Meeting of the Central Valley Flood Protection Board
May 24, 2019

Permit Staff Report

Placer County Department of Public Works
Penryn Road Bridge, Placer County

1.0 – ITEM

Consider approval of Permit No. 19381 (Attachment A).

2.0 - APPLICANT

Placer County Department of Public Works (Placer County).

3.0 – PROJECT LOCATION

The project is located along Penryn Road, approximately 0.25-miles south of the intersection with Interstate 80, near the town of Penryn. (Secret Ravine, Placer County, Attachment B)

4.0 – PROJECT DESCRIPTION

Currently, Secret Ravine flows under Penryn Road via an approximately 15.7-foot wide and 10.7-foot tall multi-plate corrugated metal culvert. The culvert does not have the hydraulic capacity necessary for storm flows and was overtopped during the 2017 and 2019 winter storms, causing settlement and damage to the roadway. Placer County proposes to remove the existing storm-damaged culvert and replace the crossing with a new single span bridge with the necessary hydraulic capacity (Attachment C). The project will consist of:

- Penryn Road closure.
- A precast, prestressed voided slab bridge deck.
- Tree removal, clearing and grubbing.

- Existing roadway deck and storm-damaged culvert removal.
- Stream bank contouring, rock slope protection (RSP).
- Installation of a clear water diversion to accommodate construction.
- Grading of road approaches. Includes gravity stone retaining wall installation.
- Pile driving for bridge abutment foundations.
- Construction of formwork for bridge foundations and abutments.
- Placement of scour RSP on abutments.
- Construction of the new roadway surface.
- Installation of safety/security fencing.

5.0 – AUTHORITY OF THE BOARD

California Water Code § 8534, 8590 – 8610.5, and 8700 – 8710

California Code of Regulations, Title 23, Division 1 (Title 23):

- § 6, Need for a Permit
- § 13.3, Consent Calendar
- § 112, Streams Regulated and Nonpermissible Work Periods
- § 121, Erosion Control
- § 125, Retaining Walls
- § 126, Fences and Gates
- § 128, Bridges

6.0 - PROJECT ANALYSIS

Secret Ravine is listed as a regulated stream in Title 23, § 112, Table 8.1. There are no levees involved in the project area. All elevations referenced are based on the North American Vertical Datum 88 (NAVD88).

The purpose of the project is to remove the existing culvert under Penryn Road and replace the crossing with a single span bridge. The culvert is approximately 15.7-foot

wide and 10.7-foot tall and was damaged during the 2017 winter storms. Subsequent storms have worsened the condition of the pipe. The culvert is showing severe rust, deterioration, and seam damage. The upper section of the culvert is deformed, and portions of the bottom have buckled up in the channel, partially blocking flows in Secret Ravine. The single span bridge will significantly increase the channel flowage area in Secret Ravine.

The project components will consist of:

1. Penryn Road will be closed on both sides of the project location during construction. A detour plan is included with the project plans. Materials and equipment that will be used for the construction of the project will be staged on Penryn Road within the project limits.

2. A precast manufacturer will be selected during the bidding and award process of the project to construct and deliver the prestressed bridge deck.

3. An estimated 19 out of 81 native trees surveyed will be removed followed by clearing and grubbing of the project area.

4. Clear water diversion and in-channel work will be done in four stages.

   - Stage 1: Temporary gravel bag berms will be constructed upstream and downstream of the crossing. Two (2) 48-inch High Density Polyethylene (HDPE) pipes will be installed through the existing culvert so crossing can be dewatered.

   - Stage 2: The existing road deck and fill will be removed to streambed depth, exposing the existing culvert. Excavation and recontouring of the creek banks will occur around the existing culvert. Compaction within the floodway will be to the density of adjacent undisturbed material. RSP will be placed along the creek banks with the proper fill slope.

   - Stage 3: A portion of the existing culvert will be removed to expose the channel bottom. New streambed material will be placed on the exposed portion of the channel. A second set of diversion pipes will be installed over the newly installed streambed material.

   - Stage 4: The first diversion pipes and remaining portion of the existing culvert will be removed. New streambed material will be placed in the remaining exposed channel. Water diversions to be removed to allow natural streamflow.

5. The new bridge deck will be higher and wider than the existing roadway. New approaches to the crossing will be required. Gravity stone retaining walls are proposed along the east sides of the crossing.

6. Each new reinforced concrete bridge abutment will be constructed on twelve (12) steel H-pile anchors with wingwalls. The H-pile anchors will need to be driven into place prior to construction of the abutment false/formwork foundations.

7. The new abutment and foundation will need to be formed over the pile anchors. The forms will be removed once the concrete has reached form removal strength.

8. Additional RSP will be placed along the creek banks up to the bridge abutment height for scour protection and to match fill slope.

9. When the concrete for the abutments has reached design strength, the prestressed concrete bridge deck will be delivered and placed into position using a crane.

10. With the bridge deck in place, the new roadway surface will be constructed.

All construction phases will incorporate appropriate Best Management Practices (BMPs). Placer County estimates it will take eighty (80) working days to complete the project.

6.1 – Hydraulic Analysis

A hydraulic analysis was performed for the existing and proposed conditions using the United States Army Corps of Engineers' (USACE) Hydrologic Engineering Center River Analysis System (HEC-RAS) version 5.0.6 modeling software. The results of the analysis are documented in a Technical Memorandum (Attachment D) that details the design flow characteristics and hydraulic assessment of the proposed project. The report also details the calculated scour potential and provides some recommended scour countermeasures. The analyses used the predicted unmitigated flows from the 2011 Placer County Report *Update to the Dry Creek Watershed Flood Control Plan* as the design flows for the project. The flows determined in this report are more conservative than the calculated discharge flow as determined by flood-frequency equations. The peak flows used in the analysis were; 4,853 cubic feet per second (cfs) for the 200-year event, 4,173 cfs for the 100-year event, and 3,230 cfs for the 50-year event. The analysis indicates that the existing culvert will overtop at all three flows. In comparison, the proposed bridge condition would provide a minimum of three (3) feet of freeboard for each of the flows that were evaluated. Additionally, the larger hydraulic

opening of the proposed bridge results in an overall decrease in average velocity through the bridge section. However, due to the reduced backwater effects, it also results in an increase in average velocities upstream of the bridge. These results, and a particle size analysis, were used to calculate the potential for scour at both abutments. Scour countermeasures, such as RSP, are being incorporated into the project based on the results.

6.2 – Geotechnical Analysis

There are no levees associated with the project. Therefore, a geotechnical analysis was not required.

7.0 – AGENCY COMMENTS AND ENDORSEMENTS

The comments and endorsements associated with this project, from all pertinent agencies, are shown below:

- There is no Local Maintaining Agency for the project area.

- Correspondence from the U.S Army Corps of Engineers (USACE) has been received for this application. The USACE Sacramento District Engineer has no comments or recommendations regarding flood control because the proposed work does not affect a federally constructed project.

8.0 – CEQA ANALYSIS

Board staff has prepared the following California Environmental Quality Act (CEQA) determination:

Board staff has determined that the project is categorically exempt from CEQA under a Class 2 Categorical Exemption (CEQA Guidelines Section 15302) because the proposed activity involves the removal of an existing failed culvert and the replacement with a bridge of substantially the same purpose and capacity. Placer County also made the determination that the project is categorically exempt from CEQA.

9.0 – CA WATER CODE SECTION 8610.5 AND OTHER CONSIDERATIONS

1. Evidence that the Board admits into its record from any party, state or local public agency, or nongovernmental organization with expertise in flood or flood plain management:

The Board will make its decision based on the evidence in the permit application and attachments, this staff report, and any other evidence presented by any individual or group.

2. The best available science that relate to the scientific issues presented by the executive officer, legal counsel, the Department of Water Resources or other parties that raise credible scientific issues.

   Board Staff reviewed the hydraulic analysis results submitted for this project and found that the existing culvert was susceptible of washing away during a storm event and the new proposed bridge is necessary for the safety of the traveling public. The accepted industry standards for hydrology and hydraulics for the work proposed under this permit as regulated by Title 23 have been applied to the review of this permit.

3. Effects of the decision on facilities of the State Plan of Flood Control (SPFC).

   The proposed bridge will improve the flood risk management, improve operation and maintenance, promote ecosystem functions, and is located approximately sixteen (16) miles east of the closest SPFC facilities. Therefore, it is expected to have no adverse effects on SPFC facilities.

4. Effects of reasonably projected future events, including, but not limited to, changes in hydrology, climate, and development within the applicable watershed:

   The proposed bridge has a larger hydraulic opening resulting in an increase in flowage area that will accommodate the design peak flows. The larger opening results in an overall decrease in average velocity through the bridge section. However, due to the reduced backwater effects, it also results in an increase in average velocities just upstream of the bridge. Therefore, there are no expected adverse effects to the proposed project from reasonably projected future events.

10.0 – STAFF RECOMMENDATION

Board staff recommends that the Board:

Adopt:

- The CEQA finding that the permit is categorically exempt from CEQA under the Class 2 exemption for the replacement and the reconstruction of existing facilities (CEQA Guidelines § 15302).

Approve:

- Encroachment Permit No. 19381 in substantially the form provided in Attachment A; and

Direct:

- The Executive Officer to take the necessary actions to execute the permit and file a Notice of Exemption pursuant to CEQA with the State Clearinghouse.

11.0 – LIST OF ATTACHMENTS

A. Draft Permit No. 19381
B. Location Maps and Photos
C. Project Drawings
D. Hydraulic Technical Memo (TM)

Reviewers:

Design Review	Humberto Negrete, Permitting Section Staff
Environmental Review	James Herota, Environmental Section Staff
Document Review	Gary W. Lemon, P.E., Permitting Section Chief
	Michael C. Wright, P.E., Chief Engineer
Legal Review	Sarah Backus, Staff Counsel

DRAFT

STATE OF CALIFORNIA
THE RESOURCES AGENCY

THE CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 19381 BD

This Permit is issued to:

Placer County Department of Public Works
3091 County Center Drive
Suite 220
Auburn, California 95603

To remove an existing damaged culvert and construct a new single span bridge on a similar alignment and at a higher elevation with a wider opening to provide additional hydraulic capacity necessary for storm flows.

Project is located along Penryn Road, approximately 0.25-miles south of the intersection with Interstate 80, near the City of Penryn, at 38.83025˚N 121.16863˚W, Secret Ravine, Placer County.

NOTE: Special Conditions have been incorporated herein which may place limitations on and/or require modification of your proposed project as described above.

(SEAL)

Dated: _____

_____
Executive Officer

GENERAL CONDITIONS:

ONE: This permit is issued under the provisions of Sections 8700 – 8723 of the Water Code.

TWO: Only work described in the subject application is authorized hereby.

THREE: This permit does not grant a right to use or construct works on land owned by the Sacramento and San Joaquin Drainage District or on any other land.

FOUR: The approved work shall be accomplished under the direction and supervision of the State Department of Water Resources, and the permittee shall conform to all requirements of the Department and The Central Valley Flood Protection Board.

FIVE: Unless the work herein contemplated shall have been commenced within one year after issuance of this permit, the Board reserves the right to

change any conditions in this permit as may be consistent with current flood control standards and policies of The Central Valley Flood Protection Board.

SIX: This permit shall remain in effect until revoked. In the event any conditions in this permit are not complied with, it may be revoked on 15 days' notice.

SEVEN: It is understood and agreed to by the permittee that the start of any work under this permit shall constitute an acceptance of the conditions in this permit and an agreement to perform work in accordance therewith.

EIGHT: This permit does not establish any precedent with respect to any other application received by The Central Valley Flood Protection Board.

NINE: The permittee shall, when required by law, secure the written order or consent from all other public agencies having jurisdiction.

TEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the State of California, or any departments thereof, the United States of America, a local district or other maintaining agencies and the officers, agents or employees thereof, the permittee shall defend and shall hold each of them harmless from each claim.

ELEVEN: The permittee shall exercise reasonable care to operate and maintain any work authorized herein to preclude injury to or damage to any works necessary to any plan of flood control adopted by the Board or the Legislature, or interfere with the successful execution, functioning or operation of any plan of flood control adopted by the Board or the Legislature.

TWELVE: Should any of the work not conform to the conditions of this permit, the permittee, upon order of The Central Valley Flood Protection Board, shall in the manner prescribed by the Board be responsible for the cost and expense to remove, alter, relocate, or reconstruct all or any part of the work herein approved.

SPECIAL CONDITIONS FOR PERMIT NO. 19381 BD

LIABILITY AND INDEMNIFICATION

THIRTEEN: The permittee shall defend, indemnify, and hold harmless the Central Valley Flood Protection Board (Board) and the State of California, including its agencies or departments thereof, including but not limited to, any and all boards, commissions, officers, agents, employees, and representatives (Indemnities), against any and all claims, liabilities, charges, losses, expenses, and costs including the State's attorneys' fees (Liabilities), that may arise from, or by reason of: (1) any action or inaction by the Indemnities in connection with the issuance or denial of any permit, lease, or other entitlement; (2) as a result of approvals or authorizations given by the Board to the permittee pursuant to, or as a result of, permittee's permit application; (3) provisions of the issued permit or lease, provisions of CEQA, an environmental document certified or adopted by the Board related to the permit application, or any other regulations, requirements, or programs by the State, except for any such Liabilities caused solely by the gross negligence or intentional acts or the State or its officers, agents, and employees.

FOURTEEN: Permittee shall reimburse the Board in full for all reasonable costs and attorneys' fees, including, but not limited to, those charged to it by the California Office of Attorney General, that the Board incurs in connection with the defense of any action brought against the Board challenging this permit or any other matter related to this permit or the work performed by the State in its issuance of this permit. In addition, the permittee shall reimburse the Board for any court costs and reasonable attorneys' fees that the Board/Indemnities may be required by a court to pay as a result of such action. The permittee may participate in the defense of the action, but its participation shall not relieve it of its obligations under the conditions of this permit.

FIFTEEN: The Board and Department of Water Resources shall not be held liable for any damages to the permitted encroachment(s) resulting from releases of water from reservoirs, flood fight, operation, maintenance, inspection, or emergency repair.

AGENCY CONDITIONS

SIXTEEN: All work approved by this permit shall be in accordance with the submitted drawings and specifications dated May 3, 2019 except as modified by special permit conditions herein. No further work, other than that approved by this permit, shall be done in the area without prior approval of the Board.

SEVENTEEN: Permittee shall pay to the Board, an inspection fee(s) to cover inspection cost(s), including staff and/or consultant time and expenses, for any inspections before, during, post-construction, and regularly thereafter as deemed necessary by the Board.

EIGHTEEN: In the event that levee or bank erosion injurious to the adopted plan of flood control occurs at or adjacent to the permitted encroachment(s), the permittee shall repair the eroded area and propose measures, to be approved by the Board, to prevent further erosion.

NINETEEN: The permittee shall be responsible for the repair of any damages to the channel, banks, floodway, or other flood control facilities due to construction, operation, or maintenance of the proposed project.

TWENTY: Correspondence was received from the Department of the Army (U.S. Army Corps of Engineers, Sacramento District) dated May 1, 2019, signifying that the District Engineer has no comments or recommendations regarding flood control because the proposed project does not affect a federally constructed project.

TWENTY-ONE: The permittee agrees to notify any new property/encroachment owner(s) that they are required to submit a permit Name Change request form to the Board upon completion of the sale. The new owner(s) will be required to comply with all permit conditions. Name Change forms are available at http://cvfpb.ca.gov/

TWENTY-TWO: The Board reserves the right to add additional, or modify existing, conditions when there is a change in ownership and/or maintenance responsibility of the work authorized under this permit.

PRE-CONSTRUCTION

TWENTY-THREE: Upon receipt of a signed copy of the issued permit the permittee shall contact the Board by telephone at (916) 574-0609 to schedule a preconstruction conference with the inspector that is assigned to your project. Failure to do so at least 10 working days prior to start of work may result in a delay of the project.

CONSTRUCTION

TWENTY-FOUR: No construction work of any kind shall be done during the flood season from November 1 to April 15 without prior approval of the Board. Failure to submit a Time Variance Request to the Board at least 10 working days prior to November 1 may result in a delay of the project.

TWENTY-FIVE: All cleared trees and brush shall be completely removed from the floodway, and downed trees or brush shall not remain in the floodway during the flood season from November 1 to April 15.

TWENTY-SIX: Temporary staging, formwork, stockpiled material, equipment, and temporary buildings shall not remain in the floodway during the flood season from November 1 to April 15.

TWENTY-SEVEN: The existing culvert shall be completely removed and disposed of outside the limits of the project right-of-way.

TWENTY-EIGHT: Backfill material for excavations within 10 feet of bridge supports within the floodway shall be placed in 4- to 6-inch layers and compacted to a minimum of 90 percent relative compaction as measured by the current ASTM D1557 standard and above optimum moisture content.

POST-CONSTRUCTION

TWENTY-NINE: All debris generated by this project shall be properly disposed of outside the project right-of-way.

THIRTY: The work area shall be restored to at least the condition that existed prior to commencement of work.

THIRTY-ONE: Upon completion of the project, the permittee shall submit as-constructed drawings to the Board.

OPERATIONS AND MAINTENANCE

THIRTY-TWO: After each period of high water, debris that accumulates at the site shall be completely removed from the floodway.

THIRTY-THREE: The permittee shall maintain the permitted encroachment(s) and the Project Works within the utilized area in the manner required and as requested by the authorized representative of the Board, the Department of Water Resources, or any other agency responsible for maintenance and shall, at all times, allow officials from these agencies to access the levee, levee slope, and any adjacent areas as necessary for flood control.

THIRTY-FOUR: The permitted encroachment(s) shall not interfere with the operation and maintenance of the flood control project. If the permitted encroachment(s) are determined by any

agency responsible for operation or maintenance of the flood control project to interfere, the permittee shall be required, at permittee's cost and expense, to modify or remove the permitted encroachment(s) within 30-days of being notified in writing by the Board. In the event of an emergency a shorter timeframe may be required. If the permittee does not comply, the Board, or a designated agency or company authorized by the Board, may modify or remove the encroachment(s) at the permittee's expense.

PROJECT ABANDONMENT / CHANGE IN PLAN OF FLOOD CONTROL

THIRTY-FIVE: If the project, or any portion thereof, is to be abandoned in the future, the permittee or successor shall abandon the project under direction of the Board at the permittee's or successor's cost and expense.

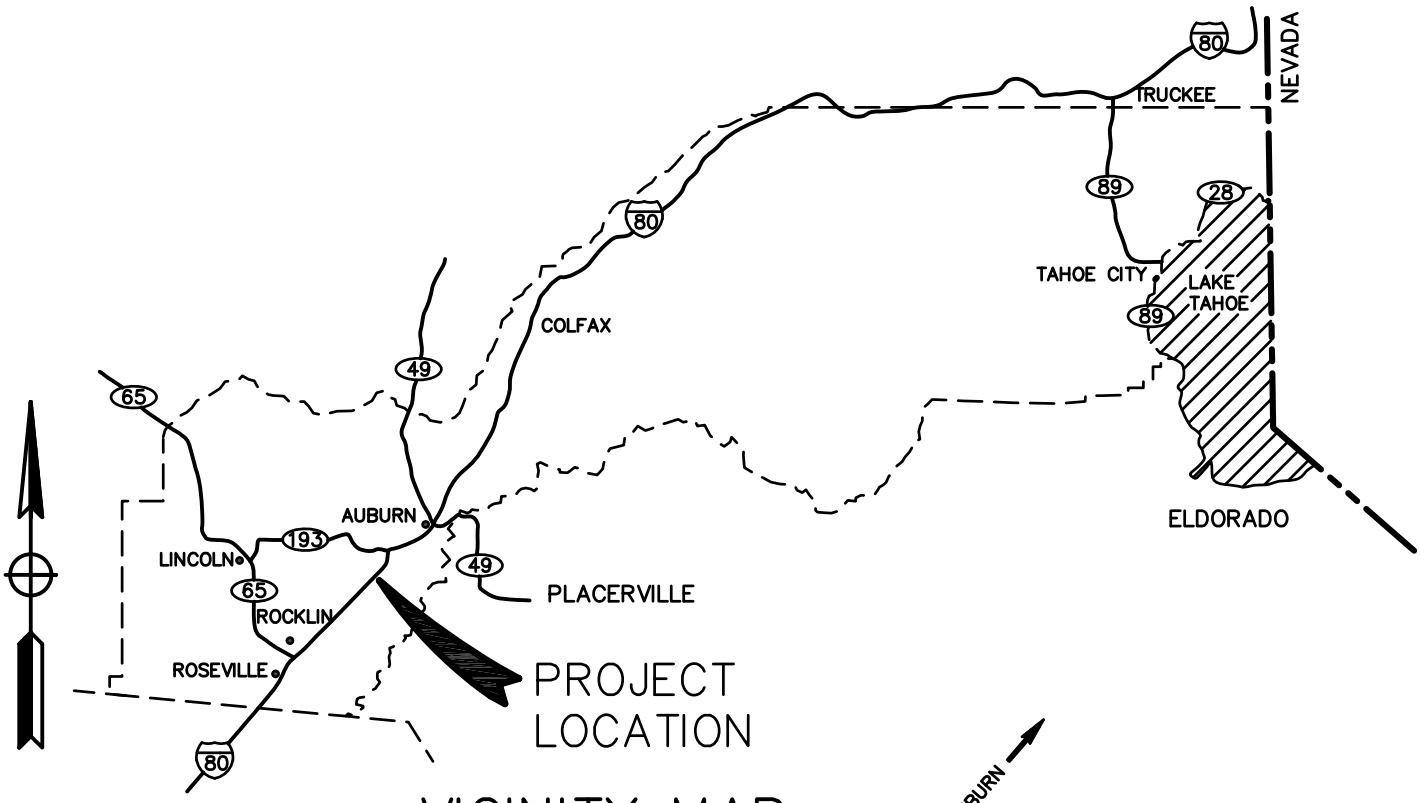
THIRTY-SIX: The permittee may be required, at permittee's cost and expense, to remove, alter, relocate, or reconstruct all or any part of the permitted encroachment(s) if in the discretion of the Board the removal, alteration, relocation, or reconstruction is necessary as part of or in conjunction with any present or future flood control plan or project or if the project is not maintained or is damaged by any cause. The permittee shall remove the encroachment(s) within 30-days of being notified in writing by the Board. In the event of an emergency a shorter timeframe may be required. If the permittee does not comply the Board will remove the encroachment(s) at the permittee's expense.

END OF CONDITIONS

Attachment B - Map & Photos

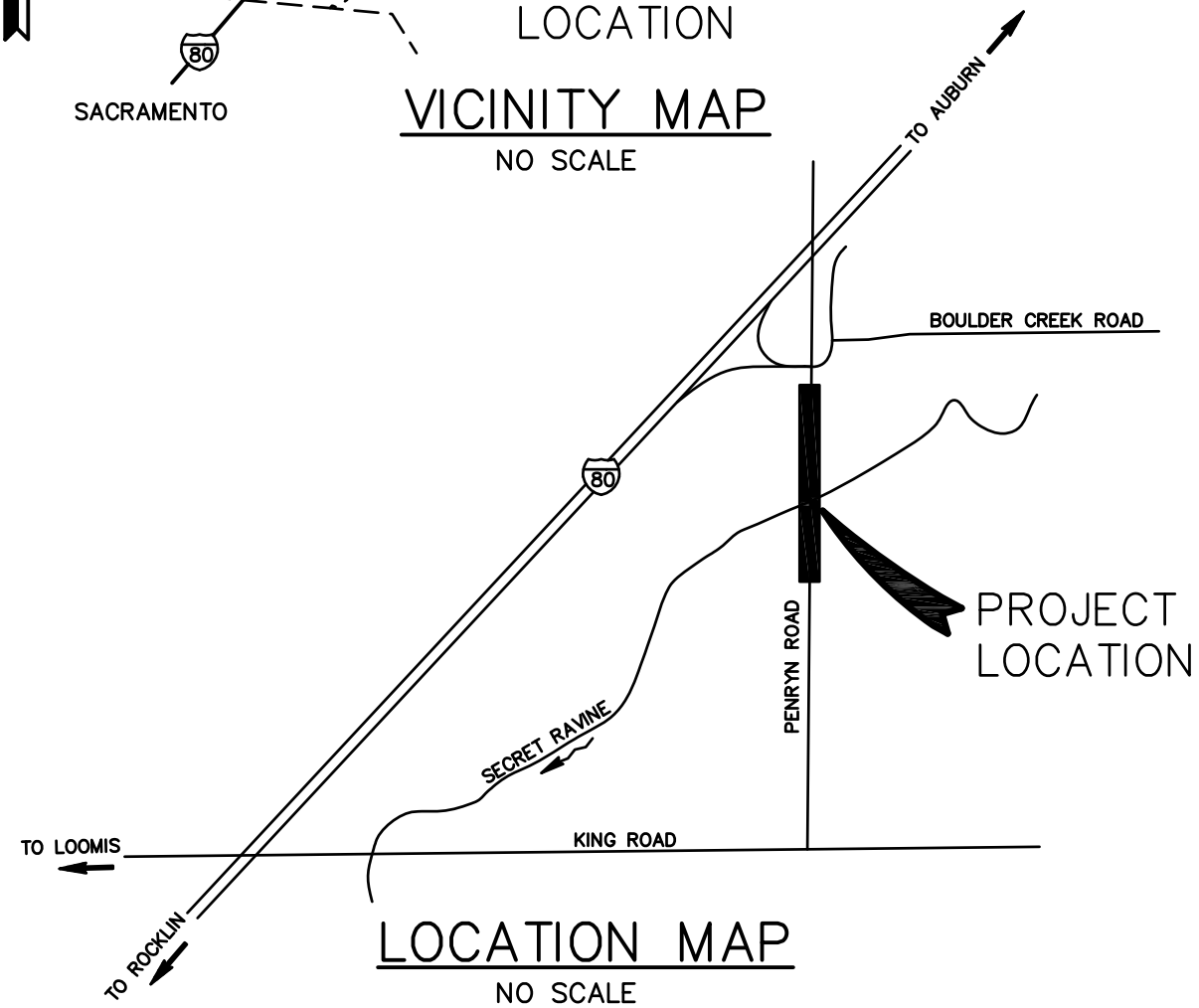
COUNTY OF PLACER
DEPARTMENT OF PUBLIC WORKS & FACILITIES

PENRYN ROAD AT SECRET RAVINE REPAIR PROJECT



VICINITY MAP

NO SCALE



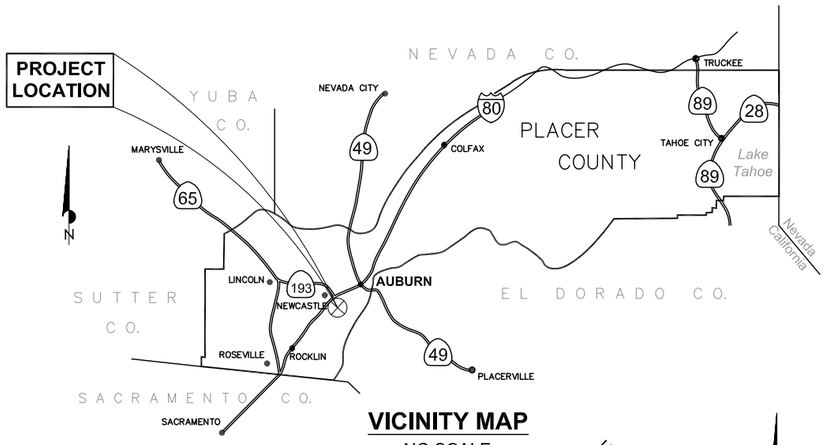
LOCATION MAP

NO SCALE

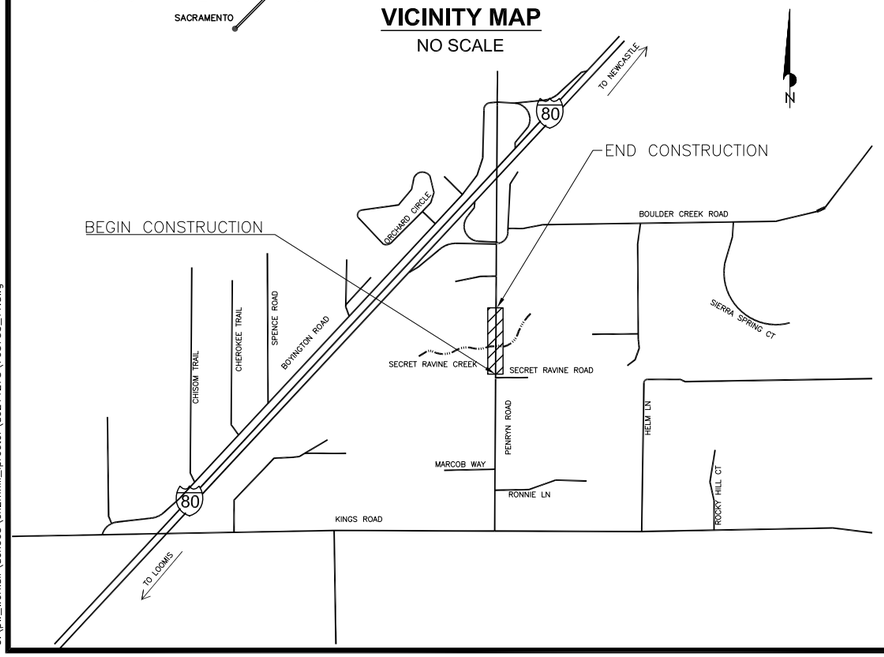
Attachment B - Map & Photos

Penryn Road at Secret Ravine, Placer County CA
Project Site / Damage Photos
February / March 2019

CALIFORNIA STATE MAP
NO SCALE



VICINITY MAP
NO SCALE



COUNTY OF PLACER

DEPARTMENT OF PUBLIC WORKS

CONSTRUCTION PLANS FOR

PENRYN ROAD BRIDGE OVER SECRET RAVINE PLACER COUNTY, CA

BRIDGE NO. 19C-0276

TO BE SUPPLEMENTED BY CALTRANS STANDARD PLANS AND SPECIFICATIONS DATED 2015

RECORD DRAWING NOTE:

ALL INFORMATION SHOWN ON THESE PLANS HAS BEEN PREPARED BY, OR UNDER THE DIRECTION OF, THE UNDERSIGNED ENGINEER. ADJUSTMENTS MADE IN THE FIELD DURING CONSTRUCTION ARE INCLUDED HEREIN AND ARE BASED UPON FIELD OBSERVATIONS MADE UNDER THE DIRECTION OF OR BY THE UNDERSIGNED AND/OR INFORMATION RECEIVED FROM THE COUNTY CONSTRUCTION INSPECTOR, PROJECT CONTRACTORS, AND OTHER SOURCES. WHEN THE ENGINEER IS ADVISED IN WRITING OF SUCH ADJUSTMENTS THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, CHANGES TO THESE PLANS NOT AUTHORIZED BY THE ENGINEER. ADJUSTMENTS MADE IN THE FIELD WERE NOT SURVEYED AND THE ACCURACY OF THESE DRAWINGS WITH RESPECT TO THOSE ADJUSTMENTS IS NOT GUARANTEED BY THE ENGINEER OR PLACER COUNTY; FIELD VERIFICATION OF ALL IMPROVEMENTS IS RECOMMENDED.

DATE

ENGINEER SIGNATURE
(STAMP OR SEAL)

CALL BEFORE YOU DIG

THE CONTRACTOR SHALL CALL "UNDERGROUND SERVICE ALERT" (USA) AT 811/1-800-227-2600 AT LEAST 2 WORKING DAYS PRIOR TO PERFORMING ANY EXCAVATION

UTILITY CONTACTS:

PG&E	ANNALESA MORLOCK	530-889-5150
AT&T	LEE NIETO	916-484-2384
WAVE	KIRK ELLINGSON	916-630-7180

SHEET INDEX

ROADWAY PLANS

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5	PP	PLAN AND PROFILE
6-9	CD1-CD4	CONSTRUCTION DETAILS
10	TD	TEMPORARY DIVERSION DETAILS
11	EC	EROSION CONTROL PLAN
12	CG	CONTOUR GRADING PLAN
13	TR	TREE REMOVAL PLAN
14	U	UTILITY PLAN
15	DP	DETOUR PLAN
16	PD	PAVEMENT DELINEATION AND SIGN PLAN
17	Q	SUMMARY OF QUANTITIES

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24	S07	GIRDER LAYOUT
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26	S09	LOG OF TEST BORINGS No. 1

NOTES:

1. THE CONSTRUCTION METHODS AND MATERIALS SHALL CONFORM TO THE MAY 2015 EDITION OF THE STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, AND STANDARD PLANS, AND APPLICABLE STANDARD DRAWINGS OF THE PLACER COUNTY GENERAL SPECIFICATIONS. IN CASE OF CONFLICT, REFER TO THE PROJECT SPECIAL PROVISIONS FOR ORDER OF PRECEDENCE.
2. THE COUNTY OF PLACER HAS MADE EVERY EFFORT TO SHOW LOCATIONS OF ANY AND ALL EXISTING SURFACE AND SUBSURFACE STRUCTURES. HOWEVER, ACTUAL FIELD CONDITIONS AND LOCATIONS CAN VARY CONSIDERABLY FROM PLAN LOCATIONS. THEREFORE, PLACER COUNTY CANNOT, AND DOES NOT, ASSUME RESPONSIBILITY OF THE EXISTENCE OR LOCATION OF ANY STRUCTURE SUCH AS, BUT NOT LIMITED TO, UTILITIES, PIPELINES AND SEWERS. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING ALL AGENCIES AND/OR OWNERS TO VERIFY THIS INFORMATION PRIOR TO AND DURING CONSTRUCTION OF IMPROVEMENTS SHOWN HEREON, AND TO CONTACT THE ENGINEER IN THE EVENT OF ANY SIGNIFICANT DISCREPANCY. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF, AND PROTECTING ALL EXISTING UTILITIES AND REPAIRING DAMAGE TO EXISTING UTILITIES.
3. THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIALS.

DATE
CHAIR-BOARD OF SUPERVISORS
DATE
DIRECTOR OF PUBLIC WORKS
DATE
PROJECT ENGINEER R.C.E.

PRELIMINARY - NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
TITLE

PLACER COUNTY CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

No.	Revision	Description	Date	Approved

THE COUNTY OF PLACER, ITS OFFICERS, OR ITS AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS DOCUMENT.

DATE: 05/03/19
DESIGN:
DRAW:
CHECK:

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. RANDALL
No. 60770
EXP. 12/31/20
CIVIL
STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
-
PROJECT NO.
PC 2972

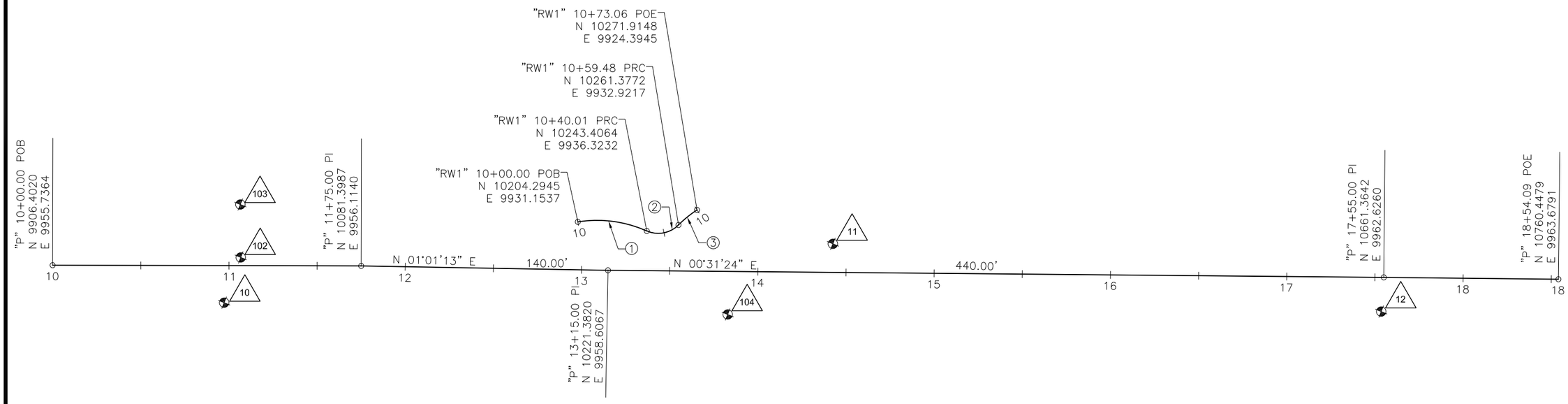
SCALE
HORIZ:
VERT:
SCALE REFERENCE
0 1"

DRAWING
T1

SHEET NO.
1 of 26

C:\pw_workdir\den003\ch2mhill_lprector\d0211278\703735_T1.dwg

CURVE DATA				
NO.	RADIUS	Δ	T	L
1	69'	33°13'24"	20.59'	40.01'
2	16'	69°43'70"	11.15'	19.47'
3	59'	13°11'35"	6.82'	13.57



SURVEY CONTROL POINTS						
NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION	"P" STA	OFFSET
103	10,012.8570	9,921.3614	421.07'	MONS–5/8	11+06.38	34.60' Lt
102	10,013.0744	9,951.3312	422.09'	MON–RR SPK	11+06.66	4.64' Lt
10	10,003.6880	9,976.9575	422.79'	DELTA 60D	10+97.33	21.01' Rt
104	10,289.2680	9,983.6493	403.95'	MONS–3/4	13+83.11	24.42' Rt
11	10,348.9385	9,943.6333	405.03'	DELTA–5/8	14+42.42	16.14' Lt
12	10,659.9334	9,982.0129	405.48'	DELTA–5/8	17+53.75	19.40' Rt

LEGEND

SURVEY CONTROL POINT

DATUM:

HORIZONTAL DATUM FOR THIS PROJECT IS BASED ON AN ASSUMED. THE VERTICAL DATUM IS BASED ON NAVD88.

