Markleeville Creek Floodplain Restoration Project
Alpine County, California

Initial Study/Mitigated Negative Declaration
Volume II – Appendices A-G

February 2014

Document Information

Prepared for	Alpine County, CA
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Project Number	3343000100
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Date	February 2014

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Appendices

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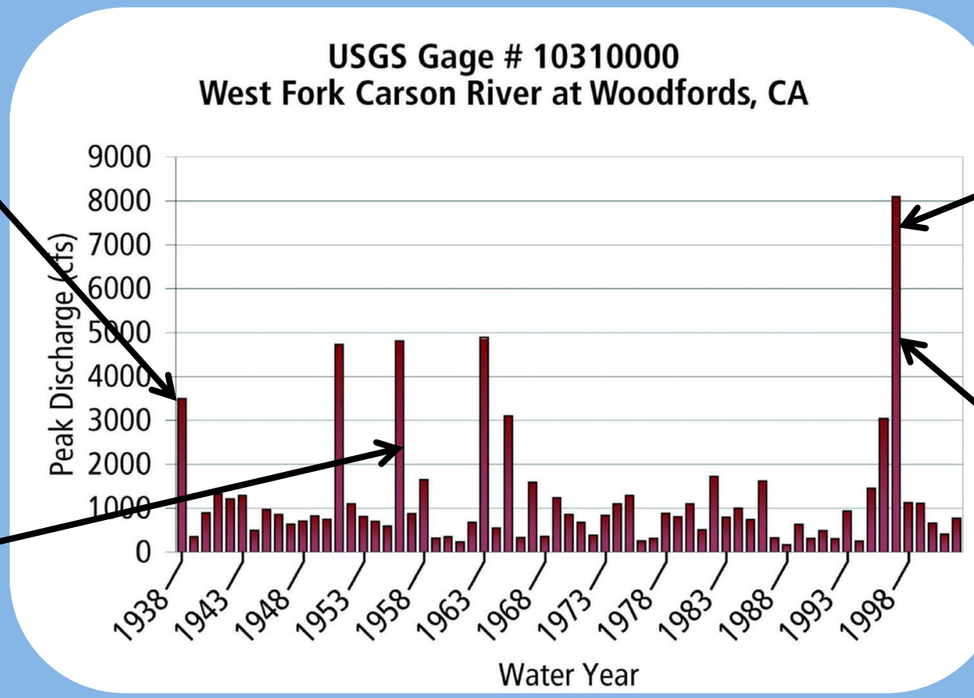
APPENDIX

A

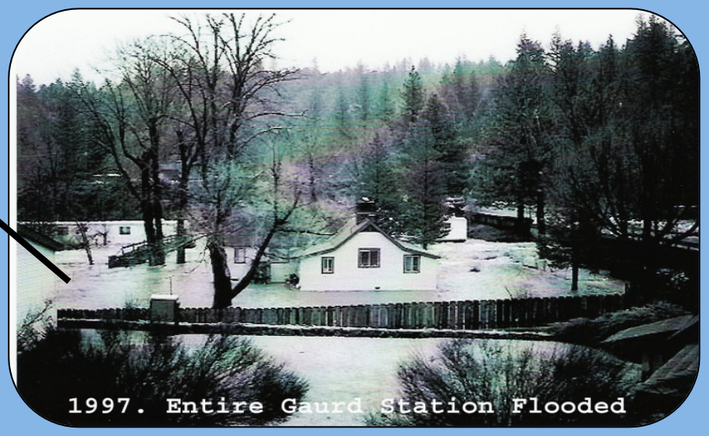
SITE FLOOD HISTORY

December 11, 1937

December 23, 1955



January 1-2, 1997



Graph Source: *Upper Carson River Watershed Stream Corridor Condition Assessment*
Prepared for Alpine Watershed Group, June 2004
Authors: MACTEC Engineering & Consulting, Swanson Hydrology & Geomorphology and River Run Consulting

**Note: Markleeville Creek is a tributary to the East Fork Carson River but the streamgage record on the West Fork Carson River covers the entire period of the flood photos.

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APPENDIX B

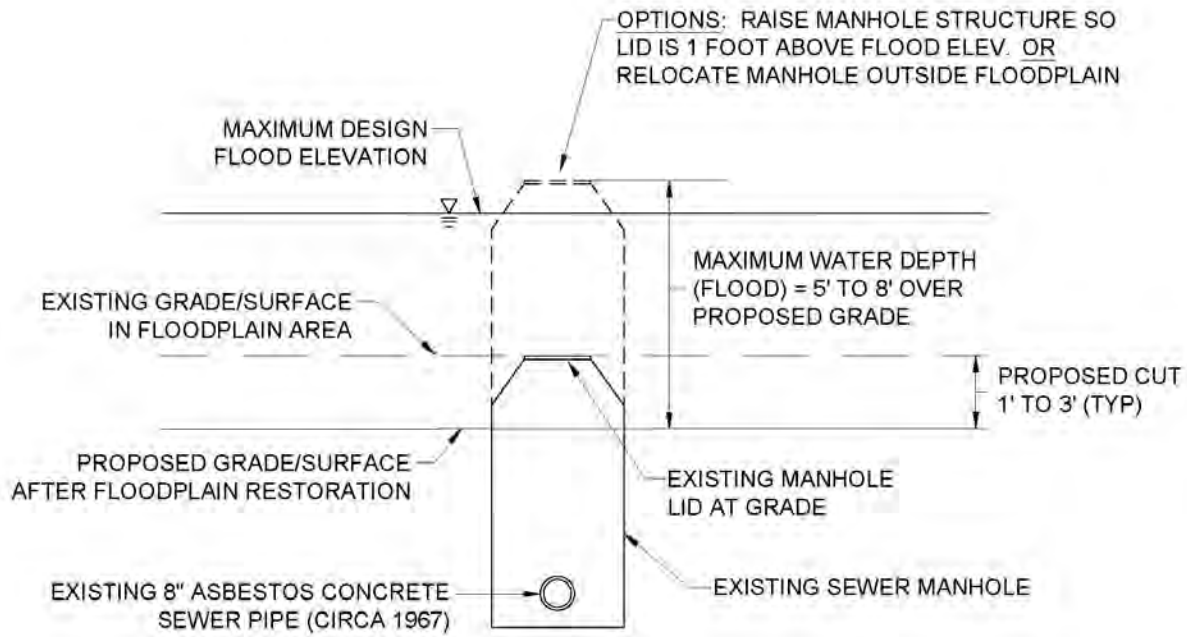
MPUD SEWER DIAGRAMS

APPENDIX B

Proposed Sewer System Modifications

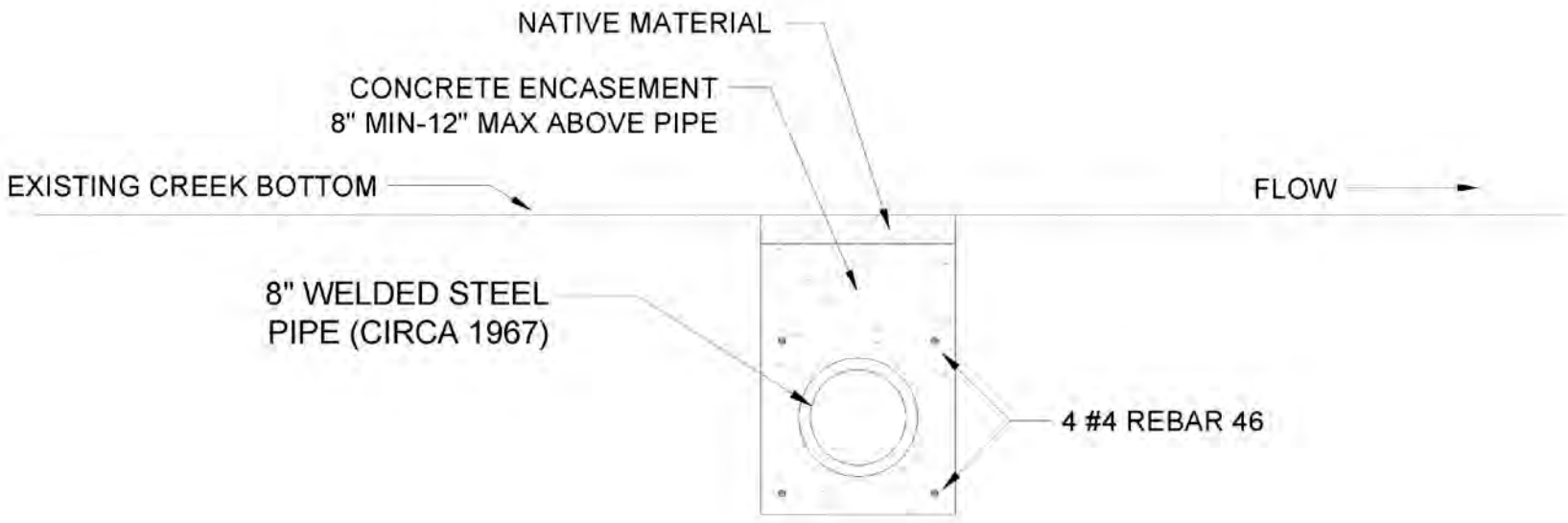
By: Matt Wheeler Engineering

Figure B-1 Existing Sewer Manhole in Floodplain Restoration Area (TYP)



EXISTING SEWER MANHOLE IN FLOODPLAIN RESTORATION AREA (TYP)

Figure B-2 Existing Sewer Undercrossing at Markleeville Creek



EXISTING SEWER UNDERCROSSING
AT MARKLEEVILLE CREEK

Figure B-3 Proposed New Sewer Undercrossing at Markleeville Creek

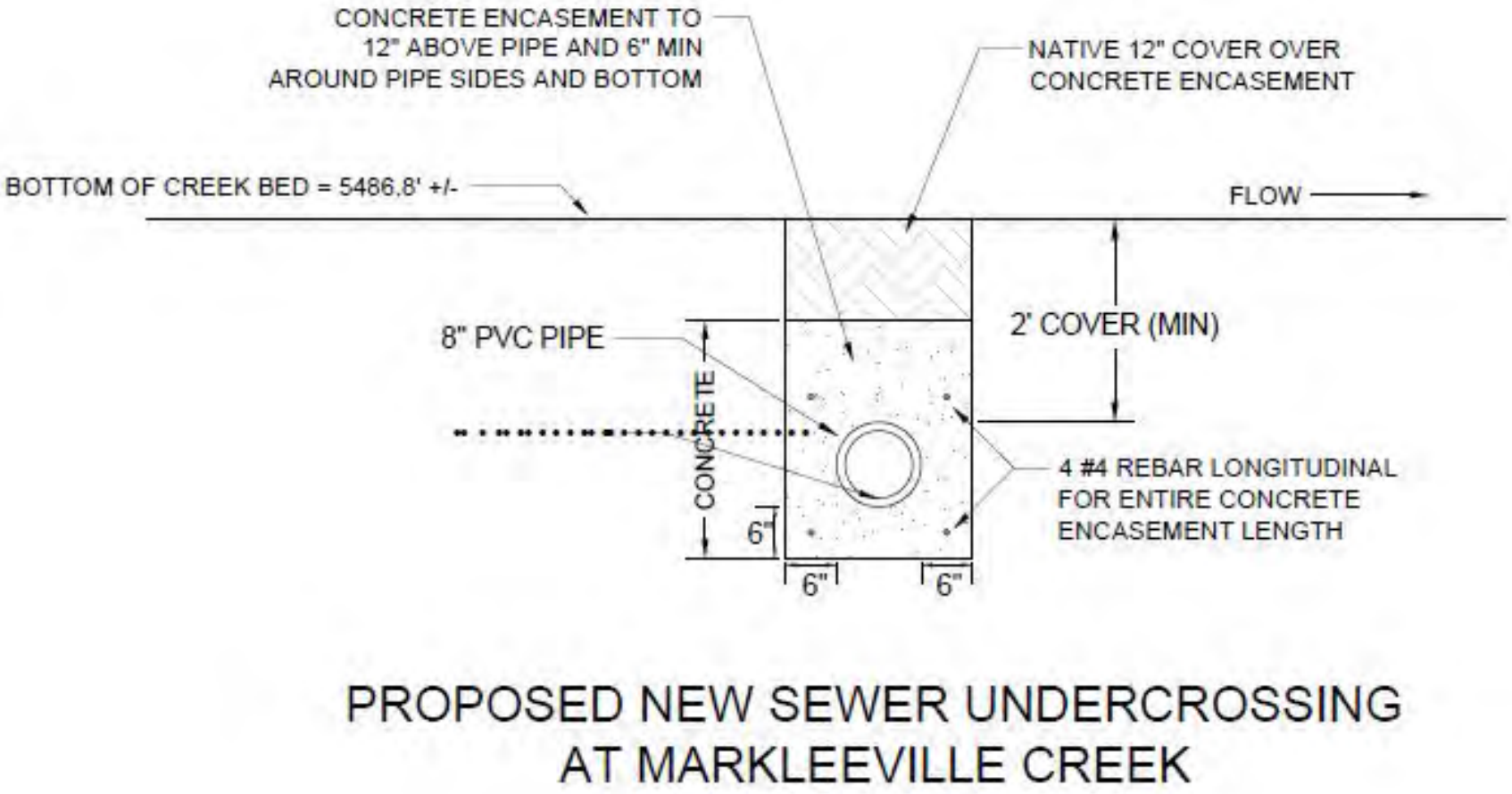


Figure B-4 Proposed Sewer Pump Station

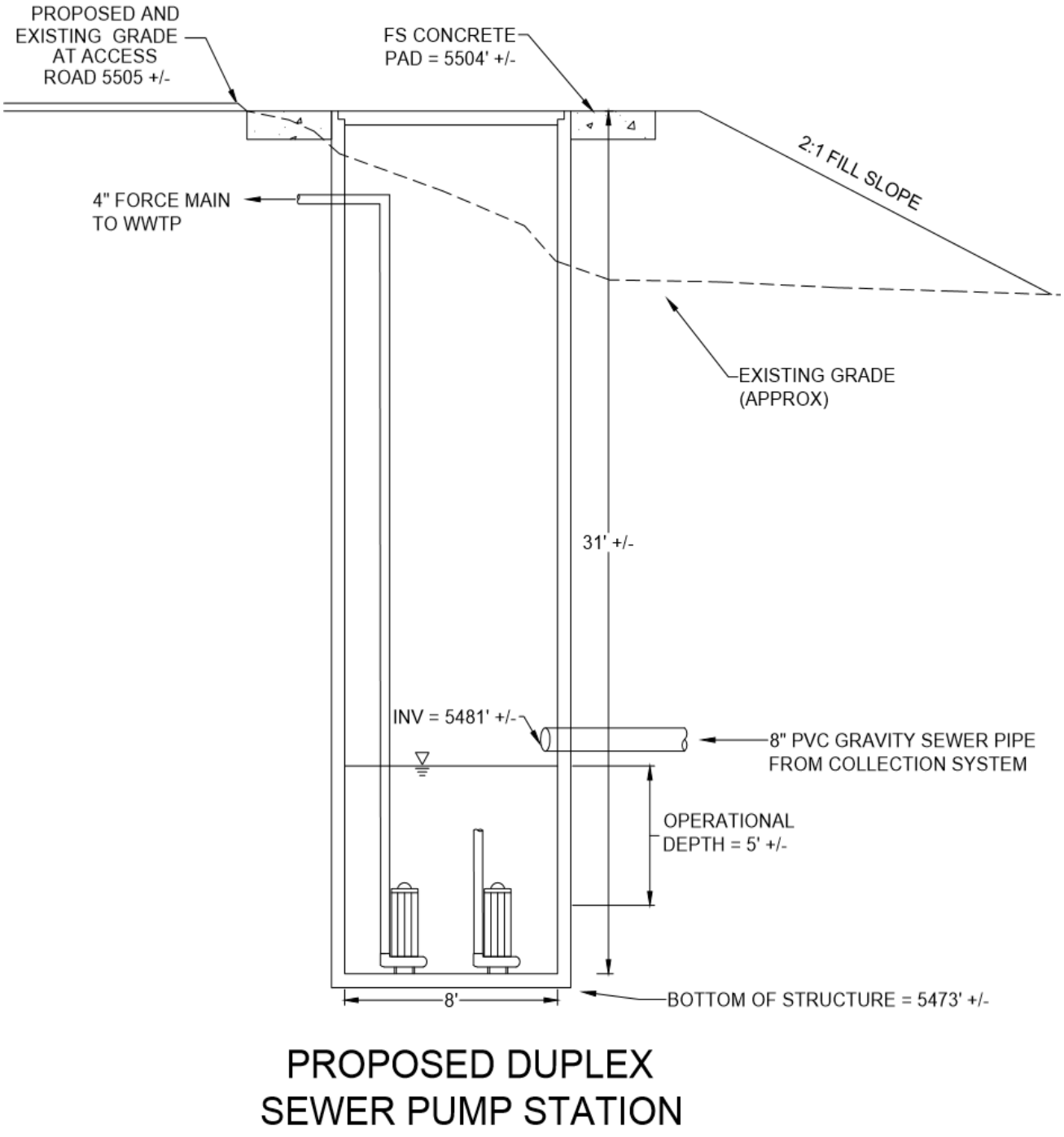
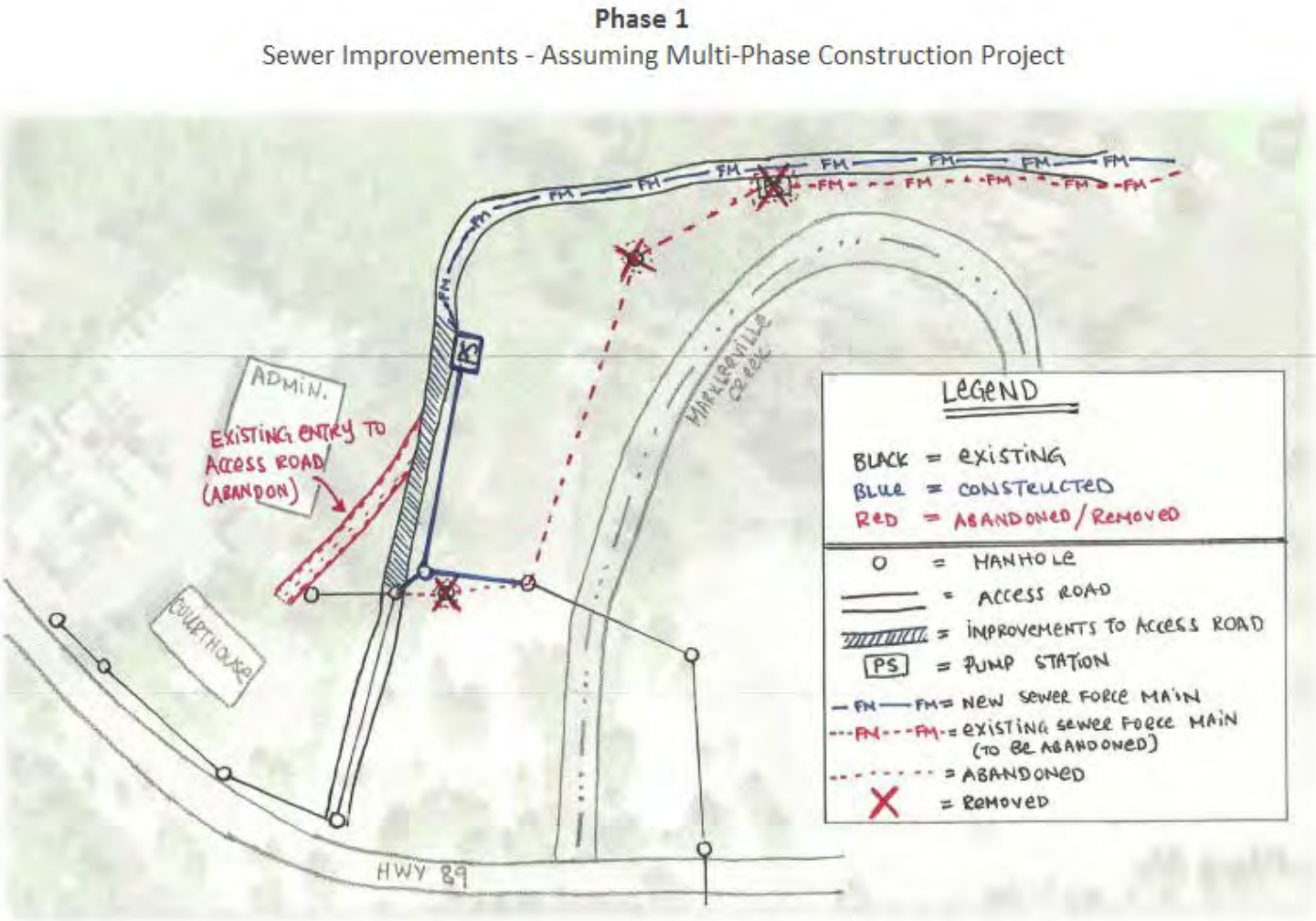


