
AASHTO-AGC-ARTBA Joint Committee

Task Force 13 Report

Guide to Standardized Highway Drainage Products

November 1999



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AASHTO-AGC-ARTBA Joint Committee

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Guide to Standardized Highway Drainage Products

November 1999

PREFACE

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November 1999

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Thanks are also extended to the manufacturers and associations that provided advice and many of the details incorporated in this guide.

CONTENTS

	<u>PAGES</u>
Preface	i
Task Force No. 13 Members	ii
Drainage Hardware Committee Members	iii
Acknowledgements	iv
Introduction	1
Index to Drawings	3
Section CP—Concrete Drainage Products	9
Section CM—Corrugated Metal Drainage Products	37
Section SP—Structural Plate Drainage Products	95
Section DH—Drainage Hardware & Accessories	137
Section P—Plastic Drainage Products	175

INTRODUCTION

This guide was prepared by Task Force No. 13 of the American Association of State Highway and Transportation Officials—Associated General Contractors of America—American Road and Transportation Builders' Association (AASHTO-AGC-ARTBA) Joint Committee's Subcommittee on New Materials. It supersedes the 1986 edition of this publication, *A Guide to Standardized Highway Drainage Products*. A new section, "Part 5-Plastic Drainage Products," has been added in this new edition of the publication. Please note, also, that, because of drawing deletions and additions, some of the drawing numbers in this edition do not match those for nominally the same items in the previous edition. This guide is one of a series of guides prepared by Task Force No. 13 in an effort to promote beneficial standardization of details for bridge and road hardware. There is no intent that this guide be viewed as a national standard. It is provided as a supplement to existing agency specifications. It is intended to provide guidance for users and specifiers of highway drainage products who may not have ready access to information contained herein or who may be looking for potentially more economical specifications or details that are in use for these products. It is hoped the guide will spare some from having to "reinvent the wheel." Additionally, the ultimate goal is to reduce highway costs to the public by reducing manufacturing and inventory costs. These costs are often higher than necessary because manufacturers cannot achieve the same efficiency in supplying several versions of essentially the same product as they can with one. Therefore, designers and specifiers of highway drainage products are invited to consider the products shown in this guide to see if they will efficiently meet their needs, especially before developing new specifications or details.

In general, the Task Force has not attempted to address the hydraulic, structural, or durability requirements associated with the items shown in this guide. These are beyond the scope of the guide and are the responsibility of the highway designer. For information on design or for sources of such information, see the *Standard Specifications for Highway Bridges* and the *Hydraulic Engineering Circular No. 1—Selected Bibliography of Hydraulic and Hydrologic Subjects*. These are available, respectively, from:

American Association of State Highway and
Transportation Officials
444 North Capitol Street, NW, Suite 249
Washington, DC 20001

and

Office of Engineering, HNG-31
Federal Highway Administration
Washington, DC 20590

A potential problem of standardization is stagnation. The Task Force is aware of this problem and wishes to avoid this resulting as a product of its activities. It, therefore, invites comments on the contents of this guide and information on needs and new developments in highway drainage products that should be considered in preparing future editions of this guide.

INDEX TO DRAWINGS

PART 1 CONCRETE DRAINAGE PRODUCTS (CP)

<u>TITLE</u>	<u>DRAWING NO.</u>	<u>PAGE</u>
SECTION CPS-SHAPES		10
Circular Concrete Pipe	CPS-1-96	11
Arch Concrete Pipe	CPS-2-96	12
Elliptical Concrete Pipe	CPS-3-96	13
Precast Concrete Box Sections	CPS-4-96	14
SECTION CPJ—JOINTING MATERIALS		15
Types of Joints for Concrete Pipe	CPJ-1-96	16
Jointing Materials for Concrete Pipe	CPJ-2-96	17
SECTION CPF—STANDARD FITTINGS		18
Concrete Pipe "Y" Fitting	CPF-1-96	19
Concrete Pipe Tee Fitting	CPF-2-96	20
Concrete Radius Pipe	CPF-3-96	21
Concrete Pipe Bends	CPF-4-96	22
SECTION CPE—END TREATMENTS		23
Precast Concrete End Section	CPE-1-96	24
Precast Concrete End Section	CPE-2-96	25
Precast Concrete End Section	CPE-3-96	26
Precast Concrete Flared Inlet	CPE-4-96	27
Concrete Pipe Skew Joints	CPE-5-96	28
Concrete Pipe 1:6 Sloped End Section	CPE-6-96	29
Precast Concrete Sloped End Section Grate	CPE-7-96	30
Concrete Pipe Sloped End Sections	CPE-8-96	31
SECTION CPA—APPURTENANCES		32
Precast Concrete Manhole Sections	CPA-1-96	33
3-m 2-Piece Precast Curb Inlet	CPA-2-96	34
1.5-m 2-Piece Precast Curb Inlet	CPA-3-96	35

PART 2
CORRUGATED METAL DRAINAGE PRODUCTS (CM)

<u>TITLE</u>	<u>DRAWING NO.</u>	<u>PAGE</u>
SECTION CMC—SHAPES		38
Corrugated Steel Pipe—Type 1 Standard Corrugations	CMCS-1-96	39
Corrugated Steel Pipe—Type 1A Standard Corrugations	CMCS-2-96	40
Corrugated Steel Pipe—Type 1R 191-mm Spiral Rib Configuration	CMCS-3-96	41
Corrugated Steel Pipe—Type 1R 292-mm Spiral Rib Configuration	CMCS-4-96	42
Concrete Lined—Corrugated Steel Pipe	CMCS-5-96	43
Corrugated Aluminum Pipe—Type 1 Standard Corrugations	CMCA-6-96	44
Corrugated Aluminum Pipe—Type 1A Standard Corrugations	CMCA-7-96	45
Corrugated Aluminum Alloy Pipe—Type 1R Spiral Rib Corrugations	CMCA-8-96	46
SECTION CMF—PIPE ARCH DIMENSIONS & FITTINGS, CIRCULAR PIPE FITTINGS		47
Corrugated Steel Pipe Arch (Type II, IIA)	CMFS-1-96	48
Corrugated Steel Pipe Arch (Type IIR)	CMFS-2-96	48A
Corrugated Aluminum Pipe Arch (Type II, IIA)	CMFA-1-96	49
Corrugated Aluminum Pipe Arch (Type IIR)	CMFA-2-96	50
Pipe Arch CMP Elbow Fittings	CMF-3-96	51
Circular CMP Tee Fittings	CMF-4-96	52
Circular CMP Cross Fittings	CMF-5-96	53
Circular CMP Lateral Fittings	CMF-6-96	54
Circular CMP Wye Fittings	CMF-7-96	55
Circular CMP 10°-45° Elbows	CMF-8-96	56
Circular CMP 50°-90° Elbows	CMF-9-96	57
Circular CMP 3-Piece 90° Elbow	CMF-10-96	58
Circular CMP Reducer	CMF-11-96	59
SECTION CME—END SECTIONS		60
End Sections for Circular Pipe	CME-1-96	61
End Sections for Pipe Arch	CME-2-96	62
End Section Connections Circular and Arch Shapes	CME-3-96	63
Sloped End Section—Type A	CME-4-96	64
Sloped End Section—Type B	CME-5-96	65
Sloped End Section—Type B without Safety Bars	CME-6-96	66
Sloped End Section—Type C Cross Drainage Structure with Safety Bars	CME-7-96	67
Sloped End Section—Type C Parallel Drainage Structure with Safety Bars	CME-8-96	68
Sloped End Section—Type C Pipe Arch Cross Drainage Structure with Safety Bars	CME-9-96	69
Sloped End Section—Type C Pipe Arch Parallel Drainage Structure with Safety Bars	CME-10-96	70

<u>TITLE</u>	<u>DRAWING NO.</u>	<u>PAGE</u>
SECTION CMB—COUPLING BANDS		71
Corrugated Steel Coupling Band 2-Piece Integral Band	CMBS-1-96	72
Corrugated Steel Coupling Band Annular Band	CMBS-2-96	73
Corrugated Steel Coupling Band Helical Band	CMBS-3-96	74
Corrugated Steel Coupling Band Universal Band—Angle Connection	CMBS-4-96	75
Corrugated Steel Coupling Band Universal Band—Bar and Strap Connection	CMBS-5-96	76
Corrugated Steel Coupling Band Universal Band—Wedge and Strap Connection	CMBS-6-96	77
Corrugated Steel Coupling Band for Reformed Helical Pipe	CMBS-7-96	78
Corrugated Steel Coupling Band Hat Band for Flanged End Pipe	CMBS-8-96	79
Corrugated Steel Coupling Band Hugger Band for Annular or Reformed End Helical Pipe	CMBS-9-96	80
Corrugated Steel Coupling Band Rod and Lug Details	CMBS-10-96	81
Corrugated Steel Coupling Band Coupling Details 51 x 51 x 5 mm Angle Clips	CMBS-11-96	82
Corrugated Steel Coupling Band—305 mm 51 x 54 x 2.77 mm "SCAFCO" Angle Clip	CMBS-12-96	83
Corrugated Steel Coupling Band—178 mm 51 x 54 x 2.77 mm "SCAFCO" Angle Clip	CMBS-13-96	84
Corrugated Steel Coupling Band—100 mm 51 x 73 x 2.77 mm "SCAFCO" Angle Clip	CMBS-14-96	85
Coupling Band Hardware	CMB-15-96	86
Corrugated Aluminum Coupling Band 2-Piece Integral Flange Band	CMBA-16-96	87
Corrugated Aluminum Coupling Band Annular Band	CMBA-17-96	88
Corrugated Aluminum Coupling Band Hugger Band for Annular or Reformed End Helical Pipe	CMBA-18-96	89
Corrugated Aluminum Coupling Band Helical Band	CMBA-19-96	90
Corrugated Aluminum Coupling Band Universal Band	CMBA-20-96	91
Ring Gaskets	CMBS-21-96	92
Flat Bands & Gaskets	CMBS-22-96	93
Sleeve Gaskets	CMBS-23-96	94

PART 3
STRUCTURAL PLATE DRAINAGE PRODUCTS (SP)

