PUBLIC REVIEW DRAFT



Initial Study/Mitigated Negative Declaration/Initial Environmental Checklist

South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow

South Lake Tahoe, California

August 2024

South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow

South Lake Tahoe, California

Initial Study/Mitigated Negative Declaration/Initial Environmental Checklist

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Executive Summary

El Dorado County (County), in cooperation with the California Department of Transportation, proposes to implement the South Tahoe Greenway – Upper Truckee River Bridge Crossing at Johnson Meadow Project (Project). The Project is one of a series of erosion control/water quality, environmental restoration, and shared-use path projects implemented by the El Dorado County Department of Transportation and an extension to the Dennis T. Machida Memorial Greenway. It is identified within the Tahoe Regional Planning Agency's (TRPA) Environmental Improvement Program as Project #03.02.02.0085 and Federal Aid Project # STPL-5925(183). The Project supports the *Linking Tahoe: Active Transportation Plan*, approved by the Tahoe Metropolitan Planning Organization and the Tahoe Valley Area Plan.

Project Description

The Project proposes to build upon the overall shared-use path network on the south shore of Lake Tahoe by constructing approximately 1.2 miles of Class 1 shared-use path and replacing a heavily trafficked bike/pedestrian bridge over the Upper Truckee River damaged by the 2017 winter storms. The Project is intended to establish a needed active transportation link between the Barton Hospital area (west of the Upper Truckee River) and the Tahoe Sierra neighborhood/Lake Tahoe Community College area (east of the Upper Truckee River). The shared-use path would begin at the south terminus of Winnemucca Avenue near Barton Memorial Hospital then extend east on public lands owned by the Tahoe Resource Conservation District (known as Johnson Meadow), cross the Upper Truckee River, then follow existing user-created trails to the intersection of Sierra Boulevard and Barbara Avenue. The shared-use path would provide connections to existing Class 1 facilities in the area, such as the short Class 1 segment between South Avenue and Winnemucca Avenue. The Project also builds upon the Sierra Boulevard Complete Streets Project (completed in 2019) and the South Tahoe Greenway Shared Use Trail Phase 2 Project (completed in 2021) at the corner of Sierra Boulevard and Barbara Avenue.

Project Features

The Project proposes to construct approximately 5,075 linear feet of asphalt path in forested upland, approximately 935 linear feet of elevated boardwalk through Johnson Meadow, and to replace the damaged bridge in the Upper Truckee River with a 140-foot bridge on a new alignment that entirely spans the river.

Potential Impacts

Based on the environmental evaluation performed for IS/MND/IEC, the proposed Project would have:

- **No Impact** on Mineral Resources, Transportation, Population and Housing.
- **Less than Significant Impact** on Aesthetics, Cultural Resources, Energy, Air Quality, Greenhouse Gas Emissions, Hazards and Hazardous Materials, Hydrology and Water Quality, Land Use and Planning, Noise, Public Services, Recreation, Utilities and Service Systems, and Wildfire.
- **Less than Significant Impact with Mitigation Incorporated** on Agricultural and Forestry Resources, Biological Resources, Geology and Soils, and Tribal Cultural Resources. The Project

will implement mitigation measures as described herein to reduce potential impacts to a Less Than Significant level.

Mitigation Measures

The County has agreed to implement the following mitigation measures to reduce Project impacts to a "Less than Significant" level:

- AFR-1**:** Implement Mitigation Measures BIO-1, BIO-4, and BIO-9.
- BIO-1**:** Prior to the start of construction activities, the limits of construction shall be clearly marked and sensitive or regulated habitats within the Project limits shall be marked with high visibility fencing or staking to ensure construction will not further encroach into waters or sensitive habitats. These areas shall be marked on the Project plans. A qualified biologist shall periodically inspect the Project Area to ensure environmentally sensitive areas remain undisturbed.
- BIO-2**:** To minimize impacts to aquatic species and habitat, heavy equipment shall not cross or enter the river unless necessary for bridge demolition and associated debris removal. Fueling, maintenance, and staging of equipment shall occur in designated upland staging areas only.
- BIO-3**:** BMPs used in the Upper Truckee River shall be installed with consideration for fish passage. Turbidity curtains or downstream screens shall be installed in a manner that allows for the passage of fish beneath or around the BMP. BMPs shall consist of materials that prevent fish and other wildlife from becoming entangled, trapped, or otherwise harmed. BMPs used in the river shall be approved for use by California Department of Fish and Wildlife (CDFW) and United States Fish and Wildlife Service (USFWS) and inspected daily by a qualified biologist.
- BIO-4**:** Prior to the start of construction activities, high visibility vegetation protection fencing shall be installed around the dripline of trees and snags in the Project Area that are not planned for removal. Trees and snags shall be marked on the Project plans for avoidance and periodically inspected by a qualified biologist to ensure they remain undisturbed.
- BIO-5: A pre-construction plant survey of the entire Project Area shall be conducted by a qualified biologist prior to construction and during the appropriate survey window(s) necessary to identify special status plants with the potential to occur. Results of the pre-construction plant survey shall be provided to the Project proponent, CDFW, and the LTBMU. If special-status plant species are detected, their locations shall be pin-flagged, and a minimum 25-foot buffer shall be marked with high visibility fencing or staking around the individual or population. A qualified biological monitor shall inspect the special status plant species and buffer(s) on a weekly basis to ensure no impacts occur because of the Project.
- BIO-6: No more than 14 days prior to construction, an SNYLF visual encounter survey shall be conducted by a USFWS-approved biologist to ensure SNYLF are absent in the Project Area, including upstream and downstream areas or suitable habitat features within 100 feet of the Project. If a frog is observed during any point of the Project, all work shall immediately halt, all equipment shall be powered off, and work shall not continue until the frog can be identified by a qualified biologist. If the frog is not a SNYLF, then a qualified biologist shall move the frog out of

harm's way prior to work proceeding. If the frog is a SNYLF, then work shall stop until the SNYLF has moved out of harm's way on its own accord as determined by the biological monitor. Consultation with the USFWS shall be re-initiated if take is exceeded or the Project action changes from that previously disclosed in the Biological Assessment.

- BIO-7: A qualified biologist shall conduct environmental awareness training for all construction personnel. The training shall include identification of SSS, required practices before the start of construction, general measures that are being implemented to conserve the species as they relate to the Project, penalties for non-compliance, and the boundaries of work and permitted disturbance zones. Supporting materials containing training information shall be prepared and distributed. Upon completion of training, all construction personnel shall sign a form stating that they have attended the training and understand all the measures. Proof of this instruction shall be kept on file by the Project proponent. The Project proponent shall provide the USFWS and CDFW with a copy of the training materials and copies of the signed forms indicating that training has been completed. If new construction personnel are added to the site, the crew foreman shall ensure that the personnel receive the mandatory training before starting work. Copies of signed forms shall be submitted monthly as additional training occurs for new employees. The crew foreman is responsible for ensuring that construction personnel adhere to the guidelines and restrictions.
- BIO-8: Immediately prior to installation of the coffer dam system around the bridge removal work area, a qualified biologist shall conduct a fish survey to ensure Lahontan cutthroat trout (LCT), mountain whitefish, and Lahontan mountain sucker are absent in the Project Area. The biologist will remain on-site and monitor installation of the coffer dam and will have authority to stop any Project activity that may impact LCT or other special-status fish species detected in the Project area. The biologist will then survey ponded water within the contained work area following completion of the coffer dam installation to ensure fish are absent. If non-federally listed fish species are found in the ponded water, they will be relocated to the river side of the coffer dam structure by the biologist. If LCT are found in the ponded area, the coffer dam system will be reopened to allow the LCT to leave on its own accord. No LCT will be handled or relocated. Although the confidence of absence in the contained work area is high based on the inclusion of the previous portions of this measure, should LCT be found during pumping of water from the contained work area, pumping will immediately cease, and the coffer dam will be reopened. The qualified biologist will also perform daily inspections of the coffer dam and any other BMPs, such as the downstream turbidity curtain, to ensure they are properly installed, in good condition, cannot trap or otherwise harm fish, and do not block fish passage. If ponded water will be pumped from the contained bridge removal work area, intake screens will be used to prevent fish being impacted by the pump and a qualified biologist will be on-site to relocate any residual non-federally listed fish species to the river side of the coffer dam structure. After bridge construction/demolition, the qualified biologist will monitor the removal of the coffer

dam and other BMPs. Should an LCT be detected in the Project area, the USFWS will be contacted immediately, and all equipment will be powered off.

- BIO-9**:** During the nesting season (March through July) and no more than 2 weeks prior to construction and vegetation removal, a qualified biologist shall conduct a protocol-level survey for northern goshawk to determine occupancy and nesting status within a 0.25-mile radius of the Project Area. If an active goshawk nest is discovered, a 0.25-mile activity-free buffer will be established around the nest site. Results of the pre-construction northern goshawk survey will be provided to CDFW and TRPA.
- BIO-10**:** During the appropriate survey periods (June 1 to June 14, June 15 to June 25, and June 26 to July 15), and no more than 2 weeks prior to construction and vegetation removal, a qualified biologist shall conduct protocol-level surveys for willow flycatcher to determine occupancy and nesting status in suitable habitat within a 100-foot buffer of the Project Area. If an active willow flycatcher nest is discovered, a 100-foot activity-free buffer will be established around the nest site. Results of the willow flycatcher surveys shall be provided to CDFW and TRPA.
- BIO-11**:** At least 14 days prior to removal or modification of snags, trees, the existing bridge, or other features that may provide roosting habitat for bats, a qualified biologist shall conduct a pre-construction survey to determine the presence or absence of bats and roosts. Results of the survey shall be provided to the Project proponent. If bats or signs indicating past or present roosting are found, the Project proponent shall report the bat observation or roost to CDFW and will delay removal until the roost can be confirmed unoccupied. The Project proponent shall coordinate with CDFW to determine an appropriate activity-free buffer area around occupied roosts in the Project Area.
- BIO-12**:** To ensure that bats have left potential roosting trees, trees shall be removed over the course of 2 days. On the first day, limbs from the identified trees shall be removed in the late afternoon. This disturbance should cause any roosting bats to seek other roosts during their nighttime foraging. The remainder of the tree can then be removed on the second day as late in the afternoon as feasible. If bats are found injured, or if bat mortality occurs during the course of tree removal, the Project proponent shall immediately notify CDFW of the event, the species recorded, and the number of individuals documented. Tree limbing or removal shall not be performed under any of the following conditions: during any precipitation events, when ambient temperatures are below 4.5 degrees Celsius, when windspeeds exceed 11 miles per hour, and/or any other condition which may lead bats to seek refuge.
- BIO-13: To mitigate the impact to stream environment zones (SEZs) in the amount of 1:1.5, the County shall first look for existing SEZ land coverage or disturbance in the Project vicinity that can be restored and permanently protected. If there is insufficient SEZ restoration potential in

the Project vicinity, the County shall utilize SEZ restoration credits from projects previously restored and banked. The project eligible at the time of this environmental analysis includes:

- El Dorado County SEZ Restoration Project #1 (Angora Wetland Bank) - up to 267,422 sf (6.139 acres) of restoration is available from implementation of this project.

This restoration project, or others as approved, includes successful soil and habitat restoration that is expected to offset floodplain and wetland disturbance as well as the TRPA and Lahontan required SEZ disturbance. If needed for this Project, a wetland delineation for the restoration projects will be completed and will determine the amount and type of wetland restoration/credit that is available.

- GEO-1**:** If shallow spread foundations were to be utilized for west abutment and boardwalk support, liquefiable soils beneath these footings shall be mitigated via ground improvement techniques. Driven piles are the preferred foundations for the boardwalk system and these piles shall be designed to provide the needed axial and lateral resistance from dense to very dense soils as well as considering downdrag loads. Native soils east of the river are not liquefiable and the east abutment of the bridge can be supported on shallow spread foundation underlain by native dense to very dense silty sand to silty sand with gravel soils. Whereas driven piles may impact the existing pipelines, the County shall continue to coordinate with the South Tahoe Public Utility District (STPUD) during design to ensure the existing sewer pipelines in the vicinity are protected.
- TCR-1: Workers Environmental Awareness Program (WEAP) Training. A Tribal Cultural Resources (TCRs) sensitivity and awareness training program (WEAP) shall be provided for all personnel involved in Project construction, including field consultants and volunteers. An archaeologist meeting the Secretary of the Interior's (SOI) Professional Qualifications Standards for Archeology (or under direct supervision of an SOI qualified Archaeologist) and representatives of culturally affiliated Native American tribes will coordinate during preparation of the WEAP. The WEAP shall occur prior to the onset of Project-related construction activities. The WEAP will include relevant information regarding sensitive cultural resources and TCRs, including applicable regulations, protocols for avoidance, and consequences of violating state laws and regulations.

  The WEAP will also describe appropriate avoidance and impact minimization measures for cultural resources and TCRs outlined in Mitigation Measure TCR-3. The WEAP will emphasize the requirement for confidentiality and culturally appropriate treatment of any discovery of significance to Native Americans and will discuss appropriate behaviors and responsive actions, consistent with Native American tribal values.
- TCR-2: Construction Monitoring. The Washoe Tribe of California and Nevada has requested, and the County has agreed to, cultural resources monitoring during ground disturbing construction activities. The County will prepare a Monitoring Plan and provide it to the Tribe prior to commencing construction, and shall continue coordination with the Tribe up to and during

ground disturbing activities of the Project concerning the avoidance and protection of Tribal Cultural Resources that may be impacted.

- TCR-3: Inadvertent Discoveries. The following measure is intended to address the evaluation and treatment of inadvertent/unanticipated discoveries of potential TCRs or archaeological resources during the Project's ground disturbing activities. An inadvertent discovery plan will be included in the monitoring plan:
    - If any suspected TCRs or archaeological resources are discovered during ground disturbing construction activities, all work shall cease within 100 feet of the discovery, or an agreed upon distance based on the Project Area and nature of the find. A qualified professional archaeologist and a Tribal Representative from a California Native American tribe that is traditionally and culturally affiliated with a geographic area shall be immediately notified and shall determine if the find is a TCR (PRC § 21074). The Tribal Representative or qualified archaeologist will make recommendations for further evaluation and treatment as necessary.
    - The contractor shall implement any measures deemed by the County to be necessary and feasible to preserve in place, avoid, or minimize impacts to the resource, including, but not limited to, facilitating the appropriate tribal treatment of the find, as necessary.
    - Work at the discovery location shall not resume until all necessary investigation and evaluation of the discovery have been satisfied.
- TCR-4: Human Remains. In the event human remains are discovered, all work shall cease immediately. All measures shall be made to secure and protect areas in which human remains and funeral objects are discovered. Construction workers and/or contractors or subcontractors on the job site will not be permitted to take photographs of human remains, or funeral objects. Archaeological resources are not to be moved or taken from the Project site and work should not resume until authorized. The County Coroner and local law enforcement shall be notified within 24 hours of the discovery to conduct proper evaluation and treatment of remains. The coroner and the law enforcement agency will evaluate the discovery to determine whether it is a crime scene or a burial. If human remains are determined to be associated with an archaeological site (burial), SBTS will notify the State Historic Preservation Office (SHPO) and will work with SHPO to determine measures to take. That office will contact the appropriate tribal representatives and consult on the disposition of the remains and any associated artifacts.

List of Abbreviations

Abbreviation	Definition
CA	California
AB	Assembly Bill
APE	Area of Potential Effect
AQMD	El Dorado County Air Quality Management District
ASR	Archaeological Survey Report
BMP	Best Management Practices
CARB	California Air Resources Board
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CGS	California Geological Survey
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalency Levels
CNPS	California Native Plant Society
CRHR	California Register of Historical Resources
CTC	California Tahoe Conservancy
CWA	Clean Water Act
dbh	Diameter at breast height
DVTE	Daily Vehicle Trip Ends
EFZ	Earthquake Fault Zone
EIP	Environmental Improvement Program
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
GHG	Greenhouse gas

HPSR	Historic Property Survey Report
IEC	Initial Environmental Checklist
IPES	Individual Parcel Evaluation System
IS	Initial Study
LCD	Land Capability District
LCT	Lahontan cutthroat trout
LSAA	Lake and Streambed Alteration Agreement
LTAB	Lake Tahoe Air Basin
LTBMU	Lake Tahoe Basin Management Unit
MBTA	Migratory Bird Treaty Act
MMRP	Mitigation Monitoring and Reporting Plan
MND	Mitigated Negative Declaration
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NCE	Nichols Consulting Engineers
NES	Natural Environment Study
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPPA	Native Plant Protection Act
NRCS	Natural Resources Conservation Service
PAS	Plan Area Statement
PRC	Public Resource Code
ROG	Reactive Organic Gases
ROW	Right-of-way
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
SER	Standard Environmental Reference
SEZ	Stream Environment Zone
SF	Square Feet

SLF	Sacred Lands File
SLTFD	South Lake Tahoe Fire Department
SNYLF	Sierra Nevada yellow-legged frog
SQIP	Scenic Quality Improvement Program
SSS	Special Status Species
STPUD	South Tahoe Public Utility District
SWPPP	Stormwater Pollution Prevention Plan
TAC	Toxic Air Contaminants
TRCD	Tahoe Resource Conservation District
TRPA	Tahoe Regional Planning Agency
UAIC	United Auburn Indian Community
US	United States
USACE	United States Army Corps of Engineers
USFS	United States Forest Service
USFWS	United State Fish and Wildlife Service
VMT	Vehicle miles traveled
WOUS	Waters of the United States
WUI	Wildland Urban Interface

1 Project Information

Type of Information	*Project Details*
1. Project title:	South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow
2. Lead agency name and address:	El Dorado County Department of Transportation 924 B Emerald Bay Road South Lake Tahoe, CA 96150
3. Contact person and phone number:	Donaldo Palaroan, P.E. El Dorado County Department of Transportation (530) 573-7920 donaldo.palaroan@edcgov.us
4. Project location:	South Lake Tahoe, California
5. Project sponsor's name and address:	El Dorado County Department of Transportation 924 B Emerald Bay Road South Lake Tahoe, CA 96150
6. General Plan designations:	County of El Dorado General Plan: Open Space Tahoe Regional Planning Agency (TRPA) Regional Plan: Open Space TRPA Plan Area Statement (PAS) 105 – Residential TRPA PAS 100 – Conservation TRPA PAS 95 – Conservation
7. Zoning:	PAS 105: Sierra Tract PAS 100: Truckee Marsh PAS 95: Trout/Cold Creek
8. Description of project:	The Project would build upon the overall shared-use path network on the south shore of Lake Tahoe by constructing approximately 1.2 miles of Class 1 shared-use path and replacing a heavily trafficked bridge over the Upper Truckee River damaged by the 2017 winter storms. The Project would construct approximately 5,075 linear feet of asphalt path in forested upland, approximately 935 linear feet of elevated boardwalk through Johnson Meadow, and replace the damaged bridge in the Upper Truckee River with a 140-foot bridge on a new alignment that entirely spans the river.

9. Surrounding land uses and setting:	PAS 105: This area is a mixture of apartments and single-family dwellings. The closest use to the trail alignment includes the residential area along Barbara Avenue and associated utilities. PAS 100: This area has limited use due to poor drainage. Recreational uses include rafting, bird watching, cross-country skiing, hiking, fishing, and some sunbathing along the shoreline of Lake Tahoe. Grazing of livestock occurs in the meadow areas. The Tahoe Keys Property Owners' Association holds a long-term lease/purchase option on 2.206 acres of land, used as a maintenance and storage facility, south of Venice Drive East. The closest use to the trail alignment includes recreation and, historically, ranching activities such as livestock grazing. PAS 95: Most of this area is in public ownership and is managed by the U.S. Forest Service (USFS) for low to moderate resource use. Forest practices include range allotment, timber harvest, wildlife habitat improvements, and dispersed recreation management. Recreational activities include hiking, fishing, cross-country skiing, and off-road vehicle use. The closest use to the trail alignment includes dispersed recreation management and forest practices including fuel reduction.
10. Other public agencies whose approval is required:	Caltrans TRPA California Tahoe Conservancy (CTC) City of South Lake Tahoe United States Forest Service (USFS)
11. Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code Section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?	A letter and attached maps were originally sent to the Native American Heritage Commission (NAHC) on May 31, 2023, requesting a record search of their Sacred Lands File (SLF) and a contact list for regional tribes that may know of cultural or tribal resources within or immediately adjacent to the Project Area. The NAHC response indicated a positive SLF result. Native American correspondence was initiated on July 18, 2023, to request consultation with all tribes affiliated with the Project Area. The United Auburn Indian Community (UAIC) has deferred to the Washoe Tribe, who will be involved with development of the monitoring plan for the Project moving forward.

2 Introduction

2.1 Focus of the Environmental Review

2.1.1 California Environmental Quality Act

The County of El Dorado (County), as the Project sponsor and Lead Agency, in cooperation with the California Department of Transportation (Caltrans) and the Tahoe Regional Planning Agency (TRPA) as Responsible Agencies, has prepared this Draft Initial Study (IS) pursuant to the California Environmental Quality Act (CEQA) for the proposed South Lake Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow Project (Project). This IS, combined with the TRPA required Initial Environmental Checklist (IEC) discussed below, is an informational document provided to help the public and decision-makers understand the effects the Project may have on the environment, and how any potential adverse effects may be mitigated. Because this document describes potentially significant impacts that can be reduced to less than significant with the adoption of mitigation measures, a Mitigated Negative Declaration (MND) has been prepared.

The Notice of Intent to Adopt a Mitigated Negative Declaration provides notice to interested agencies and the public that it is the County's intent to adopt an MND and, pending public review, expects to determine from this IS/MND/IEC that the proposed Project would not have a significant effect on the environment as mitigated. This Public Review Draft IS/MND/IEC is subject to modification based on comments received by interested agencies and the public.

2.1.2 California Department of Transportation

The Project is not located on the State Highway System; however, the Project is receiving funding from the Federal State Transportation Improvement Program. Caltrans has assumed responsibility for the Federal Highway Administration (FHWA) for projects using FHWA funding or requiring FHWA approval. Caltrans has designated the role of CEQA lead agency to the County and serves as a Responsible Agency under CEQA; Caltrans must approve all technical studies and environmental documents before the Project can proceed. Caltrans provides guidance for implementing regulations, as well as recommended report content and format, in the Standard Environmental Reference (SER; Caltrans N.D.). This guidance was used to develop supporting technical studies and CEQA topic analysis for the proposed Project.

2.1.3 Tahoe Regional Planning Agency

The County has prepared this IS/MND/IEC pursuant to the TRPA Code of Ordinances (TRPA Code; TRPA 2023) requirement for environmental documentation. The Code stipulates that TRPA shall use either an IEC checklist or environmental assessment to determine whether an environmental impact statement shall be prepared for a project. For an IEC checklist, the applicant shall submit the following (TRPA Code Section 3.3.1):

1. The applicant shall describe and evaluate the significance of all impacts receiving "yes" answers.
2. The applicant shall describe and evaluate the significance of all impacts receiving "no with mitigation" answers and shall describe in detail, the mitigation measures proposed to mitigate these impacts to a less than significant level.

2.2 Summary of Findings

The following environmental factors would be potentially affected by the Project, involving at least one impact that would be a "Potentially Significant Impact" without the implementation of mitigation measures:

- Agricultural and Forestry Resources
- Biological Resources
- Geology and Soils

Based on the environmental evaluation performed for IS/MND/IEC, the proposed Project would have:

- **No Impact** on Mineral Resources, Transportation, or Population and Housing.
- **Less than Significant Impact** on Aesthetics, Air Quality, Cultural Resources, Energy, Greenhouse Gas Emissions, Hazards and Hazardous Materials, Hydrology and Water Quality, Land Use and Planning, Noise, Public Services, Recreation, Tribal Cultural Resources, Utilities and Service Systems, and Wildfire.
- **Less than Significant Impact with Mitigation Incorporated** on Agricultural and Forestry Resources, Biological Resources, and Geology and Soils. The Project will implement mitigation measures as described herein to reduce potential impacts to a Less Than Significant level.

2.3 Required Permits and Additional Approvals

2.3.1 Permits

The Project would obtain or comply with the following permits:

- TRPA Environmental Improvement Program Project #03.02.02.0085
- CDFW Section 1602 Lake and Streambed Alteration Agreement (LSAA)
- U.S. Army Corps of Engineers (USACE) Section 404 Nationwide Permit 14 - Linear Transportation Projects
- Regional Water Quality Control Board (RWQCB) Section 401 Water Quality Certification/Report of Waste Discharge

2.3.2 Responsible Agencies

The County will be coordinating with other public agencies with CEQA responsibilities to obtain use of the respective lands. These may include, but are not limited to, special use permits, right of entry authorizations, temporary construction easements, license agreements, and multi-use trail easements from the following public agencies:

- TRPA
- Caltrans
- California Tahoe Conservancy (CTC)

2.4 Lead Agency Determination

On the basis of this initial evaluation:

__ I find that the proposed Project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

X I find that although the proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the Project have been made by or agreed to by the Project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

__ I find that the proposed Project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT (EIR) is required.

__ I find that the proposed Project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An EIR is required, but it must analyze only the effects that remain to be addressed.

__ I find that although the proposed Project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed Project, nothing further is required.

Donaldo Palaroan Digitally signed by Donaldo Palaroan Date: 2024.08.28 13:43:49 -07'00'	08/28/2024
Signature	Date
Donaldo Palaroan	Senior Civil Engineer
Name	Title

3 Project Description

The County, in cooperation with Caltrans, proposes to implement the Project. The Project is one of a series of erosion control/water quality, environmental restoration, and shared-use path projects implemented by the El Dorado County Department of Transportation and an extension to the Dennis T. Machida Memorial Greenway. It is identified within TRPA's Environmental Improvement Program as Project #03.02.02.0085 and Federal Aid Project # STPL-5925(183).

3.1 Project Location

The Project is in the City of South Lake Tahoe, located entirely within eastern El Dorado County, California. Specifically, the Project Area is in Township 12 north, Range 18 east, Sections 3 and 4 of the South Lake Tahoe U.S. Geological Survey 7.5-minute quadrangle map. The Project is bound by South Avenue and Barton Memorial Hospital to the west, U.S. Highway 50/Lake Tahoe Boulevard (US 50) to the north, Lake Tahoe Airport to the south, and Sierra Boulevard to the east (**Figure 1**).

3.2 Background

The Project proposes to build upon the overall shared-use path network on the south shore of Lake Tahoe by constructing approximately 1.2 miles of Class 1 shared-use path and replacing a heavily trafficked bridge over the Upper Truckee River damaged by the 2017 winter storms. The Project is intended to establish a needed active transportation link between the Barton Hospital area (west of the Upper Truckee River) and the Tahoe Sierra neighborhood/Lake Tahoe Community College area (east of the Upper Truckee River). The shared-use path would begin at the south terminus of Winnemucca Avenue near Barton Memorial Hospital then extend east on public lands owned by the TRCD (known as Johnson Meadow), cross the Upper Truckee River, then follow existing user-created trails to the intersection of Sierra Boulevard and Barbara Avenue. The shared-use path would provide connections to existing Class 1 facilities in the area, such as the short Class 1 segment between South Avenue and Winnemucca Avenue. The Project also builds upon the Sierra Boulevard Complete Streets Project (completed in 2019) and the South Tahoe Greenway Shared Use Trail Phase 2 Project (completed in 2021) at the corner of Sierra Boulevard and Barbara Avenue.

The project area lies within the Tahoe Resource Conservation District's (Tahoe RCD) Upper Truckee River Johnson Meadow Restoration Project area. Tahoe RCD acquired Johnson Meadow in 2018 and is in the early phases of planning for the restoration of the river and meadow. While the property was only recently acquired by Tahoe RCD, the need for restoration has long been acknowledged and there have been several previous restoration planning efforts. The early restoration alternatives identified through these efforts were used to identify the current opportunities and constraints that were analyzed in the Draft *Feasibility Report for the South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow* (El Dorado County 2021) to guide the Project design and inform the environmental review process.

3.3 Alternatives Analyzed

The existing conditions in the Project Area were examined by the County in the Feasibility Report to identify problems and analyze potential solutions (El Dorado County 2021). To meet the goals and

objectives of the Project, the Feasibility Report outlined 3 alignment alternatives for consideration by the public and the Project development team.

The alternatives describe the connection at Winnemucca Avenue near Barton Hospital from the west and the connection at Sierra Boulevard/Barbara Avenue intersection from the northeast. In general, the alignments west of the Upper Truckee River follow the existing utility access road and the historic user trail access. The differences between the 3 alignments are described related to connection(s) to either

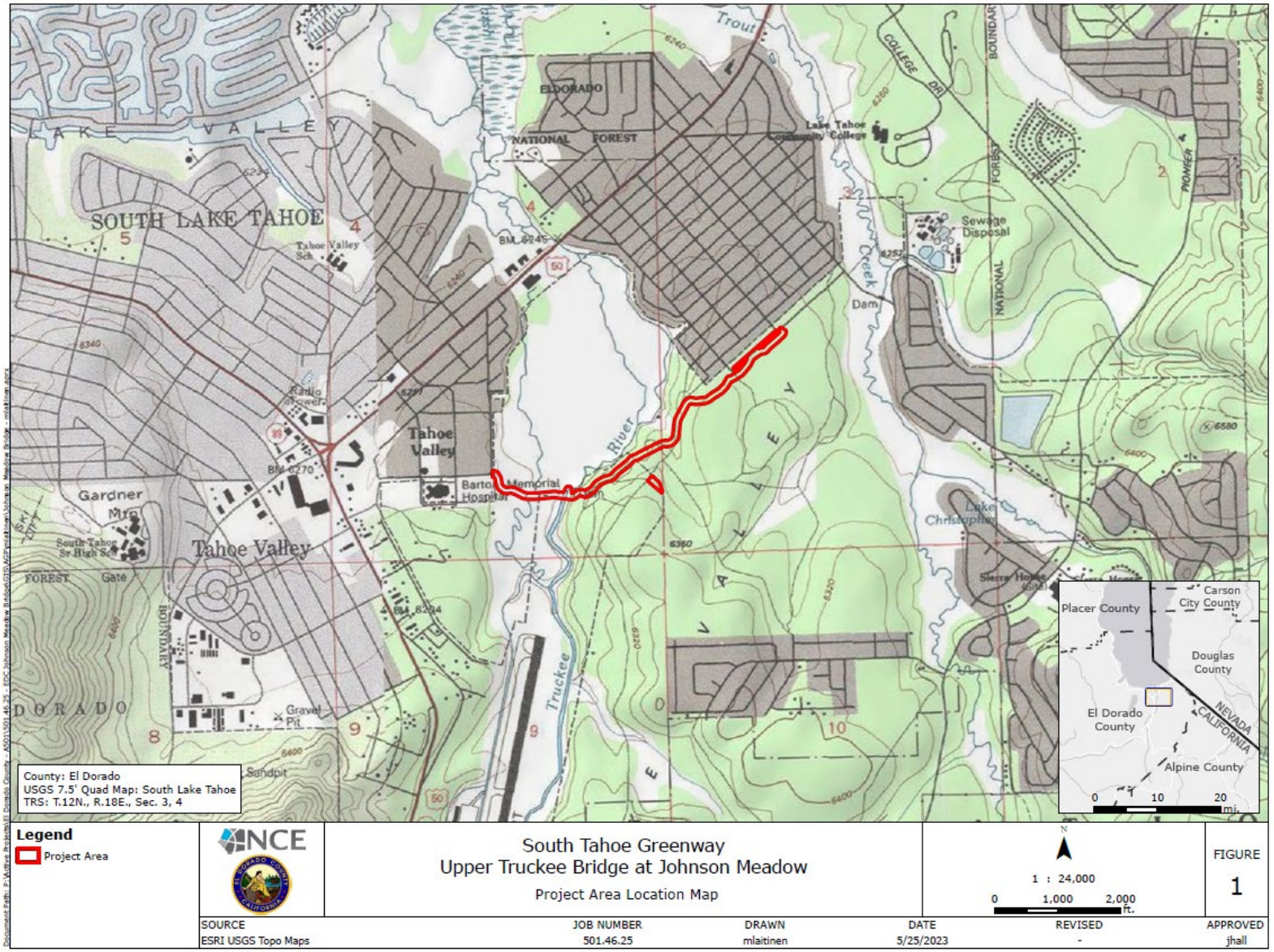


Figure 1. Project Area Location Map

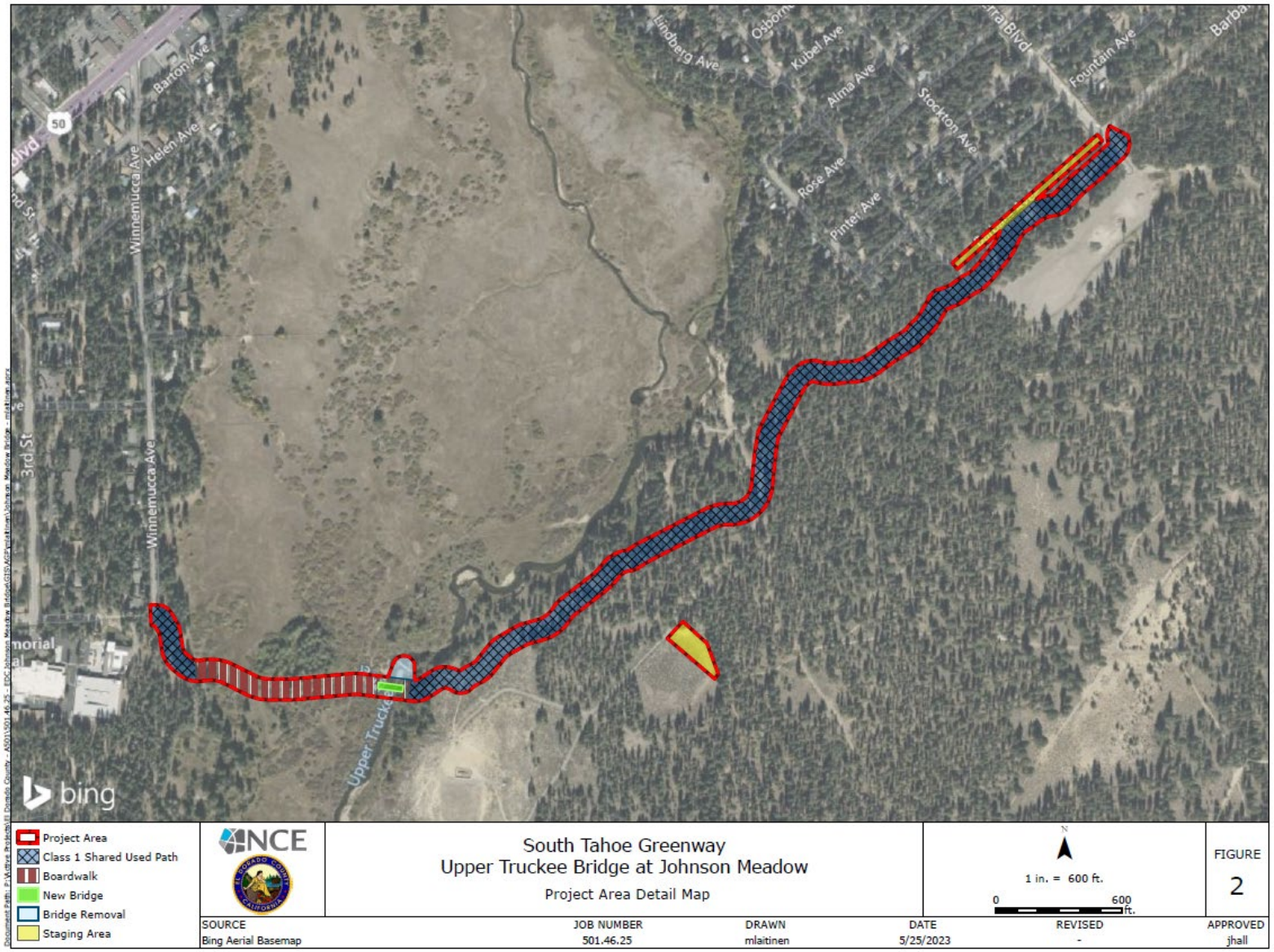


Figure 2. Project Area Detail Map

South Avenue and/or Winnemucca Avenue and the alignment of the proposed bridge crossing at the river.

- Alternative 1 – Proposed bridge location approximately 60 feet upstream of existing concrete bridge; location chosen to minimize the overall length. Alignment continues to the northeast following current user trails.
- Alternative 2 – Proposed bridge location approximately 250 feet downstream of existing concrete bridge; location chosen to optimally reduce the potential of structure foundation scour or location within the floodplain on the east side of the riverbank. Then, approximately 750 linear feet of new trail disturbance would occur before tying into existing user trail alignment. Alignment continues to the northeast.
- Alternative 3 – Proposed bridge location approximately 120 feet upstream of existing concrete bridge; location chosen to take advantage of the tangent (straight) section of the river alignment potentially reducing the overall length of the proposed bridge. Alignment to the east is similar to Alternative 1.
- Alternative 4 – No-build alternative.

A public meeting was held by the County via Zoom on February 3, 2022, to receive public comments on the Project and Draft Feasibility Report. Based on the comments received, the professional judgment of County personnel, analyses outlined in the Feasibility Report, and consensus of the Technical Advisory Committee, Alternative 3 was selected as the preferred alternative and is presented in **Figure 2**.

3.4 Project Purpose, Need, Objectives

The primary purpose of the Project is to extend and improve the existing shared-use trail to Class 1 standards and to replace the damaged bridge crossing the Upper Truckee River. The Project will re-establish a critical transportation route and improve safety for bicyclists, hikers, commuters, and other recreationalists. The existing trail is connected to various recreational and utility access routes and provides non-motorized access to facilities such as Barton Hospital and Lake Tahoe Community College.

The Project is needed to sustain the alternative transportation route by providing improvements and enhancing public safety and to prevent additional bank stabilization issues caused by the damaged bridge. In addition, the Project is needed to support *Linking Tahoe: Active Transportation Plan* (approved by the Tahoe Metropolitan Planning Organization and the Tahoe Valley Area Plan) and to build upon the Sierra Boulevard Complete Streets Project (completed in 2019) and the South Tahoe Greenway Shared Use Trail Phase 2 Project (completed in 2021).

The Project objectives are to:

- Provide an active transportation link supporting TRPA's Active Transportation Plan.
- Upgrade the existing shared-use trail to Class 1 standards by paving the trail, installing boardwalk through the Johnson Meadow, and installing associated signage.
- Improve public safety, bank stability, fish passage, and recreational access along the Upper Truckee River by removing the damaged bridge and replacing it with a new bridge that spans the river.

- Enhance recreational opportunities within the Tahoe Basin.
- Reduce fine and coarse sediment, stormwater runoff volume, and peak flows by 33%, to the maximum extent practicable.
- Reduce vehicle miles traveled (VMT) and other environmental impacts associated with automobile use by providing alternative means of travel and increasing intermodal connectivity.
- Minimize the impacts to the scenic quality of the area by using hardscape improvements that blend into the scenic environment to the maximum extent practicable.
- Stabilize eroding cut slopes, roadside ditches, and capture road abrasives utilizing source control Best Management Practices (BMPs).

3.5 Area of Potential Effect

The area of potential effect (APE) is a 100-foot wide, approximately 1.2-mile-long trail corridor extending from the south end of Winnemucca Avenue to the intersection of Sierra Boulevard and Barbara Avenue and is synonymous with the Project Area. The APE is 15.52 acres and includes 2 staging areas (**Figure 2**). Staging Area 1 is located in 0.6 acres of a previously disturbed forest clearing roughly 350 feet south of the Project corridor and is accessible via a paved segment of Lakehouse Road. Staging Area 2 covers 0.8 acres along Barbara Road, adjacent to the eastern end of the Project.

The APE includes areas of direct impacts associated with all potential Project ground disturbances including but not limited to the excavation of earth with heavy equipment, stockpiling of material, driving of heavy equipment over the ground, removal of vegetation, and staging. This includes a 100-foot corridor centered on the 1.2-mile pathway alignment, a 50-foot buffer to include the area where the old bridge would be removed, and the 2 staging areas (previous **Figure 2**).

3.6 Existing Conditions

The Project Area lies within the area known as Johnson Meadow, which covers over 230 acres and is the second in a string of 5 distinct meadow systems spread over approximately 9 miles. The Meadow consists of a broad flat meadow surface of grasslands, willows, and areas of forest bounded by the main Upper Truckee River channel along its eastern edge.

In general, the proposed alignment follows the existing disturbed utility access road and historic user trails crossing the Meadow. The Project Area is previously disturbed by encroaching urban development on the east and west ends, existing trails, utilities, access roads, the damaged Upper Truckee River bridge crossing, and forest habitat modification from wildfire fuel reduction activities. Existing paved and unpaved utility access roads, roadways, and trails currently provide public access for dispersed recreational opportunities such as river activities (canoeing, kayaking, tubing, etc.), hiking, and cycling in the Project Area. This stretch of river is heavily used by recreational paddlers and floaters.

The Project Area contains 2 STPUD water and sewer pipelines on the west side of the Upper Truckee River within a 45-foot-wide utility easement for the pipelines. There is a maintenance access road within this easement.

Dominant vegetation communities in the Project Area include Jeffrey pine (*Pinus jeffreyi*) forest, big sagebrush (*Artemisia tridentata* ssp. *tridentata*) shrubland, meadow, upper montane mixed chaparral,

and willow (*Salix* spp.) shrubland along the Upper Truckee River corridor. The elevation within the Project Area is approximately 6,245 feet above mean sea level. The topography in the area consists of a flat meadow along the Upper Truckee River corridor within the western portion, and gentle to moderate upland slopes on the east edge of the meadow. The hills in the northeastern section are approximately 6,270 feet above mean sea level.

NCE formally delineated 2.81 acres of aquatic resources within the Project Area for USACE and State of California permit applications. This includes 1.39 acres of freshwater forested/shrub wetlands, 1.06 acres of freshwater emergent wetlands, and 0.36 acres of riverine wetlands (Upper Truckee River). Upper Truckee River and its adjacent wetlands are considered federally jurisdictional Waters of the United States (WOUS) because they are hydrologically connected to a traditional navigable waterway (Lake Tahoe).

Photographs of existing site conditions and uses are included in the technical studies in the attached appendices, as appropriate to each topic.

3.6.1 Surrounding Land Uses

Within the vicinity of the Project Area, surrounding land use is approximately 50 percent urban, consisting of residences, businesses, and a portion of the Lake Tahoe Airport. The other 50 percent includes open space consisting of the Upper Truckee River and Trout Creek riparian corridors, Johnson Meadow, and mixed conifer forest, with moderately trafficked pedestrian and mountain bike trails, utility access roads, and barren staging and snow storage areas throughout.

3.6.2 Site Ownership

The Project Area encompasses City of South Lake Tahoe and County right-of-way (ROW) and public parcels owned by the City of South Lake Tahoe, South Tahoe Public Utility District (STPUD), TRCD, CTC, Caltrans, and the U.S. Forest Service (USFS).

3.7 Project Features

3.7.1 Class 1 Path

Most of the path (approximately 5,075 linear feet) would be constructed atop the existing ground surface, while the remainder (approximately 935 linear feet) would consist of an elevated boardwalk. The surface path would consist of a 3-inch layer of asphalt atop an 8-inch-thick aggregate base (**Figure 3** and **Figure 4**). The Project Area is relatively flat, and limited cut and fill would be required. The path surface would be 10 feet wide with a 2-foot-wide aggregate base shoulder to either side. Where necessary, the surface of the path would be crowned to facilitate drainage. Excavation conducted during construction of the surface path would be approximately 1.5 feet in depth, or within the approximate prism of previous disturbance. Three 6-foot by 12-foot rest area pullouts would be constructed on each side of the path.

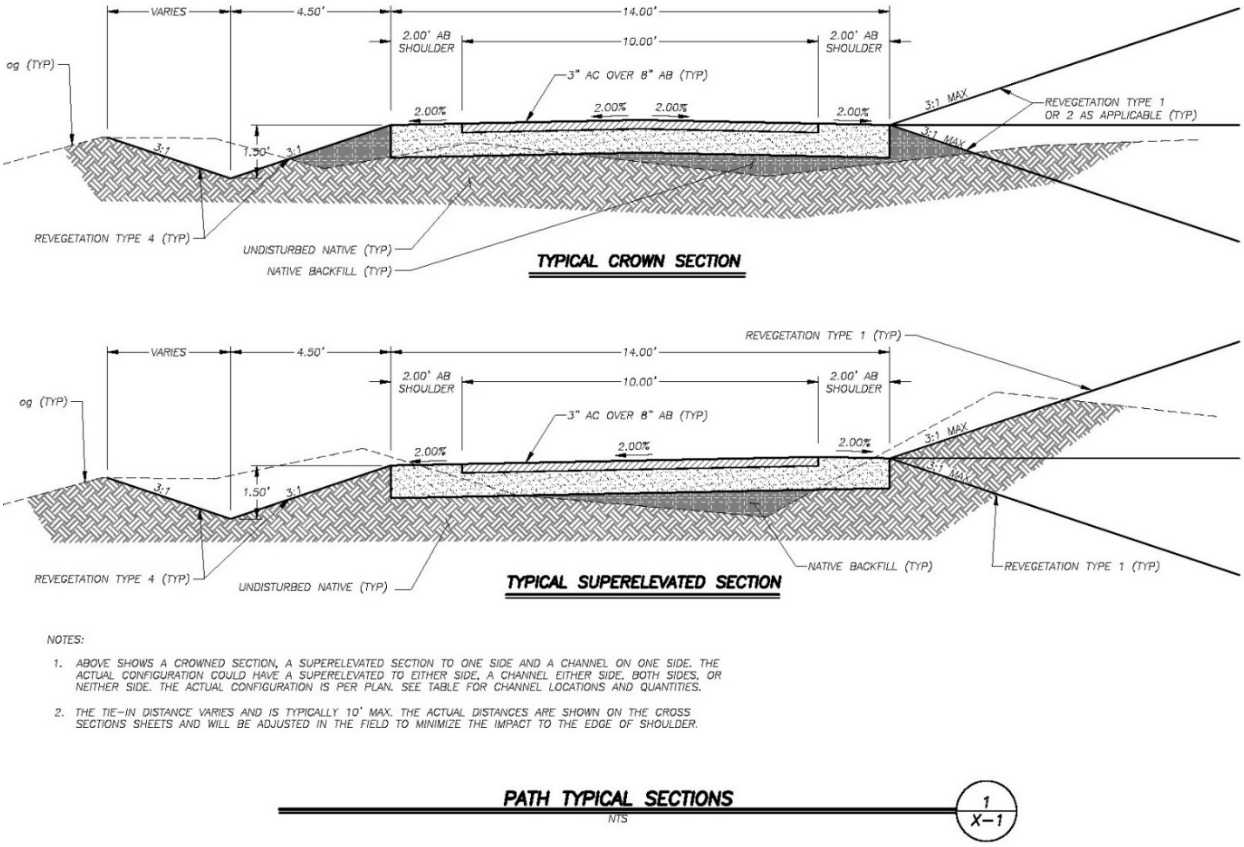


Figure 3. Path Typical Sections



Figure 4. Example Path from the San Bernardino Class 1 Bike Trail Project

Where appropriate, roadway signage would be installed to inform users of nearby bicycle facilities, mostly at or near roadway intersections at either end of the Project corridor. Signposts would be set 36 inches into the ground and 3 feet from the edge of the paved path, with a vertical height clearance of 7 to 8 feet (**Figure 5)**. Signage will include warning (hill, pedestrian crosswalk, stop ahead, etc.) and regulatory (stop, no motor vehicles) signs. There may also be future wayfinding signs to show distances/direction to common destinations (hospital, river, college, etc.).

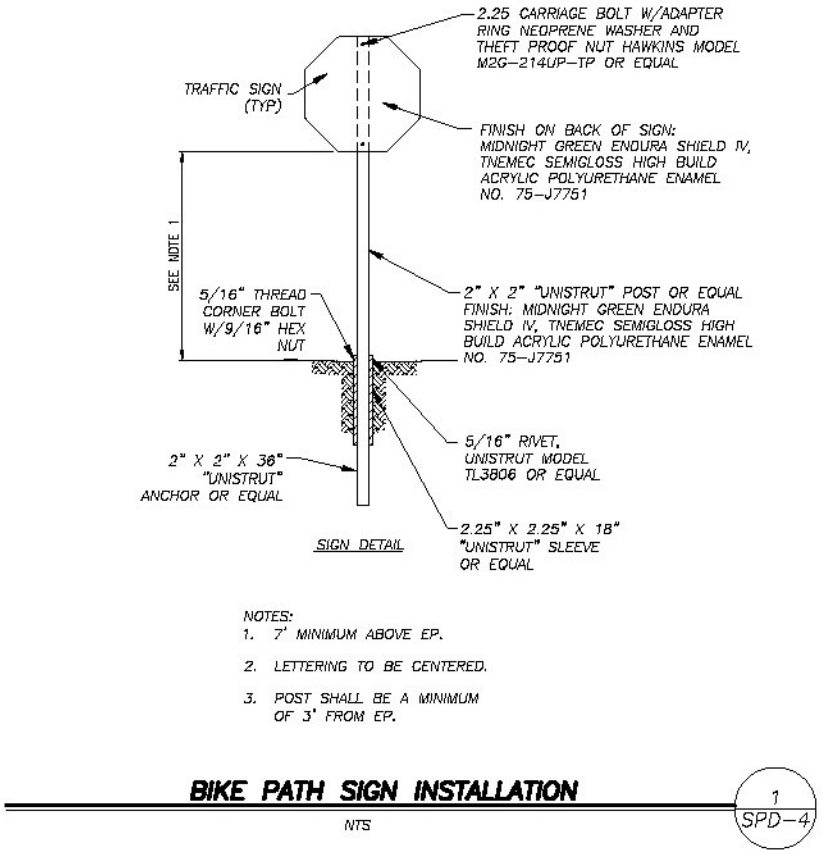


Figure 5. Bike Path Sign Installation

3.7.2 Boardwalk

The boardwalk section of the path would rest atop a structure consisting of 14-inch diameter steel pipe piles and 11-inch by 14-inch beams (**Figure 6)**. Excavation of the steel piles would be up to 35 feet deep. The boardwalk surface would be approximately 13 feet in width and would be elevated at least 2.5 to 8.5 feet above the ground surface, higher at the bridge approach to match the bridge elevation. The entire length of the boardwalk deck would have tubular steel railing with wire strands installed along both edges. Rails along the boardwalk would extend 3 feet above the boardwalk deck (**Figure 7**).

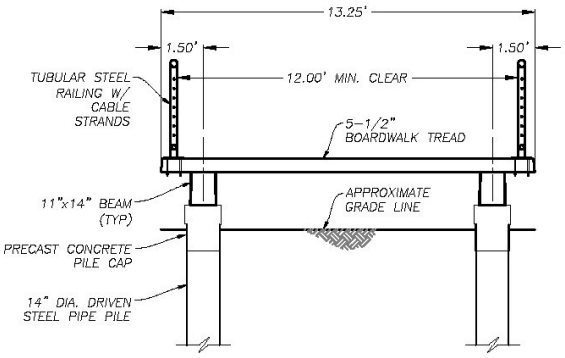


Figure 6. Boardwalk Typical Section



Figure 7. Example Elevated Boardwalk from the San Bernardino Class 1 Bike Trail Project

3.7.3 Bridge Replacement

The old concrete bridge, including abutments, wingwalls, and piers, would be demolished and removed. Bridge demolition would involve jackhammering, ramming (with a mechanical ram mounted on a backhoe or excavator), and removal of debris by a haul or dump truck. Existing abutments and wingwalls would be cut below final stream grade and covered with native river substrate, if not entirely removed. All debris generated by bridge demolition would be removed from the streambed and disposed of at a County-approved facility, consistent with local laws and regulations. Bridge removal work would likely occur when the flow of the Upper Truckee River is low, such as in late summer or fall. BMPs would be implemented during demolition and construction to contain debris within the work area. The existing bridge demolition work area would be surrounded by a cofferdam system, constructed of gravel bags and visqueen plastic sheets (or approved allowable alternative materials), to convey and maintain flow around the work area. Upon completion of bridge demolition, the temporary coffer dam would be removed.

A new bridge would be constructed to entirely span the Upper Truckee River. The new pedestrian bridge would be approximately 9 feet in height and 140 feet in length with a 146-inch-wide reinforced concrete deck (**Figure 8)**. The structure would consist of an unpainted weathered steel half-through underhung Pratt truss with 1 diagonal per truss panel and plumb end vertical members. Parallel chords with diagonal web members slanting toward the center of the span would define either edge. The top of the chords would be about 54 inches above the finish deck. Safety rails would be established along either edge of the bridge deck. The foundation would consist of poured in place concrete abutments on either bank of the river. Approximately 3 to 5 feet of the abutment on the east side of the river would be exposed, while up to 9 feet of the abutment on the west side of the river could be exposed. Excavation of footings would be required, each from 5 to 10 feet in depth. The proposed bridge is similar in type and form to the San Bernardino Bike Trail bridge constructed in 2023 (**Figure 9**), the Trout Creek Bridge (north of Martin Avenue) constructed in 2021, and the Upper Truckee Bridge (Sawmill Road and US 50) constructed in 2008.

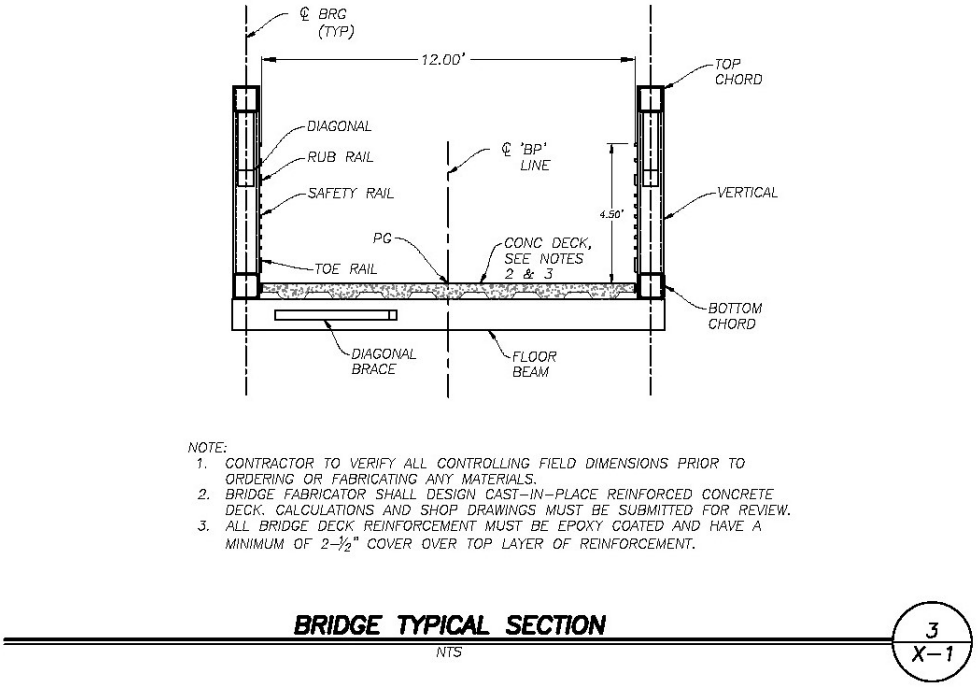


Figure 8. Bridge Typical Section



Figure 9. Example Bridge from the San Bernardino Class 1 Bike Trail Project

3.7.4 Tree Removal and Protection

Approximately 97 trees ranging in size from 6 to 40 inches in diameter at breast height (dbh) would be removed during construction of the trail. Protection measures for remaining trees would include the use of temporary 4-foot-tall fencing around tree driplines and 8-foot-tall wooden tree trunk protection. Tree trunk protection would only be used in areas where fencing around the driplines would prohibit construction access.

Tree protection must follow the standards in TRPA Code Section 33.6.10. TRPA Code Section 61.3.7.A.6 indicates that for Environmental Improvement Program (EIP) projects, trees larger than 30 inches dbh in the westside forest types may be removed when it is demonstrated that the removal is necessary for the activity. Tree removal activities would be conducted in accordance with TRPA Code Section 61.1.6, particularly subsection C regarding tree removal within SEZs.

3.7.5 Construction Dewatering

Construction of the bridge abutments and interim support would require excavation in the Upper Truckee River floodplain. Groundwater interception is likely even during late summer months when river flows are at their lowest for the year. As such, temporary dewatering would be required during footing excavation. The final construction plans would include a dewatering system consisting of facilities to move the intercepted groundwater from the abutment excavation pits to a selected dewatering location upland of the river and free of erosion and sedimentation. Besides installation of the temporary cofferdam, no work would occur within surface water of the river, avoiding direct impacts to surface water. Dewatering may also be required within the cofferdam work area.

3.7.6 Construction Schedule

Construction is anticipated to occur between May and October 2025.

3.7.7 Equipment and Labor Force

Various types of equipment would be needed construction. The equipment and labor force would include, but would not be limited to, a crane, pile driver, excavator, backhoe, trucks, paving machine, roller, sweeper, construction laborers, concrete masons, carpenters, steel workers, and welders.

3.8 Construction Controls

The Project would be required to comply with local, state, and federal regulations pertaining to protection of human health, safety, and environment. Specifically, the Project would be required to comply with the TRPA Code, El Dorado County Ordinance Code, Lahontan RWQCB, and Lake Tahoe Regional Plan.

The following required construction controls from local, state, and federal agencies are incorporated into the Project design and are considered a part of the proposed Project.

3.8.1 Air Quality

The El Dorado County Air Quality Management District (AQMD) Rule 223 establishes requirements for construction projects. Control measures for construction and other earth moving activities must follow the guidelines presented in Table 1 of Rule 223-1 “Best Management Practice.” These requirements include, but are not limited to, creation and implementation of a Fugitive Dust Control Plan, trackout management practices at the construction site, visible emissions limitation, vehicle speed limitations, material handling, and control for stockpiles and disturbed areas. Most of these requirements are also part of TRPA protocol to protect water quality. Construction would implement the following El Dorado County AQMD air quality control measures:

- Vehicle idle time shall be limited to 5 minutes or less (this is also a state regulation for diesel engines).
- EPA Tier 4F engines shall be used in all diesel equipment.
- Renewable diesel fuel shall be used in all diesel equipment.
- Dirt areas shall be exposed to water twice per day to prevent blowing dust.
- Vehicle speed on unpaved areas shall not exceed 10 mph.
- Tracked-out areas shall be swept once per week to reduce entrained road dust.

3.8.2 Biological Resources

Vegetation shall not be disturbed, injured, or removed except in accordance with the TRPA Code or conditions of project approval. All trees, major roots, and other vegetation not specifically designated and approved for removal in connection with a project would be protected according to methods approved by TRPA. All vegetation outside the construction site boundary, as well as other vegetation designated on the approved plans, would be protected by installing temporary fencing pursuant to TRPA Code Sections 33.6.9 and 33.6.10. Disturbed areas would be revegetated pursuant to TRPA Code Section 33.6.8. Additionally, construction would implement the following noxious weed control and prevention measures:

- All hay, straw, hay bales, straw bales, seed, mulch, or other material used for erosion control or landscaping shall be free of noxious weed seeds and propagules.
- All equipment brought to a project site for construction shall be thoroughly cleaned of all dirt and vegetation prior to entering the site in order to prevent importing noxious weeds.
- All materials brought to a project site, including rock, gravel, road base, sand, and topsoil, shall be free of noxious weed seeds and propagules.
- The property owner shall maintain and implement an effective program for the monitoring and control of noxious weeds.

The Project would be subject to the following TRPA requirements associated with tree removal within SEZs:

- Vehicle Restrictions: All vehicles shall be restricted to areas outside SEZs or to existing roads within SEZs.
- Soil Conditions: All work within SEZs shall be limited to times of the year when soil conditions are dry and stable, or when conditions allow for over-snow tree removal without significant soil disturbance and/or significant vegetation damage.
- Trees and Debris Kept from Streams: Felled trees and harvest debris shall be kept out of all perennial or intermittent streams. If deposited in the stream, the material shall be removed unless it is determined that such logs and woody material adds structural diversity pursuant to fish and wildlife habitat improvements in accordance with Chapter 62: Wildlife Resources, and Chapter 63: Fish Resources. This determination shall be approved by TRPA.
- Stream Crossings: The crossing of perennial streams or other wet areas shall be limited to improved crossings meeting BMPs or temporary bridge spans that can be removed upon Project completion or at the end of the work season, whichever is sooner. Any damage or disturbance to the SEZ associated with a temporary crossing shall be restored within one year of its removal. In no instance shall any method requiring the placing of rock and earthen material into the stream or streambed be considered an improved crossing. Other temporary measures may be permitted for dry stream crossings in accordance with the Handbook of Best Management Practices.
- Special Conditions: Special conditions shall be placed on all tree harvests within SEZs or within the transition or edge zone adjoining SEZs as necessary to protect in-stream aquatic habitat values and wildlife habitat integrity and diversity.

To comply with the Migratory Bird Treaty Act, Project activities that could result in nesting migratory bird and raptor take, such as removal of the existing bridge and tree, shrub, grassland, and other vegetation removal, will be conducted outside the migratory bird and raptor nesting season (typically February 15th through September 15th) as will be required by the LSAA and enforced by CDFW. September 16th through February 14th is a suitable timeframe for completing vegetation removal to minimize the potential to impact nesting birds and raptors. If Project construction, including vegetation removal and bridge removal, would occur during the nesting season, the Project proponent must hire a qualified biologist to conduct a nesting bird and raptor survey no more than 14 days prior to the

beginning of construction activities (this is anticipated for this Project). A copy of the survey shall be submitted to CDFW prior to the start of construction activities. If nesting birds or raptors were detected within or near the Project Area during the nesting bird survey, the Project proponent would coordinate with CDFW to establish a suitable activity-free buffer around active nest sites. The size of the buffer, duration of buffer, acceptable activities, etc., would be established through coordination with CDFW.

3.8.3 Cultural and Tribal Cultural Resources

The Project would be subject to the regulations and standards established in the National Historic Preservation Act, the California Register of Historical Resources (Public Resource Code (PRC) §5024.1(a)), PRC §5097.5, Caltrans SER, and the TRPA Code. It would be required to implement the following applicable regulations and standards which protect cultural resources:

- Caltrans SER (revised 2015) contains procedures that shall be followed if previously unidentified archaeological resources are encountered during construction, and the following compliance measure is integrated into Project implementation:
    - In the event of inadvertent discovery during construction, Caltrans shall promptly stop construction activity near the property and implement all reasonable measures needed to avoid, minimize, or mitigate further harm to the property. Once a discovery is made, the 106 Programmatic Agreement provides for the following actions:
        - Caltrans district notifies the Cultural Studies Office and State Historic Preservation Office within 48 hours. Caltrans district may furnish this information through correspondence, hard copy, electronic media, telephone, or meetings, at its discretion, taking into account the capabilities of the consulting parties, and must document this process for the administrative record.
        - Caltrans district notifies Indian tribes and/or Native American groups that may attach religious or cultural significance to the property within 48 hours.
- The TRPA Code (Historic Resource Protection) Section 67.3 – Resource Projection outlines requirements for the accidental discovery of resources during construction (subsection 67.3.1), requirements for site survey and consultation with the Washoe Tribe (subsection 67.3.2), and requirements for protection of known resources. Consultation with area tribes occurred, as did intensive pedestrian surveys of the area, and no resources were identified within the Project Area. Per TRPA Code Section 67.3, the following measures are integrated into the Project implementation plan as regulatory compliance measures:
    - If, during the course of a project or activity, a potential archaeological, cultural, or historical resource is discovered, all operations shall stop until a qualified archaeologist has evaluated the potential significance of the resource. In the event inadvertent

cultural resources are discovered as a result of project activities, the Washoe Tribe will be notified.

- Major excavation will involve onsite archaeological and tribal monitoring. The Washoe Tribe will be involved in the development of the monitoring plan.

- Should human remains be uncovered, the statutes of State of California Health and Safety Code Section 7050.5 must be followed. The County Coroner must be notified of the find immediately, and no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to PRC Section 5097.98. If the human remains are determined to be prehistoric, the Coroner will notify the NAHC, which will determine and notify a Most Likely Descendent. The Most Likely Descendent shall complete the inspection of the site within 24 hours of notification and may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials.

3.8.4 Geology and Soils

The Project is required to comply with the El Dorado County AQMD Rule 223, which includes requirements for construction projects, including preparation of a Fugitive Dust Control Plan. The County is also required to prepare and submit a Storm Water Pollution Prevention Plan (SWPPP) (Tahoe Construction General Permit R6T-2016-0010) to the Lahontan RWQCB to comply with the Tahoe Construction General Permit. The purpose of the SWPPP is to protect soil and water resources from impacts during construction, including groundwater. As part of the SWPPP, the contractor is required to prepare and adhere to a Temporary BMP Plan, a Spill Contingency Plan, and a Dewatering Plan that would be approved by El Dorado County. The plan would identify BMPs to minimize impact from erosion and sedimentation. BMPs would follow the Caltrans Construction Site BMP Manual (Caltrans 2017) and the TRPA BMP Handbook (TRPA 2014) to control and minimize the impacts of construction related activities and further protect soil and water resources. At a minimum, the following geology and soils controls must be implemented:

- Install temporary erosion and sediment control BMPs to prevent the transport of earthen materials and other construction waste materials from disturbed land areas, stockpiles, and staging areas during periods of precipitation or runoff (such as silt fence, erosion control fabric, fiber rolls).
- Implement temporary BMPs to prevent wind erosion and sediment transport of disturbed areas, such as use of water for dust control and covering of stockpiles during windy conditions or during non-working hours.
- Use high visibility vegetation protection fencing to prevent damage to trees or other vegetation where possible.
- Use construction boundary fencing to limit land disturbance in areas not planned for construction.
- Disturbed areas shall be revegetated to stabilize soils and shall be stabilized with mulch until vegetation is reestablished.

- Implement tracking controls (such as designated ingress and egress areas) and designated staging areas outside of drainage, swale, and SEZ areas. Staging areas shall be restored in accordance with TRPA Code Section 61.4.
- Parking shall be on paved and existing disturbed areas only.
- Limit grading to May 1 through October 15, unless an exemption is granted by TRPA. At the end of the grading season or before completion of the project, all surplus or waste earthen materials from the project site would be removed and disposed of at a TRPA approved disposal site or stabilized on-site in accordance with TRPA regulations.
- Implement a Spill Prevention Plan (see Hazards and Hazardous Materials below). Contractors would be responsible for storing on-site materials and temporary BMPs capable of capturing and containing pollutants.
- The boardwalk system is in the vicinity of STPUD utility easements where 3 STPUD sewer pipelines are located. The project shall be designed to protect all STPUD infrastructure in place to prevent impacts to the pipelines and soil contamination.

3.8.5 Greenhouse Gas Emissions and Green Energy

The Project lies entirely within the AQMD jurisdiction. The AQMD published CEQA guidelines in 2002, but they have not been updated to reflect conditions in 2024, and the Guidelines do not address greenhouse gas emissions directly. State mandated construction controls to reduce GHGs include:

- California Code of Regulations, Title 13, sections 2449(d)(3) and 2485 requires trucks to minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes. Provide clear signage that posts this requirement for workers at the entrances to the site.

3.8.6 Hydrology and Water Quality

The County must develop and implement a Stormwater Management Plan (Order No. R6T-2017-0010, National Pollutant Discharge Elimination System (NPDES) permit No. CAG616002) in addition to the SWPPP approved by the Lahontan RWQCB, as noted above. The Temporary BMP Plan, Spill Contingency Plan, and Dewatering Plan must also outline measures that will protect hydrology and water quality resources, including groundwater, from negative impacts during construction.

Additionally, TRPA Code Chapter 60 outlines standards intended to protect water quality through requirements for the installation of BMPs to protect and restore water quality.

Construction site stormwater BMPs would follow the Caltrans Construction Site Best Management Practices Manual (Caltrans 2017) and the TRPA BMP Handbook (TRPA 2014) to control and minimize the impacts of construction related activities. The following BMPs, at a minimum, are required at the site during construction:

- Install temporary erosion and sediment control BMPs to prevent the transport of earthen materials and other construction waste materials from disturbed land areas, stockpiles, and

staging areas during periods of precipitation or runoff (such as silt fence, erosion control fabric, fiber rolls).

- Implement tracking controls (such as designated ingress and egress areas) and designated staging areas outside of drainage, swale, and SEZ areas. Staging areas shall be restored in accordance with TRPA Code Section 61.4.
- Implement temporary BMPs to prevent wind erosion and sediment transport of disturbed areas, such as use of water for dust control and covering of stockpiles.
- Limit grading to May 1 through October 15, unless an exemption is granted by TRPA. At the end of the grading season or before completion of the project, all surplus or waste earthen materials from the project site would be removed and disposed of at a TRPA approved disposal site or stabilized on-site in accordance with TRPA regulations.
- Implement a Spill Prevention Plan (see Hazards and Hazardous Materials below). Contractors would be responsible for storing on-site materials and temporary BMPs capable of capturing and containing pollutants.
- Implement a Dewatering Plan as part of the SWPPP, to outline the process that will be required of the project contractors if groundwater is intercepted during construction. The Dewatering Plan shall be prepared and submitted for approval by Caltrans, Lahontan RWQCB, and TRPA prior to commencement of construction.
- Design construction sequencing to avoid and minimize the potential of encountering groundwater during construction.
- Use high visibility vegetation protection fencing to prevent damage to trees or other vegetation where possible.
- Use construction boundary fencing to limit land disturbance in areas not planned for construction.
- Place temporary erosion and sediment control devices in accordance with the shown plans to prevent sediment laden runoff from discharging from the site.
- Place high visibility construction fencing around SEZ areas.

3.8.7 Hazards and Hazardous Materials

The SWPPP Spill Contingency Plan developed along with the project specific SWPPP details site specific BMPs and TRPA approved methods to prevent accidental spills from impacting water and land resources. The plan must outline response protocols and information for contacting the Lahontan RWQCB and other responsible agencies. Additionally, spill containment and absorbent materials must be kept onsite at all times, and petroleum products and hazardous waste must be removed from the Project Area and disposed of at an appropriate location.

3.8.8 Noise During Construction

The Project must be constructed during the TRPA exempt hours between 8:00 a.m. and 6:30 p.m. per TRPA Code and the County's General Plan to reduce the impacts of temporarily increased ambient noise levels on nearby residences.

3.8.9 Transportation

The contractor must prepare and adhere to a Traffic Control Plan for TRPA, City of South Lake Tahoe (TRPA Code 22.7.7), and County review and approval. Elements of the plan include appropriate use of signage, flaggers, traffic calming, and alternative routes to accommodate local and through traffic. In addition, the County would advise local residents regarding schedules for construction traffic detours or roadway closure through signage, press releases, and distribution of flyers in area neighborhoods well in advance of construction initiation. Access would not be prohibited, at any time, for local residents, school buses, or emergency vehicles.

4 Environmental Evaluation

The following sections evaluate the potential adverse impacts of the Project in compliance with CEQA and TRPA. Appendix G of the CEQA Guidelines (California Natural Resources Agency 2016) provides a sample checklist with a series of questions designed to enable the lead agency, the County, to identify Project impacts with respect to 20 environmental topics; this IS/IEC generally follows this checklist. Topics from the TRPA Initial Environmental Checklist are included in the corresponding section with the CEQA checklist.

Except where a specific threshold has been adopted by a public agency and is specified in the sections below, such as an air quality threshold, Appendix G of the CEQA Guidelines are used as thresholds of significance for the CEQA checklist questions.

Potential environmental impacts are described as follows:

- **Potentially Significant Impact**: An environmental impact that could be significant and for which no feasible mitigation is known. If any potentially significant impacts are identified in this Checklist, an EIR must be prepared.
- **Less than Significant Impact with Mitigation Incorporated**: An environmental impact that requires the implementation of mitigation measures to reduce that impact to a less than significant level.
- **Less than Significant Impact**: An environmental impact may occur; however, the impact would not exceed significance thresholds.
- **No Impact**: No environmental impact would result from implementation of the Project.

The TRPA IEC similarly groups answers into one of the following categories:

- **Yes**
- **No**
- **No with Mitigation**
- **Data Insufficient**

4.1 Aesthetics

4.1.1 Environmental Setting

The Tahoe region belongs to the Western Cordillera Ecoregion, which is a region of high, rugged, mostly forested mountains with some wide, open valleys or meadows. Plants, animals, and water conditions vary greatly with elevation in the region. Lower elevations are commonly grass or shrub covered, mid-elevations are mostly forest covered, and many alpine areas above timberline are covered with snow and ice for much of the year.

Johnson Meadow is characterized by generally flat and gently rolling terrain surrounded by a coniferous forest with sagebrush understory and single-family residential development. A background view is provided by the towering peaks of the high alpine Sierra Nevada Mountains. One of the most notable features of the site is the Upper Truckee River, which is the largest inlet into Lake Tahoe. Other notable features include the open meadow grasses and deciduous riparian landscape.

A diversity of plant communities exists in Johnson Meadow ranging from deciduous riparian shrubs, trees, and grasses to mature Jeffrey pine stands at the meadow's edges. Swaths of willows and aspens occur throughout the meadow and Project Area and around the river's edges.

The Area of Visual Effect (AVE) is the area where the Project will be visible. The Project is approximately 0.7 miles from US 50, which is considered an Eligible Scenic Highway (Caltrans Scenic Highway Program) and designated as a Visual Resource according to TRPA (refer to 66.2.4 Scenic Highway Corridor Design Standards).

The Visual Impact Assessment Memorandum is included in **Appendix A**.

4.1.2 CEQA Checklist Summary

Except as provided in Public Resources Code Section 21099, would the project:

CEQA Question	Impact Determination
a) Have a substantial adverse effect on a scenic vista?	Less Than Significant Impact
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings, within a state scenic highway?	Less Than Significant Impact
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	Less Than Significant Impact
d) Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?	No Impact

4.1.3 Answers to CEQA Checklist Questions

Except as provided in Public Resources Code Section 21099:

a) Would the project have a substantial adverse effect on a scenic vista?

Less Than Significant Impact

Existing mature stands of willows, aspens, evergreens, and topographic variation would screen much of the Project improvements from the surrounding neighborhoods and from US 50. Glimpses of the boardwalk may be visible from Winnemucca Avenue, but the primary AVE will be the trail corridor itself and from the river looking toward the bridge and boardwalk. River users within 100 yards directly upstream of the proposed bridge would experience minor viewshed alteration. Although a change would occur, it could be perceived as an improvement of the existing bridge, which is in disrepair. There would be no adverse effect to the scenic vista to or from US 50 and the bridge replacement could be an improvement to the scenic quality for the river users. Construction disturbance will be restored, and the Class 1 trail alignment preferred alternative has been sited to minimize vegetation removal and overall grading. Therefore, the Project would have a less than significant impact on a scenic vista.

b) Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

Less Than Significant Impact

US 50 is designated as an Eligible Scenic Highway by Caltrans and as a Local Visual Resource by TRPA. The viewpoint from US 50 is the only view from a designated scenic resource. The sight location is approximately 0.7 miles south of US 50, and proximity and existing topography and vegetation would obstruct views of the Project elements. TRPA scenic quality ratings for this segment of US 50 indicate views from the highway are in non-conformance due to development that is not directly related to the view of Johnson Meadow. The site is not visible from other visual resources designated by TRPA.

Views of the Project are primarily screened from the highway due to a combination of existing stands of willow, aspen, and evergreens, as well as topography. During winter months, the density of existing willow and aspen foliage will decrease, resulting in filtered views of the Project from US 50. Although 97 trees are proposed for removal, tree removal will be conducted along the proposed alignment rather than a concentrated area. There would be a less than significant impact to the scenic vista to or from US 50.

c) In non-urbanized areas, would the project substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

Less Than Significant Impact

Viewers include people using the Project (travelers) and those surrounding the Project who may view it from a nearby neighborhood or viewpoint (neighbors). Travelers include hikers, pedestrians, cyclists, dog walkers, mountain bikers, and river users. Neighbors include residents of the nearby residential areas and motorists, cyclists, and pedestrians along the US 50 corridor.

Project users will have low viewpoint sensitivity. The change of pathway conditions from native earth to a paved surface or elevated boardwalk will be a change from the existing conditions, but the path is aligned with the existing terrain to minimize grading and vegetation disturbance and the replacement of the bridge will be an improvement over the existing conditions. Project neighbors (or those who may view the project from US 50 or the surrounding neighborhoods) have a low to no viewpoint sensitivity (low to no impact). Views of the project will be primarily screened by the surrounding vegetation. Any views of the Project will blend in with the overall viewshed.

The visual changes would be related to the construction of the new bridge, installation of the boardwalk, pavement on the pathway, and associated grading and disturbance related to construction of these features. River users may see the most visual change, but removal of the damaged bridge and restoration of the landscape would reduce those impacts, if not provide a benefit by replacing the bridge with a more visually appealing structure that entirely spans the river. The overall visual impact of the Project would be less than significant.

d) Would the project create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?

No Impact

No lighting is proposed with the Project and construction materials will consist of non-reflective materials. There would be no impact.

4.1.4 TRPA Checklist

Will the proposal:

TRPA Questions – Light and Glare	Answers	Discussion
7a) Include new or modified sources of exterior lighting?	No	No lighting is proposed with the Project.
7b) Create new illumination which is more substantial than other lighting, if any, within the surrounding area?	No	No lighting or other source of illumination is proposed with the Project.
7c) Cause light from exterior sources to be cast off-site or onto public lands?	No	No lighting is proposed with the Project and no light will be cast off-site or onto public lands.
7d) Create new sources of glare through the siting of the improvements or through the use of reflective materials?	No	No reflective materials will be installed.

TRPA Questions – Scenic Resources/Community Design	Answers	Discussion
18a) Be visible from any state or federal highway, Pioneer Trail or from Lake Tahoe?	No	US 50 is the closest scenic resource and does not have a direct line of sight to Project elements, except perhaps in the winter when vegetation is dormant and foliage density is reduced. Distance, topography, mature stands of willow, aspen, and evergreens, and riparian vegetation block views of Project features. The Project would not be visible from Pioneer Trail or from Lake Tahoe.
18b) Be visible from any public recreation area or TRPA designated bicycle trail?	Yes	The Project will not be visible from a scenic recreation area, but may be visible from the Tahoe Valley Campground, which is a TRPA designated recreation area. The Project involves development of a shared-use path with connections to existing TRPA designated bike trails.

18c) Block or modify an existing view of Lake Tahoe or other scenic vista seen from a public road or other public area?	No	Lake Tahoe or other scenic vistas would not be visible from the Project site.
18d) Be inconsistent with the height and design standards required by the applicable ordinance or Community Plan?	No	The Project would comply with TRPA and County design standards as indicated in the approved preliminary design plans.
18e) Be inconsistent with the TRPA Scenic Quality Improvement Program (SQIP) or Design Review Guidelines?	No	The Project would comply with TRPA SQIP and Design Review Guidelines.

4.2 Agricultural and Forestry Resources

4.2.1 Environmental Setting

The Project Area contains no lands identified as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, zoned for agricultural use, or a Williamson Act contract. The Project Area contains forest land, or timberlands, as defined by PRC Section 4526. The Project Area contains no timberland or timberland zoned Timberland Production, as defined by Government Code Section 51104(g).

4.2.2 CEQA Checklist Summary

Would the project:

CEQA Question	Impact Determination
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	No Impact
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	No Impact
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code (PRC) § 12220(g)), timberland (as defined by PRC § 4526), or timberland zoned Timberland Production (as defined by Government Code § 51104(g))?	Less Than Significant Impact with Mitigation Incorporated
d) Result in the loss of forest land or conversion of forest land to non-forest use?	Less Than Significant Impact
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	Less Than Significant Impact

4.2.3 Answers to CEQA Checklist Questions

a) Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

No Impact

The Project is not located in an area identified as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, and therefore would have no impact on such lands.

b) Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract?

No Impact

No conflicts with agricultural zoning would occur because land in the Project Area is zoned for Residential and Conservation. No conflicts would occur because no agricultural zoning or known Williamson Act contracts exist within the Project Area.

c) Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code (PRC) § 12220(g)), timberland (as defined by PRC § 4526), or timberland zoned Timberland Production (as defined by Government Code § 51104(g))?

Less Than Significant Impact with Mitigation Incorporated

PRC Section 12220(g) defines "forest land" as land that can support 10-percent native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits.

The Project Area is partially zoned for Conservation and meets the criteria of "forest land" as defined in PRC Section 12220(g). Within the Project Area, there are areas of forested habitat with over 10% canopy cover and TRPA threshold habitat for northern goshawk (*Accipiter gentilis*). However, the Project would not result in rezoning and avoidance and minimization measures are required in mitigation measures BIO-1, BIO-4, and BIO-9 to maintain TRPA northern goshawk habitat threshold standards for biological resources, as detailed in Section 4.4.4a. The portion of the Project requiring tree removal is a small subset of the total Project Area and tree removal is not concentrated, but instead spread out along the Project Area and trail corridor; therefore, it would not conflict with the underlying zoning. Implementing Mitigation Measures BIO-1, BIO-4, and BIO-9 for vegetation and wildlife detailed in Section 4.4 would ensure the Project is consistent with existing zoning for forest land.

- **AFR-1:** Implement Mitigation Measures BIO-1, BIO-4, and BIO-9.

Finding: By implementing mitigation measure BIO-1, BIO-4, and BIO-9 detailed in the response to Question 4.4.4a below, the Project will mitigate potential impacts to forest land to a less than significant level.

d) Would the project result in the loss of forest land or conversion of forest land to non-forest use?

Less Than Significant Impact

The Project Area overlaps a 1.63-acre USFS parcel and forest land zoned for Conservation. The existing forest land use is primarily recreation and public utility access. The Project proposes to improve the existing trail to Class 1 standards, which would include paving and signage, but would not alter the existing use as a trail and would not alter the existing forest land use from primarily recreation and public utility access. Project improvements would not result in a conversion of forest land to non-forest use.

e) Would the project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?

Less Than Significant Impact

The Project would not result in the conversion of Farmland to non-agricultural use because no land zoned for agricultural use is present in the Project Area. The Project proposes to improve the existing trail to Class 1 standards, which would include paving and signage, but would not have a significant impact on the existing forest land use, which is primarily recreation and public utility access. Project improvements would not result in a conversion of forest land to non-forest use.

4.3 Air Quality

4.3.1 Environmental Setting

The Project Area is located at the south end of Lake Tahoe in a semi-urban setting, in the County of El Dorado, California. Air pollution control officials classify the area as the Lake Tahoe Air Basin (LTAB). The LTAB is over 6,000 feet in elevation and the weather is considered montane. Lake Tahoe has a dry-summer continental climate. The climate is typical of the Sierra Nevada, with dry and sunny summers and snowy winter months.

Average temperatures in the LTAB have increased over the last century, with the greatest increase occurring in nighttime temperatures. There is also high interannual variability in precipitation, often with dry years following wet years (USFS 2020). Over the last 100 years, the average daily minimum temperature has risen 4.2 °F and is now above freezing. The average daily maximum temperature has risen 2.0 °F. As a percentage of total precipitation, snowfall has declined since 1910 (Tahoe Environmental Research Center 2024).

4.3.2 Regulatory Setting

Air Quality Standards

Air quality in El Dorado County is regulated by the El Dorado Air Quality Management District (AQMD). Air quality in the LTAB is considered separate from the western part of the County by the AQMD because it is a distinct air basin with different emission sources and climate. Air quality within the LTAB is also regulated by several agencies including TRPA, the United States Environmental Protection Agency (EPA), and the California Air Resources Board (CARB). These agencies develop rules, regulations, policies, and/or plans to achieve and maintain clean air. The EPA is responsible for implementing the federal Clean Air Act (1970), including establishing health-based National Ambient Air Quality Standards (NAAQS) for air pollutants. NAAQS established criteria pollutants under the Clean Air Act including ozone (O_3), carbon monoxide (CO), nitrogen dioxide, sulfur dioxide, $PM_{10,}$ and $PM_{2.5}$, and lead. The standards set for criteria pollutants are periodically reviewed and revised as applicable.

In California, CARB is responsible for implementing the California Clean Air Act (1988) and has established California Ambient Air Quality Standards, which are occasionally more restrictive than the national standards. In general, the CARB works with local agencies to develop policies, guidance, and regulations related to state and federal ambient air quality standards. CARB coordinates with local agencies on transportation plans and strategies and aids local air districts and transportation agencies. CARB and local agencies operate continuous air monitoring at various sites around the LTAB to ensure standards are met.

Local - TRPA

TRPA has adopted environmental threshold carrying capacities related to air quality for the Tahoe Region. Every 4 years, TRPA evaluates the environmental thresholds to determine whether each threshold standard is being achieved and/or maintained. TRPA also makes specific recommendations to address problem areas and directs general planning efforts for the next 4-year period. TRPA threshold standards address CO, O_3, regional and subregional visibility, respirable (PM_{10}) and fine ($PM_{2.5}$)

particulate matter, and nitrate deposition. Numerical standards have been established for each of these parameters, and management standards have been developed that are intended to assist in attaining the threshold standards. TRPA has classified the LTAB as an attainment area for $PM_{2.5}$ and CO standards, but as a nonattainment area for PM_{10} and O_3 standards (TRPA 2018).

TRPA considers impacts to air in its planning and permitting activities to ensure compliance with state and district air quality standards. Because TRPA's authority is granted directly from Congress, TRPA has the authority to adopt air quality and other environmental quality thresholds, and to enforce ordinances designed to achieve those thresholds. The TRPA standards generally conform with the CARB and EPA.

The EPA and CARB compute annual pollution averages to determine population exposure and compliance with air health standards. The agencies generally exclude exceptional events (wildfires, windstorms) in computing annual averages or determining compliance with air standards. The California PM_{10} 24-hour average standard (not to exceed) is 50 micrograms per cubic meter. 2022 saw levels of 113 micrograms per cubic meter (excluding exceptional events), hence the non-attainment designation. The California and federal standard for 8-hour O_3 concentrations is 0.070 parts per million. The LTAB saw one day exceedance of this standard in 2022 (CARB 2024).

4.3.3 CEQA Checklist Summary

Would the project:

CEQA Question	Impact Determination
a) Conflict with or obstruct implementation of the applicable air quality plan?	Less Than Significant Impact
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	Less Than Significant Impact
c) Expose sensitive receptors to substantial pollutant concentrations?	Less Than Significant Impact
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	Less Than Significant Impact

4.3.4 Answers to CEQA Checklist Questions

a) Would the project conflict with or obstruct implementation of the applicable air quality plan?

Less Than Significant Impact

Projects that could generate emissions in excess of the El Dorado County AQMD and the TRPA Environmental Threshold Carrying Capacities recommended significance thresholds and would be considered to potentially conflict with or obstruct implementation of the applicable air quality plan. The El Dorado County AQMD has identified the most common sources of emissions from construction projects as site preparation, earthmoving, and general construction.

The emissions generated from these activities include the following:

- Combustion emissions: (reactive organic gases, nitrogen oxides, carbon monoxide, sulfur oxides, PM_{10}) from mobile heavy-duty diesel and gasoline-powered equipment, portable auxiliary equipment, and worker commute trips.
- Fugitive dust (PM_{10}) from soil disturbance or demolition.

The Project improvements would not result in long-term increases in mobile-source emissions. As identified in Response "b" below and in **Appendix B**, short-term construction-generated emissions would not exceed applicable thresholds of significance due to the short duration required for construction and adherence to applicable County and TRPA requirements as discussed in Section 3.8, Construction Controls. The Project is required to comply with the El Dorado County AQMD Rule 223, which includes requirements for construction projects, including preparation of a Fugitive Dust Control Plan; this requirement is included as a construction control for tracking and monitoring purposes (see Section 3.8). Other control measures for construction and other earth-moving activities must follow recommendations presented in Table 1 of Rule 223-1 (El Dorado County 2005). These recommendations include, but are not limited to, stabilizing disturbed soil, limiting vehicular traffic, applying water to disturbed soil, limiting the size of staging areas, and use of tarps to cover loose soils.

Construction is scheduled to take no more than 120 days. Implementation of the construction controls is anticipated to reduce construction emissions to less than significant levels. Therefore, implementation of the Project would not conflict with or obstruct implementation of applicable air quality plans.

b) Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

Less Than Significant Impact

The LTAB is a nonattainment area for PM_{10} and O_3 standards, thus an increase in these pollutants above significance thresholds would represent a cumulatively considerable net increase. The AQMD sets a significance threshold of 82 pounds per day of emissions of Reactive Organic Gases (ROG) and Oxides of Nitrogen (NOx). Both gases are O_3 precursors and can also contribute to fine particulate matter.

In addition to the ROG and NOx limits stipulated by the AQMD, blowing dust is a source of PM_{10}. An additional source of PM_{10} is Diesel Particulate Matter, which is a toxic air contaminant and should be minimized as much as possible. Mitigations for Diesel Particulate Matter are available and are recommended for this Project along with all measures identified by the AQMD for particulates (e.g., using EPA Tier 4F engines that reduce toxic diesel emissions and NOx by over 95% compared to standard engines).

Construction emissions for this Project were calculated with California Emissions Estimator Model (CalEEMod) Version 2022.1.1.21, a computer model that calculates emissions of criteria pollutants from land use projects. Modeling assumed that construction would occur in a 5.5-month summer period (one TRPA grading season), or approximately 120 working days. Modeling also assumed that the disturbed area will be approximately 15.5 acres, and that 5,075 linear feet of trail, 10 feet wide will be paved with asphalt concrete.

A summary of the CalEEMod output is given in **Table 1** for maximum summer daily emissions without and with mitigations. The full CalEEMod model outputs are Included in **Appendix B**.

Table 1. CalEEMod Output for Maximum Summer Daily Emissions

Compound – Project Maximum Summer Day	Compound – Project Maximum Summer Day Mitigated	AQMD Significance Threshold	Significant?
NOx 50.9 lbs/day	NOx 37 lbs/day	82 lbs/day	No
ROG 5.9 lbs/day	ROG 4 lbs/day	82 lbs/day	No
PM_{10} 31.7 lbs/day	PM_{10} 27 lbs/day	None	N/A
$PM_{2.5}$ 5.01 lbs/day	$PM_{2.5}$ 4 lbs/day	None	N/A

Modeled NOx and ROG levels, both with and without emission mitigation incorporated, are less than AQMD significance thresholds. The Project would not result in a cumulatively considerable net increase of O_3 precursor ROG or NOx for which the Project region is non-attainment under an applicable federal or state ambient air quality standard.

The Project would not result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is in non-attainment. With the implementation of the construction controls outlined in Section 3.8, the Project would not violate any air quality standard or contribute substantially to an existing or projected air quality violation; therefore, the Project would have a less than significant impact.

c) Would the project expose sensitive receptors to substantial pollutant concentrations?

Less Than Significant Impact

Children, the elderly, asthmatics, and others who are at a heightened risk of negative health outcomes due to exposure to air pollution are considered sensitive receptors. Locations where sensitive receptors may congregate include hospitals, schools, daycare centers, and other locations as determined by CARB (California Health and Safety Code § 42705.5(a)(5)). Residents located close to the site along Winnemucca Avenue, South Avenue, and Barbara Avenue, and other adjacent streets, could be exposed to toxic air contaminants (TACs) during construction activities. The closest sensitive receptors to the Project Area are residential uses in the Sierra Tract and Barton Memorial Hospital which is located approximately 230 feet from the west end of the Project Area.

Construction-related activities could result in the generation of TACs, specifically diesel particulate matter, from construction equipment exhaust emissions. The AQMD CEQA thresholds do not address mobile sources of TACs. However, the U.S. Environmental Protection Agency has required all new nonroad diesel engines to meet Tier IV standards since 2015. The CARB requires fleet owners to report their equipment tiers every year. Fleet size is determined by aggregate gross horsepower. CARB has determined that more than 50 percent of diesel equipment is now Tier 4f (Levine, Johanna, CARB, personal communication on December 13, 2022). This indicates that the older equipment is still being used, but as it wears out or is sold, it must be replaced by Tier 4f. Although exposure would not be significant in terms of increased cancer risk to warrant required mitigation, it is highly recommended that the County require all offroad construction equipment used on the site be equipped with Tier 4 engines or Tier 2 or higher engines combined with the most effective Verified Diesel Emission Control

Strategies available for the engine type as certified by CARB to achieve a Tier 4 final level of diesel particulate matter control. The equipment should be properly maintained and tuned in accordance with manufacturer specifications.

The Project is linear and construction adjacent to residential receptors will be short-term and limited in scope. As discussed above, the Project emissions would fall below AQMD significance thresholds. The AQMD does not have a published significance for dust and particulate matter, but these can create a nuisance for nearby residents. The construction controls for air quality described in Section 3.8 will control particulate matter. Therefore, the Project would not expose sensitive receptors to substantial pollutant concentrations and impacts are less than significant.

d) Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Less Than Significant Impact

The Project would create dust from grading and odors from paving. Dust would be prevented by watering unpaved surfaces and other measures specified above, which will minimize potential nuisance to nearby residents. Odors from asphalt paving would be short-lived, lasting up to a few days. Therefore, the Project would not result in emissions adversely affecting a substantial number of people and the impact is less than significant.

4.3.5 TRPA Checklist – Air Quality

Will the proposal result in:

TRPA Questions	Answers	Discussion
2a) Substantial air pollutant emissions?	No	The Project would not generate substantial emissions as identified in the CalEEMod assessment and would incorporate construction controls for dust.
2b) Deterioration of ambient (existing) air quality?	No	The Project would be spread over a summer work season and peak day emissions are significantly below AQMD significance thresholds.
2c) Creation of objectionable odors?	No	Paving of less than one mile of bike path would result in temporary odors that would not be significant.
2d) Alteration of air movement, moisture, or temperature, or any change in climate, either locally or regionally?	No	The Project is a shared-use path for non-motorized vehicles (bike and pedestrian trail) and would have no effect on air movement, moisture, temperature, or any change in climate.

2e) Deterioration of ambient (existing) air quality?	No	Project O_3 precursor emissions are below thresholds set by the AQMD. Particulate matter emission would be controlled by watering unpaved surfaces and other appropriate measures as required by the AQMD, TRPA and County.

4.4 Biological Resources

4.4.1 Environmental Setting

Biological resource studies were completed for the Project to determine potential Project effects on botanical and wildlife special status species (SSS). The biological resource documents prepared for the Project include:

- Natural Environment Study (NES) (**Appendix C**)
- Biological Assessment (**Appendix D**)
- Sierra Nevada Yellow-legged Frog Site Assessment Report (**Appendix E**)
- Invasive Plant Risk Assessment (**Appendix F**)

A reconnaissance-level field survey was conducted on August 14, 2023, to identify vegetation communities, verify no critical wildlife habitats were present in the Project Area, and develop an inventory of any possible wildlife and botanical resources.

A California Natural Diversity Database (CNDDB) search was conducted within a half-mile buffer of the Project Area. The query identified 5 occurrences of SSS including northern goshawk, willow flycatcher (*Empidonax traillii*), northern leopard frog (*Lithobates pipiens*), mountain whitefish (*Prosopium williamsoni*), and Lahontan mountain sucker (*Catostomus lahontan*). During the reconnaissance-level survey, it was determined that habitat is present for these species in the Project Area, and there was one potential (*Catostomus* sp.) sighting of a Lahontan mountain sucker in the Upper Truckee River. These species were not otherwise observed during the reconnaissance-level field survey.

An updated U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) report and species list was accessed through the IPaC website for the Project Area vicinity on June 17, 2024 (USFWS 2024). The results of the IPaC report included the following species: North American wolverine (*Gulo gulo luscus*), Sierra Nevada red fox (*Vulpes vulpes necator*), California spotted owl (*Strix occidentalis occidentalis*), Sierra Nevada yellow-legged frog (SNYLF) (*Rana sierrae*), northwestern pond turtle (*Actinemys marmorata*), Lahontan cutthroat trout (LCT) (*Oncorhynchus clarkii henshawi*), and monarch butterfly (*Danaus plexippus*). The IPaC report indicated no critical habitat for these species exists within the Project Area vicinity. USFS Lake Tahoe Basin Management Unit (LTBMU) suitable habitat for SNYLF is mapped in the Project Area and surrounding Upper Truckee River corridor. To inform the level of consultation required with the USFWS, a SNYLF visual encounter survey was conducted on August 16, 2023, and a SNYLF site assessment report was prepared.

