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| **Docket Number:** | 24-OPT-02 |
| **Project Title:** | Compass Energy Storage Project |
| **TN #:** | 267219 |
| **Document Title:** | Response to Post Scoping Set 2 Data Request and Updated Application Materials |
| **Description:** | N/A |
| **Filer:** | Erin Phillips |
| **Organization:** | Dudek |
| **Submitter Role:** | Applicant Consultant |
| **Submission Date:** | 11/13/2025 5:12:32 PM |
| **Docketed Date:** | 11/14/2025 |

# MEMORANDUM

| | |
|---|---|
| **To:** | California Energy Commission Staff |
| **From:** | Compass Energy Storage LLC |
| **Subject:** | Response to Post Scoping Set 2 Data Requests for Compass Energy Storage Project (24-OPT-02) |
| **Date:** | November 13, 2025 |
| **Attachments:** | A, 2025 Southwestern Pond Turtle Habitat Assessment and Survey Results<br>B, Response to Geotechnical Review Comments<br>C, Plans for the Rehabilitation of Oso Creek - 30% Submittal<br>D, Preliminary Hydraulic Report for Oso Creek Stabilization<br>E, Preliminary Oso Creek Planting Palette<br>F, Updated Project Description<br>G, Updated Grading Plan |

This memorandum provides responses to the California Energy Commission (CEC) Post Scoping Set 2 Data Requests for Compass Energy Storage Project (24-OPT-02) dated August 12, 2025. The data request is provided in italicized text. Applicant responses follow the italicized data request and are provided in regular, non-italicized text.

## BIOLOGICAL RESOURCES

***SDR BIO-3.*** *CEC staff requests that the applicant complete visual surveys following the Western Pond Turtle Visual Survey Protocol for the Southcoast Ecoregion (USGS 2006) to confirm presence/absence of southwestern pond turtles. The surveys should be conducted as soon as possible to ensure this species is accurately addressed in the Staff Assessment. Please provide a survey report that meets the standards of the visual survey guidance.*

**Response to SDR BIO-3.** A habitat assessment and visual encounter survey for the southwestern pond turtle was completed in August 2025 in accordance with the U.S. Geological Survey's 2006 Western Pond Turtle Visual Survey Protocol for the Southcoast Ecoregion. The results of the habitat assessment and visual encounter survey were positive for southwestern pond turtle. The survey report is provided as Attachment A.

## GEOLOGIC HAZARDS and WATER RESOURCES

***SDR GEO-1.*** *CEC staff requests the applicant provide more information on the conclusion that 1-inch of total seismic settlement and 0.5 inches of differential seismic settlement are anticipated. For example, CEC staff requests the applicant provide an expanded discussion of the liquefaction analysis, including the assumptions, methods, results, and conclusions.*

*CEC staff notes that Appendix D: Liquefaction in LGC Geotechnical, Inc. (2024) contains results from 19 cone penetration tests at the project site. LGC Geotechnical, Inc.'s (2024) recommended mitigation for liquefaction hazards includes removing at least 5 feet of sediment below grade and beyond the foundation footprint, replacing that sediment with appropriate compacted fill, and constructing the project on a mat foundation.*

**Response to SDR GEO-1.** In general, liquefaction is a concern for loose to medium dense saturated sandy soils with low fines contents (i.e., silts and clays). The vast majority of the alluvial soils tested for the site are clayey, or cohesive and not considered to be susceptible to liquefaction.

The current standard of practice is to perform liquefaction analysis as outlined in "Recommended Procedures for Implementing of DMG Special Publication 117A, Guidelines for Analyzing and Mitigating Liquefaction in California" (SCEC, 1999 & CGS, 2008). Liquefaction analysis was performed using the program CLiq (GeoLogismiki, 2022) using the 1998 NCEER method of analysis (Youd, et al, 1998). Cone Penetration Test (CPT) soundings provide a near continuous log of the materials encountered during the sounding and are a very useful tool in characterizing the subsurface conditions and evaluating liquefaction. Liquefaction analysis is required to be performed for the Maximum Considered Earthquake (MCE) per Section 11.8.3 of ASCE 7-22 which is adopted by the 2022 CBC. The MCE represents the most severe earthquake an area is expected to experience, characterized by a 2 percent probability of exceedance in 50 years which corresponds to a 2,475-year return period. Liquefaction analysis was performed based on the required seismic criteria (PGAM equal to 0.56g) and corresponding earthquake magnitude of 6.7. Liquefaction analysis is required to be performed for the historic high groundwater level. Within the development area the estimated historic high groundwater is 5 feet below grade. While the vast majority of alluvial soils encountered are cohesive and not considered susceptible to liquefaction, the analysis indicates that site contains isolated typically relatively thin sandy layers that are susceptible to liquefaction. The estimated total settlement of 1-inch and differential settlement of ½ an inch over 50 feet due to liquefaction is in our opinion relatively minor.

***SDR GEO-2.*** *CEC staff requests the applicant further explain how the proposed mitigation would mitigate the potential direct and indirect impacts from liquefaction hazards to less than significant.*

*According to the CGS Earthquake Zones of Required Investigation online mapping application, slopes adjacent to the project's western boundary are landslide zones (CDOC 2024). LGC Geotechnical, Inc. (2024) observed that the landslide complex that originates upslope of the project extends under the project site. LGC Geothechnical Inc. (2024) conducted a slope stability analysis and concluded the landslides to the west of the project site are stable. LGC Geotechnical, Inc.'s (2024) recommended mitigation for landslide hazards, including not cutting into the landslide complex, a setback from the landslide complex, and a program and guidelines for maintaining long-term slope stability (Dudek 2024aa). The investigation does not appear to evaluate if the landslide deposits that underlie the project site are stable.*

**Response to SDR GEO-2.** The Project's Geotechnical engineers describe in Attachment B that it has been their experience working on numerous projects in San Juan Capistrano and the southern California area that the estimated seismic total (1-inch) and differential (1/2-inch over 50 feet) settlement is relatively minor and well within tolerable limits for proposed structures placed on a mat foundation. This differential settlement for the proposed structures is well within the requirements of ASCE 7-16 Table 12.13-3, "Differential Settlement Threshold" which has been adopted by the 2022 California Building Code (CBC). While not the governing agency but provided as a means of comparison, the City of Los Angeles allows up to 4 inches of total settlement and 2 inches of differential settlement for building placed on a mat foundation. In addition, existing soils will be removed to a minimum depth of 5 feet below existing grade and replaced with compacted fill. Based on estimated seismic settlement, proposed earthwork removals and use of mat foundations, they consider potential direct and indirect impacts from liquefaction hazards to be less than significant.

The material underlying the relatively flat-lying, development area of the site has been depicted as landslide material underlying alluvial deposits and overlying older alluvial deposits (LGC Geotechnical, 2024). This is a simplified model of the materials encountered. The landslide materials encountered in this portion of the site consisted of landslide debris interfingered with alluvial deposits. This area of "landslide" material is

not anticipated to include a basal rupture surface/slip plane. Therefore, it is not considered a slope stability concern for large block-type landslide failures that fail along a clay bed rupture surface. However, as discussed in their report (LGC Geotechnical, 2024): "Where exposed along the Oso Creek channel, some of the material was observed to have recently moved toward the stream bed as localized rotational failure, labeled as 'active.'" It is because of this concern for rotational failures of the western embankment of the Oso Creek Channel, as well as the potential for additional channel migration, that they previously recommended the development area of the site be setback from the western channel embankment (LGC Geotechnical, 2024). It should be noted that the setback recommendation is no longer considered applicable due to recent acceleration of the embankment landslides. Updated slope stability concerns for the western embankment are evaluated and addressed as part of the channel restoration component (see SDR GEO-5).

***SDR GEO-3.*** *CEC staff requests the applicant provide more information on the conclusion that the landslide complex is stable. For example, CEC staff requests the applicant provide an expanded discussion of LGC Geotechnical, Inc.'s 2024 slope stability analysis, including the assumptions, methods, results, and conclusions. CEC staff notes that Appendix E: Slope Stability Analysis in LGC Geotechnical, Inc. (2024) contains computational results for slope stability analyses on four geologic cross-sections. Also, CEC staff requests the applicant evaluate if the landslide deposits that underlie the project site are stable.*

**Response to SDR GEO-3:** As described in Attachment B, the primary input parameters in slope stability analysis are the geological model as depicted on the geologic cross sections and the soil shear strength. The soil shear parameters are based on laboratory test results, published shear strength data (CGS, 2001) and engineering judgment. Laboratory testing of recent and previous field investigations were evaluated (LGC Geotechnical, 2024). Laboratory testing for shear strength was primarily by direct shear and torsional ring shear. Direct shear and torsional ring shear are the primary laboratory tests for soil shear strength. For direct shear testing, driven undisturbed ring samples are obtained from the field evaluation. The samples are inundated with water and sheared at rate slow enough for drained conditions. Direct shear tests are typically performed to a displacement of approximately 0.25 inch. Samples are typically run at three normal stresses and the corresponding shear strength values are obtained providing a composite friction angle and cohesion intercept. Torsional ring shear is used for landslide rupture clay surfaces and clay beds. A grab sample of the clay surface is obtained during the field investigation. The clay is placed in a torsional ring shear apparatus and various normal stress are performed until the residual strength envelope is obtained. The resulting value is a friction angle with a zero cohesion (intercept) value.

Slope stability analyses were performed based on the proposed design profile. The cross-sections were digitized and converted to a series of x and y coordinates to facilitate the analysis of the geologic cross section. Slope stability analysis was performed using the computer program GEOSTASE, version 4.30.31 (Gregory Geotechnical Software, 2019) for both static and pseudo-static (seismic) loading conditions. Potential rotational and block surfaces were analyzed using Bishop's Modified Method and Janbu's Simplified Method, respectively. These computational methods are the standard of practice for the southern California area and are referenced in Special Publication 117 (Blake, et al, 2002). Slope stability analysis indicates that the large landslide complex that underlies the western portion of the BESS site and the ascending hillside to the west of the BESS site is stable with respect to the proposed development (see Attachment B).

Slope stability concerns for the western embankment are evaluated and addressed as part of the channel restoration component (see SDR GEO-5).

Regarding landslide deposits that underlie the project site refer to the discussion provided in response to SDR GEO-2.

The section of LGC Geotechnical's report entitled "Slope Maintenance Guidelines" (LGC Geotechnical, 2024) is meant to apply to onsite slopes graded as part of proposed site development. The intent is to reduce the potential for surficial slope failures, slumps, excessive erosion, localized saturated zones, nuisance type water issues, etc. for the newly constructed slopes. It is not our intent to suggest that it is the responsibility of the developer of the subject site to maintain offsite slopes.

***SDR GEO-4.*** *CEC staff requests the applicant expand their explanation of how they propose to mitigate the potential direct and indirect impacts from landslide hazards to less than significant.*

*CEC staff reviewed Geosyntec Consultants, Inc.'s (2021) geomorphic investigation of Oso Creek (2021) and Chang Consultants' sediment transport analysis of Oso Creek (2024). Both studies identify westward soil erosion on Oso Creek through vertical scour, lateral erosion, and bank collapse as a threat to the project site. (Dudek 2025i)*

*Geosyntec Consultants, Inc. (2021) calculated that, between 2014 and 2021, Oso Creek eroded laterally into its western bank, toward the proposed project site, at an average rate of 3 feet per year. Lateral erosion is episodic and varies longitudinally along the stream channel. At over 50 percent of measurement locations within Geosyntec Consultants, Inc.'s 2021s study reach, the maximum annual lateral migration rate was less than or equal to 10 feet per year. At less than 5 percent of measurement locations, the maximum annual migration rate was 80 feet per year.*

*Geosyntec Consultants, Inc. (2021) and Chang Consultants (2024) concluded that lateral erosion varies longitudinally along the stream channel. Chang Consultants concluded that most erosion occurs during high streamflow events, such as 5-year, 10-year, 25-year, and 100-year floods. (Dudek 2025i)*

*Geosyntec Consultants, Inc. (2021) proposed a retaining wall solution to protect the project site from soil erosion. Chang Consultants (2024) proposed setbacks to protect the project site from soil erosion (Dudek 2025i). LGS Geotechnical (2024) also proposed setbacks to protect the project site from soil erosion (Dudek 2024aa).*

*Application Section 4.4: Geologic Hazards and Resources stated that adherence to the recommendations provided in LGC Geotechnical (2024) would reduce potential impacts related to geologic hazards to less than significant during construction and operation. (Dudek 2024h, 2024aa)*

*Based on the results from Geosyntec Consultants, Inc. (2021) and Chang Consultants (2024) (Dudek 2025i), CEC staff concludes that Oso Creek would erode laterally into the project site during the life of the project. CEC staff concludes that setbacks are insufficient mitigation because setbacks would not alter the ongoing lateral erosion. As described in* ***SDR GEO-5, SDR GEO-6,*** *and* ***SDR WATER-1*** *(below), CEC staff are also concerned the level spreader would load stormwater onto the setback area and into Oso Creek's western streambank, which would likely destabilize the Oso Creek's western streambank and exacerbate soil erosion.*

*LGC Geotechnical, Inc. (2024) does not recommend infiltrating stormwater runoff into the subsurface because that activity would likely decrease slope stability and exacerbate soil erosion. (Dudek 2024aa)*

**Response to SDR GEO-4.** See response to SDR GEO-2 and GEO-5.

***SDR GEO-5.*** *CEC staff requests the applicant explain how they propose to mitigate soil erosion's direct and indirect impacts on the proposed project.*

*A feature labeled "Swale-1" and described as a small erosional feature in the updated aquatic resources delineation, was identified in the southeast portion of the project site (Dudek 2024yyy). This feature is also defined as a small linear topographical depression shown on the geotechnical map (Sheet 1 of 4) included in the geotechnical report prepared by LCG Geotechnical Inc., (2024) and is subparallel with the top of the Oso Creek's western embankment (Dudek 2024cc).*

*During a site visit on July 16, 2025, CEC staff observed that the Swale-1 structure was irregular in both in surface expression and depth (approximately 1 to 2.5 feet). There was no evidence of sedimentation or running water (CEC 2025s). Since the linear feature runs roughly parallel to Oso Creek's western embankment, is irregular, and shows no evidence of running water, CEC staff are concerned this might indicate a developing stream embankment slump that has occurred at several nearby upstream locations. If this is a developing slump, there are implications that the level spreader proposed to disperse stormwater would further exacerbate the stability of the Oso Creek's western embankment.*

**Response to SDR GEO-5.** As discussed in the applicant's letter to the CEC on July 11, 2025 (TN: 264698), the accelerated erosion on the western slope of Oso Creek over the prior 12 months has led the applicant to conclude that the previously recommended setbacks were insufficient. As such, the proposed project has been revised to include the repair and rehabilitation of approximately 2,600 linear feet of degraded, erosive portion of Oso Creek which lies adjacent to the eastern boundary of the BESS facility site. The creek currently exhibits high instability due to higher storm flow volumes, durations and velocities, unmanaged vegetation, and highly erodible soils. Recent installation of rip-rap and other infrastructure on the eastern slope to reinforce the railroad tracks may have contributed to accelerated erosion on the opposing slopes. Stabilizing and rehabilitating the creek is therefore a critical component of the Project necessary to prevent future bank failure, reduce channel migration, enhance native vegetation, and improve water quality. Please refer to Attachment C (Plans for the Rehabilitation of Oso Creek - 30% Submittal) and Attachment D (Preliminary Hydraulic Report for Oso Creek Stabilization). A preliminary plant palette is provided in Attachment E.

The restoration design includes a series of instream stabilization structures composed of natural rock and native vegetation. Key features will include low-head drop/stabilization structures, including rock weirs and ramps, followed by pools or stilling basins. The rock features will be spaced approximately every 300 to 400 feet between flatter channel sections and the bottom width of the creek channel will be 80 feet to reduce flow velocities to less than erosive. The western bank will be graded at a 3:1 side slope to a height of 10 feet. The slope will then be graded at a 2:1 slope until it meets the existing top of bank elevation. Native vegetation will be planted along the 2:1 side slopes. The design also entails elevating the eroded Oso Creek channel to allow reestablishment of a hyporheic zone in the creek channel bed. Collectively, these channel rehabilitation measures will stabilize the creek, protect the adjacent BESS facility, and provide long-term habitat and water quality benefits.

The proposed rehabilitated creek channel has been designed to comply with the ecological requirements of the U.S. Army Corps of Engineers Nationwide Permit 27 (Aquatic Habitat Restoration, Enhancement, and Establishment) including, using only native plant species, designing restoration to resemble a natural reference habitat, and ensuring net ecological benefits with no conversions between habitat types.

In addition, the project's stormwater design has been updated and is discussed in more detail in SDR GEO-5 below.

Compass Energy Storage LLC has updated the Opt-In Application project description (See Attachment F) to include these project elements. Other affected analyses in the application are in the process of being updated to incorporate the creek stabilization component and updated stormwater design.

***SDR GEO-6.*** *CEC staff requests the applicant evaluate the Swale-1 feature and the possible impacts from stormwater from the proposed level spreader structure.*

*Based on closer scrutiny of the project design drawings (Dudek 2024pp) and the stormwater management plan (Dudek 2024ddd), as well as the various geotechnical reports (Dudek 2024aa, 2024bb, 2024cc, 2025i, 2025l, 2025m, 2025n, 2025o, 2025p, 2025q, 2025r, 2025s, 2025t, and 2025u), it appears that the proposed solution to disperse offsite stormwater runoff could exacerbate the condition of slumping along the Oso Creek's western streambank.*

*As shown on the design drawings and described in the stormwater management plan, offsite stormwater runoff from two of the modeled drainage areas east of the project facility (West [17.01 acres] and South 27.70 acres]) would be captured by a drainage ditch along the west side of the facility and be diverted to a level spreader along the southeast corner of the project facility. The level spreader would discharge stormwater onto the bench above the west bank of Oso Creek (Dudek 2024pp, 2024ddd).*

*Modeling associated with the stormwater management plan indicates that outflow from the level spreader would have a volume of approximately 10.6 acre-feet (AF) flowing at a rate of 98.6 cubic feet per second (CFS) during a 25-year rain event, and a volume of 14.3 AF flowing at a rate of 134 CFS during a 100-year rain event (Dudek 2024ddd). The introduction of stormwater discharge in an area where slump block head scarps would be expected to form, could aggravate the condition of slumping along the west streambank of Oso Creek as described in various geotechnical reports (Dudek 2024aa, 2025i, 2025l, 2025m, 2025n, 2025o, 2025p, 2025q, 2025r, 2025s, 2025t, and 2025u)*

**Response to SDR GEO-6.** The updated proposed stormwater design is to reroute stormwater runoff from the offsite area through a series of drainage ditches, culverts and storm drain facilities as depicted in the updated Grading Plan (See Attachment G). The offsite flows are split into two areas, northerly and southerly. The northerly offsite flows will be collected at a low point on the west side of the proposed access road, just north of the proposed BESS yard. The northerly runoff will be routed into box culverts to cross under the proposed access road. The northerly runoff will then be routed through a storm drain system northeasterly to outfall within the existing rip rap just south of the existing concrete channel. The northerly runoff will exit the storm drain system through a proposed headwall above the channel limits. The runoff velocity will be decreased by proposed rip rap immediately below the proposed headwall that extends to the bottom of the channel. The southerly offsite flows will be collected in a drainage ditch along the westerly and southerly portions of the proposed BESS yard. The southerly runoff will enter a series of culverts to bypass the two proposed access roads that exit the southerly portion of the yard. The southerly runoff will then be routed into a storm drain system and directed southeasterly to an outfall above the stabilized channel limits. The runoff velocity will be decreased by internal energy dissipaters and be integrated into the proposed creek restoration rip rap immediately below the proposed headwall that extends to the bottom of the channel. This design will reduce erosion from the current site conditions as it will ensure that the flow will no longer discharge over the channel cliff and will also reduce the tributary area by the 12.2-acre site area. Compass

Energy Storage LLC has updated the Opt-In Application project description, and other affected analyses are in the process of being updated to incorporate the creek stabilization component and updated stormwater design.

***SDR WATER-1.*** *CEC staff requests that the applicant explain how the level spreader could be modified to mitigate stormwater discharge that could impact Oso Creek streambank slumping, or develop an alternative to disperse offsite stormwater runoff.*

**Response to SDR WATER -1.** The level spreader is no longer part of the project design and has been replaced with the drainage features discussed above. Please refer to SDR GEO-6 above.

# Attachment A

2025 Southwestern Pond Turtle Habitat Assessment and Survey Results

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T 949.450.2525

# MEMORANDUM

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| **To:** | Renee Robin, Compass Energy Storage LLC |
| **From:** | Max D. Murray, Biologist, Dudek |
| **Subject:** | Compass BESS Project – 2025 Southwestern Pond Turtle Habitat Assessment and Survey Results |
| **Date:** | September 19, 2025 |
| **cc:** | Tommy Molioo, Senior Biologist, Dudek |
| | Erin Phillips, Project Manager, Dudek |
| **Attachments:** | Figures 1 and 2 |
| | A – Species Compendium |
| | B – Photo Log |

This memorandum documents the methods and results of a habitat assessment and visual encounter survey for the southwestern pond turtle (*Actinemys pallida*) in support of the Compass Battery Energy Storage System Project (project).

## 1 Site Description

The project is located on the grounds of the Saddleback Church in San Juan Capistrano, within a valley between the Santa Ana Mountains to the northeast and the Laguna Woods to the west, at an elevation of approximately 185 to 210 feet above mean sea level (Figure 1, Project Location). The project site contains existing development associated with the church grounds, including agricultural land and a pollinator garden, and undeveloped lands including non-native grassland and upland coastal sage scrub. The eastern boundary of the project is bordered by Oso Creek, which supports mature riparian woodland and flowing water. Vegetation communities and land covers on the project include Fremont cottonwood (*Populus fremontii)*–arroyo willow *(Salix lasiolepis)* riparian woodland, mulefat thickets, ornamental vegetation, upland mustards, urban/developed, and agricultural lands. Habitat for southwestern pond turtle occurs throughout the landscape within the project boundary.

## 2 Species Account

Southwestern pond turtle is a California Species of Special Concern and is proposed threatened under the Federal Endangered Species Act. Southwestern pond turtles are habitat generalists and can be found in a variety of intermittent and permanent water features from Central California to northwestern Baja California (Hansen and Shedd 2025). This species is an opportunistic omnivore that has been documented feeding on various plants, invertebrates, fishes, amphibians and carrion (Bury 1986, Hansen and Shedd 2025, Lovich 1999). Southwestern pond turtles can be active year-round especially in mild coastal areas with reproduction occurring from April to October (Hansen and Shedd 2025). Southwestern pond turtles have been observed utilizing upland habitat several

hundred meters away from surface water for nesting and aestivation (Semlitsch and Bodie 2003). Hatchlings are small and likely overwinter in the nests to emerge in the following spring (Hansen and Shedd 2025).

# 3 Methods

Prior to the beginning of the habitat assessment and visual encounter survey, a literature review was conducted to identify observations of southwestern pond turtle in the vicinity of the project using the California Natural History Data Base (CDFW 2025). Recent and historic observations of southwestern pond turtle are common throughout southern Orange County with several observations being recorded within the Oso Creek (CDFW 2025). The southwestern pond turtle habitat assessment and visual encounter survey was conducted using methods described in the United States Geological Survey (2006) protocol. Two biologists scanned Oso Creek and the artificial pond with binoculars looking for swimming or basking pond turtles and recording the habitat quality within the project boundary.

# 3 Results

Aquatic and upland habitats that are required to support southwestern pond turtles were observed within the project boundary. Four southwestern pond turtles were observed basking in Oso Creek (Figure 2, Southwestern Pond Turtle Habitat Assessment and Visual Encounter Survey). Southwestern pond turtle observations were limited to the upper and middle sections of the natural bottom portion of Oso Creek within the project boundary. This was mainly due to very steeply eroded stream banks in the downstream portion of the creek with dense riparian vegetation making visual surveys impossible. Within the steep eroded stream channel there are some terraces that may provide upland habitat for southwestern pond turtles directly to the east and northeast of the nursery. Several pond sliders (*Trachemys scripta)* were observed in the upstream portion of Oso Creek and were observed in the artificial pond on the church property.

**Table 1. Survey Conditions**

| Date | Hours | Survey | Biologist | Conditions (temperature, cloud cover, wind speed) |
|---|---|---|---|---|
| 08/20/2025 | 0830–1130 | SWPT HA/VES | MDM, KN | 70°F–82°F, 0% cc, 0–3 mph |

**Notes:** MDM = Max D. Murray, KN= Kimberly Narel; °F = degrees Fahrenheit; cc = cloud cover, mph = miles per hour.

# 4 Conclusion

The results of the 2025 habitat assessment and visual encounter survey were positive for southwestern pond turtle. Four individual southwestern pond turtles of different size classes were observed within Oso Creek (Figure 2). Habitat to support all phases of southwestern pond turtle life cycle are present within the project boundary. It is likely that this portion of Oso Creek supports a population of southwestern pond turtle.

# 5 References

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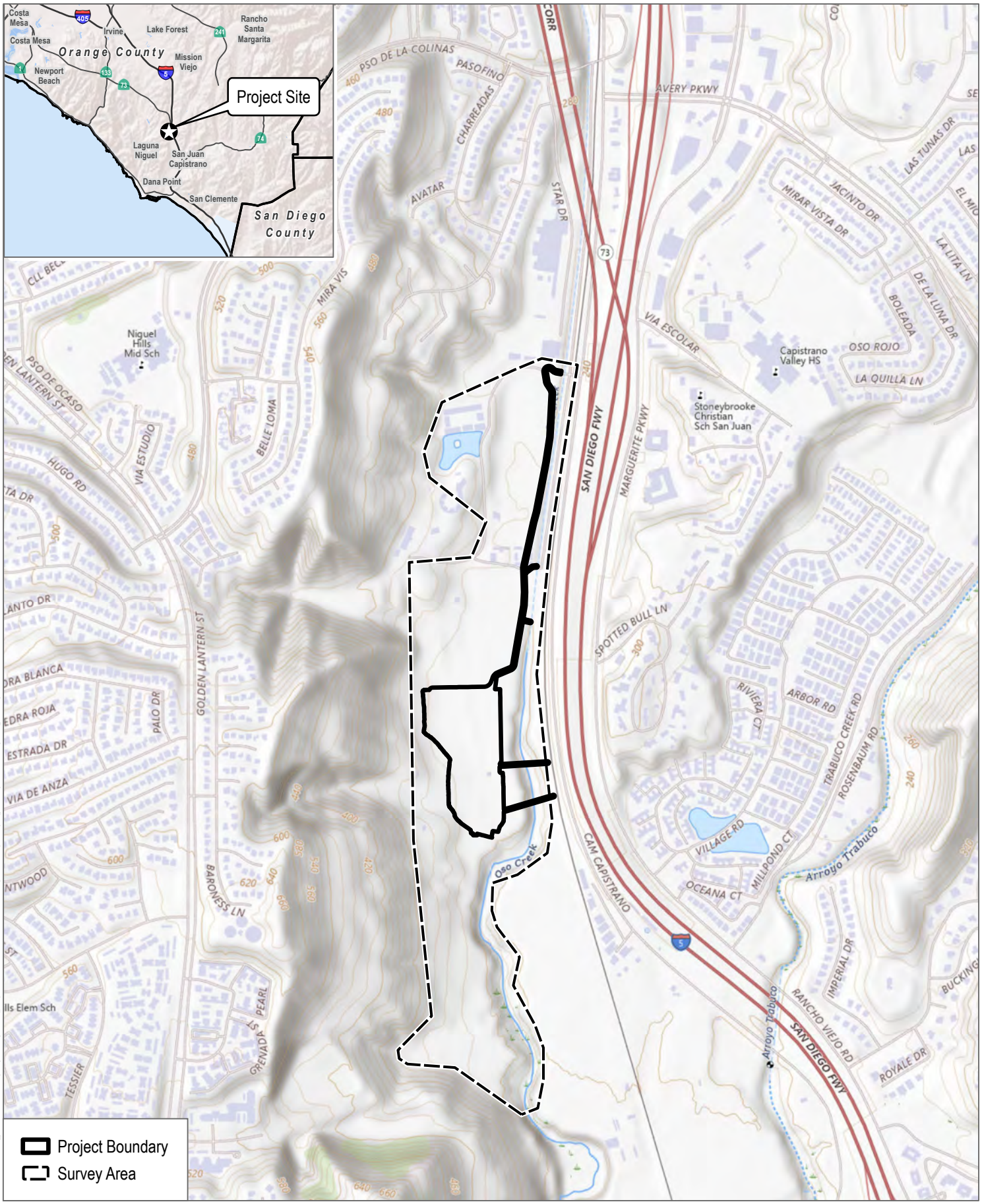



SOURCE: USGS National Map 2025

DUDEK

0 550 1,100 Feet

**FIGURE 1**

Project Location

Compass Energy Storage Project


SOURCE: USGS NHD 2024; Maxar 2023; Open Street Map 2019

DUDEK

0 250 500 Feet

**FIGURE 2**

Southwestern Pond Turtle Habitat Assessment and Visual Encounter Survey

Compass Energy Storage Project

# Attachment A

Species Compendium

# Wildlife Species–Vertebrates

## Birds

### Bushtits

#### AEGITHALIDAE—LONG-TAILED TITS AND BUSHTITS

*Psaltriparus minimus*—bushtit

### Finches

#### FRINGILLIDAE—FRINGILLINE AND CARDUELINE FINCHES AND ALLIES

*Haemorhous mexicanus*—house finch

*Spinus psaltria*—lesser goldfinch

### Flycatchers

#### TYRANNIDAE—TYRANT FLYCATCHERS

*Sayornis nigricans*—black phoebe

*Tyrannus vociferans*—Cassin's kingbird

### Hawks

#### ACCIPITRIDAE—HAWKS, KITES, EAGLES, AND ALLIES

*Buteo jamaicensis*—red-tailed hawk

### Hummingbirds

#### TROCHILIDAE—HUMMINGBIRDS

*Calypte anna*—Anna's hummingbird

*Selasphorus sasin*—Allen's hummingbird

### Jays, Magpies and Crows

#### CORVIDAE—CROWS AND JAYS

*Aphelocoma californica*—California scrub-jay

*Corvus brachyrhynchos*—American crow

### Mockingbirds and Thrashers

#### MIMIDAE—MOCKINGBIRDS AND THRASHERS

*Mimus polyglottos*—northern mockingbird

### Old World Sparrows

#### PASSERIDAE—OLD WORLD SPARROWS

* *Passer domesticus*—house sparrow

### Owls

#### STRIGIDAE—TYPICAL OWLS

*Bubo virginianus*—great horned owl

### Shorebirds

#### CHARADRIIDAE—LAPWINGS AND PLOVERS

*Charadrius vociferus*—killdeer

### Swallows

#### HIRUNDINIDAE—SWALLOWS

*Stelgidopteryx serripennis*—northern rough-winged swallow

### Wood Warblers and Allies

#### PARULIDAE—WOOD-WARBLERS

*Geothlypis trichas*—common yellowthroat

### New World Sparrows

#### PASSERELLIDAE—NEW WORLD SPARROWS

*Melospiza melodia*—song sparrow

*Melozone crissalis*—California towhee

*Pipilo maculatus*—spotted towhee

## Mammals

### Hares and Rabbits

#### LEPORIDAE—HARES AND RABBITS

*Sylvilagus audubonii*—desert cottontail

### Squirrels

#### SCIURIDAE—SQUIRRELS

*Otospermophilus beecheyi*—California ground squirrel

# Reptiles

## Snakes

### COLUBRIDAE—COLUBRID SNAKES

*Pituophis catenifer*—gophersnake

## Turtles

### EMYDIDAE—BOX AND WATER TURTLES

* *Trachemys scripta*—pond slider

*Actinemys pallida*—southwestern pond turtle

* signifies introduced (non-native) species

# Attachment B

Photo Log

**Photo 1.** Upstream boundary of habitat assessment of Oso Creek.

**Photo 2.** Ponded habitat in the downstream section of Oso Creek.

**Photo 3.** Ponded habitat in the downstream section of Oso Crek.

**Photo 4.** Basking sites in the middle section of Oso Creek.

**Photo 5.** Potential upland habitat in the middle section of Oso Creek.

**Photo 6.** Basking sites in the upstream portion of Oso Creek.

**Photo 7.** One southwestern pond turtle observed basking through binoculars.

**Photo 8.** One pond slider observed basking though binoculars.

# Attachment B

Response to Geotechnical Review Comments

October 7, 2025 Project No. 22011-02

Mr. Mike Prokes
***EPC Services Company***
10851 N. Canyon Highway, Suite 660
Phoenix, Arizona 85029

***Subject:*** ***Response to Geotechnical Review Comments, Compass Battery Energy Storage Development, San Juan Capistrano, California***

## ***Introduction***

In accordance with your request, LGC Geotechnical, Inc. has prepared this response to geotechnical review comments regarding the proposed Compass Battery Energy Storage Development to be located in San Juan Capistrano, California. The provided California Energy Commission (CEC) review comments (CEC, 2025) are based on our geotechnical report for the project (LGC Geotechnical, 2024).

This response-report should be considered as part of the project design documents in conjunction with our previous geotechnical report (LGC Geotechnical, 2024). In the case of conflict, the recommendations contained herein should supersede those provided in our previous report. The remaining recommendations provided in our previous geotechnical report (LGC Geotechnical, 2024) remain valid and applicable.

## ***Geotechnical Review Dated August 12, 2025***

For your convenience, the pertinent geotechnical review comments have been repeated below along with our responses. A copy of the review sheet is provided in Appendix B.

### ***Comment SDR GEO-1***

"CEC staff requests the applicant provide more information on the conclusion that 1-inch of total seismic settlement and 0.5 inches of differential seismic settlement are anticipated. For example, CEC staff requests the applicant provide an expanded discussion of the liquefaction analysis, including the assumptions, methods, results, and conclusions."

"CEC staff notes that Appendix D: Liquefaction in LGC Geotechnical, Inc. (2024) contains results from 19 cone penetration tests at the project site. LGC Geotechnical, Inc.'s (2024) recommended mitigation for liquefaction hazards includes removing at least 5 feet of sediment below grade and beyond the

foundation footprint, replacing that sediment with appropriate compacted fill, and constructing the project on a mat foundation."

***Response to Comment SDR GEO-1***

In general, liquefaction is a concern for loose to medium dense saturated sandy soils with low fines contents (i.e., silts and clays). The vast majority of the alluvial soils tested for the site are clayey, or cohesive and not considered to be susceptible to liquefaction.

The current standard of practice is to perform liquefaction analysis as outlined in "Recommended Procedures for Implementing of DMG Special Publication 117A, Guidelines for Analyzing and Mitigating Liquefaction in California" (SCEC, 1999 & CGS, 2008). Liquefaction analysis was performed using the program CLiq (GeoLogismiki, 2022) using the 1998 NCEER method of analysis (Youd, et al, 1998). Cone Penetration Test (CPT) soundings provide a near continuous log of the materials encountered during the sounding and are a very useful tool in characterizing the subsurface conditions and evaluating liquefaction. Liquefaction analysis is required to be performed for the Maximum Considered Earthquake (MCE) per Section 11.8.3 of ASCE 7-22 which is adopted by the 2022 CBC. The MCE represents the most severe earthquake an area is expected to experience, characterized by a 2 percent probability of exceedance in 50 years which corresponds to a 2,475-year return period. Liquefaction analysis was performed based on the required seismic criteria ($PGA_M$ equal to 0.56g) and corresponding earthquake magnitude of 6.7. Liquefaction analysis is required to be performed for the historic high groundwater level. Within the development area the estimated historic high groundwater is 5 feet below grade. While the vast majority of alluvial soils encountered are cohesive and not considered susceptible to liquefaction, the analysis indicates that site contains isolated typically relatively thin sandy layers that are susceptible to liquefaction. The estimated total settlement of 1-inch and differential settlement of ½ an inch over 50 feet due to liquefaction is in our opinion relatively minor.

***Comment SDR GEO-2***

"CEC staff requests the applicant further explain how the proposed mitigation would mitigate the potential direct and indirect impacts from liquefaction hazards to less than significant.

"According to the CGS Earthquake Zones of Required Investigation online mapping application, slopes adjacent to the project's western boundary are landslide zones (CDOC 2024). LGC Geotechnical, Inc. (2024) observed that the landslide complex that originates upslope of the project extends under the project site. LGC Geotechnical Inc. (2024) conducted a slope stability analysis and concluded the landslides to the west of the project site are stable. LGC Geotechnical, Inc.'s (2024) recommended mitigation for landslide hazards, including not cutting into the landslide complex, a setback from the landslide complex, and a program and guidelines for maintaining long-term slope stability (Dudek 2024aa). The investigation does not appear to evaluate if the landslide deposits that underlie the project site are stable."

***Response to Comment SDR GEO-2***

While we are not structural engineers, it has been our experience working on numerous projects in San Juan Capistrano and the southern California area that the estimated seismic total (1-inch) and

differential (1/2-inch over 50 feet) settlement is relatively minor and well within tolerable limits for proposed structures placed on a mat foundation. This differential settlement for the proposed structures is well within the requirements of ASCE 7-16 Table 12.13-3, "Differential Settlement Threshold" which has been adopted by the 2022 California Building Code (CBC). While not the governing agency, the City of Los Angeles allows up to 4 inches of total settlement and 2 inches of differential settlement for building placed on a mat foundation. In addition, existing soils will be removed a minimum depth of 5 feet below existing grade and replaced with compacted fill. Based on estimated seismic settlement, proposed earthwork removals and use of mat foundations, we consider potential direct and indirect impacts from liquefaction hazards to be less than significant.

The material underlying the relatively flat-lying, development area of the site has been depicted as landslide material underlying alluvial deposits and overlying older alluvial deposits (LGC Geotechnical, 2024). This is a simplified model of the materials encountered. The landslide materials encountered in this portion of the site consisted of landslide debris interfingered with alluvial deposits. This area of "landslide" material is not anticipated to include a basal rupture surface/slip plane. Therefore, it is not considered a slope stability concern for large block-type landslide failures that fail along a clay bed rupture surface. However, as discussed in our report (LGC Geotechnical, 2024); "Where exposed along the Oso Creek channel, some of the material was observed to have recently moved toward the stream bed as localized rotational failure, labeled as 'active.'" It is because of this concern for rotational failures of the western embankment of the Oso Creek Channel, as well as the potential for additional channel migration, that we recommended the development area of the site be setback from the western channel embankment (LGC Geotechnical, 2024). It should be noted that the setback recommendation is no longer considered applicable due to recent embankment landslides. Additional geotechnical evaluation (field evaluation, laboratory testing, analysis, etc.) is required. It should be further noted that it is our understanding that plans are being prepared for channel restoration of the adjacent portion of Oso Creek. Slope stability concerns for the western embankment will need to be evaluated and addressed as part of the channel restoration planning.

***Comment SDR GEO-3***

"CEC staff requests the applicant provide more information on the conclusion that the landslide complex is stable. For example, CEC staff requests the applicant provide an expanded discussion of LGC Geotechnical, Inc.'s 2024 slope stability analysis, including the assumptions, methods, results, and conclusions. CEC staff notes that Appendix E: Slope Stability Analysis in LGC Geotechnical, Inc. (2024) contains computational results for slope stability analyses on four geologic cross-sections. Also, CEC staff requests the applicant evaluate if the landslide deposits that underlie the project site are stable.

***Response to Comment SDR GEO-3***

The primary input parameters in slope stability analysis are the geological model as depicted on the geologic cross sections and the soil shear strength. The soil shear parameters are based on laboratory test results, published shear strength data (CGS, 2001) and engineering judgment. Laboratory testing of recent and previous field investigations as referenced in LGC Geotechnical, 2024 were evaluated. Laboratory testing for shear strength was primarily by direct shear and torsional ring shear. Direct shear and torsional ring shear are the primary laboratory tests for soil shear strength. For direct shear testing, driven undisturbed ring samples are obtained from the field evaluation. The samples are inundated with water and sheared at rate slow enough for drained conditions. Direct shear tests are

typically performed to a displacement of approximately 0.25 inch. Samples are typically run at three normal stresses and the corresponding shear strength values are obtained providing a composite friction angle and cohesion intercept. Torsional ring shear is used for landslide rupture clay surfaces and clay beds. A grab sample of the clay surface is obtained during the field investigation. The clay is placed in a torsional ring shear apparatus and various normal stress are performed until the residual strength envelope is obtained. The resulting value is a friction angle with a zero cohesion (intercept) value.

Slope stability analyses were performed based on the proposed design profile. The cross-sections were digitized and converted to a series of x and y coordinates to facilitate the analysis of the geologic cross section. Slope stability analysis was performed using the computer program GEOSTASE, version 4.30.31 (Gregory Geotechnical Software, 2019) for both static and pseudo-static (seismic) loading conditions. Potential rotational and block surfaces were analyzed using Bishop's Modified Method and Janbu's Simplified Method, respectively. These computational methods are the standard of practice for the southern California area and are referenced in Special Publication 117 (Blake, et al, 2002). Slope stability analysis indicates that the large landslide complex that underlies the western portion of the site and the ascending hillside to the west of the site is relatively stable with respect to the proposed development.

With respect to the western portion of the Oso Creek (eastern portion of the site) it is our understanding that plans are being prepared for channel restoration. Channel restoration should include mitigation of the slope stability concerns as discussed in response to above Comment SDR GEO-2.

Regarding landslide deposits that underlie the project site refer to our discussion provided in response to SDR GEO-2.

The section of our report entitled "Slope Maintenance Guidelines" (LGC Geotechnical, 2024) is meant to apply to onsite, slopes graded as part of proposed site development. The intent is to reduce the potential for surficial slope failures, slumps, excessive erosion, localized saturated zones, nuisance type water issues, etc. for the newly constructed slopes. It is not our intent to suggest that it is the responsibility of the developer of the subject site to maintain offsite slopes.

***Comment SDR GEO-4***

"CEC staff requests the applicant expand their explanation of how they propose to mitigate the potential direct and indirect impacts from landslide hazards to less than significant."

"CEC staff reviewed Geosyntec Consultants, Inc.'s (2021) geomorphic investigation of Oso Creek (2021) and Chang Consultants' sediment transport analysis of Oso Creek (2024). Both studies identify westward soil erosion on Oso Creek through vertical scour, lateral erosion, and bank collapse as a threat to the project site. (Dudek 2025i)."

"Geosyntec Consultants, Inc. (2021) calculated that, between 2014 and 2021, Oso Creek eroded laterally into its western bank, toward the proposed project site, at an average rate of 3 feet per year. Lateral erosion is episodic and varies longitudinally along the stream channel. At over 50 percent of measurement locations within Geosyntec Consultants, Inc.'s 2021s study reach, the maximum annual

lateral migration rate was less than or equal to 10 feet per year. At less than 5 percent of measurement locations, the maximum annual migration rate was 80 feet per year."

"Geosyntec Consultants, Inc. (2021) and Chang Consultants (2024) concluded that lateral erosion varies longitudinally along the stream channel. Chang Consultants concluded that most erosion occurs during high streamflow events, such as 5-year, 10-year, 25-year, and 100-year floods. (Dudek 2025i)."

"Geosyntec Consultants, Inc. (2021) proposed a retaining wall solution to protect the project site from soil erosion. Chang Consultants (2024) proposed setbacks to protect the project site from soil erosion (Dudek 2025i). LGS Geotechnical (2024) also proposed setbacks to protect the project site from soil erosion (Dudek 2024aa)."

"Application Section 4.4: Geologic Hazards and Resources stated that adherence to the recommendations provided in LGC Geotechnical (2024) would reduce potential impacts related to geologic hazards to less than significant during construction and operation. (Dudek 2024h, 2024aa)."

"Based on the results from Geosyntec Consultants, Inc. (2021) and Chang Consultants (2024) (Dudek 2025i), CEC staff concludes that Oso Creek would erode laterally into the project site during the life of the project. CEC staff concludes that setbacks are insufficient mitigation because setbacks would not alter the ongoing lateral erosion. As described in **SDR GEO-5, SDR GEO-6,** and **SDR WATER-1** (below), CEC staff are also concerned the level spreader would load stormwater onto the setback area and into Oso Creek's western streambank, which would likely destabilize the Oso Creek's western streambank and exacerbate soil erosion."

"LGC Geotechnical, Inc. (2024) does not recommend infiltrating stormwater runoff into the subsurface because that activity would likely decrease slope stability and exacerbate soil erosion. (Dudek 2024aa)

***Response to Comment SDR GEO-4***

See response to SDR GEO-2 & GEO-5.

***Comment SDR GEO-5***

"CEC staff requests the applicant explain how they propose to mitigate soil erosion's direct and indirect impacts on the proposed project."

"A feature labeled "Swale-1" and described as a small erosional feature in the updated aquatic resources delineation, was identified in the southeast portion of the project site (Dudek 2024yyy). This feature is also defined as a small linear topographical depression shown on the geotechnical map (Sheet 1 of 4) included in the geotechnical report prepared by LCG Geotechnical Inc., (2024) and is subparallel with the top of the Oso Creek's western embankment (Dudek 2024cc)."

"During a site visit on July 16, 2025, CEC staff observed that the Swale-1 structure was irregular in both in surface expression and depth (approximately 1 to 2.5 feet). There was no evidence of sedimentation or running water (CEC 2025s). Since the linear feature runs roughly parallel to Oso Creek's western embankment, is irregular, and shows no evidence of running water, CEC staff are concerned this might indicate a developing stream embankment slump that has occurred at several

nearby upstream locations. If this is a developing slump, there are implications that the level spreader proposed to disperse stormwater would further exacerbate the stability of the Oso Creek's western embankment."

***Response to Comment SDR GEO-5***

We understand that storm water management for the project is being revised by the project civil engineer. We further understand that the project will now include channel restoration of Oso Creek and stabilization of the western embankment of the creek.

***Comment SDR GEO-6***

"CEC staff requests the applicant evaluate the Swale-1 feature and the possible impacts from stormwater from the proposed level spreader structure."

"Based on closer scrutiny of the project design drawings (Dudek 2024pp) and the stormwater management plan (Dudek 2024ddd), as well as the various geotechnical reports (Dudek 2024aa, 2024bb, 2024cc, 2025i, 2025l, 2025m, 2025n, 2025o, 2025p, 2025q, 2025r, 2025s, 2025t, and 2025u), it appears that the proposed solution to disperse offsite stormwater runoff could exacerbate the condition of slumping along the Oso Creek's western streambank."

"As shown on the design drawings and described in the stormwater management plan, offsite stormwater runoff from two of the modeled drainage areas east of the project facility (West [17.01 acres] and South 27.70 acres]) would be captured by a drainage ditch along the west side of the facility and be diverted to a level spreader along the southeast corner of the project facility. The level spreader would discharge stormwater onto the bench above the west bank of Oso Creek (Dudek 2024pp, 2024ddd)."

"Modeling associated with the stormwater management plan indicates that outflow from the level spreader would have a volume of approximately 10.6 acre-feet (AF) flowing at a rate of 98.6 cubic feet per second (CFS) during a 25-year rain event, and a volume of 14.3 AF flowing at a rate of 134 CFS during a 100-year rain event (Dudek 2024ddd). The introduction of stormwater discharge in an area where slump block head scarps would be expected to form, could aggravate the condition of slumping along the west streambank of Oso Creek as described in various geotechnical reports (Dudek 2024aa, 2025i, 2025l, 2025m, 2025n, 2025o, 2025p, 2025q, 2025r, 2025s, 2025t, and 2025u)."

***Response to Comment SDR GEO-6***

We understand that storm water management for the project is being revised by the project civil engineer. We further understand that the project will now include channel restoration of Oso Creek and stabilization of the western embankment of the creek.

***Comment SDR WATER-1***

"CEC staff requests that the applicant explain how the level spreader could be modified to mitigate stormwater discharge that could impact Oso Creek streambank slumping, or develop an alternative to disperse offsite stormwater runoff."

***Response to Comment SDR WATER-1***

Response is the purview of the project civil engineer.

Should you have any questions regarding this report, please do not hesitate to contact this office.

Sincerely,

***LGC Geotechnical, Inc.***



Brad Zellmer, GE 2618
Director of Engineering

Kevin B. Colson, CEG 2210
Principal Geologist

KBC/BTZ/amm

Attachments: Appendix A – References
Appendix B – California Energy Commission Review Sheet dated August 12, 2025

Distribution: (1) Addressee (electronic copy)

# *Appendix A*
# *References*

## ***APPENDIX A***

## ***References***


American Society of Civil Engineers (ASCE), 2017, Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7-16, 2017.

_____, 2018, Standard 7-16, Minimum Design Loads for Buildings and Associated Criteria for Buildings and Other Structures, Supplement 1, effective: December 12, 2018.

Blake, T.F., Hollingsworth, R.A., and Stewart, J.P., 2002, Recommended Procedures for Implementation of DMG Special Publication 117-Guidelines for Analyzing and Mitigating Landslide Hazards in California: Committee organized through ASCE, Los Angeles Section Geotechnical Group, Document published by the Southern California Earthquake Center.

California Building Standards Commission, 2022, California Building Code (CBC), California Code of Regulations Title 24, Volumes 1 and 2, dated July 2022.

California Department of Conservation, California Geological Survey (CGS), California Geological Society Special Publication 117A: Guidelines for Evaluating and Mitigating Seismic Hazards in California.

California Energy Commission (CEC), 2025, Post Scoping Set 2 Data Requests for Compass Energy Storage Project (24-OPT-02), TN# 265548, dated August 12, 2025.

GeoLogismiki, 2022, CLiq program, V3.4.1.4

LGC Geotechnical, 2024**,** Geotechnical Evaluation Report, Compass Battery Energy Storage System, San Juan Capistrano, California, Project No. 22011-02, dated April 4, 2024.

California Department of Conservation, California Geological Survey (CGS), (Previously California Division of Mines and Geology [CDMG]), 2001, Seismic Hazard Evaluation of the San Juan Capistrano 7.5-Minute Quadrangle, Orange County, California, Open File Report 053, dated 2001.

_____, 2008, California Geological Society Special Publication 117A: Guidelines for Evaluating and Mitigating Seismic Hazards in California.

Southern California Earthquake Center (SCEC), 1999, "Recommended Procedure for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigation Liquefaction Hazards in California", Edited by Martin, G.R., and Lew, M., dated March 1999.

Youd, T.L., Idriss, I.M., Andrus, R.D., Arango, I., Castro, G., Christian, J.T., Dobry, R., Finn, W.D.L., Harder, L.F., Hynes, M.E., Ishihara, K., Koester, J.P., Liao, S., Marcuson III, W.F., Martin, G.R., Mitchell, J.K., Moriwaki, Y., Power, M.S., Roberston, P.K., Seed, R., and Stokoe, K.H., Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshop on Evaluation of Liquefaction Resistance of Soils, ASCE, Journal of Geotechnical and Geoenvironmental Engineering, Vol. 127, October, pp 817-833.

# *Appendix B*
# *California Energy Commission Review Sheet dated August 12, 2025*

| DOCKETED | |
|---|---|
| **Docket Number:** | 24-OPT-02 |
| **Project Title:** | Compass Energy Storage Project |
| **TN #:** | 265548 |
| **Document Title:** | Post Scoping Data Requests Set 2 |
| **Description:** | Post Scoping Set 2 Data Requests for Compass Energy Storage Project (24-OPT-02) |
| **Filer:** | Yiming Luo |
| **Organization:** | California Energy Commission |
| **Submitter Role:** | Commission Staff |
| **Submission Date:** | 8/12/2025 1:05:31 PM |
| **Docketed Date:** | 8/12/2025 |

August 12, 2025

Renée L. Robin, J.D.
Director, Permitting & Planning
Engie North America LLC
1360 Post Oak Blvd Ste 400
Houston, Texas 77056

**Post Scoping Set 2 Data Requests for Compass Energy Storage Project (24-OPT-02)**

Dear Renée L. Robin, J.D.,

Pursuant to Public Resources Code section 25545.4(d) and California Code of Regulations, title 20, section 1878(a), the California Energy Commission staff is asking for the information specified in the enclosed data requests, which is necessary for a complete staff analysis of biological resources, geologic hazards, and water resources for the Compass Energy Storage Project under the California Environmental Quality Act (CEQA). These biological resources data requests are in response to the comment letter from California Department of Fish and Wildlife (CDFW) on the Notice of Preparation of a Draft Environmental Impact Report for the Compass Energy Storage Project, SCH No. 2025050184; Orange County, CA (TN 263799).

The geologic hazards and water resources data requests are based on CEC staff analysis and in response to comments received during the Informational and Environmental Scoping Meeting (TN 264429) and written comments from the Orange County Transportation Authority, Notice of Preparation of a Draft Environmental Impact Report – Compass Energy Storage Project – Docket Number 24-OPT-02 (TN 263660). These geological hazards requests are in addition to the historic geotechnical studies identified at the informational meeting, requested by staff, and filed by the applicant into the project docket on July 2, 2025.

Pursuant to Public Resources Code section 25545.4, responses to the data requests shall be submitted within 30 days. If you are unable to provide the information requested or believe that additional time will be needed to provide a response, please send written notice to me within 10 days of receipt of this letter.

If you have any questions, please email the CEQA project manager, at renee.longman@energy.ca.gov.

Sincerely,

Drew Bohan
Executive Director

Enclosure:

Supplemental NOP Data Requests Set 2

# Supplemental NOP Data Requests Set 2 - All Topics

## BIOLOGICAL RESOURCES

CEC staff reviewed the comment letter on the Notice of Preparation of a Draft Environmental Impact Report for the Compass Energy Storage Project provided by the California Department of Fish and Wildlife (CDFW) (CDFW 2025a). The CDFW comment letter indicates that up-to-date visual surveys should be conducted for southwestern pond turtles *(Actinemys pallida*), a California Species of Special Concern and a candidate for listing under the federal Endangered Species Act.

During a site visit conducted on May 21, 2024 with the applicant, the applicant's biologists, CDFW, and CEC staff, turtles were observed within the creek adjacent to the site. While the turtles appeared to be pond turtle, CEC and CDFW staff seeks to confirm if these are the southwestern pond turtles or a non-native species. Although work is not proposed to be conducted in the creek itself, this species is routinely found in upland areas for aestivation and nesting and therefore could be impacted during construction of the project.

> **SDR BIO-3.** CEC staff requests that the applicant complete visual surveys following the Western Pond Turtle Visual Survey Protocol for the Southcoast Ecoregion (USGS 2006) to confirm presence/absence of southwestern pond turtles. The surveys should be conducted as soon as possible to ensure this species is accurately addressed in the Staff Assessment. Please provide a survey report that meets the standards of the visual survey guidance.

## GEOLOGIC HAZARDS and WATER RESOURCES

CEC staff has identified potentially significant geologic hazards associated with liquefaction, landslides, and soil erosion. Staff has also identified potential geologic hazards associated with expansive soils and compressible soils. Oral comments submitted during the Informational and Environmental Scoping Meeting, and written comments from the Orange County Transportation Authority confirmed these concerns. Two studies that the applicant performed of Oso Creek, which were docketed on June 27, 2025, and a site visit that CEC staff conducted on July 16, 2025 (CEC 2025s) also confirmed these concerns. In the supplementary data requests below, CEC staff requests additional information related to mitigation of geologic hazards.

Section 4.4: Geologic Hazards and Resources of the project application stated that potential direct and indirect impacts associated with geologic hazards would be mitigated to less than significant (Dudek 2024h). Specifically, the application (Dudek 2024h) stated that project construction and operation would mitigate geologic hazards through grading, construction, and design recommendations in the applicant's geotechnical investigation, LGC Geotechnical, Inc. (2024). CEC staff reviewed the Geotechnical Evaluation Report prepared by LGC Geotechnical, Inc. for the project site

(2024) which is included in application Appendix 4.4, Dudek (2024aa, 2024bb, and 2024cc).

CEC staff reviewed Geosyntec Consultants, Inc.'s geomorphologic analysis of Oso Creek (2021) and Chang Consultants sedimentary transport analysis of Oso Creek (2024) completed for the proposed project. Note, both studies are compiled in Dudek (2025i) and referenced by LGC Geotechnical, Inc. (2024) (Dudek 2024aa).

In addition, CEC staff reviewed the following prior geotechnical investigations that were either conducted at the site by the applicant for the proposed project or for earlier projects. Terracon Consultants, Inc. (2021) completed a geotechnical investigation for the applicant. Terracon Consultants, Inc. (2021) is compiled in Dudek (2025i).

Leighton and Associates, Inc. (2009) completed a geotechnical investigation for an earlier project at the same site. Leighton and Associates, Inc. (2009) included results from subsurface investigations conducted by Lowney and Associates in 2001 for an earlier project. Leighton and Associates, Inc. (2009) is compiled in Dudek (2025m, 2025n, 2025o, 2025p, 2025q, 2025r, 2025s, 2025t, and 2025u).

NMG Geotechnical (2001) completed a geotechnical investigation for an earlier project and is compiled in Dudek (2025l).

According to the CGS Earthquake Zones of Required Investigation online mapping application, the project is in a liquefaction zone (CDOC 2024). LGC Geotechnical, Inc.'s geotechnical investigation (2024) sampled and evaluated subsurface soils and sediments for liquefaction potential. The study observed shallow groundwater, about 5 feet below the ground surface. The investigation concluded that alluvial soils at the project site are cohesive and not considered susceptible to liquefaction. The investigation also concluded that relatively thin sandy layers up to 50 feet below the ground surface are susceptible to liquefaction. The investigation calculated there is potential for 1-inch of total seismic settlement and 0.5 inches of differential seismic settlement at the project site. The investigation does not appear to state if the landslide deposits that underlie the project site are cohesive or susceptible to liquefaction.

**SDR GEO-1.** CEC staff requests the applicant provide more information on the conclusion that 1-inch of total seismic settlement and 0.5 inches of differential seismic settlement are anticipated. For example, CEC staff requests the applicant provide an expanded discussion of the liquefaction analysis, including the assumptions, methods, results, and conclusions.

CEC staff notes that Appendix D: Liquefaction in LGC Geotechnical, Inc. (2024) contains results from 19 cone penetration tests at the project site. LGC Geotechnical, Inc.'s (2024) recommended mitigation for liquefaction hazards includes removing at least 5 feet of sediment below grade and beyond the

foundation footprint, replacing that sediment with appropriate compacted fill, and constructing the project on a mat foundation.

**SDR GEO-2.** CEC staff requests the applicant further explain how the proposed mitigation would mitigate the potential direct and indirect impacts from liquefaction hazards to less than significant.

According to the CGS Earthquake Zones of Required Investigation online mapping application, slopes adjacent to the project's western boundary are landslide zones (CDOC 2024). LGC Geotechnical, Inc. (2024) observed that the landslide complex that originates upslope of the project extends under the project site. LGC Geothechnical Inc. (2024) conducted a slope stability analysis and concluded the landslides to the west of the project site are stable. LGC Geotechnical, Inc.'s (2024) recommended mitigation for landslide hazards, including not cutting into the landslide complex, a setback from the landslide complex, and a program and guidelines for maintaining long-term slope stability (Dudek 2024aa). The investigation does not appear to evaluate if the landslide deposits that underlie the project site are stable.

**SDR GEO-3.** CEC staff requests the applicant provide more information on the conclusion that the landslide complex is stable. For example, CEC staff requests the applicant provide an expanded discussion of LGC Geotechnical, Inc.'s 2024 slope stability analysis, including the assumptions, methods, results, and conclusions. CEC staff notes that Appendix E: Slope Stability Analysis in LGC Geotechnical, Inc. (2024) contains computational results for slope stability analyses on four geologic cross-sections. Also, CEC staff requests the applicant evaluate if the landslide deposits that underlie the project site are stable.

**SDR GEO-4.** CEC staff requests the applicant expand their explanation of how they propose to mitigate the potential direct and indirect impacts from landslide hazards to less than significant.

CEC staff reviewed Geosyntec Consultants, Inc.'s (2021) geomorphic investigation of Oso Creek (2021) and Chang Consultants' sediment transport analysis of Oso Creek (2024). Both studies identify westward soil erosion on Oso Creek through vertical scour, lateral erosion, and bank collapse as a threat to the project site. (Dudek 2025i)

Geosyntec Consultants, Inc. (2021) calculated that, between 2014 and 2021, Oso Creek eroded laterally into its western bank, toward the proposed project site, at an average rate of 3 feet per year. Lateral erosion is episodic and varies longitudinally along the stream channel. At over 50 percent of measurement locations within Geosyntec Consultants, Inc.'s 2021s study reach, the maximum annual lateral migration rate was less than or equal to 10 feet per year. At less than 5 percent of measurement locations, the maximum annual migration rate was 80 feet per year.

Geosyntec Consultants, Inc. (2021) and Chang Consultants (2024) concluded that lateral erosion varies longitudinally along the stream channel. Chang Consultants concluded that most erosion occurs during high streamflow events, such as 5-year, 10-year, 25-year, and 100-year floods. (Dudek 2025i)

Geosyntec Consultants, Inc. (2021) proposed a retaining wall solution to protect the project site from soil erosion. Chang Consultants (2024) proposed setbacks to protect the project site from soil erosion (Dudek 2025i). LGS Geotechnical (2024) also proposed setbacks to protect the project site from soil erosion (Dudek 2024aa).

Application Section 4.4: Geologic Hazards and Resources stated that adherence to the recommendations provided in LGC Geotechnical (2024) would reduce potential impacts related to geologic hazards to less than significant during construction and operation. (Dudek 2024h, 2024aa)

Based on the results from Geosyntec Consultants, Inc. (2021) and Chang Consultants (2024) (Dudek 2025i), CEC staff concludes that Oso Creek would erode laterally into the project site during the life of the project. CEC staff concludes that setbacks are insufficient mitigation because setbacks would not alter the ongoing lateral erosion. As described in **SDR GEO-5, SDR GEO-6,** and **SDR WATER-1** (below), CEC staff are also concerned the level spreader would load stormwater onto the setback area and into Oso Creek's western streambank, which would likely destabilize the Oso Creek's western streambank and exacerbate soil erosion.

LGC Geotechnical, Inc. (2024) does not recommend infiltrating stormwater runoff into the subsurface because that activity would likely decrease slope stability and exacerbate soil erosion. (Dudek 2024aa)

**SDR GEO-5.** CEC staff requests the applicant explain how they propose to mitigate soil erosion's direct and indirect impacts on the proposed project.

A feature labeled "Swale-1" and described as a small erosional feature in the updated aquatic resources delineation, was identified in the southeast portion of the project site (Dudek 2024yyy). This feature is also defined as a small linear topographical depression shown on the geotechnical map (Sheet 1 of 4) included in the geotechnical report prepared by LCG Geotechnical Inc., (2024) and is subparallel with the top of the Oso Creek's western embankment (Dudek 2024cc).

During a site visit on July 16, 2025, CEC staff observed that the Swale-1 structure was irregular in both in surface expression and depth (approximately 1 to 2.5 feet). There was no evidence of sedimentation or running water (CEC 2025s). Since the linear feature runs roughly parallel to Oso Creek's western embankment, is irregular, and shows no evidence of running water, CEC staff are concerned this might indicate a developing stream embankment slump that has occurred at several nearby upstream locations. If this is a developing slump, there are implications that

the level spreader proposed to disperse stormwater would further exacerbate the stability of the Oso Creek's western embankment.

**SDR GEO-6.** CEC staff requests the applicant evaluate the Swale-1 feature and the possible impacts from stormwater from the proposed level spreader structure.

Based on closer scrutiny of the project design drawings (Dudek 2024pp) and the stormwater management plan (Dudek 2024ddd), as well as the various geotechnical reports (Dudek 2024aa, 2024bb, 2024cc, 2025i, 2025l, 2025m, 2025n, 2025o, 2025p, 2025q, 2025r, 2025s, 2025t, and 2025u), it appears that the proposed solution to disperse offsite stormwater runoff could exacerbate the condition of slumping along the Oso Creek's western streambank.

As shown on the design drawings and described in the stormwater management plan, offsite stormwater runoff from two of the modeled drainage areas east of the project facility (West [17.01 acres] and South 27.70 acres]) would be captured by a drainage ditch along the west side of the facility and be diverted to a level spreader along the southeast corner of the project facility. The level spreader would discharge stormwater onto the bench above the west bank of Oso Creek (Dudek 2024pp, 2024ddd).

Modeling associated with the stormwater management plan indicates that outflow from the level spreader would have a volume of approximately 10.6 acre-feet (AF) flowing at a rate of 98.6 cubic feet per second (CFS) during a 25-year rain event, and a volume of 14.3 AF flowing at a rate of 134 CFS during a 100-year rain event (Dudek 2024ddd). The introduction of stormwater discharge in an area where slump block head scarps would be expected to form, could aggravate the condition of slumping along the west streambank of Oso Creek as described in various geotechnical reports (Dudek 2024aa, 2025i, 2025l, 2025m, 2025n, 2025o, 2025p, 2025q, 2025r, 2025s, 2025t, and 2025u)

**SDR WATER-1.** CEC staff requests that the applicant explain how the level spreader could be modified to mitigate stormwater discharge that could impact Oso Creek streambank slumping, or develop an alternative to disperse offsite stormwater runoff.

