

Table of “n” values NEH-Chapter 5 (pg 5.4-4) is the source for the following table:

Type of Conduit and Description	Values of n			Reference
	Min.	Design	Max.	
Pipe Materials				
Cast-iron, coated	0.01	0.012-0.014	0.014	1
Cast-iron, uncoated	0.011	0.013-0.015	0.015	1
Wrought Iron-galvanized	0.013	0.015-0.017	0.017	1
Wrought Iron, black	0.012		0.015	1
Steel, riveted and spiral	0.013	0.015-0.017	0.017	1
Corrugated	0.0021	0.025	0.0255	1
Corrugated plastic		0.015		1
Corrugated metal		0.029		1
Wood stave	0.01	0.012-0.013	0.014	1
Neat Cement surface	0.01		0.013	1
Concrete	0.01	0.012-0.017	0.017	1,6
Vitrified sewer pipe	0.01	0.013-0.015	0.017	1
Clay, common drainage tile	0.011	0.012-0.014	0.017	1
Corrugated plastic	0.014	0.015-0.016	0.017	1,10,11
PVC		0.009-0.011		1,10,11
Smooth Interior PE		0.009-0.015	0.02	1,10,11
Aluminum		0.01		1,10,11
Gated Aluminum Pipe		0.013		1,10,11
Natural streams – minor stream (top width at flood stage <100 feet				
Natural Streams (Channels)				
1. Clean, straight banks, full stage, no rifts or deep pools	0.025		0.033	1,4
2. Same as above, but more stones and weeds	0.03		0.04	1,4
3. Clean, winding, some pools and shoals	0.003		0.045	1,4
4. Same as (3), lower stages, more ineffective slopes and section	0.04		0.055	1,4
5. Same as (3), some weeds and stones	0.035		0.05	1,4
6. Same as (4), stony sections	0.045		0.06	1,4
7. Sluggish reaches, rather weedy, very deep pools	0.05		0.08	1,4
8. Very weedy reaches	0.075		0.15	1,4
Unlined Channels				
Earth, straight and uniform	0.017	0.0225	0.025	1
Dredged		0.0275	0.033	1
Winding and sluggish		0.025	0.03	1
Stony bed, weeds on bank		0.035	0.04	1
Earth bottom, rubble sides		0.030-0.033	0.035	1
Rock cuts, smooth and uniform		0.033	0.035	1
Jagged and irregular	0.035		0.045	1
Lined Channels				

Metal, smooth semicircular	0.011		0.015	1,5
Metal, corrugated	0.0228	0.024	0.0244	2
Wood, planned	0.01	0.012	0.015	1,5
Wood, unplanned	0.011	0.013	0.015	1,5
Neat cement-lined	0.01		0.013	1,5
Concrete	0.012	0.014-0.016	0.0018	1,5
Cement rubble	0.017		0.03	1,5
Vegetated, small channels, shallow depths				
Bermuda grass; long-13", green	0.042			3
Long – 13", dormant	0.035		0.28	3
Short – 3", green	0.034			3
Short – 3", dormant	0.034			3
Sericea Lespedeza; long – 16", green	0.076		0.22	3
Long – 16", dormant	0.05			3
Short – 2", green	0.033			3
Short – 2", dormant	0.034			3
Excavated or Dredged Channels				
a. Earth, straight, and uniform				
1. clean, recently completed	0.016	0.018	0.020	10
2. clean, after weathering	0.018	0.022	0.025	10
3. gravel, uniform section, clean	0.022	0.025	0.030	10
4. with short grass, few weeds	0.022	0.027	0.033	10
b. Earth, winding and sluggish				10
1. no vegetation	0.023	0.025	0.030	10
2. grass, some weeds	0.025	0.030	0.033	10
3. dense weeds or aquatic plants in deep channel	0.030	0.035	0.040	10
4. earth bottom and rubble sides	0.028	0.030	0.035	10
5. stony bottom and weedy banks	0.025	0.035	0.040	10
6. cobble bottom and clean sides	0.030	0.040	0.050	10
c. Dragline-excavated or dredged				10
1. no vegetation	0.025	0.028	0.033	10
2. light brush on banks	0.035	0.050	0.060	10
d. Rock cuts				10
1. smooth and uniform	0.025	0.035	0.040	10
2. jagged and irregular	0.035	0.040	0.050	10
e. Channels not maintained, weeds and brush uncut				10
1. dense weeds, high as flow depth	0.050	0.080	0.012	10
2. clean bottom, brush on sides	0.040	0.050	0.080	10
3. same as above, highest stage of flow	0.045	0.070	0.110	10
4. dense brush, high stage	0.008	0.100	0.140	10

References:

1. King's Handbook", pp182 and 268.
2. "Hydraulics of Corrugated Metal Pipes" by H.M. Morris, St. Anthony Falls Hydraulic Laboratory, University of Minnesota.
3. "Flow of Water in Channels Protected by Vegetative Linings" by W. O. Ree and V. J. Palmer; and USDA Technical Bulletin No. 967, February 1949.
4. "Low dams" by National Resources Committee, U. S. Government Printing Office, Washington, D. C., pp.227-233.
5. "The Flow of Water in Flumes" by Fred C. Scobey; USDA Technical Bulletin No. 393, Dec. 1933.
6. "Hydraulic Studies of Twenty-four Inch Culvert", studies by St. Anthony Falls Hydraulic Laboratory, University of Minnesota; The American Concrete Pipe Association: and the Portland Cement Association.
7. "The Flow of water in Irrigation Channels" by Fred C. Scobey, USDA Bulletin 194, 1929.
8. "Flow of Water in Drainage Channels" by C. E. Ramser, USDA Technical Bulletin No. 129, 1929.
9. "Some Better Kutter's Formula Coefficients" by R.E. Horton, Engineering News, February 24, May 4, 1916.
10. "Manning's n for Channel", by Chow, 1959.
11. N-values for corrugated metal pipe vary with pipe diameter. See FHWA (2001) or USACOE (2008) to select a refined n-value