

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 421.3 cfs

Maximum Flow: 514.2 cfs

Table 1 - Summary of Culvert Flows at Crossing: Crossing 19 Frontage Road

Headwater Elevation (ft)	Total Discharge (cfs)	Rt. Sta. 374+90 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
352.90	0.00	0.00	0.00	1
354.90	51.42	51.42	0.00	1
356.08	102.84	102.84	0.00	1
357.10	154.26	154.26	0.00	1
358.00	205.68	205.68	0.00	1
358.88	257.10	257.10	0.00	1
359.79	308.52	308.52	0.00	1
360.80	359.94	359.94	0.00	1
361.22	411.36	379.99	31.16	7
361.26	421.30	381.71	39.42	5
361.54	514.20	394.35	119.65	5
361.00	369.60	369.60	0.00	Overtopping

Rating Curve Plot for Crossing: Crossing 19 Frontage Road

Total Rating Curve
Crossing: Crossing 19 Frontage Road

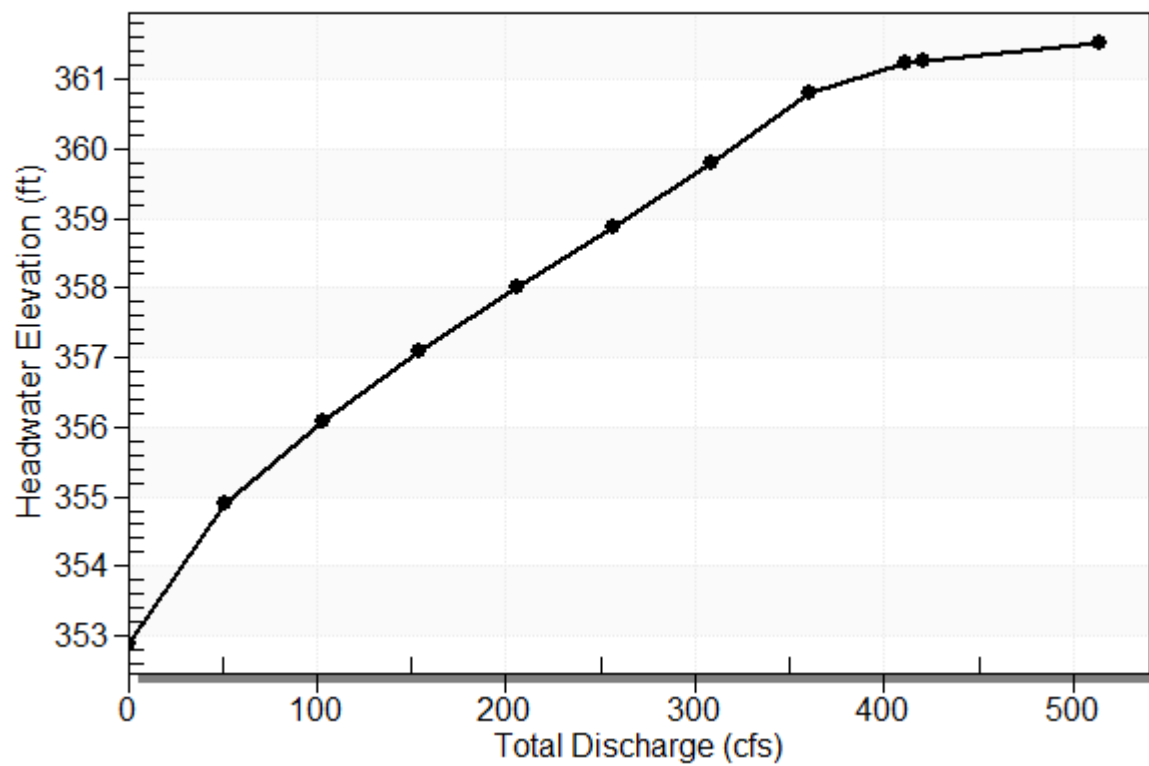


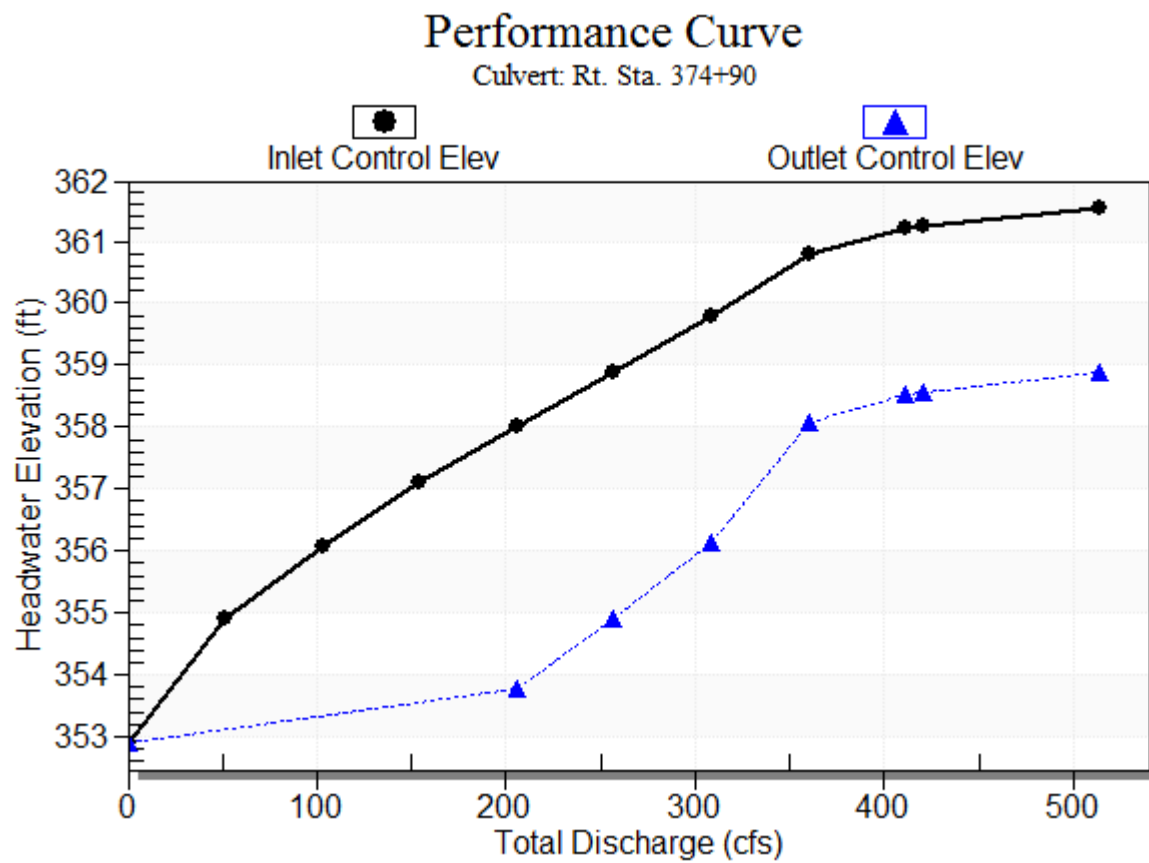
Table 2 - Culvert Summary Table: Rt. Sta. 374+90

