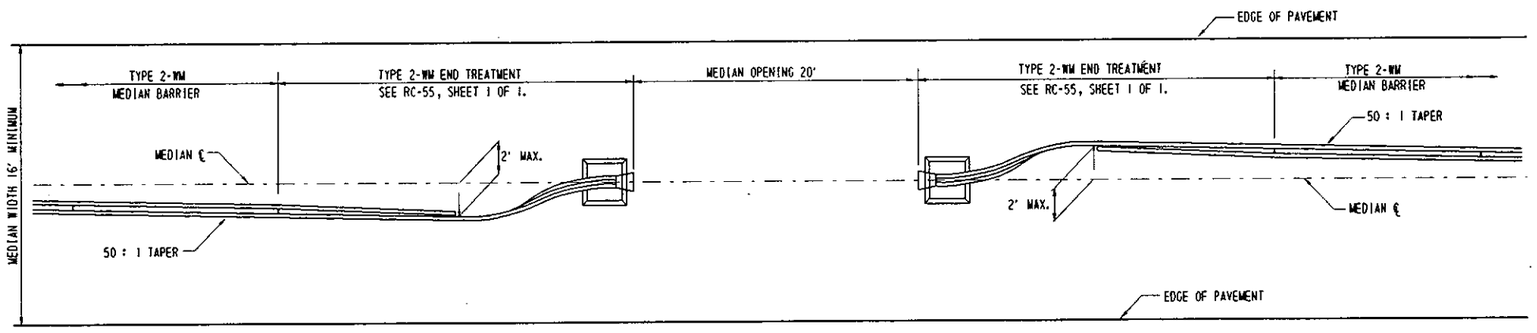
RC-54



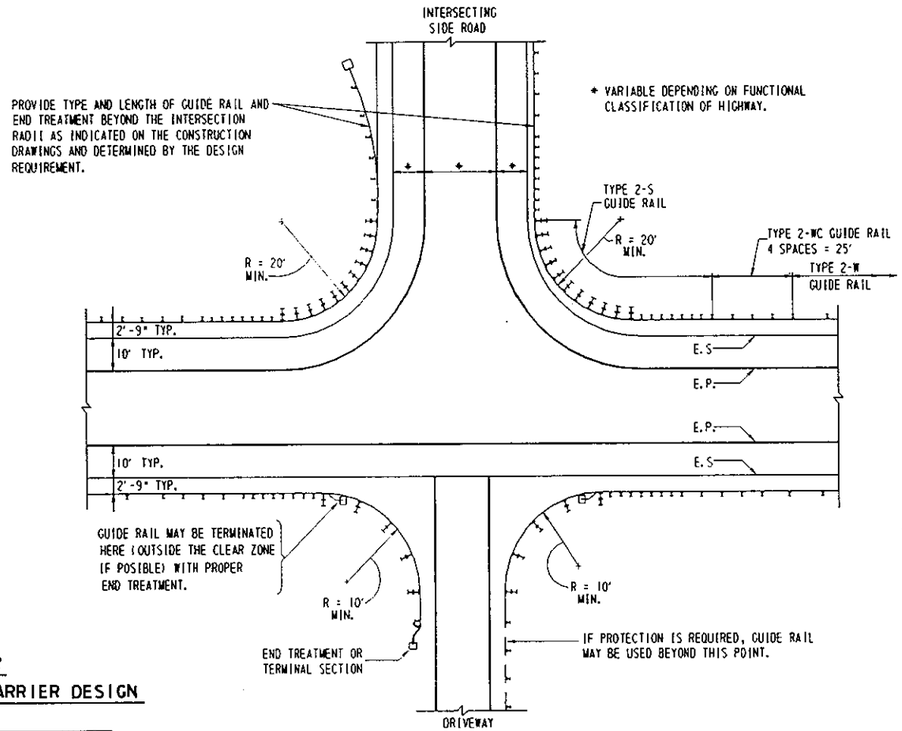
TREATMENT AT OBSTRUCTION FOR MEDIAN WIDTHS 16' OR LESS WHERE CONTINUOUS BARRIER IS REQUIRED



TREATMENT AT OBSTRUCTION FOR MEDIAN WIDTHS OF 16' TO 20' WHERE CONTINUOUS BARRIER IS REQUIRED



TREATMENT FOR TYPE 2-WM MEDIAN BARRIER CROSS-OVER



TREATMENT AT INTERSECTIONS AND DRIVEWAYS

TABLE 2
FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED (MPH)	MAXIMUM FLARE RATES	
	CONCRETE BARRIER	GUIDE RAIL
70	20 : 1	15 : 1
60	17 : 1	13 : 1
50	14 : 1	11 : 1
40	11 : 1	9 : 1
30	8 : 1	7 : 1

NOTES:

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

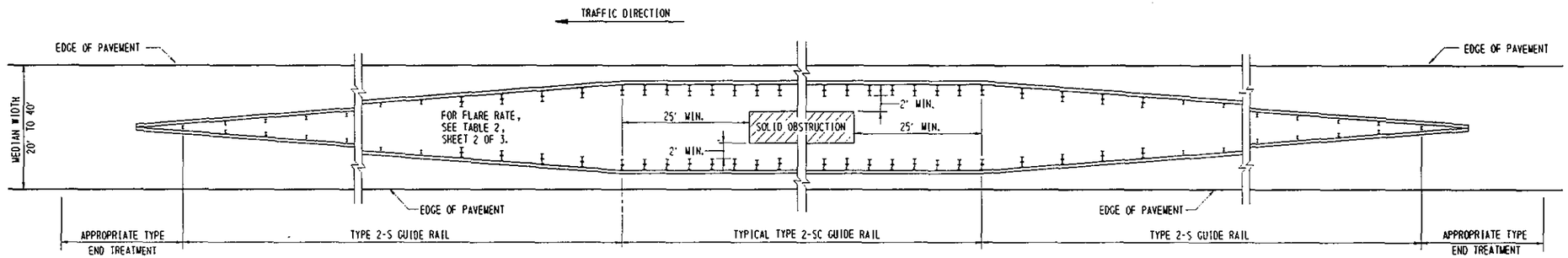
BARRIER PLACEMENT AT OBSTRUCTIONS

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

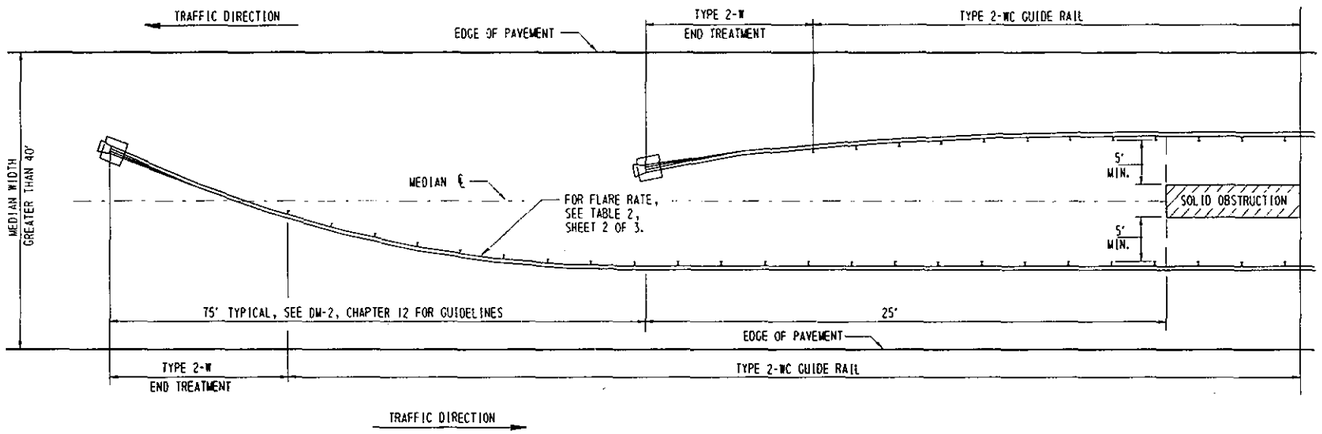
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 2 OF 3

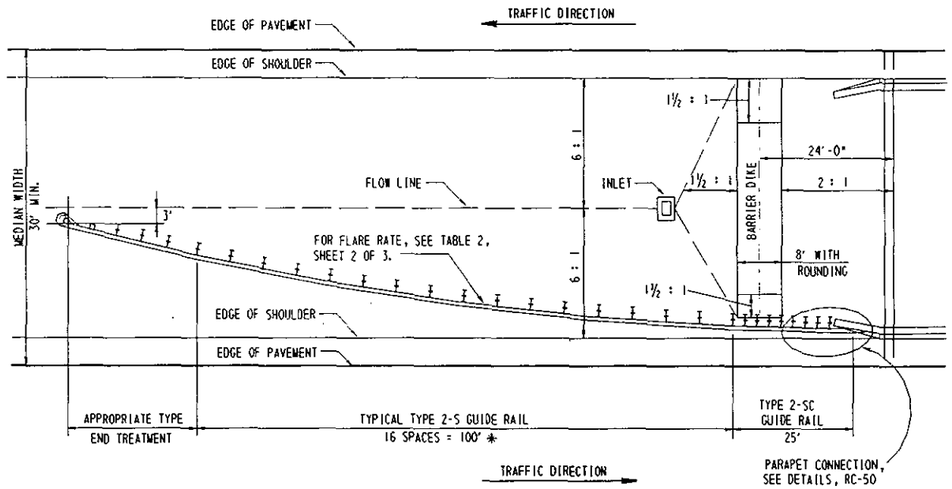
RC-54



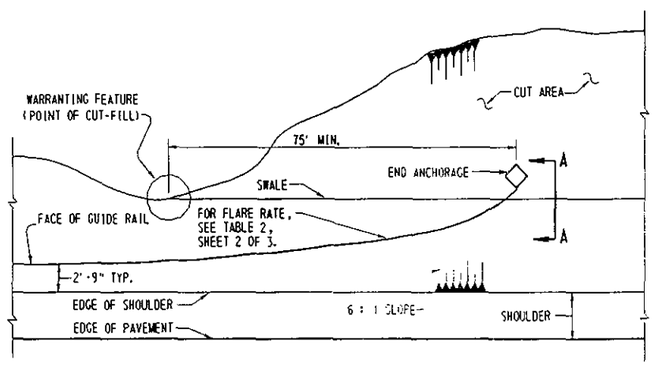
TREATMENT AT OBSTRUCTIONS FOR MEDIAN WIDTHS OF 20' TO 40' WHERE CONTINUOUS BARRIER IS NOT REQUIRED



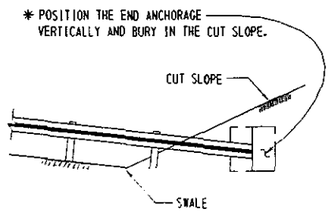
TREATMENT AT OBSTRUCTION FOR MEDIAN WIDTHS GREATER THAN 40' WHERE CONTINUOUS BARRIER IS NOT REQUIRED



MEDIAN TREATMENT AT DUAL STRUCTURES



TREATMENT - CUT TO FILL CONDITIONS



SECTION A-A

* SEE DM-2, CHAPTER 12 FOR GUIDELINES.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

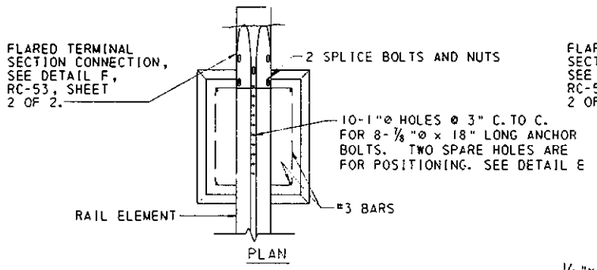
BARRIER PLACEMENT AT OBSTRUCTIONS

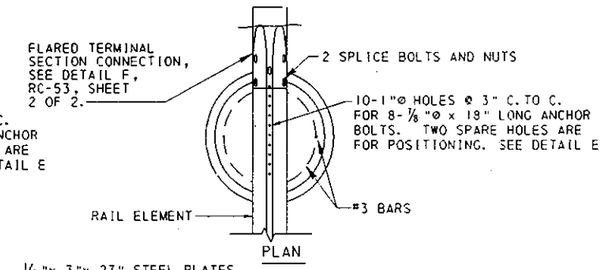
RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

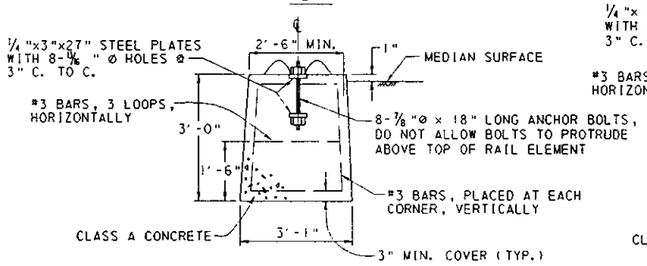
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

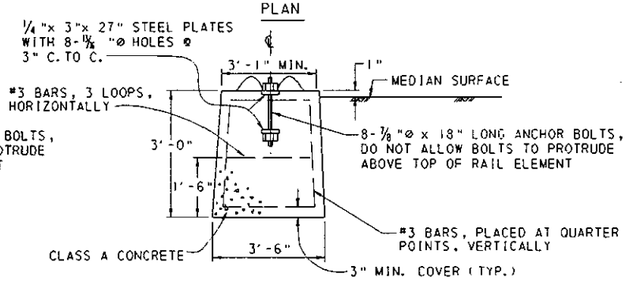
SHT. 3 OF 3

RC-54

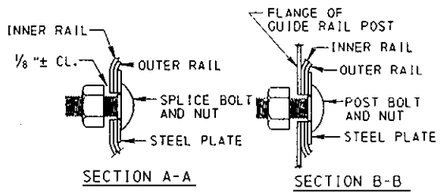


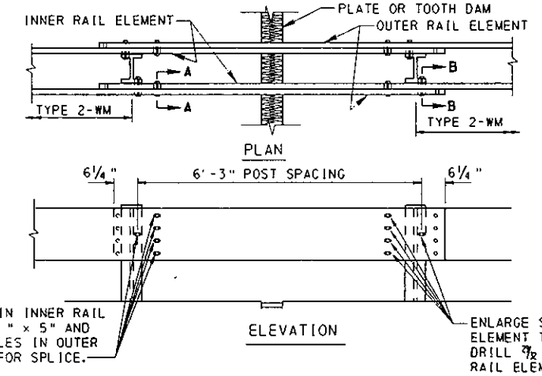






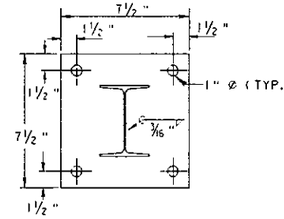
CONCRETE ANCHOR





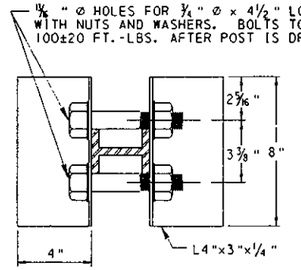
RAIL EXPANSION JOINT DETAIL

(NO SEPERATE OR ADDITIONAL PAYMENTS WILL BE MADE FOR INSTALLING RAIL EXPANSION JOINTS.)

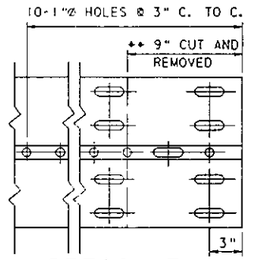


DETAIL C
BASE PLATE

(USE BASE PLATE FOR ALL TYPE 2-W AND 2-WC GUIDE RAIL POSTS.)

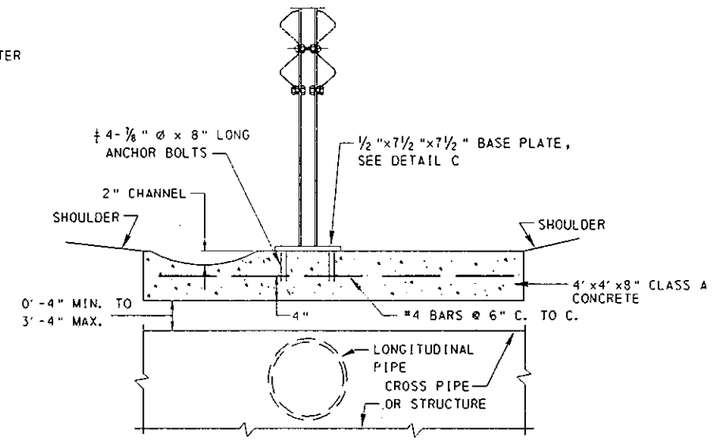


DETAIL D
END POST SUPPORT ANGLES



DETAIL E

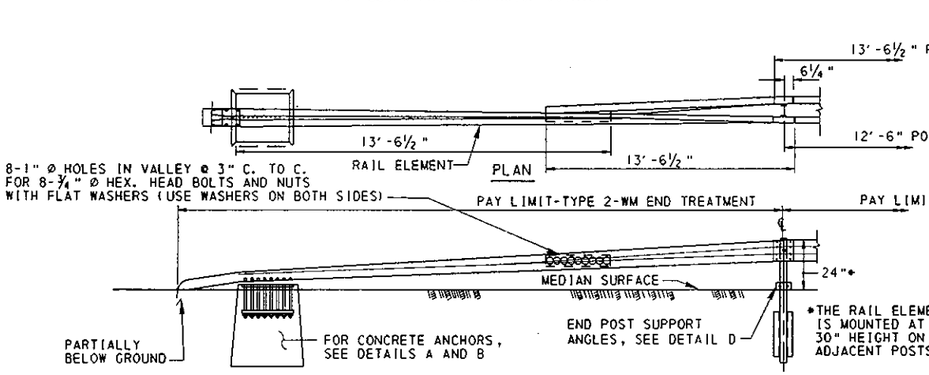
** ONLY WHEN USED WITH SHOP CURVED RAIL.



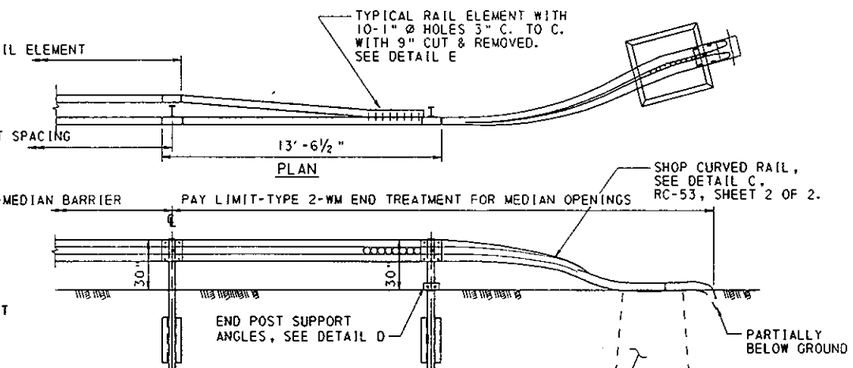
TYPICAL INSTALLATION
WHEN
CROSSING UNDERGROUND STRUCTURE

(NO SEPERATE OR ADDITIONAL PAYMENTS WILL BE MADE FOR THIS ITEM. CONCRETE, REINFORCEMENT BARS, AND HARDWARE ARE INCIDENTAL TO THE GUIDE RAIL PAY ITEM.)

‡ FOR ANCHORAGE TO EXISTING BRIDGE DECKS AND DIVISORS, SEE BRIDGE CONSTRUCTION STANDARD DRAWING BC-338A.



TYPICAL END TREATMENT

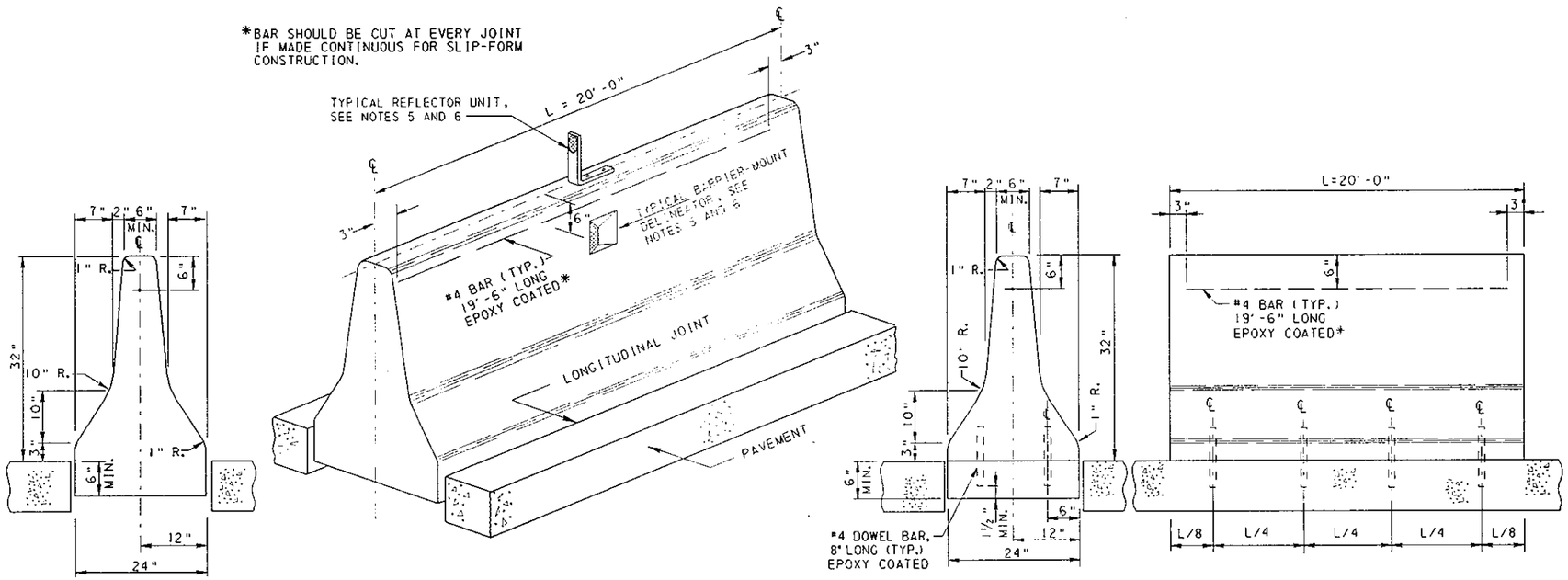


END TREATMENT-DRIVEWAYS & OPENINGS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

TYPE 2 WEAK POST MEDIAN BARRIER

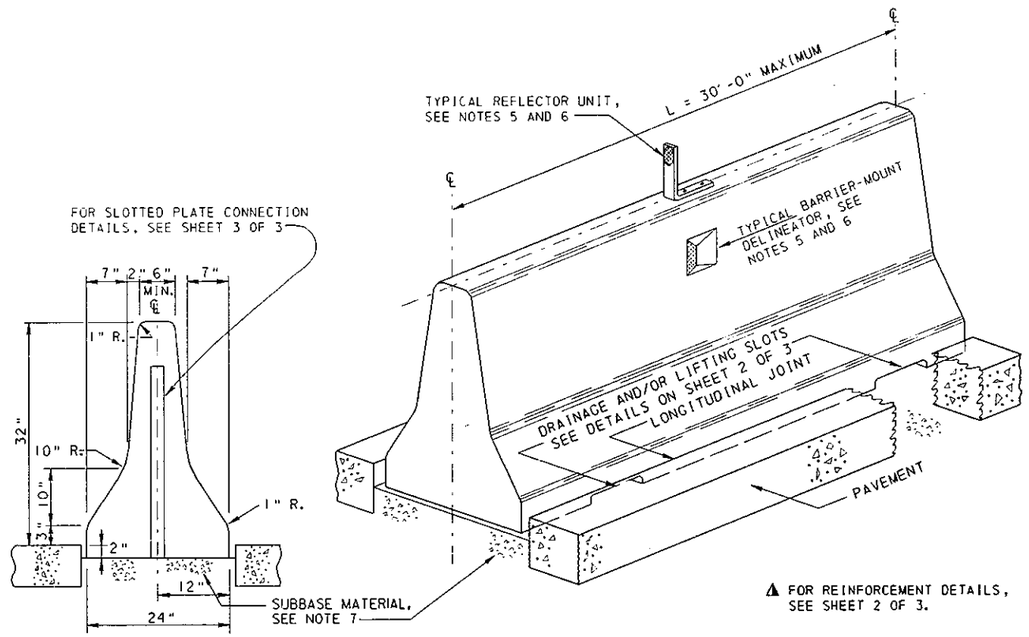
RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHT. 1 OF 1
Fredric J. Bowser	M. M. Ryan	RC-55
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	



MONOLITHIC CONSTRUCTION

DOWEL CONSTRUCTION

TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION



TYPICAL PRECAST CONSTRUCTION ▲

▲ FOR REINFORCEMENT DETAILS, SEE SHEET 2 OF 3.

NOTES

1. PROVIDE CONCRETE MEDIAN BARRIER MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 623.
2. PROVIDE PRECAST CONCRETE BARRIER SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. FOR A BULLETIN 15 LISTING, SUBMIT A 22"x 36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF CONSTRUCTION AND MATERIALS, MATERIALS AND TESTING DIVISION FOR REVIEW.
3. FOR CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION, USE PREMOLDED JOINT MATERIAL AT ALL CONSTRUCTION JOINTS.
4. CONCRETE MEDIAN BARRIER CONSTRUCTION ON EXISTING PAVEMENT WILL REQUIRE SPECIAL DETAILS TO BE SHOWN ON THE CONSTRUCTION DRAWINGS.
5. FOR PERMANENT AND TEMPORARY BARRIER INSTALLATIONS, USE SIDE-MOUNT (BARRIER-MOUNT DELINEATOR) OR TOP-MOUNT DELINEATORS (BARRIER-MOUNT DELINEATOR OR REFLECTOR UNIT) AS DETERMINED ON A PROJECT BY PROJECT BASIS. LOCATE SIDE-MOUNT DELINEATORS 6 INCHES FROM THE TOP OF THE BARRIER TO THE CENTER OF THE DEVICE. INSTALL TOP-MOUNT DELINEATORS AS FOLLOWS:
   (1) CENTER BARRIER-MOUNT DELINEATOR ALONG LONGITUDINAL CENTERLINE OF MEDIAN BARRIER.
   (2) LOCATE REFLECTOR UNITS AS SHOWN ON TRAFFIC STANDARD TC7709.

   FOR PERMANENT INSTALLATIONS, PLACE DELINEATORS AT A MAXIMUM LONGITUDINAL SPACING OF 88 FEET FOR TANGENT SECTIONS AND 66 FEET FOR CURVE SECTIONS WITH A HORIZONTAL CURVATURE GREATER THAN 2°30'. FOR TEMPORARY INSTALLATIONS, PLACE DELINEATORS AT A MAXIMUM LONGITUDINAL SPACING OF 40 FEET AND LOCATE AT L/2 ON THE DESIGNATED BARRIER SECTION. USE BARRIER-MOUNT DELINEATORS OR REFLECTOR UNITS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
6. WARNING LIGHTS MAY BE PROVIDED IN LIEU OF TOP OR SIDE-MOUNT DELINEATORS ON BARRIERS USED TEMPORARILY. INSTALL AT A MAXIMUM SPACING OF 80 FEET AND LOCATE AT L/2 ON THE DESIGNATED BARRIER SECTION. ONLY THE FIRST TWO LIGHTS AT THE START OF THE BARRIER MAY BE YELLOW TYPE 'A' FLASHING LIGHTS. PROVIDE YELLOW TYPE 'C' STEADY BURN LIGHTS FOR ALL OTHER WARNING LIGHTS. USE LIGHTS SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15.
7. COMPACT NO. 2A OR NO. 0GS MATERIAL IN ACCORDANCE WITH PUBLICATION 408 SPECIFICATIONS, SECTION 350. A ONE INCH LAYER 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.
8. PROVIDE PRECAST CONCRETE BARRIER FOR USE AS TEMPORARY (WPT) AND PERMANENT INSTALLATIONS. FOR TEMPORARY INSTALLATIONS, EMBEDMENT IS NOT REQUIRED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

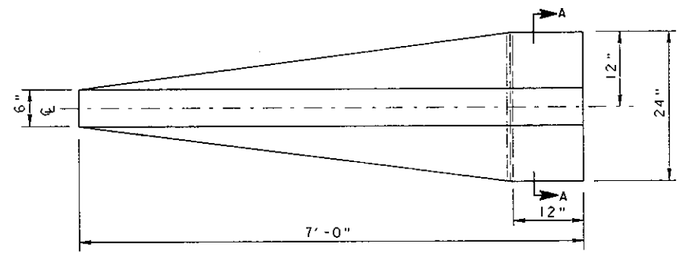
CONCRETE MEDIAN BARRIER

RECOMMENDED MAR. 25, 1994
Steadee Bowser
DIRECTOR, BUREAU OF DESIGN

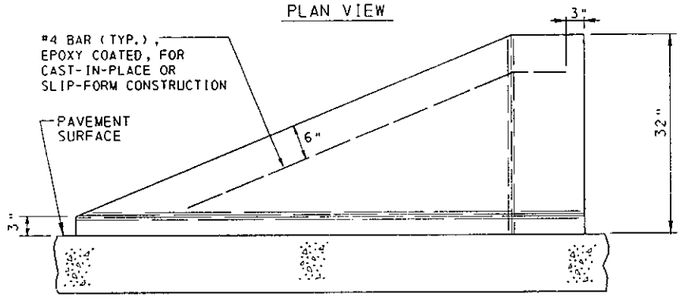
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 1 OF 3

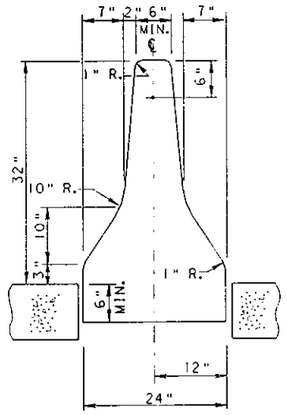
RC-57



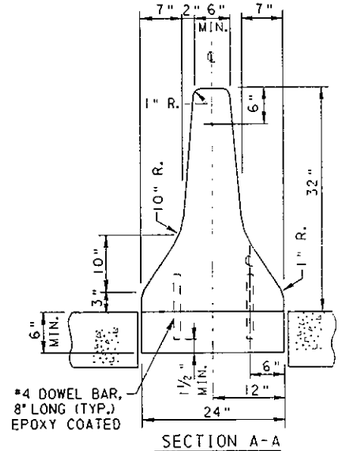
PLAN VIEW



ELEVATION VIEW

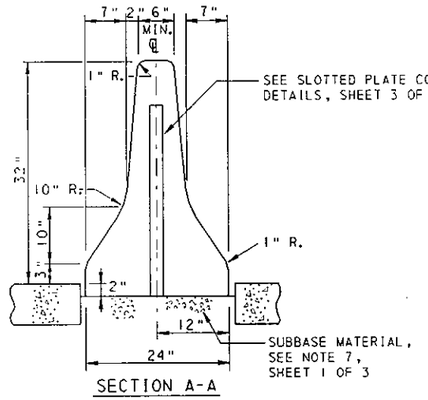


SECTION A-A
MONOLITHIC CONSTRUCTION



SECTION A-A
DOWEL CONSTRUCTION

TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION



SECTION A-A

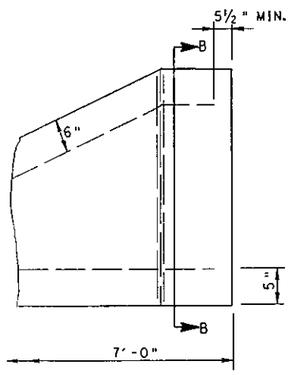
TYPICAL PRECAST CONSTRUCTION

TYPICAL END TRANSITION CONSTRUCTION

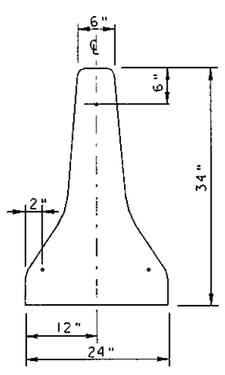
NOTES

1. A TYPICAL END TRANSITION MAY BE USED FOR PERMANENT BARRIER INSTALLATIONS ONLY WHEN THE LAST BARRIER SECTION IS LOCATED OUTSIDE THE REQUIRED CLEAR ZONE, AS DETERMINED IN DESIGN MANUAL, PART 2, CHAPTER 12. A 20 : 1 SLOPED END TRANSITION IS ACCEPTABLE FOR PERMANENT INSTALLATIONS WHERE THE LEGAL SPEED LIMIT IS 40 MPH OR LESS; OTHERWISE, USE AN IMPACT ATTENUATING DEVICE DESIGNED TO ABSORB THE ENERGY OF AN IMPACTING VEHICLE IN THE WEIGHT RANGE OF 1,800 TO 4,500 LBS. AT THE SPECIFIED DESIGN SPEED, WITH A MAXIMUM AVERAGE FORCE OF 8.5 G'S AND A MAXIMUM PEAK FORCE OF 15 G'S. WHEN CONCRETE BARRIER IS TERMINATED AT THE END OF PARALLEL RAMPS OR T INTERSECTIONS A 7'-0" END TRANSITION MAY BE USED WHERE THE LEGAL SPEED LIMIT IS 40 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 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.

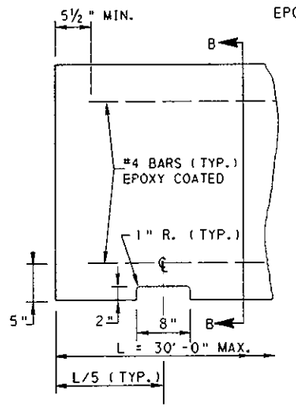
   REFER TO TABLE 1, SHEET 3 OF 3, FOR FLARE RATE REQUIREMENTS.
2. PROVIDE SUITABLE LIFTING DEVICES FOR HANDLING, INSTALLING AND REMOVING PRECAST CONCRETE BARRIER. GALVANIZE METAL DEVICES AS SPECIFIED IN PUBLICATION 408 SPECIFICATIONS, SECTION 1105.02(s).
3. PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 709 WITH A MINIMUM CONCRETE COVER OF 1½".



