Preliminary Drainage Report
For
Placer Retirement Residence

Prepared for:
Hawthorne Development, LLC

REGISTERED PROFESSIONAL ENGINEER
MARVIN L MARSHALL
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12-5-2018
CIVIL
STATE OF CALIFORNIA

Prepared by:

Kimley»Horn

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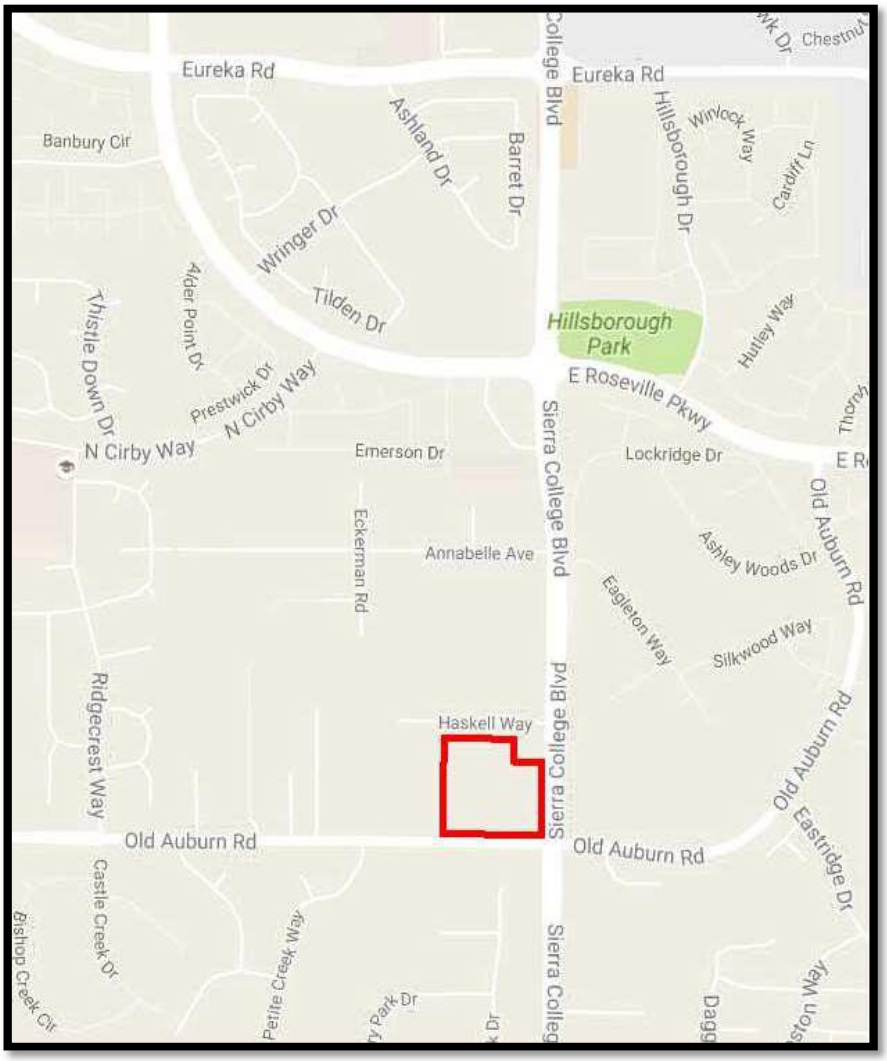
August 29, 2017
KHA No. 097264002

Project Description

The Placer Retirement Residence project proposes to construct a 145-unit congregate care facility in the Granite Bay community of Placer County. The site consists of approximately nine acres, located at the northwest corner of Sierra College Boulevard and Old Auburn Road. The project will consist of a single three story residence encircled by a drive aisle and parking. Site amenities, including gardens, walking paths, various recreational amenities and dense landscaping will surround the building. Generally, the site improvements will be set back a minimum of 95 feet from the closest adjacent right-of-way. Access to and from the site will be Old Auburn Road on the south, with “emergency only” access from Sierra College Boulevard on the eastern frontage.

Vicinity Map



Site Description

The site is bounded by Sierra College Boulevard on the east, Old Auburn Road on the south, a single family residential structure and horse pastures to the west, and large lot single family residences to the north. The site is currently undeveloped, consisting of a grassy pasture with scattered trees near the center of the property, clustered along the creek and the proposed entrance driveway. Treelake Tributary flows along the southern edge of the property, separating the site from Old Auburn Road. The creek is surrounded by dense trees and vegetation which create a natural buffer between the site and the adjacent roadways. The site is located in Zone "X" as shown on the FEMA FIRM Panel 06061C0479F, dated June 8, 1998 (See Appendix).

The project site generally drains from north to south at an average slope of approximately 5%. A high point at the north property line divides onsite flows generally toward the southwest and southeast corners of the site where they drain into Treelake Tributary which enters the site from the southeast corner of the property, flowing beneath Sierra College Boulevard via 3 – 7'x4' RCBs. A smaller tributary enters the site at the northeast corner of the property, flowing under Sierra College Boulevard via 1 – 7'x4' RCB. This tributary flows south, adjacent to Sierra College, combining with Treelake Tributary just north of Old Auburn Road. Treelake Tributary flows directly west, immediately north of and adjacent to Old Auburn Road, and exits the property to the south via 2 – 12'x10' RCBs which pass beneath Old Auburn Road. The Treelake Tributary channel will remain undisturbed by onsite development to preserve the natural character of the site and maintain the buffer that the creek provides as well as to provide a generous setback from the adjacent roadways to the new building.

Pre-Development Conditions

Offsite flows entering the site are limited to Treelake Tributary and an unnamed tributary that feeds into Treelake Tributary. Offsite flows from the east are confined to Treelake Tributary which enters the site in a well-defined channel conveyed beneath Sierra College Boulevard in 3 – 7'x4' RCBs at the southeast corner of the site. This channel flows west along the southern property line before exiting the site under Old Auburn Road. An additional culvert near the northeast corner of the site conveys smaller flows under Sierra College Boulevard. This smaller tributary channel flows directly south and combines with the Treelake Tributary main channel. Based on the findings of the *Update to the Dry Creek Watershed Flood Control Plan*, prepared in November 2011, the flow in the Treelake Tributary is estimated at 706 cubic feet per second (Linda Creek/Treelake Tributary 2009 shed label: YLC60A, Appendix G, p. 22). The smaller tributary is estimated at 180 cfs (2009 shed label: YLC55H; storm centering: LC5A). The Treelake Tributary channel along with the smaller tributary will both remain undisturbed by site development, allowing offsite flows to pass through the site along their historic route.

No offsite flows enter the site from the west as the topography directs these flows toward the west as sheet flow. Runoff from Old Auburn Road, at the south edge of the site, drains directly to Treelake Tributary via sheet flow and a drain inlet located at the west leg of the intersection.

Pre-development flows have been derived using the methods described in Chapter 5 Section E.2 of the *Placer County Flood Control and Water Conservation District Stormwater Management Manual*. Calculations are included in the appendix of this study. Drainage management area (DMA) boundaries were delineated based on on-ground survey of existing conditions. DMA boundaries can be referenced

on the *Existing Drainage Exhibit* located in the Appendix of this report. DMA calculations are also included in the Appendix. Peak flows from each drainage watershed are summarized in the table below.

Pre-Development Peak Flow Summary

Storm Event	DMA 1	DMA 2	DMA 3
10 year	3.8 cfs	5.5 cfs	6.6 cfs
100 year	7.2 cfs	11.1 cfs	13.2 cfs

Post-Development Conditions

The site will be graded to ensure the finished floor elevation above the floodplain in a 100- year storm event. At a minimum, the finished floor elevation will be set 1 foot above the Treelake Tributary 100-year water surface elevation. Onsite grading will ensure that perimeter landscaped areas and drive aisles will drain away from the building. Onsite flows will be conveyed overland to valley gutters in the drive aisles, where they will be captured in drain inlets, and routed to storm water quality features. The required stormwater quality flows will be treated before discharging to the tributary.

Based on discussions with Brad Brewer at Placer County, and following the recommendations presented in the *Update to the Dry Creek Watershed Flood Control Plan*, no onsite detention is proposed for this project. Onsite flows will be directed to Treelake Tributary to ensure that peak flows enter the creek and pass downstream prior to the peak flows from the Linda Creek watershed arriving at the site. This will help mitigate further flooding within areas of the Dry Creek watershed located downstream and ensure the project does not increase the Linda Creek peak flow.

Site drainage areas are presented on the Proposed Drainage Exhibit. Roof areas will drain via downspouts to the exterior landscaping surrounding the building where they will be collected in depressed landscaping areas. Larger flows will overflow the depressions and be directed to the drive aisle. Drainage from DMA 2 will collect in the valley gutter in the drive aisle, flowing to a drain inlet near the Emergency Vehicle Access at the northeast corner of the site. The flow will be conveyed to a storm water quality feature located along the east side of the property. Runoff from DMAs 1 and 5 will also be directed to valley gutter and drain inlets in the drive aisle, ultimately to the stormwater quality feature in the southwest corner of the site. The features will be sized to accommodate the required stormwater quality flow. Larger flows will be directed beneath the driveway and drain into the creek at the south side of the site. Runoff from DMA 4 will be conveyed in a valley gutter to a drain inlet near the southeast corner of the site. Low flows will be treated in a water quality swale before entering the creek. Larger storm events will bypass the water quality swale and flow directly to the creek. Runoff from DMA 3 will be conveyed to a low point along the southern drive aisle, then to a drainage inlet, and then to a basin for treatment before discharge to the creek.

Peak flows for each post-project DMA have been calculated using the methods described in Chapter 5 Section E.2 of the *Placer County Flood Control and Water Conservation District Stormwater Management Manual*. DMA boundaries were delineated based on the proposed grading and storm layout of the site. DMA boundaries can be referenced on the *Proposed Drainage Exhibit* located in the Appendix of this report. DMA calculations are also included in the appendix. These flows are summarized below.

Post-Development Peak Flow Summary

Storm Event	DMA 1	DMA 2	DMA 3	DMA 4	DMA 5
10 year	2.9 cfs	6.1 cfs	3.2 cfs	4.9 cfs	1.1 cfs
100 year	5.7 cfs	12.1 cfs	6.3 cfs	9.8 cfs	2.2 cfs

This project proposes to add curb and gutter improvements along the north side of Old Auburn Road, and relocate the existing curb return and drain inlet farther south. The flow collected from Old Auburn Road will be discharged to the current outfall location in the main channel.

Kimley-Horn modeled Treelake Tributary and its smaller unnamed tributary under pre- and post-project conditions using HEC-RAS v. 4.1.0. A combination of on-ground survey and LiDAR contours were used to create the pre-project geometry base. Based on the 2011 *Update to the Dry Creek Watershed Flood Control Plan*, the flow in Treelake Tributary upstream of its confluence with its tributary was quantified as 706 cfs. Per direction of Placer County Flood Control and Water Conservation District, a flow of 180 cfs was used in the tributary to Treelake Tributary based on the modeling associated with *Update to the Dry Creek Watershed Flood Control Plan*. The Manning's n values for both the left and the right overbanks were modeled with a 0.04 and the channel bottom was assigned n values of 0.04 to 0.06. These Manning's n values were used because the channel was overgrown with vegetation in an inconsistent fashion. Normal depth relative to the downstream slope was used as the model's boundary condition. The proposed site improvements were added into the cross-section geometry to accurately model the hydraulics for the post-project model. The water surface elevations from the pre- and post-project conditions HEC-RAS models were used to delineate the pre- and post-project condition 100-year floodplains. The post-project increase in on-site water surface elevations is limited to 0.23 feet. There is no post-project increase in off-site water surface elevations. A summary of water surface elevation changes can be found in the table below. Cross section locations can be referenced on the floodplain workmap, located in the appendix.

100-Year Water Surface Elevation Summary			
XS	**Existing**	**Proposed**	**Change**
Treelake Tributary			
452	195.92	195.91	-0.01
432	195.67	195.64	-0.03
420	195.56	195.52	-0.04
360	195.58	195.67	0.09
300	195.31	195.45	0.14
256	195.14	195.30	0.16
200	194.86	194.94	0.08
140	194.48	194.52	0.04
110	194.27	194.26	-0.01
69	193.88	193.81	-0.07
28	193.12	193.09	-0.03
Tributary to Treelake Tributary			
366	198.74	198.74	0.00
305	196.17	196.27	0.10
265	196.04	196.18	0.14
231	195.87	196.06	0.19
203	195.82	196.02	0.20
165	195.73	195.96	0.23
134	195.71	195.92	0.21
109	195.70	195.91	0.21
79	195.70	195.88	0.18
63	195.70	195.87	0.17
47	Pedestrian Bridge		
31	195.69	195.70	0.01
19	195.69	195.69	0.00

Stormwater Treatment

Stormwater treatment will be provided via stormwater treatment BMPs located throughout the site to treat the initial runoff, in compliance with the newly updated *West Placer Storm Water Quality Design Manual*. Based on discussions with Brad Brewer at Placer County, and following the recommendations presented in the *Update to the Dry Creek Watershed Flood Control Plan*, no onsite detention is proposed for this project. Onsite flows will be directed to Treelake Tributary to ensure that peak flows enter the creek and pass downstream prior to the peak flows from the Linda Creek watershed arriving at the site. This will help mitigate further flooding within areas of the Dry Creek watershed located downstream, and ensure the project does not increase the Linda Creek peak flow.

Construction BMPs will be installed prior to, and during construction to prevent site runoff from entering Treelake Tributary. Stormwater treatment BMPs will be utilized to treat runoff from each of the onsite DMAs as shown on the proposed Drainage Exhibit and described here:

- Tree Planting and Preservation: ±60 evergreen trees and ±175 deciduous trees are proposed on-site to provide shade, landscaping buffers and reduce stormwater runoff volumes. Existing trees are to remain where feasible to preserve the site's existing tree canopy.
- Rooftop and Impervious Area disconnection: Building rooftops and courtyard areas will be directed to depressed landscape areas via downspouts and overland flow.
- Vegetated Swales: Vegetated swales will be used where appropriate to treat initial runoff through its contact time within the landscaped area.
- Bioretention: Stormwater quality flow will be directed to bioretention areas for treatment through physical, biological and chemical treatment processes.

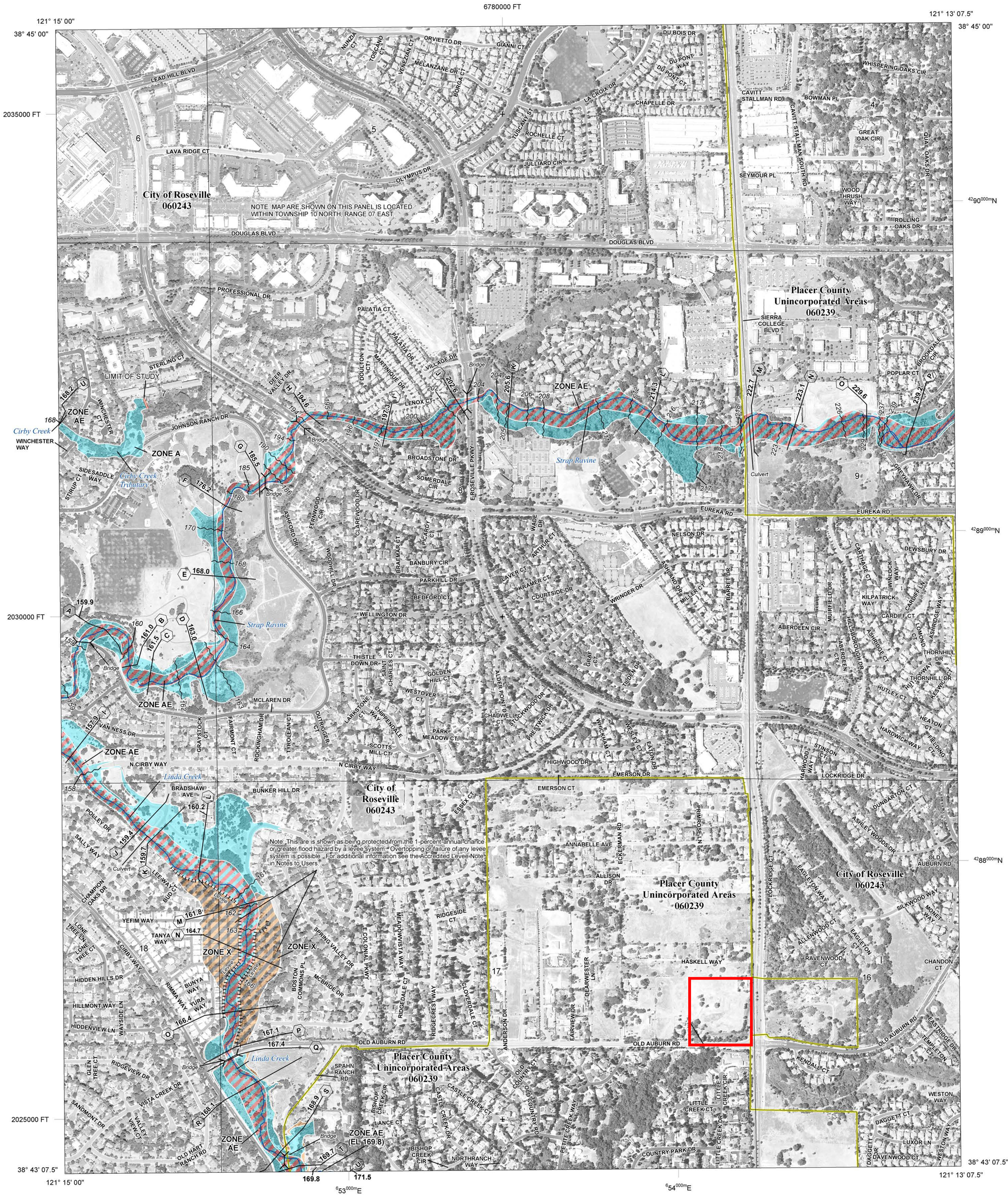
Conclusion

The Placer Retirement Residence will be designed in accordance with County design standards to ensure that the structure will be a minimum of 1 foot above the water surface elevation for the 100-year event. The proposed development increases water surface elevations by a maximum of 0.23 feet onsite and causes no off-site increases. Onsite flows will be conveyed overland and in the drive aisles to outlet locations where they will drain to the Treelake Tributary, as the site has historically done.