Figure B-5: Phase 1 Sewer Improvements – Assuming Multi-Phase Project



1 new sewer pump station

1 new sanitary sewer manhole

425 linear feet of new gravity sewer

670 linear feet of new sewer force main

196 linear feet of new access road (grading)

1 existing sewer pump station removed

2 sanitary sewer manholes removed

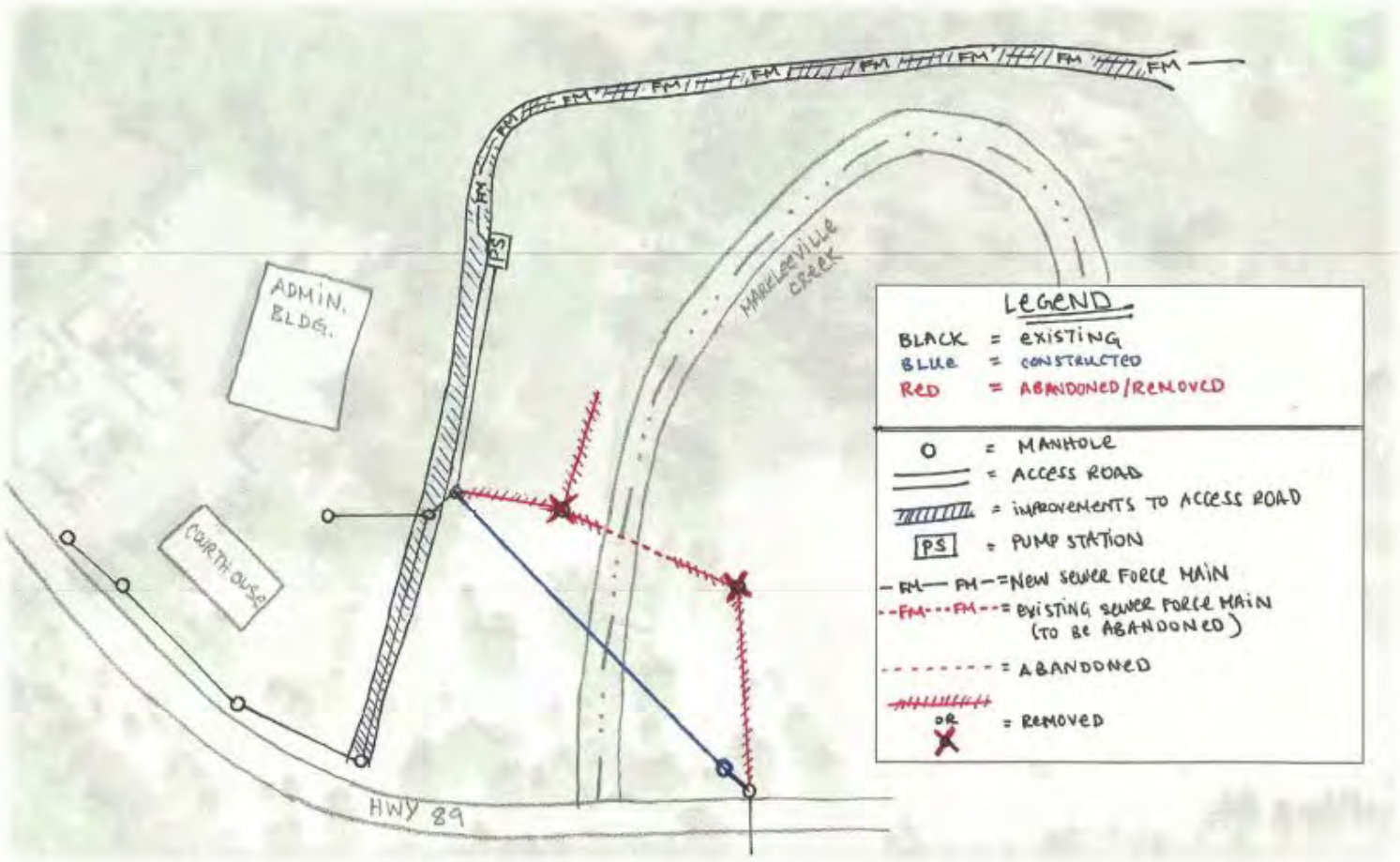
566 linear feet of gravity sewer abandoned

335 linear feet of sewer force main abandoned

Figure B-6 Phase 2 Sewer Improvements – Assuming Multi-Phase Construction

Phase 2

Sewer Improvements - Assuming Multi-Phase Construction Project



1070 linear feet of access road improvements (paving/grading)

1 new sanitary sewer manhole

359 linear feet of new gravity sewer

1 existing sewer pump station removed

4 sanitary sewer manholes removed

691 linear feet of gravity sewer removed

328 linear feet of gravity sewer abandoned

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C

RESTORATION PLANS AND DETAILS

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RESTORATION TECHNICAL SPECIFICATIONS

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RESTORATION ENGINEERS COST ESTIMATE

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APPENDIX D

HYDRAULIC MODELLING MEMO

Technical Memorandum

Date 2-18-2014

To: Sarah Green
Alpine Watershed Group

cc: Virginia Mahacek, Project File

From: Andrea Manha, PE, and Paul Wisheropp, PE

RE: **Markleeville Creek Hydraulic Memorandum**

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1.0 Introduction

This memo summarizes the hydrologic and hydraulic assumptions and results of the one-dimensional Hydrologic Engineering Center's River Analysis System v4.1.0 (HEC-RAS) model developed to simulate the existing and proposed conditions of the Markleeville Creek Restoration Project. Cardno ENTRIX chose to rebuild the existing 2007 RCI HEC-RAS model in order to create "live" cross sections that could be reliably updated for design iterations. The data used to develop this HEC-RAS model consists of existing topographic and hydrologic information from the 2007 RCI Design Report. The objectives of design and, therefore, of modeling output, were to increase overbanking and floodplain activation for the 2-year and 5-year flow events, but present adverse effects in the 25-year and 100-year flow events.

2.0 Hydrology

Design flow data was assumed from the 2007 RCI Design Report which originally estimated flows using data from the 2004 Upper Carson River Watershed Stream Corridor Assessment Report that was prepared for the Alpine Watershed Group (AWG) by MACTEC Engineering and Consulting, Swanson Hydrology & Geomorphology, and River Run Consulting.

The hydrologic design flows simulated by the model ranged from the 2-year to 100-year recurrence interval and are shown in the table below.

Return Period (Years)	Flow (cfs)
2	378
5	993
10	1,505
25	2,613
100	4,904

3.0 Hydraulics

The hydraulic routing of design flows is estimated using the 1D HEC-RAS model. The hydraulic conditions are represented in our rebuilt model by 22 cross-sections spanning approximately 900 linear ft. of Markleeville Creek and adjacent floodplain. The average distance between cross-sections is 40 ft. and the largest distance between two cross-sections is 134 ft. (downstream distance from the most upstream cross-section). For comparison, the existing conditions HEC-RAS model developed by RCI consisted of 20 cross-sections spanning 2,830 linear feet typically spaced 50 ft. apart, with the largest distance between two cross-sections being 452 ft. at the upstream end of the reach.

3.1 Existing Conditions

Cardno ENTRIX developed a digital elevation model (DEM) from the survey point information from RCI in order to create a dynamic HEC-RAS model that would be able to be updated with existing and proposed topography changes automatically. Cardno ENTRIX then cut cross-sections using GEO-RAS and imported them into HEC-RAS. The model includes the Highway 89 Bridge upstream of the project area. Bridge geometry was assumed from survey point information.

Flood walls were also represented in the existing condition model. The west floodwall is represented as a lateral weir because there are no topographic data points on the wall. Flows that overtop the floodwall elevation are directed to return to Markleeville Creek via Millberry Creek. The east floodwall is represented by topographic points.

Manning's roughness values ("n" values) were estimated during field visits by experienced hydraulic engineers and geomorphologists. Channel roughness ranges from 0.035 to 0.06, and overbank roughness ranges from 0.055 (barren floodplain) to 0.1 (thick vegetation).

In the existing condition, flows are largely confined to Markleeville Creek due to the presence of the floodwalls. Flows do not activate the west floodplain until the 25-year event, and they do not activate the east floodplain until the 100-year event. In the 100-year event, the Highway 89 Bridge experiences pressure flow, and the water surface elevation drops nearly seven feet from the cross-section upstream of the bridge to the cross-section downstream of the bridge, resulting in relatively high velocities and shear forces downstream of the bridge. Additionally, flows are slightly confined at the downstream end of the project area by a crib wall on the west overbank, and a large boulder bar on the east overbank that formed from debris deposition in the 1997 flood. Appendix A provides existing condition output HEC-RAS.

3.2 90% Design Conditions

The objective of the proposed 90% design was to increase frequency, as well as extend activation floodplain inundation. Cardno ENTRIX performed several design iterations in order to reach these goals. Ultimately, the 90% proposed design modeled: removing existing floodwalls; altering the Markleeville Creek channel geometry by narrowing the channel, lowering the banks of the channel, and modifying the bed elevations; excavating imported fill from the overbanks in order to lower the adjacent floodplain elevation; and excavating material from the downstream east boulder bar and projecting the east top of bank elevation to tie-into existing ground behind the boulder bar. Additionally, Manning's roughness values were modified to represent added floodplain roughness and mature revegetation in the disturbed upland areas.

The results of the 90% design showed partial floodplain activation in the two-year event and full floodplain activation in the five-year event. Due to the increased capacity for the 100-year event downstream of the bridge, the proposed 100-year water surface elevation was slightly lower than the existing 100-year water surface elevation. Relatively high velocities and shear forces immediately downstream of the bridge remained. Appendix B provides 90% design HEC-RAS output.

3.3 95% Design Conditions

Review of the 90% design and costs made by TAC members resulted in a request to minimize disturbance (particularly in the channel) and reduce construction costs. It was understood and agreed upon that the floodplain activation extent and recurrence interval would not need to match that of the 90% design, but would be an improvement from the existing condition. The proposed 95% design does not significantly alter channel geometry, and restricts lowering of bank heights to locations that will be disturbed by floodwall removal. The west floodplain footprint is slightly smaller, and the east floodplain footprint is limited to the area behind the existing floodwall. The east and west floodwalls remain in place downstream of the bridge through the Caltrans Right-of-Way, then transition to the finished floodplain elevation. The design of the proposed downstream boulder bar removal on the east overbank remains the same as the 90% design.

The 95% results show significant floodplain activation in the 5-year event but without the channel capacity changes proposed under the 90%, the floodplain would not broadly be inundated in the 2-year event.. As for the 90% design, increased capacity for the 100-year event downstream of the bridge lowers the proposed 100-year water surface elevation slightly. Relatively high velocities and shear forces immediately downstream of the bridge remain. Appendix C provides the 95% HEC-RAS design output.

4.0 Conclusions and Recommendations

In conclusion, the proposed 95% design for the Markleeville Creek Restoration Project will improve floodplain activation downstream of the Highway 89 Bridge. However, the existing bridge is undersized for the 100-year event and creates a substantial constriction and backwater effect that produces high shear forces and velocities downstream of the bridge under the existing and proposed conditions. These output data have been used to guide bank and bed protection design in the riffle downstream of the bridge.

