# Southern California Edison

## Application for Surrender of License
## Borel Hydroelectric Project
## FERC Project No. 382

## Volume II

## Decommissioning Plan

SOUTHERN CALIFORNIA EDISON®
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May 2023

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May 2023

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# Acronyms and Abbreviations

| | |
|---|---|
| °C | Degrees Celsius |
| °F | Degrees Fahrenheit |
| 1D | One-dimensional |
| 2D | Two-dimensional |
| ac-ft | Acre-feet |
| ACHP | Advisory Council on Historic Preservation |
| AIRs | Additional Information Requests |
| AOU | American Ornithologists Union |
| APDEA | Applicant-Prepared Draft Environmental Assessment |
| APE | Area of Potential effect |
| Auxiliary Dam | Lake Isabella Auxiliary Dam, U.S. Army Corps of Engineers |
| BA | Biological Assessment |
| BGEPA | Bald and Golden Eagle Protection Act |
| BLM | U.S. Department of the Interior, Bureau of Land Management |
| BLM-S | BLM Sensitive Species |
| BMP | Best Management Practice |
| BO2 | Blue Oak Savanna |
| Borel Project | Borel Hydroelectric Project, FERC Number 382 |
| C.F.R. | Code of Federal Regulations |
| cal YBP | Calendar Years Before Present |
| CCMP | California Coastal Management Program |
| CDFA | California Department of Food and Agriculture |
| CDFG | California Department of Fish and Game |
| CDFW | California Department of Fish and Wildlife |
| CEII | Critical Energy Infrastructure Information |
| CEQA | California Environmental Quality Act |

 

| | |
|---|---|
| CESA | California Endangered Species Act |
| CFGC | California Fish and Game Commission |
| CFR | Code of Federal Regulations |
| Cfs | Cubic Feet per Second |
| CGS | California Geological Survey |
| CNDDB | California Natural Diversity Data Base |
| CNPS | California Native Plant Society |
| Corps | U.S. Army Corps of Engineers |
| CRPR | California Rare Plant Rank |
| CRWQCB | California Regional Water Quality Control Board |
| CSB | California Stream Bioassessment |
| CUI | Controlled Unclassified Information |
| CWA | Clean Water Act |
| CWHR | California Wildlife Habitat Relationships |
| CZMA | Coastal Zone Management Act |
| DBH | Diameter at Breast Height |
| DEM | Digital Elevation Model |
| DO | Dissolved Oxygen |
| DPS | Distinct Population Segment |
| EA | Environmental Assessment |
| EAP | Emergency Action Plan |
| e-cat | Cataraft Electrofisher |
| EPT | Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) |
| ESA | Endangered Species Act |
| ESRI | Environmental Systems Research Institute |
| FAQs | Frequently Asked Questions |
| FERC | Federal Energy Regulatory Commission (or Commission) |

 

| | |
|---|---|
| FGV | Fine-grained Volcanic |
| Forest Service | U.S. Department of Agriculture, Forest Service |
| FP | Fully Protected Species |
| FPA | Federal Power Act |
| FSS | Forest Service Sensitive Species |
| ft | Feet |
| FW | Forest Service Watch List Species |
| FYLF | Foothill Yellow-legged Frog |
| GPS | Global Positioning System |
| H:V | Horizontal to Vertical |
| HABS | Historic American Buildings Survey |
| HAER | Historic American Engineering Record |
| HEC-HMS | Hydrologic Engineering Center's Hydrologic Modeling System |
| HEC-RAS | Hydrologic Engineering Center Riverine Analysis System |
| HHRD | Historic Human Remains Detection |
| HP | Horsepower |
| Hz | Hertz |
| ICF | Institute for Canine Forensics |
| IPaC | Information for Planning and Consultation |
| IRWMP | Integrated Regional Water Management Plan |
| KCF | Kern Canyon Fault |
| KOP | Key Observation Point |
| KR&LAEP | Kern River and Los Angeles Electric Power Company |
| KR-1 | Southern California Edison’s Kern River No. 1 Project |
| KRVHS | Kern River Valley Historical Society |
| KRVM | Kern River Valley Museum |
| Ksat | Saturated Hydraulic Conductivity of Soil |

 

| | |
|---|---|
| kV | Kilovolt |
| kW | Kilowatt |
| LiDAR | Light Detection and Ranging |
| Lower Borel | Downstream of the Auxiliary Dam |
| LRMP | Land and Resource Management Plan |
| msl | Mean Sea Level |
| MW | Megawatt |
| NAD83 | North American Datum of 1983 |
| NAHC | Native American Heritage Commission |
| NAVD 88 | North American Vertical Datum of 1988 |
| NED | National Elevation Dataset |
| NEPA | National Environmental Policy Act |
| NFS | National Forest System |
| NHPA | National Historic Preservation Act |
| NLCD | National Land Cover Database |
| NNIP | Non-native Invasive Plant |
| NOAA | National Oceanic and Atmospheric Administration |
| NRCS | Natural Resources Conservation Service |
| NRHP | National Register of Historic Places |
| OHV | Off Highway Vehicle |
| O&M | Operations and Maintenance |
| PCT | Pacific Crest Trail |
| PL&P | Pacific Light and Power Company |
| Plan | Decommissioning Plan |
| Plan Set | 30% Design Plans |
| Powerhouse | Borel Powerhouse |
| PT&L | Power, Transit, and Light Company |

 

| | |
|---|---|
| QSD | Qualified SWPPP Developer |
| QSP | Qualified SWPPP Practitioner |
| RM | River Mile |
| RMP | Resource Management Plan |
| RMZ | Recreational Management Zones |
| ROS | Recreation Opportunity Spectrum |
| RV | Recreational Vehicle |
| SCE | Southern California Edison Company |
| SCS | Soil Conservation Service |
| SHPO | State Historic Preservation Office(r) |
| SIO | Scenic Integrity Objective |
| SMA | Special Management Area |
| SMS | Scenery Management System |
| SQF | Sequoia National Forest |
| SR | State Route |
| SRMA | Special Recreation Management Area |
| SSC | Species of Special Concern |
| SSJVIC | Southern San Joaquin Valley Information Center |
| SSURGO | Soil Survey Geographic Database |
| Surrender Application | Application for Surrender of License |
| Switchyard | non-Project Borel Switchyard |
| SWPPP | Stormwater Pollution Prevention Plan |
| SWRCB | State Water Resources Control Board |
| TCE | Temporary Construction Easement |
| TCL | Traditional Cultural Landscape |
| TCP | Traditional Cultural Property |
| TIN | Triangular Irregular Network |

 

| | |
|---|---|
| U.S. | United States |
| U.S.C. | United States Code |
| Upper Borel | Upstream of the Auxiliary Dam |
| USDA | U.S. Department of Agriculture |
| USEPA | U.S. Environmental Protection Agency |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| v | Volt |
| VegCAMP | Vegetation Classification and Mapping Program |
| VMS | Visual Management System |
| VQO | Visual Quality Objective |
| VRM | Visual Resource Management |
| WEAP | Worker Environmental Awareness Program |
| YOY | Young of the Year |

# 1 Introduction

SCE has prepared this Decommissioning Plan (Plan) as part of its Application to FERC for surrender of the Borel Project license. This Plan is prepared in conformance with Title 18 C.F.R.), Chapter I, Subchapter B – Regulations under the FPA, Part 6 – Surrender or Termination of License.

The Borel Project, which has a FERC-authorized installed capacity of 12,000 kilowatts (kW), is located within Kern County, California, and consists of: 1) a 158-foot-long, 4-foot-high concrete Diversion Dam on the North Fork of the Kern River; 2) a 61-foot-long Intake Structure with three 10-by-10-foot radial gates; 3) Canal Inlet Structures consisting of a canal intake, trash racks, and a sluice gate; 4) Borel Canal, consisting of 1,985 feet of tunnel, 1,651 feet of steel-lined flume, 51,835 feet of concrete-lined canal, and 3,683 feet of siphon at four locations (i.e., Rich Gulch, Kern River, Bodfish and Pioneer); 5) an auxiliary intake structure to the Borel Canal located at the Corps' Lake Isabella Auxiliary Dam; 6) a small off-channel, concrete lined forebay; and 7) four steel penstocks. Penstocks 1 and 2 are 526 feet long and 565 feet long respectively, with varying diameters between 42 and 60 inches, and Penstocks 3 and 4 each are 60 inches in diameter and extend 622 feet at which point they join together to form a single 84-inch-diameter, 94-foot-long penstock; 8) the Borel Powerhouse (Powerhouse) with two 3,000- kW generators and a 6,000-kW generator for a total installed capacity of 12,000 kW, and which discharge to the Kern River; and 9) other appurtenant facilities.

The Borel Project occupies approximately 363 acres of land, of which 199.41 acres are Federally owned, as follows: 159.24 acres are managed by the United States Department of Agriculture (USDA), Forest Service (Forest Service) as part of the Sequoia National Forest (SNF), 29.47 acres are administered by the U.S. Department of the Interior, Bureau of Land Management (BLM) and 10.7 acres are administered by the Corps (Figure 1-1). Private lands include those owned by SCE and other private party parcels. The Federal Power Commission, predecessor agency to FERC, issued an original license for the Borel Project in 1925. On May 17, 2006, FERC issued a new license to SCE, with a license term ending on April 30, 2046.

Figure 1-1 shows the Borel Project features and Borel FERC Project boundary, which are described in more detail in Section 2 and Appendix B, Borel Project Segment Map Set of this Plan as well as in Exhibit A, Project Description; Exhibit F, Design Drawings; and Exhibit G, Project Maps that are available in FERC's eLibrary and hereby made part of SCE's Surrender Application by reference.

Specifically, as originally licensed, the Borel Project used a diversion dam and intake structure on the North Fork of the Kern River to divert water into the Borel Canal for power generation at the Powerhouse. The Flood Control Act of 1944 authorized the Corps' Isabella project to construct the Isabella Dam and reservoir on the Kern River, mainly to provide flood protection for Bakersfield and the surrounding communities. The Corps began construction of the Isabella Dam in 1948, which was completed in 1953. The auxiliary dam was constructed over a portion of the Borel canal, and a concrete conduit was built through the dam to allow continued flow through the canal. The elements of the Borel system beneath and to the north of Isabella Dam were heavily modified during the dam's construction. When full, Lake Isabella impounds more than 110,000 acre-feet, and the diversion dam, overflow weir, intake structure, and 4.2 miles of the upper portion of the Borel Canal are inundated. In 2017, the Corps implemented a safety modification project to its Lake Isabella Auxiliary Dam for which the Corps condemned 10.7 acres of private and public land associated with the Borel

 

Project and sealed off the existing section of conduit through the Auxiliary Dam by filling it with concrete and abandoning the conduit in place. This action rendered the Borel Project nonfunctional, requiring SCE to file an application to surrender the Borel Project license. Consequently, the Commission, by letter dated March 11, 2019, directed SCE to prepare an application to surrender its license for the Borel Project, in accordance with Section 6.1 of its regulations. SCE holds water right license No. 005731 (application No. 013778) to divert 605 cfs of water and use it for power. SCE intends to surrender its power water right at the appropriate time.

As part of the Surrender Application, this Plan consists of this introduction, Section 1, and the sections that follow:

- Section 2 describes the SCE-proposed plan to decommission the licensed Borel Project features. For ease of presentation, the Borel Project is divided into 11 canal segments; as such, Section 2 is divided into 11 corresponding subsections.
- Section 3 provides an estimated schedule for decommissioning and construction activities to take place once FERC issues its order approving the license surrender.
- Section 4 presents proposed measures that will follow the decommissioning considerations.
- Section 5 provides a list of citations for material/information referenced in the Plan.

Refer to Volume III, Applicant-Prepared Draft Environmental Assessment (APDEA), for an assessment of any effects of decommissioning on environmental, recreational, cultural, and other resources, and to Volume IV, Record of Consultation, for a description of consultation with stakeholders regarding the decommissioning of Borel Project facilities and surrender of the license. Volume V includes Privileged Information, including compiled data with regard to pre-contact and historic-era archaeological resources, historic built environment resources, Traditional Cultural Properties, and a record of consultation with Native American Tribes, as well as agencies as appropriate.

 

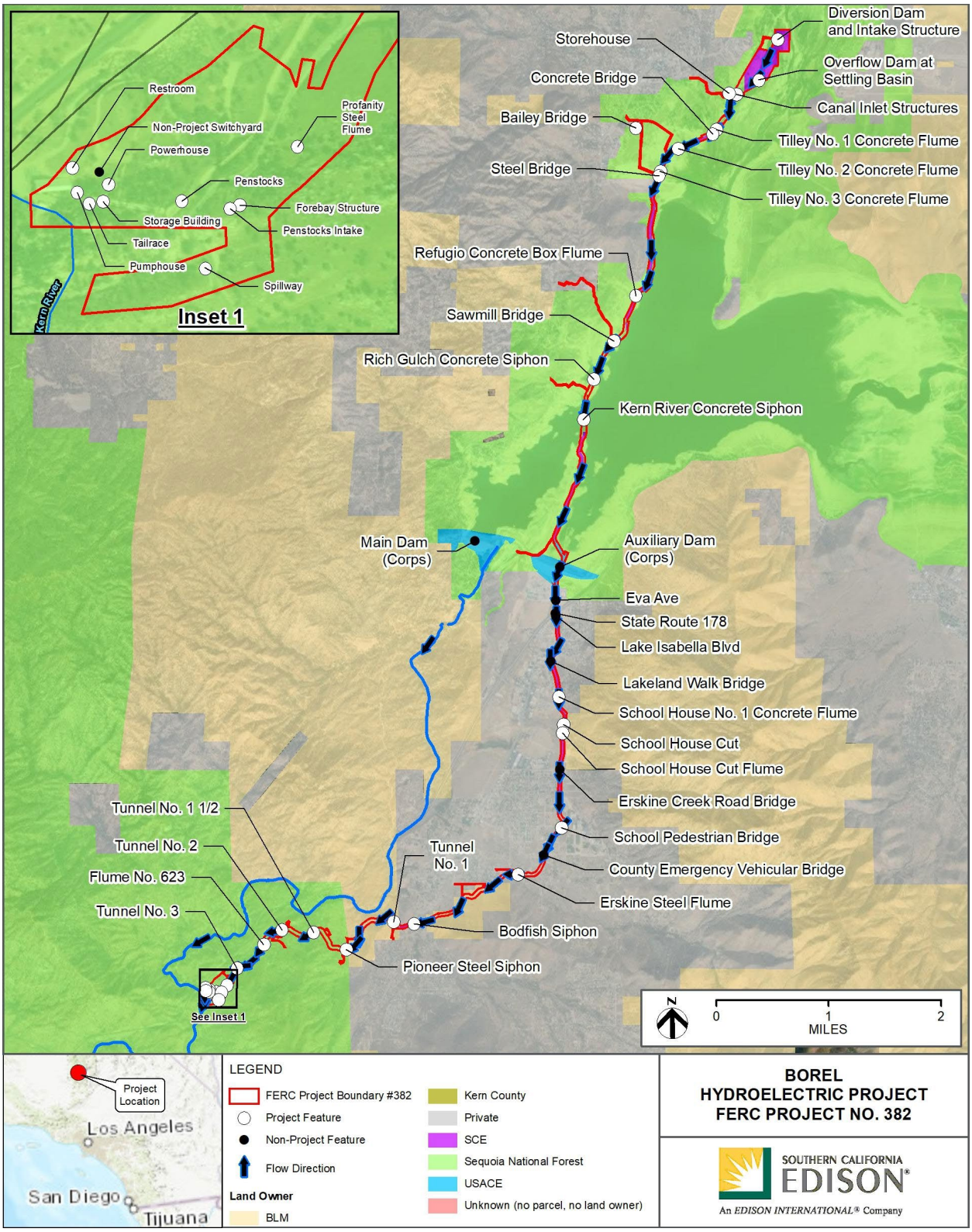


**Figure 1-1. Borel Project and Land Ownership**

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# 2 Decommissioning Plan

The following subsections describe the proposed decommissioning actions for the Borel Project by segment. For spatial orientation, photos of the Borel Project presented in Section 2 include a blue arrow (bottom left corner), indicating the direction of water flow when the Borel Project was operating, if applicable, and a north arrow (bottom right corner).

## 2.1 Borel Project Segmentation

For purposes of this Plan and related analyses, the Borel Project was divided into 11 segments based on several conditions including:

- land ownership;
- construction action;
- access;
- location; and
- other common conditions.

A list of Borel Project segments is provided in Table 2-1.

Figure 2-1 shows the 11 Borel Project segments.

**Segments 1 through 4** are located upstream from the Auxiliary Dam (Upper Borel) and entirely within the limits of Lake Isabella and subject to inundation when the water surface elevation of the reservoir is at an approximate elevation of 2,550 ft or higher. Access to these segments and decommissioning actions will be dependent upon water year and lake levels. **Segment 5** is located partially within the reservoir and partially downstream of the Auxiliary Dam (Lower Borel). **Segments 6 through 11** are located downstream from the Auxiliary Dam (Lower Borel), and access is not impacted by reservoir operations.

A series of Borel Project Segment Maps are provided in Appendix B for reference. Appendix C includes a 30% Design Plan Set (Plan Set) organized into the following sections:

- G-Series: Cover sheet, Sheet Index, and Borel Project Information
- V-Series: Aerial Photos, Property Ownership, and Site Access
- C100 - Series: Civil Improvements (Plan view and sections)
- C300 - Series: Typical Sections
- C500 – Series: Details

Throughout the following descriptions of proposed actions for Borel Project segments, reference is made to fill materials for purposes of backfilling and grading. Fill materials may be sourced from onsite or offsite. Onsite fill material is native material and will be used provided the material is free of materials larger than six inches in dimension, organic material, and other deleterious materials. Offsite fill material will be chemically screened prior to use and be weed free. Fill material is discussed in Section 4 – Proposed Measures of this Plan and will also be addressed in the Borel Project construction specifications.

 

Geotechnical investigations and earthworks specifications will be developed at subsequent phases of design that will define material properties for engineered fill, maximum lift thickness, optimum moisture content, and compaction requirements.

**Table 2-1. Borel Project Decommissioning Segments**

| Name | Description | Station[a] Number – Start | Station Number – End | Length (feet) |
|---|---|---|---|---|
| Segment 1 | Diversion Dam and Intake Structure to Tilley No. 1 Flume | 32+30 | 52+00 | 1,970 |
| Segment 2 | Tilley No. 1 Concrete Flume to Tilley No. 3 Concrete Flume | 52+00 | 88+15 | 3,615 |
| Segment 3 | Tilley No. 3 Concrete Flume to end of SCE Land | 88+15 | 161+00 | 7,285 |
| Segment 4 | End of SCE Land to Auxiliary Dam | 161+00 | 273+80 | 11,280 |
| Segment 5 | Auxiliary Dam | 273+80 | 298+00 | 2,420 |
| Segment 6 | Auxiliary Dam to Alta Sierra Avenue | 298+00 | 398+48 | 10,048 |
| Segment 7 | Alta Sierra Avenue to Erskine Steel Flume | 398+48 | 451+20 | 5,272 |
| Segment 8 | Erskine Steel Flume to Bodfish Siphon | 451+20 | 506+29 | 5,509 |
| Segment 9 | Bodfish Siphon to Pioneer Steel Siphon | 506+29 | 548+79 | 4,250 |
| Segment 10 | Pioneer Steel Siphon to Forebay Structure | 548+79 | 628+74 | 7,995 |
| Segment 11 | Forebay Structure to Tailrace[b] | 628+74 | 639+03 | 1,029 |
| | **Total** | | | **60,673** |

[a] Stationing is a form of measurement used by engineers and surveyors to show the linear distance from the point of origin. Each station is equal to one hundred feet from the linear point of origin. For example, xx + xx, where xx is multiplied by one hundred + xx is the additional number of feet. “32 + 30” is 3200+30 = 3,230 feet from the linear point of origin.
[b] End stationing for this segment at terminus of spillway channel. Borel Project stationing was not provided in the 2006 License Exhibits (F, G, K) for the Penstocks and Powerhouse.

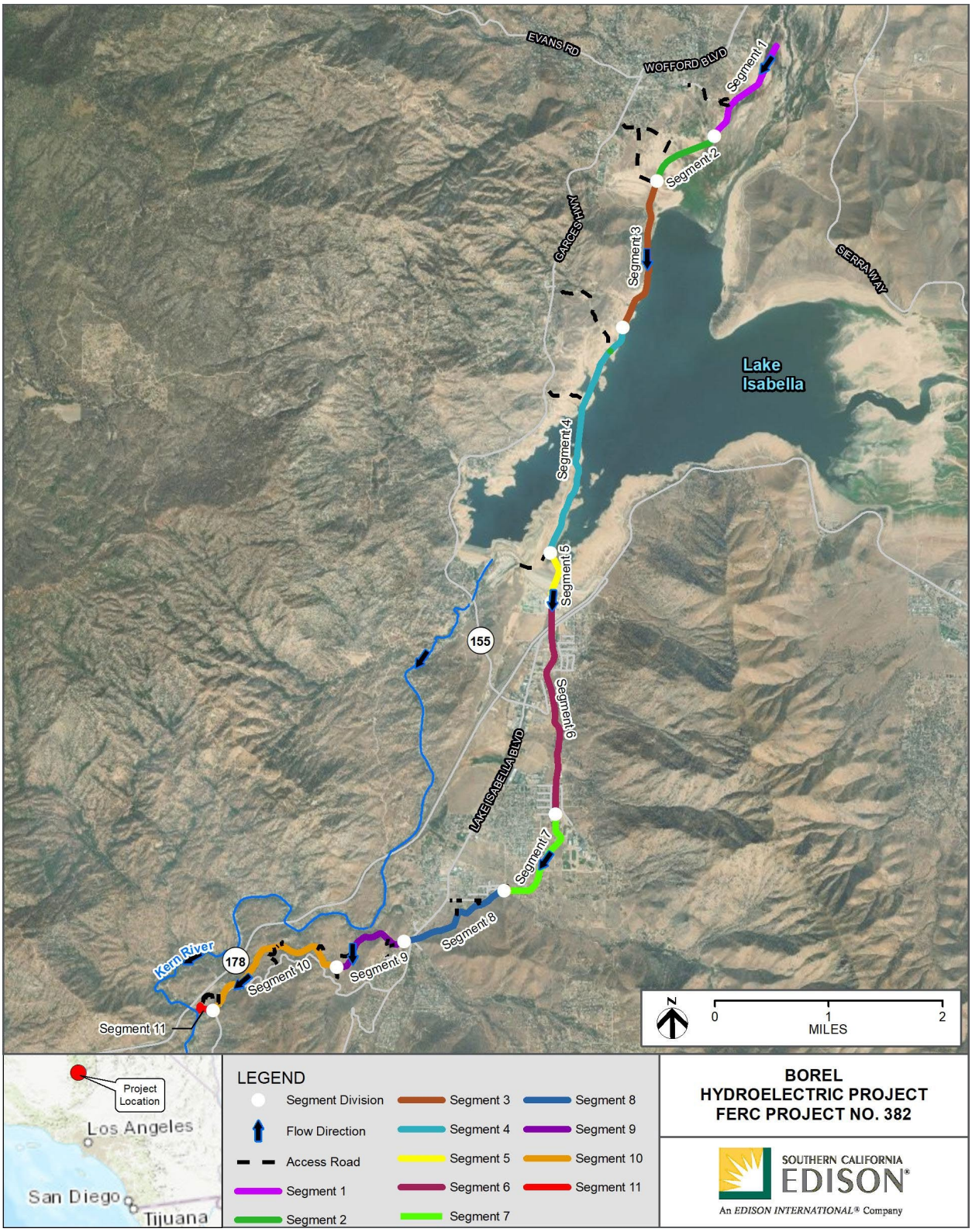


**Figure 2-1. Borel Project – Decommissioning Segments**

## 2.2 Segment 1 – Diversion Dam and Intake Structure to Tilley No.1 Concrete Flume

### 2.2.1 Existing Features

**Segment 1** extends from the Diversion Dam and Intake Structure (Station 32+30) to Tilley No. 1 Concrete Flume (Station 52+00), approximately 1,970 feet. The Diversion Dam and Intake Structure and earthen channel from the Diversion Dam and Intake Structure to the canal inlet are on property owned by SCE. The canal inlet, canal, and Storehouse are on Federal lands administered by the Forest Service. The following subsections describe Borel Project features within this segment.

#### 2.2.1.1 Diversion Dam and Intake Structure

The Diversion Dam and Intake Structure are located within Kern County on the North Fork Kern River. The Diversion Dam is a 4-foot-high, 158-foot-long mass concrete structure. The Intake Structure is approximately 61 feet long, with three 10-foot by 10-foot radial gates. An aerial view of the Diversion Dam and Intake Structure captured in 2012 is shown in Figure 2-2, with the Intake Structure visible and the Diversion Dam submerged underwater.


**Figure 2-2. Aerial View of the Diversion Dam and Intake Structure, Looking Downstream (Photo Date: 09/2012)**

An approximately 3,200-foot-long earthen berm extends from the Diversion Dam to the Canal Inlet Structure. A settling pond with an overflow dam that has a concrete section with two 8-foot by 10-foot radial gates is located on the Overflow Dam at Settling Basin approximately 1,500 feet downstream of the Diversion Dam and Intake Structure. The Diversion Dam and Intake Structure and channel are almost completely covered with sediment and overgrown with vegetation.

### 2.2.1.2 Canal Inlet Structures

The Canal Inlet Structures consist of a screen structure, sluice gate structure, and canal inlet structures. The screen structure is approximately 60 feet wide, with four openings covered with bar screens that allow for water to enter the canal from the Diversion Dam and Intake Structure channel. The sluice gate structure extends east from the end of the screen structure, consisting of four 9-foot-wide bays with sluice gates and stop logs. A concrete wing wall extends farther to the east. The screen and sluice gate structures are surrounded by dense vegetation, as shown in Figure 2-3.


**Figure 2-3. Canal Inlet Structure, Looking Downstream (Photo Date: 06/2013)**

The Canal Inlet Structures are located at the head of the canal and are approximately 40 feet wide and 30 feet long. An approximately 40-foot by 14-foot concrete deck is on top of the structure. Three manually operated steel radial gates are within the structure. Chain-link fencing lines the top of the structures on all sides to prevent access (Figure 2-4).


**Figure 2-4. Canal Inlet Structures and Concrete-lined Canal, Looking Upstream. (Photo Date: 02/2021)**

### 2.2.1.3 Concrete-lined Canal

A concrete-lined canal extends between the Canal Inlet Structure and Tilley No. 1 Concrete Flume, a distance of approximately 1,915 feet. The canal is a trapezoidal, concrete-lined structure with side slopes between 1.7 and 1.9H:1V and an average bottom width of approximately 22 feet. The amount of sedimentation and vegetation in the bottom of the canal varies greatly across the segment, (Figure 2-5). Based on available as-built drawings, the concrete liner is approximately 9 inches thick, with welded wire fabric reinforcement.


**Figure 2-5. Canal from Canal Inlet Structure to Tilley No. 1 Concrete Flume (out of frame)(looking downstream). (Photo Date: 02/2021)**

### 2.2.1.4 Storehouse

A SCE-owned storage building named the Storehouse is located adjacent to the Intake Structure. The Storehouse structure and adjacent maintenance yard are surrounded by chain-link fence (Figure 2-6). The adjacent utility line is not within the enclosed chain-link fence line.


**Figure 2-6. Storehouse and Maintenance Yard. (Photo Date: 03/2022)**

#### 2.2.1.5 Access Roads

A public access road leads to the Intake Structure from East Evans Road, which is accessible from Wofford Boulevard/State Route (SR) 155. The paved upper portion of East Evans Road extends through a residential area and is under Kern County jurisdiction. The lower portion of East Evans Road that leads to the Storehouse, Canal Inlet Structure, and canal is on Federal lands administered by the Forest Service.

### 2.2.2 SCE Proposal

The proposed decommissioning actions and the relevant considerations for **Segment 1** are summarized below. Preliminary design plans reflecting the proposed actions are included in Appendix C, Sheet C-101.

#### 2.2.2.1 Decommissioning Approach

The Plan consists of the following actions:

- **Diversion Dam and Intake Structure – Abandon in Place**: No work is proposed at the Diversion Dam and Intake Structure as natural processes have partially buried the features and vegetation has grown around the structure. The canal intake screen and sluice gate structures will likewise be abandoned in place to avoid impacts on established vegetation and habitat.

- **Earthen Channel – Abandon in Place**: No work is proposed along the former earthen channel leading from the Diversion Dam and Intake Structure to the Canal Inlet Structure. It is generally undetectable at this time and overgrown with vegetation.

- **Overflow Dam at Settling Basin – Abandon in Place**: No work is proposed at the location of the Overflow Dam at Settling Basin. The concrete and steel structure is generally undetectable at this time and has become overgrown with vegetation.

- **Canal Inlet Structure – Abandon with Modification**: The Canal Inlet Structure will be abandoned in place with modifications. Steel, trash racks, radial gates, slide gates, actuators, and fencing will be removed from the Canal Inlet Structure, and the vertical walls of the structure will be backfilled at a maximum slope of 3H:1V to daylight to adjacent ground. All waste will be hauled to an approved waste or recycling facility. If needed, the interior of the Canal Inlet Structure will be dewatered prior to fill placement.

- **Concrete-lined Canal – Abandon with Modification**: The existing concrete canal will be backfilled with imported soil. The left bank[1] of the canal will remain in place and portions may be used for access. Ground disturbance will be kept to a minimum. The right bank of the canal will remain in place to avoid ground disturbance along the hillside. If needed, the interior of the canal will be dewatered prior to fill placement.

[1] For the purposes of this Plan, the terms “left bank” and “right bank” of the Borel Canal are used when looking downstream.

 

- **Storehouse – Demolish and Haul Off Site**: The existing Storehouse, materials stored inside the maintenance area, chain-link fence, and gates will be demolished and hauled off site. The foundation of the Storehouse structure will be left in place, and the surrounding area will be minimally graded to naturally conform to adjacent topography. The utility service to the Storehouse will be removed, but utility poles and overhead lines in the area will be protected in place to maintain service to adjacent parcels.

#### 2.2.2.2 Access and Staging

Access to the Canal Inlet Structure is available via East Evans Road. The unpaved portion of East Evans Road to the terminus end at the Borel FERC Project boundary (approximately 800 linear feet) will be used for construction access and may therefore require minor improvements and grading during construction to accommodate construction vehicles. If improved, it is expected that the road will be abandoned in the improved condition. It is anticipated that all access roads for **Segment 1** will be within the limits of the concrete channel or along the left bank of the canal and access roads, which are within the Borel FERC Project boundary.

The area within the limits of the Storehouse fencing will be available for staging during construction and is approximately 0.3 acres. A second staging area will be located at the intersection of the East Evans Road terminus and the canal. The second staging area will be approximately 1.1 acres and require a temporary construction easement (TCE) as a portion of this staging area is outside the Borel FERC Project boundary and on Federal lands administered by the Forest Service. Staging areas developed for the sole purpose of construction activities will be graded back to pre-construction conditions upon completion of work.

## 2.3 Segment 2 – Tilley No. 1 Concrete Flume to Tilley No. 3 Concrete Flume

### 2.3.1 Existing Features

**Segment 2** extends from the Tilley No. 1 Concrete Flume (Station 52+00) through the Tilley No. 3 Concrete Flume (Station 88+15), a distance of approximately 3,615 feet. All features within **Segment 2** are on property owned by SCE. The following subsections describe the Borel Project features within this segment.

#### 2.3.1.1 Tilley No. 1 Concrete Flume

The Tilley No. 1 Concrete Flume (Figure 2-7) is a raised concrete flume approximately 115 feet long, including transitions. The rectangular flume is approximately 63 feet long, 16 feet wide, and 9 feet, 4 inches high. Design freeboard in the flume is approximately 1 foot, 5 inches. Concrete wingwalls extend on either side and transition to the trapezoidal lined canal.


**Figure 2-7. Tilley No. 1 Concrete Flume, Looking Upstream (Photo Date: 02/2021)**

### 2.3.1.2 Concrete-lined Canal

**Segment 2** includes approximately 3,040 feet of lined canal. The canal is a trapezoidal, concrete-lined canal with side slopes averaging 1.8H:1V, with an average bottom width of approximately 22 feet. A 25-foot-wide bridge crosses the canal just downstream of the Tilley No. 1 Concrete Flume (Figure 2-8). The condition of the concrete liner varies greatly across the segment due to erosion and sedimentation (Figure 2-9). Based on available as-built drawings, the concrete liner is approximately 9 inches thick, with welded wire fabric reinforcement.

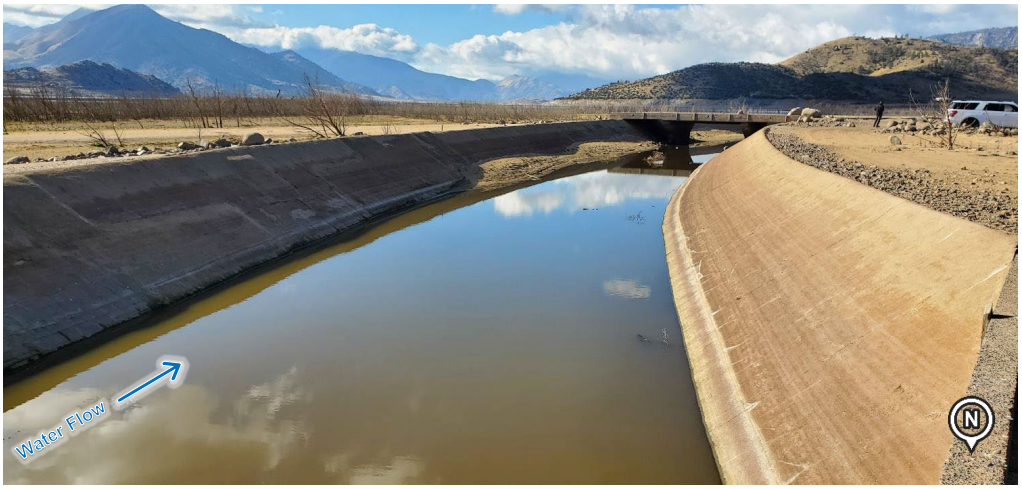


**Figure 2-8. Concrete-lined Canal and Bridge, Looking Downstream (Downstream of Tilley No. 1 Concrete Flume) (Photo Date: 02/2021)**

Portions of the canal within **Segment 2** have collapsed and/or are filled with sediment, as shown in Figure 2-9.


**Figure 2-9. Canal Filled with Sedimentation, Looking Upstream (Downstream of Tilley No. 2 Concrete Flume) (Photo Date: 03/2022)**

### 2.3.1.3 Tilley No. 2 Concrete Flume

The Tilley No. 2 Concrete Flume (Figure 2-10) is a raised concrete flume approximately 230 feet long, including transitions. The rectangular flume is approximately 153 feet, 6 inches long, 17 feet, 10 inches wide, and 11 feet high. Design freeboard in the flume is approximately 1 foot, 5 inches. Nine-inch channel beams cross the top of the flume approximately every 15 to 16 feet. Concrete transitions extend on either side, connecting to the trapezoidal lined canal.


**Figure 2-10. Tilley No. 2 Concrete Flume, Looking Downstream (Photo Date: 02/2021)**

### 2.3.1.4 Tilley No. 3 Concrete Flume

The Tilley No. 3 Concrete Flume (Figure 2-11) is a raised concrete flume approximately 230 feet long, including transitions (approx. 50 ft in length). The rectangular flume is 133 feet, 6 inches long, 18 feet wide, and 9 feet, 9 inches high. Design freeboard in the flume is approximately 1 foot, 3 inches. Nine-inch channel beams cross the top of the flume approximately every 15 to 16 feet. Concrete transitions extend on either side, connecting to the trapezoidal lined canal.


**Figure 2-11. Tilley No. 3 Concrete Flume, Looking Downstream (Photo Date: 02/2021)**

#### 2.3.1.5 Access Roads

Features within **Segment 2** of the canal can be accessed on the road parallel to the canal in **Segment 1** and from a paved public road that extends approximately 1,200 feet from SR 155 adjacent to Tillie Creek Campground (non-Project recreation facility), which is on Federal lands administered by the Forest Service. From the edge of this paved road, the road splits into two unpaved roads and enters the lakebed: the first bends and extends to Station 79+00, downstream of the Tilley No. 2 Concrete Flume, and the second connects to the canal near Station 89+00, downstream of the Tilley No. 3 Concrete Flume, in **Segment 3**. The access roads in this area are seasonal, unmaintained, and only accessible when the reservoir water elevations permit. On a year-to-year basis they do not necessarily align with the Borel FERC Project boundary. Existing public unpaved dirt access roads run parallel to the canal extending from Tilley No. 1 Concrete Flume to the Tilley No. 2 Concrete Flume.

### 2.3.2 SCE Proposal

The proposed actions for **Segment 2** minimize ground disturbance and truck trips required and are summarized below. Preliminary design plans reflecting the proposed action are included in Appendix C, Sheets C-101 through C-103.

#### 2.3.2.1 Decommissioning Approach

The Plan consists of the following actions:

- **Tilley No. 1 Concrete Flume, Tilley No. 2 Concrete Flume, and Tilley No. 3 Concrete Flume – Abandon with Modification**: Imported soil will be placed in the flume to the height of the wingwalls and will conform with the surface of the fill in the upstream and downstream canal sections. The outside walls of the flume on the waterside and landside will be backfilled and sloped at a maximum slope of 3H:1V to daylight into to the adjacent topography, appearing as an earthen embankment. Cofferdams and dewatering may be required to allow for construction access and backfill activities.
- **Concrete-lined Canal – Abandon with Modification**: The concrete canal between STA 52+00 and 74+00 will be backfilled with imported soil. The banks of the canal will remain in

place and portions may be used for access. The concrete bridge deck at STA 55+50 will be removed and processed and blended with imported soil. The bridge foundations will remain in place. Ground disturbance will be kept to a minimum. If needed, the interior of the canal will be dewatered prior to fill placement.

- **Concrete-lined Canal – Abandon in Place**: No action will be required between STA 74+00 to 86+00 because this section of the canal has naturally filled with sediment (Figure 2-9).

#### 2.3.2.2 Access and Staging

It is anticipated that access to **Segment 2** will use existing public access roads. However, the area on the north side of the canal is generally flat and subject to frequent recreational/vehicular traffic, and it is anticipated that the alignment of roadways will change through time depending on inundation and/or erosion. To minimize ground disturbance, SCE will work with the Forest Service to access the Borel Project area generally following the existing public access roads, but will likely use the roadways that are most prominent at the time of construction. These unpaved access roads will require temporary grading and other improvements for use by construction vehicles during construction. If improved, it is expected that they will be abandoned in the improved condition.

A potential staging area and additional access has been identified between the bend of the first access road to Station 79+00 and the canal within the Borel FERC Project boundary.

## 2.4 Segment 3 – Tilley No. 3 Concrete Flume to End of SCE Land

### 2.4.1 Existing Features

**Segment 3** extends from the Tilley No. 3 Concrete Flume (Station 88+15) through the Refugio Concrete Box Flume to the end of SCE land (Station 161+100) along the Borel Project alignment, a distance of approximately 7,285 feet. All system features within **Segment 3** are on property owned by SCE. Access roads are located on Federal lands administered by the Forest Service. The following sections describe the Borel Project features within this segment.

#### 2.4.1.1 Concrete-lined Canal

**Segment 3** includes approximately 7,010 feet of concrete-lined canal (Figure 2-12). The canal is a trapezoidal, concrete-lined structure with side slopes averaging 1.8H:1V and an average bottom width of approximately 22 feet, although the cross-sectional geometry of the canal in its current condition varies greatly across the segment due to sedimentation. Based on available as-built drawings, the concrete liner is approximately 9 inches thick, with welded wire fabric reinforcement. For the upper 1,700 feet of the segment, the canal is embedded in a large, flat area of the reservoir and subject to recreational/vehicular traffic when the reservoir pool is down.


**Figure 2-12. Concrete-lined Canal Downstream of Tilley No. 3 Concrete Flume, Looking Downstream (Photo Date: 02/2021)**

An embankment was constructed on the left bank of the canal for most of the remainder of the segment, with rock slope protection placed on the waterside slope to protect the bank from wind and wave erosion (Figure 2-13).


**Figure 2-13. Typical Embankment with Rock Slope Protection, Looking Upstream (Photo Date: 02/2021)**

A 5-foot-wide Steel Bridge spans the canal just downstream of the Tilley No. 3 Concrete Flume near Station 89+00. The Steel Bridge is founded on concrete abutments at either side of the canal (Figure 2-14).

 


**Figure 2-14. Unnamed Steel Bridge near Station 89+00 (Photo Date: 02/2021)**

### 2.4.1.2 Refugio Concrete Box Flume

The Refugio Concrete Box Flume (Figure 2-15) is a raised concrete flume approximately 275 feet long, including transitions. The rectangular flume is 176 feet, 6 inches long, 10 feet wide, and 10 feet high. Design freeboard in the flume is approximately 1 foot, 8 inches. Fifty-foot-long concrete transitions extend on either side, connecting to the trapezoidal, concrete-lined canal. Piers range in height from 6 to 18 feet along the flume.


**Figure 2-15. Refugio Concrete Box Flume (near Station 149+00), Looking Upstream (Photo Date: 02/2021)**

### 2.4.1.3 Bailey Bridge

Bailey Bridge (Figure 2-16) is stored on Federal lands administered by the Forest Service above the high-water line, outside the Borel FERC Project boundary off Tuttle Road, adjacent to an unpaved non-Project public road. The storage area is secured with a chain-link fence and gates. The bridge was hauled to the canal when equipment was needed to cross for marina access, emergencies or operations.

**Figure 2-16. Bailey Bridge, Stored on Federal Lands Administered by the Forest Service (Photo Date: 02/2021)**

### 2.4.1.4 Access Roads

Access to the Tilley No. 3 Concrete Flume at the upstream end of **Segment 3** is described above through **Segment 2** at Station 89+00. An existing public access road on Federal lands administered by the Forest Service runs parallel to the canal and leads to the Refugio Concrete Box Flume. Existing public roads on Federal lands administered by the Forest Service at the upstream and downstream ends of the Refugio Concrete Box Flume could be used to access the lower part of **Segment 3** but are outside the Borel FERC Project boundary.

These roads extend from Sawmill Road, accessible from Access Road 174+00 (see **Segment 4** for a description). Sawmill Road is on private land and Federal lands administered by the Forest Service. Additional unpaved, non-Project access roads near the canal system on Federal lands administered by the Forest Service could be investigated for use during construction. The area on the landside of the canal is generally flat and subject to frequent recreational/vehicular traffic, and it is anticipated that the alignment of roadways will change through time depending on inundation and/or erosion.

## 2.4.2 SCE Proposal

The proposed actions and considerations for **Segment 3** are summarized below. Preliminary design plans reflecting the proposed action are included in Appendix C.

### 2.4.2.1 Decommissioning Approach

The Plan consists of the following actions:

- **Concrete-lined Canal – Abandon with Modification**: The existing concrete canal between STA 88+15 and 118+00 (approx. 2,985 feet long) will be backfilled with imported soil to minimize ground disturbance. The banks of the canal will remain in place and portions may be used for access. Ground disturbance will be kept to a minimum. If needed, the interior of the canal will be dewatered prior to fill placement.

- **Concrete-lined Canal – Demolish and Bury**: The canal will be demolished and buried in place from station 118+00 to 161+00 (approx. 4,300 feet long). The upper portion of the existing concrete lining within the canal will be removed and processed (i.e., maximum particle size of 6 inches) mixed with native soil and used as backfill. Portions of the canal bank and adjacent area will be excavated to a maximum slope of 3H:1V and graded to naturally conform to the adjacent topography. Dewatering of the canal may be required prior to demolition and/or backfill.

- **Steel Bridge – Demolish and Haul Off Site**: The Steel Bridge will be removed and recycled at an approved recycling facility.

- **Refugio Concrete Box Flume – Demolish and Bury**: The Refugio Concrete Box Flume will be demolished, along with the abutments, transitions, and foundations. Piers and footings will be removed to a depth of 2 feet below existing grade. Concrete will be processed, mixed with native soil, and used as backfill in adjacent portions of the canal. Cofferdams and dewatering may be required at this location to accommodate demolition and removal of the flume. The area will be backfilled and graded to naturally conform to the adjacent topography.

- **Bailey Bridge** – **Abandon in Place**: Bailey Bridge will no longer be needed. The canal in this area will be backfilled making it passable by pedestrians and vehicles when reservoir levels permit.

#### 2.4.2.2 Access and Staging

To minimize ground disturbance, SCE will work with the Forest Service to access the Borel Project using roadways that are most prominent at the time of construction (Figure 2-17). These unpaved access roads will require temporary grading and other improvements for use by construction vehicles during construction. If improved, it is expected that they will be abandoned in the improved condition. Roads developed for the sole purpose of construction activities will be graded back to pre-construction conditions upon completion of work.

A 3-acre strip of land between Sawmill Road and the canal near Station 147+00 has been identified for additional access and potential staging near the Refugio Concrete Box Flume during decommissioning activities. The staging area may require a TCE as a portion of this staging area is outside the Borel FERC Project boundary and on Federal lands administered by the Forest Service. If developed, it is expected that the staging area will be graded back to pre-construction conditions upon completion of work.

 

**Figure 2-17. Example of Recreational Roads on Federal Lands Administered by the Forest Service that may be used for Construction Access. (Photo Date: 03/2022)**

## 2.5 Segment 4 – End of SCE Land to Auxiliary Dam (Corps)

### 2.5.1 Existing Features

**Segment 4** extends from the end of SCE land (Station 161+00) to the Corps' Auxiliary Dam (Station 273+80), a distance of approximately 11,280 feet. Approximately 6,815 feet is Federal lands administered by the Forest Service while SCE manages approximately 5,165 feet. The following subsections describe Borel Project features within this segment.

#### 2.5.1.1 Concrete-lined Canal

**Segment 4** includes approximately 8,770 feet of concrete-lined canal (Figure 2-18). The canal is a trapezoidal, concrete-lined structure with side slopes averaging 1.8H:1V and an average bottom width of approximately 22 feet, although the cross-sectional geometry of the canal in its current condition varies greatly across the segment due to sedimentation. Based on available as-built drawings, the concrete liner is approximately 9 inches thick, with welded wire fabric reinforcement.


**Figure 2-18. Concrete-lined Canal, Looking Downstream (Photo Date: 02/2021)**

An embankment was constructed on the left bank of the canal for most of the segment, with rock slope protection placed on the waterside slope to protect the bank from wind and wave erosion (Figure 2-19).


**Figure 2-19. Rock Slope Protection on Canal Bank (Photo Date: 02/2021)**

Sawmill Bridge is a 20-foot-wide concrete bridge that crosses the canal just upstream of Rich Gulch Concrete Siphon, near Station 173+50 (Figure 2-20). The canal transitions on both sides from trapezoidal to rectangular under Sawmill Bridge.


**Figure 2-20. Sawmill Bridge at Station 173+50, Looking Downstream (Photo Date: 02/2021)**

### 2.5.1.2 Rich Gulch Concrete Siphon

Rich Gulch Concrete Siphon (Figure 2-21) is located at Station 194+00 and is approximately 510 feet long with an interior diameter of 10 feet, 6 inches. Fifty-foot-long wingwall transitions on both ends connect to the concrete-lined trapezoidal canal. Chain-link fencing has been placed on top of the entrance and exit headwalls to the siphon.


**Figure 2-21. Rich Gulch Concrete Siphon Exit, Looking Upstream (Photo Date: 03/2022)**

### 2.5.1.3 Kern River Concrete Siphon

Kern River Concrete Siphon (Figure 2-22), located at Station 210+00, is approximately 1,920 feet long with an interior diameter of 10 feet, 6 inches. Fifty-foot-long transitions on both ends connect to the concrete-lined trapezoidal canal. Chain-link fencing has been placed on top of the entrance and exit headwalls to the siphon.


**Figure 2-22. Kern River Concrete Siphon Entrance, Looking Downstream (Photo Date: 03/2022)**

### 2.5.1.4 Engineers Point

From the terminus of the Kern River Concrete Siphon, the distance between the Borel Canal to the boundary of the Corps-condemned land is approximately 5,300 feet. Fill was placed to construct the left bank of the canal for most the segment, with rock slope protection placed on the waterside slope to protect the bank from erosion (Figure 2-23).


**Figure 2-23. Engineers Point, Looking Upstream (Photo Date: 02/2021)**

### 2.5.1.5 Access Roads

Access at the upstream end of **Segment 4** is via Sawmill Road, an existing unpaved road (Access Road 174+00) that extends approximately 1 mile from SR 155 on private land and on Federal lands administered by the Forest Service. The road enters the canal between the Refugio Concrete Box Flume and Rich Gulch Concrete Siphon. A second road (Access Road 200+00) on Federal lands administered by the Forest Service extends 2,000 feet from SR 155 to the Borel Project, between the Rich Gulch and Kern River concrete siphons.

Near the Auxiliary Dam, access to Engineers Point may be limited. Corps construction activity decommissioned the primary road used to access the Borel Project. It is not yet known if the access road will be put back into service or if it will provide access to the Borel Project. When Lake Isabella water levels are low, Engineers Point can be accessed by using existing public roads on Federal lands administered by the Forest Service from the Forest Service Auxiliary Dam Campground, located on the south shore of Lake Isabella, adjacent to the Auxiliary Dam.

## 2.5.2 SCE Proposal

The proposed actions and considerations for **Segment 4** are summarized below. Preliminary design plans reflecting the proposed action are included in Appendix C.

### 2.5.2.1 Decommissioning Approach

The Plan consists of the following actions:

- **Concrete-lined Canal – Abandon with Modification**: Two locations of existing concrete canal within this segment (between STA 168+00 and 175+00 and between STA 196+50 and 203+50) will be backfilled with imported soil to minimize ground disturbance. The banks of the canal will remain in place and portions may be used for access, but ground disturbance will be kept to a minimum. If needed, the interior of the canal will be dewatered prior to fill placement.

- **Concrete-lined Canal – Demolish and Bury**: Apart from the two locations described above, the remainder of the canal within this segment will be demolished and buried in place. The upper portion of the existing concrete lining within the canal will be removed and processed to be suitable as backfill (i.e., maximum particle size of 6 inches). Portions of the canal bank and adjacent area will be excavated to a maximum slope of 3H:1V and graded to provide drainage. Where present, the left bank of the lined canal will be excavated after removal of the upper portion of the liner, and the existing rock slope protection on the waterside slope will be removed and stockpiled. The excavated native material will be blended with processed concrete liner material and used to backfill the canal. The stockpiled rock slope protection will be placed on the finished slope on the waterside to protect against wind and wave erosion.

- **Sawmill Bridge – Demolish and Bury**: The concrete bridge will be demolished, and the concrete will be processed and buried with clean fill within the adjacent canal.

- **Siphons – Abandon with Modification**: Rich Gulch and Kern River concrete siphons will be abandoned in place and modified with a concrete slurry/plug placed at the entry and exits. Any fencing, exposed steel, or metal safety hazards will be removed. The existing wingwalls and headwalls will remain in place. The canal will be backfilled at the entry and exits with clean fill to the top of the headwalls after the concrete slurry/plugs are constructed.

#### 2.5.2.2 Access and Staging

A potential 0.1-acre staging area has been identified adjacent to the access road and approximately 300 feet west of the Borel FERC Project boundary at Station 200+00, between Rich Gulch and Kern River concrete siphons.

To minimize ground disturbance, SCE will work with the Forest Service for access using roadways that are most prominent at the time of construction. These unpaved access roads will require temporary grading and other improvements for use by construction vehicles during construction. If improved, it is expected that they will be abandoned in the improved condition. Roads and staging areas developed for the sole purpose of construction activities will be graded back to pre-construction conditions upon completion of work.

## 2.6 Segment 5 – Auxiliary Dam (Corps)

### 2.6.1 Existing Features

**Segment 5** contains the land in the vicinity of the Auxiliary Dam, which starts at Station 273+80 and ends at Station 298+00. The lands within this segment were condemned by the Corps. An estimated 900 feet of canal upstream of the Auxiliary Dam have been filled (Figure 2-24). The canal intake works at the Auxiliary Dam have been removed, destroyed, and filled as part of seismic upgrades.

 


**Figure 2-24. Limits of Corps Canal Backfill and Auxiliary Dam, Looking Downstream (Photo Date: 02/2021)**

An estimated 800 feet of the short canal segment (below the Auxiliary Dam to the boundary of Federal lands administered by the Corps) was also filled as part of the seismic upgrade construction activities (Figure 2-25).


**Figure 2-25. Federal Lands Administered by the Corps with Filled Canal and Auxiliary Dam, Looking Upstream (Photo Date: 01/2020)**

### 2.6.2 SCE Proposal

**Segment 5** is within the Federal lands administered by the Corps' and has no proposed action.

## 2.7 Segment 6 – Auxiliary Dam to Alta Sierra Avenue

### 2.7.1 Existing Features

**Segment 6** extends from the end of the fill placed by the Corps as part of upgrades to the Auxiliary Dam (Station 298+00) to Alta Sierra Avenue (Station 398+48), a distance of 10,048 feet. All lands within **Segment 6** are owned by SCE. Adjacent land use ranges from light industrial to residential to vacant.

Eva Avenue, SR 178, Lake Isabella Boulevard, and Erskine Creek Road bridges all cross the canal within this segment, as does the Kern County-owned Lakeland Walk Bridge. SCE-owned distribution lines are located along the landside toe of the right bank of the canal from Lake Isabella Boulevard downstream to Golden Spur Street, where they diverge from the canal and extend to Lake Isabella Boulevard. The following subsections describe the Borel Project features within this segment.

### 2.7.1.1 Concrete-lined Canal

**Segment 6** includes approximately 9,217 feet of concrete-lined canal (Figure 2-26). The canal is a trapezoidal, concrete-lined structure with side slopes between 1.7 and 1.9H:1V and an average bottom width of approximately 22 feet. Based on available as-built drawings, the concrete liner is approximately 9 inches thick, with welded wire fabric reinforcement.


**Figure 2-26. Concrete-lined Canal, Looking Downstream (Photo Date: 02/2021)**

### 2.7.1.2 Eva Avenue

Eva Avenue (Figure 2-27) is a two-lane, single-span, county, vehicle bridge located between the Auxiliary Dam and SR 178, near Station 303+50. Eva Avenue extends from Barlow Road on the western side of the canal and terminates at the turnaround on the eastern side of the canal before Eva Avenue reaches SR 178.


**Figure 2-27. Eva Avenue (Photo Date: 03/2023)**

### 2.7.1.3 SR 178 and Lake Isabella Boulevard Bridges

SR 178 crosses the canal near Station 309+00 via two two-lane, single-span bridges with an open median in between (Figure 2-28). Lake Isabella Boulevard is located just downstream of SR 178, near Station 310+30, and includes a two-lane, single-span, vehicle bridge (Figure 2-29). A 12-inch water line crosses under the canal at the SR 178 bridge, with an emergency 2-inch water line attached to the bridge.


**Figure 2-28. SR 178 Bridges (Photo Date: 03/2022)**


**Figure 2-29. Lake Isabella Boulevard Bridge, Looking Upstream (Photo Date: 03/2022)**

### 2.7.1.4 Lakeland Walk Bridge (Non-Project)

The Kern County-owned Lakeland Walk Bridge (Figure 2-30) is a concrete, single-span pedestrian bridge across the canal near Station 332+50. Chain-link fencing lines both sides of the bridge and there is vehicular gate access for SCE Borel Project operations and maintenance (O&M); however, this bridge is not part of the Borel Project. The bridge connects residential areas on both sides of the canal through a public access easement with SCE.


**Figure 2-30. Lakeland Walk Bridge (Non-Project), Looking Downstream (Photo Date: 03/2022)**

### 2.7.1.5 School House No. 1 Concrete Flume

The School House No. 1 Concrete Flume (Figure 2-31) is a rectangular, concrete flume crossing a seasonal drainage with transitions on the upstream and downstream ends to a trapezoidal canal. The flume extends from Station 349+42 to Station 349+95, a distance of 53 feet. The flume is approximately 24 feet wide and 9 feet tall. An unpaved access road runs along the toe of the flume, with drainage features to allow for flowthrough.


**Figure 2-31. School House No. 1 Concrete Flume, Looking Downstream (Photo Date: 02/2021)**

### 2.7.1.6 School House Cut

School House Cut (Figure 2-32) includes a concrete, rectangular canal cut through a bedrock outcrop from Station 360+00 to Station 367+16, a distance of 716 feet. The cut is approximately 22 feet wide and 7 feet high. The rectangular canal transitions from trapezoidal at the upstream end to a concrete flume at the downstream end. Concrete carrier beams with lateral concrete bracing have been constructed at the top of the canal to provide additional stability for a portion of the cut.


**Figure 2-32. School House Cut, Looking Downstream (Photo Date: 03/2022)**

### 2.7.1.7 School House Cut Flume

The School House Cut Flume (Figure 2-33) is a concrete flume, at the downstream end of School House Cut, that transitions to concrete-lined canal. The flume crosses a seasonal drainage and extends from Station 367+16 to Station 367+75, a distance of 59 feet. The flume is 23 feet wide and 9 feet high, with steel bracing the top of the flume laterally at 15-foot centers.


**Figure 2-33. School House Cut Flume, Looking Upstream (Photo Date: 02/2021)**

### 2.7.1.8 Erskine Creek Road Bridge

Erskine Creek Road Bridge crosses the canal via a two-lane, single-span, concrete bridge near Station 385+00 (Figure 2-34). Chain-link fencing lines the roadway on both sides, with vehicle gates on the northern side of the canal. Overhead utility lines cross the canal adjacent to the bridge.


**Figure 2-34. Erskine Creek Road Bridge, Looking Downstream (Photo Date: 02/2021)**

### 2.7.1.9 Access Roads

Access to **Segment 6** is from public roads under Kern County jurisdiction. Access to **Segment 6** at the upstream end is available via Eva Avenue (Station 303+50) from Barlow Road (a distance of approximately 4,500 feet from SR 155). Additional access will be available along a dirt road extending 500 feet from Lake Isabella Boulevard to the southern side of the Lake Isabella Boulevard Bridge (Station 310+50). Access to the downstream end of the Borel Project is available via Erskine Creek Road Bridge (Station 385+00).

### 2.7.2 SCE Proposal

The proposed actions and considerations for **Segment 6** are summarized below. Preliminary design plans reflecting the proposed action are included in Appendix C.

#### 2.7.2.1 Decommissioning Approach

The Plan consists of the following actions:

- **Concrete-lined Canal – Demolish and Bury**: The existing concrete lining within the canal will be removed and processed to be suitable as backfill (i.e., maximum particle size of 6 inches). Portions of the canal bank and adjacent area will be excavated to a maximum slope of 3H:1V and graded to provide drainage. A 14-foot-wide access road will be maintained on the right bank. Processed concrete and excavated material will be blended and placed within the canal as backfill. The bottom of the concrete liner will be pulverized prior to placement of backfill to allow for infiltration. Rock slope protection lines the right outboard slope of the canal between the pedestrian bridge and School House Cut. A portion of this material may be stockpiled for use in other locations within the Borel FERC Project boundary limits.

- **Vehicle Bridges – Abandon with Modifications**: The canal below the vehicle bridges will be backfilled with lightweight concrete in lieu of earthen fill to minimize loading on the existing bridge foundations. The entire concrete liner will remain in place beneath the bridges to a distance of 20 feet on both sides of the bridge footings to provide protection to the canal slope. Stormwater runoff at the Lake Isabella Boulevard and Erskine Creek Road bridges currently discharge into the Borel Canal. Additional coordination will be conducted with Kern County and California Department of Transportation Stormwater staff to determine the appropriate flow control measures.

- **Lakeland Walk Bridge – Abandon in Place**: The Kern County-owned Lakeland Walk Bridge will remain in its current condition under the existing public access easement with SCE. The canal beneath the bridge will be backfilled to match adjacent canal reaches. All existing fencing and gates will remain in place.

- **School House Cut – Abandon with Modifications**: Fill from nearby Borel Project locations will be placed within School House Cut to the top of the rectangular channel, with a high point near the middle and the fill graded to drain to the north and south. The concrete rectangular banks of the channel will not be demolished between STA 360+00 to STA368+50. Ground disturbance in this area will be kept to a minimum.

- **Flumes – Demolish and Bury**: The School House No. 1 Concrete Flume and School House Cut Flume will be demolished. The demolished concrete will be processed, blended with native material, and used to backfill the adjacent concrete-lined canal. Following demolition, the slopes on both sides of the flumes will be backfilled and graded to naturally conform to the adjacent topography. The rock slope protection material removed from the outside slope of the canal bank will be placed at the transitions of the canal within the existing drainage area to protect the newly constructed slopes and access road against erosion.

 

### 2.7.2.2 Access and Staging

Once the contractor has access to the canal, most of the work will be completed on SCE land within the Borel FERC Project boundary, with limited import or export of material. An existing access road parallel to the School House Cut that follows the historic alignment of the flume is outside the Borel FERC Project boundary. The road is used by SCE for regular O&M under easement with private landowners. Following construction activities, it is expected that the road will be scarified, hydroseeded, and abandoned in place.

## 2.8 Segment 7 – Alta Sierra Avenue to Erskine Steel Flume

### 2.8.1 Existing Features

**Segment 7** extends from Alta Sierra Avenue (Station 398+48) to Erskine Steel Flume (Station 451+20), a distance of approximately 5,272 feet. Property ownership/management within **Segment 7** varies between private landowners and Federal lands administered by BLM. Adjacent land use within the upper portion of the segment is residential, transitioning to largely vacant parcels towards the lower end. Woodrow W. Wallace Elementary and Middle School and Kern Valley High School are located adjacent to the canal near Station 411+00. The size and orientation of private parcels varies throughout **Segment 7**. SCE-owned distribution lines that exist along the northern fence line of the corridor are expected to remain in place through existing easements with private landowners. The following subsections describe Borel Project features within this segment.

#### 2.8.1.1 Concrete-lined Canal

**Segment 7** includes approximately 5,700 feet of concrete-lined canal (Figure 2-35). The canal is a trapezoidal, concrete-lined structure with side slopes between 1.7 and 1.9H:1V and an average bottom width of approximately 22 feet. Based on available as-built drawings, the concrete liner is approximately 9 inches thick with welded wire fabric reinforcement. Utility poles are located along the landside toe of the right bank of the canal.

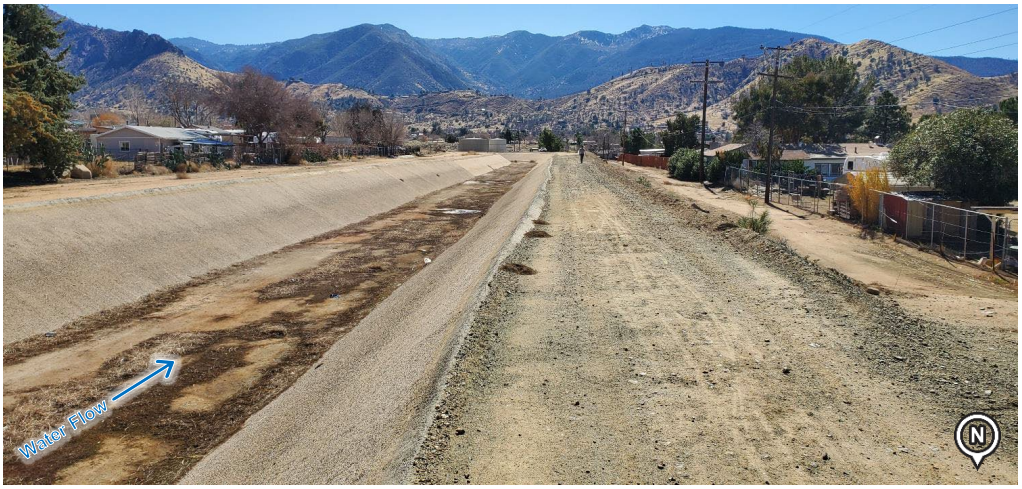


**Figure 2-35. Concrete-lined Canal, Looking Downstream (Photo Date: 02/2021)**

### 2.8.1.2 School Pedestrian Bridge

The School Pedestrian Bridge (Figure 2-36) is located at Webb Avenue. It is a steel, single-span pedestrian bridge that crosses the canal near Station 413+50 and connects residential areas on the western side of the canal to the middle school and high school on the eastern side of the canal. The bridge is approximately 4 feet wide and surrounded by chain-link material, and chain-link fencing extends across the canal bank on either side. The bridge abutments have been constructed behind the top of the concrete liner.


**Figure 2-36. School Pedestrian Bridge, Looking Downstream (Photo Date: 01/2020)**

### 2.8.1.3 County Emergency Vehicular Bridges (Non-Project)

Kern County has two adjacent parallel non-Project emergency vehicular bridges that cross the canal near Station 428+75 (Figure 2-37). These single-span bridges have concrete decks and steel supporting members. Concrete abutments have been constructed at the top of the canal bank on both sides for each bridge.


**Figure 2-37. County Emergency Vehicular Bridges (Non-Project) (Photo Date: 01/2020)**

### 2.8.1.4 Erskine Steel Flume

The Erskine Steel Flume (Figure 2-38) is a steel Lennon flume with steel support braces. The flume extends from Station 442+25 to Station 451+20, a distance of 895 feet. A steel plank walkway is located along the flume for pedestrian access. Metal chain-link fencing and gates are on both sides of the flume and limit access to the canal from the bridge.


**Figure 2-38. Erskine Creek Flume, Looking Upstream (Photo Date: 01/2020)**

### 2.8.1.5 Access Roads

Access to **Segment 7** is via public roads under Kern County jurisdiction. Access at the upstream end of **Segment 7** is available via Erskine Creek Road. Access at the downstream end of the segment is available via Commercial Avenue, an existing unpaved road that enters the canal within the limits of the Erskine Steel Flume near Station 444+00. The road is regularly used by the public and crosses under the Erskine Steel Flume. Additional access may be available along the segment if required, for example, at the County Emergency Vehicular Bridges (non-Project).

## 2.8.2 SCE Proposal

The proposed actions and considerations for **Segment 7** are summarized below. Preliminary design plans reflecting the proposed action are included in Appendix C.

### 2.8.2.1 Decommissioning Approach

The Plan consists of the following actions:

- **Concrete-lined Canal – Demolish and Bury**: The existing concrete lining within the canal will be removed and processed to be suitable as backfill (i.e., maximum particle size of 6 inches). Portions of the canal bank and adjacent area will be excavated to a maximum slope of 3H:1V and graded to provide drainage. The bottom of the concrete liner within BLM-managed parcels will be pulverized prior to placement of backfill to allow for infiltration.

- **Concrete-lined Canal – Demolish and Haul Off Site**: The entire concrete lining will be removed from the canal within private parcels. This concrete will be spread out and buried in the backfill of adjacent reaches of the canal that are owned by SCE.
- **School Pedestrian Bridge – Demolish and Haul Off Site:** The pedestrian bridge will be removed and will be recycled at an approved recycling facility. The bridge abutments will be removed and hauled away.
- **County (Non-Project) Emergency Vehicular Bridges – Abandon in Place:** The non-Project County Emergency Vehicular Bridges will remain in place. Beneath the County Emergency Vehicular Bridges, the canal will be backfilled with lightweight concrete fill to match the grading in adjacent canal reaches. All fencing and gates will remain in place. The bridges will be protected in place and remain operational after decommissioning activities.
- **Erskine Steel Flume – Demolish and Haul Off Site**: Erskine Steel Flume will be demolished, and the materials will be hauled off site. Structural steel and steel sheeting materials will be recycled at an approved recycling facility. The foundations and piers will be removed to existing grade and hauled away. The areas affected by decommissioning activities will be graded to conform to adjacent non-affected areas and hydroseeded and planted to restore natural vegetation and prevent erosion.

#### 2.8.2.2 Access and Staging

The one unpaved portion of Commercial Avenue used to access the Borel Project at Erskine Steel Flume may be upgraded for construction purposes. It is expected that the road will be left in an improved condition upon completion of work.

## 2.9 Segment 8 – Erskine Steel Flume to Bodfish Siphon

### 2.9.1 Existing Features

**Segment 8** extends from the end of the Erskine Steel Flume (Station 451+20) to Bodfish Siphon (Station 506+29), a distance of approximately 5,509 feet. Property management/ownership within **Segment 8** includes privately held parcels, SCE-owned land, and Federal land administered by BLM. The following subsections describe the Borel Project features within this segment.

#### 2.9.1.1 Concrete-lined Canal

**Segment 8** includes approximately 4,880 feet of concrete-lined canal (Figure 2-39). The canal is a trapezoidal, concrete-lined structure with side slopes between 1.7 and 1.9H:1V and an average bottom width of approximately 22 feet. Based on available as-built drawings, the concrete liner is approximately 9 inches thick with welded wire fabric reinforcement. In this area, the canal extends through a portion of the Borel Project called the Highbank, and includes private parcels, Federal land administered by BLM, and SCE land.

 


**Figure 2-39. Concrete-lined Canal, Looking Downstream (Photo Date: 01/2020)**

### 2.9.1.2 Bodfish Siphon

Bodfish Siphon is approximately 629 feet long with an interior diameter of 10 feet, 6 inches (Figure 2-40). The siphon crosses underneath Lake Isabella Boulevard and Bodfish Creek. Transitions on both ends connect to the concrete-lined trapezoidal canal. Chain-link fencing has been placed on top of the entrance and exit headwalls to the siphon. A gauging station is located at the siphon inlet and vaults and valves located at the low point of the siphon accommodate dewatering of the siphon and discharge into Bodfish Creek.


