

Basic Hydraulics Report



Project name: Channel example
Project number: 2026-Ex1
Client: SANRAL
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Included sections

1. Channel Analysis
2. Weir Analysis
3. Water Surface Profiles

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Channel Analysis

Calculated variable* : Flow rate Q
Channel shape : Trapezoidal
Roughness method : Manning n

INPUT / SOLVED PARAMETERS

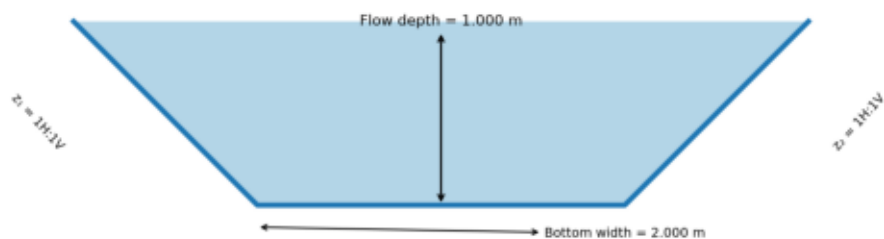
Flow rate Q* : 2.303 m³/s
Normal flow depth y : 1.000 m
Bottom width b : 2.000 m
Left side slope z₁ : 1.0000 H:V
Right side slope z₂ : 1.0000 H:V
Longitudinal slope S : 0.00100 m/m
Manning n : 0.03000 s/m^{1/3}

CALCULATED HYDRAULIC VALUES

Flow area : 3.000 m²
Wetted perimeter : 4.828 m
Hydraulic radius : 0.621 m
Top width : 4.000 m
Mean velocity : 0.768 m/s
Froude number : 0.283
Flow regime : Subcritical

Trapezoidal channel hydraulic calculation
Q=2.303 m³/s | V=0.768 m/s | Fr=0.283

S = 0.00100 m/m | n = 0.03000



Weir Analysis

Calculated variable* : Flow rate Q
Weir type : Sharp-crested
Flow rate Q : 8.500 m³/s
Head over crest H : 1.000 m
Crest length L : 5.000 m
Discharge coefficient C : 1.700

Sharp-crested weir calculation
Q=8.500 m³/s | C=1.700



Water Surface Profile Results

Channel shape : Trapezoidal
Profile description : M1
Slope classification : Mild
Method : Direct step method
Control : Downstream control
Normal depth : 1.4468 m
Critical depth : 0.7060 m
Calculated sections : 117
Final distance : 2320.0 m

WATER SURFACE PROFILE TABLE

Distance (m)	Depth (m)	Area (m ²)	Velocity (m/s)	Energy (m)	Friction slope (m/m)	Froude (-)
0.0	2.0000	14.0000	0.7143	2.0260	0.0003	0.1828
20.0	1.9859	13.8734	0.7208	2.0124	0.0003	0.1851
40.0	1.9720	13.7486	0.7273	1.9989	0.0003	0.1873
60.0	1.9582	13.6256	0.7339	1.9857	0.0003	0.1896
80.0	1.9446	13.5045	0.7405	1.9726	0.0004	0.1918
100.0	1.9312	13.3852	0.7471	1.9596	0.0004	0.1941
120.0	1.9179	13.2679	0.7537	1.9469	0.0004	0.1964
140.0	1.9048	13.1524	0.7603	1.9343	0.0004	0.1987
160.0	1.8919	13.0388	0.7669	1.9219	0.0004	0.2010
180.0	1.8792	12.9271	0.7736	1.9097	0.0004	0.2033
200.0	1.8666	12.8174	0.7802	1.8976	0.0004	0.2056
220.0	1.8543	12.7096	0.7868	1.8858	0.0004	0.2079
240.0	1.8421	12.6038	0.7934	1.8742	0.0004	0.2103
260.0	1.8301	12.5000	0.8000	1.8627	0.0004	0.2126
280.0	1.8183	12.3981	0.8066	1.8515	0.0004	0.2149
300.0	1.8068	12.2983	0.8131	1.8405	0.0005	0.2173
320.0	1.7954	12.2005	0.8196	1.8296	0.0005	0.2196
340.0	1.7842	12.1047	0.8261	1.8190	0.0005	0.2219
360.0	1.7733	12.0109	0.8326	1.8086	0.0005	0.2242
380.0	1.7625	11.9192	0.8390	1.7984	0.0005	0.2265
400.0	1.7520	11.8295	0.8453	1.7884	0.0005	0.2288
420.0	1.7417	11.7418	0.8517	1.7786	0.0005	0.2311
440.0	1.7316	11.6562	0.8579	1.7691	0.0005	0.2334
460.0	1.7217	11.5726	0.8641	1.7597	0.0005	0.2357
480.0	1.7120	11.4911	0.8702	1.7506	0.0006	0.2379
500.0	1.7026	11.4116	0.8763	1.7417	0.0006	0.2401
520.0	1.6933	11.3342	0.8823	1.7330	0.0006	0.2423
540.0	1.6843	11.2587	0.8882	1.7246	0.0006	0.2445
560.0	1.6756	11.1853	0.8940	1.7163	0.0006	0.2466
580.0	1.6670	11.1139	0.8998	1.7083	0.0006	0.2488
600.0	1.6587	11.0445	0.9054	1.7005	0.0006	0.2509
620.0	1.6506	10.9771	0.9110	1.6929	0.0006	0.2529
640.0	1.6427	10.9116	0.9165	1.6855	0.0006	0.2550
660.0	1.6350	10.8481	0.9218	1.6783	0.0007	0.2570
680.0	1.6275	10.7866	0.9271	1.6713	0.0007	0.2589

