

HY-8 Culvert Analysis Report

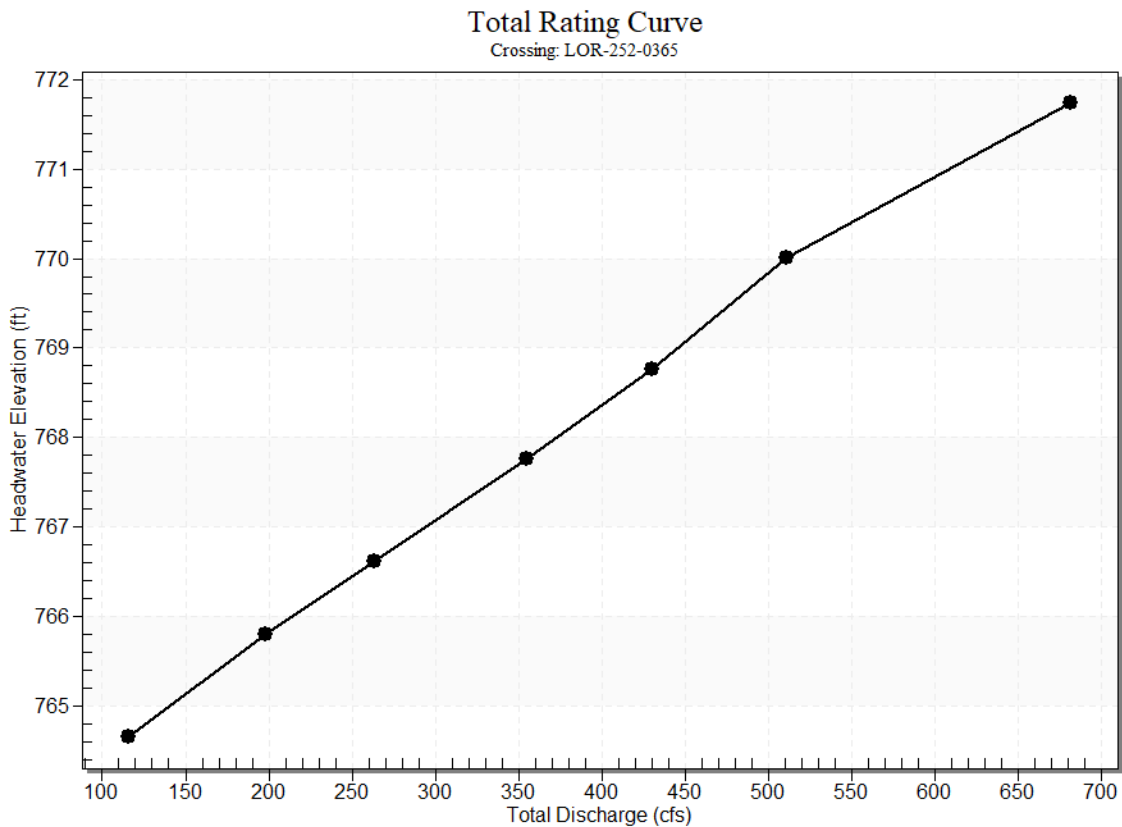
Crossing Discharge Data

Discharge Selection Method: Recurrence

Table 1 - Summary of Culvert Flows at Crossing: LOR-252-0365

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	Ex. Twin 5x5 Box Discharge (cfs)	Roadway Discharge (cfs)	Iterations
764.66	2 year	116.00	116.00	0.00	1
765.80	5 year	198.00	198.00	0.00	1
766.61	10 year	263.00	263.00	0.00	1
767.76	25 year	355.00	355.00	0.00	1
768.77	50 year	430.00	430.00	0.00	1
770.01	100 year	511.00	511.00	0.00	1
771.34	Overtopping	586.25	586.25	0.00	Overtopping