**Figure 2-40. Bodfish Siphon, Looking Downstream (Photo Date: 01/2020)**

### 2.9.1.3 Access Roads

Access to the upstream end of **Segment 8** is via Commercial Avenue, an existing unpaved road under Kern County jurisdiction that enters the canal within the limits of Erskine Steel Flume near Station 444+00 as described above for **Segment 7**. Additional access to **Segment 8** is from Canal Road, which splits and provides access the canal in two locations. The roads are under Kern County jurisdiction and on Federal land administered by the BLM. Only one road is regularly used to access the canal at Station 477+00. The older unused access road accessed the canal at Station 465+00.

## 2.9.2 SCE Proposal

The proposed actions and considerations for **Segment 8** are summarized below. Preliminary design plans reflecting the proposed action are included in Appendix C.

### 2.9.2.1 Decommissioning Approach

The Plan consists of the following actions:

- **Concrete-lined Canal – Demolish and Bury:** Within private parcels, the concrete liner will be demolished and processed (i.e., maximum particle size of 6 inches) and be used as backfill. The land will be graded to collect offsite drainage and direct stormwater flows toward Erskine Creek away from existing structures located outside the Borel FERC Project boundary.

- **Concrete-lined Canal – Demolish and Bury:** Within SCE lands and lands administered by the BLM, the upper portion of the existing concrete lining materials within the canal will be removed and processed to be suitable as backfill (i.e., maximum particle size of 6 inches). Portions of the canal bank and adjacent area will be excavated to a maximum slope of 3H:1V and graded to provide drainage. A 14-foot-wide access road will be maintained on the right bank. Processed concrete and excavated native material will be blended and placed within the canal as backfill. The bottom of the concrete liner will be pulverized prior to placement of backfill to allow for infiltration. This area of the segment will be graded to drain toward Bodfish Siphon.

- **Bodfish Siphon – Abandon with Modification**: Bodfish Siphon will be abandoned in place with modifications. The wingwalls will be demolished, and the headwalls will be protected in place. The siphon will be filled with concrete slurry, and the gauging station and concrete vaults used to dewater the siphon will be removed and filled in. The entrance of the siphon will be plugged. The land around the siphon entrance and headwalls will be graded to accommodate drainage from the Highbank area. A trapezoidal channel that is lined with rock slope protection, will convey stormwater runoff down the slope and dissipate energy prior to discharge into a biofiltration basin that will be located at the northwestern corner of the Lake Isabella Boulevard and Bodfish Canyon Road intersection (Figure 2-41). The existing culvert under Lake Isabella Boulevard will be replaced with a larger culvert to accommodate stormwater flows that exceed the capacity of the biofiltration basin. The culvert will discharge into a subsequent biofiltration swale on the SCE property (east of Lake Isabella Boulevard). During large storm events, the swale will convey stormwater runoff into Bodfish Creek.

 


**Figure 2-41. Location of Proposed Biofiltration Basin at Bodfish Siphon (Photo Date: 03/2022)**

#### 2.9.2.2 Access and Staging

Primary access to the canal is anticipated to be from the access road at the upstream end of **Segment 8** via Commercial Avenue and the road accessing the canal at Station 477+00. Road Station 465+00 is not intended to be used for construction to reduce impacts on local residents. It is expected that if access roads are improved for construction, they will be left in an improved condition upon completion of work. A 3.0-acre parcel adjacent to Bodfish Canyon Road will be utilized for staging of construction trailers only. Access to the staging area would be via Lake Isabella Boulevard and/or Bodfish Canyon Road at Station 503+00.

## 2.10 Segment 9 – Bodfish Siphon to Pioneer Steel Siphon

### 2.10.1 Existing Features

**Segment 9** extends from the end of Bodfish Siphon (Station 506+29) to Pioneer Steel Siphon (Station 548+79), a distance of approximately 4,250 feet. Most land within **Segment 9** is administered by BLM, except for the canal segment upstream of Tunnel No. 1 (SCE) and the last 240 feet of Pioneer Steel Siphon (Federal lands administered by the Forest Service). A communication line owned by Frontier runs parallel to the canal within the Borel FERC Project boundary. The following subsections describe Borel Project features within this segment.

#### 2.10.1.1 Concrete-lined Canal

**Segment 9** includes approximately 3,150 feet of concrete-lined canal (Figure 2-42). The canal is a trapezoidal, concrete-lined structure with side slopes between 1H:2V and 1H:4V and an average bottom width of approximately 15 feet. Based on available as-built drawings, the concrete liner is approximately 9 inches thick, with welded wire fabric reinforcement. An emergency overflow release is located just downstream of Tunnel No. 1 at Station 520+00.


**Figure 2-42. Concrete-lined Canal, Looking Upstream (Photo Date: 03/2022)**

A retaining wall is located on the right bank slope downstream of Tunnel No. 1 from approximately Station 526+80 to Station 528+00 (Figure 2-43). The wall includes vertical H piles with corrugated metal lagging. Drain lines are on either end of the wall. The depth of the H piles is unknown.

**Figure 2-43. Retaining Wall Structure Downstream of Tunnel No. 1, Looking Downstream (Photo Date: 01/2020)**

### 2.10.1.2 Tunnel No. 1

Tunnel No. 1 (Figure 2-44) extends from Station 512+30 to Station 519+30, a distance of 700 feet. The tunnel is horseshoe shaped with a maximum height of 12 feet and a bottom width of 10 feet. An access road provides access to the tunnel entrance and exit.


**Figure 2-44. Tunnel No. 1 Entrance, Looking Downstream (Photo Date: 06/2020)**

### 2.10.1.3 Pioneer Steel Siphon

Pioneer Steel Siphon is approximately 400 feet long with an interior diameter of 10 feet, 6 inches (Figure 2-45). The siphon crosses a gully to connect two sections of canal. A gauge station structure with power supplied via overhead line is located on the north side of the siphon. Concrete headwalls transition to the concrete-lined trapezoidal canal.


**Figure 2-45. Pioneer Steel Siphon, Looking Upstream (Photo Date: 02/2021)**

A concrete headwall directs stormwater drainage from the tributary area upstream of the siphon into three 36-inch corrugated steel pipe culverts that convey stormwater downstream of the siphon. Other appurtenant structures include valves, drainpipe, and concrete box to collect and dissipate energy from discharge flows when the siphon is dewatered (Figure 2-46).


**Figure 2-46. Pioneer Steel Siphon Dewatering and Drainage Features (Photo Date: 02/2021)**

### 2.10.1.4 Access Roads

Access to the canal in **Segment 9** is from roads on Federal lands administered by the BLM and Forest Service. At the upstream end of the segment, an unpaved public road on Federal lands administered by the BLM is accessed through a residential neighborhood via Miller Street, with an entrance approximately 1,500 feet from Lake Isabella Boulevard. The road enters the canal near Tunnel No. 1, with three access points (Station 512+00, Station 514+50, and Station 519+50). At the downstream end of the segment near the Pioneer Siphon, access is via an unpaved public road on Federal lands managed by the Forest Service and the BLM. The road enters the system at Pioneer Siphon near Station 549+00, extending 950 feet from Kern River Canyon Road. This access road continues to the upstream side of Pioneer Steel Siphon and accesses the system near Station 537+00. An area of 3.08 acres between the canal and Access Road Station 537+00 will be used for staging and access.

## 2.10.2 SCE Proposal

The proposed actions and considerations for **Segment 9** are summarized below. Preliminary design plans reflecting the proposed action are included in Appendix C.

### 2.10.2.1 Decommissioning Approach

The Plan consists of the following actions:

- **Concrete-lined Canal – Demolish and Bury**: The upper portion of the concrete liner will be removed to a depth of approximately 1 foot below finished grade on both sides of the canal and processed to be suitable as backfill (i.e., maximum particle size of 6 inches). The native soils that compose the right bank will be excavated and blended with the processed concrete for use as fill material. The excavation of the right bank will lower the ground elevation at the retaining wall, and the steel H beams and wood bulkheads will be removed and hauled away. The fill material will be placed in the remaining portion of the canal to provide positive drainage across the Borel FERC Project boundary. The Frontier-owned communication line is expected to be removed and the access road abandoned as part of the grading activities. After mass grading activities are completed, this area will be hydroseeded for erosion control.

- **Tunnel No. 1 – Abandon with Modification:** The tunnel will be backfilled with a mixture of concrete debris and flowable fill material. Work will need to be done in compliance with Occupational Safety and Health Administration Tunnel Safety Orders. In compliance with these orders, ventilation for the tunnel and additional tunnel utilities, such as lighting, will be installed. A track loader will move the lower tunnel fill materials to the midway point from both portals.

  After the lower fill procedure is complete, the upper half of the tunnel will be filled with concrete slurry. Concrete pumping pipes will be placed in the tunnel, and forms will be set at the portal entrances. These forms will have access doors to allow personnel to safely enter and exit the tunnel. At the midway point in the tunnel, the concrete pumping pipe will be equipped with an air slugger. This air slugger will inject compressed air at the discharge area to help compact the concrete slurry to completely fill the tunnel. As the tunnel is filled, ventilation duct/lighting and concrete pumping pipe sections will be removed, allowing the concrete slurry placement to proceed to the portal areas. Near the ends, the access doors in the forms will be tightly secured, allowing concrete slurry to completely fill the tunnel. The headwalls will remain, and the area will be backfilled and graded to provide a surface that naturally conforms to the adjacent topography prior to seeding the disturbed areas.

- **Pioneer Steel Siphon – Demolish and Haul Off Site:** Based on visual inspection, it appears that the steel pipe coating contains lead. Any lead remediation will be determined following testing and verification of the levels of contaminants present. If necessary, the coatings will be removed by an abatement contractor prior to starting demolition of the pipe. After coatings removal, the pipe will be cut into manageable lengths and loaded onto trucks for transport to a recycling facility. The concrete footings will be left in place. Appurtenant facilities, including the gauging station building and siphon, drainpipe, and concrete energy dissipation structure, will be removed and hauled away. The storm drainage head wall culverts will be protected in place, and rip rap will be placed along the embankment at the inlet and at the pipe discharge points to minimize erosion. The overhead communications and power lines are expected to be removed.

#### 2.10.2.2 Access and Staging

The existing unpaved roads used to access the features in this segment may require temporary grading and other improvements for use by construction vehicles during construction. If improved, it expected that they will be abandoned in the improved condition.

## 2.11 Segment 10 – Pioneer Steel Siphon to Forebay Structure

### 2.11.1 Existing Features

**Segment 10** extends from the end of Pioneer Steel Siphon (Station 548+79) to the Forebay Structure (Station 628+74), a distance of approximately 7,995 feet. All lands within **Segment 10** are Federally owned and administered by the Forest Service). A communication line owned by Frontier runs parallel to the canal within the Borel FERC Project boundary. The following subsections describe Borel Project features within this segment.

### 2.11.1.1 Concrete-lined Canal

**Segment 10** includes approximately 6,053 feet of concrete-lined canal (Figure 2-47). The canal is a trapezoidal, concrete-lined structure with side slopes between 1.2 and 1.4H:1V and an average bottom width of approximately 15 feet. Based on available as-built drawings, the concrete liner is approximately 9 inches thick, with welded wire fabric reinforcement.


**Figure 2-47. Concrete-lined Canal, Looking Downstream of Tunnel No. 1 1/2 (Photo Date: 02/2021)**

### 2.11.1.2 Tunnel No. 1 1/2

Tunnel No. 1 1/2 (Figure 2-48) extends from Station 566+35 to Station 571+05, a distance of 470 feet. The tunnel is horseshoe-shaped, with a maximum height of 12 feet and a bottom width of 10 feet. An access road extends to the entry and exit portals to the tunnel. The access road is relatively steep and may limit the type of construction equipment that can access this area.


**Figure 2-48. Tunnel No. 1 1/2 Entrance, Looking Downstream (Photo Date: 02/2021)**

### 2.11.1.3 Tunnel No. 2

Tunnel No. 2 (Figure 2-49) extends from Station 581+75 to Station 587+50, a distance of 575 feet. The tunnel is horseshoe-shaped, with a maximum height of 12 feet and a width of 10 feet. An access road provides access to the tunnel entrance and exit.

**Figure 2-49. Tunnel No. 2 Entrance, Looking Downstream (Photo Date: 02/2021)**

Utility poles line the right bank of the canal downstream of Tunnel No. 2 (Figure 2-50).


**Figure 2-50. Utility Poles on Right Bank Downstream of Tunnel No. 2, Looking Downstream (Photo Date: 02/2021)**

### 2.11.1.4 Flume No. 623

Flume No. 623 is a steel Lennon flume with steel support braces (Figure 2-51). The flume extends from Station 596+00 to Station 597+23, a distance of 123 feet. A wooden plank walkway is located

along the center of the flume for pedestrian access. Chain-link fencing and gates are located at both ends of the flume to limit access.


**Figure 2-51. Flume No. 623, Looking Downstream (Photo Date: 02/2021)**

### 2.11.1.5 Tunnel No. 3

Tunnel No. 3 (Figure 2-52) extends from Station 613+74 to Station 615+81, a distance of 207 feet, crossing under Borel Road near the intersection with Kern River Canyon Road. The tunnel is horseshoe-shaped, with a maximum height of 12 feet and a bottom width of 10 feet. Access roads extend to the entry and exit portals of the tunnel from Borel Road.


**Figure 2-52. Tunnel No. 3 Exit, Looking Upstream (Photo Date: 02/2021)**

### 2.11.1.6 Profanity Steel Flume

Profanity Steel Flume (Figure 2-53) is a steel Lennon flume with steel support braces. The flume extends from Station 623+07 to Station 625+47, a distance of 240 feet. A wooden plank walkway is located along the center of the flume for pedestrian access. Metal chain-link fencing and gates are on either end of the flume to limit access.


**Figure 2-53. Profanity Steel Flume, Looking Downstream (Photo Date: 02/2021)**

### 2.11.1.7 Access Roads

Several roads on Federal land administered by the Forest Service provide access to the canal in **Segment 10**. Access at the upstream end of the segment is through an unpaved public access road (Access Road Station 549+00), described above for **Segment 9**. At the downstream end, an unpaved public access road near Station 585+00 and Tunnel No. 2 extends approximately 1,400 feet from Kern River Canyon Road. Borel Road connects SR 178 and Kern River Canyon Road, crossing the system at Tunnel No. 3. Mid-segment, there are two gated road loops located near Tunnel No. 1 1/2 and Tunnel 2 that provide SCE Borel Project access around steep terrain.

## 2.11.2 SCE Proposal

The proposed actions and considerations for **Segment 10** are summarized below. Preliminary design plans reflecting the proposed action are included in Appendix C.

### 2.11.2.1 Decommissioning Approach

The Plan consists of the following actions:

- **Concrete-lined Canal – Demolish and Bury**: The concrete liner will be removed to a depth of approximately 1 foot below finished grade on both sides of the canal, and the materials will be processed to be suitable as backfill (i.e., maximum particle size of 6 inches). The right bank will be excavated, and the materials will be blended with the processed concrete for use as fill material. The Frontier-owned communication line is expected to be removed, and the access road abandoned as part of the grading activities. The fill material will be placed in the remaining portion of the canal to provide positive drainage, and the area will be covered with hydroseed for erosion control after decommissioning activities are completed.

- **Tunnels No. 1 1/2, 2, and 3 – Abandon with Modification:** The tunnels will be backfilled with a mixture of concrete debris and flowable fill material. Work be done in compliance with Occupational Safety and Health Administration Tunnel Safety Orders. In compliance with these orders, ventilation for the tunnel and additional tunnel utilities, such as lighting, will be installed. A track loader will move the lower tunnel fill materials to the midway point from both portals.

After the lower fill procedure is complete, the upper half of the tunnels will be filled with concrete slurry. Concrete pumping pipes will be placed in the tunnel, and forms will be set at the portal entrances. These forms will have access doors to allow personnel to safely enter and exit the tunnel. At the midway point in the tunnel, the concrete pumping pipe will be equipped with an air slugger. This air slugger will inject compressed air at the discharge area to help compact the concrete slurry to completely fill the tunnel. As the tunnel is filled, ventilation duct/lighting and concrete pumping pipe sections will be removed, allowing the concrete slurry placement to proceed to the portal areas. Near the ends, the access doors in the forms will be tightly secured, allowing concrete slurry to completely fill the tunnel. The headwalls will remain, and the area will be backfilled and graded to provide a surface that naturally conforms to the adjacent topography prior to seeding the disturbed areas.

- **Flume No. 623 and Profanity Steel Flume – Demolish and Haul Off Site:** Flume No. 623 and Profanity Flume will be demolished, and the materials will be hauled off site. To minimize fire hazards, demolition of the steel flumes will be completed by dismantling instead of flame cutting. Dismantling would begin by dropping the Lennon sheets and hanger/compression rods to the ground, where these materials will be collected and placed into either a truck or dumpster for hauling to a recycling facility. Working from lifts, the crew will remove bolted connections on the substructure steel.

  A 50-ton crane (or similar) will assist in removing the substructure steel materials by lifting these components away from the footings. The substructure steel materials will also be loaded onto trucks for hauling to a recycling facility. Existing concrete footings will remain in place to minimize ground disturbance.

#### 2.11.2.2 Access and Staging

The gated road loop located above Tunnel No. 1 1/2 (between STA 566+00 to 571+00) is steep and narrow. Grading in this area will not be allowed and access across this point will be limited, and large equipment will require transport around this area using Kern River Canyon Road and the access road near STA 585+00. Upon completion of construction, the gated road loops will be scarified (surficial), hydroseeded, and abandoned.

The primary unpaved access roads connecting to the Kern River Canyon Road may require temporary grading and other improvements for use by construction vehicles during construction. If improved, it is expected that they will be abandoned in the improved condition.

A 0.21-acre staging area which may extend beyond the Borel FERC Project boundary has been identified adjacent to Tunnel No. 3 and Borel Road, near Station 615+00. If developed, it is expected that the staging area will require a TCE and will be graded back to pre-construction conditions upon completion of work.

## 2.12 Segment 11 – Forebay Structure to Tailrace

### 2.12.1 Existing Features

**Segment 11** extends from the Forebay Structure to the Powerhouse and Tailrace. The following subsections describe Borel Project features within this segment. This segment of the Borel Project

does not follow the Borel Project control line. Therefore, unlike the previous segment descriptions, stationing is not provided for these facilities.

### 2.12.1.1 Forebay Structure

The Forebay Structure includes a trapezoidal, concrete-lined forebay leading to a trash rake structure that removes debris from the flow prior to discharge into the penstocks (Figure 2-54). Chain-link fencing lines the top of the concrete lining and top of the bank near the county road.

**Figure 2-54. Forebay Structure (Photo Date: 02/2021)**

### 2.12.1.2 Penstocks

From the Forebay Structure, four riveted-steel penstocks (Figure 2-55) convey water to the Powerhouse main turbines. Penstock No. 1 is approximately 526 feet long and has an inner diameter of 60 inches. The steel pipe feeds Unit No. 1 within the Powerhouse. Penstock No. 2 is approximately 565 feet long, with an inner diameter of 60 inches, and feeds Unit No. 2. Penstocks No. 3 and No. 4 have an inner diameter of 60 inches for 622 feet before they join one 94-foot-long, 84-inch-inner-diameter pipe that supplies Unit No. 3.


**Figure 2-55. Penstocks (Photo Date: 03/2022)**

### 2.12.1.3 Borel Powerhouse

The Powerhouse building (Figure 2-56) is approximately 168 feet long by 64 feet wide and is constructed of reinforced concrete. The control room is located on the ground floor of the structure and houses the control equipment. A machine shop area is located on the generator floor of the Powerhouse. A separate lunch/meeting room is located on the ground floor of the Powerhouse.

**Figure 2-56. Powerhouse Interior (Photo Date: 01/2020)**

The Powerhouse contains two main horizontal-shaft, Francis-type, reaction turbines direct-connected to Bullock generators and one main vertical-shaft, Francis-type, reaction turbine direct-connected to a General Electric generator. The total rated horsepower (HP) is 15,800 HP.

The Unit No. 1 and No. 2 main turbines are directly connected to horizontal shaft, partially enclosed generators, with cooling provided by air drawn from within the Powerhouse. Unit No. 3 is a vertical shaft, fully enclosed generator, with cooling provided by once-through air drawn from inside the Powerhouse and passed through a humidifier. The Powerhouse total installed capacity is 12,000 kW.

### 2.12.1.4 Powerhouse Auxiliary Buildings

A corrugated metal and wooden frame storage building is located to the west of the Powerhouse (Figure 2-57). It currently contains wood planks and an assortment of small Powerhouse parts.

**Figure 2-57. Storage Building (Photo Date: 03/2022)**

A wooden pump house shed containing a small pump is located to the west of the Powerhouse (Figure 2-58). The pump was lowered into the Kern River using a rail guide and used to provide water to the Powerhouse operations when needed.

**Figure 2-58. Pump House (Photo Date: 03/2022)**

A vault toilet restroom/outbuilding made of cinder blocks is located in the Powerhouse yard at the north edge of the parking lot (Figure 2-59). The electrical supply is connected to the Powerhouse underneath the parking lot asphalt.

**Figure 2-59. Restroom/Outbuilding at Powerhouse (Photo Date: 03/2022)**

### 2.12.1.5 Non-Project Switchyard

The non-Project Borel Switchyard (Switchyard) is located adjacent to the Powerhouse (Figure 2-60). It is within the Borel FERC Project boundary, but under separate easement with the Forest Service. The Switchyard will remain and be protected in place given its importance to system reliability and protection. The main transformer bank is connected to the 66 kV bus (non-Project) through a 3-pole, 800-amp, 66-kV oil circuit breaker. Associated disconnect switches, grounding switches, potential devices, and other related equipment are located in the Switchyard. Some of the controls for the Switchyard are located inside the Powerhouse and will be moved within the Switchyard footprint.

**Figure 2-60. Borel Switchyard and Powerhouse (Photo Date: 03/2022)**

### 2.12.1.6 Tailrace

The tailrace consists of a 65-foot-long tunnel extending from the Powerhouse to the Kern River (Figure 2-61). The spillway tunnel is an arch tunnel with a width of 16 feet and maximum height of 24 feet.


**Figure 2-61. Tailrace Outlet at Kern River (Photo Date: 03/2022)**

### 2.12.1.7 Spillway Channel

A natural spillway channel extends from the end of the Forebay Structure to the Kern River. The channel was used by SCE when a Borel Project outage or O&M required dewatering of the canal and Forebay Structure.

### 2.12.1.8 Access Roads

Several roads in **Segment 11** are used to access Borel Project facilities. All are on lands administered by the Forest Service within the Borel FERC Project boundary. There is one primary paved road that leads to the Powerhouse, Switchyard, and appurtenant facilities from Borel Road. Multiple unpaved roads provide access to Profanity Steel Flume, the Penstocks, and non-Project distribution and transmission lines.

## 2.12.2 SCE Proposal

The proposed actions and considerations for **Segment 11** are summarized below. Preliminary design plans reflecting the proposed action are included in Appendix C.

### 2.12.2.1 Decommissioning Approach

The Plan consists of the following actions:

- **Forebay Structure – Demolish and Haul Off Site:** Due to the limited access (i.e., very steep and small footprint) to the Forebay Structure, a 250-ton crane (or similar) will be set up on the wide section of Kern River Canyon Road above the Forebay. This crane will encroach into one lane of Kern River Canyon Road, and a traffic control plan will be implemented.

  Prior to concrete demolition, a crew will remove all existing electrical and lighting equipment, followed by removal of the existing Atlas Polar trash rake/conveyor belt system and gates. Miscellaneous mechanical removal and demolition includes the control building, stairs, handrails, intake screens, deck plates, skimmer plates, cabinets, and other items.

 

Concrete debris not used for backfilling will be loaded into skip boxes, lifted out by the crane, and hauled to a section of the canal where it can be processed and mixed for use as material. Revegetation plans for the forebay area will be developed during the completion of design.

- **Penstocks – Demolish and Haul Off Site**: The penstocks and anchor blocks will be removed and hauled off site. The concrete footings will be removed to existing grade to minimize ground disturbance and maintain slope stability. Demolition activities will include access improvements above and below the existing access road, near the mid-span of the Penstocks. Some large trees as well as other vegetation along the penstock route will need to be trimmed back or removed for the road extensions and/or fire protection.

  A fire protection system will be required for this operation that will include a large water tank on Kern River Canyon Road, above the existing Forebay Structure, with polyvinyl chloride piping and manifolds to the Powerhouse. The tank will be filled via water trucks.

  The steel penstock pipe will be cut into 10-foot to 20-foot-long sections and will be hauled off site to a recycling facility. The portions of the concrete anchor blocks and footings will be hauled off site to a waste facility. A crane will be staged at three or four locations along the alignment to remove the pipe segments. Revegetation plans for the penstock area will be developed during the completion of design.

- **Borel Powerhouse – Demolish and Haul Off Site:** Prior to construction, the Powerhouse will be tested for hazardous materials (e.g., lead and asbestos). Once any contaminants are identified and concentrations known, a hazardous material abatement plan will be developed as needed. The concentrations dictate the disposal process, and it is anticipated that a demolition notification (that states whether there is lead and asbestos in the Powerhouse materials) will be sent to the South Coast Air Quality Management District and a Building and Safety Permit will be required.

  The proposed approach to demolishing the Powerhouse will begin with removing the turbines, transformers, valves, and heavy equipment inside the Powerhouse using the existing 40-ton overhead crane (Figure 2-62). Once the equipment has been removed, work on plugging the draft tubes and generator pits will be filled with concrete slurry to the final ground grade.

  Work on demolition of the Powerhouse structure will require installation of scaffolding on all sides of the Powerhouse's exterior walls. Because the existing Switchyard adjacent to the Powerhouse is to remain intact, the scaffolding will function as a protective barrier between the northern Powerhouse wall and the Switchyard. A full lock-out/tag-out outage on the Switchyard will occur prior to scaffold installation.

  The roof and rafters will be removed first. Lifts operated from inside the Powerhouse will perform most of the demolition. These lifts will be supported by crew on scaffolding on the outside of the Powerhouse and a crane. After the roof and rafter removal procedure is complete, the 40-ton overhead crane (in the Powerhouse; Figure 2-62) will be removed. Lastly, the concrete walls will be demolished, leaving only the foundation in place.

 


**Figure 2-62. Existing Crane (Photo Date: 01/2020)**

- **Non-Project Switchyard –** There is no proposed action for the Switchyard because it is vital to SCE's power distribution system reliability and protection.

- **Powerhouse Auxiliary Buildings – Demolish and Haul Off Site:** The storage building, pump house, and restroom will be removed and demolished (including slab/footing) to grade and hauled away. The contents of the buildings will be removed and disposed of off-site prior to demolition. Ground disturbed by construction activities will be graded and hydroseeded.

- **Tailrace – Demolish and Bury**: The Tailrace tunnel will be demolished and backfilled with a blend of native material and processed concrete for slope stability. After grading, clean riprap will be placed on the finished surface at a slope that conforms to the contours of the Kern River channel bank. The riprap will serve to protect the slope from erosion during high flows. Depending on the Kern River water level at the time of construction, dewatering of the tailrace may be required.

- **Spillway –** There is no proposed action for the Spillway as it is very steep, dominated by bedrock, and contains pockets of naturally occurring vegetation.

### 2.12.2.2 Access and Staging

There is a paved access road from Borel Road to the Powerhouse and auxiliary buildings (near Station 628+74) (Figure 2-63). Access to the Penstocks is available via unpaved existing access roads on Federal lands administered by the Forest Service from Borel Road (near Station 615+00), which connects directly to SR 178. There is paved access from Borel Road to the Powerhouse and auxiliary buildings (near Station 628+74) (Figure 2-63). A staging area (1.10 acres) has been identified adjacent to the Borel FERC Project boundary near the Powerhouse entrance (Figure 2-64). Once construction is complete, the paved access road to the Powerhouse site will be left in place while it is expected that the remaining unpaved access roads and staging area in the segment will be graded, scarified and hydroseeded unless otherwise required for SCE access to non-Project distribution or transmission lines.

**Figure 2-63. Powerhouse Access Road (Photo Date: 03/2022)**

**Figure 2-64. Staging Area for Penstock Demolition (Mid-slope) (Photo Date: 03/2022)**

# 3 Estimated Schedule

SCE developed an estimated schedule for the Plan and can be viewed in Appendix D – Estimated Schedule. The schedule outlines anticipated activities and estimated durations for 11 phases.

Project Management and Stakeholder Outreach phases will continue through the entire schedule.

Application Development, Stakeholder Review and File Surrender Application phases are complete. These included the development of the Surrender Application and consultation with Stakeholders, as well as the 50-day stakeholder review of the draft Surrender Application and SCE filing of the Surrender Application with FERC on May 1, 2023.

The subsequent six phases are SCE's best estimate of the schedule with acknowledgement that the timing and duration of each phase is largely outside of SCE's control.

The FERC Review Phase is expected to include several elements including FERC's Notice of Filing and request for public comment, any Additional Information Requests (AIRs), the Ready for Environmental Assessment Notice, the Draft Environmental Assessment (EA), continued ESA Section 7 and NRHA Section 106 consultations and Final EA. The FERC Review Phase will conclude when FERC issues its order approving license surrender and notifies SCE that decommissioning activities may commence.

The SWRCB Water Quality Certification Phase assumes SCE will submit to the SWRCB in 2023, an application for CWA Section 401 water quality certification to support FERC's issuance of a surrender order. SCE assumes the SWRCB will within one year, issue a water quality certification or otherwise address SCE's application, including complying, as appropriate, with the California Environmental Quality Act (CEQA).

The Design and Permitting Phase, which is estimated to take approximately two to three years, may begin prior to FERC's notice that decommissioning activities may commence but will not be completed until such time as the Final EA is issued, ESA Section 7 and NHPA Section 106 consultations are completed and CEQA and water quality certification have been completed. The Design and Permitting Phase includes refinement of the current 30% design plans, development of the 60%, 90% and final construction design packages as well as continued coordination with permitting agencies, utilities and landowners directly impacted by future construction activities. As designs are being finalized (i.e., 60% stage), SCE will apply for additional required permits, such as a Corps' Section 404 permit for impacts to jurisdictional aquatic resources.

The Supplemental Investigations Phase is expected to occur during the FERC Review Phase, SWRCB Water Quality Certification Phase and Design and Permitting Phase. The nature and duration of these investigations are dependent on the specific information required by FERC, SWRCB, State and Federal Agencies, private landowners and additionally by SCE as it continues to develop and refine the decommissioning engineering designs, specifications and supporting measures.

The Construction Phase will begin when the Design and Permitting Phase is complete. Construction is estimated to take approximately three years and will be phased to the extent possible to minimize

 

impacts to the community and environment. In an effort to meet these objectives, a construction plan will be developed in advance of design completion and will be communicated to Stakeholders. To expedite construction activities throughout the Borel Project area, SCE expects to have multiple construction crews working simultaneously on Borel Project segments.

The Post Construction Monitoring Phase will include resource monitoring as prescribed by the proposed measures outlined in Section 4 below and in accordance with applicable permits. Where required, post construction monitoring is expected to commence once construction and restoration activities within a Borel Project segment are completed, though the specifics of duration and timing will vary by segment and landowner.

# 4 Proposed Measures

SCE proposes to include a comprehensive suite of measures as part of the proposed action to ensure appropriate resource protections during Borel Project decommissioning. Table 4-1 summarizes the measures that are proposed for protection of the human and natural environment.

**Table 4-1. Measures for Borel Project Decommissioning**

| Measure No. | Subject | Measure | Applicable Segment |
|---|---|---|---|
| ***General Construction Measures*** | | | |
| 1 | Permits | SCE will consult with the applicable Federal, State, and local agencies to obtain necessary permits and will comply with these permits during all decommissioning activities. | All |
| 2 | Borel Project Footprint | Work area footprints will be confined as much as reasonably practicable. All parking, storage areas, laydown sites, equipment storage, and any other surface-disturbing activities will be confined, to the greatest extent possible, to previously disturbed areas. Additionally, the site footprint/area will be clearly defined and marked to avoid working in areas outside of the approved area. Fences and flagging will be installed by the contractor in a manner that does not impact habitats and other sensitive areas to be avoided and that is clearly visible to personnel on foot and operating heavy equipment.<br><br>On National Forest System (NFS) lands, the Forest Service will approve the final proposed work area prior to commencement of work. | All |
| 3 | Garbage and Microtrash | Work areas will be kept clear of garbage, including microtrash (small pieces of trash or smaller, broken-down pieces of trash). Trash and food will be stored in closed containers and removed daily to reduce attractiveness to opportunistic predators such as coyotes, domestic and feral dogs and cats, opossums, skunks, and raccoons. Littering of trash and food waste will be prohibited. Upon completion of a decommissioning activity, the work site will be inspected to ensure it is free of garbage and microtrash. If garbage or microtrash is detected at the site, it will be removed. | All |
| 4 | Construction Timing | Impacts to the community will be minimized, to the extent possible, through the use of seasonally appropriate construction windows. | All |

**Table 4-1. Measures for Borel Project Decommissioning**

| Measure No. | Subject | Measure | Applicable Segment |
|---|---|---|---|
| 5 | Speed Limits | All construction equipment and vehicles will drive no faster than 15 miles per hour anywhere within the Borel FERC Project boundary for reasons of public safety, avoidance of wildlife collisions, and to prevent excess dust. Vehicles will stay on designated roads to the extent reasonably possible. Construction truck trips will be minimized to the extent practicable, particularly in the community and on the grade between Bakersfield and Lake Isabella. | All |
| ***General Construction Measures*** | | | |
| 6 | Hazardous Materials | The contractor will be required to provide a Project-specific hazardous materials handling plan prior to start of work. All work-related materials will be properly stored and secured. Materials that are in any type of liquid or powder form will be stored in sealed leak-proof containers. In addition, all parked vehicles/equipment will be kept free of leaks, particularly antifreeze, as this could be fatal if consumed by wildlife.<br><br>Any proposed use of herbicides on NFS land will require approval of the Forest Service. If used, information on herbicides will be documented and provided to the SQF botanist. | All |
| 7 | Hazardous Liquids | The contractor will be required to conduct vehicle refueling and O&M in upland areas, where fuel cannot enter aquatic habitats or areas that have suitable habitat to support Federally and/or State listed species. Equipment and containers will be inspected daily for leaks. Should a leak occur, contaminated soils and surfaces will be cleaned up and disposed as required by the Borel Project's regulatory permits and materials safety data sheets. | All |

**Table 4-1. Measures for Borel Project Decommissioning**

| Measure No. | Subject | Measure | Applicable Segment |
|---|---|---|---|
| 8 | Invasive Weeds Prevention | Use certified weed-free straw or rice straw for all construction, erosion control, or restoration needs. Use gravel and sand from local and weed-free sources where possible. Whenever possible, dispose of any spoils on site, graded to match local contours, and use fill collected on site.<br><br>On NFS lands, SCE will coordinate with the Forest Service on buffers around invasive weed occurrences during construction and conduct a year of post-construction monitoring for invasive weeds within the active work and work-related areas. Additionally, work will generally follow Forest Service Manual 2903 for invasive plant management, as practicable, on NFS lands. | All |
| 9 | Construction Plans | SCE or the contractor will develop a suite of plans that the contractor will be required to follow throughout the decommissioning process. These plans are expected to include, but are not limited to, a traffic control plan, a staging and haul route plan, a materials handling plan, a construction safety plan, a specific fire safety plan, a dewatering plan, and a Stormwater Pollution Prevention Plan (SWPPP). | All |
| 10 | Use of Local Construction Materials | Construction supplies will be purchased from local businesses to the extent practicable. | All |
| 11 | Clean Fill | Imported fill will be minimized to the extent possible. All imported fill will come from clean sites (soils will be chemically tested as needed) and be weed-free. | All |
| 12 | Modern Vehicles | On-road heavy duty truck fleet will comply with California Title 13 CCR § 2025, which requires that older vehicles be replaced by modern, emission-controlled trucks. | All |

**Table 4-1. Measures for Borel Project Decommissioning**

| Measure No. | Subject | Measure | Applicable Segment |
|---|---|---|---|
| ***General Construction Measures*** | | | |
| 13 | WEAP | A WEAP will be established and implemented prior to the start of work activities in the field and cover biological and cultural resources. The program will be presented by a qualified biologist and a qualified archaeologist to all construction crew members. If new employees join the crew, they will receive formal, approved training prior to working on site. Upon completion of the orientation, employees will sign a form stating they attended the program and understand all protection measures. A fact sheet containing the presented information will also be prepared and distributed.<br><br>For biological resources, the WEAP will cover special-status wildlife species, general behavior and ecology of these species, their sensitivity to human activities, their legal protection, penalties for violating Federal laws, reporting requirements, Borel Project mitigation measures, and measures to implement in the event that the species is found during activities.<br><br>For cultural resources, the WEAP will cover the existence of and potential for cultural and Tribal resources in the Borel Project Vicinity, and contractor roles/responsibilities in the case of an inadvertent discovery during construction. | All |
| ***Wildlife and Habitat Measures*** | | | |
| 14 | ESA Birds and Habitat | No work activities will take place upstream of the Canal Inlet Structure to prevent potential impacts to ESA-listed bird habitat and other sensitive natural communities present in this Borel Project segment. | 1 |
| 15 | Biological Monitor | A biological monitor will be on site during all ground-disturbing and vegetation removal activities associated with the decommissioning in areas of sensitive vegetation communities, ESA-listed species habitat or known special-status species occurrences. On NFS lands, a biological monitor will be present when work occurs near a known NNIP occurrence. | All |

**Table 4-1. Measures for Borel Project Decommissioning**

| Measure No. | Subject | Measure | Applicable Segment |
|---|---|---|---|
| ***Wildlife and Habitat Measures*** | | | |
| 16 | Pre-construction Surveys | Prior to the start of activities that may impact biological resources in each specific segment of the Borel Project, pre-construction surveys for sensitive habitats and sensitive species, including ESA-listed species and special-status plants on NFS Lands, will be conducted. Surveys will be conducted by qualified biologists and during the appropriate timeframe for detection of target species, within the given period for the activity (e.g., nesting bird surveys will not be performed for activities that will take place completely outside of the nesting bird season). On NFS lands, the designated Forest Service botanist will be consulted for specific types of data and mapping needed and the data collected will be provided to the designated Forest Service botanist. Survey timing will follow guidance described above but be confirmed with the Forest Service on NFS lands.<br><br>Pre-construction surveys will also document non-native invasive species on NFS lands. All data, including location, population numbers, and shapefiles will be collected and reported to the Forest Service botanist no later than at the completion of all construction activities. | All |
| 17 | Revegetation | Upon completion of work activities, temporarily disturbed areas will be revegetated with native plant species. A revegetation plan will be developed that addresses revegetating areas where Borel Project features have been removed. The revegetation plan will also detail any proposed non-native invasive species management and monitoring. Monitoring for a year following construction will be a part of the revegetation plan. To the extent possible, restoration of disturbed areas will use locally grown native plants that are weed and pathogen free, and species and seeds purchased will come from a verified weed-free native seed nursery. On NFS lands, any hydroseeding will follow Forest Service prescribed rules. | 6, 7, 8, 9, 10, 11 |

**Table 4-1. Measures for Borel Project Decommissioning**

| Measure No. | Subject | Measure | Applicable Segment |
|---|---|---|---|
| 18 | Reporting Injured, Diseased, or Deceased Wildlife | All decommissioning staff will report any instances of injured, notably diseased, or deceased wildlife observed within the Borel FERC Project boundary to the SCE authorized representative or designee, who will report the information to the appropriate jurisdictional agency(ies). | All |
| 19 | Active Bird Nests | To protect native breeding birds, work activities will avoid to the extent possible the general avian breeding season of February 1 through September 15. If decommissioning activities cannot be avoided during this period, a focused survey for active nests within the area proposed for work will be conducted prior to the commencement of Borel Project activities. If no nests are located, work may proceed as planned. If nesting activity is detected, a protective buffer will be established, as determined by a qualified biologist. | All |
| 20 | Bat Exclusion | The year prior to the proposed start of the removal of Borel Project facilities with suitable bat habitat, humane exclusion devices will be placed on all Borel Project facilities that will be removed/filled and have known bat occupation, signs of bat occupation, or potential bat habitat. The humane exclusion device will be installed at the appropriate time of year, outside of maternal season (April and late August) and outside of hibernation season (between November and February). Typically, humane exclusion devices should be left in place for a minimum of seven nights and, in some cases, two full weeks to ensure all bats have left the facility. Surveys will be completed by a qualified biologist to ensure humane exclusion devices have worked properly and all bats have left before permanent exclusion devices are installed. A permanent exclusion device must follow a humane exclusion device immediately after the area is bat-free. | 1, 2, 4, 6, 7, 9, 10, 11 |

**Table 4-1. Measures for Borel Project Decommissioning**

| Measure No. | Subject | Measure | Applicable Segment |
|---|---|---|---|
| ***Wildlife and Habitat Measures*** | | | |
| 21 | Bat Surveys | No more than 7 days prior to the removal/fill of Borel Project features where permanent bat exclusion devices have been placed, a qualified biologist will perform a survey of the feature(s) to ensure no bats are present and exclusion devices are still functional. Exclusion devices will only be removed, if necessary, no more than 1 day before decommissioning activities on the feature commence. | 1, 2, 4, 6, 7, 9, 10, 11 |
| 22 | Special-status Species | If special-status species are detected, those individuals will be allowed to move from the area of their own volition. If impacts to special-status species cannot be avoided, the agency(ies) with jurisdiction will be consulted and any necessary permits or approvals will be acquired prior to the commencement of decommissioning activities. Damage or injury to special-status species will be reported immediately to the agency(ies) with jurisdiction. | All |
| 23 | Excavations | For any activities requiring an excavation, if excavations are to be left open and unattended for more than 12 hours, they will either be covered, surrounded with exclusion fencing, or an escape ramp will be constructed to the bottom of the pit with less than a 2:1 slope, to provide an escape route to prevent small wildlife species (e.g., lizards, rodents) in the area from getting trapped in the excavation. To the extent feasible, excavations will not be left open at the end of the day and will be covered after confirming absence of trapped individuals. Prior to commencement of work activity each day, staff will check excavations to ensure no animals are trapped. Before backfilling or permanently closing any excavation, it will be checked to ensure no wildlife are present within the excavated area. If wildlife has become trapped, it will be removed prior to closure or backfilling. | All |

**Table 4-1. Measures for Borel Project Decommissioning**

| Measure No. | Subject | Measure | Applicable Segment |
|---|---|---|---|
| 24 | Riparian Vegetation | Riparian vegetation removal and trimming will be limited to the amount necessary to successfully complete activities, including any elderberry shrubs in riparian areas. To prevent unintended or unnecessary removal or trimming of riparian vegetation, orange barrier fencing, or flagging, will be erected to clearly define the habitat to be avoided during work activities.<br><br>The Forest Service will be consulted on the protection of elderberry shrubs located on NFS lands outside of riparian areas. They will not be afforded extra protections on non-NFS lands. | All |
| ***Wildlife and Habitat Measures*** | | | |
| 25 | Special-status Plants | Tracy's eriastrum and Kern Canyon clarkia occurrences, or other newly located occurrences of special-status plants on NFS lands, will be flagged and avoided to the extent feasible (to a maximum of 50 feet, if possible, without interfering with necessary work activities). If work is completed during reproductive life stages, a biological monitor should be present periodically to determine if there is damage or removal of the Tracy's eriastrum and Kern Canyon clarkia due to work activities. New occurrences and/or damage or injury to special-status species will be reported immediately to the agency(ies) with jurisdiction. If there is damage, the occurrence will be resurveyed after the completion of work to determine extent. | All |

**Table 4-1. Measures for Borel Project Decommissioning**

| Measure No. | Subject | Measure | Applicable Segment |
|---|---|---|---|
| 26 | Designated Biologist | A designated qualified biologist will review final plans, designate areas that need temporary fencing, and monitor construction activities within and adjacent to areas with aquatic or other sensitive habitats. The qualified biologist will monitor activities within designated areas during critical times, such as initial ground disturbing activities (e.g., ESA fencing installation), and check that all regulatory agency permit requirements, conservation measures, and mitigation measures are properly implemented and followed. The qualified biologist will check construction barriers or exclusion fencing and provide corrective measures to the contractor to keep the barriers or fencing maintained throughout construction. | All |
| 27 | Equipment Cleaning | Prior to the first time any vehicles and equipment, including hand tools, enters a work area, a qualified biologist will perform an inspection for NNIP. All visible soil, plant materials, animal remnants, or any other signs of invasive species on vehicles and equipment will be removed prior to entering the Borel Project site. Removal and decontamination requirements of vehicles and equipment will be up to the discretion of a qualified biologist. If contamination is small enough to be managed on site, the qualified biologist may approve the decontamination of the vehicle or equipment at a proper staging area with adequate containment. Any materials removed at a containment site must be bagged and taken off site. If contamination is extensive, the contractor may be required to take the vehicle or equipment to an off-site wash station. Additionally, if a vehicle or piece of equipment must leave the work site for any length of time and has been exposed to a different work site or location, it must be re-inspected prior to re-entering the work site. Vehicles and equipment that perform work in known NNIP occurrences during work activities should be cleaned before leaving the site.<br><br>The Forest Service will be notified at least five working days prior to equipment being moved on to NFS lands, including information on equipment cleaning. | All |

**Table 4-1. Measures for Borel Project Decommissioning**

| Measure No. | Subject | Measure | Applicable Segment |
|---|---|---|---|
| 28 | ESA-listed Birds | No work activities will take place within approximately 0.5 mile of any of the mapped potential nesting habitat patches for least Bell's vireo, southwestern willow flycatcher and yellow-billed cuckoo during the avian breeding season (February 1–September 1). | 1 |
| 29 | ESA-listed and CESA-listed Species | If any ESA-listed or CESA-listed species are observed during pre-construction surveys or work activities, SCE will notify USFWS and/or CDFW. All ESA-listed and CSA-listed species will be allowed to leave a work area without harassment. | All |
| ***Water Resources and Aquatic Resource Measures*** | | | |
| 30 | Natural Drainage | Natural landscape drainage patterns will be maintained to the extent practicable. | All |
| 31 | Avoidance of Aquatic Habitat | Impacts to delineated aquatic resources, outside of the Borel Canal, will be limited to the amount necessary to successfully complete all work activities. To prevent unintended or unnecessary impacts, orange barrier fencing or flagging will be erected to clearly define the aquatic habitat to be avoided. | All |
| 32 | SWPPP | SCE or the contractor will develop a SWPPP in accordance with the State Water Resources Control Board General Construction Permit and local regulations. The SWPPP will include BMPs to reduce or eliminate construction impacts to stormwater runoff. On NFS lands, Forest Service personnel will be present and work alongside the contractor's Qualified SWPPP Developer (QSD)/Qualified SWPPP Practitioner (QSP). | All |
| 33 | Lake Isabella Elevation | Work in Lake Isabella will be completed during dry conditions when the lake elevation is at 2,535 feet mean sea level or below. | 1, 2, 3, 4 |

**Table 4-1. Measures for Borel Project Decommissioning**

| Measure No. | Subject | Measure | Applicable Segment |
|---|---|---|---|
| ***Cultural and Tribal Resources Measures*** | | | |
| 34 | Ground Disturbance | Ground disturbance in the vicinity of unevaluated or NRHP-eligible archaeological sites, Traditional Cultural Properties (TCPs), and Traditional Cultural Landscapes (TCLs) will be avoided to the extent possible. All decommissioning-related ground disturbance will be confined to within the Borel FERC Project boundary. | All |
| 35 | Avoidance and Exclusion | A qualified archaeologist will review final plans and, in coordination with the appropriate land-managing agency, will designate areas that need temporary exclusion fencing, signage, flagging, barriers, or other avoidance and exclusion measures. Of particular note are the historic-era mining features located both upslope and downslope from the canal near Pioneer Siphon. Prior to any ground disturbance, these features will be relocated and designated for avoidance.<br><br>The archaeologist will check construction barriers or exclusion fencing and provide corrective measures to the contractor to ensure the barriers or fencing are maintained throughout construction. | All |
| 36 | Footings | Footings will be left in place at siphons, flumes, and penstocks to minimize ground disturbance to the extent possible. | All |
| 37 | Archaeological Analysis and Consultation | Additional analysis is required to determine effects (if any) related to the decommissioning process. Contingent on the results of the analysis, further measures may be necessary. | All |
| 38 | Tribal Consultation | Analysis and consultation with Tribes will continue to accurately characterize the extent of Tribal resources and assess effects of decommissioning activities on previously recorded or newly documented Traditional Cultural Properties (TCPs) and Traditional Cultural Landscapes (TCLs). | All |

**Table 4-1. Measures for Borel Project Decommissioning**

| Measure No. | Subject | Measure | Applicable Segment |
|---|---|---|---|
| 39 | Cultural and Tribal Monitors | On-site cultural monitoring by a qualified archaeologist will be necessary near all unevaluated and NRHP-eligible archaeological sites during decommissioning-related ground disturbance. Tribal monitoring will likely be necessary in any area deemed culturally sensitive by the Tribe(s). Identification of these areas will be borne out of the ongoing consultation effort noted in Measure Nos. 37 and 38. | All |
| ***Cultural and Tribal Resources Measures*** | | | |
| 40 | Treatment of Historic Properties | Development of an agreement document to resolve adverse effects; agreement document will outline appropriate mitigation to resolve adverse effects. Effects to the Borel Hydroelectric Historic District will include documentation of the district via HABS / HAER documentation and/or equivalent. Mitigation will be developed in consultation with consulting parties | All |
| 41 | Inadvertent Discovery | In coordination with consulting parties, develop a Borel Project Inadvertent Discovery and Monitoring Plan that details the protocols to be implemented when necessary, including any specific requirements of the SQF and BLM, in the case of an inadvertent discovery of previously unrecorded archaeological resources.<br><br>These protocols will include the necessary compliance and reporting requirements for the discovery of human remains on both Federal and non-Federal lands | All |

# 5 References

None

# Southern California Edison

## Application for Surrender of License
## Borel Hydroelectric Project
## FERC Project No. 382

## Volume II, Appendix A

## Stormwater and Drainage Report

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# Southern California Edison

## Application for Surrender of License
## Borel Hydroelectric Project
## FERC Project No. 382

## Volume II

## Stormwater and Drainage Report

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May 2023

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# Acronyms and Abbreviations

| | |
|---|---|
| °C | Degrees Celsius |
| °F | Degrees Fahrenheit |
| 1D | One-dimensional |
| 2D | Two-dimensional |
| ac-ft | Acre-feet |
| ACHP | Advisory Council on Historic Preservation |
| AIRs | Additional Information Requests |
| AOU | American Ornithologists Union |
| APDEA | Applicant-Prepared Draft Environmental Assessment |
| APE | Area of Potential effect |
| Auxiliary Dam | Lake Isabella Auxiliary Dam, U.S. Army Corps of Engineers |
| BA | Biological Assessment |
| BGEPA | Bald and Golden Eagle Protection Act |
| BLM | U.S. Department of the Interior, Bureau of Land Management |
| BLM-S | BLM Sensitive Species |
| BMP | Best Management Practice |
| BO2 | Blue Oak Savanna |
| Borel Project | Borel Hydroelectric Project, FERC Number 382 |
| C.F.R. | Code of Federal Regulations |
| cal YBP | Calendar Years Before Present |
| CCMP | California Coastal Management Program |
| CDFA | California Department of Food and Agriculture |
| CDFG | California Department of Fish and Game |
| CDFW | California Department of Fish and Wildlife |
| CEII | Critical Energy Infrastructure Information |
| CEQA | California Environmental Quality Act |

 

| | |
|---|---|
| CESA | California Endangered Species Act |
| CFGC | California Fish and Game Commission |
| CFR | Code of Federal Regulations |
| Cfs | Cubic Feet per Second |
| CGS | California Geological Survey |
| CNDDB | California Natural Diversity Data Base |
| CNPS | California Native Plant Society |
| Corps | U.S. Army Corps of Engineers |
| CRPR | California Rare Plant Rank |
| CRWQCB | California Regional Water Quality Control Board |
| CSB | California Stream Bioassessment |
| CUI | Controlled Unclassified Information |
| CWA | Clean Water Act |
| CWHR | California Wildlife Habitat Relationships |
| CZMA | Coastal Zone Management Act |
| DBH | Diameter at Breast Height |
| DEM | Digital Elevation Model |
| DO | Dissolved Oxygen |
| DPS | Distinct Population Segment |
| EA | Environmental Assessment |
| EAP | Emergency Action Plan |
| e-cat | Cataraft Electrofisher |
| EPT | Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) |
| ESA | Endangered Species Act |
| ESRI | Environmental Systems Research Institute |
| FAQs | Frequently Asked Questions |
| FERC | Federal Energy Regulatory Commission (or Commission) |

| | |
|---|---|
| FGV | Fine-grained Volcanic |
| Forest Service | U.S. Department of Agriculture, Forest Service |
| FP | Fully Protected Species |
| FPA | Federal Power Act |
| FSS | Forest Service Sensitive Species |
| ft | Feet |
| FW | Forest Service Watch List Species |
| FYLF | Foothill Yellow-legged Frog |
| GPS | Global Positioning System |
| H:V | Horizontal to Vertical |
| HABS | Historic American Buildings Survey |
| HAER | Historic American Engineering Record |
| HEC-HMS | Hydrologic Engineering Center's Hydrologic Modeling System |
| HEC-RAS | Hydrologic Engineering Center Riverine Analysis System |
| HHRD | Historic Human Remains Detection |
| HP | Horsepower |
| Hz | Hertz |
| ICF | Institute for Canine Forensics |
| IPaC | Information for Planning and Consultation |
| IRWMP | Integrated Regional Water Management Plan |
| KCF | Kern Canyon Fault |
| KOP | Key Observation Point |
| KR&LAEP | Kern River and Los Angeles Electric Power Company |
| KR-1 | Southern California Edison’s Kern River No. 1 Project |
| KRVHS | Kern River Valley Historical Society |
| KRVM | Kern River Valley Museum |
| Ksat | Saturated Hydraulic Conductivity of Soil |

 

| | |
|---|---|
| kV | Kilovolt |
| kW | Kilowatt |
| LiDAR | Light Detection and Ranging |
| Lower Borel | Downstream of the Auxiliary Dam |
| LRMP | Land and Resource Management Plan |
| msl | Mean Sea Level |
| MW | Megawatt |
| NAD83 | North American Datum of 1983 |
| NAHC | Native American Heritage Commission |
| NAVD 88 | North American Vertical Datum of 1988 |
| NED | National Elevation Dataset |
| NEPA | National Environmental Policy Act |
| NFS | National Forest System |
| NHPA | National Historic Preservation Act |
| NLCD | National Land Cover Database |
| NNIP | Non-native Invasive Plant |
| NOAA | National Oceanic and Atmospheric Administration |
| NRCS | Natural Resources Conservation Service |
| NRHP | National Register of Historic Places |
| OHV | Off Highway Vehicle |
| O&M | Operations and Maintenance |
| PCT | Pacific Crest Trail |
| PL&P | Pacific Light and Power Company |
| Plan | Decommissioning Plan |
| Plan Set | 30% Design Plans |
| Powerhouse | Borel Powerhouse |
| PT&L | Power, Transit, and Light Company |

 

| | |
|---|---|
| QSD | Qualified SWPPP Developer |
| QSP | Qualified SWPPP Practitioner |
| RM | River Mile |
| RMP | Resource Management Plan |
| RMZ | Recreational Management Zones |
| ROS | Recreation Opportunity Spectrum |
| RV | Recreational Vehicle |
| SCE | Southern California Edison Company |
| SCS | Soil Conservation Service |
| SHPO | State Historic Preservation Office(r) |
| SIO | Scenic Integrity Objective |
| SMA | Special Management Area |
| SMS | Scenery Management System |
| SQF | Sequoia National Forest |
| SR | State Route |
| SRMA | Special Recreation Management Area |
| SSC | Species of Special Concern |
| SSJVIC | Southern San Joaquin Valley Information Center |
| SSURGO | Soil Survey Geographic Database |
| Surrender Application | Application for Surrender of License |
| Switchyard | non-Project Borel Switchyard |
| SWPPP | Stormwater Pollution Prevention Plan |
| SWRCB | State Water Resources Control Board |
| TCE | Temporary Construction Easement |
| TCL | Traditional Cultural Landscape |
| TCP | Traditional Cultural Property |
| TIN | Triangular Irregular Network |

 

| | |
|---|---|
| U.S. | United States |
| U.S.C. | United States Code |
| Upper Borel | Upstream of the Auxiliary Dam |
| USDA | U.S. Department of Agriculture |
| USEPA | U.S. Environmental Protection Agency |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| v | Volt |
| VegCAMP | Vegetation Classification and Mapping Program |
| VMS | Visual Management System |
| VQO | Visual Quality Objective |
| VRM | Visual Resource Management |
| WEAP | Worker Environmental Awareness Program |
| YOY | Young of the Year |

 

# 1 Purpose

Southern California Edison (SCE), licensee of the Borel Hydroelectric Project (FERC No. 382) (Borel Project), proposes to surrender the existing Federal Energy Regulatory Commission (FERC or Commission) license for the Borel Project and decommission Borel Project facilities as described in the Decommissioning Plan (Plan; Volume II of this Application for Surrender of License [Surrender Application]). The Borel Project is located on the North Fork and main stem of the Kern River in Kern County, California. The Borel Project includes a 158-foot-long, 4-foot-high concrete diversion dam on the North Fork of the Kern River and the Borel Powerhouse (Powerhouse) with two 3,000-kilowatt (kW) generators and a 6,000-kW generator for a total installed capacity of 12 megawatts (MW). These facilities are situated on private land that is under Kern County's jurisdiction as well as on federal lands managed by the U.S. Army Corps of Engineers (Corps); U.S. Department of Agriculture, Forest Service (Forest Service); and U.S. Department of the Interior, Bureau of Land Management (BLM).

In 2017, the Corps modified the Lake Isabella Auxiliary Dam (Auxiliary Dam) for safety purposes, which required the condemnation and removal of critical Borel Project facilities that provided water to the Borel Project for power generation. Since that time, the Borel Project has been unable to generate power, and SCE has determined that no other sources of water can reasonably be utilized by the Borel Project.

Downstream of the Auxiliary Dam, the Borel Project includes a combination of conveyance facilities that include in-ground concrete canal reaches, elevated flumes, and siphons. The location of these facilities is shown in Figure 1-1. Due to the location of these facilities within the watershed, the Borel Project influences rainfall runoff patterns by intercepting, redirecting, and/or concentrating stormwater runoff flows within the watershed. Removal of, or modifications to, the canal and associated conveyance facilities, as described in the Plan, would change the runoff and channel flow patterns in the watershed.

To assess the impacts of the Borel Project on stormwater runoff patterns, hydrology and a hydraulic model were developed to characterize existing flooding patterns and perform a drainage analysis of the proposed conceptual design of the Borel Project as described in the Plan. The proposed design incorporates a series of linear detention basins throughout the current footprint with a primary purpose of controlling stormwater runoff that is currently intercepted and conveyed by the canal. The drainage analyses were performed to assess the adequacy of the proposed detention basins and their ability to infiltrate the stormwater runoff and or direct the excess runoff to natural existing drainage features.

The purpose of this report is to document the model development and preliminary drainage analysis performed. The drainage analyses are focused on the Borel canal segments that extend from downstream of the Auxiliary Dam to the Powerhouse. These segments were the focus of the drainage analyses because, under existing conditions, the canal intercepts stormwater runoff and influences drainage patterns for down-slope properties. The preliminary drainage analyses were performed to verify that the linear detention basins proposed in the Plan, can contain the design stormwater runoff and meet infiltration and freeboard requirements as described in the Kern County Standards for Drainage - Division 4 (Kern County Standards).

 

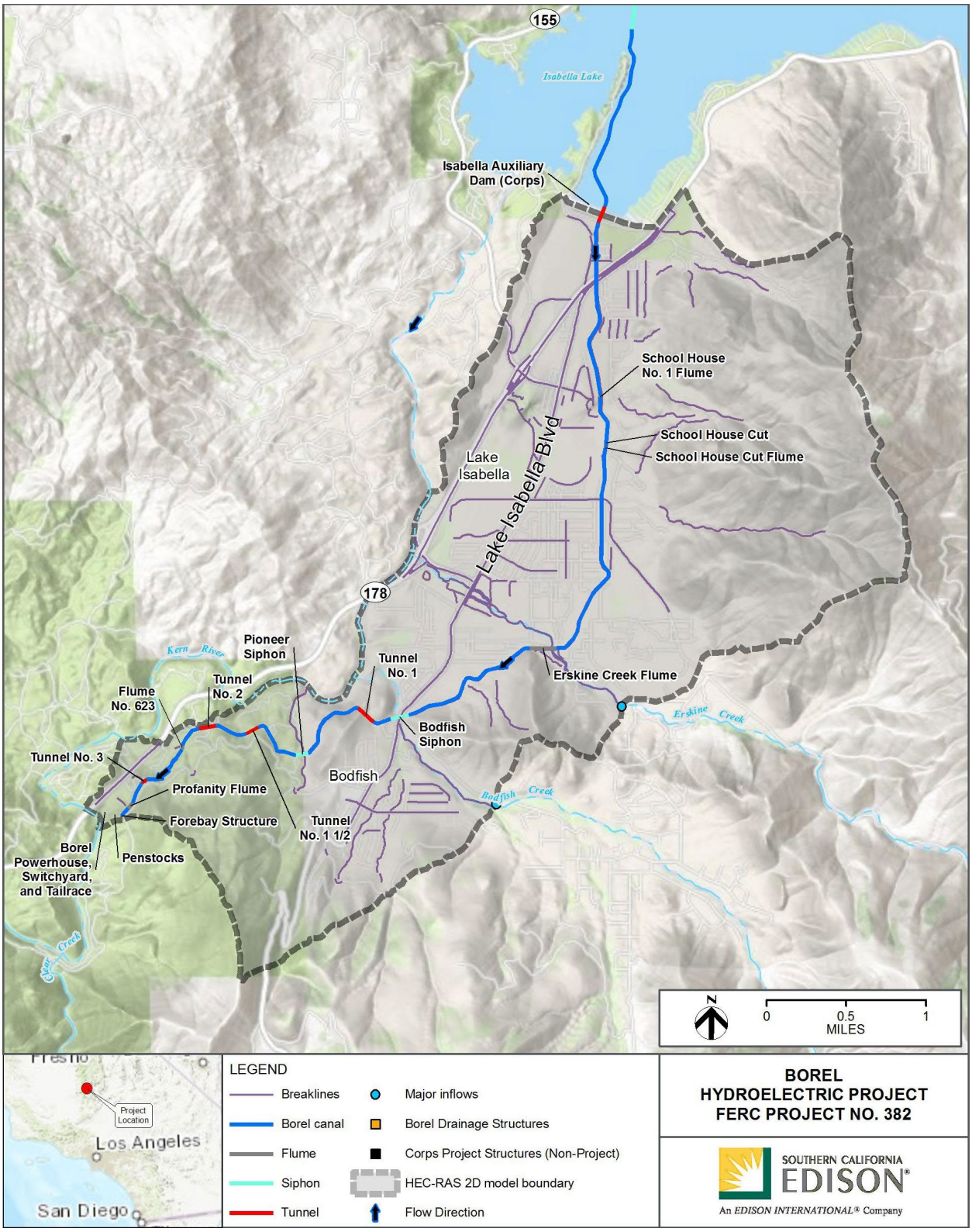


**Figure 1-1. Study Location and Borel Project Drainage Features**

# 2 Background Information

## 2.1 Watershed Description

The study area is part of the Kern River watershed, which includes several urban areas within the valley floor in the vicinity of Lake Isabella, upper watersheds, and principal drainages such as Bodfish and Erskine Creeks. The natural ground cover in the study area is chaparral and woodland, with residential or commercial landscaping in the urban areas. The stormwater runoff from the surrounding hillside slopes and upper watersheds flow to the valley floor toward the Kern River. The two largest basins located along the Borel Project have 100-year peak flood flows in the magnitude of 1,500 cubic feet per second[1]. The principal drainages cross the existing Borel Project and continue along Erskine and Bodfish creeks, respectively, until both reach the Kern River. The Borel Project was constructed above the Erskine Creek drainage course in an above-ground flume. Bodfish Creek flows over natural ground in a section of the Borel Project containing an underground siphon. Other smaller basins drain directly into the canal and when the Borel Project was operating, passed through the Powerhouse and discharged into the Kern River.

## 2.2 Previous Studies

In 2017, an initial hydrologic and hydraulic study was performed for the Borel Project area where peak flows and capacities along the Canal were developed. The study developed a Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS) model that was used to determine the hydrology and a HEC-RAS one-dimensional (1D) model that was used to analyze specific facilities along the Borel Project. Complete documentation was not obtained from this previous study; therefore, it was not used as part of this analysis.

## 2.3 Data Collection

Hydrologic inputs, terrain data, and inputs into the HEC-RAS 2D hydraulic model were developed to complete the preliminary hydraulic analysis, characterize flood flow patterns, and complete the preliminary drainage analysis. The following sources were used:

1. Hydrologic inputs were developed for a range of frequency-based design precipitation events using the National Oceanic and Atmospheric Administration (NOAA) Atlas 14-point precipitation data (Perica et al. 2011) and the *Kern County Hydrology Manual* (Hromadka 1995)
2. A digital terrain model was developed using the best available topographic data for existing conditions and natural grade configuration:
   a. Existing Conditions - With Borel Project
   b. Natural Grade Conditions - Without Borel Project
3. Saturated hydraulic conductivity (Ksat) infiltration rates from the Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) database used to calculate infiltration rate of soils.

[1] Peak flows were reported in a figure developed by Cardno in 2017 (Cardno 2017) and were confirmed using StreamStats.

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# 3 Model Development

This section provides a summary of model development such as hydrologic inputs, terrain data, and an HEC-RAS 2D hydraulic model. The hydraulic model was developed to characterize flood flow patterns and assess the feasibility of the proposed Borel Project, retaining the Borel Project as a series of linear detention basins. The development of the hydrology, terrain data and hydraulic model is described in the following subsections.

## 3.1 Hydrologic Inputs

Hydrologic inputs to the model were computed to characterize flow patterns in the hydraulic model for a range of frequency-based storm events. The hydrologic inputs are required to calculate precipitation over the watershed as well as the inflow from large upstream drainages. Frequency-based design precipitation events (hyetographs and precipitation excess time series) and frequency-based design inflow hydrographs for Erskine and Bodfish creeks were computed.

The frequency-based design precipitation events were developed. Estimates for regional precipitation were obtained by accessing historical precipitation records. NOAA Atlas 14, Volume 6, Version 2 (Perica et al. 2011) provided annual maximum precipitation depth-duration-frequency relationships for selected durations and frequencies based on regional analysis of the historical precipitation records. Annual maximum series-based point precipitation estimates for a point in the mountain range east of Borel Project (35.6131°, -118.4416°) were acquired. Representative durations (5-minute, 10-minute, 15-minute, 30-minute, 1-hour, 2-hour, 3-hour, 6-hour, 12-hour, and 24-hour) and frequencies (2-year, 10-year, 50-year, 100-year, and 500-year) were selected for each annual maximum series. The annual maximum series-based point precipitation estimates are shown in Table 3-1.

The methods to balance the depth-duration-frequency precipitation estimates into a 24-hour precipitation hyetograph were applied using the *Kern County Hydrology Manual* (Hromadka 1995) methods. The *Kern County Hydrology Manual* used a modification of the Soil Conservation Service (SCS) 24-hour storm pattern for balancing and nesting the depth-duration data into a precipitation hyetograph. The method also accounts for depth area effects. Using this method, a balanced 24-hour precipitation hyetograph for each of the five frequencies was developed. The resulting rainfall hyetographs for each of the five frequencies are shown in Figure 3-1 through Figure 3-5.

The *Kern County Hydrology Manual* methods were applied to compute rainfall losses. Rainfall losses account for initial abstraction and infiltration of the rainfall. The *Kern County Hydrology Manual* uses a modification of the SCS Curve number method to compute losses and apply them to the rainfall hyetograph, resulting in a rainfall excess time series. Inputs to the modified SCS Curve Number method are hydrologic soil type, percent impervious, and land cover type. Spatial data were acquired by using Geographic Information System using inputs from hydrologic soil type from U.S. Department of Agriculture Natural Resources Conservation Service Soil Survey Geographic database (USDA-NRCS 2020) and percent impervious and land cover type from the National Land Cover Database (NLCD 2016). The loss time series for each of the five frequencies are shown in Figure 3-1 through Figure 3-5, above each of the respective precipitation hyetographs.

