

GENERAL NOTES

- ADEQUATE COVER SHALL BE PROVIDED DURING CONSTRUCTION TO PROTECT THE STRUCTURE FROM DAMAGE. THE MINIMUM COVER SHALL BE AS SHOWN ON THESE TABLES OR CONFORM TO AASHTO REQUIREMENTS, WHICHEVER IS GREATER. THE MINIMUM COVER FOR FLEXIBLE PIPE IS MEASURED FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE PAVEMENT: HMA OR PCCP.
 - PIPE SHALL BE PLACED WITH LONGITUDINAL SEAMS AT THE SIDES OR QUARTER POINTS BUT NOT ALONG TOP OF VERTICAL AXIS.
 - STRUCTURAL PLATE PIPES OF EQUAL OR GREATER DIAMETER IN CONFORMANCE TO SECTION 510 MAY BE SUBSTITUTED FOR THE PIPES ON THESE SHEETS AT THE CONTRACTOR'S EXPENSE.
 - WHEN A PIPE IS TO BE EXTENDED, THE SAME PIPE MATERIAL AND SIZE AS IN THE ORIGINAL INSTALLATION SHALL BE USED.
 - EXTENSIONS FOR CMP ARCH PIPE SHALL MATCH THE CORRUGATIONS AND THE SPAN AND RISE DIMENSIONS OF THE PIPE TO BE EXTENDED.
 - BACKFILL AND COMPACTION SHALL BE IN ACCORDANCE WITH SECTION 206.
- ▽ PIPE ARCH WITH EQUAL PERIPHERY AND WITH SPAN AND RISE DIMENSIONS APPROXIMATELY EQUAL TO THOSE SPECIFIED ON THE PLANS WILL BE PERMITTED.
- ☑ PIPE ARCH IS INTENDED FOR USE WHERE MINIMUM COVER REQUIREMENTS FOR ROUND PIPE CANNOT BE MET. WHEN COVER EXCEEDS 11 FT. USE ROUND PIPE.
- ∅ COVER GREATER THAN 90 FT. SHALL BE USED ONLY AFTER A THOROUGH INVESTIGATION OF FOUNDATION MATERIAL.

PIPE DIA.	MIN. COVER	MAX. HEIGHT OF COVER, H (FT.) ∅				
		WALL THICKNESS (IN.)				
IN.		0.064	0.079	0.109	0.138	0.168
12	12	92	100	100	100	100
15	12	74	80	100	100	100
18	12	61	67	86	90	94
21	12	53	57	74	77	81
24	12	46	50	65	68	71
27	12	41	44	57	60	63
30	12	37	40	52	54	56
36	12	30	33	43	45	47
42	12	34	47	74	77	81
48	12	30	41	65	68	71
54	12		36	57	60	63
60	12			52	54	57
66	12				49	51
72	12				45	47
78	12					43
84	12					40

**2 2/3 IN. x 1/2 IN. CORRUGATIONS
ROUND STEEL PIPE**

PIPE DIA.	MIN. COVER	MAX. HEIGHT OF COVER, H (FT.) ∅				
		WALL THICKNESS (IN.)				
IN.		0.064	0.079	0.109	0.138	0.168
36	12	53	66	98	100	100
42	12	45	56	84	100	100
48	12	39	49	73	88	98
54	12	35	44	65	78	87
60	12	31	39	58	70	78
66	12	28	36	53	64	71
72	12	26	33	49	58	65
78	12	24	30	45	54	60
84	12	22	28	42	50	56
90	12	21	26	39	47	52
96	12		24	36	44	49
102	18		23	34	41	46
108	18			32	39	43
114	18			30	37	41
120	18			29	35	39

**3 IN. x 1 IN. CORRUGATIONS
ROUND STEEL PIPE**

PIPE DIA.	MIN. COVER	MAX. HEIGHT OF COVER, H (FT.) ∅				
		WALL THICKNESS (IN.)				
IN.		0.064	0.079	0.109	0.138	0.168
48	12	39	49	73	88	98
54	12	35	44	65	78	87
60	12	31	39	58	70	78
66	12	28	36	53	64	71
72	12	26	33	49	58	65
78	12	24	30	45	54	60
84	12	22	28	42	50	56
90	12	21	26	39	47	52
96	12		24	36	44	49
102	18		23	34	41	46
108	18			32	39	43
114	18			30	37	41
120	18			29	35	39

