

STORM SEWER

HYDRAULICALLY EQUIVALENT ROUND PIPE SIZES

(For Use Where Equivalent Pipe Types Are Allowed By the Plans or Specifications)

	Concrete	HDPE PIPE	HDPE PIPE	HDPE PIPE	CORRUGATED METAL PIPE							PVC
	Pipe	TYPE S	TYPE S	TYPE C								Pipe
		Fill Hts.<= 10'	Fill Hts.> 10'				(Steel)	(Aluminum)	Spiral Rib	(Steel)	(Aluminum)	
Corrugations (in)					2- 2/3 x 1/2	3 x 1	5 x 1	6 x 1	ALL	6 x 2	9 x 2-1/2	
Design N Value	0.012	0.012	0.015	0.025	0.025	0.028	0.026	0.025	0.012	0.035	0.035	0.012
Pipe Sizes (in)	12	12	15	18	18				12			12
	15	15	18	24	24				15			15
	18	18	24	30	24	30			18			18
	24	24	30	36	36	36	36		24			24
	30	30	36	*42	42	42	42		30			30
	36	36	*42	*54	48	54	54	48	36	60	60	36
	42	*42	*48	*60	60	60	60	60	42	66	66	42
	48	*48	*60		66	66	66	66	48	78	78	48
	54	*54			72	78	78	72	54	84	84	
	60				84	84	84	84	60	96	96	
	66					96	90	90	66	102	102	
	72					102	102	96	72	114	114	
	78					108	108	108	78	120	120	
	84					120	114	114	84	132	132	
	90					126	126		90	138	138	
	96					132	132		96	150	150	
	102					144	138		102	156	156	
	108								108	168	168	
	114								114	174	174	
	120								120	180	180	
	126								126	192	192	
	132								132	198	198	
	138								138	210	210	
	144								144	216	216	
	150									228	228	
	156									234	234	
	162									246	246	
	168									252	252	
	174									264	264	
	180									270	270	

General Notes:

1. Unless otherwise noted on the plans, the pipe size given was designed with concrete pipe with an N value of 0.012. This chart provides the hydraulic equivalence as determined by Alabama Department of Transportation for pipe types based on N value and manufacturer's tolerances. Enter the chart with the concrete pipe size in the plans and read across the chart to the equivalent size for another pipe type.
2. Flowlines cannot be changed to obtain cover if an equivalent sized pipe is selected. If flowline changes occur, these changes will require a redesign of the system.
3. Some pipe sizes are not shown because a larger pipe size is equivalent to the concrete pipe.
4. THIS CHART DOES NOT APPLY TO CROSS DRAIN OR SIDE DRAIN PIPES.
- \* 5. SEE SPECIFICATIONS FOR ALLOWED SIZES FOR STORM SEWER.


--SPECIFICATIONS--

CURRENT ALABAMA DEPARTMENT OF TRANSPORTATION

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REVISIONS

1. Added Note 5 & adjusted various pipe sizes on 06-07-07 by W.W.A.



ALABAMA DEPARTMENT  
OF TRANSPORTATION

1409 COLISEUM BOULEVARD  
MONTGOMERY, AL 36130-3050

DESIGN BUREAU SPECIAL DRAWING

HYDRAULICALLY EQUIVALENT  
ROUND PIPE (STORM SEWER)

