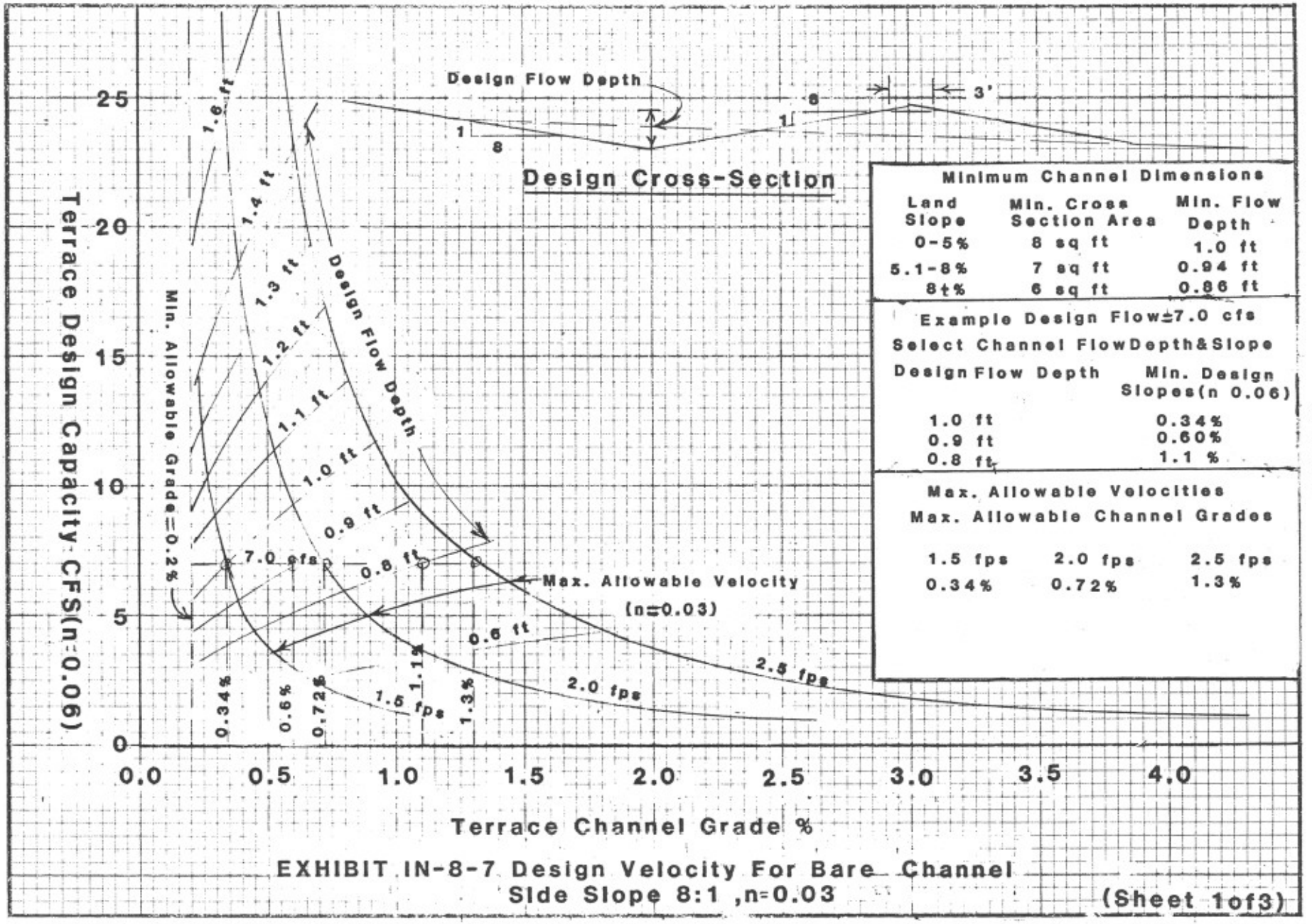
Inlet Dia. (In.)	Rows of slots	Slot Area** (Ft^2/Ft)	Holes Per Feet	Hole Area 3/4" Dia. (Ft^2/Ft)	Hole Area 1" Dia. (Ft^2/Ft)
6	4	0.128	24	0.074	0.131
8	6	0.201	36	0.110	0.196
10	8	0.268	45	0.138	0.245

*Minimum length of inlet required to keep velocity less than 2.0 feet per second through slots in non-shaded area.