Stormwater quality BMPs will be incorporated onsite to treat stormwater runoff in accordance with the County's updated Stormwater Management Manual. Onsite detention and hydromodification will not be incorporated onsite at the direction of County Staff so as to not increase peak flows in Linda Creek and to help mitigate downstream impacts.

APPENDIX

FEMA Maps



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR ZONE DESCRIPTIONS AND INDEX MAP

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTP://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A,V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
OTHER AREAS	NO SCREEN Areas Determined to be Outside the 0.2% Annual Chance Floodplain *Zone X*
	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
OTHER FEATURES	E 18.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	513 Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in the community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided in digital format by the USDA National Agriculture Imagery Program (NAIP). This information was photogrammetrically compiled at a scale of 1:24,000 from aerial photography dated 2014.

ACCREDITED LEVEE NOTES TO USERS: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at http://www.fema.gov/business/nfip/index.shtm.

SCALE

N

Map Projection:
NAD 1983 StatePlane California II FIPS 0402 Feet;
Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 500 1,000 2,000 Feet

0 125 250 500 Meters

PANEL LOCATOR

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

PLACER COUNTY, CA
And Incorporated Areas

PANEL **1051** OF **1060**

FEMA

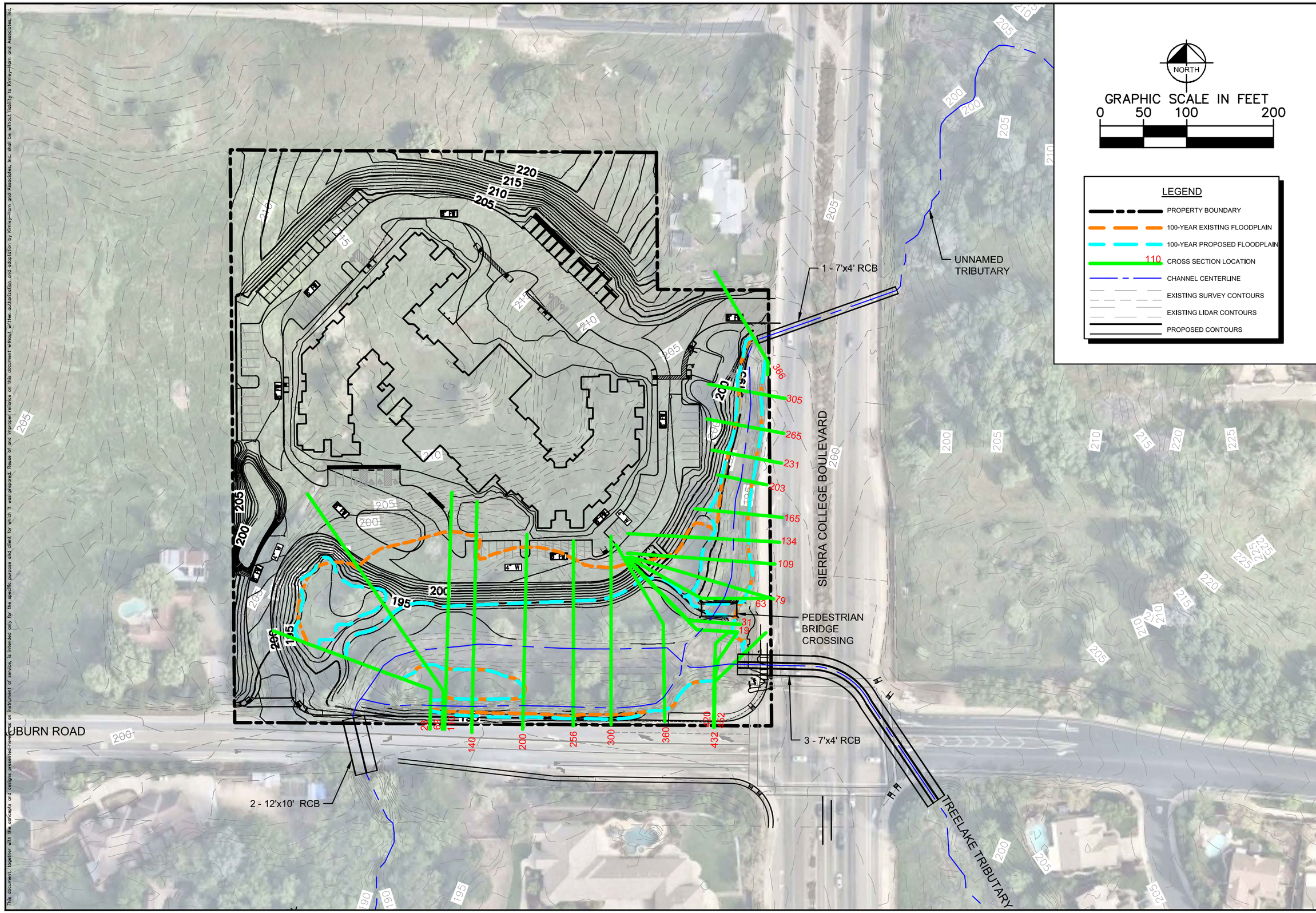
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
PLACER COUNTY	060239	1051	H
ROSEVILLE, CITY OF	060243	1051	H

VERSION NUMBER
2.3.3.3

MAP NUMBER
06061C1051H

MAP REVISED
NOVEMBER 2, 2018



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No.	REVISIONS	DATE	BY

Kimley»Horn

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KHA PROJECT 097264002

DATE OCT 2018

SCALE AS SHOWN

DESIGNED BY CBF

DRAWN BY CLS

CHECKED BY CBF

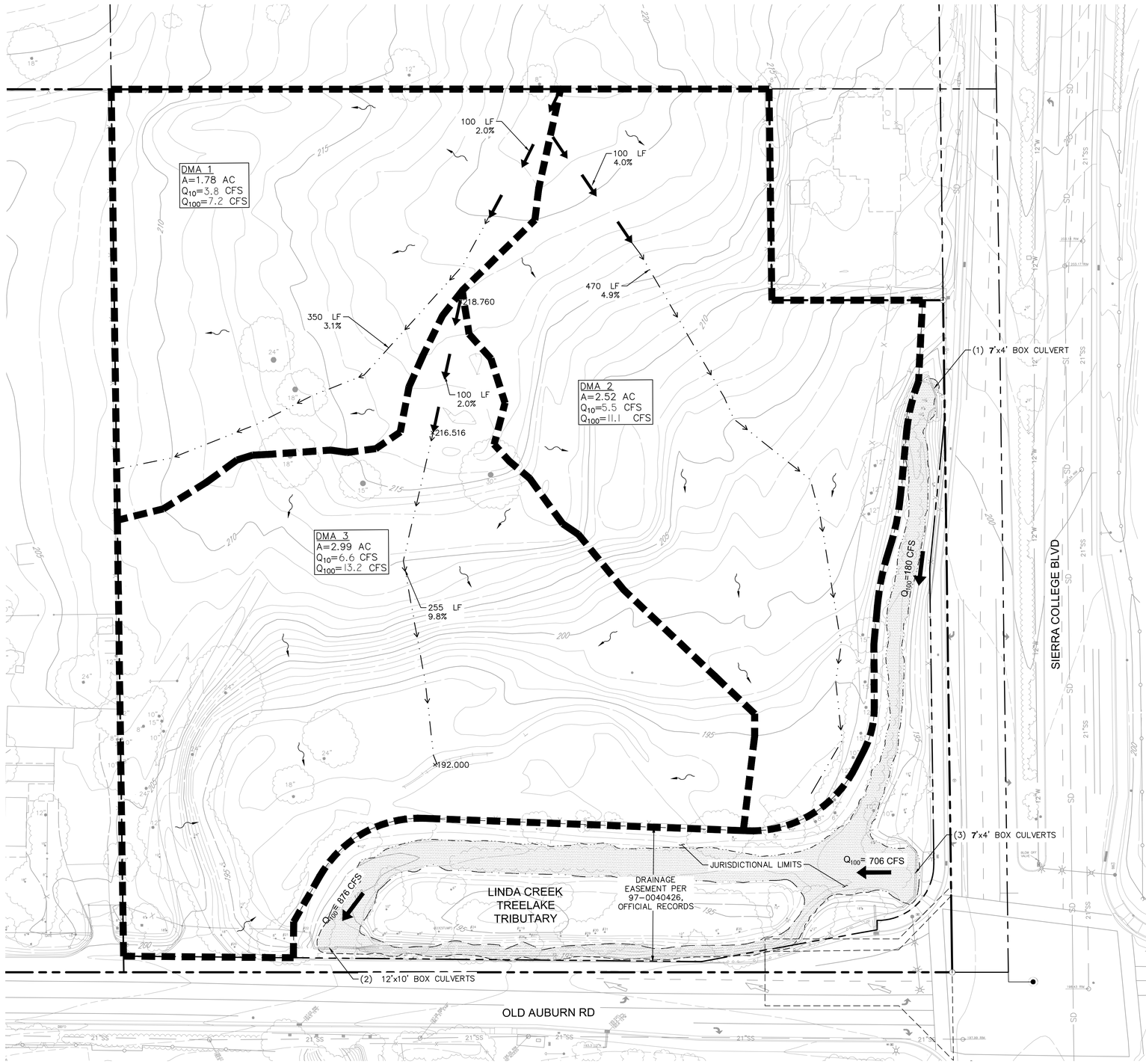
PLACER COUNTY RETIREMENT

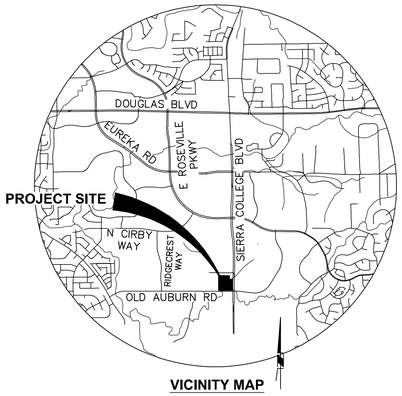
FLOODPLAIN WORKMAP

SHEET NUMBER

EXISTING DRAINAGE EXHIBIT FOR PLACER RETIREMENT RESIDENCE

OLD AUBURN ROAD
OCTOBER 2018





VICINITY MAP
NTS

PROJECT INFORMATION:

OWNER / DEVELOPER
HAWTHORN DEVELOPMENT, LLC
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CONTACT: MARVIN MARSHALL, P.E.
(916) 858-5800

EARTHWORK QUANITITIES

CUT: 50,700 CU YD
FILL: 13,600 CU YD
37,100 CU YD EXPORT

LEGEND:

- DMA BOUNDARY
- OVERLAND FLOW
- CONCENTRATED FLOW
- 200 EXISTING CONTOUR

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80

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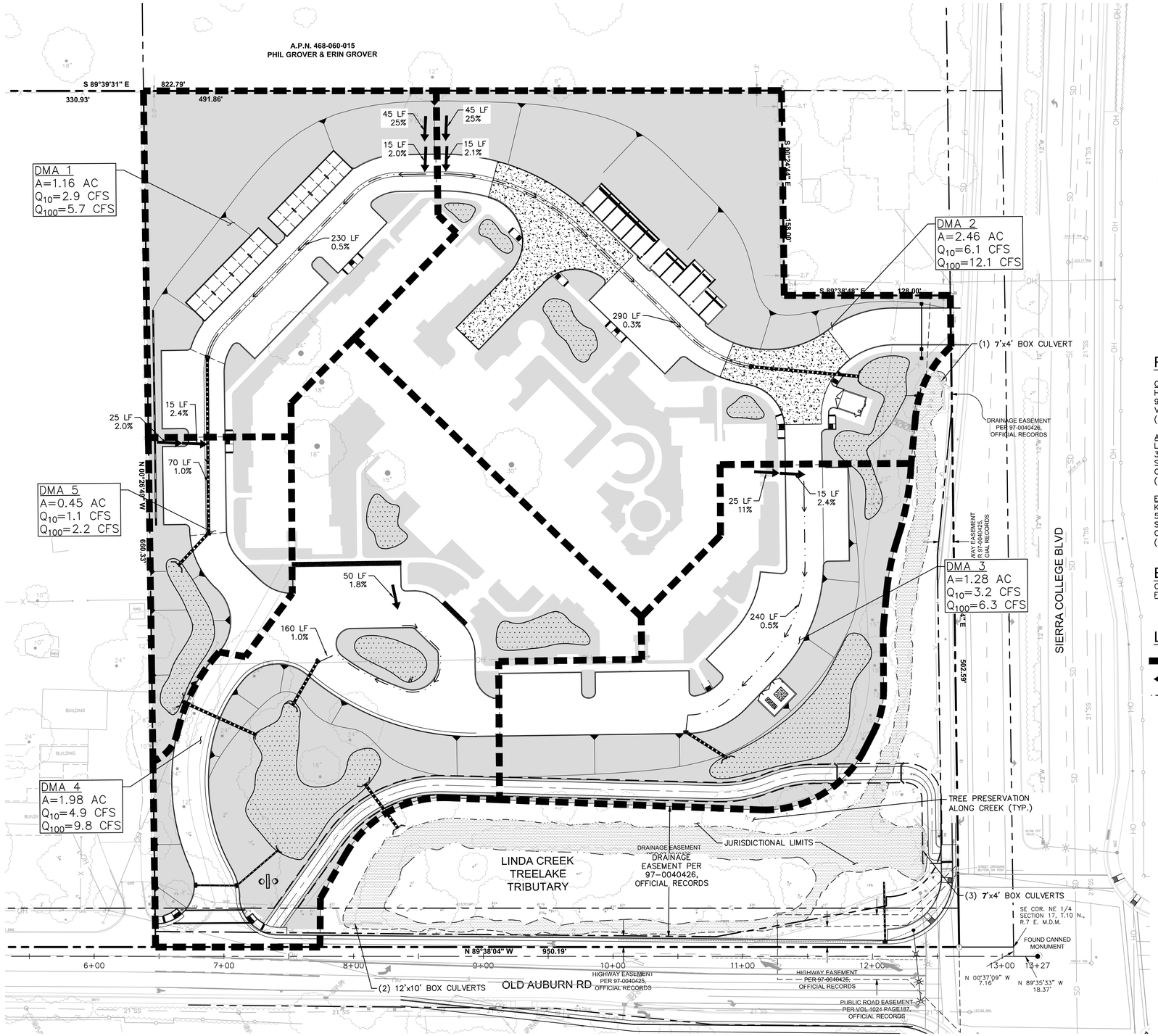
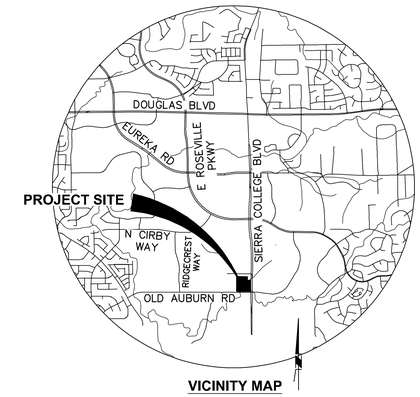
PROPOSED DRAINAGE EXHIBIT FOR PLACER RETIREMENT RESIDENCE

