



March 19, 2008

REC'D MAR 21 2008

Mr. Dennis Stark
Lyon County
27 South Main Street
Yerington, NV 89447

RE: Proposal for Hydraulic Analysis, Carson River Bridge Feasibility Study
Cardelli Road & Sutro Street, Dayton

Dear Mr. Stark:

On behalf of Summit Engineering Corporation I would like to thank you for the opportunity to provide you with the following proposal for the Hydraulic Analysis of the proposed bridge at the Cardelli Road and Sutro Street cross-section on the Carson River in Dayton, Nevada. Drew Motter and myself met with Don Tibbals at the site of the proposed bridge and discussed the need for a Hydraulic Analysis to determine the feasibility of the bridge. The Hydraulic Analysis will include the following scope of services:

Hydraulic Analysis Report

1. Seven surveyed cross-sections across the Carson River
2. Hydraulic Analysis using HEC-RAS
3. Master Hydrology Report (including Hydraulic Analysis Display(s))

FEES FOR HYDRAULIC ANALYSIS REPORT

Hydraulic Analysis of the proposed bridge (Cardelli Road & Sutro Street cross-section)\$10,960.00

The aforementioned fees are to determine the 100-year peak flow elevations at the proposed location. This analysis is to model the United States Geological Survey (USGS) peak flows at the proposed cross-section and determine the feasibility of the proposed bridge. The analysis would then provide Lyon County with the appropriate information to determine the length and height of the proposed bridge to obtain a cost estimates.

I hope this provides you with the information you've requested. Should you have any questions please contact me.

Sincerely,

SUMMIT ENGINEERING CORPORATION

Charles Dettling,
Project Manager

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Hydraulic Modeling of a Segment of Carson River For Proposed Cardelli Road Bridge

Prepared for

Lyon County



Prepared by



CIVIL
ENGINEERING
CONSULTANTS

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August, 2008

Purpose of Study

In July, 2008 TEC Civil Engineering contracted with Lyon County to complete a preliminary engineering report for a proposed highway bridge crossing of the Carson River at Cardelli Road in Dayton, Nevada. The purpose of the report is to provide the Lyon County Board of County Commissioners a preliminary analysis related to two major topics. The first one is a hydraulic analysis evaluating the potential flooding effects that may be caused on adjacent and upstream private properties as a result of a new bridge, the other one is to provide the a preliminary budget for different bridge scenarios.

The scope of services does not include a design of a bridge or any analysis or level of accuracy that might only be justified after a completed design. The intent is to provide a preliminary look at both the hydraulic conditions at the proposed location and approximate costs. In doing so, TEC has hydraulically analyzed the geometry of five different bridge scenarios against two separate flow rates. Cost estimates for each of the five bridge scenarios and flooding effects associated with them are summarized at the conclusion of this report.

Hydraulic Analysis Introduction

The proposed bridge is located at the Cardelli Road/Sutro Road alignment approximately five miles east of downtown Dayton, Nevada at Long. $119^{\circ} 31' 39.94''$ W., Lat. $39^{\circ} 16' 50.20''$ N. A 100' wide easement exists at this location for the construction of a bridge facility should it be determined feasible.

The FEMA 100-year flood plain for the segment of the Carson River was based on a study performed by Nimbus Engineers (1990). In 2002, TEC Civil Engineering performed a hydraulic analysis of the Carson River to determine the effects of a residential development in the vicinity (immediately downstream) of the Cardelli Road bridge easement. There are two FEMA FIRM panels that cover the proposed bridge and its vicinity; they are 3200290135C and 3200290142 with an update date of 7/01/2002.

TEC created a hydraulic model of the Carson River to evaluate the impact of various scenarios of a proposed bridge crossing at the Cardelli Road on the flood elevations in the vicinity of the bridge crossing. The existing floodplain conditions and future conditions with the various scenarios of the proposed bridge under both the 100-year flood and a 1.5 times the 100-year flood were analyzed.

Modeling Methodology

The hydraulic analysis of the Carson River near the proposed bridge segment was performed using the widely applied hydraulic model HEC-RAS (Version 3.1.3, May, 2005) developed by U.S. Army Corps of Engineers.

A steady state flow model with current channel and floodplain geometry as represented by the 1-foot topographic map provided by the Carson Subconservancy was constructed to calculate the water surface along the segment. The 100-year flood flow used was 36,100 cubic feet per second (cfs) as determined by the FEMA Flood Insurance Study. The flow model boundary at the upstream cross-sections was set as normal flow depth boundary as determined by the natural channel slope at the cross-section location. The flow model boundary at the downstream cross-section was set as known water level boundary at FEMA flood elevation (4294.93 ft NAVD 88 converted from 4291.53 NGVD 29 based on Longitude 119.51232°, Latitude 39.28664°).

In addition, a raised flow of 54,150 cfs equivalent to 1.5 times the 100-year flood flow (36,100 cfs x 1.5) was applied to the channel and all the proposed bridge scenarios. The flow model boundary for the increased flow at the upstream and downstream cross-sections are both set as normal flow depth boundary as determined by the natural channel slope at those locations.

Data Preparation

One (1) foot topographic map was obtained from the Carson Subconservancy. Cross-sections are located at nearly the same locations as shown in FEMA flood insurance study with additional cross-sections added to better represent the channel geometry and to meet modeling calculation requirements as well as to allow the incorporation of the proposed bridge scenarios. Therefore, the cross-sections along and next to the proposed bridge alignment do not follow the FEMA flood insurance study. The cross-section locations and the distances between them for the main channel and the left and right overbanks are shown in Figure 2. In Figure 2, the Cross-sections I, J, K, N, O are as designated by the FEMA insurance study. The actual stationing and elevation representation of the cross-sections are presented in Appendix A.

Bridge Scenarios

A total of five bridge scenarios were examined. They range from a total bridge span of 700 ft, 900 ft, 1100 ft, 1300 ft and 3200 ft. The 3200 ft scenario spans the entire floodway and floodway fringe without embankment constriction encroaching into the existing floodway fringe. The 1100 ft spans the flood way with embankment constriction encroaching the entire fringe area of the flood plain. The total bridge span of 700 ft and 900 ft both encroach within the floodway as currently delineated by the FEMA FIRM Panels.

Although the longest total bridge span scenario was 3,200 feet, each scenario bridge was assumed to be supported by piers, with a pier to pier section of individual span of 100 ft except the two spans at the center of the river channel. Those two center spans are 150 ft from pier to pier. All pier plan shapes are circular with a diameter of 6 ft. The pier bases are also circular with a diameter of 10 ft. Vertically, the base rises from below ground to

an elevation of 4298 ft (NAVD 88) and the pier with 6 ft diameter rises from 4298 ft to 4305 ft at the bottom of the low chord of the bridge structure. The bridge high chord was assumed at an elevation of 4310 ft. For convenience of reference, these bridge scenarios are designated as Scenario #1 (700 ft span), Scenario # 2 (900 ft span), Scenario #3 (1100 ft span), Scenario #4 (1300 ft span) and Scenario #5 (3200 ft span). See Figures 3, 4, 5, 6 and 7 for a schematic representation of the bridge scenarios.

Modeling Parameters

The main model parameter is the Manning's roughness coefficients for the left overbank, main channel, and right overbank for the various segments following each cross-section. TEC staff completed a field visit to visually inspect the vegetation and condition of the floodway. After visual inspection, a comparison of existing conditions and previously published conditioners were made. For the left and right overbanks, Manning's roughness coefficients are the same as or larger than those used by FEMA model.

Although the same Manning's roughness coefficient values are used in the TEC model, the geometry as represented in the TEC model is based on 1-foot topographic map and is much more refined than that represented in the FEMA model. This refined representation of the cross-section geometry results in longer wetted perimeter than those in the FEMA model. Therefore TEC's current model is more conservative in the determination of the Manning's coefficient values than the original FEMA model. For the actual Manning's coefficient values used in the TEC model, please Refer to Appendix A.

The drag coefficient for the momentum bridge modeling method was set as 1.2 for the circular piers.

Modeling Results and Discussion

Table 1 lists the model outputs for all the cross-sections under the 100 yr flood condition and Table 2 lists the model outputs for all the cross-sections under the 1.5 times of the 100 yr flood conditions.

Appendix B lists modeling results for the individual cross sections and other modeling results.

Table 1 Summary of results from the HEC-RAS model under 100y-flood condition

River Sta	Plan	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Sec. 1 (Sta 90)	No_Bridge	4291	4304.75	4304.91	0.000557	4.59	13088.96	2342.63	0.23
	100Y-S#1	4291	4305.03	4305.18	0.000516	4.49	13751.35	2432.23	0.23
	100Y-S#2	4291	4305.01	4305.16	0.000522	4.5	13697.97	2426.52	0.23
	100Y-S#3	4291	4305.01	4305.16	0.00052	4.5	13716.94	2428.55	0.23
	100Y-S#4	4291	4304.96	4305.1	0.00051	4.44	13575.16	2410.19	0.22
	100Y-S#5	4291	4304.78	4304.94	0.00055	4.57	13157.74	2352.31	0.23
Sec. 2 (Sta 80)	No_Bridge	4290	4303.72	4303.92	0.001504	5.93	12461.24	2713.7	0.36
	100Y-S#1	4290	4304.19	4304.34	0.001114	5.25	13721.75	2721.1	0.31
	100Y-S#2	4290	4304.15	4304.3	0.001139	5.3	13622.11	2720.51	0.31
	100Y-S#3	4290	4304.16	4304.32	0.00113	5.29	13657.98	2720.72	0.31
	100Y-S#4	4290	4304.09	4304.25	0.001181	5.38	13466.72	2719.6	0.32
	100Y-S#5	4290	4303.78	4303.97	0.001448	5.84	12614.97	2714.6	0.35
Sec. 3 (Sta 70)	No_Bridge	4288	4302.07	4302.28	0.001161	5.08	12452.3	2209.66	0.29
	100Y-S#1	4288	4303.03	4303.19	0.000789	4.46	14592.81	2252.02	0.24
	100Y-S#2	4288	4302.96	4303.12	0.000816	4.52	14431.21	2250.68	0.25
	100Y-S#3	4288	4302.98	4303.15	0.000806	4.5	14490.57	2251.17	0.24
	100Y-S#4	4288	4302.84	4303.01	0.000862	4.61	14167.59	2248.48	0.25
	100Y-S#5	4288	4302.23	4302.43	0.001077	4.95	12798.7	2224.31	0.28
Sec. 4 (Sta 60)	No_Bridge	4288.8	4301.27	4301.49	0.000692	4.69	13076.59	3023.85	0.25
	100Y-S#1	4288.8	4301.65	4302.2	0.001238	6.42	6522.11	3065.9	0.34
	100Y-S#2	4288.8	4301.8	4302.23	0.001013	5.86	7626.65	3080.37	0.31
	100Y-S#3	4288.8	4301.97	4302.33	0.000874	5.5	8566.44	3096.94	0.29
	100Y-S#4	4288.8	4301.89	4302.21	0.000815	5.28	9287.06	3088.75	0.28
	100Y-S#5	4288.8	4301.52	4301.71	0.000603	4.45	13833.82	3053.26	0.24
Sec. 5 (Sta 50)	No_Bridge	4288.3	4301.21	4301.39	0.000609	4.34	13508.56	3138	0.24
	100Y-S#1	4288.3	4301.26	4301.8	0.001324	6.42	6395.22	3144.13	0.35
	100Y-S#2	4288.3	4301.25	4301.63	0.00099	5.55	7772.74	3142.82	0.3
	100Y-S#3	4288.3	4301.24	4301.55	0.000867	5.19	8728	3141.37	0.28
	100Y-S#4	4288.3	4301.23	4301.52	0.000815	5.03	9395.11	3140.48	0.28
	100Y-S#5	4288.3	4301.23	4301.41	0.000602	4.33	13565.28	3140.55	0.24
Sec. 6 (Sta 40)	No_Bridge	4287.5	4300.68	4300.9	0.000894	4.93	11571.53	2344.35	0.28
	100Y-S#1	4287.5	4300.69	4300.91	0.000886	4.91	11605.89	2346.87	0.28
	100Y-S#2	4287.5	4300.69	4300.91	0.000886	4.91	11605.89	2346.87	0.28
	100Y-S#3	4287.5	4300.69	4300.91	0.000886	4.91	11605.89	2346.87	0.28
	100Y-S#4	4287.5	4300.69	4300.91	0.000886	4.91	11605.89	2346.87	0.28
	100Y-S#5	4287.5	4300.69	4300.91	0.000886	4.91	11605.89	2346.87	0.28

**Table 1 Summary of results from the HEC-RAS model under 100y-flood condition
(Continued)**

River Sta	Plan	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Sec. 7 (Sta 30)	No_Bridge	4286	4299.44	4299.75	0.001375	6.17	10235.45	2340.3	0.35
	100Y-S#1	4286	4299.44	4299.75	0.001375	6.17	10235.45	2340.3	0.35
	100Y-S#2	4286	4299.44	4299.75	0.001375	6.17	10235.45	2340.3	0.35
	100Y-S#3	4286	4299.44	4299.75	0.001375	6.17	10235.45	2340.3	0.35
	100Y-S#4	4286	4299.44	4299.75	0.001375	6.17	10235.45	2340.3	0.35
	100Y-S#5	4286	4299.44	4299.75	0.001375	6.17	10235.45	2340.3	0.35
Sec. 8 (Sta 20)	No_Bridge	4286.1	4298.72	4298.96	0.00111	5.81	11276.98	2339.19	0.32
	100Y-S#1	4286.1	4298.72	4298.96	0.00111	5.81	11276.98	2339.19	0.32
	100Y-S#2	4286.1	4298.72	4298.96	0.00111	5.81	11276.98	2339.19	0.32
	100Y-S#3	4286.1	4298.72	4298.96	0.00111	5.81	11276.98	2339.19	0.32
	100Y-S#4	4286.1	4298.72	4298.96	0.00111	5.81	11276.98	2339.19	0.32
	100Y-S#5	4286.1	4298.72	4298.96	0.00111	5.81	11276.98	2339.19	0.32
Sec. 9 (Sta 10)	No_Bridge	4285.1	4297.22	4297.51	0.00158	5.41	9509.04	2334.91	0.36
	100Y-S#1	4285.1	4297.22	4297.51	0.00158	5.41	9509.04	2334.91	0.36
	100Y-S#2	4285.1	4297.22	4297.51	0.00158	5.41	9509.04	2334.91	0.36
	100Y-S#3	4285.1	4297.22	4297.51	0.00158	5.41	9509.04	2334.91	0.36
	100Y-S#4	4285.1	4297.22	4297.51	0.00158	5.41	9509.04	2334.91	0.36
	100Y-S#5	4285.1	4297.22	4297.51	0.00158	5.41	9509.04	2334.91	0.36
Sec. 10 (Sta 0)	No_Bridge	4285	4294.93	4295.17	0.001372	4.92	10373.52	2621.86	0.33
	100Y-S#1	4285	4294.93	4295.17	0.001372	4.92	10373.52	2621.86	0.33
	100Y-S#2	4285	4294.93	4295.17	0.001372	4.92	10373.52	2621.86	0.33
	100Y-S#3	4285	4294.93	4295.17	0.001372	4.92	10373.52	2621.86	0.33
	100Y-S#4	4285	4294.93	4295.17	0.001372	4.92	10373.52	2621.86	0.33
	100Y-S#5	4285	4294.93	4295.17	0.001372	4.92	10373.52	2621.86	0.33

Table 2 Summary of results from the HEC-RAS model under 1.5x100y-flood condition

River Sta	Plan	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Sec. 1 (Sta 90)	1.5xNoBridge	4291	4306.36	4306.57	0.000651	5.4	17201	2763.58	0.26
	1.5X100Y-S#1	4291	4306.89	4307.06	0.000509	4.89	18667.9	2768.88	0.23
	1.5x100Y-S#2	4291	4306.79	4306.97	0.000533	4.98	18384	2767.86	0.23
	1.5x100Y-S#3	4291	4306.77	4306.95	0.000538	5	18331.3	2767.67	0.24
	1.5x100Y-S#4	4291	4306.68	4306.87	0.000559	5.08	18096.2	2766.82	0.24
	1.5x100y-S#5	4291	4306.4	4306.61	0.000638	5.35	17321.1	2764.01	0.25
Sec. 2 (Sta 80)	1.5xNoBridge	4290	4305.35	4305.56	0.0013	6.06	16900.1	2739.66	0.34
	1.5X100Y-S#1	4290	4306.16	4306.32	0.000878	5.21	19126.2	2755.21	0.28
	1.5x100Y-S#2	4290	4306.02	4306.18	0.000939	5.34	18725.6	2750.53	0.29
	1.5x100Y-S#3	4290	4305.99	4306.15	0.000951	5.36	18650.4	2749.83	0.29
	1.5x100Y-S#4	4290	4305.86	4306.03	0.001009	5.49	18306.8	2747.84	0.3
	1.5x100y-S#5	4290	4305.42	4305.62	0.001253	5.98	17099.4	2740.82	0.34
Sec. 3 (Sta 70)	1.5xNoBridge	4288	4303.63	4303.92	0.001359	6.08	15948.7	2263.26	0.32
	1.5X100Y-S#1	4288	4305.14	4305.33	0.000748	4.91	19394.8	2290.09	0.24
	1.5x100Y-S#2	4288	4304.91	4305.11	0.000815	5.06	18868.3	2287.27	0.25
	1.5x100Y-S#3	4288	4304.87	4305.07	0.000828	5.09	18766.7	2286.44	0.25
	1.5x100Y-S#4	4288	4304.66	4304.87	0.000896	5.23	18289.3	2282.53	0.26
	1.5x100y-S#5	4288	4303.8	4304.08	0.001263	5.92	16339.1	2266.48	0.31
Sec. 4 (Sta 60)	1.5xNoBridge	4288.8	4302.81	4303.04	0.000699	5.16	17801.5	3102.12	0.26
	1.5X100Y-S#1	4288.8	4303.31	4304.17	0.001636	8.11	7713.91	3103.44	0.4
	1.5x100Y-S#2	4288.8	4303.4	4304.06	0.001322	7.32	9096.05	3103.68	0.36
	1.5x100Y-S#3	4288.8	4303.58	4304.11	0.001104	6.76	10371.1	3104.16	0.33
	1.5x100Y-S#4	4288.8	4303.49	4303.94	0.000999	6.4	11400.5	3103.91	0.32
	1.5x100y-S#5	4288.8	4303.07	4303.28	0.000615	4.91	18611.9	3102.81	0.25
Sec. 5 (Sta 50)	1.5xNoBridge	4288.3	4302.74	4302.95	0.000628	4.84	18347.7	3178.51	0.25
	1.5X100Y-S#1	4288.3	4302.72	4303.61	0.001824	8.23	7445.33	3178.07	0.42
	1.5x100Y-S#2	4288.3	4302.75	4303.35	0.001318	7.01	9152.3	3178.59	0.36
	1.5x100Y-S#3	4288.3	4302.75	4303.23	0.001112	6.44	10421.7	3178.63	0.33
	1.5x100Y-S#4	4288.3	4302.75	4303.17	0.001009	6.13	11395.1	3178.57	0.31
	1.5x100y-S#5	4288.3	4302.77	4302.97	0.000621	4.82	18419.1	3178.87	0.25
Sec. 6 (Sta 40)	1.5xNoBridge	4287.5	4302.16	4302.43	0.000933	5.55	15096.6	2394.35	0.3
	1.5X100Y-S#1	4287.5	4302.17	4302.44	0.000927	5.54	15126.9	2394.61	0.3
	1.5x100Y-S#2	4287.5	4302.17	4302.44	0.000927	5.54	15126.9	2394.61	0.3
	1.5x100Y-S#3	4287.5	4302.17	4302.44	0.000927	5.54	15126.9	2394.61	0.3
	1.5x100Y-S#4	4287.5	4302.17	4302.44	0.000927	5.54	15126.9	2394.61	0.3
	1.5x100y-S#5	4287.5	4302.17	4302.44	0.000927	5.54	15126.9	2394.61	0.3

**Table 2 Summary of results from the HEC-RAS model under 1.5x100y-flood condition
(Continued)**

River Sta	Plan	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Sec. 7 (Sta 30)	1.5xNoBridge	4286	4300.97	4301.31	0.001334	6.71	13989.1	2546.63	0.36
	1.5X100Y-S#1	4286	4300.97	4301.31	0.001334	6.71	13989.1	2546.63	0.36
	1.5x100Y-S#2	4286	4300.97	4301.31	0.001334	6.71	13989.1	2546.63	0.36
	1.5x100Y-S#3	4286	4300.97	4301.31	0.001334	6.71	13989.1	2546.63	0.36
	1.5x100Y-S#4	4286	4300.97	4301.31	0.001334	6.71	13989.1	2546.63	0.36
	1.5x100y-S#5	4286	4300.97	4301.31	0.001334	6.71	13989.1	2546.63	0.36
Sec. 8 (Sta 20)	1.5xNoBridge	4286.1	4300.25	4300.54	0.001123	6.41	14918.6	2477.8	0.33
	1.5X100Y-S#1	4286.1	4300.25	4300.54	0.001123	6.41	14918.6	2477.8	0.33
	1.5x100Y-S#2	4286.1	4300.25	4300.54	0.001123	6.41	14918.6	2477.8	0.33
	1.5x100Y-S#3	4286.1	4300.25	4300.54	0.001123	6.41	14918.6	2477.8	0.33
	1.5x100Y-S#4	4286.1	4300.25	4300.54	0.001123	6.41	14918.6	2477.8	0.33
	1.5x100y-S#5	4286.1	4300.25	4300.54	0.001123	6.41	14918.6	2477.8	0.33
Sec. 9 (Sta 10)	1.5xNoBridge	4285.1	4298.87	4299.19	0.001356	5.77	13392	2372.03	0.34
	1.5X100Y-S#1	4285.1	4298.87	4299.19	0.001356	5.77	13392	2372.03	0.34
	1.5x100Y-S#2	4285.1	4298.87	4299.19	0.001356	5.77	13392	2372.03	0.34
	1.5x100Y-S#3	4285.1	4298.87	4299.19	0.001356	5.77	13392	2372.03	0.34
	1.5x100Y-S#4	4285.1	4298.87	4299.19	0.001356	5.77	13392	2372.03	0.34
	1.5x100y-S#5	4285.1	4298.87	4299.19	0.001356	5.77	13392	2372.03	0.34
Sec. 10 (Sta 0)	1.5xNoBridge	4285	4297.54	4297.71	0.000646	4.19	17797.9	3056.32	0.24
	1.5X100Y-S#1	4285	4297.54	4297.71	0.000646	4.19	17797.9	3056.32	0.24
	1.5x100Y-S#2	4285	4297.54	4297.71	0.000646	4.19	17797.9	3056.32	0.24
	1.5x100Y-S#3	4285	4297.54	4297.71	0.000646	4.19	17797.9	3056.32	0.24
	1.5x100Y-S#4	4285	4297.54	4297.71	0.000646	4.19	17797.9	3056.32	0.24
	1.5x100y-S#5	4285	4297.54	4297.71	0.000646	4.19	17797.9	3056.32	0.24

From Tables 1 and 2, it can be seen that the largest water level effects from the various bridge scenarios occur at Section 3, which is immediately upstream of the cross-sections (4 and 5) containing the bridge. The simulated water level increase at Section 3 ranges from 0.16 ft to 0.96 ft under the 100 year flood flow condition. Under the 1.5 x 100-y flood flow condition, the simulated water level increase range is from 0.17 to 1.51 ft at Section 3. The bridge scenarios will have negligible effects on downstream water levels (Sections 6~10).

Table 2 also shows that even at the 1.5 times of the 100y flood, the bridge low cord elevation at 4305 ft is still approximately 1.4 ft higher than the highest water level at Section 4 which is immediately upstream of the bridge.

Comparison of FEMA Flood Insurance Study Results with TEC's Model Results

The FEMA flood insurance model as performed by Nimbus Engineers (1990) determined that the flood water surface elevations for Cross-Sections I, J, K, N and O. as 4291.53 ft, 4294.27 ft, 4296.18 ft, 4300 and 4300.8 ft, respectively (as represented by the FIRM panels 3200290135C and 3200290142 with an update date of 7/01/2002). The proposed bridge alignment is primarily located at Cross-Sections L and M by crossing them due to the different alignment directions.

The elevations in the FEMA model and on the FEMA panels are referenced to the National Geodetic Vertical Datum 1929 (NGVD 29). The geometric data and the water surface elevations represented in the TEC HEC-RAS model are referenced to NAVD 1988.

In order to compare the results from FEMA with TEC's model results, all the FEMA elevations were converted from NGVD 29 to NAVD 88 for the site based on a point on Cross-Section I with an approximate Longitude 119.51232° W, Latitude 39.28664° N referenced in the horizontal grid NAD 27 to NAD 83 (Convert from NGVD 29 to NAVD 88, add 3.402 ft).

The comparison of the FEMA results with TEC's model results are listed in Table 3.

Table 3 Comparison of Water Surface Elevations from Nimbus Model and TEC model

Cross Section	Nimbus Water Surface Elevation (ft) NGVD 29	Nimbus Water Surface Elevation (ft) NAVD 88	TEC Water Surface Elevation (No bridge) NAVD 88
I	4291.53	4294.93	4294.93
J	4294.27	4297.67	4297.22
K	4296.18	4299.58	4299.75
N	4299.9	4303.30	4303.72
O	4300.8	4304.20	4304.75

Table 3 shows that TEC results are in fair agreement with those as determined by Nimbus Engineers with slightly higher TEC's water surface elevations at Cross-Sections K, N and O. This difference may be the results of the fill at the Rolling "A" ranch which has changed the river geometry slightly and the more conservative Manning's values used in the TEC model as well as the longer channel and flood plain paths as represented in the TEC model.

Summary and Conclusion regarding Hydraulic Study

A steady state hydraulic model was constructed by using HEC-RAS for a segment of Carson River near the proposed Cardelli Road to evaluate the impact of 5 bridge scenarios on the water surface level during the 100-year flood event and a flood event with 1.5 times the 100-year flood.

The basis for the channel and floodplain geometry is based on a topographic map with contour interval of 1 foot. The river channel and floodplain were field-examined to estimate their Manning's roughness coefficient values (See Appendix C for Pictures along the segment of Carson River).

Model parameters and results are compared with those contained within the FEMA Insurance Study for the area. The comparison shows that TEC's model is generally more conservative than the FEMA model and study. The final water surface elevations are fairly consistent with those of FEMA.

In conclusion, the proposed bridge scenarios will have various effects on water level upstream the bridge with a range of largest water level increase from 0.16 ft to 0.96 ft for the 100 year flood at Section 3. For the 1.5 x 100-y flood, the range is from 0.17 to 1.51 ft at Section 3. The bridge scenarios will have negligible effects on downstream water levels.

Cost Estimates

The preliminary cost estimates detailed within this report are for planning purposes only and are rudimentary in nature as no designs exist. For the purpose of this report, TEC assumed that the bridge will be a simple span bridge, constructed of reinforced concrete and steel members. The simple span bridge will have a series of piers that will be placed 100' apart except for two spans of 150' across the low flow river channel. The scour depth of the bridge piers, size and shape of the piers and number of piers are all assumed to have a cost component prorated from the total cost of the bridge.

The preliminary cost estimates detailed within this report are not based upon an actual design; rather they are based upon average costs for other recently constructed bridge projects similar to the modeled Cardelli Bridge as described above. TEC also looked into trends in the construction industry, in particular how construction prices are being affected by the current downturn in the housing market and increase in fuel prices. It was determined that materials have not decreased in price over the past year, some have even increased and labor might be less expensive on private construction projects, however public works project that require labor to be paid on a prevailing wage are non-affected by the downturn.

To estimate a preliminary construction cost, TEC had to derive a formula for estimating costs that would be comprehensive, yet still functional based upon the limited scope of the report. To determine a formula, TEC and Lyon County Engineering Staff met with members of NDOT's bridge department. NDOT provided final construction costs to design and build several similar bridges over the past six years. Each of the bridges were discussed in detail, including the type of bridge, the location of the structure, the date of construction and the number of contractors that submitted bids for the project. Based upon the discussions, we were able to eliminate some of the bridge projects from our estimates as the final cost were either inflated or low priced for specific reasons that would not likely be associated with the proposed Cardelli Bridge. After eliminating the bridges that had construction anomalies associated with them, the remaining bridges were then analyzed on a cost per square foot of bridge surface. A formula based upon an average cost per sq ft of bridge surface was derived at \$180 per Sq Ft.

For the purpose of this report, we've assumed that regardless of the bridge length, the width of the bridge will be the same (64ft). The width will be wide enough to accommodate 4 traffic lanes, a sidewalk and gutter on either side that is similar to the bridge crossing at Dayton Valley Road. The following lists the cost estimates with their assumptions.

Cardelli Road Bridge Cost Estimates

Major Assumptions

Bridge Width

- a. 4 X 11 ft lanes
 - b. 2 x 8 ft for Rail, Sidewalk and Gutter
 - c. 1 x 4 ft center
- Total width approximately 64 ft

Scenario 1

Total Bridge Span 700 ft

Scenario 2

Total Bridge Span 900 ft

Scenario 3

Total Bridge Span 1100 ft

Scenario 4

Total Bridge Span 1300 ft

Scenario 5

Total Bridge Span 3200 ft

Unit Cost

NDOT data for bridge construction costs for the period of 10/01/2006 through 9/30/07

Award Date	Contract #	Unit Cost (\$/sqft)	Bridge Type
11/22/2006	Contract 3320 B2797 (Truckee River)	176.02	PC Conc I Girder
9/18/2006	Contract 3319 B-85	151.83	PC Conc I Girder
10/4/2004	Contract 3241 B-1274	172.35	PC Conc I Girder

Cost Estimates

Scenario	Total Span (ft)	Width (ft)	Area (sqft)	Unit Cost (\$)	Total Cost (Million \$)
1	700	64	44800	180	8.064
2	900	64	57600	180	10.368
3	1100	64	70400	180	12.672
4	1300	64	83200	180	14.976
5	3200	64	204800	180	36.864

Summary and Conclusion

Hydraulic analyses and preliminary cost estimates were performed for five bridge scenarios of the proposed Cardelli Bridge. The bridge width is assumed to be 64 ft with various total span lengths representing the different scenarios. The five total span length scenarios are: 700 ft, 900 ft, 1100 ft, 1300 ft and 3200 ft.

The proposed bridge scenarios will have various effects on water level upstream the bridge with a range of largest water level increase from 0.16 ft to 0.96 ft for the 100 year flood at Section 3. For the 1.5 x 100-y flood, the range is from 0.17 to 1.51 ft at Section 3. The bridge scenarios will have negligible effects on downstream water levels.

The approximate bridge cost estimates range from \$8.06 million for the shortest total span of 700 ft to \$36.86 million for the largest total span of 3200 ft.

References

Nimbus Engineers, 1990, Carson River HEC-2 Model, prepared for FEMA under Contract #EMW-89-C-2841.

Thiel Engineering Consultants, 2002, Carson River HEC-RAS Model, prepared for Lyon County Public Works.

U.S. Army Corps of Engineers, 2005, HEC-RAS Hydraulic Reference Manual.

NDOT, Data for bridge construction costs for the period of 10/01/2006 through 9/30/07

Appendix A

HEC-RAS MODEL Input Data

For a Segment of Carson River For Proposed Cardelli Road Bridge

Cross-Section Data

Cross-Section Parameters

Reach Lengths

Proposed Bridge Parameters

Steady State Flow Model Input Data

Section 1

indicates main channel stations

Station	Elevation	Station	Elevation
0	4306.3	2100	4300
50	4306	2150	4300.3
100	4306	2200	4301.5
150	4305.8	2250	4299
200	4305.6	2300	4299
250	4305.4	2350	4299.4
300	4305.1	2400	4299
350	4304.9	2450	4299
400	4304.7	2500	4302
450	4304.4	2550	4300
500	4304	2600	4305
550	4304	2650	4304
600	4303	2700	4302.5
650	4302.3	2750	4305
700	4302	2800	4310
750	4301	2850	4314
800	4300	2900	4316
850	4299	2950	4318
900	4298	3000	4322
950	4298	3050	4329
1000	4298	3087.69	4338
1050	4299		
1100	4296.1		
1150	4296.3		
1200	4295.7		
1250	4295.3		
1300	4291		
1350	4291.2		
1400	4291		
1450	4300		
1500	4300		
1550	4298		
1600	4298		
1650	4298		
1700	4297		
1750	4298		
1800	4298.2		
1850	4298		
1900	4298		
1950	4297.5		
2000	4297		
2050	4299		

Section 2

indicates main channel stations

Station	Elevation	Station	Elevation
0	4313.3	2100	4301.2
50	4313.1	2150	4301.5
100	4313.1	2200	4299
150	4312.8	2250	4297.5
200	4312.2	2300	4297.8
250	4312.8	2350	4299
300	4313.4	2400	4301.5
350	4313	2450	4300.7
400	4306	2500	4300
450	4290	2550	4302
500	4294	2600	4302
550	4300	2650	4302
600	4297.5	2700	4302.4
650	4299	2750	4302.2
700	4298.2	2800	4302.1
750	4298	2850	4301.6
800	4298.5	2900	4301.4
850	4299	2950	4301.5
900	4299	3000	4301
950	4299.2	3050	4300.5
1000	4299.2	3100	4302.1
1050	4298.8	3150	4306
1100	4299	3200	4308
1150	4299.5	3250	4314
1200	4299	3300	4326
1250	4299.2	3350	4345
1300	4299.1	3400	4348.1
1350	4299	3450	4348.8
1400	4298.7	3459.24	4349
1450	4297.1		
1500	4296.9		
1550	4296		
1600	4297.2		
1650	4297.4		
1700	4297.5		
1750	4297.3		
1800	4297		
1850	4298.1		
1900	4299		
1950	4298		
2000	4298		
2050	4298		

Section 3

indicates main channel stations

Station	Elevation	Station	Elevation
0	4309.2	2100	4294.3
50	4310.4	2150	4300.9
100	4310	2200	4302.4
150	4309.1	2250	4301.2
200	4307	2300	4301
250	4298	2350	4301.1
300	4297	2400	4301.6
350	4297.3	2450	4301.2
400	4297	2500	4305
450	4298	2550	4323
500	4297	2600	4340
550	4297.5	2650	4348
600	4297	2700	4351
650	4295	2750	4348
700	4292.8	2800	4347
750	4291.5	2850	4348
800	4288	2889.54	4350
850	4289.8		
900	4298.1		
950	4296		
1000	4298		
1050	4298		
1100	4298.2		
1150	4298.2		
1200	4297.3		
1250	4297		
1300	4296		
1350	4296		
1400	4296.2		
1450	4296.5		
1500	4294.5		
1550	4292.9		
1600	4295.1		
1650	4294.1		
1700	4294.5		
1750	4293.2		
1800	4293		
1850	4297.3		
1900	4297		
1950	4296		
2000	4295.7		
2050	4294.5		

Section 4

indicates main channel stations

Station	Elevation	Station	Elevation
0	4301	2100	4298
50	4299	2150	4299.2
100	4302	2200	4300
150	4301.3	2250	4301.3
200	4300.5	2300	4301
250	4299.5	2350	4301
300	4297.2	2400	4301.2
350	4296.4	2450	4301
400	4295	2500	4300.5
450	4295.3	2550	4300.2
500	4295.4	2600	4299.4
550	4296.2	2650	4298.5
600	4295	2700	4297.3
650	4295	2750	4297
700	4296.5	2800	4298
750	4296	2850	4296
800	4295.4	2900	4294
850	4295.8	2950	4295
900	4296	3000	4297
950	4295	3050	4297
1000	4292	3100	4302
1050	4291	3150	4321
1100	4289.7	3200	4343
1150	4289.3	3250	4346.2
1200	4288.8	3300	4346.8
1250	4288.9	3317.18	4346.8
1300	4291.3		
1350	4295.1		
1400	4295.2		
1450	4294.5		
1500	4294.3		
1550	4293		
1600	4298		
1650	4300.1		
1700	4300.3		
1750	4300.1		
1800	4300.2		
1850	4300.3		
1900	4300.1		
1950	4300.2		
2000	4300		
2050	4299		

Section 5

indicates main channel stations

Station	Elevation	Station	Elevation
0	4305.2	2100	4300.1
50	4305.1	2150	4300.2
100	4301	2200	4300.2
150	4300	2250	4300.2
200	4300.2	2300	4300.4
250	4300.5	2350	4300.1
300	4301.3	2400	4300
350	4298	2450	4300.2
400	4298	2500	4300
450	4297.6	2550	4300
500	4298	2600	4300
550	4296	2650	4300.1
600	4296	2700	4300
650	4295	2750	4300
700	4296	2800	4301.4
750	4295	2850	4297
800	4295.4	2900	4295
850	4295	2950	4294
900	4295	3000	4298
950	4296	3050	4298.7
1000	4293	3100	4298
1050	4295	3150	4297
1100	4295	3200	4298
1150	4295	3250	4301
1200	4292	3300	4313
1250	4289	3350	4334
1300	4292.2	3400	4340
1350	4292.3	3450	4344
1400	4288.3	3500	4345
1450	4288.7	3502.78	4345
1500	4290		
1550	4294		
1600	4294		
1650	4294		
1700	4292.2		
1750	4294		
1800	4294		
1850	4300		
1900	4300.3		
1950	4300.2		
2000	4300.2		
2050	4300.3		

Section 6

indicates main channel stations

Station	Elevation	Station	Elevation
0	4307.3	2100	4298.3
50	4307	2150	4298.4
100	4298	2200	4298.6
150	4296	2250	4298.8
200	4297	2300	4298.9
250	4298	2350	4300
300	4298.1	2400	4300.5
350	4297.7	2450	4300.8
400	4297.4	2500	4304
450	4297.5	2550	4311
500	4297.7	2600	4310
550	4297.5	2650	4313
600	4297.3	2700	4310.2
650	4299.2	2750	4315
700	4298.5	2752.56	4315
750	4298		
800	4298		
850	4292		
900	4296.5		
950	4291		
1000	4294		
1050	4293.6		
1100	4295		
1150	4295		
1200	4296		
1250	4295		
1300	4296.2		
1350	4296.5		
1400	4295.7		
1450	4295		
1500	4296.3		
1550	4295.4		
1600	4295.1		
1650	4292.3		
1700	4292.1		
1750	4294.5		
1800	4293		
1850	4291.1		
1900	4289		
1950	4287.5		
2000	4289		
2050	4293.2		

Section 7

indicates main channel stations

Station	Elevation	Station	Elevation
0	4300	2100	4296.5
50	4299.8	2150	4296.7
100	4299.4	2200	4296.8
150	4299.2	2250	4297
200	4299	2300	4297.2
250	4297	2350	4297.5
300	4296.2	2400	4297.8
350	4296.5	2450	4300.1
400	4296.2	2500	4300.5
450	4296.2	2550	4301
500	4296.3	2600	4301.1
550	4296.1	2650	4301.2
600	4296.2	2700	4301.4
650	4295.9	2750	4301.7
700	4296	2800	4301.9
750	4286	2850	4305
800	4286.1	2900	4310
850	4291	2926.15	4314
900	4292		
950	4293		
1000	4293.3		
1050	4293.4		
1100	4293.9		
1150	4294.1		
1200	4295		
1250	4294.5		
1300	4294		
1350	4294.5		
1400	4294		
1450	4294.2		
1500	4293.7		
1550	4293.5		
1600	4294.1		
1650	4294.3		
1700	4294.5		
1750	4294.8		
1800	4295.1		
1850	4295.6		
1900	4295.8		
1950	4296		
2000	4296.1		
2050	4296.4		

Section 8

indicates main channel stations

Station	Elevation	Station	Elevation
0	4302.4	2100	4295.9
50	4302.2	2150	4296
100	4301.1	2200	4296
150	4298	2250	4296.2
200	4294.8	2300	4296.3
250	4294.8	2350	4296.6
300	4294.7	2400	4296.8
350	4294.6	2450	4297
400	4294.6	2500	4300.1
450	4294.5	2550	4300
500	4294.4	2600	4300.3
550	4294.3	2650	4300.5
600	4294.3	2700	4300.8
650	4294.2	2750	4304
700	4294.1	2800	4319
750	4294	2850	4332
800	4293	2900	4338
850	4293	2927.41	4338
900	4292.9		
950	4288		
1000	4286.5		
1050	4286.1		
1100	4294		
1150	4292.3		
1200	4292.4		
1250	4292.4		
1300	4292.6		
1350	4292.7		
1400	4292.9		
1450	4292.9		
1500	4293		
1550	4293.2		
1600	4293.3		
1650	4293.5		
1700	4293.6		
1750	4293.8		
1800	4294		
1850	4293.7		
1900	4295		
1950	4295.2		
2000	4295.6		
2050	4295.7		

Section 9

indicates main channel stations

Station	Elevation	Station	Elevation
0	4301	2100	4285.1
50	4300	2150	4291
100	4300	2200	4296
150	4299.7	2250	4296.1
200	4299.9	2300	4296
250	4301.2	2350	4296.1
300	4301.1	2400	4296.1
350	4301.1	2450	4296.3
400	4301	2500	4296.3
450	4299	2550	4296.4
500	4294	2600	4296.5
550	4293.1	2650	4296.6
600	4293	2700	4296.7
650	4293	2750	4296.8
700	4293.3	2800	4297
750	4293.3	2850	4301
800	4293.2	2900	4304
850	4293.1	2950	4306
900	4293.1	3000	4307
950	4292.9	3050	4308.3
1000	4292.5	3100	4309.5
1050	4292.4	3150	4310
1100	4292	3200	4309.8
1150	4292.1	3205.91	4309.7
1200	4292.2		
1250	4292.1		
1300	4292		
1350	4292.2		
1400	4292		
1450	4292		
1500	4292		
1550	4292		
1600	4292.1		
1650	4292.2		
1700	4292.2		
1750	4292.1		
1800	4292		
1850	4289		
1900	4294		
1950	4294		
2000	4288		
2050	4286.3		

Section 10

indicates main channel stations

Station	Elevation	Station	Elevation
0	4296	2100	4290.6
50	4296	2150	4290.4
100	4295.7	2200	4291
150	4295.2	2250	4290.6
200	4295	2300	4290.7
250	4297	2350	4290.7
300	4297	2400	4290.8
350	4297	2450	4290.9
400	4297	2500	4291
450	4294	2550	4290.8
500	4293.5	2600	4290.9
550	4292.7	2650	4291
600	4293.1	2700	4291
650	4293.3	2750	4291.1
700	4293.1	2800	4291.8
750	4293	2850	4294.2
800	4292.8	2900	4294.4
850	4292	2950	4294.7
900	4287	3000	4294.8
950	4285	3050	4294.9
1000	4290	3056.32	4294.9
1050	4294		
1100	4289		
1150	4285.5		
1200	4286		
1250	4286		
1300	4288		
1350	4290.2		
1400	4290.3		
1450	4290.2		
1500	4290.1		
1550	4290.3		
1600	4290.8		
1650	4291		
1700	4290		
1750	4290.3		
1800	4290.4		
1850	4290.8		
1900	4291.2		
1950	4291.4		
2000	4291.3		
2050	4291		

Manning's n or k Values

Section	River Station	Frctn (n/K)	n #1	n #2	n #3
1	90	n	0.045	0.04	0.045
2	80	n	0.05	0.04	0.06
3	72	n	0.055	0.045	0.075
4	60	n	0.05	0.04	0.05
5	50	n	0.045	0.04	0.05
6	40	n	0.05	0.04	0.05
7	30	n	0.05	0.04	0.05
8	20	n	0.05	0.04	0.05
9	10	n	0.05	0.04	0.05
10	0	n	0.045	0.04	0.045

n #1 Manning's n for left overbank

n #2 Manning's n for main channel

n #3 Manning's n for right overbank

Contraction/Expansion Coefficients

Base Geometry without Bridge

Section	River Station	Contraction	Expansion
1	90	0.1	0.3
2	80	0.1	0.3
3	72	0.3	0.5
4	60	0.3	0.5
5	50	0.1	0.3
6	40	0.1	0.3
7	30	0.1	0.3
8	20	0.1	0.3
9	10	0.1	0.3
10	0	0.1	0.3

For all Bridge Scenarios

Section	River Station	Contraction	Expansion
1	90	0.1	0.3
2	80	0.1	0.3
3	72	0.3	0.5
4	60	0.3	0.5
	55	Bridge	
5	50	0.3	0.5
6	40	0.3	0.5
7	30	0.1	0.3
8	20	0.1	0.3
9	10	0.1	0.3
10	0	0.1	0.3

Downstream Reach Lengths (ft)

Section	River Station	LOB	Channel	ROB
1	90	1528.48	1547.45	918.5
2	80	1531.51	1552.09	1061.06
3	72	1060.67	922.96	789.91
4	60	119.71	119.74	119.72
5	50	596.56	717.27	773.59
6	40	683.85	1363.67	935.62
7	30	705.88	692.91	543.4
8	20	1046.45	1201.27	1036.27
9	10	1468.91	1548.39	1751.32
10	0	10	10	10

LOB --- Left overbank

ROB --- Right overbank

Proposed Bridge Parameters

Bridge Deck Low Cord Elevation: 4305 ft (NAVD 88)

Bridge Deck High Cord Elevation: 4310 ft

Abutments Slope: 2:1 (H:V)

Piers: Circular, 6 ft diameter

Pier Elevation: 4298~4305 ft

Pier Base: Circular, 10 ft diameter

Pier Base Elevation: from Below Ground to 4298 ft

Scenario 1

Number of Piers:	5
Total Span:	700 ft
Pier Span:	100 ft
Two Central Main Span:	150 ft

Scenario 2

Number of Piers:	7
Total Span:	900 ft
Pier Span:	100 ft
Two Central Main Span:	150 ft

Scenario 3

Number of Piers:	9
Total Span:	1100 ft
Pier Span:	100 ft
Two Central Main Span:	150 ft

Scenarion 4

Number of Piers:	11
Total Span:	1300 ft
Pier Span:	100 ft
Two Central Main Span:	150 ft

Scenario 5

Number of Piers:	30
Total Span:	3200 ft
Pier Span:	100 ft
Two Central Main Span:	150 ft

Bridge Modeling Method

Using all the following methods with the highest energy as the final answer

Energy

Momentum with drag coefficient of 1.20

Yarnell with Yarnell's pier Coefficient of 1.25

Steady Flow Model Input

100 Year Flood:

Flow Rate: 36100 cubic ft per second

Upstream Boundary: Normal Depth with a slope of 0.000646

Downstream Boundary: Known WS Elevation: 4294.932 ft

1.5 X 100 Year Flood:

Flow Rate: 54150 cubic ft per second

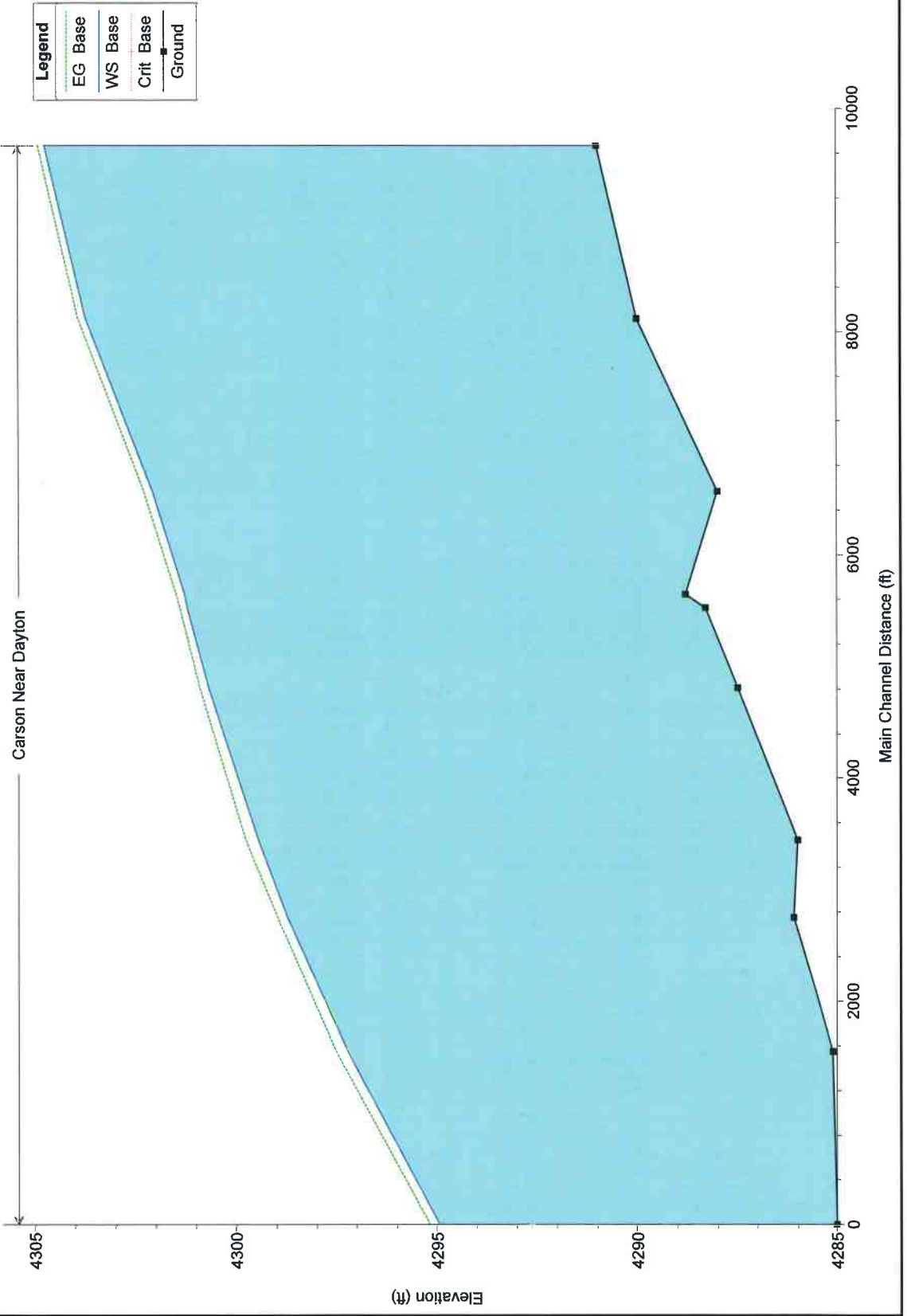
Upstream Boundary: Normal Depth with a slope of 0.000646

Downstream Boundary: Normal Depth with a slope of 0.000646

Appendix B HEC-RAS Modeling Outputs

Carson River Rolling A Bridge Plan: Base_No Bridge 7/8/2008 10:43:03 AM

Geom: River Base Geometry Flow: 100-Y Flood



Plan: No_Bridge Carson Near Dayton RS: 90 Profile: Base

E.G. Elev (ft)	4304.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.045	0.040	0.045
W.S. Elev (ft)	4304.75	Reach Len. (ft)	1528.48	1547.45	918.50
Crit W.S. (ft)		Flow Area (sq ft)	3998.24	2407.59	6683.13
E.G. Slope (ft/ft)	0.000557	Area (sq ft)	3998.24	2407.59	6683.13
Q Total (cfs)	36100.00	Flow (cfs)	8662.23	11052.16	16385.61
Top Width (ft)	2342.63	Top Width (ft)	862.59	200.00	1280.04
Vel Total (ft/s)	2.76	Avg. Vel. (ft/s)	2.17	4.59	2.45
Max Chl Dpth (ft)	13.75	Hydr. Depth (ft)	4.64	12.04	5.22
Conv. Total (cfs)	1529392.0	Conv. (cfs)	366978.9	468229.6	694183.2
Length Wtd. (ft)	1150.85	Wetted Per. (ft)	862.75	200.99	1280.69
Min Ch El (ft)	4291.00	Shear (lb/sq ft)	0.16	0.42	0.18
Alpha	1.35	Stream Power (lb/ft s)	0.35	1.91	0.45
Frctn Loss (ft)	0.99	Cum Volume (acre-ft)	608.87	586.13	959.67
C & E Loss (ft)	0.00	Cum SA (acres)	141.73	65.91	250.31

Errors Warnings and Notes

Warning:	Divided flow computed for this cross-section.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Plan: No_Bridge Carson Near Dayton RS: 80 Profile: Base

E.G. Elev (ft)	4303.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.040	0.060
W.S. Elev (ft)	4303.72	Reach Len. (ft)	1531.51	1552.09	1061.06
Crit W.S. (ft)		Flow Area (sq ft)		1216.64	11244.60
E.G. Slope (ft/ft)	0.001504	Area (sq ft)		1216.64	11244.60
Q Total (cfs)	36100.00	Flow (cfs)		7219.49	28880.51
Top Width (ft)	2713.70	Top Width (ft)		142.89	2570.82
Vel Total (ft/s)	2.90	Avg. Vel. (ft/s)		5.93	2.57
Max Chl Dpth (ft)	13.72	Hydr. Depth (ft)		8.51	4.37
Conv. Total (cfs)	930831.4	Conv. (cfs)		186153.2	744678.2
Length Wtd. (ft)	1238.26	Wetted Per. (ft)		145.55	2571.42
Min Ch El (ft)	4290.00	Shear (lb/sq ft)		0.78	0.41
Alpha	1.47	Stream Power (lb/ft s)		4.66	1.05
Frctn Loss (ft)	1.63	Cum Volume (acre-ft)	538.72	521.76	770.66
C & E Loss (ft)	0.00	Cum SA (acres)	126.60	59.82	209.71

Errors Warnings and Notes

Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
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Plan: No_Bridge Carson Near Dayton RS: 70 Profile: Base

E.G. Elev (ft)	4302.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.	0.055	0.045	0.075
W.S. Elev (ft)	4302.07	Reach Len. (ft)	1060.67	922.96	789.91
Crit W.S. (ft)		Flow Area (sq ft)	1706.91	2889.64	7855.75
E.G. Slope (ft/ft)	0.001161	Area (sq ft)	1706.91	2889.64	7855.75
Q Total (cfs)	36100.00	Flow (cfs)	4330.66	14686.90	17082.45
Top Width (ft)	2209.66	Top Width (ft)	372.63	300.00	1537.03
Vel Total (ft/s)	2.90	Avg. Vel. (ft/s)	2.54	5.08	2.17
Max Chl Dpth (ft)	14.07	Hydr. Depth (ft)	4.58	9.63	5.11
Conv. Total (cfs)	1059516.0	Conv. (cfs)	127102.5	431052.8	501360.8

Plan: No_Bridge Carson Near Dayton RS: 70 Profile: Base (Continued)

Length Wtd. (ft)	902.18	Wetted Per. (ft)	373.03	300.94	1537.99
Min Ch El (ft)	4288.00	Shear (lb/sq ft)	0.33	0.70	0.37
Alpha	1.61	Stream Power (lb/ft s)	0.84	3.54	0.80
Frctn Loss (ft)	0.80	Cum Volume (acre-ft)	508.72	448.60	538.03
C & E Loss (ft)	0.00	Cum SA (acres)	120.05	51.93	159.68

Errors Warnings and Notes

Warning: Divided flow computed for this cross-section.

Plan: No_Bridge Carson Near Dayton RS: 60 Profile: Base

E.G. Elev (ft)	4301.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4301.27	Reach Len. (ft)	119.71	119.74	119.72
Crit W.S. (ft)		Flow Area (sq ft)	3958.90	4207.29	4910.40
E.G. Slope (ft/ft)	0.000692	Area (sq ft)	3958.90	4207.29	4910.40
Q Total (cfs)	36100.00	Flow (cfs)	8693.69	19730.21	7676.11
Top Width (ft)	3023.85	Top Width (ft)	886.32	400.00	1737.53
Vel Total (ft/s)	2.76	Avg. Vel. (ft/s)	2.20	4.69	1.56
Max Chl Dpth (ft)	12.47	Hydr. Depth (ft)	4.47	10.52	2.83
Conv. Total (cfs)	1372064.0	Conv. (cfs)	330423.6	749891.8	291748.1
Length Wtd. (ft)	119.73	Wetted Per. (ft)	886.86	400.32	1738.30
Min Ch El (ft)	4288.80	Shear (lb/sq ft)	0.19	0.45	0.12
Alpha	1.80	Stream Power (lb/ft s)	0.42	2.13	0.19
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	439.74	373.42	422.28
C & E Loss (ft)	0.02	Cum SA (acres)	104.72	44.51	129.99

Errors Warnings and Notes

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Plan: No_Bridge Carson Near Dayton RS: 50 Profile: Base

E.G. Elev (ft)	4301.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.	0.045	0.040	0.050
W.S. Elev (ft)	4301.21	Reach Len. (ft)	596.56	717.27	773.59
Crit W.S. (ft)		Flow Area (sq ft)	4574.62	4135.35	4798.60
E.G. Slope (ft/ft)	0.000609	Area (sq ft)	4574.62	4135.35	4798.60
Q Total (cfs)	36100.00	Flow (cfs)	10933.22	17965.29	7201.49
Top Width (ft)	3138.00	Top Width (ft)	1045.89	400.00	1692.11
Vel Total (ft/s)	2.67	Avg. Vel. (ft/s)	2.39	4.34	1.50
Max Chl Dpth (ft)	12.91	Hydr. Depth (ft)	4.37	10.34	2.84
Conv. Total (cfs)	1463436.0	Conv. (cfs)	443215.2	728283.8	291936.8
Length Wtd. (ft)	672.69	Wetted Per. (ft)	1046.24	400.62	1693.09
Min Ch El (ft)	4288.30	Shear (lb/sq ft)	0.17	0.39	0.11
Alpha	1.62	Stream Power (lb/ft s)	0.40	1.70	0.16
Frctn Loss (ft)	0.49	Cum Volume (acre-ft)	428.01	361.95	408.94
C & E Loss (ft)	0.00	Cum SA (acres)	102.06	43.41	125.28

Errors Warnings and Notes

Warning: Divided flow computed for this cross-section.