 

**Table 3-1. Annual Maximum Series-based Point Precipitation Frequency Estimates (in inches; Latitude 35.6131° North, Longitude -118.4416° West)**

| Duration | 2-year | 10-year | 50-year | 100-year | 500-year |
|---|---|---|---|---|---|
| 5-minute | 0.12 | 0.24 | 0.38 | 0.45 | 0.64 |
| 10-minute | 0.16 | 0.34 | 0.54 | 0.65 | 0.92 |
| 15-minute | 0.20 | 0.42 | 0.66 | 0.78 | 1.12 |
| 30-minute | 0.27 | 0.56 | 0.89 | 1.06 | 1.51 |
| 1-hour | 0.38 | 0.80 | 1.26 | 1.49 | 2.13 |
| 2-hour | 0.58 | 1.09 | 1.66 | 1.96 | 2.78 |
| 3-hour | 0.72 | 1.32 | 2.00 | 2.35 | 3.31 |
| 6-hour | 1.01 | 1.82 | 2.72 | 3.17 | 4.42 |
| 12-hour | 1.32 | 2.60 | 3.91 | 4.54 | 6.20 |
| 24-hour | 1.70 | 3.76 | 5.74 | 6.66 | 8.95 |

Source: NOAA Atlas 14, Volume 6, Version 2 (Perica et al. 2011)

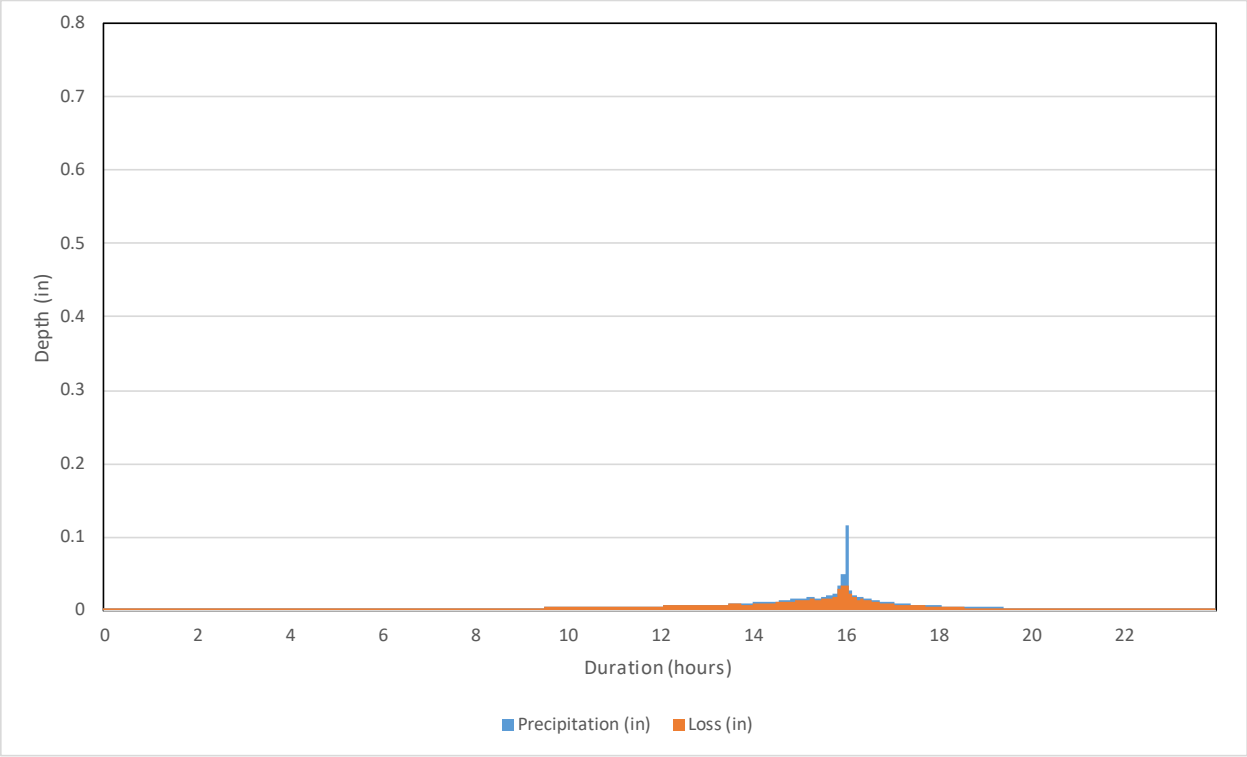


**Figure 3-1. 2-year Precipitation Hyetograph and Loss Time Series**

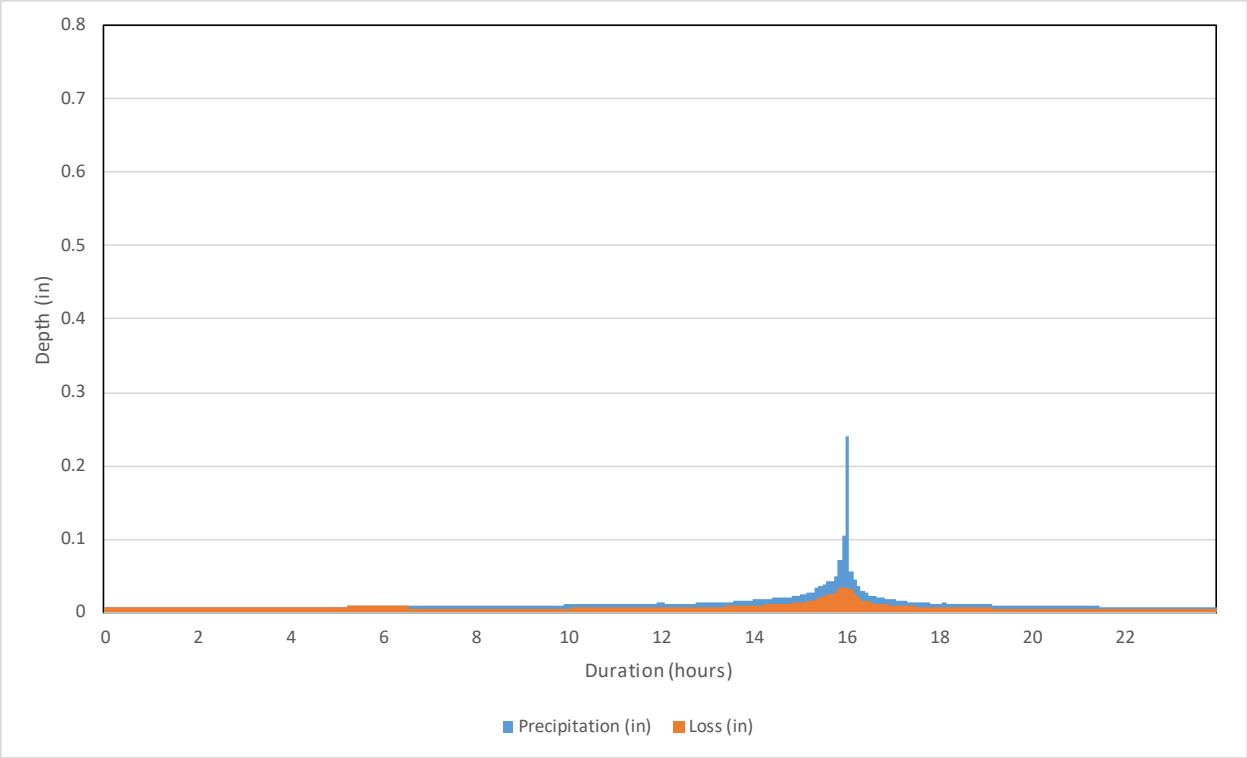


**Figure 3-2. 10-year Precipitation Hyetograph and Loss Time Series**

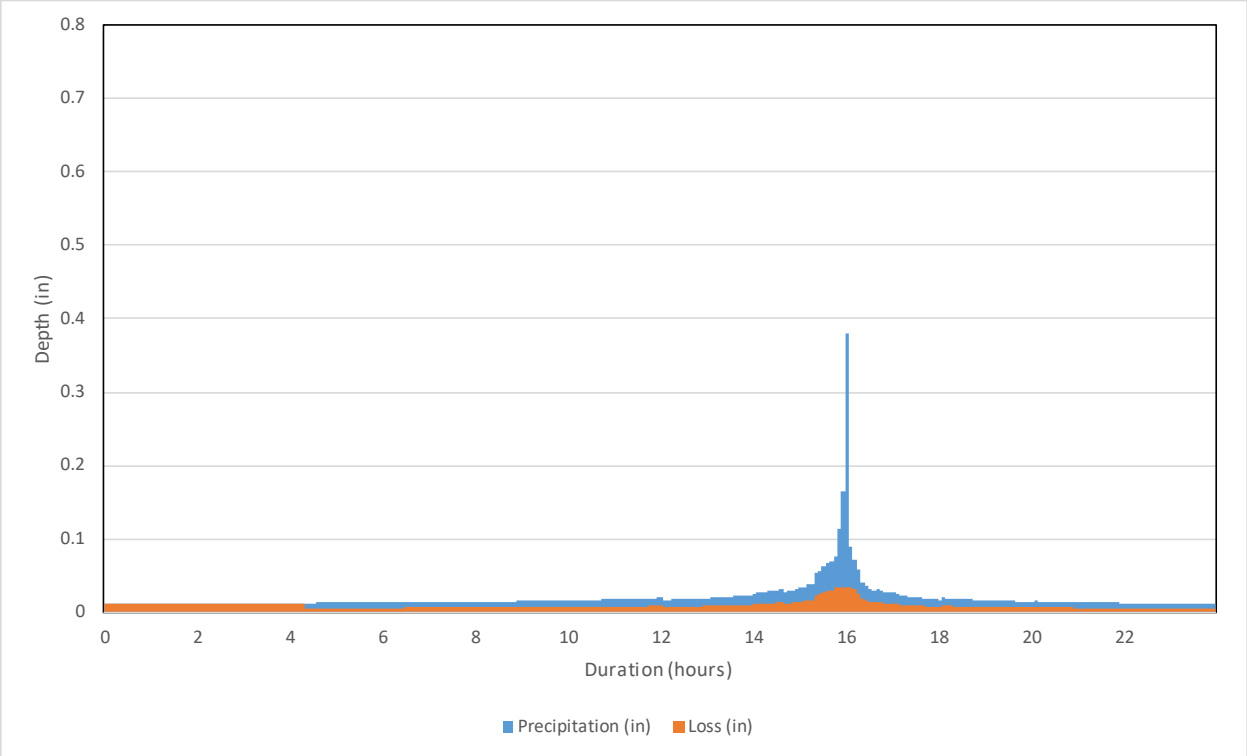


**Figure 3-3. 50-year Precipitation Hyetograph and Loss Time Series**

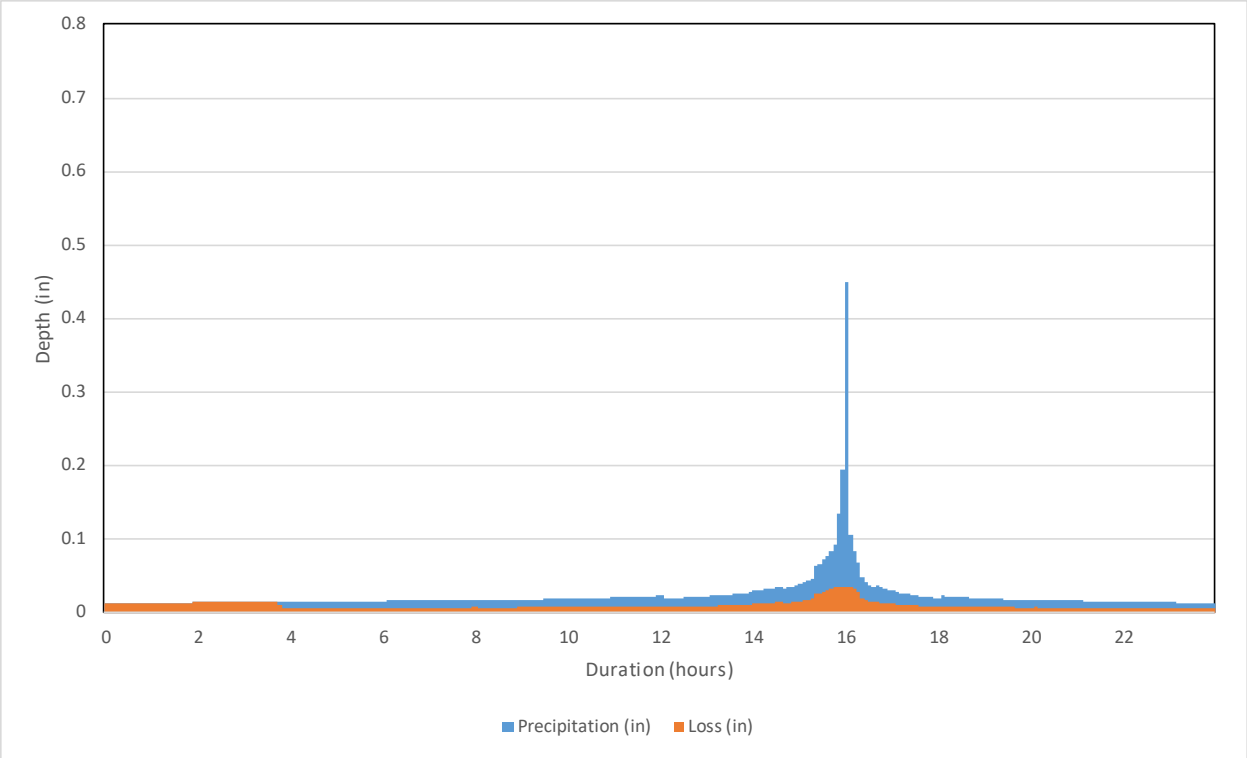


**Figure 3-4. 100-year Precipitation Hyetograph and Loss Time Series**

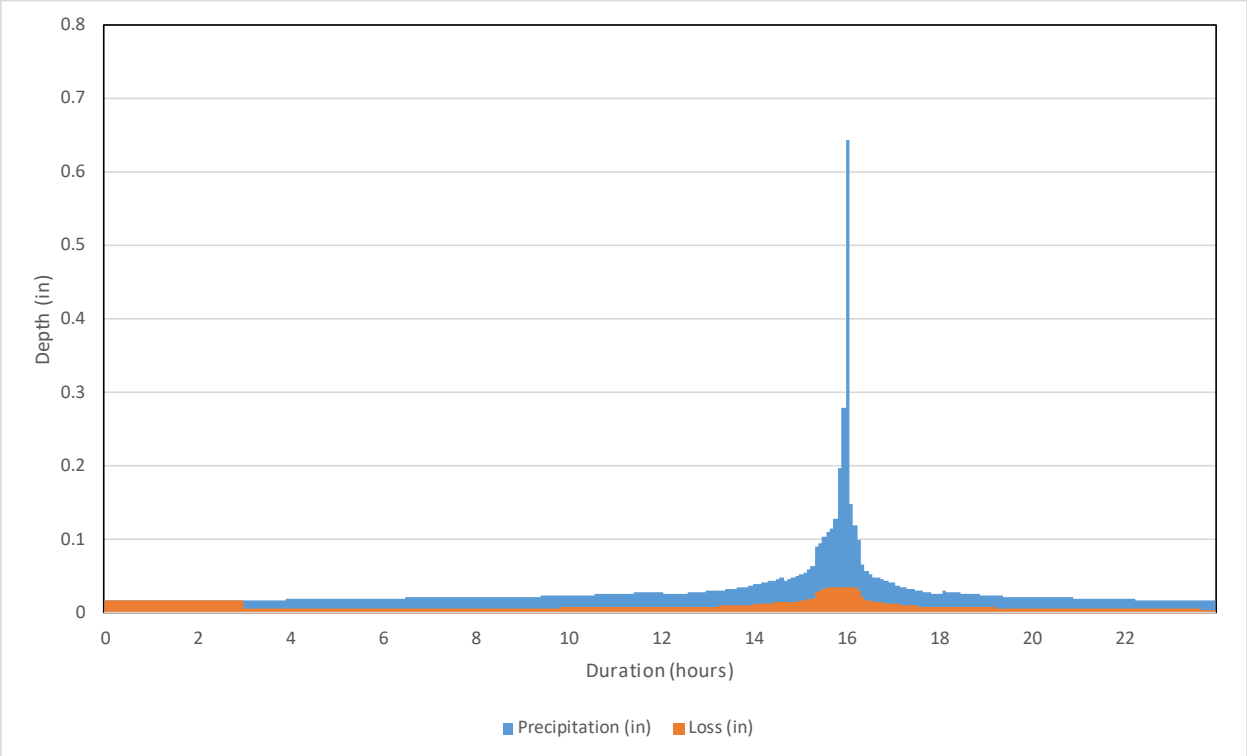


**Figure 3-5. 500-year Precipitation Hyetograph and Loss Time Series**

The following process was used to develop the frequency-based design inflow hydrographs for Erskine and Bodfish creeks:

1. Design precipitation events (hyetographs and precipitation excess time series) were developed for the Erskine and Bodfish Creek upper watersheds following the same steps described in the previous section. Figure 3-6 shows the upper watersheds in relation to the Borel study area (valley floor detailed model).
2. A routing model of the upper watersheds was developed using HEC-RAS 2D. The HEC-RAS 2D model used the best available terrain data for the upper watershed (U.S. Geological Survey [USGS] 10-meter digital elevation model [DEM]), and Manning's roughness values were applied to the grid cell faces based land cover observed in aerial imagery.
3. The rainfall excess time series for each of the five frequencies from step 1 to the HEC-RAS 2D model were applied to compute stormwater runoff hydrographs.
4. The stormwater runoff hydrographs peak flow was compared to the peak flows computed by Cardno (as a contractor to SCE) and USGS StreamStats.

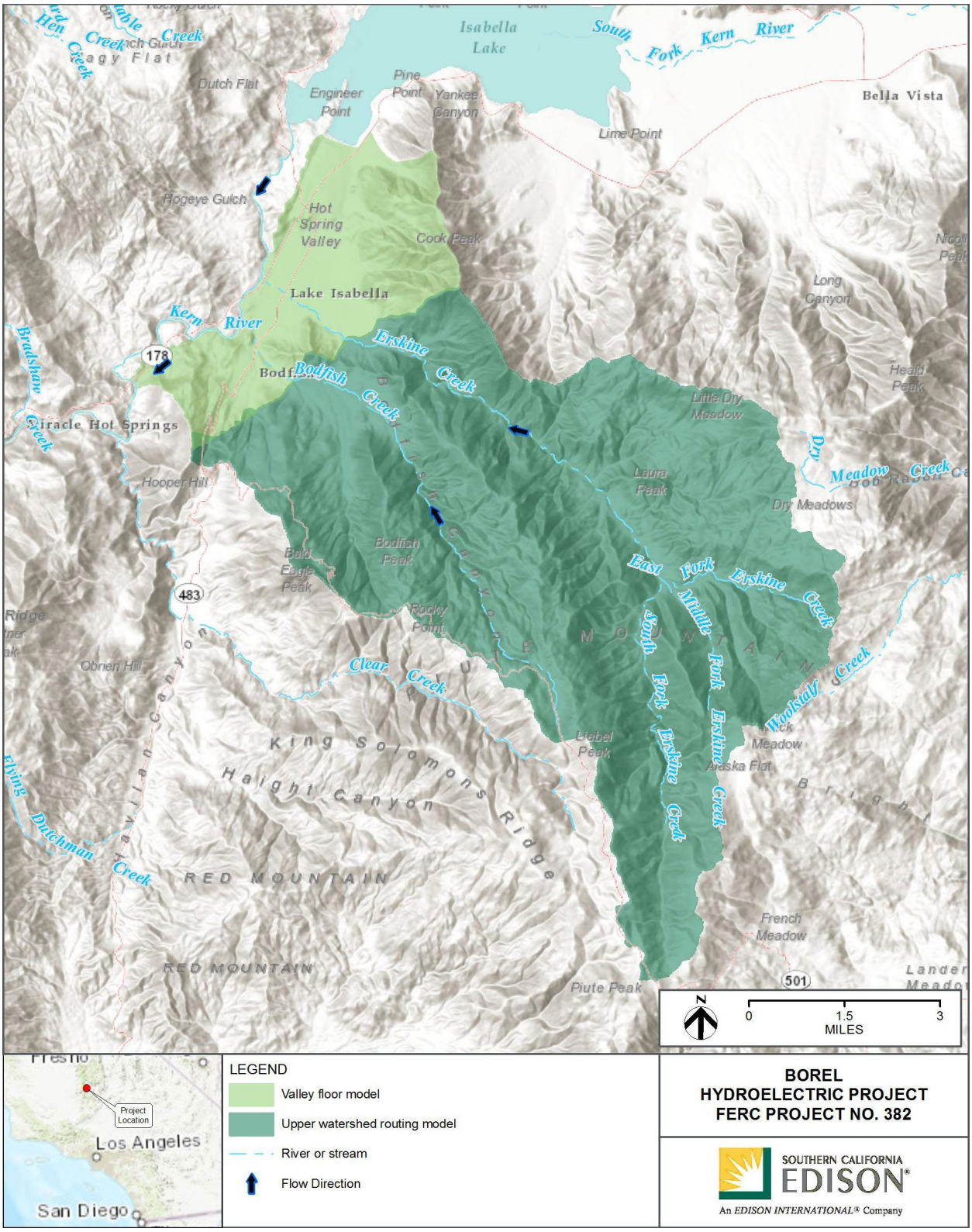


**Figure 3-6. Watershed Boundaries**

## 3.2 Terrain

The Borel Project terrain was developed from one Light Detection and Ranging (LiDAR) dataset and supplemented with the DEM: *Erosion and Sedimentation within the Kern River Canyon, CA* hosted by *Open Topography and National Elevation Dataset (NED) 1/3 arc-second,* available on the USGS National Map Viewer (USGS 2019). The USGS DEM was used to fill LiDAR coverage gaps along the boundary of the survey in order to cover the entire modeled area as shown in Figure 3-7. Both data sources were transformed to the project coordinate system: North American Datum of 1983 (NAD83), California State Plane Coordinate System Zone 5.

A LiDAR quality assessment was completed to check for obvious errors with the data. The assessment was made by an experienced LiDAR data processor familiar with all aspects of collection, processing, and analyses as well as relevant standards and guidelines. Recommendations were made to reclassify the LAS files in order to produce a more accurate ground model. Reclassification of the LiDAR was performed, including the removal of buildings and bridges that were classified incorrectly as ground (LAS class 2).

LiDAR point clouds and elevation points extracted from the USGS DEM were utilized to produce an ESRI terrain triangulated surface. A DEM was produced from bare earth ground surface consisting of only classified ground returns for the model terrain. Facilities along the Borel Project such as the flumes, siphons, and penstocks were represented within the terrain. Boundaries were delineated around features that should be excluded from the terrain representing natural grade conditions. Digitized exclusion polygons coupled with elevations values from the terrain were utilized to create a triangular irregular network (TIN). DEM patches were produced from the TIN to model the natural grade conditions, which restored the terrain to natural grade as shown in Figure 3-8.

 

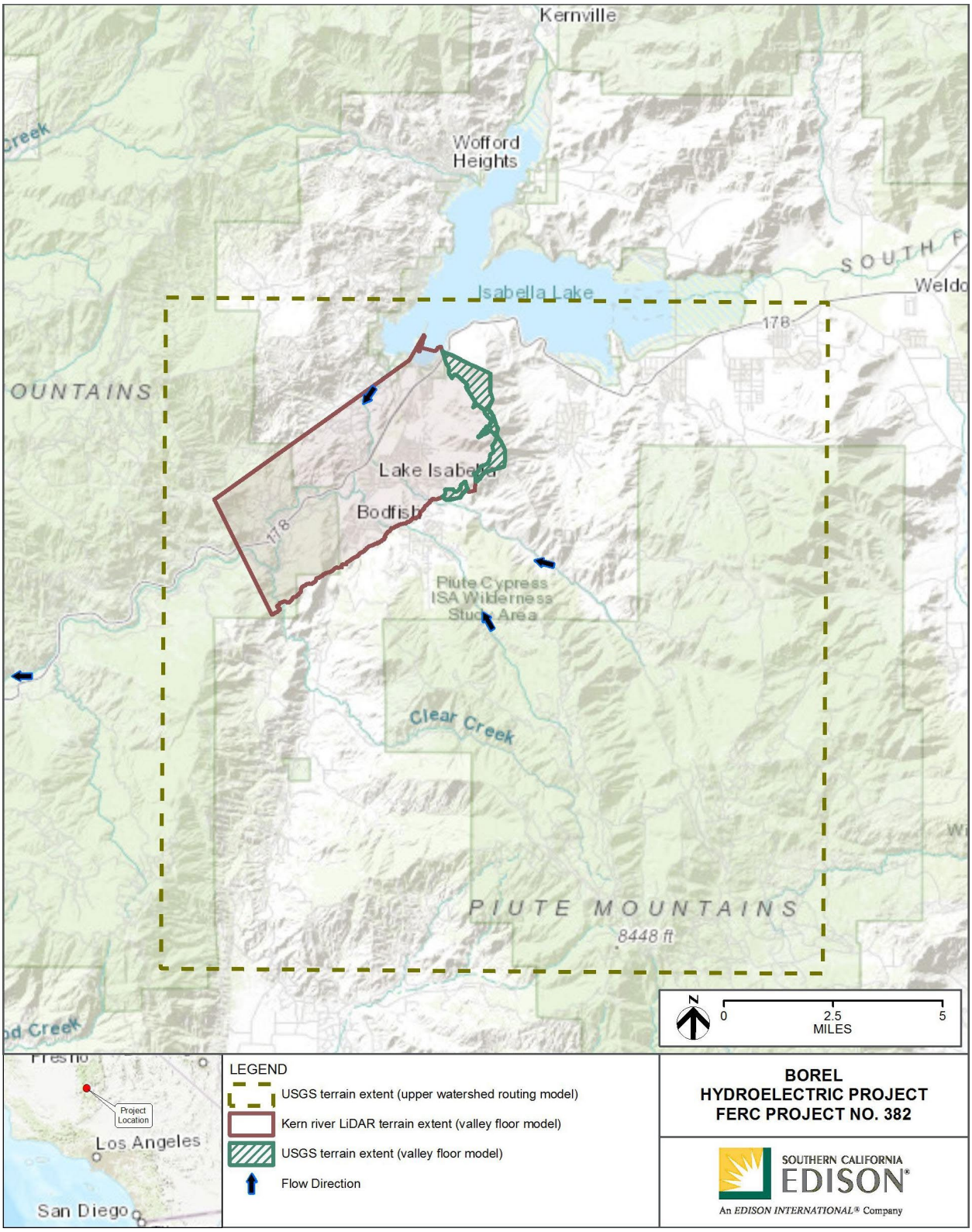


**Figure 3-7. Elevation Data Extents**

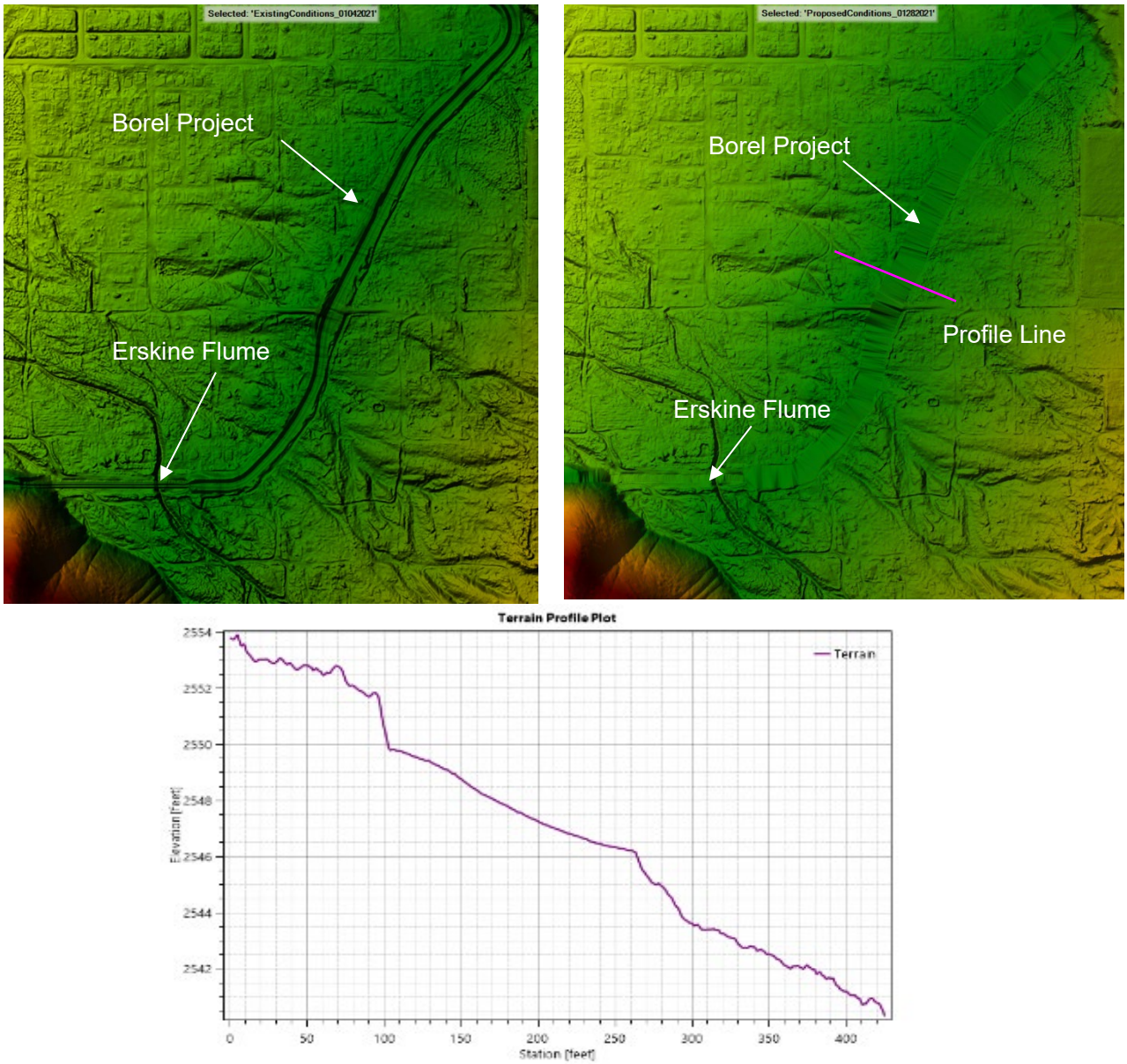


**Figure 3-8. Borel Project Removal – Natural Grade Terrain**

## 3.3 Hydraulic Model Development

This section describes the development of a HEC-RAS 2D rain-on-grid unsteady flow hydraulic model. The hydraulic model was developed to perform the drainage analysis.

An initial sensitivity and discovery analysis was executed using the hydraulic model to understand stormwater runoff patterns. Several simulations were performed using the two geometries described below. The results of various conditions evaluated in the sensitivity analysis were compared to gain an understanding of the potential stormwater runoff patterns. Section 3.4 describes the sensitivity analysis and results.

The following two conditions were evaluated as part of the initial sensitivity and discovery analysis.

- **Existing Conditions** – The Borel Project in existing state with conveyance facilities in place.
- **Natural Drainage Conditions** – The Borel Project removed. The terrain along the canal alignment is restored to natural grade.

The hydraulic model was also used to perform a preliminary drainage analysis of the proposed detention basin conceptual design described in the Plan. The drainage analysis is described in Section 4.

The model domain encompassed the watershed areas that contribute to the flow in the Borel Project below the Lake Isabella Auxiliary Dam, except for upper watersheds of Erskine and Bodfish creeks. The model domain is shown in Figure 1-1. Table 3-2 summarizes the model configuration for both the existing and natural grade conditions. Table 3-3 summarizes the boundary conditions used for both the existing and natural grade conditions model.

**Table 3-2. Model Configuration Summary**

| Parameter or Feature | Description |
|---|---|
| Model | HEC-RAS 2D rain-on-grid model, including the associated Borel Project flumes, siphons, penstocks, and drainage culverts; the model is used for the preliminary evaluation of the hydraulic impacts associated with the decommissioning of the Borel Project |
| Model Version | HEC-RAS v5.0.7, released March 2019 |
| Vertical Datum | North American Vertical Datum of 1988 |
| Equation Set | Full momentum |
| Model Domain | Model extends from Lake Isabella Dam to Kern River, covering 10.57 square miles |
| Major Hydraulic Features | • Flumes – configured within the terrain and 2D connection in order to represent the opening underneath the flume<br>• Siphons – configured with a 2D connection<br>• Canal – configured within the terrain and breaklines<br>• Penstocks – configured with a 2D connection<br>• Highway 155 and 178 – represented in the terrain<br>• Drainage culverts – configured using 2D connections with culverts; the culvert sizes were based on available design drawings and estimated from aerial imagery<br>Flumes, siphons, and the penstocks are not represented within the natural grade conditions model domain. |

**Table 3-2. Model Configuration Summary**

| Parameter or Feature | Description |
|---|---|
| Hydraulic Scenarios | • Existing conditions and natural grade conditions:<br>  ○ Valley floor, hill slopes within the valley floor, and upper watershed precipitation scenarios:<br>  ▪ 2-year<br>  ▪ 10-year<br>  ▪ 50-year<br>  ▪ 100-year<br>  ▪ 500-year<br>  ○ Hill slopes within the valley floor and upper watershed runoff scenarios:<br>  ▪ 10-year<br>  ▪ 100-year |
| Embankment Performance | The following are configured in the model using breaklines:<br>• Embankments<br>• High ground within the Borel Project area specifically the valley floor<br>Embankments are allowed to overtop but not fail. |
| 2D Flow Areas | One 2D flow area was used to represent the study area.<br>The 2D flow area uses 50-foot nominal grid cell size, with 120,368 cells covering approximately 10.57 square miles.<br>Breaklines and grid cell refinement (to sizes less than 50 feet) were used to align the grid cell faces with hydraulically significant features (e.g., roads, embankments, high ground). |
| Manning's *n* Values | Manning's *n* values were assigned to the computational grid based on the National Land Cover Database (NLCD 2016). The land use types were correlated with Manning's *n* values consistent with industry standards. Recommended Manning's *n* values range from 0.013 to 0.4, depending on the land use type. The Manning's *n* value was increased to 1,000 for houses and buildings located within the modeled area. This approach to representing structures with increased roughness values is used to minimize model instability.<br>For areas where the land cover was not consistent with observations from ESRI aerial imagery, the land cover was updated/adjusted based on the aerial imagery. |
| Topography Data | LiDAR with supplemental DEM<br>• LiDAR<br>  ○ Dataset Name: Erosion and Sedimentation within the Kern River Canyon, CA<br>  ○ Survey Date: 10/09/2016 – 10/10/2016<br>  ○ Downloaded from OpenTopography (Krugh 2019)<br>• DEM<br>  ○ Dataset Name: USGS NED 1/3 arc-second n36w119 1 x 1 degree IMG 2019<br>  ○ Publication Date: 09/24/2019<br>  ○ Downloaded from USGS 3DEP National Map Viewer (USGS 2019)<br>Cell resolution: the base terrain used in the model has a cell resolution of 2 feet; additional terrain layers have cell resolution as low as 0.1 foot. |
| Rainfall | Developed based on NOAA Atlas 14-point precipitation data as described in Section 3.1, Hydrologic Inputs. |

**Table 3-2. Model Configuration Summary**

| Parameter or Feature | Description |
|---|---|
| Infiltration | Infiltration was taken into account outside the HEC-RAS 2D model by computing losses as described in Section 3.1, Hydrologic Inputs. |
| Computation Time Step | The nominal time step is 1 second. However, a variable time step is applied using HEC-RAS advanced time step control to adjust the time steps based on a series of divisors. |
| Simulation Time | 24 hours (1 day) |

**Table 3-3. Model Boundary Conditions**

| Location | Value or method used |
|---|---|
| Lake Isabella | Normal depth outflow (out of system) into Lake Isabella<br>Friction slope = 0.085 |
| Kern River at State Route 178 and Elizabeth Norris Road | Normal depth outflow (out of system) into Kern River<br>Friction slope = 0.08 |
| Kern River at State Route 178 and Borel Road | Normal depth outflow (out of system) into Kern River<br>Friction slope = 0.02 |
| Kern River at Borel Canyon Hydroelectric Power Plant | Normal depth outflow (out of system) into Kern River<br>Friction slope = 0.417 |
| 2D Model Boundary | Precipitation developed based on NOAA Atlas 14-point precipitation data as described in Section 3.1, Hydrologic Inputs |
| Erskine Creek | Flow hydrograph |
| Bodfish Creek | Six flow hydrographs are used to represent the Bodfish watershed inflow |

## 3.4 Sensitivity and Discovery Analyses to Investigate Storm Runoff Patterns

A set of sensitivity discovery analyses were performed to investigate stormwater runoff patterns that could result if the terrain along the canal alignment were restored to natural grade. A total of fourteen simulations were performed. The 14 simulations are made up of runs for both the existing and natural grade conditions, five storm frequencies, and two rainfall locations.

- Existing and natural grade conditions:
  - Valley floor local storm:
    - 2-year
    - 10-year
    - 50-year
    - 100-year
    - 500-year

- Hill slopes and upper watershed runoff scenarios:
  - 10-year
  - 100-year

Only six of the scenario results are presented in this report as these are sufficient to show drainage patterns and present information relevant to the drainage analysis. The information for the other scenarios is available in the model if needed for future analyses. The existing conditions model domain includes the Borel Project, which extends from Lake Isabella to the Kern River. The Borel Project facilities, including flumes and siphons, are included explicitly in the model geometry. The natural grade conditions model domain shows the Borel Project removed and returned to existing grade. A terrain patch was developed to represent the terrain restored back to natural grade as shown in Figure 3-6. Flumes, siphons, and other facilities associated with the canal were removed for this analysis. A series of 2D connections with culverts were used to account for the main drainage culverts within the modeled area under Kern County jurisdiction, in locations away from the canal alignment. The culvert sizes were generally estimated from aerial imagery for the analyses and results presented herein because physical data was not available.

### 3.4.1 Sensitivity and Discovery Analyses Results

As part of the sensitivity and discovery analyses, simulations were completed for the 2-, 10-, 50-, 100-, and 500-year design storm events. The initial set of simulations assumed that both the valley floor and upper watersheds experienced the storm event. The second set of simulations were developed to analyze the flow routing when the upper watersheds and hill slopes adjacent to the valley floor experienced a storm event and the valley floor did not.

Findings for the 10- and 100-year simulations are discussed below. The other simulations are available in the model for future use. For the initial set of simulations (storm centered over the entire watershed), the maximum depth results for the 10- and 100-year (existing conditions and natural grade conditions) simulations are shown in Figure 3-9 through Figure 3-12. Based on the comparison between the existing and natural grade conditions, there was an overall increase in extent of inundation within the valley floor west of the canal when the canal was removed. However, due to changing flow patterns, some areas resulted in an increase in inundation depth, while other areas resulted in a decrease in inundation depth.

The principal difference between the existing conditions and natural grade conditions is that under existing conditions, stormwater runoff in many areas was found to be intercepted by the canal and redirected, while under natural grade conditions; the water was able to freely pass over the canal alignment terrain that had been returned to natural grade. To illustrate these changes in maximum depth, depth difference grids were created by subtracting the existing condition maximum depth results from the natural grade condition maximum depth results. These depth difference grids for the 10- and 100-year simulation are shown in Figure 3-9 and Figure 3-11, respectively. Maximum depths were also calculated from the results along profile lines to provide a general sense of the magnitude of changes in inundation depths at various locations. The alignment of the profile lines is shown in Figure 3-9 through Figure 3-12**.** The difference in maximum depth between existing and natural grade conditions along these profile lines was computed and is shown in Table 3-4. The maximum difference in depth along the profile lines was calculated by subtracting the existing conditions from the natural grade conditions.

 

**Table 3-4. Difference in Local Storm Depth between Existing and Natural Grade Conditions**

| Cross Section | Maximum Depth[a] (feet) | | | | Difference[b] (feet) | |
|---|---|---|---|---|---|---|
| | Existing Conditions | | Natural Grade Conditions | | | |
| | 10-year | 100-year | 10-year | 100-year | 10-year | 100-year |
| 1 | 2.99 | 3.54 | 2.88 | 3.36 | -0.11 | -0.18 |
| 2 | 0.67 | 2.29 | 1.37 | 2.37 | 0.7 | 0.08 |
| 3 | 1.42 | 3.60 | 2.86 | 5.58 | 1.44 | 1.98 |
| 4 | 1.34 | 1.42 | 1.42 | 1.61 | 0.08 | 0.19 |
| 5 | 3.90 | 4.51 | 2.32 | 3.34 | -1.58 | -1.17 |
| 6 | 2.73 | 3.66 | 2.53 | 3.35 | -0.2 | -0.31 |
| 7 | 3.83 | 4.63 | 3.84 | 4.78 | 0.01 | 0.15 |
| 8 | 1.07 | 2.42 | 1.66 | 2.21 | 0.59 | -0.21 |
| 9 | 0.32 | 1.43 | 0.80 | 1.44 | 0.48 | 0.01 |
| 10 | 4.88 | 5.95 | 4.85 | 5.93 | -0.03 | -0.02 |
| 11 | 4.47 | 7.12 | 3.99 | 6.17 | -0.48 | -0.95 |
| 12 | 9.55 | 21.09 | 9.50 | 21.31 | -0.05 | 0.22 |
| 13 | 2.04 | 2.57 | 2.09 | 2.99 | 0.05 | 0.42 |
| 14 | 5.69 | 7.97 | 5.70 | 7.99 | 0.01 | 0.02 |

[a] These depths represent the maximum depth along the entire profile line.
[b] The differences for each cross-section depth value for the 10-year and 100-year was calculated by subtracting the existing value from natural grade value.

Similar results were generated for the second set of simulations where the design storm was centered over the upper watershed. A comparison between the natural grade and existing conditions extent of inundation for the 10- and 100-year simulations is shown in Figure 3-10 and Figure 3-12, respectively. Separate figures were developed to show the magnitude of changes in inundation depth between existing and natural grade conditions. For these figures, the existing condition maximum depth results were subtracted from the natural grade condition maximum depth results and depth difference grids were created. These depth difference grids for the 10- and 100-year simulations are shown in Figure 3-13 and Figure 3-14, respectively.

 

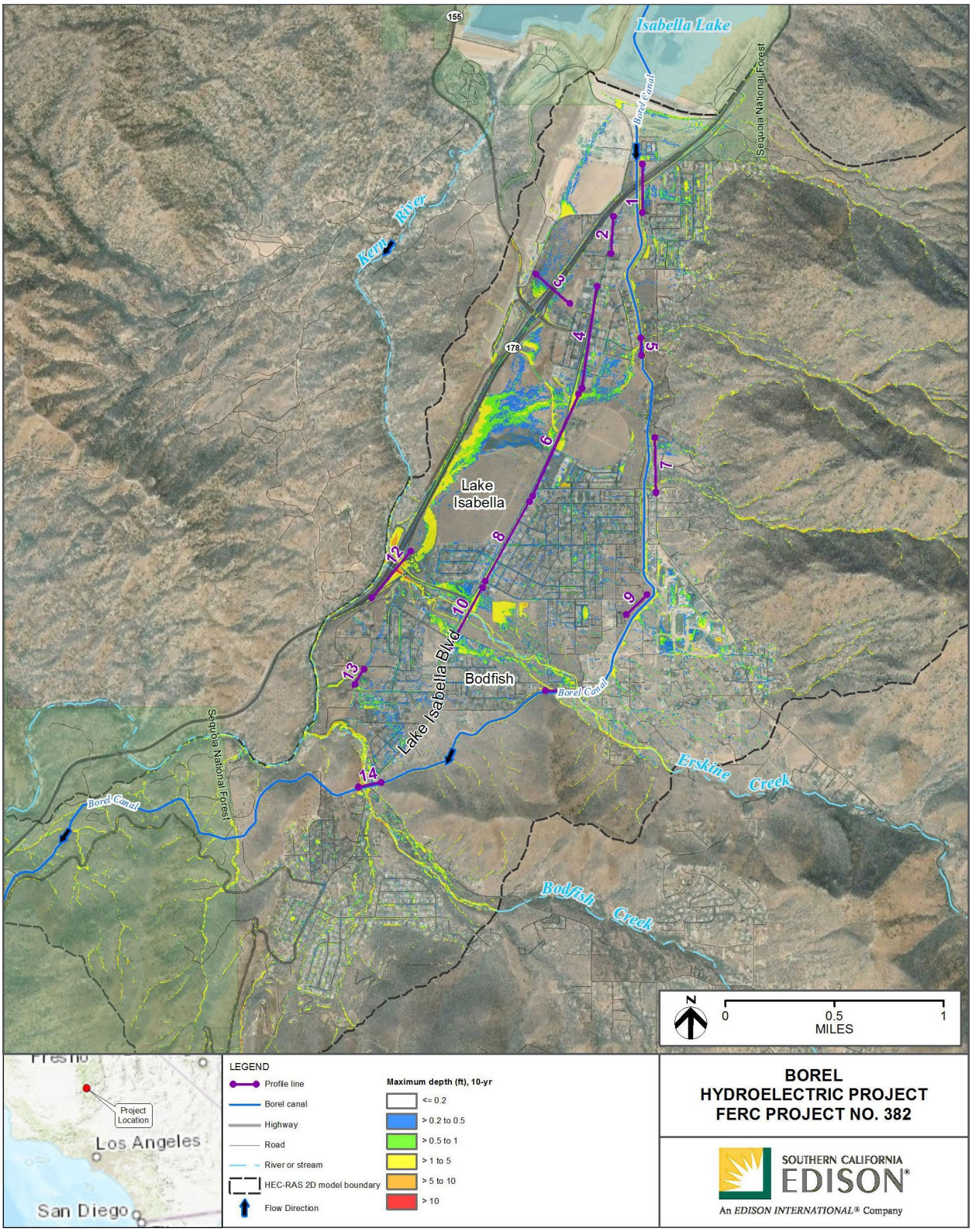


**Figure 3-9. Existing Conditions Local Storm Maximum Depth – 10 Year**

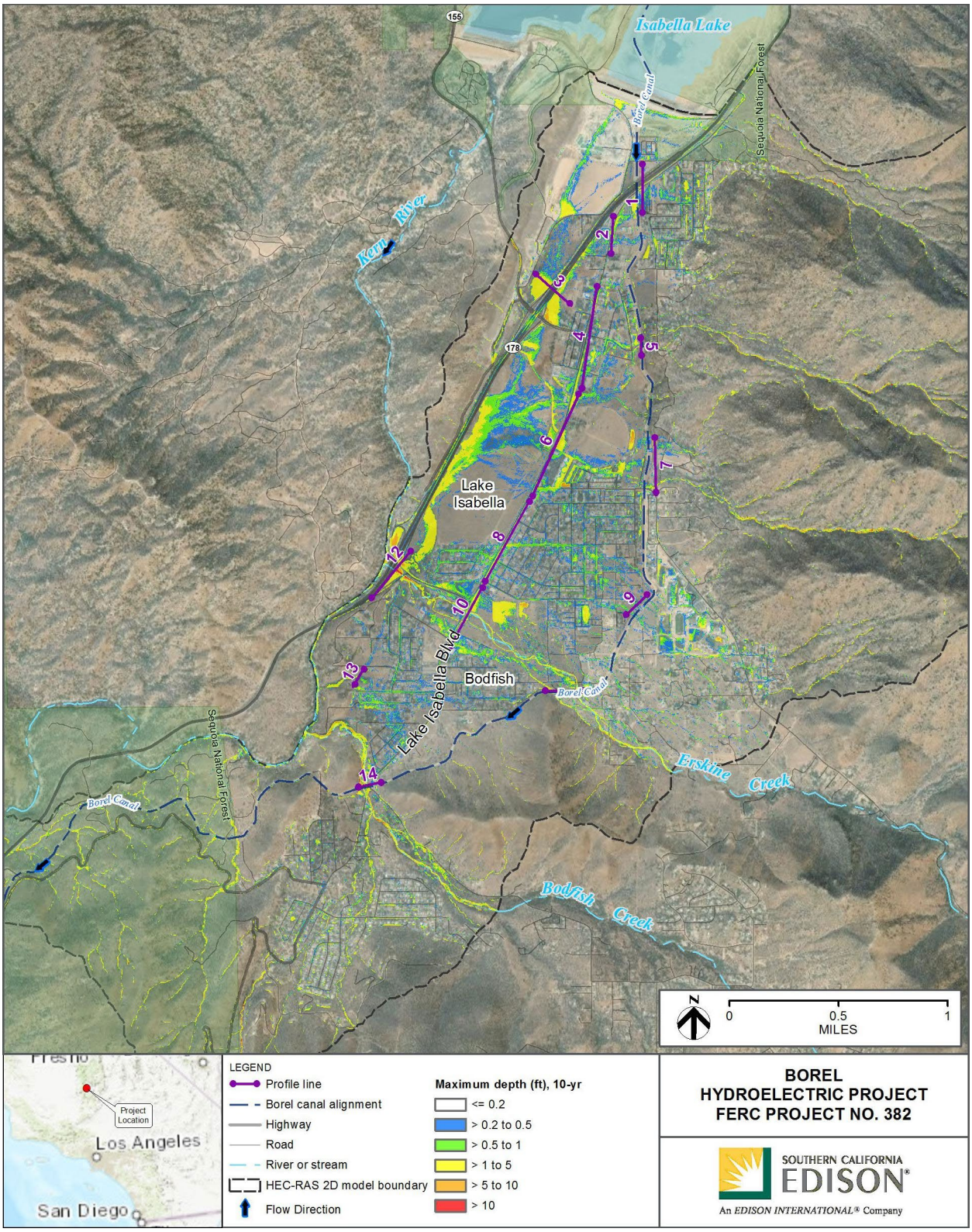


**Figure 3-10. Natural Grade Conditions Local Storm Maximum Depth – 10 Year**

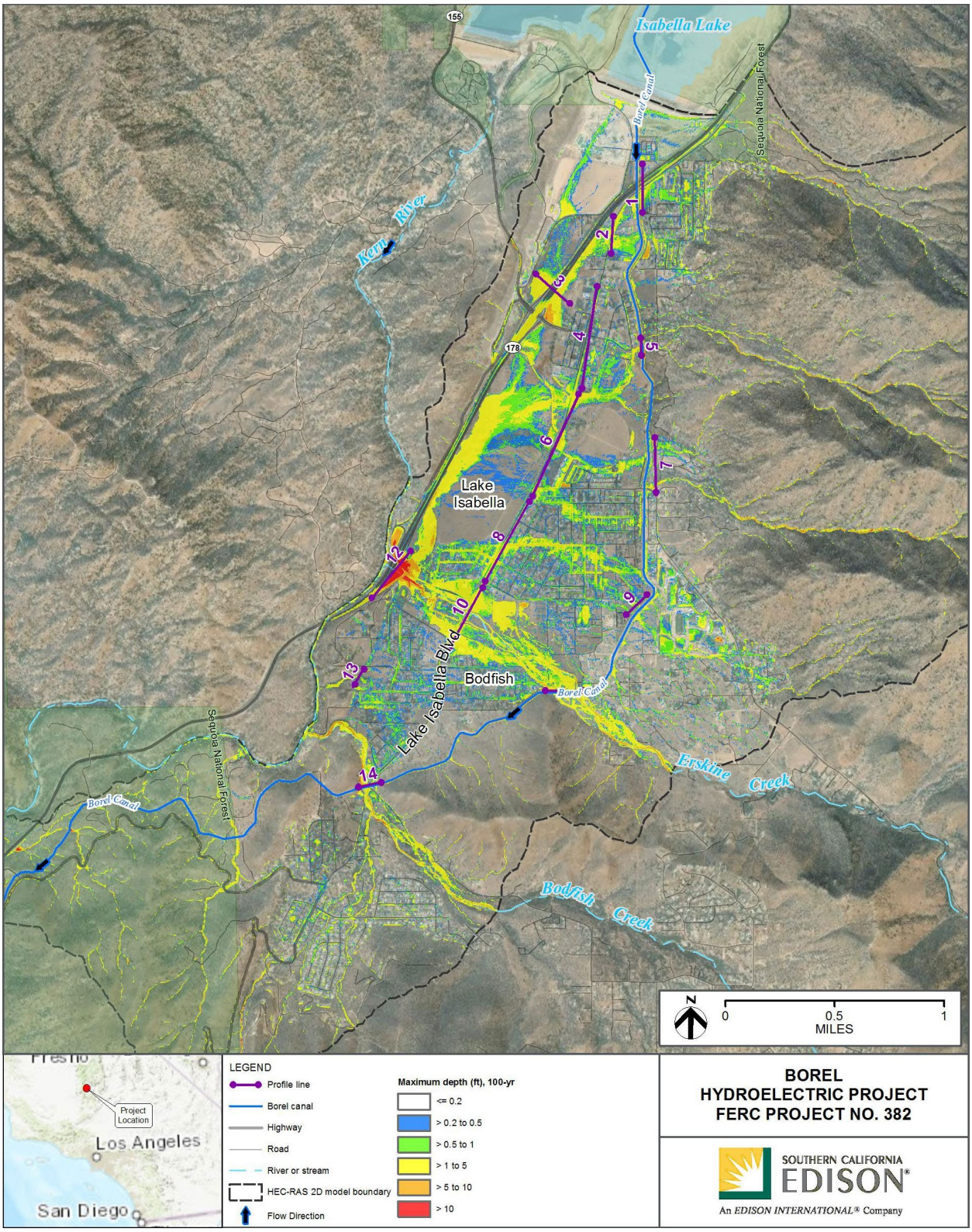


**Figure 3-11. Existing Conditions Local Storm Maximum Depth – 100 Year**

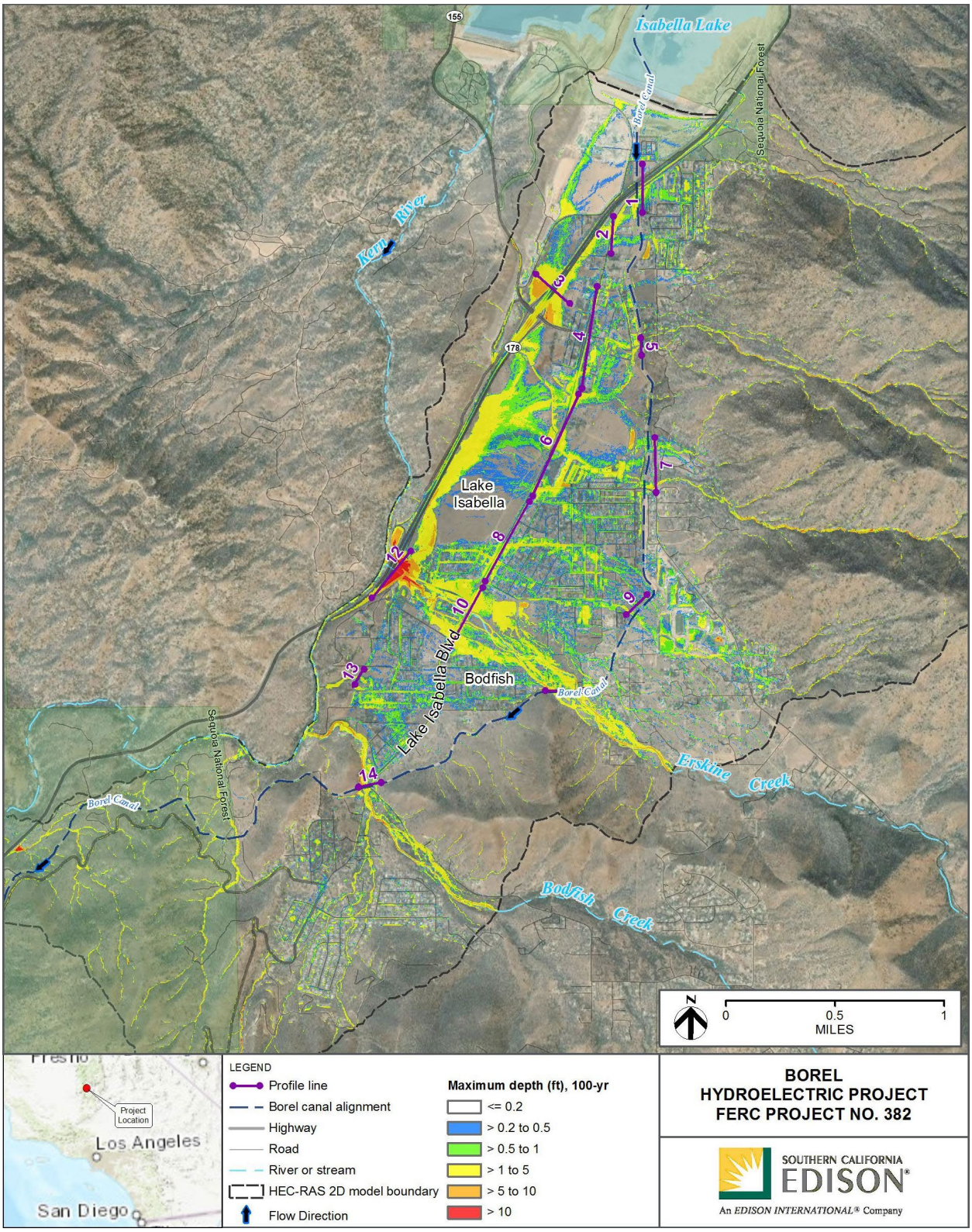


**Figure 3-12. Natural Grade Conditions Local Storm Maximum Depth – 100 Year**

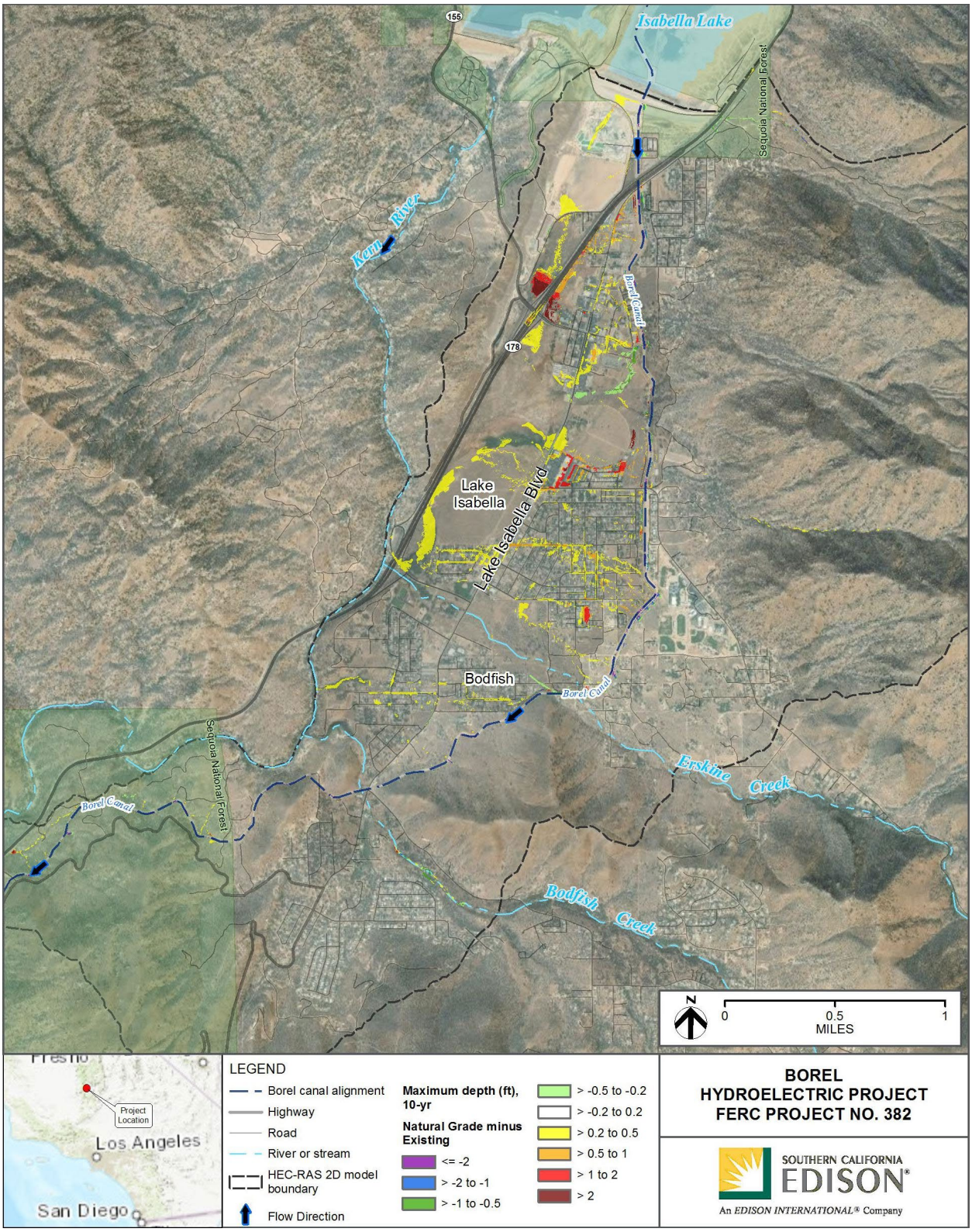


**Figure 3-13. Local Storm Depth Difference – 10 Year**

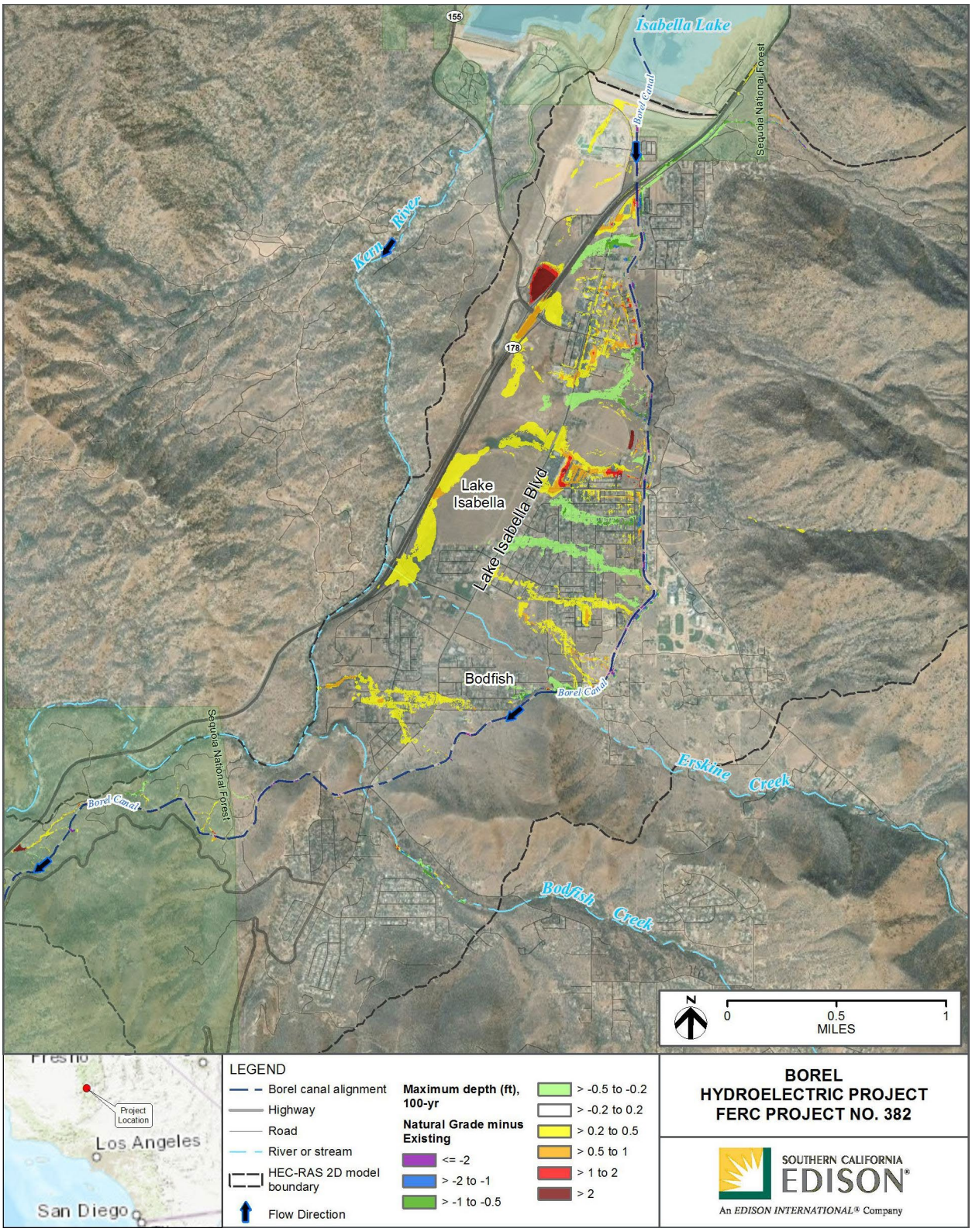


**Figure 3-14. Local Storm Depth Difference – 100 Year**

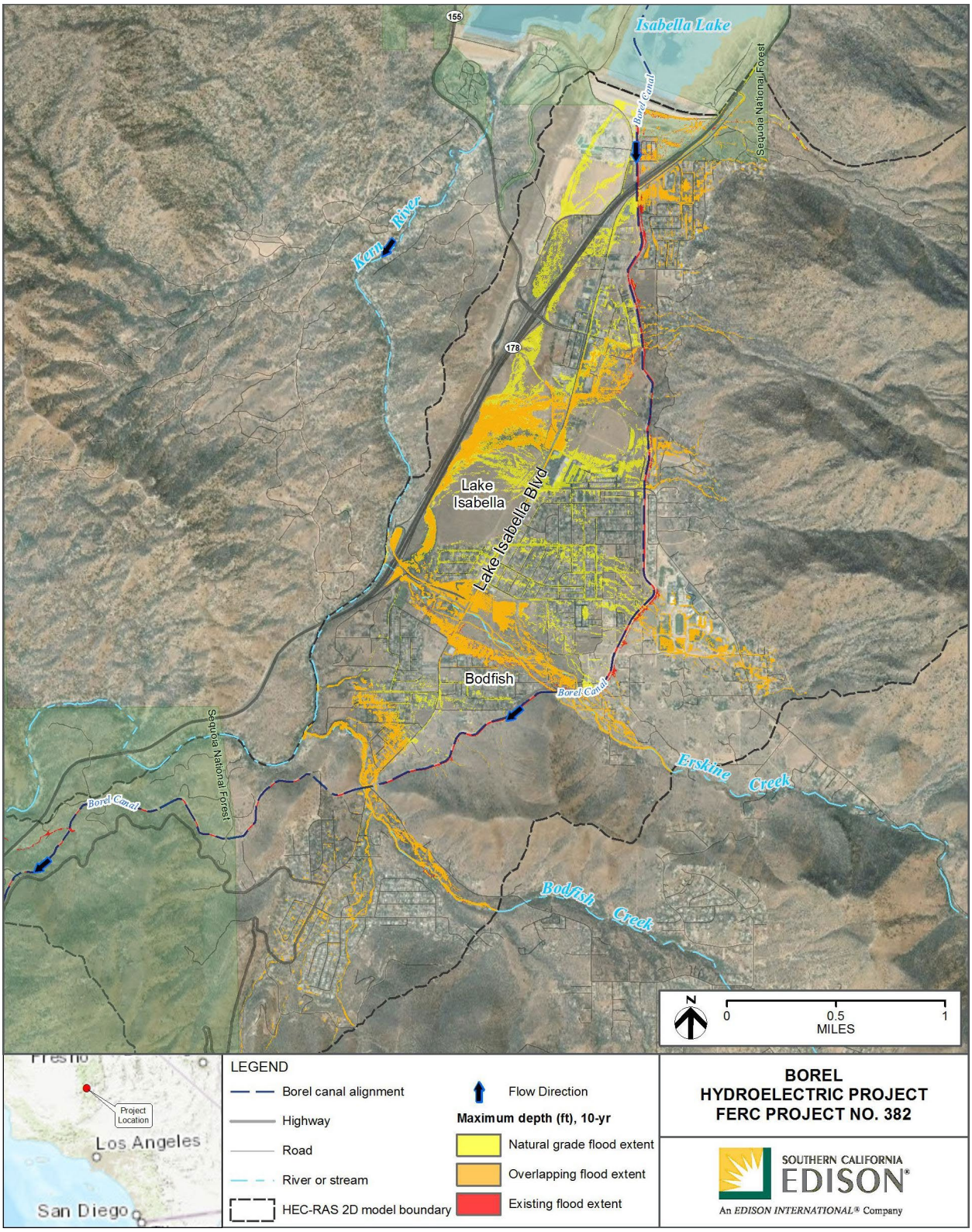


**Figure 3-15. Existing and Natural Grade Conditions Comparison, Hill Slopes and Upper Watershed Runoff Maximum Depth – 10 Year**

