ENV. LOG NO. PDS 2018-ER-18-02-003

Michael Baker INTERNATIONAL

9755 Clairemont Mesa Blvd | San Diego, CA 92124
Office: 858.614.5000 | Fax: 858.614.5001
Contact: Jay Sullivan, PE, CFM, QSD
jsullivan@mbakerintl.com



100-Year Floodplain Analysis for:

Monserate Winery

March 2018
Revised July 2018
Revised September 2018
Revised October 2018
Revised December 2018
Final January 2019

Prepared for: Integrity Golf



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INTRODUCTION

PROJECT DESCRIPTION

An existing golf course located in Fallbrook, CA (San Diego County), immediately west of Gird Road, is no longer open to the public. Golf operations have ceased, and the intent is to redevelop the project site as the Monserate Winery. Live Oak Creek, an un-named ephemeral tributary to the San Luis Rey River, flows southerly across the project site, partly as a concrete lined channel and partly as a natural, unlined channel. The Federal Emergency Management Agency (FEMA) has not studied Live Oak Creek and thus has not mapped a Special Flood Hazard Area (SFHA) across the project site.

This study is intended to define the 100-year floodplain and floodway across the project site based on present day topography and the proposed development associated with the new winery. Project-specific studies including a Drainage Study and SWQMP will be developed under separate cover and submitted to the County for approval as part of the Major Use Permit (MUP) application.

This study deals strictly with documenting the 100-year floodplain and floodway across the project site and is intended for review and approval by both the County of San Diego and FEMA.

SCOPE

The scope of this report is outlined below:

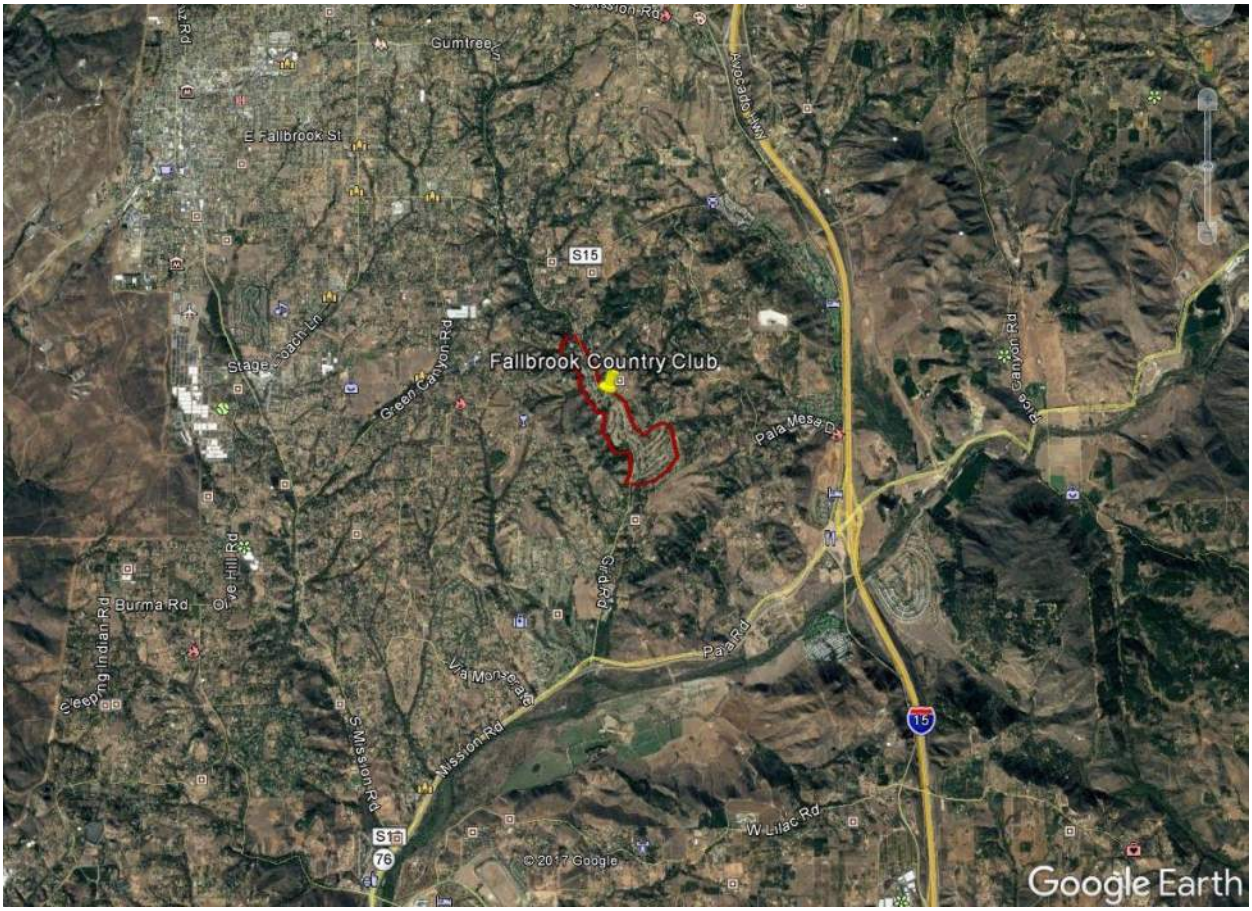
1. Develop 100-year hydrology for the tributary watershed using United States Geological Survey (USGS) Regression Equations;

2. Map the 100-year floodplain across the project site using HEC-RAS, aerial topography from 2017, field survey, proposed grading associated with the MUP application, and USGS 100-year hydrology for FEMA mapping applications.

3. Plot the 100-year floodway for the entire project site using the resources mentioned above.

This report intentionally omits the traditional 'existing' verses 'proposed' floodplain and floodway analyses, as that is considered unwarranted for this project. Topographically, the 100-year floodplain is confined within the site. Gird Road forms the easterly boundary and is raised approximately 10-15 feet above the site. Foothills on the order of 100+ feet high form the westerly boundary. Proposed improvements are minimal in the context of potential floodplain impacts.

FIGURE 1. SITE VICINITY MAP



METHODOLOGY

HYDROLOGY

This study develops 100-year peak flow using the USGS Regression Equations. The USGS Regression Equations are available online and are included in Appendix A of this study (https://streamstats.usgs.gov/ss/). This hydrologic approach is accepted by FEMA when submitting floodplain studies for review and development of Flood Insurance Rate Maps (FIRMs).

The USGS StreamStats application allows the user to delineate tributary areas and generate 100-year flows using the USGS Regression Equations for points selected within a recognized watercourse. For this project five (5) points were chosen along Live Oak Creek within the project boundary. The points were chosen to account for increases in tributary area due to the confluence of minor streams. An exhibit of the analysis points as well as USGS Regression outputs can be found in Appendix A.

HYDRAULICS

The Army Corps of Engineers' Hydrologic Engineering Center's River Analysis Software (HEC-RAS 4.1.0) has been used to map the floodplain across the project site based on present day conditions and

regulatory requirements for hydrology and hydraulics. A steady-state, subcritical flow regime has been used, consistent with floodplain mapping requirements. HEC-RAS computes water surface elevations (WSEs) using the one-dimensional energy equation and accounts for energy losses from friction using Manning's equation. Additional losses, including those due to expansion and contraction are also accounted for as a function of the change in velocity head. This floodplain modeling software is accepted by FEMA when considering revisions to Flood Insurance Rate Maps (FIRMS).

Topography

Project specific 1-foot aerial topography flown in June of 2017 combined with proposed project grading has been used to develop cross-sections used in the HEC-RAS model. Where available, field survey performed by MBI in June of 2017 is used to supplement creation of the cross-sections. Downstream of Gird Road, a combination of field survey, aerial topography from 2017 and 2-foot contour topography from SANDAG is used.

Cross Sections

HEC-RAS cross-section locations have been chosen to best represent changes in topography, channel dimensions, roughness coefficients, and proposed improvements. The cross-sections are identified on the HEC-RAS Work Maps found in Appendix B.

The northerly upstream limit of the model occurs along Via Del Robles (paved roadway). Immediately north of this road is an off-site, existing pond, which has been intentionally omitted from both the hydrologic and hydraulic calculations as a conservative approach. The pond is assumed full, thus no reduction to peak flow associated with potential storage has been considered. The southerly downstream limit of the model occurs east of Gird Road, along the southerly project boundary.

Manning's Roughness Coefficient

Manning's roughness coefficients have been applied within HEC-RAS based on present day field conditions, future conditions associated with the proposed development (i.e. planting of vines), and guidance found on Appendix A, Table A-5 of the San Diego County Hydraulic Manual (September 2014). Discussion of the surface types and roughness coefficients chosen for each channel element can be found below. Per correspondence with County Flood Control staff, a conservative value of 0.15 has been used along the main channel portion of numerous cross sections to account for the potential overgrowth in years to come. This conservative value of 0.15 comes from County recommendations despite not being documented in the County of San Diego's Hydraulic Design Manual (September 2014).

Channel Bottom

Along the upstream portion of the site (cross-section 99), the channel bottom of Live Oak Creek is vegetated and remains such until cross-section 92.5, where concrete begins. Between cross-sections 92.5 and the downstream limit of the model (cross-section 56), the channel bottom varies between concrete and vegetation.

A roughness coefficient of 0.015 is used for areas where the channel (Live Oak Creek) is concrete lined. This occurs between cross-sections 92.5-91; and 75-72. Where vegetation is considered medium to dense

density, a roughness coefficient of 0.09 has been selected, corresponding with "medium to dense brush" on Table A-5. This mostly occurs in the upper reaches of the model.

For areas of light vegetation, a roughness coefficient of 0.06 has been selected, corresponding to "light brush and trees" on Table A-5. This mostly occurs in the middle and lower reaches of the model. The applicant will enter into a maintenance agreement with the County should the use of these modeled roughness coefficients warrant such.

A roughness coefficient of 0.15 has been applied for the main channel for cross sections 71-68 and 65-56. For these cross sections downstream of Gird Road, a roughness coefficient of 0.15 has been used as a conservative measure as no future development is planned for this area and a maintenance agreement to warrant lower roughness coefficients is assumed unwarranted.

Channel Banks

A conservative approach has been taken while modeling the channel banks. A roughness coefficient of 0.11 has been applied wherever there is significant plant growth on the channel banks. A roughness coefficient of 0.11 corresponds to "heavy stand of timber, little undergrowth" on Table A-5. Additionally, a roughness coefficient of 0.15 has been used in isolated locations as a conservative approach.

Floodplain Fringe Area

The floodplain fringe areas consist of either short grass or grape vines. The areas where grape vines are proposed are delineated on the Proposed Condition Floodplain Work Map in Appendix B.

A roughness coefficient of 0.05 has been selected for grape vine areas. A coefficient of 0.05 corresponds to "mature field crops" on Table A-5. Maintenance will occur regularly order to take care of the crop and to ensure overgrowth that might raise the roughness coefficient will not be allowed to occur. A roughness coefficient of 0.04 for "mature row crops" could conceivably be chosen however a conservative approach has been assumed.

A roughness coefficient of 0.03 has been selected for the areas of short grass. A coefficient of 0.03 corresponds to "short grass" on Table A-5 of the San Diego County Hydraulic Manual (September 2014). The operations of this project will require regular maintenance for these areas.

Ponds

In all cases, on-site ponds are decorative features and are not intended (or modeled) to provide flood control relief via storage or attenuation. A pond that used to serve the golf course is included at HEC-RAS cross-section 93. Additional ponds are incorporated into the model at HEC-RAS cross sections 89 and 77. In all cases, these ponds have been modeled as "full" during the 100-year event. As such, the pond water surface elevation has been incorporated into development of the HEC-RAS cross-section, as opposed to the topographic bottom of the channel. Any flood event from Live Oak Creek will pass over these ponds similar to a paved surface. As such, a roughness coefficient of 0.015 is used across the surface of each pond.

Ineffective Flow Areas

Ineffective flow areas have been included to the HEC-RAS model along the left channel berms for cross sections 93-92.5 and the right channel berms for cross sections 89-88. Ineffective flow areas have been added to these cross sections since water will experience continuous flow on the banks up until cross sections 93-92.5 and 89-88. This is due to the fact that the lowest point elevations of the banks continually decrease up until cross sections 93-92.5 and 89-88. For that reason, the flow will not return to the main channel once again and ineffective flow areas are necessary to account for this.

On-Site Features

All structures and site features such as ponds and vines are shown on the HEC-RAS Work Map in Appendix B. The HEC-RAS model includes existing bridges associated with the golf cart path. In most cases, these bridges are best described as a deck over a trapezoidal channel. As such, contraction and expansion coefficients have not been increased in these cases.

The bridge crossing at HEC-RAS cross section 74.5 is physically deteriorating and requires emergency repair to ensure life safety. The bridge has been replaced in the HEC-RAS model with a clear span crossing that increases cross-sectional flow area, as compared to the existing condition. In this case, similar to the existing culvert beneath Gird Road, contraction and expansion coefficients have been increased per guidance in the HEC-RAS Hydraulic Reference Manual.

The bridge crossing at cross-section 74.5 has been reviewed and approved by the Fire Marshall for vehicular fire-access to the structures located along the westerly project boundary. In order to avoid any work within the natural-lined portion of Live Oak Creek, this bridge crossing at 74.5 is be re-located approximately 20 feet downstream such that all improvements occur over a concrete lined channel.

RESULTS

HYDROLOGY

Table 1 summarizes the hydrologic results for the area tributary to the project site. Refer to Appendix A for supporting calculations and exhibits.

TABLE 1. 100 YEAR HYDROLOGIC RESULTS

HEC-RAS Cross-Section	Appendix A Location Identifier	Area (sq-mi)	USGS Q100 (cfs)
101	A	4.80	1,220
96	B	5.00	1,270
89	C	5.30	1,320
72	D	5.50	1,370
61	E	6.80	1,620

HYDRAULICS

Refer to Appendix B for supporting calculations and exhibits. There are no new or existing structures located within the floodplain or floodway. Proposed development has been set-back from the channel thalweg to the maximum extent. All new structures will include finished floor elevations a minimum one foot above the adjacent 100-year water surface elevation. The 100-year floodplain is completely confined to the project site and thus does not result in flooding to adjacent roads or properties.

CONCLUSIONS

USGS Regression Equations have been used to determine Q100 for floodplain mapping across the project site. This hydrologic approach is accepted by FEMA when revising Flood Insurance Rate Maps (FIRMs). All proposed structures will be located outside the flood-fringe area. Proposed site features such as vines and decorative ponds are proposed within the fringe area and have been incorporated into the HEC-RAS model.

The proposed project will not adversely impact the 100-year floodplain across the project site. Based on current topography and the minimal proposed grading, the project will not result in the flooding of off-site features.

REFERENCES

County, S. D. (June 2003). *San Diego County Hydrology Manual.*

Diego, C. o. (September 2014). *Hydraulic Design Manual.*

Engineers, U. A. (January 2010). *HEC-RAS Hydraulic Reference Manual.*

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Appendix A: 100-Year Hydrology

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USGS
StreamStats [Development Version: Not for public consumtion]
HELP
ABOUT
REPORT
SELECT A STATE / REGION
CALIFORNIA
IDENTIFY A STUDY AREA
Step 2: Click the 'Delineate' button to activate the delineation tool
Delineate
SELECT SCENARIOS
BUILD A REPORT
POWERED BY WIM
A
B
C
D
E
Approximate project site and extent of HEC-RAS analyses
Zoom Level: 16
Map Scale: 1:9,027
Lat: 33.3475, Lon: -117.1952
100 m
500 ft
Palo Vista Rd
Valerie Dr
Country Club Ln
Via Del Cielo
Kingridge Dr
Poinsettia Ln
Gird Rd
Sugarpine Ln
Via Oeste Dr
Via Viento
Lakefree Dr
Foxglove Ln
Vista De Palomar
Via Rancheros
Toulouse Ln
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Los Campos Dr
Dos Lomas
Westmont Dr
Oakcliff Dr
Lake Garden Dr
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Leaflet

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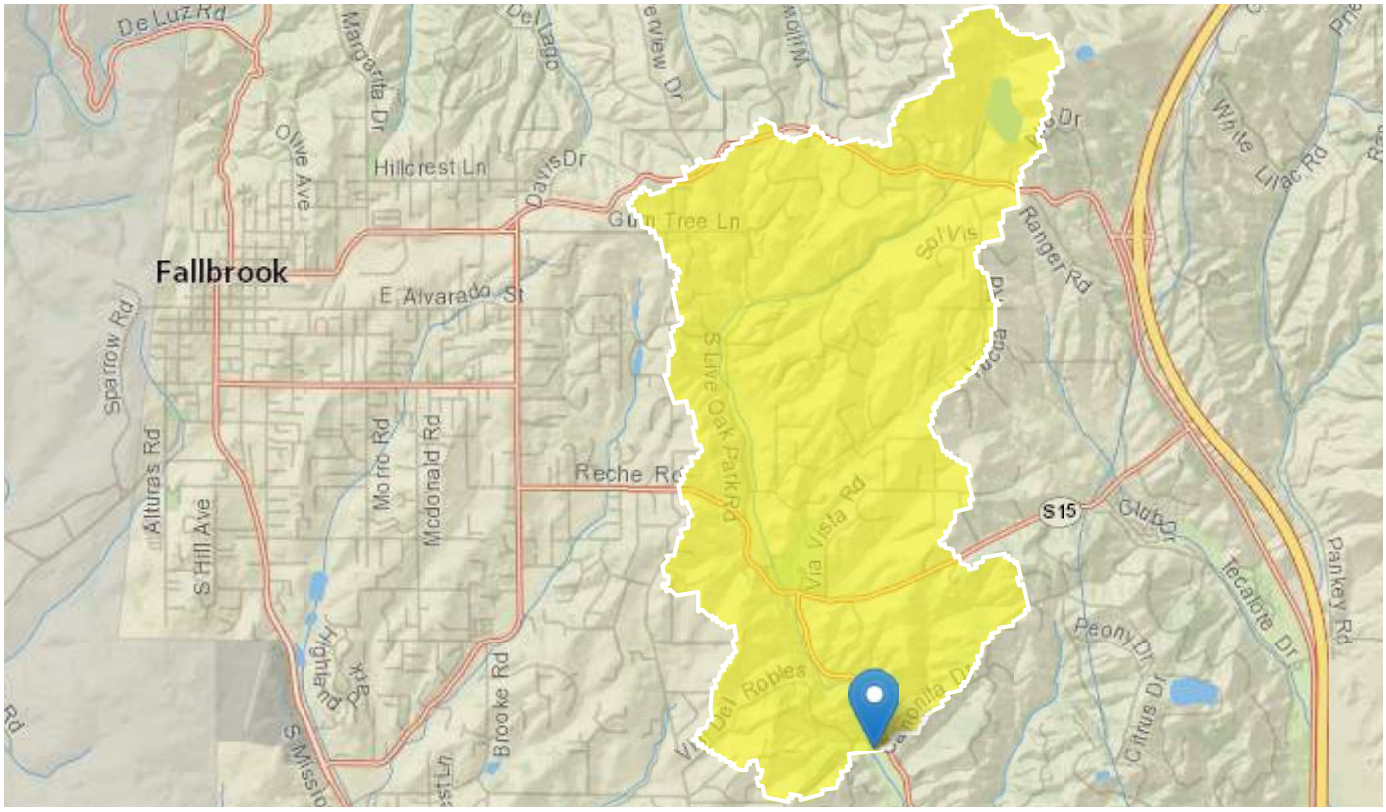
Location **A** on Site Map



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
PRECIP	Mean Annual Precipitation	17.2	inches
DRNAREA	Area that drains to a point on a stream	4.8	square miles

Peak-Flow Statistics Parameters [100 Percent (4.82 square miles) 2012 5113 Region 5 South Coast]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4.8	square miles	0.04	850

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
PRECIP	Mean Annual Precipitation	17.2	inches	10	45

Peak-Flow Statistics Flow Report [100 Percent (4.82 square miles) 2012 5113 Region 5 South Coast]

PIl: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PIl	PIu	SEp
2 Year Peak Flood	88	ft^3/s	16.2	478	134
5 Year Peak Flood	283	ft^3/s	85	943	83.1
10 Year Peak Flood	470	ft^3/s	178	1250	64
25 Year Peak Flood	743	ft^3/s	332	1660	51.5
50 Year Peak Flood	975	ft^3/s	464	2050	47.6
100 Year Peak Flood	1220	ft^3/s	581	2570	47.2
200 Year Peak Flood	1500	ft^3/s	707	3200	47.7
500 Year Peak Flood	1850	ft^3/s	829	4130	52

Peak-Flow Statistics Citations

Gotvald, A.J., Barth, N.A., Veilleux, A.G., and Parrett, Charles,2012, Methods for determining magnitude and frequency of floods in California, based on data through water year 2006: U.S. Geological Survey Scientific Investigations Report 2012–5113, 38 p., 1 pl. (http://pubs.usgs.gov/sir/2012/5113/)

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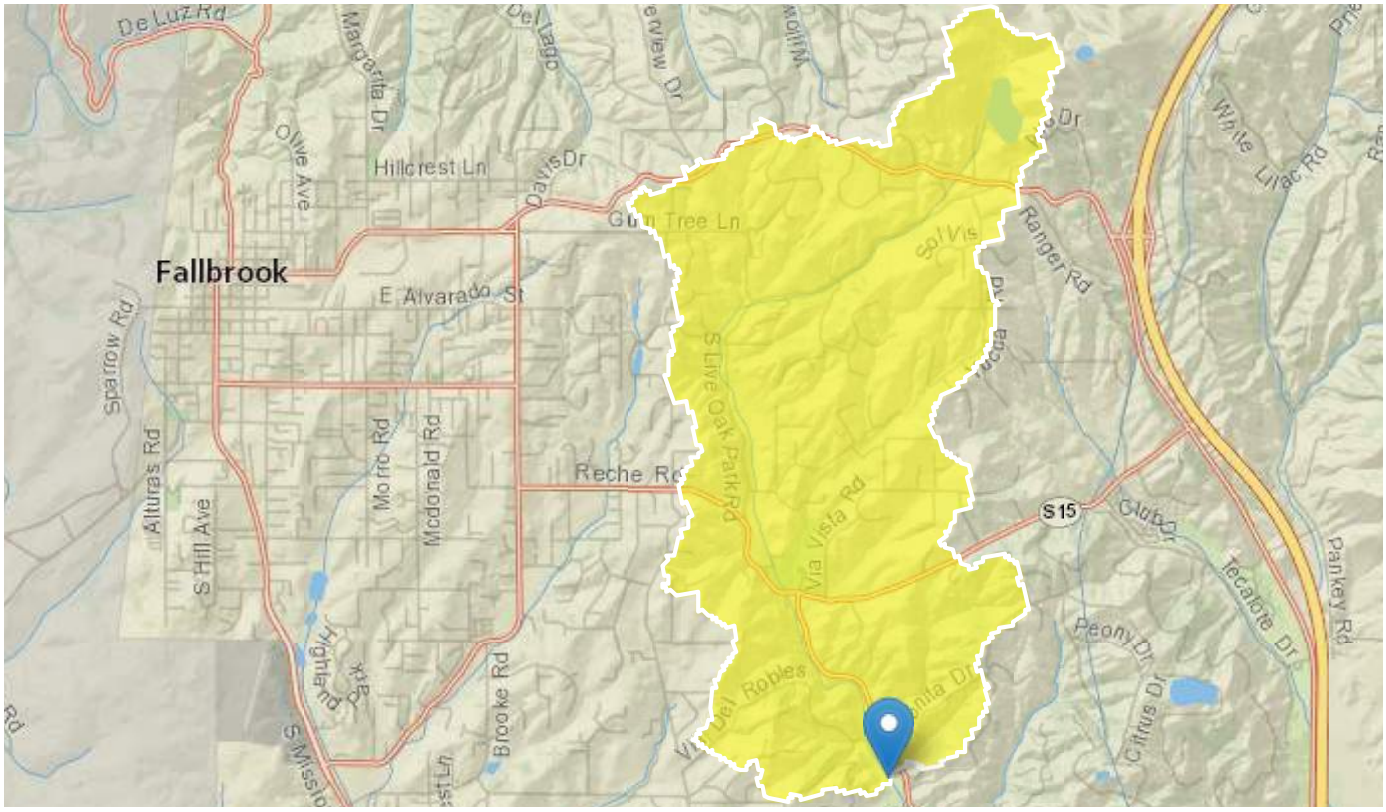
Location **B** on Site Map



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	5	square miles
PRECIP	Mean Annual Precipitation	17.2	inches

Peak-Flow Statistics Parameters [100 Percent (4.98 square miles) 2012 5113 Region 5 South Coast]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	5	square miles	0.04	850

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
PRECIP	Mean Annual Precipitation	17.2	inches	10	45

Peak-Flow Statistics Flow Report [100 Percent (4.98 square miles) 2012 5113 Region 5 South Coast]

PIl: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PIl	PIu	SEp
2 Year Peak Flood	90.4	ft^3/s	16.6	491	134
5 Year Peak Flood	292	ft^3/s	87.6	971	83.1
10 Year Peak Flood	486	ft^3/s	183	1290	64
25 Year Peak Flood	768	ft^3/s	343	1720	51.5
50 Year Peak Flood	1010	ft^3/s	480	2120	47.6
100 Year Peak Flood	1270	ft^3/s	602	2670	47.2
200 Year Peak Flood	1560	ft^3/s	734	3320	47.7
500 Year Peak Flood	1920	ft^3/s	862	4290	52

Peak-Flow Statistics Citations

Gotvald, A.J., Barth, N.A., Veilleux, A.G., and Parrett, Charles,2012, Methods for determining magnitude and frequency of floods in California, based on data through water year 2006: U.S. Geological Survey Scientific Investigations Report 2012–5113, 38 p., 1 pl. (http://pubs.usgs.gov/sir/2012/5113/)

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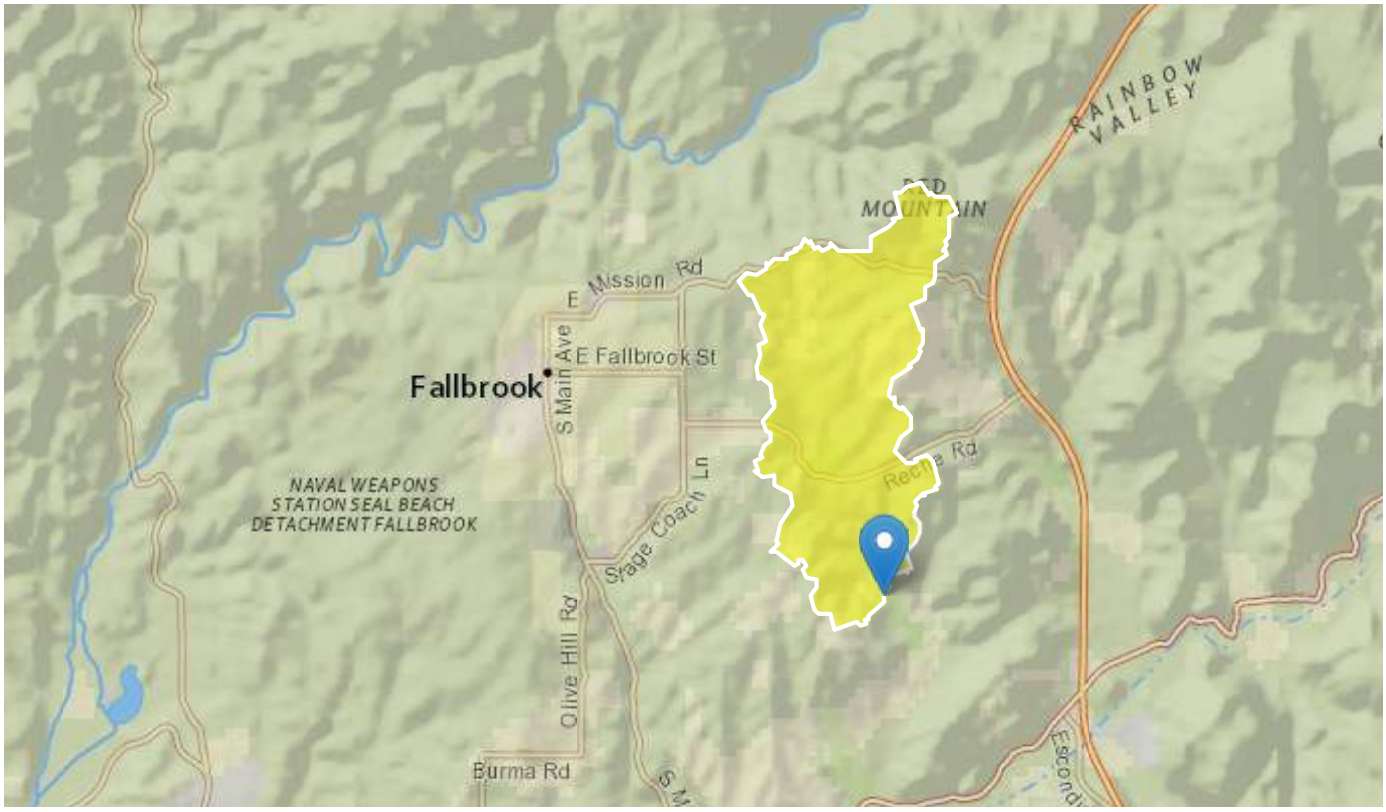

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	5.3	square miles
PRECIP	Mean Annual Precipitation	17.1	inches

Peak-Flow Statistics Parameters [100 Percent (5.32 square miles) 2012 5113 Region 5 South Coast]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	5.3	square miles	0.04	850

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
PRECIP	Mean Annual Precipitation	17.1	inches	10	45

Peak-Flow Statistics Flow Report [100 Percent (5.32 square miles) 2012 5113 Region 5 South Coast]

PIl: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PIl	PIu	SEp
2 Year Peak Flood	93.6	ft^3/s	17.2	509	134
5 Year Peak Flood	303	ft^3/s	91	1010	83.1
10 Year Peak Flood	505	ft^3/s	191	1340	64
25 Year Peak Flood	800	ft^3/s	357	1790	51.5
50 Year Peak Flood	1050	ft^3/s	501	2220	47.6
100 Year Peak Flood	1320	ft^3/s	629	2790	47.2
200 Year Peak Flood	1630	ft^3/s	766	3470	47.7
500 Year Peak Flood	2010	ft^3/s	900	4480	52

Peak-Flow Statistics Citations

Gotvald, A.J., Barth, N.A., Veilleux, A.G., and Parrett, Charles,2012, Methods for determining magnitude and frequency of floods in California, based on data through water year 2006: U.S. Geological Survey Scientific Investigations Report 2012–5113, 38 p., 1 pl. (http://pubs.usgs.gov/sir/2012/5113/)

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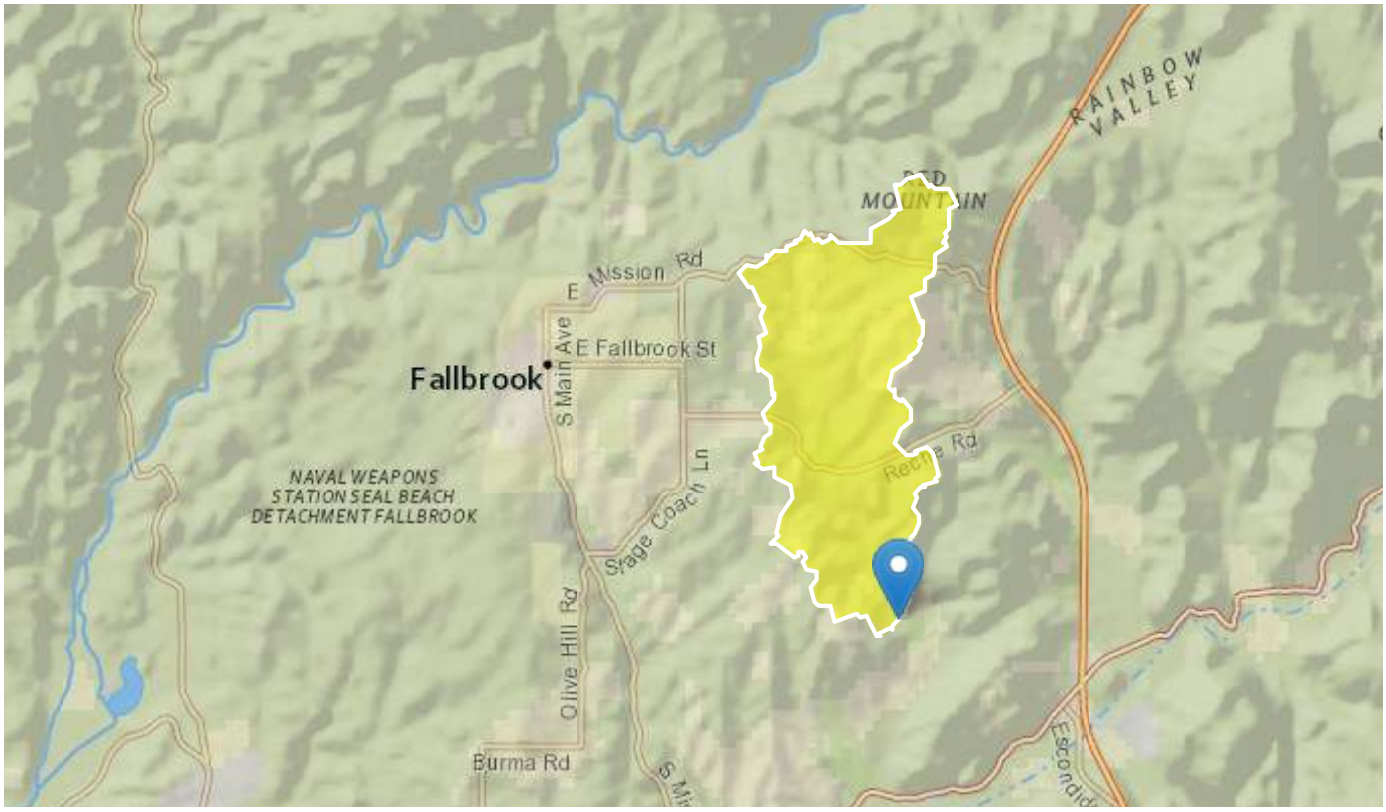

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	5.5	square miles
PRECIP	Mean Annual Precipitation	17.1	inches

Peak-Flow Statistics Parameters [100 Percent (5.5 square miles) 2012 5113 Region 5 South Coast]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	5.5	square miles	0.04	850

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
PRECIP	Mean Annual Precipitation	17.1	inches	10	45

Peak-Flow Statistics Flow Report [100 Percent (5.5 square miles) 2012 5113 Region 5 South Coast]

PIl: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PIl	PIu	SEp
2 Year Peak Flood	96	ft^3/s	17.7	521	134
5 Year Peak Flood	311	ft^3/s	93.5	1040	83.1
10 Year Peak Flood	520	ft^3/s	196	1380	64
25 Year Peak Flood	825	ft^3/s	369	1850	51.5
50 Year Peak Flood	1090	ft^3/s	517	2290	47.6
100 Year Peak Flood	1370	ft^3/s	650	2880	47.2
200 Year Peak Flood	1690	ft^3/s	793	3590	47.7
500 Year Peak Flood	2080	ft^3/s	932	4640	52

Peak-Flow Statistics Citations

Gotvald, A.J., Barth, N.A., Veilleux, A.G., and Parrett, Charles,2012, Methods for determining magnitude and frequency of floods in California, based on data through water year 2006: U.S. Geological Survey Scientific Investigations Report 2012–5113, 38 p., 1 pl. (http://pubs.usgs.gov/sir/2012/5113/)

StreamStats Report

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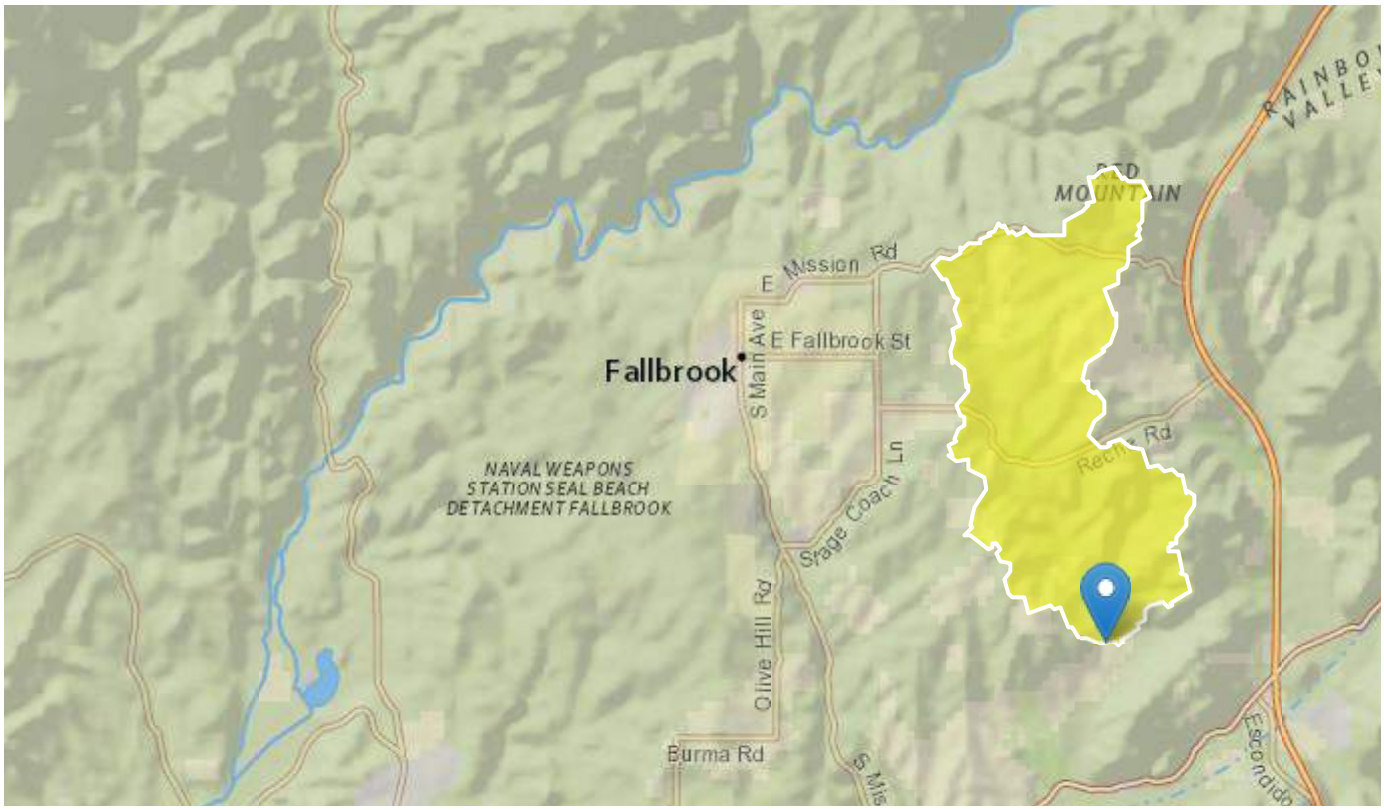

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	6.8	square miles
PRECIP	Mean Annual Precipitation	16.9	inches
LFPLENGTH	Length of longest flow path	6	miles

Peak-Flow Statistics Parameters [2012 5113 Region 5 South Coast]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	6.8	square miles	0.04	850
PRECIP	Mean Annual Precipitation	16.9	inches	10	45

Peak-Flow Statistics Flow Report [2012 5113 Region 5 South Coast]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	PIu	SEp
2 Year Peak Flood	110	ft^3/s	20.2	596	134
5 Year Peak Flood	361	ft^3/s	108	1200	83.1
10 Year Peak Flood	606	ft^3/s	229	1600	64
25 Year Peak Flood	969	ft^3/s	433	2170	51.5
50 Year Peak Flood	1280	ft^3/s	611	2700	47.6
100 Year Peak Flood	1620	ft^3/s	770	3410	47.2
200 Year Peak Flood	2010	ft^3/s	943	4270	47.7
500 Year Peak Flood	2490	ft^3/s	1110	5550	52

Peak-Flow Statistics Citations

Gotvald, A.J., Barth, N.A., Veilleux, A.G., and Parrett, Charles,2012, Methods for determining magnitude and frequency of floods in California, based on data through water year 2006: U.S. Geological Survey Scientific Investigations Report 2012–5113, 38 p., 1 pl. (http://pubs.usgs.gov/sir/2012/5113/)

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Appendix B: HEC-RAS Model

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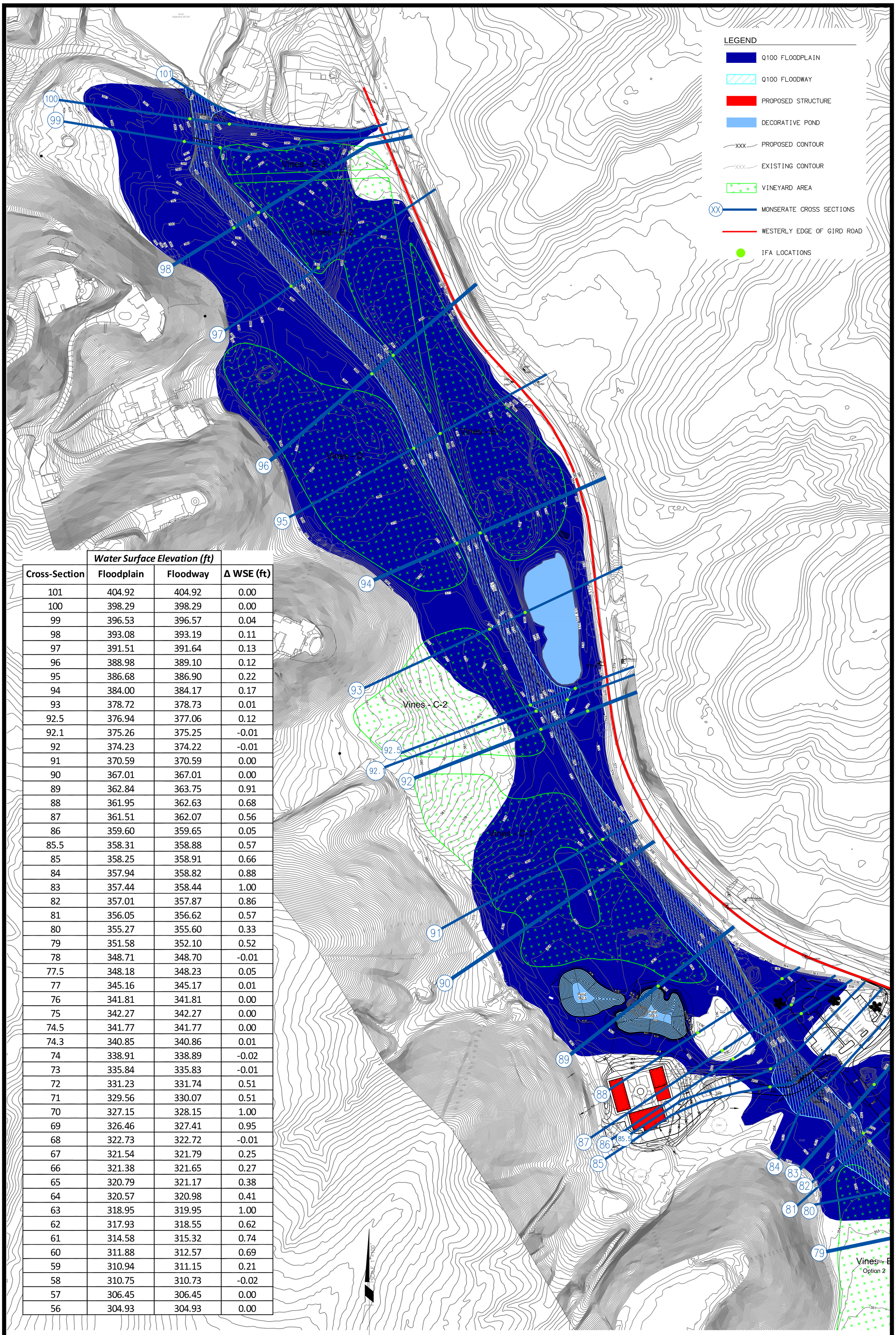


	Water Surface Elevation (ft)		
Cross-Section	**Floodplain**	**Floodway**	**Δ WSE (ft)**
101	404.92	404.92	0.00
100	398.29	398.29	0.00
99	396.53	396.57	0.04
98	393.08	393.19	0.11
97	391.51	391.64	0.13
96	388.98	389.10	0.12
95	386.68	386.90	0.22
94	384.00	384.17	0.17
93	378.72	378.73	0.01
92.5	376.94	377.06	0.12
92.1	375.26	375.25	-0.01
92	374.23	374.22	-0.01
91	370.59	370.59	0.00
90	367.01	367.01	0.00
89	362.84	363.75	0.91
88	361.95	362.63	0.68
87	361.51	362.07	0.56
86	359.60	359.65	0.05
85.5	358.31	358.88	0.57
85	358.25	358.91	0.66
84	357.94	358.82	0.88
83	357.44	358.44	1.00
82	357.01	357.87	0.86
81	356.05	356.62	0.57
80	355.27	355.60	0.33
79	351.58	352.10	0.52
78	348.71	348.70	-0.01
77.5	348.18	348.23	0.05
77	345.16	345.17	0.01
76	341.81	341.81	0.00
75	342.27	342.27	0.00
74.5	341.77	341.77	0.00
74.3	340.85	340.86	0.01
74	338.91	338.89	-0.02
73	335.84	335.83	-0.01
72	331.23	331.74	0.51
71	329.56	330.07	0.51
70	327.15	328.15	1.00
69	326.46	327.41	0.95
68	322.73	322.72	-0.01
67	321.54	321.79	0.25
66	321.38	321.65	0.27
65	320.79	321.17	0.38
64	320.57	320.98	0.41
63	318.95	319.95	1.00
62	317.93	318.55	0.62
61	314.58	315.32	0.74
60	311.88	312.57	0.69
59	310.94	311.15	0.21
58	310.75	310.73	-0.02
57	306.45	306.45	0.00
56	304.93	304.93	0.00

SCALE 1"=100'

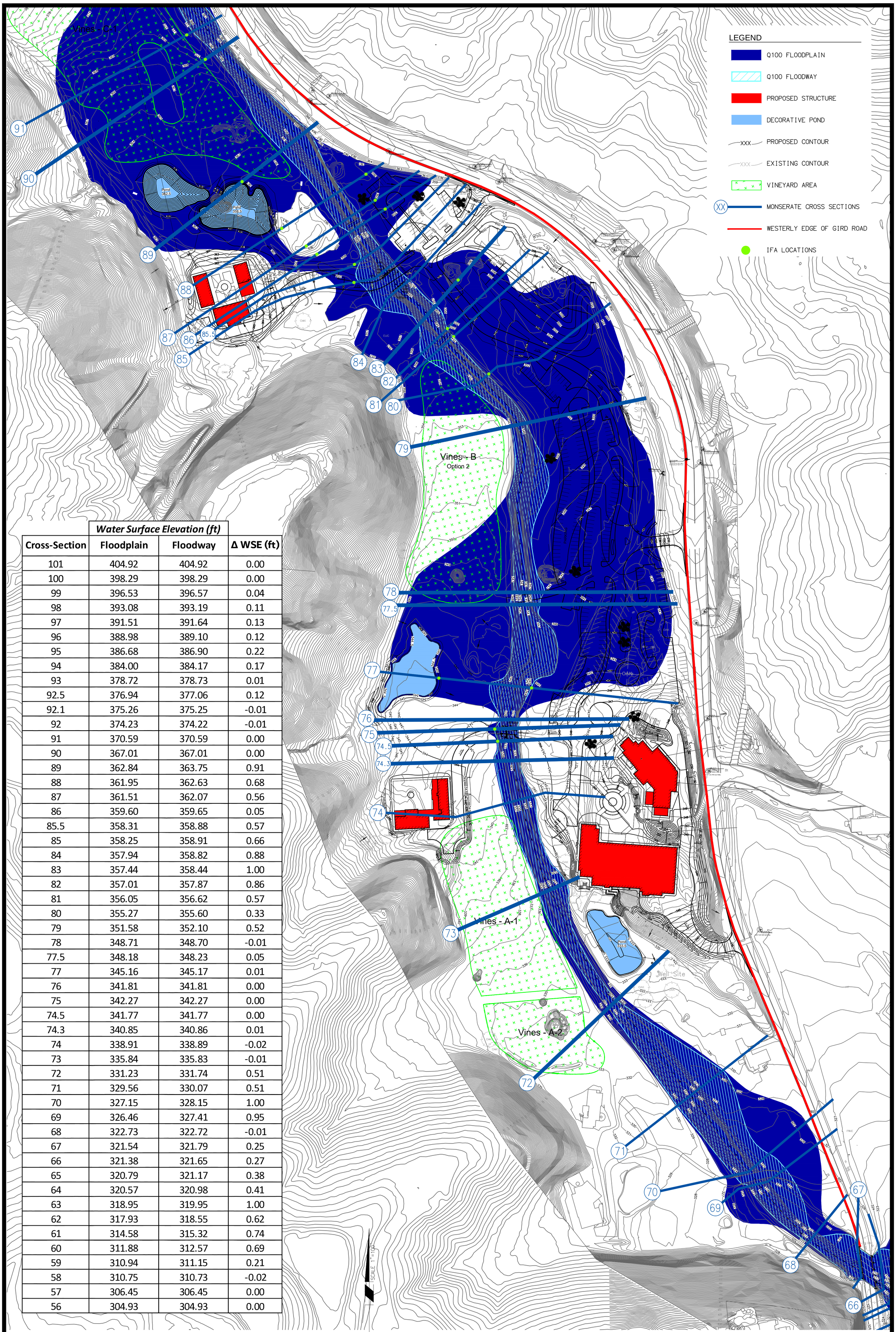
100 50 0 100 200 300

SCALE: 1"=100'

H:\PDATA\160734\CADD\STRMWATER\160734 HEC-RAS FULL AREA FEMA MODEL WORK MAP.DWG 1/15/2019 10:24 AM

Michael Baker
INTERNATIONAL
9755 Clairemont Mesa Boulevard
San Diego, CA 92124
Phone: (858) 614-5000 · MBAKERINTL.COM

MONSERATE WINERY
FEMA: PROPOSED CONDITION FLOODPLAIN WORK MAP
[PAGE 1 OF 3]
JANUARY 2019



	Water Surface Elevation (ft)		
Cross-Section	**Floodplain**	**Floodway**	**Δ WSE (ft)**
101	404.92	404.92	0.00
100	398.29	398.29	0.00
99	396.53	396.57	0.04
98	393.08	393.19	0.11
97	391.51	391.64	0.13
96	388.98	389.10	0.12
95	386.68	386.90	0.22
94	384.00	384.17	0.17
93	378.72	378.73	0.01
92.5	376.94	377.06	0.12
92.1	375.26	375.25	-0.01
92	374.23	374.22	-0.01
91	370.59	370.59	0.00
90	367.01	367.01	0.00
89	362.84	363.75	0.91
88	361.95	362.63	0.68
87	361.51	362.07	0.56
86	359.60	359.65	0.05
85.5	358.31	358.88	0.57
85	358.25	358.91	0.66
84	357.94	358.82	0.88
83	357.44	358.44	1.00
82	357.01	357.87	0.86
81	356.05	356.62	0.57
80	355.27	355.60	0.33
79	351.58	352.10	0.52
78	348.71	348.70	-0.01
77.5	348.18	348.23	0.05
77	345.16	345.17	0.01
76	341.81	341.81	0.00
75	342.27	342.27	0.00
74.5	341.77	341.77	0.00
74.3	340.85	340.86	0.01
74	338.91	338.89	-0.02
73	335.84	335.83	-0.01
72	331.23	331.74	0.51
71	329.56	330.07	0.51
70	327.15	328.15	1.00
69	326.46	327.41	0.95
68	322.73	322.72	-0.01
67	321.54	321.79	0.25
66	321.38	321.65	0.27
65	320.79	321.17	0.38
64	320.57	320.98	0.41
63	318.95	319.95	1.00
62	317.93	318.55	0.62
61	314.58	315.32	0.74
60	311.88	312.57	0.69
59	310.94	311.15	0.21
58	310.75	310.73	-0.02
57	306.45	306.45	0.00
56	304.93	304.93	0.00

