Experiment Name: Simulation of Bridge on Natural River Stream

Cross Section

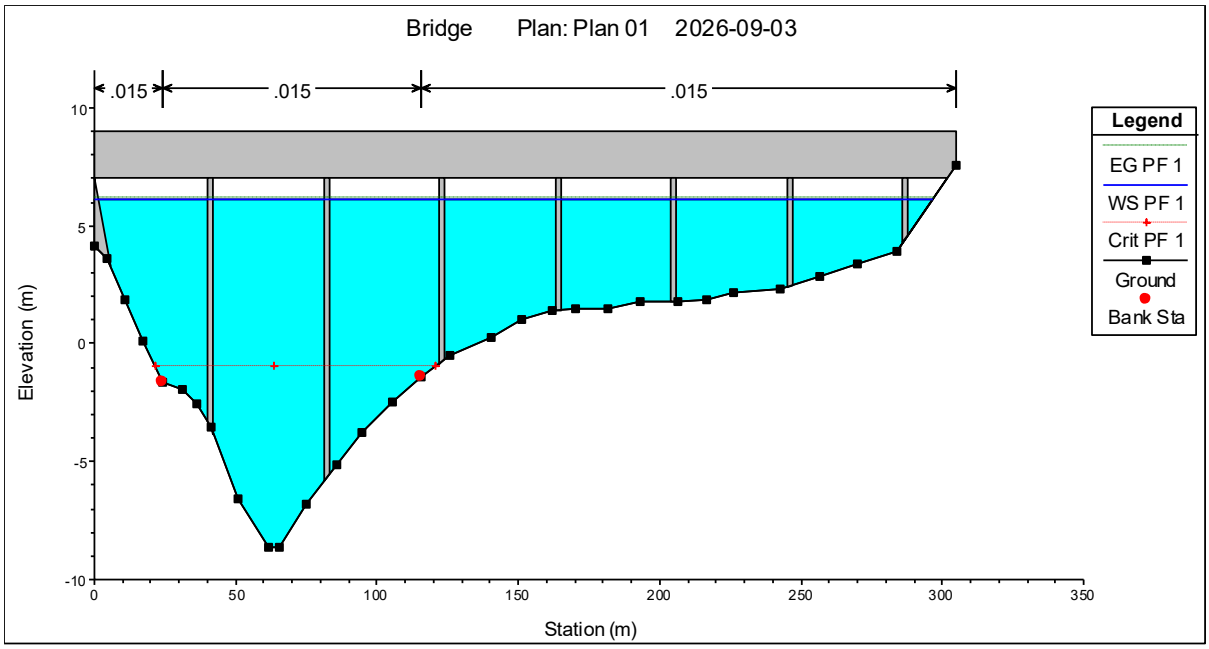


Figure 1 Upstream bridge face cross section (RS 10)