Plan: No_Bridge Carson Near Dayton RS: 40 Profile: Base

E.G. Elev (ft)	4300.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4300.68	Reach Len. (ft)	683.85	1363.67	935.62
Crit W.S. (ft)		Flow Area (sq ft)	7794.02	3276.86	500.65
E.G. Slope (ft/ft)	0.000894	Area (sq ft)	7794.02	3276.86	500.65
Q Total (cfs)	36100.00	Flow (cfs)	19365.35	16146.80	587.85
Top Width (ft)	2344.35	Top Width (ft)	1664.87	350.00	329.48
Vel Total (ft/s)	3.12	Avg. Vel. (ft/s)	2.48	4.93	1.17
Max Chl Dpth (ft)	13.18	Hydr. Depth (ft)	4.68	9.36	1.52
Conv. Total (cfs)	1207602.0	Conv. (cfs)	647801.6	540136.2	19664.7
Length Wtd. (ft)	1039.78	Wetted Per. (ft)	1666.40	350.58	329.49
Min Ch El (ft)	4287.50	Shear (lb/sq ft)	0.26	0.52	0.08
Alpha	1.46	Stream Power (lb/ft s)	0.65	2.57	0.10
Frctn Loss (ft)	1.14	Cum Volume (acre-ft)	343.31	300.92	361.88
C & E Loss (ft)	0.01	Cum SA (acres)	83.50	37.24	107.33

Errors Warnings and Notes

Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
----------	--

Plan: No_Bridge Carson Near Dayton RS: 30 Profile: Base

E.G. Elev (ft)	4299.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.31	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4299.44	Reach Len. (ft)	705.88	692.91	543.40
Crit W.S. (ft)		Flow Area (sq ft)	1537.55	2379.37	6318.53
E.G. Slope (ft/ft)	0.001375	Area (sq ft)	1537.55	2379.37	6318.53
Q Total (cfs)	36100.00	Flow (cfs)	3155.86	14668.85	18275.28
Top Width (ft)	2340.30	Top Width (ft)	604.70	250.00	1485.60
Vel Total (ft/s)	3.53	Avg. Vel. (ft/s)	2.05	6.17	2.89
Max Chl Dpth (ft)	13.44	Hydr. Depth (ft)	2.54	9.52	4.25
Conv. Total (cfs)	973671.4	Conv. (cfs)	85118.4	395641.1	492912.0
Length Wtd. (ft)	624.98	Wetted Per. (ft)	604.75	251.25	1485.67
Min Ch El (ft)	4286.00	Shear (lb/sq ft)	0.22	0.81	0.36
Alpha	1.61	Stream Power (lb/ft s)	0.45	5.01	1.06
Frctn Loss (ft)	0.77	Cum Volume (acre-ft)	270.07	212.39	288.65
C & E Loss (ft)	0.02	Cum SA (acres)	65.69	27.85	87.83

Plan: No_Bridge Carson Near Dayton RS: 20 Profile: Base

E.G. Elev (ft)	4298.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4298.72	Reach Len. (ft)	1046.45	1201.27	1036.27
Crit W.S. (ft)		Flow Area (sq ft)	3302.77	2040.47	5933.75
E.G. Slope (ft/ft)	0.001110	Area (sq ft)	3302.77	2040.47	5933.75
Q Total (cfs)	36100.00	Flow (cfs)	8697.64	11847.04	15555.33
Top Width (ft)	2339.19	Top Width (ft)	761.53	200.00	1377.66
Vel Total (ft/s)	3.20	Avg. Vel. (ft/s)	2.63	5.81	2.62
Max Chl Dpth (ft)	12.61	Hydr. Depth (ft)	4.34	10.20	4.31
Conv. Total (cfs)	1083307.0	Conv. (cfs)	261003.0	355511.9	466792.1
Length Wtd. (ft)	1102.29	Wetted Per. (ft)	761.66	200.88	1377.77
Min Ch El (ft)	4286.10	Shear (lb/sq ft)	0.30	0.70	0.30
Alpha	1.53	Stream Power (lb/ft s)	0.79	4.09	0.78
Frctn Loss (ft)	1.45	Cum Volume (acre-ft)	230.85	177.24	212.22
C & E Loss (ft)	0.00	Cum SA (acres)	54.62	24.27	69.97

Errors Warnings and Notes

Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
----------	---

Errors Warnings and Notes (Continued)

	section. This may indicate the need for additional cross sections.
--	--

Plan: No_Bridge Carson Near Dayton RS: 10 Profile: Base

E.G. Elev (ft)	4297.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.29	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4297.22	Reach Len. (ft)	1468.91	1548.39	1751.32
Crit W.S. (ft)		Flow Area (sq ft)	6180.47	2817.31	511.26
E.G. Slope (ft/ft)	0.001580	Area (sq ft)	6180.47	2817.31	511.26
Q Total (cfs)	36100.00	Flow (cfs)	20307.07	15251.75	541.18
Top Width (ft)	2334.91	Top Width (ft)	1332.18	400.00	602.73
Vel Total (ft/s)	3.80	Avg. Vel. (ft/s)	3.29	5.41	1.06
Max Chl Dpth (ft)	12.12	Hydr. Depth (ft)	4.64	7.04	0.85
Conv. Total (cfs)	908184.1	Conv. (cfs)	510874.3	383695.1	13614.7
Length Wtd. (ft)	1576.85	Wetted Per. (ft)	1332.36	401.34	602.74
Min Ch El (ft)	4285.10	Shear (lb/sq ft)	0.46	0.69	0.08
Alpha	1.28	Stream Power (lb/ft s)	1.50	3.75	0.09
Frctn Loss (ft)	2.32	Cum Volume (acre-ft)	116.94	110.25	135.56
C & E Loss (ft)	0.01	Cum SA (acres)	29.47	16.00	46.42

Errors Warnings and Notes

Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
	section. This may indicate the need for additional cross sections.

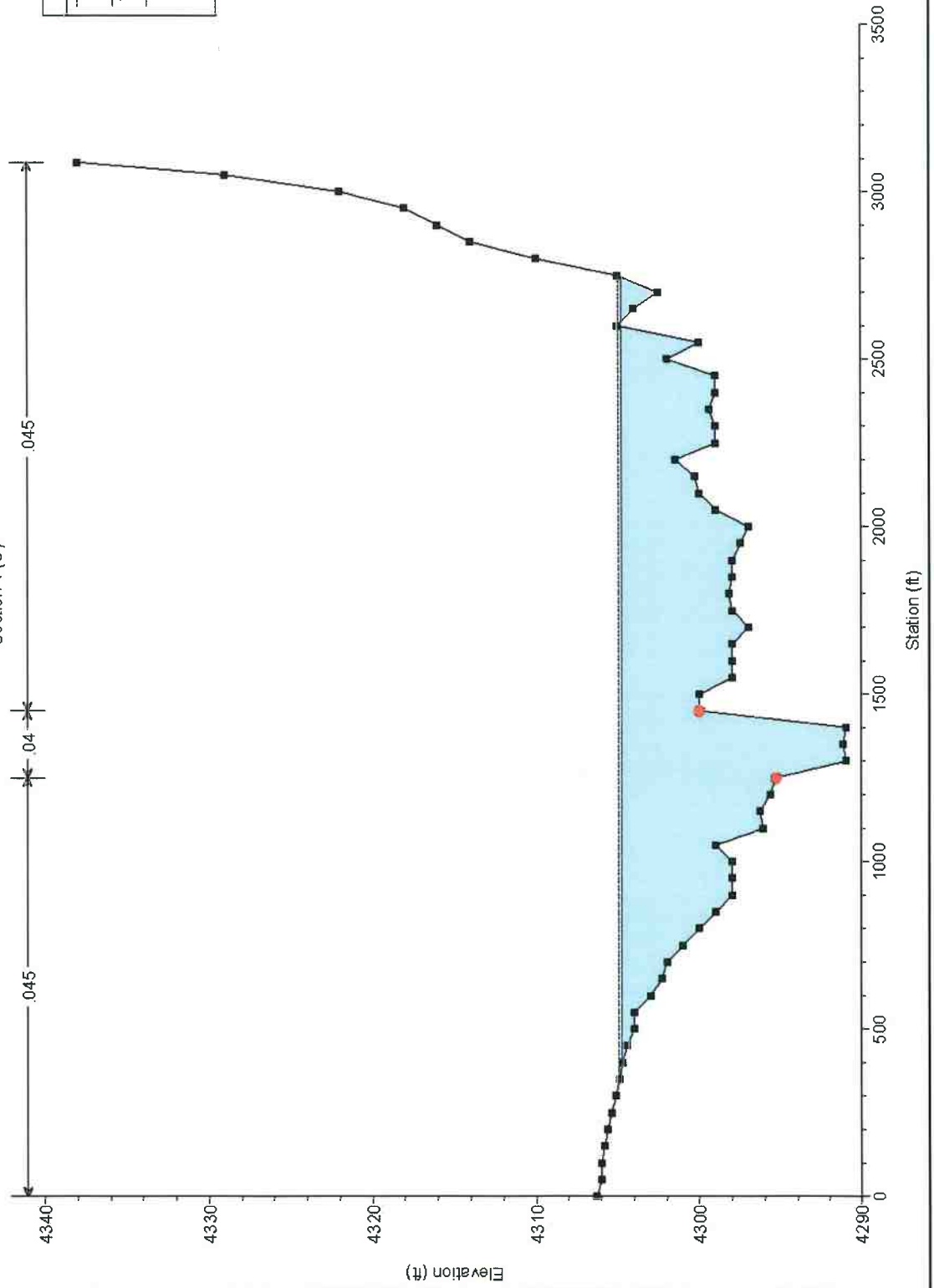
Plan: No_Bridge Carson Near Dayton RS: 0 Profile: Base

E.G. Elev (ft)	4295.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.	0.045	0.040	0.045
W.S. Elev (ft)	4294.93	Reach Len. (ft)			
Crit W.S. (ft)	4292.64	Flow Area (sq ft)	755.09	3386.06	6232.37
E.G. Slope (ft/ft)	0.001372	Area (sq ft)	755.09	3386.06	6232.37
Q Total (cfs)	36100.00	Flow (cfs)	1374.99	16649.25	18075.76
Top Width (ft)	2621.86	Top Width (ft)	415.54	500.00	1706.32
Vel Total (ft/s)	3.48	Avg. Vel. (ft/s)	1.82	4.92	2.90
Max Chl Dpth (ft)	9.93	Hydr. Depth (ft)	1.82	6.77	3.65
Conv. Total (cfs)	974736.3	Conv. (cfs)	37126.0	449546.5	488063.8
Length Wtd. (ft)		Wetted Per. (ft)	415.58	501.16	1706.44
Min Ch El (ft)	4285.00	Shear (lb/sq ft)	0.16	0.58	0.31
Alpha	1.28	Stream Power (lb/ft s)	0.28	2.84	0.91
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Carson River Rolling A Bridge Plan: Base_No Bridge 7/8/2008 10:43:03 AM

Geom: River Base Geometry Flow: 100-Y Flood

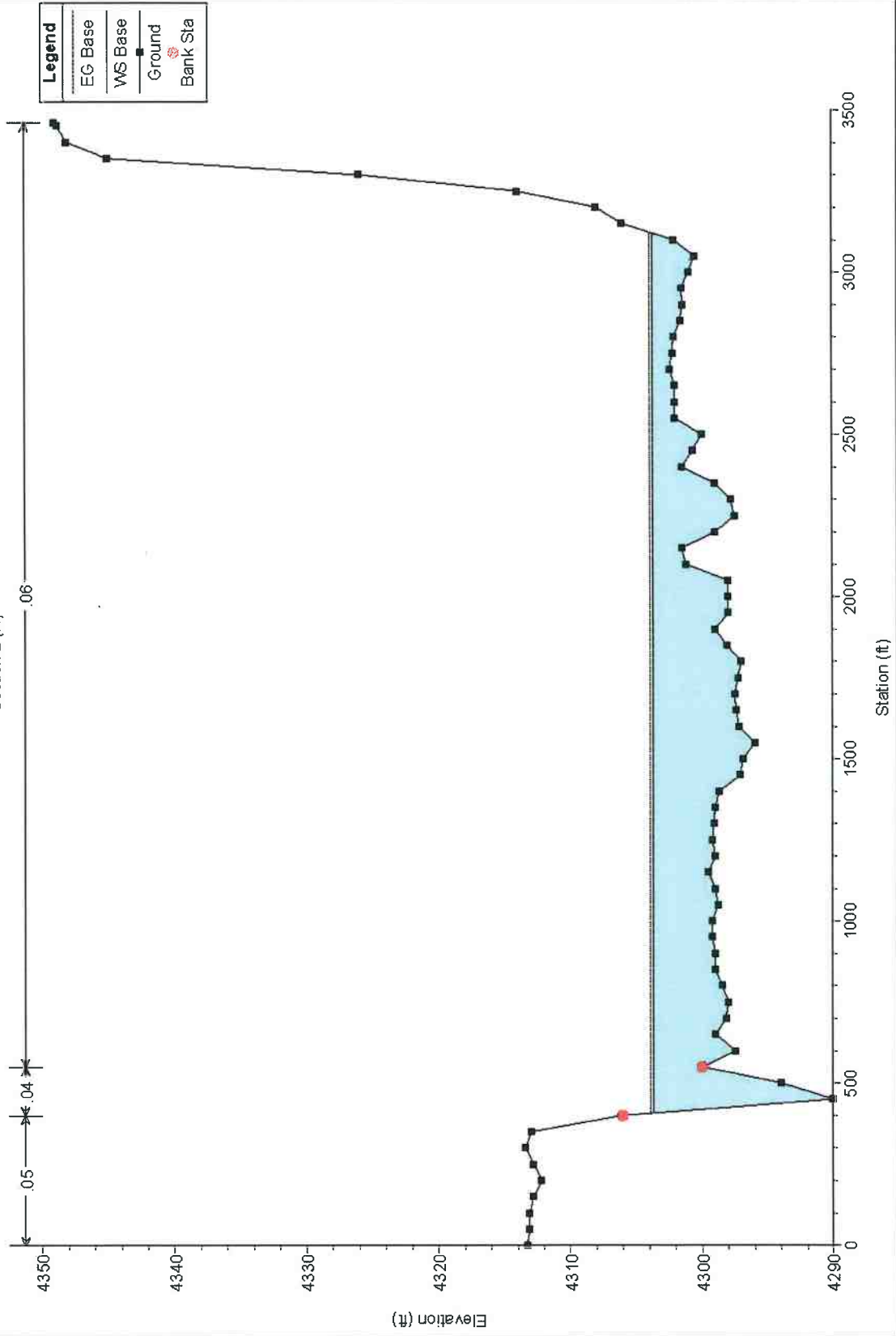
Section 1 (O)



Carson River Rolling A Bridge Plan: Base_No Bridge 7/8/2008 10:43:03 AM

Geom: River Base Geometry Flow: 100-Y Flood

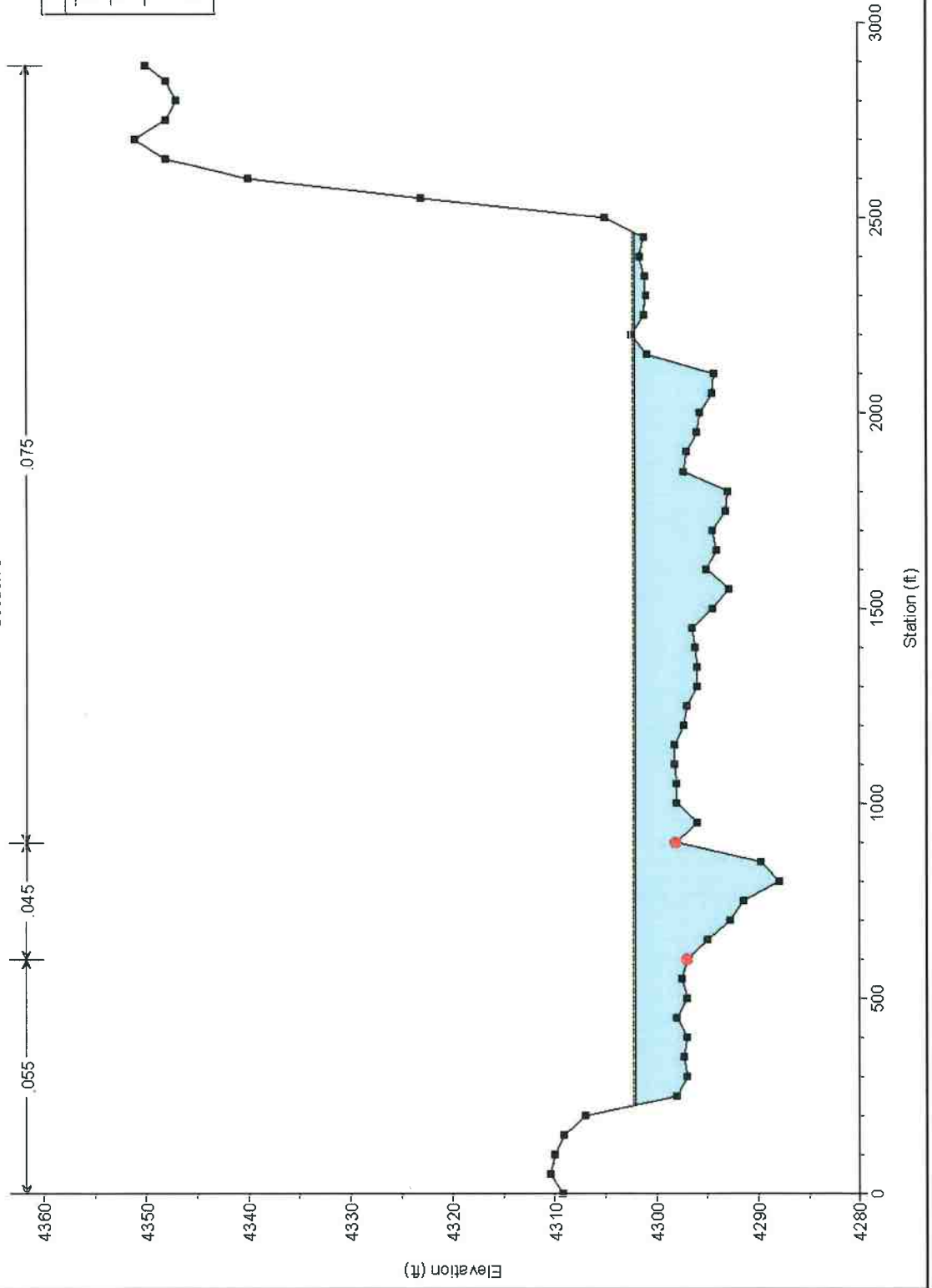
Section 2 (N)



Carson River Rolling A Bridge Plan: Base_No Bridge 7/8/2008 10:43:03 AM

Geom: River Base Geometry Flow: 100-Y Flood

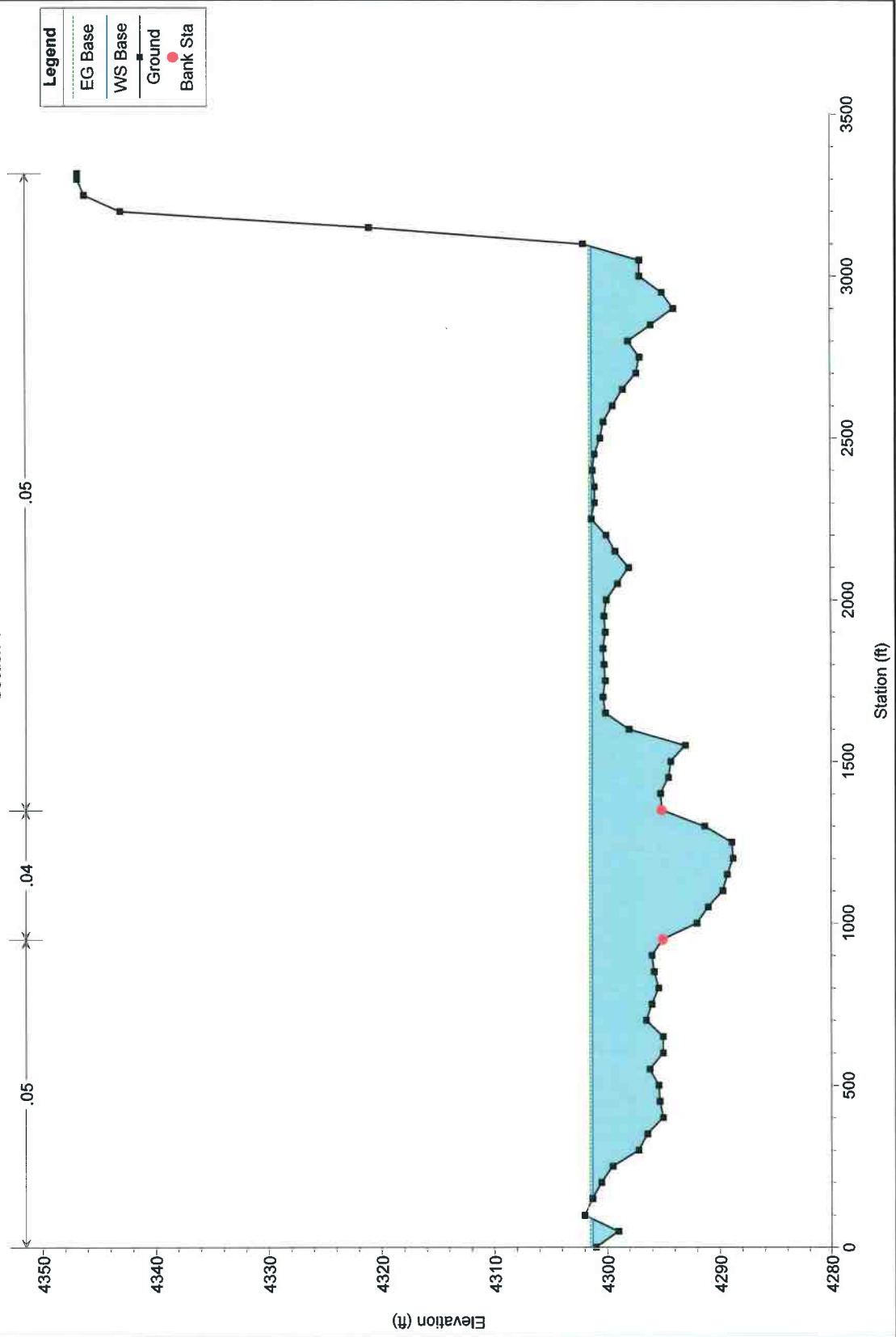
Section 3



Carson River Rolling A Bridge Plan: Base_No Bridge 7/8/2008 10:43:03 AM

Geom: River Base Geometry Flow: 100-Y Flood

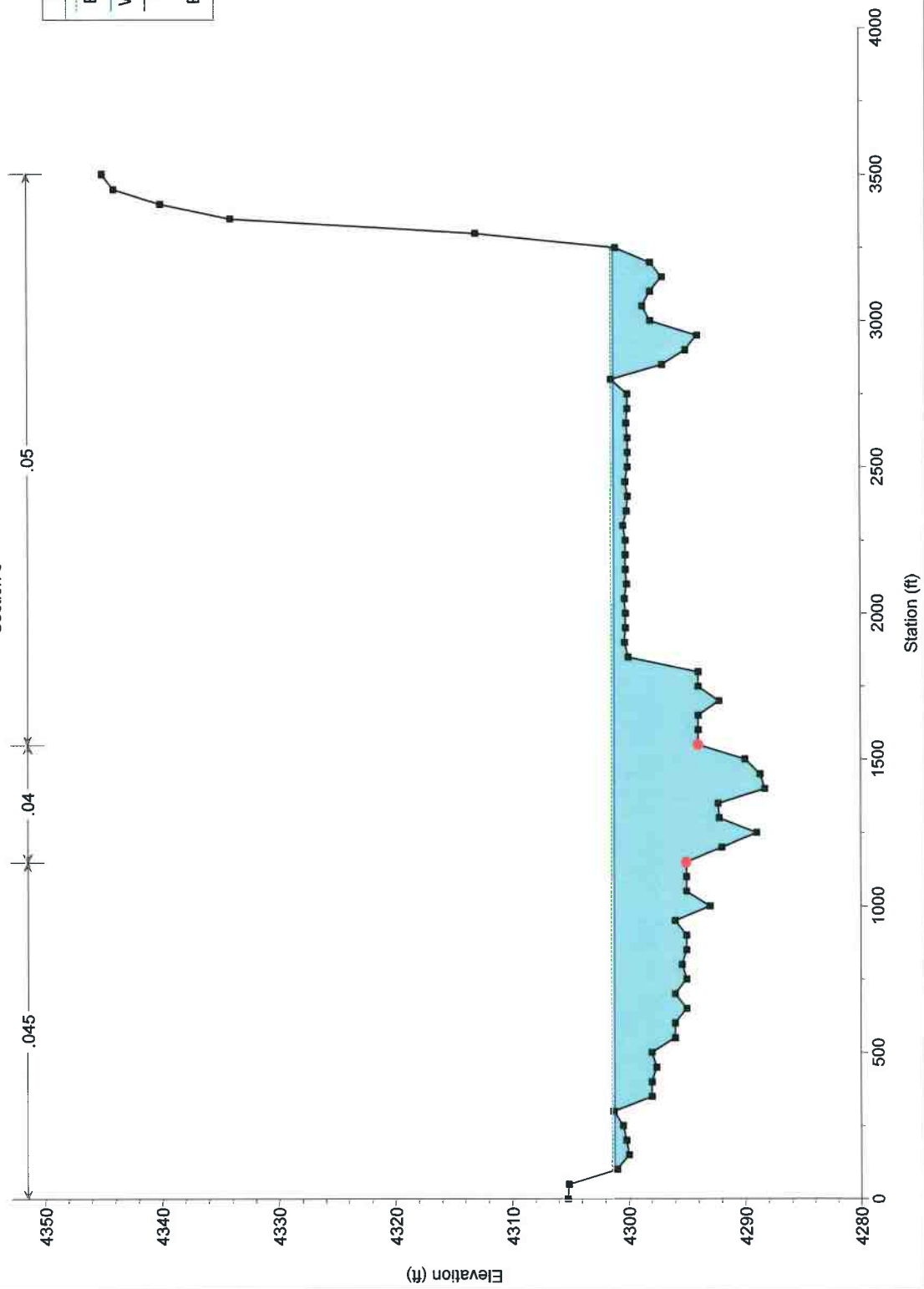
Section 4



Carson River Rolling A Bridge Plan: Base_No Bridge 7/8/2008 10:43:03 AM

Geom: River Base Geometry Flow: 100-Y Flood

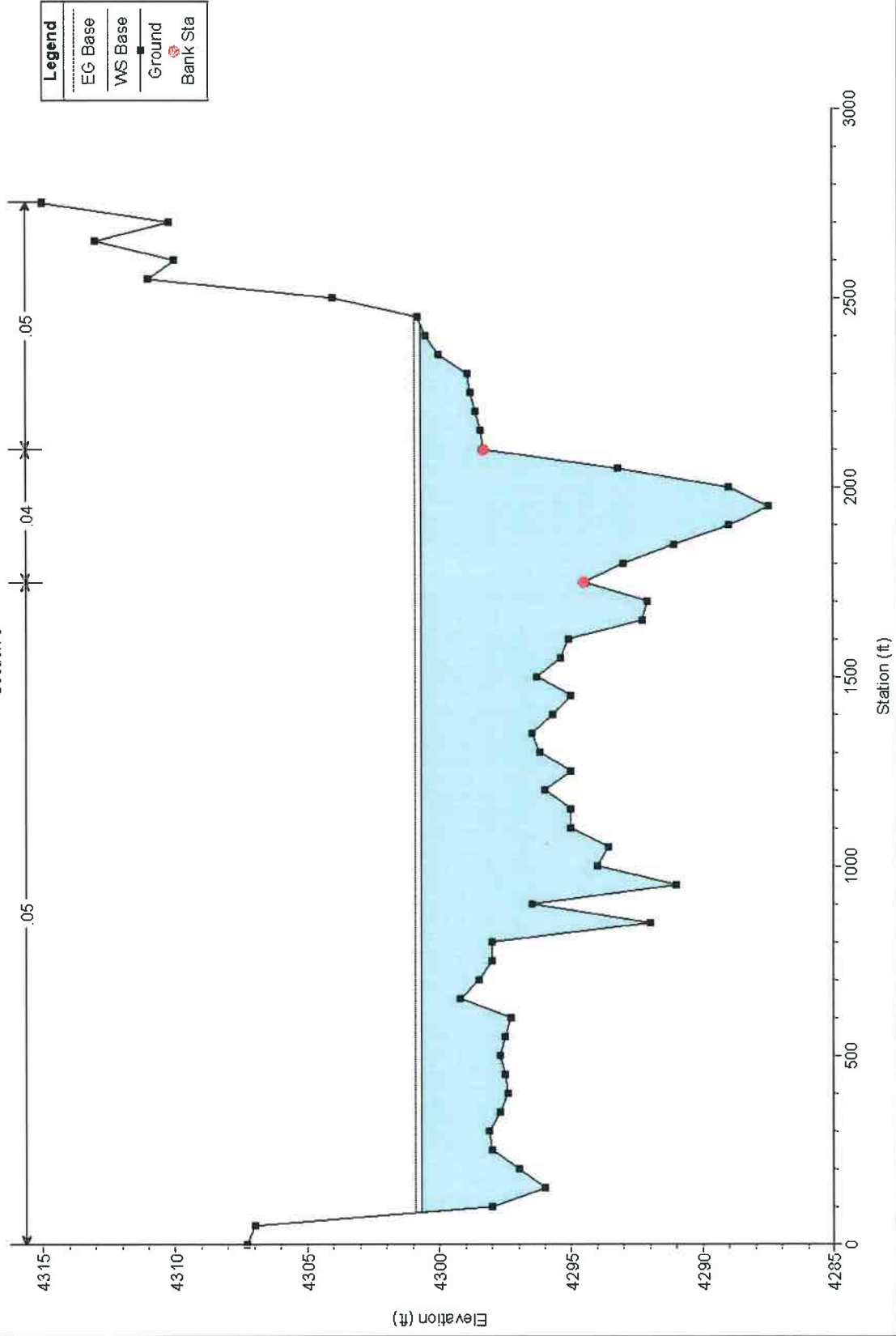
Section 5



Carson River Rolling A Bridge Plan: Base_No Bridge 7/8/2008 10:43:03 AM

Geom: River Base Geometry Flow: 100-Y Flood

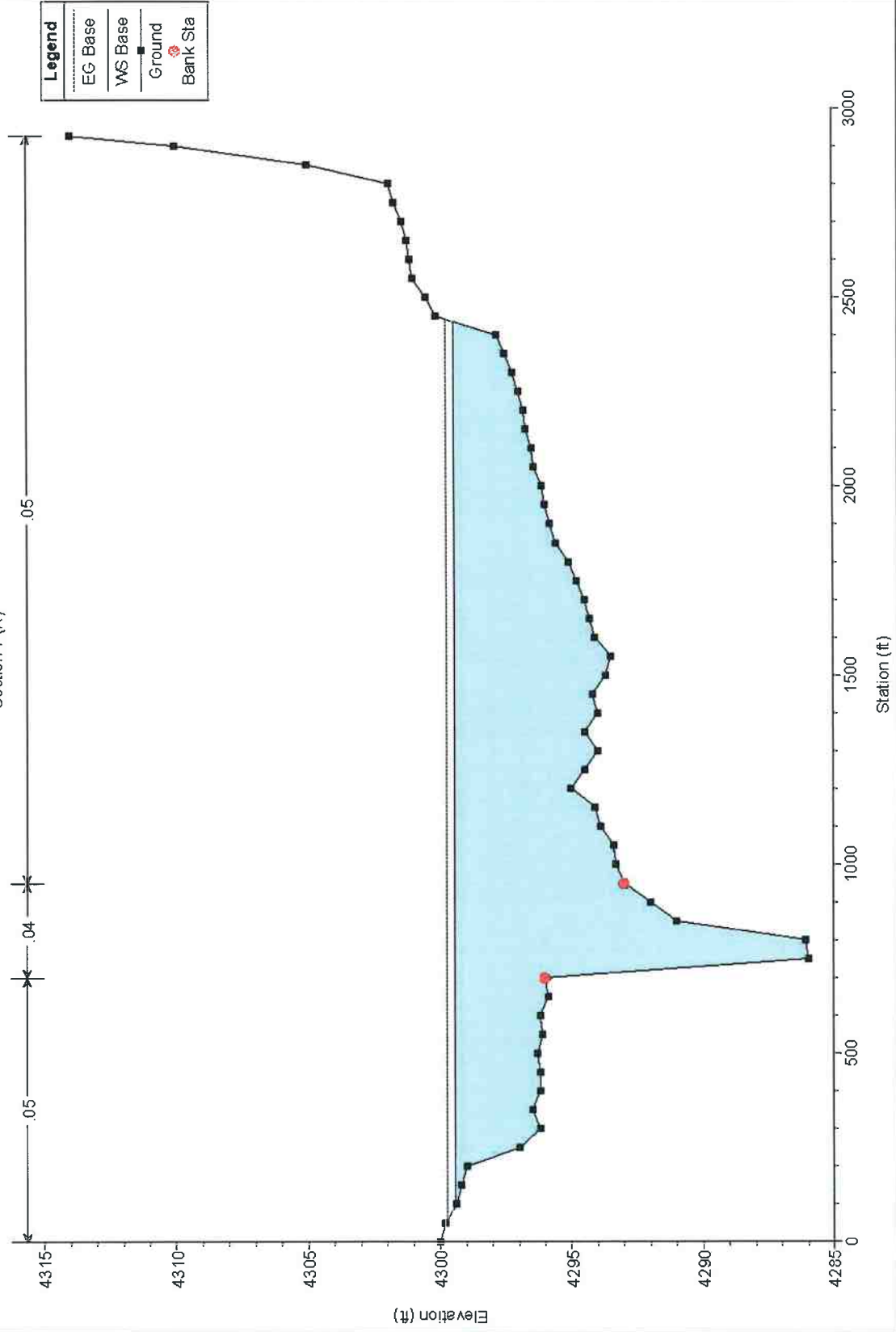
Section 6



Carson River Rolling A Bridge Plan: Base_No Bridge 7/8/2008 10:43:03 AM

Geom: River Base Geometry Flow: 100-Y Flood

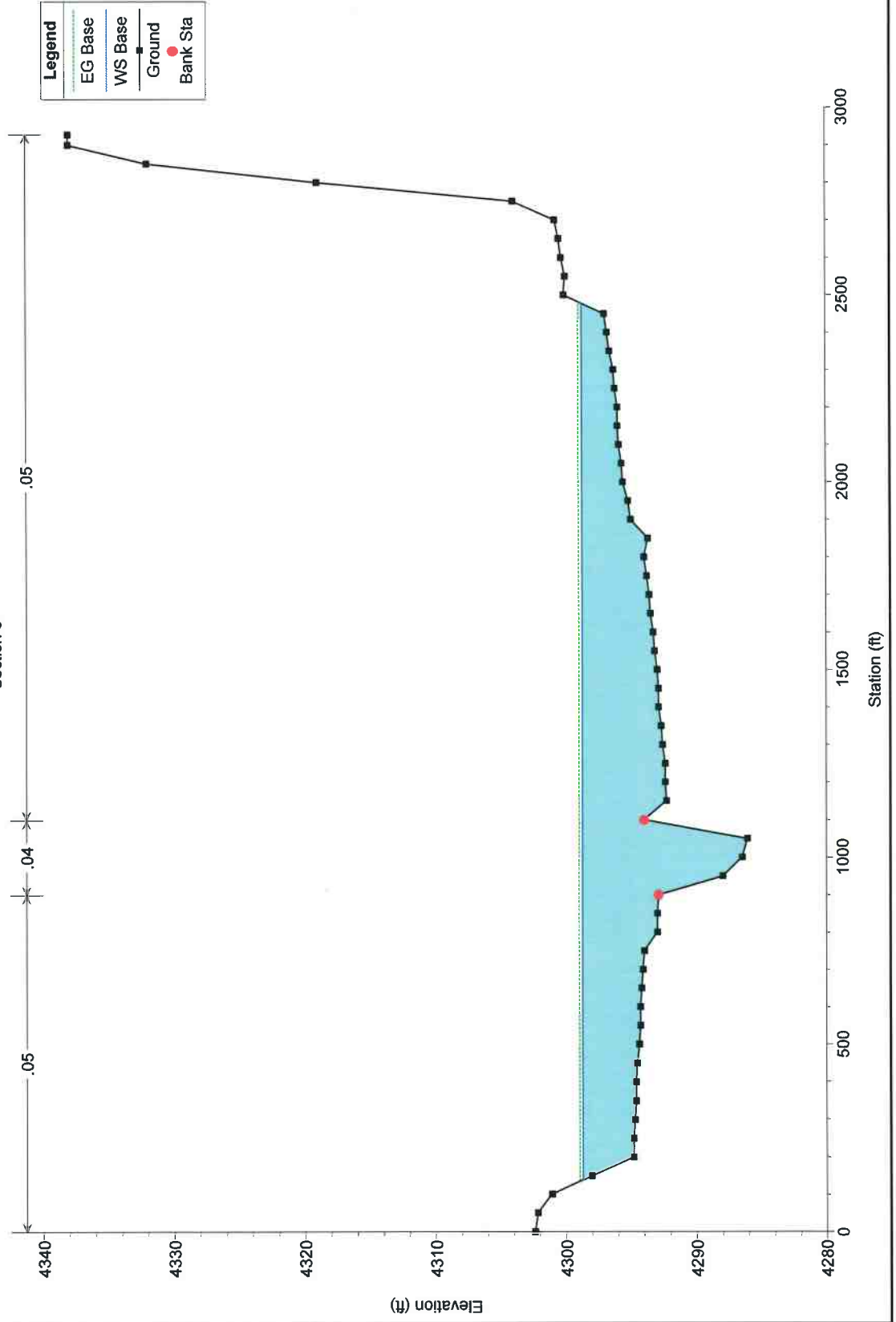
Section 7 (K)



Carson River Rolling A Bridge Plan: Base_No Bridge 7/8/2008 10:43:03 AM

Geom: River Base Geometry Flow: 100-Y Flood

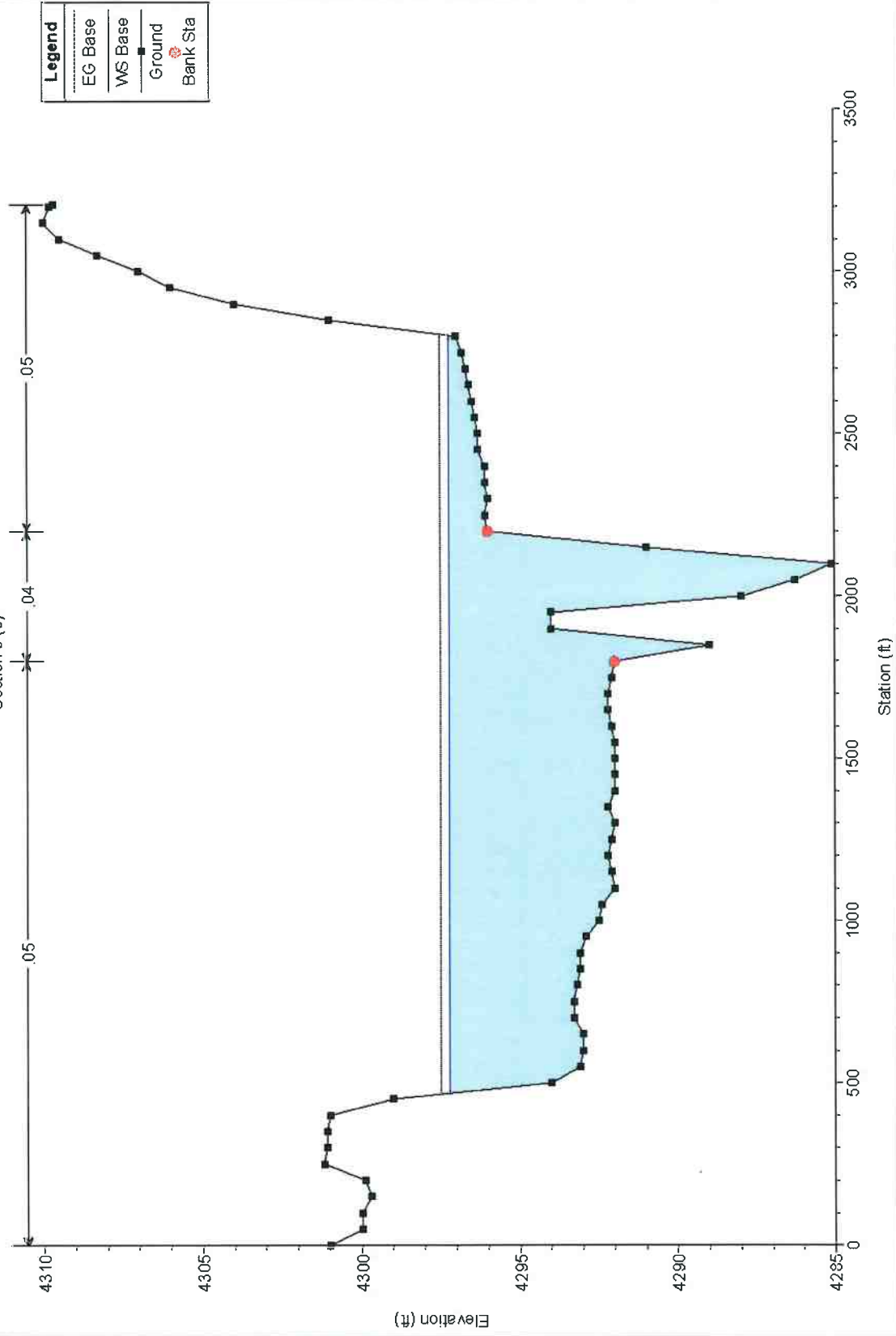
Section 8



Carson River Rolling A Bridge

Geom: River Base Geometry Flow: 100-Y Flood

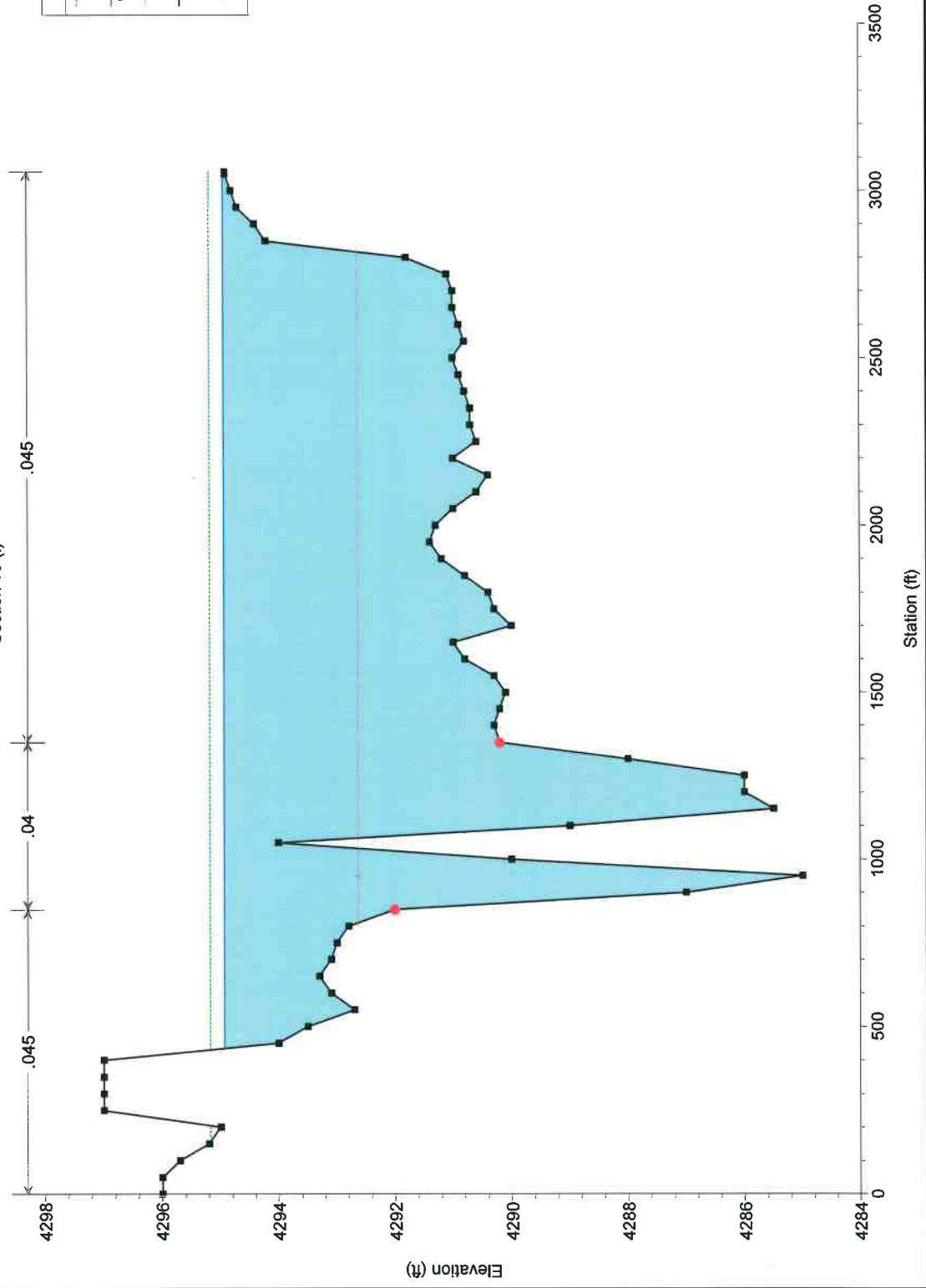
Section 9 (J)



Carson River Rolling A Bridge Plan: Base_No Bridge 7/8/2008 10:43:03 AM

Geom: River Base Geometry Flow: 100-Y Flood

Section 10 (l)

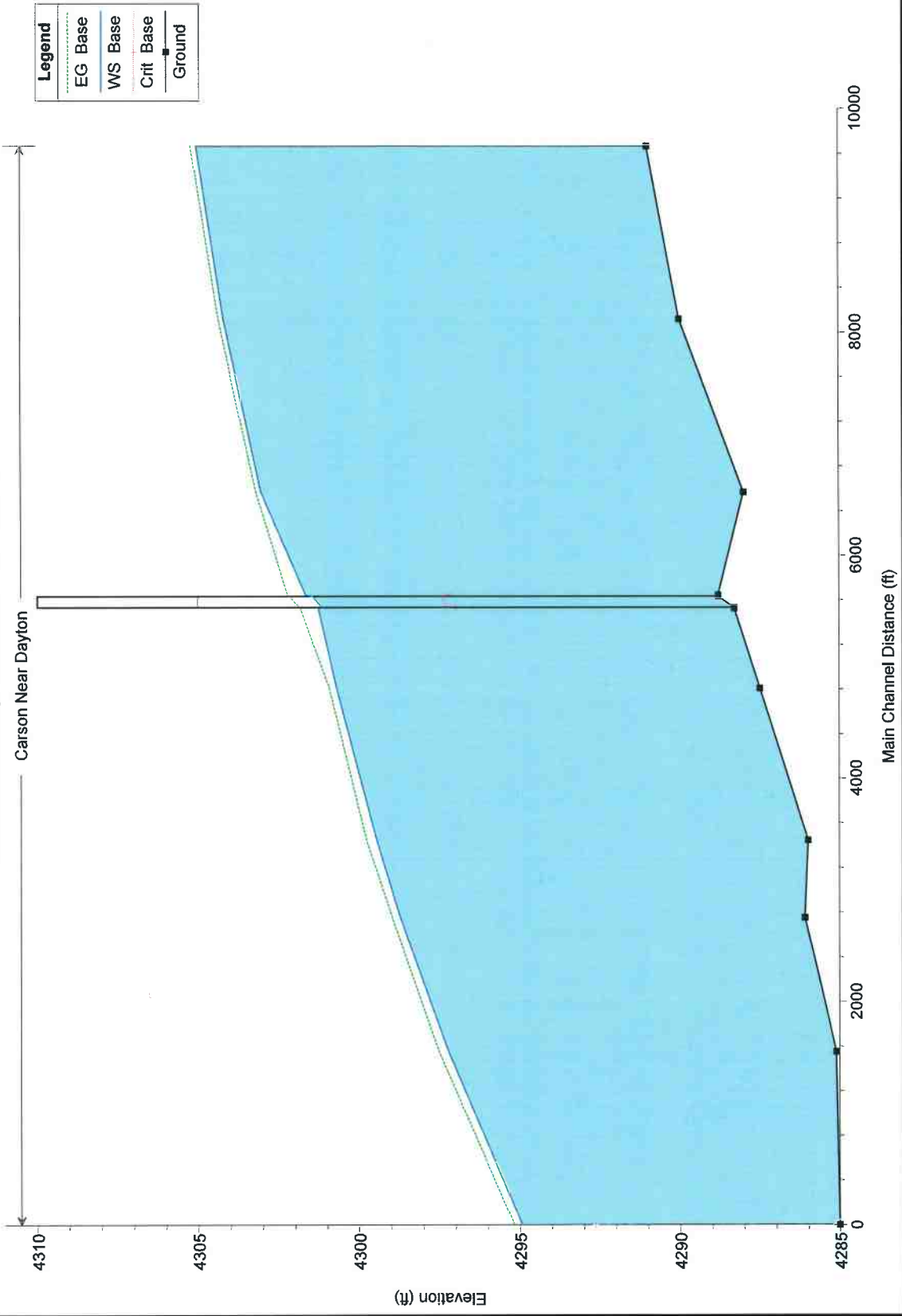


HEC-RAS Plan: No_Bridge River: Carson Reach: Near Dayton Profile: Base

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Near Dayton	90	Base	36100.00	4291.00	4304.75		4304.91	0.000557	4.59	13088.96	2342.63	0.23
Near Dayton	80	Base	36100.00	4290.00	4303.72		4303.92	0.001504	5.93	12461.24	2713.70	0.36
Near Dayton	70	Base	36100.00	4288.00	4302.07		4302.28	0.001161	5.08	12452.30	2209.66	0.29
Near Dayton	60	Base	36100.00	4288.80	4301.27		4301.49	0.000692	4.69	13078.59	3023.85	0.25
Near Dayton	50	Base	36100.00	4288.30	4301.21		4301.39	0.000609	4.34	13508.56	3138.00	0.24
Near Dayton	40	Base	36100.00	4287.50	4300.68		4300.90	0.000894	4.93	11571.53	2344.35	0.28
Near Dayton	30	Base	36100.00	4286.00	4299.44		4299.75	0.001375	6.17	10235.45	2340.30	0.35
Near Dayton	20	Base	36100.00	4286.10	4298.72		4298.96	0.001110	5.81	11278.98	2339.19	0.32
Near Dayton	10	Base	36100.00	4285.10	4297.22		4297.51	0.001580	5.41	9509.04	2334.91	0.36
Near Dayton	0	Base	36100.00	4285.00	4294.93	4292.64	4295.17	0.001372	4.92	10373.52	2621.86	0.33

Carson River Rolling A Bridge Plan: 100y-Scenario#1 7/8/2008 10:47:08 AM

Geom: Base with Bridge Scenario #1 Flow: 100-Y Flood



Plan: 100Y-S#1 Carson Near Dayton RS: 55 BR U Profile: Base

E.G. Elev (ft)	4302.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.72	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4301.43	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	4297.41	Flow Area (sq ft)	476.88	4015.26	1179.46
E.G. Slope (ft/ft)	0.002023	Area (sq ft)	476.88	4015.26	1179.46
Q Total (cfs)	36100.00	Flow (cfs)	1836.26	29212.08	5051.66
Top Width (ft)	655.73	Top Width (ft)	89.86	382.00	183.86
Vel Total (ft/s)	6.37	Avg. Vel. (ft/s)	3.85	7.28	4.28
Max Chl Dpth (ft)	12.62	Hydr. Depth (ft)	5.31	10.51	6.41
Conv. Total (cfs)	802715.9	Conv. (cfs)	40831.0	649556.9	112328.1
Length Wtd. (ft)	100.00	Wetted Per. (ft)	97.52	441.84	205.86
Min Ch El (ft)	4288.81	Shear (lb/sq ft)	0.62	1.15	0.72
Alpha	1.14	Stream Power (lb/ft s)	2.38	8.35	3.10
Frctn Loss (ft)		Cum Volume (acre-ft)	431.01	372.14	412.50
C & E Loss (ft)		Cum SA (acres)	102.52	44.38	125.88

Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
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Plan: 100Y-S#1 Carson Near Dayton RS: 55 Profile: Base

E.G. US. (ft)	4302.20	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	4301.65	E.G. Elev (ft)	4302.15	4301.84
Q Total (cfs)	36100.00	W.S. Elev (ft)	4301.43	4301.12
Q Bridge (cfs)	36100.00	Crit W.S. (ft)	4297.41	4297.28
Q Weir (cfs)		Max Chl Dpth (ft)	12.62	12.82
Weir Sta Lft (ft)		Vel Total (ft/s)	6.37	6.47
Weir Sta Rgt (ft)		Flow Area (sq ft)	5671.60	5581.87
Weir Submerg		Froude # Chl	0.40	0.40
Weir Max Depth (ft)		Specif Force (cu ft)	34689.80	33513.27
Min El Weir Flow (ft)	4311.00	Hydr Depth (ft)	8.65	8.52
Min El Prs (ft)	4305.00	W.P. Total (ft)	745.21	742.49
Delta EG (ft)	0.40	Conv. Total (cfs)	802715.9	783517.1
Delta WS (ft)	0.40	Top Width (ft)	655.73	655.13
BR Open Area (sq ft)	8036.93	Frctn Loss (ft)		
BR Open Vel (ft/s)	6.47	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	0.96	1.00
Br Sel Method	Momentum	Power Total (lb/ft s)	6.12	6.44

Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Plan: 100Y-S#1 Carson Near Dayton RS: 55 BR D Profile: Base

E.G. Elev (ft)	4301.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.72	Wt. n-Val.	0.045	0.040	0.050
W.S. Elev (ft)	4301.12	Reach Len. (ft)	9.74	9.74	9.74
Crit W.S. (ft)	4297.28	Flow Area (sq ft)	1003.72	3852.70	725.45
E.G. Slope (ft/ft)	0.002123	Area (sq ft)	1003.72	3852.70	725.45
Q Total (cfs)	36100.00	Flow (cfs)	4872.04	28051.06	3176.90
Top Width (ft)	655.13	Top Width (ft)	161.89	382.00	111.24
Vel Total (ft/s)	6.47	Avg. Vel. (ft/s)	4.85	7.28	4.38
Max Chi Dpth (ft)	12.82	Hydr. Depth (ft)	6.20	10.09	6.52
Conv. Total (cfs)	783517.1	Conv. (cfs)	105743.2	608822.3	68951.6
Length Wtd. (ft)	9.74	Wetted Per. (ft)	176.19	439.12	127.19
Min Ch El (ft)	4288.30	Shear (lb/sq ft)	0.75	1.16	0.76
Alpha	1.10	Stream Power (lb/ft s)	3.66	8.47	3.31
Frctn Loss (ft)		Cum Volume (acre-ft)	429.31	363.11	410.31
C & E Loss (ft)		Cum SA (acres)	102.23	43.50	125.55

