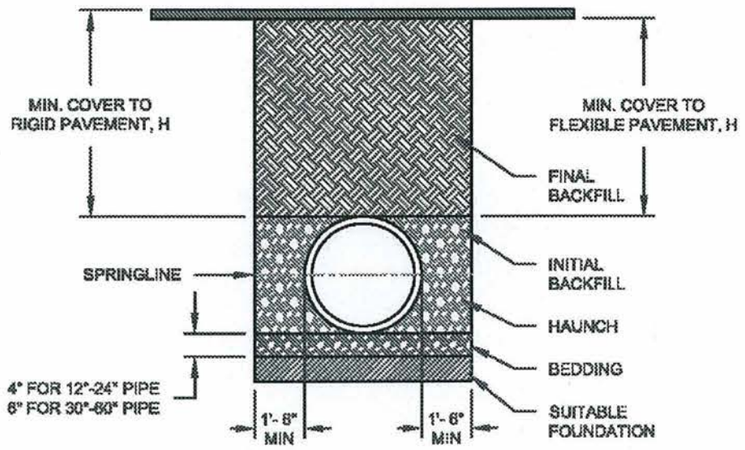
STATE	PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI A-AD 6(7)	G13	G25



Minimum and Maximum Height of Cover for High Density Polyethylene Pipe – Type C and Type S (for pipes installed above water table)
for **Hancor** (Sure-Lok & Blue Seal), **ADS** (N-12 & N-12 HC), or Equivalent Conforming to AASHTO M294, Corrugated Polyethylene Pipe

Diameter	Min. Depth of Cover (Feet)		Maximum Depth of Cover, (Feet)				
(Inches)	HL-93 Live Load*	No Live Load**	Cl-95	Si-90	Si-95	Sn-90	Sn-95
18	3	2	8	9	16	16	22
24	3	2	8	9	15	15	22
30	3	2	8	8	13	13	19
36	3	2	8	8	14	14	21
42	3	2	8	8	14	13	20
48	3	2	7	8	13	13	20
54	4	2	7	8	12	12	18
60	4	2	7	7	11	11	17

Notes:
Cl-95: Denotes clay type soil with 95% compaction.
Si-90: Denotes silt type soil with 90% compaction.
Si-95: Denotes silt type soil with 95% compaction.
Sn-90: Denotes sand and gravel type soil with 90% compaction.
Sn-95: Denotes sand and gravel type soil with 95% compaction.

* Depth of cover based on soil type/compaction, Sn-95, or controlled low strength material (CLSM).
** If there will be vehicular or construction equipment live load imposed over the pipe during its life, the minimum cover for HL-93 live load shall be provided.

NOTE:

1. *When directed, camber pipe culverts upward from a chord through the inlet and outlet inverts an ordinate amount equal to 1% of the pipe length. Develop camber on a parabolic curve. If the midpoint elevation on the parabolic curve as designed exceeds the elevation of the inlet invert, reduce the amount of camber or increase the pipe culvert gradient.*
2. *Measure minimum cover from the top of the pipe culvert to the subgrade for flexible pavements, and to the top of the pavement for rigid pavements. Measure maximum fill height from the top of the pipe to the top of the pavement for both flexible and rigid pavement.*

AS-BUILT DRAWINGS/SPECIFICATIONS
This certifies that the dimensions and details shown on this sheet reflect the dimensions and details and specifications as constructed in the field.
GOODFELLOW BROS., INC.
Contractor's Name:
Signature 1/2/14 Date

WENDY G. McLAIN
LICENSED PROFESSIONAL ENGINEER
No. 11328-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

NO SCALE

SIGNATURE 4/30/2012 EXPIRATION DATE OF THE LICENSE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY SPECIAL

PLASTIC PIPE CULVERT

SPECIAL
602-A

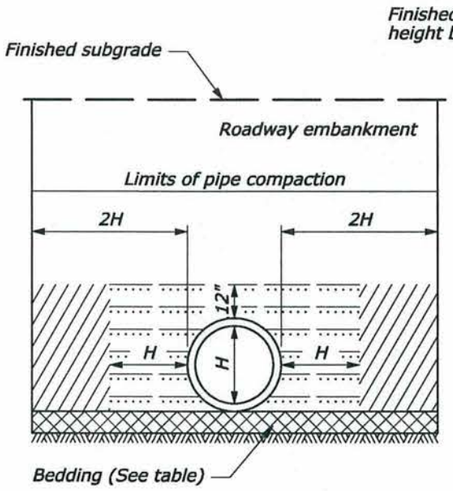
STATE	PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI A-AD 6(7)	G14	G25