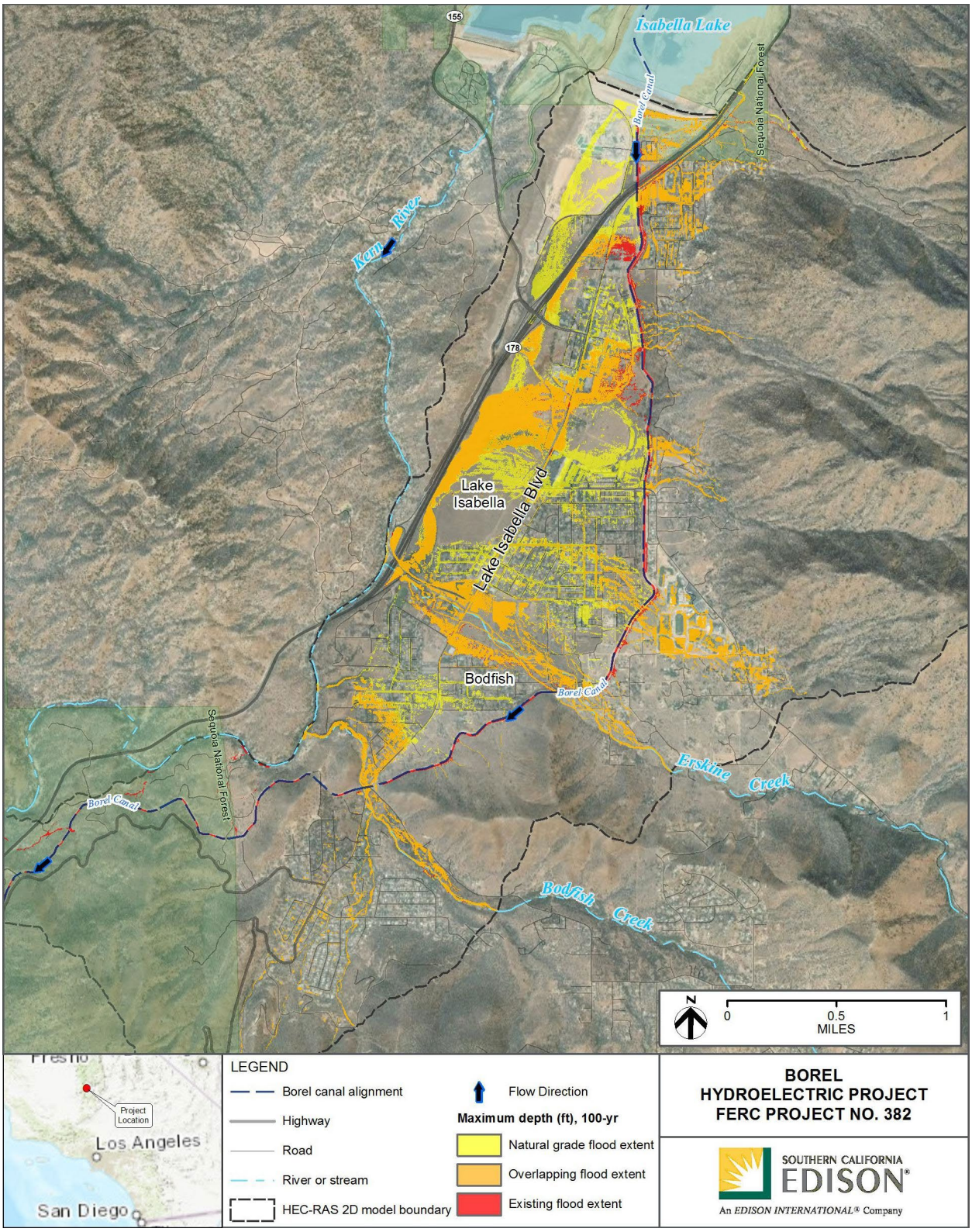


**Figure 3-16. Existing and Natural Grade Conditions Comparison, Hill Slopes and Upper Watershed Runoff Maximum Depth – 100 Year**

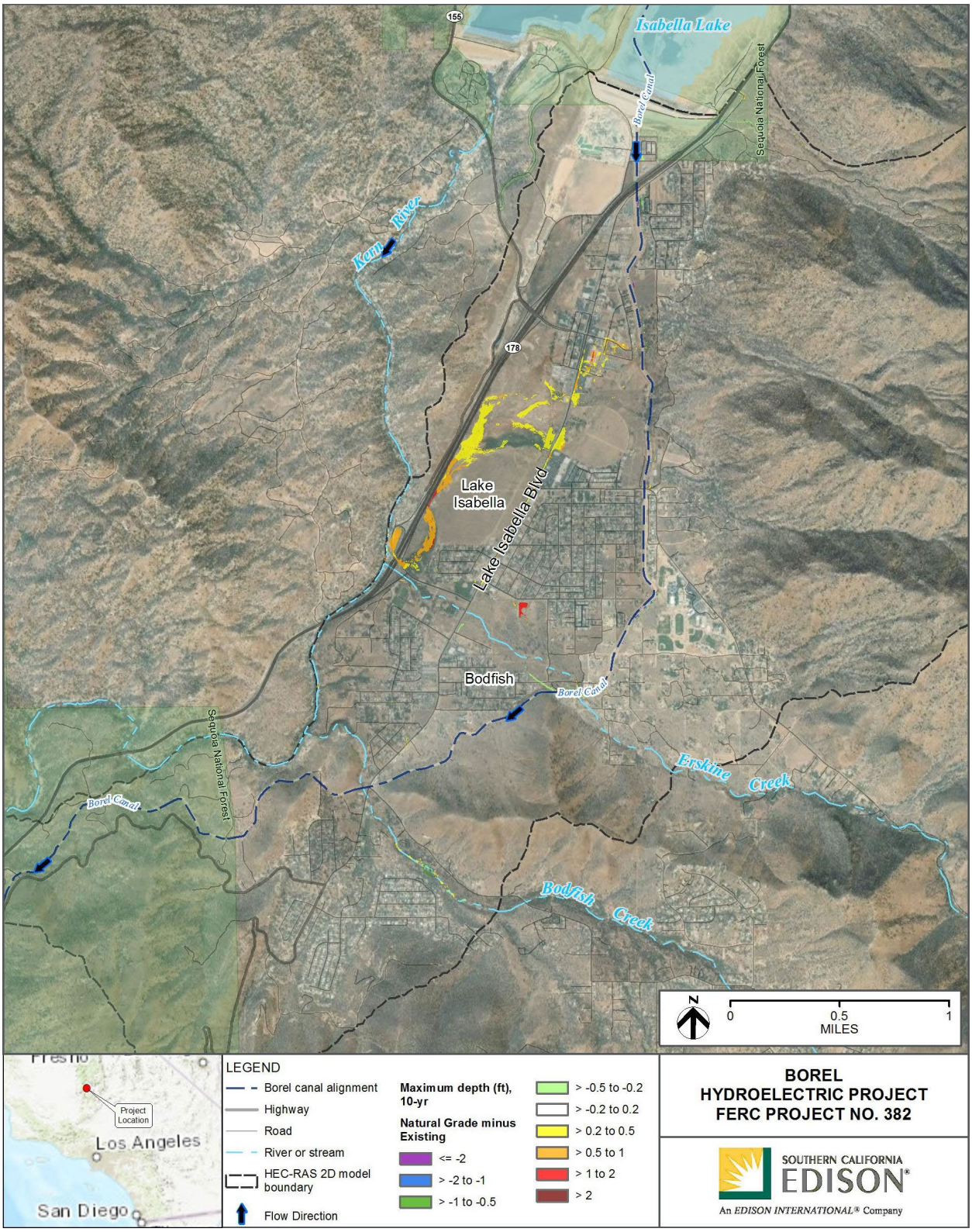


**Figure 3-17. Natural Grade Conditions Minus Existing Conditions, Hill Slopes and Upper Watershed Runoff Maximum Depth – 10 Year**

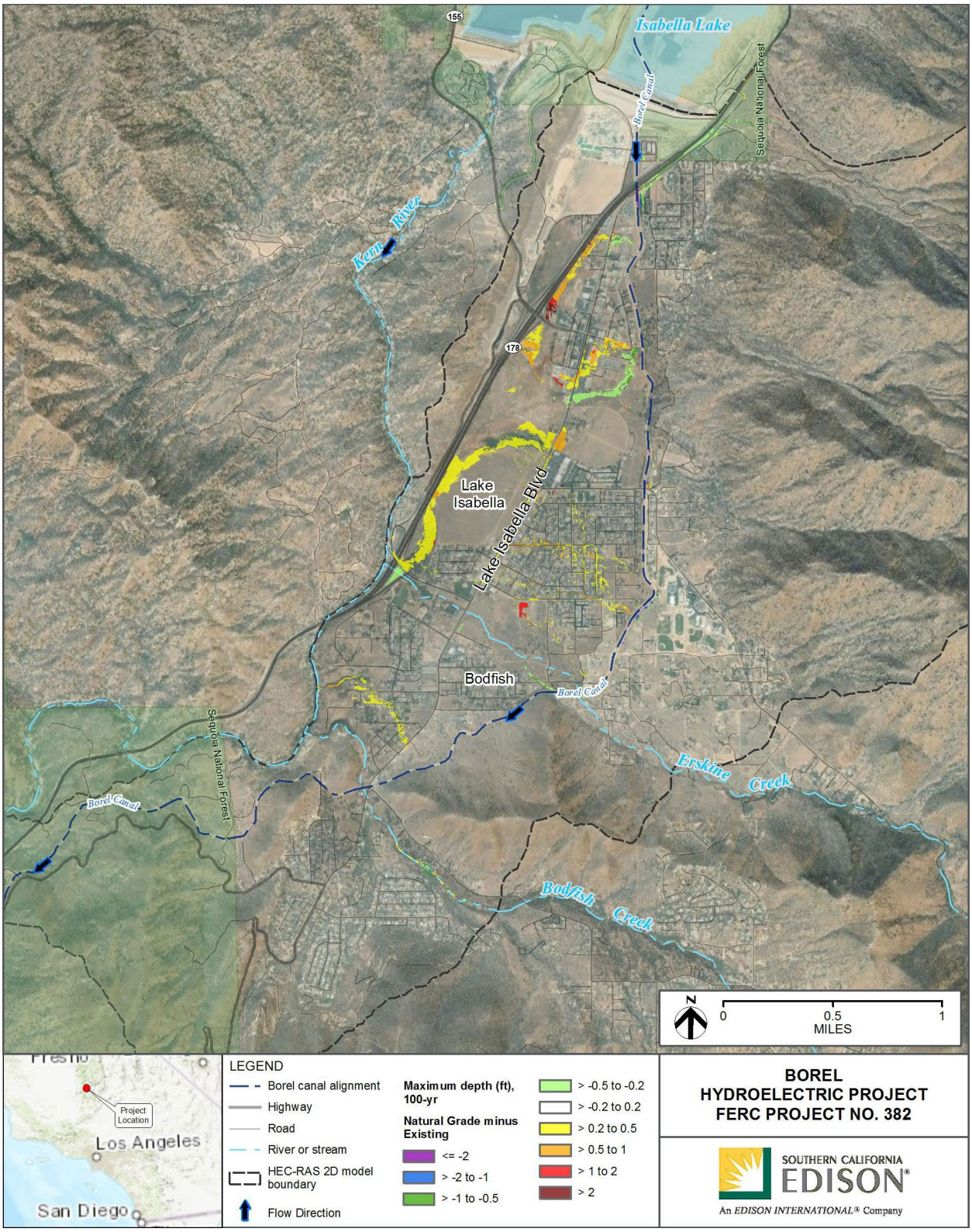


**Figure 3-18. Natural Grade Conditions Minus Existing Conditions, Hill Slopes and Upper Watershed Runoff Maximum Depth – 100 Year**

## 3.5 Sensitivity and Discovery Analyses Findings

The sensitivity and discovery analyses were performed to investigate storm runoff patterns that could result if the terrain along the canal alignment were restored to natural grade. Results confirm that the Borel Project influences rainfall runoff patterns by intercepting, redirecting, and concentrating runoff flows within the watershed. Removal of the canal and associated features would change the runoff and channel flow patterns.

The 10-year storm event results show that offsite storm runoff from the eastern portion of the watershed is either intercepted by the Borel Project or concentrated and conveyed underneath the canal's flume structures and continue westward, within existing drainage channels, towards the Kern River. Removing the Borel Project and restoring the canal alignment to natural grade would increase stormwater runoff quantities downslope of the canal and potentially result in flood damage to property and facilities. Based on these model results, SCE developed a conceptual design including a series of linear detention basins within the current Borel Project footprint to control stormwater runoff and mitigate potential flooding. The proposed design was evaluated and is described in the subsequent sections.

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# 4 Drainage Analyses and Conceptual Design Assessment

This section documents the drainage analyses performed to inform the Plan. The analyses were done to calculate the capacity and assess the feasibility of using a series of linear detention basins throughout the current footprint during storm events. The assessment included checking if the proposed basins meet the infiltration and freeboard requirements outlined in the Kern County Standards for Drainage - Division 4 (Kern County Standards).

This analysis includes:

- Quantifying approximate 10-year, 24-hour duration design rainfall runoff intercepted by each proposed detention basin.
- Assessing if the proposed detention basins can contain the 10-year design storm, completely drain the design storm within seven days, and meet freeboard criteria.

## 4.1 Criteria

Based on the Kern County Standards for Drainage, Division 4, Appendix A:

> *Retention basins shall not be permitted unless it can be demonstrated, to the satisfaction of the Director, that the basin will completely drain the design volume within seven days.*

In addition to the standards requiring the basins to completely drain within seven days, the basins must meet the following freeboard requirements:

- Six inches of freeboard will be required when the design ponding depth within the basin is four feet or less.
- Basins with design ponding depths greater than four feet, the amount of freeboard required shall be one foot.

## 4.2 Drainage Volume Calculations

A rain-on-grid 2D hydraulic model representing existing terrain and hydrologic inputs were developed as described above in Sections 3.1 and 3.3, to estimate the amount of drainage volume that would be intercepted by the Borel Project. The model was used to simulate a 10-year design storm event assuming the storm is centered over the study area watersheds. Figure 4-1 identifies the contributing drainage basins that drain to the Borel Project and Figure 4-2 shows proposed detention basin locations.

Draft model results show rainfall runoff traveling downhill in small ravines and creeks and as overland sheet flow. Once the runoff reaches the Borel Project, it is either concentrated into drainage channels that pass through the existing Borel Project alignment unobstructed (e.g., beneath flumes or over siphons) or it is intercepted by the Borel Project. The magnitude of this runoff was calculated

to help size and configure proposed detention basins along the Borel Project alignment. Table 4-1 lists the 10-year design storm peak flow and volume results.

**Table 4-1. Draft Model Results - 10-Year Design Storm Peak Flows**

| 10-Year Design Storm Peak Flows | | |
|---|---|---|
| **Drainage Basin No.[1]** | **Peak Flow (cfs)** | **Volume (acre-ft)** |
| 1 | 106 | 36 |
| 2 | 93 | 31 |
| 3 | 92 | 31 |
| 4 | 40 | 6 |
| 5 | 171 | 55 |
| 6 | 24 | 7 |
| 7 | 23 | 9 |
| 8 | 84 | 36 |
| 9 Erskine Creek | 1022 | 488 |
| 10 | 52 | 10 |
| 11 | 85 | 12 |
| 12 Bodfish Creek | 2600 | 1523 |
| 13 | 6 | 1 |
| 14 | 34 | 8 |
| 15 | 31 | 11 |
| 16 | 6 | 1 |
| 17 | 28 | 4 |
| 18 | 6 | 2 |

[1] See Figure 3-1 - *Contributing Drainage Basins for the Borel Project between the (non-Project) Auxiliary Dam to Powerhouse* for Drainage Basin Location

## 4.3 Detention Basin Assessment

An analysis was performed to assess the feasibility of reconfiguring the Borel Project and converting certain segments of the canal into a series of linear detention basins. The proposed design incorporates a series of detention basins and includes grading to intercept the 10-year design stormwater runoff. The proposed design assumes the bottom concrete liner of the canal is removed to allow for infiltration of the captured rainfall runoff. Table 4-1 shows proposed detention basin segment locations.

The analysis consisted of using the hydraulic model to estimate the inflow into each of the detention basins as described in Section 4.2, followed by calculations of the infiltration time based on soil infiltration rates and basin geometries. To perform these analyses, the model was updated with a surface representing the proposed detention basin configurations. The surface used to update the model was developed in Civil 3D as part of the conceptual design of the Plan. The proposed detention basins were designed to maximize the bottom area for greater infiltration while reducing the depth of the detention basins. The detention basins were then assessed for their ability to contain the 10-year design stormwater runoff and to check whether they meet the infiltration and freeboard requirements described in the Kern County Standards for Drainage - Division 4 (Kern County Standards).

 

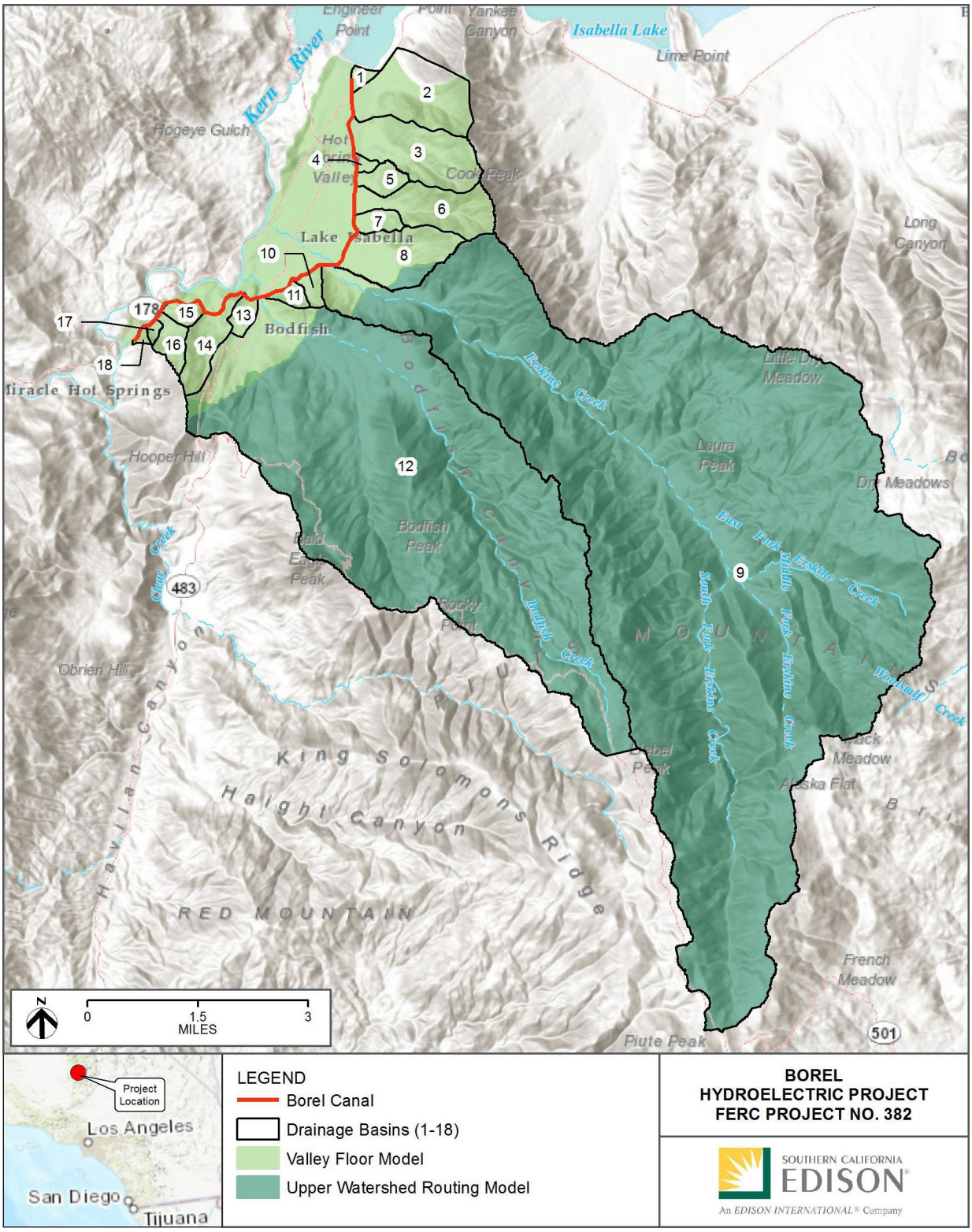


**Figure 4-1. Contributing Drainage Basins to the Borel Project between the (non-Project) Auxiliary Dam to Powerhouse**


**Figure 4-2. Proposed Detention Basin Locations**

### 4.3.1 Infiltration Ksat Values for Soils

Infiltration rates (Ksat) for soils under the proposed detention basins were selected from the NRCS SSURGO database. The SSURGO database contains information about soils collected by the National Cooperative Soil Survey over the course of a century. The soil properties and information within the SSURGO database was gathered by field inspection of the soil. In addition, many soil samples were analyzed in laboratories. The soil properties within the SSURGO database are intended for natural resource planning and management by landowners, townships, and counties.

Ksat values represent the infiltration rate once the ground has reached saturation and the infiltration rate has become constant. Ksat values are a reliable metric to quantify infiltration conditions for soils and expected performance during a storm event. The SSURGO data comes in a digital mapping layer that was overlayed on top of the footprint of each proposed detention basin. For each hydrologic soil type, the SSURGO data provides a range of Ksat values. If a proposed detention basin spanned over several hydrologic soil types, a weighted average Ksat value was estimated for the detention basin.

## 4.4 Results

Infiltration of runoff captured in each detention basin was calculated using Ksat soil infiltration rates and infiltration area. It was assumed the bottom concrete liner of the canal will be removed to allow for infiltration of the captured rainfall runoff through soil. Table 4-2 presents draft results such as the captured rain runoff for each proposed detention basin calculated by the model. The table also shows draft 7-day max infiltration and the remaining volume of runoff that potentially remains after 7 days.

**Table 4-2. Draft Results-Rainfall runoff captured in Detention Basins and 7-Day Infiltration**

| Proposed Detention Basin | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| Contributing Drainage Basin No.[1] | 1 | 2, 3 | 4 | 5, 6 | 7, 8 | 10, 11 |
| Approximate WSE (ft) | 2553.3 | 2550.2 | 2549.6 | 2547.1 | 2546.5 | 2544.2 |
| Approximate Max Depth (ft) | 5.0 | 2.6 | 4.0 | 2.1 | 2.2 | 1.7 |
| Approximate Freeboard (ft) | 1.2 | 1.0 | 1.1 | 1.2 | 1.7 | 1.1 |
| 10-Year, 24-hour Runoff Captured (ac-ft) | 36.3 | 61.8 | 5.7 | 62.4 | 44.5 | 22.2 |
| Calculated 7-day Infiltration (ac-ft) | 158.9 | 332.2 | 0.2 | 118.2 | 267.9 | 17.1 |
| Runoff volume remaining after 7-day Infiltration (ac-ft) | 0 | 0 | 5.5 | 0 | 0 | 5.1 |

[1] See Figure 3-1 - *Contributing Drainage Basins for the Borel Project between the (non-Project) Auxiliary Dam to Powerhouse* for Drainage Basin Location

Rainfall runoff captured within Detention Basins C and F do not completely infiltrate within 7 days. These detention basins are located on soil with poor hydraulic conductivity. As a result, to meet the County infiltration criteria, a drainage culvert sized to release 1 cfs from the detention basin and into adjacent drainage channels was incorporated into the conceptual design to work in combination with

infiltration. Preliminary calculations show that a drainage culvert sized to release 1 cfs can drain 5.5 ac-feet in approximately three days.

## 4.5 Findings

Preliminary results support that the proposed conceptual reconfiguring of the Borel Project, as described in the Plan, can intercept the 10-year, 24-hour duration stormwater runoff traveling from the contributing drainage basins. Preliminary results show it is feasible to infiltrate the entire design runoff volume captured within the proposed detention basins by infiltrating runoff through the bottom of each detention basin or by using a combination of infiltration and offsite drainage culverts to meet county freeboard and infiltration requirements.

# 5 References

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2019 USGS 13 arc-second n36w119 1 x 1 degree. U.S. Geological Survey National Map viewer. September 24, 2019. https://prd-tnm.s3.amazonaws.com/StagedProducts/Elevation/13/TIFF/n36w119/USGS_13_n36w119.tif.

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# Appendix B: Borel Project Segment Map Set

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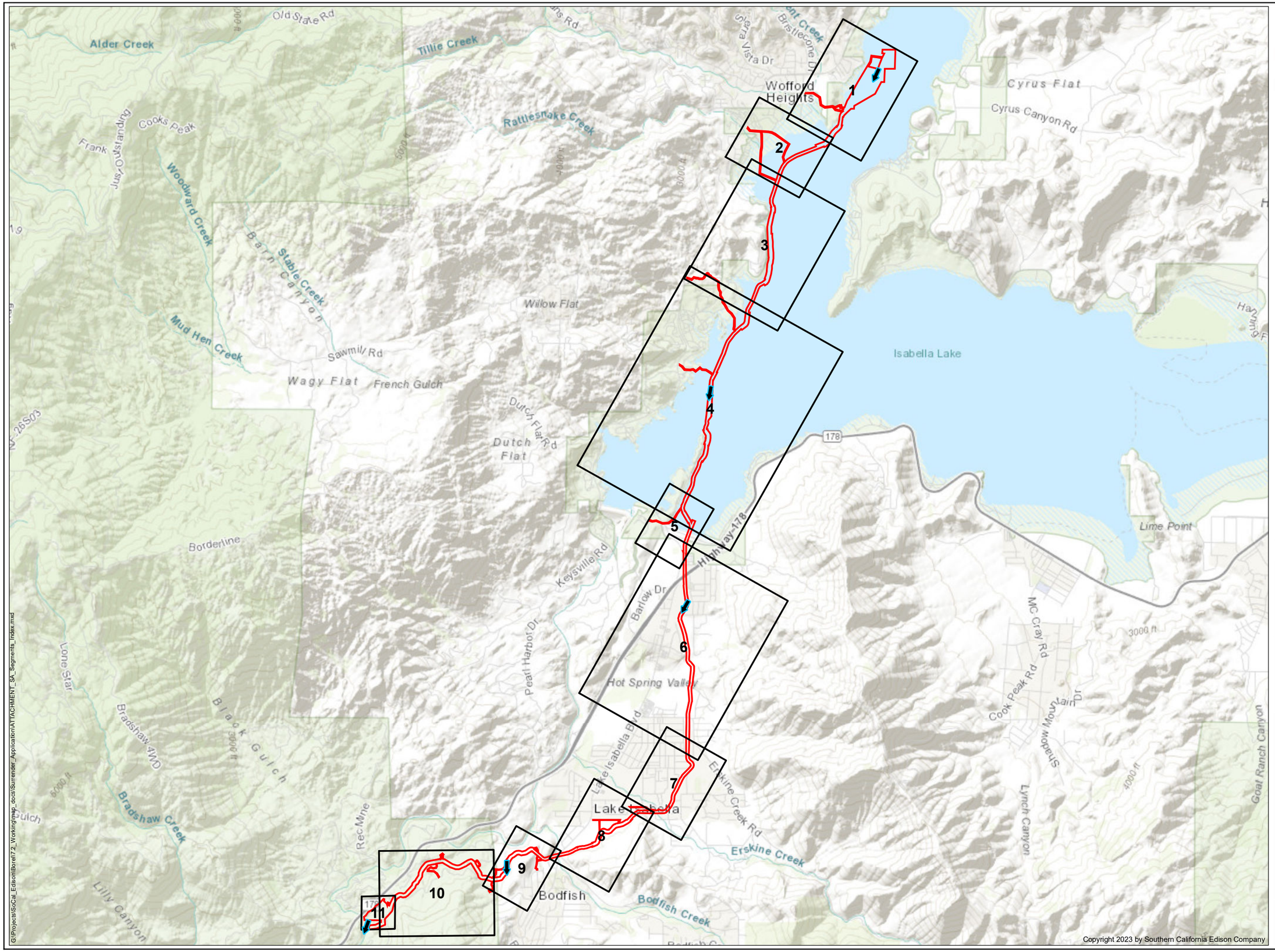


## LEGEND

- FERC Project Boundary #382
- Map Page Extent
- Flow Direction

*SOURCE: HDR (2021), SoCal Edison (2021).


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# DECOMMISSIONING PLAN SEGMENTS

## OVERVIEW

BOREL HYDROELECTRIC LICENSE SURRENDER PROJECT

0 0.5 1 Miles

Date: 3/30/2023

Projection: California State Plane Zone 5
Datum: NAD 83



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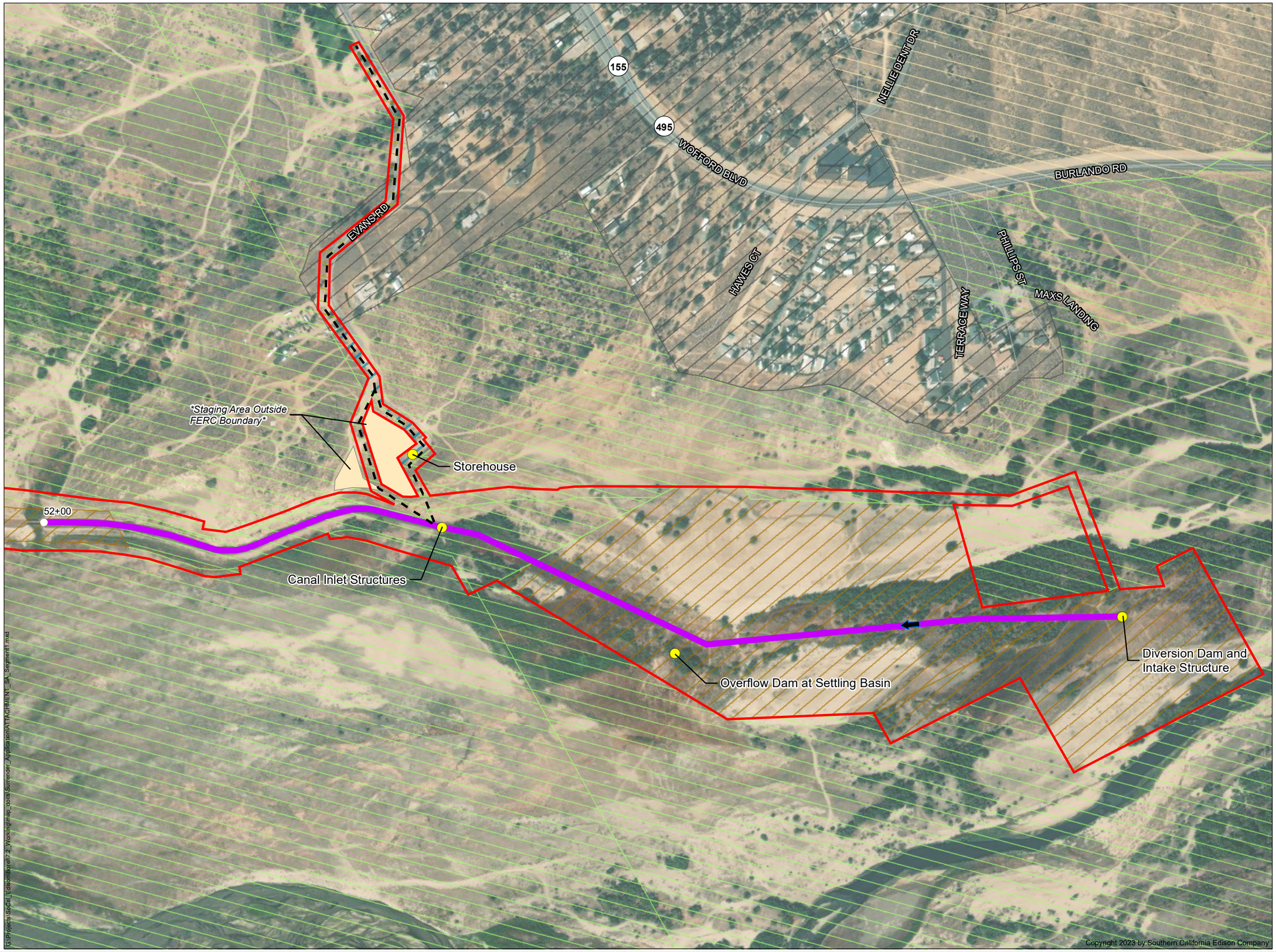



## LEGEND

- FERC No. 382 Project Boundary
- Flow Direction
- Segment 1
- Project Feature

**Decommissioning Access & Staging**

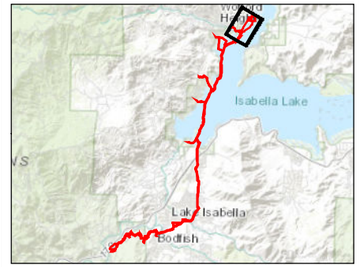
- Access Road
- Staging Area

**Land Ownership**

- BLM
- Kern County
- Private
- SCE
- Sequoia National Forest
- Corps



*SOURCE: HDR (2022), SoCal Edison (2021).

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# SEGMENT #1

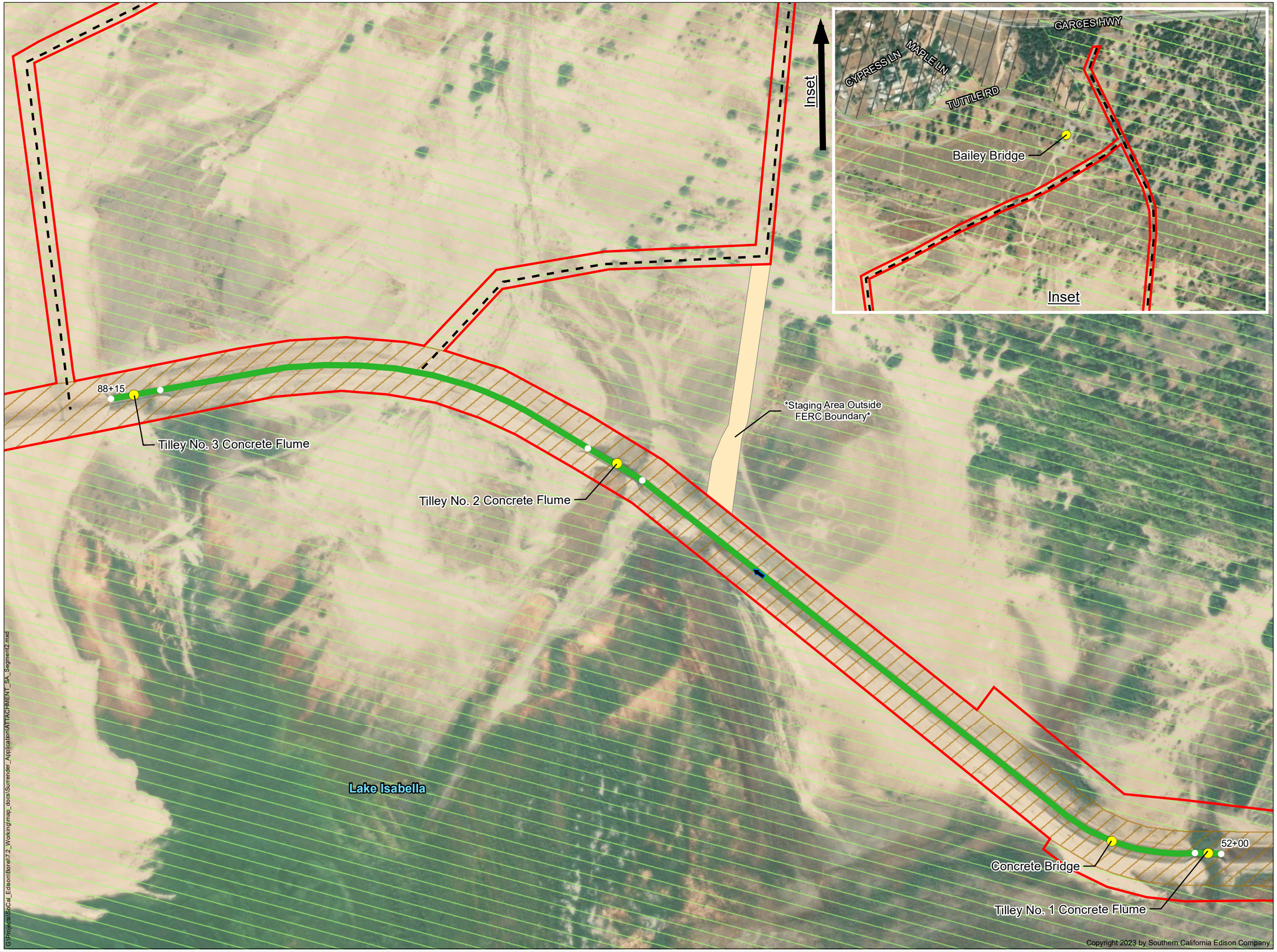
## DIVERSION DAM AND INTAKE STRUCTURE TO TILLEY NO. 1 CONCRETE FLUME

BOREL HYDROELECTRIC PROJECT
FERC PROJECT NO. 382

0 250 500 Feet

Date: 3/30/2023

**Projection: California State Plane Zone 5**
**Datum: NAD 83**




## LEGEND

- FERC No. 382 Boundary
- Flow Direction
- Segment 2
- Project Feature

**Decommissioning Access & Staging**

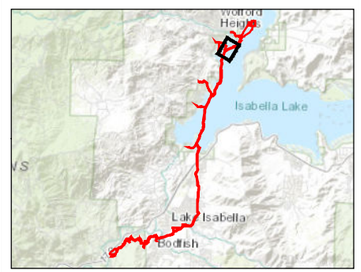
- Access Road
- Staging Area

**Land Ownership**

- SCE
- Sequoia National Forest



*SOURCE: HDR (2022), SoCal Edison (2021).

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# SEGMENT #2

## TILLEY NO. 1 CONCRETE FLUME TO TILLEY NO. 3 CONCRETE FLUME

BOREL HYDROELECTRIC PROJECT
FERC PROJECT NO. 382

0 150 300 Feet

Date: 3/30/2023

**Projection: California State Plane Zone 5**
**Datum: NAD 83**



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## LEGEND

- FERC Project Boundary #382
- Flow Direction
- Segment 3
- Project Feature
- Non-Project Feature

**Decommissioning Access & Staging**

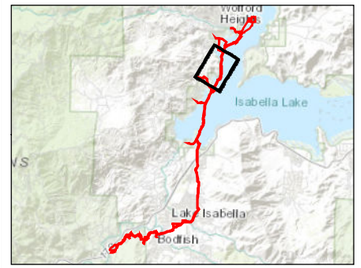
- Access Road
- Staging Area

**Land Ownership**

- Private
- SCE
- Sequoia National Forest



*SOURCE: HDR (2022), SoCal Edison (2021).

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# SEGMENT #3

## TILLEY NO. 3 CONCRETE FLUME TO END OF SCE LAND

BOREL HYDROELECTRIC PROJECT
FERC PROJECT NO. 382

0 250 500 Feet

Date: 3/30/2023

**Projection: California State Plane Zone 5**
**Datum: NAD 83**


## LEGEND

- FERC No. 382 Boundary
- Flow Direction
- Segment 4
- Project Feature
- Non-Project Feature

**Decommissioning Access & Staging**

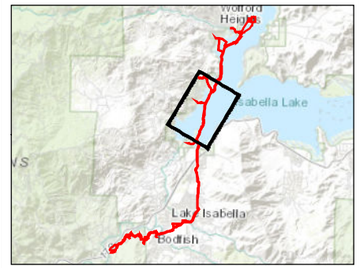
- Access Road
- Staging Area

**Land Ownership**

- BLM
- Private
- SCE
- Sequoia National Forest
- USACE



*SOURCE: HDR (2022), SoCal Edison (2021).

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# SEGMENT #4

## END OF SCE LAND TO AUXILLARY DAM

BOREL HYDROELECTRIC PROJECT
FERC PROJECT NO. 382

0 500 1,000 Feet

**Projection: California State Plane Zone 5**
**Datum: NAD 83**

Date: 3/30/2023





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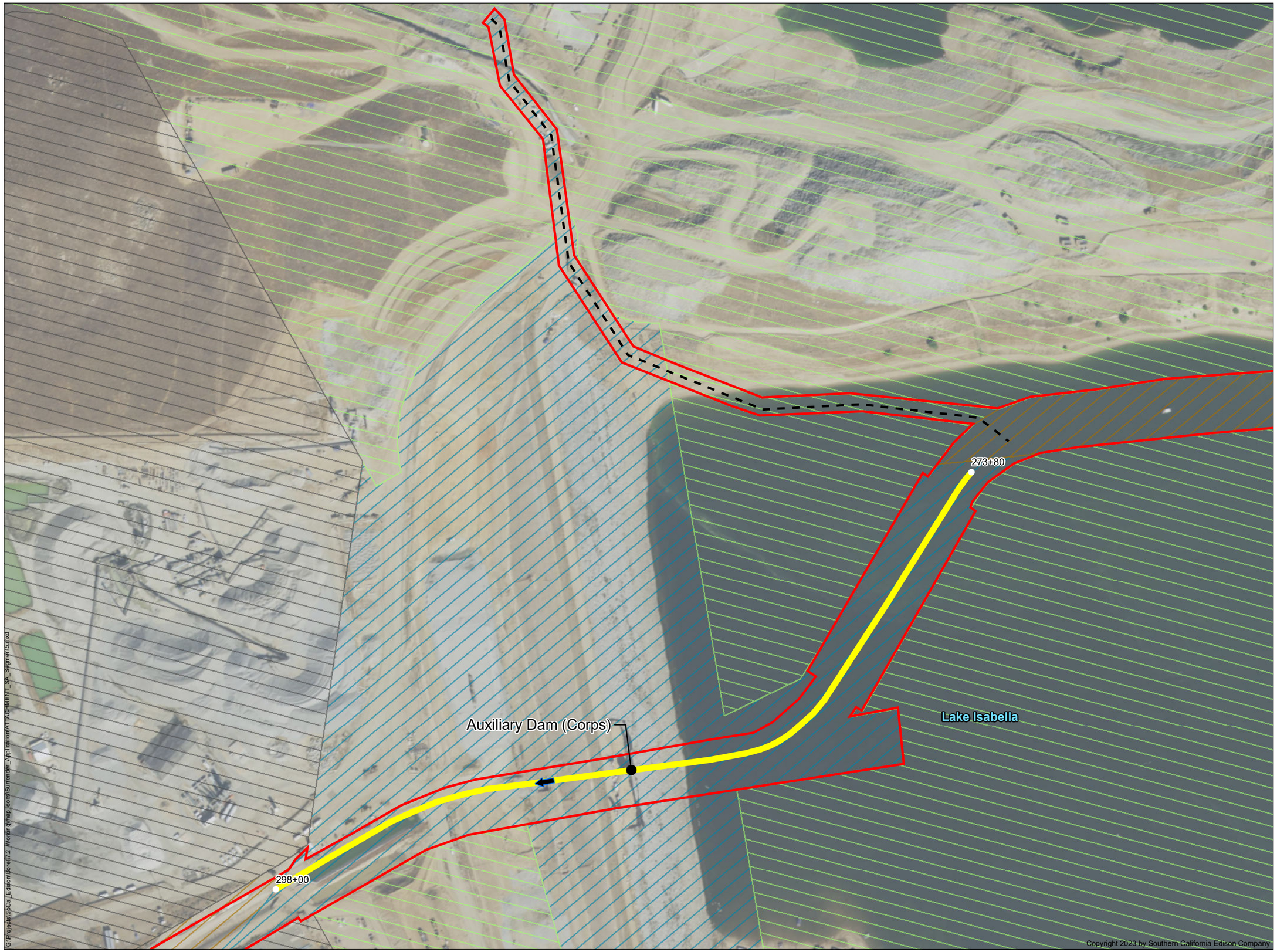


## LEGEND

- FERC Project Boundary #382
- Flow Direction
- Segment 5
- Non-Project Feature

**Decommissioning Access & Staging**

- Access Road

**Land Ownership**

- Private
- SCE
- Sequoia National Forest
- USACE



*SOURCE: HDR (2022), SoCal Edison (2021).


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# SEGMENT #5

## AUXILLARY DAM

BOREL HYDROELECTRIC PROJECT
FERC PROJECT NO. 382

0 100 200 Feet

Date: 3/30/2023

**Projection: California State Plane Zone 5**
**Datum: NAD 83**



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## LEGEND

- FERC Project Boundary #382
- Flow Direction
- Segment 6
- Project Feature
- Non-Project Feature

**Decomissioning Access & Staging**

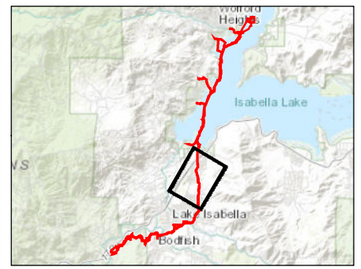
- Staging Area

**Land Ownership**

- BLM
- Private
- SCE
- Sequoia National Forest
- Corps



*SOURCE: HDR (2022), SoCal Edison (2021).

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# SEGMENT #6

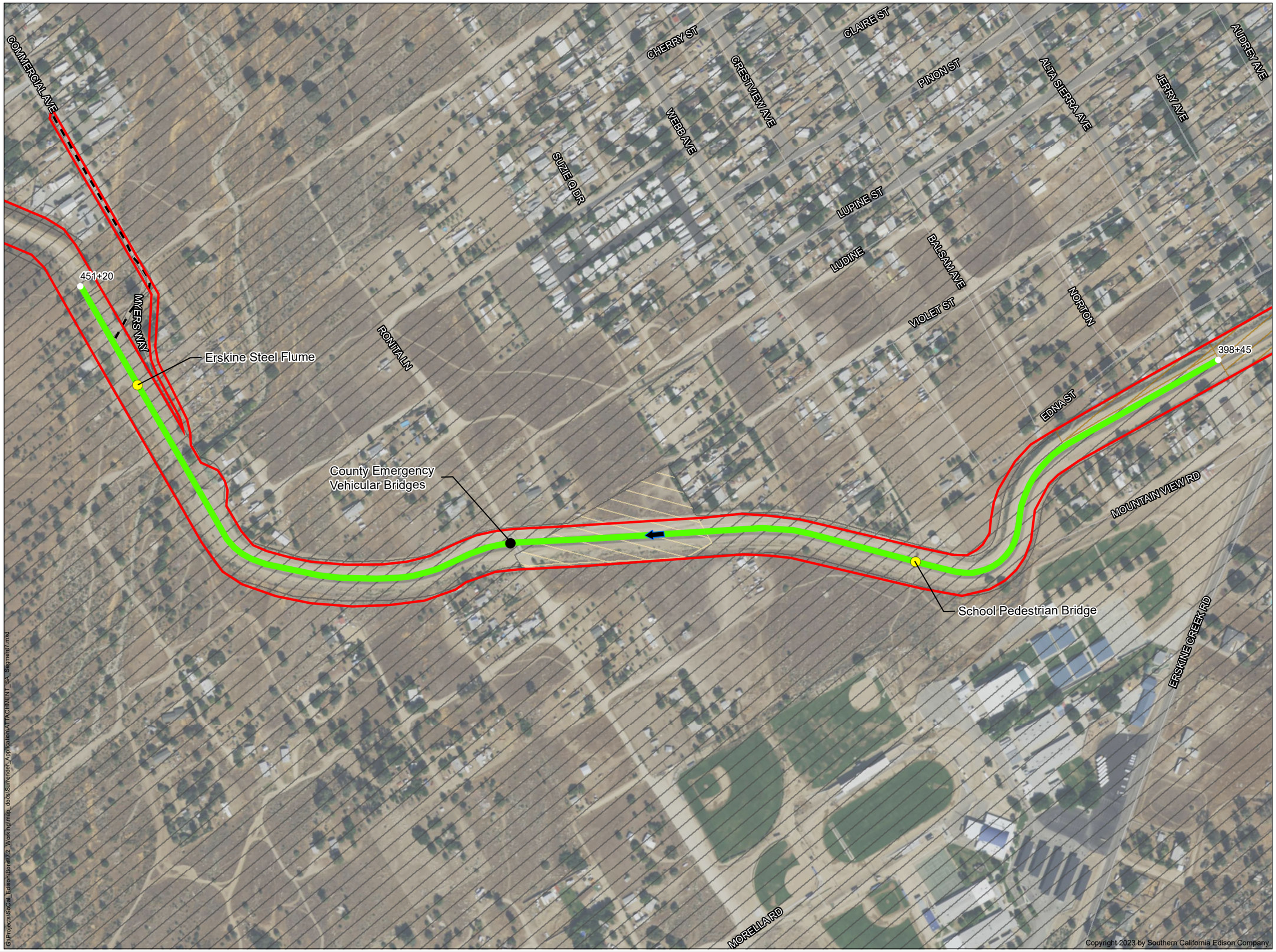
## AUXILLARY DAM TO ALTA SIERRA AVENUE

BOREL HYDROELECTRIC PROJECT
FERC PROJECT NO. 382

0 400 800 Feet

Date: 3/30/2023

**Projection: California State Plane Zone 5**
**Datum: NAD 83**




## LEGEND

- FERC Project Boundary #382
- Flow Direction
- Segment 7
- Project Feature
- Non-Project Feature

**Decommissioning Access & Staging**

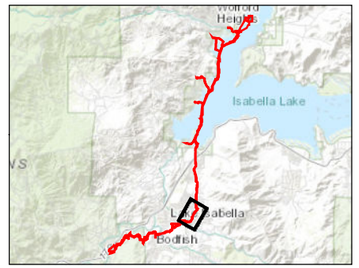
- Access Road

**Land Ownership**

- BLM
- Private
- SCE

Page 7 of 11

*SOURCE: HDR (2022), SoCal Edison (2021).

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# SEGMENT #7

## ALTA SIERRA AVENUE TO ERSKINE STEEL FLUME

BOREL HYDROELECTRIC PROJECT
FERC PROJECT NO. 382

0 200 400 Feet

Date: 3/30/2023

**Projection: California State Plane Zone 5**
**Datum: NAD 83**



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506+29
Bodfish Siphon
BODFISH CANYON RD
BODFISH ST
HARRINGTON AVE
CURRAN AVE
MARQUIS ST
WILLIAMS CT
EDITH AVE
KILBREITH DR
CHAN AVE
LAKE ISABELLA BLVD
CANAL RD
RAINBOW DR
YOUNG AVE
ANGLER AVE
COMMERCIAL AVE
BASS DR
BELDON
451+20
MYERS WAY
RED HILL RD

## LEGEND

- FERC Project Boundary #382
- Flow Direction
- Segment 8
- Project Feature

**Decommissioning Access & Staging**

- Access Road

**Land Ownership**

- BLM
- Private
- SCE

Page 8 of 11

*SOURCE: HDR (2022), SoCal Edison (2021).


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# SEGMENT #8

## ERSKINE STEEL FLUME TO BODFISH SIPHON

BOREL HYDROELECTRIC PROJECT
FERC PROJECT NO. 382

0 200 400 Feet

Date: 3/30/2023

**Projection: California State Plane Zone 5**
**Datum: NAD 83**





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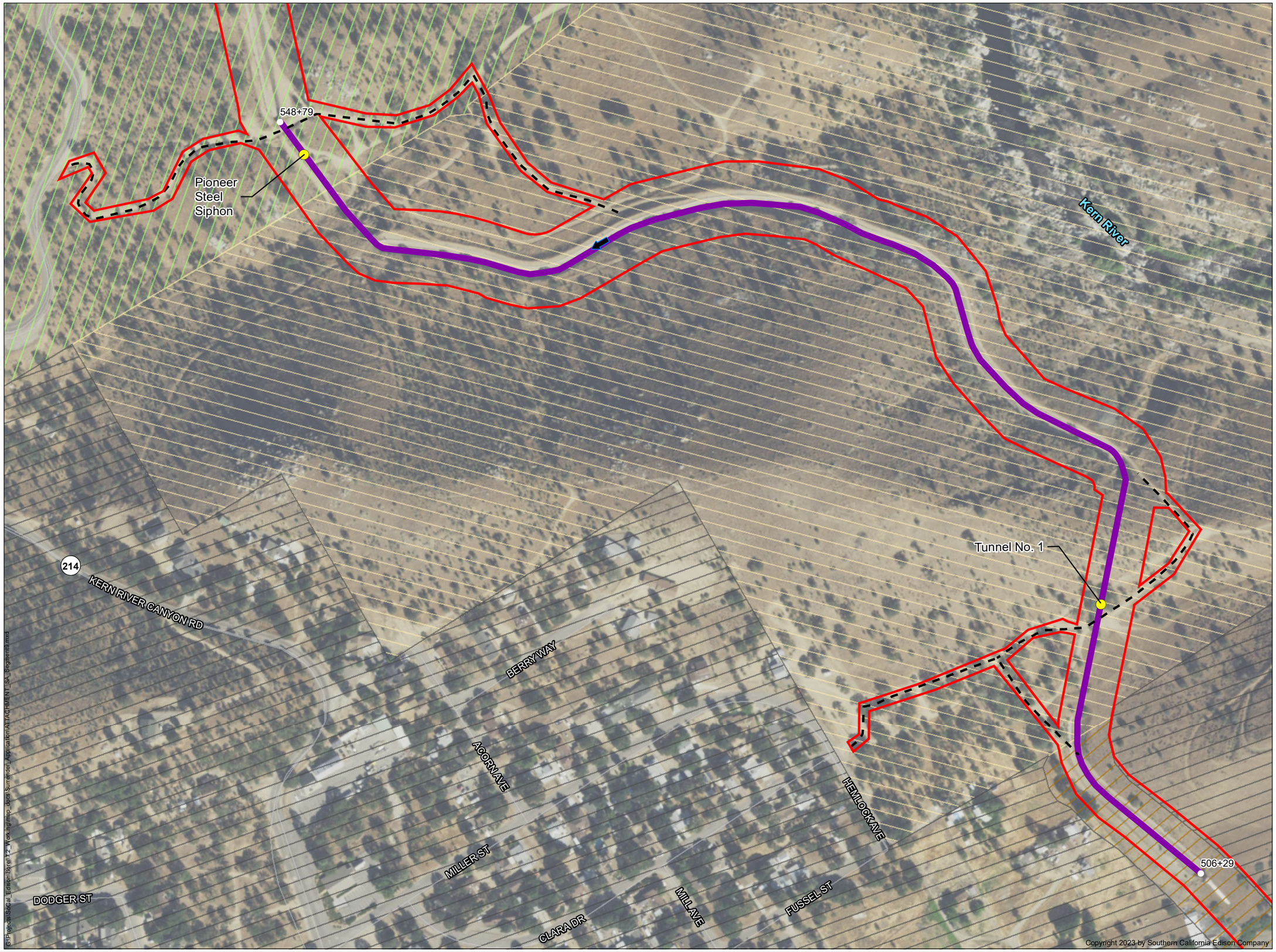



## LEGEND

- FERC Project Boundary #382
- Flow Direction
- Segment 9
- Project Feature

**Decommissioning Access & Staging**

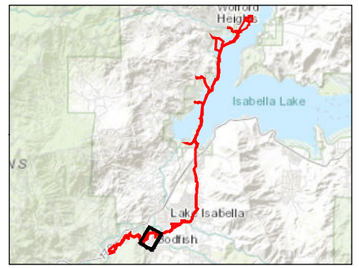
- Access Road

**Land Ownership**

- BLM
- Private
- SCE
- Sequoia National Forest



*SOURCE: HDR (2022), SoCal Edison (2021).

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An EDISON INTERNATIONAL® Company

# SEGMENT #9

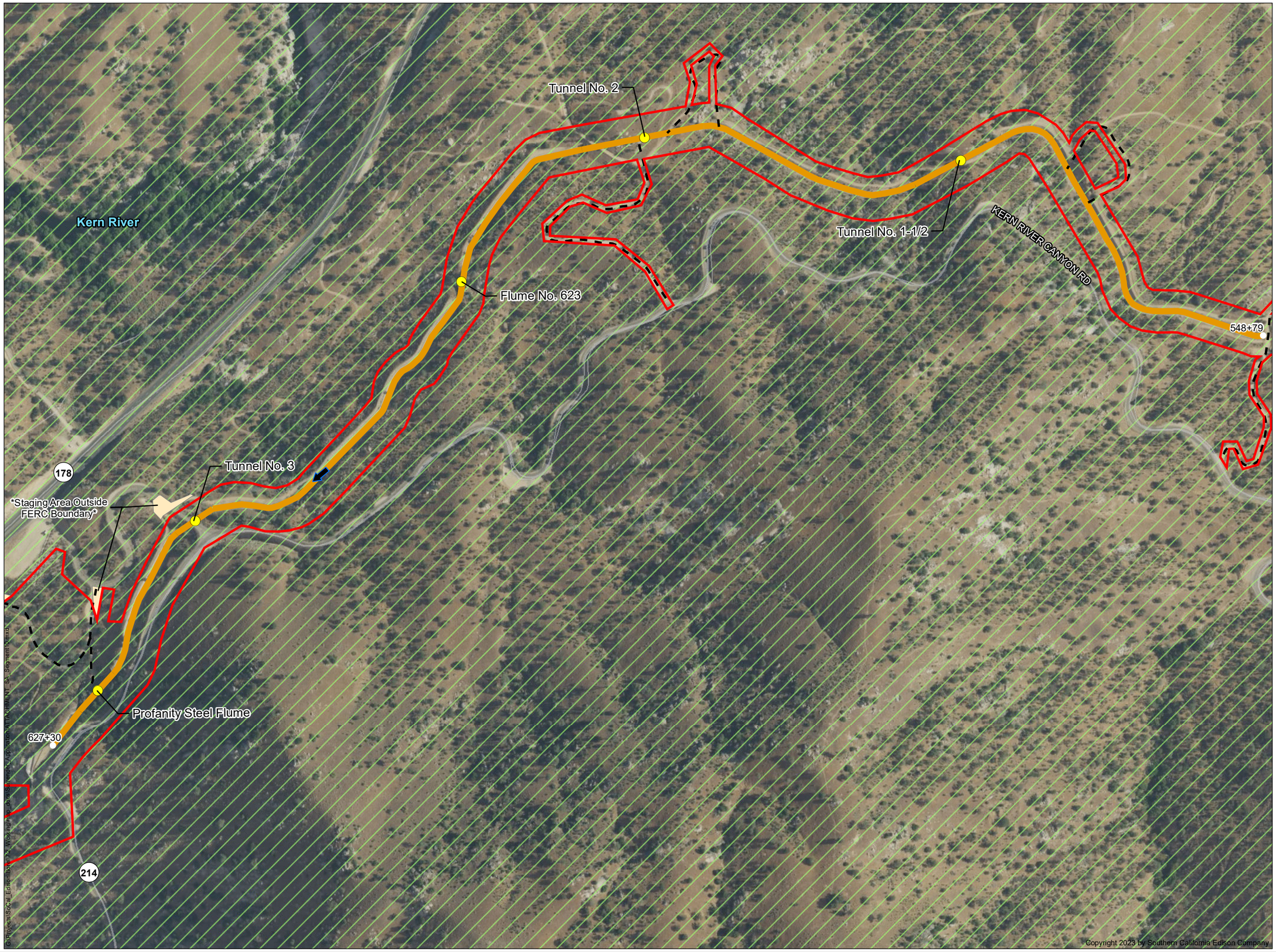
## BODFISH SIPHON TO PIONEER STEEL SIPHON

BOREL HYDROELECTRIC PROJECT
FERC PROJECT NO. 382

0 150 300 Feet

Date: 3/30/2023

**Projection: California State Plane Zone 5**
**Datum: NAD 83**




## LEGEND

- FERC Project Boundary #382
- Flow Direction
- Segment 10
- Project Feature

**Decommissioning Access & Staging**

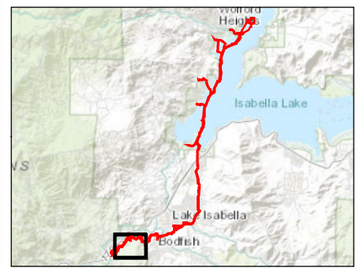
- Access Road
- Staging Area

**Land Ownership**

- Sequoia National Forest



*SOURCE: HDR (2022), SoCal Edison (2021).

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# SEGMENT #10

## PIONEER STEEL SIPHON TO FOREBAY STRUCTURE

BOREL HYDROELECTRIC PROJECT
FERC PROJECT NO. 382

0 250 500 Feet

Date: 3/30/2023

**Projection: California State Plane Zone 5**
**Datum: NAD 83**


## LEGEND

- FERC Project Boundary #382
- Flow Direction
- Segment 11
- Project Feature
- Non-Project Feature

**Decommissioning Access & Staging**

- Access Road
- Staging Area

**Land Ownership**

- Sequoia National Forest



*SOURCE: HDR (2022), SoCal Edison (2021).


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# SEGMENT #11

## FOREBAY STRUCTURE TO TAILRACE

BOREL HYDROELECTRIC PROJECT
FERC PROJECT NO. 382

0 75 150 Feet

Date: 3/30/2023

**Projection: California State Plane Zone 5**
**Datum: NAD 83**



G:\Projects\SoCal_Edison\Borel\7.2_Working\map_docs\Surrender_Application\ATTACHMENT_SA_Segment11.mxd

# Appendix C: Borel Project 30% Design Plans

 

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CAUTION! THE LOCATION OF EXISTING UTILITIES SHOWN IS APPROXIMATE. ALL EXISTING UTILITIES SHALL BE POTHOLED PRIOR TO CONSTRUCTION.

** CALL BEFORE YOU DIG **

CONTACT UNDERGROUND SERVICE ALERT (USA)
1-800-227-2600
PRIOR TO ANY CONSTRUCTION WORK

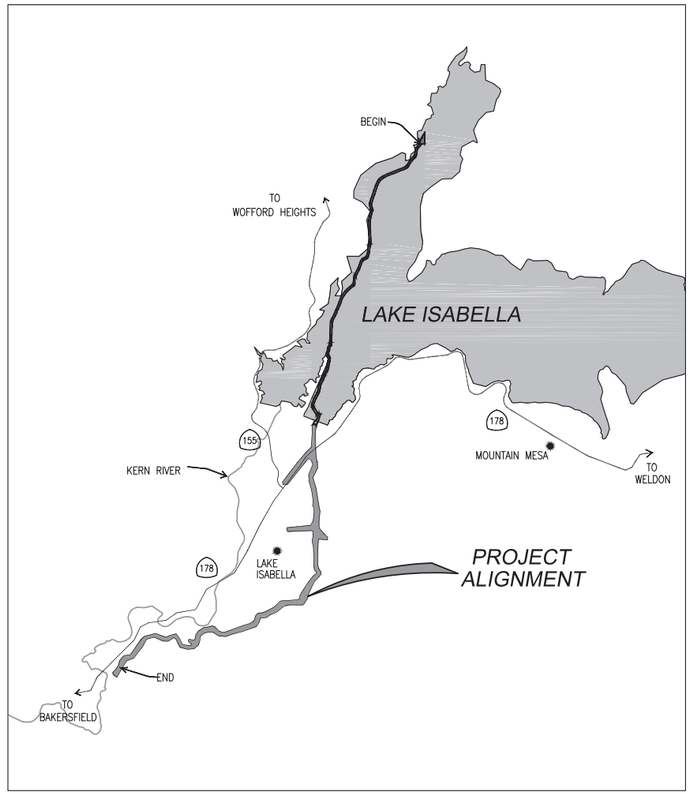
# SOUTHERN CALIFORNIA EDISON
# APPLICATION FOR SURRENDER OF LICENSE
# BOREL HYDROELECTRIC PROJECT - FERC PROJECT NO. 382

DRAFT 30% PLAN

LAKE ISABELLA, CA

MAY 2023


STATE OF CALIFORNIA
N.T.S.




ISABELLA LAKE MAP
N.T.S.

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

COVER SHEET

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

G-001

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

| DWG NO. | SHT ORDR | DESCRIPTION |
|---|---|---|
| G-001 | 1 | COVER SHEET |
| G-002 | 2 | SHEET INDEX |
| G-003 | 3 | NOTES, ABBREVIATIONS, LEGEND |
| V-101 | 4 | AERIAL PHOTO AND PROPERTY OWNERSHIP - STA 30+00 TO STA 108+00 |
| V-102 | 5 | AERIAL PHOTO AND PROPERTY OWNERSHIP - STA 108+00 TO STA 190+00 |
| V-103 | 6 | AERIAL PHOTO AND PROPERTY OWNERSHIP - STA 190+00 TO STA 269+00 |
| V-104 | 7 | AERIAL PHOTO AND PROPERTY OWNERSHIP - STA 269+00 TO STA 349+00 |
| V-105 | 8 | AERIAL PHOTO AND PROPERTY OWNERSHIP - STA 349+00 TO STA 434+00 |
| V-106 | 9 | AERIAL PHOTO AND PROPERTY OWNERSHIP - STA 434+00 TO STA 529+00 |
| V-107 | 10 | AERIAL PHOTO AND PROPERTY OWNERSHIP - STA 529+00 TO STA 628+74 |
| C-100 | 11 | CIVIL KEY MAP |
| C-101 | 12 | DECOMMISSIONING PLAN - STA 30+00 TO STA 56+00 |
| C-102 | 13 | DECOMMISSIONING PLAN - STA 56+00 TO STA 81+50 |
| C-103 | 14 | DECOMMISSIONING PLAN - STA 81+50 TO STA 108+00 |
| C-104 | 15 | DECOMMISSIONING PLAN - STA 108+00 TO STA 134+00 |
| C-105 | 16 | DECOMMISSIONING PLAN - STA 134+00 TO STA 160+00 |
| C-106 | 17 | DECOMMISSIONING PLAN - STA 160+00 TO STA 187+00 |
| C-107 | 18 | DECOMMISSIONING PLAN - STA 187+00 TO STA 213+50 |
| C-108 | 19 | DECOMMISSIONING PLAN - STA 213+50 TO STA 240+50 |
| C-109 | 20 | DECOMMISSIONING PLAN - STA 240+50 TO STA 266+00 |
| C-110 | 21 | DECOMMISSIONING PLAN - STA 266+00 TO STA 287+00 |
| C-111 | 22 | DECOMMISSIONING PLAN - STA 287+00 TO STA 311+00 |
| C-112 | 23 | DECOMMISSIONING PLAN - STA 311+00 TO STA 335+50 |
| C-113 | 24 | DECOMMISSIONING PLAN - STA 335+50 TO STA 360+00 |
| C-114 | 25 | DECOMMISSIONING PLAN - STA 360+00 TO STA 384+50 |
| C-115 | 26 | DECOMMISSIONING PLAN - STA 384+50 TO STA 410+50 |
| C-116 | 27 | DECOMMISSIONING PLAN - STA 410+50 TO STA 435+00 |
| C-117 | 28 | DECOMMISSIONING PLAN - STA 435+00 TO STA 460+00 |
| C-118 | 29 | DECOMMISSIONING PLAN - STA 460+00 TO STA 486+50 |
| C-119 | 30 | DECOMMISSIONING PLAN - STA 486+50 TO STA 511+50 |
| C-120 | 31 | DECOMMISSIONING PLAN - STA 511+50 TO STA 541+00 |
| C-121 | 32 | DECOMMISSIONING PLAN - STA 541+00 TO STA 568+00 |
| C-122 | 33 | DECOMMISSIONING PLAN - STA 568+00 TO STA 593+50 |
| C-123 | 34 | DECOMMISSIONING PLAN - STA 593+50 TO STA 619+00 |
| C-124 | 35 | DECOMMISSIONING PLAN - STA 619+00 TO STA 628+74 |
| C-150 | 36 | DECOMMISSIONING PLAN - ISLAND |
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| C-302 | 39 | TYPICAL CANAL SECTIONS (2 OF 2) |
| C-501 | 40 | DETAILS - TYPICAL CONDUIT SECTIONS |
| C-502 | 41 | DETAILS - CANAL INLET STRUCTURES |
| C-503 | 42 | DETAILS - TILLEY NO. 1 CONCRETE FLUME |
| C-504 | 43 | DETAILS - TILLEY NO. 2 CONCRETE FLUME |
| C-505 | 44 | DETAILS - TILLEY NO. 3 CONCRETE FLUME |
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| C-510 | 49 | DETAILS - ERSKINE STEEL FLUME |
| C-511 | 50 | DETAILS - BODFISH SIPHON |
| C-512 | 51 | DETAILS - PIONEER STEEL SIPHON |
| C-513 | 52 | DETAILS - FLUME NO. 623 |
| C-514 | 53 | DETAILS - PROFANITY STEEL FLUME |
| C-515 | 54 | DETAILS - FOREBAY STRUCTURE |
| C-516 | 55 | DETAILS - PENSTOCKS |
| C-517 | 56 | DETAILS - POWERHOUSE SECTIONS |

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

SHEET INDEX

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE

D/L

G-002

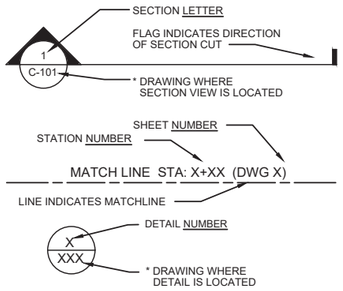
SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

## PLAN SHEET LEGEND

- PARCEL PROPERTY LINE
- EXISTING CONTOUR (5' INTERVAL)
- EXISTING CANAL EDGE
- EXISTING EDGE OF PAVEMENT
- FERC BOUNDARY
- STAGING AREA
- DEMOLITION
- SLURRY PLUG
- EARTH

## PLAN VIEW

1/4" = 1'-0"




ELEVATION, SECTION CUT, AND DETAIL MARKER


KEYNOTE DESIGNATION

## ABBREVIATIONS

| | |
|---|---|
| APPROX | APPROXIMATE, APPROXIMATELY |
| AVE | AVENUE |
| BEG | BEGIN |
| BLM | BUREAU OF LAND MANAGEMENT |
| BLVD | BOULEVARD |
| COMM | COMMUNICATION |
| CONC | CONCRETE |
| DR | DRIVE |
| (E) | EXISTING |
| E | EAST |
| FERC | FEDERAL ENERGY REGULATORY COMMISSION |
| FL | FLOW LINE |
| HORZ | HORIZONTAL |
| HP | HIGH POINT |
| LP | LOW POINT |
| MAX | MAXIMUM |
| MIN | MINIMUM |
| N.T.S | NOT TO SCALE |
| O&M | OPERATION AND MAINTENANCE |
| PIP | PROTECT IN PLACE |
| RD | ROAD |
| RSP | ROCK SLOPE PROTECTION |
| R/W | RIGHT OF WAY |
| SCE | SOUTHERN CALIFORNIA EDISON |
| ST | STREET |
| STA | STATION |
| TYP | TYPICAL |
| U.S.A | UNDERGROUND SERVICE ALERT |
| USFS | UNITED STATES FOREST SERVICE |
| VERT | VERTICAL |

## PROJECT CONTACT LIST

| PUBLIC/ UTILITY SERVICE | RESPONSIBLE ENTITY | REPRESENTATIVE | PHONE |
|---|---|---|---|
| U.S.A. | -- | -- | (800) 642-2444 |
| PROJECT MANAGER | SCE | MARY M. RICHARDSON "MEG" | (626) 238-2902 |
| PROJECT MANAGER | HDR | JARVIS CALDWELL | (916) 679-8875 |
| CIVIL ENGINEER | HDR | KEVIN FELLOWS | (916) 337-8348 |
| ROADS | KERN COUNTY PUBLIC WORKS DEPARTMENT | YOLANDA ALCANTAR | (661) 862-5292 |
| DISTRICT RANGER | USFS | ALFRED WATSON | 760-376-7381 |
| WATER | ERSKINE CREEK WATER COMPANY | JUSTIN SLINKARD | (760) 349-3232 |

## GENERAL NOTES:

1. TOPOGRAPHIC AND PROPERTY SURVEYS WILL BE COMPLETED AT THE 65% LEVEL DESIGN. THE LIMITS OF THE FERC BOUNDARY, INCLUDING DESIGNATED FERC PROJECT ACCESS ROADS, WILL BE FINALIZED AT THAT TIME. THE LIMITS OF TEMPORARY CONSTRUCTION EASEMENTS (TCE'S) REQUIRED FOR ACCESS ROADS OR STAGING AREAS MAY BE REVISED AT THE 65% LEVEL DESIGN DEPENDING UPON THE SUPPLEMENTAL SURVEY INFORMATION PROVIDED.