**5 IN. x 1 IN. CORRUGATIONS
ROUND STEEL PIPE**

PIPE SIZE SPAN x RISE	EQUIV. DIA.	WALL THICKNESS	MIN. COVER	MAX. HEIGHT OF COVER H (FT.)
IN.				CORNER BEARING PRESSURE 2 TONS PER SQ. FT.
17 x 13	15	0.064	12	11
21 x 15	18	0.064	12	9
24 x 18	21	0.064	12	8
28 x 20	24	0.064	12	7
35 x 24	30	0.064	12	5
42 x 29	36	0.064	12	5
49 x 33	42	0.079	12	5
57 x 38	48	0.109	12	5
64 x 43	54	0.109	15	6
71 x 47	60	0.138	15	6
77 x 52	66	0.168	18	6
83 x 57	72	0.168	18	7

**2 2/3 IN. x 1/2 IN. CORRUGATIONS
STEEL PIPE ARCH**

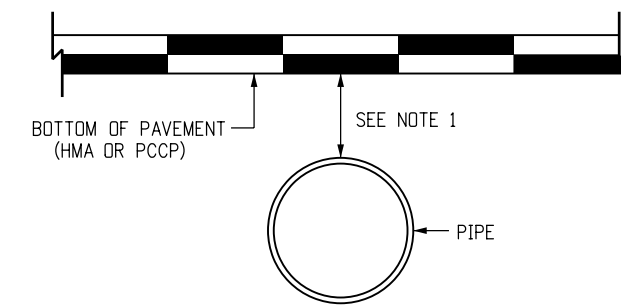
PIPE SIZE SPAN x RISE	EQUIV. DIA.	WALL THICKNESS	MIN. COVER	MAX. HEIGHT OF COVER H (FT.)
IN.				CORNER BEARING PRESSURE 2 TONS PER SQ. FT.
40 x 31	36	0.064	12	8
46 x 36	42	0.064	12	8
53 x 41	48	0.064	12	8
60 x 46	54	0.064	15	8
66 x 51	60	0.064	15	9
73 x 55	66	0.064	18	10
81 x 59	72	0.064	18	11
87 x 63	78	0.064	18	10
95 x 67	84	0.079	18	11
103 x 71	90	0.109	18	10
112 x 75	96	0.109	21	10
117 x 79	102	0.109	21	10
128 x 83	108	0.138	24	9
137 x 87	114	0.138	24	8
142 x 91	120	0.168	24	8

**3 IN. x 1 IN. AND 5 IN. x 1 IN. CORRUGATIONS
STEEL PIPE ARCH**

TYPE AND MATERIAL	DIA. (IN.)	MAX. HEIGHT OF COVER H (FT.)
RIBBED POLYVINYL CHLORIDE (PVC)	4 TO 15	25

FILL HEIGHT REQUIREMENTS GREATER THAN THE MAXIMUM ALLOWABLE HEIGHT OF COVER LISTED REQUIRE SPECIAL DESIGN.

PVC PIPE



MINIMUM COVER FOR PIPE

Computer File Information	
Creation Date: 07/04/06	Initials: DD
Last Modification Date: 07/09/09	Initials: LTA
Full Path: www.dot.state.co.us/DesignSupport/	
Drawing File Name: 603010102.dgn	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

Sheet Revisions	
Date:	Comments
07/09/09	Removed HDPE pipe.
07/09/09	Revised the drawing name.
07/09/09	Revised sheets 1 and 2.

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 Project Development Branch DD/LTA

METAL AND PVC PIPE
 Issued By: Project Development Branch on July 04, 2006

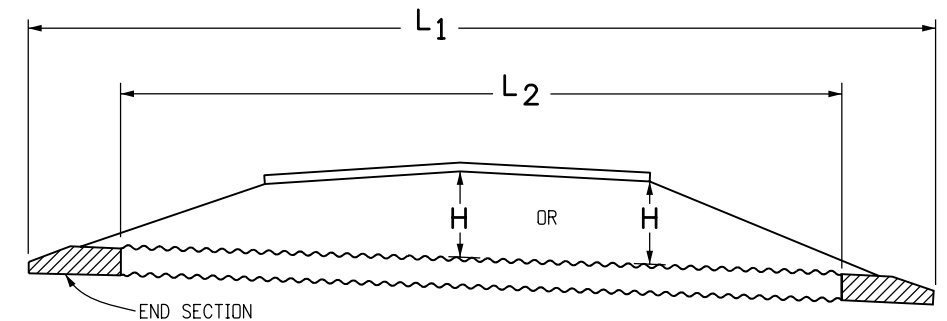
STANDARD PLAN NO.
M-603-1
 Sheet No. 1 of 2