CONCRETE ROUND PIPE CULVERT

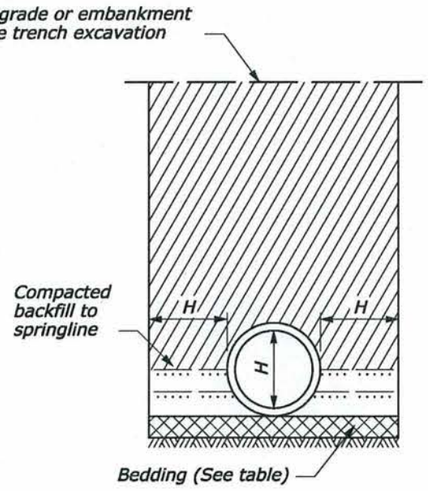
FILL HEIGHT AND PIPE CLASS TABLE

PIPE SIZE DIAMETER INCHES	MINIMUM COVER INCHES	EMBANKMENT CLASS II	EMBANKMENT CLASS III	EMBANKMENT CLASS IV	EMBANKMENT CLASS V	TRENCH CLASS II	TRENCH CLASS III	TRENCH CLASS IV	TRENCH CLASS V
		MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE IN FEET							
12	12	10	10	15	23	18	18	26	13
18	12	10	10	25	39	13	13	31	45
24	12	10	10	15	30	15	15	22	40
30	12	9	13	15	35	13	16	20	46
36	12	9	9	20	41	10	13	26	56
48	12	12	13	26	44	15	16	30	49
60	12	15	17	28	44	15	20	32	49
72	12	13	17	30	41	15	20	35	49
84	12	13	19	30		15	23	37	
96	12	13	20			15	24		
108	14	15	20			18	26		

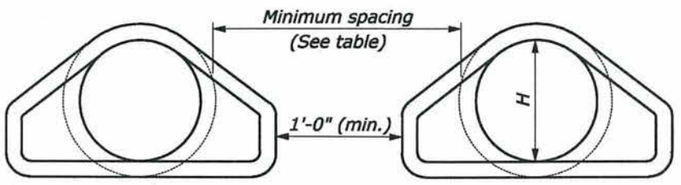
BEDDING DEPTH	
PIPE SIZE (H)	DEPTH
12" TO 54"	4"
> 54"	6"



EMBANKMENT INSTALLATION



TRENCH INSTALLATION



MULTIPLE ROUND PIPE INSTALLATION

MINIMUM SPACING		
DIAMETER	EMBANKMENT	TRENCH
12"-36"	15"	2H
36"-96"	0.5H	72"
OVER 96"	48"	72"

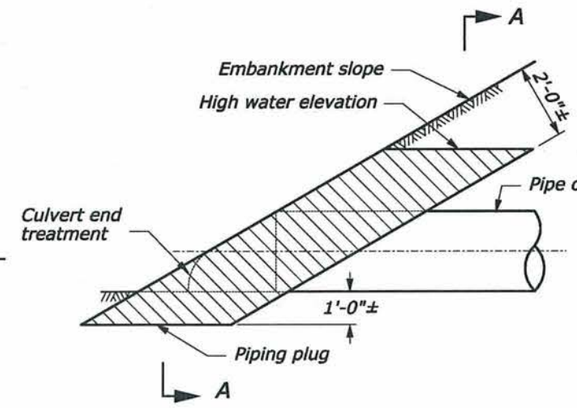
LEGEND:

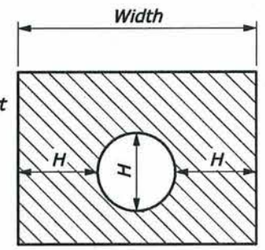
Bedding material (uncompacted).

Embankment material placed in layers not exceeding 6" compacted depth.

Compacted backfill material placed in layers not exceeding 6" compacted depth meeting the following:
Maximum particle size = 3"
Soil classification: A-1, A-2 or A-3
Or, lean concrete backfill in accordance with Section 614.

Impermeable backfill material.