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

NOTES, ABBREVIATIONS, LEGEND

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

G-003

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE


## KEY NOTES:

1. SEGMENT 1 BEGINS AT PROJECT DIVERSION DAM AND INTAKE STRUCTURE, WHICH IS NOT SHOWN. NO WORK IS PROPOSED AT THE DIVERSION DAM AND INTAKE STRUCTURE OR ANYWHERE UPSTREAM OF THE CANAL INLET STRUCTURES.
2. ABANDON BAILEY BRIDGE IN PLACE. THE BRIDGE STRUCTURE, BRIDGE SUPPORTS, AND FENCING WILL BE LEFT IN PLACE AT THE REQUEST OF THE FOREST SERVICE.

## PLAN STA 30+00 TO STA 108+00

SCALE: 1"=300'

0 300 600

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

AERIAL PHOTO AND PROPERTY OWNERSHIP
STA 30+00 TO STA 108+00

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

V-101

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE


## PLAN STA 108+00 TO STA 190+00

SCALE: 1"=300'

0 300 600

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

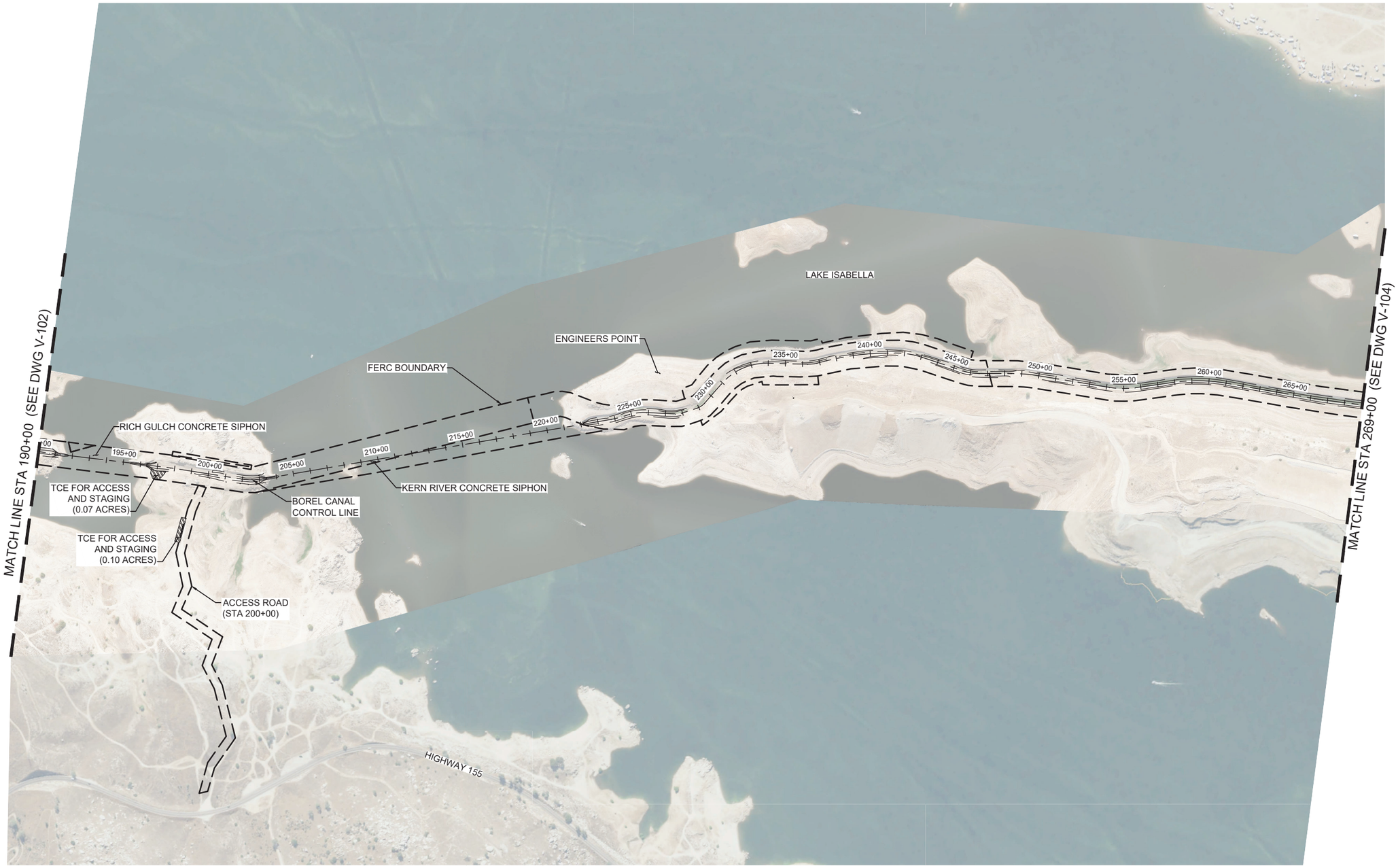
AERIAL PHOTO AND PROPERTY OWNERSHIP
STA 108+00 TO STA 190+00

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

V-102

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




PLAN STA 190+00 TO STA 269+00

SCALE: 1"=300'

0 300 600

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

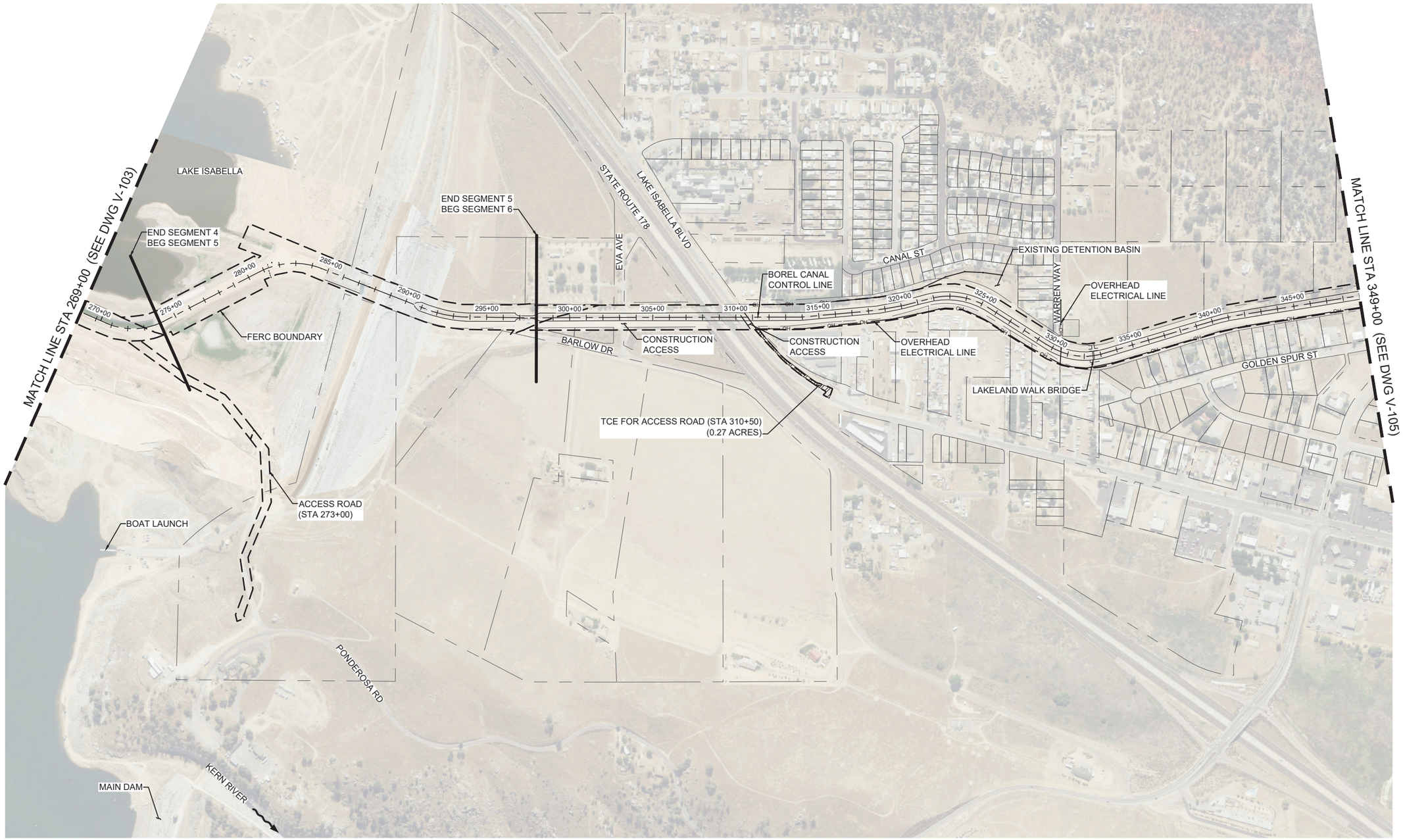
AERIAL PHOTO AND PROPERTY OWNERSHIP
STA 190+00 TO STA 269+00

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

V-103

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




## PLAN STA 269+00 TO STA 349+00

SCALE: 1"=300'

0 300 600

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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| REFERENCE DRAWINGS |
|---|
| |

LOCATION BOREL HYDRO SURRENDER

AERIAL PHOTO AND PROPERTY OWNERSHIP
STA 269+00 TO STA 349+00

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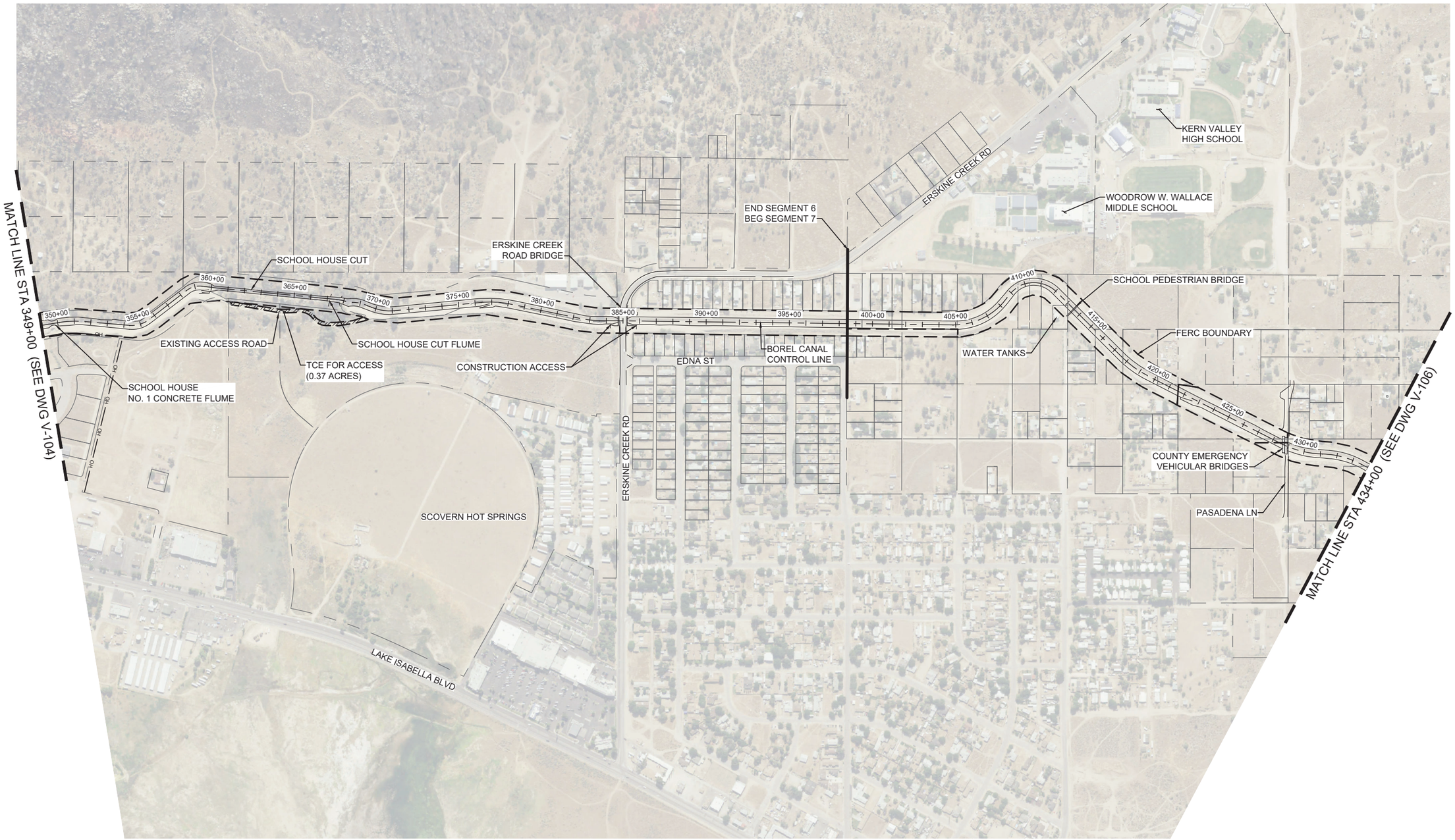
SCALE D/L

V-104

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




PLAN STA 349+00 TO STA 434+00

SCALE: 1"=300'

0 300 600

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

AERIAL PHOTO AND PROPERTY OWNERSHIP
STA 349+00 TO STA 434+00

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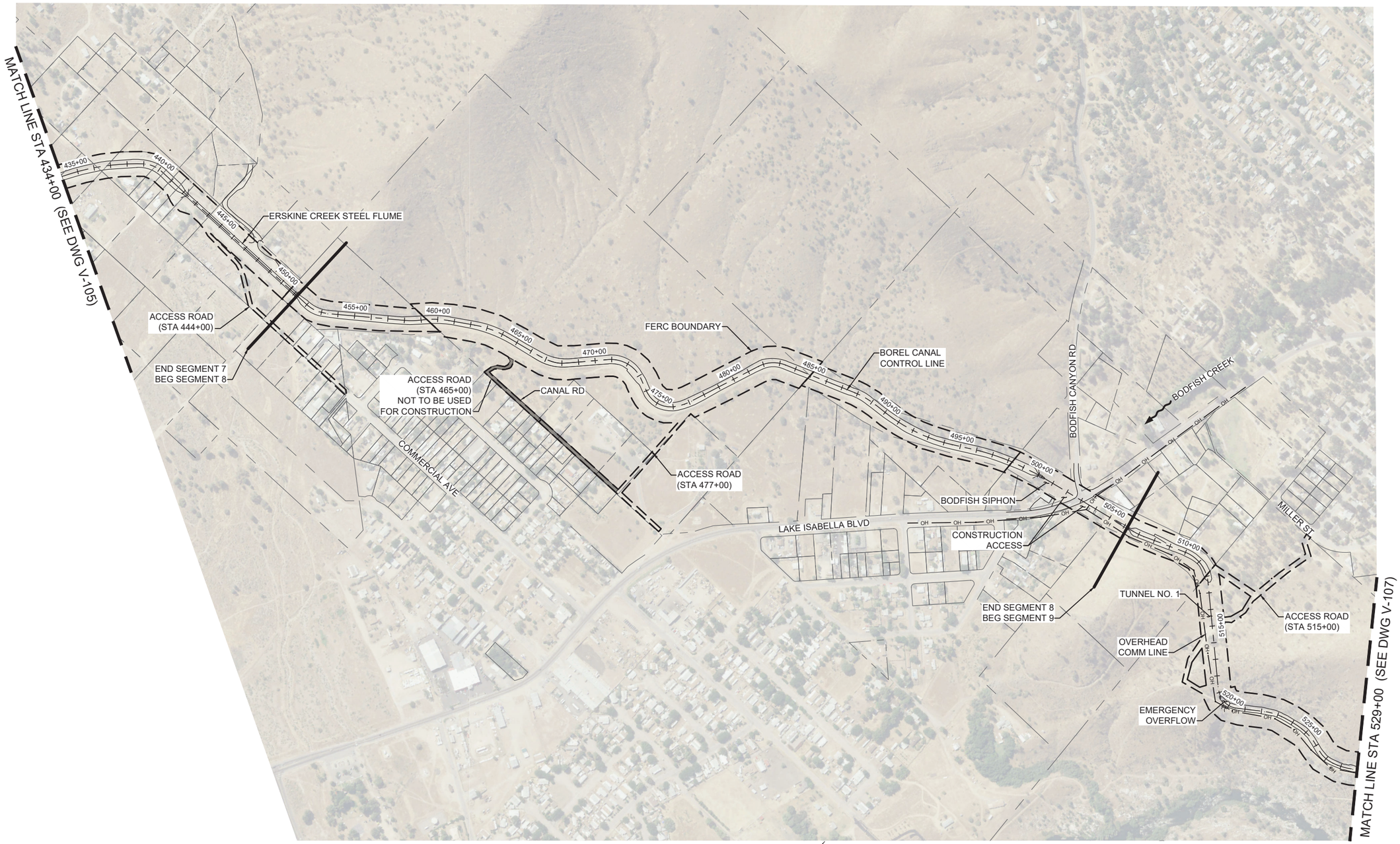
SCALE D/L

V-105

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




## PLAN STA 434+00 TO STA 529+00

SCALE: 1"=300'

0 300 600

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

AERIAL PHOTO AND PROPERTY OWNERSHIP
STA 434+00 TO STA 529+00

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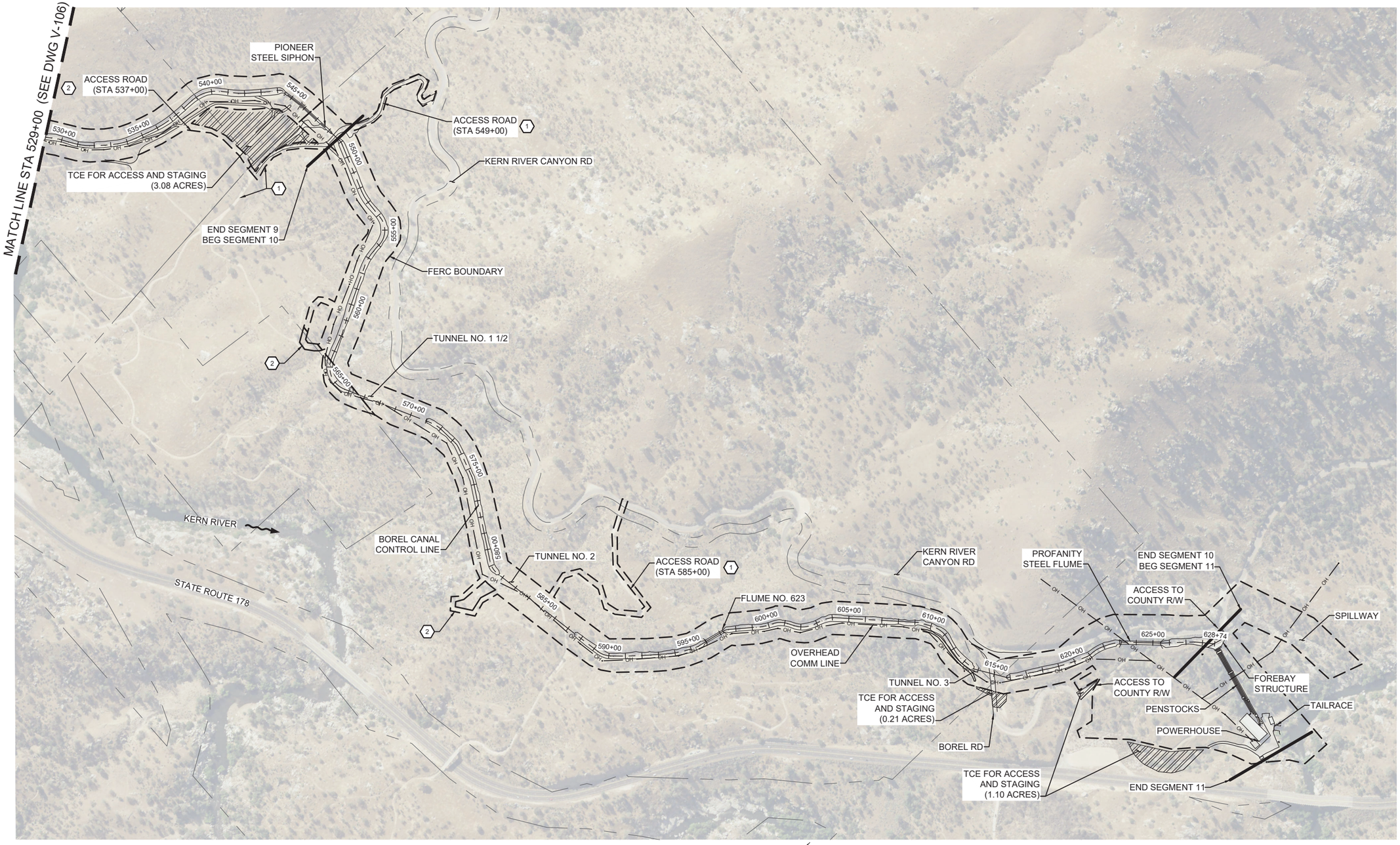
SCALE D/L

V-106

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




## KEY NOTES:

1. USFS ROADWAY. CONTRACTOR MUST MAINTAIN ACCESS THROUGH THE FERC BOUNDARY DURING CONSTRUCTION AND REPAIR TO MATCH PREPROJECT CONDITIONS UPON COMPLETION OF WORK.
2. NON-USFS ROADWAY, CONTRACTOR MUST ABANDON UPON COMPLETION OF WORK (GRADE TO PROMOTE POSITIVE DRAINAGE DOWN SLOPE, SCARIFY, AND HYDROSEED).

## PLAN STA 529+00 TO STA 628+74

SCALE: 1"=300'

0 300 600

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

AERIAL PHOTO AND PROPERTY OWNERSHIP
STA 529+00 TO STA 628+74

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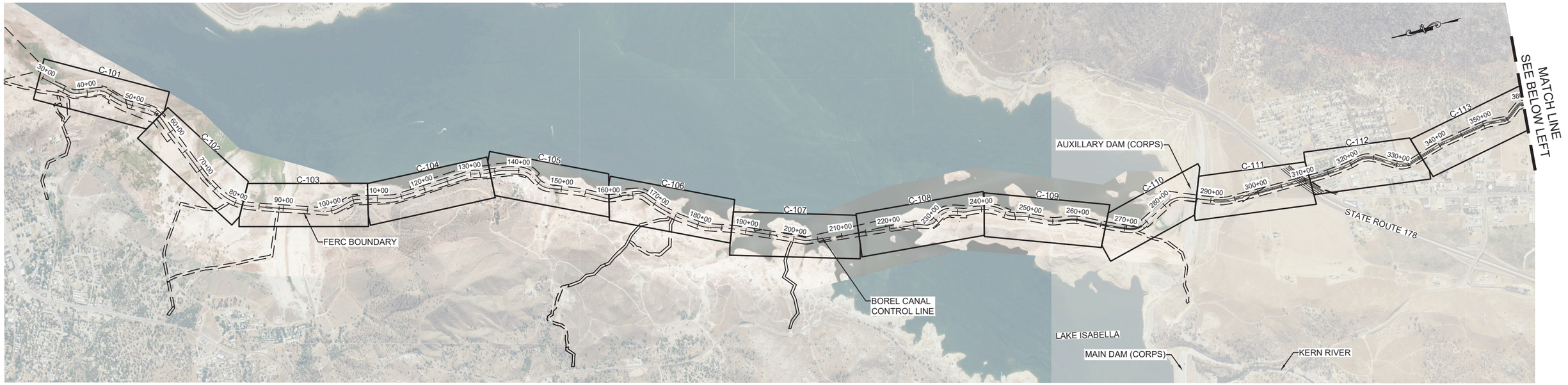
SCALE D/L

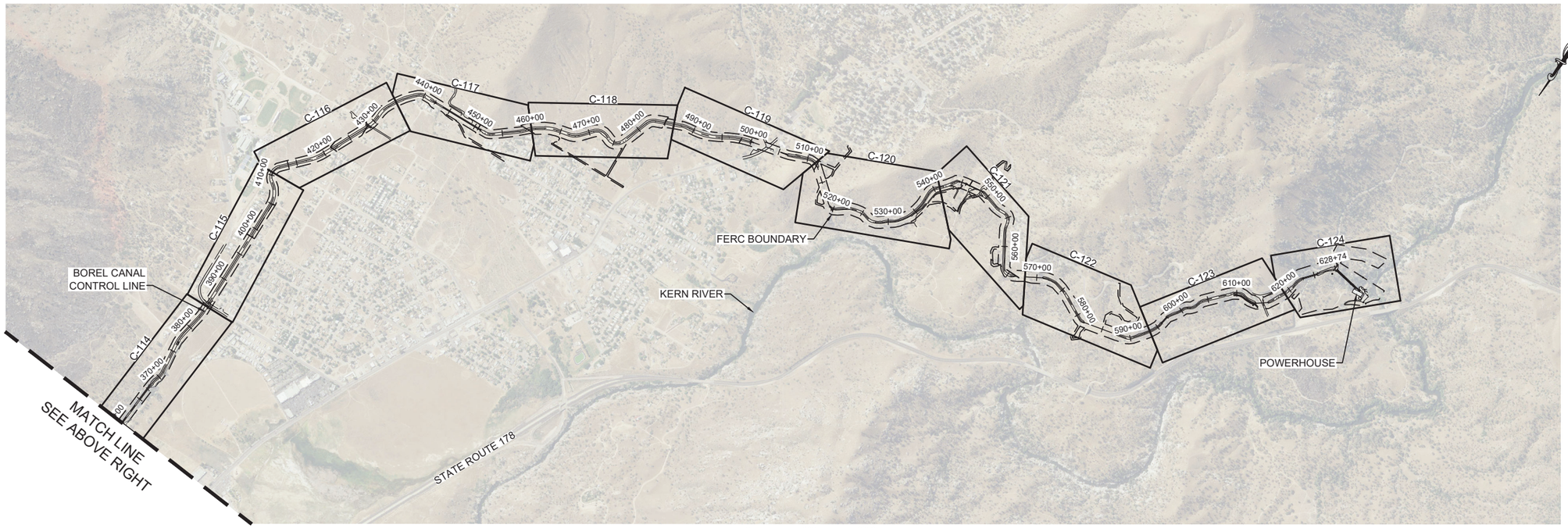
V-107

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




PLAN
SCALE: 1"=1000'

0 1000 2000




PLAN
SCALE: 1"=1000'

0 1000 2000

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

CIVIL KEY MAP

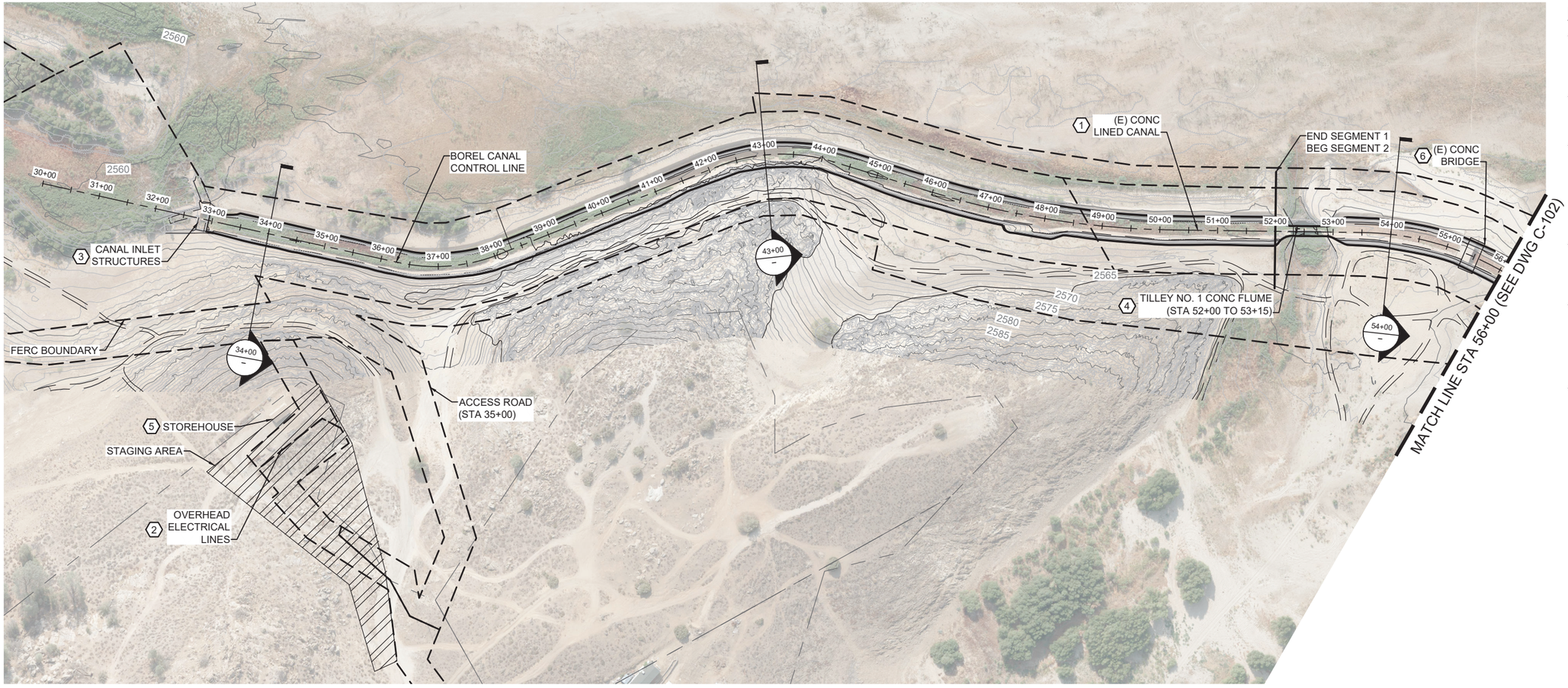
SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

HDR

SCALE D/L

C-100

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




## KEY NOTES:

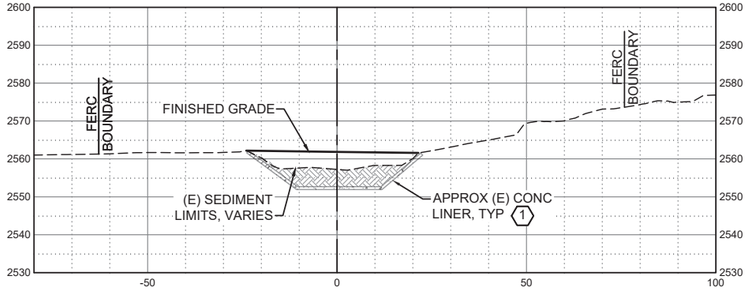
1. ABANDON EXISTING CONCRETE LINER IN PLACE AND BACKFILL CANAL WITH CLEAN IMPORTED FILL WHILE MINIMIZING DISTURBANCE OF ADJACENT SURFACES (STA 33+00 TO 74+00).
2. PROTECT EXISTING OVERHEAD LINES AND POLES IN PLACE. COORDINATE WITH UTILITY TO ABANDON SERVICE TO STOREHOUSE.
3. REMOVE SLIDE GATES, RADIAL GATES, ACTUATORS, AND MECHANICAL FEATURES. DISPOSE OF THESE MATERIALS AT AN APPROVED WASTE FACILITY. CONCRETE WALLS AND FOOTINGS TO REMAIN. PLACE IMPORTED FILL ON DOWNSTREAM/CANAL SIDE OF THE STRUCTURE. MAX 3H:1V SLOPE. SEE C-502.
4. BACKFILL CONCRETE FLUME AND WINGWALLS WITH CLEAN IMPORTED FILL. GRADE TO PROVIDE SMOOTH TRANSITIONS AND CONFORM TO ADJACENT SURFACES (3:1 MAX). SEE C-503.
5. REMOVE AND DISPOSE OF CHAIN LINK FENCING, GATE, AND ALL MATERIAL STORED INSIDE THE LIMITS OF FENCING. DEMOLISH AND REMOVE STRUCTURE ABOVE GROUND, FOUNDATION TO REMAIN. RE-GRADE TO CONFORM TO ADJACENT SURFACES AND PROVIDE POSITIVE DRAINAGE.
6. REMOVE EXISTING CONCRETE BRIDGE AND ABUTMENTS. PROTECT BRIDGE FOOTING IN PLACE AND BACKFILL CANAL WITH CLEAN IMPORTED FILL. GRADE TO PROVIDE SMOOTH TRANSITIONS AND CONFORM TO ADJACENT SURFACES (3:1 MAX).

## PLAN STA 30+00 TO STA 56+00

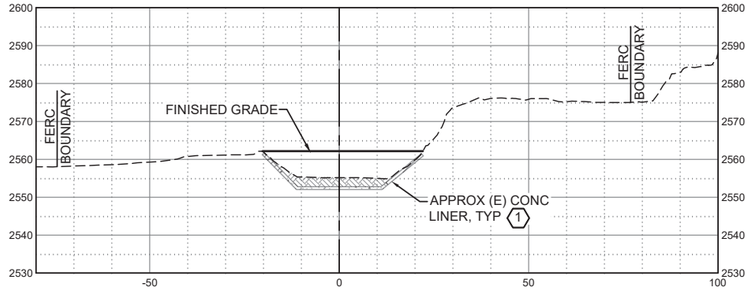
SCALE: 1"=100'

0 100 200

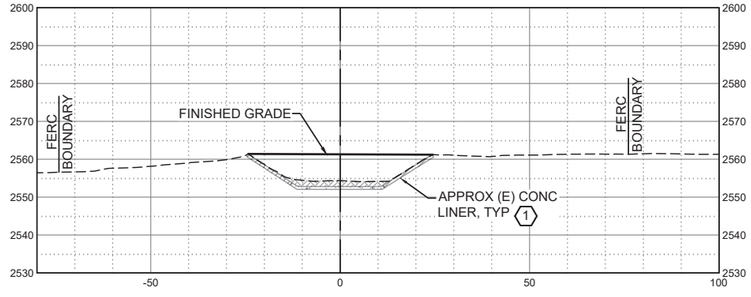
34+00




43+00




54+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

DECOMMISSIONING PLAN
STA 30+00 TO STA 56+00

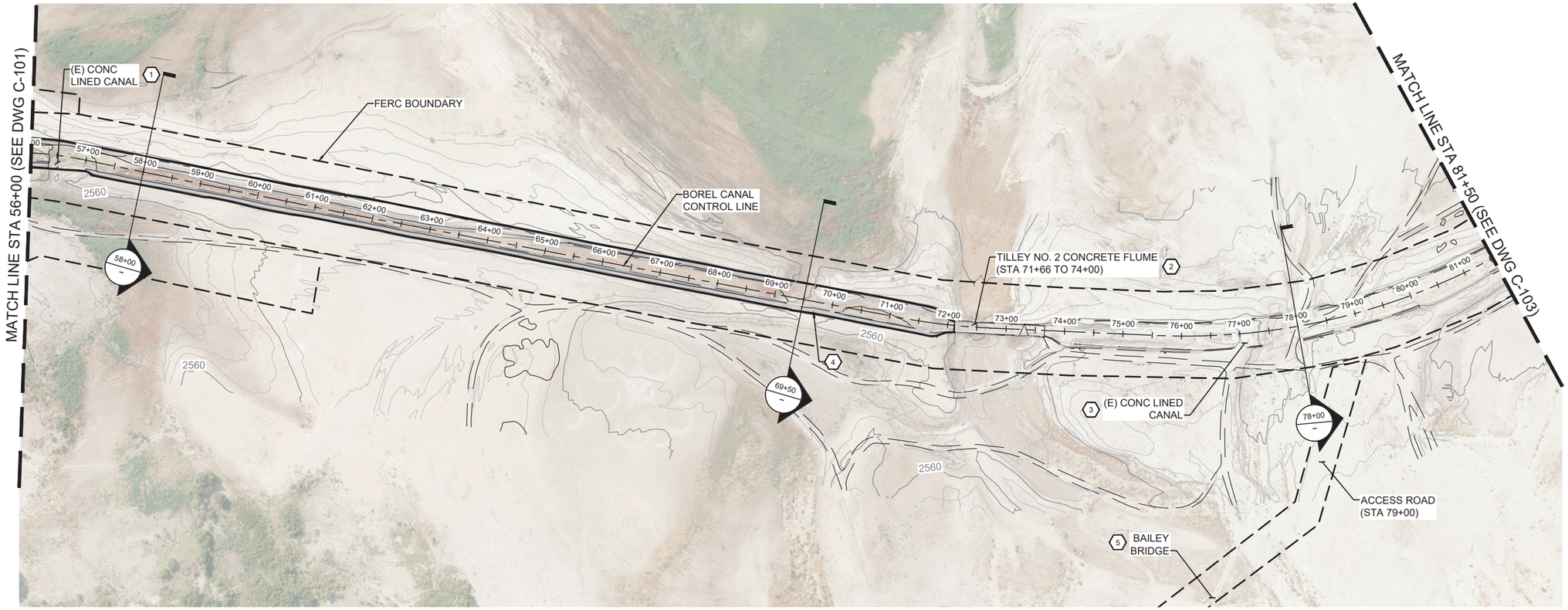
SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

HDR

SCALE D/L

C-101

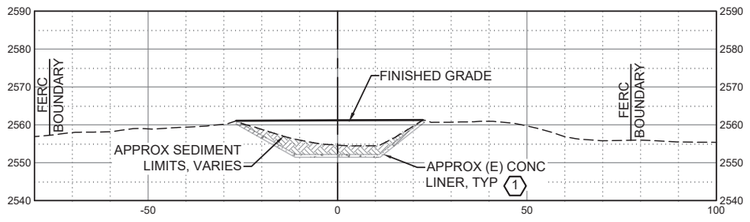
SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE



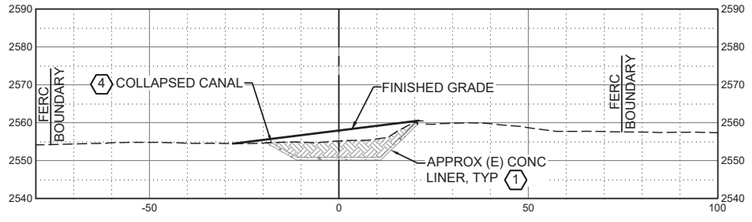

## PLAN STA 56+00 TO STA 81+50

SCALE: 1"=100'

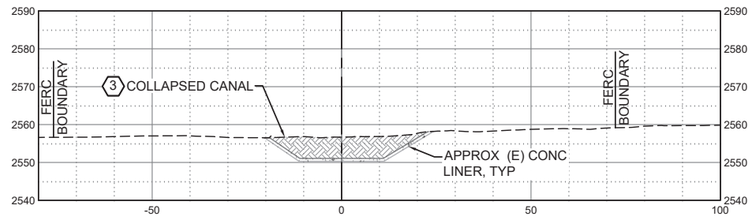
### 58+00




### 69+50




### 78+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

## KEY NOTES:

1. ABANDON EXISTING CONCRETE LINER IN PLACE AND BACKFILL CANAL WITH CLEAN IMPORTED FILL WHILE MINIMIZING DISTURBANCE OF ADJACENT SURFACES (STA 33+00 TO 74+00).
2. BACKFILL CONCRETE FLUME AND WINGWALLS WITH CLEAN IMPORTED FILL. GRADE TO PROVIDE SMOOTH TRANSITIONS AND CONFORM TO ADJACENT SURFACES (3:1). SEE C-504.
3. EXISTING CONCRETE LINER HAS COLLAPSED IN THIS REACH (STA 74+00 TO 86+00) AND SEDIMENT HAS NATURALLY BACKFILLED THE CHANNEL. NO CONSTRUCTION REQUIRED IN THIS REACH.
4. EXISTING CONCRETE CHANNEL LINER WASHED IN AT THIS LOCATION. ABANDON INTACT AND DAMAGED LINER IN PLACE. BACKFILL AND GRADING OF CHANNEL IN THIS AREA TO NATURALLY CONFORM.
5. BAILEY BRIDGE IS LOCATED OUTSIDE THE LIMITS SHOWN HEREIN. SEE SHEET V-101 FOR LOCATION. ABANDON BAILEY BRIDGE IN PLACE. THE BRIDGE STRUCTURE, BRIDGE SUPPORTS, AND FENCING WILL BE LEFT IN PLACE AT THE REQUEST OF THE FOREST SERVICE.

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

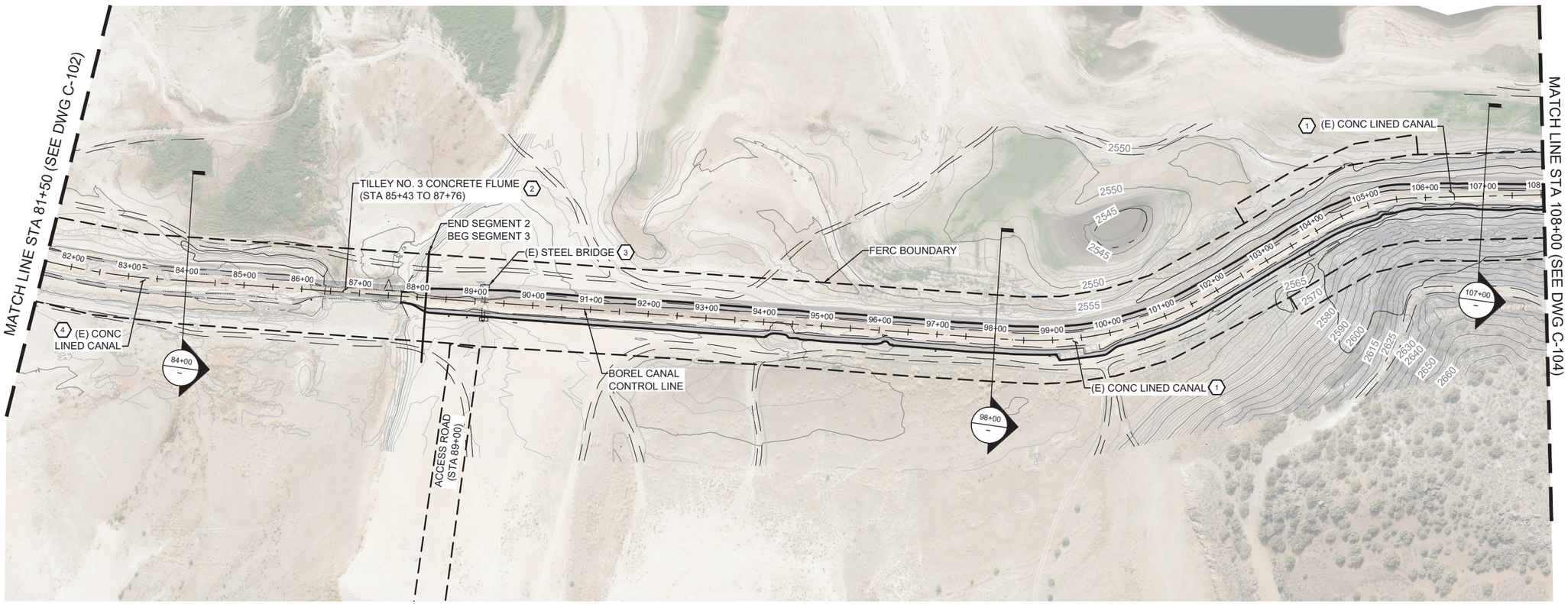
DECOMMISSIONING PLAN
STA 56+00 TO STA 81+50

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company | HDR

SCALE D/L

C-102

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




## KEY NOTES:

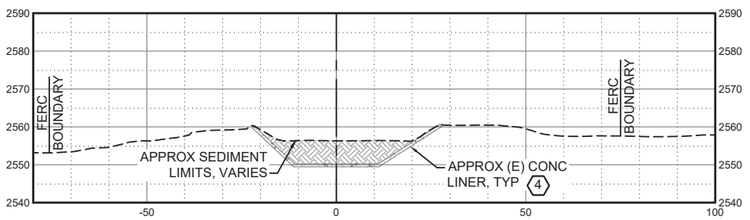
1. ABANDON EXISTING CONCRETE LINER IN PLACE AND BACKFILL CANAL WITH CLEAN IMPORTED FILL WHILE MINIMIZING DISTURBANCE OF ADJACENT SURFACES (STA 86+00 TO 118+00).
2. BACKFILL CONCRETE FLUME AND WINGWALLS WITH CLEAN IMPORTED FILL. GRADE TO PROVIDE SMOOTH TRANSITIONS AND CONFORM TO ADJACENT SURFACES (3:1 MAX). SEE C-505.
3. REMOVE STEEL BRIDGE, ABUTMENTS TO REMAIN. BACKFILL AREA AROUND ABUTMENTS TO NATURALLY CONFORM TO ADJACENT TOPOGRAPHY (3:1 MAX SLOPE). NO BRIDGE AS-BUILT DRAWINGS AVAILABLE.
4. EXISTING CONCRETE LINER HAS COLLAPSED IN THIS REACH (STA 74+00 TO 86+00) AND SEDIMENT HAS NATURALLY BACKFILLED THE CHANNEL. NO CONSTRUCTION REQUIRED IN THIS REACH.

## PLAN STA 81+50 TO STA 108+00

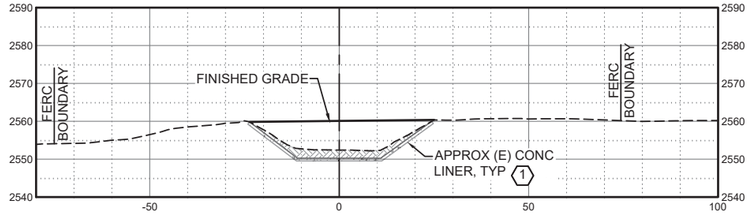
SCALE: 1"=100'

0 100 200

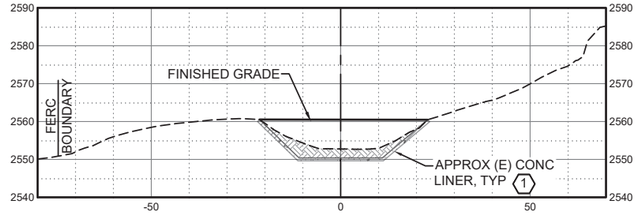
84+00




98+00




107+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

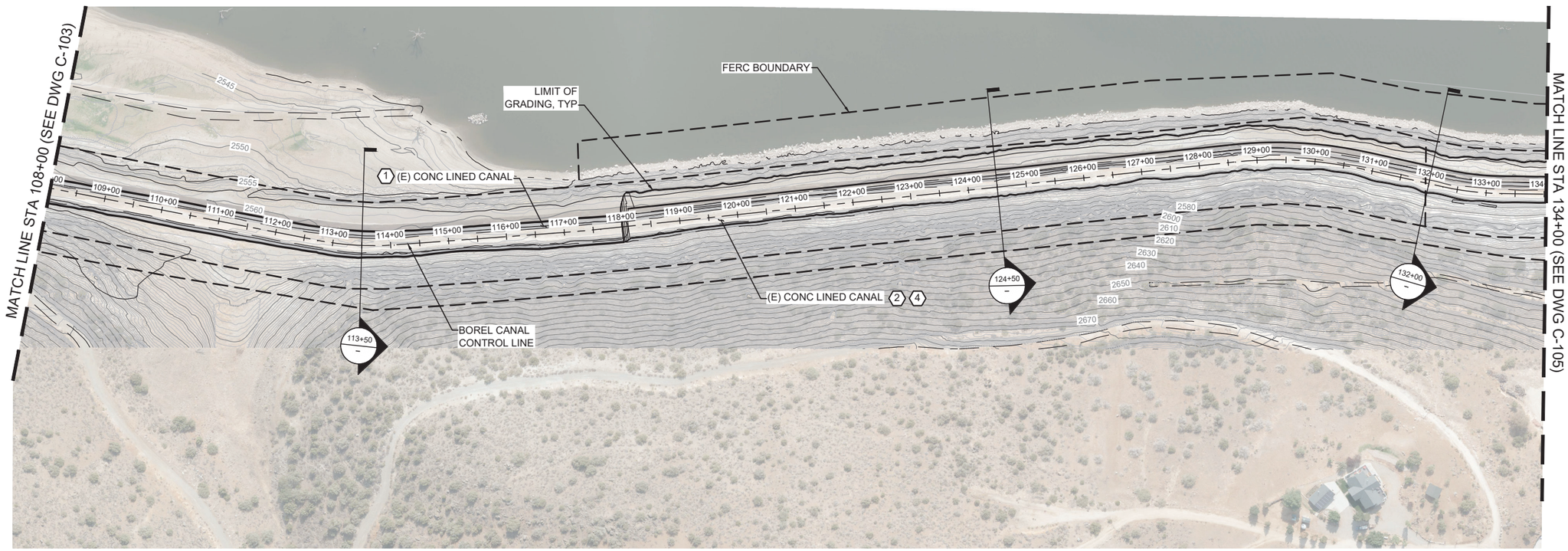
DECOMMISSIONING PLAN
STA 81+50 TO STA 108+00

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-103

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




## KEY NOTES:

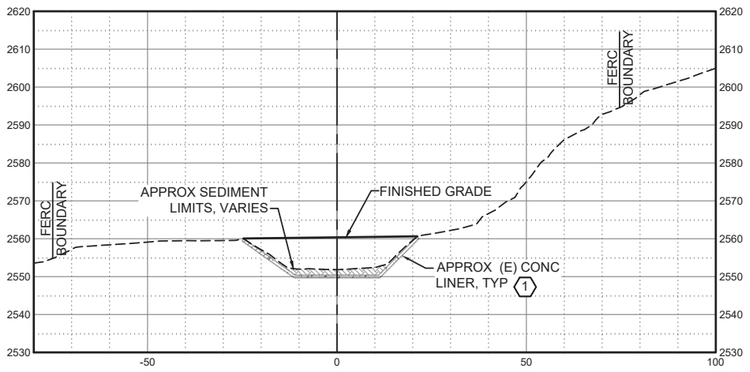
1. ABANDON EXISTING CONCRETE LINER IN PLACE AND BACKFILL CANAL WITH CLEAN IMPORTED FILL WHILE MINIMIZING DISTURBANCE OF ADJACENT SURFACES (STA 86+00 TO 118+00).
2. SAWCUT EXPOSED METAL FLUSH TO CONCRETE FACE. REMOVE ALL DEBRIS AND DISPOSE IN AN APPROVED WASTE FACILITY.
3. REMOVE EXISTING RIP RAP FROM LIMITS OF CUT SLOPE, STOCKPILE, THEN PLACE AS EROSION CONTROL BARRIER ON FINISHED SLOPES.
4. REMOVE UPPER PORTION OF CONCRETE LINER. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM. SEE C-301 FOR TYPICAL SECTION (STA 118+00 TO 168+00)

## PLAN STA 108+00 TO STA 134+00

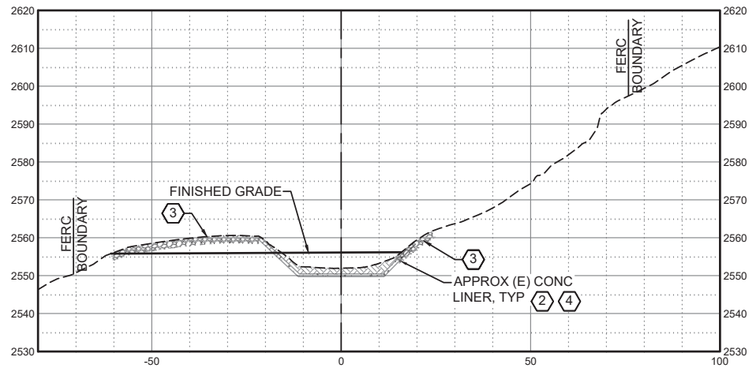
SCALE: 1"=100'

0 100 200

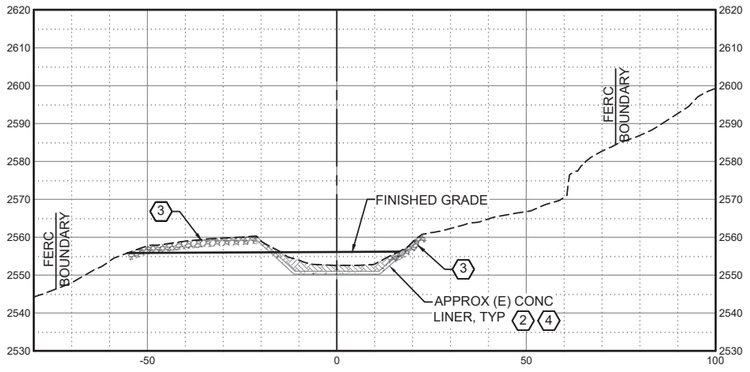
### 113+50




### 124+50




### 132+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

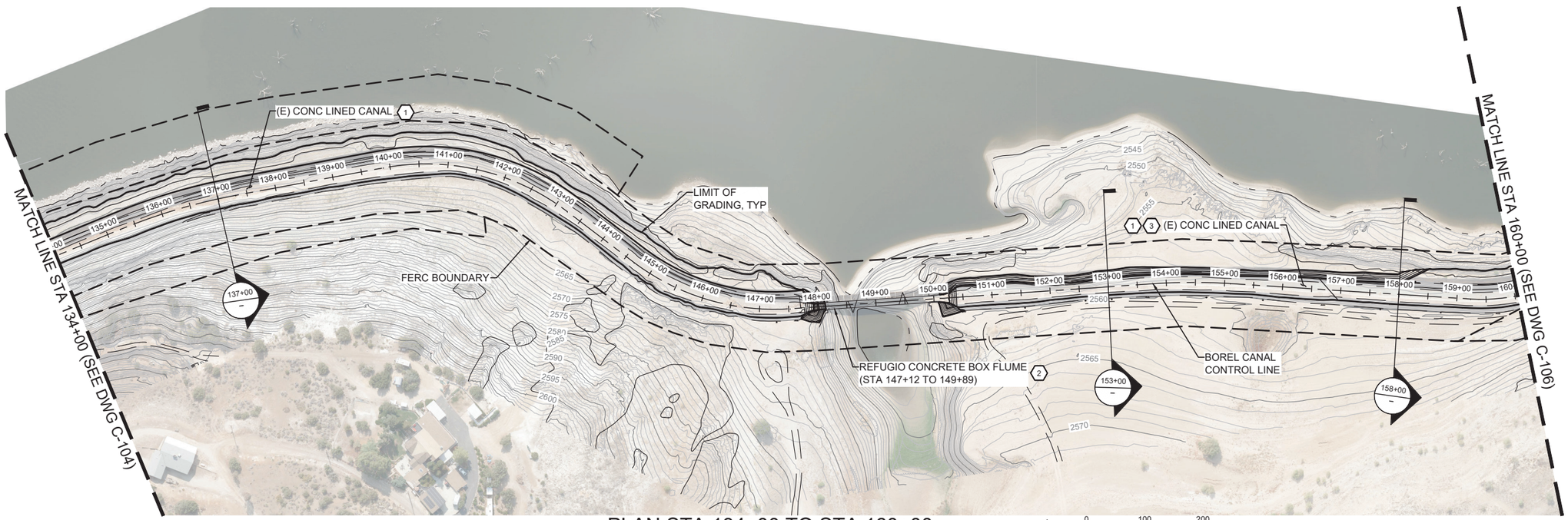
DECOMMISSIONING PLAN
STA 108+00 TO STA 134+00

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-104

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




## PLAN STA 134+00 TO STA 160+00

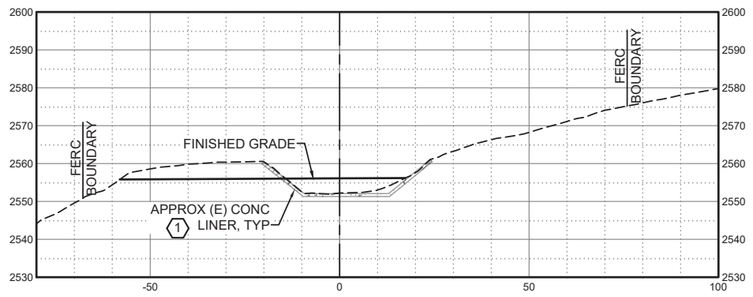
SCALE: 1"=100'

0 100 200

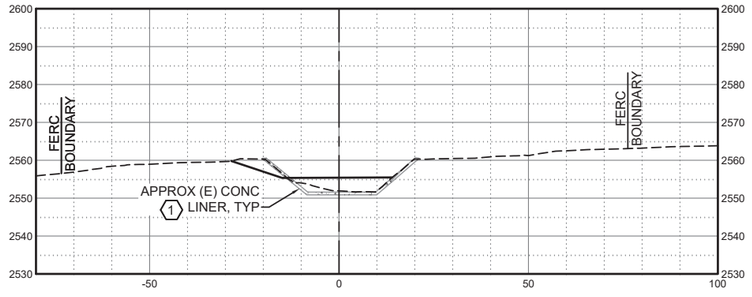
## KEY NOTES:

1. REMOVE UPPER PORTION OF CONCRETE LINER. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM. SEE C-301 FOR TYPICAL SECTION. (STA 118+00 TO 168+00)
2. REMOVE CONCRETE FLUME, HEADWALLS, AND CONCRETE PIERS TO A DEPTH OF 2-FT BELOW EXISTING GRADE. PROCESS CONCRETE DEBRIS AND PLACE WITHIN CANAL. SEE C-506 FOR AS-BUILT DRAWINGS OF REFUGIO CONCRETE BOX FLUME.
3. REMOVE EXISTING RIP RAP FROM LIMITS OF CUT SLOPE, STOCKPILE, THEN PLACE AS EROSION CONTROL BARRIER ON FINISHED SLOPES.

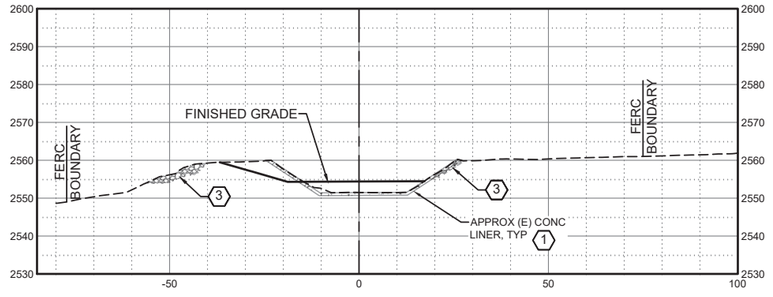
137+00




153+00




158+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

DECOMMISSIONING PLAN
STA 134+00 TO STA 160+00

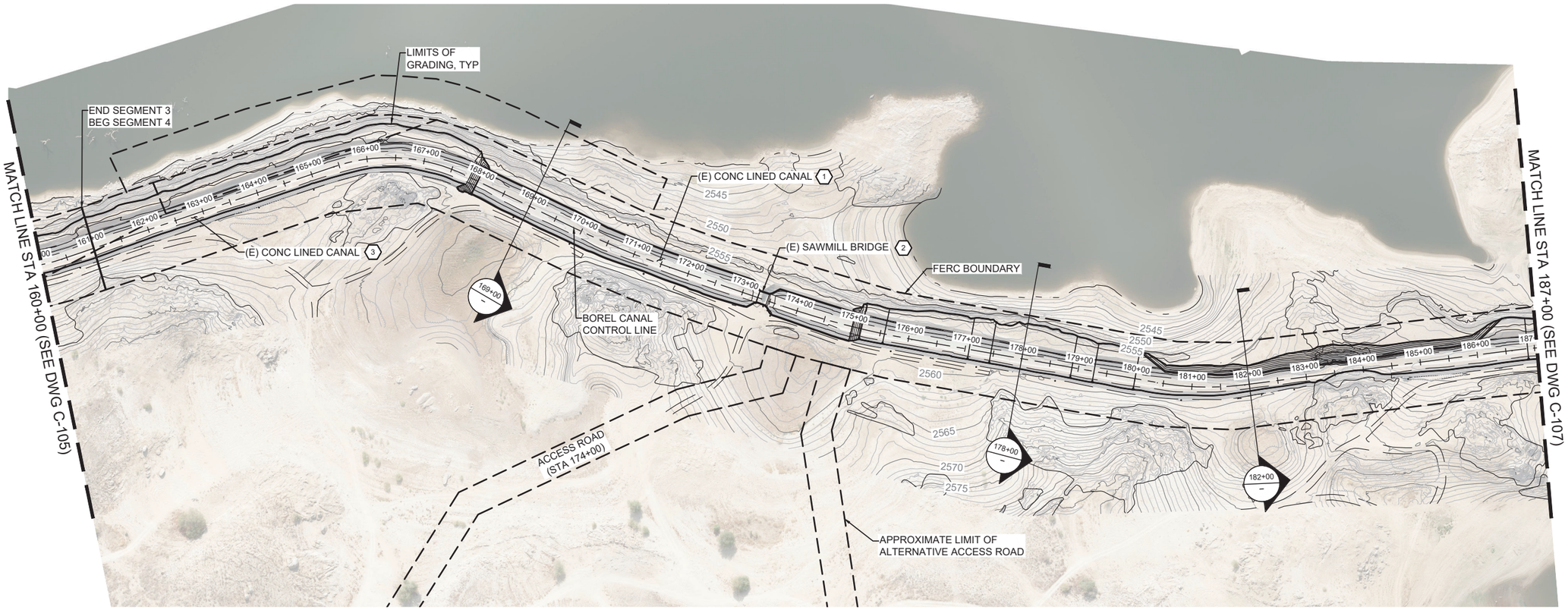
SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

HDR

SCALE D/L

C-105

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE



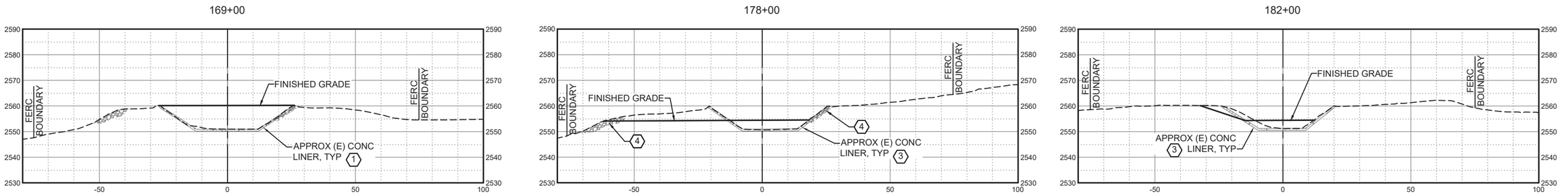

## KEY NOTES:

1. ABANDON EXISTING CONCRETE LINER IN PLACE AND BACKFILL CANAL WITH CLEAN IMPORTED FILL WHILE MINIMIZING DISTURBANCES TO ADJACENT SURFACES (STA 168+00 TO 175+00).
2. REMOVE BRIDGE. ABUTMENTS AND FOUNDATION TO REMAIN IN PLACE. PROCESS CONCRETE AND PLACE WITHIN CANAL. NO BRIDGE AS-BUILT DRAWINGS AVAILABLE.
3. REMOVE UPPER PORTION OF CONCRETE LINER. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM. SEE C-301 FOR TYPICAL SECTION. (STA 118+00 TO 168+00 AND STA 175+00 TO 191+00).
4. REMOVE EXISTING RIP RAP FROM LIMITS OF CUT, STOCKPILE, THEN PLACE AS EROSION CONTROL BARRIER ON FINISHED SLOPES.

## PLAN STA 160+00 TO STA 187+00

SCALE: 1"=100'

0 100 200




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

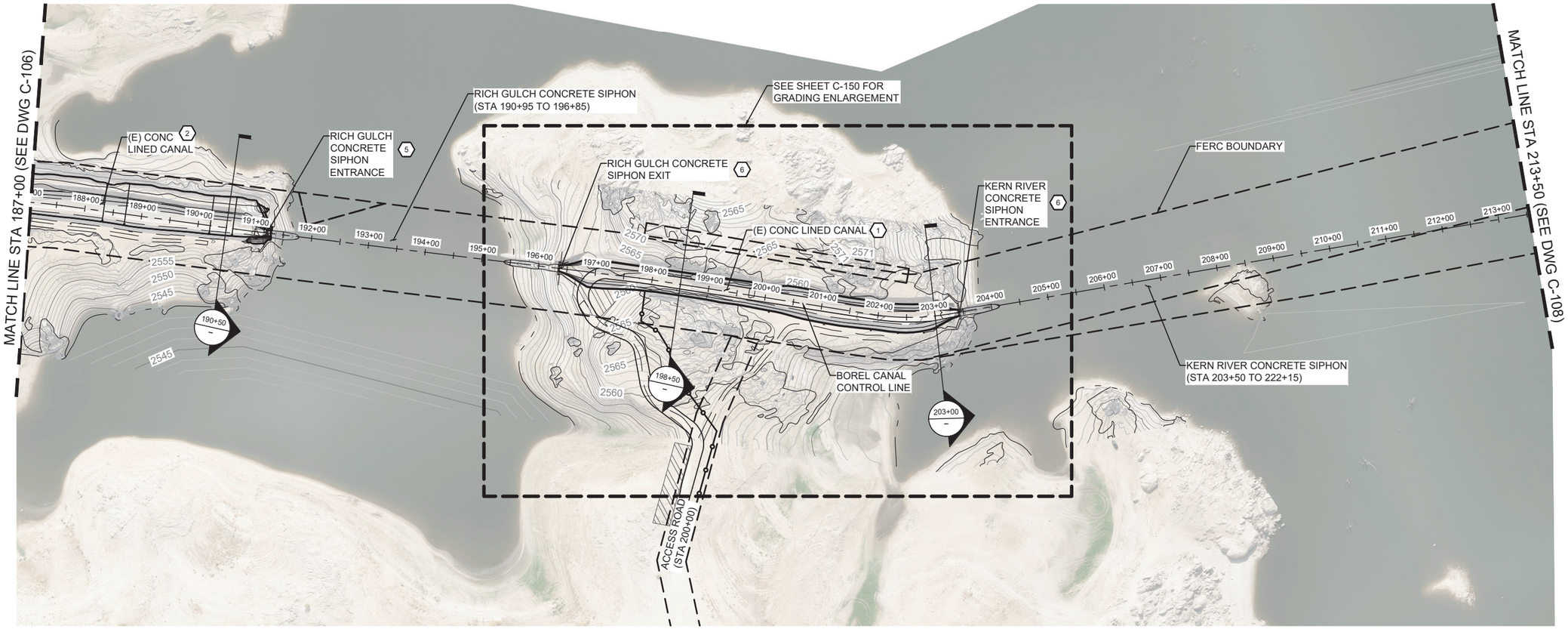
DECOMMISSIONING PLAN
STA 160+00 TO STA 187+00

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-106

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




## PLAN STA 187+00 TO STA 213+50

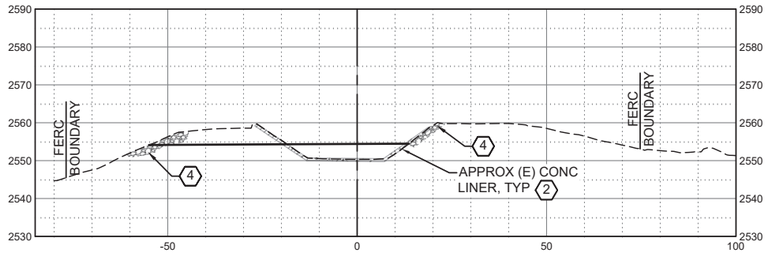
SCALE: 1"=100'

0 100 200

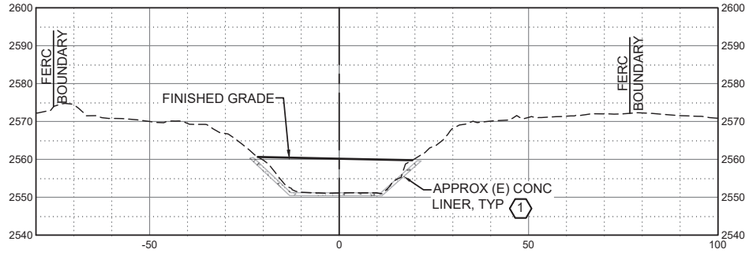
### KEY NOTES:

1. ABANDON EXISTING CONCRETE LINER IN PLACE AND BACKFILL CANAL WITH CLEAN IMPORTED FILL WHILE MINIMIZING DISTURBANCE OF ADJACENT SURFACES (STA 196+50 TO 203+50).
2. REMOVE UPPER PORTION OF CONCRETE LINER. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM. SEE C-301 FOR TYPICAL SECTION. (STA 175+00 TO 191+00)
3. REMOVE AND DISPOSE OF FENCING. PLACE SLURRY PLUG AT ENTRANCE AND EXIT OF SIPHON, MIN 20 FEET FROM END OF SIPHON.
4. REMOVE EXISTING RIP RAP FROM LIMITS OF CUT, STOCKPILE, THEN PLACE AS EROSION CONTROL BARRIER ON FINISHED SLOPES.
5. COLLAPSE WING WALLS INTO CANAL AND BACKFILL HEADWALLS WITH BLENDED FILL (3:1 MAX). SEE C-507 AND 508 FOR AS-BUILT DRAWINGS OF SIPHONS.
6. BACKFILL HEADWALLS AND WING WALLS WITH CLEAN IMPORTED FILL AND GRADE TO TRANSITION TO ADJACENT SURFACES (3:1 MAX).