OLD AUBURN ROAD
OCTOBER 2018





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EARTHWORK QUANITITIES

CUT: 50,700 CU YD
FILL: 13,600 CU YD
37,100 CU YD EXPORT

LEGEND:

- DMA BOUNDARY
- OVERLAND FLOW
- CONCENTRATED FLOW

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80

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RUNOFF CALCULATIONS

Small Watershed Peak Flow Worksheet

Date:	11/28/2018				
Engineer	Marvin Marshall				
Project:	Placer Retirement Residence				
Watershed:	1				
Area (ac)	1.16	Elevation:	205	Storm Year:	10/100

	Length (ft)	Slope	Mannings "n"	Contributing Area (ac)	Side Slope (H:V)	Response Time (min)	Comments	
Overland Flow	45	25.0%	0.15	-	N/A	2	Eq 5-3, pg V-10	n from table 5-5, pg V-8, short grass
Sheet Flow	15	2.0%	0.11	-	N/A	2	Eq 5-3, pg V-10	
Gutter	230	0.5%	0.013	1.16	4	1	Eq 5-4, pg V-10	n from table 6-3, cast-in place concrete
					Total Response Time (min)	**5**	use 5 minute minimum	

10yr Unit Peak Flow (cfs) =	2.55	Figure 5-3A, pg V-14
Infiltration Rate (in/hr)	0.09	I= table 5-3 pg V-6, good grass, type D soils
Infiltration Factor (cfs/acre)	0.15	Eq 5-5, pg V-13
Percent Impervious (%)	46%	
10yr Watershed peak Flow (cfs) =	**2.9**	Eq 5-6, pg V-13
100yr Unit Peak Flow (cfs) =	5	Figure 5-3C, pg V-16
Infiltration Rate (in/hr)	0.09	I= table 5-3 pg V-6, good grass, type D soils
Infiltration Factor (cfs/acre)	0.15	Eq 5-5, pg V-13
Percent Impervious (%)	46%	
100yr Watershed peak Flow (cfs) =	**5.7**	Eq 5-6, pg V-13

Small Watershed Peak Flow Worksheet

Date:	11/28/2018				
Engineer	Marvin Marshall				
Project:	Placer Retirement Residence				
Watershed:	2				
Area	2.46	Elevation:	205	Storm Year:	10/100

	Length (ft)	Slope	Mannings "n"	Contributing Area (ac)	Side Slope (H:V)	Response Time (min)	Comments	
Overland Flow	45	25.0%	0.15	-	N/A	2	Eq 5-3, pg V-10	n from table 5-5, pg V-8, short grass
Sheet Flow	15	2.1%	0.11	-	N/A	2		
Gutter	290	0.3%	0.013	2.46	4	1	Eq 5-4, pg V-10	n from table 6-3, cast-in place concrete
					Total Response Time (min)	**5**	use 5 minute minimum	
					10yr Unit Peak Flow (cfs) =	2.55	Figure 5-3A, pg V-14	
					Infiltration Rate (in/hr)	0.09	I= table 5-3 pg V-6, good grass, type D soils	
					Infiltration Factor (cfs/acre)	0.15	Eq 5-5, pg V-13	
					Percent Impervious (%)	52%		
					10yr Watershed peak Flow (cfs) =	**6.1**	Eq 5-6, pg V-13	
					100yr Unit Peak Flow (cfs) =	5	Figure 5-3C, pg V-16	
					Infiltration Rate (in/hr)	0.09	I= table 5-3 pg V-6, good grass, type D soils	
					Infiltration Factor (cfs/acre)	0.15	Eq 5-5, pg V-13	
					Percent Impervious (%)	52%		
					100yr Watershed peak Flow (cfs) =	**12.1**	Eq 5-6, pg V-13	

Small Watershed Peak Flow Worksheet

Date:	11/28/2018				
Engineer	Marvin Marshall				
Project:	Placer Retirement Residence				
Watershed:	3				
Area	1.28	Elevation:	205	Storm Year:	10/100

	Length (ft)	Slope	Mannings "n"	Contributing Area (ac)	Side Slope (H:V)	Response Time (min)	Comments	
Overland Flow	25	11.0%	0.15	-	N/A	2	Eq 5-3, pg V-10	n from table 5-5, pg V-10, short grass
Sheet Flow	15	2.4%	0.11	-	N/A	1	Eq 5-3, pg V-10	n from table 5-5, pg V-10, smooth surface
Gutter	240	0.5%	0.013	1.28	4	1	Eq 5-4, pg V-10	n from table 6-3, cast-in place concrete
					Total Response Time (min)	**5**	use 5 minute minimum	
					10yr Unit Peak Flow (cfs) =	2.55	Figure 5-3A, pg V-14	
					Infiltration Rate (in/hr)	0.09	I= table 5-3 pg V-6, good grass, type D soils	
					Infiltration Factor (cfs/acre)	0.15	Eq 5-5, pg V-13	
					Percent Impervious (%)	50%		
					10yr Watershed peak Flow (cfs) =	**3.2**	Eq 5-6, pg V-13	
					100yr Unit Peak Flow (cfs) =	5	Figure 5-3C, pg V-16	
					Infiltration Rate (in/hr)	0.09	I= table 5-3 pg V-6, good grass, type D soils	
					Infiltration Factor (cfs/acre)	0.15	Eq 5-5, pg V-13	
					Percent Impervious (%)	50%		
					100yr Watershed peak Flow (cfs) =	**6.3**	Eq 5-6, pg V-13	

Small Watershed Peak Flow Worksheet

Date:	11/28/2018				
Engineer	Marvin Marshall				
Project:	Placer Retirement Residence				
Watershed:	4				
Area	1.98	Elevation:	205	Storm Year:	10/100

	Length (ft)	Slope	Mannings "n"	Contributing Area (ac)	Side Slope (H:V)	Response Time (min)	Comments	
Sheet Flow	50	1.8%	0.11	-	N/A	3	Eq 5-3, pg V-10	n from table 5-5, pg V-8, short grass
Gutter	160	1.0%	0.013	1.98	4	0	Eq 5-4, pg V-10	n from table 6-3, cast-in place concrete
					Total Response Time (min)	**5**	use 5 minute minimum	
					10yr Unit Peak Flow (cfs) =	2.55	Figure 5-3A, pg V-14	
					Infiltration Rate (in/hr)	0.09	I= table 5-3 pg V-6, good grass, type D soils	
					Infiltration Factor (cfs/acre)	0.15	Eq 5-5, pg V-13	
					Percent Impervious (%)	56%		
					10yr Watershed peak Flow (cfs) =	**4.9**	Eq 5-6, pg V-13	
					100yr Unit Peak Flow (cfs) =	5	Figure 5-3C, pg V-16	
					Infiltration Rate (in/hr)	0.09	I= table 5-3 pg V-6, good grass, type D soils	
					Infiltration Factor (cfs/acre)	0.15	Eq 5-5, pg V-13	
					Percent Impervious (%)	56%		
					100yr Watershed peak Flow (cfs) =	**9.8**	Eq 5-6, pg V-13	

Small Watershed Peak Flow Worksheet

Date:	11/28/2018				
Engineer	Marvin Marshall				
Project:	Placer Retirement Residence				
Watershed:	5				
Area	0.45	Elevation:	205	Storm Year:	10/100

	Length (ft)	Slope	Mannings "n"	Contributing Area (ac)	Side Slope (H:V)	Response Time (min)	Comments	
Overland Flow	25	2.0%	0.15	-	N/A	3	Eq 5-3, pg V-10	n from table 5-5, pg V-8, short grass
Sheet Flow	15	2.4%	0.11	-	N/A	1	Eq 5-3, pg V-10	n from table 5-5, pg V-10, smooth surface
Gutter	70	1.0%	0.013	0.35	4	0	Eq 5-4, pg V-10	n from table 6-3, cast-in place concrete
					Total Response Time (min)	**5**	use 5 minute minimum	

10yr Unit Peak Flow (cfs) =	2.55	Figure 5-3A, pg V-14
Infiltration Rate (in/hr)	0.09	I= table 5-3 pg V-6, good grass, type D soils
Infiltration Factor (cfs/acre)	0.15	Eq 5-5, pg V-13
Percent Impervious (%)	52%	
10yr Watershed peak Flow (cfs) =	**1.1**	Eq 5-6, pg V-13
100yr Unit Peak Flow (cfs) =	5	Figure 5-3C, pg V-16
Infiltration Rate (in/hr)	0.09	I= table 5-3 pg V-6, good grass, type D soils
Infiltration Factor (cfs/acre)	0.15	Eq 5-5, pg V-13
Percent Impervious (%)	52%	
100yr Watershed peak Flow (cfs) =	**2.2**	Eq 5-6, pg V-13

Small Watershed Peak Flow Worksheet

Date:	11/28/2018						
Engineer	Marvin Marshall						
Project:	Placer Retirement Residence						
Watershed:	Existing 1						
Area (ac)	1.78		Elevation:	215	Storm Year:	10/100	
	Length (ft)	Slope	Mannings "n"	Contributing Area (ac)	Side Slope (H:V)	Response Time (min)	Comments
Overland Flow	100	2.0%	0.15	0.32	N/A	6	Eq 5-3, pg V-10 — n from table 5-5 for overland flow, pg V-10, short grass
Collector Flow	350	3.1%	0.03	1.46	100	2	Eq 5-4, pg V-10 — n from table 8-1, pg VIII-4, short grass
					Total Response Time (min)	**8**	5 minute minimum
					10yr Unit Peak Flow (cfs) =	2.3	Figure 5-3A, pg V-14
					Infiltration Rate (in/hr)	0.09	I= table 5-3 pg V-6, good grass, type D soils
					Infiltration Factor (cfs/acre)	0.15	Eq 5-5, pg V-13
					Percent Impervious (%)	0%	
					10yr Watershed peak Flow (cfs) =	**3.8**	Eq 5-6, pg V-13
					100yr Unit Peak Flow (cfs) =	4.2	Figure 5-3C, pg V-16
					Infiltration Rate (in/hr)	0.09	I= table 5-3 pg V-6, good grass, type D soils
					Infiltration Factor (cfs/acre)	0.15	Eq 5-5, pg V-13
					Percent Impervious (%)	0%	
					100yr Watershed peak Flow (cfs) =	**7.2**	Eq 5-6, pg V-13

Small Watershed Peak Flow Worksheet

Date:	11/28/2018						
Engineer	Marvin Marshall						
Project:	Placer Retirement Residence						
Watershed:	Existing 2						
Area (ac)	2.52		Elevation:	205	Storm Year:	10/100	
	Length (ft)	Slope	Mannings "n"	Contributing Area (ac)	Side Slope (H:V)	Response Time (min)	Comments
Overland Flow	100	4.0%	0.15	0.44	N/A	5	Eq 5-3, pg V-10 — n from table 5-5 for overland flow, pg V-10, short grass
Collector Flow	470	4.9%	0.03	2.08	100	2	Eq 5-4, pg V-10 — n from table 8-1, pg VIII-4, short grass
					Total Response Time (min)	**7**	5 minute minimum
					10yr Unit Peak Flow (cfs) =	2.35	Figure 5-3A, pg V-14
					Infiltration Rate (in/hr)	0.09	I= table 5-3 pg V-6, good grass, type D soils
					Infiltration Factor (cfs/acre)	0.15	Eq 5-5, pg V-13
					Percent Impervious (%)	0%	
					10yr Watershed peak Flow (cfs) =	**5.5**	Eq 5-6, pg V-13
					100yr Unit Peak Flow (cfs) =	4.55	Figure 5-3C, pg V-16
					Infiltration Rate (in/hr)	0.09	I= table 5-3 pg V-6, good grass, type D soils
					Infiltration Factor (cfs/acre)	0.15	Eq 5-5, pg V-13
					Percent Impervious (%)	0%	
					100yr Watershed peak Flow (cfs) =	**11.1**	Eq 5-6, pg V-13

Small Watershed Peak Flow Worksheet

Date:	11/28/2018						
Engineer	Marvin Marshall						
Project:	Placer Retirement Residence						
Watershed:	Existing 3						
Area (ac)	2.99		Elevation:	195	Storm Year:	10/100	
	Length (ft)	Slope	Mannings "n"	Contributing Area (ac)	Side Slope (H:V)	Response Time (min)	Comments
Overland Flow	100	2.0%	0.15	1	N/A	6	Eq 5-3, pg V-10 — n from table 5-5 for overland flow, pg V-10, short grass
Collector Flow	255	9.8%	0.03	1.99	100	1	Eq 5-4, pg V-10 — n from table 8-1, pg VIII-4, short grass
					Total Response Time (min)	**7**	5 minute minimum
					10yr Unit Peak Flow (cfs) =	2.35	Figure 5-3A, pg V-14
					Infiltration Rate (in/hr)	0.09	I= table 5-3 pg V-6, good grass, type D soils
					Infiltration Factor (cfs/acre)	0.15	Eq 5-5, pg V-13
					Percent Impervious (%)	0%	
					10yr Watershed peak Flow (cfs) =	**6.6**	Eq 5-6, pg V-13
					100yr Unit Peak Flow (cfs) =	4.55	Figure 5-3C, pg V-16
					Infiltration Rate (in/hr)	0.09	I= table 5-3 pg V-6, good grass, type D soils
					Infiltration Factor (cfs/acre)	0.15	Eq 5-5, pg V-13
					Percent Impervious (%)	0%	
					100yr Watershed peak Flow (cfs) =	**13.2**	Eq 5-6, pg V-13

EXCERPTSFROM DRY CREEK WATERSHED FLOOD CONTROL PLAN

WATERSHED MAPPING

Legend

- Points of Interest
- Local Detention
- Stream Gage
- Rain Gage
- Water Delivery Canals
- Storm Drain Pipes
- Hydraulic Routing Model X-sections
- Swales
- Streams
- 1992 Plan Watersheds
- Update Plan Watersheds
- Project Contour Elevations
- Existing Ponds
- County Boundary

UPDATE TO THE DRY CREEK WATERSHED FLOOD CONTROL PLAN

RBF CONSULTING

CIVIL ENGINEERING SOLUTIONS, INC.