**Slots are 3/4 inch by 4 inches spaced vertically 7 inches center to center.

Inlet Dia-meter	Min.* Length (Ft)	Orifice Diameter		Head - (feet)																		
		Inches	Sq.Ft.	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
6" C.H. Pipe	1.5	1.00	.006	.027	.033	.038	.042	.046	.050	.053	.056	.059	.062	.065	.068							
		1.25	.009	.042	.051	.059	.066	.072	.078	.083	.088	.093	.097	.102	.107							
		1.50	.012	.059	.073	.084	.094	.103	.111	.119	.126	.133	.139	.146	.153							
		1.75	.017	.081	.099	.114	.128	.140	.151	.162	.172	.181	.190	.198	.206							
		2.00	.022	.105	.129	.149	.166	.182	.197	.210	.223	.235	.247	.258	.270	.280	.290	.300	.309	.318	.326	.335
		2.25	.028	.133	.163	.188	.210	.231	.249	.266	.282	.298	.312	.326	.343	.357	.369	.381	.393	.404	.416	.426
		2.50	.034	.164	.201	.232	.259	.284	.307	.328	.348	.367	.385	.402	.417	.433	.448	.463	.477	.491	.505	.518
		2.75	.041	.199	.243	.281	.314	.344	.371	.397	.421	.444	.466	.486	.503	.522	.541	.558	.576	.592	.608	.624
	2.0	3.00	.049	.236	.289	.333	.373	.408	.441	.472	.500	.527	.553	.578	.602	.624	.646	.667	.688	.708	.727	.746
		3.25	.058	.277	.339	.391	.438	.479	.518	.554	.587	.619	.649	.678	.712	.739	.765	.790	.814	.838	.861	.883
		3.50	.067	.321	.393	.454	.508	.556	.600	.642	.681	.718	.753	.786	.822	.854	.883	.912	.941	.968	.994	1.020
8" C.H. Pipe	2.0	3.75	.077	.369	.451	.521	.583	.638	.689	.737	.782	.824	.864	.903	.945	.981	1.015	1.049	1.081	1.112	1.143	1.172
		4.00	.087	.419	.513	.592	.662	.725	.783	.837	.888	.936	.982	1.03	1.068	1.108	1.147	1.185	1.221	1.257	1.291	1.325
	2.5	4.25	.099	.473	.579	.668	.747	.818	.884	.945	1.00	1.06	1.11	1.16	1.215	1.261	1.305	1.348	1.390	1.430	1.469	1.507
		4.50	.110	.530	.649	.749	.838	.917	.991	1.06	1.12	1.18	1.24	1.30	1.350	1.401	1.451	1.498	1.544	1.589	1.632	1.675
	3.0	4.75	.123	.590	.723	.835	.933	1.02	1.10	1.18	1.25	1.32	1.38	1.45	1.509	1.567	1.622	1.675	1.727	1.777	1.825	1.873
		5.00	.136	.654	.801	.925	1.03	1.13	1.22	1.31	1.39	1.46	1.53	1.60	1.670	1.733	1.793	1.852	1.909	1.965	2.018	2.071
	3.5	5.25	.150	.721	.883	1.02	1.14	1.24	1.35	1.44	1.53	1.61	1.69	1.77	1.841	1.911	1.978	2.043	2.106	2.167	2.226	2.284
		5.50	.165	.790	.968	1.12	1.25	1.37	1.48	1.58	1.68	1.77	1.85	1.94	2.026	2.102	2.176	2.247	2.316	2.383	2.449	2.512
10" C.H. Pipe	3.5	5.75	.180	.863	1.06	1.22	1.37	1.50	1.62	1.72	1.83	1.93	2.02	2.11	2.210	2.293	2.374	2.451	2.527	2.600	2.671	2.741
		6.00	.196	.940	1.15	1.33	1.49	1.63	1.76	1.88	1.99	2.10	2.20	2.30	2.406	2.497	2.585	2.669	2.751	2.831	2.909	2.984

Exhibit IN 8-5 Discharge rates of circular orifice in CFS and minimum inlet dimensions.