## REFERENCES

CDFW 2025a – California Department of Fish and Wildlife (TN 263799). CDFW's Comments for the Notice of Preparation of a Draft Environmental Impact Report for the Compass Energy Storage Project. Docketed June 3, 2025. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

CEC 2025s – California Energy Commission (TN 265490). Staff Site Visit Report. Docketed August 8, 2025. Accessed online at https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2024h – Dudek (TN 255535-8). Section 4-4_Geological Hazards And Resources. Docketed April 5, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2024aa – Dudek (TN 255561-6). Appendix 4-4A_Geotechnical Evaluation Report Part 1. Docketed April 8, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2024bb – Dudek (TN 255561-7). Appendix 4-4A_Geotechnical Evaluation Report Part 2. Docketed April 8, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2024cc – Dudek (TN 255561-8). Appendix 4-4A_Geotechnical Evaluation Report Part 3. Docketed April 8, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2024pp – Dudek (TN 255577-3). Appendix 2A_Project Design Layout And Elevations. Docketed April 8, 2024. Available online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2024ddd – Dudek (TN 255584). Appendix 4-15A_Stormwater Management Plan Part 1. Docketed April 8, 2024. Available online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2024yyy – Dudek (TN 259938). Data Request Response 3_Attachment 1_Updated Aquatic Resources Delineation Report. Docketed November 6, 2024. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2025i – Dudek (TN 264480). Geotechnical Evaluation Report (TN #255561-6) References Part 3. Docketed June 27, 2025. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2025l – Dudek (TN 264492). Geotechnical Evaluation Report (TN #255561-6) References Part 1. Docketed June 27, 2025. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2025m – Dudek (TN 264550). Geotechnical Evaluation Report (TN #255561-6) References Part 2_1 of 9. Docketed July 2, 2025. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2025n – Dudek (TN 264551). Geotechnical Evaluation Report (TN #255561-6) References Part 2_6 of 9. Docketed July 2, 2025. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2025o – Dudek (TN 264552). Geotechnical Evaluation Report (TN #255561-6) References Part 2_5 of 9. Docketed July 2, 2025. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2025p – Dudek (TN 264553). Geotechnical Evaluation Report (TN #255561-6) References Part 2_4 of 9. Docketed July 2, 2025. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2025q – Dudek (TN 264554). Geotechnical Evaluation Report (TN #255561-6) References Part 2_3 of 9. Docketed July 2, 2025. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2025r – Dudek (TN 264555). Geotechnical Evaluation Report (TN #255561-6) References Part 2_2 of 9. Docketed July 2, 2025. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2025s – Dudek (TN 264556). Geotechnical Evaluation Report (TN #255561-6) References Part 2_9 of 9. Docketed July 2, 2025. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2025t – Dudek (TN 264557). Geotechnical Evaluation Report (TN #255561-6) References Part 2_8 of 9. Docketed July 2, 2025. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

Dudek 2025u – Dudek (TN 264558). Geotechnical Evaluation Report (TN #255561-6) References Part 2_7 of 9. Docketed July 2, 2025. Accessed online at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=24-OPT-02

# Attachment C

Plans for the Rehabilitation of Oso Creek – 30% Submittal

# County of Orange

PublicWorks

SANTA ANA, CALIFORNIA

KEVIN ONUMA, P.E., DIRECTOR

## PLANS FOR REHABILITATION OF

# OSO CREEK

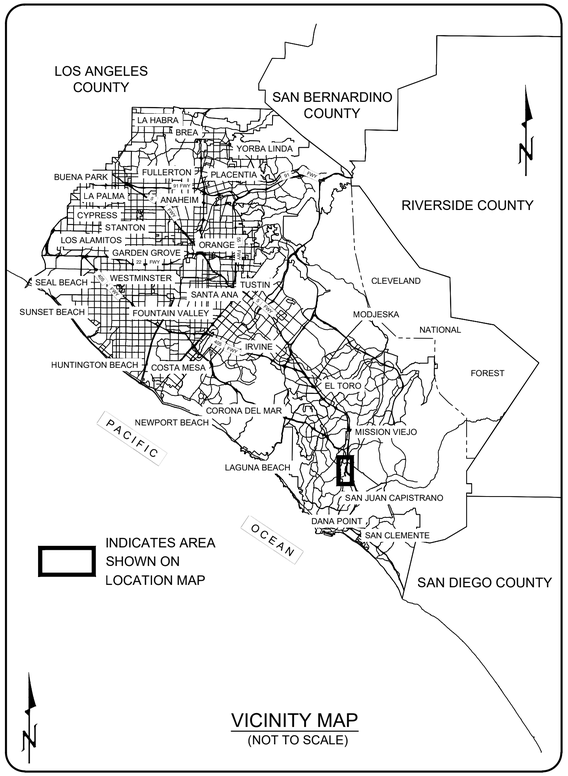
## OCFCD FACILITY No. #

FROM: DOWNSTREAM LIMIT
STA. 20+00±

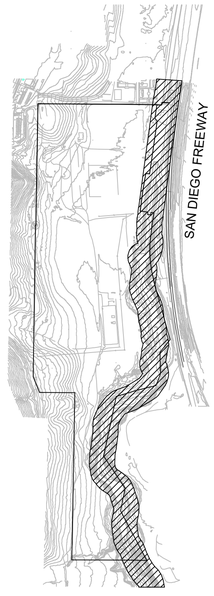
TO: UPSTREAM LIMIT
STA. 44+45±

30% SUBMITTAL

OCTOBER 2025




VICINITY MAP
(NOT TO SCALE)




LOCATION MAP
(NOT TO SCALE)

PROJECT LIMIT

FUNDED BY:
MAINTAINED BY:
POST-PROJECT OWNERSHIP:

### DEVIATIONS

NAME OF APPLICABLE MANUAL:
ENTER STANDARD NUMBER:
- DEVIATION DESCRIPTION. REFERENCE DESIGN MEMORANDUM IF APPLICABLE

APPROVED: _____ DATE
EDWARD FRONDOSO, P.E., T.E.
CHIEF ENGINEER
ORANGE COUNTY FLOOD CONTROL DISTRICT

### RECORD DRAWING

CONTRACTOR: _____
RESIDENT ENGINEER: _____
INSPECTOR(S): _____
CONSTRUCTION START DATE: _____
CONSTRUCTION COMPLETION DATE: _____

### MAINTENANCE ACCEPTANCE

APPROVED: _____ DATE
HUGO PINEDA, P.E.
DEPUTY DIRECTOR
OC OPERATIONS & MAINTENANCE

### COUNTY OF ORANGE PUBLIC WORKS DEPARTMENT

RECOMMENDED: _____ DATE
FIONA MAN, P.E.
DEPUTY DIRECTOR
OC CONSTRUCTION

APPROVED: _____ DATE
EDWARD FRONDOSO, P.E.
CHIEF ENGINEER
ORANGE COUNTY FLOOD CONTROL DISTRICT

### PREPARED BY

PREPARED UNDER RESPONSIBLE CHARGE OF:

REGISTERED PROFESSIONAL ENGINEER
TORY R. WALKER
No. 45005
Exp. 3-31-2028
CIVIL
STATE OF CALIFORNIA

TORY R. WALKER, P.E. DATE

### CITY APPROVAL

_____ DATE
EXECUTIVE DIRECTOR
PUBLIC WORKS AGENCY

_____ DATE
CITY ENGINEER
PUBLIC WORKS AGENCY

### INDEX OF SHEETS

| SHEET | DESCRIPTION |
|---|---|
| 01 | TITLE SHEET |
| 02 | GENERAL CONSTRUCTION NOTES |
| 03-05 | PLAN & PROFILE |
| 06 | TYPICAL SECTIONS |
| XX | LANDSCAPE PLANS |

### UTILITIES

| UTILITY OWNER | CONTACT | PHONE NO. |
|---|---|---|
| PURVEYOR NAME | CONTACT NAME | (XXX) XXX-XXXX |
| PURVEYOR NAME | CONTACT NAME | (XXX) XXX-XXXX |
| PURVEYOR NAME | CONTACT NAME | (XXX) XXX-XXXX |
| PURVEYOR NAME | CONTACT NAME | (XXX) XXX-XXXX |
| PURVEYOR NAME | CONTACT NAME | (XXX) XXX-XXXX |
| PURVEYOR NAME | CONTACT NAME | (XXX) XXX-XXXX |

### SURVEY NOTE

OBTAIN FROM SURVEYOR

APN 637-082-70 (PORTION), APN 637-082-71 (PORTION)

BOUNDARY ADJUSTED PER INS. NO. 1995-0434581, REC. 10/4/95, O.R.

### VERTICAL DATUM

DID NOT SEE ANY VERT DATUM NOTES ON ALTA - PLEASE GET FROM SURVEYOR

### HORIZONTAL DATUM

OBTAIN FROM SURVEYOR

BASIS OF BEARINGS - NAD 83(2011), STATE PLANE COORDINATES CA ZONE 6, PER NGS MONUMENTS 7 8 21 AND TRABUCO.

| NO. | DESCRIPTION | SHT. | APPROVED | DATE |
|---|---|---|---|---|
| | | | | |

REVISIONS

W. O. NO. EE12345
DWG. NO. XX12345

SHEET 01 OF 06

ORANGE COUNTY CHANNEL REHAB - 20+00± TO 44+45±

\\Server\projects\Projects\2025\251763_ENG\ACAD\SHEETS\251763-01_Title Sheet.dwg

## ROADWAY GENERAL NOTES

1. THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY OR SUBSTRUCTURE SHOWN ON THESE PLANS WAS OBTAINED BY A SEARCH OF AVAILABLE RECORDS. NO CERTIFICATION IS MADE AS TO THE ACCURACY OR THOROUGHNESS OF THESE RECORDS. APPROVAL OF THIS PLAN BY THE COUNTY DOES NOT CONSTITUTE A REPRESENTATION AS TO THE ACCURACY OR THE COMPLETENESS OF THE LOCATION OF THE EXISTENCE OR NONEXISTENCE OF ANY UNDERGROUND UTILITY OR SUBSTRUCTURE WITHIN THE LIMITS OF THE PROJECT.

2. ANY UTILITY WORK WITHIN COUNTY OF ORANGE RIGHT-OF-WAY SHALL CONFORM TO COUNTY OF ORANGE STANDARDS.

3. CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITION DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT TO BE LIMITED TO NORMAL WORKING HOURS.

4. PURSUANT TO THE BUSINESS AND PROFESSIONS CODE/ LAND SURVEYORS ACT SECTION 8771 OF THE STATE OF CALIFORNIA, ALL SURVEY MONUMENTS DESTROYED BY CONSTRUCTION SHALL BE PERPETUATED BY A CALIFORNIA LICENSED LAND SURVEYOR IN ACCORDANCE THE METHODOLOGY AND DOCUMENTATION REQUIREMENTS OF THE LOCAL CITY, AND COUNTY JURISDICTIONS. IN THE EVENT THAT OCPW/OC SURVEY IS NOT COMMISSIONED TO PERFORM CONSTRUCTION SUPPORT SERVICES FOR THIS PROJECT THEN THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ASSOCIATED COST WITH THIS MONUMENT PERPETUATION.

5. THE CONTRACTOR SHALL USE PROPER SAFETY SIGNING AND BARRICADING AS REQUIRED PER THE LATEST EDITION OF CA MUTCD.

6. THE FIRST COAT OF STRIPING AND PAVEMENT MARKING SHALL BE APPLIED THE SAME DAY FOLLOWING THE PLACEMENT OF THE ASPHALT CONCRETE. THE SECOND COAT SHALL BE APPLIED NO SOONER THAN (7) SEVEN CALENDAR DAYS OR LATER THAN (14) FOURTEEN CALENDAR DAYS AFTER THE FIRST COAT. REFLECTIVE FLEXIBLE ROAD TABS CAN BE PLACED THE SAME DAY AFTER PLACEMENT OF THE ASPHALT CONCRETE.

7. ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITION STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, THE LATEST EDITION STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION, THE LATEST VERSION OF THE ORANGE COUNTY OCPW STANDARD PLANS AND IN ACCORDANCE WITH THESE PLANS AND SPECIFICATIONS, ALL TO THE SATISFACTION OF THE ENGINEER OF RECORD.

8. WORK SHOWN OR INDICATED ON THESE PLANS, OR CALLED FOR IN THE SPECIFICATIONS, BUT NOT INCLUDED AS PAY QUANTITY ITEMS, SHALL BE CONSIDERED INCIDENTAL WORK, THE COST OF WHICH SHALL BE INCLUDED IN THE CONTRACTOR'S BID FOR PAY QUANTITY ITEMS.

9. ESTIMATE OF QUANTITIES IN THE BID SCHEDULE IS APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING QUANTITIES AND CONDITIONS AT THE SITE.

10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO EXISTING UTILITIES, PAVEMENT, CURBS, TRAFFIC STRIPING AND MARKING, TRAFFIC SIGNAL EQUIPMENT (INCLUDING DETECTOR LOOPS), STRUCTURES, TREES, LANDSCAPING, AND IRRIGATION SYSTEMS, AS A RESULT OF CONTRACTOR'S OPERATIONS AND WILL BE REQUIRED TO REPAIR, REMODEL OR REPLACE SAME TO THE SATISFACTION OF, AND AS DIRECTED BY, THE ENGINEER OR UTILITY COMPANY.

11. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND NOTIFY ALL UTILITY COMPANIES A MINIMUM OF 5 WORKING DAYS PRIOR TO THE START OF CONSTRUCTION. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE ALL THE PHASES OF CONSTRUCTION WITH THE VARIOUS UTILITY COMPANIES INVOLVED, UNLESS OTHERWISE NOTED.

12. THE WORK SITE AND EXTERIOR STREETS SHALL BE MAINTAINED IN A NEAT, CLEAN, HAZARD FREE, ORDERLY STATE, THROUGHOUT THE CONSTRUCTION PERIOD. CONTRACTOR SHALL SWEEP THE ENTIRE LENGTH OF AFFECTED STREETS WITH A VACUUM/BRUSH TYPE SWEEPER PRIOR TO LEAVING THE AREA FOR THE DAY. THE CONTRACTOR SHALL IMMEDIATELY HAUL AWAY AND DISPOSE OF, OFF THE PROJECT SITE, ALL EXCESS EXCAVATED MATERIAL AND CONSTRUCTION DEBRIS. ALL DISPOSALS SHALL BE AT THE CONTRACTOR'S EXPENSE.

13. CONTRACTOR SHALL NOTIFY THE FIRE AND POLICE DEPARTMENTS 48 HOURS PRIOR TO THE START OF CONSTRUCTION.

14. THE CONTRACTOR SHALL HAVE COPIES OF THE PLANS AND SPECIFICATIONS FOR THIS PROJECT ON THE SITE AT ALL TIMES, AND SHALL BE FAMILIAR WITH ALL APPLICABLE STANDARDS AND SPECIFICATIONS.

15. THE CONTRACTOR SHALL CONDUCT CONSTRUCTION OPERATIONS IN SUCH A MANNER THAT STORM OR OTHER WATERS MAY PROCEED UNINTERRUPTED ALONG THE STREET OR DRAINAGE COURSES. ALL STORM DRAIN INLETS IN THE PROJECT AREA SHALL BE PROTECTED USING GRAVEL BAGS AND FILTER FABRIC PER THE COUNTY INSPECTOR.

16. LOCATION OF REMOVALS AND WIDTHS OF REMOVALS INDICATE SCOPE OF WORK AND ARE APPROXIMATE ONLY. ACTUAL REMOVALS SHALL BE COORDINATED WITH THE ENGINEER IN THE FIELD.

17. ALL EXISTING IMPROVEMENTS INCLUDING CURB AND GUTTERS, SIDEWALKS, ASPHALT CONCRETE OR PCC PAVING WHICH ARE BEING JOINED, OR MATCHED IN CONNECTION WITH THE PROJECT, SHALL BE JOINED, OR MATCHED IN A MANNER SATISFACTORY TO THE ENGINEER, INCLUDING NECESSARY SAWCUTTING, REMOVAL, OR CAPPING. THE CONTRACTOR SHALL FOLLOW THE COUNTY'S STANDARD ENCROACHMENT CONDITIONS.

18. ALL UTILITY RELATED WORK SHALL BE CONSTRUCTED PER COUNTY OF ORANGE STANDARDS, OR LOCAL UTILITY AGENCY STANDARDS.

19. CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS AND SHALL REPORT ALL DISCREPANCIES TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK. REVISIONS SHALL NOT BE MADE TO THESE PLANS WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.

20. AT NO TIME IS ANY BUSINESS OR RESIDENCE TO BE WITHOUT ACCESS UNLESS OTHERWISE APPROVED BY THE ENGINEER.

21. THE CONTRACTOR SHALL NOTIFY THE COUNTY INSPECTOR AT LEAST 48 HOURS PRIOR TO ANY CONSTRUCTION.

22. THE CONTRACTOR SHALL NOTIFY AND COORDINATE WITH RESIDENTS PRIOR TO ANY ACCESS CLOSURES.

## STORMWATER POLLUTION PREVENTION NOTES

1. SEDIMENT FROM AREAS DISTURBED BY CONSTRUCTION SHALL BE RETAINED ON SITE USING STRUCTURAL CONTROLS TO THE MAXIMUM EXTENT PRACTICABLE.

2. STOCKPILES OF SOIL SHALL BE PROPERLY CONTAINED TO ELIMINATE OR REDUCE SEDIMENT TRANSPORT FROM THE SITE TO THE STREETS, DRAINAGE FACILITIES OR ADJACENT PROPERTIES VIA RUNOFF, VEHICLE TRACKING, OR WIND.

3. APPROPRIATE BMPS FOR CONSTRUCTION-RELATED MATERIALS, WASTES, SPILLS OR RESIDUES SHALL BE IMPLEMENTED TO MINIMIZE TRANSPORT FROM THE SITE TO STREETS, DRAINAGE FACILITIES, OR ADJOINING PROPERTIES BY WIND OR RUNOFF.

4. RUNOFF FROM EQUIPMENT AND VEHICLE WASHING SHALL BE CONTAINED AT CONSTRUCTION SITES UNLESS TREATED TO REDUCE OR REMOVE SEDIMENT AND OTHER POLLUTANTS.

5. ALL CONSTRUCTION CONTRACTOR AND SUBCONTRACTOR PERSONNEL ARE TO BE MADE AWARE OF THE REQUIRED BEST MANAGEMENT PRACTICES, GOOD HOUSEKEEPING MEASURES FOR THE PROJECT SITE, AND ANY ASSOCIATED CONSTRUCTION STAGING AREAS.

6. AT THE END OF EACH DAY OF CONSTRUCTION ACTIVITY ALL CONSTRUCTION DEBRIS NAND WASTE MATERIALS SHALL BE COLLECTED AND PROPERLY DISPOSED OF IN TRASH OR RECYCLE BINS.

7. CONSTRUCTION SITES SHALL BE MAINTAINED IN SUCH A CONDITION THAT A STORM DOES NOT CARRY WASTES OR POLLUTANTS OFF THE SITE. DISCHARGES OTHER THAN STORMWATER (NON-STORMWATER DISCHARGES) ARE PROHIBITED, EXCEPT AS AUTHORIZED BY AN INDIVIDUAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT OR THE STATEWIDE GENERAL CONSTRUCTION STORMWATER PERMIT. POTENTIAL POLLUTANTS INCLUDE BUT ARE NOT LIMITED TO: SOLID OR LIQUID CHEMICAL SPILLS; WASTES FROM PAINTS, STAINS, SEALANTS, SOLVENTS, DETERGENTS, GLUES, LIME, PESTICIDES, HERBICIDES, FERTILIZERS, WOOD PRESERVATIVES, AND ASBESTOS FIBERS, PAINT FLAKES OR STUCCO FRAGMENTS; FUELS, OILS, LUBRICANTS, AND HYDRAULIC, RADIATOR OR BATTERY FLUIDS; CONCRETE AND RELATED CUTTING OR CURING RESIDUES; FLOATABLE WASTES; WASTES FROM ENGINE/EQUIPMENT STEAM CLEANING OR CHEMICAL DEGREASING; WASTES FROM STREET CLEANING; AND SUPER-CHLORINATED POTABLE WATER FROM LINE FLUSHING AND TESTING. DURING CONSTRUCTION, DISPOSAL OF SUCH MATERIALS SHOULD OCCUR IN A SPECIFIED AND CONTROLLED TEMPORARY AREA ON-SITE PHYSICALLY SEPARATED FROM POTENTIAL STORMWATER RUNOFF, WITH ULTIMATE DISPOSAL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REQUIREMENTS.

8. DISCHARGING CONTAMINATED GROUNDWATER IS PROHIBITED. DISCHARGING OF NON-CONTAMINATED GROUNDWATER BY DEWATERING SHALL COMPLY WITH REQUIREMENTS OF APPLICABLE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMITS AS FOLLOWS: FOR PROJECTS WITHIN THE SANTA ANA REGION AND SAN DIEGO CREEK/NEWPORT BAY WATERSHED, PERMIT NO. CAG918002, ORDER R8-2019-0061 ISSUED BY THE SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD. FOR OTHER PROJECTS WITHIN THE SANTA ANA REGION, PERMIT NO. CAG998001, ORDER R8-2020-0006 ISSUED BY THE SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD. FOR PROJECTS WITHIN THE SAN DIEGO REGION, PERMIT NO. CAG919003, ORDER NO. R9-2015-0013 ISSUED BY THE SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD. THESE THREE PERMITS MAY BE UPDATED AT ANY TIME DURING THE TERM OF PROJECT. ANY INDICATION OR EVIDENCE OF WATER QUALITY THAT DOES NOT MEET REQUIRED STANDARDS WILL BE REPORTED TO OC PUBLIC WORKS/COUNTYWIDE COMPLIANCE PROGRAM AT (877) 89-SPILL.

## CAUTION NOTE TO CONTRACTOR

CONTRACTOR TO CONDUCT VARIOUS WORK OPERATIONS IN THE VICINITY OF SEVERAL BELOW AND ABOVE GROUND UTILITIES. CONTRACTOR IS TO FIELD VERIFY THE LOCATION OF ALL UTILITIES PRIOR TO ANY WORK OPERATIONS WITHIN THE PROJECT LIMITS WHICH MAY DISRUPT OR IMPACT ANY OF THE UTILITIES.

## ABBREVIATIONS

| | |
|---|---|
| AB | = AGGREGATE BASE |
| AC | = ASPHALT CONCRETE |
| AP | = ANGLE POINT |
| BC | = BEGIN CURVE |
| BCR | = BEGINNING OF CURB RETURN |
| BEG | = BEGINNING |
| BMP | = BEST MANAGEMENT PRACTICES |
| BNDY | = BOUNDARY |
| BOC | = BACK OF CURB |
| BTM | = BOTTOM |
| BW | = BACK OF WALK |
| C&G | = CURB & GUTTER |
| CB | = CATCH BASIN |
| CF | = CURB FACE |
| CLSM | = CONTROLLED LOW STRENGTH MATERIAL |
| COMM | = COMMUNICATIONS |
| CONC | = CONCRETE |
| CMB | = CRUSHED MISCELLANEOUS BASE |
| DRWY | = DRIVEWAY |
| EC | = END CURVE |
| ECB | = ELECTRIC CONTROL BOX |
| ECR | = END OF CURB RETURN |
| EG | = EXISTING GROUND |
| ELEC | = ELECTRIC |
| ELEV | = ELEVATION |
| EM | = ELECTRIC METER |
| EMH | = ELECTRIC MANHOLE |
| EP | = EDGE OF PAVEMENT |
| ESMT | = EASEMENT |
| EXIST | = EXISTING |
| FG | = FINISHED GRADE |
| FH | = FIRE HYDRANT |
| FL | = FLOW LINE |
| FG | = FINISHED GRADE |
| FS | = FINISHED SURFACE |
| GB | = GRADE BREAK |
| GV | = GAS VALVE |
| HP | = HINGE POINT |
| INV | = INVERT |
| LIP | = EDGE OF GUTTER PAN ELEVATION (GUTTER LIP) |
| LS | = LANDSCAPE |
| MAX | = MAXIMUM |
| MBGR | = METAL BEAM GUARD RAIL |
| MGS | = MIDWEST GUARDRAIL SYSTEM |
| MIN | = MINIMUM |
| N'LY | = NORTHERLY |
| OC | = ON CENTER |
| OCFCD | = ORANGE COUNTY FLOOD CONTROL DISTRICT |
| PB | = PULL BOX |
| PCC | = POINT OF COMPOUND CURVE /PORTLAND CEMENT CONCRETE |
| PPB | = PEDESTRIAN PUSH BUTTON |
| PP | = POWER POLE |
| PRC | = POINT OF REVERSE CURVE |
| PROP | = PROPOSED |
| PVC | = POINT OF VERTICAL CURVE |
| PVI | = POINT OF VERTICAL INFLECTION |
| PVMT | = PAVEMENT |
| RCP | = REINFORCED CONCRETE PIPE |
| ROE | = RIGHT OF ENTRY |
| R/W | = RIGHT OF WAY |
| SCE | = SOUTHERN CALIFORNIA EDISON |
| SCG | = SOUTHERN CALIFORNIA GAS |
| SD | = STORM DRAIN |
| SDMH | = STORM DRAIN MANHOLE |
| SHLD | = SHOULDER |
| SMH | = SEWER MANHOLE |
| SOF | = SOFFIT |
| SPPWC | = STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION |
| STA | = STATION |
| STD | = STANDARD |
| SWR | = SEWER |
| TC | = TOP OF CURB |
| TCB | = TOP OF CATCH BASIN |
| TG | = TOP OF GRATE |
| TOE | = TOE OF SLOPE |
| TPB | = TRAFFIC SIGNAL PULL BOX |
| TS | = TRAFFIC SIGNAL |
| TYP | = TYPICAL |
| UNK | = UNKNOWN |
| UV | = UTILITY VALVE |
| VAR | = VARIES |
| W'LY | = WESTERLY |
| WM | = WATER METER |
| WPJ | = WEAKENED PLANE JOINT |
| WV | = WATER VALVE |
| WVB | = WATER VALVE BOX |

## ROADWAY LEGEND

GRADING LIMITS

PROPOSED ROCK

COUNTY OF ORANGE CALIFORNIA

| MARK | DESCRIPTION | DATE | APPR. |
|---|---|---|---|
| | | | |

PREPARED UNDER THE RESPONSIBLE CHARGE OF:

REGISTERED PROFESSIONAL ENGINEER TORY R. WALKER No. 45005 Exp. 3-31-2026 CIVIL STATE OF CALIFORNIA

TORY R. WALKER, PE — DATE

| DESIGNED BY: | CHECKED BY: | | |
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| PR, MR | | PLOT DATE: ---- | |

County of Orange — PublicWorks

PREPARED BY: TORY R. WALKER ENGINEERING

ORANGE COUNTY CHANNEL REHAB

**NOTES**

SHEET REFERENCE NUMBER

02

SHEET 02 OF 06

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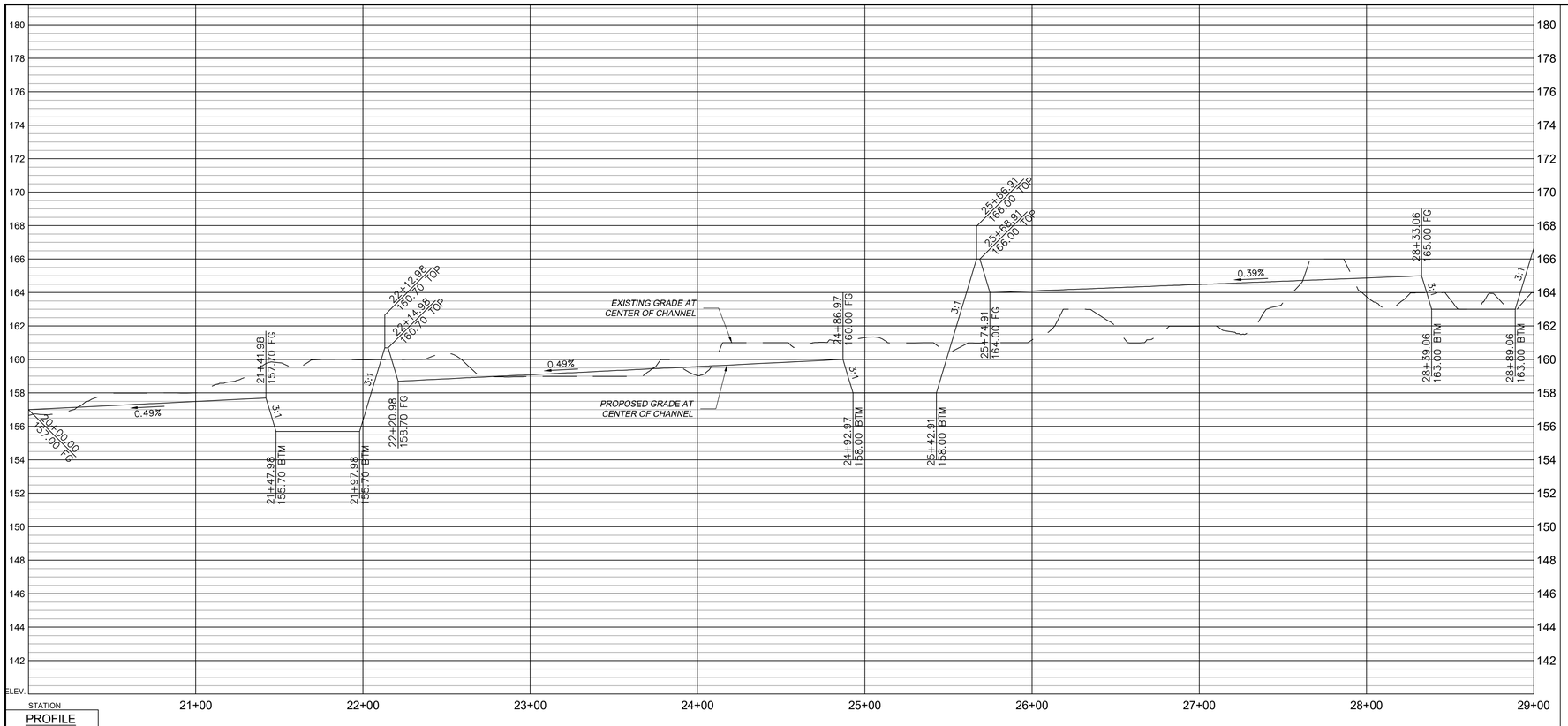


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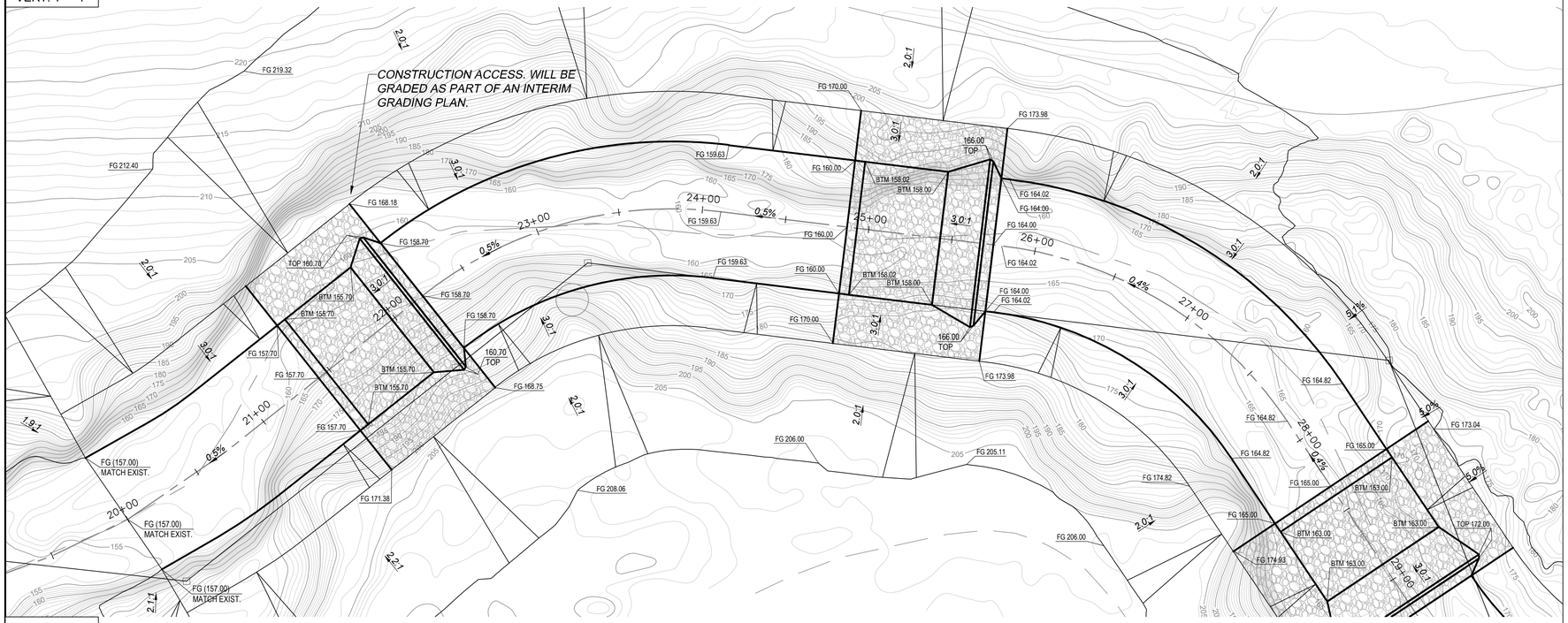
VERT. 1" = 4'




PLAN
1" = 40'

## LEGEND

——— GRADING LIMITS

PRELIMINARY EARTHWORK

CUT: 141,720 CY
FILL: 38,140 CY
NET: 103,580 CY (CUT)

## GENERAL NOTES

1. GRADED AREAS TO BE PLANTED WITH NATIVE VEGETATION. THIS WILL BE SHOWN IN MORE DETAIL WITH THE 60% DRAWINGS.

1 1/2 0 1 2
3 inches on original scale

COUNTY OF ORANGE CALIFORNIA

| MARK | DESCRIPTION | DATE | APPR. |
|---|---|---|---|
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REGISTERED PROFESSIONAL ENGINEER TORY R. WALKER No. 45005 Exp. 3-31-2026 CIVIL STATE OF CALIFORNIA
TORY R. WALKER, PE — DATE

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County of Orange PublicWorks
PREPARED BY: TORY R. WALKER ENGINEERING

ORANGE COUNTY CHANNEL REHAB
**GRADING PLAN**
20+00 - 29+00

SHEET REFERENCE NUMBER
03

SHEET 03 OF 06

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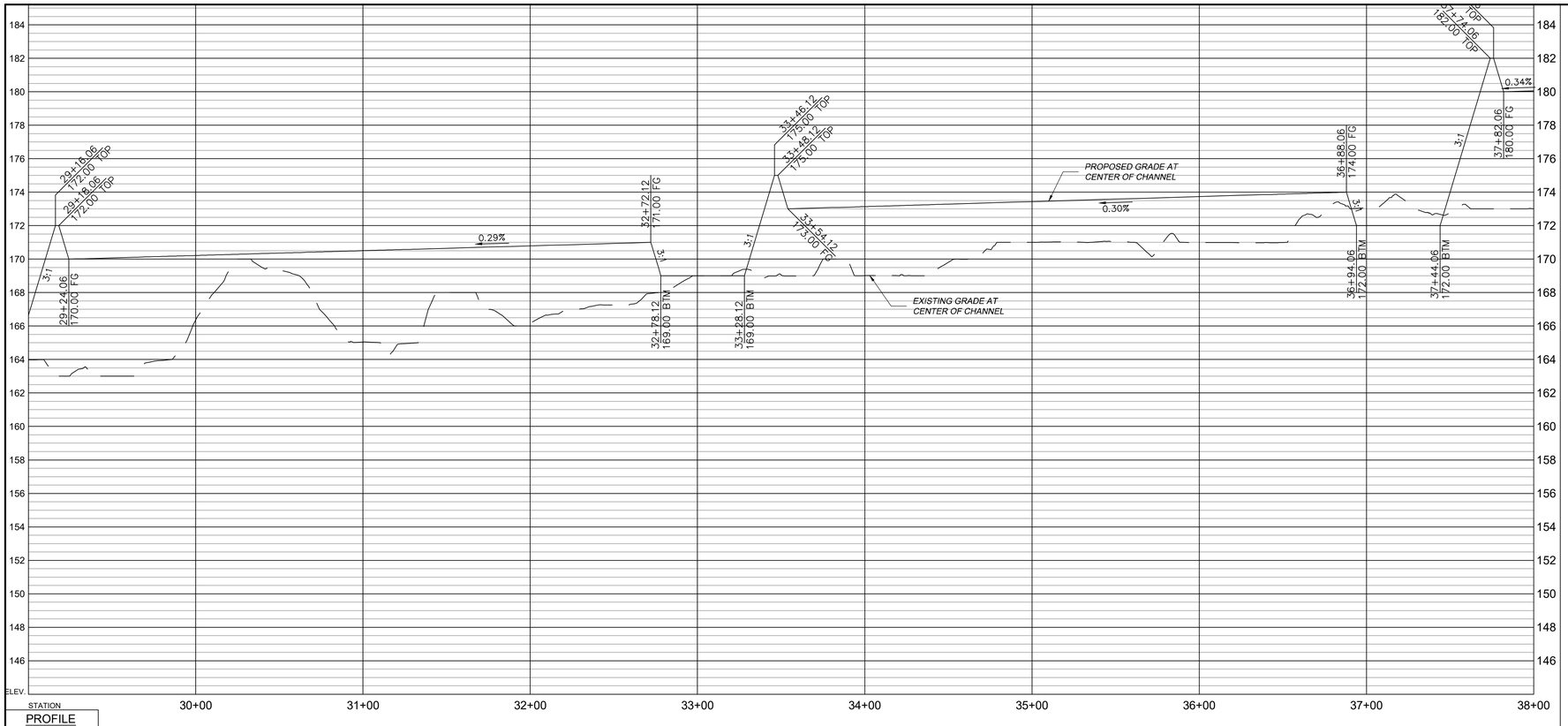


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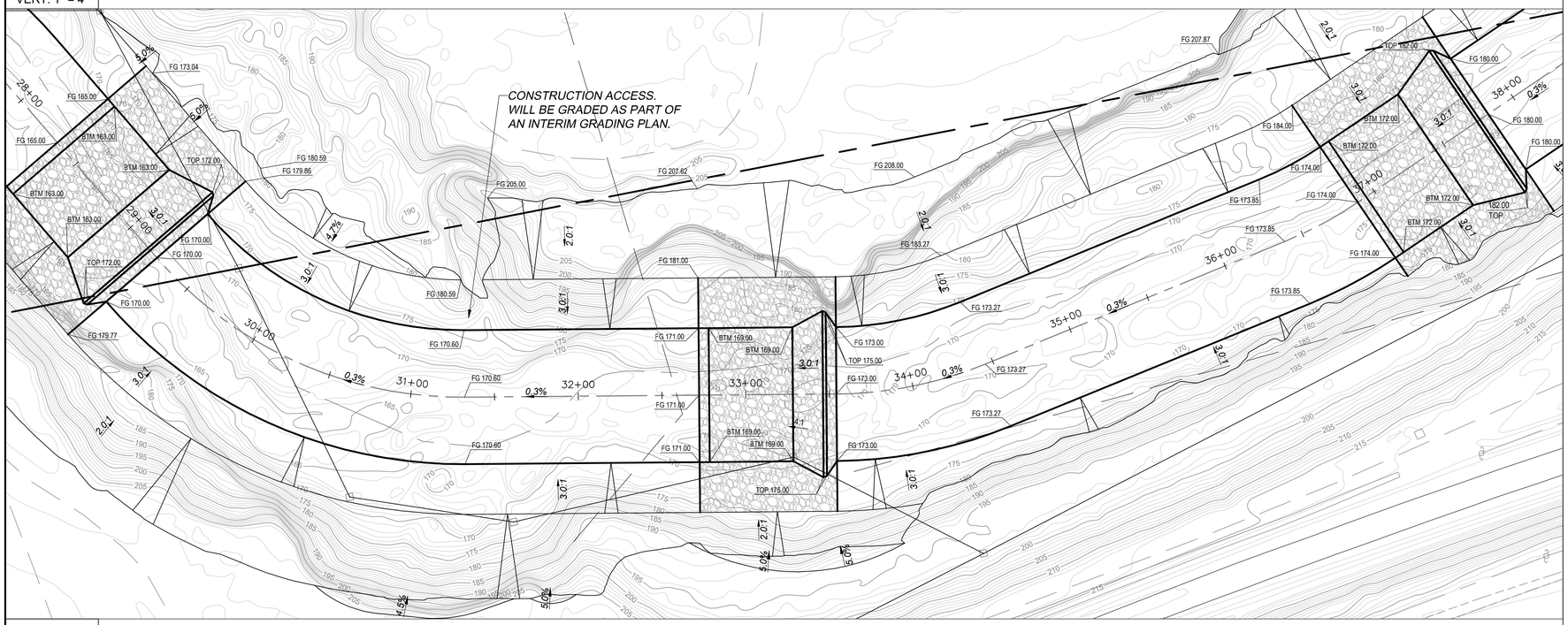
VERT. 1" = 4'




PLAN
1:40_XREF

## LEGEND

——— GRADING LIMITS

## GENERAL NOTES

1. GRADED AREAS TO BE PLANTED WITH NATIVE VEGETATION. THIS WILL BE SHOWN IN MORE DETAIL WITH THE 60% DRAWINGS.

1 1/2 0 1 2
3 inches on original scale

COUNTY OF ORANGE CALIFORNIA

| MARK | DESCRIPTION | DATE | APPR. |
|---|---|---|---|
| | | | |

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REGISTERED PROFESSIONAL ENGINEER TORY R. WALKER No. 45005 Exp. 3-31-2026 CIVIL STATE OF CALIFORNIA

TORY R. WALKER, PE — DATE

| | |
|---|---|
| DESIGNED BY: | TF |
| DRAWN BY: | PR, MR |
| CHECKED BY: | TF |
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| FILE NAME: | 251763-03-05 - P&P.dwg |
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| SCALE: | AS SHOWN |

County of Orange PublicWorks

PREPARED BY: TORY R. WALKER ENGINEERING

ORANGE COUNTY CHANNEL REHAB

**GRADING PLAN**

29+00 - 38+00

SHEET REFERENCE NUMBER

04

SHEET 04 OF 06

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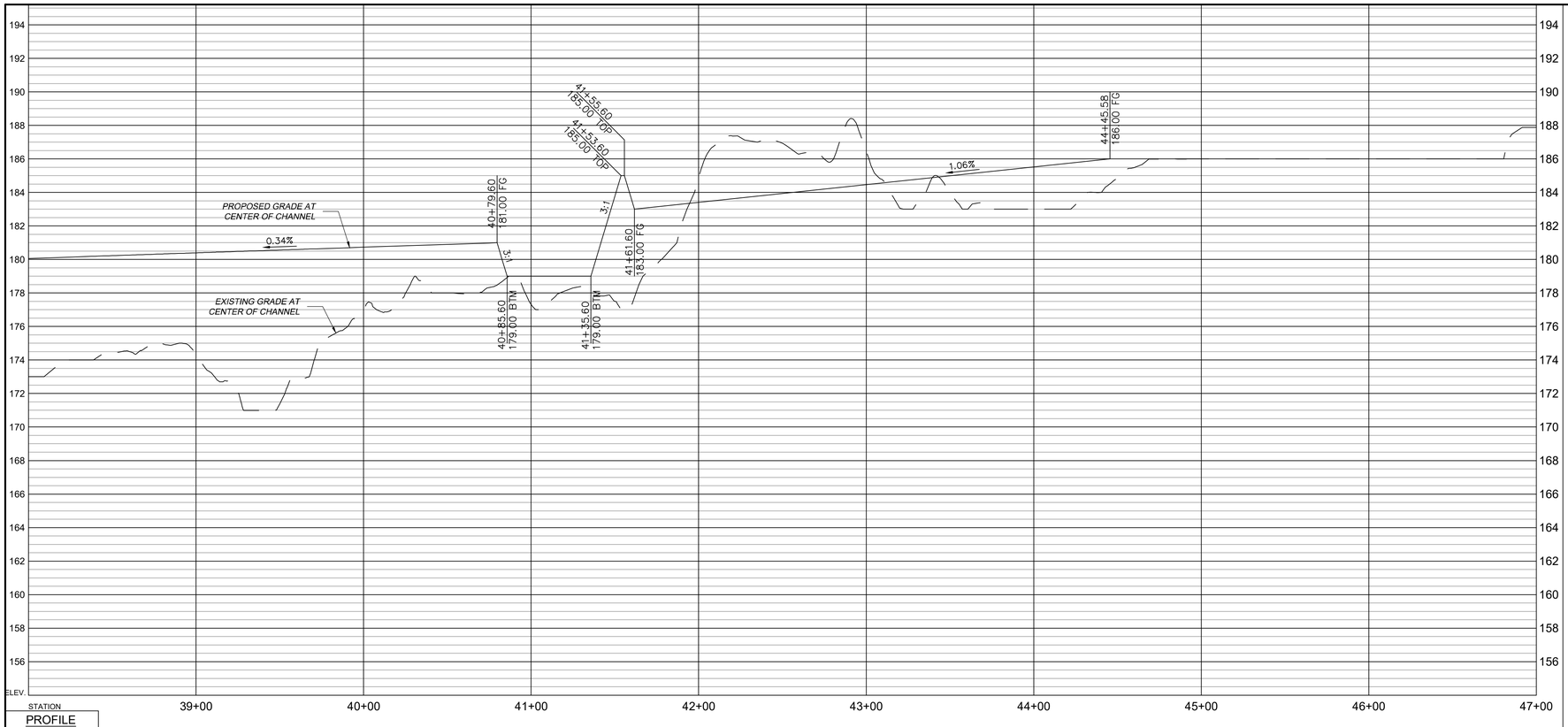


PROFILE
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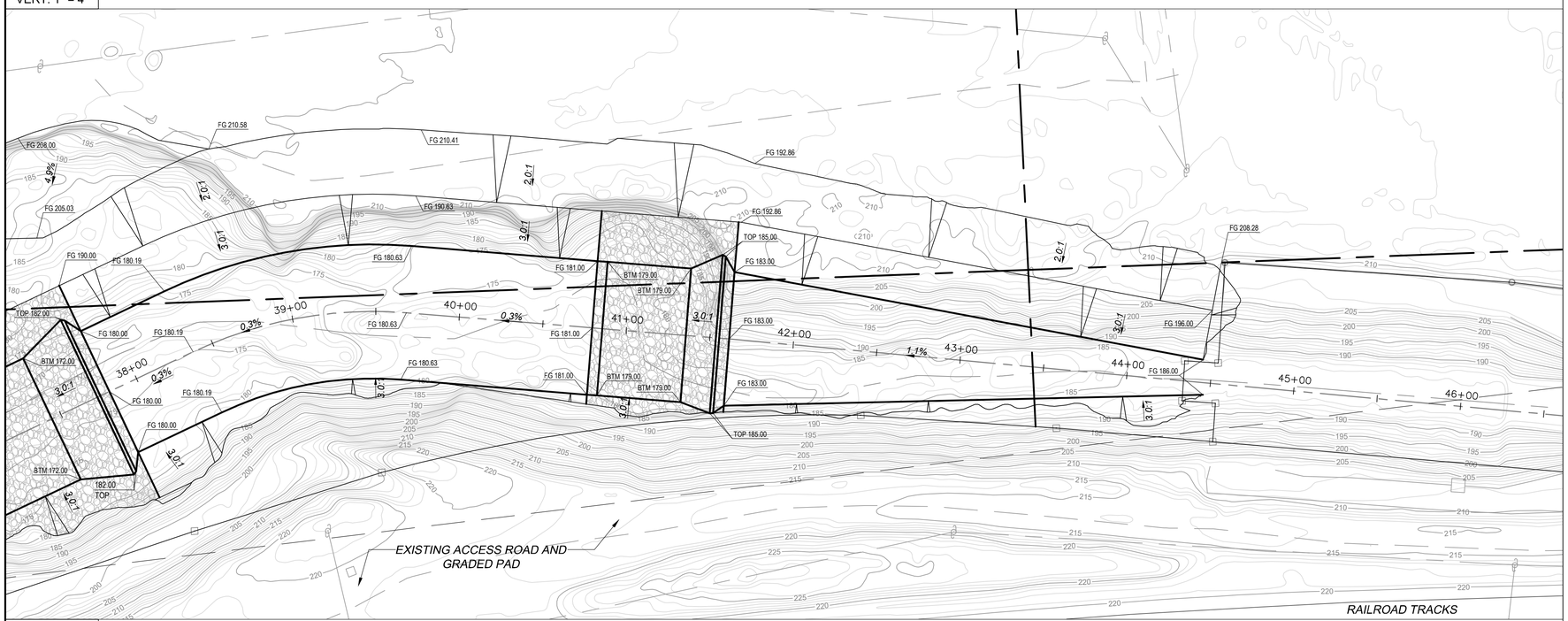
VERT. 1" = 4'




PLAN
1" = 40'

## LEGEND

——— GRADING LIMITS

## GENERAL NOTES

1. GRADED AREAS TO BE PLANTED WITH NATIVE VEGETATION. THIS WILL BE SHOWN IN MORE DETAIL WITH THE 60% DRAWINGS.

1 1/2 0 1 2
3 inches on original scale

COUNTY OF ORANGE CALIFORNIA

| MARK | DESCRIPTION | DATE | APPR. |
|---|---|---|---|
| | | | |

PREPARED UNDER THE RESPONSIBLE CHARGE OF:

REGISTERED PROFESSIONAL ENGINEER TORY R. WALKER No. 45005 Exp. 3-31-2026 CIVIL STATE OF CALIFORNIA

TORY R. WALKER, PE — DATE

| DESIGNED BY: | CHECKED BY: |
|---|---|
| TF | TF |
| DRAWN BY: | DRAWING NO.: |
| PR, MR | |
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| PLOT DATE: ---- | |

County of Orange PublicWorks

PREPARED BY: TORY R. WALKER ENGINEERING

ORANGE COUNTY CHANNEL REHAB

**GRADING PLAN**

38+00 - 44+45.58

SHEET REFERENCE NUMBER

05

SHEET 05 OF 06

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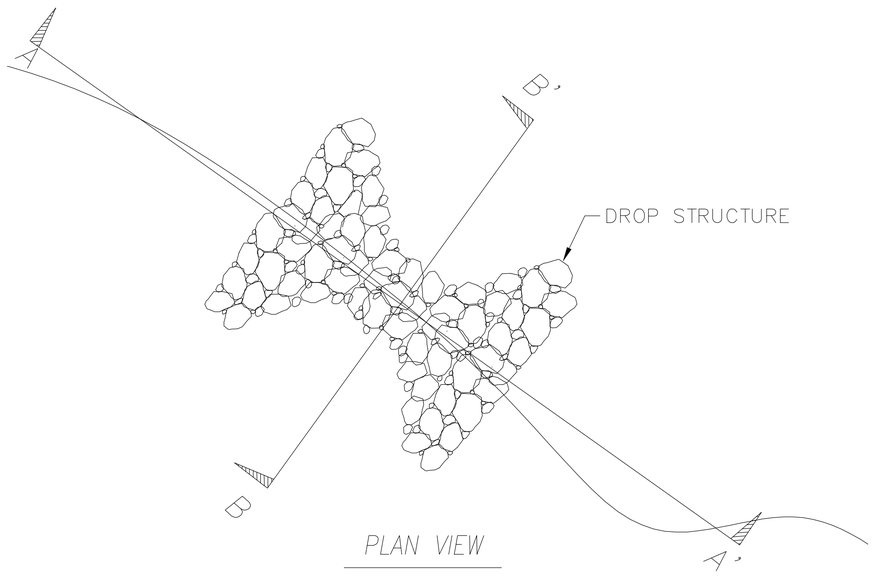
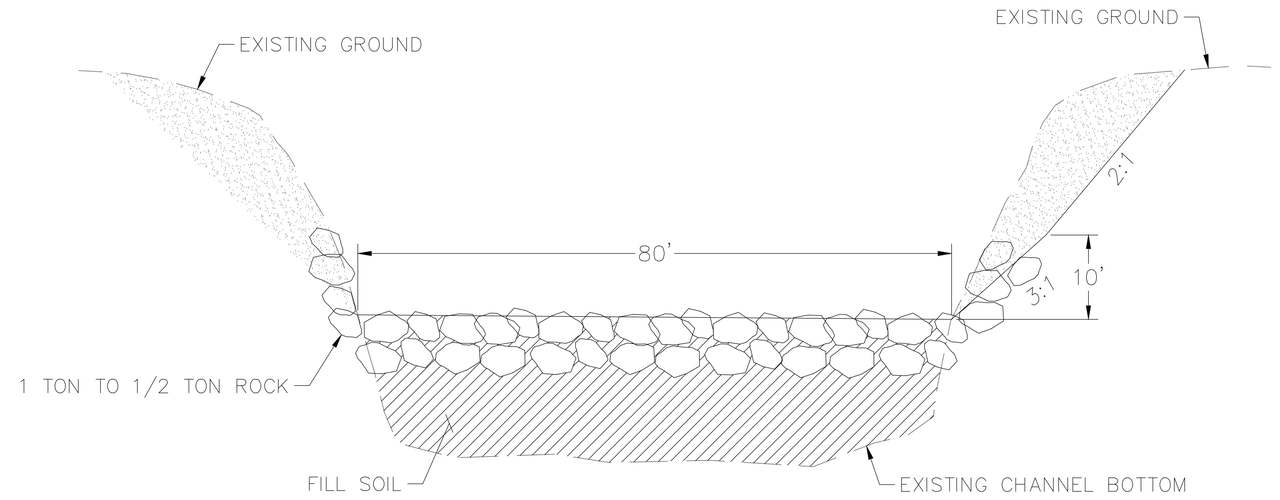


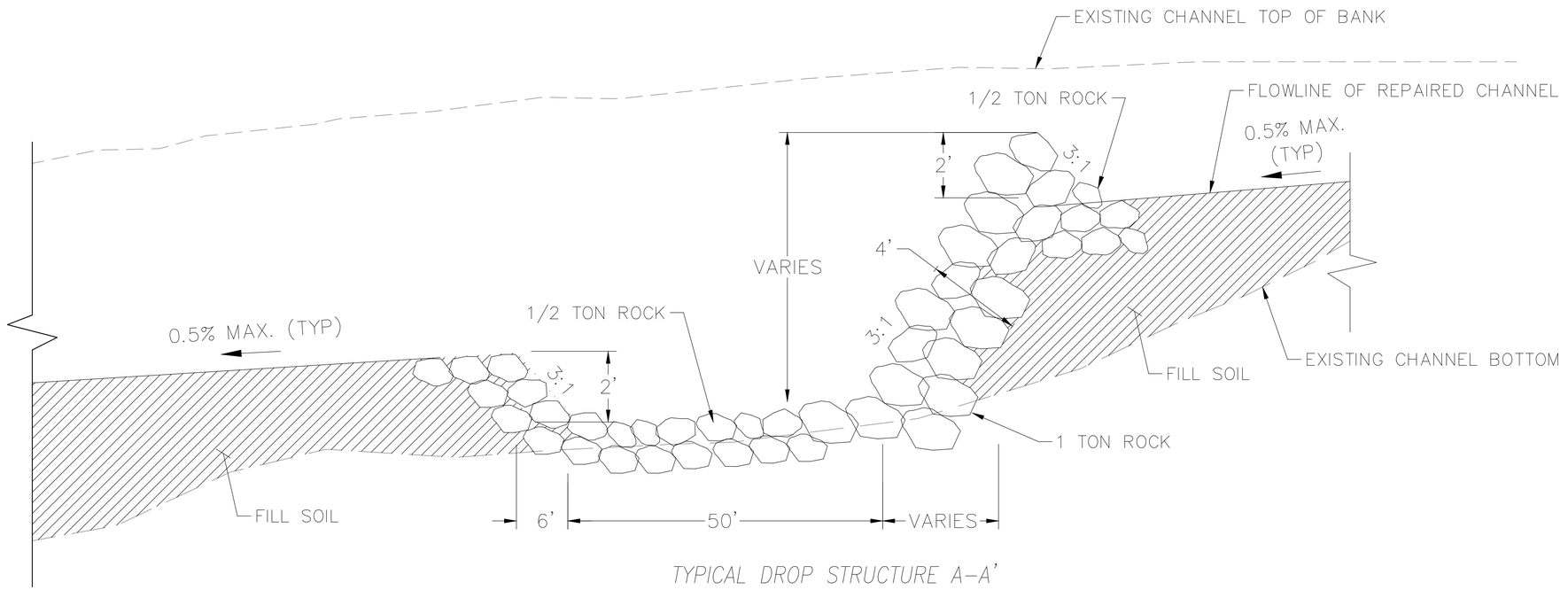

PLAN VIEW

NO SCALE




TYPICAL DROP STRUCTURE
CROSS SECTION B–B' LOOKING DOWNSTREAM

NO SCALE




TYPICAL DROP STRUCTURE A–A'

NO SCALE

COUNTY OF ORANGE CALIFORNIA

| MARK | DESCRIPTION | DATE | APPR. |
|---|---|---|---|
| | | | |

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REGISTERED PROFESSIONAL ENGINEER TORY R. WALKER No. 45005 Exp. 3-31-2026 CIVIL STATE OF CALIFORNIA

TORY R. WALKER, PE — DATE

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| PREPARED BY: TORY R. WALKER ENGINEERING | DRAWING NO.: | FILE NAME: 251763-06 - DETAILS.dwg | PLOT DATE: --- |

County of Orange
OC PublicWorks

ORANGE COUNTY CHANNEL REHAB

**DETAILS**

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06

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# Attachment D

Preliminary Hydraulic Report for Oso Creek Stabilization

TORY R. WALKER ENGINEERING

# PRELIMINARY HYDRAULIC REPORT

for

## Oso Creek Stabilization

City of San Juan Capistrano, California

Prepared for:

ENGIE North America Flexible Generation & Retail

8001 Arista Place, Suite 350

Broomfield, CO 80021

**SEPTEMBER 2025**


Prepared by;

Tory R. Walker, PE

R.C.E. 45005

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# TABLES



# FIGURES

## ATTACHMENTS

# 1. PURPOSE AND SCOPE

The Oso Creek Stabilization Project involves the repair and rehabilitation of approximately 2,600 linear feet of the Oso Creek channel, which we will refer to in this report as the "study reach". The study reach is located to the east of the Saddleback Church Rancho Capistrano property and west of the I-5 San Diego Freeway and the Southern California Regional Rail Authority (SCRRA) rail line within the city of San Juan Capistrano, California, as shown in **Figure 1** and **Figure 2**.

Over time, the creek has experienced significant vertical scour, horizontal migration, bank instability, and native and non-native vegetation overgrowth. The purpose of this study is to prepare a restoration design for the creek that will stabilize the channel, prevent future bank failure and channel migration, and will enhance native vegetation growth. This preliminary hydraulic report is therefore prepared to support a 30-percent design of a creek restoration plan using the Nationwide Permit 27 (NWP 27) process.

The proposed creek channel restoration begins at the vegetated open channel at the outfall of an existing double box culvert and ends approximately 2,600-feet downstream. The channel flows from north to south and confluences downstream with Trabuco Creek, a tributary of San Juan Creek, which flows into the Pacific Ocean.

The proposed creek channel design incorporates a series of instream stabilization structures consisting of natural rock; native vegetation will be added at the 60-percent design, but the sizing and placement of the natural rock as designed herein will ensure the stability of the restored creek channel without the subsequent reinforcing of the creek channel by that native vegetation.

The primary instream stabilization structures used for this creek restoration will be low-head drop structures consisting of rock weirs and ramps followed by pools/stilling basins. These rock structures will be spaced approximately every 300 feet between flatter channel sections to reduce flow velocities to less than erosive. This restoration design approach will thus, not only stabilize the creek channel, but facilitate the establishment of native vegetation (habitat) in both the channel bed and the 3:1 side slopes.

Another important design feature will be elevating this highly degraded section of Oso Creek; this will allow reestablishment of a hyporheic zone in the creek channel bed. Taken together, these design features will stabilize the channel, reducing the risk of ongoing vertical and horizontal scour and bank collapse, and will provide habitat and water quality improvements.

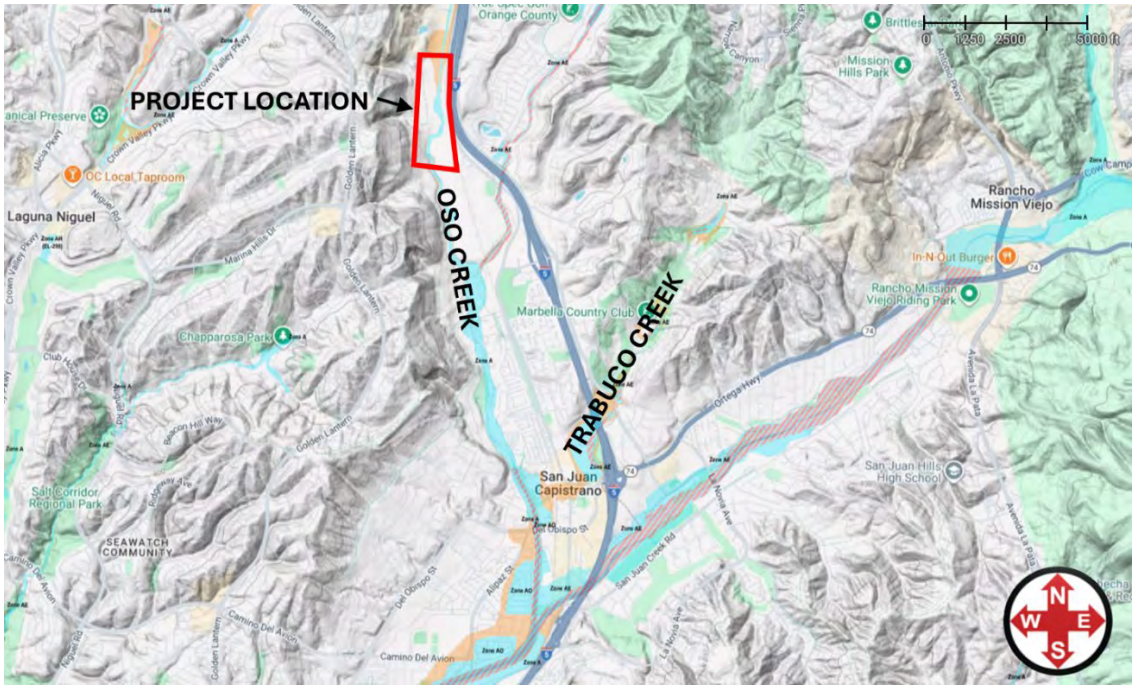



**Figure 1 | Vicinity Map Overview**


**Figure 2 | Project Location**

## 1.1. NATIONWIDE PERMIT 27

To qualify under the Nationwide Permit (NWP) 27, a creek restoration project must follow these principles:

### Authorized Activities

- Remove accumulated sediments and stream barriers
- Restore stream meanders, riffle-pool complexes, and any in-stream habitat structures
- Modify stream beds and banks to improve flow and habitat
- Install current deflectors and small water control structures
- Reestablish native vegetation and submerged aquatic plants

- Remove invasive vegetation
- Restore wetland hydrology by removing structures and reshaping ditches

### Ecological Requirements

- Use only native plant species
- Design restoration to resemble a natural reference habitat
- Ensure net ecological benefits—no conversions between habitat types (e.g., stream to wetland)

### Prohibited Actions

- Stream channelization[1]
- Conversion of tidal waters or wetlands to other aquatic uses
- Use of unsuitable materials (e.g., trash, debris, asphalt)

Each of these items was used to guide the proposed channel restoration design.

## 2. TOPOGRAPHIC DATA

Topographic survey for the north portion of the project site was prepared by Dudek on September 3, 2024. The survey is on the NAD 83 California State Plane Zone 6 coordinate system and uses vertical datum NAVD 88.

The south portion of the project site utilizes Captiva topographic data from March 3, 2021. The survey uses horizontal datum NAD 83 California State Plane Zone 6 coordinate system and uses vertical datum NAVD 88.

As-built drawings were used to identify the inverts and sizing for the existing double box culvert and downstream concrete and rock channel. These plans are on vertical datum NGVD 29. According to the NGS Coordinate Conversion calculator, the conversion between NAVD 88 and NGVD 29 is 2.2-feet.

[1] The US Army Corps of Engineers (USACE) defines stream channelization as the manipulation of a stream channel to increase the rate of water flow. Manipulation may include deepening, widening, straightening, armoring, or other activities that change the stream cross-section or other aspects of stream channel geometry to increase the rate of water flow through the stream channel. The proposed design does not include any of these activities.

## 3. HYDROLOGIC DATA

The FEMA 2019 Flood Insurance Study (FIS) shows a 100-year peak flow rate of 6,080 cfs. However, this study has elected to use the peak flow rate provided by Orange County Public Works (OCPW). According to OCPW, the 100-year peak flow rate at the downstream end of the concrete lined channel is 6,500 cubic feet per second (cfs) per the as-built Oso Creek Channel Facility No. L03 plans (Drawing No. L03-101-1A). This is supported by Rivertech's May 1987 report, *Oso Creek Channel Facility No. L03 Hydrology Study,* which determined that the 100-year flow rate to be 6,500 cfs near the downstream end of the study reach. Other peak flow rates were estimated from the 100-year flow rate; the 5-, 10-, 25-, 50-year Oso Creek flow rates were taken from PACE's January 2020 report, *Lower San Juan Creek and Trabuco Creek Invert Stabilization Master Plan.*

We estimated the 2-year flow rate from NOAA Atlas 14 by multiplying the 2-year, 24-hour rainfall intensity by the same ratio between the 10-year flow rate and the 10-year, 24-hour rainfall intensity.

**Table 1 | Oso Creek Flow Rates**

| Storm Event | Flow Rate (CFS) |
|---|---|
| 2-Year | 2,178 |
| 10-Year | 3,558 |
| 100-Year | 6,500 |

## 4. HISTORIC AND EXISTING CONDITION OF OSO CREEK

Over the last 50 years, development within the Oso Creek watershed has increased significantly, decreasing the amount of sediment produced from within the watershed. With the increase in development came traditional means of flood control in the form of concrete channels and storm drain structures. The double box culvert was built in 1984 along with a series of concrete open channels upstream. This addition of the box culvert and concrete lined channels has increased flow velocities, erosion, and scour within the creek channel. We compared the existing Oso Creek study reach topography with topography from the USGS 7.5 minute topographic map from 1949. A profile of both sets of topography along the Oso Creek channel invert are shown in **Figure 3**. This shows that over the past 76 years the channel invert over the study reach has degraded by between 20 and 30 feet.