<u>TITLE</u>	<u>DRAWING NO.</u>	<u>PAGE</u>
SECTION SPC—STANDARD CORRUGATIONS		97
Steel Structural Plate Standard Corrugations	SPCS-1-96	98
Aluminum Alloy Structural Plate Standard Corrugations	SPCA-2-96	99
SECTION SPP—STANDARD PARTS		100
Steel Structure Plate Standard Plate Details	SPPS-1-96	101
Steel Structure Plate Unbalanced Channel Detail	SPPS-2-96	102
Steel Structure Plate Culvert Bolt and Nut	SPPS-3-96	103
Aluminum or Steel Structure Plate Anchor Bolts	SPP-4-96	104
Aluminum or Steel Structure Plate Joint Sealant Tape	SPP-5-96	105
Aluminum Structure Plate Standard Plate Details	SPPA-6-96	106
Aluminum Structural Plate Footing Connection Angle	SPPA-7-96	107
Aluminum Structural Plate Box Culvert Receiving Channel	SPPA-8-96	108
Aluminum Structural Plate Wale Beam	SPPA-9-96	109
Aluminum Structural Plate Connecting Plate for Wale Beam	SPPA-10-96	110
Aluminum Structural Plate Bolts and Nuts	SPPA-11-96	111
Aluminum Structural Plate Circumferential Stiffener	SPPA-12-96	112
SECTION SPC—STANDARD SHAPES		113
Aluminum or Steel Structural Plate Pipe	SPS-1-96	114
Steel Structural Plate Pipe Arch—Series I	SPSS-2-96	115
Steel Structural Plate Pipe Arch—Series II	SPSS-3-96	116
Aluminum or Steel Structural Plate Arch	SPS-4-96	117
Steel Structural Plate Pedestrian Underpass	SPSS-5-96	118
Steel Structural Plate Vehicular Underpass	SPSS-6-96	119
Aluminum Structural Plate Pipe Arch	SPSA-7-96	120
Aluminum Structural Plate Vehicular Underpass	SPSA-8-96	121
Aluminum Structural Plate Pedestrian Underpass	SPSA-9-96	122
Aluminum or Steel Structural Plate Box Culvert	SPS-10-96	123
Various Sections Thru Steel or Aluminum Structural Plate Box Culverts	SPS-11-96	124
SECTION SPL—LONG SPANS		125
Aluminum or Steel Structural Plate Horizontal Ellipse	SPL-2-96	126
Aluminum or Steel Structural Plate Low-Profile Arch	SPL-3-96	127
Aluminum or Steel Structural Plate High-Profile Arch	SPL-4-96	128
Steel Structural Plate Pear Shape	SPL-5-96	129
Section Thru Steel and Aluminum Structural Plate Long Span Structures	SPL-6-96	130
SECTION SPE—END TREATMENTS AND SPECIAL FABRICATION		131
Aluminum or Steel Structural Plate End Conditions—Bevel	SPE-1-96	132
Aluminum or Steel Structural Plate End Conditions—Skews	SPE-2-96	133
Aluminum or Steel Structural Plate End Conditions—Skew Bevel	SPE-3-96	134
Aluminum or Steel Structural Plate Special Fabrications	SPE-4-96	135

PART 4
DRAIN HARDWARE & ACCESSORIES (DH)

<u>TITLE</u>	<u>DRAWING NO.</u>	<u>PAGE</u>
Design Considerations		138
SECTION DHD—DRAINS		139
Cast Curb Inlet, Frame and Grate	DHD-1-96	140
Cast Curb Inlet, Frame and Grate	DHD-2-96	141
Cast Curb Inlet, Frame and Grate	DHD-3-96	142
Cast Frame and Grate	DHD-4-96	143
Cast Frame and Grate	DHD-5-96	144
Grate Configurations Rectangular and Square Frames	DHD-6-96	145
Steel Grate Reticuline Configuration	DHD-7-96	146
Steel Frame and Grate	DHD-8-96	147
Corrugated Metal Slotted Drain Aluminum or Steel	DHD-9-96	148
Cast Iron Bridge Drain	DHD-10-96	149
Cast Iron Bridge Drain	DHD-11-96	150
Cast Iron Bridge Drain	DHD-12-96	151
Cast Iron Bridge Drain	DHD-13-96	152
Slotted Vane Drain	DHD-14-96	153
SECTION DHMF—MANHOLE FRAMES		154
Style "A" Frame	DHMF-1-96	155
Style "B" Frame	DHMF-2-96	156
Style "D" Frame	DHMF-3-96	157
Frame Adjusting Ring	DHMF-4-96	158
SECTION DHML—MANHOLE LIDS		159
Style 1 Lid	DHML-1-96	160
Style 2 Lid	DHML-2-96	161
Style 4 & 5 Lids	DHML-3-96	162
Style 6 Lid	DHML-4-96	163
Lid Lifting Devices	DHML-5-96	164
Lid Locking Devices	DHML-6-96	165
Selected Solid Lid Styles	DHML-7-96	166
Selected Grate Lid Styles	DHML-8-96	167
Gasket Seating System for Lids	DHML-9-96	168
SECTION DHMS—MANHOLE STEPS		169
Extruded Aluminum Manhole Step	DHMS-1-96	170
Cast Metal Manhole Step	DHMS-2-96	171
Cast Iron Manhole Step	DHMS-3-96	172
Plastic-Steel Reinforced Manhole Step	DHMS-4-96	173

PART 5
PLASTIC DRAINAGE PRODUCTS (P)

<u>TITLE</u>	<u>DRAWING NO.</u>	<u>PAGE</u>
Design Considerations		175
SECTION PE—POLYETHYLENE		177
Smooth Interior Corrugated Polyethylene Pipe	PE-1-96	178
Bell Couplers for SLCPP	PE-2-96	179
SLCPP Bends	PE-3-96	180
Split Couplers for SLCPP	PE-4-96	181
SLCPP 4-Piece 90° Bend	PE-5-96	182
SLCPP Tee Fittings	PE-6-96	183
SLCPP Lateral Fittings	PE-7-96	184
PE End Sections	PE-8-96	185
SECTION PVC—POLYVINYL CHLORIDE PIPE		186
Smooth Interior Polyvinyl Chloride (PVC) Pipe	PVC-1-96	187
Polyvinyl Chloride (PVC) Bends	PVC-2-96	188
Polyvinyl Chloride (PVC) Tees	PVC-3-96	189
Polyvinyl Chloride (PVC) Wyes	PVC-4-95	190

PART 1

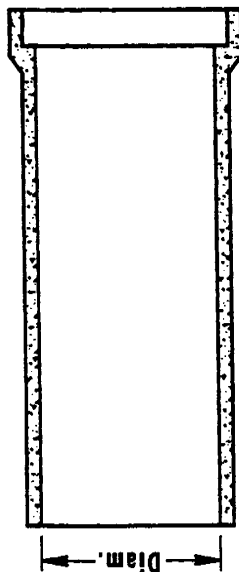
CONCRETE DRAINAGE PRODUCTS (CP)

NOTE:

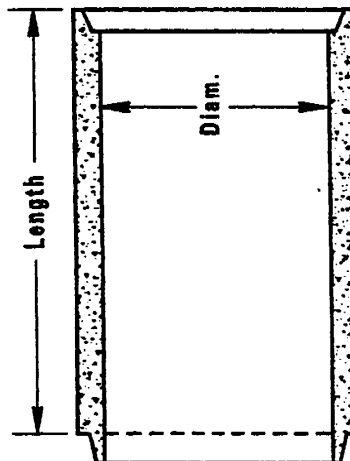
Design information for concrete pipe and box sections may be obtained from Division 1, Section 17 of the American Association of State Highway and Transportation Officials (AASHTO) bridge specifications (*Standard Specifications for Highway Bridges*). Additional information on concrete pipe and box sections may be obtained from the American Concrete Pipe Association (*Concrete Pipe Handbook* and *Concrete Pipe Design Manual*).

SECTION CPS—SHAPES

Circular Concrete Pipe	CPS-1-96	11
Arch Concrete Pipe	CPS-2-96	12
Elliptical Concrete Pipe	CPS-3-96	13
Precast Concrete Box Sections	CPS-4-96	14



BELL & SPIGOT



TONGUE & GROOVE

SPECIFICATIONS

Non-Reinforced Concrete Pipe:
 Plain - AASHTO M 86M (ASTM C 14M) (ASTM C 985)
 Porous - AASHTO M 176M (ASTM C 654M)
 Perforated - AASHTO M 175M (ASTM C 444M)
 Drain Tile - AASHTO M 178M (ASTM C 412M)
 Reinforced Concrete Pipe:
 AASHTO M 170M (ASTM C 78)*
 AASHTO M 242M (ASTM C 855M) for D-Load Pipe
 ASTM C 361 for Low-Head Pressure Pipe

Joints: See CPJ-2-96

*except that the use of elliptical reinforcement will not be permitted.

USE

Non-Reinforced and Reinforced Concrete Pipe for Culverts, Storm Drains, Sewers and Underdrains.

CIRCULAR CONCRETE PIPE

**AASHTO-AGC-ARTBA
 TF-13 DRAWING**

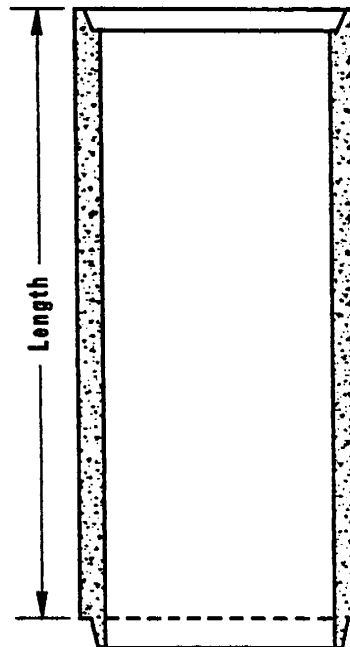
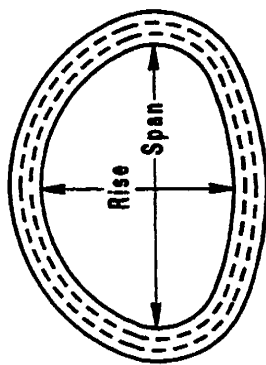
CPS-1-96

SPECIFICATIONS

AASHTO M 208M (ASTM C 506M)

USES

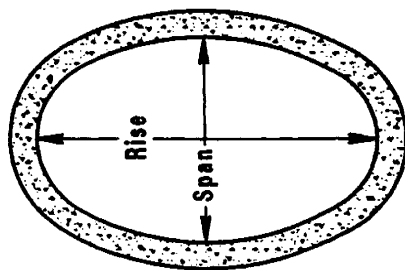
Reinforced Concrete Arch Pipe for Culverts, Storm Drains and Sewers, where clearance above the pipe is critical.