This Project is located outside of National Oceanic and Atmospheric Administration (NOAA) Fisheries jurisdiction; therefore, a NOAA Fisheries species list is not required and no effects to NOAA Fisheries species are anticipated.

A total of 30 California Native Plant Society (CNPS) rank 1 and 2 rare species were identified in the CNPS Rare Plant Inventory 9-quad search of the Project Area. Habitat for these species was assessed during the reconnaissance-level survey and it was concluded suitable habitat may be present for 15 of the 30 species in the Project Area, but they were not observed during the survey. The reconnaissance-level survey resulted in 10 non-native plant detections. Of these species, prickly lettuce (*Lactuca serriola*) is

listed by the Invasive Species Council of California and cheatgrass (*Bromus tectorum*) is a Lake Tahoe Basin Weed Coordinating Group "weed of interest" and has a California Invasive Plant Council rating of "high."

Vegetation communities in the Project Area include Jeffrey pine (*Pinus jeffreyi*) forest, big sagebrush (*Artemisia tridentata* ssp. *tridentata*) shrubland, meadow, and willow (*Salix* spp.) shrubland along the Upper Truckee River corridor. The Project Area is previously disturbed by encroaching urban development on the east and west ends, existing trails, utilities and access roads, the damaged Upper Truckee River bridge crossing, and forest habitat modification as a result of wildfire fuel reduction activities.

The dominant plant species in the Project Area varies by vegetation community. The Jeffrey pine-dominated forest contains a mixed understory of big sagebrush, antelope bitterbrush (*Purshia tridentata* var. *tridentata*), buckwheat (*Eriogonum* spp.), grasses including *Elymus* spp., and manzanita (*Arctostaphylos* spp.). The Jeffrey pine forest habitat in the Project Area has been subject to fuel reduction and mechanical thinning resulting in mature stands of forest with reduced canopy cover, complexity, and woody debris that would otherwise increase biological diversity and suitable habitat for various wildlife species. However, there are patchy, dense stands of trees that remain along the transition to the Upper Truckee River and Johnson Meadow.

Johnson Meadow has been impacted by various historical land uses and hydrological events resulting in altered wetland and riparian habitat conditions and quality. The channelization of the Upper Truckee River and formation of the east gully channel has led to dry soil conditions throughout the meadow resulting in dominant grass species tolerant of dry conditions, reduced overbank flow, and reduced lentic and surface backwater conditions which would provide herpetofauna refuge from predator fish species in the river. The meadow, Upper Truckee riverbanks, and riparian habitats are dominated by bentgrass (*Agrostis* spp.), timothy grass (*Phleum* spp.), sedges, rushes, *Bromus* spp., *Poa* spp., willows, and patches of quaking aspen (*Populus tremuloides*) groves.

Within the Project Area, there are 0.36 acres of open water (Upper Truckee River), 1.06 acres of freshwater emergent wetlands, and 1.39 acres of freshwater forested/shrub wetlands.

4.4.2 Regulatory Setting

Based on review of the biological factors and WOUS/waters of the State conditions the following permits will be required. Permitting requirements will depend on final Project improvements and potential impacts:

- USACE Section 404 Nationwide Permit 14 – Linear Transportation Projects
- RWQCB Section 401 Water Quality Certification/Report of Waste Discharge
- CDFW Section 1602 LSAA

Federal

Endangered Species Act

The federal Endangered Species Act (ESA) protects plants and wildlife that are listed as endangered or threatened by the USFWS. Section 9 of the ESA prohibits the taking of endangered wildlife, where taking

is defined as “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in such conduct” (50 Code of Federal Regulations 17.3). This statute also governs removing, possessing, maliciously damaging, or destroying any endangered plant on federal land and removing, cutting, digging-up, damaging, or destroying any endangered plant on non-federal land in knowing violation of state law.

Under Section 7 of the ESA, federal agencies are required to consult with the USFWS and/or NOAA National Marine Fisheries Service if their actions, including permit approvals or funding, could adversely affect a federally listed species (including plants) or its critical habitat.

Clean Water Act and Rivers and Harbors Act

The USACE Regulatory Branch regulates activities that discharge dredged or fill materials into WOUS, which includes wetlands under Sections 401 and 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act.

Section 401 requires that an applicant proposing to conduct any activity that may result in a discharge to a WOUS must apply for and secure a Water Quality Certification prior to construction activities. The Lahontan RWQCB will administer the Section 401 Water Quality Certification for this Project.

Migratory Bird Treaty Act

The MBTA makes it unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, or kill migratory birds. The law also applies to the removal of nests occupied by migratory birds during the breeding season.

Executive Order 13112 – Invasive Species

Executive Order 13112 requires federal agencies to combat the introduction or spread of invasive species in the United States. Invasive species are defined as “any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem whose introduction does or is likely to cause economic or environmental harm or harm to human health."

Federal Highway Administration guidance issued August 10, 1999, directs the use of the invasive species list, maintained by the California Invasive Species Council, to define the invasive plants that must be considered as part of the National Environmental Policy Act analysis of a proposed project within California.

State

California Endangered Species Act

Pursuant to the California Endangered Species Act (CESA), an Incidental Take Permit from the CDFW is required for projects that could result in the “take” of a State listed threatened or endangered species. Under the CESA, “take” is defined as an activity that would directly or indirectly kill an individual of a species proposed for listing (called “candidates” by the state). Section 2080 of the California Department of Fish and Game Code prohibits the taking, possession, purchase, sale, and import or export of endangered, threatened, or candidate species, unless otherwise authorized by permit or in the regulations.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Act provides the State with very broad authority to regulate Waters of the State (which are defined as any surface water or groundwater, including saline waters). The State RWQCB is granted ultimate authority over water quality policy in the State of California. Before allowing discharges that may affect the quality of Waters of the State, a Report of Waste Discharge must be filed with the Lahontan RWQCB.

California Native Plant Protection Act

The Native Plant Protection Act (NPPA) of 1977 (California Department of Fish and Game Code Sections 1900 – 1913) was created to "preserve, protect and enhance rare and endangered plants in this State" and is administered by CDFW. The Fish and Wildlife Commission has the authority to designate native plants as "endangered" or "rare" and to protect endangered and rare plants from take. CESA provided further protection for rare and endangered plant species, but the NPPA remains part of the California Department of Fish and Game Code.

California Fish and Game Code

The CDFW is responsible for protecting and conserving fish and wildlife resources and the habitats upon which they depend. Section 1602 of the California Fish and Game Code requires that the CDFW review any project that may do one or more of the following:

- Divert or obstruct the natural flow of any river, stream, or lake.
- Change the bed, channel, or bank of any river, stream, or lake.
- Use material from any river, stream, or lake.
- Deposit or dispose of material into any river, stream, or lake.

If it is determined by the CDFW that the activity would substantially alter a river, stream, or lake, and may substantially adversely affect existing fish or wildlife resources, then a Lake and Streambed Alteration Agreement must be prepared. It must include necessary mitigation measures to protect fish and wildlife resources from significant impacts.

Section 2080 of the California Department of Fish and Game Code prohibits the taking, possession, purchase, sale, import, and export of endangered, threatened, or candidate species unless otherwise authorized by permit or in the regulations.

Pursuant to Section 2081 of the California Fish and Game Code, an Incidental Take Permit from the CDFW is required for projects that could result in the "take" of a state listed threatened or endangered species.

Nesting birds are protected in California under Section 3503 of the California Fish and Game Code, which states "It is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto." Construction disturbance during the breeding season that could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment and/or loss of reproductive effort is considered "taking" by the CDFW.

Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code prohibit take or possession of 37 fully protected species. CDFW is unable to authorize incidental take of fully protected species when activities are proposed in areas inhabited by those species. CDFW has informed non-federal agencies and private parties that they must avoid take of any fully protected species in carrying out projects.

Tahoe Regional Planning Agency Code of Ordinances

The TRPA Code of Ordinances includes requirements for protection and management of "sensitive plants" and "uncommon plant communities" and regulations regarding tree removal (TRPA Code Chapter 61). The TRPA Code of Ordinances also includes protection of wildlife habitat, including stream environment zones (SEZs) (TRPA Code Chapter 61), and of certain animal species known as "special interest species" (TRPA Code Chapter 62). TRPA-designated special interest species are species that are "locally important because of rarity or other public interest, and threatened, endangered, or rare species as designated under state and federal endangered species acts."

Updated in 2012, the TRPA Regional Plan identifies goals for the region and policies that establish the strategies necessary to achieve those goals. This document integrates the requirements of the Bi-State Compact, the thresholds, related plans and legal requirements, and the public's input. As a result, the Regional Plan provides coordinated and integrated direction for the TRPA's Code of Ordinances and implementation programs.

TRPA special interest, threatened, endangered, and rare species are addressed in the Natural Environment Study (**Appendix C**).

Local – Tree Removal

The TRPA Code regulates the removal of trees under Section 61.1. The TRPA Code also states requirements for retained tree protection during construction, provides standards for soil and vegetation protection during tree removal, and prevents tree removal within SEZs unless certain conditions are met.

4.4.3 CEQA Checklist Summary

Would the project:

CEQA Question	Impact Determination
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies or regulations, or by the California Department of Fish & Wildlife (CDFW) or U.S. Fish & Wildlife Service (USFWS)?	Less Than Significant Impact with Mitigation Incorporated
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the CDFW or USFWS?	Less Than Significant Impact with Mitigation Incorporated

c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	Less Than Significant Impact with Mitigation Incorporated
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	Less Than Significant Impact with Mitigation Incorporated
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	Less Than Significant Impact
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	No Impact

4.4.4 Answers to CEQA Checklist Questions

a) Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies or regulations, or by the California Department of Fish & Wildlife (CDFW) or U.S. Fish & Wildlife Service (USFWS)?

Less Than Significant Impact with Mitigation Incorporated

Standard of Significance: The loss of greater than zero endangered, threatened, or rare fish or wildlife individuals or disturbance of greater than zero acres of occupied or designed critical habitat constitute a significant impact as defined by CEQA Article 5, Section 15065, CESA Sections 2062 and 2067, CDFG Code Sections 1900-1913, and TRPA Thresholds; or a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS.

As discussed under "Environmental Setting," habitat for several SSS is present in the Project Area including habitat for special status bats, herpetofauna, fish, birds, and rare plants. However, disturbance from decades of land use and hydrological modification has reduced habitat quality for many of these species. It was determined that the Project may affect but is not likely to adversely affect SNYLF. Additionally, considering the proposed impacts to the Upper Truckee River during the bridge removal, it was determined the Project may affect, but is not likely to adversely affect LCT. The Project is anticipated to have no effect on the other listed species queried on the IPaC species list considering known population ranges, habitat conditions, and lack of occurrence data in the Project Area vicinity (**Appendix D**).

Regardless, Johnson Meadow, the associated SEZ/riparian corridor, and the Upper Truckee River are sensitive biological resources that have been subject to various past and ongoing restoration projects and have historically harbored special status wildlife species including SNYLF and willow flycatcher. The Project could encounter the SNYLF or LCT during construction, and any loss of a SSS would be considered a significant effect. However, mitigation measures have been proposed and agreed to by the

County to protect these habitats and the SSS that have the potential to occupy them, as outlined below. Additional avoidance and minimization and/or mitigation measures may be required following informal consultation with USFWS for SNYLF and LCT, or by the Project permits. Additional measures required by the Project permits for SSS are not being relied on to reduce impacts below the significant threshold; rather, they are anticipated to complement the proposed mitigation measures below to meet any additional agency expectations. The mitigation measures listed below will prevent significant impacts to SSS from occurring and will minimize impacts to their habitats. Mitigation for impacts to SEZ habitat will also be required as discussed in Response "b" below. In addition, a pre-construction survey for nesting migratory birds is included as a construction control in Section 3.8 as regulated by CDFW as part of their permitting requirements.

- **BIO-1:** Prior to the start of construction activities, the limits of construction shall be clearly marked and sensitive or regulated habitats within the Project limits shall be marked with high visibility fencing or staking to ensure construction will not further encroach into waters or sensitive habitats. These areas shall be marked on the Project plans. A qualified biologist shall periodically inspect the Project Area to ensure environmentally sensitive areas remain undisturbed.
- **BIO-2:** To minimize impacts to aquatic species and habitat, heavy equipment shall not cross or enter the river unless necessary for bridge demolition and associated debris removal. Fueling, maintenance, and staging of equipment shall occur in designated upland staging areas only.
- **BIO-3:** BMPs used in the Upper Truckee River shall be installed with consideration for fish passage. Turbidity curtains or downstream screens shall be installed in a manner that allows for the passage of fish beneath or around the BMP. BMPs shall consist of materials that prevent fish and other wildlife from becoming entangled, trapped, or otherwise harmed. BMPs used in the river shall be approved for use by CDFW and USFWS and inspected daily by a qualified biologist.
- **BIO-4:** Prior to the start of construction activities, high visibility vegetation protection fencing shall be installed around the dripline of trees and snags in the Project Area that are not planned for removal. Trees and snags shall be marked on the Project plans for avoidance and periodically inspected by a qualified biologist to ensure they remain undisturbed.
- **BIO-5:** A pre-construction plant survey of the entire Project Area shall be conducted by a qualified biologist prior to construction and during the appropriate survey window(s) necessary to identify special status plants with the potential to occur. Results of the pre-construction plant survey shall be provided to the Project proponent, CDFW, and the LTBMU. If special-status plant species are detected, their locations shall be pin-flagged, and a minimum 25-foot buffer shall be marked with high visibility fencing or staking around the individual or population. A qualified biological monitor shall inspect the special status plant species and buffer(s) on a weekly basis to ensure no impacts occur because of the Project.
- **BIO-6:** No more than 14 days prior to construction, an SNYLF visual encounter survey shall be conducted by a USFWS-approved biologist to ensure SNYLF are absent in the Project Area, including upstream and downstream areas or suitable habitat features within 100 feet of the Project. If a frog is observed during any point of the Project, all work shall immediately halt, all equipment shall be powered off, and work shall not continue until the frog can be identified by a

qualified biologist. If the frog is not an SNYLF, then a qualified biologist shall move the frog out of harm's way prior to work proceeding. If the frog is an SNYLF, then work shall stop until the SNYLF has moved out of harm's way on its own accord as determined by the biological monitor. Consultation with the USFWS will be re-initiated if take is exceeded or the Project action changes from that previously disclosed in the Biological Assessment.

- **BIO-7:** A qualified biologist shall conduct environmental awareness training for all construction personnel. The training shall include identification of SSS, required practices before the start of construction, general measures that are being implemented to conserve the species as they relate to the Project, penalties for non-compliance, and the boundaries of work and permitted disturbance zones. Supporting materials containing training information shall be prepared and distributed. Upon completion of training, all construction personnel shall sign a form stating that they have attended the training and understand all the measures. Proof of this instruction shall be kept on file by the Project proponent. The Project proponent shall provide the USFWS and CDFW with a copy of the training materials and copies of the signed forms indicating that training has been completed. If new construction personnel are added to the site, the crew foreman shall ensure that the personnel receive the mandatory training before starting work. Copies of signed forms shall be submitted monthly as additional training occurs for new employees. The crew foreman is responsible for ensuring that construction personnel adhere to the guidelines and restrictions.
- **BIO-8:** Immediately prior to installation of the coffer dam system around the bridge removal work area, a qualified biologist shall conduct a fish survey to ensure LCT, mountain whitefish, and Lahontan mountain sucker are absent in the Project Area. The biologist will remain on-site and monitor installation of the coffer dam and will have authority to stop any Project activity that may impact LCT or other special-status fish species detected in the Project area. The biologist will then survey ponded water within the contained work area following completion of the coffer dam installation to ensure fish are absent. If non-federally listed fish species are found in the ponded water, they will be relocated to the river side of the coffer dam structure by the biologist. If LCT are found in the ponded area, the coffer dam system will be reopened to allow the LCT to leave on its own accord. No LCT will be handled or relocated. Although the confidence of absence in the contained work area is high based on the inclusion of the previous portions of this measure, should LCT be found during pumping of water from the contained work area, pumping will immediately cease, and the coffer dam will be reopened. The qualified biologist will also perform daily inspections of the coffer dam and any other BMPs, such as the downstream turbidity curtain, to ensure they are properly installed, in good condition, cannot trap or otherwise harm fish, and do not block fish passage. If ponded water will be pumped from the contained bridge removal work area, intake screens will be used to prevent fish being impacted by the pump and a qualified biologist will be on-site to relocate any residual non-federally listed fish species to the river side of the coffer dam structure. After bridge construction/demolition, the qualified biologist will monitor the removal of the coffer dam and

other BMPs. Should an LCT be detected in the Project area, the USFWS will be contacted immediately, and all equipment will be powered off.

- **BIO-9:** During the nesting season (March through July) and no more than 2 weeks prior to construction and vegetation removal, a qualified biologist shall conduct a protocol-level survey for northern goshawk to determine occupancy and nesting status within a 0.25-mile radius of the Project Area. If an active goshawk nest is discovered, a 0.25-mile activity-free buffer shall be established around the nest site. Results of the pre-construction northern goshawk survey shall be provided to CDFW and TRPA.
- **BIO-10:** During the appropriate survey periods (June 1 to June 14, June 15 to June 25, and June 26 to July 15), and no more than 2 weeks prior to construction and vegetation removal, a qualified biologist shall conduct protocol-level surveys for willow flycatcher to determine occupancy and nesting status in suitable habitat within a 100-foot buffer of the Project Area. If an active willow flycatcher nest is discovered, a 100-foot activity-free buffer shall be established around the nest site. Results of the willow flycatcher surveys shall be provided to CDFW and TRPA.
- **BIO-11:** At least 14 days prior to removal or modification of snags, trees, the existing bridge, or other features that may provide roosting habitat for bats, a qualified biologist shall conduct a pre-construction survey to determine the presence or absence of bats and roosts. Results of the survey shall be provided to the Project proponent. If bats or signs indicating past or present roosting are found, the Project proponent shall report the bat observation or roost to CDFW and will delay removal until the roost can be confirmed unoccupied. The Project proponent shall coordinate with CDFW to determine an appropriate activity-free buffer area around occupied roosts in the Project Area.
- **BIO-12:** To ensure that bats have left potential roosting trees, trees shall be removed over the course of 2 days. On the first day, limbs from the identified trees shall be removed in the late afternoon. This disturbance should cause any roosting bats to seek other roosts during their nighttime foraging. The remainder of the tree can then be removed on the second day as late in the afternoon as feasible. If bats are found injured, or if bat mortality occurs during the course of tree removal, the Project proponent shall immediately notify CDFW of the event, the species recorded, and the number of individuals documented. Tree limbing or removal shall not be performed under any of the following conditions: during any precipitation events, when ambient temperatures are below 4.5 degrees Celsius, when windspeeds exceed 11 miles per hour, and/or any other condition which may lead bats to seek refuge.

Finding: Implementing mitigation measures BIO-1 through BIO-12 would ensure no take of a special status species would occur during Project construction, and that TRPA standards are met for the protection of SSS.

b) Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the CDFW or USFWS?

Less Than Significant Impact with Mitigation Incorporated

Standard of Significance: Direct or indirect impact greater than zero acres for state or federal sensitive natural communities and direct or indirect impact greater than zero acres to SEZs including riparian habitat constitute a significant impact.

The Project is located within a TRPA Land Capability District (LCD) 1B SEZ, LCD 1C zone (environmentally sensitive), and state (CDFW) and federally (USACE) jurisdictional wetlands, including the Johnson Meadow and the Upper Truckee River. Necessary permits will be acquired for impacts to these resources as listed in Section 4.4.1, and all permit requirements, including mitigation, will be followed. In addition, the County has agreed to the avoidance/minimization and mitigation measures in Section 4.4.4a above to protect riparian habitat, SEZs, and jurisdictional wetlands, and will follow all TRPA Codes. Project impacts were determined to be less than significant with mitigation incorporated based on the existing trail network in the Project Area, existing habitat conditions, self-mitigating nature of the bridge removal and replacement, and anticipated permit requirements/BMPs during construction. A total of 3 trail alternatives were considered, and the proposed alignment is a direct route primarily following the existing trail, minimizing Project impacts to the SEZ/riparian habitat.

Riparian

As discussed under "Environmental Setting," there are 1.06 acres of freshwater emergent wetlands, and 1.39 acres of freshwater forested/shrub wetlands. Riparian vegetation present within the Project Area includes patches of willow shrubs and aspen groves distributed across Johnson Meadow, primarily following the Upper Truckee River channel.

Trimming and removal of the existing riparian vegetation in this location will occur to allow for construction of the bridge span and footing placement. The Project will result in approximately 0.16 acres of permanent impacts and 0.25 acres of temporary impacts to freshwater forested/shrub wetlands, and 0.15 acre of permanent impacts and 0.23 acres of temporary impacts to freshwater emergent wetlands. Temporary and permanent impacts will be a result of the Class 1 shared-use path and boardwalk construction over the existing unvegetated trail. The Project Area contains low quality habitat for willow flycatcher; therefore, the Project would implement mitigation measures BIO-1 and BIO-10, as well as general nesting bird surveys described in the construction controls Section 3.8.2 to ensure that impacts to any potentially nesting birds will be avoided.

USACE Section 404 and CDFW Section 1602 LSAA permits will require mitigation for temporary and permanent impacts. Therefore, potential impact to riparian habitat would be less than significant with mitigation measures incorporated and any additional measures required by the Project permits.

Stream Environment Zone

New disturbance and land coverage in the SEZ (LCD 1B)/100-year floodplain is necessary to construct the Class 1 trail, install boardwalk approaches to the bridge, and construct the bridge structure over the Upper Truckee River. Overall, the Project incorporates design features that reduce disturbance and the effects of disturbance, including use of raised boardwalk bridge approaches and a bridge span. Section 3.7 in the Project description describes these features. These design options minimize disturbance in the SEZ and floodplain by confining users to structured trails particularly during wet conditions, accommodating seasonal surface flows and high groundwater, and allowing for some vegetative cover

under boardwalks. Use of pier footings to raise the structures also minimizes total coverage required to construct the trail.

Both TRPA and the Lahontan RWQCB prohibit new SEZ disturbance except for limited uses, such as public service and public recreation, that can demonstrate compliance with restrictive findings related to such uses. Under the provisions of the 2014 Regional Plan Update, TRPA exempts this shared-use trail project from land coverage calculations based on the findings for this Project; however, the County must still provide offsetting SEZ restoration (TRPA Code 30.4.6.D.3). The Water Quality Control Plan for the Lahontan Region (Lahontan Basin Plan) also prohibits discharge in SEZs and 100-year floodplains (Prohibitions 5.2 and 5.3). Exceptions to those prohibitions for outdoor recreation projects may be granted for public outdoor recreation facilities if findings can be made. Please see the analysis under Question 4.7.4-1a for a discussion of these findings. As documented in the analysis and findings, the Project is exempt from TRPA land coverage requirements for SEZs, and will mitigate the new Class 1 bike trail and bridge disturbance by providing offsetting SEZ restoration in the amount of 1:1.5 as required under TRPA Code and the Lahontan Basin Plan as detailed below:

- **BIO-13:** To mitigate the impact to SEZs in the amount of 1:1.5, the County shall first look for existing SEZ land coverage or disturbance in the Project vicinity that can be restored and permanently protected. If there is insufficient SEZ restoration potential in the Project vicinity, the County shall utilize SEZ restoration credits from projects previously restored and banked. The project eligible at the time of this environmental analysis includes:
    - El Dorado County SEZ Restoration Project #1 (Angora Wetland Bank) - up to 267,422 sf (6.139 acres) of restoration is available from implementation of this project.

  This restoration project, or others as approved, includes successful soil and habitat restoration that is expected to offset floodplain and wetland disturbance as well as the TRPA and Lahontan required SEZ disturbance. If needed for this Project, a wetland delineation for the restoration projects will be completed and will determine the amount and type of wetland restoration/credit that is available.

Finding: Implementing mitigation measures BIO-13 and BIO-1, BIO-2, and BIO-4 detailed in the response to Question 4.4.4a and 4.4.4b above will result in a net increase in SEZ land and mitigate potential impacts to riparian vegetation a less than significant level.

c) Would the project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Less Than Significant Impact with Mitigation Incorporated

Standard of Significance: Greater than zero acres and/or zero linear feet of disturbance or discharge to wetlands as defined by Section 404 of the CWA through direct removal, filling, hydrologic interruption or other means constitutes a significant impact as defined by the USACE jurisdictional waters regulations, 404 CFR 230 Section 404(b)(1), CDFG Section 1600 et seq, and USEPA and State of California no net loss policies.

Within the Project Area, there are 0.36 acres of open water (Upper Truckee River), 1.06 acres of freshwater emergent wetlands, and 1.39 acres of freshwater forested/shrub wetlands. As currently proposed, the Project will result in an estimated 0.15 acres of permanent impacts to freshwater emergent wetlands, 0.16 acres of permanent impacts to freshwater forested/shrub wetlands, and 0.02 acres of permanent impacts to the Upper Truckee River resulting from the bridge and boardwalk construction. In addition, construction of the boardwalk and bridge, and removal of the existing bridge will result in 0.23 acres of temporary impacts to freshwater emergent wetlands, 0.25 acres of temporary impacts to freshwater forested/shrub wetlands, and 0.02 acres of temporary impacts to the Upper Truckee River. The total permanent impact to wetlands is 0.33 acres, and the total temporary impact to wetlands is 0.5 acres.

Compensatory mitigation will be required for impacts to state and federally jurisdictional wetland, riparian habitat, and riverine habitat resulting from construction of the boardwalk and bridge. Final impact amounts and mitigation requirements would be determined and refined during the USACE, RWQCB, and CDFW permitting process. Considering the existing disturbance in the Project Area resulting from the trail network and damaged bridge, and the self-mitigating nature of the bridge removal and replacement, Project impacts can be mitigated to less than significance. A total of 3 trail alternatives were considered, and the proposed alignment is a direct route primarily following the existing trail, minimizing Project impacts to the SEZ/riparian habitat.

Finding: Implementing mitigation measures BIO-13 and BIO-1, BIO-2, and BIO-4 detailed in the response to Question 4.4.4a and 4.4.4b above will result in a net increase in wetlands and mitigate potential impacts to wetlands to a less than significant level.

d) Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Less Than Significant Impact with Mitigation Incorporated

Standard of Significance: A significant impact results from the blockage, disruption, or impedance of use of greater than zero wildlife or fish corridors or native wildlife nursery sites, as defined by TRPA Code Chapters 62 and 63.

The Upper Truckee River provides passage and connectivity to Lake Tahoe for the federally threatened LCT and 2 CDFW species of special concern, the Lahontan mountain sucker and mountain whitefish. The Upper Truckee River corridor also provides an important avenue for terrestrial and aquatic wildlife to access Lake Tahoe and the Truckee Marsh.

During the reconnaissance-level survey and SNYLF site assessment survey, it was determined that habitat in the Project Area, specifically within the Upper Truckee River corridor, provides an important connection to high-quality habitat and allows wildlife to navigate between the surrounding urban environments. Multiple fish species were observed in the Upper Truckee River, including one that may have been a Lahontan mountain sucker. One deceased brown trout (*Salmo trutta*) was observed, indicating salmonid passage and connection to upstream or downstream areas, and a black bear (*Ursus americanus*) was observed visiting the Upper Truckee River in the Project Area to drink and bathe.

Completion of the Project would not impact or change wildlife connectivity in any meaningful way considering the existing site conditions and proposed improvements. The Project is intended to improve fish passage and bank stability by removing the damaged bridge and its concrete piers. The new bridge would entirely span the Upper Truckee River. The boardwalk design allows for passage of small animals underneath, while the higher bridge approaches (up to 8.5 feet) would allow passage for larger animals such as mule deer (*Odocoileus hemionus*) and black bears.

During construction, the use of vegetation protection fencing, silt fencing, or other Project Area boundary markers and the presence of equipment and construction crews may temporarily disrupt daytime wildlife movement in the Project Area. However, this would not preclude nighttime movement, and therefore is not considered a significant effect.

The demolition of the bridge and construction of the Project could impact fish passage or connectivity in the Upper Truckee River. The County has agreed to mitigation measure BIO-3 in Section 4.4.4a, which would maintain fish passage in the Project Area through the implementation and monitoring of appropriate BMPs while working in the Upper Truckee River. BIO-3 requires BMPs used in the Upper Truckee River to be installed with consideration for fish passage. Turbidity curtains or downstream screens must be installed in a manner that allows for the passage of fish beneath or around the BMP. BMPs must also consist of materials that prevent fish and other wildlife from becoming entangled, trapped, or otherwise harmed. Additional avoidance and minimization and/or mitigation measures may be required by the USACE, RWQCB, and CDFW permits. With these measures, the Project would not result in significant impacts to movement of fish or other wildlife species.

Finding: Implementing mitigation measure BIO-3 detailed in the response to Question 4.4.4a above will protect migratory species during construction and mitigate potential impacts to migratory species a less than significant level.

e) Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Less Than Significant Impact

The Project would comply with the TRPA Code standards that protect biological resources, including tree removal. Trees planned for removal would need to be approved by TRPA depending on diameter at breast height (dbh). The Project would comply with TRPA vegetation protection controls during construction and would only remove vegetation necessary for Project implementation and with the approval of TRPA. The Project would follow measures to comply with TRPA threshold standards for northern goshawk zones and forest structure, including the preservation of snags. By following standard management methods and revegetating disturbed areas with native species after construction, new infestations of invasive plants resulting from the Project would be minimized. Any new infestations would be immediately reported to the Forest Service botanist and treated following approved methods.

In addition, the County has agreed to the avoidance and minimization measures in Section 4.4.4a, which include measures to protect trees, sensitive habitats, and other biological resources in the Project Area during construction. Any required mitigation for tree removal would depend on final design and TRPA approval.

Approximately 97 trees ranging in size from 6 to 40 inches dbh would be removed during construction of the trail. Tree sizes and locations will be specified in the required tree removal plan once final plans are completed. Tree protection measures for remaining trees would include the use of temporary 4-foot-tall fencing around tree driplines and 8-foot-tall wooden tree trunk protection. Tree trunk protection will only be used in areas where fencing around the driplines would prohibit construction access.

Tree protection will follow the standards in TRPA Code Section 33.6.10 and tree removal will comply with TRPA Code Section, particularly TRPA Code Section 61.1.6C *Tree Cutting within Stream Environment Zones*: tree cutting within SEZs may be permitted to allow for early successional stage vegetation management, sanitation salvage cuts, fuels management for fire hazard reduction, restoration or enhancement of ecosystem health and diversity, and fish and wildlife habitat improvement projects, in accordance with the standards provided in the Code Section. The Project would be subject to the following requirements associated with tree removal within SEZs:

- Vehicle Restrictions: All vehicles shall be restricted to areas outside SEZs or to existing roads within SEZs.
- Soil Conditions: All work within SEZs shall be limited to times of the year when soil conditions are dry and stable, or when conditions allow for over-snow tree removal without significant soil disturbance and/or significant vegetation damage (see Subsection 61.1.6.F).
- Trees and Debris Kept from Streams: Felled trees and harvest debris shall be kept out of all perennial or intermittent streams. If deposited in the stream, the material shall be removed unless it is determined that such logs and woody material adds structural diversity pursuant to fish and wildlife habitat improvements in accordance with Chapter 62: Wildlife Resources, and Chapter 63: Fish Resources. This determination shall be approved by TRPA.
- Stream Crossings: The crossing of perennial streams or other wet areas shall be limited to improved crossings meeting BMPs or temporary bridge spans that can be removed upon Project completion or at the end of the work season, whichever is sooner. Any damage or disturbance to the SEZ associated with a temporary crossing shall be restored within one year of its removal. In no instance shall any method requiring the placing of rock and earthen material into the stream or streambed be considered an improved crossing. Other temporary measures may be permitted for dry stream crossings in accordance with the Handbook of Best Management Practices.
- Special Conditions: Special conditions shall be placed on all tree harvests within SEZs or within the transition or edge zone adjoining SEZs as necessary to protect in-stream aquatic habitat values and wildlife habitat integrity and diversity.

Because the Project would be required to comply with the TRPA Code pertaining to tree removal within SEZs, including implementation of required protection controls, impacts resulting from tree removal would be less than significant. Additionally, the Project would not conflict with TRPA Code pertaining to the protection of wildlife, vegetation, or fisheries as the Project incorporates avoidance/minimization and mitigation measures detailed in Sections 4.4.4a and 4.4.4b above, where appropriate, to comply with Code and other regulatory requirements pertaining to the protection of biological resources.

f) Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

No Impact

The Project would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan as none exist for the Project Area.

4.4.5 TRPA Checklist

Will the proposal result in:

TRPA Questions – Vegetation	Answers	Discussion
4a) Removal of native vegetation in excess of the area utilized for the actual development permitted by the land capability/ Individual Parcel Evaluation System (IPES) system?	No	New disturbance and land coverage are necessary within the unverified mapped LCD 1B (SEZ) and 1C to construct the Class 1 trail, install boardwalk approaches to the bridge, and construct the bridge structure over the Upper Truckee River. The Project must comply with TRPA vegetation protection controls during construction and would only remove vegetation necessary for Project implementation. Because the Project would also comply with offsetting land coverage restoration requirements associated with the land capability system, significant impacts would not occur. As discussed in Question 4.4.4b, the County has made the appropriate findings that show the Project meets the exemption conditions of TRPA Code Section 30.4.6.D.3 and will not be required to mitigate land coverage.
4b) Removal of riparian vegetation or other vegetation associated with critical wildlife habitat, either through direct removal or indirect lowering of the groundwater table?	Yes	There is no critical wildlife habitat associated with the Project. However, riparian vegetation would be removed during boardwalk construction and bridge replacement. Mitigation measures BIO-13 and BIO-1, BIO-2, and BIO-4 are detailed in the response to Question 4.4.4a and 4.4.4b above and would mitigate direct impacts to riparian habitat. Additional measures may be required by the Project permits. No indirect impacts to riparian vegetation from ground water table lowering are anticipated, as dewatering efforts for construction of the bridge footings will be temporary and minimal.

4c) Introduction of new vegetation that would require excessive fertilizer or water, or would provide a barrier to the normal replenishment of existing species?	No	Revegetated areas would utilize native species and would not require fertilizer or excessive watering. The boardwalk and Class 1 path would not act as a barrier to replenishment or recruitment of the native plant communities in the Project Area.
4d) Change in the diversity or distribution of species, or number of any species of plants (including trees, shrubs, grass, crops, micro flora and aquatic plants)?	No, with Mitigation	Construction of the Project would not result in a change in the biological diversity or distribution of any species in the Project Area vicinity. Common plant species observed during the background biological surveys are listed in the NES. There are no isolated plant populations in the Project Area that would be impacted. Additional pre-construction surveys will be conducted for rare plants that may have potential to occur in the Project Area, and if found, will be protected during construction.
4e) Reduction of the numbers of any unique, rare or endangered species of plant?	No, with Mitigation	While no SSS were observed during the biological surveys, additional pre-construction surveys will be conducted for rare plants that may have potential to occur. A detailed analysis of the potential for SSS to occur is presented in the NES.
4f) Removal of stream bank and/or backshore vegetation, including woody vegetation such as willows?	Yes	Construction of the bridge will require removal of stream bank vegetation, and construction of the boardwalk will require trimming of willow branches and likely removal of entire willow individuals. Impacts to wetland vegetation will be mitigated with on-site revegetation or through the use of credits from other County restoration projects.
4g) Removal of any native live, dead or dying trees 30 inches or greater in diameter at breast height (dbh) within TRPA's Conservation or Recreation land use classifications?	Yes	Approximately 97 trees ranging in size from 6 to 40 dbh would be removed during construction of the trail. Tree protection will follow the standards in TRPA Code Section 33.6.10 and tree removal will comply with TRPA Code Section, particularly TRPA Code Section 61.1.6C. A tree removal summary will be included as part of the County's TRPA permit application package.

4h) A change in the natural functioning of an old growth ecosystem?	No	The Project Area contains old growth elements including large trees and snags (>30 dbh), but removal is not concentrated and instead is spread along the trail alignment. Overall, the Project Area would not be considered an old growth forest. Therefore, the Project will not impact or change the natural functioning of old growth ecosystems considering existing conditions in the Project Area.

TRPA Questions – Wildlife	Answers	Discussion
5a) Change in the diversity or distribution of species, or numbers of any species of animals (birds, land animals including reptiles, fish and shellfish, benthic organisms, insects, mammals, amphibians or microfauna)?	No, with Mitigation	Construction of the Project would not result in a change in the biological diversity or distribution of any species in the Project Area vicinity. Common wildlife species observed during the background biological surveys are listed in the NES. There are no isolated wildlife populations in the Project Area that would be impacted. Additional pre-construction surveys would be conducted for special status wildlife that may have potential to occur.
5b) Reduction of the number of any unique, rare or endangered species of animals?	No, with Mitigation	While no SSS were observed during the biological surveys, additional pre-construction surveys would be conducted for special status wildlife that may occur. A detailed analysis of the potential for SSS to occur is presented in the NES.
5c) Introduction of new species of animals into an area, or result in a barrier to the migration or movement of animals?	No, with Mitigation	No new animal species would be introduced into the Project Area because of the Project. An Invasive Plant Risk Assessment was prepared for the Project, and basic preventative measures for invasive plant establishment are included in the Construction Controls. No animals, insects, or invertebrate species would be introduced. The County has agreed to the avoidance and minimization/mitigation measures in Section 4.4.4a, which include measures to maintain fish passage in the Project Area through the implementation and monitoring of appropriate BMPs while working in the Upper Truckee River.

5d) Deterioration of existing fish or wildlife habitat quantity or quality?	No, with Mitigation	The Project is proposing permanent and temporary impacts to state and federally jurisdictional wetlands, TRPA SEZs, and northern goshawk threshold habitat. Impacts to these habitats will be restored, mitigated, or avoided following the various avoidance and minimization measures in Section 4.4.4a and any additional Project permit requirements. The Project will comply with TRPA Code and threshold standards for these designated areas, and appropriate BMPs will be used to protect water quality, habitat, and other biological resources as required by the permits.

4.5 Cultural Resources

4.5.1 Environmental Setting

Project screening for cultural and historic resources was conducted by NCE in 2023. Screening efforts consisted of an archival review, Native American tribal consultation (See Section 4.18), an intensive pedestrian survey, and recordation of any identified resources. An associated Archaeological Survey Report (ASR) was prepared to detail results of the screening efforts, establish an APE for the Project, and identify prehistoric, ethnohistoric, and/or historic period archaeological resources within or immediately adjacent to the APE (NCE 2024c). The detailed setting and investigations can be found in **Appendix G**.

Approximately 19 acres underwent a comprehensive survey during the inventory process. This effort resulted in the revisitation of 3 previously documented cultural resources that intersect with the Project Area. Subsequent site updates were deemed necessary for the following sites: P-09-004529 (Lakehouse Road), P-09-004537 (unnamed historic road), and P-09-006059 (Johnson Ranch Complex). Emphasis was placed on reviewing portions of the revisited sites that lie within the Project Area. For linear sites that extend away from the Project corridor, site review was limited to 100 meters beyond the Project Area perimeter.

- Lakehouse Road (P-09-004529). Lakehouse Road is a historic road dating to the early part of the 20th century or earlier. The portion of the road within the APE is 1,317 feet in length and consists of a largely denuded swath of decomposed granite. The road enters the APE approximately 250 feet east of the washed-out bridge (P-09-006059) and 400 feet northwest of Staging Area 1. In the 1960s or 1970s the road alignment, including that portion in the APE, was used for the construction of an effluent line, resulting in a significant loss of integrity. The site was recorded in 1994 and revisited in 1999. Only a short segment of the road running between Barton Dairy and Lakehouse Road was identified as retaining integrity. That segment lies outside of the APE. The historic road was not identifiable within the APE. NCE agrees with prior integrity assessments.
- Historic Road (P-09-004537) runs roughly parallel to and south and east of the Upper Truckee River. At its northeast end, it connects to Lakehouse Road (P-09-004529). A short segment of the road at this end is 15 feet wide and paved, serving as a driveway to a residence. The south end of the road connects with a paved city street that is a vestige of the same Lakehouse Road (P-09-004529). The road was first recorded by Susan Lindstrom (1994), and it was revisited by Drews (1999). No evidence of the original roadway was noted. No roadway-related features were observed. The age of this road is unknown but Lindstrom suggested that it dates to the early part of the twentieth century based on a historic habitation and/or dump site located to the south and outside of the Project Area. The road is in poor condition due to recreational use, building improvements, and substantial modification. However, a short segment between Barton Dairy and Lakehouse Road is relativity intact (Lindstrom 1994). The revisited segment of Lakehouse Road lacks several major elements of integrity (design, materials, and workmanship).

Other elements of integrity (feeling and association) have been marginally compromised due to nearby residential development.

- The Johnson Ranch Complex (P-09-006059) is a mid-20th century cattle grazing operation associated with the Johnson family. The Johnsons were a prominent family in Lake Valley in the early 20th century, but by the 1950s they had shifted their focus to a home ranch near Mottsville in the Carson Valley. The recorded features relate specifically to the Johnson family using this wetland area for summer grazing of cattle. It is unclear when exactly the complex of features was developed, but it was after 1940 and prior to 1969. The site was originally recorded in 2019 and NCE provided updates to several features and recorded 2 previously unrecorded components of the site. No discrete features associated with this site are located within the APE, but the APE was included in the enclosed area of pasture. During the inventory the site was re-examined, and new descriptions of the individual features were prepared, a revised site map was developed, and 2 new features were recorded and added to the site record. The site has a good level of integrity but lacks historic importance.

No new prehistoric sites, features, or artifacts were found either within the APE or its immediate vicinity. Notably, no new historic or prehistoric sites were found within either the Project Area or its immediate vicinity. Most of the studied area has experienced some degree of prior disruption, primarily attributable to recreational trails, road maintenance activities, or historical logging and ranching operations.

None of the resources were determined to be eligible for the National Register of Historic Places (NRHP) or the California Register of Historical Resources (CRHR). The full Caltrans Historic Property Survey Report (HPSR), with the ASR attached, is included as **Appendix G**.

4.5.2 Regulatory Setting

Federal

The National Historic Preservation Act (1966) defined the role and responsibilities of the federal government in historic preservation and established the NRHP. It also directs agencies to identify and manage historic properties under their control, to undertake actions that would advance its provisions and avoid actions contrary to its purposes, to consult with others while carrying out historic preservation activities, and to consider the effects of their actions on historic properties.

State

California Register of Historical Resources

The CRHR is a guide to cultural resources that must be considered when a government agency undertakes a discretionary action subject to CEQA. The CRHR helps government agencies identify and evaluate California's historical resources and indicates which properties are to be protected, to the extent prudent and feasible, from substantial adverse change (PRC §5024.1(a)). Any resource listed in, or eligible for listing in, the CRHR must be considered during the CEQA process.

Caltrans

Projects with Caltrans funding must comply with federal and state environmental laws and regulations designed to protect cultural resources significant in American archaeology, architecture, history, culture, and engineering. To meet legal requirements for cultural resources management, Caltrans personnel must follow the guidelines outlined in Volume 2 of the SER (Caltrans N.D.).

Local

TRPA Code Section 67.3 outlines requirements for the accidental discovery of resources during construction and requirements for protection of known resources. See Section 3.8.

4.5.3 CEQA Checklist Summary

Would the project:

CEQA Question	Impact Determination
a) Cause a substantial adverse change in the significance of a historical resource pursuant to CEQA Guidelines § 15064.5?	Less Than Significant Impact
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines § 15064.5?	Less Than Significant Impact
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	Less Than Significant Impact

4.5.4 Answers to CEQA Checklist Questions

a) Would the project cause a substantial adverse change in the significance of a historical resource pursuant to CEQA Guidelines § 15064.5?

Less Than Significant Impact

The Project involves replacing a bridge and improving an existing trail. The Project has the potential for direct impacts on historic resources through demolition and construction of new vertical elements. Vertical elements would include the new bridge, signposts with a vertical height clearance of 7 to 8 feet, and a boardwalk. A new bridge would be constructed to entirely span the Upper Truckee River and the old concrete bridge, including abutments, wingwalls, and piers, would be demolished and removed. The new pedestrian bridge would be approximately 9 feet in height and 140 feet in length with a 146-inch-wide reinforced concrete deck. The foundation will consist of poured in place concrete abutments on either bank of the river.

As discussed in the “Environmental Setting” the bridge was determined to be not eligible for the NRHP or the CRHR. Three additional historic-era resources within the Project direct and indirect Area of Potential Effect (APE) were identified through archival research and confirmed during the field surveys: Lakehouse Road (P-09-004529), a historic road (P-09-004537), and remnant features of the Johnson Ranch (P-09-006059). As discussed under “Environmental Setting” these resources are considered not eligible for the NRHP or CRHR in their current state and therefore no adverse effects will occur to these

resources as result of the Project. Therefore, potential impacts to historic resources would be less than significant.

b) Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines § 15064.5?

Less Than Significant Impact

The Project has the potential for direct impacts on subsurface resources from general construction activities and use of temporary staging areas. The Project would involve excavation of earth with heavy equipment, stockpiling of material, and heavy equipment driving over the ground.

The Project Area consists of various forms of disturbance including existing trails, utilities, forest thinning, access roads, and the damaged bridge. The Upper Truckee River within the Project Area also exhibits signs of disturbance due to natural and anthropogenic induced channel meandering, erosion/sediment deposition, and incision. As such, the majority of the ground surface within the Project Area has undergone some amount of disturbance. Due to existing disturbance, it is unlikely this area contains cultural material that could be impacted by the Project.

Ground disturbance will include installation of the Class 1 path pavement (approximately 5,075 linear feet) constructed atop the existing ground surface in the upland, while the remainder (approximately 935 linear feet) will consist of an elevated boardwalk in the SEZ. The surface path will consist of a 3-inch layer of asphalt atop an 8-inch-thick aggregate base. The Project Area is relatively flat, and limited cut and fill will be required. The path surface will be 10 feet wide with a 2-foot-wide aggregate base shoulder to either side. Where necessary, the surface of the path will be crowned to facilitate drainage. Excavation conducted during construction of the surface path will be approximately one and a half feet in depth, or within the approximate prism of previous disturbance. Where appropriate, 6-foot by 12-foot rest area pullouts will be constructed on either side of the path.

Where appropriate, roadway signs would be installed to inform users of nearby bicycle facilities, mostly at or near roadway intersections at either end of the Project corridor. Signposts will be set 36 inches into the ground and will be set 3 feet from the edge of the paved path, with a vertical height clearance of 7 to 8 feet.

A new bridge would be constructed to entirely span the Upper Truckee River and the old concrete bridge, including abutments, wingwalls, and piers, would be demolished and removed. Existing abutments and wingwalls would be cut below final stream grade and covered with native river substrate, if not entirely removed. The existing bridge demolition work area would be surrounded by a cofferdam system, constructed of gravel bags and visqueen plastic sheets (or approved allowable alternative materials), to convey and maintain flow around the work area. Upon completion of the bridge demolition activity, the temporary coffer dam would be removed.

The new pedestrian bridge would be approximately 9 feet in height and 140 feet in length with a 146-inch-wide reinforced concrete deck. The foundation would consist of poured in place concrete abutments on either bank of the river. Excavation of footings would be required, each from 5 to 10 feet in depth. The new bridge would entirely span the river.

The potential for subsurface cultural resources was determined in the ASR/HPSR to be low based on archival research and the site survey. Compliance with federal, state, Caltrans, TRPA, and General Plan policies developed to avoid or mitigate impacts to unanticipated cultural resources during construction would ensure the Project would not cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5; therefore, potential impacts would remain less than significant.

c) Would the project disturb any human remains, including those interred outside of dedicated cemeteries?

Less Than Significant Impact

Based on the prehistoric and historic uses of the area and the prior ground disturbance of the Project Area, human remains are not expected to be discovered during construction activities. However, the potential still exists to pose a significant impact to human remains should they be encountered. Section 7050.5 of the California Health and Safety Code states that it is a misdemeanor to knowingly disturb a human grave.

Section 7050.5(b) of the California Health and Safety Code and Section 5097.98 of the State Public Resources Code specify required protocol to implement when human remains are discovered. If human remains are discovered, the Codes require that work cease within the immediate area and the County Coroner be notified. If the remains are determined to be Native American, the coroner will notify the NAHC, and the procedures outlined in CEQA Section 15064.5(d) and (e) shall be followed including notification of the Washoe and UAIC tribes.

Because the Project is required to comply with these requirements to implement controls to protect human remains against significant impact during ground-disturbance activities, the Project would not alter or adversely affect or result in the loss of these resources and their associated ethnic and cultural values. Therefore, potential impacts to human remains would remain less than significant.

4.5.5 TRPA Checklist – Archaeological/Historical

Will the proposal result in:

TRPA Questions	Answers	Discussion
20a) An alteration of or adverse physical or aesthetic effect to a significant archaeological or historical site, structure, object or building?	No	No significant archaeological, historic sites, structures, objects, or buildings were identified in the Project Area, therefore no significant impact would occur because of the Project. See discussion for Question 4.5.4a above.
20b) Is the proposed project located on a property with any known cultural, historical, and/or archaeological resources, including resources on TRPA or other regulatory official maps or records?	Yes	See discussion for Question 4.5.4a above. Three historic resources were identified through archival research and investigated during the field surveys. Within the Project Area, these resources are not eligible for listing in the NRHP or CRHR, therefore no significant impact will occur to known cultural, historical, and/or archaeological resources.
20c) Is the property associated with any historically significant events and/or sites or persons?	No	Three historic resources were identified through archival research and investigated during the field surveys. Within the Project Area, these resources are not eligible for listing in the NRHP or CRHR, therefore no historically significant events and/or sites or persons are associated with the Project Area or associated parcels. See discussion for Question 4.5.4a above.
20d) Does the proposal have the potential to cause a physical change which would affect unique ethnic cultural values?	No	No resources with unique ethnic cultural values were identified in the Project Area (NCE 2024c).
20e) Will the proposal restrict historic or pre-historic religious or sacred uses within the potential impact area?	No	Implementation of the Project would have no effect on pre-historic, historic, or sacred uses of the Project Area as none were identified during screening efforts or during Native American consultation. See also Section 4.18.

4.6 Energy

4.6.1 Environmental Setting

The Project Area encompasses the City of South Lake Tahoe and El Dorado County ROW and public parcels owned by the City of South Lake Tahoe, STPUD, CTC, and the USFS. The Project Area includes land zoned for residential and conservation. Since the east end of the Project (Staging area 1 on Barbara Avenue) is partially developed, there are energy sources in the vicinity that serve urban uses, including overhead power lines. Energy used in the area includes electricity, natural gas, gasoline and diesel fuel, and renewable energies commonly associated with residential development.

4.6.2 Regulatory Setting

TRPA has adopted a Regional Plan for energy (TRPA 2021), which includes the following goal:

- Goal E1 – Promote energy conservation programs and development of alternative energy sources to lessen dependence on scarce and high-cost energy supplies.

The goal of conserving energy implies the wise and efficient use of energy. The means of achieving this goal include:

- Decreasing overall per capita energy consumption.
- Decreasing reliance on natural gas and oil.
- Increasing reliance on renewable energy resources.

4.6.3 CEQA Checklist Summary

Would the project:

CEQA Question	Impact Determination
a) Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	Less Than Significant Impact
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	No Impact

4.6.4 Answers to CEQA Checklist Questions

a) Would the project result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Less Than Significant Impact

The Project proposes a Class 1 trail that would not require the long-term use of energy resources and that has the potential to reduce fuel consumption by providing access and connection to other trail systems for pedestrian and bicycle use. The Project, therefore, would not consume energy resources

once construction is complete and has the potential to reduce overall fuel consumption in the area. Non-renewable energy resources such as gasoline and diesel are consumed during the construction process. Because construction would be limited and would not require energy resources beyond those of typical trail construction, and because the Project has the potential to reduce automotive trips in the area on an operational basis, the Project would not result in substantial depletion or wasteful use of energy resources during construction or operation.

b) Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

No Impact

The Project would reduce fuel consumption by replacing automotive trips with pedestrian and bicycle trips. No lighting or other features that consume energy are proposed for the Project, outside of the construction process. Therefore, the Project actively supports plans for energy efficiency and would not obstruct plans to develop or expand renewable energy or energy efficiency programs.

CARB has set a goal to cut air pollution by 71% and reduce fossil fuel consumption by 86% to reach carbon neutrality by 2045 (CARB 2022). The Project would have no adverse effect and potentially a beneficial effect on this program. The Project would also not conflict or obstruct the goals and policies of the TRPA Threshold Standards and Regional Plan for energy (TRPA 2021).

Because the Project would conform with the Goals and Policies of the TRPA Threshold Standards and Regional Plan and state of California energy goals, there would be no impact.

4.6.5 TRPA Checklist

Will the proposal result in:

TRPA Questions – Natural Resources	Answers	Discussion
9a) A substantial increase in the rate of use of any natural resources?	No	The Project would not result in a substantial increase in the rate of use of any natural resources. Energy for the Project would only be required during construction and would not require additional capacity on a local or regional scale.
9b) Substantial depletion of any non-renewable natural resource?	No	The Project would not result in a substantial depletion of any non-renewable natural resource. Energy for the Project would only be required during construction.

TRPA Questions – Energy	Answers	Discussion
15a) Use of substantial amounts of fuel or energy?	No	Refer to Question 4.6.3a. Project operations would not require fuel or energy consumption outside of regular maintenance activities that already occur in the area. Construction would require fuel consumption; however, no fuels would be consumed at a higher rate than average and standard idling and equipment use restrictions would prevent wasteful use of fuel.
15b) Substantial increase in demand upon existing sources of energy, or require the development of new sources of energy?	No	The Project would not result in a substantial increase in demand for existing sources of energy or require the development of new sources of energy. The Project would reduce fuel consumption by replacing automotive trips with pedestrian and bicycle trips. Energy for the Project would only be required during construction and would not require additional capacity on a local or regional scale.

4.7 Geology and Soils

4.7.1 Environmental Setting

Lake Tahoe lies within the Sierra Nevada Geomorphic Province, occupying a basin surrounded by peaks of the Sierra Nevada Mountains with Freel Peak the highest at 10,891 feet. The eastern and western sides of the basin are composed of granite rock, with minor amounts of older metamorphic rock. Volcanic rock, some deposited as recently as 2.5 million years ago, covers most of the northern and some of the southern part of the basin. The Sierra Nevada is a gently sloping fault block mountain range that was uplifted along its eastern edge. This range is bounded on the east and west by a series of interconnected fault segments. The displacement has been greater on the eastern margin, giving the Sierra Nevada a western tilt. South of Lake Tahoe, there is a single crest dividing the gentle western slope from the steep eastern scarp. The crest splits south of the lake, with one crest trending northwesterly and the other crest trending northward creating the Carson Range. This range separates the Carson Valley from Lake Tahoe. Lake Tahoe occupies the basin between the 2 uplifted crests.

Regional Geologic Setting

The Lake Tahoe Basin was formed 2 to 3 million years ago by geologic block faulting between the northwest-trending Sierra Nevada to the west and the north-trending Carson Ridge to the east. Lake Tahoe occupies the depression, or fault-produced graben, between these 2 uplifted mountain ranges. During the past 2 million years, glaciers played an active role in shaping the Sierra Nevada Mountains and Lake Tahoe. Alpine glaciers extended below the current lake level along the west shoreline and Emerald Bay. The basement geology of the Lake Tahoe Basin is divided into 3 categories: granitic, metamorphic, and volcanic (Hyne et al. 1972).

Seismicity and Faulting

The Lake Tahoe Basin is located in a region of Holocene age and early Quaternary age, as evidenced by the features and historical data published in Natural Hazards of the Lake Tahoe Basin (Cooper, Clark and Associates 1974) and Preliminary Maps of Pleistocene to Holocene Faults in the Lake Tahoe Basin, California and Nevada (Saucedo 2005). Movements have taken place along faults adjacent to the basin within historical time (Lawson 1912, Kachadoorian 1967). Sediments at the bottom of Lake Tahoe show offsets or displacements that are indicative of faulting, and steep cliffs (30- to 45-degree slopes) and other topographic features associated with active faulting are found on both sides of Lake Tahoe (Hyne et al. 1972).

The Lake Tahoe basin lies within an area with a high potential for earthquake shaking. It is generally accepted that a maximum credible earthquake in this area would be in the range of magnitude 7 to 7.5 along the Genoa fault system of the eastern Sierra Nevada. The most active segment of this fault system in the Tahoe area is located at the base of the eastern side of the mountains approximately 8 miles east of the Project Area.

Quaternary age concealed fault splays associated with the Tahoe Valley Fault Zone are mapped by the California Geological Survey (CGS) in the Project vicinity (California Department of Conservation and CGS 2023). These fault splays extend as close as approximately 400 feet south of the proposed Project alignment and are identified by CGS as having undifferentiated Quaternary age with approximate

locations. It is noted that these fault splays are not shown in the earthquake hazards map for the South Lake Tahoe quadrangle (Trexler and Bell 1979). Holocene age (active within past 11,700 years) West Tahoe Fault is mapped by CGS at approximately 4 miles west of the Project (CGS 2023a). This Holocene age fault is also a mapped Alquist-Priolo Earthquake Fault Zone (EFZ) with required investigation (CGS 2023a). Because the site does not lie within an EFZ with required investigation and no unmapped faults were suggested within the site during our investigation, no additional fault investigation or mitigation is considered necessary for the proposed Project.

Since the 1900s, several earthquakes with an intensity of less than 5.0 Richter magnitude have been recorded in the Basin, although historical epicenters are more common to the north of Lake Tahoe and to the south-southeast of the Lake Tahoe Basin along the Sierra Nevada frontal fault system. Both of these areas have experienced moderate to high magnitude earthquake activity measuring between 5.0 and 7.5 on the Richter scale.

There are no known ground rupture locations within or in the general area of the Project. The absence of ground faults passing through the site suggests the potential for ground rupture within the Project Area is negligible.

Liquefaction/Landslides

The Project Area is identified by the earthquake hazards map for the South Lake Tahoe quadrangle to lie in area of greatest severity of shaking with possible severe liquefaction (Trexler and Bell 1979). Based on a site exploration by Corestone Engineering, Inc. (**Appendix H**), the site area west of the Upper Truckee River is underlain by submerged very loose to medium dense sand layers through approximately 12 feet depth below ground surface (bgs). Therefore, a detailed liquefaction analysis was conducted to determine the liquefaction hazard at the site and to evaluate the liquefaction-induced settlement at the bridge and boardwalk footing grades.

Landslides and debris flows triggered by earthquake ground shaking have historically caused a great deal of property damage and loss of life. Areas most susceptible to earthquake-induced landslides are generally on steep slopes or adjacent to existing landslide deposits. The possibility of landslides and seismically induced slope instability is considered low due to topography in the vicinity of the trail alignment.

The full Geotechnical Report is attached as **Appendix H**.

Land Capability

The TRPA established a land capability system based upon the Bailey Land Classification System methodology. Land capability classification delineates the amount of impermeable development coverage (e.g., base allowable land coverage) that may exist within an LCD based on soil types, potential for erosion, and other related characteristics. Lands with a ranking of 1 have the highest potential for erosion and 7 have the lowest. Level 1 is also subdivided into 3 categories: 1A – least tolerance for use; 1B – poor natural drainage in a SEZ; and 1C – fragile flora and fauna. Based on TRPA Plan Area Statement maps there are 6 land capability classes within the Project Area (**Table 1**). A request for Verification of Land Capability by TRPA staff will be forwarded by the County for those areas where work is proposed.

The land near the river is Class 1B, while areas outside of the riparian areas are 1C, 4, 5, 6, and 7 (**Figure 10**).

Table 2. Area Distribution by Land Capability Classification

Land Capability Class	Acres in Project Area	Percent of Project Area	TRPA Allowable Coverage Percent
1B	3.12	20.1	1
1C	1.25	8.05	1
4	3.52	22.7	20
5	1.19	7.67	25
6	2.27	14.6	30
7	4.17	26.9	30

Soils

Corestone Engineering, Inc. conducted a geotechnical investigation of the proposed Project Area. As part of the investigation, soil borings were collected in the vicinity of the proposed Upper Truckee River bridge crossing in September 2023. The soils profile throughout the proposed bridge crossing location consisted of surficial sandy silt and silty sand with gravel to poorly graded sand with silt or gravel soil layers through approximately 12 feet depth bgs, further underlain by dense to very dense silty sand and silty sand with gravel soils through maximum depth of exploration, approximately 41.5 feet bgs.

The soils at the survey area have been mapped by the Department of Agriculture, Natural Resources Conservation Service (NRCS), and were downloaded from the Web Soil Survey (NRCS 2023). NRCS identified 5 soil types within the survey area. Soils within the Project Area include:

- Tahoe mucky silt loam, drained, 0 to 5 percent slopes. This is a soil component that occurs on valley flats and floodplains. The parent material consists of alluvium derived from granitic and volcanic rock. This is a very poorly drained soil with more than 80 inches to paralithic bedrock. This soil is hydric and makes up 18.7 percent or 2.9 acres of the Project Area (NRCS 2023).
- Christopher loamy coarse sand, 0 to 9 percent slopes. This is a soil component that occurs on hillslopes on outwash terraces. The parent material consists of outwash derived from granodiorite. This is a somewhat excessively drained soil with more than 80 inches to paralithic bedrock. This soil is not hydric and makes up 28.3 percent or 4.4 acres of the Project Area (NRCS 2023).
- Christopher loamy coarse sand, 9 to 30 percent slopes. This is a soil component that occurs on hillslopes on outwash terraces. The parent material consists of outwash derived from

granodiorite. This is a somewhat excessively drained soil with more than 80 inches to paralithic bedrock. This soil is not hydric and makes up 7.7 percent or 1.2 acres of the Project Area (NRCS 2023).

- Christopher-Gefo complex, 0 to 5 percent slopes. This is a soil component that occurs on hillslopes on outwash terraces. The parent material consists of outwash derived from granodiorite. This is a somewhat excessively drained soil with more than 80 inches to paralithic bedrock. This soil is not hydric and makes up 27.1 percent or 4.2 acres of the Project Area (NRCS 2023).
- Ubaj sandy loam, 0 to 9 percent slopes. This is a soil component that occurs on outwash terraces and lake terraces. The parent material consists of Alluvium and/or colluvium derived from granodiorite over lacustrine deposits. This is a moderately well-drained soil with more than 80 inches to paralithic bedrock. This soil is not hydric and makes up 18.2 percent or 2.82 acres of the Project Area (NRCS 2023).

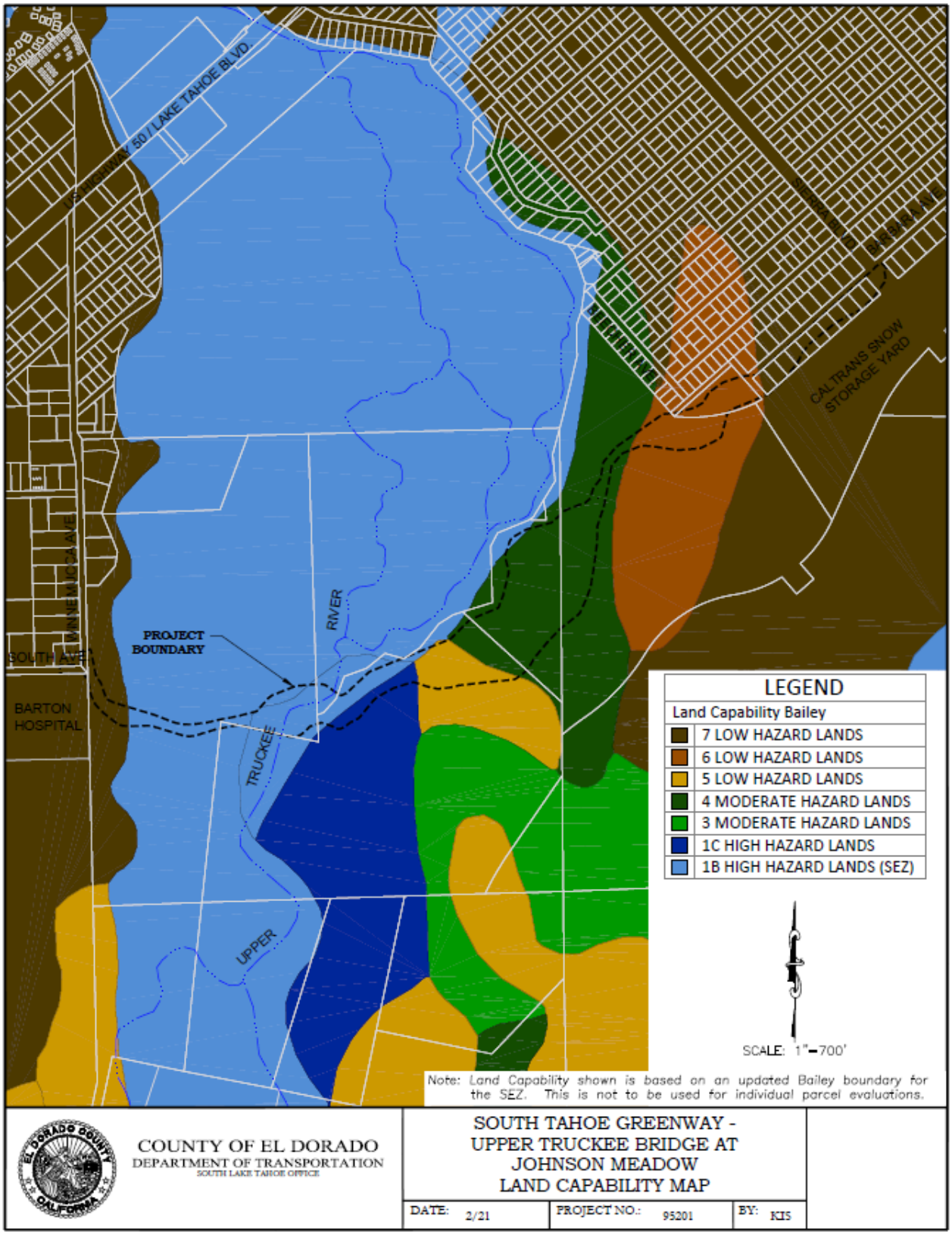


Figure 10. Land Capability Map (El Dorado County 2021).

4.7.2 CEQA Checklist Summary

Would the project:

CEQA Question	Impact Determination
a) Could the project directly or indirectly cause potential substantial adverse effects, including risk of loss, injury, or death involving: i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	Less Than Significant Impact
ii. Strong seismic ground shaking?	Less Than Significant Impact
iii. Seismic-related ground failure, including liquefaction?	Less Than Significant Impact with Mitigation Incorporated
iv. Landslides?	Less Than Significant Impact
b) Result in substantial soil erosion or the loss of topsoil?	Less Than Significant Impact
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	Less Than Significant Impact
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	Less Than Significant Impact
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	No Impact
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	No Impact

4.7.3 Answers to CEQA Checklist Questions

a) Would the project directly or indirectly cause potential substantial adverse effects, including risk of loss, injury, or death involving:

i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

Less Than Significant Impact

The Project is not located within an Alquist-Priolo Earthquake Fault Zone as designated by the CGS (CGS 2023a) and proposes no structures that are designed for human occupancy. The closest Alquist-Priolo fault zones are approximately 4.3 miles west of the Project Area. Therefore, there is no expected adverse effect on people or structures with regard to earthquake rupture as a result of this Project. The risk of fault rupture is a less than significant impact based on existing published data of officially recognized faults and proximity of the Project Area to such faults.

ii. Strong seismic ground shaking?

Less Than Significant Impact

See discussion and analysis for Question 4.7.3a above. The Lake Tahoe basin lies within an area with a high potential for earthquake shaking. It is generally accepted that a maximum credible earthquake in this area would be in the range of magnitude 7 to 7.5 along the Genoa fault system of the eastern Sierra Nevada. The most active segment of this fault system in the Tahoe area is located at the base of the eastern side of the mountains about 8 miles east of the Area. The Project Area is in a zone with a shaking potential of 0.75% of gravity (Branum et al. 2017). The boardwalk and bridge structures would be engineered to Caltrans and California Building Code requirements. These standards have been developed to ensure that structures do not fail during maximum seismic events.

iii. Seismic-related ground failure, including liquefaction?

Less Than Significant Impact with Mitigation Incorporated

The potential for liquefaction as a result of seismic events is high in areas of unconsolidated and saturated fine-grained alluvium such as at the mouth of creeks. The California Department of Conservation and CGS maps do not identify the Project Area as prone to liquefaction (CGS 2023b). However, due to the presence of submerged loose sand soils within the site area west of the Truckee River, a potential for soil liquefaction exists within the Johnson Meadow area (**Appendix H**). Liquefiable soil layers extend as deep as approximately 12 feet bgs. The boardwalk and bridge structures would be engineered to Caltrans and California Building Code requirements for liquefaction. Conventional shallow spread foundations are suitable to support bridge abutments; however, a liquefiable sand soil layer at approximately 5 to 7 feet depth bgs would require mitigation via removal and replacement with densified structural fill beneath and a minimum 5 feet outside the west abutment spread foundation. Project impacts would be less than significant with the following mitigation measure incorporated:

- **GEO-1:** If shallow spread foundations were to be utilized for west abutment and boardwalk support, liquefiable soils beneath these footings shall be mitigated via ground improvement techniques. Driven piles are the preferred foundations for the boardwalk system and these piles shall be designed to provide the needed axial and lateral resistance from dense to very dense soils as well as considering downdrag loads. Native soils east of the river are not liquefiable and the east abutment of the bridge can be supported on shallow spread foundation underlain by native dense to very dense silty sand to silty sand with gravel soils. Whereas driven piles may

impact the existing pipelines, the County shall continue to coordinate with STPUD during design to ensure the existing sewer pipelines in the vicinity are protected.

iv. Landslides?

Less Than Significant Impact

The area is relatively flat and is located partially on existing dirt trails. The Class 1 trail would include sections of pavement, raised boardwalk, and a bridge crossing of the Upper Truckee River. There are no nearby cliffs or areas of steep slopes in which a landslide could occur. The possibility of landslides and seismically induced slope instability is considered low due to topography in the vicinity of the trail alignment. In addition, the California Department of Conservation and CGS maps do not identify the Project Area as prone to landslides (CGS 2023b).

b) Would the project result in substantial soil erosion or the loss of topsoil?

Less Than Significant Impact

The Project description in Section 3 includes provisions to prevent short-term erosion from construction impacts and long-term erosion from operational and maintenance activities.

Short-Term: Construction of the Project involves soil disturbance and vegetation removal from clearing and grubbing activities, grading for cut and fill slopes necessary to achieve final trail grades, and the actual construction of the trail, boardwalk, and bridge. The potential for erosion is greatest during the construction period and prior to establishment of revegetation plantings. Construction activities could cause temporary, short-term increases in runoff, soil erosion, wind erosion and sedimentation within and down gradient of the Project Area. When disturbed sites are not adequately stabilized and revegetated, wind can dislodge soil particles and make them airborne. When runoff bypasses natural processes, this water is not infiltrated and filtered by soils to provide contribution to local groundwater supplies. Excess runoff can overwhelm stream channels with increased water volumes and pollutant concentrations and result in stream bank erosion, loss of vegetation, and reductions in functional aquatic habitat and SEZ.

The facility features and construction controls incorporated into the Project proposal to reduce short-term erosion potential include construction phasing to limit the duration of construction and extent of disturbance present at one time and temporary BMPs. Temporary BMPs provide dust control, protect and stabilize stored materials, define work zones, staging, and access areas to limit disturbance, slow runoff velocity and intercept sediment during storm events, and stabilize slopes during Project construction and initial vegetation establishment periods.

Because of a lack of steep slopes and the presence of fertile soils with good ground cover, the Project Area would not have site challenges to construction that could limit the effectiveness of standard construction controls and facility features.

Long-term: The Project proposal includes hydrologic source controls to infiltrate runoff from the trail surface into the adjacent clear zones and avoid off-site impacts to soils. The Project stabilizes and revegetates areas disturbed during construction and maintains these areas as detailed in the Project Description. Long-term maintenance of these areas minimizes long-term effects to soils. The Project proposal minimizes soil disturbance and loss of topsoil through:

- Revegetation specifications that respond to site-specific conditions
- Stabilization of cut and fill slopes
- Adequate cross drainage
- Bridge span that will avoid the Upper Truckee River channel and associated floodplain
- Installation of asphalt concrete trail on permeable fill/vented trail in areas with evidence of seasonal surface hydrology
- Long-term monitoring and adaptive management strategies to limit new disturbance from user-created unpaved trails

The Project would include facility features and construction controls that are appropriate and adequate to minimize erosion on- and off-site and stabilize soils during and upon completion of excavation, grading, and fill activities. The Project conforms to federal, regional, State, and local codified regulations for the control of soil erosion, thereby reducing potential impacts to less than significant.

c) Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

Less Than Significant Impact

See discussions and analyses under Questions 4.7.3a and 4.7.3b above.

d) Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

Less Than Significant Impact

Soils in the Project Area consist primarily of Tahoe mucky silt loam, drained, 0 to 5 percent slopes (7043), Christopher loamy coarse sand, 0 to 9 percent slopes (7441), Christopher loamy coarse sand, 9 to 30 percent slopes (7442), Christopher-Gefo complex, 0 to 5 percent slopes (7444), and Ubaj sandy loam, 0 to 9 percent slopes (7541). Shallow sand deposits show significant variation in percentages of non-plastic to low plasticity fines (from about 2 to 48 percent). Gravels are generally infrequent within the western floodplain deposits. Surficial and interbedded sandy silt and silt with sand soils within the western limits of the Project Area generally contain approximately 60 to 72 percent non-plastic to low plasticity fines. The surficial fat clay with sand encountered east of the Upper Truckee River exhibits about 80 percent high plasticity fines. The trail and bridge structure would be engineered per the California Building Code standards to avoid risks to persons using the trail and bridge or damage to the trail or bridge during a seismic event.

e) Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

No Impact

The Project does not propose to construct restroom facilities; portable facilities will be provided for construction workers. The Porter-Cologne Water Quality Act requires all sewage and wastewater to be disposed of outside the Lake Tahoe Basin. Therefore, use of septic tanks or alternative wastewater disposal are prohibited in the Lake Tahoe Region.

f) Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

No Impact

The Project Area contains no known unique paleontological resources. Although potentially fossiliferous geologic features were identified approximately 40 feet bgs, the Project does not propose to conduct activities at that depth. Therefore, no paleontological resources or unique geologic features will be directly or indirectly destroyed by the Project. Furthermore, in the event of inadvertent discovery during construction, Caltrans is required to implement procedures to comply with state and federal law pertaining to the protection of resources.

4.7.4 TRPA Questions

TRPA Questions	Answers	Discussion
1a) Compaction or covering of the soil beyond the limits allowed in the land capability or IPES?	No, with Mitigation	TRPA Code Chapter 30 contains the criteria pertinent to land coverage for the Project Area. The Project proposal includes new land coverage and disturbance of SEZs (LCD 1B) for the Class 1 trail and bridge construction. In 2013, TRPA adopted a revised Regional Plan and Code of Ordinances (TRPA 2013) altering the review and required offsetting restoration for certain shared-use trail projects in SEZ. TRPA Code Section 30.4.6.D.3 allows exemption from general SEZ disturbance prohibitions for shared-use trail projects which meet certain criteria. The following discussion identifies that the entire Class 1 trail section meet these criteria: a. Accessibility. The proposed Class 1 trail is a public trail available at no cost. b. Trail Route Design. The proposed Class 1 trail alignment is the most direct trail alignment that minimizes disturbance to sensitive lands, riparian vegetation, and large trees by reducing overall length in wetlands and SEZ and avoiding large trees where possible. It would primarily be constructed on an existing, disturbed trail alignment. c. Trail Design. The proposed Class 1 trail alignment would utilize a boardwalk and bridge to protect the sensitive SEZ habitat and soils, avoid creating obstacles in the Upper Truckee River floodplain, and accommodate seasonal surface flows and high groundwater. Design details for elevated the boardwalk sections allow for wildlife passage under the trail and under the bridge. The Project would also include a groundwater Dewatering Plan as a SWPPP component during construction and would limit removal of riparian vegetation as discussed in Section 4.4.4. Tree removal would also be minimized, and tree removal protection measures would be implemented. d. Limit on Exemption. The Class 1 trail alignment is identified in each of the Lake Tahoe Regions transportation and recreational planning documents (e.g., 2019 Federal Transportation Improvement Program and 2016 Linking Tahoe: Active Transportation Plan) and therefore qualifies for the exemption. e. Existing Trails Do Not Qualify. Trails constructed prior to January 1, 2013 do not qualify for this coverage exemption. Based on this review, the Project is exempt from land coverage transfer under the TRPA Code requirements. However, as described below, the Project must still restore disturbed SEZ to offset the new trail features.

1a) Compaction or covering of the soil beyond the limits allowed in the land capability or IPES? (*cont*.)	No, with Mitigation	**Lahontan** The Lahontan RWQCB adopted amendments in 2014 (Lahontan RWQCB 2014) which include prohibitions for discharge in SEZ and 100-year floodplains (Prohibitions 5.2 and 5.3) as well as possible exceptions to those prohibitions for outdoor recreation projects. The Regional Board may grant exemptions from Prohibitions 5.2 and 5.3 under the following circumstances: a. Roads, trails, and utilities traverse large areas of the landscape, following an alignment chosen to connect different locations (Siller Ranch Resolution No. R6T-2006-0021, page 6). The bowl-like nature of the Tahoe Region in South Lake Tahoe creates drainages with their attendant soil types that travel from the surrounding mountains to Lake Tahoe. It is not possible to create a nonmotorized transportation network within this context that avoids surface waters and associated SEZs. Therefore, such features by their very nature interact with SEZs in areas where crossings are necessary. b. No feasible alternative exists. To restore and improve connection between Barbara Avenue and South Avenue for bike and pedestrian users, a trail and bridge must be constructed between the existing termini of the 2 roadways. To connect these neighborhoods, there is no alternative other than the proposed trail and bridge replacement that will cross the Upper Truckee River and associated SEZ. Alternatives for the Project were analyzed in the Feasibility Report prepared by the County (Appendix I). The Feasibility Report identified the potential alignment alternatives, all of which would require creation of a trail crossing of the Upper Truckee River. The Feasibility Report also compiled BMP alternatives for mitigating specific problem areas and presented the evaluation of the alternatives. Following these steps, a preferred alternative was selected and documented following consensus from the Technical Advisory Committee. Alternative 3 (Project) was chosen based on the favorable river crossing due to river alignment and predictability of flows, and the proposed alignment following the existing user trail near the river. This would minimize disturbance and encroachment within the Upper Truckee River floodplain/SEZ. c. Impacts are fully mitigated. d. EZs are restored in an amount of 1:1.5 of the Project disturbance. Project modifications (asphalt trail, bridge, and boardwalk trail) will disturb at maximum 2.81 acres of SEZ, requiring 4.215 acres of offsetting restoration. Restoration of disturbed SEZ will first be completed by the removal and restoration of existing land coverage/disturbance in the Upper Truckee River vicinity (e.g., footpaths adjacent to the river, removal of the damaged bridge). Any additional restoration credits required for the Project will originate from locations under the jurisdiction of El Dorado County, or if unavailable, from the California Land Bank. As of 2016, the land bank identified restoration credit available of approximately 6.129 acres. See mitigation measure BIO-13 in Section 4.4. The Project proposal, including the provisions for BMPs and on-site SEZ restoration where possible, meets the findings necessary to avoid significant impact from additional encroachment in low capability lands.

1b) A change in the topography or ground surface relief features of site inconsistent with the natural surrounding conditions?	No	Field evaluations identify no unique geologic or physical features within the Project Area that could be destroyed, covered, or modified. The Project proposal complies with the TRPA Code Site Development Provisions and Grading and Construction Provisions, creates no impact to native geologic substructures, and minimizes changes in topography. The proposal locates the Class 1 shared-use path in areas of moderate slope – with short segments reaching 9 – 11 percent grade to conform to existing topography. Cut and fill slopes along the shared-use path alignment do not exceed 5 feet in depth.
1c) Unstable soil conditions during or after completion of the proposal?	No	The Project Description includes provisions to prevent short-term erosion from construction impacts and long-term erosion from operational and maintenance activities. See discussion for question 4.7.3b. This evaluation concludes that the Project proposal includes facility features and construction controls that are appropriate and adequate to minimize erosion on- and off-site and stabilize soils during and upon completion of excavation, grading and fill activities. The Project conforms to federal, regional, State, and local codified regulations for the control of soil erosion, thereby reducing potential impacts to less than significant.
1d) Changes in the undisturbed soil or native geologic substructures or grading in excess of 5 feet?	Yes	Excavation of footings would be required, each from 5 to 10 feet in depth. Excavation conducted during construction of the surface path will be approximately one and a half feet in depth, or within the approximate prism of previous disturbance. The Project would avoid cut slopes in SEZs. Preliminary field evaluations identified no severe soil constraints that preclude grading and construction activities except for areas of potential shallow groundwater and potential liquefaction along the Upper Truckee River near the bridge footings. The Project proposal addresses these geotechnical constraints by placing a bridge span over the Upper Truckee River channel and floodplain, with reinforced footings to reduce risk of liquefaction. TRPA prohibits excavations deeper than 5 feet because of the potential for groundwater interception or interference, except under defined and permitted conditions. Compliance with TRPA Code Subsection 33.3.6 reduces the potential impacts from excavations to a level of less than significant through conformance with codified regulations.

1e) The continuation of or increase in wind or water erosion of soils, either on or off the site?	No	The Project Description includes provisions to prevent short-term erosion from construction impacts and long-term erosion from operational and maintenance activities. See discussion and analysis for Question 4.7.4-1c above.
1f) Changes in deposition or erosion of beach sand, or changes in siltation, deposition or erosion, including natural littoral processes, which may modify the channel of a river or stream or the bed of a lake?	No	The Project Area does not include shore zone area. The Project would avoid new encroachments to the Upper Truckee River channel below its 100-year floodplain at the bridge span, and therefore, creates no significant impacts to the river channel. By removing and replacing the existing damaged bridge, the Project would improve the current deposition and erosion issues observed in the Project Area.
1g) Exposure of people or property to geologic hazards such as earthquakes, landslides, backshore erosion, avalanches, mud slides, ground failure, or similar hazards?	No	See discussion and analyses for Questions 4.7.3a – d, which conclude that potential impacts from geologic hazards would be less than significant.

4.8 Greenhouse Gas Emissions

The term greenhouse gas (GHG) is used to describe atmospheric gases that absorb solar radiation and subsequently emit radiation in the thermal infrared region of the energy spectrum, trapping heat in the Earth's atmosphere. GHGs of concern include carbon dioxide, methane, nitrous oxide, and fluorinated gases. Unlike emissions of criteria and toxic air pollutants, which have local or regional impacts, emissions of GHGs have a broader, global impact.

GHGs differ by the amount of heat each traps in the atmosphere, known as global warming potential. Carbon dioxide is the most significant GHG, so amounts of other gases are expressed relative to carbon dioxide, using a metric called "carbon dioxide equivalent" (CO_2e). The global warming potential of carbon dioxide is assigned a value of 1, and the warming potential of other gases is assessed as multiples of carbon dioxide. Generally, estimates of all GHGs are summed to obtain total emissions for a project or given time period, and are usually expressed in metric tons or million metric tons CO_2e.

4.8.1 Environmental Setting

The AQMD is the primary agency responsible for air quality regulation in the LTAB. At this time, El Dorado County does not have any adopted quantitative federal or state guidelines for GHG emission impacts.

However, the AQMD was part of the committee of air districts in the Sacramento Region involved in the development of GHG thresholds of 1,100 metric tons of CO_2e per year for the construction phase of projects. If a project exceeds this threshold, the level of mitigation is based on demonstrating consistency with CARB's Climate Change Scoping Plan and Assembly Bill (AB) 32 goals for reducing GHG emissions, which is currently 21.7 percent reduction from 2020 "no action taken" emissions (Sacramento Metropolitan AQMD 2020).

Effects of climate change are already seen. According to the National Council on Environmental Quality, "Rising GHG levels are causing corresponding increases in average global temperatures and in the frequency and severity of natural disasters including storms, flooding, and wildfires. Even if the United States and the world meet ambitious de-carbonization targets, those trends will continue for many years, adversely affecting critical components of the human environment, including water availability, ocean acidity, sea-level rise, ecosystem functions, biodiversity, energy production, energy transmission and distribution, agriculture and food security, air quality, and human health" (Council on Environmental Quality 2023).

The US Climate Resistance Tool Kit is a free online model developed cooperatively by several government agencies and was used to evaluate likely future climate changes in the Lake Tahoe portion of El Dorado County. Likely future climate changes impacting the Project Area include:

- High temperatures (days over 90 def F) will reach approximately 43 days annually within the next 50 years. This is an approximate 25 percent increase from the 1976 – 2005 baseline period. This is considered relatively low by national standards.
- Wildfire risk in the Lake Tahoe region is substantial. Climate change is not expected to increase consecutive dry days or change the total number of annual dry days. Smoke from fires in the

adjacent mountains has negatively impacted air quality and this is expected to continue. By national standards, this risk is moderate.

- Drought is not expected to worsen over the next 50 years.
- Flood risk is relatively moderate by national standards, and the new trail and bridge were designed by El Dorado County to accommodate future flooding.
- Coastal inundation risk is nil.

4.8.2 Regulatory Setting

Federal

The EPA has no regulations or legislation enacted specifically addressing GHG emissions reductions and climate change at the project level. In addition, the EPA has not issued explicit guidance or methods to conduct project-level GHG analysis.

State

The State of California has taken several legislative steps including ABs and Executive Orders to reduce increases in GHG emissions. CARB is the lead agency in the development of reduction strategies for GHGs in California (CARB 2017). California's GHG reduction requirements aim to reduce VMT, thereby improving air quality by reducing GHG emissions from automobiles.

In response to the Intergovernmental Panel on Climate Change reports, California Governor Brown signed Senate Bill 32 in 2016. This bill established a 2030 GHG reduction target of 40 percent below 1990 levels. A multi-agency "Climate Action Team," identified a range of strategies and the Air Resources Board has approved the Climate Change Scoping Plan. The Plan provides measures to reduce GHG emissions 40% below 1990 levels by 2030 and achieve carbon neutrality by 2045. A key feature of the Scoping Plan applicable to the Project is the goal to "develop walkable and bikeable communities."

Local

GHG planning guidance for the Lake Tahoe Basin is outlined in the 2020 Regional Transportation Plan (RTP) which anticipates reducing GHG emissions by focusing on regional land use and transportation policies. Strategies in the 2020 RTP include transit programs (free-to-the-user transit, transit priority access, transit schedule coordination, etc.), parking management, and mobility improvements such as this Project (TRPA 2020).

4.8.3 CEQA Checklist Summary

Would the project:

CEQA Question	Impact Determination
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	Less Than Significant Impact

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	Less Than Significant Impact

4.8.4 Answers to CEQA Checklist Questions

a) Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Less Than Significant Impact

Construction would generate temporary and one-time GHG emissions mainly from diesel-powered construction equipment and on-road trucks, with a small amount from workers' personal vehicles during construction of the Project. GHGs emitted during the combustion of diesel fuel in off-road construction equipment and on-road vehicles would consist mainly of carbon dioxide, along with small amounts of methane and nitrous oxide. Construction emissions would be intermittent and short-term throughout a 120-day construction season. CARB requires fleet owners to report their equipment tiers every year. Fleet size is determined by aggregate gross horsepower. CARB has determined that more than 50 percent of diesel equipment is now Tier 4F (Levine, Johanna, CARB, personal communication on December 13, 2022), which produces the lowest emissions. Over the long-term, these temporary emissions would be offset by reducing VMT by providing an alternative mode of transportation in the area.

The Project was estimated to emit approximately 362 annual metric tons of CO_2e (**Appendix B**) during the construction year. Being part of the Sacramento region non-attainment area, AQMD has adopted the Sacramento Metropolitan AQMD significance thresholds. The estimated amount is significantly less than the Sacramento Metropolitan AQMD significance threshold of 1,100 metric tons of CO_2e per year. GHG emissions would terminate following the completion of construction work. Therefore, it can be inferred that with the implementation of the same controls, the Project would have a less than significant impact on GHG emissions during construction.

b) Would the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Less Than Significant Impact

Given that emissions would be temporary over the course of 5.5 months, increases in GHG emissions that could be attributed to the Project would not result in a significant impact on the environment and would not limit the State's ability to attain the goals identified in AB 32 because impacts would be temporary and are below the significance threshold amount. The Project would further State goals to reduce VMT by improving a bike and pedestrian trail and bridge. Therefore, the Project would have a less than significant impact on GHG emissions and would not conflict with goals defined in AB 32.

4.9 Hazards and Hazardous Materials

4.9.1 Environmental Setting

A search of the Project site was carried out on the State Water Resources Control Board's Geotracker website (CSWRCB 2023) and the Department of Toxic Substances Control EnviroStor website (CDTSC 2023). There are no hazardous sites located within or adjacent to the Project Area.

4.9.2 CEQA Checklist Summary

Would the project:

CEQA Question	Impact Determination
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	Less Than Significant Impact
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	Less Than Significant Impact
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	Less Than Significant Impact
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	No Impact
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	Less Than Significant Impact
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	Less Than Significant Impact
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	Less Than Significant Impact

4.9.3 Answers to CEQA Checklist Questions

a) Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Less Than Significant Impact

The Project's use of hazardous materials would be limited to fuels and other maintenance-related chemicals to run machinery. New asphalt and treated wood materials would be used to construct the trail.

Transport and use of hazardous materials would be minimal. The use, storage, and management of fuels and other vehicle-related chemicals as well as construction materials would be managed according to the on-site SWPPP. For example, the SWPPP requires that equipment fueling and maintenance, if

performed at the job site, must be performed in a designated area utilizing secondary containment with a spill kit nearby. No disposal of hazardous materials is anticipated as part of this Project. Implementation of the required SWPPP would ensure impacts during construction would be less than significant. There would be no operational uses of hazardous materials associated with the Project.

b) Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Less Than Significant Impact

There are no hazardous material sites identified by Envirostor (CDTSC 2023) in the vicinity of the Project that could be disturbed by construction or operation. As described above in 4.9.3(a), hazardous materials would only be used during construction and use is expected to be minimal. The required on-site SWPPP would manage use of fuels and chemicals and would outline requirements for spill procedures. The potential for upset and accident is less than significant.

c) Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

Less than Significant Impact

The nearest school to the Project Area is Kindertown Preschool and Jubilee Kid's Academy Inc., located approximately one-quarter mile to the north of the Project Area. As discussed above, hazardous materials are anticipated to be used during construction only. Construction-related vehicles and equipment would produce routine emissions that would be temporary and less than significant. For further discussion of air quality see Section 4.3.

d) Would the project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code §65962.5 and, as a result, would it create a significant hazard to the public or the environment?

No Impact

There are no hazardous material sites identified by Envirostor (CDTSC 2023) in the vicinity of the Project, therefore the Project would have no impact.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?

Less Than Significant Impact

The nearest airport, Lake Tahoe Airport, is approximately 1.5 miles from the Project site. The Project Area is located within a comprehensive land use planning area. The Comprehensive Land Use Plan for the Lake Tahoe Airport has determined the Project site lies outside of the safety zones and excessive noise levels of the Airport. In addition, the Project would not involve habitable improvements that

would be sensitive to airport operations. Workers and future trail users would not be affected by excessive noise or safety risks from the Airport.

f) Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

Less Than Significant Impact

The Project would involve the construction of a shared-use path between the Barton Hospital area (west of the Upper Truckee River) and the Tahoe Sierra neighborhood/Lake Tahoe Community College area. Emergency response and evacuation would be maintained throughout construction and implementation of the trail and would not interfere with an adopted emergency or evacuation plan. The trail may serve the community as an additional egress route connector out of the Tahoe basin during emergencies. Replacement of the damaged bridge and construction of the paved Class 1 path and elevated boardwalk would improve emergency evacuation opportunities and capability along the trail alignment. The proposed Class 1 path alignment connects to a designated South Lake Tahoe evacuation location at the Caltrans snow storage lot, with connection to neighborhoods and Barton Hospital.

g) Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?

Less Than Significant Impact

The Project would involve the construction of a paved shared-use path in order to establish a convenient, shared-use transportation alternative and provide recreational experience for residents and visitors. As discussed in Section 4.20, portions of the Project are located within a very high fire hazard severity zone. The City of South Lake Tahoe Emergency Operations Plan includes evacuation routes and procedures for use in the event of a disaster. The trail may serve the community as an additional egress route connector during an emergency such as a wildfire. The Project would not result in an increased risk of loss, injury or death involving wildland fires.

4.9.4 TRPA Checklist

Will the proposal:

TRPA Questions – Risk of Upset	Answers	Discussion
10a) Involve a risk of an explosion or the release of hazardous substances including, but not limited to, oil, pesticides, chemicals, or radiation in the event of an accident or upset conditions?	No	Refer to CEQA item 4.9.3(a). Use and storage of typical construction materials would occur during construction. Materials would be used, stored, and disposed of in accordance with federal, state, and local laws including Lahontan RWQCB use of the Project SWPPP. Use of the Project SWPPP would protect against significant risk associated with hazardous materials used during construction. Once constructed, the Project would not require the use of hazardous substances. There would be no radiation associated with the Project.
10b) Involve possible interference with an emergency evacuation plan?	No	The Project proposes to construct a trail in an area currently lacking connectivity to adjacent trails and roads used as egress in the event of an emergency. The Project, once constructed, has potential to improve emergency evacuation by providing for an additional paved trail with connection to egress areas.

Will the proposal result in:

TRPA Questions – Human Health	Answers	Discussion
17a) Creation of any health hazard or potential health hazard (excluding mental health)?	No	The Project is not anticipated to create a human health hazard, including either through significant contributions to air quality/GHGs, impact on sensitive receptors, release of hazardous materials during construction, or other impacts to the environment which may impact human health. All impacts have been identified as less than significant, and once constructed, the trail has potential for beneficial impacts to human health.
17b) Exposure of people to potential health hazards?	No	There are no hazardous waste sites near the project area, unique geologic hazards, airport safety or noise hazards, or air emission hot spots that would impact the project area. The Project would not expose people to potential health hazards.

4.10 Hydrology and Water Quality

4.10.1 Environmental Setting

The Project Area is in the Upper Truckee River watershed, which is the largest watershed in the Lake Tahoe Basin. The Upper Truckee River watershed is approximately 10 miles in length and 6.5 miles in width with a slightly elongated shape and a spur in the northwest region encompassing the Echo Lake drainage. In general, the watershed consists of mountainous terrain within the unincorporated area of El Dorado County at elevation ranges from 6,320 to 9,590 feet. The banks of the Upper Truckee River show destabilization of the stream corridor and erosion and contribute significant amounts of sedimentation to the river.

The Project is within the jurisdictional limits of the State of California Lahontan RWQCB, which uses the Lahontan Basin Plan as its regulating document. The Lahontan RWQCB identifies beneficial uses for the Upper Truckee River in Table 2-1 in the Lahontan Basin Plan as: municipal and domestic supply, agricultural supply, groundwater recharge, navigation, water contact recreation and noncontact recreation, commercial and sport fishing, cold freshwater habitat, wildlife habitat, migration of aquatic organisms, spawning, reproduction, and development of fish and wildlife.

The Feasibility Report was developed by the County pursuant to the Storm Water Quality Improvement Committee guidelines for Environmental Improvement Program projects in the Tahoe Basin. The Feasibility Report, included as **Appendix I**, provides figures, methodology, and detailed information about the hydrology, hydraulics, and water quality for the Project.

The Feasibility Report identifies water quality objectives for the Project as:

- Reduce fine (less than 20 microns) and coarse sediment, stormwater runoff volume, and peak flows by 33%, to the maximum extent practicable.
- Stabilize eroding cut slopes, roadside ditches, and capture road abrasives utilizing source control BMPs.

Hydrologic Conditions

A Final Hydrologic Analysis Report prepared by the County (El Dorado County 2024) investigated flows along the Upper Truckee River in the vicinity of the proposed bridge crossing (**Table 3**).

Table 3. Hydrograph Analysis of Proposed Bridge Crossing.

Return Period (flood frequency)	Peak Flow (cubic feet per second)
10-year	2,416.8
25-year	3,489.7
50-year	4,459.3
100-year	5,594.9

There are varying regulatory requirements associated with bridge design for freeboard between water surface elevation and bridge elevation (discussed in Regulatory Environment below).