PIPE DIA.	MIN. COVER	MAX. HEIGHT OF COVER, H (FT.)				
		WALL THICKNESS (IN.)				
IN.		0.060	0.075	0.105	0.135	0.164
12	12	50	50	86	90	93
15	12	40	40	69	72	74
18	12	33	33	57	60	62
21	12	28	28	49	51	53
24	12	25	25	43	45	46
27	15	22	22	38	40	41
30	15		20	34	36	37
36	18		16	28	30	31
42	21			44	52	53
48	24			38	45	47
54	24			34	40	41
60	24				36	37
66	24				33	34
72	24					31

2 2/3 IN. x 1/2 IN. CORRUGATIONS
ROUND ALUMINUM PIPE Ø

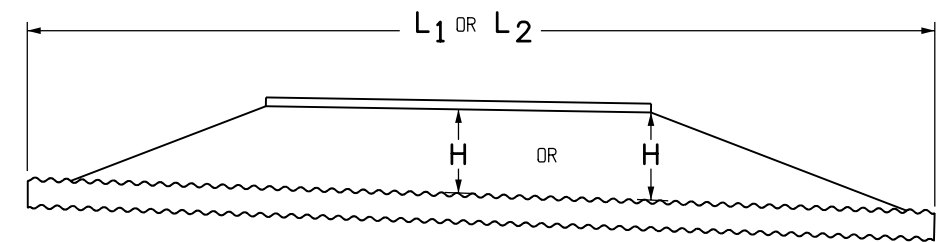
PIPE DIA.	MIN. COVER	MAX. HEIGHT OF COVER, H (FT.)				
		WALL THICKNESS (IN.)				
IN.		0.060	0.075	0.105	0.135	0.164
30	15	36	45	62	93	100
36	18	30	37	51	77	100
42	21	26	32	44	66	86
48	24	22	28	38	58	72
54	24	20	25	34	51	63
60	24	18	22	31	46	57
66	24		20	28	42	51
72	24		18	25	38	47
78	24			23	35	43
84	24			22	32	40
90	24			20	30	37
96	24			19	28	34
102	24				26	32
108	24				24	30
114	24					28
120	24					27

3 IN. x 1 IN. CORRUGATIONS
ROUND ALUMINUM PIPE Ø



PIPE WITH END SECTIONS

NOTE: USE THE H THAT IS GREATER FOR MAXIMUM ALLOWABLE FILL HEIGHT.

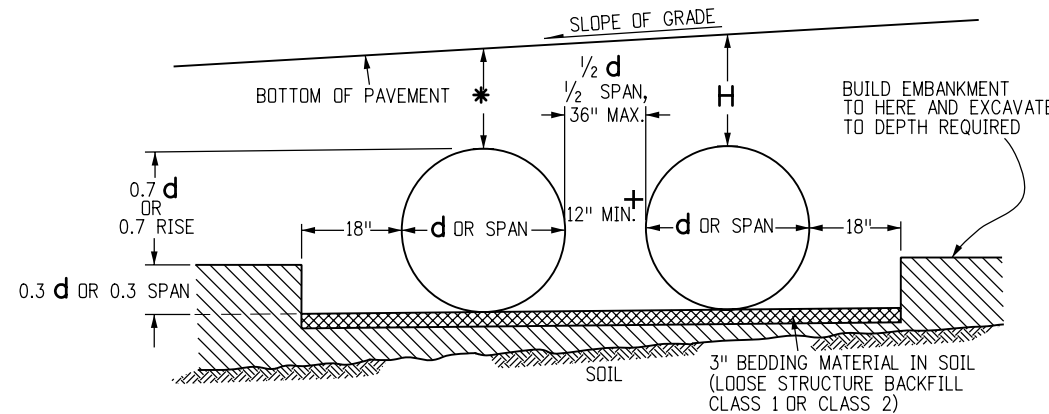
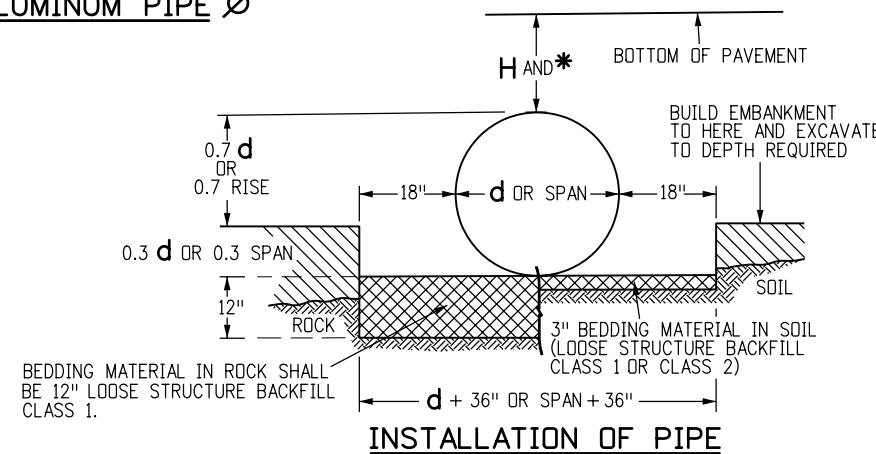