SCALE 1"=100'

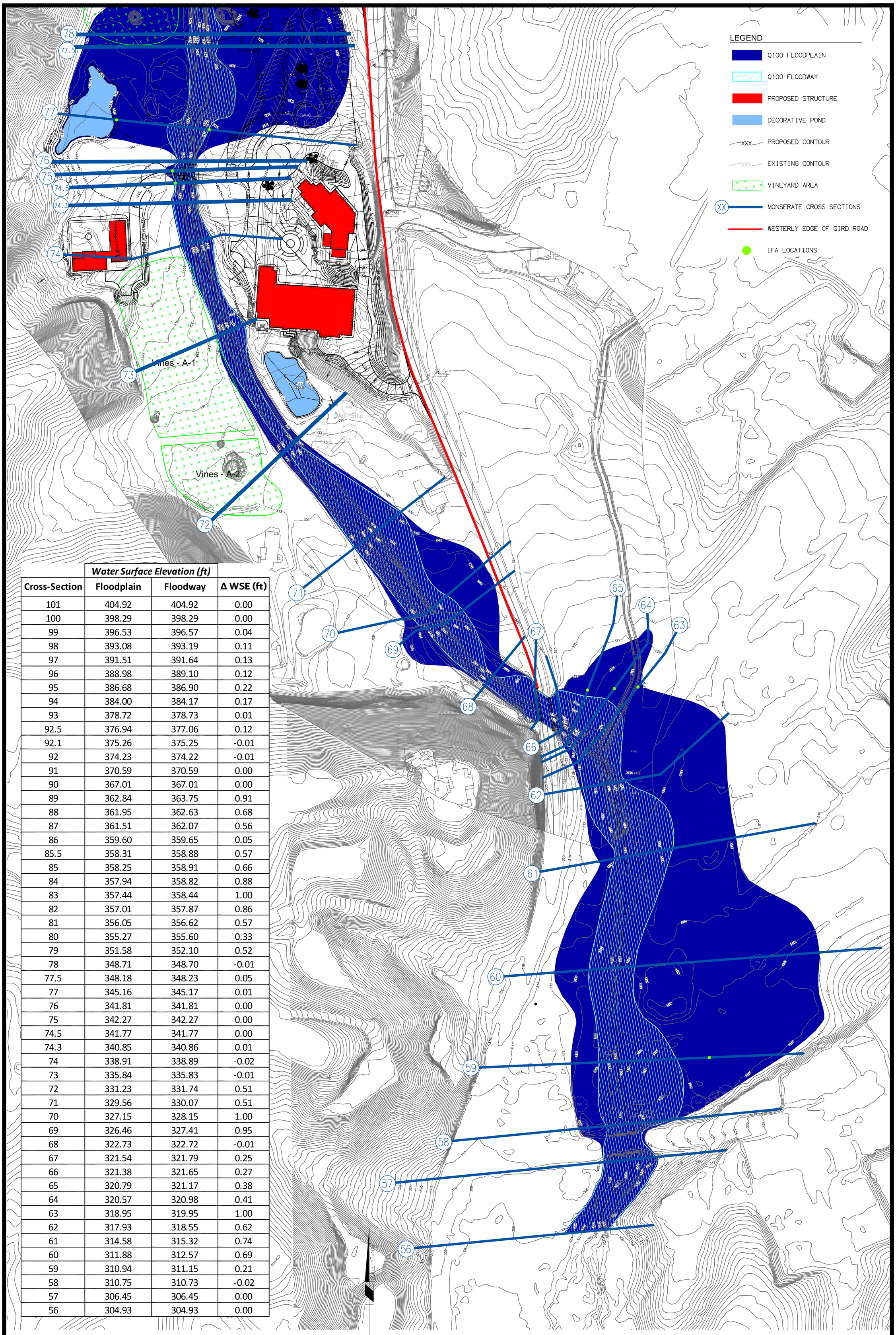
100 50 0 100 200 300

SCALE: 1"=100'

Michael Baker
INTERNATIONAL
9755 Clairemont Mesa Boulevard
San Diego, CA 92124
Phone: (858) 614-5000 · MBAKERINTL.COM

MONSERATE WINERY
FEMA: PROPOSED CONDITION FLOODPLAIN WORK MAP
[PAGE 2 OF 3]
JANUARY 2019

H:\PDATA\160734\CADD\STRMWATER\160734 HEC-RAS FULL AREA FEMA MODEL WORK MAP.DWG 1/15/2019 10:25 AM



Cross-Section	*Water Surface Elevation (ft)* Floodplain	Floodway	Δ WSE (ft)
101	404.92	404.92	0.00
100	398.29	398.29	0.00
99	396.53	396.57	0.04
98	393.08	393.19	0.11
97	391.51	391.64	0.13
96	388.98	389.10	0.12
95	386.68	386.90	0.22
94	384.00	384.17	0.17
93	378.72	378.73	0.01
92.5	376.94	377.06	0.12
92.1	375.26	375.25	-0.01
92	374.23	374.22	-0.01
91	370.59	370.59	0.00
90	367.01	367.01	0.00
89	362.84	363.75	0.91
88	361.95	362.63	0.68
87	361.51	362.07	0.56
86	359.60	359.65	0.05
85.5	358.31	358.88	0.57
85	358.25	358.91	0.66
84	357.94	358.82	0.88
83	357.44	358.44	1.00
82	357.01	357.87	0.86
81	356.05	356.62	0.57
80	355.27	355.60	0.33
79	351.58	352.10	0.52
78	348.71	348.70	-0.01
77.5	348.18	348.23	0.05
77	345.16	345.17	0.01
76	341.81	341.81	0.00
75	342.27	342.27	0.00
74.5	341.77	341.77	0.00
74.3	340.85	340.86	0.01
74	338.91	338.89	-0.02
73	335.84	335.83	-0.01
72	331.23	331.74	0.51
71	329.56	330.07	0.51
70	327.15	328.15	1.00
69	326.46	327.41	0.95
68	322.73	322.72	-0.01
67	321.54	321.79	0.25
66	321.38	321.65	0.27
65	320.79	321.17	0.38
64	320.57	320.98	0.41
63	318.95	319.95	1.00
62	317.93	318.55	0.62
61	314.58	315.32	0.74
60	311.88	312.57	0.69
59	310.94	311.15	0.21
58	310.75	310.73	-0.02
57	306.45	306.45	0.00
56	304.93	304.93	0.00

Michael Baker
INTERNATIONAL
9755 Clairemont Mesa Boulevard
San Diego, CA 92124
Phone: (858) 614-5000 · MBAKERINTL.COM

MONSERATE WINERY
FEMA: PROPOSED CONDITION FLOODPLAIN WORK MAP
[PAGE 3 OF 3]
JANUARY 2019

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HEC-RAS Plan: IFA River: Fallbrook Winery Reach: Fallbrook Winery

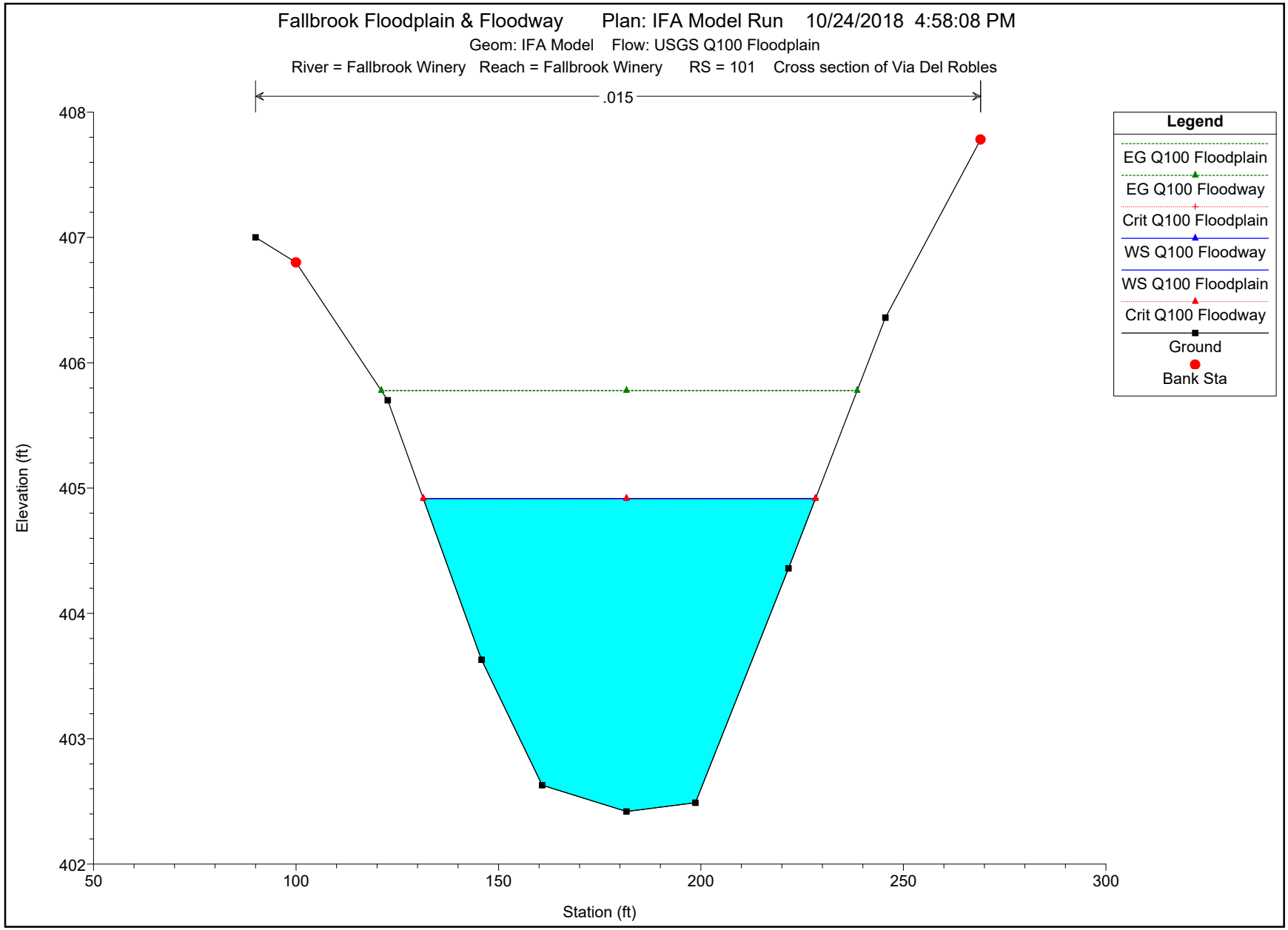
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Fallbrook Winery	101	Q100 Floodplain	1220.00	402.42	404.92	404.92	405.78	0.002806	7.44	163.92	96.86	1.01
Fallbrook Winery	101	Q100 Floodway	1220.00	402.42	404.92	404.92	405.78	0.002806	7.44	163.92	96.86	1.01
Fallbrook Winery	100	Q100 Floodplain	1220.00	394.38	398.29	397.80	399.43	0.001604	8.58	142.14	487.58	0.81
Fallbrook Winery	100	Q100 Floodway	1220.00	394.38	398.29	397.81	399.43	0.001604	8.58	142.14	40.98	0.81
Fallbrook Winery	99.5		Bridge									
Fallbrook Winery	99	Q100 Floodplain	1220.00	391.00	396.53		397.63	0.055439	8.41	145.06	553.48	0.78
Fallbrook Winery	99	Q100 Floodway	1220.00	391.00	396.57		397.65	0.054019	8.32	146.62	40.43	0.77
Fallbrook Winery	98	Q100 Floodplain	1220.00	385.00	393.08		393.39	0.009112	4.51	270.79	365.52	0.34
Fallbrook Winery	98	Q100 Floodway	1220.00	385.00	393.19		393.49	0.008937	4.41	276.55	51.66	0.34
Fallbrook Winery	97	Q100 Floodplain	1220.00	384.00	391.51		391.77	0.007487	4.08	304.88	504.07	0.31
Fallbrook Winery	97	Q100 Floodway	1220.00	384.00	391.64		391.90	0.007385	4.04	302.25	54.00	0.30
Fallbrook Winery	96	Q100 Floodplain	1270.00	381.00	388.98		389.29	0.010322	4.53	284.11	538.63	0.36
Fallbrook Winery	96	Q100 Floodway	1270.00	381.00	389.10		389.42	0.010447	4.55	279.13	55.00	0.36
Fallbrook Winery	95	Q100 Floodplain	1270.00	379.00	386.68		387.02	0.010851	4.65	274.58	562.28	0.37
Fallbrook Winery	95	Q100 Floodway	1270.00	379.00	386.90		387.21	0.010139	4.48	283.19	56.38	0.35
Fallbrook Winery	94	Q100 Floodplain	1270.00	377.00	384.00		384.47	0.009574	5.58	235.18	505.97	0.46
Fallbrook Winery	94	Q100 Floodway	1270.00	377.00	384.17	381.96	384.65	0.010245	5.58	227.59	48.00	0.45
Fallbrook Winery	93	Q100 Floodplain	1270.00	374.00	378.72	378.72	380.38	0.045870	10.33	122.95	350.64	1.01
Fallbrook Winery	93	Q100 Floodway	1270.00	374.00	378.73	378.73	380.38	0.045734	10.31	123.13	37.65	1.01
Fallbrook Winery	92.5	Q100 Floodplain	1270.00	371.00	376.94	375.81	377.23	0.003282	4.26	305.01	263.20	0.35
Fallbrook Winery	92.5	Q100 Floodway	1270.00	371.00	377.06	375.86	377.39	0.003697	4.60	285.50	97.00	0.37
Fallbrook Winery	92.2		Bridge									
Fallbrook Winery	92.1	Q100 Floodplain	1270.00	371.00	375.26	375.26	376.51	0.022873	9.02	142.44	225.66	0.95
Fallbrook Winery	92.1	Q100 Floodway	1270.00	371.00	375.25	375.25	376.51	0.023493	9.03	142.10	59.00	0.95
Fallbrook Winery	92	Q100 Floodplain	1270.00	370.00	374.23	374.23	375.27	0.001903	8.70	194.84	197.37	0.87
Fallbrook Winery	92	Q100 Floodway	1270.00	370.00	374.22	374.22	375.77	0.002526	9.99	127.09	41.00	1.00
Fallbrook Winery	91	Q100 Floodplain	1270.00	365.00	370.59		371.25	0.018818	6.51	195.20	380.33	0.65
Fallbrook Winery	91	Q100 Floodway	1270.00	365.00	370.59		371.25	0.018817	6.51	195.21	63.10	0.65
Fallbrook Winery	90	Q100 Floodplain	1270.00	362.00	367.01	367.01	368.70	0.090717	10.43	121.79	301.69	1.00
Fallbrook Winery	90	Q100 Floodway	1270.00	362.00	367.01	367.01	368.70	0.090729	10.43	121.78	36.05	1.00
Fallbrook Winery	89	Q100 Floodplain	1320.00	355.00	362.84		362.99	0.004778	3.28	447.16	457.38	0.26
Fallbrook Winery	89	Q100 Floodway	1320.00	355.00	363.75		363.91	0.003884	3.21	410.74	70.00	0.23
Fallbrook Winery	88	Q100 Floodplain	1320.00	354.00	361.95		362.17	0.005409	3.55	353.89	266.09	0.28
Fallbrook Winery	88	Q100 Floodway	1320.00	354.00	362.63		362.99	0.008993	4.78	275.99	49.00	0.36
Fallbrook Winery	87	Q100 Floodplain	1320.00	352.17	361.51	358.90	361.79	0.006612	3.77	325.28	292.57	0.31
Fallbrook Winery	87	Q100 Floodway	1320.00	352.17	362.07	358.87	362.40	0.009337	4.66	283.06	56.00	0.37
Fallbrook Winery	86.5		Bridge									
Fallbrook Winery	86	Q100 Floodplain	1320.00	351.84	359.60		360.32	0.034254	6.90	195.21	259.28	0.66
Fallbrook Winery	86	Q100 Floodway	1320.00	351.84	359.65		360.52	0.023999	7.51	175.87	38.00	0.61
Fallbrook Winery	85.5	Q100 Floodplain	1320.00	351.00	358.31		358.86	0.012949	5.76	224.98	175.68	0.49
Fallbrook Winery	85.5	Q100 Floodway	1320.00	351.00	358.88		359.38	0.009724	5.30	238.48	60.00	0.42
Fallbrook Winery	85	Q100 Floodplain	1320.00	347.85	358.25	352.91	358.46	0.003275	3.75	376.67	187.21	0.26
Fallbrook Winery	85	Q100 Floodway	1320.00	347.85	358.91	352.91	359.07	0.002116	3.22	422.22	96.00	0.21
Fallbrook Winery	84.5		Culvert									
Fallbrook Winery	84	Q100 Floodplain	1320.00	347.77	357.94		358.05	0.002091	2.66	527.89	263.71	0.24
Fallbrook Winery	84	Q100 Floodway	1320.00	347.77	358.82		358.93	0.001740	2.69	490.82	102.00	0.22
Fallbrook Winery	83	Q100 Floodplain	1320.00	349.00	357.44		357.69	0.006416	4.14	342.30	343.33	0.33
Fallbrook Winery	83	Q100 Floodway	1320.00	349.00	358.44		358.66	0.004535	3.76	350.75	61.00	0.28
Fallbrook Winery	82	Q100 Floodplain	1320.00	348.80	357.01	355.56	357.29	0.008117	4.08	315.08	347.21	0.36
Fallbrook Winery	82	Q100 Floodway	1320.00	348.80	357.87	355.56	358.27	0.010486	5.06	260.70	53.00	0.40
Fallbrook Winery	81.5		Bridge									
Fallbrook Winery	81	Q100 Floodplain	1320.00	348.72	356.05		356.36	0.008185	3.84	300.33	340.05	0.33
Fallbrook Winery	81	Q100 Floodway	1320.00	348.72	356.62		357.08	0.007829	3.97	268.78	83.50	0.32
Fallbrook Winery	80	Q100 Floodplain	1320.00	347.00	355.27	354.10	355.46	0.006313	4.12	397.04	530.85	0.31
Fallbrook Winery	80	Q100 Floodway	1320.00	347.00	355.60	353.84	356.00	0.010149	5.08	259.42	60.00	0.37

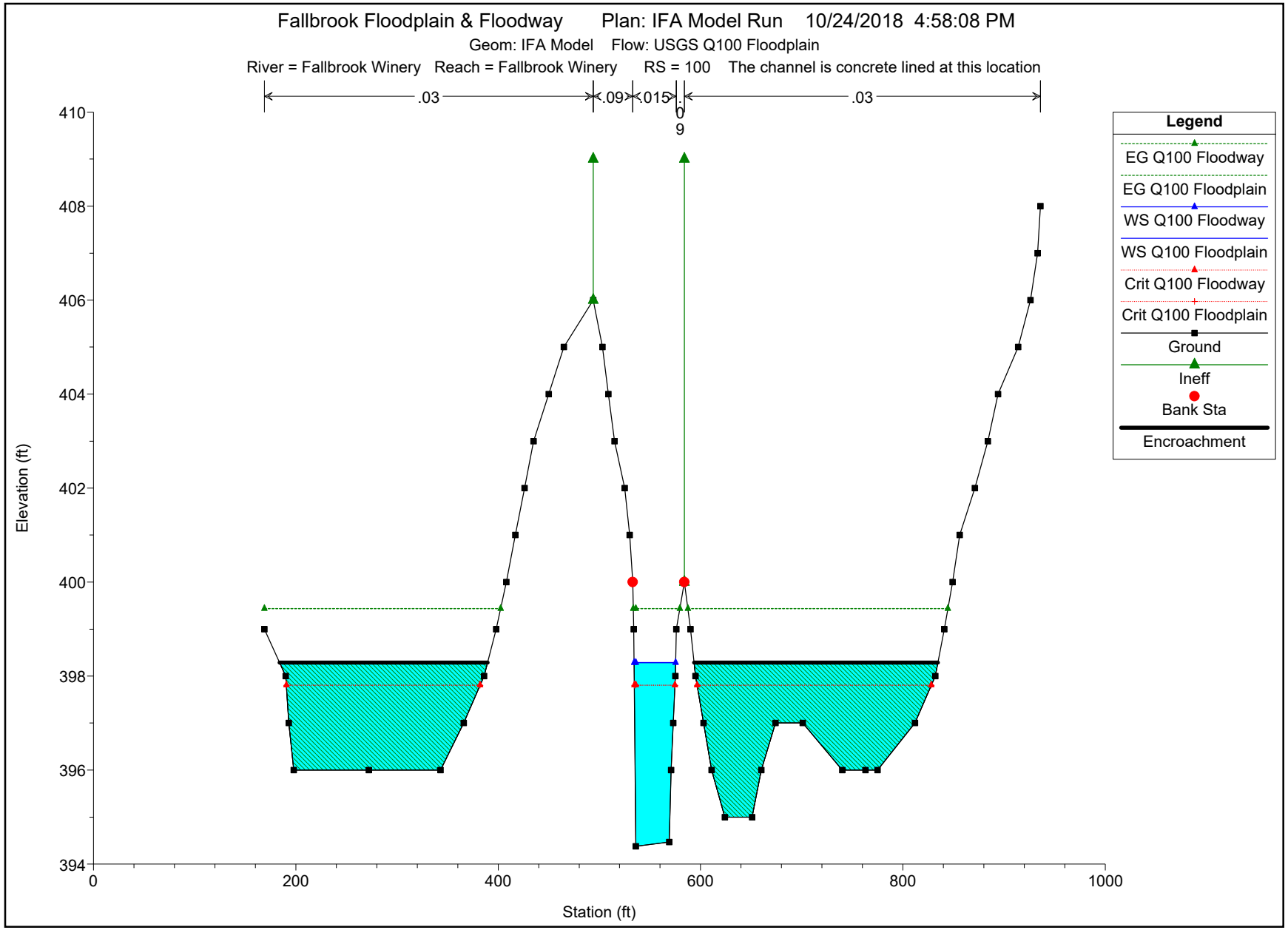
HEC-RAS Plan: IFA River: Fallbrook Winery Reach: Fallbrook Winery (Continued)

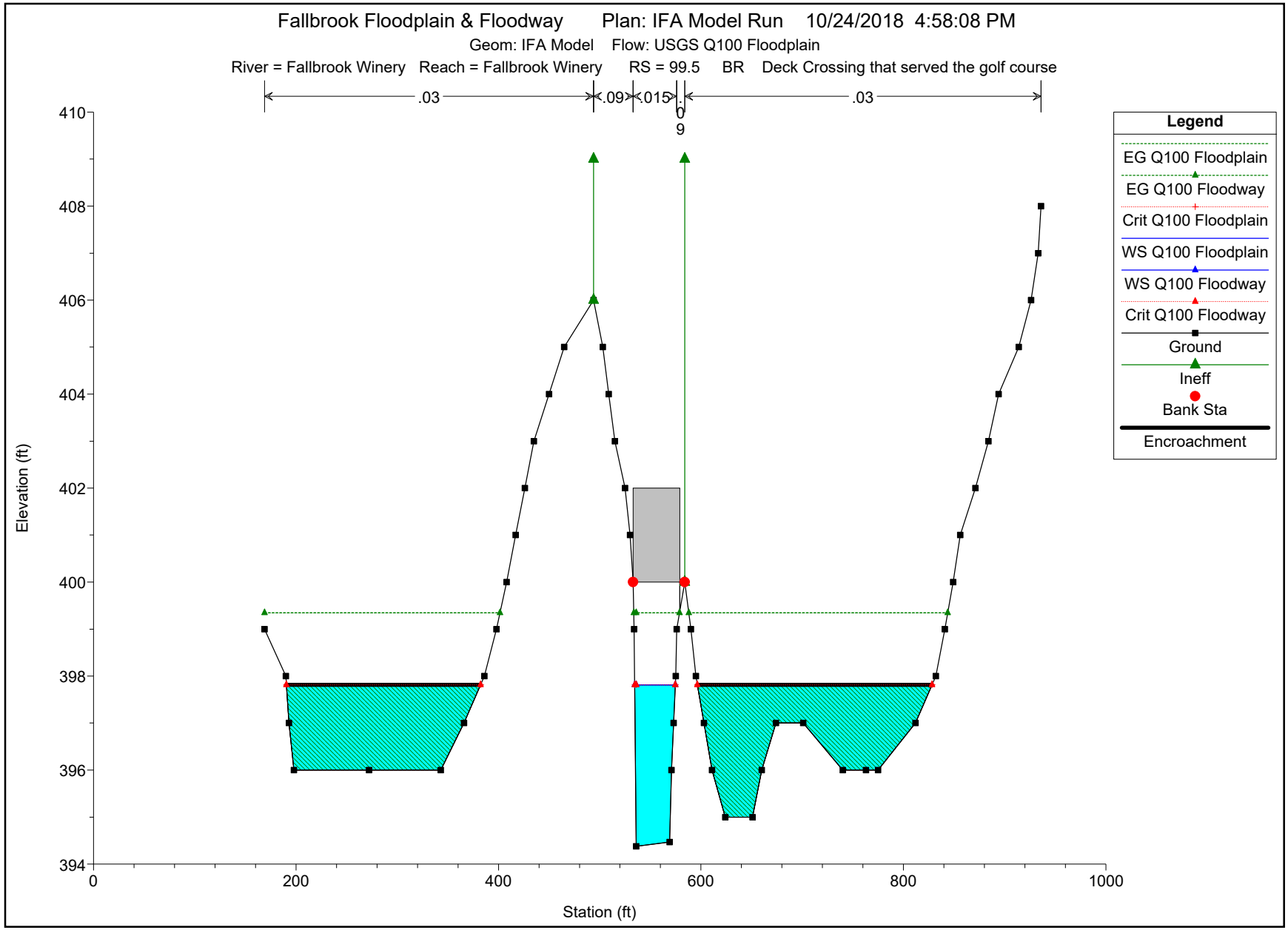
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Fallbrook Winery	79	Q100 Floodplain	1320.00	346.00	351.58	351.58	353.33	0.060226	10.61	124.40	207.11	1.01
Fallbrook Winery	79	Q100 Floodway	1320.00	346.00	352.10		353.41	0.042060	9.19	143.69	38.00	0.83
Fallbrook Winery	78	Q100 Floodplain	1320.00	341.00	348.71	346.05	348.92	0.003273	3.15	370.09	581.88	0.27
Fallbrook Winery	78	Q100 Floodway	1320.00	341.00	348.70	345.99	349.06	0.005615	4.78	272.27	67.50	0.34
Fallbrook Winery	77.75		Bridge									
Fallbrook Winery	77.5	Q100 Floodplain	1320.00	341.00	348.18		348.60	0.008498	5.23	259.34	604.33	0.41
Fallbrook Winery	77.5	Q100 Floodway	1320.00	341.00	348.23		348.65	0.008363	5.19	255.32	70.00	0.41
Fallbrook Winery	77	Q100 Floodplain	1320.00	338.00	345.16	343.16	345.47	0.016219	4.59	301.45	445.48	0.47
Fallbrook Winery	77	Q100 Floodway	1320.00	338.00	345.17	343.16	345.52	0.016852	4.69	282.46	106.00	0.48
Fallbrook Winery	76	Q100 Floodplain	1320.00	337.00	341.81	341.76	343.23	0.029989	9.54	138.33	47.56	0.99
Fallbrook Winery	76	Q100 Floodway	1320.00	337.00	341.81	341.78	343.23	0.030060	9.55	138.21	47.52	0.99
Fallbrook Winery	75	Q100 Floodplain	1320.00	337.08	342.27	339.92	342.69	0.000389	5.20	254.02	69.12	0.41
Fallbrook Winery	75	Q100 Floodway	1320.00	337.08	342.27	339.92	342.69	0.000389	5.20	253.93	49.82	0.41
Fallbrook Winery	74.75		Bridge									
Fallbrook Winery	74.5	Q100 Floodplain	1320.00	337.08	341.77		342.29	0.000537	5.76	228.97	49.63	0.47
Fallbrook Winery	74.5	Q100 Floodway	1320.00	337.08	341.77		342.29	0.000537	5.77	228.90	49.63	0.47
Fallbrook Winery	74.3	Q100 Floodplain	1320.00	336.00	340.85	340.85	342.05	0.002516	8.80	149.97	62.29	1.00
Fallbrook Winery	74.3	Q100 Floodway	1320.00	336.00	340.86	340.86	342.05	0.002508	8.79	150.21	62.38	1.00
Fallbrook Winery	74	Q100 Floodplain	1320.00	335.00	338.91	338.91	339.96	0.002171	8.24	160.21	76.20	1.00
Fallbrook Winery	74	Q100 Floodway	1320.00	335.00	338.89	338.89	339.96	0.002201	8.29	159.28	75.97	1.01
Fallbrook Winery	73	Q100 Floodplain	1320.00	331.00	335.84	335.84	336.94	0.002379	8.43	156.55	71.74	1.01
Fallbrook Winery	73	Q100 Floodway	1320.00	331.00	335.83	335.83	336.94	0.002399	8.46	155.96	71.58	1.01
Fallbrook Winery	72	Q100 Floodplain	1370.00	327.00	331.23	331.23	332.82	0.001951	10.99	158.31	59.68	0.97
Fallbrook Winery	72	Q100 Floodway	1370.00	327.00	331.74	331.74	334.02	0.002863	12.12	113.02	25.00	1.00
Fallbrook Winery	71	Q100 Floodplain	1370.00	322.00	329.56		329.70	0.019450	3.02	452.98	138.22	0.29
Fallbrook Winery	71	Q100 Floodway	1370.00	322.00	330.07		330.18	0.012083	2.61	524.45	138.50	0.24
Fallbrook Winery	70	Q100 Floodplain	1370.00	318.00	327.15	323.07	327.23	0.007089	2.50	618.93	239.44	0.19
Fallbrook Winery	70	Q100 Floodway	1370.00	318.00	328.15	323.07	328.25	0.006549	2.62	524.59	91.00	0.18
Fallbrook Winery	69.5		Bridge									
Fallbrook Winery	69	Q100 Floodplain	1370.00	318.00	326.46		326.53	0.005048	2.44	666.84	258.68	0.17
Fallbrook Winery	69	Q100 Floodway	1370.00	318.00	327.41		327.50	0.004407	2.36	563.07	96.00	0.15
Fallbrook Winery	68	Q100 Floodplain	1370.00	318.00	322.73	322.73	323.83	0.134322	8.86	167.68	73.21	0.79
Fallbrook Winery	68	Q100 Floodway	1370.00	318.00	322.72	322.72	324.78	0.258580	11.54	118.75	29.00	1.00
Fallbrook Winery	67	Q100 Floodplain	1370.00	315.80	321.54	317.84	321.65	0.003234	2.64	520.66	103.10	0.20
Fallbrook Winery	67	Q100 Floodway	1370.00	315.80	321.79	317.83	321.89	0.002800	2.51	545.51	101.58	0.19
Fallbrook Winery	66.5		Culvert									
Fallbrook Winery	66	Q100 Floodplain	1370.00	315.40	321.38		321.47	0.002529	2.39	573.32	106.15	0.18
Fallbrook Winery	66	Q100 Floodway	1370.00	315.40	321.65		321.73	0.002205	2.28	600.74	105.00	0.17
Fallbrook Winery	65	Q100 Floodplain	1370.00	315.00	320.79		321.19	0.053171	4.98	269.03	230.81	0.48
Fallbrook Winery	65	Q100 Floodway	1370.00	315.00	321.17		321.50	0.031979	4.10	306.06	127.00	0.38
Fallbrook Winery	64	Q100 Floodplain	1370.00	314.00	320.57	319.56	320.77	0.009739	2.56	414.81	323.62	0.21
Fallbrook Winery	64	Q100 Floodway	1370.00	314.00	320.98	319.55	321.19	0.008442	2.45	413.79	145.00	0.20
Fallbrook Winery	63.5		Bridge									
Fallbrook Winery	63	Q100 Floodplain	1370.00	314.00	318.95		319.13	0.009250	2.47	446.14	255.92	0.21
Fallbrook Winery	63	Q100 Floodway	1370.00	314.00	319.95		320.13	0.005929	2.27	469.78	152.00	0.17
Fallbrook Winery	62	Q100 Floodplain	1370.00	313.00	317.93		318.07	0.012401	2.08	485.10	365.89	0.23
Fallbrook Winery	62	Q100 Floodway	1370.00	313.00	318.55		318.87	0.041497	4.33	302.49	131.00	0.42
Fallbrook Winery	61	Q100 Floodplain	1620.00	308.01	314.58	314.45	314.97	0.023681	4.06	363.01	324.17	0.33
Fallbrook Winery	61	Q100 Floodway	1620.00	308.01	315.32		315.72	0.010547	2.99	370.87	143.00	0.23
Fallbrook Winery	60	Q100 Floodplain	1620.00	305.50	311.88		312.01	0.006473	2.12	602.27	494.34	0.17
Fallbrook Winery	60	Q100 Floodway	1620.00	305.50	312.57		313.21	0.008748	2.70	321.38	105.00	0.21
Fallbrook Winery	59	Q100 Floodplain	1620.00	302.92	310.94		311.03	0.002357	1.33	794.64	523.96	0.11
Fallbrook Winery	59	Q100 Floodway	1620.00	302.92	311.15		311.31	0.005200	1.96	574.02	181.97	0.15
Fallbrook Winery	58	Q100 Floodplain	1620.00	304.00	310.75	306.54	310.81	0.000851	1.30	991.79	259.09	0.10

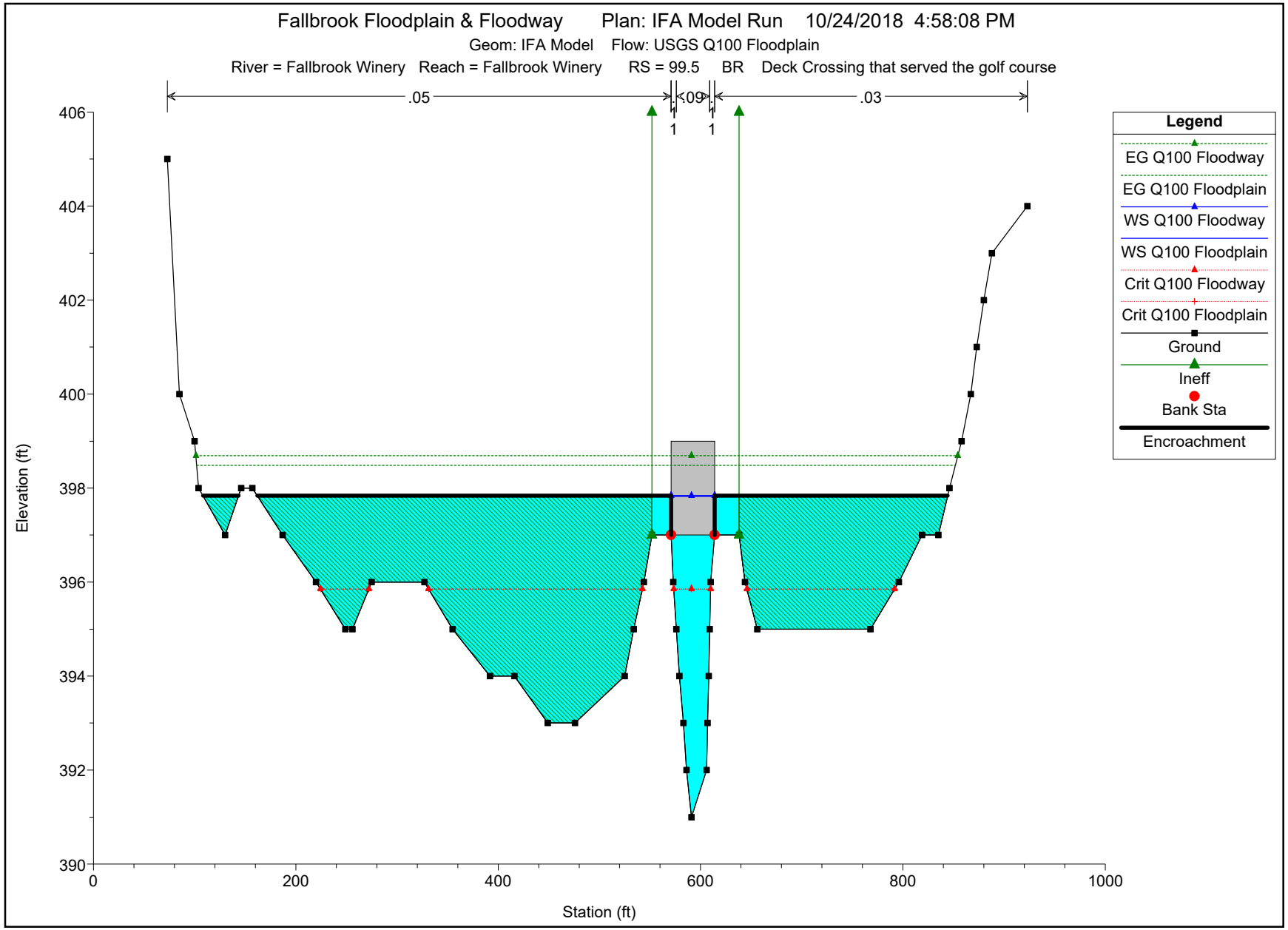
HEC-RAS Plan: IFA River: Fallbrook Winery Reach: Fallbrook Winery (Continued)

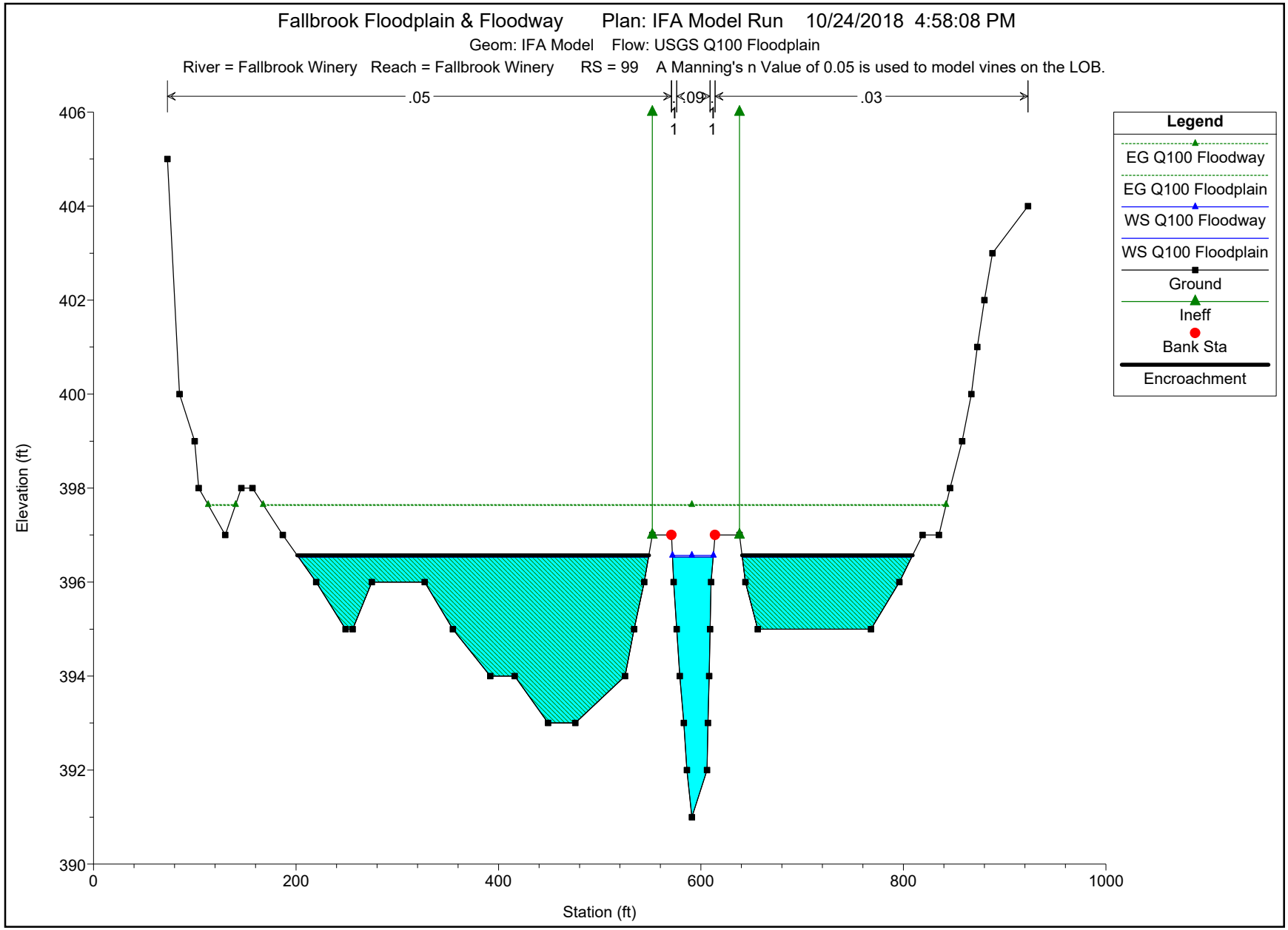
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Fallbrook Winery	58	Q100 Floodway	1620.00	304.00	310.73	306.54	310.81	0.001931	1.96	768.99	156.00	0.14
Fallbrook Winery	57.5		Culvert									
Fallbrook Winery	57	Q100 Floodplain	1620.00	300.00	306.45		306.59	0.005938	2.96	547.02	115.65	0.24
Fallbrook Winery	57	Q100 Floodway	1620.00	300.00	306.45		306.59	0.005938	2.96	547.05	115.66	0.24
Fallbrook Winery	56	Q100 Floodplain	1620.00	298.00	304.93	302.79	305.25	0.010017	4.51	359.23	105.84	0.43
Fallbrook Winery	56	Q100 Floodway	1620.00	298.00	304.93	302.79	305.25	0.010005	4.51	359.38	105.88	0.43

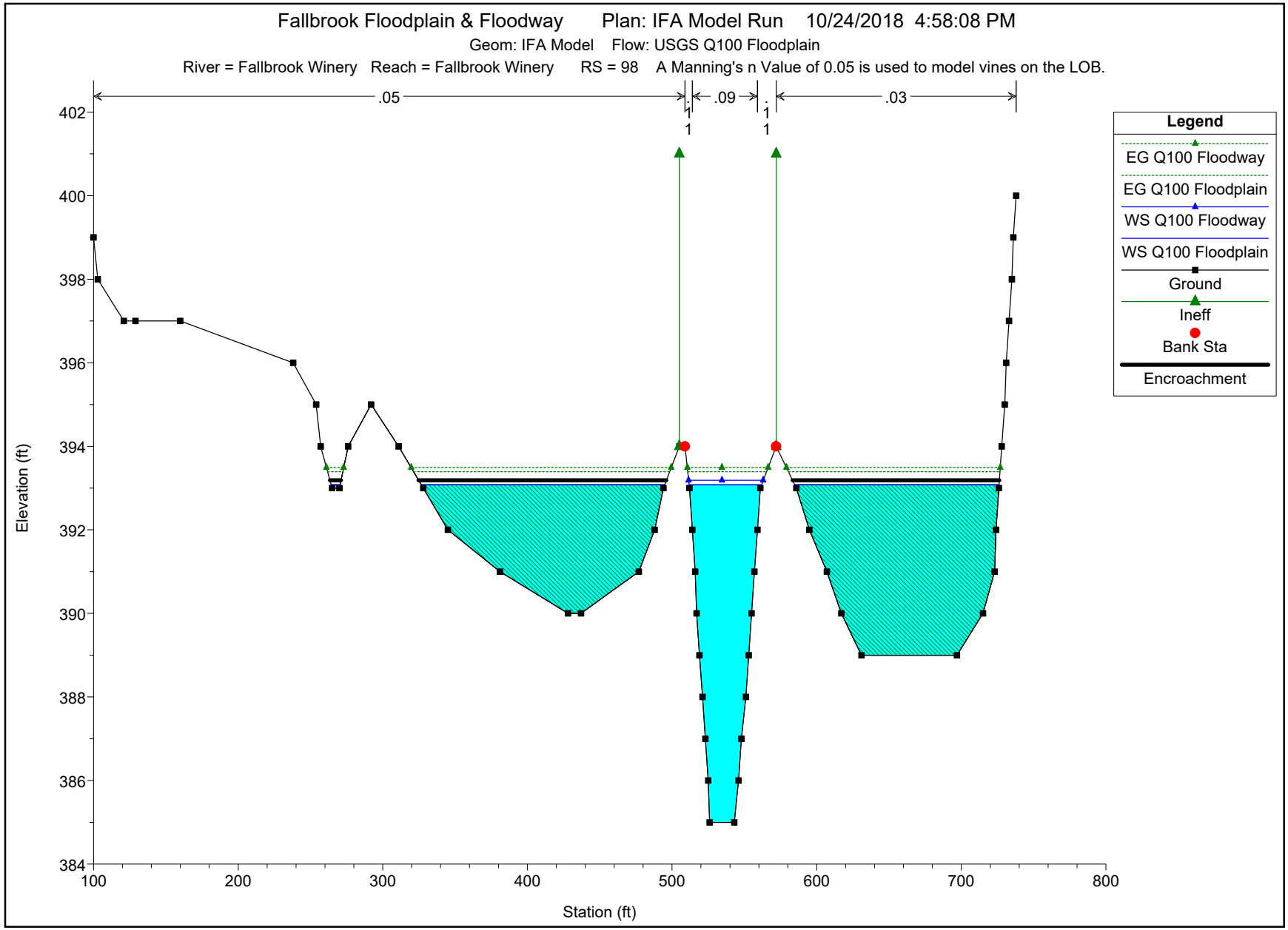

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 101 Cross section of Via Del Robles
.015
Legend
EG Q100 Floodplain
EG Q100 Floodway
Crit Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Crit Q100 Floodway
Ground
Bank Sta
Elevation (ft)
408
407
406
405
404
403
402
50
100
150
200
250
300
Station (ft)

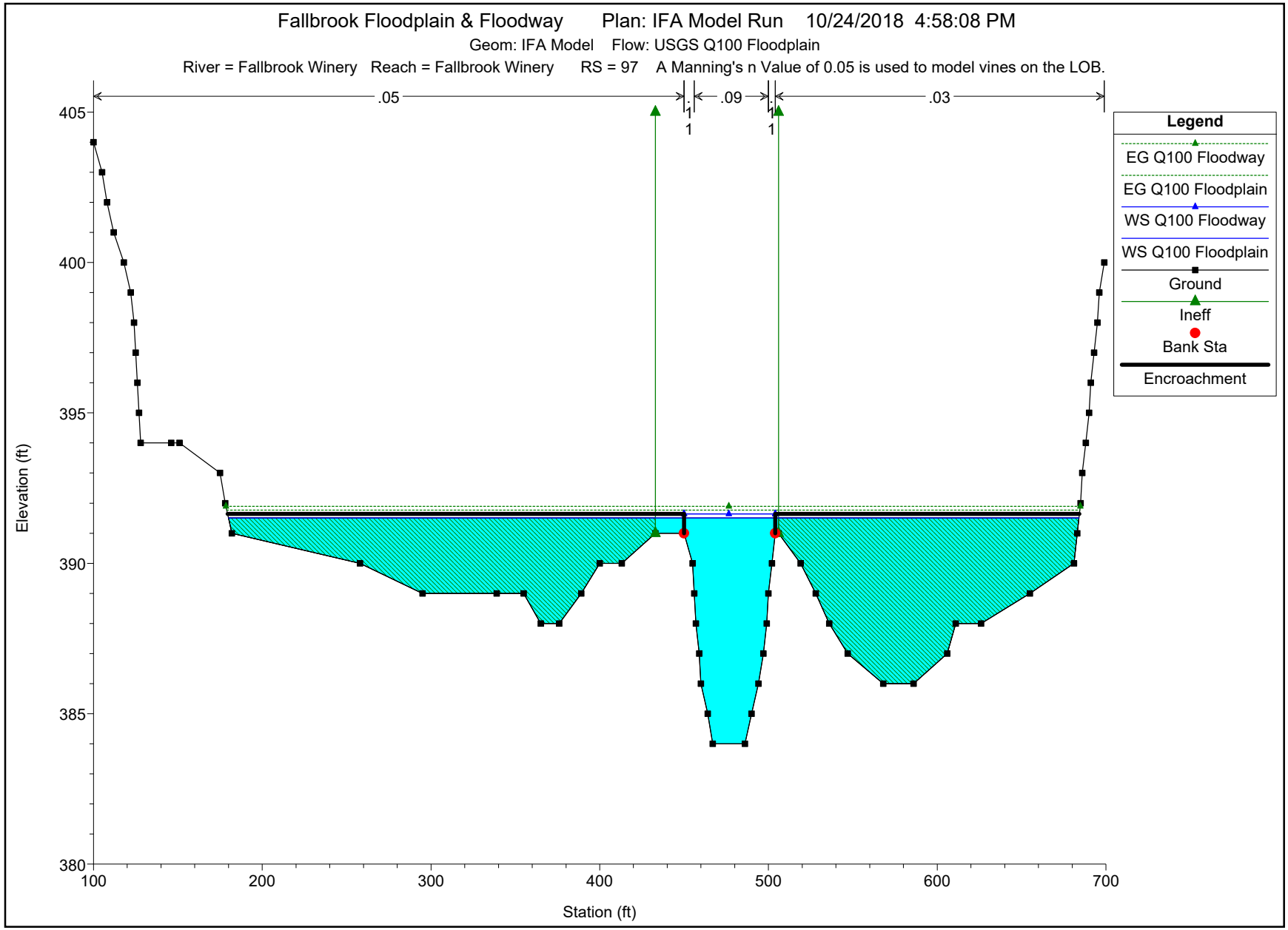

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 100 The channel is concrete lined at this location
.03
.09
.015
.03
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Crit Q100 Floodway
Crit Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
410
408
406
404
402
400
398
396
394
0
200
400
600
800
1000