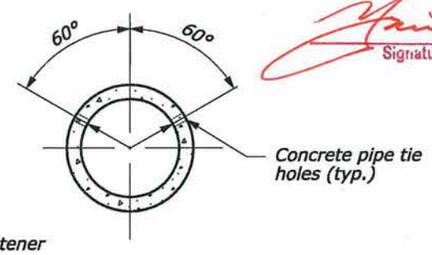


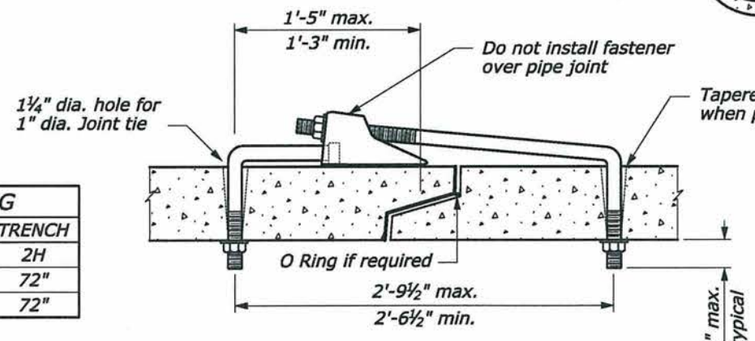


SECTION A-A

Construct a piping plug of impermeable backfill material at the pipe inlet where granular material is used for backfill. Width may be adjusted to tie into impervious material.

PIPING PLUG





SUPPLEMENTAL CONCRETE PIPE TIE

NO SCALE

NOTE:

1. When directed, camber pipe culverts upwards from a chord through the inlet and outlet inverts an ordinate amount equal to 1% of the pipe length. Develop camber on a parabolic curve. If the midpoint elevation on the parabolic curve as designed exceeds the elevation of the inlet invert, reduce the amount of camber or increase the pipe culvert gradient.
2. Measure minimum cover from the top of the pipe culvert to the subgrade for flexible pavements, and to the top of the pavement for rigid pavements. Measure maximum fill height from the top of the pipe to the top of the pavement for both flexible and rigid pavements.
3. Pipe compaction limits shown are for pipe installation in an embankment. For pipe installation in a trench, the compaction limits shall be the walls of the trench.
4. Where unyielding or unstable material is encountered, install the pipe culvert according to the limits of pipe compaction shown on Standard 602-3.
5. Maximum fill heights for pipe culvert installations may be increased on approval of site-specific structural pipe designs meeting the criteria of AASHTO Standard Specifications for Highway bridges.
6. Use Supplemental Concrete Pipe Tie when specified in the contract documents.

AS-BUILT DRAWINGS/SPECIFICATIONS
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GOODFELLOW BROS., INC.
Contractor's Name:
Signature
1/2/14
Date

WENDY G. McLAIN
LICENSED PROFESSIONAL ENGINEER
No. 11328-C
HAWAII, U.S.A.

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SIGNATURE
4/30/2012
EXPIRATION DATE OF THE LICENSE

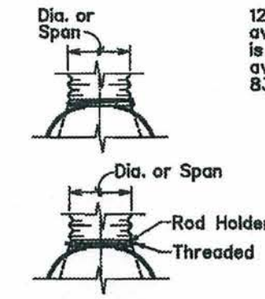
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY SPECIAL

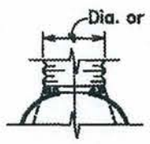
CONCRETE PIPE CULVERT INSTALLATION

SPECIAL
602-B

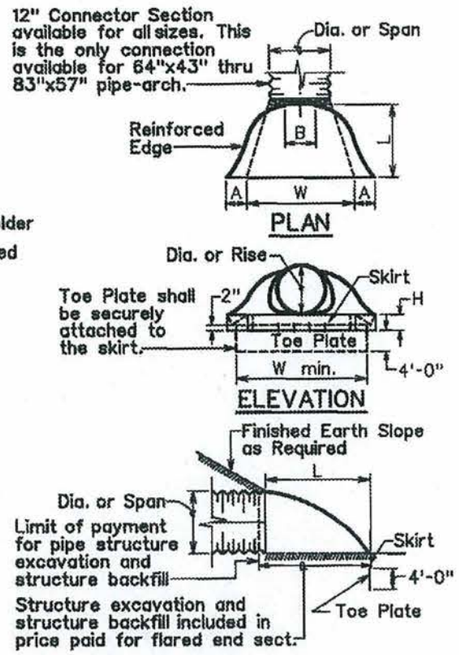
STATE	PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI A-AD 6(7)	G15	G25