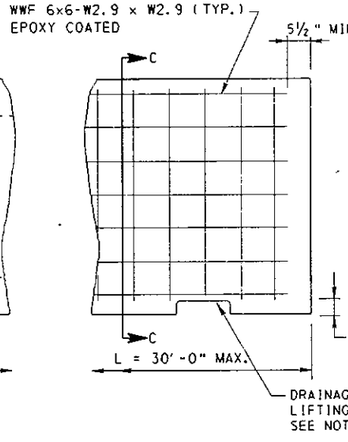
END TRANSITION



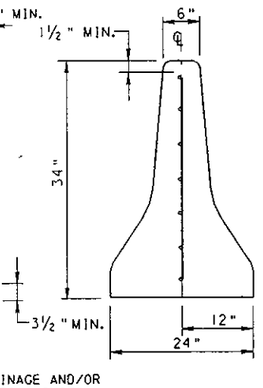
SECTION B-B



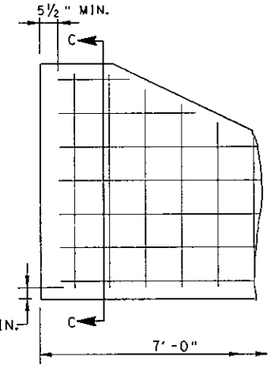
REINFORCEMENT STEEL



WELDED WIRE FABRIC



SECTION C-C



END TRANSITION

TYPICAL REINFORCEMENT DETAILS FOR PRECAST CONSTRUCTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

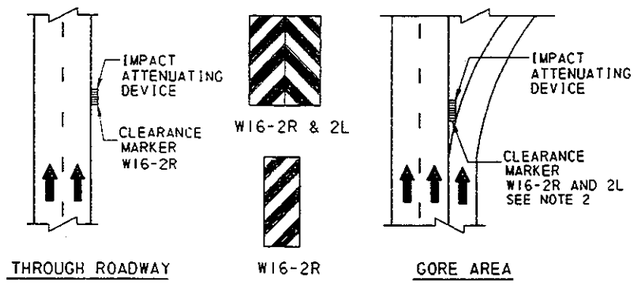
CONCRETE MEDIAN BARRIER

RECOMMENDED MAR. 25, 1994
Fredric Bowser
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

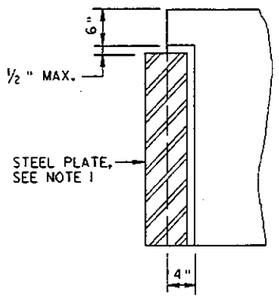
SHT. 2 OF 3

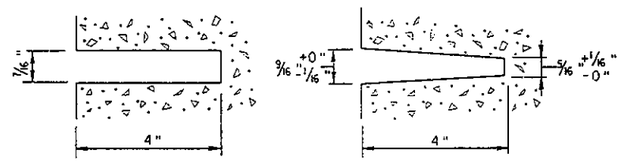
RC-57



DETAIL A

DELINEATION OF IMPACT ATTENUATING DEVICES





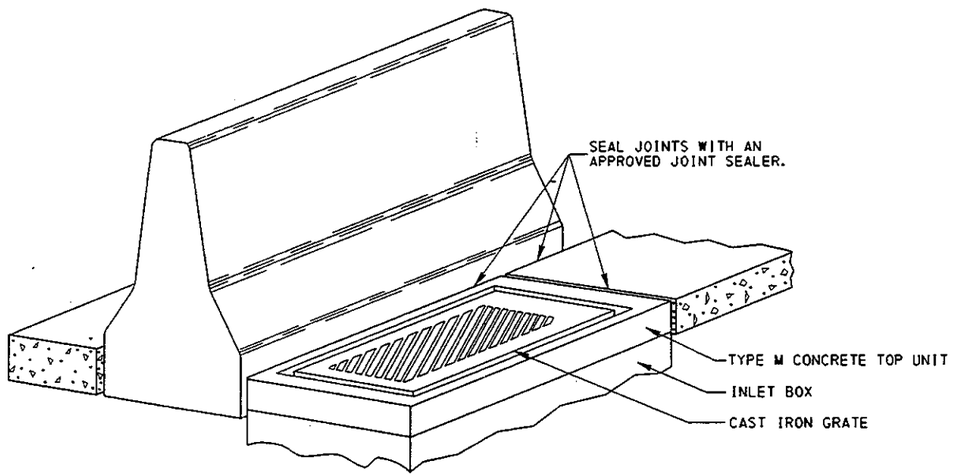
SLOTTED PLATE CONNECTION

NOTES

1. PROVIDE 5/16"x 7"x 27" PLATES MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 1105.02(s). GALVANIZE PLATES AS SPECIFIED IN PUBLICATION 408 SPECIFICATIONS, SECTION 1105.02(s) OR COAT IN ACCORDANCE WITH BULLETIN 26. ALTERNATE CONNECTIONS MAY BE USED AS APPROVED BY THE BUREAU OF DESIGN. SUBMIT A 22"x 36" REPRODUCIBLE SHOP DRAWING FOR REVIEW. SEE NOTE 2, SHEET 1 OF 3.

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; 12"x 38" AND 18"x 36". WHEN ONE MARKER IS REQUIRED, USE 18"x 36". WHEN TWO MARKERS ARE REQUIRED SIDE BY SIDE, USE 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 (MPH)	MAXIMUM FLARE RATES	
	CONCRETE BARRIER	GUIDE RAIL
70	20 : 1	15 : 1
60	17 : 1	13 : 1
50	14 : 1	11 : 1
40	11 : 1	9 : 1
30	8 : 1	7 : 1

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE MEDIAN BARRIER

RECOMMENDED MAR. 25, 1994
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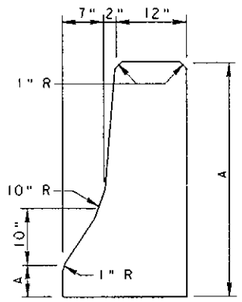
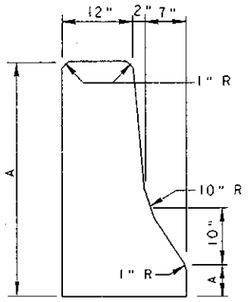
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 3 OF 3

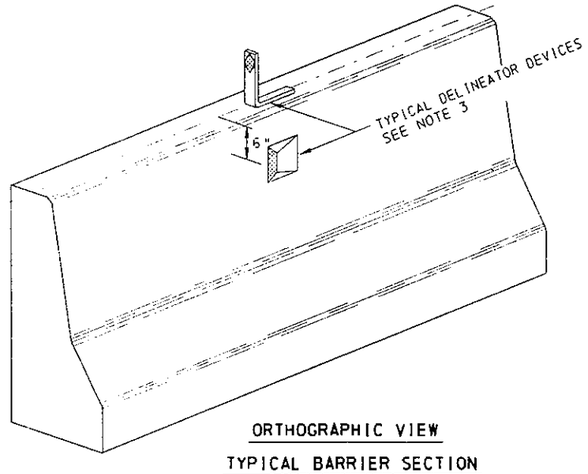
RC-57



SECTION A-A

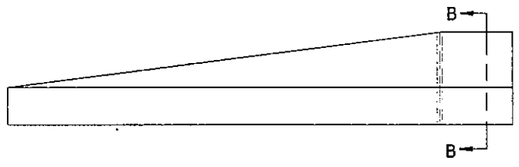


SECTION B-B

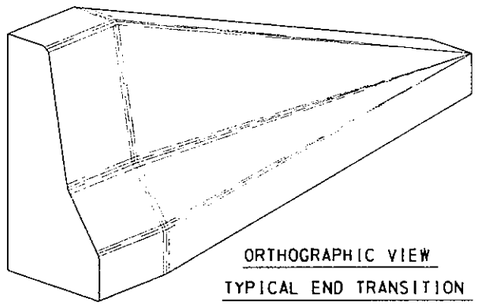


ORTHOGRAPHIC VIEW

TYPICAL BARRIER SECTION

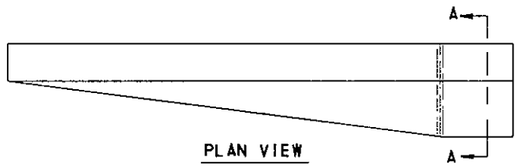


PLAN VIEW
RIGHT END TRANSITION

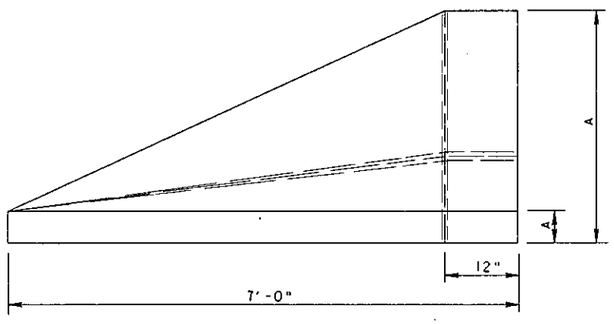


ORTHOGRAPHIC VIEW

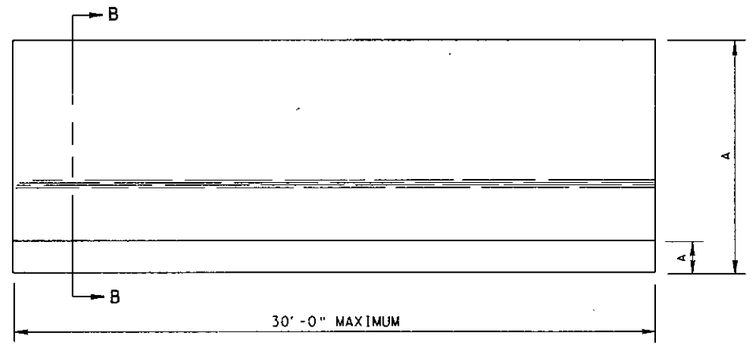
TYPICAL END TRANSITION



PLAN VIEW
LEFT END TRANSITION



ELEVATION VIEW
TYPICAL END TRANSITION
SEE NOTE 5



ELEVATION VIEW
TYPICAL BARRIER SECTION

A - SEE TYPICAL SECTIONS
SHEET 2 OF 5

NOTES

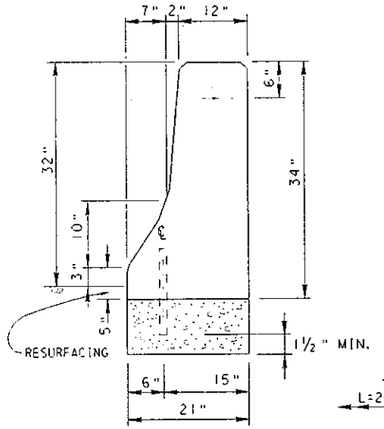
1. PROVIDE SINGLE FACE CONCRETE BARRIER MEETING THE REQUIPEMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 623.
2. PROVIDE PRECAST SINGLE FACE CONCRETE BARRIER SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. FOR A BULLETIN 15 LISTING, SUBMIT A 22"x 36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF CONSTRUCTION AND MATERIALS, MATERIALS AND TESTING DIVISION, FOR REVIEW. MODIFICATIONS OR DEVIATIONS FROM THE STANDARD WILL ALSO REQUIRE THE SUBMISSION OF SHOP DRAWINGS FOR REVIEW.
3. PROVIDE BARRIER-MOUNT OR REFLECTOR UNIT DELINEATORS, AS INDICATED ON RC-57.
4. PROVIDE REINFORCEMENT FOR SINGLE FACE CONCRETE BARRIER AS INDICATED ON SHEET 3 OF 5.
5. PROVIDE END TRANSITIONS OR IMPACT ATTENUATING DEVICES AS INDICATED ON RC-57.

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

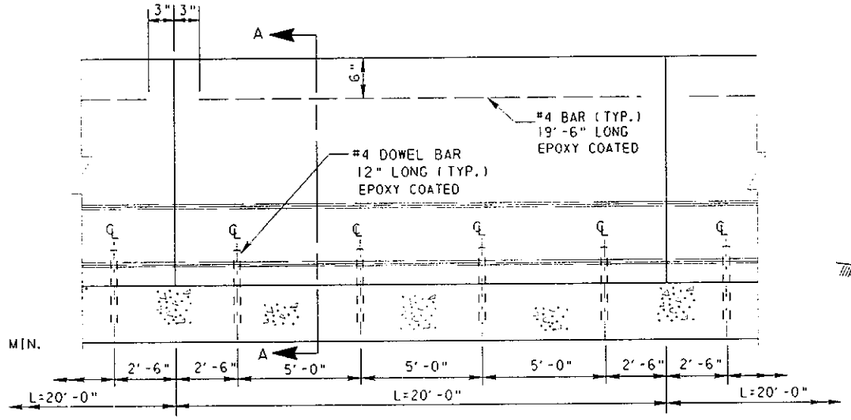
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER

RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHT. 1 OF 5
Fredric Bowser	M. M. Ryan	RC-58
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	

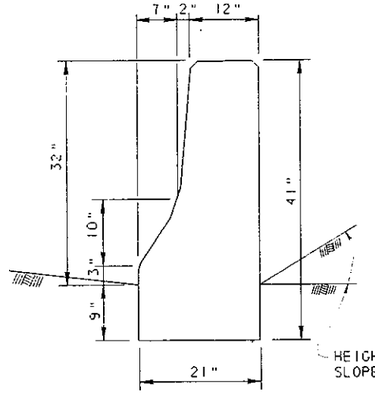


SECTION A-A

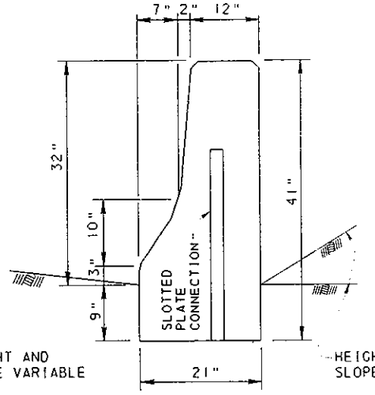


ELEVATION VIEW

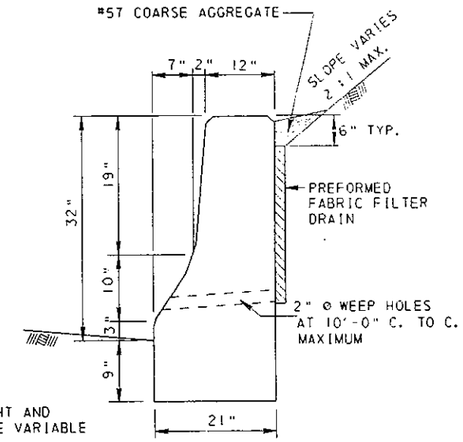
DOWEL CONSTRUCTION



CAST-IN-PLACE CONSTRUCTION



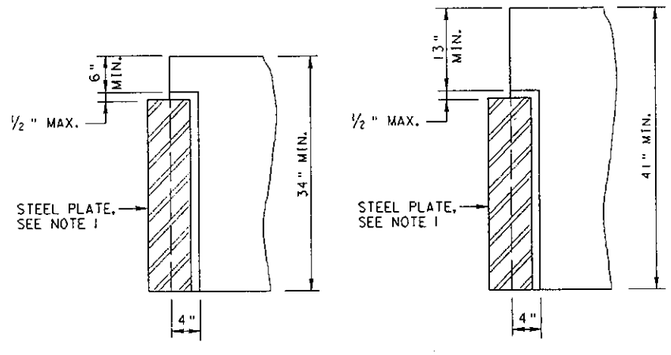
PRECAST CONSTRUCTION

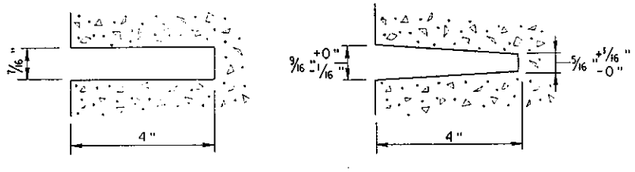


TYPICAL DRAINAGE TREATMENT

SEE NOTE 2

TYPICAL SINGLE FACE BARRIER SECTIONS

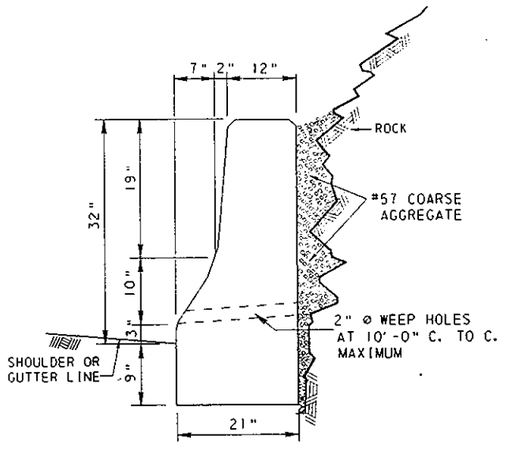




SLOT DETAIL

PERMISSIBLE TAPER

SLOTTED PLATE CONNECTION



TYPICAL ROUGH ROCK TREATMENT

NOTES

1. PROVIDE PLATES MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 1105.02(a)2. GALVANIZE PLATES AS SPECIFIED IN PUBLICATION 408 SPECIFICATIONS, SECTION 1105.02(s) OR COAT AS SPECIFIED IN SECTION 605.2(a). 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 SECTION 610. IF THE HEIGHT OR SLOPE IS INCREASED, PROVIDE OVERTURNING MOMENT COMPUTATIONS WITH THE CONSTRUCTION PLANS.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

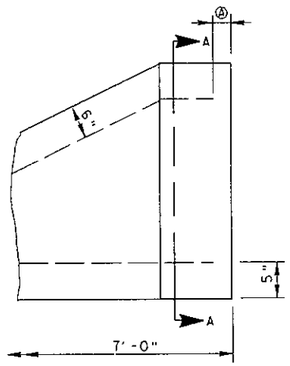
SINGLE FACE CONCRETE BARRIER

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

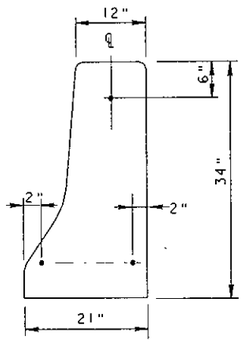
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 2 OF 5

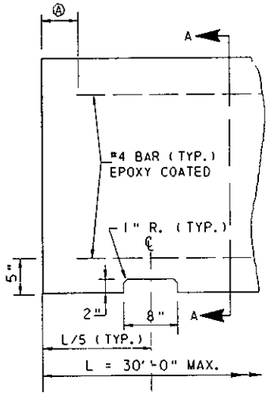
RC-58

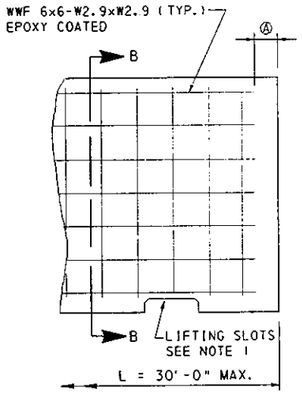


END TRANSITION



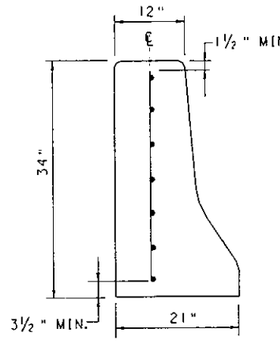
SECTION A-A



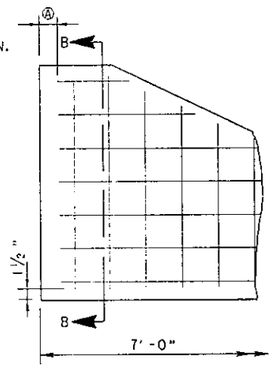


REINFORCEMENT STEEL

WELDED WIRE FABRIC



SECTION B-B



END TRANSITION

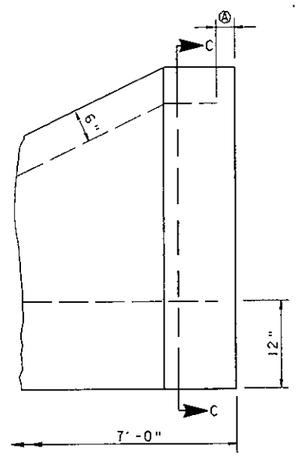
TYPICAL REINFORCEMENT DETAILS FOR 34" BARRIER

NOTES

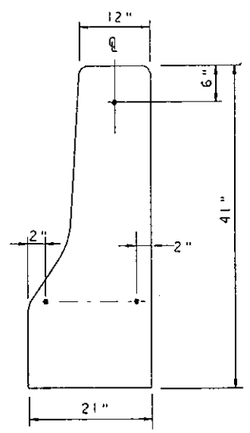
1. PROVIDE SLOTS FOR HANDLING, INSTALLING AND REMOVING PRECAST CONCRETE BARRIERS. ALTERNATE METHODS OR DEVICES MAY BE USED AS APPROVED BY THE BUREAU OF DESIGN. GALVANIZE METAL DEVICES AS SPECIFIED IN PUBLICATION 408 SPECIFICATIONS, SECTION 1105.02(s).

LEGEND

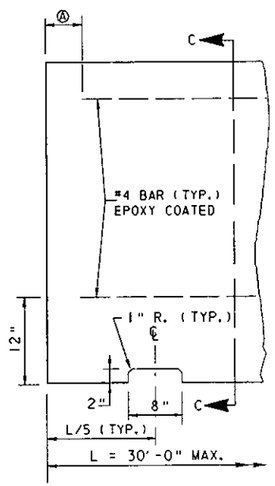
Ⓐ PROVIDE REINFORCEMENT MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 709 WITH A MINIMUM CONCRETE COVER OF 1½". KEEP WIRE FABRIC OR BAR LIMITS AT 5½" MINIMUM FOR PRECAST BARRIER WITH PLATE CONNECTIONS.

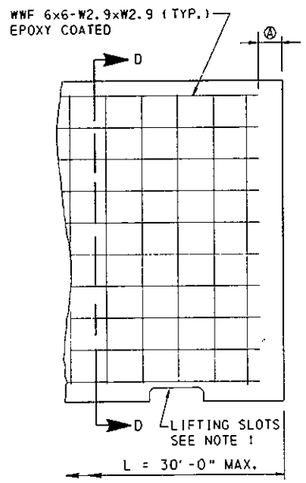


END TRANSITION



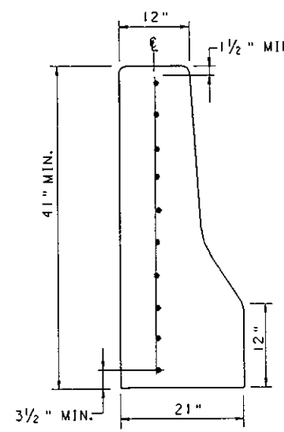
SECTION C-C



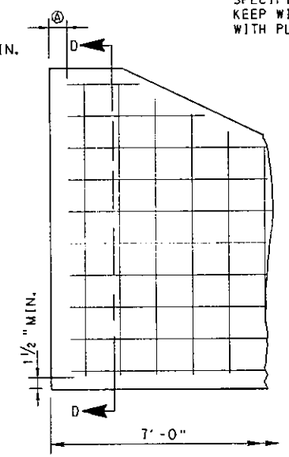


REINFORCEMENT STEEL

WELDED WIRE FABRIC



SECTION D-D



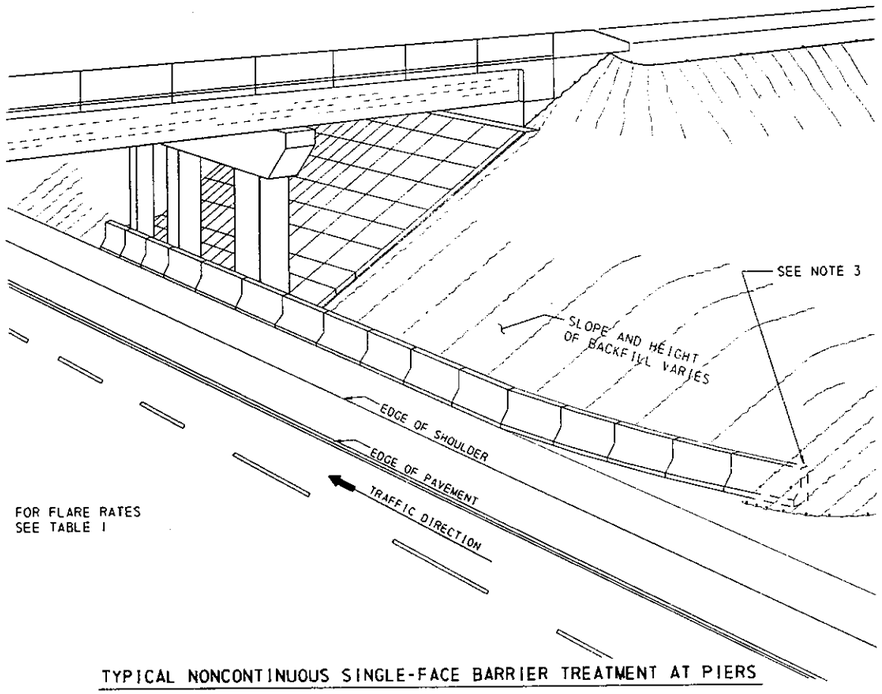
END TRANSITION

TYPICAL REINFORCEMENT DETAILS FOR 41" BARRIER

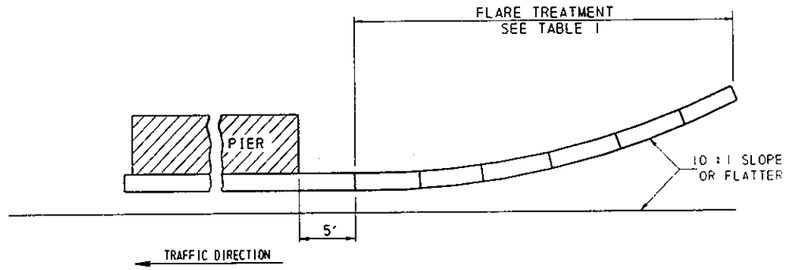
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER

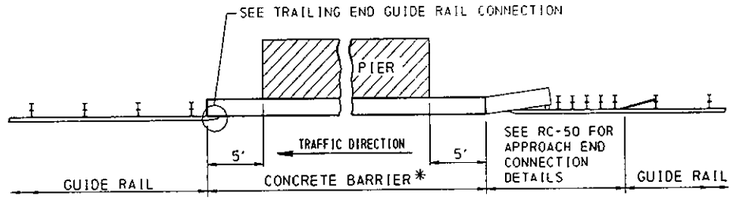
RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHT. 3 OF 5
Fredel Bowser	M. M. Ryan	RC-58
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	



TYPICAL NONCONTINUOUS SINGLE-FACE BARRIER TREATMENT AT PIERS



PLAN VIEW



CONTINUOUS GUIDE RAIL WITH SINGLE FACE BARRIER AT PIER

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

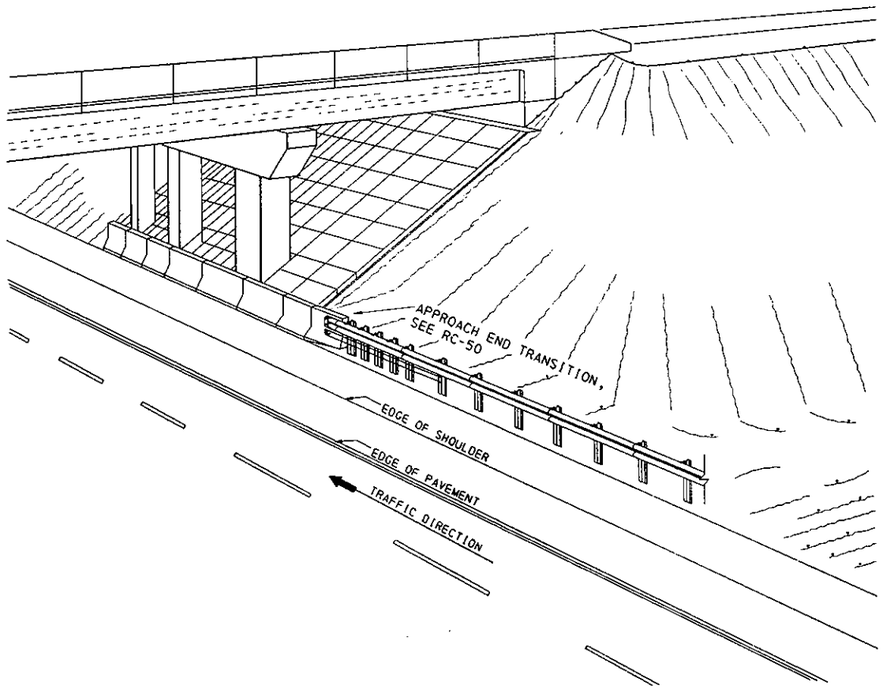
PLAN VIEW

TABLE I
FLARE RATES FOR BARRIER DESIGN

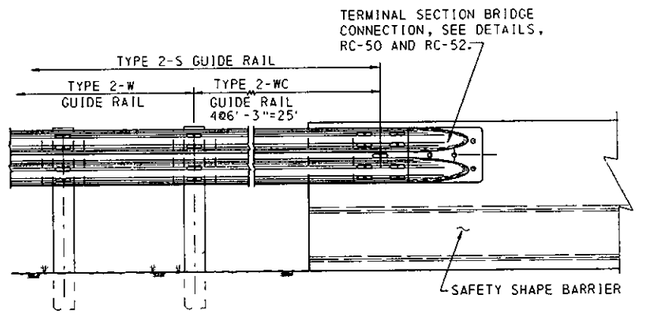
DESIGN SPEED (MPH)	MAXIMUM FLARE RATES	
	CONCRETE BARRIER	GUIDE RAIL
70	20 : 1	15 : 1
60	17 : 1	13 : 1
50	14 : 1	11 : 1
40	11 : 1	9 : 1
30	8 : 1	7 : 1

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. WHEN THE END OF CONCRETE BARRIER TERMINATES WITHIN THE CLEAR ZONE, IT MUST BE BURIED INTO THE SLOPE, (PREFERABLY 2 : 1), OTHERWISE USE AN IMPACT ATTENUATING DEVICE.



TYPICAL TREATMENT WHEN CONTINUOUS GUIDE RAIL IS REQUIRED

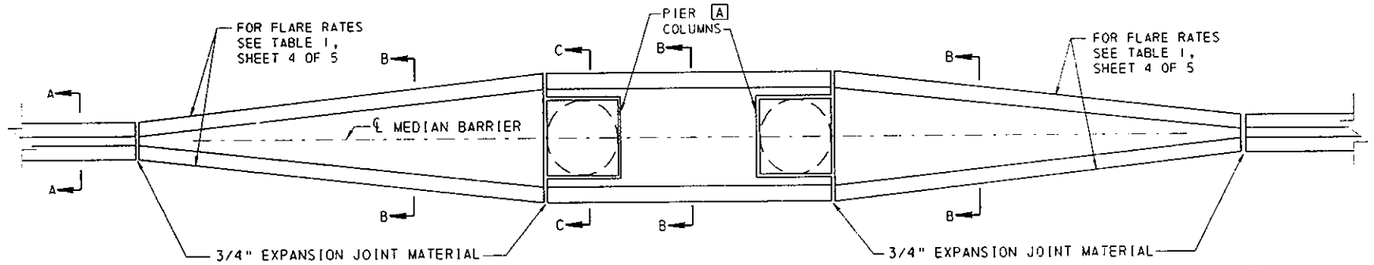


TRAILING END GUIDE RAIL CONNECTION TO SAFETY SHAPE BARRIER

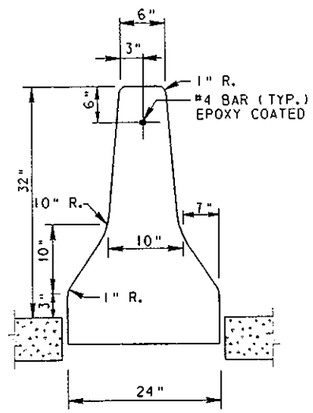
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER
PLACEMENT AT SHOULDER PIERS

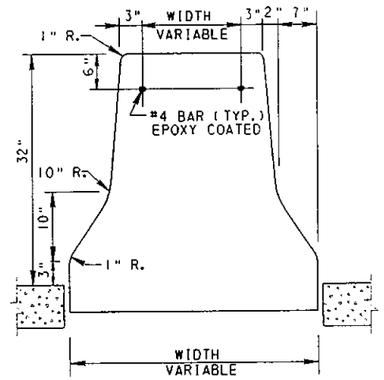
RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHT. 4 OF 5
Fredric W. Bowser	M. M. Ryan	RC-58
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	



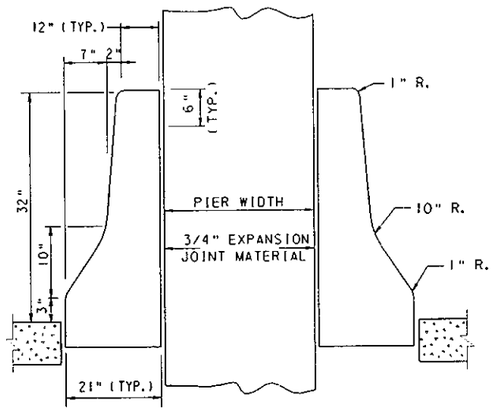
A USE ¾" EXPANSION JOINT MATERIAL AROUND ALL PIERS.