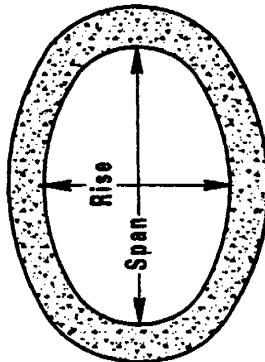
ARCH CONCRETE PIPE

AASHTO-AGC-ARTBA
TF-13 DRAWING

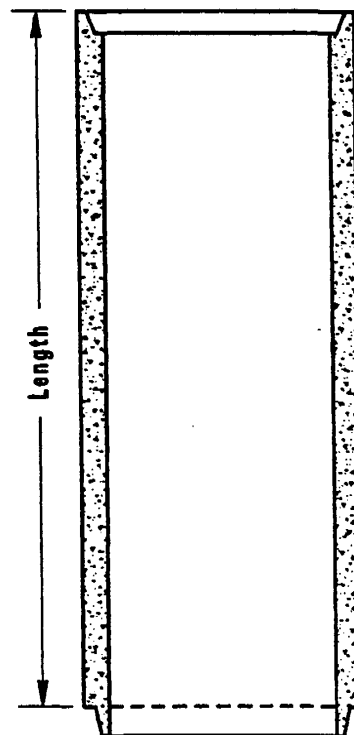
CPS-2-86



**VERTICAL
ELLIPTICAL**



**HORIZONTAL
ELLIPTICAL**



SPECIFICATIONS

AASHTO M 207M (ASTM C 507M)

USES

Reinforced Concrete Elliptical Pipe for Culverts, Storm Drains and Sewers.

ELLIPTICAL CONCRETE PIPE

AASHTO-AGC-ARTBA
TF-13 DRAWING

CPS-3-96

SPECIFICATIONS

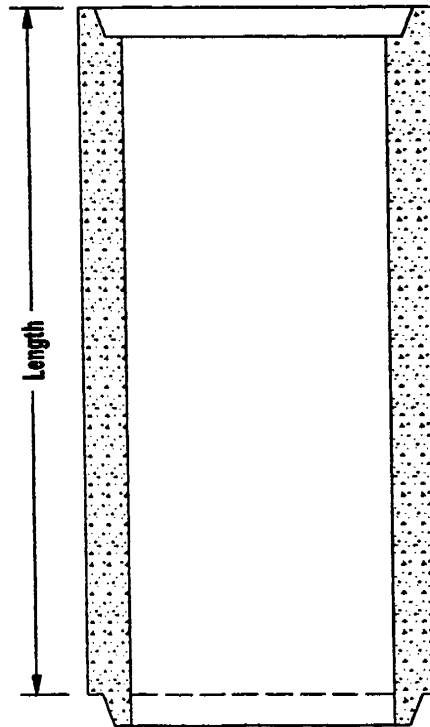
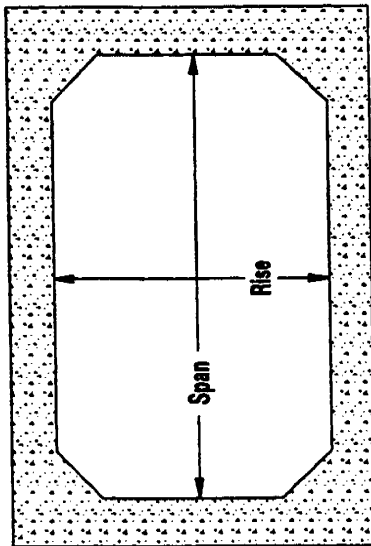
AASHTO M 259M (ASTM C 789M)
 For fill heights less than 610 mm use AASHTO M 273M (ASTM C 850M)

USES

Precast Reinforced Concrete Box Sections for Culverts, Storm Drains and Sewers.

PRECAST CONCRETE BOX SECTIONS

AASHTO-AGC-ARTBA
 TF-13 DRAWING
 CPS-4-96



SECTION CPJ—JOINTING MATERIALS

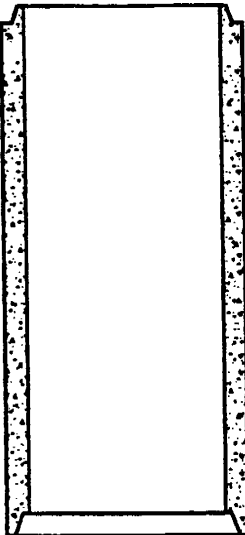
Types of Joints for Concrete Pipe	CPJ-1-96	16
Jointing Materials for Concrete Pipe	CPJ-2-96	17

SPECIFICATIONS

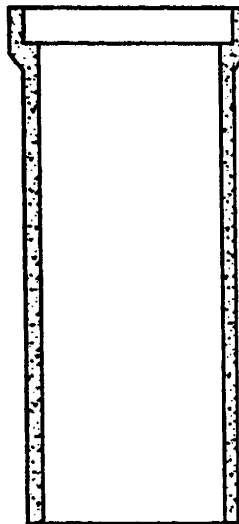
Specifications are not available on dimensions of the various types of joints. Manufacturers develop their own dimensions and can supply this data, if necessary.

USES

Tongue & Groove Joints provide smooth straight line pipe which creates fewer problems in excavation, laying or jacking.
Bell & Spigot joints require slightly more excavation and can be jacked. Butt-end joints (Tile) are used for underdrains where infiltration is desired.



TONGUE & GROOVE



BELL & SPIGOT



BUTT-END (Drain Tile)

TYPES OF JOINTS FOR CONCRETE PIPE

AASHTO-AGC-ARTBA
TF-13 DRAWING

CPJ-1-96

SPECIFICATIONS

Mastic: AASHTO M 198 ASTM C 990
Rubber Gasket: AASHTO M 315

ASTM C 443
ASTM C 361

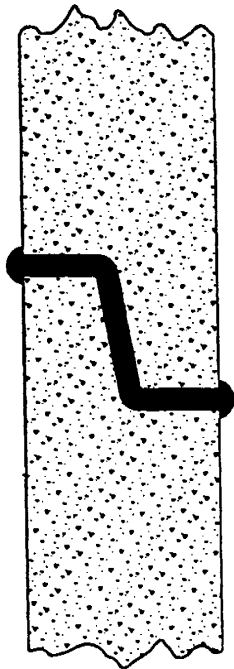
USE

For sealing of joints in Concrete Pipe Sewers and Culverts to prevent infiltration, exfiltration or provide low-head pressure sealing.

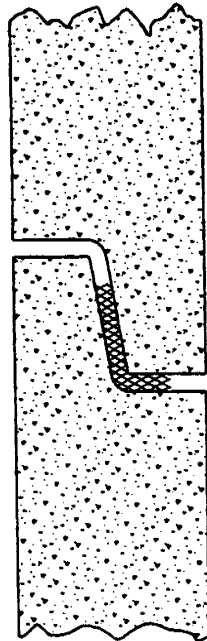
JOINTING MATERIALS FOR CONCRETE PIPE

AASHTO-AGC-ARTBA
TF-13 DRAWING

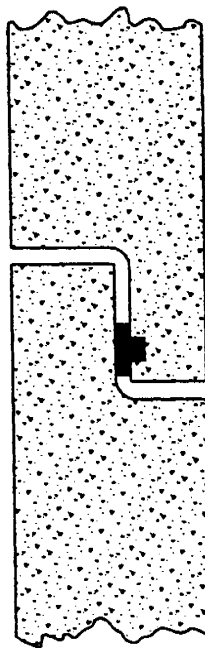
CPJ-2-96



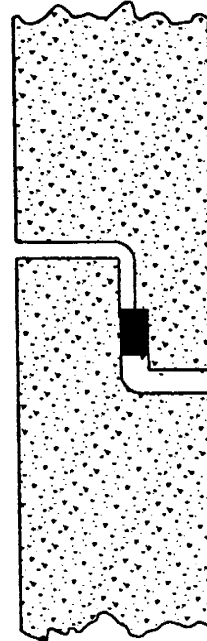
MASTIC



RUBBER GASKET*



O-RING GASKET



SINGLE OFFSET GASKET

* O-RING AND SINGLE OFFSET JOINTS USE RUBBER GASKETS

SECTION CPF—STANDARD FITTINGS

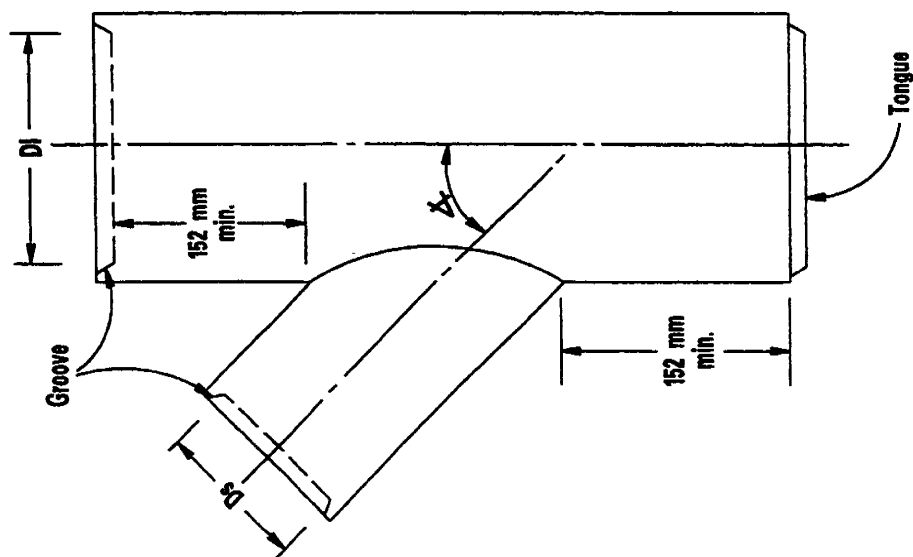
Concrete Pipe "Y" Fitting	CPF-1-96	19
Concrete Pipe Tee Fitting	CPF-2-96	20
Concrete Radius Pipe	CPF-3-96	21
Concrete Pipe Bends	CPF-4-96	22

SPECIFICATIONS

"Y" Fittings to be produced from concrete pipe meeting the specifications for the type & class of pipe required. Consult a Producer for details.

