HY-8 Culvert Analysis Report

Crossing Discharge Data

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

Minimum Flow: 239.00 cfs

Design Flow: 321.00 cfs

Maximum Flow: 463.00 cfs

Table 1 - Summary of Culvert Flows at Crossing: EX DEL-42-12.7

Headwater Elevation (ft)	Total Discharge (cfs)	EX 8x6 BOX Discharge (cfs)	Roadway Discharge (cfs)	Iterations
944.00	239.00	239.00	0.00	1
944.30	261.40	261.40	0.00	1
944.60	283.80	283.80	0.00	1
944.88	306.20	306.20	0.00	1
945.07	321.00	321.00	0.00	1
945.28	351.00	351.00	0.00	1
945.98	373.40	373.40	0.00	1
946.37	395.80	395.80	0.00	1
946.77	418.20	418.20	0.00	1
947.18	440.60	440.60	0.00	1
947.57	463.00	460.92	2.05	7
947.50	457.98	457.98	0.00	Overtopping

Culvert Data: EX 8x6 BOX

Table 1 - Culvert Summary Table: EX 8x6 BOX

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)
239.00 cfs	239.00 cfs	944.00	5.12	5.916	7-H2t	-1.00	3.03	4.92	4.90	6.08	2.74
261.40 cfs	261.40 cfs	944.30	5.44	6.220	7-H2t	-1.00	3.21	5.13	5.11	6.37	2.80

283.80 cfs	283.80 cfs	944.60	5.75	6.514	7-H2t	-1.00	3.39	5.33	5.32	6.65	2.87
306.20 cfs	306.20 cfs	944.88	6.07	6.798	7-H2t	-1.00	3.57	5.53	5.51	6.93	2.92
321.00 cfs	321.00 cfs	945.07	6.28	6.982	7-H2t	-1.00	3.68	5.65	5.63	7.10	2.96
351.00 cfs	351.00 cfs	945.28	6.71	7.199	7-H2t	-1.00	3.91	5.92	5.87	7.45	3.03
373.40 cfs	373.40 cfs	945.98	7.04	7.895	4-FFf	-1.00	4.07	5.92	6.04	7.89	3.08
395.80 cfs	395.80 cfs	946.37	7.38	8.287	4-FFf	-1.00	4.24	5.92	6.21	8.36	3.12
418.20 cfs	418.20 cfs	946.77	7.72	8.686	4-FFf	-1.00	4.39	5.92	6.37	8.84	3.17
440.60 cfs	440.60 cfs	947.18	8.08	9.094	4-FFf	-1.00	4.55	5.92	6.52	9.31	3.21
463.00 cfs	460.92 cfs	947.57	8.42	9.485	4-FFf	-1.00	4.69	5.92	6.67	9.74	3.25