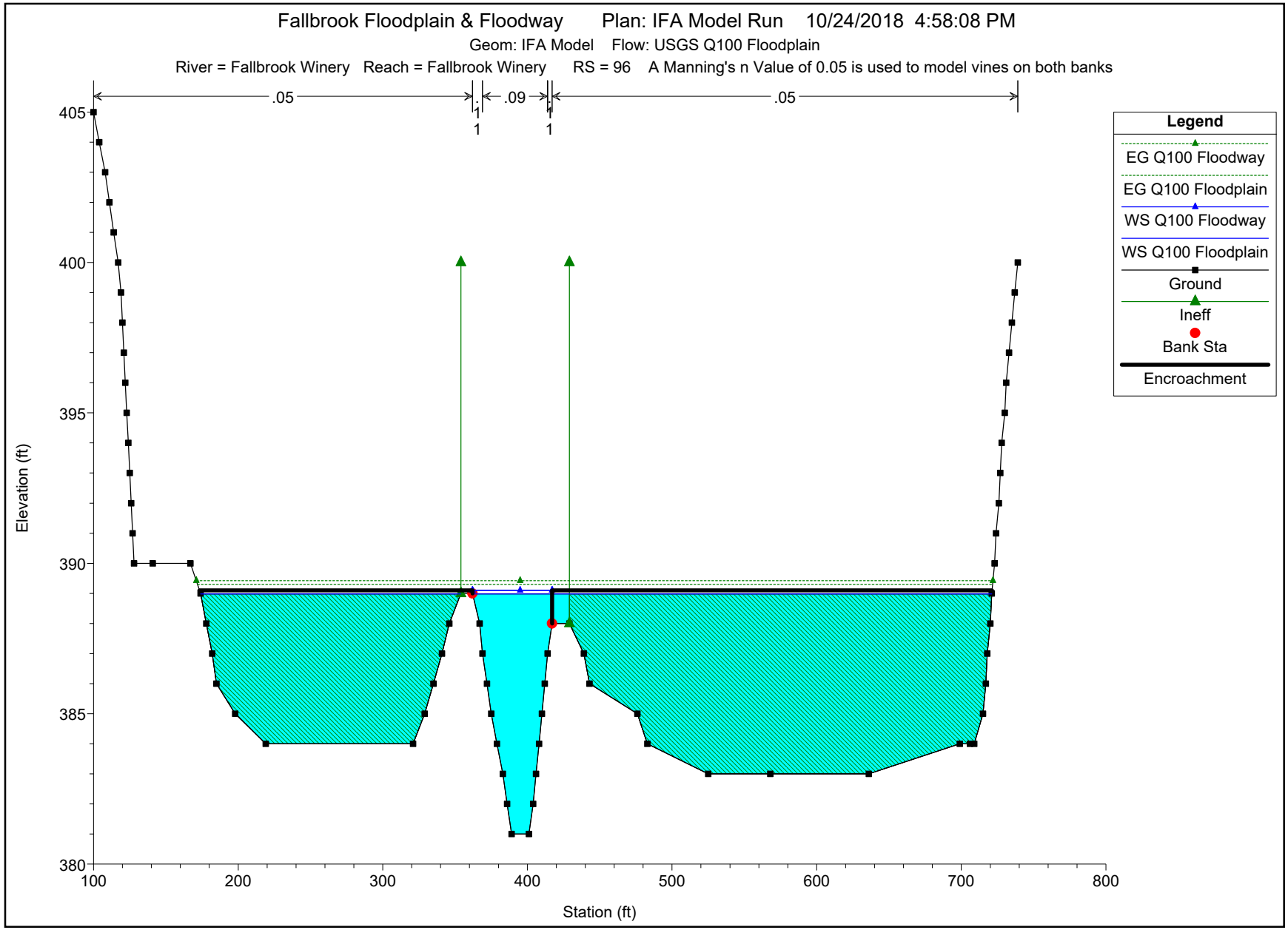

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 99.5 BR Deck Crossing that served the golf course
.03
.09
.015
.03
Legend
EG Q100 Floodplain
EG Q100 Floodway
Crit Q100 Floodplain
WS Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
410
408
406
404
402
400
398
396
394
0
200
400
600
800
1000

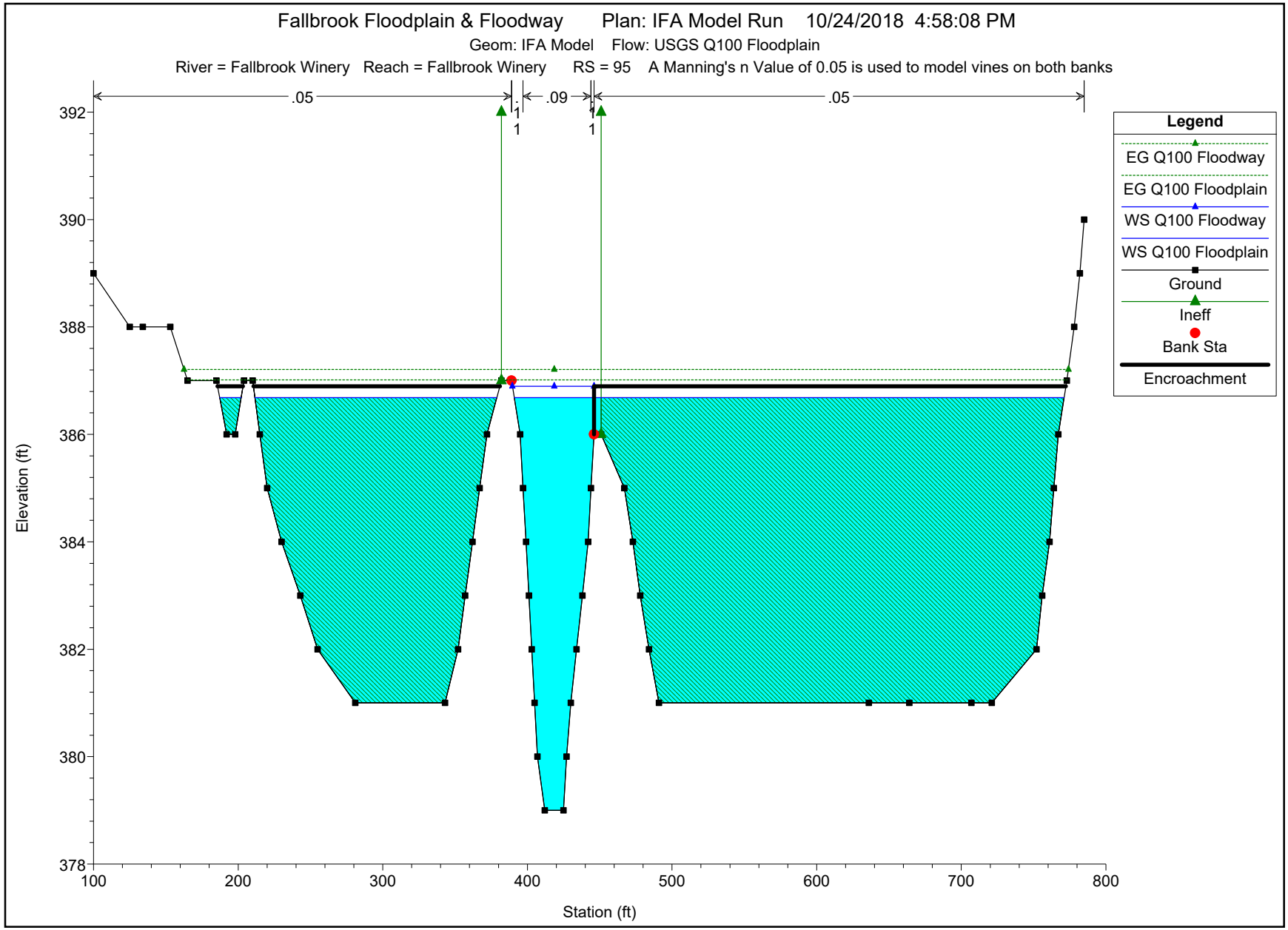

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 99.5 BR Deck Crossing that served the golf course
.05
.09
.03
1
1
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Crit Q100 Floodway
Crit Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
406
404
402
400
398
396
394
392
390
0
200
400
600
800
1000
Station (ft)

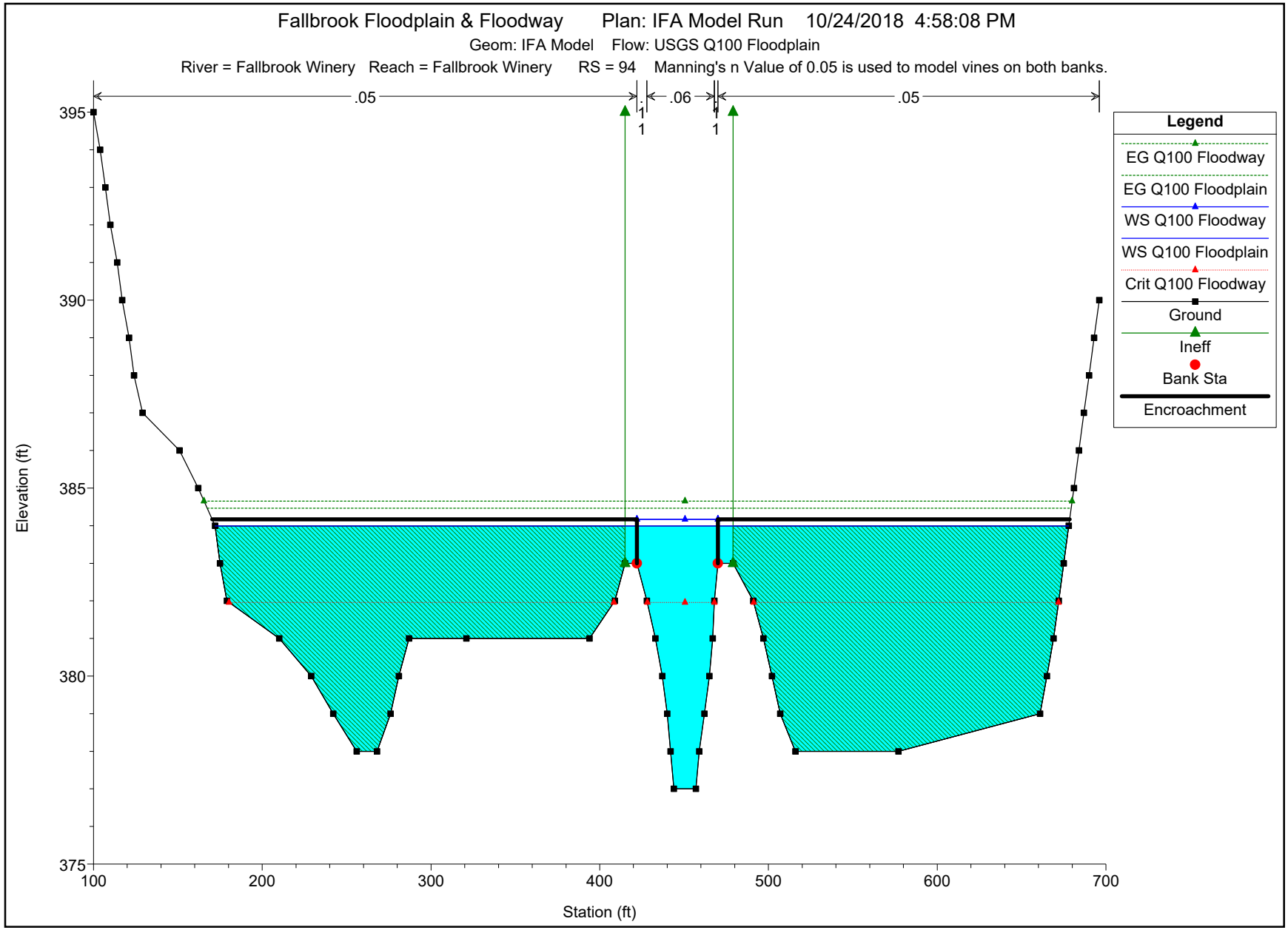

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 99 A Manning's n Value of 0.05 is used to model vines on the LOB.
.05
.09
.03
1
1
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
406
404
402
400
398
396
394
392
390
0
200
400
600
800
1000
Station (ft)

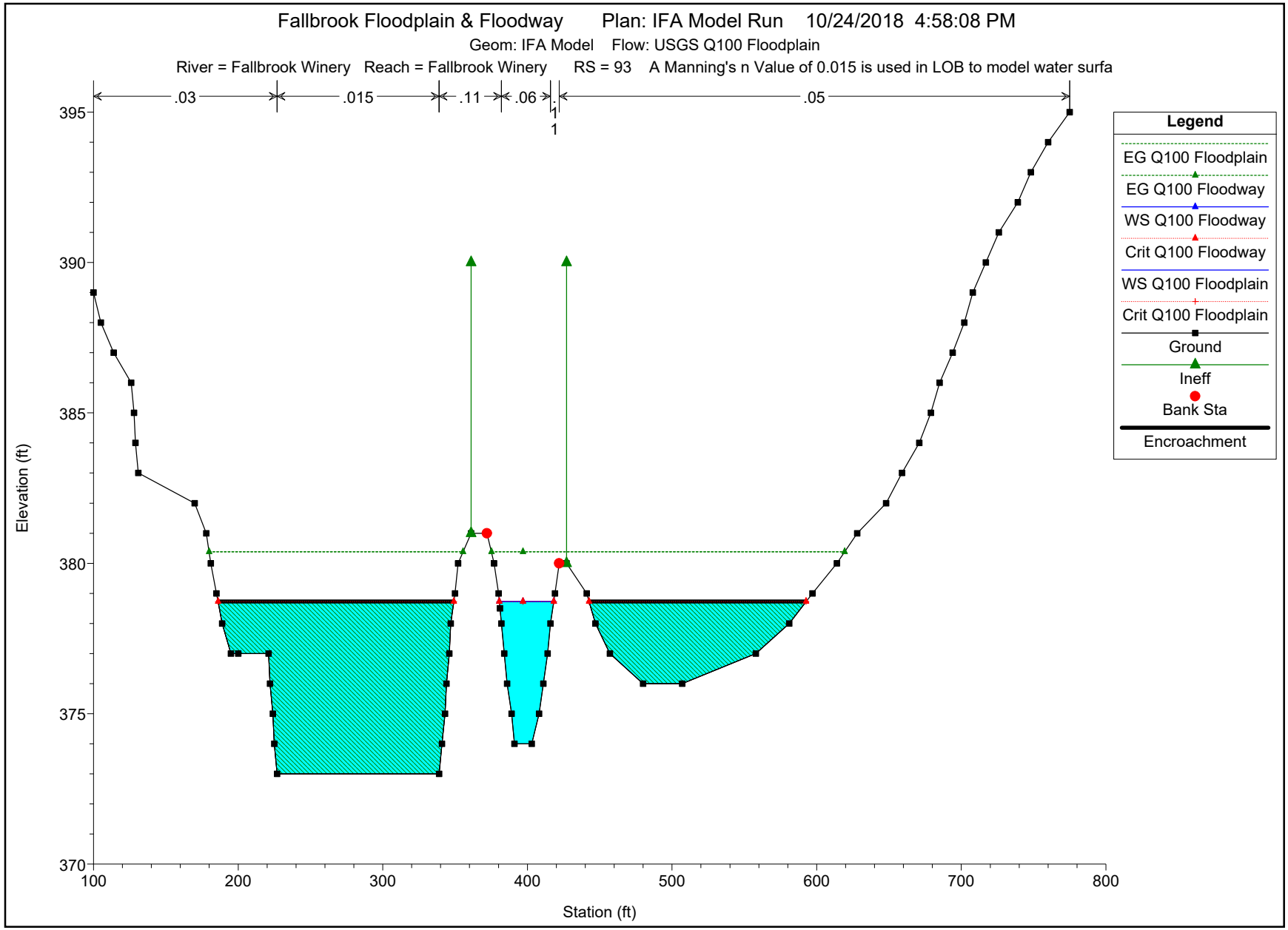

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 98 A Manning's n Value of 0.05 is used to model vines on the LOB.
.05
.09
.03
.1
.1
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
402
400
398
396
394
392
390
388
386
384
100
200
300
400
500
600
700
800

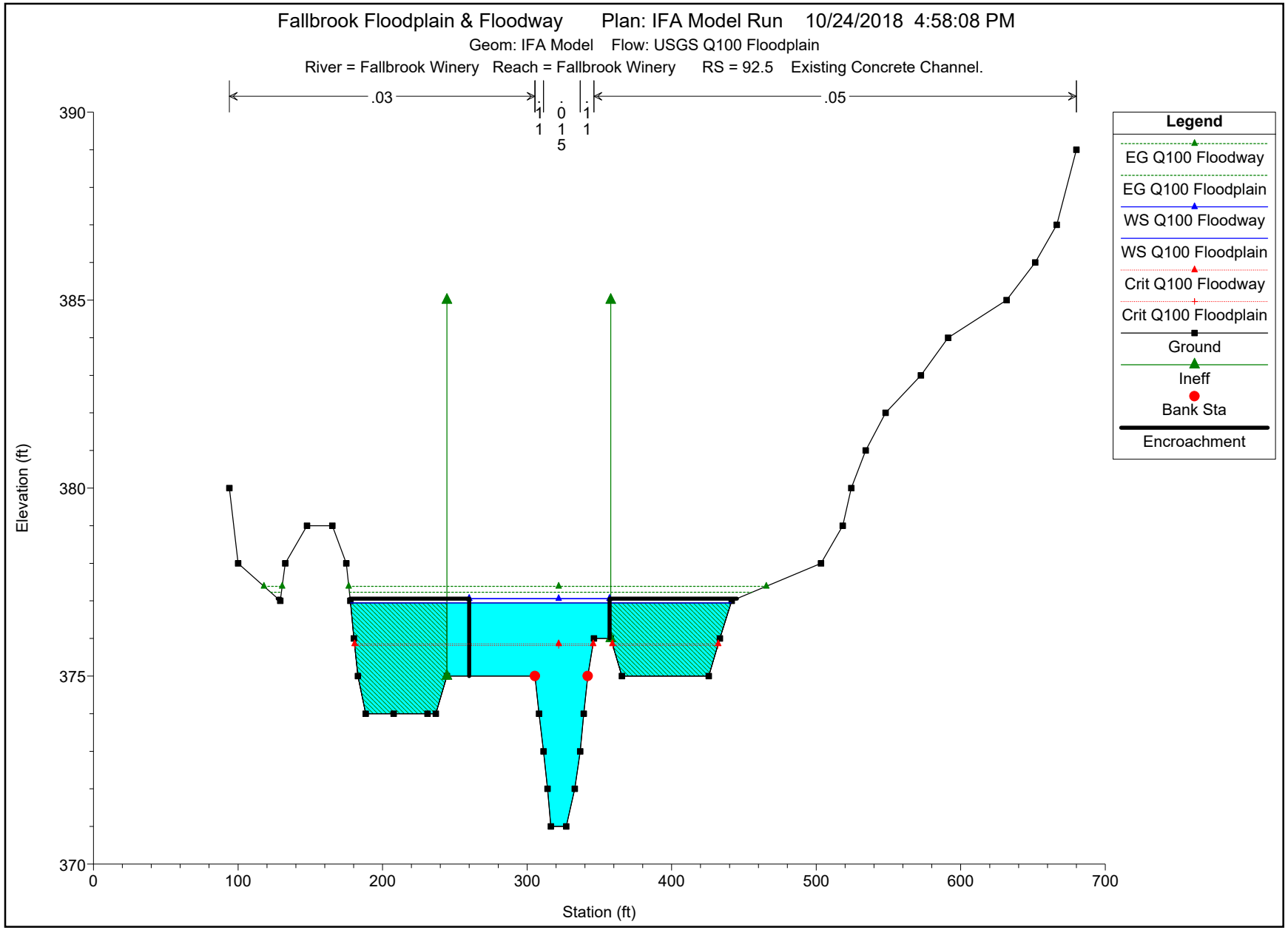

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 97 A Manning's n Value of 0.05 is used to model vines on the LOB.
.05
.09
.03
1
1
1
1
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
405
400
395
390
385
380
100
200
300
400
500
600
700
Station (ft)

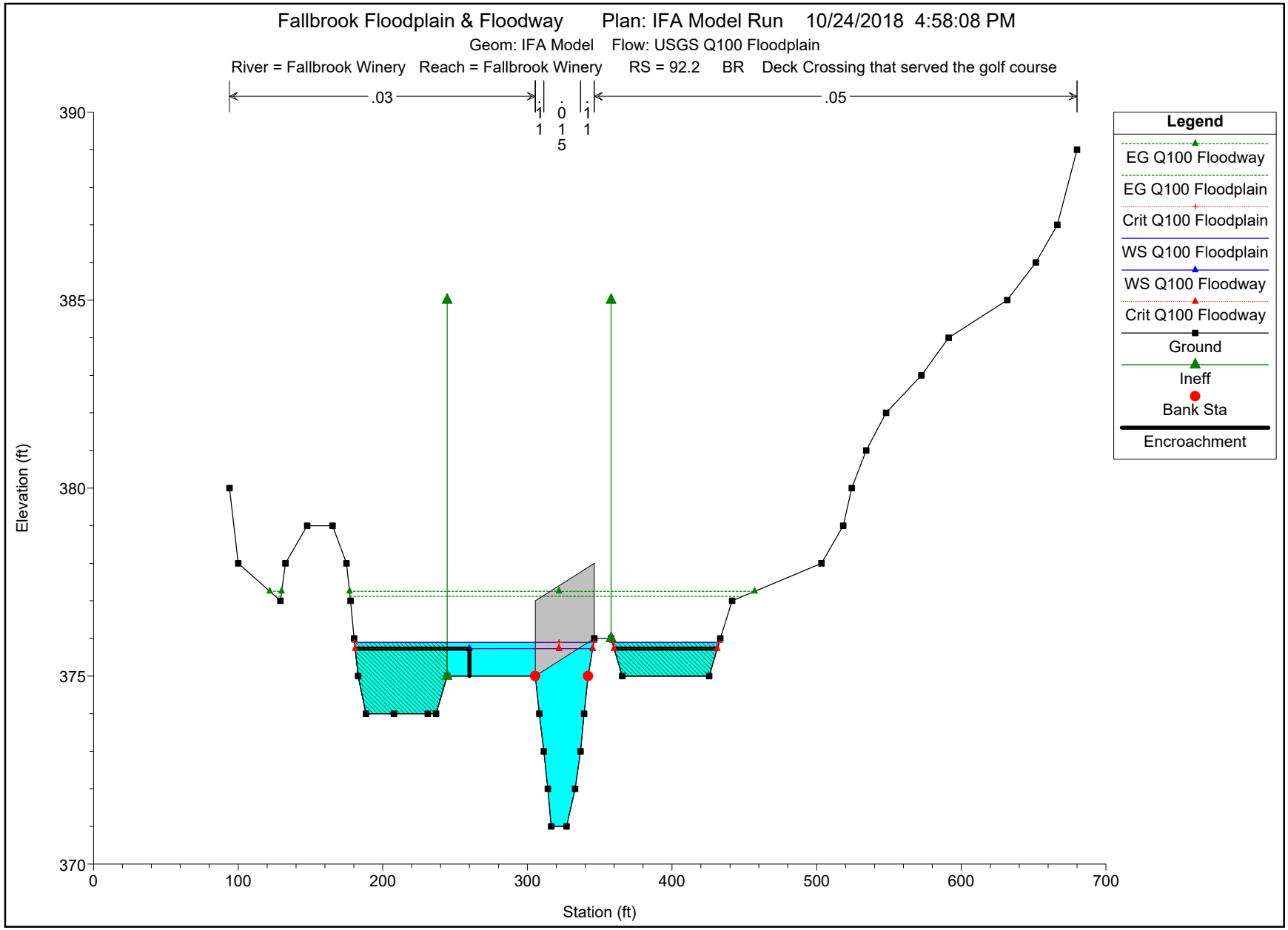

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 96 A Manning's n Value of 0.05 is used to model vines on both banks
.05
.09
.05
1
1
1
1
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
405
400
395
390
385
380
100
200
300
400
500
600
700
800
Station (ft)

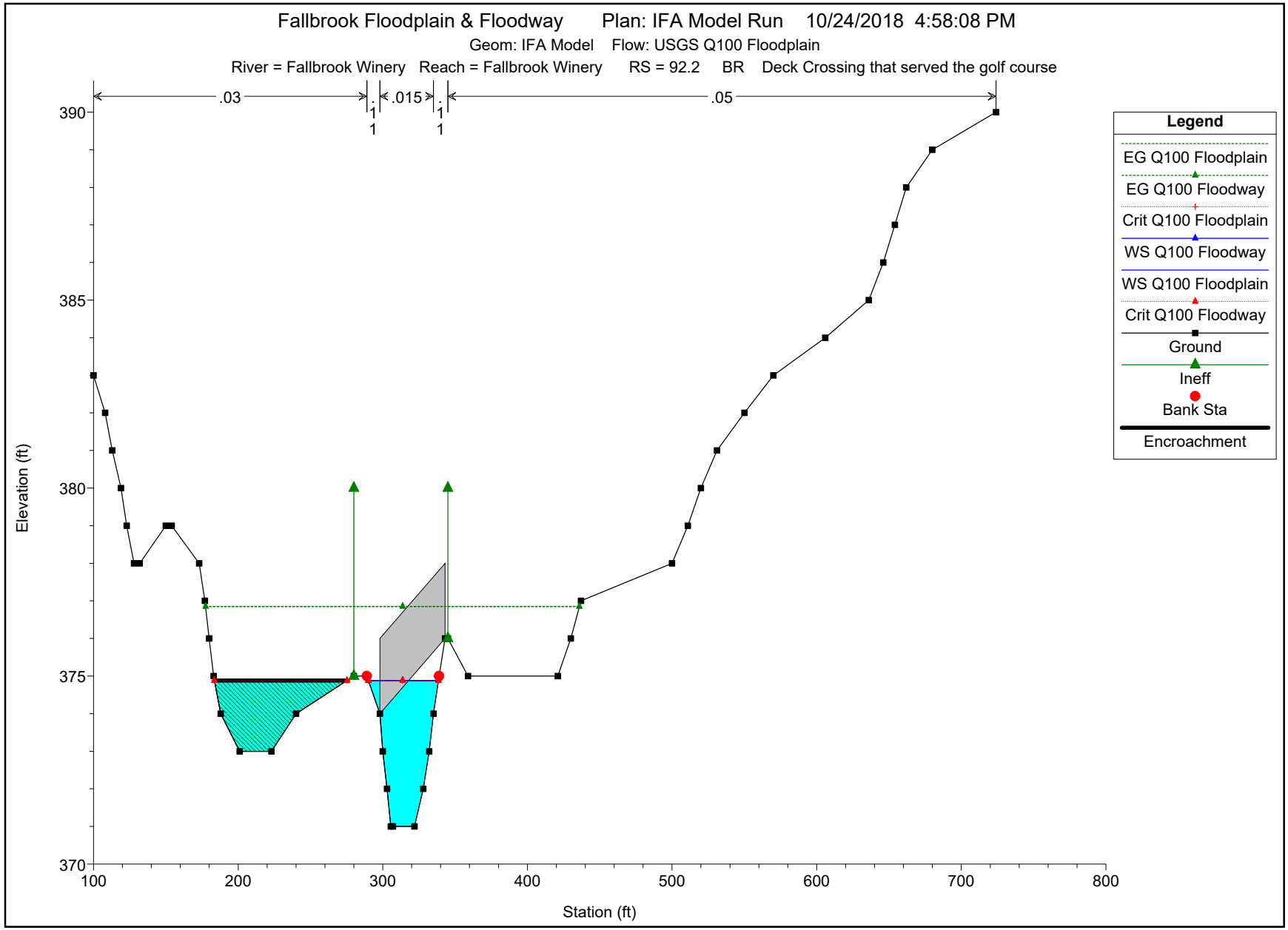

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 95 A Manning's n Value of 0.05 is used to model vines on both banks
.05
.09
.05
1
1
1
1
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
392
390
388
386
384
382
380
378
100
200
300
400
500
600
700
800
Station (ft)

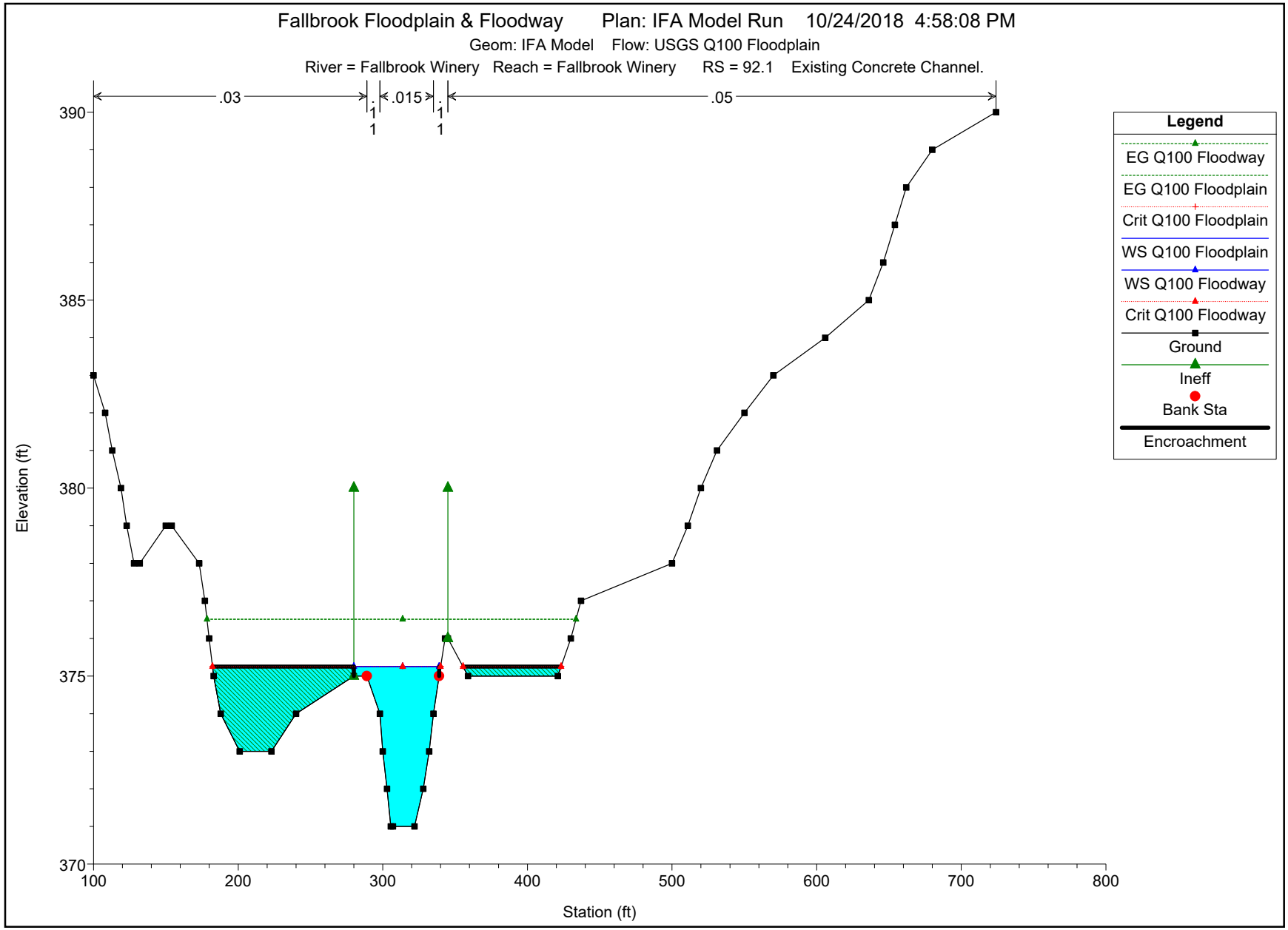

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 94 Manning's n Value of 0.05 is used to model vines on both banks.
.05
.06
.05
1
1
1
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
395
390
385
380
375
100
200
300
400
500
600
700
Station (ft)

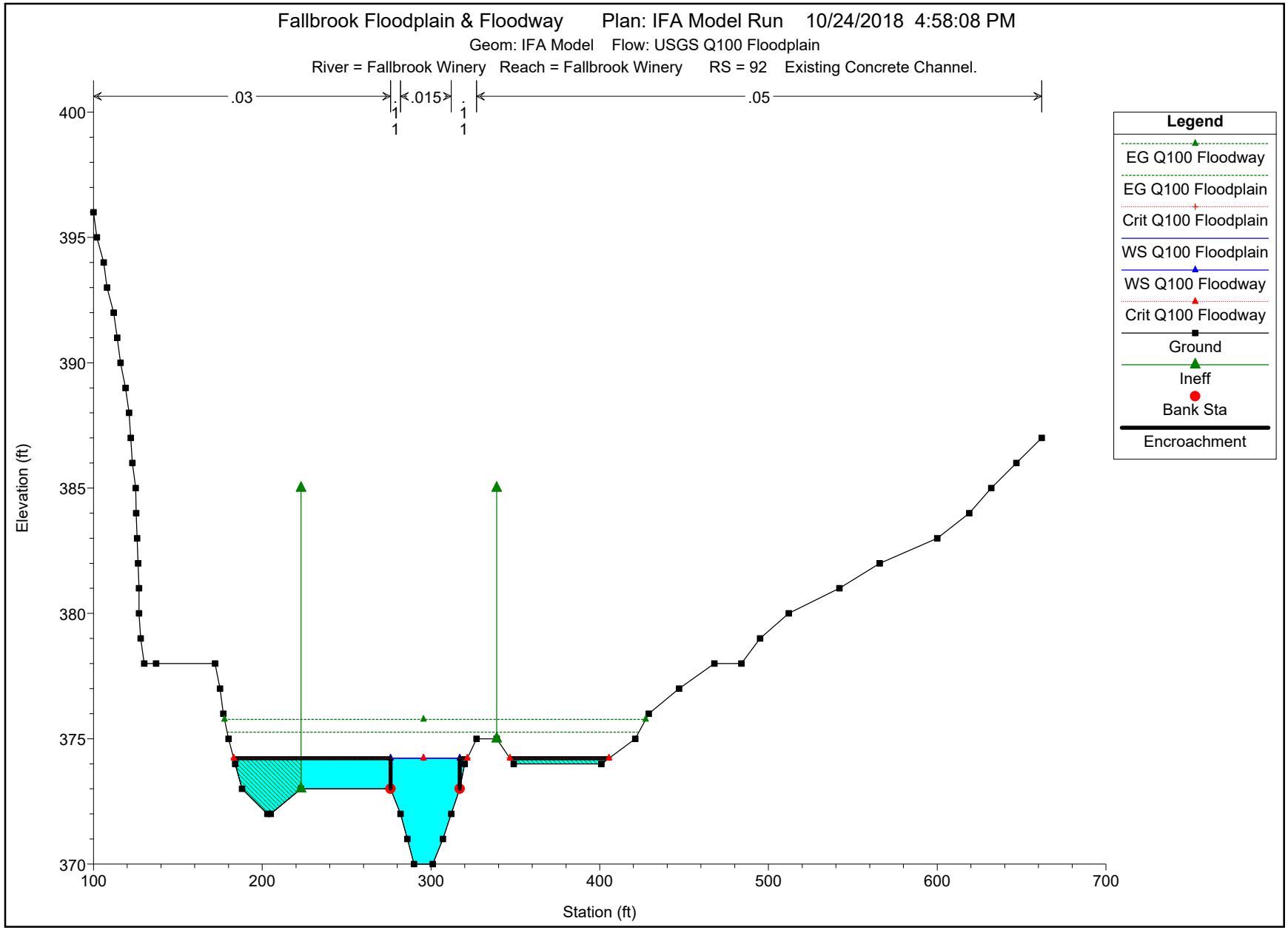

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 93 A Manning's n Value of 0.015 is used in LOB to model water surfa
.03
.015
.11
.06
.05
Legend
EG Q100 Floodplain
EG Q100 Floodway
WS Q100 Floodway
Crit Q100 Floodway
WS Q100 Floodplain
Crit Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
395
390
385
380
375
370
100
200
300
400
500
600
700
800

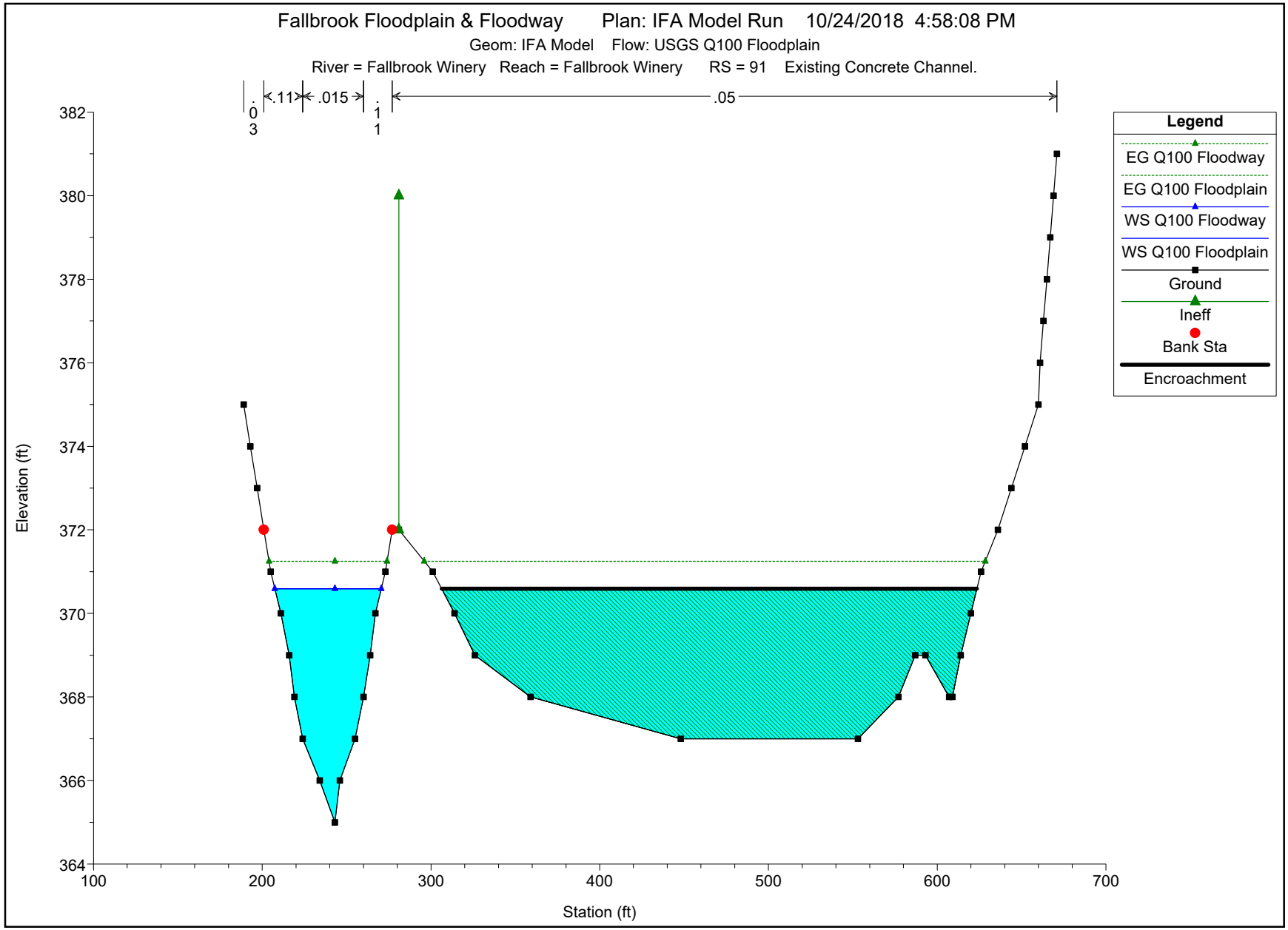

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 92.5 Existing Concrete Channel.
.03
.05
.11
.015
.11
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Crit Q100 Floodway
Crit Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
390
385
380
375
370
0
100
200
300
400
500
600
700
Station (ft)

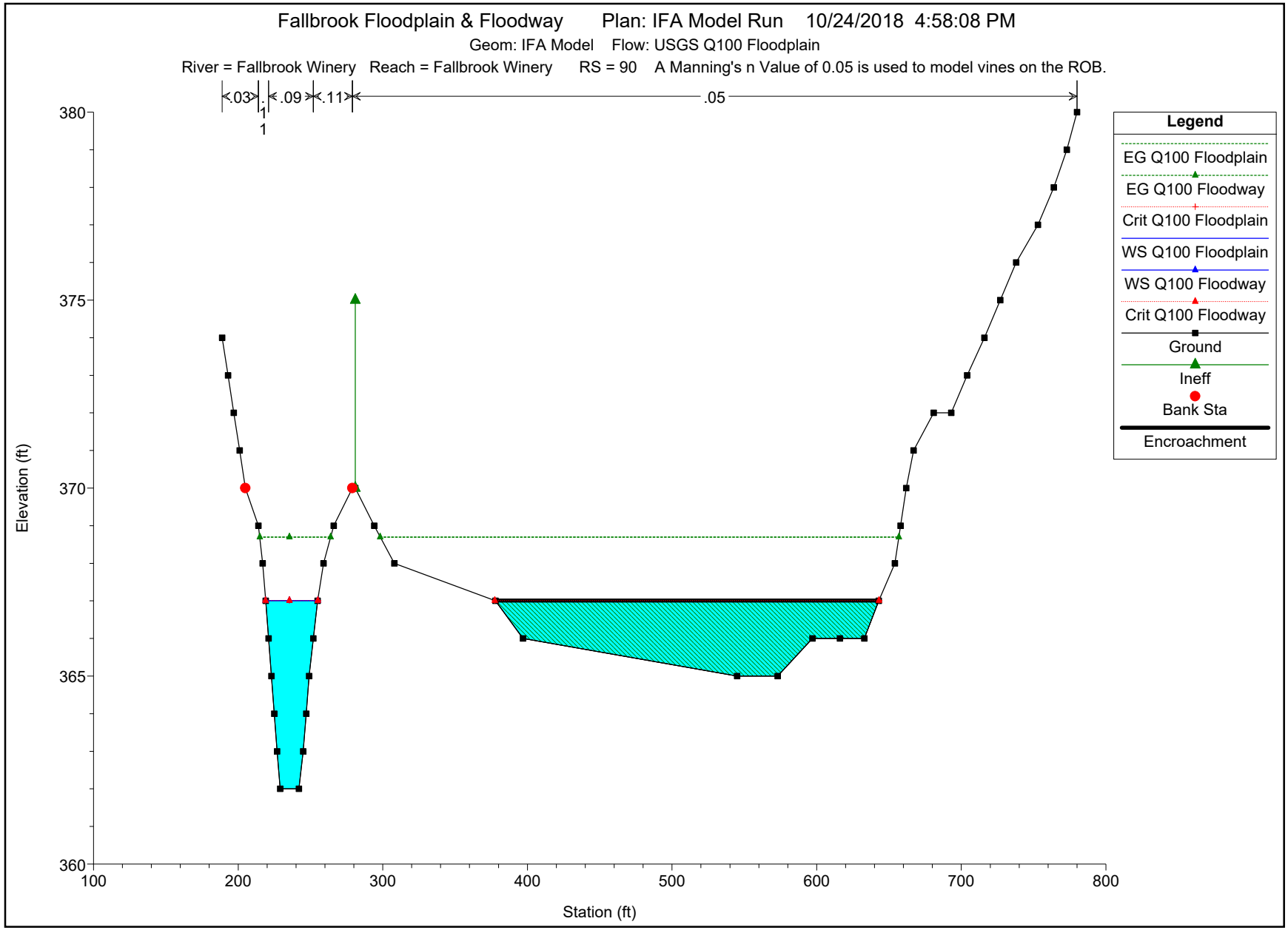

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 92.2 BR Deck Crossing that served the golf course
.03
.11
.015
.11
.05
Legend
EG Q100 Floodway
EG Q100 Floodplain
Crit Q100 Floodplain
WS Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
390
385
380
375
370
0
100
200
300
400
500
600
700
Station (ft)

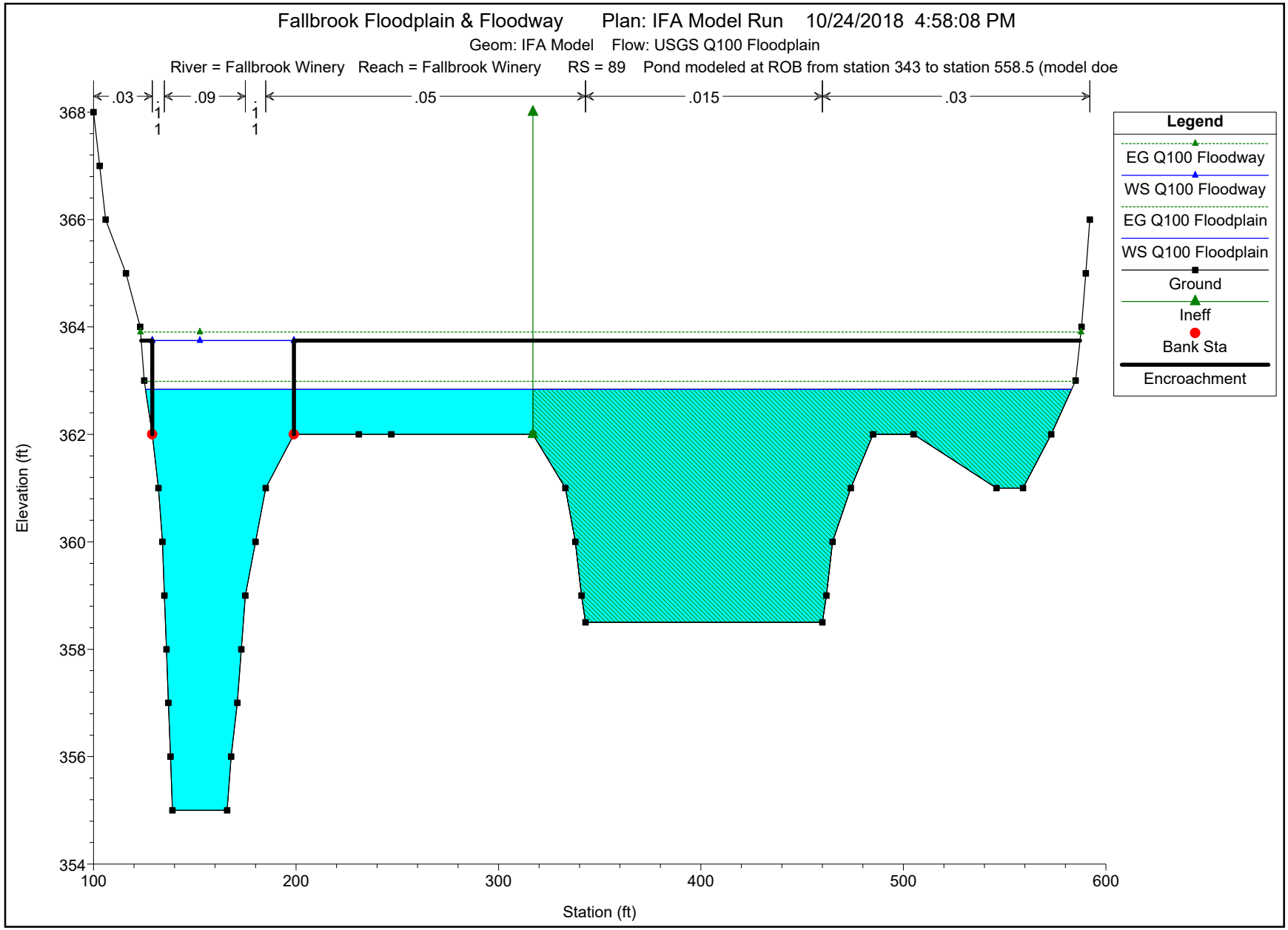

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 92.2 BR Deck Crossing that served the golf course
.03
.015
.05
1
1
1
1
Legend
EG Q100 Floodplain
EG Q100 Floodway
Crit Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
390
385
380
375
370
100
200
300
400
500
600
700
800
Station (ft)

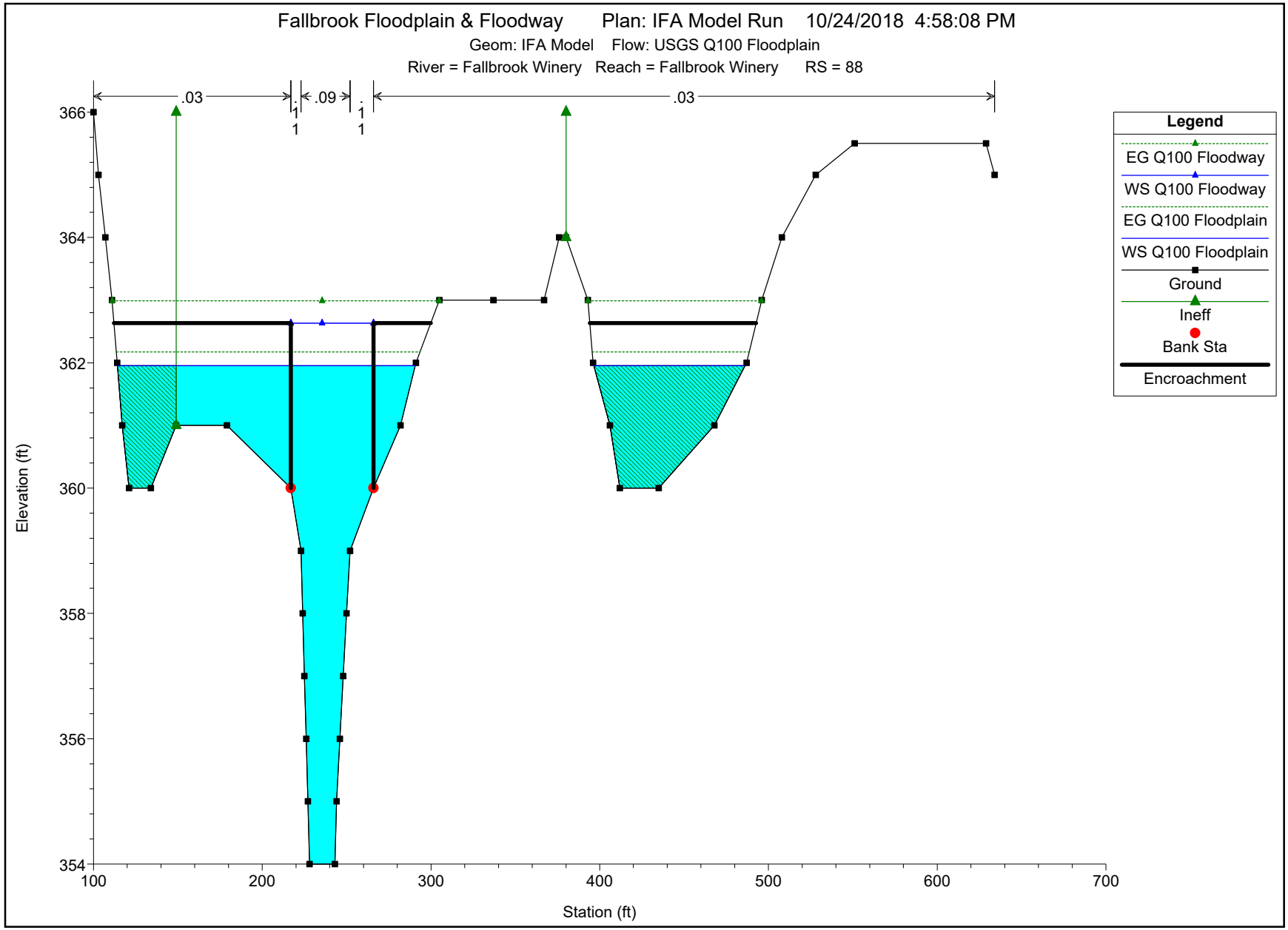

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 92.1 Existing Concrete Channel.
.03
.015
.05
1
1
1
1
Legend
EG Q100 Floodway
EG Q100 Floodplain
Crit Q100 Floodplain
WS Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
390
385
380
375
370
100
200
300
400
500
600
700
800
Station (ft)