Cardno ENTRIX
Shaping the Future

Appendix A
Existing Condition HEC-RAS Result

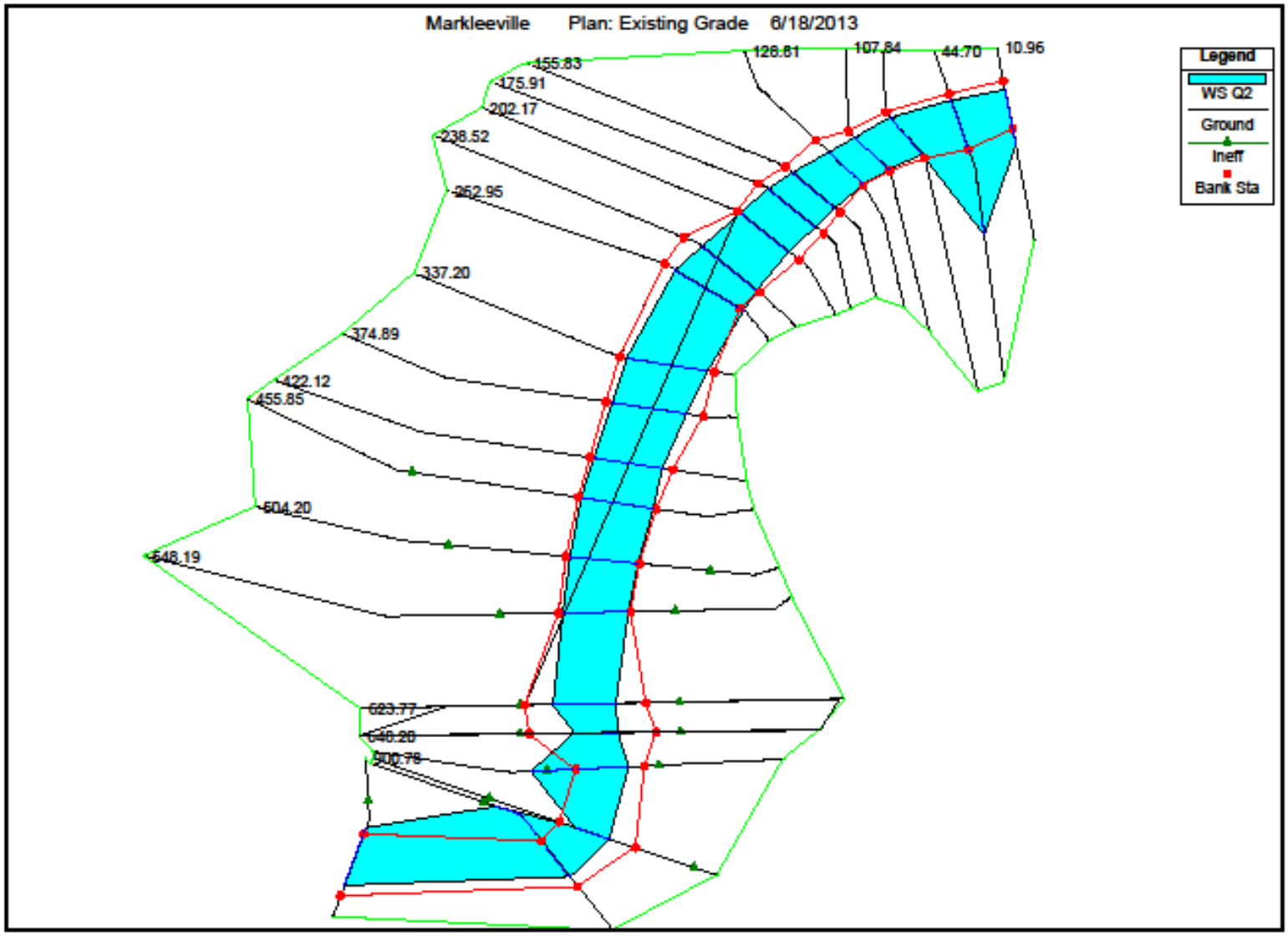

Figure A-1: Existing Condition Plan with 2-Year Water Surface

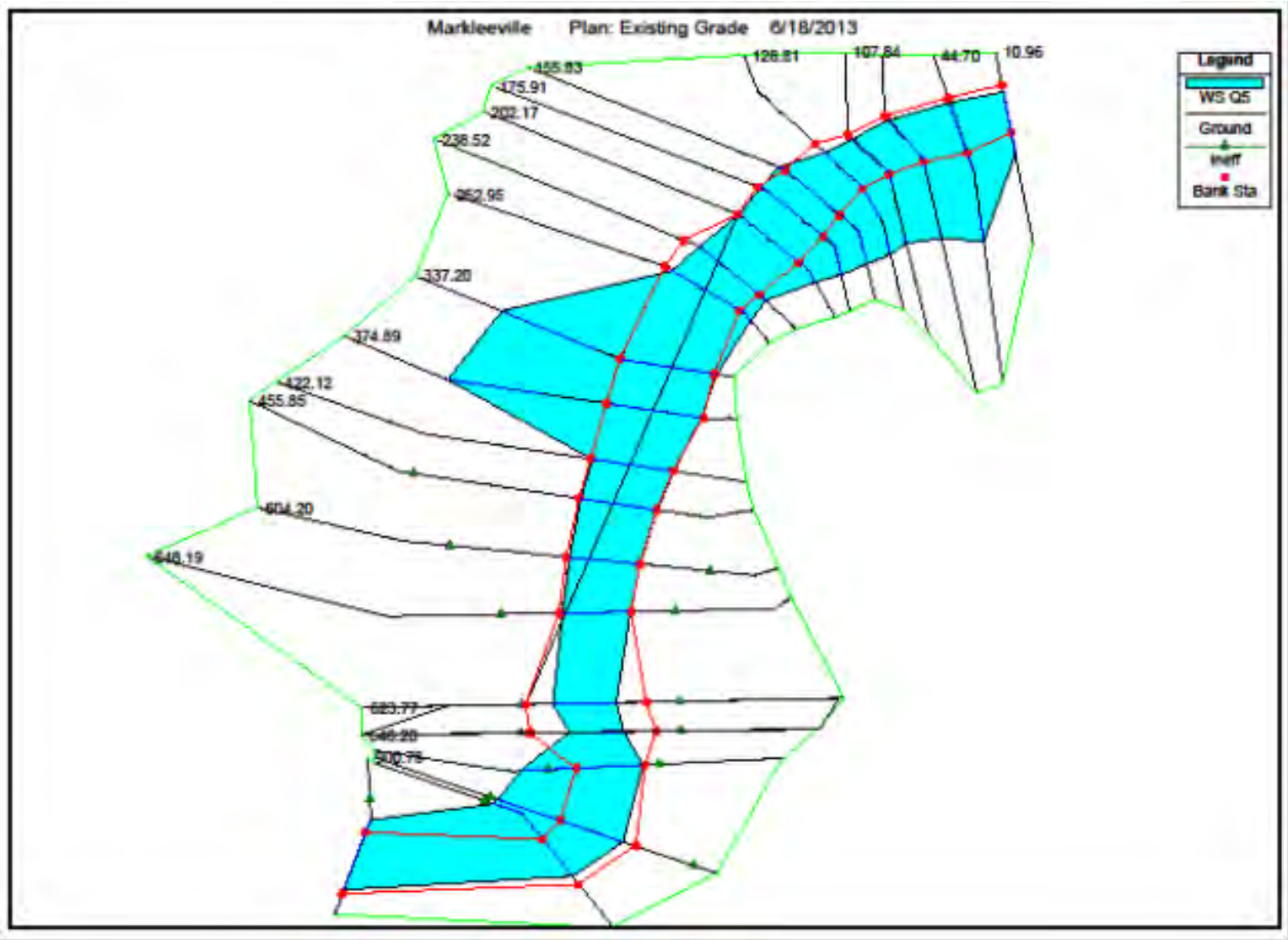

Figure A-2: Existing Condition Plan with 5-Year Water Surface

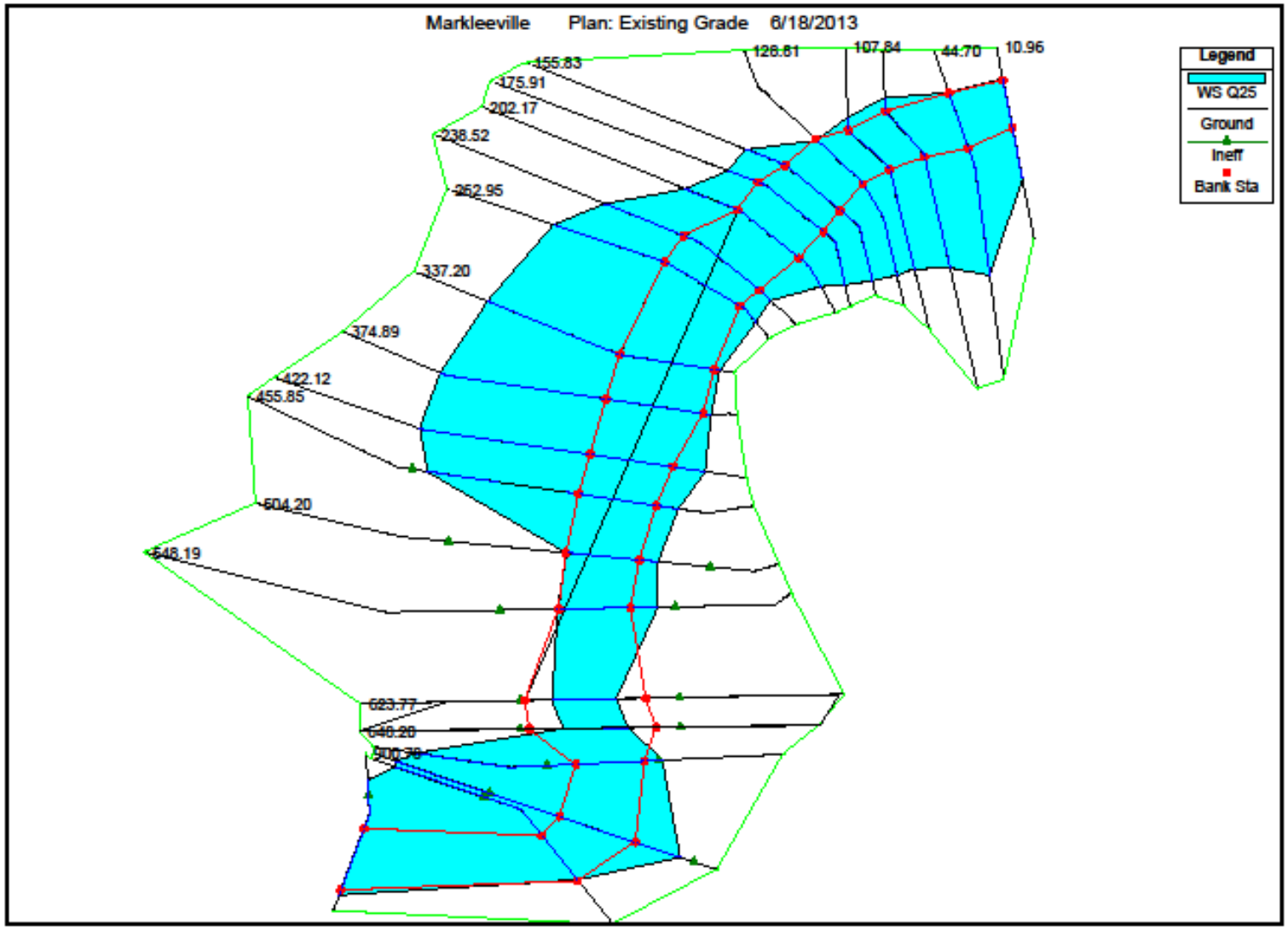

Figure A-3: Existing Condition Plan with 25-Year Water Surface

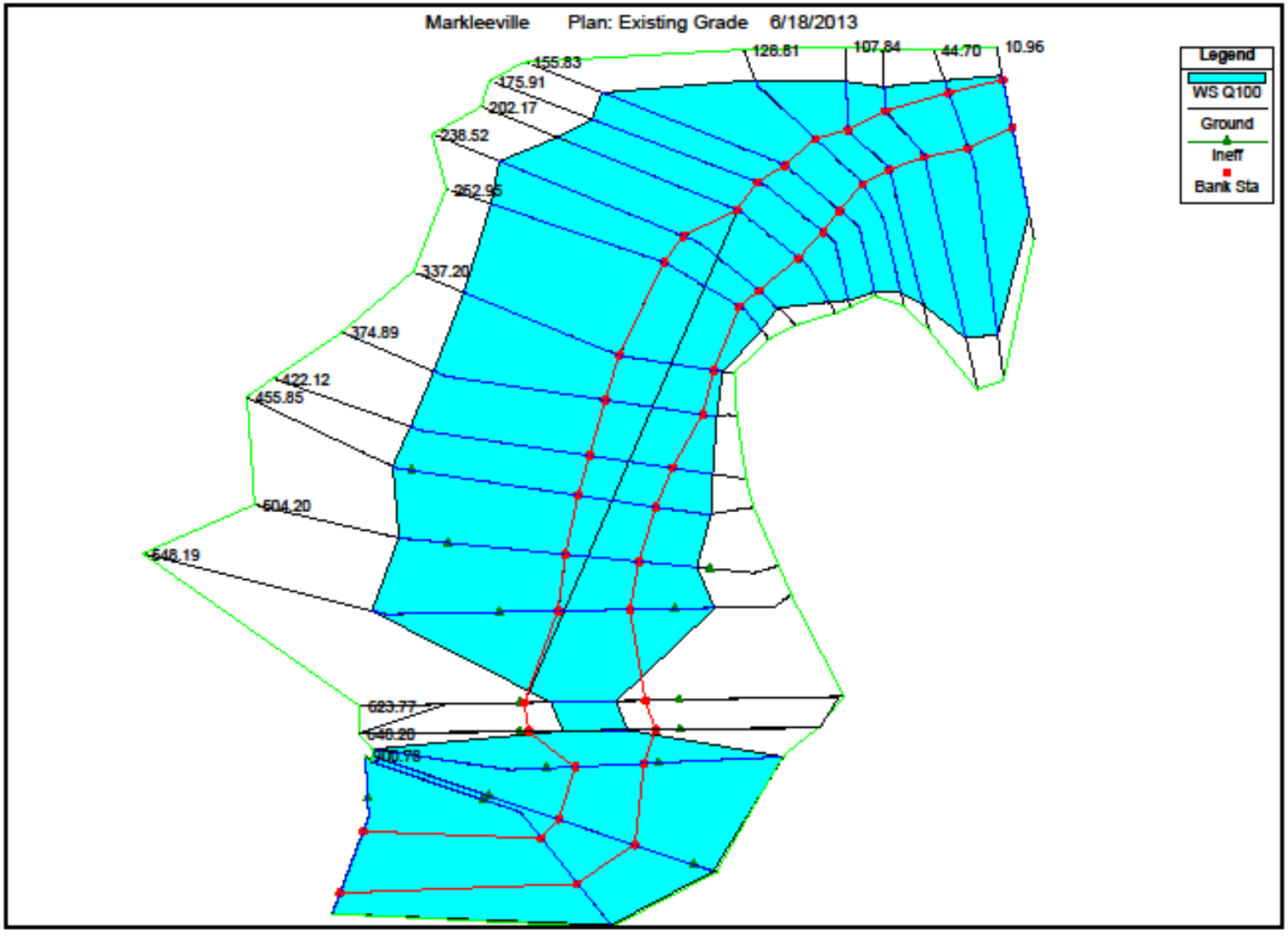

Figure A-4: Existing Condition Plan with 100-Year Water Surface

HEC-RAS Plan: EG River: Markleeville Reach: Markleeville Profile: Q100

Reach	River Sta	Profile	W.S. Elev	Area Left	Area Channel	Area Right	Vel Left	Vel Chnl	Vel Right	Vel Total	Shear LOB	Shear Chan	Shear ROB
			(ft)	(sq ft)	(sq ft)	(sq ft)	(ft/s)	(ft/s)	(ft/s)	(ft/s)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)
Markleeville	900.78	Q100	5505.03	323.86	690.97	103.92	5.05	5.92	4.61	5.71	0.94	1.37	0.82
Markleeville	766.27	Q100	5505.09	539.54	1115.47	204.70		4.07	1.95	3.74		0.42	0.17
Markleeville	732.34	Q100	5505.12	558.23	1282.30	334.28		3.42	2.02	3.16		0.33	0.19
Markleeville	677.24	Q100	5504.80	653.79	1101.69	263.73		5.41	2.89	5.19		0.55	0.35
Markleeville	648.20	Q100	5503.64		535.29			9.16		9.16		1.84	
Markleeville	624		Bridge										
Markleeville	623.77	Q100	5496.29		311.55			15.74		15.74		7.83	
Markleeville	620		Lat Struct										
Markleeville	548.19	Q100	5496.17	76.97	384.64	58.52	3.19	12.01	3.46	10.45	0.38	3.53	0.97
Markleeville	504.20	Q100	5496.00	86.52	402.38	55.20	3.50	11.34	2.55	9.53	0.43	2.77	0.61
Markleeville	455.85	Q100	5496.24	281.74	399.88	73.12	3.73	9.31	2.71	6.66	0.73	2.05	0.59
Markleeville	422.12	Q100	5496.38	413.75	419.22	68.20	3.52	7.90	1.96	5.44	0.56	1.12	0.39
Markleeville	374.89	Q100	5496.54	527.81	497.54	22.66	4.57	4.94	1.40	4.68	0.43	0.70	0.21
Markleeville	337.20	Q100	5496.45	499.73	504.80	15.33	4.57	5.15	1.29	4.81	0.42	0.76	0.18
Markleeville	262.95	Q100	5495.98	381.69	443.55	91.56	3.67	7.46	2.13	5.35	0.64	1.91	0.82
Markleeville	238.52	Q100	5495.77	341.99	344.94	151.19	3.73	8.33	4.98	5.85	0.63	2.37	1.25
Markleeville	202.17	Q100	5495.61	283.70	312.49	281.46	2.55	8.45	5.47	5.59	0.66	2.45	1.31
Markleeville	175.91	Q100	5495.63	285.66	424.18	276.34	1.95	7.05	4.90	4.97	0.51	1.75	1.00
Markleeville	155.83	Q100	5495.60	359.69	406.62	368.58	1.84	7.11	3.66	4.32	0.57	1.75	1.04
Markleeville	128.81	Q100	5495.45	189.36	336.99	474.34	8.48	5.53	3.03	4.90	0.29	1.03	0.57
Markleeville	107.84	Q100	5495.45	144.42	356.91	538.62	2.65	7.07	3.71	4.72	0.57	1.68	0.86
Markleeville	81.76	Q100	5495.42	84.44	407.71	655.29	2.50	6.69	3.00	4.27	0.42	1.21	0.55
Markleeville	44.70	Q100	5495.42	55.07	446.96	745.59	2.79	6.06	2.74	3.93	0.28	0.97	0.45
Markleeville	10.96	Q100	5494.50	94.69	295.75	304.25	6.90	10.06	4.19	7.06	1.27	2.67	1.10