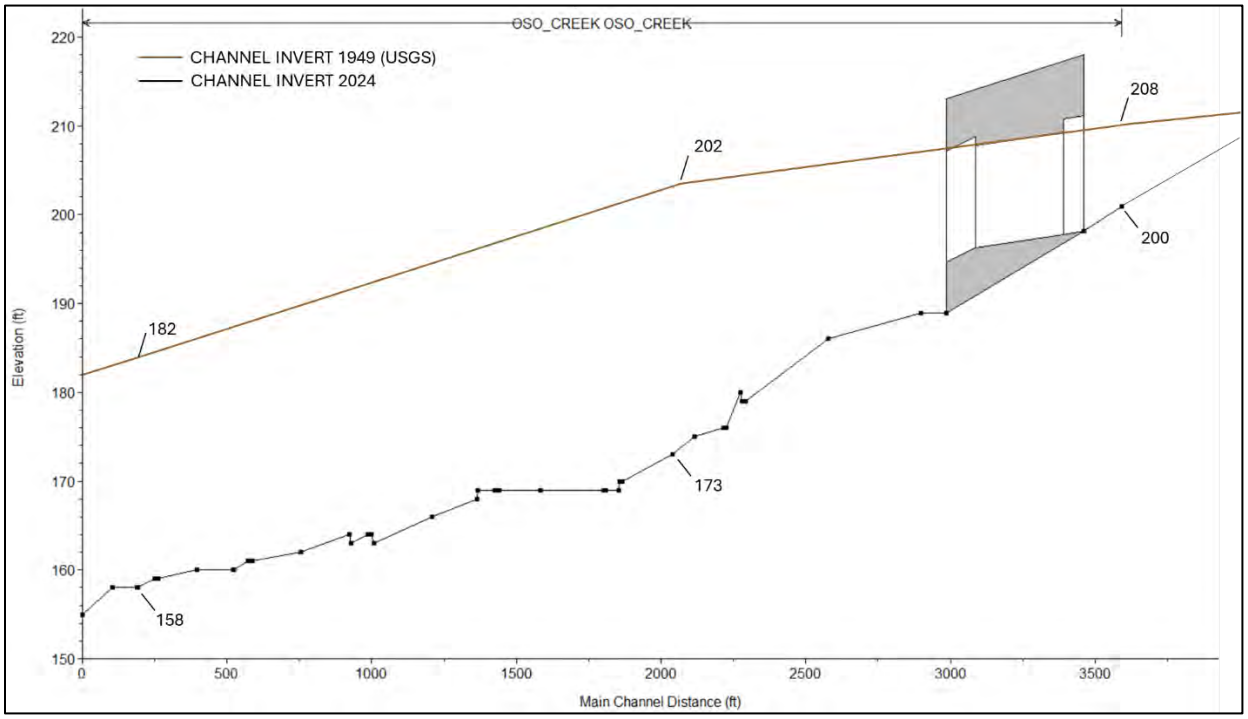



**Figure 3 | Channel Profile 1949 vs. 2024 Comparison**

Tory R. Walker Engineering (TRWE) conducted a site visit on August 21st, 2025 to assess the current physical characteristics of Oso Creek along the study reach. The existing double box culvert at the upstream end of the project site outlets to a rip rap-lined open channel (see **Figure 4**). The channel then transitions to a densely vegetated open channel lined with the same size rip rap scattered along the banks, which appears to be stable (see **Figure 5** and **Figure 6**). The creek then transitions to a natural channel without rock lining, at which point severe vertical and horizontal erosion begins and continues downstream.

According to the existing topography, the channel has flatter stretches with an average longitudinal slope of approximately 1-percent, and some short but steep stretches where the slope is as high as 20-percent.

**Figure 4 | Rip Rap Lined Open Channel at Existing RCB Outfall**

**Figure 5 | Rip Rap Channel Transitions to Vegetated Channel with Rip Rap**

**Figure 6 | Stable Vegetated Open Channel with Rip Rap Downstream of Culvert Outfall**

At this point (approximately 700-feet downstream of the existing double RCB outfall) the channel has eroded downward into a clay layer. Both native and non-native vegetation are overgrown in various areas, causing re-direction of flows away from the channel thalweg (see **Figure 7**, which was taken within Oso Creek looking upstream). Existing native and non-native vegetation are overgrown along the eastern bank, directing flows toward the western bank, which has recently collapsed.

No deposition of rocks or sediment was seen except for in areas where a scour hole might have occurred, or where a debris dam currently exists, allowing sediment to settle.

Along the western top of bank, deep cracks were observed in the soil near the edge of the creek top of bank (see **Figure 8**).

With time, these surface cracks are expected to deepen, eventually causing more bank failure. The channel at this location and continuing downstream is no longer protected by rock and is unstable and lacks proper bank vegetation in some areas. It is therefore susceptible to the high velocities that cause bank failure and horizontal migration as it continues downstream.

**Figure 7 | Oso Creek Existing Condition**

**Figure 8 | Surface Cracks Along Channel Banks**

Plants such as Giant Reed (arundo donax) and willows were observed along the channel. Their shallow and compact roots force the water away towards the west bank, stabilizing the soil beneath them but also diverting flows to the opposite channel bank (see **Figure 9**). Riprap has been placed along the east side of the corridor along the railroad just south of the culvert outfall. This rip rap has somewhat stabilized the eastern slope of the channel along the railroad, leaving the western bank more vulnerable to ongoing collapse.

Additionally, mature plants such as palms were found to be trapping debris that moved through the channel and had formed debris dams (see **Figure 10**). These overgrown plants form natural dams and barriers that re-direct high velocity flows around them and toward the banks, creating new flow paths as the water looks for a path around the blockage.

**Figure 9 | Willow Roots Inside Channel**

**Figure 10 | Palm Tree Debris Dam in Center of Channel Bottom**

The team observed clay soils along the channel bottom and along the lower banks throughout the visited channel reach. These soils are highly erosive and experience erosion at the exposed toes of slope throughout the channel. As the toe erodes, the foundation of the slope is compromised, leading to bank collapse. Undercutting and collapse of the channel banks can be seen in **Figure 11.** This photo was taken toward the downstream end of the project reach and shows the lack of rock and deposited sediment in both the channel banks and bottom.

Dry weather flows were observed during the site visit and were estimated to be approximately 1 cfs. These flows are considered a baseflow, as they occur year-round due to various sources throughout the watershed. This baseflow was clear and did not contain sediment (see **Figure 12**).


**Figure 11 | Undercutting and Bank Collapse of Clay Soils**

**Figure 12 | Dry Weather Flows**

In summary, the Oso Creek channel exhibits widespread instability as a combined result of the high velocities, unmanaged vegetation, and soils. Lateral migration and vertical scour will continue until the stream channel is rehabilitated. The channel is not expected to achieve a natural state of equilibrium for a very long time.

## 5. SEDIMENT TRANSPORT ANALYSIS

A sediment transport analysis was considered for the channel but ultimately not conducted due to the conditions observed during the site visit. Through sampling and observation, the channel bed was determined to be composed of clay and largely free of sediment deposition; the channel displayed very limited deposition in small, localized areas of vegetated overgrowth and debris dams, where localized velocities would be low. In addition, the upstream section of the creek is concrete-lined and fed from urban runoff, meaning the water entering the channel at the upstream of the project site is devoid of sediment load. The existing double box culvert at the upstream portion of the study reach is preceded by an upstream network of concrete open channels. This combination of concrete-lined channels and culverts reduces sediment in runoff. Runoff is therefore "hungry" when entering the natural stream section and will look for sediment to pick up.

During our site visit, we saw no natural deposition of rock or sediment. The only sediment deposition that was seen within the study reach was within scour holes or where vegetation overgrowth blocked flows, allowing sediment to settle. Therefore, it was determined that a sediment transport analysis would not be useful in predicting future changes within this stretch of the channel, because there is no sediment being deposited withing the study reach.

The sieve analyses performed on the sediment samples confirmed the field observation that the channel bed was composed of clay and shows that the lower banks contain mostly clay. Locations where the sediment samples were taken can be viewed in **Figure 13**. Results of the sieve analysis are summarized in **Table 2,** and the gradation results are located in **Attachment 1**.

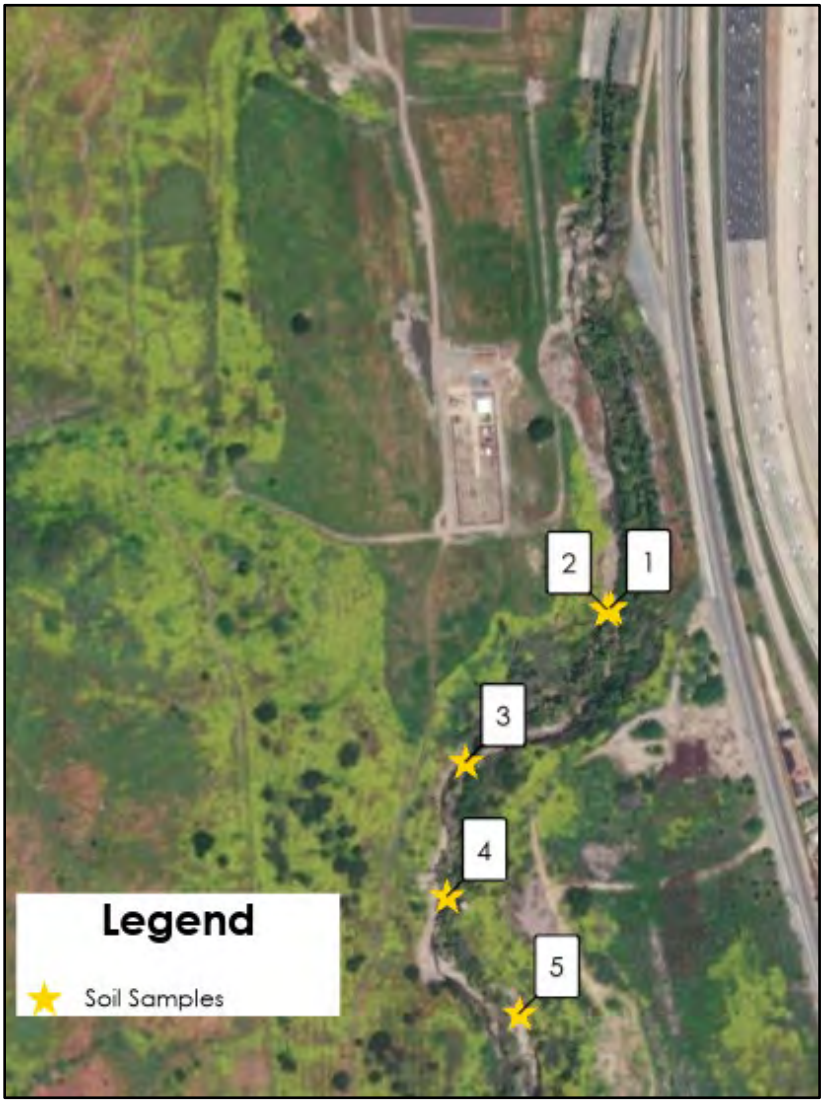



**Figure 13 | Soil Sample Locations**

**Table 2 | USCS Soil Sample Classifications**

| Sample | USCS Classification |
|---|---|
| 1 | Dark Brown CL (Clay) |
| 2 | Light Gray SM (Silty Sand)- **Bank Sample** |
| 3 | Dark Gray SM/SC (Silty Sand/Clayey Sand) |
| 4 | Dark Brown CL (Clay) |
| 5 | Gray SC/CL (Clayey Sand/Clay) |

# 6. HYDRAULIC ANALYSIS

## 6.1. Existing Condition

A hydraulic model of the study reach was prepared using the USACE river hydraulic analysis software HEC-RAS (version 6.4.1). Cross sections were drawn using the existing topographic survey, and the model was run with a mixed-flow regime to account for either subcritical or supercritical flow. The upstream and downstream boundary conditions were set to normal depth, and Manning's roughness coefficients were determined based on the geometry and physical characteristics of the channel as well as the vegetation observed during the August 2025 site visit.

The existing condition model results show the existing condition average velocities and flow depths along the channel. These values were then used to determine the most appropriate locations for the berms, drop structures, and stilling basins along the channel. The existing condition HEC-RAS results are available in **Attachment 4**.

## 6.2. Proposed Condition

There were several goals with the proposed channel rehabilitation design. Every design consideration took into account the requirements within the NWP 27 discussed in Chapter 1. With this in mind, the first goal was to reduce flow velocities in order to prevent further long-term channel scour and provide the channel banks with long-term stability. The second goal was to promote stable slopes that would allow the growth of native vegetation in the channel and along the banks. The third goal was to ensure that this rehabilitation design would be mostly self-sustaining once vegetation establishes.

A summary of the proposed design includes the following:

1. Channel base width of 80 feet.
2. Western side slope is graded at 3:1 (H:V) up to 10 feet (above the 100-year water surface elevation).
3. The upper portion of the western slope will be graded at 2:1 (H:V) until it meets the top of bank elevation. This will require cut or fill, depending on location.
4. The slopes will be planted with native vegetation, including woody vegetation.
5. The eastern slope at the north (upstream) portion of the restoration reach will remain since it appears stable and is lined with rip rap.

6. The eastern slope along the lower (southerly) portion of the channel will be graded at 3:1 and 2:1 and also replanted with native vegetation.
7. Six instream rock stabilization structures are proposed at between 300 to 400 feet apart (see **Figure 14**). Each drop structure begins with a 2-foot berm, followed by a 3:1 slope, and ending with a pool/stilling basin (see **Figure 15**, **Figure 16**, and **Figure 17**).

The purpose of the rock structures is to dissipate energy and allow for a flatter longitudinal slope of the creek channel in between each structure to approximately 0.5%. The 2-foot rock berm further reduces velocities as flows approach each rock structure. Velocities increase as the flows cascade over the steeper rock. Therefore, the pool/stilling basin provides a depth and a length to absorb the hydraulic jump and reduce velocities before flows exit the pool and continue down the creek.

The bottom width of the creek channel will be 80 feet wide. This width will ensure reduced flow depths, which in turn reduces velocities. Also, the western bank will be graded at a 3:1 side slope to a height of 10 feet. The slope will then be graded at a 2:1 slope until it meets the existing top of bank elevation. The 3:1 side slopes are stable enough to withstand the 100-year flow and are also the recommended slope for planting and establishing native vegetation, which will be planted throughout the rehabilitation area slopes. Vegetation will also be planted along the 2:1 side slopes. These slopes will not be in contact with the 100-year creek flows.

The proposed rehabilitated creek channel has been designed to comply with the ecological requirements of the NWP 27 including, using only native plant species, designing restoration to resemble a natural reference habitat, and ensuring net ecological benefits with no conversions between habitat types.

The proposed condition hydraulic model was created by adding cross sections for the berms, drop structures, and stilling basins, which were placed roughly every 400 feet along the channel at the 0.5% slope. The hydraulic model assumes a channel bottom width of 80 feet, 3:1 side slopes from the toe of slope transitioning into 2:1 side slopes at a height of 10 feet for the entire length of the rehabilitated creek section. The proposed rock structures and grading will begin downstream at Cross Section 1. The grading will include some cut and fill to construct the first two stabilization structures, as the grading fill elevates the channel invert. After the first two structures, the grading will include mostly fill as the structures and channel invert are elevated above the existing (eroded) channel invert. The grading ties in upstream where the vegetated rip rap channel ends (see **Figure 14**).

The Manning's roughness coefficients were adjusted along the rehabilitated portion of the channel to reflect the large natural rock that would be placed along each drop structure and areas of bare graded soil before vegetation establishes. HEC-RAS results are in **Attachment 4**.

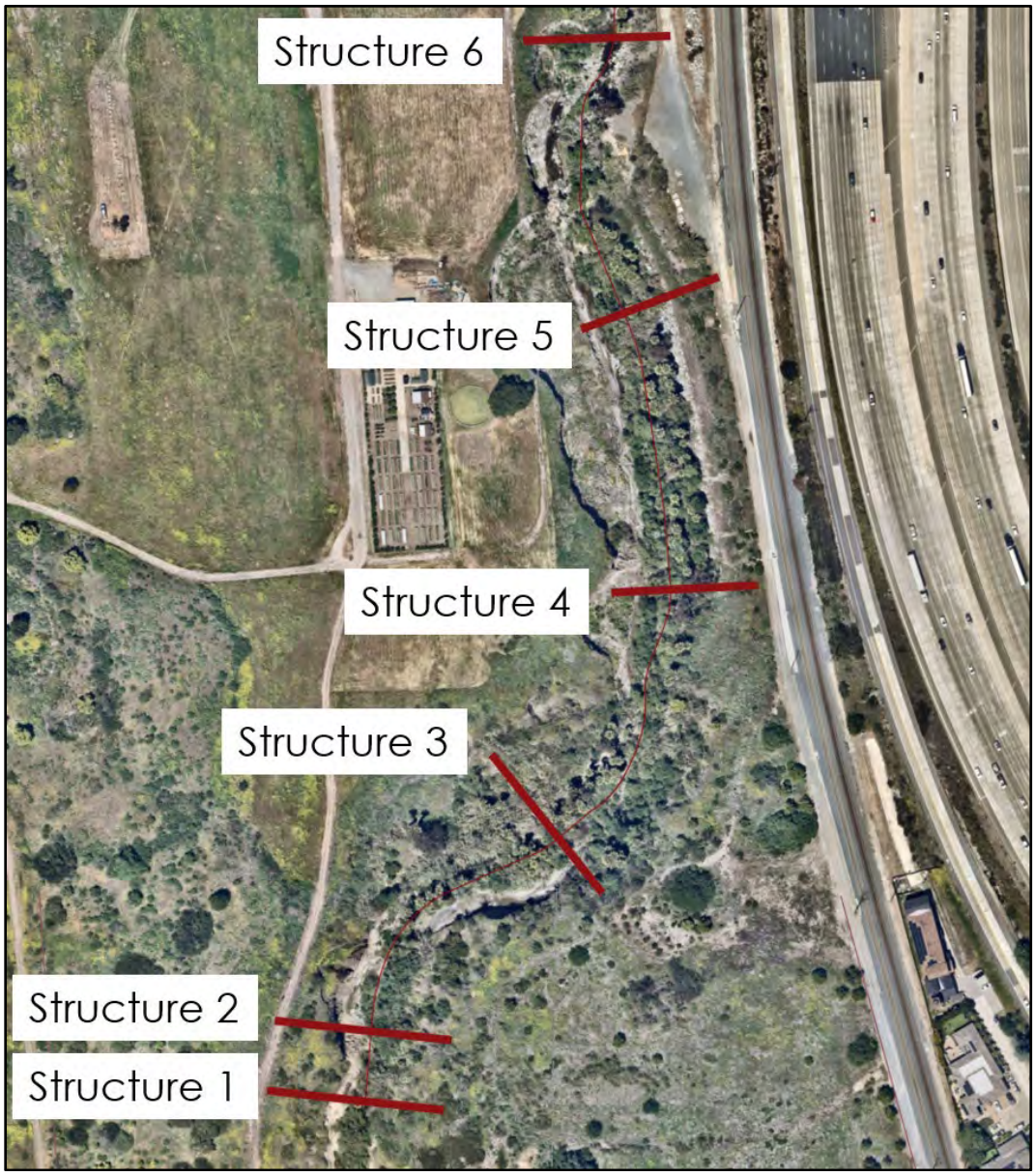



**Figure 14 | Drop Structure Locations**

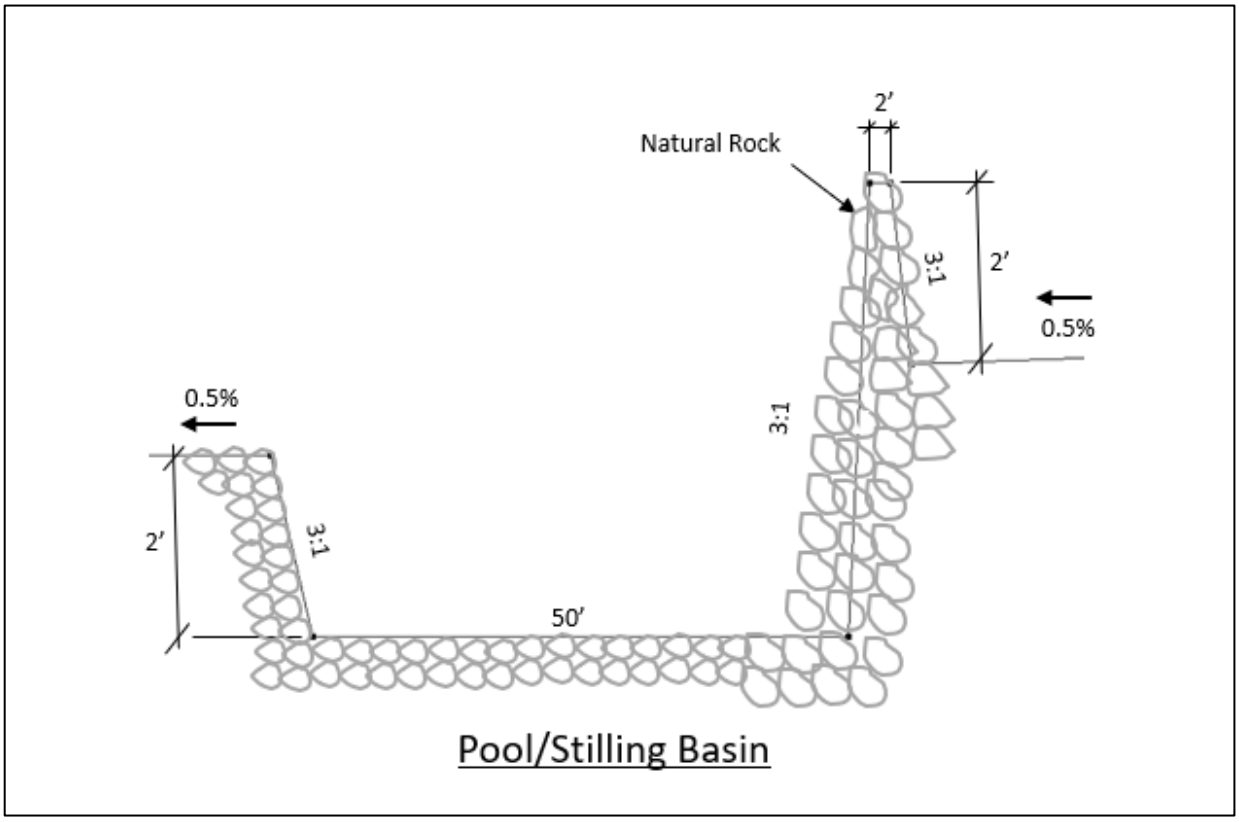



**Figure 15 | Typical Rock Stabilization Structure Profile View, Looking West**

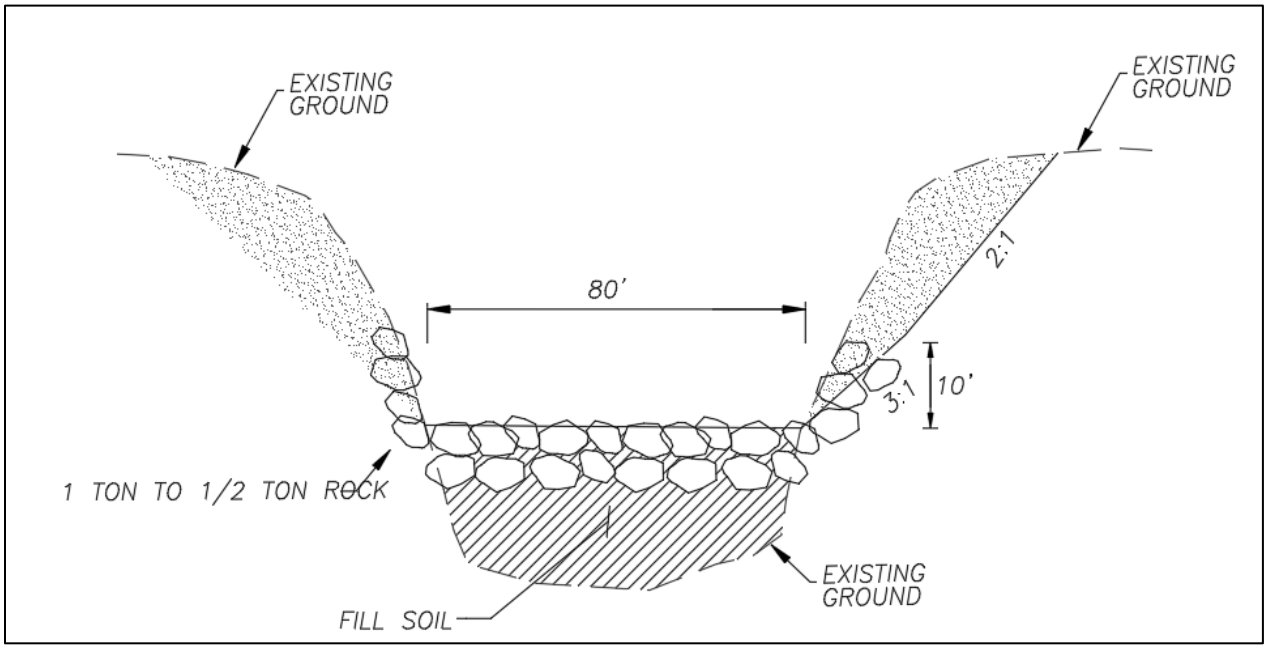



**Figure 16| Typical Rock Stabilization Structure Cross Section, Looking Downstream**

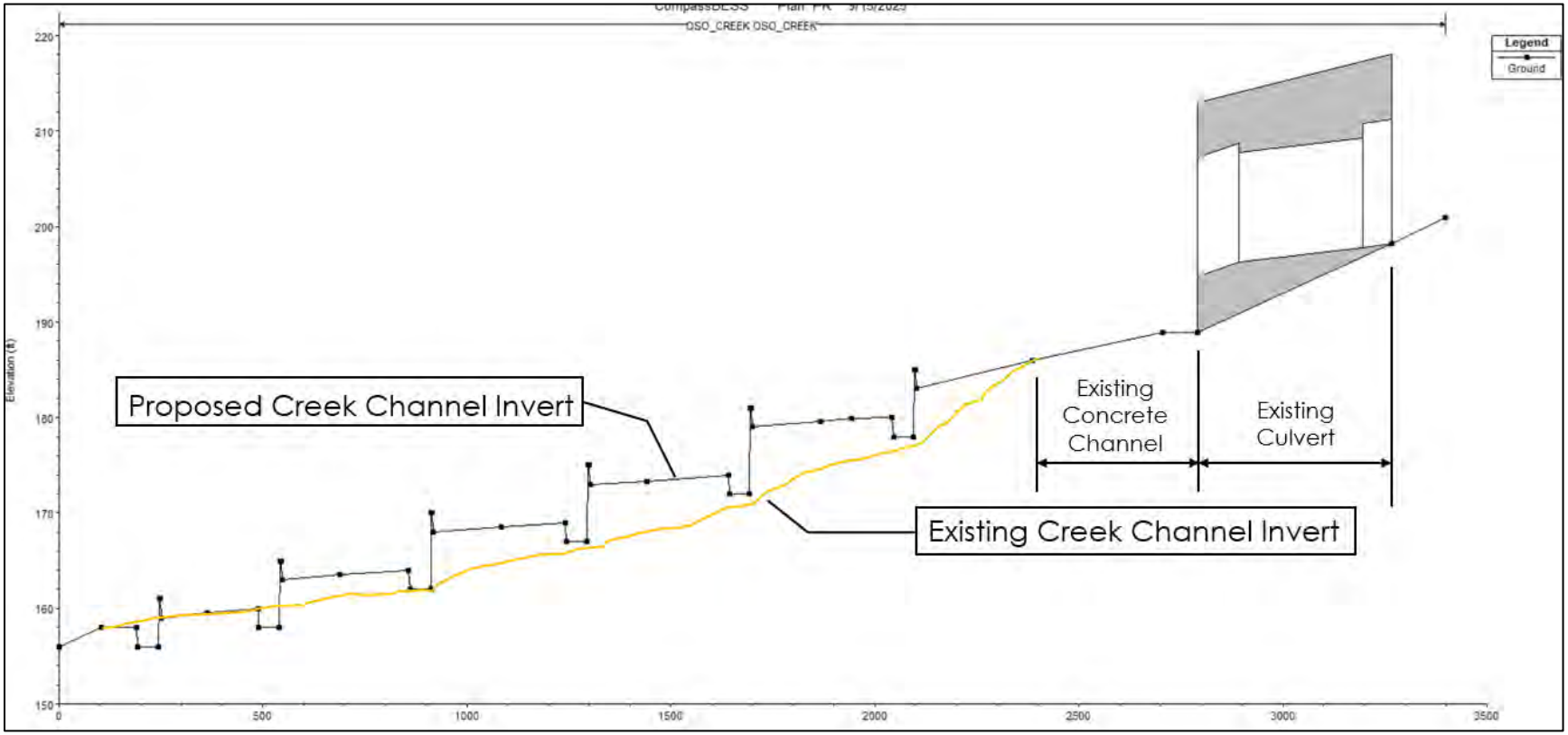



**Figure 17 | Existing Vs. Proposed Channel Profile**

## 7. RESULTS

The comparisons between the existing and proposed creek channel velocities can be seen in the tables below; the velocities for all three modeled storm events are significantly reduced in the proposed condition when compared with the existing condition.

The 2, 10, and 100-year proposed condition average velocities are reduced compared to the existing condition average velocities. The complete proposed condition results are located in **Attachment 4**. **Table 3** compares velocities for all three storm events between existing and proposed conditions. This table shows that the proposed design reduces the 2-year velocities between 60% and 70%, the 10-year velocities by 50% to 60%, and the 100-year by approximately 30%. Proposed condition results are found in **Attachment 4**.

**Table 3 | Existing and Proposed Channel Average Velocities (ft/s)**

| | Average Channel Velocity (ft/s) at Top of Study Reach XS 44 | | Average Channel Velocity (ft/s) at Middle of Study Reach XS 23 | | Average Channel Velocity (ft/s) at End of Study Reach XS 1 | |
|---|---|---|---|---|---|---|
| | EX | PR | EX | PR | EX | PR |
| 2-Year | 17.65 | 4.24 | 10.63 | 5.09 | 9.03 | 5.41 |
| 10-Year | 19.39 | 5.54 | 12.10 | 6.26 | 11.11 | 6.56 |
| 100-Year | 21.42 | 7.50 | 14.15 | 7.95 | 12.15 | 8.18 |

The 100-year proposed average velocities range between 5 to 8-ft/s and the average shear stress is approximately 1 lb/sf along the unlined portions of channel before vegetation establishes. The maximum flow depth along the channel is 9 feet. This shows that the proposed channel should remain stable during a 100-year storm and the 100-year flow depth will remain below the 3:1 side slope maximum depth of 10-feet. Once vegetation establishes over the proposed area of improvements it will further stabilize the channel.

For this preliminary study, the pool/stilling basin lengths were modeled in HEC-RAS. During final design, these lengths will be calculated using USACE stilling basin design calculations.

Preliminary rock sizing for the drop structures was calculated in accordance with the Orange County Flood Control District Design Manual. Rock sizing was based on 100-year velocities. Rock sizes were calculated using a factor of safety of 2 and the resulting diameter was rounded up to the nearest foot. Results can be seen in **Table 4** below and calculations are in **Attachment 5**.

**Table 4 | Rock Sizing**

| | Drop | | Stilling Basin | |
|---|---|---|---|---|
| Rock Structure | Max Velocity (ft/s) | $D_{30}$ (ft) | Max Velocity (ft/s) | $D_{30}$ (ft) |
| 1 | 12.25 | 3 | 6.67 | 1 |
| 2 | 12.18 | 3 | 5.48 | 1 |
| 3 | 12.01 | 3 | 5.44 | 1 |
| 4 | 12.32 | 3 | 5.37 | 1 |
| 5 | 12.73 | 3 | 5.54 | 1 |
| 6 | 12.17 | 3 | 5.32 | 1 |

## 8. CONCLUSIONS AND NEXT STEPS

The design and modeling in this study reflect a 30% proof of concept. The results from this study show that the proposed design will reduce peak flow velocities, prevent future vertical and horizontal scour within the rehabilitated section of the creek, and allow native habitat to flourish. The next phases of design will include 60-percent drawings and calculations. The 60-percent design drawings and calculations will include more detailed grading of the channel and the proposed drop structures and will address the long-term maintenance of the channel.

# ATTACHMENT 1

## SOIL GRADATION RESULTS

Universal Engineering Sciences (UES)
1441 Montiel Road, Suite 115
Escondido, CA 92026
p. 760.746.4955 | TeamUES.com
LEA NO. 008

# Report of Soil Sieve Analysis

**Project Name:** Oso Creek Gradation Test
**Project Number:** A25165.00509.000 **Lab Number:** 37548
**Sampled By:** Client **Date Sampled:** 8/26/2025
**Tested By:** L.V./J.S. **Date Tested** 9/2/2025

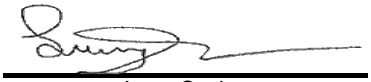
**Sample Location:**
1

**Sample Description:**
Dark Brown CL

**Specifications:**
N/A

| | | | | | | |
|---|---|---|---|---|---|---|
| Total Wet Wt: | 240.5 | U.E.S. Did not sample material | | | | |
| Total Dry Wt: | 180.5 | | | | | |
| Sieve Size | Wt. (Grams) | % Retained | % Passing | | Specifications | Remarks |
| 2 inch (50.8 mm) | 0.0 | 0 | 100 | | | |
| 1-1/2 inch (38.1 mm) | 0.0 | 0 | 100 | | | |
| 1 inch (25.4 mm) | 0.0 | 0 | 100 | | | |
| 3/4 inch (19.1 mm) | 0.0 | 0 | 100 | | | |
| 1/2 inch (12.7 mm) | 0.0 | 0 | 100 | | | |
| 3/8 inch (9.5 mm) | 0.0 | 0 | 100 | | | |
| #4 (4.75 mm) | 0.0 | 0 | 100 | | | |
| #8 (2.36 mm) | 1.2 | 1 | 99 | | | |
| #16 (1.18 mm) | 3.5 | 2 | 98 | | | |
| #30 (0.6 mm) | 5.2 | 3 | 97 | | | |
| #50 (0.3 mm) | 7.0 | 4 | 96 | | | |
| #100 (0.15 mm) | 39.1 | 22 | 78 | | | |
| #200 (0.075 mm) | 97.1 | 53.8 | 46.2 | | | |

Tested in Accordance with ASTM C117,C136

Reviewed By: 
Larry Sachs
Lab Supervisor

Date: September 11, 2025

Universal Engineering Sciences (UES)
1441 Montiel Road, Suite 115
Escondido, CA 92026
p. 760.746.4955 | TeamUES.com
LEA NO. 008

# Report of Soil Sieve Analysis

**Project Name:** Oso Creek Gradation Test
**Project Number:** A25165.00509.000 **Lab Number:** 37548
**Sampled By:** Client **Date Sampled:** 8/26/2025
**Tested By:** L.V./J.S. **Date Tested** 9/2/2025

**Sample Location:**
2

**Sample Description:**
Light Gray SM

**Specifications:**
N/A

| | | | | | | |
|---|---|---|---|---|---|---|
| Total Wet Wt: | 263.4 | U.E.S. Did not sample material | | | | |
| Total Dry Wt: | 259.4 | | | | | |
| Sieve Size | Wt. (Grams) | % Retained | % Passing | | Specifications | Remarks |
| 2 inch (50.8 mm) | 0.0 | 0 | 100 | | | |
| 1-1/2 inch (38.1 mm) | 0.0 | 0 | 100 | | | |
| 1 inch (25.4 mm) | 0.0 | 0 | 100 | | | |
| 3/4 inch (19.1 mm) | 0.0 | 0 | 100 | | | |
| 1/2 inch (12.7 mm) | 0.0 | 0 | 100 | | | |
| 3/8 inch (9.5 mm) | 0.0 | 0 | 100 | | | |
| #4 (4.75 mm) | 11.8 | 5 | 95 | | | |
| #8 (2.36 mm) | 17.9 | 7 | 93 | | | |
| #16 (1.18 mm) | 33.1 | 13 | 87 | | | |
| #30 (0.6 mm) | 85.1 | 33 | 67 | | | |
| #50 (0.3 mm) | 144.3 | 56 | 44 | | | |
| #100 (0.15 mm) | 177.0 | 68 | 32 | | | |
| #200 (0.075 mm) | 193.5 | 74.6 | 25.4 | | | |

Tested in Accordance with ASTM C117,C136

Reviewed By: Larry Sachs
Lab Supervisor

Date: September 11, 2025

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LEA NO. 008

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**Project Name:** Oso Creek Gradation Test
**Project Number:** A25165.00509.000 **Lab Number:** 37548
**Sampled By:** Client **Date Sampled:** 8/26/2025
**Tested By:** L.V./J.S. **Date Tested** 9/2/2025

**Sample Location:**
3

**Sample Description:**
Dark Gray SM/SC

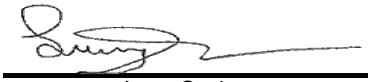
**Specifications:**
N/A

| | |
|---|---|
| Total Wet Wt: | 566.8 |
| Total Dry Wt: | 566.8 |

U.E.S. Did not sample material

| Sieve Size | Wt. (Grams) | % Retained | % Passing | | Specifications | Remarks |
|---|---|---|---|---|---|---|
| 2 inch (50.8 mm) | 0.0 | 0 | 100 | | | |
| 1-1/2 inch (38.1 mm) | 0.0 | 0 | 100 | | | |
| 1 inch (25.4 mm) | 0.0 | 0 | 100 | | | |
| 3/4 inch (19.1 mm) | 0.0 | 0 | 100 | | | |
| 1/2 inch (12.7 mm) | 0.0 | 0 | 100 | | | |
| 3/8 inch (9.5 mm) | 8.4 | 1 | 99 | | | |
| #4 (4.75 mm) | 39.4 | 7 | 93 | | | |
| #8 (2.36 mm) | 99.2 | 17 | 83 | | | |
| #16 (1.18 mm) | 181.0 | 32 | 68 | | | |
| #30 (0.6 mm) | 262.5 | 46 | 54 | | | |
| #50 (0.3 mm) | 313.5 | 55 | 45 | | | |
| #100 (0.15 mm) | 347.5 | 61 | 39 | | | |
| #200 (0.075 mm) | 363.7 | 64.2 | 35.8 | | | |

Tested in Accordance with ASTM C117,C136

Reviewed By: 
Larry Sachs
Lab Supervisor

Date: September 11, 2025

Universal Engineering Sciences (UES)
1441 Montiel Road, Suite 115
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LEA NO. 008

# Report of Soil Sieve Analysis

**Project Name:** Oso Creek Gradation Test
**Project Number:** A25165.00509.000 **Lab Number:** 37548
**Sampled By:** Client **Date Sampled:** 8/26/2025
**Tested By:** L.V./J.S. **Date Tested** 9/2/2025

**Sample Location:**
4

**Sample Description:**
Dark Brown CL

**Specifications:**
N/A

| | | | | | | |
|---|---|---|---|---|---|---|
| Total Wet Wt: | 94.4 | U.E.S. Did not sample material | | | | |
| Total Dry Wt: | 82.2 | | | | | |
| Sieve Size | Wt. (Grams) | % Retained | % Passing | | Specifications | Remarks |
| 2 inch (50.8 mm) | 0.0 | 0 | 100 | | | |
| 1-1/2 inch (38.1 mm) | 0.0 | 0 | 100 | | | |
| 1 inch (25.4 mm) | 0.0 | 0 | 100 | | | |
| 3/4 inch (19.1 mm) | 0.0 | 0 | 100 | | | |
| 1/2 inch (12.7 mm) | 0.0 | 0 | 100 | | | |
| 3/8 inch (9.5 mm) | 0.0 | 0 | 100 | | | |
| #4 (4.75 mm) | 0.0 | 0 | 100 | | | |
| #8 (2.36 mm) | 4.8 | 6 | 94 | | | |
| #16 (1.18 mm) | 14.5 | 18 | 82 | | | |
| #30 (0.6 mm) | 22.3 | 27 | 73 | | | |
| #50 (0.3 mm) | 28.2 | 34 | 66 | | | |
| #100 (0.15 mm) | 34.2 | 42 | 58 | | | |
| #200 (0.075 mm) | 38.6 | 47.0 | 53.0 | | | |

Tested in Accordance with ASTM C117,C136

Reviewed By: _____ Date: September 11, 2025

Larry Sachs
Lab Supervisor

Universal Engineering Sciences (UES)
1441 Montiel Road, Suite 115
Escondido, CA 92026
p. 760.746.4955 | TeamUES.com
LEA NO. 008

# Report of Soil Sieve Analysis

**Project Name:** Oso Creek Gradation Test
**Project Number:** A25165.00509.000 **Lab Number:** 37548
**Sampled By:** Client **Date Sampled:** 8/26/2025
**Tested By:** L.V./J.S. **Date Tested** 9/2/2025

**Sample Location:**
5

**Sample Description:**
Gray SC/CL

**Specifications:**
N/A

| | |
|---|---|
| Total Wet Wt: | 236.1 |
| Total Dry Wt: | 227.4 |

U.E.S. Did not sample material

| Sieve Size | Wt. (Grams) | % Retained | % Passing | | Specifications | Remarks |
|---|---|---|---|---|---|---|
| 2 inch (50.8 mm) | 0.0 | 0 | 100 | | | |
| 1-1/2 inch (38.1 mm) | 0.0 | 0 | 100 | | | |
| 1 inch (25.4 mm) | 0.0 | 0 | 100 | | | |
| 3/4 inch (19.1 mm) | 0.0 | 0 | 100 | | | |
| 1/2 inch (12.7 mm) | 0.0 | 0 | 100 | | | |
| 3/8 inch (9.5 mm) | 0.0 | 0 | 100 | | | |
| #4 (4.75 mm) | 0.0 | 0 | 100 | | | |
| #8 (2.36 mm) | 5.5 | 2 | 98 | | | |
| #16 (1.18 mm) | 21.3 | 9 | 91 | | | |
| #30 (0.6 mm) | 40.2 | 18 | 82 | | | |
| #50 (0.3 mm) | 62.6 | 28 | 72 | | | |
| #100 (0.15 mm) | 99.7 | 44 | 56 | | | |
| #200 (0.075 mm) | 123.5 | 54.3 | 45.7 | | | |

Tested in Accordance with ASTM C117,C136

Reviewed By: _____ Date: September 11, 2025

Larry Sachs
Lab Supervisor

# ATTACHMENT 2

## HEC-RAS WORK MAP

## LEGEND

- BANK STATIONS
- CHANNEL CENTERLINE
- HEC-RAS CROSS SECTION
- 45 XS NUMBER

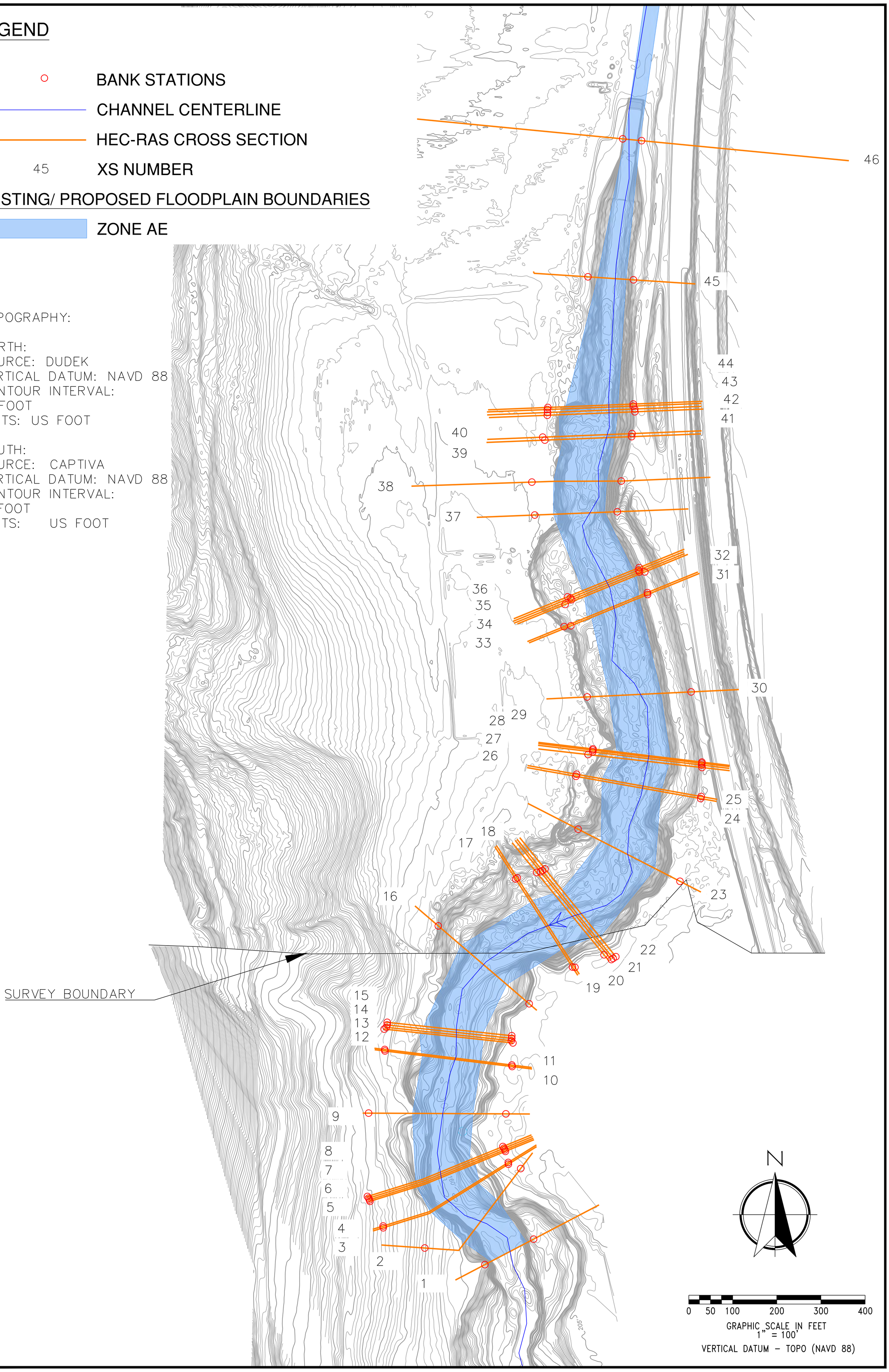
## EXISTING/ PROPOSED FLOODPLAIN BOUNDARIES

- ZONE AE

TOPOGRAPHY:

NORTH:
SOURCE: DUDEK
VERTICAL DATUM: NAVD 88
CONTOUR INTERVAL:
2-FOOT
UNITS: US FOOT

SOUTH:
SOURCE: CAPTIVA
VERTICAL DATUM: NAVD 88
CONTOUR INTERVAL:
1-FOOT
UNITS: US FOOT




TORY R. WALKER ENGINEERING
122 Civic Center Drive, Suite 206 Vista, CA 92084

REGISTERED PROFESSIONAL ENGINEER
ROSANNA FRANSSON
No. C77964
Exp. 6-30-2027
CIVIL
STATE OF CALIFORNIA

# OSO CREEK
# HYDRAULIC WORK MAP
# SEPTEMBER 2025

# ATTACHMENT 3

## CULVERT AS-BUILTS

SHEET 3B OF 35

L03-101-1A

RISE: 12.5'

RISE: 11.5'

LENGTH: 100'

LENGTH: 305'

LENGTH: 71'

STATION: 70+76.80

INVERT: 194.71'

INVERT: 196.27'

INVERT: 197.77'

INVERT: 198.17'

STATION: 66+00.00

STATION: 67+00.00

STATION: 70+05.67

LENGTH: 1.03'

## CONSTRUCTION NOTES

4. CONSTRUCT R.C. DROP STRUCTURE PER PLAN, PROFILE AND DETAILS ON SHEETS 8B, 9B & 18B.
5. CONSTRUCT ACCESS ROAD PER PLAN AND PROFILE.
6. FURNISH AND INSTALL 5.0' HIGH CHAIN LINK FENCE PER EMA STD. 412.
7. FURNISH AND INSTALL 3.5' HIGH GUARD CABLE FENCE PER EMA STD. 413.
9. FURNISH AND INSTALL 20' WIDE 5' HIGH DOUBLE SWING GATE PER EMA STD. PLAN 412.
10. CONSTRUCT 6' HIGH TEMPORARY CHAIN LINK FENCE ALONG WESTERLY LIMITS OF CONSTRUCTION.
11. CONSTRUCT 34' WIDE R.C. RECTANGULAR CHANNEL PER PLAN, PROFILE AND TYPICAL SECTION, SEE SHEET 17B.
12. CONSTRUCT 16'5½" DOUBLE BARREL R.C. BOX CULVERT, DEBRIS EXTENSION & APPURTENANCES, INCLUDING A.C. PAVING, SEE SHEETS 11B, 12B & 19B.
13. REMOVE AND RECONSTRUCT SAN JUAN BASIN AUTHORITY DIVERSION STRUCTURE, CONSTRUCT 16" ACP TO DROP STRUCTURE. SEE DETAILS ON SHEETS 31B TO 54B & 35.
14. CONSTRUCT R.C. BOX WITH INLET STRUCTURE, SEE SHEET 14.
15. CONSTRUCT GROUTED STONE LINING, SEE SHEET 14.
16. CONSTRUCT INLET TYPE V PER EMA STD. PLAN 305.
17. CONSTRUCT PIPE INLET, PER DETAILS & TABLE, SHEET 12 B.
18. CONSTRUCT PIPE INLET WITH MODIFIED JUNCTION STRUCTURE TYPE V PER DETAILS AND TABLE, SHEET 12 B.
19. CONSTRUCT 12' WIDE, 5' HIGH SINGLE SWING GATE PER EMA STD. PLAN 412.
20. FURNISH & PLACE 20" ASBESTOS CEMENT TRANSMISSION PIPE; T-40,II. SEE SHEETS 29 & 30.
21. ADJUST MANHOLE TO GRADE
34. CONSTRUCT R.C. HEADWALL PER DETAILS ON SHEET 14.
36. REMOVE AND SALVAGE BATHGATE BRIDGE.
40. REMOVE EXIST. 20" ACP WATERLINE.
41. CONSTRUCT JUNCTION STR. TYPE V.

TYPICAL SECTION
NO SCALE
STA. 70+76.80 TO STA. 75+00

TYPICAL SECTION
NO SCALE
STA. GG+01.75 TO STA. 70+76.80

| STATION | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | STATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CU. YDS. EXC. | 1,330 | 958 | 1,012 | 1,590 | 2,631 | 2,261 | 2,667 | 2,942 | 3,324 | 3,619 | | EXC. CU YDS |
| CU. YDS. FILL | 4,371 | 5,296 | 4,943 | 4,790 | 1,484 | 1,565 | 1,574 | 1,444 | 1,093 | 839 | | FILL |

PROFILE
HORIZ: 1" = 40'
VERT: 1" = 4'

PLAN
1" = 40'

LEGEND

| | | UTILITY | | OWNER |
|---|---|---|---|---|
| (1) | PROTECT | A | 12" SEWER | CITY OF SAN JUAN CAPISTRANO |
| (2) | LIMITS OF CONSTRUCTION AREA | B | 39" SEWER | MOULTON-NIGUEL WATER DISTRICT |
| (3) | REMOVE | E | DIVERSION STRUCTURE* | SAN JUAN BASIN AUTHORITY* |
| (4) | REMOVE AND SALVAGE | F | 4" TELEPHONE CONDUIT AND WIRE | PACIFIC TELEPHONE COMPANY |
| (5) | REMOVE INTERFERING PORTIONS | G | 20" ACP | SAN JUAN BASIN AUTHORITY |
| (6) | REMOVE AND RELOCATE | H | POWER POLES, GUY WIRES, AND OVERHEAD WIRES | S.D.G. & E. |
| (7) | TO BE REMOVED OR RELOCATED BY OTHERS | I | 2" BLOWOFF AND 20" BUTTERFLY VALVE | SAN JUAN BASIN AUTHORITY |
| (8) | PROPERTY CORNERS & MONUMENTS TO BE TRANSFERRED & RESET BY THE EMA. | | | |

NOTES
*1. DIVERSION STRUCTURE INCLUDES 15'-25' LONG SHEET PILES ACROSS AND ALONG EXISTING CREEK WHICH SHALL BE REMOVED.
2. DECK OF EXISTING BATHGATE BRIDGE SHALL BE REMOVED AND DELIVERED TO LOCATION AS DIRECTED BY THE ENGINEER.

BENCH MARK: O.C.S. B.M. L-785
3.5 MI. N. ALONG A.T.&S.F. RY. FROM STATION AT SAN JUAN CAPISTRANO, 0.2 MI. N. OF MILEPOST 194, 21.5' W. OF WEST RAIL, 10' S. OF T.P. 5716, 3.3' W. OF A WITNESS POST, SET IN TOP OF A CONCRETE POST PROJECTING 0.2' ABOVE THE GROUND. (1976) EL. 239.109

OSO CREEK CHANNEL HYDRAULIC DATA

| STATION TO STATION | Q100 | b | S | n=0.013(RCB) n=0.015 d/n | V/n | n=0.013(RCB) n=0.017 d/n | V/n | dc | Vc |
|---|---|---|---|---|---|---|---|---|---|
| GG+50 TO 70+76.80 | G,500 | (2)16.5' & 34' | 0.005 | 9.68 | 21.49 | 10.74 | 19.27 | 11.16 | 18.51 |
| 70+76.80 TO 75+00 | G,400 | 34' | 0.0046 | 9.33 | 21.39 | 10.13 | 19.61 | 10.86 | 18.23 |

| MARK | DATE | REVISIONS | DESCRIPTION |
|---|---|---|---|
| A | 5/15/80 | AS BUILT | |
| Δ | 10-92 | P.P. 90-00754 FE | |

DESIGNED D.E.K. DRAWN F.T. CHECKED G.J.H.

ORANGE COUNTY ENVIRONMENTAL MANAGEMENT AGENCY

ALTERNATE B
OSO CREEK CHANNEL
PLAN AND PROFILE
STA 65+00 TO STA 75+00

PREPARED UNDER SUPERVISION OF ... DATE 2-7-84

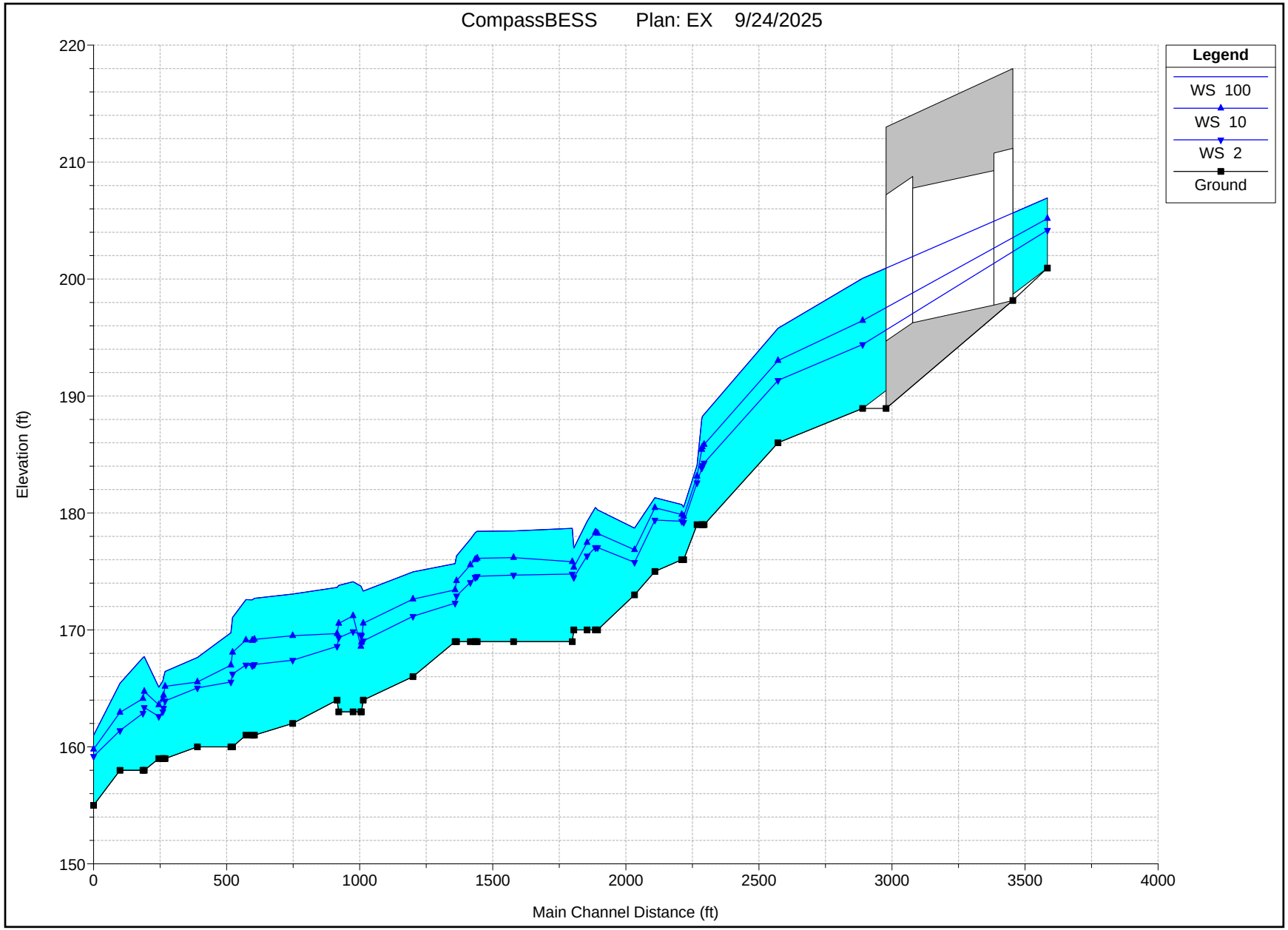
SCALE AS SHOWN | DATE JAN. 1984 | DWG. NO. L03-101-1A | SHEET 3B OF 35

3 inches on original drawing

JN 237-83-02

# ATTACHMENT 4

## HEC-RAS RESULTS


CompassBESS Plan: EX 9/24/2025
Legend
WS 100
WS 10
WS 2
Ground
Elevation (ft)
Main Channel Distance (ft)
220
210
200
190
180
170
160
150
0
500
1000
1500
2000
2500
3000
3500
4000

HEC-RAS Plan: Ex River: OSO_CREEK Reach: OSO_CREEK-DS-0

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | Max Chl Dpth | Shear Chan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | (ft) | (lb/sq ft) |
| OSO_CREEK-DS-0 | 48 | 100 | 6500.00 | 200.94 | 206.94 | 211.74 | 225.06 | 0.012241 | 34.14 | 190.37 | 35.64 | 2.60 | 6.00 | 3.39 |
| OSO_CREEK-DS-0 | 48 | 10 | 3558.00 | 200.94 | 205.17 | 208.37 | 217.17 | 0.012228 | 27.79 | 128.05 | 34.86 | 2.56 | 4.23 | 2.49 |
| OSO_CREEK-DS-0 | 48 | 2 | 2178.00 | 200.94 | 204.17 | 206.44 | 212.63 | 0.012230 | 23.33 | 93.36 | 34.42 | 2.50 | 3.23 | 1.91 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 47 | | Culvert | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 46 | 100 | 6500.00 | 188.94 | 200.06 | 200.06 | 205.29 | 0.001973 | 18.35 | 354.31 | 33.93 | 1.00 | 11.12 | 0.85 |
| OSO_CREEK-DS-0 | 46 | 10 | 3558.00 | 188.94 | 196.45 | 196.45 | 200.05 | 0.001928 | 15.22 | 233.75 | 32.79 | 1.00 | 7.51 | 0.64 |
| OSO_CREEK-DS-0 | 46 | 2 | 2178.00 | 188.94 | 194.41 | 194.41 | 197.03 | 0.001924 | 13.00 | 167.54 | 32.13 | 1.00 | 5.47 | 0.50 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 45 | 100 | 6500.00 | 186.00 | 195.79 | 195.79 | 199.21 | 0.007557 | 14.83 | 438.39 | 64.18 | 1.00 | 9.79 | 3.01 |
| OSO_CREEK-DS-0 | 45 | 10 | 3558.00 | 186.00 | 193.03 | 193.03 | 195.61 | 0.008182 | 12.89 | 276.04 | 53.52 | 1.00 | 7.03 | 2.49 |
| OSO_CREEK-DS-0 | 45 | 2 | 2178.00 | 186.00 | 191.33 | 191.33 | 193.36 | 0.008748 | 11.42 | 190.80 | 47.14 | 1.00 | 5.33 | 2.11 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 44 | 100 | 6500.00 | 179.00 | 188.43 | 190.62 | 195.56 | 0.020612 | 21.42 | 303.41 | 52.66 | 1.57 | 9.43 | 6.73 |
| OSO_CREEK-DS-0 | 44 | 10 | 3558.00 | 179.00 | 185.85 | 187.77 | 191.70 | 0.023436 | 19.39 | 183.51 | 40.69 | 1.61 | 6.85 | 5.98 |
| OSO_CREEK-DS-0 | 44 | 2 | 2178.00 | 179.00 | 184.27 | 185.78 | 189.11 | 0.026851 | 17.65 | 123.38 | 35.21 | 1.66 | 5.27 | 5.38 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 43 | 100 | 6500.00 | 179.00 | 188.25 | 190.43 | 195.42 | 0.020203 | 21.48 | 302.63 | 51.75 | 1.57 | 9.25 | 6.72 |
| OSO_CREEK-DS-0 | 43 | 10 | 3558.00 | 179.00 | 185.64 | 187.53 | 191.53 | 0.023358 | 19.46 | 182.83 | 40.58 | 1.62 | 6.64 | 6.01 |
| OSO_CREEK-DS-0 | 43 | 2 | 2178.00 | 179.00 | 184.07 | 185.58 | 188.92 | 0.026253 | 17.67 | 123.24 | 34.89 | 1.66 | 5.07 | 5.36 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 42 | 100 | 6500.00 | 179.00 | 188.03 | 190.25 | 195.35 | 0.020589 | 21.71 | 299.43 | 51.06 | 1.58 | 9.03 | 6.86 |
| OSO_CREEK-DS-0 | 42 | 10 | 3558.00 | 179.00 | 185.42 | 187.35 | 191.46 | 0.024176 | 19.70 | 180.57 | 40.45 | 1.64 | 6.42 | 6.18 |
| OSO_CREEK-DS-0 | 42 | 2 | 2178.00 | 179.00 | 183.85 | 185.42 | 188.84 | 0.027010 | 17.92 | 121.56 | 34.54 | 1.68 | 4.85 | 5.51 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 41 | 100 | 6500.00 | 179.00 | 184.07 | 186.67 | 194.41 | 0.079993 | 25.79 | 252.01 | 97.84 | 2.83 | 5.07 | 12.48 |
| OSO_CREEK-DS-0 | 41 | 10 | 3558.00 | 179.00 | 183.14 | 184.97 | 190.55 | 0.096573 | 21.84 | 162.91 | 94.03 | 2.93 | 4.14 | 10.19 |
| OSO_CREEK-DS-0 | 41 | 2 | 2178.00 | 179.00 | 182.58 | 183.97 | 188.01 | 0.082694 | 18.70 | 116.49 | 75.60 | 2.66 | 3.58 | 7.76 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 40 | 100 | 6500.00 | 176.00 | 180.49 | 182.95 | 190.29 | 0.077971 | 25.10 | 258.93 | 105.07 | 2.82 | 4.49 | 11.90 |
| OSO_CREEK-DS-0 | 40 | 10 | 3558.00 | 176.00 | 179.71 | 181.34 | 185.90 | 0.075908 | 19.96 | 178.24 | 100.20 | 2.64 | 3.71 | 8.38 |
| OSO_CREEK-DS-0 | 40 | 2 | 2178.00 | 176.00 | 179.20 | 180.40 | 183.67 | 0.079357 | 16.95 | 128.51 | 95.58 | 2.58 | 3.20 | 6.63 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 39 | 100 | 6500.00 | 176.00 | 180.72 | 183.12 | 189.51 | 0.058853 | 23.79 | 273.23 | 97.13 | 2.50 | 4.72 | 10.24 |
| OSO_CREEK-DS-0 | 39 | 10 | 3558.00 | 176.00 | 179.86 | 181.39 | 185.20 | 0.053116 | 18.52 | 192.11 | 92.36 | 2.26 | 3.86 | 6.85 |
| OSO_CREEK-DS-0 | 39 | 2 | 2178.00 | 176.00 | 179.29 | 180.39 | 183.00 | 0.050160 | 15.45 | 140.99 | 85.32 | 2.12 | 3.29 | 5.15 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 38 | 100 | 6500.00 | 175.00 | 181.31 | 182.33 | 185.34 | 0.015587 | 16.12 | 403.34 | 92.40 | 1.36 | 6.31 | 4.09 |
| OSO_CREEK-DS-0 | 38 | 10 | 3558.00 | 175.00 | 180.44 | 180.48 | 182.31 | 0.009207 | 10.96 | 324.52 | 89.69 | 1.02 | 5.44 | 2.01 |
| OSO_CREEK-DS-0 | 38 | 2 | 2178.00 | 175.00 | 179.40 | 179.40 | 180.76 | 0.009769 | 9.36 | 232.67 | 85.67 | 1.00 | 4.40 | 1.61 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 37 | 100 | 6500.00 | 173.00 | 178.70 | 180.20 | 183.93 | 0.018418 | 18.34 | 354.50 | 76.44 | 1.50 | 5.70 | 5.18 |
| OSO_CREEK-DS-0 | 37 | 10 | 3558.00 | 173.00 | 176.85 | 178.10 | 181.00 | 0.024722 | 16.33 | 217.84 | 70.57 | 1.64 | 3.85 | 4.69 |
| OSO_CREEK-DS-0 | 37 | 2 | 2178.00 | 173.00 | 175.78 | 176.84 | 179.30 | 0.032406 | 15.05 | 144.68 | 65.23 | 1.78 | 2.78 | 4.44 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 36 | 100 | 6500.00 | 170.00 | 180.27 | 179.56 | 182.05 | 0.005438 | 10.73 | 605.97 | 117.15 | 0.83 | 10.27 | 1.71 |
| OSO_CREEK-DS-0 | 36 | 10 | 3558.00 | 170.00 | 178.25 | 177.63 | 179.57 | 0.005741 | 9.21 | 386.24 | 97.76 | 0.82 | 8.25 | 1.38 |