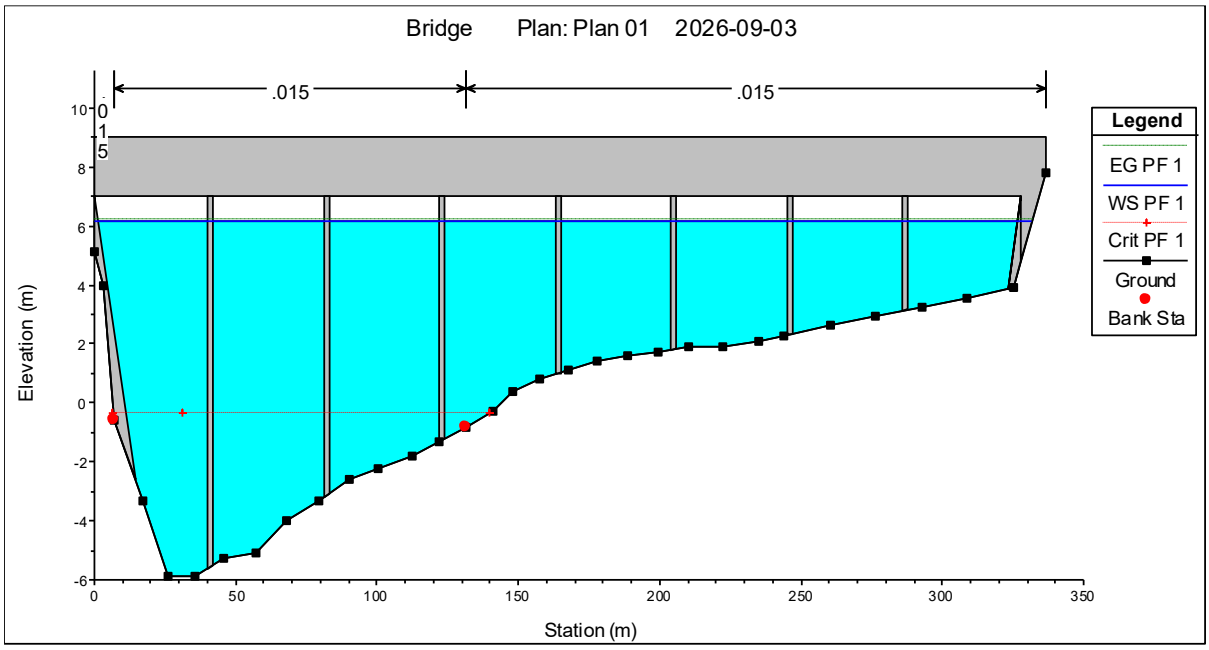
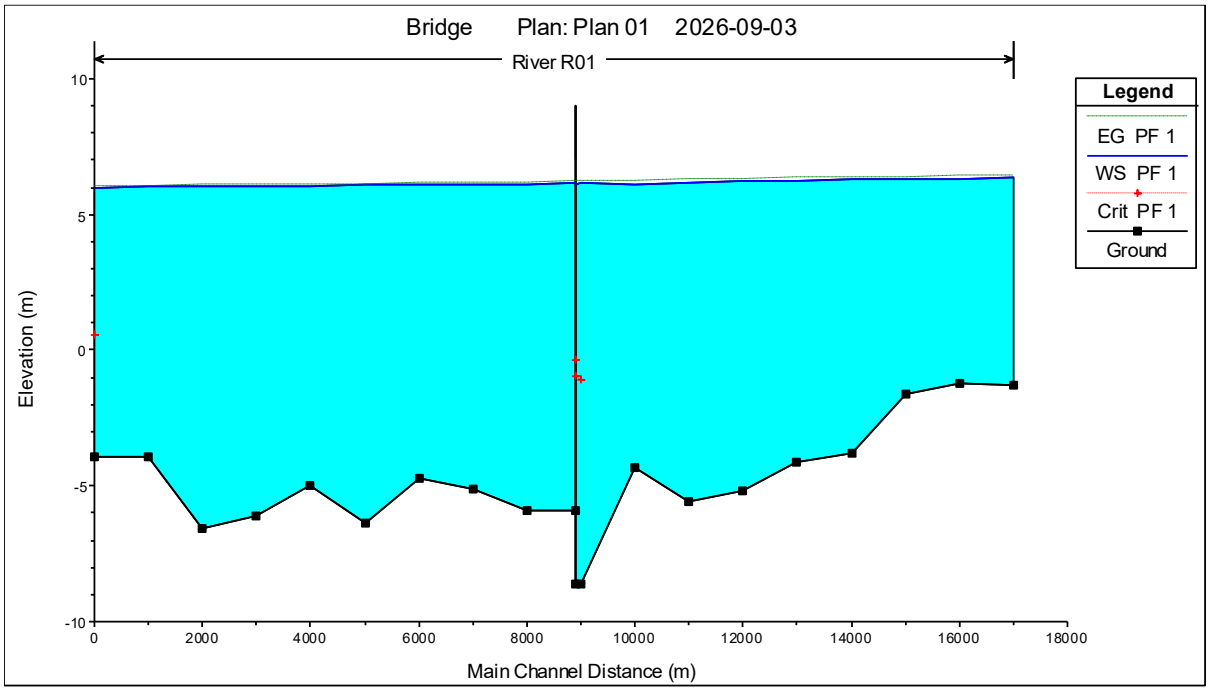


