

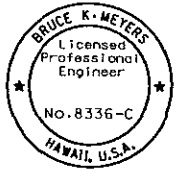
METAL ROUND PIPE CULVERT																												
FILL HEIGHT AND METAL THICKNESS TABLE																												
HELICAL LOCKSEAM AND WELDED SEAM PIPE CULVERT																												
PIPE SIZE	MINIMUM COVER	STEEL														MINIMUM COVER	ALUMINUM											
		2"x 1/2" CORRUGATIONS						3"x 1" CORRUGATIONS				5"x 1" CORRUGATIONS					2 2/3"x 1/2" CORRUGATIONS			3"x 1" CORRUGATIONS								
		METAL THICKNESS IN INCH/GAGE															METAL THICKNESS IN INCH/GAGE											
		0.064/16	0.079/14	0.109/12	0.138/10	0.168/8	0.064/16	0.079/14	0.109/12	0.138/10	0.168/8	0.064/16	0.079/14	0.109/12	0.138/10		0.168/8	0.060/16	0.075/14	0.105/12	0.135/10	0.060/16	0.075/14	0.105/12	0.135/10			
DIAMETER INCHES	INCHES	MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE IN FEET														INCHES	MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE IN FEET						MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE IN FEET					
12	12	100	100																									
15	12	100	100																									
18	12	100	100	100																								
24	12	100	100	100																								
30	12	85	100	100																								
36	12	71	88	100	100		81	100	100																			
42	12	60	76	100	100	100	69	87	100																			
48	12	53	66	93	100	100	61	76	100							54	68	95										
54	18		59	82	100	100	54	67	95	100	100	48	60	84	100	100												
60	18			74	95	100	48	61	85	100	100	43	54	76	98	100												
66	18				87	100	44	55	78	100	100	39	49	69	89	100												
72	18				79	97	40	50	71	92	100	36	45	63	81	100												
78	18					86	37	47	66	85	100	33	41	58	75	92												
84	18					75	34	43	61	78	96	31	38	54	70	85												
90	18						32	40	57	73	90	29	36	50	65	80												
96	18							38	53	69	84		34	47	61	75												
102	18							35	50	65	79		32	44	57	70												
108	18								47	61	75			42	54	66												
114	18								45	58	71			40	51	63												
120	18								42	55	67			38	49	60												
126	18									52	64				46	57												
132	18									50	61				44	55												
138	18									48	58				42	53												
144	18										56					50												

METAL PIPE ARCH CULVERT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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PIPE ARCH SIZE	CORNER RADIUS	MINIMUM COVER	STEEL															MINIMUM COVER	ALUMINUM																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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SPAN X RISE INCHES	INCHES	INCHES	MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE IN FEET															INCHES	MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE IN FEET																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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NOTES:

- 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.
- Fill heights exceeding 100 feet require special analysis by the Government.
- The fill heights in the table are for helical lockseam and welded seam pipe only. Fill heights for culvert pipe with annular corrugations are more restrictive than those of helical lockseam and welded seam pipe. Obtain approval before furnishing annular corrugated pipe.
- Measure minimum cover from the top of the pipe culvert to the top of pavement or top of future finished grade. Measure maximum fill height from the top of the pipe to the top of pavement or top of future finished grade. Minimum cover is 24 inches.
- Culvert types/sizes shown on sheets are acceptable for use.
- Steel pipe will not be allowed for this project.
- The pH of the soil, backfill and effluent shall be within range of 5.5 and 9.0 inclusive, and resistivity shall be not less than 500 ohm-centimeters.

NOTE: STEEL PIPE REFERENCES DELETED

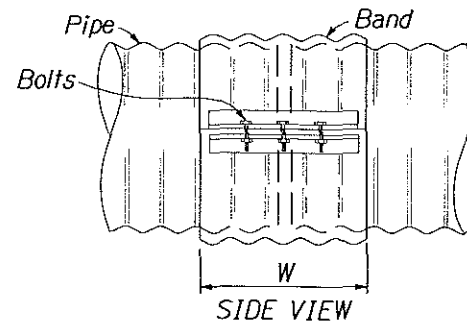
 The work was prepared by me or under my supervision and construction of this project will be in accordance with the provisions of the Hawaii Engineering Act. _____ Bruce K. Meyers Professional Engineer No. 8336-C HAWAII, U.S.A. Expiration Date of License 4/06.	U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION CENTRAL FEDERAL LANDS HIGHWAY DIVISION
	SPECIAL C602-1
	METAL PIPE CULVERT
Scale: N.T.S.	Date: December 5, 2005
SHEET No. 1 OF 1	

COUPLING BANDS FOR METAL PIPE CULVERT ^{1/}					
CORRUGATION SIZE ^{2/}	PIPE DIAMETER	PIPE-ARCH SPAN X RISE	MINIMUM BAND WIDTH		
			ANNULAR ^{3/} CORRUGATED BANDS	HELICALLY ^{4/} CORRUGATED BANDS	SEMI- ^{5/} CORRUGATED BANDS
INCHES	INCHES	INCHES	INCHES	INCHES	INCHES
1 1/2 by 1/4	underdrain ^{6/}	-	7	7	10 1/2
2 2/3 by 1/2	12 to 36	17x13 to 42x29	7	12	10 1/2
	42 to 72	49x33 to 83x57	10 1/2	12	10 1/2
	78 to 84	-	10 1/2	12	10 1/2
3 by 1	36 to 72	42x29 to 81x59	12	14	10 1/2
	78 to 144	87x63 to 142x91	12	14	10 1/2
5 by 1	48 to 72	57x38 to 81x59	20	22	10 1/2
	78 to 144	87x63 to 142x91	20	22	10 1/2

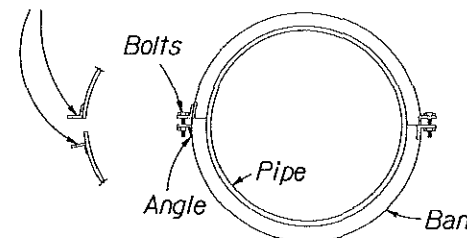
^{1/} Fabricate annular, helical and semi-corrugated type coupling bands from the same metal as the connecting pipe. Provide coupling bands not more than 3 nominal sheet thicknesses thinner than the thickness of the pipe to be connected, and no thinner than 0.052 inch (18 gage) for steel or 0.048 inch (18 gage) for aluminum. Fasten coupling bands with the following sizes of bolt:

3/8" diameter - 18" (21"x15" pipe arch) or less
1/2" diameter - 21" (24"x18" pipe arch) or more

- ^{2/} For helically corrugated pipe with rerolled ends, the nominal corrugation size refers to the dimension of the end corrugation in the pipe.
- ^{3/} Use annular corrugated bands with pipes having annular corrugations or with helical pipe having rerolled ends to form annular corrugations. A 10 1/2 inch band is acceptable on pipe ends rerolled with 2 2/3 by 1/2 inch corrugations. A 12 inch band is acceptable on pipe ends rerolled with 3 by 1 inch pipe corrugations.
- ^{4/} Use helical corrugated bands with pipes having helically corrugated ends.
- ^{5/} The minimum band widths shown for 3 by 1 and 5 by 1 inch corrugated sizes apply to 2 2/3 by 1/2 corrugations on rerolled pipe ends.
- ^{6/} Smooth sleeve-type couplers and flat bands may be used for pipe diameters of 12 inches or less. Use a matching metal having a nominal thickness of not less than 0.040 inch (20 gage) for steel, or 0.036 inch (20 gage) for aluminum, or a plastic with an equivalent strength to metal.