Table A-1: Existing Conditions Variables at 100-Year Event

Appendix B
90% Design HEC-RAS Results

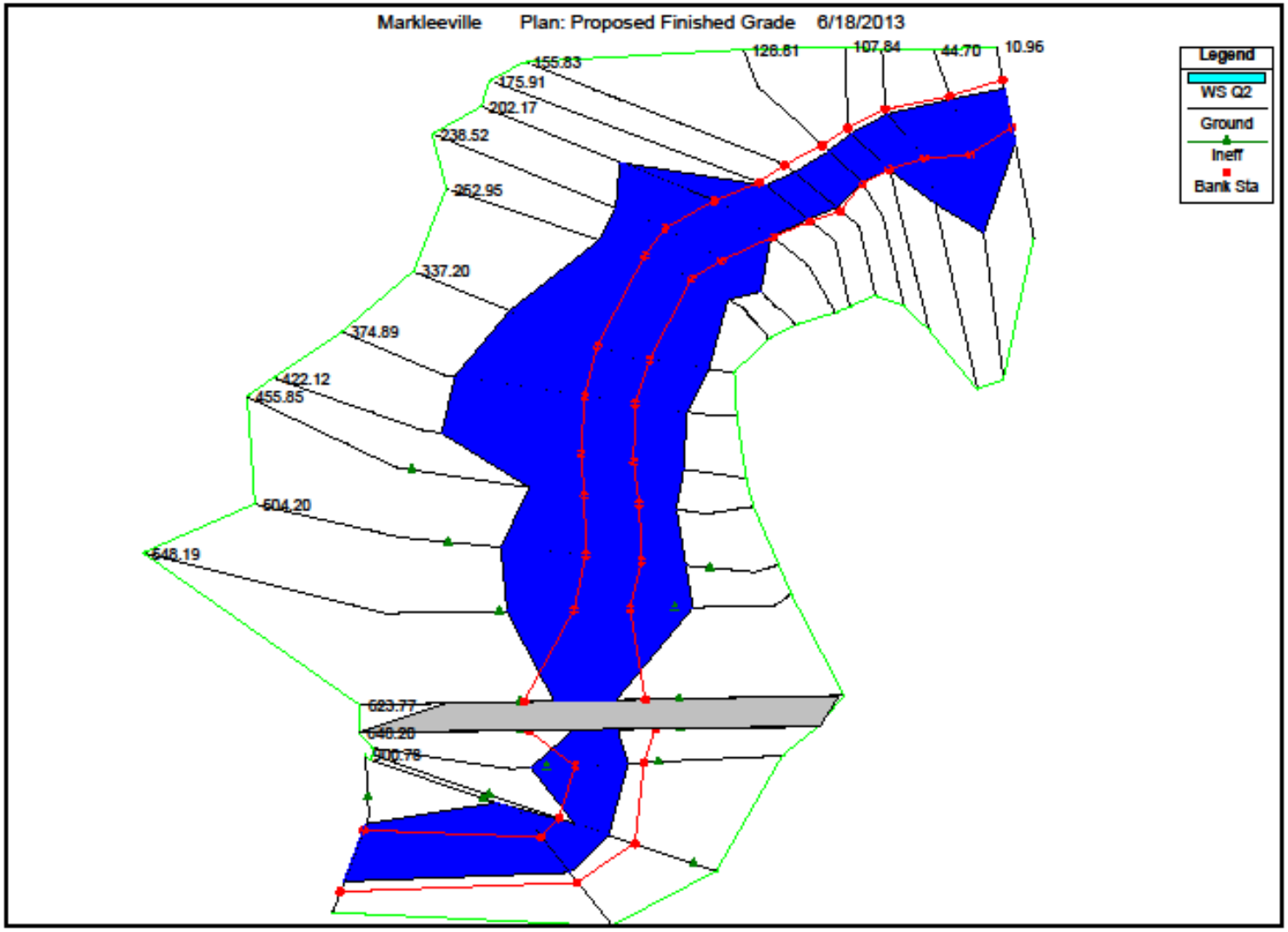

Figure B-1: 90% Design Plan with 2-Year Water Surface

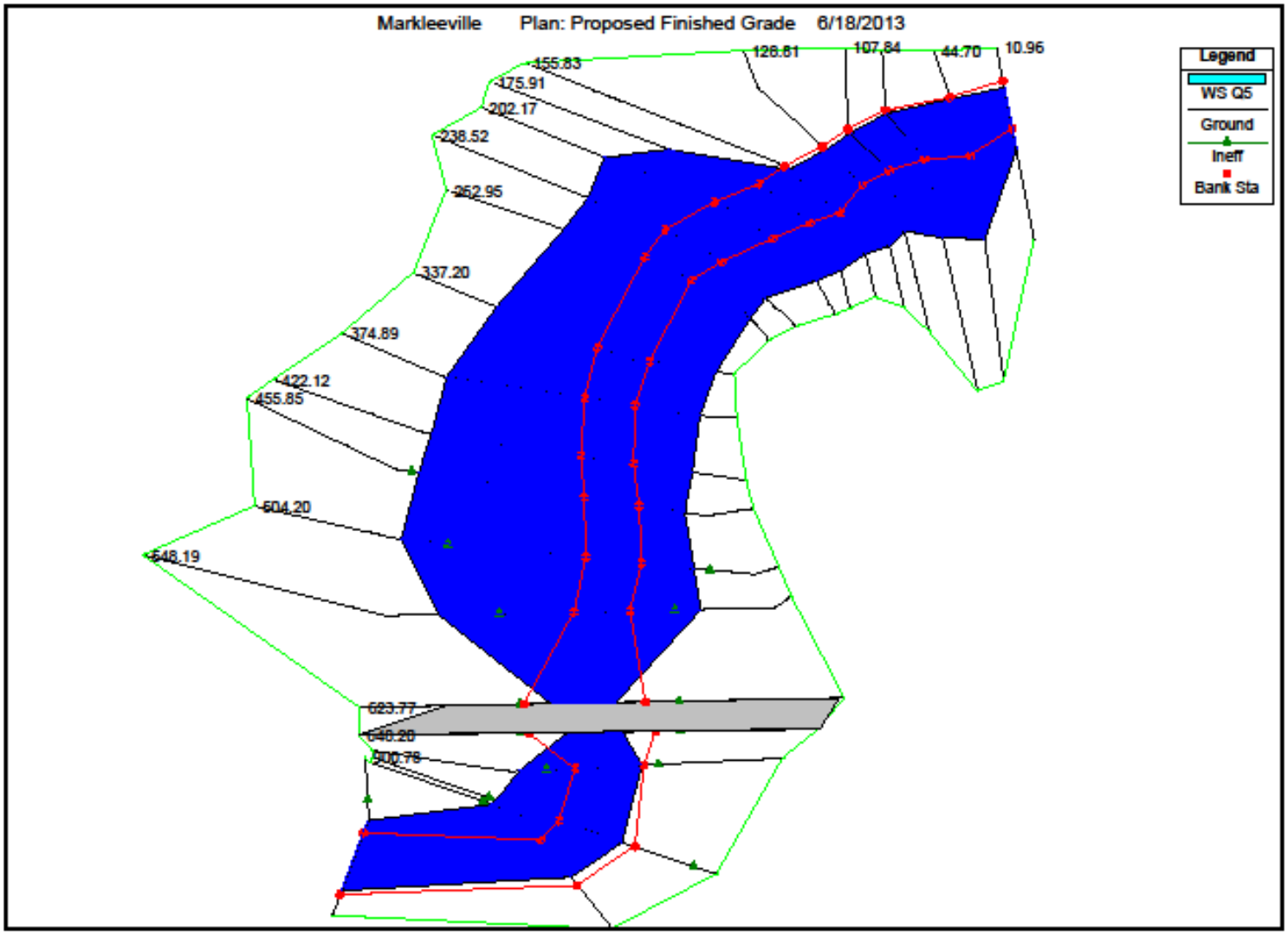

Figure B-2: 90% Design Plan with 5-Year Water Surface

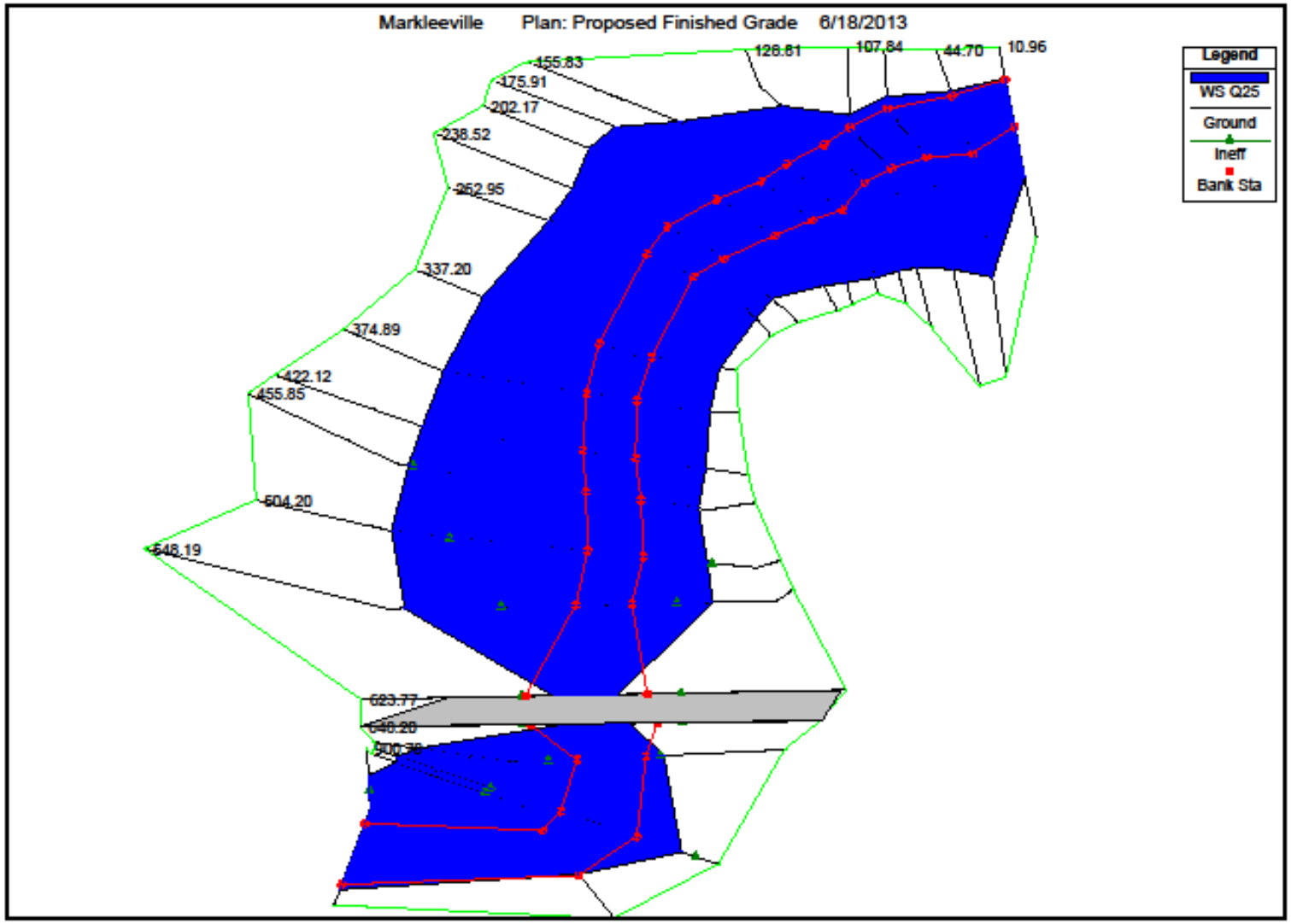

Figure B-1: 90% Design Plan with 25-Year Water Surface

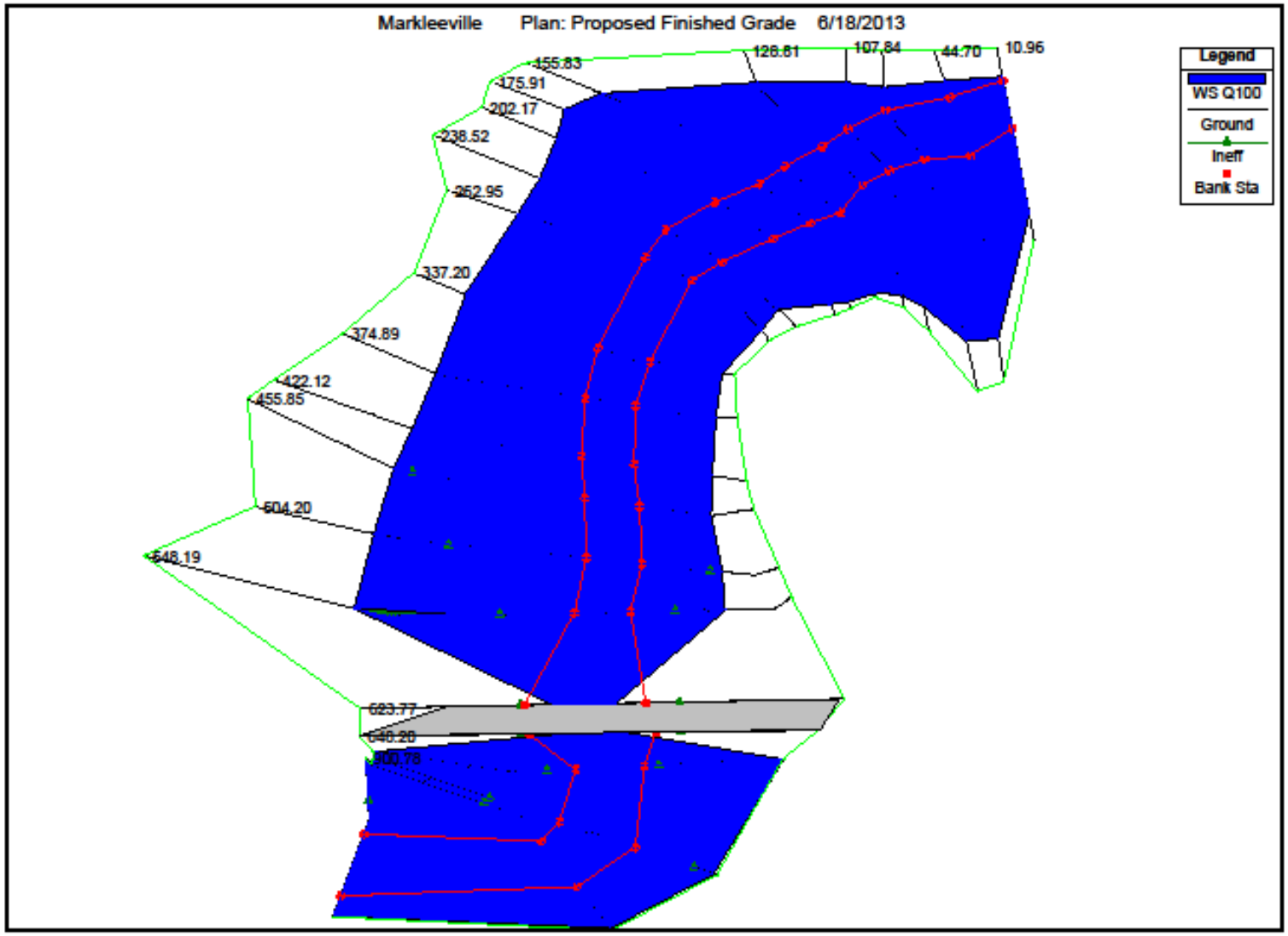

Figure B-1: 90% Design Plan with 100-Year Water Surface

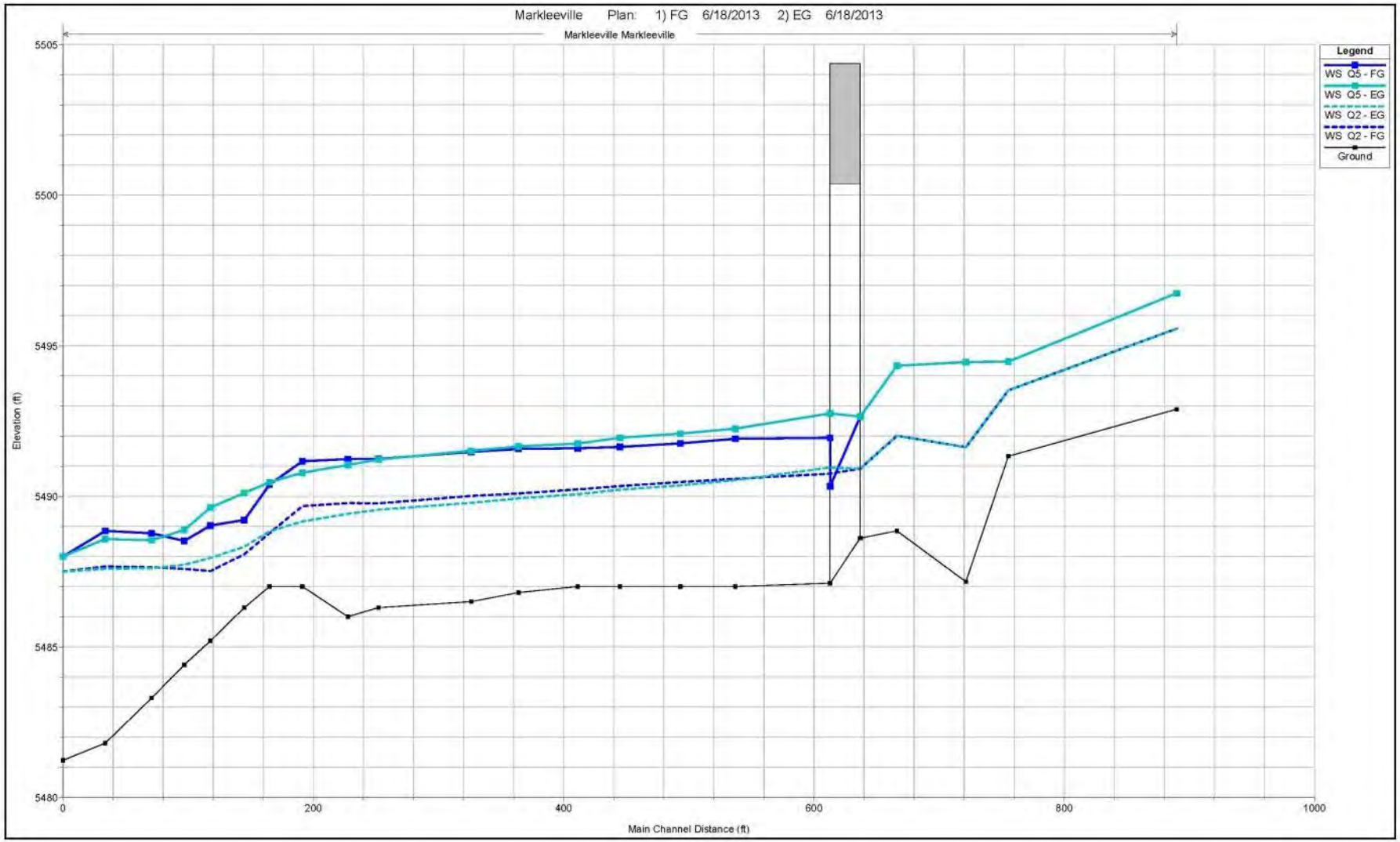

Figure B-5: Existing Condition (EG) and 90% Design (FG) Water Surface Profiles for 2 and 5-year Events

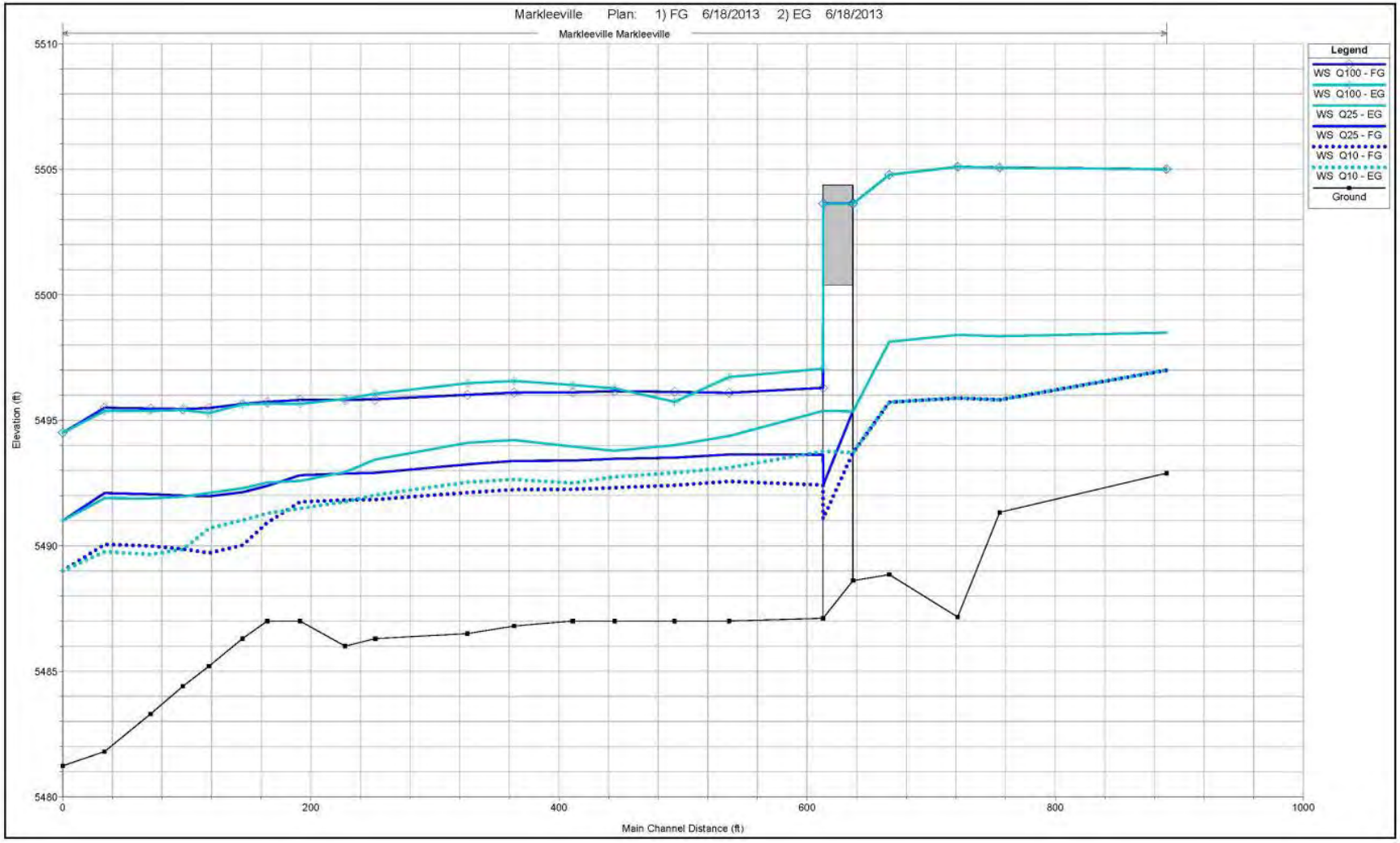

Figure B-6: Existing Condition (EG) and 90% Design (FG) Water Surface Profiles for 10, 25, and 100-year Events

HEC-RAS Plan: 90% River: Markleeville Reach: Markleeville Profile: Q100

Reach	River Sta	Profile	W.S. Elev	Area Left	Area Channel	Area Right	Vel Left	Vel Chnl	Vel Right	Vel Total	Shear LOB	Shear Chan	Shear ROB
			(ft)	(sq ft)	(sq ft)	(sq ft)	(ft/s)	(ft/s)	(ft/s)	(ft/s)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)
Markleeville	900.78	Q100	5505.00	448.63	570.71	95.90	5.32	5.91	3.52	5.50	1.00	1.35	0.54
Markleeville	766.27	Q100	5505.07	1147.75	517.00	190.42	3.69	4.51	1.89	3.75	0.42	0.41	0.17
Markleeville	732.34	Q100	5505.10	1161.62	674.96	333.11	2.80	4.00	1.94	3.16	0.30	0.31	0.18
Markleeville	677.24	Q100	5504.78	1151.34	601.30	262.29	4.37	5.83	3.15	5.19	0.67	0.64	0.41
Markleeville	648.20	Q100	5503.64		535.29			9.16		9.16		1.84	
Markleeville	624		Bridge										
Markleeville	623.77	Q100	5496.29		311.55			15.74		15.74		7.83	
Markleeville	548.19	Q100	5496.09	574.11	299.75	292.37	6.94	7.70	4.20	6.61	0.93	1.33	0.98
Markleeville	504.20	Q100	5496.13	691.45	302.18	234.86	3.57	7.81	3.36	4.77	0.72	1.04	0.66
Markleeville	455.85	Q100	5496.16	635.69	301.62	213.89	3.89	6.35	2.86	4.35	0.60	0.90	0.50
Markleeville	422.12	Q100	5496.11	609.68	287.66	258.22	3.57	6.45	3.37	4.24	0.48	0.71	0.44
Markleeville	374.89	Q100	5496.10	559.18	286.79	274.09	4.55	4.48	3.92	4.38	0.39	0.56	0.35
Markleeville	337.20	Q100	5496.01	496.90	315.52	267.07	4.66	4.97	3.83	4.54	0.42	0.69	0.44
Markleeville	262.95	Q100	5495.83	405.96	316.59	319.25	4.00	6.06	4.27	4.71	0.68	1.26	0.76
Markleeville	238.52	Q100	5495.81	414.52	409.39	283.21	3.57	5.55	4.07	4.43	0.54	1.05	0.62
Markleeville	202.17	Q100	5495.81	603.24	388.34	305.40	3.17	4.98	3.47	3.78	0.58	0.88	0.51
Markleeville	175.91	Q100	5495.73	602.60	366.43	358.08	3.11	5.54	2.78	3.70	0.60	1.09	0.68
Markleeville	155.83	Q100	5495.65	447.22	435.50	389.42	2.73	5.61	3.19	3.85	0.46	1.10	0.71
Markleeville	128.81	Q100	5495.49	214.36	371.28	525.79	2.63	6.24	3.85	4.41	0.48	1.33	0.85
Markleeville	107.84	Q100	5495.45	112.72	428.34	602.42	1.82	6.01	3.53	4.29	0.37	1.21	0.69
Markleeville	81.76	Q100	5495.47	56.17	530.63	760.05	1.34	5.29	2.66	3.64	0.20	0.74	0.36
Markleeville	44.70	Q100	5495.50	35.20	628.14	899.08	0.90	4.43	2.32	3.14	0.10	0.49	0.25
Markleeville	10.96	Q100	5494.50	8.07	382.37	304.25	3.10	9.37	4.26	7.06	0.39	2.42	1.14