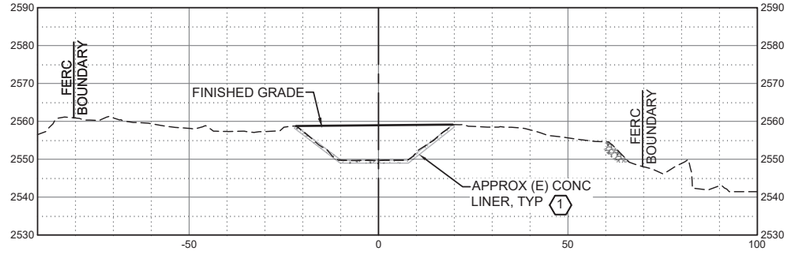
190+50




198+50




203+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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| REFERENCE DRAWINGS |
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LOCATION BOREL HYDRO SURRENDER

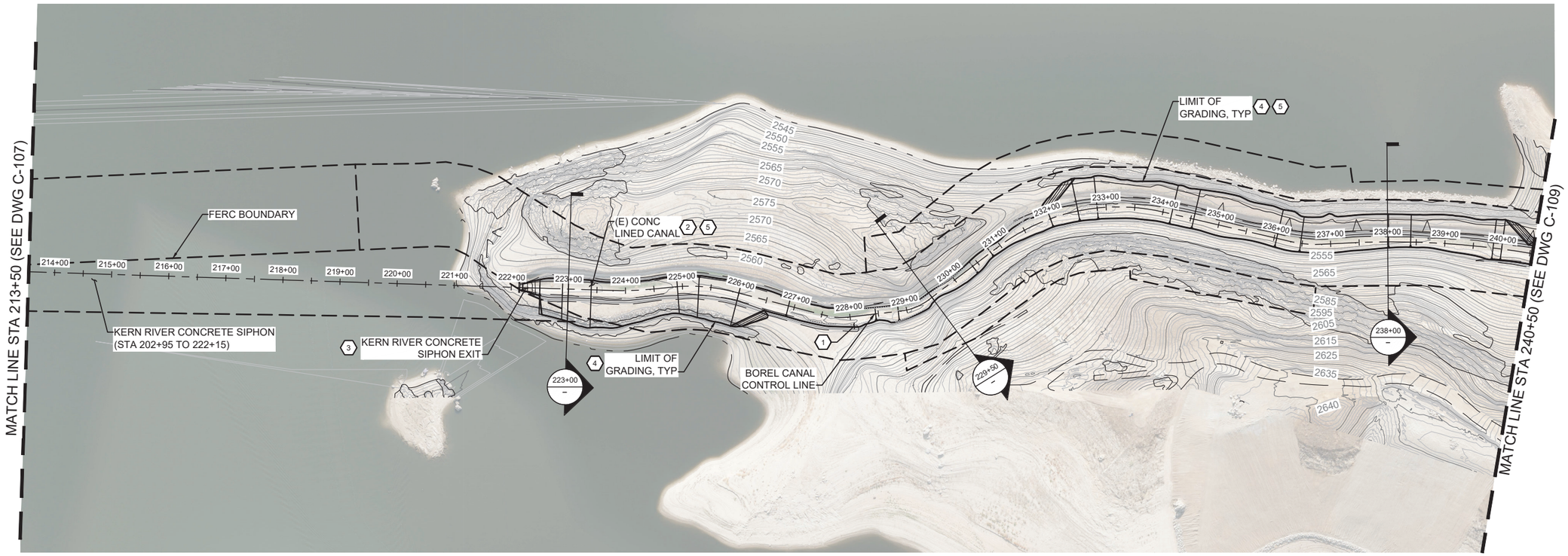
DECOMMISSIONING PLAN
STA 187+00 TO STA 213+50

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-107

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




## PLAN STA 213+50 TO STA 240+50

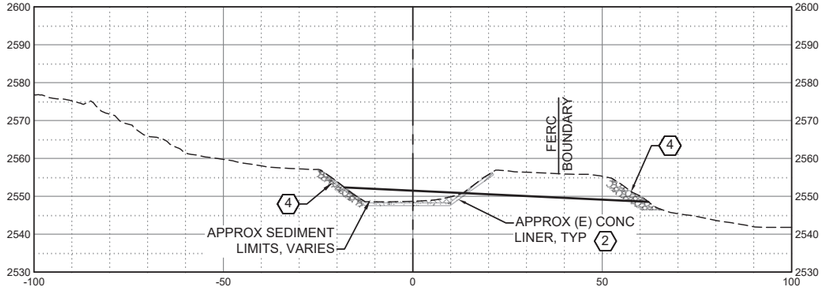
SCALE: 1"=100'

0 100 200

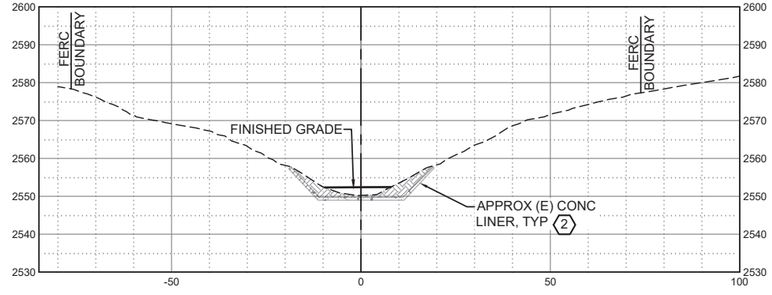
### KEY NOTES:

1. PROVIDE TEMPORARY ACCESS ALONG CANAL BANK WITHIN FERC BOUNDARY.
2. SAWCUT EXPOSED METAL FLUSH TO CONCRETE FACE. REMOVE ALL DEBRIS AND DISPOSE IN AN APPROVED WASTE FACILITY.
3. REMOVE FENCING AND METAL HAZARDS. PLACE SLURRY PLUG AT EXIT OF SIPHON, MIN 20 FEET FROM THE END OF SIPHON. COLLAPSE WING WALLS INTO CANAL AND BURY WITH CLEAN FILL. SEE C-508 FOR AS BUILT DRAWINGS OF SIPHON.
4. REMOVE EXISTING RIP RAP FROM LIMITS OF CUT SLOPE, STOCKPILE, THEN PLACE AS EROSION CONTROL BARRIER ON FINISHED SLOPE.
5. REMOVE UPPER PORTION OF CONCRETE LINER. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM. SEE C-301 FOR TYPICAL SECTION. (STA 222+20 TO 273+80).

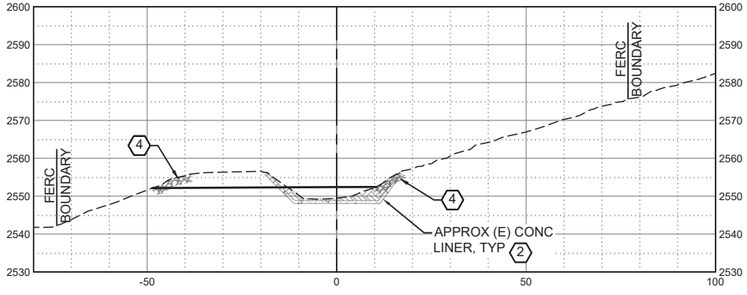
223+00




229+50




238+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

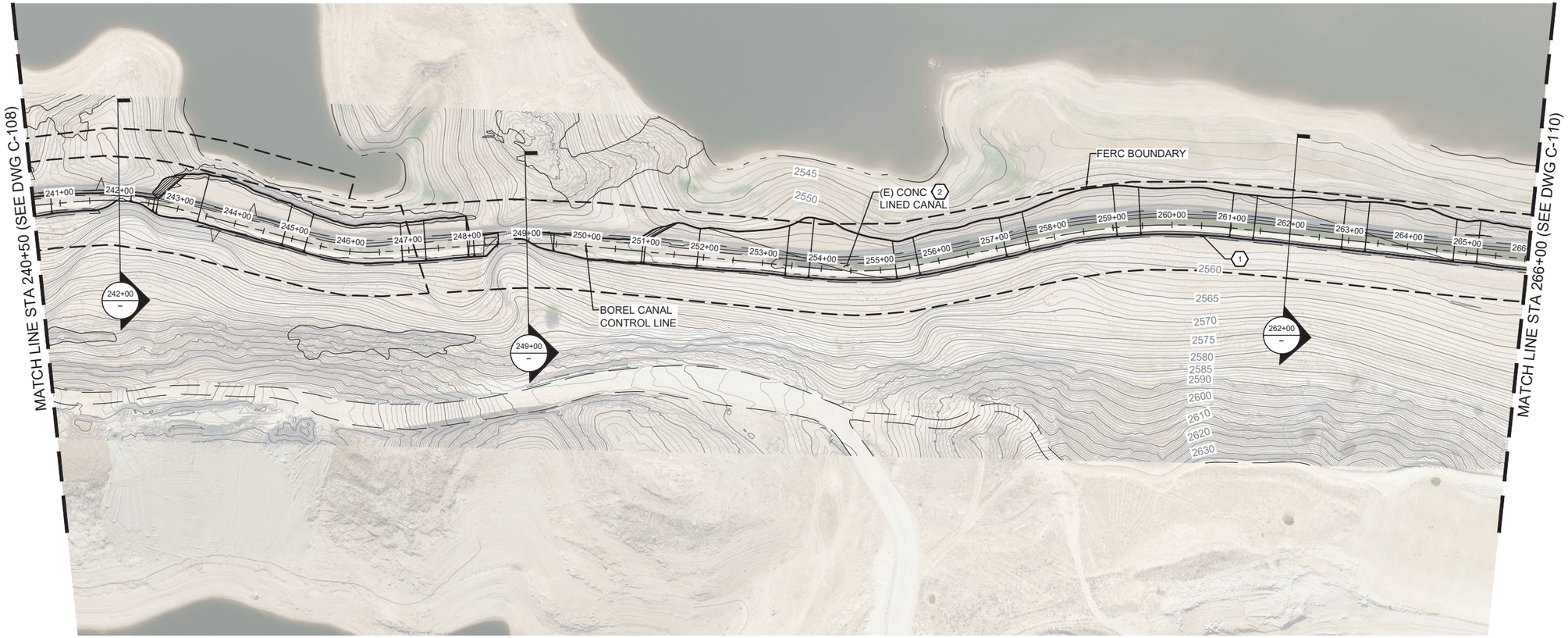
DECOMMISSIONING PLAN
STA 213+50 TO STA 240+50

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company | HDR

SCALE D/L

C-108

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

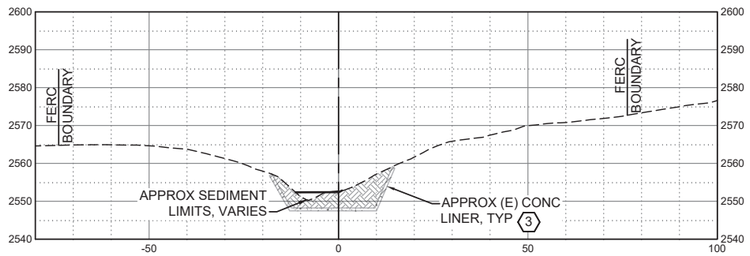



## PLAN STA 240+50 TO STA 266+00

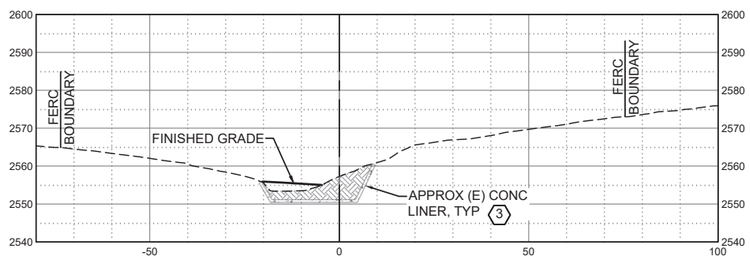
SCALE: 1"=100'

0 100 200

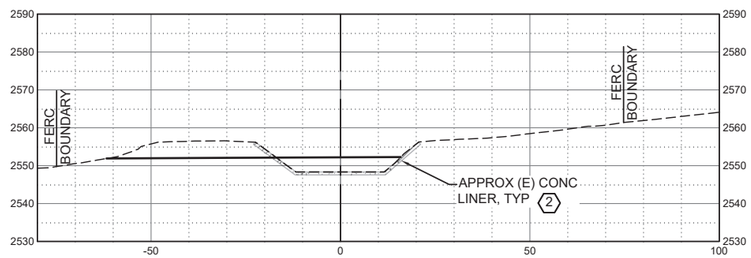
### 242+00




### 249+00




### 262+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

## KEY NOTES:

1. PROVIDE TEMPORARY ACCESS ALONG CANAL BANK WITHIN FERC BOUNDARY.
2. REMOVE UPPER PORTION OF CONCRETE LINER. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM. SEE C-301 FOR TYPICAL SECTION (STA 222+20 TO 273+80)
3. IN AREAS WHERE CANAL IS ALREADY FILLED IN LIMIT GRADING TO NATURALLY CONFORM TO ADJACENT SURFACE. CONCRETE DEMOLITION IS NOT REQUIRED IN AREAS WHERE IT IS BURIED PRIOR TO START OF WORK.

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

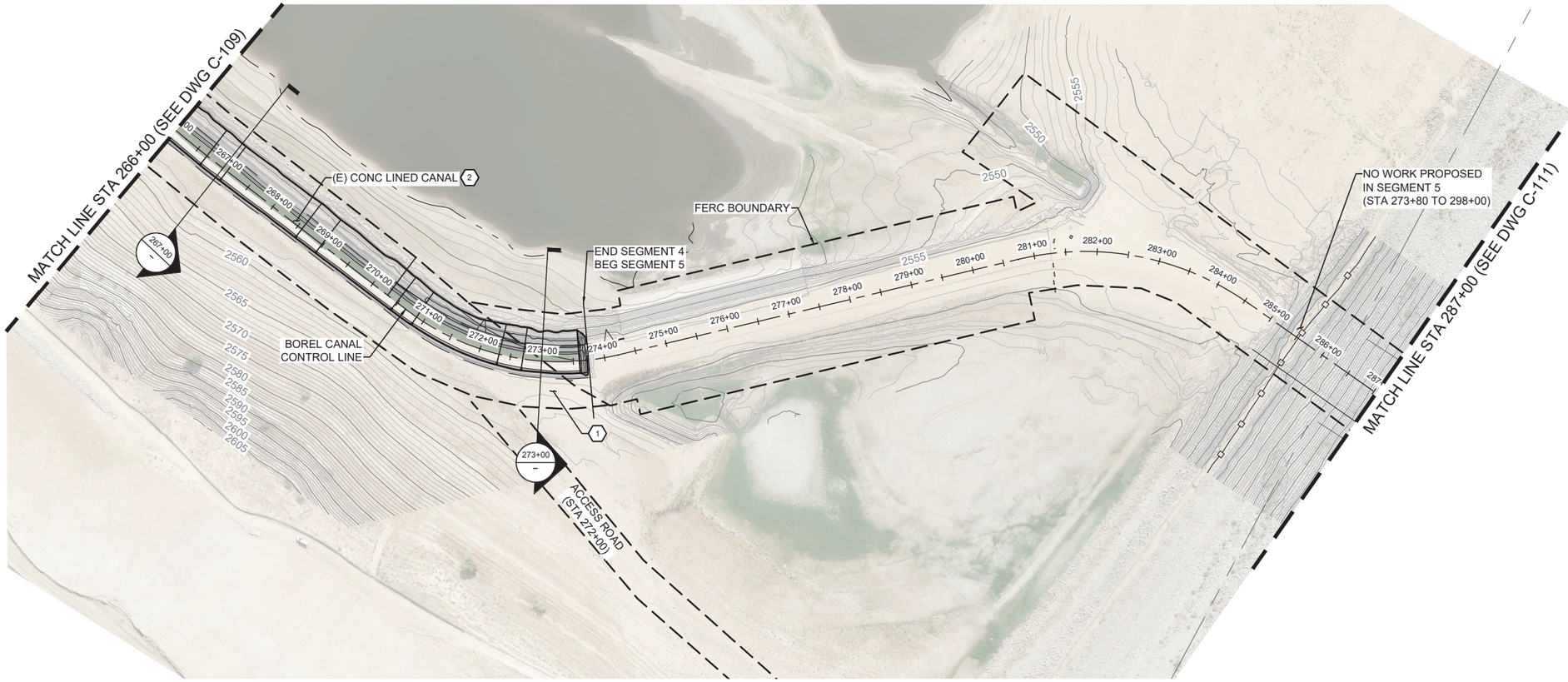
DECOMMISSIONING PLAN
STA 240+50 TO STA 266+00

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-109

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

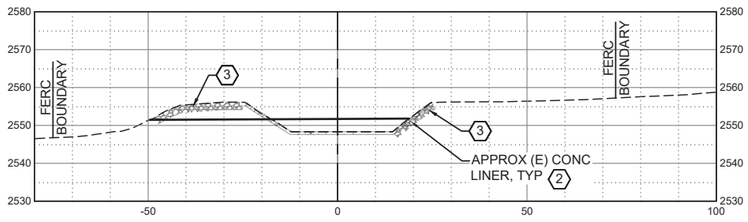



## PLAN STA 266+00 TO STA 287+00

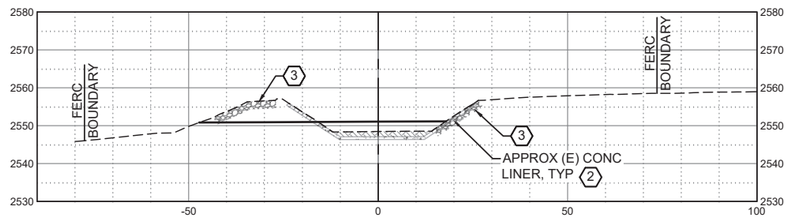
SCALE: 1"=100'

0 100 200

267+00




273+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

### KEY NOTES:

1. PROVIDE TEMPORARY ACCESS ALONG CANAL BANK WITHIN FERC BOUNDARY.
2. REMOVE UPPER PORTION OF CONCRETE LINER. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM. SEE C-301 FOR TYPICAL SECTION (STA 222+20 TO 273+80)
3. REMOVE EXISTING RIP RAP FROM LIMITS OF CUT SLOPE, STOCKPILE, THEN PLACE AS EROSION CONTROL BARRIER ON FINISHED SLOPES.

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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| | | | | | | | | | | | | | | | | | | | | | |

LOCATION BOREL HYDRO SURRENDER

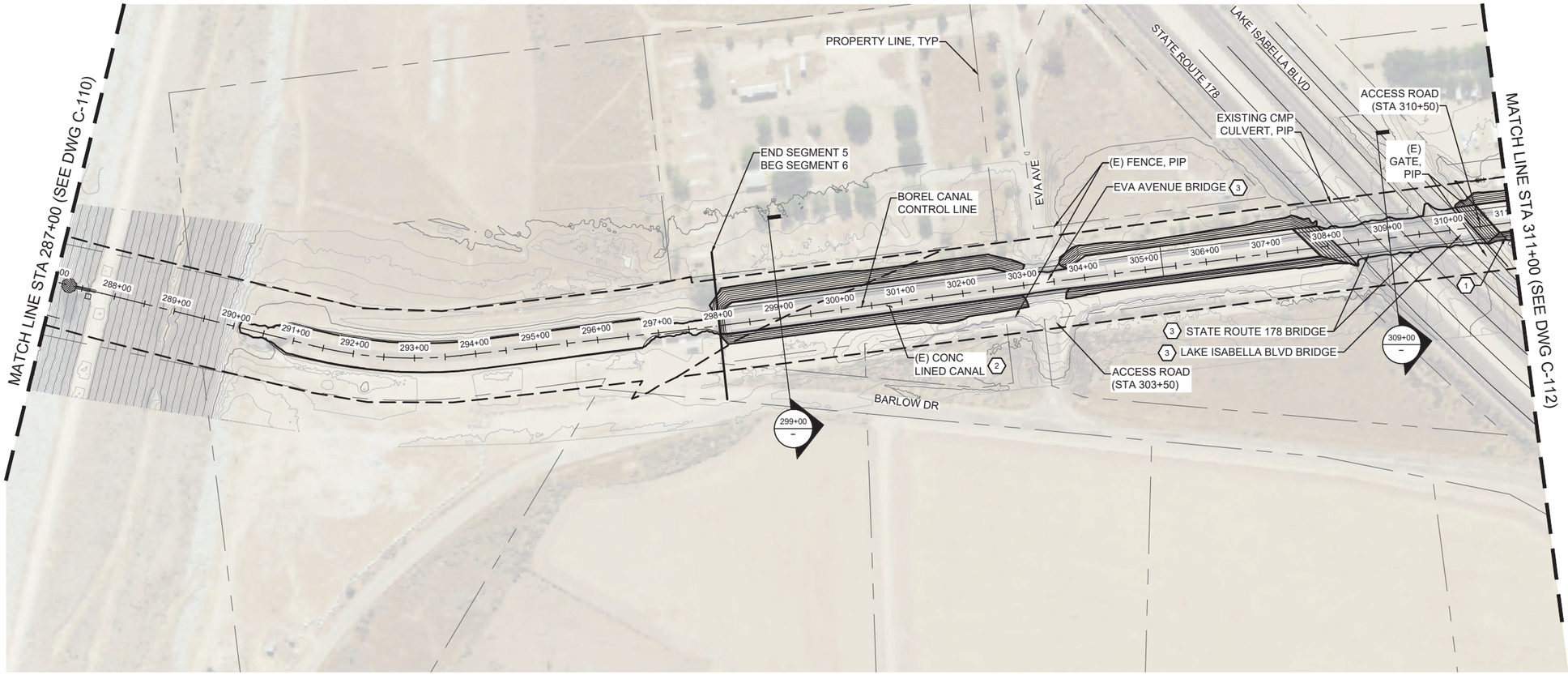
DECOMMISSIONING PLAN
STA 266+00 TO STA 287+00

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-110

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

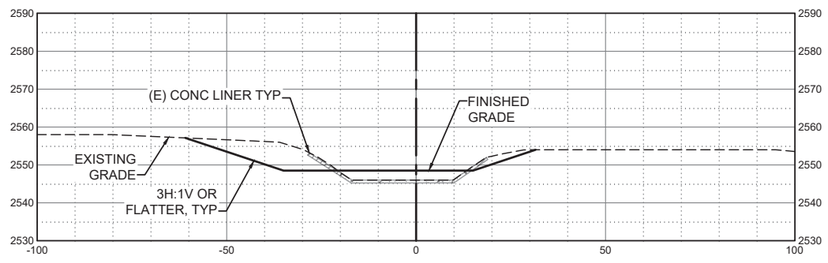



## PLAN STA 287+00 TO STA 311+00

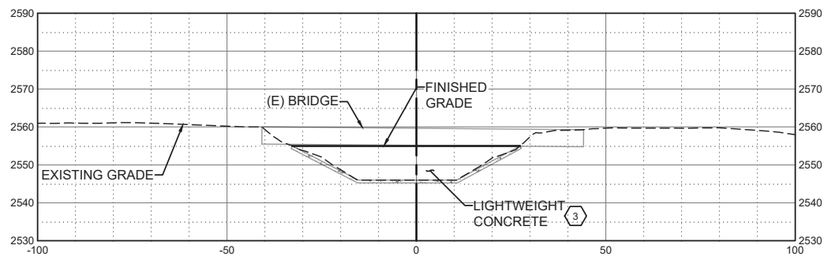
SCALE: 1"=100'

0 100 200

299+00




309+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

### KEY NOTES:

1. PROTECT EXISTING OVERHEAD COMM/ELECTRICAL UTILITIES IN PLACE.
2. REMOVE UPPER PORTION OF CONCRETE LINER. PULVERIZE REMAINING CONCRETE LINER ON BOTTOM OF CANAL. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6-IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM.
3. PROTECT EXISTING BRIDGE IN PLACE. CONCRETE LINER TO REMAIN UNDER BRIDGE TO A DISTANCE OF 20 FEET BEYOND THE FOOTING. PLACE LIGHTWEIGHT CELLULAR CONCRETE FILL ON TOP OF CONCRETE LINER TO FINISHED GRADE ELEVATIONS.

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

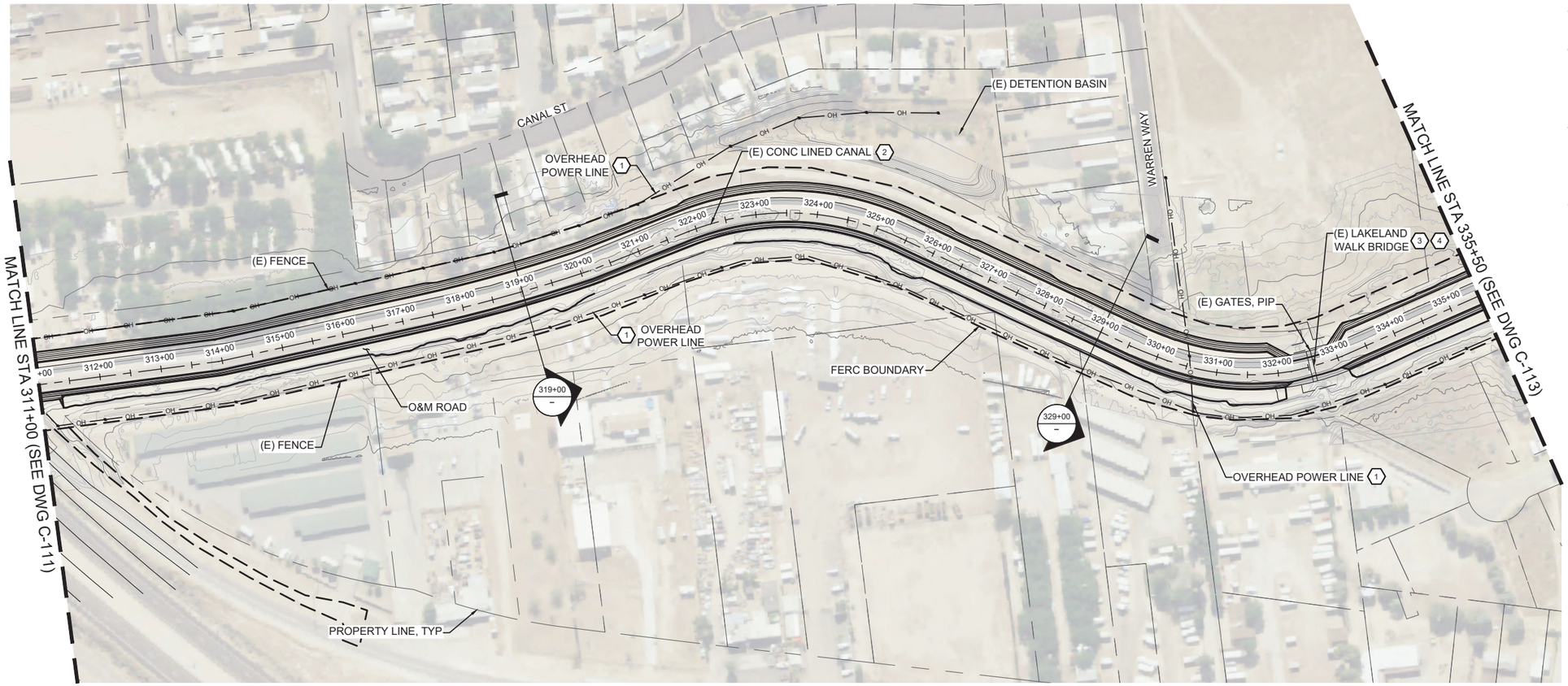
DECOMMISSIONING PLAN
STA 287+00 TO STA 311+00

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-111

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




## KEY NOTES:

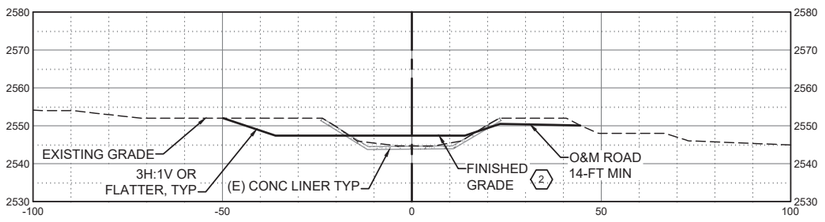
1. PROTECT EXISTING OVERHEAD COMM/ELECTRICAL UTILITIES IN PLACE.
2. REMOVE UPPER PORTION OF CONCRETE LINER AND EXCAVATE BANK. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 INCHES. BLEND PROCESSED CONCRETE AND EXCAVATED MATERIAL AND PLACE WITHIN CANAL.
3. PROTECT EXISTING BRIDGE IN PLACE. CONCRETE LINER TO REMAIN UNDER BRIDGE TO A DISTANCE OF 20 FEET BEYOND THE FOOTING. PLACE LIGHTWEIGHT CELLULAR CONCRETE FILL ON TOP OF CONCRETE LINER TO FINISHED GRADE ELEVATIONS.
4. CONTRACTOR MUST COORDINATE BRIDGE CLOSURE WITH KERN COUNTY, IF NEEDED. IF CLOSURE IS REQUIRED IT MUST OCCUR ON DAYS WHEN SCHOOL IS NOT IN SESSION.

## PLAN STA 311+00 TO STA 335+50

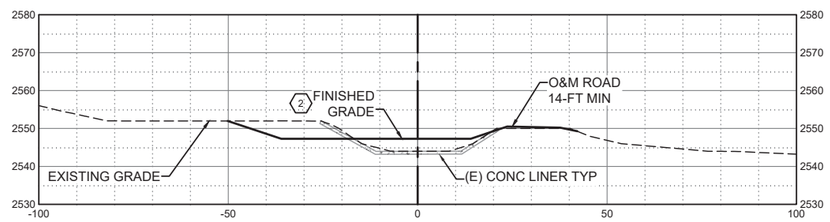
SCALE: 1"=100'

0 100 200

319+00




329+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

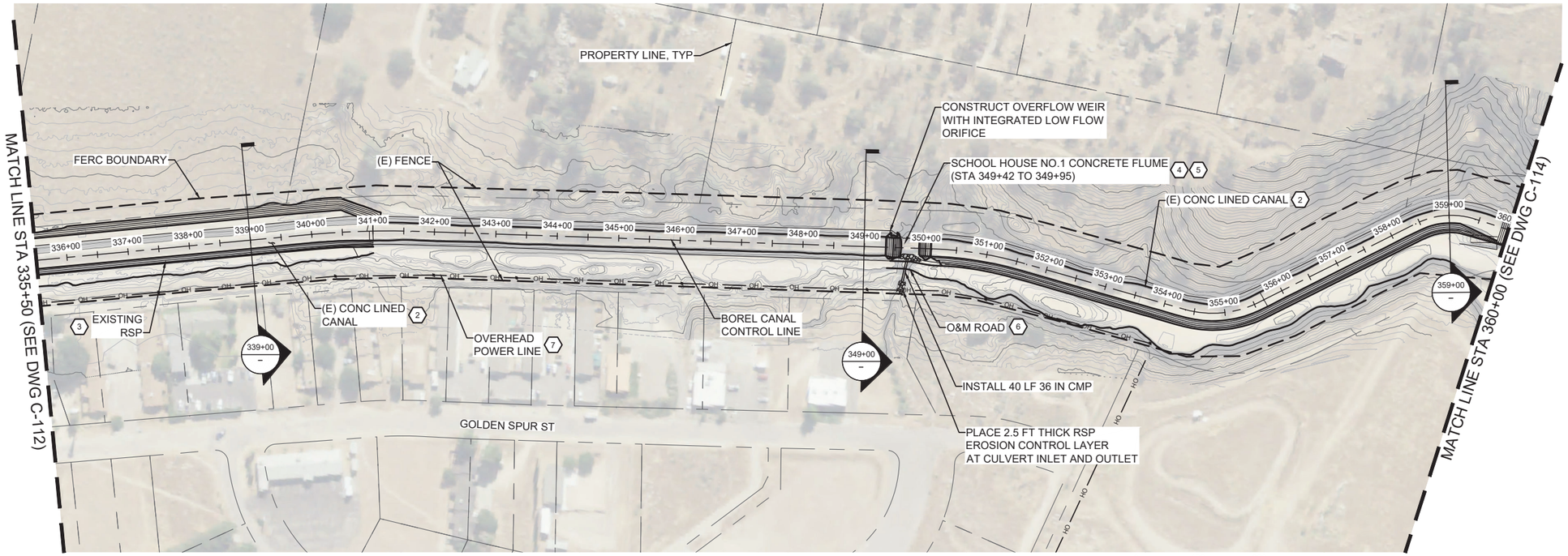
DECOMMISSIONING PLAN
STA 311+00 TO STA 335+50

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-112

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




## PLAN STA 335+50 TO STA 360+00

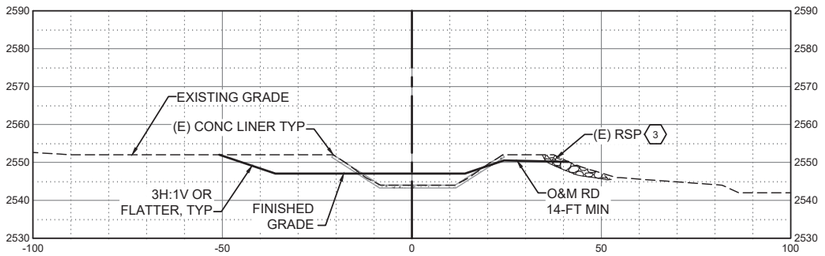
SCALE: 1"=100'

0 100 200

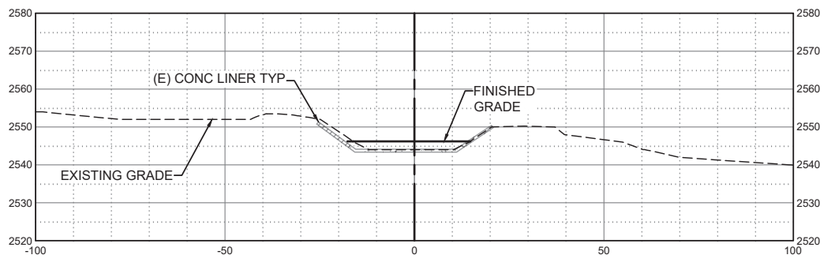
### KEY NOTES:

1. PROTECT EXISTING OVERHEAD COMM/ELECTRICAL UTILITIES IN PLACE.
2. REMOVE UPPER PORTION OF CONCRETE LINER. PULVERIZE REMAINING CONCRETE LINER ON BOTTOM OF CANAL. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6-IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM.
3. REMOVE AND STOCKPILE RSP FROM CANAL BANK WITHIN CONSTRUCTION LIMITS FOR REUSE.
4. REMOVE AND DISPOSE CONCRETE FLUME. PLACE RSP AT TRANSITIONS AND ALONG THE FINISHED SLOPES OF THE NATURAL CHANNEL AFTER REMOVAL OF THE FLUME.
5. GRADED CHANNEL TO CONFORM TO EXISTING DOWNSTREAM SECTION AND PLACE RSP.
6. CONSTRUCT O&M ROAD OVER 36 IN CULVERT WITH ARIZONA CROSSING FOR HIGH FLOW EVENTS.
7. PROTECT EXISTING OVERHEAD COMM/ELECTRICAL UTILITIES IN PLACE.

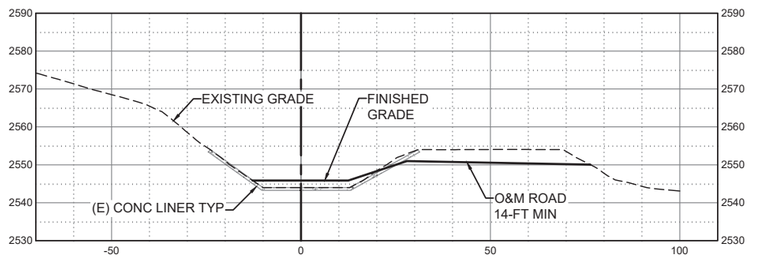
339+00




349+00




359+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1'=20"

0 20 40

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

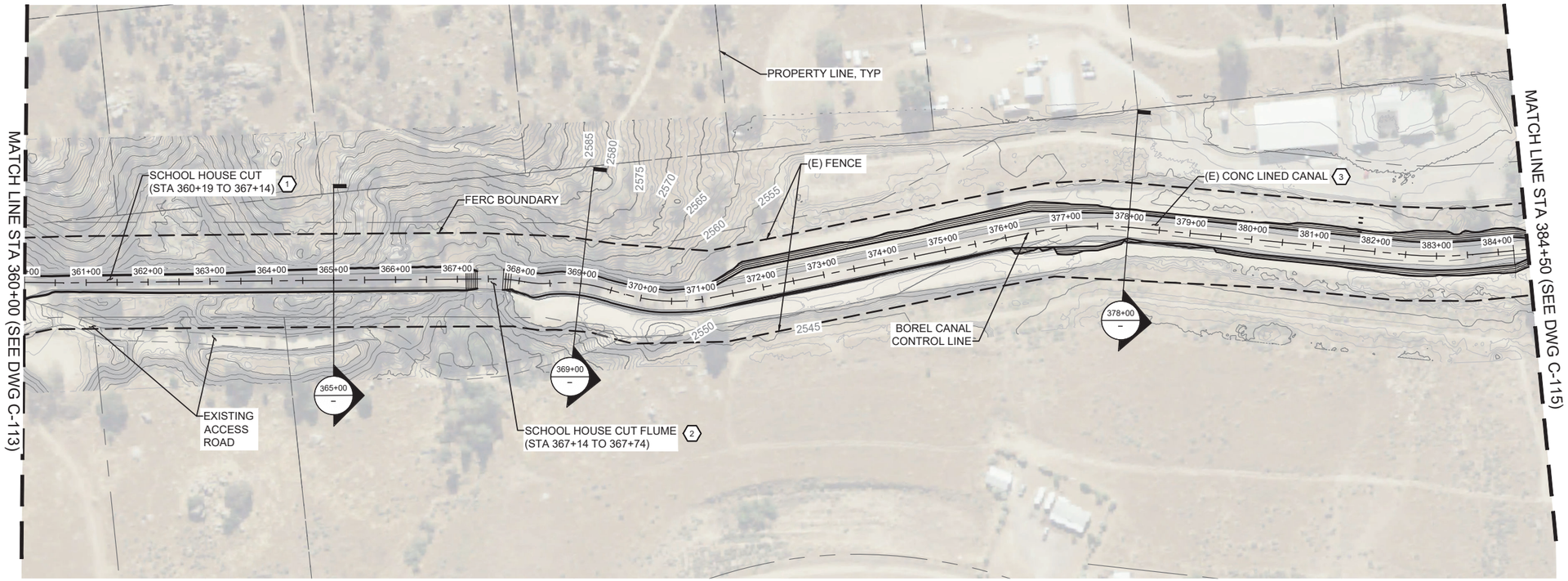
DECOMMISSIONING PLAN
STA 335+50 TO STA 360+00

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-113

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




## PLAN STA 360+00 TO STA 384+50

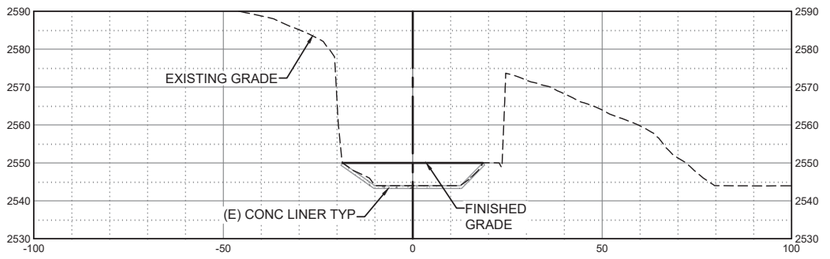
SCALE: 1"=100'

0 100 200

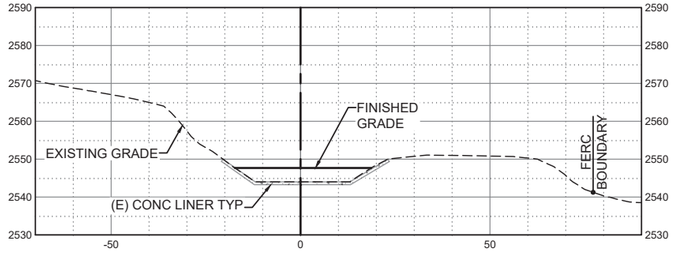
### KEY NOTES:

1. ABANDON EXISTING CONCRETE LINER IN PLACE AND BACKFILL CANAL WHILE MINIMIZING DISTURBANCE OF ADJACENT SURFACES.
2. REMOVE AND DISPOSE OF CONCRETE FLUME. PLACE RSP AT TRANSITION.
3. REMOVE UPPER PORTION OF CONCRETE LINER. PULVERIZE REMAINING CONCRETE LINER ON THE BOTTOM OF THE CANAL. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM.

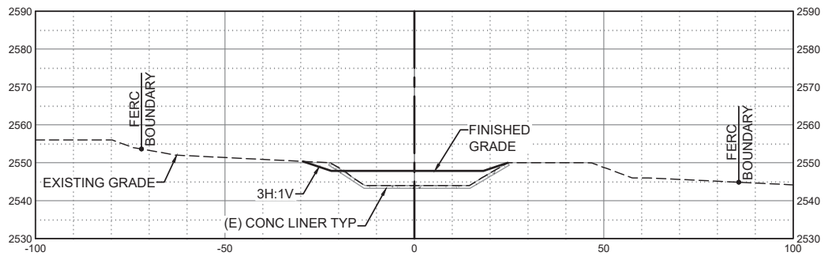
365+00




369+00




378+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

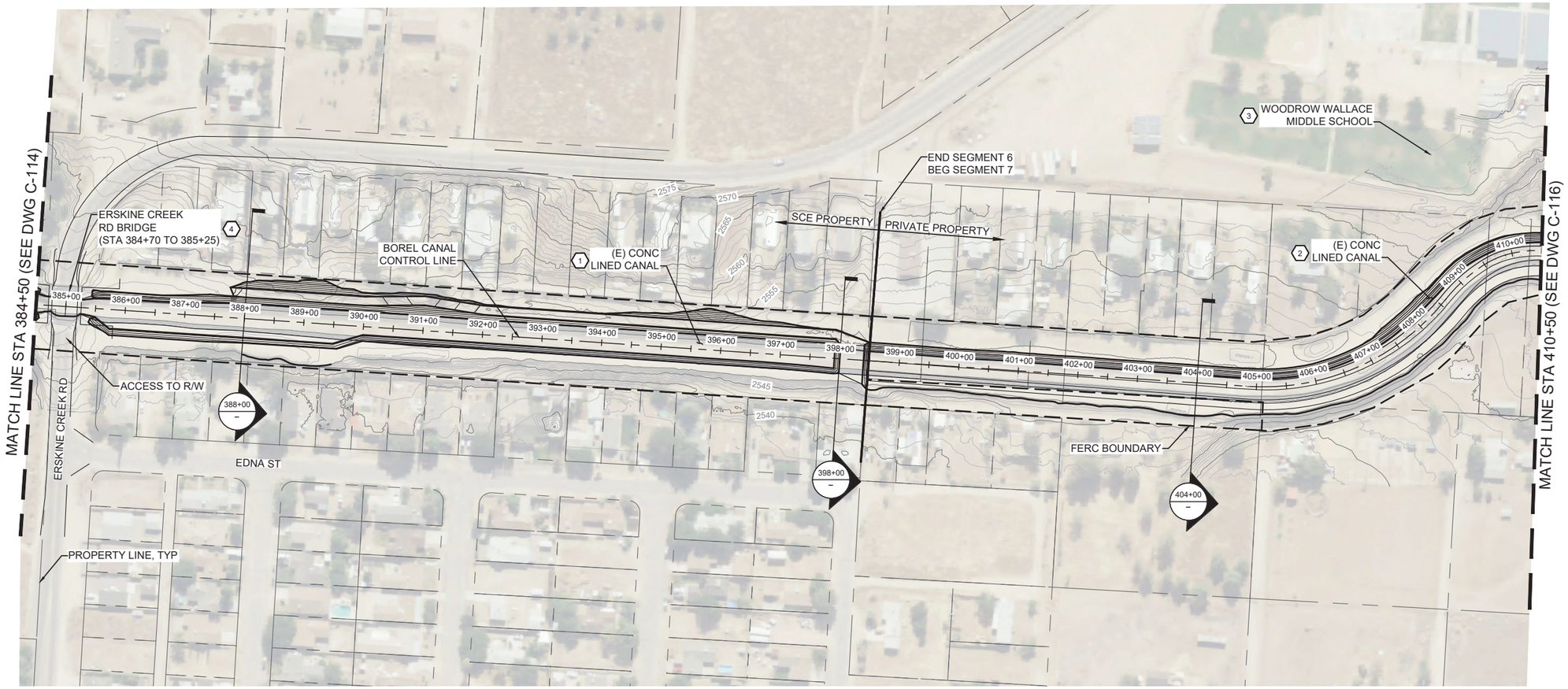
DECOMMSIONING PLAN
STA 360+00 TO STA 384+50

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-114

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




## KEY NOTES:

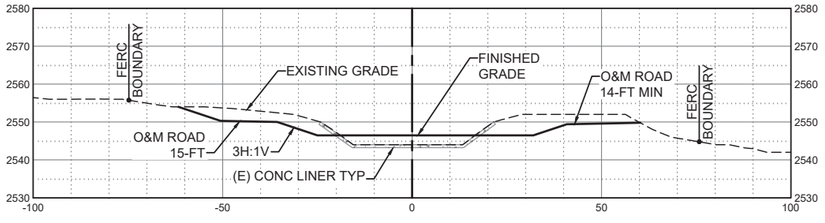
1. REMOVE UPPER PORTION OF CONCRETE LINER. PULVERIZE REMAINING CONCRETE LINER ON THE BOTTOM OF THE CANAL. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM.
2. FROM 398+45 TO 421+50 REMOVE ENTIRE CONCRETE LINER, PROCESS AND PLACE WITHIN NON-PRIVATE PARCELS. EXCAVATE BANK AND PLACE FILL IN CANAL.
3. CONSTRUCTION ACTIVITIES LIMITED TO SUMMER MONTHS WHEN SCHOOL IS NOT IN SESSION (STA 400+00 TO 420+00).
4. PROTECT EXISTING BRIDGE IN PLACE. CONCRETE LINER TO REMAIN UNDER BRIDGE TO A DISTANCE OF 20 FEET BEYOND THE FOOTING. PLACE LIGHTWEIGHT CELLULAR CONCRETE FILL ON TOP OF CONCRETE LINER TO FINISHED GRADE ELEVATIONS.

## PLAN STA 384+50 TO STA 410+50

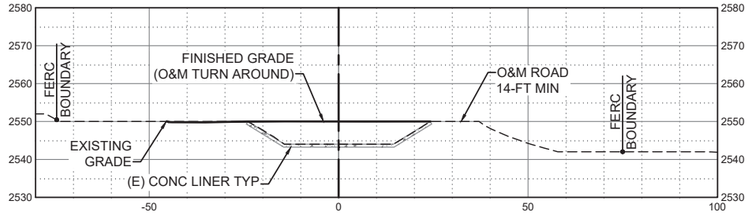
SCALE: 1"=100'

0 100 200

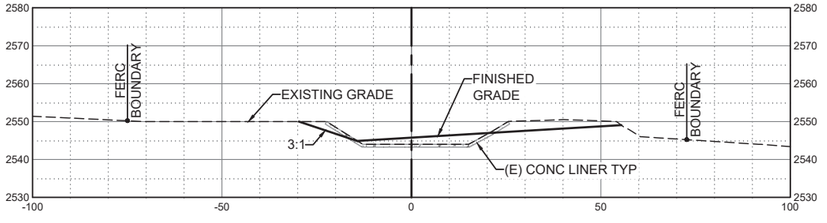
388+00




398+00




404+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

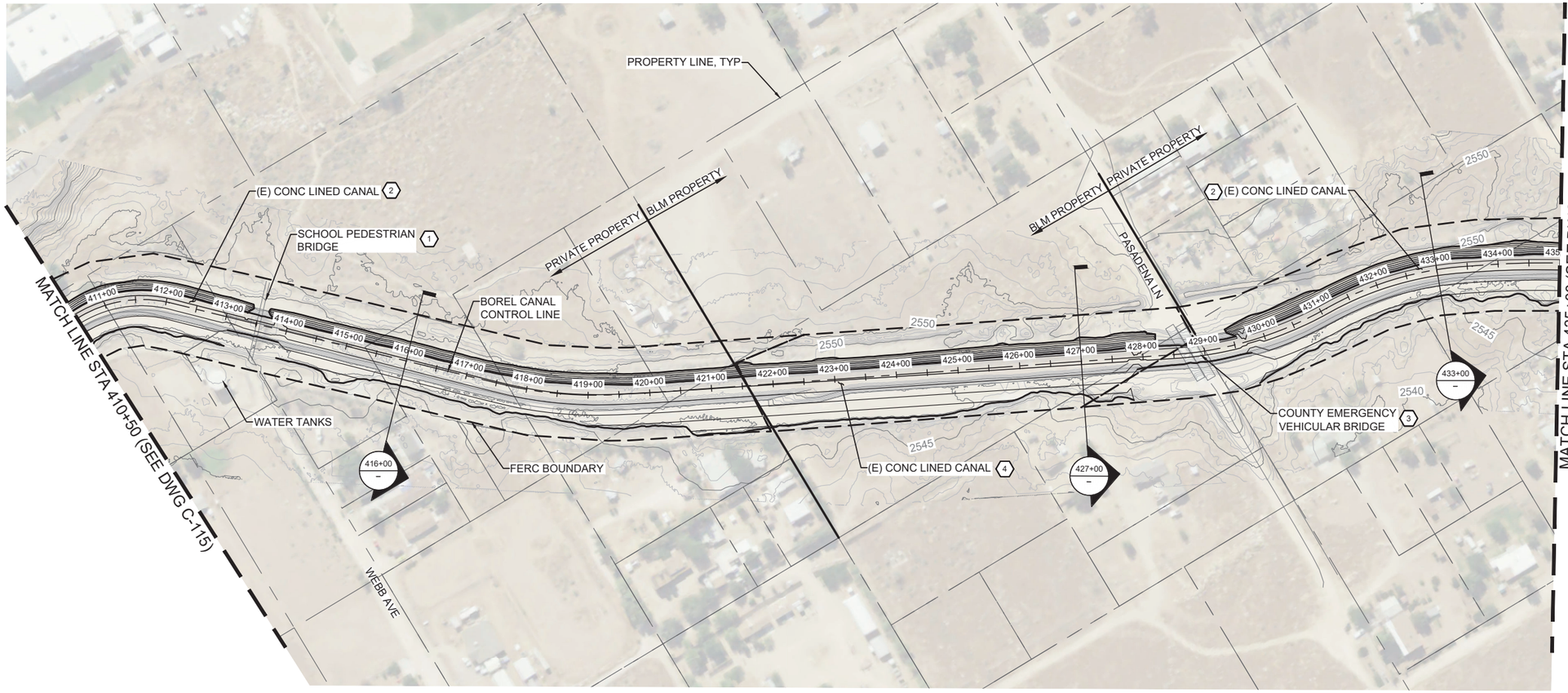
DECOMMISSIONING PLAN
STA 384+50 TO STA 410+50

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-115

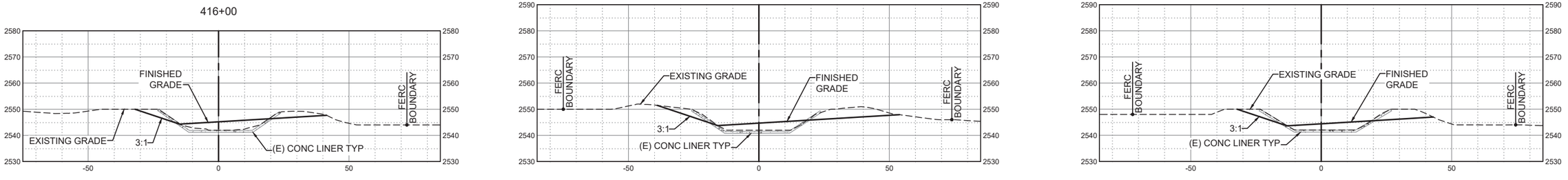
SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




## PLAN STA 410+50 TO STA 435+00

SCALE: 1"=100'

0 100 200




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

## KEY NOTES:

1. EXISTING SCHOOL PEDESTRIAN BRIDGE. DEMOLISH AND HAUL OFF SITE TO AN APPROVED RECYCLING FACILITY. BRIDGE ABUTMENTS MUST BE REMOVED TO EXISTING GRADE AND HAULED AWAY.
2. FROM 398+45 TO 421+50 AND FROM 428+95 TO 445+25, REMOVE ENTIRE CONCRETE LINER, PROCESS AND PLACE WITHIN NON-PRIVATE PARCELS. EXCAVATE NATIVE MATERIAL FROM BANK PLACE FILL IN CANAL.
3. PROTECT EXISTING BRIDGES IN PLACE. CONCRETE LINER TO REMAIN UNDER BRIDGES TO A DISTANCE OF 20 FEET BEYOND THE FOOTING. PLACE LIGHTWEIGHT CELLULAR CONCRETE FILL ON TOP OF CONCRETE LINER TO FINISHED GRADE ELEVATIONS.
4. REMOVE UPPER PORTION OF CONCRETE LINER. PULVERIZE REMAINING CONCRETE LINER ON THE BOTTOM OF THE CANAL. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND CRUSHED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM (STA 421+50 TO 429+00).

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

DECOMMISSIONING PLAN
STA 410+50 TO STA 435+00

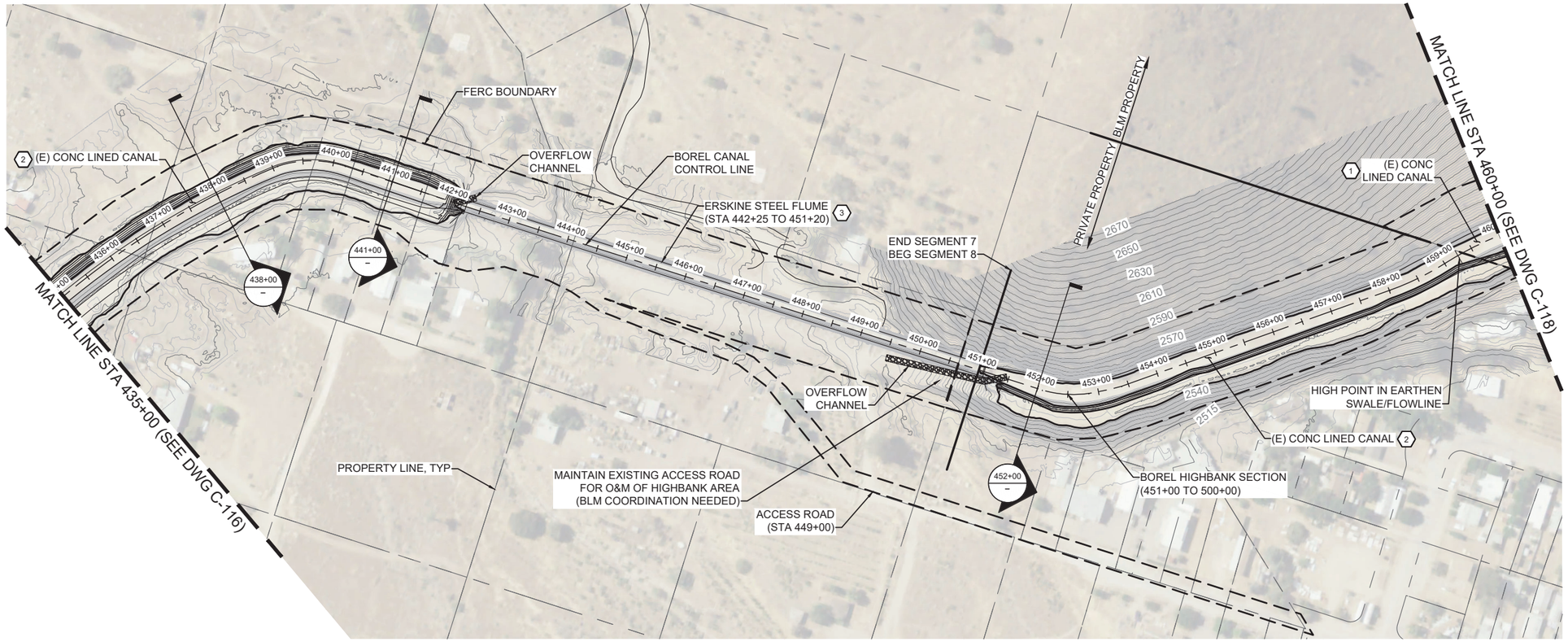
SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company | HDR | SCALE D/L

C-116

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

## KEY NOTES:

1. REMOVE UPPER PORTION OF CONCRETE LINER PULVERIZE REMAINING CONCRETE LINER ON THE BOTTOM OF THE CANAL. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND CRUSHED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM.
2. FROM 428+95 TO 442+25 AND STA 451+00 TO 459+20 REMOVE ENTIRE CONCRETE LINER, PROCESS AND PLACE WITHIN NON-PRIVATE PARCELS. EXCAVATE NATIVE MATERIAL FROM BANK AND PLACE FILL IN CANAL.
3. REMOVE AND RECYCLE STRUCTURAL STEEL AND STEEL SHEETING. REMOVE AND DISPOSE CONCRETE FOOTINGS. GRADE TO MATCH ADJACENT NATURAL TOPOGRAPHY. PLACE RSP AT TRANSITIONS SEE C-501.

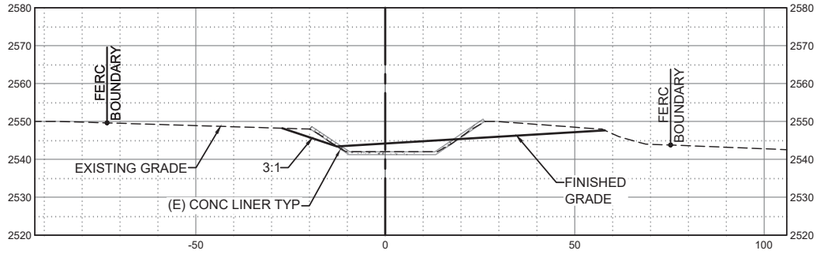



## PLAN STA 435+00 TO STA 460+00

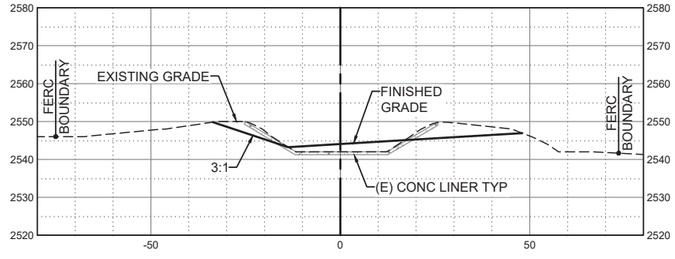
SCALE: 1"=100'

0 100 200

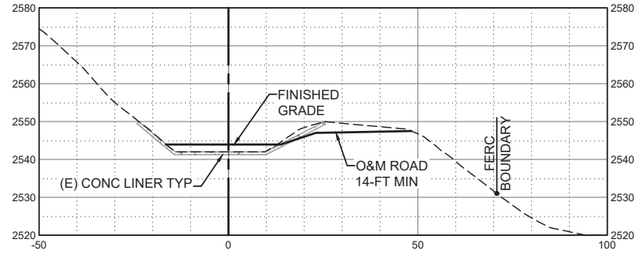
### 438+00




### 441+00




### 452+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

DECOMMISSIONING PLAN
STA 435+00 TO STA 460+00

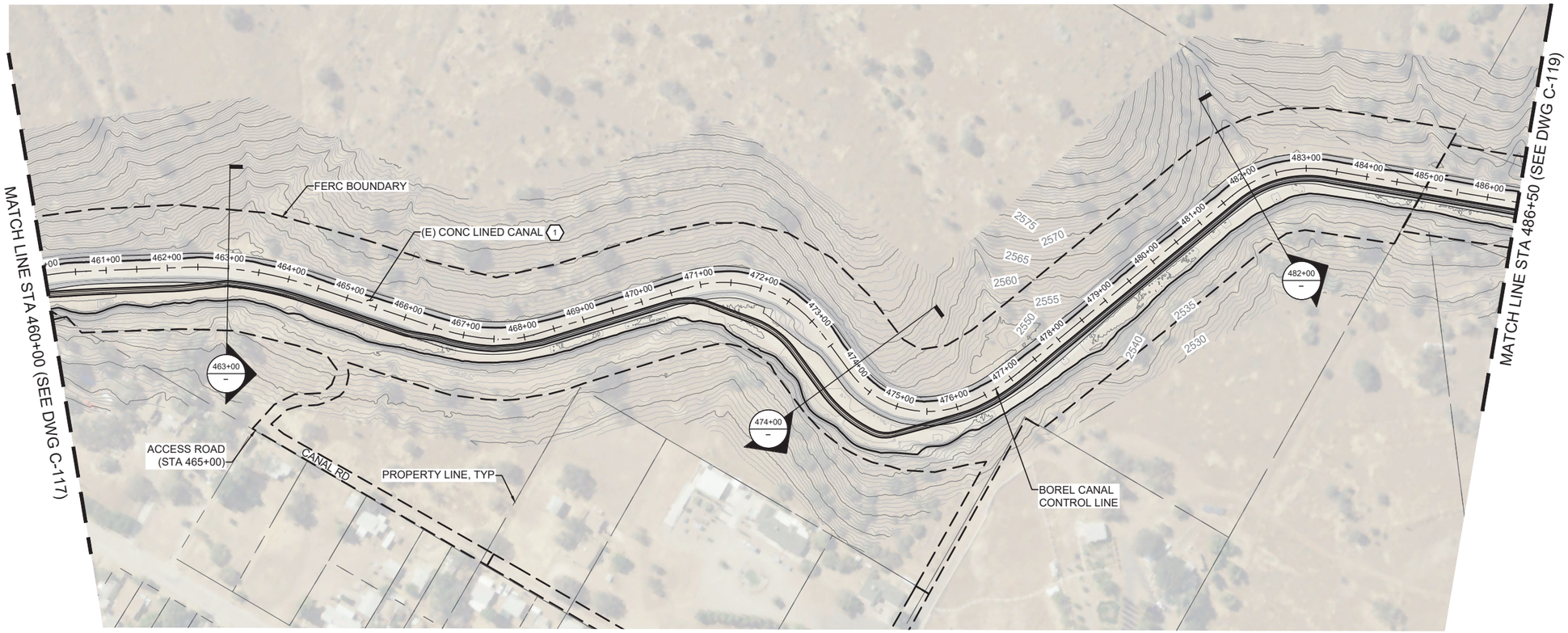
SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

HDR

SCALE D/L

C-117

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

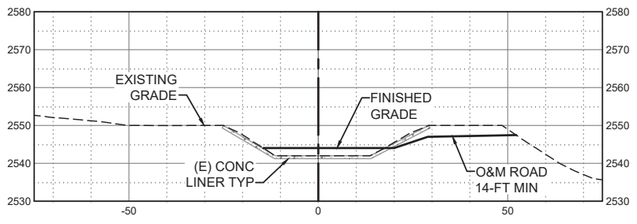



## PLAN STA 460+00 TO STA 486+50

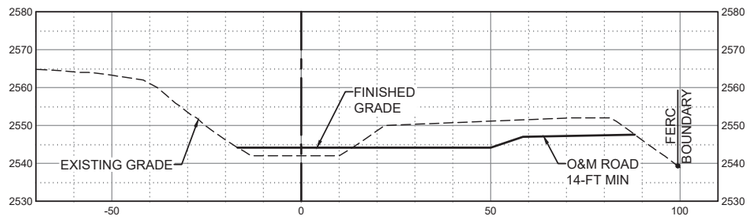
SCALE: 1"=100'

0 100 200

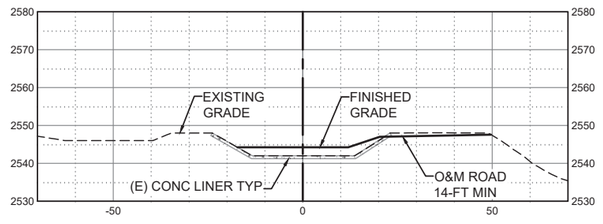
463+00




474+00




482+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

### KEY NOTES:

1. REMOVE UPPER PORTION OF CONCRETE LINER. PULVERIZE REMAINING CONCRETE LINER ON THE BOTTOM OF THE CANAL. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM.

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

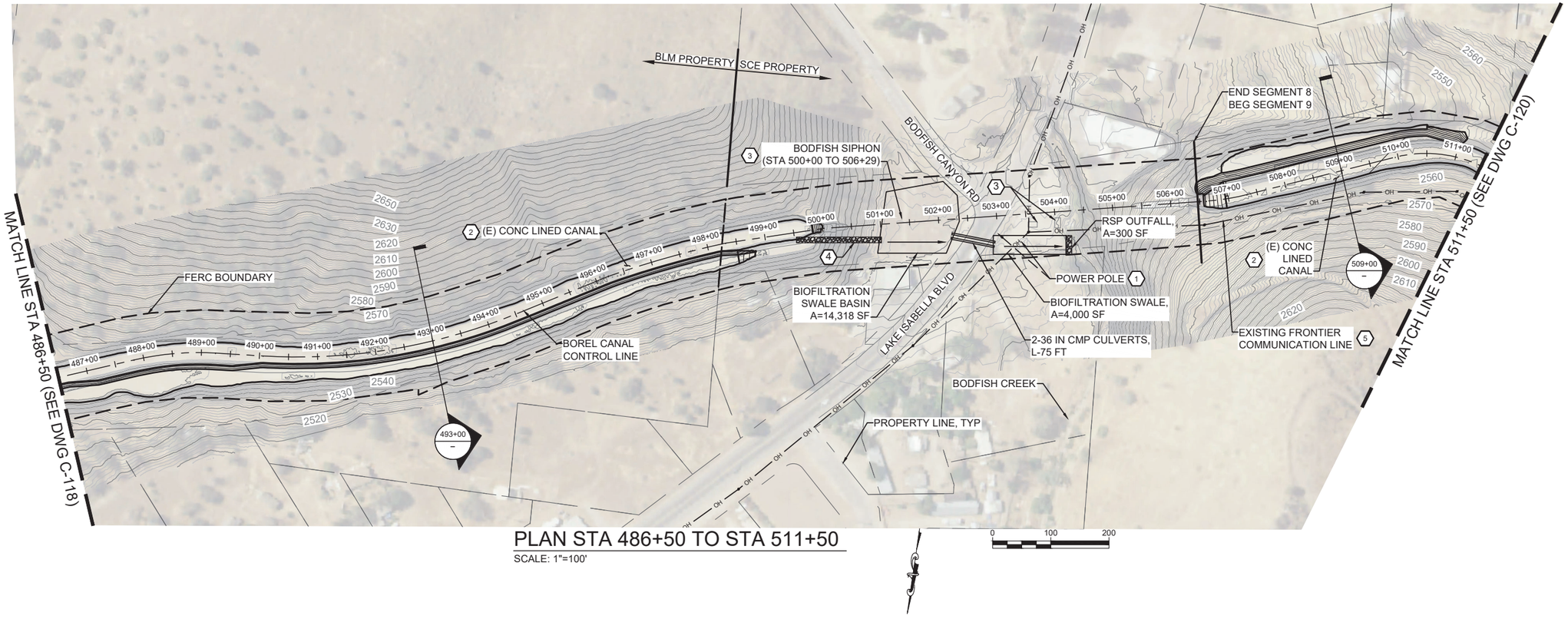
DECOMMISSIONING PLAN
STA 460+00 TO STA 486+50

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-118

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE



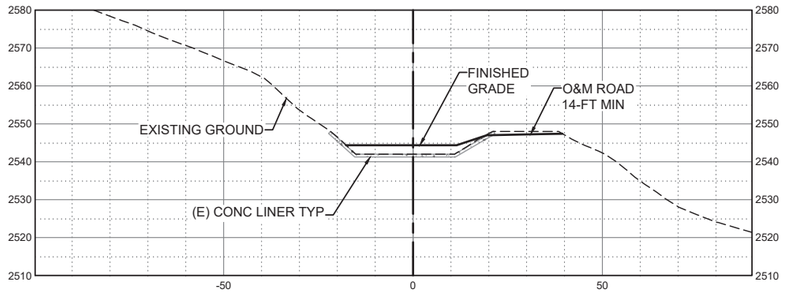

## PLAN STA 486+50 TO STA 511+50

SCALE: 1"=100'

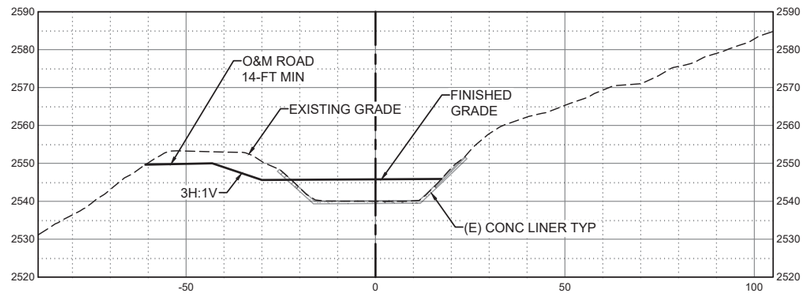
### KEY NOTES:

1. RELOCATE POWER POLE
2. REMOVE UPPER PORTION OF CONCRETE LINER. PULVERIZE REMAINING CONCRETE LINER ON THE BOTTOM OF THE CANAL. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM.
3. BODFISH SIPHON DEMOLISH WINGWALLS, GAUGING STATION, AND DRAIN VAULTS. PROTECT HEADWALLS IN PLACE. DEWATER AND FILL SIPHON WITH CONCRETE SLURRY.
4. RSP DOWNDRAIN, W=10 FT, L=120 FT.
5. EXISTING FRONTIER COMMUNICATION LINES TO BE RELOCATED BY OTHERS PRIOR TO START OF WORK.