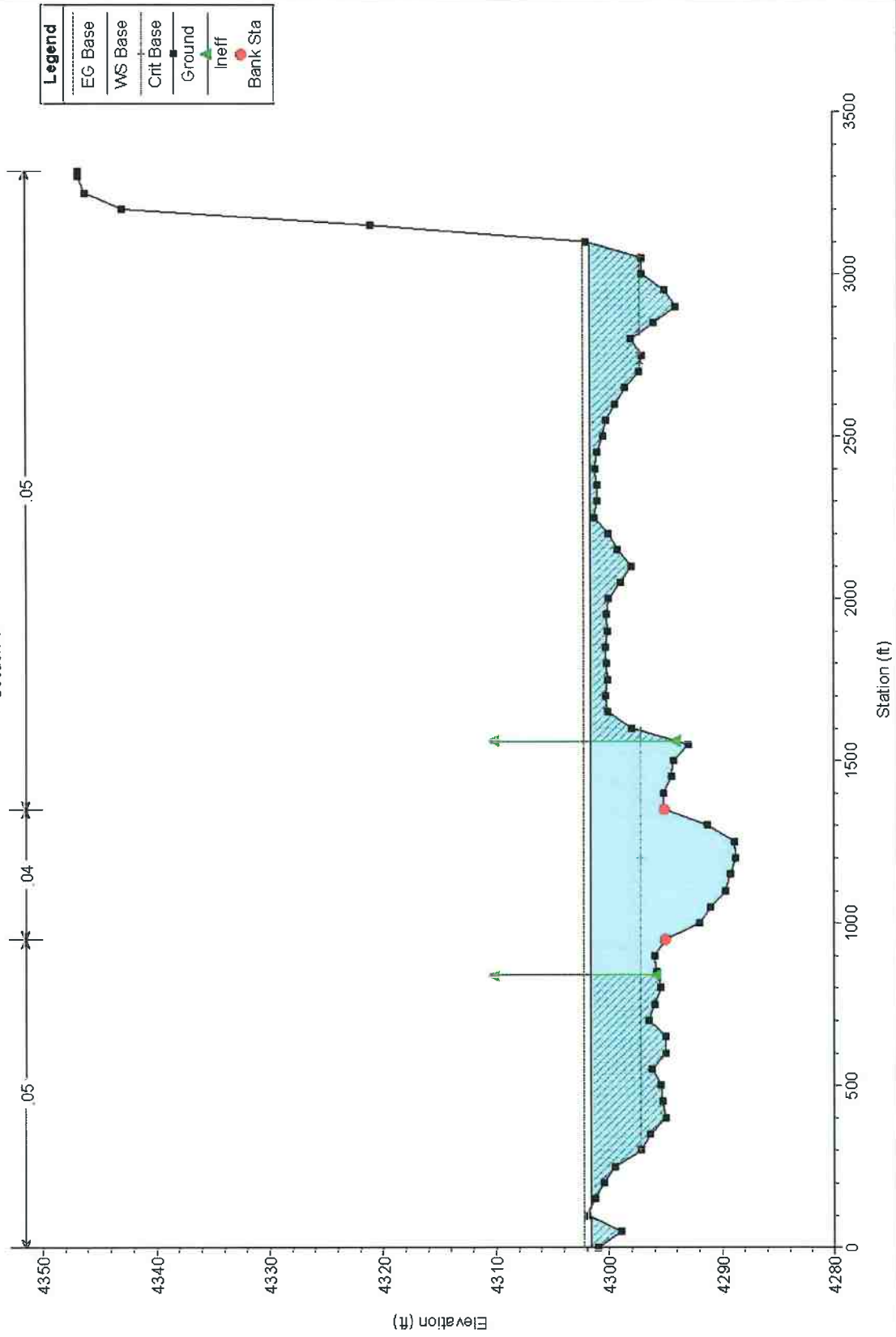
Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
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Carson River Rolling A Bridge Plan: 100y-Scenario#1 7/8/2008 10:47:08 AM

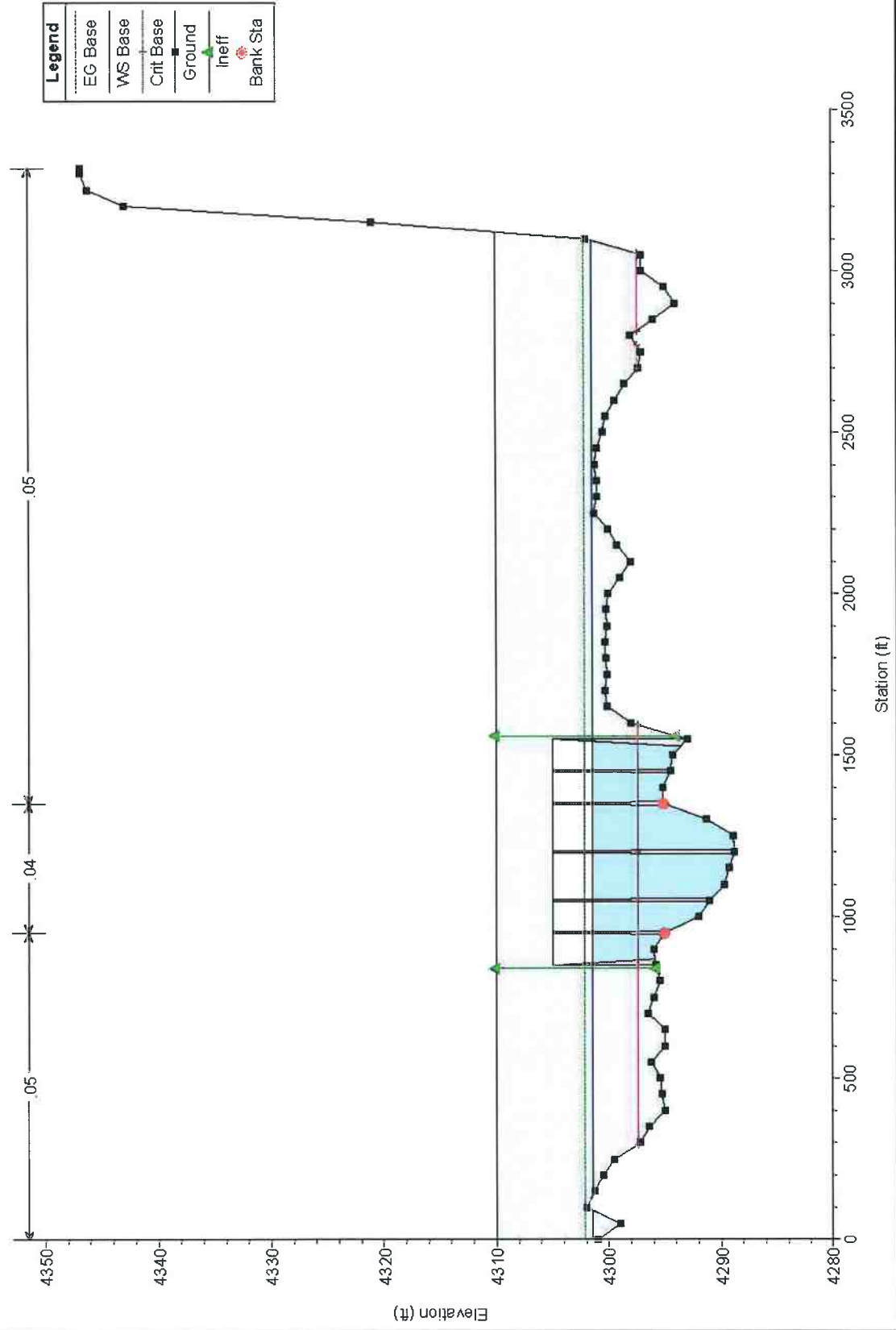
Geom: Base with Bridge Scenario #1 Flow: 100-Y Flood

Section 4



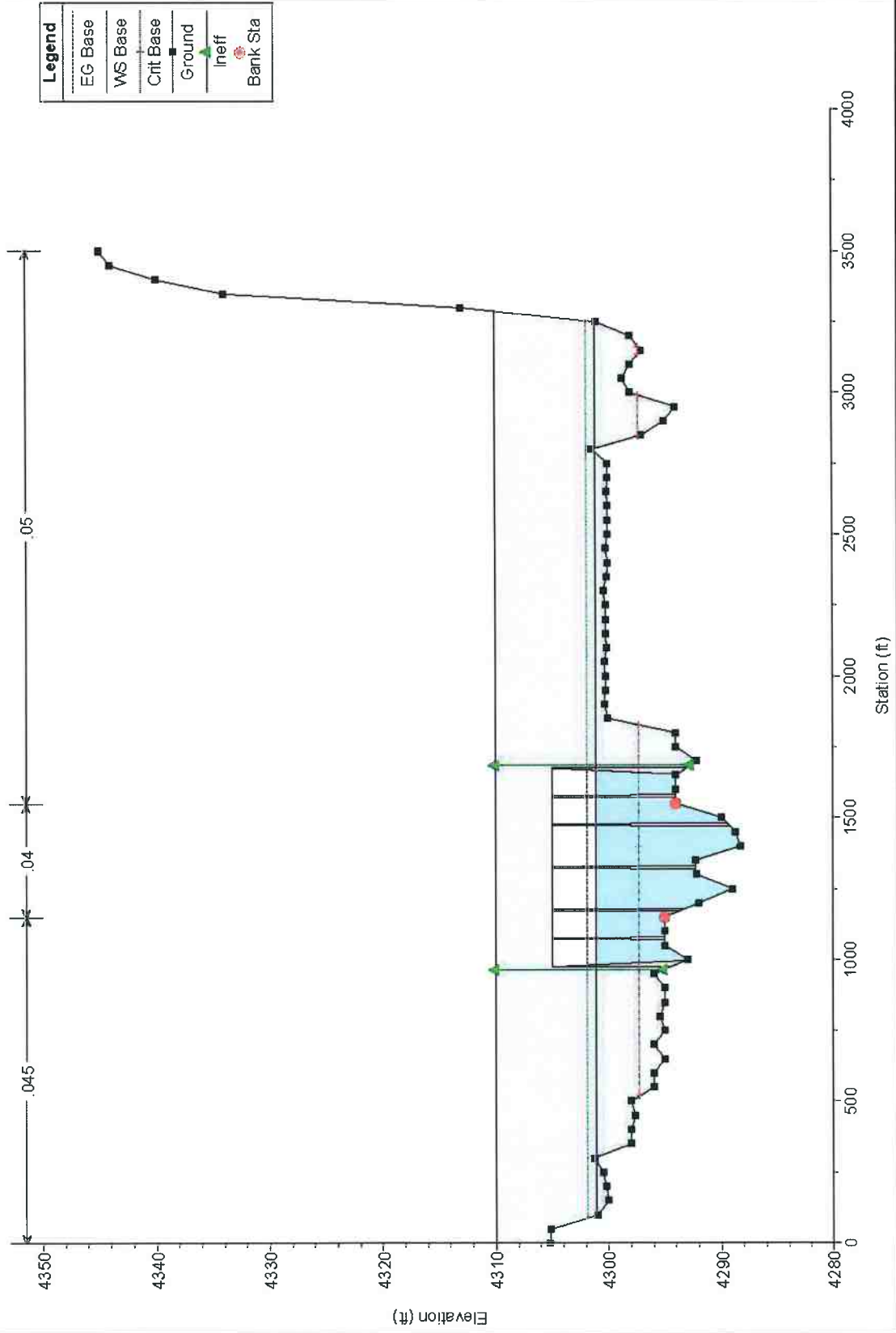
Carson River Rolling A Bridge Plan: 100y-Scenario#1 7/8/2008 10:47:08 AM

Geom: Base with Bridge Scenario #1 Flow: 100-Y Flood



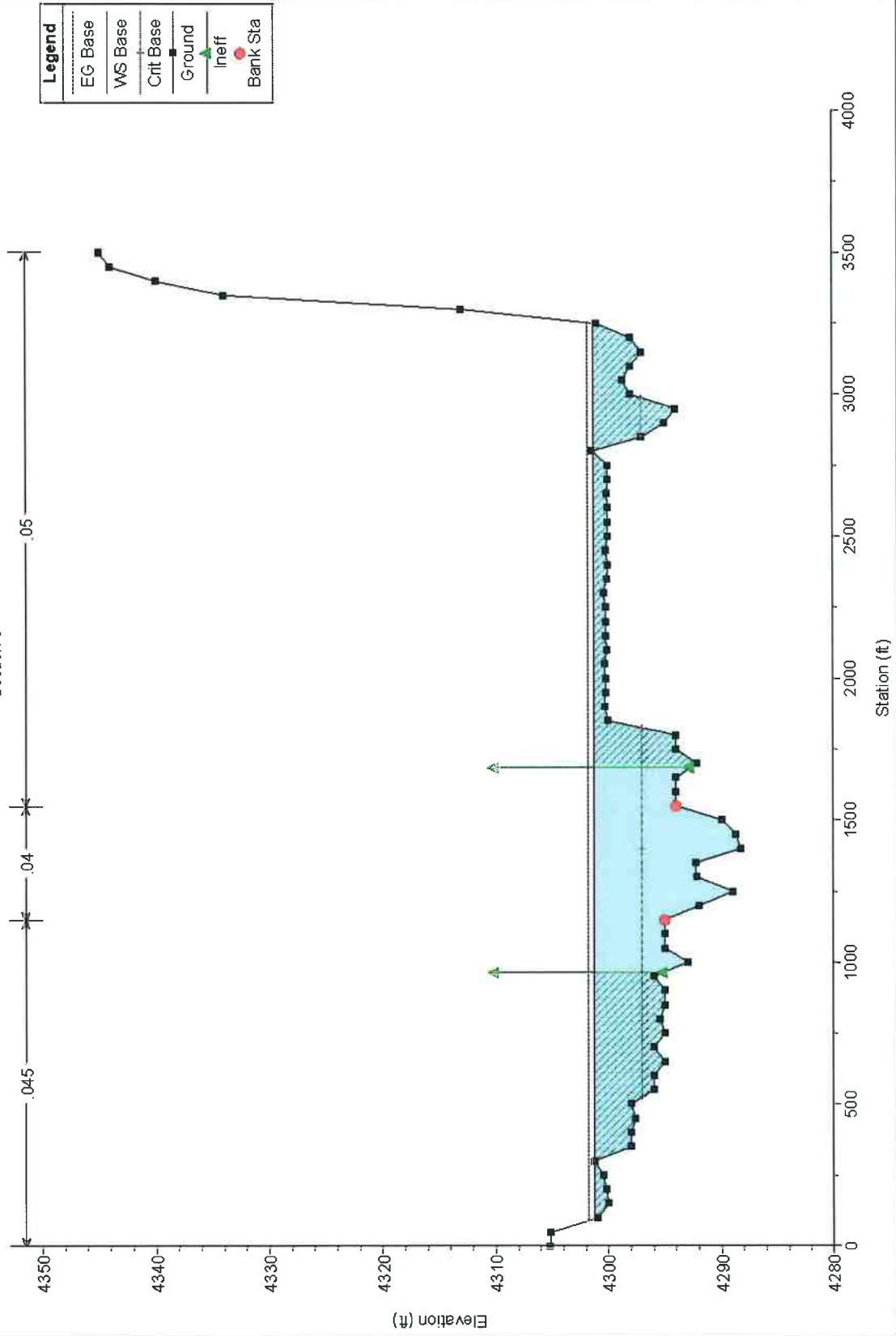
Carson River Rolling A Bridge Plan: 100y-Scenario#1 7/8/2008 10:47:08 AM

Geom: Base with Bridge Scenario #1 Flow: 100-Y Flood



Carson River Rolling A Bridge Plan: 100y-Scenario#1 7/8/2008 10:47:08 AM

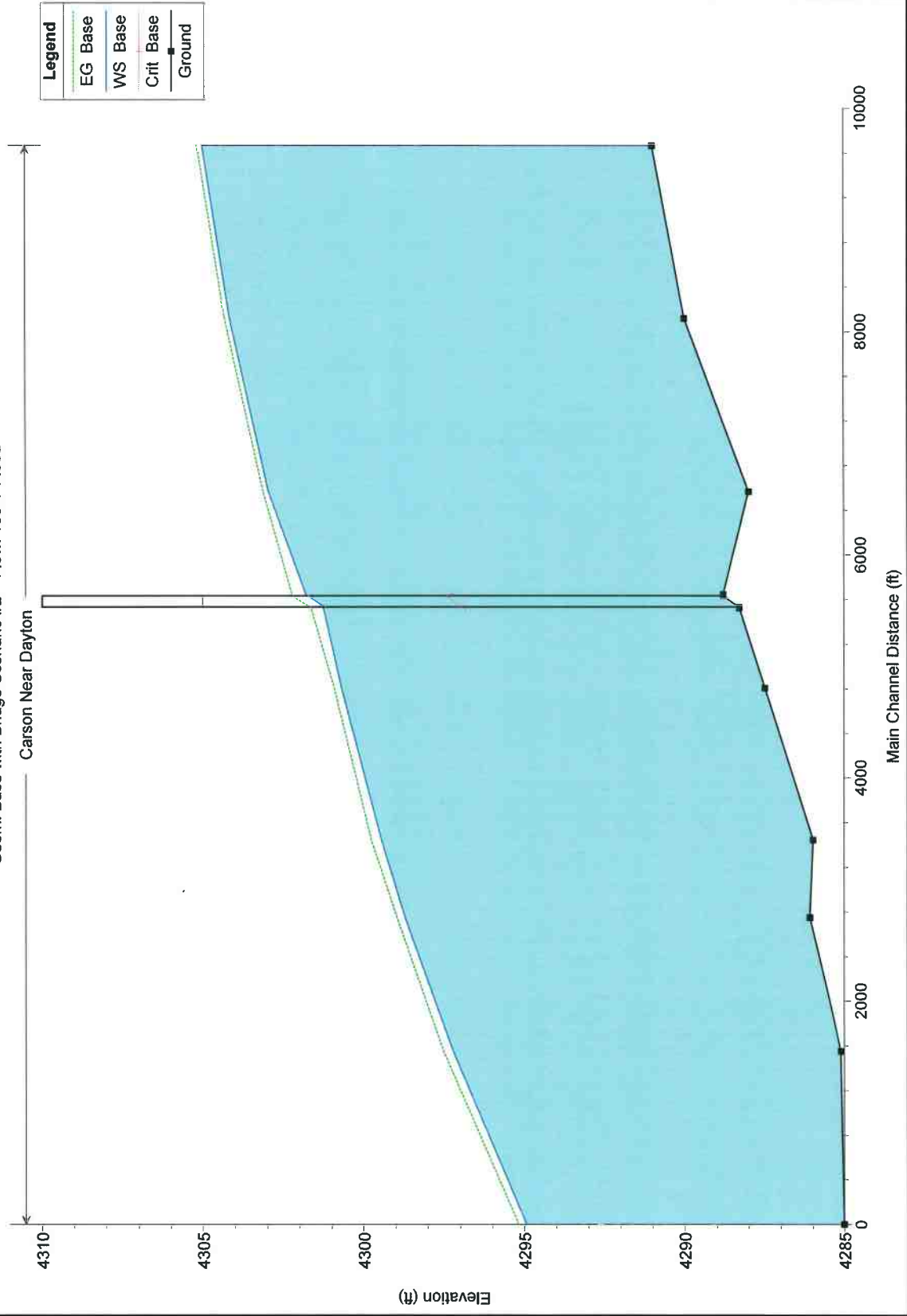
Geom: Base with Bridge Scenario #1 Flow: 100-Y Flood
Section 5



HEC-RAS Plan: 100Y-S#1 River: Carson Reach: Near Dayton Profile: Base

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
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Near Dayton	90	Base	36100.00	4291.00	4305.03		4305.18	0.000516	4.49	13751.35	2432.23	0.23
Near Dayton	80	Base	36100.00	4290.00	4304.19		4304.34	0.001114	5.25	13721.75	2721.10	0.31
Near Dayton	70	Base	36100.00	4288.00	4303.03		4303.19	0.000789	4.46	14592.81	2252.02	0.24
Near Dayton	60	Base	36100.00	4288.80	4301.65	4297.16	4302.20	0.001238	6.42	6522.11	3065.90	0.34
Near Dayton	55	Bridge										
Near Dayton	50	Base	36100.00	4288.30	4301.26	4296.98	4301.80	0.001324	6.42	6395.22	3144.13	0.35
Near Dayton	40	Base	36100.00	4287.50	4300.69		4300.91	0.000886	4.91	11605.89	2346.87	0.28
Near Dayton	30	Base	36100.00	4286.00	4299.44		4299.75	0.001375	6.17	10235.45	2340.30	0.35
Near Dayton	20	Base	36100.00	4286.10	4298.72		4298.96	0.001110	5.81	11276.98	2339.19	0.32
Near Dayton	10	Base	36100.00	4285.10	4297.22		4297.51	0.001580	5.41	9509.04	2334.91	0.36
Near Dayton	0	Base	36100.00	4285.00	4294.93	4292.64	4295.17	0.001372	4.92	10373.52	2621.86	0.33

Carson River Rolling A Bridge Plan: 100y-Scenario#2 7/8/2008 10:47:34 AM
Geom: Base with Bridge Scenario #2 Flow: 100-Y Flood



Plan: 100Y-S#2 Carson Near Dayton RS: 55 BR U Profile: Base

E.G. Elev (ft)	4302.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.51	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4301.68	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	4297.41	Flow Area (sq ft)	1059.78	4111.50	1706.84
E.G. Slope (ft/ft)	0.001514	Area (sq ft)	1059.78	4111.50	1706.84
Q Total (cfs)	36100.00	Flow (cfs)	3674.61	26235.46	6189.93
Top Width (ft)	844.73	Top Width (ft)	184.37	382.00	278.37
Vel Total (ft/s)	5.25	Avg. Vel. (ft/s)	3.47	6.38	3.63
Max Chl Dpth (ft)	12.87	Hydr. Depth (ft)	5.75	10.76	6.13
Conv. Total (cfs)	927667.3	Conv. (cfs)	94427.0	674176.6	159063.6
Length Wtd. (ft)	100.00	Wetted Per. (ft)	204.15	443.35	316.75
Min Ch El (ft)	4288.81	Shear (lb/sq ft)	0.49	0.88	0.51
Alpha	1.20	Stream Power (lb/ft s)	1.70	5.59	1.85
Frctn Loss (ft)		Cum Volume (acre-ft)	432.32	372.24	413.90
C & E Loss (ft)		Cum SA (acres)	102.74	44.38	126.11

Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
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Plan: 100Y-S#2 Carson Near Dayton RS: 55 Profile: Base

E.G. US. (ft)	4302.23	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	4301.80	E.G. Elev (ft)	4302.20	4301.65
Q Total (cfs)	36100.00	W.S. Elev (ft)	4301.68	4301.17
Q Bridge (cfs)	36100.00	Crit W.S. (ft)	4297.41	4297.02
Q Weir (cfs)		Max Chl Dpth (ft)	12.87	12.87
Weir Sta Lft (ft)		Vel Total (ft/s)	5.25	5.23
Weir Sta Rgt (ft)		Flow Area (sq ft)	6878.13	6906.01
Weir Submerg		Froude # Chl	0.34	0.34
Weir Max Depth (ft)		Specif Force (cu ft)	38086.18	37024.63
Min El Weir Flow (ft)	4311.00	Hydr Depth (ft)	8.14	8.19
Min El Prs (ft)	4305.00	W.P. Total (ft)	964.25	960.32
Delta EG (ft)	0.60	Conv. Total (cfs)	927667.3	923246.6
Delta WS (ft)	0.55	Top Width (ft)	844.73	843.31
BR Open Area (sq ft)	9701.61	Frctn Loss (ft)		
BR Open Vel (ft/s)	5.25	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	0.67	0.69
Br Sel Method	Momentum	Power Total (lb/ft s)	3.54	3.59

Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Plan: 100Y-S#2 Carson Near Dayton RS: 55 BR D Profile: Base

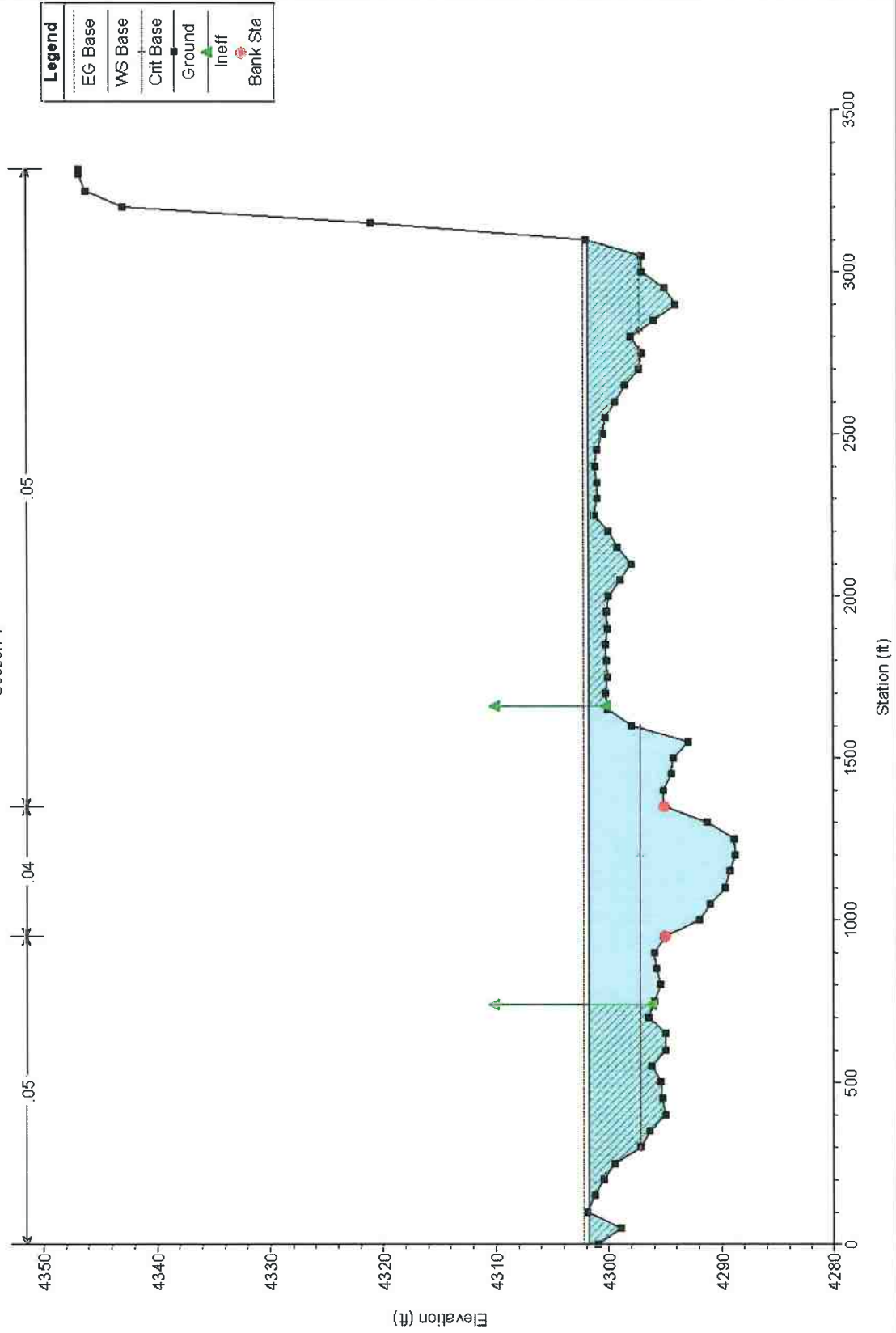
E.G. Elev (ft)	4301.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.48	Wt. n-Val.	0.045	0.040	0.050
W.S. Elev (ft)	4301.17	Reach Len. (ft)	9.74	9.74	9.74
Crit W.S. (ft)	4297.02	Flow Area (sq ft)	1565.10	3871.35	1469.56
E.G. Slope (ft/ft)	0.001529	Area (sq ft)	1565.10	3871.35	1469.56
Q Total (cfs)	36100.00	Flow (cfs)	6340.46	23987.38	5772.17
Top Width (ft)	843.31	Top Width (ft)	255.98	382.00	205.34
Vel Total (ft/s)	5.23	Avg. Vel. (ft/s)	4.05	6.20	3.93
Max Chl Dpth (ft)	12.87	Hydr. Depth (ft)	6.11	10.13	7.16
Conv. Total (cfs)	923246.6	Conv. (cfs)	162155.2	613469.9	147621.4
Length Wtd. (ft)	9.74	Wetted Per. (ft)	283.34	439.41	237.56
Min Ch El (ft)	4288.30	Shear (lb/sq ft)	0.53	0.84	0.59
Alpha	1.13	Stream Power (lb/ft s)	2.14	5.21	2.32
Frctn Loss (ft)		Cum Volume (acre-ft)	429.30	363.08	410.25
C & E Loss (ft)		Cum SA (acres)	102.23	43.50	125.55

Errors Warnings and Notes

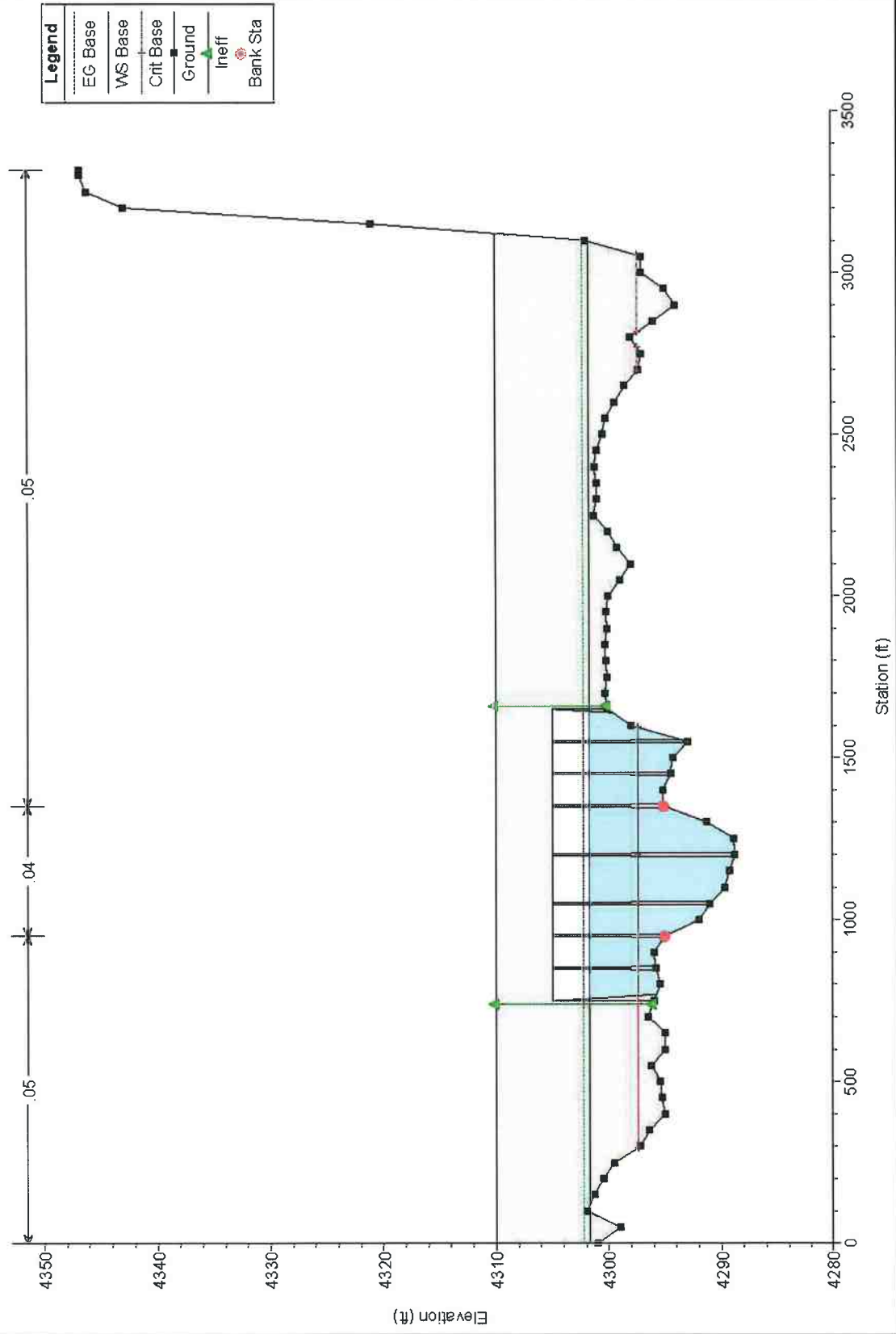
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Geom: Base with Bridge Scenario #2 Flow: 100-Y Flood

Section 4

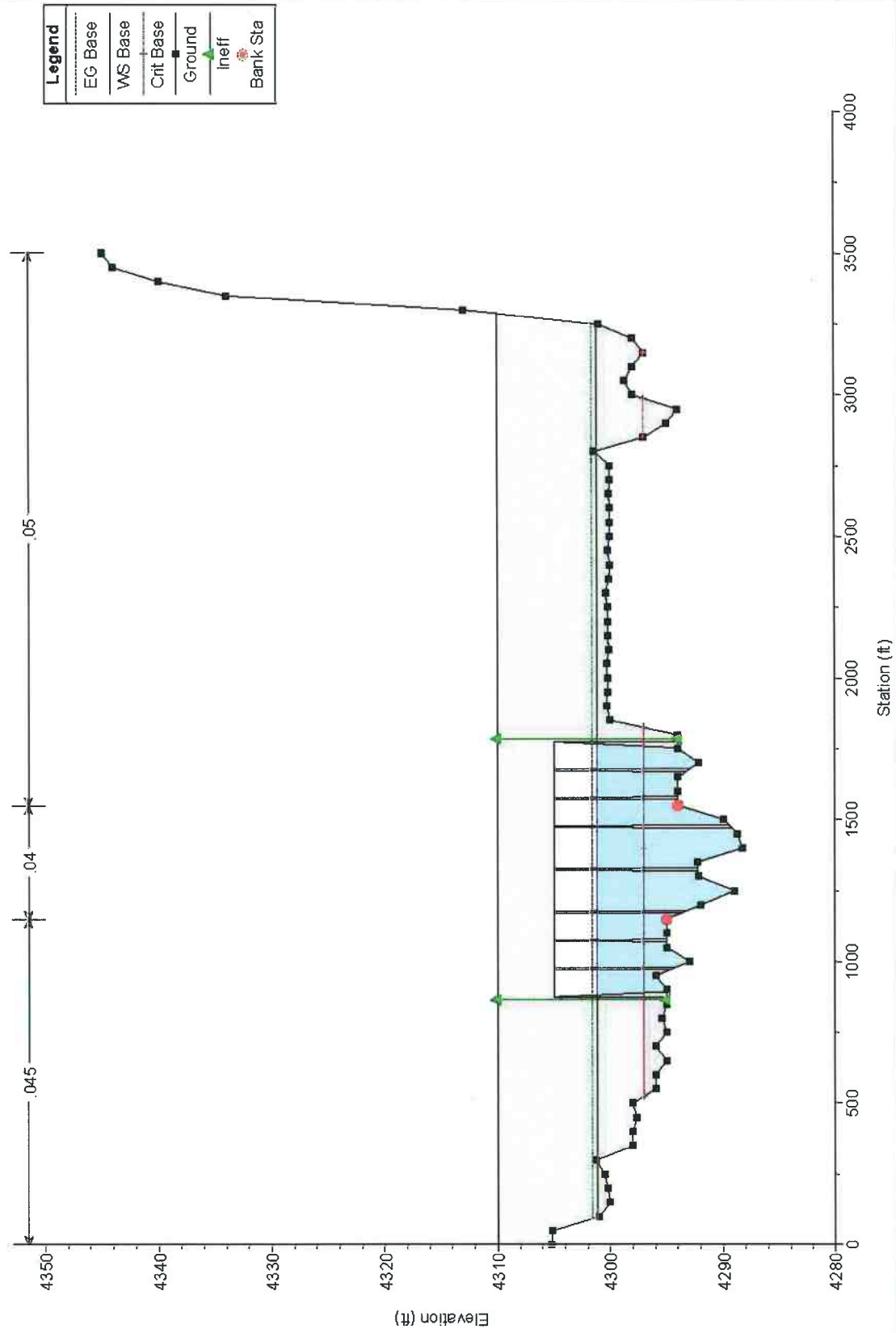


Carson River Rolling A Bridge Plan: 100y-Scenario#2 7/8/2008 10:47:34 AM
 Geom: Base with Bridge Scenario #2 Flow: 100-Y Flood



Carson River Rolling A Bridge Plan: 100y-Scenario#2 7/8/2008 10:47:34 AM

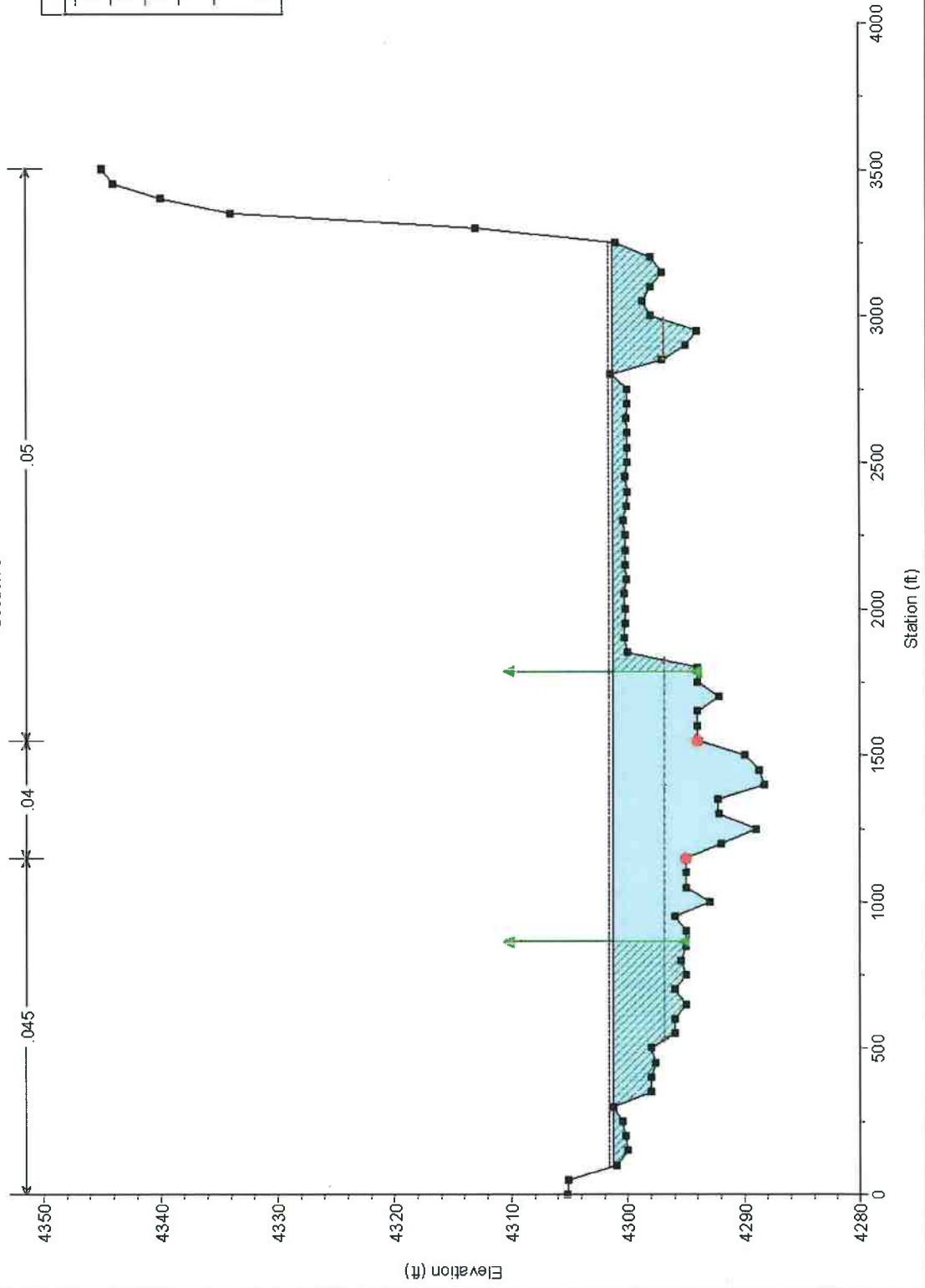
Geom: Base with Bridge Scenario #2 Flow: 100-Y Flood



Carson River Rolling A Bridge Plan: 100y-Scenario#2 7/8/2008 10:47:34 AM

Geom: Base with Bridge Scenario #2 Flow: 100-Y Flood

Section 5



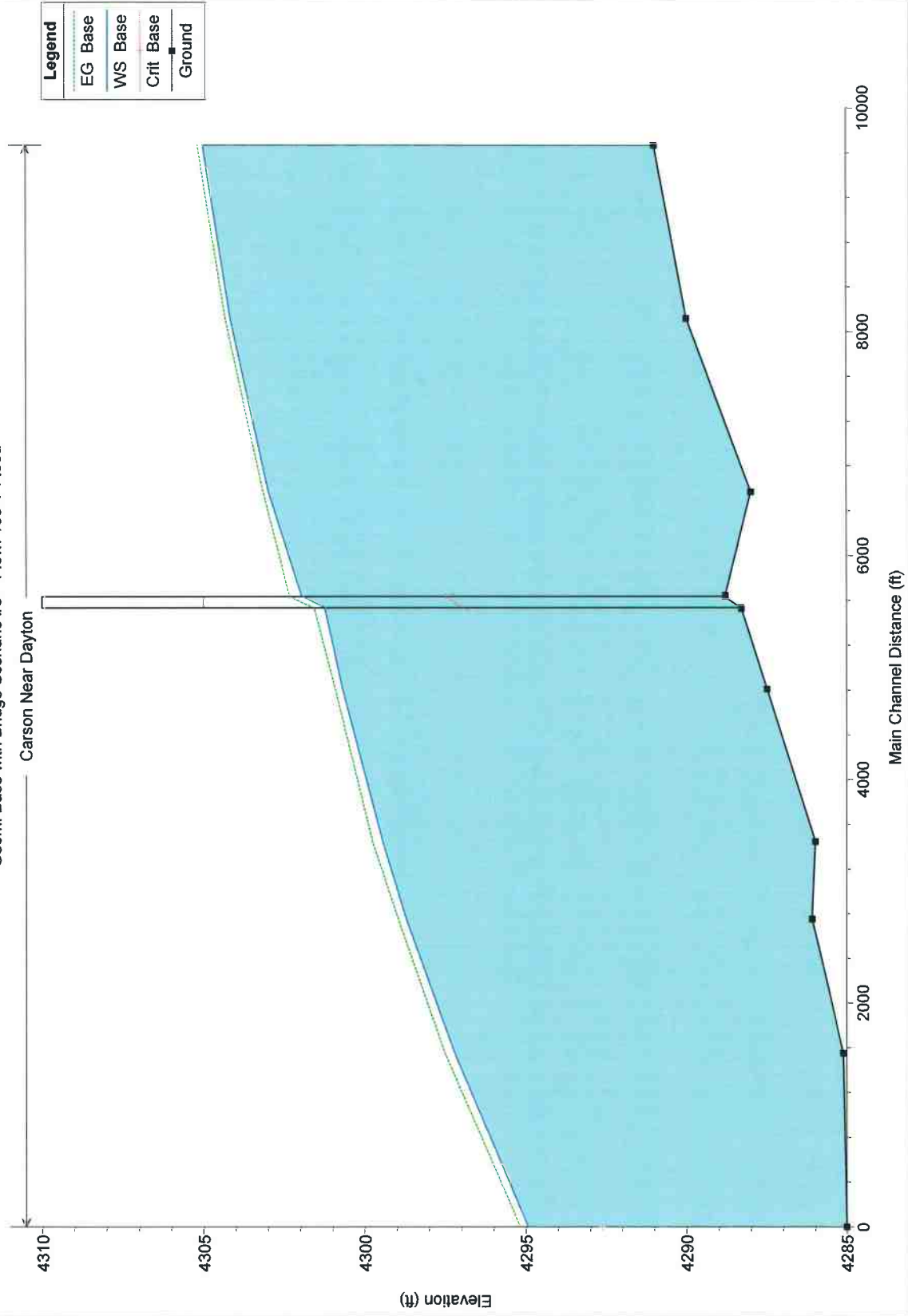
HEC-RAS Plan: 100Y-S#2 River: Carson Reach: Near Dayton Profile: Base

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chi
Near Dayton	90	Base	36100.00	4291.00	4305.01		4305.16	0.000522	4.50	13697.97	2426.52	0.23
Near Dayton	80	Base	36100.00	4290.00	4304.15		4304.30	0.001139	5.30	13622.11	2720.51	0.31
Near Dayton	70	Base	36100.00	4288.00	4302.96		4303.12	0.000816	4.52	14431.21	2250.68	0.25
Near Dayton	60	Base	36100.00	4288.80	4301.80	4297.23	4302.23	0.001013	5.86	7626.65	3080.37	0.31
Near Dayton	55	Bridge										
Near Dayton	50	Base	36100.00	4288.30	4301.25	4296.83	4301.63	0.000990	5.55	7772.74	3142.82	0.30
Near Dayton	40	Base	36100.00	4287.50	4300.69		4300.91	0.000886	4.91	11605.89	2346.87	0.28
Near Dayton	30	Base	36100.00	4286.00	4299.44		4299.75	0.001375	6.17	10235.45	2340.30	0.35
Near Dayton	20	Base	36100.00	4286.10	4298.72		4298.96	0.001110	5.81	11276.98	2339.19	0.32
Near Dayton	10	Base	36100.00	4285.10	4297.22		4297.51	0.001580	5.41	9509.04	2334.91	0.36
Near Dayton	0	Base	36100.00	4285.00	4294.93	4292.64	4295.17	0.001372	4.92	10373.52	2621.86	0.33

Carson River Rolling A Bridge Plan: 100y-Scenario#3 7/8/2008 10:47:54 AM

Geom: Base with Bridge Scenario #3 Flow: 100-Y Flood

Carson Near Dayton



Plan: 100Y-S#3 Carson Near Dayton RS: 55 BR U Profile: Base

E.G. Elev (ft)	4302.31	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.42	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4301.89	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	4297.48	Flow Area (sq ft)	1631.13	4188.91	1923.43
E.G. Slope (ft/ft)	0.001267	Area (sq ft)	1631.13	4188.91	1923.43
Q Total (cfs)	36100.00	Flow (cfs)	5212.42	24705.01	6182.57
Top Width (ft)	1033.55	Top Width (ft)	278.77	382.00	372.77
Vel Total (ft/s)	4.66	Avg. Vel. (ft/s)	3.20	5.90	3.21
Max Chl Dpth (ft)	13.08	Hydr. Depth (ft)	5.85	10.97	5.16
Conv. Total (cfs)	1014387.0	Conv. (cfs)	146465.7	694195.1	173726.3
Length Wtd. (ft)	100.00	Wetted Per. (ft)	311.06	444.56	415.80
Min Ch El (ft)	4288.81	Shear (lb/sq ft)	0.41	0.75	0.37
Alpha	1.24	Stream Power (lb/ft s)	1.32	4.39	1.18
Frctn Loss (ft)		Cum Volume (acre-ft)	433.61	372.31	414.57
C & E Loss (ft)		Cum SA (acres)	102.96	44.38	126.33

Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
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Plan: 100Y-S#3 Carson Near Dayton RS: 55 Profile: Base

E.G. US. (ft)	4302.33	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	4301.97	E.G. Elev (ft)	4302.31	4301.57
Q Total (cfs)	36100.00	W.S. Elev (ft)	4301.89	4301.20
Q Bridge (cfs)	36100.00	Crit W.S. (ft)	4297.48	4296.99
Q Weir (cfs)		Max Chl Dpth (ft)	13.08	12.90
Weir Sta Lft (ft)		Vel Total (ft/s)	4.66	4.54
Weir Sta Rgt (ft)		Flow Area (sq ft)	7743.46	7944.11
Weir Submerg		Froude # Chl	0.31	0.31
Weir Max Depth (ft)		Specif Force (cu ft)	40527.80	39526.36
Min El Weir Flow (ft)	4311.00	Hydr Depth (ft)	7.49	7.70
Min El Prs (ft)	4305.00	W.P. Total (ft)	1171.42	1174.47
Delta EG (ft)	0.78	Conv. Total (cfs)	1014387.0	1020369.0
Delta WS (ft)	0.73	Top Width (ft)	1033.55	1031.42
BR Open Area (sq ft)	10981.08	Frctn Loss (ft)		
BR Open Vel (ft/s)	4.66	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	0.52	0.53
Br Sel Method	Momentum	Power Total (lb/ft s)	2.44	2.40

Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Plan: 100Y-S#3 Carson Near Dayton RS: 55 BR D Profile: Base

E.G. Elev (ft)	4301.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.37	Wt. n-Val.	0.045	0.040	0.050
W.S. Elev (ft)	4301.20	Reach Len. (ft)	9.74	9.74	9.74
Crit W.S. (ft)	4296.99	Flow Area (sq ft)	2130.42	3882.36	1931.34
E.G. Slope (ft/ft)	0.001252	Area (sq ft)	2130.42	3882.36	1931.34
Q Total (cfs)	36100.00	Flow (cfs)	7746.39	21801.39	6552.22
Top Width (ft)	1031.42	Top Width (ft)	350.03	382.00	299.39
Vel Total (ft/s)	4.54	Avg. Vel. (ft/s)	3.64	5.62	3.39
Max Chl Dpth (ft)	12.90	Hydr. Depth (ft)	6.09	10.16	6.45
Conv. Total (cfs)	1020369.0	Conv. (cfs)	218952.3	616217.6	185198.8
Length Wtd. (ft)	9.74	Wetted Per. (ft)	389.83	439.58	345.06
Min Ch El (ft)	4288.30	Shear (lb/sq ft)	0.43	0.69	0.44
Alpha	1.16	Stream Power (lb/ft s)	1.55	3.88	1.48
Frctn Loss (ft)		Cum Volume (acre-ft)	429.29	363.05	410.15
C & E Loss (ft)		Cum SA (acres)	102.24	43.50	125.56

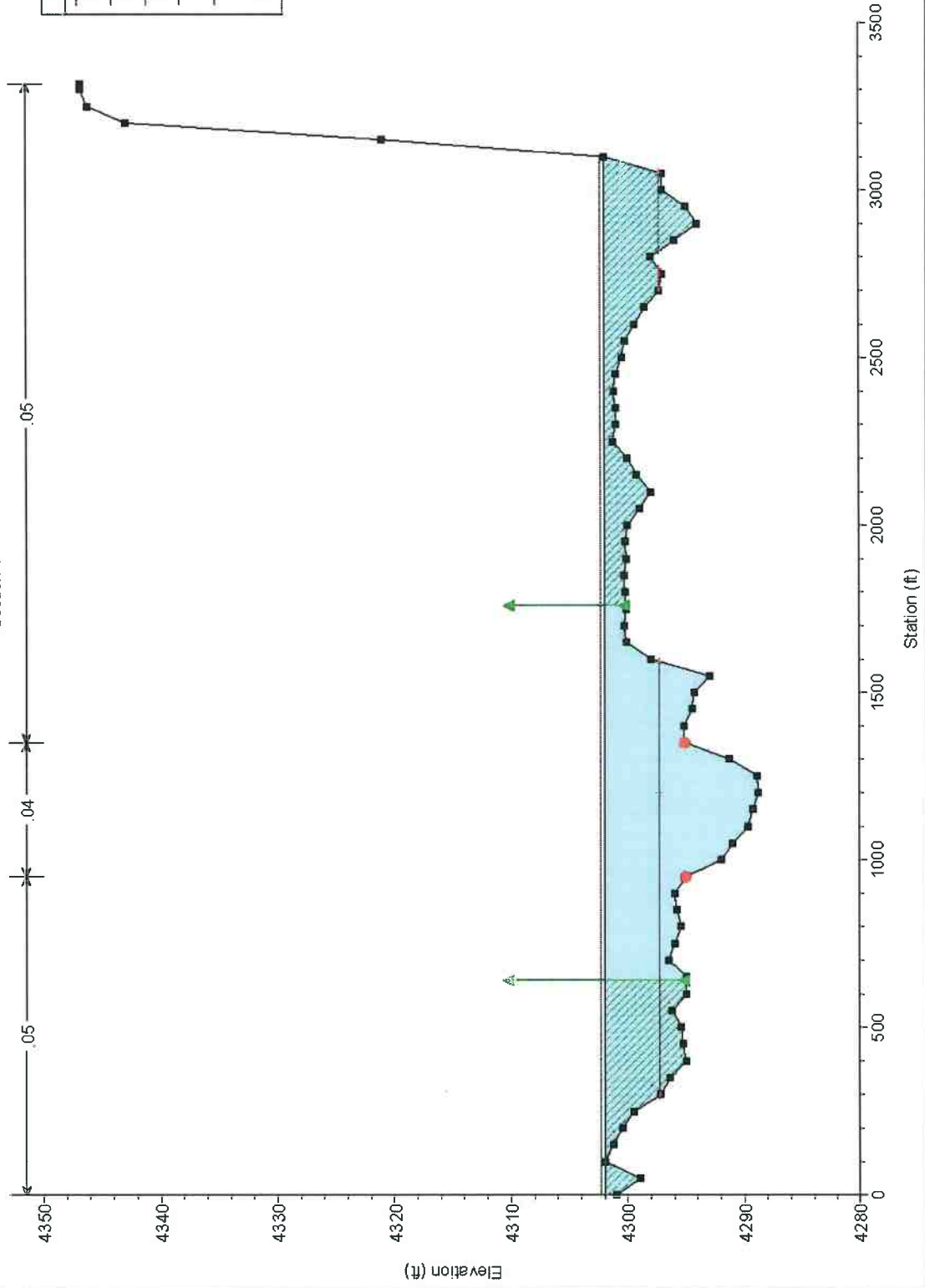
Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
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Carson River Rolling A Bridge Plan: 100y-Scenario#3 7/8/2008 10:47:54 AM

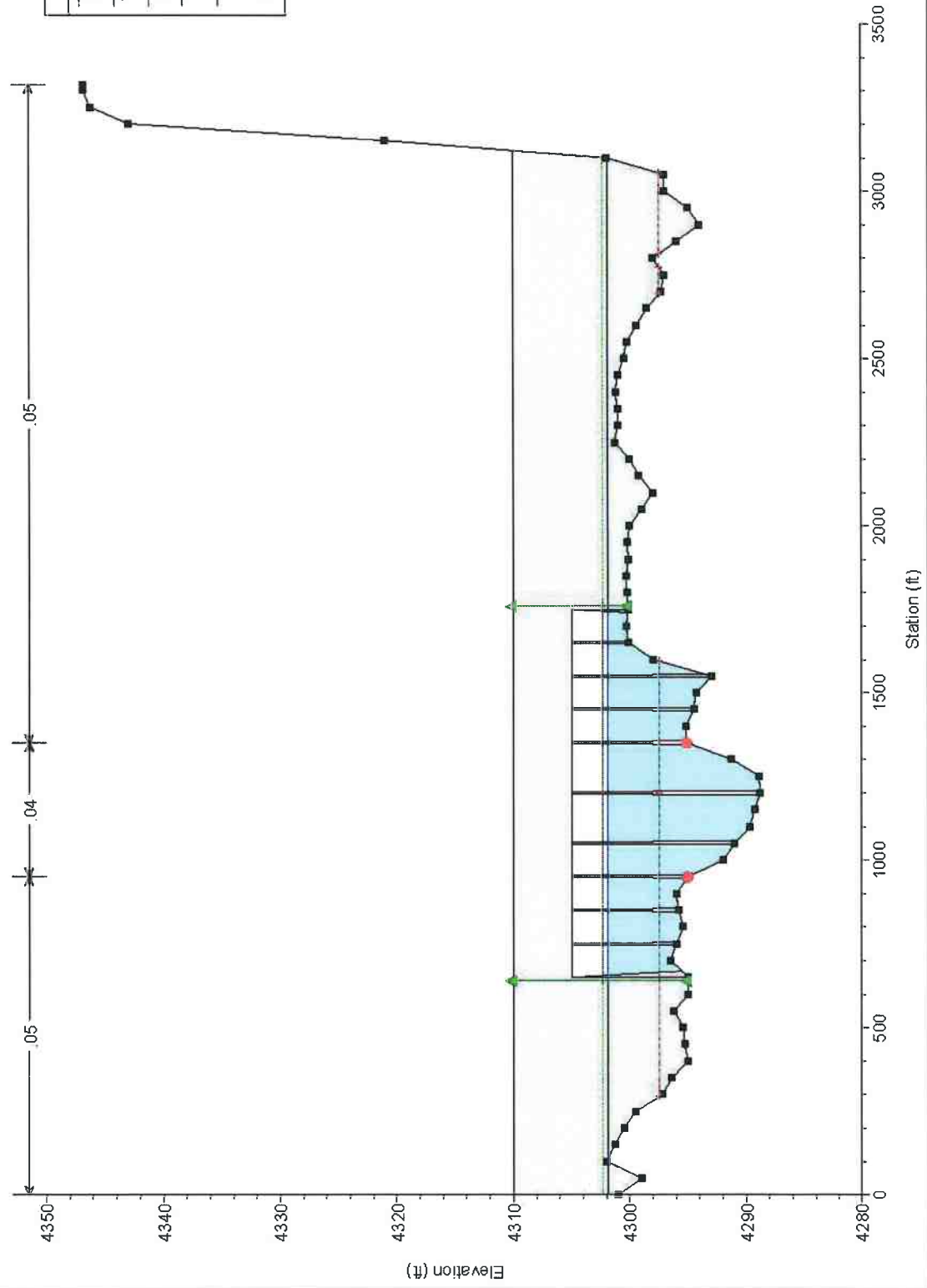
Geom: Base with Bridge Scenario #3 Flow: 100-Y Flood

