

CHAPTER 5

OPEN CHANNEL HYDROLOGY

5.3 Manning's n Values

5.3.1 General Considerations

The Manning's n value is an important variable in open channel flow computations. Variation in this variable can significantly affect discharge, depth, and velocity estimates. Since Manning's n values depend on many different physical characteristics of natural and man-made channels, care and good engineering judgment must be exercised in the selection process.

5.3.2 Artificial Channels

Recommended Manning's n values for artificial channels with rigid, unlined, temporary, and riprap linings are given in table 5.4.4-1. Recommended values for vegetative linings should be determined using Figure 5.4.4-1, which provides a graphical relationship between Manning's n values and the product of velocity and hydraulic radius for several vegetative retardance classifications (see Table 5.4.4-4). Figure 5.4.4-1 is used iteratively as described in Section 5.6.

5.3.3 Natural Channels

Recommended Manning's values for natural channels which are either excavated or dredged and natural are given in Table 5.4.4-3. For natural channels, Manning's n values should be estimated using the procedures presented in the publication Guide For Selecting Manning's Roughness Coefficients For Natural Channels And Flood Plains, FHWA-TS-84-204, 1984.

Table 5.3-1
Maximum Velocities for Comparing Lining Materials

<u>Material</u>	<u>Maximum Velocity (ft/s)</u>
Sand	2.0
Silt	3.5
Firm Loam	3.5
Fine Gravel	5.0
Stiff Clay	5.0
Graded Loam or Silt to Cobbles	5.0
Coarse Gravel	6.0
Shales and Hard Pans	6.0

**Table 5.3-2
Maximum Velocities for Vegetative Channel Linings**

<u>Vegetation Type</u>	<u>Slope Range (%)¹</u>	<u>Maximum Velocity² (ft/s)</u>
Bermudagrass	0->10	5
Bahia		4
Tall Fescue Grass		
Mixture ³	0-10	4
Kentucky bluegrass	0-5	6
Buffalo grass	5-10	5
	>10	4
Grass mixture	0-5 ¹	4
	5-10	3
Sericea Lespedeza, Weeping Lovegrass		
Alfalha	0-5 ⁴	3
Annuals ⁵	0-5	3
Sod		4
Lapped sod		5

¹Do not use on slopes steeper than 10 percent except for side-slope in combination channel.

²Use velocities exceeding 5 ft/s only where good stands can be established and maintained.

³Mixtures of Tall Fescue, Bahia, and/or Bermuda.

⁴Do not use on slopes steeper than 5 percent except for side-slope in combination channel.

⁵Annuals – used on mild slopes or as temporary protection until permanent covers are established.

END OF SECTION 5.3