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	352.90	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
51.42	51.42	354.90	2.000	0.0*	1-S2n	0.812	1.316	0.848	1.291	10.100	5.256
102.84	102.84	356.08	3.183	0.0*	1-S2n	1.314	2.090	1.343	1.852	12.764	6.377
154.26	154.26	357.10	4.196	0.0*	1-S2n	1.750	2.738	1.806	2.272	14.238	7.114
205.68	205.68	358.00	5.099	0.880	1-S2n	2.151	3.317	2.235	2.617	15.334	7.678
257.10	257.10	358.88	5.977	2.011	1-S2n	2.528	3.849	2.645	2.916	16.200	8.141
308.52	308.52	359.79	6.893	3.239	5-S2n	2.895	4.346	3.042	3.181	16.903	8.536
359.94	359.94	360.80	7.898	5.165	5-S2n	3.253	4.817	3.428	3.421	17.500	8.884
411.36	379.99	361.22	8.322	5.627	5-S2n	3.389	4.994	3.576	3.642	17.709	9.195
421.30	381.71	361.26	8.359	5.667	5-S2n	3.401	5.009	3.589	3.683	17.726	9.251
514.20	394.35	361.54	8.639	5.969	5-S2n	3.486	5.119	3.681	4.039	17.858	9.736

* Full Flow Headwater elevation is below inlet invert.