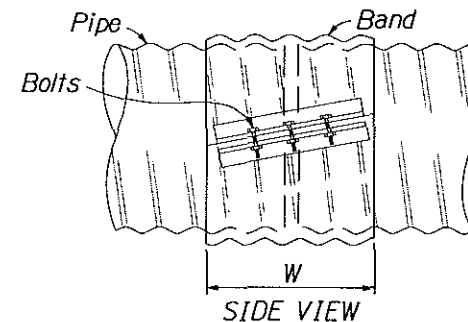
Rivet, Spotweld, or Fillet weld at crest of corrugation at heel and toe of angle.



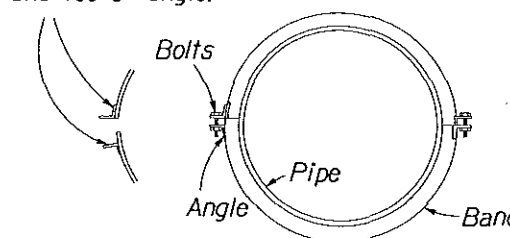
END VIEW

Note:
Second angle connection optional to 42" diameter, required above 42" diameter.

ANNULAR BAND



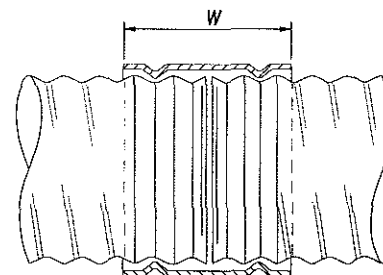
Rivet, Spotweld, or Fillet weld at crest of corrugation at heel and toe of angle.



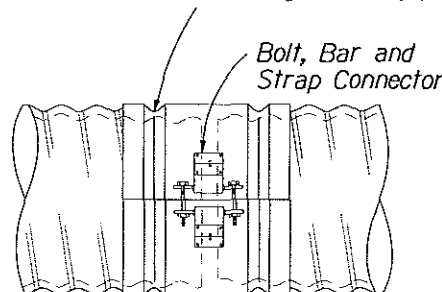
END VIEW

Note:
Second angle connection optional to 42" diameter, required above 42" diameter.

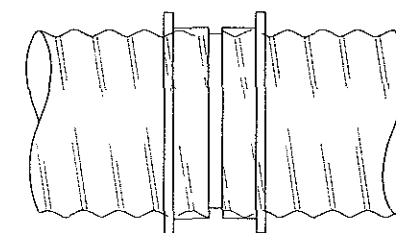
HELICAL BAND



Continuous corrugation around band meshes with second annular corrugation in pipe end.

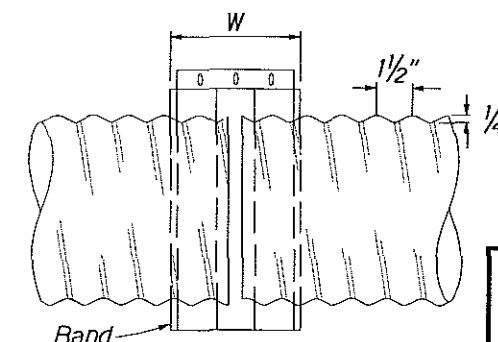


SEMI-CORRUGATED BAND



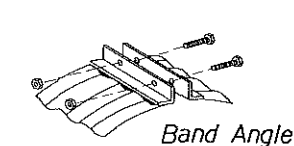
SLEEVE JOINT
Smoother sleeve with center stop.
Stab type joint.

SMOOTH SLEEVE BAND

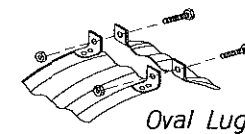


CROSS SECTION THRU PIPE JOINTS

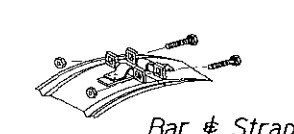
FLAT BAND



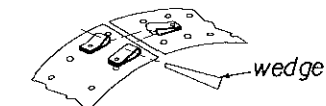
Band Angle



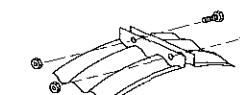
Oval Lug



Bar & Strap



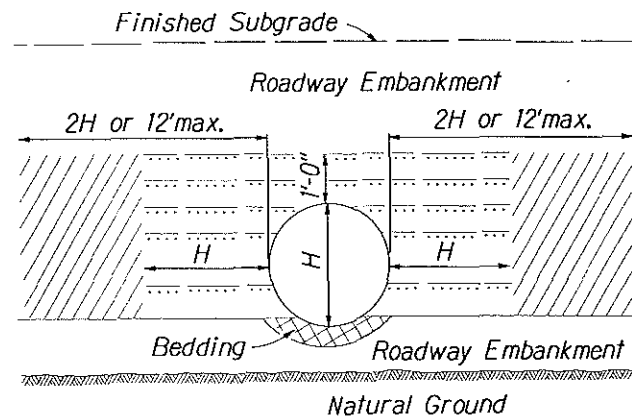
Wedge and Strap



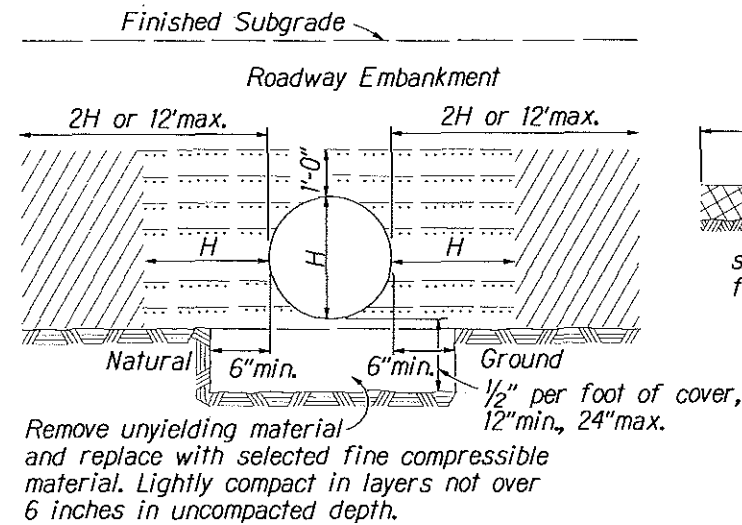
Integral Flange

STANDARD BAND CONNECTIONS

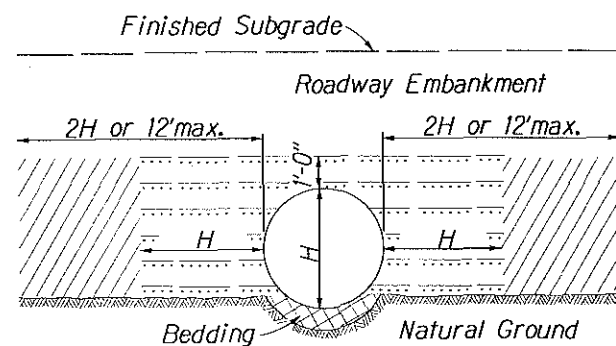
The work was prepared by me or under my supervision and construction of this project will be under my direction. Expiration Date of License: 4/06	U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION CENTRAL FEDERAL LANDS HIGHWAY DIVISION	
	SPECIAL C602-2 METAL PIPE CULVERT COUPLING BAND	
	Scale: N.T.S.	Date: December 5, 2005
	SHEET No. 1 OF 1	