Bureau Std Engr: D.J.W.  
DRAWN BY: \_\_\_\_\_ DATE DRAWN: 02-03-05

SPECIAL DRAWING NO  
HEP-I

INDEX NO  
53001

NOT TO SCALE



										CORRUGATED METAL PIPE										CONCRETE PIPE										REFERENCE PROJECT NO										FISCAL YEAR										SHEET NO																			
FILL HEIGHTS FOR CORRUGATED METAL ROUND ROADWAY PIPE																																																																					
PIPE DIAM. IN INCHES	AREA IN SQ. FT.	PIPE CHARACTERISTICS			MINIMUM COVER (INCHES)	MAXIMUM FILL HEIGHT IN FEET FOR METAL PIPE GAUGES BELOW																																																															
		CORRUGATED STEEL		ALUM.																																																																	
		2 2/3' x 1/2'	3' x 1' OR 5' x 1'	2 2/3' x 1/2'		14	12	10	8																																																												
15	1.2	●			12"	213	298	300+	300+																																																												
18	1.8	●		●	*	177	248	300+	300+																																																												
24	3.1	●		●	*	80	--	--	--																																																												
30	5	●		●	*	133	186	239	292																																																												
36	7	●		●	*	60	84	--	--																																																												
42	10	●	●	●	*	106	149	191	234																																																												
48	13	●	●	●	*	48	67	--	--																																																												
54	16	●	●	●	*	88	124	159	195																																																												
60	20	●	●	●	*	90	127	163	200																																																												
66	24	●	●	●	*	40	56	72	--																																																												
72	28	●	●	●	*	75	106	137	167																																																												
78	33	●	●	●	*	77	108	140	172																																																												
84	38	●	●	●	*	--	48	62	--																																																												
90	44	●	●	●	*	66	93	120	146																																																												
96	50	●	●	●	*	68	95	122	150																																																												
102	57	●	●	●	*	--	42	54	66																																																												
108	64	●	●	●	*	56	80	104	128																																																												
114	71	●	●	●	*	60	84	109	133																																																												
120	79	●	●	●	*	--	36	48	59																																																												
		●	●	●	*	--	68	89	109																																																												
		●	●	●	*	54	75	98	119																																																												
		●	●	●	*	--	--	42	53																																																												
		●	●	●	*	--	58	75	93																																																												
		●	●	●	*	49	68	88	108																																																												
		●	●	●	*	--	--	--	48																																																												
		●	●	●	*	--	--	64	80																																																												
		●	●	●	*	44	62	81	99																																																												
		●	●	●	*	--	--	--	38																																																												
		●	●	●	*	--	--	--	68																																																												
		●	●	●	*	41	58	74	92																																																												
		●	●	●	*	--	--	--	56																																																												
		●	●	●	*	38	54	69	85																																																												
		●	●	●	*	36	50	65	80																																																												
		●	●	●	*	33	47	61	74																																																												
		●	●	●	24"	31	44	57	70																																																												
		●	●	●	*	--	42	54	66																																																												
		●	●	●	*	--	38	50	61																																																												
		●	●	●	*	--	35	46	56																																																												
FILL HEIGHTS FOR CORRUGATED METAL AND STRUCTURAL PLATE ROADWAY ARCH PIPE																																																																					
EQUIV. PIPE DIAMETER IN INCHES	CORRUGATED METAL PIPE ARCH				STRUCT. PLATE PIPE ARCH		MINIMUM GAUGE OR PLATE THICKNESS	SPAN	RISE	MINIMUM COVER (INCHES)	MAXIMUM FILL HEIGHT (FEET)																																																										
	STEEL		ALUM.	STEEL	ALUM.	CORNER BEARING PRESSURE																																																															
	2 2/3' x 1/2'	3' x 1' OR 5' x 1'	2 2/3' x 1/2'	6' x 2'	9' x 2 1/2'	4000 LBS.					6000 LBS.	8000 LBS.																																																									
15	●			●		14	17"	13"	18	13	15	--																																																									
18	●			●		*	21"	15"	*	15	--	--																																																									
24	●			●		*	*	*	*	12	15	--																																																									
30	●			●		*	28"	20"	*	14	--	--																																																									
36	●			●		*	*	*	*	9	15	--																																																									
42	●			●		*	35"	24"	*	11	15	--																																																									
48	●			●		*	*	*	*	9	14	--																																																									
54	●	●		●		*	42"	29"	*	9	14	--																																																									
60	●			●		*	43"	27"	*	7	13	--																																																									
66	●			●		*	42"	29"	*	12	15	--																																																									
72	●			●		*	49"	33"	*	7	12	--																																																									
78	●			●		12	50"	31"	*	12	15	--																																																									
84	●			●		14	49"	33"	*	7	12	--																																																									
90	●			●		10	57"	38"	*	7	12	--																																																									
96	●			●		14	58"	36"	*	12	15	--																																																									
102	●			●		10	57"	38"	*	7	12	--																																																									
108	●			●		12	64"	43"	*	7	12	--																																																									
114	●			●		14	65"	40"	*	12	15	--																																																									
120	●			●		10	64"	43"	*	7	12	--																																																									
	●			●		*	71"	47"	*	7	12	--																																																									
	●			●		14	72"	44"	*	12	15	--																																																									
	●			●		8	71"	47"	*	7	12	--																																																									
