UPPER GUADALUPE RIVER
FLOOD RISK MANAGEMENT PROJECT
San José, California

Civil Design

Appendix A3

DRAFT INTEGRATED
GENERAL REEVALUATION REPORT
& SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

November 2022

US Army Corps
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Upper Guadalupe River, Santa Clara County, San Jose
Flood Risk Management

US Army Corps
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San Francisco District

Oct 2022

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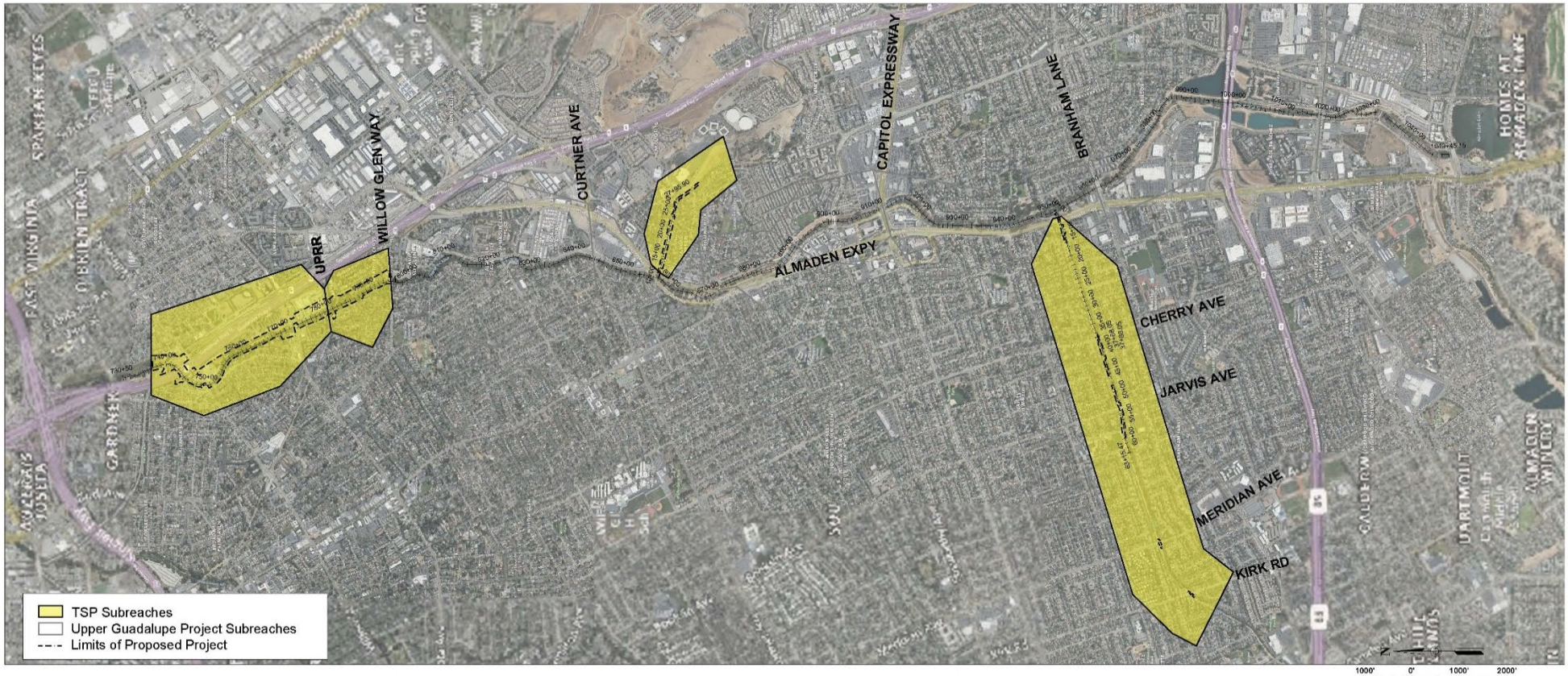

COMBO PLAN OVERVIEW
SCALE: 1" = 1000'

FIGURE 1: PROJECT LOCATION AND VICINITY MAP

1.0 GENERAL

This appendix documents the Civil Design portion of the engineering analysis. The Upper Guadalupe River Project is part of a larger system of projects to provide flood risk reduction and other benefits to the Guadalupe River watershed. The watershed consists of several reservoirs in the upper portion and four civil works projects along the Guadalupe River. The Upper Guadalupe Project covers approximately 5.5 miles of the Guadalupe River, which has been divided into segments or "reaches". The stationing of the alignment is based on the centerline of the Guadalupe River channel. The sequence of the stationing and reach number are assigned downstream to an upstream direction. The final alternative, a Combination EWN and Traditional FRM, consists of Reach 7, Reach 8, Canoas Creek, and Ross Creek (See Figure 1). Design guides for the design of floodwalls and floodgates include EM-1110-2-2000, Standard Practice for Concrete for Civil Works Structures, and ER 1110-2-1150, Engineering and Design for Civil Works Projects.

1.1 ABBREVIATIONS AND NAMES

CE/ICA - Cost Effectiveness/ Incremental Cost Analysis
CY – CUBIC YARD
EA – EACH
EJ – ENVIRONMENTAL JUSTICE
EWN – ENGINEERING WITH NATURE
FRM – FLOOD RISK MANAGEMENT
FT – FEET
H&H – HYDRAULIC AND HYDROLOGY
H:V – HORIZONTAL:VERTICAL
NAD88 – North American Datum of 1983
NAVD88 – North American Vertical Datum of 1988
NED – NATIONAL ECONOMIC DEVELOPMENT
OSE – OTHER SOCIAL EFFECTS
SQ-FT – SQUARE FEET
TSP – TENTATIVELY SELECTED PLAN

1.2 PROJECT-SPECIFIC REFERENCES

ER 1105-2-101 Risk Assessment for Flood Risk Management, July 2019
ER 1110-2-1150, Engineering and Design for Civil Works Projects, August 1999
EM-1110-2-2000, Standard Practice for Concrete for Civil Works Structures, March 2001

1.3 PROJECT ALTERNATIVES

The Upper Guadalupe River contains Reaches 7 through 12. The initial nine alternatives range from designs which evaluate the existing conditions to re-designing the Upper Guadalupe River to explore flood risk management (FRM). The final array included 8 alternatives that included no-action plan to re-evaluating previous designs and the proposed plan going forward will include Engineering with Nature (EWN) and Environmental Justice (EJ) along with key focuses that address the needs of the community.