Section 4

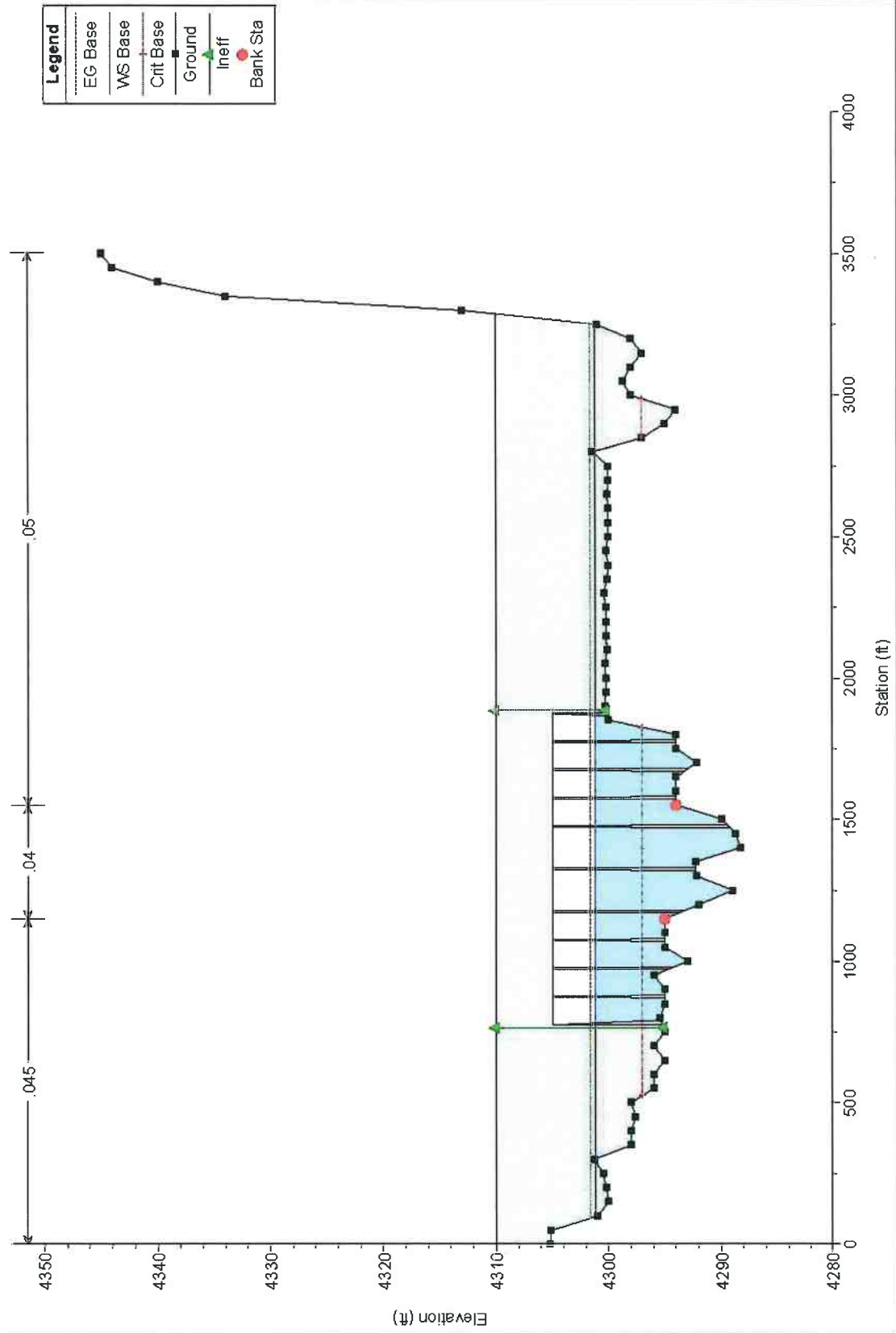


Carson River Rolling A Bridge Plan: 100y-Scenario#3 7/8/2008 10:47:54 AM

Geom: Base with Bridge Scenario #3 Flow: 100-Y Flood



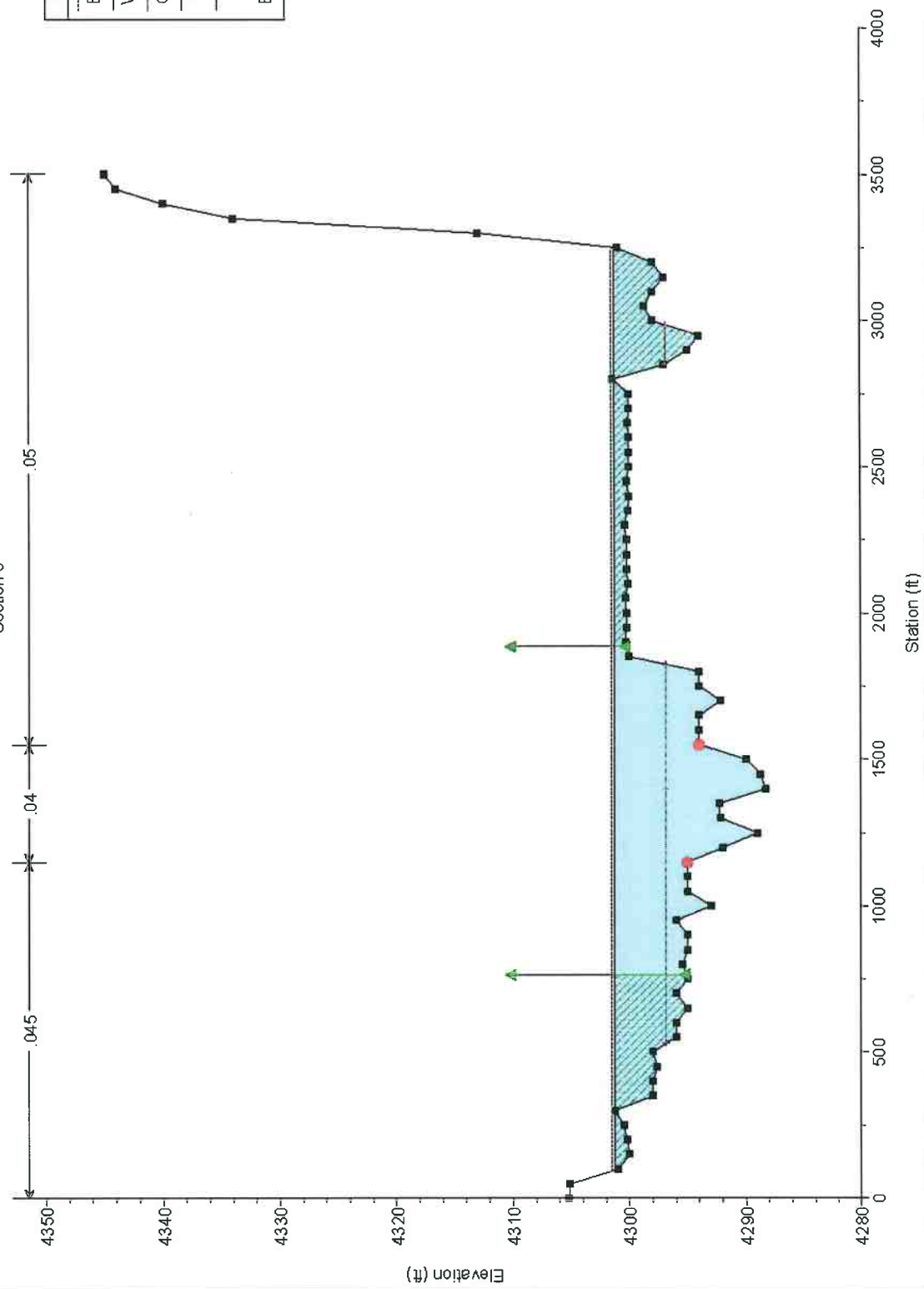
Geom: Base with Bridge Scenario #3 Flow: 100-Y Flood



Carson River Rolling A Bridge Plan: 100y-Scenario#3 7/8/2008 10:47:54 AM

Geom: Base with Bridge Scenario #3 Flow: 100-Y Flood

Section 5

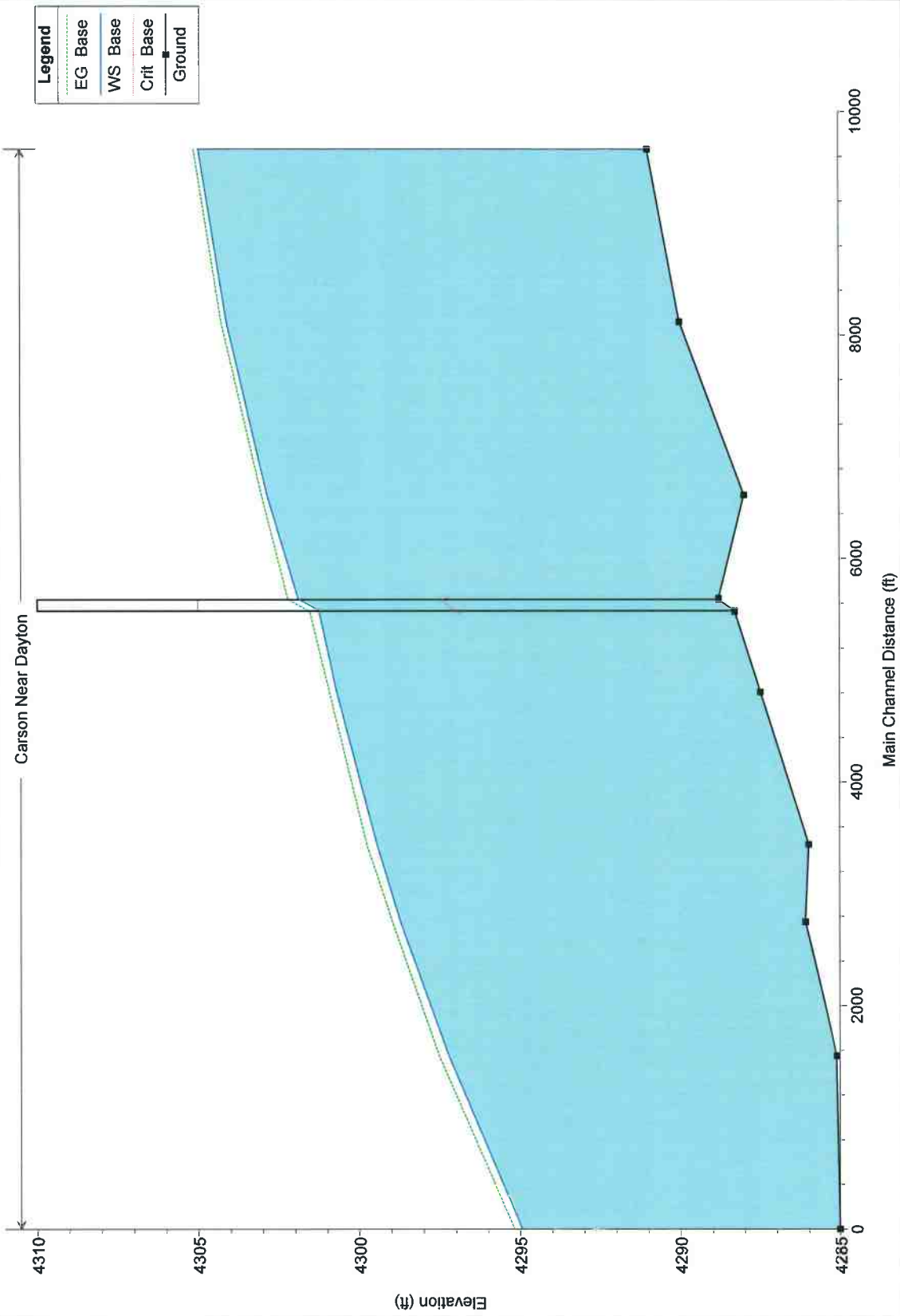


HEC-RAS Plan: 100Y-S#3 River: Carson Reach: Near Dayton Profile: Base

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Near Dayton	90	Base	36100.00	4291.00	4305.01		4305.16	0.000520	4.50	13716.94	2428.55	0.23
Near Dayton	80	Base	36100.00	4290.00	4304.16		4304.32	0.001130	5.29	13657.98	2720.72	0.31
Near Dayton	70	Base	36100.00	4288.00	4302.98		4303.15	0.000806	4.50	14490.57	2251.17	0.24
Near Dayton	60	Base	36100.00	4288.80	4301.97	4297.26	4302.33	0.000874	5.50	8566.44	3096.94	0.29
Near Dayton	55	Bridge										
Near Dayton	50	Base	36100.00	4288.30	4301.24	4296.83	4301.55	0.000867	5.19	8728.00	3141.37	0.28
Near Dayton	40	Base	36100.00	4287.50	4300.69		4300.91	0.000886	4.91	11605.88	2346.87	0.28
Near Dayton	30	Base	36100.00	4286.00	4299.44		4299.75	0.001375	6.17	10235.45	2340.30	0.35
Near Dayton	20	Base	36100.00	4286.10	4298.72		4298.96	0.001110	5.81	11276.98	2339.19	0.32
Near Dayton	10	Base	36100.00	4285.10	4297.22		4297.51	0.001580	5.41	9509.04	2334.91	0.36
Near Dayton	0	Base	36100.00	4285.00	4294.93	4292.64	4295.17	0.001372	4.92	10373.52	2621.86	0.33

Carson River Rolling A Bridge Plan: 100y-Scenario#4 7/8/2008 10:48:29 AM

Geom: Base with Bridge Scenario #4 Flow: 100-Y Flood



Plan: 100Y-S#4 Carson Near Dayton RS: 55 BR U Profile: Base

E.G. Elev (ft)	4302.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.36	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4301.82	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	4297.44	Flow Area (sq ft)	2225.61	4164.10	2052.70
E.G. Slope (ft/ft)	0.001146	Area (sq ft)	2225.61	4164.10	2052.70
Q Total (cfs)	36100.00	Flow (cfs)	6832.28	23281.10	5986.62
Top Width (ft)	1221.29	Top Width (ft)	372.64	382.00	466.64
Vel Total (ft/s)	4.28	Avg. Vel. (ft/s)	3.07	5.59	2.92
Max Chl Dpth (ft)	13.01	Hydr. Depth (ft)	5.97	10.90	4.40
Conv. Total (cfs)	1066448.0	Conv. (cfs)	201835.6	687758.6	176853.7
Length Wtd. (ft)	100.00	Wetted Per. (ft)	418.05	444.17	512.59
Min Ch El (ft)	4288.81	Shear (lb/sq ft)	0.38	0.67	0.29
Alpha	1.28	Stream Power (lb/ft s)	1.17	3.75	0.84
Frctn Loss (ft)		Cum Volume (acre-ft)	434.92	372.26	414.74
C & E Loss (ft)		Cum SA (acres)	103.18	44.38	126.55

Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid,
	energy was used.

Plan: 100Y-S#4 Carson Near Dayton RS: 55 Profile: Base

E.G. US. (ft)	4302.21	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	4301.89	E.G. Elev (ft)	4302.18	4301.53
Q Total (cfs)	36100.00	W.S. Elev (ft)	4301.82	4301.20
Q Bridge (cfs)	36100.00	Crit W.S. (ft)	4297.44	4296.99
Q Weir (cfs)		Max Chl Dpth (ft)	13.01	12.90
Weir Sta Lft (ft)		Vel Total (ft/s)	4.28	4.21
Weir Sta Rgt (ft)		Flow Area (sq ft)	8442.41	8572.02
Weir Submerg		Froude # Chl	0.30	0.29
Weir Max Depth (ft)		Specif Force (cu ft)	41742.62	40759.77
Min El Weir Flow (ft)	4311.00	Hydr Depth (ft)	6.91	7.03
Min El Prs (ft)	4305.00	W.P. Total (ft)	1374.82	1376.50
Delta EG (ft)	0.69	Conv. Total (cfs)	1066448.0	1074925.0
Delta WS (ft)	0.65	Top Width (ft)	1221.29	1219.43
BR Open Area (sq ft)	12344.74	Frctn Loss (ft)		
BR Open Vel (ft/s)	4.28	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	0.44	0.44
Br Sel Method	Momentum	Power Total (lb/ft s)	1.88	1.85

Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Plan: 100Y-S#4 Carson Near Dayton RS: 55 BR D Profile: Base

E.G. Elev (ft)	4301.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.	0.045	0.040	0.050
W.S. Elev (ft)	4301.20	Reach Len. (ft)	9.74	9.74	9.74
Crit W.S. (ft)	4296.99	Flow Area (sq ft)	2664.97	3883.48	2023.57
E.G. Slope (ft/ft)	0.001128	Area (sq ft)	2664.97	3883.48	2023.57
Q Total (cfs)	36100.00	Flow (cfs)	9098.71	20704.28	6297.02
Top Width (ft)	1219.43	Top Width (ft)	444.03	382.00	393.40
Vel Total (ft/s)	4.21	Avg. Vel. (ft/s)	3.41	5.33	3.11
Max Chl Dpth (ft)	12.90	Hydr. Depth (ft)	6.00	10.17	5.14
Conv. Total (cfs)	1074925.0	Conv. (cfs)	270926.0	616497.2	187502.0
Length Wtd. (ft)	9.74	Wetted Per. (ft)	495.74	439.60	441.16
Min Ch El (ft)	4288.30	Shear (lb/sq ft)	0.38	0.62	0.32
Alpha	1.18	Stream Power (lb/ft s)	1.29	3.32	1.01
Frctn Loss (ft)		Cum Volume (acre-ft)	429.31	363.03	410.06
C & E Loss (ft)		Cum SA (acres)	102.24	43.50	125.57

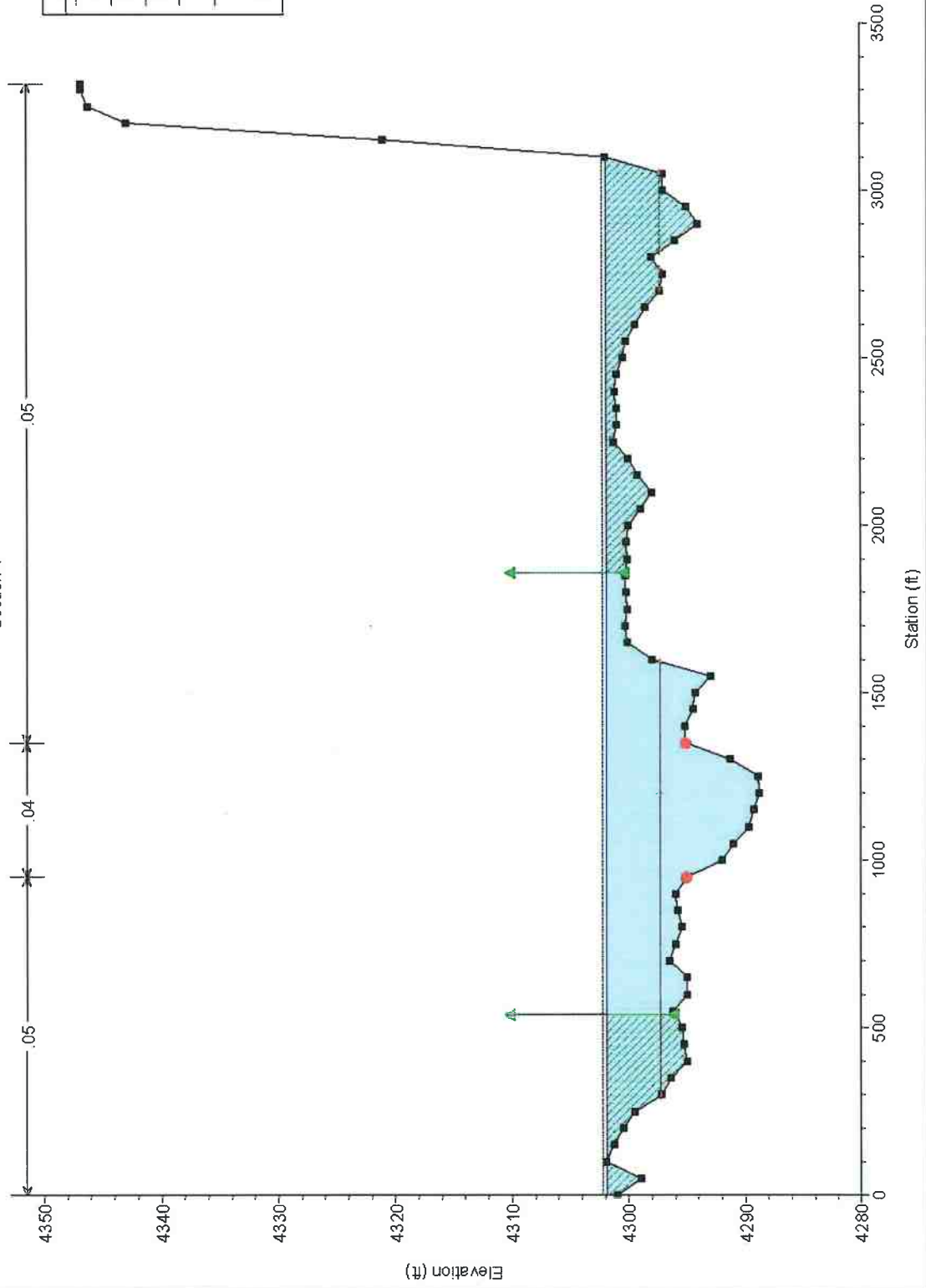
Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

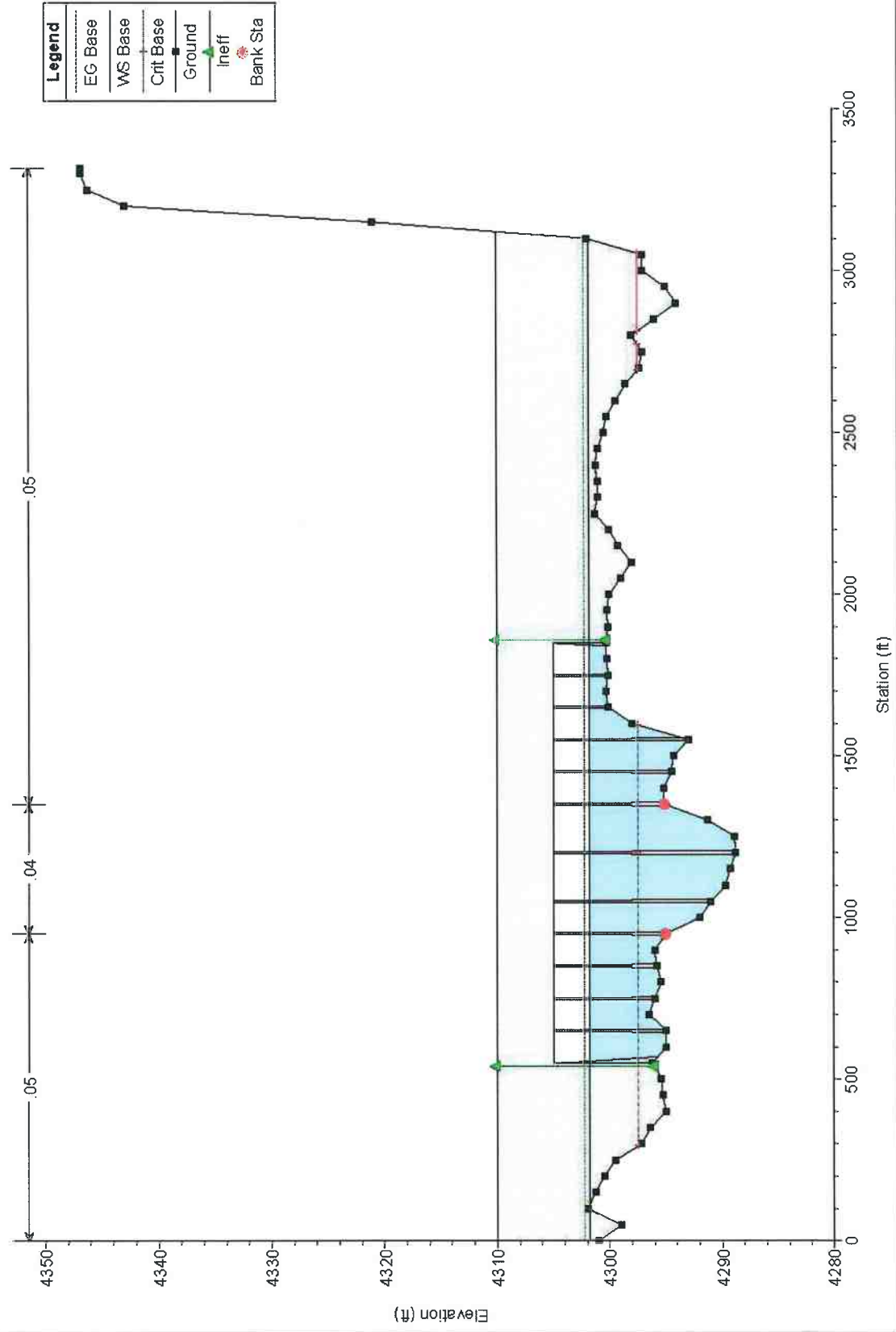
Carson River Rolling A Bridge Plan: 100y-Scenario#4 7/8/2008 10:48:29 AM

Geom: Base with Bridge Scenario #4 Flow: 100-Y Flood

Section 4

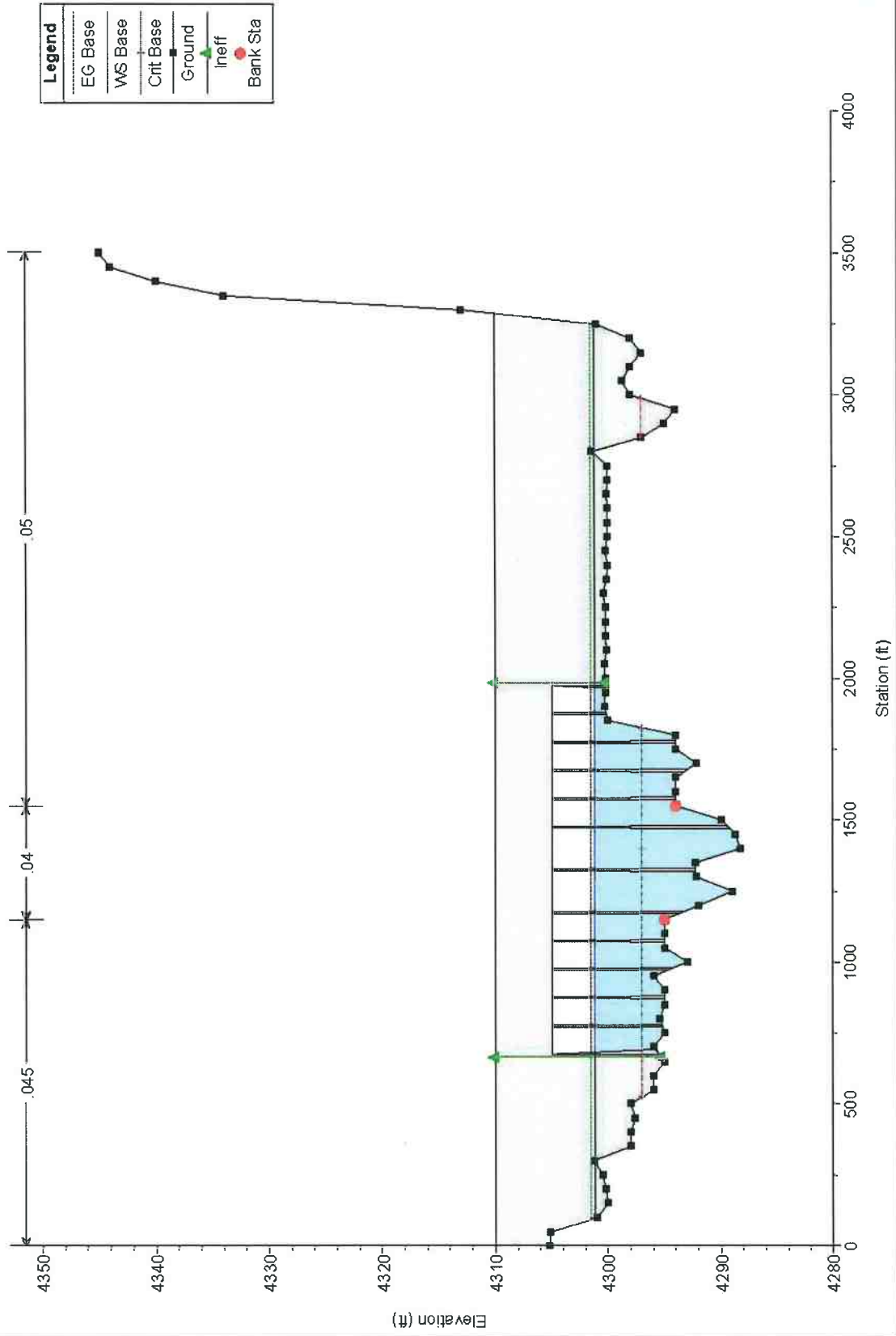


Geom: Base with Bridge Scenario #4 Flow: 100-Y Flood



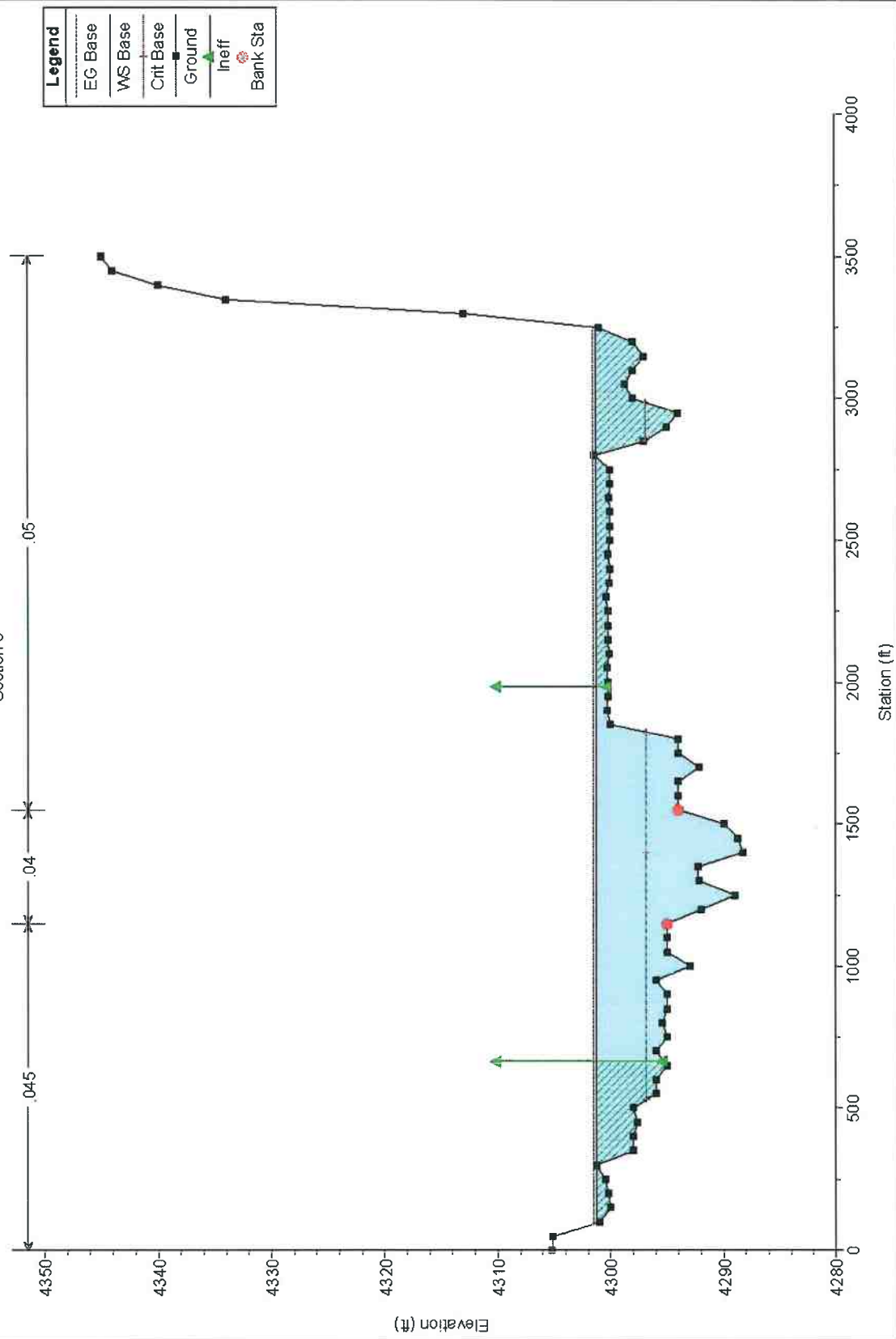
Carson River Rolling A Bridge Plan: 100y-Scenario#4 7/8/2008 10:48:29 AM

Geom: Base with Bridge Scenario #4 Flow: 100-Y Flood



Geom: Base with Bridge Scenario #4 Flow: 100-Y Flood

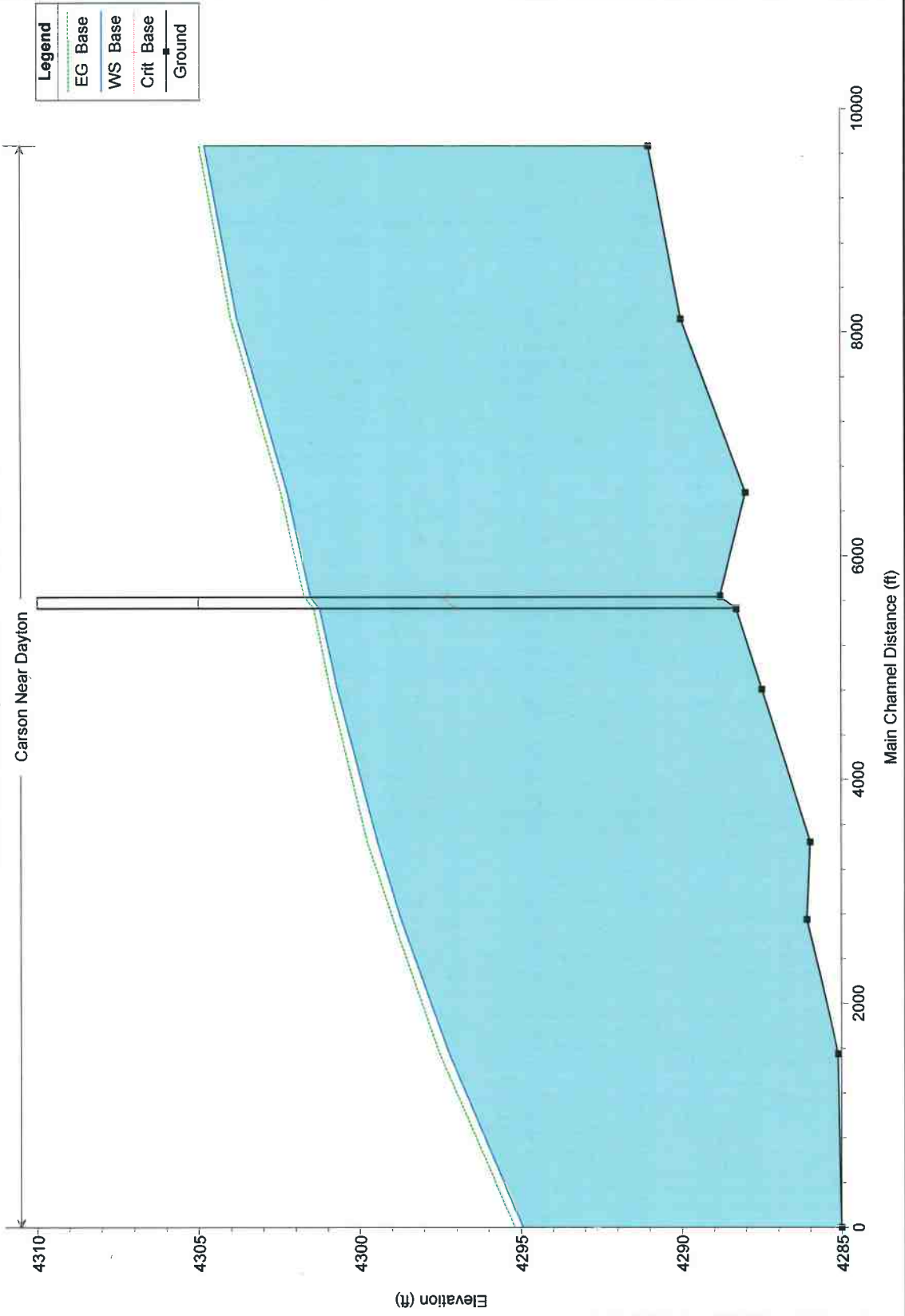
Section 5



HEC-RAS Plan: 100Y-S#4 River: Carson Reach: Near Dayton Profile: Base

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
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Near Dayton	90	Base	36100.00	4291.00	4304.96		4305.10	0.000510	4.44	13575.16	2410.19	0.22
Near Dayton	80	Base	36100.00	4290.00	4304.09		4304.25	0.001181	5.38	13466.72	2719.60	0.32
Near Dayton	70	Base	36100.00	4288.00	4302.84		4303.01	0.000862	4.61	14167.59	2248.48	0.25
Near Dayton	60	Base	36100.00	4286.80	4301.89	4297.27	4302.21	0.000815	5.28	9287.06	3088.75	0.28
Near Dayton	55	Bridge										
Near Dayton	50	Base	36100.00	4288.30	4301.23	4296.86	4301.52	0.000815	5.03	9395.11	3140.48	0.28
Near Dayton	40	Base	36100.00	4287.50	4300.69		4300.91	0.000886	4.91	11805.89	2346.87	0.28
Near Dayton	30	Base	36100.00	4286.00	4299.44		4299.75	0.001375	6.17	10235.45	2340.30	0.35
Near Dayton	20	Base	36100.00	4286.10	4298.72		4298.96	0.001110	5.81	11276.98	2339.19	0.32
Near Dayton	10	Base	36100.00	4285.10	4297.22		4297.51	0.001580	5.41	9509.04	2334.91	0.36
Near Dayton	0	Base	36100.00	4285.00	4294.93	4292.64	4295.17	0.001372	4.92	10373.52	2621.86	0.33

Carson River Rolling A Bridge Plan: 100y-Scenario#5 7/8/2008 10:48:48 AM
Geom: Base with Bridge Scenario #5 Flow: 100-Y Flood



Plan: 100Y-S#5 Carson Near Dayton RS: 55 BR U Profile: Base

E.G. Elev (ft)	4301.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4301.51	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	4297.43	Flow Area (sq ft)	3857.62	4045.48	4924.85
E.G. Slope (ft/ft)	0.000721	Area (sq ft)	3857.62	4045.48	4924.85
Q Total (cfs)	36100.00	Flow (cfs)	8695.08	17643.92	9760.99
Top Width (ft)	2872.02	Top Width (ft)	849.91	382.00	1640.11
Vel Total (ft/s)	2.81	Avg. Vel. (ft/s)	2.25	4.36	1.98
Max Chl Dpth (ft)	12.70	Hydr. Depth (ft)	4.54	10.59	3.00
Conv. Total (cfs)	1344761.0	Conv. (cfs)	323900.5	657253.8	363606.8
Length Wtd. (ft)	100.00	Wetted Per. (ft)	935.22	442.31	1750.67
Min Ch El (ft)	4288.81	Shear (lb/sq ft)	0.19	0.41	0.13
Alpha	1.46	Stream Power (lb/ft s)	0.42	1.79	0.25
Frcin Loss (ft)		Cum Volume (acre-ft)	438.81	372.15	421.13
C & E Loss (ft)		Cum SA (acres)	104.41	44.38	129.41

Plan: 100Y-S#5 Carson Near Dayton RS: 55 Profile: Base

E.G. US. (ft)	4301.71	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	4301.52	E.G. Elev (ft)	4301.69	4301.41
Q Total (cfs)	36100.00	W.S. Elev (ft)	4301.51	4301.24
Q Bridge (cfs)	36100.00	Crit W.S. (ft)	4297.43	4296.99
Q Weir (cfs)		Max Chl Dpth (ft)	12.70	12.94
Weir Sta Lft (ft)		Vel Total (ft/s)	2.81	2.86
Weir Sta Rgt (ft)		Flow Area (sq ft)	12827.95	12637.56
Weir Submerg		Froude # Chl	0.24	0.23
Weir Max Depth (ft)		Specif Force (cu ft)	47988.76	47041.84
Min El Weir Flow (ft)	4311.00	Hydr Depth (ft)	4.47	4.27
Min El Prs (ft)	4305.00	W.P. Total (ft)	3128.20	3209.86
Delta EG (ft)	0.30	Conv. Total (cfs)	1344761.0	1348408.0
Delta WS (ft)	0.29	Top Width (ft)	2872.02	2961.64
BR Open Area (sq ft)	23016.69	Frctn Loss (ft)		
BR Open Vel (ft/s)	2.86	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	0.18	0.18
Br Sel Method	Momentum	Power Total (lb/ft s)	0.52	0.50

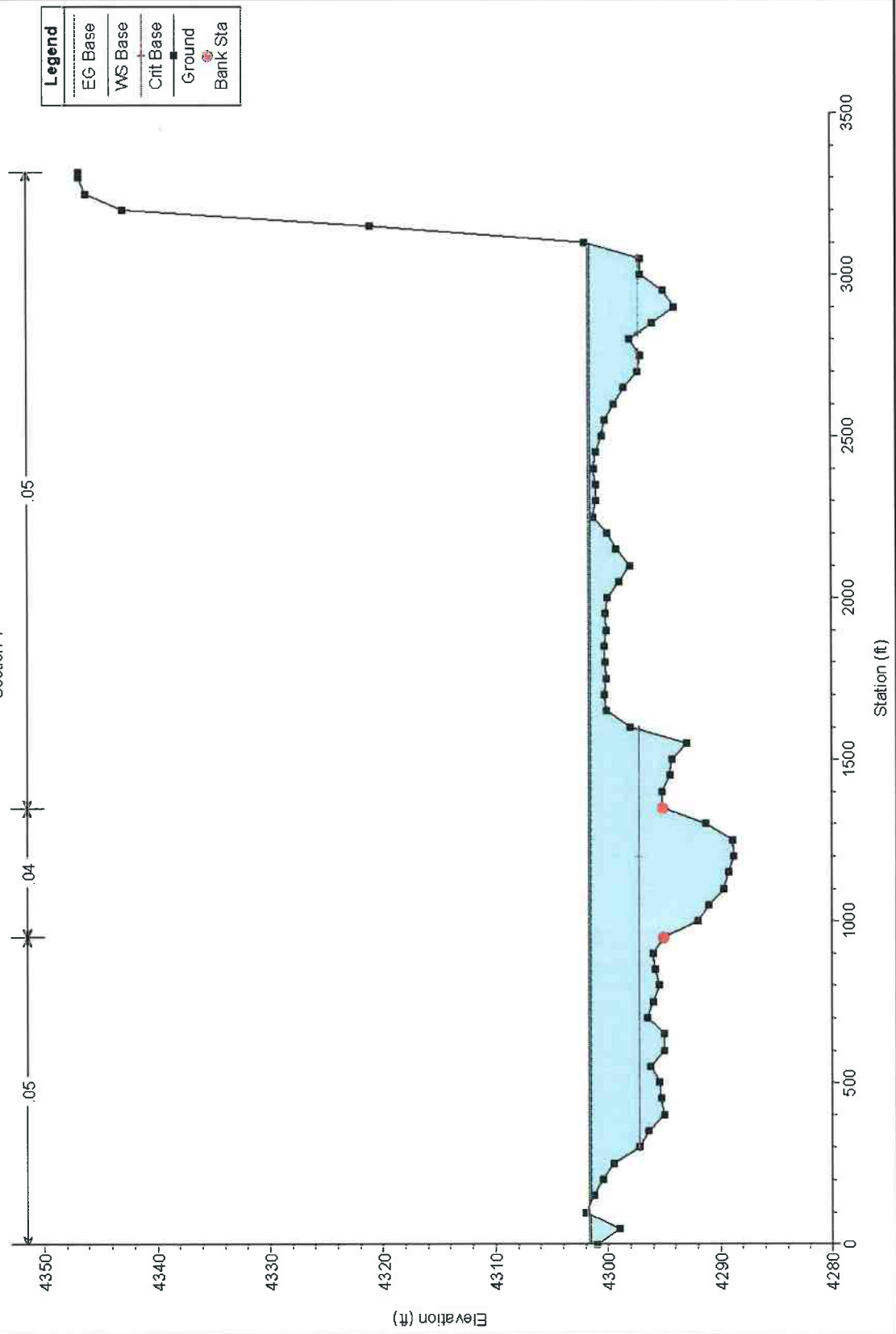
Plan: 100Y-S#5 Carson Near Dayton RS: 55 BR D Profile: Base

E.G. Elev (ft)	4301.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.045	0.040	0.050
W.S. Elev (ft)	4301.24	Reach Len. (ft)	9.74	9.74	9.74
Crit W.S. (ft)	4296.99	Flow Area (sq ft)	4267.36	3898.40	4471.81
E.G. Slope (ft/ft)	0.000717	Area (sq ft)	4267.36	3898.40	4471.81
Q Total (cfs)	36100.00	Flow (cfs)	10612.58	16604.99	8882.43
Top Width (ft)	2961.64	Top Width (ft)	988.21	382.00	1591.43
Vel Total (ft/s)	2.86	Avg. Vel. (ft/s)	2.49	4.26	1.99
Max Chl Dpth (ft)	12.94	Hydr. Depth (ft)	4.32	10.21	2.81
Conv. Total (cfs)	1348408.0	Conv. (cfs)	396401.5	620229.9	331776.6
Length Wtd. (ft)	9.74	Wetted Per. (ft)	1077.33	439.83	1692.70
Min Ch El (ft)	4288.30	Shear (lb/sq ft)	0.18	0.40	0.12
Alpha	1.36	Stream Power (lb/ft s)	0.44	1.69	0.23
Frctn Loss (ft)		Cum Volume (acre-ft)	429.49	363.03	410.34
C & E Loss (ft)		Cum SA (acres)	102.30	43.50	125.70

Carson River Rolling A Bridge Plan: 100y-Scenario#5 7/8/2008 10:48:48 AM

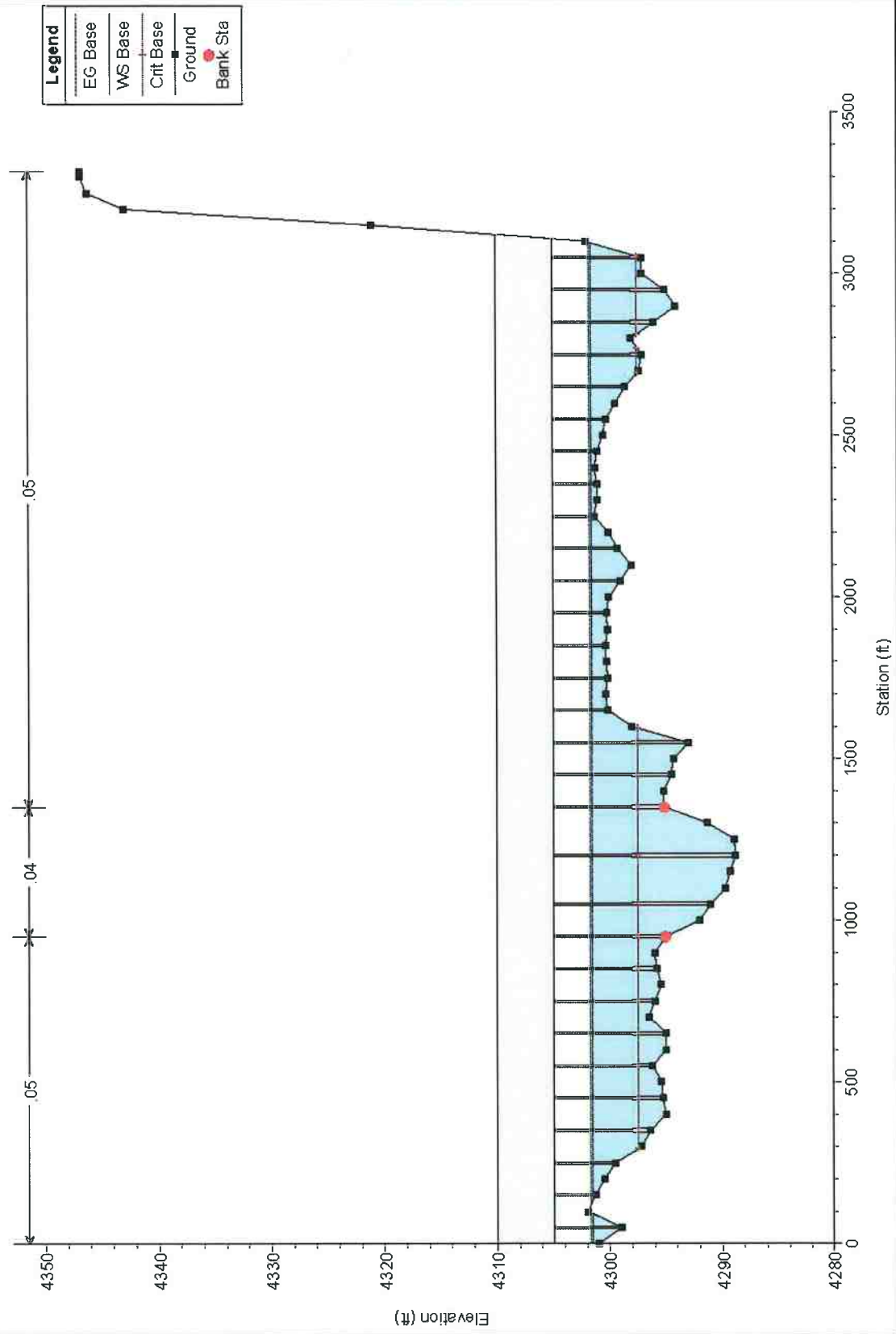
Geom: Base with Bridge Scenario #5 Flow: 100-Y Flood

Section 4



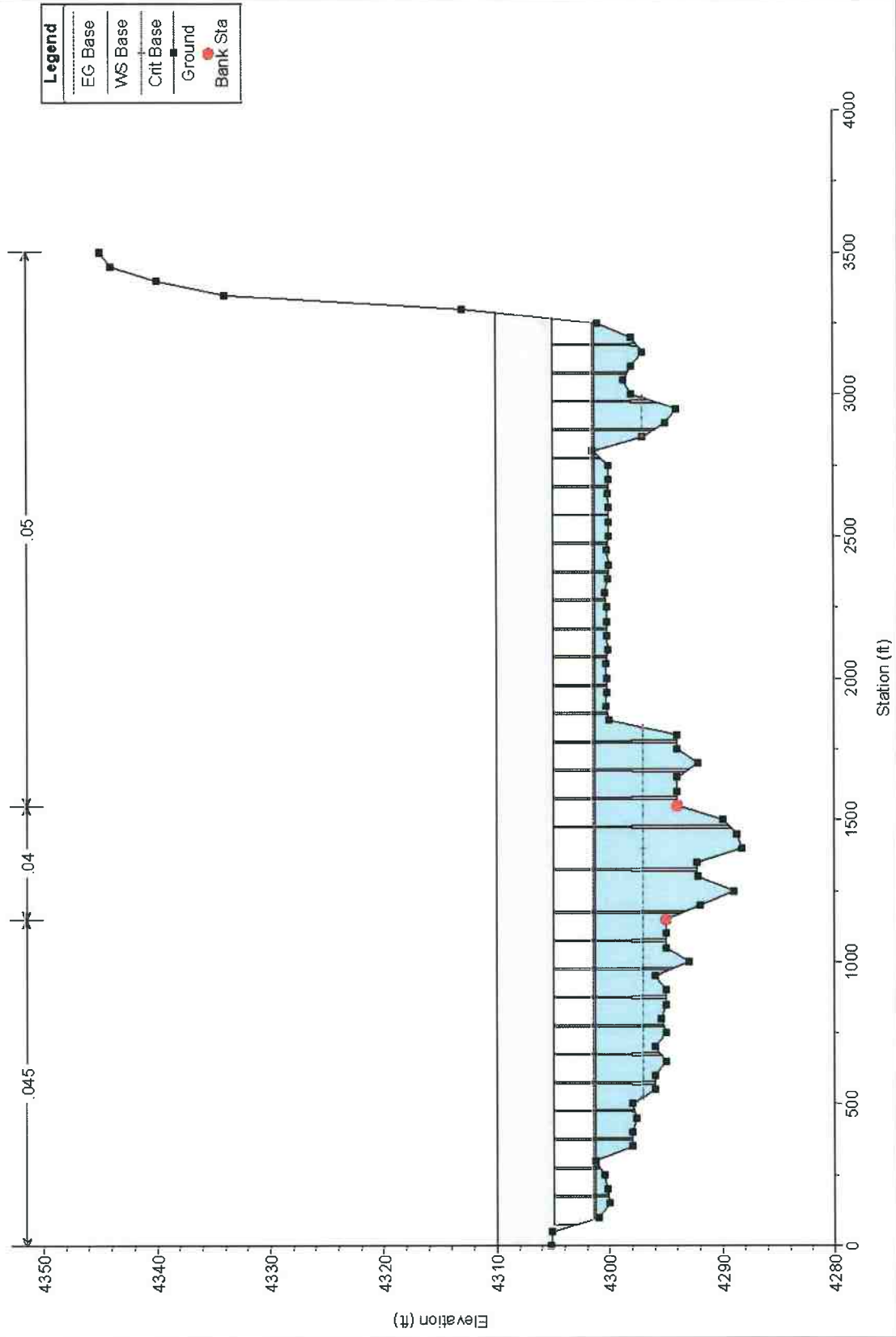
Carson River Rolling A Bridge Plan: 100y-Scenario#5 7/8/2008 10:48:48 AM

Geom: Base with Bridge Scenario #5 Flow: 100-Y Flood



Carson River Rolling A Bridge Plan: 100y-Scenario#5 7/8/2008 10:48:48 AM

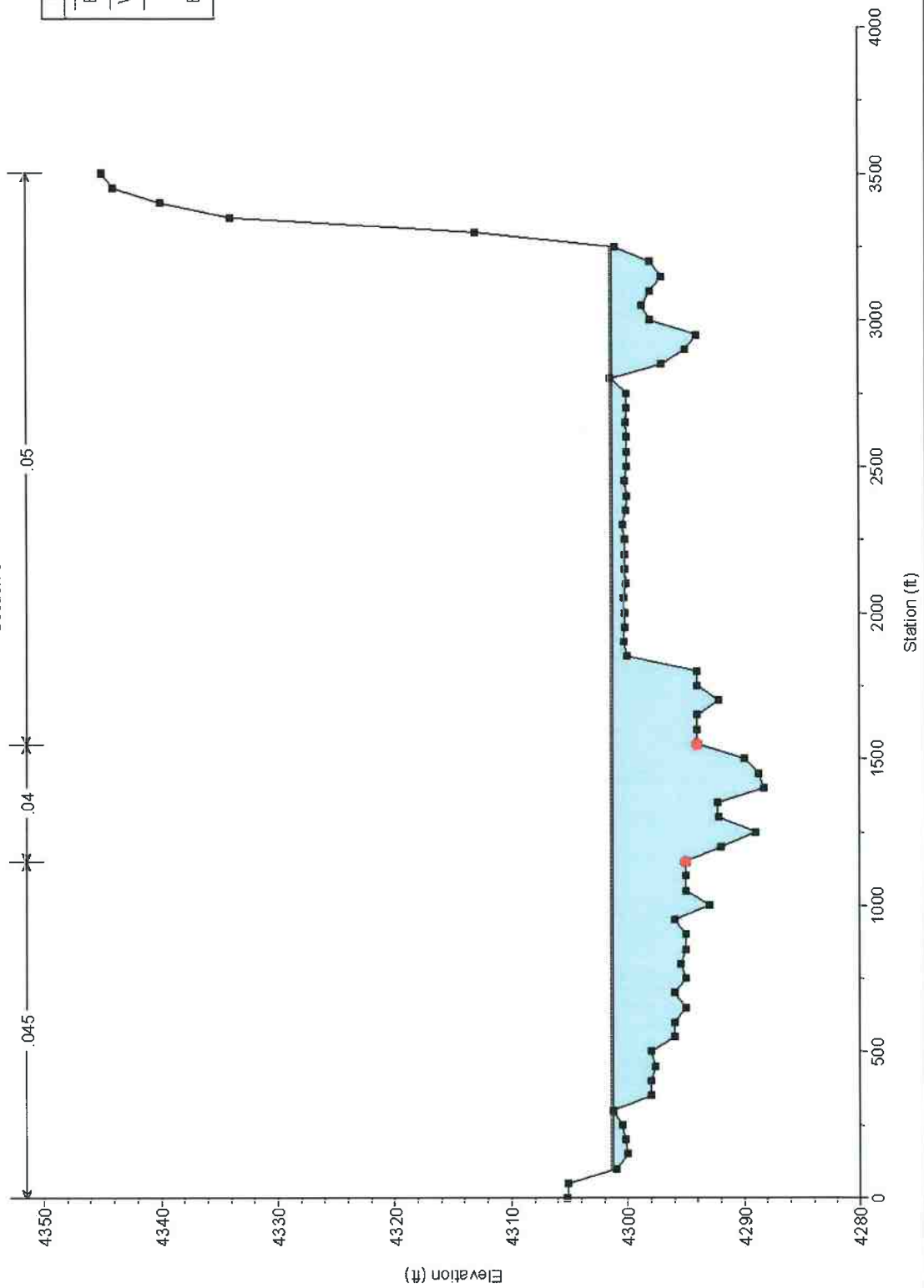
Geom: Base with Bridge Scenario #5 Flow: 100-Y Flood



