



**City Utilities  
Design Standards  
Manual**

**Exhibit SW6-1  
Values of Manning's Roughness Coefficient , n**

Created: December 31, 2013

Revised:

	<b>Manning's n Range</b>		<b>Manning's n Range</b>
<b>I. Closed Conduits:</b>		<b>IV. Street and Expressway Gutters:</b>	
A. Concrete Pipe.....	0.013	A. Concrete gutter, troweled finish .....	0.013
B. Corrugated-metal pipe or pipe arch		B. Asphalt pavement:	
1. 2_ by ½-in. Corrugation (riveted pipe):		1. Smooth texture .....	0.013
a. Plain of fully coated.....	0.024	2. Rough texture.....	0.016
b. Paved invert (range values are for 25 and 50 percent of circumference paved):		C. Concrete gutter with asphalt pavement:	
(1) Flow full depth .....	0.021-0.018	1. Smooth.....	0.013
(2) Flow .8 depth.....	0.021-0.016	2. Rough.....	0.015
(3) Flow .6 depth.....	0.019-0.013	D. Concrete pavement:	
2. 2_ by ½-in. helical corrugation.....	0.022	1. Float finish .....	0.014
3. 2_ by ½-in. annular corrugation		2. Broom finish .....	0.016
a. 15 in. to 36 in.....	0.025	E. For gutters with small slope, where sediment may accumulate, increase above values by .....	0.002
b. 42 in. to 96 in.....	0.024		
4. 3 by 1 in. corrugation .....	0.027	<b>V. Natural Stream Channels:</b>	
5. 5 by 1 in. corrugation .....	0.025	A. Minor streams (surface width at flood stage less than 100 ft.):	
C. Structural plate pipe or pipe arch		1. Fairly regular section:	
1. 6 by 2 in. corrugation .....	0.033	a. Some grass and weeds, little or no brush..	0.030-0.035
2. 9 by 2 1/2 in. corrugation .....	0.035	b. Dense growth of weeds, depth of flow materially greater than weed height.....	0.035-0.06
D. Ductile Iron Pipe .....	0.012	c. Some weeds, light brush on banks .....	0.035-0.06
E. Smooth High Density Polyethylene (HDPE).....	0.012	d. Some weeds, heavy brush on banks .....	0.05-0.07
F. Smooth-lined interior Polyvinyl Chloride (PVC) .....	0.012	e. Some weeds, dense willows on banks .....	0.06-0.08
		f. For trees within channel, with branches submerged at high stage, increase all above values by .....	0.01-0.02
<b>II. Open Channels, lined (straight alignment):</b>		2. Irregular sections, with pools, slight channel meander: Increase values given in 1 a-e about .....	0.01-0.02
A. Concrete with surfaces as indicated:			
1. Formed, no finishes .....	0.013-0.017	<b>VI. Sheet Flow (for use in time of concentration calculations only):</b>	
2. Trowel finish .....	0.012-0.014	A. Paved Surfaces	
3. Float finish.....	0.013-0.015	1. Smooth Surfaces (concrete, asphalt, gravel, or bare soil) .....	0.011
4. Float finish.....	0.015-0.017	B. Unpaved Surfaces	
5. Gunite, good section.....	0.016-0.019	1. Fallow (no residue) .....	0.05
6. Gunite, wavy section .....	0.019-0.022	2. Cultivated Soils	
B. Concrete, bottom float finished, sides as indicated:		a. Cover ≤ 20% .....	0.06
1. Dressed stone in mortar .....	0.015-0.017	b. Cover ≥ 20%.....	0.17
2. Random stone in mortar .....	0.017-0.020	3. Grass	
3. Cement rubble masonry.....	0.020-0.025	a. Short grass, prairie.....	0.15
4. Cement rubble masonry, plastered .....	0.016-0.020	b. Dense grass.....	0.24
5. Dry rubble (rip rap).....	0.020-0.030	c. Bermuda grass .....	0.41
C. Gravel Bottom, sides as indicated:		d. Range.....	0.13
1. Formed concrete .....	0.017-0.020	4. Woods	
2. Random stone in mortar .....	0.020-0.023	a. Light underbrush .....	0.04
3. Dry rubble (rip rap).....	0.014-0.017	b. Dense underbrush .....	0.80
<b>III. Open Channels, (straight alignment, natural lining):</b>			
A. Earth, uniform section:			
1. Clean, recently completed .....	0.016-0.018		
2. Clean, after weathering.....	0.018-0.020		
3. With short grass, few weeds .....	0.022-0.027		
4. In gravelly soil, uniform section, clean .....	0.022-0.025		
B. Earth, fairly uniform section:			
1. No vegetation .....	0.022-0.026		
2. Grass, some weeds.....	0.025-0.030		
3. Dense weeds or aquatic plants in deep channels .....	0.030-0.036		
4. Sides clean, gravel bottom.....	0.025-0.030		
5. Sides clean, cobble bottom.....	0.030-0.040		
C. Channels not maintained, weeds and brush uncut:			
1. Dense weeds, high as flow depth.....	0.06-0.13		
2. Clean bottom, brush on sides.....	0.05-0.06		
3. Clean bottom, brush on sides, highest stage of flow .....	0.07-0.11		
4. Dense brush, high stage.....	0.10-0.14		