Table B-1 90% Design Variables at 100-Year Event

Appendix C

95% Design HEC-RAS Results

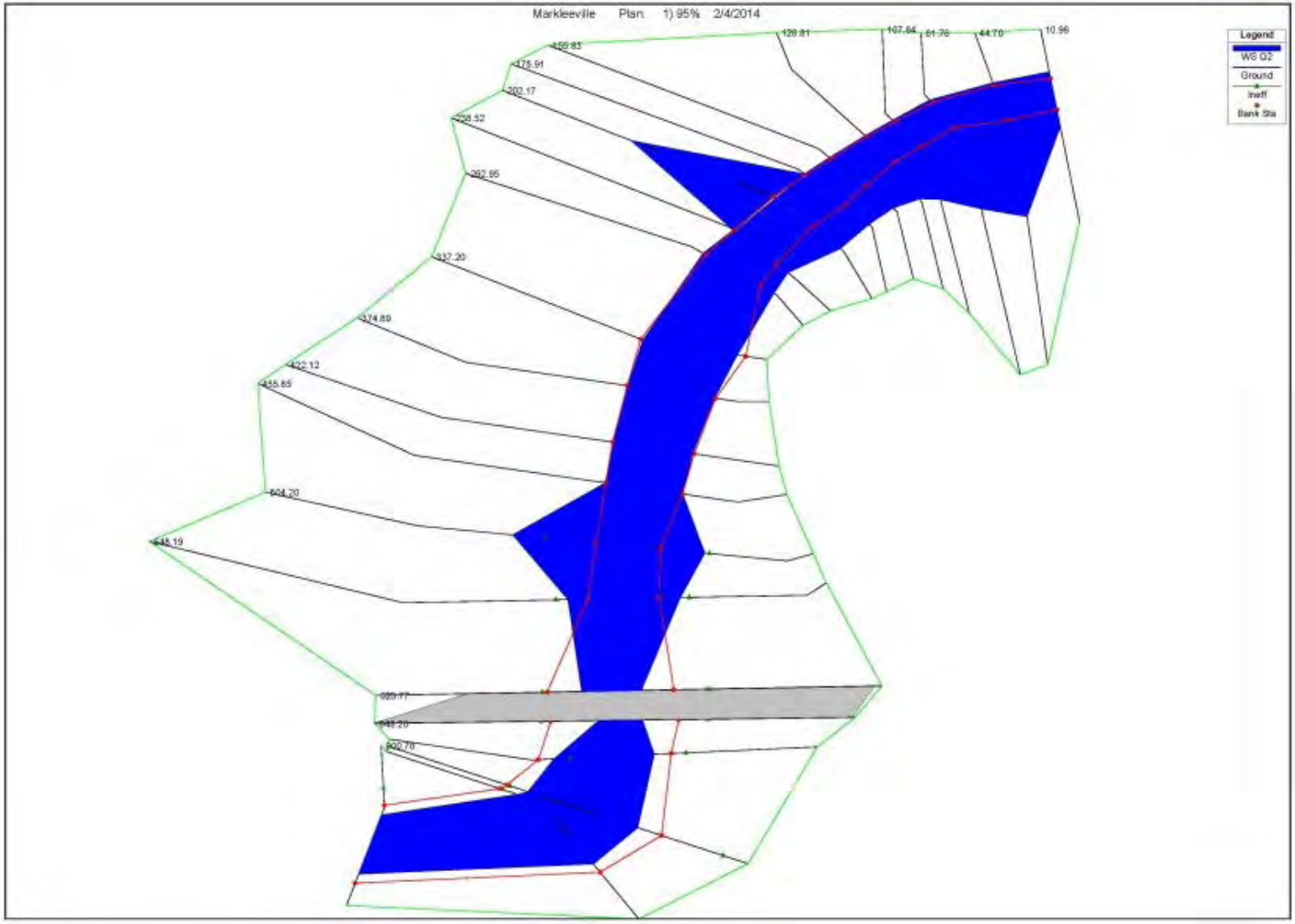

Figure C-1: 95% Design with 2-Year Water Surface

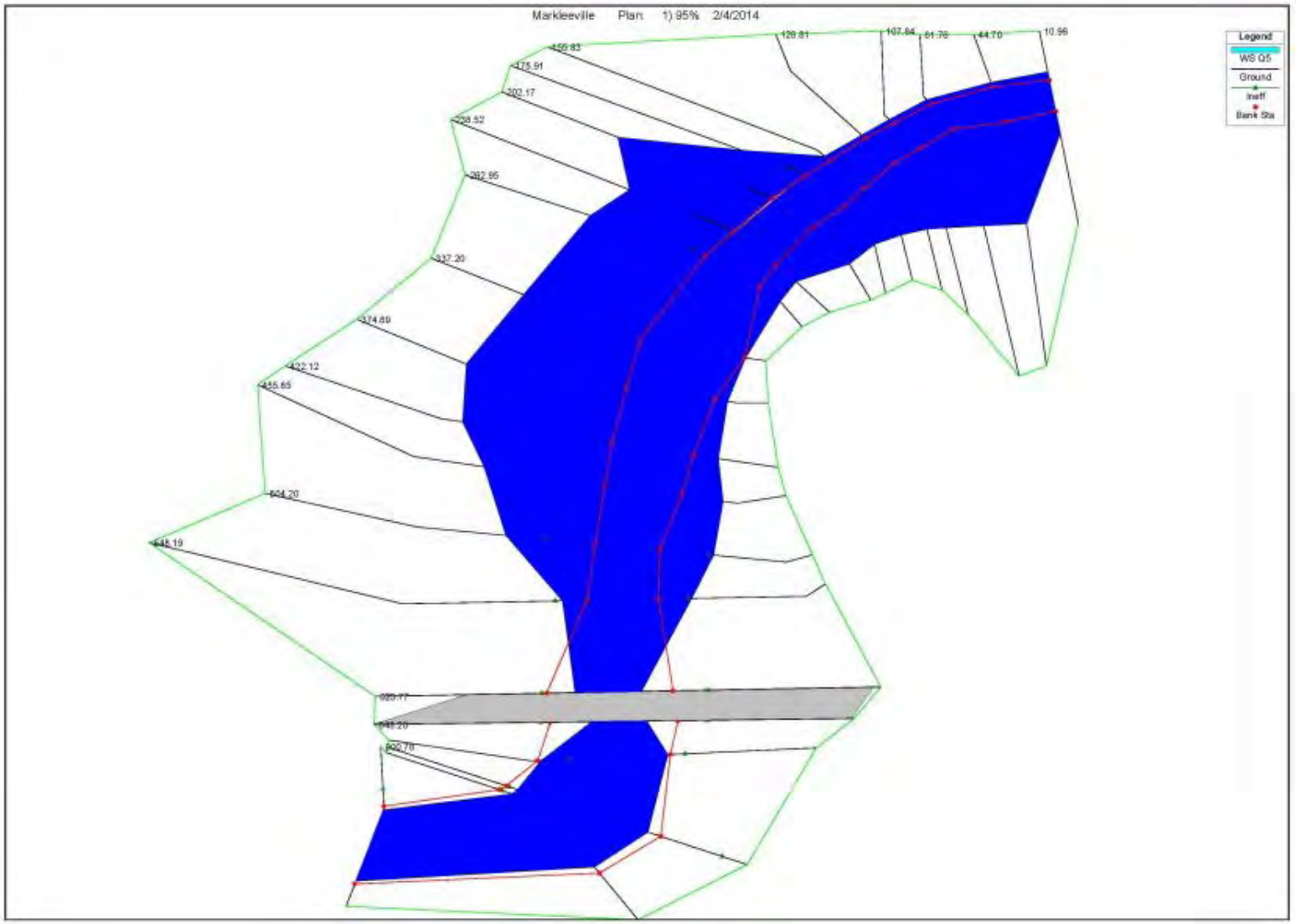

Figure C-2: 95% Design with 5-Year Water Surface

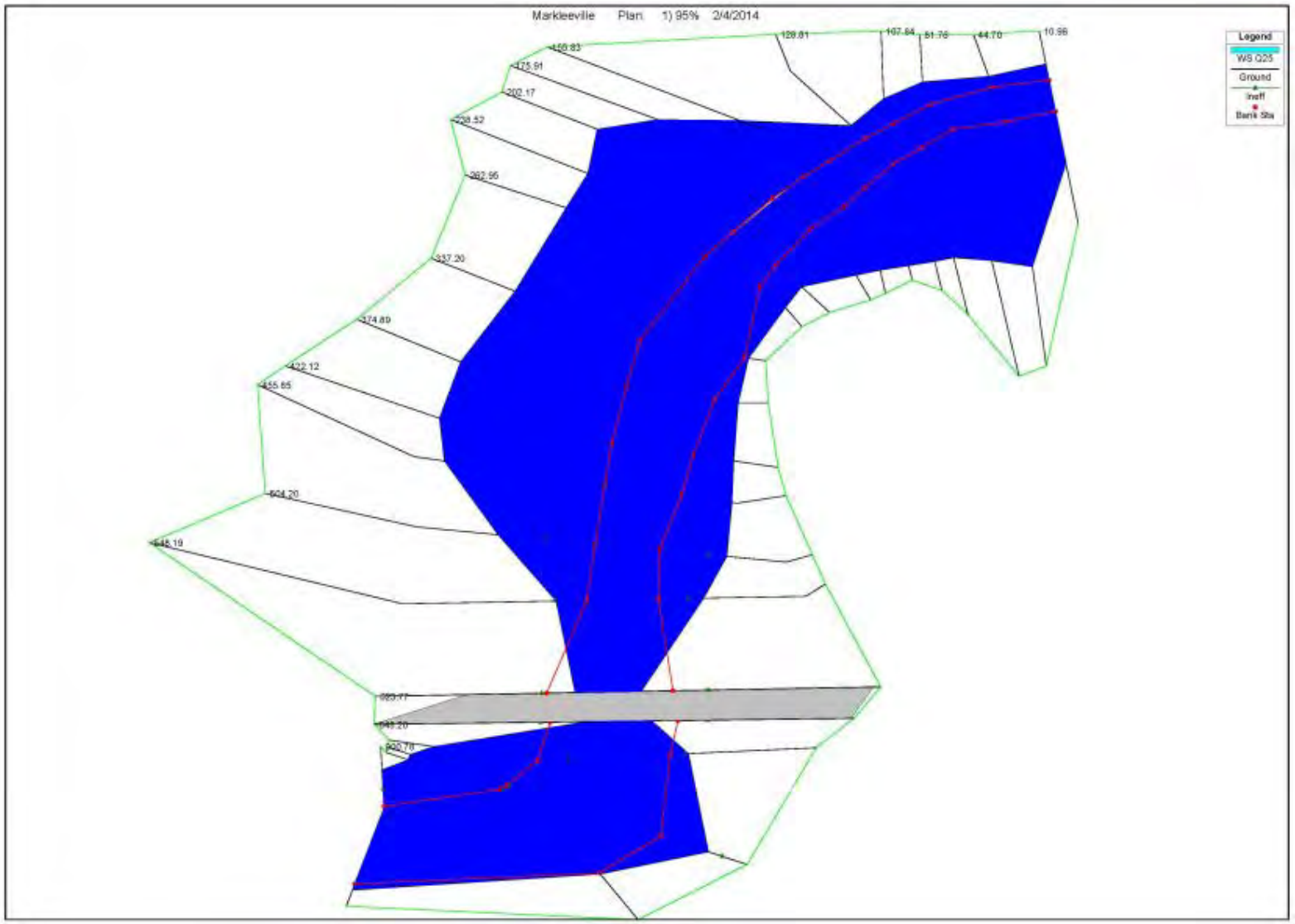

Figure C-3: 95% Design with 25-Year Water Surface

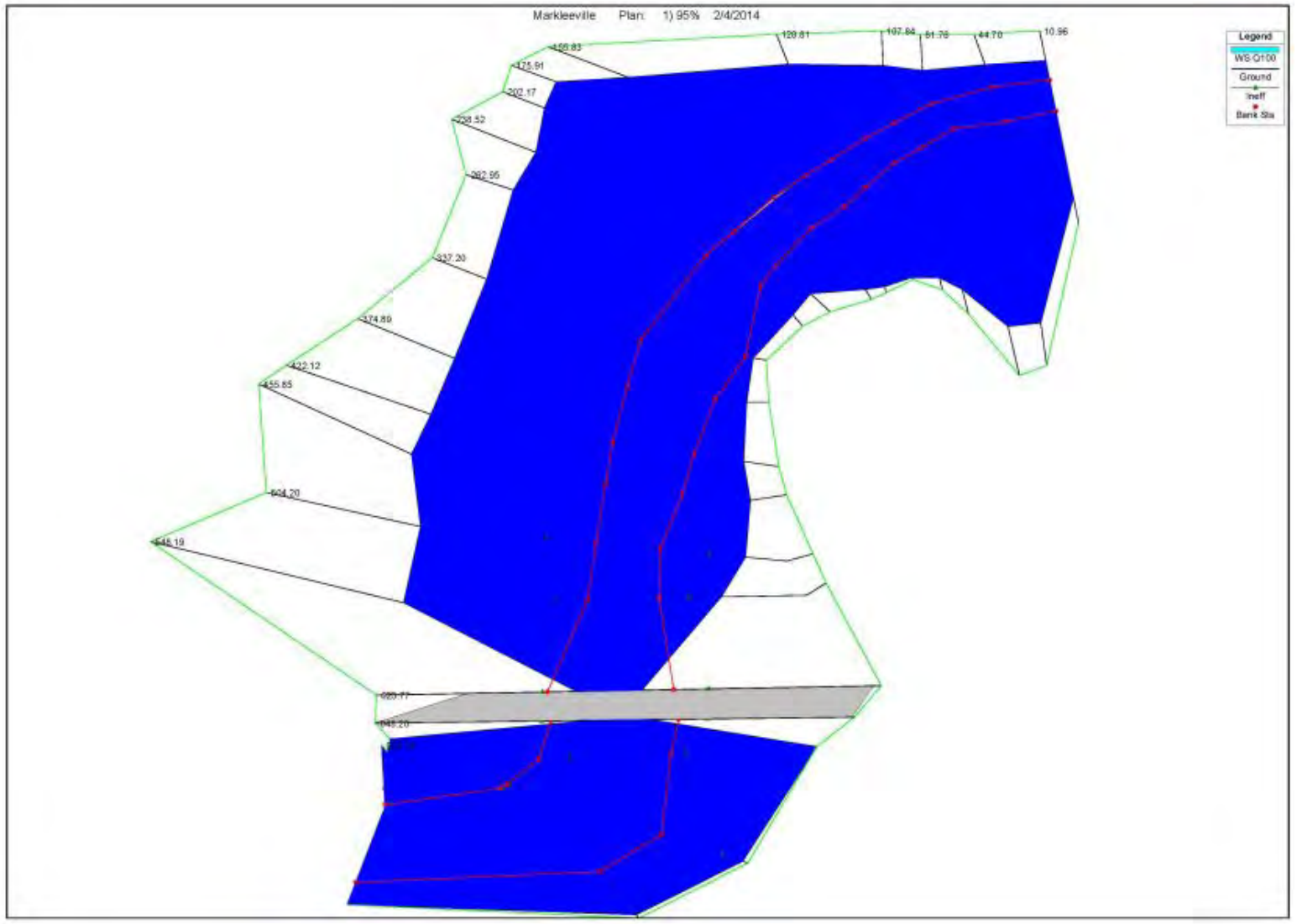

Figure C-4: 95% Design with 100-Year Water Surface

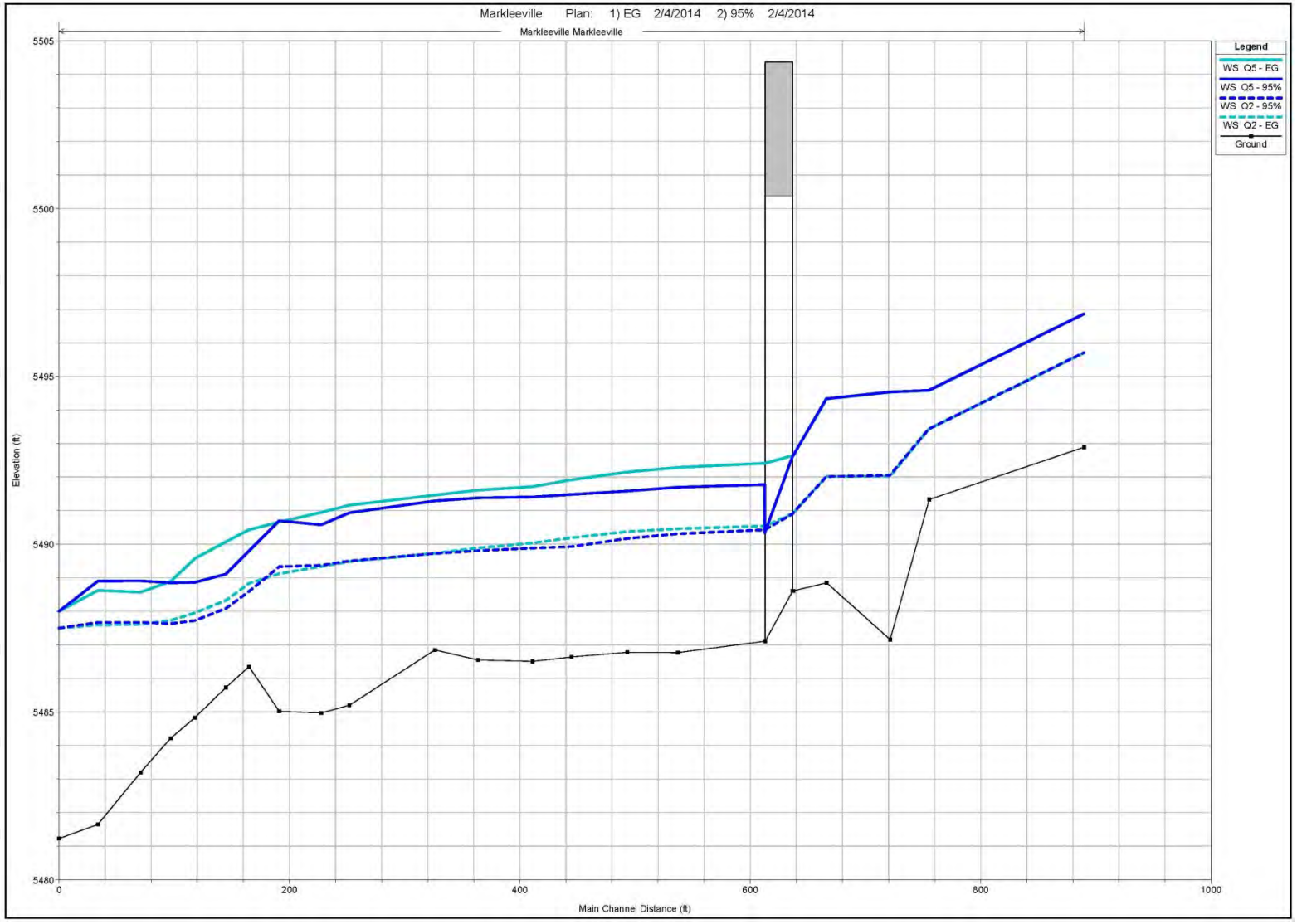

Figure C-5: Existing Condition (EG) and 95% Design (FG) Water Surface Profiles for 2 and 5-year Events