Carson River Rolling A Bridge Plan: 100y-Scenario#5 7/8/2008 10:48:48 AM

Geom: Base with Bridge Scenario #5 Flow: 100-Y Flood

Section 5



HEC-RAS Plan: 100Y-S#5 River: Carson Reach: Near Dayton Profile: Base

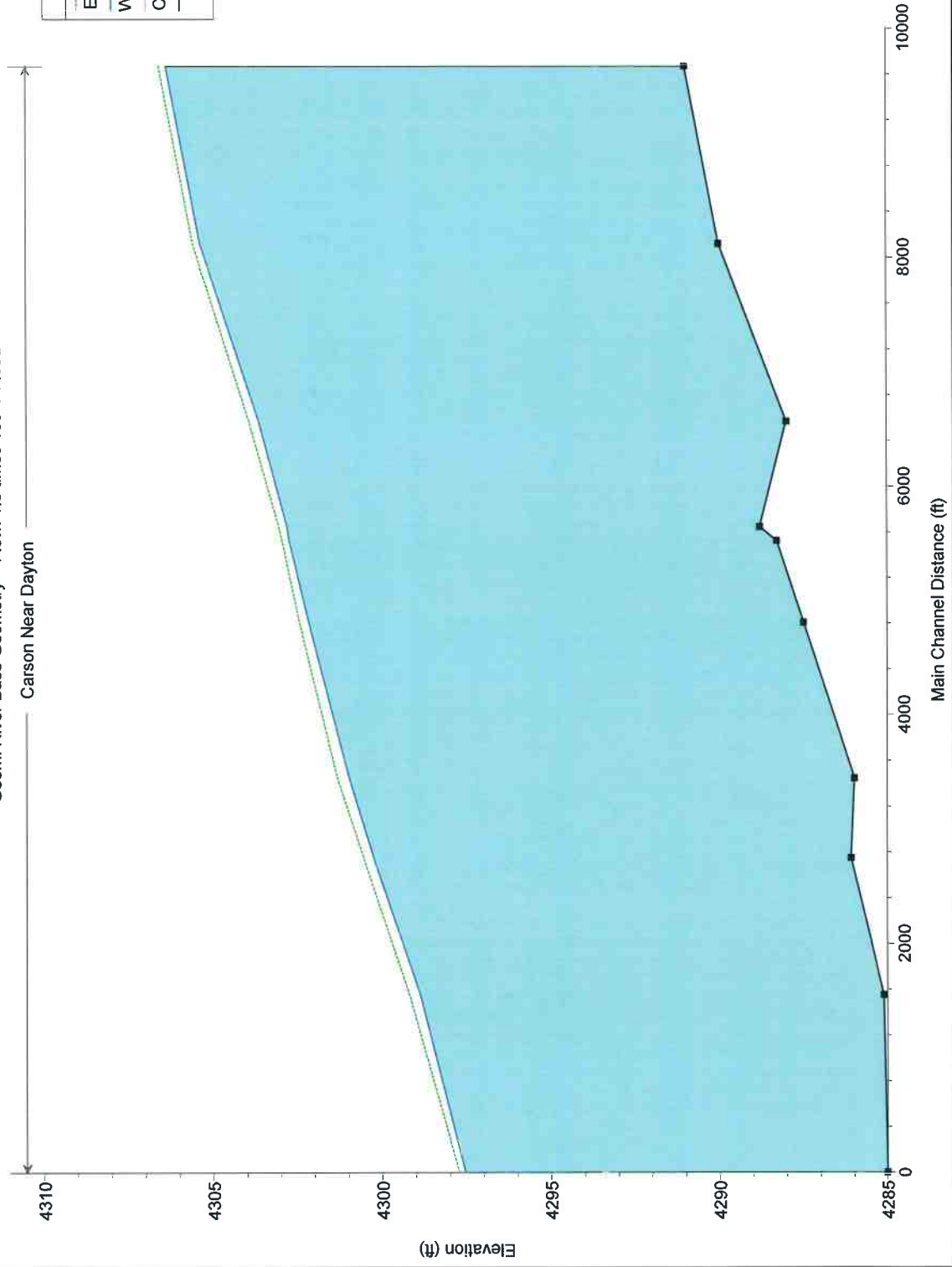
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Near Dayton	90	Base	36100.00	4291.00	4304.78		4304.94	0.000550	4.57	13157.74	2352.31	0.23
Near Dayton	80	Base	36100.00	4290.00	4303.78		4303.97	0.001448	5.84	12814.97	2714.60	0.35
Near Dayton	70	Base	36100.00	4288.00	4302.23		4302.43	0.001077	4.95	12798.70	2224.31	0.28
Near Dayton	60	Base	36100.00	4288.80	4301.52	4297.25	4301.71	0.000803	4.45	13833.82	3053.26	0.24
Near Dayton	55	Bridge										
Near Dayton	50	Base	36100.00	4288.30	4301.23		4301.41	0.000802	4.33	13565.28	3140.55	0.24
Near Dayton	40	Base	36100.00	4287.50	4300.69		4300.91	0.000886	4.91	11605.89	2346.87	0.28
Near Dayton	30	Base	36100.00	4286.00	4299.44		4299.75	0.001375	6.17	10235.45	2340.30	0.35
Near Dayton	20	Base	36100.00	4286.10	4298.72		4298.96	0.001110	5.81	11276.98	2339.19	0.32
Near Dayton	10	Base	36100.00	4285.10	4297.22		4297.51	0.001580	5.41	9509.04	2334.91	0.36
Near Dayton	0	Base	36100.00	4285.00	4294.93	4292.64	4295.17	0.001372	4.92	10373.52	2621.86	0.33

Carson River Rolling A Bridge Plan: 1.5 times 100y_No Bridge 7/8/2008 10:50:43 AM

Geom: River Base Geometry Flow: 1.5 times 100-Y Flood

Carson Near Dayton

Legend	
EG 1.5 Times	
WS 1.5 Times	
Crit 1.5 Times	
Ground	



Plan: 1.5xNoBridge Carson Near Dayton RS: 90 Profile: 1.5 Times

E.G. Elev (ft)	4306.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.	0.045	0.040	0.045
W.S. Elev (ft)	4306.36	Reach Len. (ft)	1528.48	1547.45	918.50
Crit W.S. (ft)		Flow Area (sq ft)	5692.41	2729.08	8779.51
E.G. Slope (ft/ft)	0.000651	Area (sq ft)	5692.41	2729.08	8779.51
Q Total (cfs)	54150.00	Flow (cfs)	13179.03	14726.92	26244.06
Top Width (ft)	2763.58	Top Width (ft)	1250.00	200.00	1313.58
Vel Total (ft/s)	3.15	Avg. Vel. (ft/s)	2.32	5.40	2.99
Max Chl Dpth (ft)	15.36	Hydr. Depth (ft)	4.55	13.65	6.68
Conv. Total (cfs)	2121616.0	Conv. (cfs)	516358.9	577005.8	1028251.0
Length Wtd. (ft)	1129.44	Wetted Per. (ft)	1250.22	200.99	1314.32
Min Ch El (ft)	4291.00	Shear (lb/sq ft)	0.19	0.55	0.27
Alpha	1.37	Stream Power (lb/ft s)	0.43	2.98	0.81
Frctn Loss (ft)	1.01	Cum Volume (acre-ft)	857.80	698.80	1394.47
C & E Loss (ft)	0.00	Cum SA (acres)	159.80	66.09	257.83

Errors Warnings and Notes

Warning:	The cross-section end points had to be extended vertically for the computed water surface.
Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Plan: 1.5xNoBridge Carson Near Dayton RS: 80 Profile: 1.5 Times

E.G. Elev (ft)	4305.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.		0.040	0.060
W.S. Elev (ft)	4305.35	Reach Len. (ft)	1531.51	1552.09	1061.06
Crit W.S. (ft)		Flow Area (sq ft)		1453.39	15446.69
E.G. Slope (ft/ft)	0.001300	Area (sq ft)		1453.39	15446.69
Q Total (cfs)	54150.00	Flow (cfs)		8813.41	45336.59
Top Width (ft)	2739.66	Top Width (ft)		147.97	2591.69
Vel Total (ft/s)	3.20	Avg. Vel. (ft/s)		6.06	2.94
Max Chl Dpth (ft)	15.35	Hydr. Depth (ft)		9.82	5.96
Conv. Total (cfs)	1501723.0	Conv. (cfs)		244419.2	1257304.0
Length Wtd. (ft)	1226.27	Wetted Per. (ft)		150.89	2592.35
Min Ch El (ft)	4290.00	Shear (lb/sq ft)		0.78	0.48
Alpha	1.29	Stream Power (lb/ft s)		4.74	1.42
Frctn Loss (ft)	1.63	Cum Volume (acre-ft)	757.93	624.51	1139.06
C & E Loss (ft)	0.01	Cum SA (acres)	137.87	59.91	216.66

Errors Warnings and Notes

Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
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Plan: 1.5xNoBridge Carson Near Dayton RS: 70 Profile: 1.5 Times

E.G. Elev (ft)	4303.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.29	Wt. n-Val.	0.055	0.045	0.075
W.S. Elev (ft)	4303.63	Reach Len. (ft)	1060.67	922.96	789.91
Crit W.S. (ft)		Flow Area (sq ft)	2293.70	3356.63	10298.39
E.G. Slope (ft/ft)	0.001359	Area (sq ft)	2293.70	3356.63	10298.39
Q Total (cfs)	54150.00	Flow (cfs)	7547.92	20394.05	26208.03
Top Width (ft)	2263.26	Top Width (ft)	381.28	300.00	1581.98
Vel Total (ft/s)	3.40	Avg. Vel. (ft/s)	3.29	6.08	2.54

Plan: 1.5xNoBridge Carson Near Dayton RS: 70 Profile: 1.5 Times (Continued)

Max Chl Dpth (ft)	15.63	Hydr. Depth (ft)	6.02	11.19	6.51
Conv. Total (cfs)	1469126.0	Conv. (cfs)	204780.1	553304.3	711041.2
Length Wtd. (ft)	898.01	Wetted Per. (ft)	381.82	300.94	1583.00
Min Ch El (ft)	4288.00	Shear (lb/sq ft)	0.51	0.95	0.55
Alpha	1.61	Stream Power (lb/ft s)	1.68	5.75	1.40
Frctn Loss (ft)	0.85	Cum Volume (acre-ft)	717.61	538.81	825.50
C & E Loss (ft)	0.03	Cum SA (acres)	131.16	51.93	165.82

Plan: 1.5xNoBridge Carson Near Dayton RS: 60 Profile: 1.5 Times

E.G. Elev (ft)	4303.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4302.81	Reach Len. (ft)	119.71	119.74	119.72
Crit W.S. (ft)		Flow Area (sq ft)	5391.33	4820.18	7589.96
E.G. Slope (ft/ft)	0.000699	Area (sq ft)	5391.33	4820.18	7589.96
Q Total (cfs)	54150.00	Flow (cfs)	13452.95	24861.09	15835.96
Top Width (ft)	3102.12	Top Width (ft)	950.00	400.00	1752.12
Vel Total (ft/s)	3.04	Avg. Vel. (ft/s)	2.50	5.16	2.09
Max Chl Dpth (ft)	14.01	Hydr. Depth (ft)	5.68	12.05	4.33
Conv. Total (cfs)	2048857.0	Conv. (cfs)	509015.1	940661.6	599180.4
Length Wtd. (ft)	119.73	Wetted Per. (ft)	952.10	400.32	1753.07
Min Ch El (ft)	4288.80	Shear (lb/sq ft)	0.25	0.53	0.19
Alpha	1.62	Stream Power (lb/ft s)	0.62	2.71	0.39
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	624.05	452.19	663.31
C & E Loss (ft)	0.01	Cum SA (acres)	114.96	44.51	135.59

Errors Warnings and Notes

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Plan: 1.5xNoBridge Carson Near Dayton RS: 50 Profile: 1.5 Times

E.G. Elev (ft)	4302.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.045	0.040	0.050
W.S. Elev (ft)	4302.74	Reach Len. (ft)	596.56	717.27	773.59
Crit W.S. (ft)		Flow Area (sq ft)	6197.80	4746.88	7402.98
E.G. Slope (ft/ft)	0.000628	Area (sq ft)	6197.80	4746.88	7402.98
Q Total (cfs)	54150.00	Flow (cfs)	16525.71	22969.17	14655.12
Top Width (ft)	3178.51	Top Width (ft)	1071.25	400.00	1707.26
Vel Total (ft/s)	2.95	Avg. Vel. (ft/s)	2.67	4.84	1.98
Max Chl Dpth (ft)	14.44	Hydr. Depth (ft)	5.79	11.87	4.34
Conv. Total (cfs)	2160625.0	Conv. (cfs)	659388.0	916486.8	584750.1
Length Wtd. (ft)	672.64	Wetted Per. (ft)	1071.66	400.62	1708.44
Min Ch El (ft)	4288.30	Shear (lb/sq ft)	0.23	0.46	0.17
Alpha	1.51	Stream Power (lb/ft s)	0.60	2.25	0.34
Frctn Loss (ft)	0.51	Cum Volume (acre-ft)	608.12	439.04	642.71
C & E Loss (ft)	0.01	Cum SA (acres)	112.18	43.41	130.84

Plan: 1.5xNoBridge Carson Near Dayton RS: 40 Profile: 1.5 Times

E.G. Elev (ft)	4302.43	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4302.16	Reach Len. (ft)	683.85	1363.67	935.62
Crit W.S. (ft)		Flow Area (sq ft)	10268.17	3795.70	1032.67
E.G. Slope (ft/ft)	0.000933	Area (sq ft)	10268.17	3795.70	1032.67
Q Total (cfs)	54150.00	Flow (cfs)	31220.30	21075.99	1853.71
Top Width (ft)	2394.35	Top Width (ft)	1673.11	350.00	371.24

Plan: 1.5xNoBridge Carson Near Dayton RS: 40 Profile: 1.5 Times (Continued)

Vel Total (ft/s)	3.59	Avg. Vel. (ft/s)	3.04	5.55	1.80
Max Chl Dpth (ft)	14.66	Hydr. Depth (ft)	6.14	10.84	2.78
Conv. Total (cfs)	1772986.0	Conv. (cfs)	1022219.0	690072.8	60694.3
Length Wtd. (ft)	1004.07	Wetted Per. (ft)	1674.77	350.58	371.30
Min Ch El (ft)	4287.50	Shear (lb/sq ft)	0.36	0.63	0.16
Alpha	1.36	Stream Power (lb/ft s)	1.09	3.50	0.29
Frctn Loss (ft)	1.11	Cum Volume (acre-ft)	495.37	368.71	567.80
C & E Loss (ft)	0.01	Cum SA (acres)	93.39	37.24	112.38

Errors Warnings and Notes

Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
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Plan: 1.5xNoBridge Carson Near Dayton RS: 30 Profile: 1.5 Times

E.G. Elev (ft)	4301.31	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.34	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4300.97	Reach Len. (ft)	705.88	692.91	543.40
Crit W.S. (ft)		Flow Area (sq ft)	2576.39	2761.57	8651.16
E.G. Slope (ft/ft)	0.001334	Area (sq ft)	2576.39	2761.57	8651.16
Q Total (cfs)	54150.00	Flow (cfs)	6659.96	18522.74	28967.30
Top Width (ft)	2546.63	Top Width (ft)	700.00	250.00	1596.63
Vel Total (ft/s)	3.87	Avg. Vel. (ft/s)	2.58	6.71	3.35
Max Chl Dpth (ft)	14.97	Hydr. Depth (ft)	3.68	11.05	5.42
Conv. Total (cfs)	1482582.0	Conv. (cfs)	182344.1	507137.1	793100.6
Length Wtd. (ft)	621.16	Wetted Per. (ft)	701.02	251.25	1596.73
Min Ch El (ft)	4286.00	Shear (lb/sq ft)	0.31	0.92	0.45
Alpha	1.48	Stream Power (lb/ft s)	0.79	6.14	1.51
Frctn Loss (ft)	0.76	Cum Volume (acre-ft)	394.55	266.07	463.80
C & E Loss (ft)	0.02	Cum SA (acres)	74.76	27.85	91.25

Errors Warnings and Notes

Warning:	The cross-section end points had to be extended vertically for the computed water surface.
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Plan: 1.5xNoBridge Carson Near Dayton RS: 20 Profile: 1.5 Times

E.G. Elev (ft)	4300.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.29	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4300.25	Reach Len. (ft)	1046.45	1201.27	1036.27
Crit W.S. (ft)		Flow Area (sq ft)	4490.07	2347.30	8081.25
E.G. Slope (ft/ft)	0.001123	Area (sq ft)	4490.07	2347.30	8081.25
Q Total (cfs)	54150.00	Flow (cfs)	14282.49	15045.05	24822.46
Top Width (ft)	2477.80	Top Width (ft)	786.27	200.00	1491.53
Vel Total (ft/s)	3.63	Avg. Vel. (ft/s)	3.18	6.41	3.07
Max Chl Dpth (ft)	14.15	Hydr. Depth (ft)	5.71	11.74	5.42
Conv. Total (cfs)	1616063.0	Conv. (cfs)	426249.5	449007.4	740806.4
Length Wtd. (ft)	1094.02	Wetted Per. (ft)	786.46	200.88	1491.68
Min Ch El (ft)	4286.10	Shear (lb/sq ft)	0.40	0.82	0.38
Alpha	1.40	Stream Power (lb/ft s)	1.27	5.25	1.17
Frctn Loss (ft)	1.35	Cum Volume (acre-ft)	337.29	225.43	359.44
C & E Loss (ft)	0.00	Cum SA (acres)	62.72	24.27	71.99

Errors Warnings and Notes

Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
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Plan: 1.5xNoBridge Carson Near Dayton RS: 10 Profile: 1.5 Times

E.G. Elev (ft)	4299.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4298.87	Reach Len. (ft)	1468.91	1548.39	1751.32
Crit W.S. (ft)		Flow Area (sq ft)	8392.06	3477.27	1522.72
E.G. Slope (ft/ft)	0.001356	Area (sq ft)	8392.06	3477.27	1522.72
Q Total (cfs)	54150.00	Flow (cfs)	31063.35	20064.59	3022.06
Top Width (ft)	2372.03	Top Width (ft)	1348.68	400.00	623.35
Vel Total (ft/s)	4.04	Avg. Vel. (ft/s)	3.70	5.77	1.98
Max Chl Dpth (ft)	13.77	Hydr. Depth (ft)	6.22	8.69	2.44
Conv. Total (cfs)	1470599.0	Conv. (cfs)	843614.6	544911.6	82072.8
Length Wtd. (ft)	1585.17	Wetted Per. (ft)	1348.94	401.34	623.43
Min Ch El (ft)	4285.10	Shear (lb/sq ft)	0.53	0.73	0.21
Alpha	1.25	Stream Power (lb/ft s)	1.95	4.23	0.41
Frctn Loss (ft)	1.43	Cum Volume (acre-ft)	182.56	145.12	245.20
C & E Loss (ft)	0.04	Cum SA (acres)	37.07	16.00	46.83

Errors Warnings and Notes

Warning:	The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:	The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

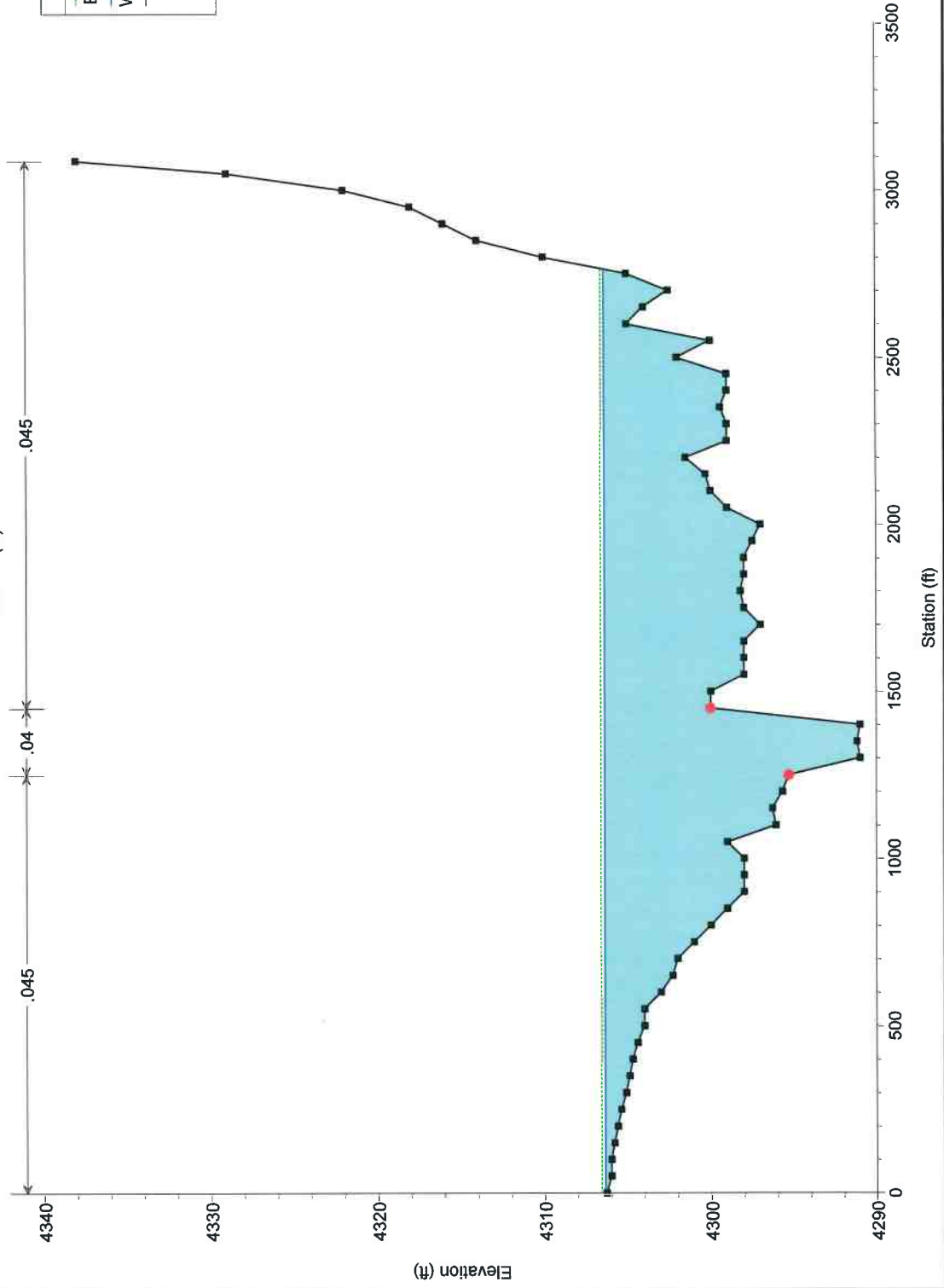
Plan: 1.5xNoBridge Carson Near Dayton RS: 0 Profile: 1.5 Times

E.G. Elev (ft)	4297.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.045	0.040	0.045
W.S. Elev (ft)	4297.54	Reach Len. (ft)			
Crit W.S. (ft)	4293.39	Flow Area (sq ft)	2435.28	4687.82	10674.80
E.G. Slope (ft/ft)	0.000646	Area (sq ft)	2435.28	4687.82	10674.80
Q Total (cfs)	54150.00	Flow (cfs)	4117.27	19648.70	30384.03
Top Width (ft)	3056.32	Top Width (ft)	850.00	500.00	1706.32
Vel Total (ft/s)	3.04	Avg. Vel. (ft/s)	1.69	4.19	2.85
Max Chl Dpth (ft)	12.54	Hydr. Depth (ft)	2.87	9.38	6.26
Conv. Total (cfs)	2130588.0	Conv. (cfs)	161998.2	773098.4	1195491.0
Length Wtd. (ft)		Wetted Per. (ft)	851.69	501.16	1709.05
Min Ch El (ft)	4285.00	Shear (lb/sq ft)	0.12	0.38	0.25
Alpha	1.20	Stream Power (lb/ft s)	0.19	1.58	0.72
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Carson River Rolling A Bridge Plan: 1.5 times 100y_No Bridge 7/8/2008 10:50:43 AM

Geom: River Base Geometry Flow: 1.5 times 100-Y Flood

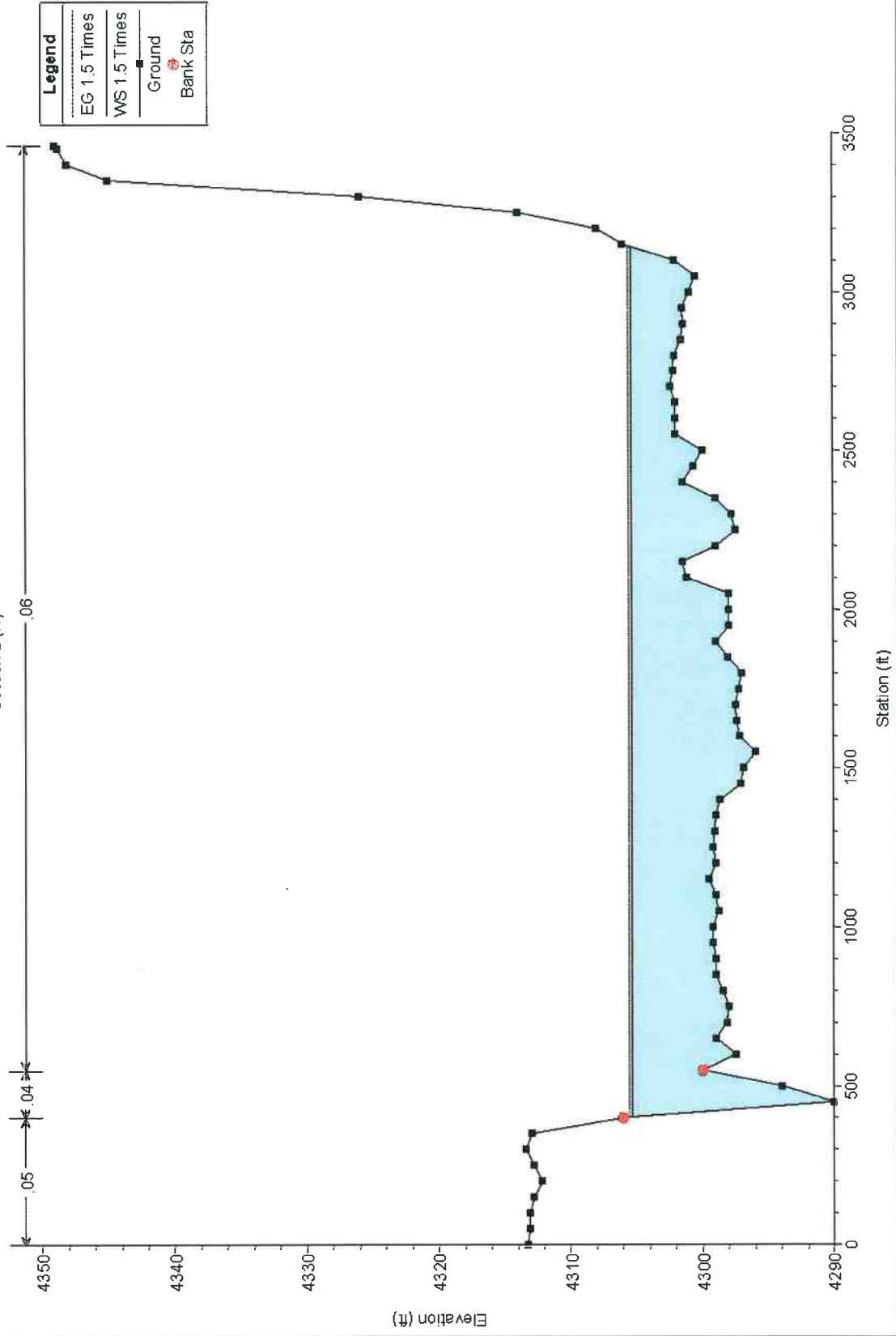
Section 1 (O)



Carson River Rolling A Bridge Plan: 1.5 times 100y No Bridge 7/8/2008 10:50:43 AM

Geom: River Base Geometry Flow: 1.5 times 100-Y Flood

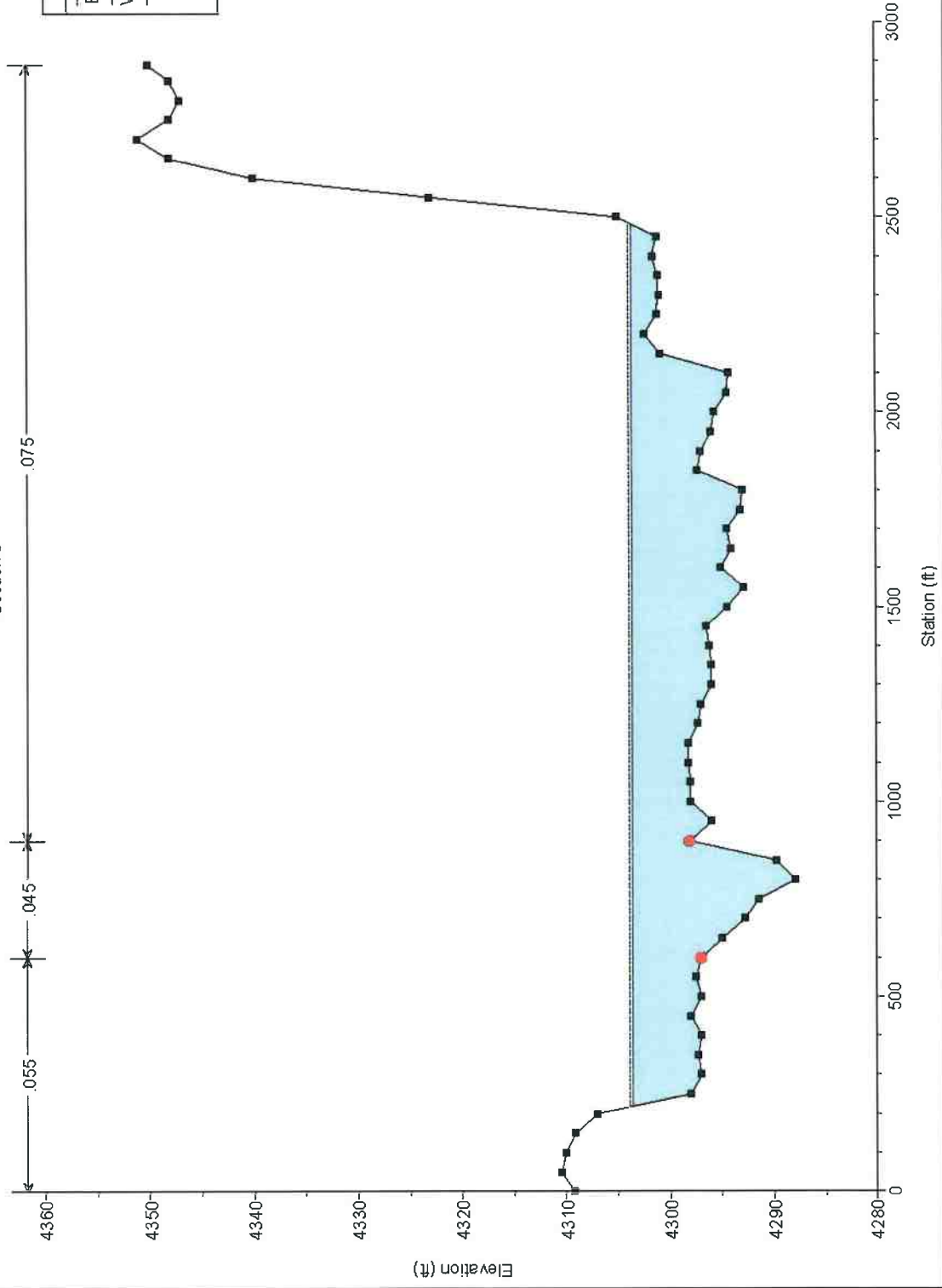
Section 2 (N)



Carson River Rolling A Bridge Plan: 1.5 times 100y_No Bridge 7/8/2008 10:50:43 AM

Geom: River Base Geometry Flow: 1.5 times 100-Y Flood

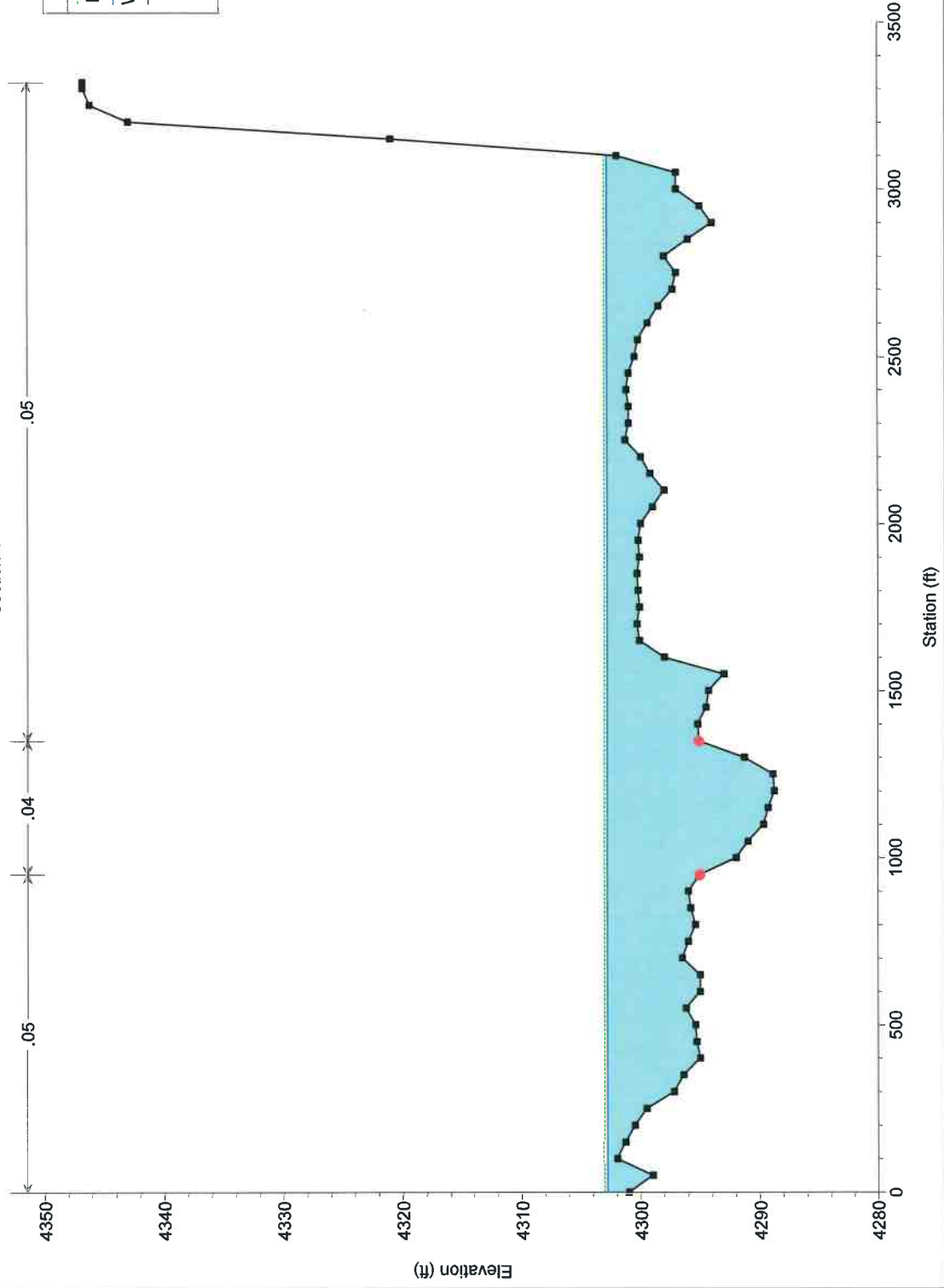
Section 3



Carson River Rolling A Bridge Plan: 1.5 times 100y_No Bridge 7/8/2008 10:50:43 AM

Geom: River Base Geometry Flow: 1.5 times 100-Y Flood

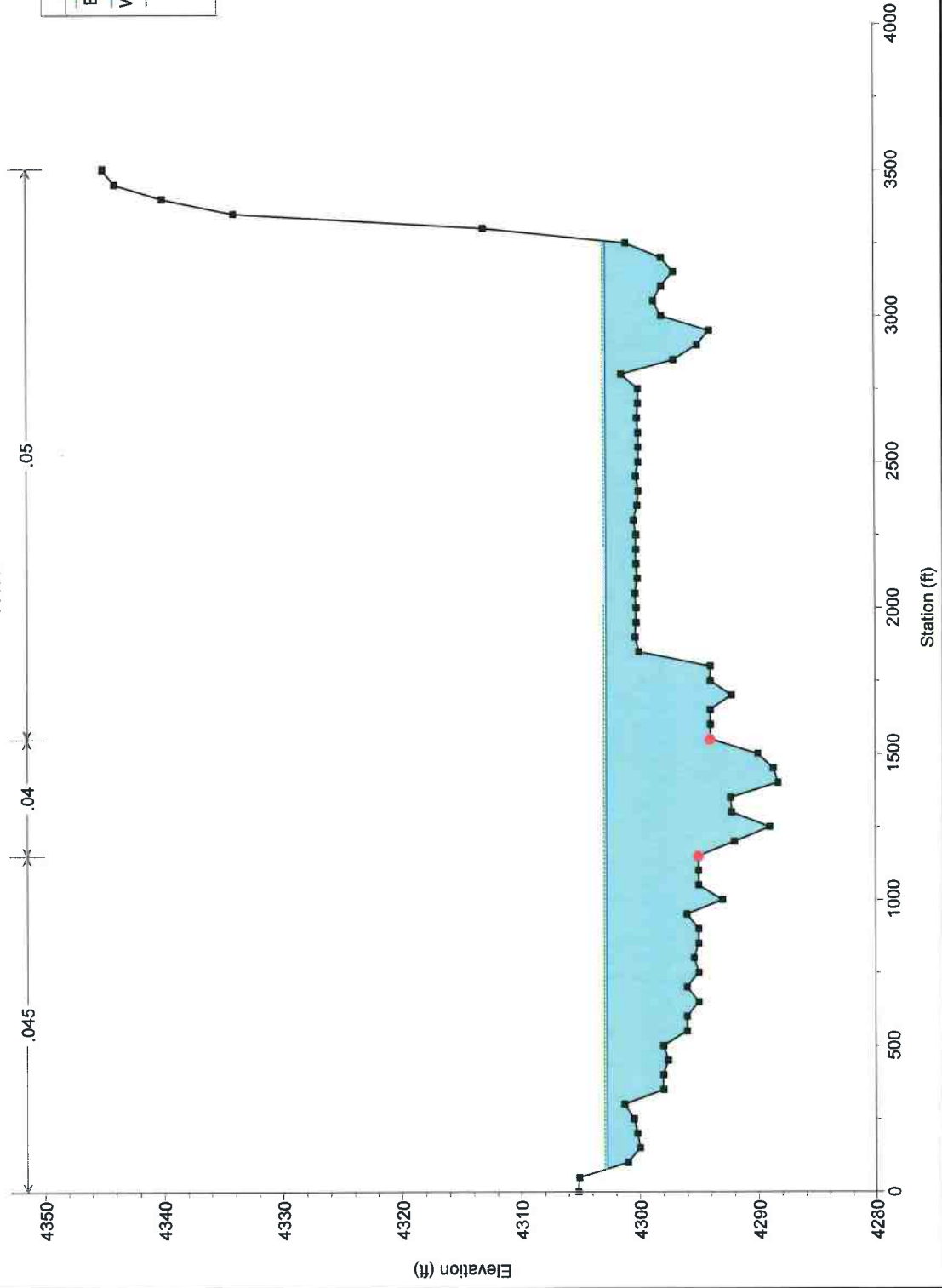
Section 4



Carson River Rolling A Bridge Plan: 1.5 times 100y_No Bridge 7/8/2008 10:50:43 AM

Geom: River Base Geometry Flow: 1.5 times 100-Y Flood

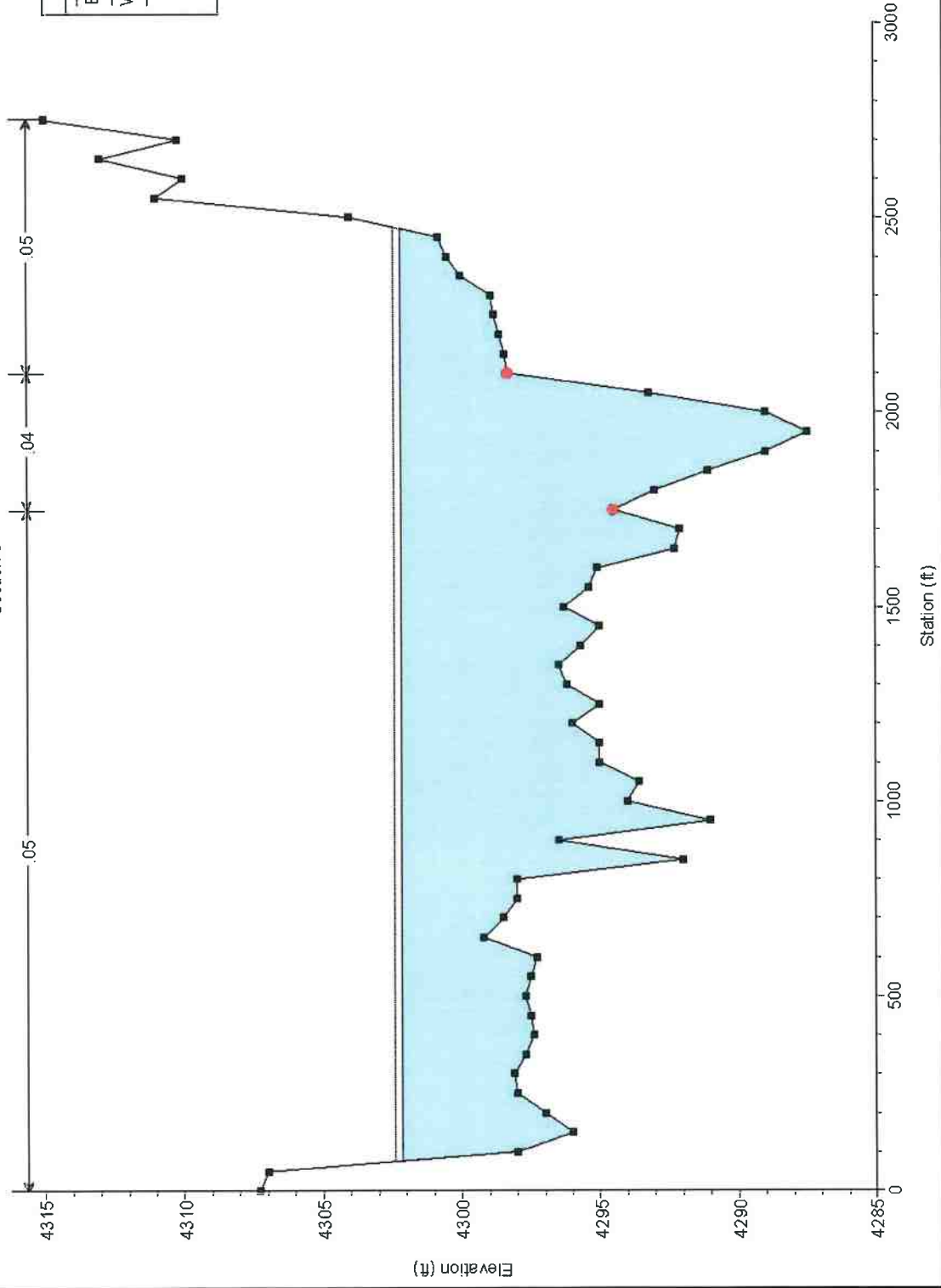
Section 5



Carson River Rolling A Bridge Plan: 1.5 times 100y_No Bridge 7/8/2008 10:50:43 AM

Geom: River Base Geometry Flow: 1.5 times 100-Y Flood

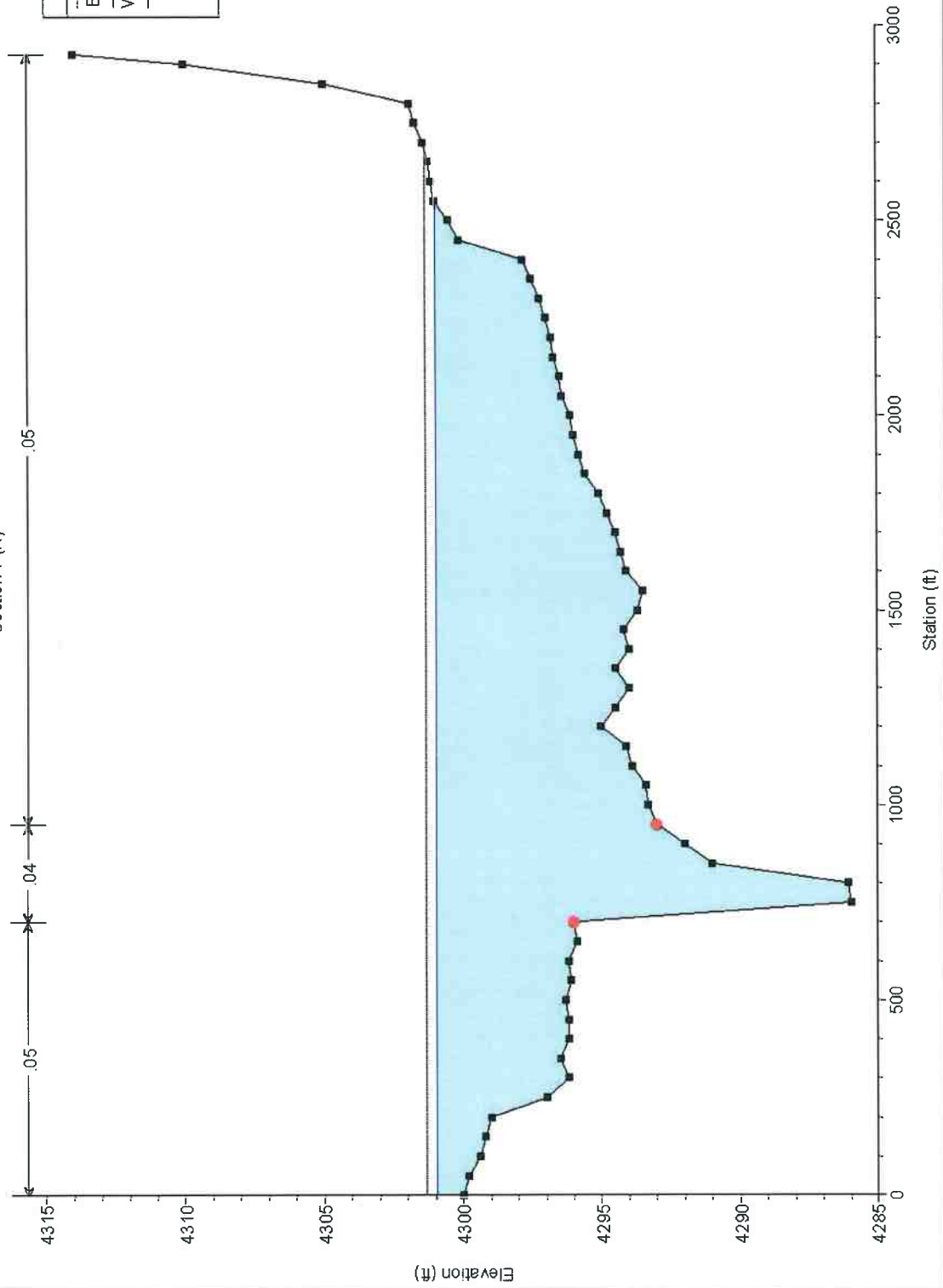
Section 6



Carson River Rolling A Bridge Plan: 1.5 times 100y No Bridge 7/8/2008 10:50:43 AM

Geom: River Base Geometry Flow: 1.5 times 100-Y Flood

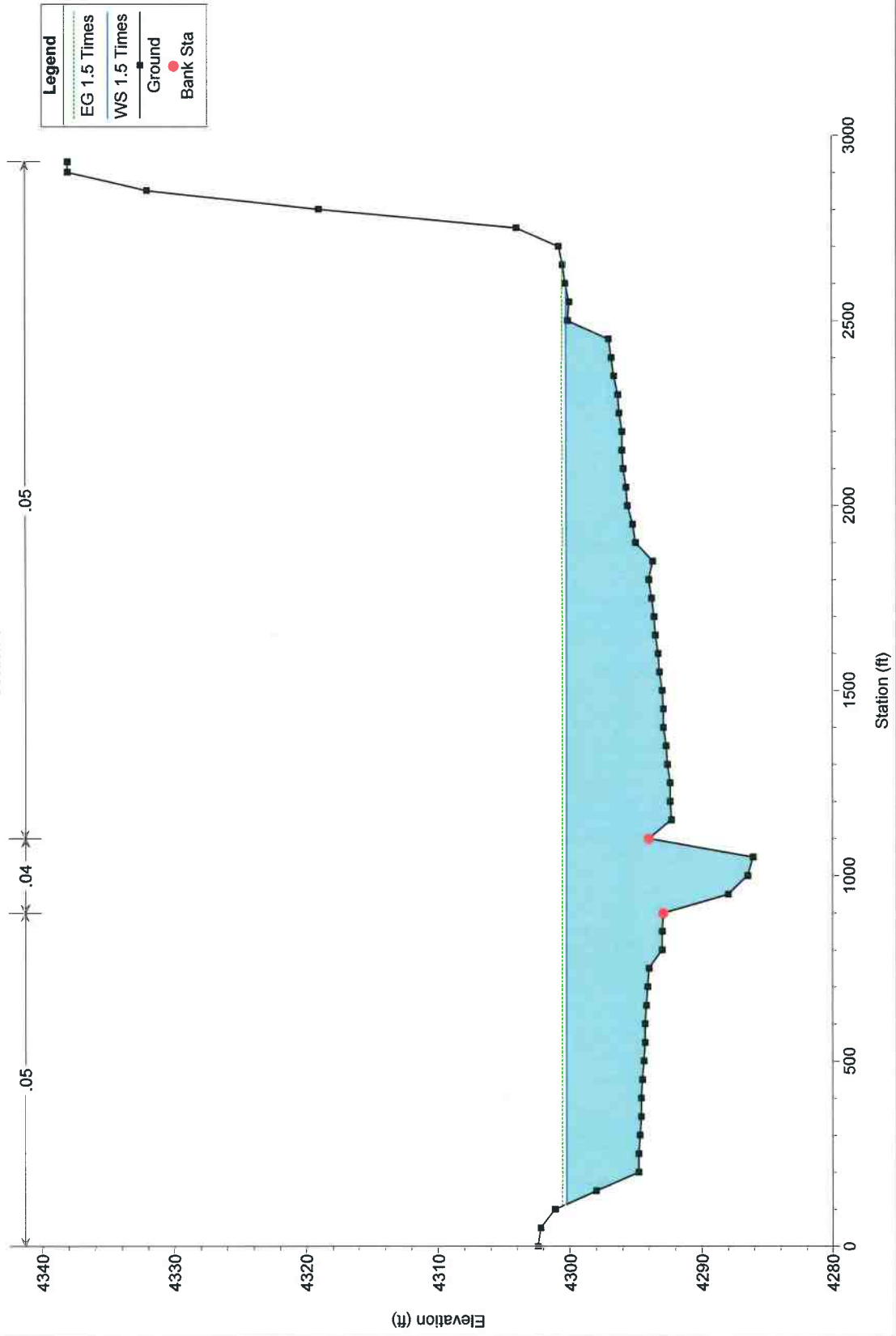
Section 7 (K)



Carson River Rolling A Bridge Plan: 1.5 times 100y_No Bridge 7/8/2008 10:50:43 AM

Geom: River Base Geometry Flow: 1.5 times 100-Y Flood

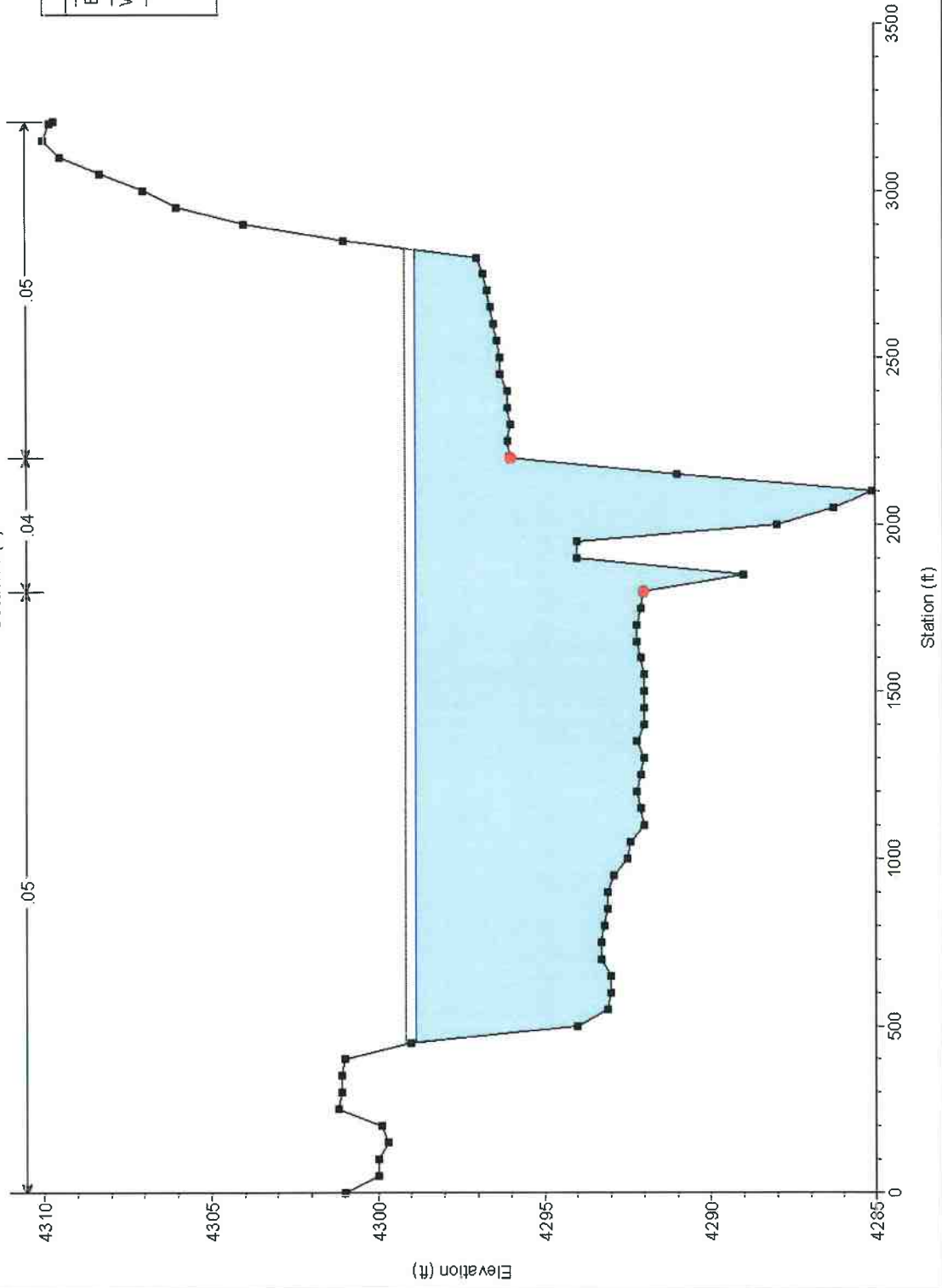
Section 8



Carson River Rolling A Bridge Plan: 1.5 times 100y_No Bridge 7/8/2008 10:50:43 AM