Soil Characteristics and Groundwater

The Upper Truckee River is experiencing incision resulting from historical land use including diversion and channelization for ranching and logging operations. The incising of the Upper Truckee River has resulted in lower groundwater compared to historic levels and the overall drying of the Johnson Meadow observed today (Ascent 2020).

Corestone Engineering, Inc. conducted a geotechnical investigation of the proposed Project Area. The full Geotechnical Report is attached as **Appendix H**. Groundwater was encountered in each soil boring sample at depths ranging between 4 and 10 feet bgs. Groundwater was encountered at depths of 4.0 to 5.5 feet within the Johnson Meadow area west of the Upper Truckee River. The eastern boring that was drilled from somewhat higher ground elevations than the river level encountered groundwater at 10 feet bgs. Fluctuations in the groundwater table will occur due to rainfall, temperature, seasonal runoff, Upper Truckee River water level, and other factors. Groundwater near the Upper Truckee River will generally be controlled by the river water level. Groundwater is expected to affect the excavations for footings west of the river and will warrant dewatering and excavation bottom stabilization efforts.

Floodplain and Regulatory Flood Zones

FEMA has designated a floodplain associated with the Upper Truckee River (**Figure 11**). Flood Insurance Rate Maps show areas of high- and moderate- to low-flood risk areas, designated by ‘zones.’ The floodplain designations within the Project Area are identified on map panel 06017C0386F, effective April 3, 2012, and include:

- Zone AE: The bridge structure, abutments, and footing, and the boardwalk approach structures are proposed within Zone AE, a ‘Special Flood Hazard Area’ regulatory floodway associated with the Upper Truckee River. This zone is also known as the 100-year floodplain. An area designated

AE is considered high-risk and has a 1% annual chance of flooding with the known base flood elevations provided.

- Zone X: Areas between the limits of the 100- and 500-year floodplains. Zone X has a 0.2% annual chance of flooding (i.e., a 500-year flood hazard), including areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile. Zone X is considered a 'moderate' flood hazard area.

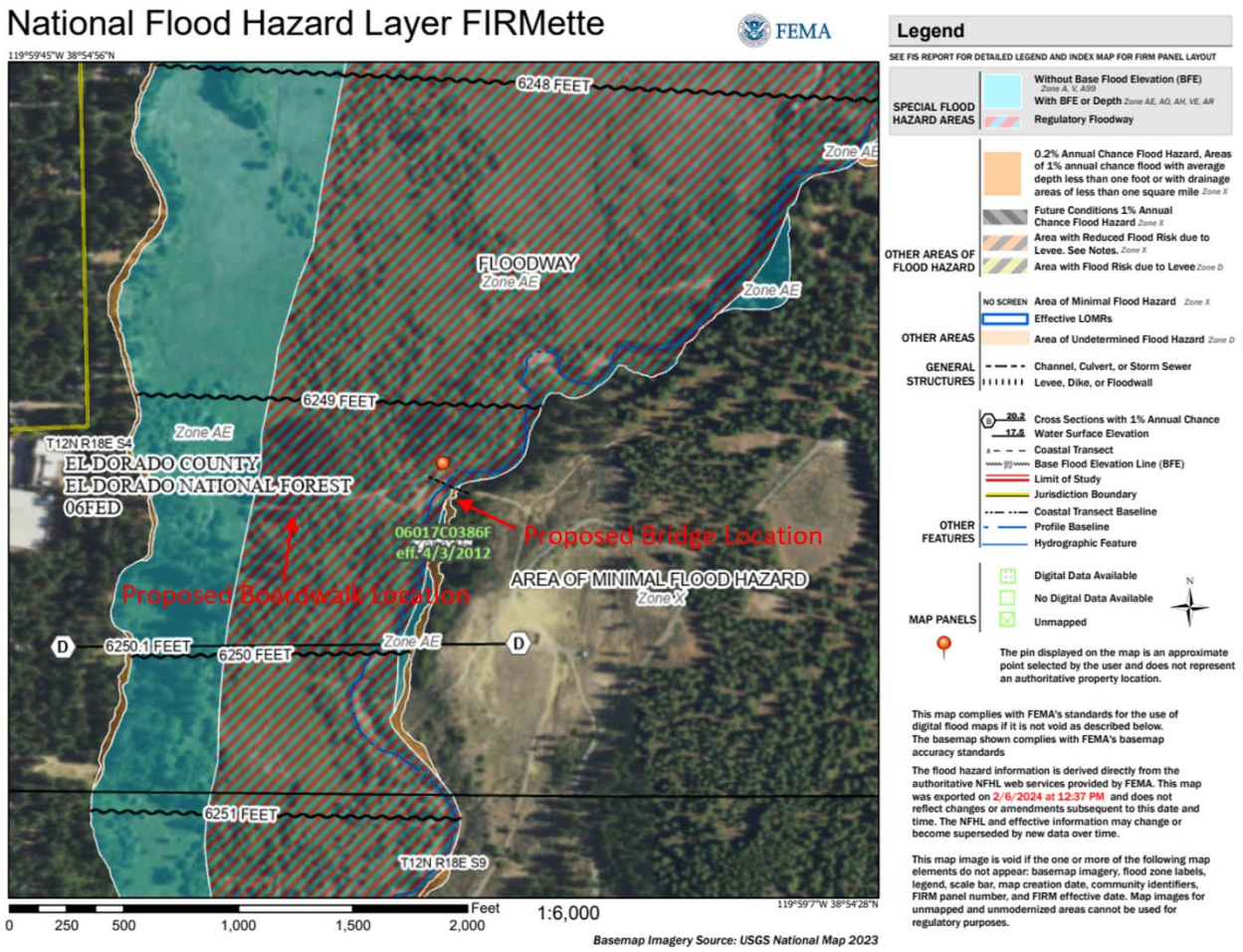


Figure 11. FEMA Flood Hazard Layer Map (Panel 06017C0386F)

4.10.2 Regulatory Setting

Federal

National Flood Insurance Program

FEMA implements the National Flood Insurance Program. Per Section 60.3(d)(3) of the National Flood Insurance Program regulations regarding floodplain management, the placement of fill, new construction, substantial improvements, and other development within the adopted regulatory floodway cannot result in any increase in flood levels during occurrences of the base flood discharge (100-year event).

State

Statewide Construction General Permit

Because the proposed Project would disturb more than 1 acre, it is subject to the statewide Construction General Permit Order 2009-0009-DWQ, which regulates stormwater leaving construction sites. Under this Order, site owners must notify the state and implement a SWPPP prepared by a

Qualified SWPPP Developer. The SWPPP must outline measures that would protect hydrology and water quality resources, including groundwater, from negative impacts during construction through implementation of BMPs and monitoring the effectiveness of BMPs. This permit is administered by the State Water Resources Control Board and overseen by the RWQCB.

Caltrans

The Final Hydrologic Analysis Report (El Dorado County 2024) was prepared to ensure that the proposed bridge would meet the specific design standards provided by both the El Dorado County, Department of Transportation and Caltrans. The El Dorado County Department of Transportation does not provide specific freeboard (the vertical clearance between the lowest structural member and the water surface elevation of the design flood) design criteria. However, the County has a practice of designing freeboard based on the Caltrans Highway Design Manual (Caltrans 2019). The proposed bridge design will satisfy the following standards and design criteria:

- County of El Dorado Drainage Manual, dated March 1995
- Caltrans Local Assistance Procedure Manual, Exhibit 11-B, dated March 2022
    - The basic rule for hydraulic design of bridges is that they should be designed to pass the 2 percent probability flood or tide (50-year) or the flood-of-record, whichever is greater without causing objectionable backwater, excessive flow velocities, or encroaching on through traffic lanes. Sufficient freeboard should be provided. A minimum freeboard of 2 feet is often assumed for preliminary bridge design.
    - The final design should be able to convey the base flood (100-year flood).
    - The minimum design flood for foundation analysis should be the base flood. Bridges with scourable beds should withstand the effects of the base flood without failure.

4.10.3 CEQA Checklist Summary

Would the project:

CEQA Question	Impact Determination
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?	Less Than Significant Impact
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	Less Than Significant Impact
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would: i. result in substantial erosion or siltation on- or off-site;	Less Than Significant Impact
ii. substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;	Less Than Significant Impact

iii. create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	Less Than Significant Impact
iv. impede or redirect flood flows?	Less Than Significant Impact
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	Less Than Significant Impact
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	No Impact

4.10.4 Answers to CEQA Checklist Questions

a) Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?

Less Than Significant Impact

Grading, excavation, and general ground disturbance associated with construction of the Project may cause direct and indirect short-term impacts to surface water and beneficial uses and contribute to polluted stormwater runoff discharging to the Upper Truckee River. For the proposed bridge and boardwalk structures, shallow groundwater associated with the SEZ may be encountered during installation of the bridge abutments and footings, requiring dewatering during construction.

The current Project design does not consider infiltration trenches or vegetated swales, and instead allows for sheet flow to take advantage of the existing terrain and landscapes for storm water runoff, as preferred for the Johnson Meadow restoration project. The boardwalk is elevated a minimum 2.5 feet above surface level to allow for such flows.

As discussed under “Regulatory Environment,” the Project would require the County to prepare and submit a SWPPP to the Lahontan RWQCB to comply with the Stormwater General Permit. As part of the SWPPP, the contractor would be required to prepare and adhere to a Temporary BMP Plan, a Spill Contingency Plan, and a Dewatering Plan that would be approved by the County. The plan would designate BMPs to minimize impact from erosion and sedimentation. Construction site stormwater BMPs would follow the Caltrans Construction Site BMPs Manual (Caltrans 2017) and the TRPA BMP Handbook (TRPA 2014) to control and minimize the impacts of construction related activities to water quality. Design features and construction controls have been incorporated into the Project during planning and design and are intended to avoid, reduce, and minimize potential effects to surface water quality and beneficial uses.

The following controls, at a minimum, would be required at the site during construction:

- Temporary erosion and sediment control BMPs to prevent the transport of earthen materials and other construction waste materials from disturbed land areas, stockpiles, and staging areas during periods of precipitation or runoff (such as silt fence, erosion control fabric, fiber rolls).

- Tracking controls (such as designated ingress and egress areas) and designated staging areas outside of drainage, swale, and SEZ areas.
- Staging area restoration in accordance with TRPA Code Section 61.4.
- Temporary BMPs to prevent wind erosion and sediment transport of disturbed areas, such as use of water for dust control and covering of stockpiles.
- Limit grading to May 1 through October 15, unless an exemption is granted by TRPA, and a variance is granted by the Lahontan RWQCB. At the end of the grading season or before completion of the Project, all surplus or waste earthen materials from the site would be removed and disposed of at a TRPA approved disposal site or stabilized on-site in accordance with TRPA and Lahontan RWQCB regulations.
- Include a Spill Prevention Plan as part of the SWPPP to plan for responding to and avoiding accidental spills during construction. Project contractors would be responsible for storing on-site materials and temporary BMPs capable of capturing and containing pollutants.
- Develop and implement a Dewatering Plan as a SWPPP component.
- Use vegetation protection fencing to prevent damage to trees or other vegetation where possible.
- Use construction boundary fencing to limit land disturbance to areas not planned for construction.

Because the Project must comply with requirements to implement a project specific SWPPP, Storm Water Management Program, and the associated BMPs designed to mitigate construction impacts on water quality, potential construction related impacts to surface water quality and beneficial uses of the Upper Truckee River would be less than significant.

For groundwater resources, the Project would require placement of support abutments/footings for the bridge structure more than 5.0 feet bgs. As indicated by the boring data collected in 2024, groundwater was encountered as shallow as 4.0 to 5.5 feet bgs within the Johnson Meadow area west of the Upper Truckee River. Therefore, groundwater interception during bridge construction is anticipated.

According to the TRPA Code Subsection 33.3.6B, excavation over 5 feet in depth or that may interfere with groundwater is prohibited unless the following findings can be made:

- A soils/hydrologic report has been prepared and approved by TRPA, and demonstrates that no interference or interception of groundwater will occur as a result of Project excavation;
- The excavation is designed such that no tree removal occurs to mature trees, except where tree removal is allowed pursuant to Subsection 33.6.5: Tree Removal, including root systems and hydrologic conditions of the soil. To ensure the protection of vegetation necessary for screening, a special vegetation protection report shall be prepared by a qualified professional identifying measures necessary to ensure damage will not occur as a result of the excavation; and
- Excavated material is disposed of pursuant to subsection 33.3.4: Disposal of Materials, and the Project Area's natural topography is maintained. If groundwater interception or interference will occur as demonstrated by a soils/hydrologic report, then the excavation can be made as an

exception provided that measures are included in the Project to maintain groundwater flows to avoid adverse impacts to SEZ vegetation and to prevent any groundwater or subsurface water flow from leaving the Project Area as surface flow.

The Project design directly addresses and minimizes impacts from excavation, grading, or filling to reduce potential impacts to soils. For construction of the bridge and boardwalk approach structures within the SEZ, additional measures would be implemented to avoid water quality impacts from interception of groundwater. These measures include defining specific work zones and protecting existing vegetation through measures such as dry-season construction. Project boardwalk design that includes helical piers avoids significant amounts of ground disturbance for footing construction. Excavation for the bridge abutment and support footing would likely encounter groundwater. The Dewatering Plan, a SWPPP component, requires Project features to include capture, storage, and appropriate discharge for groundwater.

Components of the Dewatering Plan would require that excavation sites be protected with sandbags, water berms, siltation fences, or other Lahontan RWQCB-approved techniques. Localized pumping would clear the construction area of turbid standing water. Pumped water could be used to irrigate planted vegetation, sprayed on uplands to allow infiltration within the Project Area, held in Baker Tanks, or otherwise treated to remove suspended sediment to comply with the requirements of Lahontan RWQCB Order No. R6T-2017-0010.

Additionally, as part of the final Project approvals, the County would be required to submit and obtain a TRPA Soils/Hydrologic report (TRPA Code Subsection 33.3.6B). The report would include a summary of the geologic, soil, and hydrologic conditions expected to be encountered within the Project corridor and the qualifications of the personnel conducting the soil/hydrologic investigation. The report would also be required to include measures to ensure groundwater flows are maintained to avoid impact to SEZ vegetation and to prevent groundwater from leaving the site as surface water. Compliance with TRPA Code Subsection 33.3.6B would ensure groundwater quality, movement, and SEZ vegetation is minimized during construction.

Because the Project is required to comply with local, state, and federal requirements for protection of surface and groundwater quality during construction, implementation of the required controls would ensure that the Project would not result in a violation of any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality.

b) Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Less Than Significant Impact

As discussed under “Environmental Setting” and Question 4.10.4a, the Project Area contains groundwater at depths of approximately 4 to 10 feet bgs. Groundwater was encountered at depths of 4.0 to 5.5 feet within the Johnson Meadow area west of Upper Truckee River. Construction of bridge abutments and support footing, in addition to construction of the raised boardwalk structure, could intercept groundwater during construction, affecting both groundwater quantity and movement. The Project plan would address this effect, if necessary, by constructing during the driest conditions possible,

and by implementing a Dewatering Plan that reduces short-term impacts. Once constructed, the Project would have no effect on groundwater quantity.

As part of Project design, sheet flow and groundwater infiltration on existing terrain would be accommodated along the length of the shared-use path alignment. Trail drainage design elements, in addition to the Dewatering Plan implemented during construction, would maintain the existing direction and rate of groundwater movement.

Implementation of the Dewatering Plan and design drainage of the trail would ensure compliance with requirements for protection of groundwater during construction as outlined in TRPA Code 33, Lahontan Basin Plan Chapter 5.7, and Lahontan RWQCB Order No. R6T-2017-0010.

c) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

i) Result in substantial erosion or siltation on or off-site?

Less Than Significant Impact

The Project proposes to remove the existing damaged bridge in the Upper Truckee River, which is causing debris accumulation, sedimentation, and bank instability. This bridge would be replaced with one that completely spans the river. As discussed in detail in Question 4.10.4a, implementation of the SWPPP and Dewatering Plan BMPs would ensure construction activities would not result in a substantial increase in erosion or siltation on- or off-site.

Upon completion, the new bridge would eliminate debris accumulation, sedimentation, and bank instability within the project area. There would be no impact to the existing drainage pattern of the river with the potential to result in erosion or siltation on or off-site.

The Project proposes an addition of impervious surface to the site by paving the proposed Class 1 trail segment, mostly over the existing single-track dirt trail alignment. The Class 1 segment of paved trial would begin at the end of pavement at Barbara Avenue and continue for approximately 5,075 linear feet, ending at the proposed boardwalk structure approaching the bridge abutment. The path would be 10 feet wide, resulting in approximately 50,750 square feet of impervious surface area.

Runoff from the paved surface would be allowed to sheet flow and infiltrate over the existing terrain and landscape, which is generally flat. Therefore, once the Project is constructed, it would not result in substantial erosion or siltation on- or off-site.

ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

Less Than Significant Impact

As discussed under “Environmental Setting,” one of the goals of the Project is to reduce peak flows and volumes within the Project Area while providing treatment for sediment sources and other pollutants of primary concern. The Project proposes to achieve this by allowing sheet and flow and infiltration over the existing terrain and landscape along the trail alignment. Once the Project is constructed, surface

flows and volumes would infiltrate, therefore, the Project would have a less than significant effect on surface runoff and flooding.

iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

Less Than Significant Impact

During construction, grading and excavation has the potential to cause a temporary increase in polluted surface runoff. However, with implementation of the required erosion and sediment construction control BMPs, construction of the Project would not substantially increase the rate or amount of erosion and sediment in runoff. The project is small in size and would result in approximately 50,750 square feet (1.17 acre) of new impervious surface area along a linear path, which is designed to allow sheet and flow and infiltration over the existing terrain and landscape along the trail alignment. This would not result in significant runoff and would have no effect on an existing or planned stormwater drainage system. Therefore, the Project would have a less than significant impact.

iv) Impede or redirect flood flows?

Less Than Significant Impact

As discussed under "Regulatory Setting" above, the County has defined the threshold of significance as meeting freeboard design standards based on the Caltrans Highway Design Manual. The County has determined that compliance with the Caltrans bridge design requirements listed in the Environmental Setting is sufficient to avoid potentially significant flooding hazards.

FEMA establishes Base Flood Elevations (BFEs) to identify areas at high risk of flooding. BFEs represent the height at which floodwaters are expected to rise during a base flood, which is typically a flood with a 1% annual chance of occurring, also known as a 100-year flood. These elevations are determined through detailed hydrologic and hydraulic analyses of historical flood data, topographic surveys, and watershed characteristics. In contrast, site-specific calculated elevations using hydrologic analysis consider more localized factors such as gage data, changes in land use, and specific rainfall-runoff relationships. While BFEs provide a standardized reference for floodplain management and insurance purposes, calculated elevations offer a tailored assessment that can reflect current conditions more accurately, potentially revealing discrepancies between FEMA's broader estimations and the actual flood risk for a specific property or region. Therefore, the County assumes the FEMA calculated BFE is very conservative and will utilize this information as a basis for the proposed bridge design elevation. The County's calculated water surface elevations shown in the hydrologic analysis will be used for modeling potential scour at the bridge foundation and elevated boardwalk supports.

The hydrologic study specifically included proposed bridge abutments with rock armoring, and boardwalk piers in the post-construction condition (El Dorado County 2024). The cross section provided in the Final Hydrologic Analysis Report **Appendix J** from hydraulic modeling indicates that the current 100-year and 50-year event water surfaces are 6,243.80 feet and 6,243.44 feet, respectively. The cross section provided in **Appendix J** from hydraulic modeling indicates that the 100-year and 50-year event water surfaces after Project construction would be 6,243.84 feet and 6,243.46 feet, respectively. To

maintain the required minimum 3-foot freeboard (the additional height above the Base Flood Elevation used as a safety factor) for design flood (50-year event), the low chord elevation of the bridge must be located at or above an elevation of 6,246.46 feet. The proposed preliminary design provides an approximate low chord elevation of 6,248.2 feet, which exceeds freeboard requirements at 4.74 feet in a 50 year event, and 4.36 feet in a 100 year event.

Because it is County practice to design bridge structures in accordance with Caltrans bridge design requirements, final design of the bridge structure would ensure that the structure can retain the 2 percent probability flood (50-year) or the flood-of-record, whichever is greater, without causing objectionable backwater, excessive flow velocities, or encroaching on through traffic lanes; and be able to convey the base flood (100-year flood), and withstand effects of the 100-year base-flood on scour without failure. Additionally, use of a raised boardwalk design with helical footings would further reduce impact within the floodplain. As outlined in the hydrology report (El Dorado County 2024) and in the draft plans, the bridge and the boardwalk meet these standards. The County relied on USGS data for their modeling, which is more current and accurate than FEMA data. While FEMA flood flows are more conservative, the current bridge design is well above both the report's modeled elevations and FEMA elevations (See **Appendix J**, Part II, page 29, Bridge Scour RS = 1585 Figure), which can accommodate anticipated fluctuations in weather conditions over the life of the bridge and boardwalk structures.

Therefore, design standards would ensure that construction of the bridge structure and boardwalk approach within the 100-year flood zone (Zone AE) would not result in any increase, redirection, or impediment of flood flows during occurrence of the 100-year event, consistent with FEMA regulatory floodplain design requirements.

d) In flood hazard, tsunami, or seiche zones, would the project risk release of pollutants due to project inundation?

Less Than Significant Impact

As discussed under "Environmental Setting," the Project Area is within a FEMA-designated Special Flood Hazard Area, and bridge design will accommodate the base (100-year) flood. The chance of an earthquake strong enough to cause a seiche in Lake Tahoe is only 3 to 4 percent over 50 years (Ichinose et al. 2000), so tsunamis and seiches are not considered likely to occur (Tahoe Metropolitan Planning Organization and TRPA 2012). The Project Area is 0.2 miles from Lake Tahoe, so an impact is possible, but the likelihood of Project inundation is low, and risk of release of pollutants due to inundation is temporary during construction. Therefore, there would be a less than significant impact.

e) Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

No Impact

The Lahontan Basin Plan (Lahontan RWQCB 2021) sets forth water quality standards for the surface and ground waters of the region. The Project is included in the TRPA EIP for water quality improvement; projects listed in the EIP are expected to help the TRPA comply with the environmental thresholds for water quality and would therefore comply with the Lahontan Basin Plan.

The Project would not conflict with implementation of the Lahontan Basin Plan as it would not adversely affect beneficial uses or contribute to an exceedance of water quality objectives established to protect beneficial uses. The Project would install permanent water quality features and use BMPs to improve water quality and meet local, state, and federal standards.

Implementation of the Project is intended to result in an improvement in stormwater runoff quality compared to the existing condition.

4.10.5 TRPA Checklist – Water Quality

Will the proposal result in:

TRPA Questions	Answers	Discussion
3a) Changes in currents, or the course or direction of water movements?	No	Refer to the discussion and analysis for Question 4.10.4c-ii. The Project does not propose features with the potential to result in change to currents, or the course or direction of water movements. A temporary cofferdam system will be installed during bridge removal to restrict the Upper Truckee River to its existing primary flow path around the work area. There are no proposed permanent impacts within the Upper Truckee River channel, as the new bridge will entirely span the river.
3b) Changes in absorption rates, drainage patterns, or the rate and amount of surface water runoff so that a 20 yr. 1 hr. storm runoff (approximately 1 inch per hour) cannot be contained on the site?	No	See discussions and analyses for Question 4.10.4c-i-iii. Runoff will be allowed to sheet flow and infiltrate to ensure that 20 yr. 1 hr. storm runoff (approximately 1 inch per hour) is contained onsite. The Project would comply with TRPA Code Chapter 60.
3c) Alterations to the course or flow of 100-year flood waters?	No	See discussions and analysis for Question 4.10.4c-iv that concludes the Project boardwalk and bridge structures would not impede or redirect 100-yr floodwaters and the level of impact is less than significant. The Project is designed to meet the TRPA Code exemption requirements for filling within 100-year floodplain per Subsection 35.4.2.B.
3d) Change in the amount of surface water in any water body?	No	The Project has a raised boardwalk feature and bridge span specifically designed to avoid interruption of existing surface water and groundwater movement towards the river and SEZ.

3e) Discharge into surface waters, or in any alteration of surface water quality, including but not limited to temperature, dissolved oxygen, or turbidity?	No	See discussions and analysis for Question 4.10.4a above which conclude the level of impact to surface water quality and beneficial uses is less than significant. Construction and operation of the Project would not cause alteration to surface water quality nor contribute towards non-attainment of TRPA Thresholds.
3f) Alteration of the direction or rate of flow of ground water?	No	See analysis for Question 4.10.4b, which concludes the level of impact to groundwater movement is less than significant.
3g) Change in the quantity of groundwater, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations?	No	See discussions and analyses for Questions 4.10.4a and 4.10.4b, which conclude the level of impact to groundwater quantity is less than significant.
3h) Substantial reduction in the amount of water otherwise available for public water supplies?	No	The Project does not propose features which would result in the reduction of water supplies or increase demand for new or expanded water supplies; therefore, there is no impact.
3i) Exposure of people or property to water related hazards such as flooding and/or wave action from 100-year storm occurrence or seiches?	No	See discussion and analysis for Question 4.10.4c-iv, which concludes that the Project would not result in the creation of significant hazards associated with the 100-year storm occurrence. The Project does not increase exposure of people or property to other significant water-related hazards such as wave action or seiches.
3j) The potential discharge of contaminants to the groundwater or any alteration of groundwater quality?	No	See discussions and analyses for Questions 4.10.4a and 4.10.4b above. Potential Project impacts to groundwater would be less than significant.
3k) Is the project located within 600 feet of a drinking water source?	No	The Project Area is not located within 600 feet of drinking water sources. (https://stpud.us/assets/uploads/images/So-Y-PCE-Plume_MAP.jpg)

4.11 Land Use and Planning

4.11.1 Environmental Setting

The Project is located on public land managed by the Tahoe Resources Conservation District, but under various ownership. **Appendix I**, Section 1.2.4 provides a table and figure identifying the various owners. The Project Area includes over a mile of the Upper Truckee River (APNs 031-020-046, -049, -051, -052, and 032-090-015) within the City of South Lake Tahoe and in the unincorporated area of El Dorado County. The Project is located within the County General Plan and the TRPA Regional Plan areas. TRPA and the County have designated the Project Area as Residential and Conservation.

The Project Area also lies within 3 TRPA Plan Area Statement (PAS) areas, including PAS 105: Sierra Tract, which is designated residential, and PAS 100: Truckee Marsh and PAS 95: Trout/Cold Creek, which are both designated Conservation.

4.11.2 CEQA Checklist Summary

Would the project:

CEQA Question	Impact Determination
a) Physically divide an established community?	No Impact
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	Less Than Significant Impact

4.11.3 Answers to CEQA Checklist Questions

a) Would the project physically divide an established community?

No Impact

The primary purpose of the Project is to construct a paved, shared-use path between the Barton Hospital area and the Tahoe Sierra neighborhood/Lake Tahoe Community College area. It would not physically divide an established community and would provide opportunities for greater connectivity between communities.

b) Would the project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

Less Than Significant Impact

The Project would comply with the County and TRPA land use plan, policies, and regulations adopted for the purpose of avoiding or mitigating environmental effects by implementing controls to protect or avoid impacts to sensitive resources and mitigating any impacts to less than significant levels, as described in the other sections of this IS, and it would not conflict with any land use plan, policy, or

regulation adopted for the purpose of avoiding or mitigating an environmental effect. Construction of the trail would be consistent with the Conservation land use designation.

4.11.4 TRPA Checklist – Land Use

Will the proposal:

TRPA Questions	Answers	Discussion
8a) Include uses which are not listed as permissible uses in the applicable Plan Area Statement, adopted Community Plan, or Master Plan?	No	Construction of the trail would be a permissible use within TRPA's Conservation land use areas. Riding and hiking trails are special uses within the Plan Area Statements. The County will submit special use findings to the TRPA Governing Board for approval.
8b) Expand or intensify an existing non-conforming use?	No	The Project would not expand or intensify an existing nonconforming use because the Project is rehabilitating an existing trail and replacing a damaged pedestrian bridge, which are conforming uses in the Conservation designation. A shared-use path conforms with land use designations of the Project Area.

4.12 Mineral Resources

4.12.1 Environmental Setting

The Project Area contains no mineral resources of value to the region or residents of the State of California, nor does it include the substantial use of any non-renewable natural resources.

4.12.2 CEQA Checklist Summary

Would the project:

CEQA Question	Impact Determination
a) Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	No Impact
b) Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	No Impact

4.12.3 Answers to CEQA Checklist Questions

a) Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

No Impact

According to the State Mining and Geology Board and the General Plan, there are no state or regionally valuable mineral resources within the Project boundary. The Project would not result in the loss of availability of a known mineral resource and would not result in the loss of a locally important mineral resource as identified in TRPA Threshold Standards. Therefore, there would be no impact.

b) Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

No Impact

Refer to response to CEQA item a) above. The Project Area is not located within or near any active mining operations, and no known mineral resources of value or recovery sites exist within the Project Area. There are no locally important mineral resource recovery sites delineated for the Project Area in the El Dorado County General Plan. Therefore, there would be no impact.

4.13 Noise

4.13.1 Environmental Setting

Noise is defined as a sound or series of sounds that are intrusive, objectional, or disruptive to daily life. There are no existing sources of noise within the Project Area beyond current users of the dirt trail. Noise generators in the vicinity of the Project include the Lake Tahoe Airport, vehicular traffic, and other typical neighborhood sounds from the residential neighborhood to the north.

4.13.2 Regulatory Setting

TRPA

The TRPA Code (Chapter 68) establishes noise limits for areas within TRPA's jurisdiction. Community noise levels shall not exceed levels existing on August 26, 1982, where such levels are known. TRPA prescribes the development standards for the Rural Outdoor Recreational Areas, which set the maximum community noise equivalent level at 50 Community Noise Equivalency Levels (CNEL). Project construction between 8:00 a.m. and 6:30 p.m. is exempt from noise limitations per TRPA Code.

4.13.3 CEQA Checklist Summary

Would the project result in:

CEQA Question	Impact Determination
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	Less Than Significant Impact
b) Generation of excessive ground-borne vibration or groundborne noise levels?	Less Than Significant Impact
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	Less Than Significant Impact

4.13.4 Answers to CEQA Checklist Questions

a) Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Less Than Significant Impact

During construction, workers and persons recreating in the area would be temporarily exposed to noise generated by construction equipment, such as compaction equipment, excavators, backhoes, and loaders. Backhoes and excavators can emit sound levels up to 106 dB. Sound generally attenuates 6 dB with each doubling of distance. The closest sensitive receptors are the Barton Memorial Hospital and residences approximately 365 feet to the west, and the homes along Fountain Avenue approximately

205 feet north from edge the Project Area. Minor construction noise near Barbara Avenue would attenuate approximately 30 dB, reducing construction noise at the closest residence to approximately 76 dB. By comparison, leaf and snow blowers generate up to 110 dB on residential properties.

Pile driving may be required for the bridge replacement and would be a significant temporary source of construction noise. Although pile driving can reach levels of up to 120 dB at 10 feet, the soft soils beneath the marsh would be expected to reduce typical noise levels. The closest sensitive receptors are approximately 365 feet to the west. At this distance, maximum exterior noise levels would be attenuated to approximately 90 dB if pile driving occurs at the closest point. This level would be noticeable, but since it would be temporary during exempted construction hours and less than snow and leaf blowers, it would not be significant.

Because generation of ambient noise would be temporary during construction, and the Project is primarily being constructed in uninhabited area and would comply with the TRPA Noise Ordinance requirements for construction projects, (see Section 3.8.8) the Project would not result in ambient noise levels in excess of established standards set forth in the TRPA or County Code.

b) Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

Less Than Significant Impact

During construction, workers and persons residing in the area would be temporarily exposed to minor groundborne vibrations generated by construction equipment, such as excavators, backhoes, and loaders. Minor construction vibration near Barbara Avenue would attenuate before reaching homes on Fountain Avenue. No pile driving, which is the primary source of ground borne vibrations and noise during construction, is anticipated for the Project; if it becomes necessary for the bridge supports, it would only occur in the isolated area around the bridge. Groundborne noise and vibration from pile driving would completely attenuate before reaching sensitive receptors at the hospital (1,300± feet) or residences (2,800+ feet). Because impacts would be temporary and minor and would comply with the TRPA Code, the impacts would be less than significant.

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

Less Than Significant Impact

The area is served by the Lake Tahoe Airport, located approximately 0.5 miles to the southwest of the western edge of the Project Area. According to the Noise Contour Map for the Lake Tahoe Airport, the Project would be in an area exposed to 55 – 60 decibels (dB) (City of South Lake Tahoe 2019). Noise at levels greater than 65 dB is considered significant. Because the Project would be in an area with less than 65 dB, the impacts would be less than significant.

4.13.5 TRPA Checklist – Noise

Will the proposal result in:

TRPA Questions	Answers	Discussion
6a) Increases in existing Community Noise Equivalency Levels (CNEL) beyond those permitted in the applicable Plan Area Statement, Community Plan, or Master Plan?	No	Refer to discussion and analysis for CEQA item a). The Project would be constructed during TRPA and County exempt hours in an uninhabited area. There are no long-term, operational sources of severe noise associated with the Project.
6b) Exposure of people to severe noise levels?	No	Refer to discussion and analysis for CEQA items 4.13.4a through 4.13.4c. Increases in noise are anticipated to be temporary during construction and would not be severe. TRPA has adopted additional best construction practices policies regarding noise generation. The TRPA Standard Conditions of Approval for Grading Projects include new construction provisions that call for the location of construction staging areas as far as feasible from sensitive air pollution receptors (e.g., schools or hospitals), closure of engine doors during operation except for engine maintenance, location of stationary equipment (e.g., generators or pumps) as far as feasible from noise-sensitive receptors and residential areas, installation of temporary sound barriers for stationary equipment, and use of sonic pile driving instead of impact pile driving, wherever feasible. Because the Project is required to comply with the TRPA standard conditions of approval, Project operations would result in no severe noise events. Therefore, the Project would not result in a significant impact.

6c) Single event noise levels greater than those set forth in the TRPA Noise Environmental Threshold?	No	The Project would be constructed during TRPA and County exempt hours for construction, staging would be located away from sensitive receptors per TRPA standards, and all construction equipment would be fitted with factory installed muffling devices and maintained in good working order per the County Noise Ordinance. Additionally, blasting and pile driving are not anticipated to be required to construct the Project, although some pile driving may be required at the bridge site. Single event noise levels in excess of the noise threshold at sensitive receptors are not anticipated.
6d) The placement of residential or tourist accommodation uses in areas where the existing CNEL exceeds 60 dBA or is otherwise incompatible?	No	The Project does not involve residential or tourist accommodations. There would be no impact.
6e) The placement of uses that would generate an incompatible noise level in close proximity to existing residential or tourist accommodation uses?	No	The Project would be constructed in a primarily uninhabited forested area. Once operational, use of the trail would not generate noise such that ambient noise would rise above existing conditions. Therefore, the Project would not generate an incompatible noise level.
6f) Exposure of existing structures to levels of ground vibration that could result in structural damage?	No	Refer to discussion and analysis for CEQA item 4.13.4b. There are no structures in close proximity to the Project Area. The Project would not expose structures to ground vibrations capable of resulting in structural damage.

4.14 Population and Housing

4.14.1 Environmental Setting

The Project lies in the City of South Lake Tahoe between South Avenue and Barton Memorial Hospital. As of 2023, South Lake Tahoe had an estimated population of 24,346 residents and an estimated housing stock consisting of 9,125 dwelling units (United States Census Bureau 2023). There are no dwelling units within the Project Area. Dwelling units are present north and west of the Project site.

TRPA has implemented a strict growth control system under the Bi-State Compact and Regional Plan. The system is designed to complement the region's development standards and improvement programs to achieve and maintain the Thresholds. Since the TRPA implemented a strict growth control system under the Bi-State Compact and Regional Plan, there has been very little private redevelopment in the vicinity of the Project. Overall, the TRPA growth control system limits the area's capacity for development.

4.14.2 CEQA Checklist Summary

Would the project:

CEQA Question	Impact Determination
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	No Impact
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	No Impact

4.14.3 Answers to CEQA Checklist Questions

a) Would the project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

No Impact

The Project proposes to build upon the overall shared-use path by constructing approximately 1.2 miles of Class 1 shared-use path and replacing a heavily trafficked bridge. As discussed in the Environmental Setting, the TRPA growth control system limits the Project Area's capacity for development. The proposed Project improves the existing transportation infrastructure but does not induce substantial population growth by adding new housing or commercial uses; thus, no growth-related impacts would occur.

b) Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

No Impact

The Project does not propose any removal or construction of features which would result in displacement of persons and would therefore not require construction or replacement housing elsewhere. Therefore, there would be no impact.

4.14.4 TRPA Checklist

Will the proposal:

TRPA Questions – Population	Answers	Discussion
11a) Alter the location, distribution, density, or growth rate of the human population planned for the Region?	No	The Project does not propose facilities such as housing, new infrastructure, or commercial facilities which could affect area population. Therefore, there would be no impact.
11b) Include or result in the temporary or permanent displacement of residents?	No	The Project would have no impact on the temporary or permanent displacement of residents. Temporary displacement would not be required for trail construction.

Will the proposal affect existing housing, or create a demand for additional housing? *To determine if the proposal will affect existing housing or create a demand for additional housing:*

TRPA Questions – Housing	Answers	Discussion
12a) 1. Will the proposal decrease the amount of housing in the Tahoe Region?	No	There are no homes located in the Project Area, and construction of a shared-use path would not affect existing or future housing.
12a) 2. Will the proposal decrease the amount of housing in the Tahoe Region historically or currently being rented at rates affordable by lower and very-low-income households?	No	There is no impact to existing or future housing, including lower and very low-income households.

4.15 Public Services

4.15.1 Environmental Setting

Parks

The proposed trail alignment would begin at South Avenue to the north and Barton Memorial Hospital to the west. The Project would construct a Class 1 shared-use path and replace a heavily trafficked bridge in the Johnson Meadow Open Space Area.

Fire Protection

The South Lake Tahoe Fire Department (SLTFD) provides fire and life safety, rescue and emergency medical service, and fire prevention to the study area. SLTFD is comprised of 3 stations that are located throughout South Lake Tahoe. Station 2 is located approximately 1.7 miles from the northern edge of the Project Area.

Police Protection

The South Lake Tahoe Police Department and El Dorado County Sheriff's Office provide 24/7 patrol coverage and search and rescue operations within the Project Area. The South Lake Tahoe Police Department and the El Dorado County's Sheriff's Office are approximately 1.6 miles north of the northern edge of the Project Area.

4.15.2 CEQA Checklist Summary

Would the project result in:

CEQA Question	Impact Determination
a) Would the project result in substantial adverse physical impacts associated with the need and/or provision of new or physically altered governmental services and/or facilities in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services? i) Fire protection? ii) Police protection? iii) Schools? iv) Parks? v) Other public facilities?	Less Than Significant Impact

4.15.3 Answers to CEQA Checklist Questions

a) Would the project result in substantial adverse physical impacts associated with the need and/or provision of new or physically altered governmental services and/or facilities in order

to maintain acceptable service ratios, response times, or other performance objectives for any of the public services?

i) Fire protection?

ii) Police protection?

iii) Schools?

iv) Parks?

v) Other public facilities?

Less Than Significant Impact

The proposed Project would construct a Class 1 shared-use path and replace a heavily trafficked bridge in order to enhance accessibility, recreational opportunities, and alternative transportation within the community.

The Project would not increase dwelling units or road capacity and thus involves no increase in demand for public services such as schools, libraries, parks., or other public services During construction, the Project may cause a negligible temporary increase in emergency services demand to protect construction equipment or personnel. There are adequate fire and police services to protect the construction sites and construction workers without affecting emergency services ratios, response times or other performance objectives. Therefore, the proposed Project would not require new or physically altered governmental services and/or facilities in order to maintain acceptable service ratios, response times, or other performance objectives.

4.15.4 TRPA Checklist – Public Services

Would the proposed project have an unplanned effect upon, or result in a need for new or altered governmental services in any of the following areas?

TRPA Questions	Answers	Discussion
14a) Fire protection?	No	Refer to discussion and analysis for CEQA item 4.15.3a above. There are adequate existing fire services to serve the Project.
14b) Police protection?	No	Refer to discussion and analysis for CEQA item 4.15.3a above. The Project would not result in an increase in population growth and would not require expanded police services.
14c) Schools?	No	Refer to discussion and analysis for CEQA item 4.15.3a above. The Project would not result in an increase in population growth and would not require new or expanded schools.
14d) Parks or other recreational facilities?	No	Refer to discussion and analysis for CEQA item 4.15.3a above. The Project would not result in an increase in population growth and would not result in the need for a new park or recreation facilities.

14e) Maintenance of public facilities, including roads?	No	The Project is required to comply with TRPA Code 36.5.5 - Bicycle and Pedestrian Facility Maintenance Plan: Entities responsible for the construction and maintenance of all Projects containing active transportation facilities are required to submit a Maintenance Responsibilities Chart and Plan prior to TRPA permit issuance. These plans must clearly identify responsibilities for capital improvements and annual infrastructure operation and maintenance and identify funding needs and sources. The Project improves an existing transportation facility consistent with adopted plans, and would not have an unplanned effect upon, or result in a significant need for new or altered roadway maintenance services.
14f) Other governmental service?	No	Refer to discussion and analysis for CEQA item 4.15.3a above. The Project would not result in an increase in population growth and would not result in the need for other government services.

4.16 Recreation

4.16.1 Environmental Setting

The Project Area encompasses City of South Lake Tahoe and County ROW and public parcels owned by City of South Lake Tahoe, STPUD, TRCD, and the USFS. Within the vicinity of the Project Area, surrounding land use is approximately 50 percent urban, consisting of residences, businesses, and a portion of the Lake Tahoe Airport. The other 50 percent includes open space consisting of the Upper Truckee River and Trout Creek riparian corridors, Johnson Meadow, and mixed conifer forest, with moderately trafficked pedestrian and mountain bike trails, utility access roads, and barren staging and snow storage areas throughout. The Class 1 shared-use path would begin at the south terminus of Winnemucca Avenue near Barton Memorial Hospital and extend east on public lands owned by the TRCD (known as Johnson Meadow), cross the Upper Truckee River, then follow existing user-created trails to the intersection of Sierra Boulevard and Barbara Avenue. The existing trail is connected to various recreational and utility access routes and provides non-motorized access to facilities such as Barton Memorial Hospital and Lake Tahoe Community College. Tahoe Valley Campground is also located approximately 1,000 feet southwest of the Project Area, just south of Barton Memorial Hospital. The Project proposes to improve the existing user trails by replacing the washed-out bridge and upgrading the existing trail to Class 1 standards.

4.16.2 CEQA Checklist Summary

Would the project:

CEQA Question	Impact Determination
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	Less Than Significant Impact
b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	Less Than Significant Impact

4.16.3 Answers to CEQA Checklist Questions

a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

Less Than Significant Impact

Access to the public parcels in the Project Area currently exists. By increasing non-motorized access, trail users may be encouraged to access the connected network of user-made recreational trails in the vicinity by foot or bicycle rather than by motorized methods. Therefore, while access and use would increase, the Project intends to replace the bridge and restore trail use to pre-2017 (when the bridge was damaged) conditions. Improving the trail to Class 1 specifications would make it fit to accommodate

increased use and would encourage trail users to remain on the path and prevent off-trail impacts. The use of parks or other recreational facilities in the vicinity, such as Tahoe Valley Campground, is expected to remain nearly the same. There would be no increase in population because of this Project, and no new access provided specifically to neighborhood or regional parks. No physical deterioration of parks would occur because of the Project.

b) Would the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

Less Than Significant Impact

The trail serves primarily as a pedestrian and bicycle transportation route, although it may be used for similar recreational purposes such as mountain biking and hiking considering connectivity to existing trails in the vicinity. The Project entails construction of an improved recreational facility, and physical effects are analyzed in each subsection of Chapter 4 of this document; appropriate mitigation measures are proposed as required, and all impacts have been reduced to less than significant.

4.16.4 TRPA Checklist – Recreation

Will the proposal:

TRPA Questions	Answers	Discussion
19a) Create additional demand for recreation facilities?	No	Since the Project provides access opportunities and does not increase population, a new demand for recreation facilities would not result.
19b) Create additional recreation capacity?	No	Although trail use is expected to somewhat increase compared to existing conditions, summer day use as measured by Persons at One Time are not assigned to new transportation facilities such as the Project (TRPA Code Subsection 50.8.3.A.1). Recreation capacity is not expected to increase significantly compared to pre-2017 conditions considering the damaged bridge will be removed and replaced, and the proposed shared-use path will be primarily constructed over the existing trail.
19c) Have the potential to create conflicts between recreation uses, either existing or proposed?	No	The Project would promote shared use by providing adequate width and acceptable grades capable of allowing different users simultaneous access without conflict. No conflict would occur between the use of the trail and the use of the other trails in the vicinity. The proposed bridge will entirely span the river and at 9 feet high would not cause recreational rafters/paddlers to exit the river, cause user-created trails to avert the river undercrossing or pose safety hazards to rafters/paddlers because of low clearance. Rafter/paddler safety will be improved by removal of the damaged bridge, which has lower clearance than the proposed bridge, has multiple piers in the river, and is partially obstructing river passage.

19d) Result in a decrease or loss of public access to any lake, waterway, or public lands?	No	Project construction would result in temporary (4 to 5 month) restricted access along the Class 1 segment and the Upper Truckee River crossing for purposes of public health and safety. Construction would not decrease public access to existing parks and neighborhoods outside of the active construction corridor.

4.17 Transportation

4.17.1 Environmental Setting

The Project proposes to build upon the overall shared-use path network on the south shore of Lake Tahoe by constructing approximately 1.2 miles of Class 1 shared-use path and replacing a heavily trafficked bridge over the Upper Truckee River damaged by the 2017 winter storms. The Project will create a critical active transportation link between the Barton Memorial Hospital area (west of the Upper Truckee River) and the Tahoe Sierra neighborhood/Lake Tahoe Community College area (east of the Upper Truckee River). The shared-use path will begin at the south terminus of Winnemucca Avenue near Barton Memorial Hospital and extend east on public lands owned by the TRCD (known as Johnson Meadow), cross the Upper Truckee River, then follow existing user-created trails to the intersection of Sierra Boulevard and Barbara Avenue. South Avenue and Barbara Avenue are paved county neighborhood roadways, and the proposed shared-use path will provide connections to existing and future Class 1 facilities in the area, such as the short Class 1 segment between South Avenue and Winnemucca Avenue (**Figure 12**). The Project also builds upon the Sierra Boulevard Complete Streets Project (completed in 2019) and the South Tahoe Greenway Shared-use Trail Phase 2 Project (completed in 2021) at the corner of Sierra Boulevard and Barbara Avenue.

Currently, these connections are disrupted by the damaged bridge, and trail users must wade across the Upper Truckee River to cross from one side to the other. The Upper Truckee River divides these areas with no access other than at US 50.

The Tahoe Valley Area Plan identifies the Project within the Implementation Element supporting the following Transportation and Circulation goals and policies:

- Goal T-3 – Pedestrian Facilities: To create a functional, safe, convenient, and integrated pedestrian system in the Tahoe Valley area and the surrounding neighborhoods.
    - Policy T-3.1 – Connectivity: Provide adequate pedestrian and bicycle facilities such as continuous sidewalks, bike paths and bike lanes throughout the Tahoe Valley area that connect commercial, health services, entertainment, residential, and recreation areas.
    - Policy T-3.7 – Pedestrian Access: Develop a strong pedestrian (sidewalks, paths and trails) access system that effectively links adjacent residential neighborhoods to Tahoe Valley's employment centers, commercial uses, public service uses, and recreational and educational opportunities as an alternative to vehicle trips.

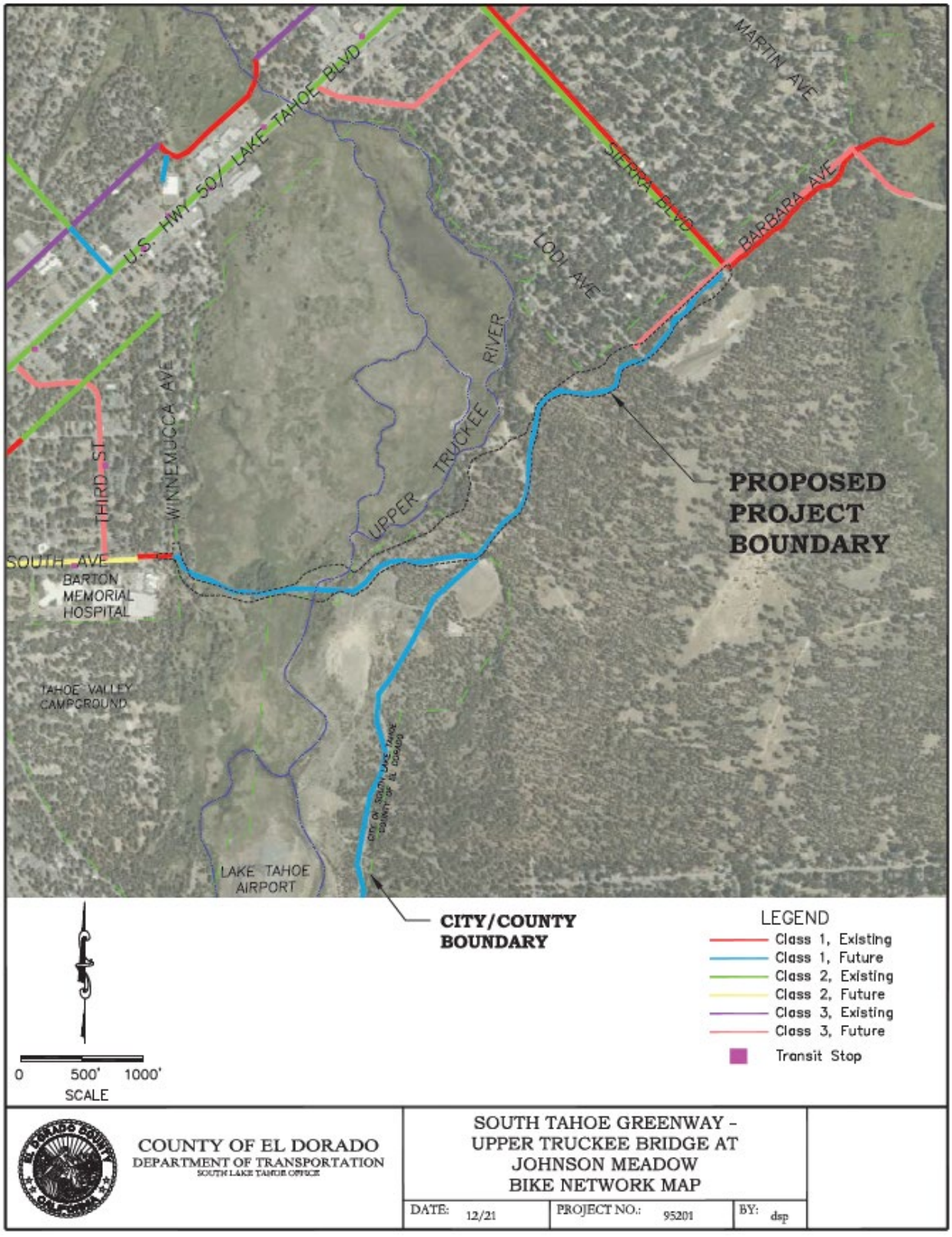


Figure 12. Bike Network Map (El Dorado County 2021).

- Goal T-4 – Bikeways: To develop a safe and efficient bikeway system that promotes biking as an alternative to local vehicle trips.
    - Policy T-4.1 – Bikeway System: Develop a bikeway system that effectively links residential neighborhoods, employment centers, commercial areas, public uses, and recreational and educational centers, both within and outside of the Tahoe Valley area. Bicycle and pedestrian improvements that are identified in the City General Plan, TRPA Regional Plan, and/or TRPA's Lake Tahoe Regional Bike and Pedestrian Master Plan, which are adjacent to or within private development project areas, shall be implemented as conditions of approval.
    - T-4.2 – Bikeway Linkages: Integrate and link existing bike paths with regional paths. Connect the Tahoe Valley trail system to the proposed Meyers – Stateline Greenway bike trail.
- Goal T-6 – Sustainable Communities Strategy: To provide a transportation and circulation system that promotes reduction in greenhouse gases, creation of multimodal networks and promotion of a mix of land uses.
    - Policy T-6.1 – Sustainable Communities Strategy Implementation: Implement the Tahoe Metropolitan Planning Organization Sustainable Communities Strategy in the Tahoe Valley Area Plan by integrating land use, transportation, and housing strategies to create a walkable Town Center, provide alternative transportation options, provide for a variety of housing types in close proximity to services, connect neighborhoods, and protect the area's natural resources.

TRPA is the designated Regional Transportation Planning Agency in the Lake Tahoe Region and has established Level of Service standards for roadways and intersections and VMT standards. TRPA and Tahoe Metropolitan Planning Organization administer regional programs to reduce VMT and achieve regional VMT standards in the Tahoe Basin. TRPA adopted a VMT Threshold Standard of 2,067,600 VMT for air quality purposes, which represents a 10 percent reduction from the 1981 VMT level. The most recent estimate of annual VMT provided by TRPA is 1,937,070 (Linking Tahoe: Regional Transportation Plan, 2017).

4.17.2 Regulatory Setting

Local and Regional Transportation

The following local and regional transportation guidance documents apply to the Project:

- The **2020 Regional Transportation Plan (RTP)** is the Lake Tahoe Regional Transportation Plan and Sustainable Communities Strategy, an element of the TRPA Regional Plan. The RTP's vision is a transportation system that prioritizes bicycling, walking, and transit and serves residents and visitors while contributing to the environmental and socioeconomic health of the Region. Important strategies of the Regional Plan and RTP are to reduce the overall environmental

impact of transportation in the Region, create walkable, vibrant communities, and provide alternatives to driving.

- The **2010 Lake Tahoe Region Bicycle and Pedestrian Plan** identifies planned bicycle and pedestrian improvements and enables El Dorado County and other implementing agencies to apply for funding assistance (TRPA 2010).
- The **TRPA Code of Ordinances** Section 36.5.5, requires "Entities responsible for the construction and maintenance of all projects containing active transportation facilities are required to submit a Maintenance Responsibilities Chart and Plan prior to permit issuance. These plans must clearly identify responsibilities for capital improvements and annual infrastructure operation and maintenance and identify funding needs and sources."

4.17.3 CEQA Checklist Summary

Would the project:

CEQA Question	Impact Determination
a) Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?	No Impact
b) Conflict or be inconsistent with CEQA Guidelines §15064.3, subdivision (b)?	No Impact
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	No Impact
d) Result in inadequate emergency access?	No Impact

4.17.4 Answers to CEQA Checklist Questions

a) Would the project conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?

No Impact

As discussed under "Environmental Setting," the Project supports goals and policies of the Tahoe Valley Area Plan and TRPA Regional Transportation Plan. The Project builds upon the Sierra Boulevard Complete Streets Project (completed in 2019) and the South Tahoe Greenway Shared-use Trail Phase 2 Project (completed in 2021) at the corner of Sierra Boulevard and Barbara Avenue. The Project has a beneficial impact by implementing this improvement that is listed in various planning documents regarding transportation improvements.

b) Would the project conflict or be inconsistent with CEQA Guidelines §15064.3, subdivision (b)?

No Impact

Since the Project proposes an alternative, non-motorized travel route, a beneficial impact may be replacing motorized VMT with pedestrian and bicycle trips. Therefore, the Project is expected to result in a net decrease in VMT in the area. The Project would not alter, revise, or conflict with an applicable congestion management program including but not limited to, level of service standards and travel demand measures, or other standards established by the congestion management agency for designated roads or highways. Improving bicycle facilities and connectivity would result in beneficial transportation impacts. No VMT increase is anticipated, therefore, no impact related to the VMT standard would occur.

c) Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

No Impact

The Class 1 trail would primarily be located on and follow the existing dirt trail and utility road between Barbara Avenue and South Avenue. The new Class 1 trail will not contain sharp curves and does not intersect with highly trafficked roads. The Project would replace a damaged and dangerous bridge structure. The trail would be used by residents and visitors in the area, and no incompatible uses would interfere with trail use. Like other roadways in the area, snow removal may occur; however, snow removal equipment serves to maintain use of the trail and new hazardous situations would not be created.

d) Would the project result in inadequate emergency access?

No Impact

See discussion and analysis for Questions 4.9.3f, 4.9.4-10b, and 4.15.3a above that conclude that implementation of the Project would not impact emergency evacuation plans or access. The Project involves the construction of a shared-use path between the Barton Memorial Hospital area (west of the Upper Truckee River) and the Tahoe Sierra neighborhood/Lake Tahoe Community College area. Emergency response and evacuation would be maintained throughout construction and implementation of the trail would not interfere with an adopted emergency or evacuation plan. The trail may serve the community as an additional egress route connector out of the Tahoe basin during emergencies. Replacement of the damaged bridge and construction of the paved Class 1 path and elevated boardwalk would improve emergency evacuation along the trail alignment. The proposed Class 1 path alignment connects to a designated South Lake Tahoe evacuation location at the Caltrans snow storage lot, with connection to neighborhoods and Barton Hospital.

4.17.5 TRPA Checklist – Transportation/Circulation

Will the proposal result in:

TRPA Questions	Answers	Discussion
13a) Generation of 650 or more new average daily Vehicle Miles Travelled?	No	As discussed in Question 4.17.4b, no increase in traffic would occur and construction would not generate 650 or more new average daily VMT. The alignment generally follows existing trails and replaces a heavily used bike and pedestrian bridge. Implementation of the Project is expected to reduce VMT by providing increased opportunity for biking and walking.
13b) Changes to existing parking facilities, or demand for new parking?	No	The Project would have no significant increase in trip generation and may promote pedestrian and non-auto access, which may reduce parking demand. The trail provides improved connectivity and is not designed as a new destination trail that would require new parking.
13c) Substantial impact upon existing transportation systems, including highway, transit, bicycle, or pedestrian facilities?	No	See discussions and analyses for CEQA Questions in Section 4.17.4 above. The Project would support the transportation system and improve bicycle and pedestrian facilities, expanding access and connections to neighborhoods currently limited by the Upper Truckee River. The Project implements the programs and policies in area planning and transportation plans.
13d) Alterations to present patterns of circulation or movement of people and/or goods?	No	As discussed in CEQA Questions 4.17.4a and 4.17.4b above, no increase in trip generation or VMT would result from Project implementation. The Project may reduce trips along US 50 by improving pedestrian and bicycle access.

13e) Alterations to waterborne, rail, or air traffic?	No	No alterations to waterborne, rail, or air traffic are proposed or would occur because of the Project.
13f) Increase in traffic hazards to motor vehicles, bicyclists, or pedestrians?	No	See Response to CEQA Questions 4.17.4a, 4.17.4c, and 4.17.4d above. The Project has the potential to reduce traffic hazards by designating a Class 1 bike route on the existing trail and by creating non-motorized trail linkage.

4.18 Tribal Cultural Resources

4.18.1 Environmental Setting

As of the mid-1800s, the Washoe inhabited the region of the study area. A Hokan-speaking hunting and gathering group, the Washoe inhabited the chain of valleys along the eastern slope of the Sierra Nevada, from Honey Lake to Antelope Valley. The Pine Nut Mountains and the Virginia Range formed the eastern boundary of Washoe territory, while the western boundary extended several miles beyond the Sierra crest.

A great deal of information has been written about Washoe land use in the Tahoe Basin and their use of the region's resources. Lake Tahoe is the center of the Washoe world, both geographically and socially. Legendary and mythological associations to places within the basin are common. Semi-sedentism and higher population densities are reported and may have developed in conjunction with their residential and subsistence resource stability.

The NAHC provided a record search of the Sacred Lands File and a contact list for regional tribes that may have knowledge of cultural or tribal resources within or immediately adjacent to the Project Area. A response was received from the NAHC on June 27, 2023, which indicated positive Sacred Lands File results within the vicinity of the APE.

Inquiry letters were emailed and mailed by the County to the tribes identified by NAHC on July 18, 2023, and 2 tribes responded. Tribal consultation resulted in the United Auburn Indian Community (UAIC) deferring to the Washoe Tribe, and the Washoe Tribe requested archaeological and tribal monitoring as well as involvement in development of a construction monitoring plan.

The full Caltrans HPSR report, with the ASR attached, is included as **Appendix G**.

Section 4.5 also details Caltrans, TRPA, and additional regulatory requirements that would be implemented during construction should undocumented resources be discovered during construction, including notification of the Washoe and UAIC tribes.

4.18.2 Regulatory Setting

Native American Consultation

In accordance with AB 52, as identified in the PRC Section 21080.3.1(b)(2) of CEQA and Section 106 of the National Historic Preservation Act, Native American tribes (tribes) identified by the NAHC must be invited to consult on projects. Additionally, the TRPA Code contains requirements for consultation with area tribes (Subsection 67.3.2).

4.18.3 CEQA Checklist Summary

Would the project:

CEQA Question	Impact Determination
a) Cause a substantial adverse change in the significance of a tribal cultural resource, defined in PRC § 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is: i. Listed or eligible for listing in CRHR, or in a local register of historical resources as defined in PRC § 5020.1(k), or	Less Than Significant Impact with Mitigation Incorporated
ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC § 5024.1. In applying the criteria set forth in subdivision (c) of PRC § 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	Less Than Significant Impact with Mitigation Incorporated

4.18.4 Answers to CEQA Checklist Questions

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in PRC § 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

i. Listed or eligible for listing in CRHR, or in a local register of historical resources as defined in PRC § 5020.1(k)?

Less Than Significant Impact with Mitigation Incorporated

or

ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC § 5024.1. In applying the criteria set forth in subdivision (c) of PRC § 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?

Less Than Significant Impact with Mitigation Incorporated

The Sacred Lands File for the Project Area was positive, and Native American consultation have indicated the potential for tribal cultural resources within the Project Area. Ground disturbing activities during construction have the possibility of exposing tribal cultural resources to damage. Such resources may include artifacts, human remains, or other sacred cultural resources.

As outlined in Section 3.8.3 construction controls, Caltrans SER (revised 2015) contains procedures that shall be followed if previously unidentified archaeological resources are encountered during

construction. In addition, TRPA Code (Historic Resource Protection) Section 67.3 – Resource Projection outlines requirements for the accidental discovery of resources during construction (subsection 67.3.1), requirements for site survey and consultation with the Washoe Tribe (subsection 67.3.2), and requirements for protection of known resources. Per TRPA Code Section 67.3, the following measures are integrated into the Project implementation plan as regulatory compliance measures:

- If, during the course of a project or activity, a potential archaeological, cultural, or historical resource is discovered, all operations shall stop until a qualified archaeologist has evaluated the potential significance of the resource. In the event inadvertent cultural resources are discovered as a result of project activities, the Washoe Tribe will be notified.
- Major excavation will involve onsite archaeological and tribal monitoring. The Washoe Tribe will be involved in the development of the monitoring plan.

Because the cultural resources inventory and initial consultations with tribes have shown there is a possibility that Native American resources may be found in the APE, construction of the Project could have a potentially significant impact on tribal cultural resources. The following measures to provide construction workers with relevant information regarding sensitive cultural resources and Tribal Cultural Resources (TCRs), including applicable regulations, protocols for avoidance, and consequences of violating state laws and regulations, and require monitoring by the culturally affiliated Native American tribal monitors would reduce potential impacts to less than significant.

TCR-1: Workers Environmental Awareness Program (WEAP) Training. A Tribal Cultural Resources (TCRs) sensitivity and awareness training program (WEAP) shall be provided for all personnel involved in project construction, including field consultants and volunteers. An archaeologist meeting the Secretary of the Interior's (SOI) Professional Qualifications Standards for Archeology (or under direct supervision of an SOI qualified Archaeologist) and representatives of culturally affiliated Native American tribes will coordinate during preparation of the WEAP. The WEAP shall occur prior to the onset of project-related construction activities. The WEAP will include relevant information regarding sensitive cultural resources and TCRs, including applicable regulations, protocols for avoidance, and consequences of violating state laws and regulations.

The WEAP will also describe appropriate avoidance and impact minimization measures for cultural resources and TCRs outlined in Mitigation Measure TCR-3. The WEAP will emphasize the requirement for confidentiality and culturally appropriate treatment of any discovery of significance to Native Americans and will discuss appropriate behaviors and responsive actions, consistent with Native American tribal values.

- **TCR-2:** Construction Monitoring. The Washoe Tribe of California and Nevada has requested, and the County has agreed, to cultural resources monitoring during ground disturbing construction activities. The County will prepare a Monitoring Plan and provide it to the Tribe prior to commencing construction, and shall continue coordination with the Tribe up to and during

ground disturbing activities of the Project concerning the avoidance and protection of Tribal Cultural Resources that may be impacted.

- **TCR-3:** Inadvertent Discoveries. The following measure is intended to address the evaluation and treatment of inadvertent/unanticipated discoveries of potential TCRs or archaeological resources during the Project's ground disturbing activities. An inadvertent discovery plan will be included in the monitoring plan:
    - If any suspected TCRs or archaeological resources are discovered during ground disturbing construction activities, all work shall cease within 100 feet of the discovery, or an agreed upon distance based on the Project Area and nature of the find. A qualified professional archaeologist and a Tribal Representative from a California Native American tribe that is traditionally and culturally affiliated with a geographic area shall be immediately notified and shall determine if the find is a TCR (PRC § 21074). The Tribal Representative or qualified archaeologist will make recommendations for further evaluation and treatment as necessary.
    - The contractor shall implement any measures deemed by the County to be necessary and feasible to preserve in place, avoid, or minimize impacts to the resource, including, but not limited to, facilitating the appropriate tribal treatment of the find, as necessary.
    - Work at the discovery location shall not resume until all necessary investigation and evaluation of the discovery have been satisfied.
- **TCR-4:** Human Remains. In the event human remains are discovered, all work shall cease immediately. All measures shall be made to secure and protect areas in which human remains and funeral objects are discovered. Construction workers and/or contractors or subcontractors on the job site will not be permitted to take photographs of human remains, or funeral objects. Archaeological resources are not to be moved or taken from the Project site and work should not resume until authorized. The County Coroner and local law enforcement shall be notified within 24 hours of the discovery to conduct proper evaluation and treatment of remains. The coroner and the law enforcement agency will evaluate the discovery to determine whether it is a crime scene or a burial. If human remains are determined to be associated with an archaeological site (burial), SBTS will notify the State Historic Preservation Office (SHPO) and will work with SHPO to determine measures to take. That office will contact the appropriate tribal representatives and consult on the disposition of the remains and any associated artifacts.

Findings: Implementation of Mitigation Measures TCR-1, TCR-2, TCR-3, and TCR-4 provide the procedures necessary during construction to ensure potentially significant impacts to TCRs as defined by a California Native American tribe are less than significant.

4.18.5 TRPA Checklist – Archaeology

Will the proposal result in:

TRPA Questions	Answers	Discussion
20a) An alteration of or adverse physical or aesthetic effect to a significant archaeological or historical site, structure, object, or building?	No, with mitigation	See discussion in Section 4.18.ii, above. Consultation with the Washoe and UAIC tribes confirmed there are known tribal cultural resources that could be affected by the Project. Mitigation Measures TCR-1, TCR-2, TCR-3, and TCR-4 have been agreed to by the County to provide for ongoing Native American consultation, coordination, and construction monitoring and mitigation to ensure resources encountered during construction are protected.
20b) Is the proposed project located on a property with any known cultural, historical, and/or archaeological resources, including resources on TRPA or other regulatory official maps or records?	Yes	See discussion in Section 4.18.ii, above. The Native American Heritage Commission Sacred Lands File was positive for the survey area.
20d) Does the proposed project have the potential to cause a physical change which would affect unique ethnic cultural values?	No, with mitigation	See discussion in Section 4.18.ii, above. Consultation with the Washoe and UAIC tribes confirmed there are known tribal cultural resources that could be affected by the Project. Mitigation Measures TCR-1, TCR-2, TCR-3, and TCR-4 have been agreed to by the County to provide for ongoing Native American consultation, coordination, and construction monitoring and mitigation to ensure resources encountered during construction are protected.
20e) Will the proposed project restrict historic or pre-historic religious or sacred uses within the potential impact area?	No, with mitigation	See discussion in Section 4.18.ii, above. Consultation with the Washoe and UAIC tribes confirmed there are known tribal cultural resources that could be affected by the Project. It is unknow whether these could be religious or sacred uses. Mitigation Measures TCR-1, TCR-2, TCR-3, and TCR-4 have been agreed to by the County to provide for ongoing Native American consultation, coordination, and construction monitoring and mitigation to ensure resources encountered during construction are protected.

4.19 Utilities and Service Systems

4.19.1 Environmental Setting

Numerous utilities are situated underground and overhead within the Project vicinity. Utilities in the Project Area include Southwest Gas natural gas lines, AT&T telephone lines, Liberty Utilities electricity lines, STPUD water and sewer lines, and Charter Communications cable television lines.

In order to better define these utilities, a utilities base map has been developed and will be coordinated with each owner (**Figure 13**). Any potential conflicts will be addressed with the appropriate utility owner and their representative by the County.

Water and Wastewater

Water service and sewage collection and treatment is provided in the vicinity by STPUD. STPUD collects, treats, and exports wastewater to Alpine County. Wastewater and water service is provided through underground pipes beneath the pavement of Beecher Avenue and crosses a portion of the east Project Area to the sewer lift station. From the lift station the sewer line and force main split and generally follow the river south crossing through the Project Area in 2 locations underground. Water and sewer lines are also present underground along Winnemucca Avenue and South Avenue near the west end of the Project Area. STPUD currently has an access road within its easement that provides access to the pipelines for maintenance.

Electricity and Natural Gas

Electricity is provided to the area by Liberty Utilities and natural gas is provided by Southwest Gas. Gas distribution lines in the Project Area are located beneath the pavement of South, Winnemucca, and Barbara Avenues to supply the nearby residences. Overhead utility poles support electrical lines along these roadways.

Telecommunications

Telecommunication services are provided by a number of companies, including AT&T and Charter. These companies provide television, internet, and telephone connection services to the residences and other buildings in the vicinity of the Project Area through above-ground infrastructure. Utility poles parallel Barbara Avenue in the Project Area.

Storm Water Drainage

The stormwater drainage structures in the Project Area are limited to the vegetated infiltration swale along Barbara Avenue.

Solid Waste

South Tahoe Refuse is under contract with this portion of El Dorado County to collect solid waste from area households and businesses as well as to process and transfer all solid waste for disposal or recycling. South Tahoe Refuse's main facility, which consists of a transfer station, materials recovery facility, and the Tahoe Basin Container Service, has a total permitted capacity of 370 tons per day, but currently receives

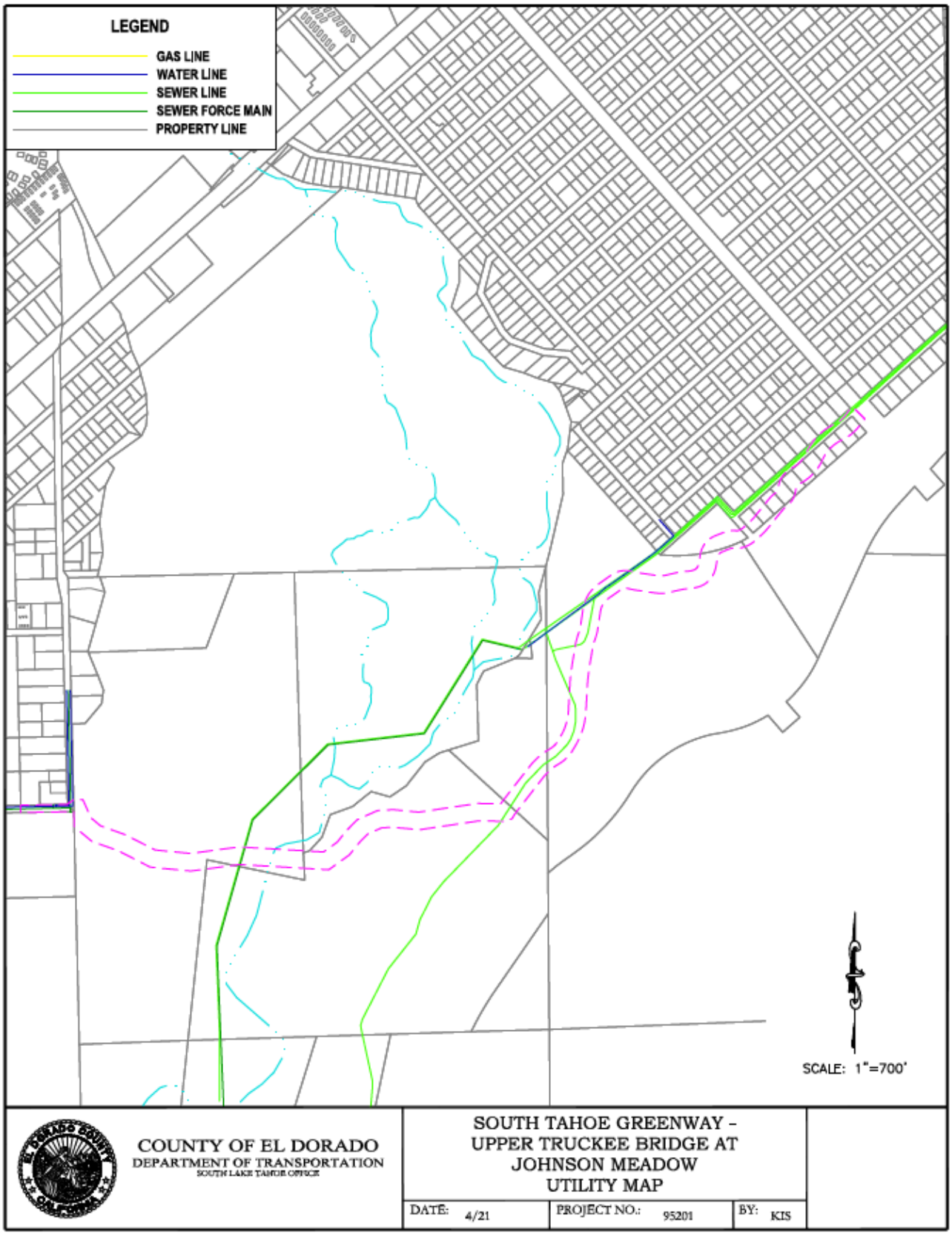


Figure 13. Utilities Location Map (El Dorado County 2021).

200 to 250 tons per day. Solid waste is transported to Lockwood Regional Landfill in Storey County, Nevada, which receives approximately 4,000 tons per day and has a lifespan of approximately 150 years.

4.19.2 CEQA Checklist Summary

Would the project:

CEQA Question	Impact Determination
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	No Impact
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	Less Than Significant Impact
c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	No Impact
d) Generate solid waste in excess of State or local standards or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	Less Than Significant Impact
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	No Impact

4.19.3 Answers to CEQA Checklist Questions

a) Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

No Impact

The Project includes no new housing that could increase resident populations in need of these services and no new non-residential facilities, and does not propose fixtures or features (e.g., restrooms) that require connections to water or wastewater. The Project installs no new permanent irrigation, restrooms, water fountains, lighting, or other fixtures requiring electrical or natural gas power. No new communications are proposed. The Project does not propose to develop additional stormwater drainage facilities in the area. The County will continue to coordinate with STPUD during design to ensure the boardwalk piles are not in the vicinity of the pipeline crossing or within the STPUD easement, and that STPUD access to the pipelines is maintained during and post-construction. The depth of construction is shallow, thus no utilities would require relocation. There would be no need to relocate or construct new or expanded utilities.

TRPA Code Chapter 32 provides regulations for utilities and services. The Project complies with these regulations as no new water or wastewater utilities are required to operate the trail.

b) Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

Less Than Significant Impact

The Project requires no new water service and therefore avoids significant effect on water supplies, entitlements, and resources. Minimal revegetation of disturbed areas may be required; therefore, water would be supplied via water truck by the County until the vegetation is established.

c) Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

No Impact

The Project requires no wastewater service.

d) Would the project generate solid waste in excess of State or local standards or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

Less Than Significant Impact

The Project provides an alternative transportation route through the area and would not create solid waste. Existing bear proof waste disposal bins at the east end of the Project Area would serve trail users and no significant increase in trash would be generated. The County monitors waste generation as a part of regular operation and maintenance and provides and maintains bins as needed. Construction would result in a temporary increase in solid waste generation; however, the quantity of solid waste would not impact collection or capacity limits. Construction waste would be recycled to the extent feasible and would not interfere with waste reduction goals. Both the STR main facility and the Lockwood Regional Landfill have sufficient capacity to manage construction waste. Therefore, this impact is less than significant.

e) Would the project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

No Impact

The Lockwood Regional Landfill receives solid waste generated in the area and has sufficient capacity to serve the area well into the future. Existing resource recovery operations provide recycling of various materials, including green waste and construction material, which further reduces the quantity of waste sent to the landfill pursuant to state law. Operation of the Class 1 trail would not generate solid waste.

4.19.4 TRPA Checklist – Utilities

Except for planned improvements, will the proposed project result in a need for new systems, or substantial alterations to the following utilities:

TRPA Questions	Answers	Discussion
16a) Power or natural gas?	No	No impact would occur as no facilities that utilize power or natural gas are proposed, and no facilities are located within the Project Area that would require relocation during construction.
16b) Communication systems?	No	Project construction and operation has no effect on demand for communication service as no increase in population, housing, or commercial units would result from the Project. The Project includes no new communication facilities. Communication lines on existing utility poles along the south side of Barbara Avenue would not be removed or altered during trail construction.
16c) Utilize additional water which amount would exceed the maximum permitted capacity of the service provider?	No	See discussion and analysis for Sections 4.19.2a and 4.19.2b. The Project would generate no demand to water systems and no alterations to existing systems are proposed. Water required to establish native vegetation would be provided by the County via water truck.
16d) Utilize additional sewage treatment capacity which amount would exceed the maximum permitted capacity of the sewage treatment provider?	No	See discussion and analysis for Sections 4.19.2a and 4.19.2c. The Project would generate no demand on sewage systems and no alterations to existing systems are proposed.
16e) Storm water drainage?	No	The new Class 1 portion of the Project would include additional paved areas; however, runoff will be allowed to sheet flow and infiltrate over the existing landscape.

TRPA Questions	Answers	Discussion
16f) Solid waste and disposal?	No	Large quantities of trash would not be generated, and the Project does not require the development of new landfills because the Project serves as a transportation route with primarily through-travel users. Therefore, no new collection equipment, personnel, or infrastructure would be needed. Existing bear-proof trash receptacles are present at the east end of the Project Area along the trail, and no new trash receptacles are expected to be required.

4.20 Wildfire

4.20.1 Environmental Setting

The CalFire Fire Hazard Severity Zones Viewer was developed to guide construction standards for building permits, use of natural hazard disclosure at time of sale, defensible space clearance around buildings, property development standards, and considerations of fire hazard in City and County general plans.

Portions of the Project Area, outside LTBMU-managed lands, are located within the Very High Hazard State Responsibility Area (**Figure 14**; CalFire 2022, 2023). CalFire mapping indicates that the Project Area is within a Local Responsibility Area, State Responsibility Area, and Federal Responsibility Area (CalFire N.D.). The LTBMU Forest Plan Wildland Urban Interface (WUI) map indicates the Project Area is located within the Defense Zone of the Wildland Urban Interface.

The Forest Plan includes direction for operations within the WUI, although mostly in relation to USFS actions to manage vegetation and habitat in the area, rather than in relation to projects and facilities. The conditions and standards in the WUI and the Project Area are described as follows:

- DC25. Unplanned fires in the WUI and in Jeffrey pine/mixed conifer forests tend to spread slowly to moderately, depending on winds, and burn as a surface fire. Occasional single-tree or group torching might occur when the fire burns through a dense clump of young trees. This burning thins the stand, promotes rapid growth of surviving trees, and creates occasional large snags by killing adjacent large trees. Unplanned fires occurring outside of the WUI in densely stocked fir or lodgepole pine forests may produce intense, stand-replacing events consistent with natural fire regimes.
- DC26. WUI zones are open canopied and dominated primarily by larger, fire-tolerant trees (e.g., thick-barked, self-pruning pine species). The WUI incorporates patterns of fuel condition that modify wildfire behavior by slowing large fire spread and reducing overall fire intensity and severity. Defensible space exists for all structures on Forest Service administrative sites, Forest Service permit authorization sites, and within 100 feet of non-federal structures.
- SG27. Suppress all unplanned ignitions in the WUI defense zone. [Standard].

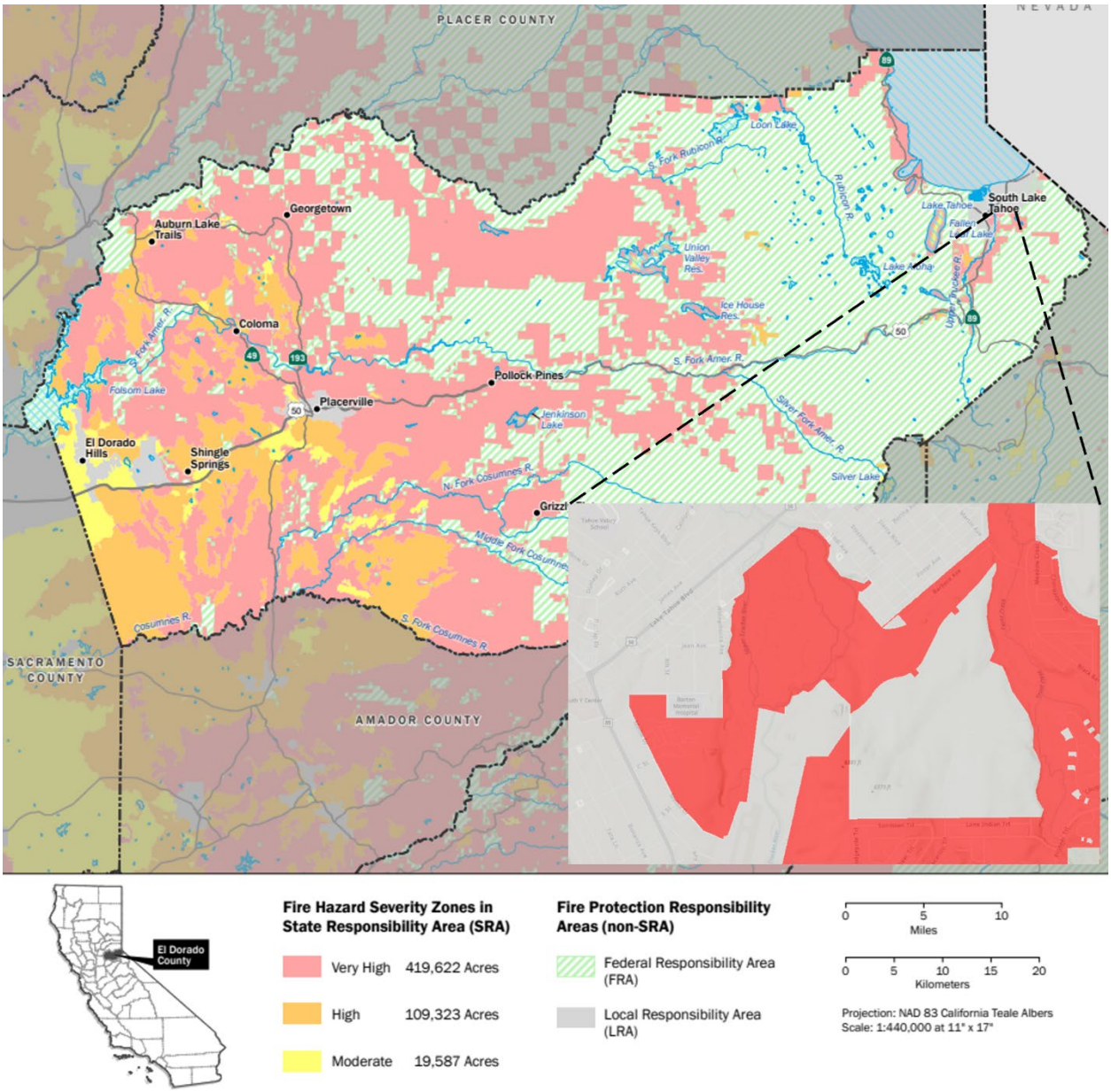


Figure 14. State Responsibility Area Fire Hazard Severity Zones.

4.20.2 CEQA Checklist Summary

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones:

CEQA Question	Impact Determination
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	No Impact

b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	No Impact
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	Less Than Significant Impact
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	Less Than Significant Impact

4.20.3 Answers to CEQA Checklist Questions

a) Would the project substantially impair an adopted emergency response plan or emergency evacuation plan?

No Impact

See discussion and analysis for Sections 4.9.3f, 4.9.3g, 4.9.4-10b, and 4.15.3a that conclude that the Project would not interfere with an adopted emergency response or evacuation plan. A trail system can be part of a wildfire management strategy and serve as emergency egress routes before or during a fire. Development of the proposed trail improves access and connection between existing neighborhoods currently disconnected by the Upper Truckee River. While the trail would not serve as a new vehicle route for personal automotive use, the trail may be used in some situations for emergency vehicle access and would serve as an evacuation resource for persons on bicycle or on foot. Replacement of the damaged bridge and construction of the paved Class 1 path and elevated boardwalk would improve emergency access along the trail alignment and for the communities connected by it. The proposed Class 1 path alignment connects to a designated South Lake Tahoe evacuation location at the Caltrans snow storage lot, with connection to neighborhoods and Barton Hospital.

b) Would the project, due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

No Impact

The Project would not be located on steep slopes and does not propose structures that would be occupied by people. Development and use of a trail would not increase wildfire risk to the area. The presence of the trail may aid in firefighting efforts by improving access and serving as a fire break. Therefore, the Project would not exacerbate wildfire risks or exposure.

c) Would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

Less Than Significant Impact

See discussion and analysis for Section 4.20.3a above. The Project is a transportation route for non-motorized transportation. Therefore, the Project itself would improve a transportation route within a high fire hazard area and would serve as a fuel break. No associated infrastructure is proposed or required for the project. There are existing overhead utility lines along Barbara Avenue, as well as water infrastructure for the residences.

The new Class 1 trail would pave an existing dirt trail and utility road, thereby reducing wildfire risk of emergency vehicles driving across vegetated areas. Construction of the trail would involve the use of heavy machinery and vegetation removal; however, all equipment would include spark arrestors, fire extinguishers, and other best management practices discussed in the Project Description. The risk of wildfire associated with use of the trail would not increase above existing conditions.

d) Would the project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

Less Than Significant Impact

See discussion and analysis for Sections 4.7.2a-iv, 4.7.2c, and 4.10.3c-ii. The Project does not propose residences or alteration to the landscape which would cause post-fire flooding or landslides that may affect existing residences in the area. The Project would not significantly alter drainage patterns and proposes drainage improvements in the area to address increased impervious coverage and existing drainage insufficiencies.

4.21 Mandatory Findings of Significance

4.21.1 CEQA Checklist Summary

CEQA Question	Impact Determination
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	Less Than Significant Impact with Mitigation Incorporated
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, or the effects of probable future projects.)	Less Than Significant Impact
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	Less Than Significant Impact

4.21.2 Answers to CEQA Mandatory Findings of Significance Questions

a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

Less Than Significant Impact with Mitigation Incorporated

The Project alignment is located within an SEZ. The TRPA and Lahontan RWQCB generally prohibit new SEZ disturbance, but TRPA allows an exemption for shared-use trails (TRPA Code Section 30.4.6.D.3) if findings can be made. Similarly, the Lahontan RWQCB may grant an exemption for trails if findings can be made, including no feasible alternatives that avoid the SEZ. As discussed in Sections 4.4.4a-c, the proposed alignment minimizes SEZ disturbance and utilizes an existing disturbed trail and utility road. The Project also includes construction of a boardwalk to avoid disturbance to wetland habitat under the influence of high groundwater. Since the Upper Truckee River divides the community, there are no feasible alternatives to avoid crossing it and the SEZ surrounding it. As part of the exemption, Lahontan RWQCB requires that the SEZ is restored in a 1:1.5 ratio of the Project disturbance. Mitigation Measure BIO-13 would implement this restoration in conjunction with coordination between the County and Lahontan RWQCB.

As mitigated through measures AFR-1 and BIO-1 through BIO-13, no rare, threatened, or endangered species or forest lands would be adversely impacted by the Project. Biological controls including pre-construction surveys and monitoring during construction, as described in the Project Description, would

be implemented. As mitigated through measures TCR-1 through TCR-4, no tribal cultural resources would be adversely impacted by the Project. Inadvertent discovery protocols are also required by TRPA, as described in the Project Description, which further ensure a less than significant effect on tribal cultural resources.

b) Does the project have impacts that are individually limited, but cumulatively considerable? "Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, or the effects of probable future projects?

Less Than Significant Impact

The Upper Truckee River has been subject to various restoration projects upstream and downstream of the Project Area over the past 2 decades, and a future restoration project in Johnson Meadow led by the TRCD is currently in the environmental review stage. These projects have addressed restoring flow to dry channels, improving bank stability, reducing sediment flow to Lake Tahoe, and improving wetland and SSS habitat. Construction of the Class 1 trail and boardwalk and the bridge replacement, as proposed by the Project, will not pose a cumulative effect with the TRCD's restoration project. Rather, the Project will support the future Johnson Meadow restoration effort by removing the damaged bridge from the river, which in its current state is causing sediment and debris accumulation, bank instability, erosion, and partially obstructing fish passage.

The Class 1 trail and boardwalk segments support long-term transportation improvement plans that will stabilize the existing dirt trails and utility access and prevent off-trail impacts both in the uplands and in the Johnson Meadow SEZ. Biological, tribal cultural resources, and geology and soils impacts can be mitigated to less than significant. Whereas all impacts identified for Project construction and operation are or have been mitigated to less than significant, no cumulative impacts would occur.

c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

Less Than Significant Impact

Potential impacts associated with the Project related to aesthetics, air quality, cultural resources, energy, GHG emissions, hazards, hydrology and water quality, land use and planning, noise, transportation, utilities and service systems, and wildfire that could directly affect human beings are less than significant and do not require mitigation. Potential adverse effects would be temporary in nature due to construction activities and standard construction controls ensure they would be less than significant. Therefore, the Project would not result in environmental effects that cause substantial adverse effects on human beings either directly or indirectly.

4.21.3 TRPA Checklist – Findings of Significance

TRPA Questions	Answers	Discussion
21a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California or Nevada history or prehistory?	No, with Mitigation	Refer to discussion and analysis for Section 4.21.2a above. The Project would implement construction controls to prevent short term effects during construction and SEZ improvements would provide long-term benefits to water quality and fish passage by removing the damaged bridge. No SSS were identified in the Project Area, but habitat for numerous species is present in the Project Area as described in Section 4.4 and the NES. Pre-construction surveys and construction monitoring for various biological resources will be implemented. As mitigated through measures TCR-1 through TCR-4, no tribal cultural resources would be adversely impacted by the Project.
21b) Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short-term impact on the environment is one which occurs in a relatively brief, definitive period of time, while long-term impacts would endure well into the future.)	No	The Project is focused on achieving long-term environmental goals. Short term effects during construction are minor and managed through construction controls and mitigation measures.
21c) Does the project have impacts which are individually limited, but cumulatively considerable? (A project may impact on two or more separate resources where the impact on each resource is relatively small, but where the effect of the total of those impacts on the environmental is significant?)	No	Refer to discussion and analysis for Section 4.21.2b above. This Project is not anticipated to result in additional actions or effects that would be added to or could interact with the effects from other actions at this location or at this time. There are no individually significant impacts that could be cumulatively considerable. The intent of the project is to provide cumulative benefits to water quality and Lake Tahoe clarity. Therefore, no cumulative impacts are anticipated.

21d) Does the project have environmental impacts which would cause substantial adverse effects on human being, either directly or indirectly?	No	Refer to discussion and analysis for Section 4.21.2c above. Potential impacts associated with construction related to aesthetics, air quality, cultural resources, energy, GHG emissions, hazards, hydrology and water quality, land use and planning, noise, transportation, utilities and service systems, and wildfire are less than significant and do not require mitigation. Potential adverse effects would be temporary in nature due to construction activities and standard construction controls ensure they would be less than significant.

5 Mitigation Monitoring and Reporting Plan

CEQA requires review of any project that could have significant adverse effects on the environment. In 1988, CEQA was amended to require reporting on, and monitoring of, mitigation measures adopted as part of the environmental review process. This Mitigation Monitoring and Reporting Plan (MMRP) is designed to aid the County in their implementation and monitoring of measures proposed in the IS for the proposed Project.

Table 4 provides details of the MMRP. The mitigation measures are taken from the IS and are assigned the same number as in the IS. The MMRP describes the actions that must take place to implement each mitigation measure, the timing of those actions, and the entities responsible for implementing and monitoring the actions.