Straight Culvert
Inlet Elevation (invert): 352.90 ft, Outlet Elevation (invert): 349.40 ft
Culvert Length: 287.02 ft, Culvert Slope: 0.0122

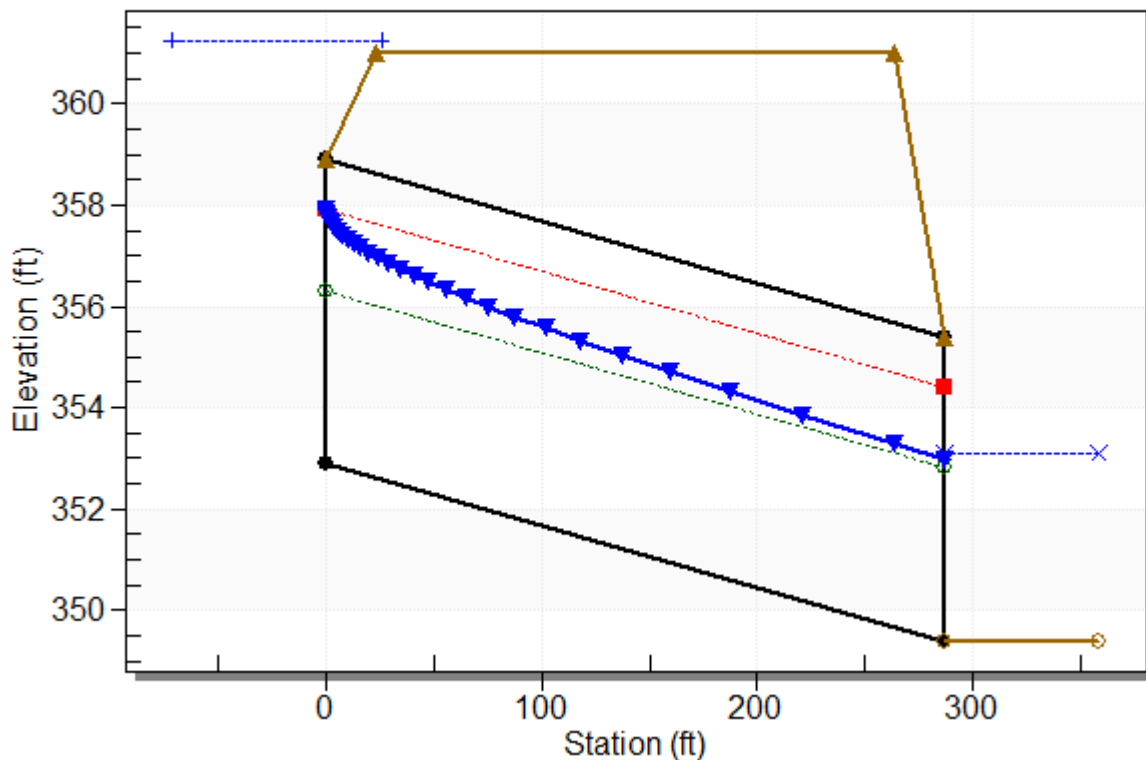
Culvert Performance Curve Plot: Rt. Sta. 374+90



Water Surface Profile Plot for Culvert: Rt. Sta. 374+90

Crossing - Crossing 19 Frontage Road, Design Discharge - 421.3 cfs

Culvert - Rt. Sta. 374+90, Culvert Discharge - 381.7 cfs



Site Data - Rt. Sta. 374+90

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 352.90 ft

Outlet Station: 287.00 ft

Outlet Elevation: 349.40 ft

Number of Barrels: 1

Culvert Data Summary - Rt. Sta. 374+90

Barrel Shape: Concrete Box

Barrel Span: 6.00 ft

Barrel Rise: 6.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge (30-75° flare) Wingwall

Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: Crossing 19 Frontage Road)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	349.40	0.00	0.00	0.00	0.00
51.42	350.69	1.29	5.26	1.61	0.94
102.84	351.25	1.85	6.38	2.31	0.99
154.26	351.67	2.27	7.11	2.84	1.01
205.68	352.02	2.62	7.68	3.27	1.03
257.10	352.32	2.92	8.14	3.64	1.04
308.52	352.58	3.18	8.54	3.97	1.05
359.94	352.82	3.42	8.88	4.27	1.06
411.36	353.04	3.64	9.19	4.55	1.07
421.30	353.08	3.68	9.25	4.60	1.07
514.20	353.44	4.04	9.74	5.04	1.09

Tailwater Channel Data - Crossing 19 Frontage Road

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 5.00 ft

Side Slope (H:V): 2.00 (2:1)

Channel Slope: 0.0200

Channel Manning's n: 0.0375

Channel Invert Elevation: 349.40 ft

Roadway Data for Crossing: Crossing 19 Frontage Road

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 361.00 ft

Roadway Surface: Paved

Roadway Top Width: 240.00 ft