BASIS OF BEARING:

THE BASIS OF BEARING IS 32–PM–8.

RECORD DRAWINGS NOTE

INITIALS DATE

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
SURVEY CONTROL DIAGRAM

PLACER COUNTY CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

No.	Revision	Description	Date	Approved

DATE: 05/03/2019
DESIGN: M.RANDALL
DRAW: P.DONOVAN
CHECK:

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. RANDALL
NO. 60770
EXP. 12/31/20
CIVIL
STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
–
PROJECT NO.
PC 2972

SCALE
HORIZ: 1"=30'
VERT: N/A
SCALE REFERENCE
0 1"

DRAWING
SCD

SHEET NO.
2 of 26

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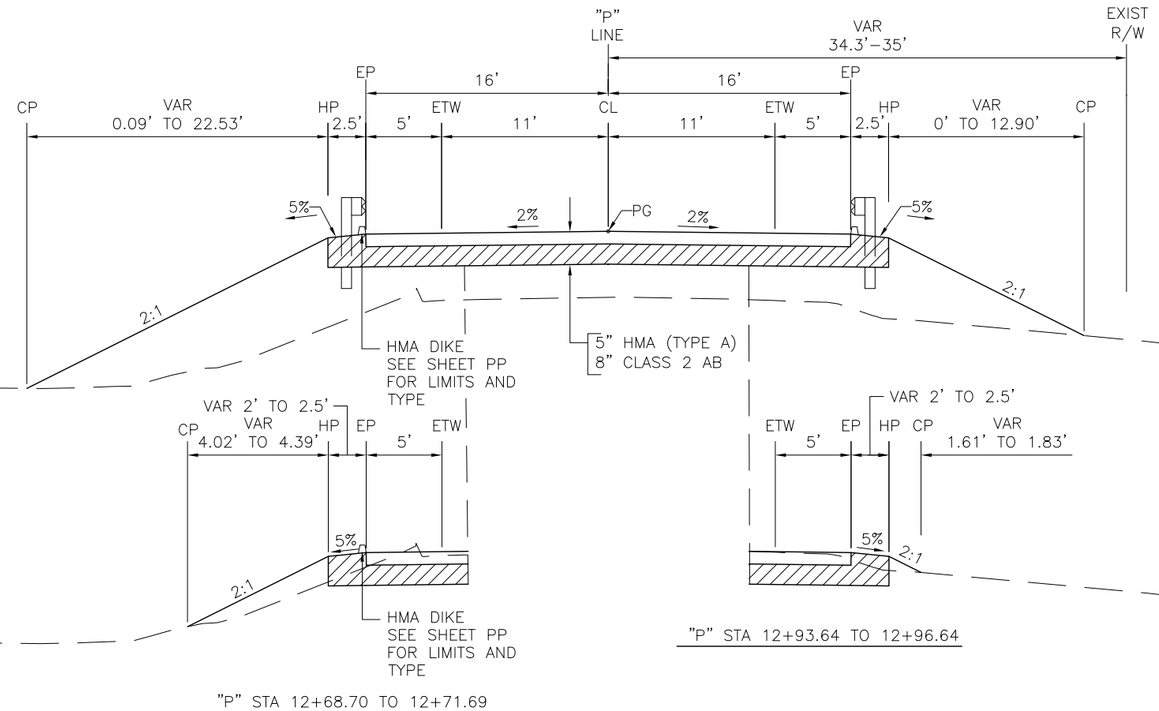
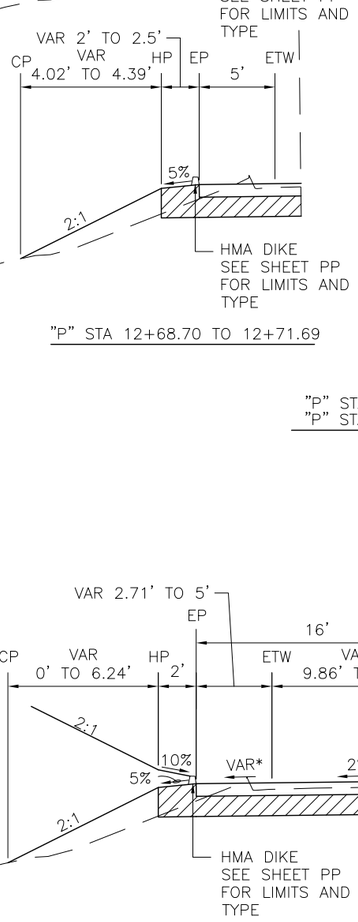
NOTE:
1. DIMENSIONS OF THE PAVEMENT STRUCTURES (STRUCTURAL SECTIONS) ARE SUBJECT TO TOLERANCES SPECIFIED IN THE STANDARD SPECIFICATIONS.

LEGEND:
CLASS 2 AB



"P" STA 12+55.00 TO 13+92.50
"P" STA 14+57.50 TO 15+43.50



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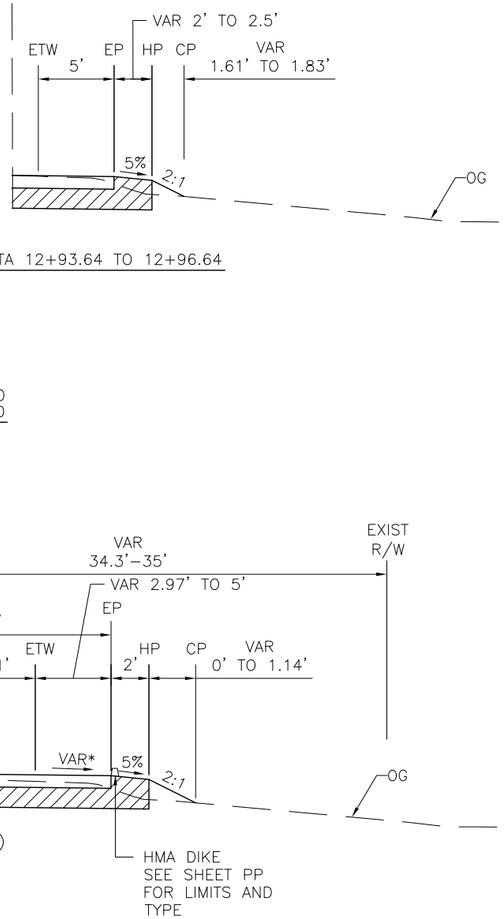
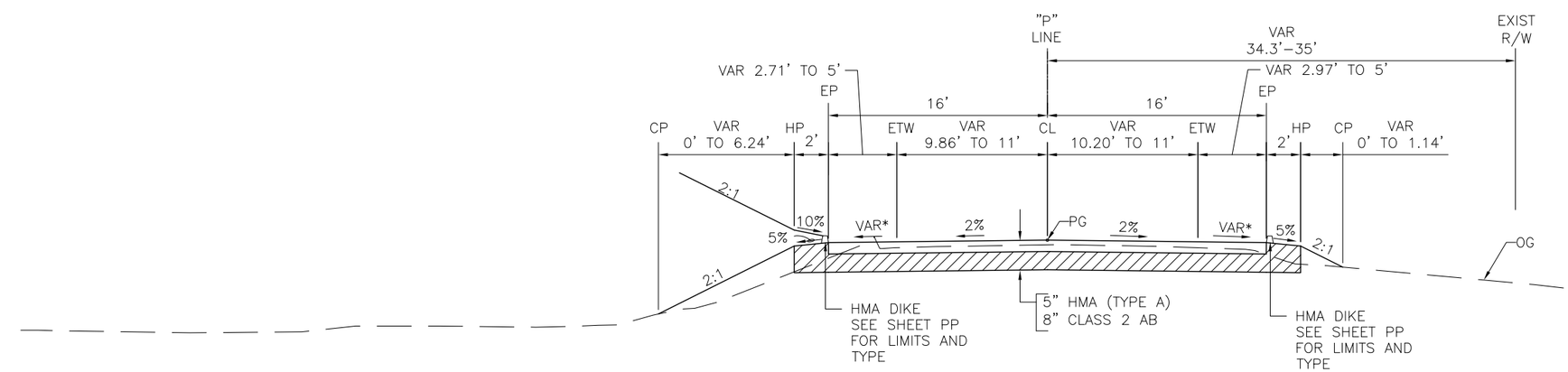


"P" STA 12+93.64 TO 12+96.64



"P" STA 11+75.00 TO 12+55.00

PENRYN ROAD
NTS

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
TYPICAL SECTIONS

DEPARTMENT OF PUBLIC WORKS
PLACER COUNTY CALIFORNIA

No.	Revision	Description	Date	Approved

DATE: 05/03/2019
DESIGN: M.RANDALL
DRAW: P.DONOVAN
CHECK:

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J RANDALL
NO. 60770
EXP. 12/31/20
CIVIL
STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
–
PROJECT NO.
PC 2972

SCALE
HORIZ: 1"=5'
VERT: N/A
SCALE REFERENCE
0 1"

DRAWING
X1

SHEET NO.
3 of 26

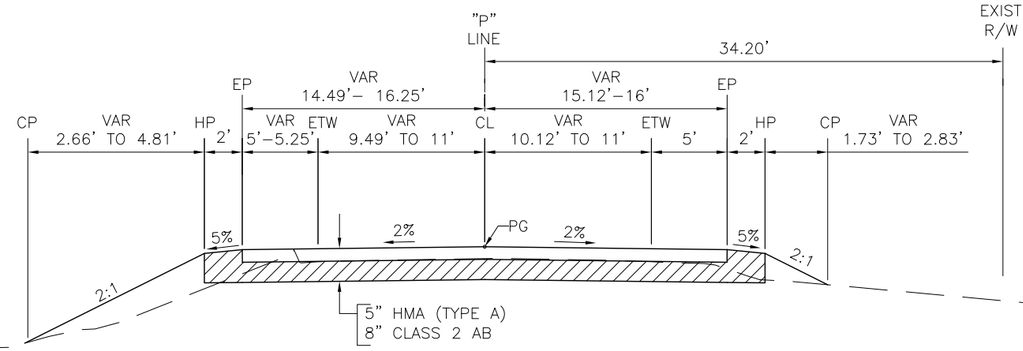
RECORD DRAWINGS NOTE
INITIALS DATE

C:\pw_workdir\den003\ch2mhill_lproctor\d0211278\703735_03_TS.dwg

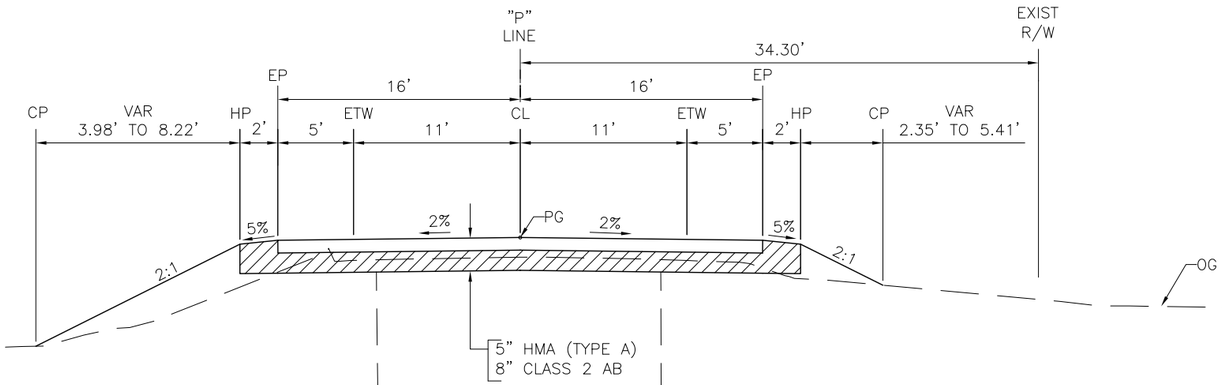
NOTES:
1. DIMENSIONS OF THE PAVEMENT STRUCTURES (STRUCTURAL SECTIONS) ARE SUBJECT TO TOLERANCES SPECIFIED IN THE STANDARD SPECIFICATIONS.
2. SEE STRUCTURES PLANS FOR BRIDGE DETAILS.

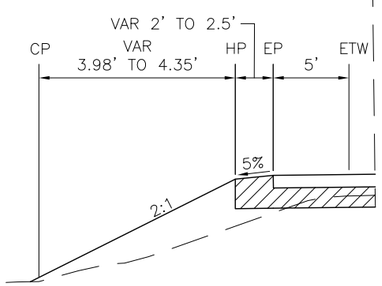
LEGEND:

CLASS 2 AB

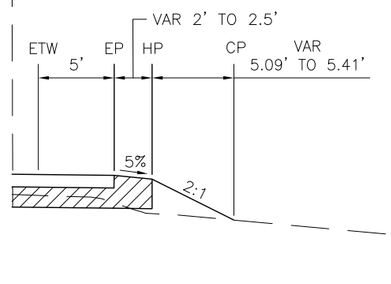


"P" STA 16+85.02 TO 17+55.00



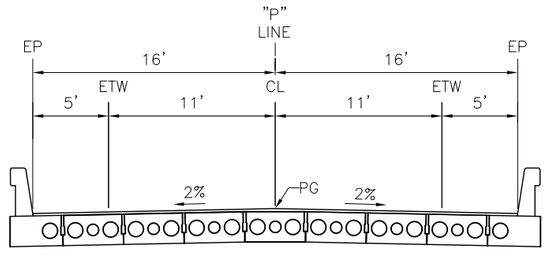


"P" STA 15+43.50 TO 15+56.50



"P" STA 15+43.50 TO 15+56.50

"P" STA 15+43.50 TO 16+85.02



"P" STA 13+92.50 TO 14+57.50

PENRYN ROAD
NTS

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
TYPICAL SECTIONS

PLACER COUNTY CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

No.	Revision	Description	Date	Approved

DATE: 05/03/2019
DESIGN: M.RANDALL
DRAW: P.DONOVAN
CHECK:

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J RANDALL
NO. 60770
EXP. 12/31/20
CIVIL
STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
–
PROJECT NO.
PC 2972

SCALE
HORIZ: 1"=5'
VERT: N/A
SCALE REFERENCE
0 1"

DRAWING
X2

SHEET NO.
4 of 26

RECORD DRAWINGS NOTE
INITIALS DATE

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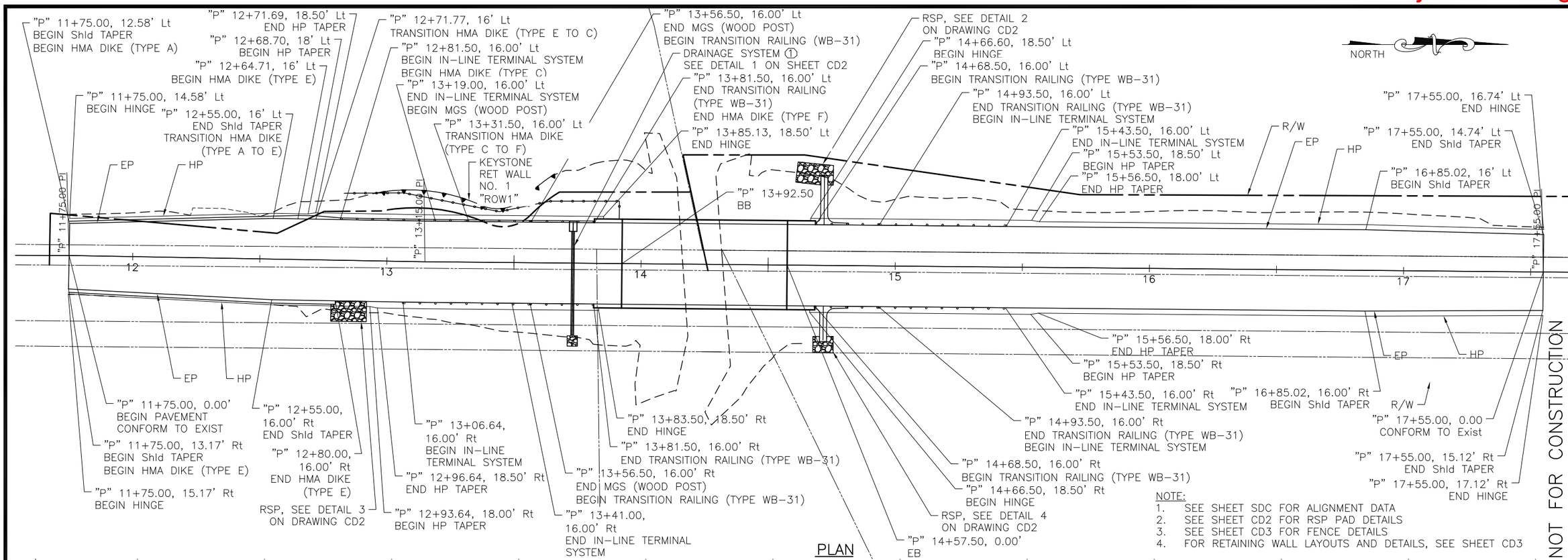
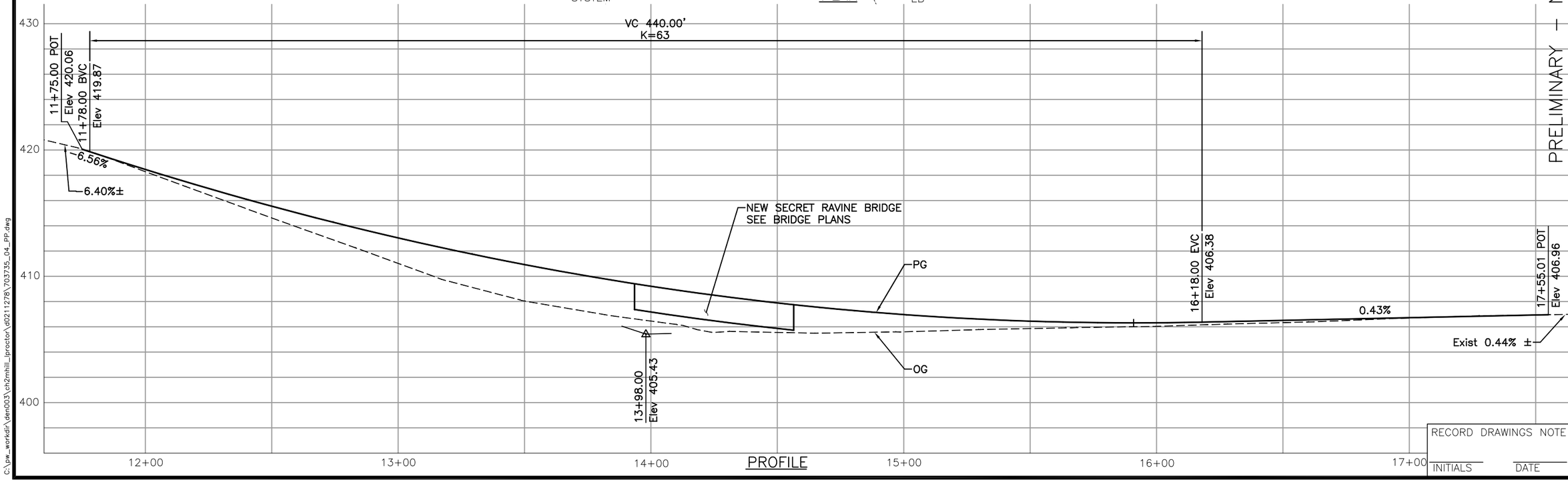


NOTE:
1. SEE SHEET SDC FOR ALIGNMENT DATA
2. SEE SHEET CD2 FOR RSP PAD DETAILS
3. SEE SHEET CD3 FOR FENCE DETAILS
4. FOR RETAINING WALL LAYOUTS AND DETAILS, SEE SHEET CD3



PROFILE

RECORD DRAWINGS NOTE

INITIALS DATE

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
PLAN AND PROFILE

DEPARTMENT OF PUBLIC WORKS
PLACER COUNTY CALIFORNIA

DATE: 05/03/2019
DESIGN: M.RANDALL
DRAW: C.AGUILAR
CHECK:

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. RANDALL
NO. 60770
EXP. 12/31/20
CIVIL
STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
–
PROJECT NO.
PC 2972

SCALE
HORIZ: 1"=20'
VERT: 1"=5'
SCALE REFERENCE
0 1"

DRAWING
PP

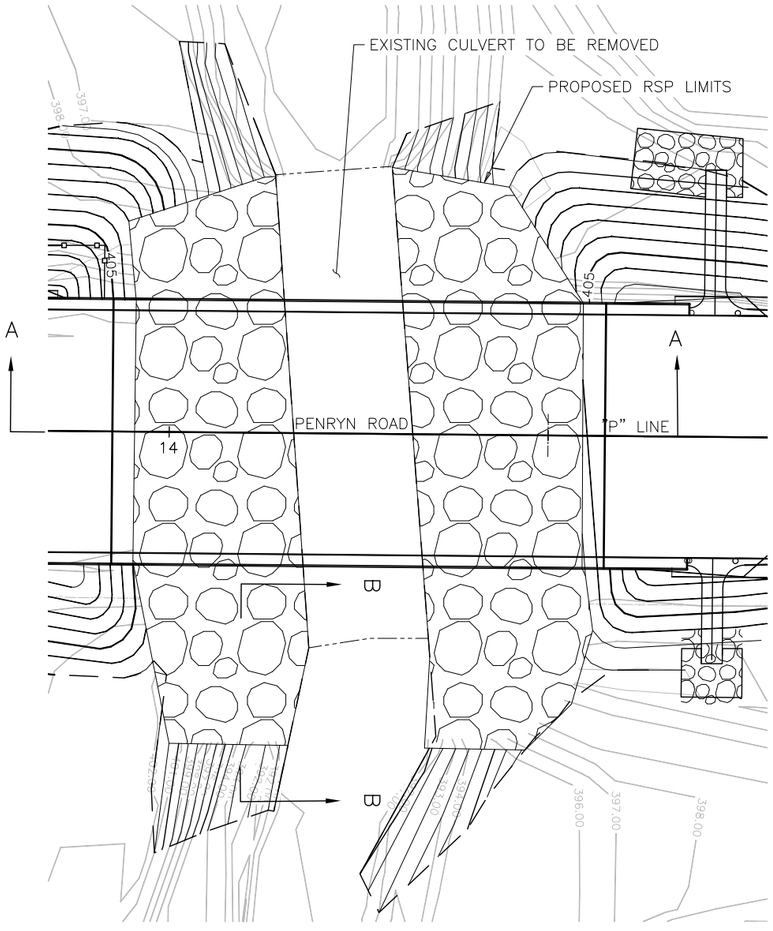
SHEET NO.
5 of 26

No.	Revision	Description	Date	Approved

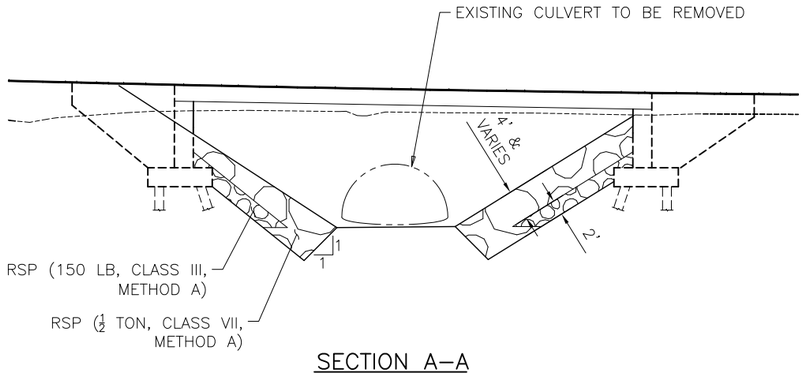
C:\pw_workdir\den003\ch2mhill_lproctor\d0211278\703735_04_PP.dwg

NOTE:

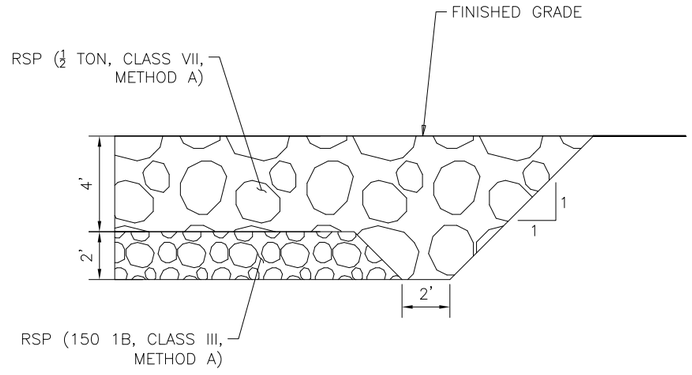
1. COMPACTION WITHIN THE FLOODWAY MUST BE TO THE DENSITY OF THE ADJACENT UNDISTURBED MATERIAL.



PLAN
SCALE:1"=5'



SECTION A–A
SCALE:1"=10'



SECTION B–B
SCALE:1"=1'

DETAIL 5: ABUTMENT ROCK SLOPE PROTECTION

NORTH

No.	Revision	Description	Date	Approved

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE REPAIR PROJECT CONSTRUCTION DETAILS

DEPARTMENT OF PUBLIC WORKS
PLACER COUNTY CALIFORNIA

DATE: 05/03/2019
DESIGN: M.RANDALL
DRAW: P.DONOVAN
CHECK:

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. RANDALL
NO. 60770
EXP. 12/31/20
CIVIL
STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
–
PROJECT NO.
PC 2972

SCALE
HORIZ: AS SHOWN
VERT: AS SHOWN
SCALE REFERENCE
0 1"

DRAWING
CD1

SHEET NO.
6 of 26

RECORD DRAWINGS NOTE
INITIALS DATE

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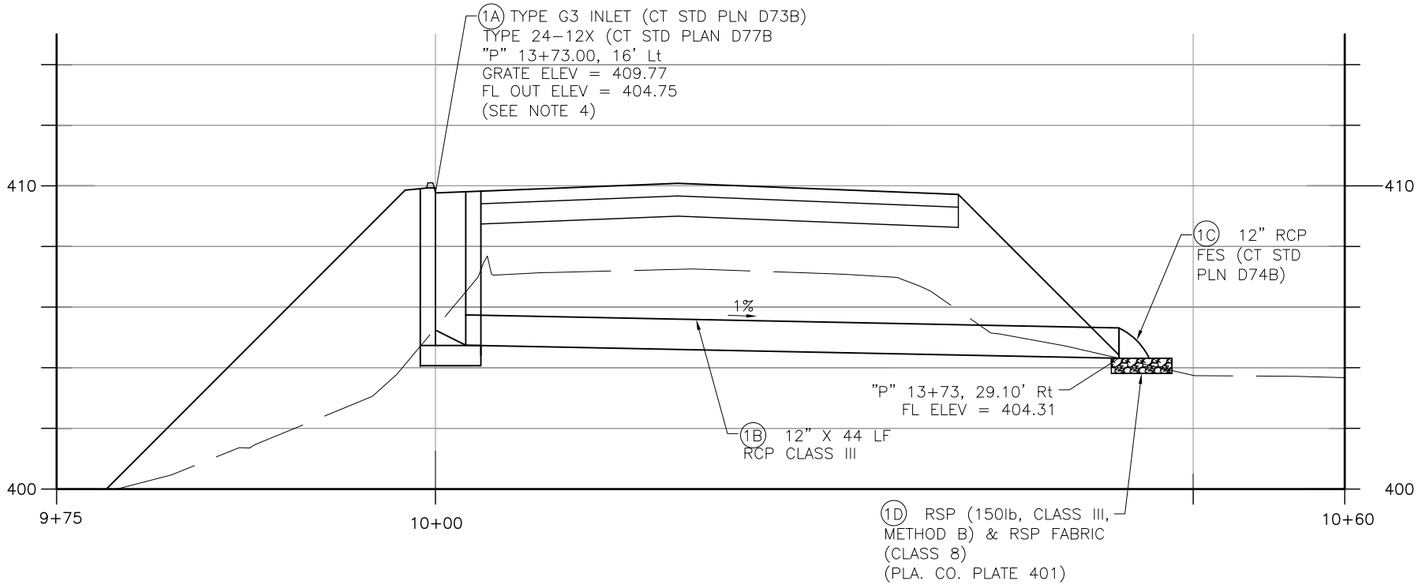
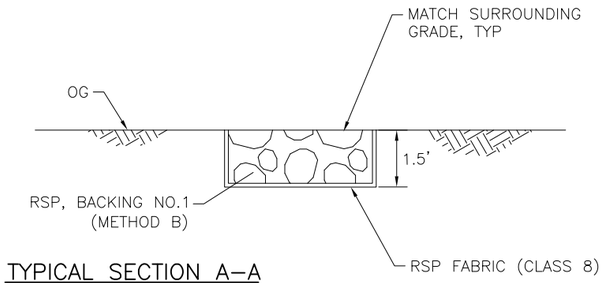
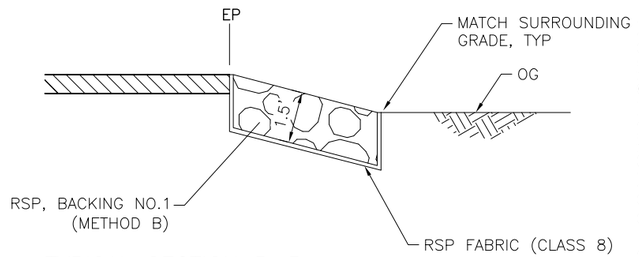


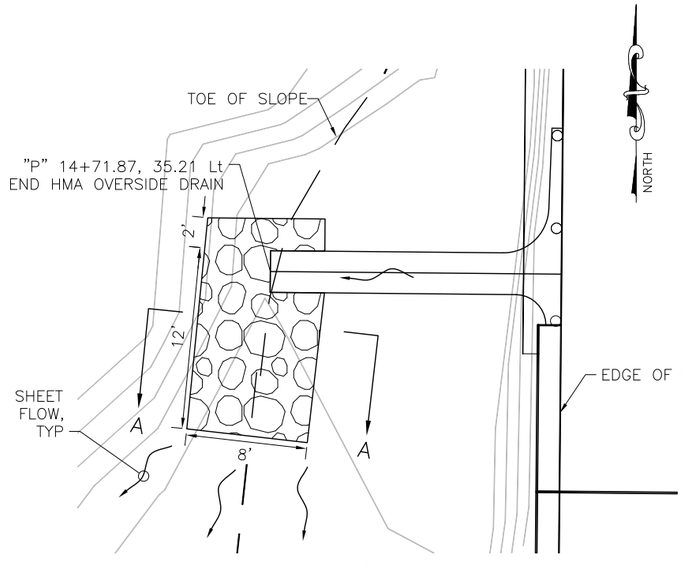
DRAINAGE SYSTEM ① – DETAIL 1
SCALE: 1"=5'



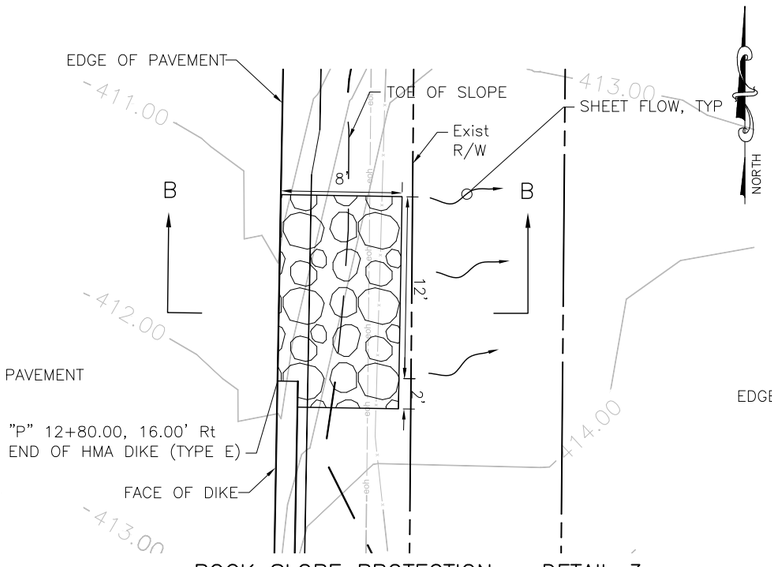
TYPICAL SECTION A–A
NTS



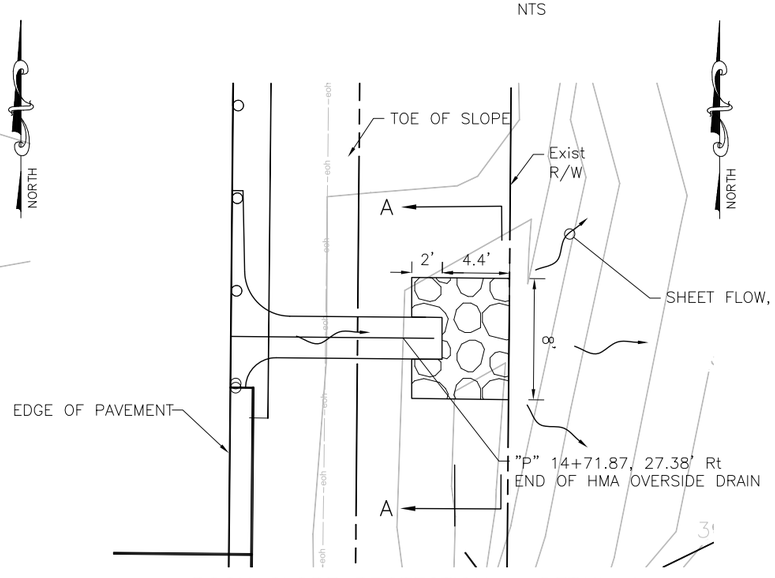
TYPICAL SECTION B–B
NTS



ROCK SLOPE PROTECTION – DETAIL 2
SCALE: 1"=5'



ROCK SLOPE PROTECTION – DETAIL 3
SCALE: 1"=5'



ROCK SLOPE PROTECTION – DETAIL 4
SCALE: 1"=5'

NOTES:

1. ALL ROCKS SHALL BE ANGULAR AND HAVE TWO FACES.
2. EXCAVATE TO DIMENSIONS SHOWN. SQUARE EDGES NOT REQUIRED. LOCALLY ADJUST AS NEEDED TO AVOID DAMAGING ANY TREE ROOTS ENCOUNTERED. PLACE RSP FABRIC LOOSELY AND PIN TO SIDES OF TRENCH. PLACE ROCK IN TRENCH. TRIM FABRIC SO THAT NONE PROTRUDES ABOVE GROUND.
3. ROCK SHALL NOT PROTRUDE ABOVE FLOW LINE OR ADJACENT GROUND.
4. MARK INLET WITH "NO DUMPING – DRAINS TO CREEK" PER PLACER CO. PLATE 403.