Minimum Channel Dimensions		
Land Slope	Min. Cross Section Area	Min. Flow Depth
0-5%	8 sq ft	1.0 ft
5.1-8%	7 sq ft	0.94 ft
8+%	6 sq ft	0.86 ft

Example Design Flow=7.0 cfs

Select Channel Flow Depth & Slope

Design Flow Depth	Min. Design Slopes (n 0.06)
1.0 ft	0.34%
0.9 ft	0.60%
0.8 ft	1.1 %

Max. Allowable Velocities

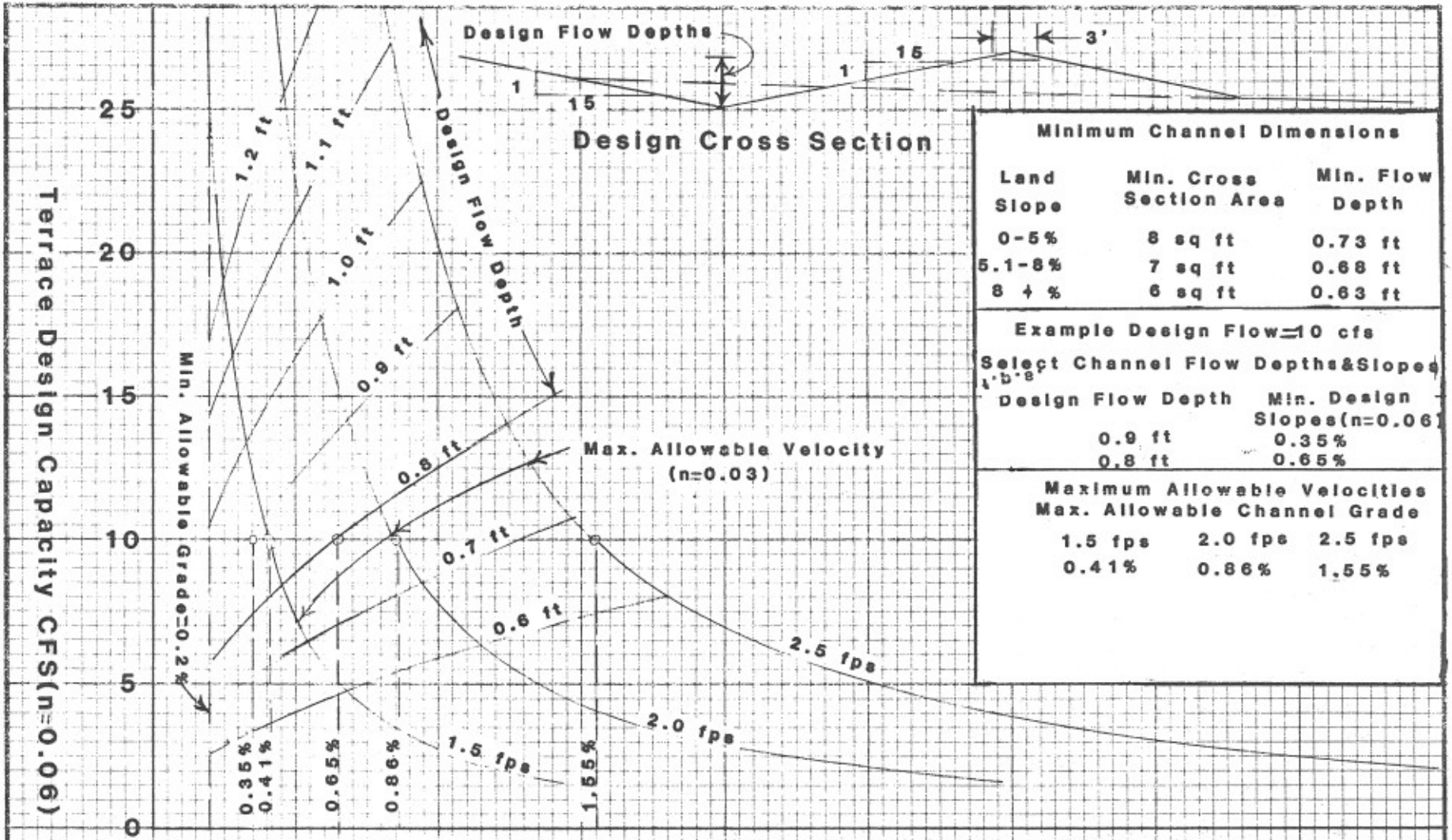
Max. Allowable Channel Grades

1.5 fps	2.0 fps	2.5 fps
0.34%	0.72%	1.3%

EXHIBIT IN-8-7 Design Velocity For Bare Channel
Side Slope 8:1 ,n=0.03

(Sheet 1of3)

(EFM Notice IN38,August 1981)



Minimum Channel Dimensions

Land Slope	Min. Cross Section Area	Min. Flow Depth
0-5%	8 sq ft	0.73 ft
5.1-8%	7 sq ft	0.68 ft
8 + %	6 sq ft	0.63 ft