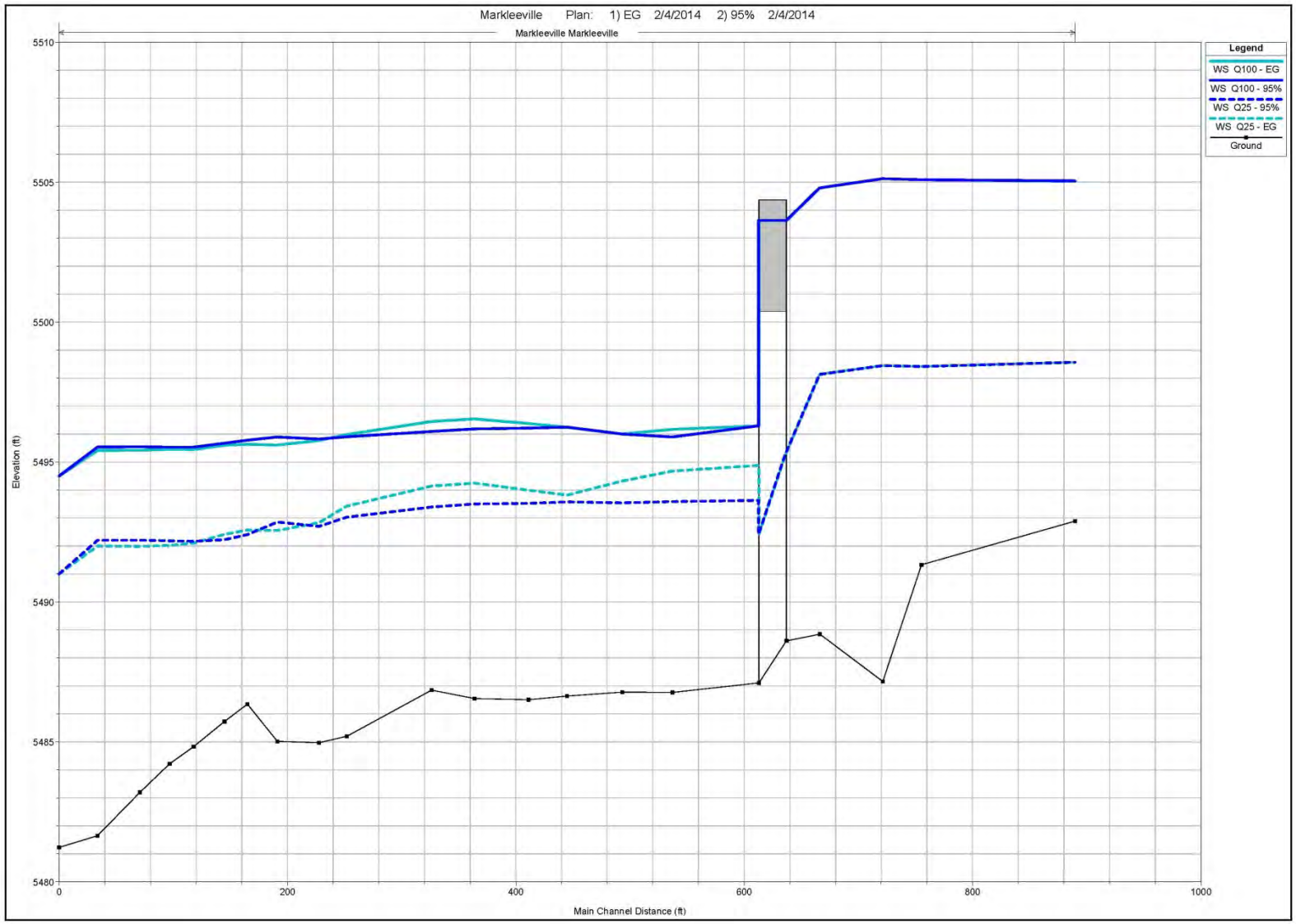

Figure C-6: Existing Condition (EG) and 95% Design (FG) Water Surface Profiles for 25 and 100-year Events

HEC-RAS Plan: 95% River: Markleeville Reach: Markleeville Profile: Q100

Reach	River Sta	Profile	W.S. Elev	Area Left	Area Channel	Area Right	Vel Left	Vel Chnl	Vel Right	Vel Total	Shear LOB	Shear Chan	Shear ROB
			(ft)	(sq ft)	(sq ft)	(sq ft)	(ft/s)	(ft/s)	(ft/s)	(ft/s)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)
Markleeville	900.78	Q100	5505.05	324.74	695.10	103.32	4.96	5.81	3.59	5.46	0.91	1.32	0.56
Markleeville	766.27	Q100	5505.09	531.83	1122.59	205.19		4.07	1.95	3.74		0.42	0.17
Markleeville	732.34	Q100	5505.12	556.81	1280.67	336.98		3.42	2.03	3.16		0.33	0.19
Markleeville	677.24	Q100	5504.79	653.70	1101.86	263.38		5.40	2.89	5.19		0.55	0.35
Markleeville	648.20	Q100	5503.64		535.41			9.16		9.16		1.84	
Markleeville	624		Bridge										
Markleeville	623.77	Q100	5496.29		311.59			15.74		15.74		7.82	
Markleeville	548.19	Q100	5495.90	153.85	366.13	145.92	8.07	9.80	5.17	8.67	1.33	2.19	1.53
Markleeville	504.20	Q100	5496.00	368.30	337.34	232.40	5.27	8.61	5.87	7.04	1.56	2.12	1.54
Markleeville	455.85	Q100	5496.25	578.80	394.88	188.99	3.64	5.74	2.81	4.22	0.54	0.92	0.49
Markleeville	422.12	Q100	5496.21	623.13	434.53	132.50	3.39	5.55	2.86	4.12	0.42	0.65	0.32
Markleeville	374.89	Q100	5496.18	623.17	476.56	77.02	4.25	4.45	1.75	4.17	0.37	0.55	0.24
Markleeville	337.20	Q100	5496.09	535.71	543.96	13.33	4.32	4.74	1.13	4.49	0.39	0.64	0.14
Markleeville	262.95	Q100	5495.90	554.74	383.68	145.69	3.69	6.06	3.63	4.52	0.59	1.25	0.63
Markleeville	262		Lat Struct										
Markleeville	238.52	Q100	5495.82	557.40	346.77	152.74	3.73	6.28	4.22	4.64	0.62	1.35	0.71
Markleeville	202.17	Q100	5495.90	821.54	322.17	314.39	2.83	4.74	3.35	3.36	0.44	0.76	0.43
Markleeville	175.91	Q100	5495.78	659.23	303.49	400.06	2.93	5.77	3.06	3.60	0.51	1.14	0.71
Markleeville	155.83	Q100	5495.67	440.19	286.64	500.08	2.80	6.15	3.82	4.00	0.43	1.27	0.83
Markleeville	128.81	Q100	5495.53	218.57	269.63	618.56	2.71	6.51	4.13	4.43	0.39	1.40	0.88
Markleeville	107.84	Q100	5495.53	179.44	270.26	729.63	2.62	6.08	3.82	4.16	0.41	1.20	0.72
Markleeville	81.76	Q100	5495.54	120.02	274.34	962.10	2.55	5.53	3.20	3.62	0.28	0.79	0.42
Markleeville	44.70	Q100	5495.53	73.24	346.08	1038.37	2.26	4.93	2.92	3.36	0.19	0.63	0.35
Markleeville	10.96	Q100	5494.50	93.19	286.52	318.34	6.84	10.07	4.34	7.03	1.24	2.66	1.12

Table C-1 Existing Conditions and 95% Design Variables at 100-Year Event

Markleeville Creek Floodplain Restoration Project
Initial Study/Mitigated Negative Declaration
Volume II – Appendices A-G

APPENDIX E

WETLAND DELINEATION REPORT

Ordinary High Water Mark & Wetland Delineation Report

Markleeville Creek Restoration Project

Cardno ENTRIX

Shaping the Future

Document Information

Prepared for	Alpine Watershed Group
Project Name	Markleeville Creek Restoration Project
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Acronyms

AWG	Alpine Watershed Group
CEQA	California Environmental Quality Act
CWA	Clean Water Act
CWHR	California Wildlife Habitat Relationship
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FAC	Facultative
FACU	Facultative Upland
FACW	Facultative Wetland
GPS	Global Positioning System
MPUD	Markleeville Public Utility District
NRCS	Natural Resource Conservation Service
OBL	Obligate
OHW	Ordinary High Water
OHWM	Ordinary High Water Mark
RWQCB	Regional Water Quality Control Board
SP	Sample Point
SWRCB	State Water Resources Control Board
USACE	United States Army Corps of Engineers
USFS	United States Forest Service
USGS	United States Geological Survey

1 Introduction

Cardno ENTRIX conducted a routine wetland delineation on behalf of the Alpine Watershed Group (AWG) for the Markleeville Creek Restoration Project (Project). This report presents the results of the field evaluation and provides an assessment of potential jurisdictional wetlands and waters of the United States as defined by the Clean Water Act (CWA) and Waters of the State as outlined in the Porter-Cologne Water Quality Control Act (Porter-Cologne Act). AWG requests that the U.S. Army Corps of Engineers (USACE) review this report and provide an Approved Wetland Delineation Verification.

1.1 Project Location

The Project is located in Markleeville, Alpine County, California at approximately 38.693832° north longitude and -119.778802° west longitude (Figure 1), and on the United States Geological Survey (USGS) 7.5 minute topographic quadrangle map for Markleeville, California, at Section 21, Township 10 North, Range 20 East, Mount Diablo Baseline & Meridian.

The Project site is the 4.3-acre former location of the United States Forest Service (USFS) Guard Station, and includes lands currently owned by Alpine County and the Markleeville Public Utility District (Figure 2). The site includes Markleeville Creek and immediate adjacent areas downstream of the Highway 89 bridge and Millberry Creek downstream of the Markleeville Public Utility District (MPUD) road on the west floodplain to its confluence with Markleeville Creek.

1.2 Project Purpose

The purpose of the Project is to restore the natural form and function of an 800-foot reach of Markleeville Creek. AWG proposes to restore the floodplain and prevent further property damage as a result of flooding and restore the streambed configuration to more closely resemble its natural state which will improve geomorphic function, with the intent of achieving the following goals:

1. Prevent future flood damage to property;
2. Improve water quality;
3. Reduce stream bank erosion and sewer line destabilization;
4. Enhance riparian and in-stream habitat;
5. Restore the stream's natural form and function;
6. Promote community stewardship; and
7. Provide recreation opportunities and visitor resource.

Figure 1. Project Vicinity

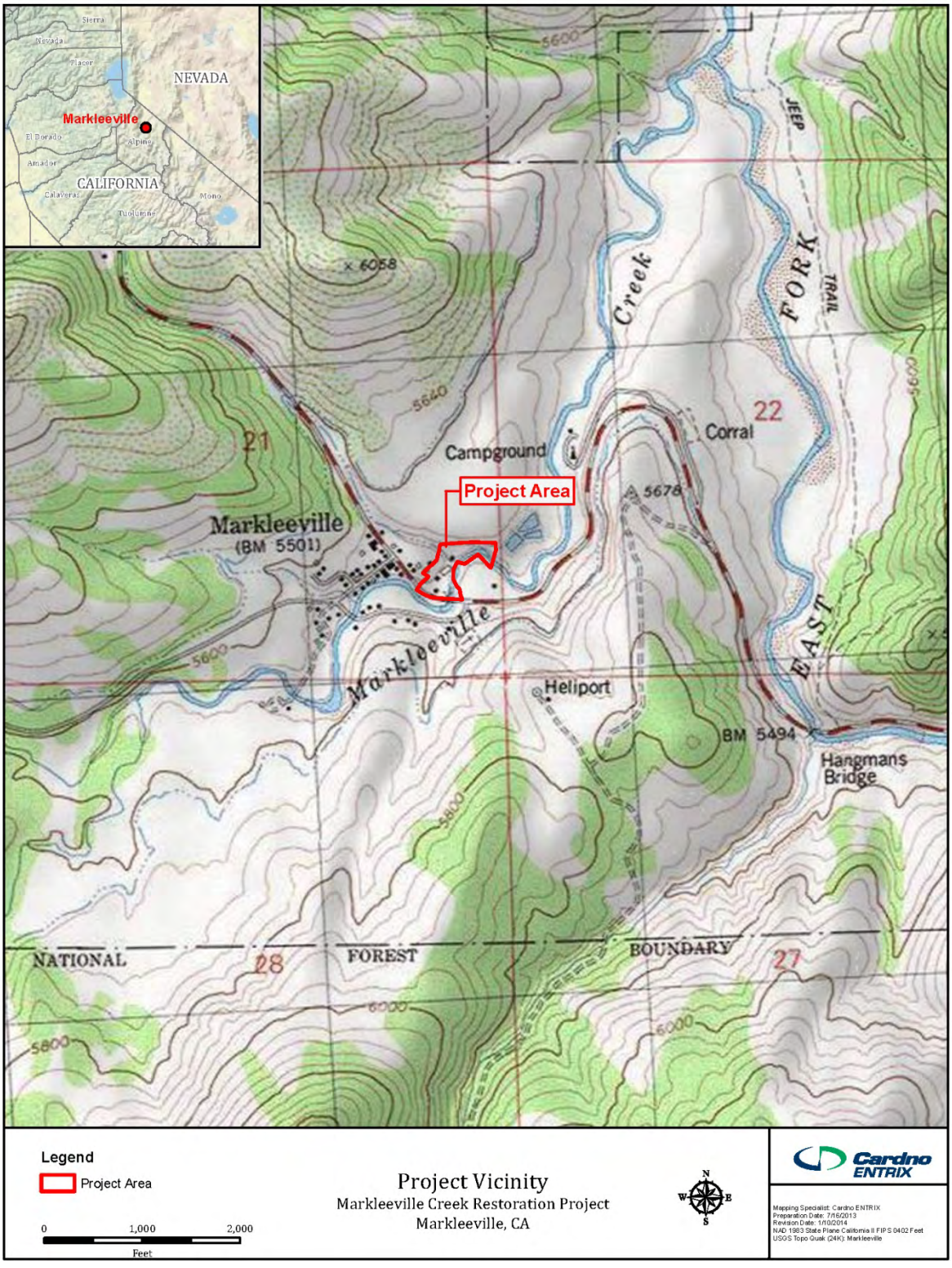
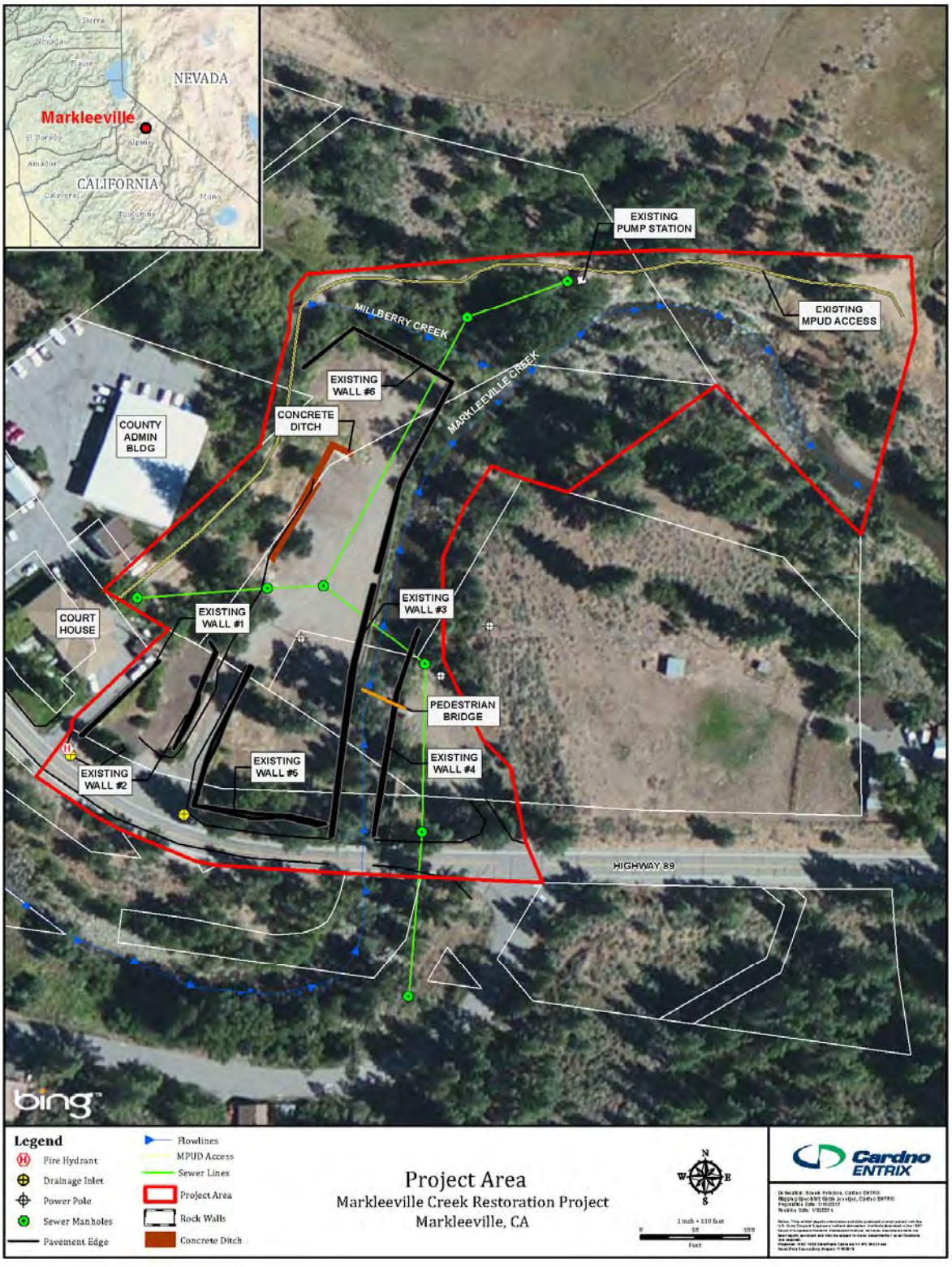


Figure 2. Project Area Map



2 Regulatory Framework

2.1 Federal Jurisdiction of Wetlands and Other Waters of the United States

2.1.1 Section 404 of the Clean Water Act

Under Section 404 of the CWA, the U.S. Environmental Protection Agency (EPA) and the USACE have regulatory and permitting authority regarding discharge of dredged or fill material into "navigable Waters of the United States". The scope of the USACE jurisdiction was further refined in Rapanos v. US and Carabell v. U.S. Guidance (EPA, 2008). The USACE asserts jurisdiction over the following waters:

- Traditional navigable waters10;
- Wetlands adjacent to traditional navigable waters;
- Non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months); and,
- Wetlands that directly abut such tributaries.

The USACE determines jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a significant nexus with a traditional navigable water:

- Non-navigable tributaries that are not relatively permanent;
- Wetlands adjacent to non-navigable tributaries that are not relatively permanent; and,
- Wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary.

A significant nexus exists when it is demonstrated that the tributary and/or wetland along with any other, similarly situated wetlands, has "more than a speculative or insubstantial effect on the chemical, physical and biological integrity of a traditional navigable water."

The USACE generally will not assert jurisdiction over the following features:

- Swales or erosional features (e .g., gullies, small washes characterized by low volume, infrequent, or short duration flow); or
- Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water.

2.2 State Jurisdiction of Wetlands and Other Waters

2.2.1 Regional Water Quality Control Board

The State Water Resources Control Board (SWRCB) and nine Regional Water Quality Control Boards (RWQCB) regulate activities in Waters of the State, under the Dickey Water Pollution Act of 1949 and the Porter-Cologne Act of 1969. Waters of the State include Waters of the United States., and are defined by the Porter-Cologne Act as "any surface water or groundwater, including saline waters, within the boundaries of the state." Additionally, the RWQCB regulates discharges of fill and dredged material under Section 401 of the CWA and the Porter-Cologne Act through the State Water Quality Certification

[10] A water body qualifies as a "navigable water of the United States" if it meets any of the tests set forth in 33 Code of Federal Regulations (C.F.R.) Part 329 (e.g., the water body is (a) subject to the ebb and flow of the tide, and/or (b) the water body is presently used, or has been used in the past, or may be susceptible for use (with or without reasonable improvements) to transport interstate or foreign commerce)

Program. The State Water Quality Certification Program regulates proposed federally permitted activity which may result in a discharge to water bodies including discharges of dredged or fill material permitted by the USACE under section 404 of the CWA (e.g., navigational dredging; flood control channelization; levee construction; channel clearing; and fill of wetlands or other water bodies for land development), and ensures consistency with the Federal CWA, California Environmental Quality Act (CEQA), California Endangered Species Act (ESA), and the Porter-Cologne Act.

The Central Valley RWQCB has jurisdiction over the Study Area. Because Waters of the State are defined more broadly than Waters of the United States, projects that do not require a federal permit may still result in dredge or fill in Waters of the State. Such projects may be regulated by the RWQCB under Waste Discharge Requirements or Certifications of Waste Discharge Requirements.