HEC-RAS Plan: Ex River: OSO_CREEK Reach: OSO_CREEK-DS-0 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | Max Chl Dpth | Shear Chan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | (ft) | (lb/sq ft) |
| OSO_CREEK-DS-0 | 36 | 2 | 2178.00 | 170.00 | 177.05 | 176.21 | 178.00 | 0.005144 | 7.84 | 277.88 | 82.43 | 0.75 | 7.05 | 1.05 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 35 | 100 | 6500.00 | 170.00 | 180.42 | 179.35 | 181.94 | 0.004772 | 9.88 | 657.65 | 130.16 | 0.78 | 10.42 | 1.46 |
| OSO_CREEK-DS-0 | 35 | 10 | 3558.00 | 170.00 | 178.34 | 177.62 | 179.48 | 0.005262 | 8.58 | 414.85 | 109.60 | 0.78 | 8.34 | 1.21 |
| OSO_CREEK-DS-0 | 35 | 2 | 2178.00 | 170.00 | 177.06 | 176.08 | 177.95 | 0.004900 | 7.59 | 286.78 | 85.92 | 0.73 | 7.06 | 0.99 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 34 | 100 | 6500.00 | 170.00 | 180.47 | 179.30 | 181.91 | 0.004868 | 9.62 | 675.45 | 141.58 | 0.78 | 10.47 | 1.41 |
| OSO_CREEK-DS-0 | 34 | 10 | 3558.00 | 170.00 | 178.33 | 177.62 | 179.47 | 0.005300 | 8.54 | 416.80 | 111.59 | 0.78 | 8.33 | 1.21 |
| OSO_CREEK-DS-0 | 34 | 2 | 2178.00 | 170.00 | 177.04 | 176.08 | 177.94 | 0.004995 | 7.62 | 285.79 | 86.50 | 0.74 | 7.04 | 1.00 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 33 | 100 | 6500.00 | 170.00 | 179.27 | 179.27 | 181.62 | 0.008109 | 12.31 | 528.04 | 112.04 | 1.00 | 9.27 | 2.32 |
| OSO_CREEK-DS-0 | 33 | 10 | 3558.00 | 170.00 | 177.47 | 177.47 | 179.20 | 0.008980 | 10.54 | 337.63 | 97.88 | 1.00 | 7.47 | 1.89 |
| OSO_CREEK-DS-0 | 33 | 2 | 2178.00 | 170.00 | 176.32 | 176.32 | 177.69 | 0.009796 | 9.37 | 232.55 | 85.99 | 1.00 | 6.32 | 1.61 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 32 | 100 | 6500.00 | 170.00 | 176.99 | 178.01 | 180.91 | 0.015897 | 15.88 | 409.31 | 97.90 | 1.37 | 6.99 | 4.02 |
| OSO_CREEK-DS-0 | 32 | 10 | 3558.00 | 170.00 | 175.35 | 176.21 | 178.40 | 0.021053 | 14.00 | 254.12 | 91.19 | 1.48 | 5.35 | 3.57 |
| OSO_CREEK-DS-0 | 32 | 2 | 2178.00 | 170.00 | 174.49 | 175.16 | 176.85 | 0.024684 | 12.32 | 176.78 | 86.81 | 1.52 | 4.49 | 3.07 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 31 | 100 | 6500.00 | 169.00 | 178.69 | 178.09 | 180.72 | 0.005878 | 11.44 | 568.09 | 104.07 | 0.86 | 9.69 | 1.92 |
| OSO_CREEK-DS-0 | 31 | 10 | 3558.00 | 169.00 | 175.83 | 176.23 | 178.11 | 0.012936 | 12.11 | 293.72 | 89.78 | 1.18 | 6.83 | 2.55 |
| OSO_CREEK-DS-0 | 31 | 2 | 2178.00 | 169.00 | 174.78 | 175.15 | 176.59 | 0.014177 | 10.78 | 201.99 | 78.99 | 1.19 | 5.78 | 2.19 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 30 | 100 | 6500.00 | 169.00 | 178.47 | 176.44 | 179.61 | 0.002686 | 8.57 | 758.17 | 120.76 | 0.60 | 9.47 | 1.02 |
| OSO_CREEK-DS-0 | 30 | 10 | 3558.00 | 169.00 | 176.18 | 174.71 | 176.98 | 0.002855 | 7.17 | 496.02 | 108.99 | 0.59 | 7.18 | 0.80 |
| OSO_CREEK-DS-0 | 30 | 2 | 2178.00 | 169.00 | 174.69 | 173.62 | 175.33 | 0.003423 | 6.44 | 338.29 | 100.57 | 0.62 | 5.69 | 0.71 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 29 | 100 | 6500.00 | 169.00 | 178.43 | 175.29 | 179.23 | 0.001551 | 7.19 | 903.74 | 123.47 | 0.47 | 9.43 | 0.69 |
| OSO_CREEK-DS-0 | 29 | 10 | 3558.00 | 169.00 | 176.12 | 173.54 | 176.62 | 0.001455 | 5.69 | 625.52 | 117.10 | 0.43 | 7.12 | 0.47 |
| OSO_CREEK-DS-0 | 29 | 2 | 2178.00 | 169.00 | 174.59 | 172.35 | 174.95 | 0.001479 | 4.83 | 451.35 | 109.91 | 0.42 | 5.59 | 0.37 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 28 | 100 | 6500.00 | 169.00 | 178.35 | 175.54 | 179.22 | 0.001831 | 7.49 | 868.11 | 126.45 | 0.50 | 9.35 | 0.76 |
| OSO_CREEK-DS-0 | 28 | 10 | 3558.00 | 169.00 | 176.03 | 173.79 | 176.61 | 0.001813 | 6.07 | 585.90 | 116.79 | 0.48 | 7.03 | 0.55 |
| OSO_CREEK-DS-0 | 28 | 2 | 2178.00 | 169.00 | 174.51 | 172.69 | 174.94 | 0.001831 | 5.21 | 417.71 | 105.69 | 0.46 | 5.51 | 0.44 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 27 | 100 | 6500.00 | 169.00 | 178.30 | 175.56 | 179.21 | 0.001963 | 7.67 | 847.95 | 125.50 | 0.52 | 9.30 | 0.80 |
| OSO_CREEK-DS-0 | 27 | 10 | 3558.00 | 169.00 | 176.00 | 173.82 | 176.60 | 0.001910 | 6.23 | 571.52 | 113.79 | 0.49 | 7.00 | 0.58 |
| OSO_CREEK-DS-0 | 27 | 2 | 2178.00 | 169.00 | 174.49 | 172.72 | 174.93 | 0.001913 | 5.32 | 409.13 | 103.50 | 0.47 | 5.49 | 0.46 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 26 | 100 | 6500.00 | 169.00 | 177.76 | 176.17 | 179.12 | 0.003741 | 9.35 | 695.08 | 123.72 | 0.70 | 8.76 | 1.27 |
| OSO_CREEK-DS-0 | 26 | 10 | 3558.00 | 169.00 | 175.55 | 174.34 | 176.52 | 0.003621 | 7.88 | 451.61 | 101.50 | 0.66 | 6.55 | 0.97 |
| OSO_CREEK-DS-0 | 26 | 2 | 2178.00 | 169.00 | 174.05 | 173.08 | 174.85 | 0.004450 | 7.13 | 305.26 | 93.23 | 0.70 | 5.05 | 0.88 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 25 | 100 | 6500.00 | 169.00 | 176.33 | 176.33 | 178.73 | 0.008202 | 12.44 | 522.54 | 109.41 | 1.00 | 7.33 | 2.36 |
| OSO_CREEK-DS-0 | 25 | 10 | 3558.00 | 169.00 | 174.20 | 174.20 | 176.14 | 0.008797 | 11.17 | 318.43 | 82.09 | 1.00 | 5.20 | 2.05 |
| OSO_CREEK-DS-0 | 25 | 2 | 2178.00 | 169.00 | 172.90 | 172.90 | 174.44 | 0.009697 | 9.96 | 218.73 | 72.08 | 1.01 | 3.90 | 1.77 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 24 | 100 | 6500.00 | 169.00 | 175.67 | 176.08 | 178.64 | 0.010005 | 13.82 | 470.30 | 98.04 | 1.11 | 6.67 | 2.91 |
| OSO_CREEK-DS-0 | 24 | 10 | 3558.00 | 169.00 | 173.42 | 173.95 | 176.02 | 0.013208 | 12.92 | 275.39 | 78.23 | 1.21 | 4.42 | 2.82 |

HEC-RAS Plan: Ex River: OSO_CREEK Reach: OSO_CREEK-DS-0 (Continued)

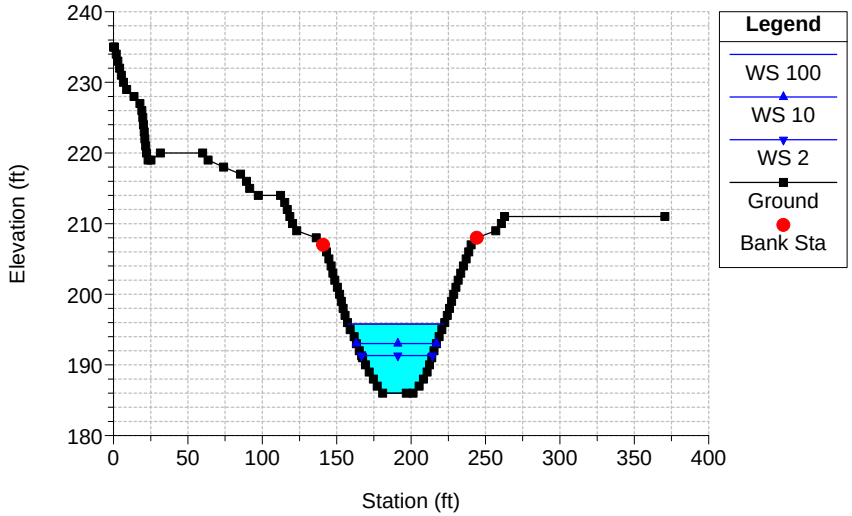
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | Max Chl Dpth | Shear Chan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | (ft) | (lb/sq ft) |
| OSO_CREEK-DS-0 | 24 | 2 | 2178.00 | 169.00 | 172.29 | 172.73 | 174.33 | 0.015311 | 11.45 | 190.20 | 72.66 | 1.25 | 3.29 | 2.44 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 23 | 100 | 6500.00 | 166.00 | 174.96 | 172.93 | 176.04 | 0.002708 | 8.36 | 777.62 | 128.28 | 0.60 | 8.96 | 0.99 |
| OSO_CREEK-DS-0 | 23 | 10 | 3558.00 | 166.00 | 172.63 | 171.16 | 173.43 | 0.002987 | 7.15 | 497.60 | 111.85 | 0.60 | 6.63 | 0.80 |
| OSO_CREEK-DS-0 | 23 | 2 | 2178.00 | 166.00 | 171.17 | 170.11 | 171.80 | 0.003411 | 6.37 | 341.71 | 100.83 | 0.61 | 5.17 | 0.70 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 22 | 100 | 6500.00 | 164.00 | 173.32 | 172.47 | 175.27 | 0.005247 | 11.19 | 580.66 | 99.37 | 0.82 | 9.32 | 1.81 |
| OSO_CREEK-DS-0 | 22 | 10 | 3558.00 | 164.00 | 170.56 | 170.56 | 172.42 | 0.009028 | 10.94 | 325.22 | 87.53 | 1.00 | 6.56 | 2.00 |
| OSO_CREEK-DS-0 | 22 | 2 | 2178.00 | 164.00 | 169.06 | 169.06 | 170.71 | 0.009371 | 10.29 | 211.74 | 64.41 | 1.00 | 5.06 | 1.84 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 21 | 100 | 6500.00 | 163.00 | 173.64 | 171.89 | 175.09 | 0.003401 | 9.67 | 672.53 | 103.20 | 0.67 | 10.64 | 1.30 |
| OSO_CREEK-DS-0 | 21 | 10 | 3558.00 | 163.00 | 168.95 | 169.93 | 172.20 | 0.016937 | 14.46 | 246.02 | 70.17 | 1.36 | 5.95 | 3.55 |
| OSO_CREEK-DS-0 | 21 | 2 | 2178.00 | 163.00 | 169.50 | 168.44 | 170.40 | 0.004253 | 7.62 | 285.87 | 75.30 | 0.69 | 6.49 | 0.96 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 20 | 100 | 6500.00 | 163.00 | 173.75 | 171.65 | 175.04 | 0.002915 | 9.11 | 713.80 | 106.49 | 0.62 | 10.75 | 1.14 |
| OSO_CREEK-DS-0 | 20 | 10 | 3558.00 | 163.00 | 168.59 | 169.66 | 172.13 | 0.019627 | 15.09 | 235.78 | 70.65 | 1.46 | 5.59 | 3.93 |
| OSO_CREEK-DS-0 | 20 | 2 | 2178.00 | 163.00 | 169.58 | 168.29 | 170.35 | 0.003493 | 7.02 | 310.32 | 79.62 | 0.63 | 6.58 | 0.81 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 19 | 100 | 6500.00 | 163.00 | 174.12 | 170.01 | 174.80 | 0.001248 | 6.61 | 982.65 | 125.08 | 0.42 | 11.12 | 0.57 |
| OSO_CREEK-DS-0 | 19 | 10 | 3558.00 | 163.00 | 171.20 | 168.29 | 171.69 | 0.001281 | 5.60 | 635.33 | 106.87 | 0.40 | 8.20 | 0.45 |
| OSO_CREEK-DS-0 | 19 | 2 | 2178.00 | 163.00 | 169.86 | 167.19 | 170.16 | 0.001016 | 4.39 | 496.09 | 101.93 | 0.35 | 6.86 | 0.29 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 18 | 100 | 6500.00 | 163.00 | 173.80 | 171.29 | 174.69 | 0.002551 | 7.55 | 861.37 | 147.04 | 0.55 | 10.80 | 0.83 |
| OSO_CREEK-DS-0 | 18 | 10 | 3558.00 | 163.00 | 170.55 | 169.43 | 171.53 | 0.004297 | 7.91 | 449.80 | 103.99 | 0.67 | 7.55 | 1.02 |
| OSO_CREEK-DS-0 | 18 | 2 | 2178.00 | 163.00 | 169.33 | 168.39 | 170.02 | 0.004240 | 6.66 | 327.17 | 96.83 | 0.64 | 6.33 | 0.78 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 17 | 100 | 6500.00 | 164.00 | 173.64 | 171.54 | 174.66 | 0.003022 | 8.10 | 802.89 | 148.37 | 0.61 | 9.64 | 0.97 |
| OSO_CREEK-DS-0 | 17 | 10 | 3558.00 | 164.00 | 169.69 | 169.63 | 171.42 | 0.008809 | 10.54 | 337.64 | 93.64 | 0.98 | 5.69 | 1.88 |
| OSO_CREEK-DS-0 | 17 | 2 | 2178.00 | 164.00 | 168.59 | 168.59 | 169.92 | 0.010448 | 9.23 | 235.91 | 91.48 | 1.01 | 4.59 | 1.61 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 16 | 100 | 6500.00 | 162.00 | 173.07 | 169.64 | 174.23 | 0.002071 | 8.63 | 752.87 | 93.19 | 0.54 | 11.07 | 0.97 |
| OSO_CREEK-DS-0 | 16 | 10 | 3558.00 | 162.00 | 169.51 | 167.44 | 170.46 | 0.002566 | 7.82 | 454.70 | 77.03 | 0.57 | 7.51 | 0.88 |
| OSO_CREEK-DS-0 | 16 | 2 | 2178.00 | 162.00 | 167.41 | 166.18 | 168.23 | 0.003319 | 7.25 | 300.40 | 70.35 | 0.62 | 5.41 | 0.84 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 15 | 100 | 6500.00 | 161.00 | 172.71 | 169.05 | 173.93 | 0.001899 | 8.89 | 730.93 | 79.96 | 0.52 | 11.71 | 0.99 |
| OSO_CREEK-DS-0 | 15 | 10 | 3558.00 | 161.00 | 169.19 | 166.73 | 170.11 | 0.002179 | 7.67 | 463.69 | 72.06 | 0.53 | 8.19 | 0.82 |
| OSO_CREEK-DS-0 | 15 | 2 | 2178.00 | 161.00 | 167.04 | 165.28 | 167.79 | 0.002593 | 6.92 | 314.64 | 66.12 | 0.56 | 6.04 | 0.74 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 14 | 100 | 6500.00 | 161.00 | 172.60 | 169.13 | 173.91 | 0.002053 | 9.18 | 707.97 | 78.16 | 0.54 | 11.60 | 1.06 |
| OSO_CREEK-DS-0 | 14 | 10 | 3558.00 | 161.00 | 169.11 | 166.76 | 170.09 | 0.002339 | 7.92 | 449.20 | 70.04 | 0.55 | 8.11 | 0.88 |
| OSO_CREEK-DS-0 | 14 | 2 | 2178.00 | 161.00 | 166.98 | 165.29 | 167.77 | 0.002748 | 7.13 | 305.53 | 64.03 | 0.58 | 5.98 | 0.78 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 13 | 100 | 6500.00 | 161.00 | 172.57 | 169.13 | 173.91 | 0.002097 | 9.27 | 701.16 | 77.36 | 0.54 | 11.57 | 1.08 |
| OSO_CREEK-DS-0 | 13 | 10 | 3558.00 | 161.00 | 169.09 | 166.75 | 170.08 | 0.002372 | 7.98 | 445.80 | 69.36 | 0.55 | 8.09 | 0.89 |
| OSO_CREEK-DS-0 | 13 | 2 | 2178.00 | 161.00 | 166.96 | 165.29 | 167.76 | 0.002752 | 7.16 | 304.09 | 63.26 | 0.58 | 5.96 | 0.79 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 12 | 100 | 6500.00 | 161.00 | 172.59 | 168.70 | 173.84 | 0.001875 | 8.96 | 725.33 | 76.09 | 0.51 | 11.59 | 1.00 |
| OSO_CREEK-DS-0 | 12 | 10 | 3558.00 | 161.00 | 169.13 | 166.31 | 170.00 | 0.001923 | 7.49 | 475.21 | 68.50 | 0.50 | 8.13 | 0.77 |

HEC-RAS Plan: Ex River: OSO_CREEK Reach: OSO_CREEK-DS-0 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | Max Chl Dpth | Shear Chan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | (ft) | (lb/sq ft) |
| OSO_CREEK-DS-0 | 12 | 2 | 2178.00 | 161.00 | 167.00 | 164.91 | 167.66 | 0.002055 | 6.51 | 334.68 | 63.93 | 0.50 | 6.00 | 0.63 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 11 | 100 | 6500.00 | 160.00 | 171.06 | 169.51 | 173.57 | 0.004476 | 12.71 | 511.61 | 60.80 | 0.77 | 11.06 | 2.10 |
| OSO_CREEK-DS-0 | 11 | 10 | 3558.00 | 160.00 | 168.09 | 166.75 | 169.78 | 0.004260 | 10.43 | 341.03 | 53.91 | 0.73 | 8.09 | 1.54 |
| OSO_CREEK-DS-0 | 11 | 2 | 2178.00 | 160.00 | 166.23 | 165.11 | 167.46 | 0.004224 | 8.90 | 244.83 | 49.91 | 0.71 | 6.23 | 1.21 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 10 | 100 | 6500.00 | 160.00 | 169.76 | 169.76 | 173.42 | 0.007777 | 15.34 | 423.61 | 58.55 | 1.01 | 9.76 | 3.20 |
| OSO_CREEK-DS-0 | 10 | 10 | 3558.00 | 160.00 | 166.98 | 166.98 | 169.64 | 0.008246 | 13.09 | 271.81 | 51.05 | 1.00 | 6.98 | 2.56 |
| OSO_CREEK-DS-0 | 10 | 2 | 2178.00 | 160.00 | 165.54 | 165.33 | 167.37 | 0.007548 | 10.84 | 200.84 | 47.61 | 0.93 | 5.54 | 1.89 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 9 | 100 | 6500.00 | 160.00 | 167.64 | 168.42 | 172.17 | 0.011250 | 17.06 | 380.95 | 59.04 | 1.18 | 7.64 | 4.11 |
| OSO_CREEK-DS-0 | 9 | 10 | 3558.00 | 160.00 | 165.54 | 165.91 | 168.45 | 0.010738 | 13.67 | 260.21 | 55.96 | 1.12 | 5.54 | 2.91 |
| OSO_CREEK-DS-0 | 9 | 2 | 2178.00 | 160.00 | 165.04 | 164.43 | 166.41 | 0.005700 | 9.37 | 232.40 | 55.19 | 0.81 | 5.04 | 1.41 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 8 | 100 | 6500.00 | 159.00 | 166.45 | 167.35 | 170.60 | 0.012567 | 16.34 | 397.72 | 75.32 | 1.25 | 7.45 | 3.96 |
| OSO_CREEK-DS-0 | 8 | 10 | 3558.00 | 159.00 | 165.17 | 165.17 | 167.31 | 0.008647 | 11.73 | 303.28 | 72.05 | 1.01 | 6.17 | 2.19 |
| OSO_CREEK-DS-0 | 8 | 2 | 2178.00 | 159.00 | 163.93 | 163.93 | 165.51 | 0.009289 | 10.09 | 215.91 | 68.53 | 1.00 | 4.93 | 1.78 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 7 | 100 | 6500.00 | 159.00 | 165.94 | 167.08 | 170.48 | 0.014897 | 17.10 | 380.06 | 76.58 | 1.35 | 6.94 | 4.43 |
| OSO_CREEK-DS-0 | 7 | 10 | 3558.00 | 159.00 | 164.42 | 164.96 | 167.19 | 0.013375 | 13.35 | 266.42 | 72.59 | 1.23 | 5.42 | 2.97 |
| OSO_CREEK-DS-0 | 7 | 2 | 2178.00 | 159.00 | 163.31 | 163.74 | 165.40 | 0.014835 | 11.58 | 188.14 | 69.21 | 1.24 | 4.31 | 2.46 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 6 | 100 | 6500.00 | 159.00 | 165.63 | 166.93 | 170.42 | 0.016361 | 17.57 | 370.00 | 77.00 | 1.41 | 6.63 | 4.72 |
| OSO_CREEK-DS-0 | 6 | 10 | 3558.00 | 159.00 | 164.08 | 164.82 | 167.12 | 0.015608 | 13.99 | 254.40 | 72.77 | 1.32 | 5.08 | 3.31 |
| OSO_CREEK-DS-0 | 6 | 2 | 2178.00 | 159.00 | 163.01 | 163.60 | 165.33 | 0.017702 | 12.21 | 178.45 | 69.34 | 1.34 | 4.01 | 2.79 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 5 | 100 | 6500.00 | 159.00 | 165.11 | 166.54 | 170.14 | 0.018083 | 17.99 | 361.31 | 77.97 | 1.47 | 6.11 | 5.01 |
| OSO_CREEK-DS-0 | 5 | 10 | 3558.00 | 159.00 | 163.59 | 164.45 | 166.84 | 0.017878 | 14.45 | 246.20 | 74.10 | 1.40 | 4.59 | 3.60 |
| OSO_CREEK-DS-0 | 5 | 2 | 2178.00 | 159.00 | 162.60 | 163.25 | 165.03 | 0.019973 | 12.50 | 174.24 | 71.44 | 1.41 | 3.60 | 2.98 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 3.1 | 100 | 6500.00 | 158.00 | 167.71 | 166.34 | 169.46 | 0.004158 | 10.61 | 612.41 | 95.84 | 0.74 | 9.71 | 1.57 |
| OSO_CREEK-DS-0 | 3.1 | 10 | 3558.00 | 158.00 | 164.74 | 164.11 | 166.31 | 0.005694 | 10.07 | 353.27 | 76.93 | 0.83 | 6.74 | 1.57 |
| OSO_CREEK-DS-0 | 3.1 | 2 | 2178.00 | 158.00 | 163.37 | 162.86 | 164.53 | 0.005832 | 8.64 | 252.11 | 71.07 | 0.81 | 5.37 | 1.26 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 3 | 100 | 6500.00 | 158.00 | 167.64 | 166.36 | 169.44 | 0.004357 | 10.78 | 603.22 | 95.40 | 0.76 | 9.64 | 1.63 |
| OSO_CREEK-DS-0 | 3 | 10 | 3558.00 | 158.00 | 164.13 | 164.13 | 166.23 | 0.008710 | 11.62 | 306.17 | 74.17 | 1.01 | 6.13 | 2.17 |
| OSO_CREEK-DS-0 | 3 | 2 | 2178.00 | 158.00 | 162.88 | 162.88 | 164.45 | 0.009275 | 10.05 | 216.67 | 69.08 | 1.00 | 4.88 | 1.77 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 2 | 100 | 6500.00 | 158.00 | 165.44 | 165.44 | 168.79 | 0.007878 | 14.69 | 442.35 | 66.18 | 1.00 | 7.44 | 3.01 |
| OSO_CREEK-DS-0 | 2 | 10 | 3558.00 | 158.00 | 162.94 | 163.06 | 165.41 | 0.009321 | 12.61 | 282.22 | 62.21 | 1.04 | 4.94 | 2.49 |
| OSO_CREEK-DS-0 | 2 | 2 | 2178.00 | 158.00 | 161.39 | 161.70 | 163.48 | 0.012415 | 11.59 | 187.96 | 59.51 | 1.15 | 3.39 | 2.36 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 1 | 100 | 6500.00 | 155.00 | 160.98 | 162.82 | 167.14 | 0.030249 | 19.91 | 326.39 | 87.88 | 1.82 | 5.98 | 6.64 |
| OSO_CREEK-DS-0 | 1 | 10 | 3558.00 | 155.00 | 159.80 | 160.96 | 163.73 | 0.030700 | 15.91 | 223.61 | 86.40 | 1.74 | 4.80 | 4.76 |
| OSO_CREEK-DS-0 | 1 | 2 | 2178.00 | 155.00 | 159.20 | 159.91 | 161.69 | 0.027094 | 12.68 | 171.79 | 85.55 | 1.58 | 4.20 | 3.28 |

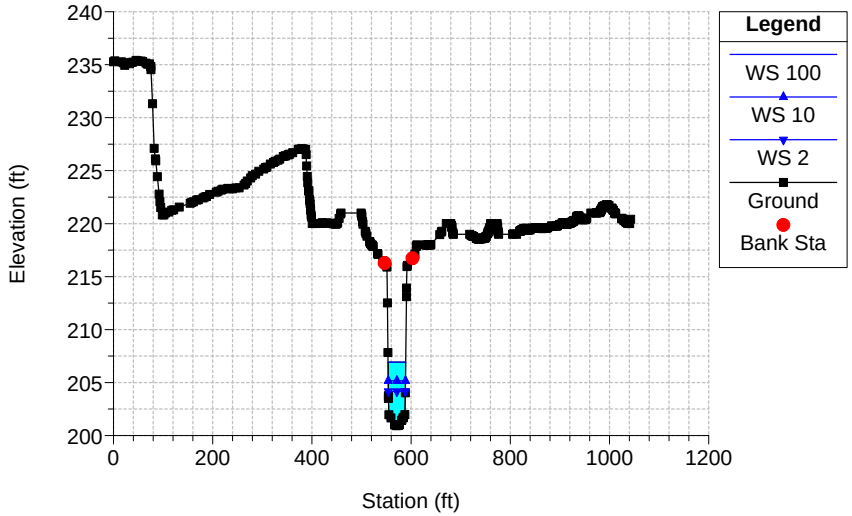
CompassBESS Plan: 1) Ex 9/24/2025

RS = 45



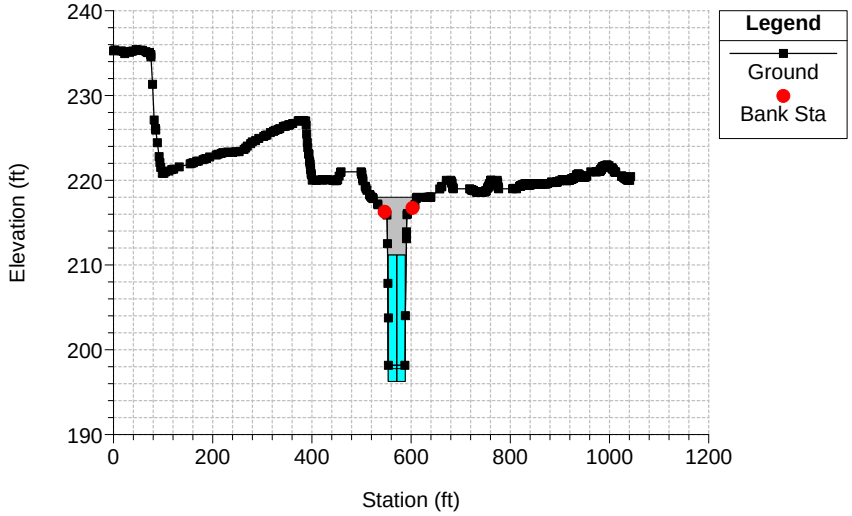

CompassBESS Plan: 1) Ex 9/24/2025

RS = 48



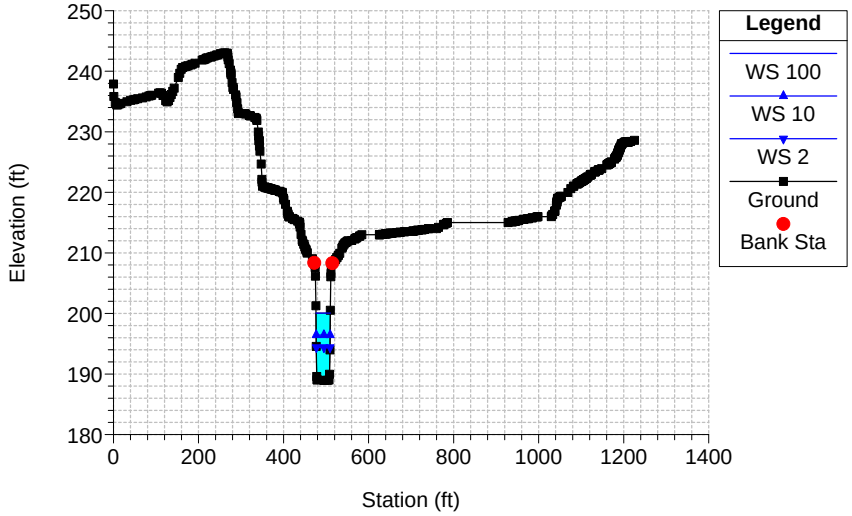

CompassBESS Plan: 1) Ex 9/24/2025

RS = 47 Culv

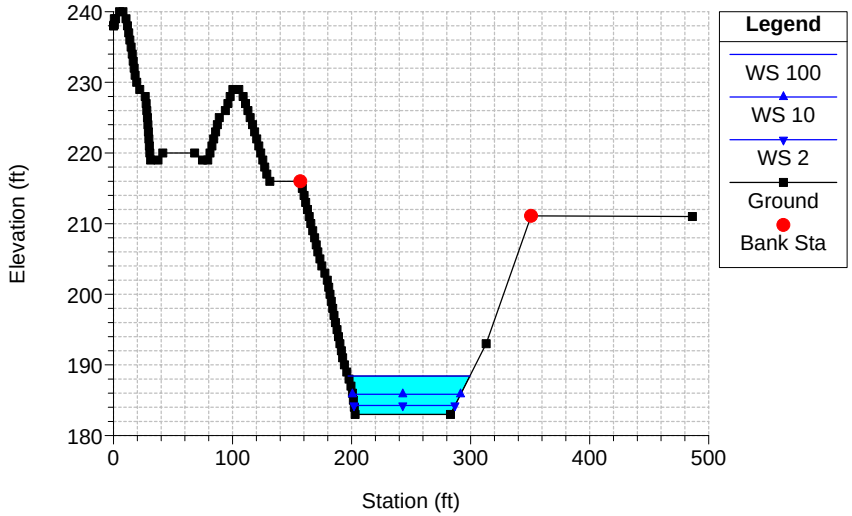



CompassBESS Plan: 1) Ex 9/24/2025

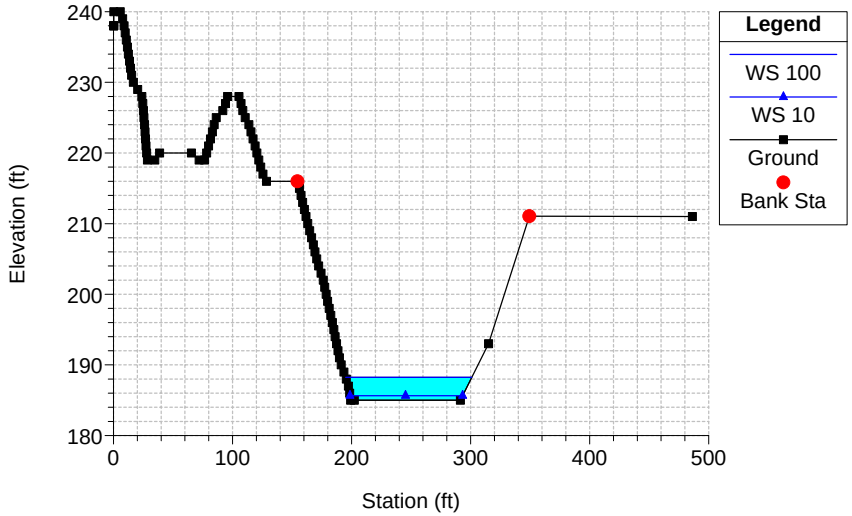
RS = 46



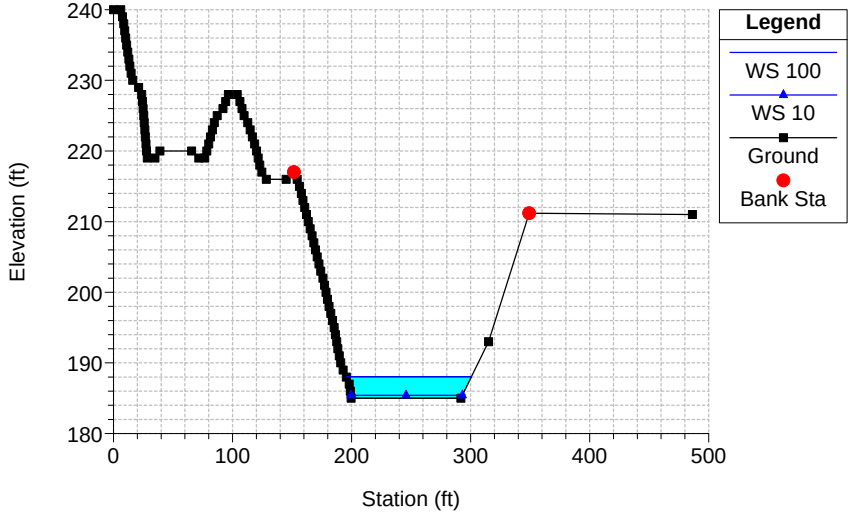
CompassBESS Plan: 1) Ex 9/24/2025
RS = 44



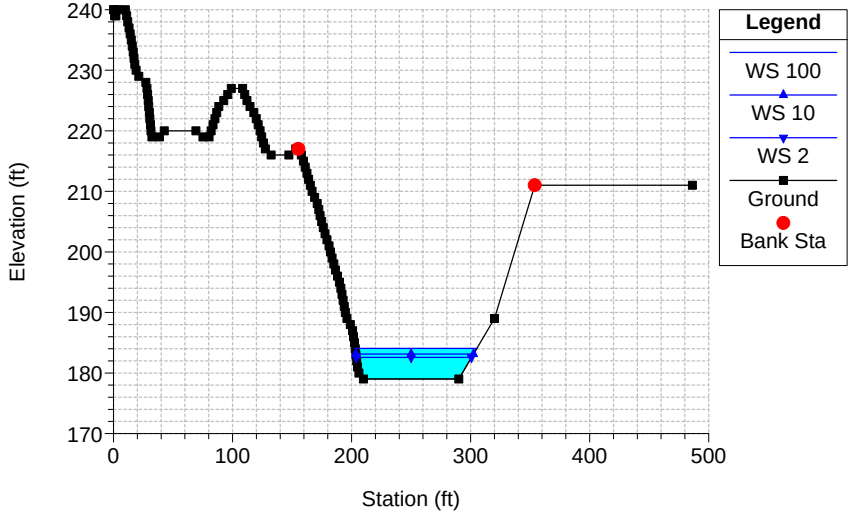

CompassBESS Plan: 1) Ex 9/24/2025
RS = 43




CompassBESS Plan: 1) Ex 9/24/2025
RS = 42

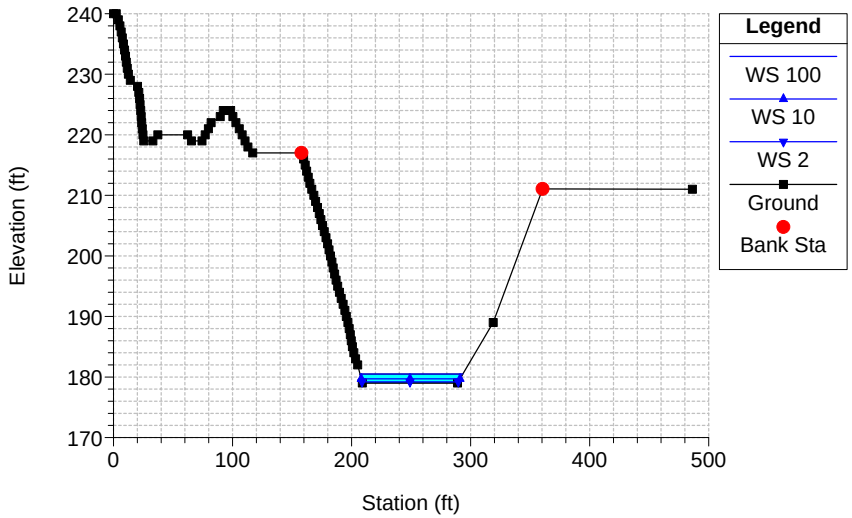



CompassBESS Plan: 1) Ex 9/24/2025
RS = 41



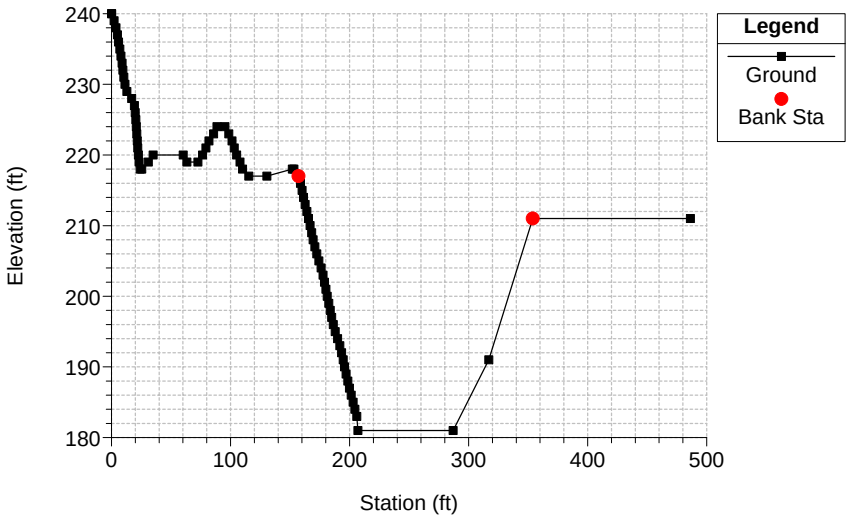
CompassBESS Plan: 1) Ex 9/24/2025

RS = 40



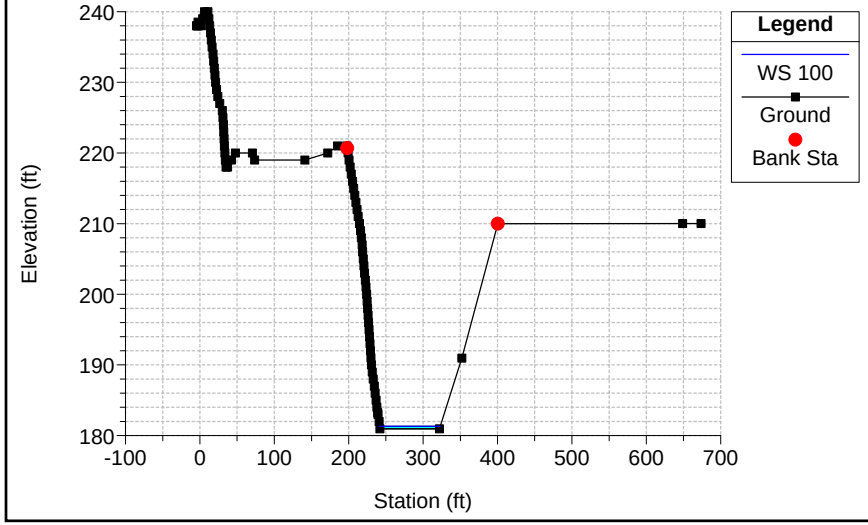

CompassBESS Plan: 1) Ex 9/24/2025

RS = 39



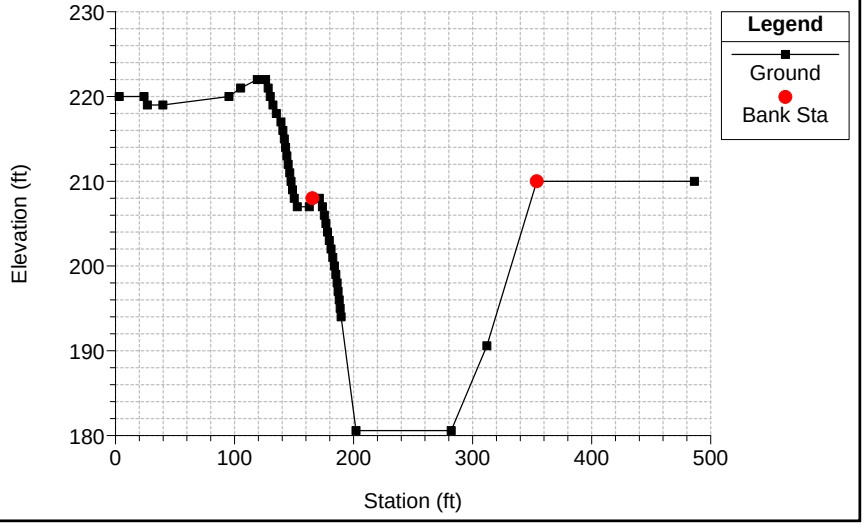

CompassBESS Plan: 1) Ex 9/24/2025

RS = 38



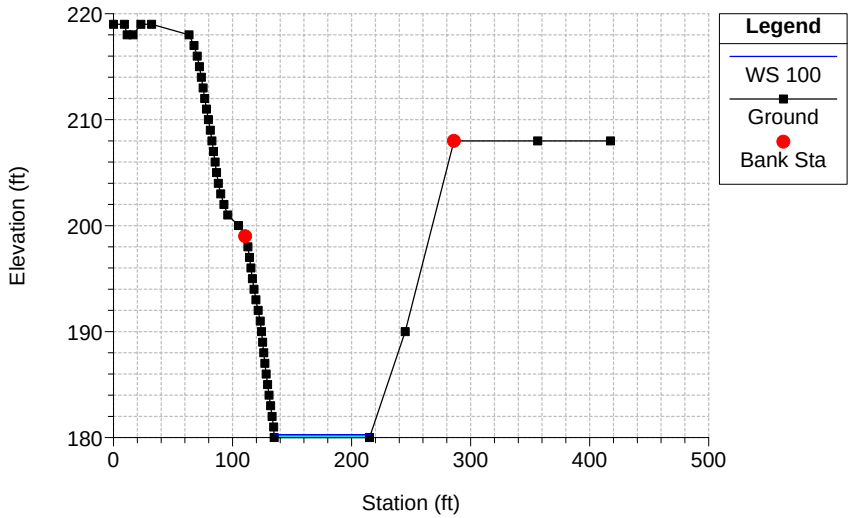

CompassBESS Plan: 1) Ex 9/24/2025

RS = 37



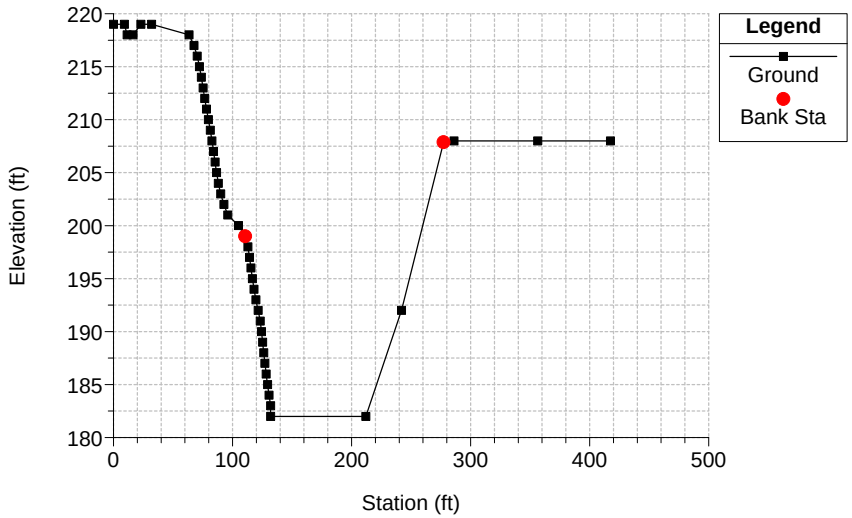
CompassBESS Plan: 1) Ex 9/24/2025

RS = 36



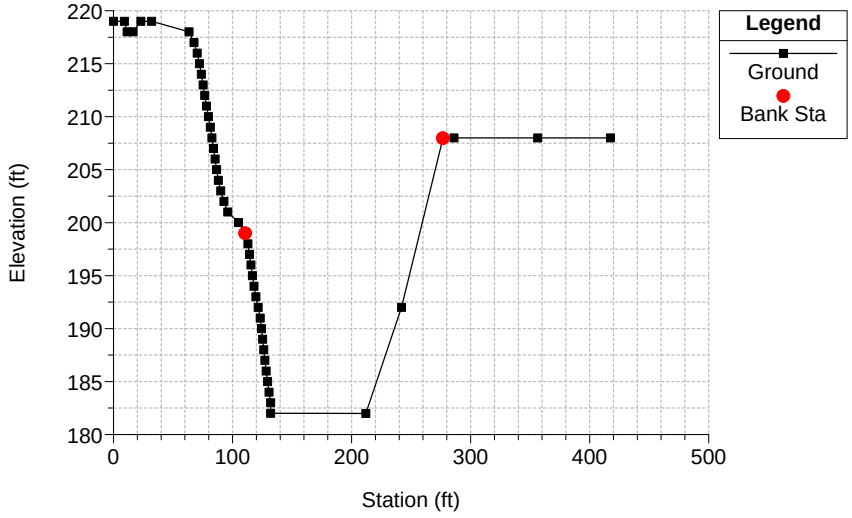

CompassBESS Plan: 1) Ex 9/24/2025

RS = 35



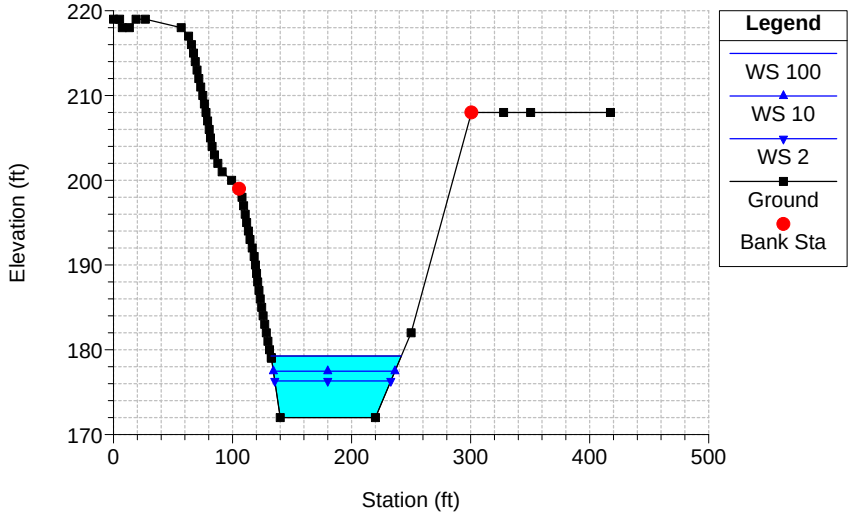

CompassBESS Plan: 1) Ex 9/24/2025

RS = 34



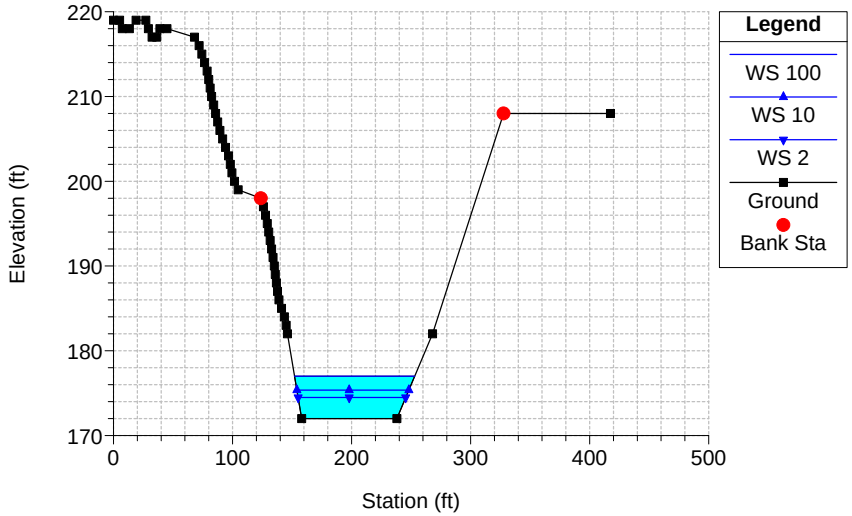

CompassBESS Plan: 1) Ex 9/24/2025

RS = 33



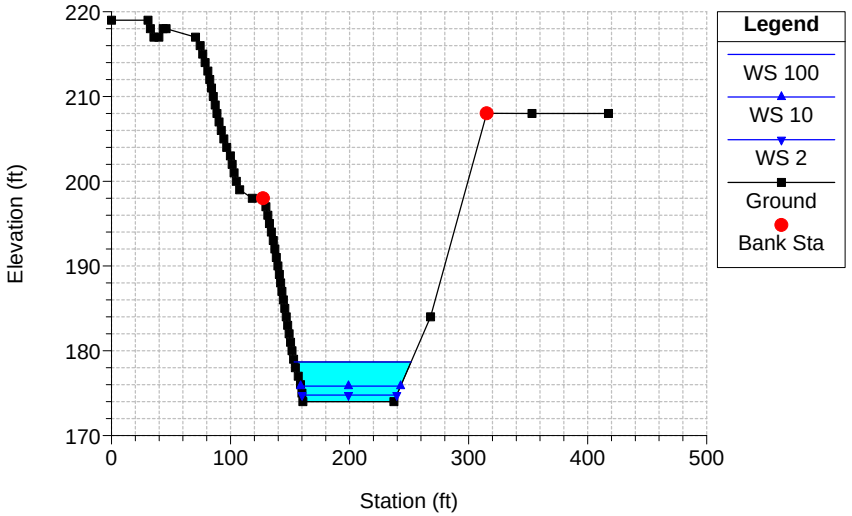
CompassBESS Plan: 1) Ex 9/24/2025

RS = 32



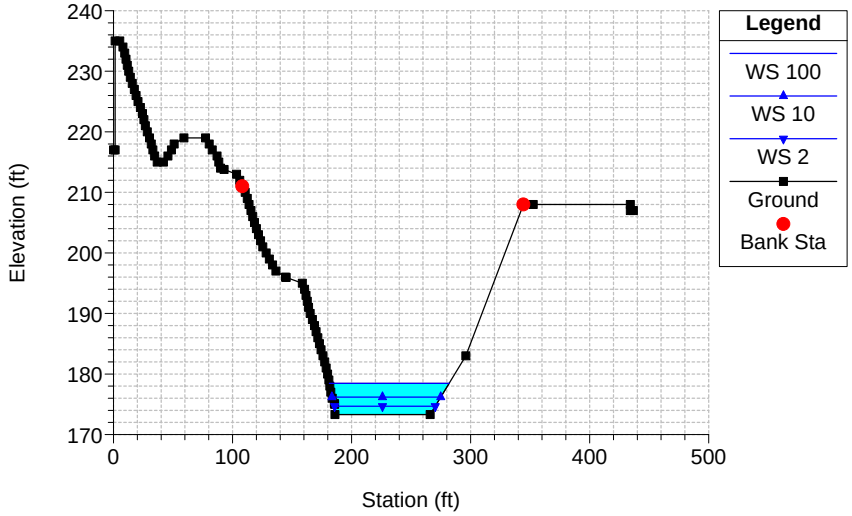

CompassBESS Plan: 1) Ex 9/24/2025

RS = 31



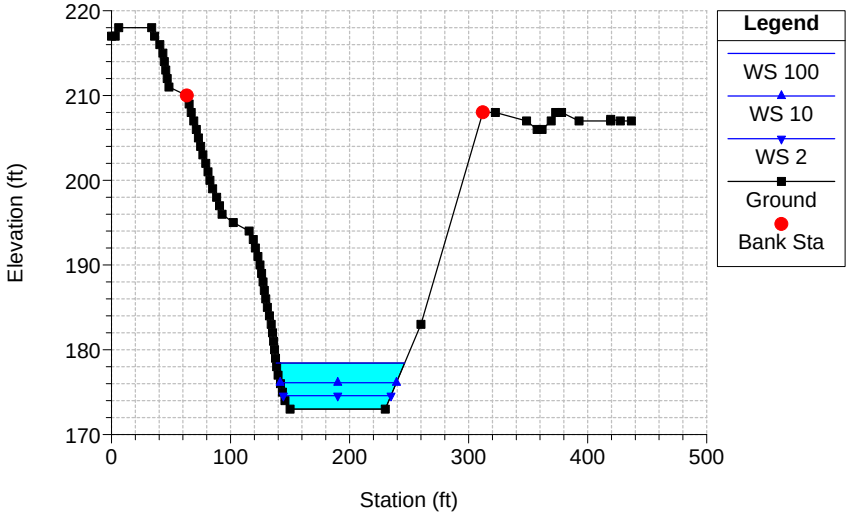

CompassBESS Plan: 1) Ex 9/24/2025

RS = 30

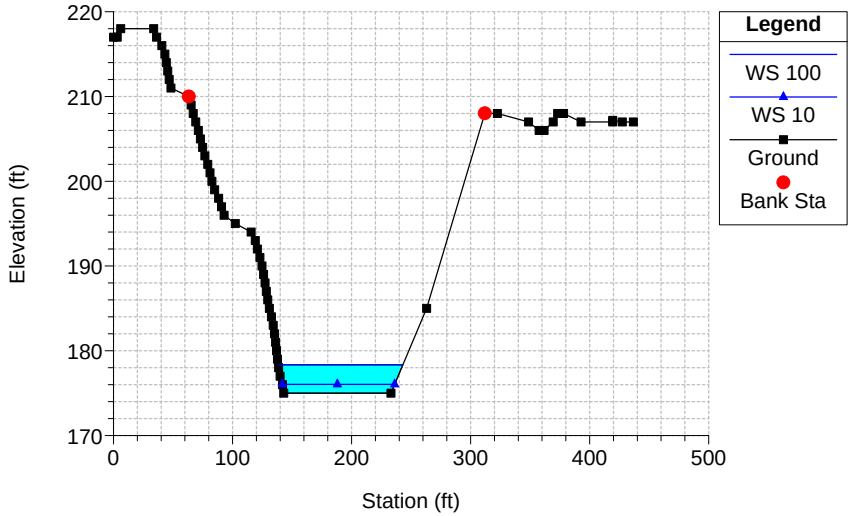



CompassBESS Plan: 1) Ex 9/24/2025

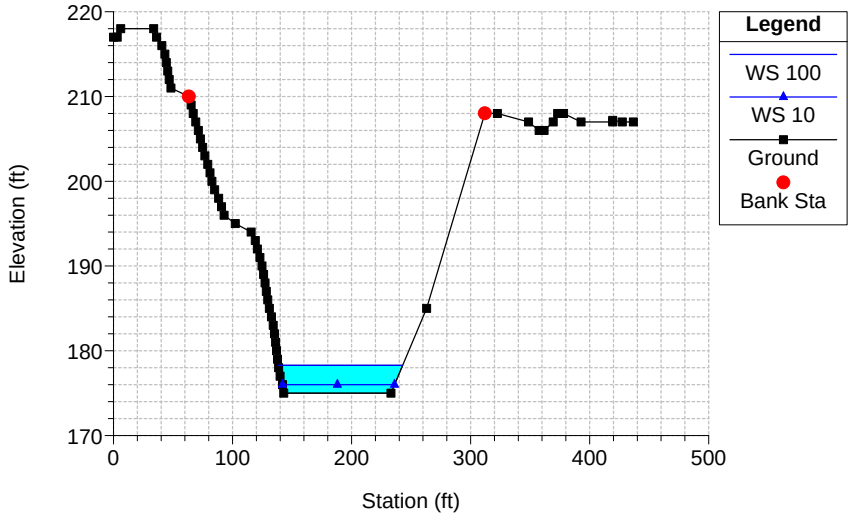
RS = 29



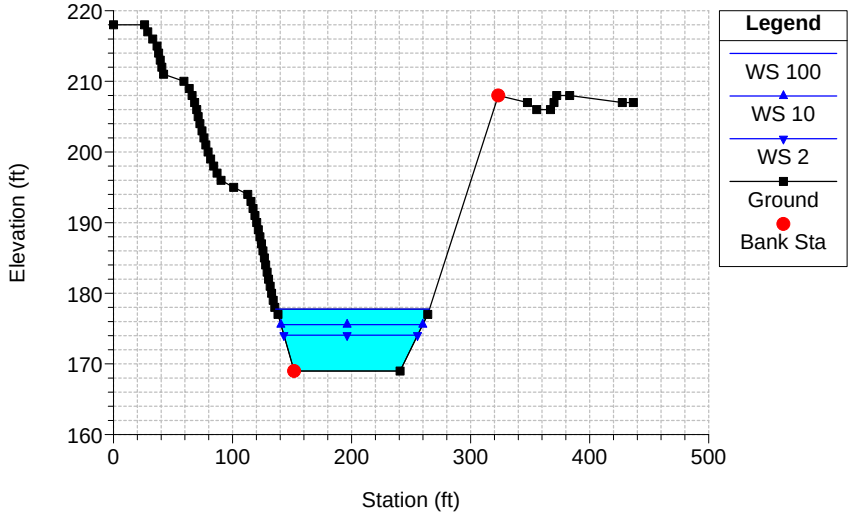
CompassBESS Plan: 1) Ex 9/24/2025
RS = 28