0 250 500 Feet

PLATE B.24

1992 No. (1000+ are 2009 Assigned)	2009 Shed Label	2009 Storm Center	Distance From Mouth 1992	HEC-RAS Stream	HEC-RAS Segment	HEC-RAS Section ID	Location Description:	100-year 1989 JMM	100-year 1992 Corrected	100-year 2007-Current	100-year Future JMM	100-year Future Unmitigated	100-year Build-out w/LID & Projects
Treelake Tributary Confluence													
80	ULC45J	LC40L_30	15900	Linda Creek	Below S Branch	181	Treelake Tributary Confluence	3285	2054	2348	3577	2518	2390
82	UC45J2	LC40L_30	19800	Linda Creek	Below S Branch	188	Indian Creek Drive	2489	2044	2330	2774	2503	2377
1082	ULC45D	LC40L_30	0	Linda Creek	Below S Branch	207	Private Bridge Near Hazel	#N/A	1841	2150	#N/A	2379	2238
83	ULC45D	LC40L_30	25300	Linda Creek	Below S Branch	211	Hazel Avenue	2220	1845	2150	2465	2384	2249
84	UC35Q3	LC40L_30	25500	Linda Creek	Below S Branch	212	Orangevale Tributary Confluence	2220	1845	2150	2465	2384	2249
1084	ULC40A	LC40L_30	0	Linda Creek	Above S Branch	3.075	BDG 17 2-24" CMPS	#N/A	1299	1437	#N/A	1631	1482
85	UC15N2	LC40L_30	31300	Linda Creek	Above S Branch	4.239	Granite Road Bridge	1251	1082	1226	1380	1418	1253
86	ULC15N	LC40L_30	32600	Linda Creek	Above S Branch	4.407	Cherry Avenue	1230	1060	1193	1351	1389	1216
1086	ULC15J	LC5A_0	0	Linda Creek	Above S Branch	5.22	Private Driveway Concrete Box Type	#N/A	780	834	#N/A	827	580
1087	YLC15J	LC5A_0	0	Linda Creek	Above S Branch	5.264	Driveway Bridge	#N/A	780	834	#N/A	824	580
1088	YLC15J	LC5A_0	0	Linda Creek	Above S Branch	5.526	Granite Glen Court (Private)	#N/A	782	840	#N/A	826	580
88	YLC15J	LC5A_0	38600	Linda Creek	Above S Branch	5.715	Wedgewood Drive	887	812	878	1031	849	582
1089	ULC102	LC5A_0	0	Linda Creek	Above S Branch	6.039	Golf Cart Bridge #5	#N/A	740	808	#N/A	790	618
1090	ULC102	LC5A_0	0	Linda Creek	Above S Branch	6.12	Golf Cart Bridge #4	#N/A	741	809	#N/A	791	622
1091	ULC102	LC5A_0	0	Linda Creek	Above S Branch	6.197	Golf Cart Bridge #3	#N/A	742	810	#N/A	791	624
1092	ULC102	LC5A_0	0	Linda Creek	Above S Branch	6.241	Golf Cart Bridge #2	#N/A	742	810	#N/A	791	624
1093	ULC5F2	LC5A_0	0	Linda Creek	Above S Branch	6.515	Golf Cart Bridge #1	#N/A	743	752	#N/A	773	627
89	ULC5F2	LC5A_0	42300	Linda Creek	Above S Branch	6.53	East Roaseville Parkway	809	743	752	995	772	626
90	ULC5F	LC5A_0	43100	Linda Creek	Above S Branch	6.759	Barton Road	762	721	733	943	777	613
91	YLC5E	LC5A_0	44600	Linda Creek	Above S Branch	7.140	Shadow Brook Place	642	632	646	797	681	439
92	ULC5B	LC5A_0	46500	Linda Creek	Above S Branch	7.479	Troy Purdy Lane	473	545	559	640	595	331
1094	ULC5C	LC5A_0	0	Linda Creek	Above S Branch	7.609	Muir Way	#N/A	441	458	#N/A	508	289
93	YLC5C	LC5A_0	48100	Linda Creek	Above S Branch	7.77	Country Court (Private)	390	442	451	553	488	291
1095	ULC1A	LC5A_0	0	Linda Creek	Above S Branch	7.839	Country Court	#N/A	893	1186	#N/A	1227	1213
94	YLC1A	LC5A_0	48700	Linda Creek	Above S Branch	8.011	Auburn Folsom Road	349	453	466	510	499	294
Linda Creek/Strap Ravine													
95	USR25C	CC5G_90	0	Strap Ravine	Reach 1	0.	Linda Creek Confluence	915	861	1158	1050	1191	1172
1095	YSR25A	CC5G_90	300	Strap Ravine	Reach 1	276	Foot Bridge in Park	#N/A	893	1186	#N/A	1227	1213
96	UR20A4	CC5G_90	1500	Strap Ravine	Reach 1	1136.900	McClaren Drive (Gage 1611)	920	919	1191	1054	1250	1227
97	UXR20A	CC5G_90	5900	Strap Ravine	Reach 1	5539.100	Johnson Ranch Drive	916	851	1199	1053	1213	1197
98	USR152	CC5G_90	6800	Strap Ravine	Reach 1	6380.600	Eureka Road	915	852	1205	1053	1214	1197
99	USR82	CC5G_90	8600	Strap Ravine	Reach 1	8201.500	East Roseville Parkway	905	727	852	1060	937	996
100	USR5C2	LC5A_0	11800	Strap Ravine	Reach 1	11366.10	Sierra College Blvd.	854	512	684	1112	751	808
101	USR1A	LC5A_0	23000	0	0	NONE	Barton Road	652	556	1061	1020	916	989
Linda Creek/Treelake Tributary													
102	ULC60B	LC40L_30	0	0	0	NONE	Linda Creek Confluence	847	540	636	958	718	698
103	YLC60B	LC40L_30	3200	0	0	NONE	Petite Way (approximated)	793	558	662	888	751	729
104	YLC60A	LC40L_30	5700	0	0	NONE	Old Auburn Road	802	501	620	982	706	686
105	YC55H3	LC40L_30	6000	0	0	NONE	Sierra College Blvd.	797	546	695	985	797	775
106	YLC55F	LC40L_30	9600	0	0	NONE	Swan Lake Drive	579	478	673	699	772	756
107	UC55L2	LC40L_30	9600	0	0	NONE	Swan Lake	579	446	650	699	746	732

PRE-PROJECT CONDITION HEC-RAS OUTPUT

HEC-RAS Plan: Existing Profile: 100-Year

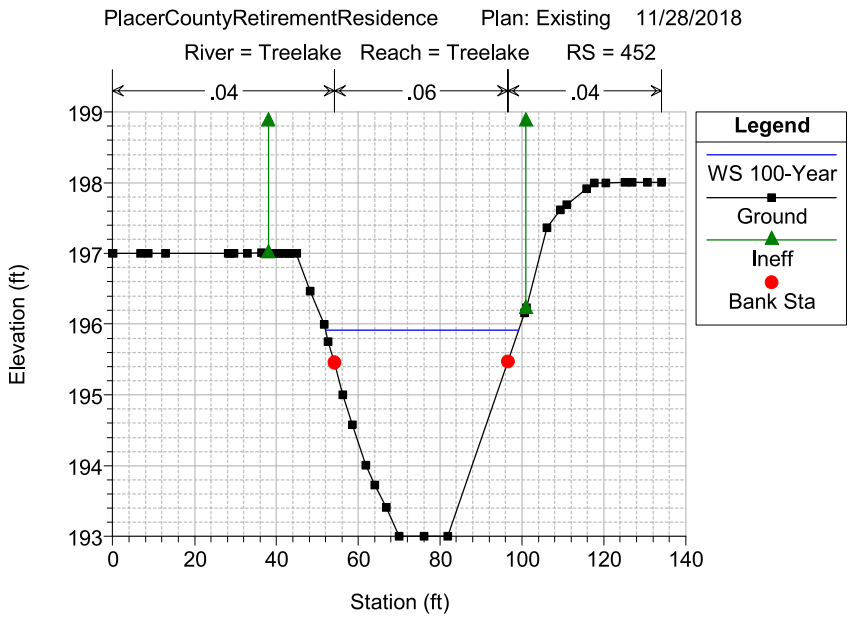
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Treelake2	Treelake2	360	100-Year	876.00	191.98	195.58		195.69	0.002460	2.55	344.51	180.85	0.26
Treelake2	Treelake2	300	100-Year	876.00	191.99	195.31		195.47	0.005390	3.47	271.17	169.58	0.38
Treelake2	Treelake2	256	100-Year	876.00	191.99	195.14		195.27	0.003815	2.90	306.37	181.01	0.31
Treelake2	Treelake2	200	100-Year	876.00	192.00	194.86		195.02	0.005124	3.32	275.87	181.78	0.36
Treelake2	Treelake2	140	100-Year	876.00	190.92	194.48		194.68	0.006056	3.86	253.18	169.41	0.40
Treelake2	Treelake2	110	100-Year	876.00	190.84	194.27		194.48	0.006994	4.06	244.44	173.79	0.43
Treelake2	Treelake2	69	100-Year	876.00	189.99	193.88		194.16	0.007887	4.72	219.45	152.34	0.47
Treelake2	Treelake2	28	100-Year	876.00	189.26	193.12	192.62	193.67	0.018032	5.97	153.00	129.23	0.68
Treelake Trib	Treelake Trib	366	100-Year	180.00	195.00	198.74	198.74	199.73	0.022522	7.98	22.55	28.22	1.00
Treelake Trib	Treelake Trib	305	100-Year	180.00	193.98	196.17	195.64	196.55	0.007964	4.93	36.49	25.57	0.64
Treelake Trib	Treelake Trib	265	100-Year	180.00	193.91	196.04	195.33	196.24	0.005090	3.62	49.75	30.48	0.50
Treelake Trib	Treelake Trib	231	100-Year	180.00	193.85	195.87		196.06	0.005223	3.56	50.50	32.43	0.50
Treelake Trib	Treelake Trib	203	100-Year	180.00	193.00	195.82		195.94	0.002551	2.83	63.60	33.65	0.36
Treelake Trib	Treelake Trib	165	100-Year	180.00	192.97	195.73		195.85	0.002332	2.73	65.91	34.41	0.35
Treelake Trib	Treelake Trib	134	100-Year	180.00	192.94	195.71		195.78	0.001431	2.32	91.02	71.81	0.28
Treelake Trib	Treelake Trib	109	100-Year	180.00	192.93	195.70		195.74	0.000769	1.74	126.83	97.08	0.21
Treelake Trib	Treelake Trib	79	100-Year	180.00	192.90	195.70		195.72	0.000447	1.45	167.54	120.79	0.16
Treelake Trib	Treelake Trib	63	100-Year	180.00	192.89	195.70		195.71	0.000323	1.24	193.94	136.61	0.14
Treelake Trib	Treelake Trib	31	100-Year	180.00	192.00	195.69		195.70	0.000204	1.08	228.02	147.63	0.11
Treelake Trib	Treelake Trib	19	100-Year	180.00	191.99	195.69		195.70	0.000184	1.04	236.95	153.29	0.11
Treelake	Treelake	452	100-Year	706.00	193.00	195.92	195.92	196.89	0.039294	7.96	89.47	47.22	0.97
Treelake	Treelake	432	100-Year	706.00	192.83	195.67	195.02	196.13	0.015306	5.47	130.30	59.10	0.62
Treelake	Treelake	420	100-Year	706.00	192.59	195.56	194.78	195.95	0.012782	5.05	141.58	67.16	0.57

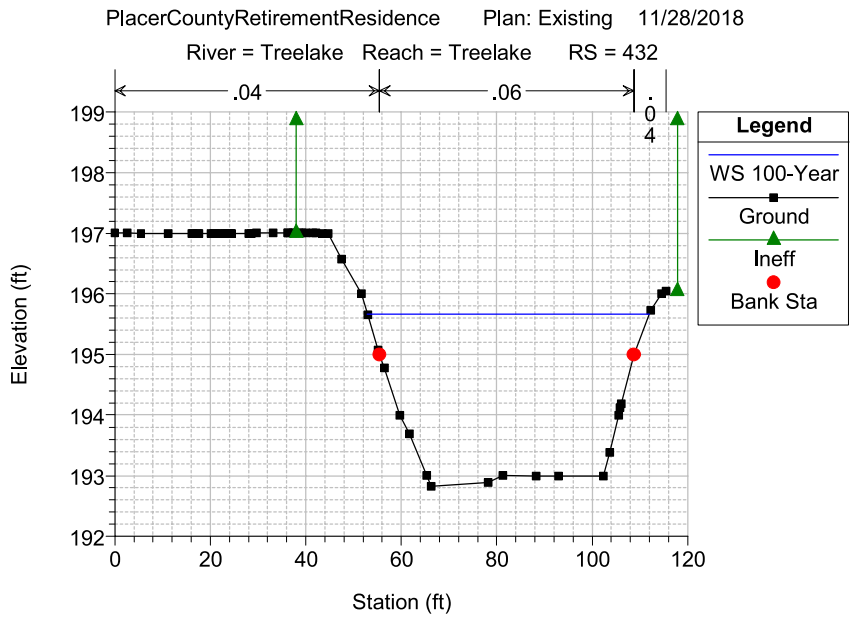
POST-PROJECT CONDITION HEC-RAS OUTPUT

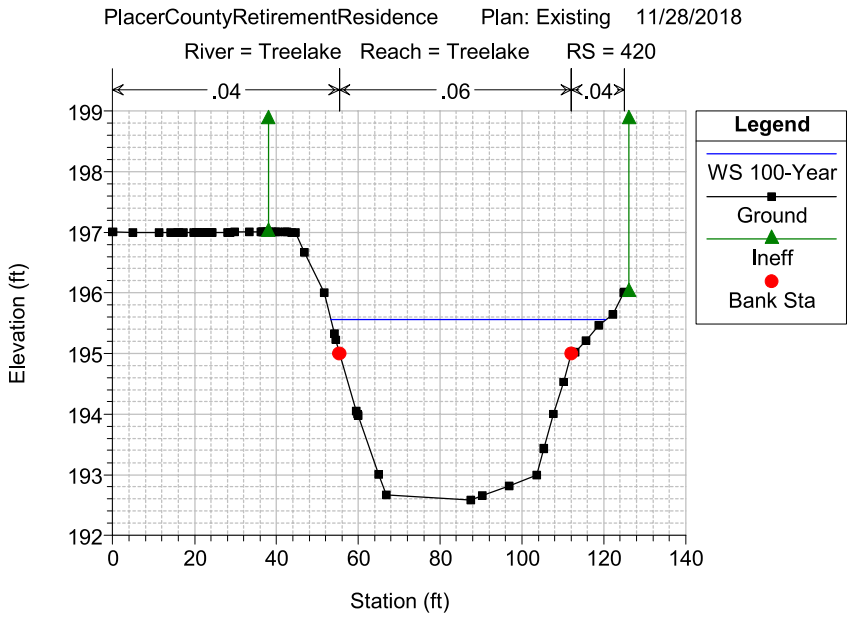
HEC-RAS Plan: Prop Profile: 100-Year

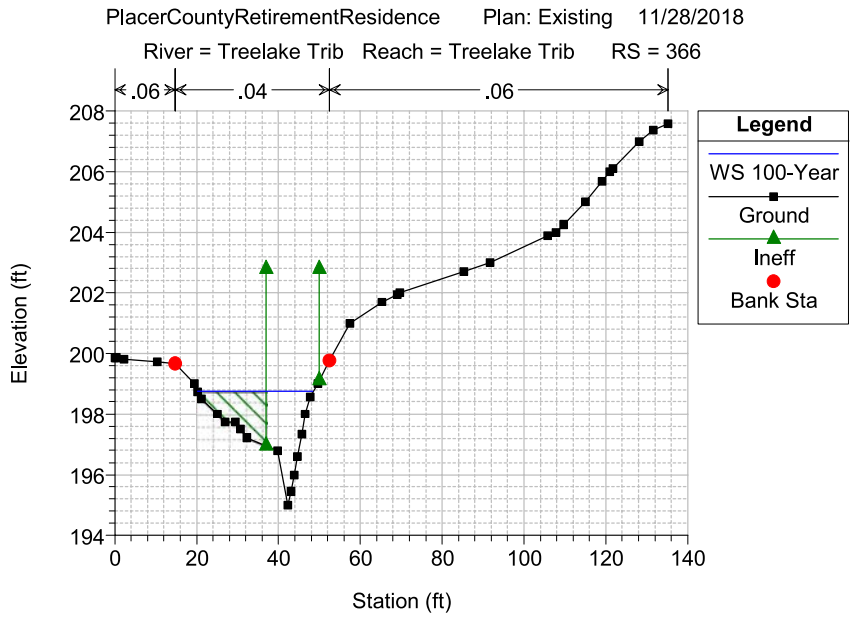
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Treelake2	Treelake2	360	100-Year	876.00	191.98	195.67		195.72	0.001140	1.84	460.25	155.64	0.18
Treelake2	Treelake2	300	100-Year	876.00	191.99	195.45		195.60	0.004209	3.05	289.52	140.65	0.33
Treelake2	Treelake2	256	100-Year	876.00	191.99	195.30		195.43	0.003378	2.81	308.30	135.79	0.30
Treelake2	Treelake2	200	100-Year	876.00	192.00	194.94		195.15	0.006896	3.77	236.25	125.98	0.42
Treelake2	Treelake2	140	100-Year	876.00	190.92	194.52		194.76	0.006323	3.91	224.20	93.61	0.41
Treelake2	Treelake2	110	100-Year	876.00	190.84	194.26		194.54	0.007842	4.26	207.31	91.08	0.45
Treelake2	Treelake2	69	100-Year	876.00	189.99	193.81	193.15	194.18	0.009540	5.12	179.99	108.17	0.51
Treelake2	Treelake2	28	100-Year	876.00	189.26	193.09	192.65	193.65	0.018021	6.13	148.46	117.02	0.68
Treelake Trib	Treelake Trib	366	100-Year	180.00	195.00	198.74	198.74	199.73	0.022522	7.98	22.55	28.22	1.00
Treelake Trib	Treelake Trib	305	100-Year	180.00	193.98	196.27	195.63	196.58	0.006535	4.47	40.31	27.85	0.58
Treelake Trib	Treelake Trib	265	100-Year	180.00	193.91	196.18	195.34	196.36	0.004146	3.38	53.31	31.03	0.45
Treelake Trib	Treelake Trib	231	100-Year	180.00	193.85	196.06		196.21	0.003907	3.18	56.65	34.80	0.44
Treelake Trib	Treelake Trib	203	100-Year	180.00	193.00	196.02		196.12	0.001997	2.56	70.33	35.91	0.32
Treelake Trib	Treelake Trib	165	100-Year	180.00	192.97	195.96		196.04	0.001797	2.29	78.91	46.83	0.30
Treelake Trib	Treelake Trib	134	100-Year	180.00	192.94	195.92	194.47	196.00	0.001389	2.25	81.18	43.99	0.27
Treelake Trib	Treelake Trib	109	100-Year	180.00	192.93	195.91	194.33	195.96	0.000945	1.80	102.52	58.11	0.22
Treelake Trib	Treelake Trib	79	100-Year	180.00	192.91	195.88	194.26	195.93	0.000761	1.88	105.99	58.55	0.21
Treelake Trib	Treelake Trib	63	100-Year	180.00	192.90	195.87	194.15	195.92	0.000653	1.71	108.55	59.49	0.19
Treelake Trib	Treelake Trib	47		Bridge									
Treelake Trib	Treelake Trib	31	100-Year	180.00	192.00	195.70	193.57	195.73	0.000389	1.59	126.09	122.12	0.16
Treelake Trib	Treelake Trib	19	100-Year	180.00	191.99	195.69	193.50	195.73	0.000341	1.49	135.12	128.33	0.15
Treelake	Treelake	452	100-Year	706.00	193.00	195.91	195.91	196.90	0.039556	7.97	89.26	47.11	0.97
Treelake	Treelake	432	100-Year	706.00	192.83	195.64	195.02	196.11	0.015989	5.54	128.51	58.84	0.63
Treelake	Treelake	420	100-Year	706.00	192.59	195.52	194.78	195.92	0.013532	5.14	138.92	66.19	0.58