Table 4. Mitigation and Monitoring Plan

Mitigation Measure	Mitigation Activities	Implemented By	Monitored By	Timing and Frequency	Verification of Compliance
AFR-1	Implement Mitigation Measures BIO-1, BIO-4, and BIO-9.	Contractor/Consultant	County	At all times/Pre-construction	Verified by: Date:
BIO-1	Prior to the start of construction activities, the limits of construction shall be clearly marked and sensitive or regulated habitats within the Project limits shall be marked with high visibility fencing or staking to ensure construction will not further encroach into waters or sensitive habitats. These areas shall be marked on the Project plans. A qualified biologist shall periodically inspect the Project Area to ensure environmentally sensitive areas remain undisturbed.	Contractor	County	Pre-construction and inspected periodically during monitoring	Verified by: Date:
BIO-2	To minimize impacts to aquatic species and habitat, heavy equipment shall not cross or enter the river unless necessary for bridge demolition and associated debris removal. Fueling, maintenance, and staging of equipment shall occur in designated upland staging areas only.	Contractor	County	At all times	Verified by: Date:

BIO-3	BMPs used in the Upper Truckee River shall be installed with consideration for fish passage. Turbidity curtains or downstream screens shall be installed in a manner that allows for the passage of fish beneath or around the BMP. BMPs shall consist of materials that prevent fish and other wildlife from becoming entangled, trapped, or otherwise harmed. BMPs used in the river shall be approved for use by CDFW and USFWS and inspected daily by a qualified biologist.	Contractor	County	During bridge removal and as needed during construction	Verified by: Date:
BIO-4	Prior to the start of construction activities, high visibility vegetation protection fencing shall be installed around the dripline of trees and snags in the Project Area that are not planned for removal. Trees and snags shall be marked on the Project plans for avoidance and periodically inspected by a qualified biologist to ensure they remain undisturbed.	Contractor	County	Pre-construction and inspected periodically during monitoring	Verified by: Date:

BIO-5	A pre-construction plant survey of the entire Project Area shall be conducted by a qualified biologist prior to construction and during the appropriate survey window(s) necessary to identify special status plants with the potential to occur. Results of the pre-construction plant survey shall be provided to the Project proponent, CDFW, and the LTBMU. If special-status plant species are detected, their locations shall be pin-flagged, and a minimum 25-foot buffer shall be marked with high visibility fencing or staking around the individual or population. A qualified biological monitor shall inspect the special status plant species and buffer(s) on a weekly basis to ensure no impacts occur because of the Project.	Biological Consultant	County	Pre-construction and weekly as needed during monitoring	Verified by: Date:

BIO-6	No more than 14 days prior to construction, an SNYLF visual encounter survey shall be conducted by a USFWS-approved biologist to ensure SNYLF are absent in the Project Area, including upstream and downstream areas or suitable habitat features within 100 feet of the Project. If a frog is observed during any point of the Project, all work shall immediately halt, all equipment shall be powered off, and work shall not continue until the frog can be identified by a qualified biologist. If the frog is not an SNYLF, then a qualified biologist shall move the frog out of harm's way prior to work proceeding. If the frog is an SNYLF, then work shall stop until the SNYLF has moved out of harm's way on its own accord as determined by the biological monitor. Consultation with the USFWS shall be re-initiated if take is exceeded or the Project action changes from that previously disclosed in the Biological Assessment.	Biological Consultant	County	Pre-construction and as needed during construction and monitoring	Verified by: Date:

BIO-7	A qualified biologist shall conduct environmental awareness training for all construction personnel. The training shall include identification of SSS, required practices before the start of construction, general measures that are being implemented to conserve the species as they relate to the Project, penalties for non-compliance, and the boundaries of work and permitted disturbance zones. Supporting materials containing training information shall be prepared and distributed. Upon completion of training, all construction personnel shall sign a form stating that they have attended the training and understand all the measures. Proof of this instruction shall be kept on file by the Project proponent. The Project proponent shall provide the USFWS and CDFW with a copy of the training materials and copies of the signed forms indicating that training has been completed. If new construction personnel are added to the site, the crew foreman shall ensure that the personnel receive the mandatory training before starting work. Copies of signed forms shall be submitted monthly as additional training occurs for new employees. The crew foreman is responsible for ensuring that construction personnel adhere to the guidelines and restrictions.	Biological Consultant	County	Pre-construction and as needed during construction	Verified by: Date:

BIO-8	Immediately prior to installation of the coffer dam system around the bridge removal work area, a qualified biologist shall conduct a fish survey to ensure Lahontan cutthroat trout (LCT), mountain whitefish, and Lahontan mountain sucker are absent in the Project Area. The biologist will remain on-site and monitor installation of the coffer dam and will have authority to stop any Project activity that may impact LCT or other special-status fish species detected in the Project area. The biologist will then survey ponded water within the contained work area following completion of the coffer dam installation to ensure fish are absent. If non-federally listed fish species are found in the ponded water, they will be relocated to the river side of the coffer dam structure by the biologist. If LCT are found in the ponded area, the coffer dam system will be reopened to allow the LCT to leave on its own accord. No LCT will be handled or relocated. Although the confidence of absence in the contained work area is high based on the inclusion of the previous portions of this measure, should LCT be found during pumping of water from the contained work area, pumping will immediately cease, and the coffer dam will be reopened. The qualified biologist will also perform daily inspections of the coffer dam and any other BMPs, such as the downstream turbidity curtain, to ensure they are properly installed, in good condition, cannot trap or otherwise harm fish, and do not block fish passage. If ponded water will be pumped from the contained bridge removal work area, intake screens will be used to prevent fish being impacted by the pump and a qualified biologist will be on-site to relocate any residual non-federally listed fish species to the river side of the coffer dam structure. After bridge construction/demolition, the qualified biologist will monitor the removal of the coffer dam and other BMPs. Should an LCT be detected in the Project area, the USFWS will be contacted immediately, and all equipment will be powered off.	Biological Consultant	County	Pre-construction and daily monitoring for coffer dam and bridge removal work	Verified by: Date:

BIO-9	During the nesting season (March through July) and no more than 2 weeks prior to construction and vegetation removal, a qualified biologist shall conduct a protocol-level survey for northern goshawk to determine occupancy and nesting status within a 0.25-mile radius of the Project Area. If an active goshawk nest is discovered, a 0.25-mile activity-free buffer shall be established around the nest site. Results of the pre-construction northern goshawk survey shall be provided to CDFW and TRPA.	Biological Consultant	County	Pre-construction, ongoing monitoring as needed for nests	Verified by: Date:
BIO-10	During the appropriate survey periods (June 1 to June 14, June 15 to June 25, and June 26 to July 15), and no more than 2 weeks prior to construction and vegetation removal, a qualified biologist shall conduct protocol-level surveys for willow flycatcher to determine occupancy and nesting status in suitable habitat within a 100-foot buffer of the Project Area. If an active willow flycatcher nest is discovered, a 100-foot activity-free buffer shall be established around the nest site. Results of the willow flycatcher surveys shall be provided to CDFW and TRPA.	Biological Consultant	County	Pre-construction, ongoing monitoring as needed for nests	Verified by: Date:

BIO-11	At least 14 days prior to removal or modification of snags, trees, the existing bridge, or other features that may provide roosting habitat for bats, a qualified biologist shall conduct a pre-construction survey to determine the presence or absence of bats and roosts. Results of the survey shall be provided to the Project proponent. If bats or signs indicating past or present roosting are found, the Project proponent shall report the bat observation or roost to CDFW and shall delay removal until the roost can be confirmed unoccupied. The Project proponent shall coordinate with CDFW to determine an appropriate activity-free buffer area around occupied roosts in the Project Area.	Biological Consultant	County	Pre-construction, ongoing monitoring as needed for roosts	Verified by: Date:

BIO-12	To ensure that bats have left potential roosting trees, trees shall be removed over the course of 2 days. On the first day, limbs from the identified trees shall be removed in the late afternoon. This disturbance should cause any roosting bats to seek other roosts during their nighttime foraging. The remainder of the tree can then be removed on the second day as late in the afternoon as feasible. If bats are found injured, or if bat mortality occurs during the course of tree removal, the Project proponent shall immediately notify CDFW of the event, the species recorded, and the number of individuals documented. Tree limbing or removal shall not be performed under any of the following conditions: during any precipitation events, when ambient temperatures are below 4.5 degrees Celsius, when windspeeds exceed 11 miles per hour, and/or any other condition which may lead bats to seek refuge.	Contractor	County	During any tree removal activity, year-round	Verified by: Date:

BIO-13	BIO-13: To mitigate the impact to SEZs in the amount of 1:1.5, the County shall first look for existing SEZ land coverage or disturbance in the Project vicinity that can be restored and permanently protected. If there is insufficient SEZ restoration potential in the Project vicinity, the County shall utilize SEZ restoration credits from projects previously restored and banked. The project eligible at the time of this environmental analysis includes: • El Dorado County SEZ Restoration Project #1 (Angora Wetland Bank) - up to 267,422 sf (6.139 acres) of restoration is available from implementation of this project. This restoration project, or others as approved, includes successful soil and habitat restoration that is expected to offset floodplain and wetland disturbance as well as the TRPA and Lahontan required SEZ disturbance. If needed for this Project, a wetland delineation for the restoration projects will be completed and will determine the amount and type of wetland restoration/credit that is available.	Consultant/County	County	Post-construction as needed	Verified by: Date:

GEO-1	If shallow spread foundations were to be utilized for west abutment and boardwalk support, liquefiable soils beneath these footings shall be mitigated via ground improvement techniques. Driven piles are the preferred foundations for the boardwalk system and these piles shall be designed to provide the needed axial and lateral resistance from dense to very dense soils as well as considering downdrag loads. Native soils east of the river are not liquefiable and the east abutment of the bridge can be supported on shallow spread foundation underlain by native dense to very dense silty sand to silty sand with gravel soils. Whereas driven piles may impact the existing pipelines, the County shall continue to coordinate with STPUD during design to ensure the existing sewer pipelines in the vicinity are protected.	Contractor	County	During construction design and implementation	Verified by: Date:

TCR-1	Workers Environmental Awareness Program (WEAP) Training. A Tribal Cultural Resources (TCRs) sensitivity and awareness training program (WEAP) shall be provided for all personnel involved in Project construction, including field consultants and volunteers. An archaeologist meeting the Secretary of the Interior's (SOI) Professional Qualifications Standards for Archeology (or under direct supervision of an SOI qualified Archaeologist) and representatives of culturally affiliated Native American tribes will coordinate during preparation of the WEAP. The WEAP shall occur prior to the onset of Project-related construction activities. The WEAP will include relevant information regarding sensitive cultural resources and TCRs, including applicable regulations, protocols for avoidance, and consequences of violating state laws and regulations. The WEAP will also describe appropriate avoidance and impact minimization measures for cultural resources and TCRs outlined in Mitigation Measure TCR-3. The WEAP will emphasize the requirement for confidentiality and culturally appropriate treatment of any discovery of significance to Native Americans and will discuss appropriate behaviors and responsive actions, consistent with Native American tribal values.	Washoe Tribe / Registered Archaeologist	County	Pre-construction	Verified by: Date:

TCR-2	Construction Monitoring. The Washoe Tribe of California and Nevada has requested, and the County has agreed, to cultural resources monitoring during ground disturbing construction activities. The County will prepare a Monitoring Plan and provide it to the Tribe prior to commencing construction, and shall continue coordination with the Tribe up to and during ground disturbing activities of the Project concerning the avoidance and protection of Tribal Cultural Resources that may be impacted.	County	County	Pre-construction	Verified by: Date:

TCR-3	Inadvertent Discoveries. The following measure is intended to address the evaluation and treatment of inadvertent/unanticipated discoveries of potential TCRs or archaeological resources during the Project's ground disturbing activities. An inadvertent discovery plan will be included in the monitoring plan: • If any suspected TCRs or archaeological resources are discovered during ground disturbing construction activities, all work shall cease within 100 feet of the discovery, or an agreed upon distance based on the Project Area and nature of the find. A qualified professional archaeologist and a Tribal Representative from a California Native American tribe that is traditionally and culturally affiliated with a geographic area shall be immediately notified and shall determine if the find is a TCR (PRC § 21074). The Tribal Representative or qualified archaeologist will make recommendations for further evaluation and treatment as necessary. • The contractor shall implement any measures deemed by the County to be necessary and feasible to preserve in place, avoid, or minimize impacts to the resource, including, but not limited to, facilitating the appropriate tribal treatment of the find, as necessary. • Work at the discovery location shall not resume until all necessary investigation and evaluation of the discovery have been satisfied.	Contractor / Registered Archaeologist / Washoe Tribe	County	Pre-construction, ongoing monitoring as needed for roosts	Verified by: Date:

TCR-4	Human Remains. In the event human remains are discovered, all work shall cease immediately. All measures shall be made to secure and protect areas in which human remains and funeral objects are discovered. Construction workers and/or contractors or subcontractors on the job site will not be permitted to take photographs of human remains, or funeral objects. Archaeological resources are not to be moved or taken from the Project site and work should not resume until authorized. The County Coroner and local law enforcement shall be notified within 24 hours of the discovery to conduct proper evaluation and treatment of remains. The coroner and the law enforcement agency will evaluate the discovery to determine whether it is a crime scene or a burial. If human remains are determined to be associated with an archaeological site (burial), SBTS will notify the State Historic Preservation Office (SHPO) and will work with SHPO to determine measures to take. That office will contact the appropriate tribal representatives and consult on the disposition of the remains and any associated artifacts.	Contractor	County	During construction	Verified by: Date:

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Appendix A

Visual Impact Assessment Memorandum

South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow

Visual Impact Assessment Memorandum

Prepared by: Stephanie Grigsby, CA RLA 4801
Design Workshop
10/24/2023

Statement of Compliance: Produced in compliance with National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) requirements, as appropriate, to meet the level of analysis and documentation that has been determined necessary for this project.

Per Exhibit D, Article XVIII, Section A. (1) of the contract: (c) 2020 California Department of Transportation.

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List of Acronyms and Abbreviations

AVE	Area of Visual Effect
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
Handbook	*Caltrans 2023 VIA Handbook*
FHWA	Federal Highway Administration
NEPA	National Environmental Policy Act
PDT	Project Development Team
VIA	Visual Impact Assessment
TRPA	Tahoe Regional Planning Agency

1 Introduction

1.1 Purpose of Report and Assessment Methodology

The visual impact assessment (VIA) memorandum documents potential visual change in the Area of Visual Effect (AVE), or the area within which the project improvements may be visible by observers both within the project area and in the surrounding contextual area. This memorandum follows the guidance outlined in the publication *Guidelines for the Visual Impact Assessment of Highway Projects*, published by the Federal Highway Administration (FHWA) in January 2015. It follows the format from *Caltrans 2023 VIA Handbook* (*Handbook)* as well as addressing TRPA and CEQA guidelines.

1.2 Project Location and Setting



Figure 1: Project Location and Context

Located in the City of South Lake Tahoe in El Dorado County, California, the project connects the active transportation system in the Sierra Boulevard neighborhood across the Upper Truckee River and surrounding Johnson Meadow, west to Winnemucca

Avenue and the Barton Memorial Hospital. U.S. Highway 50 (US 50), is an eligible California State Scenic Highway by Caltrans and a Scenic Highway Corridor according to TRPA.

The project is located within Sections 3, 4, and 9 of Township 12 North, Range 18 East as depicted on the USGS South Lake Tahoe 7.5-minute quadrangle map. The elevation within the project area is approximately 6,245 feet above mean sea level. Topography in the area consists of a flat wet meadow along the Upper Truckee River corridor within the western portion, and gentle to moderate upland slopes on the east edge of the meadow. The hills in the northeastern section are approximately 6,270 feet above mean sea level.

The area is bounded by residential areas to the east and west, US 50 to the north, and open meadows and a riparian system to the north and south. The meadow includes stands of mature willows and grasses with pockets of aspens and other deciduous riparian vegetation. A yellow pine forest with sagebrush understory runs along the perimeter that is interspersed with single-family homes.

Portions of a concrete bridge that was damaged by 2017 winter storms and the bridge's concrete abutments remain. The area is used for walking, biking, dog walking, and river recreation activities. User trails are present throughout the meadow and paved and unpaved utility access roads exist. Views of surrounding mountain ranges provide a backdrop for the meadow. Portions of the riverbanks have visible eroding cut slopes.

Project Description

The South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow Project will build upon the overall South Tahoe Greenway shared use path network through the south shore of Lake Tahoe. Most of the path (5,075 linear feet) will be constructed atop the existing ground surface, while the remainder (935 linear feet) will consist of an elevated boardwalk. The surface path will consist of a three-inch layer of asphalt atop an eight-inch-thick aggregate base. The project area is relatively flat and limited cut and fill will be required. The path surface will be ten feet wide asphalt concrete pavement with a two foot wide aggregate base shoulder to either side. Where necessary, the surface of the path will be crowned to facilitate drainage. Excavation conducted during construction of the surface path will be approximately one and a half feet in depth, or within the approximate prism of previous disturbance. In three locations approximately, rest area pullouts will be constructed in conformance with Americans with Disabilities Act design standards for rest areas.

The elevated boardwalk section of the path will rest atop a structure consisting of 14-inch diameter steel pipe piles and 11 by 14-inch beams. The boardwalk surface will be approximately 13 feet in width. Where close to the ground, the deck will have curbs along the outer edge. Approximately 20 Class 3 bike route roadway signs will be installed, mostly at or near roadway intersections. Signposts will be set 36 inches into the ground and will be set three feet from the edge of the paved path.

In addition to the new shared use bridge over the Upper Truckee River, the project includes the installation of an elevated boardwalk from Winnemucca Avenue to the proposed bridge location. The boardwalk will be built on driven steel pipe pile footings. Sections of boardwalk less than 30 inches above the surrounding grade will not include a

railing. Sections greater than 30 inches above surrounding grade will include a 42-inch-tall tubular steel railing with cable strands. Approximately 1,040 linear feet of boardwalk will include railing. Most of the path (5,075 linear feet) will be constructed atop the existing ground surface, while the remainder (935 linear feet) will consist of an elevated boardwalk. The surface path will consist of a three-inch layer of asphalt atop an eight-inch-thick aggregate base. The project area is relatively flat and limited cut and fill will be required. The path surface will be ten feet wide with a two food wide aggregate base shoulder to either side. Where necessary, the surface of the path will be crowned to facilitate drainage. Excavation conducted during construction of the surface path will be approximately one and a half feet in depth, or within the approximate prism of previous disturbance. In three locations approximately, rest area pullouts will be constructed.

A new shared use bridge will be installed over the Upper Truckee River (Figure 2). The bridge will be approximately 140 feet long and will have a concrete deck that is approximately 12 feet-two inches wide. The bridge will consist of a half-through underhung Pratt truss with one diagonal per truss panel and plumb end vertical members. Parallel chords with diagonal web members slanting toward the center of the span will define either edge. The top of the chord will be about 54-inches above the finish deck. The structure will consist of unpainted weathered steel with a reinforced concrete deck. Safety rails will be established along either edge of the bridge deck. The foundation will consist of poured in place concrete abutments on either bank of the river. Excavation of footings will be required, each from five to ten feet in depth. An existing derelict bridge will be removed. The proposed bridge is similar in type and form to the recently constructed San Bernardino Bike Trail bridge. (coordinates: 38.857256, -120.026920 (38°51'26.1"N 120°01'36.9"W)

Two staging areas have been identified. Staging Area 1 is positioned roughly 350 feet south of the project corridor. It is accessible via a paved segment of the Lakehouse Road (P-09-004529). Staging Area 2 is situated along Barbara Avenue right-of-way, adjacent to the eastern end of the project.

Grading and construction disturbance are anticipated to stay within a 25-foot-wide corridor. Disturbance will be revegetated to blend with the existing native plant communities.

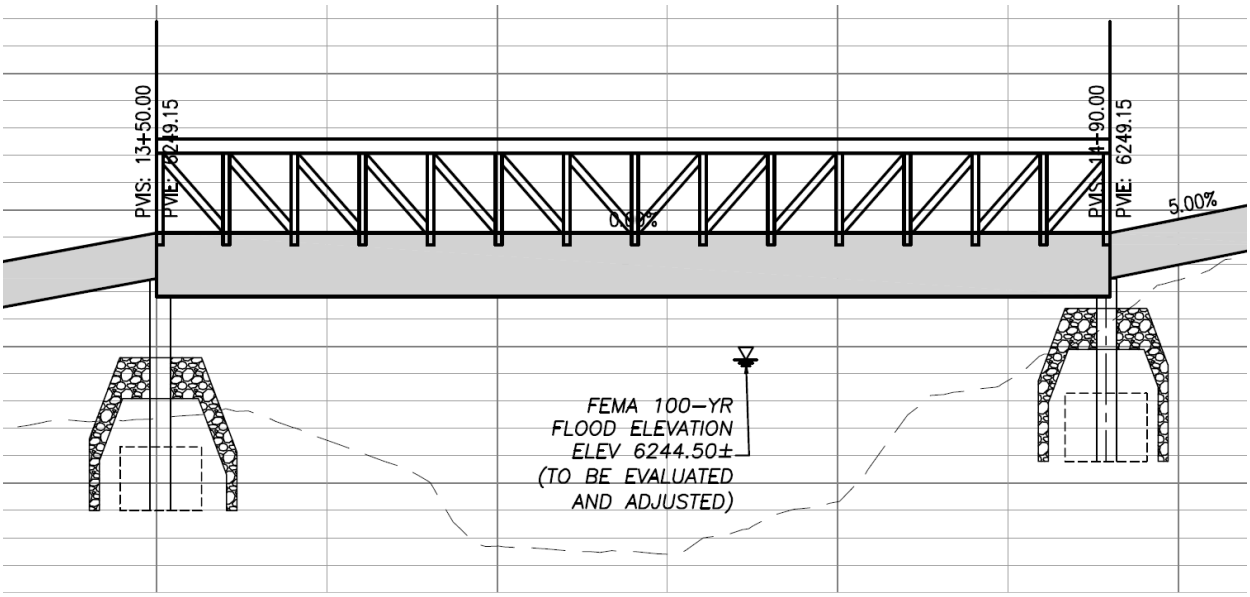


Figure 2: Proposed Bridge Elevation

1.3 Description of Area of Visual Effect

The AVE is the area where the project will be visible within the immediate vicinity of the bridge and boardwalk locations. Mature stands of willows, aspens, evergreens, and topographic variation would screen much of the project improvements from the surrounding neighborhoods and from US 50. Glimpses of the boardwalk may be visible from Winnemucca Avenue, but the primary AVE will be the trail corridor itself and from the river looking toward the bridge and boardwalk. The viewpoint to experience minor viewshed alteration would be river and other recreational users within 100 yards directly upstream of the proposed bridge. Although a change will occur it could be an improvement of the existing bridge, which is in disrepair.

LOCATION	LEVEL OF IMPACT	DESCRIPTION
US 50	NO IMPACT	No direct line of sight due to topography and vegetative screening
SIERRA BLVD	NO IMPACT	No direct line of sight due to topography and vegetative screening
WINNEMUCA AVENUE	LOW	Direct line of sight only occurs at trail head
TRAIL CORRIDOR	MODERATE	Changes to trail and bridge will be visible while on trail
RIVER CORRIDOR	MODERATE	Changes to trail and bridge will be visible by river users

Table 1: Visual Impact to various locations

1.4 Visual and Scenic Resources

The project site is approximately 0.7 miles from US 50 which is considered an Eligible Scenic Highway (Caltrans Scenic Highway Program). US 50 is designated as a Visual Resource according to TRPA (Refer to 66.2.4 Scenic Highway Corridor Design Standards). As stated above in the AVE, views of the project are primarily screened from the highway due to a combination of existing stands of willow, aspen, evergreens, and topography. During winter months the density of existing foliage will filter views of project from US 50.

2 Inventory

2.1 Description of Landscape Visual Character

The Tahoe region belongs to the Western Cordillera Ecoregion, which is a region of high, rugged, mostly forested mountains with some wide, open valleys or meadows. Plants, animals, and water conditions vary greatly with elevation in the region. Lower elevations are commonly grass or shrub covered, mid-elevations are mostly forest covered, and many alpine areas above timberline are covered with snow and ice for much of the year.

Johnson Meadow is characterized by generally flat and gently rolling terrain surrounded by a pine forest with sagebrush understory and single-family residential development. A background view is provided by the towering peaks of the high alpine Sierra Nevada Mountains. One of the most notable features of the site is the Upper Truckee River, which is the largest inlet into Lake Tahoe. Other notable features include the open meadow grasses and deciduous riparian landscape.



Figure 3: Viewpoint looking towards project location from trail head located on Winnemucca Avenue.

A diversity of plant communities exists in Johnson Meadow – ranging from deciduous riparian shrubs, trees, and grasses, to mature stands of Jeffrey pine stands at the meadow's edges. Swaths of willows and aspens occur throughout the meadow and project area and around the river's edges.

2.2 Description of Landscape Visual Quality

A visual quality rating analysis is based on potential improvements or negative impacts to the landscape's intactness, unity, and vividness and how they apply to the visual quality within the natural and cultural environments. The existing project environment does not significantly differ from the description of the natural and cultural environments. Therefore, a separate section is not provided for the existing project environment.

- Intactness is the degree to which the viewed landscape represents the desired landscape character type; its visual integrity or how well its features "fit" together.
- Unity relates to the spatial composition of the view's landscape features and if the elements appear to be in balance and scale or in harmony.
- Vividness correlates with the elements of line, form, color, and texture and per the US Forest Service definition, relates to qualities that are strong enough to make a lasting impression. Contrast can provide vividness if it avoids confusion.

2.2.1 Natural Environment

Existing conditions regarding the natural environment are of moderately high quality when in comparison to a pristine landscape.

- Moderate Intactness: Most of the landscape is consistent with views expected of naturally occurring plant species and healthy river conditions. Small obstructions occur due to existing bridge conditions, and minor habitat degradation along existing paths due to compaction and erosion.
- High Unity: Spatial scale is appropriate and there is a high sense of naturally occurring harmony, order, and coherence.
- High Vividness: The natural focal point of the river and surrounding natural landscape create an elevated level of vividness.



Figure 4: Typical View of River Corridor Directly Upstream of Proposed Bridge Location.

2.2.3 Cultural Environment

The cultural environment is of moderately low quality, which includes buildings, infrastructure, other structures, and art or artifacts.

- Low Intactness: Remnants of the existing bridge do not fit within the overall landscape. The bridge consists of multiple concrete sections which detract from the visual environment.
- Moderately Low Unity: Fencing and bridge remnants may fit within the site's historical context, but vandalism and damage has occurred degrading their unity with the overall sight.
- Low Vividness: The existing bridge does not provide a desirable visual contrast or create a sense of memorability. A lack of cohesion with the natural environment creates an obstruction to the view and could be considered a nuisance.



Figure 5: Typical View of the Existing Bridge for River Users Traveling Downstream.



Figure 6: View of Existing Fencing.

2.3 Viewers

Viewers include people using the project (travelers) and those surrounding the project who may view it from a nearby neighborhood or viewpoint (neighbors). Travelers include hikers, pedestrians, cyclists, dog walkers, mountain bikers, and river users. Neighbors include residents of the nearby residential areas and motorists, cyclists, and pedestrians along the US 50 corridor.

Project users will have low viewpoint sensitivity. The change of pathway conditions from native earth to a paved surface or elevated boardwalk will be a change from the existing conditions, but the path is aligned with the existing terrain to minimize grading and vegetation disturbance and the replacement of the bridge will be an improvement over the existing conditions.

Project neighbors (or those who may view the project from US 50 or the surrounding neighborhoods) have a low to no viewpoint sensitivity (low to no impact). Views of the project will be in the middle ground and features will be primarily screened by the surrounding vegetation. Any views of the project will blend in with the overall viewshed.



Figure 7: View of Project Location from Winnemucca Avenue.

2.4 Viewpoints

The viewpoint from US 50 is the only view from a designated scenic resource. US 50 is designated as an Eligible Scenic Highway by Caltrans and as a Local Visual Resource by TRPA. The sight location is approximately 0.7 miles south of US 50. Proximity and existing topography and vegetation obstruct views of proposed sight elements. TRPA scenic quality ratings for this segment of US 50 indicate views from the highway are in non-conformance due to development that is not directly related to the view of Johnson Meadow. The site is not visible from other visual resources designated by TRPA.

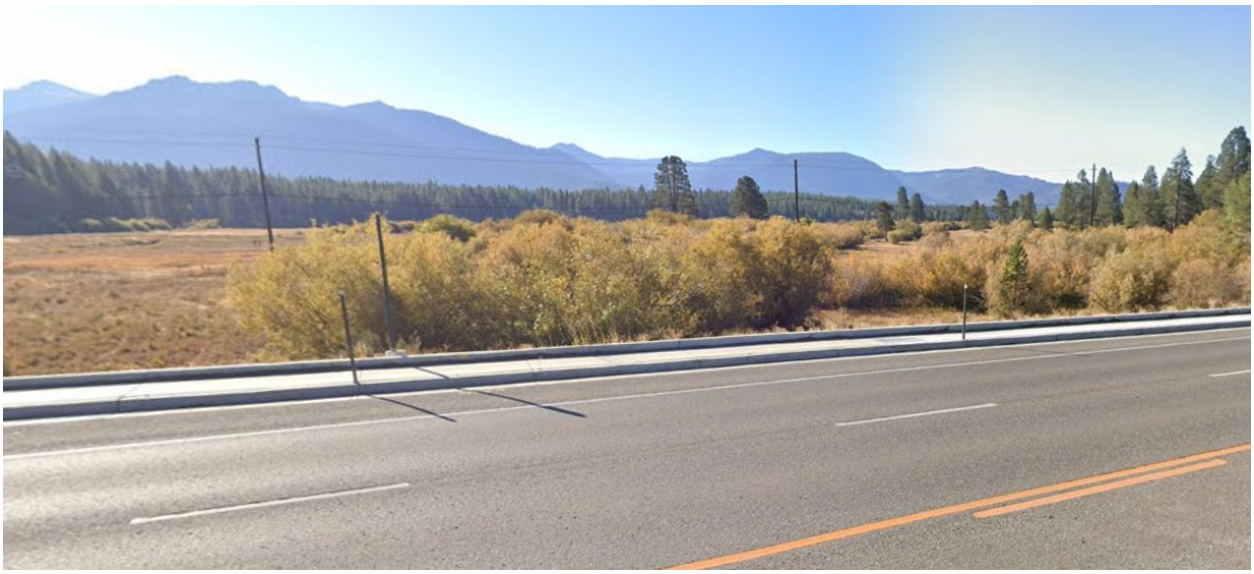


Figure 8: View of Johnson Meadow Toward Project Area from Highway 50.

3 Analysis Phase

3.1 Evaluation of Visual Impact

The overall visual impact of the project is anticipated to be low. The visual changes from the proposed project will be related to the construction of the new bridge feature, installation of the boardwalk, paving the pathway, and the associated grading and disturbance related to construction of the features. River users may have the greatest level of visual change, but removal of the existing, damaged bridge and restoration of the landscape will reduce those impacts, if not provide a benefit by replacing the bridge with a more visually appealing structure (see figure 2 for proposed bridge elevation).

Existing tree and willow stands provide substantial screening of the project changes and will screen views of the boardwalk and the bridge from the surrounding neighborhood. There would be no adverse effect to the scenic vista to or from US 50 and the bridge replacement will be an improvement to the scenic quality for the river users when comparing the visual quality of existing bridge (figure 5) to the proposed bridge (figure 2). Construction disturbance will be restored, and the pathway alignment has been sited to minimize vegetation removal and overall grading.

No designated scenic resources exist within the project boundaries. US 50 is the closest scenic resource and does not have a direct line of site to project elements. Distance and mature stands of aspens and riparian vegetation block views of project features.

No lighting is proposed with the project.

Based on the analysis above, Table 2 summarizes the level of significance relevant to the CEQA and TRPA checklists.

Table 2: CEQA and TRPA Checklist Items

CEQA Environmental Checklist Item	Potentially Significant Impact	Less Than Significant with Mitigation Measures	Less Than Significant Impact	No Impact
1. Have a substantial adverse effect on a scenic vista? (CEQA Ia)			X	
2. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings, within a state scenic highway? (CEQA Ib)			X	
3. Substantially degrade the existing visual character or quality of the site and its surroundings? (CEQA Ic)			X	
4. Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area? (CEQA Id)				X
TRPA Initial Environmental Checklist Item	Yes	No, With Mitigation	Data Insufficient	No
1. Be inconsistent with the TRPA Scenic Quality Improvement Program (SQIP) or Design Review Guidelines?				X
2. Include new or modified sources of exterior lighting?				X
3. Create new illumination which is more substantial than other lighting, if any, within the surrounding area?				X
4. Cause light from exterior sources to be cast off-site onto public lands?				X
5. Create new sources of glare through the siting of the improvements or through the use of reflective materials?				X

4 Mitigation Phase (Environmental Commitments)

4.1 Recommendations for Environmental Commitment Measures

Recommendations for environmental commitment measures for visual resources include avoidance, minimization, and enhancements.

The project should avoid removing mature stands of willows, aspens, and evergreens to the extent possible. Minimize treen and vegetation removals, especially with native trees and vegetation to maintain the existing visual character. Restore staging areas with native vegetation or vegetation representative of preconstruction conditions to the extent feasible. Revegetate disturbed areas with regionally appropriate drought-tolerant or native plant material as appropriate.

Appendix A: Scoping Questionnaire

Project and Visual Context Baseline Information Form

Project Name:	South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow
EA or EFIS Number	
Project Location (Dist-Co-Rte-PM):	03-ED-0-CR
Questionnaire Preparer Name and CA LA License Number:	Stephanie Grigsby 4801
District Landscape Architect (DLA) Providing Concurrence, CA LA Lic. #:	
Visual Features of Project and its Alternative(s).	The project proposes to construct approximately 1.2 miles of a 10-foot wide Class 1 shared-use path and to remove the existing bridge and replace the bridge with a new structure located south of the existing bridge. Two foot wide cleared AB shoulders will be included on either side of the paved path. In addition to the new pedestrian/bicyclist bridge over the Upper Truckee River, the project includes the installation of elevated boardwalk from Winnemucca Avenue to the proposed bridge location. The boardwalk will be built on driven composite pile footings. Sections of boardwalk less than 30 inches above the surrounding grade will not include a railing. Sections greater than 30 inches above surrounding grade will include a 42 inch tall tubular steel railing with cable strands. Approximately 1,040 linear feet of boardwalk will include railing. The new pedestrian/bicyclist bridge will span approximately 140 linear feet across the river. The bridge deck is anticipated to sit 5 feet above the FEMA 100-year flood level and is approximately 11 feet above the riverbed at its estimated lowest point. The bridge will be 12 feet wide with a cast-in-place reinforced concrete deck and safety railings. Grading and construction disturbance are anticipated to stay within a 25 foot wide corridor. Disturbance will be revegetated to blend with the existing native plant communities. No lighting is proposed.

Additional Visual Context Remarks:	Bridge will replace a damaged concrete bridge and is screened from views from US 50 and surrounding neighbors by mature stands of willow, aspen and pine forests.

Regulatory Framework

Potential Agencies that may have to be Involved:	☐ Federal ☒ State ☒ Local ☐ Tribal ☒ Other Notes: USFS will review from a scenic perspective and Tribal participation may occur as appropriate, but is not required. The airport will review from an airspace perspective, but FAA review is not anticipated. Tahoe Regional Planning Agency review will occur.

Visual Change and Sensitivity

Landscape Observations:	☒ Water ☐ Visually dominant landforms ☒ Natural vegetation ☐ Visually Appealing Structures ☐ Other features of interest Notes: Existing bridge is damaged and unattractive
Impact of Project on Natural, Cultural, and Existing Project Environments:	☐ Highly compatible ☒ Moderately compatible ☐ Not compatible ☐ Other Notes:
Landscape Context and Development Patterns:	☐ Natural/Undeveloped ☐ Rural ☒ Suburban ☐ Urban Notes:
Scenic, Visual and Historic Resource(s) within the Area of Visual Effect:	☐ Officially designated State Scenic Highway ☒ Eligible Scenic Highway ☐ Visual resources ☐ Federally (or otherwise) designated historic, scenic resource Notes:
Expected Agency Involvement:	Project will be reviewed by state and local agencies and the Tahoe Regional Planning Agency. USFS will review from a scenic perspective and Tribal participation may occur as appropriate, but is not required. The airport will review from an airspace perspective, but FAA review is not anticipated.

Expected Public Feedback:	☒ Scenic resources identified as important ☐ Not important ☐ No public feedback Notes:

Question	**Scoring**			
1) Does the project's aesthetic approach appear to be consistent with applicable laws, ordinances, regulations, policies, or standards? Although the State is not required to comply with regional and local planning ordinances and other regulations, these documents are critical in understanding the importance that communities place on visual resources. The Caltrans Environmental Planning branch may have copies of the planning documents that pertain to the project. If not, this information can be obtained by contacting the local planning department.	Low Consistency (4 points)	Moderate Consistency (3 Points)	High Consistency (2 Points)	Not Applicable (1 Point)
2) Will permits be required by outside regulatory agencies (i.e., federal, state, or local)? Permit requirements can have an unintended consequence on the visual environment. Anticipated permits, as well as specific permit requirements may be determined by talking with the project Environmental Planner and Project Engineer. Note: coordinate with the Caltrans representative responsible for obtaining the permit prior to communicating directly with any permitting agency.	Yes, both federal and state, or multiple permits required (4 Points)	Yes, either federal, or state, or federal and local, or state and local (3 Points)	Yes, local or multiple local only (2 Points)	No (1 Point)
3) Will the project character be compatible with the visual character of the existing landscape? Consider the types of adverse changes to the scenic integrity of the landscape caused by the project. Evaluate the scale and extent of the project features compared to the surrounding scale of the community.	No Compatibility (4 Points)	Low Compatibility (3 Points)	Moderate Compatibility (2 Points)	High Compatibility (1 Point)

Is the project likely to give an urban appearance to an existing rural or suburban community?				
4) Will the project contrast adversely with the memorability (vividness), natural harmony and/or cultural order (unity) of the existing landscape? Evaluate the scale and extent of the project features compared to the scale of the visual elements within the surroundings. Is the project likely to change the appearance in a way that is contrasting with the line, color, form, and texture of the existing landscape visual character?	High Adverse Contrast (4 Points)	Moderate Adverse Contrast (3 Points)	Low Adverse Contrast (2 Points)	No Contrast (1 Point)
5) Will the project, when viewed together with other past or foreseeable projects, result in a cumulative adverse change in the visual quality or character of the existing landscape? Identify any projects in the area (both Caltrans' and others') that have been recently constructed and/or are reasonably foreseeable and/or currently planned for future construction. The window of time and the extent of area applicable to possible cumulative impacts should be based on a reasonable anticipation of the viewing public's awareness of cumulative change.	Project may result in substantial adverse cumulative visual impacts (4 Points)	Project will result in noticeable adverse cumulative visual impacts (3 Points)	Project is unlikely to result in noticeable adverse cumulative visual impacts (2 Points)	Project will not result in cumulative impacts (1 Point)
6) Will the project produce a new source of substantial light or glare, which will adversely affect daytime or nighttime views within the area? No lighting proposed.	High potential for adverse effects (4 Points)	Moderate potential for adverse effects (3 Points)	Low potential for adverse effects (2 Points)	No potential for adverse effects (1 Point)
7) What is the potential that the project proposal will be controversial within the community? Assess the level of public concern by talking with local agency management and staff familiar with the affected community's sentiments as evidenced by past projects and/or current information.	High Potential that project will be controversial (4 Points)	Moderate Potential that project will be controversial (3 Points)	Low Potential that project will be controversial (2 Points)	No Potential that project will be controversial (1 Point)

8) How sensitive are potential viewer groups likely to be regarding visible changes proposed by the project? Consider among other factors who the viewer groups represent, the number of viewers within the group, probable viewer expectations, activities, viewing duration, and orientation. The expected viewer sensitivity level may be scoped by applying professional judgment, and by soliciting information from other Caltrans staff, local agencies and community stakeholders familiar with the affected community's sentiments and demonstrated concerns.	High Sensitivity (4 Points)	Moderate Sensitivity (3 Points)	Low Sensitivity (2 Points)	No Sensitivity (1 Point)
9) What level of local concern is there for the types of specific project features (e.g., bridge structures, large excavations, sound barriers, or median planting removal) and construction impacts that are proposed? Certain project improvements can be of special interest to local citizens, causing a heightened level of public concern, and requiring a more focused visual analysis.	High Level of Concern (4 Points)	Moderate Level of Concern (3 Points)	Low Level of Concern (2 Points)	No Concern (1 Point)
10) Are there federally, state, locally designated scenic or historic resources, or other visual resources within the project area of visual effect (i.e., viewshed)? For example: protected viewsheds, visually sensitive public use areas, national historic/scenic trails, historic sites or structures, scenic designated viewpoints, wild and scenic rivers, state scenic highways or federal scenic byways, or potential visual resources such as stands of trees, rock outcroppings, etc. Visual resources include the natural resources of the river, meadow and stands of riparian vegetation grouped as one category.	Multiple designated scenic resources (4 Points)	Multiple potential visual resources or a single designated scenic resource (3 Points)	One potential visual resource (2 Points)	No identifiable scenic resources (1 Point)
11) Will the project sponsor or public benefit from a more detailed visual analysis in order to help reach	High Benefit (4 Points)	Moderate Benefit (3 Points)	Low Benefit (2 Points)	No Benefit (1 Point)

consensus on a course of action to address potential visual impacts? Consider the proposed project features, possible visual impacts, and probable environmental commitments. Additional detail on the design aesthetics of the bridge and boardwalk, grading and construction approach would be helpful to understand as part of the visual analysis review.				
12) Will the project likely require design changes to reduce the extent of visual resource impacts? Consider design changes and enhancements such as realignment, additional alignment alternatives, vertical profile adjustments, extensive landscaping, architectural treatment, color and texture treatments and/or lighting of aboveground structures. Color, texture, and architectural treatments are under development. Slight curve adjustments may be considered to allow the path to weave through the landscape where possible. Grading is anticipated to be minimal.	Extensive changes and/or redesign (4 Points)	Some redesign or minimization measures (3 Points)	Minimal design changes (2 Points)	No design changes (1 Point)
Total Score	**23**			

Appendix B

CalEEMod Summaries

Johnson Meadows Trail Detailed Report

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1.1. Basic Project Information

Data Field	Value
Project Name	Johnson Meadows Trail
Construction Start Date	5/15/2025
Lead Agency	El Dorado County
Land Use Scale	Project/site
Analysis Level for Defaults	Air District
Windspeed (m/s)	2.70
Precipitation (days)	44.8
Location	38.91520610804045, -119.98658821534583
County	El Dorado-Lake Tahoe
City	Unincorporated
Air District	El Dorado County AQMD
Air Basin	Lake Tahoe
TAZ	417
EDFZ	0-A
Electric Utility	Liberty Utilities
Gas Utility	—
App Version	2022.1.1.21

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
Road Construction	0.85	Mile	15.5	0.00	—	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

Sector	#	Measure Title
Construction	C-2*	Limit Heavy-Duty Diesel Vehicle Idling
Construction	C-5	Use Advanced Engine Tiers
Construction	C-8	Use Renewable Diesel
Construction	C-10-A	Water Exposed Surfaces

* Qualitative or supporting measure. Emission reductions not included in the mitigated emissions results.

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	PM10T	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—
Unmit.	5.90	50.5	31.7	5.01	12,755
Mit.	4.34	36.8	27.5	3.95	12,755
% Reduced	26%	27%	14%	21%	—
Daily, Winter (Max)	—	—	—	—	—
Unmit.	2.62	23.1	14.5	2.25	5,946
Mit.	2.62	23.1	12.9	2.07	5,946
% Reduced	—	—	11%	8%	—
Average Daily (Max)	—	—	—	—	—
Unmit.	0.97	8.31	4.86	0.79	2,066
Mit.	0.63	5.31	4.14	0.59	2,066
% Reduced	35%	36%	15%	26%	—
Annual (Max)	—	—	—	—	—
Unmit.	0.18	1.52	0.89	0.14	342

Mit.	0.12	0.97	0.76	0.11	342
% Reduced	35%	36%	15%	26%	—

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	PM10T	PM2.5T	CO2e
Daily - Summer (Max)	—	—	—	—	—
2025	5.90	50.5	31.7	5.01	12,755
Daily - Winter (Max)	—	—	—	—	—
2025	2.62	23.1	14.5	2.25	5,946
Average Daily	—	—	—	—	—
2025	0.97	8.31	4.86	0.79	2,066
Annual	—	—	—	—	—
2025	0.18	1.52	0.89	0.14	342

2.3. Construction Emissions by Year, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	PM10T	PM2.5T	CO2e
Daily - Summer (Max)	—	—	—	—	—
2025	4.34	36.8	27.5	3.95	12,755
Daily - Winter (Max)	—	—	—	—	—
2025	2.62	23.1	12.9	2.07	5,946
Average Daily	—	—	—	—	—
2025	0.63	5.31	4.14	0.59	2,066
Annual	—	—	—	—	—
2025	0.12	0.97	0.76	0.11	342

3. Construction Emissions Details

3.1. Linear, Grading & Excavation (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10T	PM2.5T	CO2e
Onsite	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—
Off-Road Equipment	3.11	27.3	1.21	1.11	6,518
Dust From Material Movement	—	—	3.18	0.34	—
Onsite truck	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—
Average Daily	—	—	—	—	—
Off-Road Equipment	0.64	5.61	0.25	0.23	1,339
Dust From Material Movement	—	—	0.65	0.07	—
Onsite truck	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—
Off-Road Equipment	0.12	1.02	0.05	0.04	222
Dust From Material Movement	—	—	0.12	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—
Worker	0.15	0.08	12.3	1.25	224
Vendor	< 0.005	0.04	0.26	0.03	21.5
Hauling	< 0.005	0.05	0.29	0.03	28.6
Daily, Winter (Max)	—	—	—	—	—
Average Daily	—	—	—	—	—
Worker	0.03	0.02	2.21	0.23	42.7

Vendor	< 0.005	0.01	0.05	< 0.005	4.42
Hauling	< 0.005	0.01	0.05	0.01	5.88
Annual	—	—	—	—	—
Worker	0.01	< 0.005	0.40	0.04	7.08
Vendor	< 0.005	< 0.005	0.01	< 0.005	0.73
Hauling	< 0.005	< 0.005	0.01	< 0.005	0.97

3.2. Linear, Grading & Excavation (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10T	PM2.5T	CO2e
Onsite	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—
Dust From Material Movement	—	—	1.24	0.13	—
Off-Road Equipment	1.55	13.6	0.47	0.44	6,518
Onsite truck	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—
Average Daily	—	—	—	—	—
Dust From Material Movement	—	—	0.25	0.03	—
Off-Road Equipment	0.32	2.79	0.10	0.09	1,339
Onsite truck	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—
Dust From Material Movement	—	—	0.05	0.01	—
Off-Road Equipment	0.06	0.51	0.02	0.02	222
Onsite truck	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—
Worker	0.15	0.08	12.3	1.25	224

Vendor	< 0.005	0.04	0.26	0.03	21.5
Hauling	< 0.005	0.05	0.29	0.03	28.6
Daily, Winter (Max)	—	—	—	—	—
Average Daily	—	—	—	—	—
Worker	0.03	0.02	2.21	0.23	42.7
Vendor	< 0.005	0.01	0.05	< 0.005	4.42
Hauling	< 0.005	0.01	0.05	0.01	5.88
Annual	—	—	—	—	—
Worker	0.01	< 0.005	0.40	0.04	7.08
Vendor	< 0.005	< 0.005	0.01	< 0.005	0.73
Hauling	< 0.005	< 0.005	0.01	< 0.005	0.97

3.3. Linear, Drainage, Utilities, & Sub-Grade (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10T	PM2.5T	CO2e
Onsite	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—
Off-Road Equipment	2.51	22.9	0.91	0.84	5,713
Dust From Material Movement	—	—	2.65	0.29	—
Onsite truck	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—
Off-Road Equipment	2.51	22.9	0.91	0.84	5,713
Dust From Material Movement	—	—	2.65	0.29	—
Onsite truck	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—
Off-Road Equipment	0.25	2.26	0.09	0.08	563
Dust From Material Movement	—	—	0.26	0.03	—

Onsite truck	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—
Off-Road Equipment	0.05	0.41	0.02	0.02	93.3
Dust From Material Movement	—	—	0.05	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—
Worker	0.13	0.07	10.4	1.06	189
Vendor	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.10	0.61	0.06	59.6
Daily, Winter (Max)	—	—	—	—	—
Worker	0.12	0.09	10.4	1.06	173
Vendor	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.10	0.61	0.06	59.5
Average Daily	—	—	—	—	—
Worker	0.01	0.01	0.90	0.09	17.4
Vendor	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	0.05	0.01	5.88
Annual	—	—	—	—	—
Worker	< 0.005	< 0.005	0.16	0.02	2.87
Vendor	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	0.97

3.4. Linear, Drainage, Utilities, & Sub-Grade (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10T	PM2.5T	CO2e
Onsite	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—
Dust From Material Movement	—	—	1.03	0.11	—
Off-Road Equipment	2.51	22.9	0.91	0.84	5,713
Onsite truck	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—
Dust From Material Movement	—	—	1.03	0.11	—
Off-Road Equipment	2.51	22.9	0.91	0.84	5,713
Onsite truck	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—
Dust From Material Movement	—	—	0.10	0.01	—
Off-Road Equipment	0.25	2.26	0.09	0.08	563
Onsite truck	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—
Dust From Material Movement	—	—	0.02	< 0.005	—
Off-Road Equipment	0.05	0.41	0.02	0.02	93.3
Onsite truck	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—
Worker	0.13	0.07	10.4	1.06	189
Vendor	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.10	0.61	0.06	59.6
Daily, Winter (Max)	—	—	—	—	—
Worker	0.12	0.09	10.4	1.06	173
Vendor	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.10	0.61	0.06	59.5
Average Daily	—	—	—	—	—
Worker	0.01	0.01	0.90	0.09	17.4

Vendor	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	0.05	0.01	5.88
Annual	—	—	—	—	—
Worker	< 0.005	< 0.005	0.16	0.02	2.87
Vendor	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	0.01	< 0.005	0.97

3.5. Linear, Paving (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10T	PM2.5T	CO2e
Onsite	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—
Off-Road Equipment	0.89	7.71	0.34	0.31	1,625
Onsite truck	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—
Off-Road Equipment	0.04	0.38	0.02	0.02	80.2
Onsite truck	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—
Off-Road Equipment	0.01	0.07	< 0.005	< 0.005	13.3
Onsite truck	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—
Worker	0.08	0.07	7.55	0.77	126
Vendor	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—
Worker	< 0.005	< 0.005	0.33	0.03	6.31
Vendor	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—
Worker	< 0.005	< 0.005	0.06	0.01	1.05
Vendor	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00

3.6. Linear, Paving (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10T	PM2.5T	CO2e
Onsite	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—
Off-Road Equipment	0.49	3.99	0.14	0.13	1,625
Onsite truck	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—
Off-Road Equipment	0.02	0.20	0.01	0.01	80.2
Onsite truck	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—
Off-Road Equipment	< 0.005	0.04	< 0.005	< 0.005	13.3
Onsite truck	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—
Worker	0.08	0.07	7.55	0.77	126

Vendor	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—
Worker	< 0.005	< 0.005	0.33	0.03	6.31
Vendor	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—
Worker	< 0.005	< 0.005	0.06	0.01	1.05
Vendor	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	PM10T	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—
Total	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—
Total	—	—	—	—	—
Annual	—	—	—	—	—
Total	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10T	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—
Total	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—
Total	—	—	—	—	—
Annual	—	—	—	—	—
Total	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	PM10T	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—
Avoided	—	—	—	—	—
Subtotal	—	—	—	—	—
Sequestered	—	—	—	—	—
Subtotal	—	—	—	—	—
Removed	—	—	—	—	—
Subtotal	—	—	—	—	—
—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—
Avoided	—	—	—	—	—
Subtotal	—	—	—	—	—
Sequestered	—	—	—	—	—
Subtotal	—	—	—	—	—
Removed	—	—	—	—	—
Subtotal	—	—	—	—	—
—	—	—	—	—	—

Annual	—	—	—	—	—
Avoided	—	—	—	—	—
Subtotal	—	—	—	—	—
Sequestered	—	—	—	—	—
Subtotal	—	—	—	—	—
Removed	—	—	—	—	—
Subtotal	—	—	—	—	—
—	—	—	—	—	—

4.10.4. Soil Carbon Accumulation By Vegetation Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	PM10T	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—
Total	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—
Total	—	—	—	—	—
Annual	—	—	—	—	—
Total	—	—	—	—	—

4.10.5. Above and Belowground Carbon Accumulation by Land Use Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10T	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—
Total	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—
Total	—	—	—	—	—
Annual	—	—	—	—	—

Total	—	—	—	—	—

4.10.6. Avoided and Sequestered Emissions by Species - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	PM10T	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—
Avoided	—	—	—	—	—
Subtotal	—	—	—	—	—
Sequestered	—	—	—	—	—
Subtotal	—	—	—	—	—
Removed	—	—	—	—	—
Subtotal	—	—	—	—	—
—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—
Avoided	—	—	—	—	—
Subtotal	—	—	—	—	—
Sequestered	—	—	—	—	—
Subtotal	—	—	—	—	—
Removed	—	—	—	—	—
Subtotal	—	—	—	—	—
—	—	—	—	—	—
Annual	—	—	—	—	—
Avoided	—	—	—	—	—
Subtotal	—	—	—	—	—
Sequestered	—	—	—	—	—
Subtotal	—	—	—	—	—
Removed	—	—	—	—	—

Subtotal	—	—	—	—	—
—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Linear, Grading & Excavation	Linear, Grading & Excavation	6/1/2025	9/14/2025	5.00	75.0	—
Linear, Drainage, Utilities, & Sub-Grade	Linear, Drainage, Utilities, & Sub-Grade	8/16/2025	10/5/2025	5.00	36.0	—
Linear, Paving	Linear, Paving	10/6/2025	10/31/2025	5.00	18.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Linear, Grading & Excavation	Crawler Tractors	Diesel	Average	1.00	8.00	87.0	0.43
Linear, Grading & Excavation	Excavators	Diesel	Average	3.00	8.00	36.0	0.38
Linear, Grading & Excavation	Graders	Diesel	Average	1.00	8.00	148	0.41
Linear, Grading & Excavation	Rollers	Diesel	Average	2.00	8.00	36.0	0.38
Linear, Grading & Excavation	Rubber Tired Loaders	Diesel	Average	1.00	8.00	150	0.36
Linear, Grading & Excavation	Scrapers	Diesel	Average	2.00	8.00	423	0.48

Linear, Grading & Excavation	Signal Boards	Electric	Average	1.00	8.00	6.00	0.82
Linear, Grading & Excavation	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.00	84.0	0.37
Linear, Drainage, Utilities, & Sub-Grade	Air Compressors	Diesel	Average	1.00	8.00	37.0	0.48
Linear, Drainage, Utilities, & Sub-Grade	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Linear, Drainage, Utilities, & Sub-Grade	Graders	Diesel	Average	1.00	8.00	148	0.41
Linear, Drainage, Utilities, & Sub-Grade	Plate Compactors	Diesel	Average	1.00	8.00	8.00	0.43
Linear, Drainage, Utilities, & Sub-Grade	Pumps	Diesel	Average	1.00	8.00	11.0	0.74
Linear, Drainage, Utilities, & Sub-Grade	Rough Terrain Forklifts	Diesel	Average	1.00	8.00	96.0	0.40
Linear, Drainage, Utilities, & Sub-Grade	Scrapers	Diesel	Average	2.00	8.00	423	0.48
Linear, Drainage, Utilities, & Sub-Grade	Signal Boards	Electric	Average	1.00	8.00	6.00	0.82
Linear, Drainage, Utilities, & Sub-Grade	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.00	84.0	0.37
Linear, Paving	Pavers	Diesel	Average	1.00	8.00	81.0	0.42
Linear, Paving	Paving Equipment	Diesel	Average	1.00	8.00	89.0	0.36
Linear, Paving	Rollers	Diesel	Average	3.00	8.00	36.0	0.38
Linear, Paving	Signal Boards	Electric	Average	1.00	8.00	6.00	0.82
Linear, Paving	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.00	84.0	0.37

5.2.2. Mitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

Linear, Grading & Excavation	Crawler Tractors	Diesel	Tier 4 Final	1.00	8.00	87.0	0.43
Linear, Grading & Excavation	Excavators	Diesel	Average	2.00	8.00	36.0	0.38
Linear, Grading & Excavation	Excavators	Diesel	Tier 4 Final	1.00	8.00	36.0	0.38
Linear, Grading & Excavation	Graders	Diesel	Tier 4 Final	1.00	8.00	148	0.41
Linear, Grading & Excavation	Rollers	Diesel	Average	1.00	8.00	36.0	0.38
Linear, Grading & Excavation	Rollers	Diesel	Tier 4 Final	1.00	8.00	36.0	0.38
Linear, Grading & Excavation	Rubber Tired Loaders	Diesel	Tier 4 Final	1.00	8.00	150	0.36
Linear, Grading & Excavation	Scrapers	Diesel	Average	1.00	8.00	423	0.48
Linear, Grading & Excavation	Scrapers	Diesel	Tier 4 Final	1.00	8.00	423	0.48
Linear, Grading & Excavation	Signal Boards	Electric	Average	1.00	8.00	6.00	0.82
Linear, Grading & Excavation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Linear, Grading & Excavation	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	8.00	84.0	0.37
Linear, Drainage, Utilities, & Sub-Grade	Air Compressors	Diesel	Average	1.00	8.00	37.0	0.48
Linear, Drainage, Utilities, & Sub-Grade	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Linear, Drainage, Utilities, & Sub-Grade	Graders	Diesel	Average	1.00	8.00	148	0.41
Linear, Drainage, Utilities, & Sub-Grade	Plate Compactors	Diesel	Average	1.00	8.00	8.00	0.43
Linear, Drainage, Utilities, & Sub-Grade	Pumps	Diesel	Average	1.00	8.00	11.0	0.74

Linear, Drainage, Utilities, & Sub-Grade	Rough Terrain Forklifts	Diesel	Average	1.00	8.00	96.0	0.40
Linear, Drainage, Utilities, & Sub-Grade	Scrapers	Diesel	Average	2.00	8.00	423	0.48
Linear, Drainage, Utilities, & Sub-Grade	Signal Boards	Electric	Average	1.00	8.00	6.00	0.82
Linear, Drainage, Utilities, & Sub-Grade	Tractors/Loaders/Backhoes	Diesel	Average	2.00	8.00	84.0	0.37
Linear, Paving	Pavers	Diesel	Tier 4 Final	1.00	8.00	81.0	0.42
Linear, Paving	Paving Equipment	Diesel	Tier 4 Final	1.00	8.00	89.0	0.36
Linear, Paving	Rollers	Diesel	Average	2.00	8.00	36.0	0.38
Linear, Paving	Rollers	Diesel	Tier 4 Final	1.00	8.00	36.0	0.38
Linear, Paving	Signal Boards	Electric	Average	1.00	8.00	6.00	0.82
Linear, Paving	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Linear, Paving	Tractors/Loaders/Backhoes	Diesel	Tier 4 Final	1.00	8.00	84.0	0.37

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Linear, Grading & Excavation	—	—	—	—
Linear, Grading & Excavation	Worker	32.5	8.70	LDA,LDT1,LDT2
Linear, Grading & Excavation	Vendor	1.00	5.90	HHDT,MHDT
Linear, Grading & Excavation	Hauling	0.33	20.0	HHDT
Linear, Grading & Excavation	Onsite truck	—	—	HHDT
Linear, Drainage, Utilities, & Sub-Grade	—	—	—	—
Linear, Drainage, Utilities, & Sub-Grade	Worker	27.5	8.70	LDA,LDT1,LDT2
Linear, Drainage, Utilities, & Sub-Grade	Vendor	0.00	5.90	HHDT,MHDT

Linear, Drainage, Utilities, & Sub-Grade	Hauling	0.69	20.0	HHDT
Linear, Drainage, Utilities, & Sub-Grade	Onsite truck	—	—	HHDT
Linear, Paving	—	—	—	—
Linear, Paving	Worker	20.0	8.70	LDA,LDT1,LDT2
Linear, Paving	Vendor	0.00	5.90	HHDT,MHDT
Linear, Paving	Hauling	0.00	20.0	HHDT
Linear, Paving	Onsite truck	—	—	HHDT

5.3.2. Mitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Linear, Grading & Excavation	—	—	—	—
Linear, Grading & Excavation	Worker	32.5	8.70	LDA,LDT1,LDT2
Linear, Grading & Excavation	Vendor	1.00	5.90	HHDT,MHDT
Linear, Grading & Excavation	Hauling	0.33	20.0	HHDT
Linear, Grading & Excavation	Onsite truck	—	—	HHDT
Linear, Drainage, Utilities, & Sub-Grade	—	—	—	—
Linear, Drainage, Utilities, & Sub-Grade	Worker	27.5	8.70	LDA,LDT1,LDT2
Linear, Drainage, Utilities, & Sub-Grade	Vendor	0.00	5.90	HHDT,MHDT
Linear, Drainage, Utilities, & Sub-Grade	Hauling	0.69	20.0	HHDT
Linear, Drainage, Utilities, & Sub-Grade	Onsite truck	—	—	HHDT
Linear, Paving	—	—	—	—
Linear, Paving	Worker	20.0	8.70	LDA,LDT1,LDT2
Linear, Paving	Vendor	0.00	5.90	HHDT,MHDT
Linear, Paving	Hauling	0.00	20.0	HHDT
Linear, Paving	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Control Strategies Applied	PM10 Reduction	PM2.5 Reduction
Water unpaved roads twice daily	55%	55%
Limit vehicle speeds on unpaved roads to 25 mph	44%	44%
Sweep paved roads once per month	9%	9%

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)
Linear, Grading & Excavation	100	100	15.5	0.00	—
Linear, Drainage, Utilities, & Sub-Grade	100	100	15.5	0.00	—

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Demolished Area	2	36%	36%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
Road Construction	0.85	100%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2025	88.1	453	0.03	< 0.005

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

5.18.2.2. Mitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	31.1	annual days of extreme heat
Extreme Precipitation	9.05	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	6.63	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	2	0	0	N/A

Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	0	0	0	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	2	1	1	3
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	1	1	1	2
Air Quality Degradation	N/A	N/A	N/A	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	62.5
AQ-PM	0.49
AQ-DPM	7.63
Drinking Water	17.8
Lead Risk Housing	10.3
Pesticides	0.00
Toxic Releases	7.76
Traffic	11.8
Effect Indicators	—
CleanUp Sites	0.00
Groundwater	6.97
Haz Waste Facilities/Generators	8.76
Impaired Water Bodies	66.7
Solid Waste	70.4
Sensitive Population	—
Asthma	27.3
Cardio-vascular	2.62
Low Birth Weights	3.96
Socioeconomic Factor Indicators	—
Education	6.52
Housing	38.8

Linguistic	0.00
Poverty	27.3
Unemployment	76.1

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	54.75426665
Employed	54.30514564
Median HI	48.94135763
Education	—
Bachelor's or higher	63.26190171
High school enrollment	100
Preschool enrollment	1.873476197
Transportation	—
Auto Access	98.98626973
Active commuting	28.74374439
Social	—
2-parent households	92.2751187
Voting	69.72924419
Neighborhood	—
Alcohol availability	92.71140767
Park access	81.35506224
Retail density	7.801873476
Supermarket access	14.48736045
Tree canopy	98.1265238

Housing	—
Homeownership	68.57436161
Housing habitability	66.45707686
Low-inc homeowner severe housing cost burden	76.6970358
Low-inc renter severe housing cost burden	21.94276915
Uncrowded housing	96.93314513
Health Outcomes	—
Insured adults	68.18940074
Arthritis	0.0
Asthma ER Admissions	92.2
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	99.6
Cognitively Disabled	6.4
Physically Disabled	26.6
Heart Attack ER Admissions	93.6
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	68.3
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—

Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	86.4
SLR Inundation Area	0.0
Children	87.0
Elderly	45.9
English Speaking	69.9
Foreign-born	5.8
Outdoor Workers	62.5
Climate Change Adaptive Capacity	—
Impervious Surface Cover	93.0
Traffic Density	16.9
Traffic Access	0.0
Other Indices	—
Hardship	46.2
Other Decision Support	—
2016 Voting	65.5

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	3.00
Healthy Places Index Score for Project Location (b)	64.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

Measure Title	Co-Benefits Achieved
CR-1: Adapt and Re-use Vacant Lots for Green Infrastructure	Enhanced Energy Security, Enhanced Food Security, Improved Ecosystem Health, Improved Public Health, Social Equity

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Characteristics: Project Details	Start date
Construction: Construction Phases	Expanded work period for grading.
Construction: Paving	Around 5075 linear feet of bike path 10 feet wide

Johnson Meadows Trail Summary Report

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7.3. Overall Health & Equity Scores

7.5. Evaluation Scorecard

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Johnson Meadows Trail
Construction Start Date	5/15/2025
Lead Agency	El Dorado County
Land Use Scale	Project/site
Analysis Level for Defaults	Air District
Windspeed (m/s)	2.70
Precipitation (days)	44.8
Location	38.91520610804045, -119.98658821534583
County	El Dorado-Lake Tahoe
City	Unincorporated
Air District	El Dorado County AQMD
Air Basin	Lake Tahoe
TAZ	417
EDFZ	0-A
Electric Utility	Liberty Utilities
Gas Utility	—
App Version	2022.1.1.21

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
Road Construction	0.85	Mile	15.5	0.00	—	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

Sector	#	Measure Title
Construction	C-2*	Limit Heavy-Duty Diesel Vehicle Idling
Construction	C-5	Use Advanced Engine Tiers
Construction	C-8	Use Renewable Diesel
Construction	C-10-A	Water Exposed Surfaces

* Qualitative or supporting measure. Emission reductions not included in the mitigated emissions results.

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	PM10T	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—
Unmit.	5.90	50.5	31.7	5.01	12,755
Mit.	4.34	36.8	27.5	3.95	12,755
% Reduced	26%	27%	14%	21%	—
Daily, Winter (Max)	—	—	—	—	—
Unmit.	2.62	23.1	14.5	2.25	5,946
Mit.	2.62	23.1	12.9	2.07	5,946
% Reduced	—	—	11%	8%	—
Average Daily (Max)	—	—	—	—	—
Unmit.	0.97	8.31	4.86	0.79	2,066
Mit.	0.63	5.31	4.14	0.59	2,066
% Reduced	35%	36%	15%	26%	—
Annual (Max)	—	—	—	—	—
Unmit.	0.18	1.52	0.89	0.14	342

Mit.	0.12	0.97	0.76	0.11	342
% Reduced	35%	36%	15%	26%	—

6. Climate Risk Detailed Report

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	2	0	0	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	0	0	0	N/A
Air Quality Degradation	N/A	N/A	N/A	N/A

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6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	2	1	1	3
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A

Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	1	1	1	2
Air Quality Degradation	N/A	N/A	N/A	N/A

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The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

7. Health and Equity Details

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	3.00
Healthy Places Index Score for Project Location (b)	64.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
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a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

Appendix C

Natural Environment Study

South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow NES



Natural Environment Study

Supporting Documents: Biological Assessment, Sierra Nevada Yellow-legged Frog Site Assessment, USACE Aquatic Resources Delineation and Assessment

South Lake Tahoe, California

Caltrans District 3 - El Dorado County

STPL 5925(183)

March 2024

Caltrans
CALIFORNIA DEPARTMENT OF TRANSPORTATION

Natural Environment Study

Supporting Documents: Biological Assessment, Sierra Nevada Yellow-legged Frog Site Assessment, USACE Aquatic Resources Delineation and Assessment

South Lake Tahoe, California

Caltrans District 3 - El Dorado County

STPL 5925(183)

March 2024

STATE OF CALIFORNIA

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Acronyms List

BSA	Biological Study Area
Cal-IPC	California Invasive Plant Council
CALVEG	Classification and Assessment with Landsat of Visible Ecological Groupings
CDFA	California Department of Food and Agriculture
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CWA	Clean Water Act
DOT	Department of Transportation
EO	Executive Order
ESA	Environmentally Sensitive Area
FESA	Federal Endangered Species Act (referred to as ESA in USFWS/NOAA Fisheries literature)
FHWA	Federal Highway Administration
GIS	Geographic Information System
IPaC	Information for Planning and Consultation
ISCC	Invasive Species Council of California
LCT	Lahontan Cutthroat Trout
LSAA	Lake and Streambed Alteration Agreement
LTBMU	Lake Tahoe Basin Management Unit
LTBWCG	Lake Tahoe Basin Weed Coordinating Group

NEPA	National Environmental Policy Act
NES	Natural Environment Study
NOAA Fisheries	National Oceanic and Atmospheric Administration National Marine Fisheries Service (sometimes abbreviated as NMFS)
NPPA	Native Plant Protection Act
NRCS	Natural Resource Conservation Service
NWI	National Wetland Inventory
ROW	El Dorado County Right of Way
RWQCB	Regional Water Quality Control Board
SEZ	Stream Environment Zone
SNYLF	Sierra Nevada Yellow-legged Frog
SSS	Special Status Species
SWRCB	State Water Resources Control Board
TRPA	Tahoe Regional Planning Agency
USACE	U. S. Army Corps of Engineers
USDA	U. S. Department of Agriculture
USFS	U. S. Forest Service
USFWS	U. S. Fish and Wildlife Service
USGS	U. S. Geological Survey
VES	Visual Encounter Survey
WDR	Waste Discharge Requirements
WOUS	Waters of the U. S.

Summary

This summary presents the results of the biological database research, reconnaissance-level field survey, impact analysis, and a summary of the general biological environment for the South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow Project (Project). This section also includes a discussion of proposed avoidance, minimization, and mitigation measures and Project permits that are anticipated for compliance with federal, state, and local regulations.

An extension to the Dennis T. Machida Memorial Greenway, the Project aims to build upon the overall shared-use path network on the south shore of Lake Tahoe. The Project aims to construct approximately 1.2 miles of Class 1 shared-use path and replace a heavily trafficked bridge over the Upper Truckee River damaged by the 2017 winter storms. The Project will provide active transportation users with a critical link between Barton Hospital, west of the Upper Truckee River, and the Tahoe Sierra neighborhood and the Lake Tahoe Community College east of the Upper Truckee River.

Dominant vegetation communities in the Project area include Jeffrey pine (*Pinus jeffreyi*) forest, big sagebrush (*Artemisia tridentata* ssp. *tridentata*) shrubland, wet meadow, and willow (*Salix* spp.) shrubland along the Upper Truckee River corridor. The Project area is previously disturbed by encroaching urban development on the east and west ends, existing trails, utilities and access roads, the damaged Upper Truckee River bridge crossing, and forest habitat modification as a result of wildfire fuel reduction activities.

A reconnaissance-level field survey was conducted on August 14, 2023, to evaluate and verify vegetation communities, verify no critical wildlife habitats were present in the Project area, and to develop an inventory for any possible special status species (SSS) and non-SSS wildlife and botanical resources.

A California Natural Diversity Database (CNDDB) search was conducted for the Biological Study Area (BSA), which is a half-mile buffer of the Project area. The query identified five occurrences of SSS including northern goshawk (*Accipiter gentilis*), willow flycatcher (*Empidonax traillii*), northern leopard frog (*Lithobates pipiens*), mountain whitefish (*Prosopium williamsoni*), and Lahontan mountain sucker (*Catostomus lahontan*). During the reconnaissance-level survey, it was determined habitat is present for these species in the Project area and/or BSA, and there was one potential (unconfirmed) sighting of a Lahontan mountain sucker in the Upper Truckee River. Otherwise, these CNDDB species were not observed during the reconnaissance-level field survey.

A United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) report and species list was accessed through the IPaC website for the BSA on December 1, 2023 (USFWS 2023a). The results of the IPaC report included the following species: North American wolverine (*Gulo gulo luscus*), Sierra Nevada red fox (*Vulpes vulpes necator*), California spotted owl (*Strix occidentalis occidentalis*), Sierra Nevada yellow-legged frog (SNYLF) (*Rana sierrae*), Lahontan cutthroat trout (LCT) (*Oncorhynchus clarkii henshawi*), and monarch butterfly (*Danaus plexippus*). The IPaC report indicated no critical habitat for these species exists within the BSA. During the renaissance-level field survey, it was confirmed suitable habitat for these species may be present in the BSA and Project area, but they were not observed during the survey. United States Forest Service (USFS) Lake Tahoe Basin Management Unit (LTBMU) suitable habitat for SNYLF is mapped in the BSA and Project area.

To inform the level of consultation required with the USFWS, a SNYLF visual encounter survey (VES) was conducted on August 16, 2023, and a SNYLF site assessment report was prepared. It was determined that the Project may affect, but is not likely to adversely affect SNYLF. Additionally, considering the proposed impacts to the Upper Truckee River during the bridge removal, the substantial reintroduction efforts to Lake Tahoe in 2022, and riverine connectivity, it was determined the Project may affect, but is not likely to adversely affect LCT. Informal consultation with USFWS will be necessary for SNYLF and LCT. The Project is anticipated to have no effect on the other listed species queried on the IPaC species list considering known population ranges, habitat conditions, and lack of occurrence data in the BSA.

This Project is located outside of National Oceanic and Atmospheric Administration (NOAA) Fisheries jurisdiction; therefore, a NOAA Fisheries species list is not required and no effects to NOAA Fisheries species are anticipated.

A total of 30 California Native Plant Society (CNPS) rank 1 and 2 rare species were identified in the CNPS Rare Plant Inventory 9-quad search of the Project area. Habitat for these species was assessed during the biological survey and it was concluded suitable habitat may be present for 15 of the 30 species in the BSA, but they were not observed during the reconnaissance-level field survey. The reconnaissance-level field survey resulted in ten non-native plant detections. Of these species, prickly lettuce (*Lactuca serriola*) is listed by the Invasive Species Council of California (ISCC) and cheatgrass (*Bromus tectorum*) is a Lake Tahoe Basin Weed Coordinating Group (LTBWCG) “weed of interest” and has a Cal-IPC rating of “high”.

Within the Project area, there are 0.36 acres of open water (Upper Truckee River), 1.06 acres of freshwater emergent wetlands, and 1.39 acres of freshwater forested/shrub wetlands. Based on review of the biological factors and Waters of the United States (WOUS)/waters of the State conditions the following permits will be required. Permitting requirements will depend on final Project improvements and potential impacts:

- U.S. Army Corps of Engineers (USACE) Section 404 Nationwide Permit 14 – Linear Transportation Projects

- Regional Water Quality Control Board (RWQCB) Section 401 Water Quality Certification/Report of Waste Discharge

- California Department of Fish and Wildlife (CDFW) Section 1602 Lake and Streambed Alteration Agreement (LSAA)

As currently proposed, the Project will result in an estimated 0.15 acres of permanent impacts to freshwater emergent wetlands, 0.16 acres of permanent impacts to freshwater forested/shrub wetlands, and 0.02 acres of permanent impacts to the Upper Truckee River resulting from the bridge and boardwalk construction. In addition, construction of the boardwalk, bridge, and the removal of the existing bridge will result in 0.23 acres of temporary impacts to freshwater emergent wetlands, 0.25 acres of temporary impacts to freshwater forested/shrub wetlands, and 0.02 acres of temporary impacts to the Upper Truckee River. The total permanent impact to wetlands is 0.33 acres, and the total temporary impact to wetlands is 0.5 acres. Impacts to riparian vegetation includes 0.31 acres of permanent impacts and 0.48 acres of temporary impacts (equivalent to the sum of permanent and temporary impacts to freshwater emergent and forested/shrub wetlands). Compensatory mitigation will be required for impacts to wetland/riparian and riverine habitat resulting from construction of the boardwalk and bridge.

Final impact amounts and mitigation requirements will be refined and determined during the USACE, RWQCB, and CDFW permitting process.

Pre-construction surveys of the Project area and biological monitoring will be conducted to ensure there are no impacts to special status plant and wildlife species, including surveys for nesting birds and raptors, fish, herpetofauna, bats, and rare plants. Additional permit conditions and avoidance and minimization measures, such as pre-construction surveys and protocol surveys, may be identified in the Project permits.

Chapter 1: Introduction

Project History

Project Purpose and Need

An extension to the Dennis T. Machida Memorial Greenway, the Project aims to build upon the overall shared-use path network on the south shore of Lake Tahoe. The Project aims to construct approximately 1.2 miles of Class 1 shared-use path and replace a heavily trafficked bridge over the Upper Truckee River damaged by the 2017 winter storms. The Project will provide active transportation users with a critical link between Barton Hospital, west of the Upper Truckee River, and the Tahoe Sierra neighborhood and the Lake Tahoe Community College east of the Upper Truckee River.

Project Description

The Project is a Tahoe Regional Planning Agency (TRPA) Environmental Improvement Program project (#03.02.02.0085) and will construct approximately 1.2 miles of Class 1 shared-use path. The shared-use path begins at the southern terminus of Winnemucca Avenue, heads east on public lands owned by the Tahoe Resource Conservation District (known as Johnson Meadow) towards the Upper Truckee River, crossing the river, and following the user trails towards the intersection of Sierra Boulevard and Barbara Avenue. The shared-use path will cross public parcels owned by the City of South Lake Tahoe, South Tahoe Public Utility District, California Tahoe Conservancy, and the USFS.

The proposed shared-use path will provide connections to existing and future Class 1 facilities in the area. For example, on the west end, there exists a short Class 1 segment between South Avenue and Winnemucca Avenue. The Project builds upon the Sierra Boulevard Complete Streets Project (completed in 2019) and the South Tahoe Greenway Shared Use Trail Phase 2 (completed in 2021) at the corner of Sierra Boulevard and Barbara Avenue. This Project provides a critical link to the bicycle network between the Tahoe Valley Area Plan and bicycle network near the Tahoe Sierra neighborhood. The Project supports the Linking Tahoe: Active Transportation Plan and the Tahoe Valley Area Plan. The Project proposes to install a pedestrian bridge over the Upper Truckee River to replace the old, unusable, concrete bridge washed out during the winter in late 2017 as well as an elevated boardwalk approximately 1.5 to 2 feet above the ground. The new bridge will entirely span the Upper Truckee River and the old bridge will be demolished and removed. Bridge demolition will involve jackhammering, ramming (with a mechanical ram, mounted on a backhoe), and a haul or dump truck to export debris. The existing bridge, including abutments and piers, in the Upper Truckee River will be removed. Existing abutments will be cut below final stream grade and covered with native river substrate, if not entirely removed. All debris generated by bridge demolition will be removed from the streambed and disposed of at a County-approved facility, consistent with local laws and regulations. Bridge removal work will likely occur when the flow of the Upper Truckee River is low, such as the late summer or fall.

Best management practices will be implemented during construction to prevent construction debris (e.g., concrete, or other materials) from entering the Upper Truckee River. The existing bridge demolition work area will be surrounded by a coffer dam system, constructed of gravel bags and visqueen plastic sheets (or comparable materials), to convey flows around the work area. The coffer dam system will maintain

Upper Truckee River flows around the work area. Upon completion of the existing bridge demolition activity, the temporary coffer dam will be removed.

The Project is located in Township 12 north, Range 18 east, and Sections 3 and 4 of the South Lake Tahoe U. S. Geological Survey (USGS) 7.5-minute quadrangle map. The Project is bound by South Avenue and Barton Memorial Hospital to the west, U.S. Highway 50/Lake Tahoe Boulevard (US 50) to the north, Lake Tahoe Airport to the south, and Sierra Boulevard to the east (**Appendix A, Figure 1**). The current total Project area is 15.52 acres and encompasses City of South Lake Tahoe and El Dorado County Right-of-Way (ROW) and public parcels owned by City of South Lake Tahoe, South Tahoe Public Utility District, California Tahoe Conservancy, and the USFS. The Project area includes two staging areas in a previously disturbed forest clearing and along Barbara Avenue, which are 0.6 and 0.8 acres, respectively (**Appendix A, Figure 2**).

Within the Project area, there are 0.36 acres of open water (Upper Truckee River), 1.06 acres of freshwater emergent wetlands, and 1.39 acres of freshwater forested/shrub wetlands. The Project will result in 0.33 acres of permanent impacts and 0.5 acres of temporary impacts to wetlands, including 0.02 acres of permanent impacts and 0.02 acres of temporary impacts to the Upper Truckee River.

Chapter 2 – Study Methods

Regulatory Requirements

The Project intends to satisfy all applicable federal and state regulations as well as local ordinances and regulations that protect biological resources. The following regulatory requirements are applicable for the Project.

Federal Regulatory Requirements

Endangered Species Act

The Federal Endangered Species Act (FESA) protects plants and wildlife that are listed as endangered or threatened by the USFWS. Section 9 of the FESA prohibits the taking of endangered wildlife, where taking is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in such conduct" (50 CFR 17.3). This statute also governs removing, possessing, maliciously damaging, or destroying any endangered plant on federal land and removing, cutting, digging up, damaging, or destroying any endangered plant on non-federal land, in knowing violation of state law.

Under Section 7 of the FESA, federal agencies are required to consult with the USFWS or National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries) as applicable if their actions, including permit approvals or funding, could adversely affect an endangered species (including plants) or its critical habitat. Through consultation and the issuance of a biological opinion, the USFWS or NOAA Fisheries may issue an incidental take statement allowing take of the species that is incidental to another authorized activity provided the action will not jeopardize the continued existence of the species. Section 10 of FESA provides for issuance of incidental take permits to private parties provided a habitat conservation plan is developed.

Clean Water Act

Provides guidance for the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters.

Section 404: USACE Jurisdiction over fill materials in essentially all water bodies, including wetlands. All federal agencies are to avoid impacts to wetlands whenever there is a practicable alternative. Section 404 established a permit program administered by USACE regulating the discharge of dredged or fill material into waters of the U.S. (including wetlands).

Section 401: Requires that an applicant for a federal license or permit that allows activities resulting in a discharge to waters of the U.S., must obtain a state certification that the discharge complies with other provisions of the Clean Water Act (CWA). The State Water Resources Control Board (SWRCB) and RWQCB administer the certification program in California.

The guidelines allow the discharge of dredged or fill material into the aquatic system only if there is no practicable alternative that would have less adverse impacts.

Rivers and Harbors Act

Requires permits in navigable waters of the U.S. for all structures such as riprap and activities such as dredging. Navigable waters are defined as those subject to the ebb and flow of the tide and susceptible to use in their natural condition or by reasonable improvements as means to transport interstate or foreign commerce. USACE grants or denies permits based on the effects on navigation.

Migratory Bird Treaty Act

This treaty with Canada, Mexico and Japan makes it unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, or kill migratory birds. The Migratory Bird Treaty Act (MBTA) applies to the removal of nests (such as swallow nests on bridges) occupied by migratory birds during the breeding season. California Fish and Game Code Sections 3503 and 3503.5 (protection of birds' nests) and 3513 (taking MBTA birds) also prohibit the destruction of any nest, egg, or nestling.

The Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (Eagle Act) prohibits the taking or possession of and commerce in bald and golden eagles with limited exceptions. Under the Eagle Act, it is a violation to "*take, possess, sell, purchase, barter, offer to sell, transport, export or import, at any time or in any manner, any bald eagle commonly known as the American eagle, or golden eagle, alive or dead, or any part, nest, or egg, thereof.*" Take is defined to Include pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, and disturb. Disturb is further defined in 50 CFR Part 22.3 as "*to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available (1) Injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.*"

Executive Order 11990 – Protection of Wetlands

Established a national policy to avoid adverse impacts on wetlands whenever there is a practicable alternative. The U. S. Department of Transportation (DOT) promulgated DOT Order 5660.1A in 1978 to comply with this direction. On federally funded projects, impacts on wetlands must be identified. Alternatives that avoid wetlands must be considered. If wetland impacts cannot be avoided, then all practicable measures to minimize harm must be included.

This must be documented in a specific Wetlands Only Practicable Alternative Finding.

An additional requirement is to provide early public involvement in projects affecting wetlands. The Federal Highway Administration (FHWA) provides technical assistance in the *Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (Technical Advisory T 6640.8A) and reviews environmental documents for compliance.

Executive Order 13112 – Invasive Species

On February 3, 1999, President William J. Clinton signed Executive Order (EO) 13112 requiring federal agencies to combat the introduction or spread of invasive species in the United States. The order defines invasive species as "any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not

native to that ecosystem whose introduction does or is likely to cause economic or environmental harm or harm to human health." FHWA guidance issued August 10, 1999 directs the use of the State's invasive species list, maintained by the ISCC to define the invasive plants that must be considered as part of the National Environmental Policy Act (NEPA) analysis for a proposed project.

Under the EO, federal agencies cannot authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless all reasonable measures to minimize risk of harm have been analyzed and considered.

National Wild and Scenic Rivers Act

The National Wild and Scenic Rivers Act prohibits federal agencies from activities that would adversely affect the values for which a river was designated. FHWA consults with the managing agencies during the NEPA process on projects that affect designated rivers or their immediate environments to reduce potential conflicts with wild and scenic river values that are protected by the Act.

State Regulatory Requirements

California Endangered Species Act

Pursuant to the California Endangered Species Act (CESA) and Section 2081 of the California Fish and Game Code, an Incidental Take Permit from the CDFW is required for projects that could result in the "take" of a State listed threatened or endangered species. Under the CESA, "take" is defined as an activity that would directly or indirectly kill an individual of a species proposed for listing (called "candidates" by the state). Section 2080 of the California Fish and Game Code prohibits the taking, possession, purchase, sale, and import or export of endangered, threatened, or candidate species, unless otherwise authorized by permit or in the regulations. A Section 2081 permit is issued when a project is consistent with an existing Biological Opinion.

California Native Plant Protection Act

The Native Plant Protection Act (NPPA) of 1977 (California Fish and Game Code Sections 1900-1913) was created in order to "preserve, protect and enhance rare and endangered plants in this State." The NPPA is administered by CDFW. The Fish and Wildlife Commission has the authority to designate native plants as "endangered" or "rare" and to protect endangered and rare plants from take. CESA provided further protection for rare and endangered plant species, but the NPPA remains part of the California Fish and Game Code. No species protected by the California NPPA have been identified in the BSA or Project area.

California Department of Fish and Wildlife Section 1602 Streambed Alteration Agreement

Sections 1600–1616 of the California Fish and Game Code protect waters of the State. Section 1602 of the code regulates any work that will: (1) substantially divert or obstruct the natural flow of any river, stream, or lake; (2) substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or (3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake. For project activities that may affect stream

channels and/or riparian vegetation regulated under Sections 1600 through 1603, CDFW authorization is required in the form of a LSAA. The project will require a LSAA from the CDFW since proposed construction activities will impact the Upper Truckee River and associated riparian vegetation.

Porter-Cologne Water Quality Control Act

This regulatory law is becoming more prominent on projects involving impacts to isolated waters of the State (non 404/401 waters). The RWQCB is increasingly requiring Waste Discharge Requirements (WDR) permits for impacts to waters of the State.

Local Regulatory Requirements

Tahoe Regional Planning Agency Code of Ordinances and Regional Plan

The Tahoe Regional Planning Agency Code of Ordinances includes requirements for protection and management of “sensitive plants” and “uncommon plant communities”, regulations regarding tree removal, and protection of wildlife habitat, including stream environment zones (SEZs) (TRPA Code Chapter 61). TRPA Code also includes regulations regarding protection of certain animal species known as “special interest species” (TRPA Code Chapter 62). TRPA designated special interest species are species that are “locally important because of rarity or other public interest, and threatened, endangered, or rare species as designated under state and federal endangered species acts.”

Updated in 2012, the TRPA Regional Plan identifies goals for the region and policies that establish the strategies necessary to achieve those goals. This document integrates the requirements of the Bi-State Compact, the thresholds, related plans and legal requirements, and the public’s input. As a result, the Regional Plan provides coordinated and integrated direction for the TRPA’s regulatory Code of Ordinances and implementation programs.

El Dorado County General Plan, Objective 7.4.2: Identify and Protect Resources

Identification and protection, where feasible, of critical fish and wildlife habitat including deer winter, summer, and fawning ranges; deer migration routes; stream and river riparian habitat; lake shore habitat; fish spawning areas; wetlands; wildlife corridors; and diverse wildlife habitat.

Studies Required

The BSA includes all areas that could potentially be impacted by the project plus a half-mile buffer. To inform the reconnaissance-level field survey, identify critical habitats, and determine the studies/surveys required to adequately inform this NES, the following literature and database searches were conducted for the BSA:

- CNDDB
    - 2023 Inventory of rare plants and wildlife occurrences.
- CNPS Rare Plant Inventory

  - 2023 Inventory of rare and endangered plants occurrences.

- CDFW Special Animals List
  - 2023 state listed species that may occur in or be affected by the Project.
- USFWS IPaC
  - Federally endangered and threatened species, and their critical habitats, that may occur or be affected by the Project (**Appendix B**).
- USFWS National Wetland Inventory (NWI)
  - Review of wetland and deepwater habitat geospatial data.
- NOAA Fisheries Species List
  - The project is located outside of NOAA Fisheries jurisdiction; therefore, a NOAA Fisheries species list is not required.
- US Department of Agriculture (USDA)
  - 2009 Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG) geographic information system (GIS) Layers.
- Natural Resource Conservation Service (NRCS)
  - Web Soil Survey.
- TRPA and LTBMU open GIS data
  - 2023 Sensitive and special interest plant and wildlife species.

Personnel and Survey Dates

A reconnaissance-level field survey of the Project area was performed on August 14, 2023, by an NCE scientist with six years of experience identifying special status plants and animals in various counties throughout California, including two years of experience in the Lake Tahoe basin. Weather conditions during the survey were 62 to 80 degrees Fahrenheit, 25 to 50 percent cloud cover, and zero to five mile-per-hour winds. The survey took place between 0734 and 1405. Timing was appropriate for a reconnaissance-level field survey of biological resources in the Project area.

Agency Coordination and Professional Contacts

Based on preliminary guidance given to the County by USFWS, a VES and site assessment for SNYLF are required for this project to assist with Section 7 consultation requirements. Further coordination with the USFWS, CDFW, RWQCB, and/or USACE will be based on the results of this NES and accompanying technical studies, including the SNYFL site assessment report. Permits that will be required for the project include a USACE Section 404 Nationwide Permit 14 – Linear Transportation Projects, RWQCB Section 401 Water Quality Certification/Report of Waste Discharge, and a CDFW

Section 1602 LSAA. Any additional survey requirements will be determined during this coordination which will be administered by the County and Caltrans.

Survey Methods

The purpose of the reconnaissance-level field survey was to 1) evaluate and verify vegetation communities, 2) verify no critical wildlife habitats were present in the Project area, and 3) develop an inventory for any possible SSS and non-SSS wildlife and botanical resources.

The reconnaissance-level survey involved walking meandering transects through the Project area identifying suitable habitats for SSS, identifying plants and vegetation communities, observing fish in the Upper Truckee River, observing birds and noting any potential nest sites, identifying potential bat roosts, and noting any other wildlife observations, including tracks and signs. Important microhabitats and structures that may provide refugia for SSS, such as ponds and snags, were also noted.

The botanical component of the reconnaissance-level survey was conducted by walking the entire Project area following the CDFW Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities (CDFW 2018). All plant and animal species observed were identified and recorded. Plant and animal species observed are presented in **Tables 1 and 2,** respectively.

A VES for SNYLF was conducted on August 16, 2023. Methodology and results of the VES are discussed in the SNYLF site assessment report (NCE 2023).

Limitations That May Influence Results

The Upper Truckee River has been subject to various restoration projects upstream and downstream of the Project area over the past two decades, and a future restoration project in Johnson Meadow led by the Tahoe Resource Conservation District is currently in the environmental review stage. These projects have addressed restoring flow to relict channels, improving bank stability, reducing sediment flow to Lake Tahoe, and improving wetland and special status species habitat. There have also been stocking and restoration efforts for LCT in Lake Tahoe and its tributaries by various agencies, including the release of approximately 100,000 individuals to Lake Tahoe in 2022. The Upper Truckee River is one such tributary subject to LCT restoration efforts by the LTBMU in the far upstream reaches near Meiss Meadow (USFS 2012). The Upper Truckee River may provide suitable spawning habitat and/or passage to spawning habitat, but the reconnaissance-level survey was conducted post-spawning season and LCT are not documented migrating through or utilizing the BSA. No LCT were observed during the survey and an intensive fish survey (e.g., e-fishing) was not conducted; however, one deceased brown trout (*Salmo trutta*) was observed suggesting positive salmonid passage through the Project area. Spawning habitat for LCT, and habitat for other SSS addressed in this NES, may be improved following completion of the Tahoe Resource Conservation District's Johnson Meadow Restoration Project.

During the reconnaissance-level survey no willow flycatchers or *Empidonax* spp. Were heard or observed; however, the August 14, 2023, reconnaissance-level survey is considered late in the season for willow flycatcher detections. By this time, singing rates decline and the species begins migration to Central and South America. Willow flycatchers are a state endangered species. There are no CNDDB occurrences of willow flycatcher along the Upper Truckee River, but egg collections are documented in the

early and mid-1900's along Trout Creek in the BSA. Patches of suitable habitat for willow flycatcher are mapped by TRPA and LTBMU 0.2 and 0.5-miles south of the BSA adjacent to the Lake Tahoe Airport.

Numerous bat species are listed as sensitive species by the USFS/LTBMU and as species of special concern by the CDFW. The existing bridge and various snags throughout the Project area may provide suitable bat roosting features. While no bats were detected during the daytime reconnaissance-level survey, a bat survey conducted at dusk would increase the probability of bat detections at these potential roost features. It is recommended a survey of these features be conducted prior to their removal to ensure no bat species are impacted.

Chapter 3 – Results: Environmental Setting

Description of the Existing Physical and Biological Conditions

Study Area

The Project area includes City of South Lake Tahoe and El Dorado County Right-of-Way (ROW), and public parcels owned by City of South Lake Tahoe, South Tahoe Public Utility District, California Tahoe Conservancy, and the USFS. Within the BSA, land use is approximately 50 percent urban, consisting of residences, businesses, and a portion of the Lake Tahoe Airport. The remaining 50 percent of the BSA includes open space consisting of the Upper Truckee River and Trout Creek riparian corridors, wet meadow, and mixed conifer forest. Land use in the BSA also includes moderately trafficked pedestrian and mountain bike trails, utility access roads, and staging areas.

Physical Conditions

The Project area is located within Sections 3 and 4, Township 12 north, Range 18 east within the USGS South Lake Tahoe 7.5-minute quadrangle map. The elevation within the Project area is approximately 6,275 feet above mean sea level. Topography in the BSA consists of a flat wet meadow along the Upper Truckee River corridor with gentle to moderate upland slopes on the east and west ends. Hills in the southeast section of the BSA reach an elevation of 6,360 feet (**Appendix 1, Figure 1**). Photographs of the Project area are presented in **Appendix C**.

Regional climate in South Lake Tahoe generally consists of mild, warm summers and cold winters. Temperatures vary throughout the year from an average maximum temperature of 79.7 degrees Fahrenheit in July to an average minimum temperature in December of 16.2 degrees Fahrenheit. Most precipitation falls from October to April averaging 16.3 inches per year. Average annual snow depth is 2 inches, with a maximum monthly average snow depth of 8 inches in January (WRCC 2023).

According to the NRCS Web Soil Survey (USDA 2023), the Project area contains:

- 18.6% Tahoe mucky silt loam, drained, 0 to 5% slopes
- 28.3% Christopher loamy coarse sand, 0 to 9% slopes
- 7.4% Christopher loamy coarse sand, 9 to 30% slopes
- 27% Christopher-Gefo complex, 0 to 5% slopes
- 18.6% Ubaj sandy loam, 0 to 9% slopes

Tahoe mucky silt loam is the only soil in the Project area with a hydric soil rating (**Appendix A, Figure 3**).

The USFWS NWI identifies a freshwater emergent wetland, a freshwater forested/shrub wetland, and riverine feature within the BSA (**Appendix A, Figure 4**). These aquatic resources were formally delineated by NCE for USACE and State of California permit applications, and it was determined 2.81 acres of aquatic resources are present within the Project area. Specifically, 1.39 acres of freshwater forested/shrub wetlands, 1.06

acres of freshwater emergent wetlands, and 0.36 acres of riverine (Upper Truckee River) are within the Project area. The Upper Truckee River and the adjacent wetlands are considered federally jurisdictional WOUS because they are hydrologically connected to a traditional navigable waterway (Lake Tahoe).

The Upper Truckee River crosses the Project area and flows north. High elevation drainages and lakes fed by snowmelt and rainfall, including Round Lake, Dardanelles Lake, Showers Lake, and Meiss Lake, are the primary sources for the Upper Truckee River. The Upper Truckee River is Lake Tahoe's largest tributary at approximately 23 miles in length.

Biological Conditions

Natural communities and vegetation types in the BSA were initially analyzed with CALVEG and verified during the reconnaissance-level survey. Vegetation alliances in the BSA include Jeffrey pine, lodgepole pine (*Pinus contorta*), big sagebrush, upper montane mixed chaparral, wet meadow, perennial grass/forb, quaking aspen (*Populus tremuloides*), mountain sagebrush (*Artemisia tridentata* ssp. *vaseyana*), shrub willow, urban, and barren (USDA 2016). The Project area resides within Jeffrey pine, upper mixed chaparral, wet meadow, and shrub willow alliances (**Appendix A, Figure 5**). Unless otherwise referenced, the descriptions of the habitats found in the BSA below are taken from the USFS Vegetation Descriptions for the Great Basin Ecological Province, CALVEG Zone 9 (USDA 2009).

Jeffrey Pine Alliance: The Jeffrey Pine Alliance makes up 11.75 acres of the project area. Jeffrey pine assumes dominance without a Great Basin understory occasionally in the Pine Nut Mountains, Fort Sage Mountains – Lemmon Valley and Glass Mountain Subsections (Mono) on flat to moderately steep slopes. Elevations are commonly in the range of about 5,200 – 8,600 feet (1,586 – 2,623 meters). Incense cedar (*Calocedrus decurrens*) is associated with this type as well as shrubs of the Upper Montane Mixed Chaparral Alliance, such as greenleaf manzanita (*Arctostaphylos patula*) and mountain whitethorn (*Ceanothus cordulatus*). The Mixed Conifer - Fir Alliance commonly occurs adjacent to these sites.

Lodgepole Pine Alliance: The Lodgepole Pine Alliance is present in the BSA but absent in the Project area. This Alliance has been mapped extensively in the Glass Mountain Subsection and more sparsely in the Sweetwater Mountains — Pine Grove Hills and White Mountains Subsections (Mono) and Sheldon Range Subsection (Northwest). Sites tend to be on flat to low gradient slopes having volcanic and pyroclastic deposits at elevations mainly between 6,800 — 10,600 feet (2,074 – 3,233 meters). Quaking aspen occasionally forms a hardwood understory at elevations below about 9,400 feet (2,867 meters). The Eastside Pine Alliance is often found adjacent to this Alliance.

Big Sagebrush Alliance: The Big Sagebrush Alliance is present in the BSA but absent in the Project area. The Big Sagebrush Alliance, consisting of dominant big and/or mountain sagebrushes, is the most extensively mapped shrub type in this zone, occurring in sixteen subsections of the Mono, Northwest and Southeast Sections. Developing on a wide range of substrates, this Alliance has been mapped within the elevation range of about 4,200 – 11,000 feet (1,280 – 3,355 meters). It occurs in association with other Great Basin shrubs such as bitterbrush (*Purshia tridentata*), curlleaf mountain mahogany (*Cercocarpus ledifolius*) and black sagebrush (*Artemisia*

nova). In association with Jeffrey pine, it is one of the understory indicator species that identifies the Eastside Pine Alliance and is strongly associated with singleleaf pinyon pine (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*) at lower elevations as well as bristlecone (*Pinus longaeva*), limber (*Pinus flexilis*), and lodgepole pines on higher elevation sites.