493+00




509+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

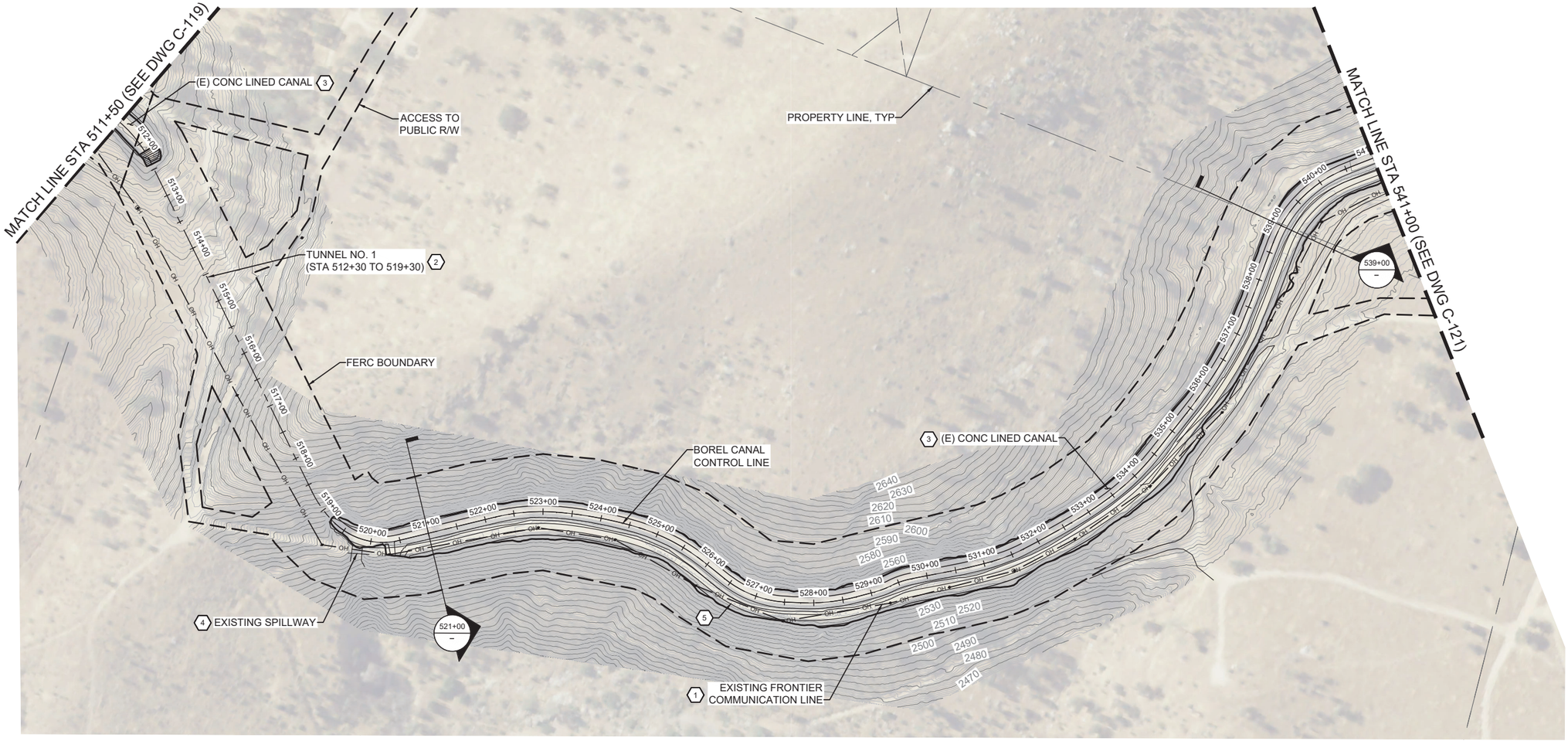
DECOMMISSIONING PLAN
STA 486+50 TO STA 511+50

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-119

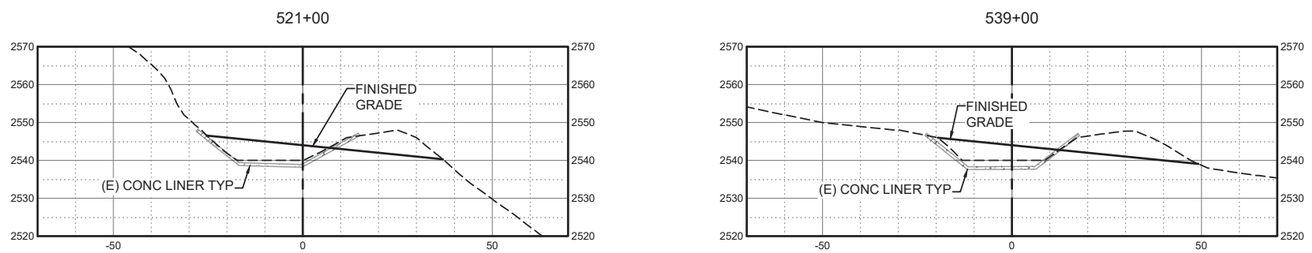
SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




## PLAN STA 511+50 TO STA 541+00

SCALE: 1"=100'

0 100 200




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

### KEY NOTES:

1. EXISTING FRONTIER COMMUNICATION LINES TO BE RELOCATED BY OTHERS PRIOR TO START OF WORK.
2. BACKFILL TUNNEL WITH 50% FLOWABLE FILL AND 50% FILL MIXED WITH DEMOLISHED CONCRETE. AT TUNNEL ENTRANCE AND EXIT BACKFILL HEADWALLS WITH NATIVE SOIL TO NATURALLY CONFORM GRADING SURFACE TO ADJACENT TOPOGRAPHY. SEE SHEET C-501 FOR TYPICAL TUNNEL PORTAL DIMENSIONS.
3. REMOVE UPPER PORTION OF CONCRETE LINER. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM.
4. REMOVE GATES AND CROSSING MATERIALS BACKFILL STRUCTURE WALLS AND FOOTING WITH CHANNEL BACKFILL OPERATIONS. SEE SHEET C-501 FOR DIMENSIONS.
5. EXISTING H-PILES AND RETAINING WALL (STA 526+50 TO 527+50). REMOVE AND DISPOSE.

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

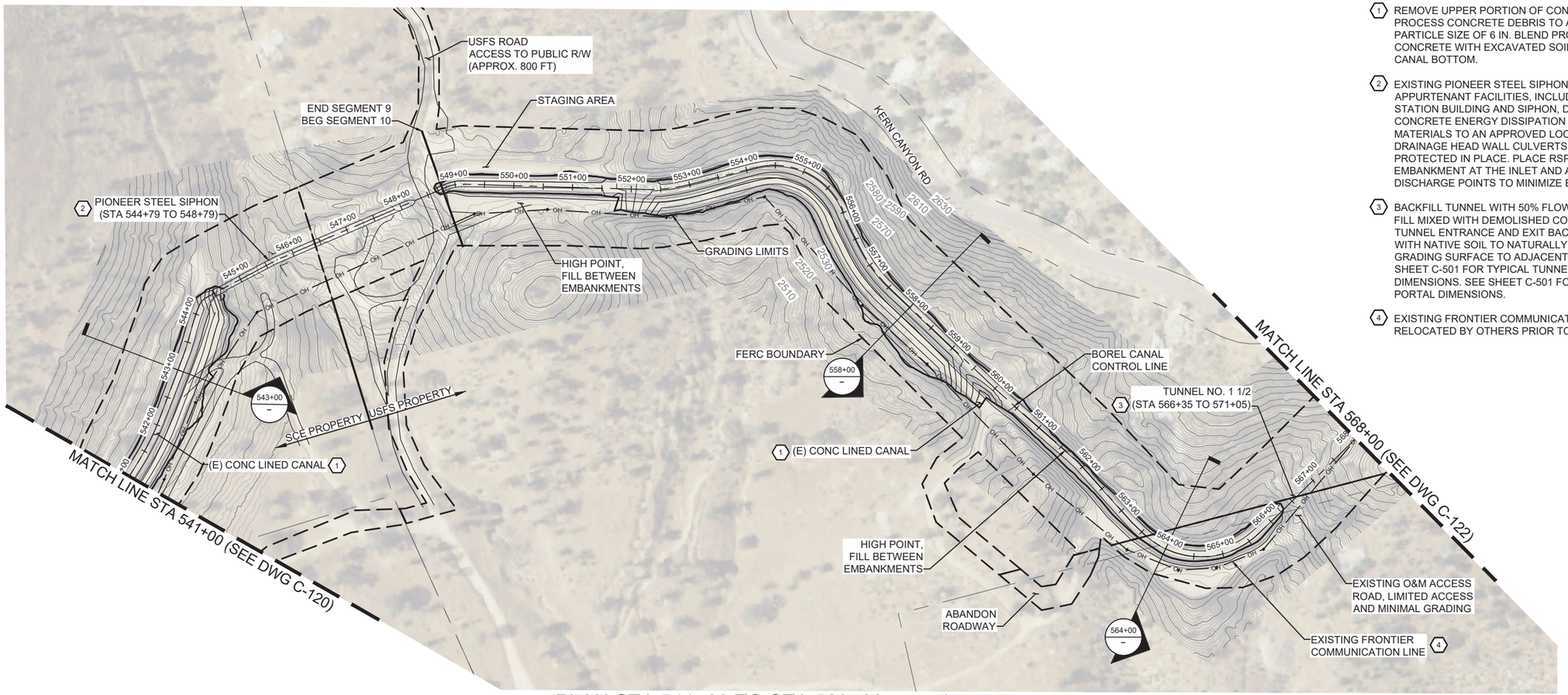
DECOMMISSIONING PLAN
STA 511+50 TO STA 541+00

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-120

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE



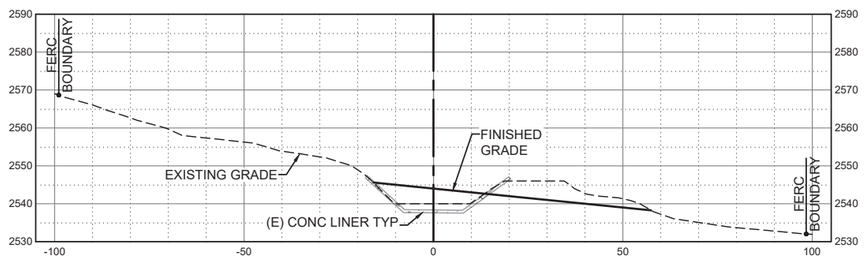

## KEY NOTES:

1. REMOVE UPPER PORTION OF CONCRETE LINER. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM.
2. EXISTING PIONEER STEEL SIPHON. REMOVE APPURTENANT FACILITIES, INCLUDING THE GAUGING STATION BUILDING AND SIPHON, DRAINPIPE, AND CONCRETE ENERGY DISSIPATION STRUCTURE. HAUL MATERIALS TO AN APPROVED LOCATION. THE STORM DRAINAGE HEAD WALL CULVERTS WILL BE PROTECTED IN PLACE. PLACE RSP ALONG THE EMBANKMENT AT THE INLET AND AT THE PIPE DISCHARGE POINTS TO MINIMIZE EROSION.
3. BACKFILL TUNNEL WITH 50% FLOWABLE FILL AND 50% FILL MIXED WITH DEMOLISHED CONCRETE. AT TUNNEL ENTRANCE AND EXIT BACKFILL HEADWALLS WITH NATIVE SOIL TO NATURALLY CONFORM GRADING SURFACE TO ADJACENT TOPOGRAPHY SEE SHEET C-501 FOR TYPICAL TUNNEL PORTAL DIMENSIONS. SEE SHEET C-501 FOR TYPICAL TUNNEL PORTAL DIMENSIONS.
4. EXISTING FRONTIER COMMUNICATION LINES TO BE RELOCATED BY OTHERS PRIOR TO START OF WORK.

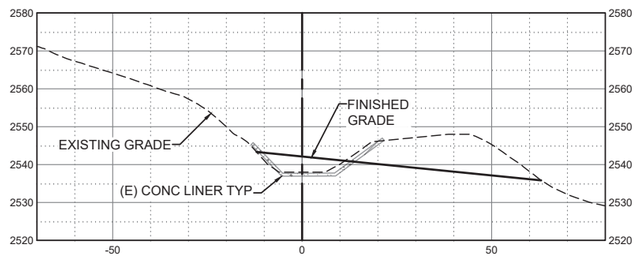
## PLAN STA 541+00 TO STA 568+00

SCALE: 1"=100'

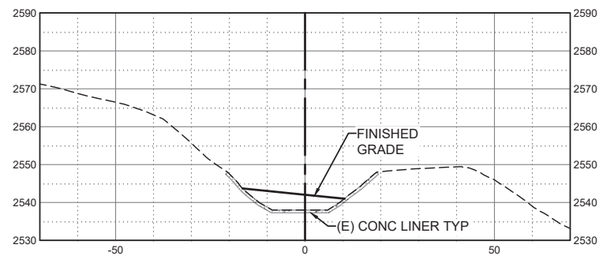
543+00




558+00




564+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

DECOMMISSIONING PLAN
STA 541+00 TO STA 568+00

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

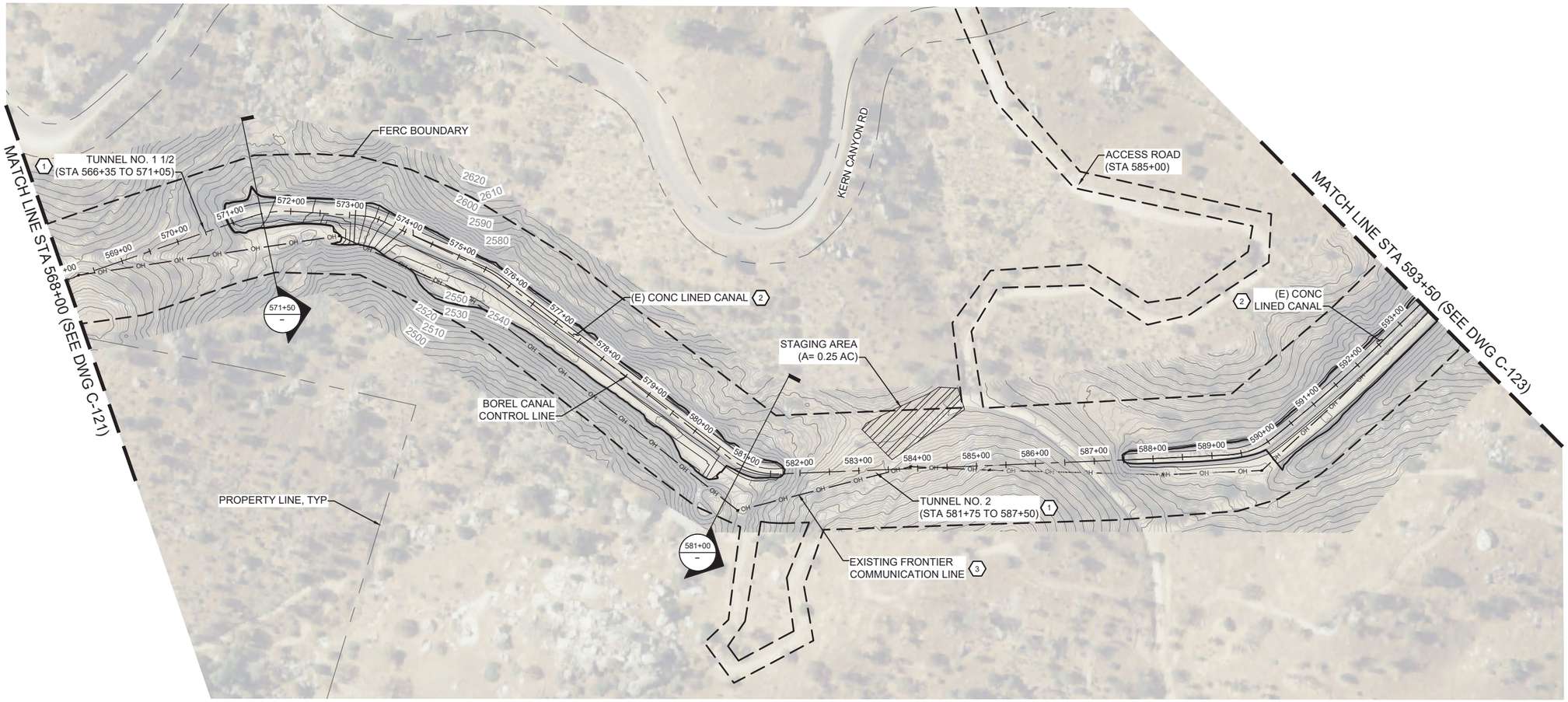
SCALE D/L

C-121

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

KEY NOTES:

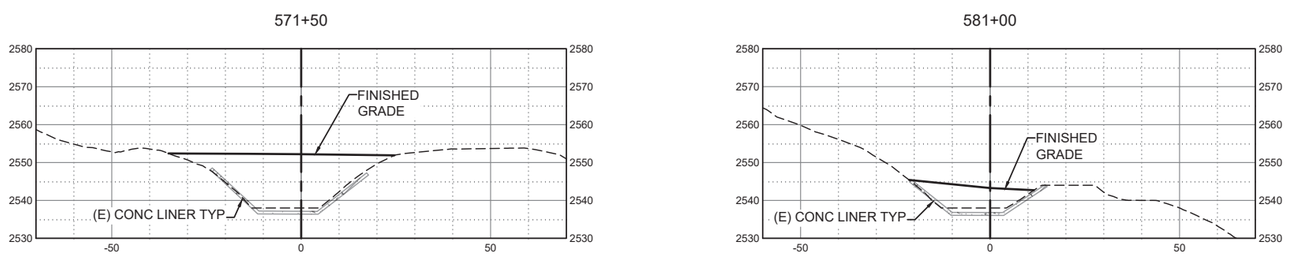
1. BACKFILL TUNNEL WITH 50% FLOWABLE FILL AND 50% FILL MIXED WITH DEMOLISHED CONCRETE. AT TUNNEL ENTRANCE AND EXIT BACKFILL HEADWALLS WITH NATIVE SOIL TO NATURALLY CONFORM GRADING SURFACE TO ADJACENT TOPOGRAPHY SEE SHEET C-501 FOR TYPICAL TUNNEL PORTAL DIMENSIONS.
2. REMOVE UPPER PORTION OF CONCRETE LINER. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM.
3. EXISTING FRONTIER COMMUNICATION LINES TO BE RELOCATED BY OTHERS PRIOR TO START OF WORK.




## PLAN STA 568+00 TO STA 593+50

SCALE: 1"=100'

100 200




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

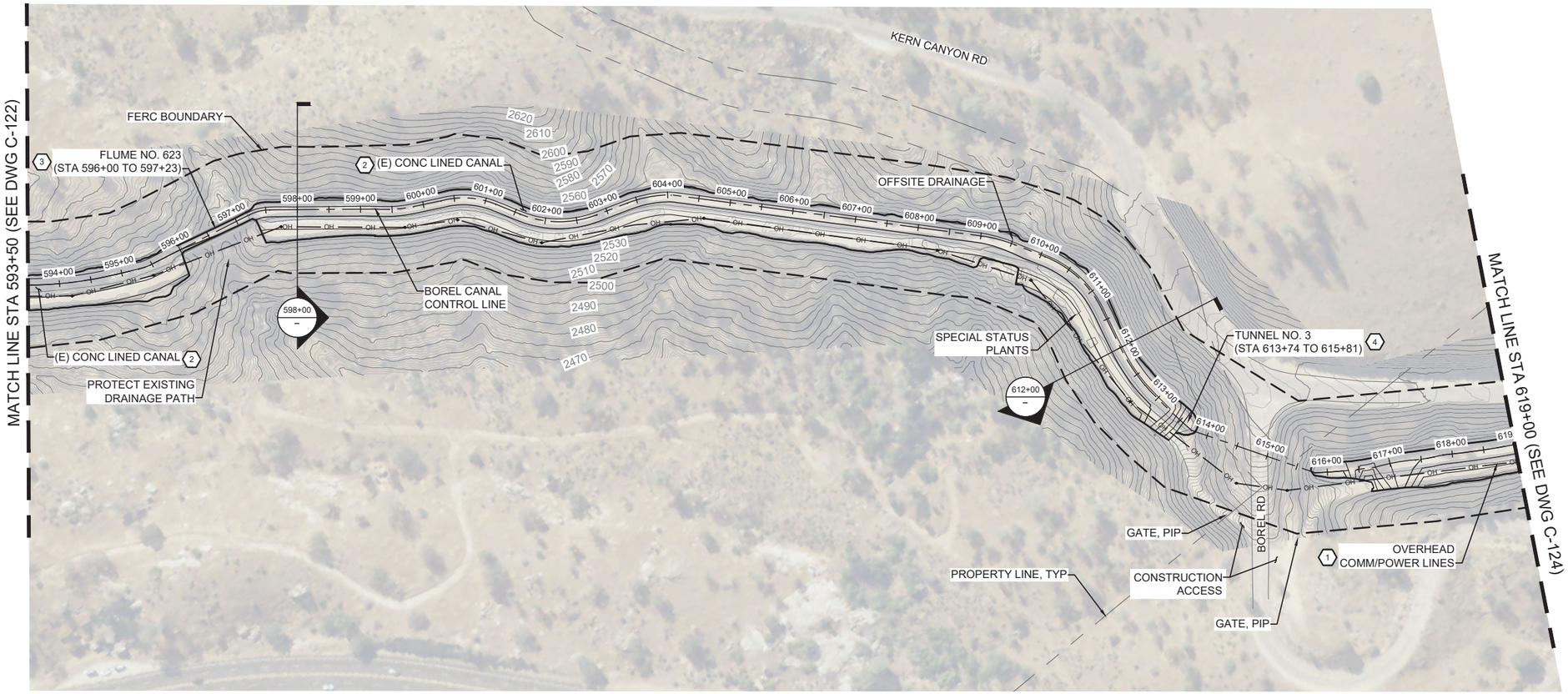
DECOMMISSIONING PLAN
STA 568+00 TO STA 593+50

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-122

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

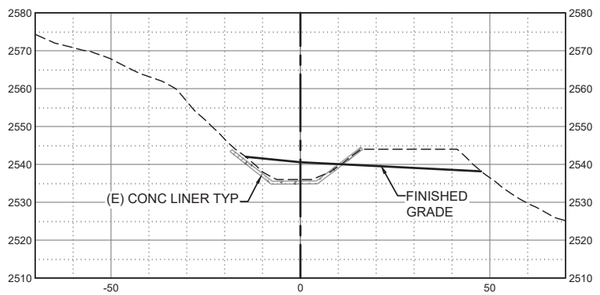



## PLAN STA 593+50 TO STA 619+00

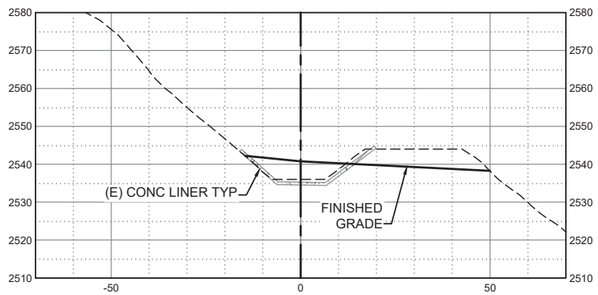
SCALE: 1"=100'

0 100 200

598+00




612+00




## SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

### KEY NOTES:

1. PROTECT EXISTING OVERHEAD COMM/ELECTRICAL UTILITIES IN PLACE.
2. REMOVE UPPER PORTION OF CONCRETE LINER. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND PLACE IN CANAL BOTTOM.
3. REMOVE AND RECYCLE STRUCTURAL STEEL AND STEEL SHEETING. CONCRETE HEADWALLS AND FOOTINGS TO REMAIN.
4. BACKFILL TUNNEL WITH 50% FLOWABLE FILL AND 50% FILL MIXED WITH DEMOLISHED CONCRETE. AT TUNNEL ENTRANCE AND EXIT BACKFILL HEADWALLS WITH NATIVE SOIL TO NATURALLY CONFORM GRADING SURFACE TO ADJACENT TOPOGRAPHY SEE SHEET C-501 FOR TYPICAL TUNNEL PORTAL DIMENSIONS. SEE SHEET C-501 FOR TYPICAL TUNNEL PORTAL DIMENSIONS.

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

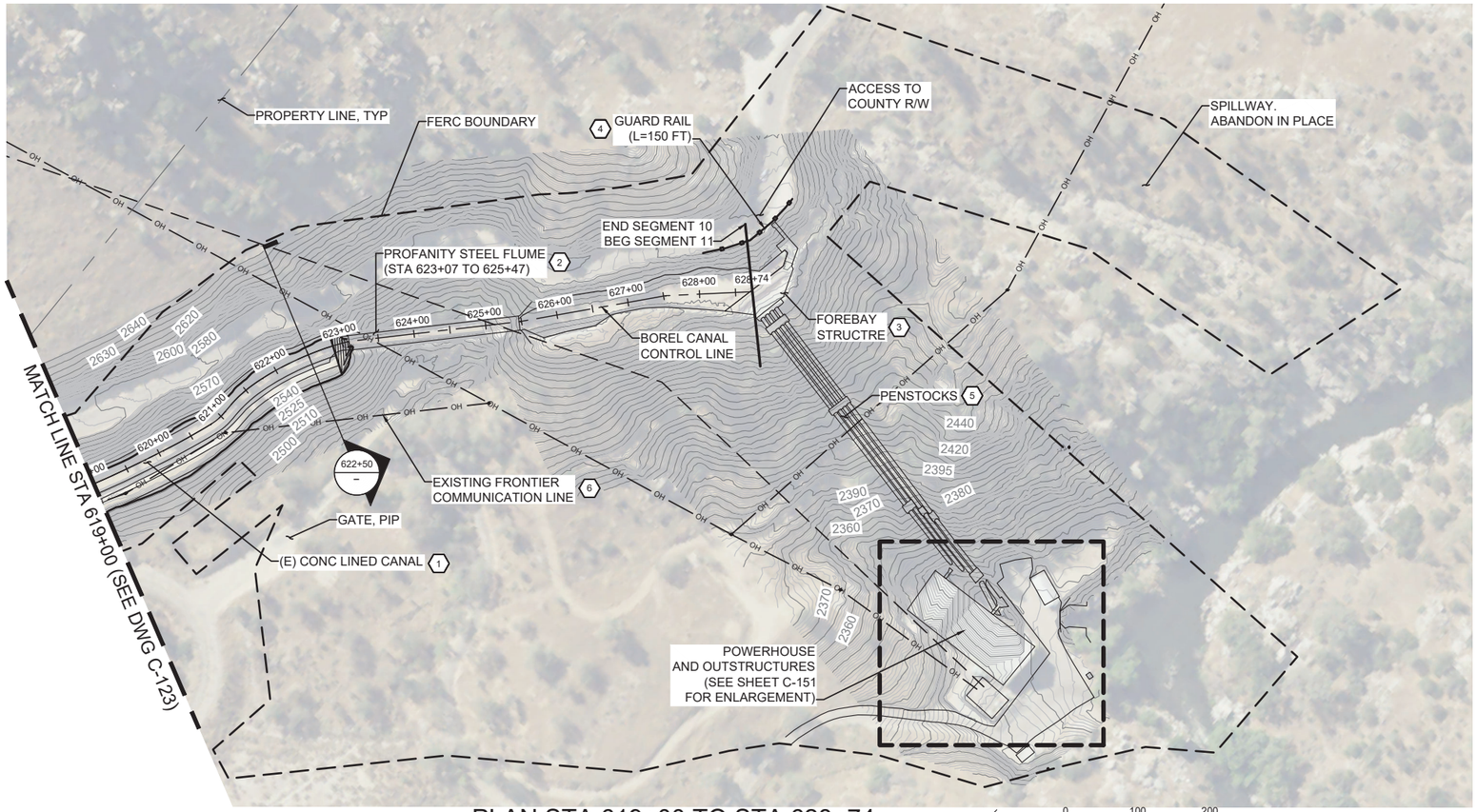
DECOMMISSIONING PLAN
STA 593+50 TO STA 619+00

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-123

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

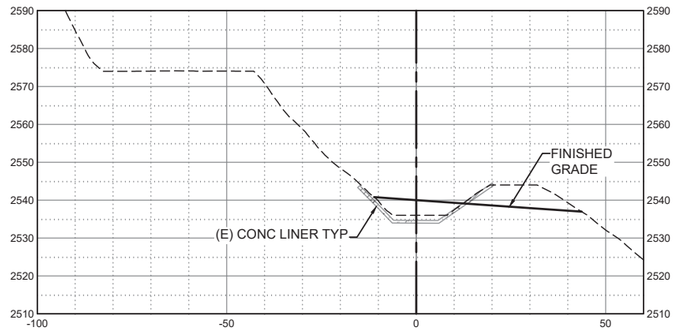



PLAN STA 619+00 TO STA 628+74

SCALE: 1"=100'

0 100 200

622+50




SECTION VIEWS

HORZ SCALE: 1"=20', VERT SCALE: 1"=20'

0 20 40

## KEY NOTES:

1. REMOVE UPPER PORTION OF CONCRETE LINER. PROCESS CONCRETE DEBRIS TO A MAXIMUM PARTICLE SIZE OF 6 IN. BLEND PROCESSED CONCRETE WITH EXCAVATED SOIL AND USE BLENDED MATERIALS TO BACKFILL CANAL AND FOREBAY STRUCTURE PLACE IN CANAL BOTTOM.
2. REMOVE AND RECYCLE STRUCTURAL STEEL AND STEEL SHEETING. CONCRETE HEADWALLS AND FOOTINGS TO REMAIN.
3. REMOVE ELECTRICAL AND CONTROL EQUIPMENT, TRASH RACK, GATES, BELT SYSTEM, CONTROL BUILDING, AND STAIRS. DEMOLISH CONCRETE WALLS, PROCESS CONCRETE, MIX NATIVE SOIL AND BACKFILL THE AREA (3:1 MAX SLOPE). CONCRETE NOT USED IN BACKFILL MUST BE REMOVED, PROCESSED AND MIXED WITH NATIVE SOIL FOR BACKFILL IN OTHER AREAS OF THE PROJECT.
4. INSTALL GUARDRAIL AFTER DEMOLITION AND REMOVAL OF CHAIN LINK FENCING AND GATES
5. REMOVE PENSTOCKS AND RECYCLE OFFSITE. DEMOLISH AND REMOVE ANCHOR BLOCKS AND FOOTINGS.
6. EXISTING FRONTIER COMMUNICATION LINES TO BE RELOCATED BY OTHERS PRIOR TO START OF WORK.

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

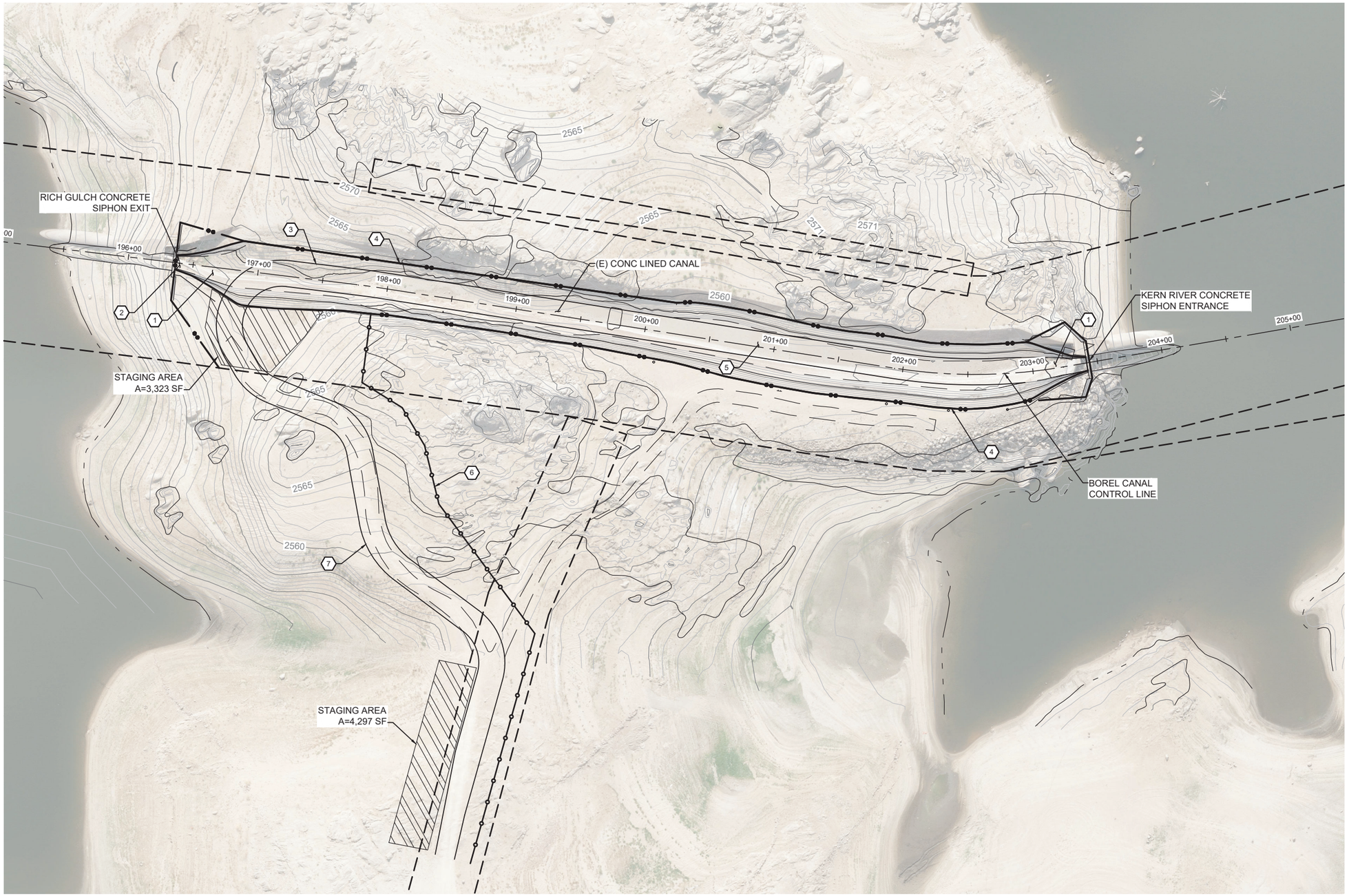
DECOMMISSIONING PLAN
STA 619+00 TO STA 628+74

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-124

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




PLAN

SCALE: 1"=40'

0 40 80

## GENERAL NOTES:

1. CONTRACTOR MUST LIMIT DISTURBANCE OF NATIVE MATERIAL TO THE ACCESS ROAD AND STAGING AREA
2. ALL OF THE CONTRACTORS EMPLOYEES MUST ATTEND CULTURAL EDUCATION/TRAINING PRIOR TO START OF WORK.

## KEY NOTES:

1. ABANDON CANAL IN PLACE
2. REMOVE FENCING, INSTALL CONCRETE PLUG AT END OF SIPHON AND BACKFILL HEADWALLS WITH CLEAN IMPORTED SOIL (3:1 MAX SLOPE)
3. CONTRACTOR MUST CONSTRUCT ACCESS RAMP INTO CANAL USING CLEAN IMPORTED SOIL
4. CONSTRUCTION LIMIT ON PLANS WILL STOP AT THE TOP OF THE CONCRETE LINING ON EAST SIDE OF CANAL. CONTRACTOR WILL NOT BE ALLOWED TO ACCESS OR DISTURB ANYTHING BEYOND THAT POINT
5. CONSTRUCTION ACCESS TO THE KERN RIVER SIPHON HEADWALL MUST REMAIN WITHIN THE LIMITS OF THE CONCRETE LINED CHANNEL (BOTTOM WIDTH OF THE CANAL APPROX. 24 FT WIDE)
6. PRIOR TO START OF WORK, CONTRACTOR MUST CONSULT WITH CULTURAL AND ENVIRONMENTAL MONITORING LEADS PRIOR TO INSTALLING HIGH VISIBILITY ORANGE FENCING.
7. APPROXIMATE LOCATION OF ACCESS ROAD.

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

DECOMMISSIONING PLAN
ISLAND

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-150

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE


PLAN
SCALE: 1"=30'

0 30 60

## KEY NOTES:

1. REMOVE AND DISPOSE ALL EQUIPMENT, MACHINERY, GENERATORS, TURBINES, AND FURNITURE FROM CONTROL ROOM, MACHINERY ROOM, AND LUNCH ROOM. SEE SHEET C-517 FOR AS-BUILT INFORMATION FOR THE POWERHOUSE AND INTERNAL FEATURES.
2. BACKFILL DRAFT TUBES, AND TUNNELS, WITH FLOWABLE FILL. COLLAPSE TAILRACE OUTLET AND COVER WITH CLEAN FILL. GRADE TO MATCH ADJACENT BANK GRADES PLACE CLEAN RSP ON FINISHED SURFACE OF TAILRACE BACKFILL ALONG THE RIVER BANK.
3. PROTECT EXISTING SWITCHYARD AND SECURITY FENCING IN PLACE
4. DEMOLISH RESTROOM OUT STRUCTURE TO FOUNDATION AND DISPOSE OF DEBRIS OFFISTE
5. DEMOLISH PUMPHOUSE STRUCTURE TO FOUNDATION, REMOVE AND DISPOSE OF CONTROLS AND ELECTRICAL SERVICE
6. REMOVE AND DISPOSE OF MATERIALS REMAINING IN STORAGE OUTSTRUCTURE. DEMOLISH STORAGE OUTSTRUCTURE TO FOUNDATION AND DISPOSE OF OFFSITE
7. REMOVE PENSTOCKS AND RECYCLE OFFSITE. DEMOLISH AND REMOVE ANCHOR BLOCKS AND FOOTINGS.
8. EXISTING FRONTIER COMMUNICATION LINES TO BE RELOCATED BY OTHERS PRIOR TO START OF WORK.

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
|---|---|---|---|---|---|---|---|---|---|
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REFERENCE DRAWINGS

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

DECOMMISSIONING PLAN
POWERHOUSE

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

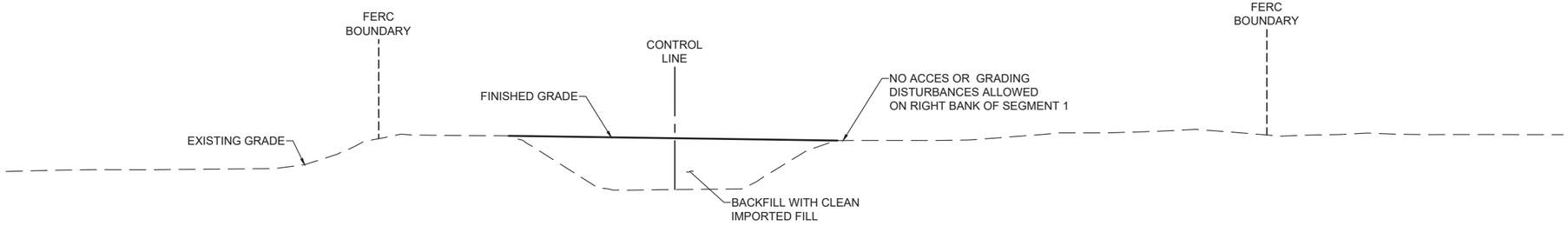
SCALE D/L

C-151

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

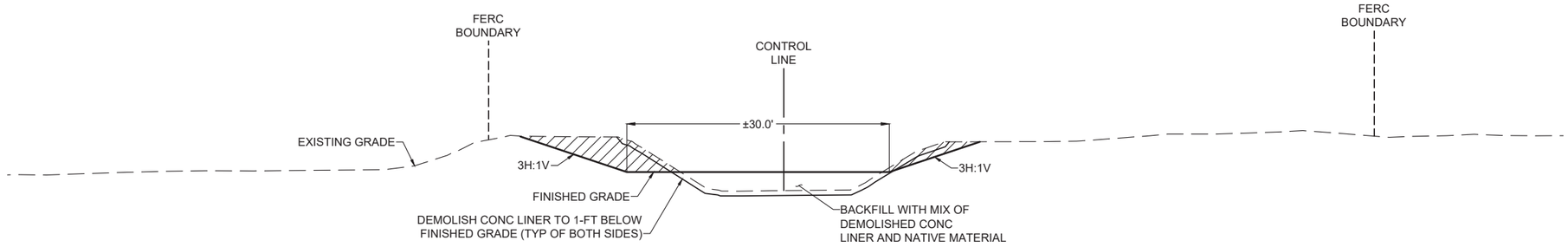
GENERAL NOTES:

1. SEE DECOMMISSIONING PLAN SHEETS FOR LOCATION OF CANAL WITHIN FERC BOUNDARY.



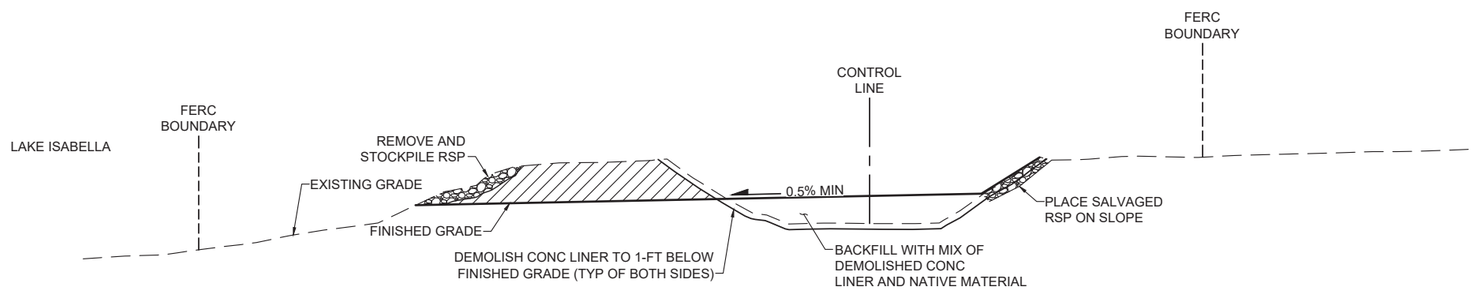

## TYPICAL SECTION (SEGMENT 1 AND 2)

SCALE: 1"=10'




## TYPICAL SECTION (SEGMENT 3)

SCALE: 1"=10'




## TYPICAL SECTION (SEGMENT 3 AND 4)

SCALE: 1"=10'

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

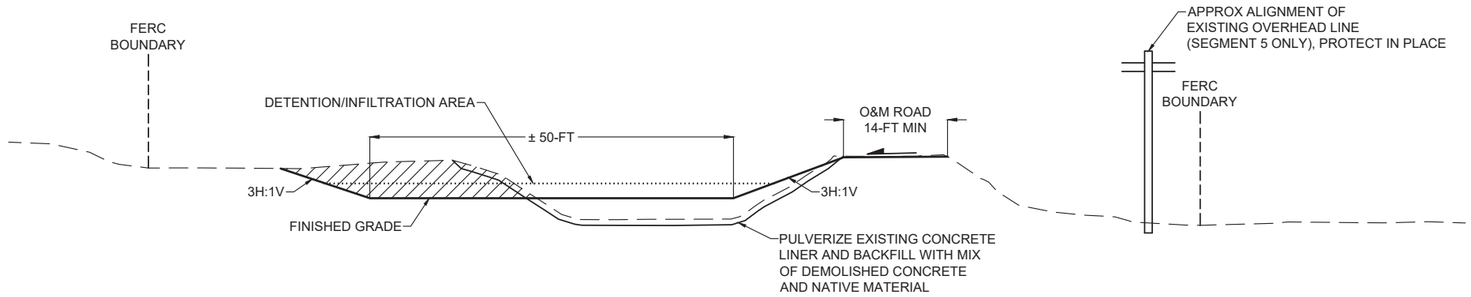
TYPICAL CANAL SECTIONS (1 OF 2)

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

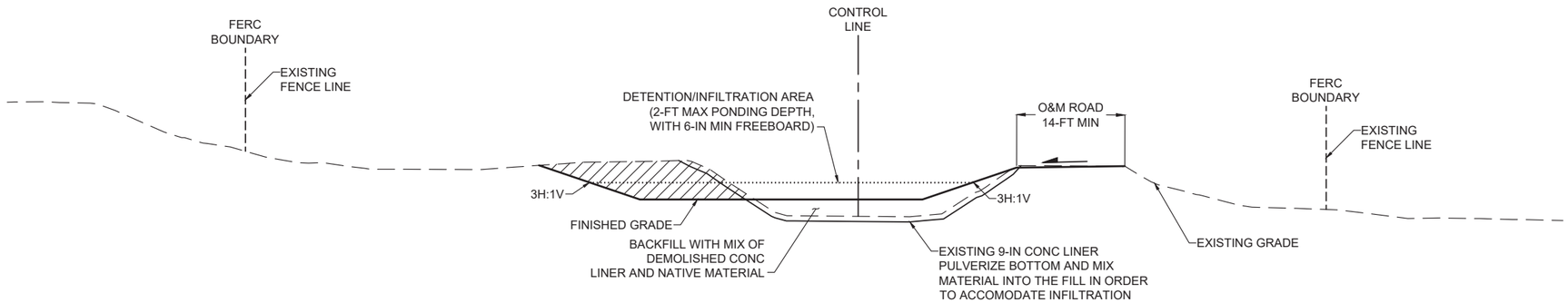
C-301

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE



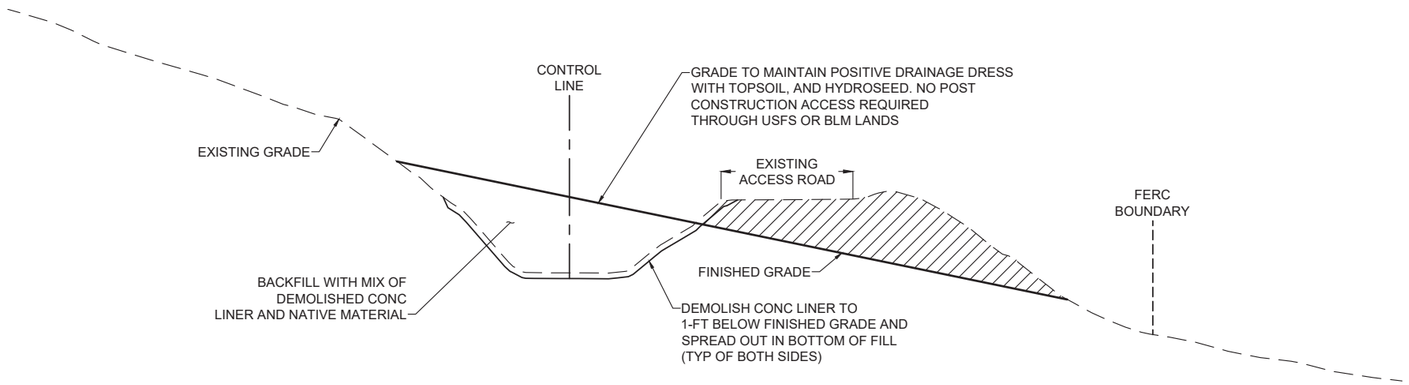

## TYPICAL SECTION (SEGMENT 6 AND 7)

SCALE: 1"=10'




## TYPICAL SECTION (SEGMENT 8)

SCALE: 1"=10'




## TYPICAL SECTION (SEGMENT 9 AND 10)

SCALE: 1"=10'

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | |

LOCATION BOREL HYDRO SURRENDER

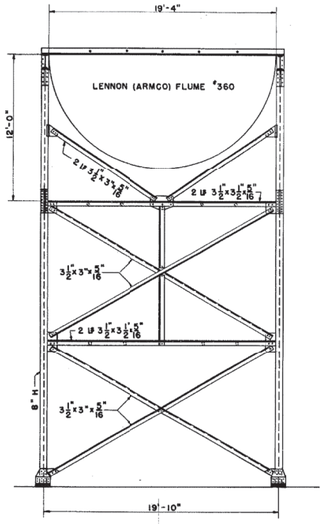
TYPICAL CANAL SECTIONS
(2 OF 2)

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

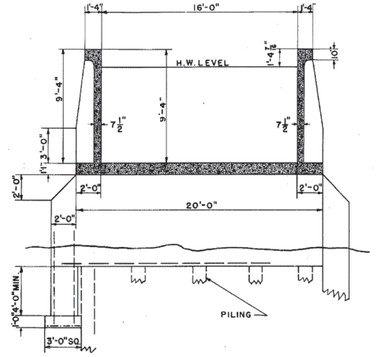
C-302

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE



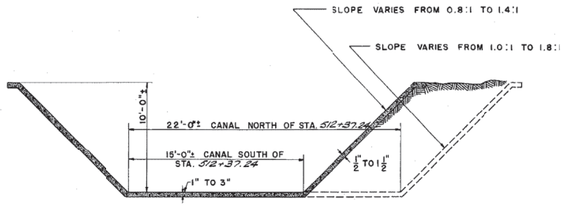

TYPICAL STEEL SUPPORTED SECTION

SCALE 1/4"=1'-0"



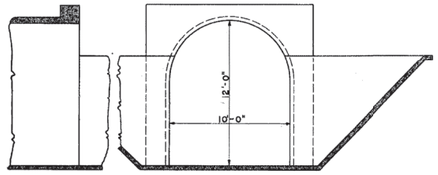

TYPICAL CONCRETE SECTION

SCALE 1/4"=1'-0"




TYPICAL CANAL SECTION

SCALE 1/4"=1'-0"




LONGITUDINAL SECTION ELEVATION

TUNNEL PORTAL

SCALE 1/8"=1'-0"

## MAJOR CANAL REPAIRS

— 1937 —

NEW 1½" GUNITE LINING PLACED BETWEEN:
STA 401+39.91 AND STA 498+54.86
" 43+62.62 " " 147+62.62
" 148+24.06 " " 152+28.12
NEW 1½" GUNITE FLOOR PLACED BETWEEN:
STA 268+45.77 AND STA 328+45.77

— 1945 —

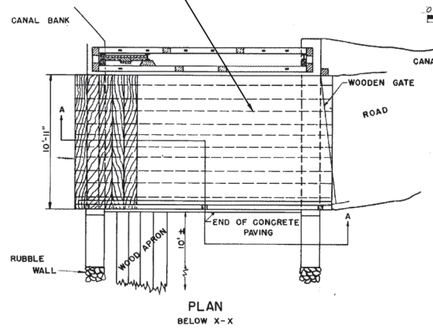
3" CONCRETE FLOOR & 1½" GUNITE SIDES REINFORCED WITH WIRE MESH
THESE ITEMS PLACED BETWEEN THE FOLLOWING STATIONS:

| | |
|---|---|
| STA 114+44.61 AND STA | 140+14.62 |
| " 225+27.47 " | " 243+27.47 |
| " 282+44.58 " | " 327+44.58 |
| " 348+80.26 " | " 350+86.24 |
| " 403+88.66 " | " 409+80.66 |
| " 442+16.11 " | " 438+66.11 |
| " 450+22.81 " | " 471+33.81 |
| " 512+27.24 " | " 544+71.06 |
| " 553+84.18 " | " 567+48.85 |
| " 571+04.70 " | " 581+76.80 |
| " 588+81.15" | " 589+22.15 |
| " 597+24.88 " | " 618+74.24 |
| " 624+78.25" | " 623+06.62 |

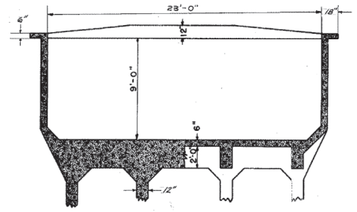
### SINCE 1949

| STATIONS | TYPE | YEAR |
|---|---|---|
| 483+02.24/500+02.24 | GUNITED SECTION | 1963 |
| 931+70.83/944+71.06 | GUNITED SECTION | 1963 |
| 311+24.79/312+24.79 | GUNITED BANK ONLY | 1967 |
| 267+43.53/460+73.53 | R/C PATCH BOTTOM ONLY | 1967 |
| 267+43.91/288+43.91 | GUNITED BANK ONLY | 1967 |
| 450+22.81/469+22.81 | R/C PATCH BOTTOM ONLY | 1967 |
| 571+04.70/581+76.80 | GUNITED SECTION | 1967 |
| 603+00.33/613+24.24 | GUNITED SECTION | 1968 |
| 58+27.54/592+48.30 | GUNITED SECTION | 1970 |
| 190+70.22/195+73.22 | FLUME REPLACED BY SIPHON | 1950 |
| 202+83.42/222+62.33 | FLUME REPLACED BY SIPHON | 1950 |
| 442+16.11/451+01.81 | FLUME SUBSTRUCT. REPLACED | 1957 |
| 593+43.45/594+42.32 | FLUME SUBSTRUCT. REPLACED | 1967 |
| 618+78.25/620+28.25 | FLUME SUBSTRUCT. REPLACED | 1971 |
| 623+06.62/624+78.25 | FLUME SUBSTRUCT. REPLACED | 1971 |
| 0+00/290+55.51 | INUNDATED BY ISABELLA RESERVOIR | |

DEMOLISH AND REMOVE WOOD BRIDGE, GATES, ABOVE GROUND RAILING AND BEAMS. BACKFILL CONCRETE FOOTINGS/WALLS WITH NATIVE MATERIAL

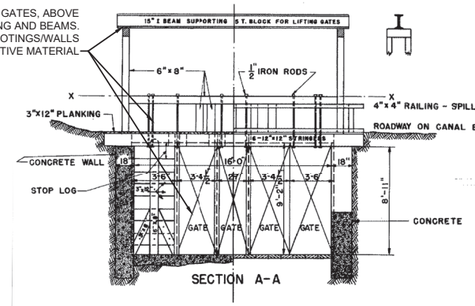



PLAN
BELOW X-X




CONCRETE FLUME AT STATION 367+18.59

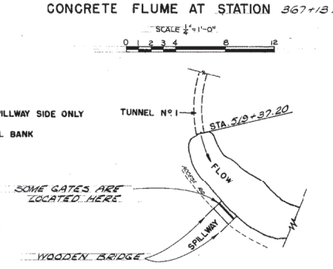
DEMOLISH AND REMOVE GATES, ABOVE GROUND RAILING AND BEAMS. BACKFILL CONCRETE FOOTINGS/WALLS WITH NATIVE MATERIAL




SECTION A-A

SPILLWAY GATES BELOW TUNNEL NO. 1
BOREL CONDUIT

SCALE 1/4"=1'-0"




PLAN

CONTAINS CRITICAL ENERGY INFRASTRUCTURE INFORMATION -DO NOT RELEASE-

GENERAL NOTES:

1. AS-BUILT DRAWING TAKEN FROM DRAWING NUMBER 5106483-1, INDEX ID 382-1018.

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

| REFERENCE DRAWINGS | REFERENCE DRAWINGS |
|---|---|
| | |

LOCATION BOREL HYDRO SURRENDER

DETAILS
TYPICAL CONDUIT SECTIONS

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

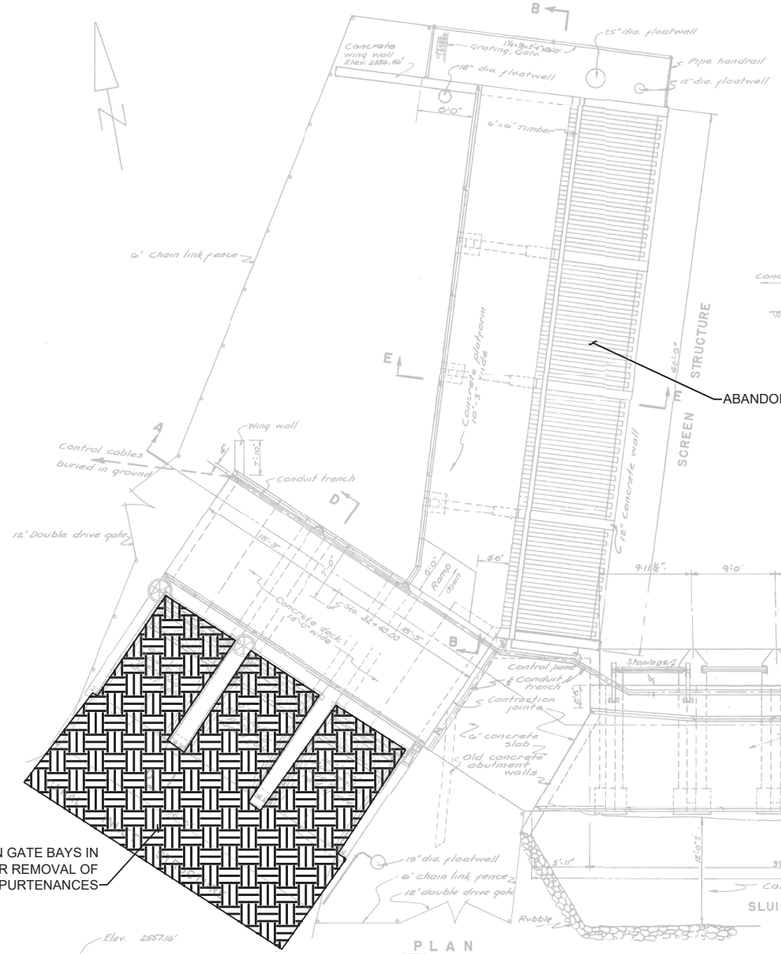
SCALE D/L

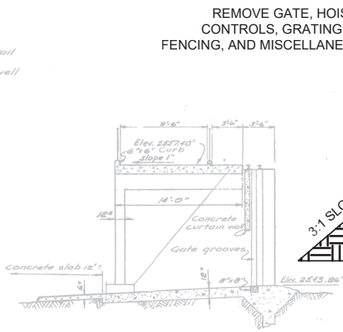
C-501

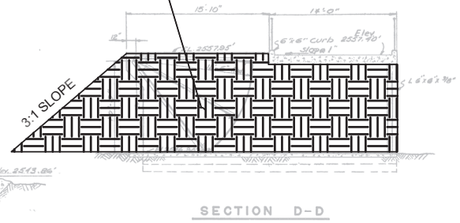
SOUTHERN CALIFORNIA EDISON
2012 — 4 SIZE

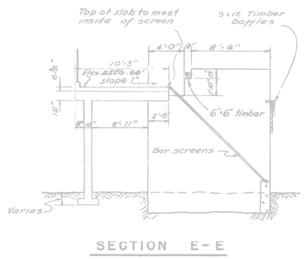
## GENERAL NOTES:

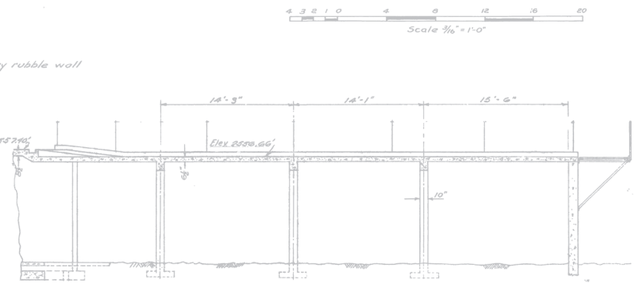
1. AS-BUILT DRAWING TAKEN FROM DRAWING NUMBER 5106469-1, INDEX ID 382-1004.
2. FILL TO TOP OF STRUCTURE WITH IMPORTED FILL. 3H:1V SLOPE FOR FILL ON CANAL SIDE.




* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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| | | | | | | | | | | | | | | | | | | | | | |

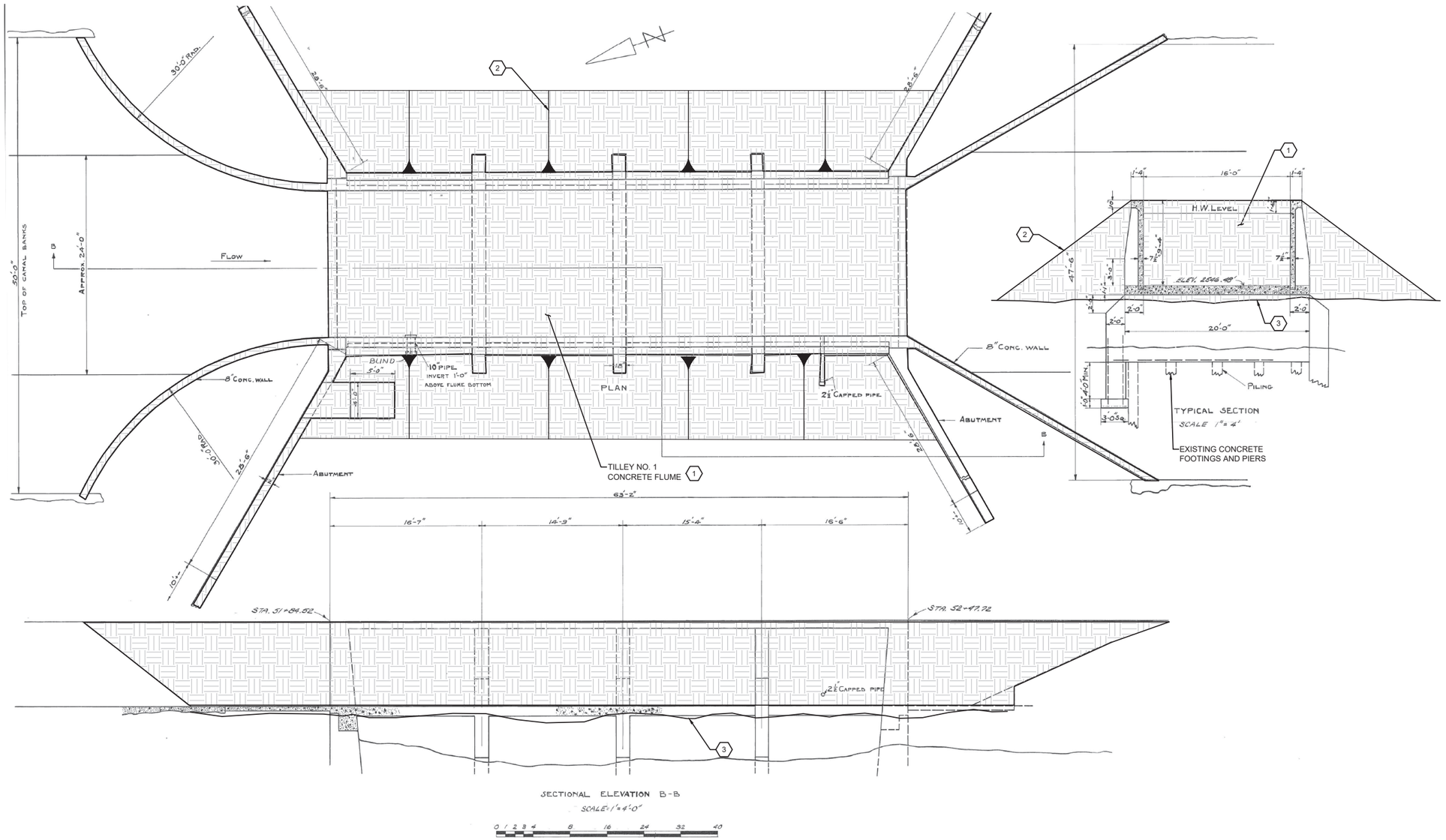
LOCATION BOREL HYDRO SURRENDER

DETAILS
CANAL INLET STRUCTURES

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company | HDR | SCALE D/L

C-502

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




## GENERAL NOTES:

1. AS-BUILT DRAWING TAKEN FROM DRAWING NUMBER 5106470-1, INDEX ID 382-1005.

## KEY NOTES:

(1) BACKFILL CONCRETE FLUME, HEADWALLS AND ABUTMENTS.

(2) BACKFILL(3:1 MAX) TO PROVIDE SMOOTH TRANSITIONS AND NATURALLY CONFORM TO ADJACENT TOPOGRAPHY.

(3) APPROXIMATE EXISTING GROUND SURFACE.

CONTAINS CRITICAL ENERGY INFRASTRUCTURE INFORMATION -DO NOT RELEASE-

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

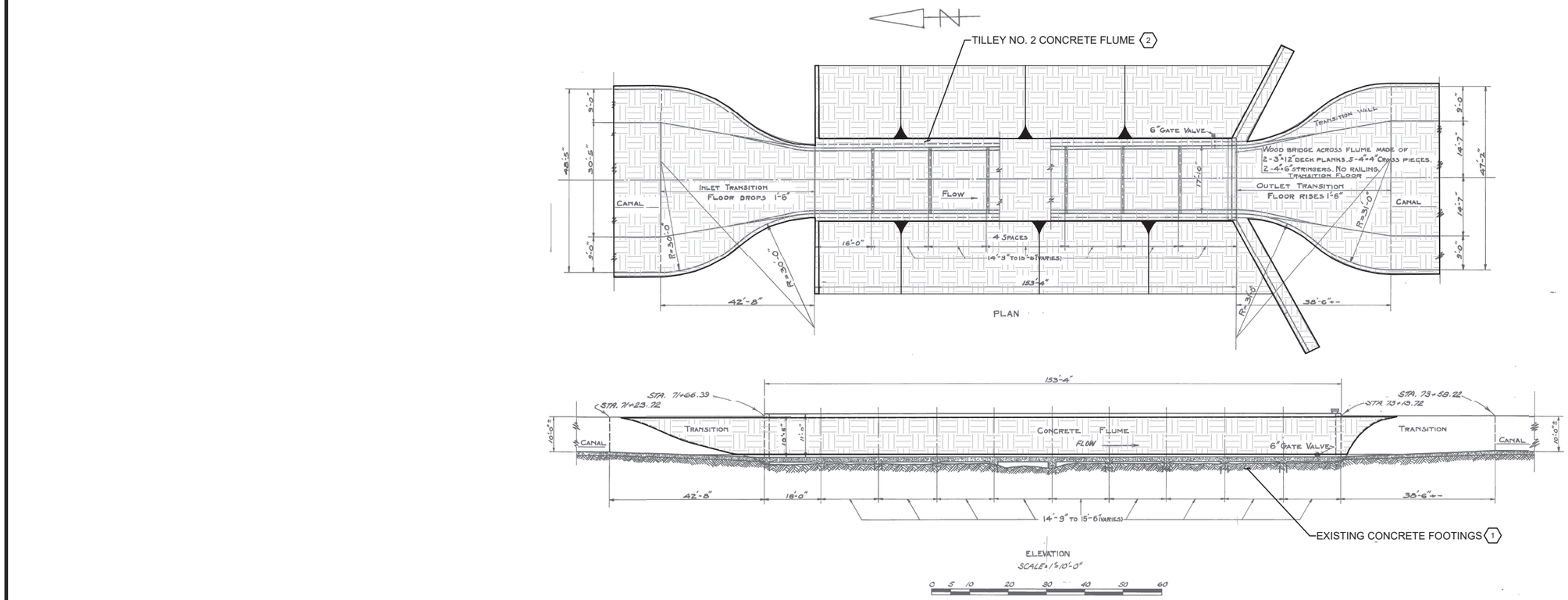
DETAILS
TILLEY NO. 1 CONCRETE FLUME

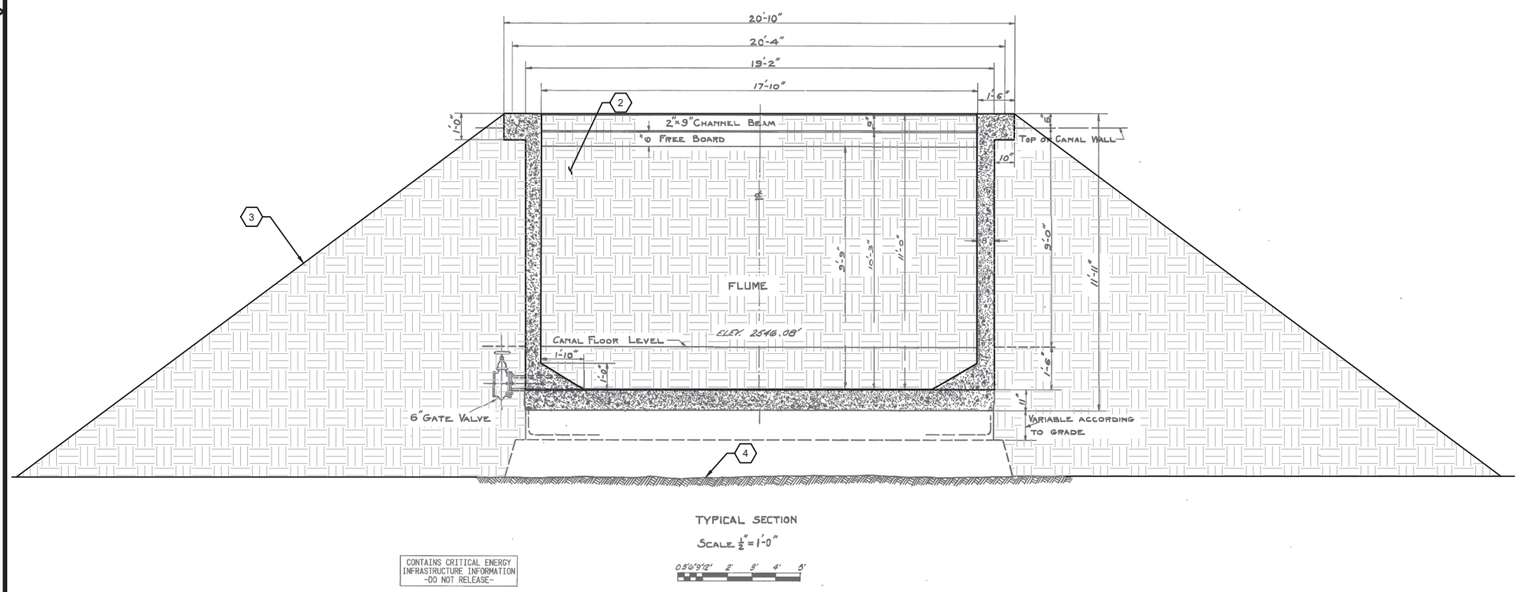
SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company | HDR

SCALE D/L

C-503

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




CONTAINS CRITICAL ENERGY INFRASTRUCTURE INFORMATION -DO NOT RELEASE-

## GENERAL NOTES:

1. AS-BUILT DRAWING TAKEN FROM DRAWING NUMBER 5106471-1, INDEX ID 382-1006.

## KEY NOTES:

1. LEAVE CONCRETE FLOOR AND FOOTINGS IN PLACE. BACKFILL TO PROVIDE SMOOTH TRANSITIONS AND NATURALLY CONFORM TO ADJACENT TOPOGRAPHY.
2. BACKFILL CONCRETE FLUME, HEADWALLS AND ABUTMENTS.
3. BACKFILL(3:1 MAX) TO PROVIDE SMOOTH TRANSITIONS AND NATURALLY CONFORM TO ADJACENT TOPOGRAPHY.
4. APPROXIMATE EXISTING GROUND SURFACE.