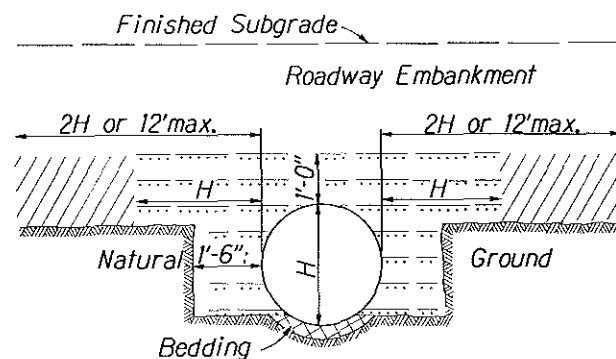
ABOVE NATURAL GROUND



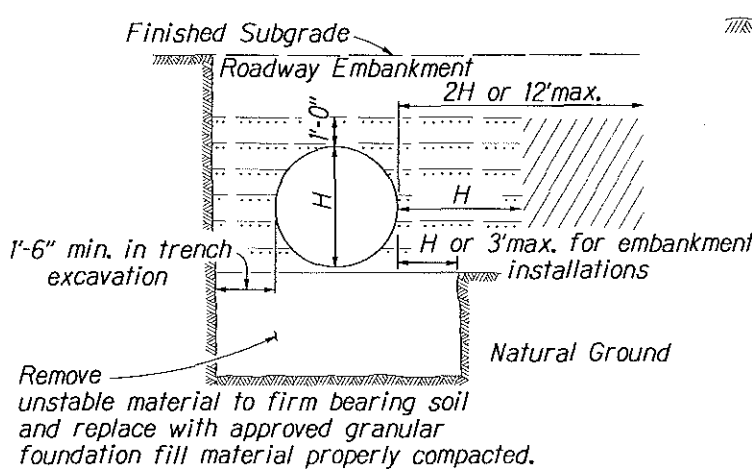
ON UNYIELDING MATERIAL



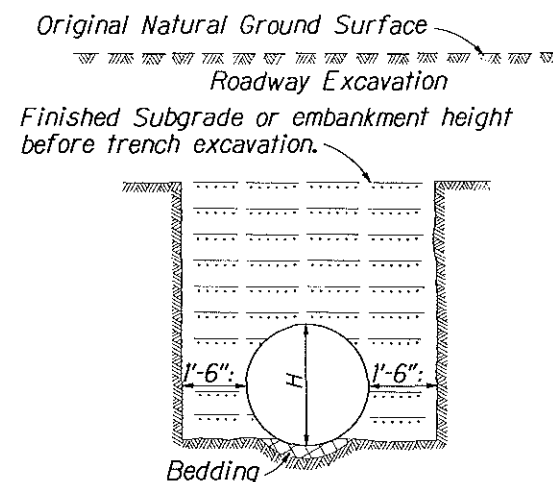
ON NATURAL GROUND



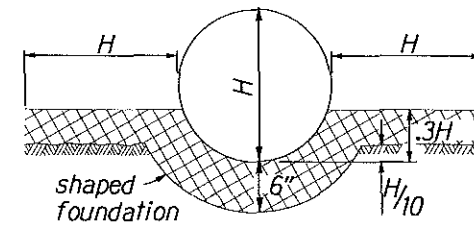
ABOVE AND BELOW NATURAL GROUND



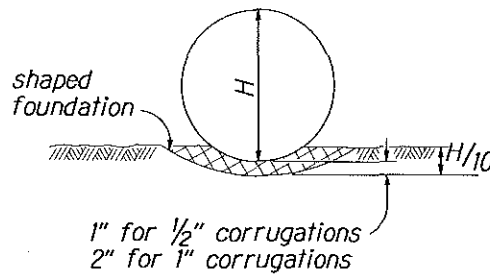
ON UNSTABLE MATERIAL



BELOW NATURAL GROUND OR TRENCH EXCAVATION IN EMBANKMENT



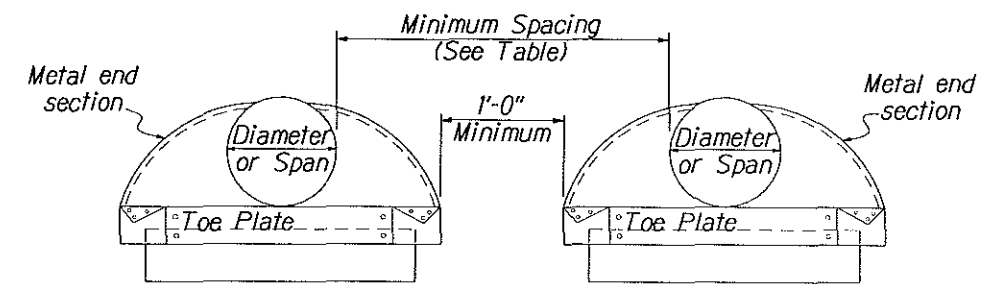
CLASS B BEDDING



CLASS C BEDDING

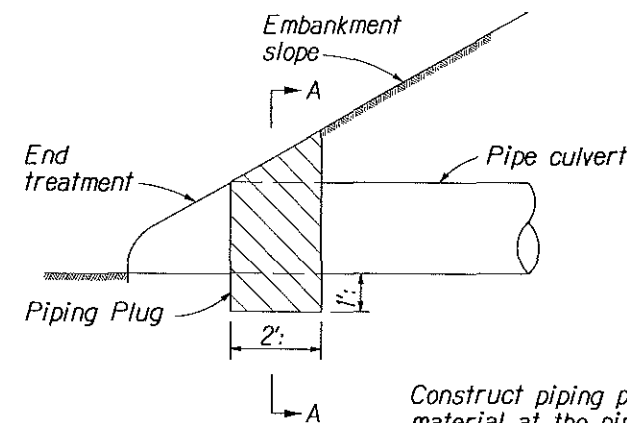
NOTES:

- 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.
- H equals the diameter of all round pipe culverts or the rise dimension of all pipe arch culverts.
- Bed pipe culverts 48 inches and larger in diameter and pipe arch culverts 38 inches and greater in rise in Class B Bedding. Bed smaller pipe culverts in Class B or C Bedding.



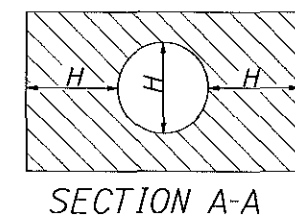
MINIMUM SPACING	
DIAMETER or SPAN INCHES	SPACING INCHES
UP to 48	24
48 and UP	1/2 Diameter or Span or 36 whichever is less

MULTIPLE PIPE INSTALLATION



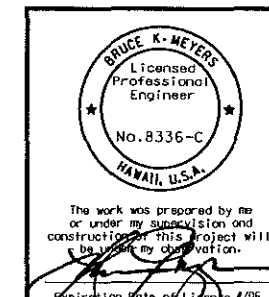
Construct piping plug of impermeable backfill material at the pipe culvert inlet where granular material is used for backfill.