Upper Montane Mixed Chaparral Alliance: The Upper Montane Mixed Chaparral Alliance makes up 1.2 acres of the Project area. This Alliance is a mid to high elevation shrub type in which no single species is dominant. Not well represented in this zone, it has been mapped sparsely in six subsections of the Mono Section and one in the Northwest Section. Characteristic, non-dominant species in this area generally include only greenleaf manzanita, mountain whitethorn, and snowbrush (*Ceanothus velutinus*). Slopes tend to be south and west facing within the general elevation mapped, about 4,400 — 10,400 feet (1,342 – 3,172 meters).

Wet Meadows Alliance: The Wet Meadows Alliance makes up 1.84 acres of the Project area. Despite the general aridity of this zone, surface and near-surface waters are plentiful in some areas, such as the Owens River watershed in the Crowley Flowlands Subsection of the Mono Section. These seasonally or permanently wet herbaceous sites have been mapped in widely scattered areas over seventeen subsections. The Wet Meadows Alliance has been chiefly identified on saturated alluvium and coarse substrates within a wide elevation range from below 4,000 feet (1,220 meters) to about 12,000 feet (3,660 meters). Indicator forbs and graminoids of this area include Hartweg iris and western blue flag (*Iris hartwegii, Iris missouriensis*), various rushes (*Juncus* spp.), false hellebore (*Veratrum californicum*), buttercup (*Ranunculus* spp.), stinging nettle (*Urtica dioica*), water sedge and various other sedges (*Carex aquatilis, Carex* spp.), mat muhly (*Muhlenbergia richardsonis*), streamside bluebells (*Mertensia ciliata*), scented shootingstar (*Dodecatheon redolens*), dwarf larkspur (*Delphinium depauperatum*), fringed willowherb (*Epilobium ciliatum*) and sierra woodrush (*Luzula orestera*). Since this type has been mapped extensively within all subsections of the Northwest Section, some of these sites share alkaline-tolerant species more characteristic of the Alkaline Mixed Grasses and Forbs Alliance as well.

Perennial Grass/Forb Alliance: The Perennial Grass/Forb Alliance is present in the BSA but absent in the Project area. The Alliance consisting of perennial grasslands and forbs has been identified in scattered patches within the broad elevation range of about 4,000 — 12,000 feet (1,220 – 3,660 meters). It has been mapped within twelve subsections of the Mono, Northwest and Southeast Sections. Mule's ears (*Wyethia mollis*) is a diagnostic species on many sites, but this Alliance includes some species within the Alpine Grasses and Forbs Alliance at the highest elevations. The mixture may include both native and introduced bluegrass (*Poa* spp.), the natives Indian ricegrass (*Achnatherum hymenoides*), Nevada needlegrass (*Achnatherum nevadense*), pine needlegrass (*Achnatherum pinetorum*), thingrass (*Agrostis pallens*), Great Basin wild rye (*Leymus cinereus*), and squirreltail (*Elymus elymoides*) at most elevations; the non-native crested wheatgrass (*Agropyron desertortum*), tall wheatgrass (*Elytrigia elongata*) and quackgrass (*Elytrigia repens*) on the lowest and more disturbed sites; and many native perennial forbs such as Eaton's daisy (*Erigeron eatonii*), glaucous willowherb (*Epilobium glaberrimum*), Congdon's false horkelia (*Horkeliella congdonis*) and desert biscuitroot (*Lomatium foeniculaceum*).

Quaking Aspen Alliance: The Quaking Aspen Alliance is present in the BSA but absent in the Project area. Quaking aspen occurs as an indicator of moist conditions in high

elevation meadows and other moist areas. It is generally dominant on more productive sites, often forming dense, long-lived clonal patches on the landscape in the Sweetwater Mountains — Pine Grove Hills and Glass Mountain Subsections, more sparsely in eight other subsections of the Mono Section and in three subsections of the Northwest Section. In this area, it has been mapped chiefly at elevations above 6,000 feet (1,830 meters) on a variety of geologic substrates. Quaking aspen has been identified as the principal hardwood understory species in bristlecone pine, Jeffrey pine, lodgepole pine, and limber pine sites. Along with arboreal curlleaf mountain mahogany, it forms the hardwood associates of singleleaf pinyon pine stands. Shrub associates on moist sites include interior rose (*Rosa woodsii*), currants (*Ribes* spp.) and silver sagebrush (*Artemisia cana*) and on drier sites big sagebrush, and bitterbrush. Other associated taxa are herbaceous species in dry and seasonally moist grasslands and meadows and riparian hardwoods such as willows and water birch (*Betula occidentalis*).

Mountain Sagebrush Alliance: The Mountain Sagebrush Alliance makes up 0.57 acres of the Project area. The Mountain sagebrush subspecies of big sagebrush has been differentiated from big basin sagebrush in certain areas of the Great Basin region but a few mapped sites also include the lower elevation big basin sagebrush in abundance. Mountain sagebrush forms dominant stands and has been mapped prominently in the Sweetwater Mountains — Pine Grove Hills and Bodie Hills — Excelsior Mountains Subsections (Mono Section), and more sparsely in seven other subsections of the Mono and Northwest Sections. Elevations are generally higher than those of Big Basin Sagebrush, up to about 10,000 feet (3,050 meters). Low sagebrush (*Artemisia arbuscula*) and singleleaf pinyon pine often occur near and within these sites, as do the Bitterbrush – Sagebrush, Big Basin Sagebrush and Great Basin Mixed Scrub Alliances.

Shrub Willow Alliance: The Shrub Willow Alliance makes up 0.62 acres of the Project area. Shrub forms of willow are mapped as this Alliance where they dominate the shrub layer in a riparian, seep, or meadow site. In this region, they have been identified at low to high elevations, often on gravel bars adjacent to or in permanent water sources, and chiefly in middle to upper montane locations. These sites are widely scattered within fifteen subsections of the four sections (Mono, Northern Mono, Southeast and Northwest). Willows in this Alliance may include any combination of narrow-leaved (*Salix exigua*), Geyer's (*Salix geyeriana*), Lemmon's (*Salix lemmonii*), shining (*Salix lucida*), yellow (*Salix lutea*), and gray-leaved Sierra (*Salix orestera*). Grasses and grass-like plants such as water sedge, meadow barley (*Hordeum brachyantherum*), Nebraska sedge (*Carex nebrascensis*), and woolly sedge (*Carex lanuginosa*) may be common in this Alliance. Associated trees and shrubs in this wide-ranging type may include quaking aspen, interior rose, blue elderberry (*Sambucus mexicana*), gooseberry (*Rubus* spp.), and moist site sagebrush species in the Riparian Mixed Shrub Alliance.

Barren: Landscapes generally devoid of vegetation as seen from a high-altitude image source such as aerial photography, are labeled as Barren. This category includes mappable landscape units in which surface lithology is dominant, such as exposed bedrock, cliffs, interior sandy or gypsum areas, and the like. It does not include areas considered modified or developed, as in urban areas. There is 0.0028 acres of barren landscape mapped in the project area.

Urban: This category applies to landscapes that are dominated by urban structures, residential units, or other developed land use elements such as highways, city parks, cemeteries, and the like. In those cases, in which the managed landscapes may have a considerable vegetation component, other land use categories may be more

appropriate, such as Ornamental Conifer and Hardwood mixtures within city parks. Urban areas are mapped in the BSA but not in the project area. However, the Barbara Avenue staging area should be mapped as urban considering it is a developed roadway (0.8 acres, mapped as Jeffrey Pine Alliance).

The dominant plant species in the Project area varies by vegetation community. The Jeffrey pine-dominated forest contains a mixed understory of big sagebrush, antelope bitterbrush (*Purshia tridentata* var. *tridentata*), *Eriogonum* spp., *Elymus* spp., and manzanita (*Arctostaphylos* spp.). The Jeffrey pine forest habitat in the Project area has been subject to fuel reduction and mechanical thinning resulting in mature stands of forest with reduced canopy cover, complexity, and woody debris that would otherwise increase biological diversity and suitable habitat for various wildlife species. However, there are patchy, dense stands of trees that remain along the transition to the Upper Truckee River and Johnson Meadow.

The wet meadow, Upper Truckee riverbanks, and riparian habitats are dominated by bentgrass (*Agrostis* spp.), timothy grass (*Phleum* spp.), sedges, rushes, *Bromus* spp., *Poa* spp., willows, and patches of quaking aspen groves. A list of plant species observed during the survey is included in **Table 1**. Johnson Meadow has been impacted by various historical land uses and hydrological events resulting in altered wetland and riparian habitat conditions and quality. The channelization of the Upper Truckee River and formation of the east gully channel has led to dry soil conditions throughout the meadow resulting in dominant grass species tolerant of xeric conditions, reduced overbank flow, and reduced lentic and surface backwater conditions which would provide herpetofauna refuge from predator fish species in the river.

Table 1: *Plant species observed during the August 14, 2023, survey.*

Species Name	Common Name	Native; Y, N
Abies concolor	White fir	Y
Achillea millefolium	Common yarrow	Y
Agropyron cristatum	Crested wheatgrass	N
Agrostis gigantea	Creeping bentgrass	N
Agrostis idahoensis	Idaho bentgrass	Y
Allium campanulatum	Dusky onion	Y
Aquilegia formosa	Western columbine	Y
Arctostaphylos nevadensis	Pinemat manzanita	Y
Arctostaphylos patula	Greenleaf manzanita	Y
Artemisia douglasiana	California mugwort	Y
Artemisia tridentata	Big sagebrush	Y
Astragalus cicer	Chickpea milkvetch	N
Berberis aquifolium	Mountain grape	Y
Bromus inermis	Smooth brome	N
Bromus tectorum	Cheatgrass	N
Carex athrostachya	Slender beak sedge	Y
Carex aquatilis	Water sedge	Y
Carex utriculata	Northwest territory sedge	Y
Castilleja miniata	Great red paintbrush	Y

Ceanothus cordulatus	Mountain whitethorn	Y
Chamerion angustifolium	Fireweed	Y
Chrysothamnus viscidiflorus	Yellow rabbitbrush	Y
Cirsium andersonii	Anderson's thistle	Y
Danthonia californica	California oatgrass	Y
Deschampsia cespitosa	Tufted hairgrass	Y
Eleocharis macrostachya	Common spikerush	Y
Elymus elymoides	Squirreltail	Y
Elymus glaucus	Blue wild rye	Y
Elymus triticoides	Beardless wild rye	Y
Epilobium ciliatum	Fringed willowherb	Y
Equisetum arvense	Field horsetail	Y
Eriogonum nudum	Naked buckwheat	Y
Eriogonum umbellatum	Sulphur buckwheat	Y
Erythranthe guttata	Seep monkey flower	Y
Fragaria virginiana	Mountain strawberry	Y
Galium triflorum	Fragrant bedstraw	Y
Gayophytum diffusum	Spreading groundsmoke	Y
Geum macrophyllum	Large leaved avens	Y
Gnaphalium palustre	Western marsh cudweed	Y
Ipomopsis aggregata	Scarlet gilia	Y
Juncus articulates	Jointleaf rush	Y
Juncus balticus	Baltic rush	Y
Juncus ensifolius	Sword leaved rush	Y
Kelloggia galioides	Milk kelloggia	Y
Lactuca serriola	Prickly lettuce	N
Letharia vulpina	Wolf lichen	Y
Lotus corniculatus	Bird's foot trefoil	Y
Lupinus sp.	Lupine	Y
Madia glomerata	Mountain tarweed	Y
Oreostemma alpigenum	Tundra aster	Y
Paeonia brownii	Brown's peony	Y
Pedicularis semibarbata	Pinewoods lousewort	Y
Penstemon speciosus	Royal beardtongue	Y
Phacelia hastata	Silverleaf phacelia	Y
Phleum alpinum	Timothy grass	Y
Phleum pratense	Common timothy	N
Phlox diffusa	Spreading phlox	Y
Pinus contorta	Lodgepole pine	Y
Pinus jeffreyi	Jeffrey pine	Y
Plantago major	Common plantain	N
Platanthera leucostachys	Sierra bog orchid	Y
Poa bulbosa	Bulbous blue grass	N
Poa secunda	One-sided blue grass	Y

Populus tremuloides	Quaking aspen	Y
Populus trichocarpa	Black cottonwood	Y
Potentilla gracilis	Northwest cinquefoil	Y
Prunella vulgaris	Common selfheal	Y
Pterospora andromedea	Woodland pinedrops	Y
Purshia tridentata var. *tridentata*	Antelope bitterbrush	Y
Pyrola asarifolia	Bog wintergreen	Y
Ribes cereum	Wax currant	Y
Rosa woodsii	Woods' rose	Y
Rumex salicifolius	Willow dock	Y
Salix lasiandra	Pacific willow	Y
Salix lemmonii	Lemmon's willow	Y
Scirpus microcarpus	Panicled bulrush	Y
Sidalcea oregana	Oregon checker mallow	Y
Solidago canadensis	Canada goldenrod	Y
Sphenosciadium capitellatum	Ranger's button	Y
Thalictrum fendleri	Fendler's meadow rue	Y
Tragopogon dubius	Yellow salsify	N
Trifolium longipes	Long stalked clover	Y
Veratrum californicum var. *californicum*	California corn lily	Y
Wyethia mollis	Woolly mule ears	Y

For the purposes of this report, invasive species are non-native plants and wildlife which are listed by the ISCC, plants designated as "noxious" by the USDA or the California Department of Food and Agriculture (CDFA), any plants listed on the California Invasive Plant Council (Cal-IPC) Invasive Plant Inventory, and priority terrestrial invasive weeds listed by the LTBWCG. The reconnaissance-level field survey resulted in ten non-native plant detections. Of these species, prickly lettuce is listed by the ISCC and cheatgrass is a LTBWCG "weed of interest" and has a Cal-IPC rating of "high".

All wildlife species observed during the survey were documented and are presented in **Table 2**. Numerous barn swallow (*Hirundo rustica*) and stick nests were observed under the damaged bridge. The nests were inactive during the survey; however, barn swallow juveniles and family groups were observed around the bridge indicating these nests were previously active this season. No amphibians were observed during the reconnaissance-level survey; however, a nocturnal survey would be more likely to produce detections of local common amphibian species. Bird and butterfly diversity is high in the vicinity of the Project area, and many common mammal species were also observed, including an adult black bear (*Ursus americanus*). Garter snakes were observed along the Upper Truckee River and near the small ponds in the wet meadow/shrub willow/quaking aspen grove areas.

***Table 2**: Wildlife species observed during August 14, 2023, survey.*

Scientific Name	Common Name	Native: Y/N
Avians		
Branta canadensis	Canada goose	Y
Buteo jamaicensis	Red-tailed hawk	Y
Coccothraustes vespertinus	Evening grosbeak	Y
Colaptes auratus	Northern flicker	Y
Contopus sordidulus	Western wood-pewee	Y
Cyanocitta stelleri	Steller's jay	Y
Dryobates albolarvatus	White-headed woodpecker	Y
Hirundo rustica	Barn swallow	Y
Leuconotopicus villosus	Hairy woodpecker	Y
Passerina amoena	Lazuli bunting	Y
Poecile gambeli	Mountain chickadee	Y
Selasphorus rufus	Rufous hummingbird	Y
Sialia mexicana	Western bluebird	Y
Sitta canadensis	Red-breasted nuthatch	Y
Sitta carolinensis	White-breasted nuthatch	Y
Sitta pygmaea	Pygmy nuthatch	Y
Streptopelia decaocto	Eurasian collared-dove	N
Turdus migratorius	American robin	Y
Mammals		
Sciurus griseus	Western gray squirrel	Y
Tamias sp.	Chipmunk	Y
Tamiasciurus douglasii	Douglas squirrel	Y
Ursus americanus	Black bear	Y
Reptiles		
Sceloporus occidentalis	Fence lizard	Y
Thamnophis elegans	Garter snake	Y
Fish		
Catostomus sp.	Sucker	Y
Salmo trutta	Brown trout	N
Crustaceans		
Pacifastacus sp.	Crayfish	N
Insects		
Colias eurytheme	Orange sulphur	Y
Hemileuca hera	Hera moth	Y
Hyles lineata	White-lined sphinx moth	Y
Limenitis lorquini	Lorquin's admiral	Y
Lycaena editha	Edith's copper	Y
Neophasia menapia	Pine white	Y

Habitat Connectivity

The Project area is located in the Upper Truckee River riparian and wet meadow corridor, which consists of native vegetation and allows wildlife species to find water, food, shelter, and potential mates. The corridor enables the movement of animals and the continuation of viable populations, thus playing a role in the maintenance of biodiversity. The Project area includes habitat connecting wildlife populations and larger areas of similar upstream and downstream wildlife habitat. However, the Project improvements will have little to no impact on the wildlife corridor or habitat connectivity in the Project area considering the new bridge will entirely span the Upper Truckee River and the approximately 1.5 to 2-foot elevated boardwalk and Class 1 share-use path will not obstruct the movement of animals. The project plans indicate segments of the boardwalk will include cable strand railing for safety, approximately 5 to 6 feet above the ground (including the elevated boardwalk height), but it is assumed large wildlife such as mule deer and black bears will be capable of jumping/climbing over the railing or will be able to pass across nearby boardwalk segments without the cable strand railing.

Various fish species were observed during the reconnaissance-level field survey, including a potential, unconfirmed sighting of a Lahontan mountain sucker. During the August 14, 2023, reconnaissance-level field survey, water levels in the river and conditions in the Project area were suitable for fish passage, including for salmonid species. The Upper Truckee River currently outflanks the damaged bridge on the west side. There is currently low flow under the existing bridge because of sedimentation and debris accumulation at the bridge piers. Completion of the Project, including temporary BMPs anticipated during bridge removal, including a temporary turbidity curtain and coffer dam system, will not obstruct or impact fish passage along the Upper Truckee River. The turbidity curtain will allow fish passage underneath the BMP, and the coffer dam system will restrict the river to its current primary flow path outflanking and west of the damaged bridge, maintaining fish passage at existing conditions while also containing the work area. The Project will improve fish passage in the Project area by removing the damaged bridge and associated piers, and having the new bridge entirely span the river.

Regional Species and Habitats and Natural Communities of Concern

Special status species databases were reviewed to determine the potential for SSS to occur within the Project area. The following site-specific references and background information were reviewed:

- CNPS Rare Plant Inventory
    - 2023 Inventory of rare and endangered plants occurrences.
- CNDDB
    - 2023 Inventory of rare plants and wildlife occurrences.
- USFWS IPaC
    - Federally endangered and threatened species, and their critical habitats, that may occur or be affected by the Project (**Appendix B**).

- CDFW Special Animals List
    - 2023 state listed species that may occur in or be affected by the Project.
- TRPA and LTBMU open GIS data
    - 2023 Sensitive and special interest plant and wildlife species.

A total of 30 CNPS rank 1 and 2 rare species were identified in the CNPS Rare Plant Inventory 9-quad search of the Project area. Habitat for these species was assessed during the biological survey and it was concluded habitat may be present for 15 of the 30 species in the BSA, but they were not observed during the reconnaissance-level field survey. **Table 3** lists the special status plant species that have potential to occur within the BSA as well as a brief rationale as to the possible presence or absence of the species within the Project area.

A USFWS IPaC report and species list was accessed through the IPaC website for the BSA on December 1, 2023 (USFWS 2023a). The results of the IPaC report included the following species:

- North American wolverine
- Sierra Nevada red fox
- California spotted owl
- SNYLF
- LCT
- Monarch butterfly

The IPaC report indicated no critical habitat for these species exists within the BSA. During the renaissance-level field survey, it was determined habitat for LCT and SNYLF are present in the BSA and Project area, but these species were not observed during the survey. USFS LTBMU suitable habitat for SNYLF is also mapped in the BSA and Project area (**Appendix A, Figure 6**).

A CNDDB search was conducted for the BSA, which is a half-mile buffer of the Project area. The query identified five occurrences of SSS (**Appendix A, Figure 7**):

- northern goshawk
- willow flycatcher
- northern leopard frog
- mountain whitefish
- Lahontan mountain sucker

During the reconnaissance-level survey, it was determined habitat is present for these species in the Project area and/or BSA, and there was one potential (unconfirmed) sighting of a Lahontan mountain sucker in the Upper Truckee River. Otherwise, these CNDDB species were not observed during the reconnaissance-level field survey. The locations of biological features identified during the reconnaissance-level survey including snags, nests, ponds, and the potential Lahontan mountain sucker sighting are presented in **Appendix A, Figure 8**.

The database and literature review identified a total of 18 special status wildlife species known to occur or with the potential to occur within the BSA. Of these species, 8 have a moderate potential to occur within the Project area itself due to the presence of suitable habitat. **Table 4** lists all special status wildlife species that have potential to occur within the BSA as well as a brief rationale as to the possible presence or absence of special status species identified by the database research within the Project area.

Natural communities of special concern were determined to be present in the Project area considering the presence of LTBMU suitable habitat for SNYLF, TRPA northern goshawk threshold habitat, suitable habitat and connectivity for mountain whitefish, Lahontan mountain sucker, LCT, rare plant habitat, and riverine/wetland habitats in the Upper Truckee River corridor. These habitats and aquatic resources are discussed in further detail in Chapter 4.

***Table 3**: List of special status plant species known to occur in the vicinity of Project area.*

Scientific Name Common Name	Regulatory Status			Habitat Requirements	Blooming Period	Potential for Occurrence
	Federal	State	CNPS			
Arabis rigidissima* var. *demota Galena Creek rockcress	FSS	SI	1B.2	Broad-leaved upland forests, upper montane coniferous forests on rocky substrates. Known in CA from only two occurrences near Martis Peak and in NV from eleven occurrences in the Carson Range. Elevation range 7,398 to 8,398 feet.	July to August	**Absent.** Outside of elevation range.
Astragalus austiniae Austin's astragalus			1B.3	Alpine boulder and rock field, subalpine coniferous forest. Elevation range 8,005 to 9,727 feet.	July to September	**Absent.** Outside of elevation range.
Boechera tularensis Tulare rockcress			1B.3	Perennial herb that prefers rocky slopes, subalpine coniferous forest, and upper montane coniferous forest. Elevation range is from 6,000 to 11,000 feet.	June to July	**Potential.** May occur. Not encountered.
Botrychium ascendens Upswept moonwort	FSS		2B.3	Wet or moist soils in lower montane coniferous forests, such as along the edges of lakes and streams. Elevation range 4,950 to 6,039 feet.	Fertile early July to early September	**Absent.** Outside of elevation range.
Botrychium crenulatum Scalloped moonwort	FSS		2B.2	Lower montane coniferous forests, meadows and seeps, marshes and swamps. Elevation range 4,950 to 10,800 feet.	Fronds mature June to September	**Potential.** May occur. Not encountered.
Botrychium montanum Western goblin	FSS		2B.1	Lower montane coniferous forest, meadows and seeps, upper montane coniferous forest. Elevation range 4,805 to 7,155 feet.	July to September	**Potential.** May occur. Not encountered.
Brasenia schreberi Watershield			2B.3	Freshwater marshes and swamps. Elevation range 0 to 7,220 feet.	June to September	**Absent.** Project area lacks suitable habitat.
Carex davyi Davy's sedge			1B.3	Perennial herb that prefers subalpine and upper montane coniferous forests between 5,000 to 10,500 feet; usually in wetlands.	May to August	**Potential.** May occur. Not encountered.
Carex hystericina Porcupine sedge			2B.1	Marshes and swamps along streambanks. Elevation range 2,000 to 3,000 feet.	May to June	**Absent.** Outside of elevation range.

Scientific Name Common Name	Regulatory Status			Habitat Requirements	Blooming Period	Potential for Occurrence
	Federal	State	CNPS			
Carex limosa Mud sedge			2B.2	Perennial rhizomatous herb that prefers bogs, fens, meadows, seeps, marshes, swamps, and both lower and upper montane coniferous forests. Elevation range is between 3,900 and 8,900 feet.	June to August	**Potential.** May occur. Not encountered.
Chaenactis douglasii* var. *alpina Alpine dusty maidens			2B.3	Open, subalpine to alpine gravel and crevices; granitic substrate. Elevation range is between 7,749 and 11,007 feet.	July to September	**Absent.** Outside of elevation range.
Claytonia megarhiza Fell-fields claytonia			2B.3	Alpine boulder and rock field, subalpine coniferous forest. Elevation range 8,530 to 11,590 feet.	July to September	**Absent.** Outside of elevation range.
Draba asterophora* var. *asterophora Tahoe draba	FSS	SI	1B.2	Alpine boulder and rock fields in crevices, and open talus slopes of decomposed granite in subalpine coniferous forests. Elevation range 8,325 to 11,670 feet.	July to September	**Absent.** Outside of elevation range.
Draba asterophora* var. *macrocarpa Cup Lake draba	FSS	SI	1B.1	Alpine boulder and rock fields in shade of granitic rocks in subalpine coniferous forest. Elevation range 8,202 to 9,235 feet.	July to August	**Absent.** Outside of elevation range.
Elodium blandowii Blandow's bog moss	FSS		2B.2	Damp soils in meadows and seeps, subalpine coniferous forest. Elevation range is between 6,110 and 8,860 feet.	-	**Potential.** Suitable habitat is present, not encountered during the reconnaissance-level field survey.
Epilobium palustre Marsh willowherb			2B.2	Bogs and fens, meadows and seeps (mesic). Elevation range is between 4,215 and 7,695 feet.	July to September	**Potential.** Suitable habitat is present, not encountered during the reconnaissance-level field survey.
Erigeron miser Starved daisy	FSS		1B.3	Upper montane coniferous forests in rocky areas. Elevation range is between 2,600 and 8,600 feet.	June to October	**Potential.** May occur. Not encountered.
Eriogonum luteolum* var. *saltuarium Jack's wild buckwheat	FSS		1B.2	Granitic, sandy soils in Great Basin scrub, upper montane coniferous forest. Elevation range is between 5,580 and 7,875 feet.	July to September	**Potential.** May occur. Not encountered.

Scientific Name Common Name	Regulatory Status			Habitat Requirements	Blooming Period	Potential for Occurrence
	Federal	State	CNPS			
Erythranthe carsonensis Carson Valley monkeyflower			1B.1	Granitic soils in Great Basin scrub (openings). Elevation range is between 4,593 and 5,183 feet.	April to June	**Absent.** Outside of elevation range.
Glyceria grandis American manna grass			2B.3	Perennial rhizomatous herb that prefers bogs, fens, meadows, seeps, marshes, and swamps along stream banks, or lake margins. Elevation range is from 50 to 6,500 feet.	June to August	**Potential.** Suitable habitat is present, not encountered during the reconnaissance-level field survey.
Lewisia longipetala Long-petaled lewisia	FSS	SI	1B.3	Alpine boulder and rock fields in subalpine coniferous forests. Elevation range 8,325 to 9,740 feet.	June to August	**Absent.** Outside of elevation range.
Meesia uliginosa Broad-nerved hump-moss	FSS		2B.2	Bogs and fens, meadows and seeps in montane coniferous forests. Elevation range 4,290 to 8,250 feet.	July to October	**Potential.** May occur. Not encountered.
Oreocarya crymophila Subalpine cryptantha			1B.3	Subalpine coniferous forest (rocky, volcanic). Elevation range 8,530 to 10,500 feet.	July to August	**Absent.** Outside of elevation range.
Phacelia stebbinsii Stebbins' phacelia	FSS		1B.2	This annual herb grows in cismontane woodland, lower montane coniferous forests, and in meadows and seeps. Generally found among rocks and rubble on metamorphic rock benches, mostly on northern exposure. Elevation range 2,000 to 6,500 feet.	May to July	**Potential.** May occur. Not encountered.
Potamogeton robbinsii Robbins' pondweed			2B.3	Marshes and swamps (lakes, deep water). Elevation range 5,020 to 10,825 feet.	July to August	**Absent.** Project area lacks suitable habitat.
Rorippa subumbellata Tahoe yellow cress		SE SI	1B.1	Shoreline supporting decomposed granitic soils; known only from the shoreline of Lake Tahoe. Elevation range 6,210 to 6,230 feet.	May to September	**Absent.** Project area lacks suitable habitat.
Schoenoplectus subterminalis Water bulrush			2B.3	Perennial rhizomatous herb that prefers bogs, fens, marshes and swamps, especially along montane lake margins. Elevation range 2,400 to 7,300 feet.	June to August	**Absent.** Project area lacks suitable habitat.

Scientific Name Common Name	Regulatory Status			Habitat Requirements	Blooming Period	Potential for Occurrence
	Federal	State	CNPS			
Scutellaria galericulata Marsh skullcap			2B.2	Perennial rhizomatous herb that prefers lower montane coniferous forests, meadows, seeps, marshes, and swamps. Elevation range 0 to 6,800 feet.	June to September	**Potential.** May occur. Not encountered.
Stuckenia filiformis* ssp. *alpina Northern slender pondweed			2B.2	Perennial rhizomatous herb that prefers marshes, swamps, and a variety of shallow freshwater habitats. Elevation range 980 to 7,000 feet.	May to July	**Potential.** May occur. Not encountered.
Viola purpurea* ssp. *aurea Golden violet			2B.2	Sandy soils in Great Basin scrub, pinyon and juniper woodland. Elevation range 3,280 to 8,205 feet.	April to June	**Potential.** May occur. Not encountered.

Special Status Codes

Federally Listed Species (Federal):
FE = Federally Endangered
FT = Federally Threatened
FD = Federally Delisted
PT = Proposed Threatened
FCE = Federally Endangered Candidate
FPD = Proposed for Delisting
FSS = Forest Service Sensitive

Source: CNPS 2023

California Listed Species (State):
SE = State Endangered
ST = State Threatened
SR = State Rare
SC = State Candidate

Tahoe Regional Planning Agency
SI = Special Interest Species

California Native Plant Society (CNPS) List Categories:
1 = Rare in California and elsewhere
2 = Rare in California, but not elsewhere
A = Presumed extirpated or extinct
B = Rare, threatened, or endangered
3 = Plants about which we need more information
4 = Plants of limited distribution

CNPS Threat Code Extensions:
.1 = Seriously endangered in California (Over 80% of occurrences threatened)
.2 = Fairly endangered in California (20-80% occurrences threatened)
.3 = Not very endangered in California (<20% of occurrences threatened)

***Table 4**: List of special status wildlife species known to occur in the vicinity of Project area.*

Scientific Name Common Name	Federal Status	State Status	Habitat Requirements	Potential for Occurrence
Mammals				
Antrozous pallidus Pallid bat	FSS	SSC	Suitable habitat includes lowland desert scrub, arid deserts and grasslands, intermontane basins, mountainous areas, and open coniferous forest and woodland often near rocky outcrops and water (Baker et al. 2008). Roosts include crevices of rock outcrops, caves, mines, buildings, bridges, and hollows of live and dead trees (Caire et al. 1989).	**Potential:** No documented occurrences in the BSA or Project area. Coniferous forest provides suitable foraging habitat in the Project area, and trees and snags in the Project area may provide suitable roosting habitat. Not encountered during the reconnaissance-level survey.
Corynorhinus townsendii Townsend's big-eared bat	FSS	SSC	Throughout much of the known range, these bats commonly occur in mesic habitats characterized by coniferous and deciduous forests (Kunz and Martin 1982), but they occupy a broad range of habitats including shrubland, chaparral, desert, woodlands, forests, cliffs, and savannas (Handley 1959). Roosts include caves, buildings, and tree cavities.	**Potential:** Coniferous forest, shrubland, and chaparral in the Project area may provide suitable habitat. Snags and tree cavities in the Project area may also provide suitable roost habitat. Not encountered during the reconnaissance-level survey.
Gulo gulo luscus North American wolverine	PT FSS	ST	Occupy a variety of habitats across North America including tundra, boreal forest, mixed forest, redwood forest, and coniferous forest. Dens are well-camouflaged and located in difficult to access areas. Avoids areas of human development or disturbance (USFWS 2018).	**Absent.** Project area may contain suitable habitat, but existing disturbance levels and development in the vicinity make this species unlikely to occur. Not encountered during the reconnaissance-level survey. This species is remarkably rare, and no individuals are currently known to occur in the Lake Tahoe basin.
Lasiurus blossevillii Western red bat		SSC	Roosting habitat for the species includes foliage of woodlands and forests, including mixed conifer forests of the Sierra Nevada. Foraging habitat includes shrublands, grasslands, forest openings, and croplands. Strongly associated with riparian habitat including sycamores and cottonwoods in the lower reaches of large rivers (Pierson et al. 2006).	**Potential:** Uncommon in the Lake Tahoe basin but has been detected in the Upper Truckee Marsh in 2020 (Tahoe Resource Conservation District survey data). Aspen stands and coniferous forest in the Project area provide suitable roosting habitat, and foraging habitat is present throughout the meadow. Not encountered during the reconnaissance-level survey.

Scientific Name Common Name	Federal Status	State Status	Habitat Requirements	Potential for Occurrence
Myotis thysanodes Fringed myotis	FSS		Fringed myotis is mostly found in dry habitats where open areas (e.g., grasslands and deserts) are interspersed with mature forests (usually ponderosa pine, pinyon-juniper, or oak), creating complex mosaics with ample edges and abundant snags. Common habitats include ponderosa pine forest at middle elevations. Most reported occurrences are at elevations between roughly 3,900 and 6,900 ft (Keinath 2004). Roosts are located in caves, mines, cliffs, crevices, buildings, bridges, and snags.	**Potential:** Suitable roosting habitat is present in various snags and the old bridge structure. Suitable forest and open meadow edge habitat is present in the Project area, but the species is not documented in the BSA. Not encountered during the reconnaissance-level survey.
Odocoileus hemionus Mule deer		SI	Mule deer utilize various habitat types but prefer arid open areas and rocky hillsides, grasslands, cold desert shrubland and sagebrush, meadows, and upland forests (NDOW 2012).	**Potential:** Mule deer may move through the Upper Truckee River corridor, including the Project area. Johnson Meadow is unlikely to provide fawning habitat considering disturbance levels and proximity to development. There is no TRPA deer fawning habitat in the BSA. Not encountered during the reconnaissance-level survey.
Vulpes vulpes necator Sierra Nevada red fox	FE		In the Sierra Nevada, high-elevation (8,100 to 11,608 feet) forests interspersed with meadows or alpine fell-fields. Open areas are used for hunting while forested habitats are used for cover and reproduction. Forest edges are utilized extensively (Seidensticker 1999). The Sierra Nevada Distinct Population Segment sightings have been limited to federal lands in Alpine, Fresno, Inyo, Madera, Mono and Tuolumne counties. Less than 50 individuals exist in the wild (USFWS 2021).	**Absent.** Project area may contain suitable habitat, but existing disturbance levels and development in the vicinity make this species unlikely to occur. Not encountered during the reconnaissance-level survey. This species is remarkably rare, and no individuals are currently known to occur in the Lake Tahoe basin.
Birds				

Scientific Name Common Name	Federal Status	State Status	Habitat Requirements	Potential for Occurrence
Accipiter gentilis Northern goshawk	FSS	SSC SI	Northern goshawks are distributed throughout California in middle to higher elevation forested areas, particularly in the North Coast Ranges through Sierra Nevada, Klamath, Cascade, and Warner Mountains (Zeiner et al. 1990). Locally, they can be yearlong residents and seasonal migrants. Goshawks usually nest on north-facing slopes near water and require mature conifer or aspen forests with large diameter trees, dense canopy cover, and an open under story interspersed with meadows or shrub patches. Open areas provide foraging opportunities, while logs, snags, and broken-top trees are used as "plucking posts" to de-feather prey (Woodbridge and Hargis 2006). Nests are usually located within the largest tree in the stand, next to the bole of the tree, in the lower third of the canopy.	**Low Potential.** There is a CNDDB occurrence at Tahoe Valley Campground (1995) southwest of the project area. There is suitable foraging and nesting habitat and TRPA threshold habitat within the BSA and Project area, but the species was not encountered during the reconnaissance-level field survey. Nesting is unlikely within the Project area considering existing disturbance levels and human activity, but this species may utilize habitat features in the Project area and nest in the BSA.
Empidonax traillii Willow flycatcher	FSS	SE	A rare to locally uncommon, summer resident in wet meadow and montane riparian habitats at 600-2,500 m (2,000-8,000 ft) in the Sierra Nevada and Cascade Range. They most often occur in broad, open river valleys or large mountain meadows with lush growth of shrubby willows associated with surface water or saturated soils within the defended territory in the early breeding season. Dense willow thickets are required for nesting and roosting. Low, exposed branches are used for singing posts and hunting perches (Serena 1982, Sanders & Flett 1989, Bombay 1999). This species was once locally abundant along willow dominated riparian and meadow communities across California, including the Upper Truckee River (Bombay et al. 2003).	**Low Potential.** CNDDB documents presence along the Trout Creek corridor in the BSA, east of the Project area. Low quality willow habitat is present in Johnson Meadow along the Upper Truckee River in the BSA and Project area. Not encountered during the reconnaissance-level survey.

Scientific Name Common Name	Federal Status	State Status	Habitat Requirements	Potential for Occurrence
Haliaeetus Leucocephalus Bald eagle	FSS	SE SI	Locally, bald eagles are yearlong residents and migrants in the Tahoe Basin. Bald eagles use shorelines along large bodies of water and river courses for both nesting and wintering. Snags, broken-topped trees, or rocks near water are required for foraging and nesting. Most nests are located in large trees with open branches within 1 mile of a water body. In Lake Tahoe, known nesting sites include Emerald Bay, Marlette Lake, and Sugar Pine Point. Wintering sites are located in Taylor, Tallac, Pope, and Upper Truckee Marshes (TRPA special interest species data).	**Low Potential:** Bald eagles may occur in the Project area as transients but are not expected to utilize the Project area or BSA for nesting or foraging considering disturbance levels associated with human activity, recreation, and development. No nests or wintering sites are documented in the BSA. Not encountered during the reconnaissance-level survey.
Pandion haliaetus Osprey		SI	Ospreys occur along rivers, lakes, reservoirs, and seacoasts and often cross land between water bodies. They build large stick nests on living or dead trees, manmade structures, usually near or above water (Campbell et al. 1990, Palmer 1988). In the Lake Tahoe basin, osprey nests are located near the northeastern and southwestern shorelines and near Fallen Leaf Lake (TRPA special interest species data).	**Low Potential:** Ospreys are not documented nesting in the BSA. The species may occur as a transient or use perch sites in the vicinity; however, foraging habitat is low quality considering existing conditions of the Upper Truckee River in Johnson Meadow. Not encountered during the reconnaissance-level survey.
Strix occidentalis occidentalis California spotted owl	PT FSS	SSC SI	An uncommon, permanent resident in suitable habitat. Resides in dense, old-growth, multi-layered mixed conifer, redwood, and Douglas-fir habitats from sea level up to approximately 2,300 m (0-7,600 ft). Often associated with sources of water (Garrett and Dunn 1981). May move downslope in winter along the eastern and western slopes of the Sierra Nevada, and in other areas. Uses dense, multi-layered canopy cover for roost seclusion.	**Low Potential.** Project area and BSA may contain suitable foraging habitat, but existing disturbance levels and forest structure (fuel reduction activities) make this species unlikely to occur or nest in the vicinity. Not encountered during the reconnaissance-level survey.
Amphibians				

Scientific Name Common Name	Federal Status	State Status	Habitat Requirements	Potential for Occurrence
Lithobates pipiens Northern leopard frog		SSC	Springs, slow streams, marshes, bogs, ponds, canals, flood plains, reservoirs, and lakes; usually in or near permanent water with rooted aquatic vegetation. In summer, they commonly inhabit wet meadows and fields. Take cover underwater, in damp niches, or in caves when inactive. Wintering sites are usually underwater, though some frogs possibly overwinter underground. Eggs are laid and larvae develop in typically shallow, still, permanent water, in areas well exposed to sunlight. Generally, eggs are attached to vegetation just below the surface of the water (NatureServe 2023a).	**Low Potential.** Project area contains suitable habitat but was not encountered during the reconnaissance-level survey. CNDDB occurrence at the confluence of Cold Creek and Trout Creek east of the project area is from 1970. There is no recent LTBMU detection data for this species in the Lake Tahoe basin (2023 LTBMU herpetofauna survey data).
Rana sierrae Sierra Nevada yellow-legged frog	FE FSS	ST WL	Inhabit the Sierra Nevada mountains in lakes, ponds, marshes, meadows, and streams at elevations ranging from 4,500 to 12,000 feet. Their range extends from the western Sierra Nevada north of Fresno County and the eastern Sierra Nevada in Inyo and Mono counties. They are primarily found in National Forests and National Parks in Lassen, Plumas, Sierra, Nevada, Placer, El Dorado, Amador, Alpine, Calaveras, Tuolumne, Mono, Mariposa, Madera, Fresno, and Inyo counties, California. Breeds in the shallows of ponds and lakes or in inlet streams and deposit their eggs underwater in clusters, which they attach to rocks, gravel, or vegetation (USFWS Species Profile).	**Low Potential.** LTBMU-mapped suitable habitat is present within the project area and BSA. Site assessment and VES confirmed low quality habitat is present, but no individuals were found. Database occurrences are lacking in the BSA.
Fish				

Scientific Name Common Name	Federal Status	State Status	Habitat Requirements	Potential for Occurrence
Catostomus lahontan Lahontan mountain sucker		SSC	Shallow (less than 2 m), clear, low-gradient streams in the Lahontan basin associated with diverse substrates from sand to boulders in areas with dense cover, macrophytes, logs, and undercut banks. May also be found in larger, more turbid rivers and smaller lakes and reservoirs, but not large lakes such as Tahoe, Eagle, or Pyramid lakes. Largely absent from California reservoirs (CDFW 2015).	**Present.** Potential (unconfirmed) sighting of one individual (*Catostomus* sp.) during the reconnaissance-level survey. CNDDB documents many occurrences from e-fishing efforts in 2005 and 2011 downstream of the Highway 50 crossing and lower 6 miles of the Upper Truckee River. LTBMU also documents the presence of mountain and Tahoe suckers in the BSA (USFS 2011). Assumed present.
Oncorhynchus clarkii henshawi Lahontan cutthroat trout	FT		Inhabits cool, well-oxygenated freshwater lakes, rivers, streams and requires spawning and nursery habitat characterized by cool water pools in close proximity to cover and velocity breaks, well vegetated and stable stream banks, and silt-free rocky substrate in riffle-run areas. Found in drainages of the Truckee, Humboldt, Carson, Walker, and Quinn Rivers (USFWS 1995).	**Potential.** 100,000 individuals were stocked into Lake Tahoe by the Lahontan National Fish Hatchery Complex in 2022. Not observed during the reconnaissance-level survey. The Upper Truckee River has been subject to various LCT restocking efforts. USFS assumes presence in the entire Upper Truckee River based on populations in the headwaters and Lake Tahoe.
Prosopium williamsoni Mountain whitefish		SSC	Cold mountain lakes (to depths of at least 10 m) and fast, clear or silty streams with large pools. Stream populations spawn in riffles over gravel and small rubble. Lake populations move into tributaries to spawn between October and early December or seek gravel shallows in lake. Eggs stick to bottom substrate. No nest is constructed (NatureServe 2023b).	**Potential.** CNDDB documents occurrences from 2011 e-fishing efforts in the lower 6 miles of the Upper Truckee River. Not observed during the survey.
Insects				

Scientific Name Common Name	Federal Status	State Status	Habitat Requirements	Potential for Occurrence
Danaus plexippus Monarch butterfly	C		Species occurs in various habitats across North America including fields, roadsides, open areas, grassland, tundra, wetlands, and mountains. During the breeding season, monarchs lay their eggs on obligate milkweed host plants (*Asclepias* spp.). Multiple generations can breed year-round. Species migrates from Nevada to the coastal regions of California in fall and return in the spring (USFWS Species Profile).	**Absent.** Not observed during the reconnaissance-level survey. No milkweed host plants were observed during the survey, therefore no potential to breed in the Project area. May occur as a transient.
Sources: United States Fish and Wildlife Service (USFWS) California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB)			<u>Federally Listed Species (ESA):</u> C = Candidate FE = Federally Endangered FT = Federally Threatened FSC = Species of Concern PT = Proposed Threatened FCE = Candidate for Endangered FPD = Proposed for Delisting FSS = Forest Service Sensitive BCC = Bird of Conservation Concern <u>Tahoe Regional Planning Agency</u> SI = Special Interest Species	<u>California State Listed Species:</u> SE = State Endangered ST = State Threatened SR = State Rare SC = State Candidate WL = CDFW Watch List SSC = CDFW Species of Special Concern

Chapter 4 – Results: Biological Resources, Discussion of Impacts, and Mitigation

Habitats and Natural Communities of Special Concern

Habitats are considered to be of special concern based on (1) federal, State, or local laws regulating their development; (2) limited distributions; and/or (3) the habitat requirements of special-status plants or animals occurring on site. The following habitats were identified within the BSA and Project area during database research and the reconnaissance-level field survey and were determined to be of special concern or sensitive:

- Suitable riverine habitat, passage, and connectivity for mountain whitefish, Lahontan mountain sucker, and LCT
- Riparian and wet meadow habitats in the Upper Truckee River corridor
- LTBMU suitable habitat for SNYLF (**Appendix A, Figure 6**)
- TRPA northern goshawk threshold habitat (**Appendix A, Figure 6**)

WOUS (which includes wetlands) are considered sensitive by both federal and State agencies and are discussed in more detail within the Aquatic Resources Delineation Report.

Discussion of Riverine Habitat

The Upper Truckee River flows through the Project area in Johnson Meadow within a single channel, then splits into a gully channel approximately 0.3 miles northeast of the Project area. The main Upper Truckee River channel was historically excavated and channelized for livestock grazing and has become incised. The lowering of the streambed, bank instability, erosion, and sediment accumulation around the damaged bridge have degraded the riverine habitat in the Project area, but riverine habitat remains suitable for fish and other aquatic species.

Riverine Habitat Survey Results

NCE delineated a total of 0.36 acres of riverine habitat/open water (Upper Truckee River) in the Project area (**Appendix A, Figure 9**). The Upper Truckee River is a jurisdictional WOUS and Waters of the State due to the presence of ordinary high water mark indicators, soils, and vegetation communities. The Upper Truckee River is a tributary and significant nexus to Lake Tahoe, a traditionally navigable waterbody.

Riverine Habitat Project Impacts

The Project will result in approximately 0.02 acre of permanent impacts and 0.02 acre of temporary impacts to the Upper Truckee River. Temporary impacts will include disturbance associated with removal of the damaged bridge and installation of the temporary coffer dam system. Permanent impacts will include construction of the new bridge on the new alignment to the south, which will span the Upper Truckee River.

Riverine Habitat Avoidance and Minimization Efforts

- BIO-1: Prior to the start of construction activities, the limits of construction will be clearly marked and sensitive or regulated habitats within the Project limits will be marked with

high visibility fencing or staking to ensure construction will not further encroach into waters or sensitive habitats. These areas will be marked on the Project plans. A qualified biologist will periodically inspect the Project area to ensure environmentally sensitive areas (ESAs) remain undisturbed.

- BIO-2: Heavy equipment will be prohibited from entering the river to the maximum extent possible during the bridge removal. Fueling, maintenance and staging of equipment will occur in the designated upland staging areas only.

Additional avoidance and minimization measures may also be required by the USACE, RWQCB, and CDFW permits.

Riverine Habitat Compensatory Mitigation

Compensatory mitigation may be required for impacts to riverine habitat resulting from construction of the new bridge; however, the impact amount may be offset with removal of the existing damaged bridge (approximately 0.01 acre). Final impacts and mitigation requirements for riverine habitat will be determined during the USACE, RWQCB, and CDFW permitting process.

Riverine Habitat Cumulative Impacts

This Project is not anticipated to result in additional actions or effects that would be added to or could interact with the effects from other actions at this location or at this time; therefore, no cumulative impacts are anticipated.

Discussion of Wildlife and Fisheries Connectivity

The Upper Truckee River provides passage and connectivity to Lake Tahoe for the federally threatened LCT and two CDFW species of special concern, the Lahontan mountain sucker and mountain whitefish. The Upper Truckee River corridor provides an important avenue for terrestrial and aquatic wildlife to access Lake Tahoe and the Truckee Marsh.

Wildlife and Fisheries Connectivity Survey Results

During the reconnaissance-level survey and SNYLF site assessment survey, it was determined habitat in the Project area, specifically within the Upper Truckee River corridor, provides an important connection to areas of high-quality habitat and allows wildlife to navigate between the surrounding urban environments. Multiple fish species were observed in the Upper Truckee River, including a potential sighting of a Lahontan mountain sucker. One deceased brown trout was observed indicating salmonid passage and connection to upstream or downstream areas, and a brown bear was observed visiting the Upper Truckee River in the Project area to drink and bathe.

Wildlife and Fisheries Connectivity Project Impacts

Completion of the Project will not impact or change wildlife connectivity in any meaningful way considering the existing site conditions and proposed improvements. The construction of the Project will not impact fish passage or connectivity in the Upper Truckee River, rather, the Project plans to improve fish passage and bank stability by removing the damaged bridge and its concrete piers. The new bridge will entirely span the Upper Truckee River. The Project may temporarily disrupt fish passage in the Upper Truckee River corridor with the use of a turbidity curtain or downstream screen during removal of the existing bridge. The boardwalk design allows for passage of small animals underneath, while a gap in the railed boardwalk section will

allow passage for larger animals such as mule deer and black bears. The use of vegetation protection fencing, silt fencing, or other Project area boundary markers, and the presence of equipment and construction crews, may temporarily disrupt wildlife movement in the Project area during construction.

Wildlife and Fisheries Connectivity Avoidance and Minimization Efforts

- BIO-3: BMPs used in the Upper Truckee River will be installed with consideration for fish passage. Turbidity curtains or downstream screens will be installed in a manner that allows for the passage of fish beneath or around the BMP. BMPs will consist of materials that prevent fish and other wildlife from becoming entangled, trapped, or otherwise harmed. BMPs used in the river will be approved for use by CDFW and USFWS and inspected daily by a qualified biologist.

Additional avoidance and minimization measures may also be required by the USACE, RWQCB, and CDFW permits.

Wildlife and Fisheries Connectivity Compensatory Mitigation

Compensatory mitigation is not anticipated considering the Project will not impact or alter wildlife connectivity in the area and proposes to improve fish passage with a new bridge that spans the river. Final impacts and mitigation requirements for wildlife connectivity will be refined and determined during the regulatory permitting process.

Wildlife and Fisheries Connectivity Cumulative Impacts

This Project is not anticipated to result in additional actions or effects that would be added to or could interact with the effects from other actions at this location or at this time; therefore, no cumulative impacts are anticipated.

Discussion of Wetland Habitat

Wetland habitat in the Project area includes freshwater forested/shrub wetlands and freshwater emergent wetlands. These habitats provide suitable habitat for many wildlife species and rare plants and are considered wetlands under jurisdiction of USACE. These wetlands are also associated with the Upper Truckee River riparian corridor under jurisdiction of CDFW.

Wetland Habitat Survey Results

NCE delineated a total of 1.39 acres freshwater forested/shrub wetlands and 1.06 acres of freshwater emergent wetlands associated with the Upper Truckee River riparian corridor in the Project area (**Appendix A, Figure 9**).

Wetland Habitat Project Impacts

The Project will result in approximately 0.16 acre of permanent impacts and 0.25 acre of temporary impacts to freshwater forested/shrub wetlands, and 0.15 acre of permanent impacts and 0.23 acre of temporary impacts to freshwater emergent wetlands. Temporary and permanent impacts will be a result of the Class 1 shared-use path and boardwalk construction over the existing unvegetated trail.

Wetland Habitat Avoidance and Minimization Efforts

- BIO-1: Prior to the start of construction activities, the limits of construction will be clearly marked and sensitive or regulated habitats within the Project limits will be marked with high visibility fencing or staking to ensure construction will not further encroach into

waters or sensitive habitats. These areas will be marked on the Project plans. A qualified biologist will periodically inspect the Project area to ensure ESAs remain undisturbed.

Additional avoidance and minimization measures may also be required by the USACE, RWQCB, and CDFW permits.

Wetland Habitat Compensatory Mitigation

Compensatory mitigation will be required for impacts to wetland habitat resulting from construction of the boardwalk. Final impact amounts and mitigation requirements for wetlands will be refined and determined during the USACE, RWQCB, and CDFW permitting process.

Wetland Habitat Cumulative Impacts

This Project is not anticipated to result in additional actions or effects that would be added to or could interact with the effects from other actions at this location or at this time; therefore, no cumulative impacts are anticipated.

Discussion of LTBMU SNYLF Suitable Habitat

The Upper Truckee River corridor, and nearly all tributaries and wetland areas in the Lake Tahoe basin, have been identified by the LTBMU as suitable habitat for SNYLF. LTBMU SNYLF suitable habitat is a buffered area of all wetland features in the Lake Tahoe basin including streams, lakes, ponds, wet meadows, etc.

LTBMU SNYLF Suitable Habitat Survey Results

Approximately 3.16 acres of LTBMU SNYLF suitable habitat are mapped within the Project area (**Appendix A, Figure 6**). SNYLF were not detected during the August 14, 2023, reconnaissance-level field survey or the August 16, 2023, VES.

LTBMU SNYLF Suitable Habitat Project Impacts

Impacts to LTBMU SNYLF suitable habitat are synonymous with the previously discussed impacts to riverine, riparian, and wet meadow habitats, for a total of 0.33 acre of permanent and 0.5 acre of temporary impacts. Temporary and permanent impacts will be a result of boardwalk construction and the bridge replacement.

LTBMU SNYLF Suitable Habitat Avoidance and Minimization Efforts

- BIO-1: Prior to the start of construction activities, the limits of construction will be clearly marked and sensitive or regulated habitats within the Project limits will be marked with high visibility fencing or staking to ensure construction will not further encroach into waters or sensitive habitats. These areas will be marked on the Project plans. A qualified biologist will periodically inspect the Project area to ensure ESAs remain undisturbed.

Additional avoidance and minimization measures may also be required by the USACE, RWQCB, and CDFW permits.

LTBMU SNYLF Suitable Habitat Compensatory Mitigation

Compensatory mitigation will be required for impacts to wetland habitat resulting from construction of the boardwalk. Final impact amounts and mitigation requirements for wetlands/SNYLF habitat will be refined and determined during the USACE, RWQCB, and CDFW permitting process.

LTBMU SNYLF Suitable Habitat Cumulative Impacts

This Project is not anticipated to result in additional actions or effects that would be added to or could interact with the effects from other actions at this location or at this time; therefore, no cumulative impacts are anticipated.

Discussion of TRPA Northern Goshawk Threshold Habitat

Under the Bi-State Compact, Regional Plan, Code of Ordinances, and Environmental Improvement Program, the TRPA is required to develop and maintain threshold standards for natural resources, including standards for vegetation, plants, and wildlife. Northern goshawk threshold zones are 500 acres of the best habitat surrounding a nesting site, including a 0.25-mile radius of the nest. Snags are also identified by TRPA as important wildlife features subject to Regional Plan management goals.

TRPA Northern Goshawk Threshold Habitat Survey Results

Approximately 5.57 acres of TRPA northern goshawk threshold habitat is mapped within the Project area (**Appendix A, Figure 6**). No northern goshawks were detected during the August 14, 2023, reconnaissance-level field survey. Numerous snags were identified in the eastern vicinity of the Project area (**Appendix A, Figure 8**), which may serve as prey "plucking posts" for northern goshawks. According to the TRPA Threshold Standards and Regional Plan, Goal VEG-5, the appropriate stocking level and distribution of snags and coarse woody debris shall be retained in the region's forests to provide habitat for organisms that depend on such features and to perpetuate natural ecological processes.

TRPA Northern Goshawk Threshold Habitat Project Impacts

Impacts to TRPA northern goshawk threshold habitat include 0.64 acres of permanent impacts and 1.76 acres of temporary impacts resulting from the boardwalk construction, bridge replacement, Class 1 shared-use path construction, and use of the southern staging area.

TRPA Northern Goshawk Threshold Habitat Avoidance and Minimization Efforts

- BIO-1: Prior to the start of construction activities, the limits of construction will be clearly marked and sensitive or regulated habitats within the Project limits will be marked with high visibility fencing or staking to ensure construction will not further encroach into waters or sensitive habitats. These areas will be marked on the Project plans. A qualified biologist will periodically inspect the Project area to ensure ESAs remain undisturbed.

- BIO-4: Prior to the start of construction activities, trees and snags in the Project area that are not planned for removal will be provided high visibility vegetation protection fencing around the dripline. Trees and snags will be marked on the Project plans for avoidance and periodically inspected by a qualified biologist to ensure they remain undisturbed.

Additional avoidance and minimization measures may also be required by Project's TRPA permit.

TRPA Northern Goshawk Threshold Habitat Compensatory Mitigation

Compensatory mitigation may be required for impacts to northern goshawk threshold habitat. Final impact amounts and mitigation requirements for northern goshawk threshold habitat will be refined and determined during the TRPA permitting process.

TRPA Northern Goshawk Threshold Habitat Cumulative Impacts

This Project is not anticipated to result in additional actions or effects that would be added to or could interact with the effects from other actions at this location or at this time; therefore, no cumulative impacts are anticipated.

Special Status Plant Species

The plants described below are considered to be of special concern based on (1) federal, state, or local laws regulating their development; (2) limited distributions; and/or (3) the presence of habitat required by the special-status plants occurring on site.

Discussion of Special Status Plant Species

A CNPS 9-quad search was conducted prior to the reconnaissance-level survey to determine which special status plants are known to occur in the BSA and which habitats may be considered suitable for special status plants in the Project area. The CNPS 9-quad query resulted in 30 total plants with a CNPS ranking of 1 or 2 (**Table 3**). The IPaC and CNDDB database searches did not return any plant species.

Special Status Plant Survey Results

During the August 14, 2023 reconnaissance-level survey, no special status plants were found to be present within the Project area. Following the survey, it was determined habitat may be available in the Project area and BSA for 15 special status plants (**Table 3**). Habitats present in the Project area and BSA that can support these species include meadows, seeps, damp soils, sagebrush, and coniferous forest. Known elevation ranges were also considered when evaluating potential for these species to occur.

Special Status Plant Project Impacts

No impacts to special status plant species are expected considering there is a lack of occurrence data for special status plants in the BSA and no special status plants were found during the reconnaissance-level survey. However, suitable habitat is present, specifically in the wetland areas, and lack of occurrence data does not preclude special status plants from occurring. There is potential for the Project to impact special status plant species if they are found during the pre-construction survey mentioned below.

Special Status Plant Avoidance and Minimization Efforts

- BIO-5: A pre-construction plant survey of the entire Project area will be conducted by a qualified biologist no more than two weeks prior to construction. Results of the pre-construction plant survey will be provided to the Project proponent, CDFW, and the LTBMU. If special status plant species are detected, their locations will be pin-flagged, and a minimum 25-foot buffer will be marked with high visibility fencing or staking around the individual or population. A qualified biological monitor will inspect the special status plant species and buffer(s) on a weekly basis to ensure no impacts occur because of the Project.

Additional avoidance and minimization measures for special status plants may also be required by the Project's TRPA and CDFW permits.

Special Status Plant Compensatory Mitigation

Since the Project will avoid impacts to special status plant species by following avoidance and minimization measure BIO-5, no compensatory mitigation is anticipated.

Special Status Plant Cumulative Impacts

This Project is not anticipated to result in additional actions or effects that would be added to or could interact with the effects from other actions at this location or at this time; therefore, no cumulative impacts are anticipated.

Special Status Animal Species

Animals are considered to be of special concern based on (1) federal, State, or local laws regulating their development; (2) limited distributions; and/or (3) the habitat requirements of special-status animals occurring on site. No special status wildlife species were found to be present within the Project area during the August 14, 2023, reconnaissance-level survey. However, there was a potential sighting of a Lahontan mountain sucker (unidentified *Catostomus* sp.), which is a CDFW species of special concern.

Multiple special status wildlife species were identified during the database research of the BSA, and it was determined there is potential for special status species to occur in the BSA and Project area. The analysis of potential for these species to occur with the Project area due to the presence or absence of habitat and database occurrences is summarized in **Table 4**. Of these species with potential to occur, only SNYLF and LCT are listed under the Federal Endangered Species Act (FESA).

Discussion of Sierra Nevada Yellow-legged Frog

The SNYLF was listed as an endangered species under the FESA in 2014 and 24 critical habitat units covering 1,082,147 acres were designated in 2016 (USFWS 2016). Threats contributing to the danger of extinction throughout the species' range include habitat destruction due to dams, water diversions, recreation, grazing, road construction, and timber harvesting, predation by trout, bullfrogs, and other non-native species, climate change, drought, and chytrid fungus. Historically, SNYLF inhabited lakes, ponds, marshes, meadows, and streams at elevations between 4,500 and 12,000 feet in the western Sierra Nevada from Fresno, Inyo, and Mono Counties and areas north of Lake Tahoe. Generally, they are not found more than 1 meter from water and breed in a variety of habitats including shallows of still lakes or ponds and slow-flowing inlet streams. Egg masses are deposited underwater and attach to rocks, gravel, or vegetation, or are deposited under banks. At high elevations, both frogs and tadpoles overwinter under ice in lakes and streams. Throughout its range, SNYLF did not co-evolve with any species of fish, as they predominantly occur in water bodies above natural fish barriers (US Fish and Wildlife Service 2014).

Estimates of SNYLF population losses range between 69% and 93%, with an estimated 44% reduction of suitable watershed habitat (USFWS 2014). Current SNYLF population trends are unknown but are assumed to remain declining or artificially stable with reintroduction efforts. The USFWS has not yet published a 5-year review of the species, which was initiated in early 2020.

Sierra Nevada Yellow-legged Frog Survey Results

SNYLF critical habitat is absent within the BSA. The closest critical habitat area is approximately five miles west of the BSA in the Desolation Wilderness.

A SNYLF VES was conducted on August 16, 2023, and a site assessment report was prepared to evaluate habitat, determine presence or absence of SNYLF, and assess potential project impacts. Additional information is provided in the SNYLF site assessment report prepared for the Project. During the August 16, 2023, VES and the August 14, 2023, reconnaissance-level survey, no SNYLF were detected; however, low-quality suitable habitat was determined to be present, consistent with the LTBMU-mapped suitable habitat for SNYLF in the BSA and Project area. SNYLF habitat present in the Project area includes the wetlands of Johnson Meadow that can support lentic backwaters and ponded features isolated from predatory fish species in the Upper Truckee River. Flows of the Upper Truckee River in the BSA are generally too rapid for SNYLF foraging and breeding, but pools between riffles and runs can provide suitable microhabitats; however, the presence of predatory fish species such as trout reduce potential for SNYLF. This riverine and meadow habitat is different from the high-elevation alpine lakes of the Desolation Wilderness where the species is currently known to occur, and the small, isolated ponds, inlet streams, and other vernal wetland features in the Project area that can provide habitat for SNYLF are limited resulting from the channelization and incision of the Upper Truckee River.

According to the LTBMU, known occurrences of SNYLF in the Lake Tahoe basin are in the Desolation Wilderness at Tamarack, Cagwin, Lucille, Margery, Jabu, and Upper, Middle, and Lower Velmas Lakes and the headwaters of Trout Creek at Hell Hole. The only SNYLF historical occurrence associated with the Upper Truckee River body is from 1952 as documented by the CNDDB. The LTBMU conducts annual surveys for herpetofauna, including SNYLF, throughout the Lake Tahoe basin. However, LTBMU has not conducted surveys on the Upper Truckee River near the Project area. Despite the presence of suitable habitat, the potential for occurrence is low considering the presence of predatory trout species in the Upper Truckee River and the lack of occurrence data in the South Lake Tahoe region.

Sierra Nevada Yellow-legged Frog Project Impacts

Based on NCE's 2023 surveys, lack of historical occurrences, and presence of predatory species, the proposed Project **may affect, but is not likely to adversely affect SNYLF**. The presence of native and non-native predatory fish within stocked reaches in the Upper Truckee River, other predatory species such as crayfish and garter snakes, in addition to the lack of low flow streams and quality lentic backwaters likely precludes SNYLF. This is further supported by the lack of any recent occurrence data within the Upper Truckee River.

Permanent and temporary impacts to SNYLF habitat are the same as the permanent and temporary impacts to CDFW and USACE jurisdictional aquatic resources identified by the aquatic resources determination for the Project. There will be 0.15 acres of permanent impacts to freshwater emergent wetlands, 0.16 acres of permanent impacts to freshwater forested/shrub wetlands, and 0.02 acres of permanent impacts to the Upper Truckee River resulting from the bridge and boardwalk construction. In addition, construction of the boardwalk, bridge, and the removal of the existing bridge will result in 0.23 acres of temporary impacts to freshwater emergent wetlands, 0.25 acres of temporary impacts to freshwater forested/shrub wetlands, and 0.02 acres of temporary impacts to the Upper Truckee River. The total permanent impact to wetlands is 0.33 acres, and the total temporary impact to wetlands is 0.5 acres. Removal of the old bridge will result in the gain of 0.01 acres of SNYLF habitat.

There is no designated federal critical habitat for the species in the Project area or BSA; therefore, no impacts to critical habitat will result from the Project.

Sierra Nevada Yellow-legged Frog Avoidance and Minimization Efforts

Although SNYLF are not expected to be present during construction, due to the presence of low-quality suitable habitat, the following measures are proposed:

- BIO-1: Prior to the start of construction activities, the limits of construction will be clearly marked and sensitive or regulated habitats within the Project limits will be marked with high visibility fencing or staking to ensure construction will not further encroach into waters or sensitive habitats. These areas will be marked on the Project plans. A qualified biologist will periodically inspect the Project area to ensure ESAs remain undisturbed.

- BIO-6: No more than 14 days prior to construction, a SNYLF VES will be conducted by a USFWS-approved biologist to ensure SNYLF are absent in the Project area, including upstream and downstream areas or suitable habitat features within 100 feet of the Project. If a frog is observed during any point of the Project, all work shall immediately halt, all equipment shall be powered off, and work shall not continue until the frog species can be identified by a qualified biologist. If the frog is not a SNYLF, then a qualified biologist shall move the frog out of harm's way prior to work proceeding. If the frog is a SNYLF, then work will stop until the SNYLF has moved out of harm's way on its own accord as determined by the biological monitor. Consultation with the USFWS will be re-initiated if take is exceeded or the Project action changes from that previously disclosed in the Biological Assessment.

- BIO-7: A qualified biologist shall conduct environmental awareness training for all construction personnel. The training shall include identification of special-status species, required practices before the start of construction, general measures that are being implemented to conserve the species as they relate to the Project, penalties for non-compliance, and boundaries of work and of the permitted disturbance zones. Supporting materials containing training information shall be prepared and distributed. Upon completion of training, all construction personnel shall sign a form stating that they have attended the training and understand all the measures. Proof of this instruction shall be kept on file with the Project proponent. The Project proponent shall provide the USFWS and CDFW with a copy of the training materials and copies of the signed forms indicating that training has been completed. If new construction personnel are added to the site, the crew foreman shall ensure that the personnel receive the mandatory training before starting work. Copies of signed forms shall be submitted monthly as additional training occurs for new employees. The crew foreman is responsible for ensuring that construction personnel adhere to the guidelines and restrictions.

Additional avoidance and minimization measures, such as pre-construction surveys for other SSS and/or biological monitoring, may be required by the project's LSAA or as a result of consultation with USFWS. These requirements will be presented in the final Project permits.

Sierra Nevada Yellow-legged Frog Compensatory Mitigation

No compensatory mitigation is proposed with the implementation of the avoidance and minimization measures discussed above and the addition of 0.01 acres of suitable habitat gained from the removal of the old bridge.

Sierra Nevada Yellow-legged Frog Cumulative Impacts

No cumulative impacts are anticipated due to the presumed absence of SNYLF and the existing site conditions. There are no future or reasonably foreseeable actions that may impact SNYLF habitat in the BSA as a result of the Project.

Discussion of Lahontan Cutthroat Trout

The LCT was listed under the FESA as threatened in 1975. Critical habitat has not been designated for the species. This species inhabits freshwater lakes, streams, and rivers in the Lahontan Basin which includes hydrographic systems in northern Nevada, northeastern Sierra Nevada mountains of California, and southeastern Oregon. Historically, LCT were found in cold-water habitats including Pyramid Lake, Walker Lake, Lake Tahoe, Independence Lake, low gradient rivers including Humboldt, Carson, Truckee, Walker, and Marys Rivers, and headwater tributaries including Donner and Prosser Creeks. Riverine habitat is characterized by small, cool, silt-free streams with pools associated with velocity breaks and vegetation cover, stable banks, and riffle-run areas with rocky substrates (USFWS 1995).

At the time of listing, anthropogenic impacts and other threats including mining, logging, grazing, pollution, water diversions, dams and reservoirs, and non-native trout introduction had resulted in declining habitat quality and connectedness leading to reduced population numbers and viability across its range. The most recent 5-year review of LCT was published in 2023 and states that non-native trout, habitat loss, fragmentation, and degradation remain the primary threats to LCT. A rising contemporary threat is hybridization with non-native rainbow trout (USFWS 2023b).

The Upper Truckee River is within the Tahoe LCT Management Unit. This management unit is unique in that LCT are frequently stocked in several water bodies by the Lahontan National Fish Hatchery, several state hatcheries, and Numana Fish Hatchery, for differing purposes. Only one of the potential LCT recovery populations in the Truckee River watershed and Tahoe LCT Management Unit is resilient, which is the Upper Truckee River/Meiss Meadow population approximately 12 miles south of the BSA (USFWS 2023b). In 2022, approximately 100,000 LCT were released into Lake Tahoe (USFWS 2022).

Lahontan Cutthroat Trout Survey Results

Critical habitat has not been designated for this species, but the Upper Truckee River is identified by the USFWS as suitable habitat for LCT. No LCT were observed during the reconnaissance-level survey or the SNYLF VES; however, these surveys were conducted after the spawning season. One deceased brown trout was observed just upstream of the Project area indicating positive salmonid passage through the Project area. During the surveys, it was determined suitable habitat for LCT is present in the Project area considering the presence of the Upper Truckee River, which is a freshwater river located within the LCT Management Unit and historic range of the species. The Upper Truckee River in the Project area exhibits consistent, adequate flow which provides connectivity between stocked and managed populations of LCT in the southern Lake Tahoe basin. Pools near cover and velocity breaks, well-vegetated stream banks, and riffle-run areas with a silt-free rocky substrate are present in the Project area which may provide suitable LCT spawning and nursery habitat.

Occurrences of LCT in the lower reaches of the Upper Truckee River appear to be rare, but hatchery LCT have been documented in the Upper Truckee River near the Truckee Marsh (USFS 2011). The BSA is approximately 1.3 miles from the shore of Lake Tahoe, resulting in the possibility for LCT to make their way upstream from Lake Tahoe to the Project area.

According to the LTBMU, the USFS assumes LCT occupancy in the entire Upper Truckee River considering the resilient population in the headwaters and the stocked population in Lake Tahoe. Although there are numerous barriers to fish passage between the Project area and the Upper Truckee River/Meiss Meadow recovery population, there is a possibility LCT can make their way downstream to the Project area depending on the various upstream recovery efforts and changing river flow and barrier conditions (USFS 2012).

Lahontan Cutthroat Trout Project Impacts

The project will result in approximately 0.02 acres of permanent impacts and 0.02 acres of temporary impacts to the Upper Truckee River. Removal of the bridge will involve installation of a coffer dam system (gravel bags, visqueen plastic sheeting, or other similar materials) to protect the work area and maintain Upper Truckee River flows around the washed-out bridge abutment. Creation of the coffer dam system may result in LCT or other fish being trapped in ponded river water within the work area but will also prevent fish from entering. LCT or other fish trapped in the ponded water have the potential to be impacted by heavy equipment during the bridge demolition and removal process. Dewatering of ponded river water in the contained work area may also be required, posing an additional potential impact. A downstream turbidity curtain poses low potential to impact LCT as it will be made with fish-friendly material and will allow fish passage underneath the skirt.

The Upper Truckee River is not known to be used for spawning or migration for a Lake Tahoe population and there is limited occurrences of hatchery LCT making their way up the Upper Truckee River, resulting in a low likelihood of LCT being trapped in the work area and low likelihood of relocation efforts, which would involve placing the LCT on the river side of the coffer dam structure. As previously mentioned, the only known resilient population is the Upper Truckee River/Meiss Meadow population approximately 12 miles south of the BSA which is separated from the Project area by numerous barriers to fish passage. Considering the potential Project impacts during the bridge removal, lack of occurrence data in the Project area, the presence of the upstream recovery population, stocking efforts in Lake Tahoe, existing hydrological conditions, presence of non-native trout species, and results of the reconnaissance-level survey, it was determined the Project **may affect, but is not likely to adversely affect LCT**. The Project will improve habitat for LCT by removing the damaged bridge and replacing it with one that spans the Upper Truckee River.

Lahontan Cutthroat Trout Avoidance and Minimization Efforts

- BIO-1: Prior to the start of construction activities, the limits of construction will be clearly marked and sensitive or regulated habitats within the Project limits will be marked with high visibility fencing or staking to ensure construction will not further encroach into waters or sensitive habitats. These areas will be marked on the Project plans. A qualified biologist will periodically inspect the Project area to ensure ESAs remain undisturbed.

- BIO-3: BMPs used in the Upper Truckee River will be installed with consideration for fish passage. Turbidity curtains or downstream screens will be installed in a manner that allows for the passage of fish beneath or around the BMP. BMPs will consist of materials that prevent fish and other wildlife from becoming entangled, trapped, or otherwise harmed. BMPs used in the river will be approved for use by CDFW and USFWS and inspected daily by a qualified biologist.

- BIO-7: A qualified biologist shall conduct environmental awareness training for all construction personnel. The training shall include identification of special-status species,

required practices before the start of construction, general measures that are being implemented to conserve the species as they relate to the Project, penalties for non-compliance, and boundaries of work and of the permitted disturbance zones. Supporting materials containing training information shall be prepared and distributed. Upon completion of training, all construction personnel shall sign a form stating that they have attended the training and understand all the measures. Proof of this instruction shall be kept on file with the Project proponent. The Project proponent shall provide the USFWS and CDFW with a copy of the training materials and copies of the signed forms indicating that training has been completed. If new construction personnel are added to the site, the crew foreman shall ensure that the personnel receive the mandatory training before starting work. Copies of signed forms shall be submitted monthly as additional training occurs for new employees. The crew foreman is responsible for ensuring that construction personnel adhere to the guidelines and restrictions.

- BIO-8: Immediately prior to installation of the coffer dam system around the bridge removal work area, a qualified biologist will conduct a fish survey to ensure LCT, mountain whitefish, and Lahontan mountain sucker are absent in the Project area. The biologist will remain onsite and monitor installation of the coffer dam and will have authority to stop any Project activity that may impact LCT or other special status fish species detected in the Project area. The biologist will then survey ponded water within the contained work area following completion of the coffer dam installation to ensure fish are absent. If fish are found in the ponded water, they will be relocated to the river side of the coffer dam structure by the biologist. If LCT are found in the ponded area, the coffer dam system will be reopened to allow the LCT to leave on its own accord. No LCT will be handled or relocated. The qualified biologist will also perform daily inspections of the coffer dam and any other BMPs, such as the downstream turbidity curtain, to ensure they are properly installed, in good condition, cannot trap or otherwise harm fish, and do not block fish passage. If ponded water will be pumped from the contained bridge removal work area, intake screens will be used to prevent fish take and a qualified biologist will be onsite to relocate fish to the river side of the coffer dam structure. After bridge construction/demolition, the qualified biologist will monitor the removal of the coffer dam and other BMPs. Consultation with the USFWS and/or CDFW will be re-initiated if take is exceeded or the Project action changes.

Additional avoidance and minimization measures, such as pre-construction surveys for other SSS and/or biological monitoring, may be required by the project's LSAA or as a result of consultation with USFWS. These requirements will be presented in the final Project permits.

Lahontan Cutthroat Trout Compensatory Mitigation

Since the Project may affect, but is not likely to adversely affect LCT, avoidance measures will be followed, and that removal of the old bridge would provide a benefit to the species, no compensatory mitigation is anticipated.

Lahontan Cutthroat Trout Cumulative Impacts

No cumulative impacts are anticipated due to the absence of LCT and the existing site conditions. The Project intends to remove the damaged bridge which is partially obstructing fish passage. Fish passage and bank stability will be improved as a result of the Project since the new bridge will completely span the Upper Truckee River. There are no future or reasonably foreseeable actions that may impact LCT habitat in the BSA as a result of the Project. Spawning habitat for LCT, and habitat for other special species addressed in this NES, may be

improved in the Project vicinity following completion of the Tahoe Resource Conservation District's Johnson Meadow Restoration Project.

Discussion of Northern Goshawk

Northern goshawks are a USFS sensitive species, TRPA special interest species, and CDFW species of special concern. They are distributed throughout California in middle to high elevation forested areas, particularly in the North Coast Ranges through Sierra Nevada, Klamath, Cascade, and Warner Mountains (Zeiner et al. 1990). Goshawks usually nest on north-facing slopes near water or meadows and require mature conifer or aspen forests with large diameter trees, dense canopy cover, and an open under story interspersed with meadows or shrub patches. Open areas provide foraging opportunities, while logs, snags, and broken-top trees are used as "plucking posts" to de-feather prey. Goshawks typically have multiple nest sites within a territory which they alternate between years (Woodbridge and Hargis 2006). Depending on location, goshawk populations can be migratory or year-long residents. Nest construction begins around March and early April, eggs are typically laid mid-April to early may, and fledging occurs from late June through late July (Squires and Reynolds 1997).

Northern Goshawk Survey Results

Northern goshawks were not detected during the reconnaissance-level survey. There is a CNDDB occurrence at Tahoe Valley Campground (1995) southwest of the Project area. There is also suitable foraging and nesting habitat and TRPA threshold habitat within the BSA and Project area. Suitable habitat was determined to be present in the Project area considering the presence mature conifer and aspen stands near water, areas of dense canopy cover, and open meadow and shrub patches in the understory. Approximately 5.57 acres of TRPA northern goshawk threshold habitat is mapped within the Project area (**Appendix A, Figure 6**). However, the existing levels of human disturbance and proximity to development reduces the likelihood for northern goshawks to nest in the Project area.

Northern Goshawk Project Impacts

Impacts to TRPA northern goshawk threshold habitat include 0.64 acres of permanent impacts and 1.76 acres of temporary impacts resulting from the boardwalk construction, bridge replacement, Class 1 shared-use path construction, and use of the southern staging area. The Project has potential to impact northern goshawks by destroying nests during vegetation removal or disturbing nesting individuals with other construction related activity and noise.

Northern Goshawk Avoidance and Minimization Efforts

- BIO-1: Prior to the start of construction activities, the limits of construction will be clearly marked and sensitive or regulated habitats within the Project limits will be marked with high visibility fencing or staking to ensure construction will not further encroach into waters or sensitive habitats. These areas will be marked on the Project plans. A qualified biologist will periodically inspect the Project area to ensure ESAs remain undisturbed.

- BIO-9: During the nesting season (March through July) and no more than two weeks prior to construction and vegetation removal, a qualified biologist will conduct a protocol-level survey for northern goshawk to determine occupancy and nesting status within a 0.25-mile radius of the Project area. If an active goshawk nest is discovered, a 0.25-mile activity-free buffer will be established around the nest site. Results of the pre-construction northern goshawk survey will be provided to CDFW and TRPA.

- BIO-10: Project activities that could result in nesting migratory bird and raptor take, such as removal of the existing bridge, tree, shrub, grassland, and other vegetation removal, will be conducted outside the migratory bird and raptor nesting season (typically February 15th through September 15th). September 16th through February 14th is a suitable timeframe for completing vegetation removal to minimize the potential to impact nesting birds and raptors. If Project construction, including vegetation removal and bridge removal, will occur during the nesting season, the Project proponent will hire a qualified biologist to conduct a nesting bird and raptor survey no more than 14 days prior to the beginning of construction activities. A copy of the survey shall be submitted to CDFW prior to the start of construction activities. If nesting birds or raptors are detected within or near the Project area during the nesting bird survey, the Project proponent will coordinate with CDFW to establish a suitable activity-free buffer around active nest sites. The size of the buffer, duration of buffer, acceptable activities, etc. will be established through coordination with CDFW.

Additional avoidance and minimization measures may also be required by Project's TRPA permit and LSAA.

Northern Goshawk Compensatory Mitigation

Compensatory mitigation may be required for impacts to northern goshawk threshold habitat. Final impact amounts and mitigation requirements for northern goshawk threshold habitat will be refined and determined during the TRPA permitting process.

Northern Goshawk Cumulative Impacts

This Project is not anticipated to result in additional actions or effects that would be added to or could interact with the effects from other actions at this location or at this time; therefore, no cumulative impacts are anticipated.

Discussion of Willow Flycatcher

Willow flycatchers are a USFS sensitive species and listed as endangered under the CESA. They are rare to locally uncommon, summer residents in wet meadow and montane riparian habitats at 2,000 to 8,000 feet in the Sierra Nevada and Cascade Range. They most often occur in broad, open river valleys or large mountain meadows with lush growth of shrubby willows associated with surface water or saturated soils in the early breeding season. Dense willow thickets typically 6 to 12 feet high are required for nesting and roosting and low, exposed branches are used for singing posts and hunting perches (Serena 1982, Sanders & Flett 1989, Bombay 1999). This species was once locally abundant along willow dominated riparian and meadow communities across California, including the Upper Truckee River (Bombay et al. 2003).

Willow Flycatcher Survey Results

During the reconnaissance-level survey no willow flycatchers or *Empidonax* spp. were observed and no diagnostic "fitz-bew" calls were heard; however, the August 14, 2023, reconnaissance-level survey is considered late in the season for willow flycatcher detections. By this time, singing rates decline and the species begins migration to Central and South America. There are no CNDDB occurrences of willow flycatcher along the Upper Truckee River, but egg collections are documented in the early and mid-1900's along Trout Creek in the BSA. Patches of suitable habitat for willow flycatcher are mapped by TRPA and LTBMU 0.2 and 0.5-miles south of the BSA adjacent to the Lake Tahoe Airport, which are assumed to match habitat conditions in the

Project area. Suitable habitat was determined to be present in the Project area in the freshwater forested/shrub wetlands. These wetland types within the Project area contain patches of dense willows which can accommodate willow flycatcher foraging and nesting. However, soil moisture and surface water conditions are lacking, likely as a result of channelization of the river and other historic land-use disturbances, limiting high quality habitat for the species in the Project area and Johnson Meadow.

Willow Flycatcher Project Impacts

The Project will result in approximately 0.16 acre of permanent impacts and 0.25 acre of temporary impacts to willow flycatcher habitat (freshwater forested/shrub wetlands) resulting from removal of the damaged bridge and construction of the new bridge and boardwalk. The Project has potential to impact willow flycatchers by destroying nests during vegetation removal or disturbing nesting individuals with other construction related activities and noise.

Willow Flycatcher Avoidance and Minimization Efforts

- BIO-1: Prior to the start of construction activities, the limits of construction will be clearly marked and sensitive or regulated habitats within the Project limits will be marked with high visibility fencing or staking to ensure construction will not further encroach into waters or sensitive habitats. These areas will be marked on the Project plans. A qualified biologist will periodically inspect the Project area to ensure ESAs remain undisturbed.

- BIO-10: Project activities that could result in nesting migratory bird and raptor take, such as removal of the existing bridge, tree, shrub, grassland, and other vegetation removal, will be conducted outside the migratory bird and raptor nesting season (typically February 15th through September 15th). September 16th through February 14th is a suitable timeframe for completing vegetation removal to minimize the potential to impact nesting birds and raptors. If Project construction, including vegetation removal and bridge removal, will occur during the nesting season, the Project proponent will hire a qualified biologist to conduct a nesting bird and raptor survey no more than 14 days prior to the beginning of construction activities. A copy of the survey shall be submitted to CDFW prior to the start of construction activities. If nesting birds or raptors are detected within or near the Project area during the nesting bird survey, the Project proponent will coordinate with CDFW to establish a suitable activity-free buffer around active nest sites. The size of the buffer, duration of buffer, acceptable activities, etc. will be established through coordination with CDFW.

- BIO-11: During the appropriate survey periods (June 1 to June 14, June 15 to June 25, and June 26 to July 15), and no more than two weeks prior to construction and vegetation removal, a qualified biologist will conduct protocol-level surveys for willow flycatcher to determine occupancy and nesting status in suitable habitat within a 100-foot buffer of the Project area. If an active willow flycatcher nest is discovered, a 100-foot activity-free buffer will be established around the nest site. Results of the willow flycatcher surveys will be provided to CDFW and TRPA.

Additional avoidance and minimization measures may also be required by Project's TRPA permit and LSAA.

Willow Flycatcher Compensatory Mitigation

Since the Project is not anticipated to effect willow flycatcher and avoidance measures will be followed, no compensatory mitigation is anticipated.

Willow Flycatcher Cumulative Impacts

This Project is not anticipated to result in additional actions or effects that would be added to or could interact with the effects from other actions at this location or at this time; therefore, no cumulative impacts are anticipated.

Discussion of California Spotted Owl

The California spotted owl is a proposed threatened species under the FESA, a USFS sensitive species, a CDFW species of special concern, and a TRPA special interest species. They rely on mature, multi-layered, complex, high canopy cover forests with coarse woody debris, such as fallen dead trees and large branches, for foraging, roosting, and nesting. California spotted owl nesting and fledging activity lasts from mid-February to mid-September, and they typically have one nest per year. Most of their time is spent in activity centers which are approximately 299 acres of habitat in a territory where individuals nest, roost, and forage. Mechanical thinning for fuel reduction and forest management may increase long-term habitat resiliency and prevent stand-replacing fires; however, California spotted owl occupancy, reproduction, and foraging is negatively correlated with thinned forest habitat as a result of reduced canopy cover and mammalian prey species habitat (USFWS 2023c).

California Spotted Owl Survey Results

There may be suitable habitat for this species in the southeastern sections of the BSA, but the Project area and BSA primarily contain low-quality habitat for California spotted owl foraging and nesting because of fuel reduction/forest thinning and residential development surrounding the site, which breaks up contiguous habitat required for suitable activity centers. The closest TRPA/LTBMU California spotted owl protected activity centers are 1.5-miles southeast of the BSA (on the opposite side of Pioneer Trail and Trout Creek) and 2 miles west of the BSA (Fallen Leaf Lake), which is outside the distance for any Project-related auditory impacts.

California Spotted Owl Project Impacts

Considering the lack of mature, complex, contiguous forest habitat, and lack of occurrence data in the BSA, California spotted owl is not anticipated to nest in the vicinity or occur in the Project area during construction. Therefore, the Project will have **no effect** on California spotted owl.

California Spotted Owl Avoidance and Minimization Efforts

The Project area is located outside of California spotted owl protected activity centers. No avoidance and minimization measures are proposed for California spotted owl since the species is not likely to nest or occur in the Project area and will not be impacted by the Project. Avoidance and minimization measures for California spotted owl may be required by the Project's TRPA permit or LSAA.

California Spotted Owl Compensatory Mitigation

Since the Project will not impact California spotted owl, no compensatory mitigation is anticipated.

California Spotted Owl Cumulative Impacts

This Project is not anticipated to result in additional actions or effects that would be added to or could interact with the effects from other actions at this location or at this time; therefore, no cumulative impacts are anticipated.

Discussion of Lahontan Mountain Sucker

The Lahontan mountain sucker is a CDFW species of special concern that prefers shallow (less than 2 meters), clear, low-gradient streams in the Lahontan basin associated with pools and diverse substrates from sand to boulders in areas with dense cover, macrophytes, logs, and undercut banks. May also be found in larger, more turbid rivers and smaller lakes and reservoirs, but not large lakes such as Tahoe, Eagle, or Pyramid lakes. Lahontan mountain suckers spawn between June and early August in the rifles of small streams. Fertilized eggs attach to stream substrates and juveniles move into stream margins with beds of aquatic algae associated with pools. They were once abundant in the Upper Truckee River but are now infrequently found (CDFW 2015).

Lahontan Mountain Sucker Survey Results

During the reconnaissance-level survey, it was determined suitable habitat for Lahontan mountain sucker is present in the Project area considering the characteristics of the Upper Truckee River including the shallow, clear water, low-gradient flow, pools, riffles, substrate, and undercut banks. Also, a sucker (*Catostomus* sp.) was observed during the reconnaissance-level survey. The individual was briefly observed in a pool along the riverbank before retreating into an undercut on the bank. The individual was unable to be relocated for capture and proper identification but is thought to have been a *Catostomus* sp. based on its size (10-15 centimeters in length), subterminal mouth, and fin arrangements. CNDDB documents many occurrences of Lahontan mountain suckers from e-fishing efforts in 2005 and 2011 downstream of the Highway 50 crossing and the lower 6 miles of the Upper Truckee River, north of the Project area.

Lahontan Mountain Sucker Project Impacts

The Project area contains suitable habitat for the species, CNDDB occurrences, and a *Catostomus* sp. was observed during the reconnaissance-level survey. Therefore, Lahontan mountain sucker has potential to occur during construction and the Project has potential to impact the species during removal of the existing bridge with the use of heavy equipment, changes to water quality and turbidity, and the use of BMPs such as turbidity curtains or downstream screens for debris capture.

Lahontan Mountain Sucker Avoidance and Minimization Efforts

- BIO-1: Prior to the start of construction activities, the limits of construction will be clearly marked and sensitive or regulated habitats within the Project limits will be marked with high visibility fencing or staking to ensure construction will not further encroach into waters or sensitive habitats. These areas will be marked on the Project plans. A qualified biologist will periodically inspect the Project area to ensure ESAs remain undisturbed.

- BIO-3: BMPs used in the Upper Truckee River will be installed with consideration for fish passage. Turbidity curtains or downstream screens will be installed in a manner that allows for the passage of fish beneath or around the BMP. BMPs will consist of materials that prevent fish and other wildlife from becoming entangled, trapped, or otherwise harmed. BMPs used in the river will be approved for use by CDFW and USFWS and inspected daily by a qualified biologist.

- BIO-7: A qualified biologist shall conduct environmental awareness training for all construction personnel. The training shall include identification of special-status species, required practices before the start of construction, general measures that are being implemented to conserve the species as they relate to the Project, penalties for non-

compliance, and boundaries of work and of the permitted disturbance zones. Supporting materials containing training information shall be prepared and distributed. Upon completion of training, all construction personnel shall sign a form stating that they have attended the training and understand all the measures. Proof of this instruction shall be kept on file with the Project proponent. The Project proponent shall provide the USFWS and CDFW with a copy of the training materials and copies of the signed forms indicating that training has been completed. If new construction personnel are added to the site, the crew foreman shall ensure that the personnel receive the mandatory training before starting work. Copies of signed forms shall be submitted monthly as additional training occurs for new employees. The crew foreman is responsible for ensuring that construction personnel adhere to the guidelines and restrictions.

- BIO-8: Immediately prior to installation of the coffer dam system around the bridge removal work area, a qualified biologist will conduct a fish survey to ensure LCT, mountain whitefish, and Lahontan mountain sucker are absent in the Project area. The biologist will remain onsite and monitor installation of the coffer dam and will have authority to stop any Project activity that may impact LCT or other special status fish species detected in the Project area. The biologist will then survey ponded water within the contained work area following completion of the coffer dam installation to ensure fish are absent. If fish are found in the ponded water, they will be relocated to the river side of the coffer dam structure by the biologist. If LCT are found in the ponded area, the coffer dam system will be reopened to allow the LCT to leave on its own accord. No LCT will be handled or relocated. The qualified biologist will also perform daily inspections of the coffer dam and any other BMPs, such as the downstream turbidity curtain, to ensure they are properly installed, in good condition, cannot trap or otherwise harm fish, and do not block fish passage. If ponded water will be pumped from the contained bridge removal work area, intake screens will be used to prevent fish take and a qualified biologist will be onsite to relocate fish to the river side of the coffer dam structure. After bridge construction/demolition, the qualified biologist will monitor the removal of the coffer dam and other BMPs. Consultation with the USFWS and/or CDFW will be re-initiated if take is exceeded or the Project action changes.

Additional avoidance and minimization measures for Lahontan mountain sucker may be required by the Project's LSAA.

Lahontan Mountain Sucker Compensatory Mitigation

Since the Project will avoid impacts to Lahontan mountain sucker by following avoidance and minimization measures, no compensatory mitigation is anticipated.

Lahontan Mountain Sucker Cumulative Impacts

This Project is not anticipated to result in additional actions or effects that would be added to or could interact with the effects from other actions at this location or at this time; therefore, no cumulative impacts are anticipated.

Discussion of Mountain Whitefish

The mountain whitefish is a CDFW species of special concern that prefers cold mountain lakes (to depths of at least 10 meters) and fast, clear or silty streams with large pools. Stream populations spawn in riffles over gravel and small rubble. Lake populations move into tributaries in October and breeding occurs in fall from November to December, but they may also seek gravel shallows in lakes. For the Lake Tahoe population, large numbers of fish migrate up

tributaries to spawn mid-October and migration lasts about two weeks (Snyder 1917). Eggs take approximately 5 months to hatch when water temperatures rise above 35 degrees Fahrenheit (NatureServe 2023b). The mountain whitefish is one of the most abundant native fish in western North America (Lance and Baxter 2011).

Mountain Whitefish Survey Results

No mountain whitefish were observed during the reconnaissance-level survey; however, the reconnaissance-level survey was conducted prior to the October migration period when the species moves up tributaries of Lake Tahoe, such as the Upper Truckee River. Suitable habitat was determined to be present in the Project area considering the presence of pools, riffles, and gravely substrates in the Upper Truckee River and connectivity to Lake Tahoe. CNDDB documents occurrences from 2011 e-fishing efforts in the lower 6 miles of the Upper Truckee River downstream (north) of the Project area.

Mountain Whitefish Project Impacts

The Project has potential to impact mountain whitefish during removal of the existing bridge with the use of heavy equipment, changes to water quality and turbidity, and the use of BMPs such as turbidity curtains or downstream screens for debris capture.

Mountain Whitefish Avoidance and Minimization Efforts

- BIO-1: Prior to the start of construction activities, the limits of construction will be clearly marked and sensitive or regulated habitats within the Project limits will be marked with high visibility fencing or staking to ensure construction will not further encroach into waters or sensitive habitats. These areas will be marked on the Project plans. A qualified biologist will periodically inspect the Project area to ensure ESAs remain undisturbed.

- BIO-3: BMPs used in the Upper Truckee River will be installed with consideration for fish passage. Turbidity curtains or downstream screens will be installed in a manner that allows for the passage of fish beneath or around the BMP. BMPs will consist of materials that prevent fish and other wildlife from becoming entangled, trapped, or otherwise harmed. BMPs used in the river will be approved for use by CDFW and USFWS and inspected daily by a qualified biologist.

- BIO-7: A qualified biologist shall conduct environmental awareness training for all construction personnel. The training shall include identification of special-status species, required practices before the start of construction, general measures that are being implemented to conserve the species as they relate to the Project, penalties for non-compliance, and boundaries of work and of the permitted disturbance zones. Supporting materials containing training information shall be prepared and distributed. Upon completion of training, all construction personnel shall sign a form stating that they have attended the training and understand all the measures. Proof of this instruction shall be kept on file with the Project proponent. The Project proponent shall provide the USFWS and CDFW with a copy of the training materials and copies of the signed forms indicating that training has been completed. If new construction personnel are added to the site, the crew foreman shall ensure that the personnel receive the mandatory training before starting work. Copies of signed forms shall be submitted monthly as additional training occurs for new employees. The crew foreman is responsible for ensuring that construction personnel adhere to the guidelines and restrictions.

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Additional avoidance and minimization measures for mountain whitefish may be required by the Project's LSAA.

Mountain Whitefish Compensatory Mitigation

Since the Project will avoid impacts to mountain whitefish by following avoidance and minimization measures, no compensatory mitigation is anticipated.

Mountain Whitefish Cumulative Impacts

This Project is not anticipated to result in additional actions or effects that would be added to or could interact with the effects from other actions at this location or at this time; therefore, no cumulative impacts are anticipated.

Discussion of Migratory Nesting Birds

Nesting birds are protected in California under the State Fish and Game Code in Section 3503. Section 3503 states, "It is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto." Nesting migratory birds are also federally protected under the MBTA (50 CFR Part 10 and Part 21) which protects migratory birds, their occupied nests, and their eggs from disturbance and/or destruction.

Birds of prey are protected in California under provisions of the State Fish and Game Code, Section 3503.5, which states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." Construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered "taking" by the CDFW.