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
CONSTRUCTION DETAILS

PLACER COUNTY CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

No.	Revision	Description	Date	Approved

DATE: 05/03/2019
DESIGN: M.RANDALL
DRAW: P.DONOVAN
CHECK:

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. RANDALL
No. 60770
EXP: 12/31/20
CIVIL
STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
–
PROJECT NO.
PC 2972
SCALE
HORIZ: AS SHOWN
VERT: N/A
SCALE REFERENCE
0 1"
DRAWING
CD2
SHEET NO.
7 of 26

RECORD DRAWINGS NOTE
INITIALS DATE

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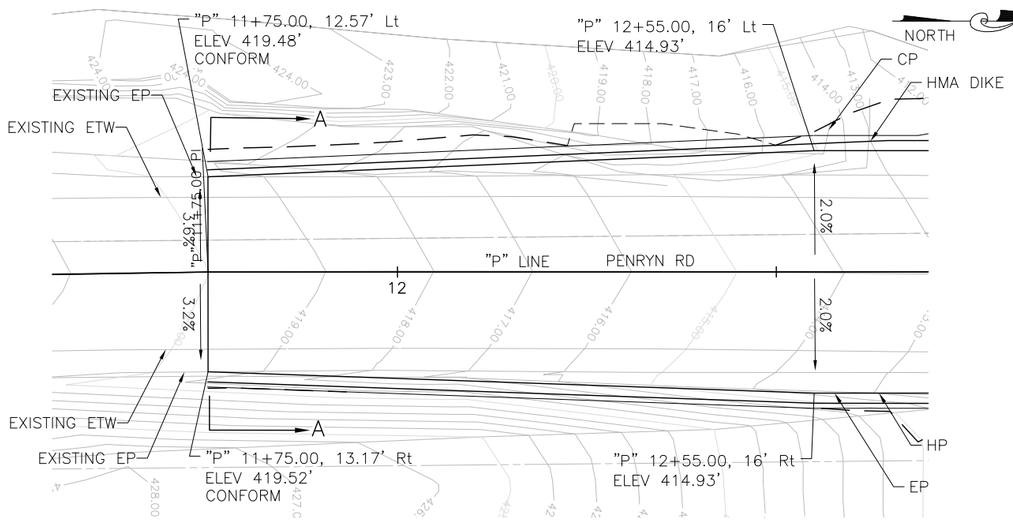
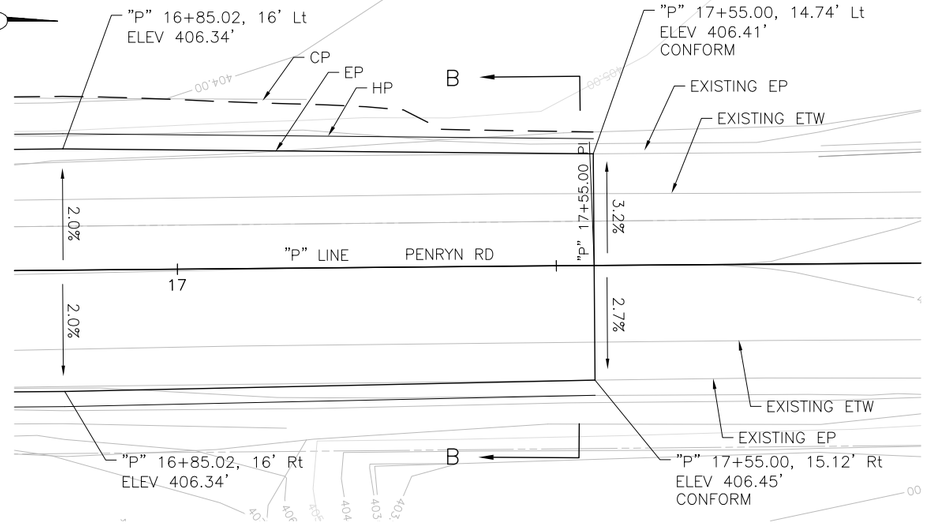
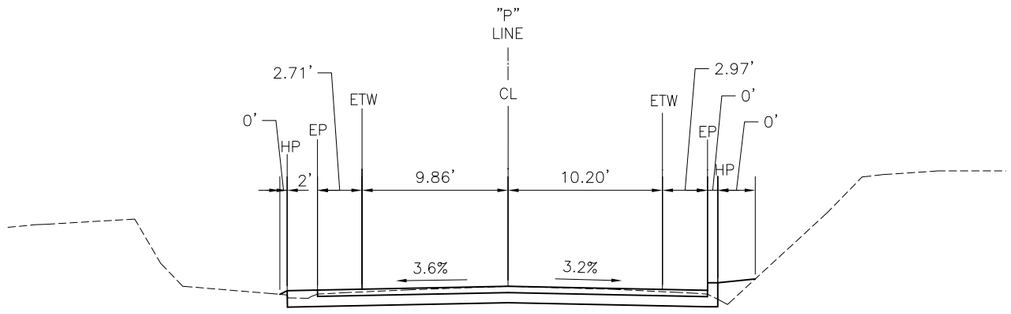


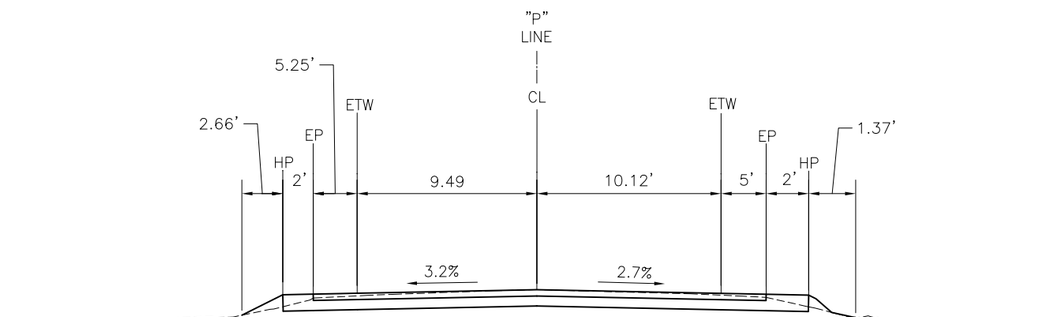
SOUTHERN ROADWAY GRADE TIE IN – DETAIL 6
SCALE: 1"=10'



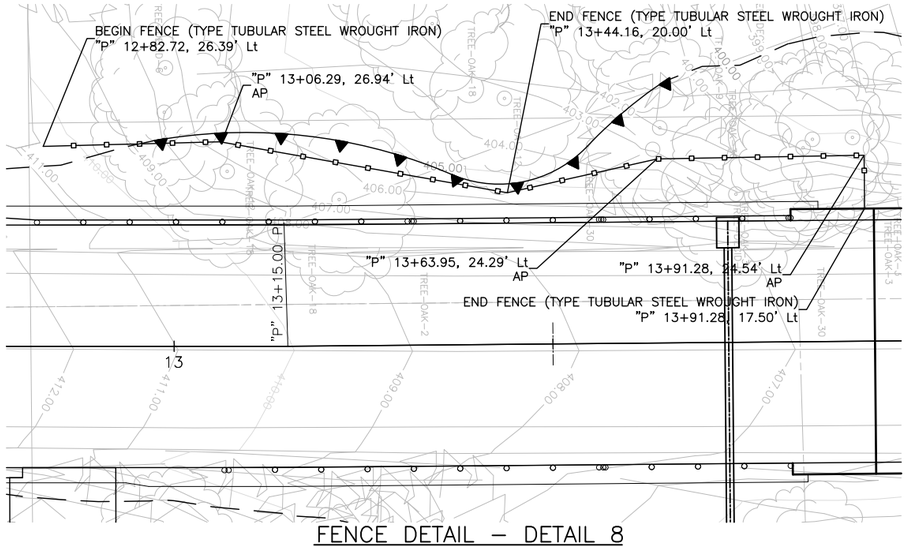
NORTHERN ROADWAY GRADE TIE IN – DETAIL 7
SCALE: 1"=10'



SECTION A–A
SCALE: 1"=5'



SECTION B–B
SCALE: 1"=5'



FENCE DETAIL – DETAIL 8
SCALE: 1"=10'

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
CONSTRUCTION DETAILS

PLACER COUNTY CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

No.	Revision	Description	Date	Approved

DATE: 05/03/2019
DESIGN: M.RANDALL
DRAW: P.DONOVAN
CHECK:

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J RANDALL
No. 60770
EXP. 12/31/20
CIVIL
STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
–

PROJECT NO.
PC 2972

SCALE
HORIZ: AS SHOWN
VERT: N/A

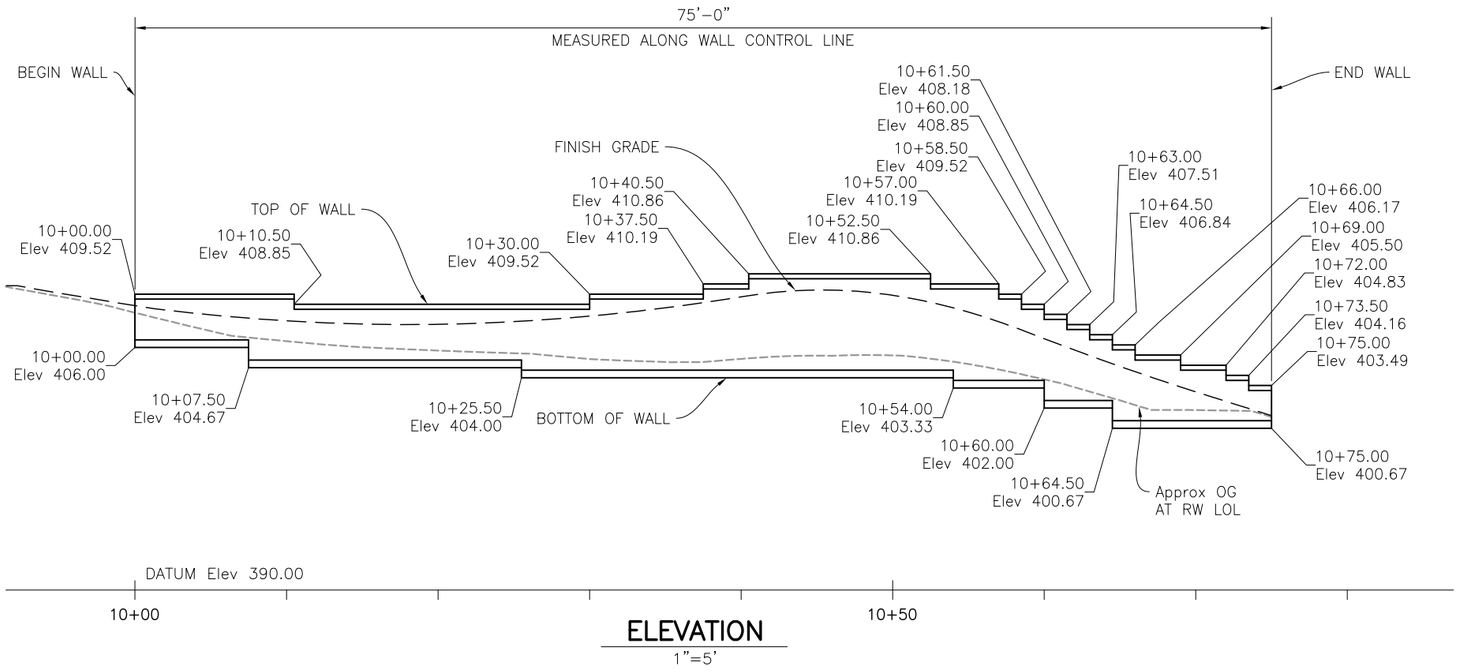
SCALE REFERENCE
0 1"

DRAWING
CD3

SHEET NO.
8 of 26

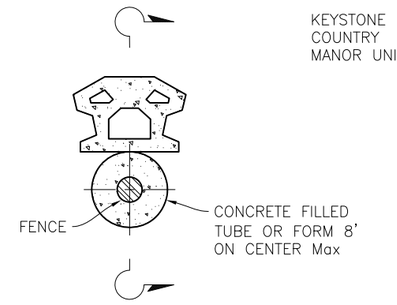
RECORD DRAWINGS NOTE
INITIALS DATE

C:\pw_workdir\den0003\ch2mhill_lprocter\d0211278\703735_05_CD3.dwg

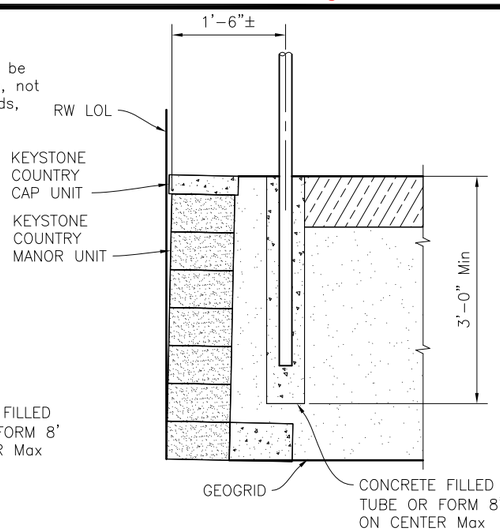


ELEVATION
1"=5'

Note:
Concrete filled tube or form to be set during the wall construction, not drilled through geogrid afterwards, when directly behind units.

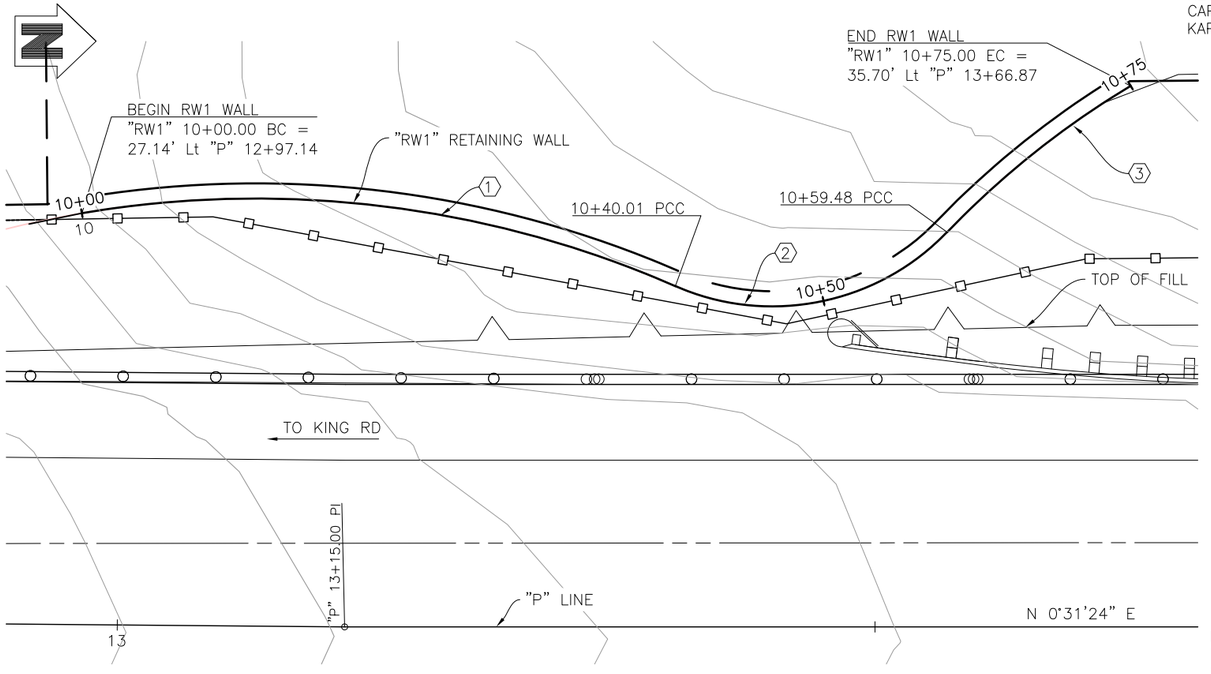


FENCE PLAN DETAIL

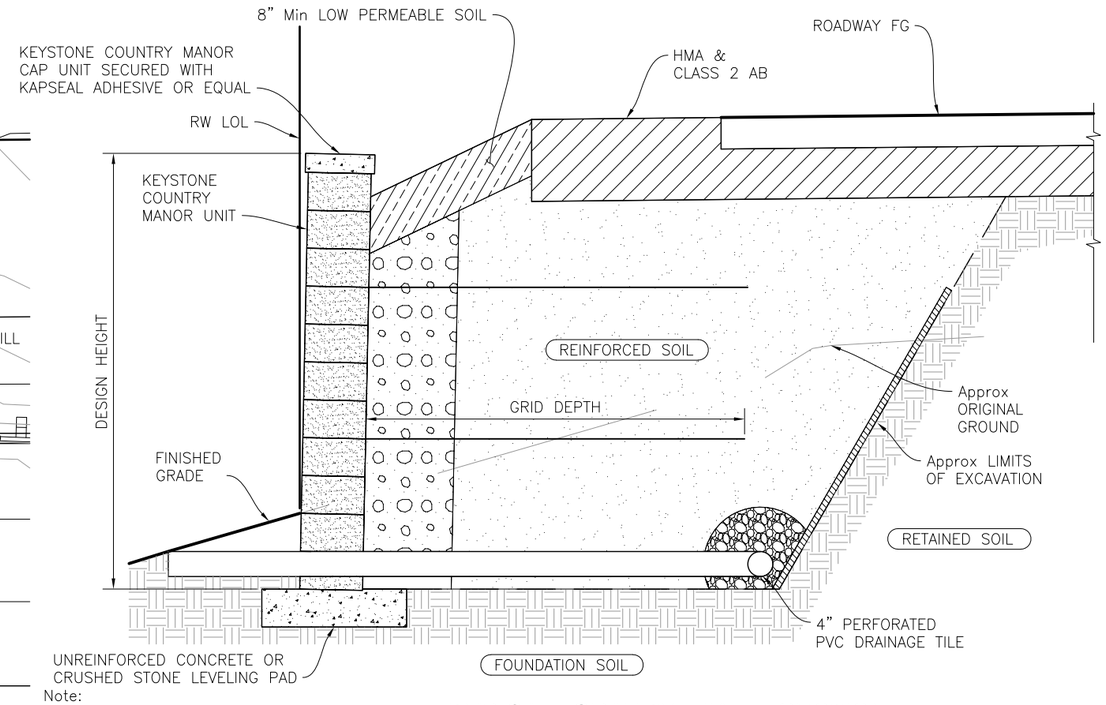


FENCE SECTION DETAIL
NO SCALE

CURVE DATA				
NO.	RADIUS	Δ	T	L
1	69'	33°13'24"	20.59'	40.01'
2	16'	69°43'70"	11.15'	19.47'
3	59'	15°04'38"	7.81'	15.53



PLAN
1"=5'



Note:
When site conditions require, wrap drainage tile in 3/4" agregate and filter fabric with drainage composite or aggregate back drain system, as directed by geotechnical engineer.

TYPICAL GRAVITY WALL SECTION
1"=1'-0"

PRELIMINARY – NOT FOR CONSTRUCTION

No.	Revision	Description	Date	Approved

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
CONSTRUCTION DETAILS

DEPARTMENT OF PUBLIC WORKS
PLACER COUNTY CALIFORNIA

DATE: 05/03/2019
DESIGN: M. RANDALL
DRAW: D. MONK
CHECK: J. LOOMIS

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. RANDALL
NO. 60770
EXP. 12/31/20
CIVIL
STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
–
PROJECT NO.
PC 2972
SCALE
HORIZ:
VERT:
SCALE REFERENCE
0 1"

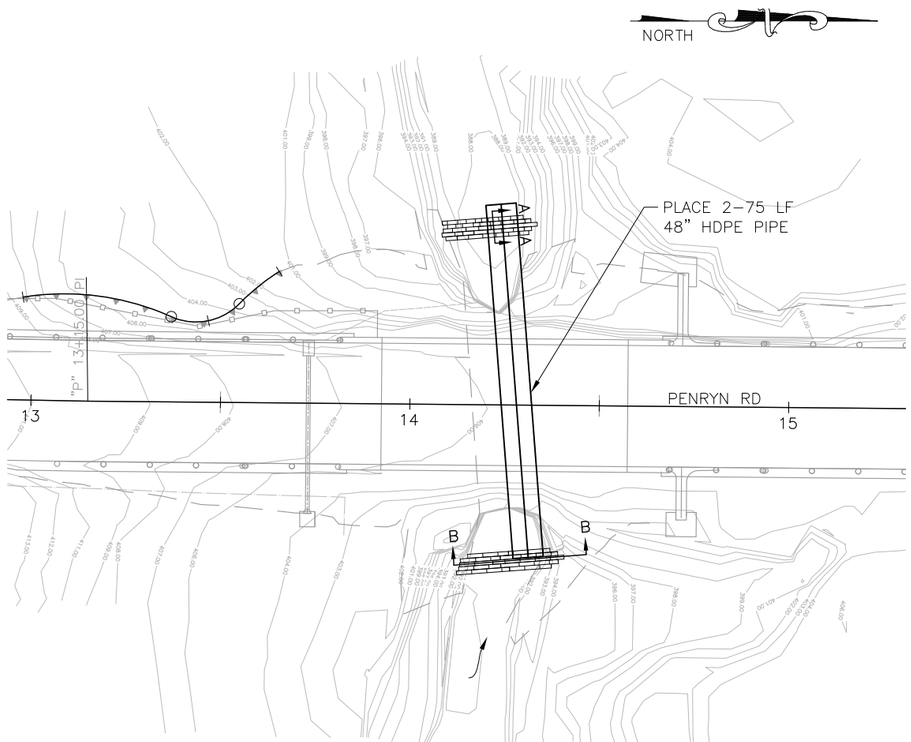
DRAWING
CD4
SHEET NO.
9 of 26

RECORD DRAWINGS NOTE
INITIALS DATE

C:\pw_workdir\den0003\ch2mhill_lprocter\d0211278\703735_05_CD4.dwg

NOTES:

1. CONTRACTOR TO DESIGN SIZE OF TEMPORARY STREAM DIVERSION. TEMPORARY STREAM DIVERSION MUST CONVEY NO LESS THAN THE MAXIMUM ESTIMATED DRY SEASON FLOW OF 324 CFS.



PLAN

STAGE 1

1. INSTALL SANDBAGS / VISQUEEN UPSTREAM AND DOWNSTREAM OF CULVERT.
2. INSTALL PIPES THROUGH EXISTING CULVERT.

STAGE 2

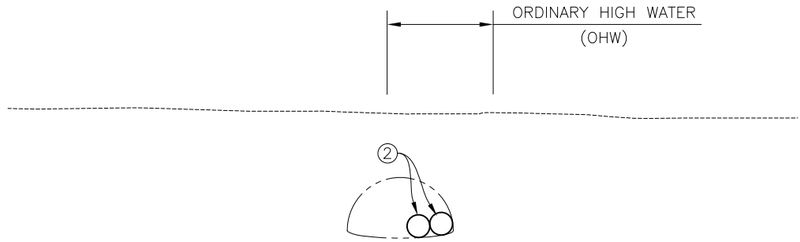
1. EXCAVATE AROUND EXISTING CULVERT.
2. PLACE RSP.
3. CONSTRUCT FILL SLOPES.

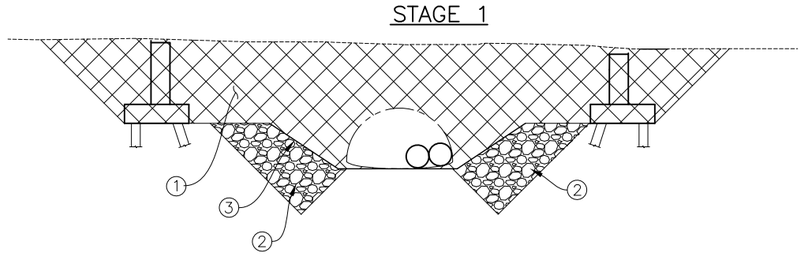
STAGE 3

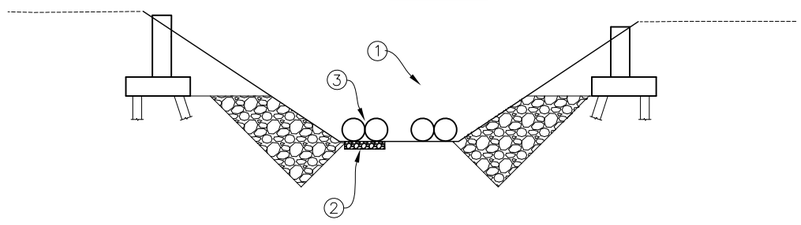
1. REMOVE PORTION OF EXISTING CULVERT.
2. PLACE NEW STREAMBED MATERIAL IN EXPOSED PORTION OF CHANNEL.
3. INSTALL SECOND DIVERSION

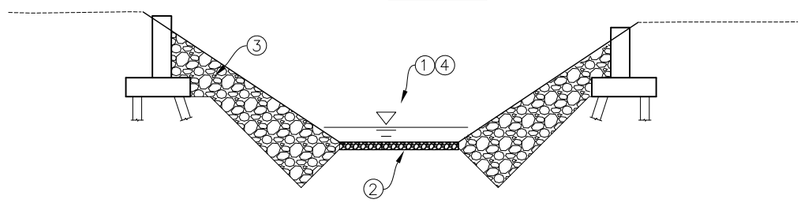
STAGE 4

1. REMOVE REMAINING PORTION OF CULVERT.
2. PLACE NEW STREAMBED MATERIAL IN REMAINING EXPOSED CHANNEL.
3. PLACE REMAINING RSP.
4. REMOVE FIRST DIVERSION.

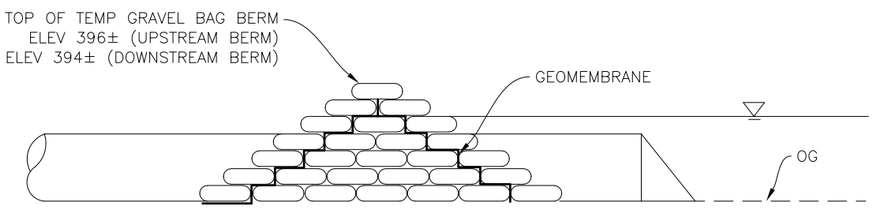




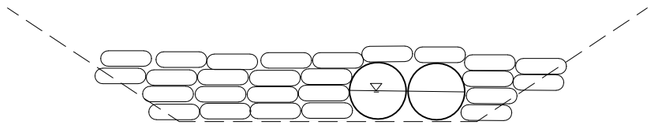




STAGE 4



SECTION A–A
NTS



SECTION B–B
NTS

RECORD DRAWINGS NOTE

INITIALS DATE

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
TEMPORARY DIVERSION DETAILS

PLACER COUNTY CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

No.	Revision	Description	Date	Approved

DATE: 05/03/2019
DESIGN: M.RANDALL
DRAW: L.NOWLAKHA
CHECK: M.NEGRETE

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. RANDALL
No. 60770
EXP. 12/31/20
CIVIL
STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
–
PROJECT NO.
PC 2972

SCALE
HORIZ: 1"=20'
VERT: N/A
SCALE REFERENCE
0 1"

DRAWING
TD

SHEET NO.
10 of 26

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LEGEND

TEMPORARY FIBER ROLL PER CT STD PLN T56

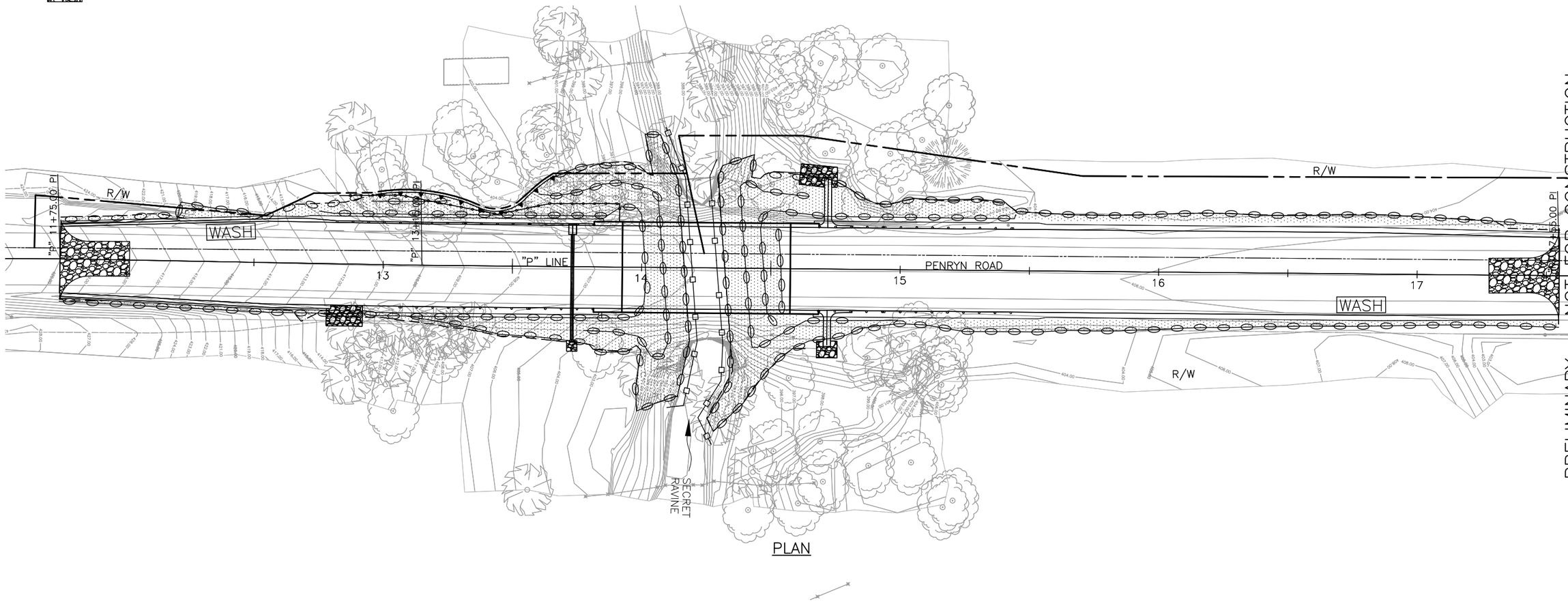
DRY SEED PLUS ALL DISTURBED SOIL AREAS AS DIRECTED BY ENGINEER

WASH — TEMPORARY CONCRETE WASHOUT AREA PER CT STD PLN T59

TEMPORARY SILT FENCE PER CT STD PLN T51

TEMPORARY CONSTRUCTION ENTRANCE (TYPE 1) PER CT STD PLN T58

MAGNETIC



PLAN

RECORD DRAWINGS NOTE

INITIALS DATE

PRELIMINARY — NOT FOR CONSTRUCTION

No.	Revision	Description	Date	Approved

PENRYN ROAD AT SECRET RAVINE REPAIR PROJECT EROSION CONTROL PLAN

DEPARTMENT OF PUBLIC WORKS

PLACER COUNTY CALIFORNIA

DATE: 05/03/2019
DESIGN: M.RANDALL
DRAW: L.NOWLAKHA
CHECK:

REGISTERED PROFESSIONAL ENGINEER — MATTHEW J RANDALL — No. 60770 — EXP. 12/31/20 — CIVIL — STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
–

PROJECT NO.
PC 2972

SCALE
HORIZ: 1"=20'
VERT: N/A

SCALE REFERENCE
0 — 1"

DRAWING
EC

SHEET NO.
11 of 26

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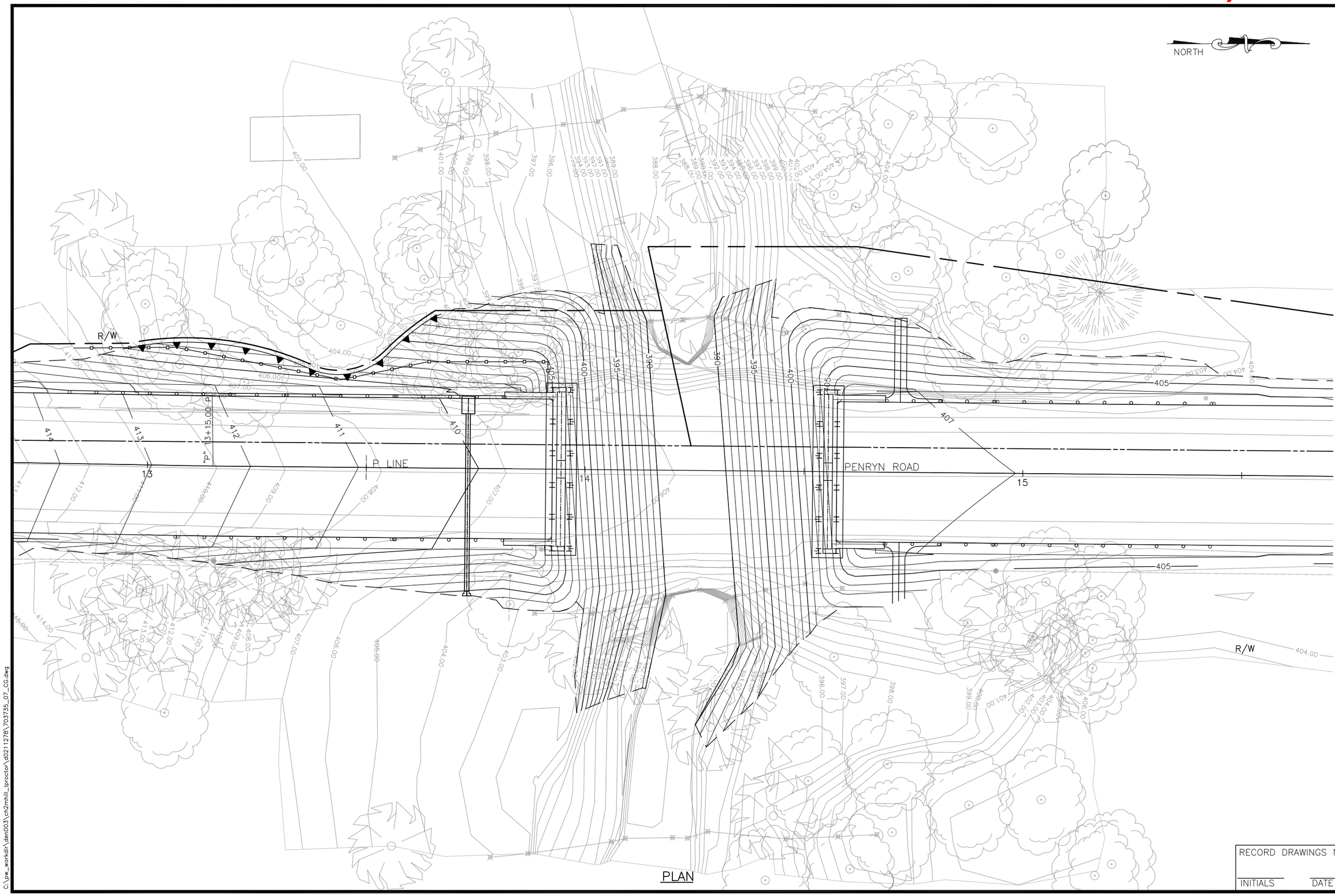

PLAN

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
CONTOUR GRADING PLAN

PLACER COUNTY CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

No.	Revision	Description	Date	Approved

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DATE: 05/03/2019
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DRAW: C.AGUILAR
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REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. RANDALL
No. 60770
EXP. 12/31/20
CIVIL
STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
–
PROJECT NO.
PC 2972

SCALE
HORIZ: 1"=20'
VERT: 1"=5'

SCALE REFERENCE
0 1"

DRAWING
CG

SHEET NO.
12 of 26

RECORD DRAWINGS NOTE

INITIALS DATE

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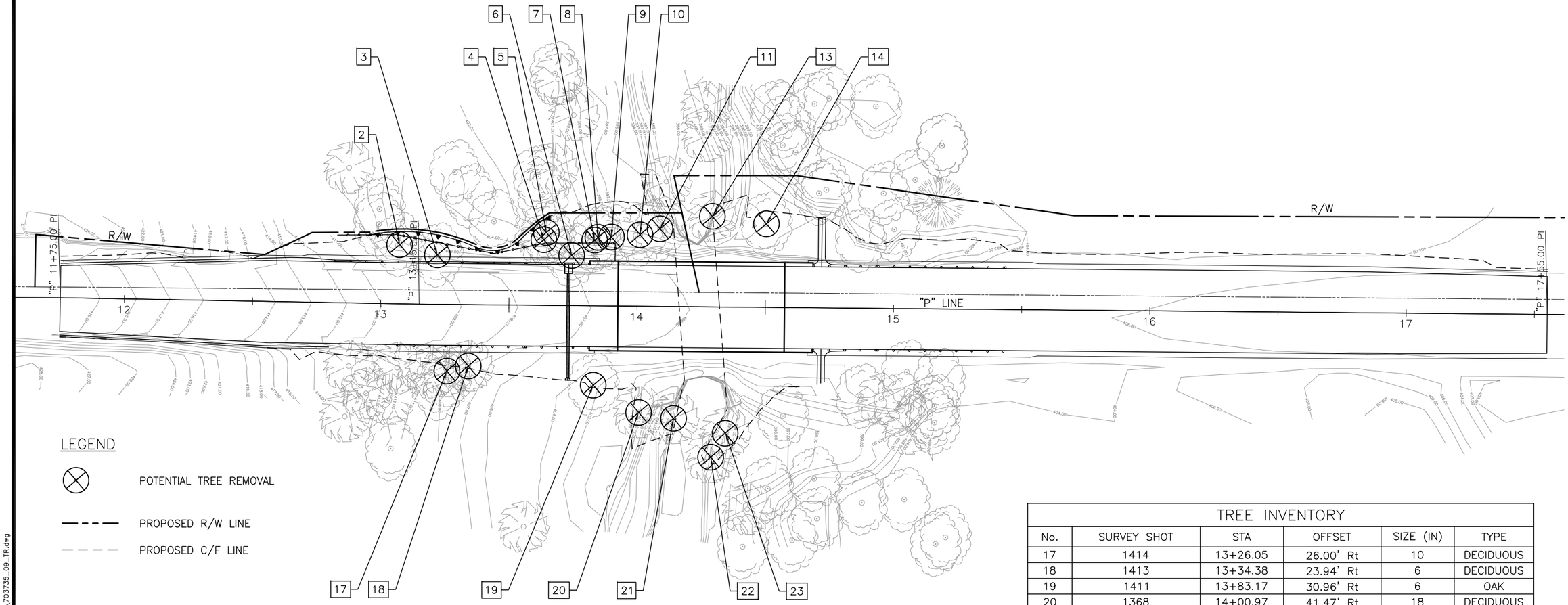
TREE INVENTORY					
No.	SURVEY SHOT	STA	OFFSET	SIZE (IN)	TYPE
2	1516	13+06.99	23.08' Lt	18	OAK
3	1517	13+21.94	19.30' Lt	2	OAK
4	1475	13+63.30	25.57' Lt	8	DECIDUOUS
5	1476	13+64.35	28.38' Lt	3	OAK
6	1474	13+74.32	19.55' Lt	30	OAK
7	1473	13+83.25	25.58' Lt	3	OAK
8	1472	13+84.48	26.69' Lt	3	OAK
9	1471	13+89.77	26.86' Lt	5	OAK
10	1470	14+00.89	27.88' Lt	5	OAK

TREE INVENTORY					
No.	SURVEY SHOT	STA	OFFSET	SIZE (IN)	TYPE
11	1469	14+08.68	30.25' Lt	4	OAK
13	1255	14+29.06	35.28' Lt	8	DECIDUOUS
14	1256	14+50.17	32.56' Lt	8	OAK