USES

To provide a prefabricated intersection of two lines of pipe.



CONCRETE PIPE "Y" FITTING

AASHTO-AGC-ARTBA
TF-13 DRAWING

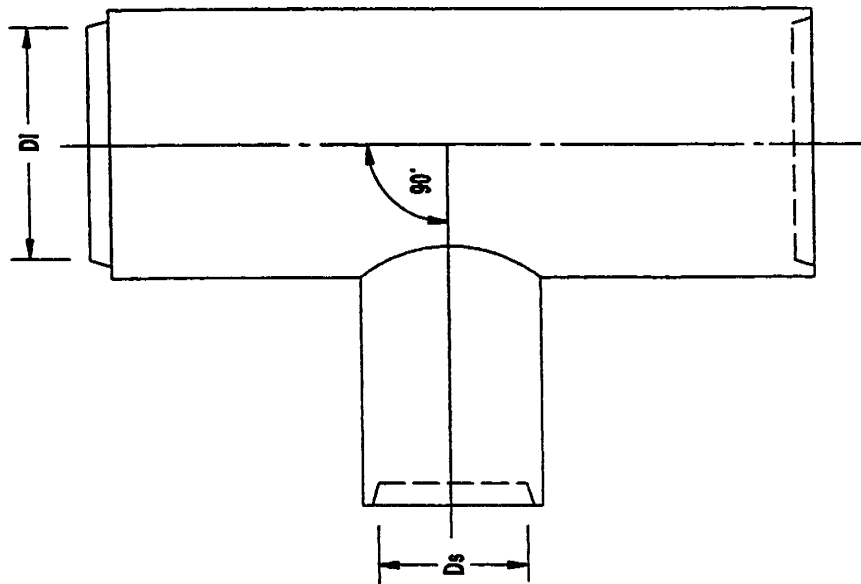
CPF-1-96

SPECIFICATIONS

Tee fittings are to be produced from concrete pipe meeting the specifications for the type & class of pipe required. Consult a Producer for details.

USES

To provide a prefabricated right angle intersection of two lines of pipe.



CONCRETE PIPE TEE FITTING

AASHTO-AGC-ARTBA
TF-13 DRAWING

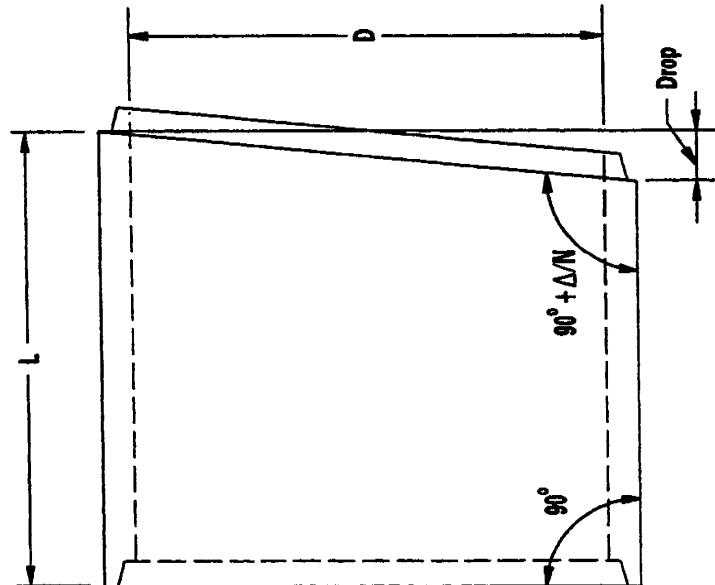
CPF-2-96

SPECIFICATIONS

Radius pipe shall be produced in accordance with the applicable specifications for circular pipe. Consult a producer for details.

USES

For sharply curving lines of pipe which cannot be accommodated by the deflected straight pipe method or by other special precast fittings.



CONCRETE RADIUS PIPE

AASHTO-AGC-ARTBA
TF-13 DRAWING

CPF-3-96

SPECIFICATIONS

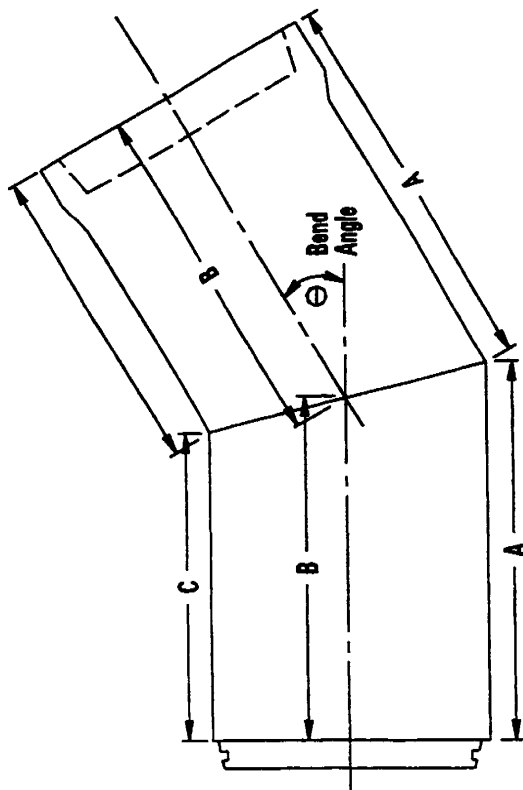
Bends to be produced from concrete pipe meeting the Specifications for the type & Class of pipe required.

ASTM C-76M ("O"-Ring Gasket, Bell and Spigot shown)

USE

For sharply curving lines of pipe or for redirection of line pipe.

Bends normally produced with bend angles of 15°, 30°, 45°, & 90°.



CONCRETE PIPE BENDS

AASHTO-AGC-ARTBA
TF-13 DRAWING

CPF-4-96

SECTION CPE—END TREATMENTS

Precast Concrete End Section	CPE-1-96	24
Precast Concrete End Section	CPE-2-96	25
Precast Concrete End Section	CPE-3-96	26
Precast Concrete Flared Inlet	CPE-4-96	27
Concrete Pipe Skew Joints	CPE-5-96	28
Concrete Pipe 1:6 Sloped End Section	CPE-6-96	29
Precast Concrete Pipe Sloped End Section Grate	CPE-7-96	30
Concrete Pipe Sloped End Sections	CPE-8-96	31

APPLICABLE SPECIFICATIONS

Precast End Sections shall be of the same quality as the pipe with which they are to be used.

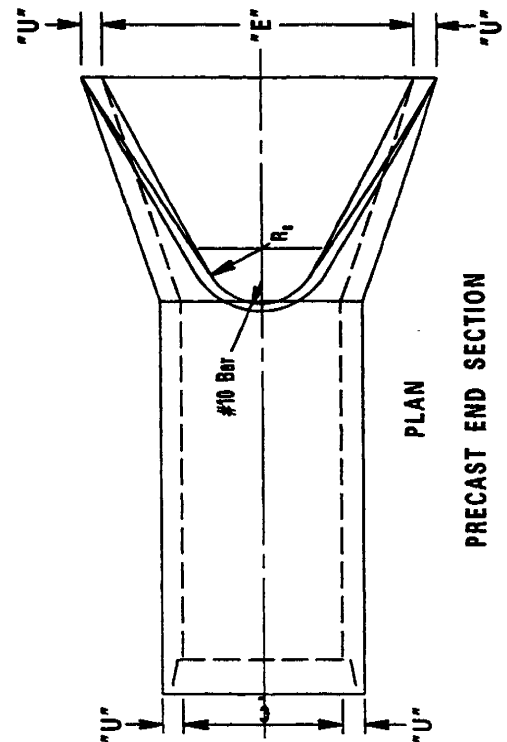
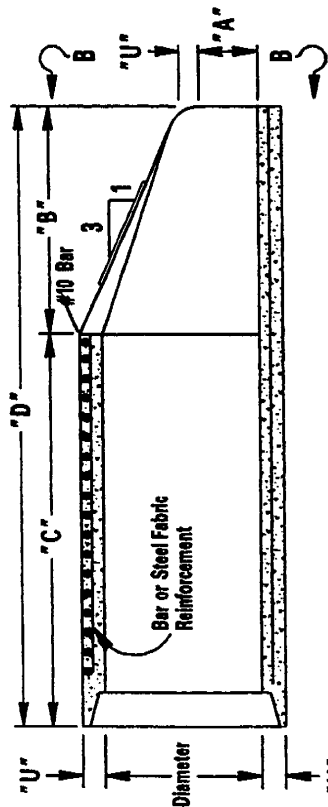
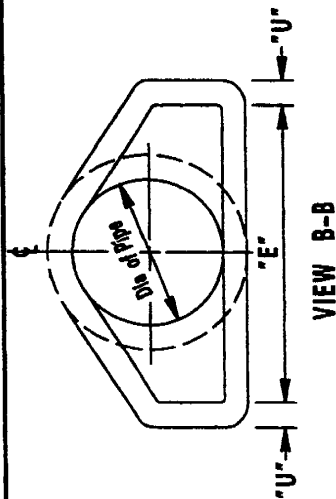
Precast reinforced concrete flared end sections shall be constructed in accordance with the applicable portions of AASHTO M 170M Class III, wall B reinforced concrete pipe.