A Hydraulic and Hydrology (H&H) engineer developed a HEC-RAS model that simulates the hydraulic water flows of the Upper Guadalupe River. The model was used to simulate 25-year, 50-year, and 100-year flows to determine the next course of action. The findings from the model were inputted into developing the Cost Effectiveness/Incremental Cost Analysis (CE/ICA). The CE/ICA software utilized two inputs, the construction cost estimate of the individual subreaches and the benefits each subreach

produces. The final list of the array of alternatives includes the Valley View Plan (NED Plan from 1998), Bypass Channel Plan (Locally Preferred and Authorized Plan), Lower Scope FRM with EWN, and Traditional FRM Features with EWN. These alternatives were then compared based on their efficiencies to provide the highest benefits and opportunities, their cost effectiveness, and their support to combat other social effects (OSE) for the community. For the detailed analyses, evaluations, and processes utilized for the comparison of the alternatives that resulted in the selection of the TSP, refer to Section 6 of the main report (Plan Comparison and Selection) and the Economic Appendix.

1.4 TENTATIVELY SELECTED PLAN (TSP)/RECOMMENDED PLAN

The tentatively selected plan (TSP) was the Combination EWN and Traditional FRM which features channel widening, additional culverts and replacements, bridge expansion and rehabilitation, gravel augmentation, floodwalls, and flood warning systems. This alternative consists of improvements on subreaches 7, 8, Canoas Creek and Ross Creek. Additional environmental benefits to this alternative are the use of mitigation islands and permanent placement areas along Reach 7 and 8 to reduce the distance traveled to the landfill. The mitigation islands also allow for existing habitats to remain intact. Not only does the TSP provide flood risk reduction utilizing EWN components, but it is also economically justified by combating the areas that are more socially vulnerable flood impacted areas. Like all Corps projects, the design approaches used in this project are made in strict conformance with the applicable USACE regulatory and engineering guidelines required for all the engineering products. The proposed design features described in the following paragraphs provide sufficient details to inform the feasibility phase effort during the analyses and final determination of the tentatively selected plan (TSP).

1.4.1 REACH 7

Reach 7 (STA 741+00 to STA 781+00) is approximately 3,845-ft in length that spans from an active Caltrain bridge crossing to an abandoned UPRR bridge.

The Caltrain bridge will be extended to encompass the proposed widening of the Guadalupe River. The design for the Caltrain bridge extension will be in coordination with Valley Water/UPRR going forward. The bridge is currently being designed for rehabilitation by Valley Water due to fire damage. The expansion design will include the new bridge design and will be designed and reviewed by a structural engineer.

The proposed design for Guadalupe River includes widening the eastern bank and implementing a new bypass channel at the Caltrain crossing. The expanded floodplain will include a maintenance road with access ramps at crossing, gravel augmentation and a pilot channel which will allow low-flow activities. The extended 50-ft wide floodplain will have a gradual 2% slope towards the existing channel which consists of riparian vegetation. The extended floodplain allows the low-flow channel and the natural mitigation islands to help reducing high velocity flow. These mitigation islands will also reduce the environmental impact by reducing truck trips to landfill. The 18-ft wide maintenance road will be located at the toe of the new eastern channel embankment which can be accessed by the new ramp. The 2H:1V side slopes will be stabilized by natural planting.

At Willow Street Crossing and Alma Avenue Crossing, new bridges and bypasses have been proposed at both locations. These bypass channels allow connection to existing channels without disruption to the structural integrity of the bridges. As mentioned, there are 2 proposed permanent placement sites within Reach 7: Willow Street/Lelong Street and W Alma Avenue (Elks Lodge). These sites will act as a temporary staging and lay-down areas reducing truck trips to transport earthwork and environmental

impacts during construction. Cross Sections have been created throughout Reach 7 to illustrate the proposed design (See Figure 2).