Rating Curve Plot for Crossing: LOR-252-0365



Culvert Data: Ex. Twin 5x5 Box

Table 1 - Culvert Summary Table: Ex. Twin 5x5 Box

Disc harg e Nam es	Total Disc harg e (cfs)	Culv ert Disc harg e (cfs)	Head water Eleva tion (ft)	Inle t Con trol Dep th (ft)	Out let Con trol Dep th (ft)	Fl o w Ty pe	Nor mal Dep th (ft)	Crit ical De pth (ft)	Ou tle t De pth (ft)	Tail water r Dept h (ft)	Outl et Vel ocit y (ft/ s)	Tail water r Velo city (ft/s)
2 year	116.0 0 cfs	116.0 0 cfs	764.6 6	2.74	1.52 7	1- S2 n	1.37	1.6 1	1.4 2	2.04	8.14	3.53
5 year	198.0 0 cfs	198.0 0 cfs	765.8 0	3.88	2.47 6	1- S2 n	2.01	2.3 0	2.0 9	2.74	9.49	4.13
10 year	263.0 0 cfs	263.0 0 cfs	766.6 1	4.69	3.25 8	1- S2 n	2.48	2.7 8	2.5 6	3.19	10.2 7	4.49
25 year	355.0 0 cfs	355.0 0 cfs	767.7 6	5.84	4.44 7	5- S2 n	3.11	3.4 0	3.1 9	3.73	11.1 3	4.88
50 year	430.0 0 cfs	430.0 0 cfs	768.7 7	6.85	6.07 5	5- S2 n	3.61	3.8 6	3.6 7	4.12	11.7 1	5.15
100 year	511.0 0 cfs	511.0 0 cfs	770.0 1	8.09	7.08 0	5- S2 n	4.14	4.3 3	4.1 8	4.51	12.2 3	5.40