Geom: River Base Geometry Flow: 1.5 times 100-Y Flood

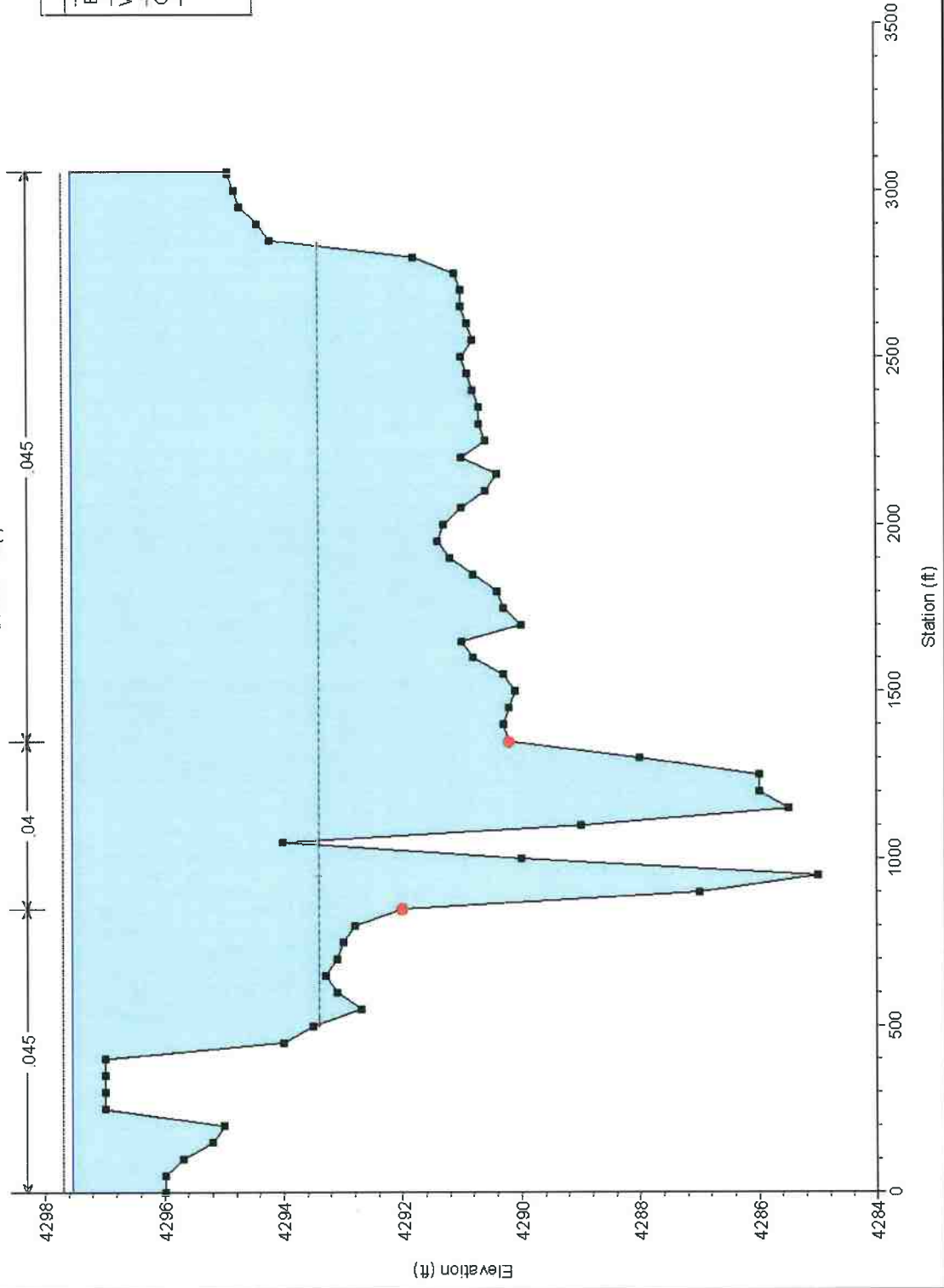
Section 9 (J)



Carson River Rolling A Bridge Plan: 1.5 times 100y_No Bridge 7/8/2008 10:50:43 AM

Geom: River Base Geometry Flow: 1.5 times 100-Y Flood

Section 10 (l)

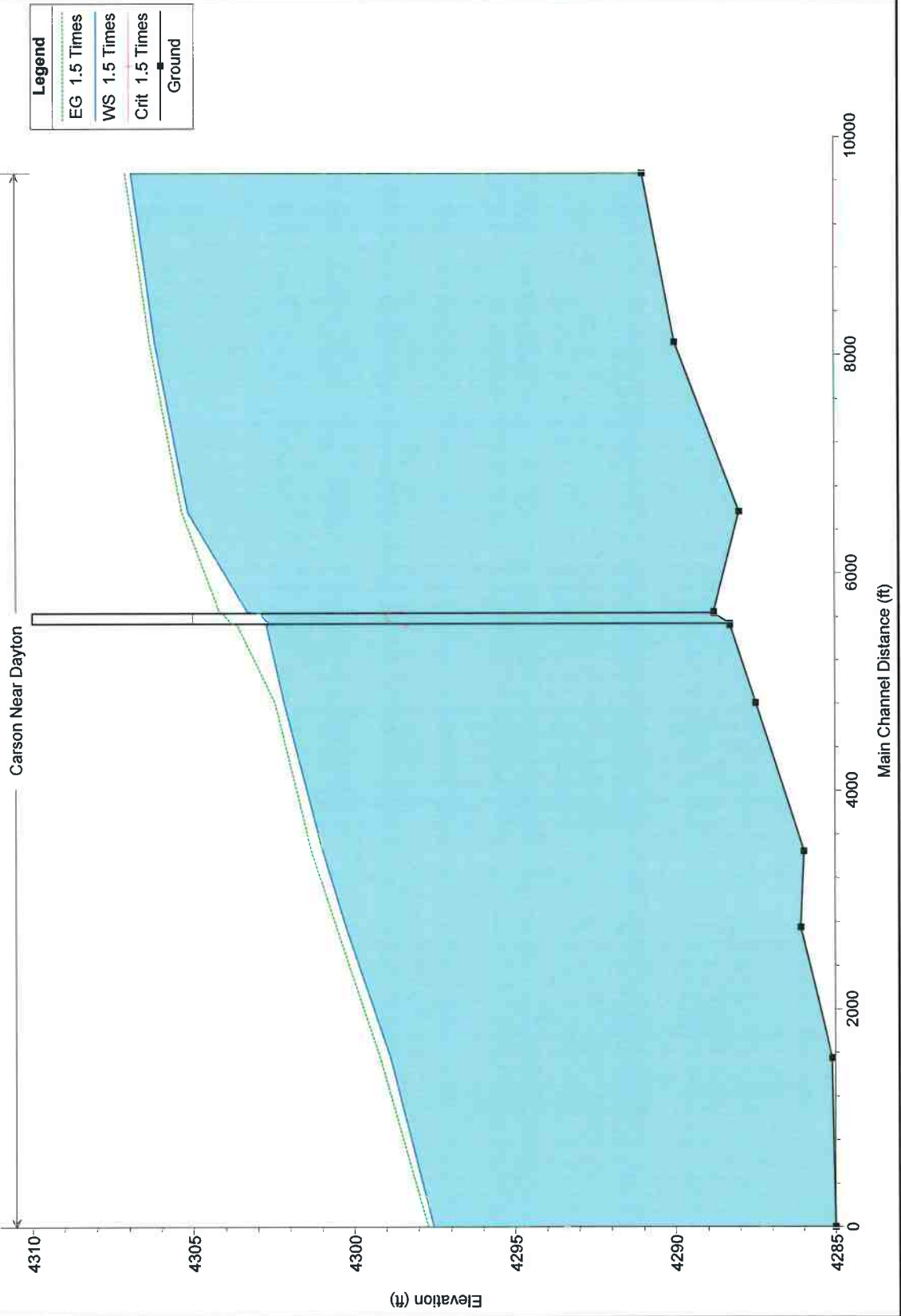


HEC-RAS Plan: 1.5xNoBridge River: Carson Reach: Near Dayton Profile: 1.5 Times

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Near Dayton	90	1.5 Times	54150.00	4291.00	4306.36		4306.57	0.000651	5.40	17200.99	2763.58	0.26
Near Dayton	80	1.5 Times	54150.00	4290.00	4305.35		4305.56	0.001300	6.08	16900.08	2739.66	0.34
Near Dayton	70	1.5 Times	54150.00	4288.00	4303.63		4303.92	0.001359	6.08	15948.71	2263.26	0.32
Near Dayton	60	1.5 Times	54150.00	4288.80	4302.81		4303.04	0.000699	5.16	17801.47	3102.12	0.26
Near Dayton	50	1.5 Times	54150.00	4288.30	4302.74		4302.95	0.000628	4.84	18347.66	3178.51	0.25
Near Dayton	40	1.5 Times	54150.00	4287.50	4302.16		4302.43	0.000933	5.55	15096.55	2394.35	0.30
Near Dayton	30	1.5 Times	54150.00	4286.00	4300.97		4301.31	0.001334	6.71	13989.12	2546.63	0.36
Near Dayton	20	1.5 Times	54150.00	4286.10	4300.25		4300.54	0.001123	6.41	14918.62	2477.80	0.33
Near Dayton	10	1.5 Times	54150.00	4285.10	4298.87		4299.19	0.001356	5.77	13392.04	2372.03	0.34
Near Dayton	0	1.5 Times	54150.00	4285.00	4297.54	4293.39	4297.71	0.000646	4.19	17797.90	3056.32	0.24

Carson River Rolling A Bridge Plan: 1.5times100yS#1 7/8/2008 10:51:20 AM

Geom: Base with Bridge Scenario #1 Flow: 1.5 times 100-Y Flood



Plan: 1.5X100Y-S#1 Carson Near Dayton RS: 55 BR U Profile: 1.5 Times

E.G. Elev (ft)	4304.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.17	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4302.89	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	4299.06	Flow Area (sq ft)	610.16	4572.78	1449.93
E.G. Slope (ft/ft)	0.002872	Area (sq ft)	610.16	4572.78	1449.93
Q Total (cfs)	54150.00	Flow (cfs)	3197.09	42668.84	8284.07
Top Width (ft)	661.56	Top Width (ft)	92.78	382.00	186.78
Vel Total (ft/s)	8.16	Avg. Vel. (ft/s)	5.24	9.33	5.71
Max Chl Dpth (ft)	14.08	Hydr. Depth (ft)	6.58	11.97	7.76
Conv. Total (cfs)	1010494.0	Conv. (cfs)	59661.0	796243.5	154589.0
Length Wtd. (ft)	100.00	Wetted Per. (ft)	102.24	450.59	213.51
Min Ch El (ft)	4288.81	Shear (lb/sq ft)	1.07	1.82	1.22
Alpha	1.13	Stream Power (lb/ft s)	5.61	16.98	6.96
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)	611.20	450.40	646.00
C & E Loss (ft)	0.01	Cum SA (acres)	112.61	44.38	131.39

Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid,
	energy was used.

Plan: 1.5X100Y-S#1 Carson Near Dayton RS: 55 Profile: 1.5 Times

E.G. US. (ft)	4304.17	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	4303.31	E.G. Elev (ft)	4304.06	4303.76
Q Total (cfs)	54150.00	W.S. Elev (ft)	4302.89	4302.61
Q Bridge (cfs)	54150.00	Crit W.S. (ft)	4299.06	4298.86
Q Weir (cfs)		Max Chl Dpth (ft)	14.08	14.31
Weir Sta Lft (ft)		Vel Total (ft/s)	8.16	8.25
Weir Sta Rgt (ft)		Flow Area (sq ft)	6632.87	6560.80
Weir Submerg		Froude # Chl	0.48	0.48
Weir Max Depth (ft)		Specif Force (cu ft)	50530.98	49358.69
Min El Weir Flow (ft)	4311.00	Hydr Depth (ft)	10.03	9.93
Min El Prs (ft)	4305.00	W.P. Total (ft)	766.34	763.80
Delta EG (ft)	0.56	Conv. Total (cfs)	1010494.0	998319.0
Delta WS (ft)	0.59	Top Width (ft)	661.56	660.83
BR Open Area (sq ft)	8036.93	Frctn Loss (ft)	0.29	0.02
BR Open Vel (ft/s)	8.25	C & E Loss (ft)	0.01	0.13
Coef of Q		Shear Total (lb/sq ft)	1.55	1.58
Br Sel Method	Energy only	Power Total (lb/ft s)	12.67	13.02

Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Plan: 1.5X100Y-S#1 Carson Near Dayton RS: 55 BR D Profile: 1.5 Times

E.G. Elev (ft)	4303.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.15	Wt. n-Val.	0.045	0.040	0.050
W.S. Elev (ft)	4302.61	Reach Len. (ft)	9.74	9.74	9.74
Crit W.S. (ft)	4298.86	Flow Area (sq ft)	1246.60	4421.04	893.17
E.G. Slope (ft/ft)	0.002942	Area (sq ft)	1246.60	4421.04	893.17
Q Total (cfs)	54150.00	Flow (cfs)	8044.77	40981.81	5123.43
Top Width (ft)	660.83	Top Width (ft)	164.61	382.00	114.22
Vel Total (ft/s)	8.25	Avg. Vel. (ft/s)	6.45	9.27	5.74
Max Chl Dpth (ft)	14.31	Hydr. Depth (ft)	7.57	11.57	7.82
Conv. Total (cfs)	998319.0	Conv. (cfs)	148314.7	755547.9	94456.4
Length Wtd. (ft)	9.74	Wetted Per. (ft)	182.27	448.04	133.49
Min Ch El (ft)	4288.30	Shear (lb/sq ft)	1.26	1.81	1.23
Alpha	1.09	Stream Power (lb/ft s)	8.11	16.80	7.05
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	609.07	440.08	643.31
C & E Loss (ft)	0.13	Cum SA (acres)	112.31	43.50	131.05

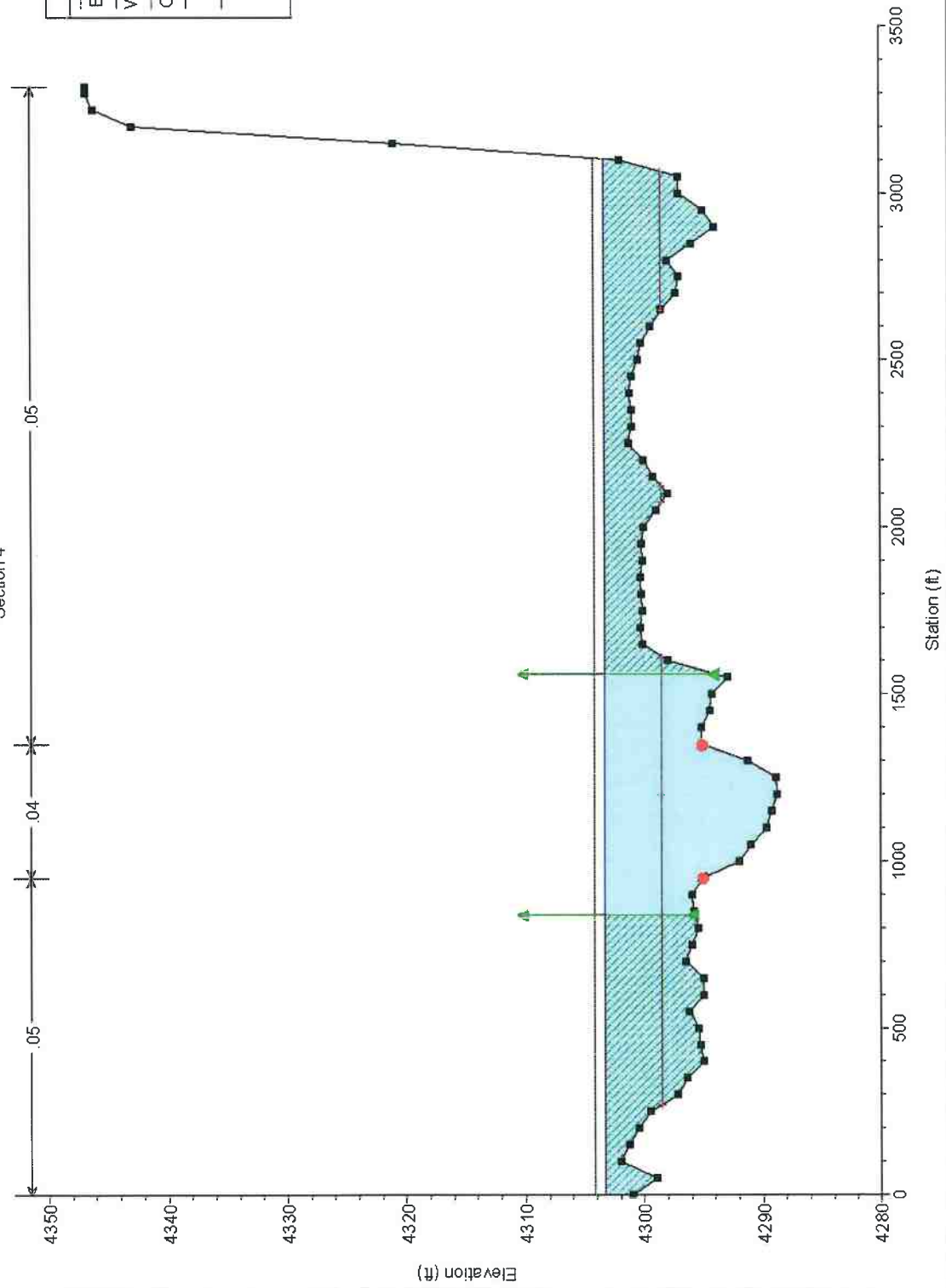
Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
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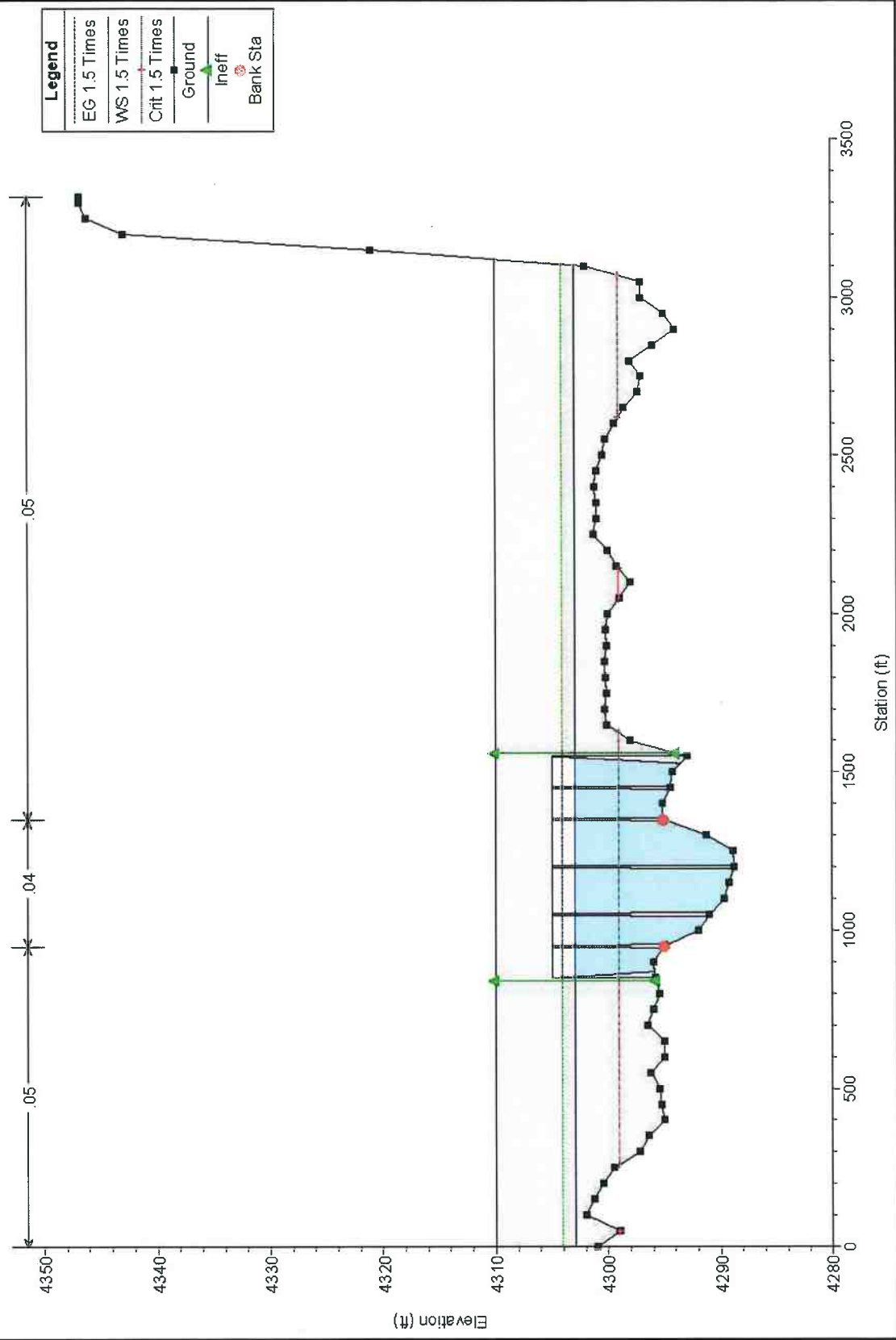
Carson River Rolling A Bridge Plan: 1.5times100yS#1 7/8/2008 10:51:20 AM

Geom: Base with Bridge Scenario #1 Flow: 1.5 times 100-Y Flood

Section 4

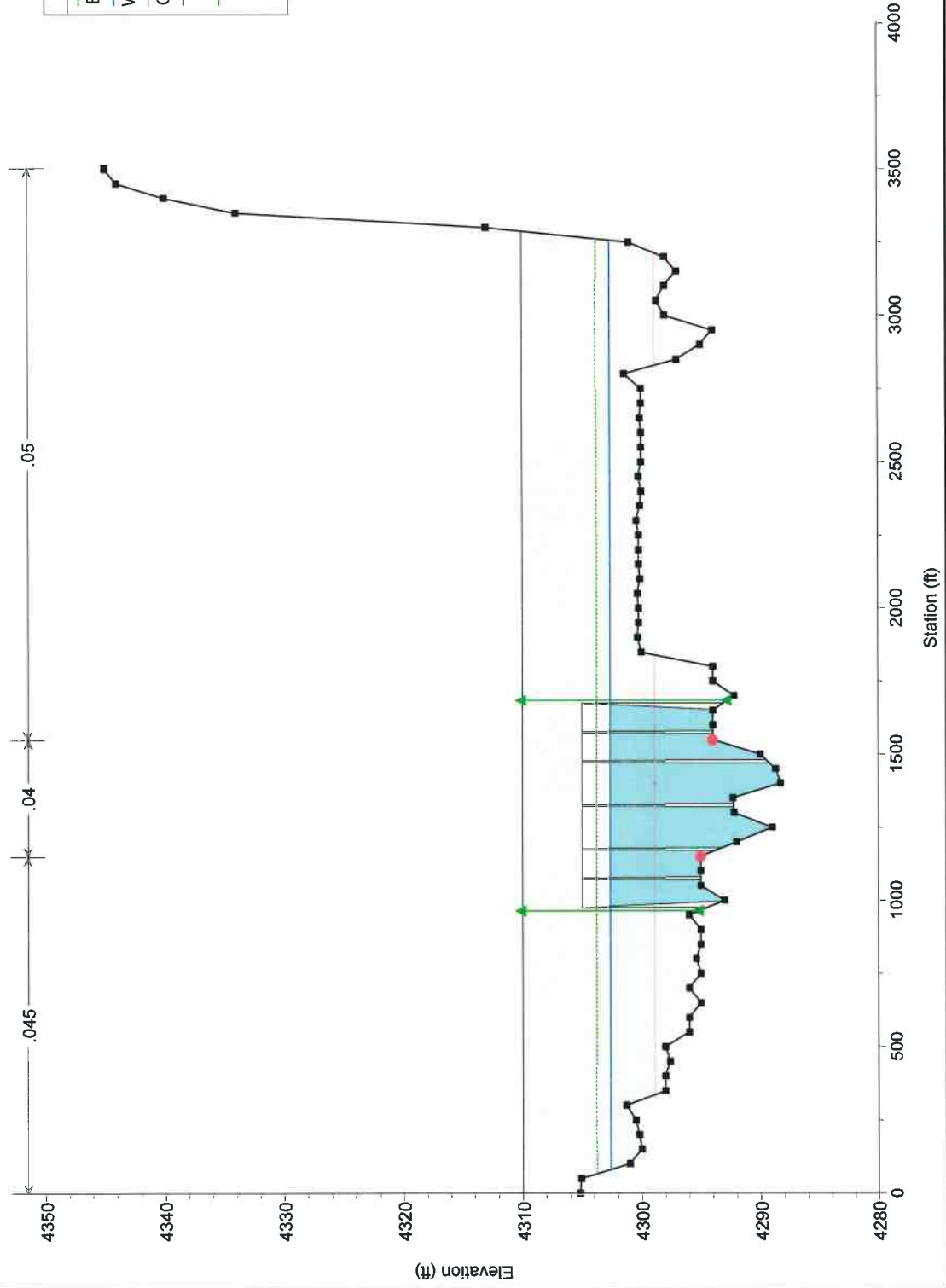


Carson River Rolling A Bridge Plan: 1.5times100yS#1 7/8/2008 10:51:20 AM
 Geom: Base with Bridge Scenario #1 Flow: 1.5 times 100-Y Flood



Carson River Rolling A Bridge Plan: 1.5times100yS#1 7/8/2008 10:51:20 AM

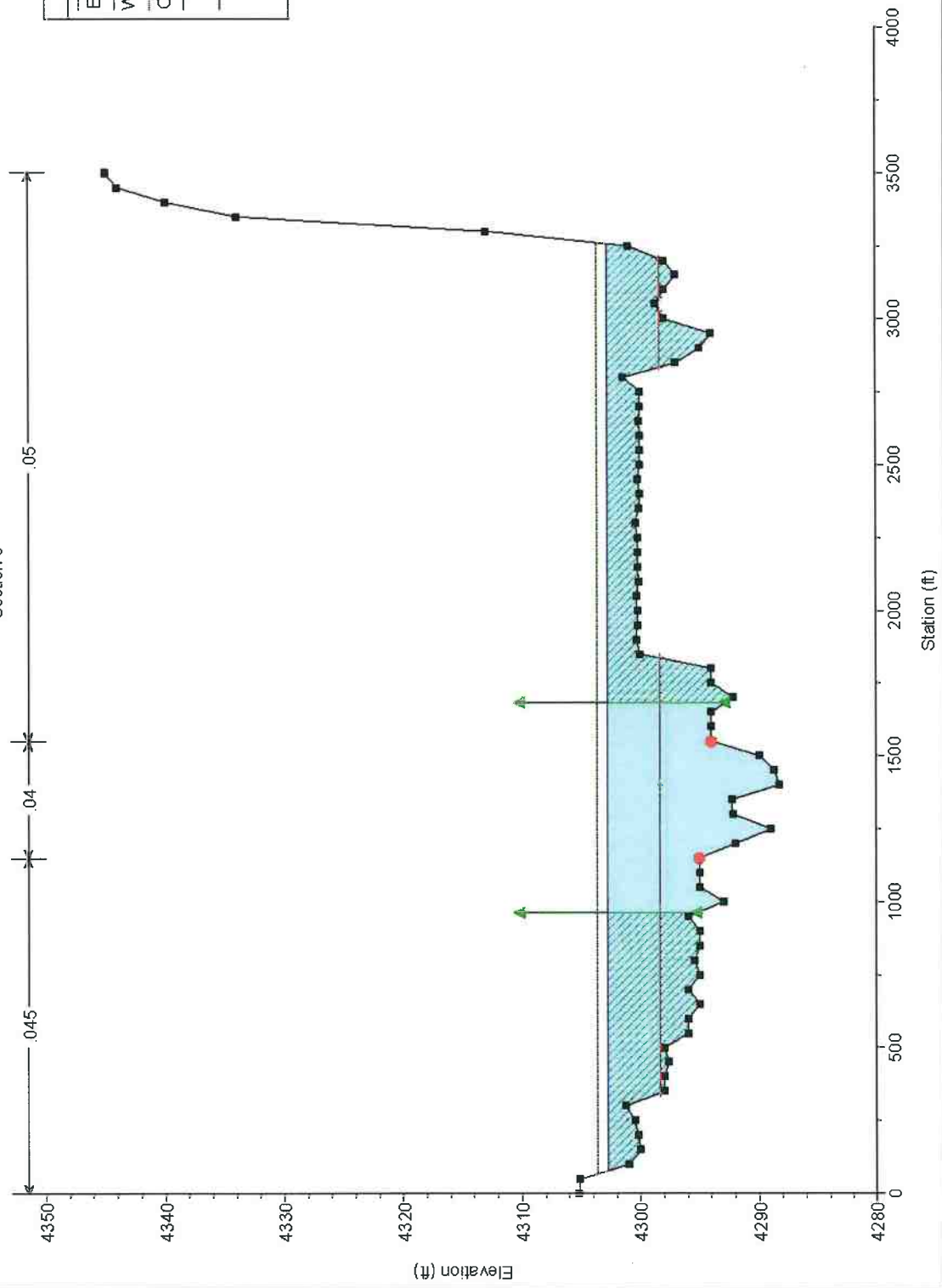
Geom: Base with Bridge Scenario #1 Flow: 1.5 times 100-Y Flood



Carson River Rolling A Bridge	Plan: 1.5times100yS#1	7/8/2008 10:51:20 AM
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Geom: Base with Bridge Scenario #1 Flow: 1.5 times 100-Y Flood

Section 5



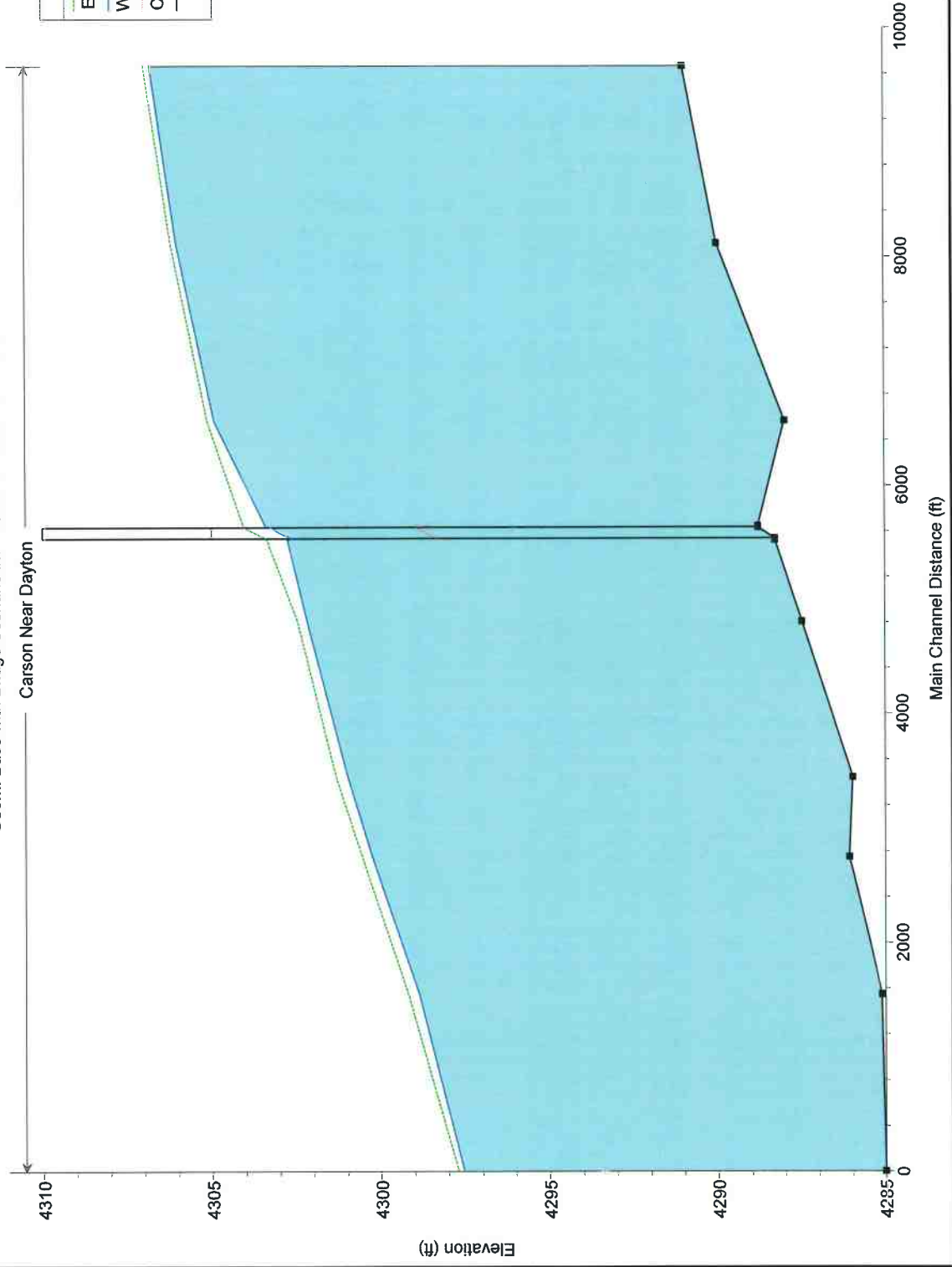
HEC-RAS Plan: 1.5X100Y-S#1 River: Carson Reach: Near Dayton Profile: 1.5 Times

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Near Dayton	90	1.5 Times	54150.00	4291.00	4306.89		4307.06	0.000509	4.89	18667.85	2768.88	0.23
Near Dayton	80	1.5 Times	54150.00	4290.00	4306.16		4306.32	0.000878	5.21	19126.15	2755.21	0.28
Near Dayton	70	1.5 Times	54150.00	4288.00	4305.14		4305.33	0.000748	4.91	19394.76	2290.09	0.24
Near Dayton	60	1.5 Times	54150.00	4288.80	4303.31	4298.52	4304.17	0.001636	8.11	7713.91	3103.44	0.40
Near Dayton	55	Bridge										
Near Dayton	50	1.5 Times	54150.00	4288.30	4302.72	4298.36	4303.61	0.001824	8.23	7445.33	3178.07	0.42
Near Dayton	40	1.5 Times	54150.00	4287.50	4302.17		4302.44	0.000927	5.54	15126.94	2394.61	0.30
Near Dayton	30	1.5 Times	54150.00	4286.00	4300.97		4301.31	0.001334	6.71	13989.12	2546.63	0.36
Near Dayton	20	1.5 Times	54150.00	4286.10	4300.25		4300.54	0.001123	6.41	14918.62	2477.80	0.33
Near Dayton	10	1.5 Times	54150.00	4285.10	4298.87		4299.19	0.001356	5.77	13392.04	2372.03	0.34
Near Dayton	0	1.5 Times	54150.00	4285.00	4297.54	4293.39	4297.71	0.000646	4.19	17797.90	3056.32	0.24

Carson River Rolling A Bridge Plan: 1.5times100yS#2 7/8/2008 10:52:14 AM

Geom: Base with Bridge Scenario #2 Flow: 1.5 times 100-Y Flood

Carson Near Dayton



Plan: 1.5x100Y-S#2 Carson Near Dayton RS: 55 BR U Profile: 1.5 Times

E.G. Elev (ft)	4304.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.80	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4303.21	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	4298.93	Flow Area (sq ft)	1344.26	4696.07	2135.16
E.G. Slope (ft/ft)	0.002067	Area (sq ft)	1344.26	4696.07	2135.16
Q Total (cfs)	54150.00	Flow (cfs)	6219.30	37735.34	10195.35
Top Width (ft)	850.86	Top Width (ft)	187.43	382.00	281.43
Vel Total (ft/s)	6.62	Avg. Vel. (ft/s)	4.63	8.04	4.77
Max Chl Dpth (ft)	14.40	Hydr. Depth (ft)	7.17	12.29	7.59
Conv. Total (cfs)	1191000.0	Conv. (cfs)	136790.3	829968.6	224241.3
Length Wtd. (ft)	100.00	Wetted Per. (ft)	212.16	452.53	327.83
Min Ch EI (ft)	4288.81	Shear (lb/sq ft)	0.82	1.34	0.84
Alpha	1.18	Stream Power (lb/ft s)	3.78	10.76	4.01
Frctn Loss (ft)		Cum Volume (acre-ft)	613.15	450.65	648.38
C & E Loss (ft)		Cum SA (acres)	112.84	44.38	131.62

Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid,
	energy was used.

Plan: 1.5x100Y-S#2 Carson Near Dayton RS: 55 Profile: 1.5 Times

E.G. US. (ft)	4304.06	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	4303.40	E.G. Elev (ft)	4304.02	4303.38
Q Total (cfs)	54150.00	W.S. Elev (ft)	4303.21	4302.62
Q Bridge (cfs)	54150.00	Crit W.S. (ft)	4298.93	4298.39
Q Weir (cfs)		Max Chl Dpth (ft)	14.40	14.32
Weir Sta Lft (ft)		Vel Total (ft/s)	6.62	6.66
Weir Sta Rgt (ft)		Flow Area (sq ft)	8175.49	8130.93
Weir Submerg		Froude # Chl	0.40	0.41
Weir Max Depth (ft)		Specif Force (cu ft)	55133.57	53421.27
Min EI Weir Flow (ft)	4311.00	Hydr Depth (ft)	9.61	9.58
Min EI Prs (ft)	4305.00	W.P. Total (ft)	992.51	986.84
Delta EG (ft)	0.70	Conv. Total (cfs)	1191000.0	1179053.0
Delta WS (ft)	0.65	Top Width (ft)	850.86	848.86
BR Open Area (sq ft)	9701.61	Frctn Loss (ft)		
BR Open Vel (ft/s)	6.66	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	1.06	1.08
Br Sel Method	Momentum	Power Total (lb/ft s)	7.04	7.23

Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Plan: 1.5x100Y-S#2 Carson Near Dayton RS: 55 BR D Profile: 1.5 Times

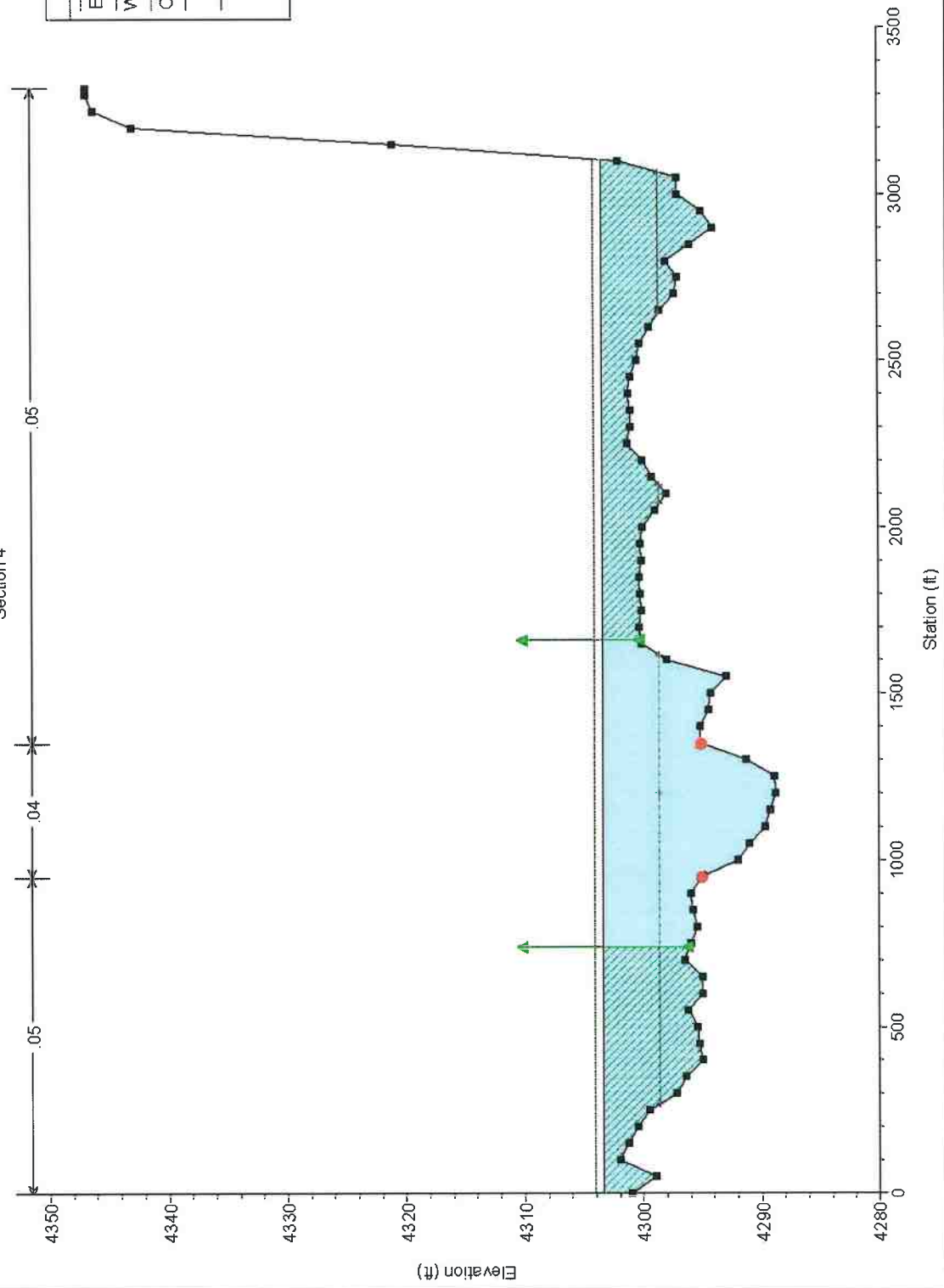
E.G. Elev (ft)	4303.38	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.77	Wt. n-Val.	0.045	0.040	0.050
W.S. Elev (ft)	4302.62	Reach Len. (ft)	9.74	9.74	9.74
Crit W.S. (ft)	4298.39	Flow Area (sq ft)	1937.61	4424.39	1768.93
E.G. Slope (ft/ft)	0.002109	Area (sq ft)	1937.61	4424.39	1768.93
Q Total (cfs)	54150.00	Flow (cfs)	10403.61	34741.01	9005.38
Top Width (ft)	848.86	Top Width (ft)	258.63	382.00	208.23
Vel Total (ft/s)	6.66	Avg. Vel. (ft/s)	5.37	7.85	5.09
Max Chl Dpth (ft)	14.32	Hydr. Depth (ft)	7.49	11.58	8.49
Conv. Total (cfs)	1179053.0	Conv. (cfs)	226526.5	756445.1	196081.7
Length Wtd. (ft)	9.74	Wetted Per. (ft)	292.16	448.10	246.59
Min Ch El (ft)	4288.30	Shear (lb/sq ft)	0.87	1.30	0.94
Alpha	1.11	Stream Power (lb/ft s)	4.69	10.21	4.81
Frctn Loss (ft)		Cum Volume (acre-ft)	609.38	440.18	643.90
C & E Loss (ft)		Cum SA (acres)	112.33	43.50	131.06

Errors Warnings and Notes

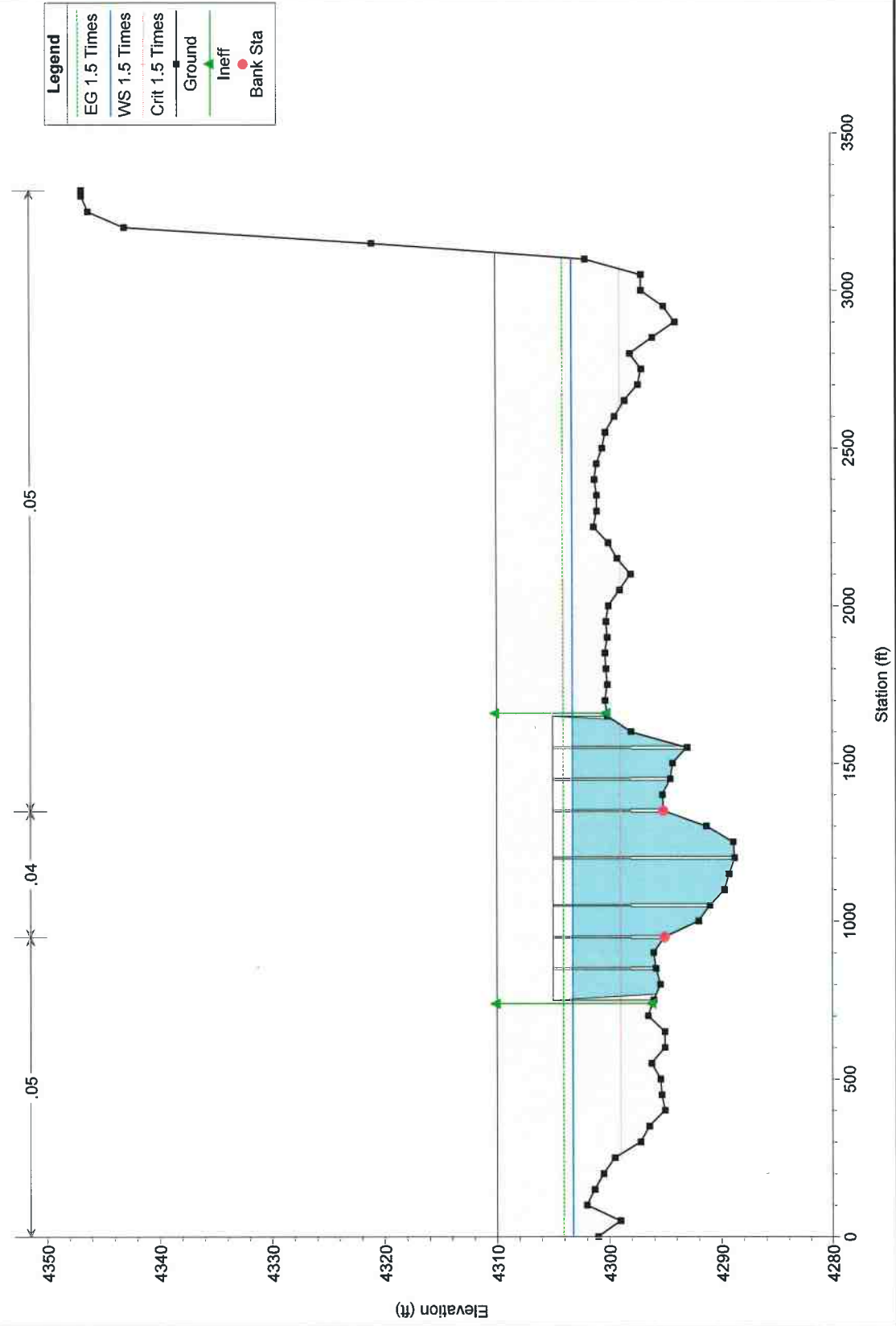
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid,
	energy was used.

Geom: Base with Bridge Scenario #2 Flow: 1.5 times 100-Y Flood

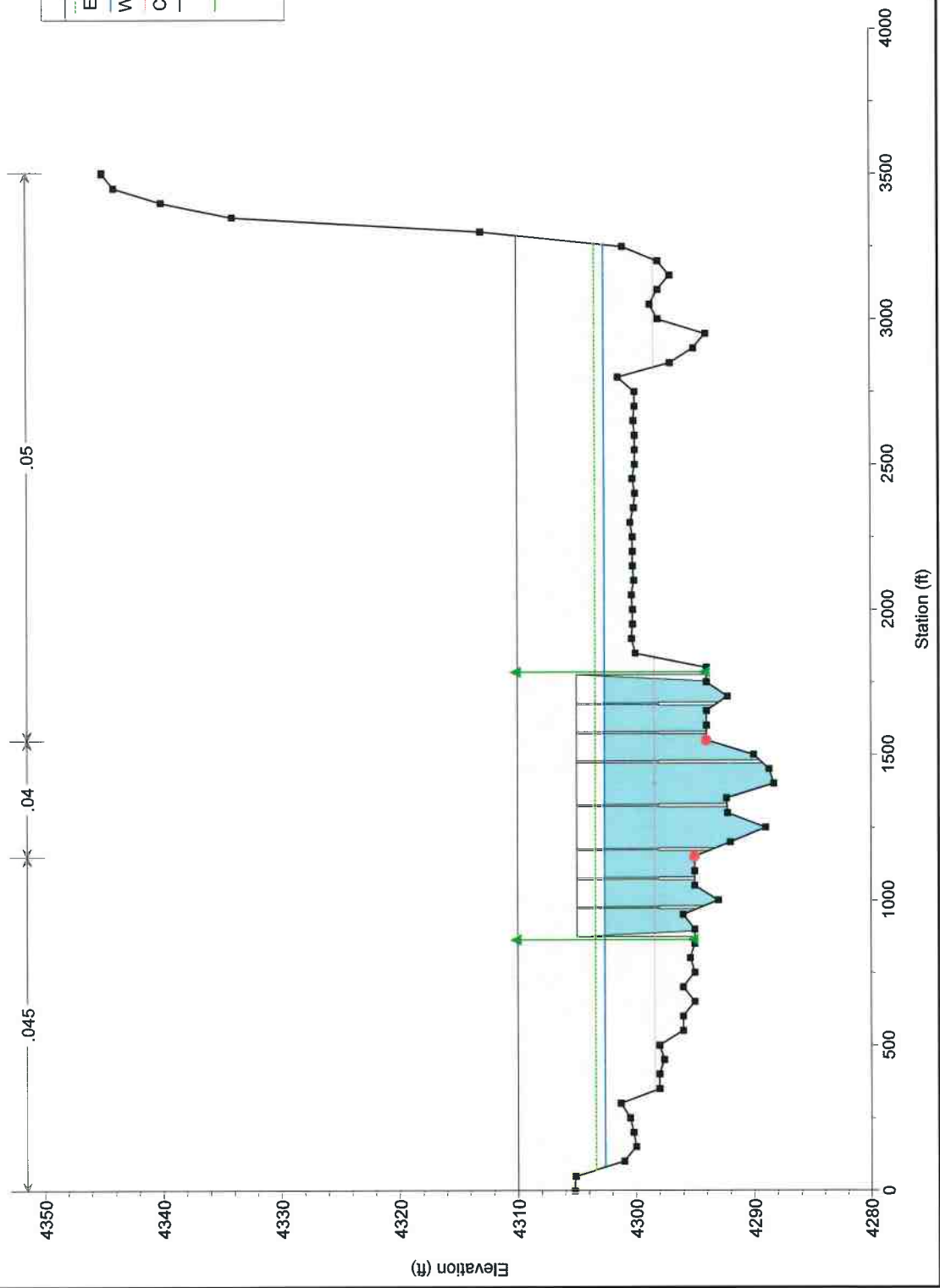
Section 4



Carson River Rolling A Bridge Plan: 1.5times100yS#2 7/8/2008 10:52:14 AM
 Geom: Base with Bridge Scenario #2 Flow: 1.5 times 100-Y Flood



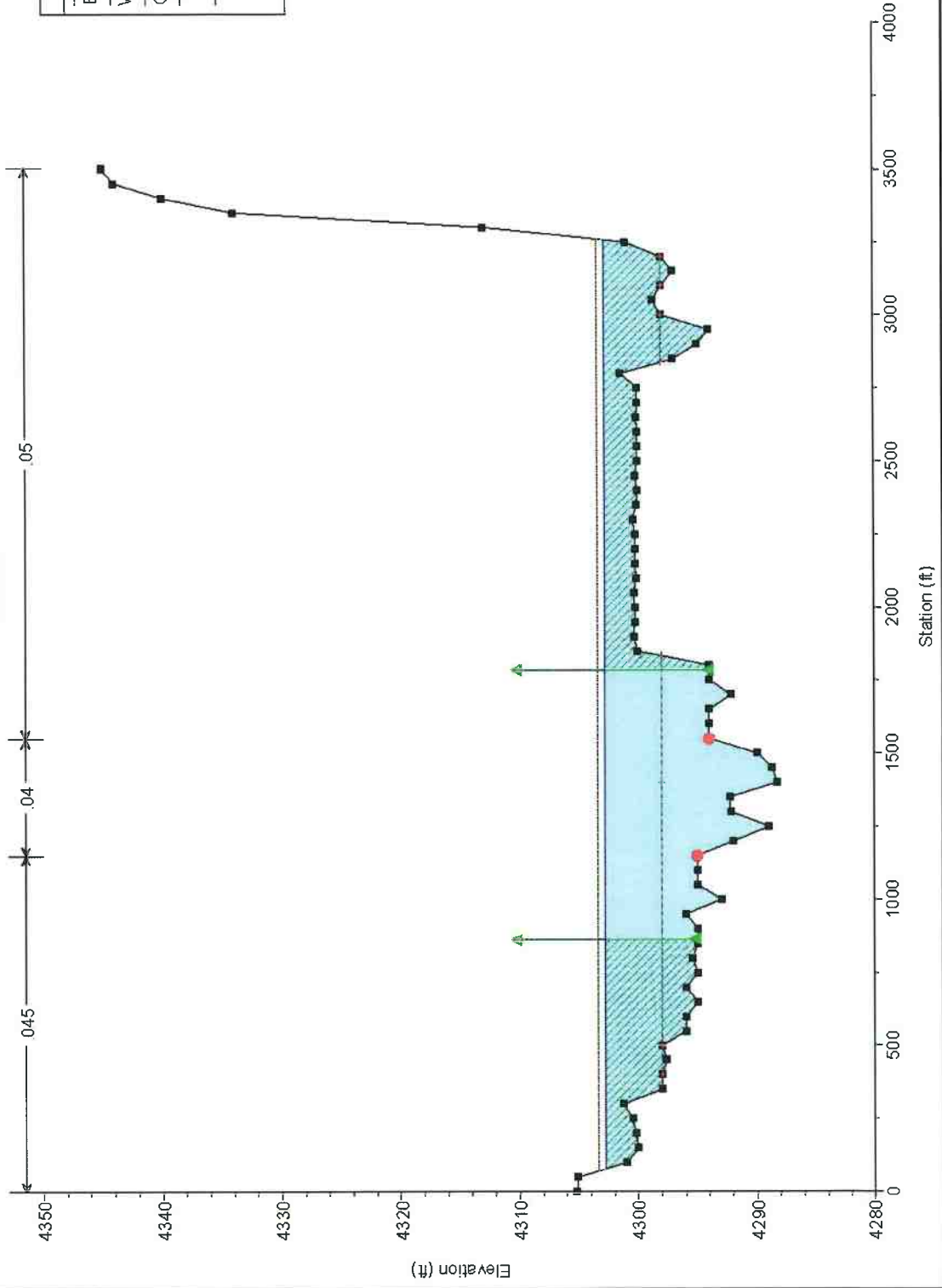
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Geom: Base with Bridge Scenario #2 Flow: 1.5 times 100-Y Flood



Carson River Rolling A Bridge Plan: 1.5Times100yS#2 7/8/2008 10:52:14 AM

Geom: Base with Bridge Scenario #2 Flow: 1.5 times 100-Y Flood

Section 5

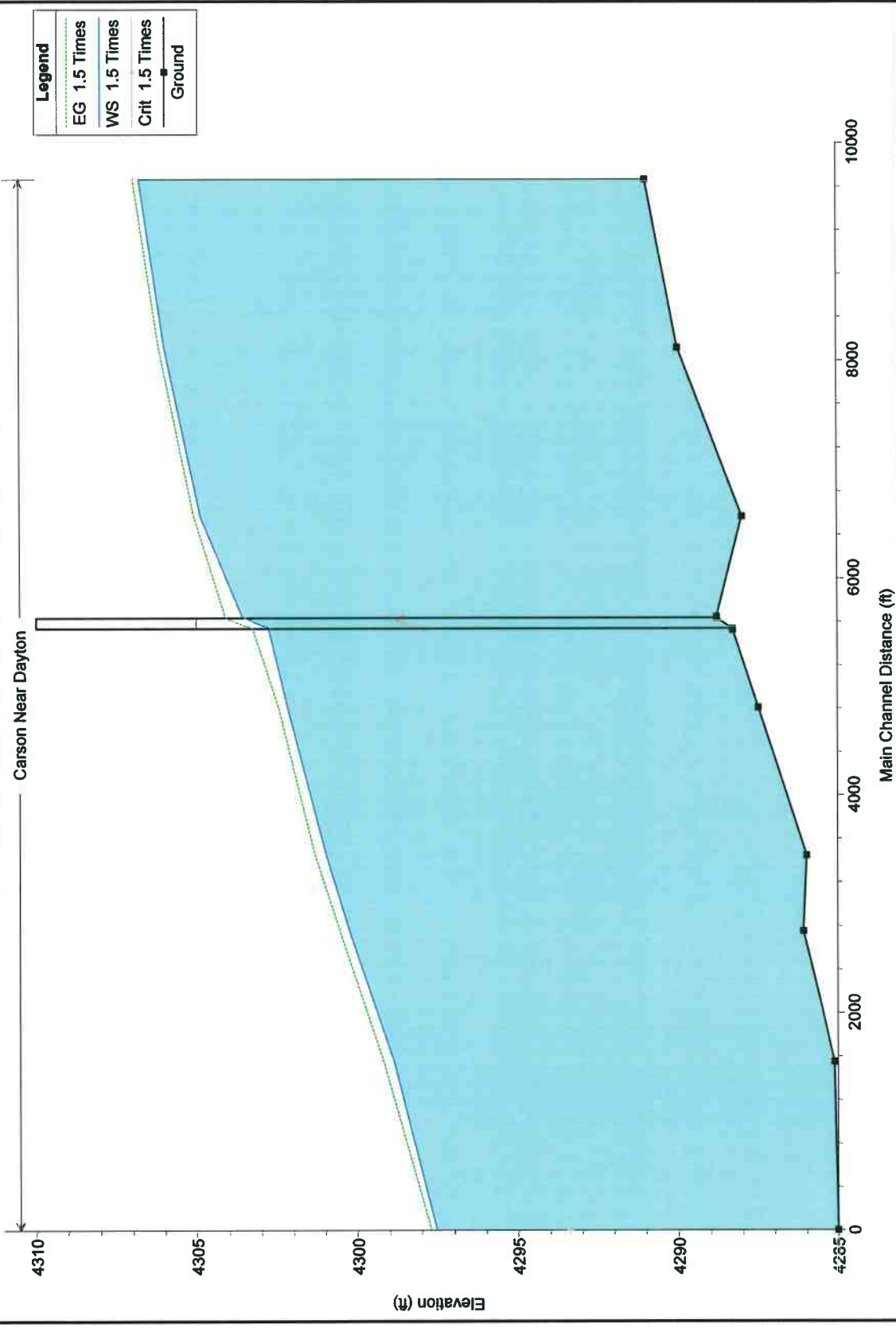


HEC-RAS Plan: 1.5x100Y-S#2 River: Carson Reach: Near Dayton Profile: 1.5 Times

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Near Dayton	90	1.5 Times	54150.00	4291.00	4306.79		4306.97	0.000533	4.98	18383.98	2767.86	0.23
Near Dayton	80	1.5 Times	54150.00	4290.00	4306.02		4306.18	0.000939	5.34	18725.59	2750.53	0.29
Near Dayton	70	1.5 Times	54150.00	4288.00	4304.91		4305.11	0.000815	5.06	18868.34	2287.27	0.25
Near Dayton	60	1.5 Times	54150.00	4288.80	4303.40	4298.59	4304.06	0.001322	7.32	9096.05	3103.68	0.36
Near Dayton	55	Bridge										
Near Dayton	50	1.5 Times	54150.00	4288.30	4302.75	4298.00	4303.35	0.001318	7.01	9152.30	3178.59	0.36
Near Dayton	40	1.5 Times	54150.00	4287.50	4302.17		4302.44	0.000927	5.54	15126.94	2394.61	0.30
Near Dayton	30	1.5 Times	54150.00	4286.00	4300.97		4301.31	0.001334	6.71	13989.12	2546.63	0.36
Near Dayton	20	1.5 Times	54150.00	4286.10	4300.25		4300.54	0.001123	6.41	14918.62	2477.80	0.33
Near Dayton	10	1.5 Times	54150.00	4285.10	4298.87		4299.19	0.001356	5.77	13392.04	2372.03	0.34
Near Dayton	0	1.5 Times	54150.00	4285.00	4297.54	4293.39	4297.71	0.000646	4.19	17797.90	3056.32	0.24

Carson River Rolling A Bridge Plan: 1.5times100yS#3 7/8/2008 10:45:53 AM

Geom: Base with Bridge Scenario #3 Flow: 1.5 times 100-Y Flood



Plan: 1.5x100Y-S#3 Carson Near Dayton RS: 55 BR U Profile: 1.5 Times

E.G. Elev (ft)	4304.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.63	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4303.45	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	4298.92	Flow Area (sq ft)	2069.29	4785.97	2508.51
E.G. Slope (ft/ft)	0.001679	Area (sq ft)	2069.29	4785.97	2508.51
Q Total (cfs)	54150.00	Flow (cfs)	8709.06	35022.89	10418.06
Top Width (ft)	1039.80	Top Width (ft)	281.90	382.00	375.90
Vel Total (ft/s)	5.78	Avg. Vel. (ft/s)	4.21	7.32	4.15
Max Chl Dpth (ft)	14.64	Hydr. Depth (ft)	7.34	12.53	6.67
Conv. Total (cfs)	1321699.0	Conv. (cfs)	212571.6	854842.2	254285.0
Length Wtd. (ft)	100.00	Wetted Per. (ft)	322.37	453.94	430.24
Min Ch EI (ft)	4288.81	Shear (lb/sq ft)	0.67	1.10	0.61
Alpha	1.22	Stream Power (lb/ft s)	2.83	8.08	2.54
Frctn Loss (ft)		Cum Volume (acre-ft)	614.90	450.79	649.61
C & E Loss (ft)		Cum SA (acres)	113.07	44.38	131.85

Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid,
	energy was used.