NORTH



LEGEND

- POTENTIAL TREE REMOVAL
- PROPOSED R/W LINE
- PROPOSED C/F LINE

PLAN

TREE INVENTORY					
No.	SURVEY SHOT	STA	OFFSET	SIZE (IN)	TYPE
17	1414	13+26.05	26.00' Rt	10	DECIDUOUS
18	1413	13+34.38	23.94' Rt	6	DECIDUOUS
19	1411	13+83.17	30.96' Rt	6	OAK
20	1368	14+00.97	41.47' Rt	18	DECIDUOUS
21	1372	14+14.61	43.66' Rt	8	DECIDUOUS
22	1326	14+29.23	58.64' Rt	6	DECIDUOUS
23	1325	14+34.79	49.26' Rt	8	DECIDUOUS

RECORD DRAWINGS NOTE

INITIALS DATE

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE REPAIR PROJECT TREE REMOVAL PLAN

DEPARTMENT OF PUBLIC WORKS

PLACER COUNTY CALIFORNIA

No.	Revision	Description	Date	Approved

DATE: 05/03/2019
DESIGN: M.RANDALL
DRAW: C.AGUILAR
CHECK:

REGISTERED PROFESSIONAL ENGINEER – MATTHEW J. RANDALL – NO. 60770 – EXP. 12/31/20 – CIVIL – STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
–
PROJECT NO.
PC 2972

SCALE
HORIZ: 1"=20'
VERT: N/A
SCALE REFERENCE 0 1"

DRAWING
TR

SHEET NO.
13 of 26

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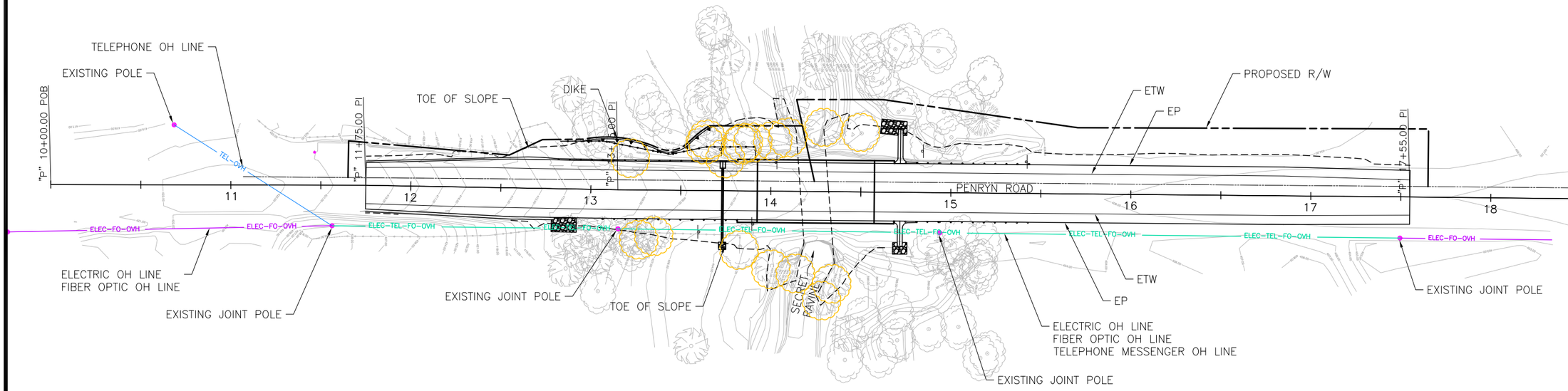
LEGEND:

- EXISTING OVERHEAD TELEPHONE
- EXISTING OVERHEAD ELECTRIC & FIBER OPTIC
- EXISTING OVERHEAD TELEPHONE, ELECTRIC & FIBER OPTIC
- EXISTING POLE TO REMAIN
- EXISTING TREE TO BE REMOVED

NORTH



PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
UTILITY MAP

PLACER COUNTY CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

No.	Revision	Description	Date	Approved

DATE: 05/03/2019
DESIGN: L.REINKING
DRAW: L.NOWLAKHA
CHECK: M.NEGRETE

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. RANDALL
No. 60770
EXP. 12/31/20
CIVIL
STATE OF CALIFORNIA

DATE: _____

CONSTRUCTION CONTRACT NO.
–

PROJECT NO.
PC 2972

SCALE
HORIZ: 1"=30'
VERT: N/A

SCALE REFERENCE
0 — 1"

DRAWING
U

SHEET NO.
14 of 26

RECORD DRAWINGS NOTE

____-eoh— INITIALS ____-eoh— DATE

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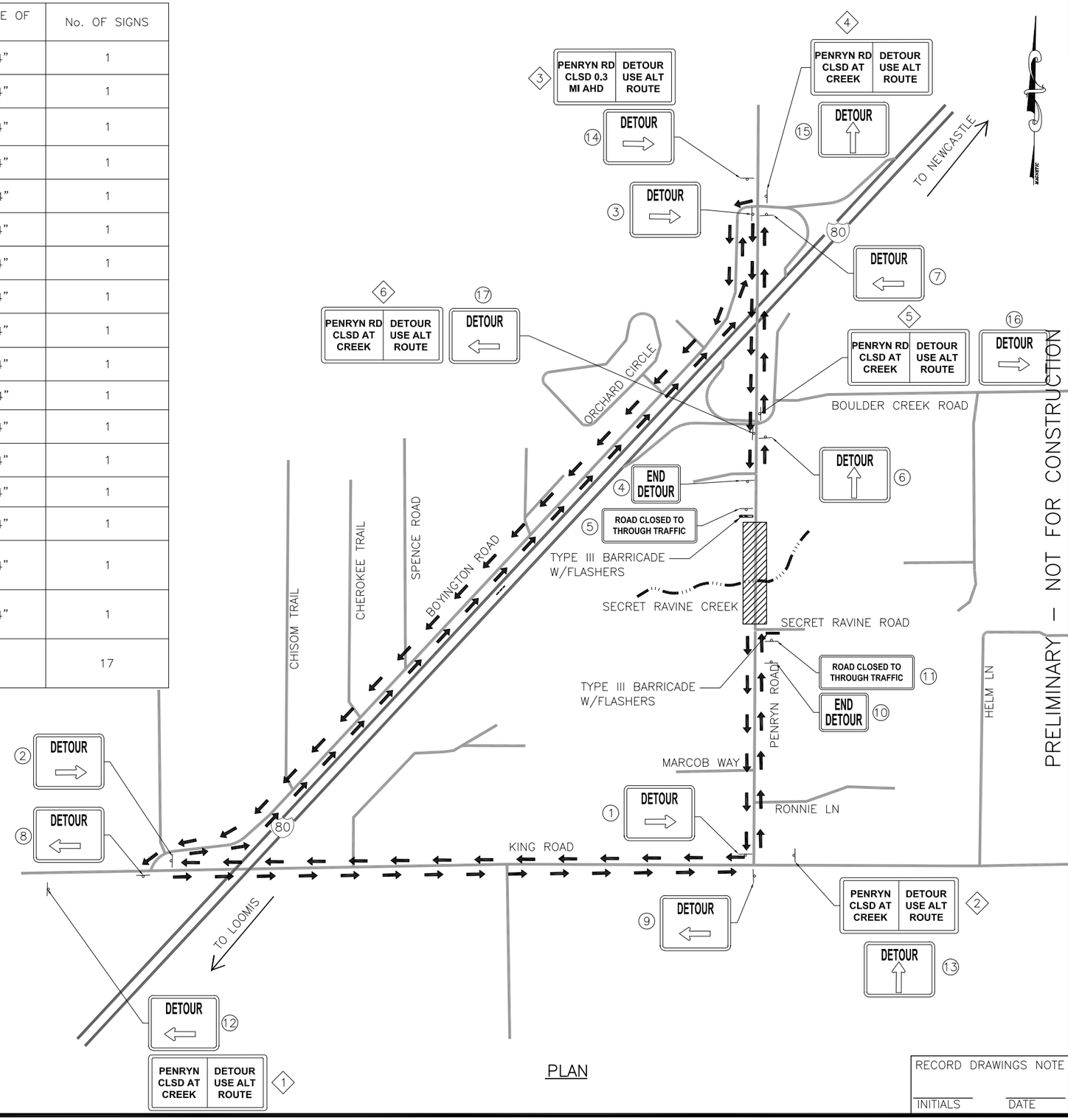
SIGN #	LOCATION	SIGN CODE	SIGN MESSAGE	PANEL SIZE	No. & SIZE OF POST	No. OF SIGNS
①	SB PENRYN ROAD, NORTH OF KING ROAD	M4-9R	DETOUR "ARROW RIGHT"	30" X 24"	1-4"x4"	1
②	WB KING ROAD, EAST OF BOYINGTON ROAD	M4-9R	DETOUR "ARROW RIGHT"	30" X 24"	1-4"x4"	1
③	EB BOYINGTON ROAD, WEST OF PENRYN ROAD	M4-9R	DETOUR "ARROW RIGHT"	30" X 24"	1-4"x4"	1
④	SB PENRYN ROAD, SOUTH OF BOULDER CREEK RD	M4-8A	END DETOUR	24" X 18"	1-4"x4"	1
⑤	SB PENRYN ROAD, NORTH OF SECRET RAVINE	R11-4	ROAD CLOSED TO THROUGH TRAFFIC	60" X 30"	2-4"x4"	1
⑥	NB PENRYN ROAD, SOUTH OF BOULDER CREEK RD	SC9 (CA)	DETOUR "ARROW UP"	36" X 36"	1-4"x4"	1
⑦	NB PENRYN ROAD, SOUTH OF BOYINGTON ROAD	M4-9L	DETOUR "ARROW LEFT"	30" X 24"	1-4"x4"	1
⑧	WB KING ROAD, SOUTH OF BOYINGTON ROAD	M4-9L	DETOUR "ARROW LEFT"	30" X 24"	1-4"x4"	1
⑨	EB KING ROAD, SOUTH OF PENRYN ROAD	M4-9L	DETOUR "ARROW LEFT"	30" X 24"	1-4"x4"	1
⑩	NB PENRYN ROAD, SOUTH OF SECRET RAVINE	M4-8A	END DETOUR	24" X 18"	1-4"x4"	1
⑪	NB PENRYN ROAD, SOUTH OF SECRET RAVINE	R11-4	ROAD CLOSED TO THROUGH TRAFFIC	60" X 30"	2-4"x4"	1
⑫	EB KING ROAD, SOUTH OF BOYINGTON ROAD	M4-9L	DETOUR "ARROW LEFT"	30" X 24"	1-4"x4"	1
⑬	WB KING ROAD, EAST OF PENRYN ROAD	SC9 (CA)	DETOUR "ARROW UP"	36" X 26"	1-4"x4"	1
⑭	SB PENRYN ROAD, NORTH OF BOYINGTON ROAD	M4-9R	DETOUR "ARROW RIGHT"	30" X 24"	1-4"x4"	1
⑮	WB I-80 PENRYN ROAD EXIT, NORTH OF BOYINGTON ROAD	SC9 (CA)	DETOUR "ARROW LEFT"	30" X 24"	1-4"x4"	1
⑯	WB BOULDER CREEK ROAD, INTERSECTION OF BOULDER CREEK ROAD/PENRYN ROAD	M4-9R	DETOUR "ARROW RIGHT"	30" X 24"	1-4"x4"	1
⑰	EB I-80 PENRYN ROAD EXIT, INTERSECTION OF BOULDER CREEK ROAD/PENRYN ROAD	M4-9L	DETOUR "ARROW LEFT"	30" X 24"	1-4"x4"	1
				TOTAL	19	17

CMS	LOCATION	MESSAGE	
		PHASE 1	PHASE 2
◇1	EB KING ROAD, SOUTH OF BOYINGTON ROAD	PENRYN CLSD AT CREEK	DETOUR USE ALT ROUTE
◇2	WB KING ROAD, EAST OF PENRYN ROAD	PENRYN CLSD AT CREEK	DETOUR USE ALT ROUTE
◇3	SB PENRYN ROAD, NORTH OF BOYINGTON ROAD	PENRYN CLSD 0.3 MI AHD	DETOUR USE ALT ROUTE
◇4	WB I-80 PENRYN ROAD EXIT, NORTH OF BOYINGTON ROAD	PENRYN CLSD AT CREEK	DETOUR USE ALT ROUTE
◇5	WB BOULDER CREEK ROAD, INTERSECTION OF BOULDER CREEK ROAD/PENRYN ROAD	PENRYN CLSD AT CREEK	DETOUR USE ALT ROUTE
◇6	EB I-80 PENRYN ROAD EXIT, INTERSECTION OF BOULDER CREEK ROAD/PENRYN ROAD	PENRYN CLSD AT CREEK	DETOUR USE ALT ROUTE
		TOTAL	6



PLAN

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
DETOUR PLAN

DEPARTMENT OF PUBLIC WORKS
PLACER COUNTY CALIFORNIA

THE COUNTY OF PLACER, ITS OFFICERS, OR ITS AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS DOCUMENT.

No.	Revision	Description	Date	Approved

DATE: 05/03/2019
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DRAW: C.AGUILAR
CHECK:

REGISTERED PROFESSIONAL ENGINEER – MATTHEW L. RANDALL – No. 60770 – EXP: 12/31/20 – CIVIL – STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
–

PROJECT NO.
PC 2972

SCALE
HORIZ: NO SCALE
VERT: NO SCALE

SCALE REFERENCE
0 1"

DRAWING
DP

SHEET NO.
15 of 26

RECORD DRAWINGS NOTE
INITIALS DATE

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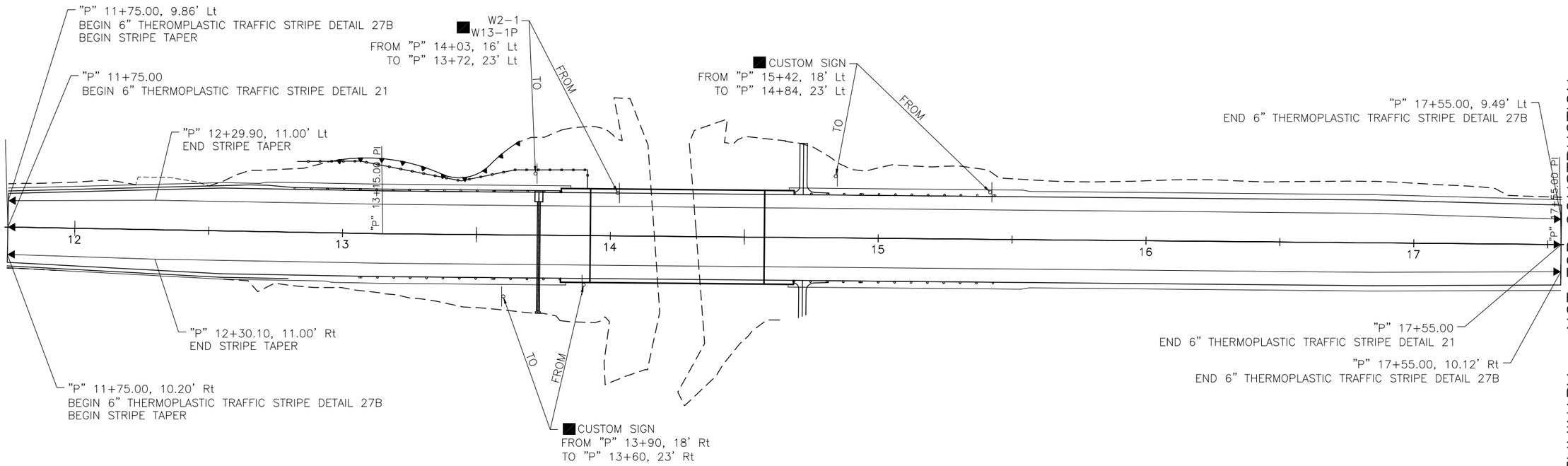
LEGEND

- RELOCATE EXISTING ROADSIDE SIGN
- ROADSIDE SIGN (ONE POST)
- CHANGE IN STRIPE PATTERN

NORTH



PLAN

PRELIMINARY – NOT FOR CONSTRUCTION

RECORD DRAWINGS NOTE

INITIALS DATE

No.	Revision	Description	Date	Approved

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
PAVEMENT DELINEATION AND SIGN PLAN

PLACER COUNTY CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

DATE: 05/03/2019
DESIGN: M.RANDALL
DRAW: P.DONOVAN
CHECK:

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. RANDALL
NO. 60770
EXP: 12/31/20
CIVIL
STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
–
PROJECT NO.
PC 2972

SCALE
HORIZ: 1"=20'
VERT:

SCALE REFERENCE
0 1"

DRAWING
PD

SHEET NO.
16 of 26

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STATION LIMITS	DIRECTION	TEMPORARY FIBER ROLL	TEMPORARY SILT FENCE	TEMPORARY CONSTRUCTION ENTRANCE	TEMPORARY CONCRETE WASHOUT
	Lt/Rt	LF	LF	EA	EA
"P" 11+75.00 to 13+25.71	LT	158			
"P" 12+75.00 to 14+1.50	LT	146			
"P" 11+75.00 to 14+1.50	RT	247			
"P" 13+60.00 to 14+8.25	LT	81			
"P" 13+27.00 to 14+8.25	RT	65			
"P" 13+66.00 to 14+16.50	LT	121			
"P" 13+10.00 to 14+16.50	RT	178			
"P" 14+51.00 to 15+44.00	LT	142			
"P" 14+53.00 to 14+54.50	LT	30			
"P" 14+32.00 to 17+55.00	LT	375			
"P" 14+32.00 to 17+55.00	RT	412			
"P" 14+40.00 to 14+64.00	LT	56			
"P" 14+40.00 to 14+99.00	RT	93			
"P" 14+10.00 to 14+09.00			116		
"P" 14+27.00 to 14+29.00			115		
"P" 11+75.00				1	
"P" 17+55.00				1	
"P"12+40.00	LT				1
"P" 16+80.00	RT				1
TOTAL =		2104	231	2	2

STATION LIMITS	DIRECTION	MIDWEST GUARDRAIL SYSTEM (WOOD POST)	TRANSITION RAILING (TYPE WB-31)	ALTERNATIVE IN-LINE TERMINAL SYSTEM	FENCE (TYPE TUBULAR STEEL, WROUGHT IRON)	TYPE III BARRICADE
	LT/RT	LF	EA	EA	LF	EA
NB Penryn Road, South of Secret Ravine	RT					1
SB Penryn Road, North of Secret Ravine	LT					1
"P" 13+31.50 to 13+56.50	LT	25				
"P" 13+56.50 to 13+81.50	LT		1			
"P" 14+68.50 to 14+93.50	LT		1			
"P" 13+56.50 to 13+81.50	RT		1			
"P" 14+68.50 to 14+93.50	RT		1			
"P" 12+81.50 to 13+31.50	LT			1		
"P" 14+93.50 to 15+43.50	LT			1		
"P" 13+06.64 to 13+56.50	RT			1		
"P" 14+93.50 to 15+43.50	RT			1		
"P" 12+82.72 TO 13+91.28	LT				116.5	
TOTAL =		25	4	4	116.5	2

DRY SEED	ROCK SLOPE PROTECTION (NO. 1, METHOD B)	ROCK SLOPE PROTECTION (1/2 T, METHOD A)	ROCK SLOPE PROTECTION (150 LB, CLASS III, METHOD B)	ROCK SLOPE PROTECTION FABRIC (CLASS 8)	12" REINFORCED CONCRETE PIPE	MINOR CONCRETE (MINOR STRUCTURE)	MISCELLANEOUS IRON AND STEEL
SF	CY	CY	CY	SQYD	LF	CY	LB
	6						
	6						
	4						
				20			
				19			
				13			
			0.9				
					44		
	16	0	1	52		2	
							167
4560							
4876							
9435	31	0	2	104	44	2	167

STATION LIMITS	DIRECTION	ROADWAY EXCAVATION	IMPORTED BORROW	RELOCATE ROADSIDE SIGN	CLASS 2 AGGREGATE BASE	HOT MIX ASPHALT (TYPE A)	PLACE HOT MIX ASPHALT DIKE (TYPE A)	PLACE HOT MIX ASPHALT DIKE (TYPE C)	PLACE HOT MIX ASPHALT DIKE (TYPE E)	PLACE HOT MIX ASPHALT DIKE (TYPE F)	PLACE HOT MIX ASPHALT (MISCELLANEOUS AREA)	THERMOPLASTIC TRAFFIC STRIPE
	LT/RT	CY	CY	EA	CY	TON	LF	LF	LF	LF	SQYD	LF
"P" 11+75.00 to 17+55.00		427	244									
"P" 11+75.00 to 12+55.00	LT				6							
"P" 11+75.00 to 12+55.00	RT				6							
"P" 12+55.00 to 13+92.50	LT				14							
"P" 12+55.00 to 13+92.50	RT				14							
"P" 14+57.50 to 15+43.50	LT				9							
"P" 14+57.50 to 15+43.50	RT				9							
"P" 15+43.50 to 16+85.02	LT				11							
"P" 15+43.50 to 16+85.02	RT				11							
"P" 16+85.02 to 17+55.00	LT				6							
"P" 16+85.02 to 17+55.00	RT				6							
"P" 11+75.00 to 13+92.50					166							
"P" 14+57.50 to 17+55.00					233							
"P" 11+75.00 to 13+92.50						210						
"P" 14+57.50 to 17+55.00						295						
"P" 14+72.00	LT					0.96						
"P" 14+72.00	RT					0.64						
"P" 11+75.00 TO 13+81.50	LT					0.17						
"P" 11+75.00 to 12+80.00	RT					0.10						
"P" 11+75.00 TO 12+55.00	LT						80					
"P" 12+55.00 to 12+64.71	LT						10					
"P" 12+71.77 to 12+81.50	LT							10				
"P" 12+81.50 to 13+31.50	LT							50				
"P" 12+64.71 to 12+71.77	LT								17			
"P" 11+75.00 to 12+80.00	RT								105			
"P" 13+31.50 to 13+41.50	LT									10		
"P" 13+41.50 to 13+81.50	LT									40		
"P" 13+90 to 13+60	LT			1								
"P" 14+03 to 13+72	LT			1								
"P" 15+42 to 14+84	RT			1								
"P" 11+75.00 to 17+55.00	LT											580
"P" 11+75.00 to 17+55.00												1160
"P" 11+75.00 to 17+55.00	RT											580
"P" 14+72.00	LT										7	
"P" 14+72.00	RT										5	
TOTAL =		427	244	3	491	507	90	60	122	50	12	2320

RECORD DRAWINGS NOTE

INITIALS DATE

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
SUMMARY OF QUANTITIES

PLACER COUNTY CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

No.	Revision	Description	Date	Approved

THE COUNTY OF PLACER, ITS OFFICERS, OR ITS AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS DOCUMENT.

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REGISTERED PROFESSIONAL ENGINEER – MATTHEW J. RANDALL – NO. 60770 – EXP: 12/31/20 – CIVIL – STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
–
PROJECT NO.
PC 2972

SCALE
HORIZ:
VERT:
SCALE REFERENCE 0 1"

DRAWING
Q

SHEET NO.
17 of 26

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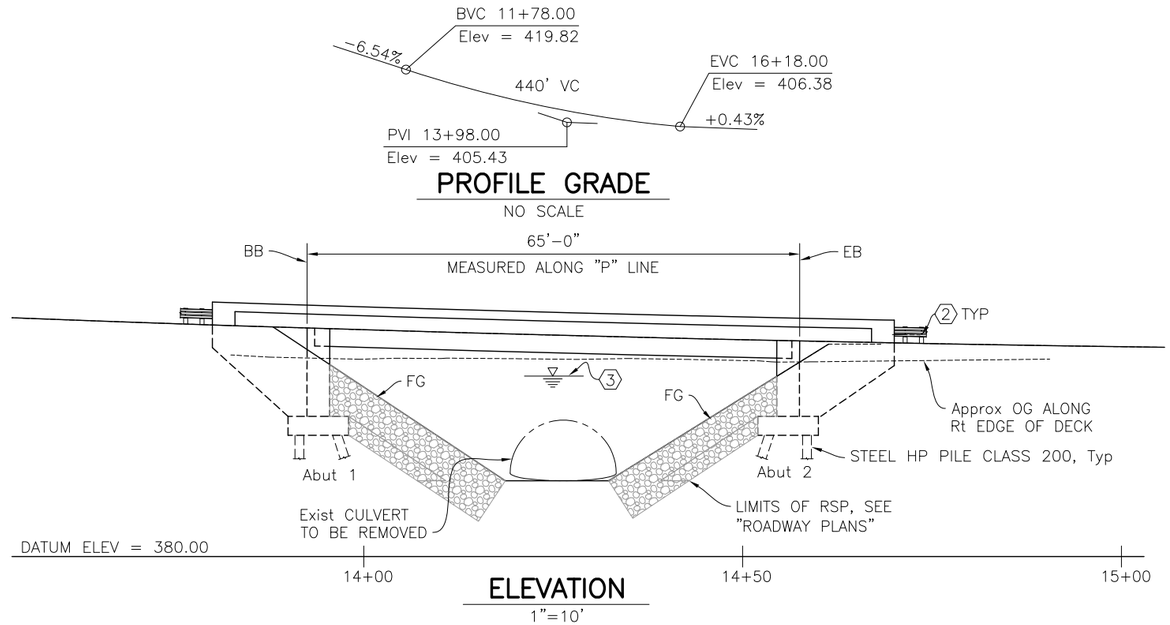
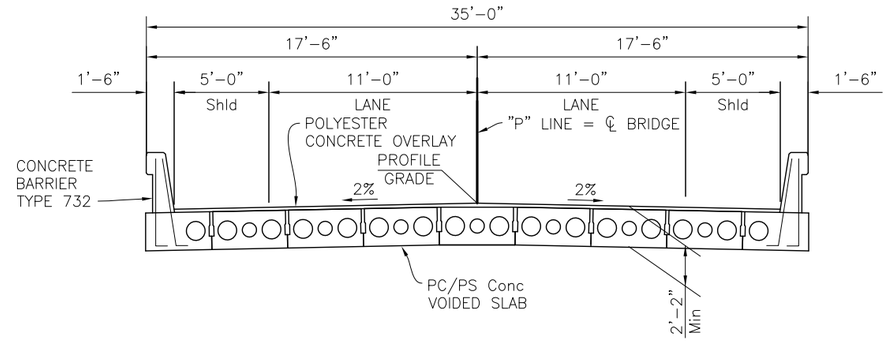


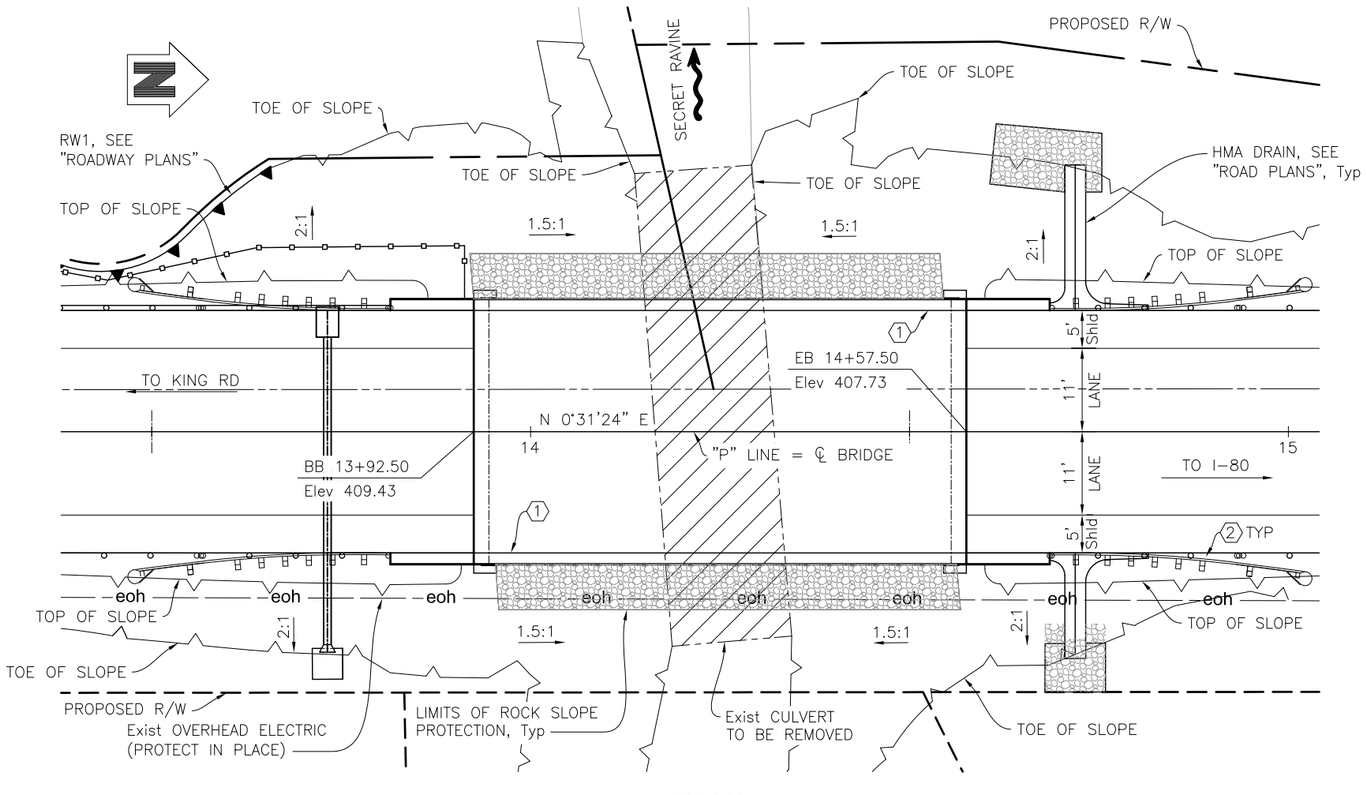
PROFILE GRADE
NO SCALE

ELEVATION
1"=10'



TYPICAL SECTION
1/4"=1'

INDEX TO PLANS



PLAN
1"=10'

NOTES:

1. For General Notes, see "DECK CONTOURS" sheet
2. For Hydrologic Summary & Pile Data, see "FOUNDATION PLAN" sheet.
3. Stream diversion required for culvert removal and abutment construction, see "ROADWAY PLANS".
4. Traffic to be detoured away from site during construction. See "DETOUR PLAN" sheet.

LEGEND:

- (1) Paint Bridge Number, Year Completed, and "SECRET RAVINE Br."
- (2) MGS, see "ROAD PLANS"
- (3) 100-Yr WS Elev. For Hydrologic Data, see "FOUNDATION PLAN"
- —— ——eoh—— Electrical Overhead Line (protect in place)
- ———— Indicates new structure
- ———— - ———— - ———— Indicates limits of existing culvert
- Indicates Culvert Removal
- Rock Slope Protection (RSP)

RECORD DRAWINGS NOTE

INITIALS DATE

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
GENERAL PLAN

DEPARTMENT OF PUBLIC WORKS
PLACER COUNTY CALIFORNIA

No.	Revision	Description	Date	Approved

THE COUNTY OF PLACER, ITS OFFICERS, OR ITS AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS DOCUMENT.

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. RANDALL
NO. 60770
EXP. 12/31/20
CIVIL
STATE OF CALIFORNIA

DATE: 05/03/2019
DESIGN: M. RANDALL
DRAW: D. MONK
CHECK: J. LOOMIS

DATE:

CONSTRUCTION CONTRACT NO.
–
PROJECT NO.
PC 2972

SCALE
HORIZ:
VERT:
SCALE REFERENCE
0 1"

DRAWING
S01

SHEET NO.
18 of 26

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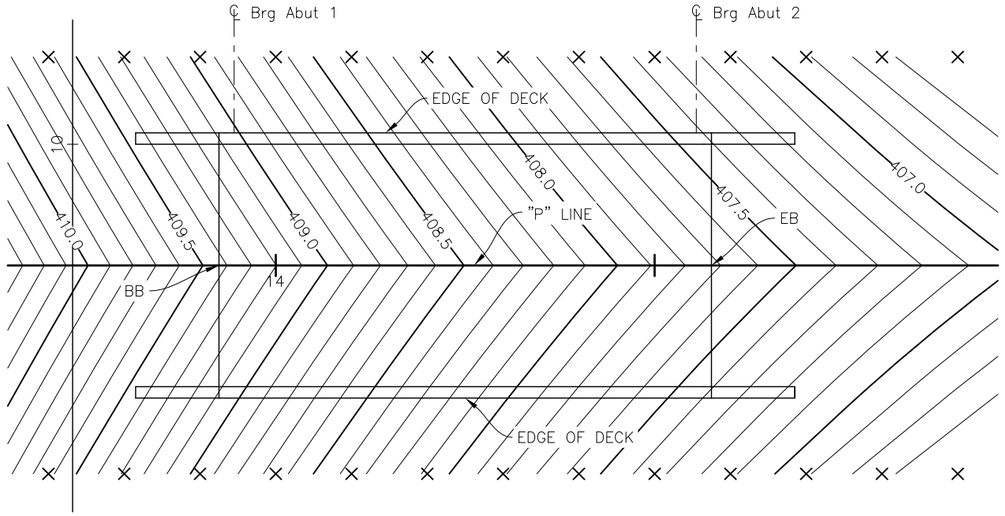


NOTES:

1. Contours shown are at the top of the roadway surface.
2. Contours do not include camber.
3. Contour interval = 0.10'.
4. X = 10' along "P" line.

DECK CONTOURS

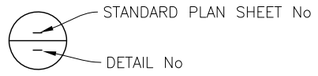
1"=10'

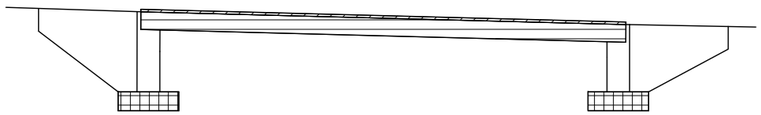
QUANTITY SUMMARY

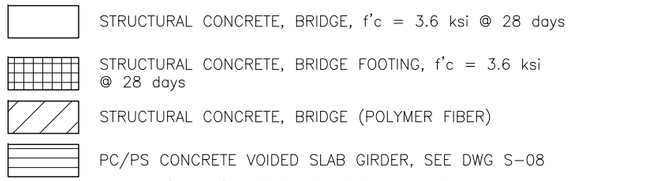
STREAM DIVERSION	1	LS
CULVERT REMOVAL	1	LS
STRUCTURE EXCAVATION (BRIDGE)	0	CY
STRUCTURE BACKFILL (BRIDGE)	0	CY
PERVIOUS BACKFILL MATERIAL	0	CY
FURNISH PILING (CLASS 200)	0	LF
DRIVE PILE (CLASS 200)	24	EA
PRESTRESSING STEEL	0	LB
STRUCTURAL CONCRETE, BRIDGE FOOTING	0	CY
STRUCTURAL CONCRETE, BRIDGE	0	CY
STRUCTURAL CONCRETE, BRIDGE (POLYMER FIBER)	0	CY
FURNISH PRECAST PRESTRESSED CONCRETE SLAB	9	EA
ERECT PRECAST CONCRETE GIRDER	9	EA
JOINT SEAL (MR 1/2")	0	LF
BAR REINFORCING STEEL (BRIDGE)	0	LB
CONCRETE BARRIER TYPE (732)	0	LF
CONCRETE BARRIER TYPE (732A)	0	LF

STANDARD PLANS: DATED 2015

	A3A	ABBREVIATIONS (SHEET 1 OF 3)
	A3B	ABBREVIATIONS (SHEET 2 OF 3)
	A3C	ABBREVIATIONS (SHEET 3 OF 3)
	A10A	LINES AND SYMBOLS (SHEET 1 OF 5)
RSP	A10B	LINES AND SYMBOLS (SHEET 2 OF 5)
	A10C	LINES AND SYMBOLS (SHEET 3 OF 5)
	A10D	LINES AND SYMBOLS (SHEET 4 OF 5)
	A10E	LINES AND SYMBOLS (SHEET 5 OF 5)
	A10F	LEGEND – SOIL (SHEET 1 OF 2)
	A10G	LEGEND – SOIL (SHEET 2 OF 2)
	A10H	LEGEND – ROCK
	A62C	LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL BRIDGE
	B0-1	BRIDGE DETAILS
RSP	B0-3	BRIDGE DETAILS
	B0-13	BRIDGE DETAILS
	B6-21	JOINT SEALS (MAXIMUM MOVEMENT RATING=2")
RSP	B11-55	CONCRETE BARRIER TYPE 732

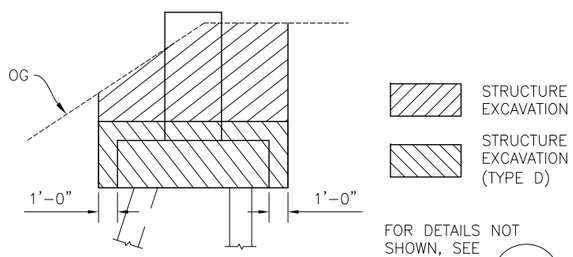






CONCRETE TYPE LIMITS

NO SCALE



STRUCTURE EXCAVATION DIAGRAM

NO SCALE

GENERAL NOTES

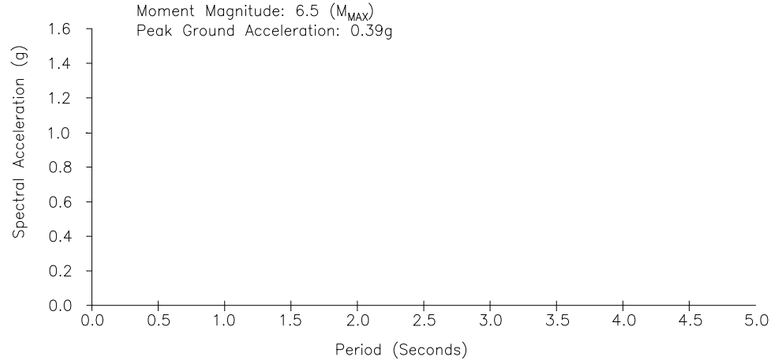
DESIGN: AASHTO LRFD Bridge Design Specifications, Sixth Edition, 2012 with Caltrans Amendments, preface dated January 2014.