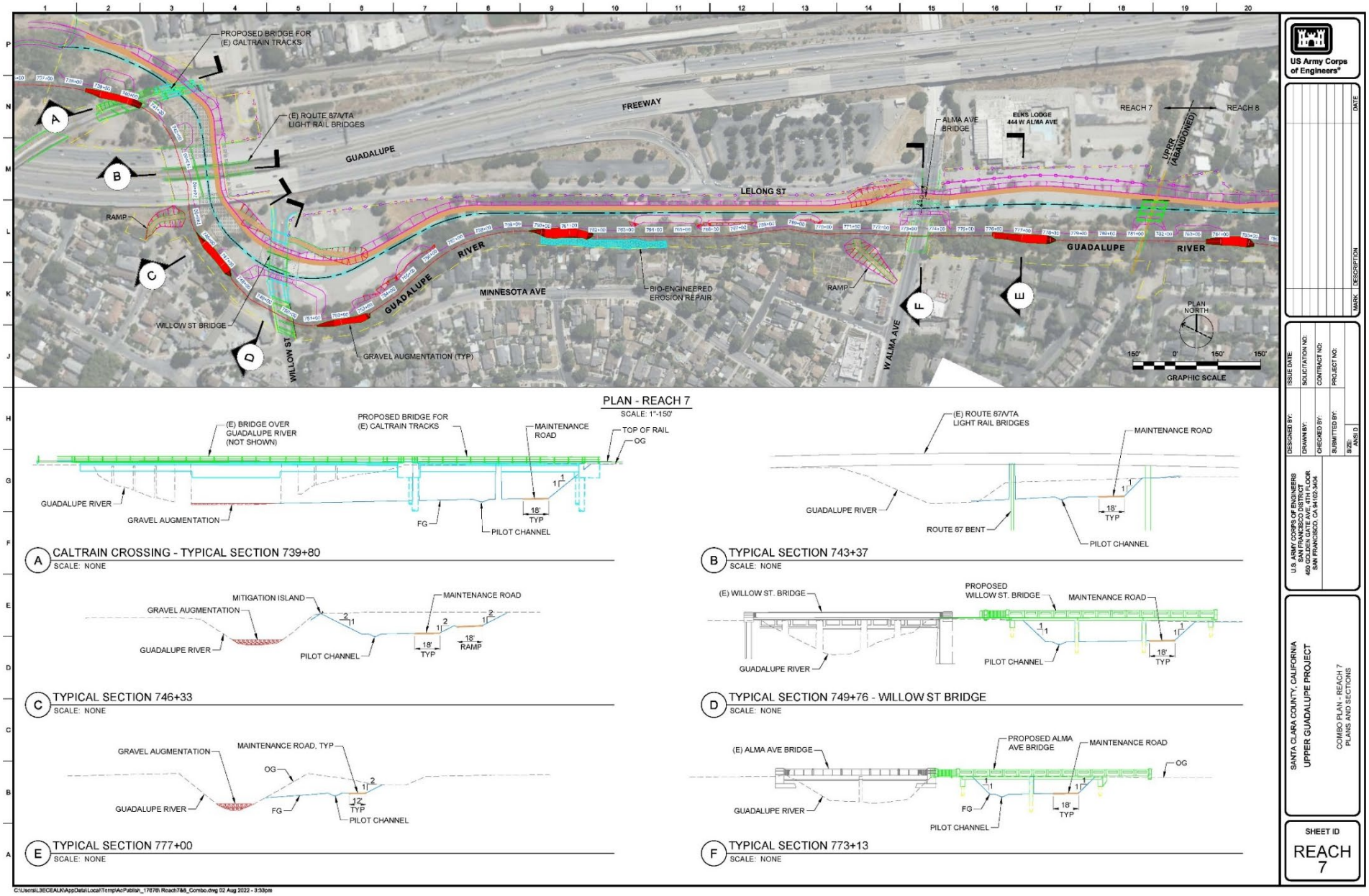

FIGURE 2: REACH 7 CROSS SECTIONS

1.4.2 REACH 8

Reach 8 (STA 781+00 to STA 795+00) is a continuation of the widen channel from the previous reach. The proposed design for the Reach 8 will include widening of the eastern bank and creating a bypass channel with the use of natural mitigation islands. The abandoned UPRR Bridge will be rehabilitated to provide recreation access and connectivity across the Guadalupe River. In addition, a new 3-cell box culvert will be installed below the existing UPRR tracks adjacent to the existing bridge. The widened portion of the design will consist of an expanded floodplain with maintenance road and access ramp, rip rap and a pilot channel for low flow activities. The bypass portion of the design will consist of an adjacent channel, separated by a mitigation island, with a maintenance road, access ramp, and a pilot channel to allow for low flow activities. The permanent placement site within Reach 8 is along Mackey Avenue. Cross Sections have been created throughout Reach 8 to illustrate the proposed design (See Figure 3).