PIPE WITHOUT END SECTIONS

NOTE: USE THE H THAT IS GREATER FOR MAXIMUM ALLOWABLE FILL HEIGHT.

PIPE SIZE SPAN x RISE	EQUIV. DIA.	MIN. COVER	WALL THICKNESS	MAX. HEIGHT OF COVER H (FT.)	
				CORNER RADII	CORNER BEARING PRESSURE 2 TONS PER SQ. FT.
IN.					
17 x 13	15	12	0.060	3	11
21 x 15	18	12	0.060	3	9
24 x 18	21	12	0.060	3	8
28 x 20	24	15	0.075	3	7
35 x 24	30	18	0.075	3	5
42 x 29	36	21	0.105	3 1/2	5
49 x 33	42	24	0.105	4	5
57 x 38	48	24	0.135	5	5
64 x 43	54	24	0.135	6	6
71 x 47	60	24	0.164	7	6

2 2/3 IN. x 1/2 IN. CORRUGATIONS
ALUMINUM PIPE ARCH ▽



INSTALLATION OF MULTIPLE PIPES

LEGEND

- H = HEIGHT OF COVER LIMIT, MAXIMUM ALLOWABLE HEIGHT OF FILL OVER THE TOP OF THE PIPE, EXCLUDING PAVEMENT THICKNESS.
- * = THE MINIMUM COVER SHALL BE AS SHOWN ON THESE TABLES OR CONFORM TO AASHTO REQUIREMENTS, WHICHEVER IS GREATER. MINIMUM COVER FOR FLEXIBLE PIPE IS MEASURED FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE PAVEMENT: HMA OR PCCP.
- L1 = LENGTH OF PIPE TO BE MEASURED WHEN PLACED IN ACCORDANCE WITH SECTION 617 OR 624.
- L2 = LENGTH OF PIPE TO BE MEASURED WHEN PLACED IN ACCORDANCE WITH SECTION 603.
- + = MINIMUM SPACING BETWEEN OUTSIDE WALLS OF PIPE OR END SECTION.
- ▽ = PIPE ARCH WITH EQUAL PERIPHERY AND WITH SPAN AND RISE DIMENSIONS APPROXIMATELY EQUAL TO THOSE REQUIRED BY PLANS WILL BE PERMITTED.
- ▣ = PIPE ARCH IS INTENDED FOR USE WHERE MINIMUM COVER REQUIREMENTS FOR ROUND PIPE CANNOT BE MET. WHEN COVER EXCEEDS 11 FT. USE ROUND PIPE.
- Ø = COVER GREATER THAN 90 FT. SHALL BE USED ONLY AFTER THOROUGH INVESTIGATION OF FOUNDATION MATERIAL.

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Creation Date: 07/04/06	Initials: DD
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Drawing File Name: 603010202.dgn	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

Sheet Revisions	
Date:	Comments
07-09-09	Deleted "Metal or Plastic" from the detail titles.
(R-X)	
(R-X)	
(R-X)	
(R-X)	

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STANDARD PLAN NO.
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