Water Surface Profile Results

WATER SURFACE PROFILE TABLE (continued)

Distance (m)	Depth (m)	Area (m²)	Velocity (m/s)	Energy (m)	Friction slope (m/m)	Froude (-)
700.0	1.6203	10.7269	0.9322	1.6646	0.0007	0.2609
720.0	1.6133	10.6691	0.9373	1.6581	0.0007	0.2628
740.0	1.6065	10.6132	0.9422	1.6517	0.0007	0.2646
760.0	1.5999	10.5591	0.9471	1.6456	0.0007	0.2665
780.0	1.5935	10.5068	0.9518	1.6397	0.0007	0.2682
800.0	1.5873	10.4563	0.9564	1.6340	0.0007	0.2700
820.0	1.5814	10.4075	0.9608	1.6284	0.0007	0.2717
840.0	1.5756	10.3605	0.9652	1.6231	0.0007	0.2733
860.0	1.5700	10.3151	0.9695	1.6179	0.0008	0.2750
880.0	1.5647	10.2714	0.9736	1.6130	0.0008	0.2765
900.0	1.5595	10.2293	0.9776	1.6082	0.0008	0.2781
920.0	1.5545	10.1888	0.9815	1.6036	0.0008	0.2796
940.0	1.5497	10.1498	0.9852	1.5991	0.0008	0.2810
960.0	1.5450	10.1123	0.9889	1.5949	0.0008	0.2824
980.0	1.5406	10.0763	0.9924	1.5908	0.0008	0.2838
1000.0	1.5363	10.0417	0.9958	1.5868	0.0008	0.2851
1020.0	1.5322	10.0085	0.9991	1.5831	0.0008	0.2863
1040.0	1.5282	9.9767	1.0023	1.5794	0.0008	0.2876
1060.0	1.5244	9.9461	1.0054	1.5760	0.0008	0.2888
1080.0	1.5208	9.9168	1.0084	1.5726	0.0008	0.2899
1100.0	1.5173	9.8888	1.0112	1.5694	0.0008	0.2910
1120.0	1.5140	9.8620	1.0140	1.5664	0.0009	0.2921
1140.0	1.5108	9.8363	1.0166	1.5634	0.0009	0.2931
1160.0	1.5077	9.8117	1.0192	1.5606	0.0009	0.2941
1180.0	1.5048	9.7882	1.0216	1.5580	0.0009	0.2951
1200.0	1.5020	9.7657	1.0240	1.5554	0.0009	0.2960
1220.0	1.4993	9.7442	1.0262	1.5530	0.0009	0.2969
1240.0	1.4967	9.7237	1.0284	1.5506	0.0009	0.2977
1260.0	1.4943	9.7042	1.0305	1.5484	0.0009	0.2985
1280.0	1.4919	9.6855	1.0325	1.5463	0.0009	0.2993
1300.0	1.4897	9.6677	1.0344	1.5442	0.0009	0.3000
1320.0	1.4876	9.6507	1.0362	1.5423	0.0009	0.3007
1340.0	1.4855	9.6345	1.0379	1.5404	0.0009	0.3014
1360.0	1.4836	9.6191	1.0396	1.5387	0.0009	0.3021
1380.0	1.4818	9.6044	1.0412	1.5370	0.0009	0.3027
1400.0	1.4800	9.5903	1.0427	1.5354	0.0009	0.3033
1420.0	1.4783	9.5770	1.0442	1.5339	0.0009	0.3039
1440.0	1.4767	9.5643	1.0456	1.5324	0.0009	0.3044
1460.0	1.4752	9.5522	1.0469	1.5311	0.0009	0.3049
1480.0	1.4738	9.5407	1.0481	1.5297	0.0009	0.3054
1500.0	1.4724	9.5298	1.0493	1.5285	0.0009	0.3059
1520.0	1.4711	9.5194	1.0505	1.5273	0.0009	0.3064
1540.0	1.4698	9.5095	1.0516	1.5262	0.0009	0.3068
1560.0	1.4686	9.5001	1.0526	1.5251	0.0009	0.3072
1580.0	1.4675	9.4912	1.0536	1.5241	0.0010	0.3076
1600.0	1.4664	9.4827	1.0546	1.5231	0.0010	0.3080
1620.0	1.4654	9.4747	1.0554	1.5222	0.0010	0.3083
1640.0	1.4645	9.4670	1.0563	1.5213	0.0010	0.3086
1660.0	1.4635	9.4597	1.0571	1.5205	0.0010	0.3090
1680.0	1.4627	9.4528	1.0579	1.5197	0.0010	0.3093