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

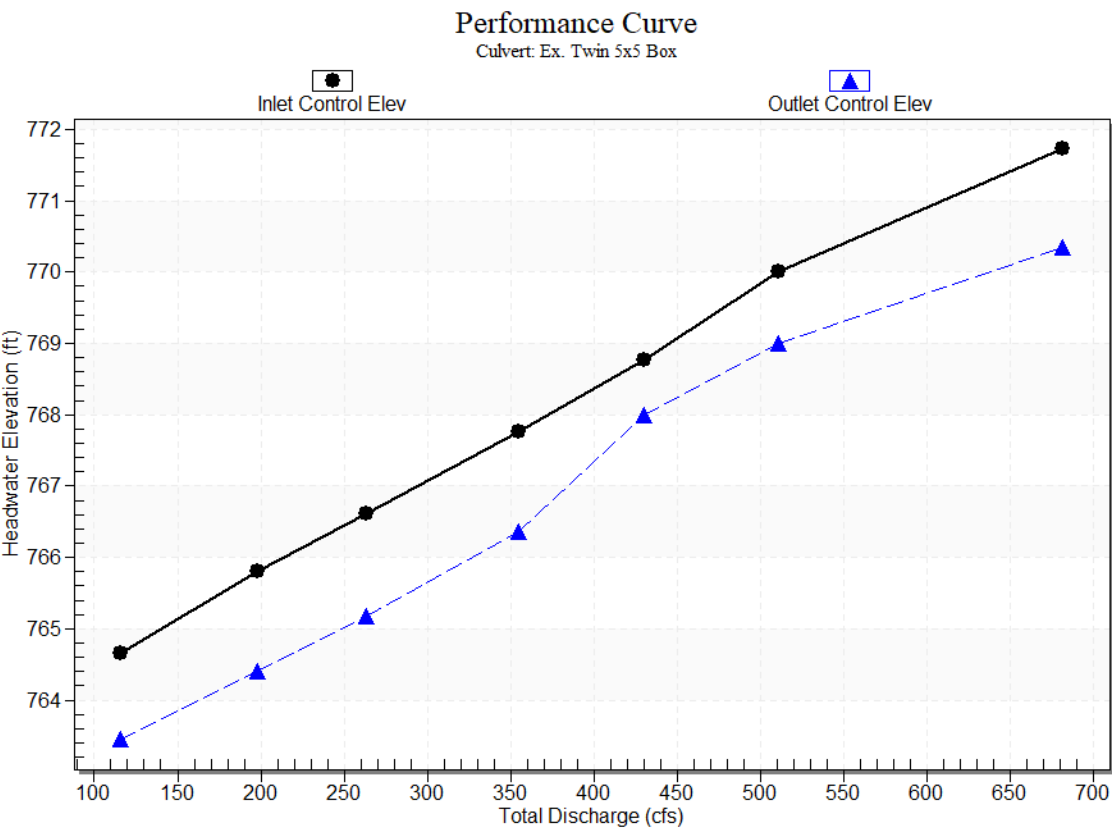
Inlet Elevation (invert): 761.92 ft,

Outlet Elevation (invert): 761.70 ft

Culvert Length: 40.29 ft,

Culvert Slope: 0.0055

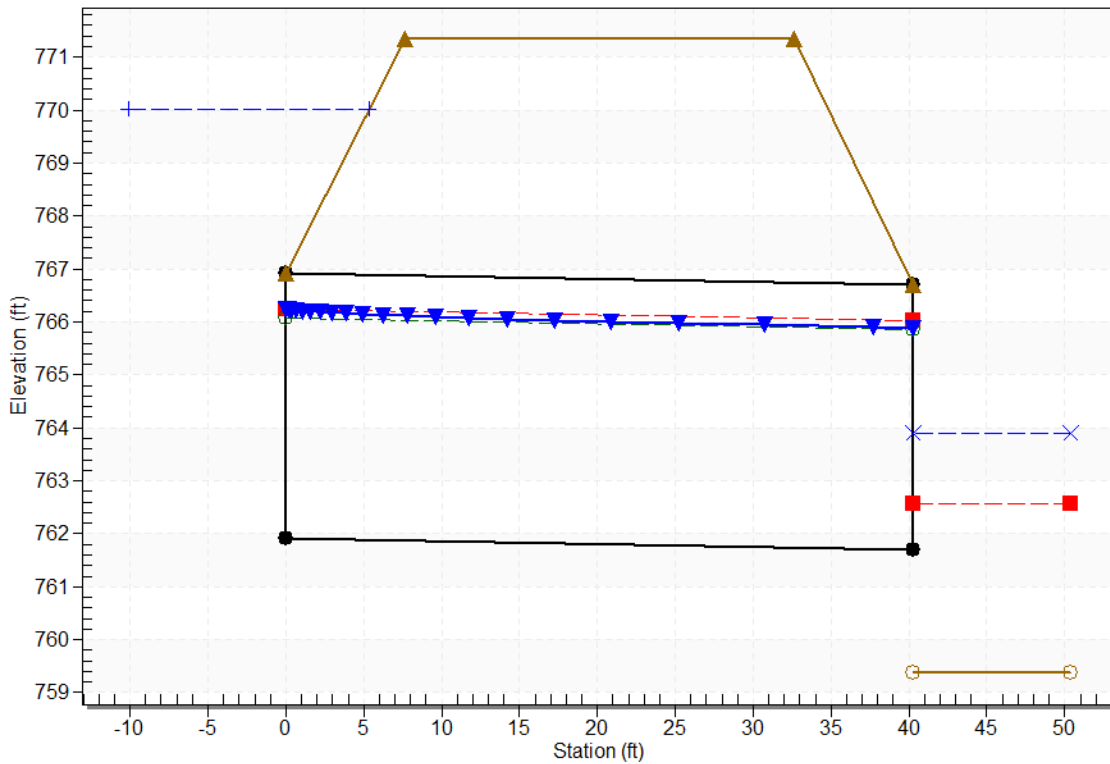
Culvert Performance Curve Plot: Ex. Twin 5x5 Box



Water Surface Profile Plot for Culvert: Ex. Twin 5x5 Box

Crossing - LOR-252-0365, Design Discharge - 511.0 cfs

Culvert - Ex. Twin 5x5 Box, Culvert Discharge - 511.0 cfs



Site Data - Ex. Twin 5x5 Box

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 761.92 ft

Outlet Station: 40.29 ft

Outlet Elevation: 761.70 ft

Number of Barrels: 2

Culvert Data Summary - Ex. Twin 5x5 Box

Barrel Shape: Concrete Box

Barrel Span: 5.00 ft

Barrel Rise: 5.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge (90°) Headwall

Inlet Depression: None

Tailwater Data for Crossing: LOR-252-0365

Table 2 - Downstream Channel Rating Curve (Crossing: LOR-252-0365)

Flow (cfs)	Water Surface Elev (ft)	Velocity (ft/s)	Depth (ft)	Shear (psf)	Froude Number
116.00	761.42	2.04	3.53	0.64	0.49
198.00	762.12	2.74	4.13	0.85	0.50
263.00	762.57	3.19	4.49	1.00	0.51
355.00	763.11	3.73	4.88	1.17	0.52
430.00	763.50	4.12	5.15	1.29	0.53
511.00	763.89	4.51	5.40	1.41	0.54

Tailwater Channel Data - LOR-252-0365

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.00 ft

Side Slope (H:V): 2.00 (┐:1)