3 Methodology

The Study Area for this delineation encompasses all anticipated construction and staging areas in the vicinity of the Project Area (Figure 2). On May 14, 2012, a Cardno ENTRIX biologist collected field data and delineated potential USACE and RWQCB jurisdictional boundaries in the Study Area.

For each sampling site, the site location was recorded and the geographic coordinates (longitude and latitude) were collected. The boundaries of each potential jurisdictional wetland area identified in the Study Area were digitally recorded using a handheld Trimble Geo 6000 XT (2012 Series) Global Positioning System (GPS) unit capable of sub-meter accuracy. The banks of Markleeville Creek and Millberry Creek were inspected for ordinary high water mark (OHWM) indicators, and GPS points were recorded along the banks. Vegetative communities were classified pursuant to the California Wildlife Habitat Relationship (CWHR) scheme (Mayer and Laudenslayer 1988). Plant species were identified using the *Jepson Manual of Higher Plants of California* (Baldwin 2012). Representative photographs of the Study Area are in Appendix A.

The GPS data were subsequently downloaded from the GPS unit, differentially corrected using Trimble Pathfinder Office software and converted to GIS shapefiles. These shapefiles were then overlaid on base maps of the Study Area, showing the location of wetlands and OHWM in relation to topographical features. Due to the Project location, topography, and canopy cover, sub-meter GPS data were not always achievable. Data points and wetland locations were also measured from known topographic features using a compass and measuring tape. GPS data were corrected as necessary based on the distance and bearing from known topographic features and facilities, and the acreage of each wetland or other water in the Study Area was calculated.

3.1 Waters of the United States

3.1.1 Potential Section 404 Jurisdictional Wetlands

The delineation of Waters of the United States was conducted in accordance with the *1987 Corps of Engineers Wetlands Delineation Manual* (USACE, 1987) (Wetland Delineation Manual), *U.S. Corps of Engineers Jurisdictional Determination Form Instructional Guidebook* (USACE, 2007), and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region 2.0* (USACE, 2008) (Regional Supplement). A Level 2, routine wetland determination, was conducted (as defined in the Wetland Delineation Manual) which consisted of an onsite inspection and evaluation of three parameters that identify and delineate the boundaries of wetlands, including (1) the dominance of wetland vegetation; (2) the presence of hydric soils; and (3) hydrologic conditions that result in periods of inundation or saturation on the surface as a result of flooding or ponding.

The *National List of Plant Species That Occur in Wetlands: California* (Region 0) (Reed, 1988), was consulted as a guideline; however, per USACE regulatory notice dated May 10, 2012 the draft *North American Digital Flora: National Wetland Plant List* (Lichvar and Kartesz, 2012) was used to determine the wetland indicator status of plants identified in the Study Area. The *U.S. Department of Agriculture Natural Resource Conservation Service (NRCS) Web Soil Survey for Alpine County, Western Area California* (Soil Survey Staff, 2013) and the *National List of Hydric Soils* (NRCS, 2013) were used to preliminarily identify soil types in the Study Area.

Data on vegetation, soils, and hydrologic characteristics were recorded in the field on data forms for the Arid West Region (Appendix B).

3.1.1.1 Vegetation

A visual assessment was made of all plant species located in and around the Study Area. Habitat was classified based on *A Guide to Habitat Classification of California* (Mayer, 1988) and vegetation series were defined based on *A Manual of California Vegetation, Second Edition* (Sawyer, et al., 2009). Plant species were identified using *The Jepson Manual: Vascular Plants of California, Second Edition* (Baldwin, 2012) and analyzed to determine the presence or absence of hydrophytic vegetation. The procedure for determining the presence of hydrophytic vegetation followed that identified in the Regional Supplement. Specifically, it involves the following assessment for each sample plot:

1. Apply Indicator 1 (Dominance Test). If the plant community passes the dominance test, then the vegetation is hydrophytic and no further vegetation analysis is required.
   a. If the plant community fails the dominance test and indicators of hydric soil and/or wetland hydrology are absent, then hydrophytic vegetation is absent unless the site meets the requirements for a problematic wetland vegetation.
   b. If the plant community fails the dominance test, but indicators of hydric soil and wetland hydrology are both present, proceed to Step 2.

1. Apply Indicator 2 (Prevalence Index). This and the following step assume that at least one indicator of hydric soil and one primary or two secondary indicators of wetland hydrology are present.
   a. If the plant community satisfies the prevalence index, then the vegetation is hydrophytic. No further vegetation analysis is required.
   b. If the plant community fails the prevalence index, proceed to Step 3.

2. Apply Indicator 3 (Morphological Adaptations).
   a. If the indicator is satisfied, then the vegetation is hydrophytic.
   b. If none of the indicators are satisfied, then hydrophytic vegetation is absent unless indicators of hydric soil and wetland hydrology are present and the site meets the requirements for a problematic wetland situation.

Wetland indicator species include those listed as Obligate (OBL), Facultative Wetland (FACW), or Facultative (FAC) in the National List of Plant Species that Occur in Wetlands: California (Region 0). Vegetation was described in terms of both species and percent coverage per strata. Sample plots that had vegetation that met the above criteria were identified as hydrophytic.

3.1.1.2 Soils

The Soil Survey of Alpine County was used to identify potential soils (map units) present in the vicinity of the Study Area. Soils were examined by digging a test pit to a depth of 20 inches, where feasible, to determine if soils exhibited hydric characteristics. In some cases loose soil, groundwater, or a restrictive layer prohibited the digging of 20 inch test pits, and pits were dug to a depth sufficient to identify hydric indicators. The determination of hydric soils was based on soil texture, matrix color, and/or the presence of other hydric soil indicators such as mottles.

The NRCS maintains a list of hydric soil indicators that are known to occur in the United States. Soil samples were collected and described according to the methodology provided in the Regional Supplement. Soil chroma and values were determined by using a standard Munsell soil color chart (Munsell, 2009). Hydric soils were determined to be present if any of the soil samples met one or more of the hydric soil indicators described by the NRCS.

3.1.1.3 Hydrology

The USACE jurisdictional wetland hydrology criterion is satisfied if an area is inundated or saturated for a period of time sufficient to create anoxic soil conditions during the growing season (a minimum of 14 consecutive days in the Arid West Region). Evidence of wetland hydrology can include primary indicators, such as visible inundation or saturation, drift deposits, oxidized root channels, and salt crusts, or secondary indicators such as the FAC-neutral test, or the presence of a shallow aquitard. The Regional Supplement contains 18 primary hydrology indicators and nine secondary hydrology indicators.

The presence of these primary or secondary indicators was used to determine whether each sample point met the wetland hydrology criteria. A minimum of one primary indicator or two secondary indicators are required to meet the wetland hydrology criterion.

3.1.2 Potential Section 404 Other Waters

The Study Area was evaluated for the presence of "other waters," including lakes, rivers, and perennial or intermittent streams. Potential "other waters" may be identified by the presence of a defined river or streambed, a bank, or evidence of flow, or the absence of emergent vegetation in ponds and lakes. The extent of other waters was mapped to the OHWM as defined by the USACE Regulatory Guidance Letter No. 05-05 Ordinary High Water Mark Identification (USACE, 2005).

CWA regulations define the OHWM at 33 CFR 328.3(e) as the following:

> The term ordinary high water mark means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

The following geomorphic OHWM indicators, as described in the United States Army Corps of Engineers (USACE) publication *A Field Guide to the Identification of the OHWM in the Arid West Region of the Western United States* (Lichvar and McColley 2008), were used to delineate the OHWM of the Markleeville Creek and Millberry Creek Waters of the United States:

2. **Benches**: Formed by the removal of previously aggraded sediment, and located near the below/at ordinary high water (OHW) boundary and potentially near the at/above boundary.
3. **Drift**: Organic debris larger than twigs. Tends to be oriented in the direction of flow, and often collects behind/in obstructions or is simply deposited by receding flow.
4. **Exposed Root Hairs Below Intact Soil Layer**: Exposed by erosion of sediment. Tend to be located along the above/at OHW boundary or where benches have formed.
5. **Change in Particle Size Distribution**: Transition from coarser to finder sediment common, and likely to occur near the at/below OHW boundary.
6. **Upper Limit of Sand-Sized Particles**: Deposited due to reduced flow competence, and tends to be concentrated near the at/below OHW boundary but may extend to the above OHW boundary.
7. **Valley Flat**: Formed by the deposition of fine-grained sediment during over-bank flow, and located adjacent to low-flow feature(s) and extends to the break in slope (when present) near the at/above OHW boundary.

3.1.3 Areas Excluded from Section 404 Jurisdiction

Some areas that meet the technical criteria for wetlands or other waters may not be jurisdictional under the CWA. Included in this category are (1) some man-induced wetlands, which are areas that have developed at least some characteristics of naturally occurring wetlands due to either intentional or incidental human activities, and (2) "isolated" wetlands, or non-navigable waters which are not connected or adjacent to a navigable Waters of the United States through either a hydrologic or economic

connection. Per SWANCC v. United States, examples of man-induced wetlands include, but are not limited to, irrigated wetlands, impoundments (such as stock ponds for livestock), drainage ditches constructed in uplands, wetlands resulting from filling of formerly deep water habitats, dredged material disposal areas, and wetlands resulting from stream channel realignment. Isolated wetlands include wetland areas which do not have a surface or groundwater connection to, and are not adjacent to navigable Waters of the United States.

3.2 Waters of the State

Although the SWRCB and RWQCB are in the process of establishing a formal wetland delineation protocol and wetland definition for Waters of the State, these agencies have typically accepted the USACE delineation protocol. However, these agencies do regulate “isolated waters” and non-navigable waters under the Porter-Cologne Act. Therefore, the methods described in Section 3.1 (Waters of the United States) were used to determine potential Waters of the State, but it was assumed that all wetlands and waters delineated using the USACE methods fall in the state’s jurisdiction under the Porter-Cologne Act.

4 Study Area

The Study Area is approximately 4.3 acres and includes portions of the Markleeville Creek and Millberry Creek corridors. It consists of a gravel lot on the east floodplain and access road, paved driveway, a flood wall, and adjacent riparian corridor. The general boundaries of the Study Area extended from the Highway 89 Bridge crossing downstream approximately 800 feet where the creek takes a sharp bend to the east. The Study Area included the gravel plot on the east terrace and the access road, paved driveway, and Millberry Creek to the west of Markleeville Creek. These locations are shown in Figure 2. The Study Area is a disturbed and graded site, with minimal vegetation.

4.1 Vegetation

Natural communities in the Study Area include Ornamental trees/Non-native annual grassland, Developed, *Populus trichocarpa* forest alliance (Black cottonwood forest), *Salix* spp. woodland alliance (willow thickets), *Juncus* sp. herbaceous alliance (rush marshes) and Non-native annual grassland.

The majority of the floodplain is compacted gravel and dirt with minimal vegetation. Dominant tree species along the riparian corridor include black cottonwood (*Populus trichocarpa*), Sandbar willow (*Salix exigua*), willow (*Salix* sp.), Oregon ash (*Fraxinus latifolia*), mountain alder (*Alnus incana*), and quaking aspen (*Populus tremuloides*).

4.2 Soils

The soil map units and miscellaneous land types in the Study Area and vicinity are described in soil report for the Alpine County, California (USDA Soil Conservation Service, 2013). The Study Area is dominated by the lostpepper loam soil series, 2 to 15 percent slopes (Figure 3), which located on outwash terraces. This soil series is a very deep, well drained soils that formed in alluvium derived from mixed rocks, typified as well drained; with very high surface runoff; slow permeability; and often displays redox concentration in areas where flooding is frequent. The lostpepper loam soil series is not hydric per the National List of Hydric Soils.

4.3 Hydrology

The Study Area is located in the East Fork Carson River Watershed. Markleeville Creek has a broad 60 square mile watershed and joins the East Fork of the Carson River roughly 1.5 miles downstream of the Study Area. The Carson River ultimately terminates in the Lahontan Reservoir.

Millberry Creek has a narrow five square mile watershed and is a tributary to Markleeville Creek near the downstream end of the project area. Millberry Creek drains the highest point of the Markleeville Creek watershed. There are several active diversions along Millberry Creek upstream of the Study Area. The largest diversion, roughly ½ mile upstream of the Study Area, appears to divert 100% of the stream flow during low flows.

The Study Area slopes generally towards Markleeville Creek from the north and south. The northern portion of the site was previously developed, and a concrete lined v-ditch and culvert towards the center of the previous Guard Station direct flows into the creek through the culvert, rather than overland.

Figure 3. Soils

5 Results and Discussion

The application of methods described in Section 3.0 identified two seasonal wetlands (W-1 and W-2) within the Study Area. W-2 is a man-induced wetland and may not fall under the jurisdiction of the USACE. Portions of Markleeville and Millberry creeks are perennial streams, and are likely jurisdictional waters of the U.S. pursuant to 33 CFR 328.3(a). Figure 4 depicts the OHWM of Markleeville Creek and Millberry Creek and wetland polygons projected over aerial imagery of the Study Area. A number of sample points were selected to determine the extent of the upland areas adjacent to wetlands, and assess dominant plant species, soils, and hydrology indicators. Sample Points SP 1, SP 3, SP 7, SP 9, SP10, and SP12 typify the upland habitat found within the Study Area. All upland points lacked hydric soil and hydrology indicators. Some upland Sample Points were unvegetated, while others were dominated by a mix of rushes, sedges and annual grasses. SP 4 was selected due based on landscape position and was located in a shallow roadside drainage ditch. This shallow drainage lacked wetland indicators, and did not exhibit ordinary high water mark indicators and did not meet the definition of a wetland or other water.

A summary of these Sample Points is provided in Table 1 below.

Table 1. Summary of Wetland Determination Form Sample Points

Sample Point	Hydrophytic Vegetation Indicator (Y/N)	Hydric Soil Indicator (Y/N)	Hydrology Indicator (Y/N)	Wetland (Y/N)	Notes
SP 1	Y (Dominance Test)	N	N	N	Upland, upslope of W-1
SP 2	Y (Dominance Test)	Y (Redox Dark Surface)	Y (Surface water)	Y	W-1, terrace between slope and Milberry Creek
SP 3	N	N	N	N	Upland, near utility road
SP 4	N	N	N	N	Shallow roadside ditch between access road and slope
SP 5	N	N	N	N	terrace
SP 6	Y (Dominance Test)	Y (Sandy Redox)	Y (Surface water)	Y	Adjacent to Markleeville Creek, below OHWM
SP 7	Y (Prevalence Index)	None	None	N	Upland
SP 8	Y (Dominance Test)	Y (Redox Dark Surface)	Y (Saturation)	Y	Depression adjacent to concrete ditch; discharges to Markleeville Creek via a culvert pipe
SP 9	Y (Dominance Test)	N	N	N	Upland; upslope of SP08

Sample Point	Hydrophytic Vegetation Indicator (Y/N)	Hydric Soil Indicator (Y/N)	Hydrology Indicator (Y/N)	Wetland (Y/N)	Notes
SP 10	None	N	N	N	Upland; upslope of SP08
SP 11	Y (Dominance Test)	Y (Redox Dark Surface)	Y (Saturation)	Y	Located in W-2
SP 12	N	N	N	N	Upland; gravel parking lot

The two seasonal wetlands are discussed in Section 5.1. Other waters are discussed further detail in Section 5.2.

5.1 Seasonal Wetlands

Two seasonal wetlands were identified in the Study Area, W-1 and W-2. Figure 4 shows the locations of these two wetland features.

Seasonal Wetland W-1 (0.03 acre)

W-1 is located northeast of Millberry Creek, near the toe of a slope. W-1 extends on both sides of the utility access road, connecting under the road with a culvert. W-1 includes a willow patch with and dense herbaceous vegetation comprised of sedges and forbs, including (*Carex praegracilis*) and Smallfruited bulrush (*Scirpus microcarpus*). Surface water was observed during the site visit and W-1 exhibited the redox dark surface hydric soil indicator. W-1 receives water from direct precipitation, snow melt, and seepage from the adjacent slope, and discharges into Millberry Creek.

Seasonal Wetland W-2 (0.01 acre)

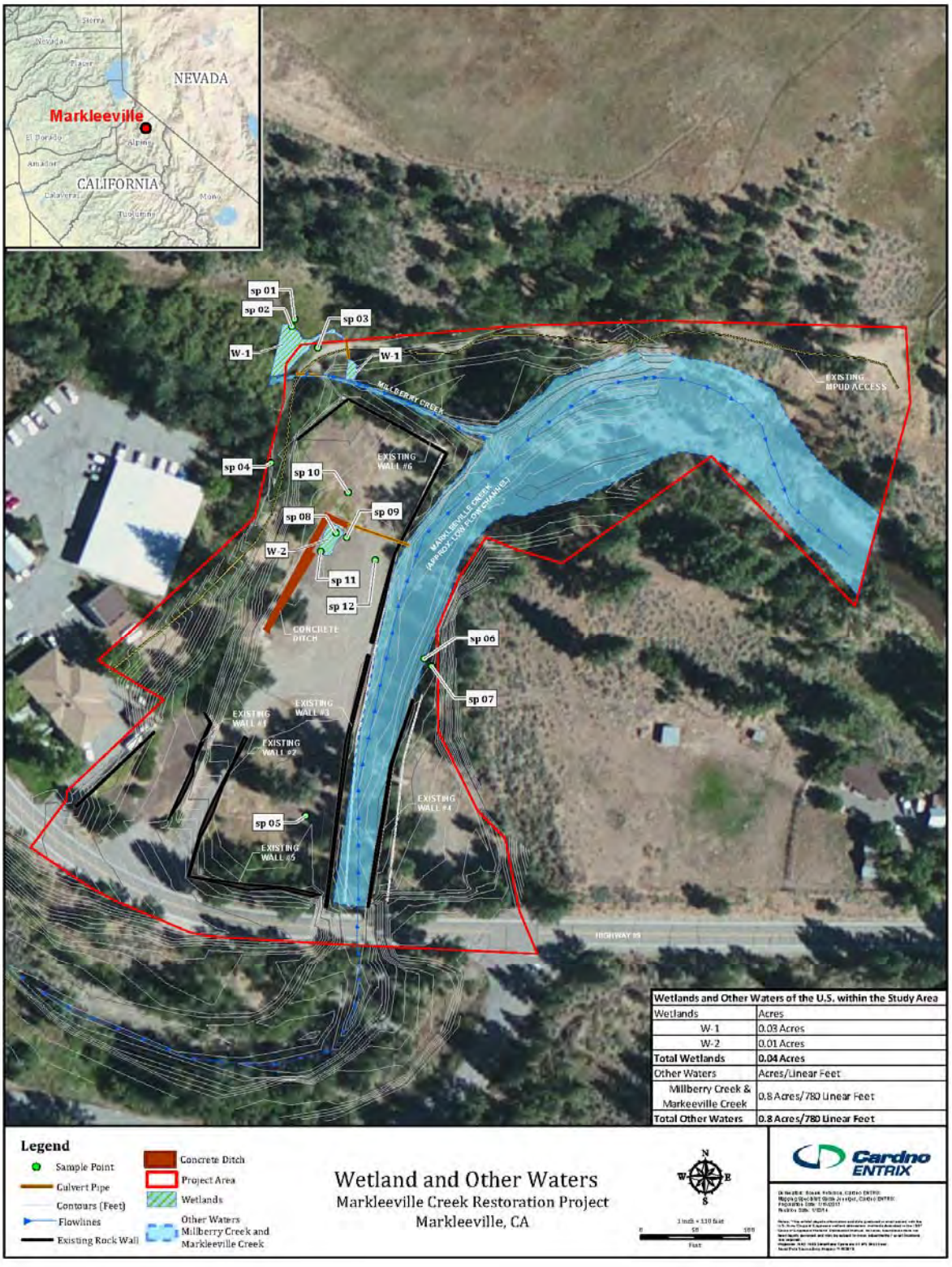
W-2 is a man-induced wetland formed in a shallow depression adjacent to a concrete drainage ditch in the footprint of a previous USFS building, which has since been removed. This wetland exhibits low vegetative cover of facultative and facultative wetland plant species including, toad rush (*Juncus bufonius*) and slender wheatgrass (*Elymus trachycaulu*) and clear and distinct redox concentration within the soil matrix and surface saturation. W-2 is fed by a concrete lined ditch which carried direct precipitation, snow melt, and seepage from the northern slopes into a culvert pipe and discharges into Markleeville Creek.