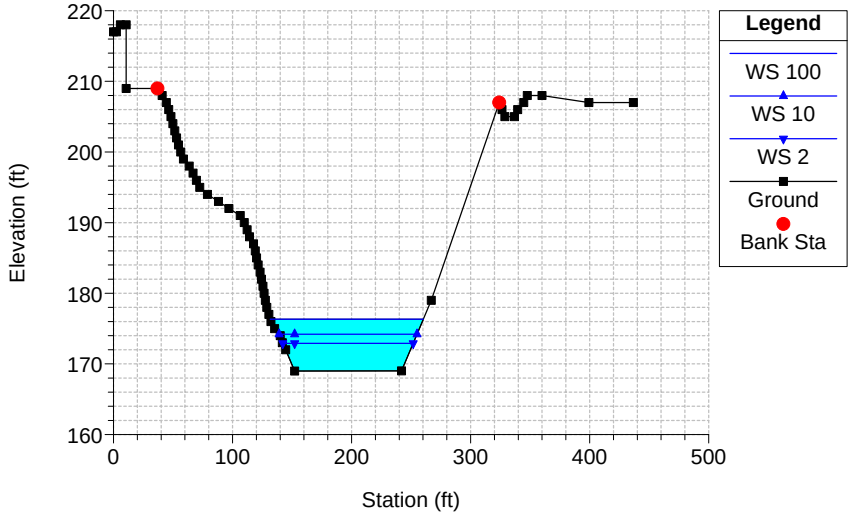

CompassBESS Plan: 1) Ex 9/24/2025
RS = 27




CompassBESS Plan: 1) Ex 9/24/2025
RS = 26

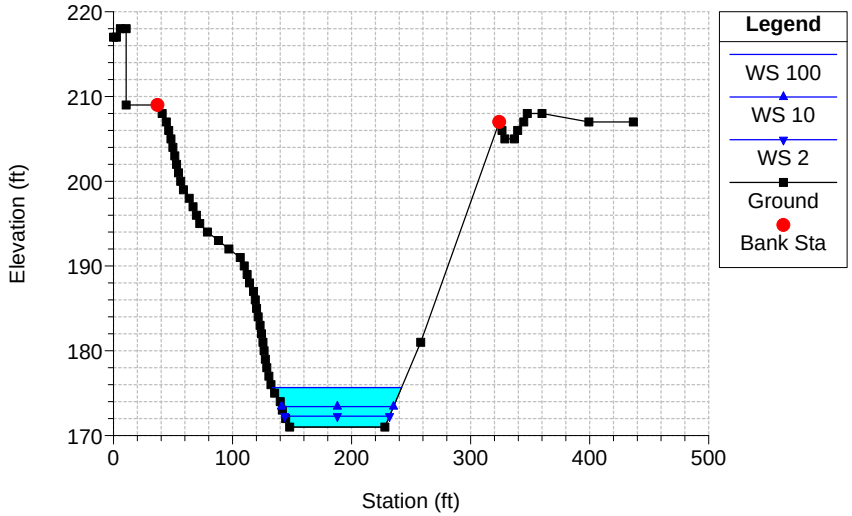



CompassBESS Plan: 1) Ex 9/24/2025
RS = 25



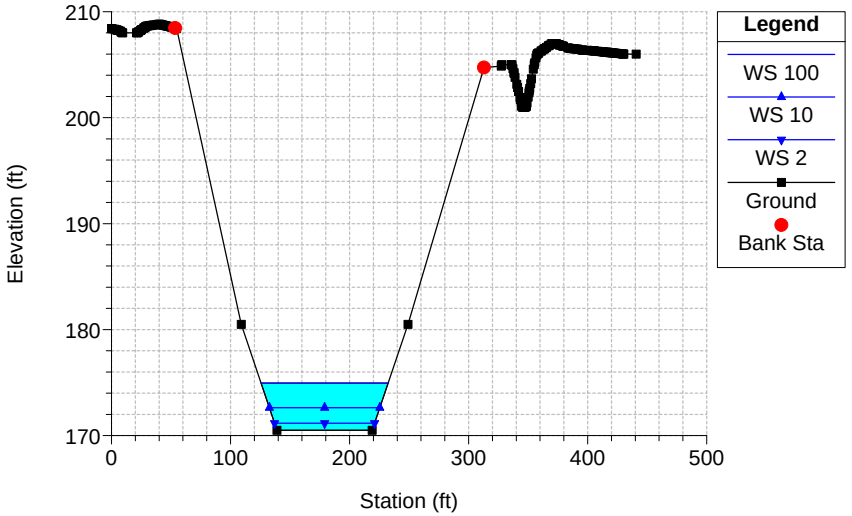
CompassBESS Plan: 1) Ex 9/24/2025

RS = 24



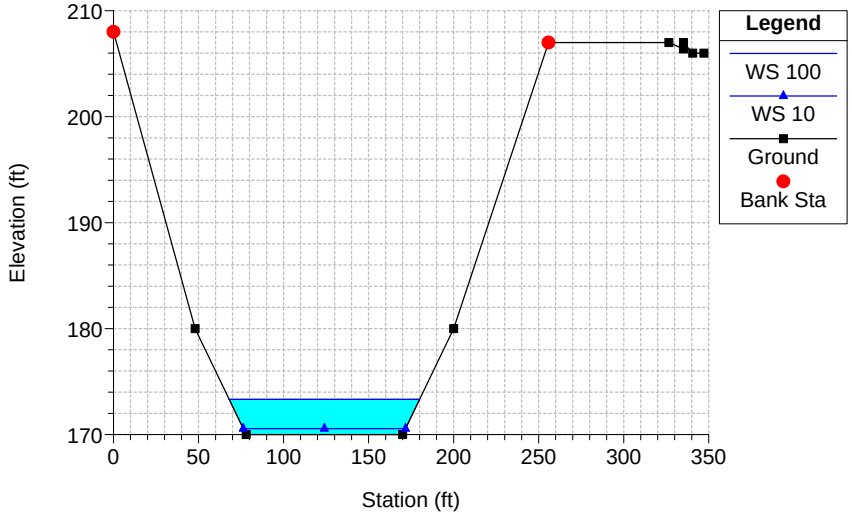

CompassBESS Plan: 1) Ex 9/24/2025

RS = 23



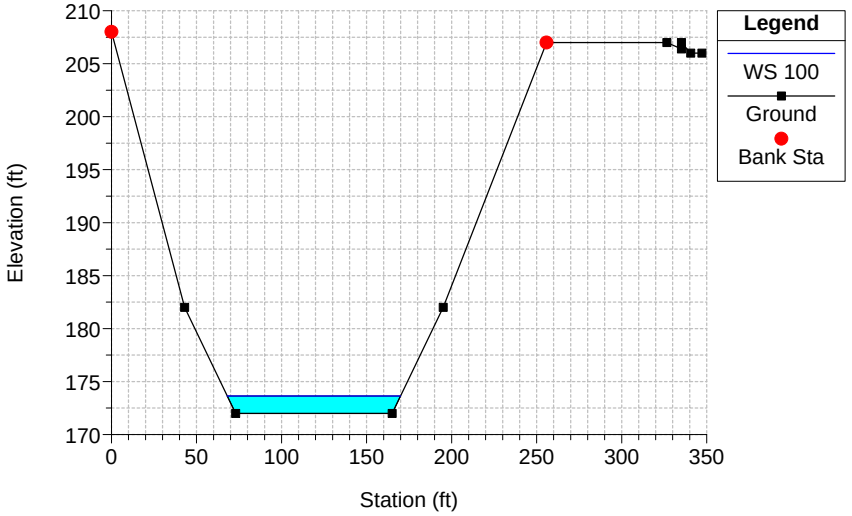

CompassBESS Plan: 1) Ex 9/24/2025

RS = 22



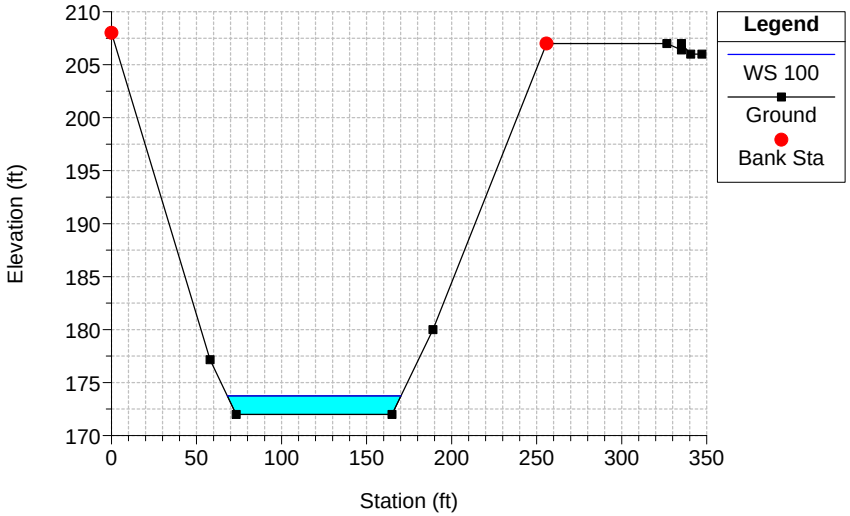

CompassBESS Plan: 1) Ex 9/24/2025

RS = 21



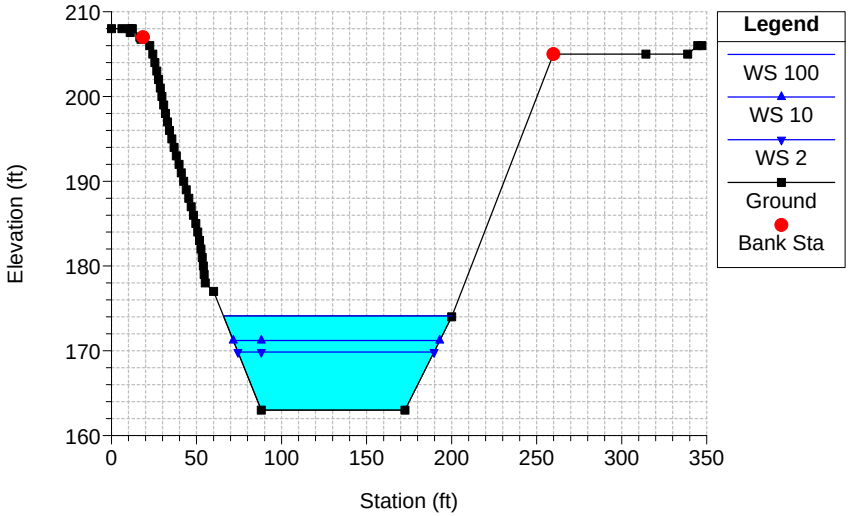
CompassBESS Plan: 1) Ex 9/24/2025

RS = 20



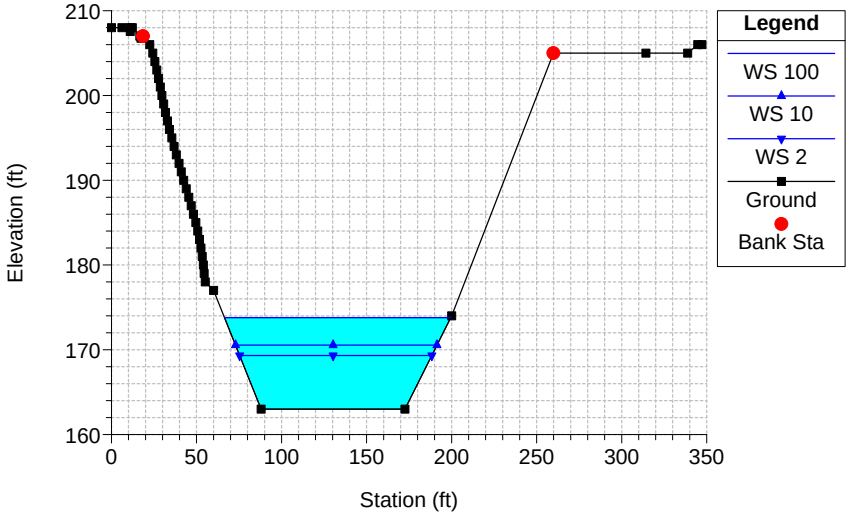

CompassBESS Plan: 1) Ex 9/24/2025

RS = 19



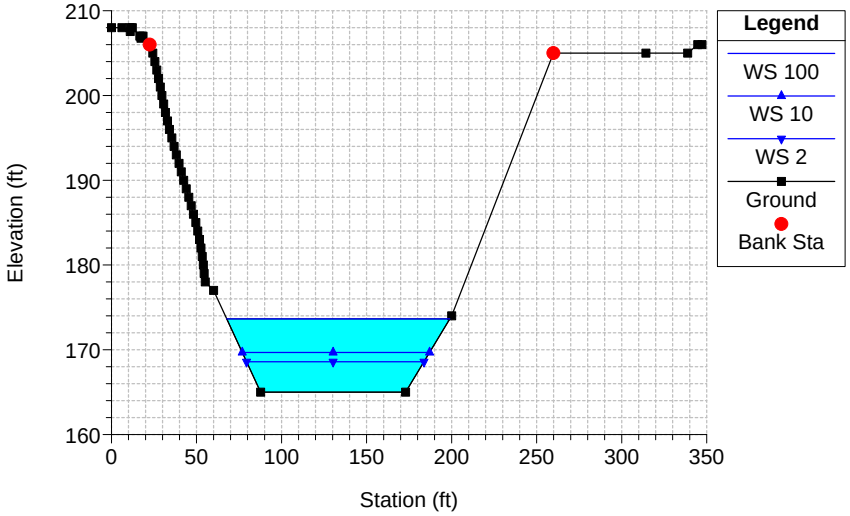

CompassBESS Plan: 1) Ex 9/24/2025

RS = 18



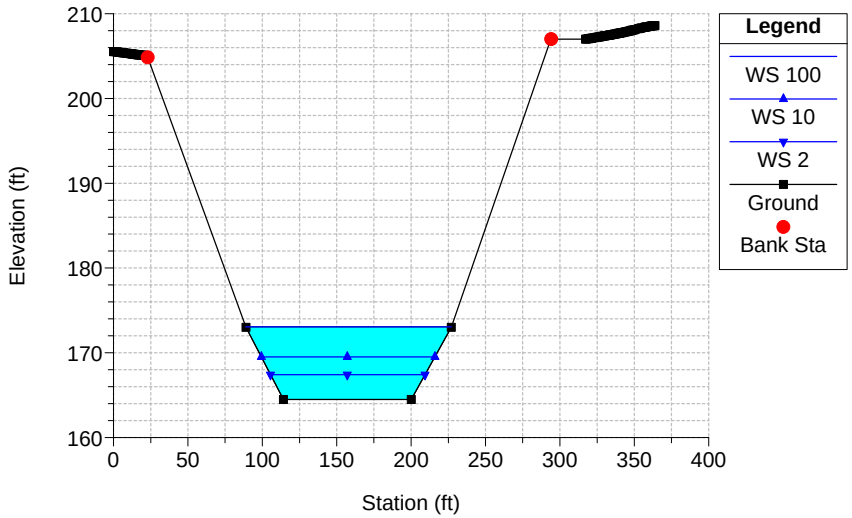

CompassBESS Plan: 1) Ex 9/24/2025

RS = 17



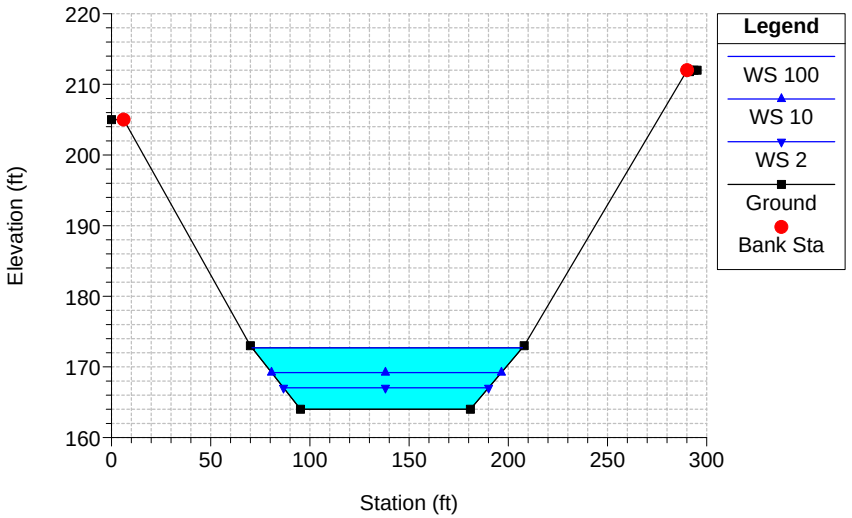
CompassBESS Plan: 1) Ex 9/24/2025

RS = 16



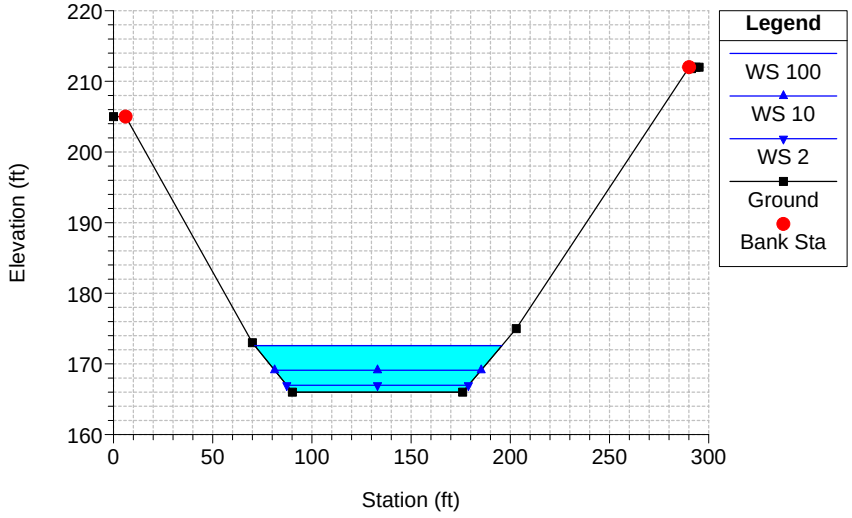

CompassBESS Plan: 1) Ex 9/24/2025

RS = 15



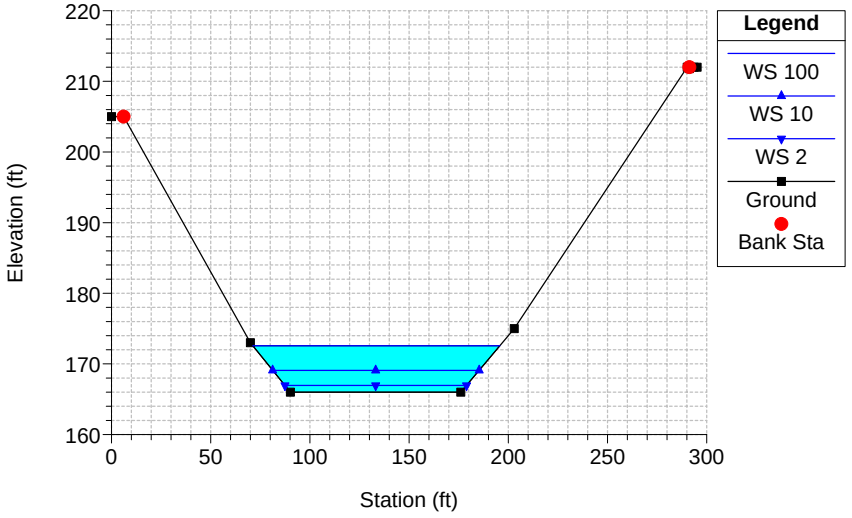

CompassBESS Plan: 1) Ex 9/24/2025

RS = 14

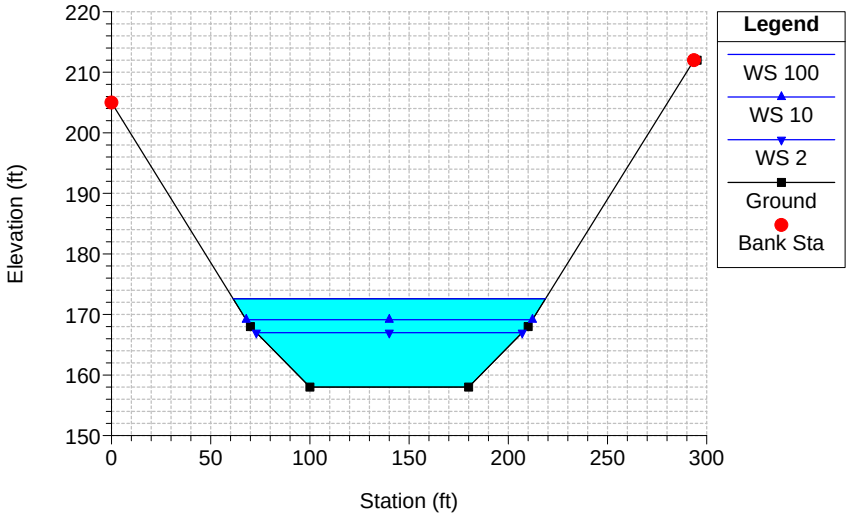



CompassBESS Plan: 1) Ex 9/24/2025

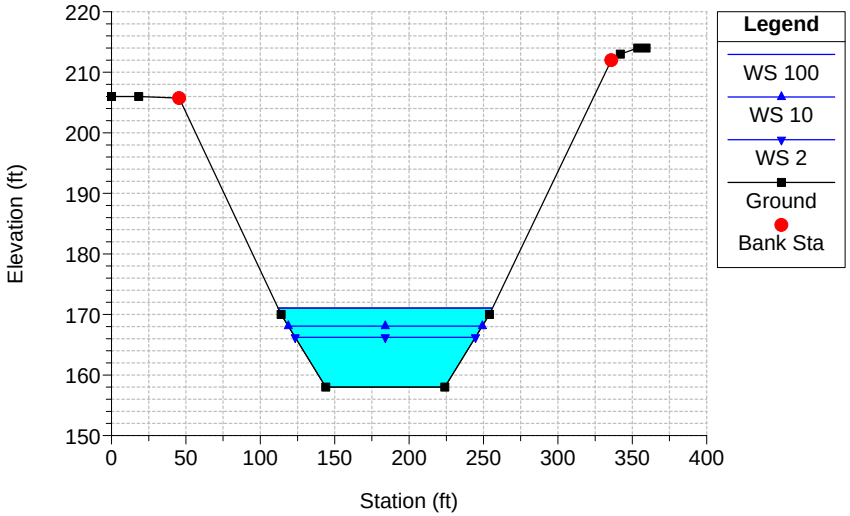
RS = 13



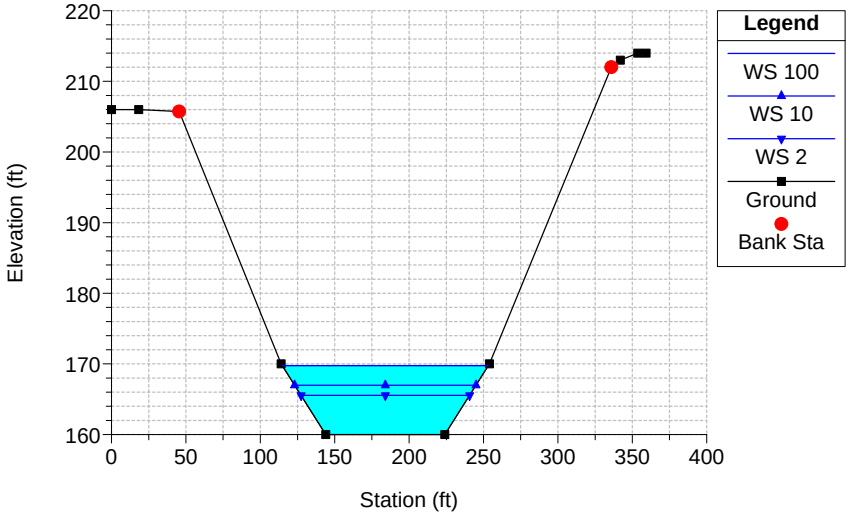
CompassBESS Plan: 1) Ex 9/24/2025
RS = 12



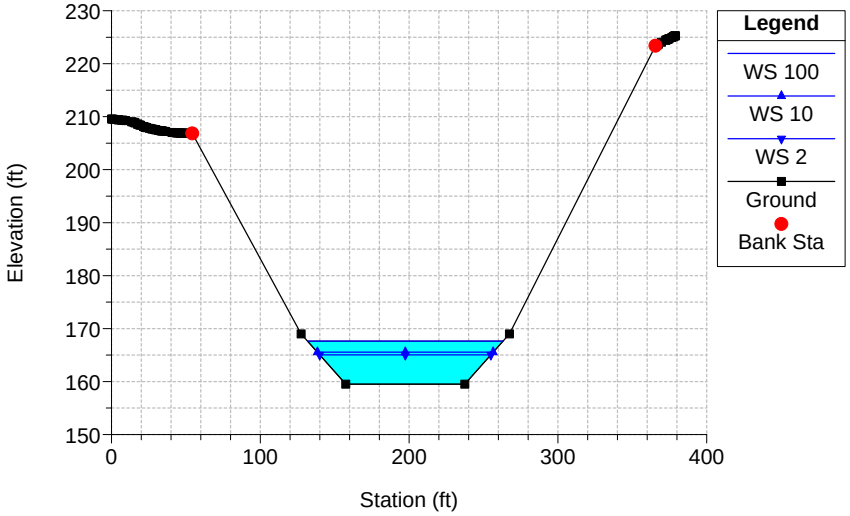

CompassBESS Plan: 1) Ex 9/24/2025
RS = 11



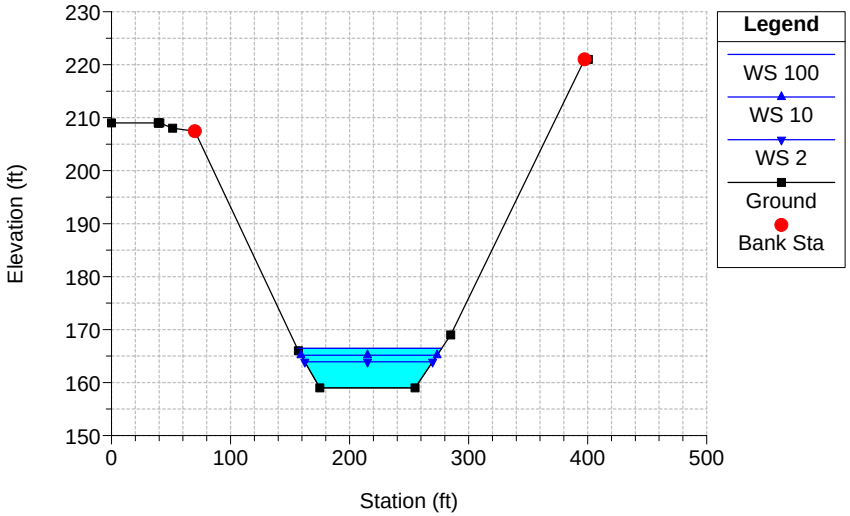

CompassBESS Plan: 1) Ex 9/24/2025
RS = 10



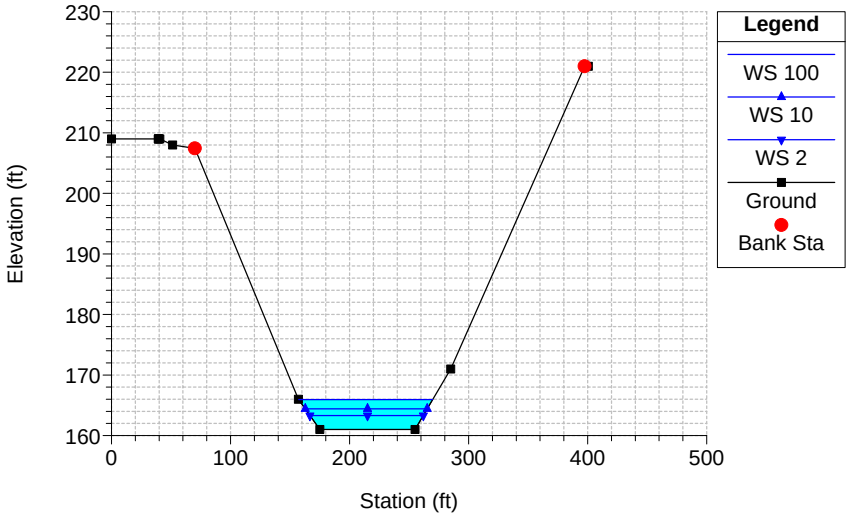

CompassBESS Plan: 1) Ex 9/24/2025
RS = 9



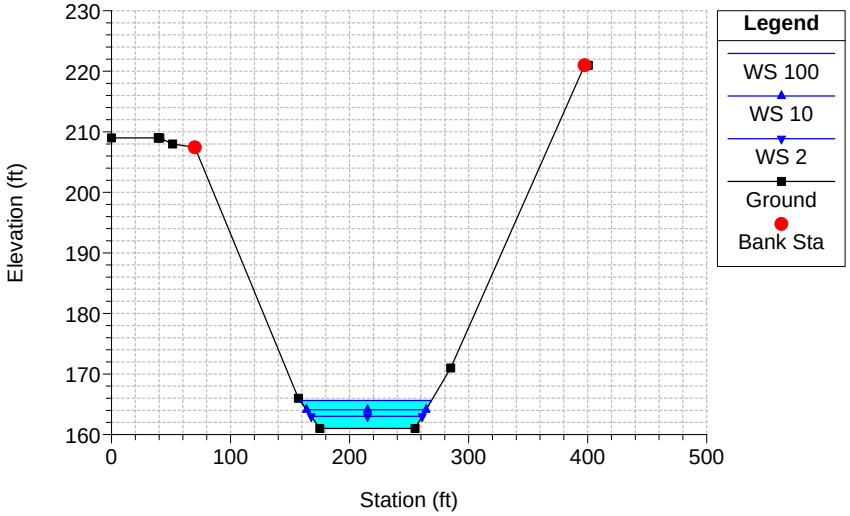
CompassBESS Plan: 1) Ex 9/24/2025
RS = 8



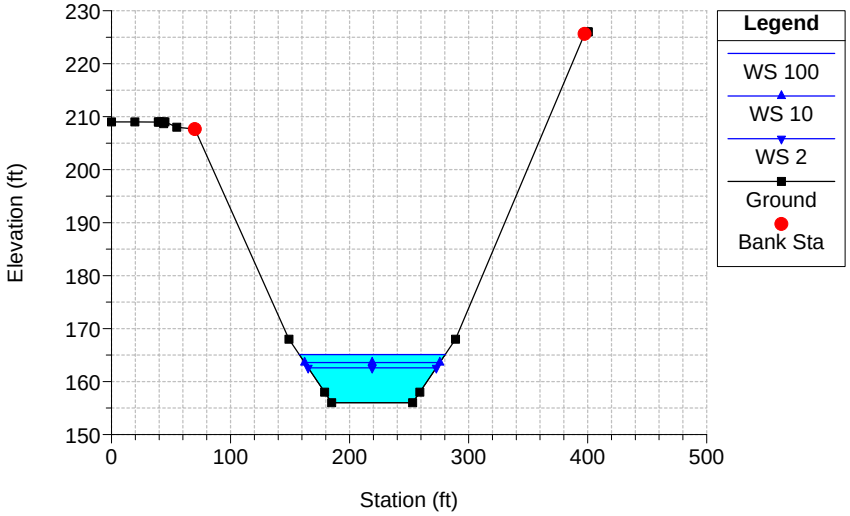

CompassBESS Plan: 1) Ex 9/24/2025
RS = 7




CompassBESS Plan: 1) Ex 9/24/2025
RS = 6

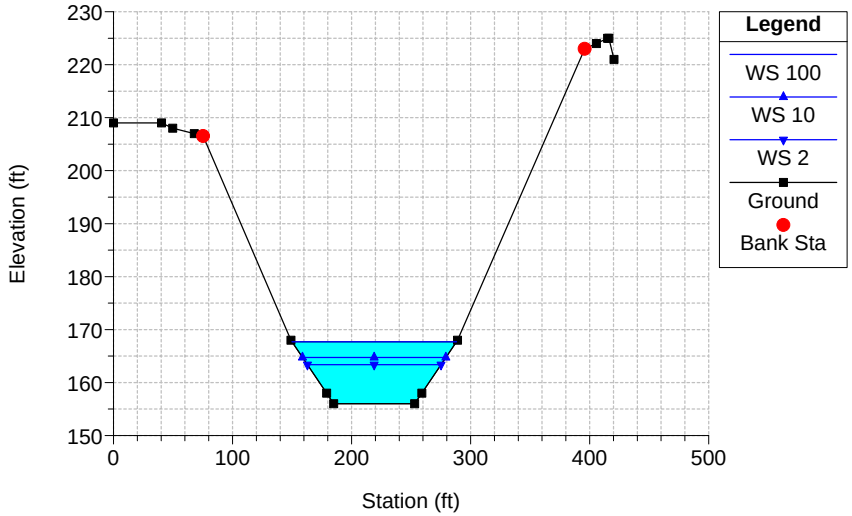



CompassBESS Plan: 1) Ex 9/24/2025
RS = 5



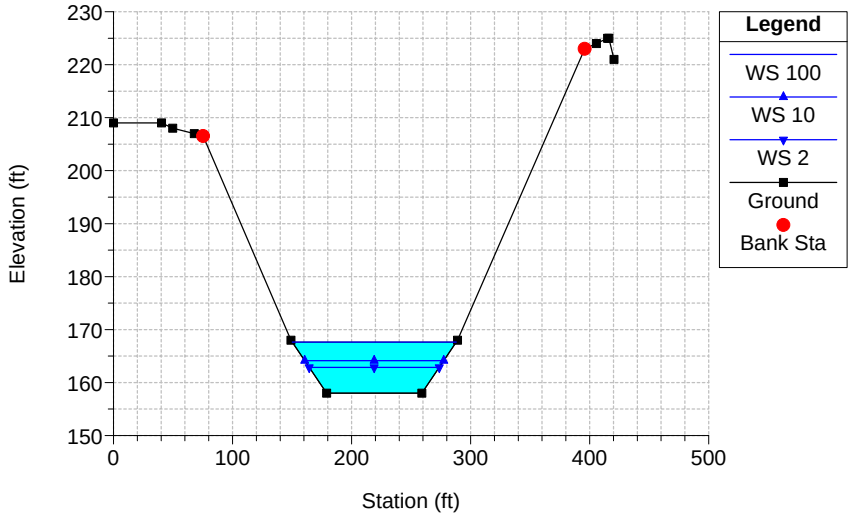
CompassBESS Plan: 1) Ex 9/24/2025

RS = 3.1



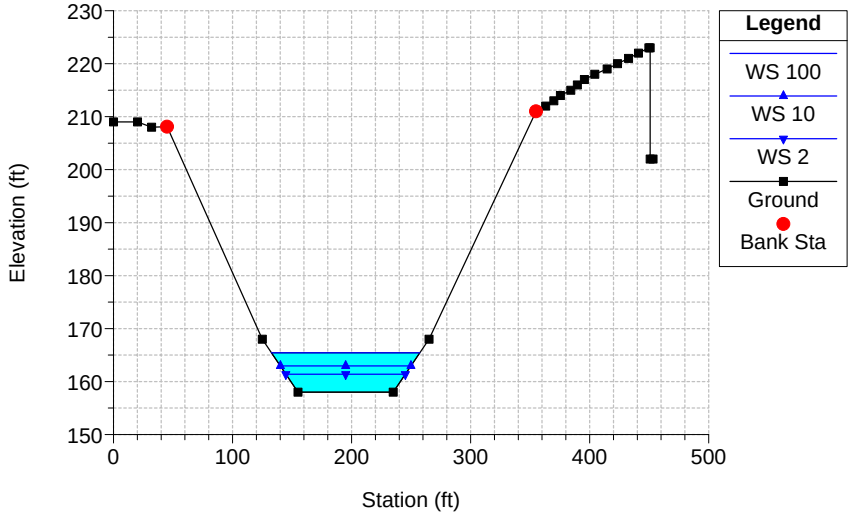

CompassBESS Plan: 1) Ex 9/24/2025

RS = 3



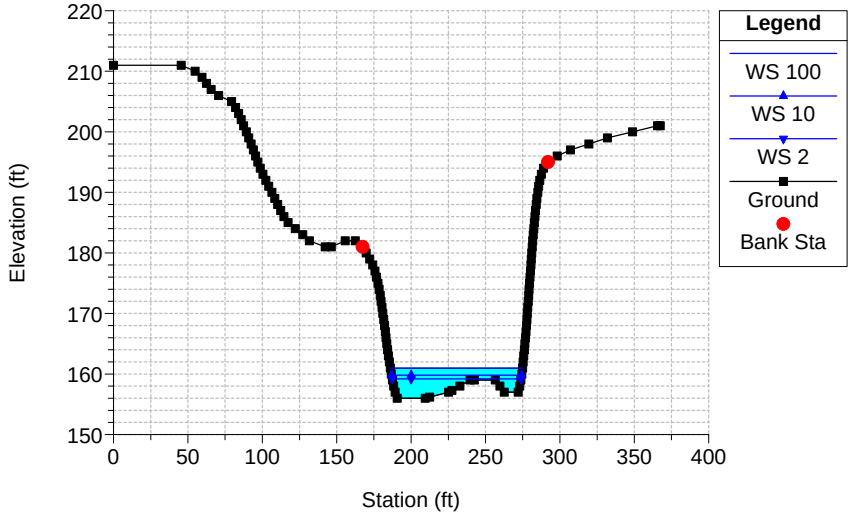

CompassBESS Plan: 1) Ex 9/24/2025

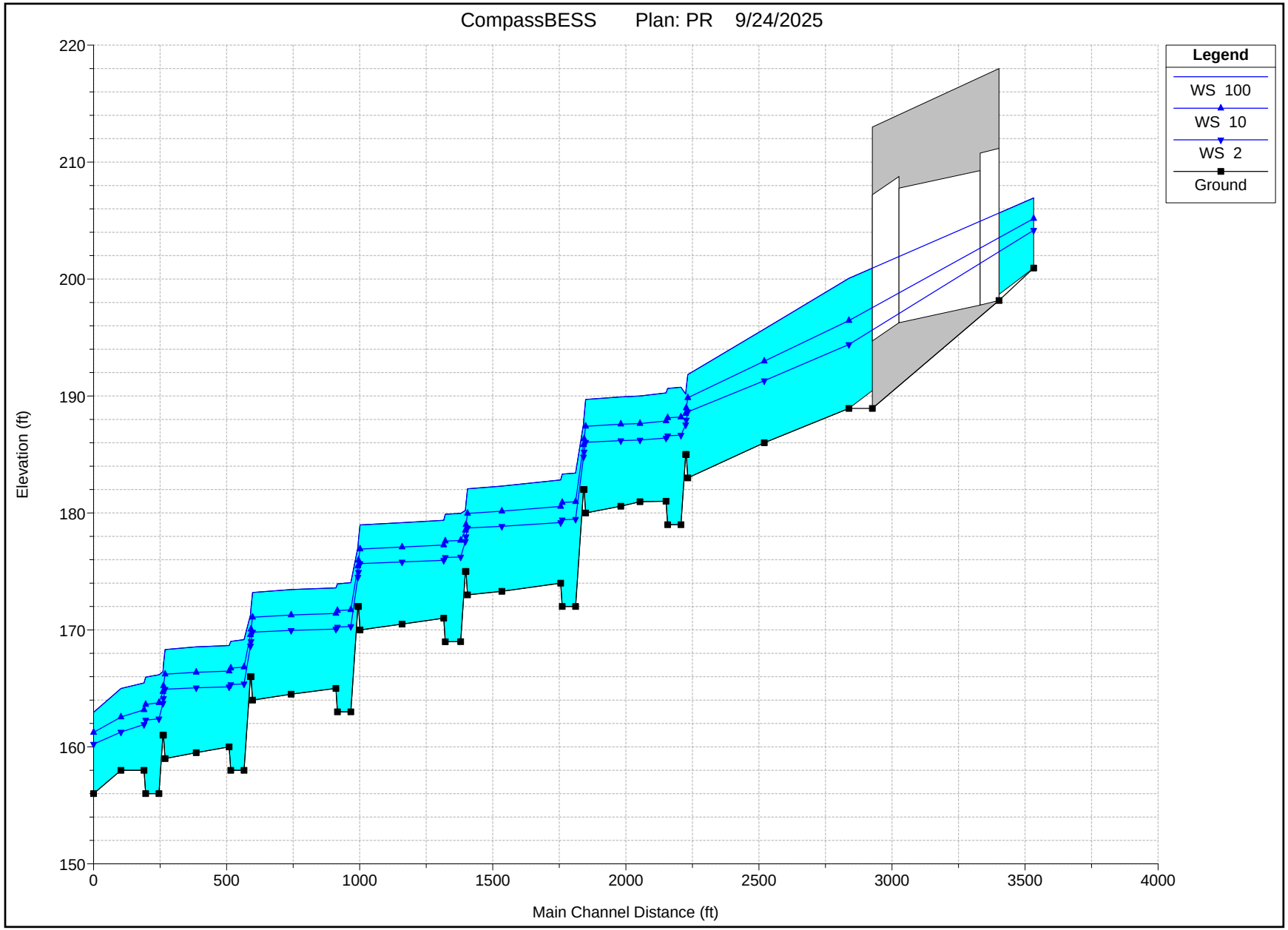
RS = 2




CompassBESS Plan: 1) Ex 9/24/2025

RS = 1




CompassBESS Plan: PR 9/24/2025
Legend
WS 100
WS 10
WS 2
Ground
Elevation (ft)
Main Channel Distance (ft)
220
210
200
190
180
170
160
150
0
500
1000
1500
2000
2500
3000
3500
4000

HEC-RAS Plan: PR River: OSO_CREEK Reach: OSO_CREEK-DS-0

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | Max Chl Dpth | Shear Chan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | (ft) | (lb/sq ft) |
| OSO_CREEK-DS-0 | 48 | 100 | 6500.00 | 200.94 | 206.94 | 211.74 | 225.06 | 0.012241 | 34.14 | 190.37 | 35.64 | 2.60 | 6.00 | 3.39 |
| OSO_CREEK-DS-0 | 48 | 10 | 3558.00 | 200.94 | 205.17 | 208.37 | 217.17 | 0.012228 | 27.79 | 128.05 | 34.86 | 2.56 | 4.23 | 2.49 |
| OSO_CREEK-DS-0 | 48 | 2 | 2178.00 | 200.94 | 204.17 | 206.44 | 212.63 | 0.012230 | 23.33 | 93.36 | 34.42 | 2.50 | 3.23 | 1.91 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 47 | | Culvert | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 46 | 100 | 6500.00 | 188.94 | 200.06 | 200.06 | 205.29 | 0.001973 | 18.35 | 354.31 | 33.93 | 1.00 | 11.12 | 0.85 |
| OSO_CREEK-DS-0 | 46 | 10 | 3558.00 | 188.94 | 196.45 | 196.45 | 200.05 | 0.001928 | 15.22 | 233.75 | 32.79 | 1.00 | 7.51 | 0.64 |
| OSO_CREEK-DS-0 | 46 | 2 | 2178.00 | 188.94 | 194.41 | 194.41 | 197.03 | 0.001924 | 13.00 | 167.54 | 32.13 | 1.00 | 5.47 | 0.50 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 45 | 100 | 6500.00 | 186.00 | 195.71 | 195.71 | 199.15 | 0.021242 | 14.87 | 436.99 | 64.27 | 1.01 | 9.71 | 8.44 |
| OSO_CREEK-DS-0 | 45 | 10 | 3558.00 | 186.00 | 192.98 | 192.98 | 195.56 | 0.022762 | 12.88 | 276.20 | 53.69 | 1.00 | 6.98 | 6.92 |
| OSO_CREEK-DS-0 | 45 | 2 | 2178.00 | 186.00 | 191.30 | 191.30 | 193.32 | 0.024317 | 11.38 | 191.33 | 47.53 | 1.00 | 5.30 | 5.84 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 44 | 100 | 6500.00 | 183.00 | 191.83 | 188.62 | 192.70 | 0.004690 | 7.50 | 866.81 | 117.90 | 0.49 | 8.83 | 2.07 |
| OSO_CREEK-DS-0 | 44 | 10 | 3558.00 | 183.00 | 189.85 | 186.82 | 190.33 | 0.003433 | 5.54 | 641.80 | 109.32 | 0.40 | 6.85 | 1.22 |
| OSO_CREEK-DS-0 | 44 | 2 | 2178.00 | 183.00 | 188.64 | 185.78 | 188.92 | 0.002494 | 4.24 | 513.80 | 103.25 | 0.34 | 5.64 | 0.75 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 43 | 100 | 6500.00 | 185.00 | 190.72 | 190.16 | 192.56 | 0.015870 | 10.87 | 597.92 | 118.05 | 0.85 | 5.72 | 4.90 |
| OSO_CREEK-DS-0 | 43 | 10 | 3558.00 | 185.00 | 188.97 | 188.50 | 190.21 | 0.016493 | 8.92 | 398.76 | 109.50 | 0.82 | 3.97 | 3.68 |
| OSO_CREEK-DS-0 | 43 | 2 | 2178.00 | 185.00 | 187.95 | 187.54 | 188.83 | 0.016906 | 7.54 | 289.02 | 104.49 | 0.80 | 2.95 | 2.87 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 42 | 100 | 6500.00 | 185.00 | 190.17 | 190.17 | 192.47 | 0.022574 | 12.17 | 533.98 | 116.12 | 1.00 | 5.17 | 6.34 |
| OSO_CREEK-DS-0 | 42 | 10 | 3558.00 | 185.00 | 188.50 | 188.50 | 190.13 | 0.025469 | 10.24 | 347.58 | 107.77 | 1.00 | 3.50 | 5.04 |
| OSO_CREEK-DS-0 | 42 | 2 | 2178.00 | 185.00 | 187.54 | 187.54 | 188.76 | 0.027998 | 8.84 | 246.44 | 102.50 | 1.00 | 2.54 | 4.14 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 41 | 100 | 6500.00 | 179.00 | 190.75 | 184.50 | 191.17 | 0.001617 | 5.23 | 1241.95 | 128.67 | 0.30 | 11.75 | 0.93 |
| OSO_CREEK-DS-0 | 41 | 10 | 3558.00 | 179.00 | 188.20 | 182.74 | 188.43 | 0.001162 | 3.85 | 923.92 | 119.20 | 0.24 | 9.20 | 0.54 |
| OSO_CREEK-DS-0 | 41 | 2 | 2178.00 | 179.00 | 186.65 | 181.72 | 186.78 | 0.000816 | 2.92 | 744.99 | 111.85 | 0.20 | 7.65 | 0.33 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 40 | 100 | 6500.00 | 179.00 | 190.65 | 184.58 | 191.09 | 0.001679 | 5.32 | 1221.17 | 127.35 | 0.30 | 11.65 | 0.96 |
| OSO_CREEK-DS-0 | 40 | 10 | 3558.00 | 179.00 | 188.13 | 182.80 | 188.37 | 0.001200 | 3.90 | 911.35 | 118.57 | 0.25 | 9.13 | 0.55 |
| OSO_CREEK-DS-0 | 40 | 2 | 2178.00 | 179.00 | 186.60 | 181.77 | 186.74 | 0.000855 | 2.97 | 734.34 | 112.61 | 0.20 | 7.60 | 0.34 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 39 | 100 | 6500.00 | 181.00 | 190.26 | 186.64 | 191.04 | 0.003960 | 7.09 | 917.36 | 119.35 | 0.45 | 9.26 | 1.82 |
| OSO_CREEK-DS-0 | 39 | 10 | 3558.00 | 181.00 | 187.86 | 184.83 | 188.34 | 0.003397 | 5.53 | 643.36 | 108.93 | 0.40 | 6.86 | 1.21 |
| OSO_CREEK-DS-0 | 39 | 2 | 2178.00 | 181.00 | 186.41 | 183.78 | 186.71 | 0.002899 | 4.45 | 489.61 | 102.47 | 0.36 | 5.41 | 0.84 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 38 | 100 | 6500.00 | 180.96 | 190.00 | 186.54 | 190.81 | 0.001509 | 7.24 | 898.32 | 118.52 | 0.46 | 9.04 | 0.69 |
| OSO_CREEK-DS-0 | 38 | 10 | 3558.00 | 180.96 | 187.65 | 184.76 | 188.14 | 0.001296 | 5.64 | 630.81 | 108.72 | 0.41 | 6.69 | 0.46 |
| OSO_CREEK-DS-0 | 38 | 2 | 2178.00 | 180.96 | 186.23 | 183.73 | 186.55 | 0.001099 | 4.53 | 481.30 | 102.53 | 0.37 | 5.27 | 0.31 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 37 | 100 | 6500.00 | 180.58 | 189.92 | 186.20 | 190.70 | 0.001388 | 7.08 | 918.32 | 116.67 | 0.44 | 9.34 | 0.65 |
| OSO_CREEK-DS-0 | 37 | 10 | 3558.00 | 180.58 | 187.59 | 184.40 | 188.04 | 0.001127 | 5.42 | 656.87 | 107.51 | 0.39 | 7.01 | 0.41 |
| OSO_CREEK-DS-0 | 37 | 2 | 2178.00 | 180.58 | 186.18 | 183.35 | 186.47 | 0.000909 | 4.27 | 509.80 | 102.00 | 0.34 | 5.60 | 0.27 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 36 | 100 | 6500.00 | 180.00 | 189.70 | 185.62 | 190.40 | 0.003335 | 6.72 | 967.83 | 119.47 | 0.42 | 9.70 | 1.61 |
| OSO_CREEK-DS-0 | 36 | 10 | 3558.00 | 180.00 | 187.41 | 183.82 | 187.81 | 0.002564 | 5.05 | 704.60 | 110.44 | 0.35 | 7.41 | 0.98 |

HEC-RAS Plan: PR River: OSO_CREEK Reach: OSO_CREEK-DS-0 (Continued)

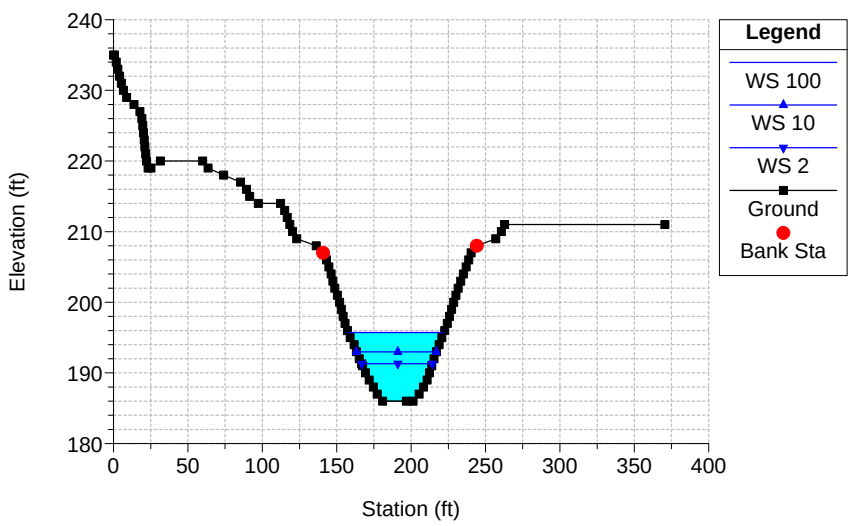
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | Max Chl Dpth | Shear Chan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | (ft) | (lb/sq ft) |
| OSO_CREEK-DS-0 | 36 | 2 | 2178.00 | 180.00 | 186.05 | 182.78 | 186.28 | 0.001948 | 3.91 | 557.30 | 104.94 | 0.30 | 6.05 | 0.63 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 35 | 100 | 6500.00 | 182.00 | 188.28 | 187.62 | 190.24 | 0.015397 | 11.23 | 578.65 | 104.86 | 0.84 | 6.28 | 5.11 |
| OSO_CREEK-DS-0 | 35 | 10 | 3558.00 | 182.00 | 186.34 | 185.82 | 187.68 | 0.016359 | 9.30 | 382.60 | 97.13 | 0.83 | 4.34 | 3.91 |
| OSO_CREEK-DS-0 | 35 | 2 | 2178.00 | 182.00 | 185.22 | 184.78 | 186.18 | 0.016917 | 7.89 | 276.15 | 92.51 | 0.80 | 3.22 | 3.08 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 34 | 100 | 6500.00 | 182.00 | 187.63 | 187.63 | 190.15 | 0.022528 | 12.73 | 510.51 | 102.28 | 1.00 | 5.63 | 6.78 |
| OSO_CREEK-DS-0 | 34 | 10 | 3558.00 | 182.00 | 185.83 | 185.83 | 187.60 | 0.025040 | 10.67 | 333.53 | 95.06 | 1.00 | 3.83 | 5.34 |
| OSO_CREEK-DS-0 | 34 | 2 | 2178.00 | 182.00 | 184.79 | 184.79 | 186.11 | 0.027563 | 9.21 | 236.47 | 90.71 | 1.01 | 2.79 | 4.39 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 33 | 100 | 6500.00 | 172.00 | 183.42 | 177.60 | 183.89 | 0.001862 | 5.51 | 1179.79 | 126.28 | 0.32 | 11.42 | 1.04 |
| OSO_CREEK-DS-0 | 33 | 10 | 3558.00 | 172.00 | 180.96 | 175.82 | 181.22 | 0.001325 | 4.04 | 880.51 | 117.12 | 0.26 | 8.96 | 0.60 |
| OSO_CREEK-DS-0 | 33 | 2 | 2178.00 | 172.00 | 179.46 | 174.77 | 179.61 | 0.000937 | 3.07 | 709.85 | 110.46 | 0.21 | 7.46 | 0.36 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 32 | 100 | 6500.00 | 172.00 | 183.32 | 177.59 | 183.79 | 0.001900 | 5.54 | 1172.74 | 126.49 | 0.32 | 11.32 | 1.05 |
| OSO_CREEK-DS-0 | 32 | 10 | 3558.00 | 172.00 | 180.89 | 175.80 | 181.15 | 0.001342 | 4.06 | 877.19 | 117.26 | 0.26 | 8.89 | 0.60 |
| OSO_CREEK-DS-0 | 32 | 2 | 2178.00 | 172.00 | 179.42 | 174.77 | 179.56 | 0.000947 | 3.07 | 708.43 | 111.06 | 0.21 | 7.42 | 0.36 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 31 | 100 | 6500.00 | 174.00 | 182.83 | 179.72 | 183.73 | 0.004873 | 7.64 | 851.02 | 116.14 | 0.50 | 8.83 | 2.15 |
| OSO_CREEK-DS-0 | 31 | 10 | 3558.00 | 174.00 | 180.56 | 177.92 | 181.11 | 0.004160 | 5.94 | 598.62 | 106.49 | 0.44 | 6.56 | 1.42 |
| OSO_CREEK-DS-0 | 31 | 2 | 2178.00 | 174.00 | 179.18 | 176.85 | 179.53 | 0.003560 | 4.78 | 455.65 | 100.51 | 0.40 | 5.18 | 0.98 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 30 | 100 | 6500.00 | 173.30 | 182.30 | 178.93 | 183.14 | 0.001599 | 7.38 | 880.85 | 116.87 | 0.47 | 9.00 | 0.72 |
| OSO_CREEK-DS-0 | 30 | 10 | 3558.00 | 173.30 | 180.15 | 177.13 | 180.63 | 0.001233 | 5.56 | 640.08 | 107.48 | 0.40 | 6.85 | 0.44 |
| OSO_CREEK-DS-0 | 30 | 2 | 2178.00 | 173.30 | 178.86 | 176.09 | 179.15 | 0.000947 | 4.32 | 504.73 | 102.22 | 0.34 | 5.56 | 0.28 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 29 | 100 | 6500.00 | 173.00 | 182.06 | 178.46 | 182.81 | 0.003792 | 6.95 | 935.84 | 122.02 | 0.44 | 9.06 | 1.75 |
| OSO_CREEK-DS-0 | 29 | 10 | 3558.00 | 173.00 | 179.96 | 176.72 | 180.38 | 0.002851 | 5.17 | 688.45 | 113.87 | 0.37 | 6.96 | 1.05 |
| OSO_CREEK-DS-0 | 29 | 2 | 2178.00 | 173.00 | 178.71 | 175.71 | 178.96 | 0.002128 | 3.97 | 549.09 | 109.13 | 0.31 | 5.71 | 0.65 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 28 | 100 | 6500.00 | 175.00 | 180.80 | 180.21 | 182.66 | 0.015518 | 10.93 | 594.91 | 114.11 | 0.84 | 5.80 | 4.91 |
| OSO_CREEK-DS-0 | 28 | 10 | 3558.00 | 175.00 | 179.00 | 178.53 | 180.26 | 0.016516 | 9.00 | 395.38 | 107.25 | 0.83 | 4.00 | 3.73 |
| OSO_CREEK-DS-0 | 28 | 2 | 2178.00 | 175.00 | 177.97 | 177.57 | 178.86 | 0.017123 | 7.61 | 286.30 | 103.20 | 0.81 | 2.97 | 2.92 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 27 | 100 | 6500.00 | 175.00 | 180.21 | 180.21 | 182.57 | 0.022476 | 12.32 | 527.45 | 111.81 | 1.00 | 5.21 | 6.45 |
| OSO_CREEK-DS-0 | 27 | 10 | 3558.00 | 175.00 | 178.53 | 178.53 | 180.18 | 0.025376 | 10.32 | 344.84 | 105.40 | 1.01 | 3.53 | 5.10 |
| OSO_CREEK-DS-0 | 27 | 2 | 2178.00 | 175.00 | 177.57 | 177.57 | 178.79 | 0.027900 | 8.87 | 245.50 | 101.51 | 1.01 | 2.57 | 4.16 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 26 | 100 | 6500.00 | 169.00 | 179.96 | 174.26 | 180.39 | 0.001613 | 5.37 | 1248.87 | 136.76 | 0.30 | 10.96 | 0.96 |
| OSO_CREEK-DS-0 | 26 | 10 | 3558.00 | 169.00 | 177.65 | 172.56 | 177.88 | 0.001133 | 3.88 | 941.96 | 128.84 | 0.25 | 8.65 | 0.54 |
| OSO_CREEK-DS-0 | 26 | 2 | 2178.00 | 169.00 | 176.24 | 171.59 | 176.36 | 0.000798 | 2.92 | 764.18 | 122.29 | 0.20 | 7.24 | 0.32 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 25 | 100 | 6500.00 | 168.99 | 179.89 | 174.18 | 180.29 | 0.001628 | 5.08 | 1279.80 | 142.18 | 0.30 | 10.90 | 0.89 |
| OSO_CREEK-DS-0 | 25 | 10 | 3558.00 | 168.99 | 177.60 | 172.52 | 177.81 | 0.001153 | 3.70 | 962.82 | 134.00 | 0.24 | 8.61 | 0.50 |
| OSO_CREEK-DS-0 | 25 | 2 | 2178.00 | 168.99 | 176.19 | 171.56 | 176.32 | 0.000819 | 2.80 | 779.06 | 128.04 | 0.20 | 7.20 | 0.30 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 24 | 100 | 6500.00 | 171.00 | 179.38 | 176.48 | 180.23 | 0.001749 | 7.42 | 875.92 | 125.97 | 0.50 | 8.38 | 0.74 |
| OSO_CREEK-DS-0 | 24 | 10 | 3558.00 | 171.00 | 177.26 | 174.75 | 177.77 | 0.001499 | 5.75 | 618.25 | 116.73 | 0.44 | 6.26 | 0.49 |

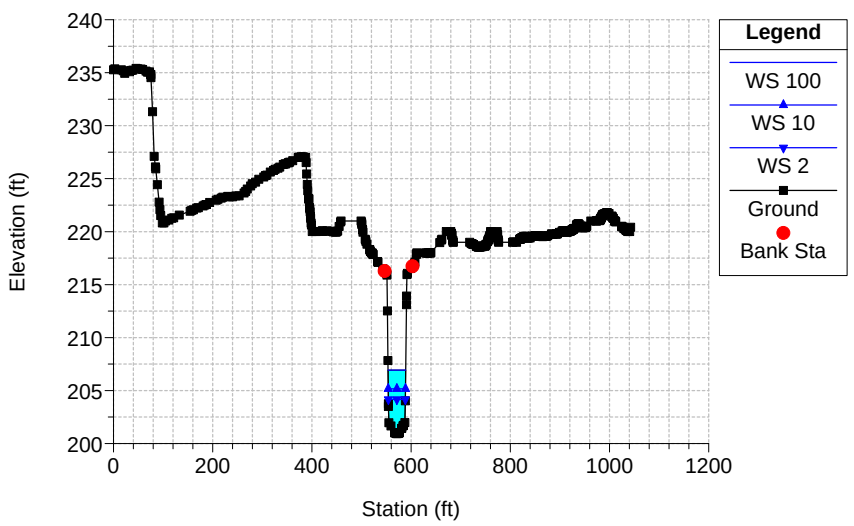
HEC-RAS Plan: PR River: OSO_CREEK Reach: OSO_CREEK-DS-0 (Continued)

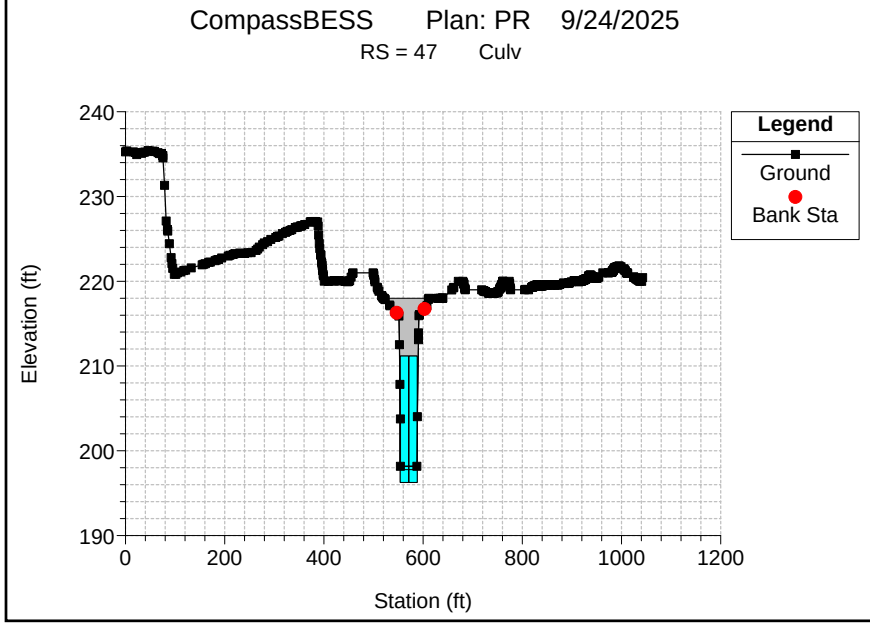
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | Max Chl Dpth | Shear Chan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | (ft) | (lb/sq ft) |
| OSO_CREEK-DS-0 | 24 | 2 | 2178.00 | 171.00 | 175.96 | 173.73 | 176.29 | 0.001290 | 4.63 | 470.49 | 110.44 | 0.40 | 4.96 | 0.34 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 23 | 100 | 6500.00 | 170.50 | 179.17 | 175.99 | 179.95 | 0.001575 | 7.07 | 919.50 | 132.04 | 0.47 | 8.67 | 0.67 |
| OSO_CREEK-DS-0 | 23 | 10 | 3558.00 | 170.50 | 177.08 | 174.25 | 177.54 | 0.001265 | 5.42 | 656.47 | 119.49 | 0.41 | 6.58 | 0.43 |
| OSO_CREEK-DS-0 | 23 | 2 | 2178.00 | 170.50 | 175.81 | 173.24 | 176.10 | 0.001006 | 4.27 | 509.65 | 111.87 | 0.35 | 5.31 | 0.28 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 22 | 100 | 6500.00 | 170.00 | 178.98 | 175.06 | 179.55 | 0.003032 | 6.09 | 1067.64 | 145.86 | 0.40 | 8.98 | 1.36 |
| OSO_CREEK-DS-0 | 22 | 10 | 3558.00 | 170.00 | 176.91 | 173.45 | 177.23 | 0.002298 | 4.57 | 779.06 | 133.46 | 0.33 | 6.91 | 0.82 |
| OSO_CREEK-DS-0 | 22 | 2 | 2178.00 | 170.00 | 175.67 | 172.51 | 175.86 | 0.001718 | 3.52 | 618.34 | 126.03 | 0.28 | 5.67 | 0.52 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 21 | 100 | 6500.00 | 172.00 | 177.73 | 177.06 | 179.41 | 0.014727 | 10.38 | 626.26 | 126.41 | 0.82 | 5.73 | 4.49 |
| OSO_CREEK-DS-0 | 21 | 10 | 3558.00 | 172.00 | 175.95 | 175.45 | 177.12 | 0.015933 | 8.66 | 410.69 | 115.72 | 0.81 | 3.95 | 3.49 |
| OSO_CREEK-DS-0 | 21 | 2 | 2178.00 | 172.00 | 174.93 | 174.51 | 175.78 | 0.016586 | 7.37 | 295.46 | 109.59 | 0.79 | 2.93 | 2.77 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 20 | 100 | 6500.00 | 172.00 | 177.07 | 177.07 | 179.31 | 0.022795 | 12.01 | 541.16 | 121.90 | 1.01 | 5.07 | 6.23 |
| OSO_CREEK-DS-0 | 20 | 10 | 3558.00 | 172.00 | 175.46 | 175.46 | 177.04 | 0.025371 | 10.09 | 352.78 | 112.30 | 1.00 | 3.46 | 4.93 |
| OSO_CREEK-DS-0 | 20 | 2 | 2178.00 | 172.00 | 174.52 | 174.52 | 175.70 | 0.028004 | 8.72 | 249.71 | 106.69 | 1.01 | 2.52 | 4.06 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 19 | 100 | 6500.00 | 163.00 | 174.04 | 168.41 | 174.49 | 0.001840 | 5.39 | 1206.61 | 134.15 | 0.32 | 11.04 | 1.00 |
| OSO_CREEK-DS-0 | 19 | 10 | 3558.00 | 163.00 | 171.72 | 166.67 | 171.96 | 0.001271 | 3.92 | 907.51 | 123.74 | 0.26 | 8.72 | 0.56 |
| OSO_CREEK-DS-0 | 19 | 2 | 2178.00 | 163.00 | 170.29 | 165.67 | 170.43 | 0.000889 | 2.96 | 735.51 | 117.31 | 0.21 | 7.29 | 0.34 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 18 | 100 | 6500.00 | 163.00 | 173.94 | 168.40 | 174.40 | 0.001897 | 5.44 | 1193.96 | 133.73 | 0.32 | 10.94 | 1.02 |
| OSO_CREEK-DS-0 | 18 | 10 | 3558.00 | 163.00 | 171.65 | 166.67 | 171.90 | 0.001302 | 3.95 | 900.19 | 123.47 | 0.26 | 8.65 | 0.58 |
| OSO_CREEK-DS-0 | 18 | 2 | 2178.00 | 163.00 | 170.25 | 165.67 | 170.38 | 0.000906 | 2.98 | 731.09 | 117.15 | 0.21 | 7.25 | 0.34 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 17 | 100 | 6500.00 | 165.00 | 173.60 | 170.32 | 174.36 | 0.001511 | 7.00 | 928.98 | 130.93 | 0.46 | 8.60 | 0.65 |
| OSO_CREEK-DS-0 | 17 | 10 | 3558.00 | 165.00 | 171.41 | 168.62 | 171.87 | 0.001274 | 5.43 | 655.13 | 119.29 | 0.41 | 6.41 | 0.43 |
| OSO_CREEK-DS-0 | 17 | 2 | 2178.00 | 165.00 | 170.07 | 167.64 | 170.36 | 0.001076 | 4.35 | 500.18 | 112.16 | 0.36 | 5.07 | 0.29 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 16 | 100 | 6500.00 | 164.50 | 173.46 | 169.76 | 174.09 | 0.001221 | 6.40 | 1015.41 | 139.84 | 0.42 | 8.96 | 0.54 |
| OSO_CREEK-DS-0 | 16 | 10 | 3558.00 | 164.50 | 171.28 | 168.08 | 171.65 | 0.000996 | 4.92 | 723.37 | 127.46 | 0.36 | 6.78 | 0.35 |
| OSO_CREEK-DS-0 | 16 | 2 | 2178.00 | 164.50 | 169.96 | 167.12 | 170.19 | 0.000799 | 3.89 | 560.31 | 119.38 | 0.32 | 5.46 | 0.23 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 15 | 100 | 6500.00 | 164.00 | 173.20 | 169.29 | 173.82 | 0.003164 | 6.28 | 1034.48 | 138.83 | 0.41 | 9.20 | 1.44 |
| OSO_CREEK-DS-0 | 15 | 10 | 3558.00 | 164.00 | 171.08 | 167.60 | 171.43 | 0.002416 | 4.73 | 752.48 | 126.85 | 0.34 | 7.08 | 0.88 |
| OSO_CREEK-DS-0 | 15 | 2 | 2178.00 | 164.00 | 169.81 | 166.63 | 170.01 | 0.001818 | 3.66 | 595.40 | 119.42 | 0.29 | 5.81 | 0.56 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 14 | 100 | 6500.00 | 166.00 | 171.86 | 171.27 | 173.66 | 0.015602 | 10.77 | 603.70 | 120.27 | 0.85 | 5.86 | 4.81 |
| OSO_CREEK-DS-0 | 14 | 10 | 3558.00 | 166.00 | 170.06 | 169.60 | 171.31 | 0.016698 | 8.97 | 396.49 | 109.66 | 0.83 | 4.06 | 3.72 |
| OSO_CREEK-DS-0 | 14 | 2 | 2178.00 | 166.00 | 169.01 | 168.63 | 169.92 | 0.017329 | 7.64 | 285.13 | 103.51 | 0.81 | 3.01 | 2.95 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 13 | 100 | 6500.00 | 166.00 | 171.26 | 171.26 | 173.57 | 0.022616 | 12.18 | 533.57 | 116.82 | 1.00 | 5.26 | 6.35 |
| OSO_CREEK-DS-0 | 13 | 10 | 3558.00 | 166.00 | 169.59 | 169.59 | 171.23 | 0.025287 | 10.27 | 346.52 | 107.01 | 1.01 | 3.59 | 5.06 |
| OSO_CREEK-DS-0 | 13 | 2 | 2178.00 | 166.00 | 168.62 | 168.62 | 169.85 | 0.027703 | 8.87 | 245.48 | 101.31 | 1.00 | 2.62 | 4.15 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 12 | 100 | 6500.00 | 158.00 | 169.30 | 163.47 | 169.70 | 0.001635 | 5.06 | 1285.03 | 144.93 | 0.30 | 11.30 | 0.88 |
| OSO_CREEK-DS-0 | 12 | 10 | 3558.00 | 158.00 | 166.88 | 161.74 | 167.10 | 0.001203 | 3.76 | 947.22 | 133.29 | 0.25 | 8.88 | 0.52 |

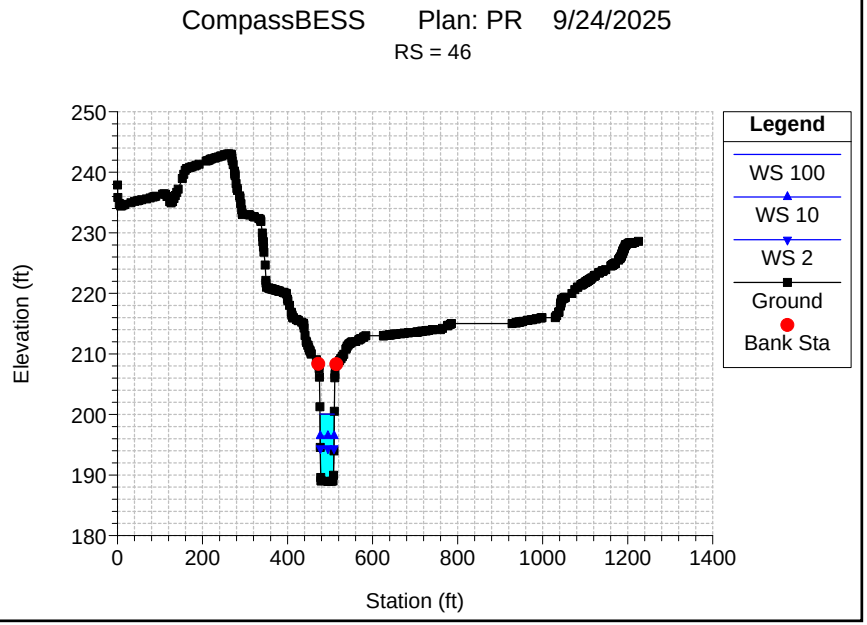
HEC-RAS Plan: PR River: OSO_CREEK Reach: OSO_CREEK-DS-0 (Continued)