Channel Slope: 0.0050

Channel Manning's n: 0.0400

Channel Invert Elevation: 759.38 ft

Roadway Data for Crossing: LOR-252-0365

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 771.34 ft

Roadway Surface: Paved

Roadway Top Width: 25.00 ft

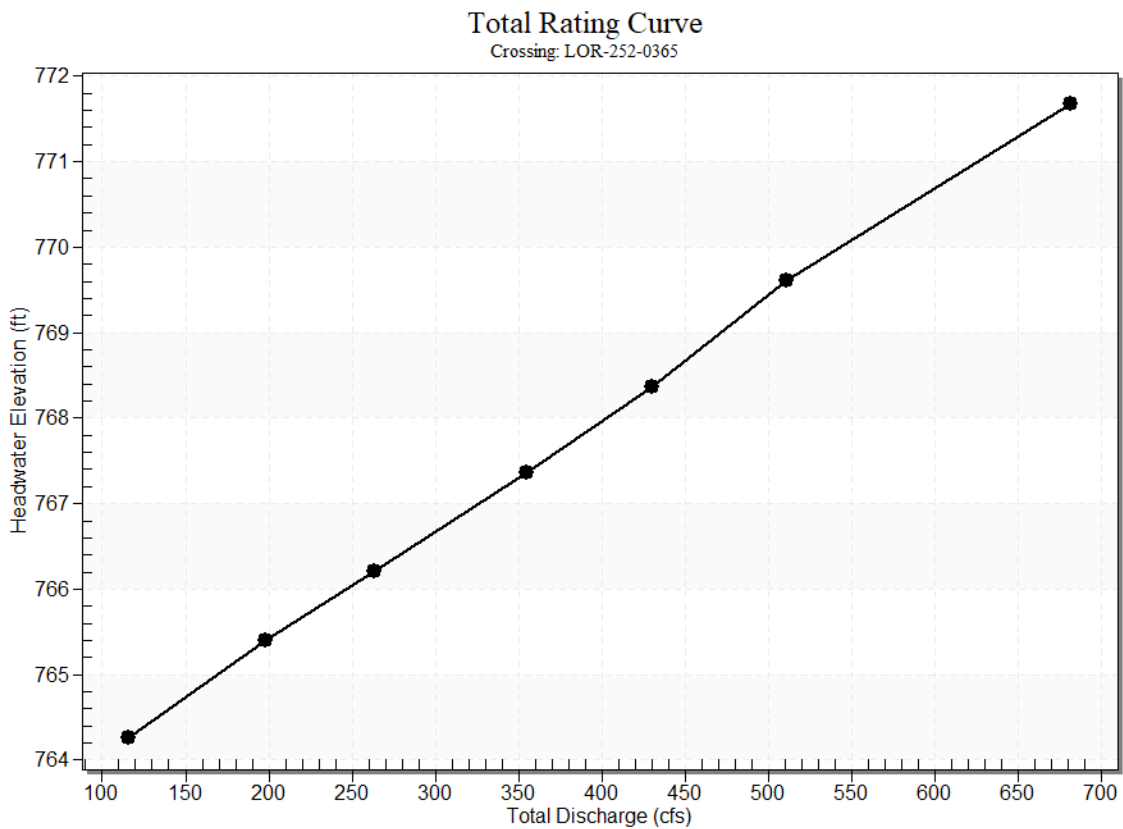
Crossing Discharge Data

Discharge Selection Method: Recurrence

Table 3 - Summary of Culvert Flows at Crossing: LOR-252-0365

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	Pr. 10x5 Box Discharge (cfs)	Roadway Discharge (cfs)	Iterations
764.26	2 year	116.00	116.00	0.00	1
765.40	5 year	198.00	198.00	0.00	1
766.21	10 year	263.00	263.00	0.00	1
767.36	25 year	355.00	355.00	0.00	1
768.37	50 year	430.00	430.00	0.00	1
769.61	100 year	511.00	511.00	0.00	1
771.34	Overtopping	606.90	606.90	0.00	Overtopping

