

Lining Category	Lining Type	$k_s$ (m)	n - value		
			Depth Ranges		
			0 - 0.15 m	0.15 - 0.6 m	> 0.6 m
Rigid	Concrete		0.015	0.013	0.013
	Grouted Riprap		0.040	0.030	0.028
	Stone Masonry		0.042	0.032	0.030
	Soil Cement		0.025	0.022	0.020
	Asphalt		0.018	0.016	0.016
Unlined	Bare Soil		0.023	0.020	0.020
	Rock Cut		0.045	0.035	0.025
Temporary*	Woven Paper Net	0.001	0.016	0.015	0.015
	Jute Net	0.012	0.028	0.022	0.019
	Fiberglass Roving	0.011	0.028	0.022	0.019
	Straw with Net	0.037	0.065	0.033	0.025
	Curled Wood Mat	0.034	0.066	0.035	0.028
	Synthetic Mat	0.020	0.036	0.025	0.021
Gravel Riprap	25 mm $D_{50}$	0.025	0.044	0.033	0.030
	50 mm $D_{50}$	0.050	0.066	0.041	0.034
Rock Riprap	150 mm $D_{50}$	0.150	0.104	0.069	0.035
	300 mm $D_{50}$	0.300	--	0.078	0.040

*Note: Values listed are representative values for the respective depth ranges. Manning's roughness coefficients,  $n$ , vary with the flow depth. For riprap  $k_s = D_{50}$ .*

\*Some "temporary" linings become permanent when buried.

*Source: HEC 15*

**MANNING'S ROUGHNESS COEFFICIENTS AND ROUGHNESS  
ELEMENT HEIGHT,  $k_s$   
Figure 30-6D**