CONNECTIONS WITH ANNULAR CORRUGATIONS



ALTERNATIVE CONNECTIONS



General Notes:

1. All 3pc. bodies to have 0.105" thick sides and 0.135" thick center panels. Width of center panels to be greater than 20% of the pipe periphery. Multiple panel bodies to have lap seams which are to be tightly joint by ⅜" stainless steel rivets or bolts.
2. Reinforced edges to be supplemented with zinc coated stiffener angles for the 60" thru 84" round, 77"x52" and 83"x57" pipe-arch sizes. The angles will be 2"x2"x1/4" for the 60" thru 72" round, 77"x52" and 83"x57" pipe-arch sizes and 2½"x2½"x¼" for 78" and 84" round. The angles to be attached by ⅜" stainless steel nuts and bolts.
3. Angle reinforcement will be placed under the center panel seams on the 77"x52" and 83"x57" pipe-arch sizes.
4. Aluminum toe plate to be available as an accessory when specified.
5. End of pipe to be finished with annular corrugations to conform to flared end so that no leakage results from the connection. Other designs may be used with approval of the Engineer.
6. Corrugated Aluminum Pipe (CAP) culvert shall conform to AASHTO M196-92 (ASTM B745/B)

TYPICAL CROSS-SECTION

CIRCULAR PIPES					
INCHES	DIMENSIONS-INCHES				
	A	B	H	L	W
PIPE DIA.	1±	MAX.	1±	1½±	2±
12	6	6	6	21	24
15	7	8	6	28	30
18	8	10	6	31	36
21	9	12	6	36	42
24	10	13	6	41	48
30	12	16	8	51	60
36	14	19	9	60	72
42	16	22	11	69	84
48	18	27	12	78	90
54	18	30	12	84	102
60	18	33	12	87	114
66	18	36	12	87	120
72	18	39	12	87	126
78	18	42	12	87	132
84	18	45	12	87	138

PIPE-ARCHES						
INCHES		DIMENSIONS-INCHES				
		A	B	H	L	W
SPAN	RISE	1±	MAX.	1±	1½±	2±
21	15	7	10	6	23	36
24	18	8	12	6	28	42
28	20	9	14	6	32	48
35	24	10	16	8	39	60
42	29	12	18	9	46	75
49	33	13	21	12	53	85
57	38	18	26	12	63	90
64	43	18	30	12	70	102
71	47	18	33	12	77	114
77	52	18	36	12	77	126
83	57	18	39	12	77	138

FLARED END SECTIONS FOR C.A.P. CULVERTS AND FOR HDPE CULVERTS

AS-BUILT DRAWINGS/SPECIFICATIONS
This certifies that the dimensions and details shown on this sheet reflect the dimensions and details and specifications as constructed in the field.
GOODFELLOW BROS., INC.
Contractor's Name:
Signature 1/2/14 Date

DATE	REVISION	APP'D.
00/00/00	X	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD PLAN H-25
FLARED END SECTION FOR CULVERTS

WENDY G. McLAIN
LICENSED PROFESSIONAL ENGINEER
No. 11328-C
HAWAII, U.S.A.

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SIGNATURE 4/30/2012 EXPIRATION DATE OF THE LICENSE

STANDARD PLAN H-25 05/31/07

NO SCALE

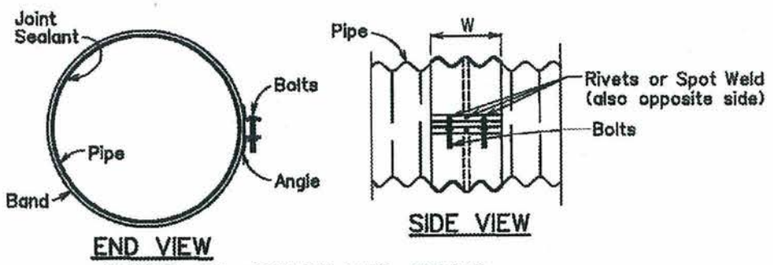
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY SPECIAL