SEISMIC DESIGN: Caltrans Seismic Design Criteria (SDC), Version 1.7, dated April 2013.

DEAD LOAD: Includes 35 psf for future wearing surface.

LIVE LOADING: HL-93 and permit design load.

SEISMIC LOADING: Soil Profile: Soil Profile Type C with V_{s30} = 472 m/s
Moment Magnitude: 6.5 (M_{MAX})
Peak Ground Acceleration: 0.39g



REINFORCED CONCRETE: ASTM A706
fy = 60 ksi
f'c = 3.6 ksi at 28 days (Except as shown on "Concrete Type Limits" diagram)
n = 8

RECORD DRAWINGS NOTE

INITIALS DATE

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
DECK CONTOURS

DEPARTMENT OF PUBLIC WORKS
PLACER COUNTY CALIFORNIA

No.	Revision	Description	Date	Approved

DATE: 05/03/2019
DESIGN: M. RANDALL
DRAW: D. MONK
CHECK: J. LOOMIS

REGISTERED PROFESSIONAL ENGINEER – MATTHEW J. RANDALL – NO. 60770 – EXP. 12/31/20 – CIVIL – STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
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PROJECT NO.
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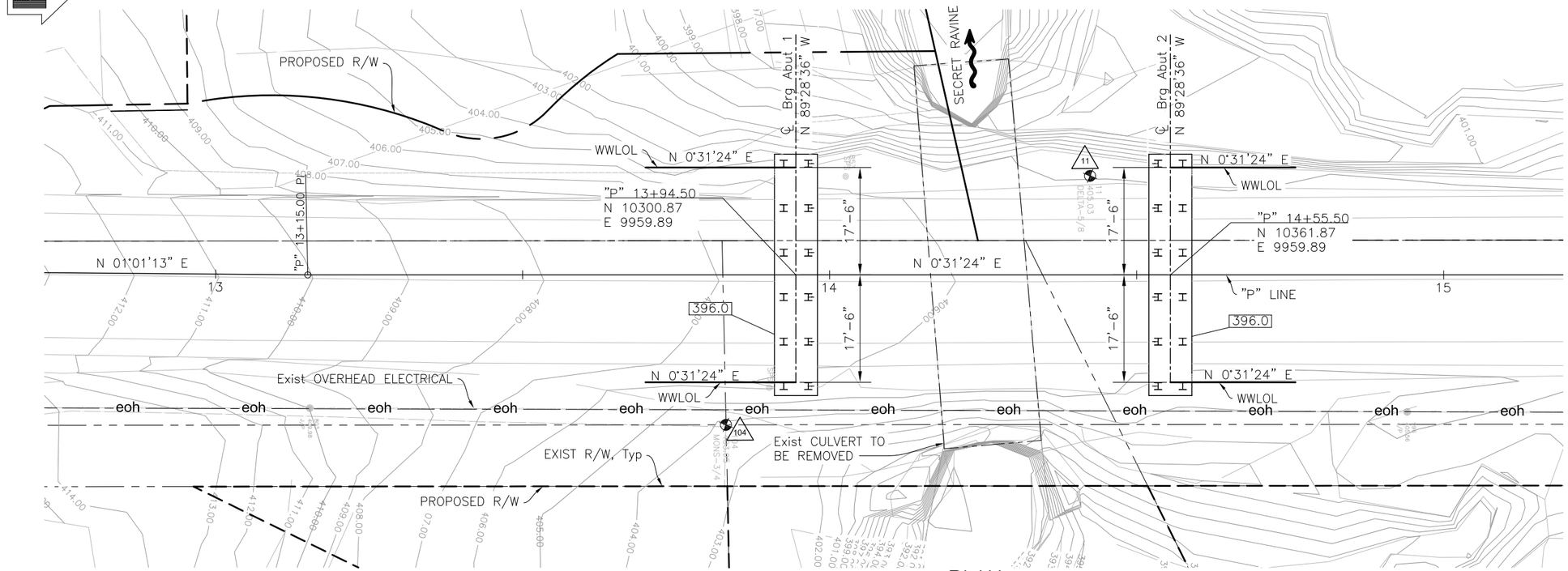

PLAN
1"=10'

SURVEY CONTROL
Horizontal Datum: Assumed Horizontal Datum
Vertical Datum: NAVD 88

BENCHMARK (104)
¾" CAPPED REBAR
"P" Sta 13+83.11
N: 10289.268
E: 9983.649
Elev = 403.95'

BENCHMARK (11)
⅝" CAPPED REBAR
"P" Sta 14+42.42
N: 10348.939
E: 9943.633
Elev = 405.03'

HYDROLOGIC / HYDRAULIC DATA SUMMARY
DRAINAGE AREA : 7.3 SQUARE MILES

FREQUENCY (YEARS)	50	100	200
DISCHARGE (CUBIC FEET PER SECOND)	3,230	4,173	4,853
WATER SURFACE ELEVATION (FEET)	400.1	401.2	401.8

Flood plain data are based upon information available when the plans were prepared and are shown to meet federal requirements. The accuracy of said information is not warranted by the State and interested or affected parties should make their own investigations.

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material.

ABUTMENT PILE DATA TABLE

LOCATION	PILE TYPE	NOMINAL RESISTANCE (kips)		DESIGN TIP ELEVATION (ft)	SPECIFIED TIP ELEVATION (ft)	REQUIRED NOMINAL DRIVING RESISTANCE (kips)
		COMPRESSION	TENSION			
ABUTMENT 1	STEEL HP CLASS 200	–	–	–	375.0	–
ABUTMENT 2	STEEL HP CLASS 200	–	–	–	379.0	–

Design tip elevations are controlled by a) Compression, b) Tension c) Settlement, d) Lateral Load
The Specified Tip Elevation shall not be raised above the design tip elevations for tension load, lateral load, and tolerable settlement.

SCOUR DATA TABLE

SUPPORT LOCATION	LONG TERM (DEGRADATION AND CONTRACTION) SCOUR ELEVATION (ft)	SHORT TERM (LOCAL) SCOUR DEPTH (ft)
ABUTMENT 1	393.0	12.5
ABUTMENT 2	392.8	16.3

LEGEND:
- ——— INDICATES NEW CONSTRUCTION
- — – — – — INDICATES EXISTING STRUCTURE
- xxx.x INDICATES BOTTOM OF FOOTING ELEVATION
- —— eoh —— Exist ELECTRICAL OVERHEAD LINE
- SURVEY CONTROL
- H INDICATES STEEL HP PILE CLASS 200
- H INDICATES BATTERED STEEL HP PILE CLASS 200

RECORD DRAWINGS NOTE
INITIALS DATE

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
FOUNDATION PLAN

DEPARTMENT OF PUBLIC WORKS
PLACER COUNTY CALIFORNIA

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DRAW: D. MONK
CHECK: J. LOOMIS

REGISTERED PROFESSIONAL ENGINEER – STATE OF CALIFORNIA – MATTHEW J. RANDALL – NO. 60770 – EXP. 12/31/20 – CIVIL
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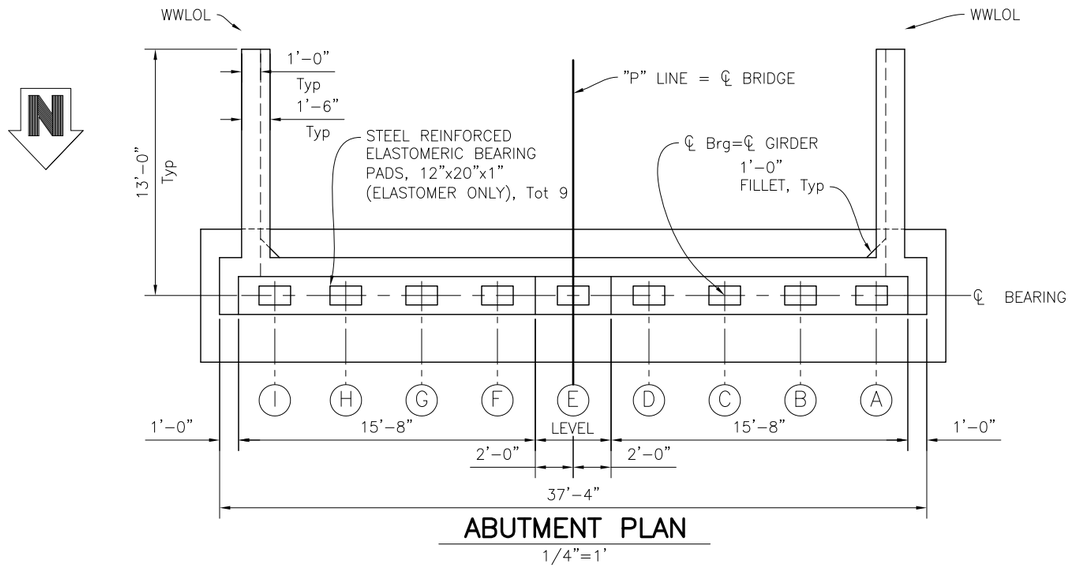
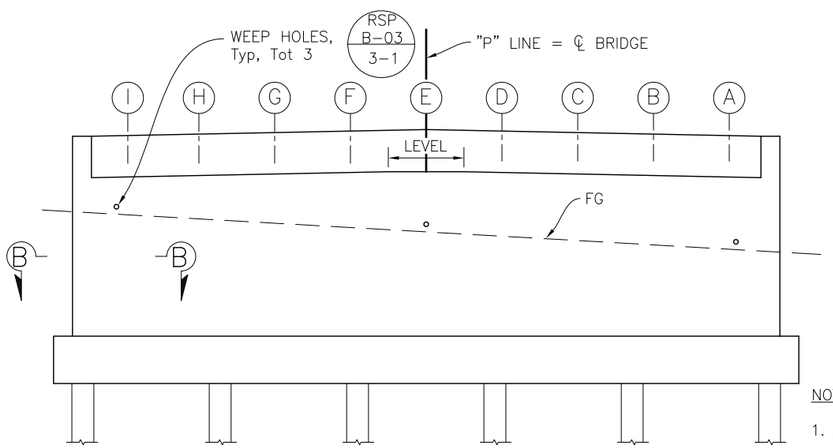
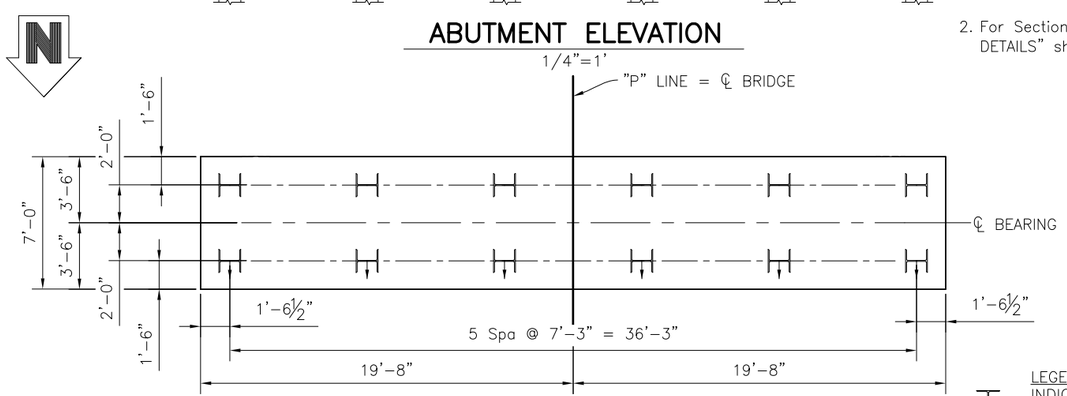


ABUTMENT PLAN
1/4"=1'



ABUTMENT ELEVATION
1/4"=1'



NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material.

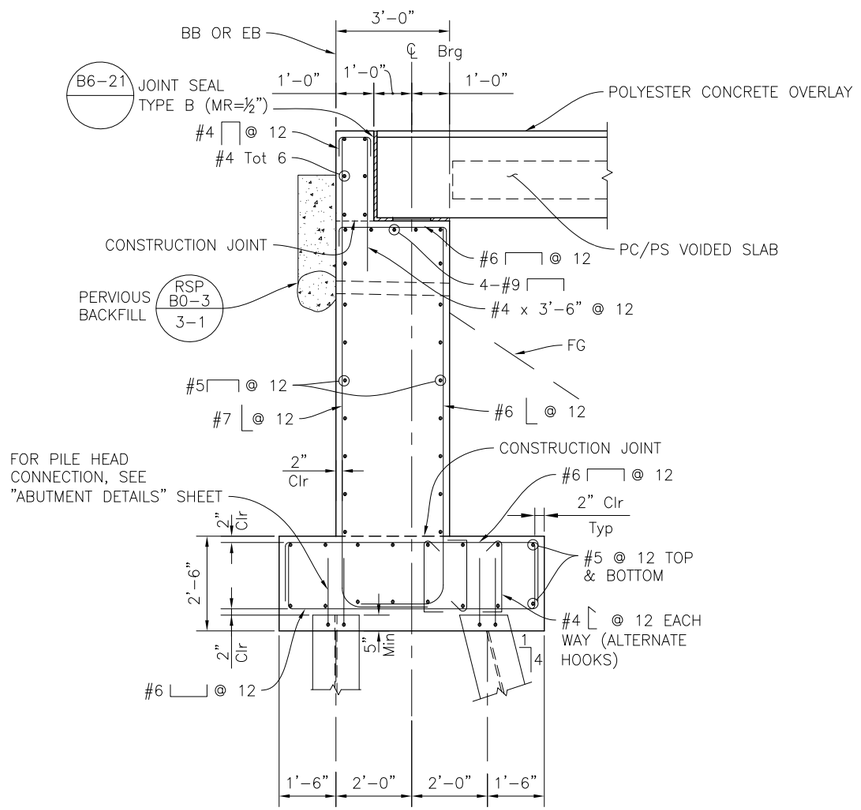
ABUTMENT PILE LAYOUT
1/4"=1'

NOTES:

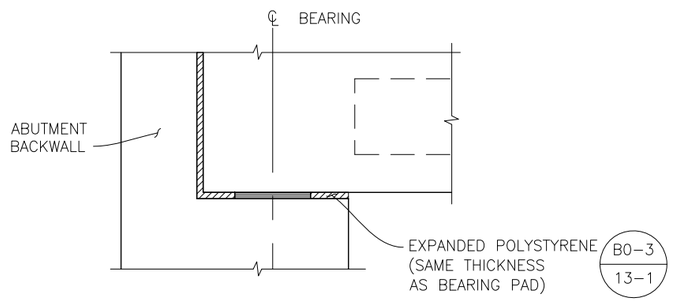
1. Abut 1 shown, Abut 2 similar.
2. For Section B–B see "ABUTMENT DETAILS" sheet.

LEGEND:
INDICATES STEEL HP PILE CLASS 200

INDICATES BATTERED STEEL HP PILE CLASS 200



ABUTMENT SECTION
1/2"=1'



BEARING PAD DETAIL
1"=1'

RECORD DRAWINGS NOTE

INITIALS DATE

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
ABUTMENT LAYOUT

PLACER COUNTY CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

No.	Revision	Description	Date	Approved

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. RANDALL
No. 60770
EXP: 12/31/20
CIVIL
STATE OF CALIFORNIA

DATE:

DATE: 05/03/2019
DESIGN: M. RANDALL
DRAW: D. MONK
CHECK: J. LOOMIS

CONSTRUCTION CONTRACT NO.
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PROJECT NO.
PC 2972

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21 of 26

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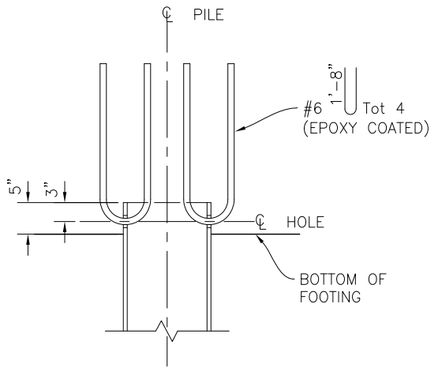
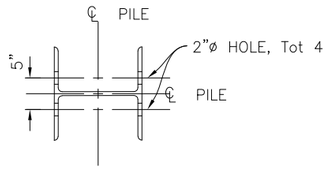
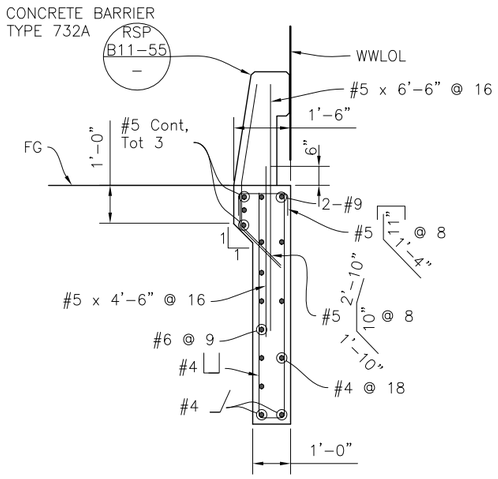


ELEVATION

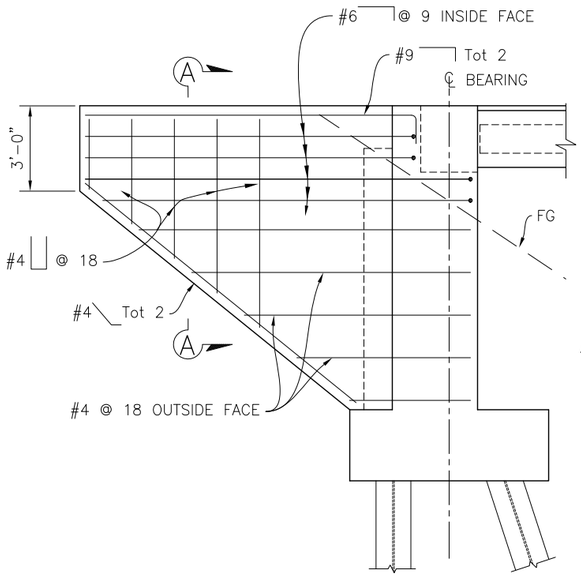


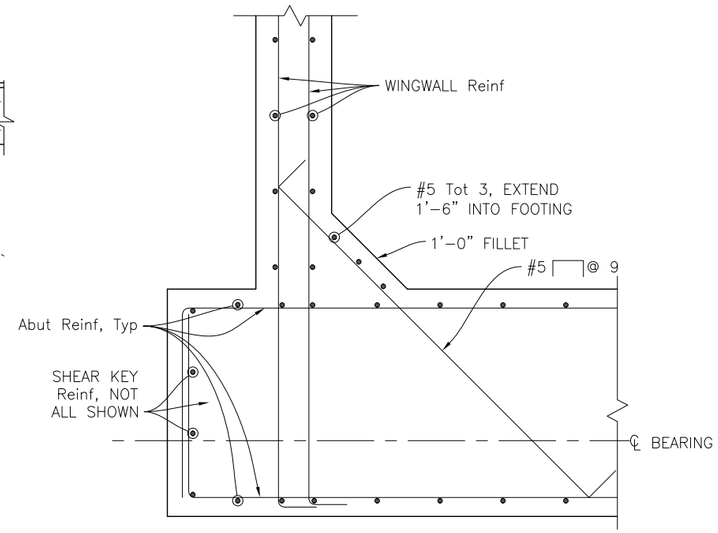
PLAN

STEEL PILE ANCHOR
1"=1'-0"



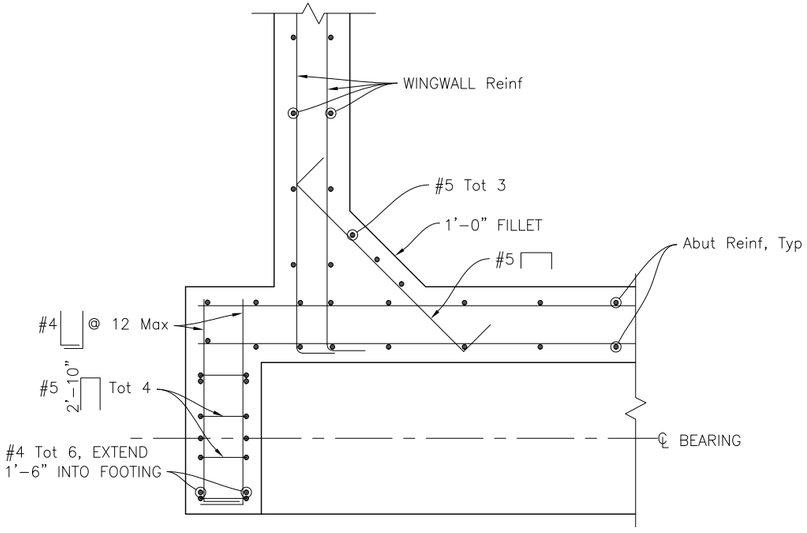
SECTION A–A
1/2"=1'-0"



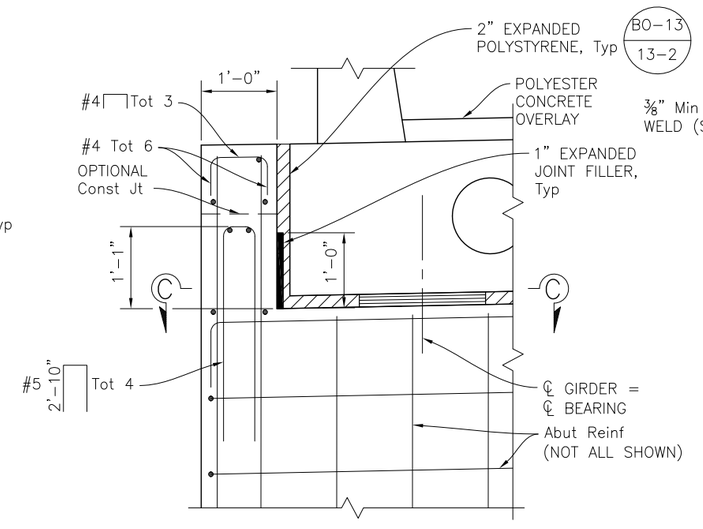


WINGWALL ELEVATION
3/8"=1'-0"

B0-1
–

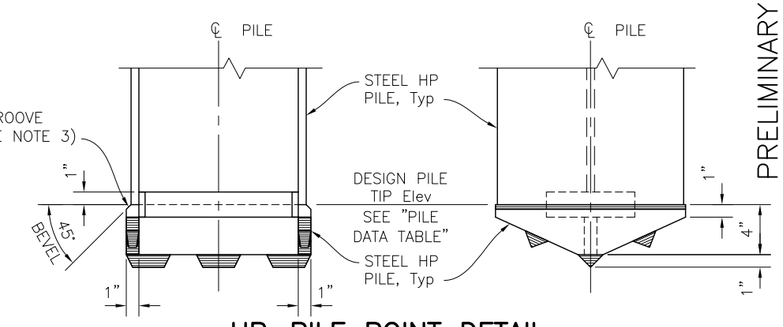


SECTION C–C
1"=1'-0"



SHEAR KEY DETAIL
1"=1'-0"

SECTION B–B
1"=1'-0"



HP–PILE POINT DETAIL
NO SCALE

NOTE:
1. HP–Pile points shall be ASTM A148 Grade 90/60 (Fu = 90 ksi & Fy = 60 ksi).

2. Concept HP–Pile point details are shown and alternative HP–Pile points will be considered at the approval of the Engineer.

3. HP–Pile points shall be welded to the HP–Pile tip per Manufacturer recommendation.

RECORD DRAWINGS NOTE

INITIALS DATE

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
ABUTMET DETAILS

DEPARTMENT OF PUBLIC WORKS
PLACER COUNTY CALIFORNIA

No.	Revision	Description	Date	Approved

DATE: 05/03/2019
DESIGN: M. RANDALL
DRAW: D. MONK
CHECK: J. LOOMIS

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. RANDALL
No. 60770
EXP: 12/31/20
CIVIL
STATE OF CALIFORNIA

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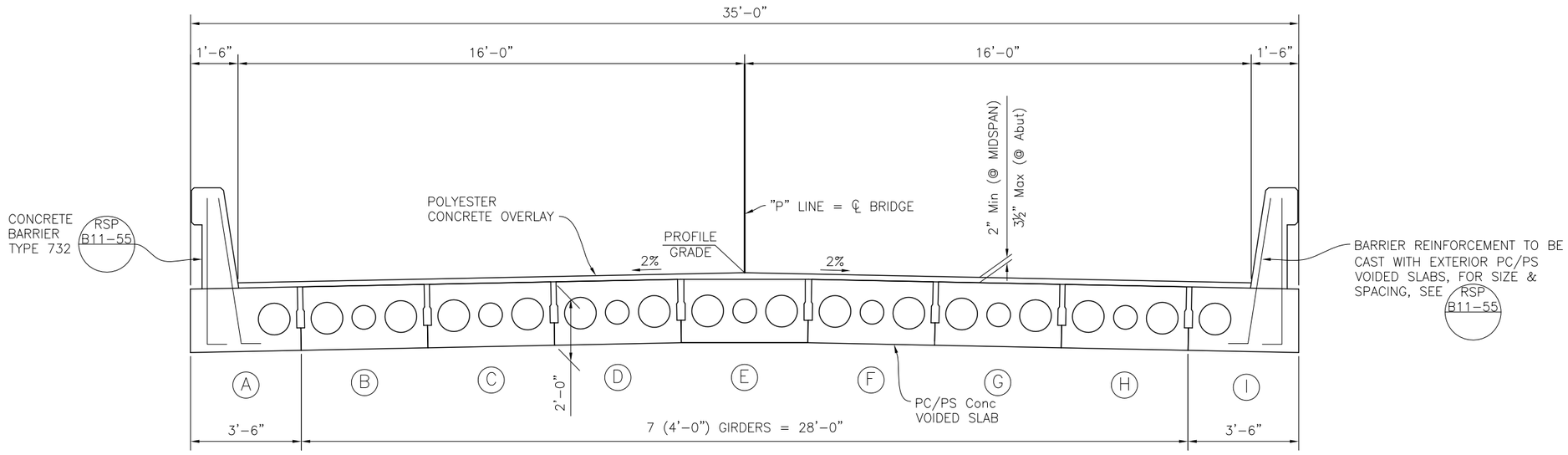

TYPICAL SECTION

1/2"=1'

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material.

RECORD DRAWINGS NOTE

INITIALS DATE

PRELIMINARY – NOT FOT FOR CONSTRUCTION

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PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
TYPICAL SECTION

DEPARTMENT OF PUBLIC WORKS
PLACER COUNTY CALIFORNIA

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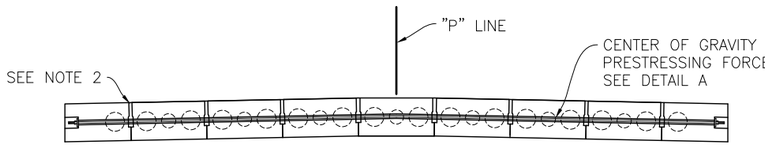
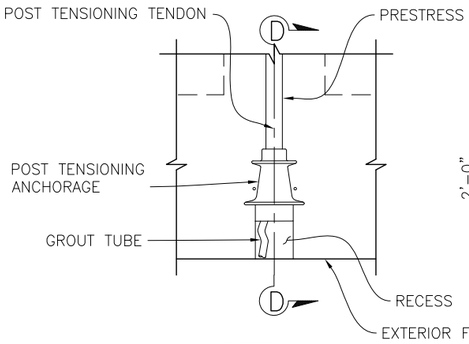
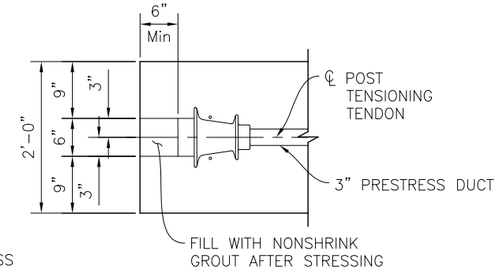


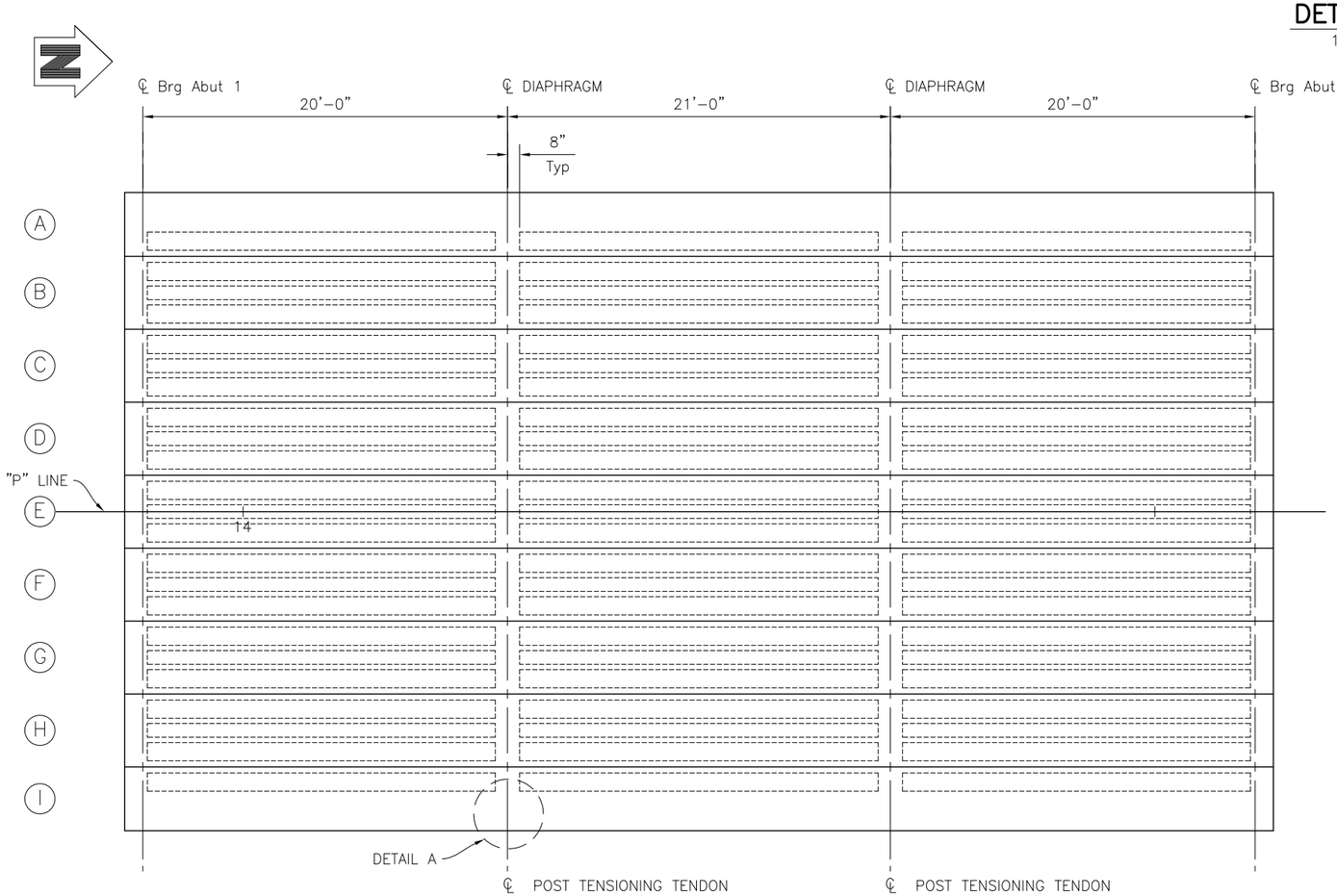
POST TENSIONING DETAIL
1/4"=1'



DETAIL A
1"=1'



SECTION D–D
1"=1'



SLAB LAYOUT
1/4"=1'

NOTES:

1. The post tensioning tendons shall be tensioned to snug tight conditions to close bottom gaps between slabs.
2. After post tensioning tendons are snug tight, grout the key–ways and holes at abutments with non–shrink grout with minimum compressive strength of 6000 psi (in 24 hours). Allow grout to cure for 24 hours before stressing to final force.
3. Pressure grout ducts and fill recesses with non–shrink grout.
4. Contractor is responsible to monitor camber of slabs prior to post tensioning to avoid differential displacement between slabs.

PRESTRESSING NOTES:

270 ksi low relaxation strand:

P–Jack: 175 kips

Anchor set: $\frac{3}{8}$"

The Contractor shall submit working drawings to the engineer for approval. The working drawings shall include and additional or rearrangement of reinforcing steel from that shown on plans.

Design based on u=0.15 and k=0.0002

NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material.

RECORD DRAWINGS NOTE

INITIALS DATE

PRELIMINARY – NOT FOR CONSTRUCTION

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
GIRDER LAYOUT

PLACER COUNTY CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

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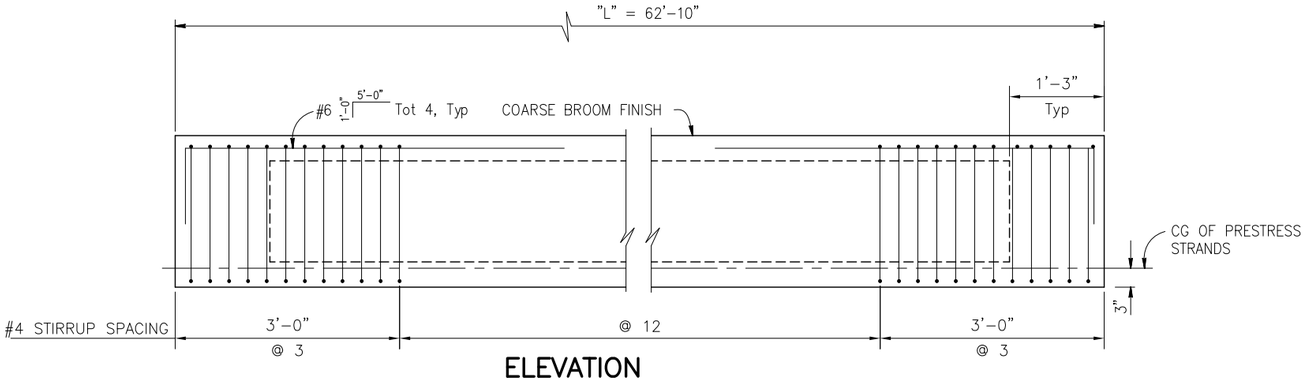
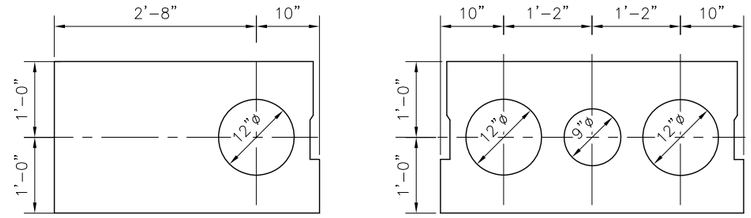
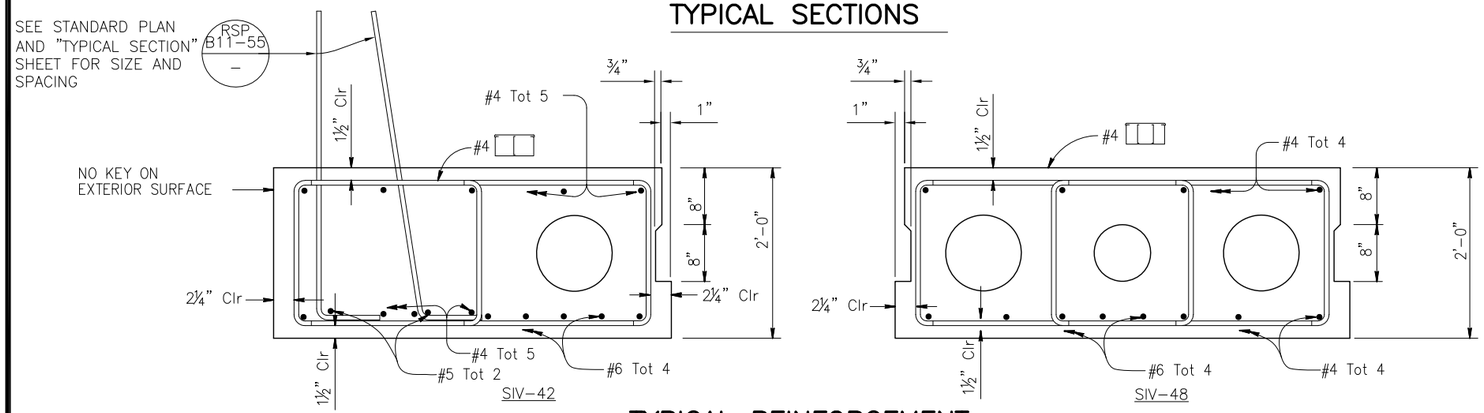


ELEVATION

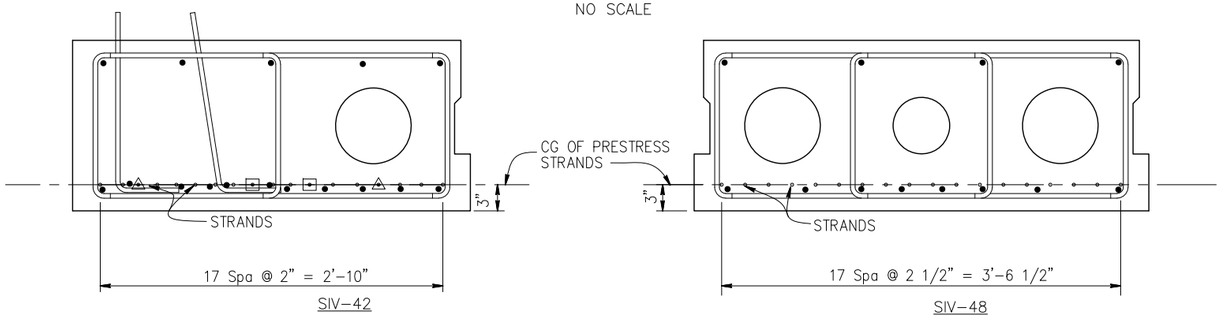


TYPICAL SECTIONS



TYPICAL REINFORCEMENT

NO SCALE



NOTE:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material.