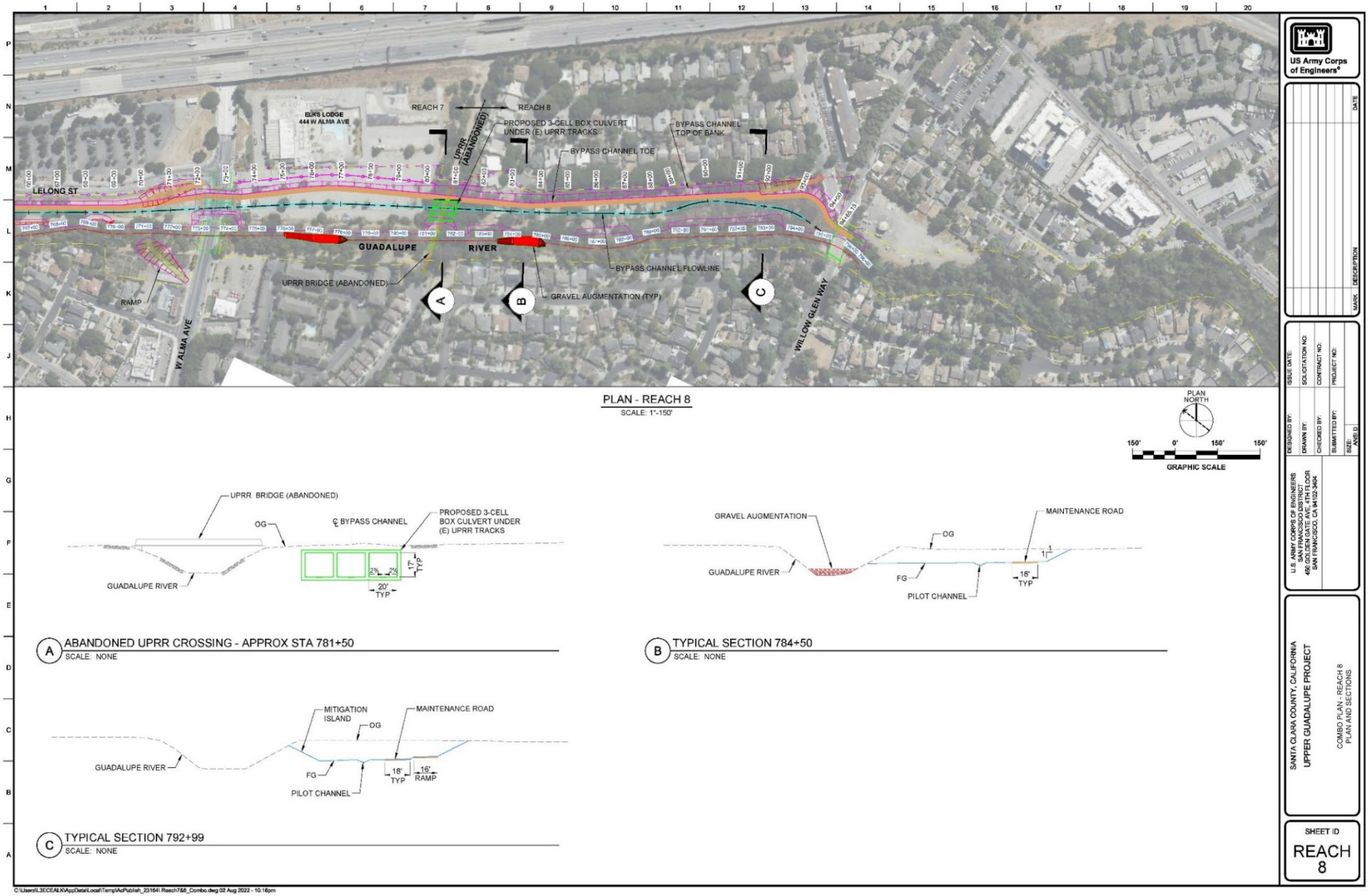

FIGURE 3: REACH 8 CROSS SECTIONS

1.4.3 CANOAS CREEK

The improvements for Canoas Creek spans from Almaden Expressway to Nightingale Drive. The design consists of widening the channel on the eastern bank. Floodwalls on top of existing levees will be implemented along Canoas Creek. The proposed design at both Almaden Expressway and Nightingale Drive Crossing is to install an additional culvert adjacent to the existing culverts. At Almaden Expressway Culvert Crossing, a new box culvert will be constructed on the northern side adjacent to the existing double culverts. While the new box culvert at Nightingale Drive Crossing will be built on the southern side adjacent to the existing double culverts. New northern wingwall at Almaden Expressway and new southern wingwall at Nightingale Drive will be built to incorporate the additional culverts. Utilities will be protected and adjusted in coordination with implementing these new culverts at both locations. Floodwalls are proposed along both creek banks (each floodwall approximately 2800-ft in length) to increase the channel height. Floodwall heights varies between 4-ft to 6-ft from existing grade. The south bank floodwalls are extended approximately 650-ft passing Nightingale Drive to incorporate concerns during HEC-RAS modeling. Cross Sections have been created at Canoas Creek to illustrate the proposed design (See Figure 4).

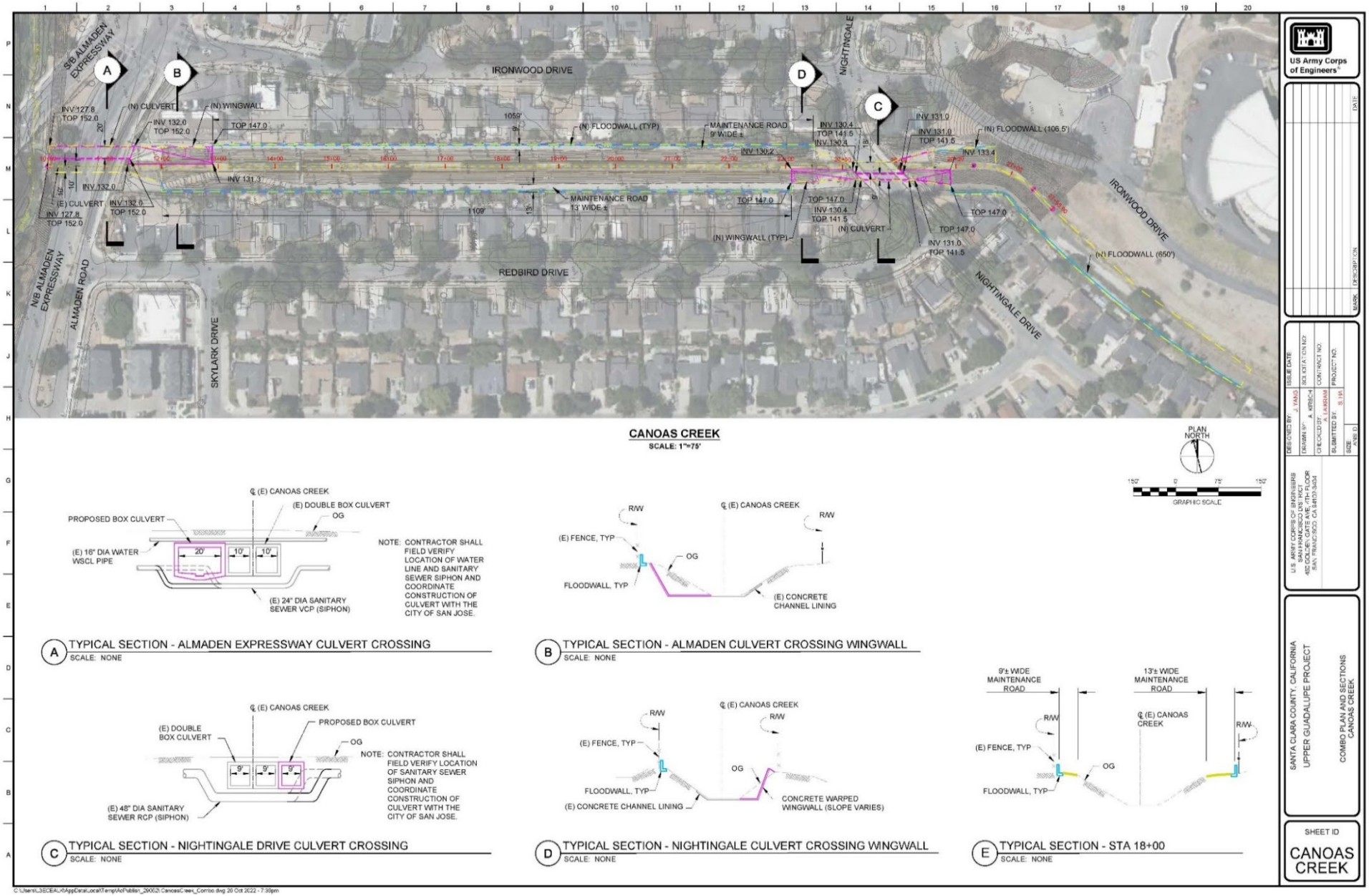

FIGURE 4: CANOAS CREEK CROSS SECTIONS

1.4.4 ROSS CREEK

Culverts at Almaden Expressway, Cherry Avenue, Jarvis Avenue, Meridian, and Kirk Road are being widened to help with the flood risk reduction along Ross Creek. A new adjacent box culvert will be implemented at Almaden Expressway, Cherry Avenue, Jarvis Avenue, and Kirk Road each. The culvert at Meridian Avenue will be replaced with a 3-box culvert. The wingwalls at all expanded crossings will be updated to incorporate the new culverts. Floodwalls are proposed along both creek banks near culverts. At Almaden Crossing, the floodwalls on north side will approximately be 325-ft from Briarglen Drive, while south side floodwalls will be 125-ft from Briarglen Drive. At Cherry Avenue Crossing, floodwalls on north side will be placed approximately 712-ft upstream from Cherry Avenue, while floodwalls on south side will run approximately 359-ft upstream from Cherry Avenue. At Jarvis Avenue Crossing, floodwalls on north side are 516-ft (upstream) and 334-ft (downstream), while floodwalls on south side are approximately 530-ft upstream from Jarvis Avenue. The floodwall heights will be approximately 6-ft from existing grade. Cross Sections have been created along Ross Creek to illustrate the proposed designs (See Figure 5-8).