(HDOT STD H-25)
FLARED END SECTION FOR CULVERTS

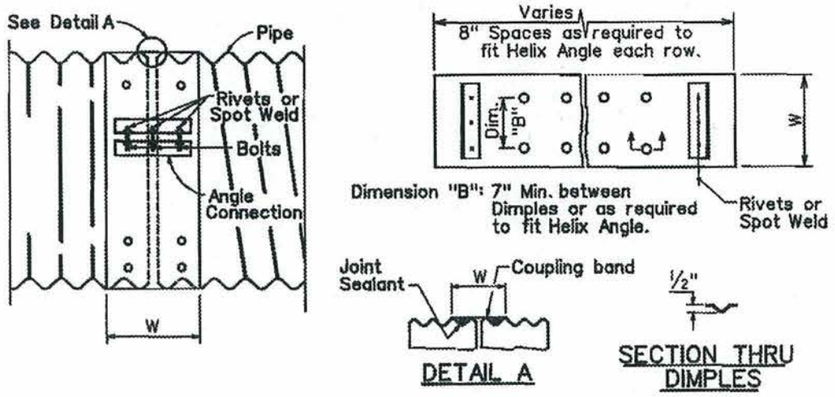
SPECIAL 602-C

STATE	PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI A-AD 6(7)	G16	G25



ANNULAR COUPLING BAND

Not to Scale



UNIVERSAL COUPLING BAND ANGLE CONNECTION

COUPLING TYPE	CORRUGATION	PIPE SIZE	W	PIPE WALL THICKNESS	ANGLE CONNECTIONS- QUANTITIES PER CONNECTION			
					DIMENSIONS	BOLTS	RIVETS	SPOT WELD
UNIVERSAL	2⅔ X½	12-36	10½	0.075-0.138	2-2x2x7/16x7	2-½x6	3-⅞	3-½
		42-60	16½	0.164-0.168	2-2x2x7/16x12	3-½x6	4-⅞	5-½
		66-84	16½	0.164-0.168	2-2x2x7/16x12	3-½x6	4-⅞	
	3X1	36-72	10½	0.075-0.138	2-2x2x7/16x7	2-½x6	3-⅞	
		78-120	16½	0.075-0.138	2-2x2x7/16x12	3-½x6	4-⅞	
ANNULAR	2⅔ X½	12-36	7	0.075-0.138	2-2x2x7/16x7	2-½x6	3-⅞	3-½
		42-72	12	0.075-0.138	2-2x2x7/16x12	3-½x6	4-⅞	5-½
		78-84	12	0.075-0.168	2-2x2x7/16x12	3-½x6	4-⅞	5-½
	3X1	36-42	14	0.075-0.109	2-2x2x7/16x12	3-½x6	4-⅞	
		48-84	14	0.075-0.109	2-2x2x7/16x12	3-½x6	4-⅞	5-½
		90-120	14	0.075-0.109	2-2x2x7/16x12	3-½x6	4-⅞	

General Notes:

1. All coupling band connection hardware shall be stainless steel in accordance with Standard Specifications.
2. For pipe arches use same width band as for round pipe of same periphery.
3. Two pieces band required for pipe greater than 48" diameter.
4. Fillet welds of equivalent strengths may be substituted for spot welds or rivets.
5. Dimensions and thickness shown are in inches and are nominal.

DATE	REVISION	APP'D.
00/00/00	X	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD PLAN H-27
CAP COUPLING DETAILS
STANDARD JOINT

STANDARD PLAN H-27 05/31/07

NO SCALE

AS-BUILT DRAWINGS/SPECIFICATIONS
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GOODFELLOW BROS., INC.
Contractor's Name:
Signature 1/2/14 Date

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No. 11328-C
HAWAII, U.S.A.

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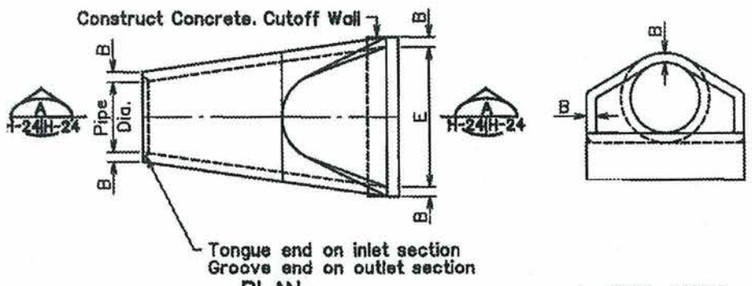
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY SPECIAL