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
|---|---|---|---|---|---|---|---|---|---|
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

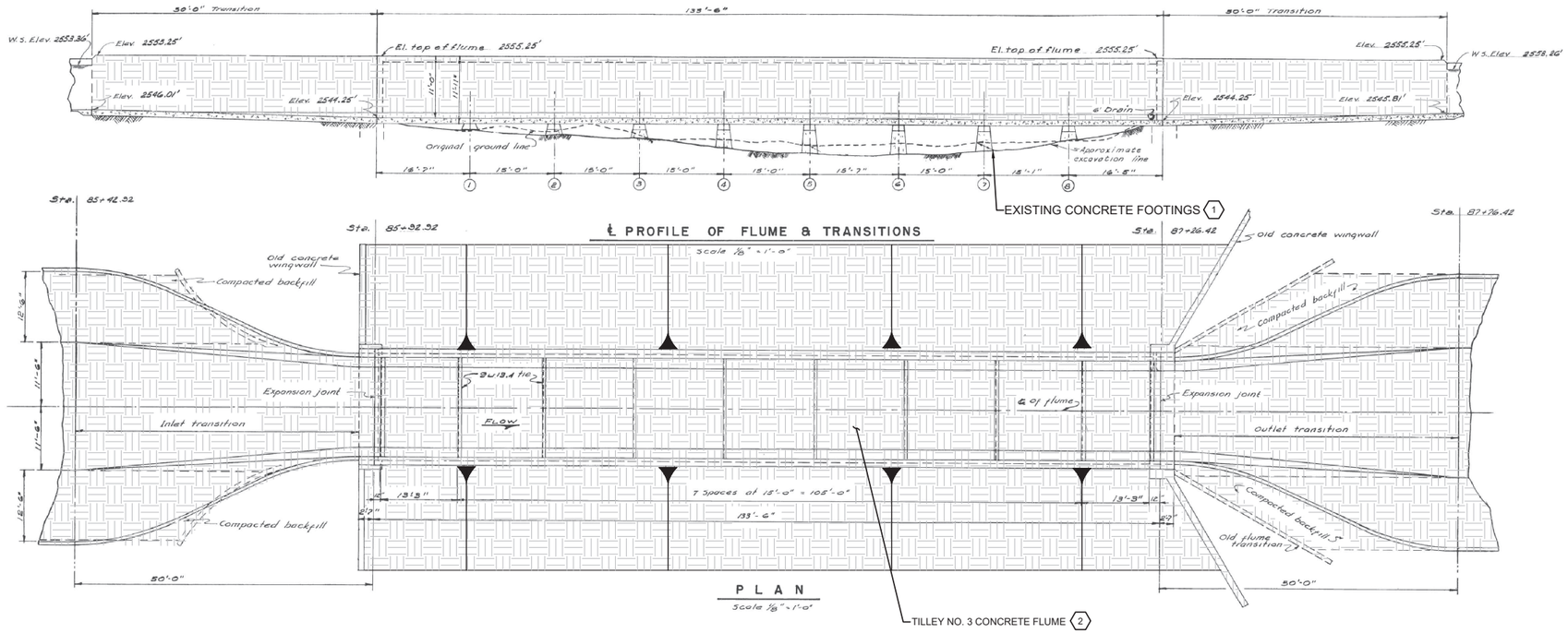
DETAILS
TILLEY NO. 2 CONCRETE FLUME

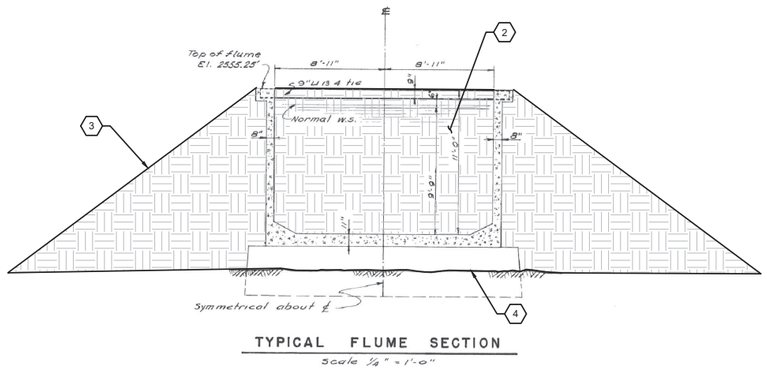
SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

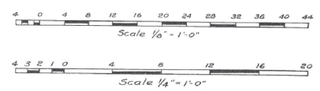
C-504

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




TYPICAL FLUME SECTION
Scale 1/4" = 1'-0"




## GENERAL NOTES:

1. AS-BUILT DRAWING TAKEN FROM DRAWING NUMBER 5106472-1, INDEX ID 382-1007.

## KEY NOTES:

1. LEAVE CONCRETE FLOOR AND FOOTINGS IN PLACE. BACKFILL TO PROVIDE SMOOTH TRANSITIONS AND NATURALLY CONFORM TO ADJACENT TOPOGRAPHY.
2. BACKFILL CONCRETE FLUME, HEADWALLS AND ABUTMENTS.
3. BACKFILL(3:1 MAX) TO PROVIDE SMOOTH TRANSITIONS AND NATURALLY CONFORM TO ADJACENT TOPOGRAPHY.
4. APPROXIMATE EXISTING GROUND SURFACE.

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

LOCATION BOREL HYDRO SURRENDER

DETAILS
TILLEY NO. 3 CONCRETE FLUME

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-505

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

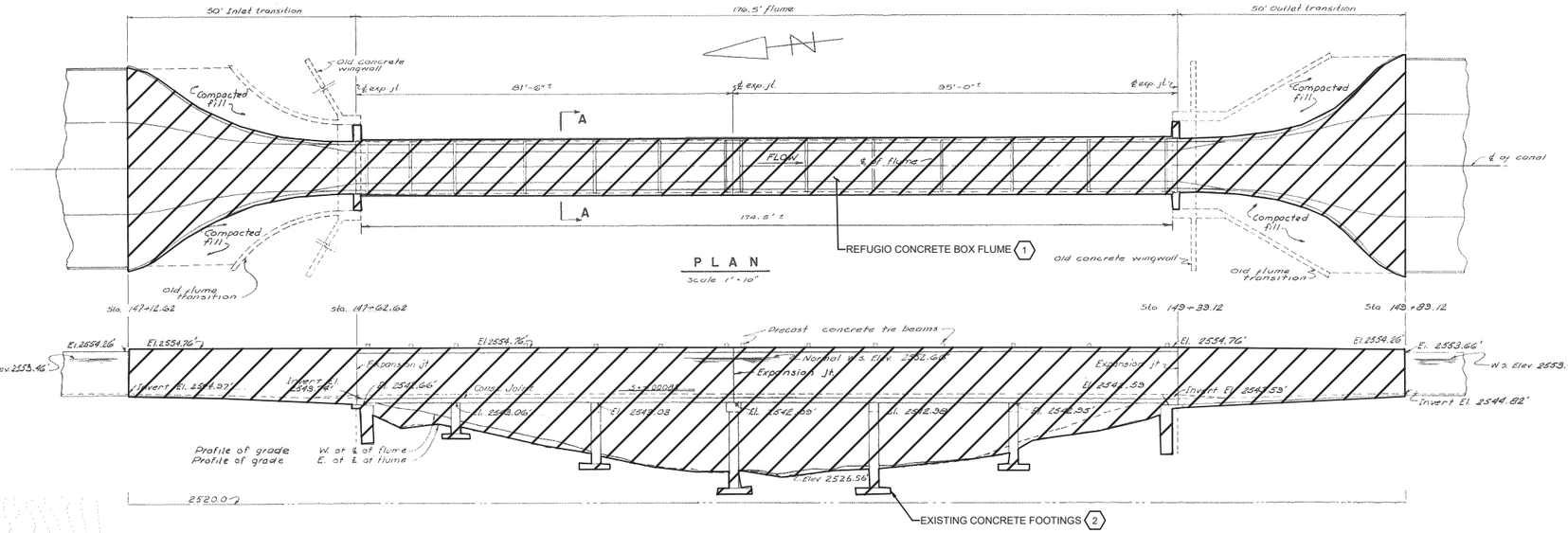
## GENERAL NOTES:

1. AS-BUILT DRAWING TAKEN FROM DRAWING NUMBER 5106473-1, INDEX ID 382-1008.

## KEY NOTES:

(1) REMOVE CONCRETE FLUME, HEADWALLS AND ABUTMENTS. PROCESS CONCRETE DEBRIS AND PLACE WITHIN CANAL.

(2) REMOVE CONCRETE PIERS TO A DEPTH OF 2 FT BELOW EXISTING GRADE. BACKFILL TO NATURALLY CONFORM TO ADJACENT TOPOGRAPHY




* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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LOCATION BOREL HYDRO SURRENDER

DETAILS
REFUGIO CONCRETE BOX FLUME

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-506

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

## GENERAL NOTES:

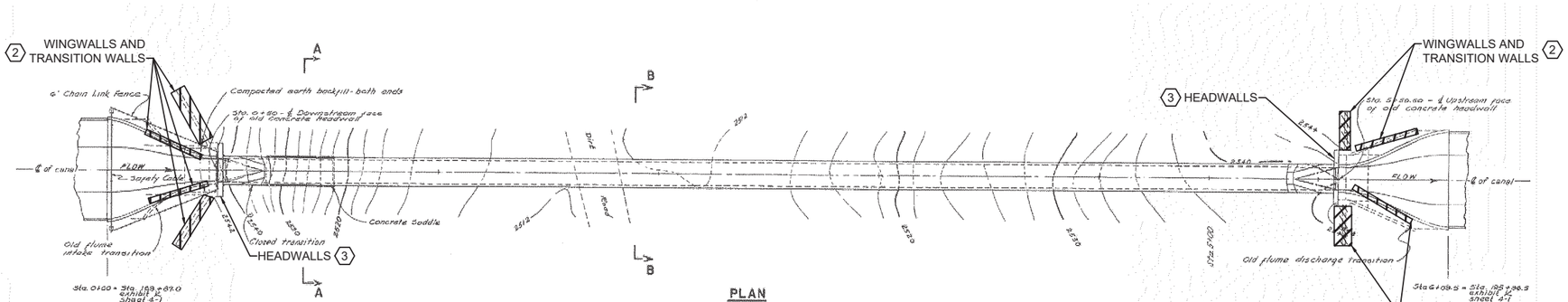
1. AS-BUILT DRAWING TAKEN FROM DRAWING NUMBER 5106474-1.

## KEY NOTES:

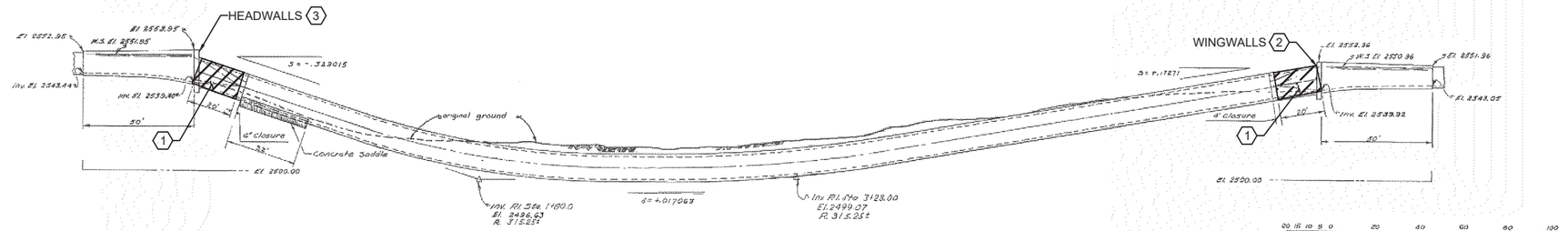
(1) PLACE SLURRY PLUG AT ENTRY AND EXIT TO SIPHON, MIN 20-FT.

(2) DEMOLISH WINGWALLS AND TRANSITION WALLS

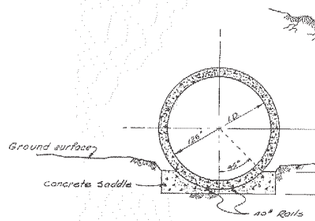
(3) LEAVE HEADWALLS IN PLACE. BACKFILL WITH NATIVE MATERIAL 3:1 MAXIMUM TO NATURALLY CONFORM TO ADJACENT TOPOGRAPHY



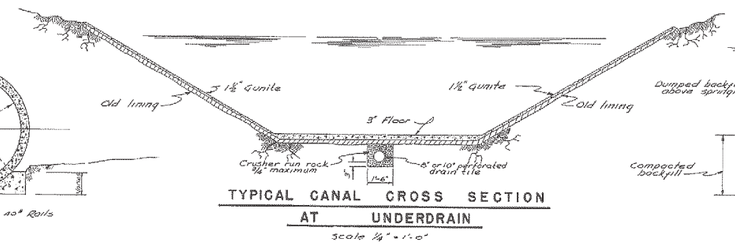

PLAN
scale 1" = 20'



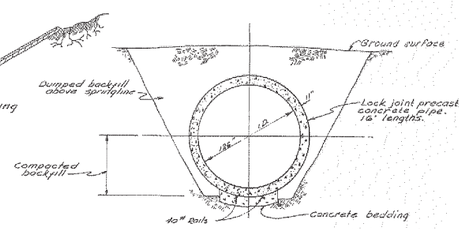

PROFILE
scale 1" = 20'



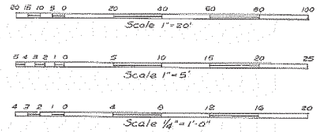

SECTION A-A
TYPICAL SADDLE
scale 1" = 5'




TYPICAL CANAL CROSS SECTION AT UNDERDRAIN
scale ½" = 1'-0"




SECTION B-B
TYPICAL BEDDING
scale 1" = 5'




This map is a part of an application for amendment of the license for Project 382 made by the undersigned the 28th day of July, 1950, and is filed pursuant to order of the Federal Power Commission issued July 19, 1950, in connection therewith and supersedes sheet 22 of Exhibit L.

Southern California Edison Company.

By Jean H. Farrington
Vice President

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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LOCATION BOREL HYDRO SURRENDER

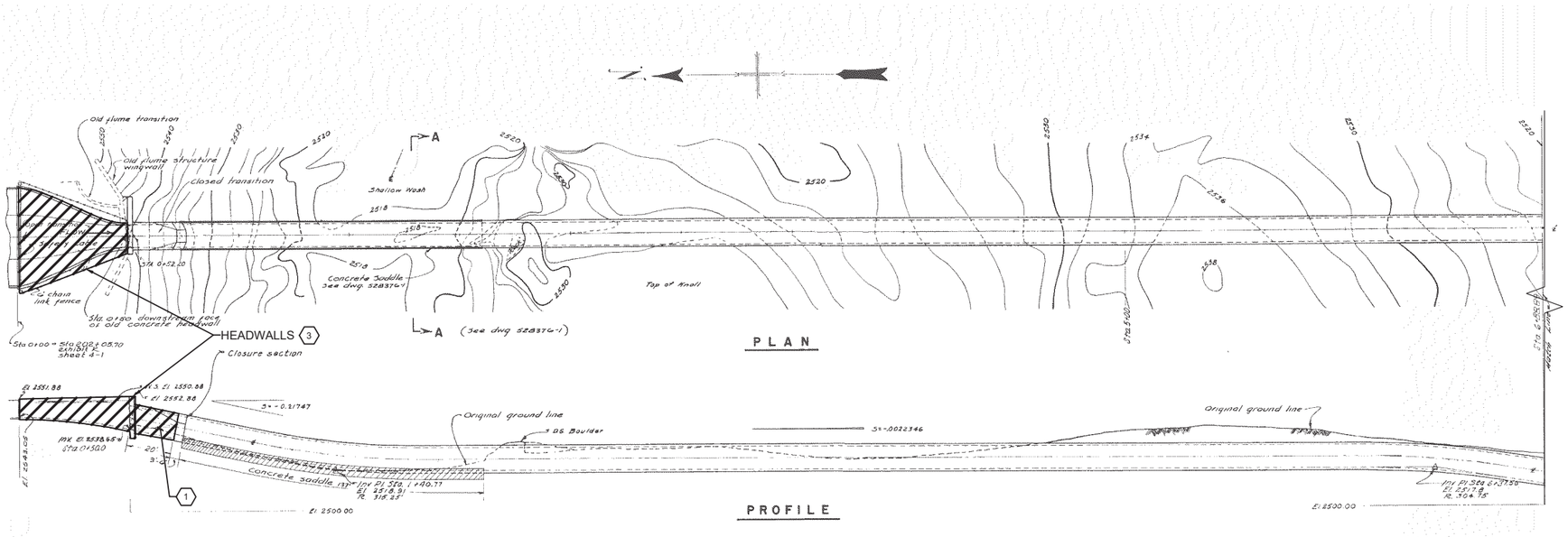
DETAILS
RICH GULCH CONCRETE SIPHON

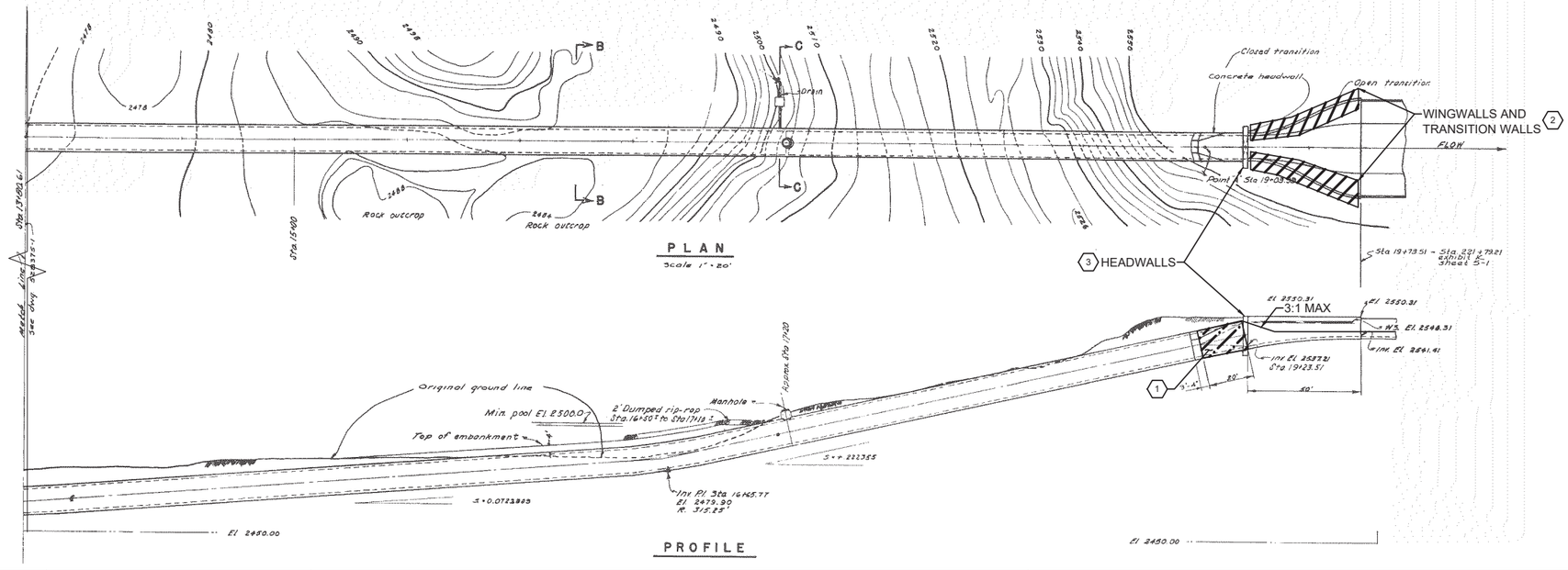
SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-507

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




GENERAL NOTES:

1. AS-BUILT DRAWING TAKEN FROM DRAWING NUMBER 5106474-1.

KEY NOTES:

1. PLACE SLURRY PLUG AT ENTRY AND EXIT TO SIPHON, MIN 20-FT LONG.
2. DEMOLISH WINGWALLS AND TRANSITION WALLS.
3. LEAVE HEADWALLS IN PLACE. BACKFILL WITH NATIVE MATERIAL 3:1 MAXIMUM TO NATURALLY CONFORM TO ADJACENT TOPOGRAPHY.

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
|---|---|---|---|---|---|---|---|---|---|
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| REFERENCE DRAWINGS |
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LOCATION BOREL HYDRO SURRENDER

DETAILS
KERN RIVER CONCRETE SIPHON

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-508

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

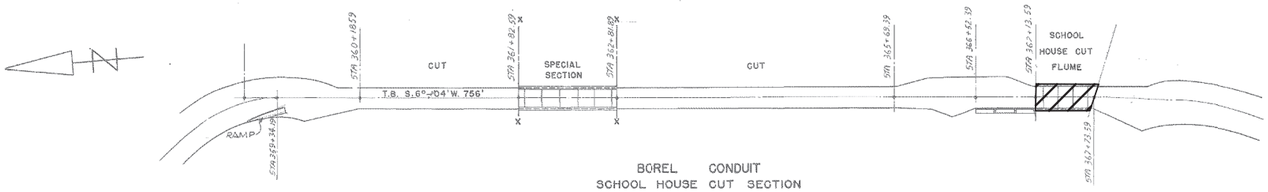
## GENERAL NOTES:

1. AS-BUILT DRAWING TAKEN FROM DRAWING NUMBER 5106477-2, INDEX ID 382-1012.

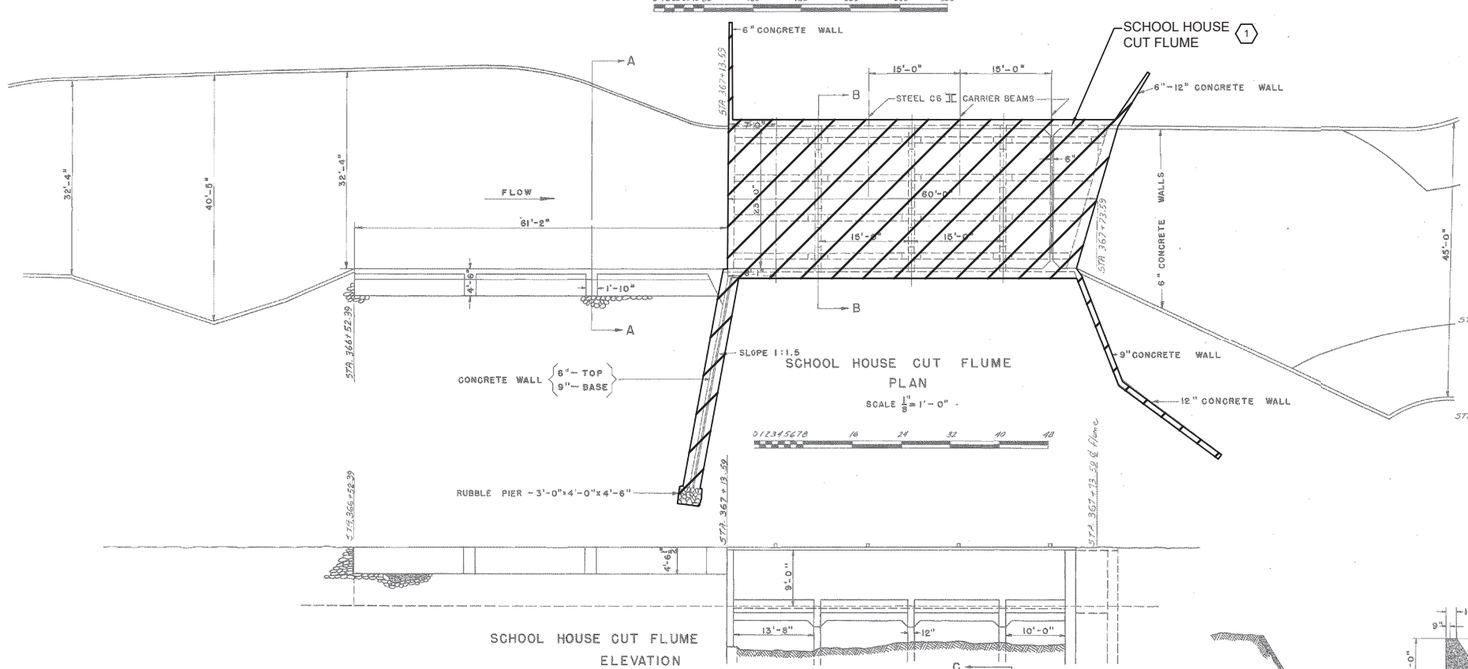
## KEY NOTES:

(1) REMOVE AND DISPOSE OF CONCRETE FLUME. PLACE RSP AT TRANSITION.

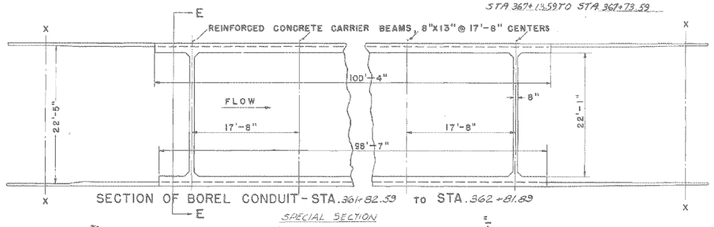
(2) BACKFILL AND GRADE TO NATURALLY CONFORM TO ADJACENT TOPOGRAPHY.




BOREL CONDUIT
SCHOOL HOUSE CUT SECTION
SCALE 1"=50'-0"




SCHOOL HOUSE CUT FLUME
ELEVATION
STA 367+13.59 TO STA 367+73.59




SECTION OF BOREL CONDUIT - STA. 361+82.59 TO STA. 362+81.89

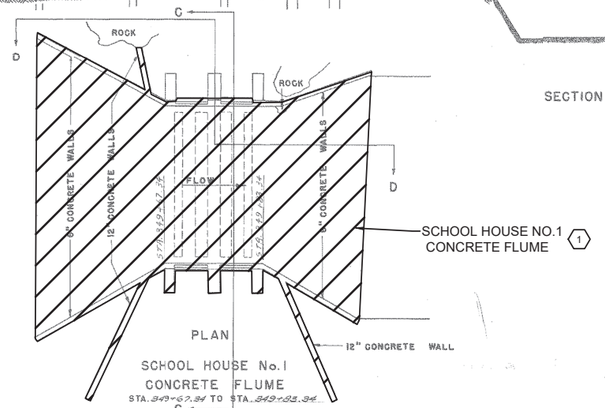

SECTION X-X
TYPICAL SECTION - STA. 360+18.59 TO STA. 361+82.59 AND STA. 362+81.89 TO STA. 365+69.39



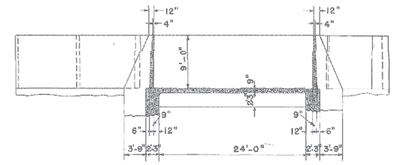

SECTION E-E

SCALE 1/8"=1'-0"

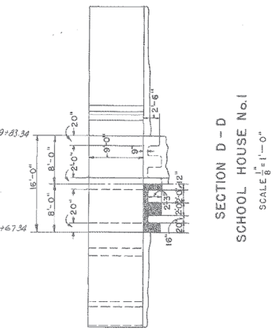
CONTAINS CRITICAL ENERGY INFRASTRUCTURE INFORMATION -DO NOT RELEASE-



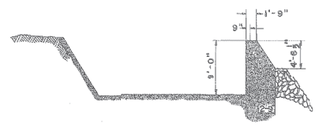

SCALE 1/8"=1'-0"



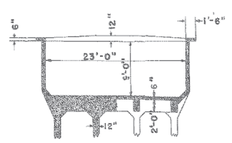

SECTION C-C
SCHOOL HOUSE No.1
SCALE 1/8"=1'-0"




SECTION D-D
SCHOOL HOUSE No.1
SCALE 1/8"=1'-0"




SECTION A-A




SECTION B-B

SCHOOL HOUSE CUT FLUME
SCALE 1/8"=1'-0"

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

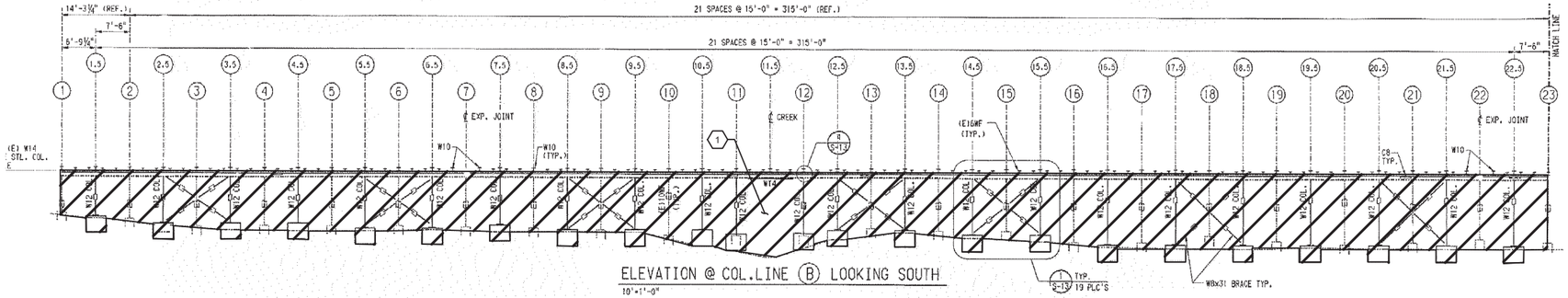
DETAILS
SCHOOL HOUSE NO. 1 CONCRETE FLUME
AND SCHOOL HOUSE CUT FLUME

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company | HDR

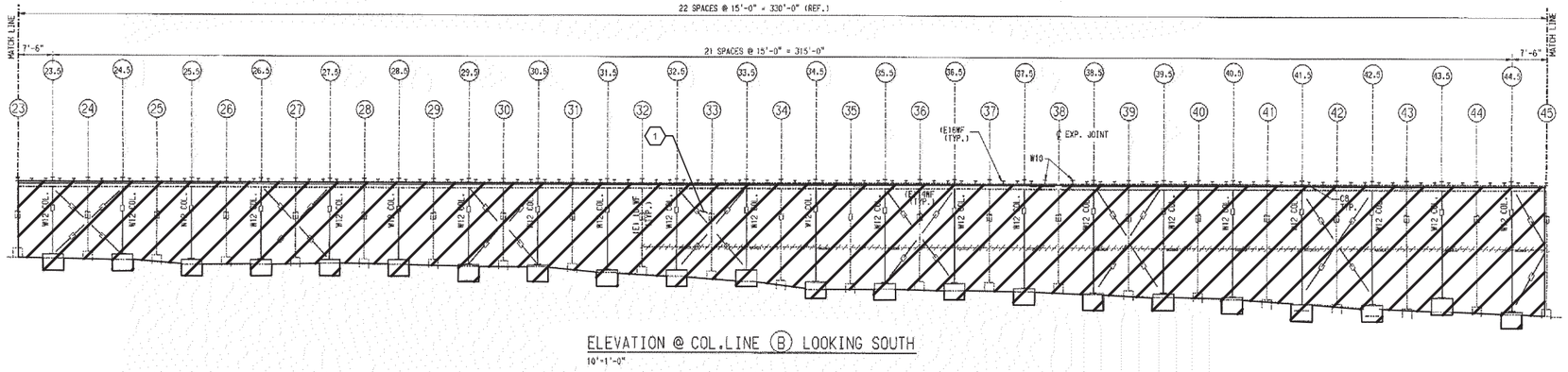
SCALE D/L

C-509

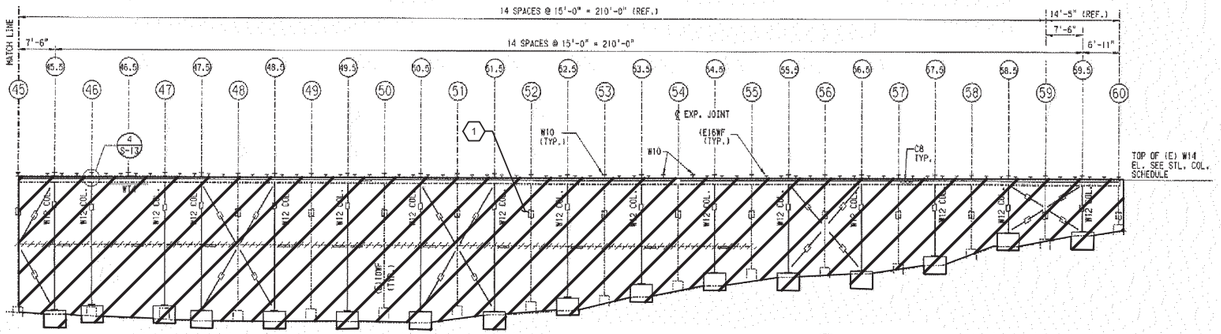
SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE



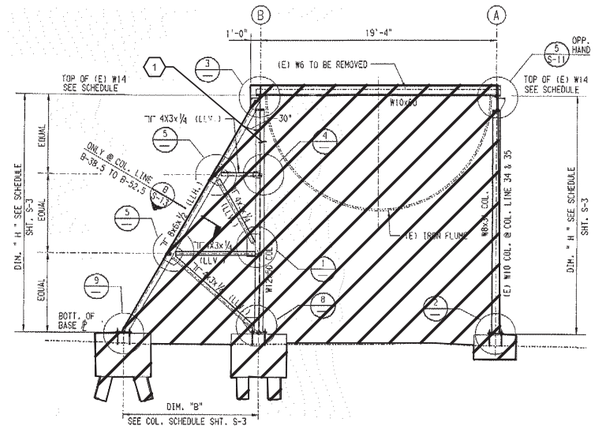

ELEVATION @ COL.LINE (B) LOOKING SOUTH
10'=1'-0"




ELEVATION @ COL.LINE (B) LOOKING SOUTH
10'=1'-0"




ELEVATION @ COL.LINE (B) LOOKING SOUTH
10'=1'-0"




NOTE : FOR FOUNDATION SEE SHTS S-4, S-5, AND S-6

BENT ELEVATION @ COL. LINE B-31.5 THRU B-52.5 AND B-46 & B-47
¾" 1'-0"

GENERAL NOTES:

1. AS-BUILT DRAWING TAKEN FROM DRAWING NUMBER 5249463-4 AND 5249463-5.

KEY NOTES:

(1) REMOVE AND RECYCLE STRUCTURAL STEEL AND STEEL SHEETING. REMOVE AND DISPOSE CONCRETE FOOTINGS TO A DEPTH OF 2 FEET BELOW GRADE. GRADE TO CONFORM TO ADJACENT NATURAL TOPOGRAPHY. PLACE ROCK SLOPE PROTECTION AT TRANSITIONS.

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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| REFERENCE DRAWINGS | REFERENCE DRAWINGS |
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LOCATION BOREL HYDRO SURRENDER

DETAILS
ERSKINE STEEL FLUME

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company | HDR

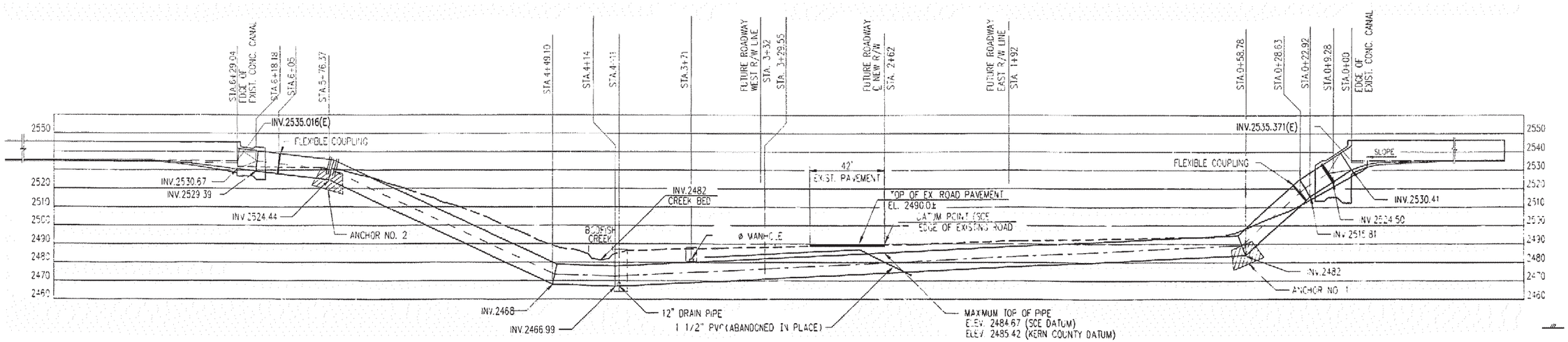
SCALE D/L

C-510

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

GENERAL NOTES:

1. AS-BUILT DRAWING TAKEN FROM DRAWING NUMBER 5251354-8.




SECTION A
1" = 30'

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

DETAILS
BODFISH SIPHON

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-511

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

GENERAL NOTES:

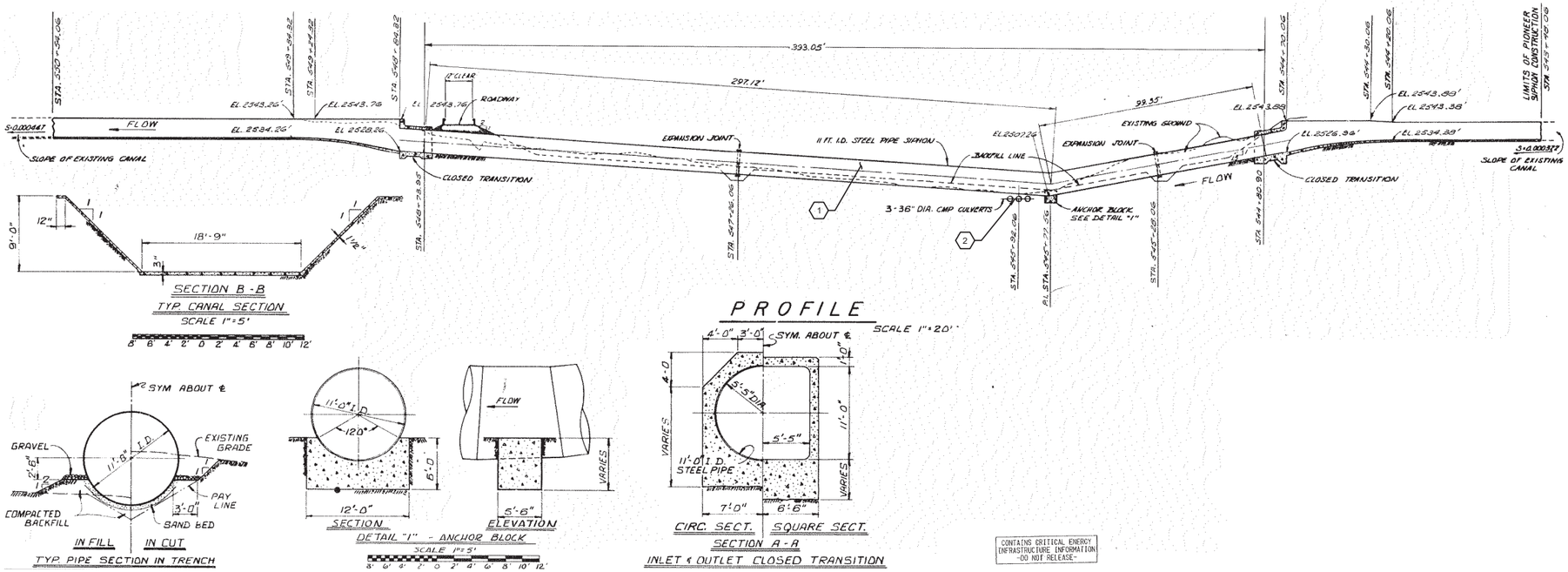
1. AS-BUILT DRAWING TAKEN FROM DRAWING NUMBER 5106480-2, SHEET ID 382-1015.

KEY NOTES:

(1) DEMOLISH AND REMOVE STEEL PIPE CONTROL BUILDING AND POWER SERVICE. HEADWALLS AND FOOTINGS TO REMAIN.

(2) PROTECT EMBANKMENT AND EXISTING 36 IN CULVERTS AND HEADWALL

(3) GRADE DISTURBED AREAS TO NATURALLY CONFORM TO ADJACENT TOPOGRAPHY




CONTAINS CRITICAL ENERGY INFRASTRUCTURE INFORMATION -DO NOT RELEASE-

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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| REFERENCE DRAWINGS | REFERENCE DRAWINGS |
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LOCATION BOREL HYDRO SURRENDER

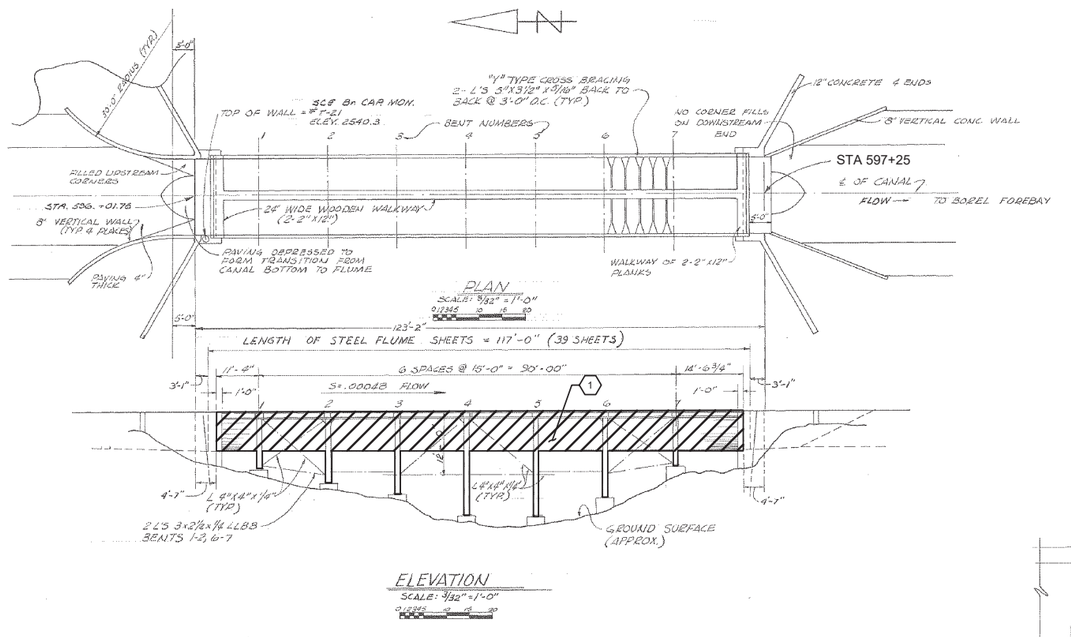
DETAILS
PIONEER STEEL SIPHON

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

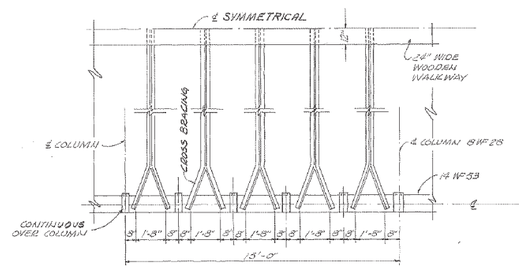
C-512

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

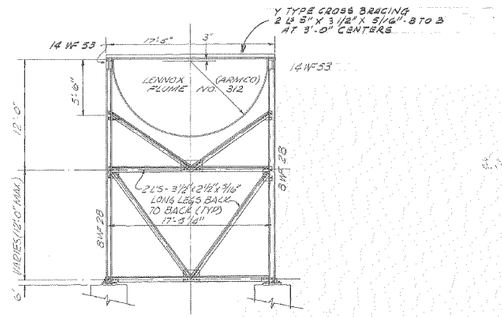



PLAN
SCALE: 3/32" = 1'-0"

ELEVATION
SCALE: 3/32" = 1'-0"




CROSS BRACING DETAIL
SCALE: 3/8" = 1'-0"




623 FLUME (TYPICAL BENT)
3/16" = 1'-0"

## GENERAL NOTES:

1. AS-BUILT DRAWING TAKEN FROM DRAWING NUMBER 5106481-1, SHEET ID 382-1016.

## KEY NOTES:

(1) REMOVE AND RECYCLE STRUCTURAL STEEL AND STEEL SHEETING. CONCRETE HEADWALLS AND FOOTINGS TO REMAIN.

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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| REFERENCE DRAWINGS | REFERENCE DRAWINGS |
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LOCATION BOREL HYDRO SURRENDER

DETAILS
FLUME NO. 623

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-513

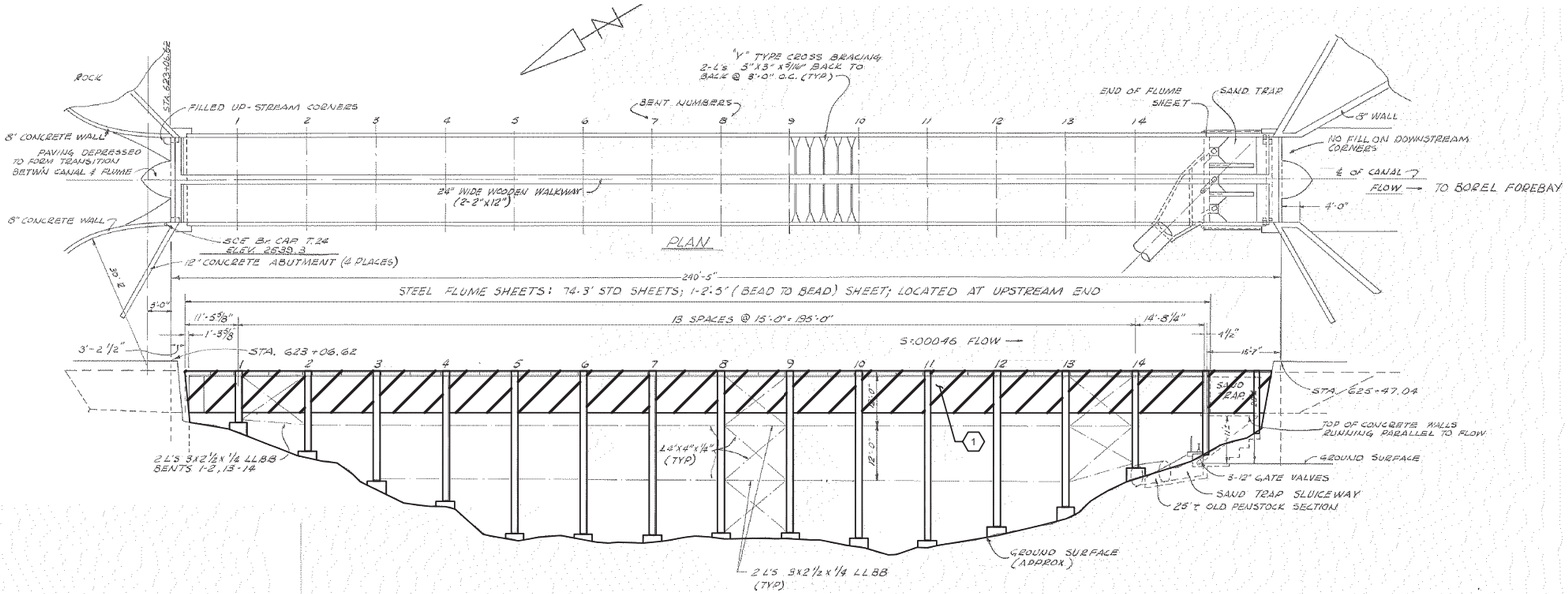
SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

## GENERAL NOTES:

1. AS-BUILT DRAWING TAKEN FROM DRAWING NUMBER 5106482-1, SHEET ID 382-1017.

## KEY NOTES:

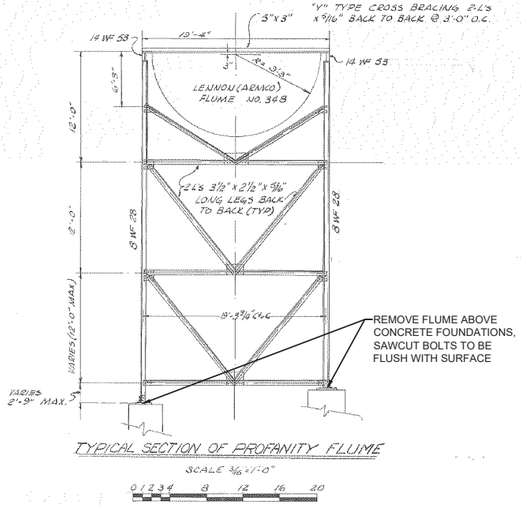
(1) REMOVE AND RECYCLE STRUCTURAL STEEL AND STEEL SHEETING. CONCRETE HEADWALLS AND FOOTINGS TO REMAIN.




ELEVATION - PROFANITY FLUME

SCALE 3/32"=1'-0"

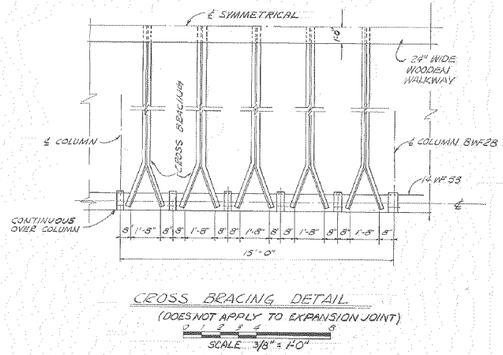
0 1 2 3 4 5 15 25 35 43 55 65 75




TYPICAL SECTION OF PROFANITY FLUME

SCALE 3/16"=1'-0"

0 1 2 3 4 8 12 16 20




CROSS BRACING DETAIL

(DOES NOT APPLY TO EXPANSION JOINT)

SCALE 3/8"=1'-0"

0 1 2 3 4 9

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS | NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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LOCATION BOREL HYDRO SURRENDER

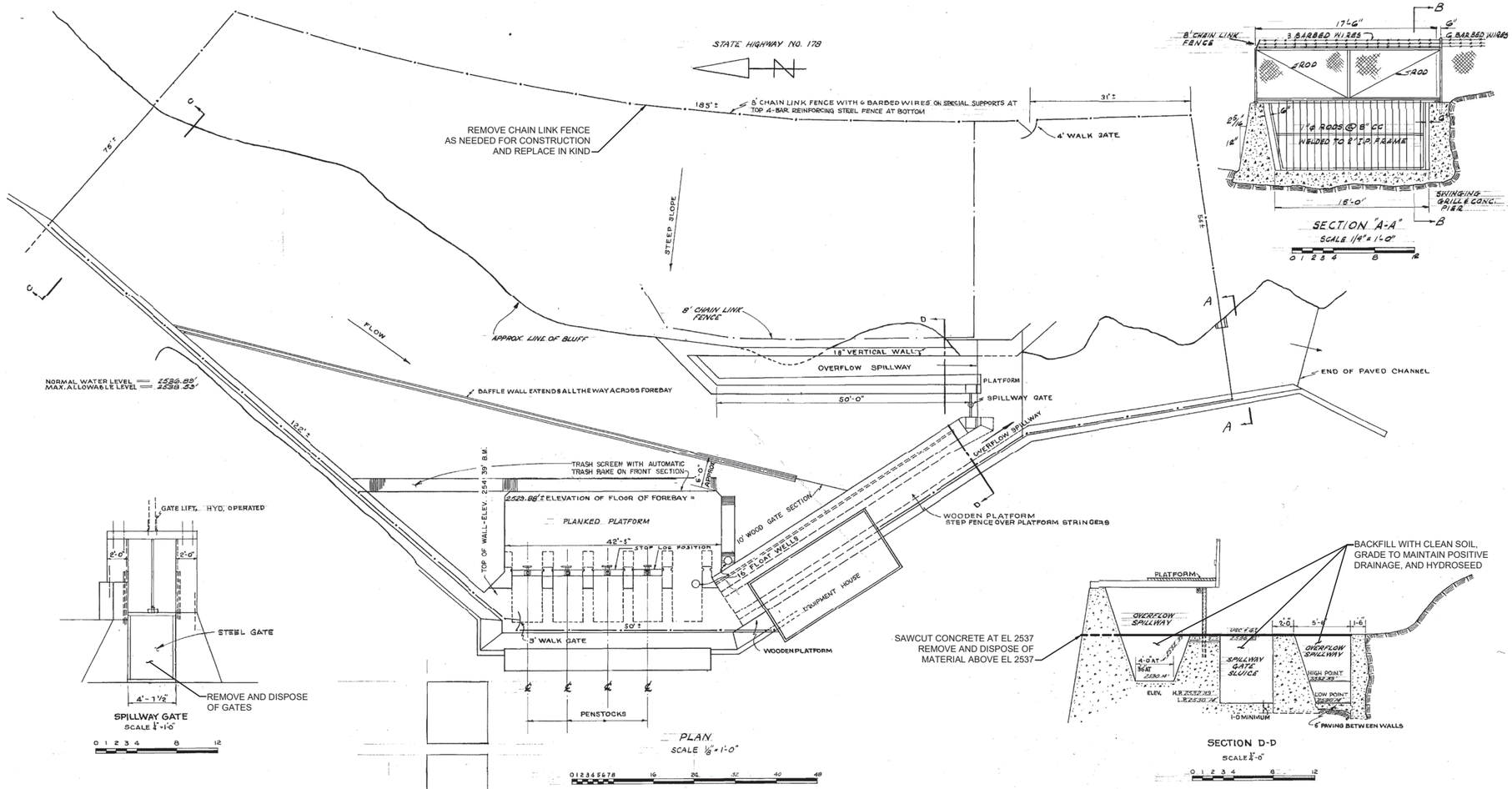
DETAILS
PROFANITY STEEL FLUME

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-514

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




## GENERAL NOTES:

1. AS-BUILT DRAWING TAKEN FROM DRAWING NUMBER 5106484-2, SHEET ID 382-1019.

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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REFERENCE DRAWINGS

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
|---|---|---|---|---|---|---|---|---|---|
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REFERENCE DRAWINGS

LOCATION BOREL HYDRO SURRENDER

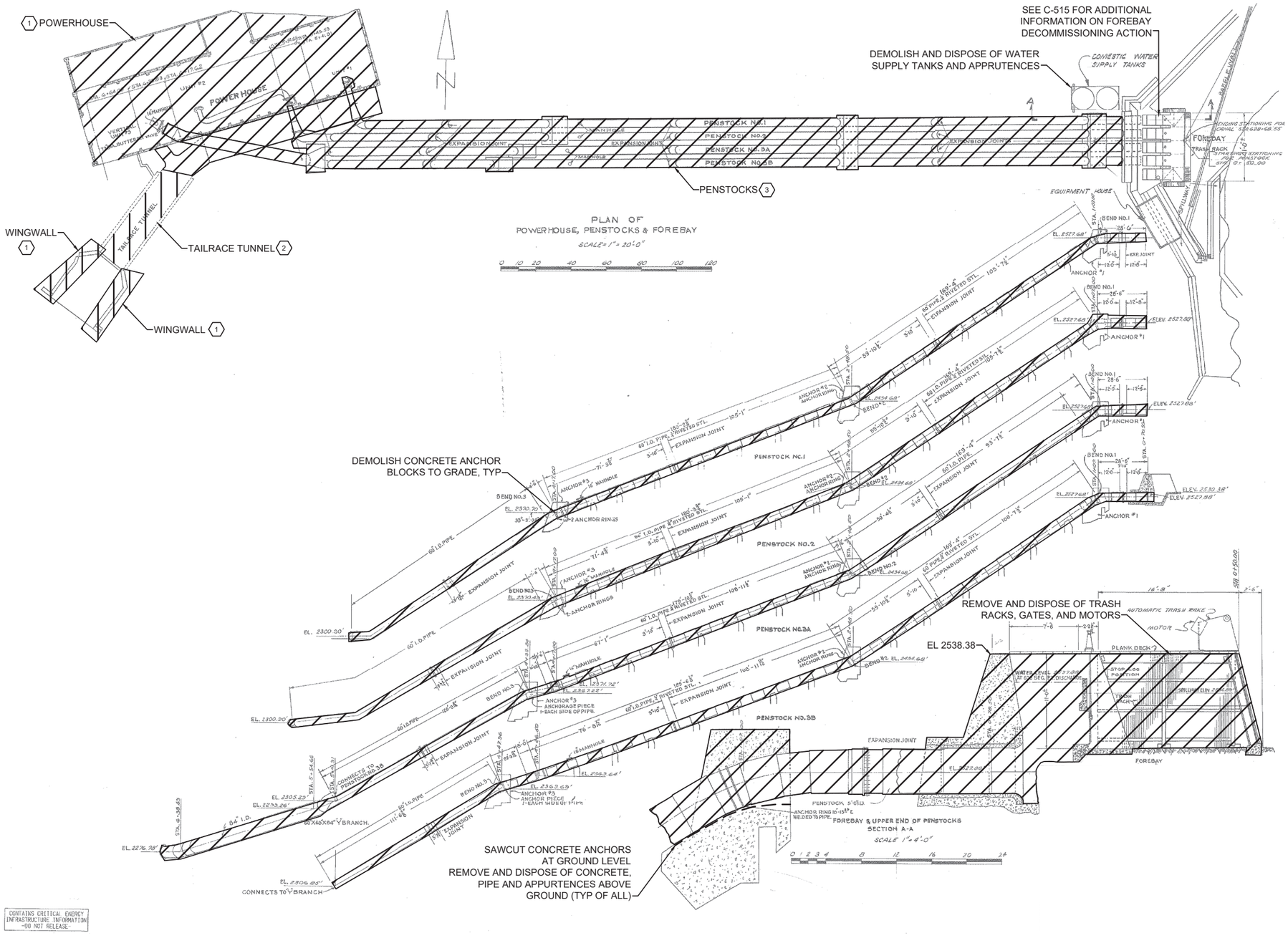
DETAILS
FOREBAY

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-515

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE




CONTAINS CRITICAL ENERGY INFRASTRUCTURE INFORMATION -DO NOT RELEASE-

GENERAL NOTES:

1. AS-BUILT DRAWING TAKEN FROM DRAWING NUMBER 5106485-1, SHEET ID 382-1020.

KEY NOTES:

1. DEMOLISH POWERHOUSE AND DISPOSE OFFSITE. REFER TO C-517 FOR ADDITIONAL DETAIL.
2. CONTRACTOR MUST PROVIDE A FIRE PROTECTION PLAN FOR APPROVAL AND INSTALL FIRE PROTECTION SYSTEM PRIOR TO ANY WORK IN THIS AREA
3. REMOVE PENSTOCK PIPES AND DISPOSE OFFSITE. CONCRETE FOOTING AND ANCHOR REMOVAL LIMITED TO THAT NEEDED TO REMOVE PIPE

* REVISE ON AUTOCAD SYSTEM ONLY *

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
|---|---|---|---|---|---|---|---|---|---|
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| REFERENCE DRAWINGS | REFERENCE DRAWINGS |
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| | |

LOCATION BOREL HYDRO SURRENDER

DETAILS
PENSTOCKS

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company | HDR

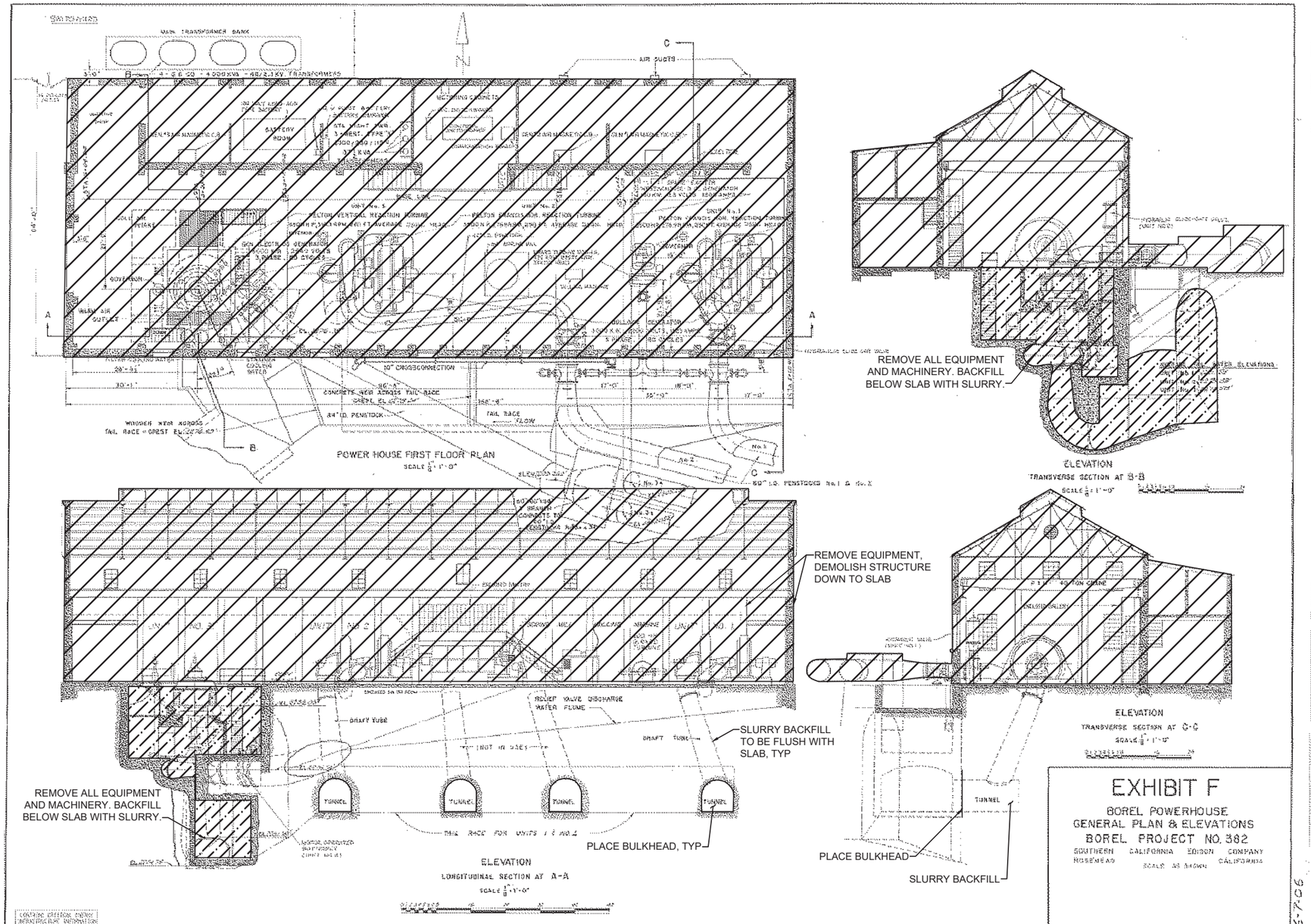
SCALE D/L

C-516

SOUTHERN CALIFORNIA EDISON
2012 – 4 SIZE

GENERAL NOTES:

1. AS-BUILT DRAWING TAKEN FROM DRAWING NUMBER 5106486-2, SHEET ID 382-1021.




# EXHIBIT F

BOREL POWERHOUSE
GENERAL PLAN & ELEVATIONS
BOREL PROJECT NO. 382
SOUTHERN CALIFORNIA EDISON COMPANY
ROSEMEAD CALIFORNIA
SCALE AS SHOWN

6-7-06

382-1021 SHEET 2: 5106486-2

* REVISE ON AUTOCAD SYSTEM ONLY *

| REFERENCE DRAWINGS | REFERENCE DRAWINGS |
|---|---|

| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
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| NO | REVISIONS | DATE | SAP WO | SUPV | APPROVED | ENGR | CK'D | MADE | P.E. |
|---|---|---|---|---|---|---|---|---|---|

LOCATION BOREL HYDRO SURRENDER

DETAILS
POWERHOUSE SECTIONS

SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

SCALE D/L

C-517

SOUTHERN CALIFORNIA EDISON
2012 — 4 SIZE

# Appendix D: Estimated Schedule

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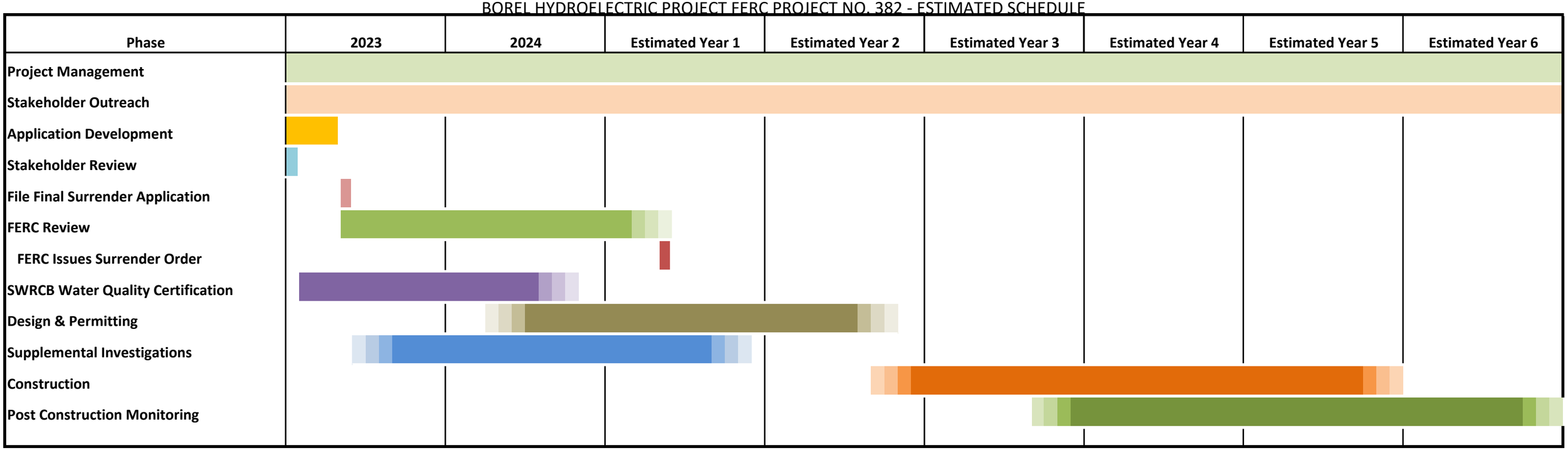
BOREL HYDROELECTRIC PROJECT FERC PROJECT NO. 382 - ESTIMATED SCHEDULE




May 2023

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