Example Design Flow=10 cfs

Select Channel Flow Depths&Slopes

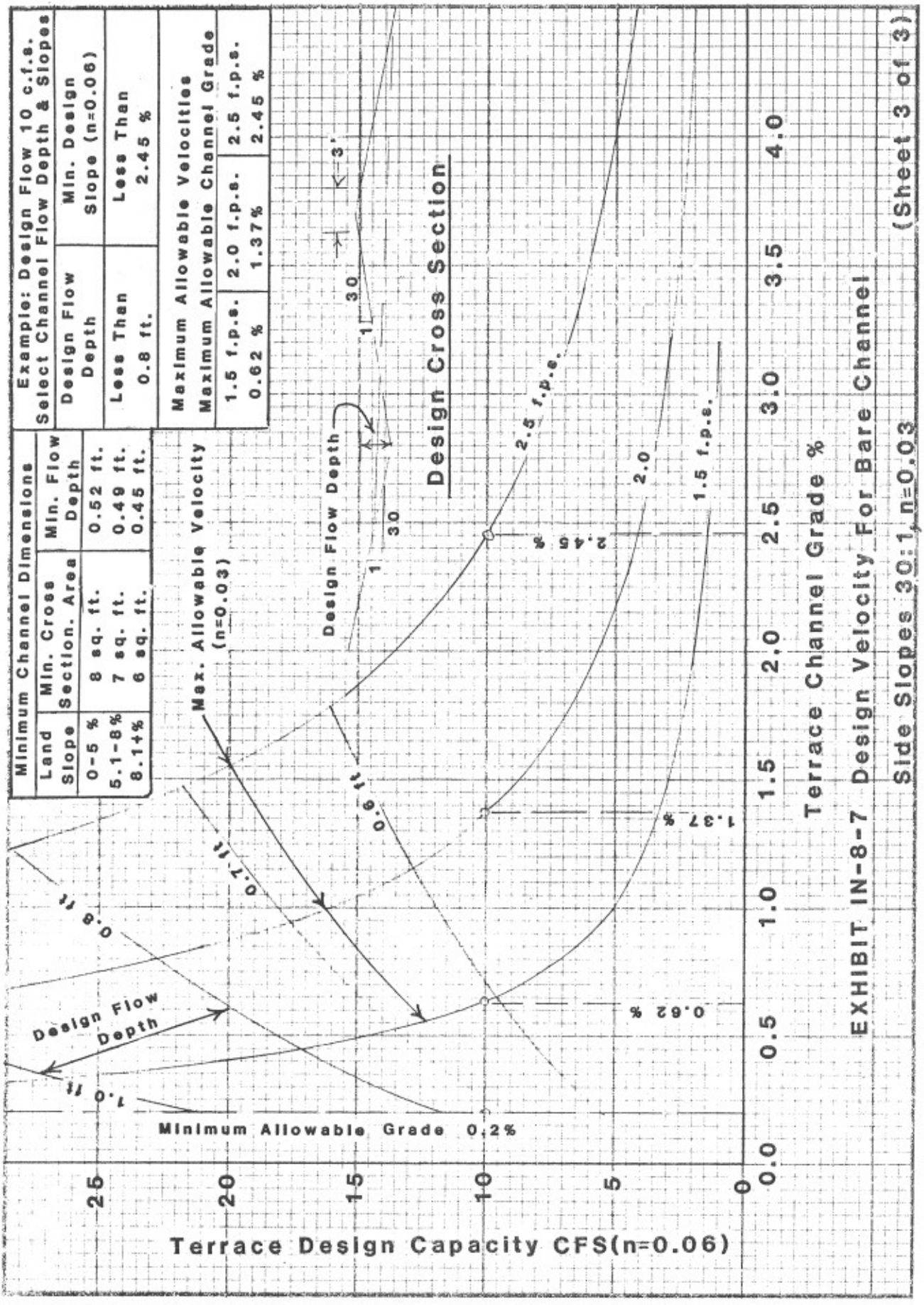
Design Flow Depth	Min. Design Slopes(n=0.06)
0.9 ft	0.35%
0.8 ft	0.65%

Maximum Allowable Velocities
Max. Allowable Channel Grade

1.5 fps	2.0 fps	2.5 fps
0.41%	0.86%	1.55%

EXHIBIT IN-8-7 Design Velocity For Bare Channel

Side Slopes 15:1, n=0.03 **(Sheet 2 of 3)**



Minimum Channel Dimensions		
Land Slope	Min. Cross Section. Area	Min. Flow Depth
0-5 %	8 sq. ft.	0.52 ft.
5.1-8%	7 sq. ft.	0.49 ft.
8.1+%	6 sq. ft.	0.45 ft.