(HDOT STD H-27) CAP COUPLING DETAILS

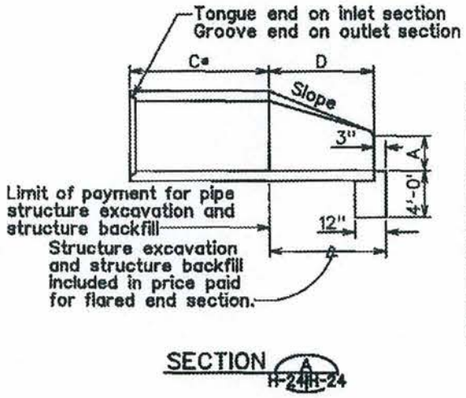
SPECIAL 602-D

STATE	PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI A-AD 6(7)	G17	G25



PLAN

END VIEW

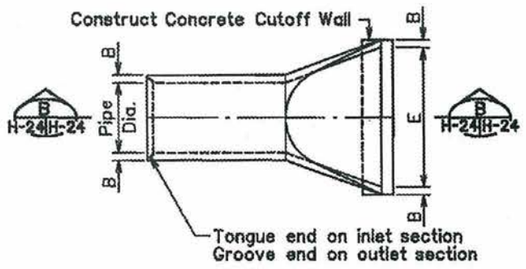


SECTION A H-24 H-24

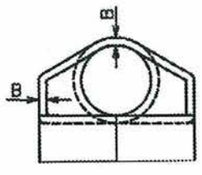
C* dimension shall be as desired by manufacturer and will be paid for at the price paid for concrete pipe.

MINIMUM DIMENSIONS						
PIPE DIA.	A	B	C*	D	E	SLOPE
12"	4"	2"		2'-0"	2'-0"	2:1 OR FLATTER
18"	9"	2½"		2'-3"	3'-0"	
24"	9½"	3"		3'-7½"	4'-0"	
30"	1'-0"	3½"		4'-6"	5'-0"	
36"	1'-3"	4"		5'-3"	6'-0"	
42"	1'-9"	4½"		5'-3"	6'-6"	
48"	2'-0"	5"		6'-0"	7'-0"	
54"	2'-3"	5½"		5'-5"	7'-6"	

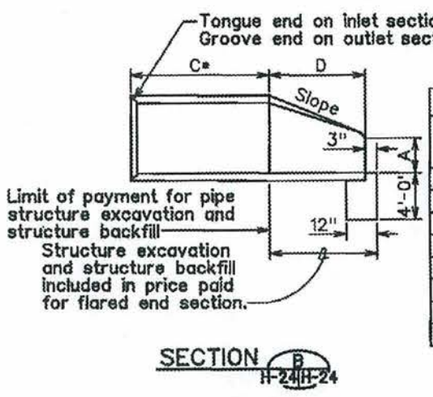
CONCRETE FLARED END SECTION TYPE A



PLAN



END VIEW



SECTION B H-24 H-24

C* dimension shall be as desired by manufacturer and will be paid for at the price paid for concrete pipe.

MINIMUM DIMENSIONS						
PIPE DIA.	A	B	C*	D	E	SLOPE
12"	4"	1¼"		1'-10"	2'-0"	2:1 OR FLATTER
18"	9"	2"		2'-1"	3'-0"	
24"	9½"	2½"		3'-6"	4'-0"	
30"	1'-0"	3"		4'-5"	5'-0"	
36"	1'-3"	3⅜"		5'-2"	6'-0"	
42"	1'-9"	3¾"		5'-3"	6'-6"	
48"	2'-0"	4¼"		6'-0"	7'-0"	
54"	2'-3"	4⅝"		5'-6"	6'-10"	

CONCRETE FLARED END SECTION TYPE B

General Notes:

1. Contractor shall have the option of furnishing either Type A or B precast or cast-in-place concrete flared end section.
2. See B-01 for additional notes.

DATE	REVISION	APP'D.
00/00/00	X	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STANDARD PLAN H-24

FLARED END SECTION FOR CULVERTS

STANDARD PLAN H-24 05/31/07

NO SCALE

AS-BUILT DRAWINGS/SPECIFICATIONS
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GOODFELLOW BROS., INC.
Contractor's Name:
Signature
1/2/14
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FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY SPECIAL

(HDOT STD H-24)
FLARED END SECTION FOR CULVERTS

SPECIAL
602-E