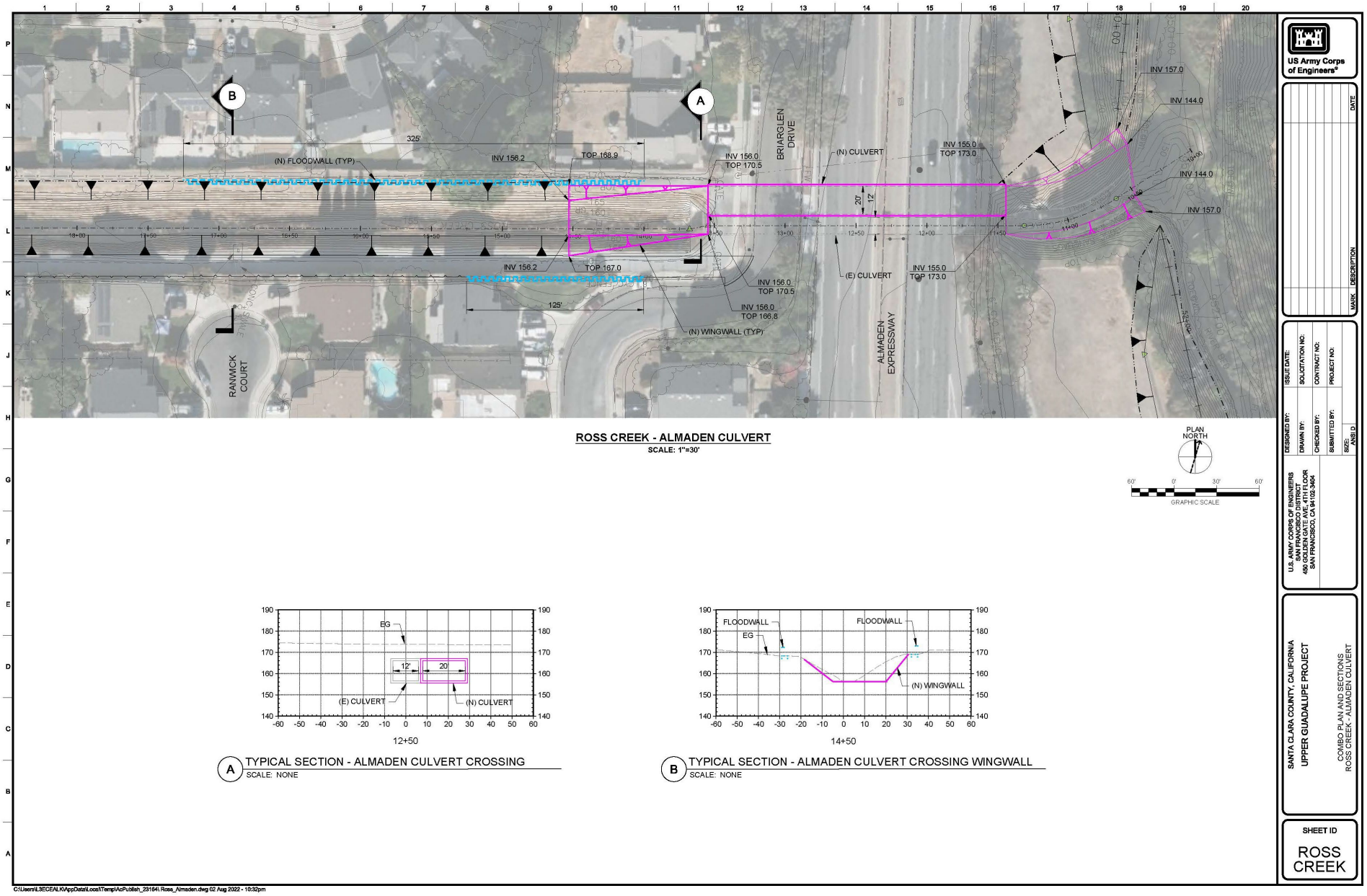

FIGURE 5: ROSS CREEK CROSS SECTIONS AT ALMADEN EXPRESSWAY

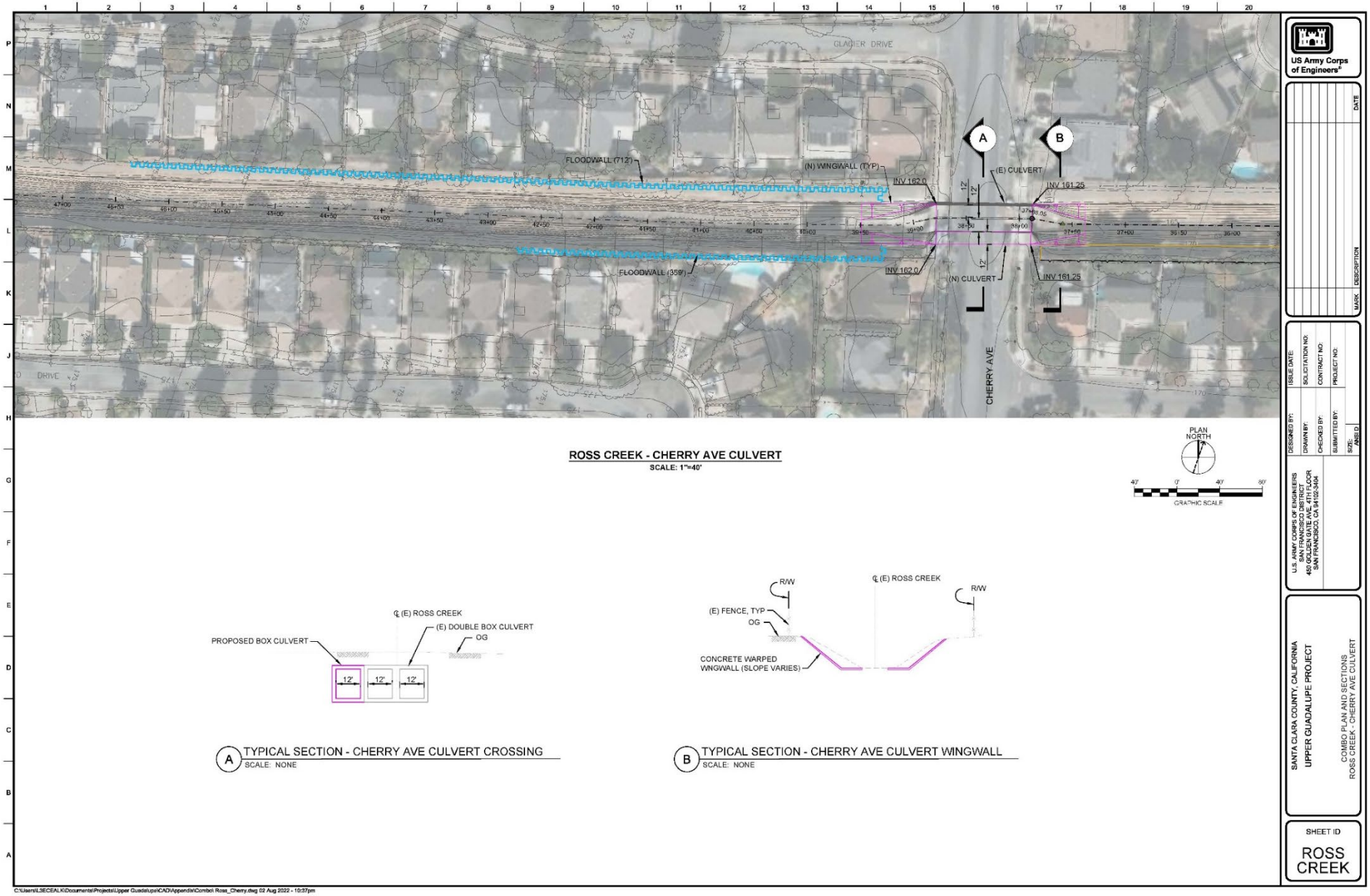

FIGURE 6: ROSS CREEK CROSS SECTIONS AT CHERRY AVENUE

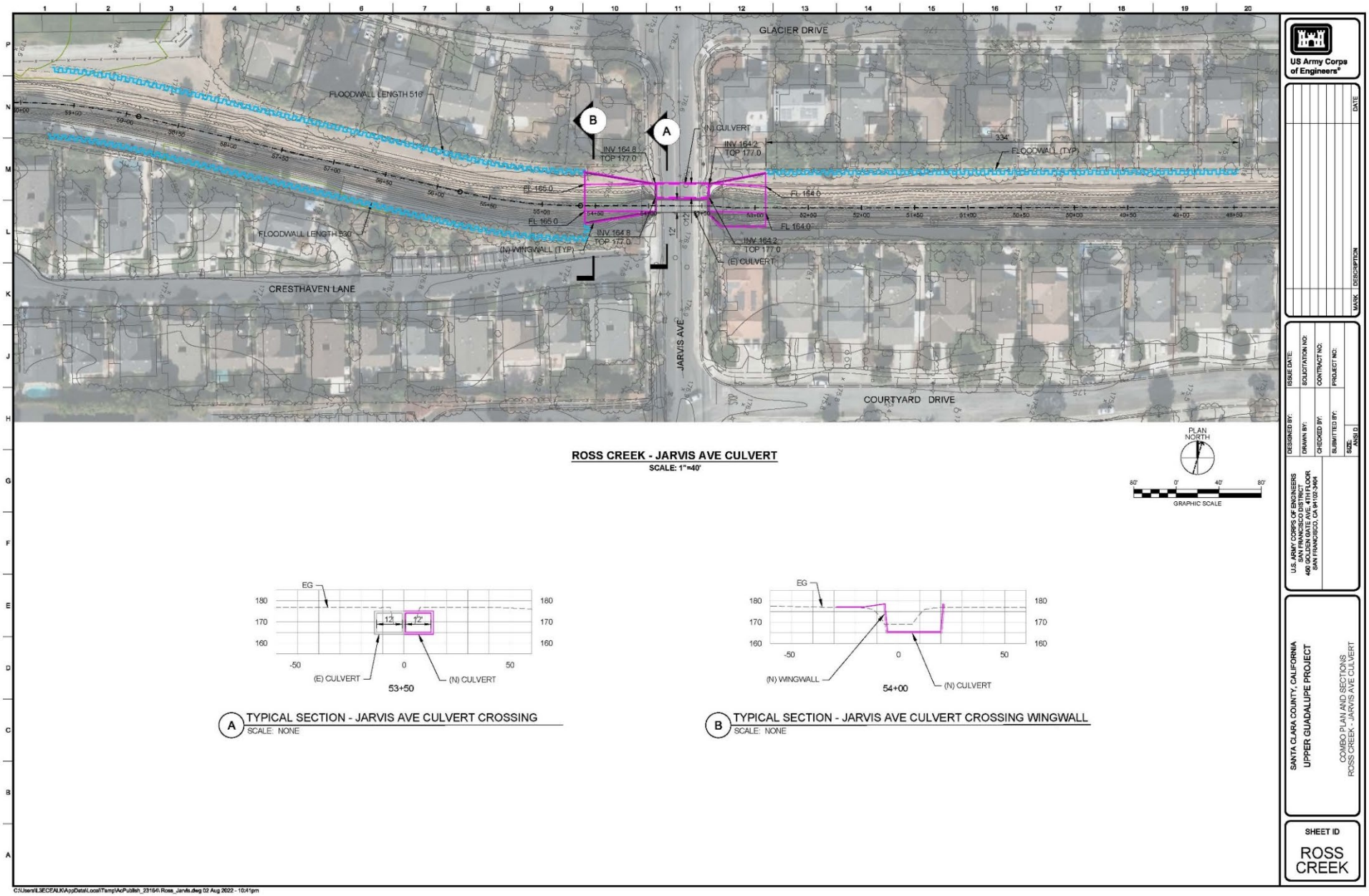

FIGURE 7: ROSS CREEK CROSS SECTIONS AT JARVIS AVENUE

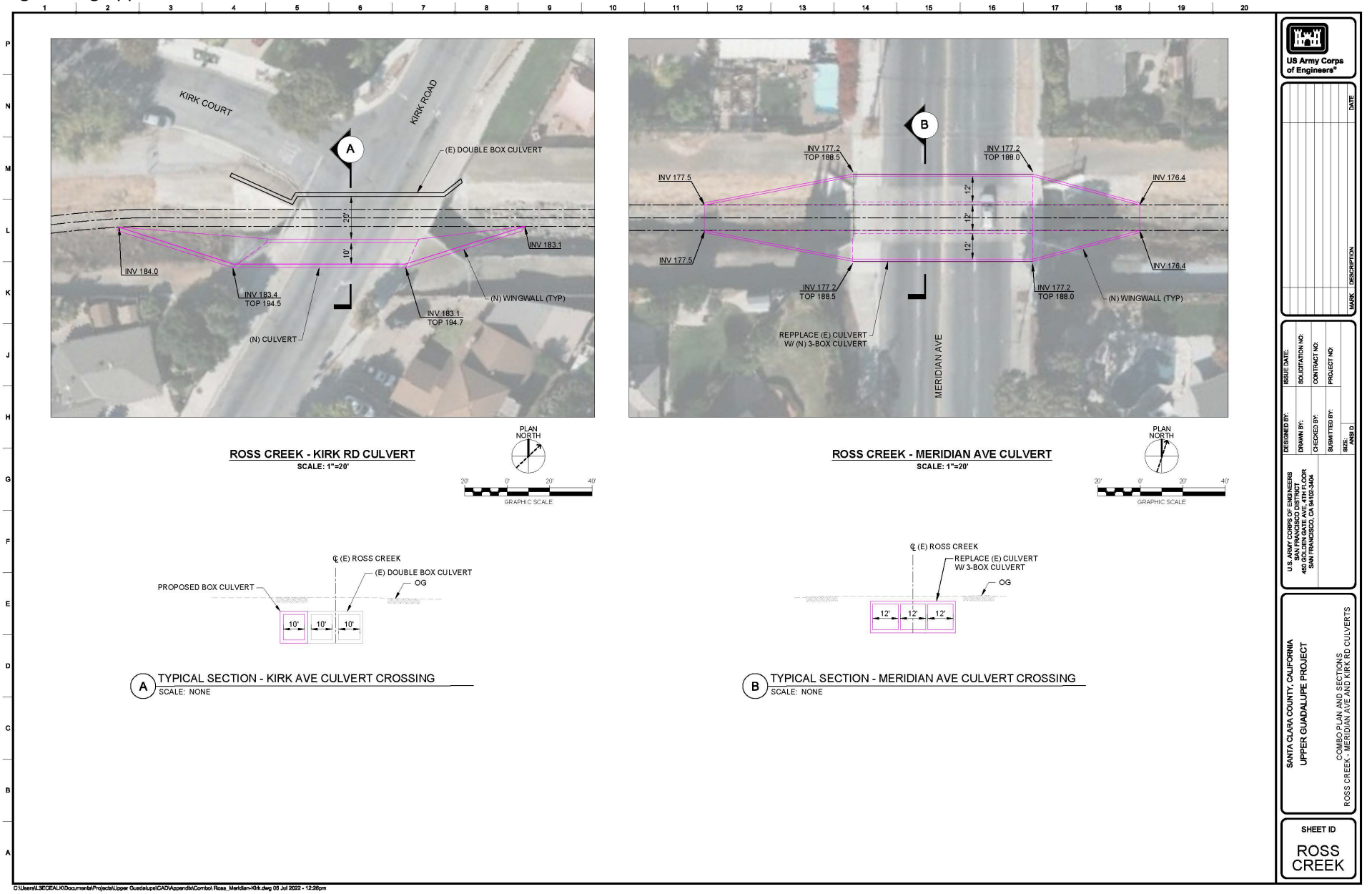

FIGURE 8: ROSS CREEK CROSS SECTIONS AT MERIDIAN AVENUE AND KIRK ROAD

1.5 QUANTITY COMPUTATION

Earthwork quantities were calculated for cut and fill of grading footprint, and on-site placement utilizing survey data obtained from 2008 and implemented into AutoCAD Civil3D. This software provides 3D modeling of the project to create surface models and calculate earthwork quantities. Volume