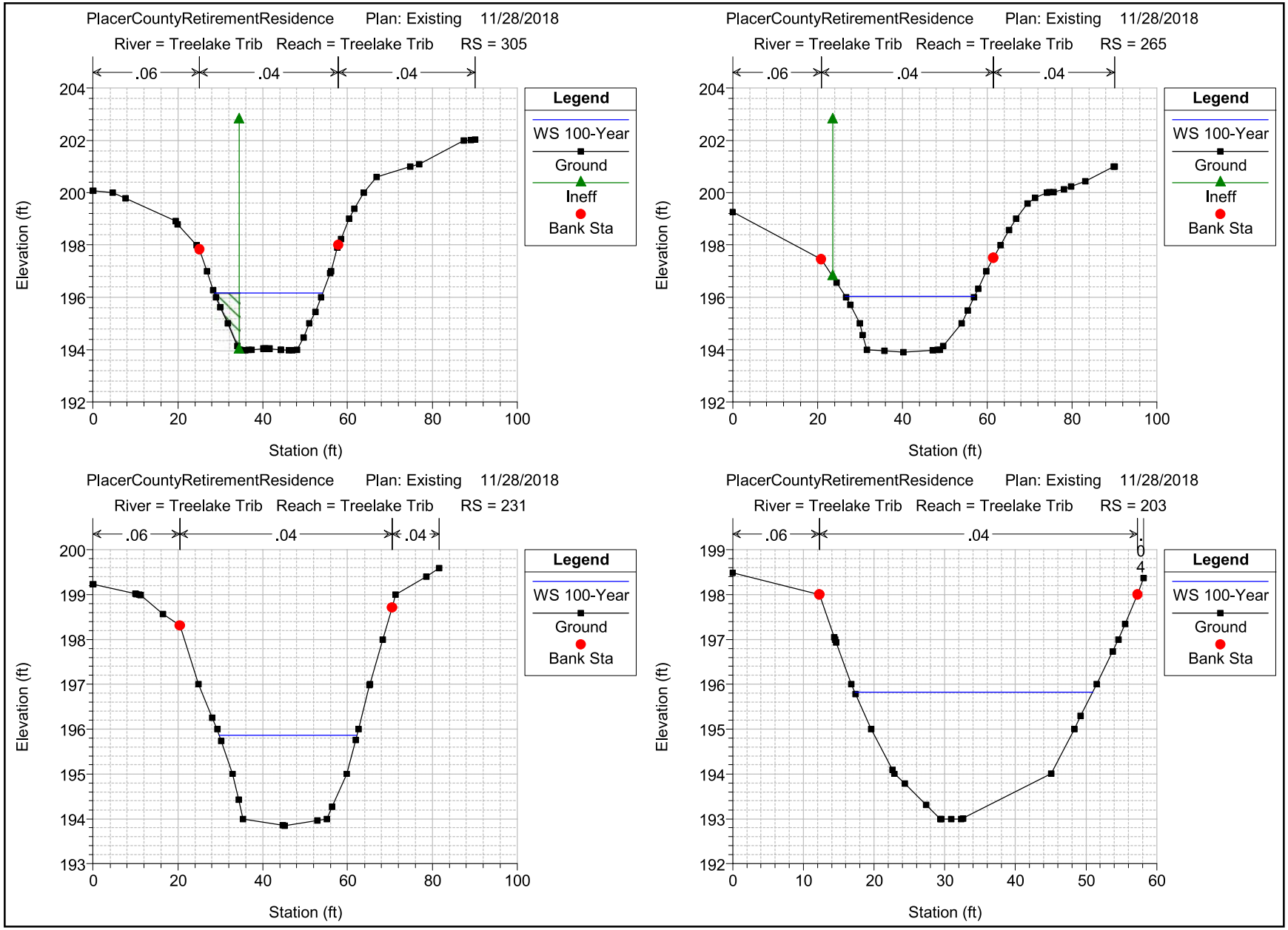
PRE-PROJECT CONDITION HEC-RAS CROSS SECTIONS

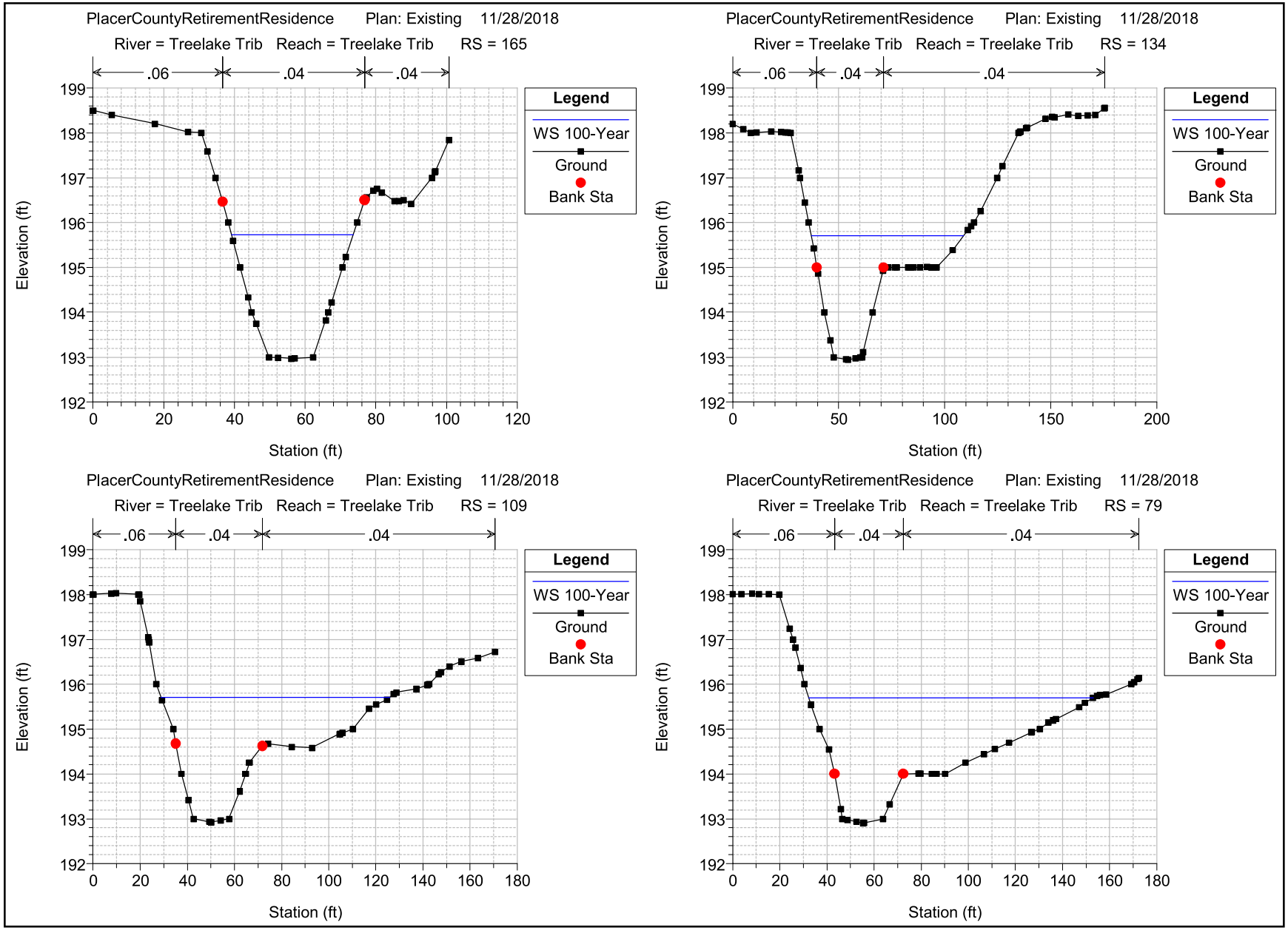

PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake Reach = Treelake RS = 452
.04
.06
.04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

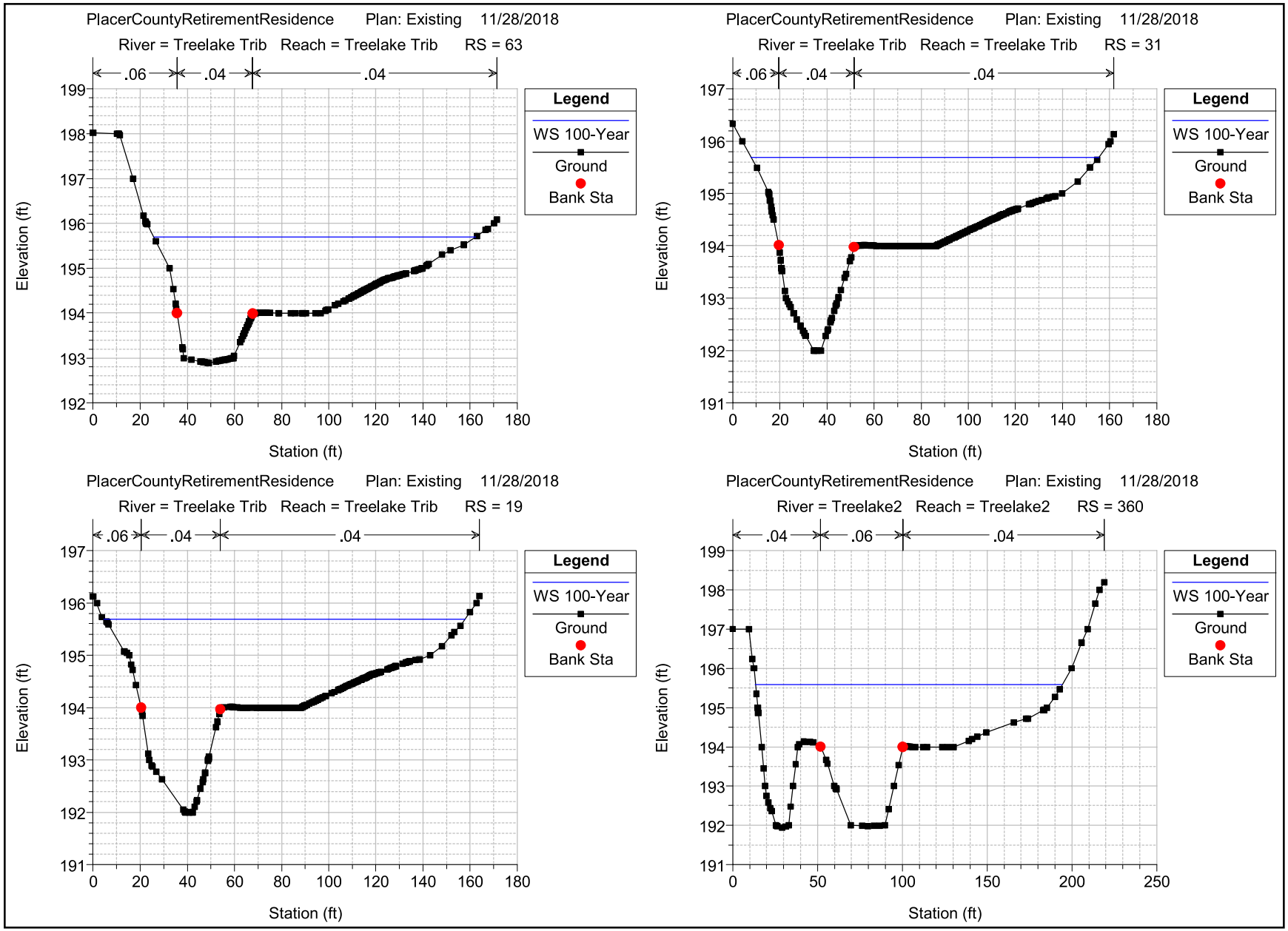

PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake Reach = Treelake RS = 432
.04
.06
.04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

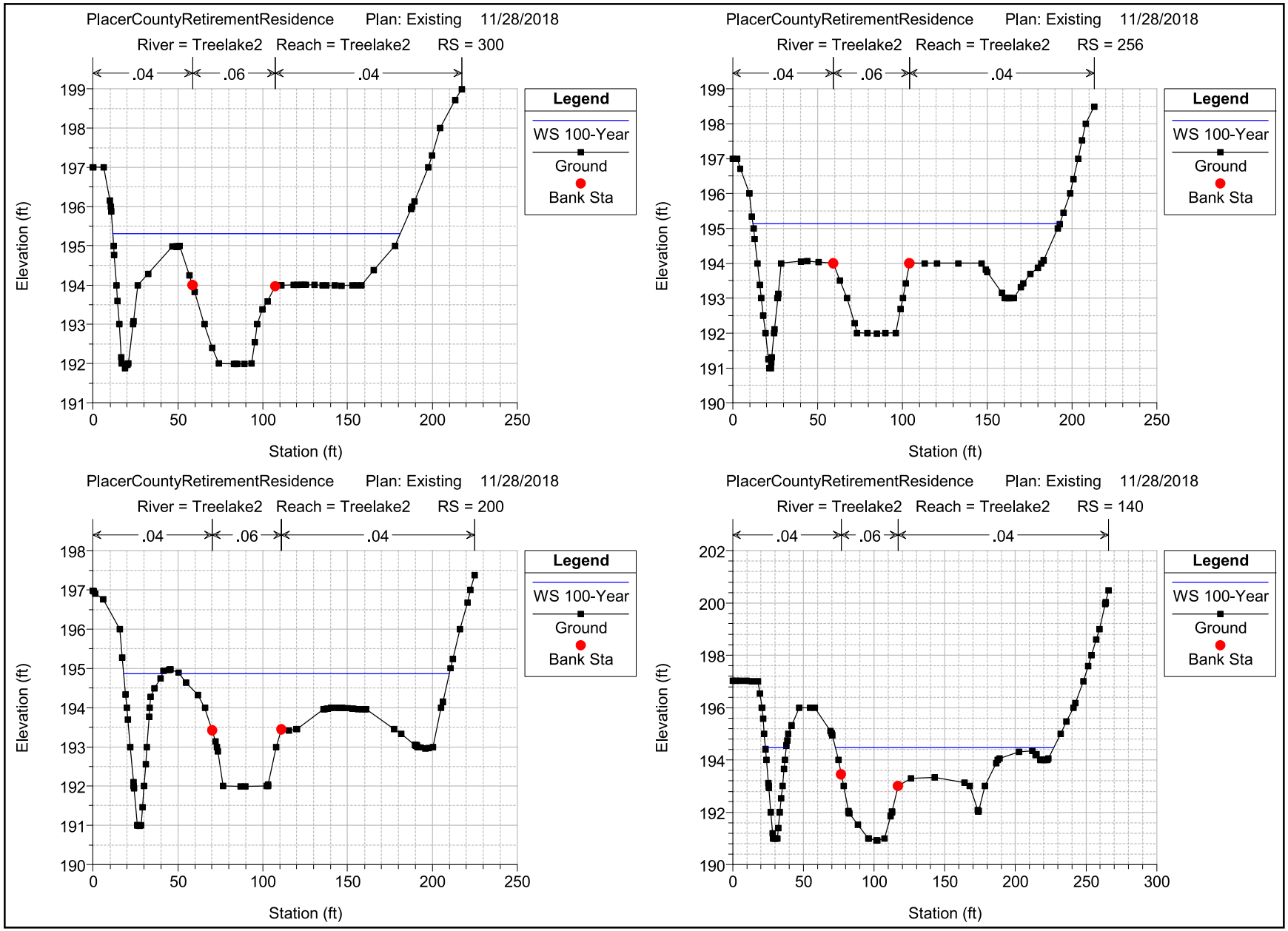

PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake Reach = Treelake RS = 420
.04
.06
.04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