5.2 Other Waters (Markleeville and Millberry Creeks)

Markleeville Creek and Millberry Creek are both perennial streams, Cowardin class Riverine. Millberry Creek flows through the Markleeville Creek west floodplain and discharges into Markleeville Creek. Millberry Creek is culverted under an existing utility road. The creek is typified by dense riparian vegetation, primarily mature willows. Ordinary high water mark indicators include distinct banks, sediment sorting, exposed roots, and water marks.

Markleeville Creek is bound below the Highway 89 bridge along both streambanks by an existing flood wall and fill material, constructed to protect previous USFS structures. Riparian habitat is comprised of sparse willows, alders, and cottonwoods. Ordinary high water mark indicators include water marks on existing flood walls, sediment sorting, exposed roots, and distinct shelving.

Figure 4. Wetlands and Other Waters



6 Findings

6.1 Summary of Potential Jurisdiction

Based on the area delineated for this study, two seasonal wetlands (0.04 acres in total) and 0.8 acres (780 linear feet) of perennial stream are located within the Study Area. Acreage of wetlands and other Waters in the Study Area are summarized in Table 2.

Markleeville Creek and Millberry Creek are wetted sufficiently to be considered relatively permanent non-navigable tributaries to the Carson River traditional navigable water. W-2 is a man-induced wetland and may not fall within the jurisdiction of the USACE. Markleeville Creek and Millberry Creek and W-1 are likely jurisdictional waters of the United States pursuant to 33 CFR 328.3(a).

No additional wetlands or waters were identified in the Study Area. All Wetlands and Waters, including the man-induced wetland (W-2) within the Study Area meet the broader criteria for Water of the State and should be considered RWQCB jurisdiction.

Table 2. Wetlands and Other Waters in the Study Area

Wetlands	**Acres**
W-1	0.03 Acres
W-2	0.01 Acres
Total Wetlands	**0.04 Acres**
Other Waters	**Acres/Linear Feet**
Markleeville Creek and Millberry Creek	0.8 Acres/780 Linear Feet
Total Other Waters	**0.8 Acres/780 Linear Feet**

7 Supplemental Information

7.1 Directions to the Study Area

From Sacramento travel East on US-50 towards Lake Tahoe. Turn right on CA-89 Luther Pass Road and proceed 11.2 miles. Turn left on CA-88 Carson Pass Road and proceed 5.8 miles. Turn right on CA-89 south and travel 6.5 miles to the site located on the left, north of CA-89 at Markleeville Creek.

7.2 Contact Information

Applicant

Alpine Watershed Group
Post Office Box 296
Markleeville, CA 96120
Phone (530) 694-2327
Fax (530) 694-2149
watershed@alpinecountyca.com

Wetland Delineation

Virginia Mahacek
Cardno ENTRIX
295 Highway 50, Suite 1, P.O. Box 1533
Zephyr Cove, NV 89448
775-588-9069
Virginia.mahacek@cardno.com

8 References

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_____. 2007 Jurisdictional Determination Form Instructional Guidebook. May 2007.

_____. 2008. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0). September 2008.

APPENDIX

A

REPRESENTATIVE SITE PHOTOS

Representative Site Photos

Sample Point 1 (SP1), upland site, May 15, 2012.

Sample Point 2 (SP2), wetland site W-1, May 15, 2012.

Sample Point 3 (SP3), upland site, May 15, 2012.

Sample Point 4 (SP4), shallow roadside drainage ditch, upland site, May 15, 2012.

Sample Point 5 (SP5), upland site, May 15, 2012.

Sample Point 6 (SP6), adjacent to Markleeville Creek, east bank, wetland site, May 15, 2012.

Sample Point 7 (SP7), upland sample point adjacent to stream, May 15, 2012

Sample Point 8 (SP8), wetland site W-2, May 15, 2012

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Sample Point 9 (SP9), upland site, May 15, 2012

Sample Point 10 (SP10), upland site, May 15, 2012.

Sample Point 11 (SP11), wetland site W-2, May 15, 2012.

APPENDIX

B

DATA SHEETS

Insert data sheets here

APPENDIX

C

PLANT LIST

List of Markleeville Creek Restoration Project Wetland Delineation Plant Species Observed.

Family	Scientific Name	Common Name	National Wetland Indicator Status
Asteraceae	*Achiellea millefolium*	Yarrow	FACU
	Agoseris heterophylla	Annual mountain dandelion	UPL
	Agoseris	Dandelion	--
	Chrysothamnus sp.		--
	Cirsium sp.	thistle	--
	Erigeron breweri	Brewer's Fleabane	UPL
Betulaceae	*Alnus sp.*	Alder	FACW
Brassicaceae	*Cardamine sp.*	bittercress	--
	Descurainia pinnata	Western tansy mustard	UPL
	Lepidium campestre	Field pepperweed	UPL
Cyperaceae	*Bulbostylis capillaris*	Threadleaf beakseed	FAC
	Carex douglasii	Douglas' sedge	FAC
	Carex leptopoda	Slender-footed sedge	OBL
	Carex praegracilis	Clustered field sedge	FACW
	Carex sp.	sedge	--
	Cyperus sp.	sedge	--
	Eleocharis acicularis	Needle spikerush	UPL
	Elymus trachyaulus	Slender wheatgrass	FAC
	Elymus sp.		--
	Scirpus microcarpus	Mountain bog bulrush	OBL
Equisetaceae	*Equisetum arvense*	Common horsetail	FAC
Fabaceae	*Hosackia sp.*		--
	Lathyrus latifolius	Sweet pea	UPL
	Lotus sp.		--
	Medicago lupulina	Black medick	FACU
	Vicia villosa	Hairy vetch	UPL
Juncaceae	*Juncus bufonius*	Common toad rush	FACW
Onagraceae	*Epilobium sp.*		--
Plantaginaceae	*Collinsia parviflora*	Blue-eyed Mary	UPL
Poaceae	*Agrostis variabilis*	Mountain bent grass	UPL
	Bromus carinatus	California brome	UPL
	Bromus tectorum	Cheatgrass	UPL
	Deschampsia sp.	Hairgrass	--
	Elymus glaucus ssp. glacus	Western rye grass	FACU
	Poa bulbosa	Bulbous blue grass	UPL
	Poa pratensis	Kentucky blue grass	FAC
Polygonaceae	*Polygonum sp.*		--
Ranunculaceae	*Ranunculus testiculatus*	Tubercled crowfoot	UPL

Family	Scientific Name	Common Name	National Wetland Indicator Status
Rosaceae	*Purshia tridentata*	Antelope bitterbrush	UPL
Salicaceae	*Salix lutea*	Yellow Willow	OBL
	Populus trichocarpa	Black Cottonwood	UPL

-- Not enough information to determine native or wetland indicator status since plant was not identified to specie level.

Wetland Indicator Status:
UPL – Upland
FACU – Facultative Upland
FAC – Facultative
FACW – Facultative Wetland
OBL - Obligate

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APPENDIX F

NOXIOUS WEEDS/INVASIVE PLANTS MEMO

Technical Memorandum

Date January 21, 2014

To: Sarah Green
Alpine Watershed Group

From: Virginia Mahacek and Katie Ross-Smith (Cardno ENTRIX)

RE: **Noxious Weeds Memo**

Cardno ENTRIX

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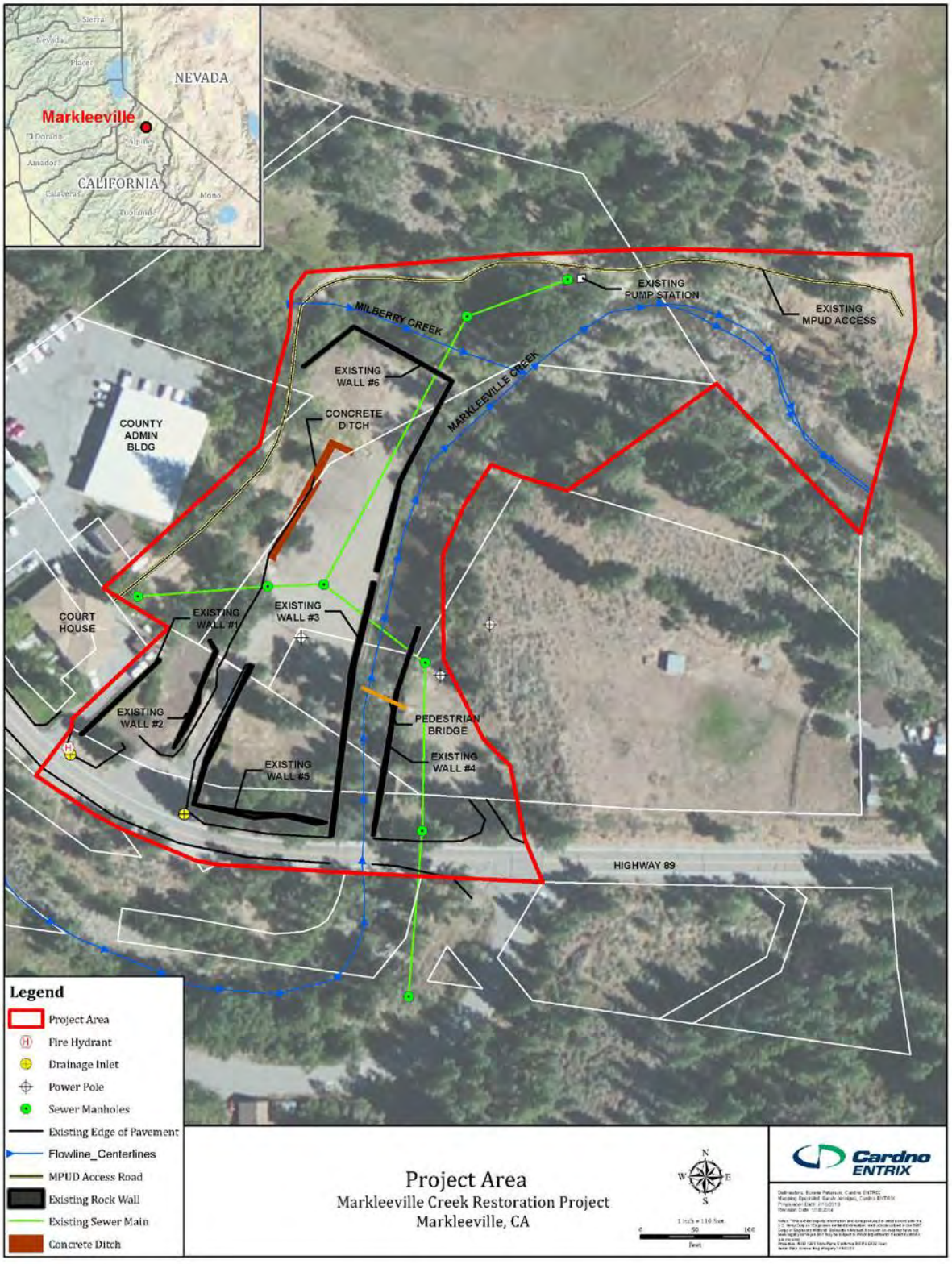
1.0 Introduction

This technical memorandum describes a survey conducted by Cardno ENTRIX for the Alpine Watershed Group (AWG) for the Markleeville Creek Restoration Project (Project). For the purposes of this technical memorandum, the term “noxious weed” refers to both noxious weeds and non-native invasive species. Noxious weed is a term used by government agencies for non-native invasive plants that have been defined as pests by law or regulation (CDFA 2012). The California Invasive Plant Council (Cal-IPC) defines non-native plants as those species introduced to California after European contact and as a direct or indirect result of human activity. Invasive non-native plants are plants that: (1) are not native to, yet can spread into, wildland ecosystems; and (2) displace native species, hybridize with native species, alter biological communities, or alter ecosystem processes (Cal-IPC 2013).

The objective of the noxious weed survey was to document noxious weed populations in the Project site.

2.0 Extent of Survey Area

The survey area encompassed all anticipated construction and staging areas in the Project Boundary (Figure 1)


NEVADA
Markleeville
CALIFORNIA
EXISTING PUMP STATION
EXISTING MPUD ACCESS
MILBERRY CREEK
MARKLEEVILLE CREEK
EXISTING WALL #6
CONCRETE DITCH
COUNTY ADMIN BLDG
COURT HOUSE
EXISTING WALL #1
EXISTING WALL #3
EXISTING WALL #2
EXISTING WALL #5
PEDESTRIAN BRIDGE
EXISTING WALL #4
HIGHWAY 89
Legend
Project Area
Fire Hydrant
Drainage Inlet
Power Pole
Sewer Manholes
Existing Edge of Pavement
Flowline_Centerlines
MPUD Access Road
Existing Rock Wall
Existing Sewer Main
Concrete Ditch
Project Area
Markleeville Creek Restoration Project
Markleeville, CA
Cardno ENTRIX

3.0 Methodology and Analysis or Experimental Methods and Analysis

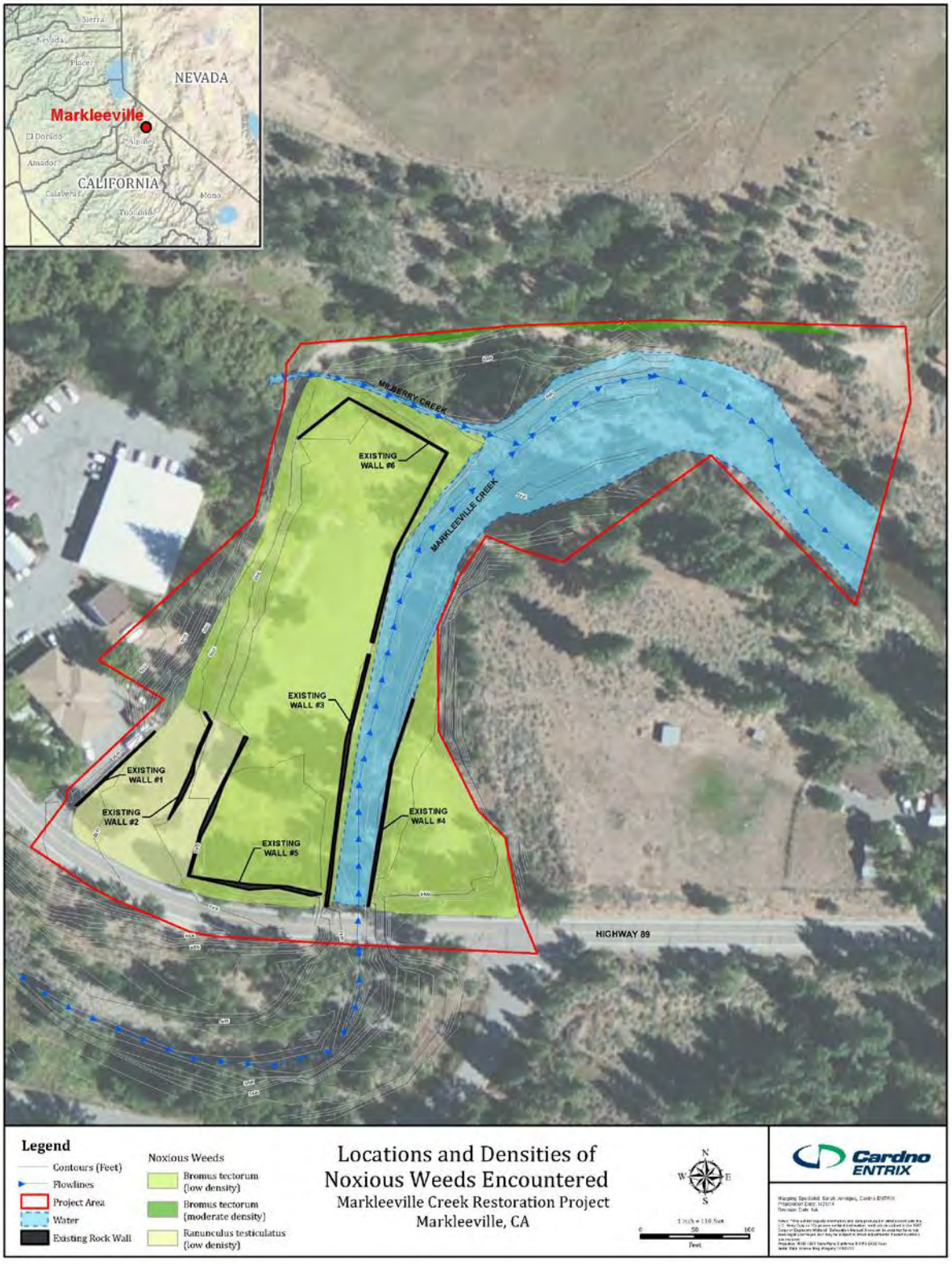
Existing information on noxious weeds and invasive plant species known to occur or potentially occurring in the vicinity of the Project was obtained from the CalFlora (CalFlora 2013) and Cal-IPC (Cal-IPC 2013) databases. These sources were reviewed to identify noxious weeds and non-native invasive species of potential concern within the vicinity of the Project site prior to conducting field surveys. Cal-IPC rates noxious weed species according to the severity of their impact on ecosystems:

- High – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.
- Moderate – These species have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.
- Limited – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic (Cal-IPC 2012).

A field surveys was conducted on May 14, 2012. General locations of noxious and invasive weeds encountered during the field survey was mapped in the field and information on the population documented (density, general location).

4.0 Results and Discussion

Two noxious or invasive weed species was encountered during the field surveys: (1) tubercled crowfoot (*Ranunculus testiculatus*), a non-native invasive weed species, was observed at a low density throughout the gravel parking lot; and (2) cheatgrass (*Bromus tectorum*) (Cal-IPC inventory rating of high) was observed at a low density through most of the Project site and moderate density along the utility road (particularly along the northern side of the road) (Figure 2). No noxious or invasive weeds were observed in the wetlands or other waters or within the riparian corridor.


NEVADA
Markleeville
CALIFORNIA
MILLERRY CREEK
MARKLEEVILLE CREEK
EXISTING WALL #6
EXISTING WALL #3
EXISTING WALL #1
EXISTING WALL #2
EXISTING WALL #5
EXISTING WALL #4
HIGHWAY 89
Legend
Contours (Feet)
Flowlines
Project Area
Water
Existing Rock Wall
Noxious Weeds
Bromus tectorum (low density)
Bromus tectorum (moderate density)
Ranunculus testiculatus (low denisty)
Locations and Densities of Noxious Weeds Encountered
Markleeville Creek Restoration Project
Markleeville, CA
Cardno ENTRIX

5.0 Conclusions and Recommendations

Construction activities associated with the Markleeville Creek Restoration Project could directly disturb and/or spread noxious or invasive plants, and/or introduced weed seeds through equipment and vehicles used on site. In addition, noxious weeds could spread in the Project site via materials imported to the site during restoration activities. As noxious weed species are found throughout the majority of the Project site, we recommend: (1) that the Project incorporate treatment of existing or known occurrences of noxious weeds/non-native species into the plans and specifications; and (2) the plan specifications require preventative measures to limit the potential for re-introduction and spread of noxious weeds during construction and revegetation activities.

6.0 References

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APPENDIX

G

CULTURAL RESOURCES INVENTORY AND RECOMMENDATIONS LETTER REPORT

**The Cultural Resources Inventory and Recommendations Letter Report contains confidential information and cannot be released to the public in its entirety. It is on file with Alpine County.