Example: Design Flow 10 c.f.s. Select Channel Flow Depth & Slopes	
Design Flow Depth	Min. Design Slope (n=0.06)
Less Than 0.8 ft.	Less Than 2.45 %

Maximum Allowable Velocities Maximum Allowable Channel Grade		
1.5 f.p.s.	2.0 f.p.s.	2.5 f.p.s.
0.62 %	1.37%	2.45 %

EXHIBIT IN-8-7 Design Velocity For Bare Channel

Side Slopes 30:1, n=0.03

(Sheet 3 of 3)

(EFM Notice IN-38, August 1981)

DESIGN NOTES: The design velocity chart permits a check on channel velocity for vegetated channels. The channel velocity shall not exceed the following velocities:

Permanently Vegetated Channel	Velocity (feet per second)
Poor	3.0
Fair	4.0
Good	5.0

This chart is based on variable side slopes and a roughness coefficient of "n" of 0.08. Runoff can be figured by multiplying area drained in acres by 4 c.f.s.

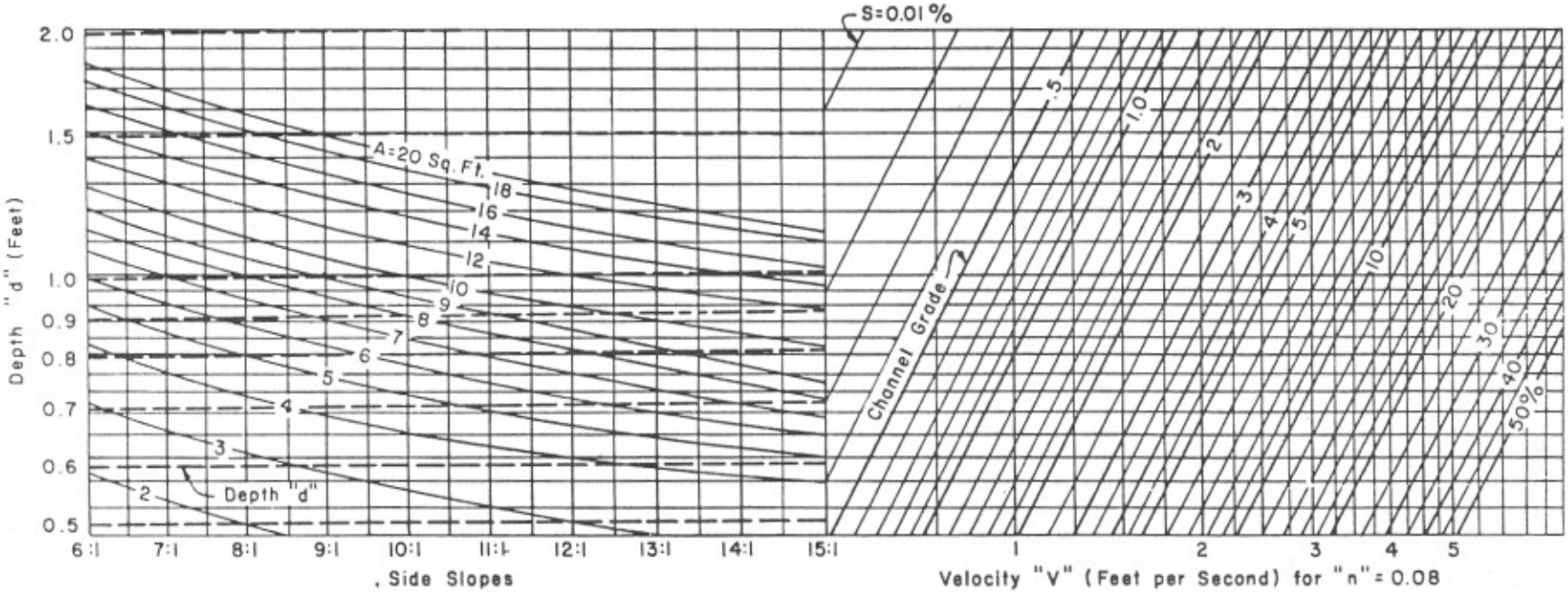


EXHIBIT 8-8:
GRAPHIC SOLUTION OF VEGETATED CHANNEL DIMENSIONS (Triangular cross section for various side slopes)
By Manning Formula