	●			●		8	77"	52"	*	7	12	--																																																									
	●			●		14	73"	55"	*	15	--	--																																																									
	●			●		0.109"	6'-4"	4'-9"	*	15	--	--																																																									
	●			●		0.10"	5'-11"	5'-4"	*	15	--	--																																																									
	●			●		8	83"	57"	*	8	13	--																																																									
	●			●		14	81"	59"	*	15	--	--																																																									
	●			●		0.109"	7'-0"	5'-1"	*	15	--	--																																																									
	●			●		0.10"	6'-8"	5'-7"	*	15	--	--																																																									
	●			●		14	87"	63"	*	14	15	--																																																									
	●			●		0.109"	7'-8"	5'-5"	*	12	15	--																																																									
	●			●		0.10"	7'-4"	5'-11"	*	15	--	--																																																									
	●			●		12	95"	67"	*	12	15	--																																																									
	●			●		0.109"	8'-2"	5'-9"	24	11	15	--																																																									
	●			●		0.10"	8'-0"	6'-2"	18	14	--	--																																																									
	●			●		12	103"	71"	24	11	15	--																																																									
	●			●		0.109"	9'-4"	6'-3"	*	10	15	--																																																									
	●			●		0.10"	8'-7"	6'-6"	*	13	--	--																																																									
	●			●		12	112"	75"	*	10	15	--																																																									
	●			●		0.109"	9'-9"	6'-7"	*	10	15	--																																																									
	●			●		0.10"	9'-6"	6'-10"	*	13	--	--																																																									
	●			●		12	117"	79"	*	10	15	--																																																									
	●			●		0.109"	10'-8"	6'-11"	*	9	13	--																																																									
	●			●		0.10"	10'-5"	7'-3"	*	12	--	--																																																									
	●			●		10	128"	83"	*	10	14	--																																																									
	●			●		0.109"	11'-5"	7'-3"	*	7	12	15																																																									
	●			●		0.125"	11'-2"	7'-6"	*	15	--	--																																																									
	●			●		0.109"	11'-10"	7'-7"	*	7	12	15																																																									
	●			●		0.125"	11'-8"	7'-10"	*	14	--	--																																																									
	●			●		0.109"	12'-6"	7'-11"	*	6	11	15																																																									
	●			●		0.125"	12'-5"	8'-2"	*	13	--	--																																																									
	●			●		0.109"	13'-5"	8'-5"	*	5	7	14																																																									
	●			●		0.15"	13'-1"	8'-5"	*	12	15	--																																																									
	●			●		0.109"	14'-1"	8'-9"	*	5	11	14																																																									
	●			●		0.15"	13'-10"	8'-9"	*	12	15	--																																																									
	●			●		0.138"	14'-0"	9'-8"	*	--	10	13																																																									
	●			●		0.175"	14'-9"	9'-2"	*	10	15	--																																																									
	●			●		0.138"	14'-5"	10'-0"	*	--	10	13																																																									
	●			●		0.175"	15'-6"	9'-6"	*	10	15	--																																																									
	●			●		0.138"	15'-4"	10'-4"	*	--	10	13																																																									
	●			●		0.20"	16'-2"	9'-9"	36	10	15	--																																																									
	●			●		0.138"	15'-10"	10'-8"	24	--	9	12																																																									
	●			●		0.25"	16'-11"	10'-1"	36	9	14	--																																																									
	●			●		0.138"	17'-0"	11'-2"	*	--	8	12																																																									
FILL HEIGHTS FOR HELICAL RIBBED ROADWAY PIPE 7 1/2' x 3/4' CORRUGATIONS																																																																					
PIPE DIAMETER IN INCHES	THICKNESS AND SPECIFIED GAUGE																																																																				
	(.079") 14				(.109") 12																																																																
	MIN. COVER	MAX. FILL	MIN. COVER	MAX. FILL																																																																	
18"	1.0'	96'	--	--																																																																	
21"	1.0'	82'	1.0'	138'																																																																	
24"	1.0'	72'	1.0'	121'																																																																	
30"	1.0'	57'	1.0'	97'																																																																	
36"	1.0'	48'	1.0'	80'																																																																	
42"	1.0'	41'	1.0'	69'																																																																	
48"	1.0'	36'	1.0'	60'																																																																	
54"	1.5'	32'	1.0'	53'																																																																	
60"	1.5'	28'	1.0'	48'																																																																	
66"	--	--	1.5'	44'																																																																	
72"	--	--	1.5'	40'																																																																	
FILL HEIGHTS FOR CORRUGATED METAL SIDEDRAIN PIPE (STEEL & ALUMINUM)																																																																					
PIPE DIAM.	MIN. COVER	GAUGE	CORRUGATION	MAX. FILL HT.																																																																	
15"	24"	16	2 2/3' x 1/2'	50 FT.																																																																	
18"	"	"	"	"																																																																	
24"	"	"	"	"																																																																	
30"	"	14	"	30 FT.																																																																	
36"	"	"	"	"																																																																	
42"	"	"	"	"																																																																	
FOR PIPE LOCATED WHERE FINISHED GRADE IS LESS THAN 24" FROM TOP OF PIPE, USE 14 GAUGE PIPE. FOR FILL HEIGHTS GREATER THAN THOSE SHOWN, SEE ROADWAY PIPE TABLES.																																																																					
--SPECIFICATIONS--																																																																					
CURRENT ALABAMA DEPARTMENT OF TRANSPORTATION																																																																					
NOT TO SCALE																																																																					