PIPING PLUG



SECTION A-A

- Bedding Material
- Embankment material placed in layers not exceeding 6" compacted depth.
- Approved granular material or fine compactable soil placed in layers not exceeding 6" compacted depth.



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

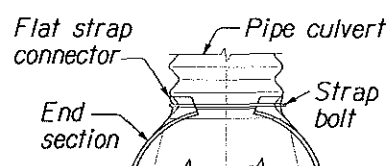
DETAIL C602-3
METAL AND PLASTIC
PIPE CULVERT BEDDING

Scale: N.T.S. Date: December 5, 2005

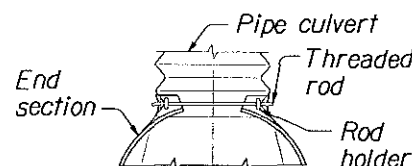
SHEET No. 1 OF 1

END SECTIONS FOR PIPE ARCH CULVERT											
PIPE SIZE SPAN X RISE INCHES	MINIMUM METAL THICKNESS				DIMENSIONS						SLOPE Approx.
	STEEL		ALUM.		A	B	H	F	L	W	
	INCH	GAGE	INCH	GAGE	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	
17 x 13	.064	16	.060	16	5	9	6	28	20	52	2 1/8
21 x 15	.064	16	.060	16	6	11	6	34	24	58	2
24 x 18	.064	16	.060	16	7	12	6	40	28	63	2 1/8
28 x 20	.064	16	.060	16	7	16	6	46	32	70	2
35 x 24	.079	14	.075	14	9	16	6	58	39	85	1 1/8
42 x 29	.079	14	.075	14	11	18	7	73	46	104	1 1/8
49 x 33	.109	12	.105	12	12	21	9	82	53	117	1 3/4
57 x 38	.109	12	.105	12	16	26	12	88	62	132	1 1/8
53 x 41	.109	12	.105	12	17	26	12	88	63	130	1 3/4
64 x 43	.109	12	.105	12	17	30	12	100	69	144	1 1/8
60 x 46	.109	12	.105	12	17	36	12	100	70	142	1 1/8
71 x 47	.109	12	.105	12	17	36	12	112	77	156	1 1/8
66 x 51	.109	12	.105	12	17	36	12	112	77	156	1 3/4
77 x 52	.109	12	.105	12	17	36	12	124	77	167	1 1/8
73 x 55	.109	12	.105	12	17	36	12	124	77	168	1 1/2
83 x 57	.109	12	.105	12	17	44	12	130	77	177	1 1/2
81 x 59	.109	12	.105	12	17	44	12	136	77	179	1 5/8
87 x 63	.109	12	.105	12	17	44	12	136	77	186	1 1/2
95 x 67	.109	12	.105	12	17	44	12	160	87	210	1 1/2
103 x 71	.109	12	.105	12	17	44	12	172	87	222	1 1/2
112 x 75	.109	12	.105	12	17	44	12	172	87	226	1 1/4

END SECTIONS FOR ROUND PIPE CULVERT											
PIPE SIZE DIAMETER INCHES	MINIMUM METAL THICKNESS				DIMENSIONS						SLOPE
	STEEL		ALUM.		A	B	H	F	L	W	Approx.
	INCH	GAGE	INCH	GAGE	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	
12	.064	16	.060	16	5	7	6	22	21	44	2 1/4
15	.064	16	.060	16	6	8	6	28	26	52	2 1/4
18	.064	16	.060	16	7	10	6	34	31	58	2 1/8
21	.064	16	.060	16	8	12	6	40	36	66	2 1/8
24	.064	16	.060	16	9	13	6	46	41	72	2 1/8
30	.079	14	.075	14	11	16	8	55	51	88	2 1/8
36	.079	14	.075	14	13	19	9	70	60	105	2
42	.109	12	.105	12	15	25	10	82	69	122	2 1/8
48	.109	12	.105	12	17	29	12	88	78	131	2
54	.109	12	.105	12	17	33	12	100	84	143	2
60	.109	12	.105	12	17	36	12	112	87	157	1 7/8
66	.109	12	.105	12	17	39	12	118	87	162	1 5/8
72	.109	12	.105	12	17	44	12	120	87	169	1 1/2
78	.109	12	.105	12	17	48	12	130	87	178	1 3/8
84	.109	12	.105	12	17	52	12	136	87	184	1 1/2
90	.109	12	.105	12	17	58	12	142	87	188	1 1/4
96	.109	12	.105	12	17	58	12	144	87	197	1 1/8

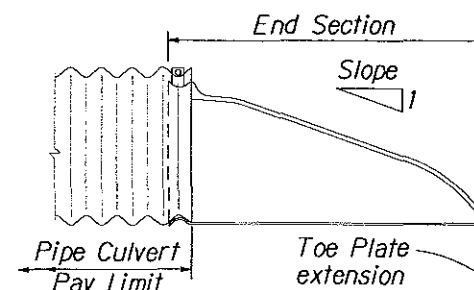
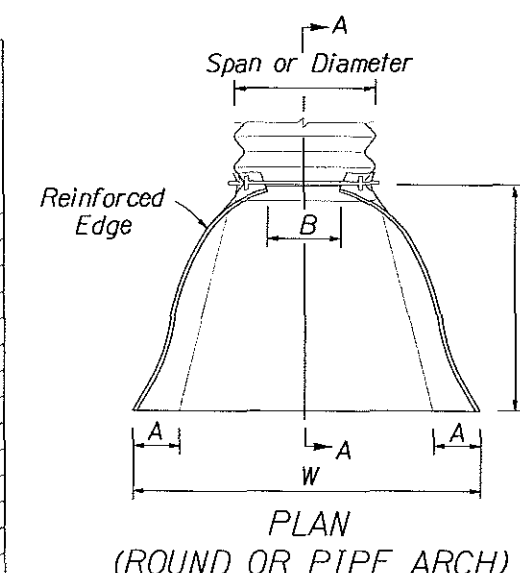