SECTION A-A

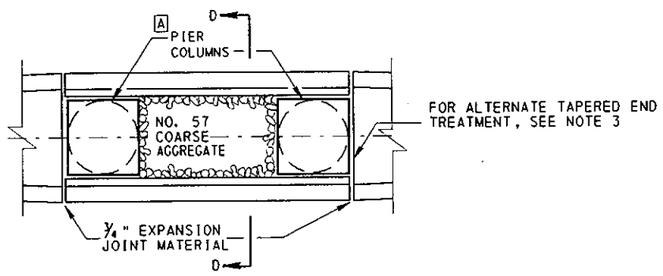


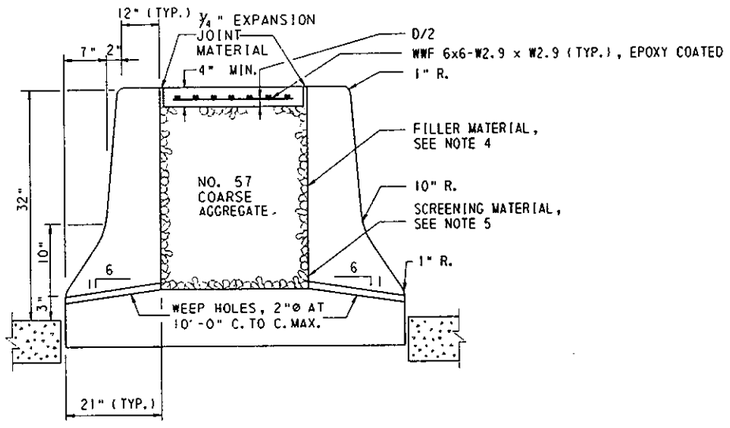
SECTION B-B



SECTION C-C

TYPICAL BARRIER TREATMENT AT PIERS





SECTION D-D

TYPICAL ALTERNATE BARRIER TREATMENT AT PIERS

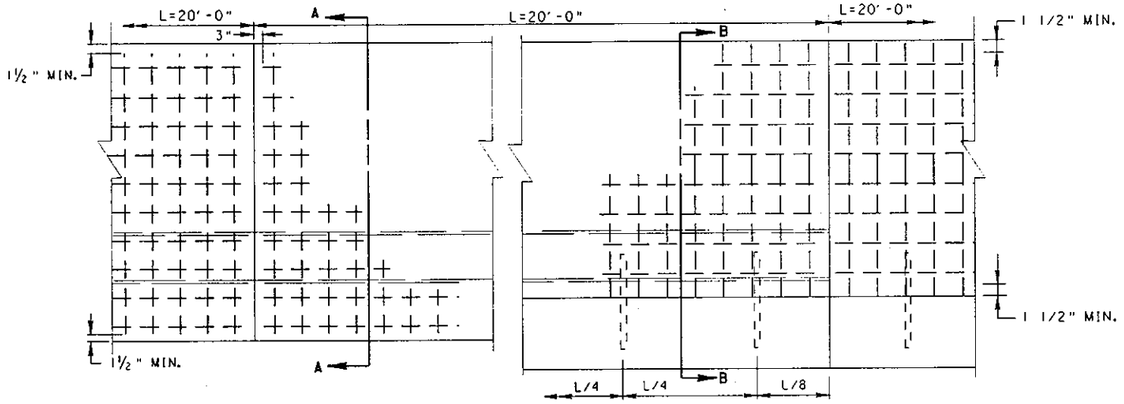
NOTES

1. REFER TO BRIDGE STANDARD DRAWINGS (BD-601) FOR DETAILS OF CONCRETE MEDIAN BARRIER ACROSS STRUCTURES.
2. NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR TRANSITIONS IN THE CONCRETE MEDIAN BARRIER AT PIERS OR STRUCTURES.
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 SPECIFICATIONS, 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.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

SINGLE FACE CONCRETE BARRIER PLACEMENT AT MEDIAN PIERS

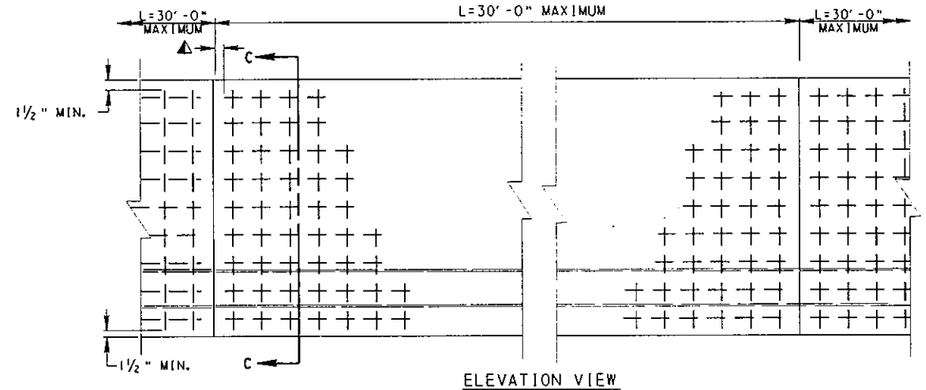
RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHT. 5 OF 5
Fredric W Bowser	W M Ryan	RC-58
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	



ELEVATION VIEW

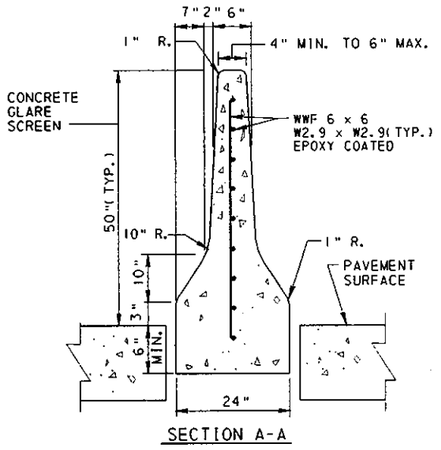
TYPICAL CAST-IN-PLACE OR SLIP-FORM CONSTRUCTION

▲ SEE RC-57, SHEET 2 OF 3 FOR MINIMUM FABRIC LIMITS FOR PRECAST BARRIER.

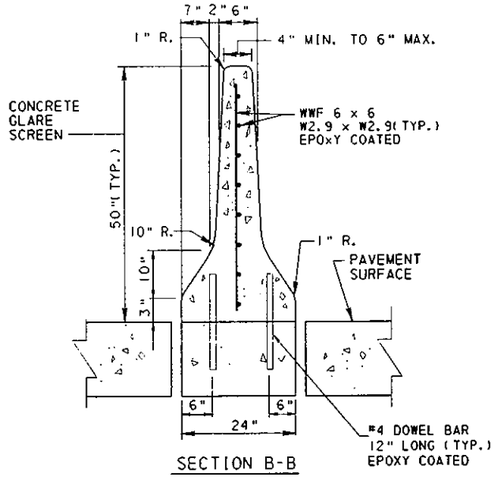


ELEVATION VIEW

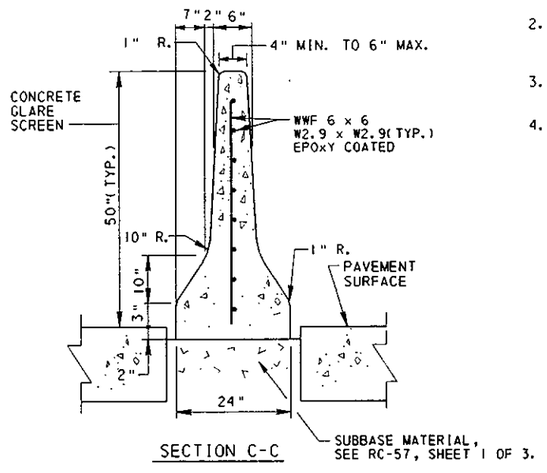
PRECAST CONSTRUCTION



SECTION A-A



SECTION B-B



SECTION C-C

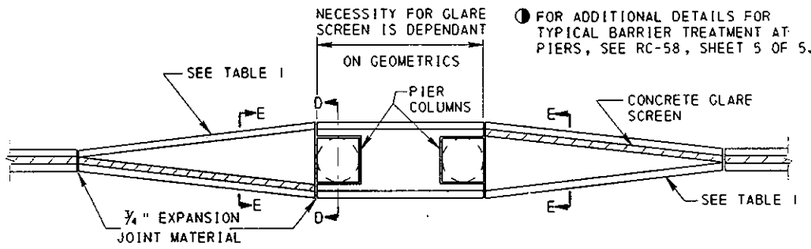
NOTES

1. PROVIDE CONCRETE GLARE SCREEN MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTIONS 622 AND 714.
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-57, SHEET 3 OF 3.
4. PROVIDE PRECAST CONCRETE GLARE SCREEN SUPPLIED BY A MANUFACTURER AS LISTED IN BULLETIN 15. FOR A BULLETIN 15 LISTING, SUBMIT A 22" x 36" REPRODUCIBLE SHOP DRAWING TO THE MATERIALS AND TESTING DIVISION, BUREAU OF CONSTRUCTION AND MATERIALS FOR REVIEW.

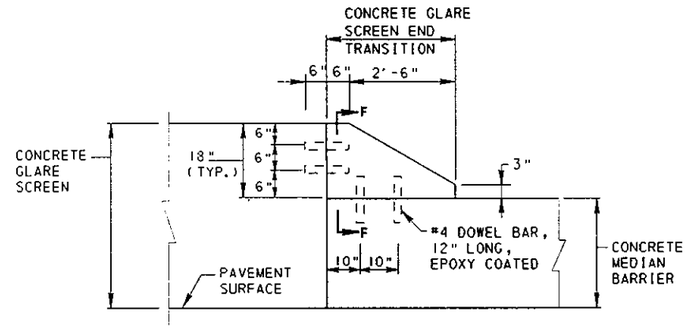
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE GLARE SCREEN

RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHT. 1 OF 2
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	RC-59



TYPICAL TREATMENT AT PIERS ◑



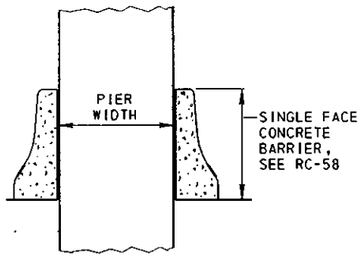
ELEVATION VIEW

TYPICAL END TRANSITION CONSTRUCTION FOR CONCRETE GLARE SCREEN

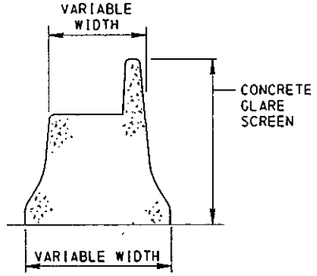
(CAST-IN-PLACE CONSTRUCTION ONLY)

NOTES

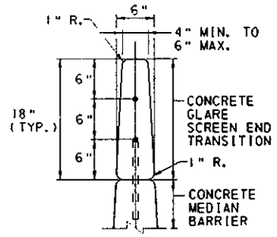
1. PROVIDE BARRIER-MOUNT DELINEATORS, WHEN INDICATED, AS SPECIFIED ON RC-57, SHEET 1 OF 3.



SECTION D-D



SECTION E-E



SECTION F-F

TABLE I
FLARE RATES FOR BARRIER DESIGN

DESIGN SPEED (MPH)	MAXIMUM FLARE RATES	
	CONCRETE BARRIER	GUIDE RAIL
70	20 : 1	15 : 1
60	17 : 1	13 : 1
50	14 : 1	11 : 1
40	11 : 1	9 : 1
30	8 : 1	7 : 1

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

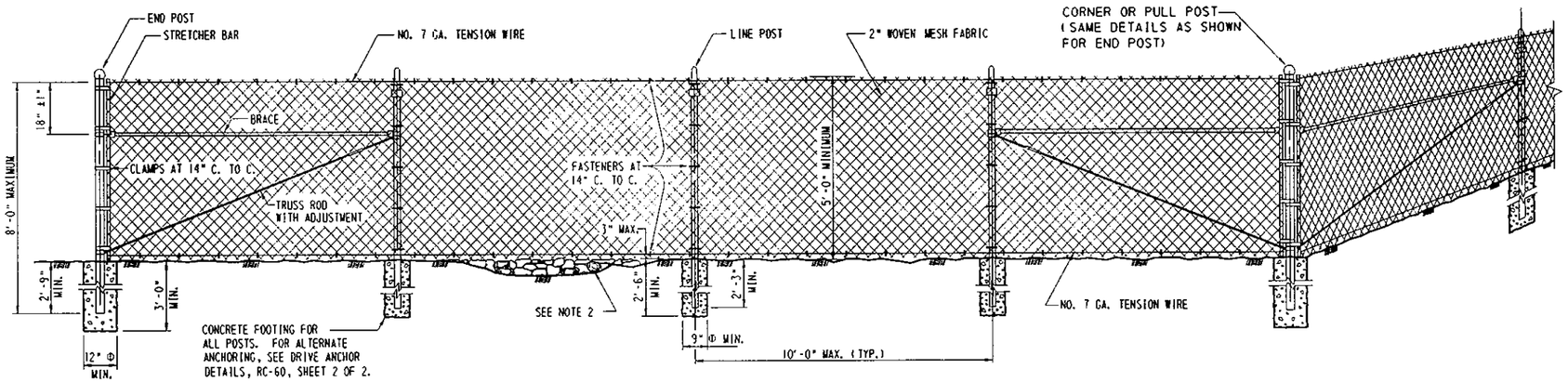
CONCRETE GLARE SCREEN

RECOMMENDED MAR. 25, 1994
Fredrick Bowser
DIRECTOR, BUREAU OF DESIGN

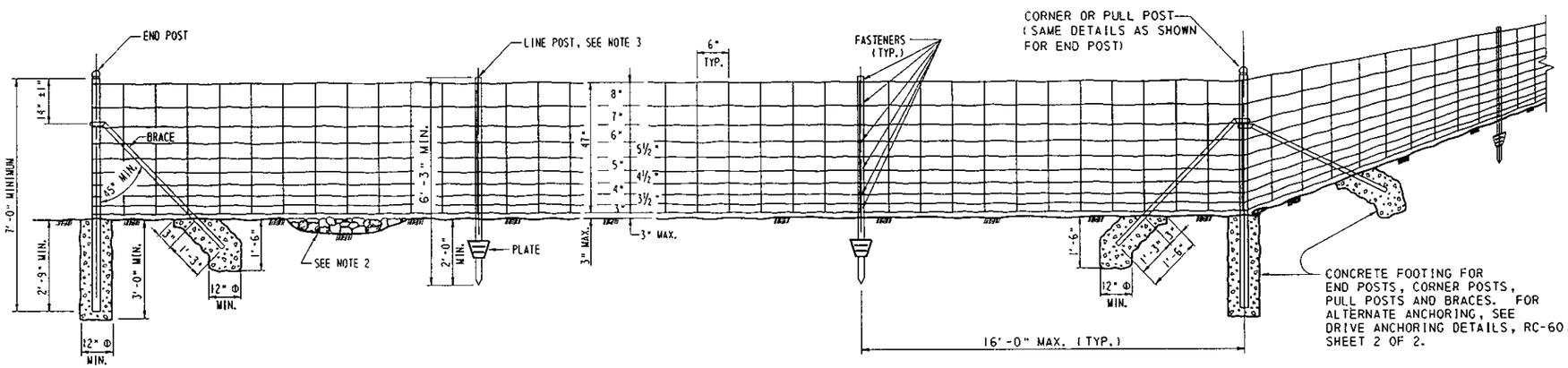
RECOMMENDED MAR. 25, 1994
M. M. Ryan
CHIEF ENGINEER

SHT. 2 OF 2

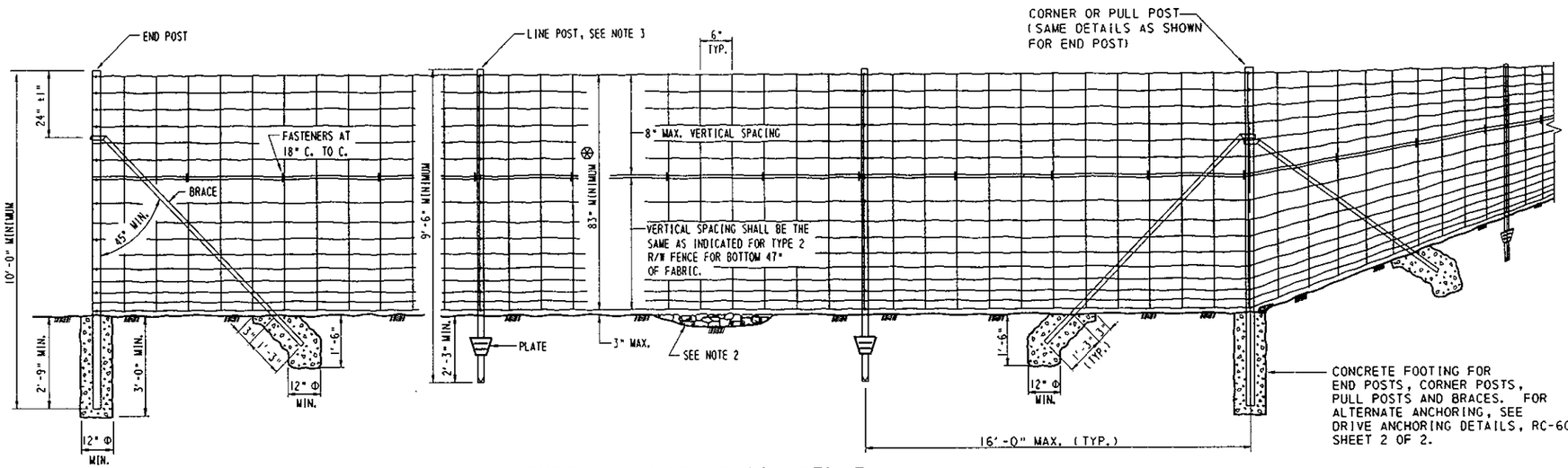
RC-59



TYPE 1 RIGHT-OF-WAY FENCE



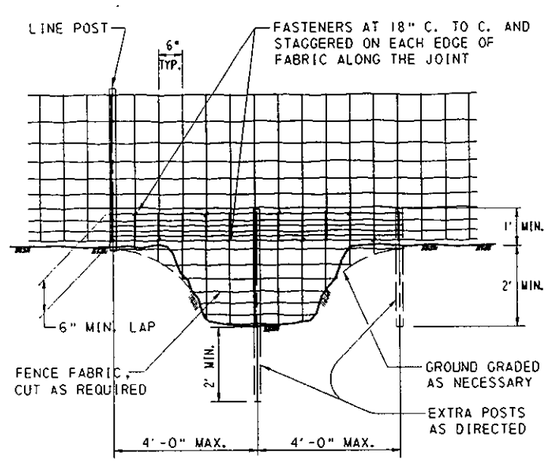
TYPE 2 RIGHT-OF-WAY FENCE



TYPE 5 RIGHT-OF-WAY FENCE

NOTES:

1. CONSTRUCT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 624.
2. FILL ALL DEPRESSIONS GREATER THAN 3 INCHES AND LESS THAN 1 FOOT WITH ROCKS OR COMPACTED EARTH TO PREVENT ANIMALS FROM GOING UNDER THE RIGHT-OF-WAY FENCE.
3. INSTALL CONCRETE FOOTING OR DRIVE ANCHORS AT MAXIMUM INTERVALS OF 160 FEET FOR ALL LINE POSTS.
4. PLACE PULL POSTS AT ANGLE POINTS IN VERTICAL ALIGNMENT AT MAXIMUM 500 FOOT INTERVALS BETWEEN END AND/OR CORNER POSTS IN LEVEL TERRAIN AND/OR WHERE DIRECTED.



TREATMENT AT GROUND DEPRESSIONS GREATER THAN ONE FOOT

(FOR TYPES 2 AND 5 RIGHT-OF-WAY FENCE)

⊛ FABRIC SHALL BE AS FOLLOWS:

(1.) TYPE 2 R/W FENCE FABRIC AND A 36 INCH WIDE FABRIC CONNECTED AS SHOWN; OR

(2.) A SINGLE FABRIC HAVING A MINIMUM WIDTH OF 83 INCHES; OR

(3.) A COMBINATION OF TWO FABRICS TO ACHIEVE A MINIMUM WIDTH OF 83 INCHES. IF THE FABRICS ARE OVERLAPPED, CONNECT BY FASTENERS SPACED AT 18" C. TO C. AND STAGGERED ON EACH EDGE OF FABRIC ALONG THE JOINT.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

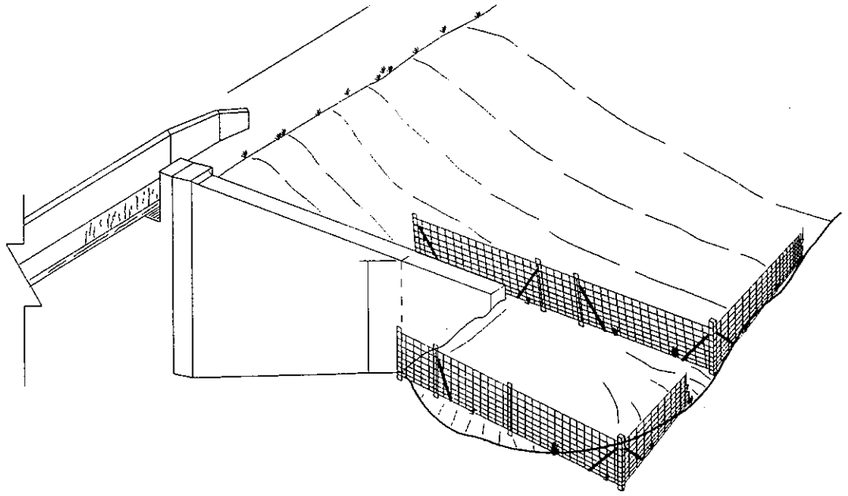
RIGHT-OF-WAY FENCE

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

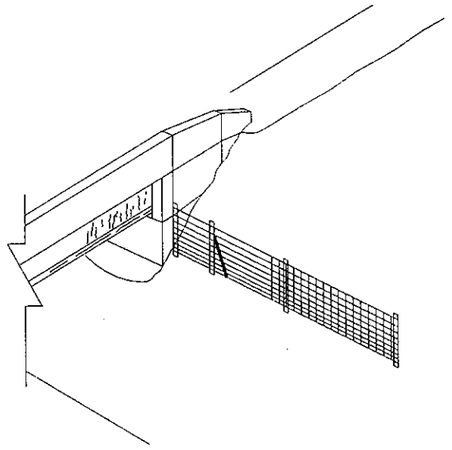
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 1 OF 2

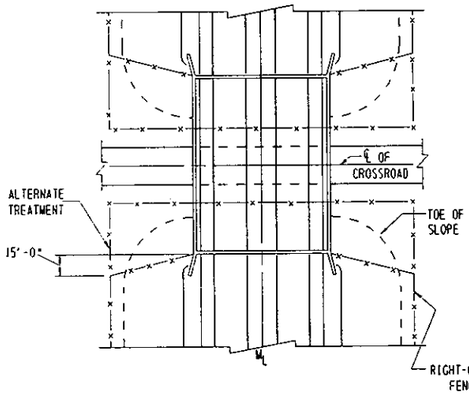
RC-60



R/W FENCE TREATMENT AT HIGH WALLED ABUTMENT

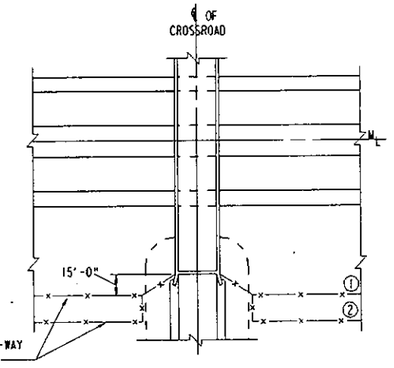


R/W FENCE TREATMENT AT STUB ABUTMENTS



HIGHWAY OVER CROSSROAD

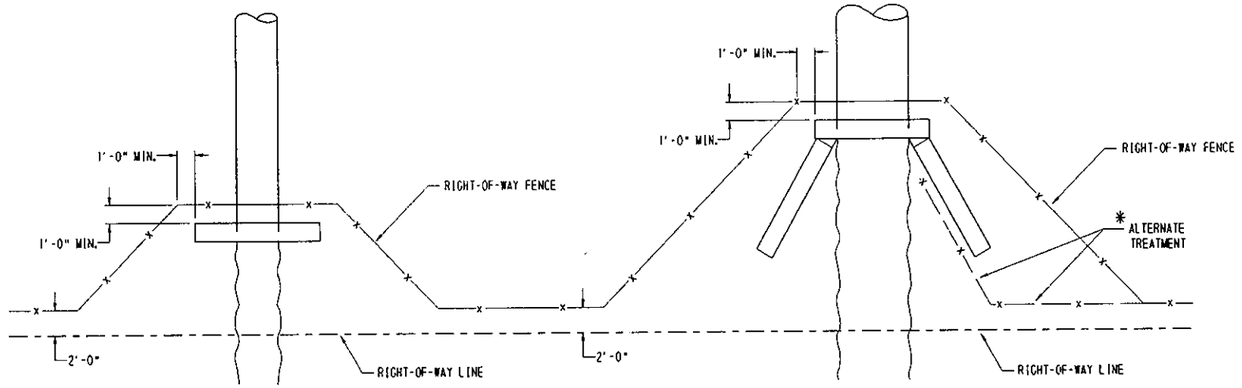
IF THE ROADWAY HAS DUAL STRUCTURES, ERECT THE RIGHT-OF-WAY FENCE TO CLOSE OFF THE MEDIAN AREA.



HIGHWAY UNDER CROSSROAD

① IF RIGHT-OF-WAY FENCE IS WITHIN 15 FEET OR LESS OF THE PROJECTED FACE OF THE BACKWALL, ANGLE THE FENCE INTO THE ABUTMENT AS SHOWN.

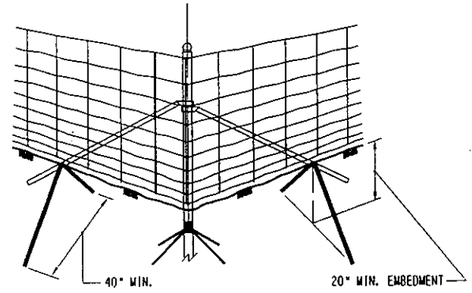
② IF RIGHT-OF-WAY FENCE IS GREATER THAN 15 FEET FROM THE PROJECTED FACE OF THE BACKWALL, PLACE FENCE PARALLEL TO CROSSROAD AND ANGLE INTO ABUTMENT AS SHOWN.



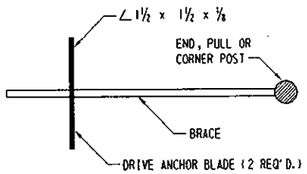
R/W FENCE TREATMENT AT CULVERTS

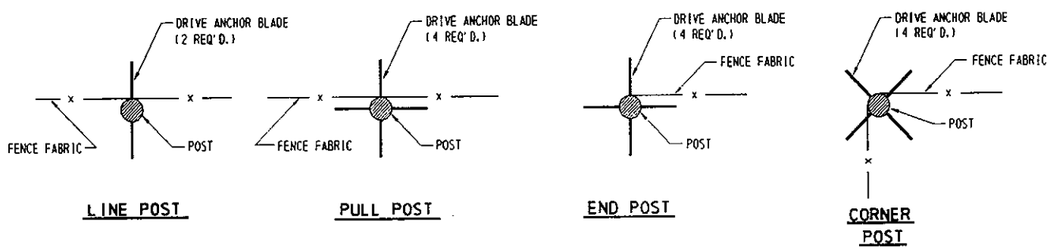
(CAUTION SHOULD BE EXERCISED WHEN LOCATING POSTS NEAR CULVERT. ANY DAMAGE WILL BE AT CONTRACTOR'S EXPENSE.)

* THE LAST POST SHALL BE WITHIN 6" OF THE WALL AND AT A POINT WHERE THE WALL HEIGHT IS NOT LESS THAN 10'-0".

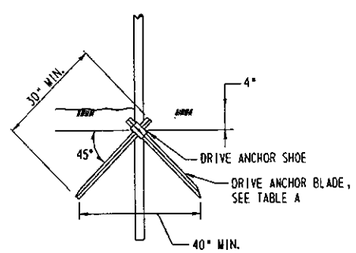


DRIVE ANCHOR DETAILS FOR POST BRACES ON TYPE 2 AND TYPE 5 R/W FENCE





DRIVE ANCHOR ORIENTATION



DRIVE ANCHOR

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

FENCE HEIGHT	MINIMUM BLADE SIZE
5' OR LESS	1" x 1" x ⅛"
GREATER THAN 5' BUT LESS THAN 7'	1¼" x 1¼" x ⅛"
7' OR GREATER	1½" x 1½" x ⅛"

TABLE A

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

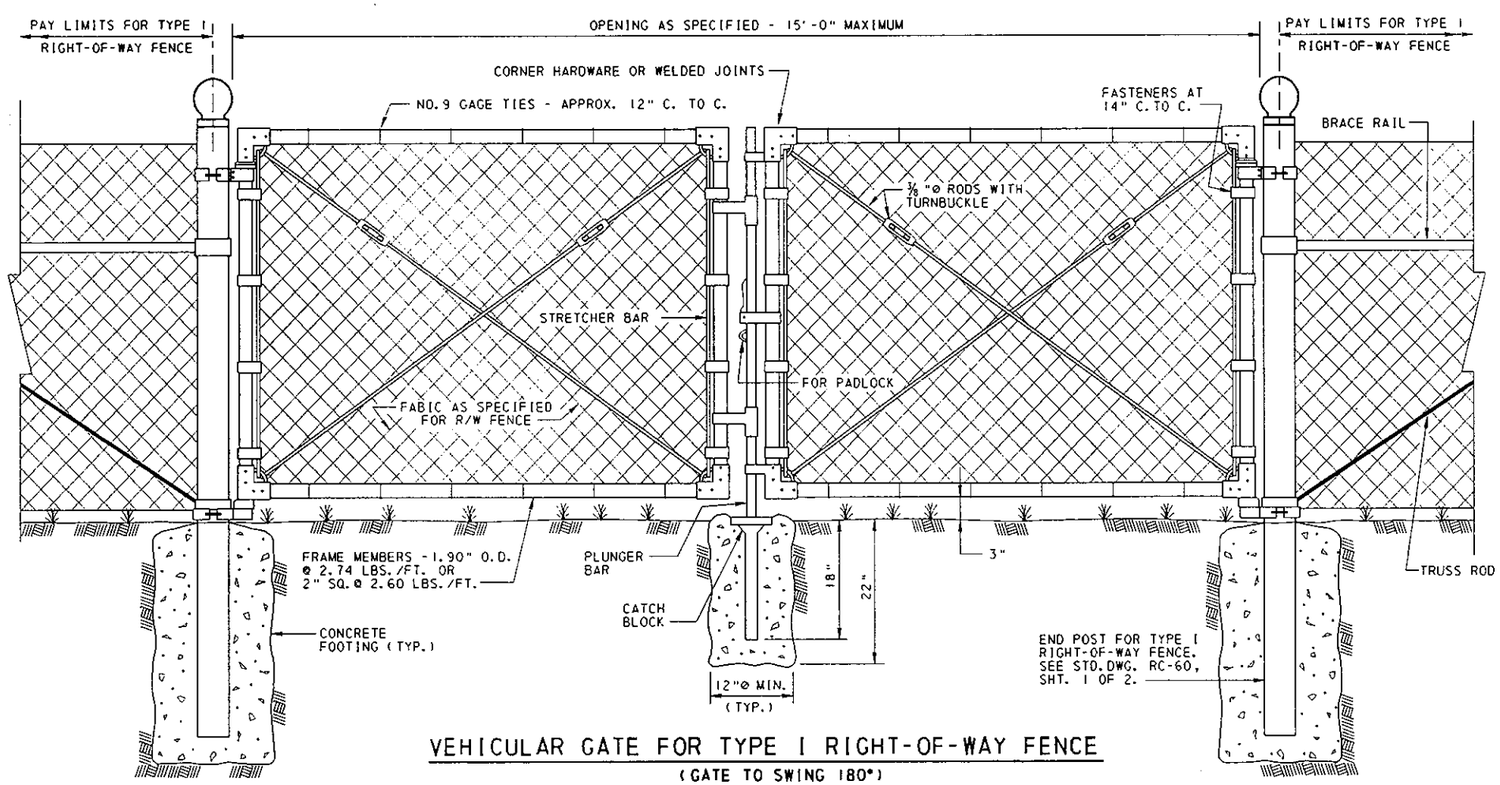
RIGHT-OF-WAY FENCE

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

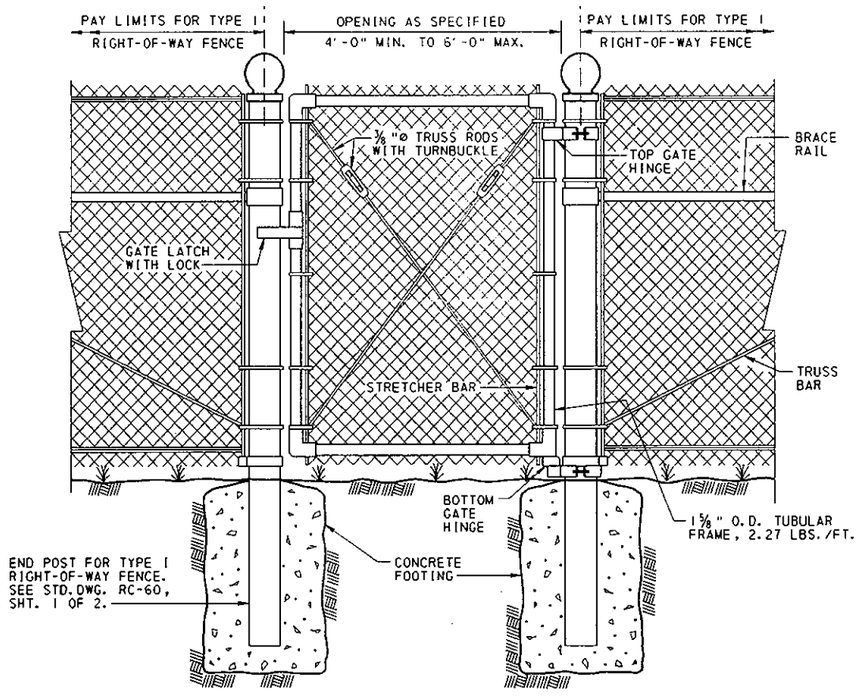
SHT. 2 OF 2

RC-60



VEHICULAR GATE FOR TYPE I RIGHT-OF-WAY FENCE

(GATE TO SWING 180°)



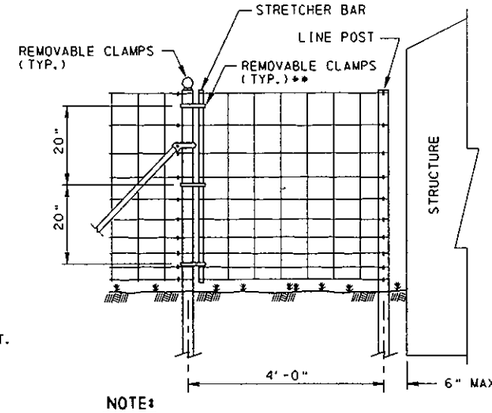
PEDESTRIAN GATE FOR TYPE I RIGHT-OF-WAY FENCE

(GATE TO SWING 90°)

* INCLUDES STRETCHER BAR, BRACE AND REMOVEABLE CLAMPS OR FASTENERS. SEE STD. DWG. RC-60, SHT. 1 OF 2, FOR END POST DETAILS.