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl | Max Chl Dpth | Shear Chan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | | (ft) | (lb/sq ft) |
| OSO_CREEK-DS-0 | 12 | 2 | 2178.00 | 158.00 | 165.41 | 160.74 | 165.54 | 0.000865 | 2.88 | 757.34 | 124.45 | 0.21 | 7.41 | 0.32 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 11 | 100 | 6500.00 | 158.00 | 169.15 | 163.53 | 169.60 | 0.001880 | 5.40 | 1202.71 | 135.75 | 0.32 | 11.15 | 1.01 |
| OSO_CREEK-DS-0 | 11 | 10 | 3558.00 | 158.00 | 166.79 | 161.77 | 167.04 | 0.001322 | 3.97 | 896.53 | 123.96 | 0.26 | 8.79 | 0.58 |
| OSO_CREEK-DS-0 | 11 | 2 | 2178.00 | 158.00 | 165.35 | 160.75 | 165.49 | 0.000933 | 3.01 | 723.08 | 116.75 | 0.21 | 7.35 | 0.35 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 10 | 100 | 6500.00 | 160.00 | 168.82 | 165.48 | 169.56 | 0.001483 | 6.92 | 938.87 | 132.92 | 0.46 | 8.82 | 0.64 |
| OSO_CREEK-DS-0 | 10 | 10 | 3558.00 | 160.00 | 166.54 | 163.76 | 167.01 | 0.001291 | 5.46 | 651.94 | 119.26 | 0.41 | 6.54 | 0.43 |
| OSO_CREEK-DS-0 | 10 | 2 | 2178.00 | 160.00 | 165.17 | 162.74 | 165.47 | 0.001109 | 4.41 | 493.35 | 111.00 | 0.37 | 5.17 | 0.30 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 9 | 100 | 6500.00 | 159.50 | 168.72 | 164.95 | 169.37 | 0.001241 | 6.46 | 1005.81 | 138.22 | 0.42 | 9.22 | 0.55 |
| OSO_CREEK-DS-0 | 9 | 10 | 3558.00 | 159.50 | 166.45 | 163.23 | 166.84 | 0.001028 | 5.02 | 708.64 | 123.90 | 0.37 | 6.95 | 0.36 |
| OSO_CREEK-DS-0 | 9 | 2 | 2178.00 | 159.50 | 165.09 | 162.23 | 165.33 | 0.000835 | 3.99 | 545.39 | 115.28 | 0.32 | 5.59 | 0.24 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 8 | 100 | 6500.00 | 159.00 | 168.43 | 164.57 | 169.15 | 0.002936 | 7.19 | 1000.47 | 131.38 | 0.41 | 9.43 | 1.73 |
| OSO_CREEK-DS-0 | 8 | 10 | 3558.00 | 159.00 | 166.27 | 162.79 | 166.67 | 0.002262 | 5.30 | 728.76 | 120.37 | 0.35 | 7.27 | 1.03 |
| OSO_CREEK-DS-0 | 8 | 2 | 2178.00 | 159.00 | 164.96 | 161.76 | 165.19 | 0.001729 | 4.06 | 575.37 | 113.19 | 0.29 | 5.96 | 0.64 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 7 | 100 | 6500.00 | 161.00 | 167.12 | 166.52 | 169.00 | 0.013358 | 11.49 | 611.82 | 118.69 | 0.82 | 6.12 | 5.10 |
| OSO_CREEK-DS-0 | 7 | 10 | 3558.00 | 161.00 | 165.24 | 164.76 | 166.55 | 0.014819 | 9.48 | 398.49 | 107.98 | 0.81 | 4.24 | 3.92 |
| OSO_CREEK-DS-0 | 7 | 2 | 2178.00 | 161.00 | 164.15 | 163.75 | 165.10 | 0.015764 | 8.01 | 284.49 | 100.77 | 0.80 | 3.15 | 3.10 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 6 | 100 | 6500.00 | 161.00 | 166.52 | 166.52 | 168.91 | 0.019361 | 12.91 | 541.63 | 115.64 | 0.97 | 5.52 | 6.67 |
| OSO_CREEK-DS-0 | 6 | 10 | 3558.00 | 161.00 | 164.76 | 164.76 | 166.48 | 0.022508 | 10.79 | 347.93 | 104.85 | 0.98 | 3.76 | 5.29 |
| OSO_CREEK-DS-0 | 6 | 2 | 2178.00 | 161.00 | 163.75 | 163.75 | 165.03 | 0.025283 | 9.27 | 244.66 | 98.13 | 0.99 | 2.75 | 4.34 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 5 | 100 | 6500.00 | 156.00 | 166.05 | 162.07 | 166.81 | 0.002930 | 7.49 | 986.38 | 128.30 | 0.42 | 10.05 | 1.84 |
| OSO_CREEK-DS-0 | 5 | 10 | 3558.00 | 156.00 | 163.73 | 160.17 | 164.16 | 0.002329 | 5.61 | 704.77 | 114.37 | 0.36 | 7.73 | 1.12 |
| OSO_CREEK-DS-0 | 5 | 2 | 2178.00 | 156.00 | 162.37 | 159.05 | 162.63 | 0.001765 | 4.29 | 555.20 | 106.24 | 0.30 | 6.37 | 0.70 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 3.1 | 100 | 6500.00 | 156.00 | 165.86 | 162.07 | 166.65 | 0.003153 | 7.67 | 961.58 | 127.13 | 0.43 | 9.86 | 1.94 |
| OSO_CREEK-DS-0 | 3.1 | 10 | 3558.00 | 156.00 | 163.59 | 160.17 | 164.04 | 0.002493 | 5.73 | 688.64 | 113.52 | 0.37 | 7.59 | 1.18 |
| OSO_CREEK-DS-0 | 3.1 | 2 | 2178.00 | 156.00 | 162.27 | 159.05 | 162.54 | 0.001873 | 4.37 | 544.29 | 105.62 | 0.31 | 6.27 | 0.73 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 3 | 100 | 6500.00 | 158.00 | 165.29 | 163.55 | 166.58 | 0.002635 | 9.56 | 742.46 | 123.73 | 0.62 | 7.29 | 1.20 |
| OSO_CREEK-DS-0 | 3 | 10 | 3558.00 | 158.00 | 163.10 | 161.78 | 163.98 | 0.002842 | 7.82 | 485.54 | 110.57 | 0.61 | 5.10 | 0.90 |
| OSO_CREEK-DS-0 | 3 | 2 | 2178.00 | 158.00 | 161.88 | 160.76 | 162.49 | 0.002780 | 6.45 | 355.47 | 103.27 | 0.58 | 3.88 | 0.67 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 2 | 100 | 6500.00 | 158.00 | 164.74 | 163.55 | 166.29 | 0.003504 | 10.46 | 674.91 | 120.41 | 0.71 | 6.74 | 1.47 |
| OSO_CREEK-DS-0 | 2 | 10 | 3558.00 | 158.00 | 162.39 | 161.78 | 163.63 | 0.004812 | 9.21 | 408.94 | 106.34 | 0.78 | 4.39 | 1.32 |
| OSO_CREEK-DS-0 | 2 | 2 | 2178.00 | 158.00 | 161.18 | 160.76 | 162.13 | 0.005572 | 7.99 | 284.45 | 99.06 | 0.79 | 3.18 | 1.11 |
| | | | | | | | | | | | | | | |
| OSO_CREEK-DS-0 | 1 | 100 | 6500.00 | 156.00 | 162.95 | 162.91 | 165.65 | 0.008211 | 13.18 | 493.35 | 90.90 | 1.00 | 6.95 | 2.58 |
| OSO_CREEK-DS-0 | 1 | 10 | 3558.00 | 156.00 | 161.23 | 161.11 | 162.95 | 0.008199 | 10.52 | 338.34 | 89.20 | 0.95 | 5.23 | 1.84 |
| OSO_CREEK-DS-0 | 1 | 2 | 2178.00 | 156.00 | 160.23 | 160.06 | 161.41 | 0.008204 | 8.73 | 249.46 | 87.99 | 0.91 | 4.23 | 1.39 |


CompassBESS Plan: PR 9/24/2025
RS = 45
Elevation (ft)
Station (ft)
Legend
WS 100
WS 10
WS 2
Ground
Bank Sta

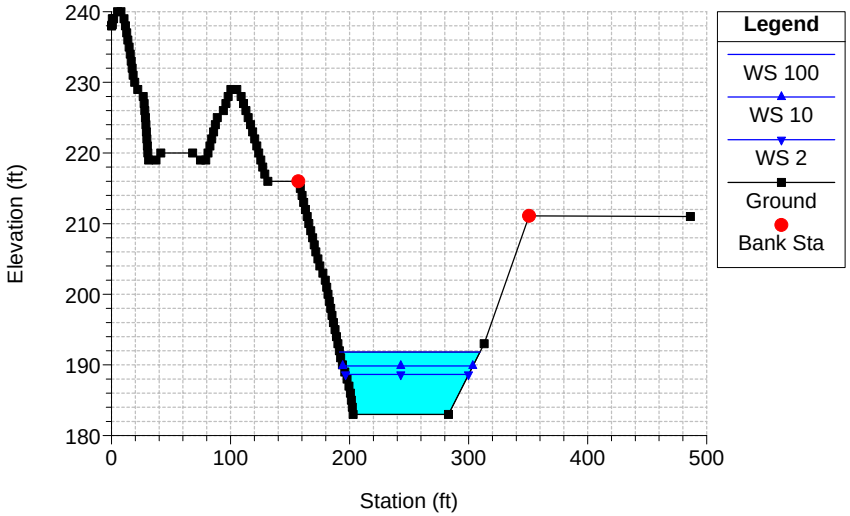

CompassBESS Plan: PR 9/24/2025
RS = 48
Elevation (ft)
Station (ft)
Legend
WS 100
WS 10
WS 2
Ground
Bank Sta


CompassBESS Plan: PR 9/24/2025
RS = 47 Culv
Elevation (ft)
Station (ft)
Legend
Ground
Bank Sta


CompassBESS Plan: PR 9/24/2025
RS = 46
Elevation (ft)
Station (ft)
Legend
WS 100
WS 10
WS 2
Ground
Bank Sta

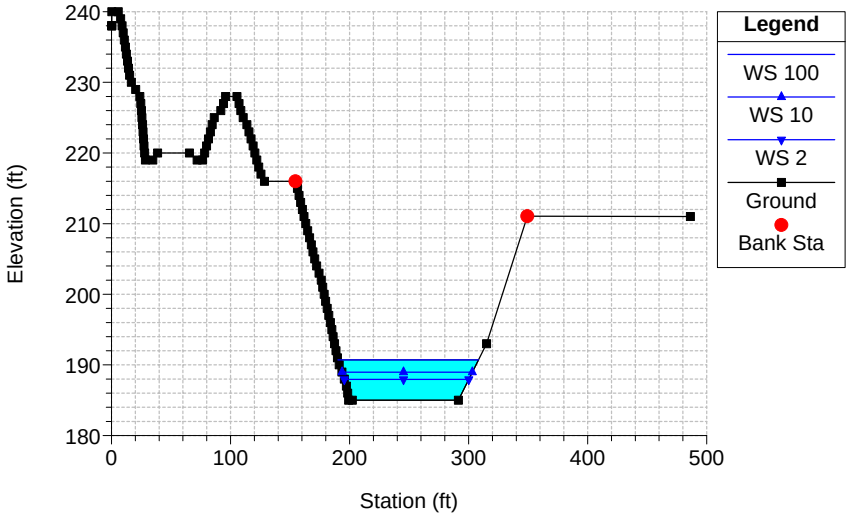
CompassBESS Plan: PR 9/24/2025

RS = 44



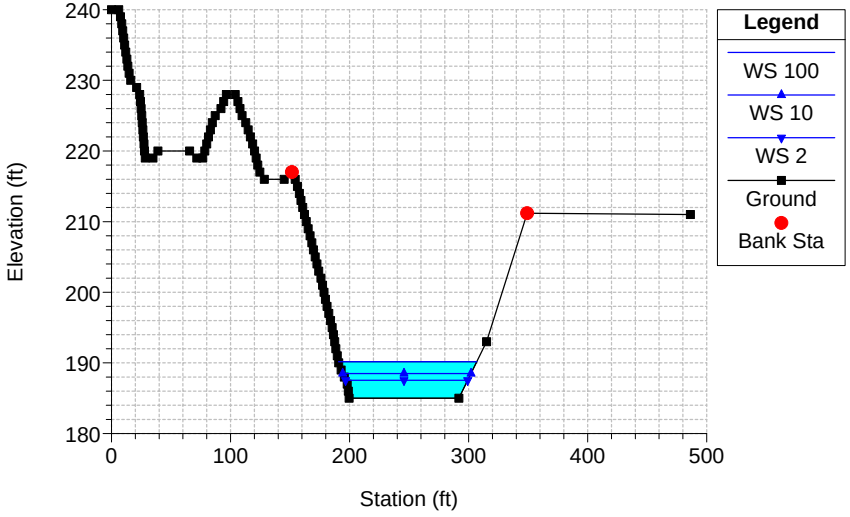

CompassBESS Plan: PR 9/24/2025

RS = 43



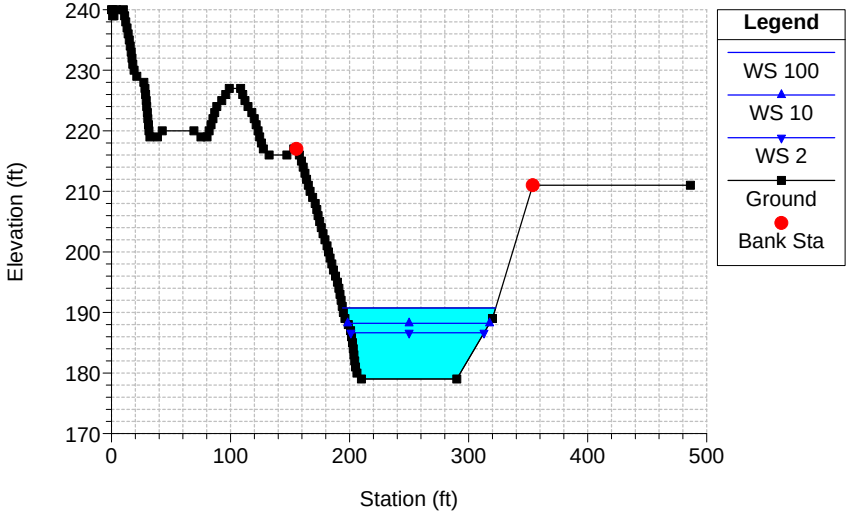

CompassBESS Plan: PR 9/24/2025

RS = 42



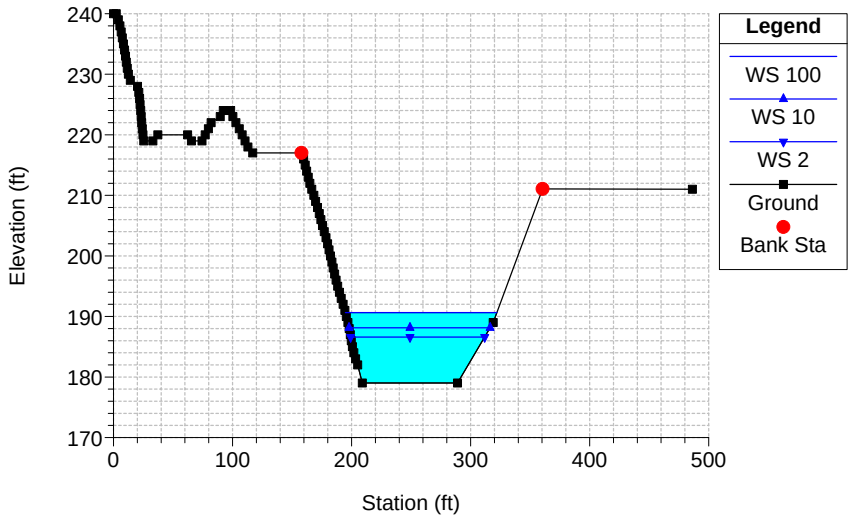

CompassBESS Plan: PR 9/24/2025

RS = 41



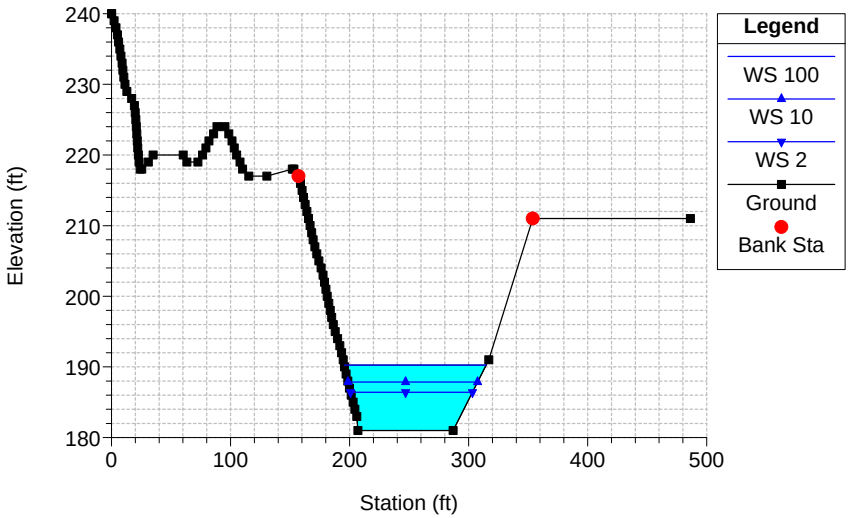
CompassBESS Plan: PR 9/24/2025

RS = 40



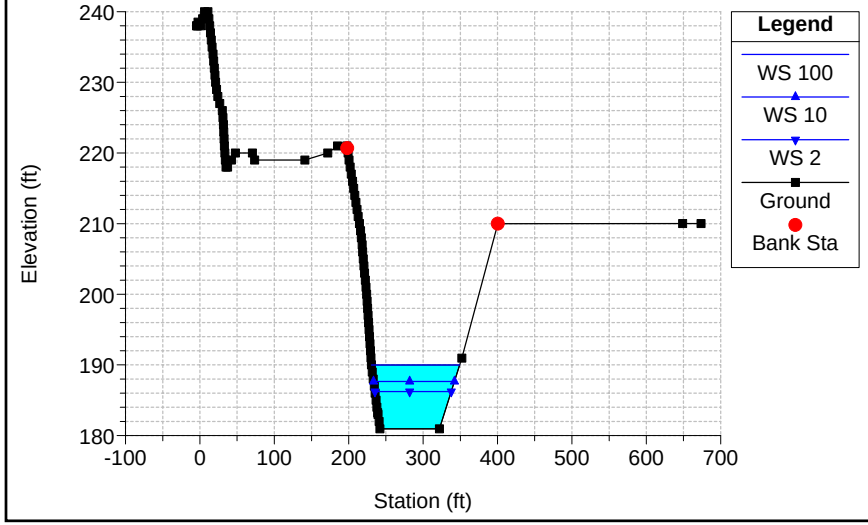

CompassBESS Plan: PR 9/24/2025

RS = 39



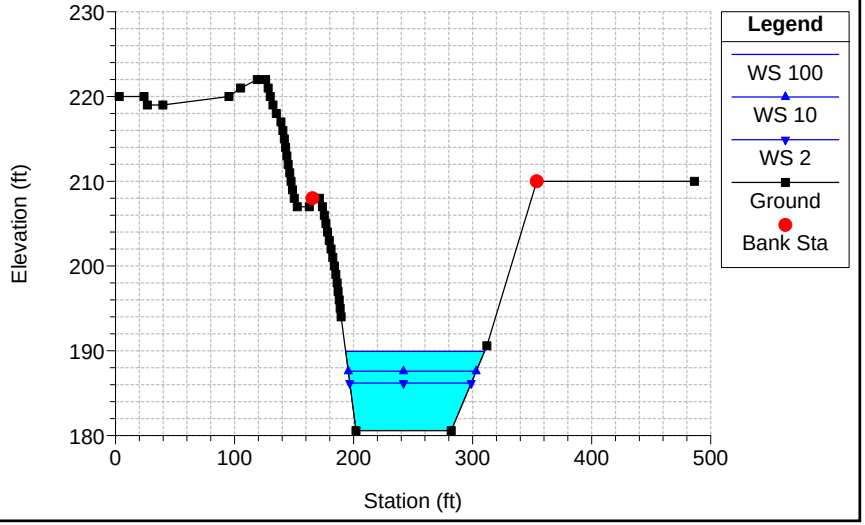

CompassBESS Plan: PR 9/24/2025

RS = 38



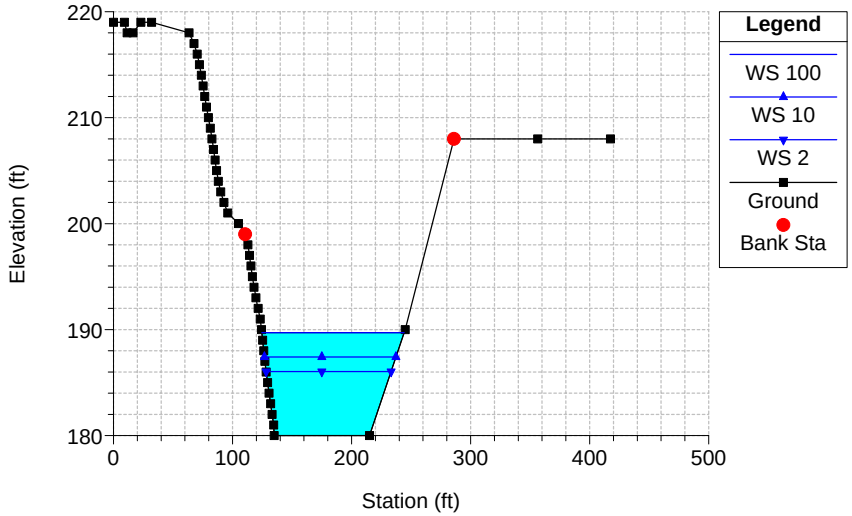

CompassBESS Plan: PR 9/24/2025

RS = 37



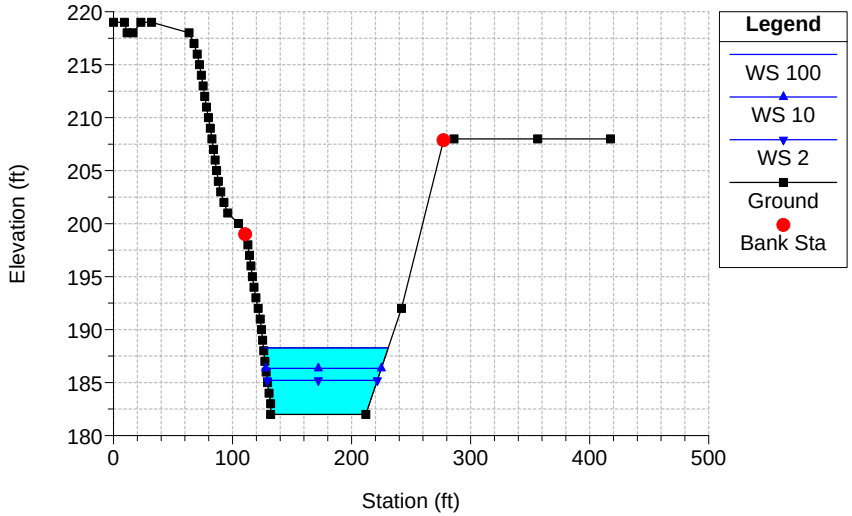
CompassBESS Plan: PR 9/24/2025

RS = 36



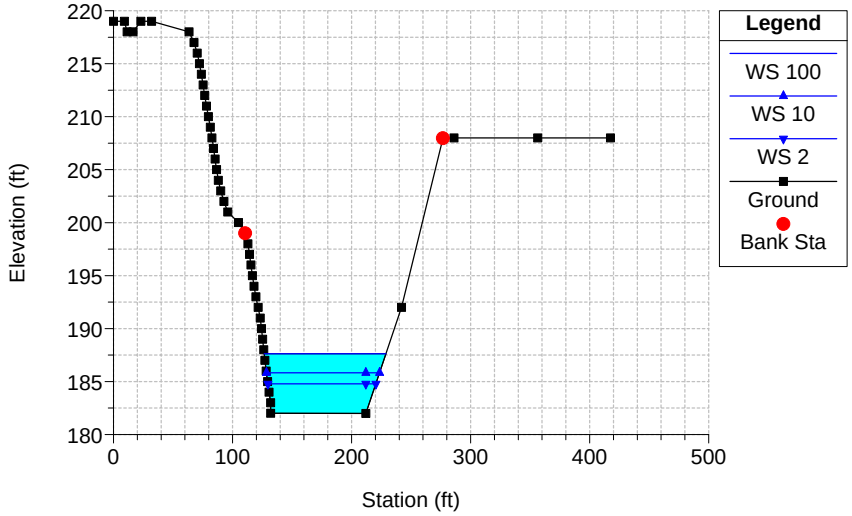

CompassBESS Plan: PR 9/24/2025

RS = 35



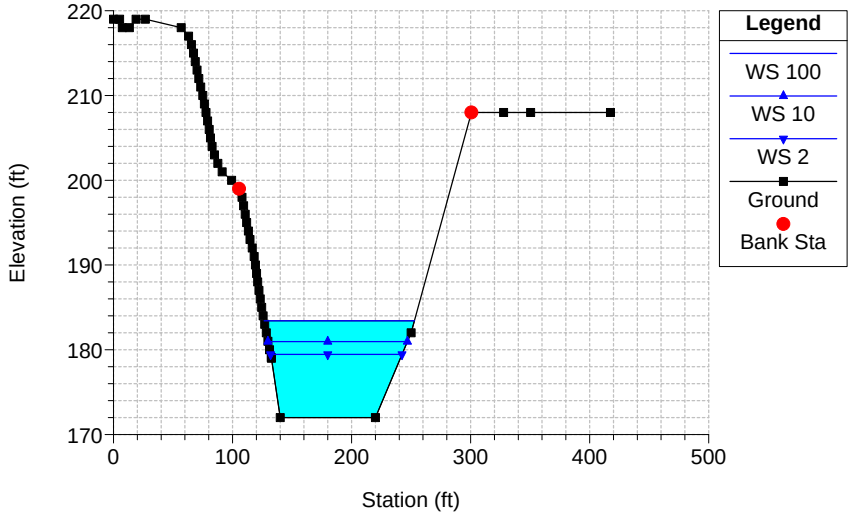

CompassBESS Plan: PR 9/24/2025

RS = 34



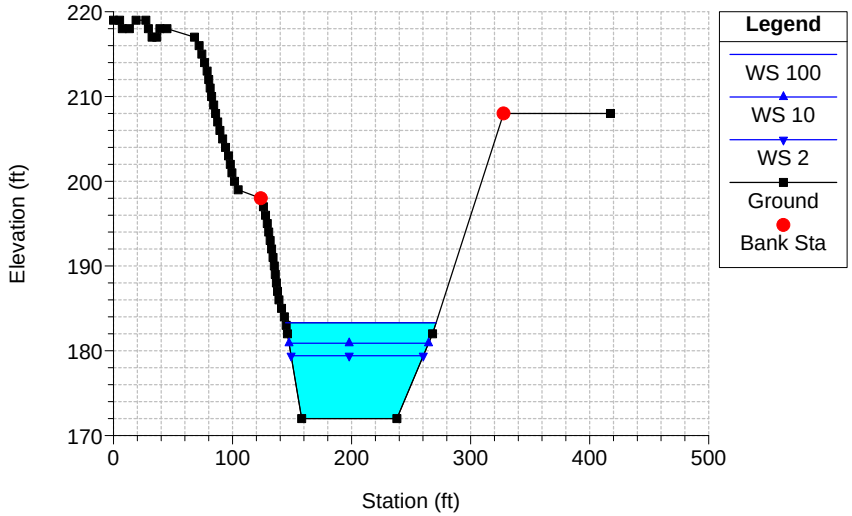

CompassBESS Plan: PR 9/24/2025

RS = 33



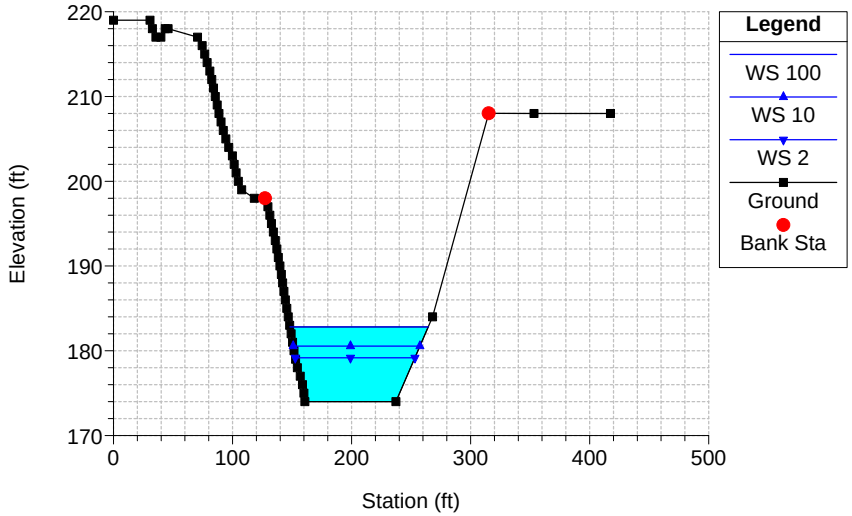
CompassBESS Plan: PR 9/24/2025

RS = 32



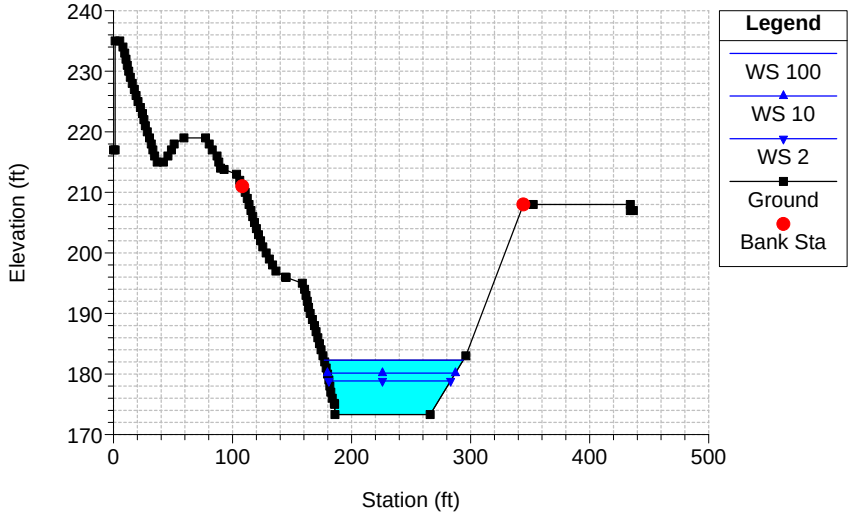

CompassBESS Plan: PR 9/24/2025

RS = 31



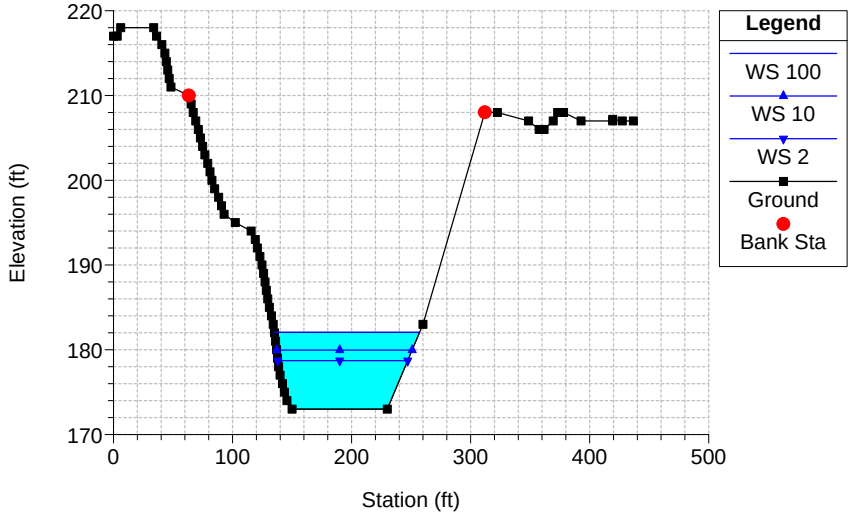

CompassBESS Plan: PR 9/24/2025

RS = 30



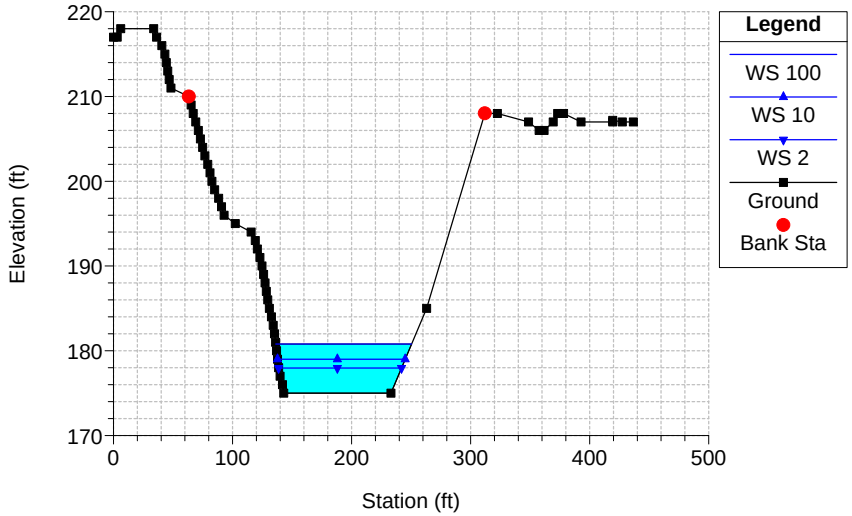

CompassBESS Plan: PR 9/24/2025

RS = 29



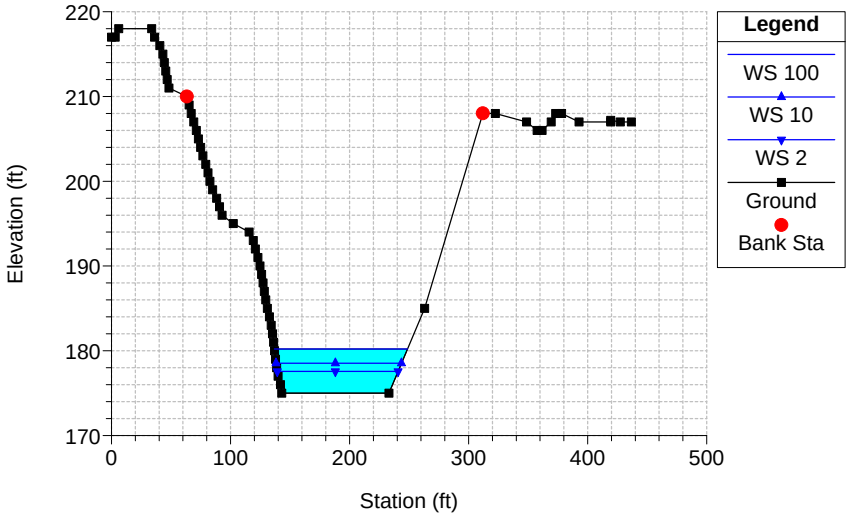
CompassBESS Plan: PR 9/24/2025

RS = 28




CompassBESS Plan: PR 9/24/2025

RS = 27




CompassBESS Plan: PR 9/24/2025

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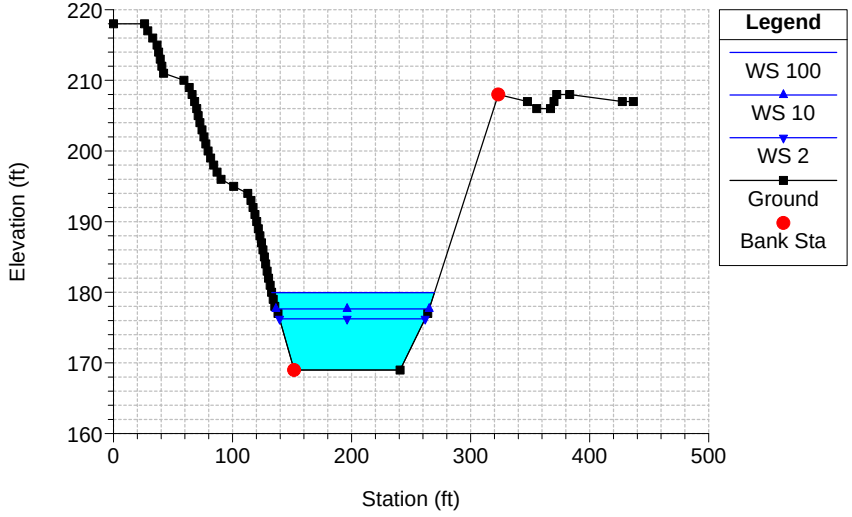
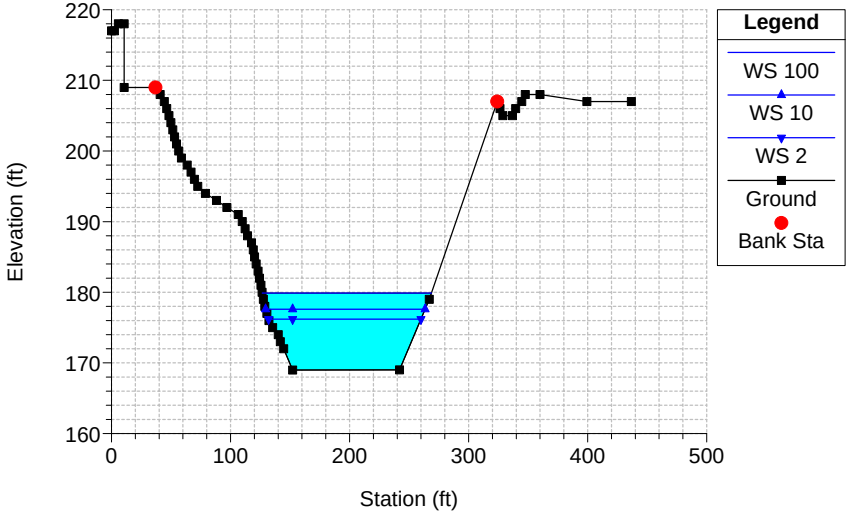



CompassBESS Plan: PR 9/24/2025

RS = 25



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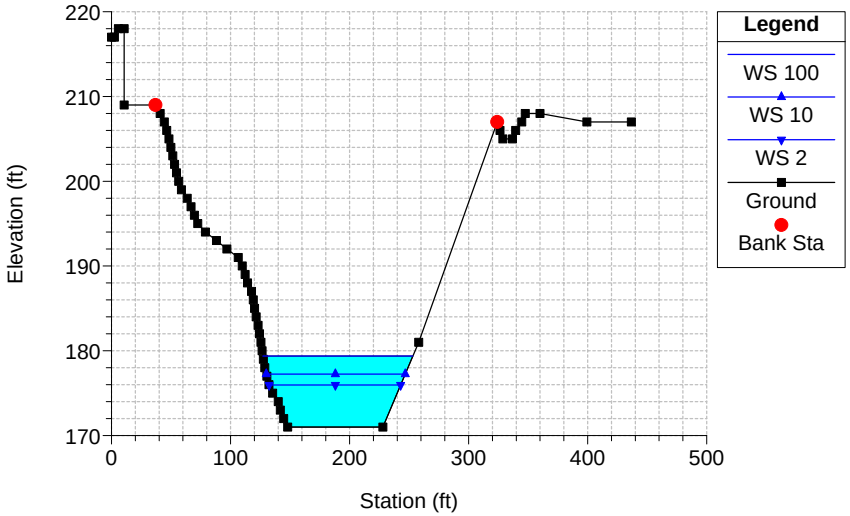


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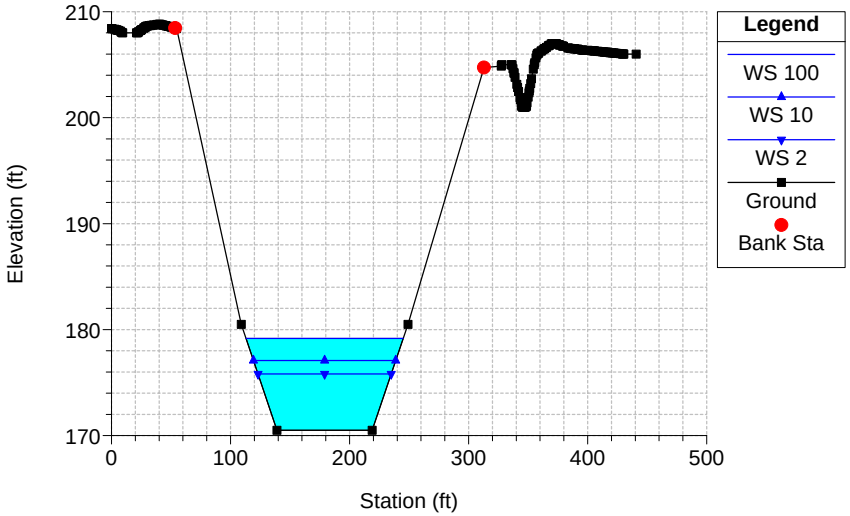


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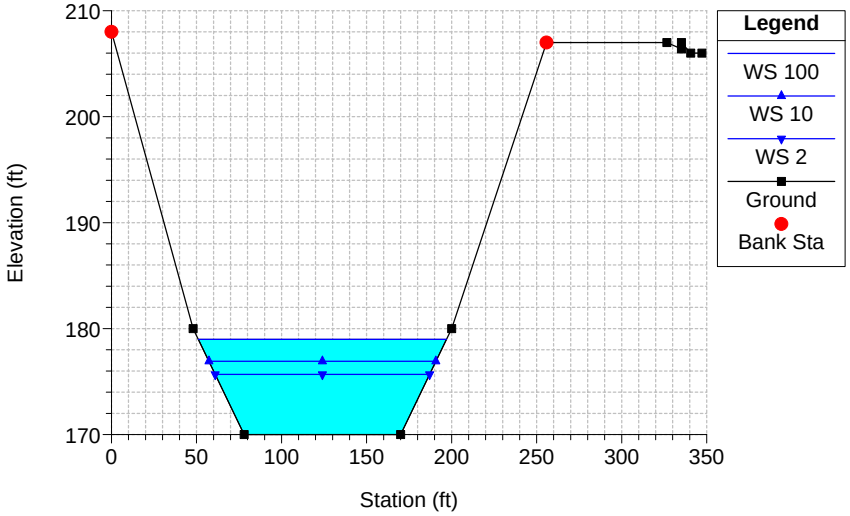


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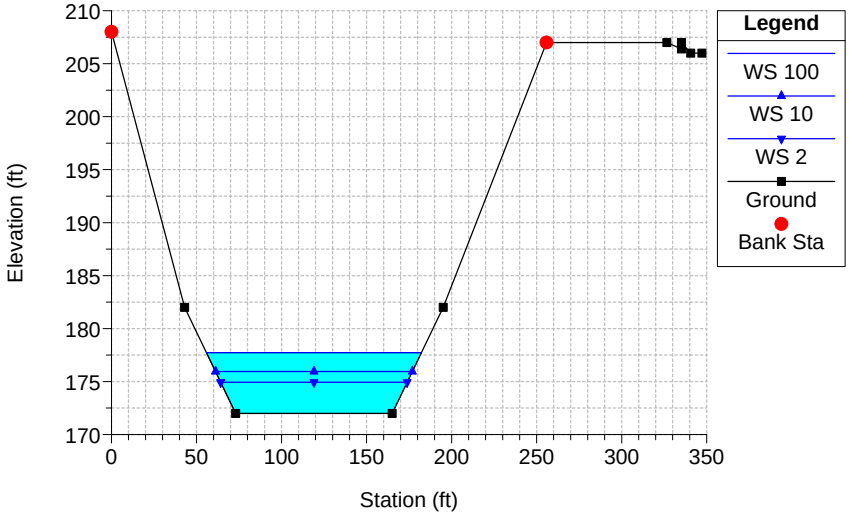
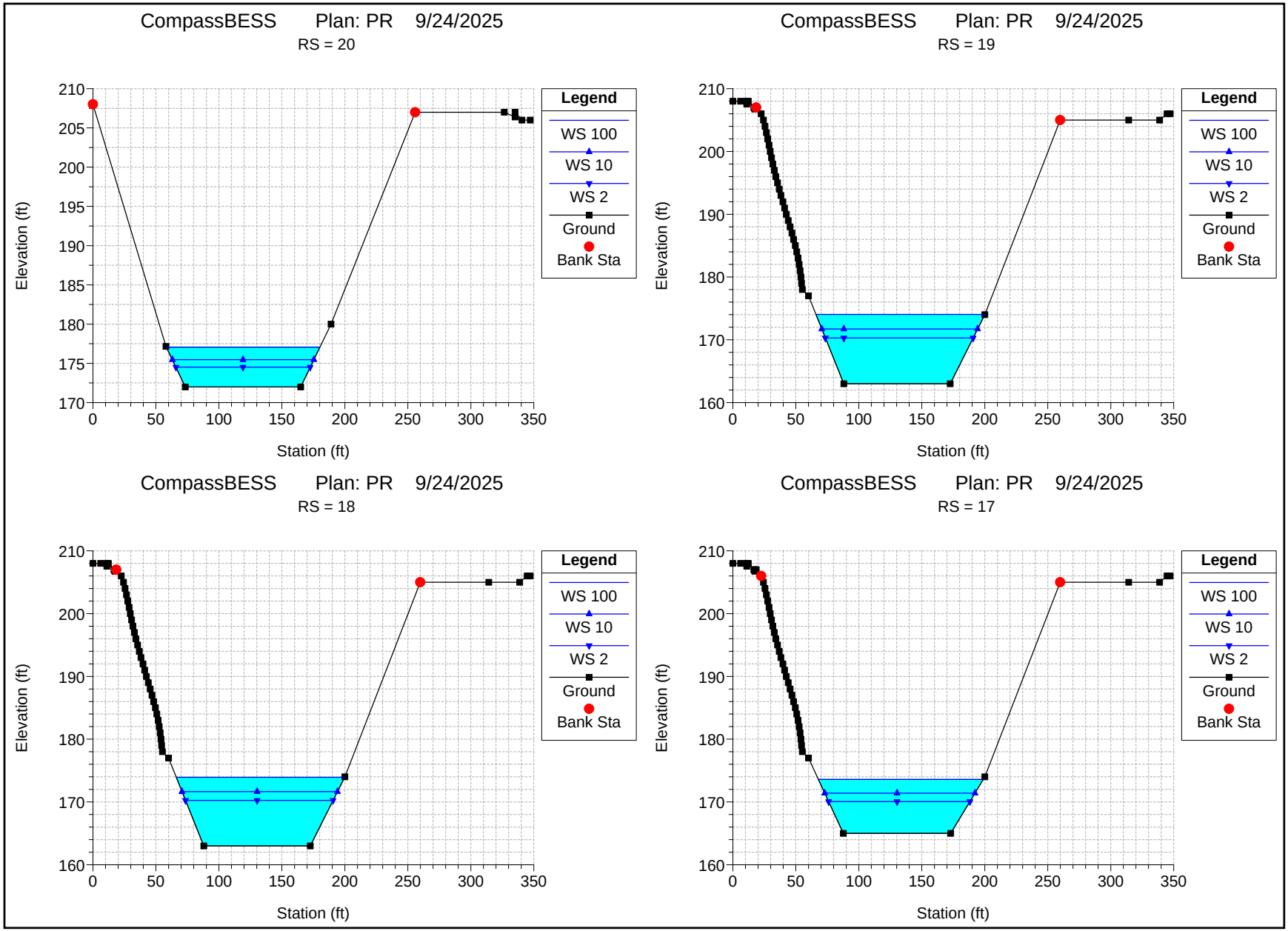
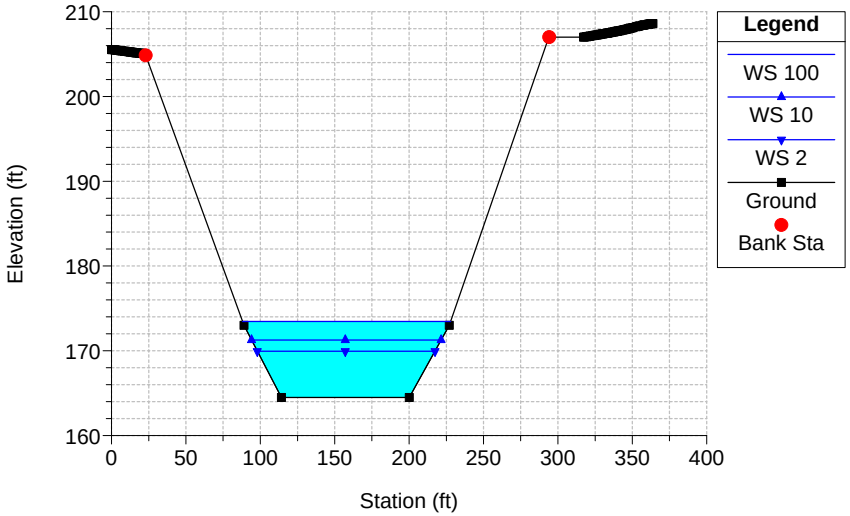



CompassBESS Plan: PR 9/24/2025
RS = 20
Elevation (ft)
Station (ft)
Legend
WS 100
WS 10
WS 2
Ground
Bank Sta
CompassBESS Plan: PR 9/24/2025
RS = 19
Elevation (ft)
Station (ft)
Legend
WS 100
WS 10
WS 2
Ground
Bank Sta
CompassBESS Plan: PR 9/24/2025
RS = 18
Elevation (ft)
Station (ft)
Legend
WS 100
WS 10
WS 2
Ground
Bank Sta
CompassBESS Plan: PR 9/24/2025
RS = 17
Elevation (ft)
Station (ft)
Legend
WS 100
WS 10
WS 2
Ground
Bank Sta

CompassBESS Plan: PR 9/24/2025
RS = 16




CompassBESS Plan: PR 9/24/2025
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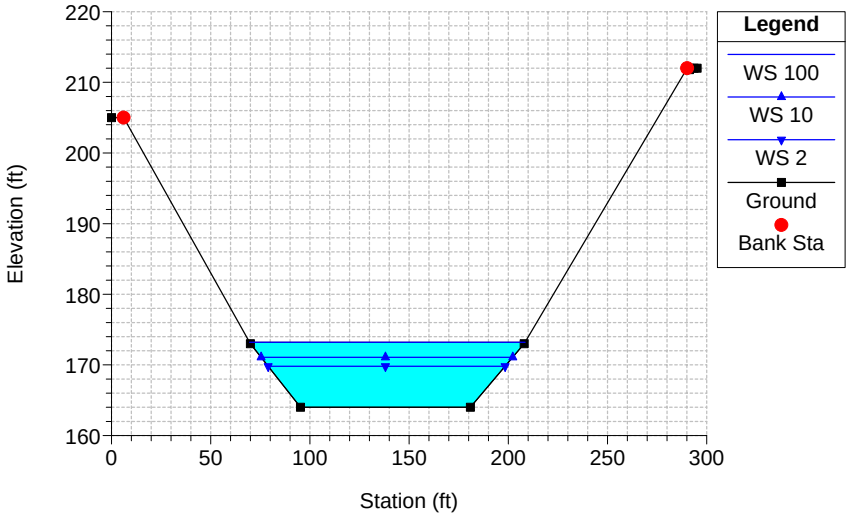


CompassBESS Plan: PR 9/24/2025
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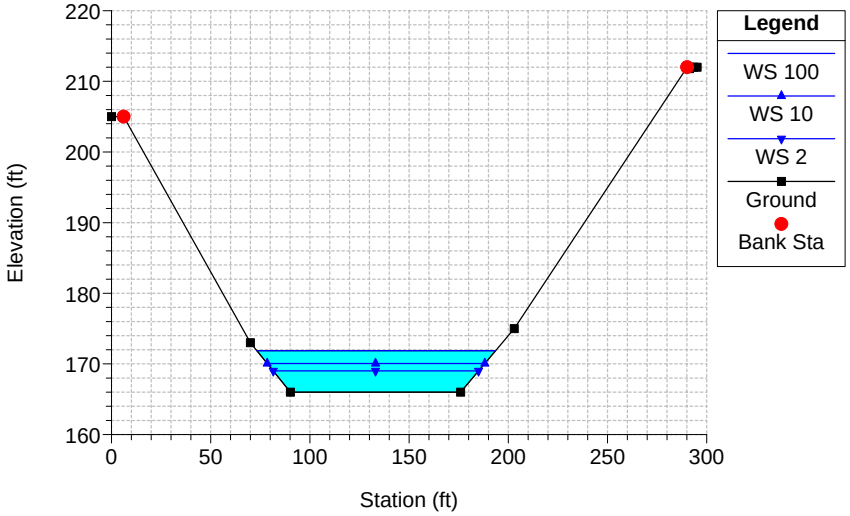


CompassBESS Plan: PR 9/24/2025
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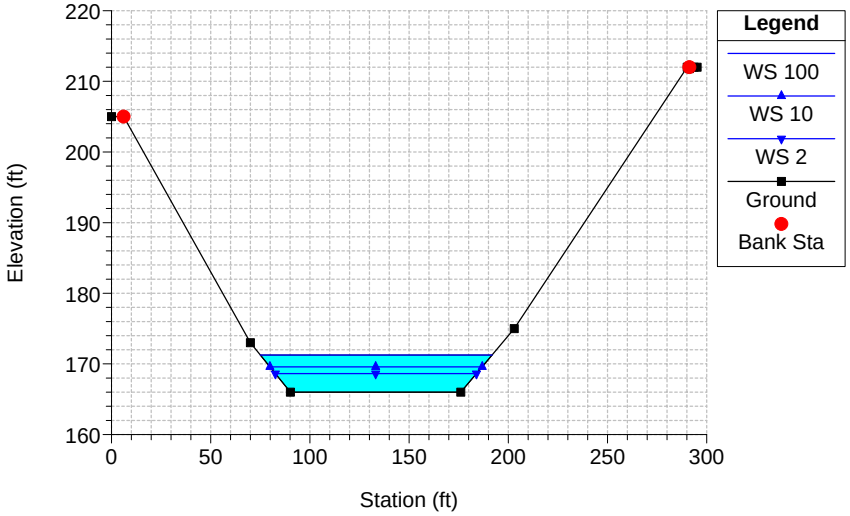
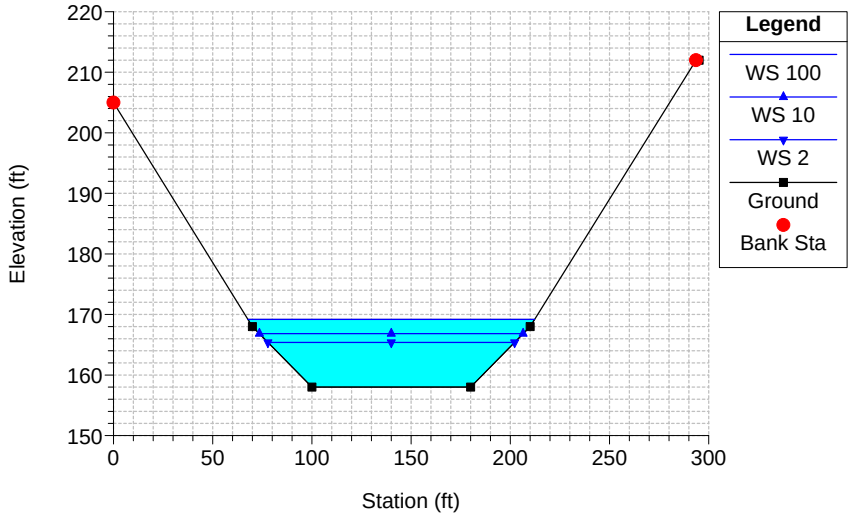
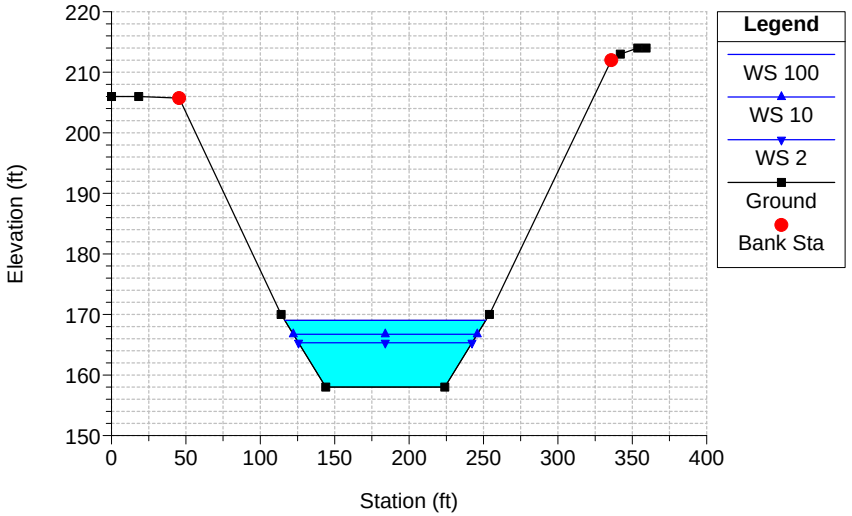


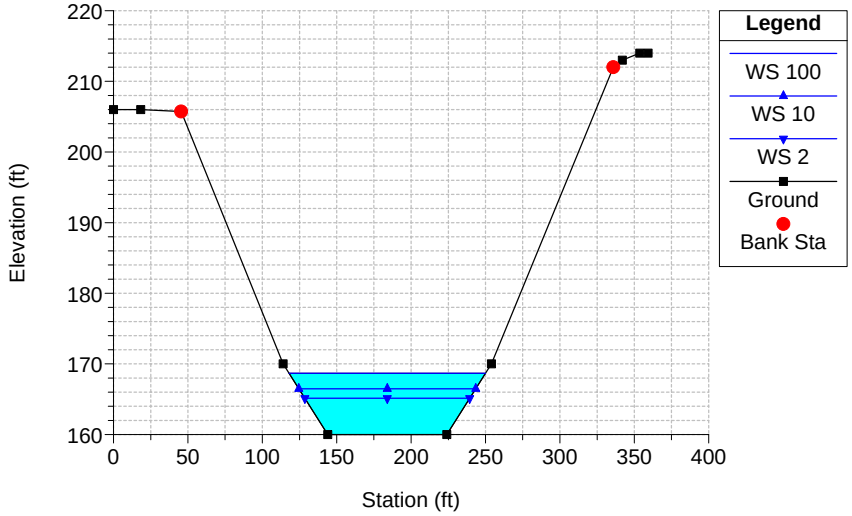
CompassBESS Plan: PR 9/24/2025
RS = 12



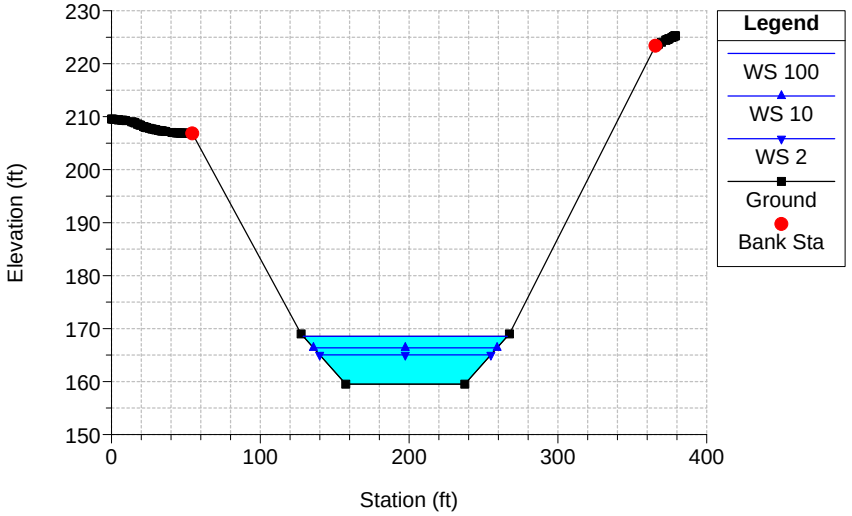

CompassBESS Plan: PR 9/24/2025
RS = 11




CompassBESS Plan: PR 9/24/2025
RS = 10

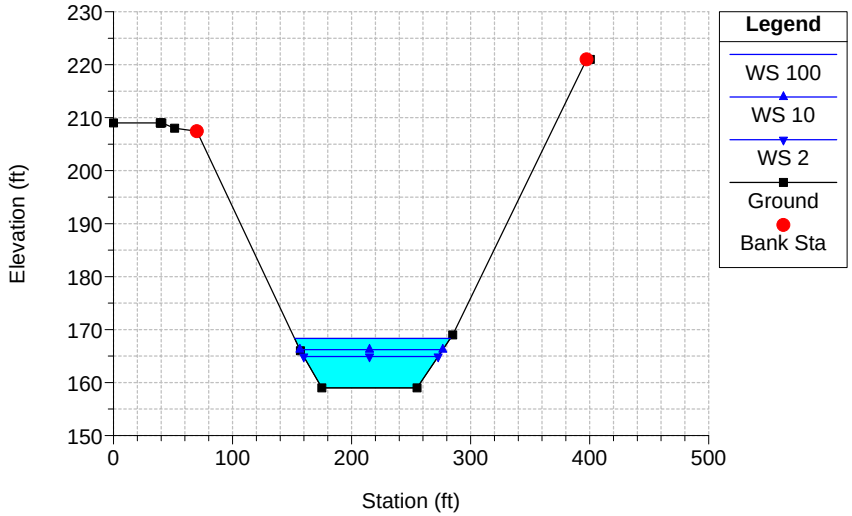



CompassBESS Plan: PR 9/24/2025
RS = 9



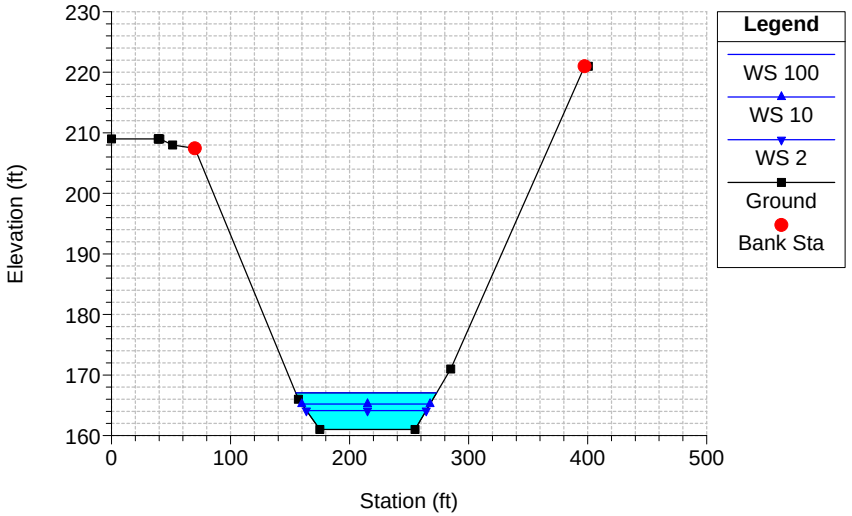
CompassBESS Plan: PR 9/24/2025

RS = 8



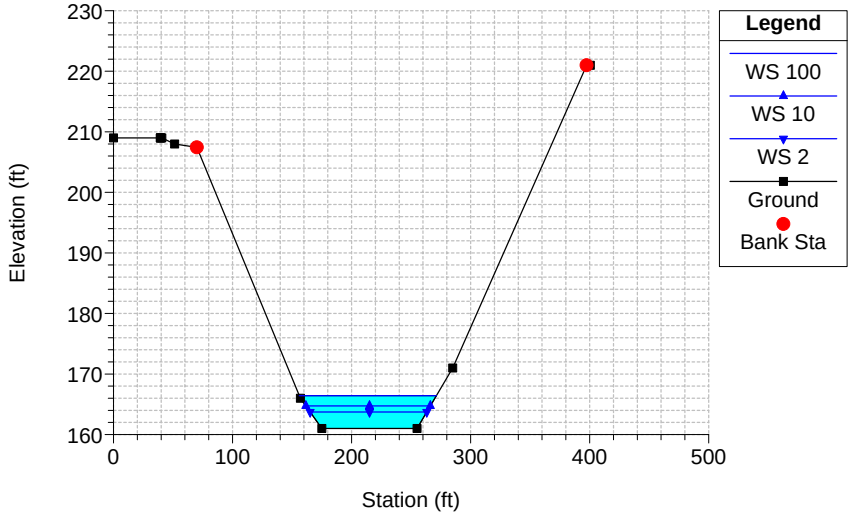

CompassBESS Plan: PR 9/24/2025

RS = 7



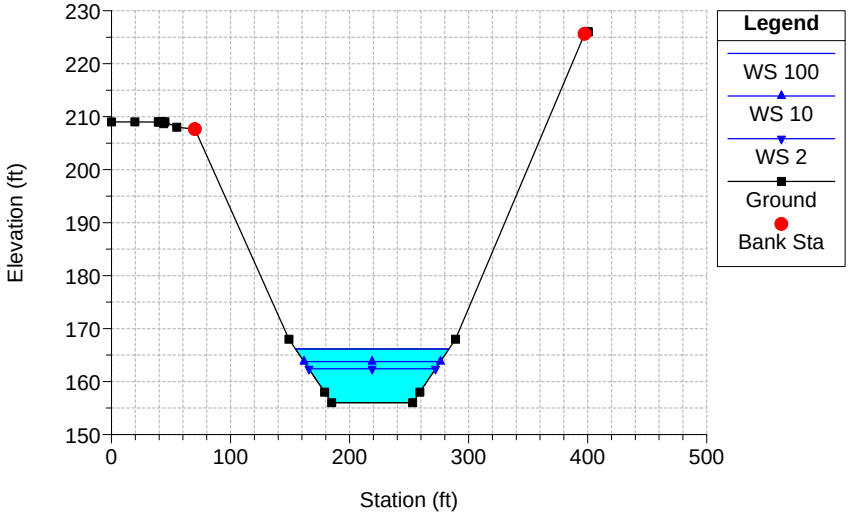

CompassBESS Plan: PR 9/24/2025

RS = 6



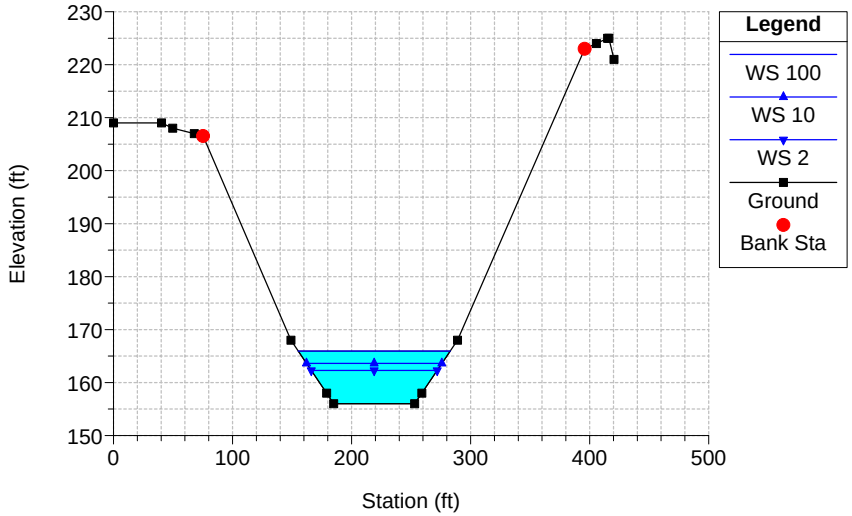

CompassBESS Plan: PR 9/24/2025

RS = 5



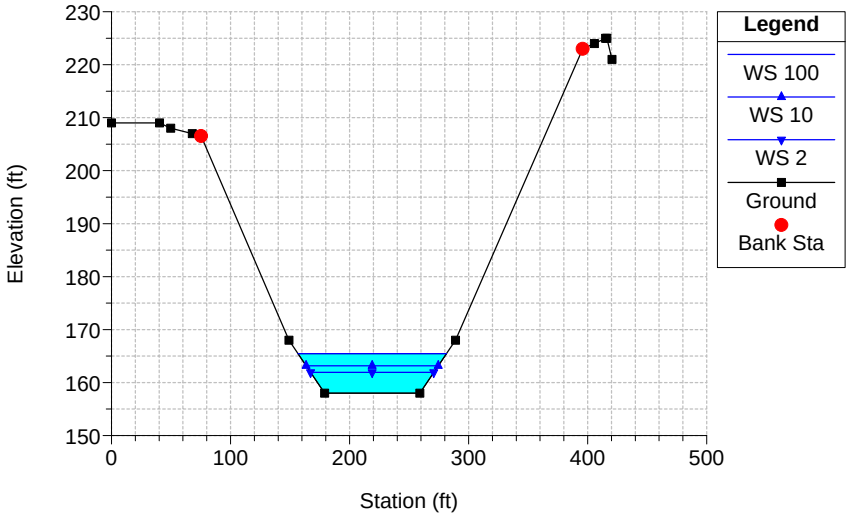
CompassBESS Plan: PR 9/24/2025

RS = 3.1



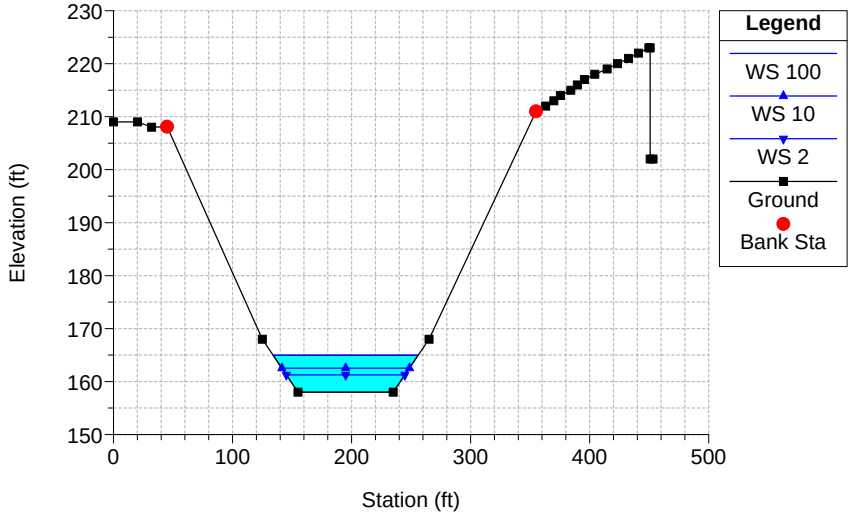

CompassBESS Plan: PR 9/24/2025

RS = 3



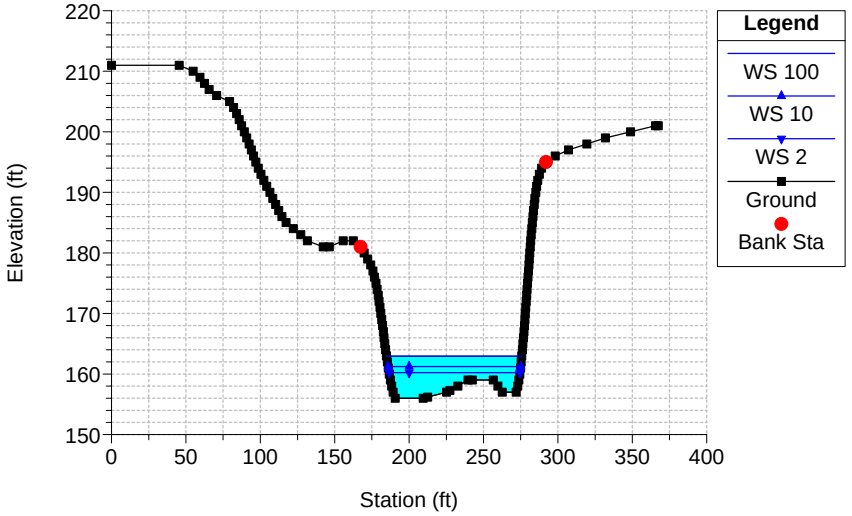

CompassBESS Plan: PR 9/24/2025

RS = 2




CompassBESS Plan: PR 9/24/2025

RS = 1



# ATTACHMENT 5

## ROCK SIZING CALCULATIONS

$$D_{30} = (FS)C_s C_V C_T D \left[ \left( \frac{\gamma_w}{\gamma_s - \gamma_w} \right)^{1/2} \frac{V}{\sqrt{K_1 g D}} \right]^{5/2}$$

Where: $D_{30}$ = riprap size of which 30 percent is finer by weight (ft)
$FS$ = safety factor
$C_s$ = stability coefficient for incipient failure
$C_V$ = vertical velocity distribution coefficient
$C_T$ = thickness coefficient
$D$ = local depth of flow (ft)
$\gamma_w$ = unit weight of water (lb/ft³)
$\gamma_s$ = saturated surface dry specific unit weight of stone (lb/ft³)
$V$ = local depth-averaged velocity (ft/s)
$K_1$ = side slope correction factor
$g$ = gravitational constant = 32.2 ft/s²

Use of this equation should be limited to longitudinal slopes less than 2 percent. Further explanation regarding the variables shown above is included in EM 1110-2-1601 (USACE, 1994).