Migratory Nesting Birds Survey Results

Numerous barn swallow/stick nests were observed under the damaged bridge. The nests were inactive during the survey; however, barn swallow juveniles and family groups were observed around the bridge indicating these nests were previously active this season. Various habitats in the Project area including mature conifer forest, sagebrush, aspen groves, chaparral, wet meadow, willow shrub, and grassland also provide suitable habitat for nesting birds.

Migratory Nesting Birds Project Impacts

The Project has potential to impact nesting birds during vegetation removal, during removal of the existing bridge, or by disturbing nesting individuals with construction related noise.

Migratory Nesting Birds Avoidance and Minimization Efforts

- BIO-10: Project activities that could result in nesting migratory bird and raptor take, such as removal of the existing bridge, tree, shrub, grassland, and other vegetation removal, will be conducted outside the migratory bird and raptor nesting season (typically February 15th through September 15th). September 16th through February 14th is a suitable timeframe for completing vegetation removal to minimize the potential to impact nesting birds and raptors. If Project construction, including vegetation removal and bridge removal, will occur during the nesting season, the Project proponent will hire a qualified biologist to conduct a nesting bird and raptor survey no more than 14 days prior to the beginning of construction activities. A copy of the survey shall be submitted to CDFW prior to the start of construction activities. If nesting birds or raptors are detected within or near the Project area during the nesting bird survey, the Project proponent will coordinate with CDFW to establish a suitable activity-free buffer around active nest sites. The size of the buffer, duration of buffer, acceptable activities, etc. will be established through coordination with CDFW.

Additional avoidance and minimization measures for nesting birds may be required by the Project's LSAA and TRPA permit.

Migratory Nesting Birds Compensatory Mitigation

The Project will avoid impacts to nesting birds by following avoidance and minimization measure BIO-10; therefore, no compensatory mitigation is anticipated.

Migratory Nesting Birds Cumulative Impacts

This Project is not anticipated to result in additional actions or effects that would be added to or could interact with the effects from other actions at this location or at this time; therefore, no cumulative impacts are anticipated.

Discussion of Bats

Numerous bat species listed as sensitive by the LTBMU and as species of special concern by CDFW have been uncommonly documented in the Lake Tahoe basin over the past two decades. These species include pallid bat (*Antrozous pallidus*), western red bat (*Lasiurus blossevilliiare*), fringed myotis (*Myotis thysanodes*) and Townsend's big-eared bat (*Corynorhinus townsendii*). Life history, preferred habitats, roost structures, and hibernacula are variable among bat species, but in general, habitat suitable for bats include crevices, peeling bark on trees, snags, rock outcrops, cavities, bridges, buildings, mines, etc., that may provide shelter for roosting, hibernation, or maternal colonies.

Bat Survey Results

While no bat species were identified in the BSA or Project area by the database searches or during the reconnaissance-level survey, the existing damaged bridge, snags, and trees throughout the Project area provide suitable bat roosting habitat (**Appendix A, Figure 8**). The reconnaissance-level survey was conducted during the day which allowed for the evaluation of potential roosting features and suitable habitat. Evening pre-construction surveys, discussed in the avoidance and minimization measures below, are recommended to evaluate bat occupancy in the Project area and roosting habitats.

Project Impacts to Bats

The Project has potential to impact bats during removal of snags, trees, or the existing damaged bridge. Project activity near occupied roost sites may also disturb roosting individuals or colonies with construction related noise.

Bat Avoidance and Minimization Efforts

- BIO-12: At least 14 days prior to removal or modification of snags, trees, the existing bridge, or other features that may provide roosting habitat for bats, a qualified biologist will conduct a pre-construction survey to determine the presence or absence of bats and roosts. Results of the survey will be provided to the Project proponent. If bats or signs indicating past or present roosting are found, the Project proponent will report the bat observation or roost to CDFW and will delay removal until the roost can be confirmed unoccupied. The Project proponent will coordinate with CDFW to determine an appropriate activity-free buffer area around occupied roosts in the Project area.

- BIO-13: To ensure that bats have left potential roosting trees, trees shall be removed over the course of two days. On the first day, limbs from the identified trees shall be removed in the late afternoon. This disturbance should cause potentially roosting bats to seek other roosts during their nighttime foraging. The remainder of the tree can then be removed on the second day as late in the afternoon as feasible. If bats are found injured, or if bat mortality occurs during the course of tree removal, the project proponent shall immediately notify CDFW of the event, the species recorded, and the number of individuals documented. Tree limbing or removal shall not be performed under any of the following conditions: during any precipitation events, when ambient temperatures are below 4.5 degrees Celsius, when windspeeds exceed 11 miles per hour, and/or any other condition which may lead to bats seeking refuge.

Additional avoidance and minimization efforts for bats may be required by the Projects LSAA or following LTBMU review of the Project.

Bat Compensatory Mitigation

Impacts to bats will be prevented by following avoidance and minimization measures BIO-12 and BIO-13; therefore, no compensatory mitigation is anticipated.

Bat Cumulative Impacts

This Project is not anticipated to result in additional actions or effects that would be added to or could interact with the effects from other actions at this location or at this time; therefore, no cumulative impacts are anticipated.

Chapter 5 – Conclusions and Regulatory Determinations

Federal Endangered Species Act Consultation Summary

The Project is located outside of NOAA Fisheries jurisdiction; therefore, a NOAA Fisheries species list is not required and no effects to NOAA Fisheries species are anticipated. A USFWS IPaC species list was acquired for the project on December 1, 2023 (**Appendix C**). According to this list, federally listed species that may occur in the BSA include:

- SNYLF – Endangered
- LCT – Threatened
- Monarch butterfly – Candidate
- North American wolverine – Proposed Threatened
- Sierra Nevada red fox – Endangered
- California spotted owl – Proposed Threatened

A SNYLF VES was conducted on August 16, 2023, and a site assessment report was prepared to evaluate habitat, determine presence or absence of SNYLF, and assess potential project impacts. No SNYLF were detected during the VES and reconnaissance-level field survey of the Project area. The BSA is within the species' historic range, but there is no critical habitat associated with the Project. The Project is located within LTBMU-mapped SNYLF suitable habitat, and suitable habitat was confirmed during the reconnaissance-level survey. However, predatory native and non-native aquatic species including brown trout and crayfish reduce potential for SNYLF to occur in the Project area, and there have been no documented occurrences of the species occurring in the BSA. Restocking efforts for LCT in the Upper Truckee River further reduce likelihood for SNYLF, as SNYLF are adapted to environments without the pressures of predatory native and non-native trout species. SNYLF habitat in the BSA and Johnson Meadow has likely been degraded by the general channelization of the river, reduction of backwater pools, and previous land use over the past century. The closest extant populations are located within the high-altitude Desolation Wilderness critical habitat area west of the BSA. Considering the lack of occurrence data in the BSA, Project area habitat conditions, and the avoidance and minimization measures (pre-construction SNYLF VES/SSS surveys) that will be followed, **the Project may affect, but is not likely to adversely affect SNYLF**.

No LCT were detected during the reconnaissance-level field survey of the Project area. The BSA is within the species' historic range, but the USFWS has not assigned critical habitat to the species. However, the Upper Truckee River is recognized by the USFWS as suitable habitat for LCT, and there have been rigorous restocking and restoration efforts in the Upper Truckee River and Lake Tahoe over the past few years by various agencies. The Upper Truckee River/Meiss Meadow recovery population is the only LCT population in the Truckee watershed identified by the USFWS as resilient in the most recent 5-year species review. Although there is a low likelihood of LCT to occur in the Project area because of barriers to fish passage between the Meiss Meadow recovery population, LCT can make their way upstream to the Project area from Lake Tahoe (USFS 2011). Because of the potential for occurrence, it was determined **the Project may affect, but is not likely to adversely affect LCT**. The Project will involve a suite

of rigorous erosion and sediment control BMPs to protect potential downstream LCT and water quality for compliance with the project's Storm Water Pollution Prevention Plan and anticipated rigorous permit requirements. BMPs placed in the Upper Truckee River, such as turbidity curtains or downstream screens, will be designed and implemented with consideration for potential impacts to LCT and other SSS.

The monarch butterfly is listed as a federal candidate species. Candidate species receive no statutory protection under the FESA. The USFWS encourages cooperative conservation efforts for these species because they are, by definition, species that may warrant future protection under the FESA. No monarch butterflies were observed during the reconnaissance-level field survey, no milkweed (*Asclepias* spp.) host plants were observed, and overwintering habitat is not present. Considering the lack of host plants and overwintering habitat, the species is unlikely to occur and **the Project will have no effect on monarch butterfly**.

The North American wolverine occupies a variety of habitats across North America including tundra, boreal forest, mixed forest, redwood forest, and coniferous forest. The best available information suggests the species ecological needs include large territories in relatively inaccessible landscapes at high elevation (5,906 to 11,483 feet), access to a variety of food resources that vary with seasons, and physical features such as talus slopes and rugged terrain linked to reproductive behavioral patterns and denning. Dens are well-camouflaged, located in difficult to access areas, and avoid areas of human development or disturbance. Currently, there is only one known wolverine in California which dispersed from the Rocky Mountain range and now resides in the Sierra Nevada (USFWS 2018). Considering the species' habitat requirements, lack of nearby denning habitat, reconnaissance-level survey outcomes, and overall rarity of the species in the Sierra Nevada, **the Project will have no effect on North American wolverine**. There is no critical habitat for this species associated with the Project.

The current range of the Sierra Nevada red fox (Sierra Nevada distinct population segment) and high-quality habitat, as recognized by the USFWS at the time of listing in 2021, is limited to the Sierra crest south of California State Highway 88 to a few miles north of King's Canyon National Park. Habitats typically utilized include high-elevation meadows, rocky areas, scrub, and woodlands of mountain hemlock (*Tsuga mertensiana*), whitebark pine (*Pinus albicaulus*) and lodgepole pine (Fites-Kaufman *et al.* 2007, Sacks *et al*. 2015, Quinn 2017). The Sierra Nevada distinct population segment is a single population of less than 50 known individuals. The USFWS has not designated critical habitat for the species. While habitats in the Project area may fit suitable habitat descriptions for the species, the Sierra Nevada red fox tends to prefer higher elevations of the Sierra Nevada (8,100 to 11,608 feet) (USFWS 2021). Considering the species' elevational preferences, currently known range, Project location, overall rarity, occurrence data, and reconnaissance-level survey outcomes, **the Project will have no effect on Sierra Nevada red fox**.

The California spotted owl Sierra Nevada distinct population segment is currently listed as threatened under the USFWS' February 23, 2023, proposed rule. California spotted owls rely on mature, multi-layered, complex, high canopy cover forests with coarse woody debris, such as fallen dead trees and large branches, for foraging, roosting, and nesting (USFWS 2023c). There may be suitable habitat for this species in the southeastern sections of the BSA, but the Project area and BSA primarily contain low-quality habitat for California spotted owl foraging, nesting, and roosting as a result of fuel reduction activities and forest thinning surrounding the urban environment. The closest TRPA/LTBMU California spotted owl protected activity centers are 1.5-miles southeast of the BSA (on the opposite side of Pioneer Trail and Trout Creek) and two miles west of the BSA (Fallen Leaf Lake), which is outside the distance for any auditory impacts.

Considering the lack of mature, complex forest habitat and occurrence data in the BSA, California spotted owl is not anticipated to occur or be impacted by the Project. Therefore, **the Project will have no effect on California spotted owl.**

The County, in coordination with Caltrans, proposes to initiate Informal Consultation with the USFWS under Section 7 of the FESA for the proposed Project.

Essential Fish Habitat Consultation Summary

The Project is located outside of NOAA Fisheries jurisdiction; therefore, a NOAA Fisheries species list is not required, there is no essential fish habitat present in the Project area, and no effects to NOAA Fisheries species are anticipated.

California Endangered Species Act Consultation Summary

One state-listed species, the willow flycatcher, is historically known to occur in the BSA along the Upper Truckee River and Trout Creek. During the reconnaissance-level survey no willow flycatchers or *Empidonax* spp. were observed; however, the August 14, 2023, reconnaissance-level survey is considered late for willow flycatcher detections. By this time, singing rates decline and the species begins migration to Central and South America. It was determined suitable willow flycatcher habitat is available in the BSA and Project area in the willow dominated riparian and meadow areas associated with the Upper Truckee River corridor. There are no CNDDB occurrences of willow flycatcher along the Upper Truckee River, but egg collections are documented in the early and mid-1900's along Trout Creek in the BSA. Patches of suitable habitat for willow flycatcher are mapped by TRPA and LTBMU 0.2 and 0.5-miles south of the BSA adjacent to the Lake Tahoe Airport.

Considering the lack of recently documented occurrences in the BSA, it is unlikely a willow flycatcher will occur in the Project area; however, the presence of suitable habitat warrants pre-construction surveys. It is assumed the Project's TRPA permit and LSAA will require pre-construction nesting bird surveys and potential protocol-level surveys for willow flycatcher. If a willow flycatcher is detected during the pre-construction or protocol-level surveys, or during construction, Project activities will cease and consultation with CDFW will be reinitiated.

Wetlands and Other Waters Coordination Summary

An aquatic resources delineation was conducted within the Project area and a total of 2.81 acres of aquatic resources were delineated (**Appendix A, Figure 9**). This includes 0.36 acres of riverine (Upper Truckee River), 1.39 acres of freshwater forested/shrub wetlands, and 1.06 acres of freshwater emergent wetlands. There are no other drainages or other proposed federally jurisdictional WOUS or waters of the State in the Project area. The Aquatic Resources Delineation Report will be submitted to the USACE for a Jurisdictional Determination. NCE is requesting that a USACE Preliminary Jurisdictional Determination be provided for this project.

The Project will result in approximately 0.15 acres of permanent impacts to freshwater emergent wetlands, 0.16 acres of permanent impacts to freshwater forested/shrub wetlands, and 0.02 acres of permanent impacts to the Upper Truckee River resulting from the bridge and boardwalk construction. In addition, construction of the boardwalk, bridge, and the removal of the existing bridge will result in 0.23 acres of temporary impacts to freshwater emergent wetlands, 0.25 acres of temporary impacts to freshwater forested/shrub wetlands, and 0.02 acres of temporary impacts to the Upper Truckee River. The total permanent impact to wetlands is 0.33 acres, and the total temporary impact to wetlands is 0.5 acres.

The Upper Truckee River is hydrologically connected to downgradient Lake Tahoe and the Truckee River, which are traditional navigable waterways. Because the Project will result in temporary and permanent impacts to the Upper Truckee River and a significant nexus existing between the Upper Truckee River and Lake Tahoe, a traditional navigable waterway, a Section 404 permit will be required from the USACE.

Due to the potential to impact waters of the State of California, an Application for CWA Section 401 Water Quality Certification and/or Waste Discharge Requirements for Projects Involving Discharge of Dredged and/or Fill Material to WOUS and/or Waters of the State application will be completed and submitted to the RWQCB. The Project will also require a Section 1602 LSAA with CDFW.

Invasive Species

For the purposes of this report, invasive species are non-native plants and wildlife which are listed by the ISCC, plants designated as “noxious” by the USDA or the CDFA, plants listed on the Cal-IPC Invasive Plant Inventory, and priority terrestrial invasive weeds listed by the LTBWCG. The reconnaissance-level field survey resulted in ten non-native plant detections. Of these species, prickly lettuce is listed by the ISCC and cheatgrass is a LTBWCG “weed of interest” and has a Cal-IPC rating of “high”. The following best management practices will be implemented to prevent the spread of invasive species during project activities:

- All hay, straw, hay bales, straw bales, seed, mulch, or other material used for erosion control or landscaping shall be free of noxious weed seeds and propagules. Noxious weeds are defined in Title 3, Division 4, Chapter 6, Section 4500 of the California Code of Regulations, and the California Quarantine Policy – Weeds.

- All equipment brought to the Project site for construction shall be thoroughly cleaned of all dirt and vegetation prior to mobilization to prevent the introduction of invasive species from other locations.

- All materials brought to the Project site, including rock, gravel, road base, sand, backfill, topsoil, etc. shall be free of invasive seeds and propagules.

- The property owner shall maintain and implement an effective program for the monitoring and control of invasive species.

- Any landscaping proposed as part of the Project will be designed and implemented in conformance with local landscape standards and practices.

Other

Senate Bill 857 Section 156 requires that Caltrans submits an assessment of potential barriers to fish passage to CDFW. During the reconnaissance-level survey it was determined the existing bridge partially obstructs fish passage in the Project area, as the Upper Truckee River has washed out the west footing and now outflanks the bridge. Sediment and woody debris accumulation on the upstream (south) side of the existing bridge impede passage between the bridge piers (**Appendix C, Photograph 2**). The Project intends to replace the damaged bridge with a bridge that entirely spans the Upper Truckee River, which will improve fish passage, bank stabilization, and prevent potential fish passage obstructions in the future.

Chapter 6 – References

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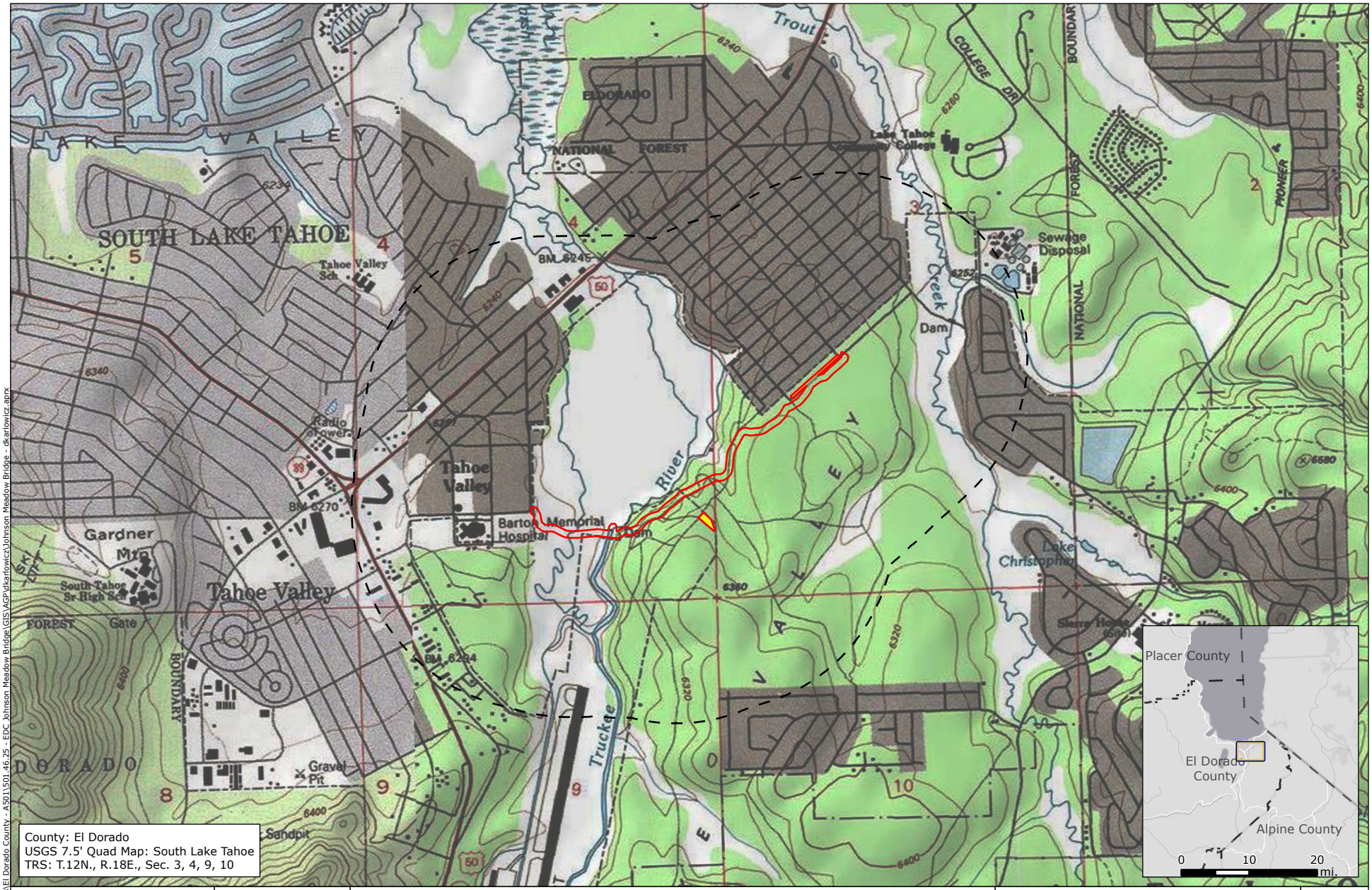
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Appendix A - Figures



County: El Dorado
USGS 7.5' Quad Map: South Lake Tahoe
TRS: T.12N., R.18E., Sec. 3, 4, 9, 10

Legend

- Project Area
- Staging Area
- Biological Study Area

NCE

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow

Project and Biological Study Area Location Map

N

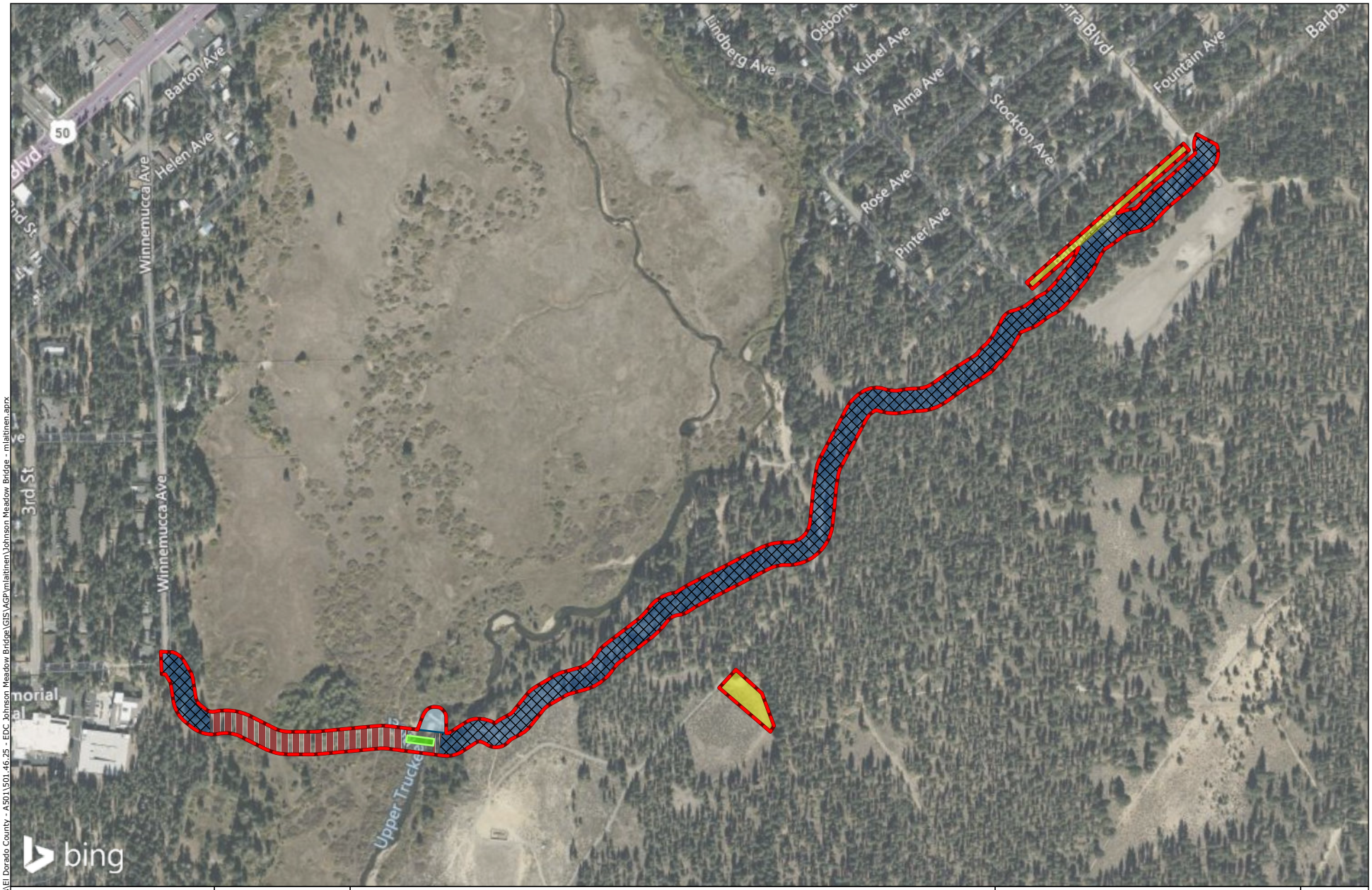
1 : 24,000

0 1,000 2,000 ft.

FIGURE 1

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
ESRI USGS Topo Maps, El Dorado County, NCE	501.46.25	mlaitinen/dkarlowicz	10/4/2023	-	drios

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Project Area
Class 1 Shared Used Path
Boardwalk
New Bridge
Bridge Removal
Staging Area

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow

Project Area Detail Map

N

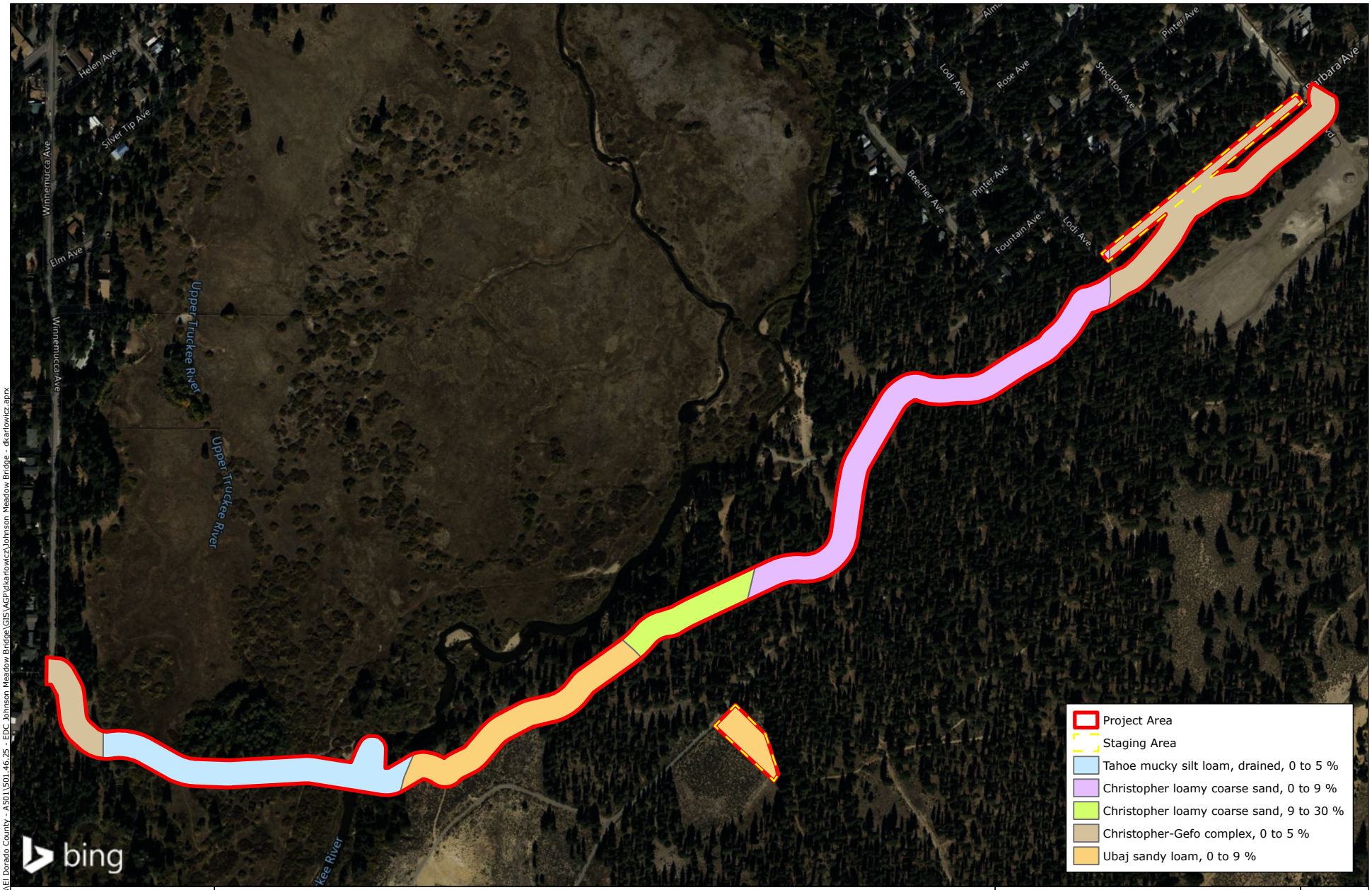
1 in. = 600 ft.

0 600 ft.

FIGURE 2

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Basemap	501.46.25	mlaitinen	5/25/2023	-	jhall

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NCE

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow
USDA Natural Resources Conservation Service (NRCS) Soils Map

N

1 in. = 500 ft.

0 500 ft.

FIGURE 3

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Basemap, El Dorado County, NCE, NRCS	501.46.25	dkarlowicz	10/4/2023	-	drios

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Project Area
Staging Area
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Riverine

NCE

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow
National Wetland Inventory (NWI) Map

N

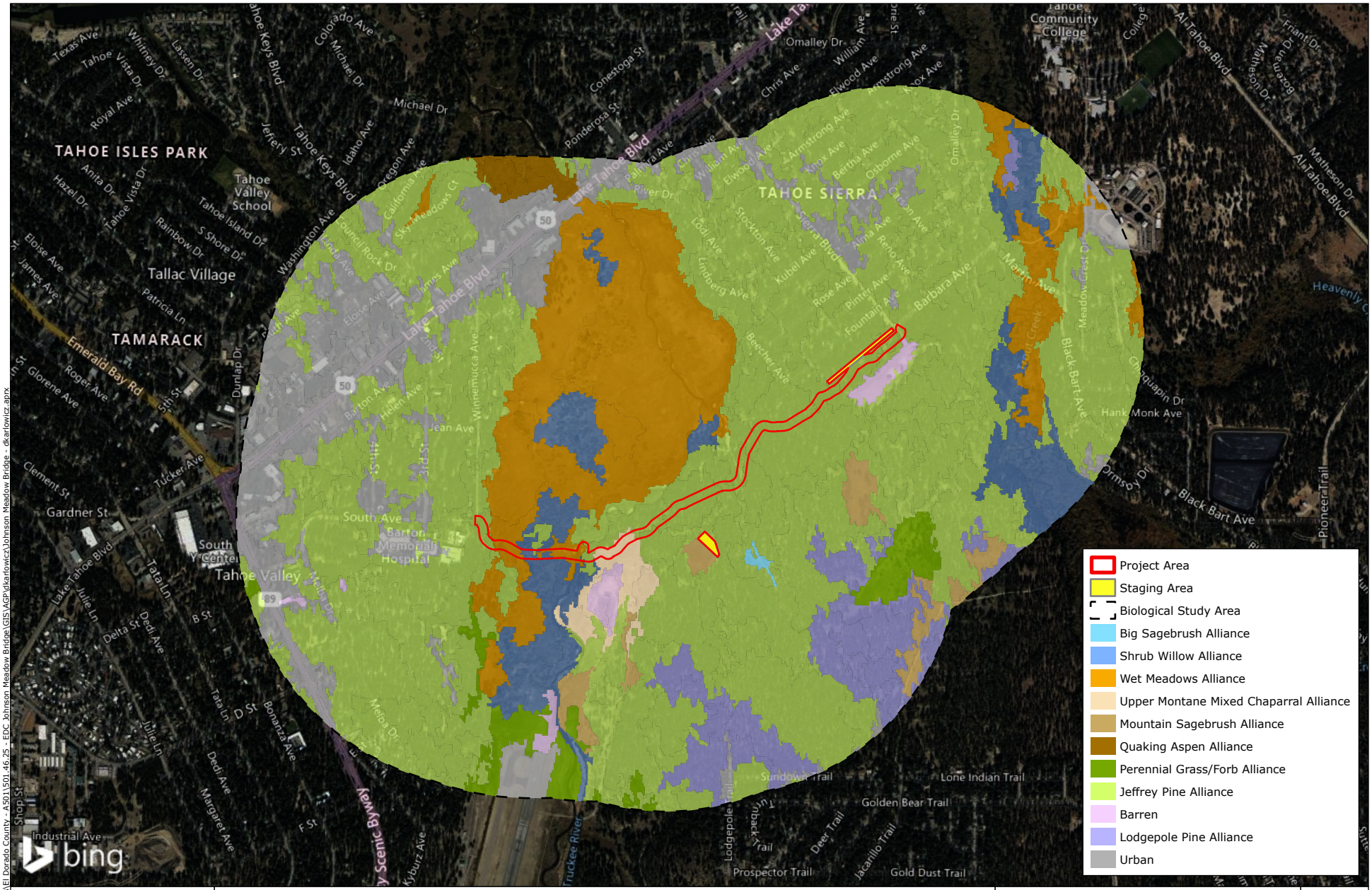
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0 250 500 ft.

FIGURE 4

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Basemap, El Dorado County, NCE, NWI	501.46.25	dkarlowicz	10/4/2023	-	drios

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South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow
Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG) Map

N

1 in. = 1,500 ft.

0 1,500 ft.

FIGURE 5

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Basemap, El Dorado County, NCE, CALVEG	501.46.25	dkarlowicz	9/12/2023	-	drios

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Project Area
Staging Area
Biological Study Area
TRPA NOGO[1] Threshold Habitat
LTBMU SNYLF[2] Suitable Habitat

[1]NOGO = Northern goshawk
[2]SNYLF = Sierra Nevada yellow-legged frog

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow
Lake Tahoe Basin Management Unit (LTMBU) and
Tahoe Regional Planning Agency (TRPA) Biological Resources

N

1 in. = 1,500 ft.

0 1,500 ft.

FIGURE 6

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Basemap, El Dorado County, NCE, LTBMU, TRPA	501.46.25	dkarlowicz	9/8/2023	-	drios

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NCE

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow
California Natural Diversity Database (CNDDB) Map

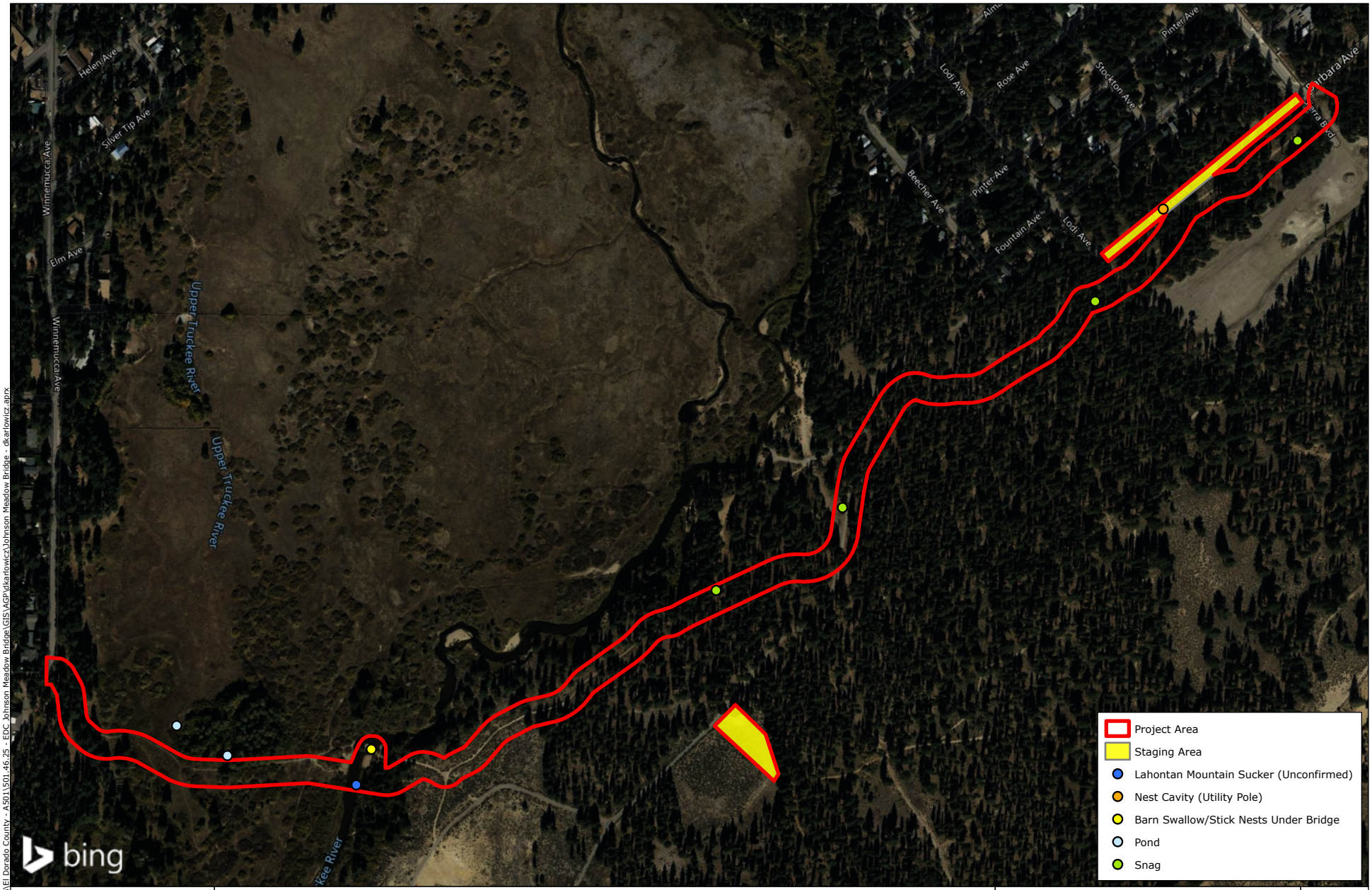
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1 in. = 1,500 ft.

0 1,500 ft.

FIGURE 7

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Basemap, NCE, El Dorado County, CNDDB	501.46.25	dkarlowicz	10/4/2023	-	drios



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NCE

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow
Reconnaissance-level Survey Observations

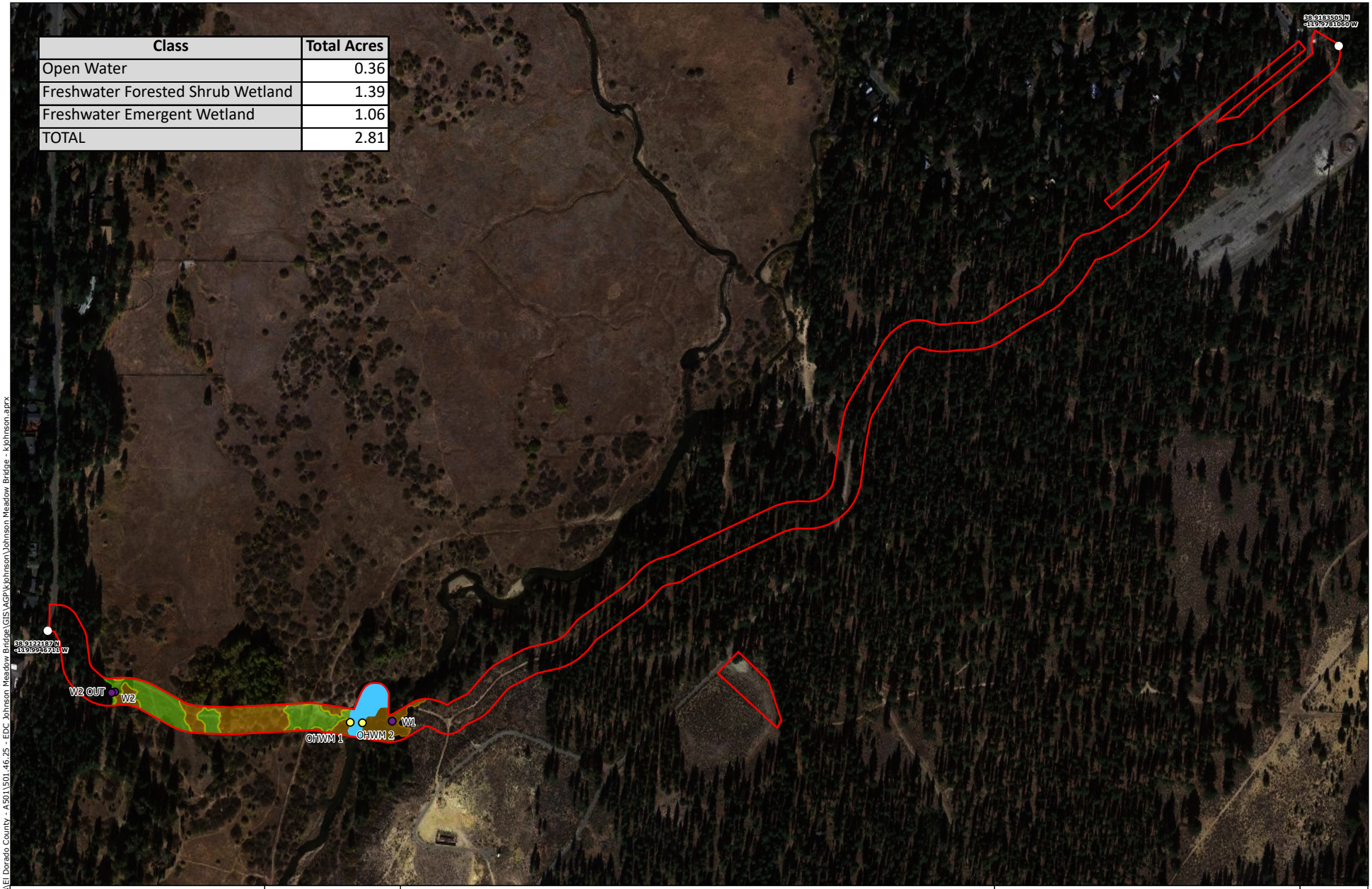
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1 in. = 500 ft.

0 500 ft.

FIGURE 8

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Basemap, El Dorado County, NCE	501.46.25	dkarlowicz	10/5/2023	-	drios



Class	Total Acres
Open Water	0.36
Freshwater Forested Shrub Wetland	1.39
Freshwater Emergent Wetland	1.06
TOTAL	2.81

- Survey Area
- Open Water
- Freshwater Forested Shrub Wetland
- Freshwater Emergent Wetland
- OHWM
- Soil Pit (W1, W2, W2 out)

NCE

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow
Proposed Delineation Map

N

1 in. = 500 ft.

0 250 500 ft.

FIGURE 9

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Google Satellite, NCE, El Dorado County	501.46.25	kjohnson	10/04/2023	-	drios

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Appendix B – USFWS IPaC Report

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Reno Fish And Wildlife Office
1340 Financial Boulevard, Suite 234
Reno, NV 89502-7147
Phone: (775) 861-6300 Fax: (775) 861-6301

In Reply Refer To: December 01, 2023
Project Code: 2024-0022020
Project Name: South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow NES

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through IPaC by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see Migratory Bird Permit | What We Do | U.S. Fish & Wildlife Service (fws.gov).

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

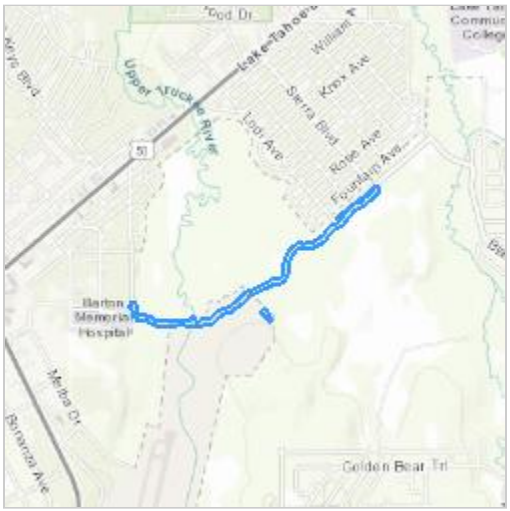
This species list is provided by:

Reno Fish And Wildlife Office
1340 Financial Boulevard, Suite 234
Reno, NV 89502-7147
(775) 861-6300

PROJECT SUMMARY

Project Code: 2024-0022020
Project Name: South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow NES
Project Type: Bridge - Replacement
Project Description: South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow NES
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.9149375,-119.98397206144458,14z



Counties: El Dorado County, California

ENDANGERED SPECIES ACT SPECIES

There is a total of 6 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
North American Wolverine *Gulo gulo luscus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5123	Threatened
Sierra Nevada Red Fox *Vulpes vulpes necator* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4252	Endangered

BIRDS

NAME	STATUS
California Spotted Owl *Strix occidentalis occidentalis* Population: Sierra Nevada No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7266	Proposed Threatened

AMPHIBIANS

NAME	STATUS
Sierra Nevada Yellow-legged Frog *Rana sierrae* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9529	Endangered

FISHES

NAME	STATUS
Lahontan Cutthroat Trout *Oncorhynchus clarkii henshawi*	Threatened

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/3964

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus*	Candidate

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/9743

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: NCE
Name: Dylan Karlowicz
Address: P.O Box 1760
City: Zephyr Cove
State: CA
Zip: 89448-0000
Email dylankarlowicz@gmail.com
Phone: 7755882505

Appendix C – Photographs



Photograph 1. South-facing view of Upper Truckee River and willow shrub habitat.



Photograph 2. North-facing view of Upper Truckee River and washed-out pedestrian bridge.



Photograph 3. View of multiple stick nests under washed out pedestrian bridge.



Photograph 4. East-facing view of proposed bridge replacement crossing location.



Photograph 5. North-facing view of representative forested/willow shrub wetland and wet meadow habitat west of the Upper Truckee River.



Photograph 6. Representative photo of small ponds in forested/willow shrub wetland.



Photograph 7. East-facing view of existing path and wet meadow habitat west of the Upper Truckee River.



Photograph 8. West-facing view of the existing trail on the east end of the Project.



Photograph 9. West-facing view of big sagebrush and conifer habitats east of the Upper Truckee River.



Photograph 10. Various snags within the Project area may provide suitable features for bat roosts and nesting raptors.



Photograph 11. Southwest-facing view of the Barbara Avenue staging area.



Photograph 12. South-facing view of the southern staging area.

Appendix D

Biological Assessment

South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow



Biological Assessment

South Lake Tahoe, California

Caltrans District 3 - El Dorado County

STPL 5925(183)

July 2024

The environmental review, consultation, and any other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by Caltrans pursuant to 23 USC 327 and the Memorandum of Understanding dated December 23, 2016 and executed by FHWA and Caltrans.

Caltrans
CALIFORNIA DEPARTMENT OF TRANSPORTATION

Biological Assessment

South Lake Tahoe, California

Upper Truckee River Crossing at Johnson Meadow

Caltrans District 3 - El Dorado County

STPL 5925(183)

July 2024

STATE OF CALIFORNIA
Department of Transportation

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Prepared By: _____ Date: 7/17/2024
Dave Rios, Associate Scientist
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Recommended
For Approved By: _____ Date: 7/17/2024
Gregory Saiyo, Environmental Scientist
(530) 845-3397
District 3 Environmental
California Department of Transportation

Approved By: Veronica Wilson Date: 7/22/2024
Veronica Wilson, Acting Branch Chief, M1
(530) 649-4871
District 3 Environmental
California Department of Transportation

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Figure 3. CALVEG Map
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Figure 5. LTBMU SNYLF Suitable Habitat Map

Acronym List

BA	Biological Assessment
Caltrans	California Department of Transportation
CALVEG	Classification and Assessment with Landsat of Visible Ecological Groupings
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
County	El Dorado County
CWA	Clean Water Act
FESA	Federal Endangered Species Act
FHWA	Federal Highway Administration
IPaC	Information for Planning and Consultation
LCT	Lahontan Cutthroat Trout
LSAA	Lake and Streambed Alteration Agreement
LTBMU	Lake Take Basin Management Unit
NOAA Fisheries	National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service
RWQCB	Regional Water Quality Control Board
SNYLF	Sierra Nevada Yellow-legged Frog
TRPA	Tahoe Regional Planning Agency
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service

USGS	United States Geological Survey
VES	Visual Encounter Survey
WOUS	Waters of the United States

Executive Summary

The purpose of this biological assessment (BA) is to provide technical information and to review the proposed Project in sufficient detail to determine to what extent the proposed Project potentially may affect threatened, endangered, or proposed species. The California Department of Transportation (Caltrans), as assigned by the Federal Highway Administration (FHWA), has prepared this BA under its assumption of responsibility at 23 United States Code (USC) 326 or 23 USC 327. The BA is also prepared in accordance with 50 Code of Federal Regulations (CFR) 402, legal requirements found in section 7 (a)(2) of the Federal Endangered Species Act (FESA; 16 USC 1536(c)) and with FHWA and Caltrans regulations, policy and guidance. The document presents technical information upon which later decisions regarding Project effects are developed.

El Dorado County (County), in cooperation with Caltrans, proposes to build upon the overall shared-use path network on the south shore of Lake Tahoe with construction of South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow Project. The Project is 1 in a series of erosion control/water quality, environmental restoration, and shared-use path projects implemented by the El Dorado County Department of Transportation and an extension to the Dennis T. Machida Memorial Greenway. It is identified within the Tahoe Regional Planning Agency's (TRPA) Environmental Improvement Program as Project #03.02.02.0085 and Federal Aid Project # STPL-5925(183). The Project supports the Linking Tahoe: Active Transportation Plan, approved by the Tahoe Metropolitan Planning Organization and the Tahoe Valley Area Plan.

Based on review of the Information for Planning and Consultation (IPaC) report, database research, survey results, and habitat conditions in the Project area, this BA considers the following federally listed species with "May Affect, Not Likely to Adversely Affect" determinations:

- Sierra Nevada yellow-legged frog (SNYLF) (*Rana sierrae*)
- Lahontan cutthroat trout (LCT) (*Oncorhynchus clarkii henshawi*)

In addition, it was determined that the proposed Project will have "No Effect" on the following species:

- North American wolverine (*Gulo gulo luscus*)
- Sierra Nevada red fox (*Vulpes vulpes necator*)
- California spotted owl (*Strix occidentalis occidentalis*)
- Monarch Butterfly (*Danaus plexippus*)
- Northwestern pond turtle (*Actinemys marmorata*)

There is no designated or proposed critical habitat in the Project area.

Chapter 1. Introduction

1.1. Purpose and Need of the Proposed Action

The County, in cooperation with Caltrans, proposes to build upon the overall shared-use path network on the south shore of Lake Tahoe with construction of the South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow Project (Project). An extension to the Dennis T. Machida Memorial Greenway, the Project includes construction of approximately 1.2 miles of Class 1 shared-use path and replacement of the heavily trafficked bridge over the Upper Truckee River that was damaged by winter storms in 2017. The Project will provide active transportation users with a critical link between Barton Hospital, west of the Upper Truckee River, and the Tahoe Sierra neighborhood and Lake Tahoe Community College, east of the Upper Truckee River.

The primary purpose of the Project is to extend and improve the existing shared-use trail to Class 1 standards and to replace the damaged bridge crossing the Upper Truckee River to improve safety for bicyclists, hikers, commuters, and other recreationalists. The existing trail is connected to various recreational and utility access routes and provides non-motorized access to facilities such as Barton Hospital and Lake Tahoe Community College.

The Project is needed to sustain the alternative transportation route by providing improvements and enhancing public safety and to prevent additional bank stabilization issues caused by the damaged bridge. In addition, the Project is needed to support Linking Tahoe: Active Transportation Plan (approved by the Tahoe Metropolitan Planning Organization and the Tahoe Valley Area Plan) and to build upon the Sierra Boulevard Complete Streets Project (completed in 2019) and the South Tahoe Greenway Shared Use Trail Phase 2 Project (completed in 2021).

The Project objectives are to:

- Provide an active transportation link supporting TRPA's Active Transportation Plan.
- Upgrade the existing shared-use trail to Class 1 standards by paving the trail, installing boardwalk through the Johnson Meadow, and installing associated signage.
- Improve public safety, bank stability, and fish passage along the Upper Truckee River by removing the damaged bridge and replacing it with a new bridge that spans the river.
- Enhance recreational opportunities within the Tahoe Basin.
- Reduce fine and coarse sediment, stormwater runoff volume, and peak flows by 33%, to the maximum extent practicable.
- Reduce vehicle miles traveled (VMT) and other environmental impacts associated with automobile use by providing alternative means of travel and increasing intermodal connectivity.

- Minimize the impacts to the scenic quality of the area by using hardscape improvements that blend into the scenic environment to the maximum extent practicable.
- Stabilize eroding cut slopes, roadside ditches, and capture road abrasives utilizing source control Best Management Practices (BMPs).

1.2. Species and Critical Habitats Assessed

An IPaC species list was provided by the U.S. Fish and Wildlife Service (USFWS) on June 17, 2024, for the action area of the Project (**Appendix A**). The following listed and proposed species and/or designated or proposed critical habitats were identified on the updated federal species list and are considered during this analysis. A summary of these species' presence or absence in the action area, presence or absence of designated critical habitat, and effect determinations is provided in **Table 1**.

Threatened Species

- North American wolverine
- LCT

Endangered Species

- Sierra Nevada red fox
- SNYLF

Critical Habitat

The proposed action addressed within this document does not fall within designated critical habitat for threatened or endangered species.

Proposed Threatened Species

- California spotted owl
- Northwestern pond turtle

Proposed Critical Habitat

The proposed action addressed within this document does not fall within proposed critical habitat for proposed threatened or endangered species.

Candidate Species

- Monarch butterfly

Table 1. Threatened, endangered and proposed/candidate species, designated and proposed critical habitat, and effect determinations.

Threatened, Endangered, Proposed Species, or Designated Critical Habitat	Scientific Name	Listing Status	Presence of Species in Action Area (Yes/No)	Presence of Critical Habitat in Action Area (Yes/No)	Effect Determination
North American Wolverine	*Gulo gulo luscus*	Threatened	No	No	No Effect
Lahontan Cutthroat Trout	*Oncorhynchus clarkii henshawi*	Threatened	Yes (Assumed)	No	May Affect, Not Likely to Adversely Affect
Sierra Nevada Red Fox	*Vulpes vulpes necator*	Endangered	No	No	No Effect
Sierra Nevada yellow-legged frog	*Rana sierrae*	Endangered	No	No	May Affect, Not Likely to Adversely Affect
California spotted owl	*Strix occidentalis occidentalis*	Proposed threatened	No	No	No Effect
Monarch butterfly	*Danaus plexippus*	Candidate	No	No	No Effect
Northwestern pond turtle	*Actinemys marmorata*	Proposed threatened	No	No	No Effect

Species with "May Affect, Not Likely to Adversely Affect" Determinations

It was determined the Project may affect, but is not likely to adversely affect SNYLF and LCT because of temporary and permanent impacts to suitable habitat. The potential for SNYLF and LCT to occur in the Project area is low considering the best available information on species abundance and distribution in the region, and the County will minimize the potential to adversely affect SNYLF and LCT through avoidance and

minimization measures presented in Section 2.4. Avoidance and minimization measures currently agreed upon by the County and Caltrans include marking environmentally sensitive areas, a contractor environmental awareness education program, pre-construction surveys, and biological monitoring. Species-specific mitigation measures have not been proposed, as impacts to SNYLF and LCT are not anticipated because of low likelihood of occurrence and lack of critical habitat in the action area. Additional avoidance, minimization, and mitigation measures will be developed through informal consultation with USFWS. Additional avoidance and minimization measures for special status species may also be stipulated by the Project's Lake and Streambed Alteration Agreement (LSAA) and TRPA permit.

Species with "No Effect" Determinations

The monarch butterfly is listed as a federal candidate species. Eggs, larvae, and adults depend on healthy and abundant milkweed (*Asclepias* spp.) host plants. Flowering plants are required for adult feeding throughout the breeding and migration seasons, during which individuals in the western region migrate from coastal California overwintering sites. Monarchs migrate from Mexico and California to Canada, with multiple generations breeding along the way in a single season, returning to their overwintering sites in the fall. Overwintering and roosting habitat provides suitable microclimate, protection, and are typically associated with nectar and water sources (USFWS 2020). No monarch butterflies were observed during the reconnaissance-level field survey, no milkweed host plants were observed, and overwintering habitat is not present. Considering the lack of host plants and overwintering habitat in the Project area, the species is unlikely to occur, and the Project will have no effect on monarch butterfly.

The North American wolverine occupies a variety of habitats across North America including tundra, boreal forest, mixed forest, redwood forest, and coniferous forest. The species ecological needs include large territories in relatively inaccessible landscapes at high elevation (5,906 to 11,483 feet), access to a variety of food resources that vary with seasons, and physical features such as talus slopes and rugged terrain linked to reproductive behavioral patterns and denning. Dens are well-camouflaged, located in difficult to access areas, and avoid areas of human development or disturbance. Currently, there is only one known wolverine in California which dispersed from the Rocky Mountain range and now resides in the Sierra Nevada mountains (USFWS 2018a). Considering the species' habitat requirements, lack of nearby denning habitat, reconnaissance-level survey outcomes, and overall rarity of the species in the Sierra Nevada, the Project will have no effect on North American wolverine. There is no critical habitat for this species associated with the Project.

The current range of the Sierra Nevada red fox (Sierra Nevada distinct population segment) and high-quality habitat, as recognized by the USFWS at the time of listing in 2021, is limited to the Sierra crest south of California State Highway 88 to a few miles north of King's Canyon National Park. Habitats typically utilized include high-elevation meadows, rocky areas, scrub, and woodlands of mountain hemlock (*Tsuga mertensiana*), whitebark pine (*Pinus albicaulus*), and lodgepole pine (*Pinus contorta*)

(Fites-Kaufman et al. 2007, Sacks et al. 2015, Quinn 2017). North American subspecies are typically monogamous and mate between late winter and early spring, with birth occurring from March through May in sheltered dens located in natural opening in rock piles at the base of cliffs and slopes (USFWS 2018b). The Sierra Nevada distinct population segment is a single population of less than 50 known individuals. The USFWS has not designated critical habitat for the species. While habitats in the Project area may fit suitable habitat descriptions for the species, the Sierra Nevada red fox tends to prefer higher elevations of the Sierra Nevada (8,100 to 11,608 feet) (USFWS 2021). Considering the species' elevational preferences, currently known range, Project location, overall rarity, occurrence data, and reconnaissance-level survey outcomes, the Project will have no effect on Sierra Nevada red fox.

The California spotted owl Sierra Nevada distinct population segment is currently listed as proposed threatened under the USFWS' February 23, 2023, proposed rule. California spotted owls rely on mature, multi-layered, complex, high canopy cover forests with coarse woody debris, such as fallen dead trees and large branches, for foraging, roosting, and nesting (USFWS 2023a). The breeding season occurs from mid-February to mid-September, and individuals spend the majority of their time at activity centers during this period. Breeding may not occur every year, and fecundity is low, with 1-3 eggs per clutch and less than approximately one successful offspring per reproductive female per year in the Sierra Nevada (USFWS 2022a). The Project area vicinity contains low-quality habitat for California spotted owl foraging, nesting, and roosting as a result of fuel reduction activities and forest thinning surrounding the urban environment. The closest TRPA/Lake Tahoe Basin Management Unit (LTBMU) California spotted owl protected activity centers are 2-miles southeast of the Project (on the opposite side of Pioneer Trail and Trout Creek) and 2.5-miles west of the Project (Fallen Leaf Lake), which is outside the distance for any auditory impacts. Considering the lack of mature, complex forest habitat and occurrence data, California spotted owl is not anticipated to occur or be impacted by the Project. Therefore, the Project will have no effect on California spotted owl.

The northwestern pond turtle is a proposed threatened species. They are considered habitat generalists, inhabiting many types of water bodies including permanent, intermittent, freshwater, and brackish conditions such as creeks, small moving rivers, marshes, natural and artificial ponds, lakes, reservoirs, and vernal pools. Preferred habitats also include basking sites and slow-flowing water with underwater refugia such as vegetation, bank undercuts, and logs. They are mostly aquatic but leave water to overwinter, bask, nest, and aestivate in upland habitats (USGS 2006). While low-quality aquatic, terrestrial nesting, and upland overwintering/aestivation habitat for northwestern pond exists in the Project area, the species has not been documented in the Lake Tahoe Basin (USFWS 2023b). Northwestern pond turtles are not anticipated to occur because the Project area is at the upper limit of the species' elevational range and is isolated from extant populations. Therefore, the Project will have no effect on northwestern pond turtle.

1.3. Authorities and Discretion

Based on review of the biological factors and Waters of the U.S. (WOUS)/Waters of the State conditions, the following permits will be required. Permitting requirements will depend on final Project improvements and potential impacts:

- U.S. Army Corps of Engineers (USACE) Section 404 Nationwide Permit 14 – Linear Transportation Projects
- Regional Water Quality Control Board (RWQCB) Section 401 Water Quality Certification/Report of Waste Discharge
- California Department of Fish and Wildlife (CDFW) Section 1602 LSAA

A description of the federal, state, and local authorities, policies, and ordinances under which the Project is being proposed, implemented, maintained, regulated, or otherwise affected includes:

Federal

Endangered Species Act

The FESA protects plants and wildlife that are listed as endangered or threatened by the USFWS. Section 9 of the FESA prohibits the taking of endangered wildlife, where taking is defined as “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in such conduct” (50 CFR 17.3). This statute also governs removing, possessing, maliciously damaging, or destroying any endangered plant on federal land and removing, cutting, digging-up, damaging, or destroying any endangered plant on non-federal land in knowing violation of state law.

Under Section 7 of the FESA, federal agencies are required to consult with the USFWS and/or National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) if their actions, including permit approvals or funding, could adversely affect a federally listed species (including plants) or its critical habitat.

Clean Water Act and Rivers and Harbors Act

The USACE Regulatory Branch regulates activities that discharge dredged or fill materials into WOUS, which includes wetlands under Sections 401 and 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act.

Section 401 requires that an applicant proposing to conduct any activity that may result in a discharge to WOUS must apply for and secure a Water Quality Certification prior to construction activities. The Lahontan RWQCB will administer the Section 401 Water Quality Certification for this Project.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act makes it unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, or kill migratory birds. The law also applies to the removal of nests occupied by migratory birds during the breeding season.

Executive Order 13112 – Invasive Species

Executive Order 13112 requires federal agencies to combat the introduction or spread of invasive species in the United States. Invasive species are defined as “any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem whose introduction does or is likely to cause economic or environmental harm or harm to human health."

FHWA guidance issued August 10, 1999, directs the use of the invasive species list, maintained by the California Invasive Species Council, to define the invasive plants that must be considered as part of the National Environmental Policy Act analysis of a proposed project within California.

State

California Endangered Species Act

Pursuant to the California Endangered Species Act (CESA), an Incidental Take Permit from the CDFW is required for projects that could result in the “take” of a State listed threatened or endangered species. Under the CESA, “take” is defined as an activity that would directly or indirectly kill an individual of a species proposed for listing (called “candidates” by the state). Section 2080 of the California Department of Fish and Game Code prohibits the taking, possession, purchase, sale, and import or export of endangered, threatened, or candidate species, unless otherwise authorized by permit or in the regulations.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Act provides the State with very broad authority to regulate Waters of the State (which are defined as any surface water or groundwater, including saline waters). The State RWQCB is granted ultimate authority over water quality policy in the State of California. Before allowing discharges that may affect the quality of Waters of the State, a Report of Waste Discharge must be filed with the Lahontan RWQCB.

California Native Plant Protection Act

The Native Plant Protection Act of 1977 (California Department of Fish and Game Code Sections 1900 – 1913) was created to “preserve, protect and enhance rare and endangered plants in this State” and is administered by CDFW. The Fish and Wildlife Commission has the authority to designate native plants as “endangered” or “rare” and to protect endangered and rare plants from take. CESA provided further protection for rare and endangered plant species, but the Native Plant Protection Act remains part of the California Department of Fish and Game Code.

California Fish and Game Code

The CDFW is responsible for protecting and conserving fish and wildlife resources and the habitats upon which they depend. Section 1602 of the California Fish and Game Code requires that the CDFW review any project that may do one or more of the following:

- Divert or obstruct the natural flow of any river, stream, or lake.
- Change the bed, channel, or bank of any river, stream, or lake.
- Use material from any river, stream, or lake.
- Deposit or dispose of material into any river, stream, or lake.

If it is determined by the CDFW that the activity would substantially alter a river, stream, or lake, and may substantially adversely affect existing fish or wildlife resources, then a LSAA must be prepared. It must include necessary mitigation measures to protect fish and wildlife resources from significant impacts.

Section 2080 of the California Department of Fish and Game Code prohibits the taking, possession, purchase, sale, import, and export of endangered, threatened, or candidate species unless otherwise authorized by permit or in the regulations.

Pursuant to Section 2081 of the California Fish and Game Code, an Incidental Take Permit from the CDFW is required for projects that could result in the “take” of a state listed threatened or endangered species.

Nesting birds are protected in California under Section 3503 of the California Fish and Game Code, which states “It is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto.” Construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered “taking” by the CDFW.

Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code prohibit take or possession of 37 fully protected species. CDFW is unable to authorize incidental take of fully protected species when activities are proposed in areas inhabited by those species. CDFW has informed non-federal agencies and private parties that they must avoid take of any fully protected species in carrying out projects.

Local – Tree Removal

The TRPA Code regulates the removal of trees under Section 33.6.5. The TRPA Code also states requirements for retained tree protection during construction, provides standards for soil and vegetation protection during tree removal, and prevents tree removal within stream environment zones unless certain conditions are met.

1.4. Consultation History

Caltrans and the County received guidance from the Reno USFWS Office during development of the Preliminary Environmental Study for the Project in 2022. The Reno USFWS Office requested a SNYLF Site Assessment Report and Visual Encounter Survey (VES) to inform Section 7 consultation requirements. Based on the outcome of the SNYLF Site Assessment Report and VES, the recommended avoidance and minimization measures, and "may effect, not likely to adversely affect" determinations, this BA is intended to support informal Section 7 consultation for SNYLF and LCT. The IPaC report and species list for the Project area was last queried on June 17, 2024 (**Appendix A**).

1.5. Resource Agency Coordination and Professional Contacts

Coordination with LTBMU aquatic biologist Erin Miller was initiated on November 30, 2023, to request information on SNYLF and LCT in the vicinity of the Project area, including documented survey efforts and detections. Further coordination with the USFWS, CDFW, RWQCB, and/or USACE will occur during informal consultation and permit applications. Permits that will be required for the Project include a USACE Section 404 Nationwide Permit 14 – Linear Transportation Projects, RWQCB Section 401 Water Quality Certification/Report of Waste Discharge, and a CDFW Section 1602 LSAA. Any additional requirements will be determined during this coordination which will be administered by the County and Caltrans.

The North American wolverine, Sierra Nevada red fox, and SNYLF area also listed as threatened under the CESA, which is described in Fish and Game Code sections 2050 through 2100. Compliance with CESA requires the impacts of any take of a CESA-listed or candidate species incidental to otherwise lawful activities to "be minimized and fully mitigated." Under Fish and Game Code, section 86, "take" means hunt, pursue, catch, capture, or kill, or to attempt to hunt, pursue, catch, capture, or kill. Under Fish and Game Code section 2080.1, CDFW may determine that the results of section 7 consultation are consistent with CESA. If a consistency determination is made, no further approval or authorization is necessary under CESA for listed or candidate species identified in the section 7 consultation. If a consistency determination is not made, CDFW may authorize incidental take of CESA-listed or candidate species through an incidental take permit pursuant to Fish and Game Code section 2081.

The County has not begun coordination with CDFW on the proposed action and does not anticipate applying for a consistency determination for CESA compliance because formal Section 7 consultation and an incidental take permit/incidental take statement are not anticipated.

1.6. Study Methods

The following databases and information were reviewed to assess occurrences of federally listed and other special status species and their habitats within the Project area prior to field surveys:

- IPaC report and species list (June 17, 2024)
- CDFW California Natural Diversity Database (CNDDB) occurrence data within a 0.5-mile buffer
- California Native Plant Society (CNPS) rare plant inventory, 1- and 9-quad search
- TRPA special interest species data within a 0.5-mile buffer
- United States Forest Service (USFS) LTBMU biological resources data within a 0.5-mile buffer

In addition, the most recent species status reviews, recovery plans, and other documentation available on the USFWS website were reviewed to analyze potential Project effects. A list of references is included in Chapter 5.

1.6.1. Personnel and Survey Dates

Reconnaissance-level Survey for Special Status Species

A reconnaissance-level field survey of the Project area was performed on August 14, 2023, by an NCE scientist. Temperature during the survey ranged from 62 °F to 80 °F, cloud cover from 25% to 50%, and wind from 0 to 5 miles per hour (mph). The survey took place between 0734 and 1405.

The reconnaissance-level survey involved walking meandering transects through the Project area identifying suitable habitats for special status species, identifying plants and vegetation communities, observing fish in the Upper Truckee River, observing birds, noting potential nest sites, identifying potential bat roosts, and noting any other wildlife, including tracks and sign. Important microhabitats and structures that may provide refugia for special status species, such as ponds and snags, were also noted.

The botanical component of the reconnaissance-level survey was conducted by walking the entire Project area following the CDFW Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities (CDFW 2018). All plant and animal species observed were identified and recorded.

SNYLF Visual Encounter Survey

The SNYLF VES was conducted by an NCE scientist on August 16, 2023, between 0950 and 1335. During the survey, temperatures ranged from 72 °F to 79 °F, cloud cover from 0% to 50%, and wind from 1 to 4 mph. Survey equipment consisted of a dip net, waders, binoculars, smartphone utilizing the ESRI Field Maps application, notebook, and Kestrel 3000 pocket weather meter. The survey followed USFWS-provided VES protocol for SNYLF, which involved walking the stream banks of the Upper Truckee River 250 feet upstream and downstream of the proposed pedestrian bridge replacement site. The stream banks were surveyed in an upstream direction, wading parallel to the banks, searching in the stream habitat, rocks, over-hanging banks, and backwater pools. The dip net was also waved over riverbank vegetation to flush frogs. The meadow west of the Upper Truckee River, mapped as SNYLF suitable

habitat by the LTBMU, was also surveyed within a 100-foot buffer of the Project area in a thorough, zigzag pattern to search for amphibians in grassy areas and any small streams or lentic water. Ponds were surveyed 10 feet above the shoreline and along the water's edge and were thoroughly dip netted to search for amphibians. All equipment in contact with water was disinfected for chytrid (Bd) fungus prior to the survey.

1.6.2. Limitations and Assumptions that may Influence Results

The Upper Truckee River has been subject to various restoration projects upstream and downstream of the Project area over the past two decades, and a future restoration project in Johnson Meadow led by the Tahoe Resource Conservation District (TRCD) is currently in the environmental review stage. These projects have addressed restoring flow to relict channels, improving bank stability, reducing sediment flow to Lake Tahoe, and improving wetland and special status species habitat. There have also been stocking and restoration efforts for LCT in Lake Tahoe and its tributaries by various agencies, including the release of approximately 100,000 individuals to Lake Tahoe in 2022. The Upper Truckee River is one such tributary subject to LCT restoration efforts by the LTBMU in the far upstream reaches near Meiss Meadow (USFS 2012). The Upper Truckee River may provide suitable spawning habitat and/or passage to spawning habitat, but the reconnaissance-level survey was conducted post-spawning season and LCT are not documented migrating through or utilizing the Project area. No LCT were observed during the survey and an intensive fish survey (e.g., e-fishing) was not conducted; however, one deceased brown trout (*Salmo trutta*) was observed suggesting positive salmonid passage through the Project area. Spawning habitat for LCT, and habitat for other special status species, may be improved following completion of the TRCD Johnson Meadow Restoration Project.

Chapter 2. Proposed Agency Action

2.1. Proposed Action Location

The Project is located in Township 12 north, Range 18 east, and Sections 3 and 4 of the South Lake Tahoe United States Geological Survey (USGS) 7.5-minute quadrangle map (**Appendix B**, **Figure 1**). It is bounded by South Avenue and Barton Memorial Hospital to the west, U.S. Highway 50/Lake Tahoe Boulevard to the north, Lake Tahoe Airport to the south, and Sierra Boulevard to the east. The current total Project area is 15.52 acres and encompasses City of South Lake Tahoe and El Dorado County Right-of-Way and public parcels owned by City of South Lake Tahoe, South Tahoe Public Utility District, California Tahoe Conservancy, and the USFS. The Project area includes 2 staging areas, 1 in a previously disturbed forest clearing (0.60 acres), and 1 along Barbara Avenue (0.80 acres) (**Appendix B**, **Figure 2**). Representative photographs of the Project area are included in **Appendix C**.

2.2. Description of Proposed Action

An extension to the Dennis T. Machida Memorial Greenway, this TRPA Environmental Improvement Program project (#03.02.02.0085) aims to build upon the overall shared-use path network on the south shore of Lake Tahoe. The Project will include construction of approximately 1.2 miles of Class 1 shared-use path and replacement of a heavily trafficked bridge over the Upper Truckee River that was damaged by winter storms in 2017. The Project will provide active transportation users with a critical link between Barton Hospital, west of the Upper Truckee River, and the Tahoe Sierra neighborhood and the Lake Tahoe Community College, east of the Upper Truckee River.

The proposed shared-use path will provide connections to existing and future Class 1 facilities in the area. For example, on the west end, there exists a short Class 1 segment between South Avenue and Winnemucca Avenue. The Project builds upon the Sierra Boulevard Complete Streets Project (completed in 2019) and the South Tahoe Greenway Shared Use Trail Phase 2 (completed in 2021) at the corner of Sierra Boulevard and Barbara Avenue. This Project provides a critical link to the bicycle network between the Tahoe Valley Area Plan and bicycle network near the Tahoe Sierra neighborhood. The Project supports the Linking Tahoe: Active Transportation Plan and the Tahoe Valley Area Plan. Plans including cross-sections of the boardwalk, bridge, and Class 1 path are included in **Appendix D**.

2.3. Deconstruct the Proposed Action

The Project proposes to install a pedestrian bridge over the Upper Truckee River to replace the old, unusable, concrete bridge washed out during the winter in late 2017 and install approximately 935 linear feet of elevated boardwalk through Johnson Meadow. The new bridge will entirely span the Upper Truckee River and the old bridge will be demolished and removed. The new pedestrian bridge would be approximately 9

feet in height and 140 feet in length with a 146-inch-wide reinforced concrete deck. Bridge demolition will involve jackhammering, ramming (with a mechanical ram, mounted on a backhoe), and a haul or dump truck to export debris. The existing bridge, including abutments and piers, in the Upper Truckee River will be removed. Existing abutments will be cut below final stream grade and covered with native river substrate, if not entirely removed. All debris generated by bridge demolition will be removed from the streambed and disposed of at a County-approved facility, consistent with local laws and regulations. Bridge removal work will likely occur when the flow of the Upper Truckee River is low, such as the late summer or fall. The bridge demolition work area will be surrounded by a coffer dam system, constructed of gravel bags and visqueen plastic sheets (or comparable materials), to restrict the Upper Truckee River to its existing primary flow path around the damaged bridge and contain any concrete debris. Upon completion of the existing bridge demolition activity, the temporary coffer dam will be removed.

The boardwalk surface would be approximately 13 feet in width and would be elevated 1 to 4 feet above the ground surface, and higher at the bridge approach to match the bridge elevation. Portions of the boardwalk deck close to the ground would have curbs along the outer edge, while elevated portions would have tubular steel railing with wire strands installed along both edges. Where boardwalk height is greater than 30 inches, rails along the boardwalk would extend 3 feet above the boardwalk deck. Boardwalk construction would follow the bridge demolition and replacement and involves installation of steel pipe piles, pile caps, placement of the boardwalk beams and treads, and the tubular steel cable railing.

Construction of the paved path would involve grading, placement of compact aggregate base subgrade, placement and compaction of hot mix asphalt, placement and compaction of aggregate base shoulder, painting a stripe centerline and pavement markings, and installation of signs. The paved path is in the upland areas east of the Upper Truckee River and far west end of the action area where the alignment exits the meadow near South Avenue/Winnemucca Avenue. These areas are not within suitable habitat for SNYLF and LCT; therefore, the paved path will not be discussed in further detail in this BA.

Typical equipment expected to be used for construction of the boardwalk, bridge, and paved path includes pickup trucks, a water truck, excavator, loader, skip loader, graders, dump trucks (bobtail, end dumps, 10-wheel dumps, belly dumps), crane, pile driving equipment, and welding equipment. Ground disturbance will typically occur during grading and excavation, tree removal, equipment travel and operations, pile installation, backfill and compaction, and paving.

2.3.1 Construction Scenario Summary

Access to the Project area will primarily utilize existing paved roads and recreational/utility trails. Within the Project area, there are 0.36 acres of open water (part of the Upper Truckee River), 1.06 acres of freshwater emergent wetlands, and 1.39 acres of freshwater forested/shrub wetlands. The Project will result in 0.33 acres of

permanent impacts and 0.50 acres of temporary impacts to wetlands from the bridge replacement and boardwalk construction. Aside from revegetation of disturbed areas post-construction, opportunity for on-site restoration is minimal and the County will instead utilize banked mitigation credits, as necessary to comply with Project permits for impacts to state and federally jurisdictional areas/habitats.

The most likely construction scenario from start to finish involves:

Site Preparation

- Install temporary BMPs (vegetation protection, silt fence, fiber rolls, etc.)
- Clear and grub area of proposed improvements
- Create temporary access road to work area utilizing low ground pressure equipment
- Install bridge removal temporary protection measure and dewatering coffer dam

Dewatering and Bridge Work

- Remove existing bridge
- Stabilize bank
- Remove temporary protection measure and coffer dam utilized for bridge removal
- Excavate for bridge foundation (abutment and footing) and install bar reinforcing steel
- Pour concrete for footing
- Pour concrete for abutment
- Backfill footing abutment
- Install and place bridge

Boardwalk and Paved Path

- Install steel pipe piles
- Install pile caps
- Place boardwalk beam and treads
- Install tubular steel cable railing
- Place and compact aggregate base subgrade
- Place and compact hot mix asphalt
- Place and compact aggregate base shoulder
- Grade and compact embankment fill
- Stripe centerline and install pavement markings
- Install signs

Revegetation and Site Cleanup

- Revegetate embankment and other disturbed areas

- Site cleanup and BMP removal
- De-mobilize site

2.3.2 Project Operation and Maintenance

The Class 1 path, boardwalk, and bridge may require maintenance by County staff once constructed and maintenance is unlikely to be a stressor to any SNYLF or LCT that may be present in the future considering the boardwalk will be elevated and the new bridge will entirely span the Upper Truckee River. Disturbed areas may require additional watering and seeding post-construction; however, the County plans on using mitigation credits and on-site restoration is anticipated to be minimal.

2.3.3 Sequencing and Schedule

Construction is anticipated to occur between May 1 and October 15, 2025, limited to the grading season enforced by TRPA and the Lahontan RWQCB. A grading season exception/variance may be approved by both agencies, if necessary, to work outside of this window. No night work is anticipated. Phasing is currently unknown; however, the Project proponent will phase construction as necessary to minimize the amount of disturbed soil area at a given time.

2.4 Conservation Measures

2.4.1 Project Design Modifications for Avoidance and Minimization

The existing conditions in the Project area were examined by the County in the Feasibility Report to identify problems and analyze potential solutions (El Dorado County 2021). To meet the goals and objectives of the Project, the Feasibility Report outlined 3 alignment alternatives for consideration by the public and the Project development team.

The alternatives describe the connection at Winnemucca Avenue near Barton Hospital from the west and the connection at Sierra Boulevard/Barbara Avenue intersection from the northeast. In general, the alignments west of the Upper Truckee River follow the existing utility access road and the historic user trail access. The differences between the 3 alignments are described related to connection(s) to either South Avenue and/or Winnemucca Avenue and the alignment of the proposed bridge crossing at the river.

- **Alternative 1** – Proposed bridge location approximately 60 feet upstream of existing concrete bridge; location chosen to minimize the overall length. Alignment continues to the northeast following current user trails.
- **Alternative 2** – Proposed bridge location approximately 250 feet downstream of existing concrete bridge; location chosen to optimally reduce the potential of structure foundation scour or location within the floodplain on the east side of the riverbank. Then, approximately 750 linear feet of new trail disturbance would occur before tying into existing user trail alignment. Alignment continues to the northeast.

- **Alternative 3** – Proposed bridge location approximately 120 feet upstream of existing concrete bridge; location chosen to take advantage of the tangent (straight) section of the river alignment potentially reducing the overall length of the proposed bridge. Alignment to the east is similar to Alternative 1.
- **Alternative 4** – No-build alternative.

A public meeting was held by the County via Zoom on February 3, 2022, to receive public comments on the Project and Draft Feasibility Report. Based on the comments received, the professional judgment of County personnel, analyses outlined in the Feasibility Report, and consensus of the Technical Advisory Committee, Alternative 3 was selected as the preferred alternative and is presented in **Appendix B**, **Figure 2**. This alternative was selected as it is the most preferred river crossing due to alignment and predictability of flows, requiring less bridge length than other alternatives and reducing potential impacts to the Upper Truckee River. Impact minimization to sensitive habitats (Johnson Meadow and the Upper Truckee River) were considered during the initial design and are being carried out through final design. This includes the bridge being designed as a single span so there are no bridge footings being placed in the river, and a boardwalk where the trail alignment crosses Johnson Meadow rather than an at-grade trail to minimize impacts to wetlands.

In addition, the following avoidance and minimization measures are being proposed to protect biological resources, sensitive habitat areas, and jurisdictional WOUS/Waters of the State. These avoidance and minimization measures will be incorporated into Project design.

- **BIO-1:** Prior to the start of construction activities, the limits of construction will be clearly marked and sensitive or regulated habitats within the Project limits will be marked with high visibility fencing or staking to ensure construction will not further encroach into waters or sensitive habitats. These areas will be marked on the Project plans. A qualified biologist will periodically inspect the Project area to ensure environmentally sensitive areas remain undisturbed.
- **BIO-2:** Heavy equipment will avoid entering the river as much as possible during bridge removal. Fueling, maintenance, and staging of equipment will occur in designated upland staging areas only.
- **BIO-3:** BMPs used in the Upper Truckee River will be installed with consideration for fish passage. Turbidity curtains or downstream screens will be installed in a manner that allows for the passage of fish beneath or around the BMP. BMPs will consist of materials that prevent fish and other wildlife from becoming entangled, trapped, or otherwise harmed. BMPs used in the river will be approved for use by CDFW and USFWS and inspected daily by a qualified biologist.
- **BIO-4:** A qualified biologist shall conduct environmental awareness training for all construction personnel. The training shall include identification of special status species, required practices before the start of construction, general measures that are being implemented to conserve the species as they relate to the Project, penalties for non-compliance, and the boundaries of work and permitted disturbance zones. Supporting materials containing training information shall be prepared and distributed. Upon completion of training, all construction personnel

shall sign a form stating that they have attended the training and understand all the measures. Proof of this instruction shall be kept on file by the Project proponent. The Project proponent shall provide the USFWS and CDFW with a copy of the training materials and copies of the signed forms indicating that training has been completed. If new construction personnel are added to the site, the crew foreman shall ensure that the personnel receive the mandatory training before starting work. Copies of signed forms shall be submitted monthly as additional training occurs for new employees. The crew foreman is responsible for ensuring that construction personnel adhere to the guidelines and restrictions.

2.4.2 Species Specific Conservation Measures – Sierra Nevada Yellow-legged Frog

- **BIO-5:** No more than 14 days prior to construction, a SNYLF visual encounter survey will be conducted by a qualified biologist to ensure SNYLF are absent in the Project area, including upstream and downstream areas or suitable habitat features within 100 feet of the Project. If a frog is observed during any point of the Project, all work shall immediately halt, all equipment shall be powered off, and work shall not continue until the frog can be identified by a qualified biologist. If the frog is not a SNYLF, then a qualified biologist shall move the frog out of harm's way prior to work proceeding. If the frog is a SNYLF, then work will stop until the SNYLF has moved out of harm's way on its own accord as determined by the biological monitor. Consultation with the USFWS will be re-initiated if take is exceeded or the Project action changes from that previously disclosed in the Biological Assessment.

2.4.3 Species Specific Conservation Measures – Lahontan Cutthroat Trout

- **BIO-6:** Immediately prior to installation of the coffer dam system around the bridge removal work area, a qualified biologist will conduct a fish survey to ensure LCT are absent in the Project area. The biologist will remain on-site and monitor installation of the coffer dam and will have authority to stop any Project activity that may impact LCT or other special-status fish species detected in the Project area. The biologist will then survey ponded water within the contained work area following completion of the coffer dam installation to ensure fish are absent. If non-listed fish species are found in the ponded water, they will be relocated to the river side of the coffer dam structure by the biologist. If LCT are found in the ponded area, the coffer dam system will be reopened to allow the LCT to leave on its own accord. No LCT will be handled or relocated. Although the confidence of absence in the contained work area is high based on the inclusion of the previous portions of this measure, should LCT be found during pumping of water from the contained work area, pumping will immediately cease, and the coffer dam will be reopened. The qualified biologist will also perform daily inspections of the coffer dam and any other BMPs, such as the downstream turbidity curtain, to ensure they are properly installed, in good condition, cannot trap or otherwise harm fish, and do not block fish passage. If ponded water will be pumped

from the contained bridge removal work area, intake screens will be used to prevent fish being impacted by the pump and a qualified biologist will be on-site to relocate any residual non-listed fish species to the river side of the coffer dam structure. After bridge construction/demolition, the qualified biologist will monitor the removal of the coffer dam and other BMPs. Should an LCT be detected in the Project area, the USFWS will be contacted immediately, and all equipment will be powered off. Consultation with the USFWS and/or CDFW will be re-initiated if take is exceeded or the Project action changes.

2.5 Compensation

No compensation strategies are currently proposed as occurrence of SNYLF and LCT are unlikely, and the avoidance and minimization measures incorporated into the Project will prevent adverse effects to these species. In addition, replacement of the damaged bridge with a bridge that entirely spans the river will improve habitat for LCT and SNYLF since the damaged bridge is causing sediment and debris accumulation in the river, bank instability, and partially obstructing fish passage. All areas disturbed by the Project will be revegetated, and the County will implement mitigation as necessary to comply with Project permits for impacts to state and federally jurisdictional areas/habitats. Revegetation would consist of both upland and wetland seed mixes and placement of wood fiber mulch. Willow clippings and willow transplanting will be used for bank stabilization, especially after bridge removal on the east bank of the river.

Chapter 3. Environmental Baseline

Environmental baseline refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR §402.02).

3.1 Summary of Environmental Baseline

The action area is defined as “all areas affected directly or indirectly by the Federal action and not merely the immediate area involved in the action” (CFR Title 50, Section 402.02). The action area described above, which includes the staging areas, bridge removal, bridge construction, and Class 1 path/boardwalk construction, represents the limits of the action area (**Appendix B, Figure 2**). This action area was identified based on a conservative approach that took into account the total area of impact from all Project alternatives being considered by the County and Caltrans. All construction activities will be confined to the identified action area limits. The action area accommodates minor design changes during construction and their potential indirect effects. The directly affected (temporarily and permanently impacted) areas will be limited to the maximum extent possible within the action area during construction. The Project area is synonymous with the action area, and the term action area is used for the remainder of this biological assessment.

Vegetation communities in the action area include Jeffrey pine (*Pinus jeffreyi*) forest, big sagebrush (*Artemisia tridentata* ssp. *tridentata*) shrubland, meadow, and willow (*Salix* spp.) shrubland along the Upper Truckee River corridor. The action area is previously disturbed by encroaching urban development on the east and west ends, existing trails, utilities and access roads, the damaged Upper Truckee River bridge crossing, and forest habitat modification as a result of wildfire fuel reduction activities.

Federally listed species known to occur in the vicinity of the action area, as identified by the IPaC species list, include Sierra Nevada yellow-legged frog, Lahontan cutthroat trout, North American wolverine, Sierra Nevada red fox, California spotted owl, monarch butterfly, and northwestern pond turtle. Overall, habitat for these species in the action area is either absent or disturbed, and there are no recent documented occurrences of listed species in the action area vicinity.

3.2 Description of the Action Area

The action area includes a 100-foot-wide (50 feet from center line) buffer of the proposed trail starting at the south end of Winnemucca Avenue, crossing Johnson Meadow and the Upper Truckee River, and extending to the south end of Sierra Boulevard. A 50-foot buffer of the bridge removal location is also included in the action area, as are 2 staging areas, one located along Barbara Avenue (0.8 acres), and one at an existing 0.6-acre disturbed staging location south of the trail alignment. The 0.6 acre staging area is accessible via a partially paved dirt road (**Figure 2**). The total action area, including the 2 staging areas and access, is 15.52 acres.

The action area encompasses City of South Lake Tahoe and County Right-of-Way and public parcels owned by the City of South Lake Tahoe, South Tahoe Public Utility District (STPUD), TRCD, California Tahoe Conservancy (CTC), Caltrans, and the USFS.

Within the vicinity of the action area (1-mile buffer), surrounding land use is approximately 50 percent urban, consisting of residences, businesses, and a portion of the Lake Tahoe Airport. The other 50 percent includes open space consisting of the Upper Truckee River and Trout Creek riparian corridors, Johnson Meadow, and mixed conifer forest, with moderately trafficked pedestrian and mountain bike trails, utility access roads, and barren staging and snow storage areas throughout.

According to the United Stated Department of Agriculture (USDA) Natural Resources Conservation Service Web Soil Survey (USDA 2023), the action area contains:

- 18.6% Tahoe mucky silt loam, drained, 0 to 5% slopes
- 28.3% Christopher loamy coarse sand, 0 to 9% slopes
- 7.4% Christopher loamy coarse sand, 9 to 30% slopes
- 27% Christopher-Gefo complex, 0 to 5% slopes
- 18.6% Ubaj sandy loam, 0 to 9% slopes

Tahoe mucky silt loam is the only soil in the action area with a hydric soil rating.

The USFWS National Wetland Inventory identifies a freshwater emergent wetland, a freshwater forested/shrub wetland, and riverine feature within the action area. These aquatic resources were formally delineated by NCE for USACE and State of California permit applications, and it was determined 2.81 acres of aquatic resources are present within the action area. Specifically, 1.39 acres of freshwater forested/shrub wetlands, 1.06 acres of freshwater emergent wetlands, and 0.36 acres of riverine (Upper Truckee River) are within the action area. The Upper Truckee River and the adjacent wetlands are considered federally jurisdictional WOUS because they are hydrologically connected to a traditional navigable waterway (Lake Tahoe).

The Upper Truckee River crosses the action area and flows north. High elevation drainages and lakes fed by snowmelt and rainfall, including Round Lake, Dardanelles Lake, Showers Lake, and Meiss Lake, are the primary sources for the Upper Truckee

River. The Upper Truckee River is Lake Tahoe's largest tributary at approximately 23 miles in length.

Natural communities and vegetation types in the action area were initially analyzed with Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG) and verified during the reconnaissance-level survey (USDA 2009). Vegetation alliances in the action area include Jeffrey pine, upper montane mixed chaparral, wet meadow, and shrub willow (**Appendix B, Figure 3**). These alliances and their dominant species are described below.

Jeffrey Pine Alliance

The dominant upland vegetation community in the action area is Jeffrey pine forest. Understory species include greenleaf manzanita (*Arctostaphylos patula*), pinemat manzanita (*Arctostaphylos nevadensis*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), wild rye (*Elymus* spp.), Woods' rose (*Rosa* woodsii), wax currant (*Ribes cereum*), antelope bitterbrush (*Purshia tridentata* var. *tridentata*), and big sagebrush (*Artemisia tridentata*). The Jeffrey pine forest habitat in the action area is adjacent to an urbanized area and has been subject to intense thinning and fuel reduction activities resulting in a mature, climax forest structure with low complexity (lack of woody debris, snags, fallen trees, multiple canopy layers, etc.). The Barbara Avenue staging area is mapped by CALVEG as Jeffrey pine alliance, but more likely represents an urban environment as it is now a paved roadway adjacent to residences.

Upper Montane Mixed Chaparral Alliance

The upper montane mixed chaparral alliance mapped by CALVEG in the action area is more accurately described as a big sagebrush alliance, as this species dominates the mapped area, and no single species is dominant in typical upper montane mixed chaparral alliance. This area also contains greenleaf manzanita and mountain whitethorn (*Ceanothus cordulatus*), likely representing an ecotone of the upper montane mixed chaparral and big sagebrush alliances.

Wet Meadows Alliance

Dominant plant species of the wet meadow alliance mapped in the action area are variable, depending on distance from the Upper Truckee riverbanks, vernal depressions, lentic ponds, groundwater levels, and disturbances such as the existing trail and previous land use (ranching). Common species observed in the wet meadow area included rushes (*Juncus* spp.), timothy grass (*Phleum alpinum*), common timothy (*Phleum pratense*), northwest territory sedge (*Carex utriculate*), water sedge (*Carex aquatilis*), Panicled bulrush (*Scirpus microcarpus*), smooth brome (*Bromus inermis*), one-sided blue grass (*Poa secunda*), *Elymus* spp., and various other common wetland forbs such as northwest cinquefoil (*Potentilla gracilis*), ranger's button (*Sphenosciadium capitellatum*), and Oregon checker mallow (*Sidalcea oregana*).

Shrub Willow Alliance

This willow-dominated alliance is present in patchy distributions throughout Johnson Meadow and along the Upper Truckee riverbanks. Within the action area, willow species present include Lemmon's willow (*Salix lemmonii*) and pacific willow (*Salix lasiandra*). There are also isolated groves of quaking aspen (*Populus tremuloides*) and black cottonwood (*Populus trichocarpa*) present along the existing trail through Johnson Meadow.

The dominant plant species in the action area varies by vegetation community. The Jeffrey pine-dominated forest contains a mixed understory of big sagebrush, antelope bitterbrush, *Eriogonum* spp., *Elymus* spp., and manzanita (*Arctostaphylos* spp.). The Jeffrey pine forest habitat in the action area has been subject to fuel reduction and mechanical thinning resulting in mature stands of forest with reduced canopy cover, complexity, and woody debris that would otherwise increase biological diversity and suitable habitat for various wildlife species. However, there are patchy, dense stands of trees that remain along the transition to the Upper Truckee River and Johnson Meadow.

The wet meadow, Upper Truckee riverbanks, and riparian habitats are dominated by bentgrass (*Agrostis* spp.), timothy grass (*Phleum* spp.), sedges, rushes, *Bromus* spp., *Poa* spp., willows, and patches of quaking aspen groves. A list of plant species observed during the surveys is included in **Table 2**.

Table 2. Plant species observed during the August 14 and 16, 2023, surveys.