USES

Precast End Sections serve as a Prefabricated Headwall for Culverts and Storm Sewers

TABLE OF DIMENSIONS (millimeters)

PIPE DIA.	"U"	"A"	"B"	"C"	"D"	"E"	"R ₃ "
300	50	100	600	1250	1850	600	100
375	57	150	675	1180	1855	750	150
450	63	225	675	1180	1855	900	188
525	69	225	900	955	1855	1050	125
600	75	241	1077	790	1867	1200	200
675	82	267	1224	643	1867	1350	225
750	88	300	1350	523	1873	1500	200
825	94	343	1446	954	2400	1650	225
900	100	381	1557	843	2400	1800	275
1050	113	533	1551	849	2400	1950	275
1200	125	600	1800	600	2400	2100	300

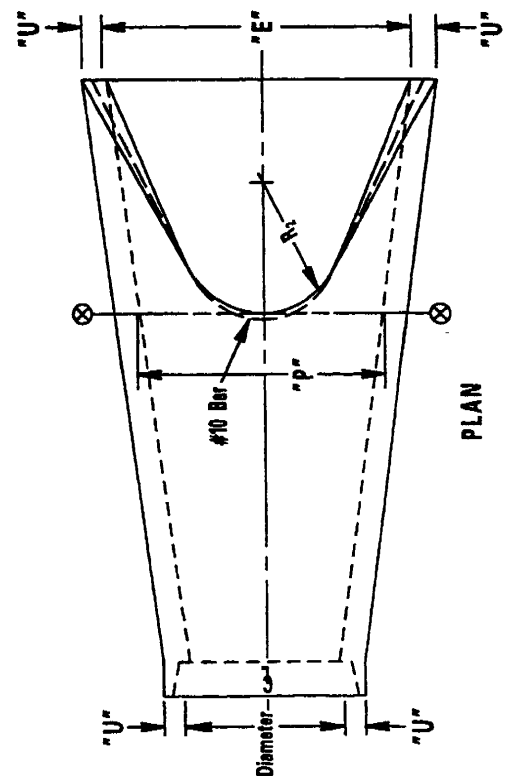
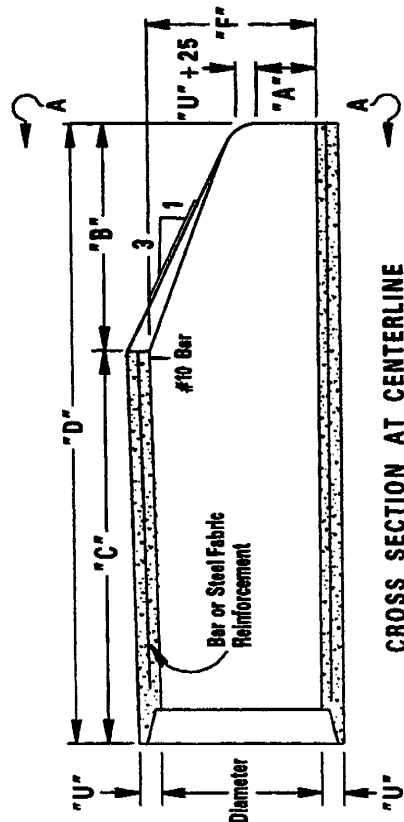
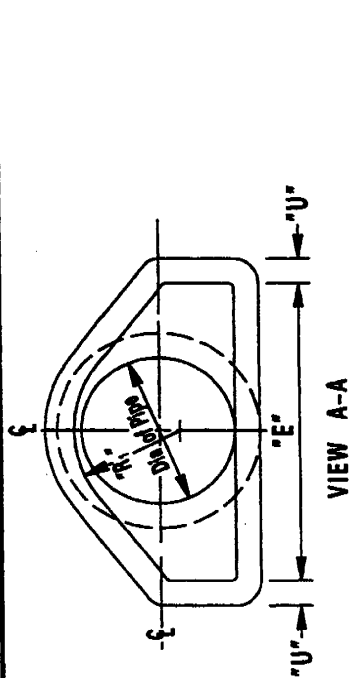


PRECAST END SECTION

PRECAST CONCRETE END SECTION

AASHTO-AGC-ARTBA
TF-13 DRAWING

CPE-1-96



PRECAST END SECTION

APPLICABLE SPECIFICATIONS

Precast End Sections shall be of the same quality as the pipe with which they are to be used.

Precast reinforced concrete flared end sections shall be constructed in accordance with the applicable portions of AASHTO M-170M Class III, wall B reinforced concrete pipe.

USES

Precast End Sections serve as a Prefabricated Headwall for Culverts and Storm Sewers

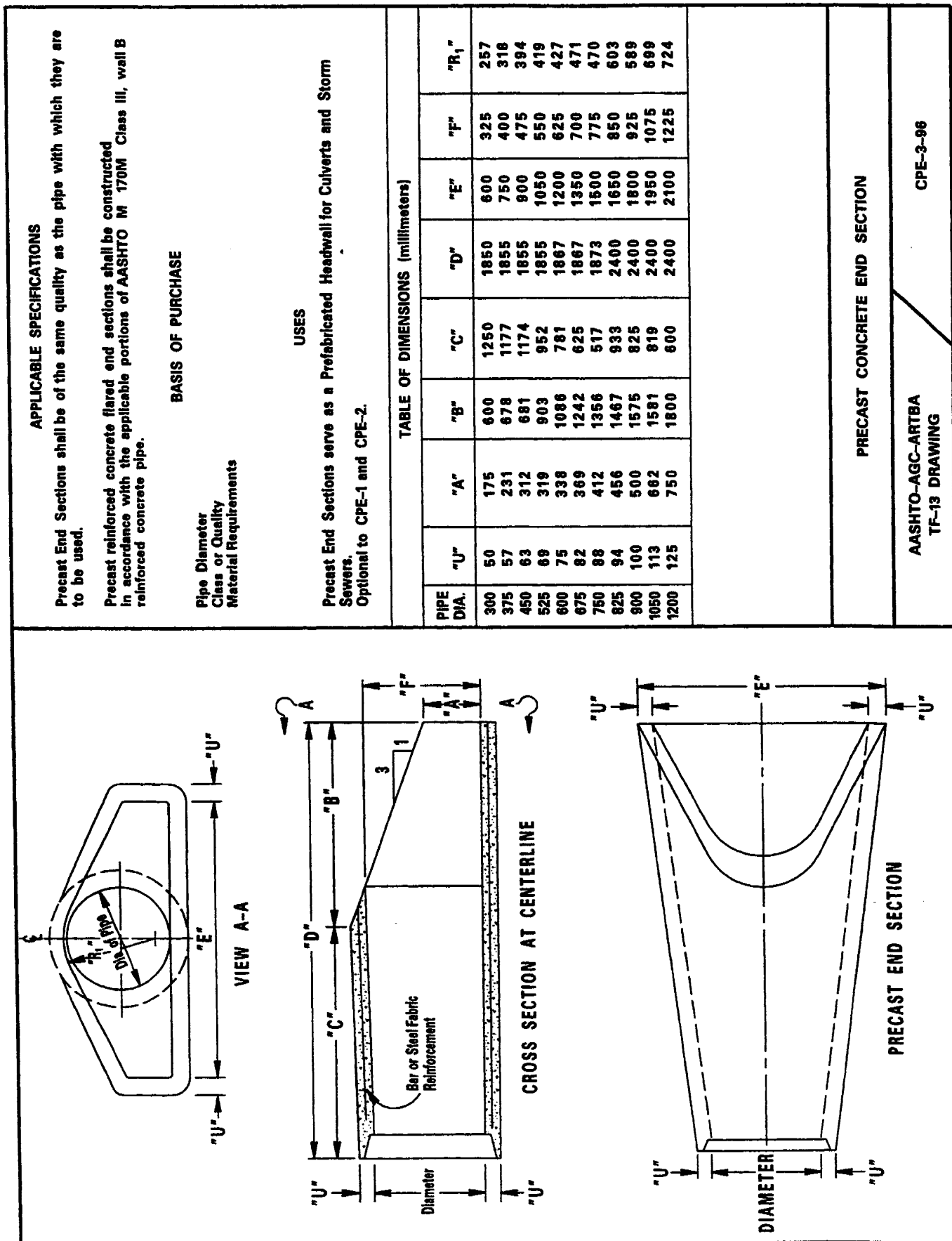
TABLE OF DIMENSIONS (millimeters)

PIPE DIA.	"U"	"A"	"B"	"C"	"D"	"E"	"F"	AT X-X ONLY			"R ₂ "
								"P"	"R ₁ "	"R ₂ "	
300	50	100	600	1250	1850	600	325	256	257	225	
375	57	150	675	1180	1855	750	400	589	318	275	
450	63	225	675	1180	1855	900	475	737	394	300	
525	69	225	900	955	1855	1050	550	797	419	325	
600	75	241	1077	790	1867	1200	625	843	427	350	
675	82	267	1224	643	1867	1350	700	985	471	383	
750	88	300	1350	523	1873	1500	775	940	470	375	
825	94	343	1446	954	2400	1850	850	1148	603	438	
900	100	381	1557	843	2400	1800	925	1156	589	500	
1050	113	533	1551	849	2400	1950	1075	1359	698	550	
1200	125	600	1800	600	2400	2100	1225	1441	724	550	

PRECAST CONCRETE END SECTION

AASHTO-AGC-ARTBA
TF-13 DRAWING

CPE-2-86

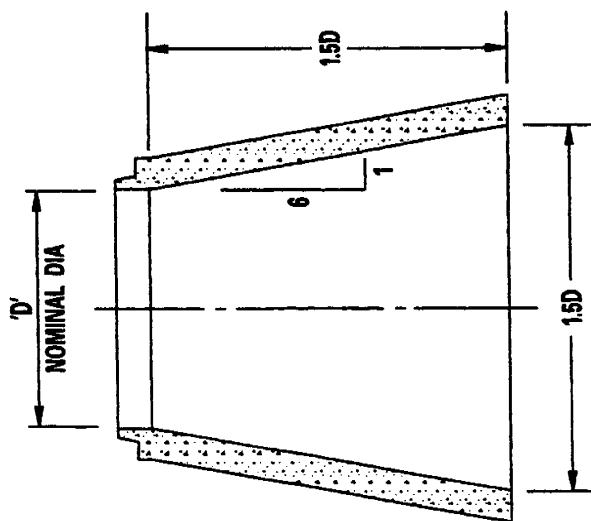


APPLICABLE SPECIFICATIONS

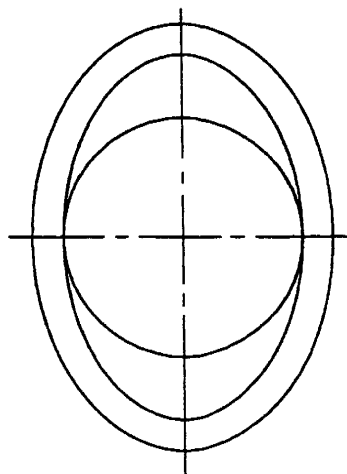
Flared Inlet shall meet the applicable Sections of AASHTO M-207M (ASTM C 507M) for materials, reinforcement and concrete strength.