$S_f$ = safety factor (see *c* below)

* $C_s$ = stability coefficient for incipient failure, $D_{85}/D_{15}$ = 1.7 to 5.2

= 0.30 for angular rock

* = 0.375 for rounded rock

$C_T$ = vertical velocity distribution coefficient

= 1.0 for straight channels, inside of bends

= 1.283 - 0.2 log (R/W), outside of bends (1 for (R/W) > 26)

= 1.25, downstream of concrete channels

= 1.25, ends of dikes

$C_T$ = thickness coefficient (see d(1) below)

* = 1.0 for thickness = $1D_{100}$(max) or 1.5 $D_{50}$(max), whichever is greater

* $d$ = local depth of flow, length (same location as $V$)

$\gamma_w$ = unit weight of water, weight/volume

* $V$ = local depth-averaged velocity, $V_{ss}$ for side slope riprap, length/time

$K_1$ = side slope correction factor (see *d*(1) below)

$g$ = gravitational constant, length/time²

$$K_1 = \sqrt{1 - \frac{\sin^2 \theta}{\sin^2 \phi}} \qquad (3\text{-}4)$$

where

$\theta$ = angle of side slope with horizontal

$\phi$ = angle of repose of riprap material (normally 40 deg)

Structure 1 at Drop:

| **D30=** | **2.2** | **ft** |
|---|---|---|
| FS | 2 | |
| Cs | 0.3 | |
| Cv | 1 | |
| Ct | 1 | |
| D | 4.61 | ft |
| $\gamma$W | 62.4 | lb/cu ft |
| $\gamma$S | 150 | lb/cu ft |
| V | 12.25 | ft/s |
| K1 | 0.87 | |
| g | 32 | ft/s2 |

Structure 1 at Basin:

| **D30=** | **0.4** | **ft** |
|---|---|---|
| FS | 2 | |
| Cs | 0.3 | |
| Cv | 1 | |
| Ct | 1 | |
| D | 8.12 | ft |
| $\gamma$W | 62.4 | lb/cu ft |
| $\gamma$S | 150 | lb/cu ft |
| V | 6.67 | ft/s |
| K1 | 0.87 | |
| g | 32 | ft/s2 |

Structure 2 at Drop:

| **D30=** | **2.2** | **ft** |
|---|---|---|
| FS | 2 | |
| Cs | 0.3 | |
| Cv | 1 | |
| Ct | 1 | |
| D | 4.69 | ft |
| $\gamma$W | 62.4 | lb/cu ft |
| $\gamma$S | 150 | lb/cu ft |
| V | 12.18 | ft/s |
| K1 | 0.87 | |
| g | 32 | ft/s2 |

Structure 2 at Basin:

| **D30=** | **0.3** | **ft** |
|---|---|---|
| FS | 2 | |
| Cs | 0.3 | |
| Cv | 1 | |
| Ct | 1 | |
| D | 8.75 | ft |
| $\gamma$W | 62.4 | lb/cu ft |
| $\gamma$S | 150 | lb/cu ft |
| V | 5.48 | ft/s |
| K1 | 0.87 | |
| g | 32 | ft/s2 |

Structure 3 at Drop:

| **D30=** | **2.1** | **ft** |
|---|---|---|
| FS | 2 | |
| Cs | 0.3 | |
| Cv | 1 | |
| Ct | 1 | |
| D | 4.69 | ft |
| $\gamma$W | 62.4 | lb/cu ft |
| $\gamma$S | 150 | lb/cu ft |
| V | 12.01 | ft/s |
| K1 | 0.87 | |
| g | 32 | ft/s2 |

Structure 3 at Basin:

| **D30=** | **0.2** | **ft** |
|---|---|---|
| FS | 2 | |
| Cs | 0.3 | |
| Cv | 1 | |
| Ct | 1 | |
| D | 9.03 | ft |
| $\gamma$W | 62.4 | lb/cu ft |
| $\gamma$S | 150 | lb/cu ft |
| V | 5.44 | ft/s |
| K1 | 0.87 | |
| g | 32 | ft/s2 |

Structure 4 at Drop:

| **D30=** | **2.2** | **ft** |
|---|---|---|
| FS | 2 | |
| Cs | 0.3 | |
| Cv | 1 | |
| Ct | 1 | |
| D | 4.72 | ft |
| $\gamma$W | 62.4 | lb/cu ft |
| $\gamma$S | 150 | lb/cu ft |
| V | 12.32 | ft/s |
| K1 | 0.87 | |
| g | 32 | ft/s2 |

Structure 4 at Basin:

| **D30=** | **0.2** | **ft** |
|---|---|---|
| FS | 2 | |
| Cs | 0.3 | |
| Cv | 1 | |
| Ct | 1 | |
| D | 8.89 | ft |
| $\gamma$W | 62.4 | lb/cu ft |
| $\gamma$S | 150 | lb/cu ft |
| V | 5.37 | ft/s |
| K1 | 0.87 | |
| g | 32 | ft/s2 |

Structure 5 at Drop:

| **D30=** | **2.4** | **ft** |
|---|---|---|
| FS | 2 | |
| Cs | 0.3 | |
| Cv | 1 | |
| Ct | 1 | |
| D | 4.99 | ft |
| $\gamma$W | 62.4 | lb/cu ft |
| $\gamma$S | 150 | lb/cu ft |
| V | 12.73 | ft/s |
| K1 | 0.87 | |
| g | 32 | ft/s2 |

Structure 5 at Basin:

| **D30=** | **0.3** | **ft** |
|---|---|---|
| FS | 2 | |
| Cs | 0.3 | |
| Cv | 1 | |
| Ct | 1 | |
| D | 9.27 | ft |
| $\gamma$W | 62.4 | lb/cu ft |
| $\gamma$S | 150 | lb/cu ft |
| V | 5.54 | ft/s |
| K1 | 0.87 | |
| g | 32 | ft/s2 |

Structure 6 at Drop:

| **D30=** | **2.2** | **ft** |
|---|---|---|
| FS | 2 | |
| Cs | 0.3 | |
| Cv | 1 | |
| Ct | 1 | |
| D | 4.6 | ft |
| $\gamma$W | 62.4 | lb/cu ft |
| $\gamma$S | 150 | lb/cu ft |
| V | 12.17 | ft/s |
| K1 | 0.87 | |
| g | 32 | ft/s2 |

Structure 6 at Basin:

| **D30=** | **0.2** | **ft** |
|---|---|---|
| FS | 2 | |
| Cs | 0.3 | |
| Cv | 1 | |
| Ct | 1 | |
| D | 9.67 | ft |
| $\gamma$W | 62.4 | lb/cu ft |
| $\gamma$S | 150 | lb/cu ft |
| V | 5.32 | ft/s |
| K1 | 0.87 | |
| g | 32 | ft/s2 |

# Attachment E

Preliminary Oso Creek Planting Palette

**Riparian Channel Seed Mix**

| Scientific Name | Common Name |
|---|---|
| Ambrosia psilostachya | Western ragweed |
| Anemopis californica | Yerba mansa |
| Artemisia douglasiana | California mugwort |
| Distichlis spicata | Saltgrass |
| Eleocharis macrostachya | Common spikerush |
| Erythranthe cardinalis | Scarlet monkeyflower |
| Erythranthe guttata | Seep monkeyflower |
| Typha latifolia | Broadleaf cattail |
| Juncus bufonius | Toad rush |
| Juncus xiphioides | Irisleaf rush |
| Pluchea odorata | Saltmarsh fleabane |

**California Sycamore - Coast Live Oak Riparian Woodlands Plant Palette (Lower Banks)**

| Scientific Name | Common Name |
|---|---|
| Amorpha fruticosa | Western false indigo |
| Artemisia dracunculus | Wild tarragon |
| Baccharis salicifolia | Mulefat |
| Elymus condensatus | Giant wild rye |
| Heteromeles arbutifolia | Toyon |
| Platanus racemosa | California sycamore |
| Pluchea sericera | Arrowweed |
| Quercus agrifolia | Coast live oak |
| Sambucus nigra | Black elderberry |

**California Sycamore - Coast Live Oak Riparian Woodlands Seed Palette (Lower Banks)**

| Scientific Name | Common Name |
|---|---|
| Ambrosia psilostachya | Western ragweed |
| Artemisia douglasiana | California mugwort |
| Distichlis spicata | Saltgrass |
| Elymus condensatus | Giant wild rye |
| Elymus triticoides | Creeping wild rye |
| Malvela leprosa | Alkali mallow |
| Phacelia ramossisima | Branching phacelia |
| Pluchea odorata | Saltmarsh fleabane |
| Verbena lasiostachys | Western vervain |

**Coastal sage scrub Plant Palette (Upper banks)**

| Scientific Name | Common Name |
|---|---|
| Artemisia californica | Calfornia sagebrush |
| Atriplex lentiformis | Big saltbush |
| Baccharis pilularis | Coyote brush |
| Elymus condensatus | Giant wild rye |

| | |
|---|---|
| Eriogonum fasciculatum | Calfironia buckwheat |
| Isocoma menzesii | Menzie's goldenbush |
| Malosma laurina | Laurel sumac |
| Opuntia littoralis | Coast prickly pear |
| Quercus agrifolia | Coast Live oak |
| Rhus integrifolia | Lemonade berry |
| Sambucus nigra | Black elderberry |

**Coastal sage scrub Seed Palette (Upper banks)**

| **Scientific Name** | **Common Name** |
|---|---|
| Acmispon glaber | Deerweed |
| Amsinckia menziesii | Menzie's fiddleneck |
| Artemisia californica | California sagebrush |
| Deinandra fasciculata | Clustered tarweed |
| Encelia californica | California bush sunflower |
| Eriogonum fasciculatum | California buckwheat |
| Eriophyllum confertiflorum | Golden yarrow |
| Eschscholzia californica | California poppy |
| Lupinus bicolor | Miniature lupine |
| Salvia apiana | White sage |
| Salvia mellifera | Black sage |
| Stipa lepida | Foothill needlegrass |

# Attachment F

Updated Project Description

# 2 Project Description

## 2.1 Overview and Location

The battery energy storage (BESS) project (Project) proposed by Compass Energy Storage LLC is a 250 MW, up to 1000 MWh facility composed of lithium-iron phosphate, or similar technology batteries (LFP), inverters, medium-voltage (MV) transformers, a switchyard, a collector substation, and other associated equipment to interconnect into the San Diego Gas and Electric (SDG&E) Trabuco to Capistrano 138 kilovolt (kV) transmission line (Point of Interconnection). The Project includes a switchyard to be owned and operated by SDG&E. The batteries will be installed in non-habitable steel cabinet-enclosures. The enclosures will have battery storage racks, with relay and communications systems for remote, automated monitoring and managing of the batteries. The BESS will also include a battery management system to control the charging/discharging of the batteries, along with temperature monitoring and control of individual battery cell temperature with an integrated cooling system. Batteries operate with direct current (DC) electricity, which must be converted to alternating current (AC) for compatibility with the existing electric grid. Power inverters to convert between AC and DC, along with transformers to step up the voltage, will be included as part of the Project. Electric energy will be transferred from the existing power grid to the Project batteries for storage and from the Project batteries to the power grid when additional electricity is needed.

Following construction, the Project will not create air emissions, will not require sanitary facilities, will generate minimal vehicle trips, and will only require water for landscape irrigation and to supply on-site fire hydrants.

The proposed BESS facility consists of approximately 12.2 acres of an approximately 40.8-acre parcel in the City of San Juan Capistrano, California (City). The Project also includes approximately 2.47 acres of offsite components (access road). The Project site is located within the northern portion of the City, adjacent to Camino Capistrano with Interstate-5 located to the east. The Project site is utilized by the current owner, Saddleback Church, for ancillary activities and is adjacent to the Saddleback Church Rancho Capistrano to the north, mostly open space to the south, Oso Creek to the south and east, Metrolink Railroad and Interstate-5 to the east, and open space and residences outside of the City limits to the west. Stabilization and rehabilitation of Oso Creek will occur along approximately 2,600 linear feet area of the non-channelized portion of the creek (12.49 acres) to ensure long term site integrity, support project infrastructure, protect sensitive resources and improve water quality. The SDG&E Trabuco to Capistrano 138 kV transmission line is located approximately 500 feet to the east and runs alongside the Metrolink Railroad tracks.

Upon commencement of construction, Compass Energy Storage LLC will be the owner of the battery project site and upon completion of construction, the SDG&E switchyard site will be deeded to SDG&E.

The Project site was selected given it is in an area of high energy demand near SDG&E facilities. The Project site is one of the few remaining suitable and available sites in Orange County with minimal topography and associated grading/civil improvements in immediate proximity to transmission with full capacity and deliverability --and where extensive off-site transmission upgrades are not required. The Project location requires minimal new facilities to interconnect into the SDG&E grid with only 500 feet of transmission improvements. The Project site is also located immediately adjacent to existing roadways that provide readily available access for construction and operations. The site is also located outside of sensitive biological habitat as the site has been mostly previously disturbed.

## 2.2 Project Components

The Project will include the development of an approximately 250 MW BESS and associated infrastructure, including stabilization and restoration of the adjacent Oso Creek. A BESS is comprised of stationary equipment that receives electrical energy and then utilizes batteries to store that energy to then supply electrical energy at a future time. Power released or captured by the proposed Project will be transferred to and from the SDG&E Trabuco to Capistrano 138kV transmission line via a loop-in generation transmission line that will interconnect to an SDG&E switchyard that will be constructed within the Project site. The Project will consist of LFP or similar technology batteries installed in racks and contained inside non-habitable enclosures; inverters; MV transformers; an SDG&E switchyard; a Project substation; and other associated equipment. The Project will include the following components:

- Battery Energy Storage System
- Power Inverters and Transformers
- Project Substation
- SDG&E Switchyard
- Telecommunication Facilities
- Perimeter Visual Screening and Security Walls
- Stormwater Detention Facilities
- Oso Creek Stabilization and Rehabilitation
- Landscaping and Fuel Modification
- Access Road Improvements
- Site Access and Security
- Loop-In Transmission Line
- Fire Protection System
- Operations and Maintenance Area

The BESS facilities will be remotely operated year-round and be available to receive or deliver electrical energy to the grid 24 hours a day and 365 days a year. After commissioning and during the operational life of the Project, qualified technicians would routinely inspect the battery energy storage system and conduct necessary maintenance to ensure safe operational readiness. If an issue arises, the system can remotely shut down and de-energize.

Project components are also described in the following subsections. Figure 2-1, Site Plan, shows the Project layout. Appendix 2A contains scale plan and elevation drawings depicting the relative size and location of all facilities.

### 2.2.1 Battery Energy Storage System

The LFP batteries will be housed in racks similar to common computer server racks. The racks are typically made of aluminum but sometimes may be composed of steel. The LFP battery technology is considered one of the safest, best understood, and most efficient methods of energy storage on the market. The proposed facility will use an LFP battery technology that has a long lifespan and boasts superior safety and stability characteristics. The battery racks will be designed and installed in accordance with the local seismic design requirements.

The battery racks will be housed in non-habitable enclosures. The BESS will be designed and installed in conformance with the nationally recognized National Fire Protection Association (NFPA) 855 Standard for the Installation of Stationary Energy Storage Systems, along with all applicable state and local fire protection requirements. The BESS development area will be connected with an improved access road that will meet OCFA requirements. Future augmentation area will be located within the BESS yard.

A Battery Management System (BMS) is used in conjunction with the energy storage system, which can monitor the battery voltage, current, temperature, managing energy absorption and release, thermal management, low voltage power supply, high voltage security monitoring, fault diagnosis and management, external communication with PCS and Emergency Management System (EMS), and ensure the stable operation of the energy storage system.

The Project will use battery storage systems that are compliant with National Fire Protection Association (NFPA) 855, that are Underwriters Laboratories (UL) certified, and that include built-in failsafe and cooling systems designed to prevent thermal runaway and the spread of fire. A fire protection system is installed to automatically shut down any affected battery storage components and prevent the spread of the fire to the other battery storage modules. A detailed hazard mitigation analysis, air dispersion models and emergency response plan have been prepared for the project and coordinated with the Orange County Fire Authority.

In addition, the site will include infra-red sensors and visual monitoring by the operations team as part of its Hazard Mitigation and Emergency Response program.

### 2.2.2 Power Inverters and Transformers

Compass Energy Storage LLC uses only industry-standard, nationally (and internationally) recognized equipment. The inverters are unattended, stand-alone units that operate in all conditions. They operate in both a charge mode and a discharge mode. They are UL listed for bi-directional use and are monitored and controlled remotely. There will be on-site disconnects in the event of an emergency or unscheduled maintenance. They are robust in their design and are designed to last more than 30 years with proper preventive maintenance, scheduled maintenance, and occasional major overhauls.

MV transformers and additional electrical equipment will be installed outside the BESS enclosure. From the MV transformer, cabling will be run to the Project substation. All outside electrical equipment will be housed in the appropriate National Electrical Manufacturers Association (NEMA) rated enclosures and screened from view to the extent possible, on all sides.

### 2.2.3 Project Substation

A Project substation will be installed that will include open rack, air insulated switch gear and the main power transformer to step up from 34.5 kV to 138 kV, as well as a pole to connect the Project substation to the SDG&E switchyard.

### 2.2.4 SDG&E Switchyard

An SDG&E switchyard will be installed adjacent to the Project substation that will include open rack, air insulated switch gear to deliver power to the nearby Trabuco to Capistrano 138kV transmission line. There will also be a Transmission Control Center within the switchyard area.

## 2.2.5 Telecommunication Facilities

The Project will include telecommunication facilities for communication with the SDG&E/CAISO facilities and to support remote Project operations monitoring. To provide for communication with SDG&E facilities, a fiber-optic cable will be used to connect the Project site switchyard with the SDG&E point of interconnection. Utility interconnection regulations require the installation of a second, separate, redundant fiber-optic cable. The redundant fiber-optic cable will also be installed within the Project footprint. For remote monitoring and operations communication, the Project will use local exchange carrier services, connecting to existing telecommunication fiber-optic lines owned and managed by local telecommunication providers.

## 2.2.6 Stormwater Detention Structures

As discussed above, the proposed Project layout consists of access roads, substation area, and battery storage area. The batteries and other equipment will sit on top of concrete foundations and the remaining operational areas will have aggregate surfacing. The Project has been designed to meet regulatory standards and reduce potential for stormwater to be discharged off site in exceedance of existing conditions. Stormwater runoff from the Project site currently outflows to an un-channelized section of Oso Creek. Currently, storm runoff from the hills west of Oso Creek drain across the property as mostly unconcentrated sheet flow, with high infiltration of runoff occurring on the property during the more frequent low intensity storms. During less frequent high intensity storms, runoff cascades over the west bank of the channel, which contributes to the instability of the channel bank. It is thus prudent to manage the offsite (and onsite) storm runoff by capturing and controlling it in an engineered conveyance system that discharges the runoff to the creek channel at a point where erosion will not occur.

### Onsite Flows

The onsite stormwater runoff from the Project will be detained in an underground storage chamber system located under and adjacent to the internal access roads and is sized for the 100-year storm event. From here, the water will be routed to the north through a storm drain where it will meet with the northerly offsite flow location at the proposed culvert location. From here the onsite and offsite flows will discharge together into the creek as described in more detail below.

### Offsite Flows

Stormwater runoff from the offsite area will be re-routed through a series of drainage ditches, culverts, and storm drain facilities sized for the 100-year storm event. The offsite flows are split into two areas, northerly and southerly. The northerly offsite flows will be collected at a low point on the west side of the proposed access road, just north of the proposed BESS yard. The northerly runoff will be routed into box culverts to cross under the proposed access road. The northerly runoff will then be routed through a storm drain system northeasterly to outfall within the existing rip rap just south of the existing concrete channel. The northerly runoff will exit the storm drain system through a proposed headwall above the channel limits. The runoff velocity will be decreased by proposed rip rap immediately below the proposed headwall that extends to the bottom of the channel. The southerly offsite flows will be collected in a drainage ditch along the westerly and southerly portions of the proposed BESS yard. The southerly runoff will enter a series of culverts to bypass the two proposed access roads that exit the southerly portion of the yard. The southerly runoff will then be routed into a storm drain system and directed southeasterly to an outfall above the stabilized channel limits. The runoff velocity will be decreased by internal energy dissipaters and be integrated into the proposed creek restoration rip rap immediately below the proposed headwall that extends to the bottom of the channel. This design will reduce erosion from the current site conditions as it will ensure that the flow will no longer

discharge over the channel cliff and will also reduce the tributary area by the 12.2-acre site area. The updated off-site storm drain system is depicted in Appendix 2A.

## 2.2.7 Oso Creek Stabilization and Rehabilitation

The proposed Project includes the repair and rehabilitation of approximately 2,600 linear feet of the degraded, erosive portion of Oso Creek, which lies adjacent to the eastern boundary of the BESS facility site. The creek currently exhibits high instability due to higher storm flow volumes, durations and velocities, unmanaged vegetation, and highly erodible soils. Stabilizing and rehabilitating the creek is therefore a critical component of the Project necessary to prevent future bank failure, reduce channel migration, enhance native vegetation, and improve water quality.

The restoration design includes a series of instream stabilization structures composed of natural rock and native vegetation. Key features will include low head drop/stabilization structures, including rock weirs and ramps, followed by pools or stilling basins. The rock features will be spaced approximately every 300 to 400 feet between flatter channel sections and the bottom width of the creek channel will be 80 feet to reduce flow velocities. The western bank will be graded at a 3:1 side slope to a height of 10 feet. The slope will then be graded at a 2:1 slope until it meets the existing top of bank elevation. Native vegetation will be planted along the 2:1 side slopes. The design also entails elevating the eroded Oso Creek channel to allow reestablishment of a hyporheic zone[1] in the creek channel bed. Collectively, these channel rehabilitation measures will stabilize the creek, protect the adjacent BESS facility, and provide long-term habitat and water quality benefits.

The proposed rehabilitated creek channel has been designed to comply with the ecological requirements of the U.S. Army Corps of Engineers Nationwide Permit 27 (Aquatic Habitat Restoration, Enhancement, and Establishment) including, using only native plant species, designing restoration to resemble a natural reference habitat, and ensuring net ecological benefits with no conversions between habitat types.

Preliminary design drawings, a hydraulic report, and a planting plan and palette are provided in Appendix 2D.

## 2.2.8 Perimeter Wall, Landscaping, Aesthetics, and Fuel Modification Zones

A 10-foot-tall perimeter wall around the site will be constructed that consists of a prefabricated masonry material for both visual enhancement, security and fire protection. This wall will be combined with perimeter landscaping and a 20-foot-tall visual screening fence along the northeastern perimeter to minimize or eliminate visual impacts from public views. A detailed Landscape Plan is provided in Appendix 2B.

The Project will incorporate an approximate 20-foot landscape buffer around the perimeter for screening and aesthetic enhancement. The landscape buffer will consist of a mixture of trees, shrubs, groundcover, and vines to create a varied, aesthetically pleasing visual buffer. Trees within the landscape buffer will include species native to southern California, 24-inch box size, with heights of 20 to 60 feet and widths of 15 to 40 feet, depending on the

[1] The hyporheic zone is defined as the subsurface area where stream water flows through segments of its adjacent bed and lower banks, characterized by the mixing of stream water and groundwater, crucial for aquatic ecosystems, providing habitat and performing vital functions like filtering pollutants and regulating water temperature

tree type. Additional information related to planting sizes, spacing, quantities, and representative tree photographs are included in Appendix 2B. All plantings will require minimal supplemental irrigation until established.

The applicant has provided visual simulations of the Project with landscaping from several public vantage points. Pursuant to CEC Application Requirements and Appendix G of the CEQA Guidelines, if the Project is located in an urbanized area the Project should not conflict with applicable zoning and other regulations governing scenic quality. As the City of San Juan Capistrano qualifies as an "urbanized area" under CEQA, the urbanized area threshold requiring an assessment of scenic quality policy and regulation consistency is the appropriate threshold to apply (and is referenced below). While visual simulations are not required to make this assessment, the applicant has offered these figures to further clarify the Project's conformity with policies and standards governing scenic quality (See Section 4.13 herein, and See also Figures 4.13-2 and 2a and 4.13-3 and 3a).

The Project has prepared a draft fuel modification plan for the areas surrounding the BESS facility outside of the 10-foot-tall perimeter wall to incorporate OCFA fire safety policies and to promote wildfire prevention and safety as recommended by the OCFA in their Community Wildfire Prevention Plan. The draft fuel modification plan has been submitted to the OCFA for its review and approval. Proposed fuel modification consists of the following three zones:

- Zone "A". 10- to 85-foot variable width on the outside of the 10-foot walls, flat level terrain, automatic irrigation system, fire resistant plants selected from Fuel Modification Zone Plant List.
- Zone "B". 40- to 170-foot variable width, flat level terrain, non-irrigated, mowing of annual grass and forbs (or more frequently as needed).
- Zone "C". 25- to 170-foot variable width, gently sloping terrain (up to 20%), non-irrigated, 50% thinning of native shrubs annually (or more frequently as needed).

### 2.2.9 Site Access and Security

Interstate-5 is the largest highway in the area and provides regional access to the Project site from the north and south. Access to the Project site will be provided via an existing access road off of Camino Capistrano approximately 0.6 miles northeast of the Project site. A new access road will be improved from the entry access road off Camino Capistrano along the east side of the property to the Project site. Road improvements shall consist of converting existing dirt roads into gravel roads and widening the roads to meet OCFA and SDG&E standards (30-feet wide). There will be three separate entrances/driveways into the BESS facility in accordance with OCFA standards. The three entrances/driveways will be located along the northern border of the BESS yard.

As noted above, perimeter walls will be installed around the Project site for fire safety and security purposes, as well as for visual screening. Access will only be available to authorized personnel. A Knox box will be provided at all access gates to allow for emergency access.

Permanent motion-sensitive, directional security lights will be installed to provide adequate illumination around the substation area and points of ingress/egress. All lighting will be shielded and directed downward to minimize the potential for glare or spillover onto adjacent properties. Security cameras will be placed on site and monitored 7 days a week and 24 hours per day.

### 2.2.10 Loop-In Transmission Line

A loop-in transmission line will be constructed that will transfer power to and from the proposed Project and the SDG&E Trabuco to Capistrano 138kV transmission line approximately 500 feet to the east of the Project site, which runs north-south adjacent to the railroad. The loop-in transmission line will be supported by up to 5 pole structures which will be sited to fully avoid Oso Creek. These poles consist of two poles on the Project site within the SDG&E switchyard, west of Oso Creek, and three poles on the east side of Oso Creek (two of which will be replacing existing poles); only one pole on the east side of Oso Creek will be new).

### 2.2.11 Fire Protection System

Compass Energy Storage LLC will use battery storage systems that are both NFPA 855 Code compliant and UL certified, and that include built-in failsafe and cooling systems designed to prevent thermal runaway and the spread of fire. A fire protection system will be installed to automatically shut down any affected battery storage components and, in the event of a thermal runaway event, to prevent the spread of the fire to the other battery storage modules.

The perimeter wall discussed above will also provide fire protection – both to prevent wildfire from impacting the site, as well to reduce the chance of an on-site fire from escaping beyond the property. The fire wall will be consistent with both the NFPA 1144 Standard for Reducing Structure Ignition Hazards from Wildland Fire – 2008 Edition, Section 5.1.3.3 and A.5.1.3.3, and the International Urban Wildland Interface Code (ICC 2012). The fire wall shall also serve as a decorative wall for the Project site. In addition, fire hydrants will be installed in accordance with OCFA standards.

In coordination County fire and public safety officials, the Project prepared a detailed Hazard Mitigation Analysis and Emergency Response Plan that has been approved by the OCFA as part of their approved Fire Management Plan. See Section 4.17, Wildfire and Fire Prevention).

### 2.2.12 Operations and Maintenance Area

The Project would include up to six conex containers to house equipment and materials necessary to complete operations and maintenance activities. Additionally, there would be a prefabricated mobile office trailer with self-contained water and sanitary for technicians to utilize while on-site for routine inspections and maintenance of the Project.

## 2.3 Construction

### 2.3.1 Schedule and Workforce

The physical construction/site activities of the proposed Project are expected to last approximately 17 months, including 3 months of testing and commissioning. Table 2-2 includes proposed construction phasing.

**Table 2-2. Proposed Construction Phasing**

| Phase Name | Start Date | End Date | Days per Week | Workdays per Phase |
|---|---|---|---|---|
| Oso Creek Stabilization and Rehabilitation | 9/1/2026 | 6/17/2027 | 5 | 195 |
| Access Road Site Preparation, Grading, and Paving | 9/1/2026 | 9/30/2026 | 5 | 22 |
| BESS/Substation Site Preparation | 9/15/2026 | 9/30/2026 | 5 | 12 |
| Switchyard Site Preparation | 9/15/2026 | 9/30/2026 | 5 | 12 |
| BESS/Substation Site Grading and Stormwater Detention Structures | 2/16/2027 | 4/29/2027 | 5 | 50 |
| Switchyard Grading | 2/16/2027 | 3/27/2027 | 5 | 30 |
| Battery/Container and Substation Installation | 4/19/2027 | 12/17/2027 | 5 | 175 |
| Switchyard Installation | 3/30/2027 | 10/25/2027 | 5 | 150 |
| Loop-In Transmission Line Foundation and Tower Erection | 8/31/2027 | 9/27/2027 | 5 | 20 |
| Loop-In Transmission Stringing and Pulling | 9/28/2027 | 10/25/2027 | 5 | 20 |
| Landscaping Installation | 9/28/2027 | 10/25/2027 | 5 | 20 |
| Commissioning | 10/26/2027 | 1/17/2028 | 5 | 60 |
| Decommissioning | 1/1/2058 | 8/7/2058 | 5 | 157 |

The proposed Project will be constructed by several specialized construction contractors. Construction will primarily occur during daylight hours, Monday through Saturday between 7:00 a.m. and 6:00 p.m., as required to meet the construction schedule. Any construction work performed outside the normal work schedule will be coordinated with the appropriate agencies and will conform to City regulations.

## 2.3.2 Site Grading and Earthwork

Construction activities will include excavation and grading of the Project site. Site preparation and construction will occur in accordance with all federal, state, and local code and requirements. Stabilization of Oso Creek will commence during the dry summer season. Noise-generating construction activities will be limited to Monday through Saturday between 7:00 a.m. and 6:00 p.m. All stationary equipment and machines with the potential to generate a significant increase in noise or vibration levels will be located away from noise receptors to the extent feasible. The contractor will conduct construction activities in such a manner that the maximum noise levels at the affected buildings will not exceed established noise levels.

The BESS facility grading is anticipated to generate approximately 582 cy of export and approximately 48,028 cy of import. The stabilization and rehabilitation of Oso Creek is anticipated to generate approximately 141,720 cy of cut and 38,140 cy of fill for a net export of 103,580 cy. A portion of the import necessary for the BESS facility grading (approximately 38,024 cy) can be met by using available net export of the creek (103,580 cy) which will result in a remaining 65,556 cy net export of the creek. This will result in a total Project export of 76,142 cy (65,556 cy plus 10,586 cy). Export will occur over the duration of the BESS grading phase, which is assumed to be 50 workdays.

All applicable federal, state, and local requirements and best management practices (BMPs) will be incorporated into the construction activities for the Project site. Beginning work on the Project site will involve preparing the land for installation of the BESS-related infrastructure, access driveways, and temporary construction staging areas. The construction contractor will be required to incorporate BMPs consistent with the City zoning ordinance and with guidelines provided in the California Stormwater Quality Association's Construction BMP Handbook (CASQA 2019), as well as a soil erosion and sedimentation control plan to reduce potential impacts related to construction of the proposed Project. Prior to initial construction mobilization, pre-construction surveys will be performed, and sediment and erosion controls will be installed in accordance with state and City guidelines. Stabilized construction entrances and exits will be installed at driveways to reduce tracking of sediment onto adjacent public roadways.

Site preparation will be consistent with City BMPs and the South Coast Air Quality Management District Rule 403: Fugitive Dust (SCAQMD 2005). Site preparation will involve the removal and proper disposal of existing debris that would unduly interfere with Project construction or the health and safety of on-site personnel. Dust-minimizing techniques will be employed, such as placement of wind control fencing, application of water, and application of dust suppressants. Conventional grading will be performed throughout the Project site but minimized to the maximum extent possible to reduce unnecessary soil movement that may result in dust. Earthworks scrapers, excavators, dozers, water trucks, paddlewheels, haul vehicles, and graders may all be used to perform grading. Land-leveling equipment, such as a smooth steel drum roller, will be used to even the ground surface and compact the upper layer of soil to a value recommended by a geotechnical engineer for structural support. Soil movement from grading will be balanced on the site. However, Class II road base will be imported to create necessary compaction under the equipment, as determined by geotechnical testing and Project specifications.

Trenching will be required for placement of underground electrical and communication lines as well as stormwater facilities, and may include the use of trenchers, backhoes, excavators, haul vehicles, compaction equipment, and water trucks. After preparation of the site, concrete pads, equipment enclosures, and equipment vaults will be installed per geotechnical engineer recommendations. The SDG&E switchyard and Project substation area will have a grounding grid installed and will be covered with aggregate surfacing for safe operation.

During this work, multiple crews will be working on the site with various equipment and vehicles, including vehicles for transporting the batteries and other equipment. As the BESS enclosures are constructed, the electrical collection and communication systems will be installed. The wiring will connect to the appropriate electrical and communication terminations, and the circuits will be checked and commissioned prior to operation. The total number of construction workers (consisting of laborers, craftsmen, supervisory personnel, support personnel, and construction management personnel) will consist of approximately 100 to 120 workers (average). It is estimated that construction will require the vehicle trips and equipment listed in Table 2-3.

## Table 2-3. Construction Scenario Assumptions

| Construction Phase | One-Way Vehicle Trips | | | Equipment | | |
|---|---|---|---|---|---|---|
| | Average Daily Worker Trips | Average Daily Vendor Truck Trips | Average Daily Haul Truck Trips | Equipment Type | Quantity | Usage Hours |
| Oso Creek Stabilization and Rehabilitation | 20 | 4 | 0 | Dozer | 1 | 8 |
| | | | | Excavators | 2 | 8 |
| | | | | Loader | 1 | 8 |
| | | | | Offroad Haul Trucks | 2 | 8 |
| | | | | Pump | 1 | 8 |
| | | | | Generator | 1 | 8 |
| Access Road Site Preparation, Grading, and Paving | 40 | 4 | 20 | Graders | 1 | 8 |
| | | | | Tractors/loaders/ backhoes | 1 | 8 |
| | | | | Rubber-tired loaders/ | 1 | 8 |
| | | | | Paving machine | 1 | 8 |
| | | | | Roller | 1 | 8 |
| | | | | Skid steer loaders | 1 | 8 |
| BESS/Substation Site Preparation | 40 | 4 | 20 | Graders | 2 | 8 |
| | | | | Tractors/loaders/ backhoes | 2 | 8 |
| | | | | Rubber-tired loaders | 2 | 8 |
| | | | | Skid steer loaders | 2 | 8 |
| Switchyard Site Preparation | 40 | 4 | 2 | Tractors/loaders/ backhoes | 2 | 8 |
| | | | | Rubber-tired dozers | 2 | 8 |
| BESS/Substation Grading and Stormwater Detention Structures | 40 | 4 | 190 | Graders | 2 | 8 |
| | | | | Rubber-tired loaders | 2 | 8 |
| | | | | Tractors/loaders/ backhoes | 2 | 8 |
| | | | | Plate compactors | 2 | 8 |
| | | | | Rollers | 2 | 8 |
| | | | | Skid steer loaders | 2 | 8 |
| Switchyard Grading | 40 | 4 | 0 | Rollers | 2 | 8 |
| | | | | Rubber-tired dozers | 2 | 8 |
| | | | | Tractors/loaders/ backhoes | 2 | 8 |
| Battery/Container and Substation Installation | 40 | 20 | 8 | Air compressors | 2 | 8 |
| | | | | Cranes | 2 | 8 |
| | | | | Excavators | 2 | 8 |
| | | | | Generator sets | 4 | 8 |
| | | | | Plate compactors | 2 | 8 |

## Table 2-3. Construction Scenario Assumptions

| Construction Phase | One-Way Vehicle Trips | | | Equipment | | |
|---|---|---|---|---|---|---|
| | Average Daily Worker Trips | Average Daily Vendor Truck Trips | Average Daily Haul Truck Trips | Equipment Type | Quantity | Usage Hours |
| | | | | Rollers | 2 | 8 |
| | | | | Rough terrain forklifts | 2 | 8 |
| | | | | Skid steer loaders | 4 | 8 |
| | | | | Tractors/loaders/ backhoes | 2 | 8 |
| Switchyard Installation | 40 | 20 | 0 | Aerial lifts | 4 | 8 |
| | | | | Air compressors | 2 | 8 |
| | | | | Bore/drill rigs | 2 | 8 |
| | | | | Cranes | 1 | 8 |
| | | | | Excavators | 1 | 8 |
| | | | | Generator sets | 2 | 8 |
| | | | | Rollers | 2 | 8 |
| | | | | Rough terrain forklifts | 2 | 8 |
| | | | | Rubber-tired dozers | 2 | 8 |
| | | | | Skid steer loaders | 2 | 8 |
| | | | | Tractors/loaders/ backhoes | 4 | 8 |
| | | | | Trenchers | 4 | 8 |
| Loop-In Transmission Foundation and Tower Erection | 10 | 4 | 0 | Air compressors | 2 | 8 |
| | | | | Crane | 1 | 8 |
| | | | | Forklifts | 1 | 8 |
| | | | | Generator sets | 2 | 8 |
| | | | | Pumps | 2 | 8 |
| | | | | Drill rig | 1 | 8 |
| | | | | Welders | 2 | 8 |
| Loop-In Transmission Stringing and Pulling | 8 | 4 | 0 | Forklifts | 1 | 8 |
| | | | | Bucket truck | 3 | 8 |
| | | | | Tractors/loaders/ backhoes | 2 | 8 |
| | | | | Puller | 1 | 8 |
| | | | | Generator sets | 2 | 8 |
| Landscaping Installation | 40 | 4 | 8 | Excavators | 2 | 8 |
| | | | | Trenchers | 2 | 8 |
| | | | | Tractors/loaders/ backhoes | 2 | 8 |
| Commissioning | 160 | 0 | 0 | NA | NA | NA |

**Table 2-3. Construction Scenario Assumptions**

| Construction Phase | One-Way Vehicle Trips | | | Equipment | | |
|---|---|---|---|---|---|---|
| | Average Daily Worker Trips | Average Daily Vendor Truck Trips | Average Daily Haul Truck Trips | Equipment Type | Quantity | Usage Hours |
| Decommissioning | 40 | 4 | 0 | Cranes | 2 | 8 |
| | | | | Tractors/loaders/ backhoes | 2 | 8 |
| | | | | Concrete/industrial saws | 2 | 8 |
| | | | | Rubber-tired dozers | 2 | 8 |

## 2.3.3 Construction Water Use

During construction of the proposed Project, water will be required for common construction-related purposes, including but not limited to dust suppression, soil compaction, and grading. Dust-control water may be used during ingress and egress of on-site construction vehicle equipment traffic and during the construction of the energy storage equipment. A sanitary water supply will not be required during construction because restroom facilities will be provided by portable units serviced by licensed providers.

The water used is anticipated to be supplied by purchase from the local water purveyor,

## 2.3.4 Solid and Nonhazardous Waste

The Project will produce a small amount of solid waste from construction activities. This may include paper, wood, glass, plastics from packing material, waste lumber, insulation, scrap metal and concrete, empty nonhazardous containers, and vegetation waste. These wastes will be segregated, where practical, for recycling. Non-recyclable waste will be placed in covered dumpsters and removed on a regular basis by a certified waste-handling contractor for disposal at a Class III (nonhazardous waste) landfill.

## 2.3.5 Hazardous Materials

The hazardous materials used for construction will be typical of most construction projects of this type. Materials will include small quantities of gasoline, diesel fuel, oils, lubricants, solvents, detergents, degreasers, paints, ethylene glycol, dust palliatives, herbicides, and welding materials/supplies. A hazardous materials business plan will be provided. The hazardous materials business plan will include a complete list of all materials used on site and information regarding how the materials will be transported and in what form they will be used. This information will be recorded to maintain safety and prevent possible environmental contamination or worker exposure. During Project construction, material safety data sheets for all applicable materials present at the site will be made readily available to on-site personnel.

### 2.3.6 Hazardous Waste

Small quantities of hazardous waste will most likely be generated over the course of construction. These wastes may include waste paint, spent construction solvents, waste cleaners, waste oil, oily rags, waste batteries, and spent welding materials. Workers will be trained to properly identify and handle all hazardous materials. Hazardous waste will be either recycled or disposed of at a permitted and licensed treatment and/or disposal facility. All hazardous waste shipped off site for recycling or disposal will be transported by a licensed and permitted hazardous waste hauler.

## 2.4 Operations

The BESS and all associated equipment will be remotely monitored and controlled. Qualified technicians would visit the site approximately 1-2 times per month to conduct routine inspections and maintenance as well as semiannual and annual services. Periodically, batteries and various components may be replaced or renewed to ensure optimal performance.

Operational water will be limited to water necessary for landscape irrigation and to supply on-site fire hydrants.

### 2.4.1 Solid and Nonhazardous Waste

The Project will produce a small amount of waste associated with maintenance activities, which could include broken and rusted metal, defective or malfunctioning electrical materials, empty containers, and other miscellaneous solid waste, including typical refuse generated by workers. Most of these materials will be collected and delivered back to the manufacturer or to recyclers. Non-recyclable waste will be placed in covered dumpsters and removed on a regular basis by a certified waste-handling contractor for disposal at a Class III landfill.

### 2.4.2 Hazardous Materials

Limited amounts of hazardous materials will be stored or used on the site during operations, including diesel fuel, gasoline, and motor oil for vehicles; mineral oil to be sealed within the transformers; and lead-acid-based batteries for emergency backup. Appropriate spill containment and cleanup kits will be maintained during operation of the Project. A spill prevention control and countermeasures plan will be developed for site operations.

### 2.4.3 Hazardous Waste

Fuels and lubricants used in operations will be subject to the spill prevention control and countermeasures plan to be prepared for the proposed Project. Solid waste, if generated during operations, will be subject to the material disposal and solid waste management plan to be prepared for the proposed Project.

## 2.5 Decommissioning

Decommissioning of the Project at the end of its useful life would include the removal of BESS equipment from the foundations, disconnection of wiring, and removal of site infrastructure. A Decommissioning Plan has been prepared and included as part of this application (see Appendix 2C). The facilities would be decommissioned and dismantled, and the site would be restored. The vast majority of the Project components are recyclable, and the

batteries and other equipment and materials will be recycled to the extent feasible to minimize disposal in landfills. The switchyard area will be deeded to SDG&E upon completion of construction and is anticipated to remain in place for ongoing use and operation.

Decommissioning activities will require a workforce of approximately 20 workers and would take approximately 7 months to complete. In general, activities would include the following:

- Dismantling and removal of all aboveground equipment (battery enclosure units, Excavation and removal of all underground cabling less than 3 feet below ground
- Removal of fencing
- Break up and removal of concrete pads and foundations
- Scarification of compacted areas
- Seeding of disturbed areas with a native seed mix

Project Site
Parcel B1

**Project Components**

- Battery Storage Yard
- SDG&E 138kV Interconnection Switchyard
- Internal Access Roads
- Drainage Ditch
- Maintenance Area
- Rock Drop Structure
- Offsite Access Road/Emergency Vehicle Access
- Landscaping
- Creek Stabilization and Rehabilitation Work Area
- Transmission Pole (replacement)
- Transmission Pole (new)
- Transmission Line
- 20' Tall Visual Screening Fence
- 10' Tall Perimeter Wall
- Internal Security Fence
- Gate
- Stormwater Discharge Line
- Relocated Portion of Unnamed Trail (Preliminary Alignment)
- 2:1 Slope Limit
- 3:1 Slope Limit
- Existing San Diego Gas and Electric (SDG&E) Trabuco to Capistrano 138 kilovolt (kV) transmission line

SOURCE: Maxar 2024; ECI 2025

DUDEK

N

0 150 300 Feet

**FIGURE 2-1**

Site Plan

Compass Energy Storage Project

# Attachment G

Updated Grading Plan


# GRADING PLAN FOR
# COMPASS ENERGY STORAGE

## BASIS OF BEARINGS

NAD 85(2011), STATE PLANE COORDINATES CA ZONE, 6, PER NGS MONUMENTS 7 8 21 AND TRABUCO

## BENCHMARK

TBD

## LEGAL DESCRIPTION

(PER FIDELITY NATIONAL TITLE INSURANCE COMPANY ORDER NO. 997-30049472-A-ML6, DATE OCT. 28, 2020)

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF SAN JUAN CAPISTRANO IN THE COUNTY OR ORANGE, STATE OF CALIFORNIA , AND IS DESCRIBED AS FOLLOWS:

PARCEL B:

BEGINNING THEREFROM THE SOUTHEAST CORNER OF THE NORTHEAST QUARTER OF SECTION 26, TOWNSHIP 7 SOUTH, RANGE 8 WEST, SAN BERNARDINO BASE AND MERIDIAN.

EXCEPTING THEREFROM, THAT PART THEREOF INCLUDED WITHIN THE RIGHT OF WAY OF THE ATCHISON, TOPEKA AND SANTA FE RAILWAY.

ALSO EXCEPTING THEREFROM THE INTEREST CONVEYED TO ORANGE COUNTY FLOOD DISTRICT A BODY CORPORATE AND POLITIC, IN AND TO THE LAND CONVEYED BY THAT CERTAIN GRANT DEED EXECUTED BY CRYSTAL CATHEDRAL MINISTRIES, A CALIFORNIA NON-PROFIT RELIGIOUS CORPORATION, RECORDED OCTOBER 04, 1995 AS INSTRUMENT NO. 19950434581 OF OFFICIAL RECORDS

APN 637-082-70 (PORTION)

PARCEL B2:
ALL THAT TRACT COMMENCING AT THE SOUTHEAST CORNER OF THE NORTHEAST QUARTER OF SECTION 26, TOWNSHIP 7 SOUTH, RANGE 8 WEST, SAN BERNARDINO BASE AND MERIDIAN.

EXCEPTING THEREFROM, THAT PORTION INCLUDED WITHIN THE RIGHT-OF-WAY OF THE ATCHISON TOPEKA AND SANTA FE RAILWAY.

ALSO EXCEPTING THEREFROM, THE FOLLOWING DESCRIBED LAND CONVEYED TO WILLIAM BATHGATE AND OTHERS, BY DEED RECORDED OCTOBER 19, 1928 IN BOOK 206, PAGE 335 OF OFFICIAL RECORDS.

BEGINNING AT THE SOUTHEAST CORNER OF THE NORTHEAST QUARTER OF SECTION 26, TOWNSHIP 7 SOUTH, RANGE 8 WEST, SAN BERNARDINO BASE AND MERIDIAN;

ALSO EXCEPTING THEREFROM THAT PORTION THEREOF BEGINNING AT THE NORTHWEST CORNER OF THE SOUTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 25, IN TOWNSHIP 7 SOUTH, RANGE 8 WEST, SAN BERNARDINO BASE AND MERIDIAN.

ALSO, EXCEPT THEREFROM THE INTEREST CONVEYED TO ORANGE COUNTY FLOOD CONTROL DISTRICT, A BODY CORPORATE AND POLITIC, IN AND TO THE LAND CONVEYED BY THAT CERTAIN GRANT DEED EXECUTED BY CRYSTAL CATHEDRAL MINISTRIES, A CALIFORNIA NON- PROFIT RELIGIOUS CORPORATION, RECORDED OCTOBER 04, 1995 AS INSTRUMENT NO. 19950434581 OF OFFICIAL RECORDS

APN 637-082-70 (PORTION), APN 637-082-71 (PORTION)

## SHEET INDEX



## PREPARED BY:


### OWNER
COMPASS ENERGY STORAGE, LLC.
1360 POST OAK BLVD., STE. 400
HOUSTON, TX 77056

### CIVIL ENGINEER
ELECTRICAL CONSULTANTS, INC.
3521 GABEL ROAD
BILLINGS, MT 59102

### ELECTRICAL ENGINEER
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3521 GABEL ROAD
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### GEOTECHNICAL ENGINEER
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SAN DIEGO, CA 92101

### SURVEYOR
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78-075 MAIN STREET, STE G-203
LA QUINTA, CA 92253

### DEVELOPER
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HOUSTON, TX 77056

### LANDSCAPE ARCHITECT
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78-075 MAIN STREET, STE G-203
LA QUINTA, CA 92253

### STORMWATER CONSULTANT
KIMLEY-HORN AND ASSOCIATES, INC.
3801 UNIVERSITY AVE., STE 300
RIVERSIDE, CA 92501


### TOPOGRAPHY SOURCE
UAV LIDAR SURVEY COMPLETED APRIL 2024

BY:
DUDEK
A78-075 MAIN STREET, STE G-203
LA QUINTA, CA 92253

**ISSUED FOR 30% REVIEW**

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ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

| NO | REVISION | DATE | BY | APR |
|---|---|---|---|---|
| | | | | |
| | | | | |
| 0C | ISSUED FOR 30% REVIEW | 11/07/25 | KJF | CRS |
| 0B | ISSUED FOR 30% REVIEW | 07/07/25 | KJF | MLM |
| 0A | PRELIMINARY | 05/02/25 | KJF | MLM |

ENGIE

| ENGINEERING RECORD | | DATE |
|---|---|---|
| DRAWN | FULTON | 04/30/25 |
| DESIGNED | FULTON | 04/30/25 |
| CHECKED | STAFFORD | 11/07/25 |
| APPROVED | | |
| DWG SCALE: NONE | PLT SCALE: 1:1 | |

## COMPASS ENERGY STORAGE
## 250 MW / 1000 MWH BATTERY SYSTEM
## COVER SHEET

DWG. NAME: CMP-D-P000-01 | REVISION NO : 0C

FILE LOCATION: N:\SHARED\01 ECI\EPC SERVICES\02 PROJECTS\EPCS-592 COMPASS BESS\GRADING\300 DESIGN\320 CIVIL & STRUCTURAL\322 SITE DESIGN\12_CAD-GRADING PLAN SHEETS\SHT 2-NOTES.DWG LAST SAVED BY: kjfulton 10/31/2025 2:56 PM PLOTTED BY: Kyle J. Fulton 11/7/2025 11:58 AM Tab:COVER SHEET

"Engineering with Distinction"

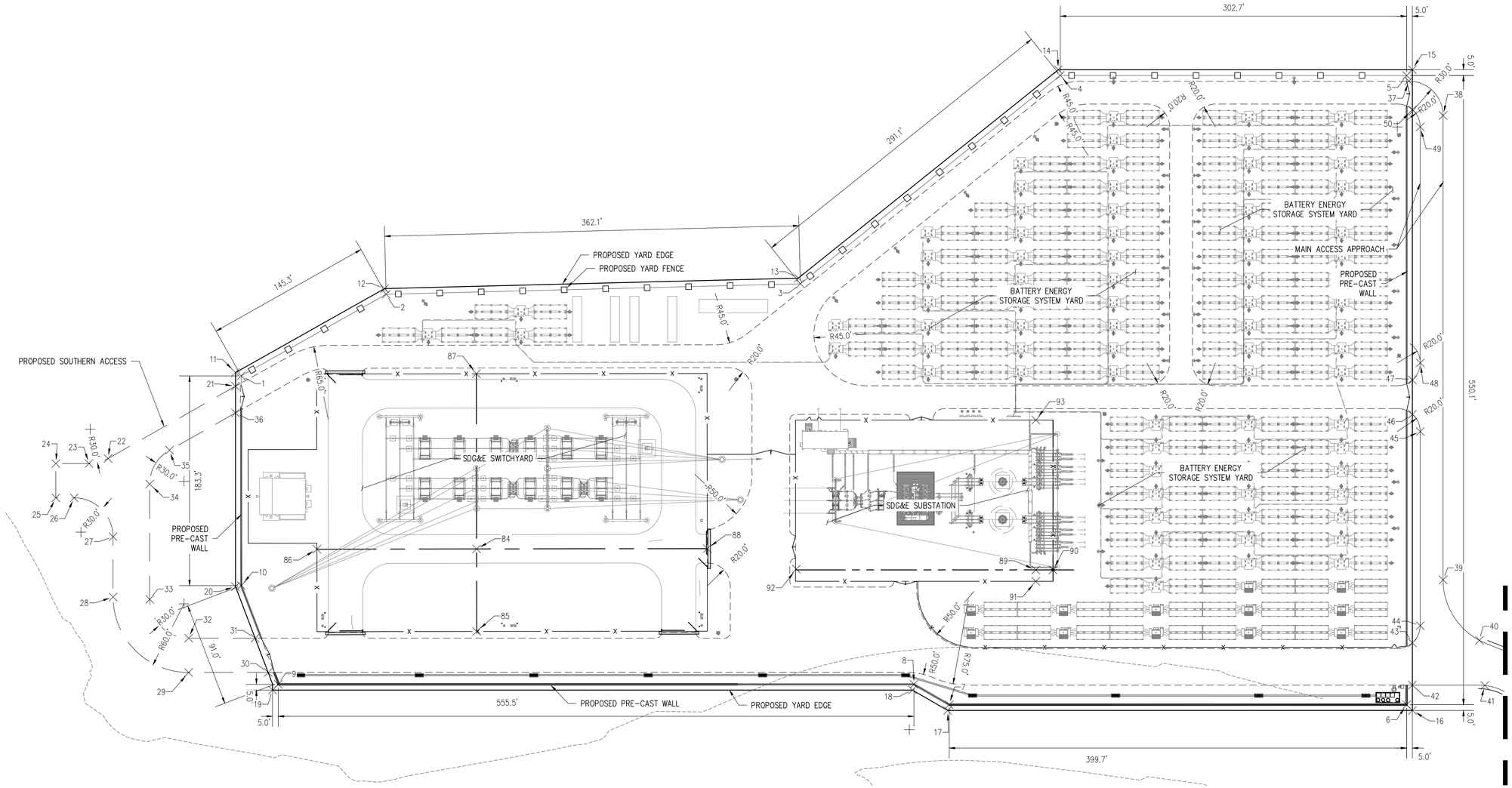
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

| NO | REVISION | DATE | BY | APR |
|---|---|---|---|---|
| | | | | |
| | | | | |
| 0C | ISSUED FOR 30% REVIEW | 11/07/25 | KJF | CRS |
| 0B | ISSUED FOR REVIEW | 06/20/25 | KJF | MLM |
| 0A | PRELIMINARY | 05/02/25 | KJF | MLM |

| ENGINEERING RECORD | | DATE |
|---|---|---|
| DRAWN | *K. FULTON* | 04/30/25 |
| DESIGNED | *K. FULTON* | 04/30/25 |
| CHECKED | *C. STAFFORD* | 11/07/25 |
| APPROVED | | |
| DWG SCALE: NONE | PLT SCALE: 1:1 | |

# COMPASS BESS YARD
## 100 MW / 200 MWH BATTERY SYSTEM
## NOTES

DWG. NAME: CMP-D-P002-02 | REVISION NO : 0C




MATCHLINE: SEE SHT CMP-D-P002-04

| EASTING/NORTHING POINT TABLE | | | |
|---|---|---|---|
| POINT # | EASTING | NORTHING | DESCRIPTION |
| 84 | 6126711.52 | 2140256.29 | SWITCHYARD BASELINE INTERSECTION |
| 85 | 6126783.66 | 2140256.39 | SWITCHYARD BASELINE END |
| 86 | 6126711.72 | 2140116.71 | SWITCHYARD BASELINE END |
| 87 | 6126558.38 | 2140256.08 | SWITCHYARD BASELINE END |
| 88 | 6126711.24 | 2140457.89 | SWITCHYARD BASELINE END |
| 89 | 6126729.84 | 2140744.93 | SUBSTATION BASELINE INTERSETCION |
| 90 | 6126729.84 | 2140759.93 | SUBSTATION BASELINE END |
| 91 | 6126739.84 | 2140744.93 | SUBSTATION BASELINE END |
| 92 | 6126729.14 | 2140535.63 | SUBSTATION BASELINE END |
| 93 | 6126598.84 | 2140744.93 | SUBSTATION BASELINE END |

| EASTING/NORTHING POINT TABLE | | | |
|---|---|---|---|
| POINT # | EASTING | NORTHING | DESCRIPTION |
| 1 | 6126560.23 | 2140050.58 | FENCE CORNER |
| 2 | 6126488.91 | 2140177.22 | FENCE CORNER |
| 3 | 6126479.75 | 2140539.18 | FENCE CORNER |
| 4 | 6126297.57 | 2140766.24 | FENCE CORNER |
| 5 | 6126297.57 | 2141068.94 | FENCE CORNER |
| 6 | 6126847.67 | 2141068.94 | FENCE CORNER |
| 7 | 6126847.67 | 2140669.23 | FENCE CORNER |
| 8 | 6126829.91 | 2140638.46 | FENCE CORNER |
| 9 | 6126829.91 | 2140082.97 | FENCE CORNER |
| 10 | 6126743.55 | 2140050.58 | FENCE CORNER |

| EASTING/NORTHING POINT TABLE | | | |
|---|---|---|---|
| POINT # | EASTING | NORTHING | DESCRIPTION |
| 11 | 6126557.31 | 2140045.58 | YARD CORNER |
| 12 | 6126483.94 | 2140175.85 | YARD CORNER |
| 13 | 6126474.79 | 2140537.37 | YARD CORNER |
| 14 | 6126292.57 | 2140764.48 | YARD CORNER |
| 15 | 6126292.57 | 2141073.94 | YARD CORNER |
| 16 | 6126852.67 | 2141073.94 | YARD CORNER |
| 17 | 6126852.67 | 2140667.90 | YARD CORNER |
| 18 | 6126834.91 | 2140637.12 | YARD CORNER |
| 19 | 6126834.91 | 2140077.97 | YARD CORNER |
| 20 | 6126744.47 | 2140045.58 | YARD CORNER |

| EASTING/NORTHING POINT TABLE | | | |
|---|---|---|---|
| POINT # | EASTING | NORTHING | DESCRIPTION |
| 21 | 6126569.24 | 2140045.58 | APPROACH EDGE |
| 22 | 6126632.46 | 2139934.21 | APPROACH EDGE |
| 23 | 6126636.84 | 2139917.53 | APPROACH EDGE |
| 24 | 6126636.84 | 2139888.64 | APPROACH EDGE |
| 25 | 6126666.84 | 2139888.64 | APPROACH EDGE |
| 26 | 6126666.84 | 2139904.64 | APPROACH EDGE |
| 27 | 6126700.84 | 2139938.64 | APPROACH EDGE |
| 28 | 6126753.53 | 2139938.64 | APPROACH EDGE |
| 29 | 6126819.53 | 2140004.64 | APPROACH EDGE |
| 30 | 6126819.53 | 2140074.15 | APPROACH EDGE |

| EASTING/NORTHING POINT TABLE | | | |
|---|---|---|---|
| POINT # | EASTING | NORTHING | DESCRIPTION |
| 31 | 6126789.53 | 2140062.73 | APPROACH EDGE |
| 32 | 6126789.53 | 2140004.64 | APPROACH EDGE |
| 33 | 6126755.53 | 2139970.64 | APPROACH EDGE |
| 34 | 6126654.78 | 2139970.64 | APPROACH EDGE |
| 35 | 6126625.15 | 2139987.95 | APPROACH EDGE |
| 36 | 6126592.61 | 2140045.58 | APPROACH EDGE |
| 37 | 6126302.57 | 2141070.77 | APPROACH EDGE |
| 38 | 6126548.84 | 2141080.77 | APPROACH EDGE |
| 39 | 6126738.55 | 2141100.77 | APPROACH EDGE |
| 40 | 6126791.48 | 2141132.52 | APPROACH EDGE |

| EASTING/NORTHING POINT TABLE | | | |
|---|---|---|---|
| POINT # | EASTING | NORTHING | DESCRIPTION |
| 41 | 6126830.89 | 2141137.32 | APPROACH EDGE |
| 42 | 6126830.55 | 2141073.94 | APPROACH EDGE |
| 43 | 6126793.61 | 2141073.94 | APPROACH EDGE |
| 44 | 6126778.55 | 2141080.77 | APPROACH EDGE |
| 45 | 6126608.84 | 2141080.77 | APPROACH EDGE |
| 46 | 6126593.79 | 2141073.94 | APPROACH EDGE |
| 47 | 6126563.90 | 2141073.94 | APPROACH EDGE |
| 48 | 6126548.84 | 2141080.77 | APPROACH EDGE |
| 49 | 6126342.57 | 2141080.77 | APPROACH EDGE |
| 50 | 6126327.51 | 2141073.94 | APPROACH EDGE |

0 20FT 50FT 100FT
SCALE: 1"=50'

## LEGEND

- PROPOSED SITE FENCE
- PROPOSED PRE-CAST WALL
- PROPOSED YARD BORDER FENCE
- PROPOSED YARD EDGE (END FLEXIBLE BASE)

## NOTES

1. STORM DRAIN CONVEYANCE PLAN ON SHEET 7 AND 8

**ISSUED FOR 30% REVIEW**

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

| NO | REVISION | DATE | BY | APR |
|---|---|---|---|---|
| 0C | ISSUED FOR 30% REVIEW | 11/07/25 | KJF | CRS |
| 0B | ISSUED FOR 30% REVIEW | 07/07/25 | KJF | MLM |
| 0A | PRELIMINARY | 05/02/25 | KJF | MLM |