For 12" thru 24" round pipe and
17"x 13" thru 28"x 20" pipe arch

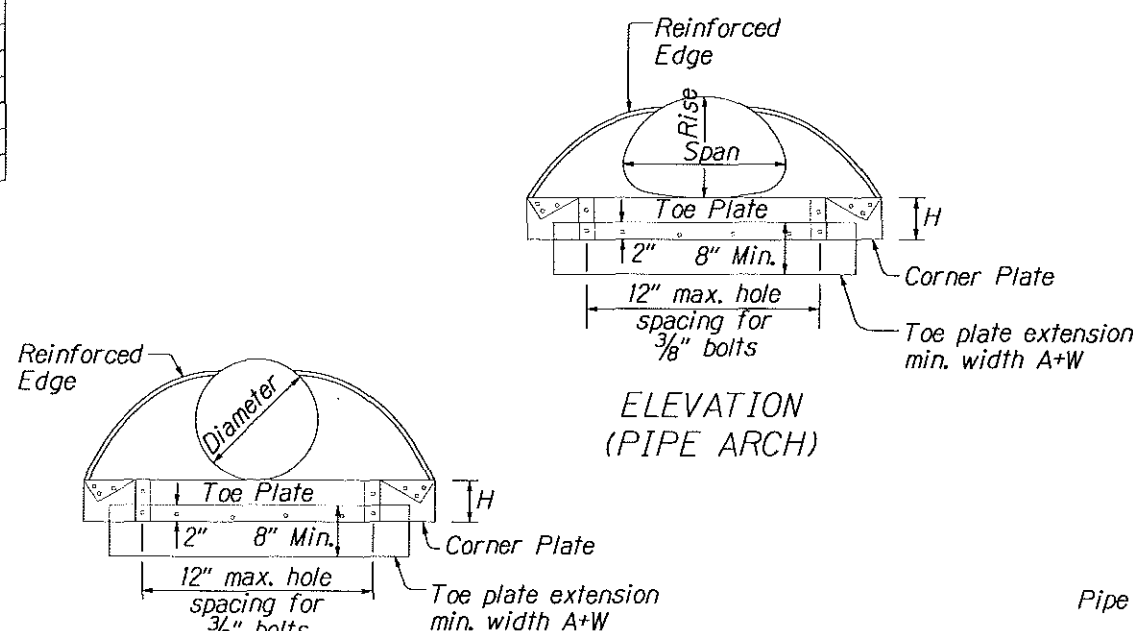


For 30" thru 60" round pipe and
35"x24" thru 66"x51" pipe arch

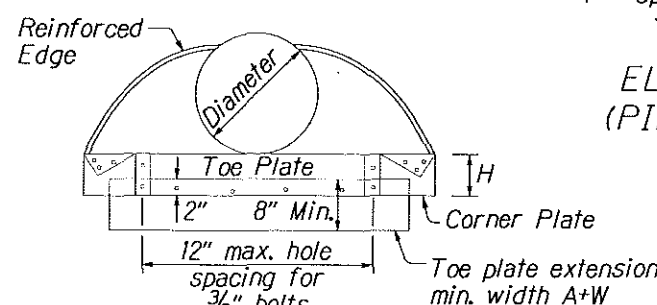
DESIGN A
CONNECTION TO ANNULAR CORRUGATED METAL PIPE



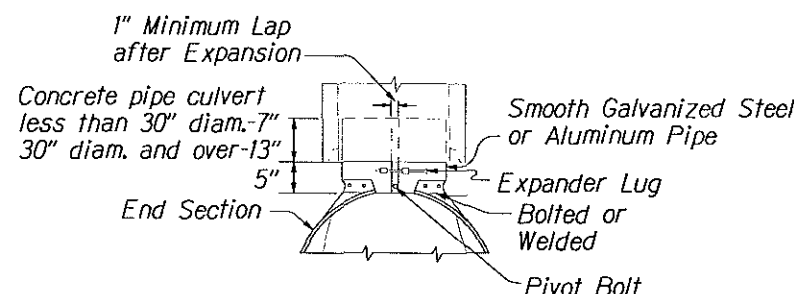
SECTION A-A



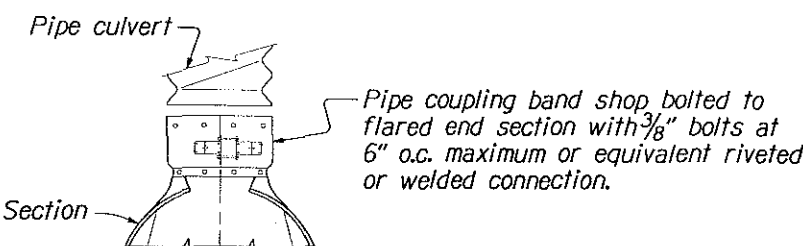
ELEVATION (PIPE ARCH)



ELEVATION (ROUND)

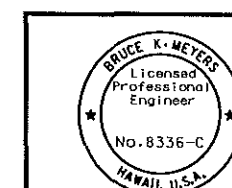


DESIGN B
CONNECTION TO CONCRETE PIPE
INLET END



For all sizes of round pipe and pipe arch.

DESIGN C
CONNECTION TO METAL PIPE
OR OUTLET END OF CONCRETE PIPE



The work was prepared by me
or under my supervision and
construction of this project will
be in accordance with the
expiration date of license 4/06

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

SPECIAL C602-4

METAL END SECTIONS

Scale: N.T.S.

Date: December 5, 2005

SHEET No. 1 OF 1

POLYETHYLENE (PE) PLASTIC ROUND PIPE CULVERT																
FILL HEIGHT TABLE AND MINIMUM CELL CLASSIFICATION NUMBER PER ASTM D 3350																
SMOOTH WALL, CORRUGATED AND RIBBED PIPE CULVERT																
PIPE SIZE DIAMETER INCHES		MINIMUM COVER INCHES	SMOOTH WALL (SOLID WALL)						CORRUGATED				RIBBED			
			CELL CLASSIFICATION NUMBER 335434C						PIPE SIZE DIAMETER INCHES	MINIMUM COVER INCHES	CELL CLASS. NO. 315412C	CELL CLASS. NO. 324420C	PIPE SIZE DIAMETER INCHES	MINIMUM COVER INCHES	CELL CLASS. NO. 334433C	CELL CLASS. NO. 335434C
			MINIMUM WALL THICKNESS IN INCHES													
			0.607	0.857	0.923	1.154	1.385	1.292								
MAXIMUM FILL HEIGHT IN FEET																
12	12	57							12	12	11	10	18	12	18	24
18	12		52						15	12	11	10	24	12	22	28
24	12			38					18	12	12	10	30	12	22	28
30	12				38				24	12	12	10	36	12	25	31
36	12					38			30	12	12	10	42	12	21	27
42	12						27		36	12	11	10	48	12	21	26
48	12							27								

NOTES:

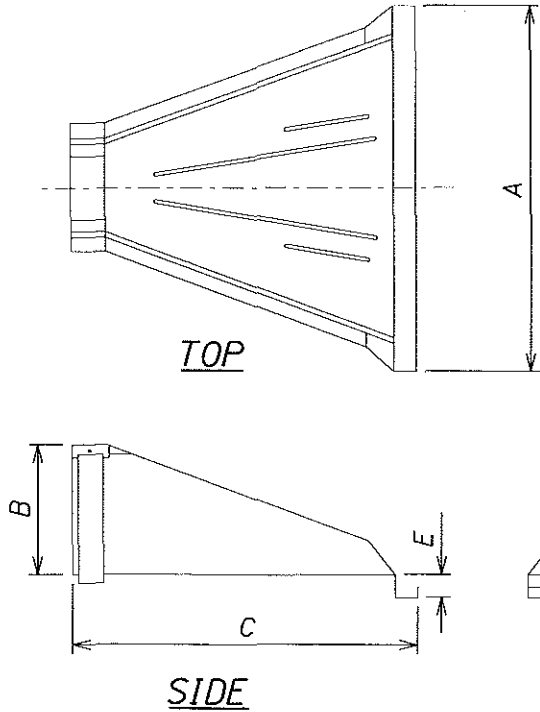
- When directed, camber pipe culverts upward from a chord through the inlet and outlet inverts an ordinate amount equal to 1% of the pipe length. Develop camber on a parabolic curve. If the midpoint elevation on the parabolic curve as designed exceeds the elevation of the inlet invert, reduce the amount of camber or increase the pipe culvert gradient.
- Measure minimum cover from the top of the pipe culvert to the top of pavement or future finished grade. Measure maximum fill height from the top of the pipe to the top of pavement or future finished grade. Minimum cover is 24 inches.
- Minimum HDPE pipe culvert size is 18 inches and the maximum is 48 inches.