Species Name	Common Name	Native; Y, N
Abies concolor	White fir	Y
Achillea millefolium	Common yarrow	Y
Agropyron cristatum	Crested wheatgrass	N
Agrostis gigantea	Creeping bentgrass	N
Agrostis idahoensis	Idaho bentgrass	Y
Allium campanulatum	Dusky onion	Y
Aquilegia formosa	Western columbine	Y
Arctostaphylos nevadensis	Pinemat manzanita	Y
Arctostaphylos patula	Greenleaf manzanita	Y
Artemisia douglasiana	California mugwort	Y
Artemisia tridentata	Big sagebrush	Y
Astragalus cicer	Chickpea milkvetch	N
Berberis aquifolium	Mountain grape	Y
Bromus inermis	Smooth brome	N
Bromus tectorum	Cheatgrass	N
Carex athrostachya	Slender beak sedge	Y
Carex aquatilis	Water sedge	Y
Carex utriculata	Northwest territory sedge	Y
Castilleja miniata	Great red paintbrush	Y
Ceanothus cordulatus	Mountain whitethorn	Y

Chamerion angustifolium	Fireweed	Y
Chrysothamnus viscidiflorus	Yellow rabbitbrush	Y
Cirsium andersonii	Anderson's thistle	Y
Danthonia californica	California oatgrass	Y
Deschampsia cespitosa	Tufted hairgrass	Y
Eleocharis macrostachya	Common spikerush	Y
Elymus elymoides	Squirreltail	Y
Elymus glaucus	Blue wild rye	Y
Elymus triticoides	Beardless wild rye	Y
Epilobium ciliatum	Fringed willowherb	Y
Equisetum arvense	Field horsetail	Y
Eriogonum nudum	Naked buckwheat	Y
Eriogonum umbellatum	Sulphur buckwheat	Y
Erythranthe guttata	Seep monkey flower	Y
Fragaria virginiana	Mountain strawberry	Y
Galium triflorum	Fragrant bedstraw	Y
Gayophytum diffusum	Spreading groundsmoke	Y
Geum macrophyllum	Large leaved avens	Y
Gnaphalium palustre	Western marsh cudweed	Y
Ipomopsis aggregata	Scarlet gilia	Y
Juncus articulates	Jointleaf rush	Y
Juncus balticus	Baltic rush	Y
Juncus ensifolius	Sword leaved rush	Y
Kelloggia galioides	Milk kelloggia	Y
Lactuca serriola	Prickly lettuce	N
Letharia vulpina	Wolf lichen	Y
Lotus corniculatus	Bird's foot trefoil	Y
Lupinus sp.	Lupine	Y
Madia glomerata	Mountain tarweed	Y
Oreostemma alpigenum	Tundra aster	Y
Paeonia brownii	Brown's peony	Y
Pedicularis semibarbata	Pinewoods lousewort	Y
Penstemon speciosus	Royal beardtongue	Y
Phacelia hastata	Silverleaf phacelia	Y
Phleum alpinum	Timothy grass	Y
Phleum pratense	Common timothy	N
Phlox diffusa	Spreading phlox	Y
Pinus contorta	Lodgepole pine	Y
Pinus jeffreyi	Jeffrey pine	Y
Plantago major	Common plantain	N
Platanthera leucostachys	Sierra bog orchid	Y
Poa bulbosa	Bulbous blue grass	N
Poa secunda	One-sided blue grass	Y

Populus tremuloides	Quaking aspen	Y
Populus trichocarpa	Black cottonwood	Y
Potentilla gracilis	Northwest cinquefoil	Y
Prunella vulgaris	Common selfheal	Y
Pterospora andromedea	Woodland pinedrops	Y
Purshia tridentata var. *tridentata*	Antelope bitterbrush	Y
Pyrola asarifolia	Bog wintergreen	Y
Ribes cereum	Wax currant	Y
Rosa woodsii	Woods' rose	Y
Rumex salicifolius	Willow dock	Y
Salix lasiandra	Pacific willow	Y
Salix lemmonii	Lemmon's willow	Y
Scirpus microcarpus	Panicled bulrush	Y
Sidalcea oregana	Oregon checker mallow	Y
Solidago canadensis	Canada goldenrod	Y
Sphenosciadium capitellatum	Ranger's button	Y
Thalictrum fendleri	Fendler's meadow rue	Y
Tragopogon dubius	Yellow salsify	N
Trifolium longipes	Long stalked clover	Y
Veratrum californicum var. *californicum*	California corn lily	Y
Wyethia mollis	Woolly mule ears	Y

For the purposes of this BA, invasive species are non-native plants and wildlife which are listed by the Invasive Species Council of California, plants designated as "noxious" by the USDA or the California Department of Food and Agriculture (CDFA), any plants listed on the California Invasive Plant Council (Cal-IPC) Invasive Plant Inventory, and priority terrestrial invasive weeds listed by the Lake Tahoe Basin Weed Coordinating Group. The reconnaissance-level field survey resulted in ten non-native plant detections. Of these species, prickly lettuce is listed by the Invasive Species Council of California and cheatgrass is a Lake Tahoe Basin Weed Coordinating Group "weed of interest" and has a Cal-IPC rating of "high".

All wildlife species observed during the surveys were documented and are presented in **Table 3**. Numerous barn swallow (*Hirundo rustica*) and stick nests were observed under the damaged bridge. The nests were inactive during the survey; however, barn swallow juveniles and family groups were observed around the bridge indicating these nests were previously active this season. No amphibians were observed during the reconnaissance-level survey; however, a nocturnal survey would be more likely to produce detections of local common amphibian species. Bird and butterfly diversity is high in the vicinity of the action area, and many common mammal species were also observed, including an adult black bear (*Ursus americanus*). Garter snakes (*Thamnophis* sp.) were observed along the Upper Truckee River and near the small ponds in the wet meadow/shrub willow/quaking aspen grove areas.

Table 3. Wildlife species observed during the August 14 and 16, 2023, surveys.

Scientific Name	Common Name	Native: Y/N
Avians		
Branta canadensis	Canada goose	Y
Buteo jamaicensis	Red-tailed hawk	Y
Coccothraustes vespertinus	Evening grosbeak	Y
Colaptes auratus	Northern flicker	Y
Contopus sordidulus	Western wood-pewee	Y
Cyanocitta stelleri	Steller's jay	Y
Dryobates albolarvatus	White-headed woodpecker	Y
Hirundo rustica	Barn swallow	Y
Leuconotopicus villosus	Hairy woodpecker	Y
Passerina amoena	Lazuli bunting	Y
Poecile gambeli	Mountain chickadee	Y
Selasphorus rufus	Rufous hummingbird	Y
Sialia mexicana	Western bluebird	Y
Sitta canadensis	Red-breasted nuthatch	Y
Sitta carolinensis	White-breasted nuthatch	Y
Sitta pygmaea	Pygmy nuthatch	Y
Streptopelia decaocto	Eurasian collared-dove	N
Turdus migratorius	American robin	Y
Mammals		
Sciurus griseus	Western gray squirrel	Y
Tamias sp.	Chipmunk	Y
Tamiasciurus douglasii	Douglas squirrel	Y
Ursus americanus	Black bear	Y
Reptiles		
Sceloporus occidentalis	Fence lizard	Y
Thamnophis sp.	Garter snake	Y
Fish		
Catostomus sp.	Sucker	Y
Salmo trutta	Brown trout	N
Crustaceans		
Pacifastacus sp.	Crayfish	N
Insects		
Colias eurytheme	Orange sulphur	Y
Hemileuca hera	Hera moth	Y
Hyles lineata	White-lined sphinx moth	Y
Limenitis lorquini	Lorquin's admiral	Y
Lycaena editha	Edith's copper	Y
Neophasia menapia	Pine white	Y

The action area is located in the Upper Truckee River riparian and meadow corridor, which consists of native vegetation and allows wildlife species to find water, food, shelter, and potential mates. The corridor enables the movement of animals and the continuation of viable populations, thus playing a role in the maintenance of biodiversity in the region. The action area includes habitat connecting wildlife populations and larger areas of similar upstream and downstream wildlife habitat. However, the Project improvements will have little to no impact on the wildlife corridor or habitat connectivity in the action area considering the new bridge will entirely span the Upper Truckee River and the elevated boardwalk and Class 1 share-use path will not obstruct the movement of animals. Where boardwalk height is greater than 30 inches, rails along the boardwalk would extend 3 feet above the boardwalk deck. Larger wildlife such as mule deer (*Odocoileous hemionus*) and black bears will be capable of jumping/climbing over the boardwalk or will be able to pass under the higher, railed boardwalk segments.

Various fish species were observed during the reconnaissance-level field survey, including an unconfirmed sighting of a Lahontan mountain sucker (*Catostomus lahontan*). During the August 14, 2023, reconnaissance-level field survey, water levels in the river and conditions in the action area were suitable for fish passage, including for salmonid species. The Upper Truckee River currently outflanks the damaged bridge on the west side. There is currently low flow under the existing bridge because of sedimentation and debris accumulation at the piers of the damaged bridge.

3.3 Habitat Conditions in the Action Area

The Upper Truckee River flows through the action area in Johnson Meadow within a single channel, then splits into a gully channel approximately 0.3 miles northeast of the action area. The main Upper Truckee River channel was historically excavated and channelized for livestock grazing and has become incised. The lowering of the streambed, bank instability, erosion, and sediment accumulation around the damaged bridge have degraded the riverine habitat in the action area, but riverine habitat remains suitable for fish and other aquatic species, including LCT. The Upper Truckee River provides passage and connectivity to Lake Tahoe for the LCT and two CDFW species of special concern, the Lahontan mountain sucker and mountain whitefish (*Prosopium williamsoni*). However, occurrences of stocked LCT in Lake Tahoe moving up the Upper Truckee River are rare, and the species is not documented using the lower reaches of the Upper Truckee River for reproduction.

During the reconnaissance-level survey and SNYLF VES, it was determined habitat in the action area, specifically within the Upper Truckee River corridor, provides an important connection to areas of high-quality habitat and allows wildlife to navigate between the surrounding urban environments. One deceased brown trout was observed indicating salmonid passage and connection to upstream or downstream areas, and a brown bear was observed visiting the Upper Truckee River in the action area to drink and bathe. NCE delineated a total of 0.36 acres of riverine habitat/open water (Upper Truckee River) in the action area (**Appendix B, Figure 4**). The Upper Truckee River is a jurisdictional WOUS and Waters of the State due to the presence of ordinary high

water mark indicators, soils, and vegetation communities. The Upper Truckee River is a tributary and significant nexus to Lake Tahoe, a traditionally navigable waterbody.

Wetland habitat in the action area includes freshwater forested/shrub wetlands and freshwater emergent wetlands. These habitats provide suitable habitat for many wildlife species and rare plants and are considered wetlands under jurisdiction of USACE. These wetlands are also associated with the Upper Truckee River riparian corridor under jurisdiction of CDFW. NCE delineated a total of 1.39 acres freshwater forested/shrub wetlands and 1.06 acres of freshwater emergent wetlands associated with the Upper Truckee River riparian corridor in the action area (**Appendix B, Figure 4**).

The Upper Truckee River corridor, and nearly all tributaries and wetland areas in the Lake Tahoe basin, have been identified by the LTBMU as suitable habitat for SNYLF. LTBMU SNYLF suitable habitat is a buffered area of all wetland features in the Lake Tahoe basin including streams, lakes, ponds, wet meadows, etc. Approximately 3.16 acres of LTBMU SNYLF suitable habitat are mapped within the action area (**Appendix B, Figure 5**). SNYLF were not detected during the August 14, 2023, reconnaissance-level field survey or the August 16, 2023, VES. Habitat quality for SNYLF in the Johnson Meadow and along the Upper Truckee River corridor has been degraded by incision and channelization of the river resulting in unfavorable conditions for a breeding population because of a lack of ponds, inlet streams, and other vernal wetland features isolated from predatory fish species. However, small turbid ponds (likely unsuitable for breeding) were observed in the meadow adjacent to the action area isolated from the river. Conditions of these small ponds likely vary seasonally/annually depending on precipitation and groundwater levels.

3.4 Status of Federally-Listed/Proposed Species

3.4.1 Discussion of Sierra Nevada Yellow-legged Frog

Habitat and Life History

Historically, SNYLF inhabited lakes, ponds, marshes, meadows, and streams at elevations between 4,500 and 12,000 feet in the western Sierra Nevada from Fresno, Inyo, and Mono Counties and areas north of Lake Tahoe. Generally, they are not found more than 1 meter from water and breed in a variety of habitats including shallows of still lakes or ponds and slow-flowing inlet streams. Egg masses are deposited underwater and attached to rocks, gravel, or vegetation, or are deposited under banks. At high elevations, both frogs and tadpoles overwinter under ice in lakes and streams (USFWS 2014).

The Upper Truckee River corridor, and nearly all tributaries and wetland areas in the Lake Tahoe basin, have been identified by the LTBMU as suitable habitat for SNYLF. According to the LTBMU, known occurrences of SNYLF in the Lake Tahoe basin are in the Desolation Wilderness at Tamarack, Cagwin, Lucille, Margery, Jabu, and Upper, Middle, and Lower Velmas Lakes and the headwaters of Trout Creek at Hell Hole. The

only SNYLF historical occurrence associated with the Upper Truckee River body is from 1952 as documented by the CNDDB. The LTBMU conducts annual surveys for herpetofauna, including SNYLF, throughout the Lake Tahoe basin. However, LTBMU has not conducted surveys on the Upper Truckee River near the action area. Despite the presence of suitable habitat, the potential for occurrence is low considering the presence of predatory trout species in the Upper Truckee River, sparse and low-quality meadow ponds, and the lack of occurrence data in the South Lake Tahoe region.

Trends and Threats

Threats contributing to the danger of extinction throughout the species' range include habitat destruction due to dams, water diversions, recreation, grazing, road construction, and timber harvesting, predation by introduced fish, non-native salmonids, bullfrogs, and other non-native species, climate change, drought, and chytrid (Bd) fungus. The USFWS has not yet published a 5-year review of the species. Estimates of SNYLF population losses range between 69% and 93%, with an estimated 44% reduction of suitable watershed habitat (USFWS 2014).

3.4.2 Survey Results

A SNYLF VES was conducted on August 16, 2023, and a site assessment report was prepared to evaluate habitat, determine presence or absence of SNYLF, and assess potential Project impacts. Additional information is provided in the SNYLF site assessment report prepared for the Project. During the August 16, 2023, VES and the August 14, 2023, reconnaissance-level survey, no SNYLF were detected; however, low-quality suitable habitat was determined to be present, consistent with the LTBMU-mapped suitable habitat for SNYLF in the action area (**Appendix B, Figure 5**). SNYLF habitat present in the action area includes the wetlands of Johnson Meadow that can support lentic backwaters and ponded features isolated from predatory fish species in the Upper Truckee River. Considering the Project is within the historic range of the species, presence of LTBMU-mapped suitable habitat, lack of LTBMU survey information along the Upper Truckee River body and Project vicinity, and proximity to critical habitat, habitat in the action area is low quality for SNYLF and there is low potential for the species to occur.

3.4.3 Status of Designated Critical Habitat in the Action Area for Sierra Nevada Yellow-legged Frog

The SNYLF was listed as endangered under the Federal Endangered Species Act (FESA) in 2014 (USFWS 2014) and 24 critical habitat units covering 1,082,147 acres were designated in 2016 (USFWS 2016). SNYLF critical habitat is absent within the action area and 0.5-mile buffer, therefore, no impacts to critical habitat will result from the Project. The closest critical habitat area is approximately 5 miles west of the action area in the high-elevation Desolation Wilderness. A recovery plan for SNYLF has not been developed.

3.4.4 Discussion of Lahontan Cutthroat Trout

Habitat and Life History

The LCT inhabits freshwater lakes, streams, and rivers in the Lahontan Basin which includes hydrographic systems in northern Nevada, northeastern Sierra Nevada mountains of California, and southeastern Oregon. Historically, LCT were found in cold-water habitats including Pyramid Lake, Walker Lake, Lake Tahoe, Independence Lake, low gradient rivers including Humboldt, Carson, Truckee, Walker, and Marys Rivers, and headwater tributaries including Donner and Prosser Creeks. Riverine habitat is characterized by small, cool, silt-free streams with pools associated with velocity breaks and vegetation cover, stable banks, and riffle-run areas with rocky substrates (USFWS 1995).

Trends and Threats

At the time of listing, anthropogenic impacts and other threats including mining, logging, grazing, pollution, water diversions, dams and reservoirs, and non-native trout introduction had resulted in declining habitat quality and connectedness leading to reduced population numbers and viability across its range. The most recent 5-year review of LCT was published in 2023 and states that non-native trout, habitat loss, fragmentation, and degradation remain the primary threats to LCT. A rising contemporary threat is hybridization with non-native rainbow trout (USFWS 2023c).

The Upper Truckee River is within the Tahoe LCT Management Unit. This management unit is unique in that LCT are frequently stocked in several water bodies by the Lahontan National Fish Hatchery, several state hatcheries, and the Numana Fish Hatchery. In 2022, approximately 100,000 LCT were released into Lake Tahoe (USFWS 2022b). Only one of the potential LCT recovery populations in the Truckee River watershed and Tahoe LCT Management Unit, the Upper Truckee River/Meiss Meadow population approximately 12 miles south (upstream) of the action area, is resilient (USFWS 2023c).

3.4.5 Survey Results

No LCT were observed during the reconnaissance-level survey or the SNYLF VES; however, these surveys were conducted after the spawning season. One deceased brown trout was observed just upstream of the action area indicating positive salmonid passage through the action area. During the surveys, it was determined suitable habitat for LCT is present in the action area considering the presence of the Upper Truckee River, which is a freshwater river located within the LCT Management Unit and historic range of the species. The Upper Truckee River in the action area exhibits consistent, adequate flow which provides connectivity between stocked and managed populations of LCT in the southern Lake Tahoe basin. Pools near cover and velocity breaks, well-vegetated stream banks, and riffle-run areas with a silt-free rocky substrate are present in the action area which may provide suitable LCT spawning and nursery habitat.

Occurrences of LCT in the lower reaches of the Upper Truckee River appear to be rare, but hatchery LCT have been documented in the Upper Truckee River near the Truckee Marsh (USFS 2011). The action area is approximately 1.3 miles from the shore of Lake Tahoe, resulting in the possibility for LCT to make their way upstream from Lake Tahoe to the action area. According to the LTBMU, the USFS assumes LCT occupancy in the entire Upper Truckee River considering the resilient population in the headwaters and the stocked population in Lake Tahoe. Although there are numerous barriers to fish passage between the action area and the Upper Truckee River/Meiss Meadow recovery population, there is a possibility LCT can make their way downstream to the action area depending on the various upstream recovery efforts and changing river flow and barrier conditions (USFS 2012).

3.4.6 Status of Designated Critical Habitat in the Action Area for Lahontan Cutthroat Trout

The LCT was listed under the FESA as threatened in 1975. Critical habitat has not been designated for the species, but the Upper Truckee River is identified by the USFWS as suitable habitat. A recovery plan for the LCT was published in 1995.

Chapter 4. Effects of the Action

Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including consequences of other activities that are caused by the proposed action. The analysis of effects of the action first identifies stressors from Project actions, then exposure to stressors, and finally the response to exposure to stressors to determine consequences. The effects of the action are used to make determinations for each listed species and critical habitat.

4.1 Stressors from the Action

Stressors induce an adverse response in an organism by any physical, chemical, or biological alteration of the environment that can lead to a response from the individual.

Stressors on Sierra Nevada Yellow-legged Frog

No SNYLF were identified in the action area, and the species has not been documented along the Upper Truckee River since 1952. Should a SNYLF occur in the action area vicinity, potential stressors from the Project would include changes to turbidity in the Upper Truckee River and ponds in the Johnson Meadow associated with stormwater runoff, temporary noise, and vibrations from heavy equipment during construction of the boardwalk and bridge, removal of meadow/riparian vegetative cover, and operation of heavy equipment. No changes to stream velocity or channel morphology are anticipated; however, removal of the washed-out bridge partially obstructing the river may result in a change towards more natural flow patterns and restore pre-bridge failure stream bed conditions in the action area.

Stressors on Lahontan Cutthroat Trout

Occurrences of LCT in the lower reaches of the Upper Truckee River appear to be rare, but hatchery LCT have been documented in the Upper Truckee River near the Truckee Marsh (USFS 2011). The action area is approximately 1.3 miles from the shore of Lake Tahoe, resulting in the possibility for LCT to make their way upstream from Lake Tahoe to the action area. Should a LCT occur in the action area vicinity, potential stressors from the Project would include changes to turbidity in the Upper Truckee River associated with stormwater runoff, entrapment within the temporary coffer dam system, visual disturbance caused by crews, equipment, and temporary BMPs such as turbidity curtains, and dewatering in the coffer dam/bridge removal work area and heavy equipment operation. No changes to stream velocity or channel morphology are anticipated; however, removal of the washed-out bridge partially obstructing the river may result in a change towards more natural flow patterns and restore pre-bridge failure stream bed conditions in the action area.

4.2 Exposure to Stressors from the Action

Exposures are defined as the interaction of the species, their resources, and the stressors that result from the Project action.

Sierra Nevada Yellow-legged Frog

In the unlikely event of occurrence, SNYLF individuals of various life stages could be exposed to the stressors identified in the previous section including changes to turbidity in the Upper Truckee River and small ponds in the Johnson Meadow, temporary noise, and vibrations during construction of the boardwalk and bridge, removal of meadow/riparian vegetative cover, and operation of heavy equipment. SNYLF could be exposed to these stressors temporarily during the construction process, depending on the activity and Project phasing, from May to October. Exposure is most likely to occur during initial vegetation clearing and grading, during which individuals have the greatest chance to come into contact with heavy equipment or be exposed to direct sunlight or predators.

There is no SNYLF critical habitat in the action area; however, suitable habitat is present which has been impacted by human activity over previous decades. Permanent and temporary impacts to SNYLF habitat are the same as the permanent and temporary impacts to CDFW and USACE jurisdictional aquatic resources identified by the aquatic resources determination for the Project. There will be 0.15 acres of permanent impacts to freshwater emergent wetlands, 0.16 acres of permanent impacts to freshwater forested/shrub wetlands, and 0.02 acres of permanent impacts to the Upper Truckee River resulting from the bridge and boardwalk construction. In addition, construction of the boardwalk, bridge, and the removal of the existing bridge will result in 0.23 acres of temporary impacts to freshwater emergent wetlands, 0.25 acres of temporary impacts to freshwater forested/shrub wetlands, and 0.02 acres of temporary impacts to the Upper Truckee River. The total permanent impact to wetlands is 0.33 acres, and the total temporary impact to wetlands is 0.5 acres. Removal of the old bridge will result in the gain of 0.01 acres of SNYLF habitat. Exposure could occur during these temporary and permanent habitat modifications.

Lahontan Cutthroat Trout

Should a LCT occur in the action area vicinity, individuals could be exposed to various stressors from the Project including changes to turbidity in the Upper Truckee River, entrapment within the temporary coffer dam system, visual disturbance caused by crews, equipment, and temporary BMPs such as turbidity curtains, and dewatering in the coffer dam/bridge removal work area and heavy equipment operation in the river work area. Bridge demolition will involve jackhammering, ramming (with a mechanical ram, mounted on a backhoe), and a haul or dump truck to export debris. LCT could be exposed to these stressors temporarily during the construction process, primarily during coffer dam construction, dewatering of the coffer dam work area, and bridge demolition and construction, from May to October.

There is no LCT critical habitat designated for the species; however, the Upper Truckee River provides suitable habitat. The Project will result in approximately 0.02 acres of permanent impacts and 0.02 acres of temporary impacts to the Upper Truckee River. Removal of the bridge will involve installation of a coffer dam system (gravel bags, visqueen plastic sheeting, or other similar materials) to protect the work area and maintain Upper Truckee River flows around the washed-out bridge abutment. Fish passage will be maintained throughout the course of construction and will be improved because of the Project. Removal of the old bridge will result in the gain of 0.01 acres of LCT habitat. Exposure could occur during these temporary and permanent habitat modifications.

4.3 Response to the Exposure

The timeframe, pathway, and intensity of exposure to the various potential stressors varies and will depend on the phase and nature of the activity. The conservation measures in Section 2.4 will be incorporated to reduce the chance of exposure to these stressors and prevent adverse effects/responses.

Sierra Nevada Yellow-legged Frog

While occurrence is unlikely and impacts to water quality are not anticipated, exposure to increased turbidity would likely elicit various behavioral and physiological responses from SNYLF, including avoidance of undesirable aquatic conditions and movement to more suitable areas, increased metabolic rate resulting from increased oxygen demands and energy expenditure, and reduced respiratory capability of eggs and tadpoles. Exposure to vibrations, noise, and removal of vegetative cover, may also cause individuals to relocate resulting in an expenditure of time, energy, and putting the individual at increased risk of predation. Removal of vegetative cover may also expose individuals to heat and direct sunlight resulting in desiccation and predation. Direct contact with heavy equipment during vegetation removal and during construction would likely result in mortality of individuals that cannot move out of harm’s way.

The greatest risk of SNYLF exposure to stressors will occur during vegetation clearing and initial grading. During this initial onset of construction, individuals have potential to be crushed by equipment or flushed from habitat which would elicit a series of physiological responses including increased heart rate, respiration, and expenditure of energy reserves. In addition, habitat would be altered as vegetation is removed and soil is exposed to direct sunlight, and the boardwalk and bridge are constructed. However, the elevated boardwalk will allow vegetation to fill in beneath the boardwalk structure, and the new bridge will be an improvement of habitat compared to existing conditions as the damaged concrete bridge will be removed, and the new bridge will entirely span the river.

Lahontan Cutthroat Trout

Individuals or egg masses exposed to increased turbidity would experience reduced respiratory capability; however, LCT are not documented using the lower reaches of the

Upper Truckee River for spawning and nursing. In addition, increased turbidity levels in the Upper Trucke River are not anticipated as protection of water quality is a top priority for the Project. LCT incidentally contained within the gravel bag/visqueen coffer dam structure may be exposed to increased turbidity and other variances in abiotic conditions such as water temperature, triggering various physiological responses resulting in reduced respiratory capability and energy expenditure. Temporary visual disturbances from the presence of construction personnel, BMPs, and equipment in the river may flush individuals resulting in an increased metabolic rate and expenditure of time and energy. Dewatering and heavy equipment operation in the coffer dam work area can expose individuals to direct mortality because of suffocation, being sucked into the pump, or being crushed by equipment or falling concrete debris during bridge demolition.

4.4 Effects of the Action

Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur (50 CFR §402.17). Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (50 CFR §402.02). The effect of the action is the consequence (behavioral, physical, or physiological) of a response to a stressor.

A conclusion that activities are reasonably certain to occur must be based on clear and substantial information, using the best scientific and commercial data available. Factors to consider whether an activity caused by the proposed action is reasonably certain to occur include but are not limited to past experiences with similar activities that have resulted from actions that are similar in scope, nature, and magnitude to the proposed action; existing plans for the activities; any remaining economic, administrative, and legal requirements necessary for the activity to go forward.

Considerations for determining a consequence to the species or critical habitat is not caused by the proposed action include, but are not limited to: the consequence is so remote in time from the proposed action that it is not reasonably certain to occur; or the consequence is so geographically remote from the immediate area involved in the proposed action that it is not reasonably certain to occur; or the consequence is only reached through a lengthy causal chain that involves so many steps as to make the consequence not reasonably certain to occur (50 CFR §402.17).

Sierra Nevada Yellow-legged Frog

Suitable habitat is present within the action area; however, the likelihood of occurrence is low considering the lack of recent detections in previous decades, low quality lentic backwaters and ponded features isolated from predatory fish species in the Upper Truckee River, and results of the visual encounter survey. The Upper Truckee River has been subject to various restoration projects upstream and downstream of the action

area over the past two decades, and a future restoration project in Johnson Meadow led by the Tahoe Resource Conservation District is currently in the environmental review stage. These projects have addressed restoring flow to relict channels, improving bank stability, reducing sediment flow to Lake Tahoe, and improving wetland and special status species habitat.

Overall, the Project will have minimal effect on existing habitat quality considering the presence of informal trails and utility access routes in the action area. By providing an elevated boardwalk through the Johnson Meadow, the Project would reduce impacts from pedestrians and mountain bikers and would maintain access through the meadow during periods of elevated groundwater and saturated soils while allowing native vegetation to fill in space beneath the boardwalk. Removal of the damaged bridge and construction of the new bridge will address erosion and bank instability issues in the Upper Truckee River. Since no direct adverse impacts are anticipated and individuals are unlikely to occur, the Project will have no impact on the resiliency, representation, and redundancy of known SNYLF populations.

Lahontan Cutthroat Trout

Though suitable habitat is present within the Upper Truckee River, it is not known to be used for spawning or migration for a Lake Tahoe population and there is limited occurrences of hatchery LCT making their way up the Upper Truckee River, resulting in a low likelihood of LCT occurring in the action area. As previously mentioned, the only known resilient population is the Upper Truckee River/Meiss Meadow population approximately 12 miles south of the action area which is separated from the action area by numerous barriers to fish passage.

The Project would improve habitat quality for LCT by removing the damaged bridge, which partially obstructs river flow and fish passage, and replacing it with a bridge that entirely spans the river. Removal of the damaged bridge will also address erosion and bank instability issues. Therefore, the Project is anticipated to have an overall beneficial effect on LCT. Since no direct adverse impacts are anticipated and individuals are unlikely to occur, the Project will have no impact on the resiliency, representation, and redundancy of known LCT populations.

4.5 Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area described in this biological assessment. Future federal actions that are unrelated to the proposed action are not considered in this cumulative effects analysis because those actions will require separate consultation pursuant to section 7 of the Federal Endangered Species Act.

The Upper Truckee River has been subject to various restoration projects upstream and downstream of the Action Area over the past two decades, and a future restoration project in Johnson Meadow led by the TRCD is currently in the environmental review stage. The key objective of TRCD’s project is to restore overbank flows of the Upper

Truckee River to disperse and spread across the meadow surface. Construction of the Class 1 trail and boardwalk and the bridge replacement, as proposed by the County's Project, will not pose a cumulative effect with TRCD's restoration project. Rather, the Project will support the future Johnson Meadow restoration effort by removing the damaged bridge from the river, which in its current state is causing sediment and debris accumulation, bank instability, erosion, and partially obstructing fish passage. The TRCD restoration project will also be subject to its own USACE Section 404 Nationwide Permit and will likely receive its own Section 7 analysis.

The Class 1 trail and boardwalk segments support long-term transportation improvement plans that will stabilize the existing dirt trails and utility access and prevent off-trail impacts both in the uplands and in the Johnson Meadow Stream Environment Zone. Whereas all impacts identified for Project construction and operation are or have been mitigated to less than significant, and no cumulative impacts would occur.

Cumulative effects of the proposed action are not described in further detail as part of this analysis because all listed species within the action area are not likely to be adversely affected by the proposed action, and no designated critical habitat is present.

4.6 Discussion Supporting Determination

Sierra Nevada Yellow-legged Frog

Flows of the Upper Truckee River in the action area are generally too rapid for SNYLF foraging and breeding, but pools between riffles and runs may provide suitable microhabitats; however, the presence of predatory fish species such as trout reduce potential for SNYLF. This riverine and meadow habitat is different from the high-elevation alpine lakes of the Desolation Wilderness, where the species is currently known to occur, and the small, isolated ponds, inlet streams, and other vernal wetland features in the action area that may provide habitat for SNYLF are limited resulting from the channelization and incision of the Upper Truckee River associated with historic disturbance and land use.

According to the LTBMU, known occurrences of SNYLF in the Lake Tahoe basin are in the Desolation Wilderness at Tamarack, Cagwin, Lucille, Margery, Jabu, and Upper, Middle, and Lower Velmas Lakes and the headwaters of Trout Creek at Hell Hole. The only SNYLF historical occurrence associated with the Upper Truckee River body is from 1952 as documented by the CNDDB. The LTBMU conducts annual surveys for herpetofauna, including SNYLF, throughout the Lake Tahoe basin. However, LTBMU has not conducted surveys on the Upper Truckee River near the action area. Despite the presence of suitable habitat, the potential for occurrence is low considering the channelization of the Upper Truckee River, presence of predatory trout species, and the lack of occurrence data in the South Lake Tahoe region.

During the August 16, 2023, VES and the August 14, 2023, reconnaissance-level survey, no SNYLF were detected; however, low-quality suitable habitat was determined to be present, consistent with the LTBMU-mapped suitable habitat for SNYLF in the

action area (**Appendix B, Figure 5**). SNYLF habitat present in the action area includes the Johnson Meadow which can support lentic backwaters and ponded features isolated from predatory fish species in the Upper Truckee River.

Based on the presence of low-quality habitat, lack of occurrence data, survey results, and the potential frequency, intensity, and severity of stressors, the conservation measures in Section 2.4 will prevent adverse effects to SNYLF. For example, an additional VES will be conducted in suitable habitat areas prior to construction, and sensitive habitat areas will be clearly marked on Project plans and protected with vegetation/silt fencing, which includes the stream environment zone associated with the Upper Truckee River and Johnson Meadow. In addition, a biological monitor will be present with authority to stop construction to identify potential SNYLF observed in the action area. Any individual will be allowed to move out of harm's way on their own accord, and no SNYLF will be handled or relocated.

Lahontan Cutthroat Trout

Critical habitat has not been designated for this species, but the Upper Truckee River is identified by the USFWS as suitable habitat for LCT. No LCT were observed during the reconnaissance-level survey or the SNYLF VES; however, these surveys were conducted after the spawning season. During the surveys, it was determined suitable habitat for LCT is present in the action area considering the presence of the Upper Truckee River, which is a freshwater river located within the LCT Management Unit and historic range of the species. The Upper Truckee River in the action area exhibits consistent, adequate flow which provides connectivity between stocked and managed populations of LCT in the southern Lake Tahoe basin. Pools near cover and velocity breaks, well-vegetated stream banks, and riffle-run areas with a silt-free rocky substrate are present in the action area which may provide suitable LCT spawning and nursery habitat.

Although occurrences of LCT in the lower reaches of the Upper Truckee River appear to be rare, hatchery LCT have been documented in the Upper Truckee River near the Truckee Marsh (USFS 2011). The action area is approximately 1.3 miles from the shore of Lake Tahoe, resulting in the possibility for stocked LCT to make their way upstream from Lake Tahoe to the action area. According to the LTBMU, the USFS assumes LCT occupancy in the entire Upper Truckee River considering the resilient population in the headwaters and the stocked population in Lake Tahoe. Although there are numerous barriers to fish passage between the action area and the Upper Truckee River/Meiss Meadow recovery population, there is a possibility LCT can make their way downstream to the action area depending on the various upstream recovery efforts and changing river flow and barrier conditions (USFS 2012).

Demolition and removal of the existing bridge poses the greatest risk of adverse effects to LCT as removal of the existing bridge foundation, which is placed directly in the river, will require the use of heavy equipment. However, potential direct and indirect impacts will be avoided by following the proposed avoidance and minimization measures discussed in Section 2.4. A coffer dam system will be installed to restrict the Upper

Truckee River to its primary flow path around the damaged bridge while it is demolished and removed. Dewatering may be required in the contained coffer dam area prior to bridge removal work. The new bridge will entirely span the river and poses less risk than removal of the existing bridge to impact LCT during construction, and a rigorous suite of temporary construction BMPs will be required to comply with CDFW, TRPA, USACE, and RWQCB permits. The Project will result in a net improvement of LCT habitat by replacing the damaged bridge, which in its current state partially obstructs fish passage in the Upper Truckee River, with a bridge that entirely spans the river.

Based on the presence of suitable habitat, lack of occurrence data, and the potential frequency, intensity, and severity of stressors, the avoidance and minimization measures in Section 2.4 will reduce the potential for adverse effects to LCT. Specifically, a pre-construction fish survey will be conducted, and a biologist will be present to monitor coffer dam installation and removal, dewatering, and bridge demolition. In addition, the Upper Truckee River will be marked on the Project plans as an environmentally sensitive area which will be protected with silt fence and other BMPs. Any BMPs used in the river will be approved by CDFW and/or USFWS, will maintain fish passage at all times, and will be frequently inspected by a biological monitor. No LCT will be handled or relocated.

4.7 Determination

4.7.1 Species and critical habitat determination

1) No Effect

A no effect determination was made for the following species and their associated designated critical habitat. No consultation is required. Additional rational for Project findings are provided in section 1.2 and in the Natural Environment Study.

- North American Wolverine
- Sierra Nevada Red Fox
- California spotted owl
- Monarch butterfly
- Northwestern pond turtle

2) May Affect-Not Likely to Adversely Affect

A may affect-not likely to adversely affect determination was made for the following species and/or designated critical habitat. Informal consultation is required.

- Sierra Nevada yellow-legged frog
- Lahontan cutthroat trout

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United States Fish and Wildlife Service. 2022b. “Lake Tahoe to Receive 100,000 Lahontan Cutthroat Trout This Summer.” June 3, 2022 Press Release. https://fws.gov/press-release/2022-06/lake-tahoe-receive-100000-lahontan-cutthroat-trout-summer. Accessed 9/18/2023.

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turtle (*Actinemys pallida*)", Version 1.1, April 2023. U.S. Fish and Wildlife Service, Ventura Fish and Wildlife Office, Ventura, California.

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United States Geological Survey. 2006. "USGS western pond turtle (*Emys marmorata*) visual survey protocol for the southcoast ecoregion." U. S. Geological Survey protocol. San Diego, CA. 56 pp.

Appendix A USFWS IPaC Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Reno Fish And Wildlife Office
1340 Financial Boulevard, Suite 234
Reno, NV 89502-7147
Phone: (775) 861-6300 Fax: (775) 861-6301

In Reply Refer To: 06/17/2024 18:27:04 UTC
Project Code: 2024-0104944
Project Name: South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through IPaC by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see Migratory Bird Permit | What We Do | U.S. Fish & Wildlife Service (fws.gov).

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Reno Fish And Wildlife Office
1340 Financial Boulevard, Suite 234
Reno, NV 89502-7147
(775) 861-6300

PROJECT SUMMARY

Project Code: 2024-0104944

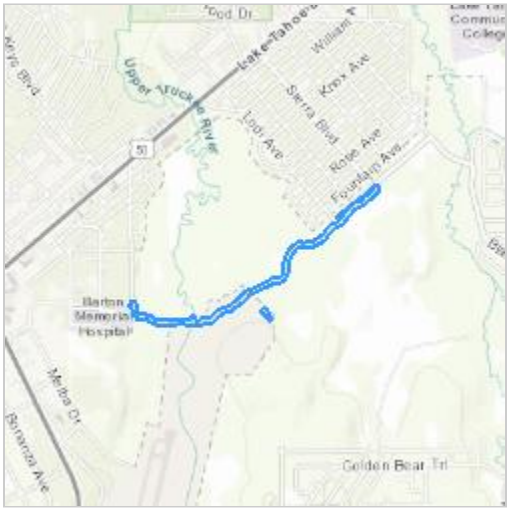
Project Name: South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow

Project Type: Bridge - Replacement

Project Description: El Dorado County (County), in cooperation with Caltrans, proposes to build upon the overall shared-use path network on the south shore of Lake Tahoe with construction of South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow Project. The Project is 1 in a series of erosion control/water quality, environmental restoration, and shared-use path projects implemented by the El Dorado County Department of Transportation and an extension to the Dennis T. Machida Memorial Greenway. It is identified within the Tahoe Regional Planning Agency's (TRPA) Environmental Improvement Program as Project #03.02.02.0085 and Federal Aid Project # STPL-5925(183). The Project supports the Linking Tahoe: Active Transportation Plan, approved by the Tahoe Metropolitan Planning Organization and the Tahoe Valley Area Plan.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.9149375,-119.98397206144458,14z



Counties: El Dorado County, California

ENDANGERED SPECIES ACT SPECIES

There is a total of 7 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
North American Wolverine *Gulo gulo luscus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5123	Threatened
Sierra Nevada Red Fox *Vulpes vulpes necator* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4252	Endangered

BIRDS

NAME	STATUS
California Spotted Owl *Strix occidentalis occidentalis* Population: Sierra Nevada No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7266	Proposed Threatened

REPTILES

NAME	STATUS
Northwestern Pond Turtle *Actinemys marmorata* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1111	Proposed Threatened

AMPHIBIANS

NAME	STATUS
Sierra Nevada Yellow-legged Frog *Rana sierrae* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9529	Endangered

FISHES

NAME	STATUS
Lahontan Cutthroat Trout *Oncorhynchus clarkii henshawi* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3964	Threatened

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are likely bald eagles present in your project area. For additional information on bald eagles, refer to Bald Eagle Nesting and Sensitivity to Human Activity

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Jan 1 to Aug 31

NAME	BREEDING SEASON
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Dec 1 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

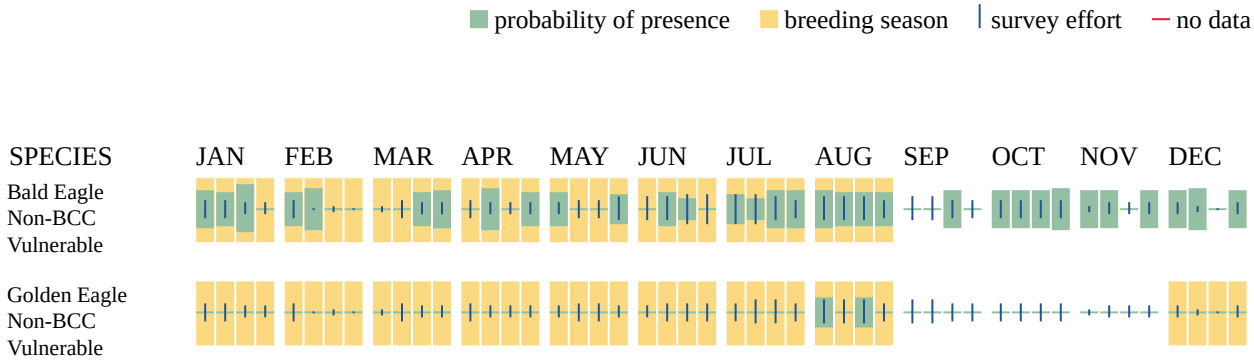
Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management

- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Dipper *Cinclus mexicanus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/11928	Breeds Mar 21 to Aug 21
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Jan 1 to Aug 31
Black-throated Gray Warbler *Setophaga nigrescens* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9584	Breeds May 1 to Jul 20

NAME	BREEDING SEASON
California Gull *Larus californicus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10955	Breeds Mar 1 to Jul 31
Calliope Hummingbird *Selasphorus calliope* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9526	Breeds May 1 to Aug 15
Cassin's Finch *Haemorhous cassinii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9462	Breeds May 15 to Jul 15
Clark's Grebe *Aechmophorus clarkii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10575	Breeds Jun 1 to Aug 31
Evening Grosbeak *Coccothraustes vespertinus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9465	Breeds May 15 to Aug 10
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Dec 1 to Aug 31
Hermit Warbler *Setophaga occidentalis* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/11957	Breeds May 5 to Jul 15
Lawrence's Goldfinch *Spinus lawrencei* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9464	Breeds Mar 20 to Sep 20
Lewis's Woodpecker *Melanerpes lewis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9408	Breeds Apr 20 to Sep 30
Long-eared Owl *asio otus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3631	Breeds Mar 1 to Jul 15

NAME	BREEDING SEASON
Olive-sided Flycatcher *Contopus cooperi* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31
Western Grebe *aechmophorus occidentalis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/6743	Breeds Jun 1 to Aug 31
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10669	Breeds Apr 20 to Aug 5

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

■ probability of presence ■ breeding season | survey effort – no data

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC


American Dipper
BCC - BCR
Bald Eagle
Non-BCC
Vulnerable
Black-throated
Gray Warbler
BCC - BCR
California Gull
BCC Rangewide
(CON)
Calliope
Hummingbird
BCC Rangewide
(CON)
Cassin's Finch
BCC Rangewide
(CON)
Clark's Grebe
BCC Rangewide
(CON)
Evening Grosbeak
BCC Rangewide
(CON)
Golden Eagle
Non-BCC
Vulnerable
Hermit Warbler
BCC - BCR
Lawrence's
Goldfinch
BCC Rangewide
(CON)
Lewis's
Woodpecker
BCC Rangewide
(CON)
SPECIES
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Long-eared Owl
BCC Rangewide
(CON)
Olive-sided
Flycatcher
BCC Rangewide
(CON)
Western Grebe
BCC Rangewide
(CON)

Willet
BCC Rangewide
(CON)



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

RIVERINE

- R4SBA
- R3UBF
- R3UBH

FRESHWATER EMERGENT WETLAND

- PEM1B

FRESHWATER FORESTED/SHRUB WETLAND

- PSS1C

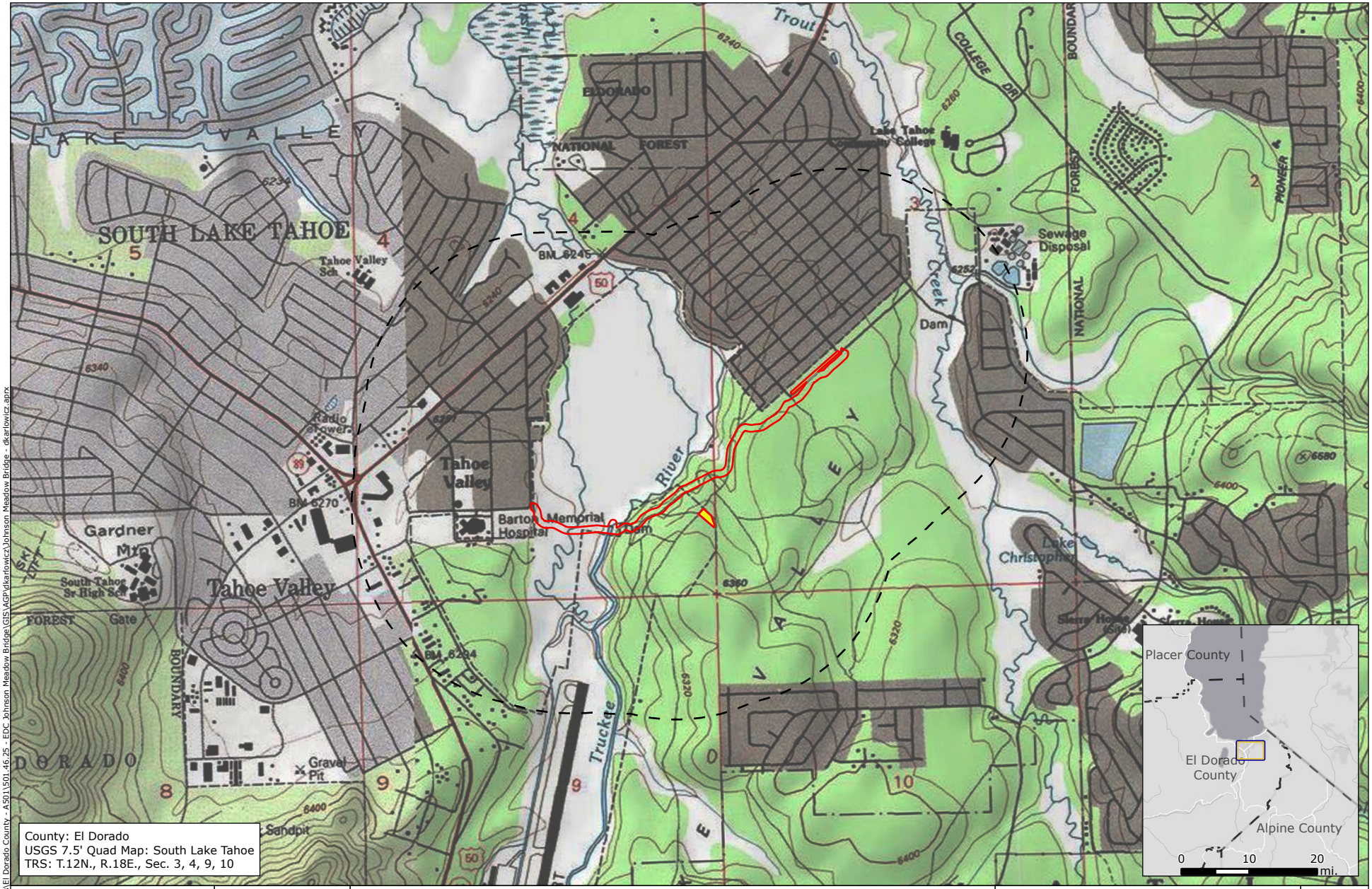
IPAC USER CONTACT INFORMATION

Agency: NCE
Name: Dylan Karlowicz
Address: PO Box 1760
City: Zephyr Cove
State: NV
Zip: 89448
Email dkarlowicz@ncenet.com
Phone: 7755882505

LEAD AGENCY CONTACT INFORMATION

Lead Agency: California Department of Transportation

Appendix B Figures



County: El Dorado
USGS 7.5' Quad Map: South Lake Tahoe
TRS: T.12N., R.18E., Sec. 3, 4, 9, 10

Legend

- Project Area
- Staging Area
- 0.5-mile buffer

NCE

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow

Project Area Location Map

N

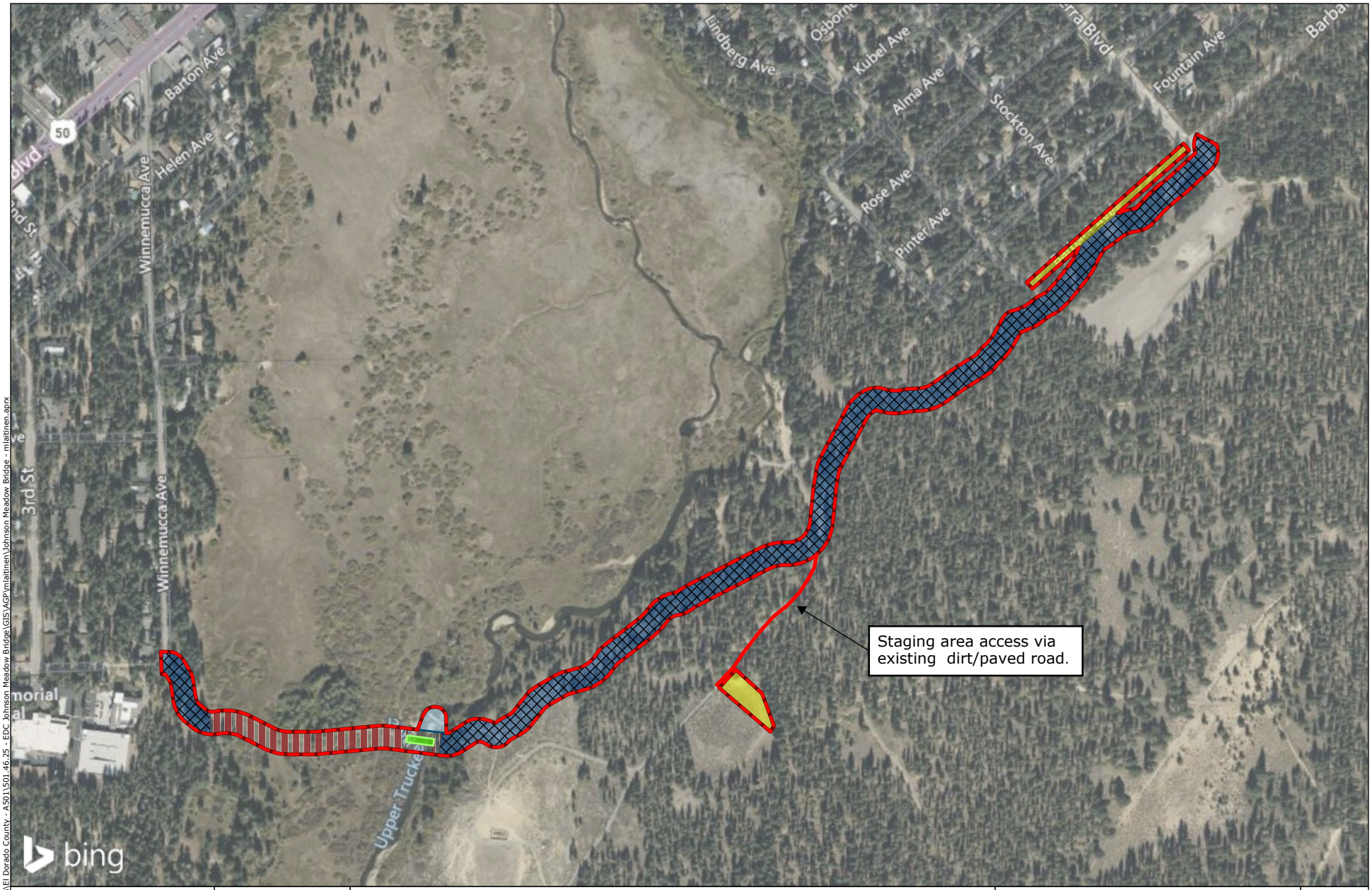
1 : 24,000

0 1,000 2,000 ft.

FIGURE 1

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
ESRI USGS Topo Maps, El Dorado County, NCE	501.46.25	dkarlowicz	10/4/2023	-	drios

Document Path: P:\Active Projects\El Dorado County - A501\501.46.25 - EDC Johnson Meadow Bridge\GIS\AGP\dkarlowicz\Johnson Meadow Bridge - dkarlowicz.aprx



Project Area
Class 1 Shared Used Path
Boardwalk
New Bridge
Bridge Removal
Staging Area

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow
Project Area Detail Map

N

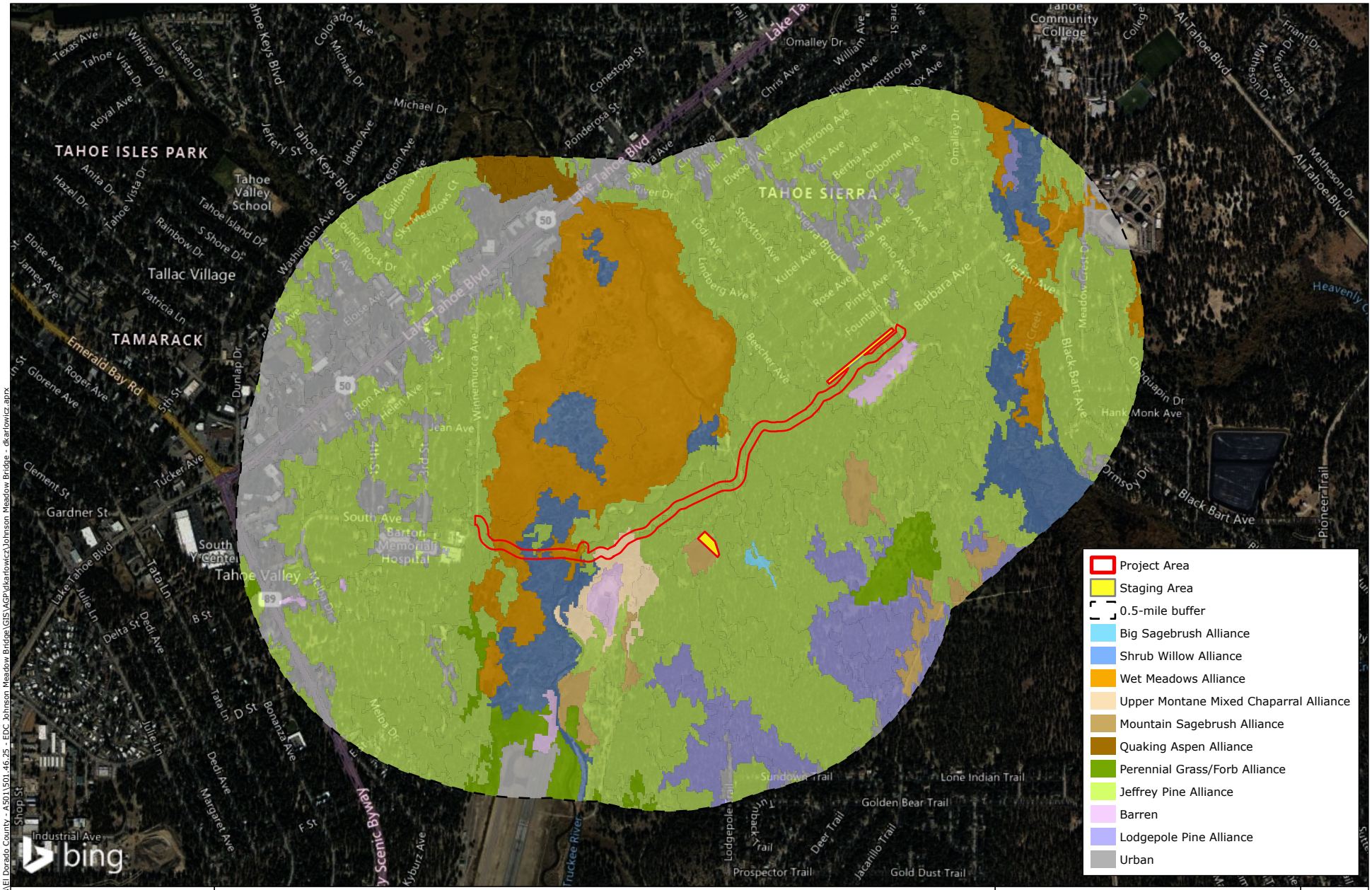
1 in. = 600 ft.

0 600 ft.

FIGURE 2

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Basemap	501.46.25	mlaitinen	5/25/2023	-	jhall

Document Path: P:\Active Projects\El Dorado County - A501\501.46.25 - EDC Johnson Meadow Bridge\GIS\AGP\mlaitinen\Johnson Meadow Bridge - mlaitinen.aprx



South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow
Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG) Map

N

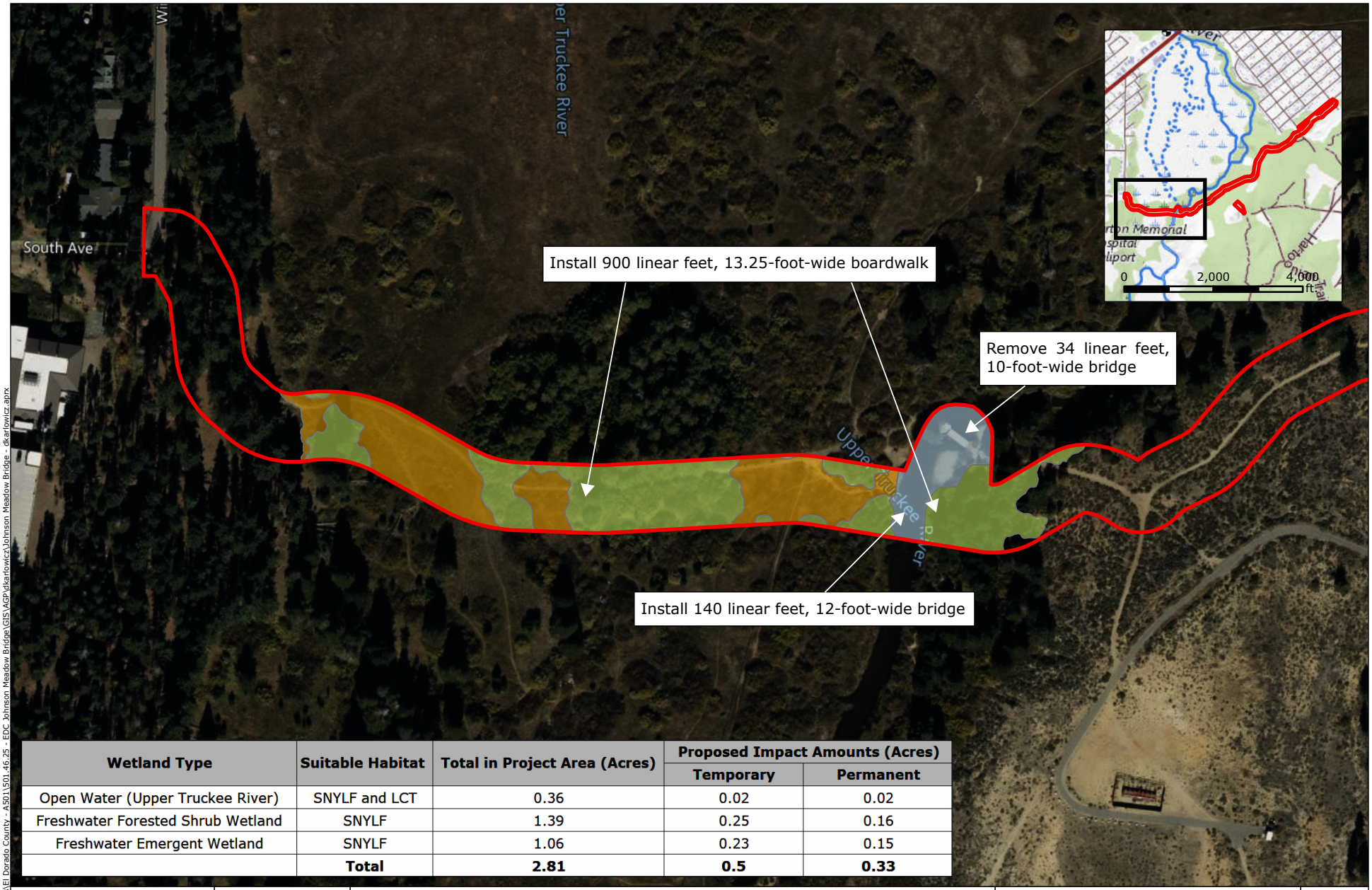
1 in. = 1,500 ft.

0 1,500 ft.

FIGURE 3

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Basemap, El Dorado County, NCE, CALVEG	501.46.25	dkarlowicz	9/12/2023	-	drios

Document Path: P:\Active Projects\El Dorado County - A501\501.46.25 - EDC Johnson Meadow Bridge\GIS\AGP\dkarlowicz\Johnson Meadow Bridge - dkarlowicz.aprx



Wetland Type	Suitable Habitat	Total in Project Area (Acres)	Proposed Impact Amounts (Acres)	
			Temporary	Permanent
Open Water (Upper Truckee River)	SNYLF and LCT	0.36	0.02	0.02
Freshwater Forested Shrub Wetland	SNYLF	1.39	0.25	0.16
Freshwater Emergent Wetland	SNYLF	1.06	0.23	0.15
	Total	**2.81**	**0.5**	**0.33**

Project Area
Open Water
Freshwater Forested Shrub Wetland
Freshwater Emergent Wetland

NCE

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow
Sierra Nevada Yellow-legged Frog (SNYLF) and Lahontan Cutthroat Trout (LCT)
Suitable Habitat Impact Map

N
1 in. = 200 ft.
0 100 200 ft.

FIGURE 4

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Basemap, El Dorado County, NCE	501.46.25	dkarlowicz	11/8/2023	-	drios

Document Path: P:\Active Projects\El Dorado County - A501\501.46.25 - EDC Johnson Meadow Bridge\GIS\AGP\dkarlowicz\Johnson Meadow Bridge - dkarlowicz.aprx



Project Area
0.5-mile Buffer
Staging Area
SNYLF Suitable Habitat

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow
Lake Tahoe Basin Management Unit (LTMBU)
Sierra Nevada Yellow-legged Frog (SNYLF) Suitable Habitat

N

1 in. = 1,500 ft.

0 1,500 ft.

FIGURE 5

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Basemap, El Dorado County, NCE, LTBMU	501.46.25	dkarlowicz	9/8/2023	-	drios

Document Path: P:\Active Projects\El Dorado County - A501\501.46.25 - EDC Johnson Meadow Bridge\GIS\AGP\dkarlowicz\Johnson Meadow Bridge - dkarlowicz.aprx

Appendix C Photographs



Photograph 1. South-facing view of Upper Truckee River and willow shrub habitat.



Photograph 2. North-facing view of Upper Truckee River and washed-out pedestrian bridge.



Photograph 3. North-facing view of bar and woody debris accumulation at the damaged bridge.



Photograph 4. West-facing view of the Upper Truckee River primary flow path around the damaged bridge.



Photograph 5. East-facing view of proposed bridge replacement crossing location.



Photograph 6. North-facing view of representative forested/willow shrub wetland and wet meadow habitat west of the Upper Truckee River.



Photograph 7. Representative photo of small ponds in forested/willow shrub wetland.



Photograph 8. East-facing view of existing path and wet meadow habitat west of the Upper Truckee River.



Photograph 9. West-facing view of the existing trail on the east end of the Project.



Photograph 10. West-facing view of big sagebrush and conifer habitats east of the Upper Truckee River.



Photograph 11. Southwest-facing view of the Barbara Avenue staging area.



Photograph 12. South-facing view of the southern staging area.

Appendix D Plans

INDEX OF SHEETS

SHEET	PLAN SHEET	TITLE
1		TITLE SHEET
2-5	CD-1 THRU CD-4	SURVEY CONTROL DIAGRAM
6	X-1	TYPICAL SECTIONS
7-17	L-1 THRU L-11	LAYOUT & PROFILE
18-?	C-1 THRU C?	CONSTRUCTION DETAILS
?-?	SPD-1 THRU SPD-?	SIGNING & PAVEMENT DELINEATION
?-?	CS-1 THRU CS-?	CONSTRUCTION AREA SIGNS
?-?	TR-1 THRU TR-5	TREE REMOVAL & PROTECTION
?-?	EC-1 THRU EC-?	EROSION CONTROL

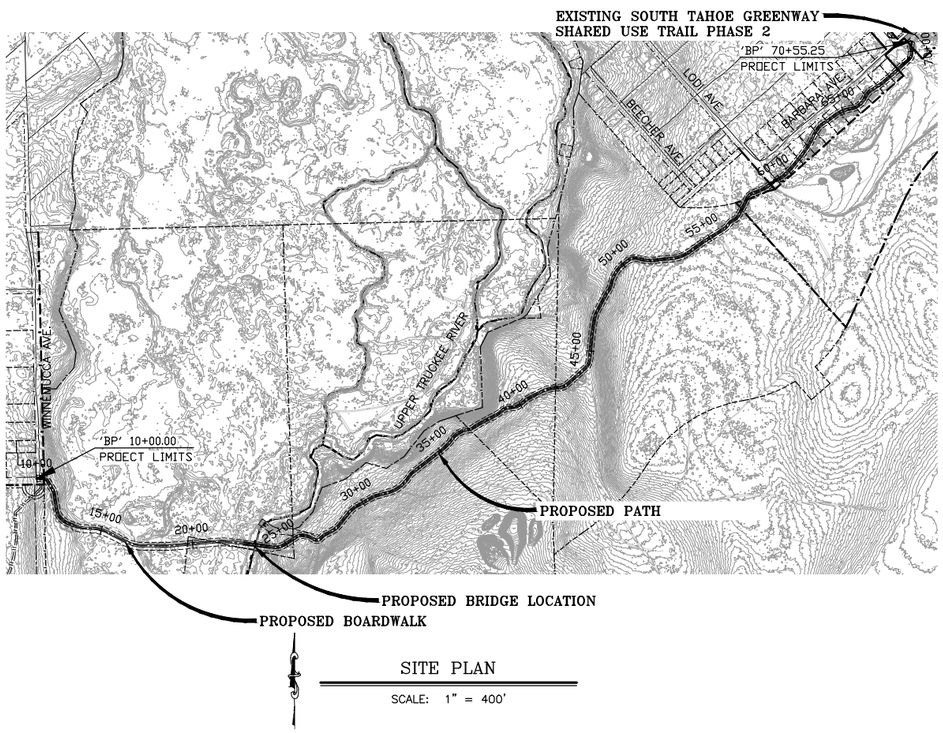
COUNTY OF EL DORADO, CA
DEPARTMENT OF TRANSPORTATION

PROJECT PLANS FOR THE CONSTRUCTION OF

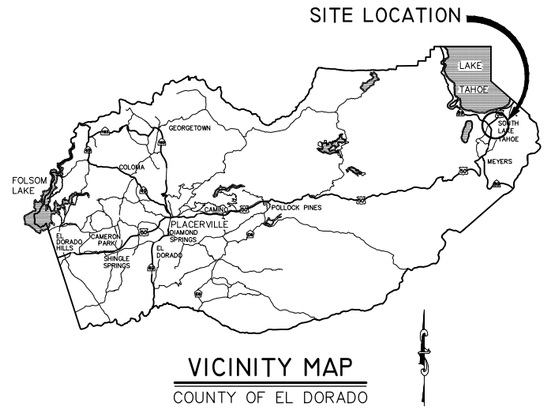
SOUTH TAHOE GREENWAY – UPPER TRUCKEE RIVER BRIDGE AT JOHNSON MEADOW

IN THE COUNTY OF EL DORADO, DISTRICT 5,
IN THE CITY OF SOUTH LAKE TAHOE AND THE UNINCORPORATED AREA OF EL DORADO COUNTY BETWEEN WINNEMUCCA AVENUE AND SIERRA BOULEVARD

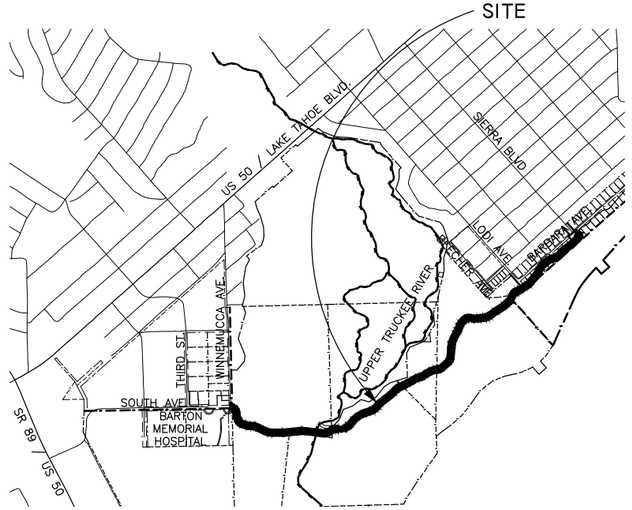
To be supplemented with Standard Plans and Specifications dated 2022, including 2022 Revised Standard Specifications, of the California Department of Transportation, unless otherwise noted.



SITE PLAN
SCALE: 1" = 400'



VICINITY MAP
COUNTY OF EL DORADO



LOCATION MAP
SCALE: 1" = 1000'

FUNDING AGENCY

CONTRACTOR'S LICENSE CLASSIFICATION: Bidders shall be properly licensed to perform the Work pursuant to the State Contractor's License Law (Business and Professions Code section 7000 et seq.) and shall possess a CLASS A LICENSE or equivalent combination of Classes required by the categories and type of Work included in the Contract Documents and Plans, at the time the Contract is awarded, and shall maintain a valid license through completion and acceptance of the Work including guarantee and warranty period. If the Contractor possesses a Class A license instead of the equivalent combination of Classes required by the categories and type of work included in the Contract Documents and Plans, then the Contractor or a subcontractor must also possess a CLASS C27 "Landscaping Contractor" license. Failure of the successful Bidder to obtain proper and adequate licensing for an award of the Contract shall constitute a failure to execute the Contract, and shall result in forfeiture of the Bidders security.

REVISIONS

MARK	DATE	BY	

EL DORADO COUNTY CALIFORNIA

PREFINAL-PARTIAL

SUBMITTED BY:
CIVIL ENGINEER
STATE OF CALIFORNIA NO.

DATE

BOARD OF SUPERVISORS

ADOPTED AND APPROVED BY:

CHAIR, EL DORADO COUNTY BOARD OF SUPERVISORS

APPROVED BY:

DEPARTMENT OF TRANSPORTATION

DEPUTY DIRECTOR, ENGINEERING

DATE

DATE

DATE

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
(530) 573-7900 (530) 621-5900
924 B EMERALD BAY ROAD 2850 FAIRLANE CT
SOUTH LAKE TAHOE, CA PLACERVILLE, CA
96150 95667

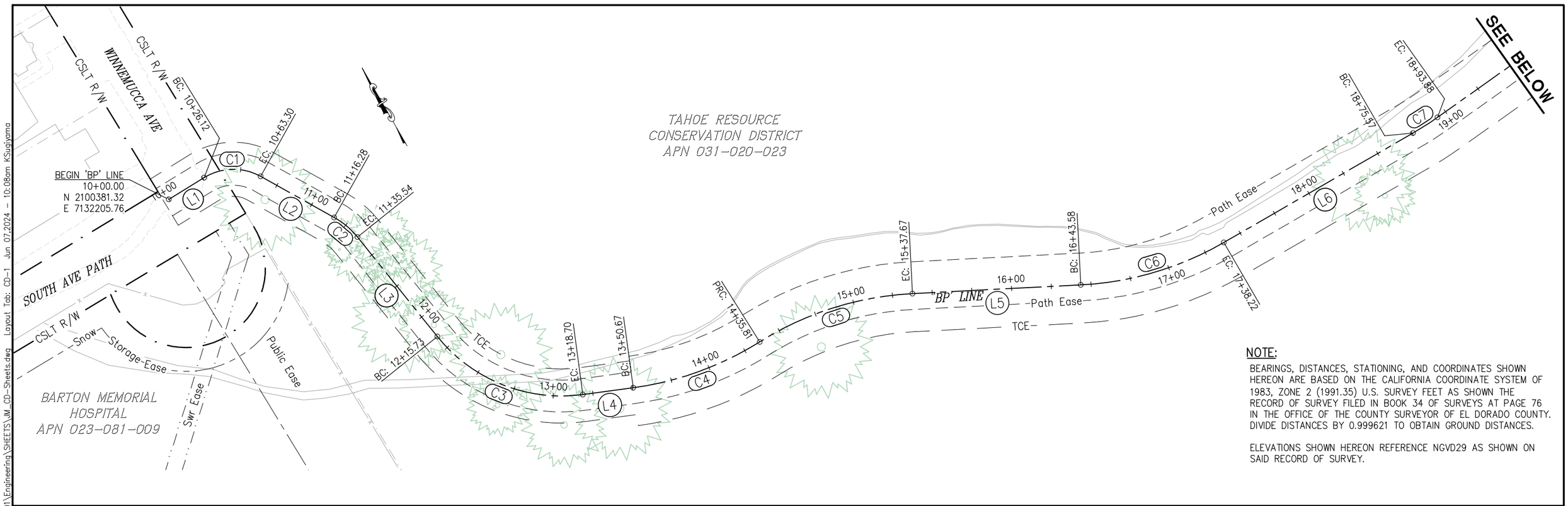
CONTRACT NO. ----, CIP NO. 36107023

SOUTH TAHOE GREENWAY - UPPER TRUCKEE RIVER BRIDGE AT JOHNSON MEADOW

TITLE SHEET

SHEET 1 OF ??

Drawing name: \\CDAData\TD-SLT-Engineering\CIVIL 3D PROJECTS\95201\Engineering\SHEETS\JM_TITLE-Sheet.dwg



NOTE:

BEARINGS, DISTANCES, STATIONING, AND COORDINATES SHOWN HEREON ARE BASED ON THE CALIFORNIA COORDINATE SYSTEM OF 1983, ZONE 2 (1991.35) U.S. SURVEY FEET AS SHOWN THE RECORD OF SURVEY FILED IN BOOK 34 OF SURVEYS AT PAGE 76 IN THE OFFICE OF THE COUNTY SURVEYOR OF EL DORADO COUNTY. DIVIDE DISTANCES BY 0.999621 TO OBTAIN GROUND DISTANCES.

ELEVATIONS SHOWN HEREON REFERENCE NGVD29 AS SHOWN ON SAID RECORD OF SURVEY.

SURVEY DIAGRAM
SCALE : 1" = 30'

ORIGINAL SCALE IS IN INCHES
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FOR REDUCED PLANS

REVISION NUMBER	DATE	DESCRIPTION	BY

PRELIMINARY

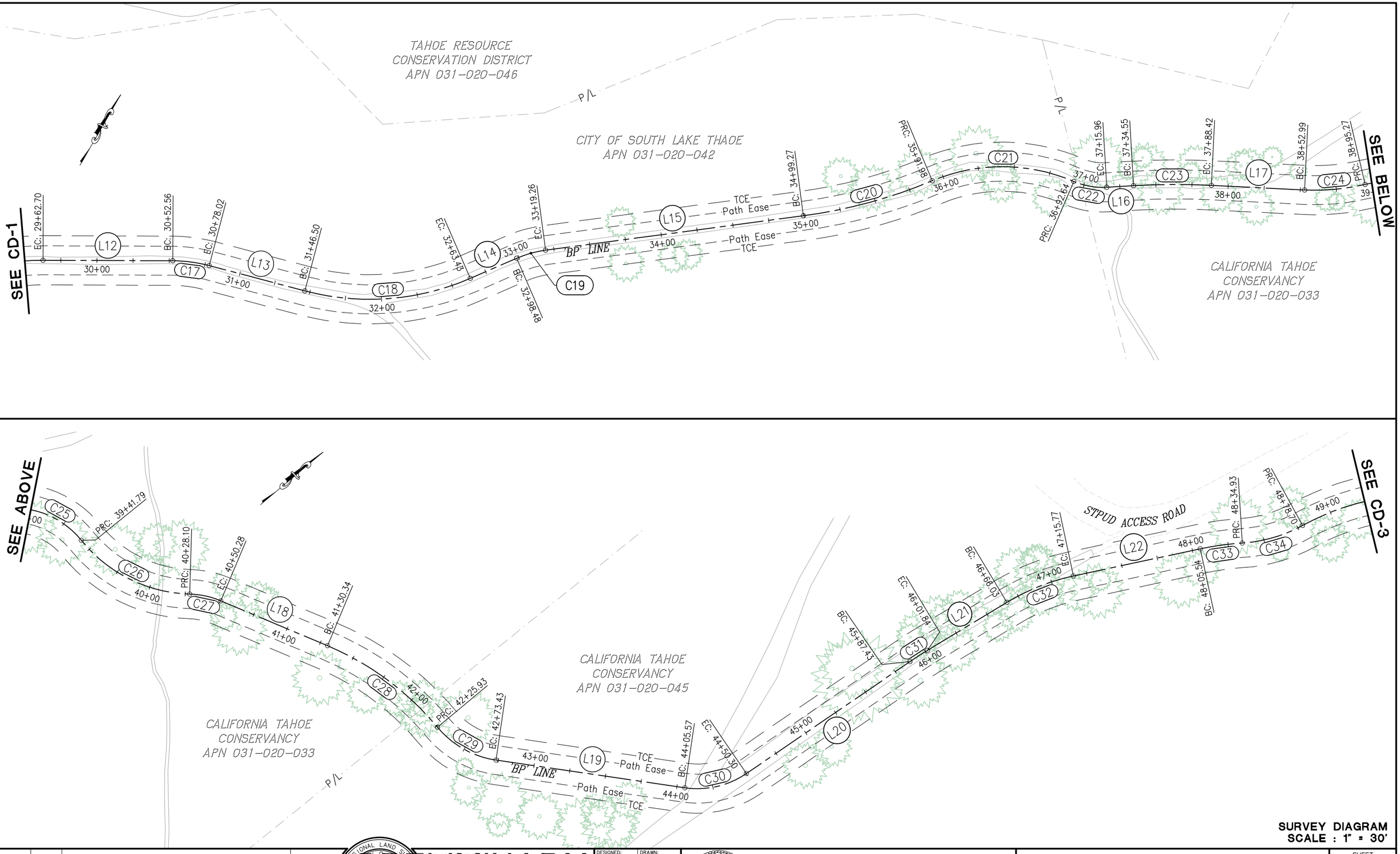
PREPARED UNDER THE SUPERVISION OF:
Joseph D. Judy
No. LS 9026
PROFESSIONAL LAND SURVEYOR
DATE: MONTH DAY YEAR

DESIGNED: DSP	DRAWN: KIS
CHECKED: JCN	DATE: 06/2024
ROAD NUMBER: NA	

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY -
UPPER TRUCKEE RIVER BRIDGE
AT JOHNSON MEADOW

SHEET
CD-1
2 OF ??
W.O. No.
36107023



SURVEY DIAGRAM
SCALE : 1" = 30'

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0 1 2

FOR REDUCED PLANS

REVISION NUMBER	DATE	DESCRIPTION	BY

PROFESSIONAL LAND SURVEYOR — STATE OF CALIFORNIA

PRELIMINARY

PREPARED UNDER THE SUPERVISION OF:
Jason D. Kay
PROFESSIONAL LAND SURVEYOR
DATE: MONTH DAY YEAR

DESIGNED:	DRAWN:
DSP	KIS
CHECKED:	DATE:
JCN	06/2024
ROAD NUMBER:	
NA	

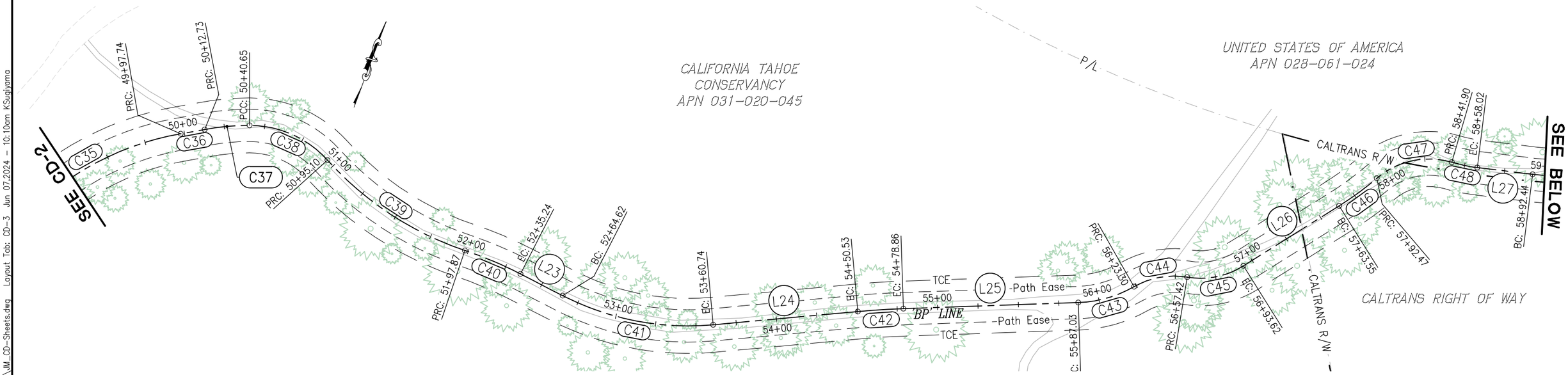
EL DORADO COUNTY — CALIFORNIA

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

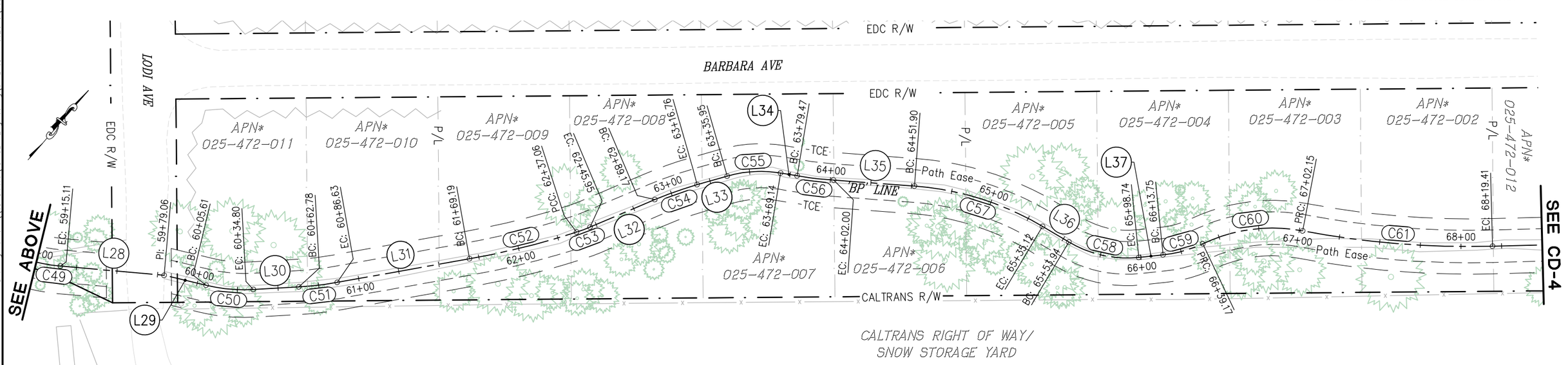
SOUTH TAHOE GREENWAY - UPPER TRUCKEE RIVER BRIDGE AT JOHNSON MEADOW

SHEET
CD-2
3 OF ??
W.O. No.
36107023

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FOR REDUCED PLANS



APN* OWNERSHIP:
STATE OF CALIFORNIA TAHOE CONSERVANCY



SURVEY DIAGRAM
SCALE : 1" = 30'

REVISION				
NUMBER	DATE	DESCRIPTION	BY	

PREPARED UNDER THE SUPERVISION OF:
Stephen L. Ruiz
No. LS 9126
PROFESSIONAL LAND SURVEYOR
DATE: MONTH DAY YEAR

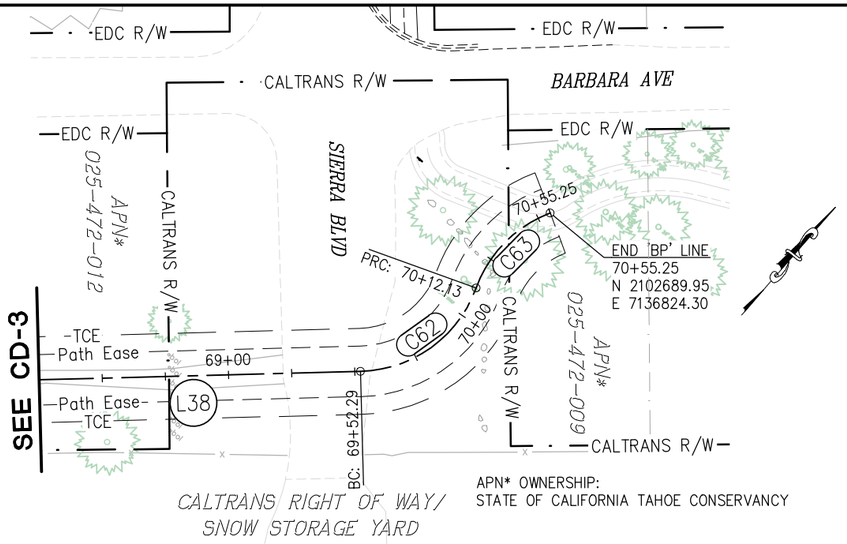
PRELIMINARY

DESIGNED: DSP	DRAWN: KIS
CHECKED: JCN	DATE: 06/2024
ROAD NUMBER: NA	

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY -
UPPER TRUCKEE RIVER BRIDGE
AT JOHNSON MEADOW

SHEET CD-3 4 OF ??
W.O. No. 36107023



'BP' LINE

NUMBER	LENGTH	RADIUS	LINE / CHORD DIRECTION & LENGTH	DELTA
L1	26.12		N 88° 19' 08" E	
C1	37.18	35.00	S 61° 14' 54" E – 35.46	60° 51' 56"
L2	52.98		S 30° 48' 56" E	
C2	19.26	50.00	S 19° 46' 53" E – 19.14	22° 04' 05"
L3	80.19		S 8° 44' 50" E	
C3	102.97	100.00	S 38° 14' 50" E – 98.48	59° 00' 00"
L4	31.97		S 67° 44' 50" E	
C4	85.14	200.00	S 79° 56' 34" E – 84.50	24° 23' 27"
C5	101.86	200.00	S 77° 32' 52" E – 100.76	29° 10' 51"
L5	105.91		S 62° 57' 27" E	
C6	94.64	200.00	S 76° 30' 49" E – 93.76	27° 06' 45"
L6	137.34		N 89° 55' 49" E	
C7	18.31	200.00	N 87° 18' 26" E – 18.31	5° 14' 46"
L7	241.88		N 84° 41' 03" E	
C8	42.88	200.00	S 89° 10' 26" E – 42.80	12° 17' 02"
L8	254.60		S 83° 01' 55" E	
C9	51.85	75.00	N 77° 09' 41" E – 50.83	39° 36' 48"
L9	82.00		N 57° 21' 17" E	
C10	28.99	50.00	N 73° 57' 56" E – 28.59	33° 13' 18"
C11	28.75	100.00	S 81° 11' 12" E – 28.65	16° 28' 27"
C12	41.64	150.00	S 64° 59' 50" E – 41.50	15° 54' 16"
C13	35.92	25.00	N 81° 47' 43" E – 32.91	82° 19' 09"
C14	37.11	100.00	N 51° 16' 00" E – 36.90	21° 15' 43"

'BP' LINE

NUMBER	LENGTH	RADIUS	LINE / CHORD DIRECTION & LENGTH	DELTA
L10	41.04		N 61° 53' 52" E	
C15	40.91	100.00	N 50° 10' 41" E – 40.62	23° 26' 22"
L11	84.25		N 38° 27' 30" E	
C16	56.99	150.00	N 49° 20' 32" E – 56.65	21° 46' 05"
L12	89.86		N 60° 13' 35" E	
C17	25.46	100.00	N 67° 31' 16" E – 25.39	14° 35' 21"
L13	68.48		N 74° 48' 56" E	
C18	116.93	175.00	N 55° 40' 25" E – 114.77	38° 17' 02"
L14	35.05		N 36° 31' 54" E	
C19	20.78	75.00	N 44° 28' 05" E – 20.71	15° 52' 21"
L15	180.01		N 52° 24' 15" E	
C20	92.70	350.00	N 44° 48' 59" E – 92.43	15° 10' 33"
C21	100.66	125.00	N 60° 17' 56" E – 97.97	46° 08' 28"
C22	23.32	50.00	N 70° 00' 32" E – 23.11	26° 43' 17"
L16	18.59		N 56° 38' 54" E	
C23	53.86	500.00	N 59° 44' 04" E – 53.84	6° 10' 20"
L17	64.57		N 62° 49' 13" E	
C24	42.28	150.00	N 54° 44' 42" E – 42.14	16° 09' 03"
C25	46.52	60.00	N 68° 52' 58" E – 45.37	44° 25' 35"
C26	86.31	100.00	N 66° 22' 14" E – 83.65	49° 27' 04"
C27	22.17	60.00	N 52° 13' 58" E – 22.05	21° 10' 31"
L18	80.06		N 62° 49' 13" E	
C28	95.59	200.00	N 76° 30' 47" E – 94.69	27° 23' 07"
C29	47.50	65.00	N 69° 16' 15" E – 46.45	41° 52' 11"
L19	132.13		N 48° 20' 09" E	
C30	44.74	60.00	N 26° 58' 33" E – 43.71	42° 43' 12"
L20	137.13		N 5° 36' 57" E	
C31	14.41	250.00	N 7° 16' 02" E – 14.41	3° 18' 11"
L21	64.19		N 8° 55' 08" E	
C32	49.73	150.00	N 18° 25' 01" E – 49.50	18° 59' 46"
L22	89.77		N 27° 54' 54" E	
C33	29.39	200.00	N 32° 07' 32" E – 29.37	8° 25' 15"
C34	43.76	100.00	N 23° 47' 53" E – 43.42	25° 04' 31"
C35	119.04	175.00	N 30° 44' 53" E – 116.76	38° 58' 30"
C36	14.99	1000.00	N 49° 48' 21" E – 14.99	0° 51' 33"
C37	27.92	150.00	N 54° 42' 32" E – 27.88	10° 39' 53"
C38	54.45	65.00	N 84° 02' 18" E – 52.87	47° 59' 39"
C39	102.77	200.00	S 86° 41' 07" E – 101.64	29° 26' 29"
C40	37.37	250.00	N 82° 52' 34" E – 37.33	8° 33' 52"

'BP' LINE

NUMBER	LENGTH	RADIUS	LINE / CHORD DIRECTION & LENGTH	DELTA
L23	29.38		N 87° 09' 30" E	
C41	96.11	170.00	N 70° 57' 43" E – 94.84	32° 23' 35"
L24	89.79		N 54° 45' 55" E	
C42	28.33	500.00	N 56° 23' 19" E – 28.33	3° 14' 47"
L25	108.17		N 58° 00' 42" E	
C43	36.27	75.00	N 44° 09' 26" E – 35.92	27° 42' 33"
C44	34.12	50.00	N 49° 51' 03" E – 33.46	39° 05' 46"
C45	36.20	50.00	N 48° 39' 20" E – 35.42	41° 29' 10"
L26	69.93		N 27° 54' 45" E	
C46	28.91	200.00	N 23° 46' 17" E – 28.89	8° 16' 56"
C47	49.43	50.00	N 47° 57' 16" E – 47.45	56° 38' 53"
C48	16.12	100.00	N 71° 39' 33" E – 16.11	9° 14' 19"
L27	34.42		N 67° 02' 23" E	
C49	22.67	100.00	N 60° 32' 48" E – 22.62	12° 59' 10"
L28	63.96		N 54° 03' 13" E	
L29	26.55		N 62° 26' 27" E	
C50	29.19	100.00	N 54° 04' 45" E – 29.08	16° 43' 24"
L30	27.98		N 45° 43' 03" E	
C51	23.84	200.00	N 42° 18' 07" E – 23.83	6° 49' 51"
L31	82.56		N 38° 53' 12" E	
C52	67.87	500.00	N 34° 59' 54" E – 67.81	7° 46' 37"
C53	8.89	100.00	N 28° 33' 43" E – 8.89	5° 05' 44"
L32	43.22		N 26° 00' 51" E	
C54	27.59	225.00	N 29° 31' 37" E – 27.57	7° 01' 33"
L33	19.19		N 33° 02' 24" E	
C55	33.19	75.00	N 45° 43' 03" E – 32.92	25° 21' 18"
L34	10.33		N 58° 23' 42" E	
C56	22.53	250.00	N 55° 48' 48" E – 22.52	5° 09' 50"
L35	49.90		N 53° 13' 53" E	
C57	83.21	180.00	N 66° 28' 31" E – 82.48	26° 29' 17"
L36	18.83		N 79° 43' 10" E	
C58	44.79	70.00	N 61° 23' 16" E – 44.03	36° 39' 47"
L37	15.01		N 43° 03' 22" E	
C59	25.42	75.00	N 33° 20' 41" E – 25.30	19° 25' 22"
C60	62.98	100.00	N 41° 40' 30" E – 61.94	36° 04' 59"
C61	117.27	550.00	N 53° 36' 30" E – 117.05	12° 12' 58"
L38	132.87		N 47° 30' 01" E	
C62	59.84	50.00	N 13° 12' 56" E – 56.33	68° 34' 09"
C63	43.12	50.00	N 3° 38' 23" E – 41.80	49° 25' 03"

SURVEY DIAGRAM
SCALE : 1" = 30'

ORIGINAL SCALE IS IN INCHES
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0 1 2
FOR REDUCED PLANS

REVISION				
NUMBER	DATE	DESCRIPTION	BY	

PROFESSIONAL LAND SURVEYOR — STATE OF CALIFORNIA — No. LS 9126
PREPARED UNDER THE SUPERVISION OF:
PROFESSIONAL LAND SURVEYOR
DATE: MONTH, DAY, YEAR

PRELIMINARY

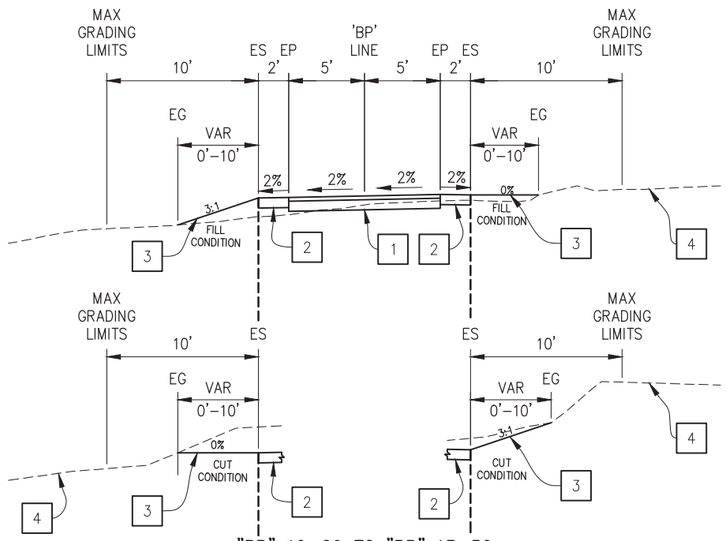
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DSP	KIS
CHECKED:	DATE:
JCN	06/2024
ROAD NUMBER:	
NA	

EL DORADO COUNTY CALIFORNIA

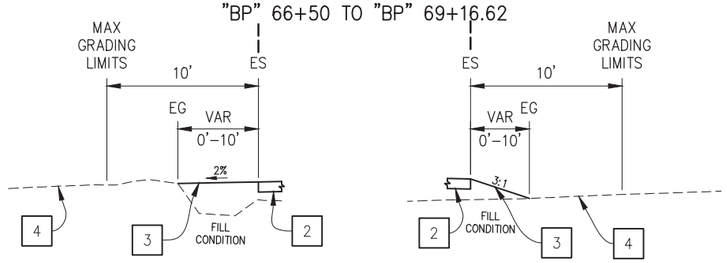
COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY -
UPPER TRUCKEE RIVER BRIDGE
AT JOHNSON MEADOW

SHEET
CD-4
5 OF ??
W.O. No.
36107023



"BP" 10+29 TO "BP" 13+50
"BP" 24+30 TO "BP" 53+90
"BP" 59+84.09 TO "BP" 60+30
"BP" 66+50 TO "BP" 69+16.62

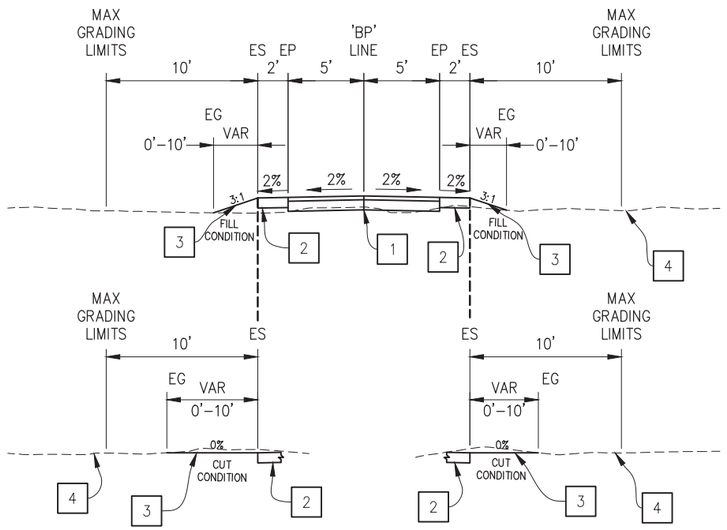


"BP" 26+00 TO "BP" 26+70

"BP" 66+50 TO "BP" 69+16.62

PATH SUPER LEFT

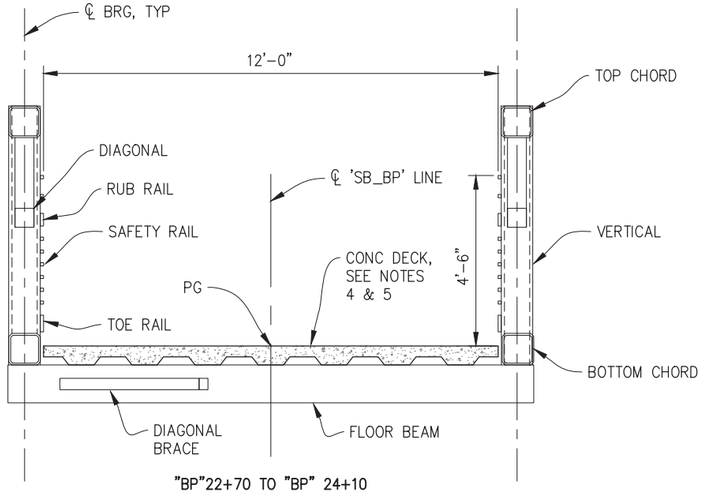
NTS



"BP" 53+90 TO "BP" 59+50.79
"BP" 69+63.35 TO "BP" 70+44.58

PATH CROWN

NTS



"BP"22+70 TO "BP" 24+10

STEEL TRUSS BRIDGE

1/2" = 1'–0"

PREFINAL

ABBREVIATIONS:

EG – EDGE OF GRADING

GENERAL NOTES:

1. SEE S SHEETS FOR BOARDWALK AND BRIDGE DETAILS.
2. TRANSITIONS TO AND FROM BOARDWALK, PCC LANDINGS, AND CROSS SLOPE CHANGES SHALL BE 10' UNLESS OTHERWISE NOTED ON L SHEETS.