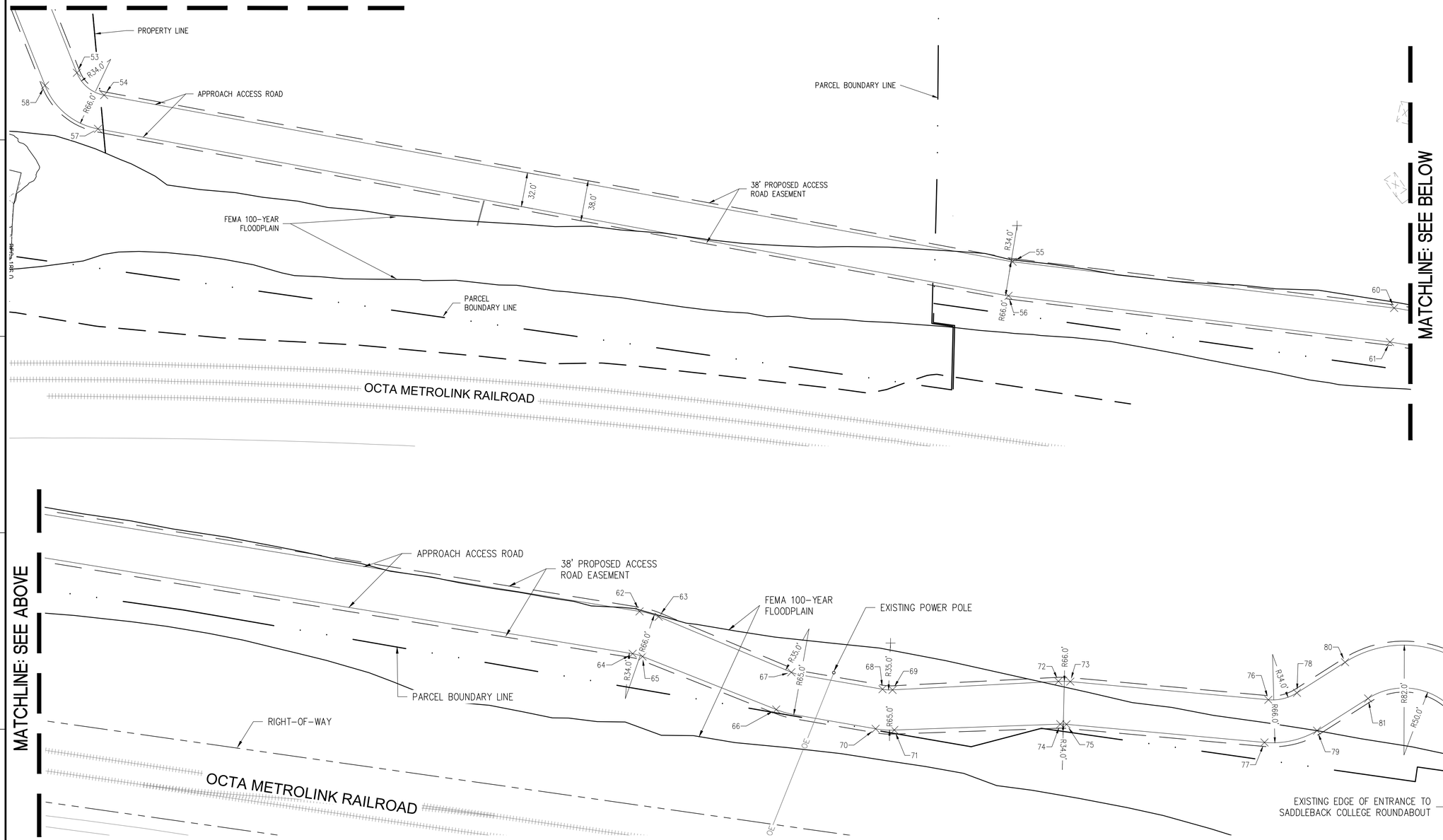
ENGIE

| ENGINEERING RECORD | | DATE |
|---|---|---|
| DRAWN | FULTON | 04/30/25 |
| DESIGNED | FULTON | 04/30/25 |
| CHECKED | STAFFORD | 11/07/25 |
| APPROVED | | |
| DWG SCALE: 1" = 50' | PLT SCALE: 1:1 | |

# COMPASS ENERGY STORAGE
## 250 MW / 1000 MWH BATTERY SYSTEM
## SITE DIMENSION PLAN

DWG. NAME: CMP-D-P002-03 REVISION NO : 0C

MATCHLINE: SEE SHT CMP-D-P002-03




## EASTING/NORTHING POINT TABLE

| POINT # | EASTING | NORTHING | DESCRIPTION |
|---|---|---|---|
| 51 | 6126805.77 | 2141167.62 | APPROACH EDGE |
| 52 | 6126842.56 | 2141204.60 | APPROACH EDGE |
| 53 | 6126939.33 | 2141243.24 | APPROACH EDGE |
| 54 | 6126960.18 | 2141268.69 | APPROACH EDGE |
| 55 | 6127115.68 | 2142116.68 | APPROACH EDGE |
| 56 | 6127147.45 | 2142112.83 | APPROACH EDGE |
| 57 | 6126991.65 | 2141262.92 | APPROACH EDGE |
| 58 | 6126951.18 | 2141213.52 | APPROACH EDGE |
| 59 | 6126864.27 | 2141178.84 | APPROACH EDGE |
| 60 | 6127158.80 | 2142472.75 | APPROACH EDGE |
| 61 | 6127190.57 | 2142468.90 | APPROACH EDGE |
| 62 | 6127233.11 | 2142929.25 | APPROACH EDGE |
| 63 | 6127237.13 | 2142943.55 | APPROACH EDGE |
| 64 | 6127264.69 | 2142924.11 | APPROACH EDGE |
| 65 | 6127266.77 | 2142931.47 | APPROACH EDGE |
| 66 | 6127306.36 | 2143031.29 | APPROACH EDGE |
| 67 | 6127278.58 | 2143042.61 | APPROACH EDGE |
| 68 | 6127291.21 | 2143110.68 | APPROACH EDGE |
| 69 | 6127291.70 | 2143118.18 | APPROACH EDGE |
| 70 | 6127320.77 | 2143105.55 | APPROACH EDGE |
| 71 | 6127321.67 | 2143119.48 | APPROACH EDGE |
| 72 | 6127285.34 | 2143242.07 | APPROACH EDGE |
| 73 | 6127285.55 | 2143250.93 | APPROACH EDGE |
| 74 | 6127317.31 | 2143243.45 | APPROACH EDGE |
| 75 | 6127317.42 | 2143248.02 | APPROACH EDGE |
| 76 | 6127299.09 | 2143398.82 | APPROACH EDGE |
| 77 | 6127330.96 | 2143395.90 | APPROACH EDGE |
| 78 | 6127293.93 | 2143420.14 | APPROACH EDGE |
| 79 | 6127322.13 | 2143435.14 | APPROACH EDGE |
| 80 | 6127271.09 | 2143456.12 | APPROACH EDGE |
| 81 | 6127298.11 | 2143473.27 | APPROACH EDGE |
| 82 | 6127279.43 | 2143554.99 | APPROACH EDGE |
| 83 | 6127331.93 | 2143549.36 | APPROACH EDGE |

| LEGEND | NOTES |
|---|---|
| PROPERTY LINE | |
| RIGHT-OF-WAY | |
| FEMA 100-YEAR FLOODPLAIN | |
| PROPOSED ACCESS APPROACH EDGE | |
| PROPOSED ACCESS APPROACH EASEMENT | |

0 20FT 50FT 100FT
SCALE: 1"=50'

ISSUED FOR 30% REVIEW

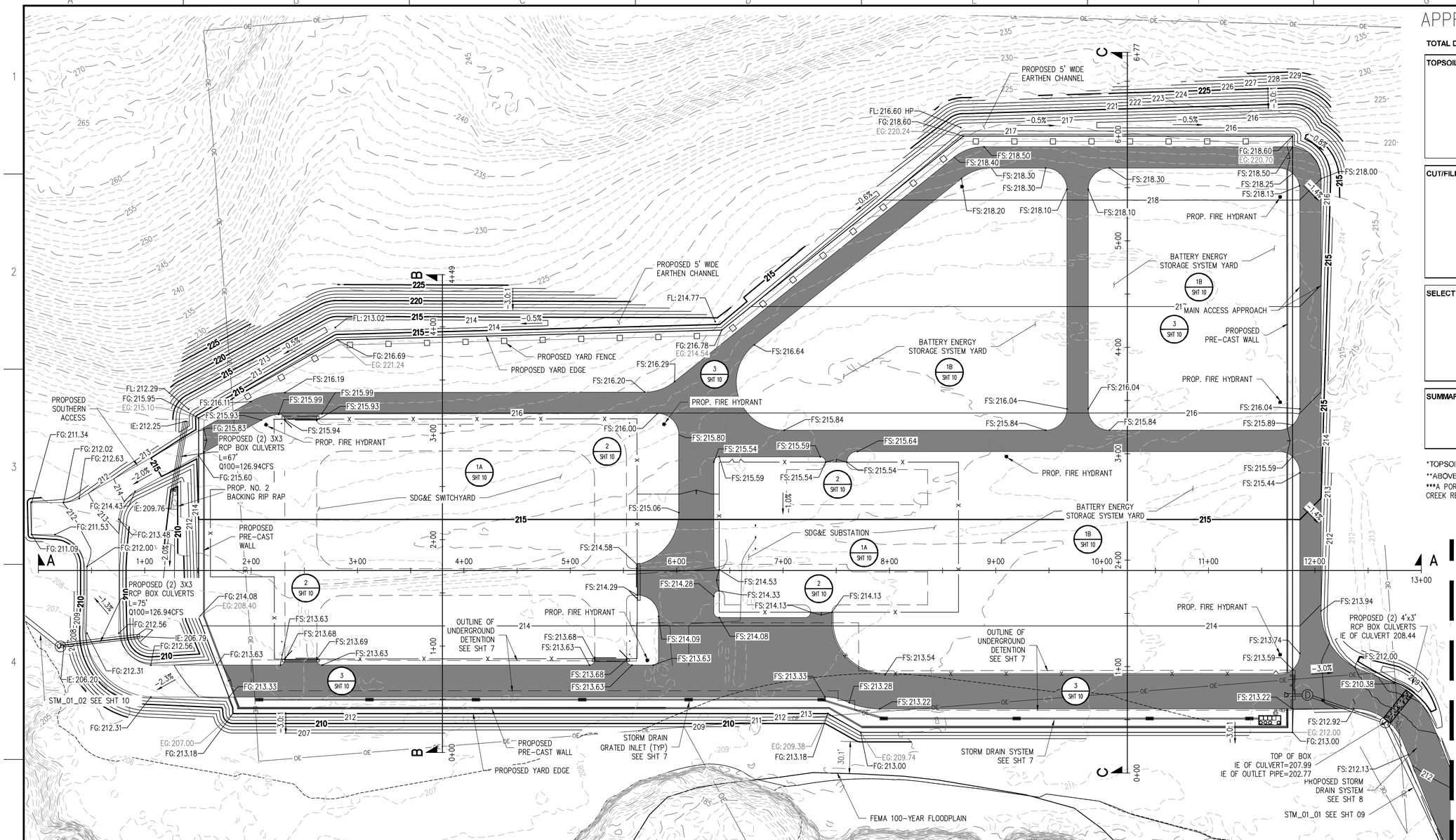
"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

| NO | REVISION | DATE | BY | APR |
|---|---|---|---|---|
| 0C | ISSUED FOR 30% REVIEW | 11/07/25 | KJF | CRS |
| 0B | ISSUED FOR 30% REVIEW | 07/07/25 | KJF | MLM |
| 0A | PRELIMINARY | 05/02/25 | KJF | MLM |

| ENGINEERING RECORD | | DATE |
|---|---|---|
| DRAWN | FULTON | 04/30/25 |
| DESIGNED | FULTON | 04/30/25 |
| CHECKED | STAFFORD | 11/07/25 |
| APPROVED | | |
| DWG SCALE: 1" = 50' | PLT SCALE: 1:1 | |

# COMPASS ENERGY STORAGE
## 250 MW / 1000 MWH BATTERY SYSTEM
## SITE DIMENSION PLAN

DWG. NAME: CMP-D-P002-04 | REVISION NO : 0C




# APPROXIMATE EARTHWORK QUANTITIES

**TOTAL DISTURBED AREA** 14.7 ACRES

| TOPSOIL | | | | |
|---|---|---|---|---|
| REMOVAL | AREA (SF) | DEPTH (IN) | VOL (CY) | |
| YARD | 531,295 | 6 | 9,839 | |
| APPROACH | 107,756 | 6 | 1,995 | |
| TOTALS | 14.7 | ACRES | 11,834 | CY |
| RE-USED ON SITE-SUB/SWY | 113,556 | 16 | 5,608 | |
| RE-USED ON SITE-BESS | 228,588 | 8 | 5,644 | |
| EXPORT / STOCKPILED / WASTED | | | 582 | CY |

| CUT/FILL QUANTITIES* | CUT | FILL | NET | |
|---|---|---|---|---|
| YARD (INCLUDES PAVED ROAD) | 8,986 | 60,947 | 51,961 | FILL |
| ADS STORMTECH | 14,640 | 0 | 0 | CUT |
| EXTERNAL YARD ACCESS ROADS | 2,277 | 2,980 | 703 | FILL |
| NET CUT/FILL TO R.G. | 25,903 | 63,927 | 38,024 | FILL |
| ONSITE MATERIAL IS SUITABLE AS FILL | | | | |
| CUT AVAILABLE FOR FILL | | | 25,903 | CY |
| STRUCTURAL FILL REQUIRED*** | | | 38,024 | CY |

| SELECT IMPORT** | AREA (SF) | DEPTH (IN) | VOL (CY) |
|---|---|---|---|
| SUB/SWY-CRUSHED ROCK | 113,556 | 6 | 2,103 |
| SUB/SWY-FLEXIBLE BASE | 113,556 | 8 | 2,804 |
| SUB/SWY-DRIVE AISLES | 36,004 | 14 | 1,556 |
| BESS-FLEXIBLE BASE | 228,588 | 8 | 5,644 |
| AC PAVED ROAD | 183,997 | TBD | TBD |
| RIP RAP | 4,500 | TBD | TBD |
| | | TOTAL | 10,004 |

| SUMMARY | | |
|---|---|---|
| TOTAL CUT (TOPSOIL + NET CUT) | 37,737 | CY |
| TOTAL FILL (SELECT IMPORT + NET FILL) | 73,931 | CY |
| TOTAL EXPORT / STOCKPILED / WASTED | 582 | CY |
| TOTAL IMPORT (SELECT IMPORT + STRUCTURAL FILL)*** | 48,028 | CY |

*TOPSOIL STRIPPED SURFACE COMPARED TO ROUGH GRADE

**ABOVE ROUGH GRADE

***A PORTION OF NON-SELECT IMPORT MATERIAL TO BE PROCURED FROM ASSOCIATED CREEK RESTORATION PROJECT.

## LEGEND

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED SITE FENCE
- PROPOSED PRE-CAST WALL
- PROPOSED YARD BORDER FENCE
- PROPOSED YARD EDGE (END FLEXIBLE BASE)
- PROPOSED ASPHALT ROAD

EG EXISTING GRADE
FG FINISHED GRADE
FS FINISHED SURFACE

## NOTES

1. STORM DRAIN CONVEYANCE PLAN ON SHEET 7 AND 8

0 20FT 50FT 100FT
SCALE: 1"=50'

**ISSUED FOR 30% REVIEW**

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

| NO | REVISION | DATE | BY | APR |
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| ENGINEERING RECORD | | DATE |
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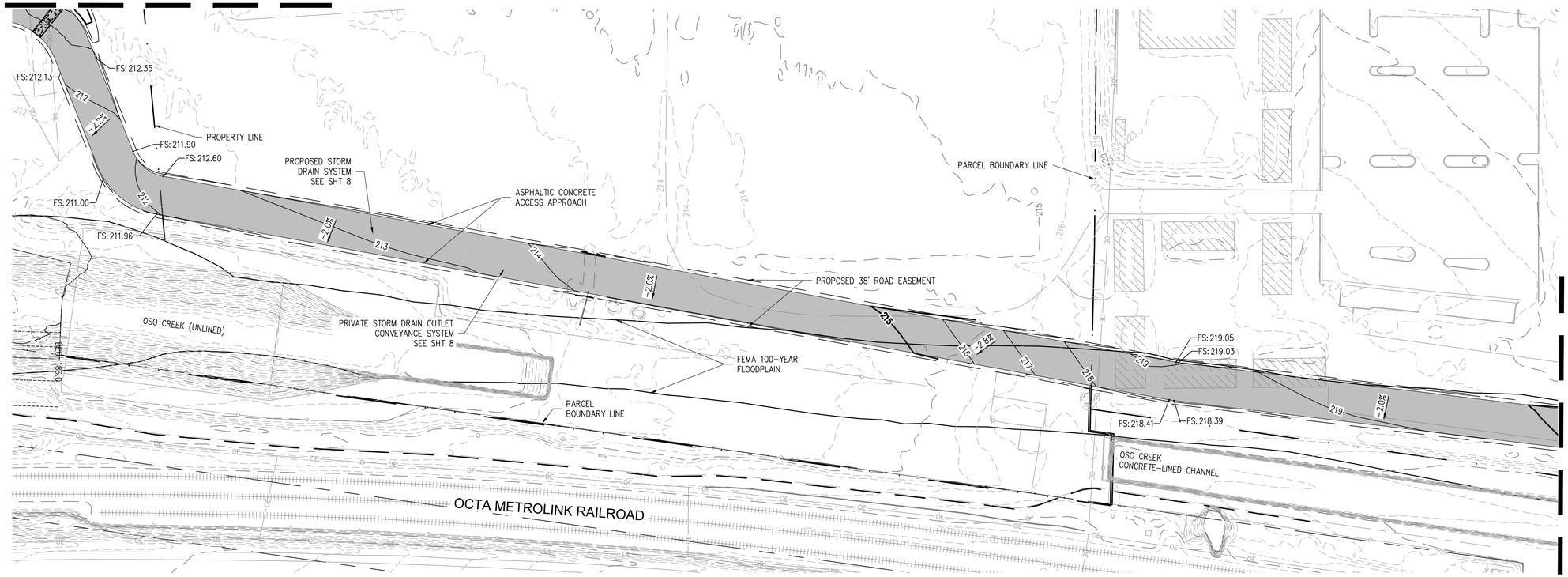
| DRAWN | FULTON | 04/30/25 |
| DESIGNED | FULTON | 04/30/25 |
| CHECKED | STAFFORD | 11/07/25 |
| APPROVED | | |
| DWG SCALE: 1" = 50' | PLT SCALE: 1:1 | |

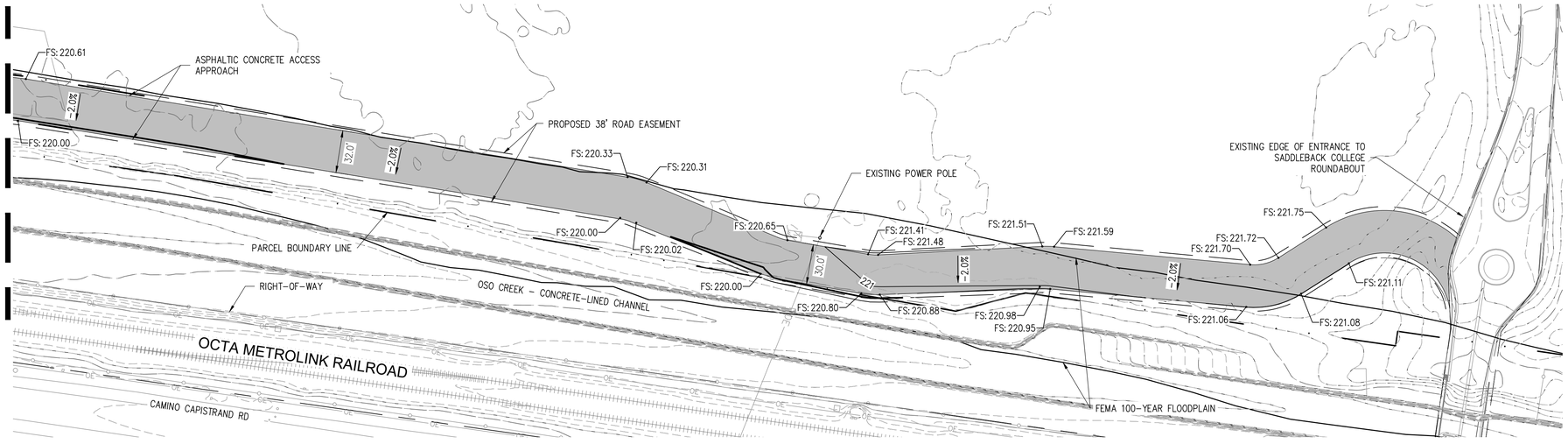
# COMPASS ENERGY STORAGE
## 250 MW / 1000 MWH BATTERY SYSTEM
## SITE GRADING PLAN

DWG. NAME: CMP-D-P002-05 REVISION NO : 0C

MATCHLINE: SEE SHT CMP-D-P002-05




MATCHLINE: SEE ABOVE




0 20FT 50FT 100FT
SCALE: 1"=50'

| LEGEND | |
|---|---|
| | EXISTING MAJOR CONTOUR |
| | EXISTING MINOR CONTOUR |
| | PROPOSED MINOR CONTOUR |
| | PROPOSED MAJOR CONTOUR |
| | PROPOSED SITE FENCE |
| | PROPOSED PRE-CAST WALL |
| | PROPOSED YARD BORDER FENCE |
| | PROPOSED YARD EDGE (END FLEXIBLE BASE) |
| | PROPOSED ASPHALT ROAD |
| EG | EXISTING GRADE |
| FG | FINISHED GRADE |
| FS | FINISHED SURFACE |

**NOTES**

1. STORM DRAIN CONVEYANCE PLAN ON SHEET 7 AND 8

**ISSUED FOR 30% REVIEW**

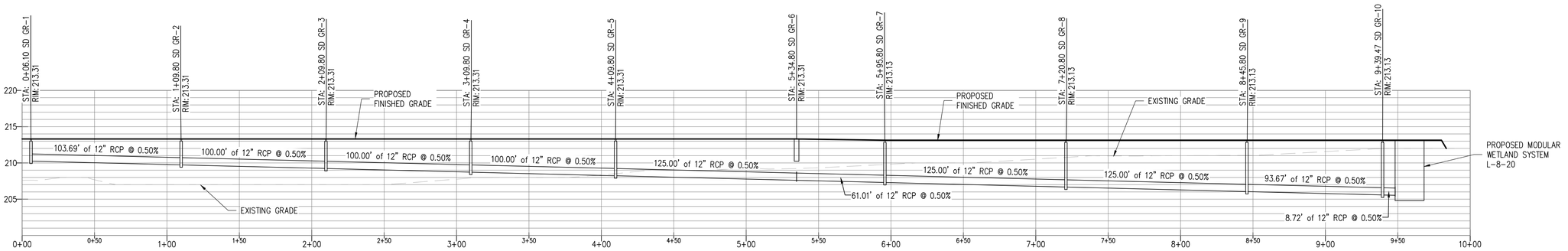
"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

| NO | REVISION | DATE | BY | APR |
|---|---|---|---|---|
| 0C | ISSUED FOR 30% REVIEW | 11/07/25 | KJF | CRS |
| 0B | ISSUED FOR 30% REVIEW | 07/07/25 | KJF | MLM |
| 0A | PRELIMINARY | 05/02/25 | KJF | MLM |

| ENGINEERING RECORD | | DATE |
|---|---|---|
| DRAWN | FULTON | 04/30/25 |
| DESIGNED | FULTON | 04/30/25 |
| CHECKED | STAFFORD | 11/07/25 |
| APPROVED | | |
| DWG SCALE: 1" = 50' | PLT SCALE: 1:1 | |

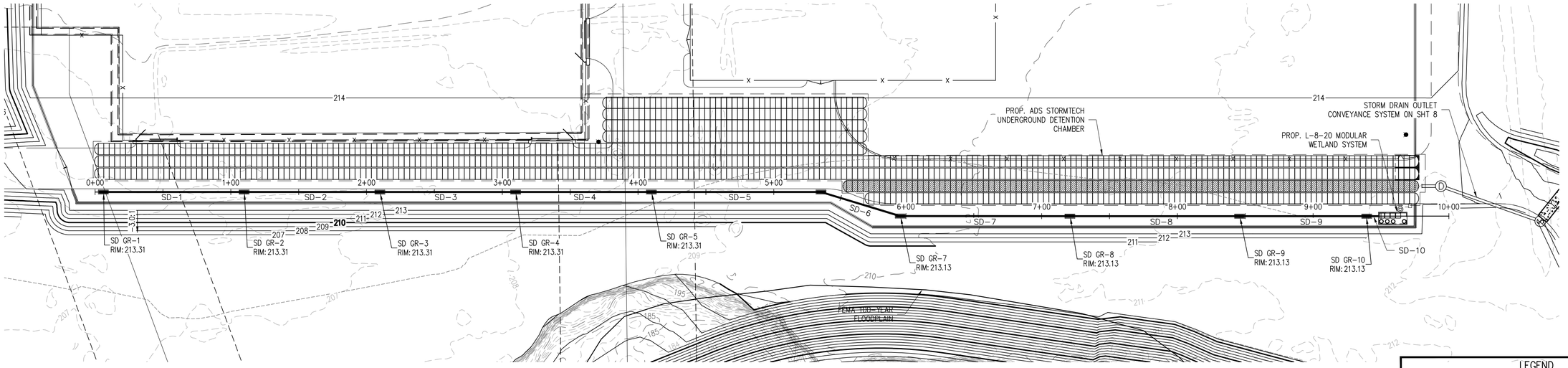
# COMPASS ENERGY STORAGE
## 250 MW / 1000 MWH BATTERY SYSTEM
## SITE GRADING PLAN

DWG. NAME: CMP-D-P002-06 | REVISION NO : 0C




## PRIVATE YARD STORM DRAIN

SCALE: 1"=40' HORIZONTAL
1"=8' VERTICAL




## PLAN VIEW

SCALE: 1"=40'

| PRIVATE STORM DRAIN | | | | | | |
|---|---|---|---|---|---|---|
| NAME | SIZE | LENGTH | SLOPE | MATERIAL | IE IN | IE OUT |
| SD-1 | 12" | 103.69' | 0.50% | RCP | 210.25 | 209.73 |
| SD-2 | 12" | 100.00' | 0.50% | RCP | 209.73 | 209.23 |
| SD-3 | 12" | 100.00' | 0.50% | RCP | 209.23 | 208.73 |
| SD-4 | 12" | 100.00' | 0.50% | RCP | 208.73 | 208.23 |
| SD-5 | 12" | 125.00' | 0.50% | RCP | 208.23 | 207.61 |
| SD-6 | 12" | 61.01' | 0.50% | RCP | 207.61 | 207.30 |
| SD-7 | 12" | 125.00' | 0.50% | RCP | 207.30 | 206.68 |
| SD-8 | 12" | 125.00' | 0.50% | RCP | 206.68 | 206.05 |
| SD-9 | 12" | 93.67' | 0.50% | RCP | 206.05 | 205.58 |
| SD-10 | 12" | 8.72' | 0.50% | RCP | 205.58 | 205.54 |

### LEGEND

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED SITE FENCE
- PROPOSED PRE-CAST WALL
- PROFILE FINISHED GRADE
- PROFILE EXISTING GRADE
- PROPOSED STORM DRAIN
- SD STORM DRAIN

### NOTES

0 20FT 40FT 80FT
SCALE: 1"=40'

**ISSUED FOR 30% REVIEW**

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BILLINGS, MONTANA

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| 0B | ISSUED FOR 30% REVIEW | 07/07/25 | KJF | MLM |
| 0A | PRELIMINARY | 05/02/25 | KJF | MLM |

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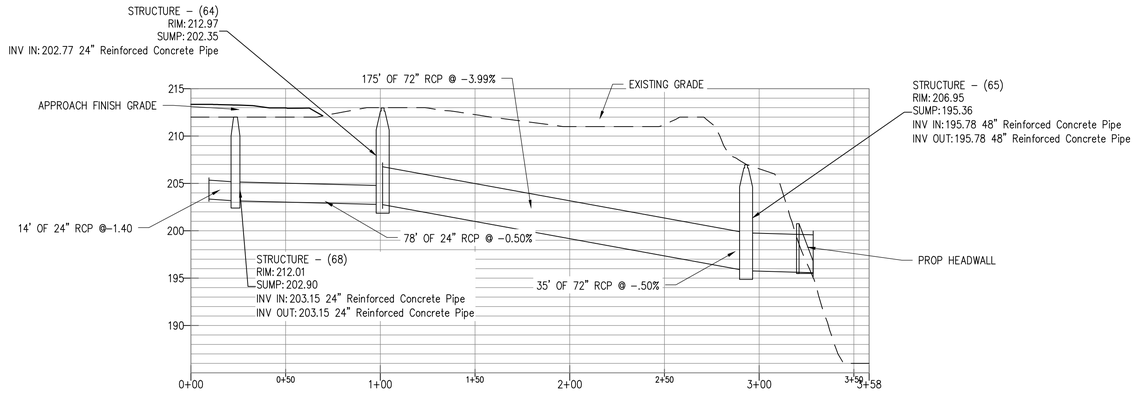
| ENGINEERING RECORD | | DATE |
|---|---|---|
| DRAWN | FULTON | 04/30/25 |
| DESIGNED | FULTON | 04/30/25 |
| CHECKED | STAFFORD | 11/07/25 |
| APPROVED | | |
| DWG SCALE: 1" = 40' | PLT SCALE: 1:1 | |

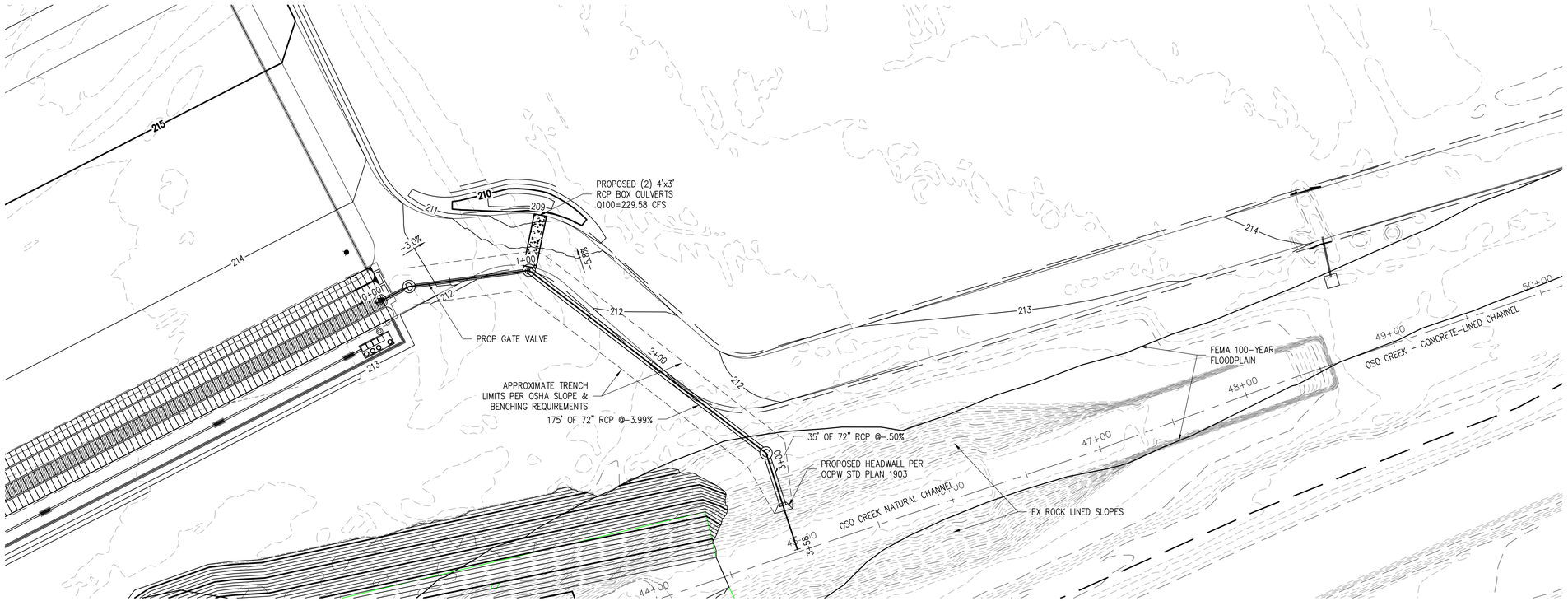
# COMPASS ENERGY STORAGE
## 250 MW / 1000 MWH BATTERY SYSTEM
## STORM DRAIN PLAN & PROFILE

DWG. NAME: CMP-D-P002-07
REVISION NO : 0C




PROFILE VIEW

SCALE: 1"=40'




PLAN VIEW

SCALE: 1"=40'

| LEGEND | |
|---|---|
| | EXISTING MAJOR CONTOUR |
| | EXISTING MINOR CONTOUR |
| | PROPOSED MINOR CONTOUR |
| | PROPOSED MAJOR CONTOUR |
| | PROPOSED SITE FENCE |
| | PROPOSED PRE-CAST WALL |
| | PROFILE FINISHED GRADE |
| | PROFILE EXISTING GRADE |
| | PROPOSED STORM DRAIN |
| SD | STORM DRAIN |

NOTES

0 20FT 40FT 80FT

SCALE: 1"=40'

**ISSUED FOR 30% REVIEW**

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

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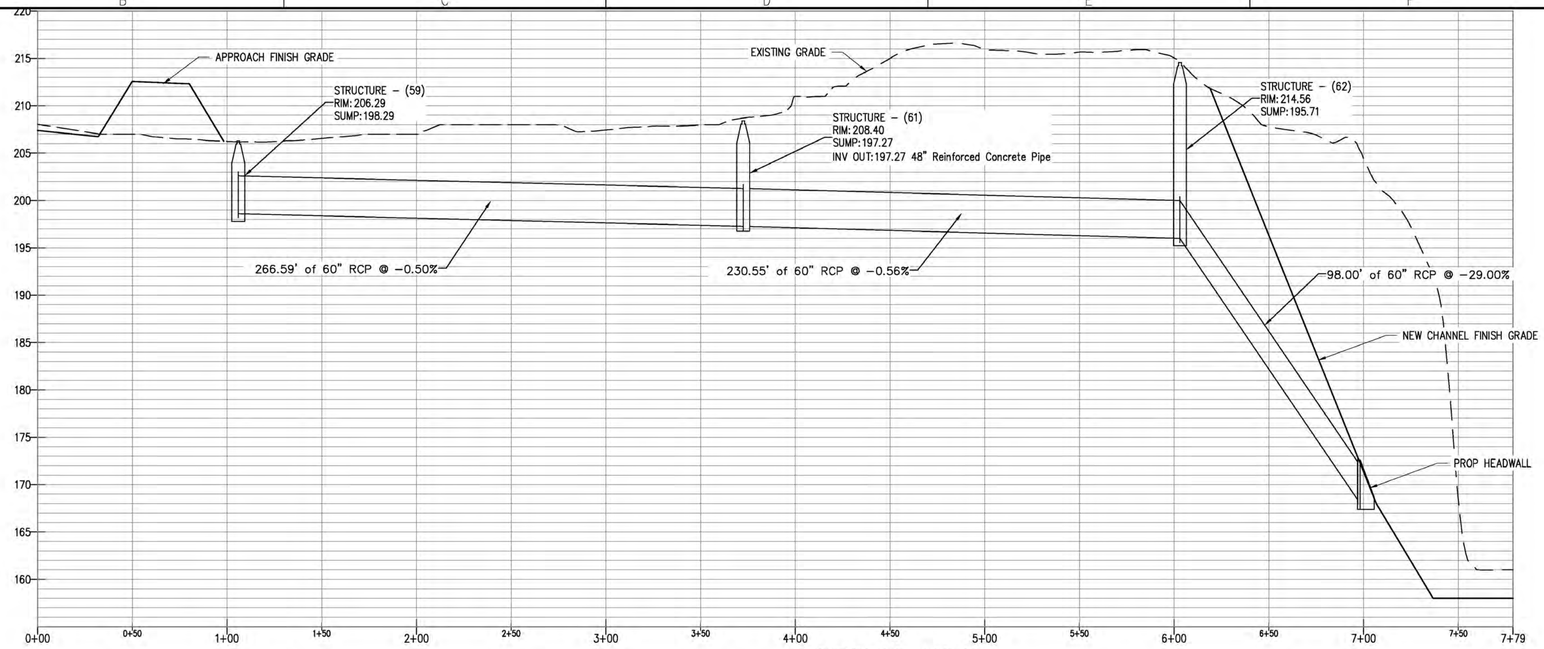
|---|---|---|---|---|
| 0A | ISSUED FOR 30% REVIEW | 11/07/25 | KJF | CRS |

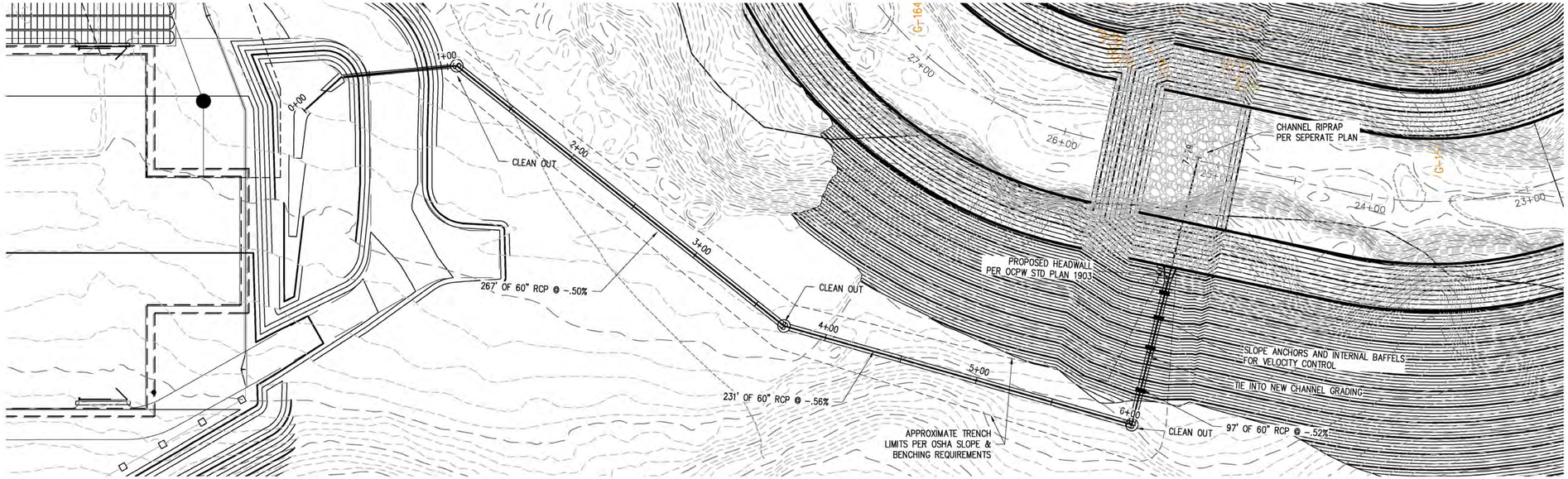
| ENGINEERING RECORD | | DATE |
|---|---|---|
| DRAWN | FULTON | 04/30/25 |
| DESIGNED | FULTON | 04/30/25 |
| CHECKED | STAFFORD | 11/07/25 |
| APPROVED | | |
| DWG SCALE: 1" = 40' | PLT SCALE: 1:1 | |

# COMPASS ENERGY STORAGE
## 250 MW / 1000 MWH BATTERY SYSTEM
## STORM DRAIN PLAN & PROFILE

DWG. NAME: CMP-D-P002-08 | REVISION NO : 0A




PROFILE VIEW
STM_01_01
SCALE: 1"=40'




PLAN VIEW
SCALE: 1"=40'

| LEGEND | |
|---|---|
| | EXISTING MAJOR CONTOUR |
| | EXISTING MINOR CONTOUR |
| | PROPOSED MINOR CONTOUR |
| | PROPOSED MAJOR CONTOUR |
| | PROPOSED SITE FENCE |
| | PROPOSED PRE-CAST WALL |
| | PROFILE FINISHED GRADE |
| | PROFILE EXISTING GRADE |
| SD | PROPOSED STORM DRAIN<br>STORM DRAIN |

NOTES

0 20FT 40FT 80FT
SCALE: 1"=40'

**ISSUED FOR 30% REVIEW**

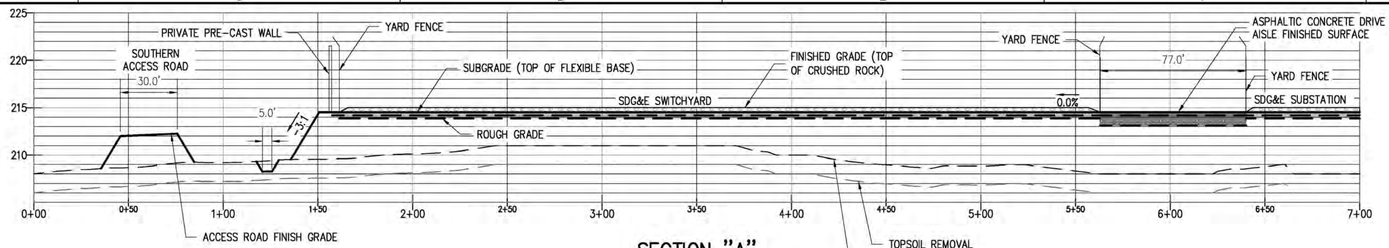
"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

| NO | REVISION | DATE | BY | APR |
|---|---|---|---|---|
| OA | ISSUED FOR 30% REVIEW | 11/07/25 | KJF | CRS |

| ENGINEERING RECORD | | DATE |
|---|---|---|
| DRAWN | FULTON | 04/30/25 |
| DESIGNED | FULTON | 04/30/25 |
| CHECKED | STAFFORD | 11/07/25 |
| APPROVED | | |
| DWG SCALE: 1" = 40' | PLT SCALE: 1:1 | |

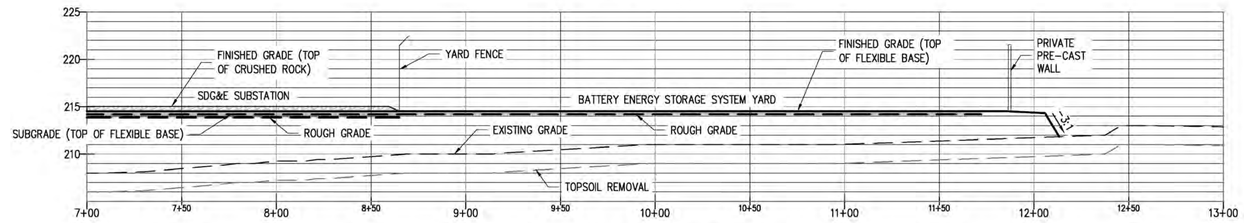
# COMPASS ENERGY STORAGE
## 250 MW / 1000 MWH BATTERY SYSTEM
## STORM DRAIN PLAN & PROFILE

DWG. NAME: CMP-D-P002-09
REVISION NO : OA



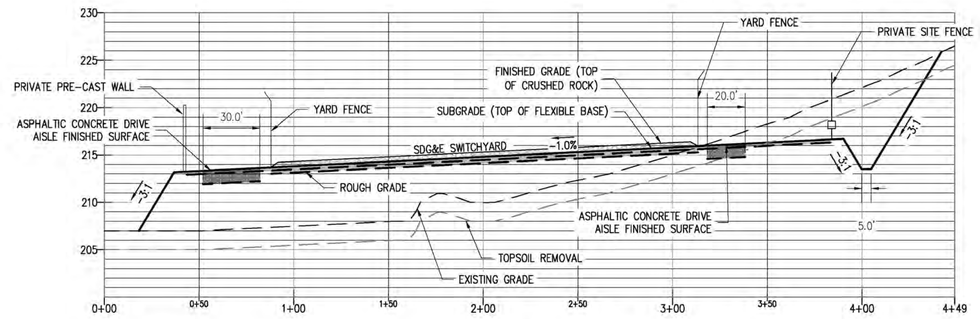

## SECTION "A"

SCALE: 1"=40' HORIZONTAL
1"=8' VERTICAL



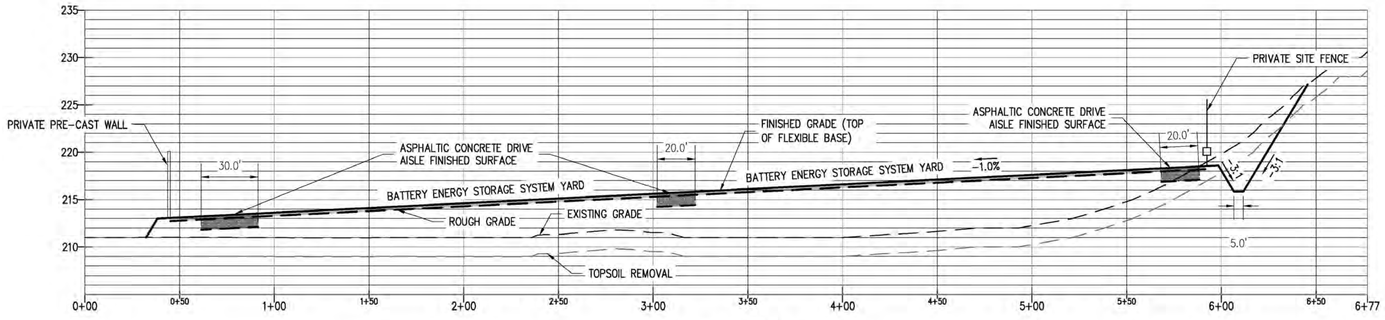

## SECTION "A" CONTINUED

SCALE: 1"=40' HORIZONTAL
1"=8' VERTICAL




## SECTION "B"

SCALE: 1"=40' HORIZONTAL
1"=8' VERTICAL




## SECTION "C"

SCALE: 1"=40' HORIZONTAL
1"=8' VERTICAL

| LEGEND |
|---|
| EXISTING GRADE |
| TOPSOIL REMOVAL |
| FINISHED GRADE (AS NOTED) |
| SUBGRADE (AS NOTED) |
| ROUGH GRADE |

**NOTES**

1. YARD AND ROAD SURFACING DETAILS SHOWN ON SHEET 10.

0 20FT 40FT 80FT
SCALE: 1"=40'

**ISSUED FOR 30% REVIEW**

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ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

| NO | REVISION | DATE | BY | APR |
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| OB | ISSUED FOR 30% REVIEW | 07/07/25 | KJF | MLM |
| OA | PRELIMINARY | 05/02/25 | KJF | MLM |

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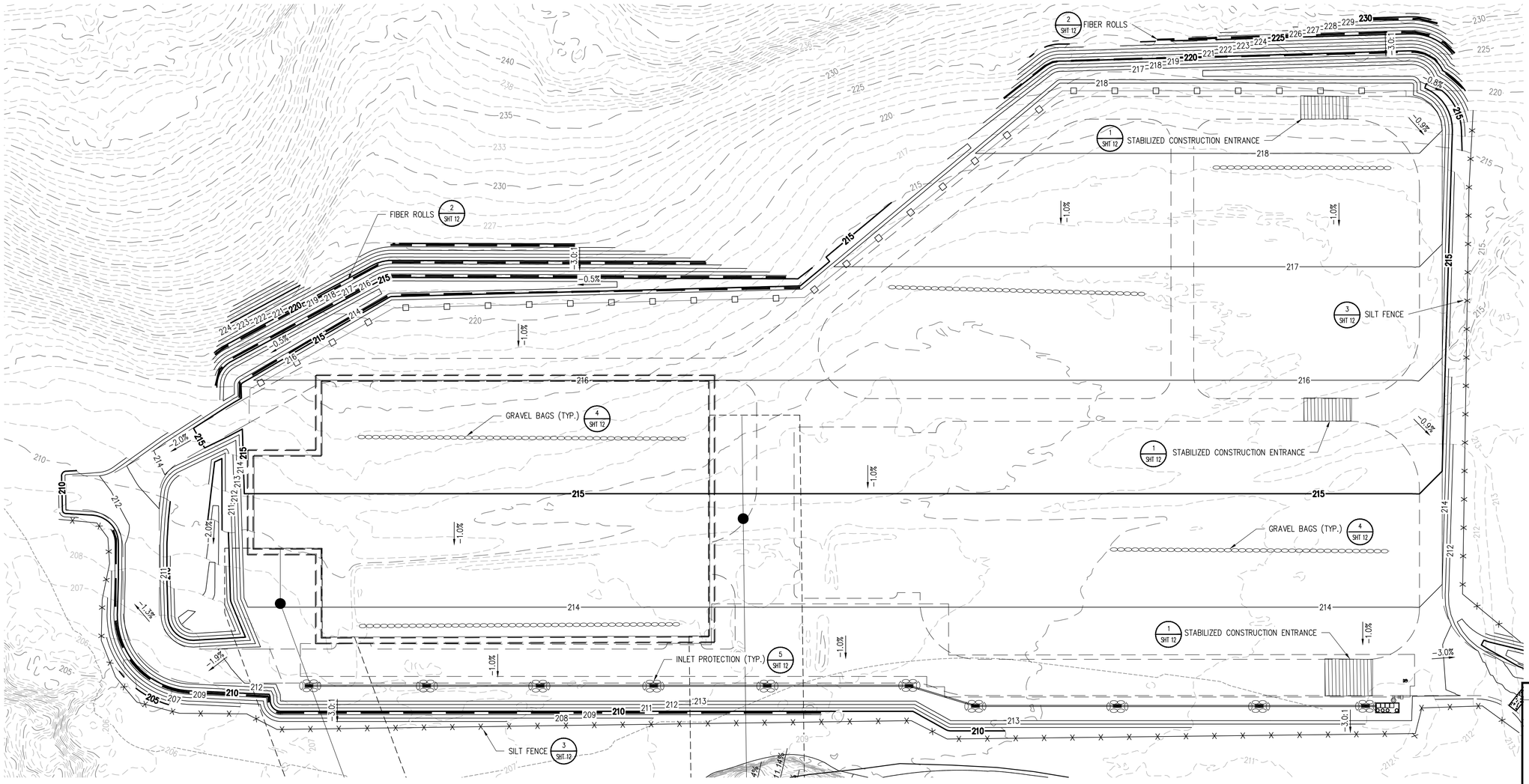
| ENGINEERING RECORD | | DATE |
|---|---|---|
| DRAWN | FULTON | 04/30/25 |
| DESIGNED | FULTON | 04/30/25 |
| CHECKED | STAFFORD | 11/07/25 |
| APPROVED | | |
| DWG SCALE: AS NOTED | PLT SCALE: 1:1 | |

# COMPASS ENERGY STORAGE
## 250 MW / 1000 MWH BATTERY SYSTEM
## SITE GRADING SECTIONS

DWG. NAME: CMP-D-P002-10
REVISION NO : OC




LEGEND

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED YARD BORDER FENCE
- PROPOSED YARD EDGE (END FLEXIBLE BASE)
- PROPOSED ASPHALT ROAD
- GRAVEL BAGS
- FIBER ROLLS
- STABILIZED CONSTRUCTION ENTRANCE
- SILT FENCE

NOTES

0 20FT 50FT 100FT
SCALE: 1"=50'

**ISSUED FOR 30% REVIEW**

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ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

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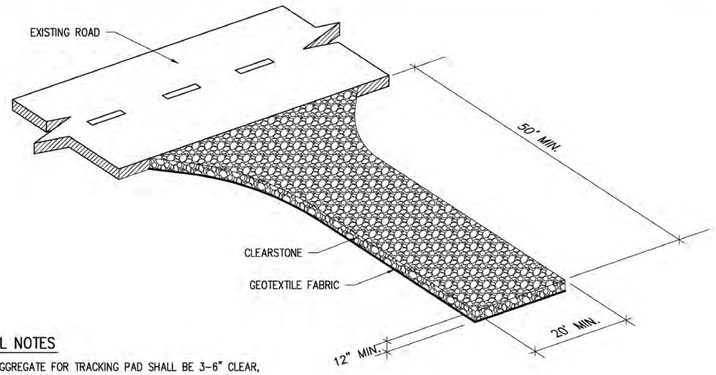
|---|---|---|---|---|
| | | | | |
| | | | | |
| OC | ISSUED FOR 30% REVIEW | 11/07/25 | KJF | CRS |
| OB | ISSUED FOR 30% REVIEW | 07/07/25 | KJF | MLM |
| OA | PRELIMINARY | 05/02/25 | KJF | MLM |

ENGIE

| ENGINEERING RECORD | | DATE |
|---|---|---|
| DRAWN | FULTON | 04/30/25 |
| DESIGNED | FULTON | 04/30/25 |
| CHECKED | STAFFORD | 11/07/25 |
| APPROVED | | |
| DWG SCALE: | 1" = 50' | PLT SCALE: 1:1 |

# COMPASS ENERGY STORAGE
## 250 MW / 1000 MWH BATTERY SYSTEM
## EROSION CONTROL PLAN

DWG. NAME: CMP-D-P002-11 REVISION NO : OC




## MATERIAL NOTES

1. THE AGGREGATE FOR TRACKING PAD SHALL BE 3–6" CLEAR, ANGULAR STONE.
2. THE TRACKING PAD SHALL BE UNDERLAIN WITH A GEOTEXTILE FABRIC.

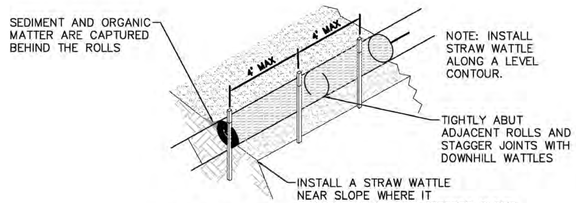
## INSTALLATION NOTES

1. INSTALLATION SHALL CONFORM WITH LOCAL REQUIREMENTS.
2. THE TRACKING PAD SHALL BE INSTALLED PRIOR TO ANY TRAFFIC LEAVING THE SITE. STONE TRACKING PAD SHALL BE USED AT ALL POINTS OF CONSTRUCTION EGRESS.
3. DIMENSIONS OF THE TRACKING PAD SHALL BE MINIMUM AS NOTED ON THE FIGURE ABOVE.
4. SURFACE WATER SHALL BE PREVENTED FROM PASSING THROUGH THE TRACKING PAD. FLOWS SHALL BE DIVERTED AWAY FROM TRACKING PADS OR CONVEYED UNDER AND AROUND THEM USING CULVERTS OR OTHER PRACTICES.
5. TRACKING PAD SHALL BE REMOVED FROM THE SITE ONLY AFTER CONSTRUCTION IS COMPLETE AND THE SITE HAS BEEN STABILIZED.

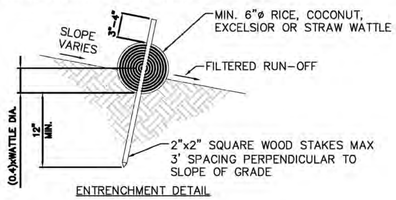
## INSPECTION & MAINTENANCE NOTES

1. STONE TRACKING PADS SHALL BE INSPECTED WEEKLY AND WITHIN 24 HOURS AFTER EVERY PRECIPITATION EVENT THAT PRODUCES 0.5 INCHES OF RAIN OR MORE DURING A 24 HOUR PERIOD.
2. ADDITIONAL AGGREGATE SHALL BE PLACED IF THE TRACKING PAD BECOMES BURIED OR IF SEDIMENT IS NOT BEING REMOVED EFFECTIVELY FROM THE VEHICLE TIRES.
3. A MINIMUM 12–INCH THICK PAD SHALL BE MAINTAINED AT ALL TIMES.
4. THE TRACKING PAD PERFORMANCE SHALL BE MAINTAINED BY SCRAPING OR TOP–DRESSING WITH ADDITIONAL AGGREGRATE.
5. ANY SEDIMENT TRACKED ONTO A PUBLIC OR PRIVATE ROAD SHOULD BE REMOVED BY STREET CLEANING AT THE END OF EACH WORKING DAY.
6. MAINTENANCE SHALL BE COMPLETED AS SOON AS POSSIBLE WITH CONSIDERATION FOR SITE CONDITIONS.

STABILIZED CONSTRUCTION ENTRANCE — 1 / SHT 11
SCALE: NONE

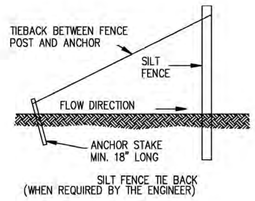



TYPICAL STRAW WATTLE INSTALLATION DETAIL

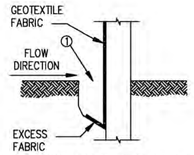



ENTRENCHMENT DETAIL

FIBER ROLL — 2 / SHT 11
SCALE: NONE

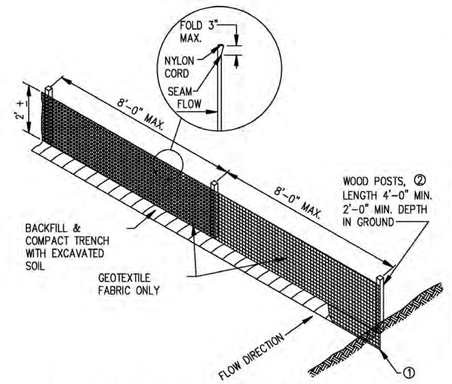



SILT FENCE TIE BACK (WHEN REQUIRED BY THE ENGINEER)




NOTE: ADDITIONAL POST DEPTH OR TIE BACKS MAY BE REQUIRED IN UNSTABLE SOILS

TRENCH DETAIL

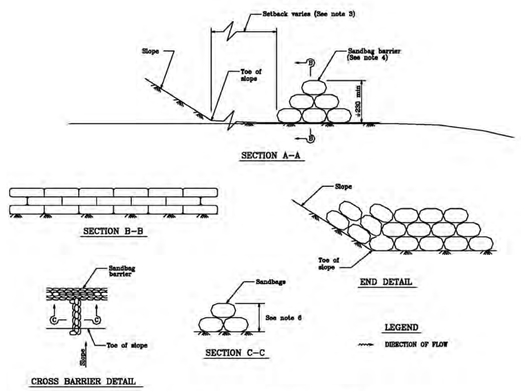



DETAIL OF CONSTRUCTION NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND APPLICABLE SPECIAL PROVISIONS.

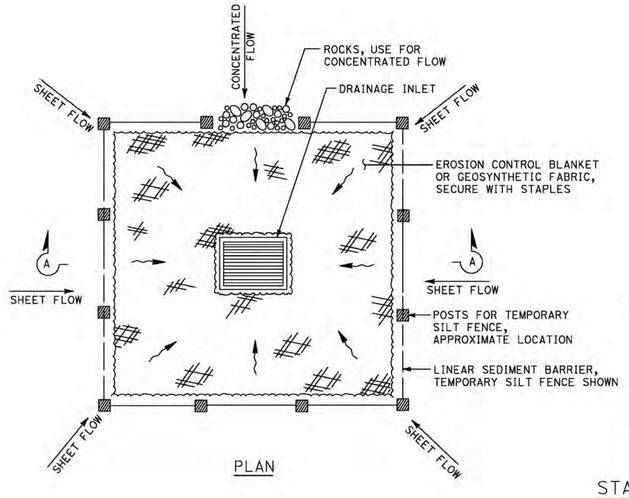
① TRENCH SHALL BE A MINIMUM OF 4" WIDE AND 6" DEEP TO BURY AND ANCHOR THE GEOTEXTILE FABRIC. FOLD MATERIAL TO FIT TRENCH AND BACKFILL AND COMPACT TRENCH WITH EXCAVATED SOIL.

② WOOD POSTS SHALL BE A MINIMUM SIZE OF 1 1/8" x 1 1/8" OF OAK OR HICKORY.

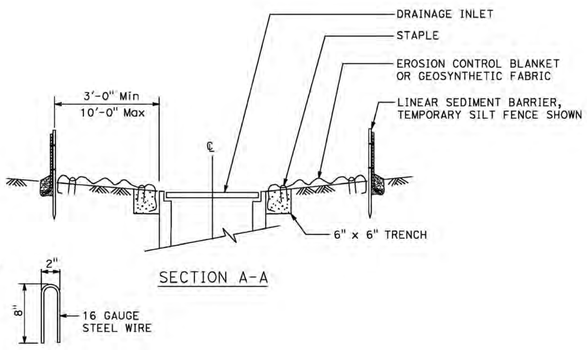
SILT FENCE — 3 / SHT 11
SCALE: NONE




GRAVEL BAG, CALTRANS SC–8 — 4 / SHT 11
SCALE: NONE




PLAN




SECTION A–A

STAPLE DETAIL

TEMPORARY DRAINAGE INLET PROTECTION, CALTRANS T61 — 5 / SHT 11
SCALE: NONE

| NOTES |
|---|
| |

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ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

| NO | REVISION | DATE | BY | APR |
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| 0C | ISSUED FOR 30% REVIEW | 11/07/25 | KJF | CRS |
| 0B | ISSUED FOR 30% REVIEW | 07/07/25 | KJF | MLM |
| 0A | PRELIMINARY | 05/02/25 | KJF | MLM |

ENGIE

| ENGINEERING RECORD | | DATE |
|---|---|---|
| DRAWN | FULTON | 04/30/25 |
| DESIGNED | FULTON | 04/30/25 |
| CHECKED | STAFFORD | 11/07/25 |
| APPROVED | | |
| DWG SCALE: NONE | PLT SCALE: 1:1 | |

# COMPASS ENERGY STORAGE
## 250 MW / 1000 MWH BATTERY SYSTEM
## EROSION CONTROL DETAILS

DWG. NAME: CMP–D–P002–12 | REVISION NO : 0C


LEGEND

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED YARD BORDER FENCE

NOTES

**ISSUED FOR 30% REVIEW**

"Engineering with Distinction"

ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

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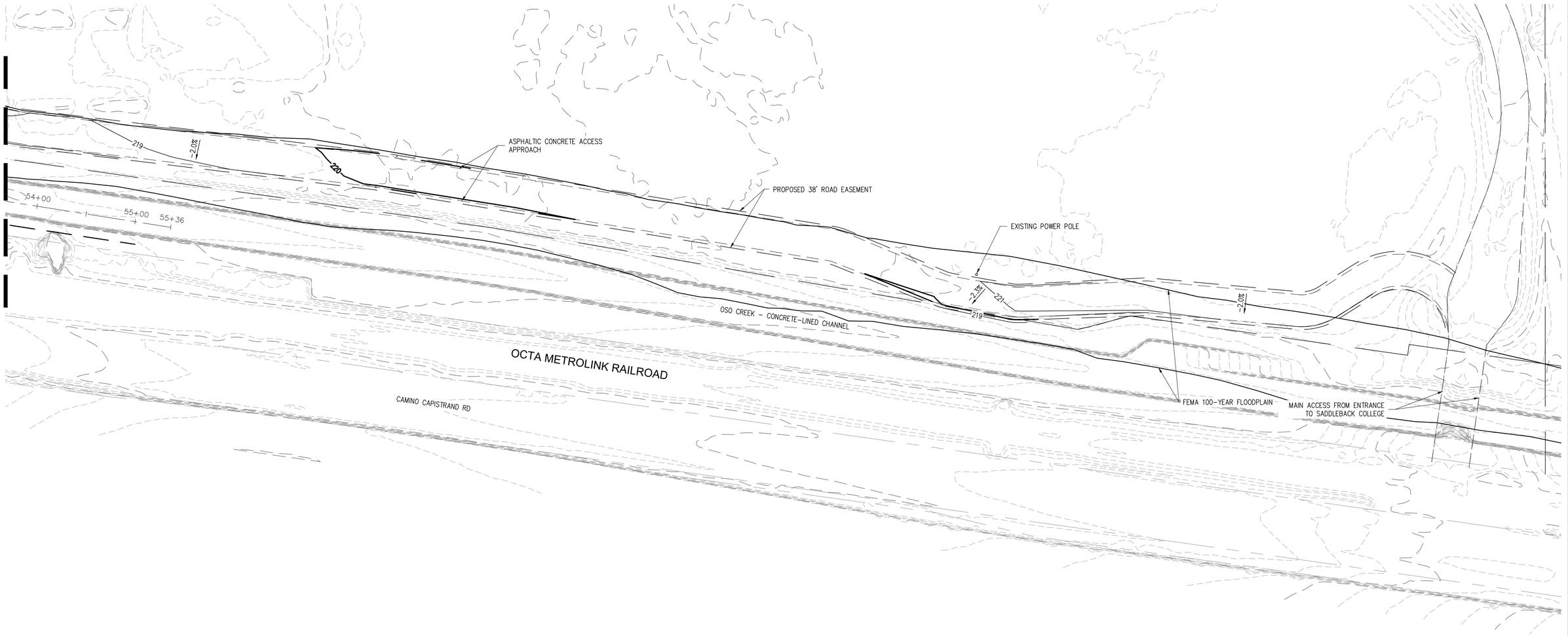
ENGIE

| ENGINEERING RECORD | | DATE |
|---|---|---|
| DRAWN | FULTON | 04/30/25 |
| DESIGNED | FULTON | 04/30/25 |
| CHECKED | STAFFORD | 11/07/25 |
| APPROVED | | |
| DWG SCALE: 1" = 50' | PLT SCALE: 1:1 | |

# COMPASS ENERGY STORAGE
## 250 MW / 1000 MWH BATTERY SYSTEM
## SITE CONSTRUCTION ACCESS PLAN

DWG. NAME: CMP-D-P002-13 | REVISION NO : 0B

MATCHLINE: SEE SHT CMP-D-P002-13




| LEGEND |
|---|
| EXISTING MAJOR CONTOUR |
| EXISTING MINOR CONTOUR |
| PROPOSED MINOR CONTOUR |
| PROPOSED MAJOR CONTOUR |
| PROPOSED YARD BORDER FENCE |

NOTES

0 20FT 50FT 100FT
SCALE: 1"=50'

ISSUED FOR 30% REVIEW

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
BILLINGS, MONTANA

| NO | REVISION | DATE | BY | APR |
|---|---|---|---|---|
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| | | | | |
| 0C | ISSUED FOR 30% REVIEW | 11/07/25 | KJF | CRS |
| 0B | ISSUED FOR 30% REVIEW | 07/07/25 | KJF | MLM |
| 0A | PRELIMINARY | 05/02/25 | KJF | MLM |

ENGIE

| ENGINEERING RECORD | | DATE |
|---|---|---|
| DRAWN | FULTON | 04/30/25 |
| DESIGNED | FULTON | 04/30/25 |
| CHECKED | STAFFORD | 11/07/25 |
| APPROVED | | |
| DWG SCALE: 1" = 50' | PLT SCALE: 1:1 | |

# COMPASS ENERGY STORAGE
## 250 MW / 1000 MWH BATTERY SYSTEM
## SITE CONSTRUCTION ACCESS PLAN

DWG. NAME: CMP-D-P002-14 | REVISION NO : 0C