POLYVINYL CHLORIDE (PVC) PLASTIC ROUND PIPE CULVERT

FILL HEIGHT TABLE AND MINIMUM CELL CLASSIFICATION NUMBER PER ASTM D 1784

SMOOTH WALL AND RIBBED PIPE CULVERT

SMOOTH WALL (SOLID WALL)						RIBBED			
PIPE SIZE DIAMETER INCHES	MINIMUM COVER INCHES	CELL CLASS. NO. 12454C		CELL CLASS. NO. 12364C		PIPE SIZE DIAMETER INCHES	MINIMUM COVER INCHES	CELL CLASS. NO. 12454C	CELL CLASS. NO. 12364C
		MIN. WALL THICKNESS IN INCHES							
		0.358	0.438	0.358	0.438				
		MAX. FILL HEIGHT IN FEET							
12	12	65		69		12	12	37	26
15	12		82		66	15	12	32	22
						18	12	33	23
						24	12	29	21
						30	12	28	20
						36	12	27	19
						42	12	26	18
						48	12	24	17



PLASTIC PIPE END SECTION				
PIPE SIZE DIAMETER	DIMENSIONS			
	A	B	C	E
12	42	15	33	6
15	46	25	45	6
18	54	29	55	6
24	64	37	65	6
30	88	36	64	6
36	88	43	67	6

BRUCE K. MEYERS

Licensed Professional Engineer

No. 8336-C

HAWAII, U.S.A.

The work was prepared by me or under my supervision and construction of this project will be under my supervision.

Expiration Date of License 4/06

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

SPECIAL C602-5

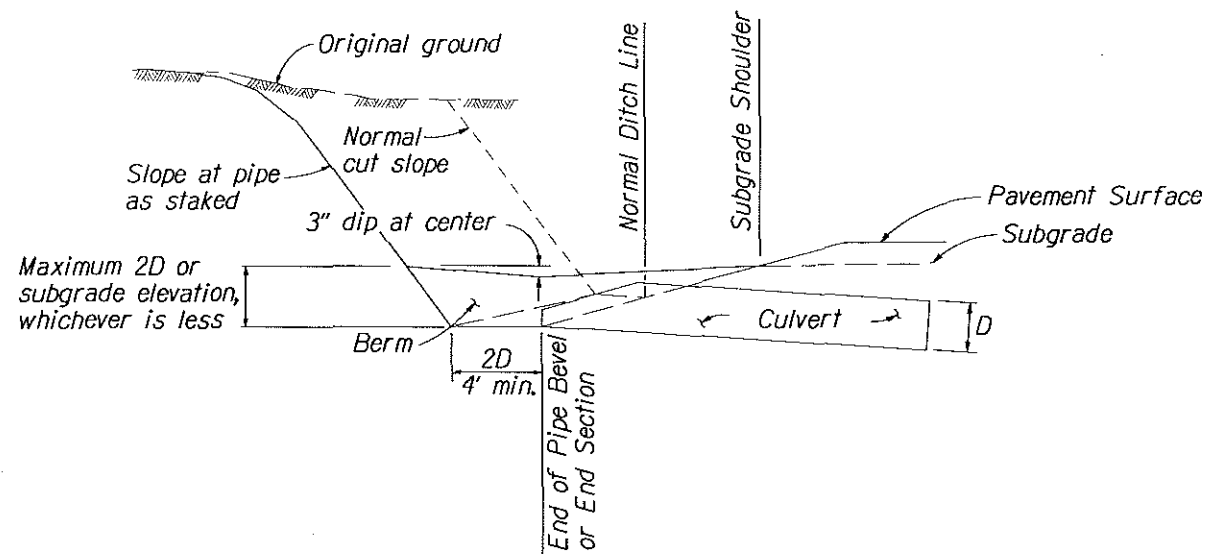
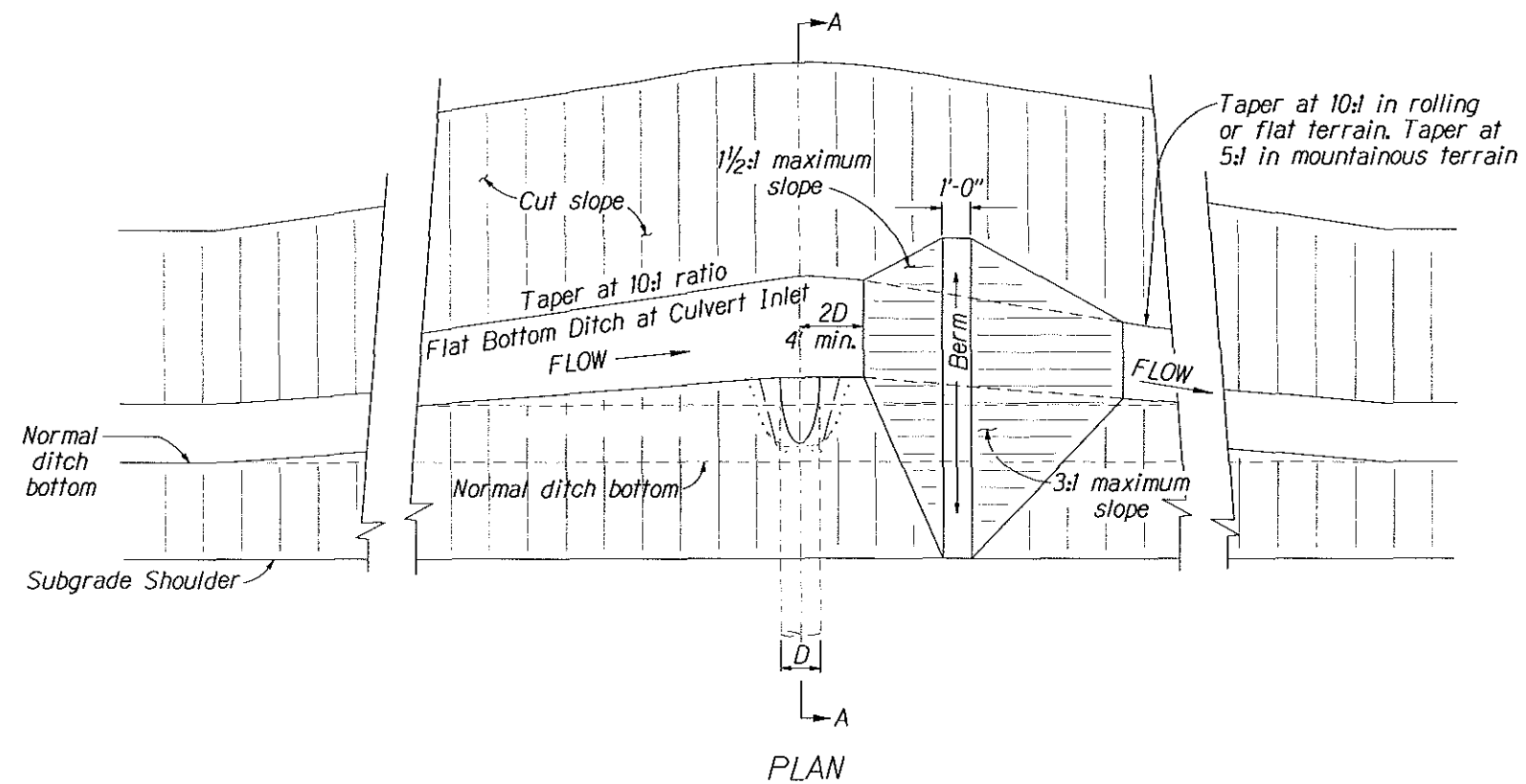
PLASTIC PIPE CULVERT