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

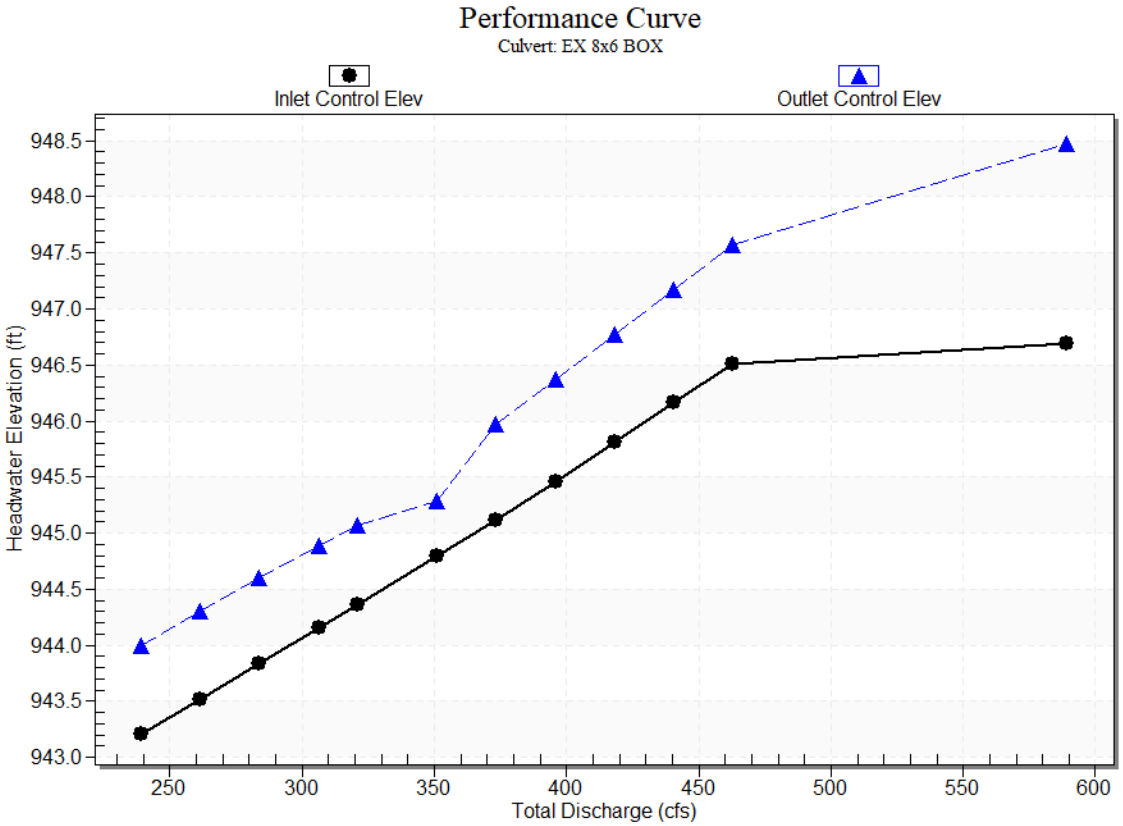
Inlet Elevation (invert): 938.08 ft,

Outlet Elevation (invert): 938.08 ft

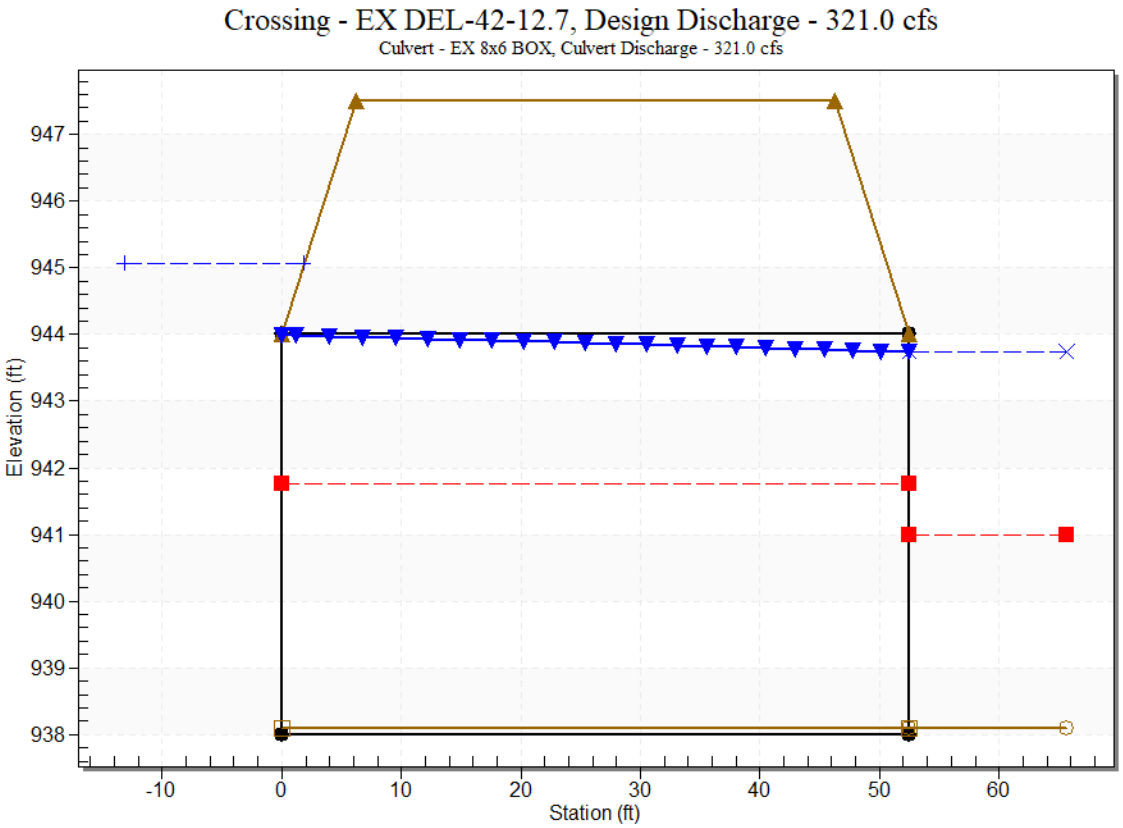
Culvert Length: 52.50 ft,

Culvert Slope: 0.0000

Culvert Performance Curve Plot: EX 8x6 BOX



Water Surface Profile Plot for Culvert: EX 8x6 BOX



Site Data - EX 8x6 BOX

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 938.00 ft

Outlet Station: 52.50 ft

Outlet Elevation: 938.00 ft

Number of Barrels: 1

Culvert Data Summary - EX 8x6 BOX

Barrel Shape: Concrete Box

Barrel Span: 8.00 ft

Barrel Rise: 6.00 ft

Barrel Material: Concrete

Embedment: 1.00 in

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0350 (bottom)

Culvert Type: Straight

Inlet Configuration: Square Edge (90º) Headwall (Ke=0.5)

Inlet Depression: None

Tailwater Data for Crossing: EX DEL-42-12.7

Table 2 - Downstream Channel Rating Curve (Crossing: EX DEL-42-12.7)

Flow (cfs)	Water Surface Elev (ft)	Velocity (ft/s)	Depth (ft)	Shear (psf)	Froude Number
239.00	943.00	4.90	2.74	0.31	0.27
261.40	943.21	5.11	2.80	0.32	0.27
283.80	943.42	5.32	2.87	0.33	0.27
306.20	943.61	5.51	2.92	0.34	0.28
321.00	943.73	5.63	2.96	0.35	0.28
351.00	943.97	5.87	3.03	0.37	0.28
373.40	944.14	6.04	3.08	0.38	0.28
395.80	944.31	6.21	3.12	0.39	0.28
418.20	944.47	6.37	3.17	0.40	0.28
440.60	944.62	6.52	3.21	0.41	0.28
463.00	944.77	6.67	3.25	0.42	0.28

Tailwater Channel Data - EX DEL-42-12.7

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 8.00 ft

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

Channel Slope: 0.0010

Channel Manning's n: 0.0350

Channel Invert Elevation: 938.10 ft

Roadway Data for Crossing: EX DEL-42-12.7

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 40.00 ft

Crest Elevation: 947.50 ft

Roadway Surface: Paved

Roadway Top Width: 40.00 ft