STRAND PATTERN DETAILS

NO SCALE

GENERAL NOTES:

1. The Jacking Force (P) is the jacking force required at the point of control along the span. The jacking force does not include any fabrication specific losses.

2. The maximum tensile stress in the prestressing steel upon release shall not exceed 75% of the specified minimum ultimate tensile strength of the prestressing steel.

3. The maximum temporary tensile stress (jacking stress) in the prestressing steel shall not exceed 80% of the specified minimum ultimate tensile strength of the prestressing steel.

4. Concrete Strength:
   f'ci is at time of initial stressing
   f'c is at 28 days

5. Keyways to be filled with non-shrink grout.

6. See other sheets for railing requirements.

7. Design based on 0.6" diameter 270 ksi low relaxation strands.

8. Midspan Deflection Components are informational only and to be used in setting screed elevations.

Girder Location	Jacking Force (P), Kips	Concrete Strength (ksi)		Midspan Deflection Components (in)	
		f'ci	f'c	Overlay	Barrier
A & I	791	4.5	6.0	0.25	0.13
B – H	791	4.5	6.0	0.25	0.13

LEGEND:

⊡ Denotes debonded strand – 2' each end

△ Denotes debonded strand – 4' each end

RECORD DRAWINGS NOTE

INITIALS DATE

PRELIMINARY – NOT FOR CONSTRUCTION

No.	Revision	Description	Date	Approved

PENRYN ROAD AT SECRET RAVINE
REPAIR PROJECT
PC/PS GIRDER DETAILS

DEPARTMENT OF PUBLIC WORKS
PLACER COUNTY CALIFORNIA

DATE: 05/03/2019
DESIGN: M. RANDALL
DRAW: D. MONK
CHECK: J. LOOMIS

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. RANDALL
NO. 60770
EXP: 12/31/20
CIVIL
STATE OF CALIFORNIA

DATE:

CONSTRUCTION CONTRACT NO.
–
PROJECT NO.
PC 2972
SCALE
HORIZ:
VERT:
SCALE REFERENCE
0 1"
DRAWING
S08
SHEET NO.
25 of 26

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Technical Memorandum

Date: March 27, 2019

To: Matt Randall – Placer County

From: Han-Bin Liang and Wana Chiu – WRECO

Project: Penryn Road over Secret Ravine Emergency Repair Project (Project)
Placer County, California
County Project No. PC3022. WRECO Project No. 17066.002

Subject: Hydrology and Hydraulics

INTRODUCTION

The Penryn Road culvert at Secret Ravine in an unincorporated area of Placer County (County) sustained damage during the 2017 and 2019 winter storms. After the 2017 storms, County road maintenance crews repaired the depressed roadway section and signed Penryn Road with 7-ton load limit signs to maintain traffic. During the most recent storms, the roadway section settled several inches in the viscinity of the culvert and the steel-plate culvert sections deformed and buckled in several locations. To maintain traffic, the County road maintenance crews placed steel plates over the settled roadway area, installed stop signs and changeable message warning signs to slow traffic on either side of the failed culvert. County road crews, County Sheriff's deputies, and the California Highway Patrol are monitoring the roadway section over the failed culvert on a regular basis with instructions to close the road if the damage gets worse. Photos of the road damage and failed culvert are provided as an attachment to this letter. The existing culvert needs to be replaced as soon as possible due to the on-going settlement, and risk of wash-out from future storm events.

A photo of the damaged existing culvert taken on February 28, 2019 is shown in Photo 1.

The Project proposed by the Placer County Department of Public Works (DPW) will remove the existing culvert and construct a new bridge on a similar alignment and at a higher elevation under an expedited design and construction schedule this summer. If approved, the proposed Project will also provide the additional hydraulic capacity necessary for storm flows, and will meet current Placer County Flood Control and Water Conversation District design standards and Central Valley Flood Protection Board (CVFPB) requirements.

Study Purpose

The purpose of this Technical Memorandum is to present the design flow characteristics and hydraulic assessment for the Project site. This report also provides the calculated scour potential and recommendations on the need for scour countermeasures for the proposed bridge.

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Photo 1. Existing Culvert at Outfall

PROJECT LOCATION

The Project is located approximately 4 miles (mi) northeast of the city of Rocklin, in an unincorporated rural area of southern Placer County. The Project location is shown in Figure 1, the Project vicinity is shown in Figure 2, and an aerial of the Project vicinity is shown in Figure 3.

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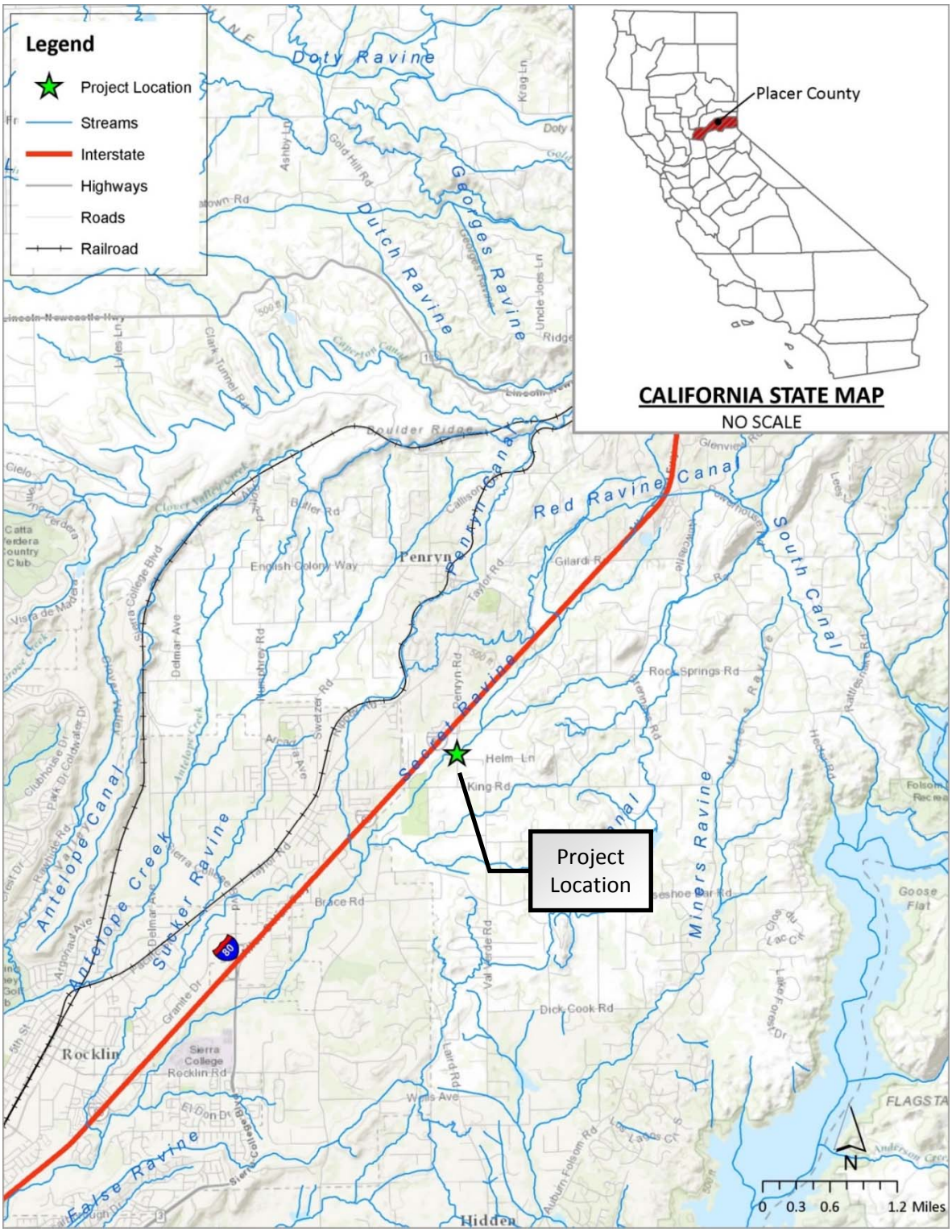

Figure 1. Project Location Map

Source: Environmental Systems Research Institute (ESRI)

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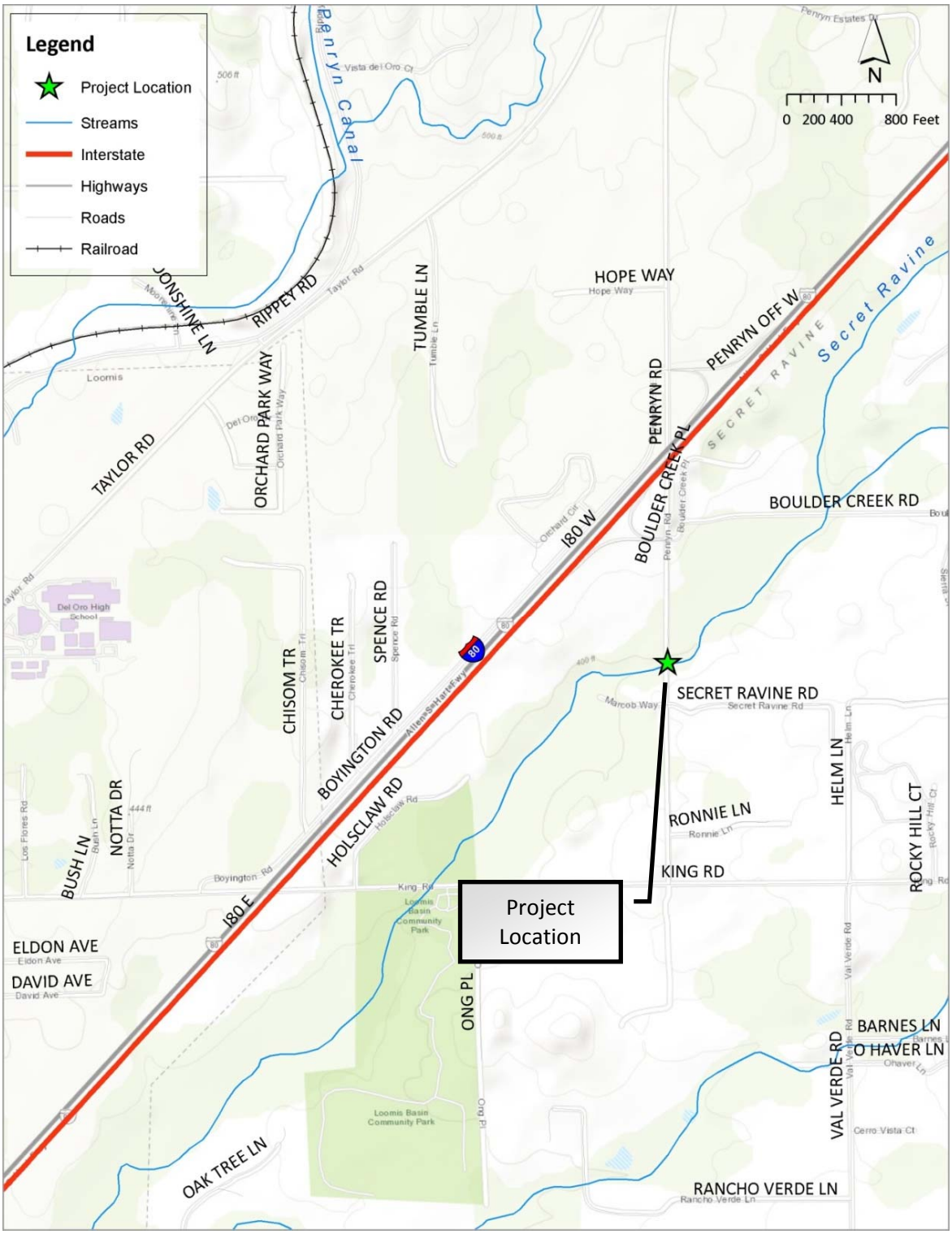

Figure 2. Project Vicinity Map

Source: ESRI

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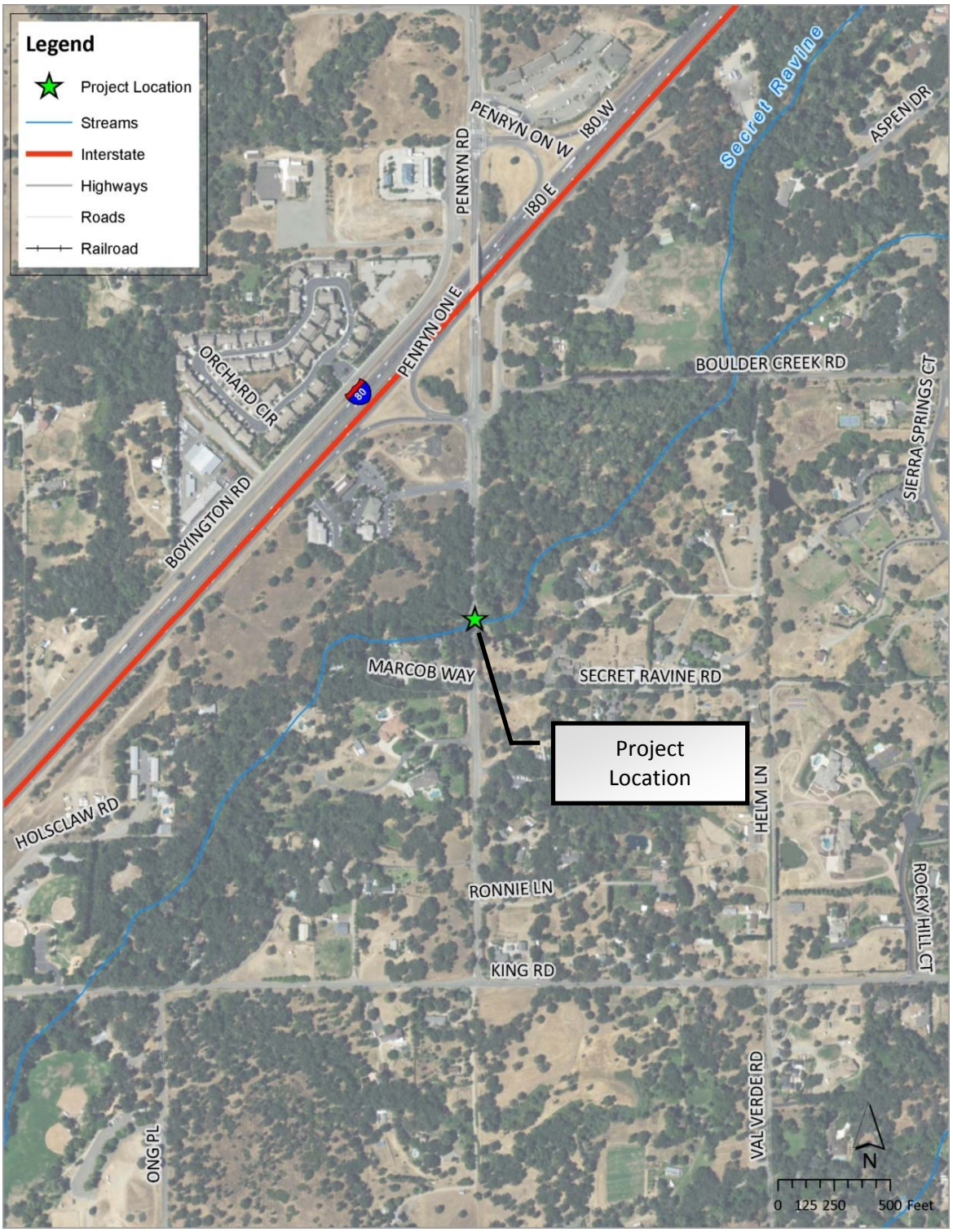

Figure 3. Project Aerial Map

Source: ESRI

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Existing and Proposed Structures

Existing Culvert

The existing culvert is approximately 15 feet (ft), 8 inches wide and 10 ft, 8 inches tall, and it is comprised of steel multi-plate corrugated metal pipe. Upon inspection of the culvert, severe rust, deterioration, and damage of the bottom and seams of the existing culvert were observed; bolts are missing or damaged at place connections. In many locations throughout the culvert, there is no structural section left. The portions of the top section of the culvert are distorted and/or deformed from the original shape, and some portions of the bottom of the failed pipe have buckled up into the flowing channel of Secret Ravine. In other portions of the pipe, the invert section has completely separated from the rest of the cross section of the pipe. See Photo 2 and Photo 3 for the condition of the culvert in 2017, which were taken during the Project Team's field visit on May 19, 2017 at the Project site.

Photo 2. Upstream Face of Existing Culvert at Penryn Road over Secret Ravine

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Photo 3. Downstream Face of Existing Culvert at Penryn Road over Secret Ravine

Proposed Bridge

The Project proposes to remove and replace the existing culvert with a proposed bridge on Penryn Road at Secret Ravine. The replacement bridge will be on the existing alignment and widened on both sides of the existing culvert. The roadway would be designed to meet the American Association of State Highway and Transportation Officials' (AASHTO) standards. In order to satisfy minimum hydraulic requirements, the roadway profile will be raised, and the proposed bridge would have a wider bridge opening to pass flows. The proposed bridge will be a single-span, precast, pre-stressed concrete voided slab bridge that is approximately 63 ft long and 35 ft wide. See Figure 4 for the proposed bridge general plan.

Datum

All elevations presented in this study reference the North American Vertical Datum of 1988 (NAVD 88).

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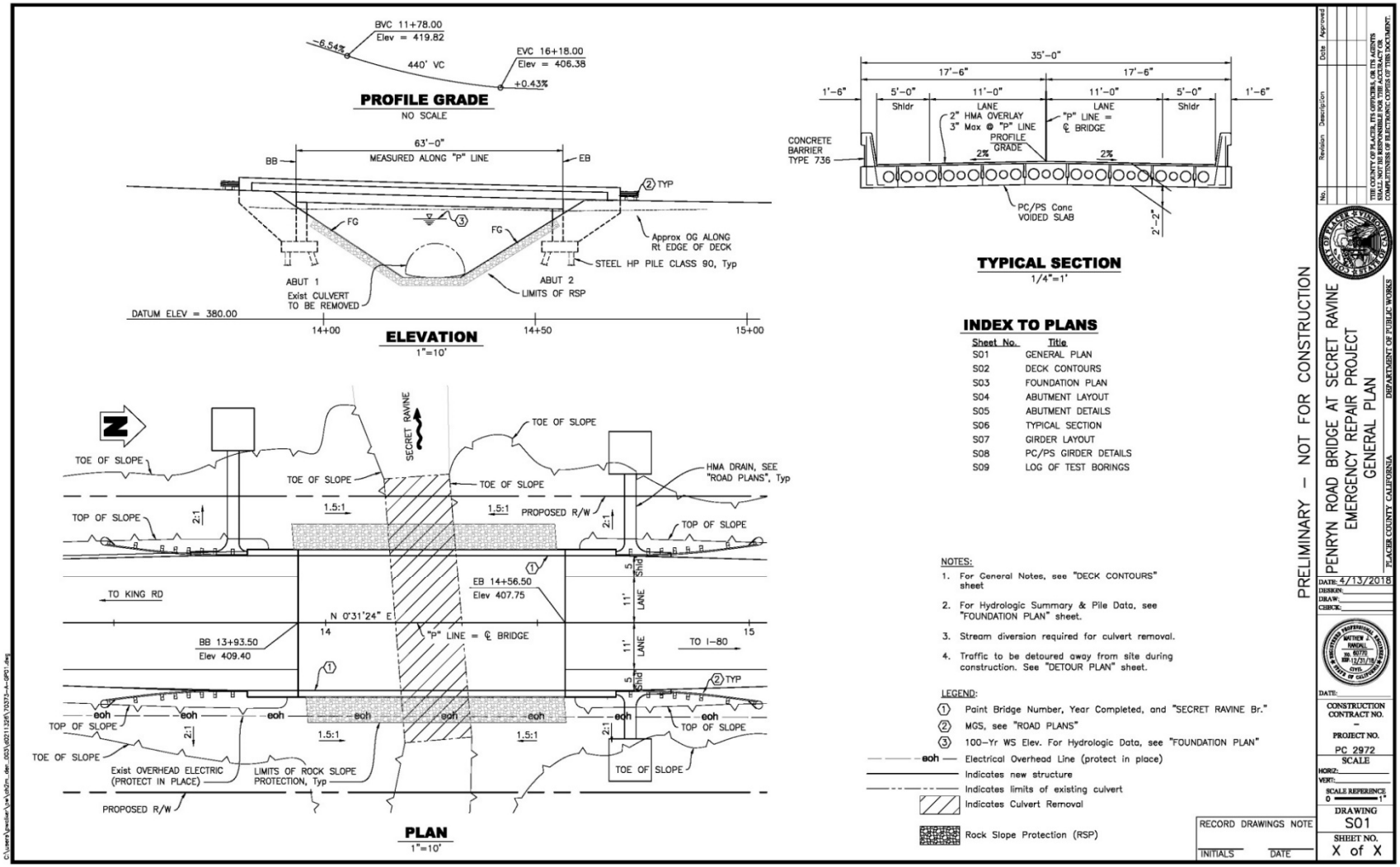

Figure 4. Proposed Bridge General Plan

Source: County DPW

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HYDROLOGY

The existing Penryn Road culvert over Secret Ravine is located at 38°49'48.91" north latitude and 121°10'7.06" west longitude. Based on the United States Geological Survey's (USGS) StreamStats, Secret Ravine drains a watershed area of approximately 7.3 square mi at the Project location. See Figure 5 for the watershed delineation. The mean precipitation of the watershed is 29.6 inches.

The following sources and methods were utilized to evaluate the hydrology for Secret Ravine at the Project site:

1. Review of the *Update to the Dry Creek Watershed Flood Control Plan* (RBF Consulting Inc., 2011); and
2. USGS regional regression analysis

Update to the Dry Creek Watershed Flood Control Plan

Through coordination with the County Flood Control and Water Conservation District, the future unmitigated flows from the *Update to the Dry Creek Watershed Flood Control Plan* study should be used as the design flows for the Project. The *Update to the Dry Creek Watershed Flood Control Plan* was prepared for the County Flood Control and Water Conservation District by RBF Consulting Inc. in 2011. The future unmitigated flows for Secret Ravine at Penryn Road are summarized in Table 1.

Table 1. Update to the Dry Creek Watershed Flood Control Plan Design Discharges at Project Site

Recurrence Interval (year)	Flow (cubic feet per second [cfs])
200	4,853
100	4,173
50	3,230

United States Geological Survey Regional Regression Analysis

Flood-frequency equations have been developed by the USGS based on analysis of data from gaging stations. California is divided into six regions; the Project site is within the Sierra Nevada region. These flood-frequency equations are generally used to estimate stream flow for ungaged sites that are not affected by substantial urban development and that are natural (unregulated) streams.

On July 18, 2012, the USGS issued *Methods for Determining Magnitude and Frequency of Floods in California, Based on Data through Water Year 2006* (Gotvald et. al., 2012), which contains updated regional flood-frequency equations, and revised the boundaries of the six unique regions within California. These equations are based on annual peak-flow data through water year 2006 for 771 streamflow-gaging stations in California having 10 or more years of data. The updated equations were used in support of the Project's hydrologic analysis.

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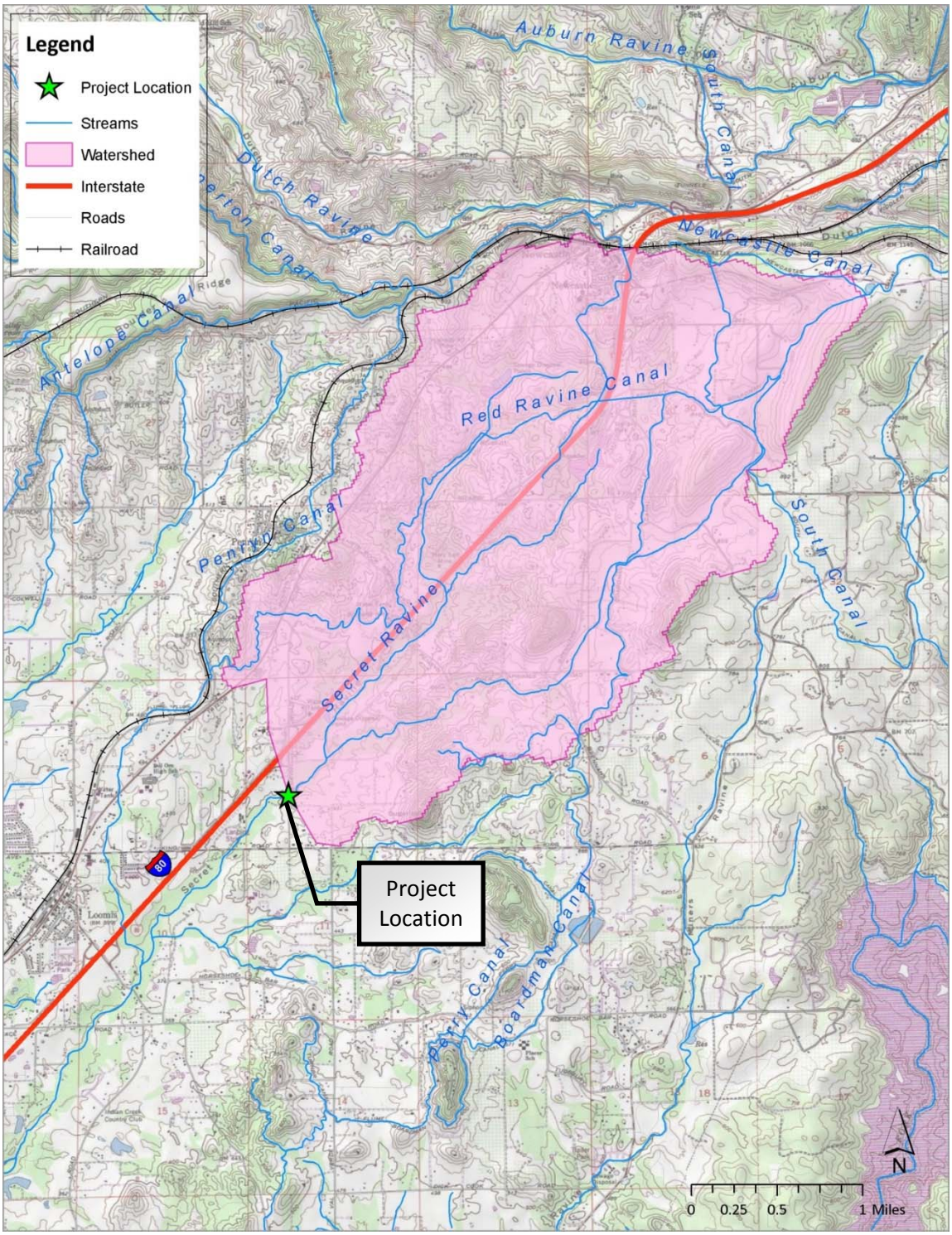

Figure 5. Project Watershed Map

Sources: USGS and ESRI

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The flood-frequency equations are as follows (Gotvald et. al., 2012):

$$Q_{100} = 20.6(DRNAREA)^{0.874}(ELEV)^{-0.250}(PRECIP)^{1.24}$$
$$Q_{50} = 21.1(DRNAREA)^{0.879}(ELEV)^{-0.316}(PRECIP)^{1.31}$$

Where:

Q_x =	peak discharge for a storm event with a return period of x years, cubic feet per second (cfs)
DRNAREA =	drainage area, square mi
ELEV =	mean basin elevation, ft
PRECIP =	mean annual precipitation, in.

With a drainage area of 7.3 square mi, a mean basin elevation of 785 ft, and a mean annual precipitation of 29.6 inches (obtained from StreamStats), the design discharges were calculated as summarized in Table 2.

Table 2. Regional Regression Design Discharges at Project Site

Recurrence Interval (year)	Flow (cfs)
100	1,475
50	1,250

Selected Design Discharges for Project

The peak flows from the *Update to the Dry Creek Watershed Flood Control Plan* were more conservative than the peak flows based on the USGS regional regression equations, and it was also suggested by the County Flood Control and Water Conservation District that the peak design flows from the *Update to the Dry Creek Watershed Flood Control Plan* be used for this Project. These peak design flows are presented in Table 1.

HYDRAULICS

The following sections discuss the development of the hydraulic models and summarize the results for the existing and proposed conditions. The hydraulic analyses were performed for the existing and proposed conditions using the United States Army Corps of Engineers' (USACE) Hydrologic Engineering Centers River Analysis System (HEC-RAS) modeling software, Version 5.0.6.

Hydraulic Design Criteria

The proposed bridge has been designed in consideration of the Federal Highway Administration (FHWA), California Department of Transportation (Caltrans), and CVFPB freeboard criteria. The most stringent of the three agencies' criteria is to pass the 100-year water surface elevation with 2 ft of freeboard, per the CVFPB criterion. The proposed bridge has been designed to meet CVFPB's criterion.

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Federal Highway Administration Standards

The FHWA criterion refers to the *California Amendments to AASHTO Load Resistance Factor Design (LRFD) Bridge Design Specifications* (2014), which indicates that the proposed bridge profile should provide adequate freeboard to pass anticipated drift for the 50-year design flood, to pass the 100-year base flood without freeboard, or the flood of record without freeboard, whichever is greater.

Caltrans Standards

The Caltrans criteria for the hydraulic design of bridges is that they be designed to pass the 2% probability of annual exceedance flow (50-year design discharge) or the flood of record, whichever is greater, with adequate freeboard to pass anticipated drift. Two feet of freeboard is commonly used in bridge designs. The bridge should also be designed to pass the 1% probability of annual exceedance flow (100-year design discharge, or base flood). No freeboard is added to the base flood.

Central Valley Flood Protection Board Standards

Streams regulated by the CVFPB must adhere to the design criteria from Title 23 of the *Barclays Official California Code of Regulations* (2014). The Project is located within the jurisdiction of the CVFPB. CVFPB's list of regulated streams includes Secret Ravine, and they maintain non-permissible work periods during the flood season from November 1 through April 15. Based on coordination with CVFPB, the freeboard criteria for the Project site is 2 feet above the 100-year water surface elevation.

Hydraulic Modeling Development

The channel geometry for the hydraulic models was developed using topographic survey data provided by the County on June 2017. The locations of the cross sections are shown in Figure 6. A total of 9 cross sections generated. The model covers an extent approximately 410 ft upstream and 215 ft downstream of the existing culvert along Secret Ravine. The cross section naming convention is by river station (RS) with the cross section number increasing in RS (measured in feet) going upstream.

The geometry of the existing culvert in the hydraulic model was based on information from topographic survey data provided by the County. The existing culvert is arch-shaped with 15.67-ft-span and 10.67-ft-rise. The upstream and downstream invert elevation of the existing culvert is 390.0 ft NAVD 88 and 388.3 ft NAVD 88, respectively.

The proposed structural design and roadway profiles for the proposed bridge replacement were based on the general plan provided by the County (see Figure 4). The proposed bridge soffit was modeled to be 2.0 ft, 2 inches below the bridge deck, and the minimum soffit elevation is 405.2 ft NAVD 88.

The hydraulic model was evaluated using the steady state flow analysis with subcritical flow regime. The downstream boundary condition in the model was set to a normal depth slope of 0.00622 ft/ft based on the channel gradient in the Project vicinity determined from the survey.

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Figure 6. Cross Section Locations

Manning's *n* values were used in the hydraulic model to estimate energy losses in the flow due to friction. A Manning's *n* value of 0.04 was used to describe the low flow channel, 0.05 was used to describe the channel banks, and 0.06 and 0.08 were used to describe the overbank areas. These values were selected based on observed site conditions and aerial images of the Project vicinity.

Expansion and contraction coefficients were used in the hydraulic model to represent energy losses in the channel. An expansion coefficient of 0.3 and a contraction coefficient of 0.1 were used to represent the channel. These values represent a channel with gradual transitions between cross sections. The expansion and contraction coefficients used in the vicinity of the bridge were 0.5 and 0.3, respectively. These values represent the flow interference caused by the bridge.

Hydraulic Modeling Results

The following discussions present the results of the hydraulic modeling. The water surface elevations, the available freeboard for the proposed structure, and the average channel velocities are presented. Additional hydraulic modeling exhibits are included in the appendices.

The water surface elevations for Secret Ravine were estimated in the vicinity of the proposed Penryn Road bridge (see Table 3 for the water surface elevations at the upstream face of the bridge). Based on a soffit elevation of 405.2 ft, the proposed bridge would provide over 3 ft of freeboard for the evaluated conditions. The proposed bridge would provide sufficient freeboard to meet FHWA, Caltrans, and CVFPB's freeboard

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criteria. The water surface profiles are presented in Figure 7 through Figure 9, and the cross sections at the upstream face of the structures are presented in Figure 10 (the existing culvert) and Figure 11 (the proposed bridge). The cross sections face the downstream direction, or west at the bridge.

Table 3. Water Surface Elevations and Available Freeboard at Upstream Face of Structure

Evaluated Condition	Return Period	Minimum Soffit Elevation (ft NAVD 88)	Water Surface Elevation (ft NAVD 88)	Available Freeboard (ft)
Existing	200-year	400.7	406.3	-5.7
	100-year	400.7	406.3	-5.6
	50-year	400.7	406.0	-5.4
Proposed	200-year	405.2	401.8	3.4
	100-year	405.2	401.2	4.0
	50-year	405.2	400.1	5.1

The average channel velocities in the vicinity of the structure are presented in Table 4. Overall, the proposed bridge would result in decreases in average velocity through the bridge section with the larger hydraulic opening compared with the existing culvert. The proposed bridge would also result in an overall increase in average velocities upstream of the bridge with the reduced backwater effects.