** FOR TYPE 2 R/W FENCE USE 3 CLAMPS AS SHOWN. FOR TYPE 1 R/W FENCE USE 4 CLAMPS EQUALLY SPACED. FOR TYPE 5 R/W FENCE USE 5 CLAMPS EQUALLY SPACED.

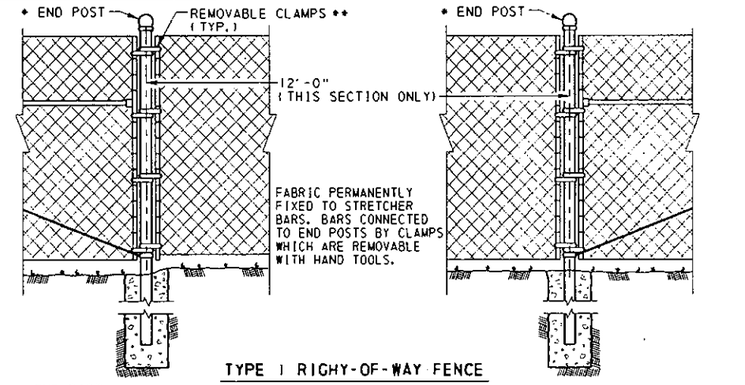
*** THE PAYMENT FOR REMOVEABLE FENCE SECTIONS WILL BE CONSIDERED INCIDENTAL TO THE R/W FENCE.



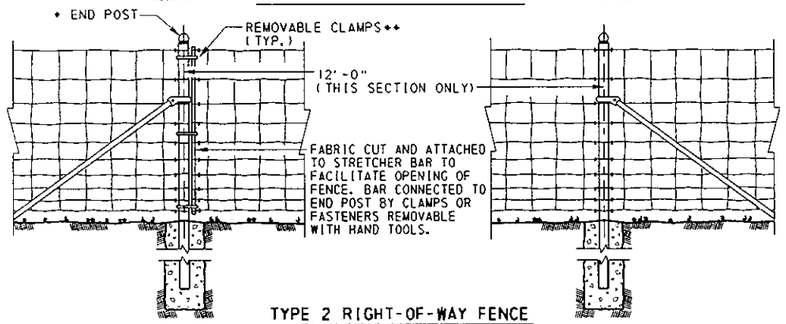
NOTE:

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

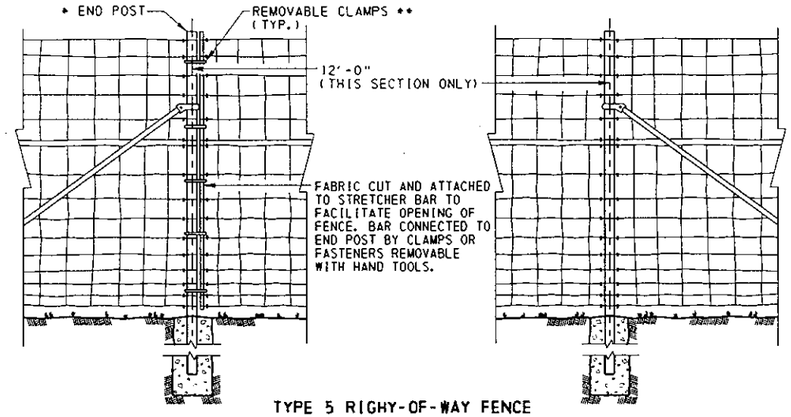
***REMOVEABLE FENCE SECTIONS AT STRUCTURES



TYPE 1 RIGHY-OF-WAY FENCE



TYPE 2 RIGHT-OF-WAY FENCE



TYPE 5 RIGHY-OF-WAY FENCE

REMOVEABLE FENCE SECTIONS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

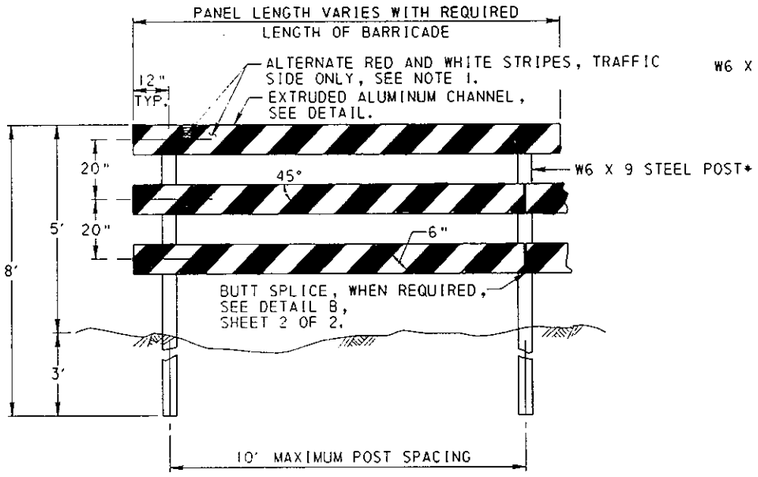
RIGHT-OF-WAY GATES AND REMOVEABLE FENCE SECTIONS

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

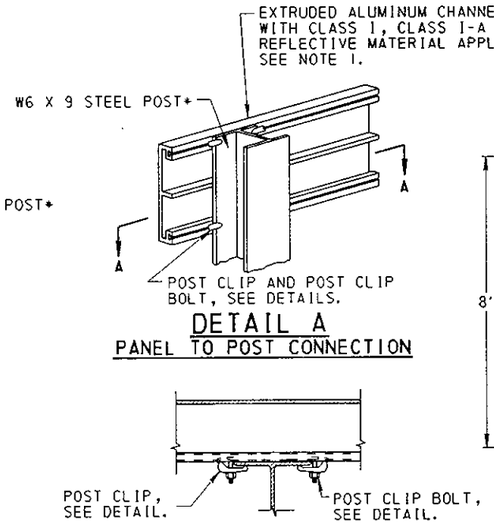
SHT. 1 OF 1

RC-61



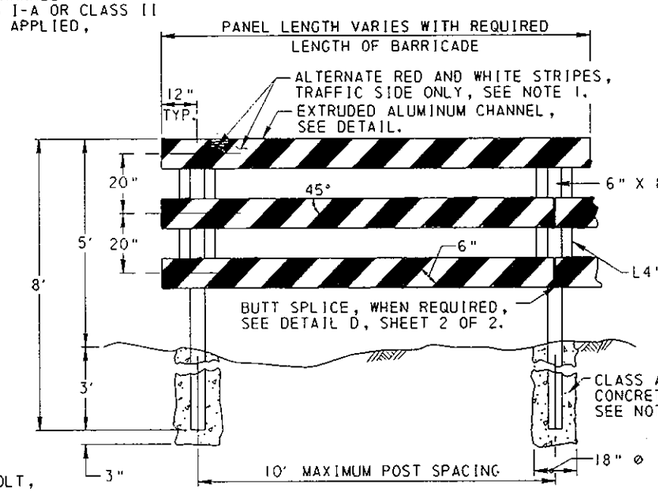
ALUMINUM PANEL - STEEL POSTS

*(A W6 X 8.5 STEEL SHAPE MAY ALSO BE USED)

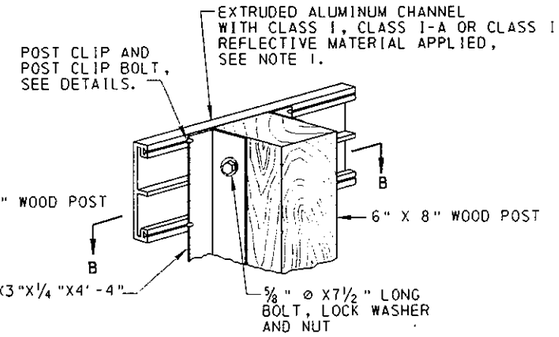


DETAIL A
PANEL TO POST CONNECTION

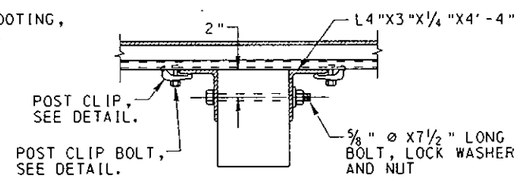
SECTION A-A



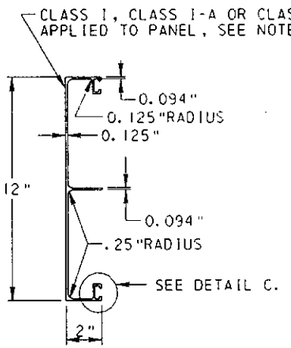
ALUMINUM PANEL - WOOD POSTS



DETAIL B
PANEL TO POST CONNECTION

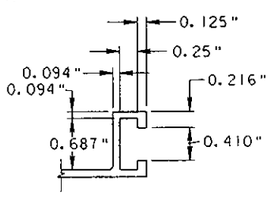


SECTION B-B

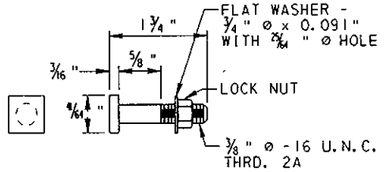


EXTRUDED ALUMINUM CHANNEL

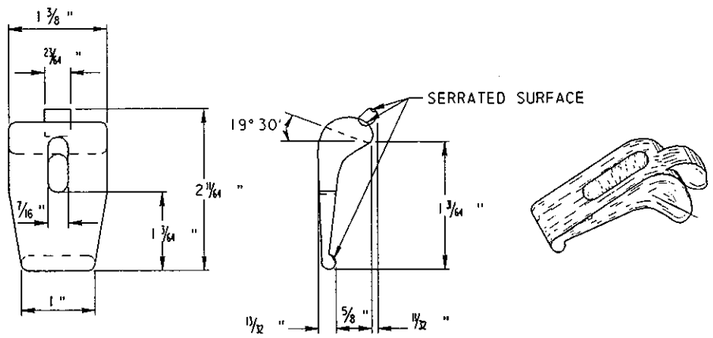
(DIMENSIONS FOR PANELS MAY VARY DEPENDING UPON MANUFACTURING COMPANY'S DESIGN)



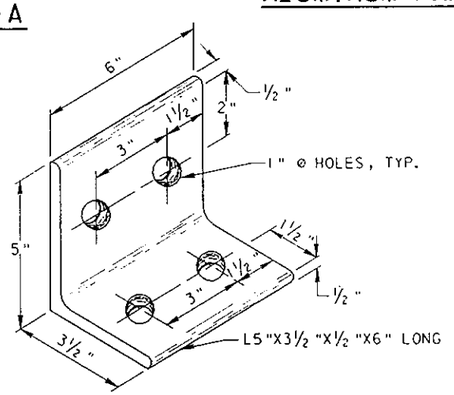
DETAIL C



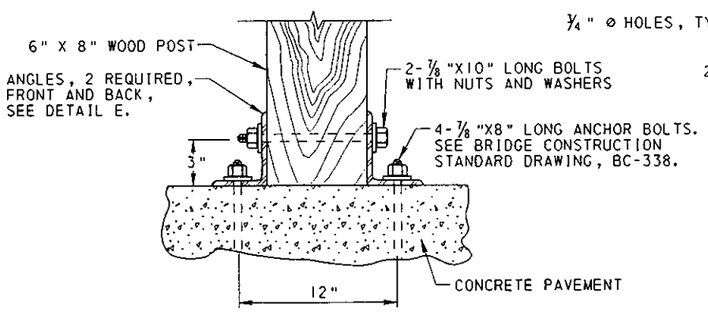
POST CLIP BOLT



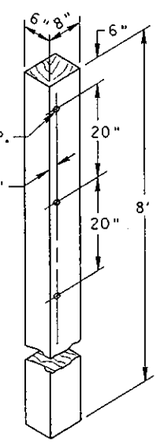
POST CLIP



DETAIL E



DETAIL D



WOOD POST FOR ALUMINUM PANEL

NOTES

1. ONLY CLASS I, CLASS I-A OR CLASS II REFLECTIVE SHEETING MATERIAL SUPPLIED BY A MANUFACTURER, AS LISTED IN BULLETIN 15 PERMITTED.
2. MECHANICALLY DRIVE POSTS OR ERECT IN CONCRETE FOOTING.
3. SEE RC-52, SHEET 1 OF 5, FOR MOUNTING OF STEEL POSTS ON CONCRETE PAVEMENT. SEE DETAIL D, FOR MOUNTING OF WOOD POSTS ON CONCRETE PAVEMENT.
4. USE MATERIALS WHICH MEET THE REQUIREMENTS OF PUBLICATION 408, SECTION 678.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

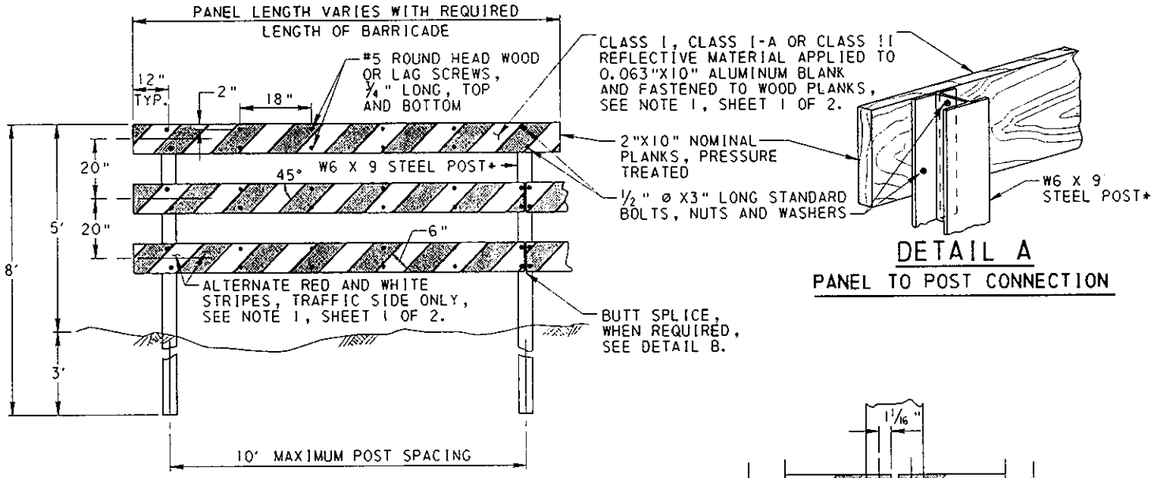
PERMANENT BARRICADES
ALUMINUM PANEL

RECOMMENDED MAR. 25, 1994
Fredric Bowser
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
M M Ryan
CHIEF ENGINEER

SHT. 1 OF 2

RC-63

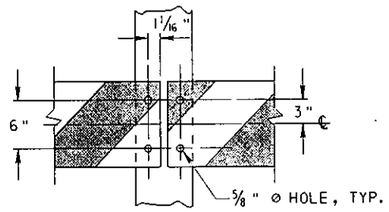


WOOD PANEL - STEEL POSTS

*(A W6 X 8.5 STEEL SHAPE MAY ALSO BE USED)

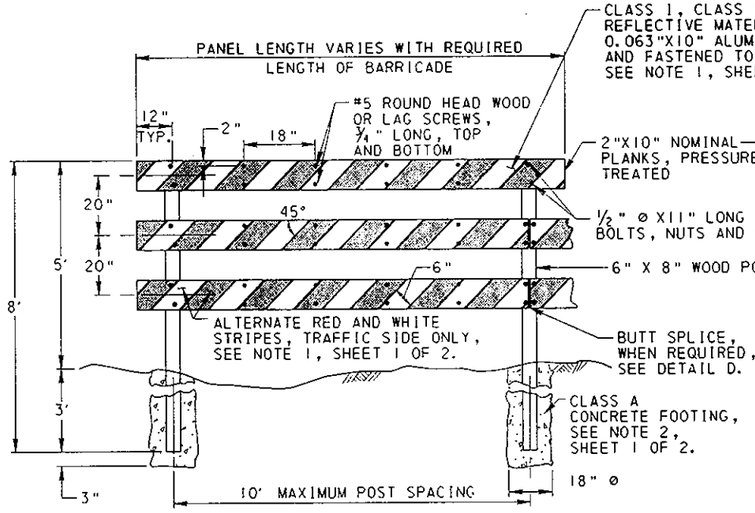
DETAIL A

PANEL TO POST CONNECTION



DETAIL B

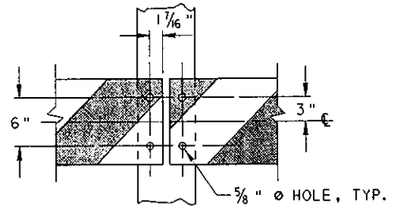
BUTT SPLICE



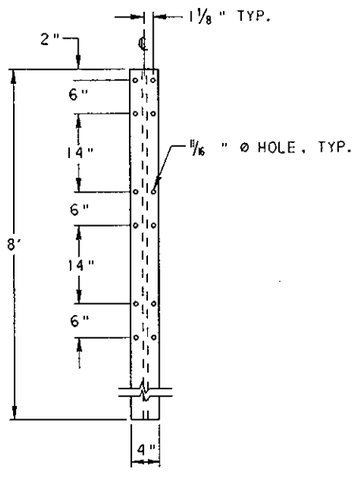
WOOD PANEL - WOOD POSTS

DETAIL C

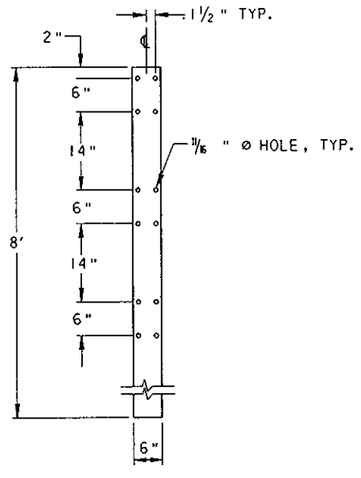
PANEL TO POST CONNECTION



DETAIL D



STEEL POST FOR WOOD PANEL



WOOD POST FOR WOOD PANEL

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

PERMANENT BARRICADES

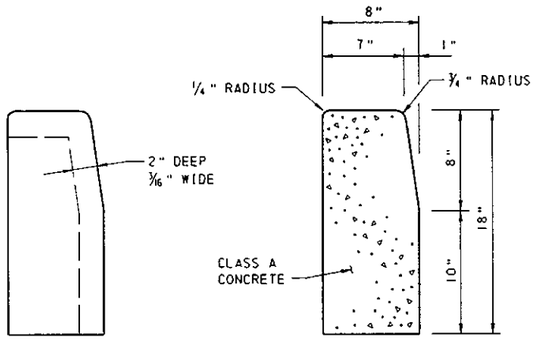
WOOD PANEL

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 2 OF 2

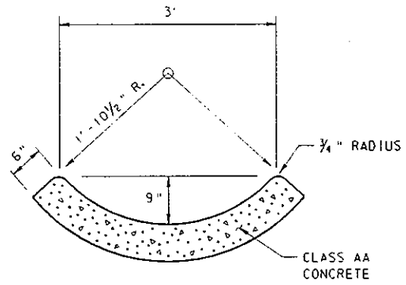
RC-63



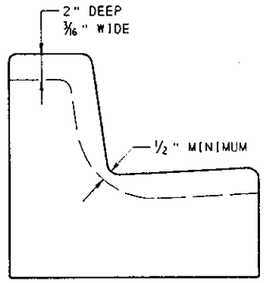
DETAIL A
CONTRACTION JOINT

TYPICAL
CROSS SECTION

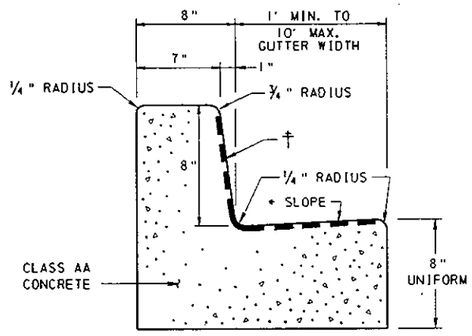
DETAIL B
CONTRACTION JOINT



TYPICAL
CROSS SECTION



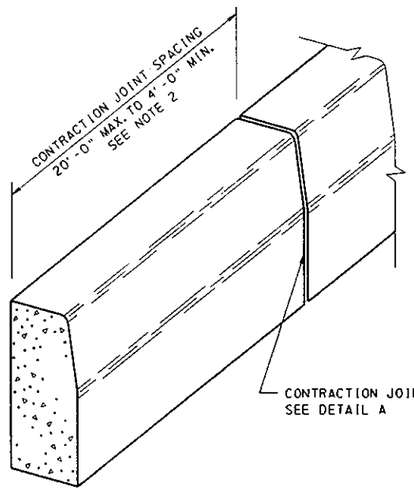
DETAIL C
CONTRACTION JOINT



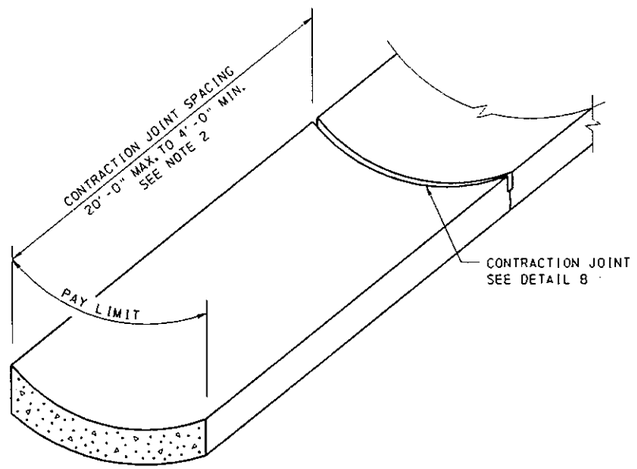
TYPICAL
CROSS SECTION

• UNDER 5' GUTTER WIDTH = 1" PER FT. MIN.
5' AND GREATER GUTTER WIDTH = ½" PER FT. MIN.

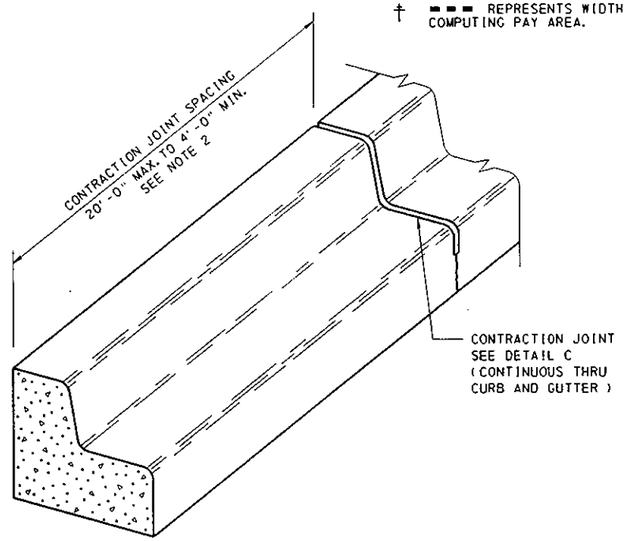
† ▬ ▬ ▬ REPRESENTS WIDTH OF GUTTER FOR COMPUTING PAY AREA.



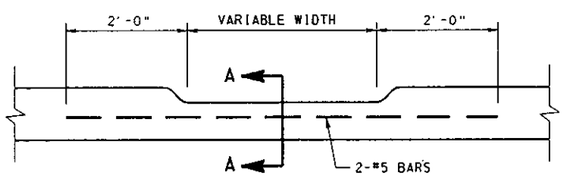
PLAIN CONCRETE CURB



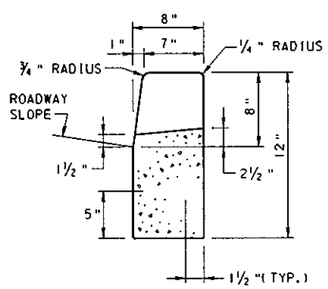
PLAIN CONCRETE GUTTER



PLAIN CONCRETE CURB GUTTER



PLAN VIEW



SECTION A-A

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 630 FOR PLAIN CONCRETE CURB AND DEPRESSED CURB, SECTION 640 FOR PLAIN CONCRETE CURB AND FOR PLAIN CONCRETE CURB GUTTER.
2. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS.
3. PLACE ¾-INCH PREMOLDED EXPANSION JOINT FILLER MATERIAL AT STRUCTURES AND AT THE END OF THE WORK DAY. CUT MATERIAL TO CONFORM TO AREA ADJACENT TO CURB OR TO CONFORM TO CROSS SECTIONAL AREA OF CURB.
4. SEE RC-50 FOR PLAIN CONCRETE CURB SLOPED TOP TREATMENT AT END OF STRUCTURES.

DEPRESSED CURB FOR DRIVES

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

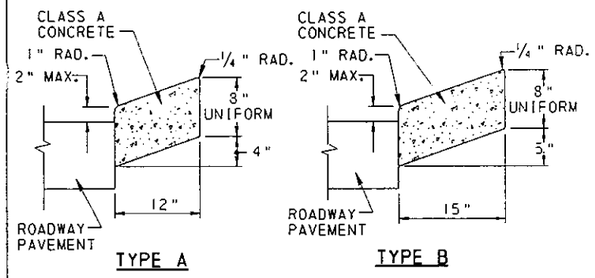
CURBS AND GUTTERS

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

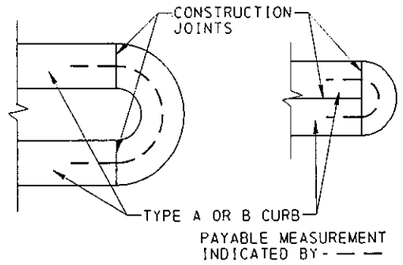
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 1 OF 1

RC-64



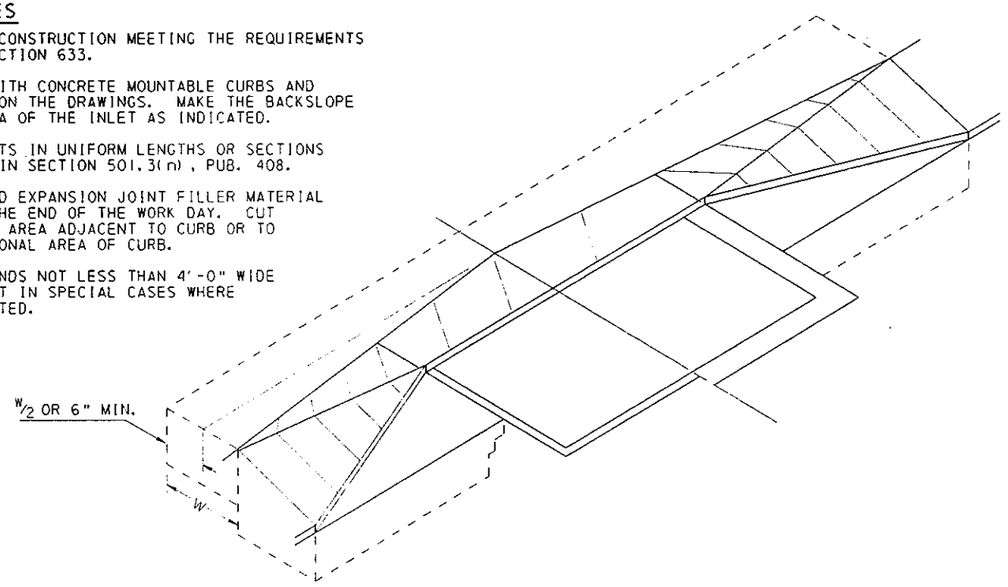
CONCRETE MOUNTABLE CURBS

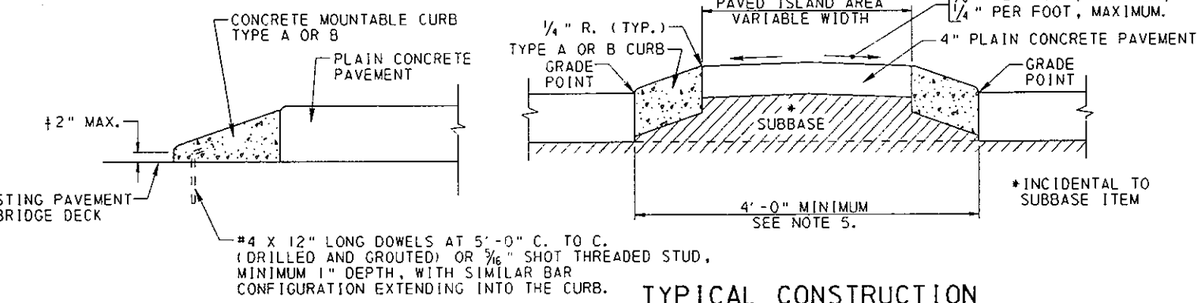


END DETAILS

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 633.
2. INSTALL TYPE M INLET WITH CONCRETE MOUNTABLE CURBS AND LOCATE INLET AS SHOWN ON THE DRAWINGS. MAKE THE BACKSLOPE TRAVERSABLE IN THE AREA OF THE INLET AS INDICATED.
3. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS AND SEAL AS SPECIFIED IN SECTION 501.3(n), PUB. 408.
4. PLACE 1/4-INCH PREMOLDED EXPANSION JOINT FILLER MATERIAL AT STRUCTURES AND AT THE END OF THE WORK DAY. CUT MATERIAL TO CONFORM TO AREA ADJACENT TO CURB OR TO CONFORM TO CROSS SECTIONAL AREA OF CURB.
5. PROVIDE ELONGATED ISLANDS NOT LESS THAN 4'-0" WIDE AND 20'-0" LONG, EXCEPT IN SPECIAL CASES WHERE SPACE IS SEVERELY LIMITED.

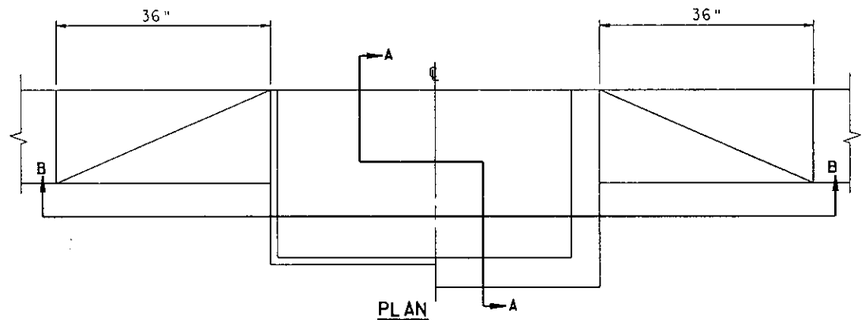




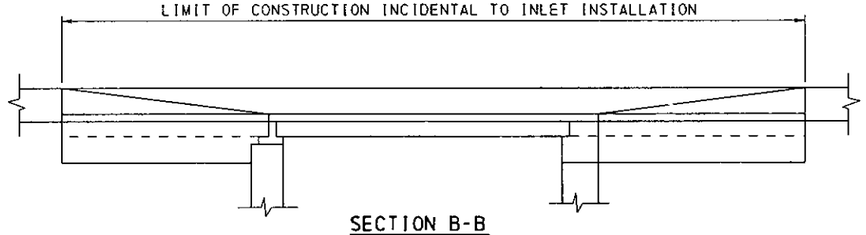
TYPICAL CONSTRUCTION

CONCRETE MOUNTABLE CURB ON EXISTING CONCRETE PAVEMENT AND BRIDGE DECKS

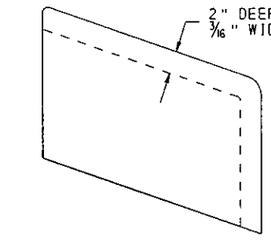
†(PLANS MAY PROVIDE FOR A DEEPER FACE AT CURB WHEN AN OVERLAY IS PLACED ON THE EXISTING PAVEMENT. HOWEVER, EXPOSED FINAL FACE OF CURB SHALL BE 2" MAXIMUM.)