USES

Flared inlets are used on the upstream end of culverts or sewers to improve the hydraulic operation of the facility entrance.



PLAN VIEW



END VIEW

PRECAST CONCRETE FLARED INLET

AASHTO-AGC-ARTBA
TF-13 DRAWING

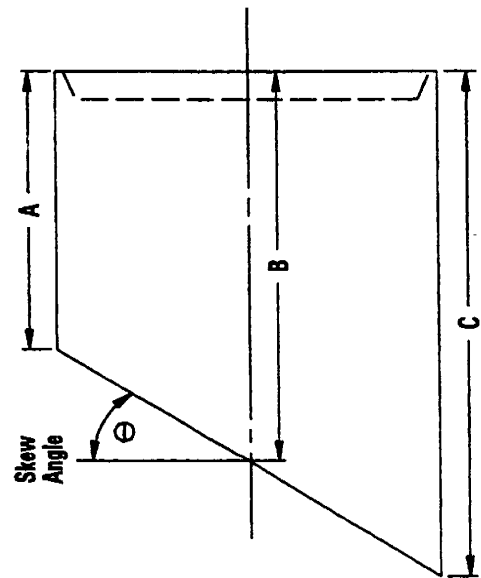
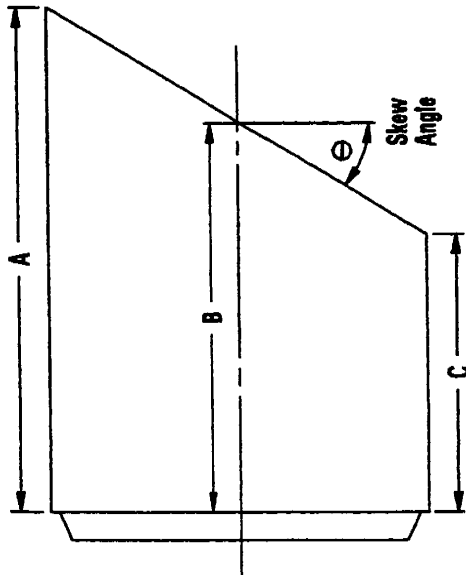
CPE-4-86

APPLICABLE SPECIFICATIONS

Skews to be produced from concrete pipe meeting the specifications for the type & Class of pipe required. ASTM C 76M (Tongue & Groove shown)

USE

To provide end finish to a line of pipe conforming to embankment contour.



CONCRETE PIPE SKEW JOINTS

AASHTO-AGC-ARTBA
TF-13 DRAWING

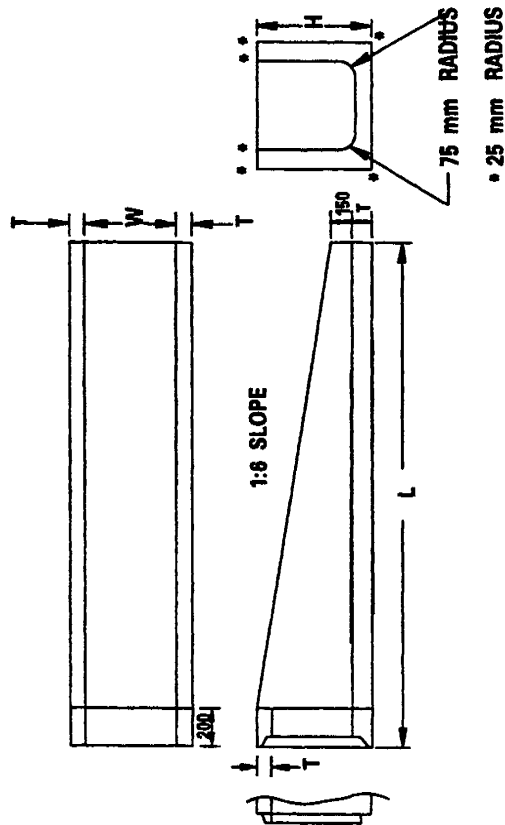
CPE-5-86

APPLICABLE SPECIFICATIONS

Precast reinforced concrete sloped end sections shall be in accordance with the applicable portions of AASHTO M 170M, with concrete strength and reinforcement equivalent to class II pipe except that an additional #13 bar shall be added in the top and bottom of each side.

USES

To provide inlets and outlets where a 1V:6H slope safety end treatment is required on culverts and storm sewers.



Not to Scale

Pipe Dia.	T	W	H	L
375	75	375	525	1950
450	75	450	600	2400
600	75	600	750	3300
750	100	750	950	4350
900	100	900	1100	5250
1050	100	1050	1250	6150
1200	125	1200	1450	7200

NOTE: ALL DIMENSIONS SHOWN ARE IN MILLIMETERS

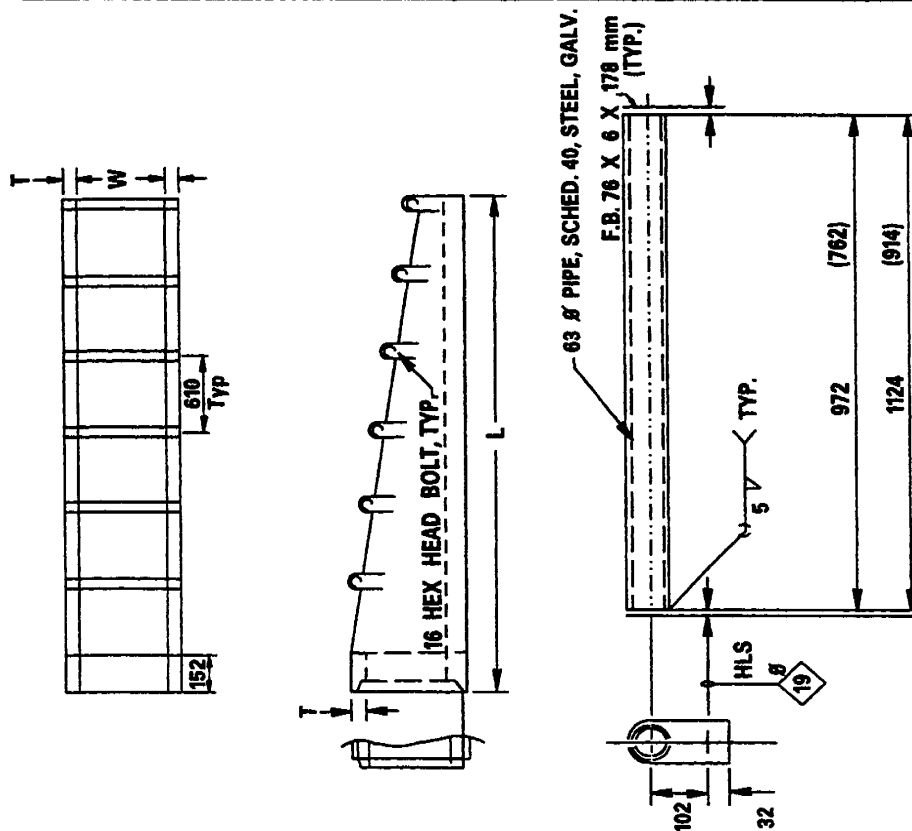
PRECAST CONCRETE 1:8 SLOPED END SECTION

AASHTO-AGC-ARTBA
TF-13 DRAWING

CPE-6-86

APPLICABLE SPECIFICATIONS

Note:
Sloped ends are typically used to reduce hazard of culvert end to errant vehicles. Grates or other devices may be required, especially on ≤ 750 mm diameter size of parallel drains and ≤ 1050 mm diameter size of cross drains. On parallel drains the grates are transverse, and on cross drains they are longitudinal.



Note: All dimensions are in millimeters.

PRECAST CONCRETE SLOPED END SECTION GRATE

AASHTO-AGC-ARTBA
TF-13 DRAWING

CPE-7-96

APPLICABLE SPECIFICATIONS

Sloped End Sections to be produced from Concrete Pipe meeting the specifications for the type and class of pipe required.

ASTM C 76M (Tongue & Groove shown)

NOTE: Sloped ends are typically used to reduce hazard of culvert end to errant vehicles. Grates or other devices may also be required to effect this end.

USES

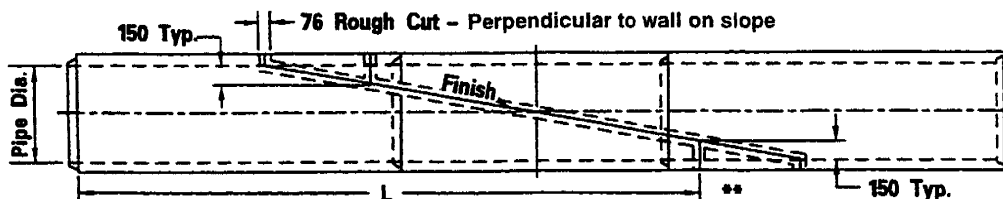
To provide end finish to a line of pipe conforming to embankment contour. Various slopes may be specified.

Note: All dimensions are in millimeters.

CONCRETE PIPE SLOPED END SECTIONS

AASHTO-AGC-ARTBA
TF-13 DRAWING

CPE-8-86

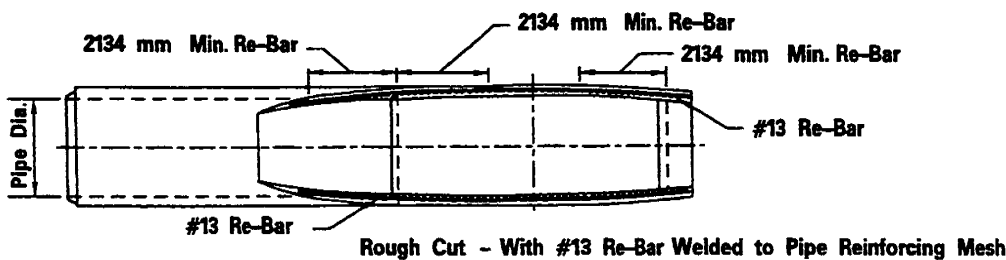


Typical Rough Cut Layout - 1:6 Slope Pipe to be Shipped As Individual Joints.