calculations were obtained by comparing the existing surface to the proposed design surface of cross sections.

Table 1: Earthwork Quantities for TSP

Alternative	Reach/Section	Estimated Grading Cut/Volume		On-site Placement Volume
		Cut (Cu.Yd)	Fill (Cu.Yd)	Fill (Cu.Yd)
Valley View Plan	7	154494.56	0.00	51305.85
	8	90488.33	398.30	
	9	73751.07	5016.09	
	10	66527.27	830.56	
	11	51037.35	48.41	
	Canoas Creek	3076.07	0.00	
	Ross Creek	39437.67	1706.30	
Bypass Plan	7 and 8	235218.93	0.13	
	9	73751.07	5016.09	51305.85
	10A	814.81	0.00	
	10B	6749.81	2252.76	
	10C	51763.89	0.00	
	11A	72935.70	0.00	
	11(Other)	28962.96	0.00	
	12	17618.42	3272.42	
	Canoas Creek	329.63	0.00	
	Ross Creek	1250.00	0.00	
Lower Scope Plan	7 and 8	289499.10	1880.73	51305.85
	Canoas Creek	4995.66	8.24	
	Ross Creek	3606.55	0.74	
Combo Plan	7 and 8	289499.10	1880.73	51305.85
	Canoas Creek	5241.93	8.36	
	Ross Creek	9173.70	147.16	

Note: Excavation quantities for culverts, walls, etc. are relatively small and will be calculated in further detailed design phases.

1.6 UTILITIES WITHIN SELECTED REACHES

Utilities are currently being gathered from utility owners and analyzed to assure updated and accurate information. There are several known utilities that will be affected by the project. The PDT team is processing storm, sewer, water, and electric lines to ensure that there aren't complications nor disruptions to the residence during construction.