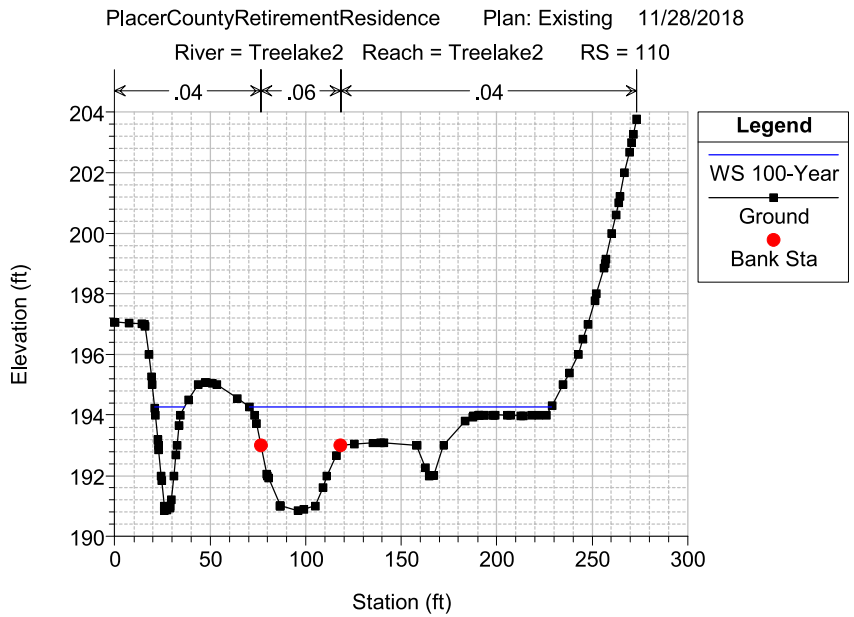

PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 366
.06
.04
.06
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

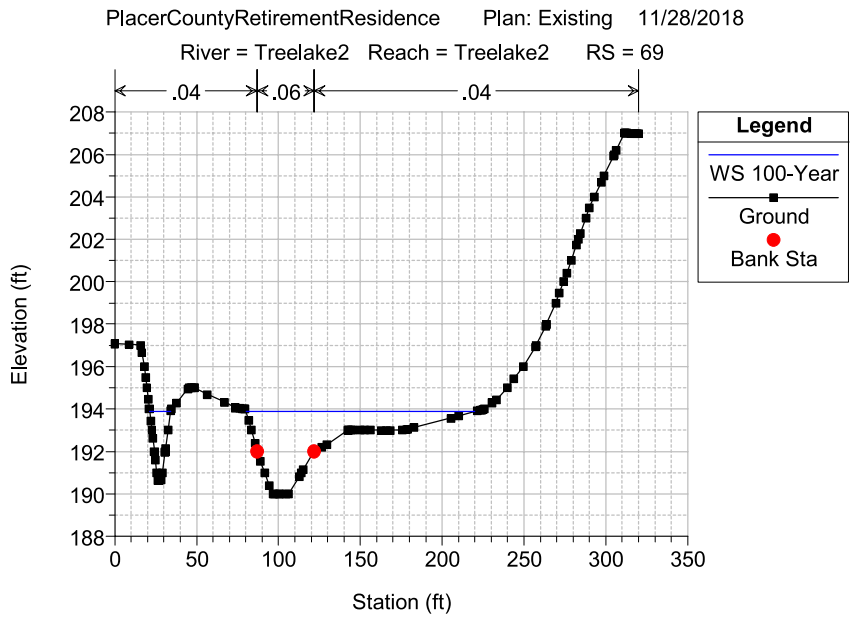

PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 305
.06
.04
.04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 265
.06
.04
.04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 231
.06
.04
.04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 203
.06
.04
.04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)

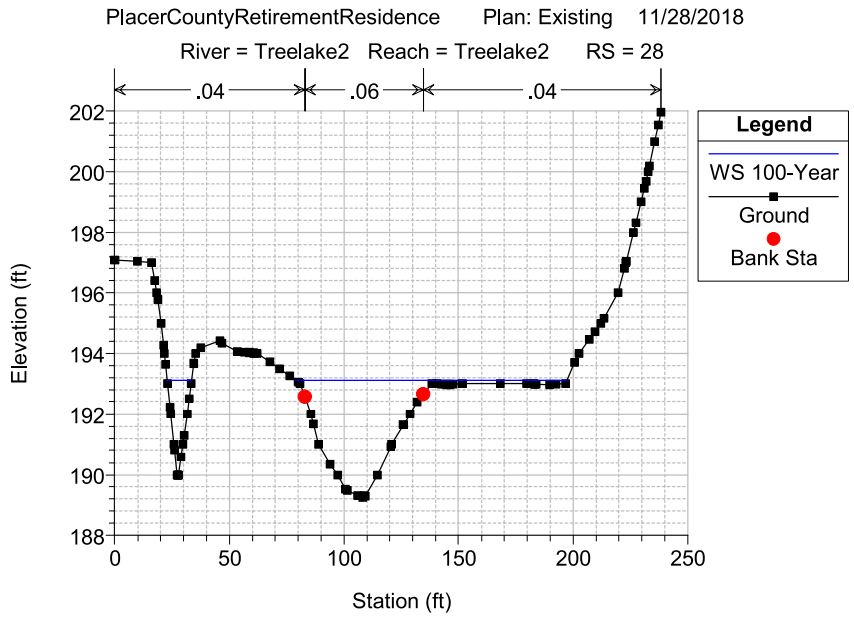

PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 165
.06
.04
.04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 134
.06
.04
.04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 109
.06
.04
.04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 79
.06
.04
.04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)


PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 63
.06 .04 .04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 31
.06 .04 .04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 19
.06 .04 .04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake2 Reach = Treelake2 RS = 360
.04 .06 .04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)

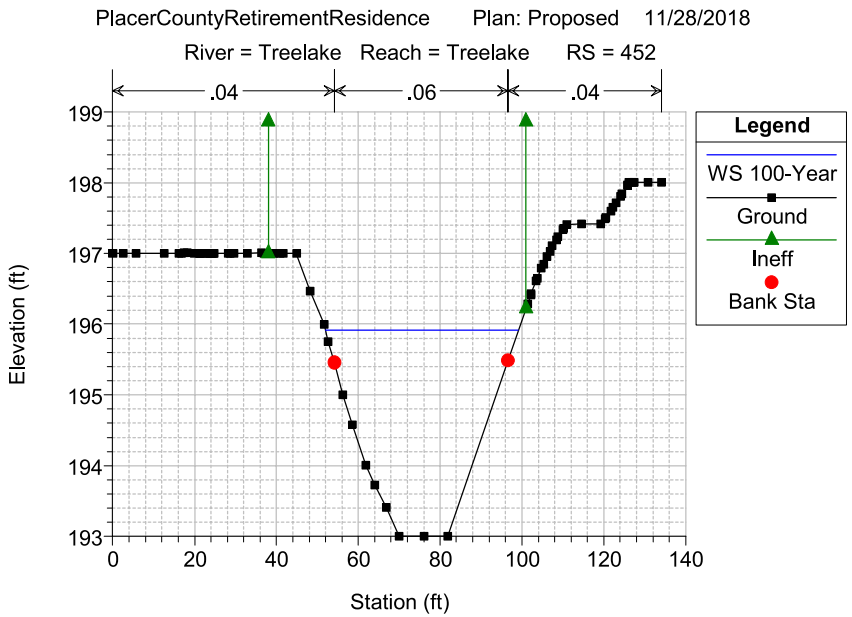

PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake2 Reach = Treelake2 RS = 300
.04 .06 .04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake2 Reach = Treelake2 RS = 256
.04 .06 .04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake2 Reach = Treelake2 RS = 200
.04 .06 .04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake2 Reach = Treelake2 RS = 140
.04 .06 .04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)

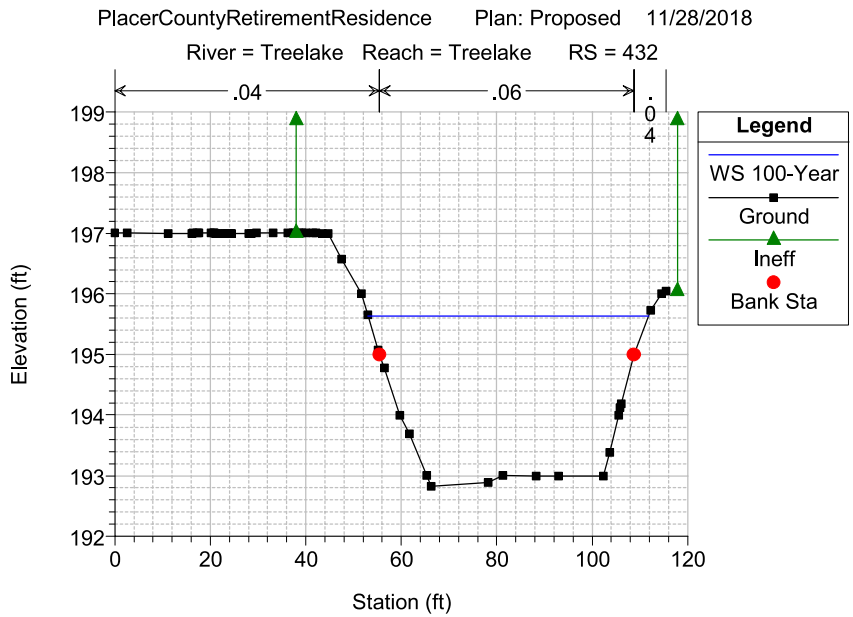

PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake2 Reach = Treelake2 RS = 110
.04
.06
.04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)

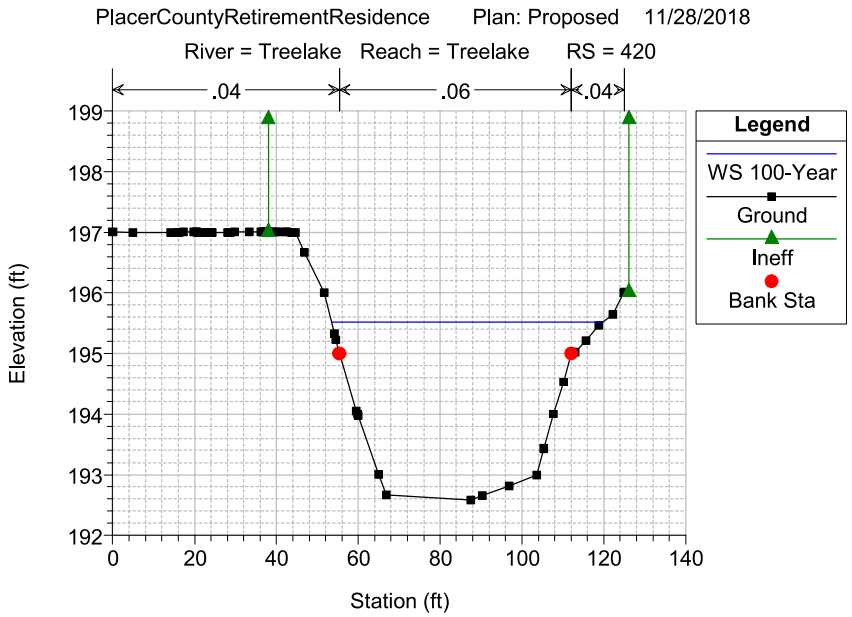

PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake2 Reach = Treelake2 RS = 69
.04
.06
.04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)

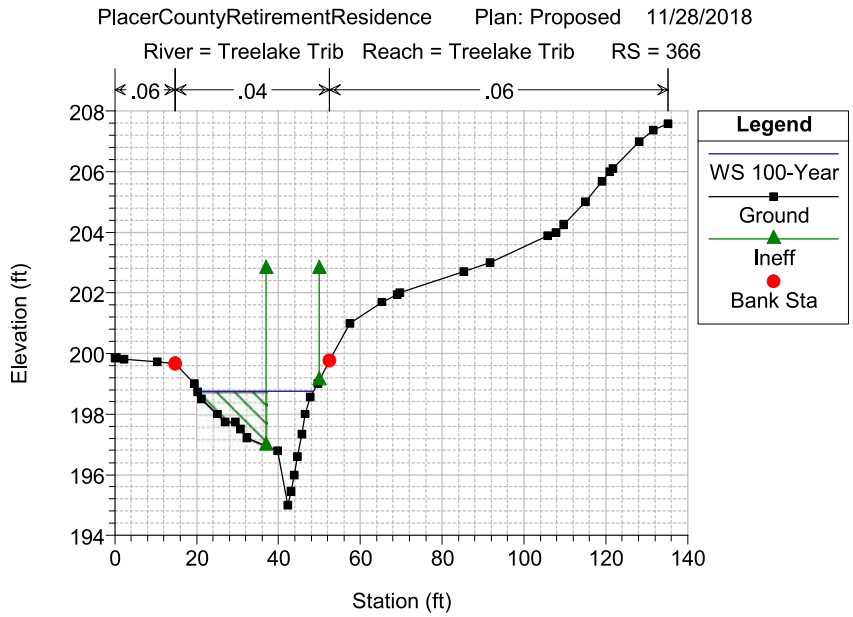

PlacerCountyRetirementResidence Plan: Existing 11/28/2018
River = Treelake2 Reach = Treelake2 RS = 28
.04
.06
.04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)

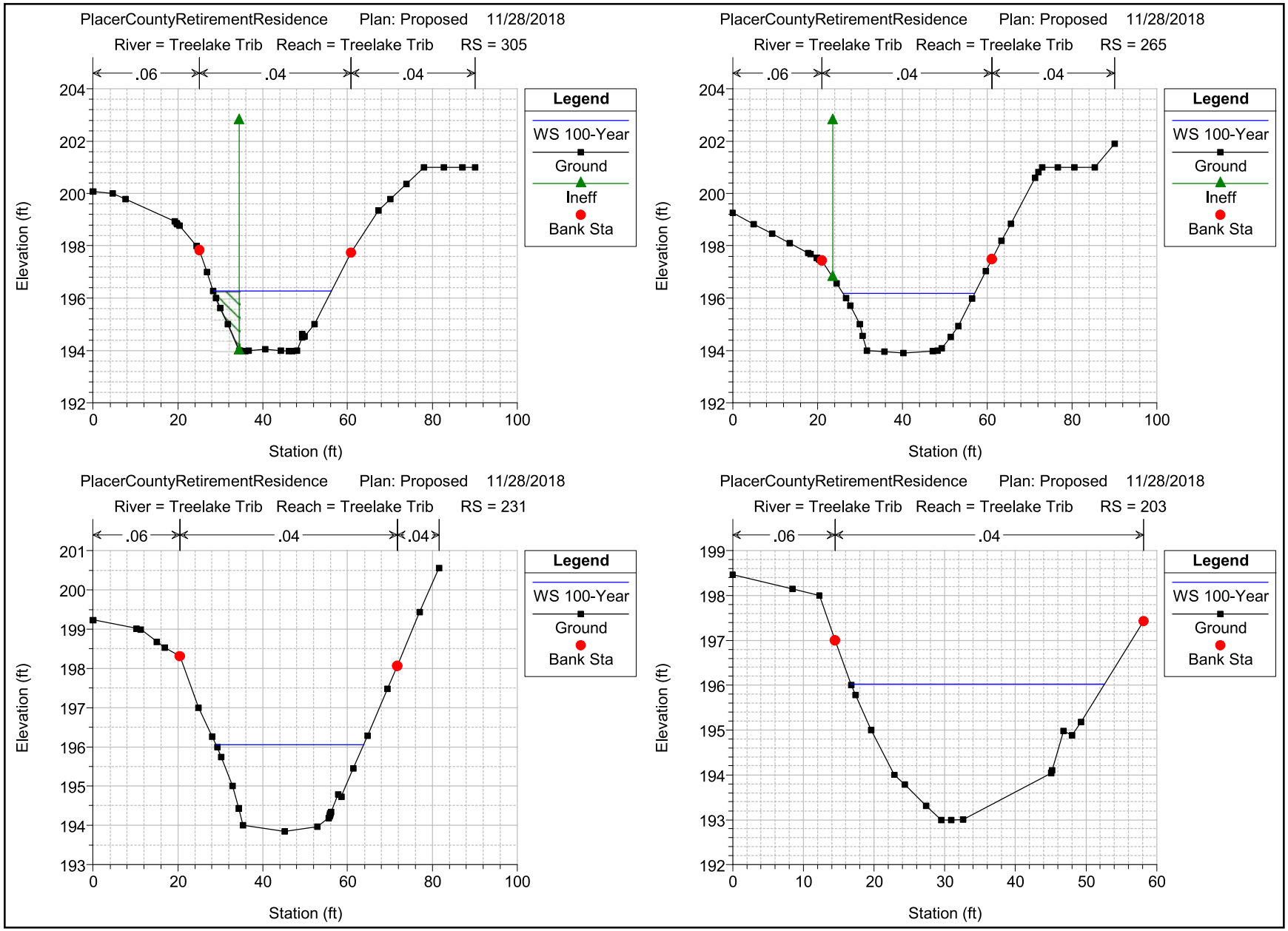
POST-PROJECT CONDITION HEC-RAS CROSS SECTIONS

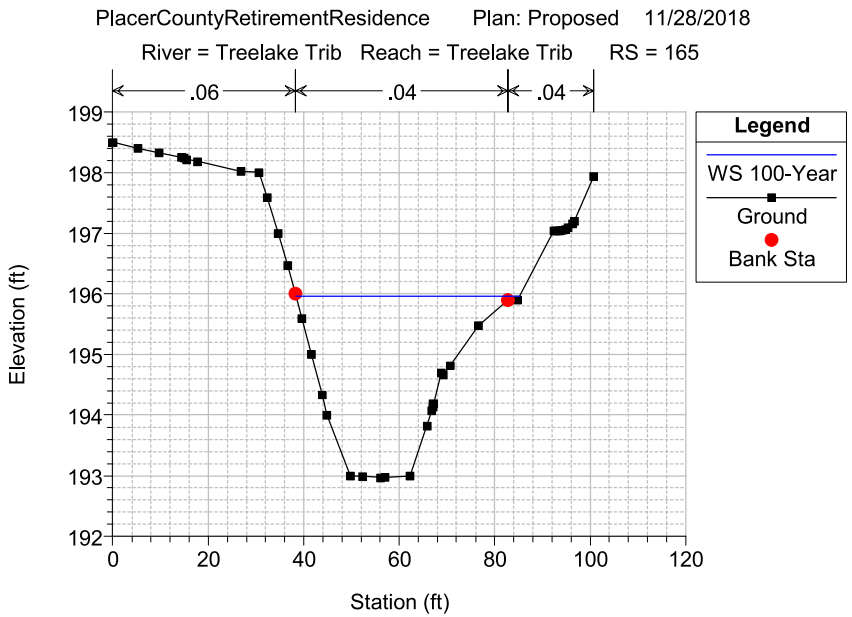

PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake Reach = Treelake RS = 452
.04
.06
.04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