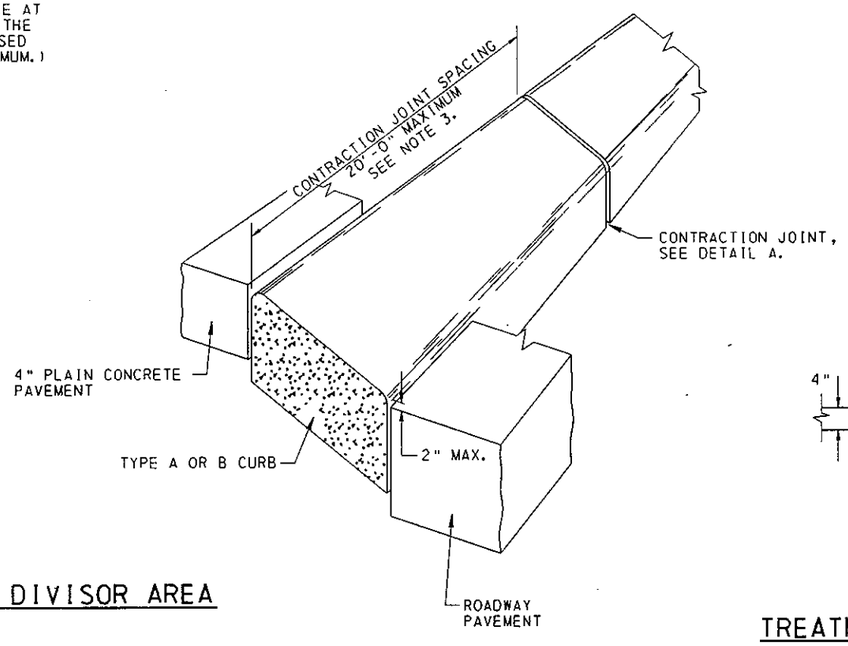
PLAN



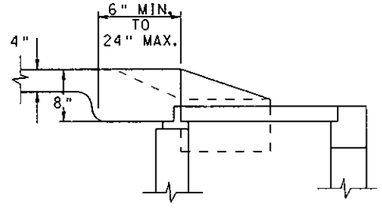
SECTION B-B



DETAIL A
CONTRACTION JOINT



TYPICAL DIVISOR AREA



SECTION A-A

TREATMENT FOR CONCRETE MOUNTABLE CURBS AT INLETS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

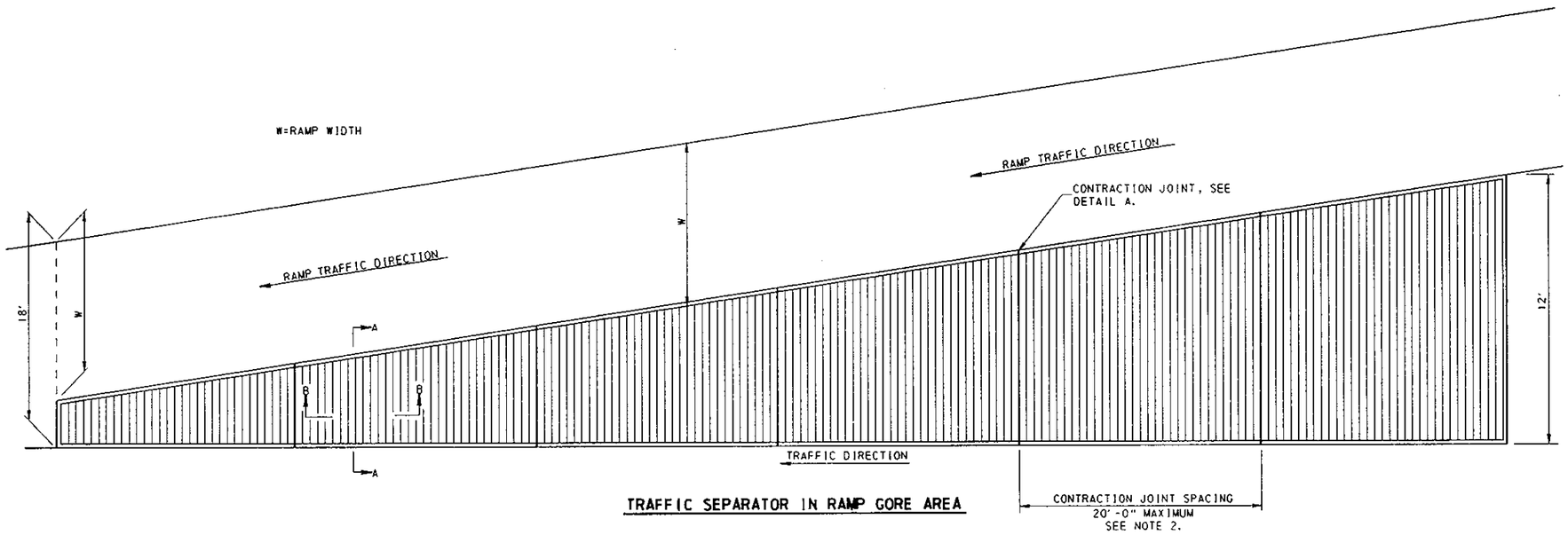
CONCRETE MOUNTABLE CURBS

RECOMMENDED MAR. 25, 1994
Frederick Bowser
DIRECTOR, BUREAU OF DESIGN

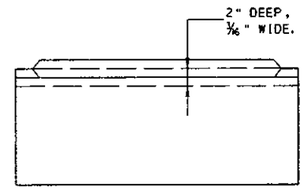
RECOMMENDED MAR. 25, 1994
W.W. Ryan
CHIEF ENGINEER

SHT. 1 OF 1

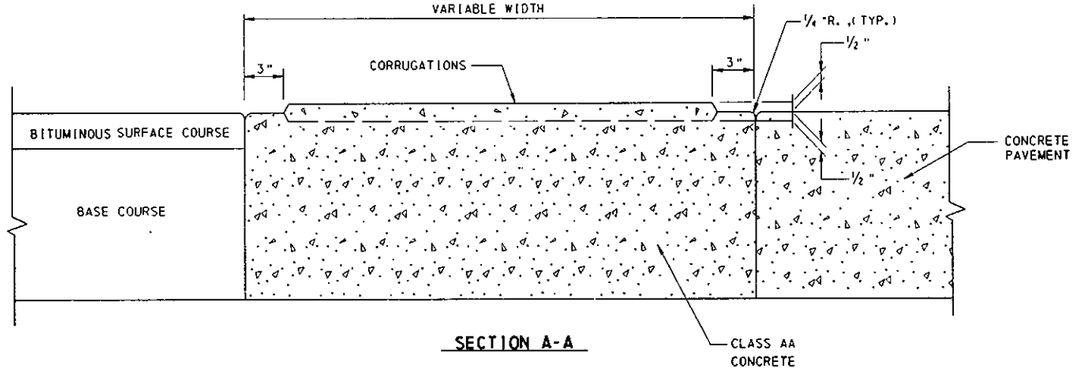
RC-65



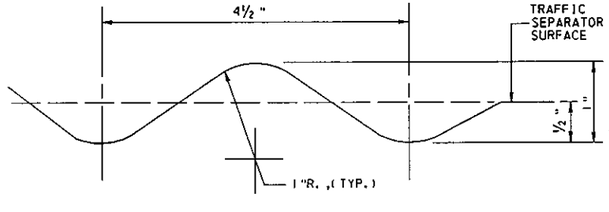
TRAFFIC SEPARATOR IN RAMP GORE AREA



DETAIL A
CONTRACTION JOINT



SECTION A-A



SECTION B-B
CORRUGATION DETAIL

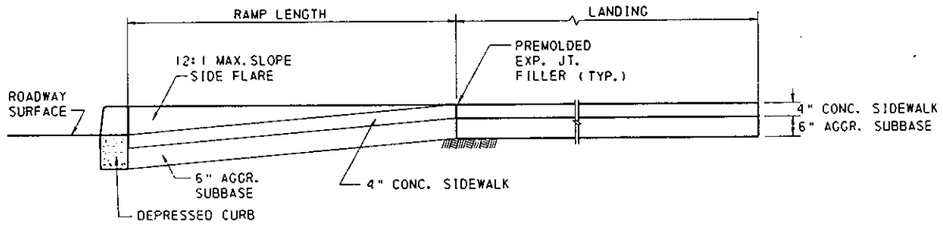
NOTES

1. USE MATERIALS AND CONSTRUCTION METHODS WHICH MEET THE REQUIREMENTS OF PUBLICATION 408, SECTION 629.
2. SPACE CONTRACTION JOINTS IN UNIFORM LENGTHS OR SECTIONS AND PLACE IN LINE WITH ADJACENT PAVEMENT JOINTS.
3. THE CONTRACTION JOINTS AND CORRUGATIONS MAY BE CONSTRUCTED AT A SKEW TO MATCH THE PAVEMENT JOINTS.
4. PLACE 1/4" PREMOLDED EXPANSION JOINT FILLER MATERIAL AT STRUCTURES AND AT THE END OF THE WORK DAY. CUT MATERIAL TO CONFORM TO AREA ADJACENT TO CURB OR TO CROSS SECTIONAL AREA.

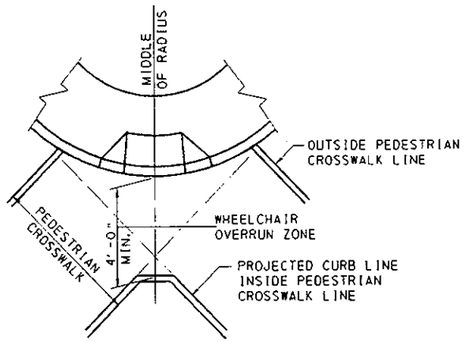
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

CONCRETE TRAFFIC SEPARATOR

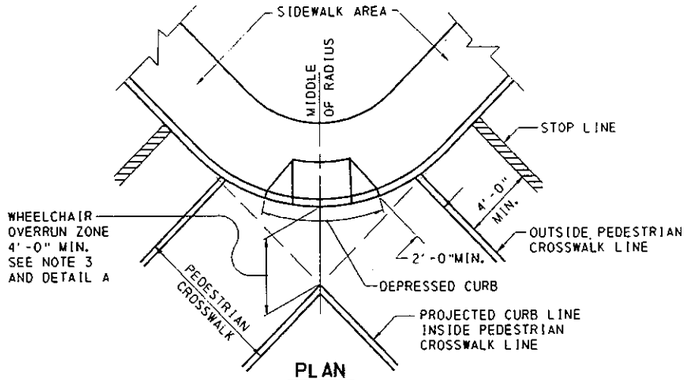
RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	Sht. 1 of 1
Fredrick Bowser	M.M. Ryan	RC-66
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	



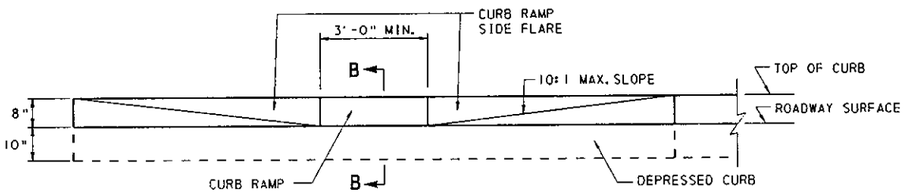
SECTION A-A
TYPE 1



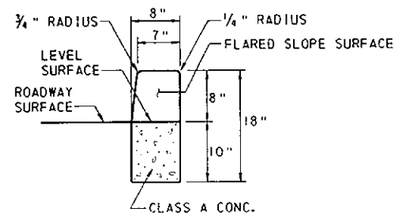
DETAIL A
PLAN
OVERRUN ZONE
CROSSWALK MARKINGS



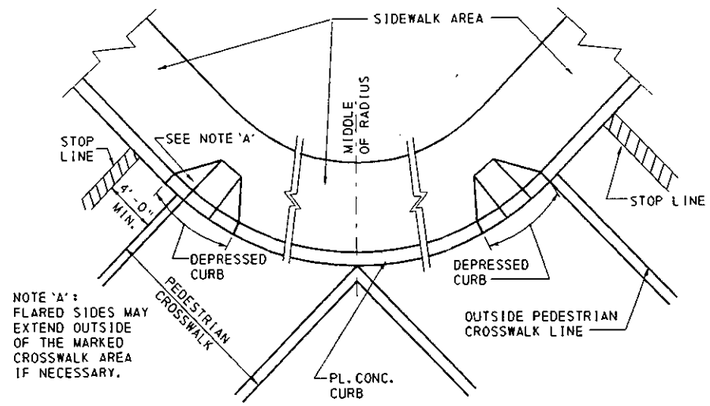
PLAN
TYPE 1 SINGLE CURB RAMP
AT CORNER WITH
CROSSWALK MARKINGS



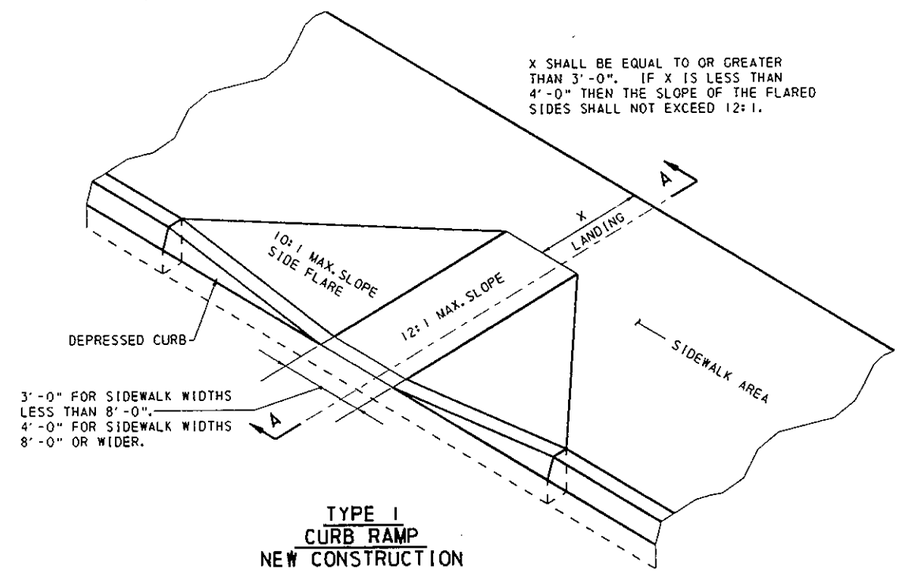
ELEVATION
TYPE 1



DEPRESSED CURB
SECTION B-B



PLAN
TYPE 1 DOUBLE CURB RAMPS
AT CORNER WITH
CROSSWALK MARKINGS



TYPE 1
CURB RAMP
NEW CONSTRUCTION

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTIONS 630, 676, 420, 421 AND 422.
2. PROVIDE ½" EXPANSION JOINT MATERIAL WHERE CURB RAMP ADJOINS ANY RIGID PAVEMENT, SIDEWALK OR STRUCTURE WITH THE TOP OF JOINT FILLER FLUSH WITH ADJACENT CONCRETE SURFACE.
3. IF PEDESTRIAN CROSSWALKS ARE NOT WIDE ENOUGH TO PROVIDE MINIMUM 4'-0" WIDE WHEELCHAIR OVERRUN ZONE AT THE BOTTOM OF THE RAMP, POSITION CROSSWALKS AS INDICATED IN DETAIL A.
4. SEAL JOINTS WITH AN APPROVED SEALING MATERIAL.
5. PROVIDE SLIP RESISTANT TEXTURE ON CURB RAMP BY COARSE BROOMING TRANSVERSE TO THE SLOPE OF THE RAMP. EXTEND TEXTURE THE FULL WIDTH AND LENGTH OF THE CURB RAMP INCLUDING FLARED SIDE RAMPS.
6. CONSTRUCTION DETAILS SHALL BE MODIFIED TO ADAPT DIMENSIONS TO EXISTING CURB ALTERATIONS WHERE THE CURB IS LESS THAN THE STANDARD 8-INCH HEIGHT.
7. CURB RAMP AND SIDE FLARE LENGTHS ARE VARIABLE AND BASED ON CURB HEIGHT AND THE SIDEWALK PITCH. SEE TABLE A (SHT. 2 OF 2) FOR TYPICAL RAMP DIMENSIONS.
8. DEPRESSED CURB WILL BE MEASURED AND PAID FOR IN ACCORDANCE WITH SECTION 630.4.
9. WHENEVER POSSIBLE, CONSTRUCT THE TRANSITION SLOPE FROM THE CURB RAMP AND FLARE SIDES TO ADJOINING SURFACES WITH A GRADUAL CURVE RATHER THAN AN ABRUPT ANGLE.
10. BUILT-UP CURB RAMP TO BE CONSTRUCTED OF BITUMINOUS MATERIAL AS INDICATED, INCLUDING SURFACE PREPARATION AND TACK COAT, AS REQUIRED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

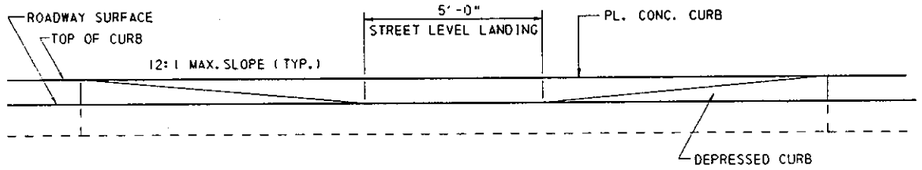
CURB RAMPS

RECOMMENDED MAR. 25, 1994
Frederic Bowser
DIRECTOR, BUREAU OF DESIGN

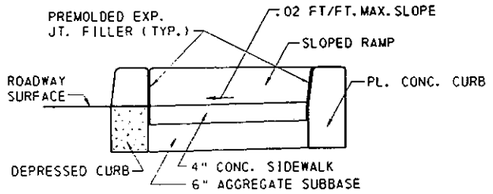
RECOMMENDED MAR. 25, 1994
M. M. Ryan
CHIEF ENGINEER

SHT. 1 OF 2

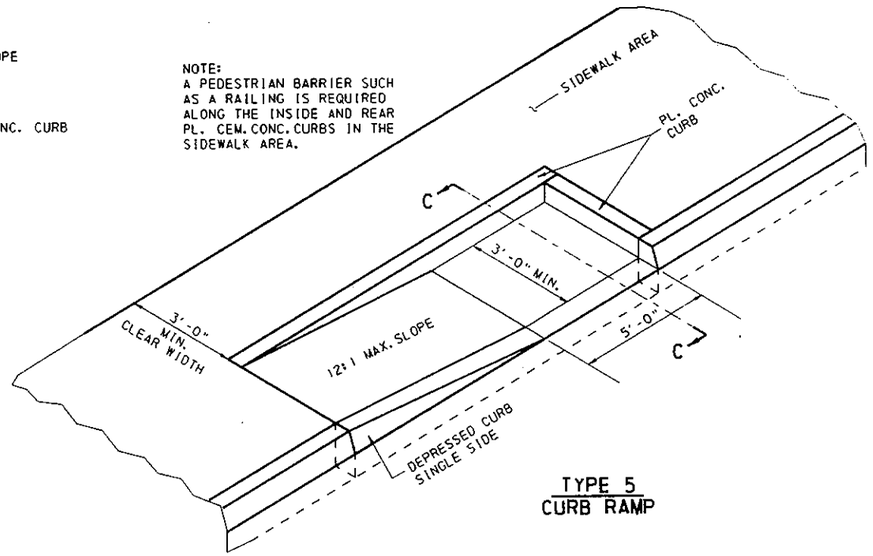
RC-67



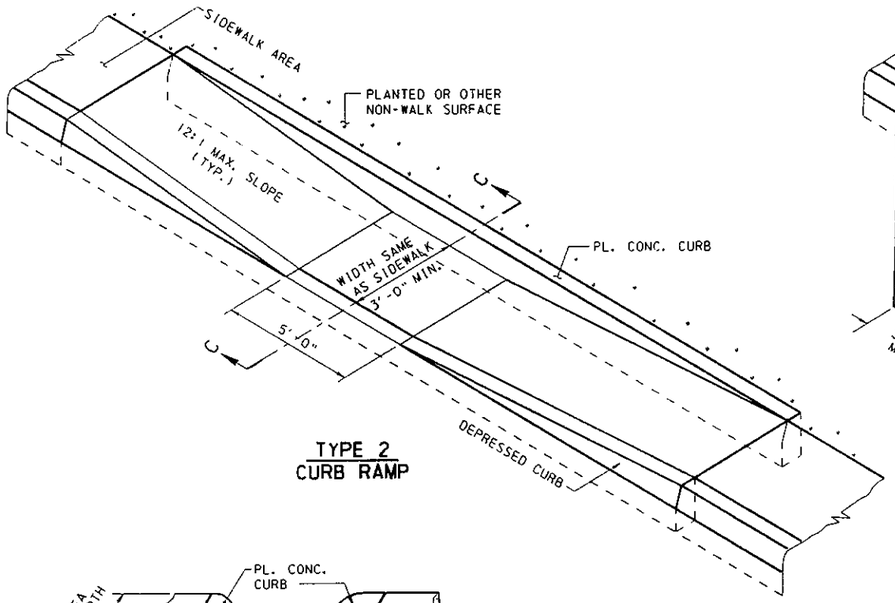
TYPE 2 CURB RAMP
ELEVATION



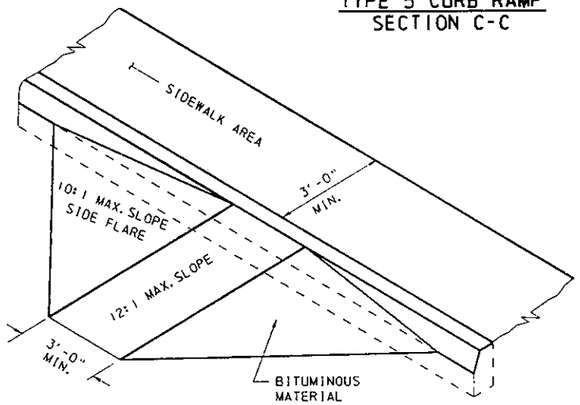
TYPE 2 CURB RAMP AND
TYPE 5 CURB RAMP
SECTION C-C



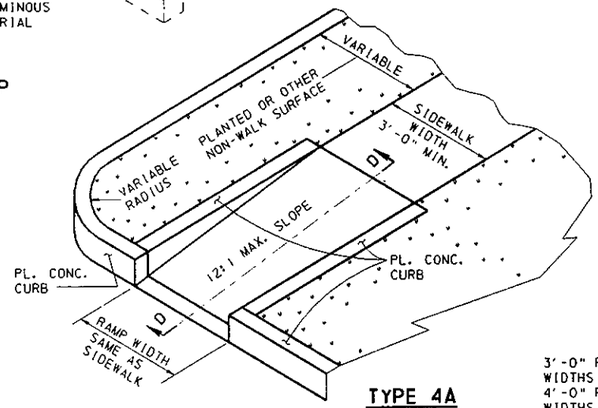
TYPE 5
CURB RAMP



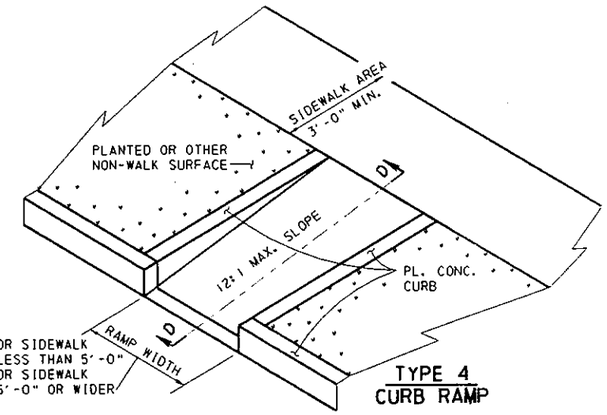
TYPE 2
CURB RAMP



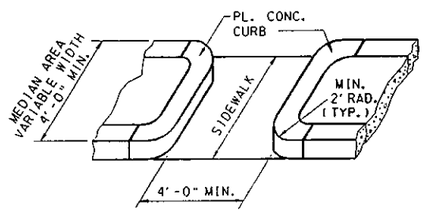
TYPE 3
BUILT-UP CURB RAMP



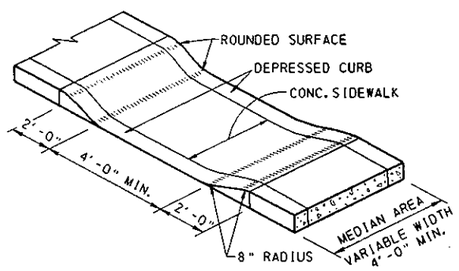
TYPE 4A
CURB RAMP



TYPE 4
CURB RAMP



TYPE A
TYPICAL MEDIAN OR ISLAND
ACCESS OPENING
WITH CURB SIDES



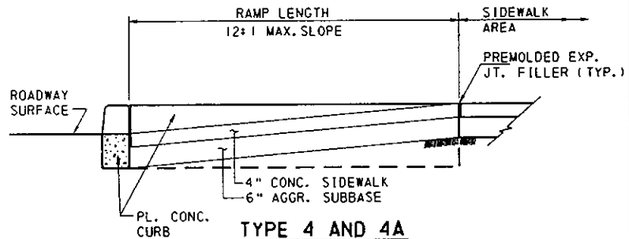
TYPE B
TYPICAL MEDIAN OR ISLAND
ACCESS OPENING WITH
FLARED SIDES

TABLE A

* CURB HEIGHT PLUS RISE OF SIDEWALK CROSS SLOPE

CURB RAMP DIMENSIONS NEW CONSTRUCTION				
* RISE OF RAMP	MAX. RAMP SLOPE	NOMINAL RAMP LENGTH (12 : 1)	SIDE FLARE DIMENSION AT CURB (10 : 1)	SIDE FLARE DIMENSION AT CURB (12 : 1)
3"	12 : 1	3.0 FT.	2.5 FT.	3.0 FT.
4"	12 : 1	4.0 FT.	3.3 FT.	4.0 FT.
5"	12 : 1	5.0 FT.	4.2 FT.	5.0 FT.
6"	12 : 1	6.0 FT.	5.0 FT.	6.0 FT.
7"	12 : 1	7.0 FT.	5.8 FT.	7.0 FT.
8"	12 : 1	8.0 FT.	6.7 FT.	8.0 FT.
9"	12 : 1	9.0 FT.	7.5 FT.	9.0 FT.
10"	12 : 1	10.0 FT.	8.4 FT.	10.0 FT.
11"	12 : 1	11.0 FT.	9.2 FT.	11.0 FT.
12"	12 : 1	12.0 FT.	10.0 FT.	12.0 FT.
CURB RAMP DIMENSIONS EXISTING CONDITION *				
* MAX. RISE OF RAMP	MAX. RAMP SLOPE	NOMINAL RAMP LENGTH	SIDE FLARE DIMENSION AT CURB (10 : 1)	SIDE FLARE DIMENSION AT CURB (12 : 1)
3"	8 : 1	2.0 FT.	2.5 FT.	3.0 FT.
4"	10 : 1	3.3 FT.	3.3 FT.	4.0 FT.
5"	10 : 1	4.2 FT.	4.2 FT.	5.0 FT.
6"	10 : 1	5.0 FT.	5.0 FT.	6.0 FT.

* USE ONLY WHEN SPACE LIMITATIONS PROHIBIT THE CONSTRUCTION OF 12 : 1 OR FLATTER SLOPES.



TYPE 4 AND 4A
SECTION D-D

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

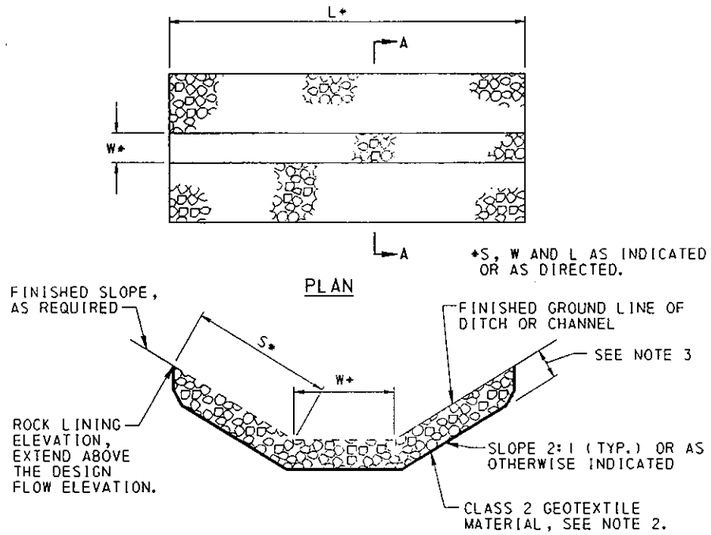
CURB RAMPS

RECOMMENDED MAR. 25, 1994
Fredrick Bowser
DIRECTOR, BUREAU OF DESIGN

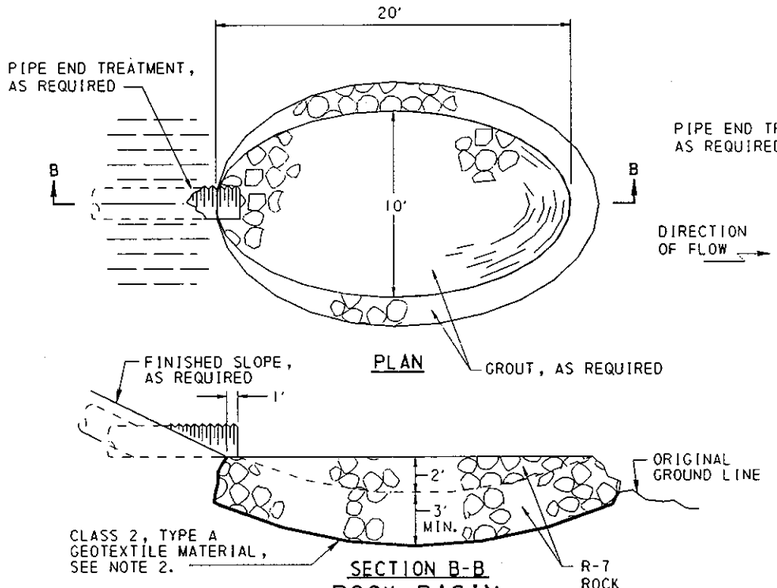
RECOMMENDED MAR. 25, 1994
W. M. Ryon
CHIEF ENGINEER

SHT. 2 OF 2

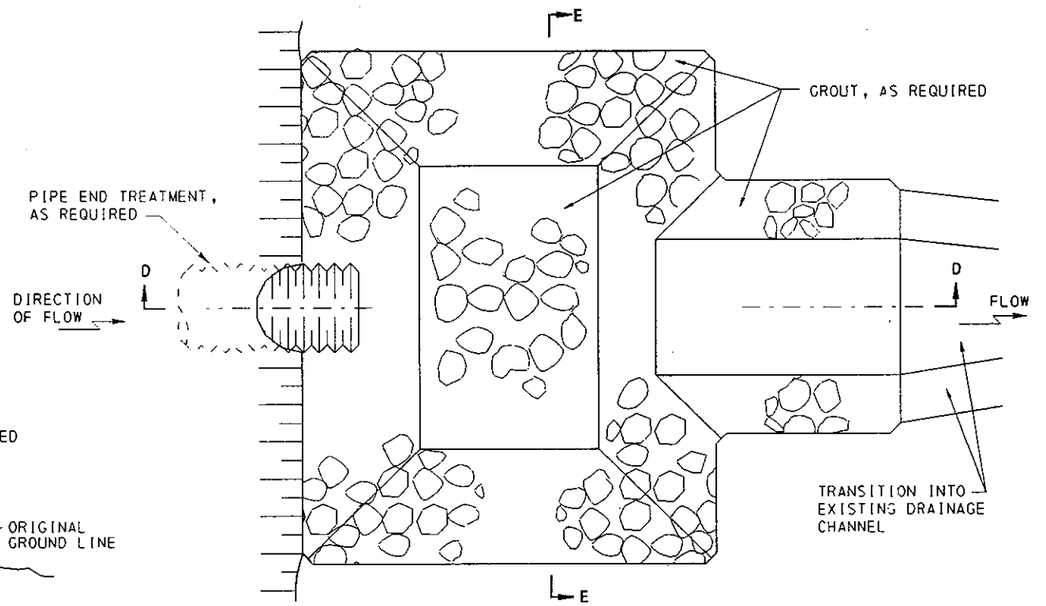
RC-67

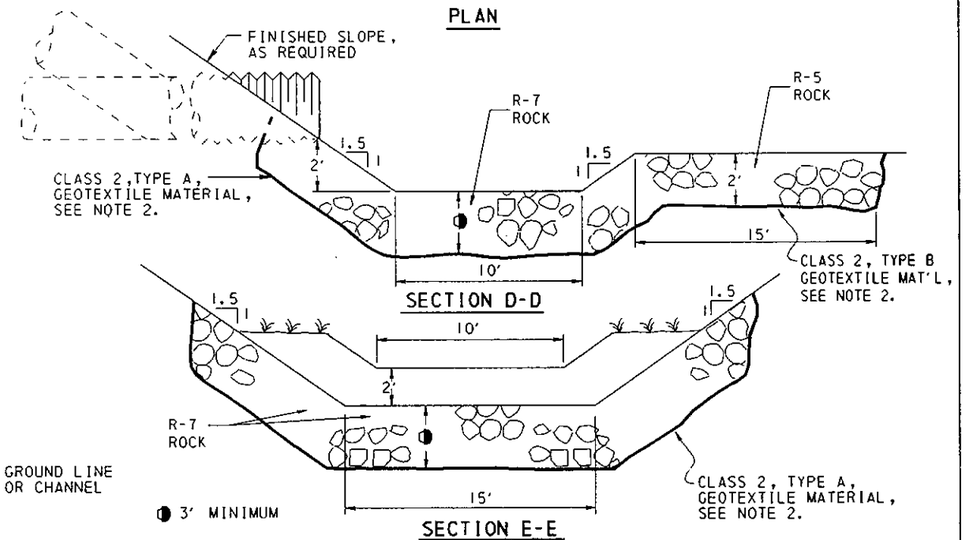


ROCK LINING



ROCK BASIN

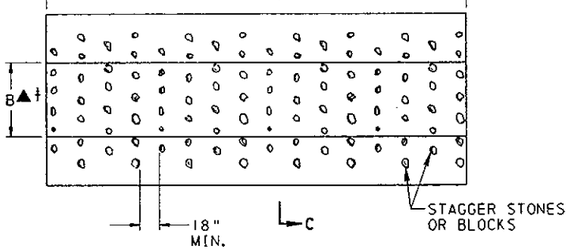


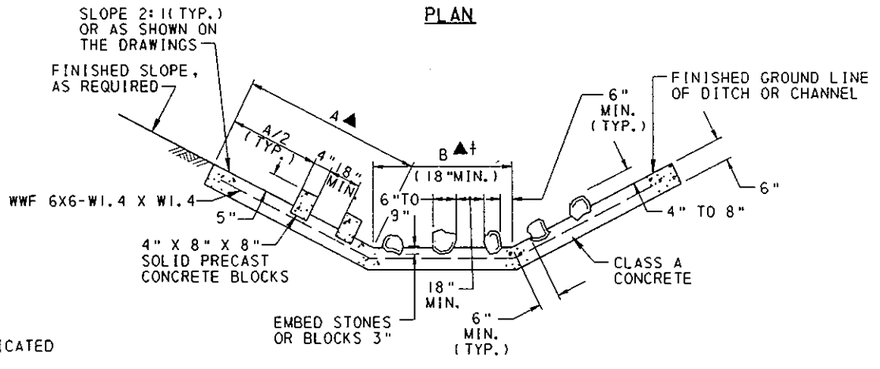


ROCK ENERGY DISSIPATOR

NOTES

1. PROVIDE GEOTEXTILE MATERIAL MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, 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 Pub. 408, Sec. 850.





▲ A, B, AND L AS INDICATED OR AS DIRECTED.

† WHEN CHANNEL BOTTOM WIDTH IS LESS THAN 36", USE A SINGLE, STAGGERED ROW OF STONES OR BLOCKS ALONG CHANNEL BOTTOM.