Plan: 1.5x100Y-S#3 Carson Near Dayton RS: 55 Profile: 1.5 Times

E.G. US. (ft)	4304.11	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	4303.58	E.G. Elev (ft)	4304.08	4303.26
Q Total (cfs)	54150.00	W.S. Elev (ft)	4303.45	4302.68
Q Bridge (cfs)	54150.00	Crit W.S. (ft)	4298.92	4298.24
Q Weir (cfs)		Max Chl Dpth (ft)	14.64	14.38
Weir Sta Lft (ft)		Vel Total (ft/s)	5.78	5.71
Weir Sta Rgt (ft)		Flow Area (sq ft)	9363.77	9475.81
Weir Submerg		Froude # Chl	0.36	0.36
Weir Max Depth (ft)		Specif Force (cu ft)	58677.70	57108.02
Min El Weir Flow (ft)	4311.00	Hydr Depth (ft)	9.01	9.14
Min El Prs (ft)	4305.00	W.P. Total (ft)	1206.54	1207.53
Delta EG (ft)	0.88	Conv. Total (cfs)	1321699.0	1325287.0
Delta WS (ft)	0.83	Top Width (ft)	1039.80	1037.10
BR Open Area (sq ft)	10981.08	Frctn Loss (ft)		
BR Open Vel (ft/s)	5.78	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	0.81	0.82
Br Sel Method	Momentum	Power Total (lb/ft s)	4.70	4.67

Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Plan: 1.5x100Y-S#3 Carson Near Dayton RS: 55 BR D Profile: 1.5 Times

E.G. Elev (ft)	4303.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.58	Wt. n-Val.	0.045	0.040	0.050
W.S. Elev (ft)	4302.68	Reach Len. (ft)	9.74	9.74	9.74
Crit W.S. (ft)	4298.24	Flow Area (sq ft)	2650.80	4448.08	2376.92
E.G. Slope (ft/ft)	0.001669	Area (sq ft)	2650.80	4448.08	2376.92
Q Total (cfs)	54150.00	Flow (cfs)	12608.43	31166.69	10374.88
Top Width (ft)	1037.10	Top Width (ft)	352.74	382.00	302.36
Vel Total (ft/s)	5.71	Avg. Vel. (ft/s)	4.76	7.01	4.36
Max Chl Dpth (ft)	14.38	Hydr. Depth (ft)	7.51	11.64	7.86
Conv. Total (cfs)	1325287.0	Conv. (cfs)	308583.4	762785.1	253918.8
Length Wtd. (ft)	9.74	Wetted Per. (ft)	401.81	448.47	357.25
Min Ch EI (ft)	4288.30	Shear (lb/sq ft)	0.69	1.03	0.69
Alpha	1.14	Stream Power (lb/ft s)	3.27	7.24	3.03
Frctn Loss (ft)		Cum Volume (acre-ft)	609.48	440.20	644.00
C & E Loss (ft)		Cum SA (acres)	112.34	43.50	131.07

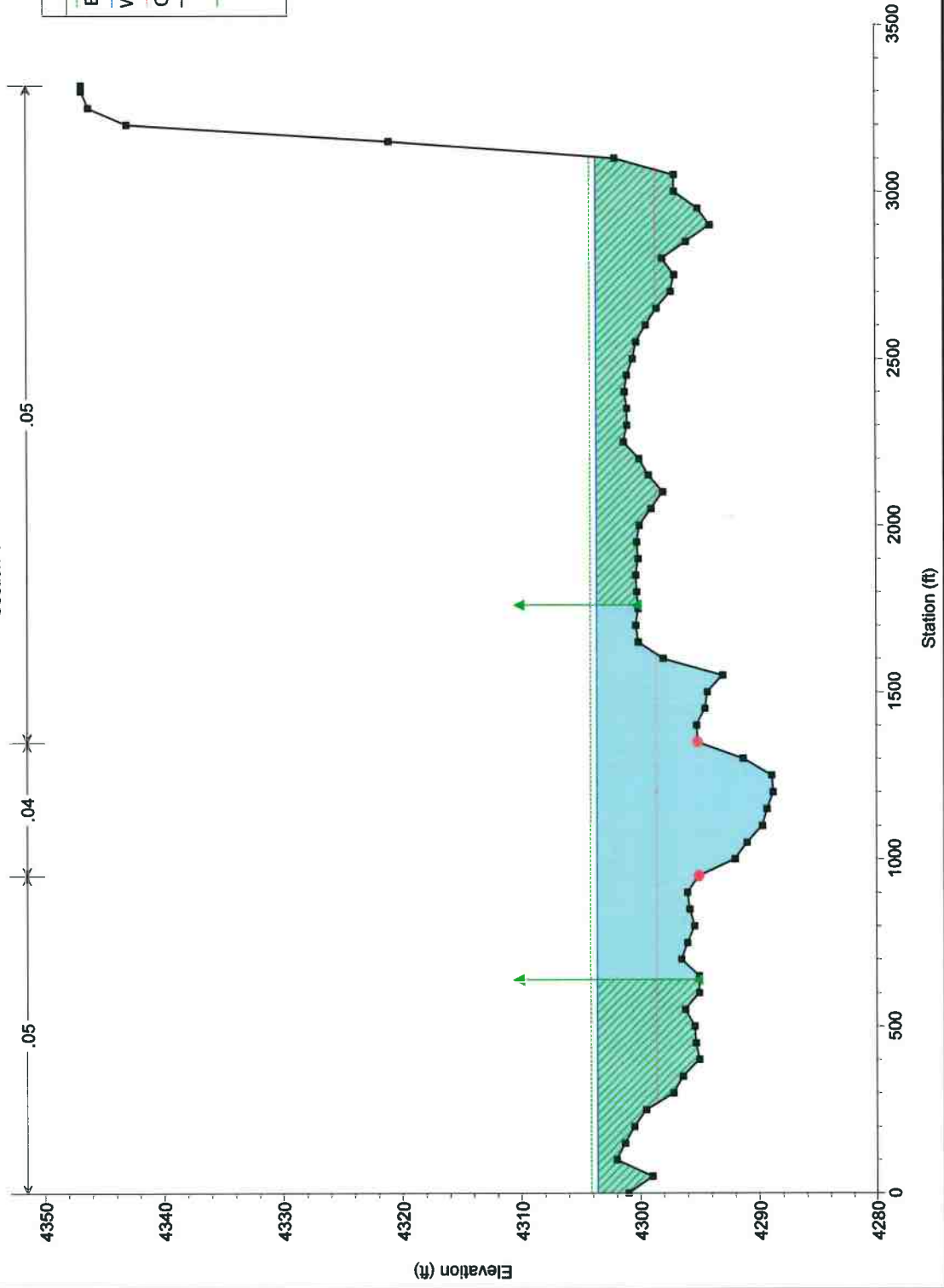
Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid,
	energy was used.

Carson River Rolling A Bridge Plan: 1.5times100yS#3 7/8/2008 10:45:53 AM

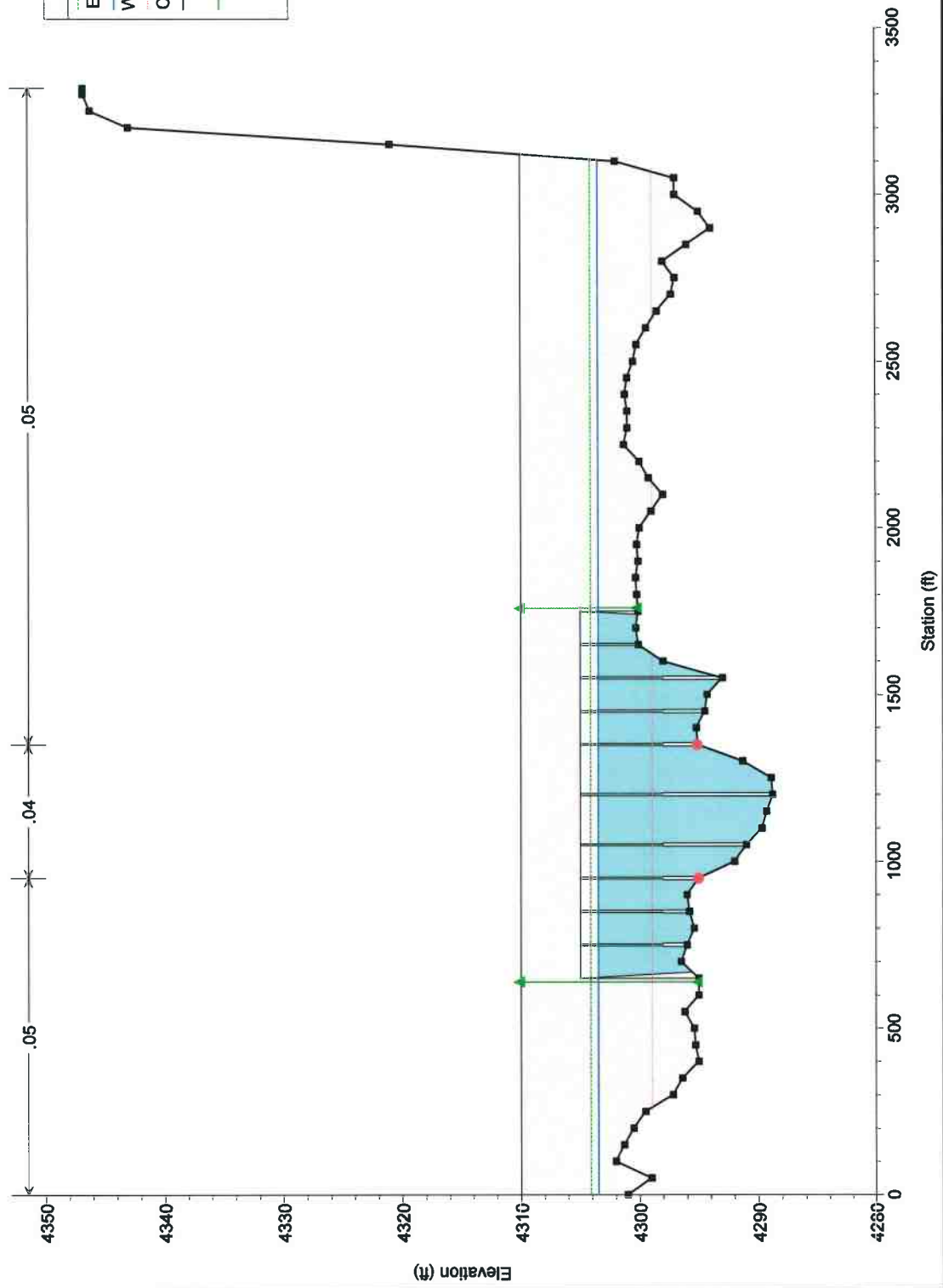
Geom: Base with Bridge Scenario #3 Flow: 1.5 times 100-Y Flood

Section 4

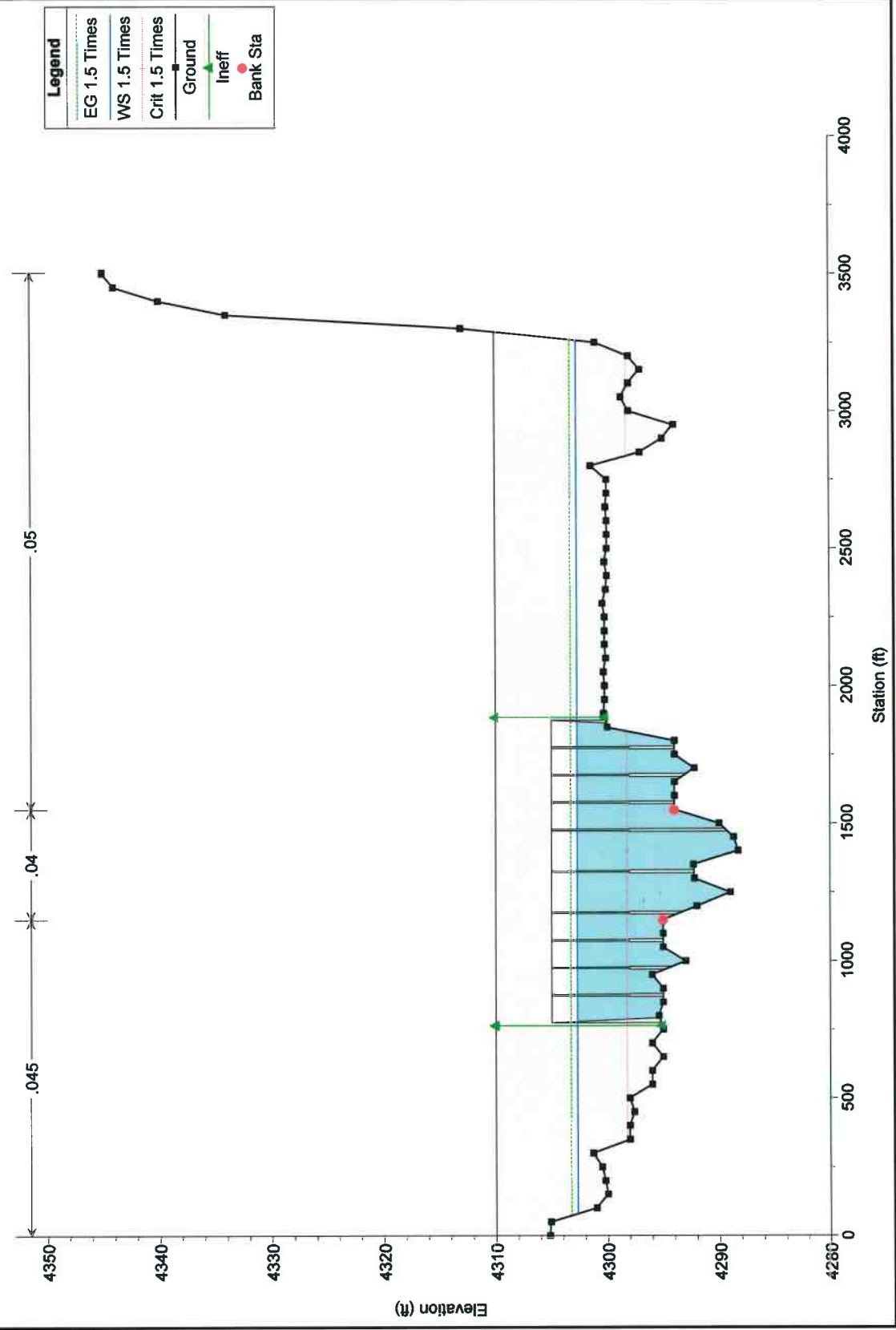


Carson River Rolling A Bridge Plan: 1.5times100yS#3 7/8/2008 10:45:53 AM

Geom: Base with Bridge Scenario #3 Flow: 1.5 times 100-Y Flood



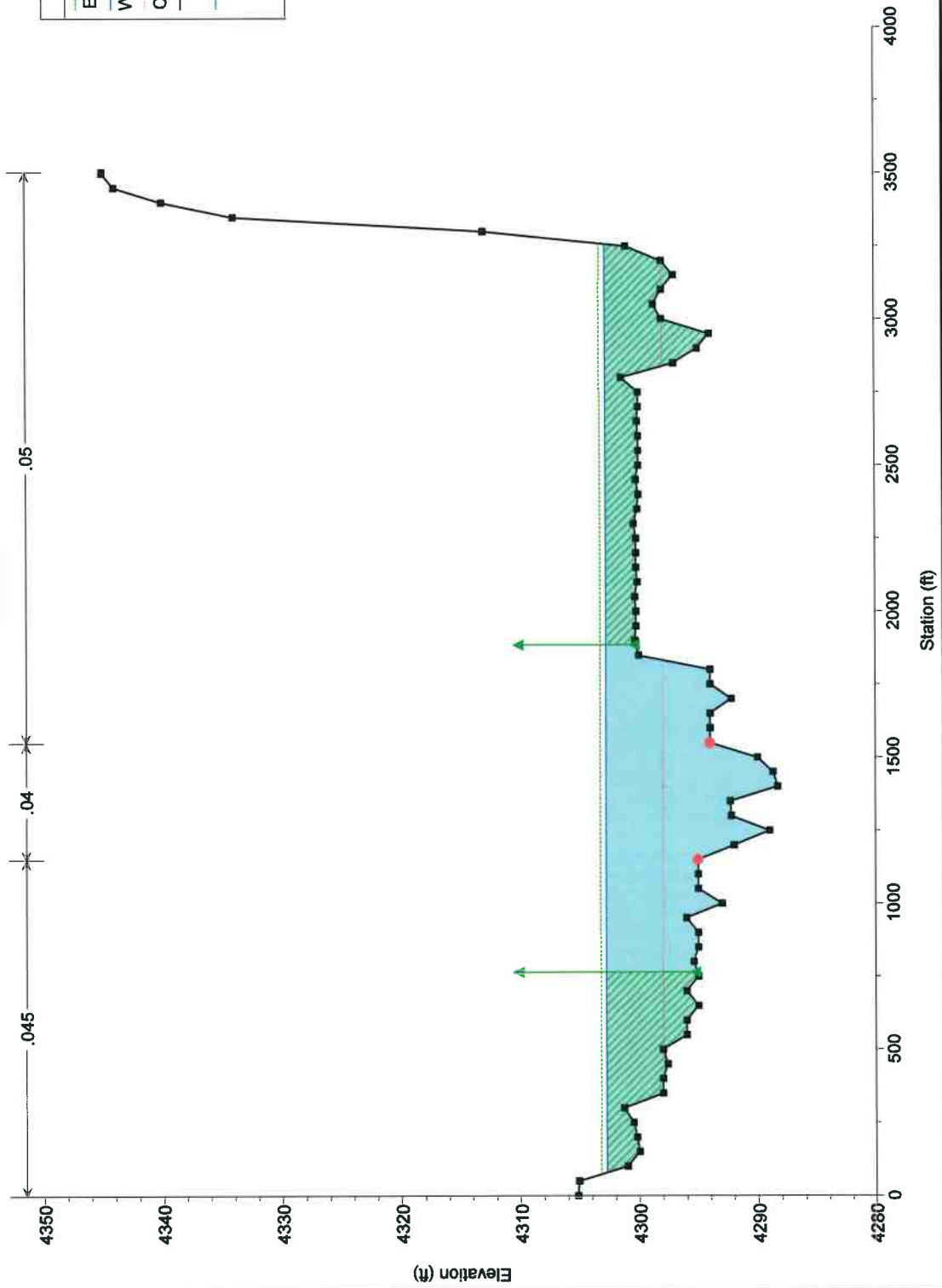
Carson River Rolling A Bridge Plan: 1.5times100yS#3 7/8/2008 10:45:53 AM
 Geom: Base with Bridge Scenario #3 Flow: 1.5 times 100-Y Flood



Carson River Rolling A Bridge Plan: 1.5times100yS#3 7/8/2008 10:45:53 AM

Geom: Base with Bridge Scenario #3 Flow: 1.5 times 100-Y Flood

Section 5

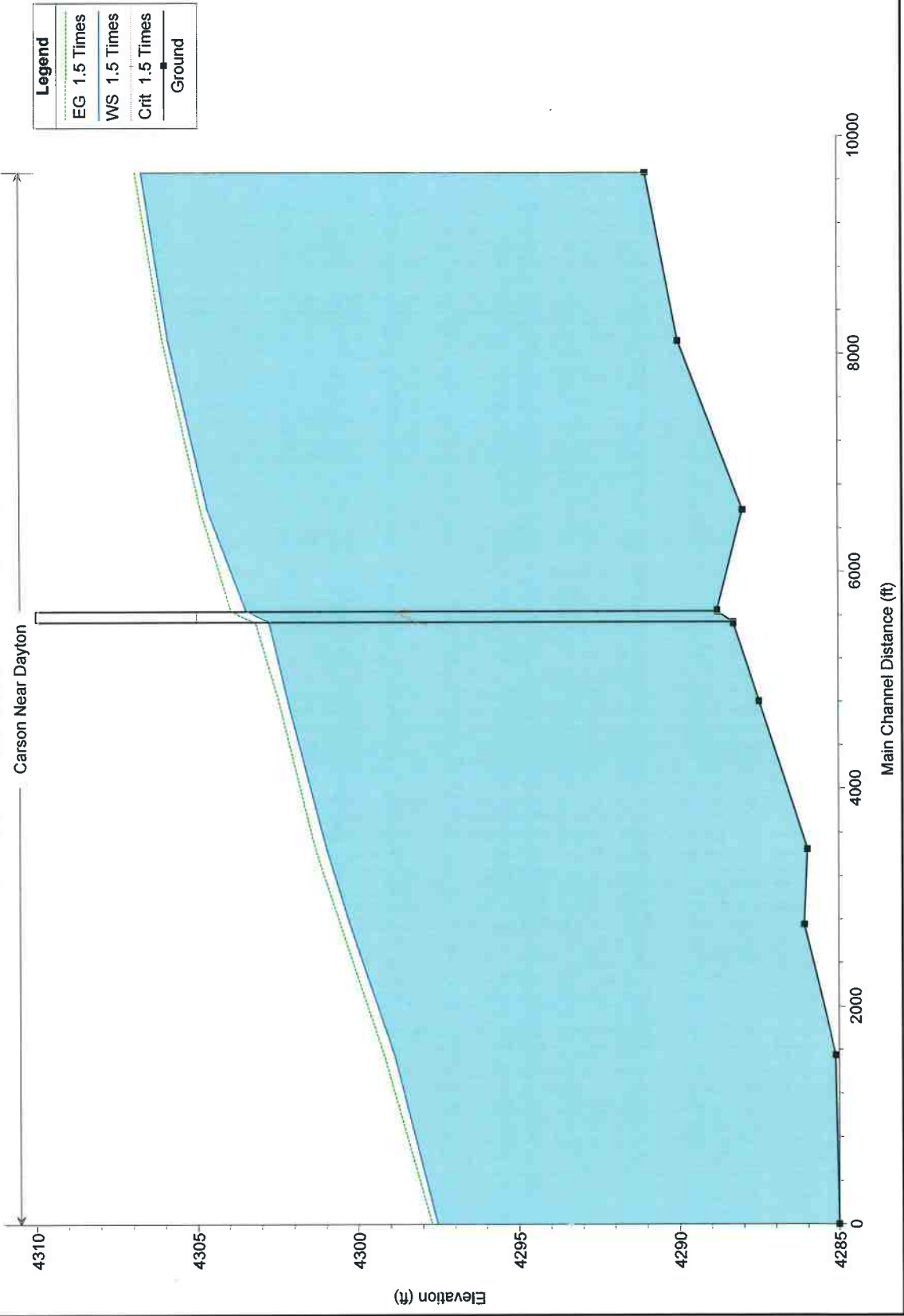


HEC-RAS Plan: 1.5x100Y-S#3 River: Carson Reach: Near Dayton Profile: 1.5 Times

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Near Dayton	90	1.5 Times	54150.00	4291.00	4306.77		4306.95	0.000538	5.00	18331.28	2767.67	0.24
Near Dayton	80	1.5 Times	54150.00	4290.00	4305.99		4306.15	0.000951	5.36	18650.39	2749.83	0.29
Near Dayton	70	1.5 Times	54150.00	4288.00	4304.87		4305.07	0.000828	5.09	18766.73	2286.44	0.25
Near Dayton	60	1.5 Times	54150.00	4288.80	4303.58	4298.57	4304.11	0.001104	6.76	10371.12	3104.16	0.33
Near Dayton	55	Bridge										
Near Dayton	50	1.5 Times	54150.00	4288.30	4302.75	4297.95	4303.23	0.001112	6.44	10421.67	3178.63	0.33
Near Dayton	40	1.5 Times	54150.00	4287.50	4302.17		4302.44	0.000927	5.54	15126.94	2394.61	0.30
Near Dayton	30	1.5 Times	54150.00	4286.00	4300.97		4301.31	0.001334	6.71	13989.12	2546.63	0.36
Near Dayton	20	1.5 Times	54150.00	4286.10	4300.25		4300.54	0.001123	6.41	14918.62	2477.80	0.33
Near Dayton	10	1.5 Times	54150.00	4285.10	4298.87		4299.19	0.001356	5.77	13392.04	2372.03	0.34
Near Dayton	0	1.5 Times	54150.00	4285.00	4297.54	4293.39	4297.71	0.000646	4.19	17797.90	3056.32	0.24

Carson River Rolling A Bridge Plan: 1.5times100yS#4 7/8/2008 10:46:11 AM

Geom: Base with Bridge Scenario #4 Flow: 1.5 times 100-Y Flood



Plan: 1.5x100Y-S#4 Carson Near Dayton RS: 55 BR U Profile: 1.5 Times

E.G. Elev (ft)	4303.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.53	Wt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4303.38	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	4298.81	Flow Area (sq ft)	2809.94	4760.61	2783.81
E.G. Slope (ft/ft)	0.001479	Area (sq ft)	2809.94	4760.61	2783.81
Q Total (cfs)	54150.00	Flow (cfs)	11189.20	32609.87	10350.93
Top Width (ft)	1227.53	Top Width (ft)	375.77	382.00	469.77
Vel Total (ft/s)	5.23	Avg. Vel. (ft/s)	3.98	6.85	3.72
Max Chl Dpth (ft)	14.57	Hydr. Depth (ft)	7.48	12.46	5.93
Conv. Total (cfs)	1407806.0	Conv. (cfs)	290899.9	847800.1	269106.2
Length Wtd. (ft)	100.00	Wetted Per. (ft)	432.47	453.54	530.14
Min Ch EI (ft)	4288.81	Shear (lb/sq ft)	0.60	0.97	0.49
Alpha	1.25	Stream Power (lb/ft s)	2.39	6.64	1.80
Frctn Loss (ft)		Cum Volume (acre-ft)	616.58	450.76	650.17
C & E Loss (ft)		Cum SA (acres)	113.29	44.38	132.07

Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid,
	energy was used.

Plan: 1.5x100Y-S#4 Carson Near Dayton RS: 55 Profile: 1.5 Times

E.G. US. (ft)	4303.94	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	4303.49	E.G. Elev (ft)	4303.91	4303.18
Q Total (cfs)	54150.00	W.S. Elev (ft)	4303.38	4302.70
Q Bridge (cfs)	54150.00	Crit W.S. (ft)	4298.81	4298.20
Q Weir (cfs)		Max Chl Dpth (ft)	14.57	14.40
Weir Sta Lft (ft)		Vel Total (ft/s)	5.23	5.21
Weir Sta Rgt (ft)		Flow Area (sq ft)	10354.36	10400.70
Weir Submerg		Froude # Chl	0.34	0.34
Weir Max Depth (ft)		Specif Force (cu ft)	60697.36	59162.17
Min El Weir Flow (ft)	4311.00	Hydr Depth (ft)	8.44	8.49
Min El Prs (ft)	4305.00	W.P. Total (ft)	1416.15	1415.88
Delta EG (ft)	0.78	Conv. Total (cfs)	1407806.0	1416329.0
Delta WS (ft)	0.74	Top Width (ft)	1227.53	1225.17
BR Open Area (sq ft)	12344.74	Frctn Loss (ft)		
BR Open Vel (ft/s)	5.23	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	0.68	0.67
Br Sel Method	Momentum	Power Total (lb/ft s)	3.53	3.49

Errors Warnings and Notes

Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Plan: 1.5x100Y-S#4 Carson Near Dayton RS: 55 BR D Profile: 1.5 Times

E.G. Elev (ft)	4303.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.49	Wt. n-Val.	0.045	0.040	0.050
W.S. Elev (ft)	4302.70	Reach Len. (ft)	9.74	9.74	9.74
Crit W.S. (ft)	4298.20	Flow Area (sq ft)	3331.34	4454.98	2614.38
E.G. Slope (ft/ft)	0.001462	Area (sq ft)	3331.34	4454.98	2614.38
Q Total (cfs)	54150.00	Flow (cfs)	14713.77	29234.02	10202.21
Top Width (ft)	1225.17	Top Width (ft)	446.78	382.00	396.39
Vel Total (ft/s)	5.21	Avg. Vel. (ft/s)	4.42	6.56	3.90
Max Chl Dpth (ft)	14.40	Hydr. Depth (ft)	7.46	11.66	6.60
Conv. Total (cfs)	1416329.0	Conv. (cfs)	384848.4	764635.3	266845.6
Length Wtd. (ft)	9.74	Wetted Per. (ft)	510.83	448.58	456.47
Min Ch El (ft)	4288.30	Shear (lb/sq ft)	0.60	0.91	0.52
Alpha	1.16	Stream Power (lb/ft s)	2.63	5.95	2.04
Frctn Loss (ft)		Cum Volume (acre-ft)	609.53	440.19	643.98
C & E Loss (ft)		Cum SA (acres)	112.35	43.50	131.08

Errors Warnings and Notes

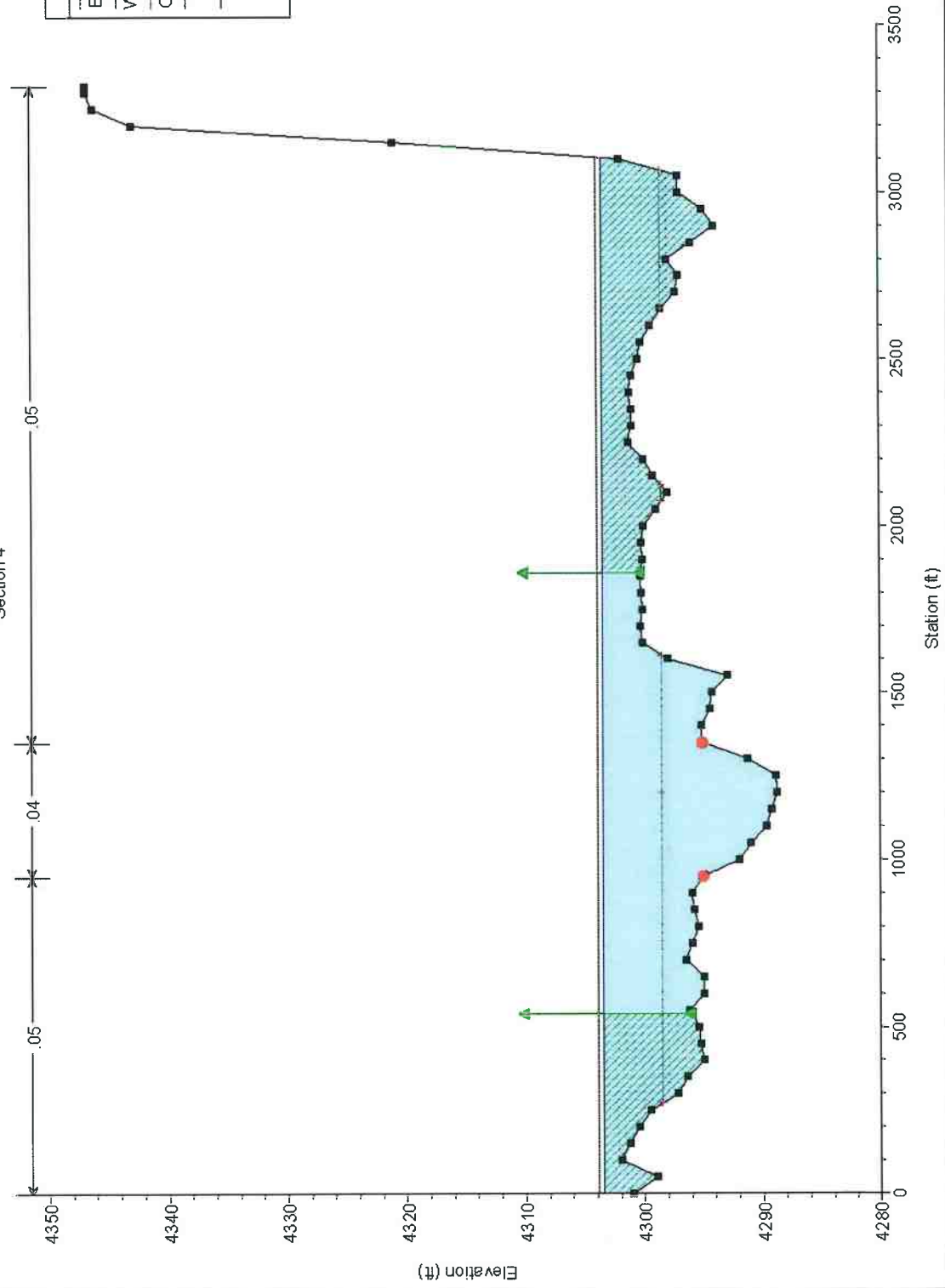
Note:	Multiple critical depths were found at this location. The critical depth with the lowest, valid,
	energy was used.

Carson River Rolling A Bridge

Plan: 1.5times100yS#4

Geom: Base with Bridge Scenario #4 Flow: 1.5 times 100-Y Flood

Section 4

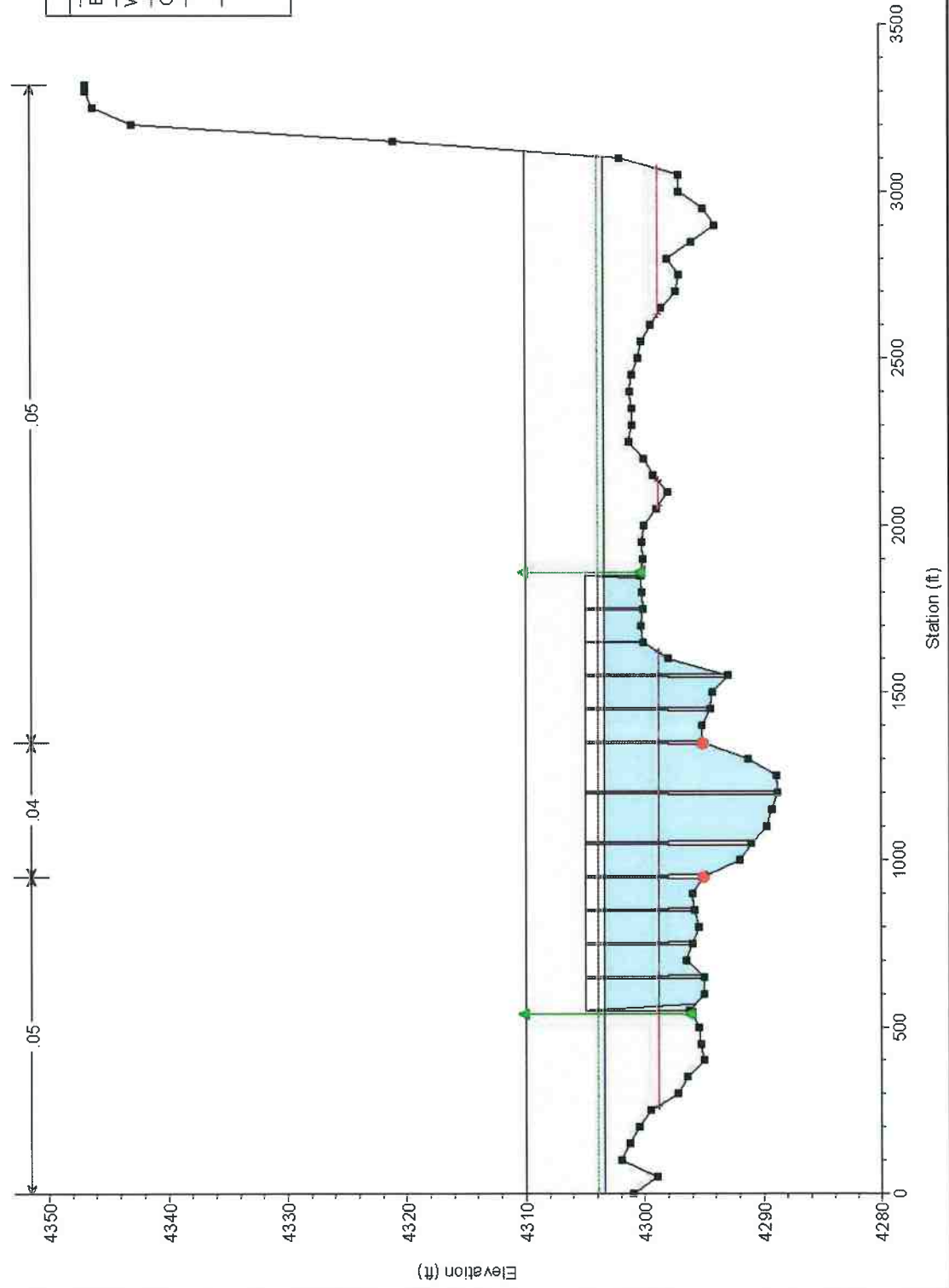


Carson River Rolling A Bridge

Plan: 1.5times100yS#4

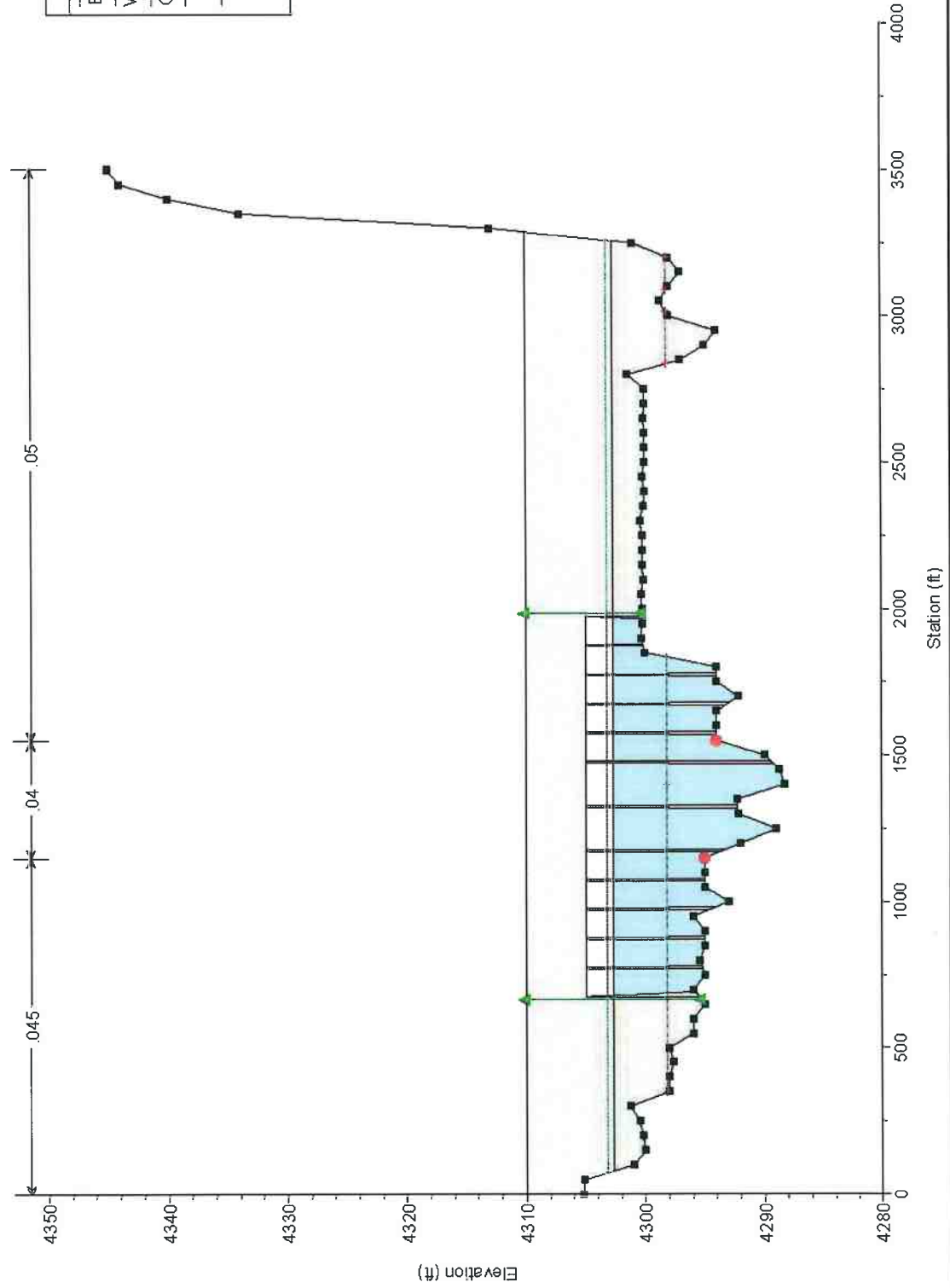
7/8/2008 10:46:11 AM

Geom: Base with Bridge Scenario #4 Flow: 1.5 times 100-Y Flood



Carson River Rolling A Bridge Plan: 1.5times100yS#4 7/8/2008 10:46:11 AM

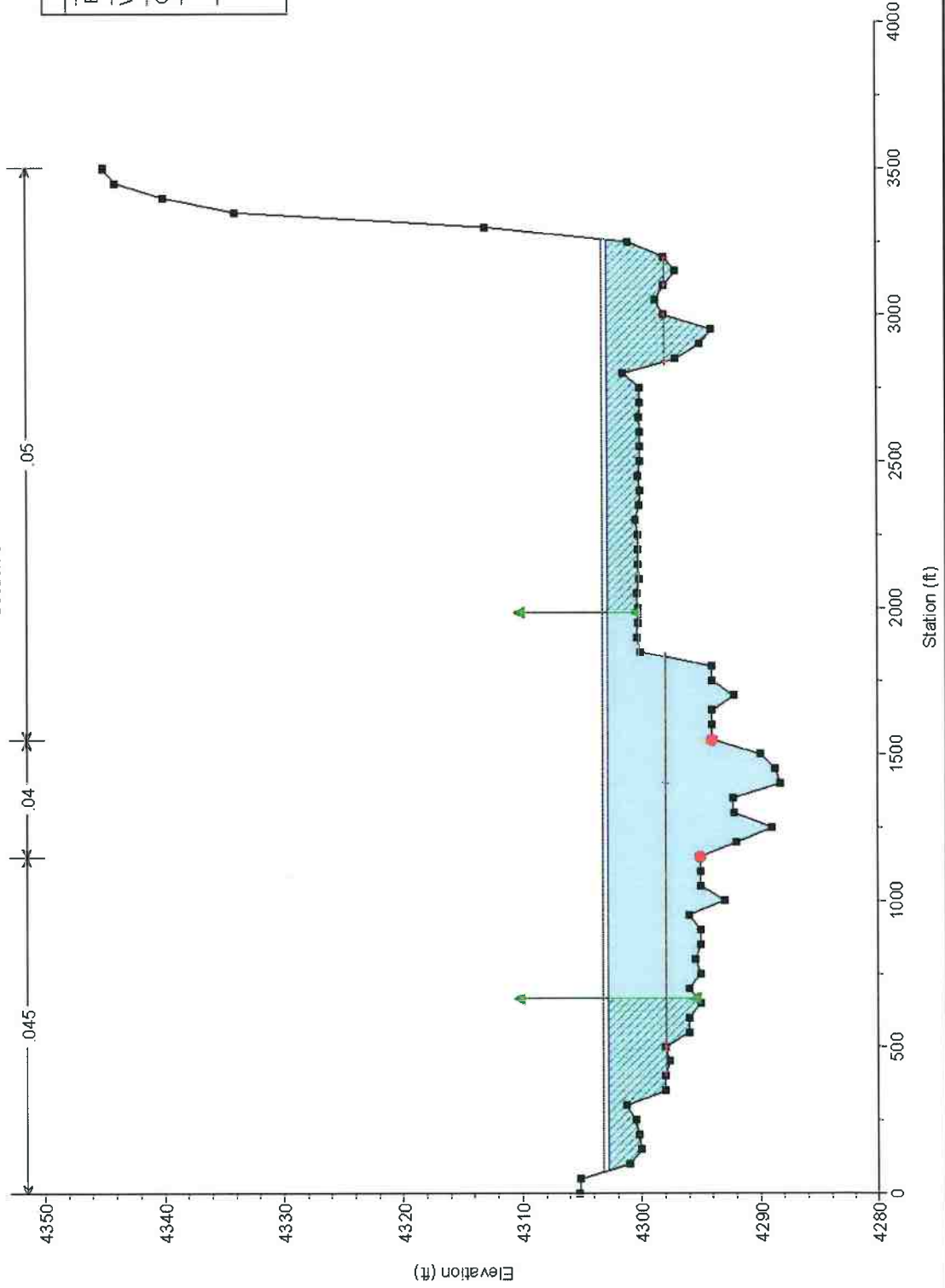
Geom: Base with Bridge Scenario #4 Flow: 1.5 times 100-Y Flood



Carson River Rolling A Bridge Plan: 1.5times100yS#4 7/8/2008 10:46:11 AM

Geom: Base with Bridge Scenario #4 Flow: 1.5 times 100-Y Flood

Section 5



HEC-RAS Plan: 1.5x100Y-S#4 River: Carson Reach: Near Dayton Profile: 1.5 Times

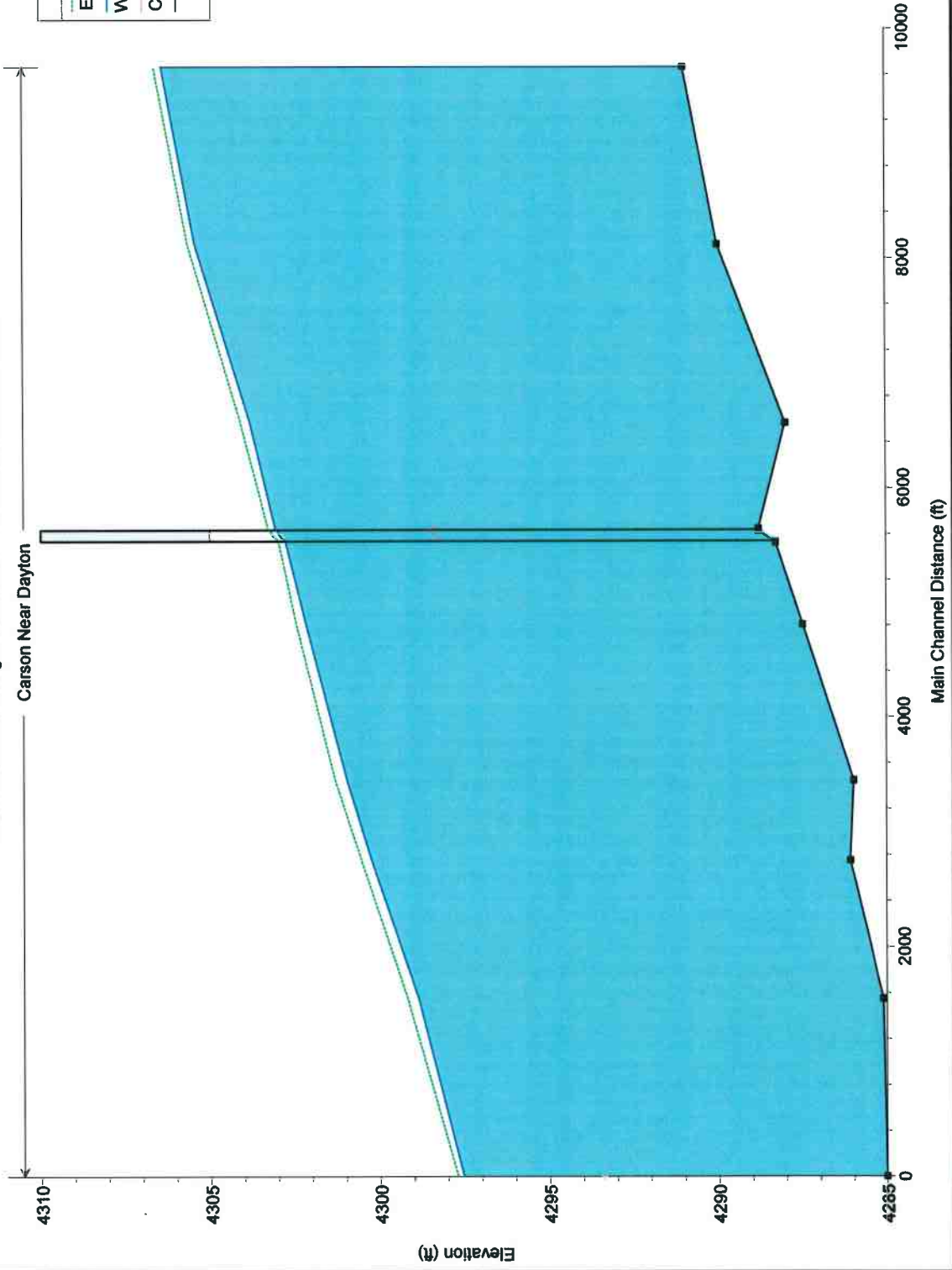
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Near Dayton	90	1.5 Times	54150.00	4291.00	4306.68		4306.87	0.000559	5.08	18096.17	2766.82	0.24
Near Dayton	80	1.5 Times	54150.00	4290.00	4305.86		4306.03	0.001009	5.49	18306.79	2747.84	0.30
Near Dayton	70	1.5 Times	54150.00	4288.00	4304.66		4304.87	0.000896	5.23	18289.31	2282.53	0.26
Near Dayton	60	1.5 Times	54150.00	4288.80	4303.49	4298.50	4303.94	0.000999	6.40	11400.48	3103.91	0.32
Near Dayton	55	Bridge										
Near Dayton	50	1.5 Times	54150.00	4288.30	4302.75	4297.89	4303.17	0.001009	6.13	11395.09	3178.57	0.31
Near Dayton	40	1.5 Times	54150.00	4287.50	4302.17		4302.44	0.000927	5.54	15126.94	2394.61	0.30
Near Dayton	30	1.5 Times	54150.00	4286.00	4300.97		4301.31	0.001334	6.71	13989.12	2546.63	0.36
Near Dayton	20	1.5 Times	54150.00	4286.10	4300.25		4300.54	0.001123	6.41	14918.62	2477.80	0.33
Near Dayton	10	1.5 Times	54150.00	4285.10	4298.87		4299.19	0.001356	5.77	13392.04	2372.03	0.34
Near Dayton	0	1.5 Times	54150.00	4285.00	4297.54	4293.39	4297.71	0.000646	4.19	17797.90	3056.32	0.24