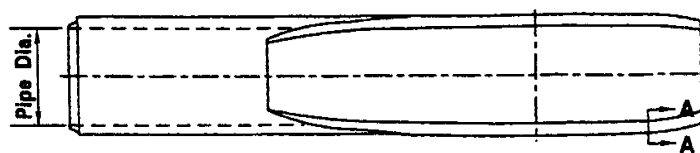
Rough Cut As Shown - Cut Reinforcing in field Lay Pipe - Weld on #13 Bar - Finish As Required.

** Other slopes and some pipe diameters may require different number of pipe segments.

* As an alternate to finish shown, cast cut edge into slope apron.

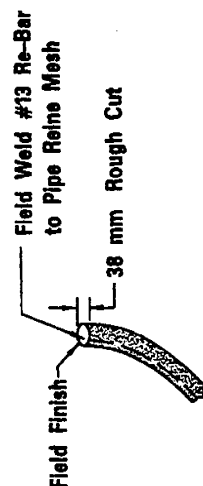


Rough Cut - With #13 Re-Bar Welded to Pipe Reinforcing Mesh



Field Finish Slope

Section A-A



SECTION CPA—APPURTENANCES

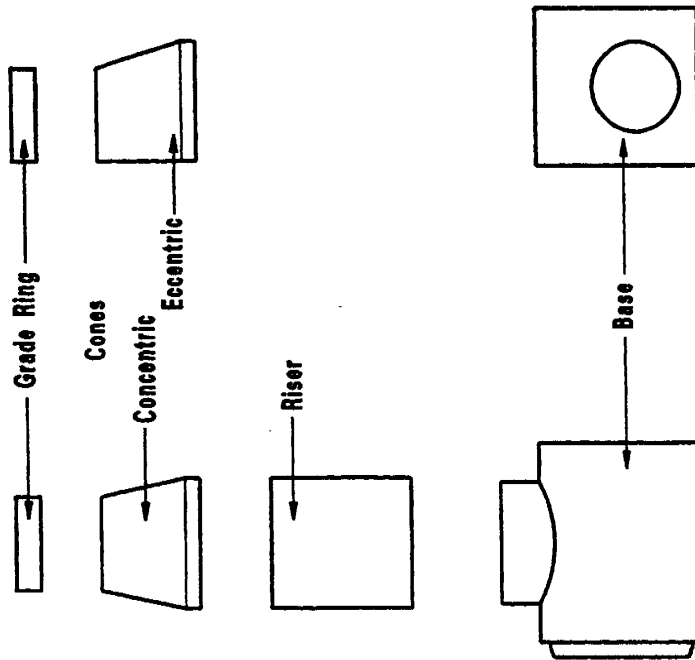
Precast Concrete Manhole Sections	CPA-1-96	33
3-m 2-Piece Precast Curb Inlet	CPA-2-96	34
1.5-m 2-Piece Precast Curb Inlet	CPA-3-96	35

APPLICABLE SPECIFICATIONS

AASHTO M 199M (ASTM C 478M) except that the minimum wall thickness shall be 76 mm.

USE

Precast Manholes provide a vertical access to drainage structures and allow for intersection and junction.



TYPICAL CONFIGURATION
OF
PRECAST MANHOLE SECTIONS

PRECAST CONCRETE MANHOLE SECTIONS

AASHTO-AGC-ARTBA
TF-13 DRAWING

CPA-1-98

APPLICABLE SPECIFICATIONS

AASHTO Standard Specifications for Highway Bridges. Section 8

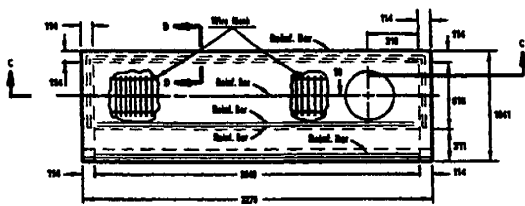
USE

Provide an entry for drainage water from a curbed gutter to a storm drain or culvert.

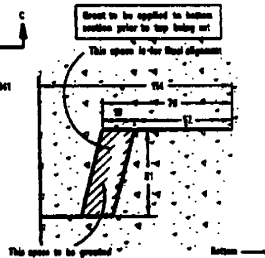
3-m 2-PIECE PRECAST CURB INLET

AASHTO-AGC-ARTBA
TF-13 DRAWING

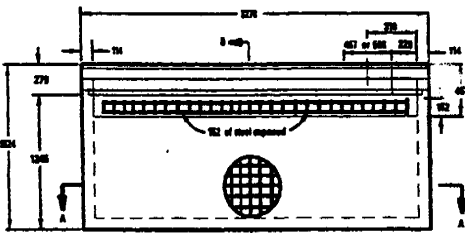
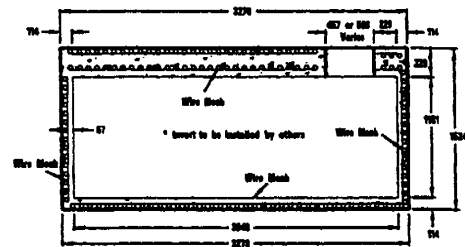
CPA-2-98



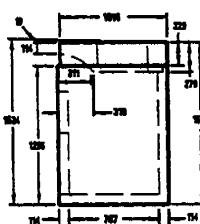
TOP PLAN



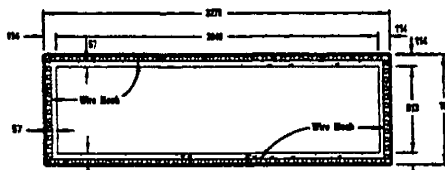
SECTION D-D JOINT DETAIL



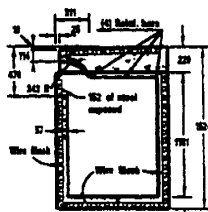
FRONT ELEVATION



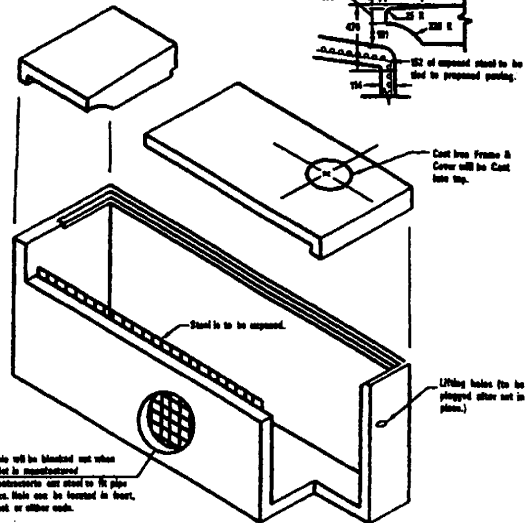
END ELEVATION



SECTION A-A



SECTION B-B



NOTE: All dimensions shown are in millimeters.

APPLICABLE SPECIFICATIONS

AASHTO Standard Specifications for Highway Bridges, Section 8

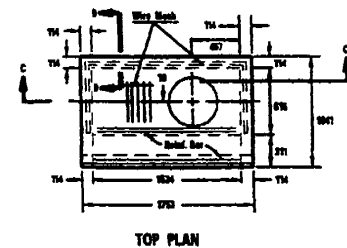
USE

Provide an entry for drainage water from a curbed gutter to a storm drain or culvert.

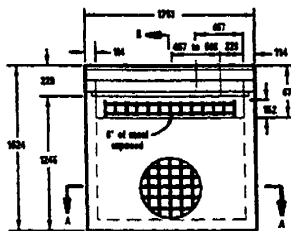
1.5-m 2-PIECE PRECAST CURB INLET

AASHTO-AGC-ARTBA
TF-13 DRAWING

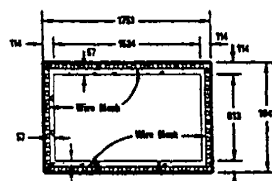
CPA-3-96



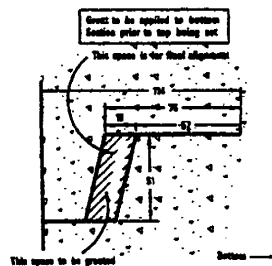
TOP PLAN



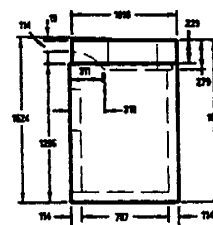
FRONT ELEVATION



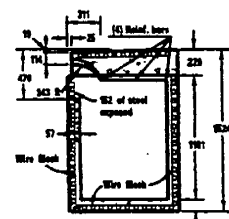
SECTION A-A



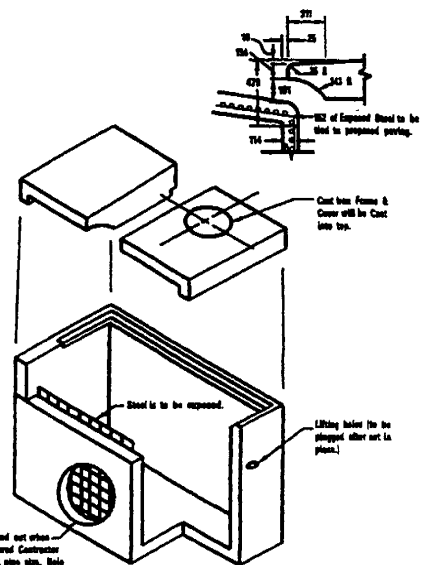
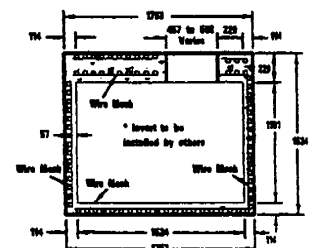
SECTION D-D JOINT DETAIL



END ELEVATION



SECTION B-B



Note: Male will be blocked out when
inset in manufacturer's concrete
to set into the pipe rim. Male
can be located in front, back or
either ends.