Table 4. Average Channel Velocities in the Vicinity of the Culvert/Bridge

Evaluated Condition	Return Period	Average Channel Velocity (ft/second)			
		Upstream of Structure	Upstream Face of Structure	Downstream Face of Structure	Downstream of Structure
		RS 259.03	RS 258/BR U	RS 258/BR D	RS 194.2
Existing	200-year	11.0	15.0	15.0	14.2
	100-year	9.6	15.2	15.2	13.1
	50-year	8.1	15.6	15.6	11.6
Proposed	200-year	10.9	11.1	10.6	10.6
	100-year	10.1	10.3	9.7	9.8
	50-year	9.0	9.1	8.6	8.7

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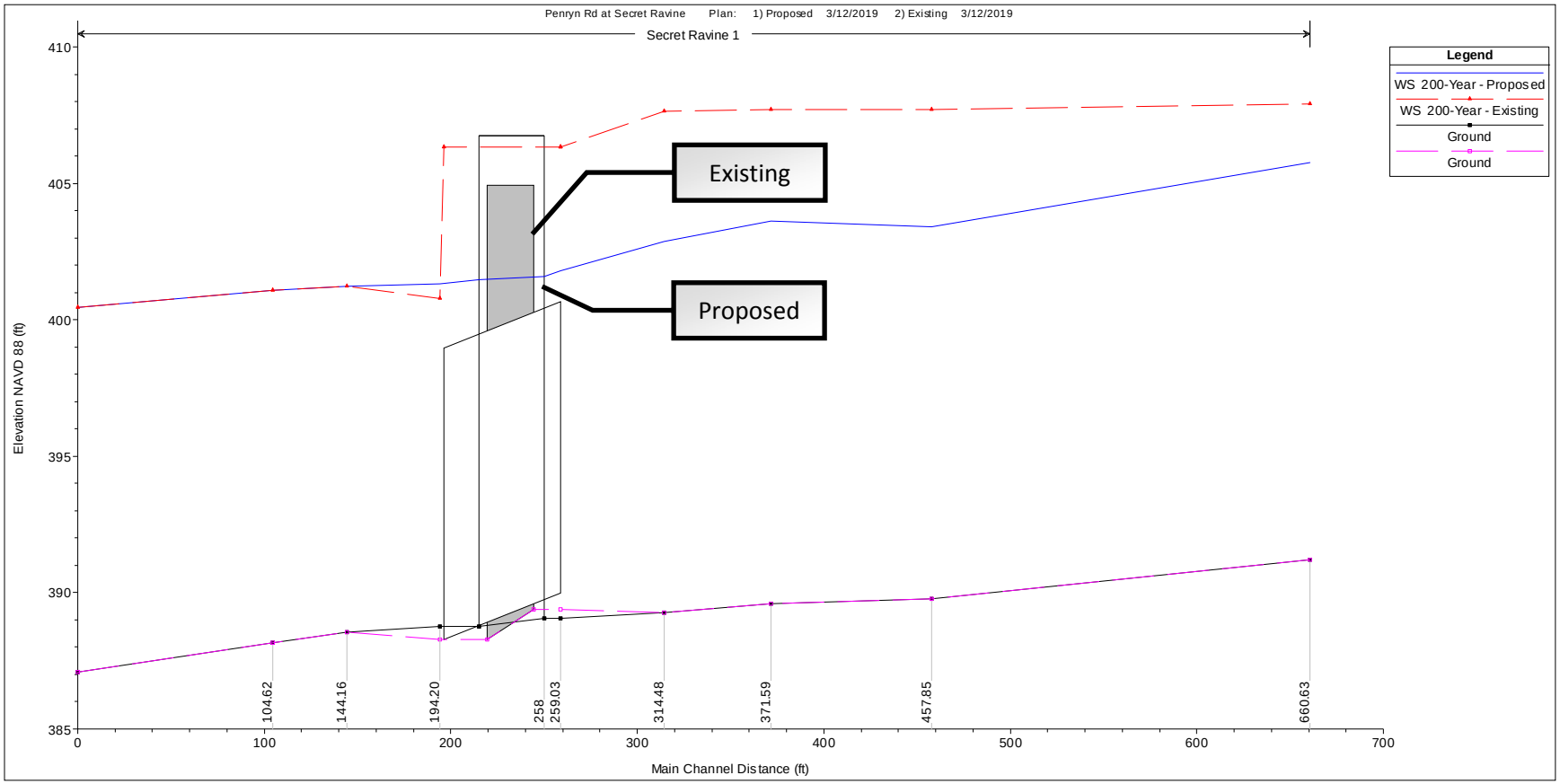

Figure 7. Secret Ravine 200-Year Water Surface Profile Comparison

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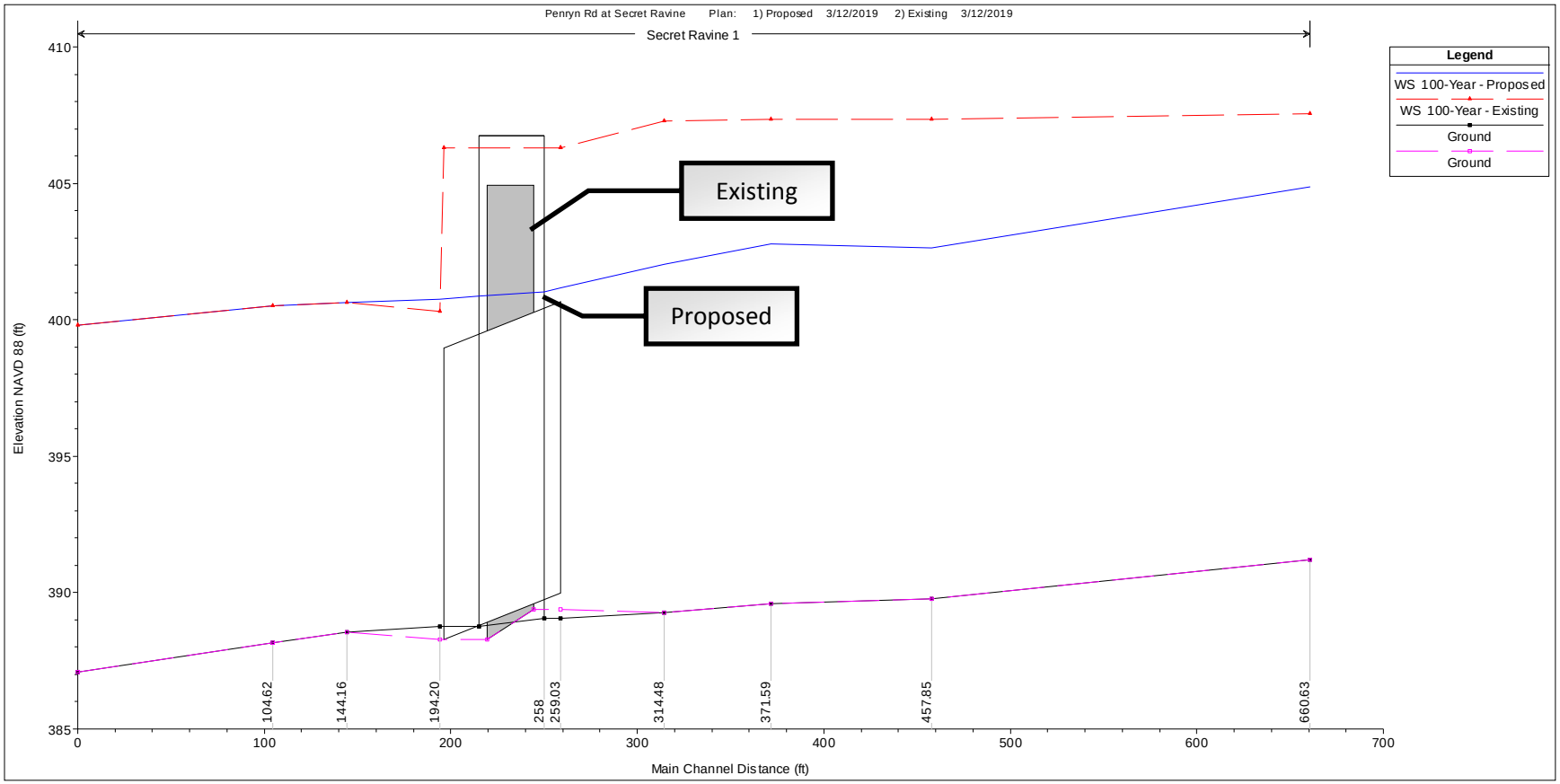

Figure 8. Secret Ravine 100-Year Water Surface Profile Comparison

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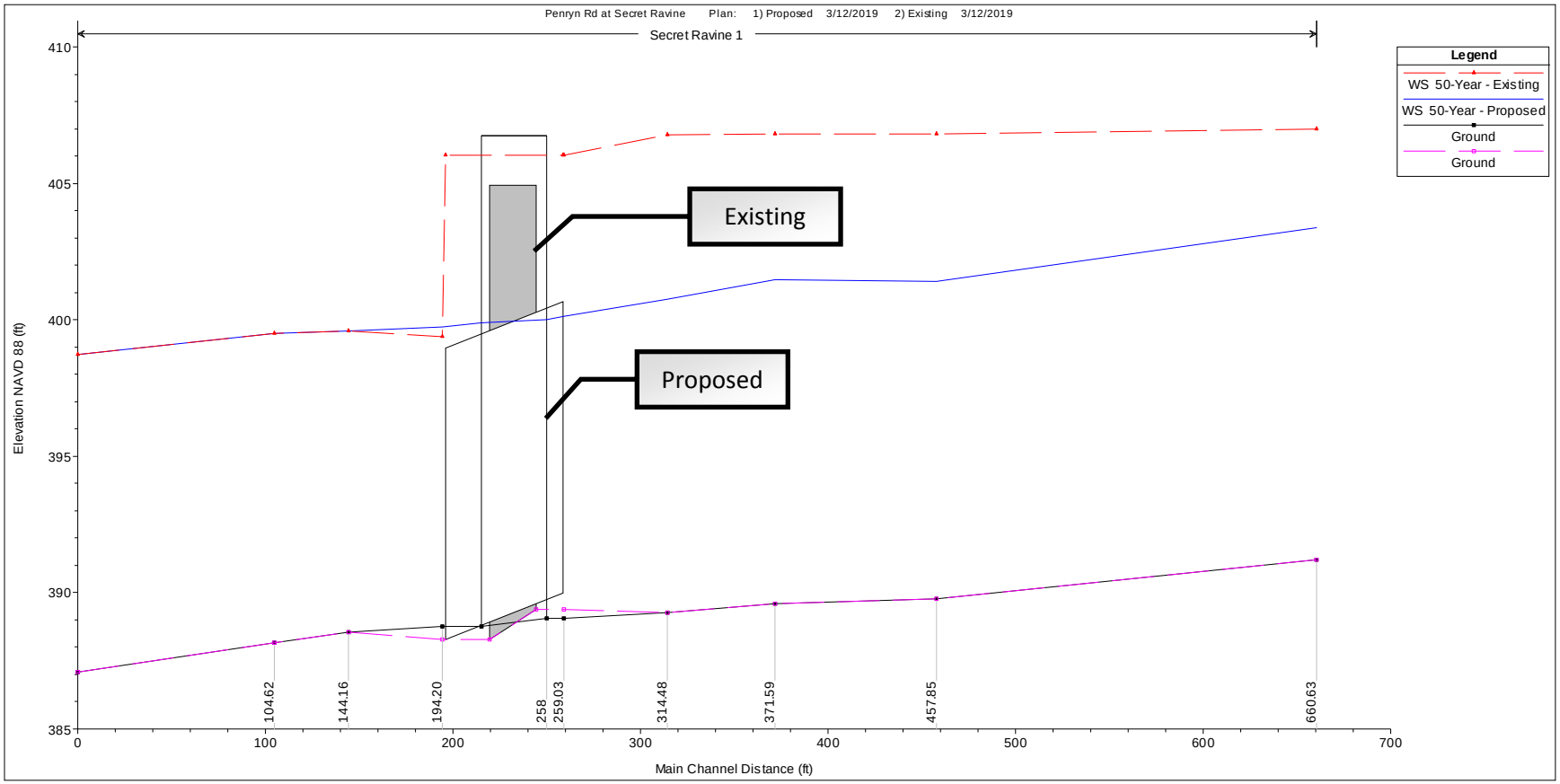

Figure 9. Secret Ravine 50-Year Water Surface Profile Comparison

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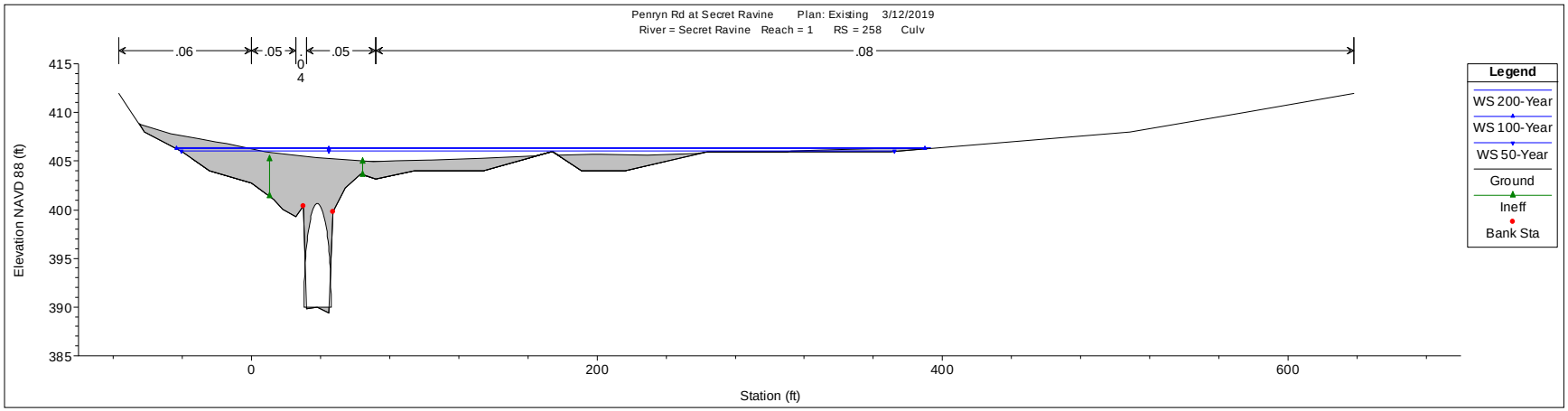

Figure 10. Upstream Face of Existing Culvert

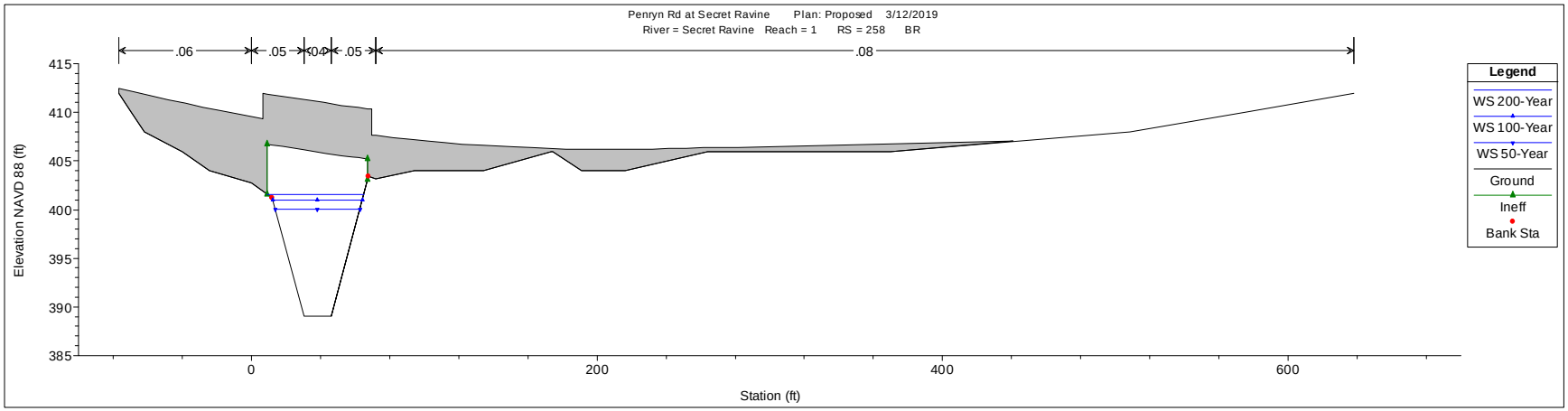

Figure 11. Upstream Face of Proposed Bridge

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SCOUR ASSESSMENT AND BANK EROSION CONTROL RECOMMENDATIONS

Scour Assessment

WRECO evaluated bridge scour per the criteria described in "Evaluating Scour at Bridges" (FHWA, 2012). The minimum design criterion for bridge scour is the 100-year design storm. WRECO evaluated the scour potential and scour countermeasure analysis using the results of the steady-state flow analysis from HEC-RAS for the proposed bridge.

The contraction scour calculations were based on the flow characteristics from the hydraulic model for the 100-year peak flow and the grain size distribution from the particle size analysis. Based on the particle size analysis performed by Geocon Consultants, Inc., dated March 13, 2018, the median grain size diameter ranges from 0.144 to 3.674 millimeters (mm), and the percentage of fines of the samples collected range from 6.3 to 87.6%. Therefore, the channel bed material exhibits both cohesive and cohesionless properties. Rock was encountered at approximate elevations 375 ft at Abutment 1 (south) and 379.8 ft at Abutment 2 (north) that would be considered scour resistant; scour would not be expected to extend below these elevations (Geocon Consultants, Inc.).

The contraction scour calculated using the cohesive (ultimate) scour equation produced deeper scour. The local abutment scour was calculated using the Froehlich equation. See Table 5, which presents the calculated scour depths at both abutments. The scour calculations are included in the appendices. Long-term bed elevation change was not estimated for the Project, but the new bridge should be monitored for scour during the routine bridge inspections. The total scour depths listed in Table 5 is the sum of the contraction and local scour depths at each support. Per the *California Amendments to the AASHTO LRFD Bridge Design Specifications* (Caltrans, 2014), foundations should be designed to withstand the conditions of scour. The total estimated scour depths reflect the sum of the contraction and local scour, assuming the bridge is supported on soil or degradable rock.

Table 5. Scour Depth Summary

Support No.	Contraction (ft)	Local (ft)	Total (ft)
Abut 1 (South)	8.2	12.5	20.7
Abut 2 (North)	8.2	16.3	24.5

According to a Caltrans memorandum dated October 23, 2015, *Scour Data Table on Foundation Plan*, a scour data table on the Foundation Plan for all contract plans should also present a long-term scour elevation based upon the long-term bed degradation and contraction scour depths, and a short-term depth based upon the local scour depth. The scour data table (see Table 6) is the format that Caltrans requires on the foundation plans. The scour elevation is typically based upon the thalweg elevation of the channel at the proposed bridge. When scour countermeasures, such as rock slope protection (RSP), are incorporated into the design of the bridge abutments, the potential for thalweg migration is reduced, in which case the foundations of the bridge abutments would not be required to reference the channel thalweg elevation. Because scour countermeasures will be incorporated in the bridge replacement, the scour elevations at the

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abutments were based upon the proposed finished ground elevations at the abutments. The finished grade elevations are approximately 401.2 ft NAVD 88 at Abutment 1 and 401.0 ft NAVD 88 at Abutment 2.

Table 6. Scour Data Table

Support No.	Long-Term (Degradation and Contraction) Scour Elevation (ft)	Short-Term (Local) Scour Depth (ft)
Abut 1	393.0	12.5
Abut 2	392.8	16.3

Scour Countermeasure Recommendations

RSP, or rock riprap, is recommended as a bank erosion countermeasure to protect the embankment slopes at the abutments. RSP generally consists of rocks on channel and structure boundaries to limit the effects of erosion. RSP sizing calculations were performed for the Project to estimate a minimum recommended rock class to protect the channel banks from erosion following the procedures and recommendations from the FHWA's *Hydraulic Engineering Circular No. 23* (HEC-23) and Caltrans' *Highway Design Manual*. The scour countermeasure calculations are included in the appendices.

WRECO recommends a minimum of Class VII RSP, which has a median diameter of 2 ft and a median weight of 1/2 ton. The minimum thickness of the RSP layer needs to be 1.5 times the median diameter, or the maximum diameter, whichever is greater. The minimum layer thickness for Class VII RSP is 4 ft. The Class VII RSP should be underlain with a 2-ft-thick layer of Class III RSP (median diameter of 12 inches and median weight of 150 pounds). The placement method for Class III RSP is Method B, which involves dumping the rock near its planned location, and working the rock to its final position with machinery. The placement method for Class VII RSP can be Method A or B. Method A RSP placement requires individually placed rocks to achieve three-point bearing on adjacent rocks to ensure stability. Class 8 RSP geotextile filter fabric should be placed on the bank as a separator material between the RSP layers and the channel bank.

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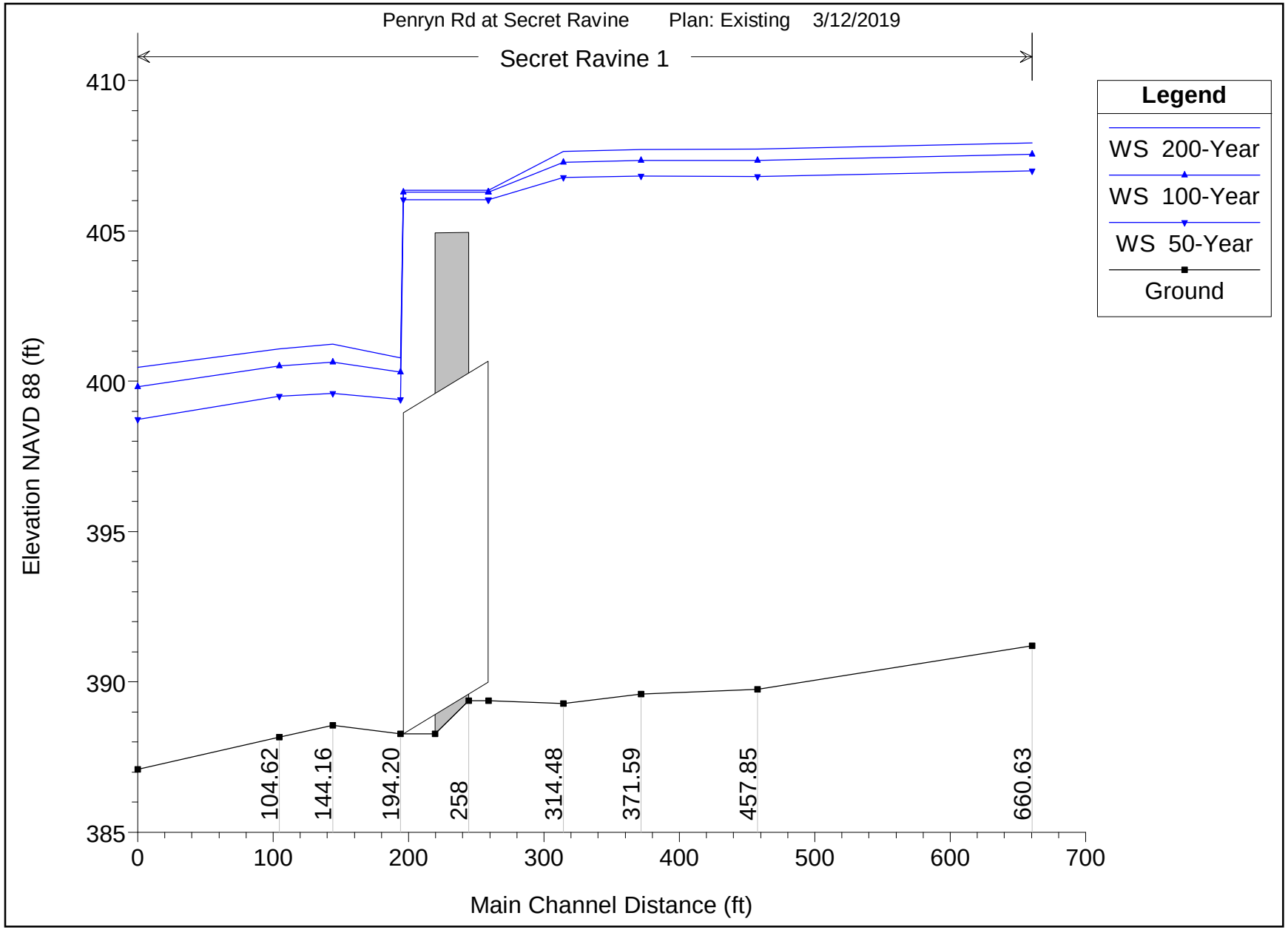
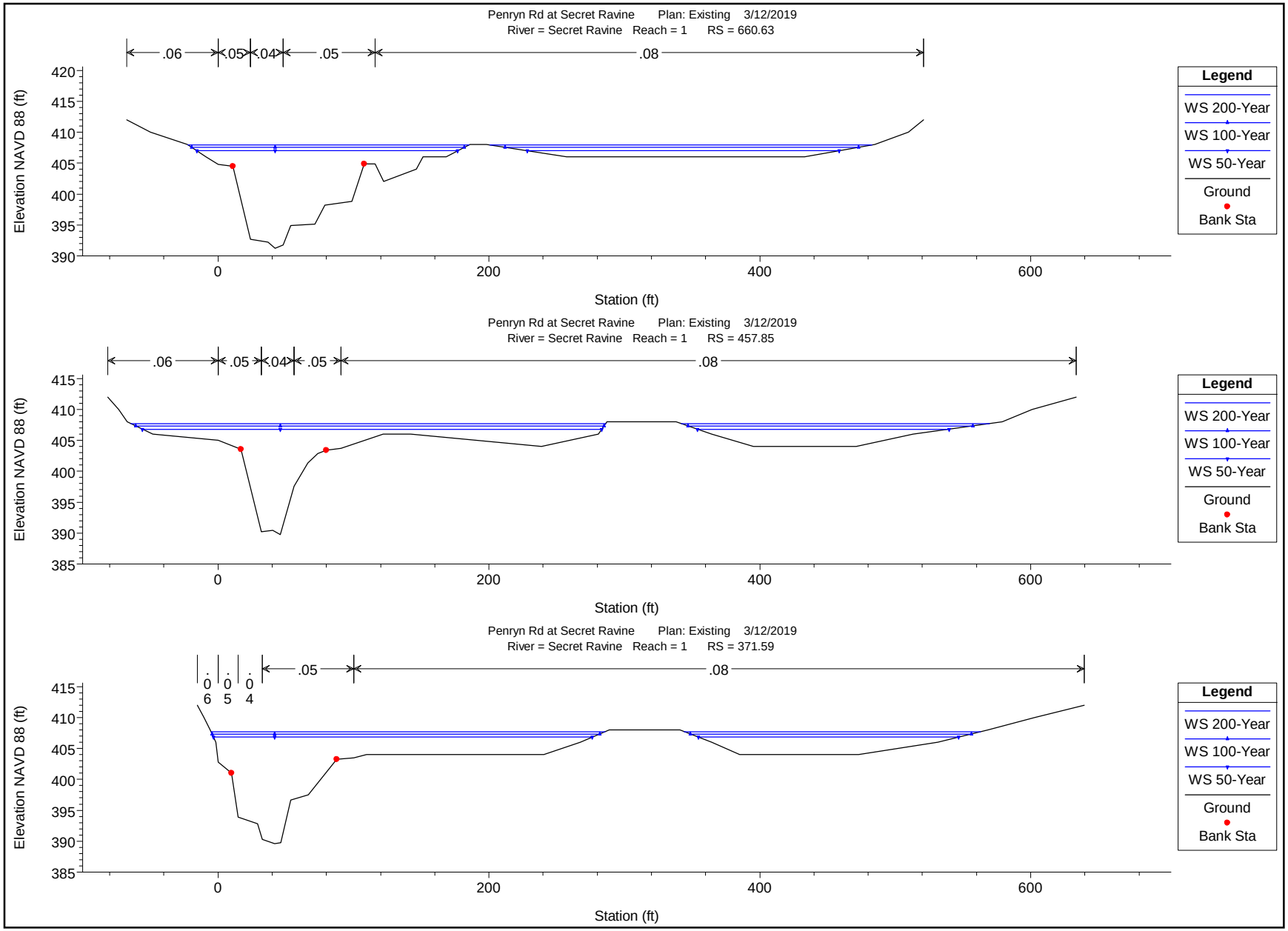
APPENDICES

- HEC-RAS Hydraulic Model Output
- Scour Calculations
- Rock Slope Protection Calculations

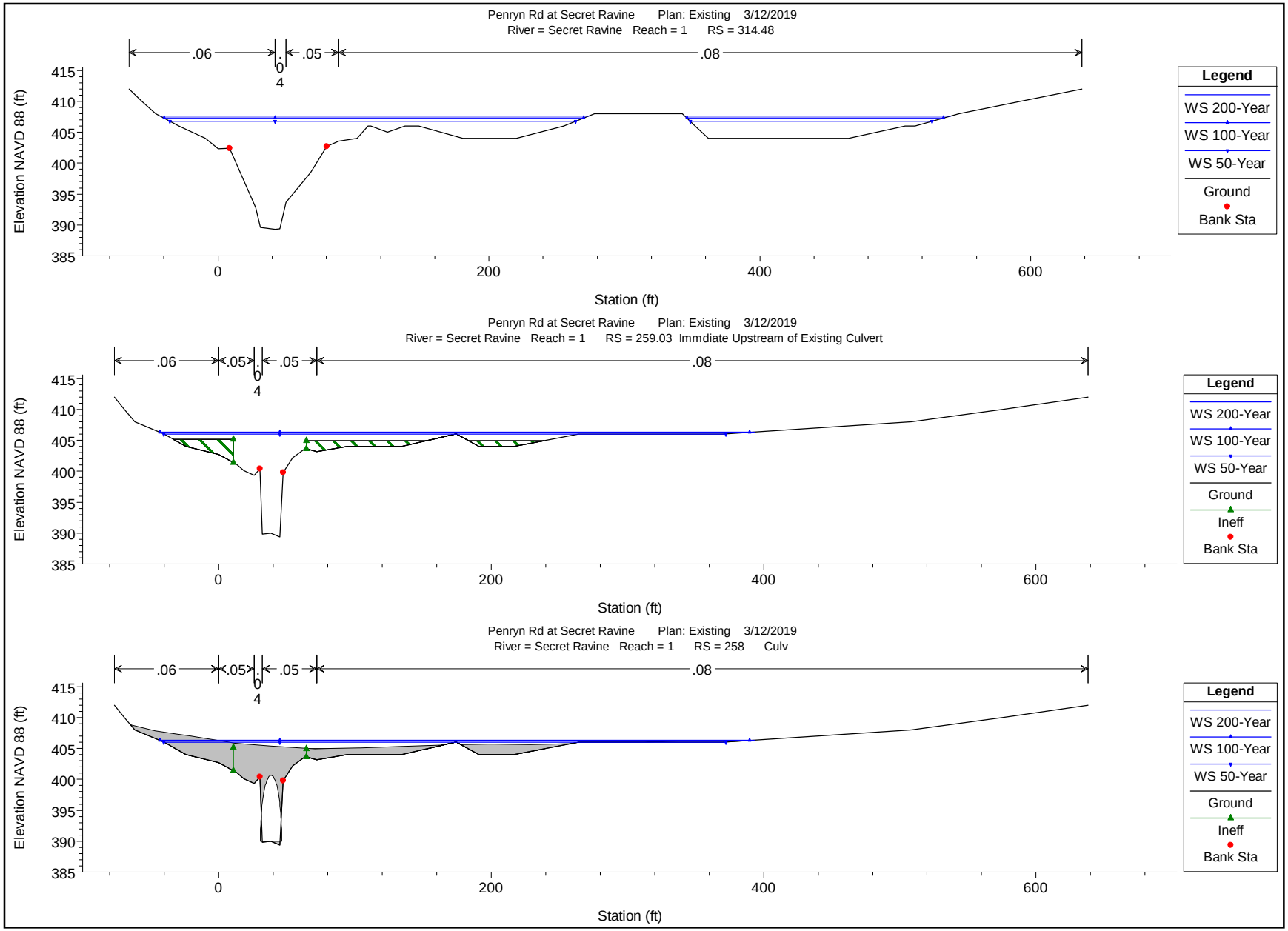

Penryn Rd at Secret Ravine Plan: Existing 3/12/2019
Secret Ravine 1
Legend
WS 200-Year
WS 100-Year
WS 50-Year
Ground
Elevation NAVD 88 (ft)
Main Channel Distance (ft)
410
405
400
395
390
385
0
100
200
300
400
500
600
700
104.62
144.16
194.20
258
314.48
371.59
457.85
660.63

HEC-RAS Plan: Existing River: Secret Ravine Reach: 1

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	Hydr Depth	Hydr Depth C	Length Chnl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)	(ft)
1	660.63	200-Year	4853.00	391.21	407.93		408.12	0.000597	3.73	1889.46	489.67	0.19	3.86	11.77	202.78
1	660.63	100-Year	4173.00	391.21	407.55		407.71	0.000518	3.40	1708.35	462.61	0.18	3.69	11.39	202.78
1	660.63	50-Year	3230.00	391.21	406.99		407.11	0.000393	2.86	1462.10	423.04	0.15	3.46	10.84	202.78
1	457.85	200-Year	4853.00	389.76	407.71		407.96	0.001037	4.73	1975.48	578.05	0.25	3.42	11.16	86.26
1	457.85	100-Year	4173.00	389.76	407.34		407.56	0.000954	4.43	1763.92	556.13	0.24	3.17	10.78	86.26
1	457.85	50-Year	3230.00	389.76	406.81		406.99	0.000788	3.89	1476.94	524.92	0.21	2.81	10.25	86.26
1	371.59	200-Year	4853.00	389.59	407.71		407.86	0.000570	3.69	2269.84	509.54	0.19	4.45	12.30	57.11
1	371.59	100-Year	4173.00	389.59	407.34		407.48	0.000498	3.38	2086.79	493.90	0.17	4.23	11.94	57.11
1	371.59	50-Year	3230.00	389.59	406.82		406.92	0.000383	2.88	1834.43	471.48	0.15	3.89	11.41	57.11
1	314.48	200-Year	4853.00	389.28	407.64		407.82	0.000814	3.96	2107.60	513.79	0.20	4.10	12.26	55.45
1	314.48	100-Year	4173.00	389.28	407.28		407.44	0.000721	3.65	1925.22	499.09	0.19	3.86	11.90	55.45
1	314.48	50-Year	3230.00	389.28	406.77		406.89	0.000563	3.13	1674.71	478.15	0.16	3.50	11.38	55.45
1	259.03	200-Year	4853.00	389.38	406.34	406.34	407.61	0.008172	11.01	782.49	437.04	0.50	1.79	15.29	64.84
1	259.03	100-Year	4173.00	389.38	406.29	404.04	407.27	0.006271	9.63	760.84	433.05	0.43	1.76	15.24	64.84
1	259.03	50-Year	3230.00	389.38	406.04	402.70	406.77	0.004522	8.08	653.63	412.73	0.37	1.58	14.99	64.84
1	258		Culvert												
1	194.20	200-Year	4853.00	388.28	400.77	400.27	403.83	0.013713	14.24	353.26	93.71	0.86	7.51	8.50	50.04
1	194.20	100-Year	4173.00	388.28	400.30	399.57	402.88	0.012427	13.05	331.09	88.99	0.81	7.04	8.03	50.04
1	194.20	50-Year	3230.00	388.28	399.39		401.42	0.011423	11.55	288.27	78.16	0.76	6.13	7.12	50.04
1	144.16	200-Year	4853.00	388.56	401.23		402.45	0.006575	8.83	549.63	78.50	0.59	7.00	7.00	39.54
1	144.16	100-Year	4173.00	388.56	400.63		401.70	0.005984	8.28	503.84	74.10	0.56	6.80	6.80	39.54
1	144.16	50-Year	3230.00	388.56	399.59		400.47	0.005283	7.50	430.43	67.43	0.52	6.38	6.38	39.54
1	104.62	200-Year	4853.00	388.16	401.07		402.19	0.005151	8.47	573.12	69.66	0.52	8.23	8.23	104.62
1	104.62	100-Year	4173.00	388.16	400.51		401.46	0.004636	7.81	534.31	68.04	0.49	7.85	7.85	104.62
1	104.62	50-Year	3230.00	388.16	399.50		400.24	0.004054	6.91	467.25	65.15	0.46	7.17	7.17	104.62
1	0	200-Year	4853.00	387.10	400.46	397.85	401.59	0.006224	8.77	636.79	144.08	0.57	4.42	7.47	
1	0	100-Year	4173.00	387.10	399.81	397.09	400.88	0.006231	8.46	548.16	128.51	0.56	4.27	7.07	
1	0	50-Year	3230.00	387.10	398.73	395.86	399.70	0.006224	7.91	421.56	96.16	0.55	4.38	6.39	



1 in Horiz. = 105 ft 1 in Vert. = 23 ft



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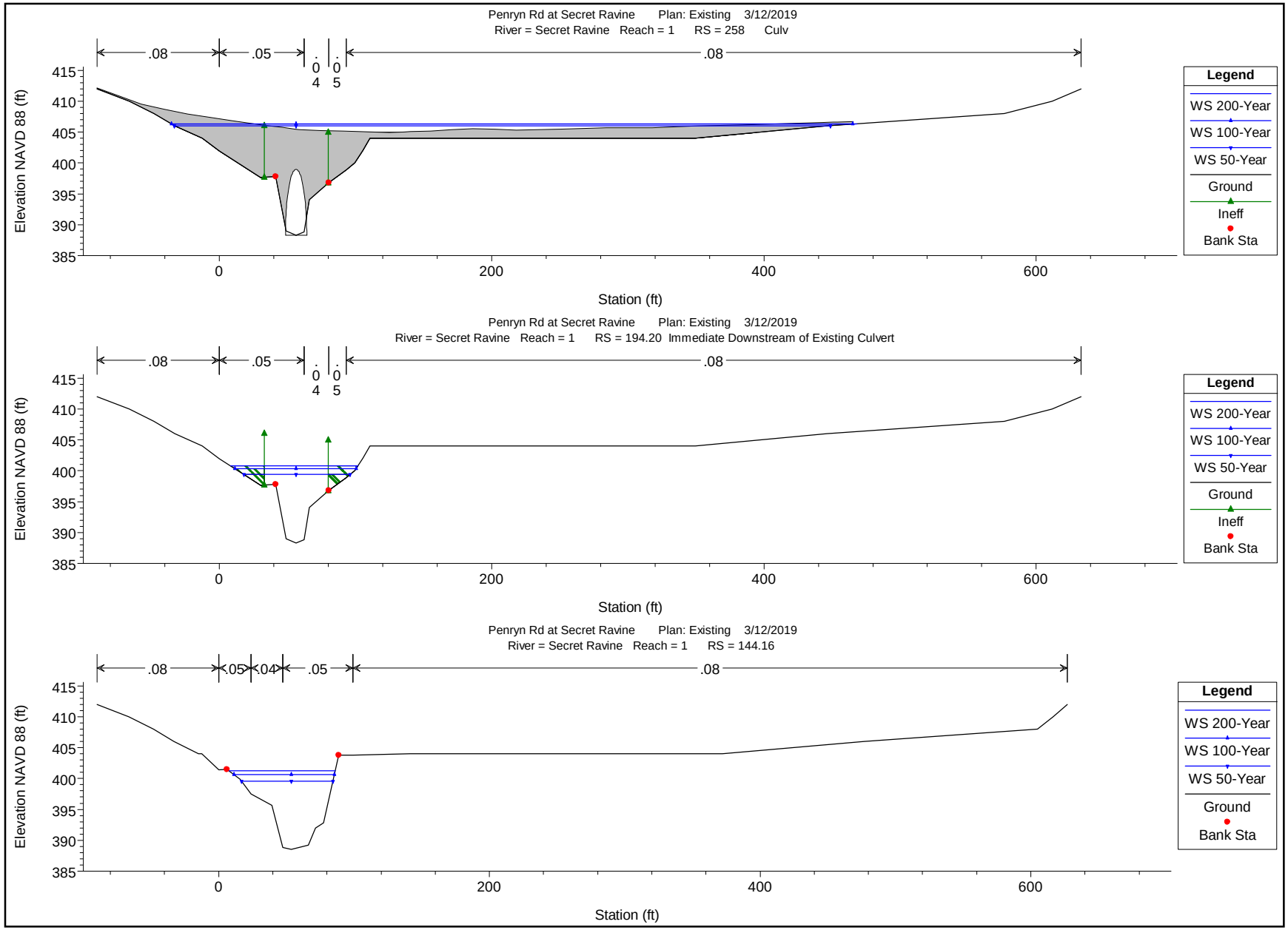