Carson River Rolling A Bridge Plan: 1.5times100yS#5 7/8/2008 10:46:20 AM

Geom: Base with Bridge Scenario #5 Flow: 1.5 times 100-Y Flood

Carson Near Dayton

Legend	
EG 1.5 Times	
WS 1.5 Times	
Crit 1.5 Times	
Ground	



Plan: 1.5x100y-S#5 Carson Near Dayton RS: 55 BR U Profile: 1.5 Times

E.G. Elev (ft)	4303.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Vt. n-Val.	0.050	0.040	0.050
W.S. Elev (ft)	4303.04	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	4298.58	Flow Area (sq ft)	5214.49	4630.41	7443.99
E.G. Slope (ft/ft)	0.000785	Area (sq ft)	5214.49	4630.41	7443.99
Q Total (cfs)	54150.00	Flow (cfs)	13863.68	22756.22	17530.11
Top Width (ft)	2922.74	Top Width (ft)	893.00	382.00	1647.74
Vel Total (ft/s)	3.13	Avg. Vel. (ft/s)	2.66	4.91	2.35
Max Chl Dpth (ft)	14.23	Hydr. Depth (ft)	5.84	12.12	4.52
Conv. Total (cfs)	1932099.0	Conv. (cfs)	494662.8	811953.1	625482.8
Length Wtd. (ft)	100.00	Wetted Per. (ft)	1008.96	451.50	1812.11
Min Ch El (ft)	4288.81	Shear (lb/sq ft)	0.25	0.50	0.20
Alpha	1.40	Stream Power (lb/ft s)	0.67	2.47	0.47
Frctn Loss (ft)		Cum Volume (acre-ft)	622.58	450.71	661.22
C & E Loss (ft)		Cum SA (acres)	114.60	44.38	134.95

Plan: 1.5x100y-S#5 Carson Near Dayton RS: 55 Profile: 1.5 Times

E.G. US. (ft)	4303.28	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	4303.07	E.G. Elev (ft)	4303.26	4302.97
Q Total (cfs)	54150.00	W.S. Elev (ft)	4303.04	4302.76
Q Bridge (cfs)	54150.00	Crit W.S. (ft)	4298.58	4298.17
Q Weir (cfs)		Max Chl Dpth (ft)	14.23	14.46
Weir Sta Lft (ft)		Vel Total (ft/s)	3.13	3.15
Weir Sta Rgt (ft)		Flow Area (sq ft)	17288.89	17184.87
Weir Submerg		Froude # Chl	0.25	0.25
Weir Max Depth (ft)		Specif Force (cu ft)	73339.92	72012.97
Min El Weir Flow (ft)	4311.00	Hydr Depth (ft)	5.92	5.73
Min El Prs (ft)	4305.00	W.P. Total (ft)	3272.57	3337.74
Delta EG (ft)	0.31	Conv. Total (cfs)	1932099.0	1952688.0
Delta WS (ft)	0.30	Top Width (ft)	2922.74	2997.87
BR Open Area (sq ft)	23016.69	Frctn Loss (ft)		
BR Open Vel (ft/s)	3.15	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	0.26	0.25
Br Sel Method	Momentum	Power Total (lb/ft s)	0.81	0.78

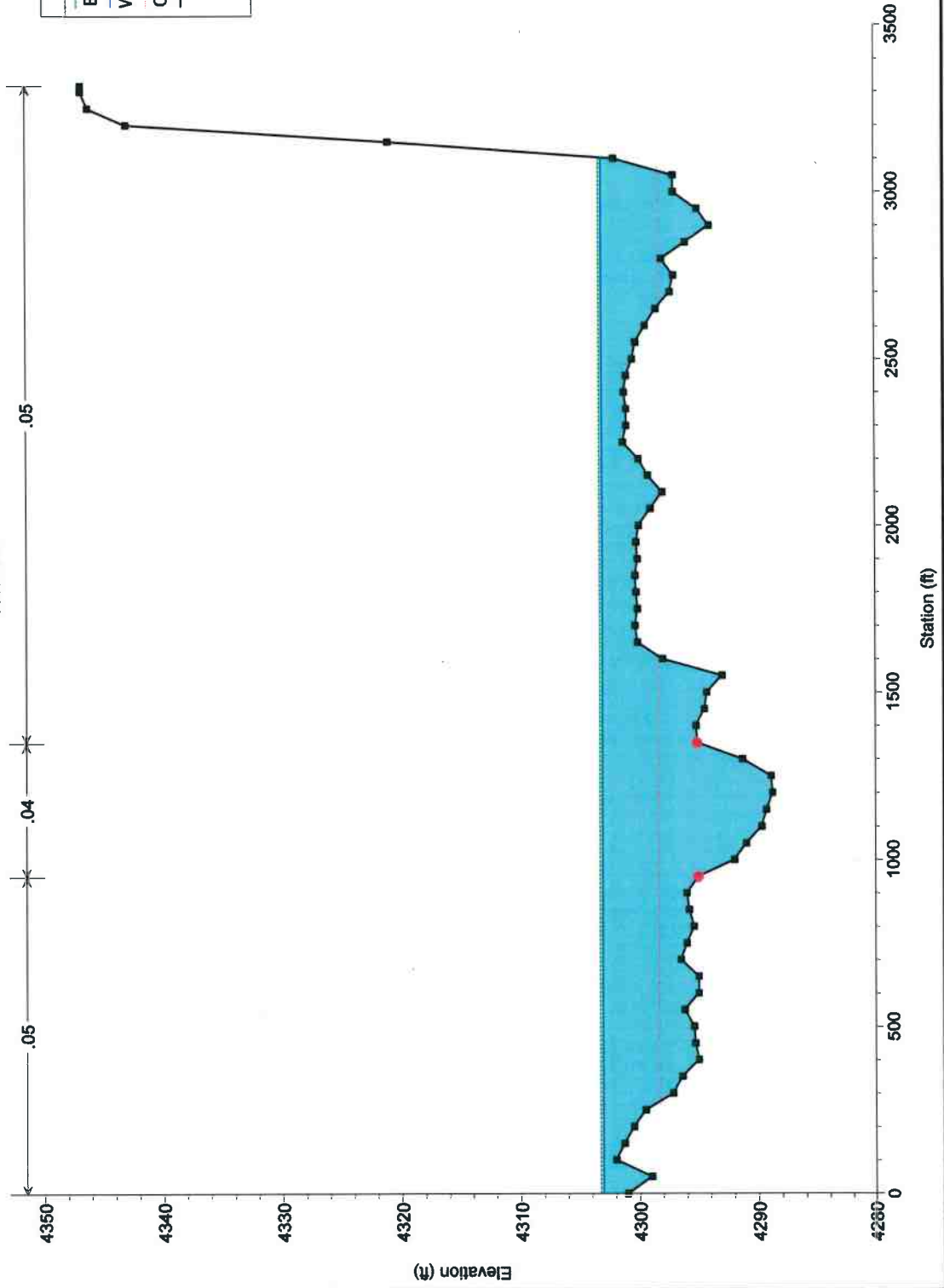
Plan: 1.5x100y-S#5 Carson Near Dayton RS: 55 BR D Profile: 1.5 Times

E.G. Elev (ft)	4302.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.045	0.040	0.050
W.S. Elev (ft)	4302.76	Reach Len. (ft)	9.74	9.74	9.74
Crit W.S. (ft)	4298.17	Flow Area (sq ft)	5793.48	4480.16	6911.22
E.G. Slope (ft/ft)	0.000769	Area (sq ft)	5793.48	4480.16	6911.22
Q Total (cfs)	54150.00	Flow (cfs)	16858.57	21391.67	15899.77
Top Width (ft)	2997.87	Top Width (ft)	1010.53	382.00	1605.34
Vel Total (ft/s)	3.15	Avg. Vel. (ft/s)	2.91	4.77	2.30
Max Chl Dpth (ft)	14.46	Hydr. Depth (ft)	5.73	11.73	4.31
Conv. Total (cfs)	1952688.0	Conv. (cfs)	607932.1	771398.8	573356.9
Length Wtd. (ft)	9.74	Wetted Per. (ft)	1130.18	448.97	1758.58
Min Ch EI (ft)	4288.30	Shear (lb/sq ft)	0.25	0.48	0.19
Alpha	1.33	Stream Power (lb/ft s)	0.72	2.29	0.43
Frctn Loss (ft)		Cum Volume (acre-ft)	609.94	440.25	644.74
C & E Loss (ft)		Cum SA (acres)	112.41	43.50	131.22

Carson River Rolling A Bridge Plan: 1.5times100yS#5 7/8/2008 10:46:20 AM

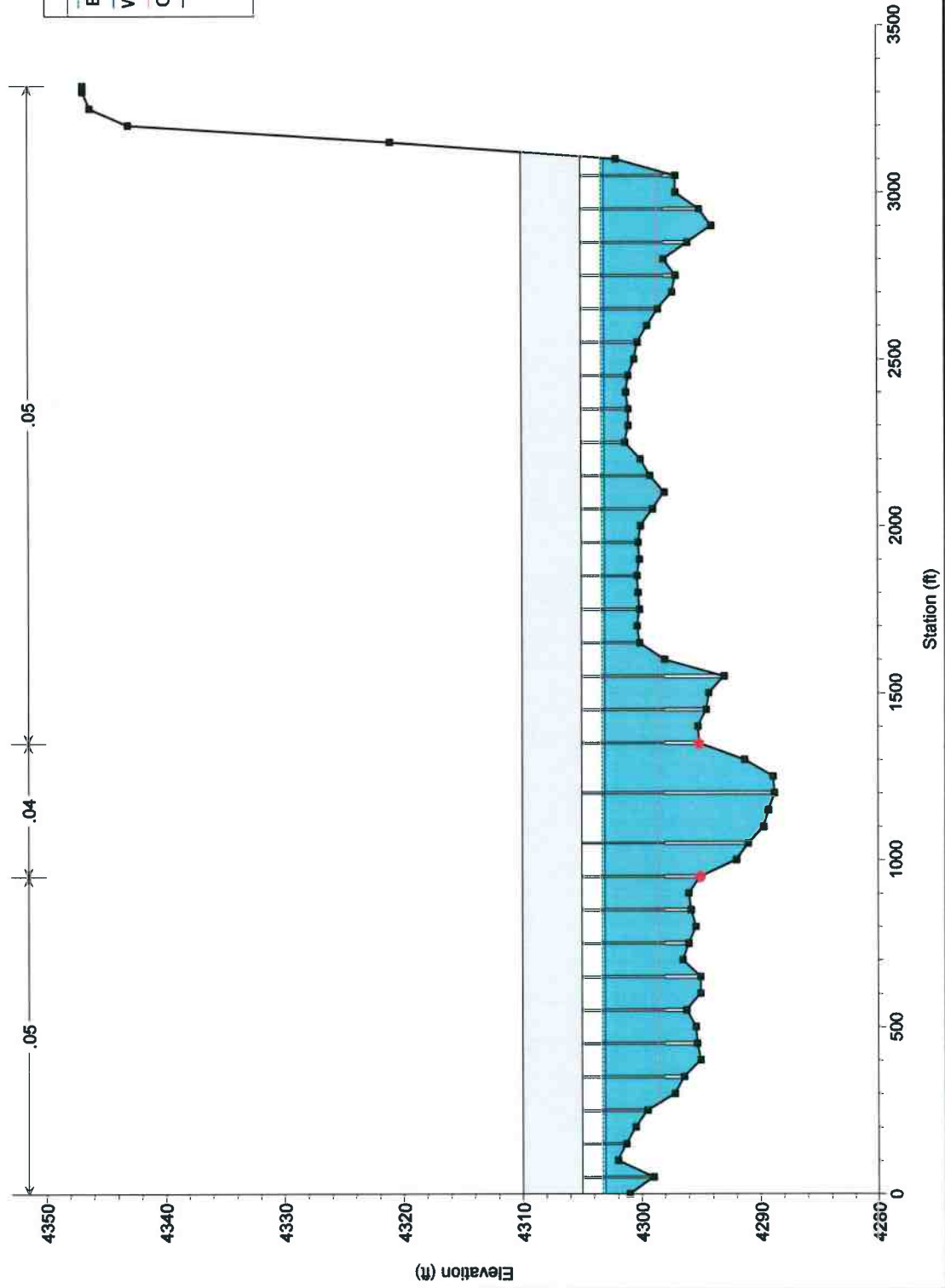
Geom: Base with Bridge Scenario #5 Flow: 1.5 times 100-Y Flood

Section 4

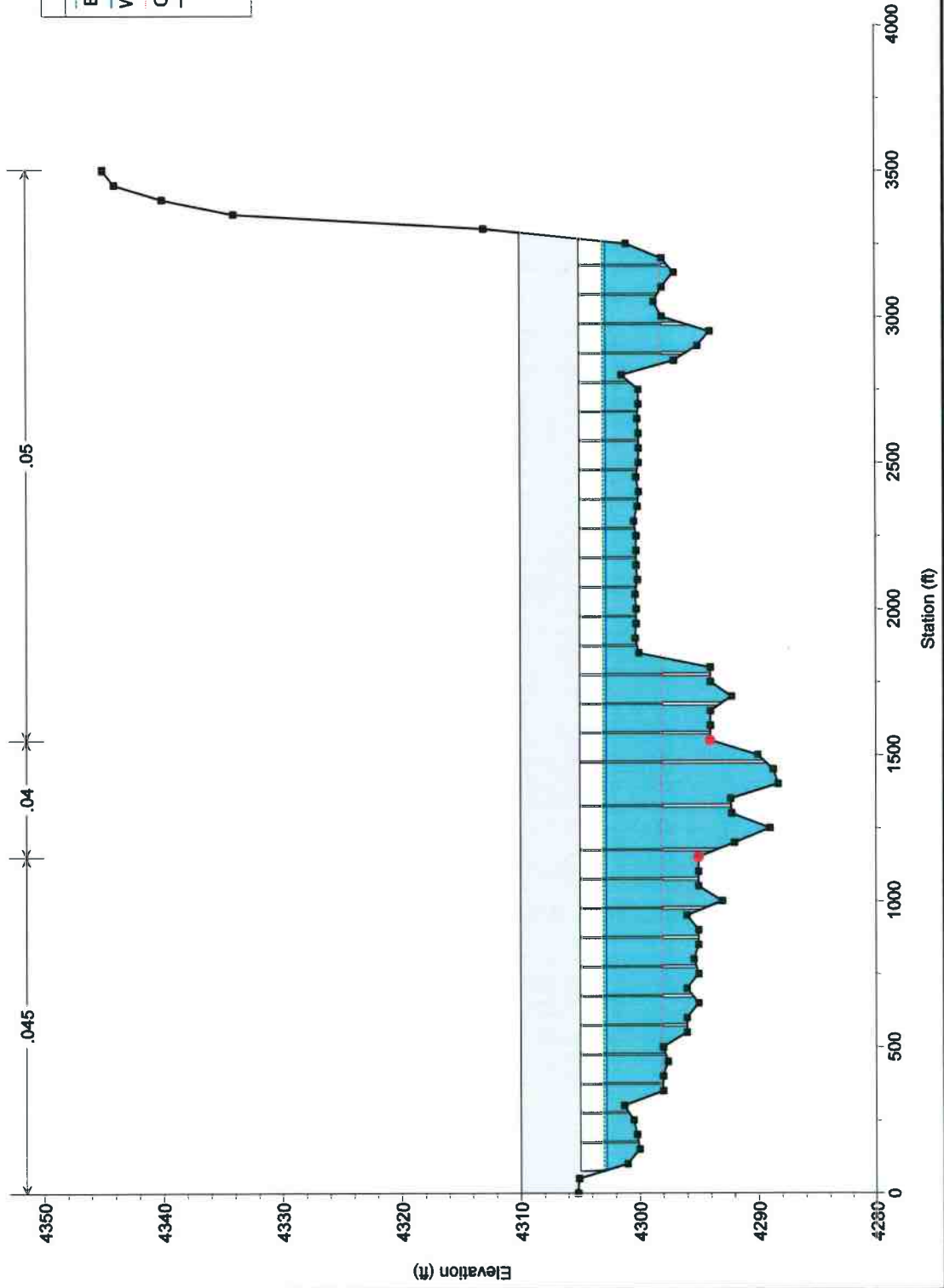


Carson River Rolling A Bridge Plan: 1.5times100yS#5 7/8/2008 10:46:20 AM

Geom: Base with Bridge Scenario #5 Flow: 1.5 times 100-Y Flood



Carson River Rolling A Bridge Plan: 1.5times100yS#5 7/8/2008 10:46:20 AM
Geom: Base with Bridge Scenario #5 Flow: 1.5 times 100-Y Flood



Legend

EG 1.5 Times

WS 1.5 Times

Crit 1.5 Times

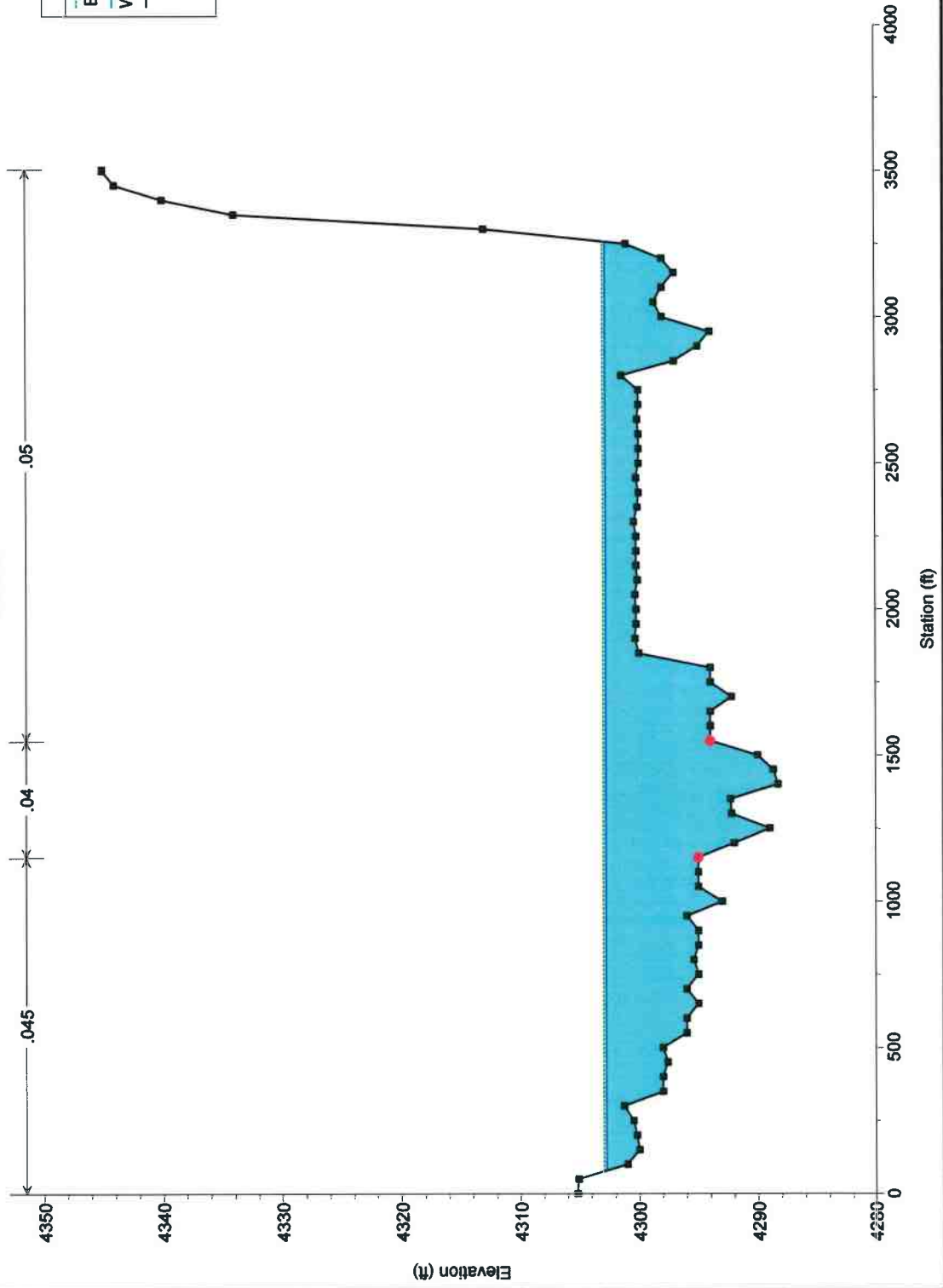
Ground

Bank Sta

Carson River Rolling A Bridge Plan: 1.5times100yS#5 7/8/2008 10:46:20 AM

Geom: Base with Bridge Scenario #5 Flow: 1.5 times 100-Y Flood

Section 5



HEC-RAS Plan: 1.5x100y-S#5 River: Carson Reach: Near Dayton Profile: 1.5 Times

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Near Dayton	90	1.5 Times	54150.00	4291.00	4306.40		4306.61	0.000638	5.35	17321.10	2764.01	0.25
Near Dayton	80	1.5 Times	54150.00	4290.00	4305.42		4305.62	0.001253	5.98	17099.44	2740.82	0.34
Near Dayton	70	1.5 Times	54150.00	4288.00	4303.80		4304.08	0.001263	5.92	16339.10	2266.48	0.31
Near Dayton	60	1.5 Times	54150.00	4288.80	4303.07	4298.32	4303.28	0.000615	4.91	18611.93	3102.81	0.25
Near Dayton	55	Bridge										
Near Dayton	50	1.5 Times	54150.00	4288.30	4302.77		4302.97	0.000621	4.82	18419.05	3178.87	0.25
Near Dayton	40	1.5 Times	54150.00	4287.50	4302.17		4302.44	0.000927	5.54	15126.94	2394.61	0.30
Near Dayton	30	1.5 Times	54150.00	4286.00	4300.97		4301.31	0.001334	6.71	13989.12	2546.63	0.36
Near Dayton	20	1.5 Times	54150.00	4286.10	4300.25		4300.54	0.001123	6.41	14918.62	2477.80	0.33
Near Dayton	10	1.5 Times	54150.00	4285.10	4298.87		4299.19	0.001356	5.77	13392.04	2372.03	0.34
Near Dayton	0	1.5 Times	54150.00	4285.00	4297.54	4293.39	4297.71	0.000646	4.19	17797.90	3056.32	0.24

Appendix C Site Pictures and Estimates of Manning's n



Picture 1 Between Sections 1 & 2 looking toward W.-Main channel Manning's $n=0.04$,
Right overbank Manning's $n=0.045$



Picture 2 Between Sections 1 & 2 looking toward NW.-Left overbank Manning's
 $n=0.045$



Picture 3 Between Sections 2 & 3 looking toward E.-Main channel Manning's $n=0.04$,
Right overbank Manning's $n=0.06$



Picture 4 Between Sections 2 & 3 looking toward W. -Right overbank Manning's $n=0.06$



Picture 5 At Section 3 looking toward N-Main channel between Sections 3 and 4
Manning's $n=0.045$, Left overbank Manning's $n=0.055$



Picture 6 At Section 3 looking toward E.-Right overbank at Section 3
Manning's $n=0.075$



Picture 7 At Section 3 looking toward NE.-Left overbank at Section 3
Manning's $n=0.055$



Picture 8 Between Sections 3 & 4 looking toward W.-Main channel Manning's $n=0.045$,
Right overbank Manning's $n=0.075$



Picture 9 At Sections 4 looking toward NW.-Main channel Manning's $n=0.04$, Left overbank Manning's $n=0.055$



Picture 10 At Section 4 looking toward N.-Main channel Manning's $n=0.04$, Left overbank Manning's $n=0.05$



Picture 11 At Section 4 looking toward NE.-Main channel Manning's $n=0.04$, Left Overbank Manning's $n=0.05$



Picture 12 At Section 5 looking toward NE-E.-Main channel Manning's $n=0.04$,



Picture 13 At Section 5 looking toward E.-Right overbank Manning's $n=0.05$



Picture 14 At Section 6 looking toward W.-Right overbank Manning's $n=0.05$



Picture 15 At Section 6 looking toward NW.- Main channel Manning's $n=0.04$, Left overbank Manning's $n=0.05$



Picture 16 At Section 6 looking toward NE.-Main channel Manning's $n=0.04$, Left overbank Manning's $n=0.05$



Picture 17 At Section 6 looking toward E.-Right overbank Manning's $n=0.05$



Picture 18 At Section 8 looking toward W.-Right overbank Manning's $n=0.05$



Picture 19 At Section 8 looking toward NW.-Left overbank Manning's $n=0.05$



Picture 20 At Section 8 looking toward N.-Left overbank Manning's $n=0.05$



Picture 21 At Section 8 looking toward NE.-Left overbank Manning's $n=0.05$



Picture 22 At Section 8 looking toward S.-Right overbank Manning's $n=0.05$



Picture 23 At Section 9 looking toward W.-Right overbank Manning's $n=0.05$



Picture 24 At Section 9 looking toward NW.-Main channel Manning's $n=0.04$, Left Overbank Manning's $n=0.05$



Picture 25 At Section 9 looking toward NE.-Main channel Manning's $n=0.04$, Left overbank Manning's $n=0.05$



Picture 26 At Section 9 looking toward E.-Right overbank Manning's $n=0.045\sim0.05$

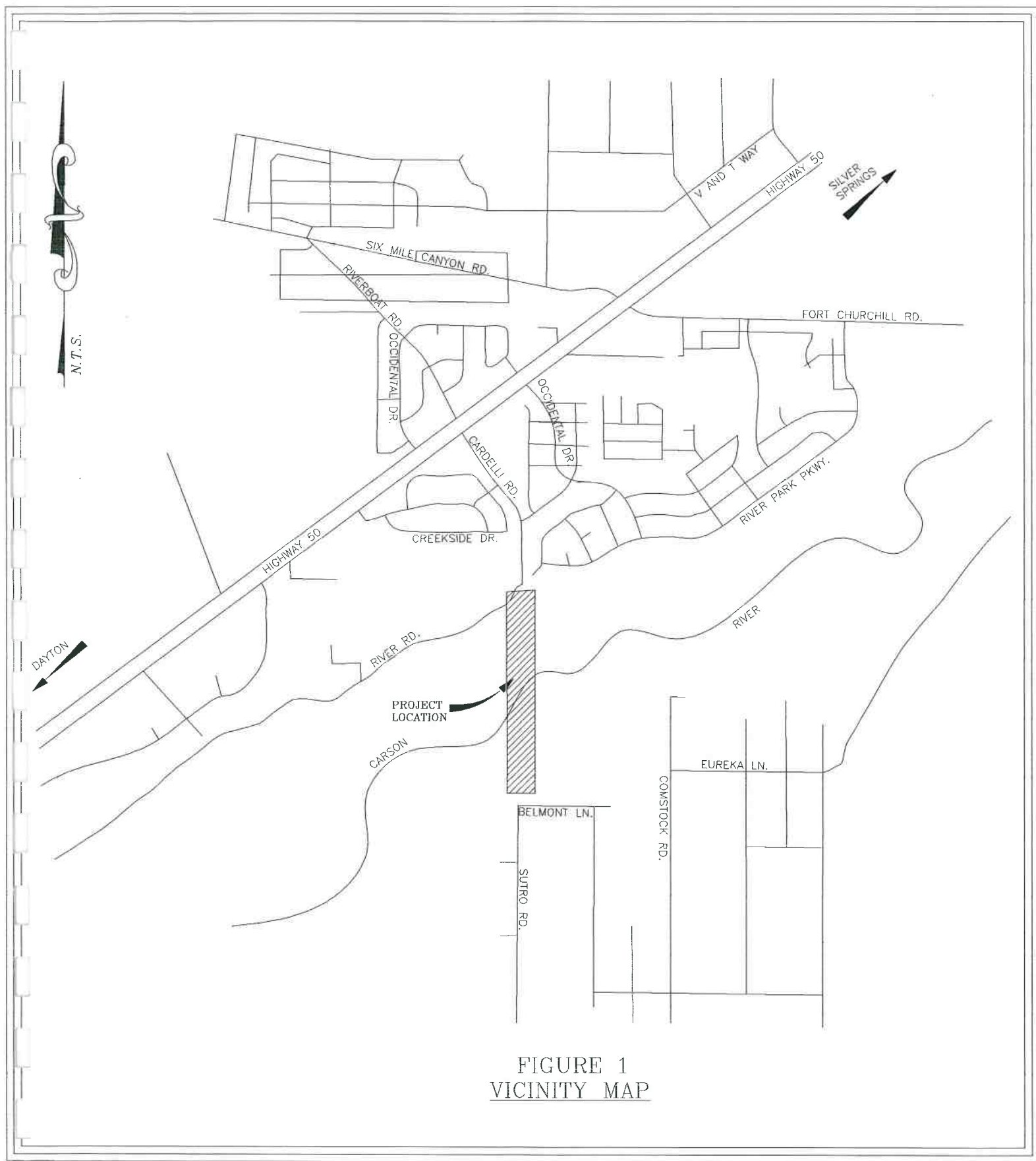
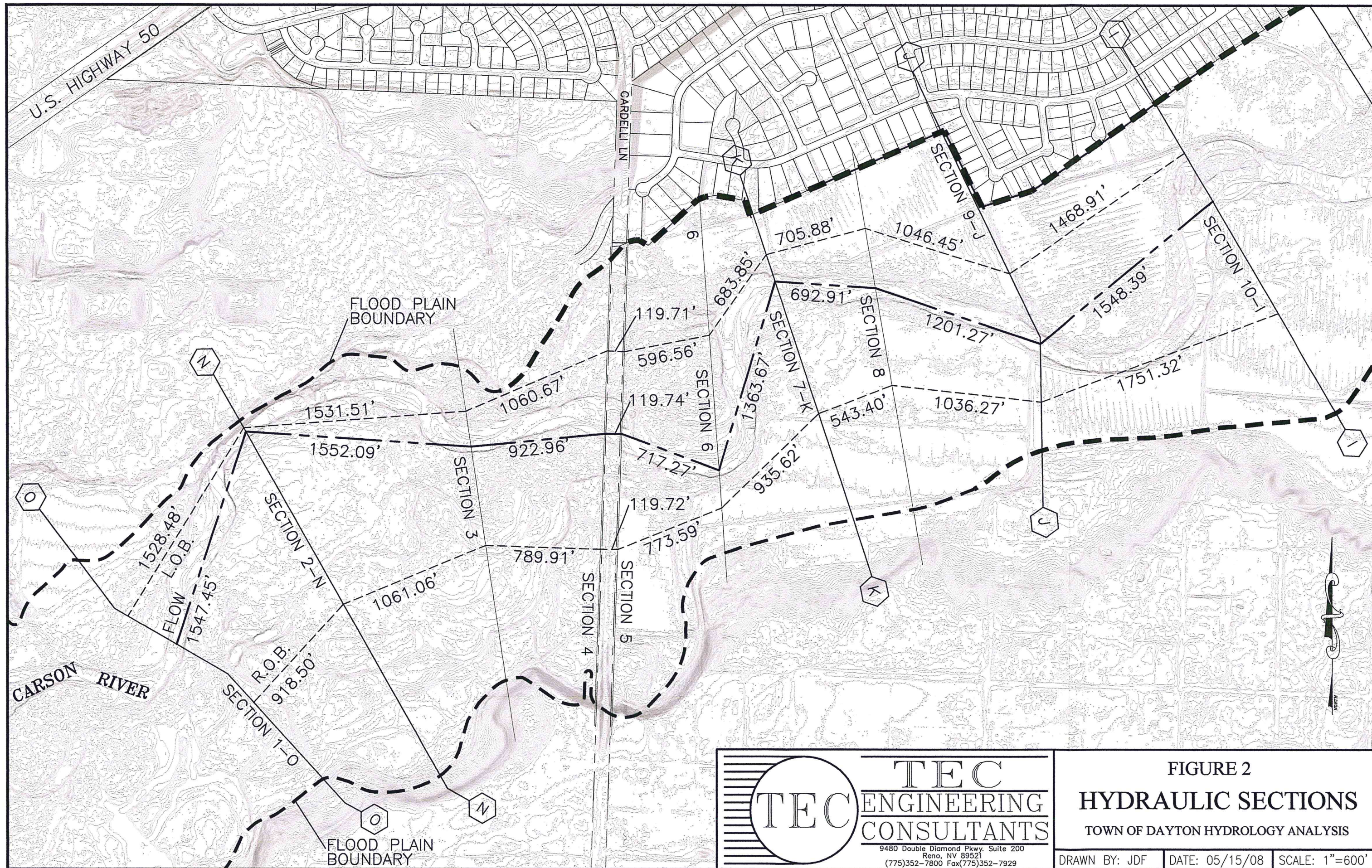


FIGURE 1
VICINITY MAP



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FIGURE 2

HYDRAULIC SECTIONS

TOWN OF DAYTON HYDROLOGY ANALYSIS

DRAWN BY: JDF | DATE: 05/15/08 | SCALE: 1"=600'

FIGURE 3
CARDELLI/SUTRO BRIDGE
DAYTON, NEVADA
NO BRIDGE SCENARIO

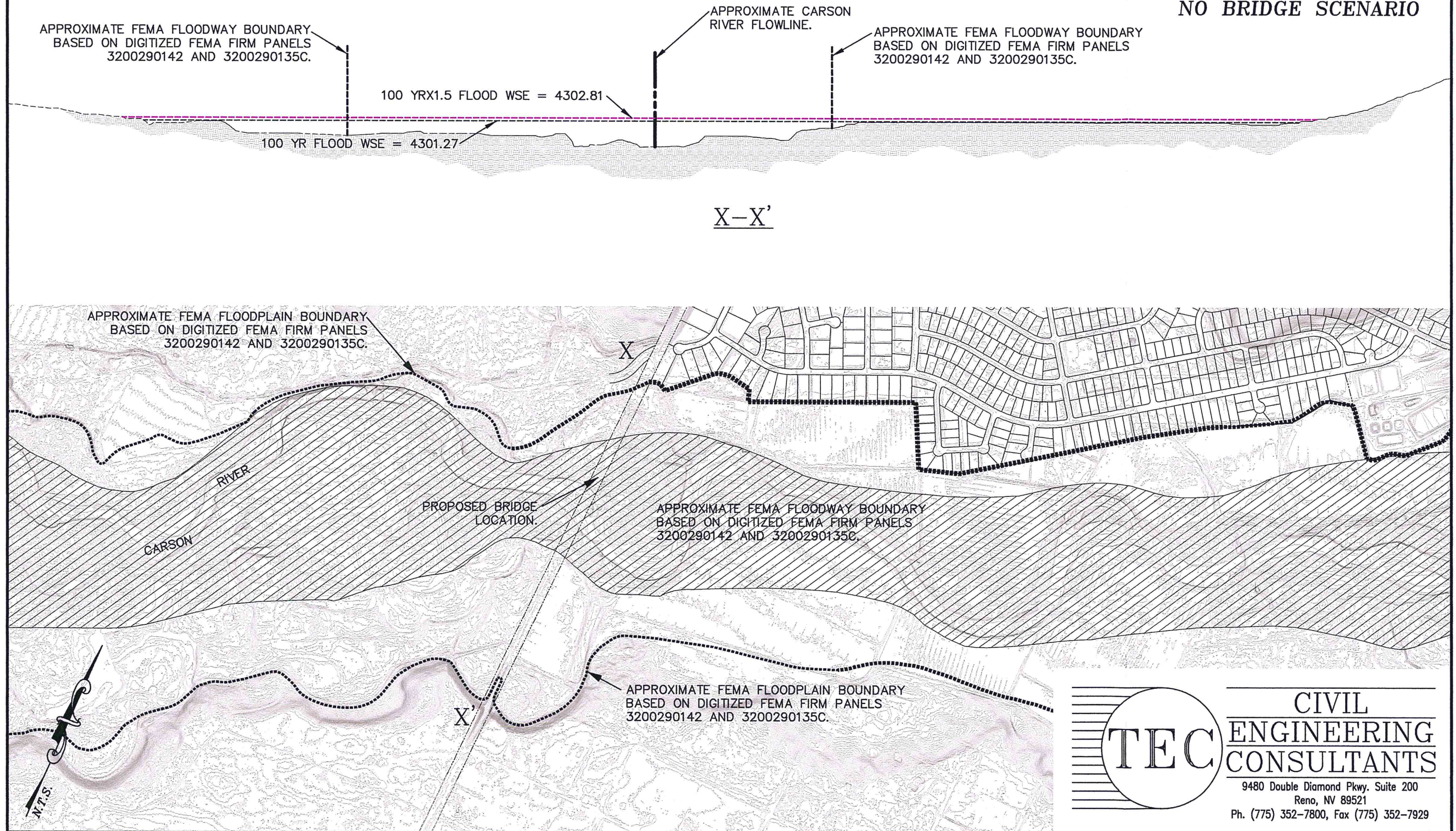


FIGURE 4
CARDELLI/SUTRO BRIDGE
DAYTON, NEVADA
BRIDGE SCENARIO #1
COST: \$8.064M

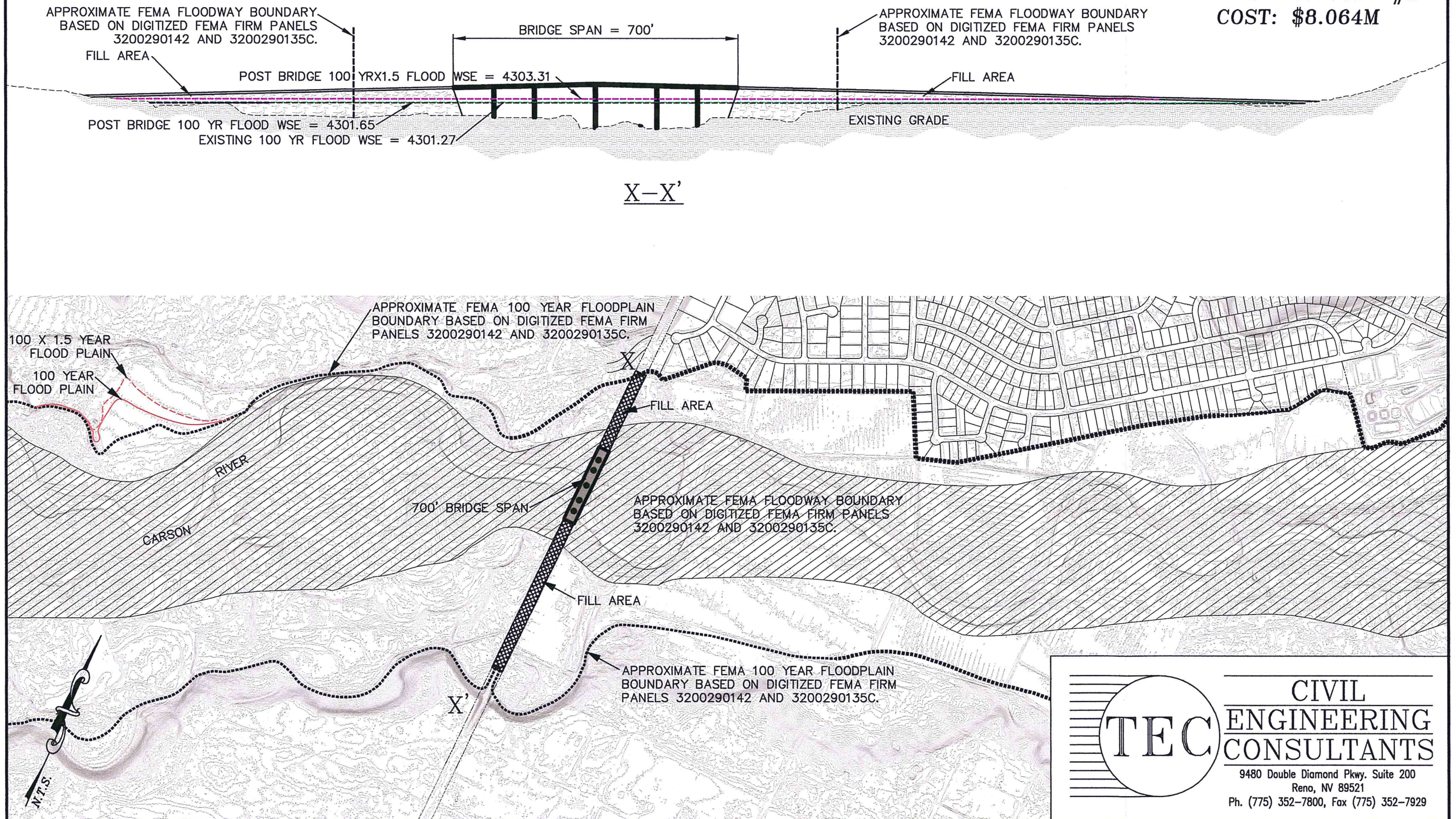


FIGURE 5
CARDELLI/SUTRO BRIDGE
DAYTON, NEVADA
BRIDGE SCENARIO #2
COST: \$10.368M

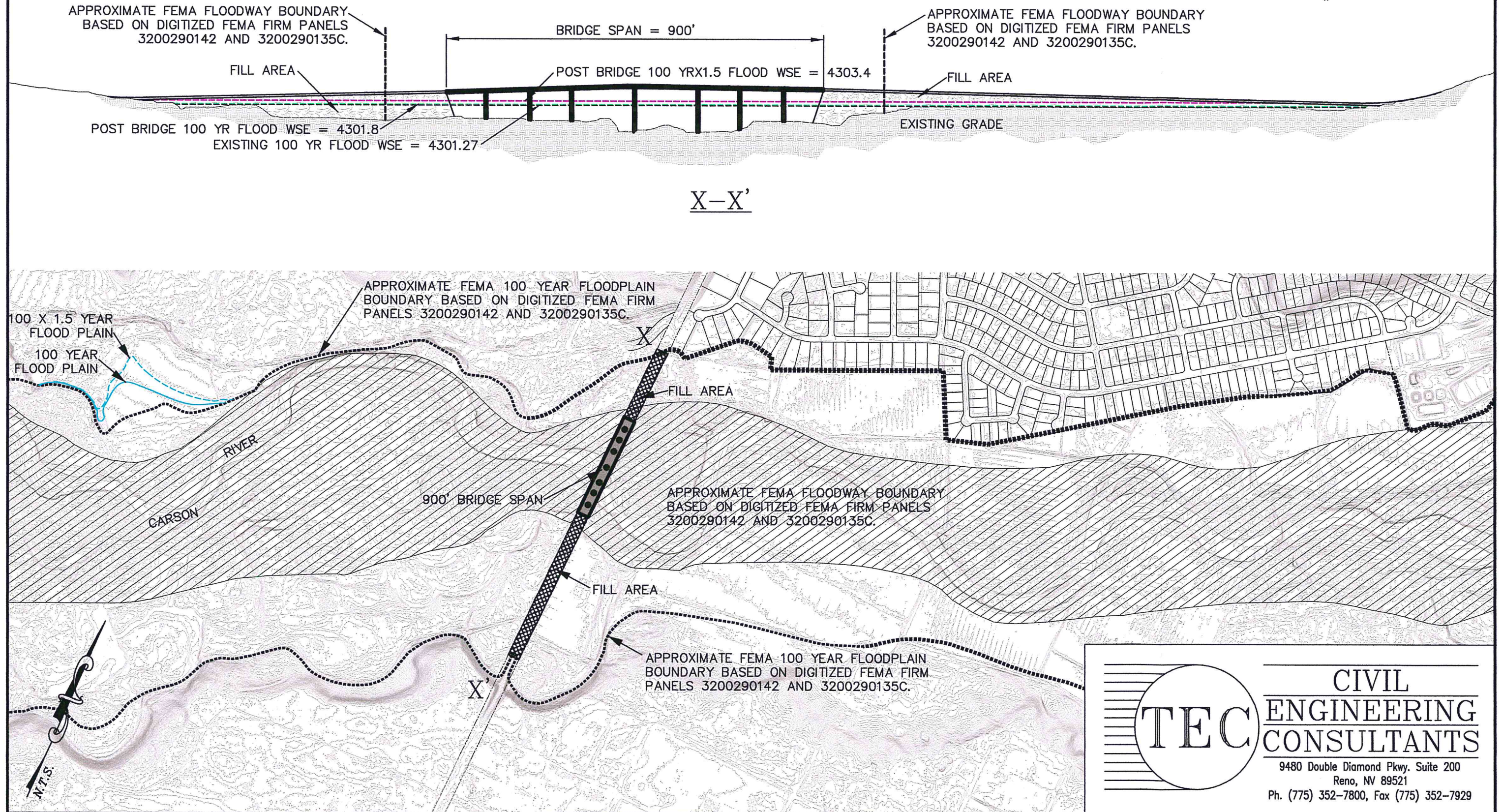


FIGURE 6
CARDELLI/SUTRO BRIDGE
DAYTON, NEVADA
BRIDGE SCENARIO #3
COST: \$12.672M

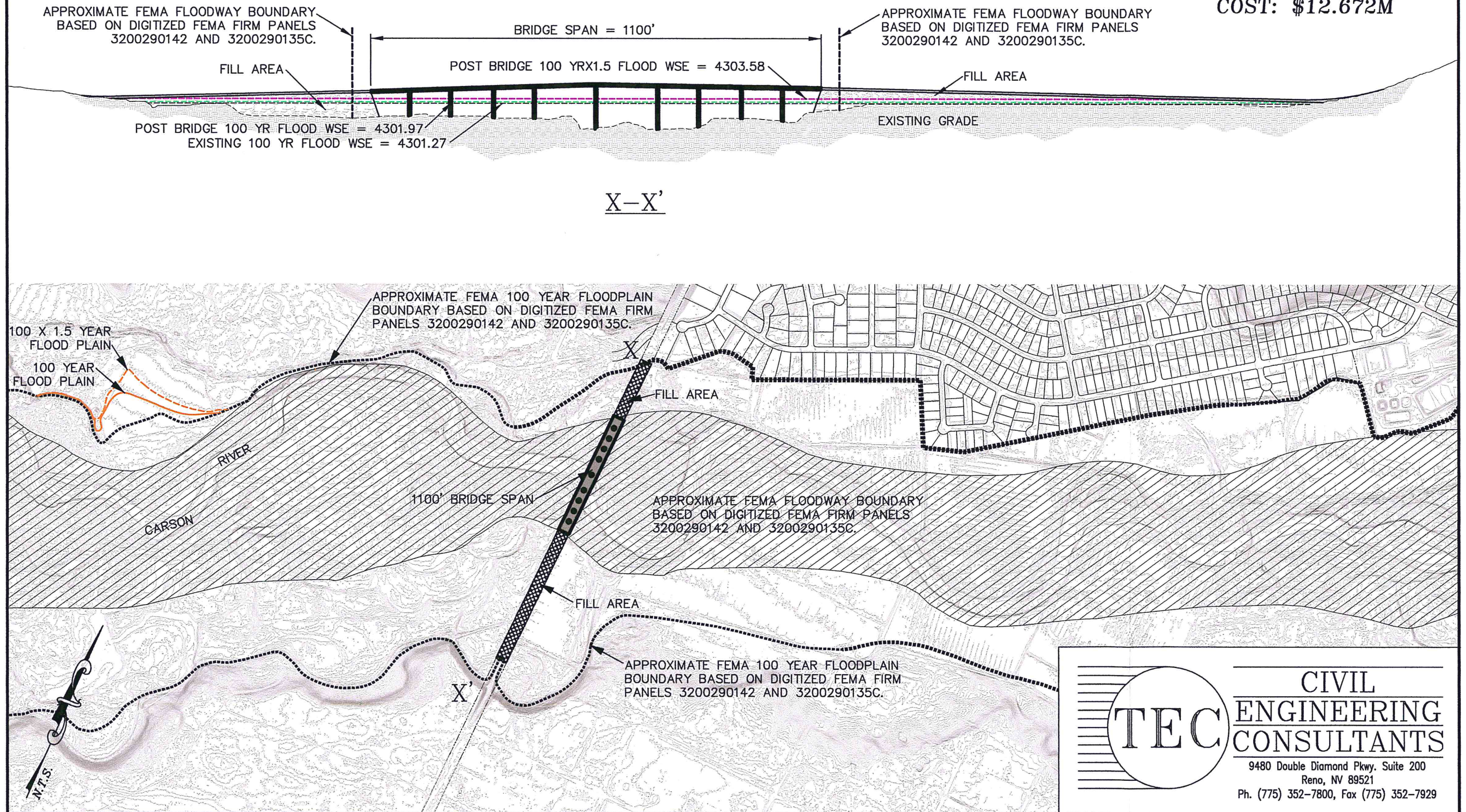
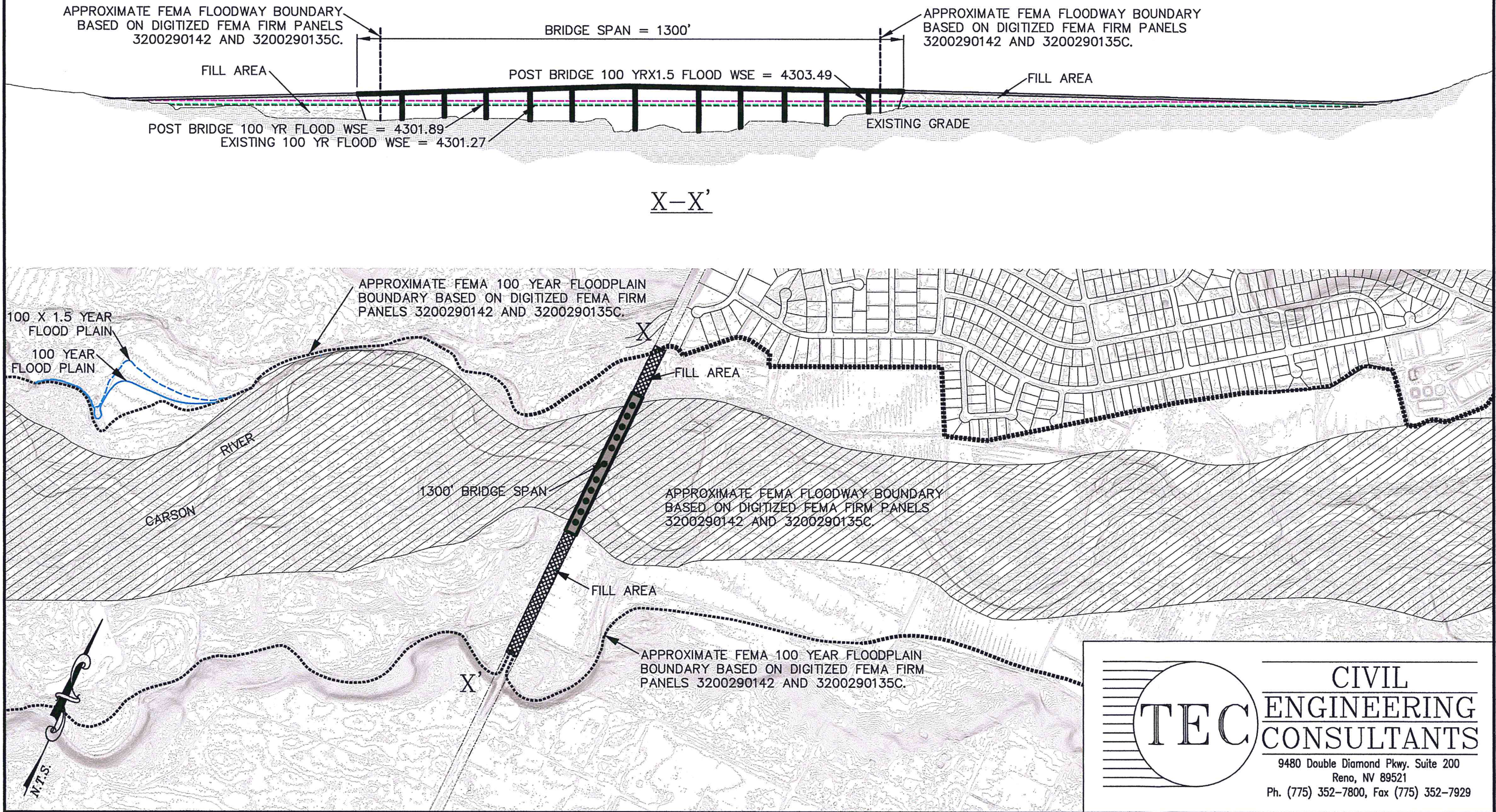
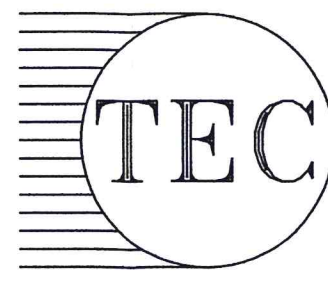


FIGURE 7
CARDELLI/SUTRO BRIDGE
DAYTON, NEVADA
BRIDGE SCENARIO #4
COST: \$14.976M





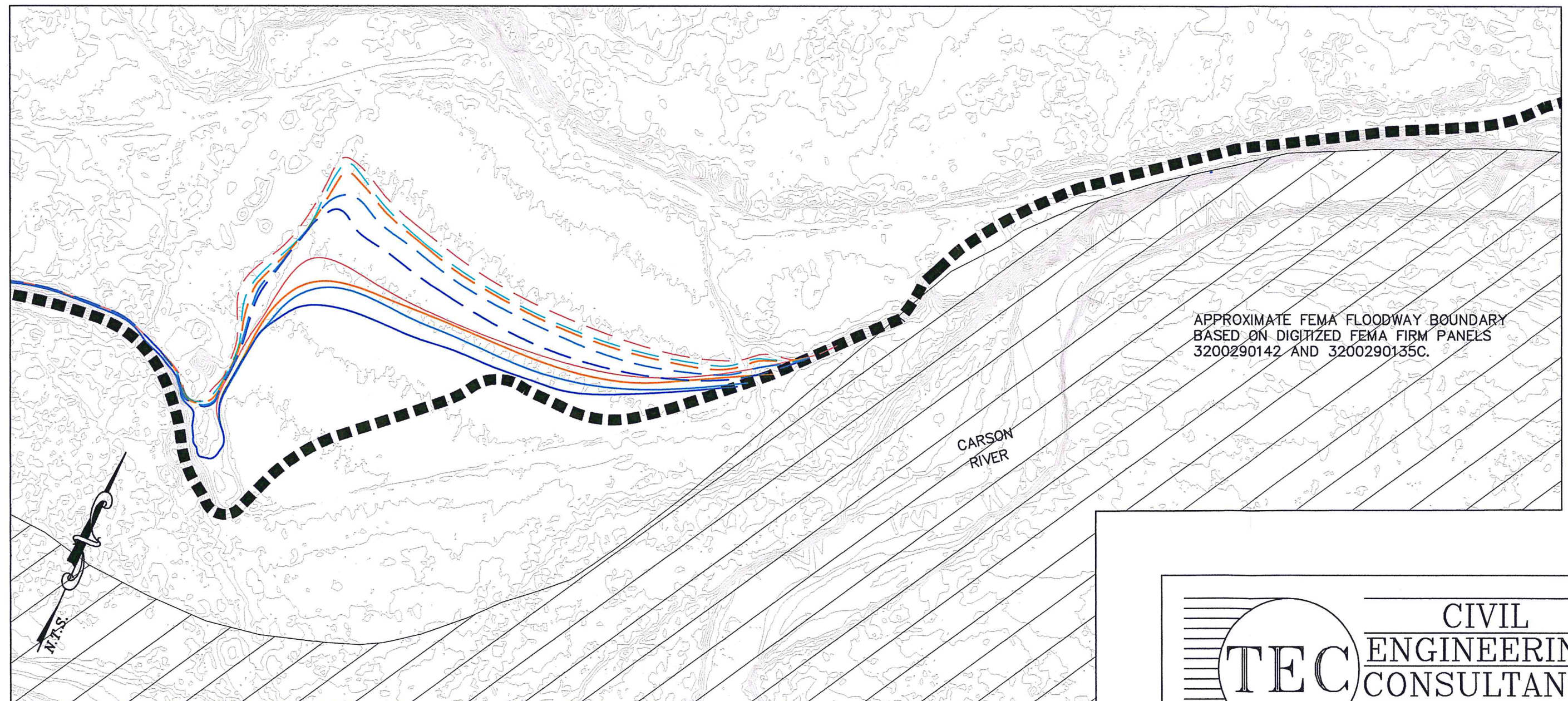
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Reno, NV 89521
Ph. (775) 352-7800, Fax (775) 352-7929

FIGURE 9
CARDELLI/SUTRO BRIDGE
DAYTON, NEVADA
FLOODPLAIN SCENARIO
COMPARISON

KEY:

- | | | | |
|-----------|---------------------------------------|-----------|---------------------------------|
| — — — — — | DIGITIZED FEMA 100 YEAR FLOODPLAIN | — — — — — | SCENARIO #1 100 YEAR FLOODPLAIN |
| - - - - - | SCENARIO #1 100 YEAR X 1.5 FLOODPLAIN | - - - - - | SCENARIO #2 100 YEAR FLOODPLAIN |
| - - - - - | SCENARIO #2 100 YEAR X 1.5 FLOODPLAIN | - - - - - | SCENARIO #3 100 YEAR FLOODPLAIN |
| - - - - - | SCENARIO #3 100 YEAR X 1.5 FLOODPLAIN | - - - - - | SCENARIO #4 100 YEAR FLOODPLAIN |
| - - - - - | SCENARIO #4 100 YEAR X 1.5 FLOODPLAIN | - - - - - | SCENARIO #5 100 YEAR FLOODPLAIN |
| - - - - - | SCENARIO #5 100 YEAR X 1.5 FLOODPLAIN | | |



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