Water Surface Profile Results

WATER SURFACE PROFILE TABLE (continued)

Distance (m)	Depth (m)	Area (m²)	Velocity (m/s)	Energy (m)	Friction slope (m/m)	Froude (-)
1700.0	1.4619	9.4463	1.0586	1.5190	0.0010	0.3096
1720.0	1.4611	9.4400	1.0593	1.5183	0.0010	0.3098
1740.0	1.4603	9.4341	1.0600	1.5176	0.0010	0.3101
1760.0	1.4596	9.4285	1.0606	1.5169	0.0010	0.3103
1780.0	1.4589	9.4232	1.0612	1.5163	0.0010	0.3106
1800.0	1.4583	9.4182	1.0618	1.5158	0.0010	0.3108
1820.0	1.4577	9.4134	1.0623	1.5152	0.0010	0.3110
1840.0	1.4571	9.4089	1.0628	1.5147	0.0010	0.3112
1860.0	1.4566	9.4046	1.0633	1.5142	0.0010	0.3114
1880.0	1.4561	9.4005	1.0638	1.5137	0.0010	0.3116
1900.0	1.4556	9.3966	1.0642	1.5133	0.0010	0.3118
1920.0	1.4551	9.3929	1.0646	1.5129	0.0010	0.3119
1940.0	1.4547	9.3895	1.0650	1.5125	0.0010	0.3121
1960.0	1.4543	9.3862	1.0654	1.5121	0.0010	0.3122
1980.0	1.4539	9.3830	1.0658	1.5118	0.0010	0.3124
2000.0	1.4535	9.3801	1.0661	1.5114	0.0010	0.3125
2020.0	1.4531	9.3773	1.0664	1.5111	0.0010	0.3126
2040.0	1.4528	9.3746	1.0667	1.5108	0.0010	0.3128
2060.0	1.4525	9.3721	1.0670	1.5105	0.0010	0.3129
2080.0	1.4522	9.3697	1.0673	1.5102	0.0010	0.3130
2100.0	1.4519	9.3674	1.0675	1.5100	0.0010	0.3131
2120.0	1.4516	9.3653	1.0678	1.5097	0.0010	0.3132
2140.0	1.4514	9.3632	1.0680	1.5095	0.0010	0.3133
2160.0	1.4511	9.3613	1.0682	1.5093	0.0010	0.3134
2180.0	1.4509	9.3595	1.0684	1.5091	0.0010	0.3134
2200.0	1.4507	9.3578	1.0686	1.5089	0.0010	0.3135
2220.0	1.4505	9.3561	1.0688	1.5087	0.0010	0.3136
2240.0	1.4503	9.3546	1.0690	1.5085	0.0010	0.3137
2260.0	1.4501	9.3531	1.0692	1.5083	0.0010	0.3137
2280.0	1.4499	9.3517	1.0693	1.5082	0.0010	0.3138
2300.0	1.4497	9.3504	1.0695	1.5080	0.0010	0.3138
2320.0	1.4496	9.3491	1.0696	1.5079	0.0010	0.3139

Water Surface Profile

Trapezoidal channel — gradually varied flow profile M1
Mild slope | Direct step method | Downstream control