PAVED ENERGY DISSIPATOR

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

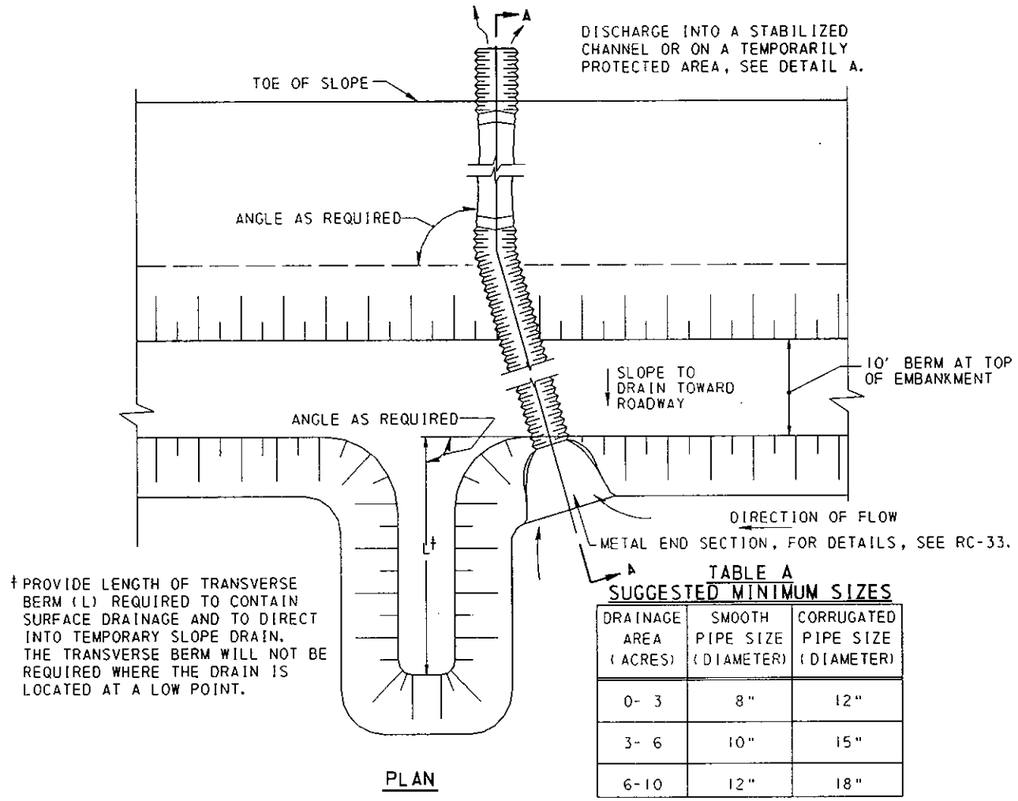
EROSION & SEDIMENT POLLUTION CONTROL

RECOMMENDED MAR. 25, 1994
Freddie Bowser
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
W. M. Ryan
CHIEF ENGINEER

SHT. 1 OF 4

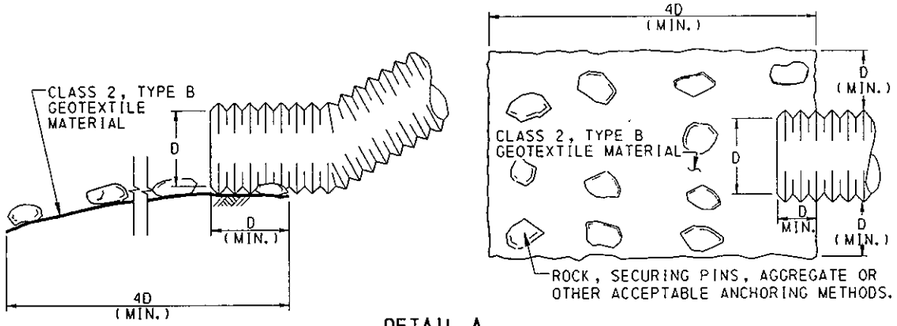
RC-70



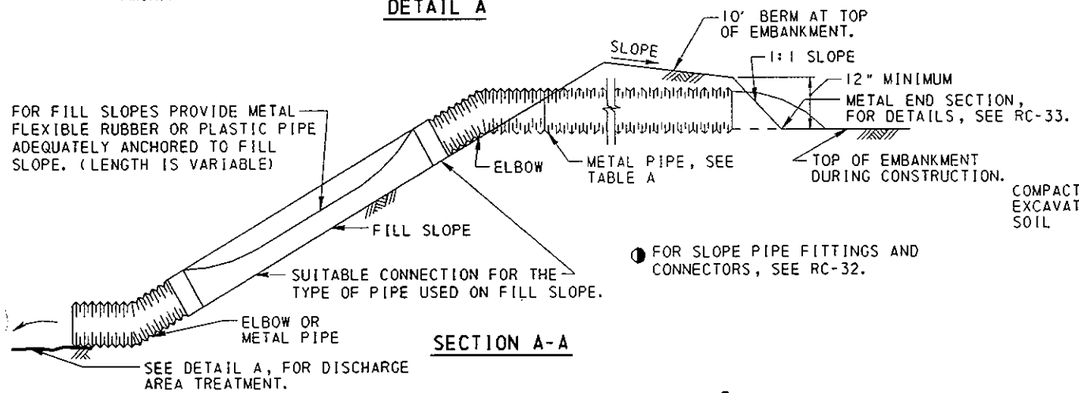
PLAN

TABLE A
SUGGESTED MINIMUM SIZES

DRAINAGE AREA (ACRES)	SMOOTH PIPE SIZE (DIAMETER)	CORRUGATED PIPE SIZE (DIAMETER)
0- 3	8"	12"
3- 6	10"	15"
6-10	12"	18"

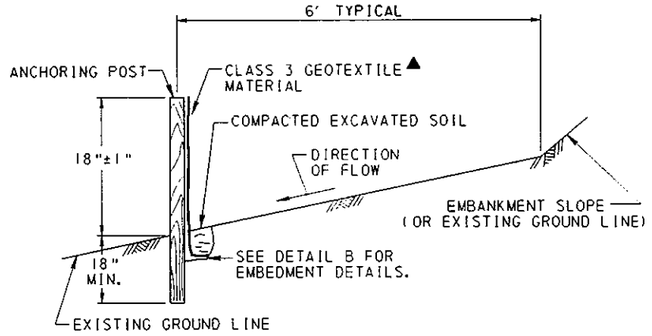


DETAIL A

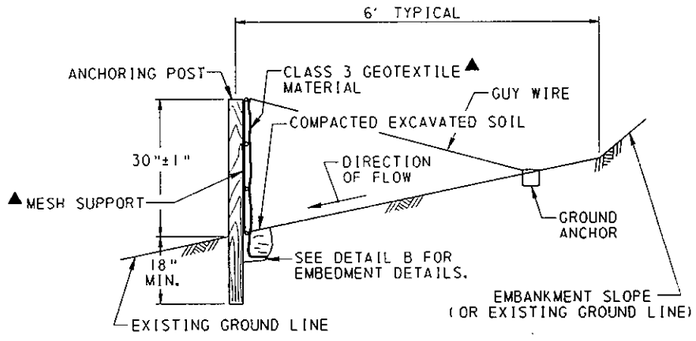


SECTION A-A

TEMPORARY SLOPE PIPE DRAIN◑

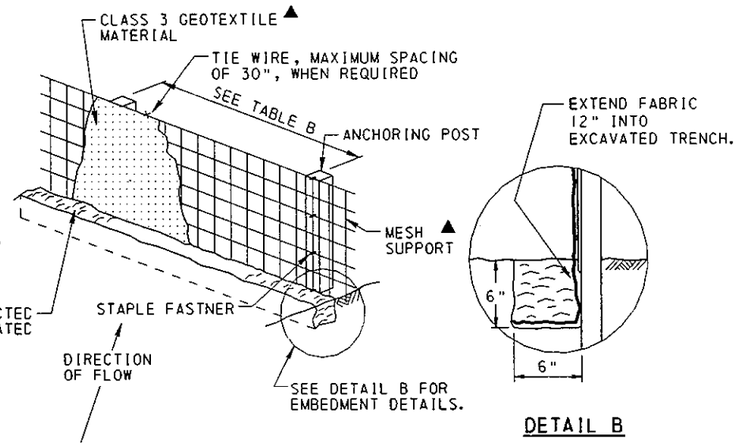


18" HIGH FENCE



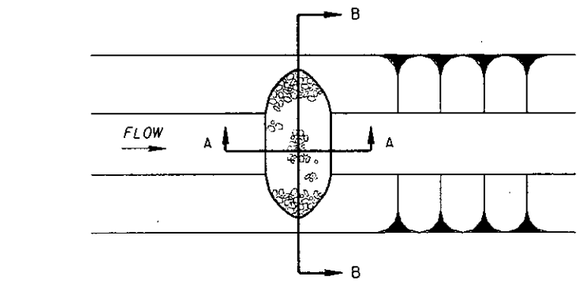
30" HIGH FENCE

▲ SEE TABLE B

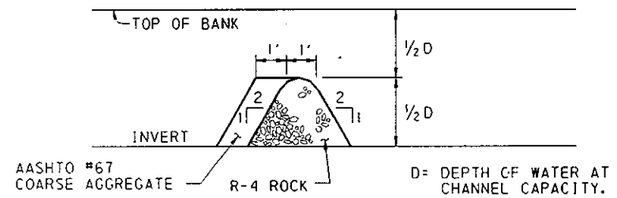


DETAIL B

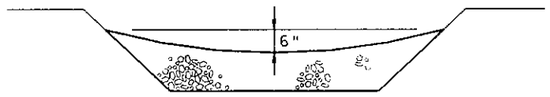
SILT BARRIER FENCE



PLAN VIEW



TYPICAL SECTION A-A



TYPICAL SECTION B-B

ROCK BARRIER

TABLE B
SILT BARRIER FENCE
GEOTEXTILE SELECTION

TYPE OF CLASS 3 GEOTEXTIVE MATERIAL	NOMINAL FABRIC HEIGHT	MAX. POST SPACING WITHOUT MESH SUPPORT	MAX. POST SPACING WITH MESH SUPPORT
3A	18"	8'-0"	NA
3A	30"	NA	8'-0"
3B	18"	4'-0"	NA
3B	30"	NA	4'-0"

NA = NOT APPLICABLE

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

EROSION & SEDIMENT

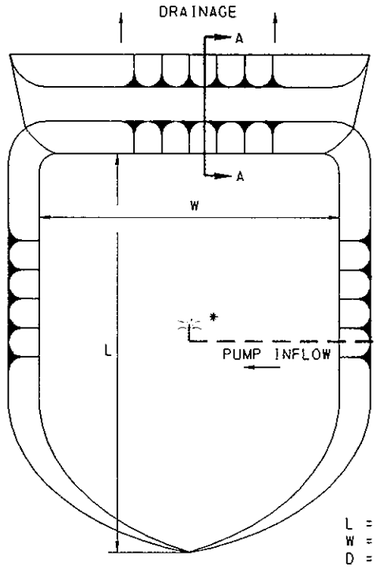
POLLUTION CONTROL

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 2 OF 4

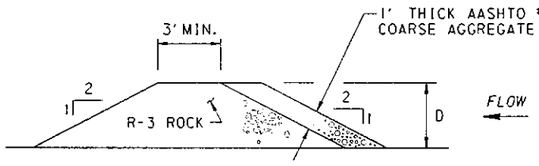
RC-70



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

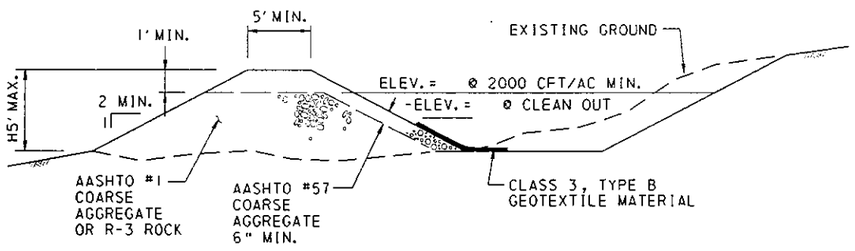
L = LENGTH
W = AVG. WIDTH
D = DEPTH
WHERE = LxWxD = 100cf/100gpm INFLOW

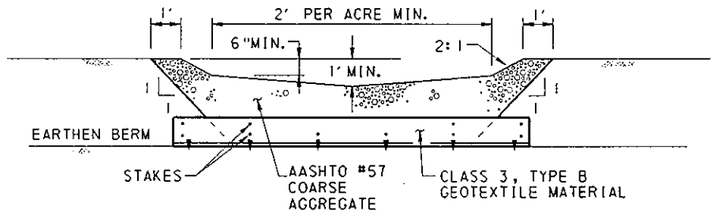
PLAN VIEW



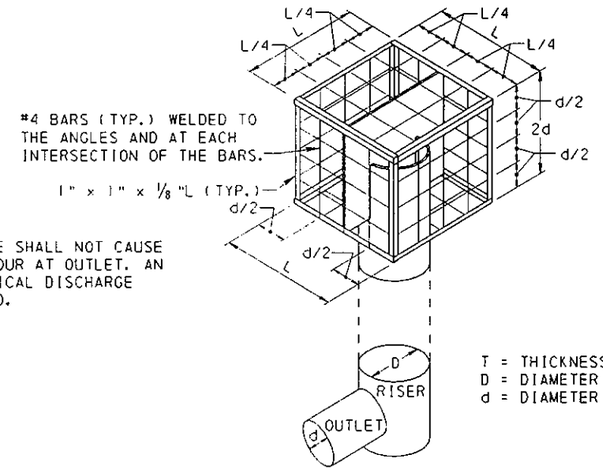
TYPICAL SECTION A-A

DEWATERING BASIN



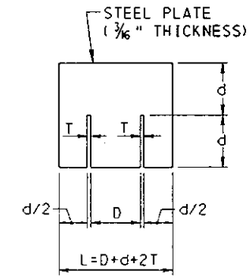


SEDIMENT TRAP

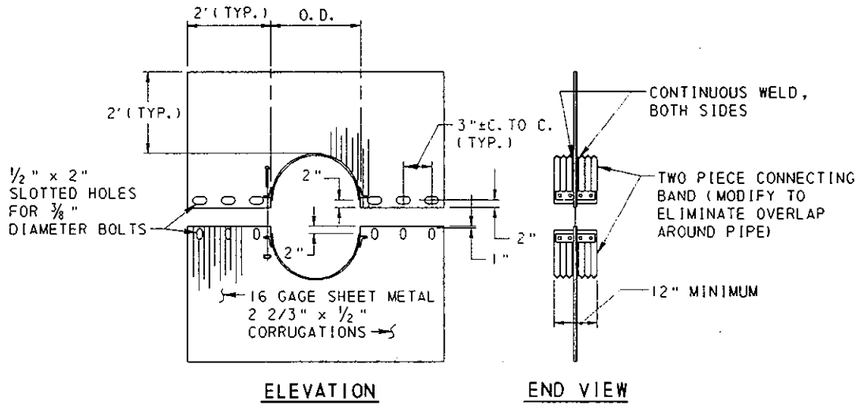


T = THICKNESS OF RISER PIPE.
D = DIAMETER OF RISER PIPE.
d = DIAMETER OF OUTLET PIPE.

TRASH RACK AND ANTI-VORTEX DEVICE



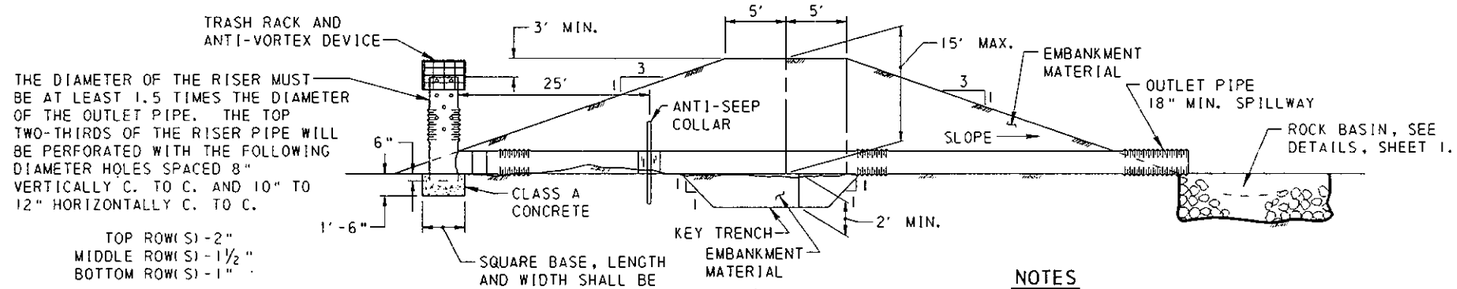
ANTI-VORTEX DEVICE



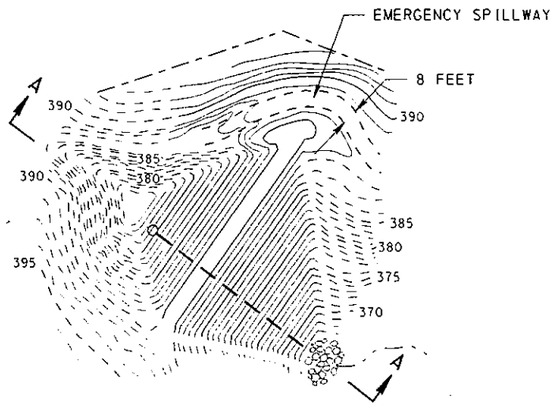
ELEVATION END VIEW

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.



SECTION A-A SEDIMENTATION POND



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

NOTES

1. PROVIDE AN EMERGENCY SPILLWAY WITH A MINIMUM BOTTOM WIDTH OF 8 FEET 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. THE ELEVATION OF THE EMERGENCY SPILLWAY MUST BE SUCH THAT THE DAM IS AT LEAST 2 FEET ABOVE THE MAXIMUM DESIGN FLOW OF THE SPILLWAY. THE COMBINED CAPACITY OF THE RISER AND EMERGENCY SPILLWAY MUST BE AT LEAST 2 CFS PER ACRE FROM THE ENTIRE WATERSHED OF THE BASIN.
4. CONSTRUCT THE CREST OF THE EMERGENCY SPILLWAY ONE FOOT 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 SEVENTH OF THE TOTAL POND CAPACITY, TO PROVIDE ADEQUATE SEDIMENT STORAGE.

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RECOMMENDED: MAR. 25, 1994
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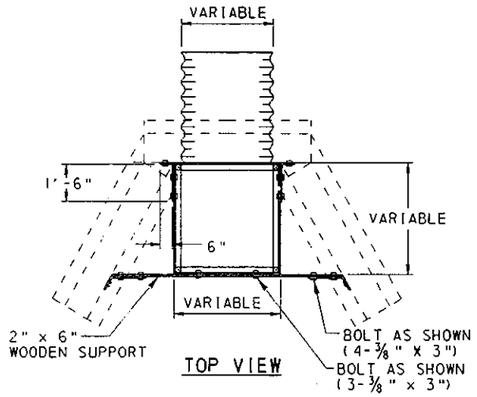
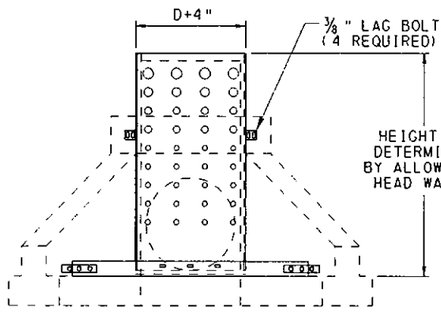
RECOMMENDED: MAR. 25, 1994
CHIEF ENGINEER

SHT. 3 OF 4

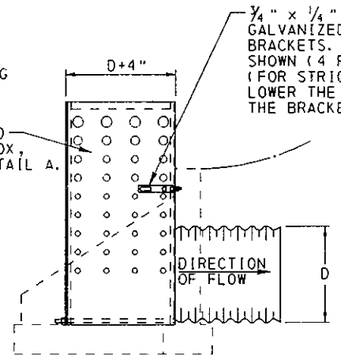
RC-70



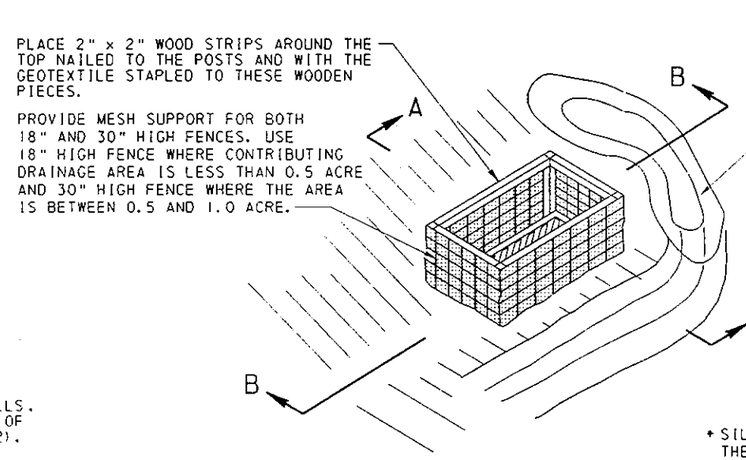
TOP VIEW

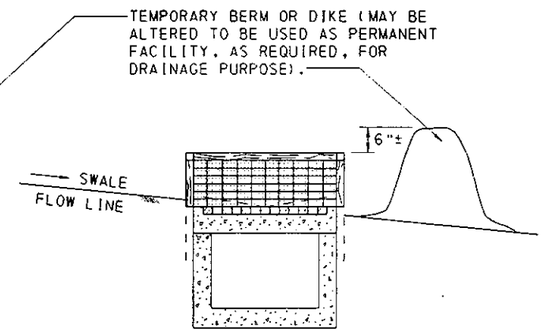


END VIEW



SIDE VIEW





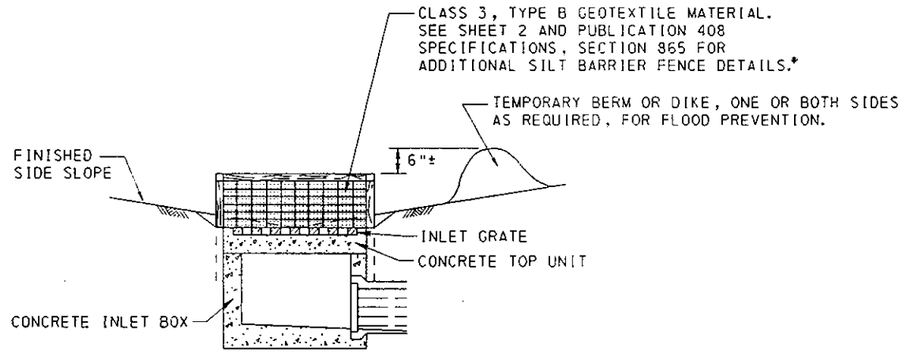
SECTION B-B

NOTES

DRILL HOLES 2" DEEP IN CONCRETE ENDWALL AND INSERT LEAD EXPANDER TO RECEIVE 3/8"ø LAG BOLT. UPON REMOVAL OF STANDBOX, FILL HOLES IN THE ENDWALL WITH MORTAR MEETING REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 705.7.

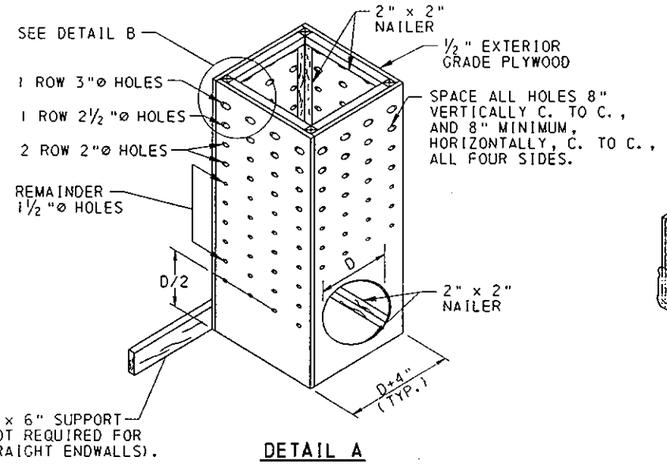
** COVER 1/2 THE HEIGHT OF WIDTH AT THE BOTTOM OF THE STANDBOX. USE THE "IMBEDMENT DETAILS" SHOWN ON SHEET 2 OF 4 IF BOTTOM IS NOT PAVED. USE ASPHALT MATERIAL FOR FASTENING IF PAVED APRON IS PROVIDED.

* SILT BARRIER FENCE SHOULD BE LOCATED TO PREVENT THE INFILTRATION OF FINES OR SEDIMENTS INTO THE INLET BOX. IF BACKFILL OPERATIONS HAVE NOT BEEN PERFORMED, LOCATE THE SILT BARRIER FENCE OUTSIDE THE AREA EXCAVATED FOR THE INLET BOX.

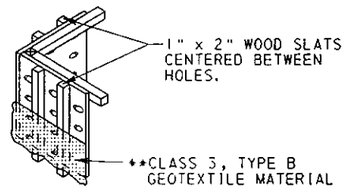


SECTION A-A

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.

NOTES

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
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EROSION & SEDIMENT POLLUTION CONTROL

RECOMMENDED MAR. 25, 1994
Freddie Bowser
DIRECTOR, BUREAU OF DESIGN

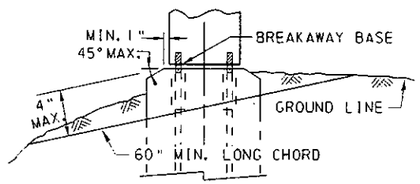
RECOMMENDED MAR. 25, 1994
M. M. Ryan
CHIEF ENGINEER

SHT. 4 OF 4
RC-70

▲ FORM 6" BELOW GROUND LEVEL. BELOW THIS POINT, PLACE CONCRETE AGAINST NATURAL GROUND.

† DESIGNED FOR 30 FEET MAXIMUM ARM LENGTH. SEE TABLE A FOR FOUNDATION DIMENSIONS.

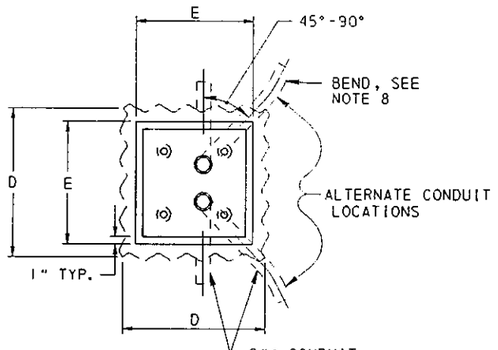
SEE TYPE A POLE BASE FOUNDATION DETAILS FOR ADDITIONAL TYPE S POLE BASE FOUNDATION REQUIREMENTS.



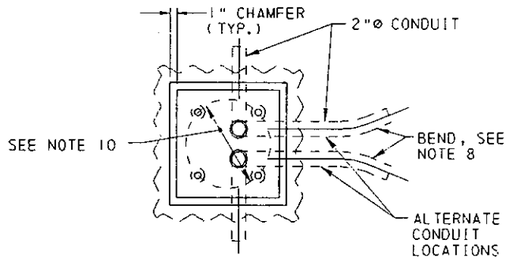
DETAIL FOR TYPE S POLE BASE FOUNDATION

(SEE NOTE 12)

THE MAXIMUM NEGATIVE SLOPE FOR TYPE S POLE BASE FOUNDATION LOCATION IS 6:1



PLAN



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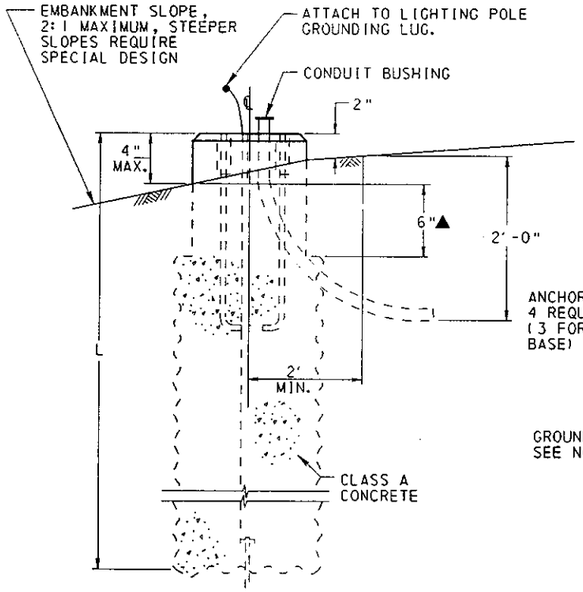
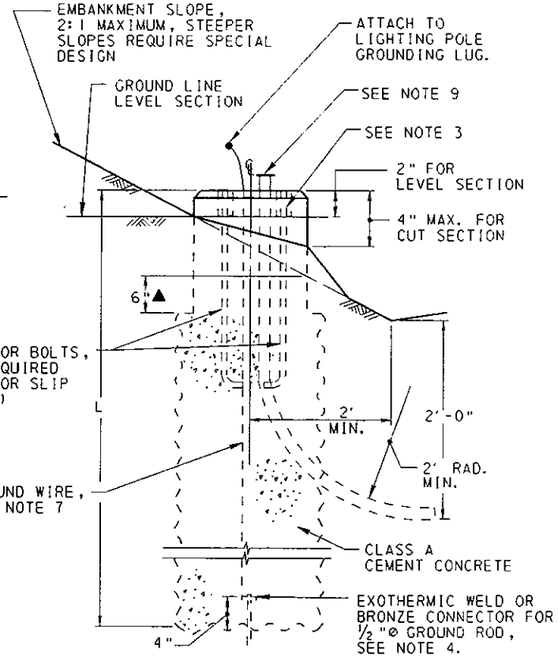


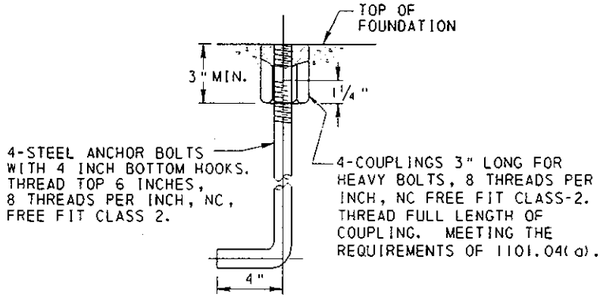
DETAIL FOR TYPE A POLE BASE FOR FILL SECTION



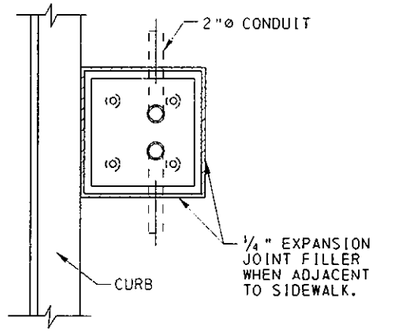
DETAIL FOR TYPE A POLE BASE FOR CUT OR LEVEL SECTION

TYPE FC FOUNDATION†

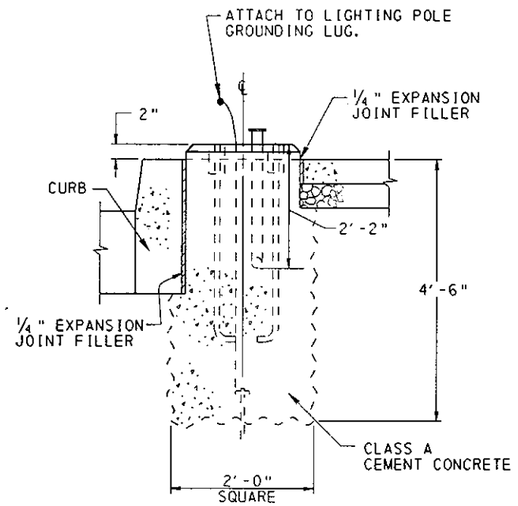
SEE NOTE 12



DETAIL OF ANCHOR BOLT



PLAN



FOR STREET LIGHTING

(30' MAXIMUM MOUNTING HEIGHT, 15' MAXIMUM ARM LENGTH).

TYPE P FOUNDATION

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 910 AND 1101.
2. LEVEL TOP OF FORMS IN BOTH DIRECTIONS.
3. GALVANIZE ALL ANCHORAGE HARDWARE, STEEL FLAT OR SPRING LOCK WASHERS AND TOP 12" OF ANCHOR BOLTS.
4. GROUND ROD ½"⌀ x 8' MINIMUM, COPPER CLAD STEEL WITH 25 OHM MAXIMUM RESISTANCE TO EARTH GROUND.
5. SEE RC-83 FOR POLE DETAILS.
6. FOR LIGHTING POLE ANCHORAGES ON BRIDGES, SEE BRIDGE CONSTRUCTION STANDARD DRAWINGS, BC-722.
7. PROVIDE 30 INCHES OF #4 GROUND WIRE COILED ABOVE FOUNDATION. (WIRE EXTENDS THROUGH CENTER OF FOUNDATION).
8. MINIMUM BEND RADIUS TO BE TWELVE TIMES CONDUIT DIAMETER, UNLESS OTHERWISE SPECIFIED.
9. TOP OF CONDUIT BUSHING NOT TO BE HIGHER THAN 1" FROM THE TOP OF THE FOUNDATION.
10. THE LIGHTING POLE MANUFACTURER WILL PROVIDE TEMPLATE FOR SETTING ANCHOR BOLTS FOR TYPE "A" OR TYPE "S" LIGHTING POLES, AND ALL HARDWARE, INCLUDING GALVANIZED HEX HEAD CAP BOLT OR STUD AND NUT OF APPROPRIATE LENGTH.
11. USE 3-CONDUIT ACCESS WHERE PLAN CIRCUITS INDICATE BRANCH TAP INSIDE POLE BASE. POSITION CONDUITS IN FOUNDATION TO AVOID UNNECESSARY BENDS. PROVIDE ONE, TWO OR THREE CONDUITS AS REQUIRED.
12. FOR TYPE S POLES - PROVIDE A MAXIMUM OF 4" TO THE TOP OF THE FOUNDATION, ANCHOR BOLT, OR STUB OF BREAK-AWAY DEVICE, WHICHEVER IS HIGHER, MEASURED FROM AN IMAGINARY 60" LONG CHORD, ALIGNED RADIALLY (PERPENDICULAR) TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE CHORD EXTENDING TO THE GROUND SURFACE ON BOTH SIDES OF THE SUPPORT. PROVIDE A MAXIMUM TAPER OF 45 DEGREES TO THE EDGE OF THE FOUNDATION AS REQUIRED TO SATISFY THE ABOVE REQUIREMENT. BEGIN THE TAPER NOT LESS THAN 1" FROM THE OUTSIDE OF THE BREAKAWAY BASE DIMENSION. MODIFY THE E x E DIMENSION IN TABLE A AS REQUIRED. MOUNTING SURFACE OF FOUNDATION IS TO EXTEND ABOVE THE GROUND LINE.