1.7 CONSTRUCTION ACCESS – HAUL ROUTES, ACCESS RAMPS AND STAGING AREAS

The project construction schedule is extensive for 2 years. It is divided into several phases to work around environmental windows. During the mobilization temporary staging areas will be provided at Reach 7 and Reach 8 utilizing mitigation islands and permanent placement areas. Within Reach 7, the mitigation island and permanent placement area will provide approximately 9800 sq-ft and 58,000 sq-ft respectively. For Reach 8, approximately 45,000 sq-ft from a permanent placement site will be utilized. Guadalupe River has several existing ramps that can be utilized for access and proposed maintenance. Additionally, new access ramps will be constructed for accessing some project areas. The proposed disposal site for excavated soil from access ramps is Keller Canyon Landfill approximately 80 miles away from the project. As mentioned in Section 1.4, permanent placement sites have been planned at Reach 7 and 8 to reduce the truck trips to lessen environmental impacts.

2.0 CULVERT DESIGNS

Currently the design utilizes survey data from 1998 and new survey is schedule to be conducted to get updated topography of the area for the PED. Utilizing HEC-RAS modeling completed by H&H, implementing culverts aligns with the proposed widening the design to optimize the flow in the channel so that it can withstand a 50-year event.

A 3-cell culvert has been proposed in Reach 8 at the Abandoned UPRR Crossing to create a bypass channel. The design at Canoas Creek and Ross Creek is to implement additional culverts adjacent to the existing culverts which will reduce the bottle-necking effect at the existing crossings. Canoas Creek will have 2 proposed culverts. At Almaden Expressway and Canoas Creek, a 20-ft wide culvert will be built adjacent to the existing double 10-ft wide culverts. The proposed 9-ft wide culvert at Nightingale Drive and Canoas Creek culvert will be placed adjacent to the existing double 9-ft wide culverts.

Ross Creek will have 5 proposed culverts, 4 culverts to be placed alongside the existing culvert and one replacement of an existing culvert. At Almaden Expressway and Ross Creek, a 20-ft wide culvert will be built on the north side adjacent to the existing 12-ft wide culvert. At Cherry Ave and Ross Creek, a 12-ft wide culvert will be built on the south end adjacent to the existing double 12-ft wide culverts. At Jarvis Ave and Ross Creek, a 12-ft wide culvert will be built on the north side adjacent to the existing 12-ft wide culvert. At Meridian Ave and Ross Creek, a 3-box 12-ft wide culvert will replace the existing 12-ft wide culvert. At Kirk Rd and Ross Creek, a 10-ft wide culvert will be built adjacent to the existing double 10-ft wide culverts.

2.1 FLOODWALL CONSIDERATIONS

The proposed floodwalls along Canoas Creek and Ross Creek will be an inverted cantilever wall or T-wall. From the HEC-RAS model, the elevation of the wall has been determined to be approximately 6-ft in height from the surface. The preliminary design of the wall will include a 7-ft stem with a base width of 7-ft wide. The floodwall design will have a toe width of 2-ft and the heel width of 4-ft. (See Figure 9). In case the proposed floodwalls are closed to the right-of-way, the widths of toes and heels need to be adjusted to accommodate site constraints. Keys under floodwall footings maybe required depending on soil properties. This will be further developed once more information are collected from survey and boring samples.

The floodwalls are going to be placed on both the left and right bank between Almaden Expressway and Nightingale Drive at Canoas Creek. The floodwall lengths with be approximately 1059-ft (right bank) and 1109-ft (left bank). Additional 650-ft floodwall to be installed along the left bank of Canoas from Nightingale Drive and Kingfisher Drive. Top of floodwall elevation at Canoas is 152-ft. The distance

between the front of the floodwall to the top of the levee edge are 13-ft (left bank) and 9-ft (right bank). See Figure 2 for typical cross section. The length of the left bank floodwall is approximately 325-ft and right bank flood wall is approximately 125-ft along Ross Creek between Almaden Expressway and Ranwick Court. The floodwalls upstream from Cherry Ave along Ross Creek are approximately 712-ft (left bank) and 359-ft (right bank). The floodwalls upstream from Jarvis Ave along Ross Creek are approximately 516-ft (left bank) and 530-ft (right bank) and the downstream end is approximately 334-ft. All the wingwalls will be adjusted accordingly to ensure a sound structure. Quantities shown below in Table 2. The distance between the front of the floodwall to the top of the levee edge are 10-ft (left bank) and 12-ft (right bank). See Figure 10 below for typical cross sections.

Table 2: Floodwall lengths and quantities

Alternatives		Floodwall length (Ft)		Total Volume (Cu.Ft)	Total Volume (Cu.Yd)
		Left Bank	Right Bank		
Low Scope Plan	Canoas Creek	1109	1059	30352	1125
	Ross Creek	4271	4124	117530	4353
Combo Plan	Canoas Creek	1759	1165.5	40943	1517
	Ross Creek	1887	1014	40614	1505

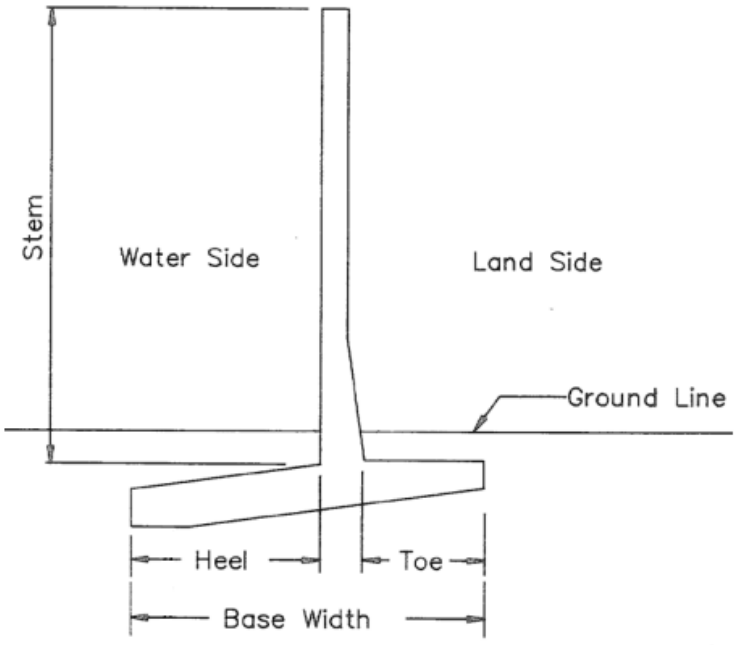

FIGURE 9: PRELIMINARY FLOODWALL DESIGN

FIGURE 10: ROSS CREEK FLOODWALLS