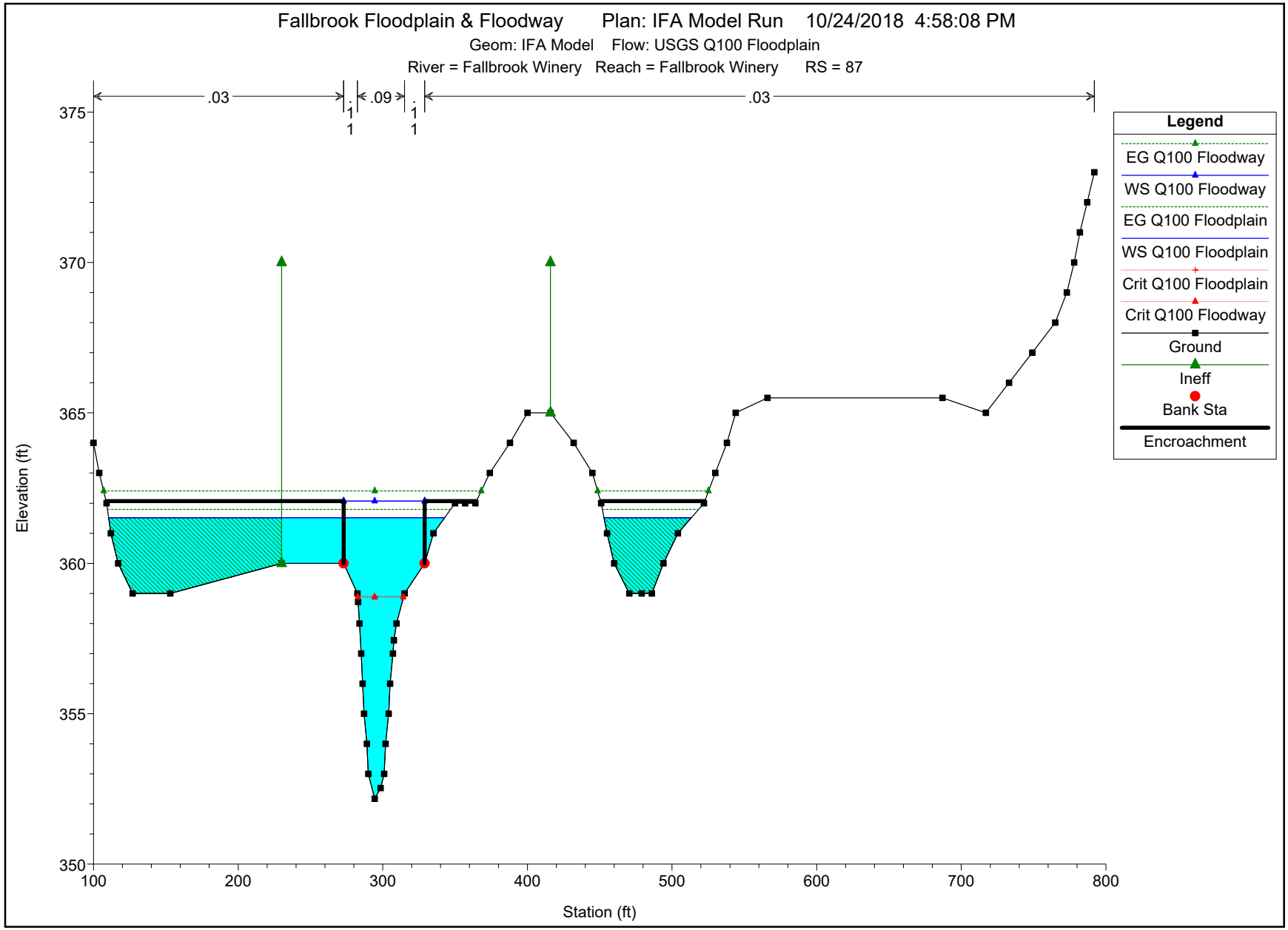

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 92 Existing Concrete Channel.
.03
.015
.05
1
1
1
1
Legend
EG Q100 Floodway
EG Q100 Floodplain
Crit Q100 Floodplain
WS Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
400
395
390
385
380
375
370
100
200
300
400
500
600
700
Station (ft)

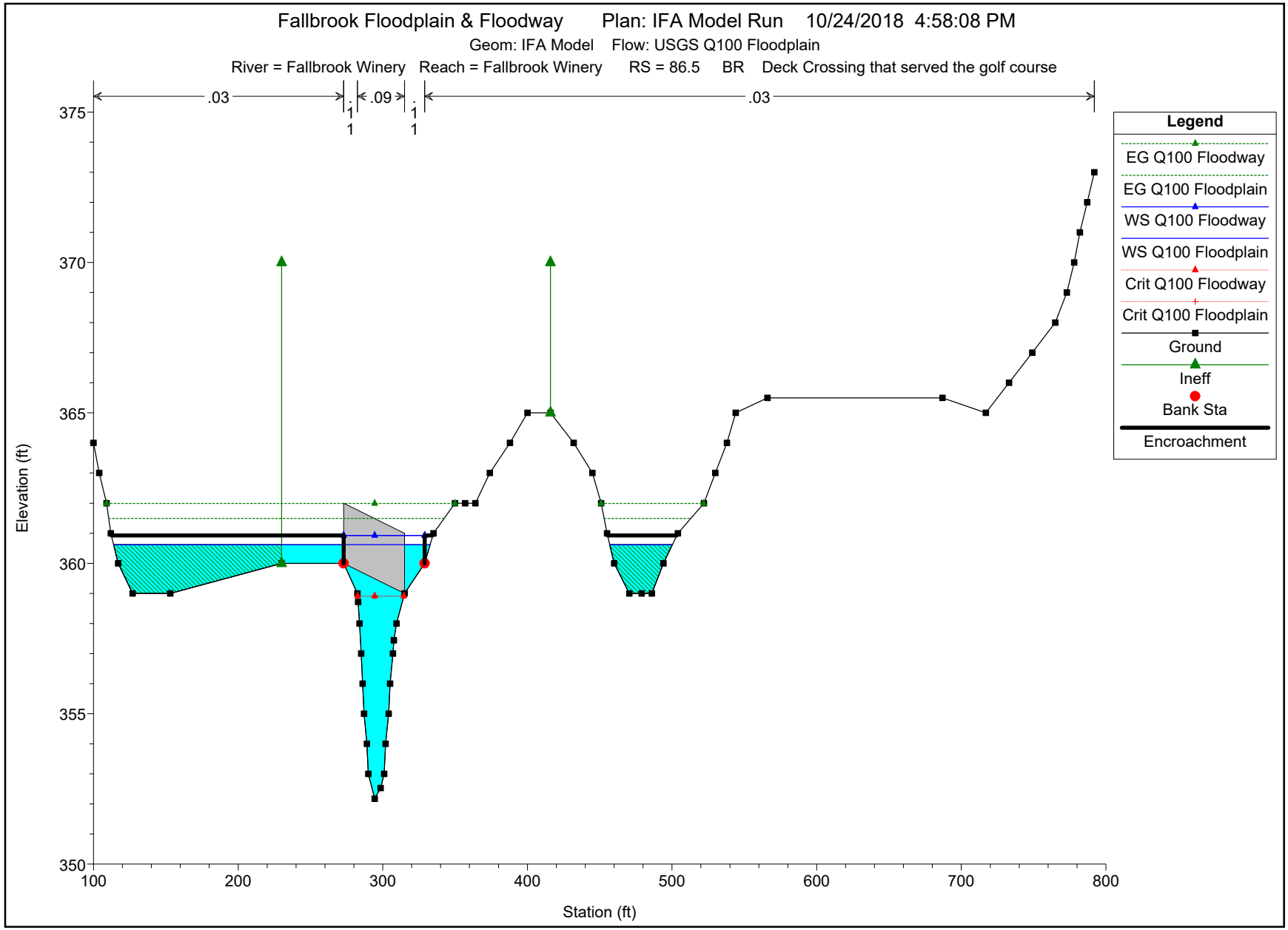

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 91 Existing Concrete Channel.
.03
.11
.015
.11
.05
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
382
380
378
376
374
372
370
368
366
364
100
200
300
400
500
600
700
Station (ft)

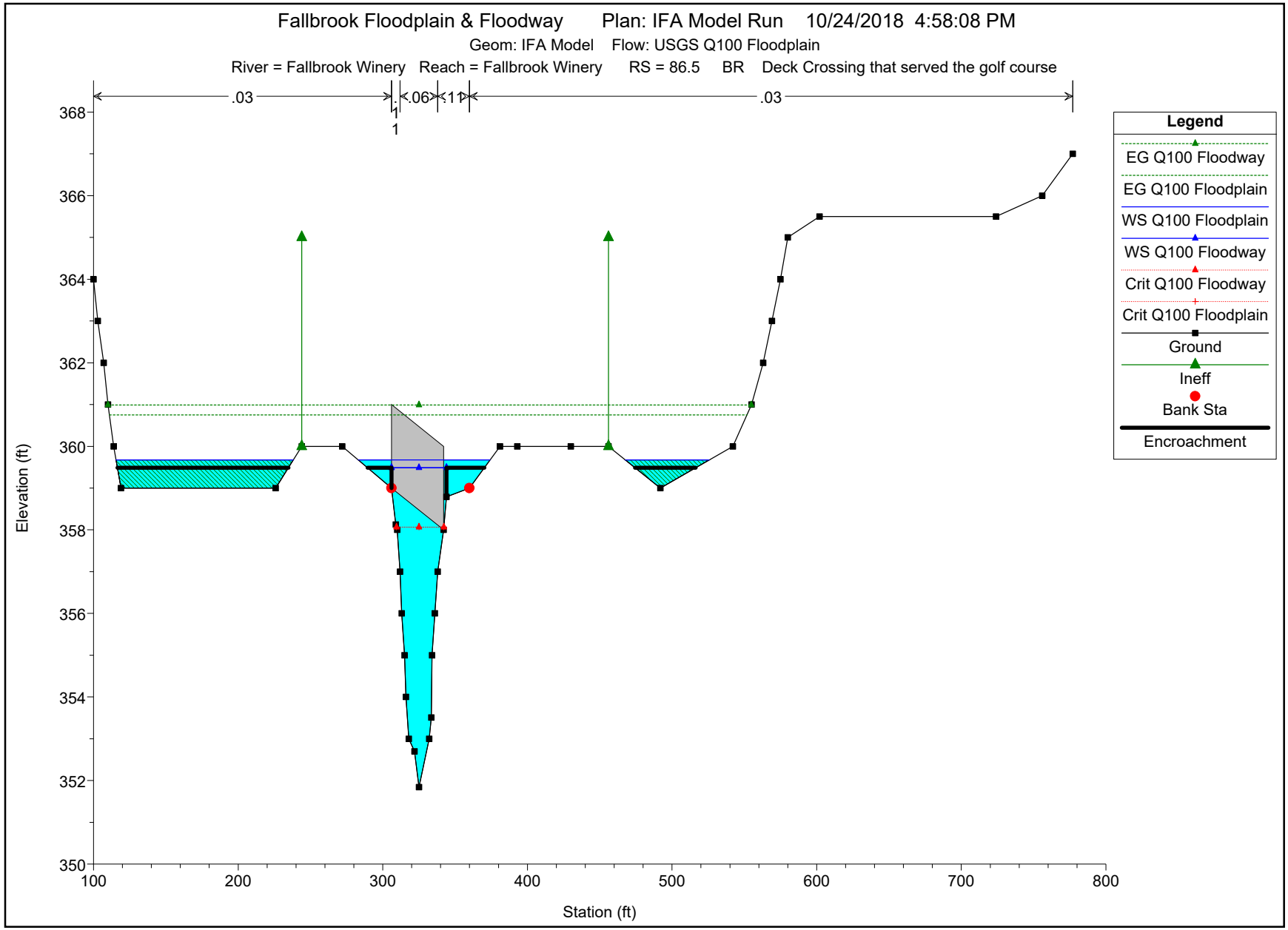

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 90 A Manning's n Value of 0.05 is used to model vines on the ROB.
.03
.09
.11
.05
Legend
EG Q100 Floodplain
EG Q100 Floodway
Crit Q100 Floodplain
WS Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
380
375
370
365
360
100
200
300
400
500
600
700
800
Station (ft)

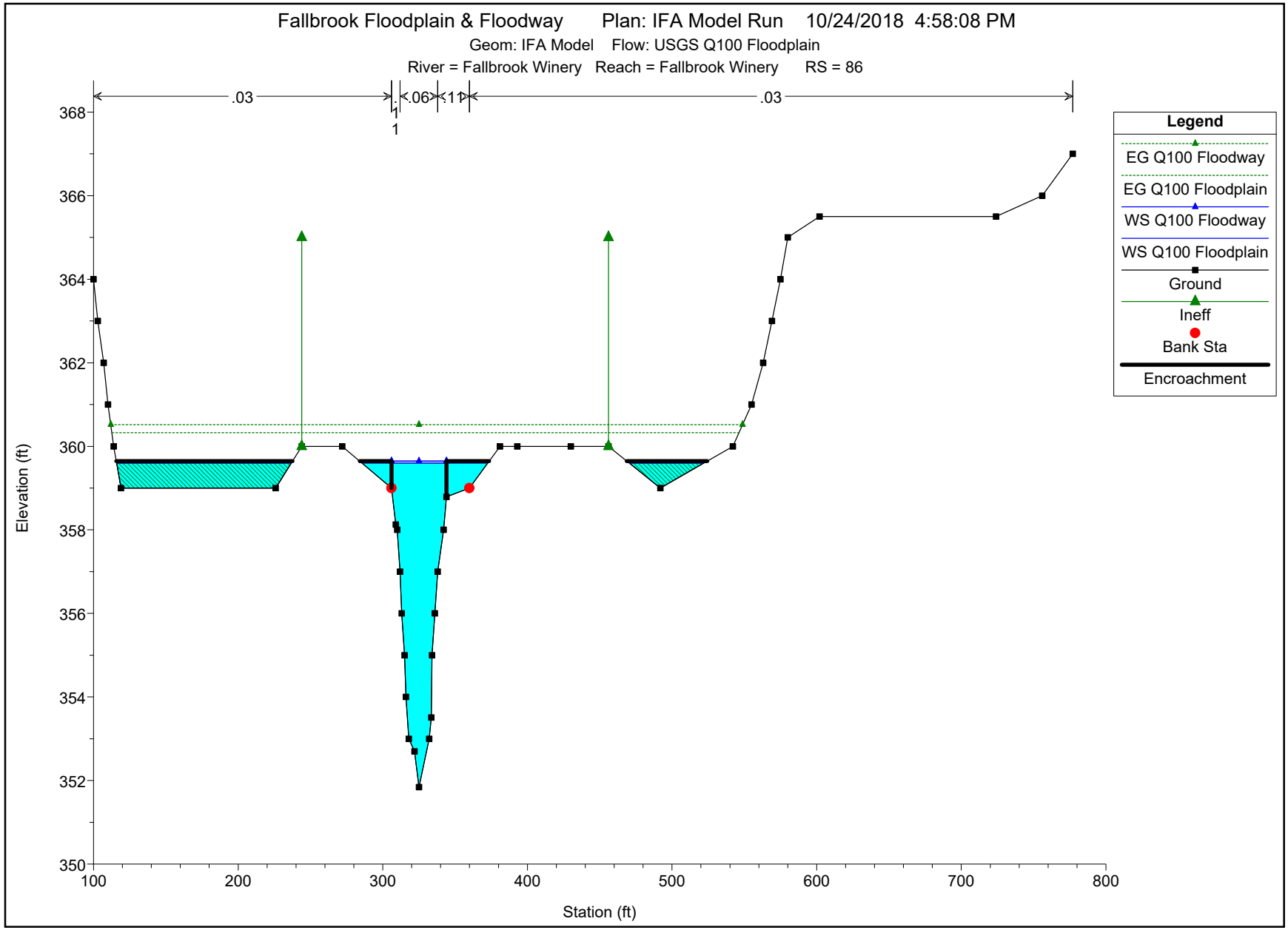

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 89 Pond modeled at ROB from station 343 to station 558.5 (model doe
.03
.1
1
.09
.1
1
.05
.015
.03
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
368
366
364
362
360
358
356
354
100
200
300
400
500
600
Station (ft)


Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 88
.03
.09
.03
.1
.1
.1
.1
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
366
364
362
360
358
356
354
100
200
300
400
500
600
700
Station (ft)


Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 87
.03
.1
.1
.09
.1
.1
.03
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
375
370
365
360
355
350
100
200
300
400
500
600
700
800
Station (ft)


Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 86.5 BR Deck Crossing that served the golf course
.03
.1
.1
.09
.1
.1
.03
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Crit Q100 Floodway
Crit Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
375
370
365
360
355
350
100
200
300
400
500
600
700
800
Station (ft)


Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 86.5 BR Deck Crossing that served the golf course
.03
.06
.11
.03
1
1
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodway
Crit Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
350
352
354
356
358
360
362
364
366
368
100
200
300
400
500
600
700
800


Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 86
.03
.06
.11
.03
1
1
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
350
352
354
356
358
360
362
364
366
368
100
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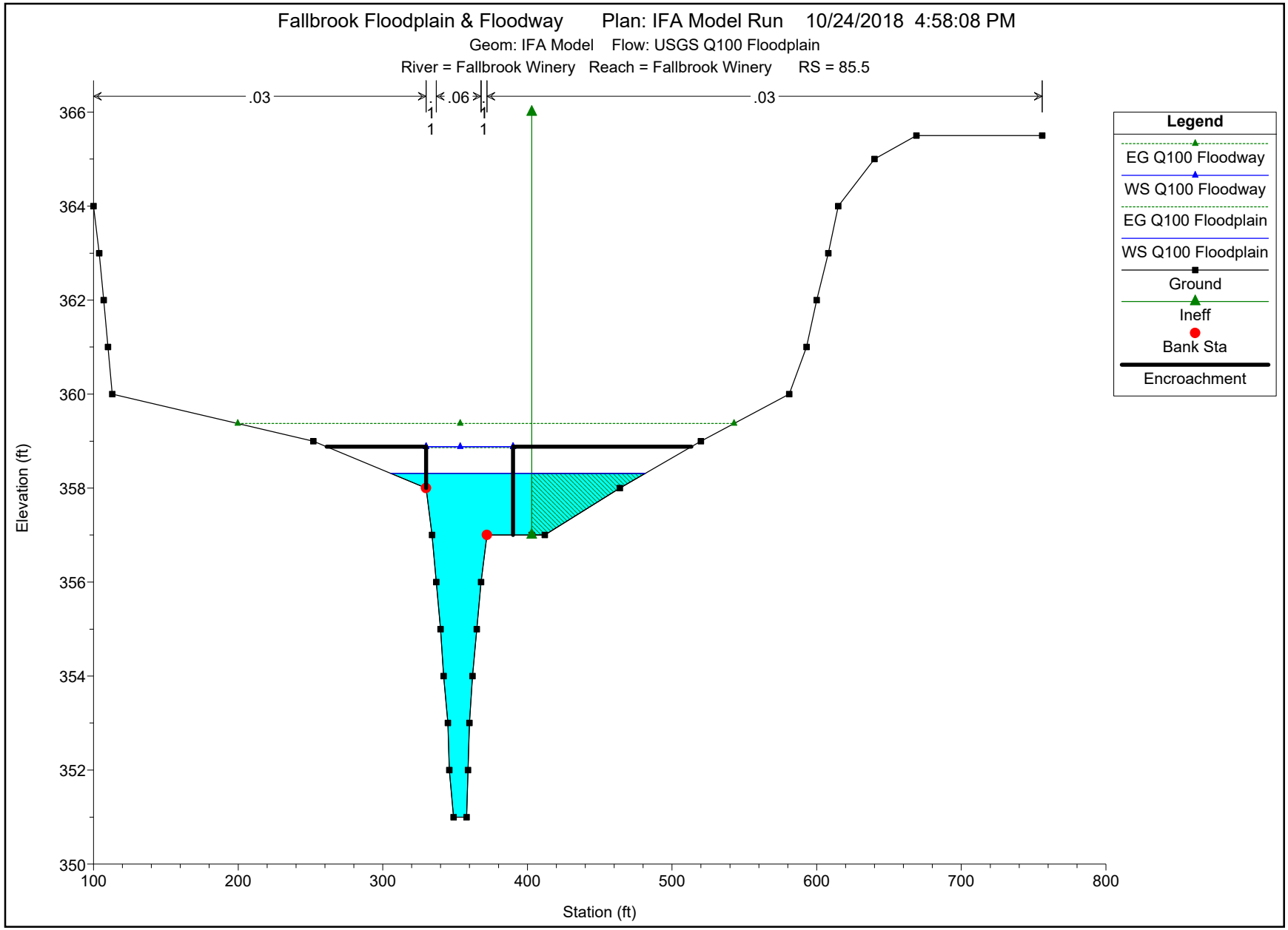
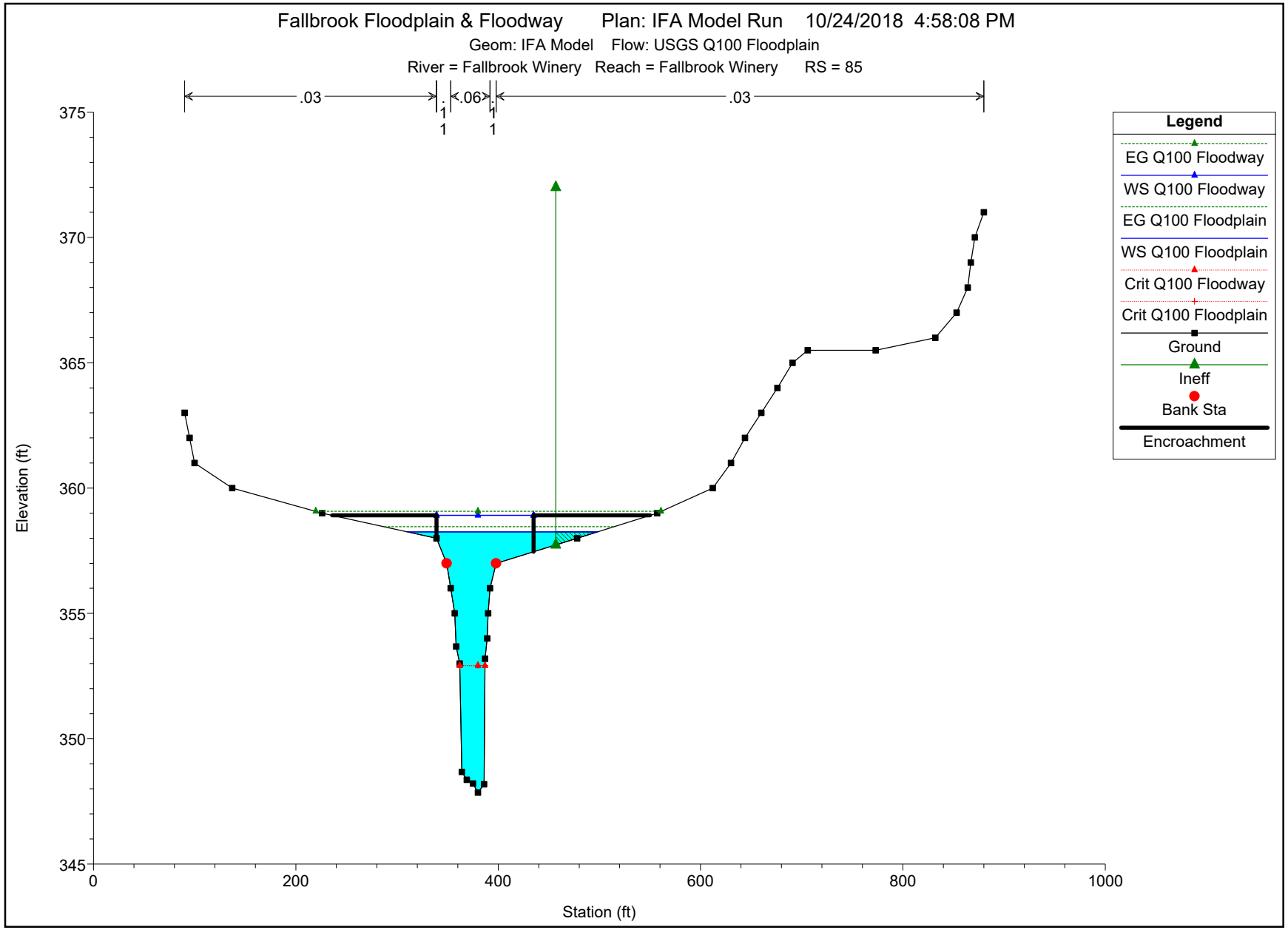
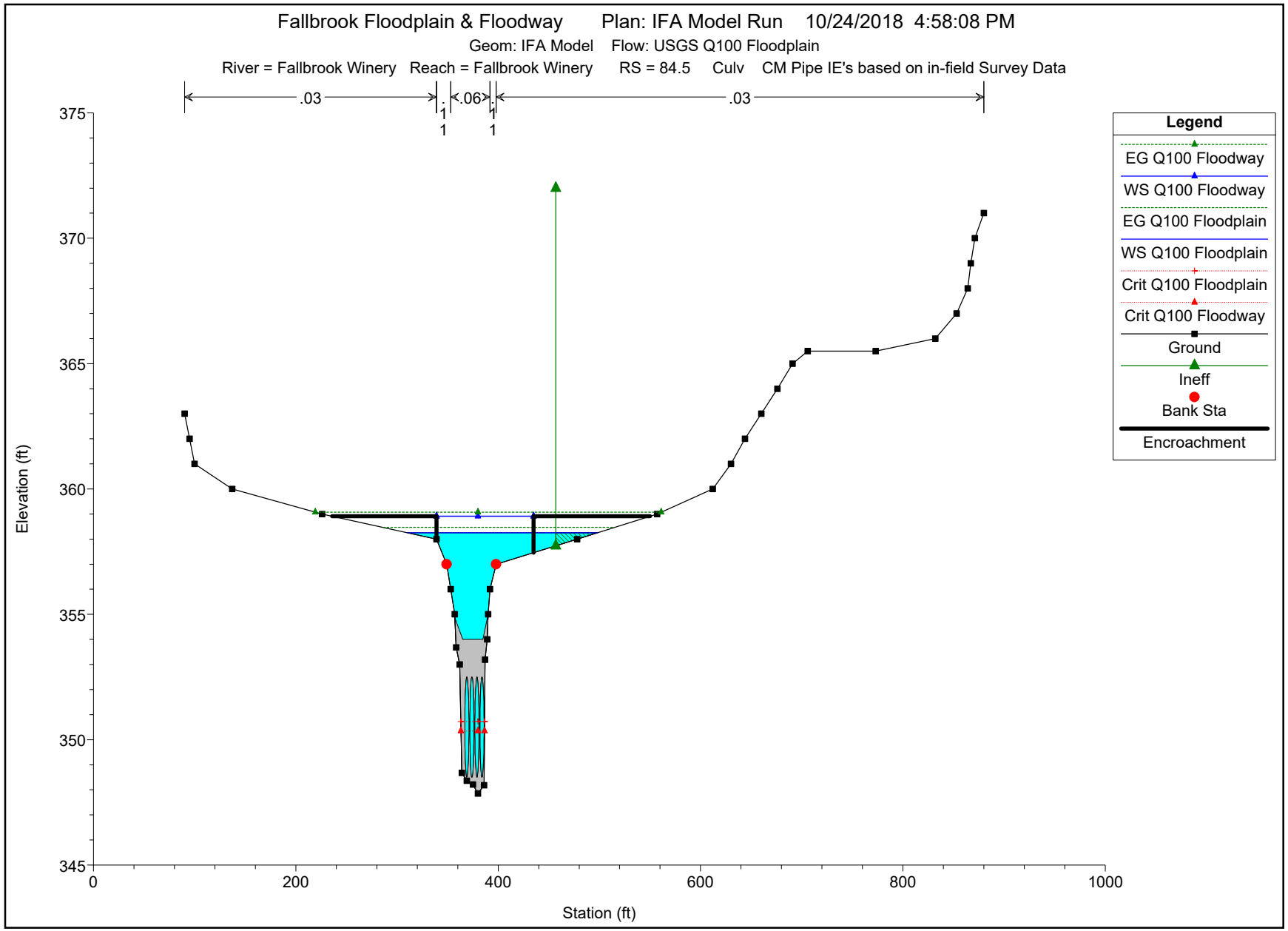
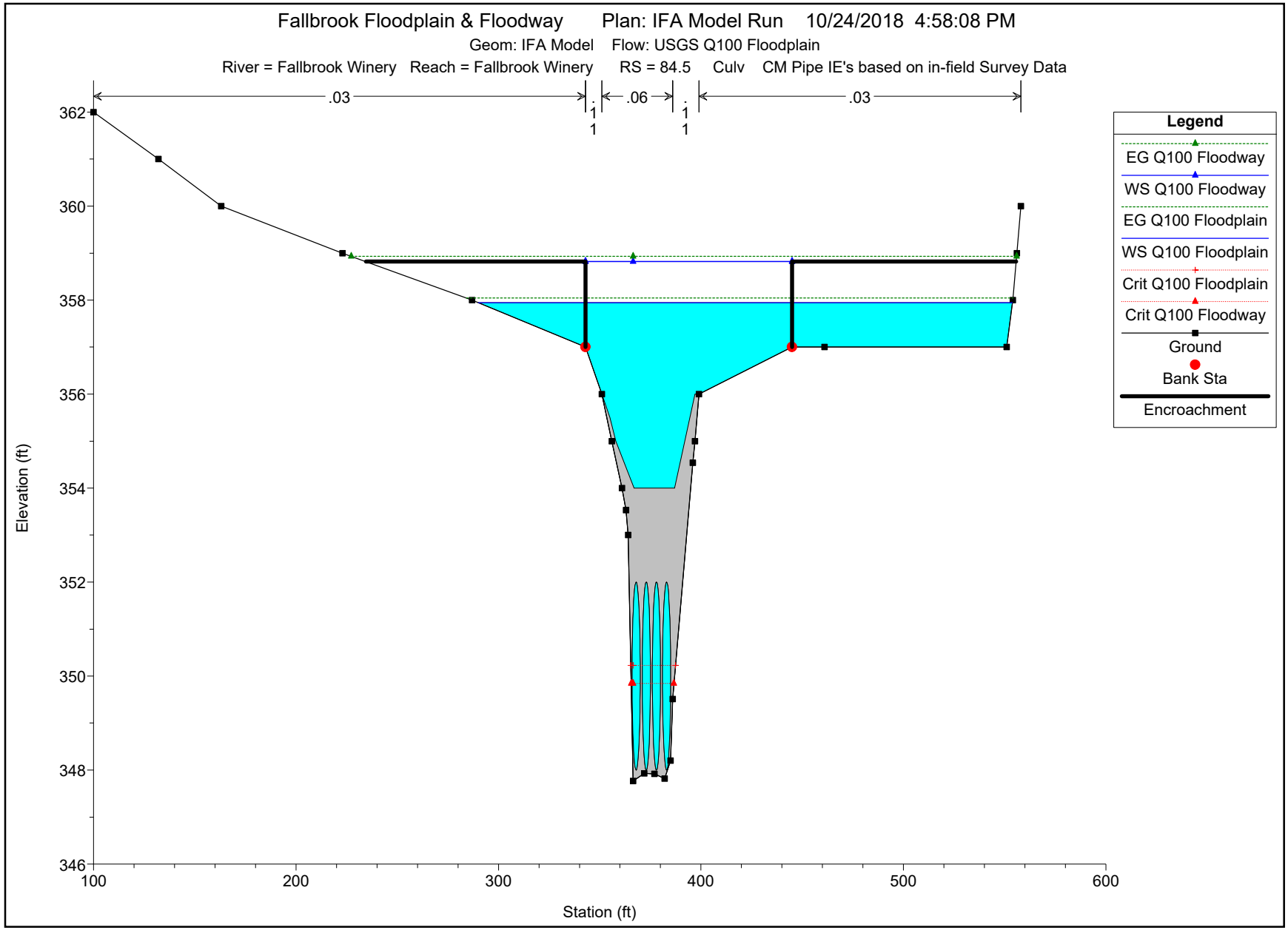
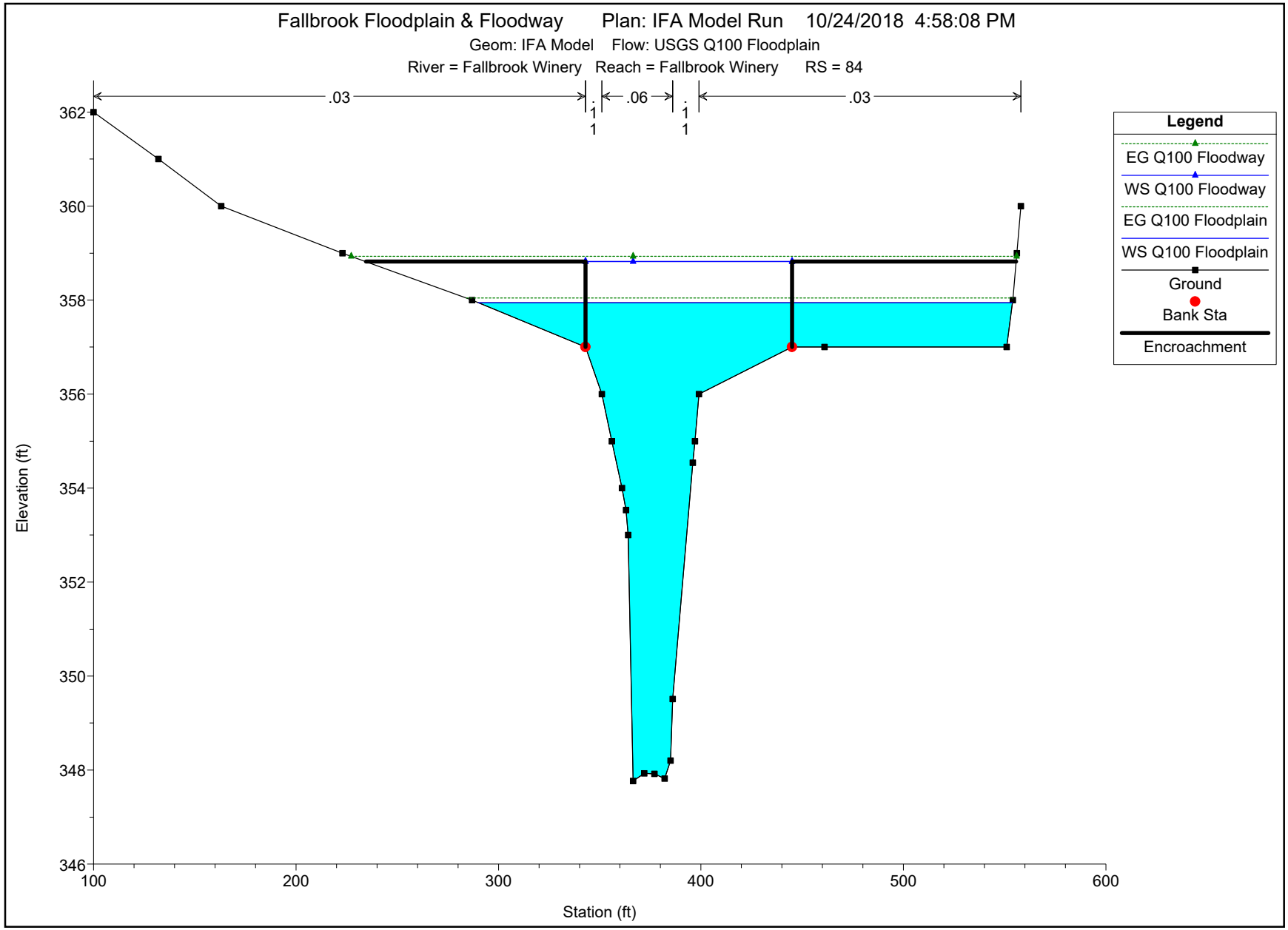
300
400
500
600
700
800

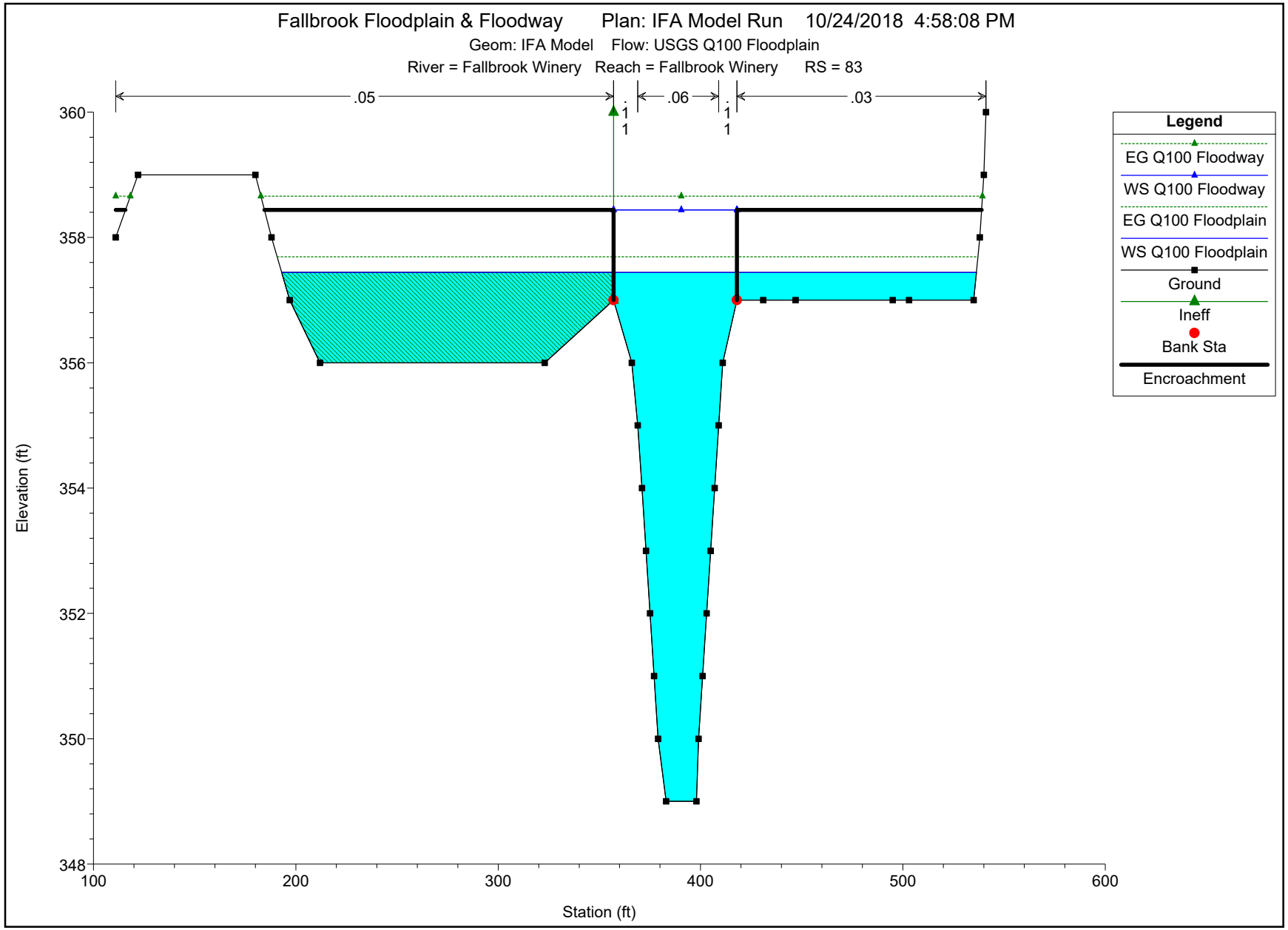

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 85.5
.03
.06
.03
1
1
1
1
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
366
364
362
360
358
356
354
352
350
100
200
300
400
500
600
700
800
Station (ft)

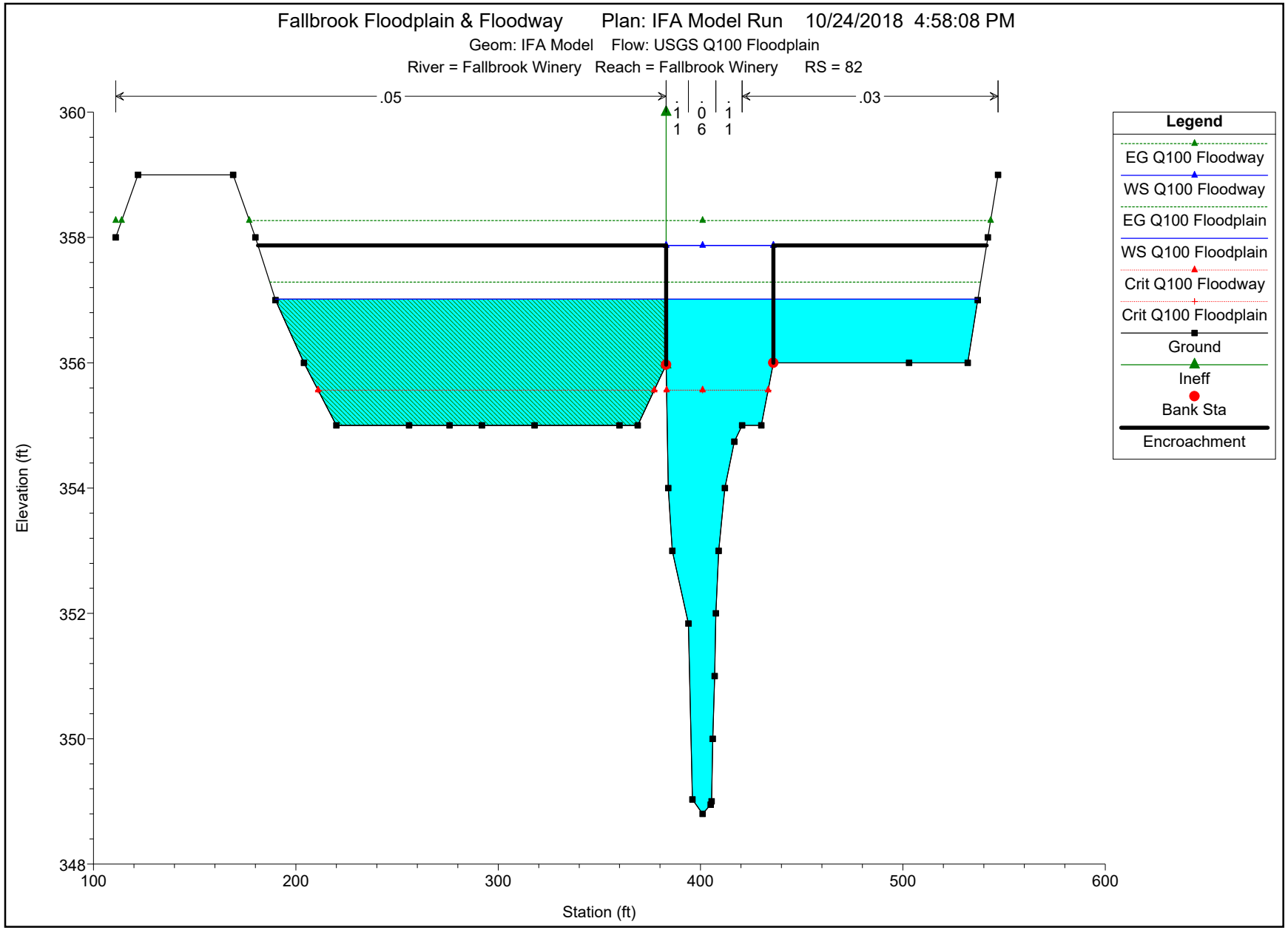

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 85
.03
.06
.03
1
1
1
1
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Crit Q100 Floodway
Crit Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
375
370
365
360
355
350
345
0
200
400
600
800
1000
Station (ft)

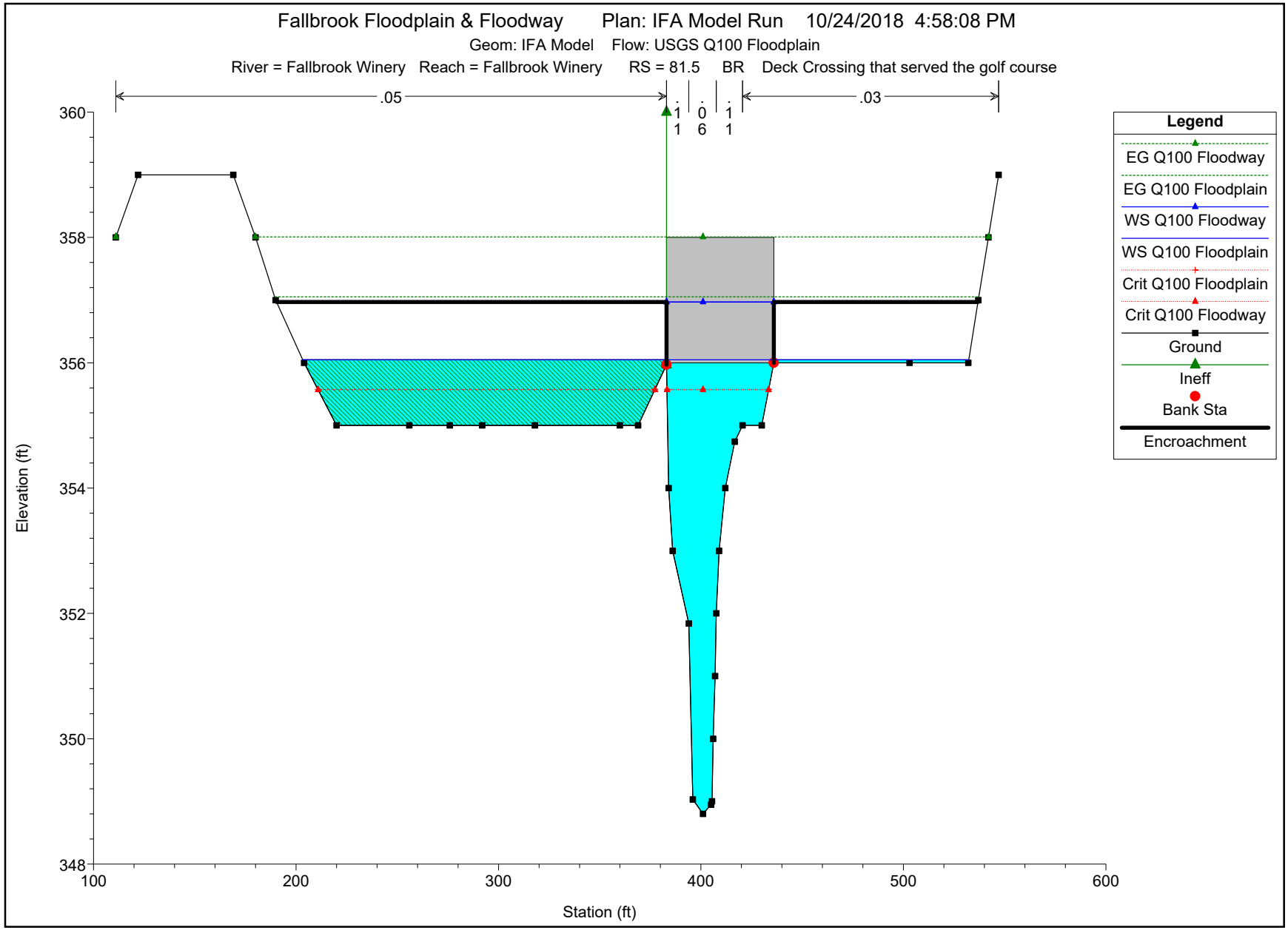

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 84.5 Culv CM Pipe IE's based on in-field Survey Data
.03
.06
.03
1
1
1
1
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
375
370
365
360
355
350
345
0
200
400
600
800
1000
Station (ft)

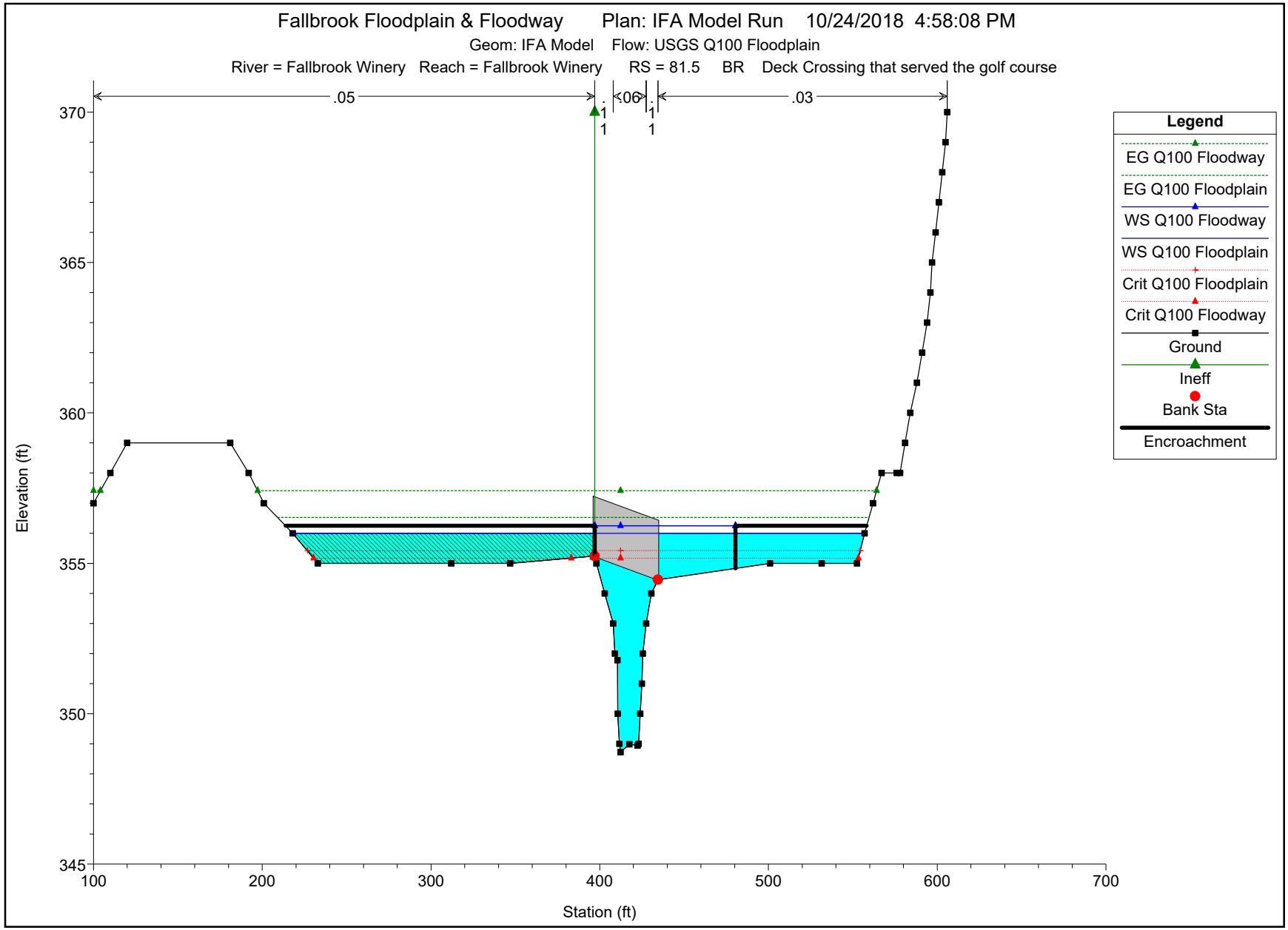

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 84.5 Culv CM Pipe IE's based on in-field Survey Data
.03
.1
.1
.06
.1
.1
.03
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Bank Sta
Encroachment
Elevation (ft)
362
360
358
356
354
352
350
348
346
100
200
300
400
500
600
Station (ft)