Figure 2 Downstream bridge face cross section (RS 9)

Longitudinal Profile



Profile Output Table

HEC-RAS Plan: Plan 01 River: River Reach: R01 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
R01	18	PF 1	2000.00	-1.26	6.37		6.46	0.000038	1.38	1481.92	261.99	0.18
R01	17	PF 1	2000.00	-1.25	6.34		6.42	0.000033	1.32	1550.98	258.54	0.17
R01	16	PF 1	2000.00	-1.60	6.29		6.39	0.000031	1.40	1437.35	198.06	0.16
R01	15	PF 1	2000.00	-3.80	6.29		6.36	0.000017	1.13	1800.54	227.33	0.12
R01	14	PF 1	2000.00	-4.10	6.26		6.34	0.000020	1.32	1681.11	234.36	0.14
R01	13	PF 1	2000.00	-5.20	6.25		6.31	0.000018	1.13	1792.79	238.63	0.13
R01	12	PF 1	2000.00	-5.60	6.18		6.29	0.000026	1.57	1545.13	253.25	0.16
R01	11	PF 1	2000.00	-4.30	6.13		6.25	0.000042	1.68	1395.99	260.03	0.19
R01	10	PF 1	2000.00	-8.60	6.14	-1.11	6.21	0.000018	1.36	1871.00	296.87	0.13
R01	9.5		Bridge									
R01	9	PF 1	2000.00	-5.90	6.13		6.19	0.000016	1.21	2012.78	331.73	0.13
R01	8	PF 1	2000.00	-5.10	6.11		6.17	0.000017	1.22	2057.91	347.18	0.13
R01	7	PF 1	2000.00	-4.70	6.09		6.15	0.000018	1.21	2035.78	348.15	0.13
R01	6	PF 1	2000.00	-6.40	6.09		6.13	0.000013	1.18	2212.99	319.78	0.11
R01	5	PF 1	2000.00	-5.00	6.06		6.12	0.000017	1.25	2037.38	321.97	0.13
R01	4	PF 1	2000.00	-6.10	6.04		6.10	0.000018	1.36	1994.74	334.12	0.13
R01	3	PF 1	2000.00	-6.60	6.03		6.08	0.000014	1.14	2202.98	350.96	0.12
R01	2	PF 1	2000.00	-3.90	6.01		6.07	0.000017	1.18	2147.09	381.96	0.13
R01	1	PF 1	2000.00	-3.90	6.00	0.53	6.05	0.000016	1.13	2288.14	442.94	0.12

Discussion

Under the design discharge of 2000 cumec, the water surface profile demonstrates subcritical flow throughout the reach, controlled by the 6.00 m downstream boundary condition. Froude numbers stay well below 0.20, indicating stable, low-velocity flow regimes across all cross sections.

Across the bridge between River Stations 9 and 10, the hydraulic impact of the structure is negligible. The water surface elevation rises by only 0.01 m (from 6.13 m at RS 9 to 6.14 m at RS 10), producing a total head loss of just 0.02 m. This minimal afflux occurs because the seven 2.0 m piers block only 14 m of waterway width across a deep channel section exceeding 1800 m^2 in conveyance area, keeping channel velocities between 1.21 and 1.36 m/s.

With the low chord set at 7.00 m, the upstream water surface elevation of 6.14 m maintains 0.86 m of freeboard. The bridge operates entirely under open-channel flow without deck submergence, pressure orifice flow, or roadway overtopping. Sealing the right approach embankment from Station 328 to the natural bank eliminates bypass flow, directing all flood discharge safely through the eight spans.