Scale: N.T.S. Date: December 5, 2005

SHEET No. 1 OF 1

L10

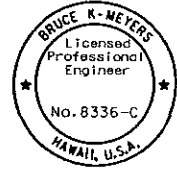
STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI A-AD/STP 6(3) # 200(1)	L11	L16



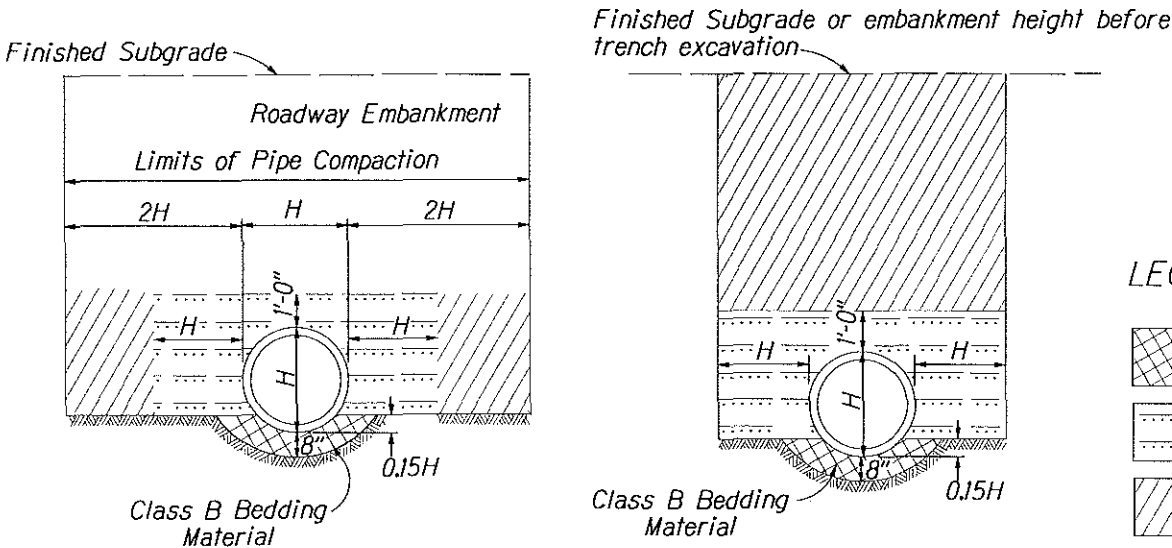
SECTION A-A

NOTE:

1. D equals the diameter of all round pipe or the rise dimension of all pipe arch culverts.

 The work was prepared by me or under my supervision and construction of this project will be under my observation. Expiration Date of License: 3/06	U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION CENTRAL FEDERAL LANDS HIGHWAY DIVISION	
	SPECIAL C602-6	
	PIPE CULVERT INLET TREATMENT IN CUT SLOPES	
	Scale: N.T.S.	Date: December 5, 2005
SHEET No. 1 OF 1		

CONCRETE ROUND PIPE CULVERT									
FILL HEIGHT AND PIPE CLASS TABLE									
PIPE SIZE DIAMETER INCHES	MINIMUM COVER INCHES	EMBANKMENT				TRENCH			
		CLASS II	CLASS III	CLASS IV	CLASS V	CLASS II	CLASS III	CLASS IV	CLASS V
		MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE IN FEET							
12	24	11	11	16	23	18	18	26	37
18	24	10	10	25	39	14	14	31	45
24	24	11	11	15	31	15	15	22	40
30	24	9	13	16	35	13	17	20	46
36	24	9	9	20	41	11	14	26	56
48	24	12	14	26	44	16	17	31	50
60	24	16	17	28	44	16	20	32	50
72	24	13	17	31	41	16	20	35	49
84	24	13	19	31		15	23	37	
96	24	13	20			16	24		
108	24	16	20			19	26		

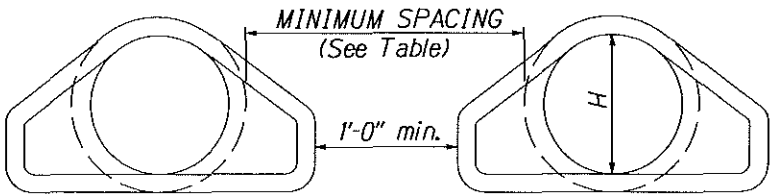


EMBANKMENT INSTALLATION

TRENCH INSTALLATION

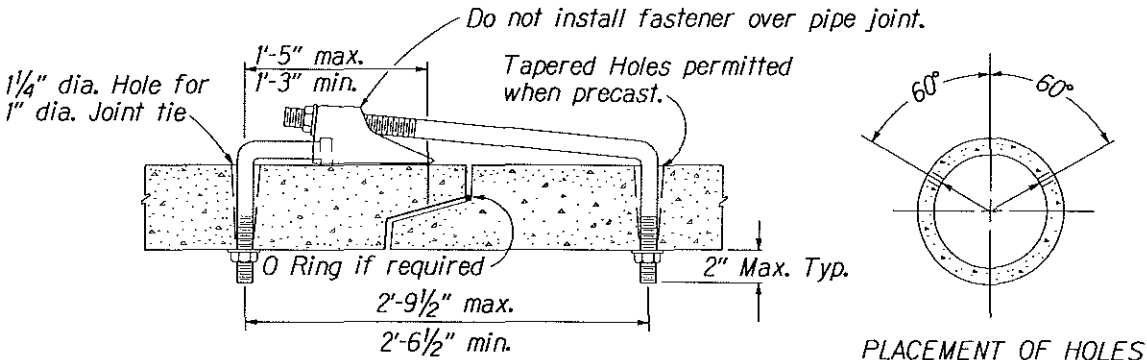
LEGEND:

- Bedding Material
- Approved granular material or fine compactable soil placed in layers not exceeding 6" compacted depth.
- Embankment material placed in layers not exceeding 6" compacted depth.
- Impermeable backfill material