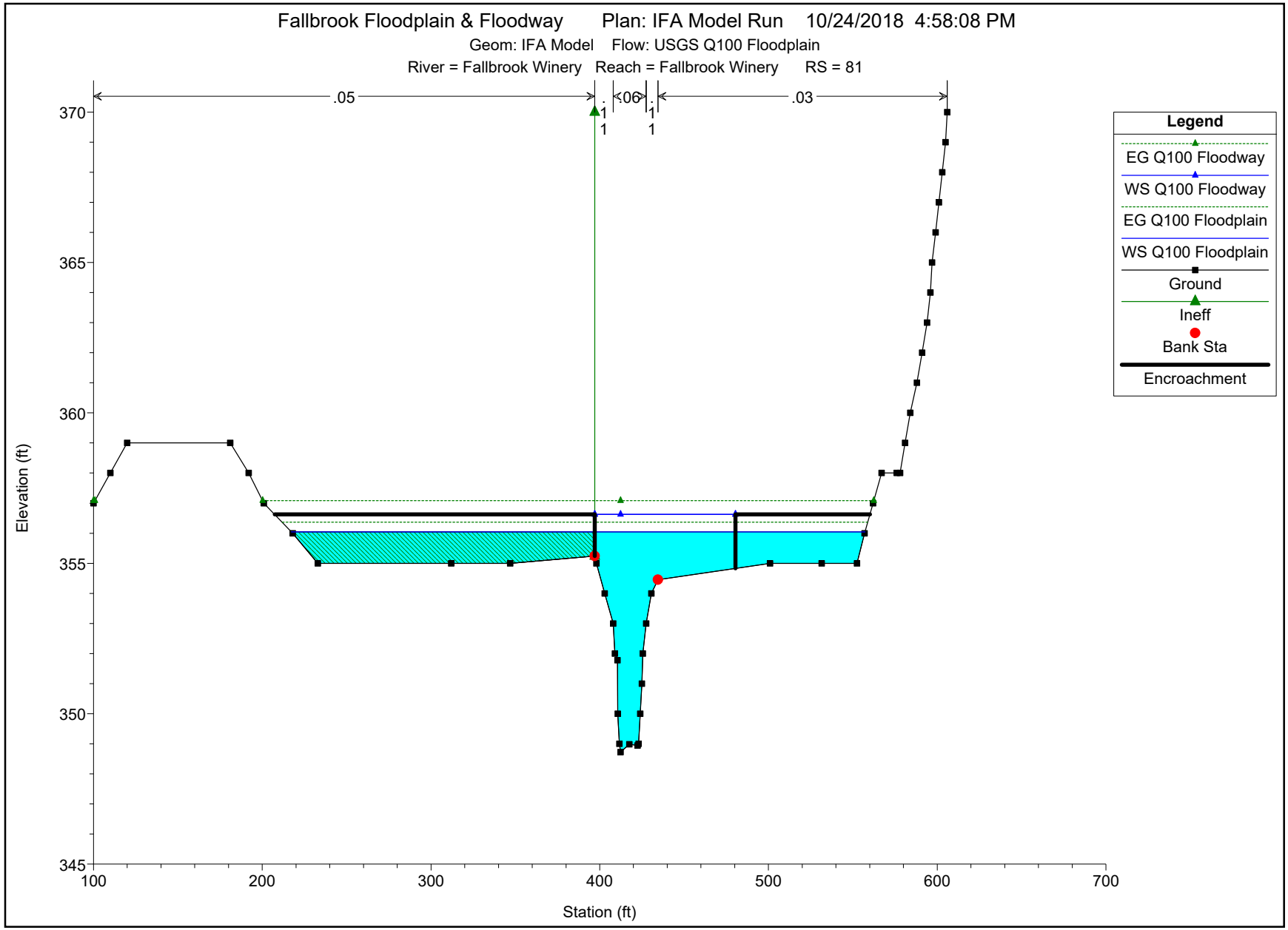

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 84
.03
.1
.1
.06
.1
.1
.03
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Ground
Bank Sta
Encroachment
Elevation (ft)
362
360
358
356
354
352
350
348
346
100
200
300
400
500
600
Station (ft)

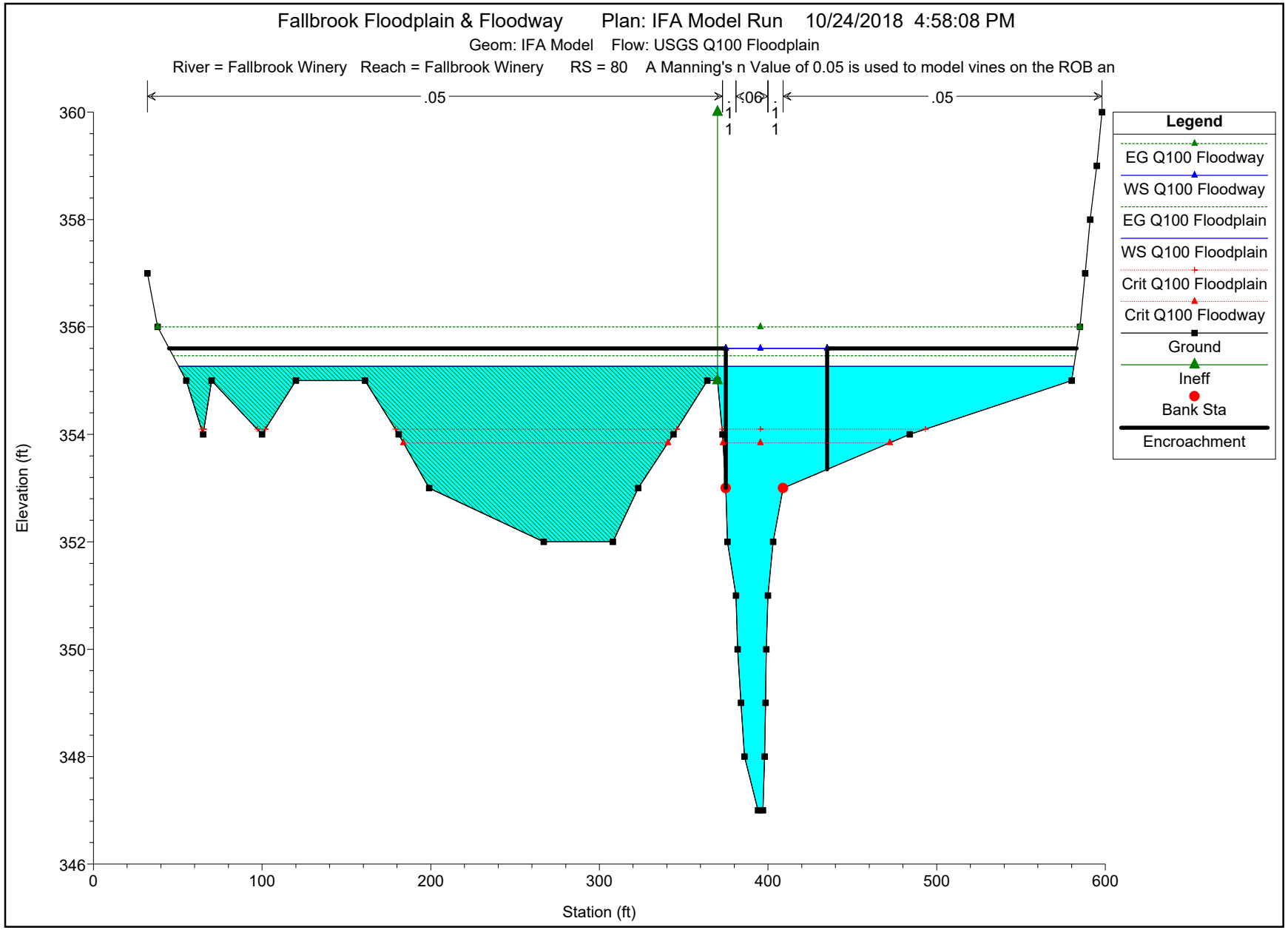

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 83
.05
.06
.03
.1
.1
.1
.1
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
360
358
356
354
352
350
348
100
200
300
400
500
600
Station (ft)

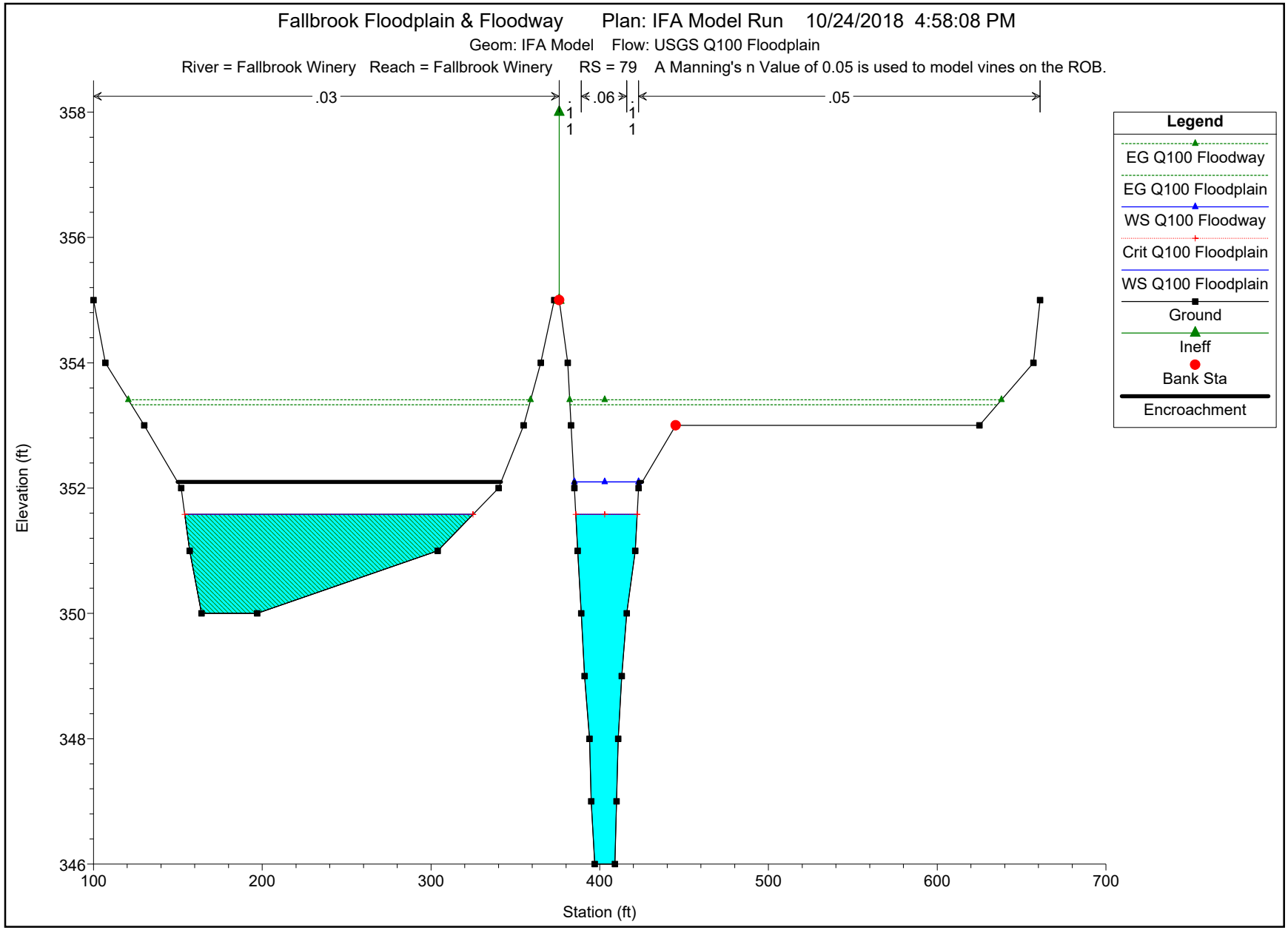

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 82
.05
.03
.11
.06
.11
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Crit Q100 Floodway
Crit Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
360
358
356
354
352
350
348
100
200
300
400
500
600
Station (ft)

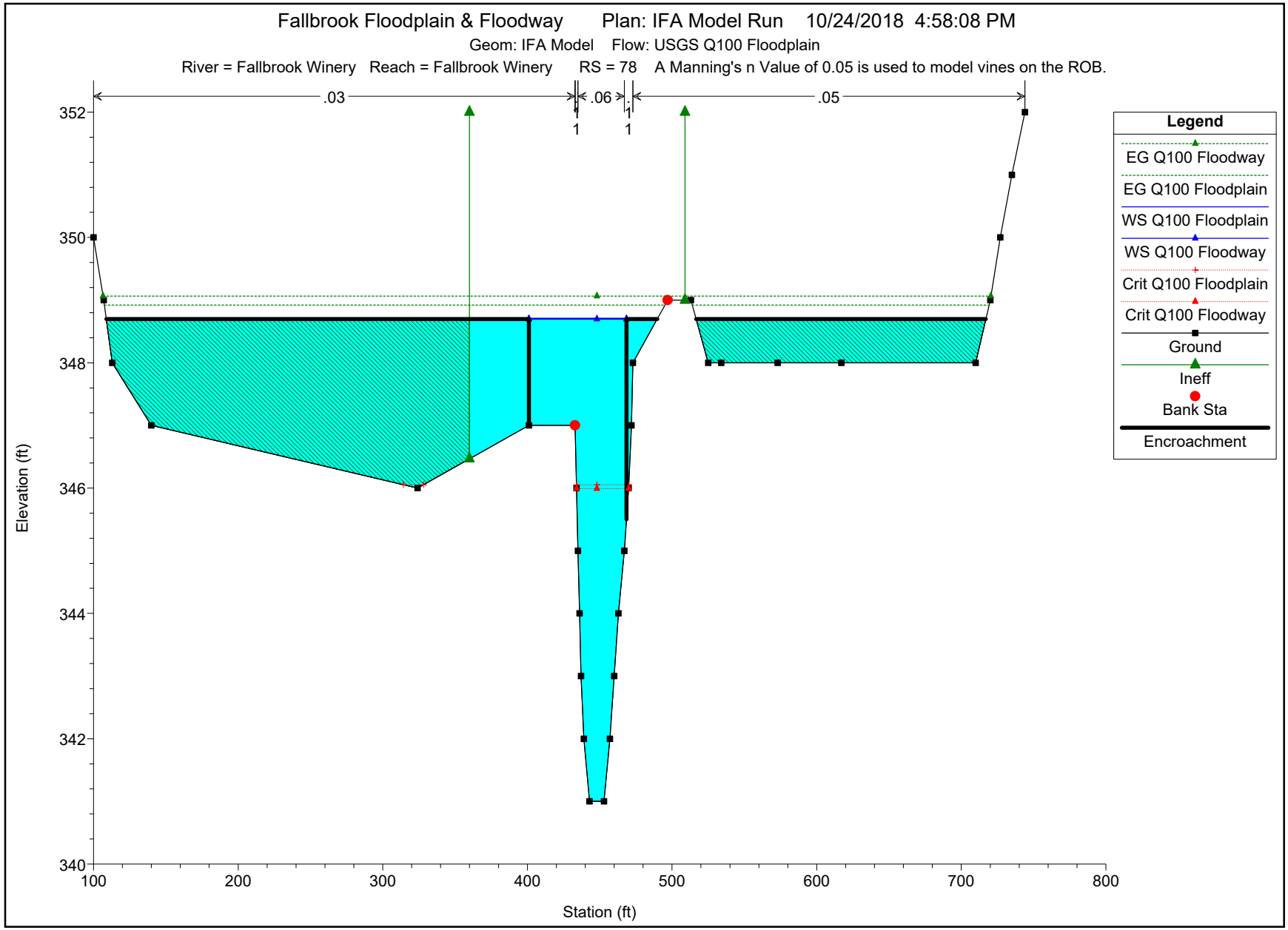

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 81.5 BR Deck Crossing that served the golf course
.05
.1 1
.0 6
.1 1
.03
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
360
358
356
354
352
350
348
100
200
300
400
500
600
Station (ft)

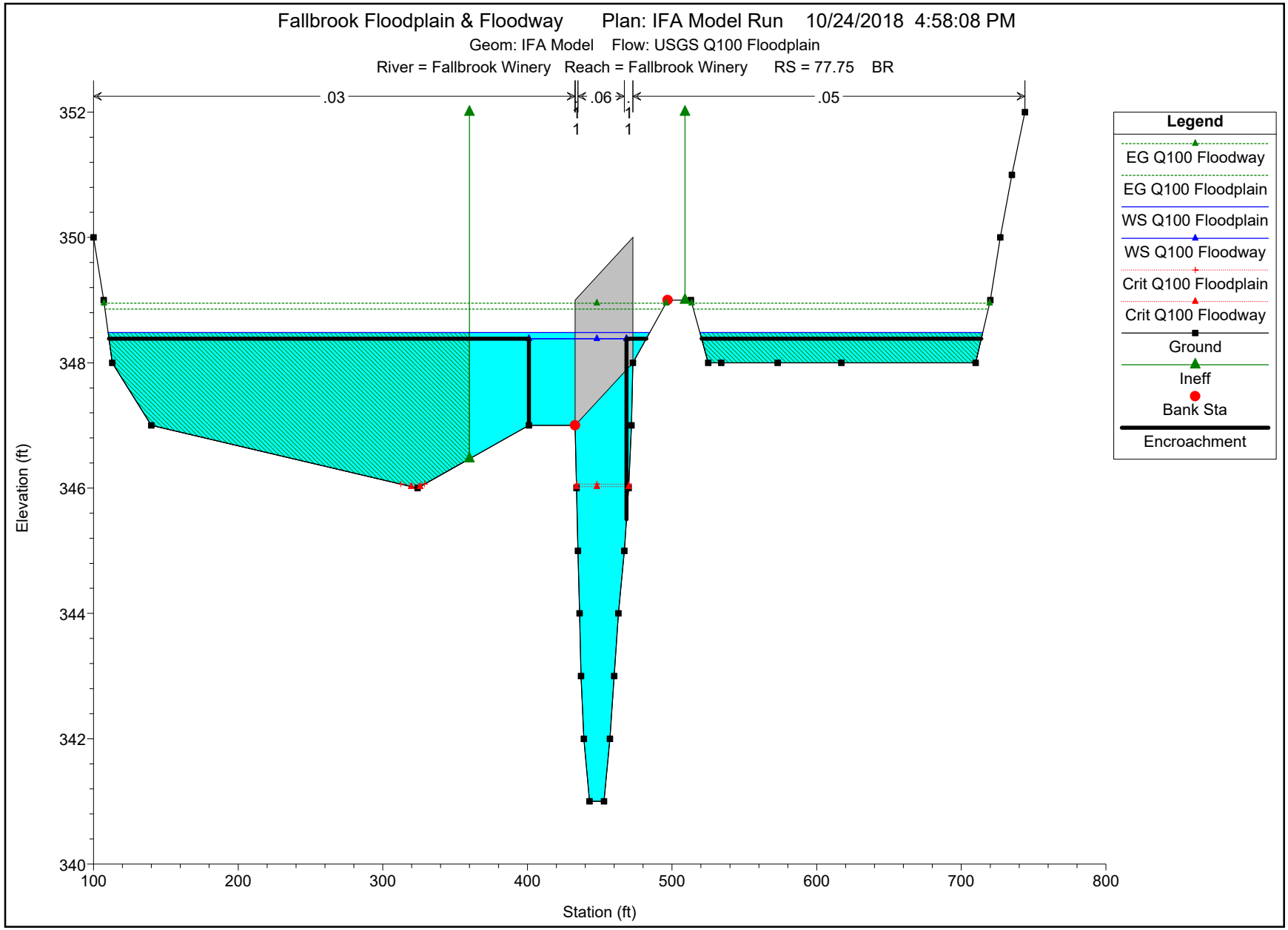

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 81.5 BR Deck Crossing that served the golf course
.05
.06
.03
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
370
365
360
355
350
345
100
200
300
400
500
600
700
Station (ft)

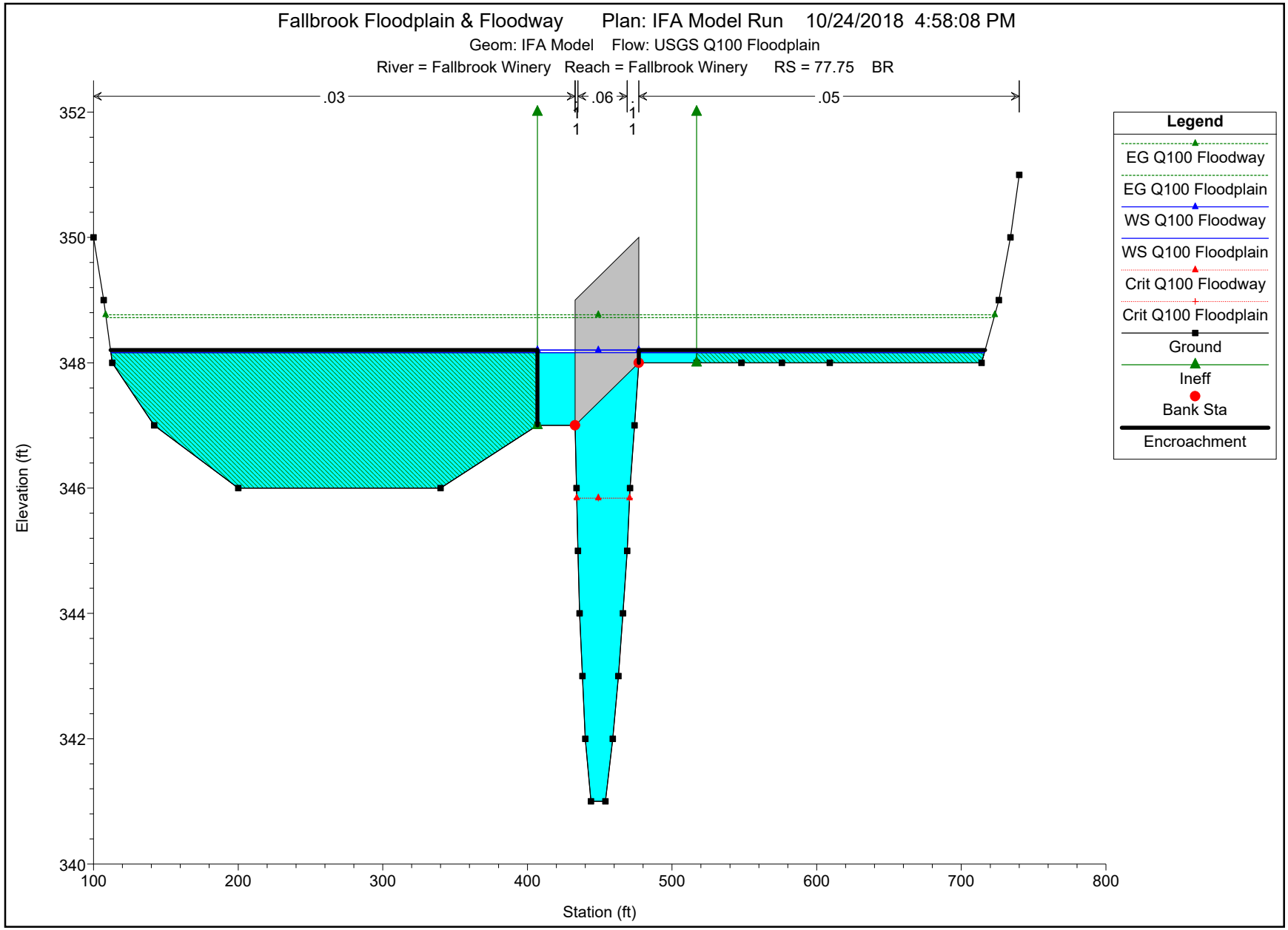

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 81
.05
.06
.03
.1
1
1
.1
1
1
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
370
365
360
355
350
345
100
200
300
400
500
600
700
Station (ft)

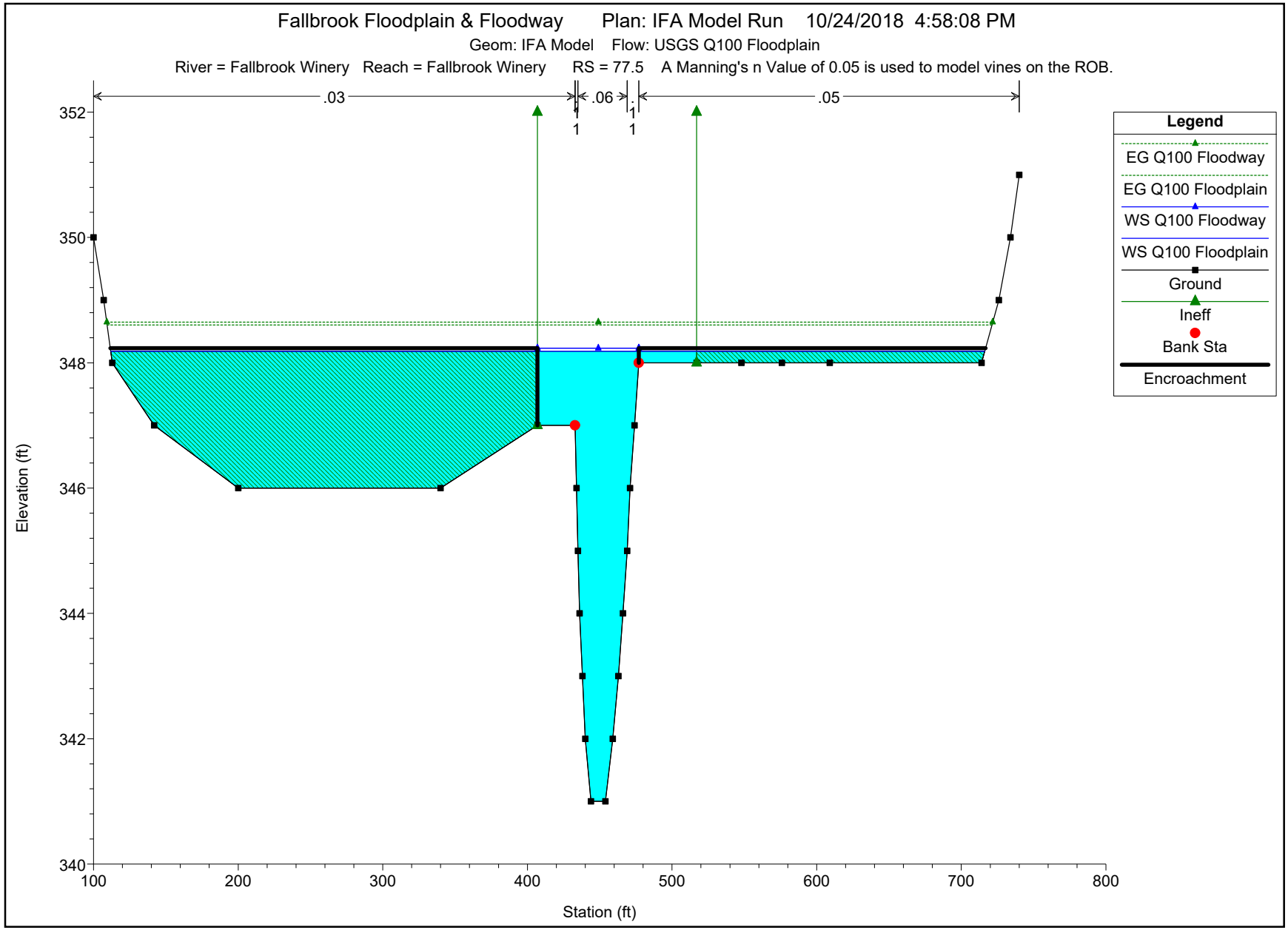

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 80 A Manning's n Value of 0.05 is used to model vines on the ROB an
.05
.06
.05
.1
.1
.1
.1
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
360
358
356
354
352
350
348
346
0
100
200
300
400
500
600
Station (ft)

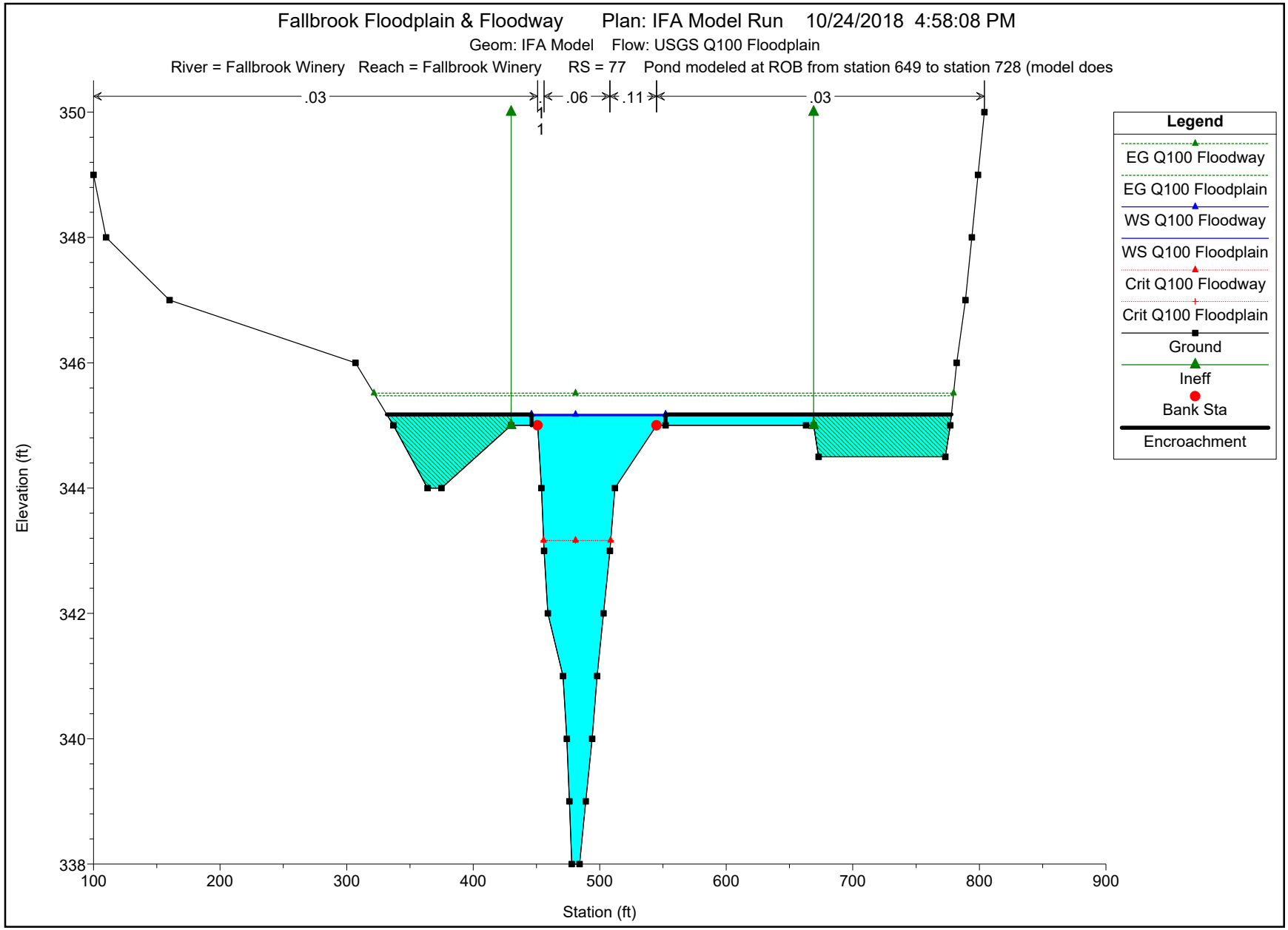

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 79 A Manning's n Value of 0.05 is used to model vines on the ROB.
.03
.06
.05
.1
1
.1
1
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodplain
WS Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
358
356
354
352
350
348
346
100
200
300
400
500
600
700
Station (ft)

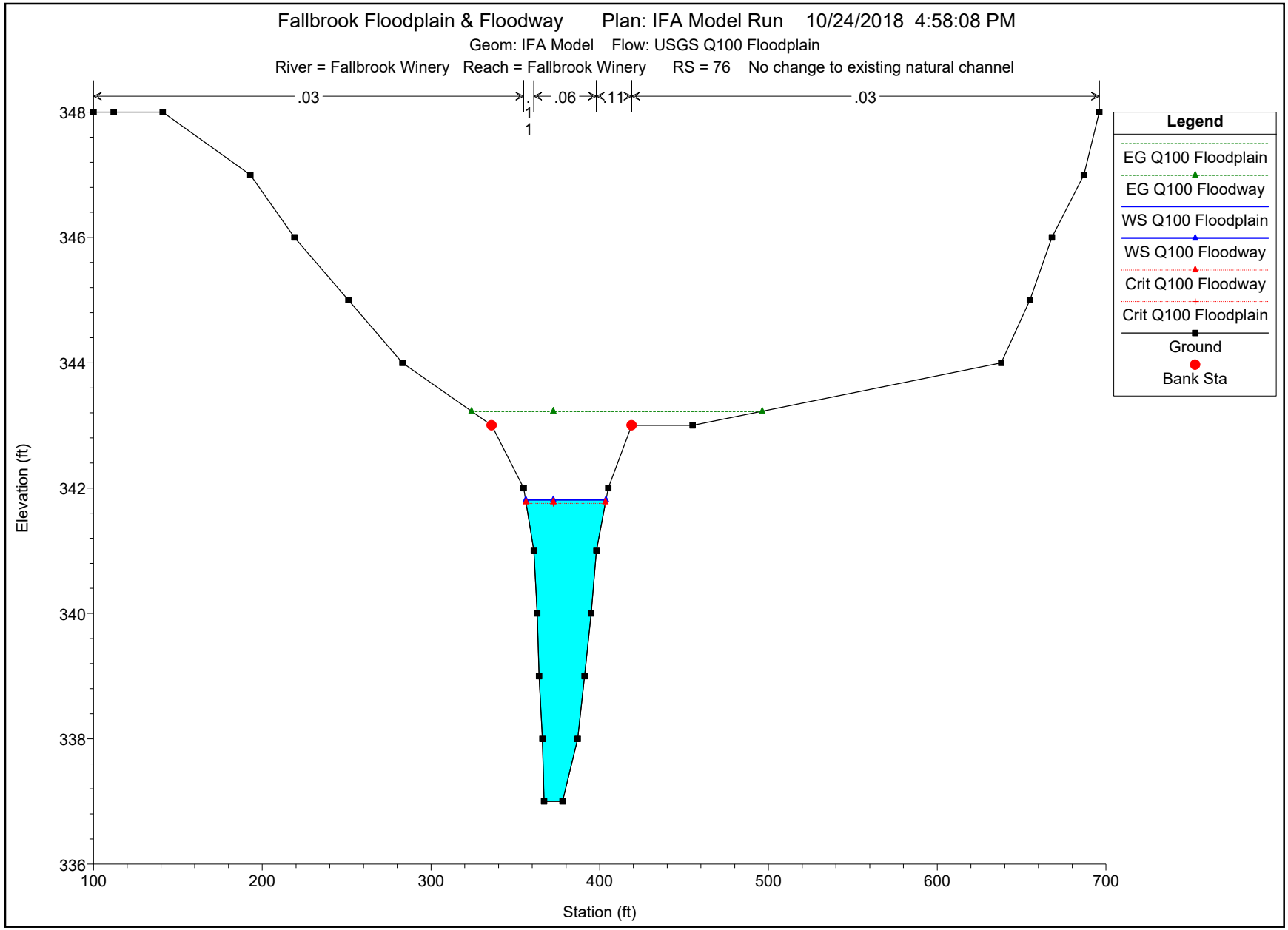

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 78 A Manning's n Value of 0.05 is used to model vines on the ROB.
.03
.06
.05
1
1
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
352
350
348
346
344
342
340
100
200
300
400
500
600
700
800
Station (ft)

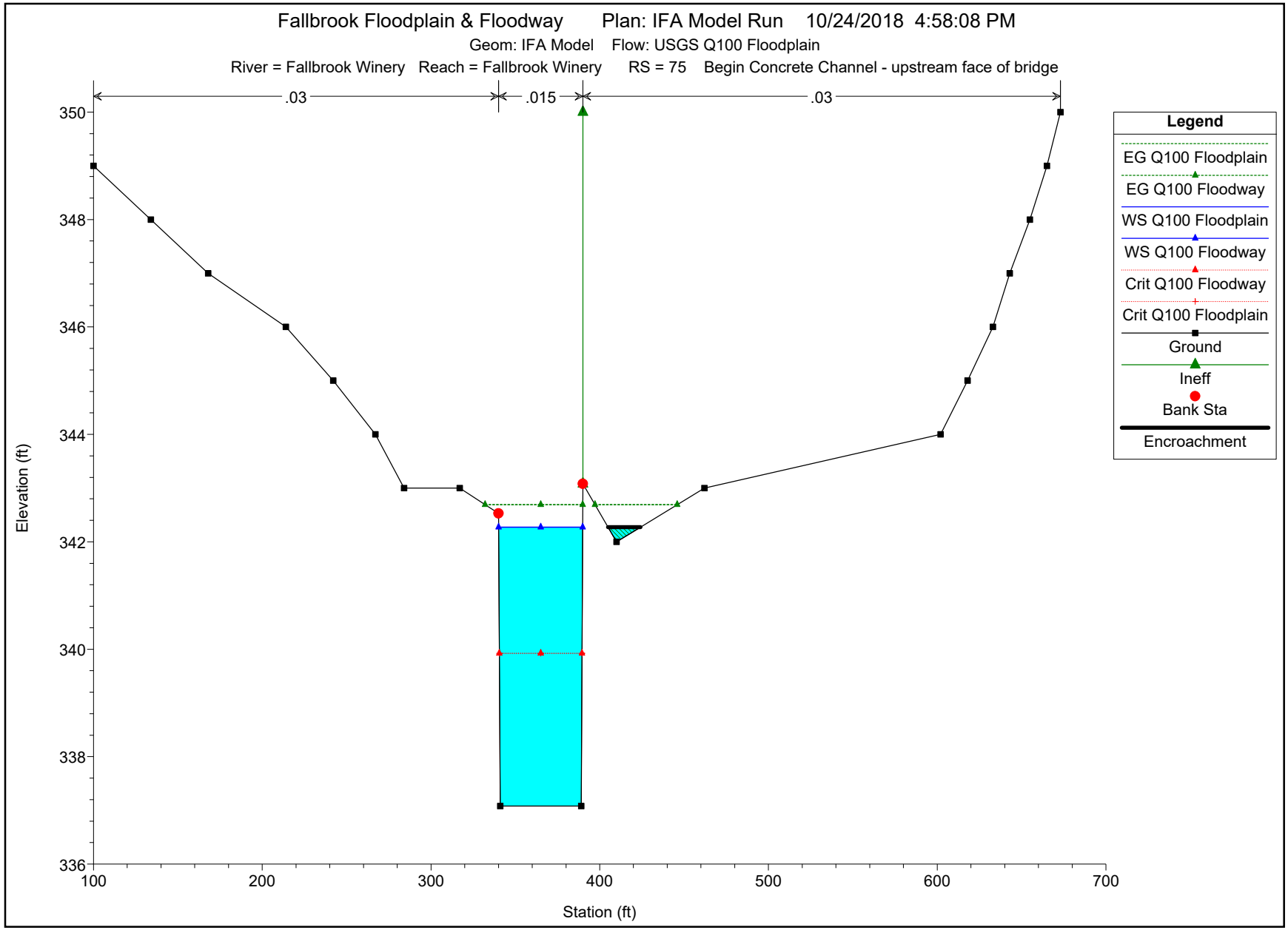

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 77.75 BR
.03
.06
.05
1
1
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
352
350
348
346
344
342
340
100
200
300
400
500
600
700
800
Station (ft)

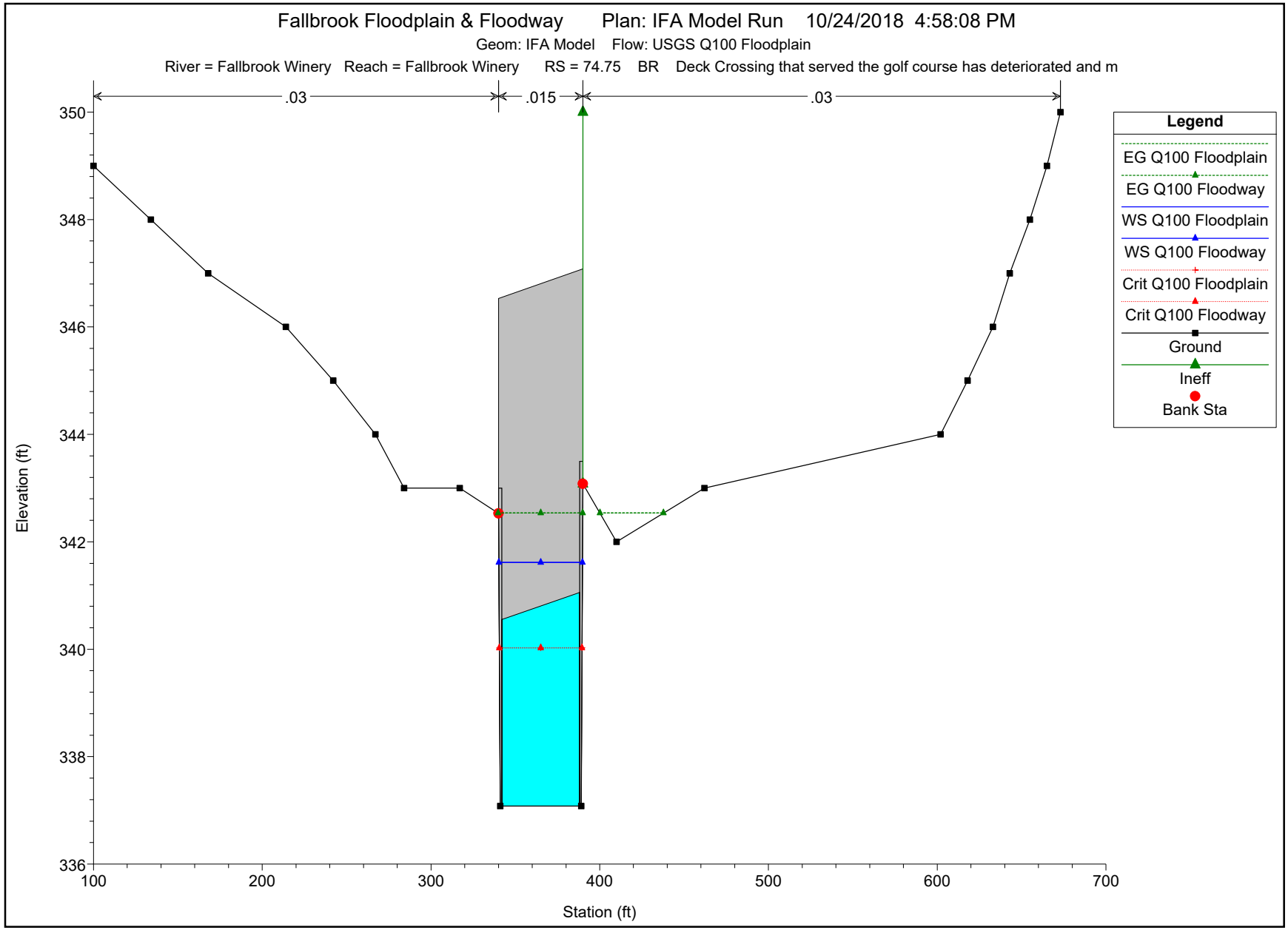

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 77.75 BR
.03
.06
.05
1
1
1
1
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Crit Q100 Floodway
Crit Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
352
350
348
346
344
342
340
100
200
300
400
500
600
700
800
Station (ft)


Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 77.5 A Manning's n Value of 0.05 is used to model vines on the ROB.
.03
.06
.05
1
1
1
1
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
352
350
348
346
344
342
340
100
200
300
400
500
600
700
800
Station (ft)


Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 77 Pond modeled at ROB from station 649 to station 728 (model does
.03
.06
.11
.03
1
1
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Crit Q100 Floodway
Crit Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
350
348
346
344
342
340
338
100
200
300
400
500
600
700
800
900
Station (ft)


Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 76 No change to existing natural channel
.03
.06
.11
.03
Legend
EG Q100 Floodplain
EG Q100 Floodway
WS Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodway
Crit Q100 Floodplain
Ground
Bank Sta
Elevation (ft)
348
346
344
342
340
338
336
100
200
300
400
500
600
700
Station (ft)


Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 75 Begin Concrete Channel - upstream face of bridge
.03
.015
.03
Legend
EG Q100 Floodplain
EG Q100 Floodway
WS Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodway
Crit Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
350
348
346
344
342
340
338
336
100
200
300
400
500
600
700
Station (ft)


Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 74.75 BR Deck Crossing that served the golf course has deteriorated and m
.03
.015
.03
Legend
EG Q100 Floodplain
EG Q100 Floodway
WS Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Elevation (ft)
350
348
346
344
342
340
338
336
100
200
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400
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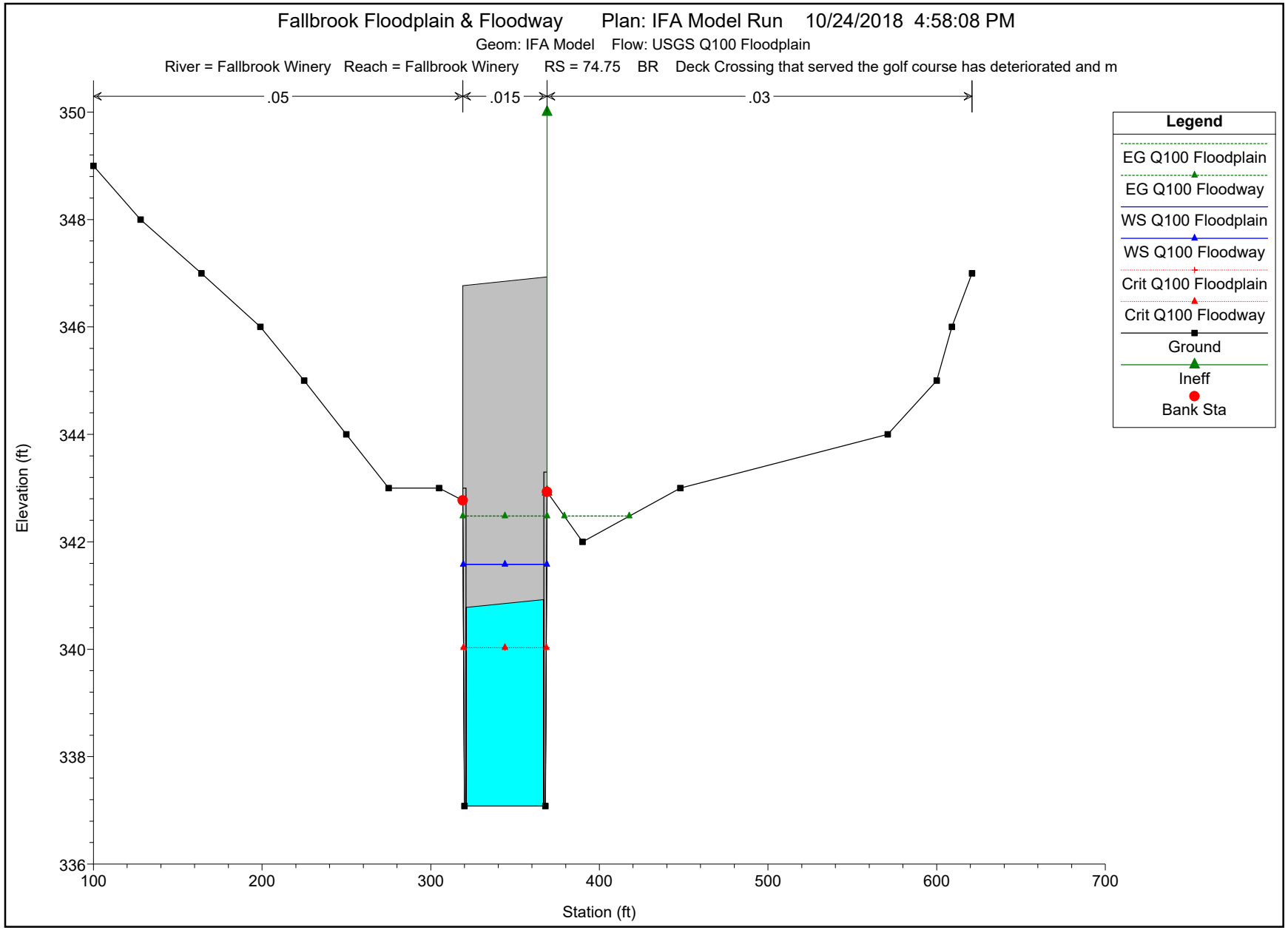
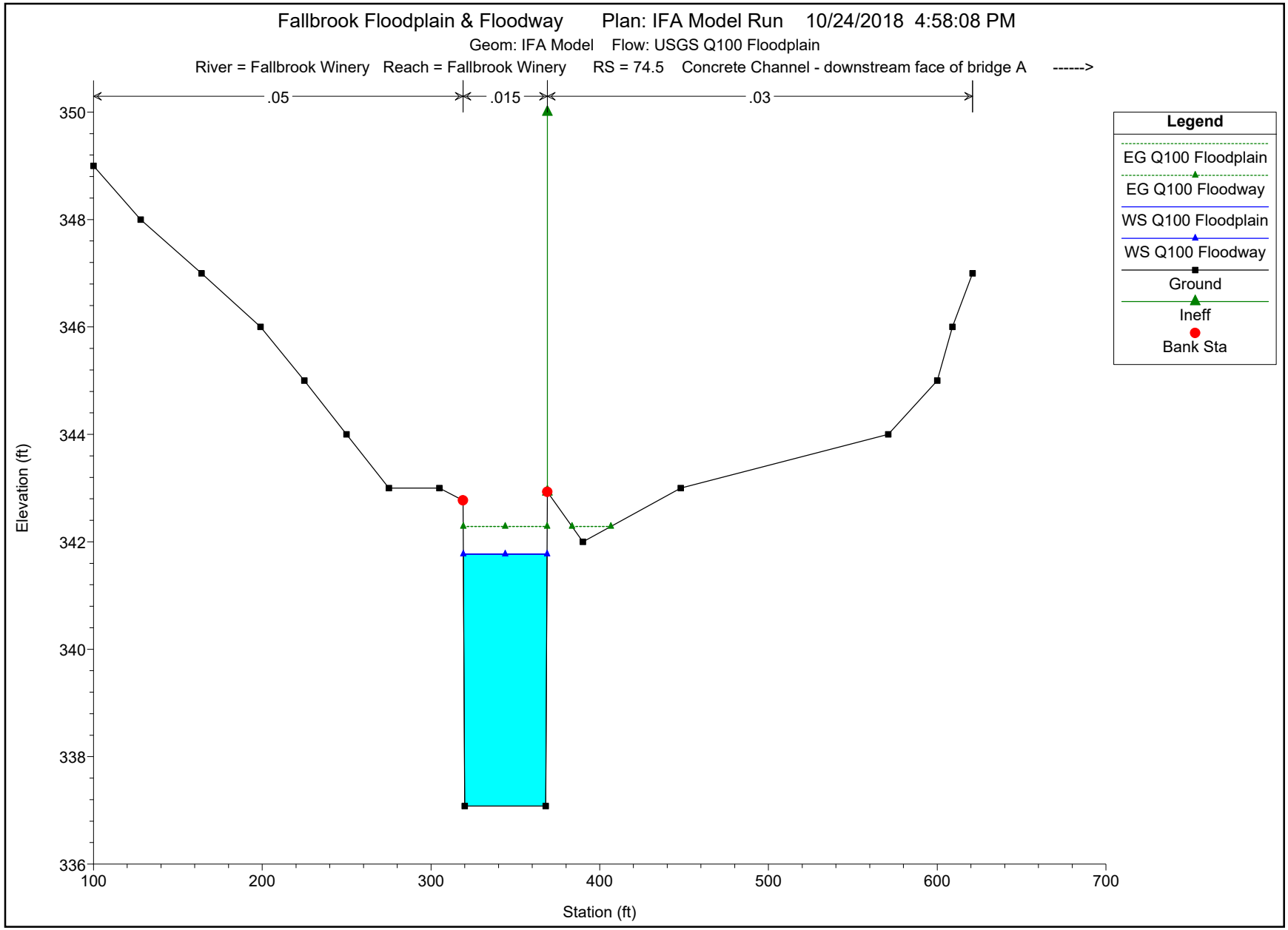
600
700
Station (ft)


Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 74.75 BR Deck Crossing that served the golf course has deteriorated and m
.05
.015
.03
Legend
EG Q100 Floodplain
EG Q100 Floodway
WS Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Elevation (ft)
350
348
346
344
342
340
338
336
100
200
300
400
500
600
700
Station (ft)


Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 74.5 Concrete Channel - downstream face of bridge A ------>
.05
.015
.03
Legend
EG Q100 Floodplain
EG Q100 Floodway
WS Q100 Floodplain
WS Q100 Floodway
Ground
Ineff
Bank Sta
Elevation (ft)
350
348
346
344
342
340
338
336
100
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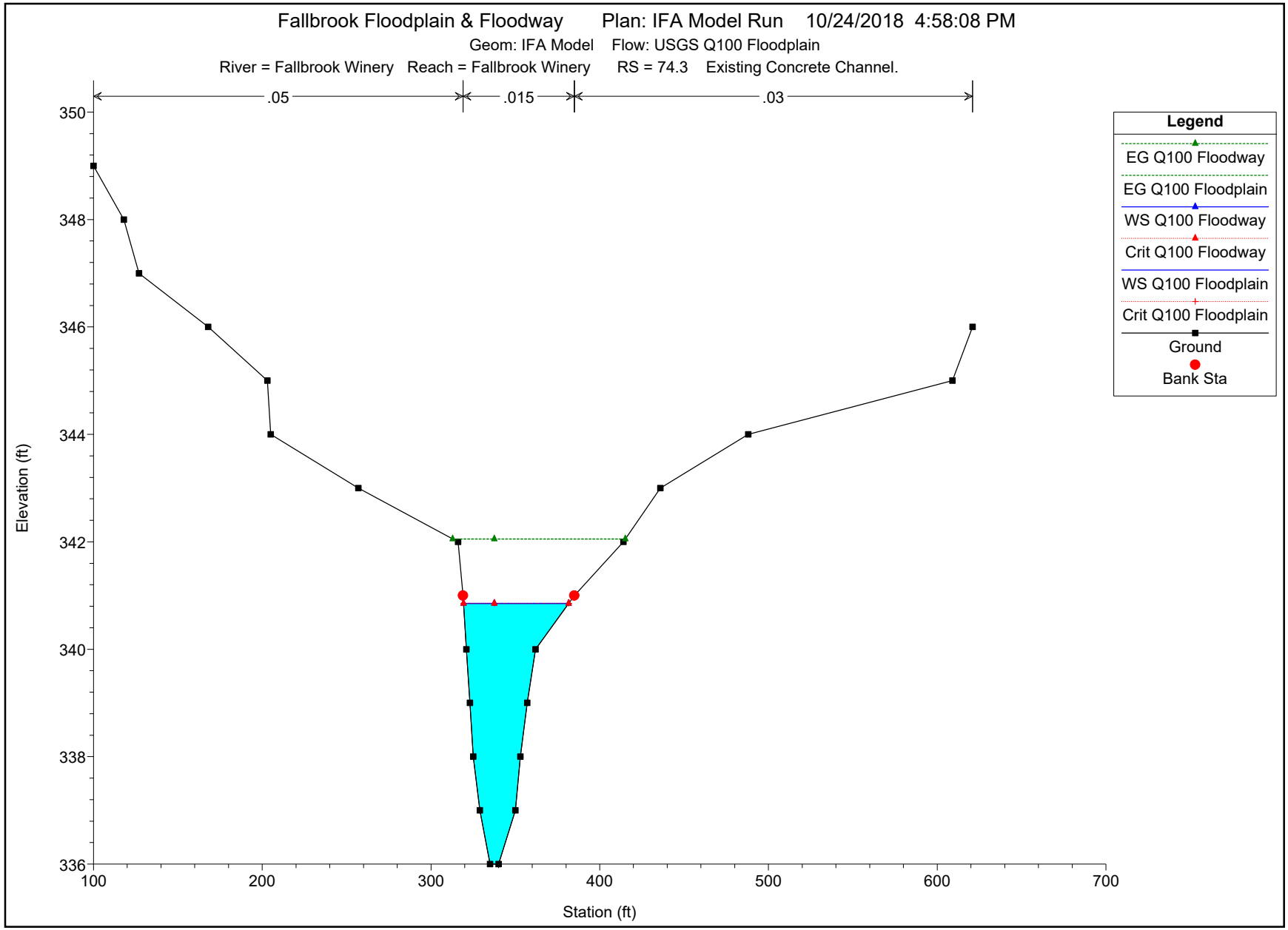
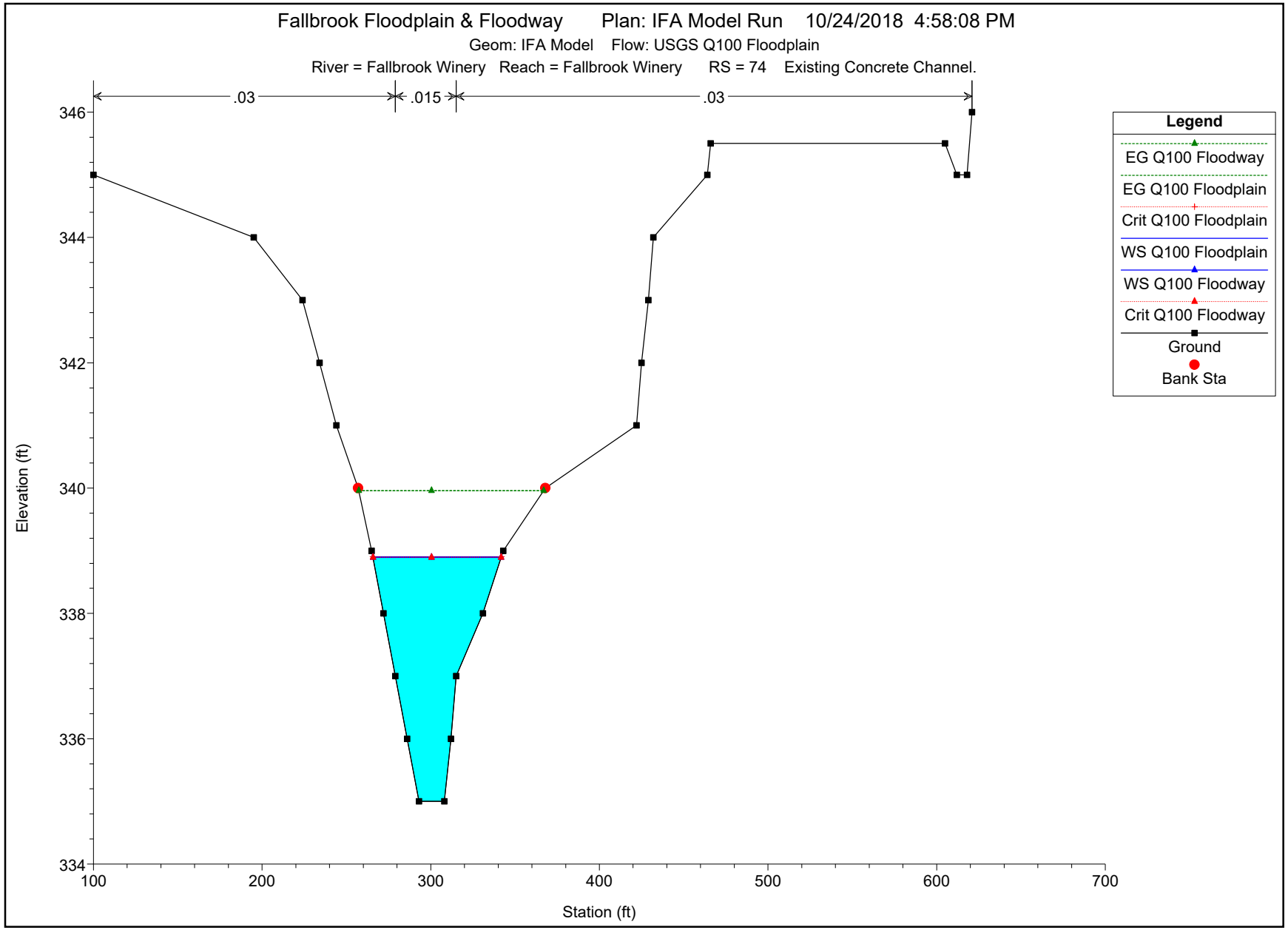
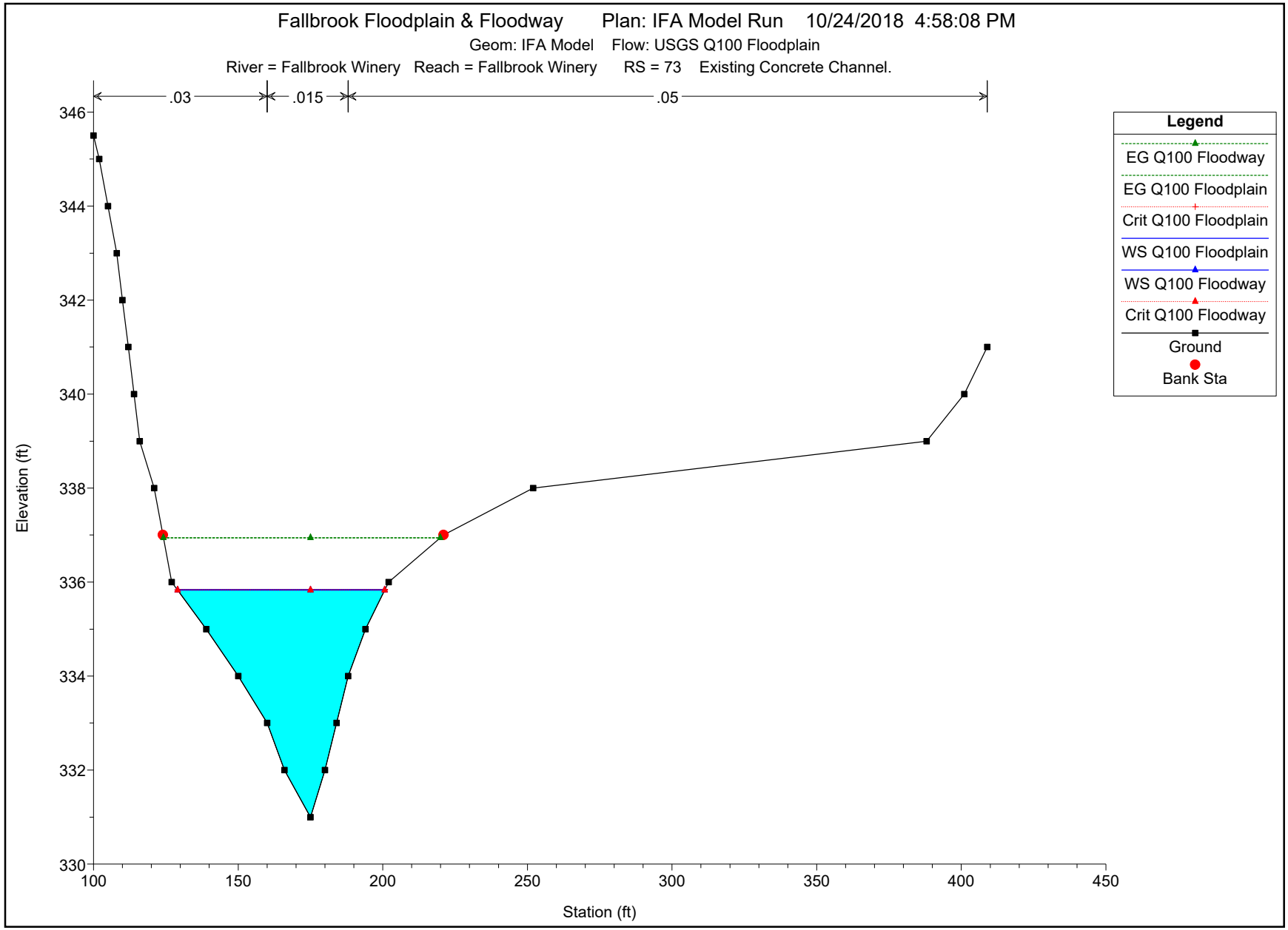
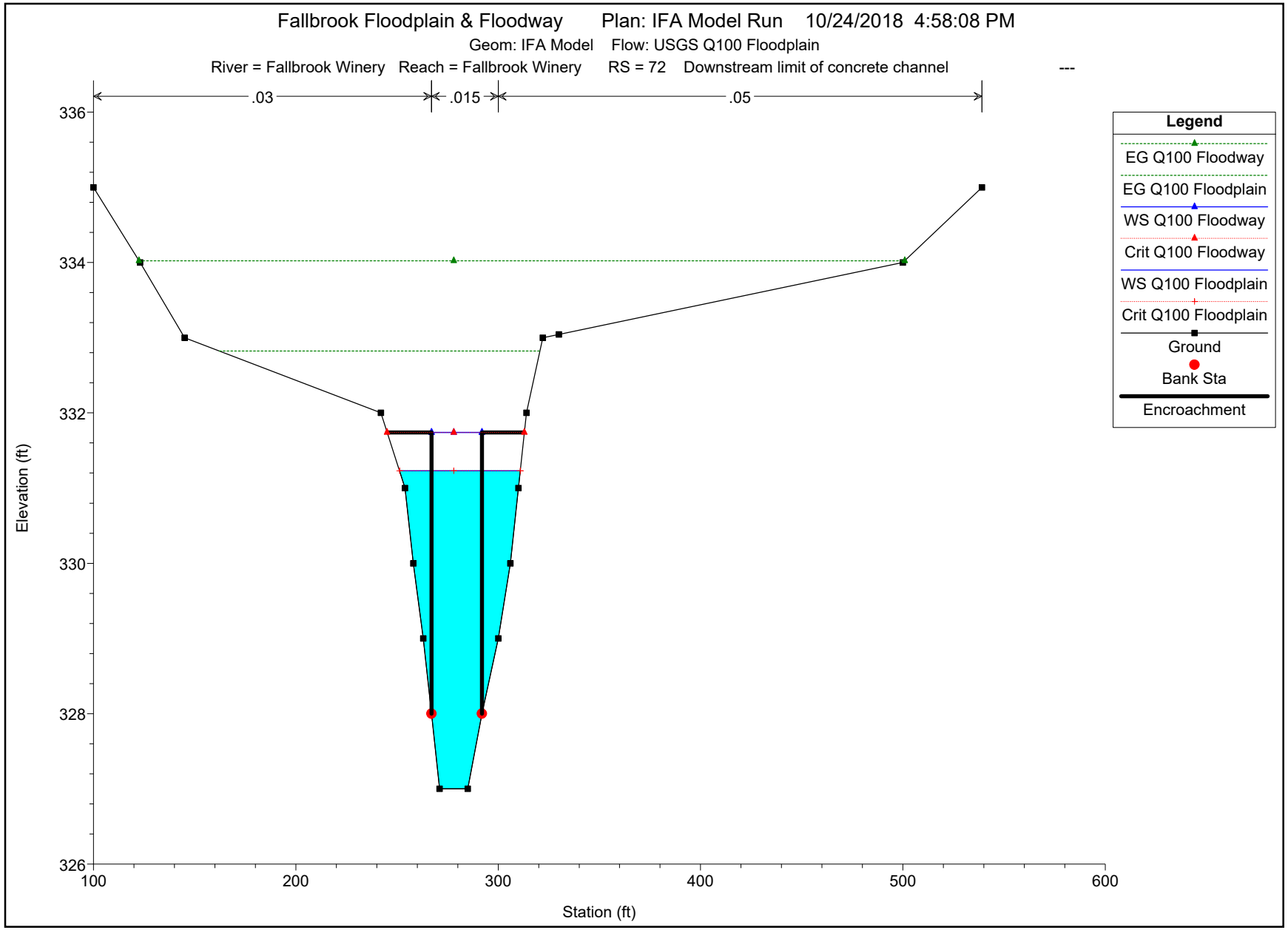
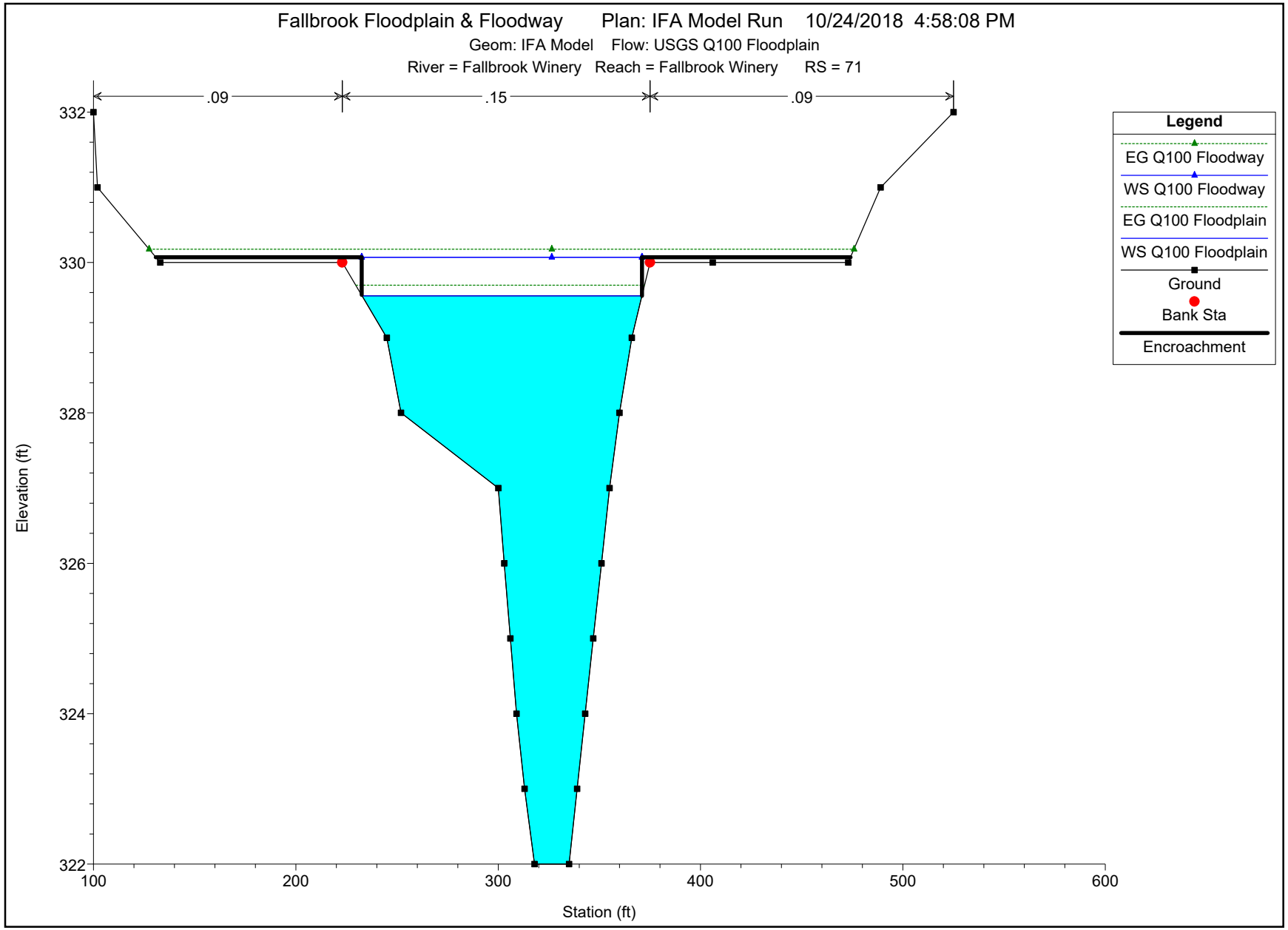
300
400
500
600
700
Station (ft)

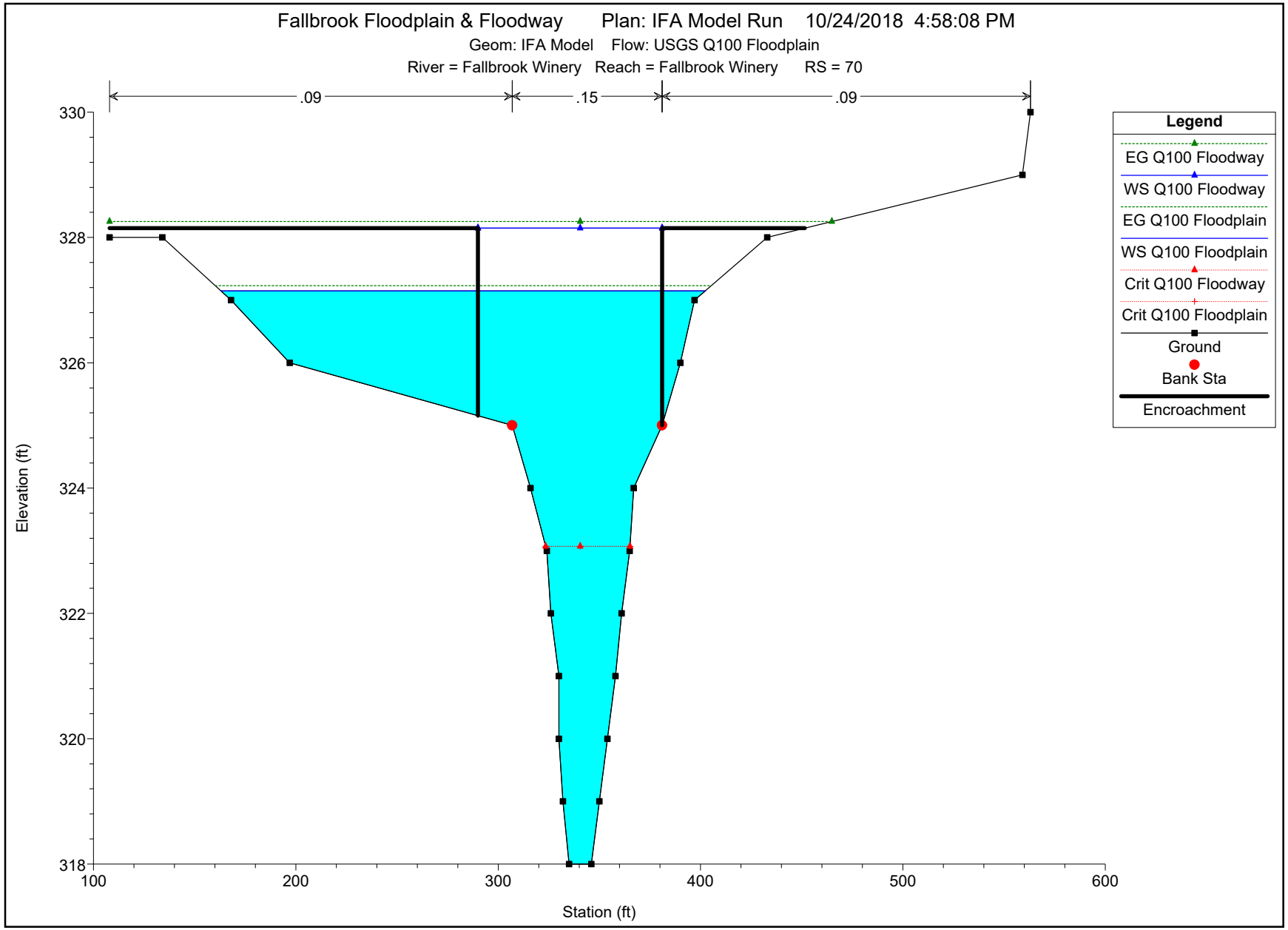

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 74.3 Existing Concrete Channel.
.05
.015
.03
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodway
WS Q100 Floodplain
Crit Q100 Floodplain
Ground
Bank Sta
Elevation (ft)
350
348
346
344
342
340
338
336
100
200
300
400
500
600
700
Station (ft)

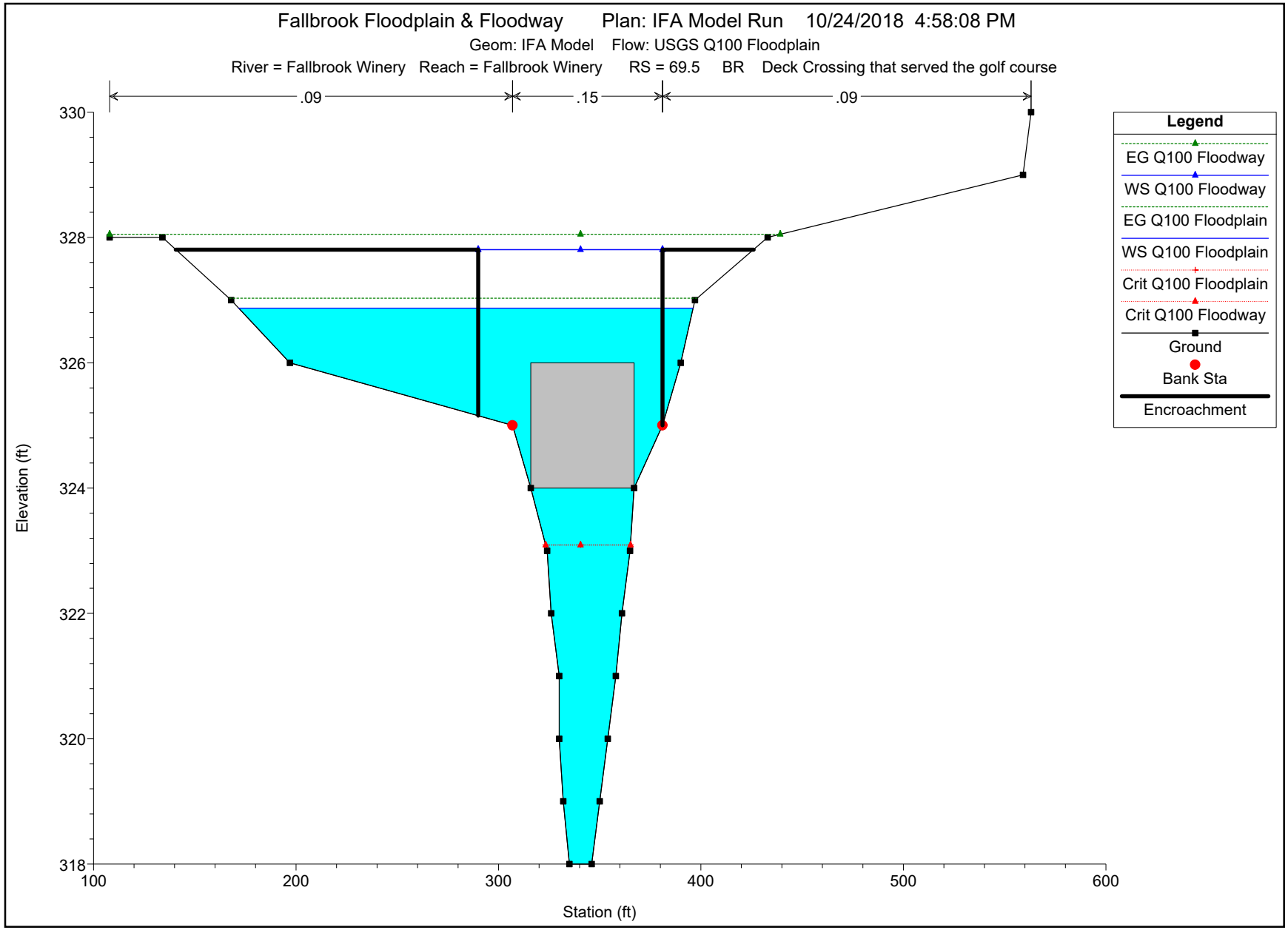

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 74 Existing Concrete Channel.
.03
.015
.03
Legend
EG Q100 Floodway
EG Q100 Floodplain
Crit Q100 Floodplain
WS Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodway
Ground
Bank Sta
Elevation (ft)
346
344
342
340
338
336
334
100
200
300
400
500
600
700
Station (ft)

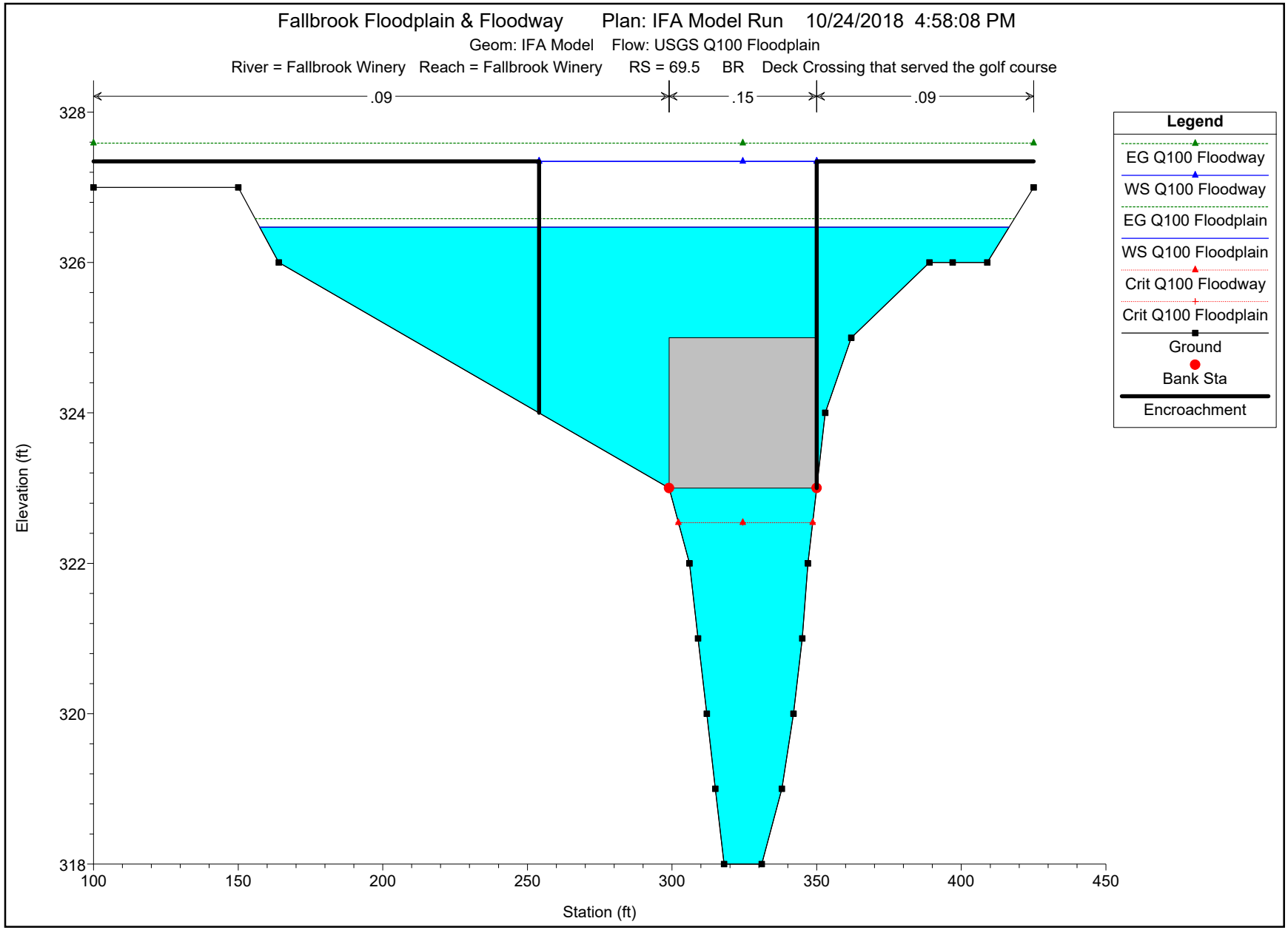

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 73 Existing Concrete Channel.
.03
.015
.05
Legend
EG Q100 Floodway
EG Q100 Floodplain
Crit Q100 Floodplain
WS Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodway
Ground
Bank Sta
Elevation (ft)
346
344
342
340
338
336
334
332
330
100
150
200
250
300
350
400
450
Station (ft)

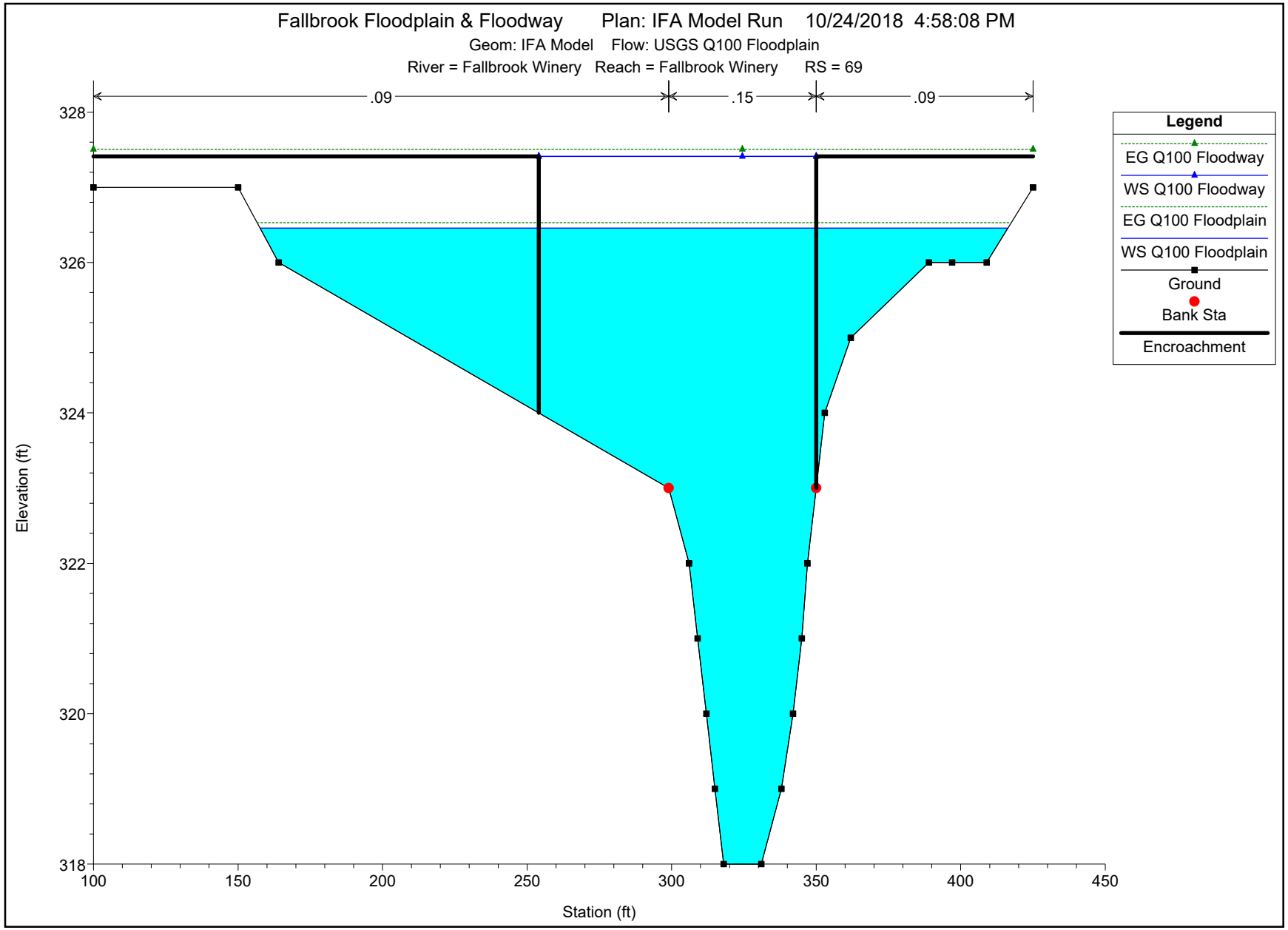

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 72 Downstream limit of concrete channel ---
.03
.015
.05
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodway
WS Q100 Floodplain
Crit Q100 Floodplain
Ground
Bank Sta
Encroachment
Elevation (ft)
336
334
332
330
328
326
100
200
300
400
500
600
Station (ft)

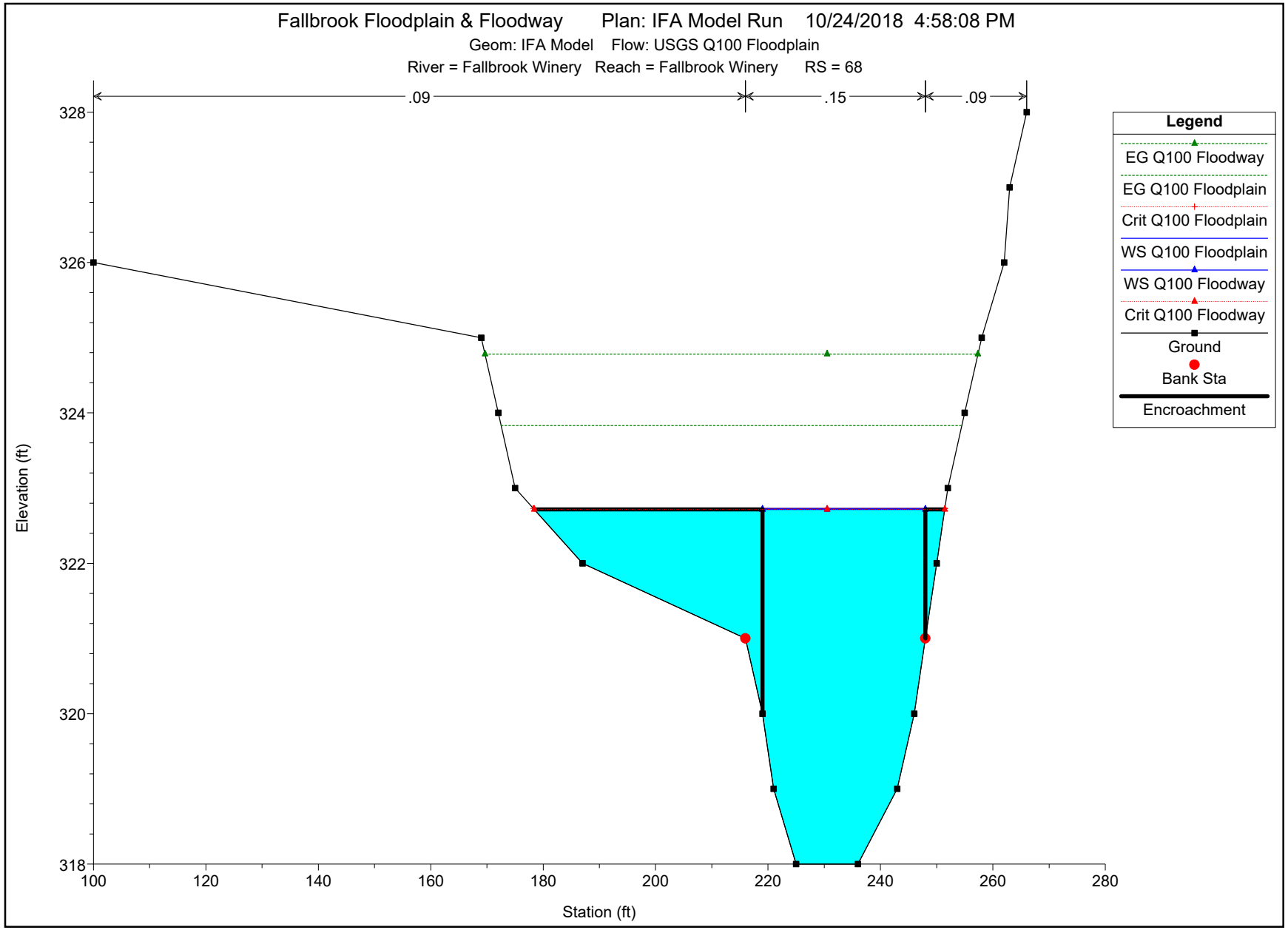

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 71
.09
.15
.09
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Ground
Bank Sta
Encroachment
Elevation (ft)
332
330
328
326
324
322
100
200
300
400
500
600
Station (ft)

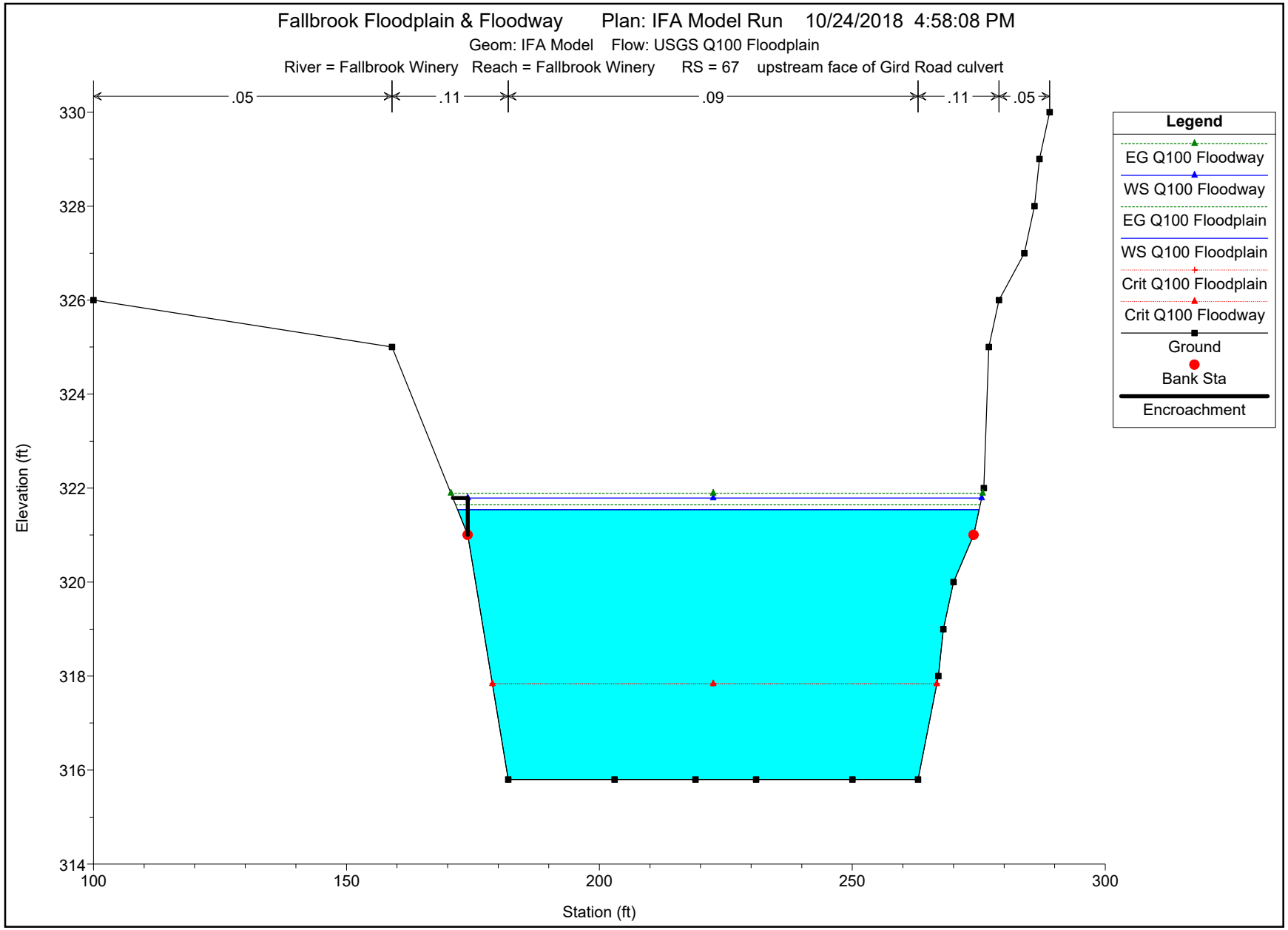

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 70
.09
.15
.09
330
328
326
324
322
320
318
Elevation (ft)
100
200
300
400
500
600
Station (ft)
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Crit Q100 Floodway
Crit Q100 Floodplain
Ground
Bank Sta
Encroachment

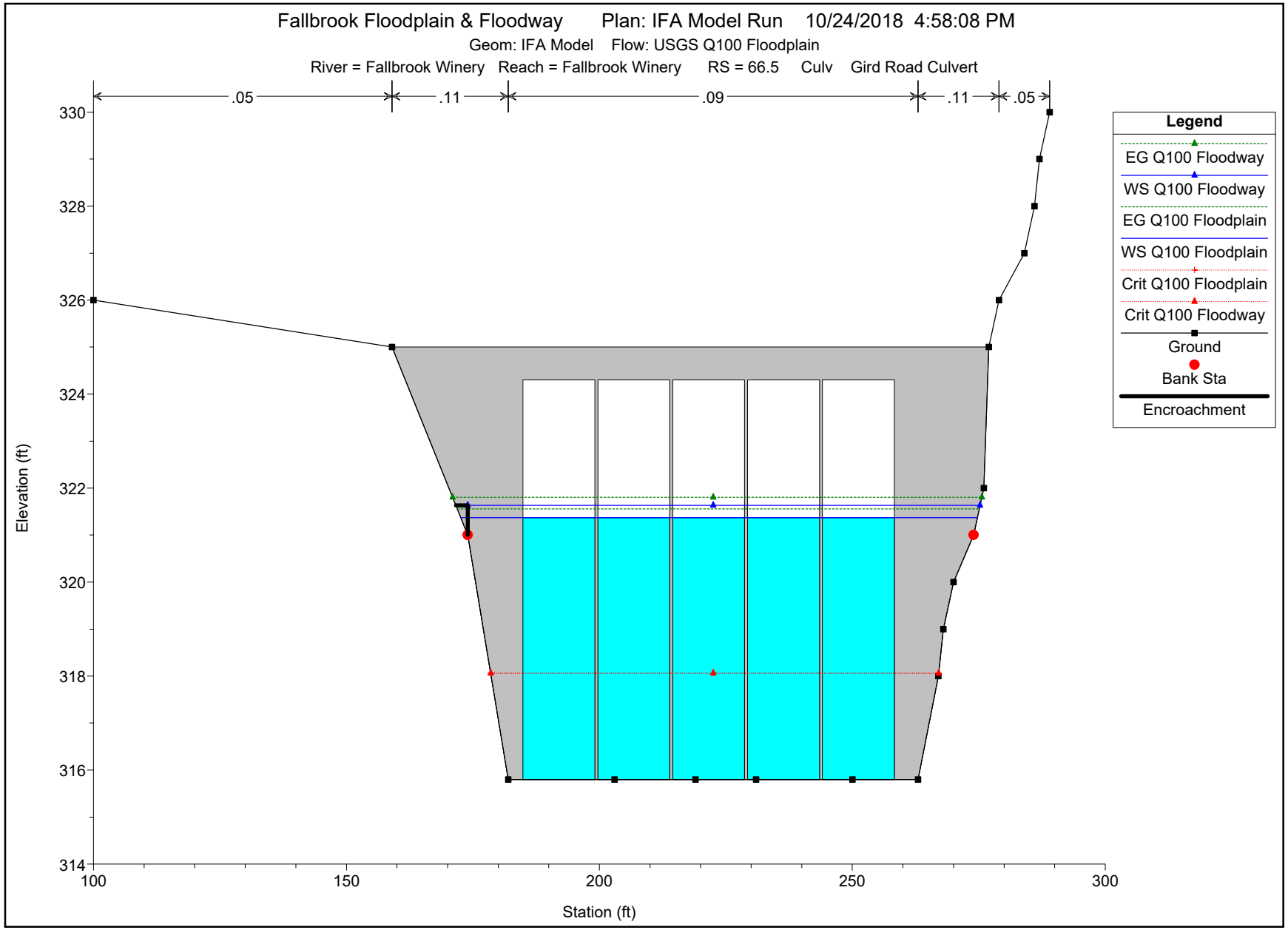

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 69.5 BR Deck Crossing that served the golf course
.09
.15
.09
330
328
326
324
322
320
318
Elevation (ft)
100
200
300
400
500
600
Station (ft)
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Bank Sta
Encroachment

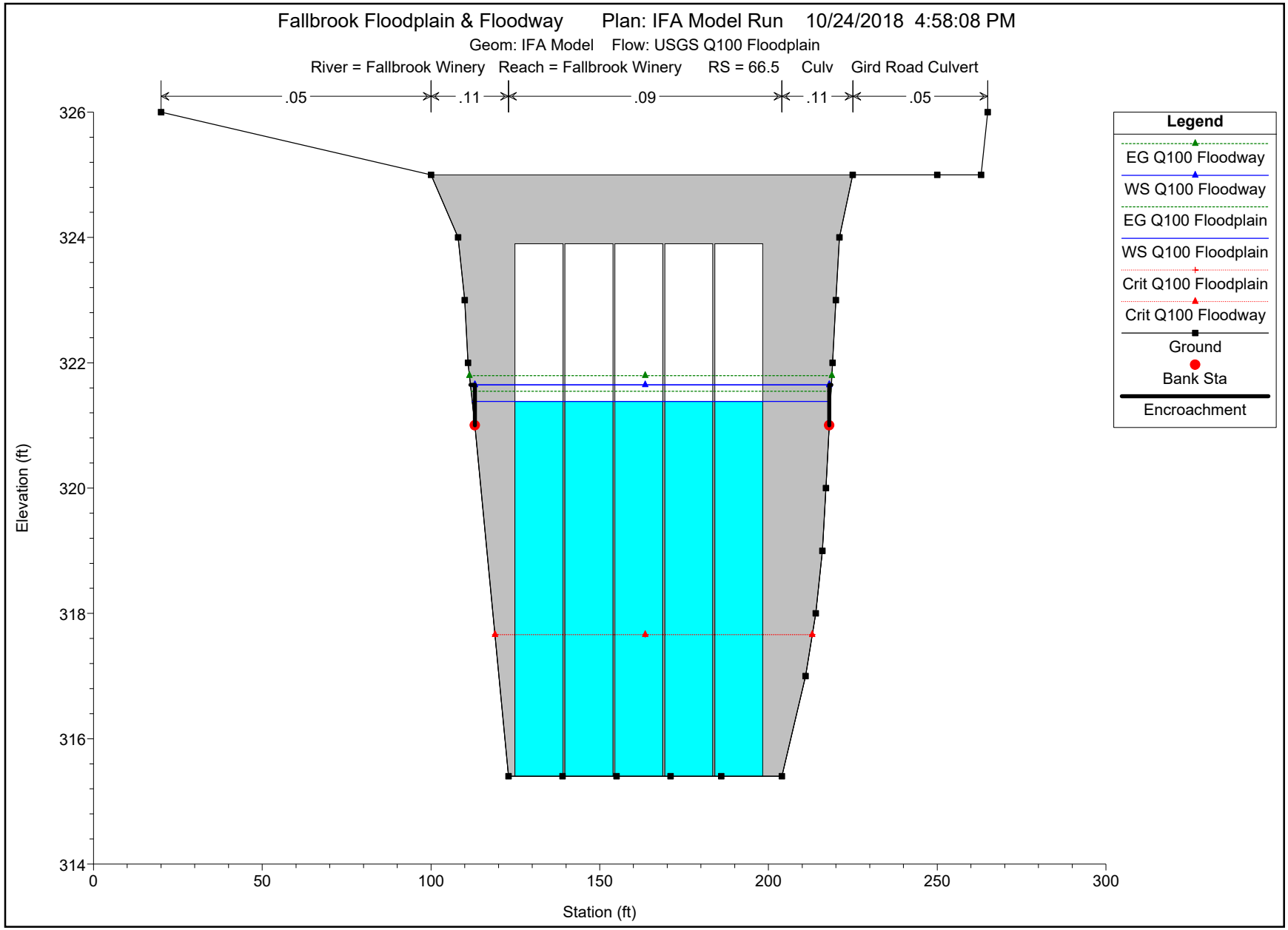

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 69.5 BR Deck Crossing that served the golf course
.09
.15
.09
328
326
324
322
320
318
Elevation (ft)
100
150
200
250
300
350
400
450
Station (ft)
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Crit Q100 Floodway
Crit Q100 Floodplain
Ground
Bank Sta
Encroachment