TABLE 2:  
HIGH DENSITY CORRUGATED POLYETHYLENE PIPE  
HEIGHT OF COVER  
H-20 AND LIVE LOADS  
(AS PER STANDARD SPECIFICATIONS)

NOMINAL DIAMETER IN	MINIMUM COVER (HEIGHT OF FILL) IN	MAXIMUM COVER (HEIGHT OF FILL) FT
12"-36"	24"	25'

TABLE 3: RECOMMENDED TRENCH WIDTH

DIAMETER	OUTSIDE DIA	TRENCH WIDTH
12"	14.45"	34"
15"	17.57"	38"
18"	21.20"	44"
24"	27.80"	54"
30"	35.10"	65"
36"	41.70"	75"

The trench width must be wide enough to accomodate compaction equipment.

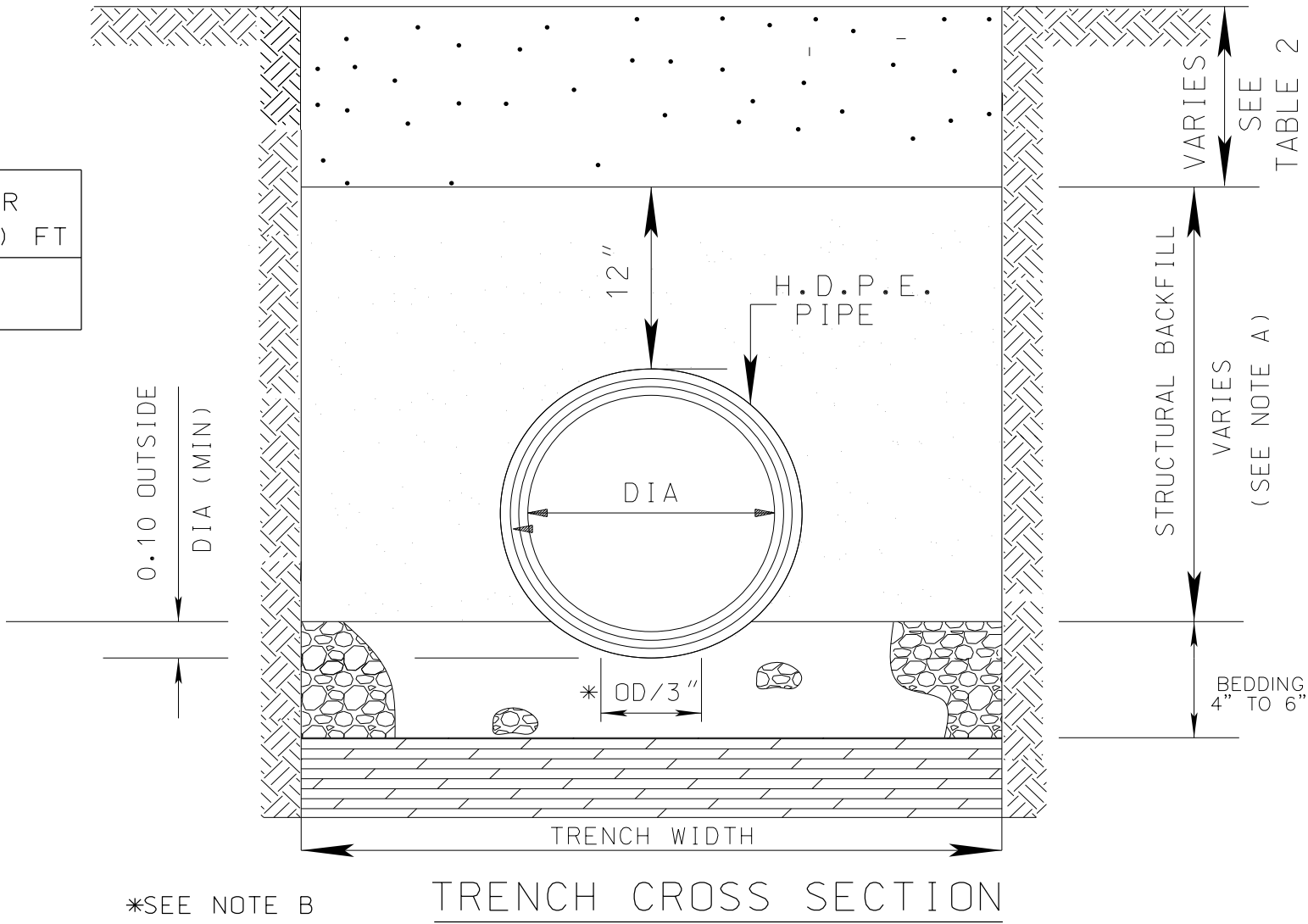


TABLE 4: MULTIPLE INSTALLATION OF  
POLYETHYLENE PIPES

DIAMETER OF PIPE IN	CLEAR DISTANCES BETWEEN PIPES FT
18	1' 2"
24	1' 5"
30	1' 8"
36	1' 11"

STANDARD INSTALLATION  
OF H.D.P.E. PIPE

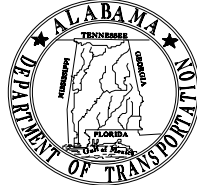
GENERAL NOTES (H.D.P.E. PIPE)

- A. MATERIALS: THERMOPLASTIC PIPE: POLYETHYLENE PIPE SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M 294, LATEST EDITION. BEDDING MATERIAL AND STRUCTURAL BACKFILL: SHALL MEET THE REQUIREMENTS OF AASHTO A-1, A-3, A-2-4 OR A-2-5.
- B. INSTALLATION: MINIMUM TRENCH WIDTHS SHALL MEET THE REQUIREMENTS OF TABLE 3. THE MIDDLE THIRD OF THE BEDDING MATERIAL UNDER THE PIPE SHOULD BE LOOSELY PLACED. WHILE THE REMAINDER SHALL BE COMPACTED TO A MINIMUM 95% OF MAXIMUM DENSITY PER AASHTO T-99. A MINIMUM OF 4 INCHES OF BEDDING SHALL BE PROVIDED PRIOR TO PLACEMENT OF THE PIPE. STRUCTURAL BACKFILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT EXCEEDING A 6 INCH LOOSE LIFT THICKNESS AND BROUGHT UP EVENLY ON BOTH SIDES OF THE PIPE TO AN ELEVATION NOT LESS THAN 12 INCHES ABOVE THE THE TOP OF THE PIPE. A MINIMUM COMPACTION LEVEL OF 95% STANDARD DENSITY PER AASHTO T-99 SHALL BE ACHIEVED. MINIMUM COVER REQUIREMENT SHALL MEET THE REQUIREMENTS OF TABLE 2. FOR MULTIPLE INSTALLATION OF POLYETHYLENE PIPES, A CLEAR DISTANCE BETWEEN PIPES SHALL MEET THE REQUIREMENTS OF TABLE 4.
- C. CALCULATIONS FOR FILL DEPTHS ARE BASED ON PROPERTIES DEFINED IN AASHTO M294 AND CALCULATIONS IN AASHTO SEC 12 AND SEC 30.
- D. ANY COST OF BEDDING AND BACKFILL MATERIAL REQUIRED TO INSTALL THE H.D.P.E. PIPE IN ADDITION TO THAT SHOWN IN THE PLANS SHALL BE INCLUDED IN THE PRICE BID FOR THE PIPE.

--SPECIFICATIONS--  
CURRENT ALABAMA DEPARTMENT OF TRANSPORTATION

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REVISIONS  
1. Created sheet to consolidate all HDPE on one page on 11-05-13 by J.F.T.



ALABAMA DEPARTMENT  
OF TRANSPORTATION  
1409 COLISEUM BOULEVARD  
MONTGOMERY, AL 36130-3050

DESIGN BUREAU SPECIAL DRAWING  
  
BEDDING AND FILL HEIGHTS FOR  
ALL ROADWAY PIPE CULVERTS  
(H.D.P.E. PIPE)

Bureau Std Engr: D.J.W.  
DRAWN BY: \_\_\_\_\_ DATE DRAWN: 05-26-75

SPECIAL DRAWING NO  
RPC-530 (SHEET 3 OF 3)

INDEX NO  
53006

NOT TO SCALE