Rating Curve Plot for Crossing: LOR-252-0365



Culvert Data: Pr. 10x5 Box

Table 2 - Culvert Summary Table: Pr. 10x5 Box

Disc harg e Nam es	Total Disc harg e (cfs)	Culv ert Disc harg e (cfs)	Head water Eleva tion (ft)	Inle t Con trol Dep th (ft)	Out let Con trol Dep th (ft)	Fl o w Ty pe	Nor mal Dep th (ft)	Crit ical De pth (ft)	Ou tle t De pth (ft)	Tail water r Dept h (ft)	Outl et Vel ocit y (ft/ s)	Tail water r Velo city (ft/s)
2 year	116.0 0 cfs	116.0 0 cfs	764.2 6	2.74	1.35 0	1- S2 n	1.30	1.6 1	1.3 5	1.08	8.62	7.60
5 year	198.0 0 cfs	198.0 0 cfs	765.4 0	3.88	2.30 7	1- S2 n	1.85	2.3 0	1.9 5	1.46	10.1 3	9.05
10 year	263.0 0 cfs	263.0 0 cfs	766.2 1	4.69	3.09 7	1- S2 n	2.24	2.7 8	2.3 9	1.72	11.0 1	9.90
25 year	355.0 0 cfs	355.0 0 cfs	767.3 6	5.84	4.30 2	5- S2 n	2.76	3.4 0	2.9 6	2.03	12.0 1	10.86
50 year	430.0 0 cfs	430.0 0 cfs	768.3 7	6.85	5.94 6	5- S2 n	3.16	3.8 6	3.3 9	2.26	12.6 8	11.51
100 year	511.0 0 cfs	511.0 0 cfs	769.6 1	8.09	6.97 1	5- S2 n	3.57	4.3 3	3.8 4	2.49	13.3 2	12.12