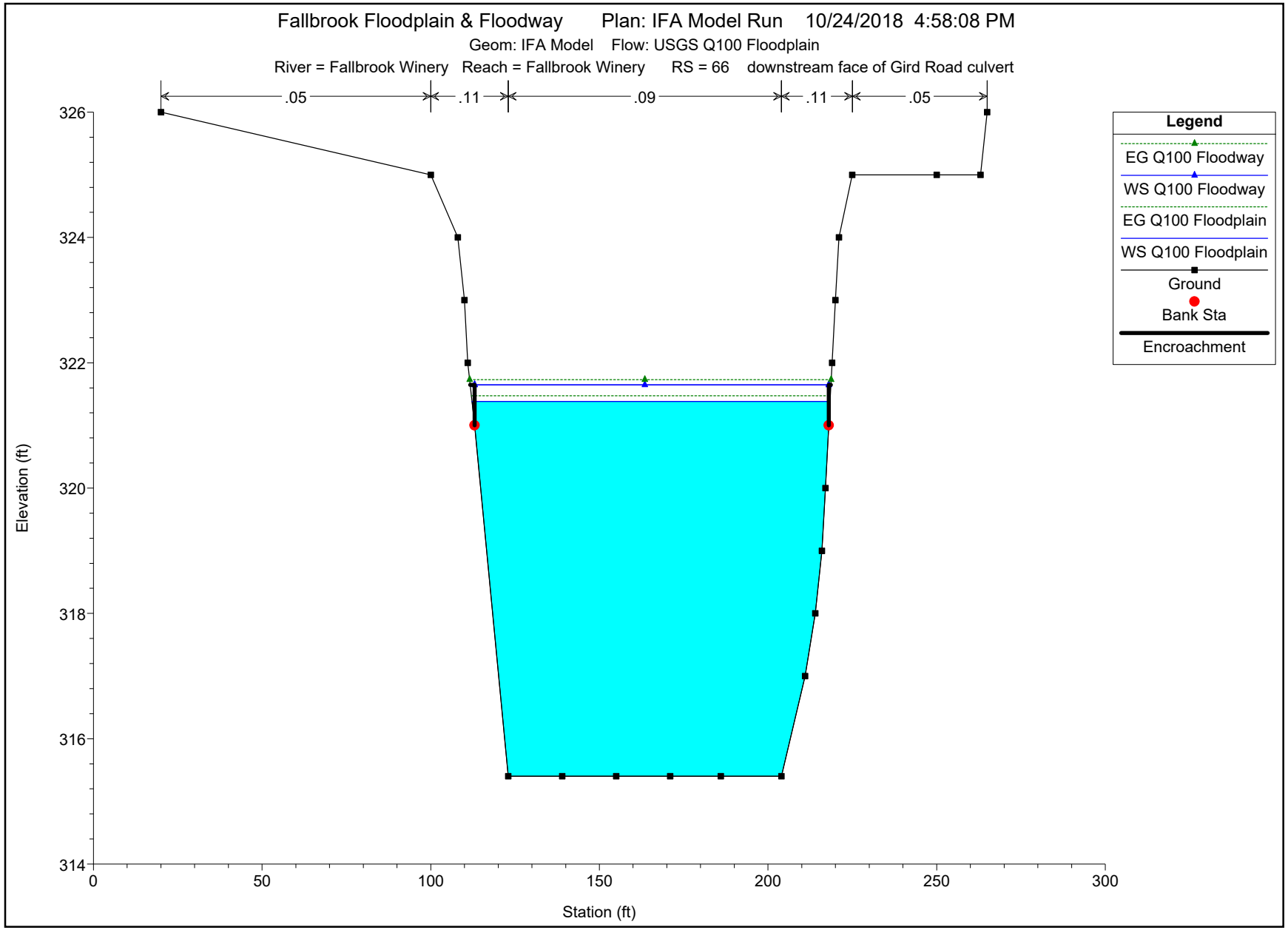

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 69
.09
.15
.09
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Ground
Bank Sta
Encroachment
Elevation (ft)
328
326
324
322
320
318
100
150
200
250
300
350
400
450
Station (ft)

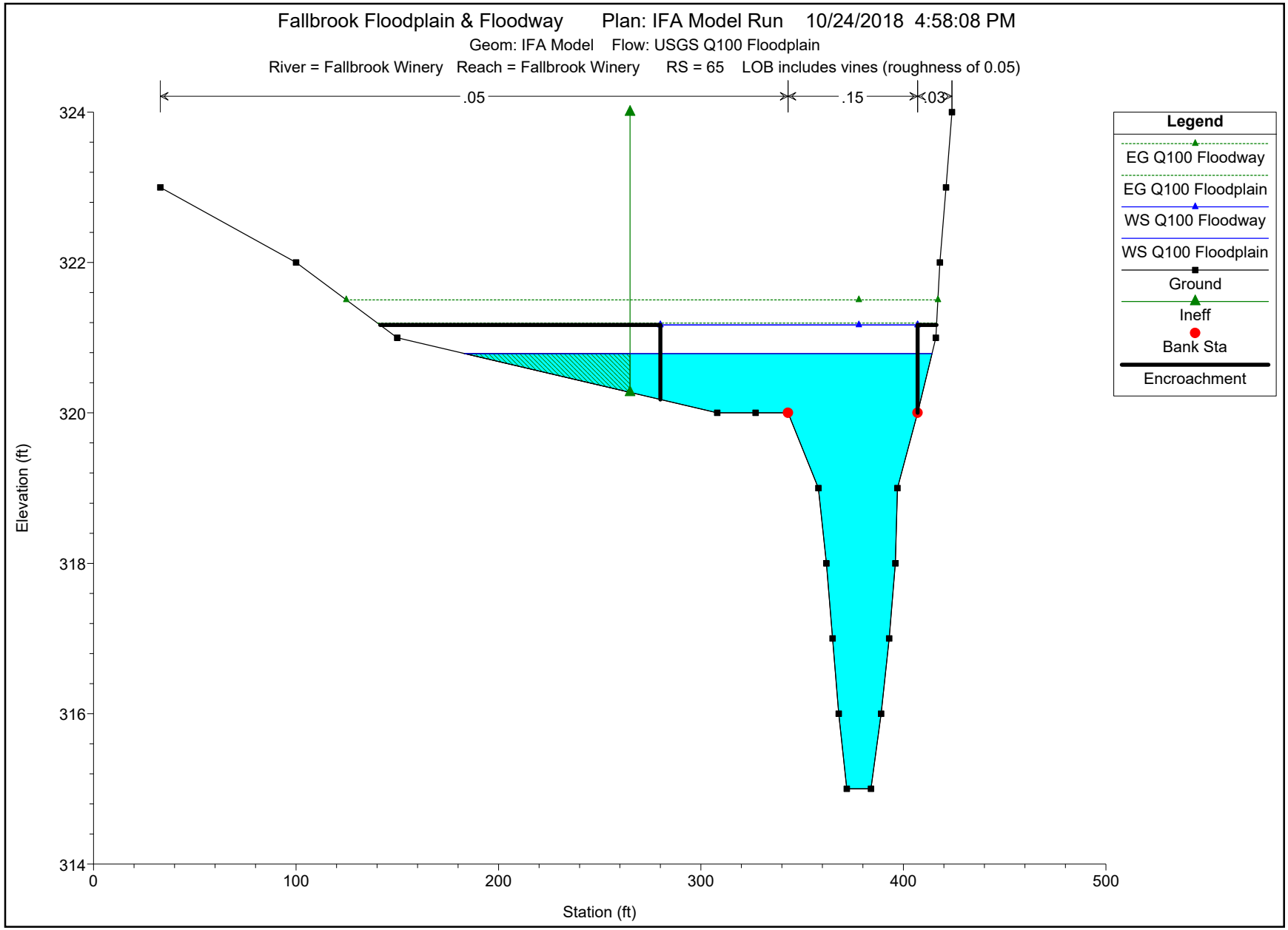

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 68
.09
.15
.09
Legend
EG Q100 Floodway
EG Q100 Floodplain
Crit Q100 Floodplain
WS Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodway
Ground
Bank Sta
Encroachment
Elevation (ft)
328
326
324
322
320
318
100
120
140
160
180
200
220
240
260
280
Station (ft)

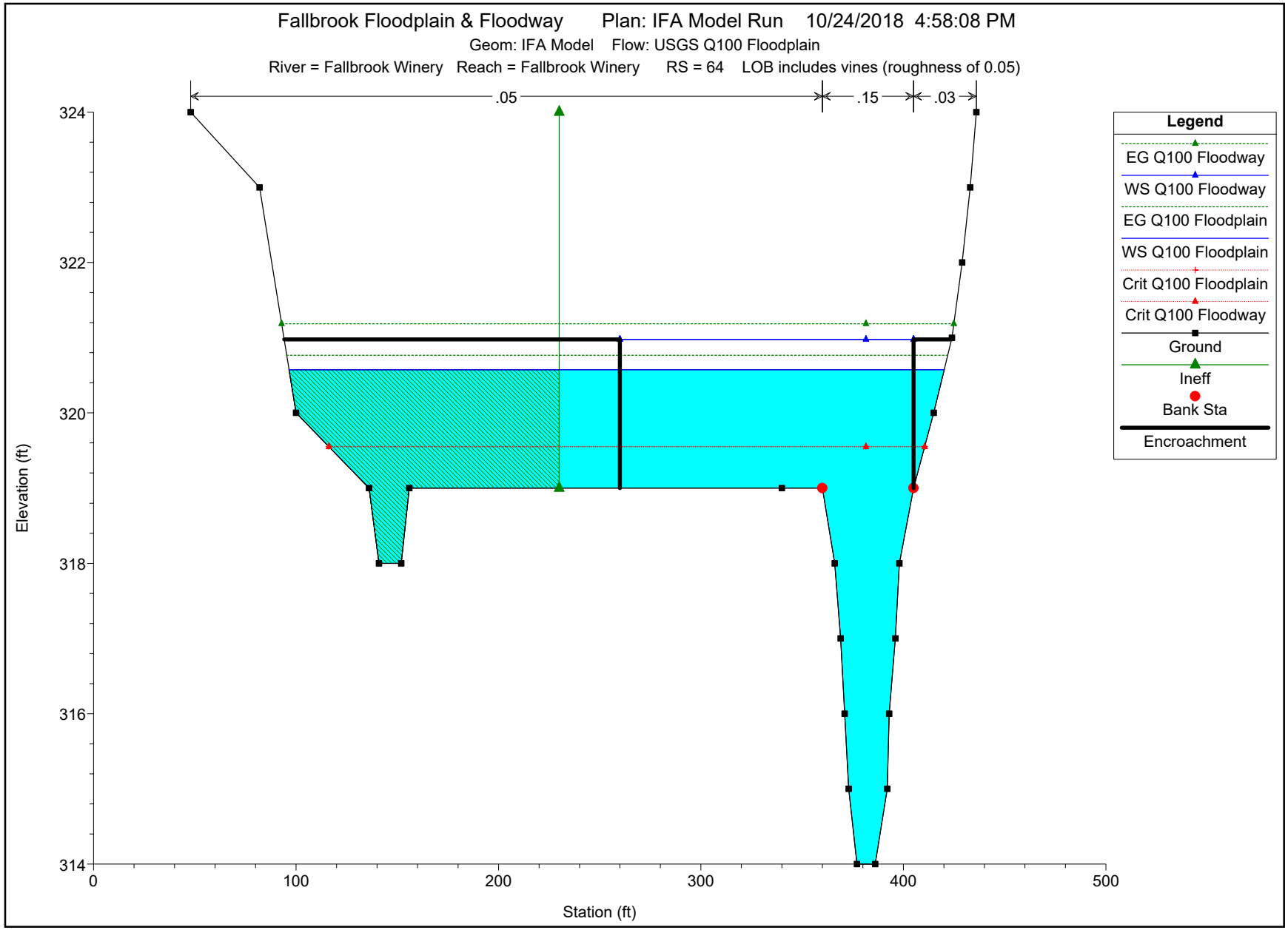

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 67 upstream face of Gird Road culvert
.05
.11
.09
.11
.05
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Bank Sta
Encroachment
Elevation (ft)
330
328
326
324
322
320
318
316
314
100
150
200
250
300
Station (ft)

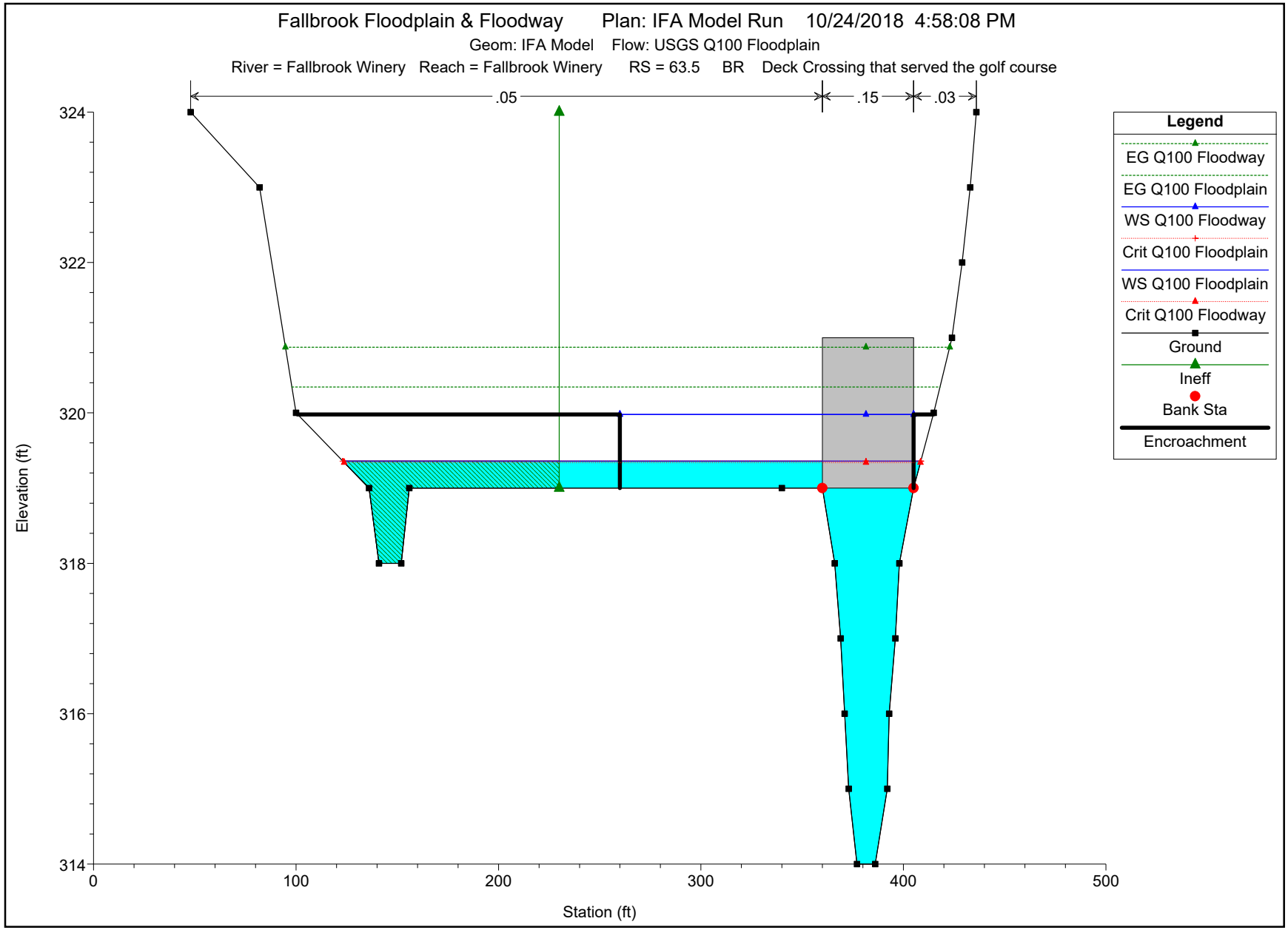

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 66.5 Culv Gird Road Culvert
.05
.11
.09
.11
.05
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Bank Sta
Encroachment
Elevation (ft)
330
328
326
324
322
320
318
316
314
100
150
200
250
300
Station (ft)

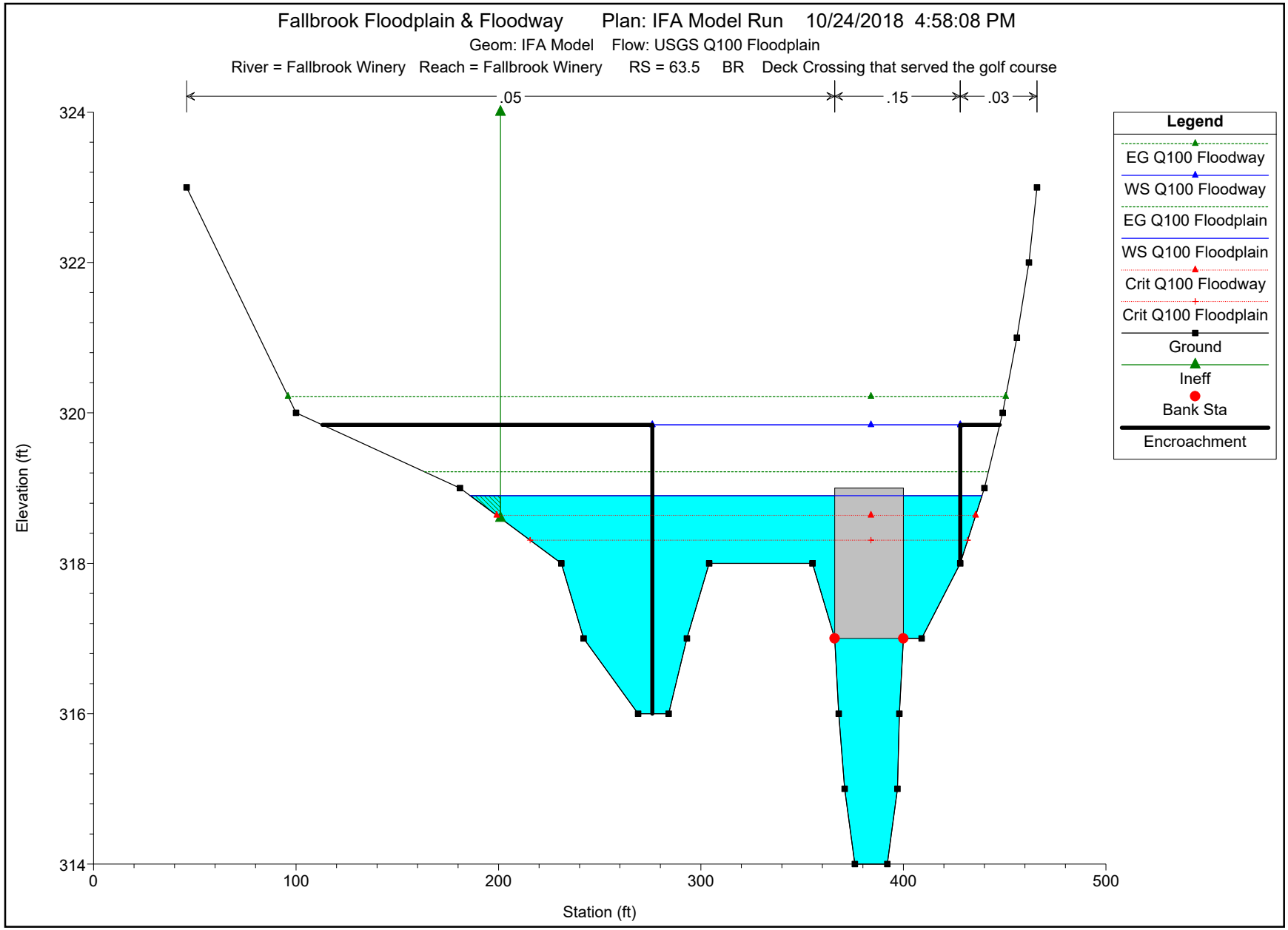

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 66.5 Culv Gird Road Culvert
.05
.11
.09
.11
.05
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Bank Sta
Encroachment
Elevation (ft)
326
324
322
320
318
316
314
0
50
100
150
200
250
300
Station (ft)

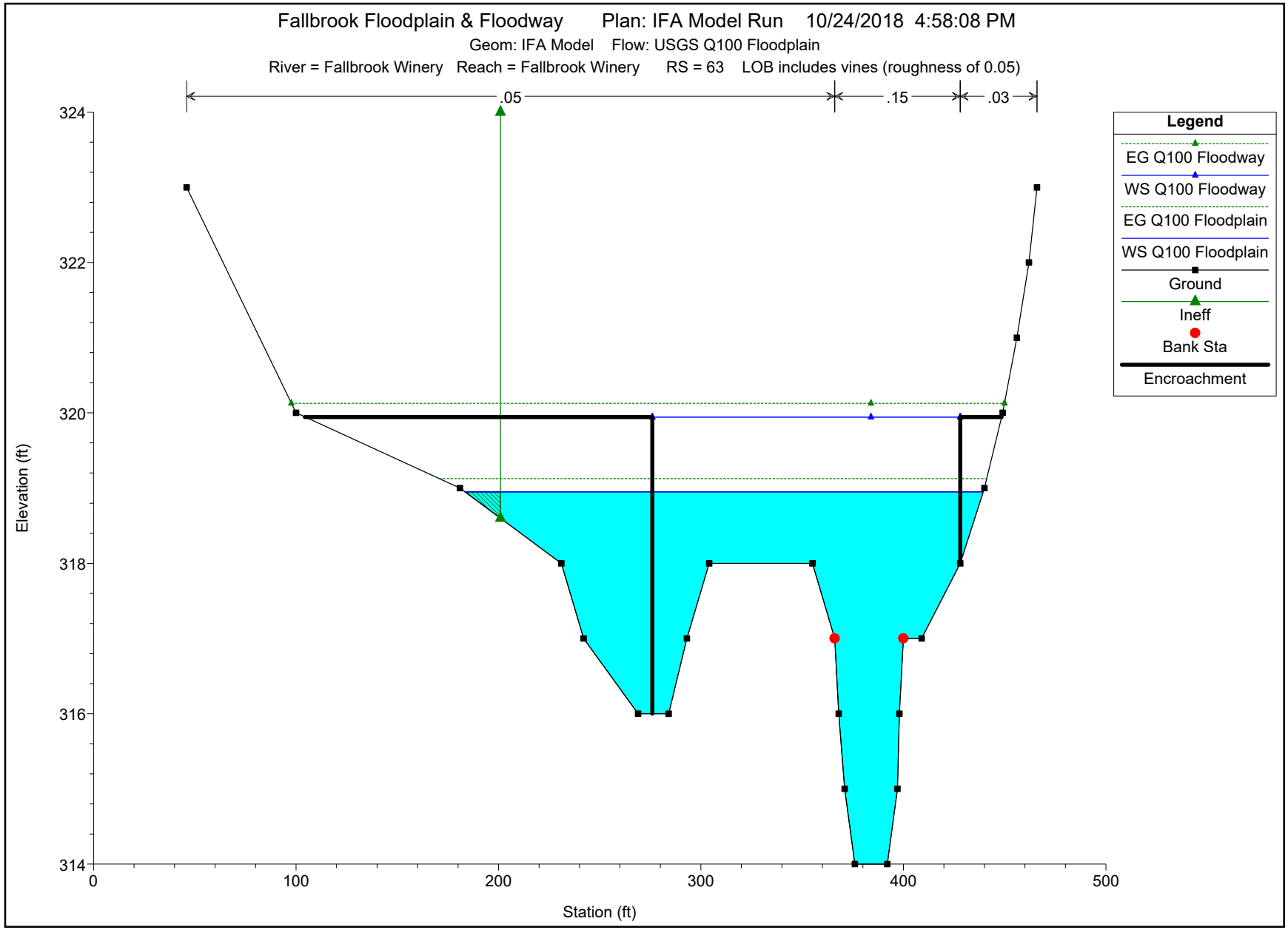

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 66 downstream face of Gird Road culvert
.05
.11
.09
.11
.05
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Ground
Bank Sta
Encroachment
Elevation (ft)
326
324
322
320
318
316
314
0
50
100
150
200
250
300
Station (ft)

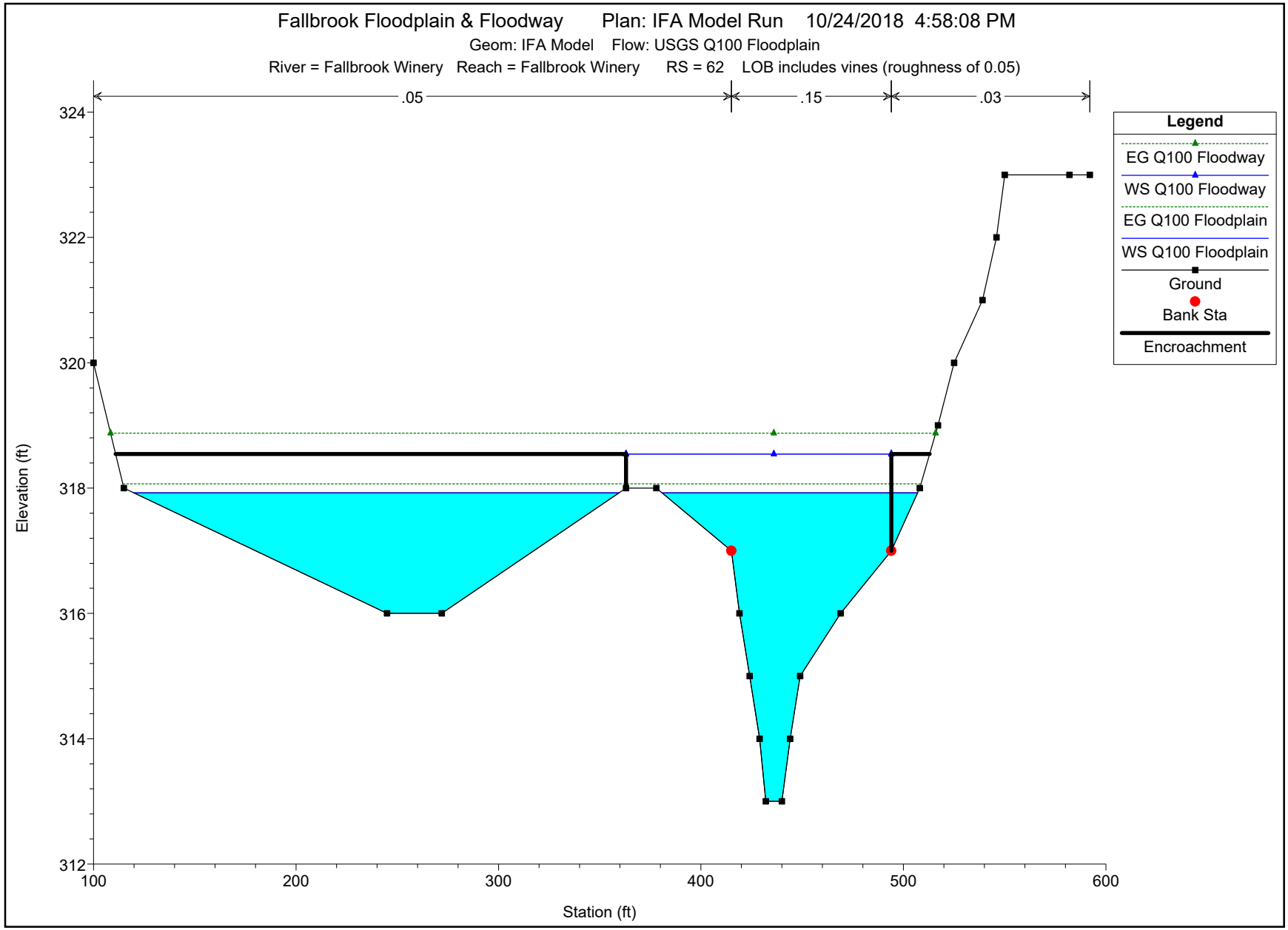

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 65 LOB includes vines (roughness of 0.05)
.05
.15
.03
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
324
322
320
318
316
314
0
100
200
300
400
500
Station (ft)

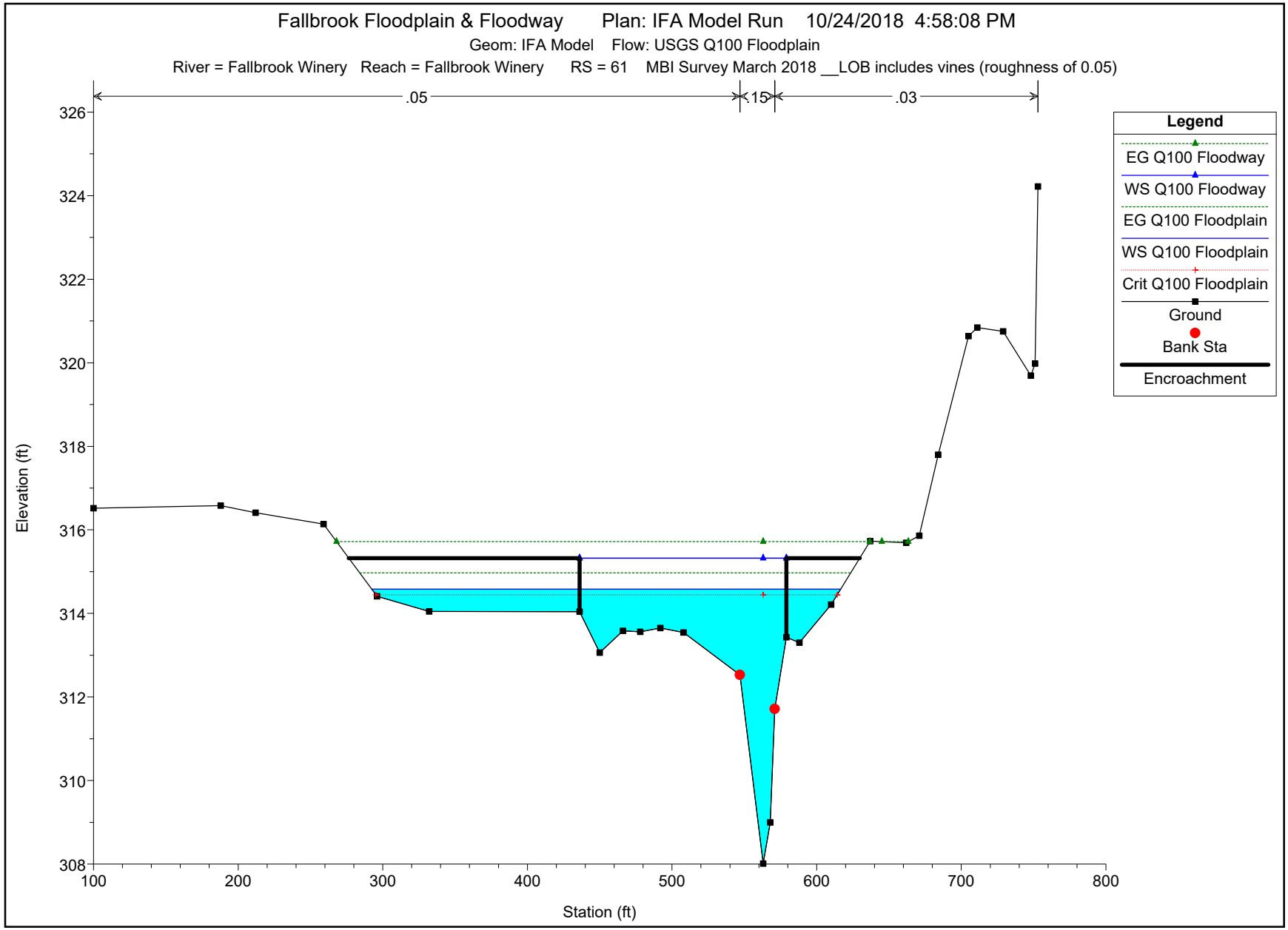

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 64 LOB includes vines (roughness of 0.05)
.05
.15
.03
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
324
322
320
318
316
314
0
100
200
300
400
500
Station (ft)

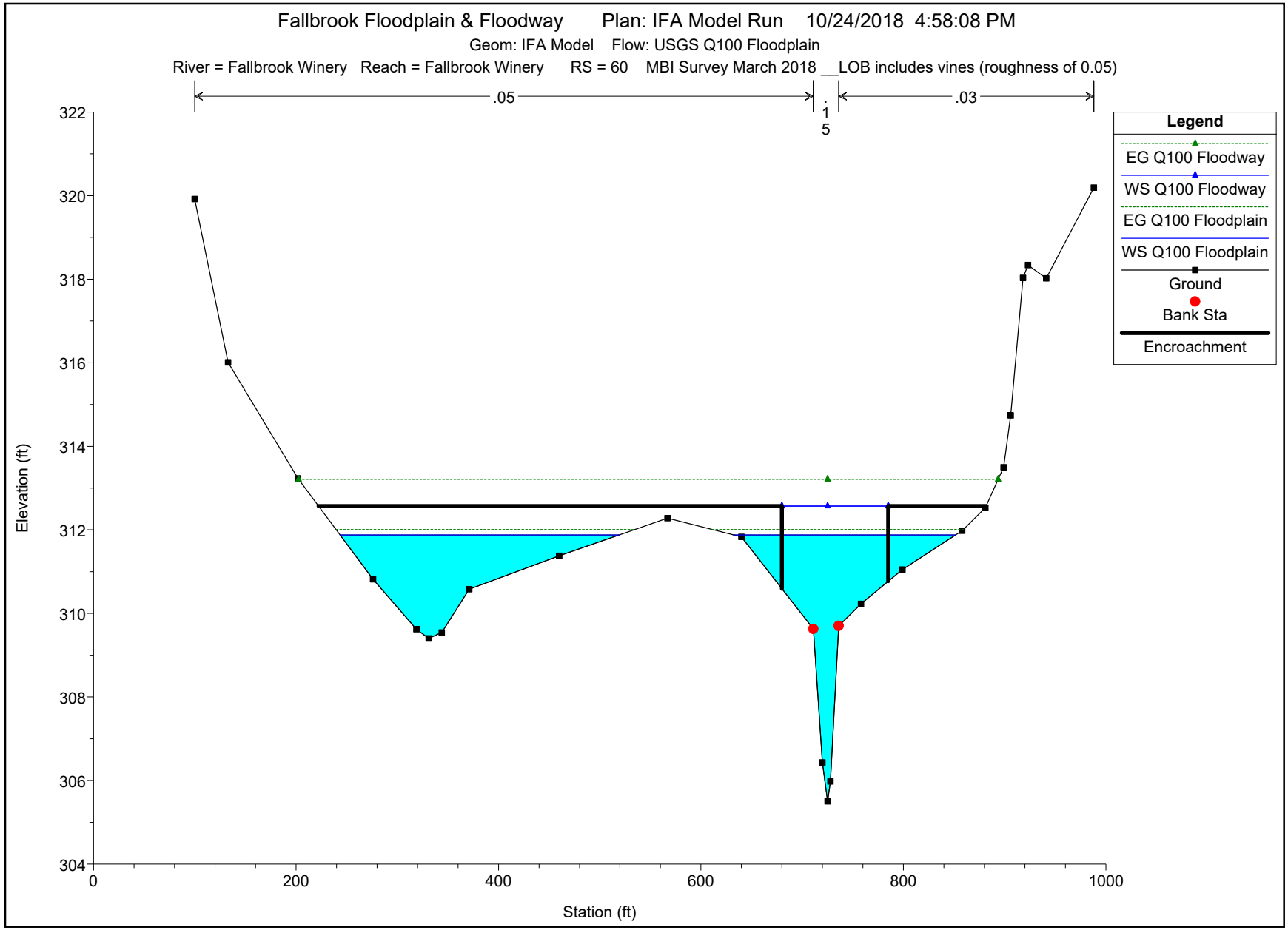

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 63.5 BR Deck Crossing that served the golf course
.05
.15
.03
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodplain
WS Q100 Floodplain
Crit Q100 Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
324
322
320
318
316
314
0
100
200
300
400
500
Station (ft)

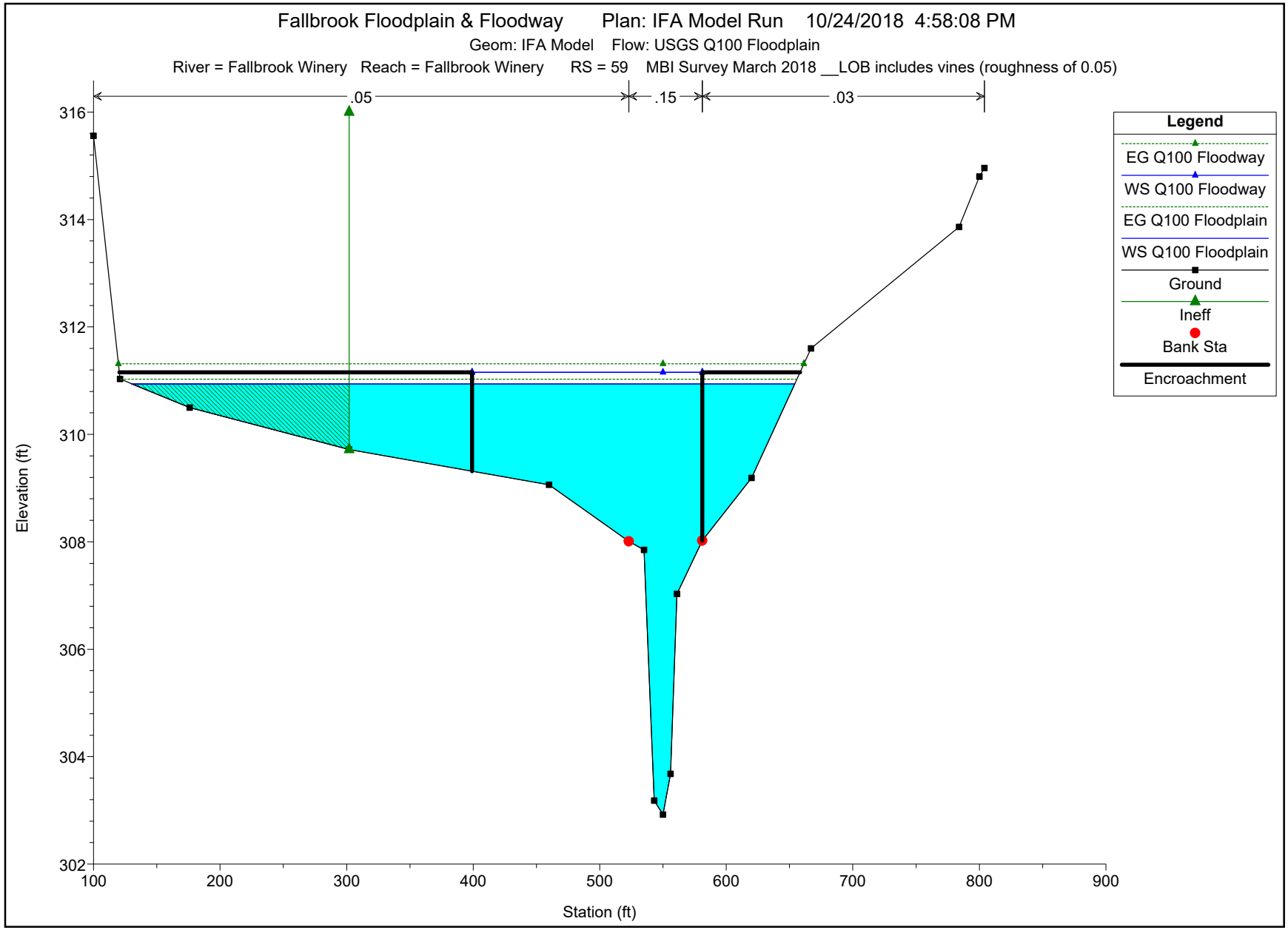

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 63.5 BR Deck Crossing that served the golf course
.05
.15
.03
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Crit Q100 Floodway
Crit Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
324
322
320
318
316
314
0
100
200
300
400
500
Station (ft)

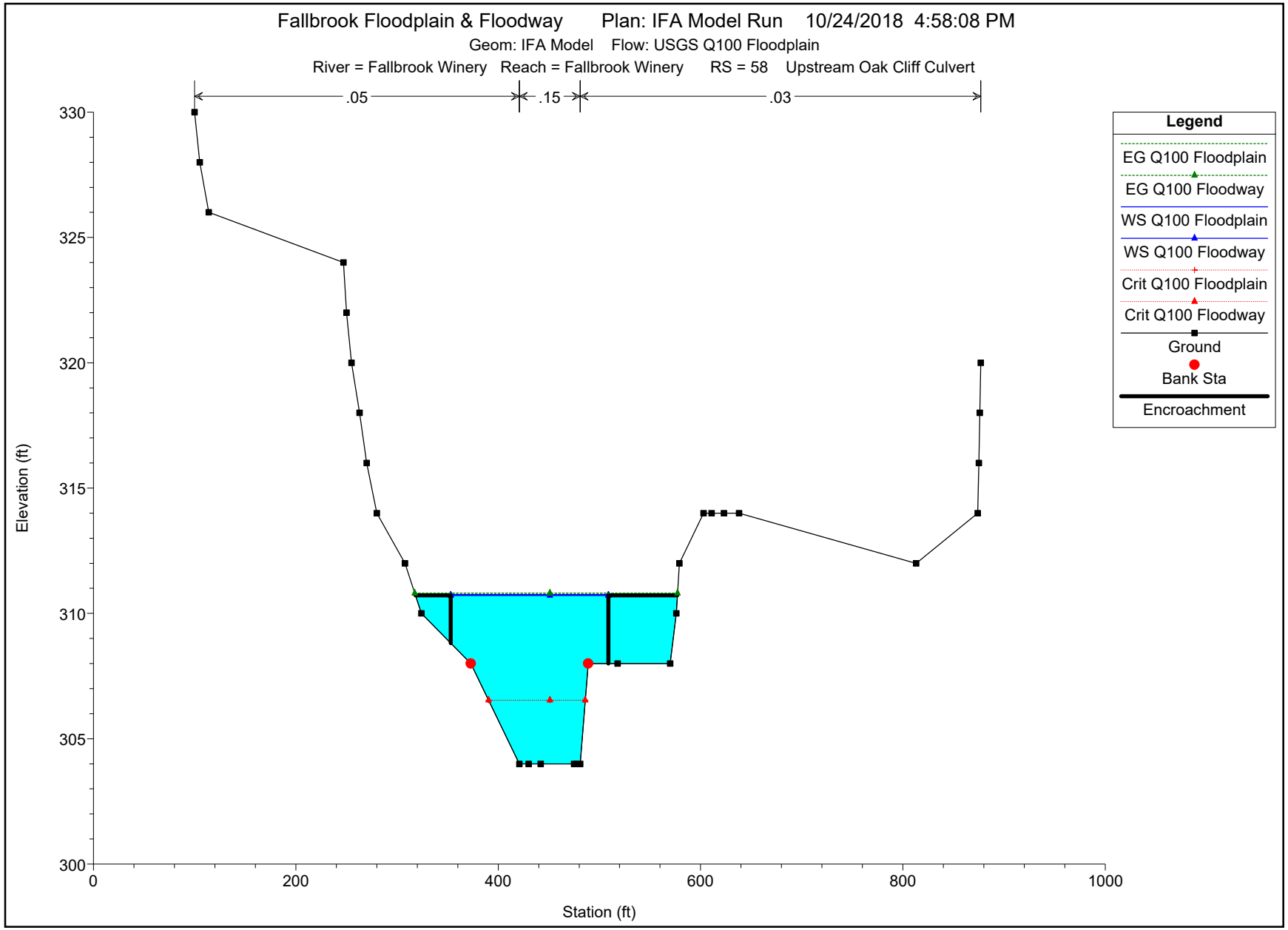

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 63 LOB includes vines (roughness of 0.05)
.05
.15
.03
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
324
322
320
318
316
314
0
100
200
300
400
500
Station (ft)

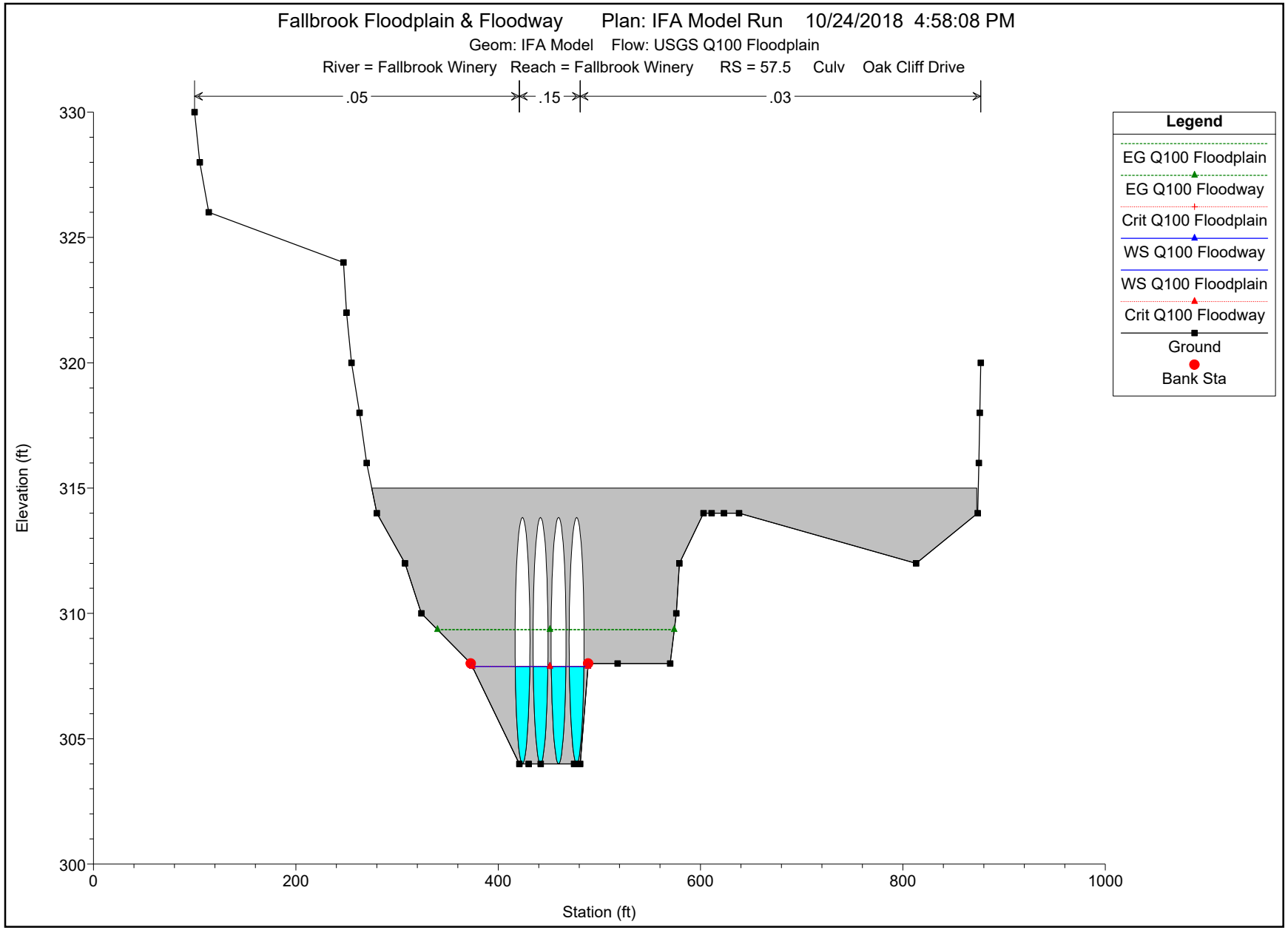

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 62 LOB includes vines (roughness of 0.05)
.05
.15
.03
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
324
322
320
318
316
314
312
100
200
300
400
500
600

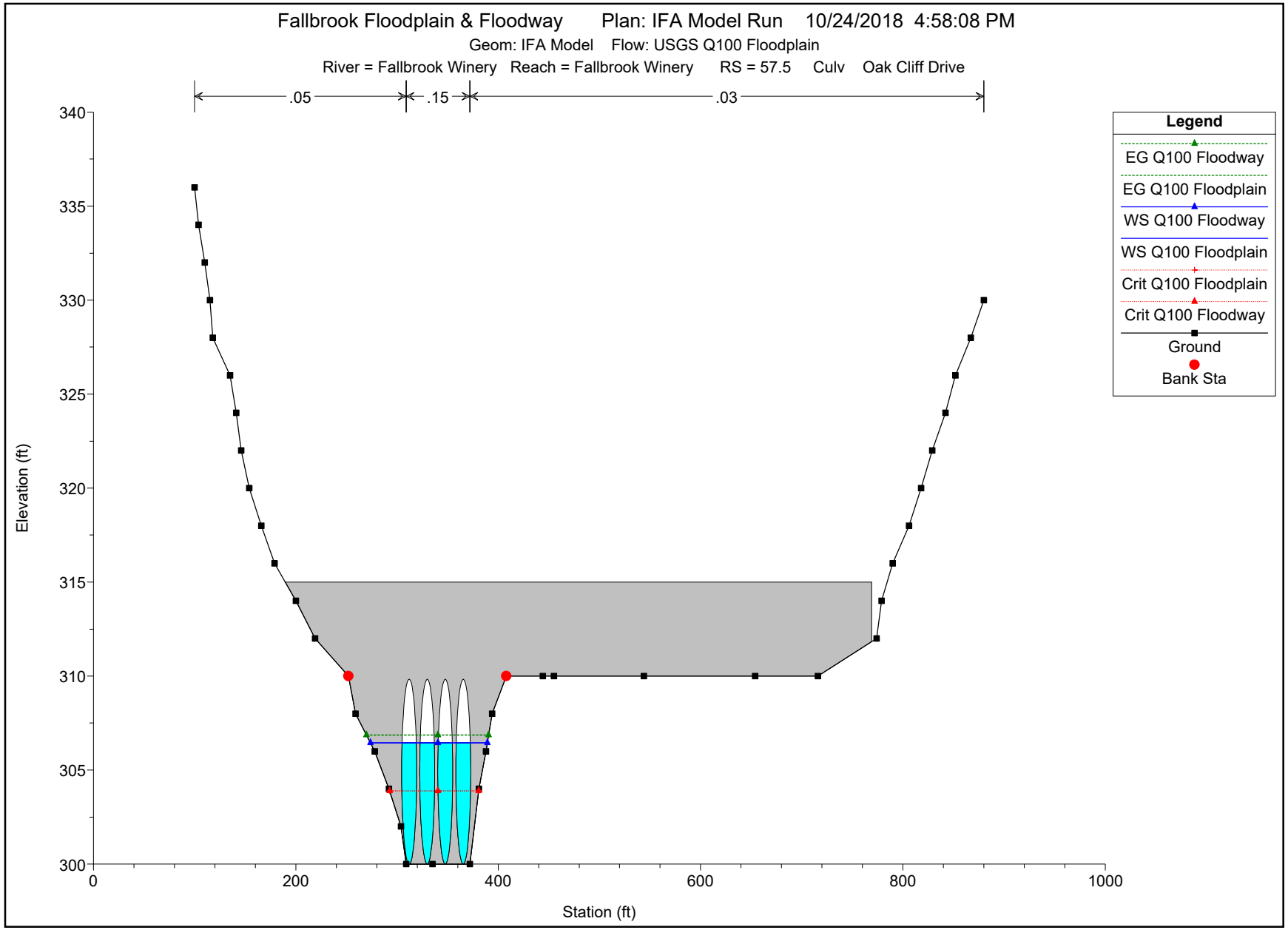

Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 61 MBI Survey March 2018 __LOB includes vines (roughness of 0.05)
.05
.15
.03
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Crit Q100 Floodplain
Ground
Bank Sta
Encroachment
Elevation (ft)
Station (ft)
326
324
322
320
318
316
314
312
310
308
100
200
300
400
500
600
700
800


Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 60 MBI Survey March 2018 __LOB includes vines (roughness of 0.05)
.05
.15
.03
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Ground
Bank Sta
Encroachment
Elevation (ft)
322
320
318
316
314
312
310
308
306
304
0
200
400
600
800
1000
Station (ft)


Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 59 MBI Survey March 2018 __LOB includes vines (roughness of 0.05)
.05
.15
.03
Legend
EG Q100 Floodway
WS Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodplain
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
316
314
312
310
308
306
304
302
100
200
300
400
500
600
700
800
900
Station (ft)


Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 58 Upstream Oak Cliff Culvert
.05
.15
.03
Legend
EG Q100 Floodplain
EG Q100 Floodway
WS Q100 Floodplain
WS Q100 Floodway
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Bank Sta
Encroachment
Elevation (ft)
330
325
320
315
310
305
300
0
200
400
600
800
1000
Station (ft)


Fallbrook Floodplain & Floodway Plan: IFA Model Run 10/24/2018 4:58:08 PM
Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 57.5 Culv Oak Cliff Drive
.05
.15
.03
Legend
EG Q100 Floodplain
EG Q100 Floodway
Crit Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Crit Q100 Floodway
Ground
Bank Sta
Elevation (ft)
330
325
320
315
310
305
300
0
200
400
600
800
1000
Station (ft)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Geom: IFA Model Flow: USGS Q100 Floodplain
River = Fallbrook Winery Reach = Fallbrook Winery RS = 57.5 Culv Oak Cliff Drive
.05
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.03
Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Bank Sta
Elevation (ft)
340
335
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400
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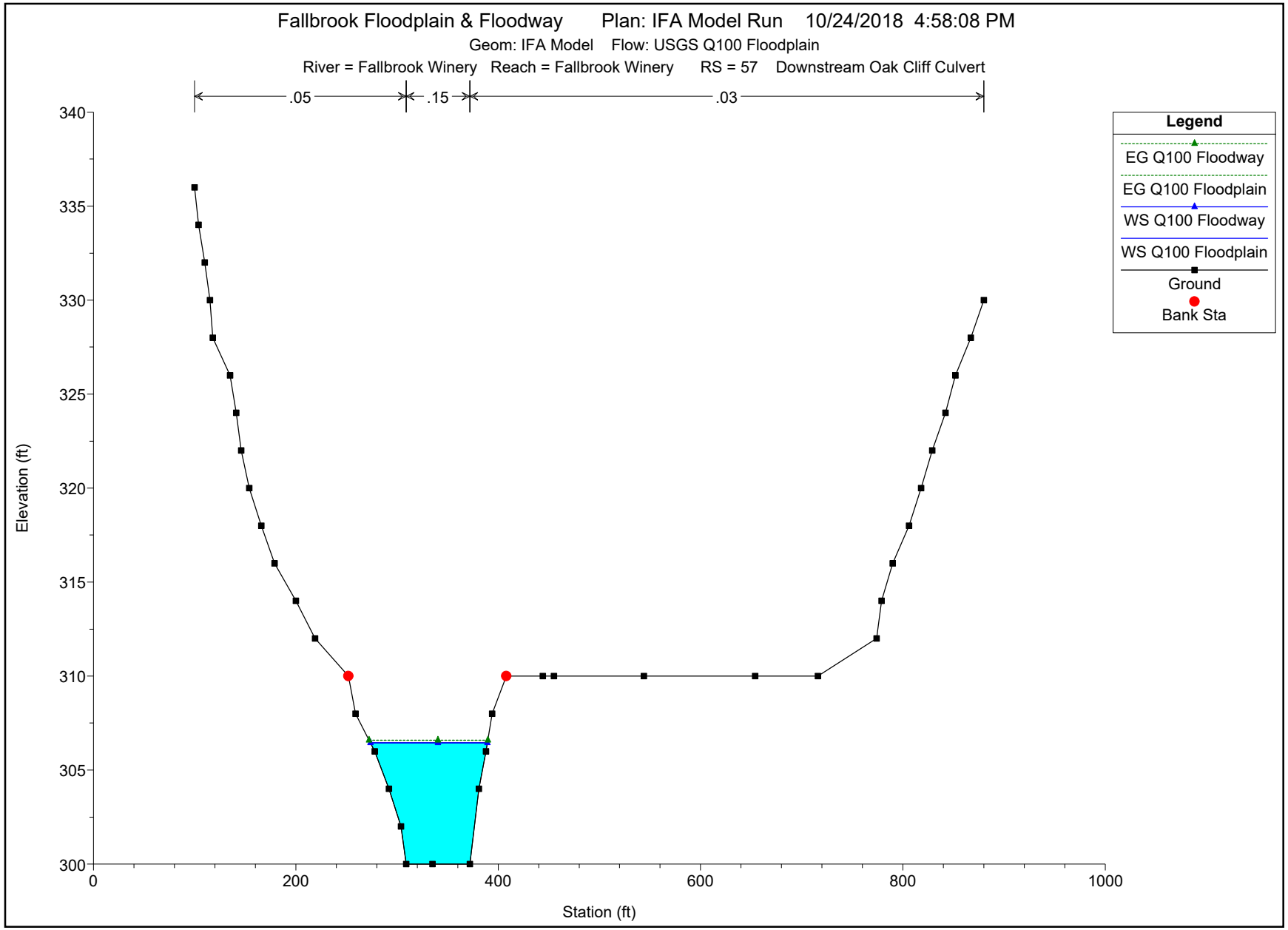
Station (ft)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River = Fallbrook Winery Reach = Fallbrook Winery RS = 57 Downstream Oak Cliff Culvert
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Legend
EG Q100 Floodway
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Ground
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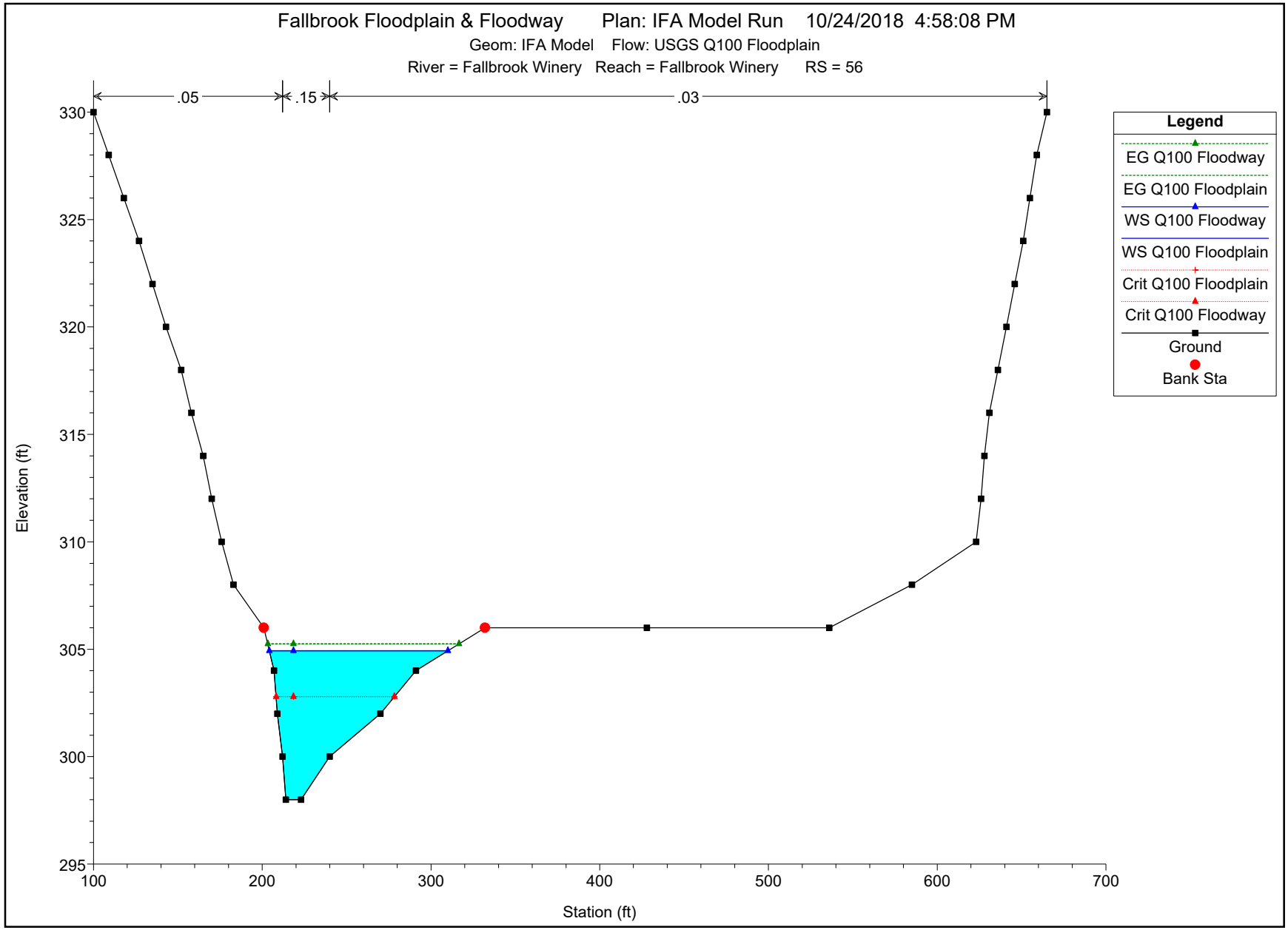
Station (ft)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.05
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Legend
EG Q100 Floodway
EG Q100 Floodplain
WS Q100 Floodway
WS Q100 Floodplain
Crit Q100 Floodplain
Crit Q100 Floodway
Ground
Bank Sta
Elevation (ft)
330
325
320
315
310
305
300
295
100
200
300
400
500
600
700
Station (ft)

Michael Baker
INTERNATIONAL

Appendix C: Supporting Material

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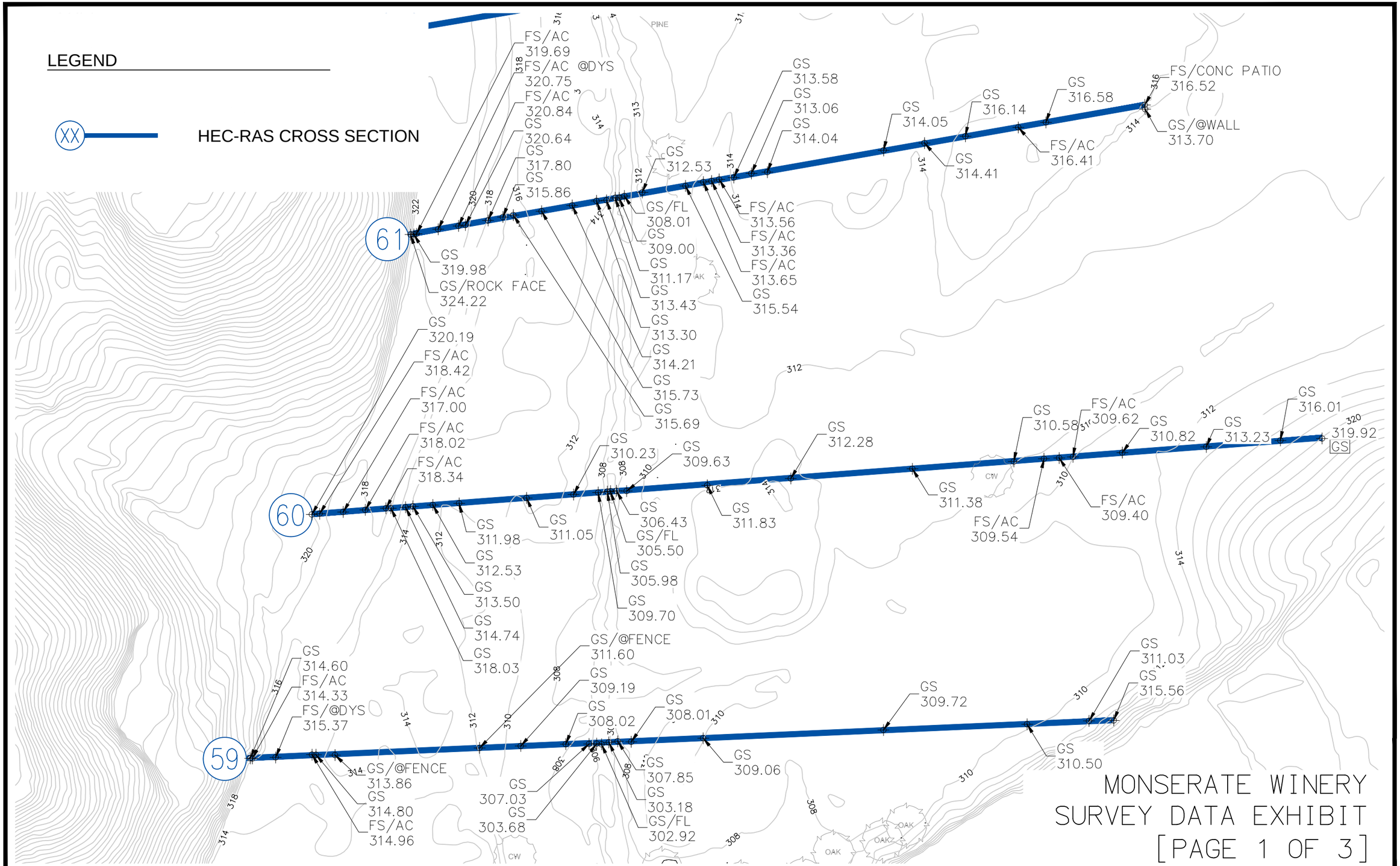
LEGEND

XX HEC-RAS CROSS SECTION



MONSERATE WINERY
SURVEY DATA EXHIBIT
[PAGE 1 OF 3]

Michael Baker INTERNATIONAL
9755 Clairemont Mesa Boulevard
San Diego, CA 92124
Phone: (858) 614-5000 · MBAKERINTL.COM

88
87
86
85.5
85
84
83
SDIN/48iCMP
348.36
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348.21
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SDOUT/48iCMP
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SDOUT/48iCMP
347.92
SDOUT/48iCMP
347.82
2.2%
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1.2%
5.2%
EUC
LEGEND
XX
HEC-RAS CROSS SECTION
MONSERATE WINERY
SURVEY DATA EXHIBIT
[PAGE 2 OF 3]
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INTERNATIONAL
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LEGEND

XX — HEC-RAS CROSS SECTION

MONSERATE WINERY
SURVEY DATA EXHIBIT
[PAGE 3 OF 3]

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San Diego, CA 92124
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Fallbrook
Monserate Winery
Site Photo Log For HEC-RAS Roughness Coefficients



Looking downstream at HEC-RAS Cross Section 101 (roughness of 0.015 used along channel bottom and 0.09 used along banks.



Looking downstream at HEC-RAS Cross Section 98 (roughness of 0.09 used along channel bottom and 0.11 used along banks.



Looking upstream at HEC-RAS Cross Section 90



Looking downstream at HEC-RAS Cross Section 90 (roughness of 0.06 use along channel bottom – the greenery seen here is easily flattened during minor storm events. These are intrusive weeds that get blown out when any measurable flow occurs; roughness of 0.09 used along banks, similar case).



Looking Upstream at the Existing Bridge at HEC-RAS Cross Section 75.5 (requires repair). This existing structure is intentionally omitted from the HEC-RAS modeling. Rather, a 50-foot clear-span bridge (46-foot wide rectangular flow conveyance) is proposed and included in the HEC-RAS model. The new bridge-crossing will be relocated approximately 20-feet downstream to ensure all improvements occur over existing concrete and no disturbance to the upstream natural-channel occurs as a result of this repair.



Looking downstream at HEC-RAS Cross Section 75



Immediately upstream of Gird Road culvert (HEC-RAS Cross Section 67)



Immediately downstream of Gird Road culvert (HEC-RAS Cross Section 66)

September 2014



County of San Diego
Department of Public Works
Flood Control Section

San Diego County

HYDRAULIC DESIGN MANUAL

Table A-3

Table A-3 Average Manning Roughness Coefficients for Small Open Channels Conveying Less than 50 cfs[4]

	Design Flow Depth		
Lining Type	**0 – 0.5 ft**	**0.5 – 2.0 ft**	**> 2.0 ft**
Concrete (Poured)	0.015	0.013	0.013
Air Blown Concrete	0.023	0.019	0.016
Grouted Riprap	0.040	0.030	0.028
Stone Masonry	0.042	0.032	0.030
Soil Cement	0.025	0.022	0.020
Bare Soil	0.023	0.020	0.020
Rock Cut	0.045	0.035	0.025
Rock Riprap	Based on Rock Size (See Section 5.7.2)		

Table A-4

Table A-4 Average Manning Roughness Coefficients for Larger Open Channels

Unlined Channels
- Clay Loam 0.023
- Sand 0.020

Lined Channels
- Grass Lined (Well-Maintained) 0.035
- Grass Lined (Not Maintained) 0.045
- Wetland-Bottom Channels (New Channel) 0.023

Wetland-Bottom Channels (Mature Channel) ..... See Table A-5
Riprap-Lined Channels ..... See Section 5.7.2
Concrete (Poured) 0.014
Air Blown Mortar (Gunite or Shotcrete)[5] 0.016
Asphaltic Concrete or Bituminous Plant Mix 0.018

For channels with revetments or multiple lining types, use composite Manning roughness coefficient based on component lining materials.

[4] Based on materials and workmanship required by standard specifications.
[5] For air-blown concrete, use n=0.012 (if troweled) and n=0.025 if purposely roughened.

Table A-5

Table A-5 Average Manning Roughness Coefficients for Natural Channels

Minor Streams (Surface Width at Flood Stage < 100 ft)

Fairly Regular Section	
(A) Some Grass and Weeds, Little or No Brush	0.030
(B) Dense Growth of Weeds, Depth of Flow Materially Greater Than Weed Height	0.040
(C) Some Weeds, Light Brush on Banks	0.040
(D) Some Weeds, Heavy Brush on Banks	0.060
(E) For Trees within Channel with Branches Submerged at High Stage, Increase All Above Values By	0.015
Irregular Section, with Pools, Slight Channel Meander	
Channels (A) to (E) Above, Increase All Values By	0.015
Mountain Streams; No Vegetation in Channel, Banks Usually Steep, Trees and Brush along Banks Submerged at High Stage	
(A) Bottom, Gravel, Cobbles and Few Boulders	0.050
(B) Bottom, Cobbles with Large Boulders	0.060

Flood Plains (Adjacent To Natural Streams)

Pasture, No Brush	
(A) Short Grass	0.030
(B) High Grass	0.040
Cultivated Areas	
(A) No Crop	0.040
(B) Mature Row Crops	0.040
(C) Mature Field Crops	0.050
Heavy Weeds, Scattered Brush	0.050
Light Brush and Trees	0.060
Medium To Dense Brush	0.090
Dense Willows	0.170
Cleared Land with Tree Stumps, 100-150 Per Acre	0.060
Heavy Stand of Timber, Little Undergrowth	
(A) Flood Depth below Branches	0.110
(B) Flood Depth Reaches Branches	0.140

Proposed Bridge-crossing at HEC-RAS cross-section 75



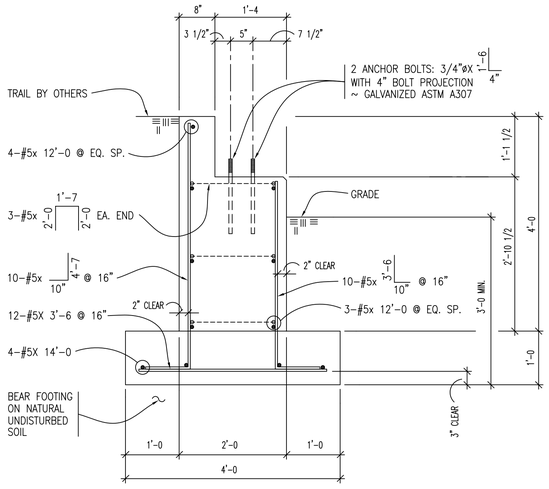
BRIDGE MANUFACTURING CO.
www.excelbridge.com
12001 Shoemaker Ave
Santa Fe Springs CA 90670
(800) 548-0054
Fax (562) 944-4025

LIST OF TOOLS

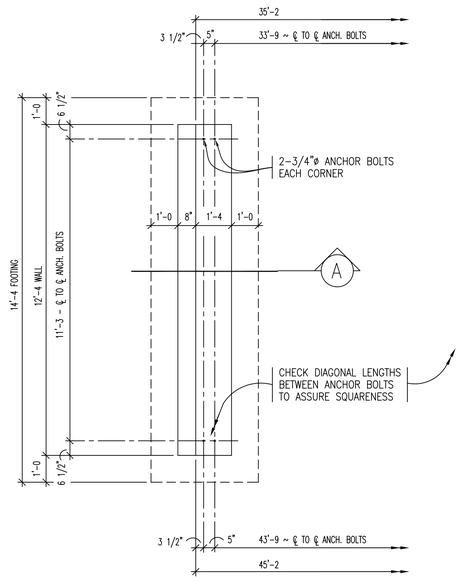
suggested for bridge installation, in addition to the usual rigging.

NOTE! your most important tool is your phone:

- **At time of order and during fabrication, the customer should keep Excel abreast of the latest expected installation date. You must call Excel at least two weeks before the delivery date to confirm.** Coordination of the delivery is as much the contractors responsibility as it is Excel's. There are variables on both sides like weather, construction problems, right-of-way permits, material shortages, special truck trailer type coordination, over sized shipment permits, shipping curfews, etc. The telephone is your most important installation tool. Call Excel with your questions early and often.
- Excel Shop Drawings that were approved for fabrication. READ the installation instructions and notes on the drawings. If your project has a concrete deck, the re-bar design will be indicated in the notes or on the drawings.
- Wrenches for anchor bolt nuts
- Timbers
- lever bar
- Grease
- **If your project has a splice(s), you may need:**
- AISC manual which includes turn-of-the-nut method instructions
- Hand winches to pull splices together for spliced bridges
- Large tapered pins, wedges and lever bars
- Paint, crayon or scribe to mark bolt heads for spliced bridges
- Hammer and long chisel to remove nubs sometimes found on bolt holes inside tubes on spliced bridges
- If your project is painted: Straps instead of chains, and brushes etc. for touch up work
- If your project has a wood deck, a few deck planks must sometime be shipped loose at the splice area. To install them you may need: A drill with correct size bits, possibly a counter sink, and possibly a star driver for your drill. Wrenches will be needed for the nuts & bolts on these loose planks. If self tapping bolts are used, pay very close attention to drilling the correct sized holes in the correct order. Warning, if your project has an Ironwood® deck, this hard wood will shear bolts off if over tightened or if the drilled hole is too small.
- If your project comes with a concrete form pan, check the shop drawings for the method of attaching the loose sheets at the splice point, if any.



A ABUTMENT SECTION 3/4" = 1'-0"



ABUTMENT PLAN 3/8" = 1'-0"

ANCHOR BOLT SETTING

THESE DRAWINGS AND THE DESIGN ARE THE PROPERTY OF EXCEL BRIDGE MANUFACTURING COMPANY AND ARE NOT TO BE COPIED OR MANUFACTURED WITHOUT THEIR WRITTEN CONSENT.

GENERAL NOTES:

1. FOUNDATIONS:
   A. Soil data was taken from I.B.C. Table 1804.2:
      1. Soil bearing pressure ..... 1500 psf.
      2. Passive soil pressure ..... 100 pcf.
      3. Lateral resistance ..... 130 psf.
   B. Concrete shall develop 3000 psi compressive strength in 28 days and shall have 5% entrapped air.
   C. Reinforcing bars shall conform to ASTM A615-Grade 60.

2. BRIDGE REACTIONS in pounds per base plate (4 per bridge unless noted):

Bridge Length		45'-0"	35'-0"
Dead load		6,750 lbs.	5,050 lbs.
Uniform live load		9,600 lbs.	7,450 lbs.
Vehicle live load		4,600 lbs.	4,400 lbs.
Wind:	vertical	4,700 lbs.	3,700 lbs.
	transverse	2,200 lbs.	1,700 lbs.
Seismic:	transverse	1,000 lbs.	700 lbs.
	longitudinal (2)	2,000 lbs.	1,400 lbs.

LYKKEN and KRAMER
Consulting Structural Engineers
143 Fourth Street, P.O. Box 774229
Steamboat Springs, Colorado 80477
Phone: 970-879-2018

DESIGN & DRAWN : LEK/SS
DATE : 6/24/08
L & K JOB NO. 07-17R

MARK	DATE	PURPOSE
		REVISIONS

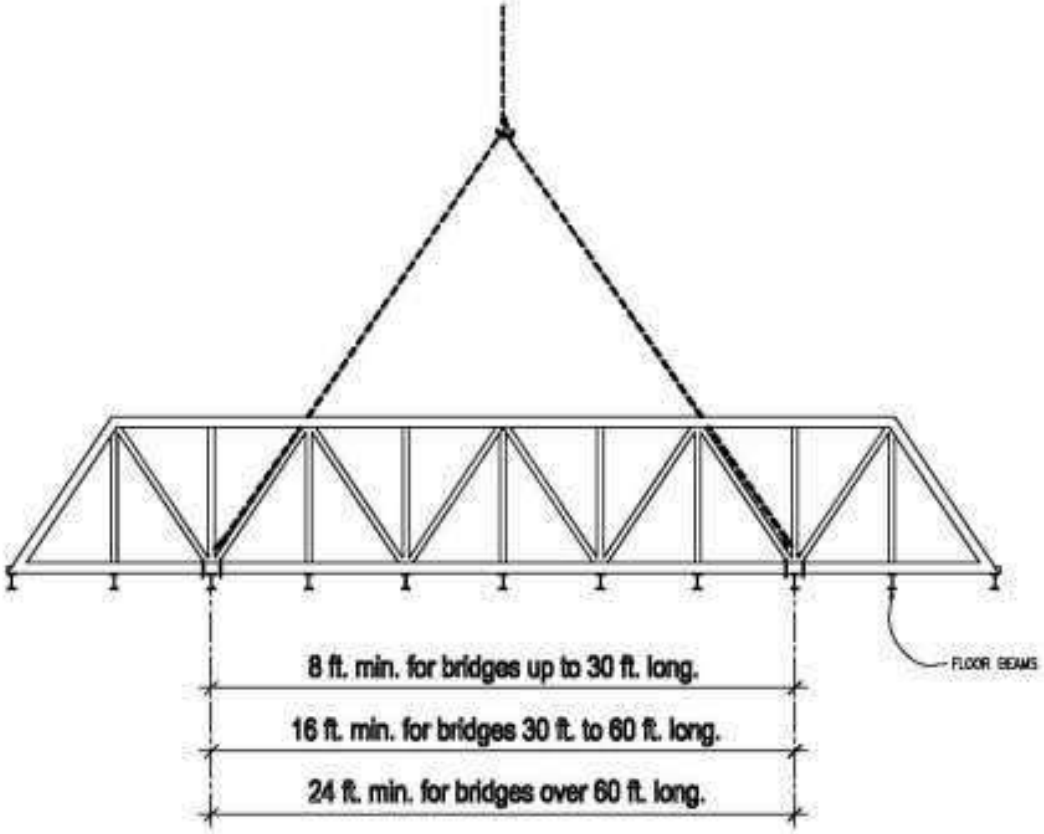
12001 SHOEMAKER AVE.
SANTA FE SPRINGS, CA. 90670
(562) 944-0701
FAX (562) 944-4025
OUTSIDE CA. (800) 548-0054

EXCEL BRIDGE MANUFACTURING CO.

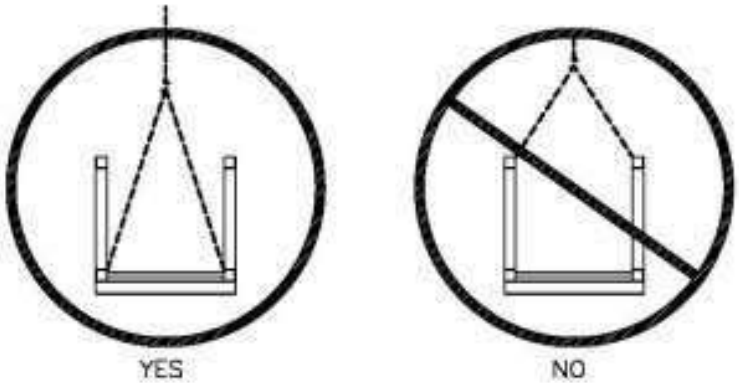
FOUNDATION FOR
10'-0 WIDE x 45'-0 LONG AND
(2) 10'-0 WIDE x 35'-0 LONG
FALLBROOK - SIGNAL BRIDGES
THORNTON, CO.

EXCEL JOB NO. 07B011

SHEET 1 OF 1.

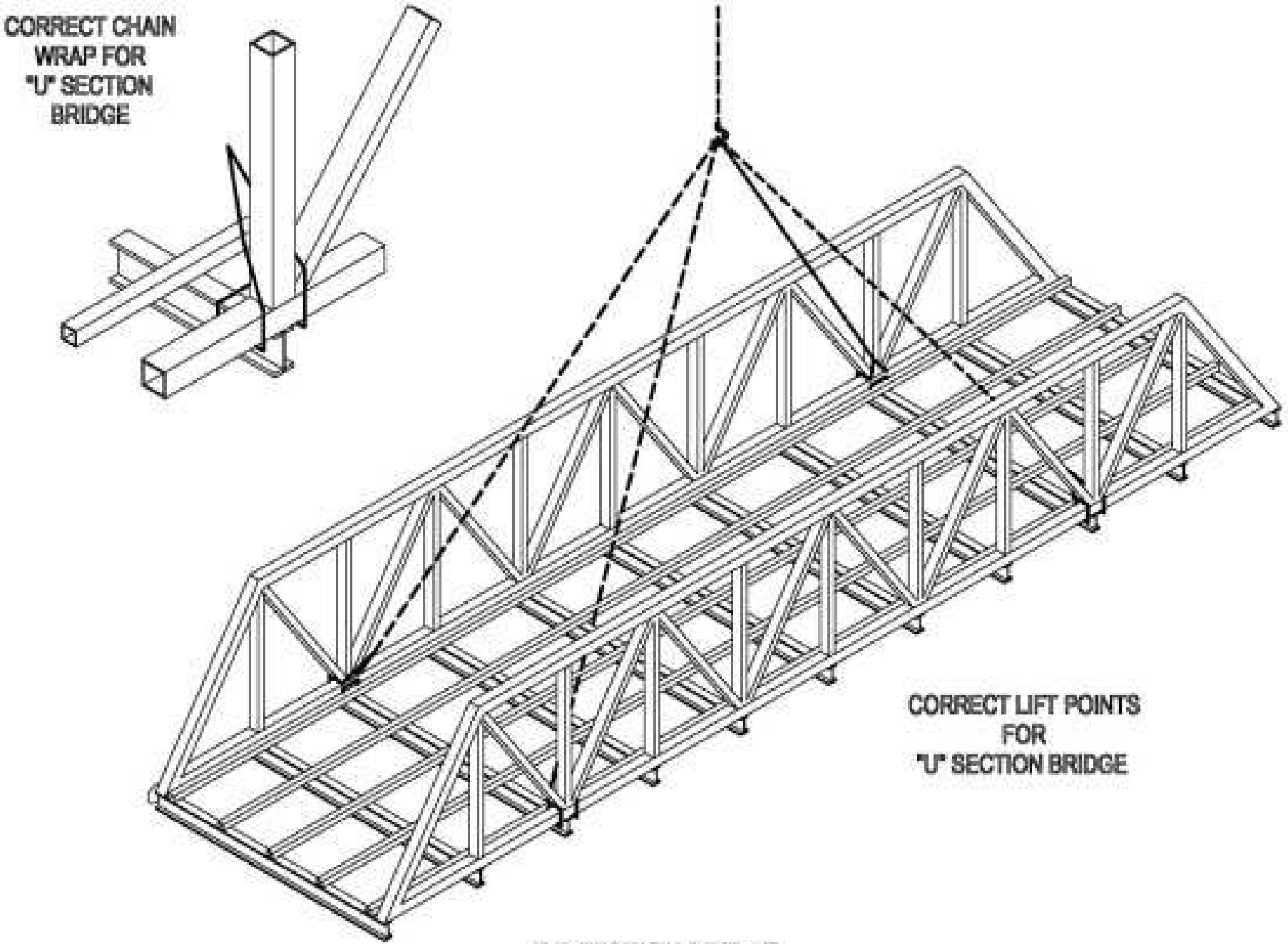


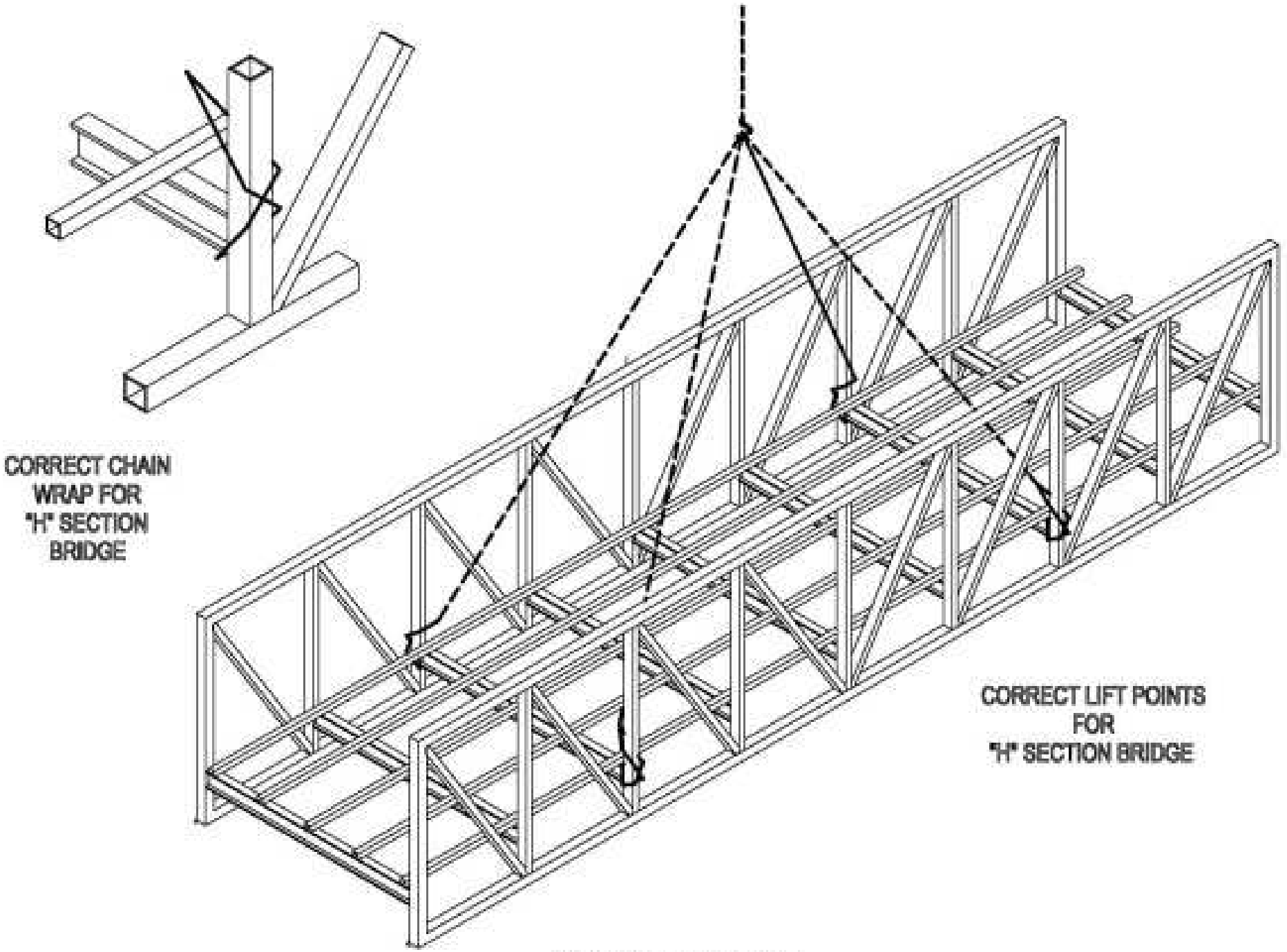
Rule of thumb - attach strap or chain
1/3 of span length from each end.



ERECTION PROCEDURE

* Run chain or cable through truss web and around floor beams at no more than 30' from each end. (See sketch matching your bridge type).
* Return chain or cable immediately inside truss and bring to one central point above center of bridge.
  CAUTION: Chain or cable should not contact railing system or top chord.
* Swing bridge into place and stop approximately 6" above bridge seat. "Clip" one mount plate over each corner of bridge.
* Set bridge making sure mount plates slide over anchor bolts.
* Install and tighen nuts on anchor bolts per instructions on your approved drawings.
* For bridge weight, see approval drawing.
* Depending on crane size, longer bridges may require two cranes.
* Bridge placement is to be performed by qualified crane operators and riggers only. Excel Bridge Mfg. is not responsible for damage and/or injury during bridge erection.


CORRECT CHAIN WRAP FOR "U" SECTION BRIDGE
CORRECT LIFT POINTS FOR "U" SECTION BRIDGE
"U" SECTION BRIDGE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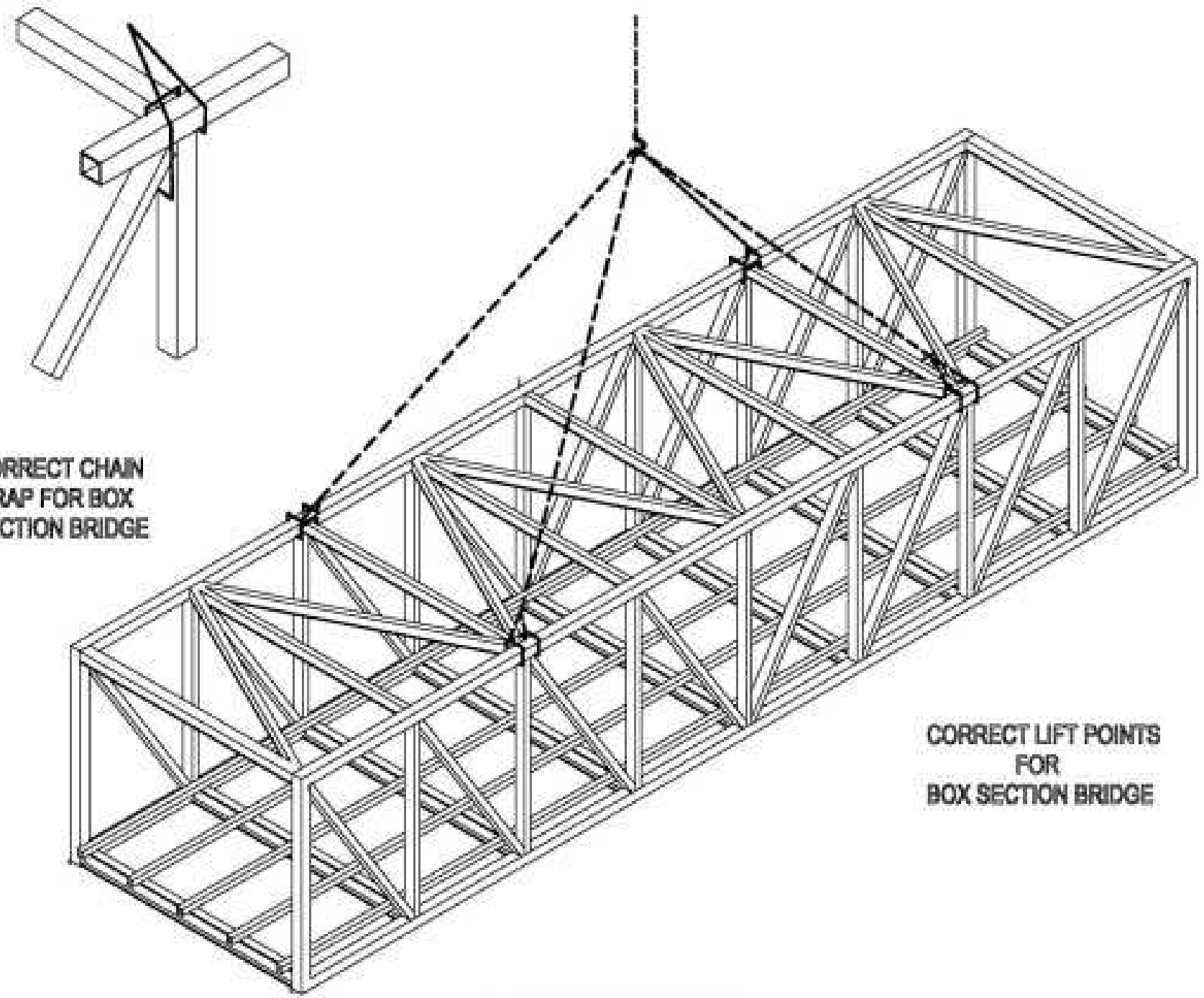
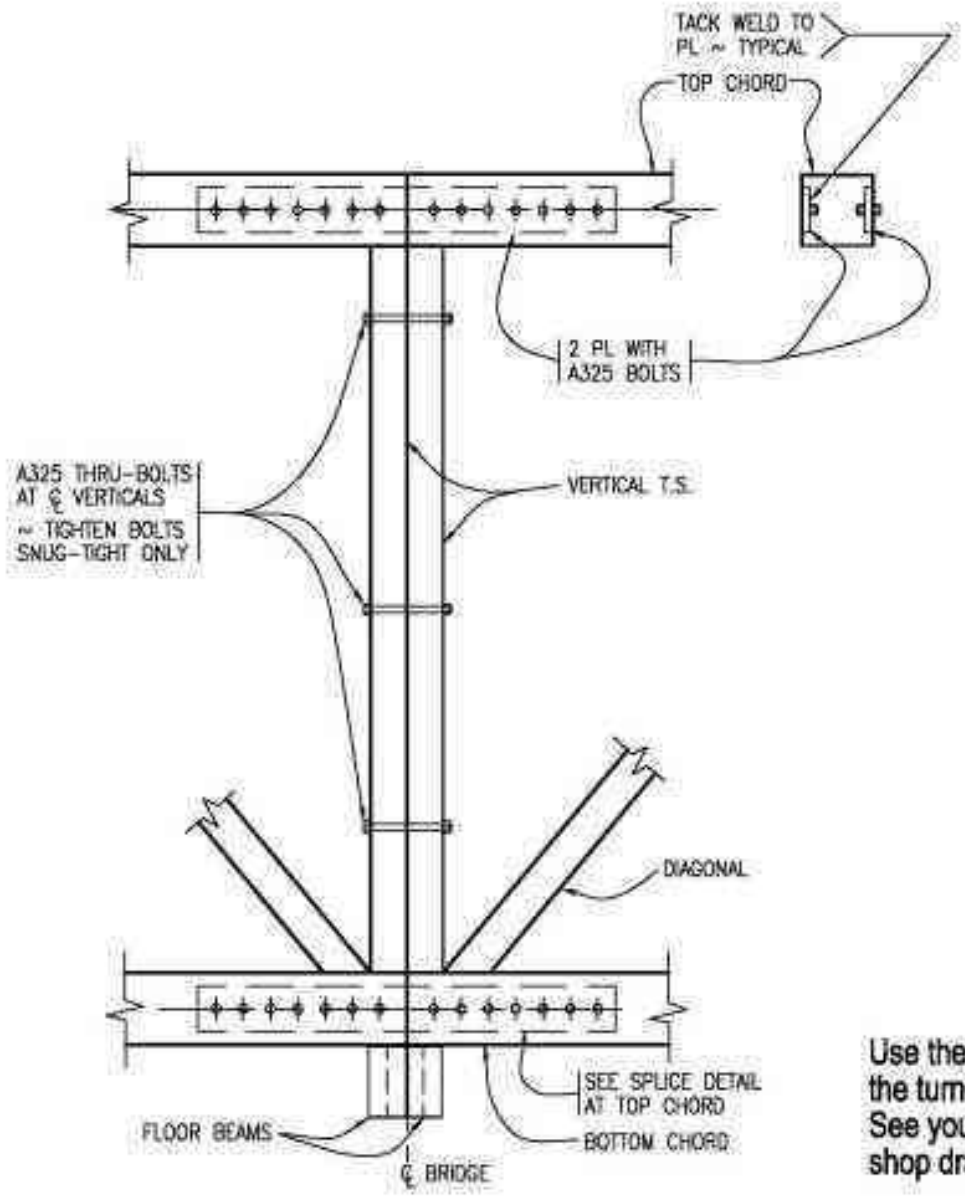
CORRECT LIFT POINTS FOR "H" SECTION BRIDGE
"H" SECTION BRIDGE



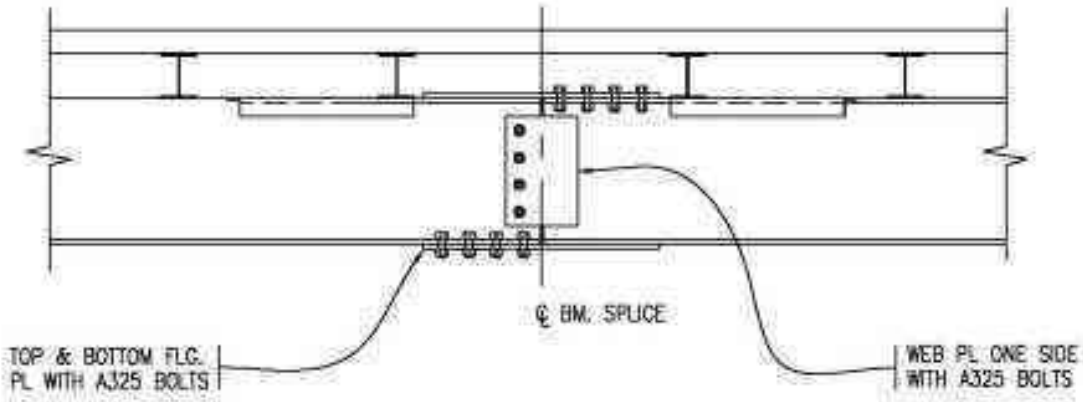
BOX SECTION BRIDGE



Use the AISC manual following the turn-of-the-nut method. See your Excel "approved" shop drawings for instruction.

TYPICAL SPLICE DETAIL

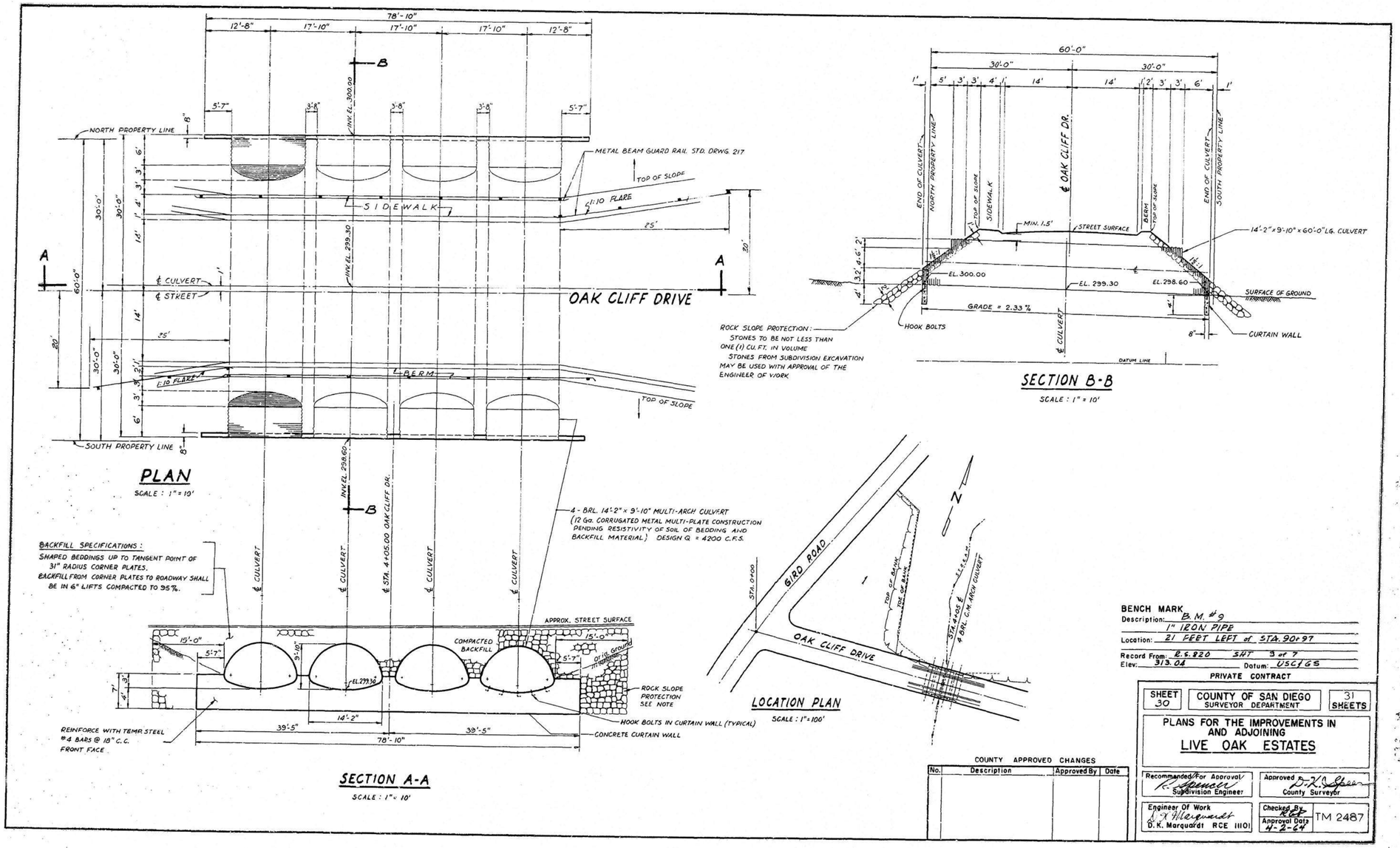
Use the AISC manual and
follow the instructions
on your Excel "approved"
shop drawings.



TYPICAL FLOOR BEAM - SPLICE

(COMMON ONLY WITH BRIDGE DECKS OVER 14' WIDE)

Live Oak Culvert Plan & Section Views



BENCH MARK
Description: B.M. #9
1" IRON PIPE
Location: 21 FEET LEFT of STA. 90+97
Record From: R.S. 820 SHT 3 of 7
Elev: 313.04 Datum: USC/GS

PRIVATE CONTRACT

SHEET 30	COUNTY OF SAN DIEGO SURVEYOR DEPARTMENT	31 SHEETS

PLANS FOR THE IMPROVEMENTS IN AND ADJOINING
LIVE OAK ESTATES

Recommended For Approval: K. Spencer, Subdivision Engineer	Approved: D. K. Spencer, County Surveyor
Engineer Of Work: D. K. Marquardt, D. K. Marquardt RCE 11101	Checked By: RCE; Approval Date: 4-2-64; TM 2487

COUNTY APPROVED CHANGES

No.	Description	Approved By	Date

2088