NOTE: All dimensions shown are in millimeters.

PART 2

CORRUGATED METAL DRAINAGE PRODUCTS (CM)

Design information for corrugated metal pipe may be obtained from Division I, Section 12 of the American Association of State Highway & Transportation Officials' (AASHTO) *Standard Specifications for Highway Bridges*.

Additional design information on CSP may be obtained from the American Iron & Steel Institute's *Handbook of Steel Drainage & Highway Construction Products*.

Additional design information on CORRUGATED ALUMINUM PIPE may be obtained from the Aluminum Association's *Aluminum Drainage Products Manual*.

SECTION CMC—SHAPES

Corrugated Steel Pipe—Type 1 Standard Corrugations	CMCS-1-96	39
Corrugated Steel Pipe—Type 1A Standard Corrugations	CMCS-2-96	40
Corrugated Steel Pipe—Type 1R 191-mm Spiral Rib Configuration	CMCS-3-96	41
Corrugated Steel Pipe—Type 1R 292-mm Spiral Rib Configuration	CMCS-4-96	42
Concrete Lined—Corrugated Steel Pipe	CMCS-5-96	43
Corrugated Aluminum Pipe—Type 1 Standard Corrugations	CMCA-6-96	44
Corrugated Aluminum Pipe—Type 1A Standard Corrugations	CMCA-7-96	45
Corrugated Aluminum Alloy Pipe—Type 1R Spiral Rib Configuration	CMCA-8-96	46

38x6.5 mm Corrugations (Helical) Pitch = 38 mm Depth = 6.5 mm	51x13 mm Corrugations (Helical) Pitch = 51 mm Depth = 13 mm	68x13 mm Corrugations (Annular or Helical) Pitch = 68 mm Depth = 13 mm 17.5 mm	75x25 mm Corrugations (Annular or Helical) Pitch = 75 mm Depth = 25 mm 14.3 mm	125x25 mm Corrugations (Helical) Pitch = 125 mm Depth = 25 mm 40.0 mm																																			
APPLICABLE SPECIFICATIONS 1. Corrugated Steel Pipe shall conform to the requirements of: AASHTO M 36M & M 218 (Galvanized Steel) AASHTO M 36M & M 274 (Aluminum Coated (type 2)) AASHTO M 36M & M 289 (Aluminum-Zinc Alloy Coated) AASHTO M 245M & M 246M (Polymer Coated Steel) AASHTO M 190 (Bituminous Coated) AASHTO M 36M & ASTM A 885 (Fiber Bonded) 2. The corrugations shall form smooth and continuous tangents. The corrugations may be annular, spiral, or a combination of annular and spiral. 3. Type 1 pipe is round pipe. INTENDED USE Pipe for culverts, underdrains and storm sewers CORRUGATIONS & STANDARD THICKNESS <table><tr><th>38 x 6.5</th><th>51 x 13</th><th>68 x 13</th><th>75 x 25</th><th>127 x 25</th></tr><tr><td>1.32</td><td>1.32</td><td>1.32</td><td>1.32</td><td>2.01</td></tr><tr><td>1.63</td><td>1.63</td><td>1.63</td><td>1.63</td><td>2.77</td></tr><tr><td></td><td>2.01</td><td>2.01</td><td>2.01</td><td>3.51</td></tr><tr><td></td><td>2.77</td><td>2.77</td><td>2.77</td><td></td></tr><tr><td></td><td>3.51</td><td>3.51</td><td>3.51</td><td></td></tr><tr><td></td><td>4.27</td><td>4.27</td><td>4.27</td><td></td></tr></table> *Standard Thicknesses are in millimeters and include the base steel plus the zinc or aluminumized coating on both sides. It does not include the thickness of polymer or bituminous coatings.					38 x 6.5	51 x 13	68 x 13	75 x 25	127 x 25	1.32	1.32	1.32	1.32	2.01	1.63	1.63	1.63	1.63	2.77		2.01	2.01	2.01	3.51		2.77	2.77	2.77			3.51	3.51	3.51			4.27	4.27	4.27	
38 x 6.5	51 x 13	68 x 13	75 x 25	127 x 25																																			
1.32	1.32	1.32	1.32	2.01																																			
1.63	1.63	1.63	1.63	2.77																																			
	2.01	2.01	2.01	3.51																																			
	2.77	2.77	2.77																																				
	3.51	3.51	3.51																																				
	4.27	4.27	4.27																																				
CORRUGATED STEEL PIPE—TYPE 1 STANDARD CORRUGATIONS																																							
AASHTO-AGC-ARTBA TF-13 DRAWING CMCS-1-98																																							

APPLICABLE SPECIFICATIONS

1. Smooth lined corrugated steel pipe shall conform to the requirements of:
 AASHTO M 36M & M 218 (Galvanized Steel)
 AASHTO M 36M & M 274 (Aluminum Coated (Type 2))
 AASHTO M 36M & M 289 (Aluminum-Zinc Alloy Coated)
 AASHTO M 245M & M 246M (Polymer Coated Steel)
 AASHTO M 190 (Bituminous Coated)
 ASTM A 796

2. The corrugations shall form smooth and continuous tangents. The corrugations shall be spiral (helical) with a smooth liner integrally attached at the lockseams spaced not more than 762 mm apart and extending from end to end of each length of pipe.

3. Type 1A pipe is round pipe with a smooth liner and helically corrugated shell.

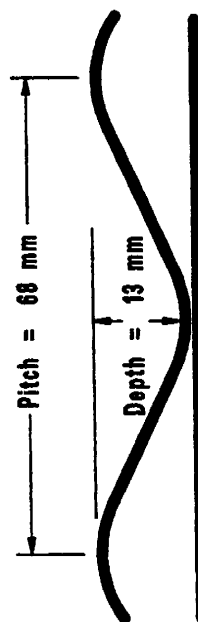
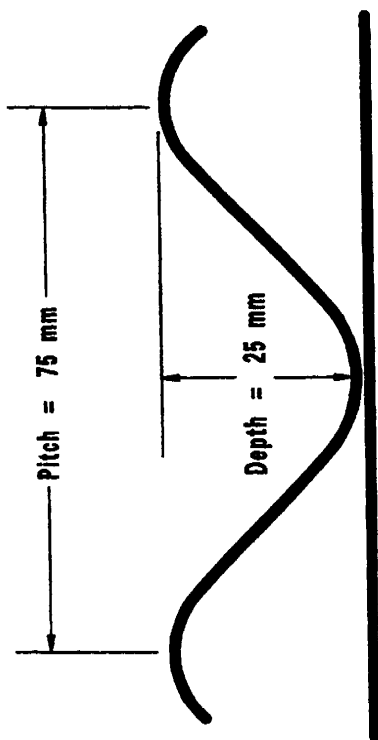
INTENDED USES

Pipe for storm drains

STANDARD THICKNESS

EQUIVALENT TYPE 1 PIPE	TYPE A	
	SMOOTH LINER	CORR. SHELL
1.63	1.02	1.32
2.01	1.02	1.32
2.77	1.02	2.01
3.51	1.02	2.77
4.27	1.02	3.51

NOTE: All dimensions shown are in millimeters.

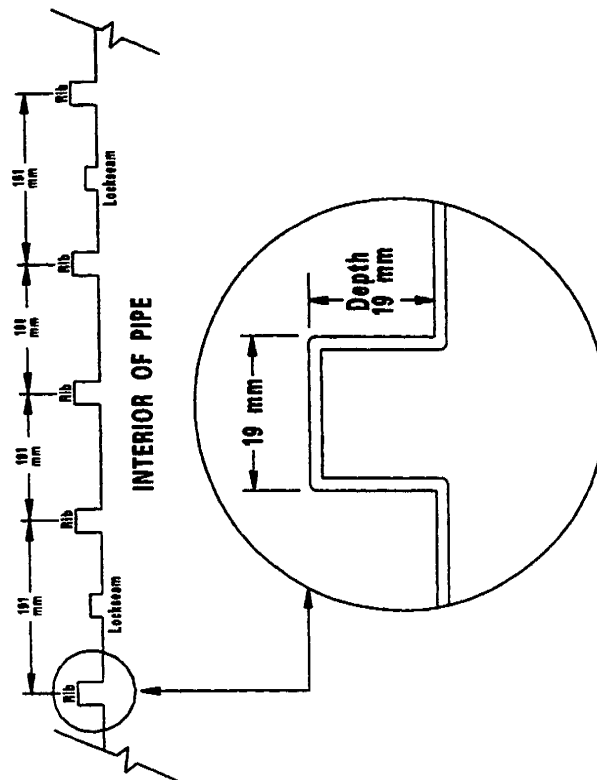


CORRUGATED STEEL PIPE—TYPE 1A
 STANDARD CORRUGATIONS

AASHTO-AGC-ARTBA
 TF-13 DRAWING

CMCS-2-86

LONGITUDINAL SECTION SPIRAL RIB CONFIGURATION



Rib Detail

Note: All dimensions are in millimeters

APPLICABLE SPECIFICATIONS

1. Spiral Ribbed steel pipe shall conform to the requirements of:
AASHTO M 38M & M 218 (Galvanized Steel)
AASHTO M 36M & M 274 (Aluminum Coated (Type 2))
AASHTO M 38M & M 289 (Aluminum-Zinc Alloy Coated)
AASHTO M 245M & M 248M (Polymer Coated Steel)
AASHTO M 190 (Bituminous Coated)
ASTM A 849
2. The pipe is fabricated from a single thickness of smooth sheet with helical spaced ribs projecting outwardly.
3. Type 1R pipe is round pipe.

INTENDED USES

Pipe for storm drains which require the hydraulic efficiency of smooth interior wall pipe. Polymer or Bituminous coatings may be required in addition to metallic coatings.

STANDARD THICKNESS*

1.63
2.01
2.77
3.51

NOTE: Standard thickness includes the base steel plus the metallic coating on both sides. It does not include the thickness of the polymer or bituminous coatings.

CORRUGATED STEEL PIPE—TYPE 1R
191-mm SPIRAL RIB CONFIGURATION

AASHTO-AGC-ARTBA
TF-13 DRAWING

CMCS-3-96