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

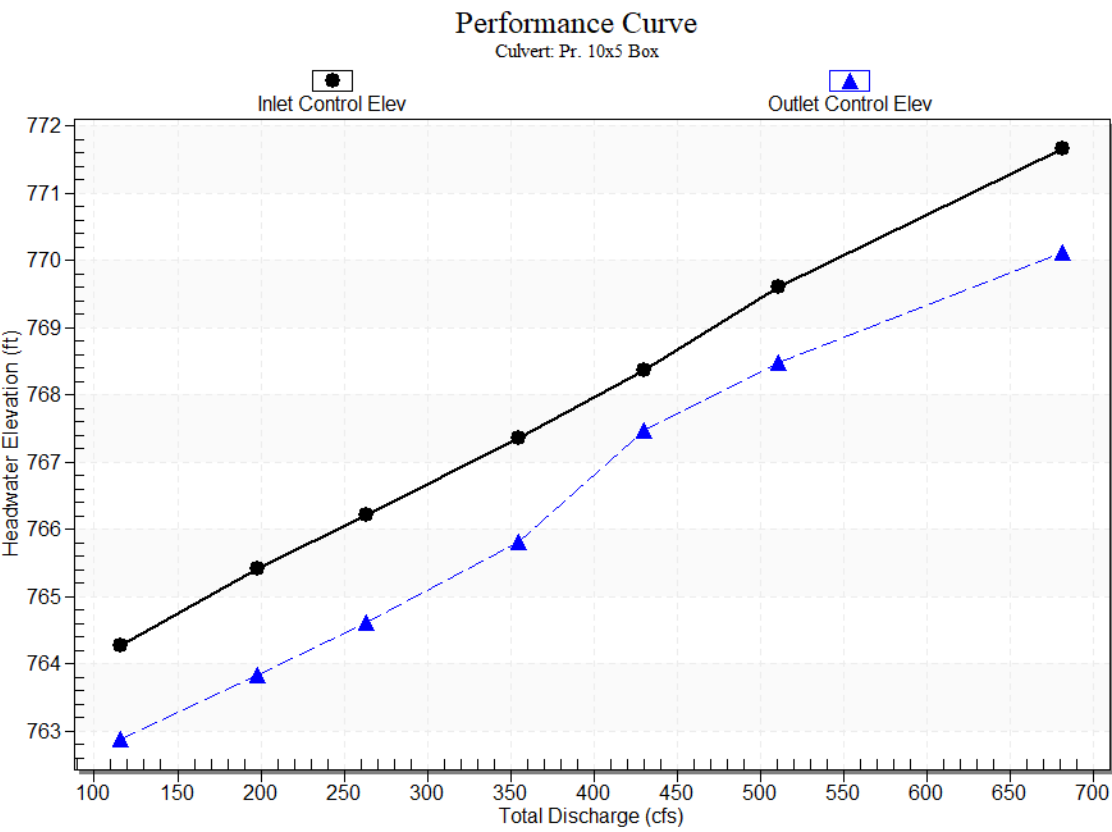
Inlet Elevation (invert): 761.52 ft,

Outlet Elevation (invert): 761.12 ft

Culvert Length: 80.00 ft,

Culvert Slope: 0.0050

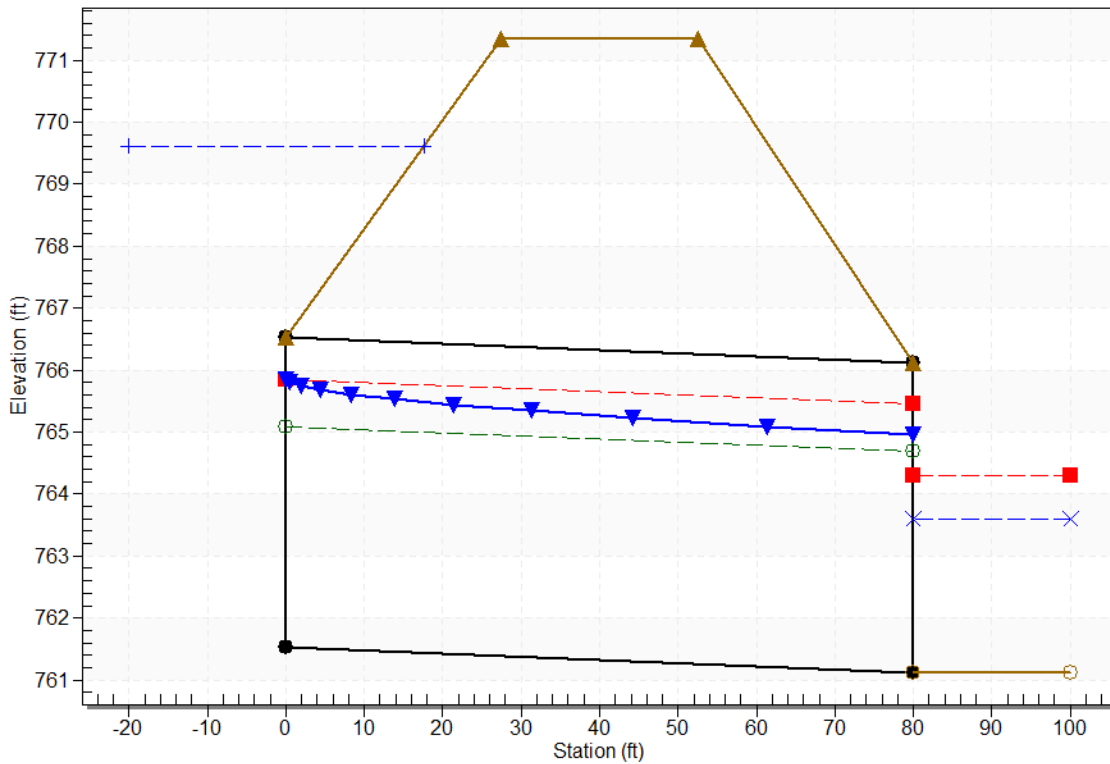
Culvert Performance Curve Plot: Pr. 10x5 Box



Water Surface Profile Plot for Culvert: Pr. 10x5 Box

Crossing - LOR-252-0365, Design Discharge - 511.0 cfs

Culvert - Pr. 10x5 Box, Culvert Discharge - 511.0 cfs



Site Data - Pr. 10x5 Box

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 761.52 ft

Outlet Station: 80.00 ft

Outlet Elevation: 761.12 ft

Number of Barrels: 1

Culvert Data Summary - Pr. 10x5 Box

Barrel Shape: Concrete Box

Barrel Span: 10.00 ft

Barrel Rise: 5.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

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

Inlet Depression: None

Tailwater Data for Crossing: LOR-252-0365

Table 4 - Downstream Channel Rating Curve (Crossing: LOR-252-0365)

Flow (cfs)	Water Surface Elev (ft)	Velocity (ft/s)	Depth (ft)	Shear (psf)	Froude Number
116.00	762.20	1.08	7.60	3.21	1.39
198.00	762.58	1.46	9.05	4.36	1.44
263.00	762.84	1.72	9.90	5.12	1.47
355.00	763.15	2.03	10.86	6.05	1.50
430.00	763.38	2.26	11.51	6.73	1.52
511.00	763.61	2.49	12.12	7.40	1.54

Tailwater Channel Data - LOR-252-0365

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.00 ft

Side Slope (H:V): 2.00 (┐:1)

Channel Slope: 0.0477

Channel Manning's n: 0.0400

Channel Invert Elevation: 761.12 ft

Roadway Data for Crossing: LOR-252-0365

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 100.00 ft

Crest Elevation: 771.34 ft

Roadway Surface: Paved

Roadway Top Width: 25.00 ft