TABLE A
FOUNDATION DIMENSIONS

MOUNTING HEIGHT	D x D	E x E	AUGER DIAMETER	L
UP TO 30'	2'-0" x 2'-0"	1'-8" x 1'-8"	2'-4"	6'-0"
35'	2'-6" x 2'-6"	2'-2" x 2'-2"	2'-10"	6'-0"
40'	2'-6" x 2'-6"	2'-2" x 2'-2"	2'-10"	6'-6"
45'	2'-6" x 2'-6"	2'-2" x 2'-2"	2'-10"	7'-0"
50'	2'-6" x 2'-6"	2'-2" x 2'-2"	2'-10"	7'-6"

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

HIGHWAY LIGHTING FOUNDATIONS

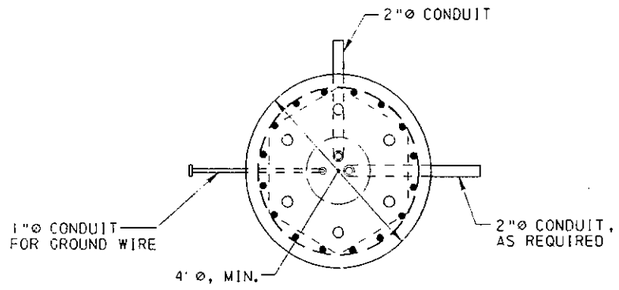
CONVENTIONAL LIGHTING POLE

RECOMMENDED MAR. 25, 1994
Bradley Bowser
DIRECTOR, BUREAU OF DESIGN

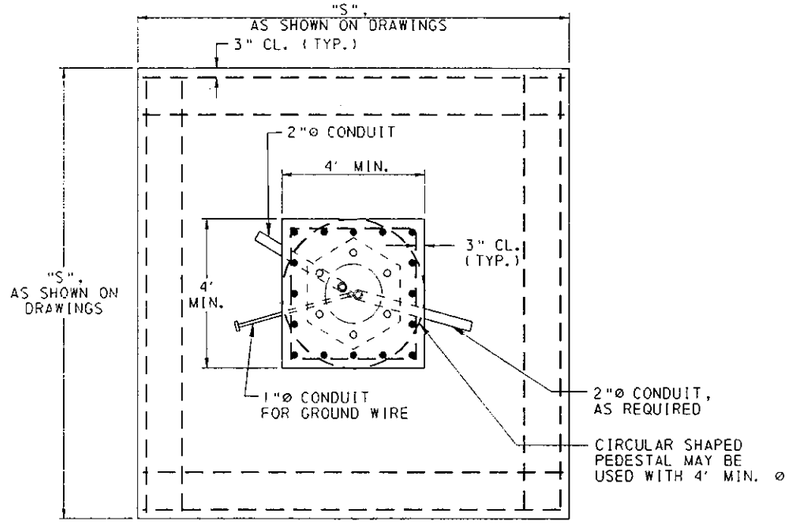
RECOMMENDED MAR. 25, 1994
M.M. Ryan
CHIEF ENGINEER

SHT. 1 OF 2

RC-80



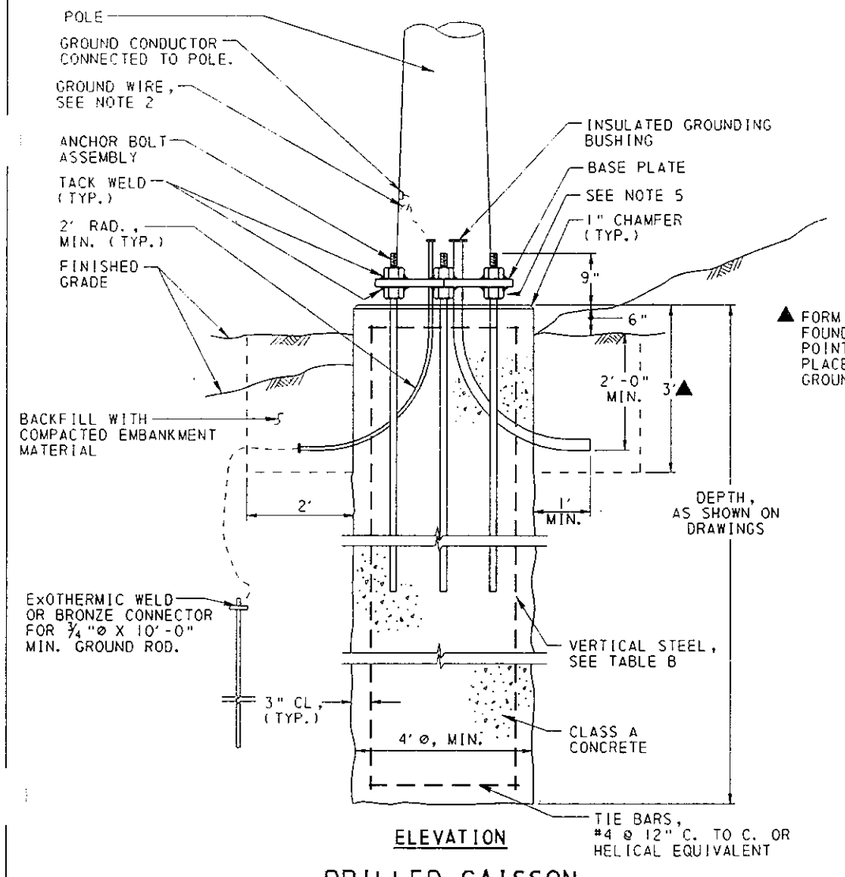
PLAN



PLAN

NOTES

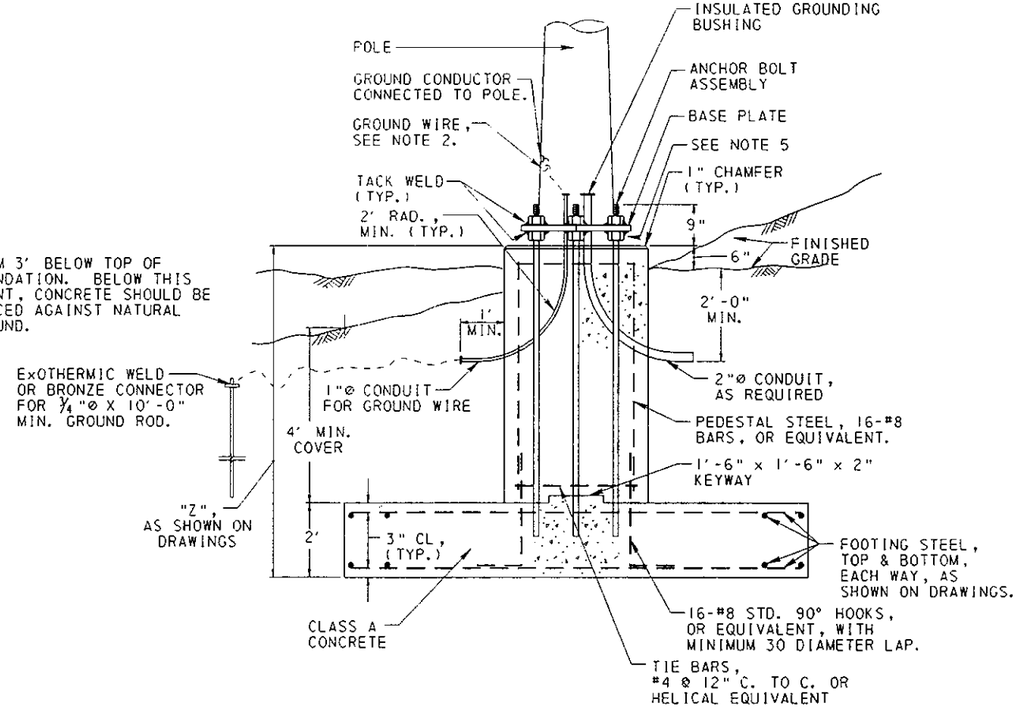
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 910 AND 1101.
2. PROVIDE A 30" LENGTH OF #4 GROUND WIRE COILED ABOVE FOUNDATION. EXTEND WIRE THROUGH THE 1"ø CONDUIT IN THE CENTER OF THE FOUNDATION.
3. THE SIZE OF PEDESTAL OR DRILLED CAISSON SHOWN WILL ACCOMMODATE THE PREASSEMBLED ANCHOR BOLT ASSEMBLY SUPPLIED BY THE MANUFACTURER FOR BOLT CIRCLE DIAMETERS 34" AND LESS. FOR BOLT CIRCLE DIAMETERS GREATER THAN 34", MODIFY PEDESTAL OR DRILLED CAISSONS ACCORDINGLY.
4. FOR REINFORCEMENT BAR FABRICATION DETAILS, SEE BRIDGE CONSTRUCTION STANDARD DRAWING, BC-736.
5. SEAL WITH GALVANIZED SCREEN, ¼" TO ⅜" OPENING, TO PREVENT ENTRY OF RODENTS. SCREEN TO BE REMOVABLE AND ATTACHED TO BASE PLATE WITH S.S. HARDWARE. SCREEN TO BE OF SUFFICIENT STIFFNESS TO PREVENT ENTRY BETWEEN SCREEN AND FOUNDATION WHILE PERMITTING DRAINAGE.
6. VERIFY THE GROUND ELEVATION AT THE FOUNDATION LOCATION FOR ALL HIGH MAST POLE FOUNDATIONS. NOTIFY THE DEPT. OF ANY DISCREPANCY OF MORE THAN FIVE (5) FEET BEFORE PROCEEDING WITH CONSTRUCTION. THE POLE LENGTH MAY BE AFFECTED.



▲ FORM 3' BELOW TOP OF FOUNDATION. BELOW THIS POINT, CONCRETE SHOULD BE PLACED AGAINST NATURAL GROUND.

ELEVATION

DRILLED CAISSON FOUNDATION



ELEVATION

SPREAD FOOTING FOUNDATION

TABLE B

POLE HEIGHTS	VERTICAL STEEL
80'	16- #9
90'	16- #9
100'	16- #9
110'	16- #9
120'	16-#11

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HIGHWAY LIGHTING FOUNDATIONS

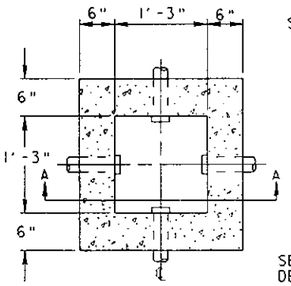
HIGH MAST LIGHTING POLE

RECOMMENDED MAR. 25, 1994
Gradie Bowser
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
M. M. Ryan
CHIEF ENGINEER

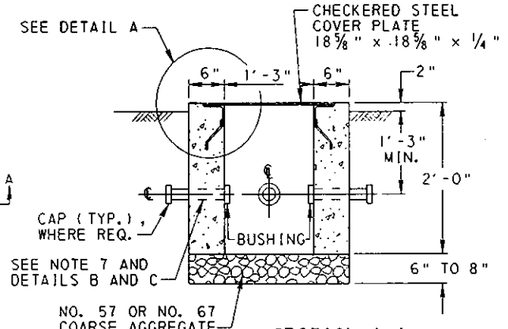
SHT. 2 OF 2

RC-80

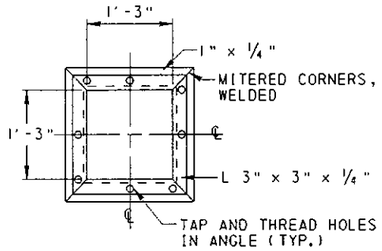


PLAN

(WITHOUT FRAME AND COVER PLATE)



SECTION A-A

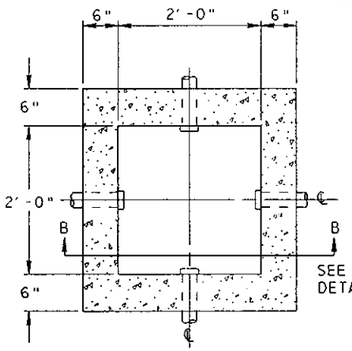


FRAME PLAN

(WITHOUT COVER PLATE)

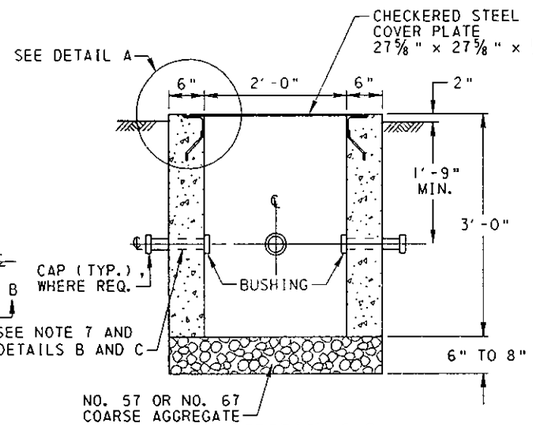
TYPE JB-1

(1'-3" x 1'-3")

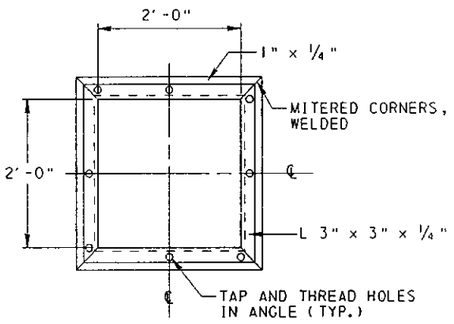


PLAN

(WITHOUT FRAME AND COVER PLATE)



SECTION B-B

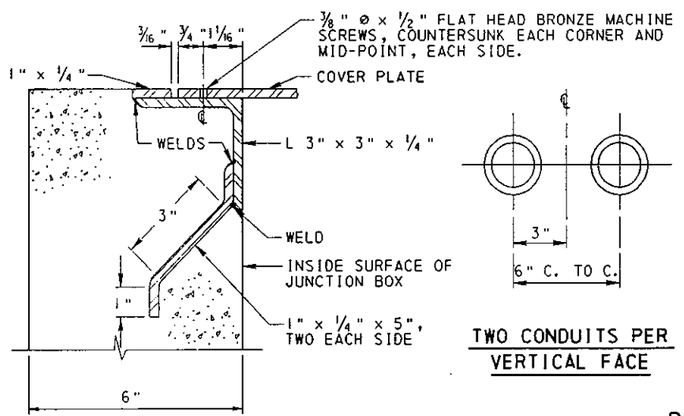


FRAME PLAN

(WITHOUT COVER PLATE)

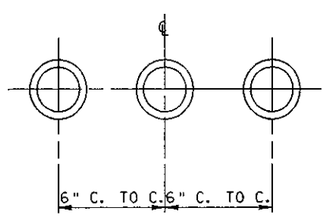
TYPE JB-2

(2'-0" x 2'-0")



DETAIL A

TWO CONDUITS PER VERTICAL FACE

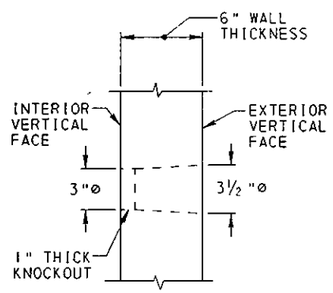


THREE CONDUITS PER VERTICAL FACE

DETAIL B

MULTIPLE CONDUITS IN PLACE

(CAST-IN-PLACE OR PRECAST UNITS)



DETAIL C

TYPICAL KNOCKOUT

(PRECAST UNITS ONLY)

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTION 910, 1101 AND 1071.
2. USE JB-1 AND JB-2 JUNCTION BOXES IN LOCATIONS SUBJECT TO LOADS NO HEAVIER THAN PEDESTRIAN TRAFFIC. USE JB-11 AND JB-12 JUNCTION BOXES IN OTHER LOCATIONS AS SHOWN ON RC-82.
3. PROVIDE PRECAST CONCRETE JUNCTION BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR A BULLETIN 15 LISTING, SUBMIT A 22"x36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF CONSTRUCTION AND MATERIALS, MATERIALS AND TESTING DIVISION FOR REVIEW.
4. PROTECTIVE COATINGS - STEEL FRAME AND STEEL COVER PLATE. COAT THE ENTIRE STEEL ASSEMBLY WITH ALUMINUM MASTIC IN ACCORDANCE WITH PUB. 408, SEC. 1071, OR HOT DIP GALVANIZING IN ACCORDANCE WITH PUB. 408, SEC. 1105.02(s).
5. FOR THE LOCATION, SIZE AND NUMBER OF CONDUITS REQUIRED FOR EACH JUNCTION BOX, SEE THE LIGHTING PLANS.
6. IN SIDEWALK AREAS, CONSTRUCT TOP OF JUNCTION BOX TO CONFORM TO SIDEWALK SLOPE. WHEN INSTALLED IN THE RECOVERY AREA, PROVIDE A MAXIMUM OF 4" TO THE TOP OF THE JUNCTION BOX, MEASURED FROM AN IMAGINARY 60" CHORD ALIGNED RADIALLY (PERPENDICULAR) TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE CHORD EXTENDING TO THE GROUND SURFACE ON BOTH SIDES OF THE JUNCTION BOX.
7. THE CONDUIT LOCATIONS SHOWN REPRESENT NORMAL POSITIONS. FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION, WHEN TWO OR THREE CONDUITS ARE INDICATED ON THE SAME VERTICAL FACE, SPACE CONDUITS AT 6" C. TO C. AND SYMMETRICAL ABOUT THE CENTERLINE OF THE BOX, AS INDICATED IN DETAIL B, WITH FULL WALL THICKNESS BETWEEN OPENINGS. PROVIDE KNOCKOUTS FOR PRECAST UNITS AS INDICATED IN DETAIL C AND LOCATE AS INDICATED IN DETAIL B. GROUT THE CONDUIT OR SLEEVE IN ACCORDANCE WITH SECTION 910.3(p).
8. PROVIDE POSITIVE DRAINAGE (1½" - 2" NON-METALLIC CONDUIT) FOR JUNCTION BOXES WHEN FEASIBLE. PROVIDE RODENT PROOF DRAIN. (SEE NOTE #5, RC-82)
9. PROVIDE STRUCTURAL STEEL CONFORMING TO ASTM - A36.
10. PROVIDE AS A MINIMUM :
    CLASS A CONCRETE FOR CAST-IN-PLACE BOXES AND
    CLASS AA CONCRETE FOR PRECAST BOXES

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

HIGHWAY LIGHTING

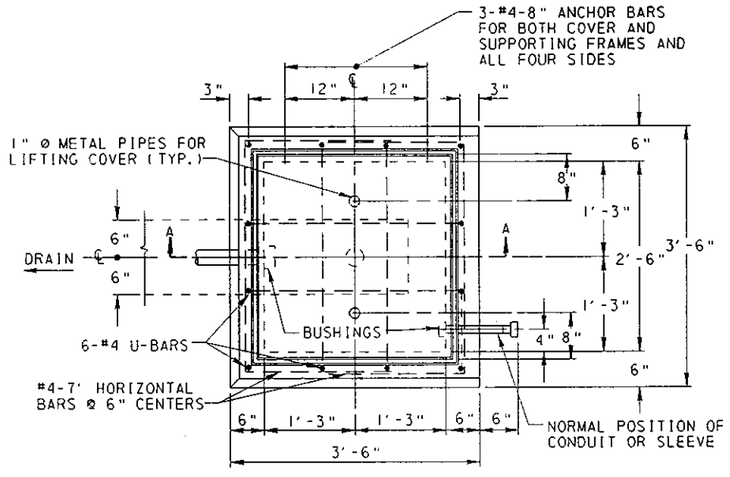
JUNCTION BOXES-LIGHT DUTY CAST-IN-PLACE OR PRECAST

RECOMMENDED MAR. 25, 1994
DIRECTOR, BUREAU OF DESIGN

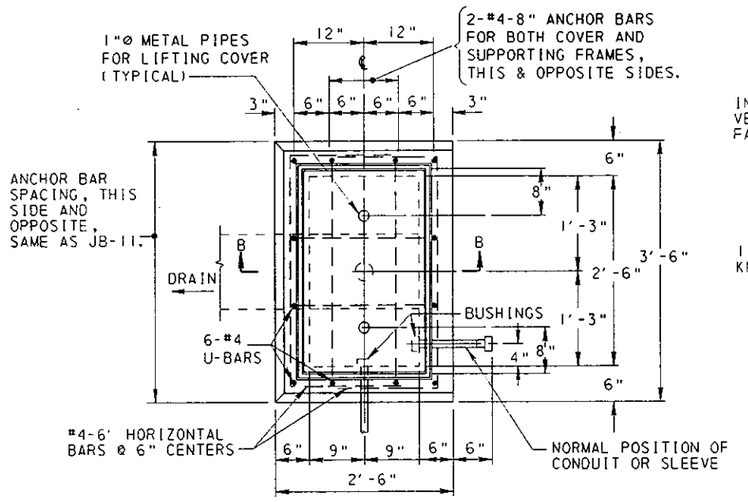
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 1 OF 1

RC-81



PLAN



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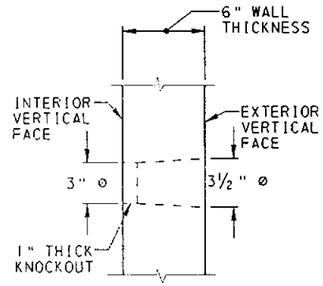
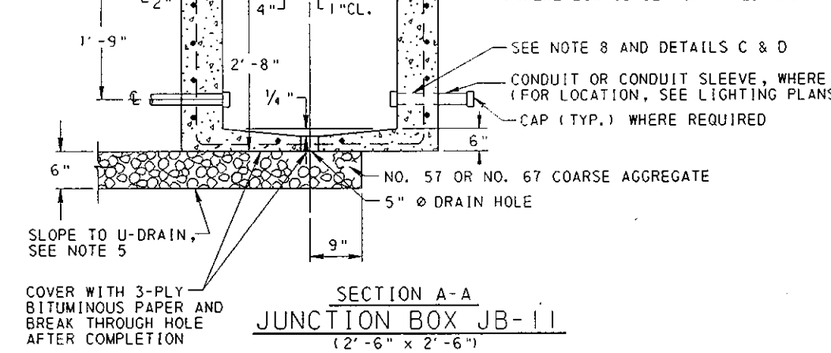


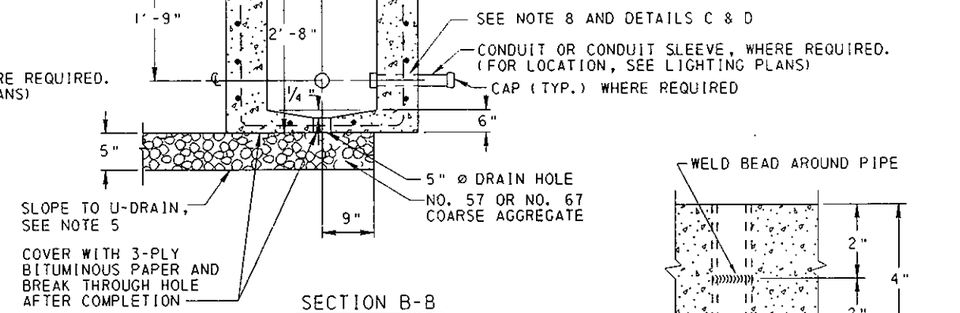
DETAIL D
TYPICAL KNOCKOUT
(PRECAST UNITS ONLY)

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 910, 1101 AND 1071.
2. USE JB-11 AND JB-12 JUNCTION BOXES IN SHOULDERS OR OTHER LOCATIONS SUBJECT TO VEHICULAR LOADS. USE JB-1 AND JB-2 JUNCTION BOXES IN LOCATIONS WITH PEDESTRIAN TYPE LOADINGS, SEE DETAILS ON RC-81.
3. PROVIDE PRECAST CONCRETE JUNCTION BOXES SUPPLIED BY A MANUFACTURER LISTED IN BULLETIN 15. FOR A BULLETIN 15 LISTING, SUBMIT A 22"x36" REPRODUCIBLE SHOP DRAWING TO THE BUREAU OF CONSTRUCTION AND MATERIALS, MATERIALS AND TESTING DIVISION FOR REVIEW.
4. PROTECTIVE COATINGS - STEEL FRAME AND STEEL LID. COAT THE ENTIRE STEEL ASSEMBLY WITH ALUMINUM MASTIC IN ACCORDANCE WITH PUB. 408, SEC. 1071, OR HOT DIP GALVANIZING IN ACCORDANCE WITH PUB. 408, SEC. 1105.02(s).
5. PROVIDE 2 FT.^{3} OF NO. 57 OR NO. 67 COARSE AGGREGATE WHEN NO UNDERDRAIN IS AVAILABLE.
6. FOR THE LOCATION, SIZE AND NUMBER OF CONDUITS REQUIRED FOR EACH JUNCTION BOX, SEE THE LIGHTING PLANS.
7. IN SIDEWALK AREAS, CONSTRUCT TOP OF JUNCTION BOX TO CONFORM TO SIDEWALK SLOPE. WHEN INSTALLED IN THE RECOVERY AREA, PROVIDE A MAXIMUM OF 4" TO THE TOP OF THE JUNCTION BOX, MEASURED FROM AN IMAGINARY 60" CHORD ALIGNED RADIALLY (PERPENDICULAR) TO THE CENTERLINE OF THE ROADWAY, AND CONNECTING ANY POINT WITHIN THE LENGTH OF THE CHORD EXTENDING TO THE GROUND SURFACE ON BOTH SIDES OF THE JUNCTION BOX.
8. THE CONDUIT LOCATIONS SHOWN REPRESENT NORMAL POSITIONS. FOR CAST-IN-PLACE OR PRECAST CONSTRUCTION, WHEN TWO OR THREE CONDUITS ARE INDICATED ON THE SAME VERTICAL FACE, SPACE CONDUITS AT 6" C. TO C. AND SYMMETRICAL ABOUT THE CENTERLINE OF THE BOX, AS INDICATED IN DETAIL C, WITH FULL WALL THICKNESS BETWEEN OPENINGS. PROVIDE KNOCKOUTS FOR PRECAST UNITS AS INDICATED IN DETAIL D AND LOCATE AS INDICATED IN DETAIL C. GROUT THE CONDUIT OR SLEEVE IN ACCORDANCE WITH SECTION 910.3(p).
9. PROVIDE POSITIVE DRAINAGE (1½"-2" NON-METALLIC CONDUIT) FOR JUNCTION BOXES WHEN FEASIBLE. PROVIDE RODENT PROOF DRAIN.
10. PROVIDE STRUCTURAL STEEL CONFORMING TO ASTM - A36. PROVIDE ALUMINUM CONFORMING TO ASTM - B221 ALLOY 6061 - T6.
11. PROVIDE AS A MINIMUM :
    CLASS A CONCRETE FOR CAST-IN-PLACE BOXES AND CLASS AA CONCRETE FOR PRECAST BOXES.

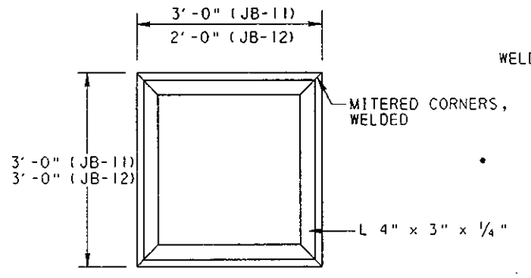


SECTION A-A
JUNCTION BOX JB-11
(2'-6" x 2'-6")

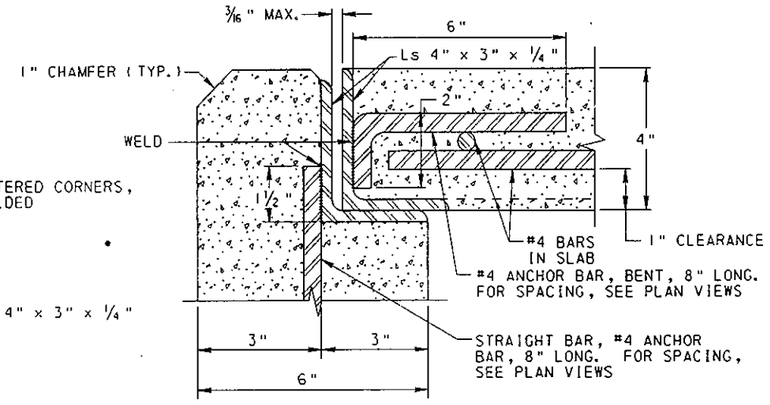


SECTION B-B
JUNCTION BOX JB-12
(1'-6" x 2'-6")

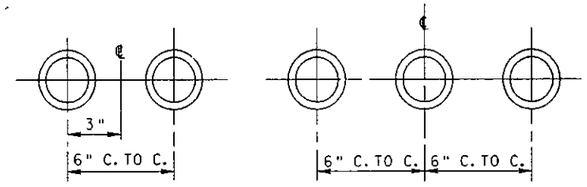
DETAIL A



FRAME PLAN
(STEEL OR ALUMINUM)



DETAIL B
COVER FRAME AND SUPPORTING FRAME



TWO CONDUITS PER VERTICAL FACE

THREE CONDUITS PER VERTICAL FACE

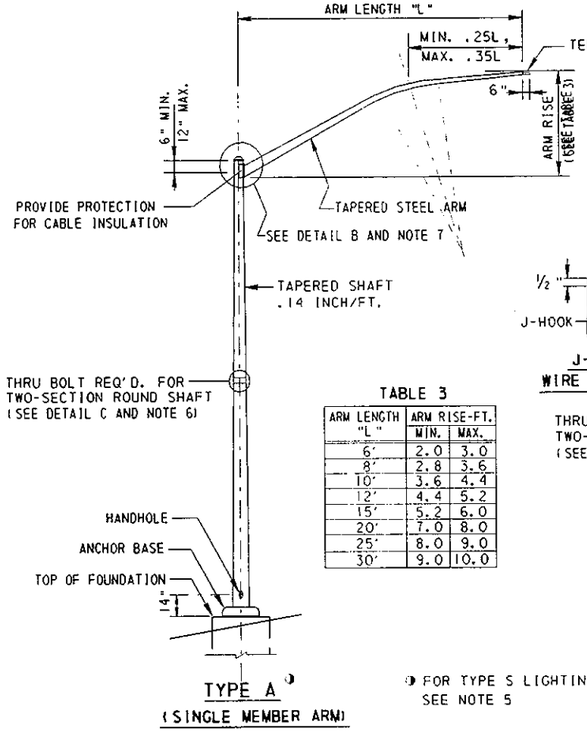
DETAIL C
MULTIPLE CONDUITS IN PLACE
(CAST-IN-PLACE OR PRECAST UNITS)

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

HIGHWAY LIGHTING

JUNCTION BOXES-HEAVY DUTY
CAST-IN-PLACE OR PRECAST

RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHT. 1 OF 1
Fredric Bowser	W. M. Ryan	RC-82
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	

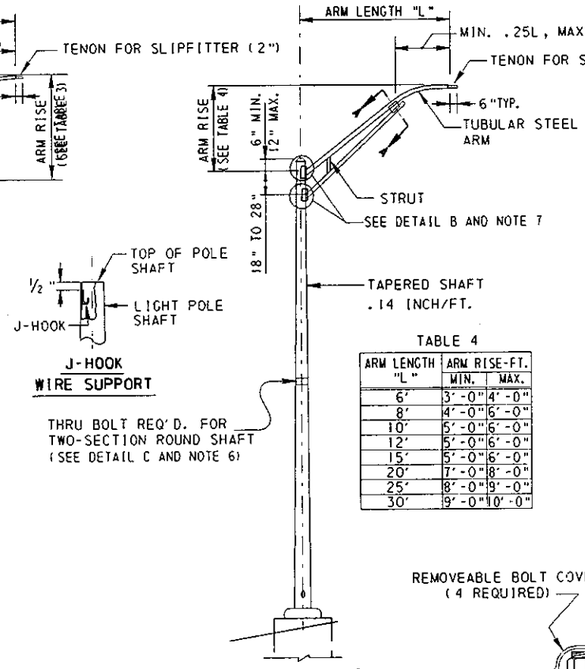


TYPE A ◑
(SINGLE MEMBER ARM)

TABLE 3

ARM LENGTH "L"	ARM RISE-FT. MIN.	MAX.
6'	2.0	3.0
8'	2.8	3.6
10'	3.6	4.4
12'	4.4	5.2
15'	5.2	6.0
20'	7.0	8.0
25'	8.0	9.0
30'	9.0	10.0

◑ FOR TYPE S LIGHTING POLES, SEE NOTE 5

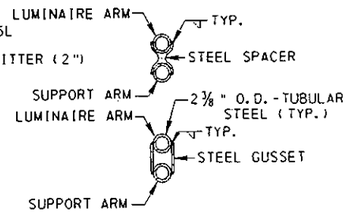


TYPE A ◑
(TRUSS ARM)

TABLE 4

ARM LENGTH "L"	ARM RISE-FT. MIN.	MAX.
6'	3'-0"	4'-0"
8'	4'-0"	6'-0"
10'	5'-0"	6'-0"
12'	5'-0"	6'-0"
15'	5'-0"	6'-0"
20'	7'-0"	8'-0"
25'	8'-0"	9'-0"
30'	9'-0"	10'-0"

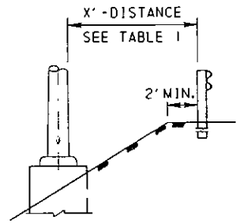
J-HOOK
WIRE SUPPORT



SECTION A-A

TABLE 1

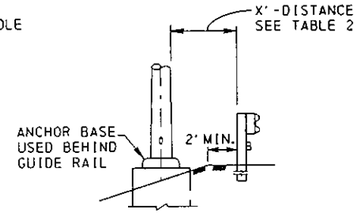
TYPE OF GUIDE RAIL	X'-DISTANCE (MINIMUM)
2-W	8'
2-WC	5'
2-WCC	4'