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

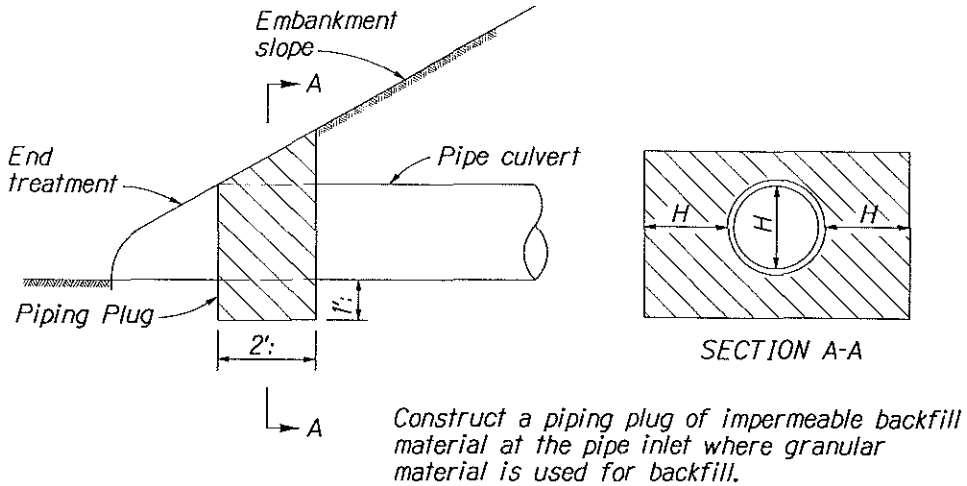
MULTIPLE ROUND PIPE INSTALLATION



SUPPLEMENTAL CONCRETE PIPE TIE

NOTE:

- 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.
- 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. Minimum cover is 24 inches under the paved sections.
- 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.
- Where unyielding or unstable material is encountered, install the pipe culvert according to the limits of pipe compaction shown on detail C602-3.
- When grades exceed 10%, install supplemental concrete pipe ties on pipe culvert or install bell and spigot pipe.
- 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.

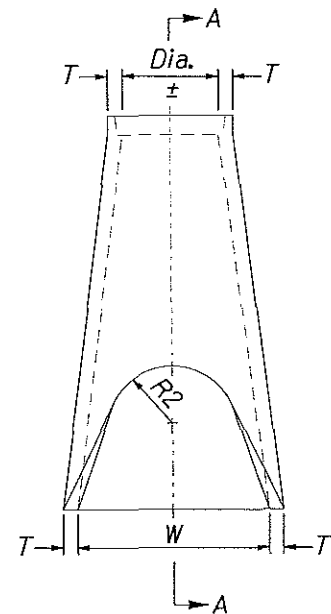


PIPING PLUG

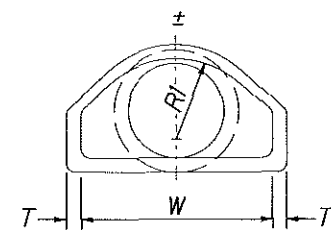
	U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION CENTRAL FEDERAL LANDS HIGHWAY DIVISION	
	SPECIAL C602-7	
	CONCRETE PIPE CULVERT INSTALLATION	
	Scale: N.T.S.	Date: December 5, 2005
SHEET No. 1 OF 1		

NOTES:

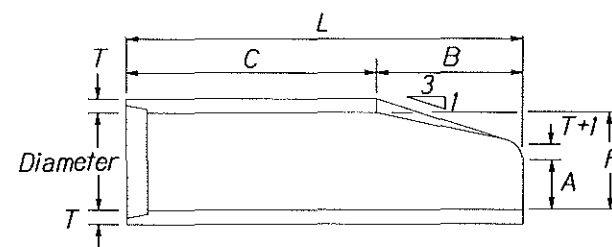
- Variations in design and dimensions are permitted to allow for manufacturer's standards.
- Fabricate the outlet end section with a groove end and the inlet end section with a tongue end.
- Warp embankment slopes to match the slope of the flared end section.



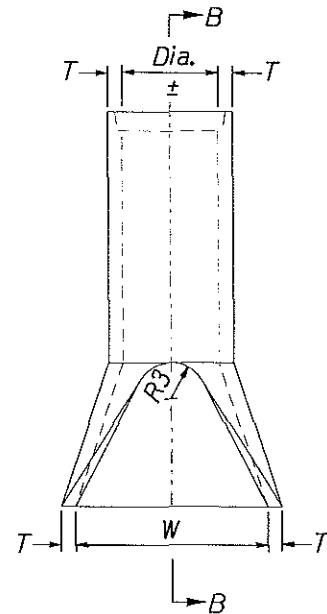
PLAN



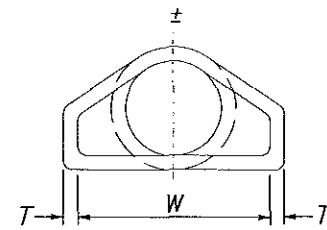
ELEVATION



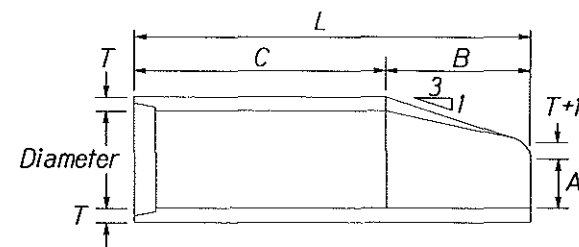
SECTION A-A



PLAN



ELEVATION



SECTION B-B

END SECTIONS FOR ROUND PIPE CULVERT

PIPE SIZE	DIMENSIONS									
	T	A	B	C	L	W	F	R1	R2	R3
DIAMETER INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES
12	2	4	24	48 ⁷ / ₈	72 ⁷ / ₈	24	13	10 ¹ / ₈	9	4
15	2 ¹ / ₄	6	27	46	73	30	16	12 ¹ / ₂	11	6
18	2 ¹ / ₂	9	27	46	73	36	19	15 ¹ / ₂	12	7 ¹ / ₂
21	2 ³ / ₄	9	36	37	73	42	22	16 ¹ / ₂	13	5
24	3	9 ¹ / ₂	43 ¹ / ₂	30	73 ¹ / ₂	48	25	16 ¹³ / ₁₆	14	8
27	3 ¹ / ₄	10 ¹ / ₂	48	25 ¹ / ₂	73 ¹ / ₂	54	28	--	14 ¹ / ₂	9
30	3 ¹ / ₂	12	54	19 ³ / ₄	73 ³ / ₄	60	31	18 ¹ / ₂	15	8
33	3 ³ / ₄	13 ¹ / ₂	58 ¹ / ₂	37 ¹ / ₂	96	66	34	23 ³ / ₄	17 ¹ / ₂	9
36	4	15	63	33	96	72	37	23 ³ / ₁₆	20	11
42	4 ¹ / ₂	21	63	33	96	78	43	--	22	11
48	5	24	72	24	96	84	49	--	22	12

BRUCE K. MEYERS
Licensed Professional Engineer
No. 8336-C
HAWAII, U.S.A.

The work was prepared by me or under my supervision and construction of this project will be in accordance with the provisions of the Hawaii Engineering Act.

Expiration Date of License 4/06.

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

DETAIL C602-8

**CONCRETE END SECTION
FOR ROUND PIPE**

Scale: N.T.S. Date: December 5, 2005

SHEET No. 1 OF 1