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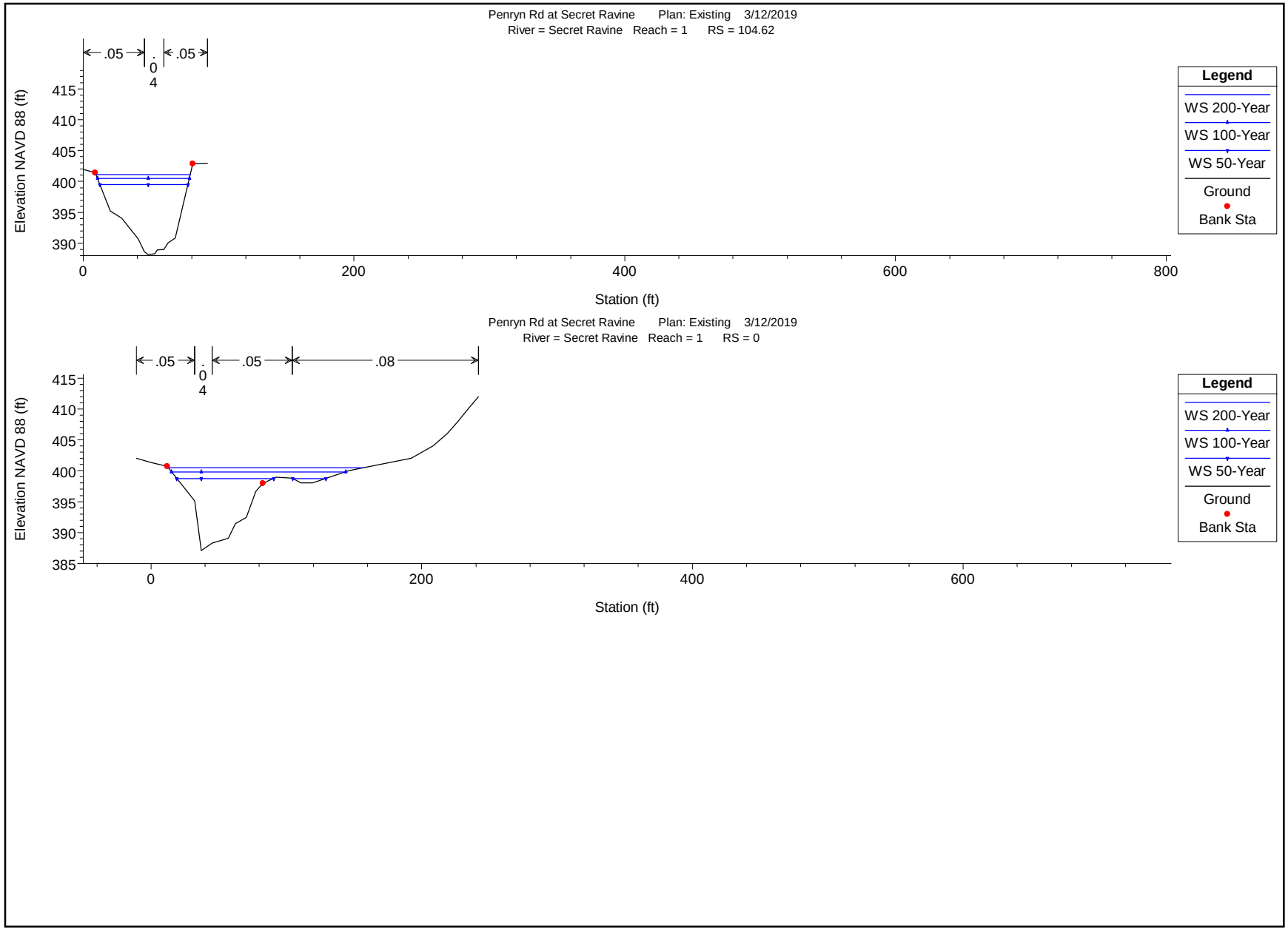

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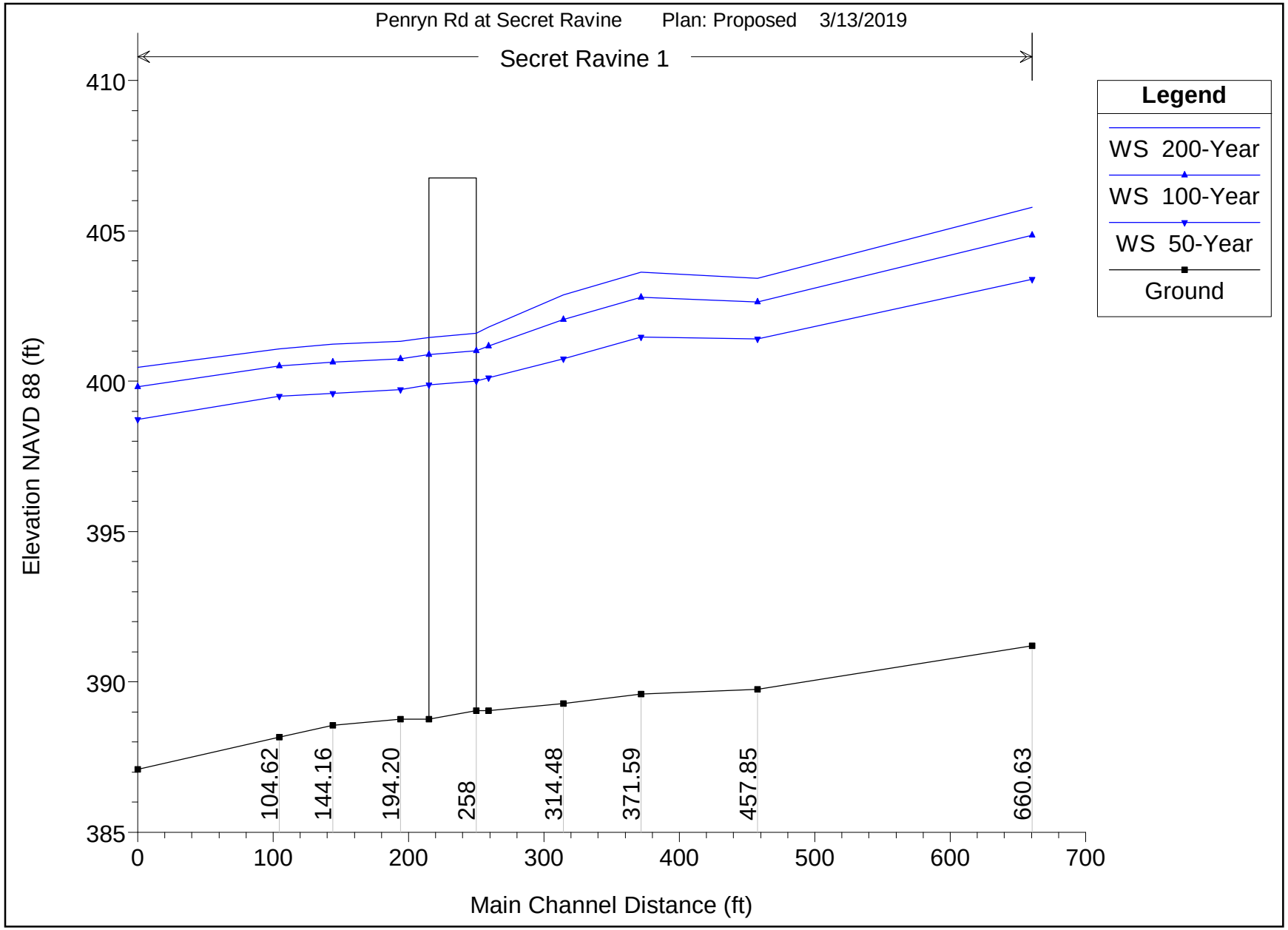
Penryn Rd at Secret Ravine
Plan: Proposed
3/13/2019
Secret Ravine 1
Legend
WS 200-Year
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Elevation NAVD 88 (ft)
Main Channel Distance (ft)
410
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314.48
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457.85
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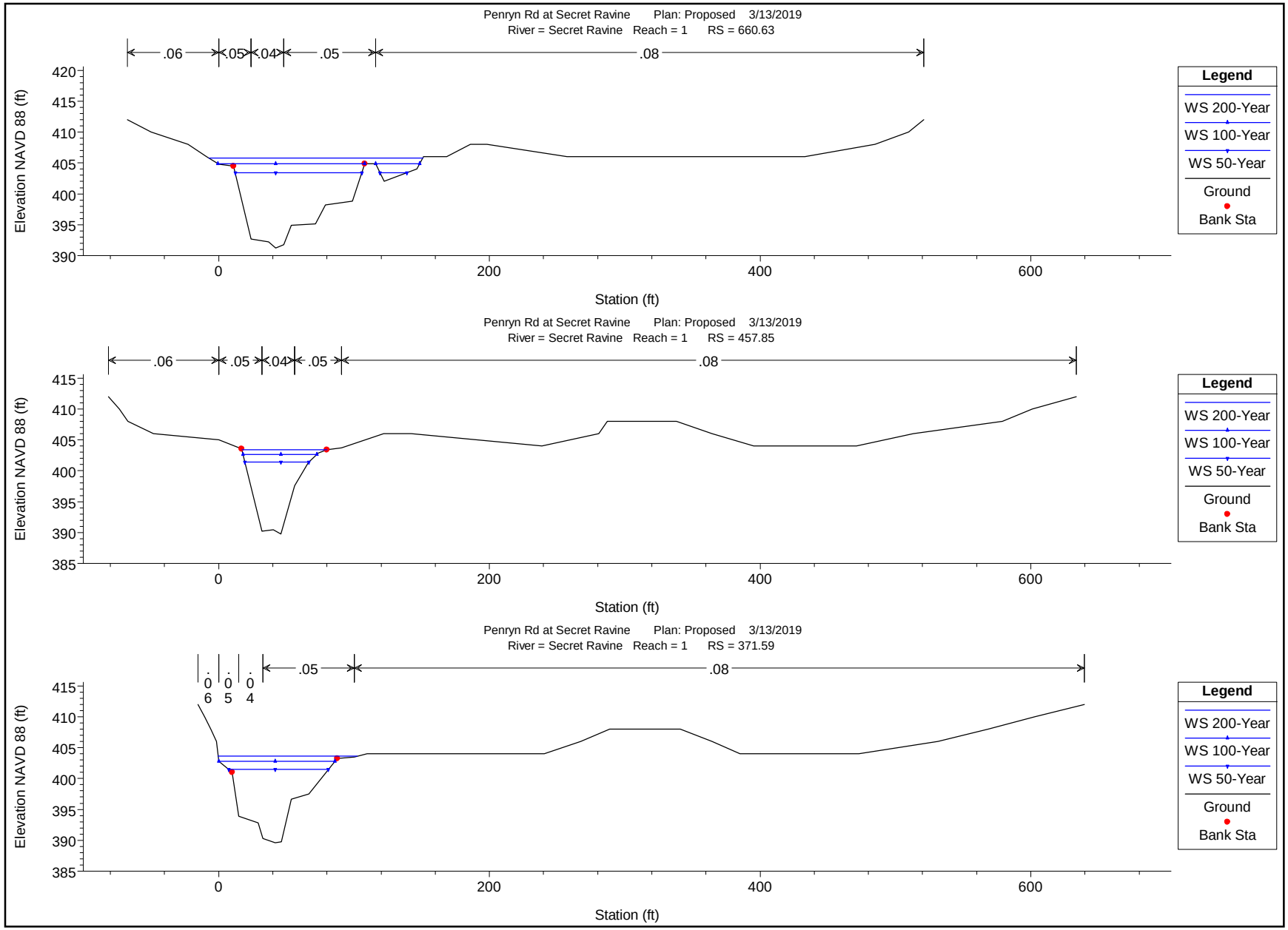
HEC-RAS Plan: Proposed River: Secret Ravine Reach: 1

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	Hydr Depth	Hydr Depth C	Length Chnl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)	(ft)
1	660.63	200-Year	4853.00	391.21	405.78		406.16	0.001434	5.06	1042.50	157.99	0.29	6.60	9.62	202.78
1	660.63	100-Year	4173.00	391.21	404.86		405.22	0.001523	4.87	901.81	140.93	0.29	6.40	8.71	202.78
1	660.63	50-Year	3230.00	391.21	403.38		403.71	0.001613	4.58	717.61	113.25	0.29	6.34	7.53	202.78
1	457.85	200-Year	4853.00	389.76	403.41	401.45	405.37	0.011104	11.23	431.97	62.60	0.75	6.90	6.90	86.26
1	457.85	100-Year	4173.00	389.76	402.63		404.44	0.009857	10.80	386.36	54.54	0.72	7.08	7.08	86.26
1	457.85	50-Year	3230.00	389.76	401.40		402.95	0.008679	9.97	323.86	47.34	0.67	6.84	6.84	86.26
1	371.59	200-Year	4853.00	389.59	403.62		404.50	0.004088	7.55	656.93	102.82	0.46	6.39	8.22	57.11
1	371.59	100-Year	4173.00	389.59	402.79		403.61	0.004248	7.27	580.80	85.76	0.47	6.77	7.54	57.11
1	371.59	50-Year	3230.00	389.59	401.46		402.18	0.004379	6.81	474.97	73.57	0.46	6.46	6.68	57.11
1	314.48	200-Year	4853.00	389.28	402.86		404.14	0.008261	9.07	539.64	84.59	0.58	6.38	7.47	55.45
1	314.48	100-Year	4173.00	389.28	402.05		403.24	0.008526	8.75	476.79	68.81	0.59	6.93	6.93	55.45
1	314.48	50-Year	3230.00	389.28	400.75		401.81	0.008671	8.25	391.45	62.58	0.58	6.26	6.26	55.45
1	259.03	200-Year	4853.00	389.05	401.79	399.36	403.62	0.008419	10.85	448.36	57.92	0.66	7.99	8.38	9.00
1	259.03	100-Year	4173.00	389.05	401.16	398.58	402.74	0.007825	10.08	413.96	52.35	0.63	7.91	7.91	9.00
1	259.03	50-Year	3230.00	389.05	400.12	397.36	401.36	0.006738	8.95	360.92	49.21	0.58	7.33	7.33	9.00
1	258 BR U	200-Year	4853.00	389.05	401.60	399.37	403.52	0.009032	11.11	437.46	55.83	0.68	7.84	8.23	35.00
1	258 BR U	100-Year	4173.00	389.05	401.01	398.59	402.65	0.008244	10.28	405.87	51.88	0.65	7.82	7.82	35.00
1	258 BR U	50-Year	3230.00	389.05	400.01	397.37	401.29	0.007019	9.09	355.40	48.87	0.59	7.27	7.27	35.00
1	258 BR D	200-Year	4853.00	388.77	401.46	399.08	403.14	0.006259	10.59	487.29	58.00	0.51	8.40	9.64	20.84
1	258 BR D	100-Year	4173.00	388.77	400.88	398.40	402.30	0.005744	9.74	453.77	58.00	0.49	7.82	9.07	20.84
1	258 BR D	50-Year	3230.00	388.77	399.88	397.19	400.99	0.005179	8.56	396.08	58.00	0.45	6.83	8.07	20.84
1	194.20	200-Year	4853.00	388.77	401.33		403.00	0.006376	10.60	479.75	99.29	0.61	8.27	9.51	50.04
1	194.20	100-Year	4173.00	388.77	400.75		402.18	0.005917	9.79	446.14	93.49	0.58	7.69	8.94	50.04
1	194.20	50-Year	3230.00	388.77	399.73		400.87	0.005496	8.70	386.92	82.51	0.55	6.67	7.91	50.04
1	144.16	200-Year	4853.00	388.56	401.23		402.45	0.006575	8.83	549.63	78.50	0.59	7.00	7.00	39.54
1	144.16	100-Year	4173.00	388.56	400.63		401.70	0.005984	8.28	503.85	74.10	0.56	6.80	6.80	39.54
1	144.16	50-Year	3230.00	388.56	399.59		400.47	0.005283	7.50	430.43	67.43	0.52	6.38	6.38	39.54
1	104.62	200-Year	4853.00	388.16	401.07		402.19	0.005151	8.47	573.12	69.66	0.52	8.23	8.23	104.62
1	104.62	100-Year	4173.00	388.16	400.51		401.46	0.004636	7.81	534.31	68.04	0.49	7.85	7.85	104.62
1	104.62	50-Year	3230.00	388.16	399.50		400.24	0.004054	6.91	467.25	65.15	0.46	7.17	7.17	104.62
1	0	200-Year	4853.00	387.10	400.46	397.85	401.59	0.006224	8.77	636.79	144.08	0.57	4.42	7.47	
1	0	100-Year	4173.00	387.10	399.81	397.08	400.88	0.006231	8.46	548.17	128.51	0.56	4.27	7.07	
1	0	50-Year	3230.00	387.10	398.73	395.87	399.70	0.006224	7.91	421.56	96.15	0.55	4.38	6.39	



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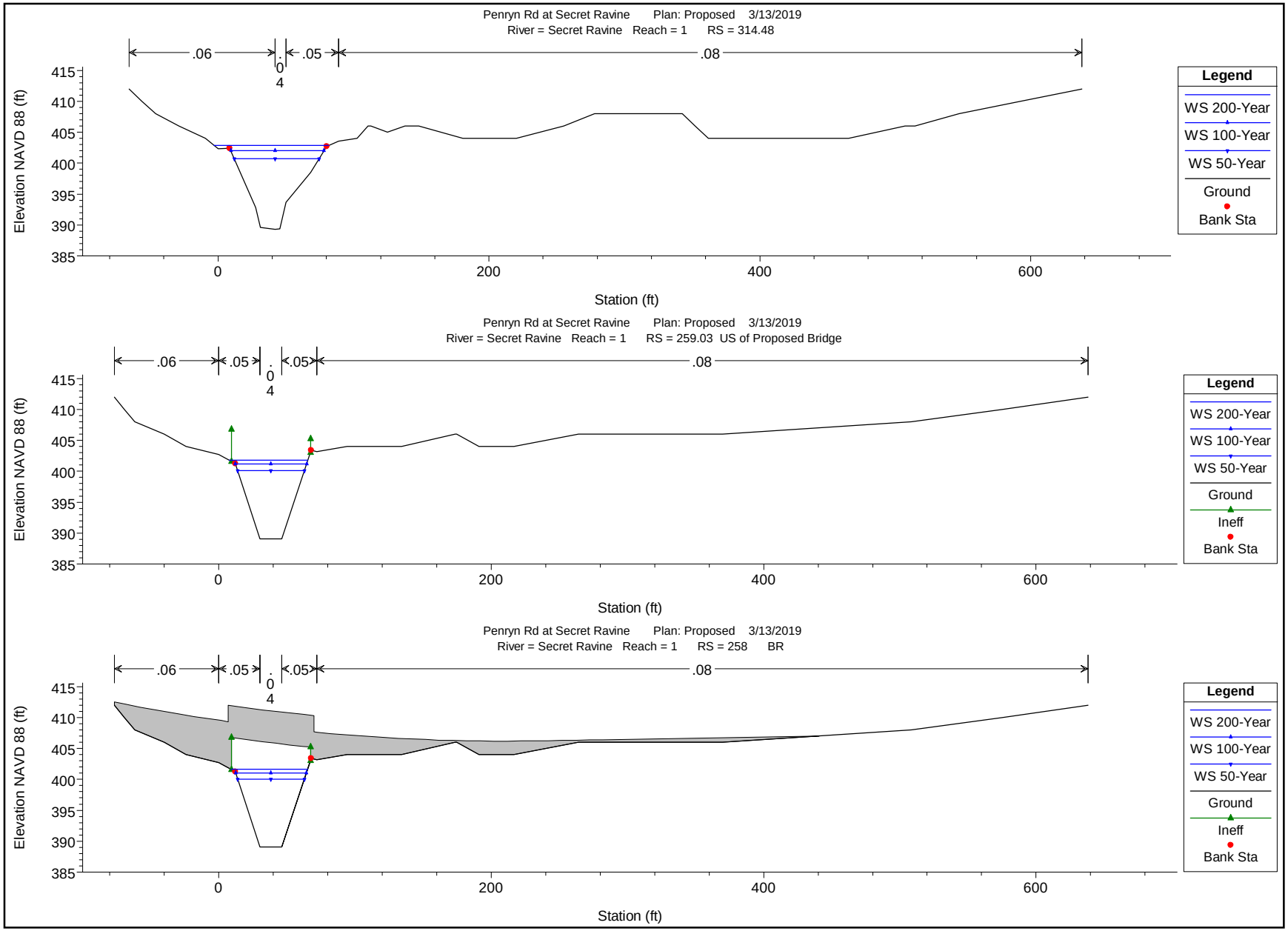

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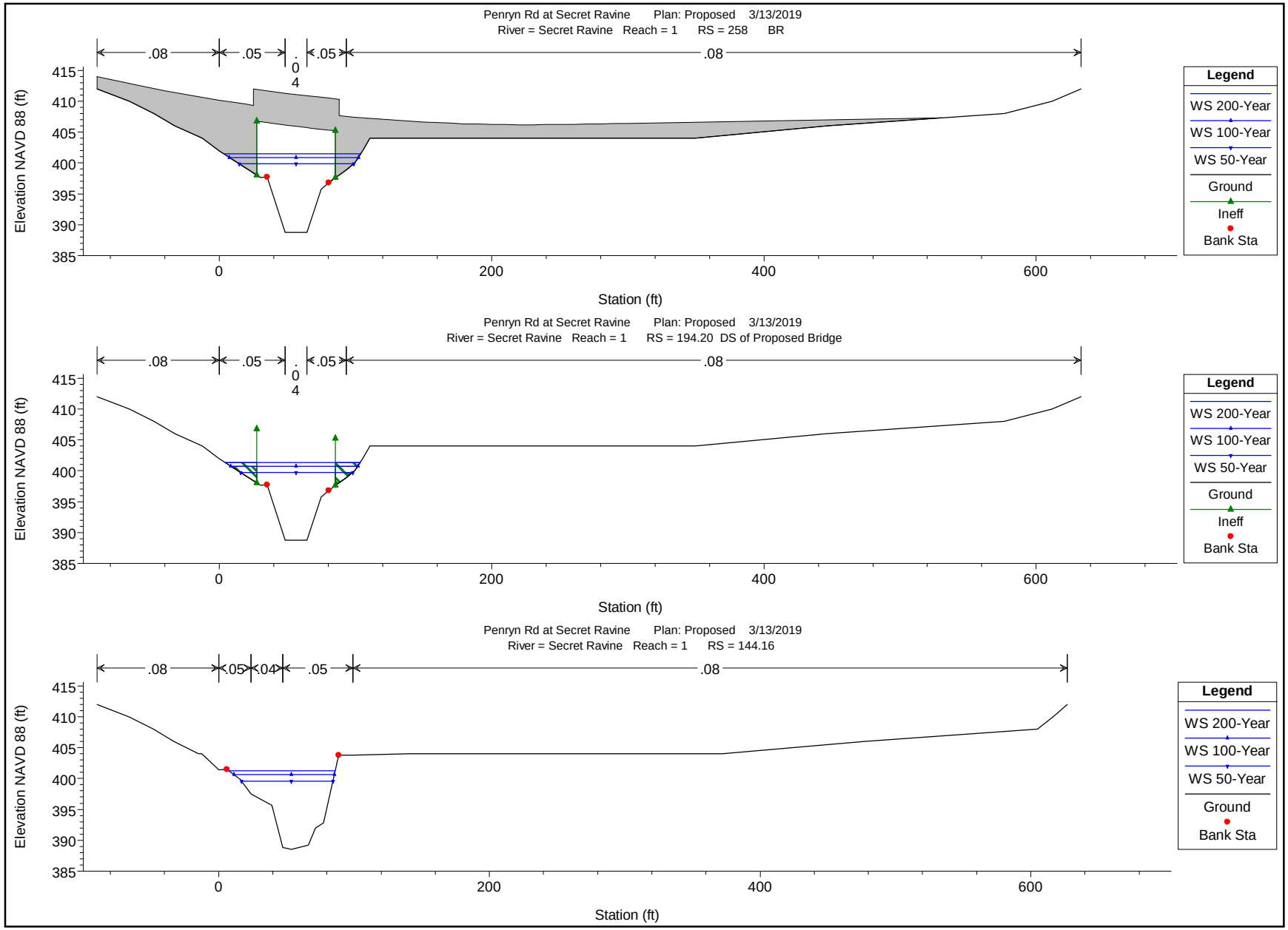

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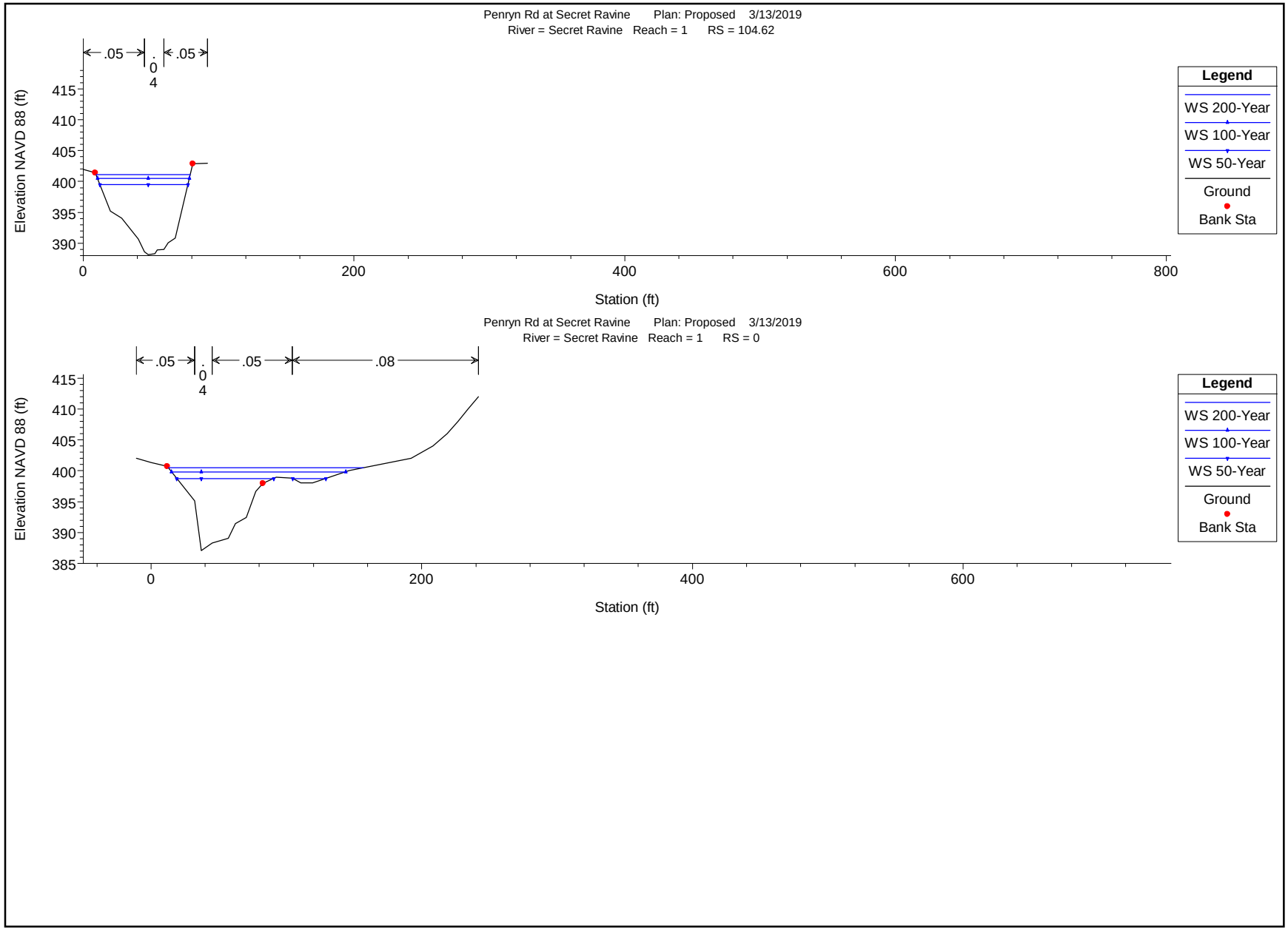

1 in Horiz. = 105 ft 1 in Vert. = 23 ft

Penryn Road over Secret Ravine Emergency Repair Project

Placer County, California

Ultimate (Contraction) Scour

100-year Flow
Calculation guideline from HEC-18 5th Edition
Input from HEC-RAS for Proposed Bridge

Input

Equation 6.7:

$$\tau = \gamma \left(\frac{V_2 n}{K_u} \right)^2 y_o^{-1/3}$$

Variable	English Units		Metric Units		Description
τ	3.4	lb/ft^2	163	N/m^2=Pa	initial shear stress for a specific flow
g	62.4	lb/ft^3	9800	N/m^3	unit weight of water (62.4 lb/ft^3 and 9800 N/m^3)
V_2	10.28	ft/s	3.1	m/s	average velocity in contracted section
n	0.05		0.05		Manning's roughness coefficient
K_u	1.486		1		1.486 for U.S. Customary, and 1.0 for S.I.
y_o	6.93	ft	2.1	m	Upstream flow depth
τ_c	0	lb/ft^2	0	N/m^2=Pa	Critical shear stress (from Figure 6.11)
CHECK	Contraction scour will occur				If initial shear stress exceeds critical value, then contraction scour will occur during that flow period, and the ultimate scour is computed from Equation 6.6.

Equation 6.6:

$$y_{s-ult} = 0.94 y_1 \left(\frac{1.83 V_2}{\sqrt{g y_1}} - \frac{K_u \sqrt{\frac{\tau_c}{\rho}}}{g n y_1^{1/3}} \right)$$

Variable	English Units		Metric Units		Description
y_1	6.9	ft	2.1	m	Upstream average flow depth
V_2	10.3	ft/s	3.1	m/s	Average velocity in contracted section
τ_c	0		0	N/m^2=Pa	Critical shear stress of channel bed material
n	0.05		0.05		Manning's roughness coefficient
K_u	1.486		1		1.486 for U.S. Customary, and 1.0 for S.I.
ρ	3.5	slugs/ft^3	1800	kg/m^3	Density of channel bed material (from 1250 to 1800)
g	32.2	ft/s^2	9.81	m/s^2	acceleration due to gravity
D_{50}			1.461	mm	grain size for which 50% of bed material is finer
y_{s_ult}	8.2	ft	2.5	m	Ultimate contraction scour

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Penryn Road over Secret Ravine Emergency Repair Project
Placer County, California
Local Scour at Abutments - Froehlich or HIRE

100-year Flow
Calculation guideline from HEC-18 5th Edition
Input from HEC-RAS for Proposed Bridge

Units = (SI or English)	English	
g = acceleration due to gravity =	32.2	ft/s^2

Left Overbank = Abutment 1 (South)

y1 = depth of flow at abutment on the overbank or in the main channel =	12.0	ft
L = length of embankment projected normal to flow =	106.9	ft
Ratio of projected embankment length to flow depth = L/y1 =	8.9	
Abutment scour equation to be used =	Froehlich	

Froehlich's Live Bed Abutment Scour Equation

L' = length of active flow obstructed by the embankment =	21.6	ft
ya = average depth of flow on the flood plain =	5.09	ft
Ae = flow area of the approach cross section obstructed by the embankment =	110.0	ft^2
Ve = flow velocity =	6.0	ft/s
Qe = flow obstructed by the abutment and approach embankment = Ae * Ve =	656	ft^3/s
Fr = Froude Number of approach flow upstream of the abutment =	0.47	
Θ = abutment skew =	90	degrees
K1 = coefficient for abutment shape =	0.55	
K2 = coefficient for angle of embankment shape = (Θ/90)^0.13 =	1	
Ys = abutment scour = ya*(2.27*k1*k2*((L'/ya)^0.43)*(Fr^0.61)+1) =	**12.5**	**ft**

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Penryn Road over Secret Ravine Emergency Repair Project
Placer County, California
Local Scour at Abutments - Froehlich or HIRE

100-year Flow
Calculation guideline from HEC-18 5th Edition
Input from HEC-RAS for Proposed Bridge

Units = (SI or English)	English	
g = acceleration due to gravity =	32.2	ft/s^2

Right Overbank = Abutment 2 (North)

y1 = depth of flow at abutment on the overbank or in the main channel =	12.0	ft
L = length of embankment projected normal to flow =	127.2	ft
Ratio of projected embankment length to flow depth =	10.6	
Abutment scour equation to be used =	Froehlich	

Froehlich's Live Bed Abutment Scour Equation

L' = length of active flow obstructed by the embankment =	33.3	ft
ya = average depth of flow on the flood plain =	5.37	ft
Ae = flow area of the approach cross section obstructed by the embankment =	178.6	ft^2
Ve = flow velocity =	8.1	ft/s
Qe = flow obstructed by the abutment and approach embankment = Ae * Ve =	1453	ft^3/s
Fr = Froude Number of approach flow upstream of the abutment =	0.62	
Θ = abutment skew =	90	degrees
K1 = coefficient for abutment shape =	0.55	

K2 = coefficient for angle of embankment shape = (Θ/90)^0.13 = 1

Ys = abutment scour = ya*(2.27*k1*k2*((L'/ya)^0.43)*(Fr^0.61)+1) = **16.3 ft**

Penryn Road over Secret Ravine Emergency Repair Project

Placer County, California

Streambank Rock Slope Protection

Calculation guideline from Caltrans Highway Design Manual

Input from HEC-RAS for Proposed Bridge

100-year Flow

Input

Location along stream:	Upstream	Upstream Face	Downstream Face	Downstream	
V_{avg}	10.1	10.3	9.7	9.8	ft/s
g	32.2	32.2	32.2	32.2	ft/s^2
Depth based on	Average	Average	Average	Average	
y	4.0	3.9	4.5	4.5	ft
S_f	1.1	1.1	1.1	1.1	
C_s	0.3	0.3	0.3	0.3	
Cross section location:	Straight channel	Straight channel	Straight channel	Straight channel	
C_v	1.00	1.00	1.00	1.00	

For outside of bends, need R_c and W:

Note: these parameters also affect the V_{des}; for natural channels, $V_{des}=V_{avg}$ for $R_c/W>26$

Note: these parameters also affect the V_{des}; for trapezoidal channels, $V_{des}=V_{avg}$ for $R_c/W>8$

R_c	26.0	26.0	26.0	26.0	ft
W	1.0	1.0	1.0	1.0	ft
C_t	1.0	1.0	1.0	1.0	
S_g	2.65	2.65	2.65	2.65	
Type of channel:	Natural	Natural	Natural	Natural	
V_{des}	10.1	10.3	9.8	9.8	ft/s
K_1	0.72	0.72	0.72	0.72	
θ	33.7	33.7	33.7	33.7	degrees
SS	1.5	1.5	1.5	1.5	
D_{30}	0.8	0.8	0.7	0.7	ft
D_{50}	1.0	1.0	0.9	0.9	ft
D_{50}	11.6	12.2	10.3	10.4	inches
	III	IV	III	III	RSP Class
	150 lb	**300 lb**	**150 lb**	**150 lb**	Median particle weight
	12	**15**	**12**	**12**	Median particle diameter (inches)

Penryn Road over Secret Ravine Emergency Repair Project

Placer County, California

Rock Slope Protection Calculations for Abutments

Calculation guideline from HEC-23 3rd Edition

Input from HEC-RAS for Proposed Bridge

100-year Flow

Location	Upstream	Upstream Face	Downstream Face	Downstream	
V	10.1	10.3	9.7	9.8	ft/s
g	32.2	32.2	32.2	32.2	ft/s^2
y	7.9	7.8	9.1	8.9	ft
Fr	0.63	0.65	0.57	0.58	
Equation	**Isbash**	**Isbash**	**Isbash**	**Isbash**	

For Froude Numbers $(V/(gy)^{1/2})<=0.80$, Isbash relationship (Equation 14.1)

$$D_{50} = \frac{yK}{(S_s - 1)}\left[\frac{V^2}{gy}\right]$$

y	7.9	7.8	9.1	8.9	depth of flow in the contracted bridge opening, ft
K	1.02	1.02	1.02	1.02	1.02 for vertical wall abutment, 0.89 or for spill-through abutment
S_s	2.65	2.65	2.65	2.65	specific gravity of rock
V	10.1	10.3	9.7	9.8	average velocity in contracted section, ft/s
g	32.2	32.2	32.2	32.2	gravitational acceleration, ft/s^2
D_{50}	2.0	2.0	1.8	1.8	median stone diameter, ft
D_{50}	23.4	24.3	21.9	22.1	median stone diameter, inches
	VII	VIII	VII	VII	RSP Class
	1/2 ton	1 ton	1/2 ton	1/2 ton	Median particle weight
	24	30	24	24	Median particle diameter (inches)