WEAK POST GUIDE RAIL

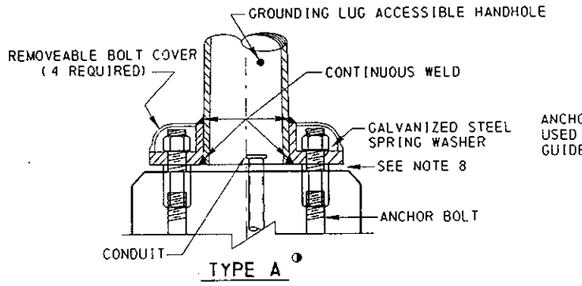
TABLE 2

TYPE OF GUIDE RAIL	X'-DISTANCE (MINIMUM)
2-S	4'
2-SC	2'



STRONG POST GUIDE RAIL

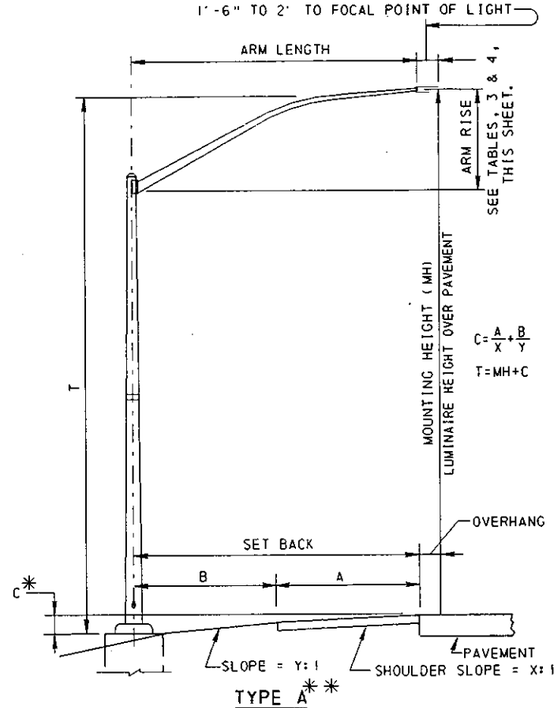
GUIDE RAIL CLEARANCES



TYPE A ◑

POLE MOUNTING DETAILS

◑ FOR TYPE S LIGHTING POLES, SEE NOTE 5



TYPE A**

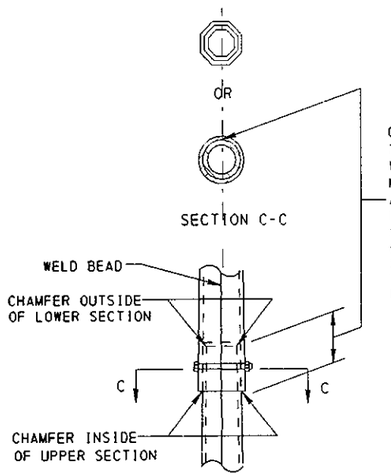
* C-DIMENSIONS, APPLICABLE TO CONVENTIONAL LIGHTING POLES, ARE FOR ESTIMATING PURPOSES ONLY AND SHOULD NOT BE USED FOR DETERMINING LIGHTING POLE DIMENSIONS WITHOUT VERIFICATION. THE CONTRACTOR IS RESPONSIBLE FOR FURNISHING LIGHTING POLES OF PROPER DIMENSIONS TO PROVIDE THE MOUNTING HEIGHT SPECIFIED.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

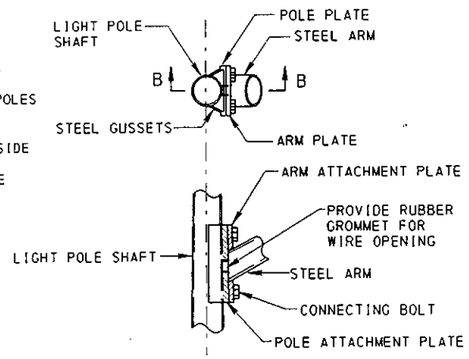
TERMINOLOGY

ROUND AND OCTAGONAL STEEL POLES

(FLAT OR FLUTED)



DETAIL C
POLE OVERLAP DETAIL



SECTION B-B
DETAIL B
ARM ATTACHMENT TO POLE SHAFT

NOTES

1. PROVIDE MATERIALS, CONSTRUCTION AND MANUFACTURERS CERTIFICATION OF COMPLIANCE WITH LOAD TESTS MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 910 AND 1101.
2. SEE RC-80 FOR POLE FOUNDATION DETAILS.
3. WHERE STEEL OR ALUMINUM BASES ARE IN CONTACT WITH CONCRETE, CAULK WITH AN APPROVED ALUMINUM IMPREGNATED GRAY MASTIC TYPE CAULKING COMPOUND MEETING THE TEST REQUIREMENTS OF FEDERAL SPECIFICATION TT-C598 (2).
4. PROVIDE IDENTIFICATION & DATE TAGS, AS SHOWN ON RC-83, SHEET 2 OF 2, FOR ALL POLES. I.D. SHALL BE AS DESIGNATED ON PROJECT PLANS.
5. 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.
6. CONSTRUCT POLE SHAFTS 30 FT. OR LESS IN LENGTH OF ONE PIECE. POLE SHAFTS OVER 30 FT. IN LENGTH MAY BE TWO SECTIONS. MINIMUM SECTION LENGTH FOR TWO SECTION POLE SHAFT IS 15 FEET.
7. 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.
8. USE GALVANIZED OR STAINLESS STEEL FLAT WASHERS TO PROVIDE A ⅛" TO ¼" DRAINAGE GAP ABOVE CONVENTIONAL POLE FOUNDATIONS. THIS ELIMINATES THE NEED FOR DRAIN GROOVES, DRAIN PIPES AND CAULKING. USE SHIMS AS REQUIRED.
9. FURNISH CONVENTIONAL LIGHTING POLES WITH SINGLE MEMBER BRACKET TYPE ARMS UNLESS OTHERWISE INDICATED OR SPECIFIED ON THE PLANS OR SPECIAL PROVISIONS.
10. THE MOUNTING HEIGHT IS DEFINED AS THE HEIGHT OF THE LUMINAIRE ABOVE THE ROADWAY AND IS TO BE WITHIN ONE (1) FOOT OF THE MOUNTING HEIGHT SPECIFIED.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

HIGHWAY LIGHTING

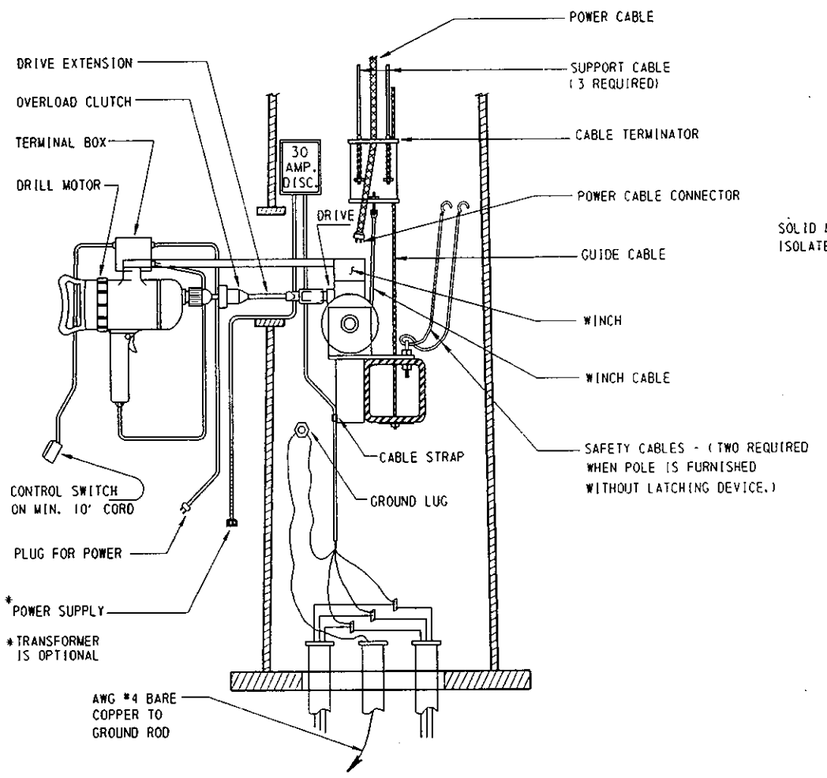
CONVENTIONAL LIGHTING POLE DETAILS

RECOMMENDED MAR. 25, 1994
Frederick Bowers
DIRECTOR, BUREAU OF DESIGN

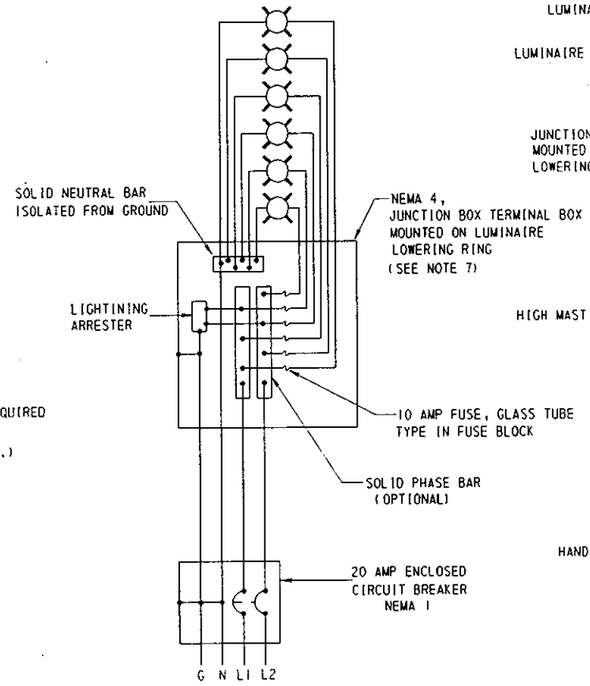
RECOMMENDED MAR. 25, 1994
CHIEF ENGINEER

SHT. 1 OF 2

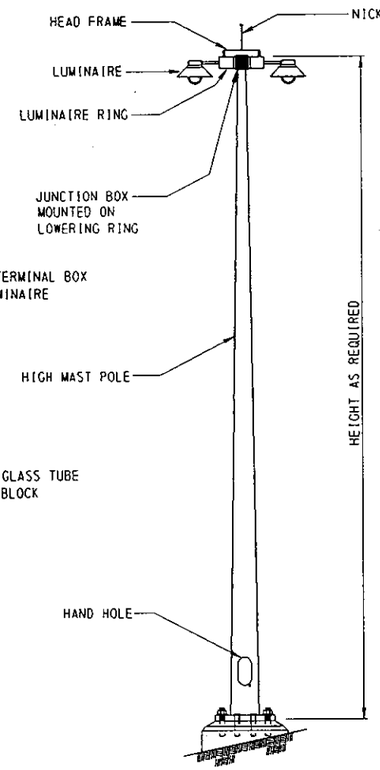
RC-83



TYPICAL LOWER SECTION MECHANISM



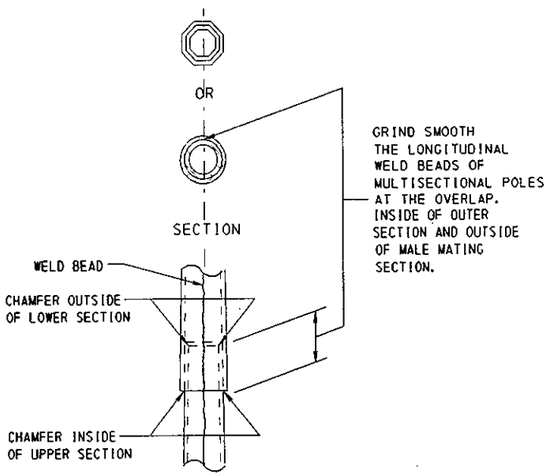
TYPICAL CIRCUIT SCHEMATIC



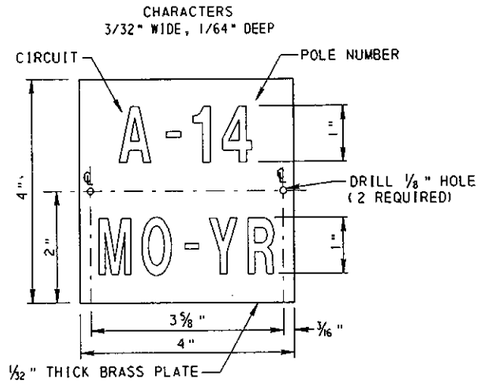
TYPICAL HIGH MAST POLE

NOTES

1. SEAL HEAD FRAME AND LUMINAIRE ASSEMBLIES TO PREVENT INTRUSION OF BIRD LIFE.
2. PROVIDE 2 POLE, CIRCUIT BREAKER DISCONNECT, RATED FOR 240 / 480 VOLT SYSTEM, AND IN NEMA 1 ENCLOSURE.
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. ALL MISCELLANEOUS HARDWARE SHALL BE STAINLESS STEEL.
5. PROVIDE WIRING, FROM JUNCTION 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 SPECIFICATIONS, SECTION 1101.11 (C). PADLOCKS ARE NOT REQUIRED FOR THE BOXES.



POLE OVERLAP DETAIL



POLE IDENTIFICATION AND DATE TAG DETAIL

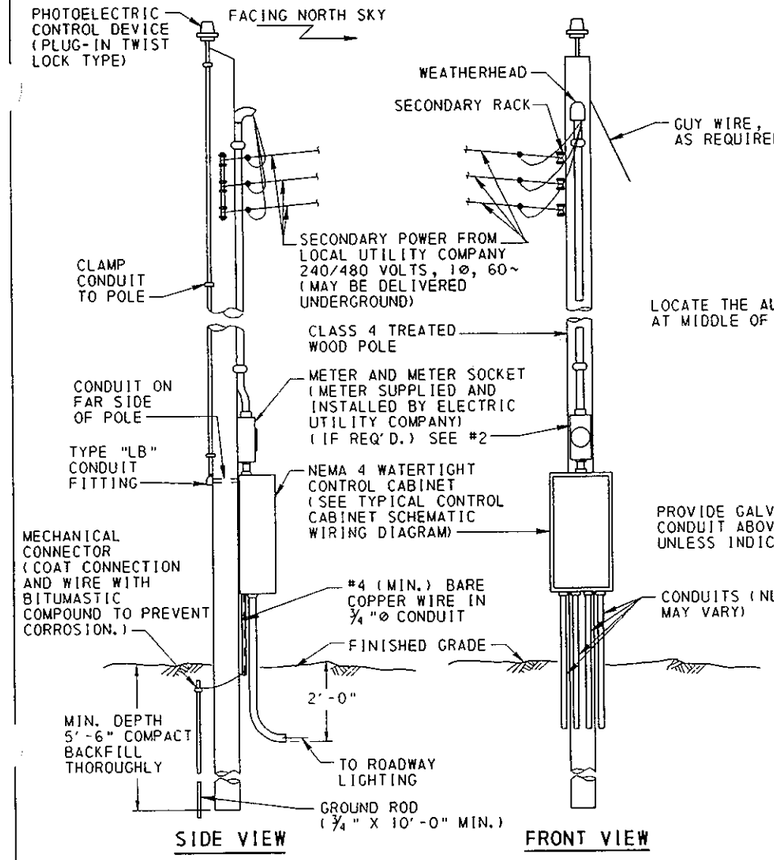
FOR CONVENTIONAL AND HIGH MAST POLES

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

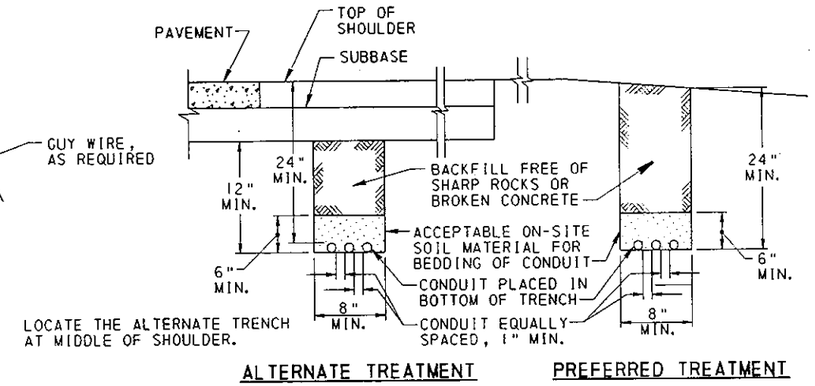
HIGHWAY LIGHTING

HIGH MAST LIGHTING POLE DETAILS

RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHT. 2 OF 2
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	RC-83



TYPICAL TERMINAL POLE EQUIPMENT ARRANGEMENT FOR POWER SUPPLY



DIRECT-BURIED CABLE AND CONDUIT

NOTES FOR DIRECT-BURIED CABLE AND CONDUIT

TRENCH ALONG THE GENERAL LINE SHOWN ON THE PLANS.

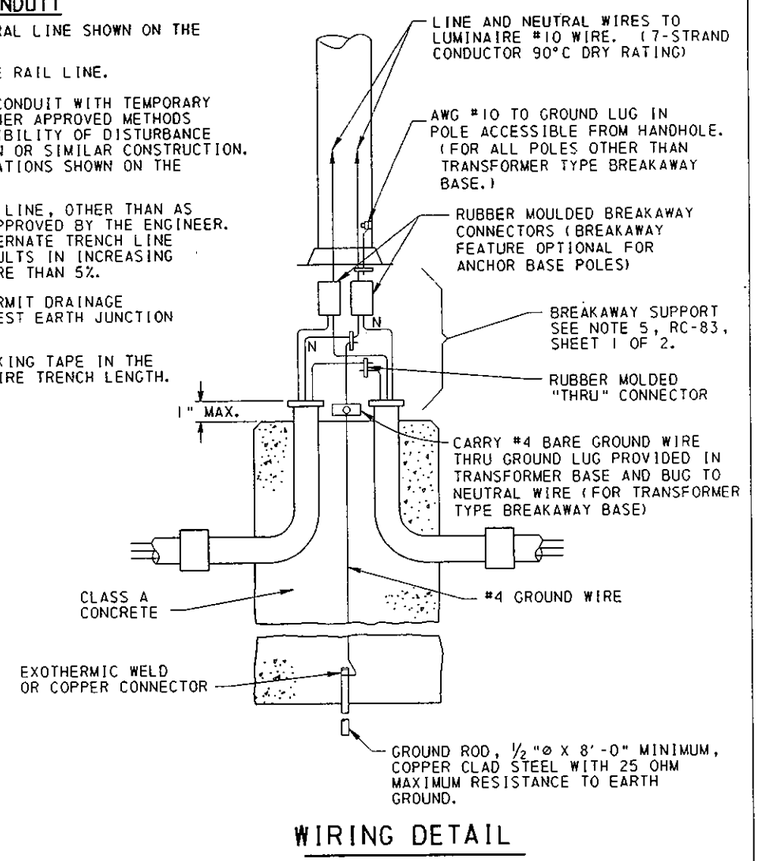
DO NOT TRENCH IN GUIDE RAIL LINE.

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

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

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

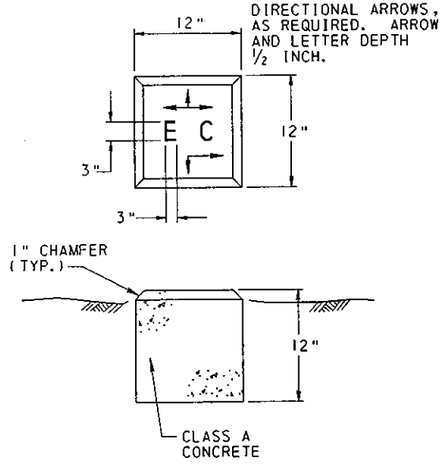
PROVIDE PERMANENT MARKING TAPE IN THE LAST LIFT FOR THE ENTIRE TRENCH LENGTH.



WIRING DETAIL

NOTES

1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408, SECTIONS 910 AND 1101.
2. PROVIDE METERED ELECTRIC SERVICE EXCEPT WHERE DEPARTMENT APPROVED SPECIAL UNMETERED ENERGY ONLY RATE IS AVAILAVLE.
3. MAKE ALL SPLICES WITH PRE-MOLDED, WATERPROOF, DISCONNECTABLE CONNECTOR KITS. PROVIDE SPLICES WITH FUSES FOR TAPS TO LUMINAIRES FOR CONVENTIONAL LIGHTING.

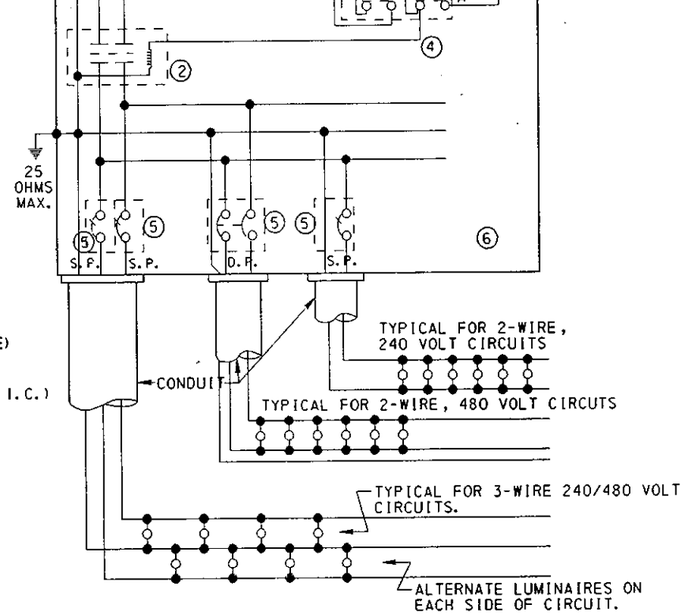


CABLE AND CONDUIT MARKER

ITEMS

- N -NEUTRAL
- L_1-LINE 1
- L_2-LINE 2
- M -MANUAL
- A -AUTOMATIC
- ① -MAIN CIRCUIT BREAKER
- ② -CONTROL CONTACTOR
- ③ -PHOTOELECTRIC CELL (PLUG-IN TYPE)
- ④ -SELECTOR SWITCH
- ⑤ -DISTRIBUTION BREAKERS (10,000 A.I.C.)
- ⑥ -CONTROL CABINET
- ⑦ -15 AMP, S.P. BREAKER
- ⑧ -LIGHTNING ARRESTER
- S.P. -SINGLE POLE
- D.P. -DOUBLE POLEB

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



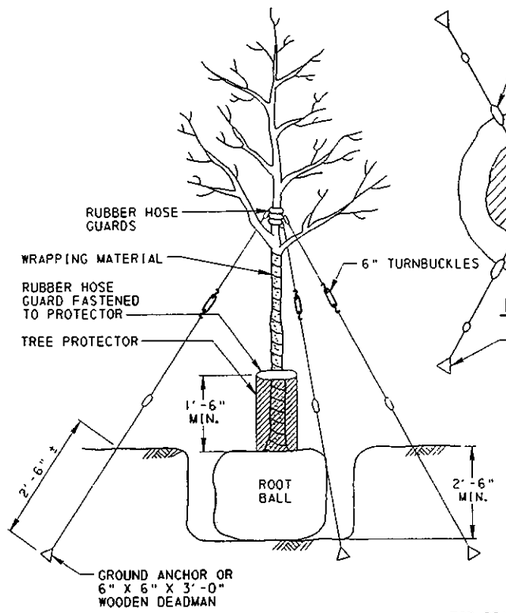
TYPICAL CONTROL CABINET SCHEMATIC WIRING DIAGRAM

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

HIGHWAY LIGHTING

LIGHTING AND ELECTRICAL DETAILS

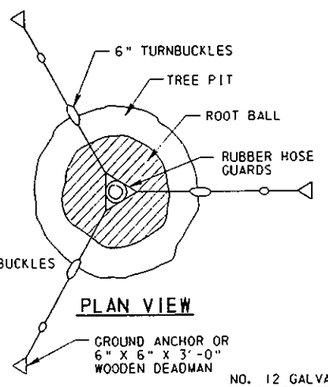
RECOMMENDED MAR. 25, 1994	RECOMMENDED MAR. 25, 1994	SHT. 1 OF 1
DIRECTOR, BUREAU OF DESIGN	CHIEF ENGINEER	RC-84



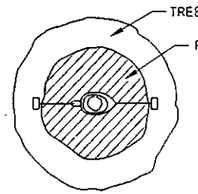
ELEVATION VIEW

TYPE 1 BRACING*

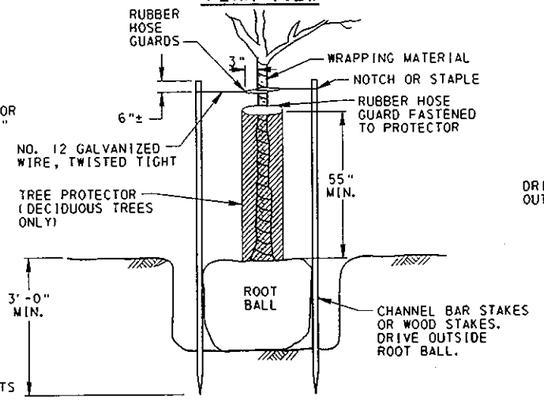
(NOT FOR STREET, SLOPE PLANTING OR REST AREA TREES)



PLAN VIEW



PLAN VIEW

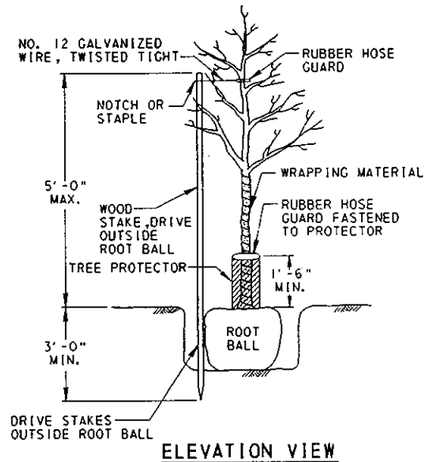


*FOR BRACING REQUIREMENTS SEE TABLE A.

ELEVATION VIEW

TYPE 2 BRACING*

(FOR ALL STREET AND REST AREA TREES OVER 1½" CALIPER)



ELEVATION VIEW

TYPE 3 BRACING*

NOTES

1. USE MOUNDS, CONSISTING OF MATERIAL FROM THE EXCAVATION FREE OF ALL STONES AND FOREIGN MATERIAL TWO (2) INCHES OR LARGER IN ANY DIMENSION, FOR ALL TREE PLANTING EXCEPT FOR REST AREAS AND OTHER HIGH-MAINTENANCE AREAS, AS DIRECTED.
2. SET TOP OF ROOT BALL ONE (1) TO TWO (2) INCHES HIGHER THAN SURROUNDING GROUND WHERE MOUNDS ARE USED.
3. ATTACH GUYS TO THE TREE ABOVE SUBSTANTIAL BRANCHES AT A POINT NOT LESS THAN ONE-HALF (½) THE HEIGHT OF THE TREE AND TO A POINT ON THE GROUND A DISTANCE OF APPROXIMATELY ONE-HALF (½) THE HEIGHT OF THE TREE FOR TYPE 1 BRACING.
4. PROVIDE TREE PROTECTOR DIAMETERS AS FOLLOWS:

   6" DIAMETER OR 6" SQUARE FOR TREES 4" CALIPER AND UNDER.
   12" DIAMETER OR 12" SQUARE FOR TREES OVER 4" CALIPER.

   LINE TOP OF PROTECTOR WITH A RUBBER HOSE GUARD FOR METAL PROTECTORS. USE PLASTIC PROTECTOR DEVICES OR HARDWARE CLOTH PROTECTORS IN UNMOWED AREAS.
5. PROVIDE BACKFILL MIX COMPOSED OF TOPSOIL ONLY, IN WET SOIL CONDITIONS, AS DETERMINED BY THE ENGINEER.
6. ANCHOR WEED BARRIER MAT FOR TREE PITS WITH A MINIMUM OF THREE (3) U-SHAPED STAPLES EQUALLY SPACED AROUND THE TREE. ANCHOR WEED BARRIER MAT FOR SHRUB BED AREAS WITH U-SHAPED STAPLES SPACED EVERY THREE (3) FEET AT THE EDGES OF THE MAT AND ALONG ALL OVERLAPS OF THE MAT MATERIAL, OR AS DIRECTED.
7. SPACE ROOT CONTACT FERTILIZER PACKETS EQUALLY AROUND THE BALL OR ROOTS AND SET SIX (6) TO EIGHT (8) INCHES DEEP. PLACE FERTILIZER TABLETS AT THE ROOT ZONE APPROXIMATELY THREE (3) TO FOUR (4) INCHES DEEP.
8. DO NOT PLACE WEED BARRIER MAT IN THE PIT FOR TREES TO BE PLANTED IN UNMOWED AREAS. USE CRUSHED NO. 67 GRADATION AGGREGATE FOR MULCH.
9. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF PUBLICATION 408 SPECIFICATIONS, SECTION 808.

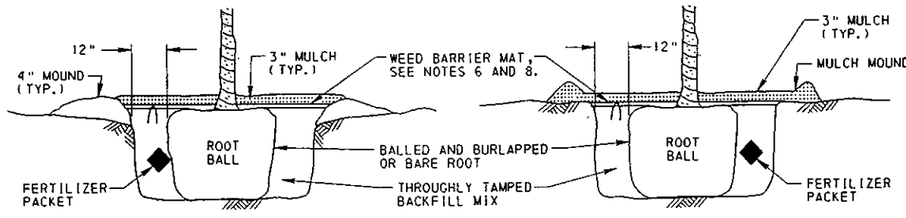
TABLE B
4 OZ., 16-8-16 ROOT CONTACT FERTILIZER PACKET SCHEDULE

TREE SIZE		NUMBER
DECIDUOUS	EVERGREEN	OF PACKETS
UNDER 1" CALIPER	18" TO 36" HEIGHT	1
1" TO 2" CALIPER	3'-0" TO 6'-0" HEIGHT	2
2" TO 2½" CALIPER	6'-0" TO 8'-0" HEIGHT	3
2½" TO 3½" CALIPER	-----	4
3½" TO 4" CALIPER	-----	5
4" TO 5" CALIPER	-----	6
FLOWERING TREES		NUMBER OF PACKETS
5'-0" TO 10'-0" HEIGHT		3
SHRUBS		NUMBER OF PACKETS
12" TO 24" SPREAD OR HEIGHT		1
24" TO 36" SPREAD OR HEIGHT		2
3'-0" TO 5'-0" HEIGHT		3

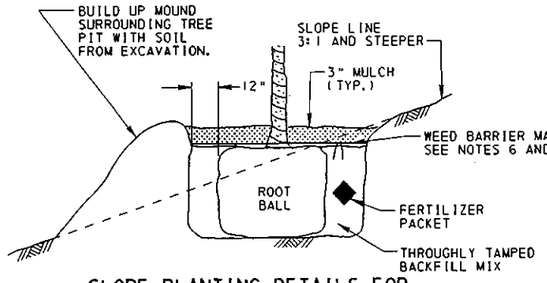
TABLE C
10 GRAM, 20-10-5 FERTILIZER TABLET SCHEDULE

ALL EVERGREENS/DECIDUOUS SEEDLINGS	1 TABLET
ALL GROUNDCOVER MATERIAL	1 TABLET

BRACING DETAILS

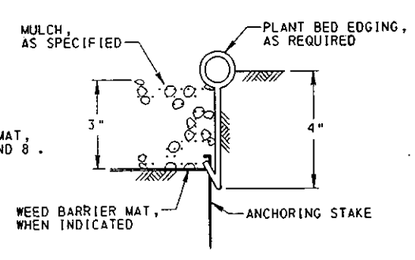


TREE PLANTING DETAILS



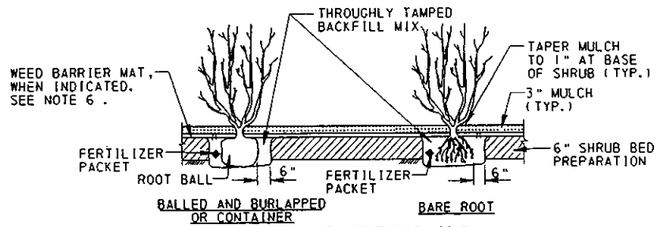
SLOPE PLANTING DETAILS FOR DECIDUOUS AND EVERGREEN TREES

(USE TYPE 2 OR TYPE 3 BRACING, AS REQUIRED)



PLANT BED EDGING DETAILS

PLANTING DETAILS



SHRUB PLANTING AND SHRUB BED PREPARATION DETAILS

TABLE A
BRACING REQUIREMENTS

BRACING TYPE	TREE SIZE		MINIMUM POST LENGTH	STAKE BRACE TYPE	REQUIRED POST SIZES†
	DECIDUOUS	EVERGREEN			
1	OVER 3½" CAL.	OVER 8'-0" HT.	-----	-----	-----
2	-----	4'-0" TO 6'-0" HT.	6'-6"	CHANNEL BAR	1¼ LB. POST H2-1
				WOOD	2" X 2" FULL DIM.
2	1½" TO 2½" CAL.	6'-0" TO 8'-0" HT.	8'-0"	CHANNEL BAR	3 LB. POST H2-2
				WOOD	2" X 2" FULL DIM.
2	2½" TO 3½" CAL.	-----	11'-0"	CHANNEL BAR	3 LB. POST H2-2
				WOOD	3" X 3" FULL DIM.
2	OVER 3½" CAL.	-----	12'-6"	CHANNEL BAR	3 LB. POST H2-3
				WOOD	3" X 3" FULL DIM.
3	5'-0" HT. TO 1½" CAL.	-----	8'-0"	WOOD	2" X 2" FULL DIM.

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

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF DESIGN

LANDSCAPE AND PLANTING DETAILS

RECOMMENDED MAR. 25, 1994
Frederick Bowser
DIRECTOR, BUREAU OF DESIGN

RECOMMENDED MAR. 25, 1994
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SHT. 1 OF 1

RC-91