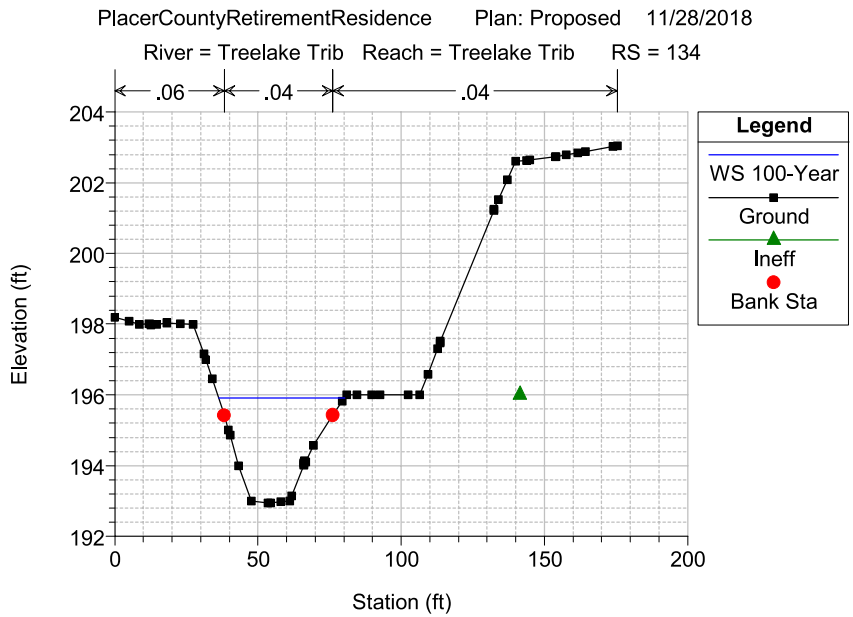

PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake Reach = Treelake RS = 432
.04
.06
.04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

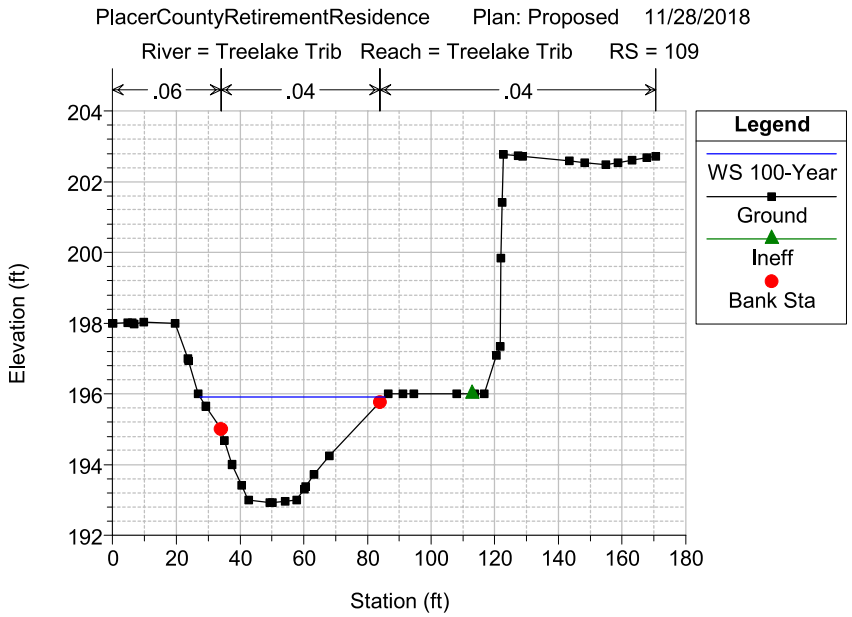

PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake Reach = Treelake RS = 420
.04
.06
.04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

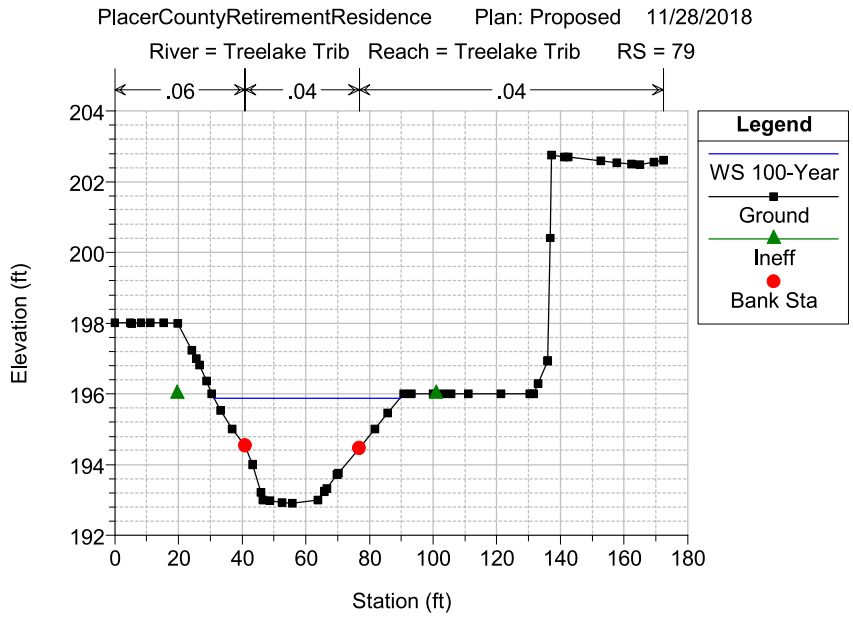

PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 366
.06
.04
.06
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

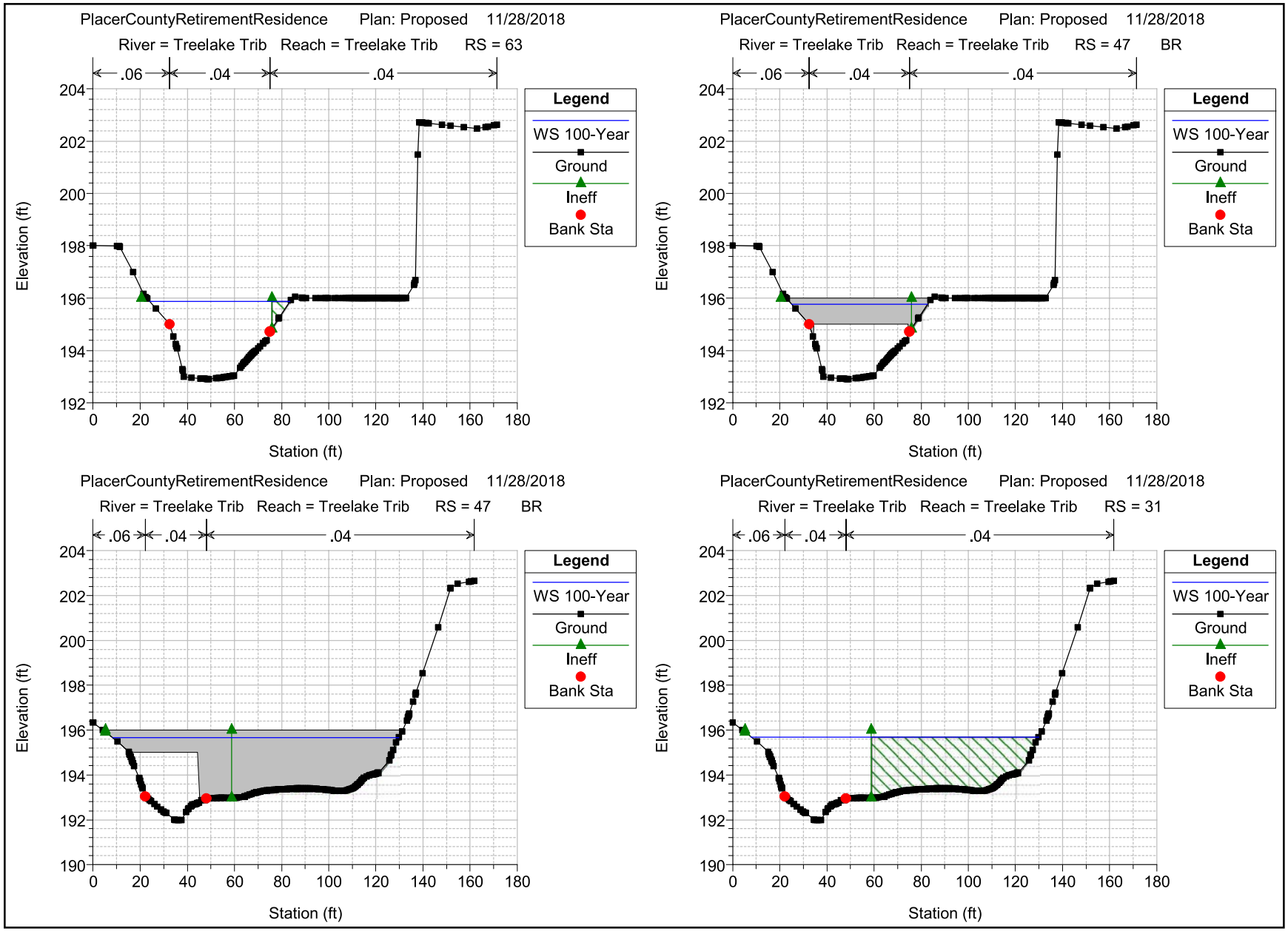

PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 305
.06
.04
.04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 265
.06
.04
.04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 231
.06
.04
.04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 203
.06
.04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)

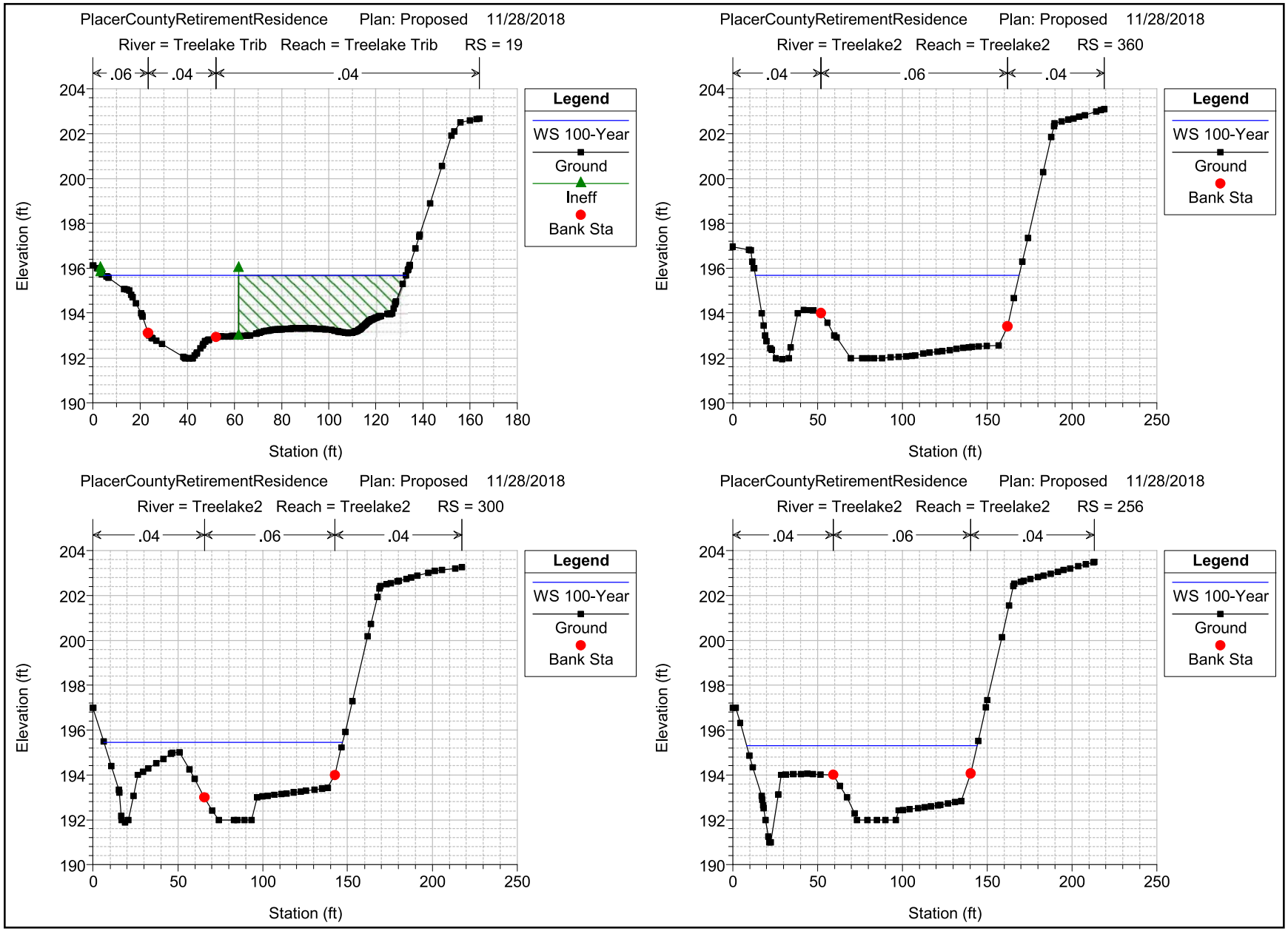

PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 165
.06
.04
.04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)

