REPORT ON COMPARATIVE STORM SEWER PIPE SIZES

FOR EQUAL FLOW CAPACITY

TYPE OF PIPE (1)	DIAMETERS										
Reinforced Concrete Pipe	12"	15"	18"	21"	24"	27"	30"	33"	36"	42"	48"
Spiral Rib Steel Pipe	12"	15"	18"	21"	24"	27"	30"	33"	36"	42"	48"
2-2/3" x 1/2" Helical Lockseam Corrugated Steel Pipe	12"	15"	18"	22"	26"	30"	34"	38"	42"	49"	56"
2-2/3" x 1/2" Annular Riveted Corrugated Steel Pipe	15"	21"	24"	27"	30"	36"	42"	42"	48"	54"	60"

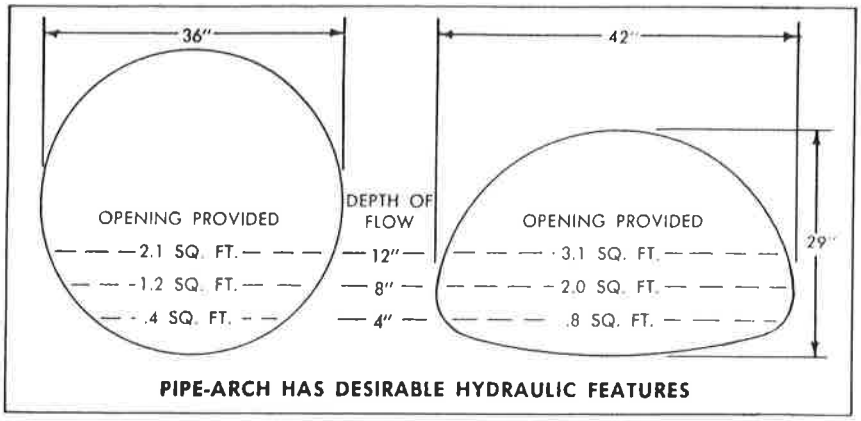
TYPE OF PIPE (1)	DIAMETERS										
Reinforced Concrete Pipe	48"	54"	60"	66"	72"	78"	84"	90"	96"		
Spiral Rib Steel Pipe	48"	54"	60"	66"	72"	78"	84"	90"	96"		
3" x 1" Helical Lockseam Corrugated Steel Pipe	60"	68"	76"	84"	93"	101"	108"	114"	120"		
3" x 1" Annular Riveted Corrugated Steel Pipe	66"	72"	78"	90"	96"	102"	114"	120"	126"		

NOTES: * All pipe diameter comparisons are based on pipes flowing full.

(1) Coefficients of Surface Roughness (expressed as Mannings n) are as follows:
For RCP, n is assumed as .013 (all diameters).
For Spiral Rib Steel Pipe, n is .0125 for all diameters.
For Helical CSP (2-2/3" x 1/2" corr.) (a) n ranges from .011 for 12" dia. to .0205 for 56" dia.
For Helical CSP (3" x 1" corr.) (a) (b) n ranges from .021 for 36" to .026 as a peak value at 72" diameter and .0255 at 96" dia.
For Annular CSP (2-2/3" x 1" corr.) (a) n for all diameters is assumed as .024.
For Annular CSP (3" x 1" corr.) (b) ranges from .0275 at 48" diameter to .027 at 60" dia to .026 at 120" diameter.

REFERENCE:

"HANDBOOK OF STEEL DRAINAGE AND HIGHWAY CONSTRUCTION PRODUCTS", FIFTH EDITION 1994.



PIPE-ARCH HAS DESIRABLE HYDRAULIC FEATURES

The above example illustrates a 36" round pipe reformed into a 29" x 42" pipe-arch. At low flows it offers a wider channel to carry more water.

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Hydraulics of pipes are affected by many factors, not only by size, shape and headwater height, but also by inlet and outlet controls. There is no good substitute for an outside professional to review the hydraulics of any installations before you make changes.

Values of Coefficient of Roughness (n) for Standard Corrugated Steel Pipe (Manning's Formula)

Corrugations	Annular (Riveted)	Helical												
	2 2/3 x 1/2 in.	2 2/3 x 1/2 in.												
	Diameters	12 in.	15 in.	18 in.	24 in.	30 in.	36 in.	42 in.	48 in.	54 in. and larger				
Flowing Full	0.024	0.011	0.012	0.013	0.015	0.017	0.018	0.019	0.020	0.021				
	Pipe Arch		17 x 13	21 x 15	28 x 20	35 x 24	42 x29	49 x 33	57 x 38	64 x 43 in. and larger				
Flowing Full	0.026		0.013	0.014	0.016	0.018	0.019	0.020	0.021	0.022				
	Annular (Riveted)	Helical 3 x 1 in.												
	3 x 1 in.						36 in.	42 in.	48 in.	54 in.	60 in.	66 in.	72 in.	78 in. and larger
Flowing Full	0.027						0.022	0.022	0.023	0.023	0.024	0.025	0.026	0.027
	Annular (Riveted)	Helical 5 x 1 in.												
	5 x 1 in.								48 in.	54 in.	60 in.	66 in.	72 in.	78 in and larger
Flowing Full	0.025								0.022	0.022	0.023	0.024	0.0024	0.025
SPIRAL RIB Flowing Full		All Diameters 0.012												

* Modified table 3.9 from the "Handbook of Steel Drainage and Highway Construction Products" - Fifth Edition 1994