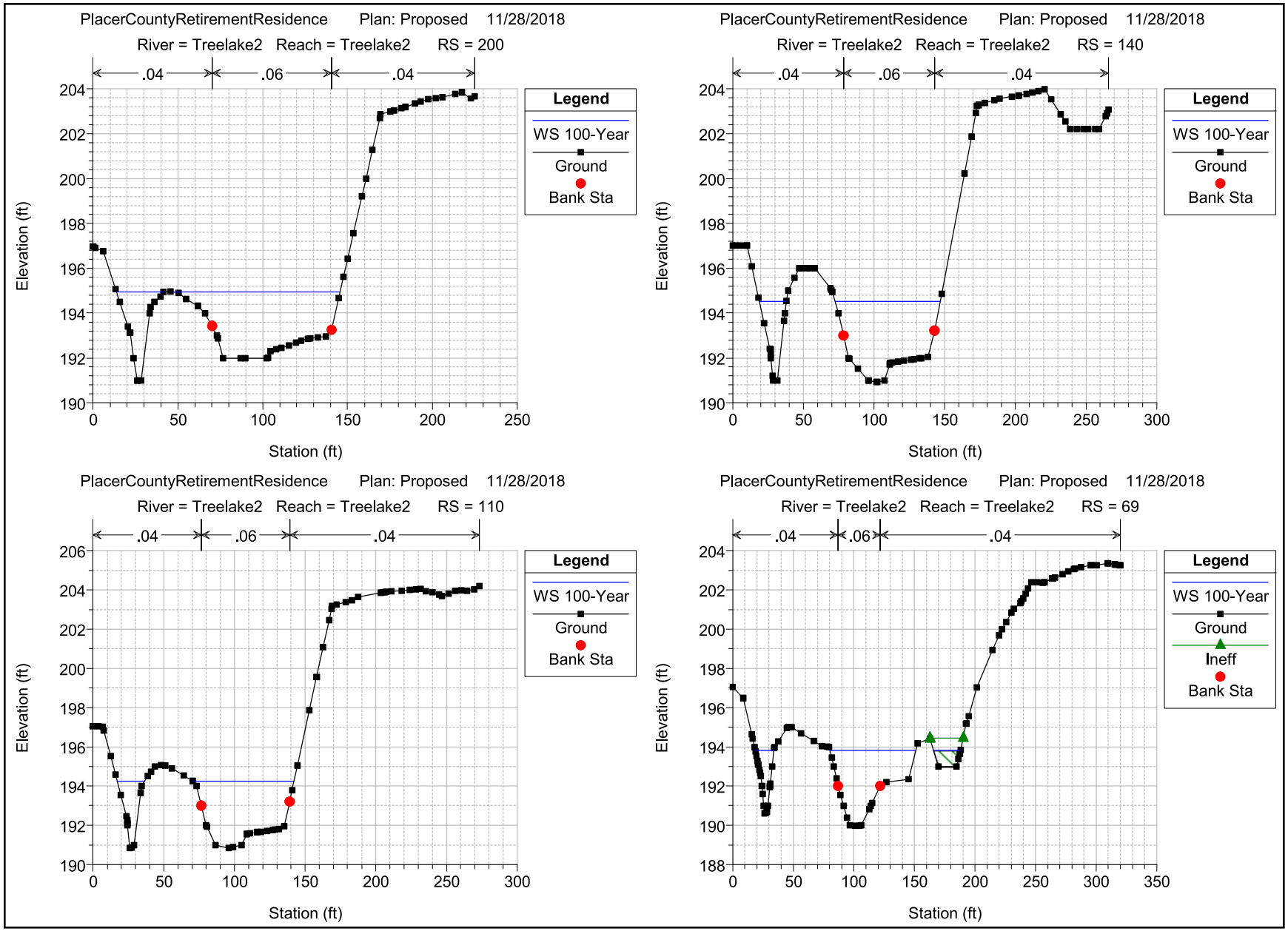

PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 134
.06
.04
.04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 109
.06
.04
.04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 79
.06
.04
.04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

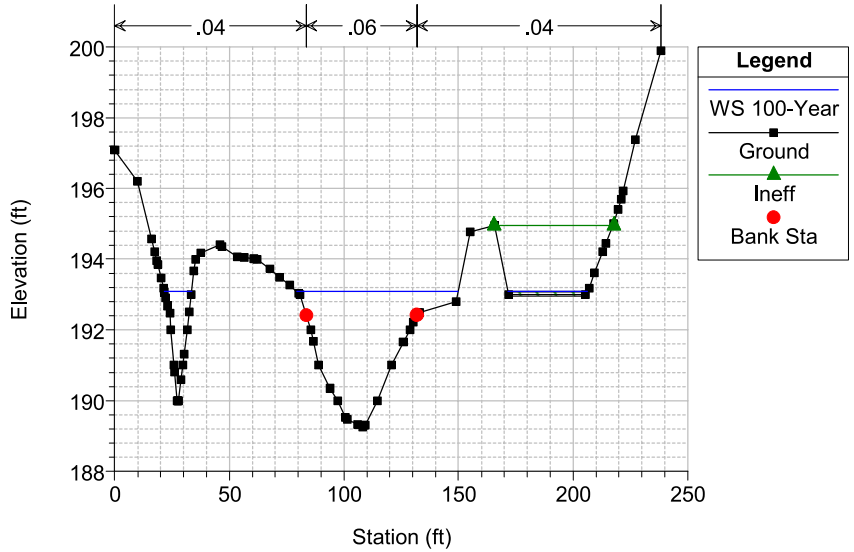

PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 63
.06
.04
.04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 47 BR
.06
.04
.04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 47 BR
.06
.04
.04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 31
.06
.04
.04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake Trib Reach = Treelake Trib RS = 19
.06 .04 .04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake2 Reach = Treelake2 RS = 360
.04 .06 .04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake2 Reach = Treelake2 RS = 300
.04 .06 .04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake2 Reach = Treelake2 RS = 256
.04 .06 .04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)


PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake2 Reach = Treelake2 RS = 200
.04 .06 .04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake2 Reach = Treelake2 RS = 140
.04 .06 .04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake2 Reach = Treelake2 RS = 110
.04 .06 .04
Legend
WS 100-Year
Ground
Bank Sta
Elevation (ft)
Station (ft)
PlacerCountyRetirementResidence Plan: Proposed 11/28/2018
River = Treelake2 Reach = Treelake2 RS = 69
.04 .06 .04
Legend
WS 100-Year
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

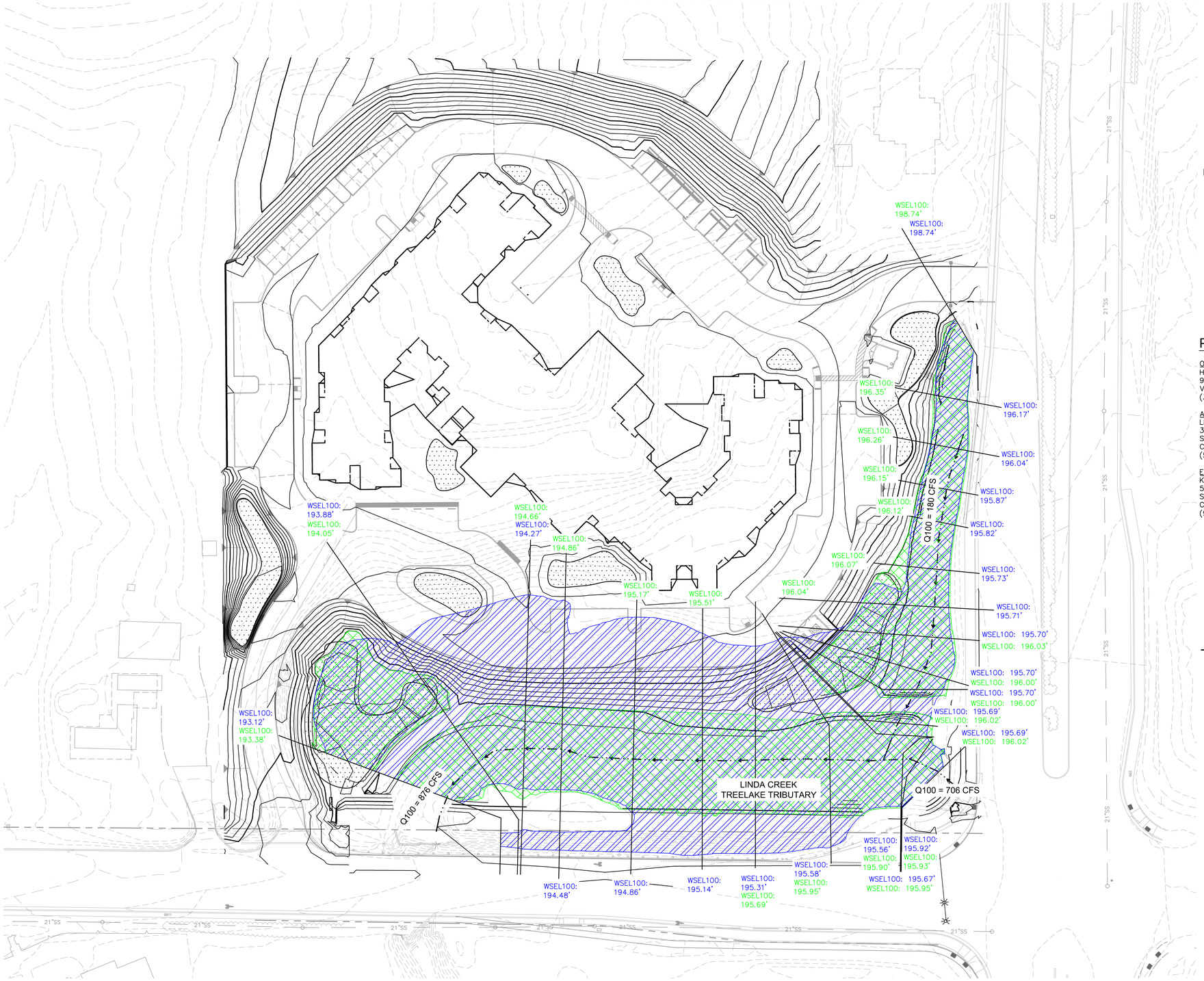
PlacerCountyRetirementResidence Plan: Proposed 11/28/2018

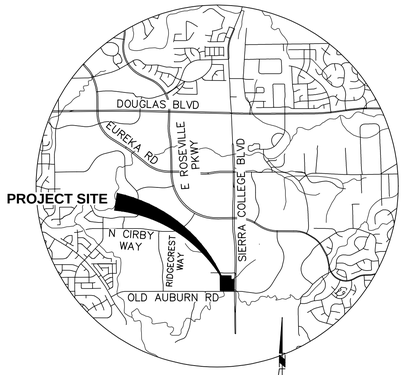
River = Treelake2 Reach = Treelake2 RS = 28



PROPOSED FULL FRONTAGE 100 YEAR FLOODPLAIN FOR PLACER RETIREMENT RESIDENCE

OLD AUBURN ROAD
NOVEMBER 2018





VICINITY MAP
NTS

PROJECT INFORMATION:

OWNER / DEVELOPER
HAWTHORN DEVELOPMENT, LLC
9310 NE VANCOUVER MALL DR., SUITE 200
VANCOUVER, WA 98662
(360) 213–1550

ARCHITECT
LENITY ARCHITECTURE
3150 KETTLE COURT SE
SALEM, OR 97301
CONTACT: SAM THOMAS
(503) 399–1090

ENGINEER
KIMLEY–HORN AND ASSOCIATES, INC.
555 CAPITOL MALL, SUITE 300
SACRAMENTO, CA 95814
CONTACT: MARVIN MARSHALL, P.E.
(916) 858–5800

LEGEND:

- EXISTING 100 YEAR FLOODPLAIN
- CHANNEL CROSS SECTION
- CONCENTRATED FLOW
- WSEL100: 195.33' — EXISTING 100 YEAR WATER SURFACE ELEVATION IN CHANNEL
- PROPOSED FULL FRONTAGE 100 YEAR FLOODPLAIN
- WSEL100: 195.73' — PROPOSED FULL FRONTAGE 100 YEAR WATER SURFACE ELEVATION IN CHANNEL

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80

Kimley»Horn

Engineering, Planning, and Environmental Consultants

555 Capitol Mall, Suite 300
Sacramento, CA 95814
www.kimley-horn.com

Tel. No. (916) 858–5800

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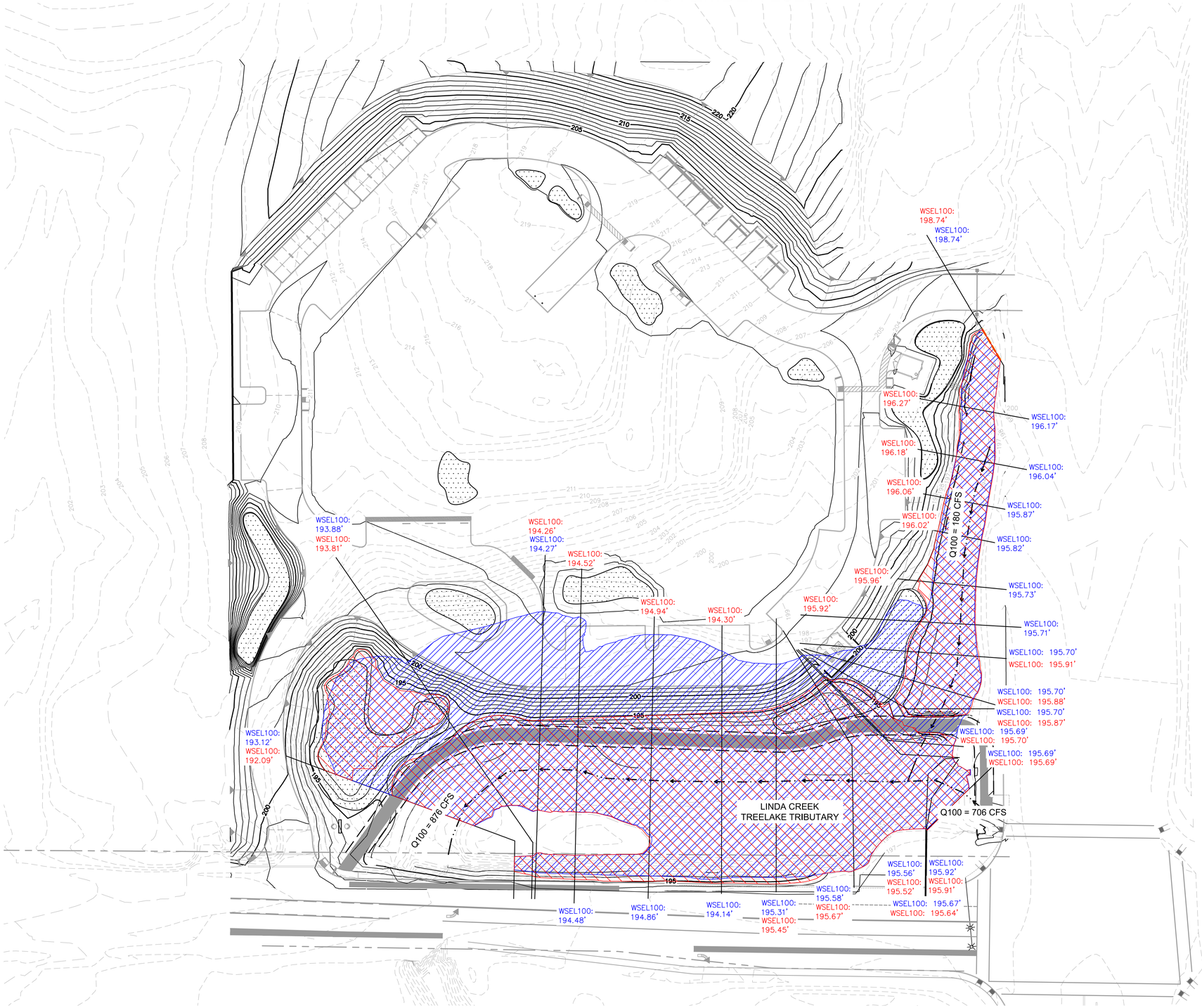
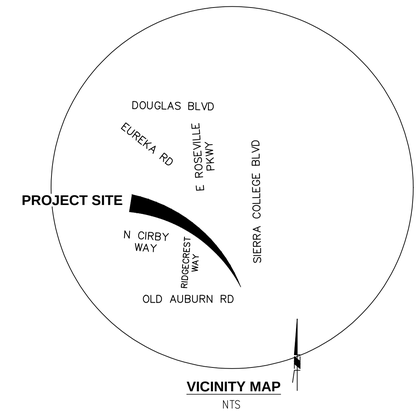
PROPOSED 100 YEAR FLOODPLAIN FOR PLACER RETIREMENT RESIDENCE

OLD AUBURN ROAD
NOVEMBER 2018





VICINITY MAP
NTS

PROJECT INFORMATION:

OWNER / DEVELOPER
HAWTHORN DEVELOPMENT, LLC
9310 NE VANCOUVER MALL DR., SUITE 200
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KIMLEY–HORN AND ASSOCIATES, INC.
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CONTACT: MARVIN MARSHALL, P.E.
(916) 858–5800

LEGEND:

- EXISTING 100 YEAR FLOODPLAIN
- CHANNEL CROSS SECTION
- CONCENTRATED FLOW
- WSEL100: 195.33' — EXISTING 100 YEAR WATER SURFACE ELEVATION IN CHANNEL
- PROPOSED 100 YEAR FLOODPLAIN
- WSEL100: 195.73' — PROPOSED 100 YEAR WATER SURFACE ELEVATION IN CHANNEL

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80

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Sacramento, CA 95814
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