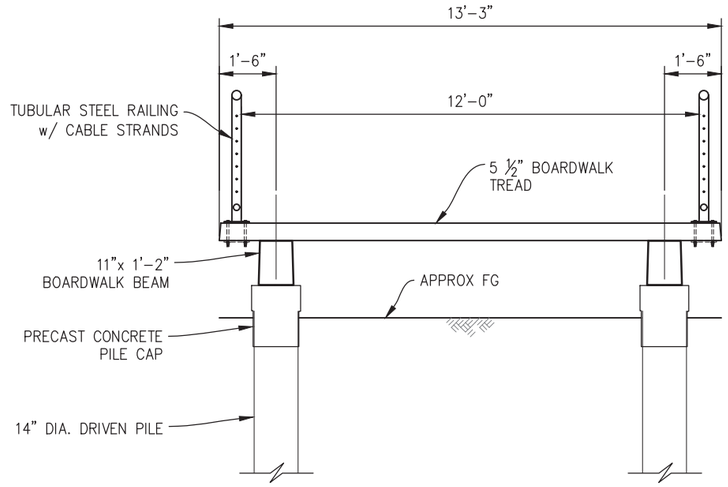
CONSTRUCTION NOTES:

1 – 3" HMA (TYPE A) OVER 8" AB (CLASS 2)

2 – 8" AB (CLASS 2) SHOULDER

3 – DAYLIGHT
FOR SITUATIONS WHERE DAYLIGHT CUT OR FILL WILL GO BEYOND 10', CUT OR FILL TO 10' BEYOND SHOULDER PER DIRECTION OF ENGINEER IN THE FIELD.

4 – OG



"BP" 13+50 TO "BP" 22+70
"BP" 24+10 TO "BP" 24+30

BOARDWALK

NTS

TYPICAL SECTIONS
SCALE : NONE

REVISION				
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER

DATE:

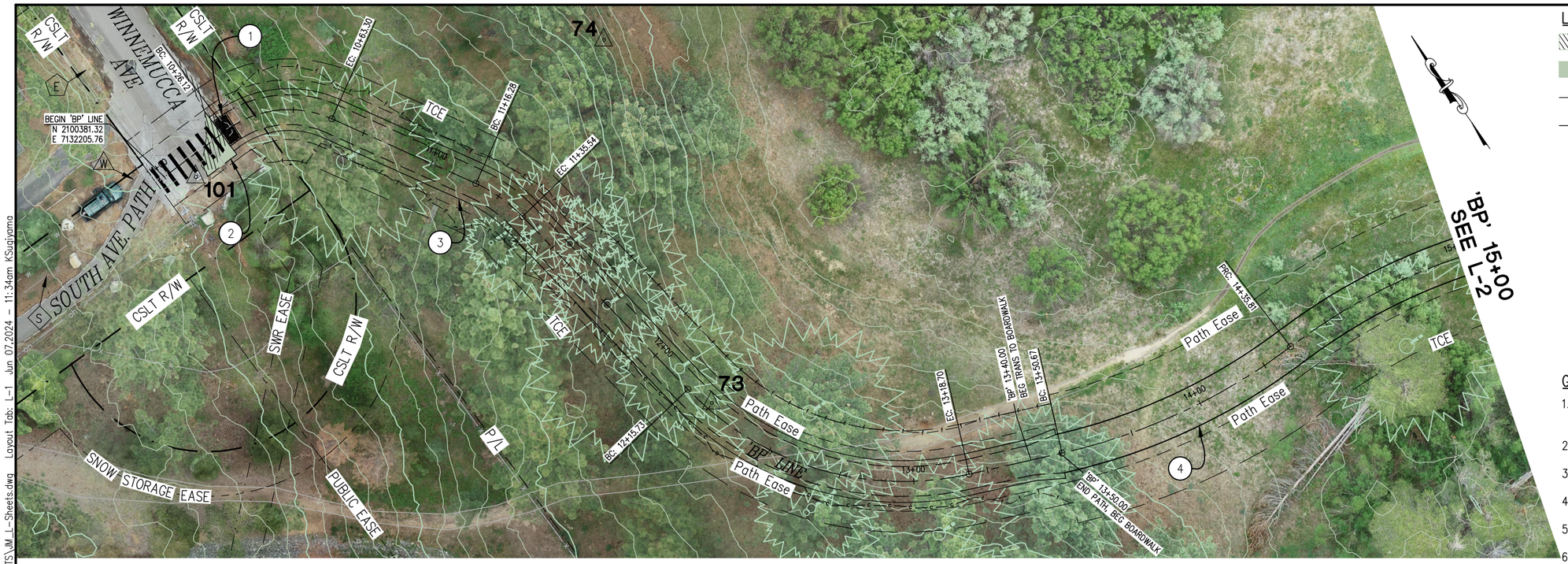
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DSP	KIS
CHECKED:	DATE:
DSP	06/2024
ROAD NUMBER:	
NA	

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY – UPPER TRUCKEE RIVER BRIDGE AT JOHNSON MEADOW

SHEET
X–1
6 OF ??
W.O. No.
36107023

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES
Drawing name: Y:\CIVIL 3D PROJECTS\95201\Engineering\SHEETS\M_X-Sheets.dwg Layout Tab: X-1 Jun 10,2024 - 3:28pm dpalacon



LEGEND

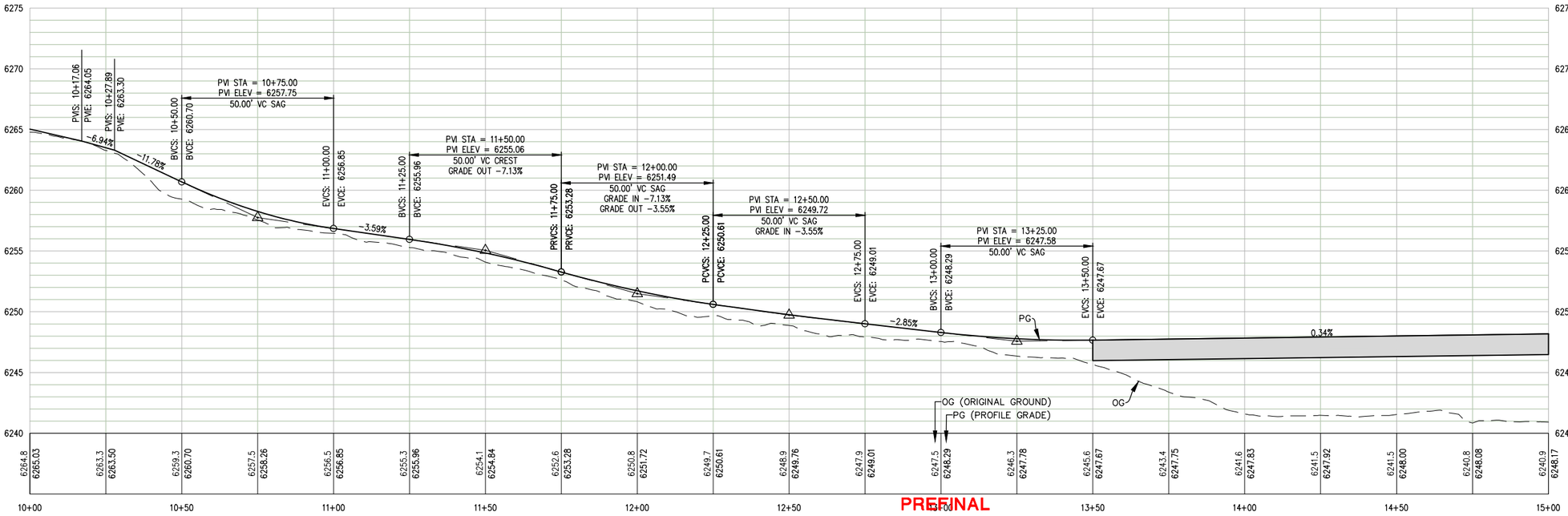
- REMOVE HMA
- INSTALL HMA
- FILL SLOPE GRADING LIMITS
- CUT SLOPE GRADING LIMITS
- 1b — LAND CAPABILITY
- W — WATER LINE
- S — SEWER LINE
- E — OVERHEAD ELECTRICAL LINE
- (E) SURVEY CONTROL

GENERAL NOTES:

1. CONTRACTOR TO NOTIFY ENGINEER PRIOR TO DISTURBANCE OF ANY SURVEY MONUMENTS OR SURVEY CONTROL POINTS.
2. INSTALL TEMPORARY FENCING PER THE EC SHEETS.
3. SEE SHEET TR-1 FOR TREE REMOVAL AND PROTECTION.
4. ALL DISTURBED SOIL SHALL BE REVEGETATED PER THE EC SHEETS.
5. SEE SPD SHEETS FOR SIGNING AND STRIPING DETAILS.
6. THIS PROJECT IS LOCATED IN AN ENVIRONMENTALLY SENSITIVE AREA. THE CONTRACTOR SHALL EXERCISE UTMOST CARE TO PROTECT AND MAINTAIN EXISTING VEGETATION AND MINIMIZE SOIL COMPACTION WITHIN CONSTRUCTION AREAS.
7. CONTRACTOR SHALL POSITIVELY DETERMINE ALL HORIZONTAL AND VERTICAL LOCATIONS OF ALL UTILITIES SHOWN ON THE CONTRACT PLANS OR IDENTIFIED VIA USA MARKINGS.

CONSTRUCTION NOTES:

1. – PCC LANDING WITH DETECTABLE WARNING SURFACE. SEE DETAIL A, SHEET C-1.
2. – REMOVE AND REPLACE HMA. SEE DETAIL B, SHEET C-1.
3. – PATH, SHEET X-1.
4. – BOARDWALK, SEE S SHEETS.



PREFINAL

LAYOUT & PROFILE
SCALE : 1" = 20' H, 1" = 5' V

ORIGINAL SCALE IS IN INCHES
Drawing name: \\CDAData05\TD-SLT-Engineering\CIVIL 3D PROJECTS\95201\Engineering\SHEETS\JM_L-Sheets.dwg Layout Tab: L-1 Jun 07,2024 - 11:34am KSugiyama

FOR REDUCED PLANS 0 1 2

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER

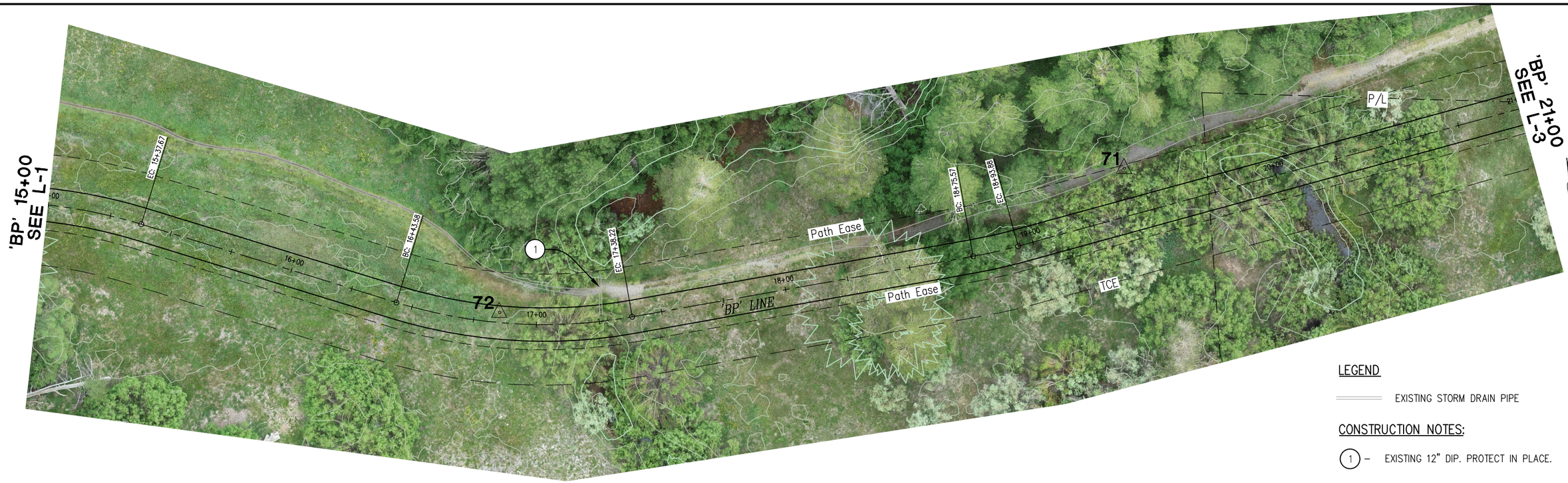
DATE:

DESIGNED: DSP	DRAWN: KIS
CHECKED: DSP	DATE: 06/2024
ROAD NUMBER: NA	

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY -
UPPER TRUCKEE RIVER BRIDGE
AT JOHNSON MEADOW

SHEET L-1
7 OF ??
W.O. No. 36107023

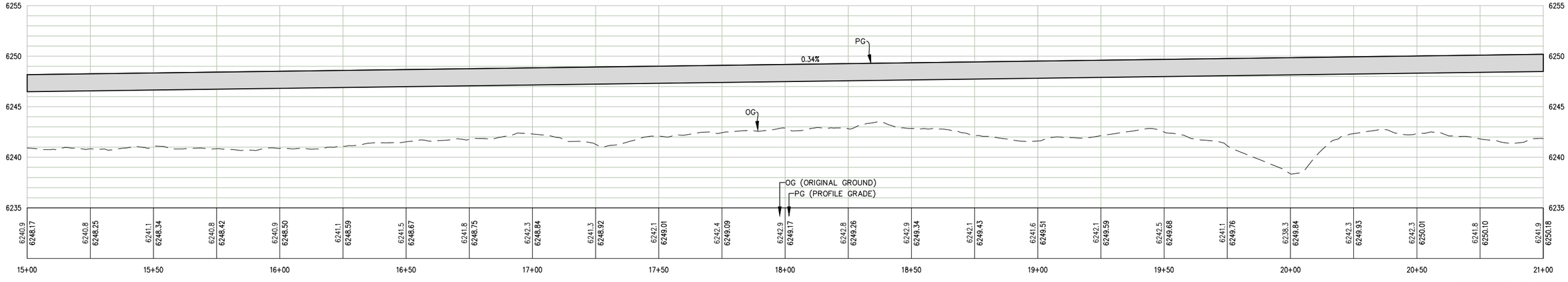


LEGEND

EXISTING STORM DRAIN PIPE

CONSTRUCTION NOTES:

(1) – EXISTING 12" DIP. PROTECT IN PLACE.



PREFINAL

LAYOUT & PROFILE
SCALE : 1" = 20' H, 1" = 5' V

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER

DATE:

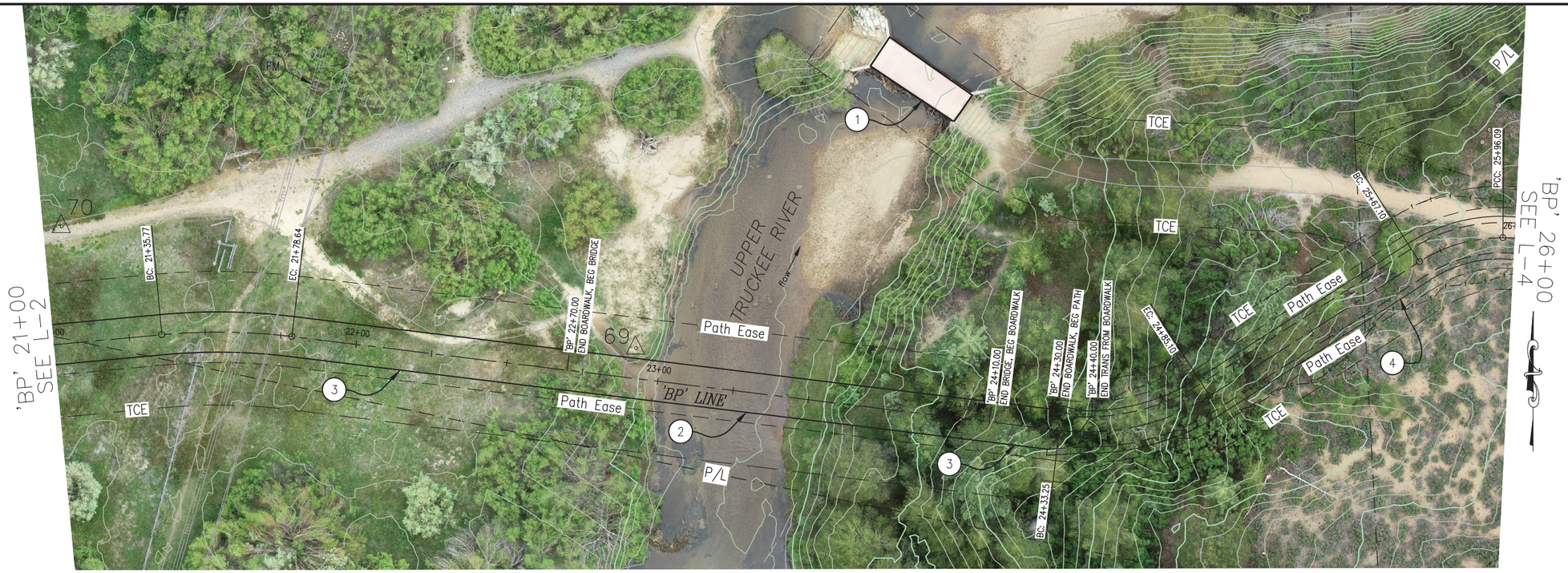
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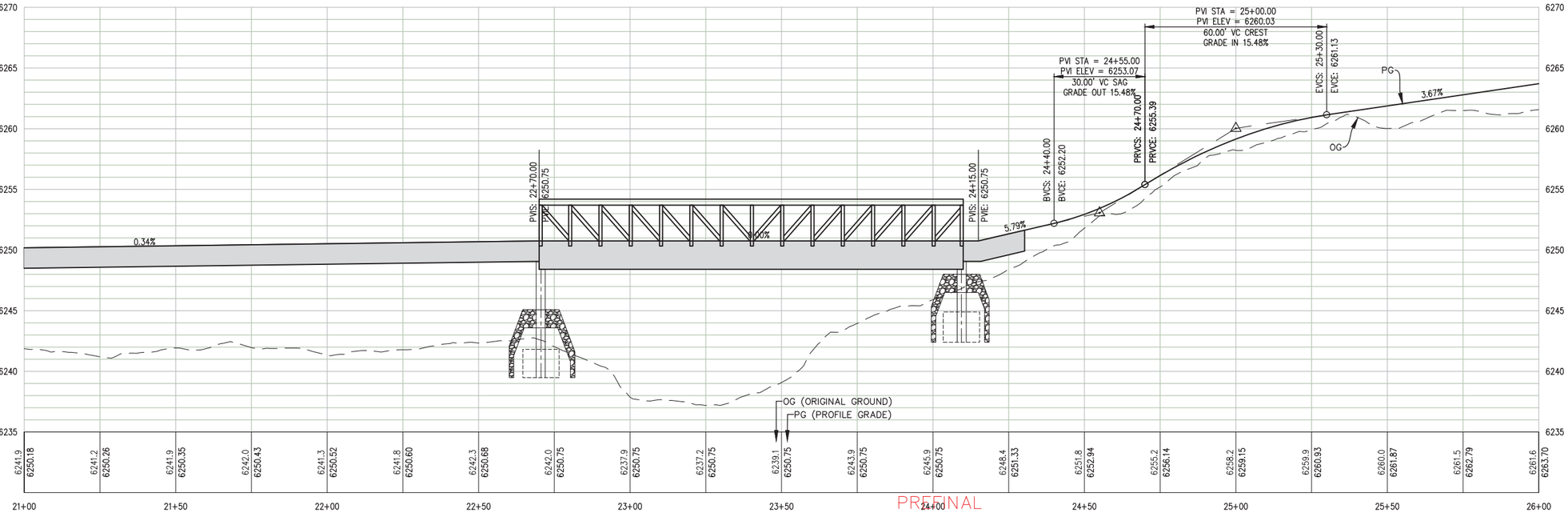
COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY -
UPPER TRUCKEE RIVER BRIDGE
AT JOHNSON MEADOW

SHEET L-2
8 OF ??
W.O. No. 36107023

FOR REDUCED PLANS
0 1 2
ORIGINAL SCALE IS IN INCHES
Drawing name: \\CDAData5\TD-SLT-Engineering\CIVIL 3D PROJECTS\95201\Engineering\SHEETS\JM_L-Sheets.dwg Layout Tab: L-2 Jun 07,2024 - 11:34am KSugiyama





LEGEND

(FM) SEWER FORCEMAIN

CONSTRUCTION NOTES:

1. REMOVE EXISTING BRIDGE AND WING WALLS.
2. BRIDGE, SEE S SHEETS.
3. BOARDWALK, SEE S SHEETS.
4. PATH, SEE SHEET X-1

PREFINAL

LAYOUT & PROFILE
SCALE : 1" = 20' H, 1" = 5' V

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER

DATE:

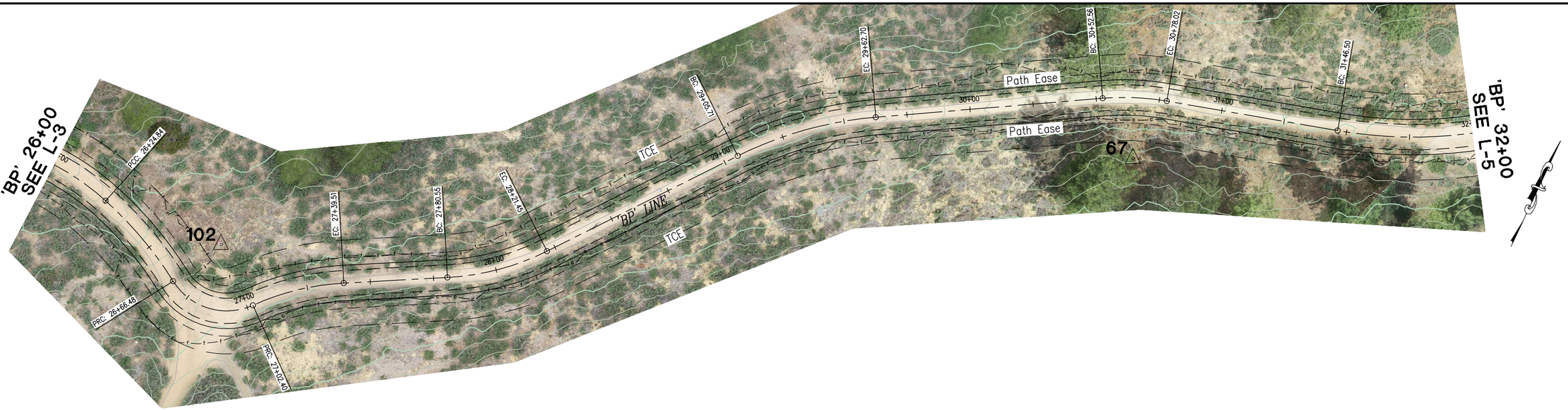
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DSP	KIS
CHECKED:	DATE:
DSP	06/2024
ROAD NUMBER:	
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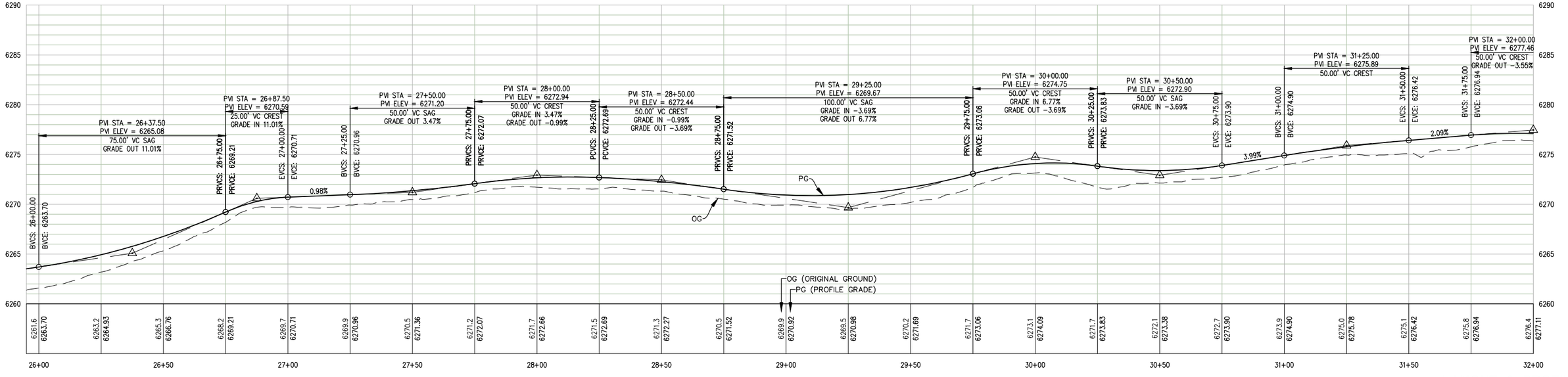
COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY –
UPPER TRUCKEE RIVER BRIDGE
AT JOHNSON MEADOW

SHEET
L-3
9 OF ??
W.O. No.
36107023

FOR REDUCED PLANS
0 1 2
ORIGINAL SCALE IS IN INCHES
Drawing name: Y:\CIVIL 3D PROJECTS\95201\Engineering\SHEETS\JM_L-Sheets.dwg Layout Tab: L-3 Jun 10,2024 - 3:31pm dpalaroan





PREFINAL

LAYOUT & PROFILE
SCALE : 1" = 20' H, 1" = 5' V

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES
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REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER

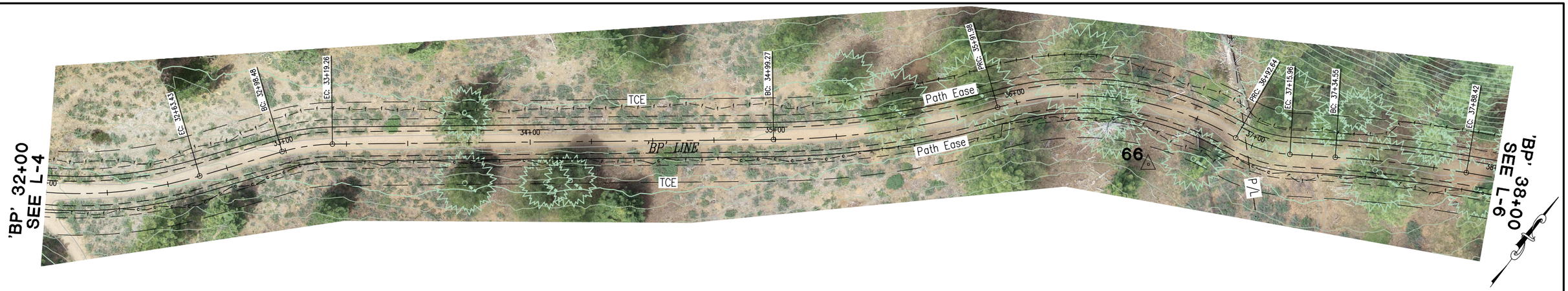
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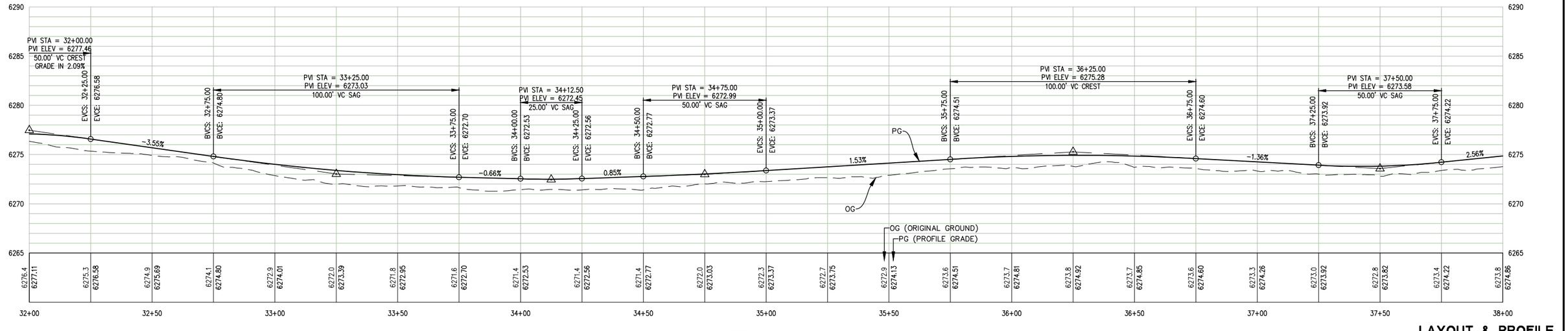
DESIGNED: DSP	DRAWN: KIS
CHECKED: DSP	DATE: 06/2024
ROAD NUMBER:	NA

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY -
UPPER TRUCKEE RIVER BRIDGE
AT JOHNSON MEADOW

SHEET
L-4
10 OF ??
W.O. No.
36107023





PREFINAL

LAYOUT & PROFILE
SCALE : 1" = 20' H, 1" = 5' V

ORIGINAL SCALE IS IN INCHES
Drawing name: \\CDAData05\TD-SLT-Engineering\CIVIL 3D PROJECTS\95201\Engineering\SHEETS\JM_L-Sheets.dwg Layout Tab: L-5 Jun 07,2024 - 9:21am KSugiyama

FOR REDUCED PLANS
0 1 2

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER

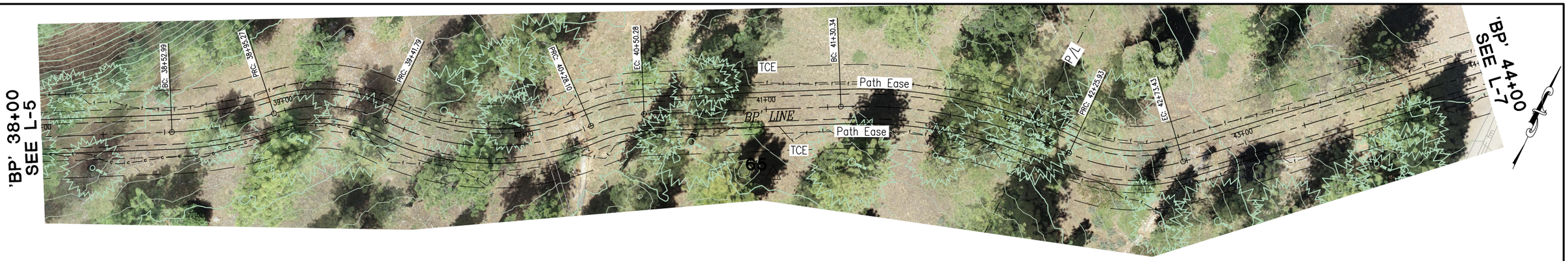
DATE:

DESIGNED: DSP	DRAWN: KIS
CHECKED: DSP	DATE: 06/2024
ROAD NUMBER:	NA

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY -
UPPER TRUCKEE RIVER BRIDGE
AT JOHNSON MEADOW

SHEET
L-5
11 OF ??
W.O. No.
36107023



PREFINAL

LAYOUT & PROFILE
SCALE : 1" = 20' H, 1" = 5' V

ORIGINAL SCALE IS IN INCHES
Drawing name: \\CDAData5\TD-SLT-Engineering\CIVIL 3D PROJECTS\95201\Engineering\SHEETS\JM_L-Sheets.dwg Layout Tab: L-6 Jun 07,2024 - 9:22am KSugiyama

FOR REDUCED PLANS
0 1 2

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER

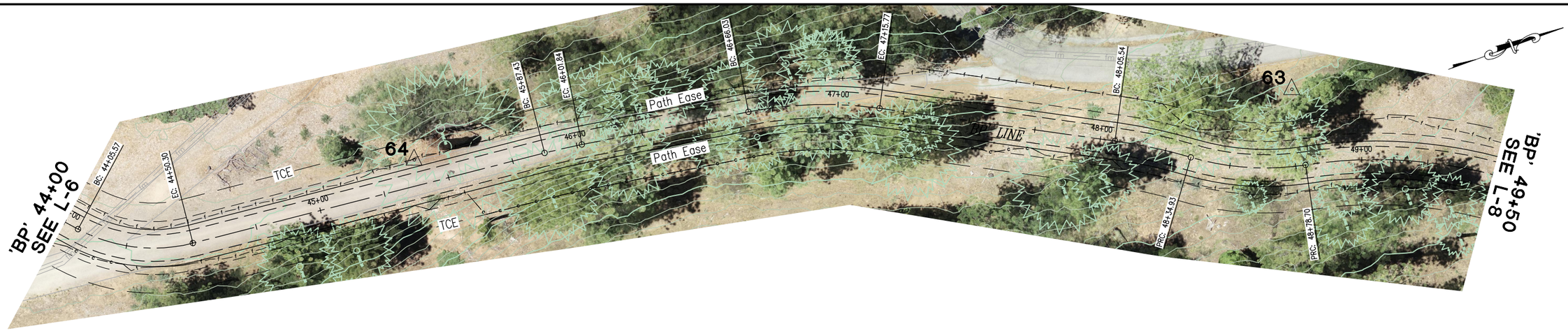
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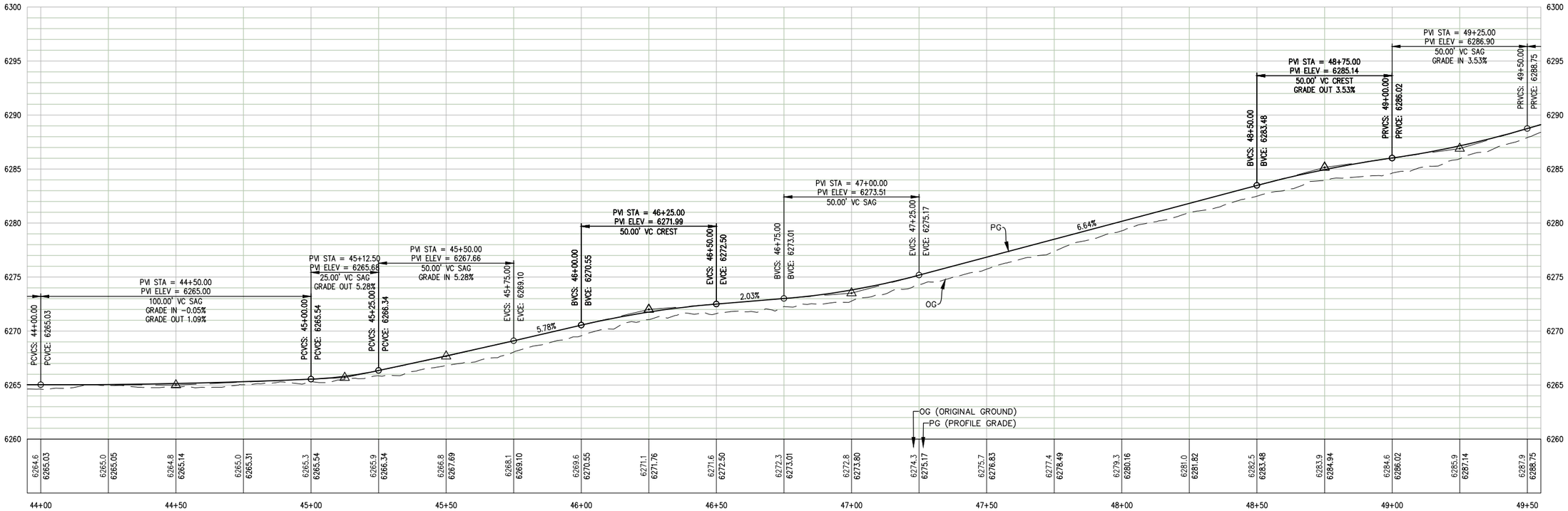
DESIGNED:	DRAWN:
DSP	KIS
CHECKED:	DATE:
DSP	06/2024
ROAD NUMBER:	
NA	

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY -
UPPER TRUCKEE RIVER BRIDGE
AT JOHNSON MEADOW

SHEET
L-6
12 OF ??
W.O. No.
36107023





PREFINAL

LAYOUT & PROFILE
SCALE : 1" = 20' H, 1" = 5' V

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER

DATE:

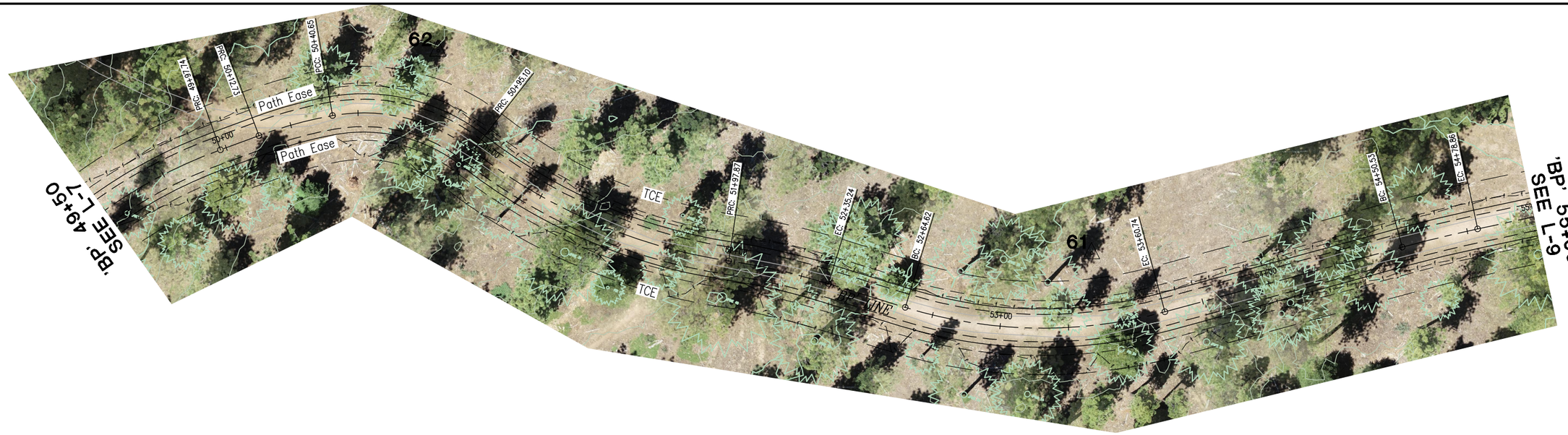
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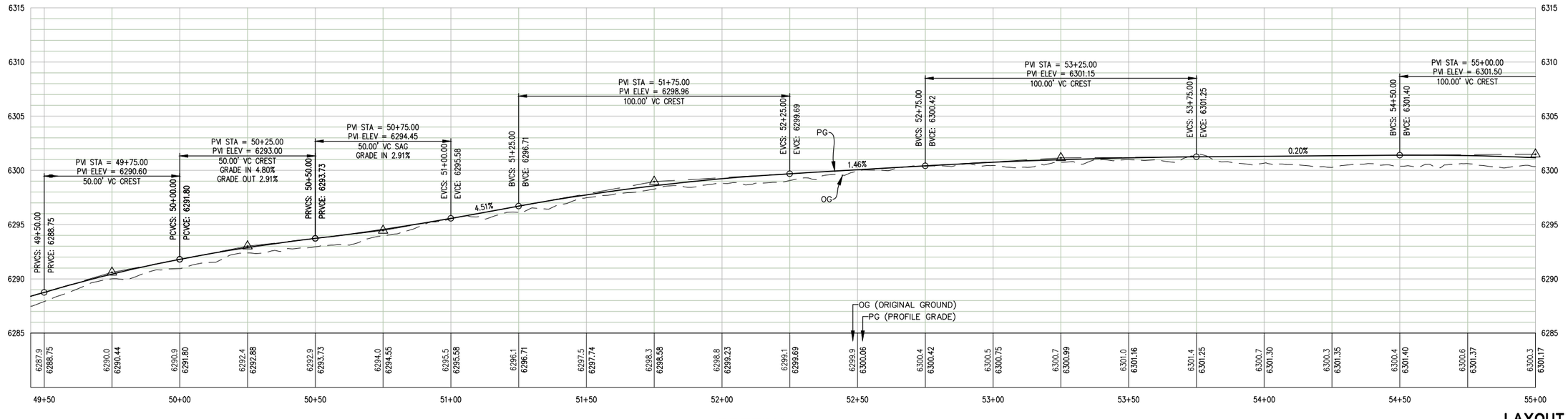
COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY -
UPPER TRUCKEE RIVER BRIDGE
AT JOHNSON MEADOW

SHEET L-7
13 OF ??
W.O. No. 36107023

FOR REDUCED PLANS
0 1 2
ORIGINAL SCALE IS IN INCHES
Drawing name: \\CDAD1ds5\TD-SLT-Engineering\CIVIL 3D PROJECTS\95201\Engineering\SHEETS\JM_L-Sheets.dwg Layout Tab: L-7 Jun 07,2024 - 9:22am KSugiyama





PREFINAL

LAYOUT & PROFILE
SCALE : 1" = 20' H, 1" = 5' V

FOR REDUCED PLANS
0 1 2
ORIGINAL SCALE IS IN INCHES
Drawing name: \\CDAData5\TD-SLT-Engineering\CIVIL 3D PROJECTS\95201\Engineering\SHEETS\JM_L-Sheets.dwg Layout Tab: L-8 Jun 07,2024 - 9:23am KSugiyama

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER

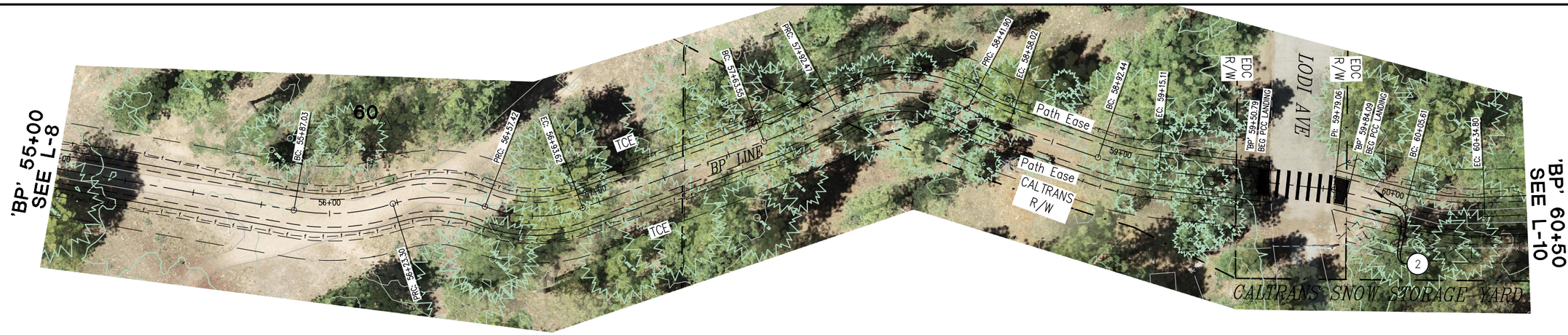
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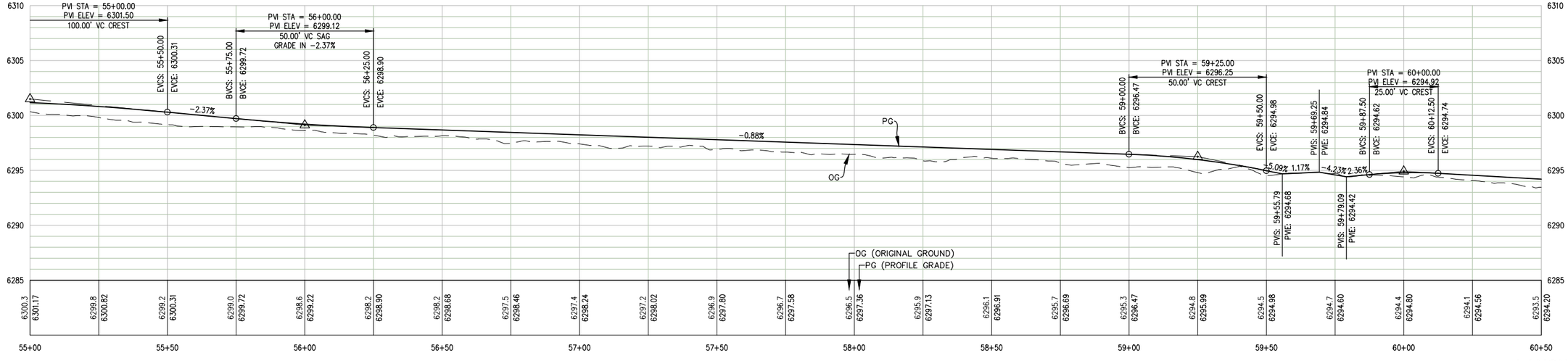
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CHECKED: DSP	DATE: 06/2024
ROAD NUMBER: NA	

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY -
UPPER TRUCKEE RIVER BRIDGE
AT JOHNSON MEADOW

SHEET
L-8
14 OF ??
W.O. No.
36107023





CONSTRUCTION NOTES:

1. – PCC LANDING WITH DETECTABLE WARNING SURFACE. SEE DETAIL 1, SHEET C–1.
2. – REMOVE PORTIONS OF SPLIT RAIL FENCE PER ENGINEER.

PREFINAL

LAYOUT & PROFILE
SCALE : 1" = 20' H, 1" = 5' V

REVISION				
NUMBER	DATE	DESCRIPTION	BY	

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER

DATE:

DESIGNED: DSP	DRAWN: KIS
CHECKED: DSP	DATE: 06/2024
ROAD NUMBER:	NA

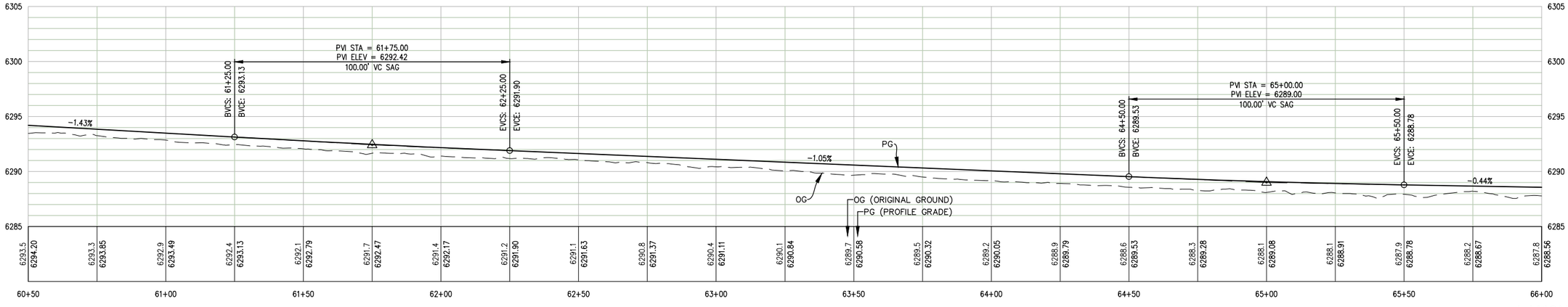
COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY - UPPER TRUCKEE RIVER BRIDGE AT JOHNSON MEADOW

SHEET L-9
15 OF ??
W.O. No. 36107023

FOR REDUCED PLANS
0 1 2
ORIGINAL SCALE IS IN INCHES
Drawing name: \\CDAData05\TD-SLT-Engineering\CIVIL 3D PROJECTS\95201\Engineering\SHEETS\JM_L-Sheets.dwg Layout Tab: L-9 Jun 07,2024 - 9:49am KSugiyama





PREFINAL

LAYOUT & PROFILE
SCALE : 1" = 20' H, 1" = 5' V

FOR REDUCED PLANS
0 1 2
ORIGINAL SCALE IS IN INCHES
Drawing name: \\CDAData05\TD-SLT-Engineering\CIVIL 3D PROJECTS\95201\Engineering\SHEETS\JM_L-Sheets.dwg Layout Tab: L-10 Jun 07,2024 - 9:25am KSudiyama

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER

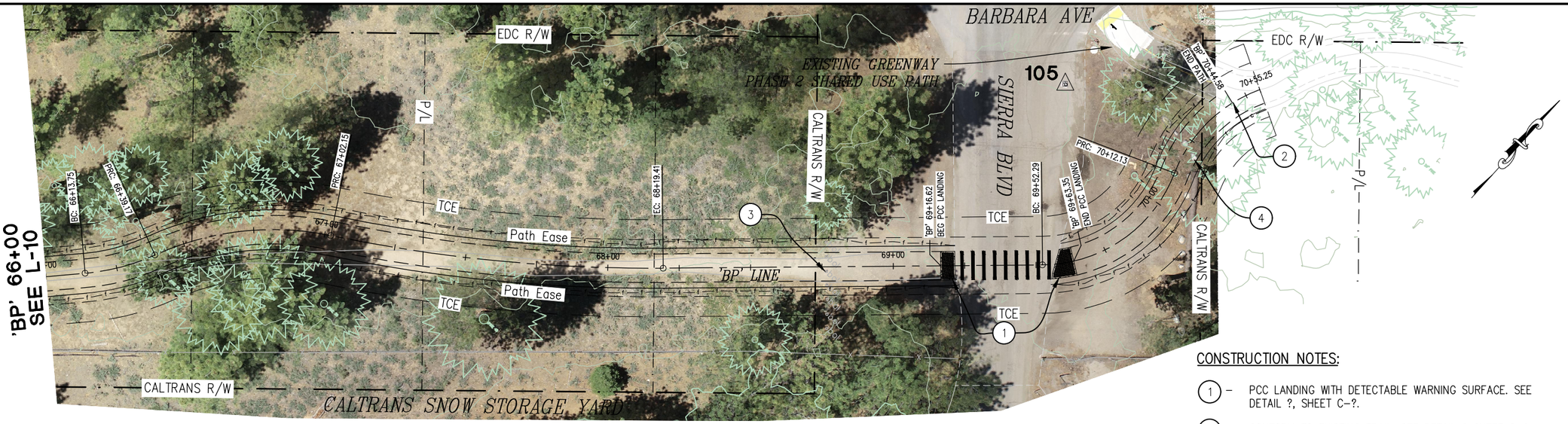
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DESIGNED:	DRAWN:
DSP	KIS
CHECKED:	DATE:
DSP	06/2024
ROAD NUMBER:	
NA	

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

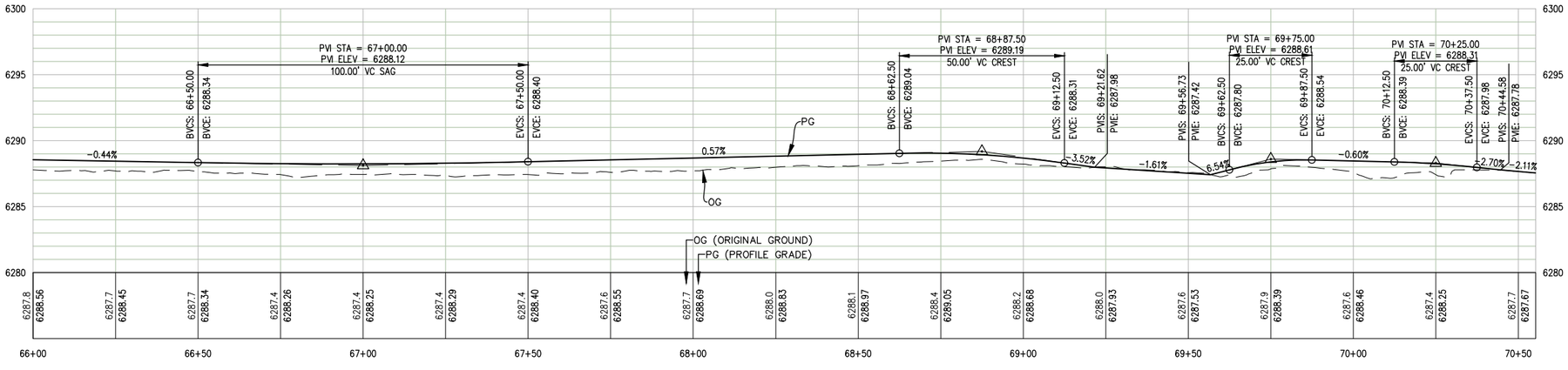
SOUTH TAHOE GREENWAY -
UPPER TRUCKEE RIVER BRIDGE
AT JOHNSON MEADOW

SHEET
L-10
16 OF ??
W.O. No.
36107023



CONSTRUCTION NOTES:

1. – PCC LANDING WITH DETECTABLE WARNING SURFACE. SEE DETAIL ?, SHEET C–?.
2. – CONFORM TO EXISTING TRAIL. SEE DETAIL ? SHEET C–?
3. – REMOVE BOLLARDS PER ENGINEER IN THE FIELD.
4. – REMOVE BOULDERS PER ENGINEER IN THE FIELD.



PREFINAL

LAYOUT & PROFILE
SCALE : 1" = 20' H, 1" = 5' V

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER

DATE:

DESIGNED: DSP	DRAWN: KIS
CHECKED: DSP	DATE: 06/2024
ROAD NUMBER: NA	

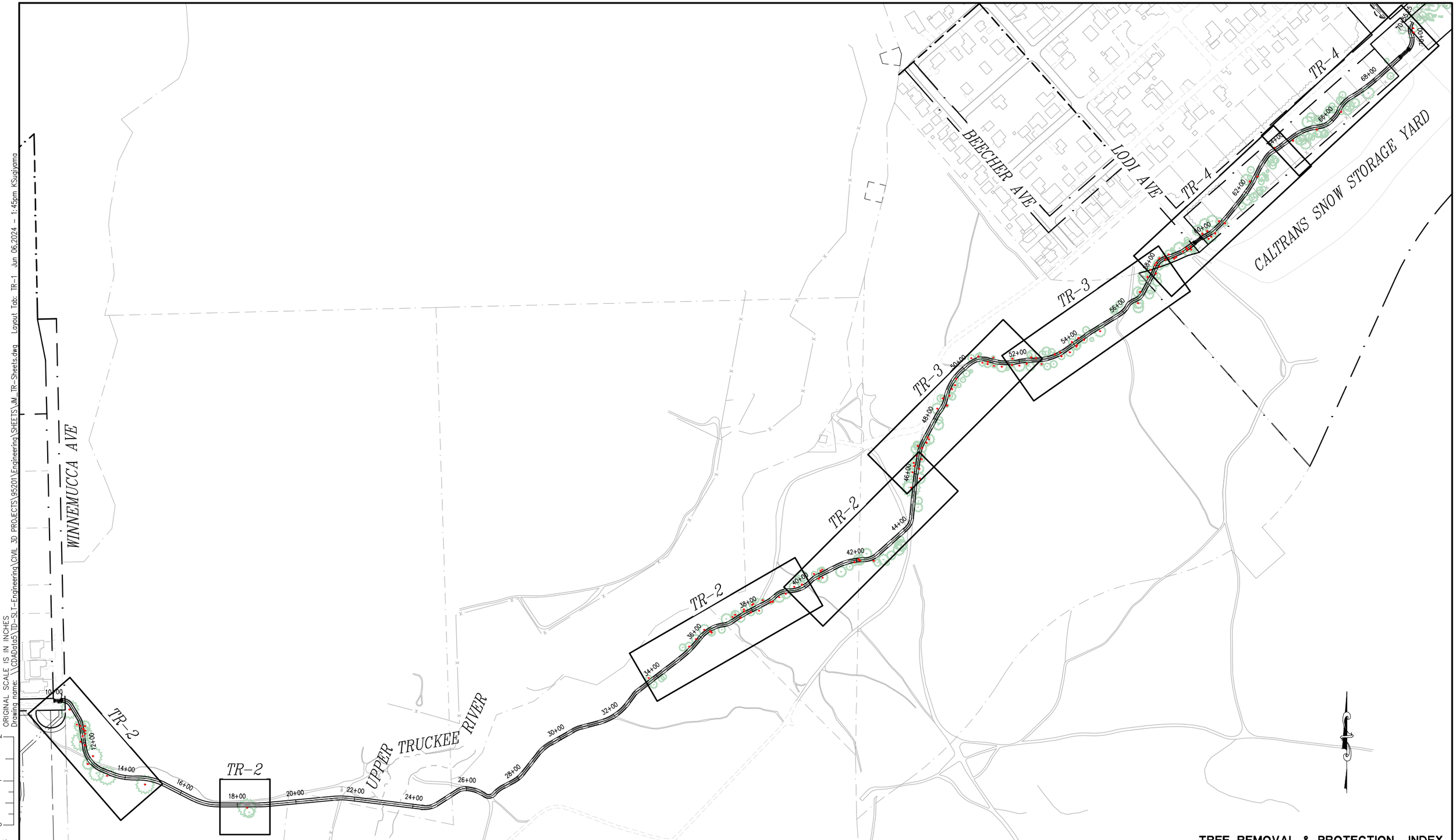
COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY -
UPPER TRUCKEE RIVER BRIDGE
AT JOHNSON MEADOW

SHEET
L-11
17 OF ??
W.O. No.
36107023

FOR REDUCED PLANS
0 1 2
ORIGINAL SCALE IS IN INCHES
Drawing name: \\CDAData05\TD-SLT-Engineering\CIVIL 3D PROJECTS\95201\Engineering\SHEETS\JM_L-Sheets.dwg Layout Tab: L-11 Jun 07,2024 - 9:50am KSugiyama

ORIGINAL SCALE IS IN INCHES
Drawing name: \\CDAData5\TD-SLT-Engineering\CIVIL 3D PROJECTS\95201\Engineering\SHEETS\JM_TR-Sheets.dwg Layout Tab: TR-1 Jun 06,2024 - 1:45pm KSugiyama
0 1 2
FOR REDUCED PLANS



PREFINAL

TREE REMOVAL & PROTECTION INDEX
SCALE : 1" = 150'

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER

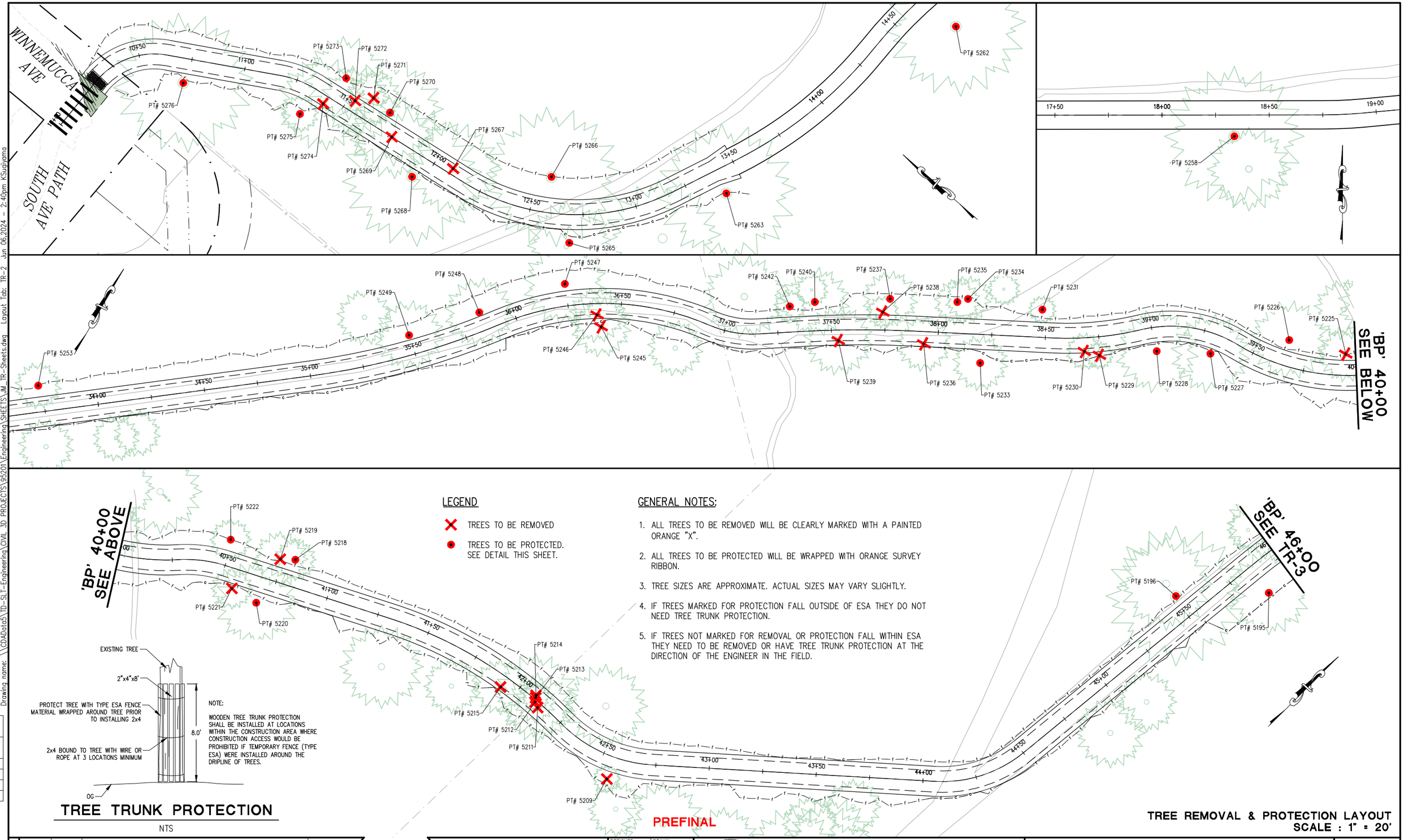
DATE:

DESIGNED: DSP	DRAWN: KIS
CHECKED: DSP	DATE: 06/2024
ROAD NUMBER: NA	

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY -
UPPER TRUCKEE RIVER BRIDGE
AT JOHNSON MEADOW

SHEET
TR-1
X OF ??
W.O. No.
36107023



LEGEND

- TREES TO BE REMOVED
- TREES TO BE PROTECTED. SEE DETAIL THIS SHEET.

GENERAL NOTES:

1. ALL TREES TO BE REMOVED WILL BE CLEARLY MARKED WITH A PAINTED ORANGE "X".
2. ALL TREES TO BE PROTECTED WILL BE WRAPPED WITH ORANGE SURVEY RIBBON.
3. TREE SIZES ARE APPROXIMATE. ACTUAL SIZES MAY VARY SLIGHTLY.
4. IF TREES MARKED FOR PROTECTION FALL OUTSIDE OF ESA THEY DO NOT NEED TREE TRUNK PROTECTION.
5. IF TREES NOT MARKED FOR REMOVAL OR PROTECTION FALL WITHIN ESA THEY NEED TO BE REMOVED OR HAVE TREE TRUNK PROTECTION AT THE DIRECTION OF THE ENGINEER IN THE FIELD.

TREE TRUNK PROTECTION

NTS

PREFINAL

TREE REMOVAL & PROTECTION LAYOUT
SCALE : 1" = 20'

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER

DATE:

DESIGNED: DSP	DRAWN: KIS
CHECKED: DSP	DATE: 06/2024
ROAD NUMBER: NA	

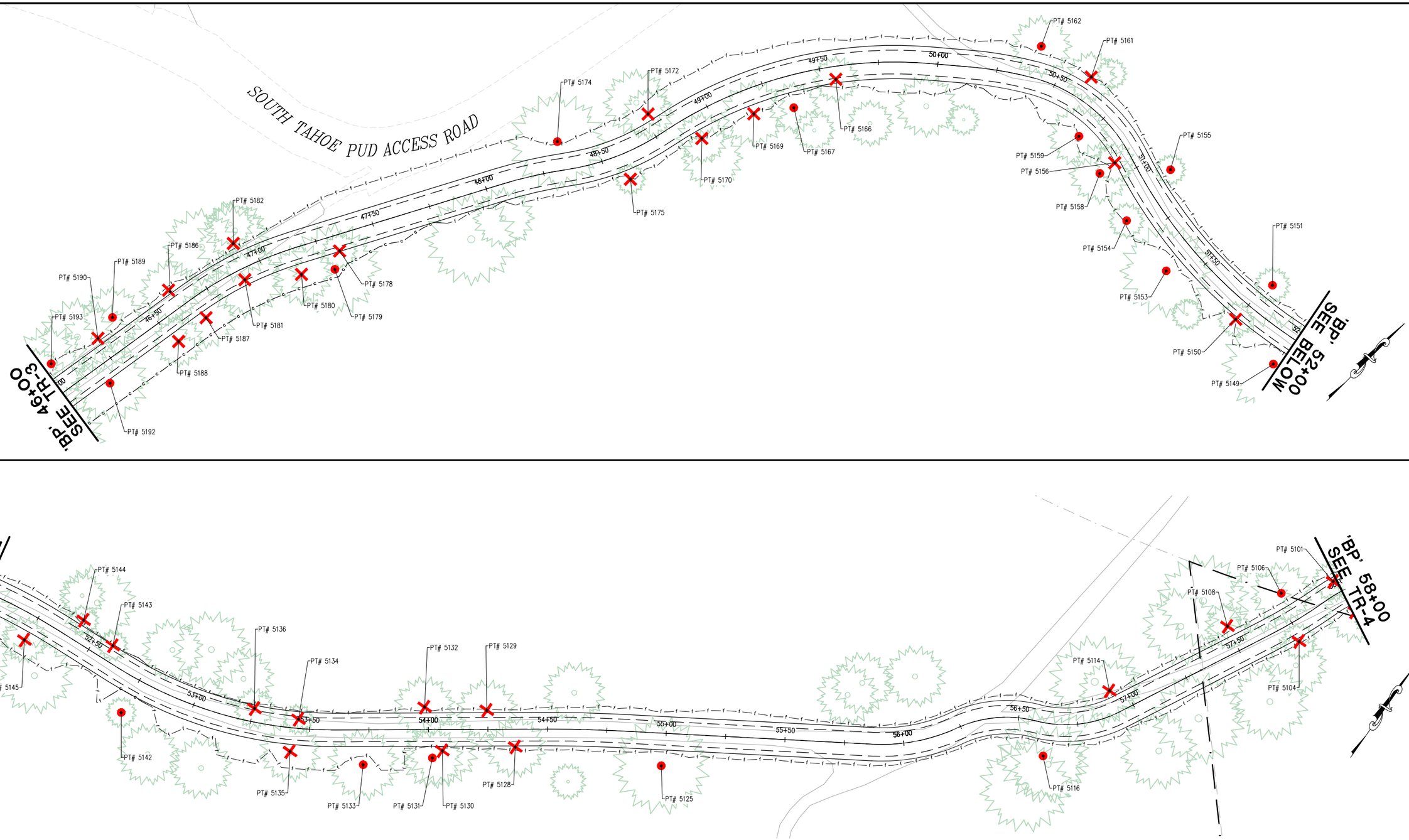
COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY - UPPER TRUCKEE RIVER BRIDGE AT JOHNSON MEADOW

SHEET TR-2 X OF ??

W.O. No. 36107023

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES
Drawing name: \\DAData5\TD-SLT-Engineering\CIVIL 3D PROJECTS\95201\Engineering\SHEETS\JM_TR-Sheets.dwg Layout Tab: TR-2 Jun 06,2024 - 2:40pm KSugiyama



PREFINAL

TREE REMOVAL & PROTECTION LAYOUT
SCALE : 1" = 20'

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER

DATE:

DESIGNED: DSP	DRAWN: KIS
CHECKED: DSP	DATE: 06/2024
ROAD NUMBER: NA	

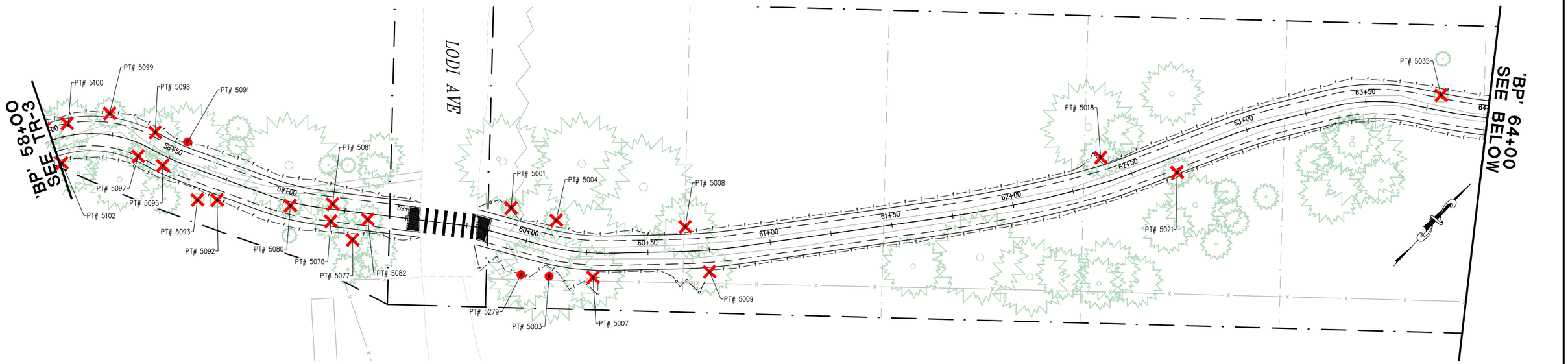
COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

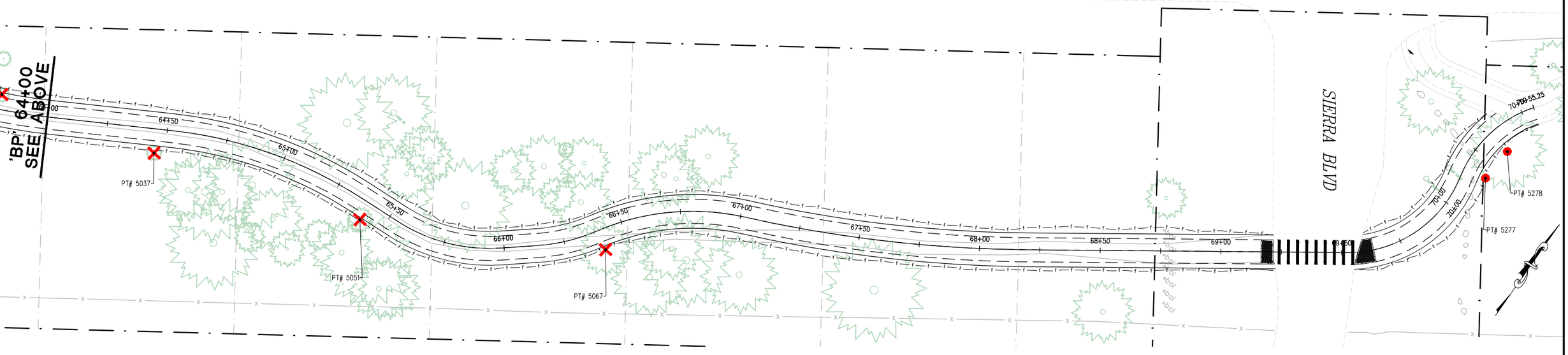
SOUTH TAHOE GREENWAY -
UPPER TRUCKEE RIVER BRIDGE
AT JOHNSON MEADOW

SHEET
TR-3
X OF ??
W.O. No.
36107023

FOR REDUCED PLANS
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FOR REDUCED PLANS





PREFINAL

TREE REMOVAL & PROTECTION LAYOUT
SCALE : 1" = 20'

REVISION			
NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER

DATE:

DESIGNED: DSP	DRAWN: KIS
CHECKED: DSP	DATE: 06/2024
ROAD NUMBER:	NA

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY -
UPPER TRUCKEE RIVER BRIDGE
AT JOHNSON MEADOW

SHEET
TR-4
X OF ??
W.O. No.
36107023

TREE REMOVAL TABLE

POINT NO.	STATION	OFFSET	NORTHING	EASTING	DESCRIPTION
5001	'BP' 59+90.46	11.20' LT	2101969.68	7136111.25	JPINE 8
5004	'BP' 60+10.00	11.18' LT	2101978.55	7136128.10	JPINE 10
5007	'BP' 60+28.09	9.86' RT	2101971.79	7136154.85	JPINE 24
5008	'BP' 60+65.55	10.01' LT	2102012.37	7136168.33	JPINE 24
5009	'BP' 60+74.37	8.80' RT	2102005.75	7136188.00	JPINE 18
5018	'BP' 62+39.88	10.23' LT	2102148.27	7136272.73	JPINE 16
5021	'BP' 62+67.38	6.35' RT	2102165.09	7136299.57	JPINE 12
5035	'BP' 63+79.66	6.22' LT	2102261.32	7136356.74	JPINE 6
5037	'BP' 64+45.51	10.03' RT	2102286.59	7136419.33	JPINE 6
5051	'BP' 65+40.19	7.83' RT	2102324.57	7136500.45	JPINE 10
5067	'BP' 66+39.58	8.52' RT	2102384.85	7136583.35	JPINE 20
5077	'BP' 59+29.56	11.38' RT	2101916.20	7136072.93	JPINE 16
5078	'BP' 59+19.82	4.99' RT	2101915.66	7136061.29	JPINE 14
5080	'BP' 59+02.86	1.43' RT	2101909.11	7136044.91	JPINE 10
5081	'BP' 59+19.72	2.03' LT	2101921.28	7136057.09	JPINE 12
5082	'BP' 59+34.68	2.39' RT	2101926.49	7136071.80	JPINE 12
5092	'BP' 58+74.22	8.96' RT	2101890.45	7136021.57	JPINE 6
5093	'BP' 58+66.68	11.65' RT	2101885.03	7136015.68	SNAG 60
5095	'BP' 58+48.95	3.80' RT	2101885.61	7135995.81	JPINE 12
5097	'BP' 58+38.30	5.01' RT	2101881.56	7135985.94	JPINE 10
5098	'BP' 58+40.19	6.78' RT	2101893.41	7135984.38	JPINE 20
5099	'BP' 58+22.79	8.67' LT	2101886.44	7135965.56	JPINE 12
5100	'BP' 58+07.73	4.29' LT	2101871.50	7135956.45	JPINE 20&14 TWIN
5101	'BP' 57+98.58	5.28' LT	2101863.53	7135950.33	JPINE 16
5102	'BP' 58+01.10	10.21' RT	2101858.35	7135965.11	JPINE 24
5104	'BP' 57+73.73	8.31' RT	2101834.70	7135953.06	JPINE 14
5108	'BP' 57+50.24	11.35' LT	2101822.65	7135924.73	JPINE 18
5114	'BP' 56+93.74	9.78' LT	2101771.99	7135899.67	JPINE 24
5128	'BP' 54+36.47	7.46' RT	2101609.38	7135708.56	JPINE 24
5129	'BP' 54+24.60	7.98' LT	2101615.14	7135689.95	JPINE 24
5130	'BP' 54+05.84	8.90' RT	2101590.53	7135684.37	JPINE 28
5132	'BP' 53+98.47	9.40' LT	2101601.22	7135667.79	JPINE 24
5134	'BP' 53+45.02	3.83' LT	2101566.64	7135627.24	JPINE 12
5135	'BP' 53+42.82	10.00' RT	2101553.50	7135632.12	FIR 24
5136	'BP' 53+25.53	5.62' LT	2101559.74	7135609.51	JPINE 16
5143	'BP' 52+57.80	6.71' LT	2101547.20	7135545.59	FIR 12
5144	'BP' 52+41.72	9.25' LT	2101548.95	7135529.40	FIR 12
5145	'BP' 52+24.57	10.83' RT	2101527.85	7135513.76	JPINE 18
5150	'BP' 51+74.78	8.02' RT	2101523.51	7135464.17	JPINE 14
5156	'BP' 50+93.97	7.20' RT	2101534.09	7135381.69	JPINE 16
5161	'BP' 50+61.18	10.36' LT	2101552.57	7135349.26	JPINE 20
5166	'BP' 49+56.21	5.49' RT	2101476.00	7135274.00	JPINE 18
5169	'BP' 49+17.27	10.76' RT	2101441.35	7135259.85	JPINE 26
5170	'BP' 48+91.49	10.75' RT	2101418.59	7135251.71	JPINE 20

TREE REMOVAL TABLE

POINT NO.	STATION	OFFSET	NORTHING	EASTING	DESCRIPTION
5172	'BP' 48+77.50	9.87' LT	2101409.88	7135228.49	JPINE 20
5175	'BP' 48+58.32	11.09' RT	2101385.25	7135242.62	JPINE 12
5178	'BP' 47+33.39	6.81' RT	2101277.47	7135177.49	JPINE 14
5180	'BP' 47+15.12	11.51' RT	2101259.18	7135173.12	JPINE 24
5181	'BP' 46+90.88	4.68' RT	2101240.76	7135157.89	JPINE 30
5182	'BP' 46+93.18	11.15' LT	2101248.10	7135143.67	JPINE 30
5186	'BP' 46+61.51	8.68' LT	2101215.02	7135139.24	JPINE 24&18 TWIN
5187	'BP' 46+67.51	9.94' RT	2101217.94	7135157.63	JPINE 24
5188	'BP' 46+52.22	11.22' RT	2101202.74	7135156.53	JPINE 20
5190	'BP' 46+25.59	9.79' LT	2101179.68	7135131.65	JPINE 28
5209	'BP' 42+55.28	10.73' RT	2100857.45	7134993.43	JPINE 12
5211	'BP' 42+12.39	2.13' RT	2100858.17	7134947.01	JPINE 30
5212	'BP' 42+09.75	0.94' RT	2100859.18	7134944.31	FIR 18
5213	'BP' 42+08.66	0.74' LT	2100860.76	7134943.09	FIR 12
5214	'BP' 42+08.05	1.72' LT	2100861.69	7134942.40	JPINE 36
5215	'BP' 41+92.47	5.39' RT	2100852.72	7134927.98	JPINE 24
5219	'BP' 40+73.63	10.66 LT	2100822.20	7134813.02	JPINE 24
5221	'BP' 40+56.26	9.24' RT	2100796.57	7134806.66	JPINE 18
5225	'BP' 39+94.84	9.93' LT	2100776.45	7134749.03	JPINE 24
5229	'BP' 38+74.48	8.66' RT	2100718.45	7134649.68	JPINE 12
5230	'BP' 38+67.92	6.35' RT	2100716.49	7134642.67	JPINE 16
5236	'BP' 37+93.44	5.72' RT	2100682.07	7134575.95	JPINE 24
5238	'BP' 37+73.86	8.35' LT	2100685.33	7134551.99	JPINE 14
5239	'BP' 37+52.14	4.36' RT	2100663.47	7134540.63	JPINE 30&24 TWIN
5245	'BP' 36+40.39	10.97' RT	2100613.61	7134441.54	JPINE 26
5246	'BP' 36+38.44	5.33' RT	2100617.50	7134437.07	JPINE 24
5267	'BP' 12+08.77	2.85' LT	2100229.57	7132310.52	JPINE 40
5269	'BP' 11+76.66	0.03' LT	2100260.87	7132302.85	JPINE 36
5271	'BP' 11+59.82	10.89' LT	2100279.17	7132311.02	JPINE 24
5272	'BP' 11+53.15	5.20' LT	2100284.90	7132304.38	JPINE 30
5274	'BP' 11+41.30	3.94' RT	2100295.22	7132293.55	JPINE 40

TREE PROTECTION TABLE

POINT NO.	STATION	OFFSET	NORTHING	EASTING	DESCRIPTION
5003	'BP' 60+11.98	11.70' RT	2101959.87	7136141.48	JPINE 36
5091	'BP' 58+54.49	9.10 LT	2101899.56	7135996.63	JPINE 30
5106	'BP' 57+77.62	12.95' LT	2101847.00	7135935.30	JPINE 24
5116	'BP' 56+62.51	13.82' RT	2101733.56	7135892.49	JPINE 36
5125	'BP' 54+98.64	13.72' RT	2101638.10	7135763.38	JPINE 38
5131	'BP' 54+01.64	11.93' RT	2101585.63	7135682.68	JPINE 24
5133	'BP' 53+72.52	14.65' RT	2101566.61	7135660.47	JPINE 28
5142	'BP' 52+74.79	15.51' RT	2101526.23	7135564.57	JPINE 12
5149	'BP' 51+97.52	13.54' RT	2101521.41	7135488.66	JPINE 40
5151	'BP' 51+77.51	12.89' LT	2101544.58	7135464.97	JPINE 14

TREE PROTECTION TABLE

POINT NO.	STATION	OFFSET	NORTHING	EASTING	DESCRIPTION
5153	'BP' 51+41.53	14.29' RT	2101517.25	7135429.11	JPINE 36
5154	'BP' 51+16.48	15.03' RT	2101520.40	7135402.42	JPINE 14
5155	'BP' 51+08.12	11.99' LT	2101548.63	7135400.34	JPINE 12
5158	'BP' 50+95.22	14.81' RT	2101526.51	7135380.41	JPINE 24
5159	'BP' 50+72.67	12.49' RT	2101531.32	7135363.16	JPINE 24
5162	'BP' 50+40.41	13.68' LT	2101546.86	7135325.24	JPINE 24
5167	'BP' 49+35.30	13.55' RT	2101455.06	7135269.91	JPINE 20
5174	'BP' 48+32.79	12.20' LT	2101374.68	7135209.70	JPINE 38
5179	'BP' 47+29.21	13.61' RT	2101270.59	7135181.55	JPINE 36
5189	'BP' 46+35.69	13.31' LT	2101190.21	7135129.73	JPINE 24
5192	'BP' 46+18.58	8.40' RT	2101169.94	7135148.52	JPINE 30
5193	'BP' 46+03.38	12.74' LT	2101158.20	7135125.28	JPINE 30
5195	'BP' 45+86.01	14.97' RT	2101137.53	7135150.57	JPINE 36
5196	'BP' 45+51.52	11.39' LT	2101105.79	7135120.96	JPINE 60
5218	'BP' 40+80.38	12.54' LT	2100826.96	7134818.17	JPINE 18
5220	'BP' 40+69.15	12.16' RT	2100799.86	7134819.45	JPINE 36
5222	'BP' 40+49.04	12.26' LT	2100812.27	7134790.19	JPINE 18
5226	'BP' 39+64.26	12.08' LT	2100768.94	7134722.90	JPINE 34
5227	'BP' 39+31.47	9.41' RT	2100745.04	7134694.19	JPINE 34
5228	'BP' 39+00.90	11.21' RT	2100733.50	7134671.89	JPINE 36
5231	'BP' 38+47.98	12.95' LT	2100723.59	7134615.94	JPINE 12
5233	'BP' 38+20.20	13.34' RT	2100687.51	7134603.24	JPINE 24
5234	'BP' 38+13.05	16.26' LT	2100710.58	7134583.36	JPINE 20
5235	'BP' 38+08.14	14.57' LT	2100706.83	7134579.76	JPINE 20
5237	'BP' 37+77.06	14.62' LT	2100692.41	7134551.85	JPINE 24
5240	'BP' 37+42.87	13.43' LT	2100673.58	7134522.16	JPINE 30
5242	'BP' 37+31.30	11.97' LT	2100665.94	7134513.07	FIR 14
5247	'BP' 36+24.86	10.31' LT	2100622.50	7134416.81	JPINE 36
5248	'BP' 35+85.02	8.77' LT	2100591.01	7134388.89	FIR 30
5249	'BP' 35+49.61	9.22' LT	2100565.39	7134365.81	JPINE 30
5253	'BP' 33+73.34	12.27' LT	2100458.38	7134227.61	JPINE 20
5258	'BP' 18+33.74	9.97' RT	2100016.45	7132861.95	LPINE 60
5262	'BP' 14+70.83	20.60' RT	2100095.89	7132514.62	LPINE 60
5263	'BP' 13+40.55	11.84' RT	2100125.68	7132385.47	JPINE 60
5265	'BP' 12+68.93	13.19' RT	2100165.88	7132319.92	JPINE 36&20 TWIN
5266	'BP' 12+57.74	16.80' LT	2100192.37	7132337.68	JPINE 60
5268	'BP' 11+94.59	10.62' RT	2100241.53	7132295.05	JPINE 60
5270	'BP' 11+69.93	9.16' LT	2100268.92	7132310.85	JPINE 46
5273	'BP' 11+44.00	11.88' LT	2100294.95	7132309.59	JPINE 36
5275	'BP' 11+34.35	13.72' RT	2100300.28	7132282.86	JPINE 16
5276	'BP' 10+72.90	11.46' RT	2100350.91	7132258.02	JPINE 60
5277	'BP' 70+16.39	9.76' RT	2102655.00	7136829.66	JPINE 36
5278	'BP' 70+34.29	10.32' RT	2102669.21	7136828.73	JPINE 30
5279	'BP' 60+01.56	13.88' RT	2101952.57	7136132.69	JPINE 26

TREE REMOVAL & PROTECTION TABLES
SCALE : NA

PREFINAL

ORIGINAL SCALE IS IN INCHES
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FOR REDUCED PLANS
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REVISION

NUMBER	DATE	DESCRIPTION	BY

PREPARED UNDER THE SUPERVISION OF :

REGISTERED CIVIL ENGINEER

DATE:

DESIGNED:	DRAWN:
DSP	KIS
CHECKED:	DATE:
DSP	06/2024
ROAD NUMBER:	
NA	

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY -
UPPER TRUCKEE RIVER BRIDGE
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Appendix E

Sierra Nevada Yellow-legged Frog Site Assessment Report

December 15, 2023

Donaldo Palaroan, P.E.
Senior Civil Engineer
El Dorado County
Department of Transportation
924 B Emerald Bay Road
So. Lake Tahoe, CA 96150

RE: Sierra Nevada Yellow-legged Frog Site Assessment Report for the South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow Project

Mr. Palaroan:

This site assessment report presents the background, methodology, and results of a Sierra Nevada yellow-legged frog (SNYLF) (*Rana sierrae*) visual encounter survey (VES) for the South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow Project (Project) in South Lake Tahoe, California. This VES was conducted based on preliminary guidance from the Reno Fish and Wildlife Office and in support of the environmental document, permit applications, and Section 7 consultation with the United State Fish and Wildlife Service (USFWS). This site assessment report is complementary to a Natural Environmental Study and Biological Assessment that are being prepared by NCE concurrently to this report.

Project Description

The Project is a Tahoe Regional Planning Agency (TRPA) Environmental Improvement Program project (#03.02.02.0085) and will construct approximately 1.2 miles of Class 1 shared-use path. The shared-use path begins at the south end terminus of Winnemucca Avenue, to the east on public lands owned by the Tahoe Resource Conservation District (known as Johnson Meadow) towards the Upper Truckee River, crossing the river and following the user trails towards the intersection of Sierra Boulevard and Barbara Avenue, crossing publicly-owned parcels by the City of South Lake Tahoe, South Tahoe Public Utility District, California Tahoe Conservancy, and the United States Forest Service (USFS).

The proposed shared-use path will provide connections to existing and future Class 1 facilities in the area. For example, on the west end, there exists a short Class 1 segment between South Avenue and Winnemucca Avenue. The Project builds upon the Sierra Boulevard Complete Streets Project (completed in 2019) and the South Tahoe Greenway Shared Use Trail Phase 2 (completed in 2021) at the corner of Sierra Boulevard and Barbara Avenue. This Project provides a critical link to the bicycle network between the Tahoe Valley Area Plan and bicycle network near the Tahoe Sierra neighborhood. The Project supports the Linking Tahoe: Active Transportation Plan and the Tahoe Valley Area Plan. The Project proposes to install a pedestrian bridge over the Upper Truckee River to replace the old, unusable, concrete bridge washed out during the winter in late 2017. The new bridge will entirely span the Upper Truckee River and the old bridge will be demolished and removed. Bridge demolition will involve jackhammering, ramming (with a mechanical ram, mounted on a backhoe), and a haul or dump truck to export debris. The existing bridge, including abutments and piers, in the Upper Truckee River will be removed. Existing

abutments will be cut below final stream grade and covered with native river substrate, if not entirely removed. All debris generated by bridge demolition will be removed from the streambed and disposed of at a County-approved facility, consistent with local laws and regulations. Bridge removal work will likely occur when the flow of the Upper Truckee River is low, such as the late summer or fall.

Best management practices will be implemented during construction to prevent construction debris (e.g., concrete, or other materials) from entering the Upper Truckee River. The existing bridge demolition work area will be surrounded by a coffer dam system, constructed of gravel bags and visqueen plastic sheets (or comparable materials), to convey flows around the work area. The coffer dam system will maintain Upper Truckee River flows around the work area. Upon completion of the existing bridge demolition activity, the temporary coffer dam will be removed.

The Project is bound by South Avenue and Barton Memorial Hospital to the west, U.S. Highway 50/Lake Tahoe Boulevard (US 50) to the north, Lake Tahoe Airport to the south, and Sierra Boulevard to the east (**Attachment A, Figure 1**). The total Project area is 15.52 acres (**Attachment A, Figure 2**) and encompasses City of South Lake Tahoe and El Dorado County Right-of-Way (ROW) and public parcels owned by City of South Lake Tahoe, South Tahoe Public Utility District, California Tahoe Conservancy, and the USFS.

Background

The SNYLF was listed as an endangered species under the Federal Endangered Species Act in 2014 and 24 critical habitat units covering 1,082,147 acres were designated in 2016 (USFWS 2016). In addition, the USFS Lake Tahoe Basin Management Unit (LTBMU) has developed a SNYLF suitable habitat GIS layer. The Upper Truckee River corridor, and nearly all tributaries and wetland areas in the Lake Tahoe basin, have been identified by the LTBMU as suitable habitat for SNYLF. This data is presented within the context of the Project area in **Attachment A, Figure 3**.

Threats contributing to the danger of extinction throughout the species' range include habitat destruction due to dams, water diversions, recreation, grazing, road construction, and timber harvesting, predation by trout, bullfrogs, and other non-native species, climate change, drought, and chytrid fungus. Historically, SNYLF inhabited lakes, ponds, marshes, meadows, and streams at elevations between 4,500 and 12,000 feet in the western Sierra Nevada from Fresno, Inyo, and Mono Counties and areas north of Lake Tahoe. Generally, they are not found more than 1 meter from water and breed in a variety of habitats including shallows of still lakes or ponds and slow-flowing inlet streams. Egg masses are deposited underwater and attach to rocks, gravel, or vegetation, or are deposited under banks. At high elevations, both frogs and tadpoles overwinter under ice in lakes and streams. Throughout its range, SNYLF did not co-evolve with any species of fish, as they predominantly occur in water bodies above natural fish barriers (US Fish and Wildlife Service 2014).

Estimates of SNYLF population losses range between 69% and 93%, with an estimated 44% reduction of suitable watershed habitat (USFWS 2014). Current SNYLF population trends are unknown but are assumed to remain declining or artificially stable with reintroduction efforts. The USFWS has not yet published a 5-year review of the species, which was initiated in early 2020.

Methodology

The SNYLF VES was conducted by an NCE Scientist on August 16, 2023 between 9:50 am and 13:35 pm. During the survey, weather conditions included temperatures between 72 and 79°F, 0-50% cloud cover, and 1-4 mph winds. The survey equipment consisted of a dip net, waders, binoculars, a smartphone utilizing the ESRI Field Maps application, notebook, and a Kestrel 3000 pocket weather meter. The survey followed USFWS-provided VES protocol for SNYLF which involved walking the stream banks of the Upper Truckee River 250 feet upstream and downstream of the proposed pedestrian bridge replacement. The stream banks were surveyed in an upstream direction, wading parallel to the banks, searching in the stream habitat, rocks, over-hanging banks, and backwater pools. The dip net was also waved over riverbank vegetation to flush frogs. The wet meadow west of the Upper Truckee River, mapped as LTBMU SNYLF suitable habitat, was also surveyed within a 100-foot buffer of the Project area in a thorough, zigzag pattern to search for amphibians in grassy areas and any small streams or lentic water. Ponds were surveyed 10 feet above the shorelines, along the water's edge, and thoroughly dip netted to search for amphibians. All equipment in contact with the water was disinfected for chytrid fungus prior to the survey.

Results

The Project area is outside of the USFWS designated critical habitat for SNYLF; however, the Project area overlaps with 3.16 acres of the LTBMU SNYLF suitable habitat. The closest critical habitat area is approximately five miles west of the Project in the Desolation Wilderness.

Habitat present in the Project area includes the wetlands of Johnson Meadow that can support lentic backwaters and ponded features isolated from predatory fish species in the Upper Truckee River. Flows of the Upper Truckee River are generally too rapid for SNYLF foraging and breeding, but pools between riffles and runs can provide suitable microhabitats; however, the presence of predatory fish species such as trout reduce potential for SNYLF. This riverine and meadow habitat is different from the high-elevation alpine lakes of the Desolation Wilderness where the species is currently known to occur, and the small, isolated ponds, inlet streams, and other vernal wetland features in the Project area that can provide habitat for SNYLF are limited resulting from the channelization and incision of the Upper Truckee River.

No SNYLF or other amphibians were observed during the VES, although multiple garter snakes (*Thamnophis elegans*) were observed. Fish species observed in the Upper Truckee River included brown trout (*Salmo trutta*) and an unidentified sucker species (*Catostomus* sp.). Database searches, including the California Natural Diversity Database (CNDDB) and existing LTBMU survey data, revealed no occurrences of SNYLF in a half-mile buffer of the Project area. Habitats in the Project area include mixed Jeffrey pine (*Pinus jeffreyi*) forest, big sagebrush (*Artemisia tridentata*), pacific willow (*Salix lasiandra*) shrub and quaking aspen (*Populus tremuloides*) forested wetland, wet meadow, and riverine. The wet meadow contained vernal depressions but was considerably dry during the survey, as soil was unsaturated and standing water was absent (**Attachment B, Photograph 4**). Two small ponds, each approximately 100 square feet with a depth of 3 feet, were found in the forested/willow shrub wetland 15 and 85 feet north of the Project area (**Attachment B, Photograph 5**).

Low-quality suitable habitat for SNYLF is limited to the western portion of the Project area (Johnson Meadow) and includes the riverine, pacific willow shrub and quaking aspen forested wetland, and wet meadow habitats which is consistent with the LTBMU SNYLF suitable habitat in **Figure 3**. According to the LTBMU, known occurrences of SNYLF in the Lake Tahoe basin are in the Desolation Wilderness at Tamarack, Cagwin, Lucille, Margery, Jabu, and Upper, Middle, and Lower Velmas Lakes and the headwaters of Trout Creek at Hell Hole. The only SNYLF historical

occurrence associated with the Upper Truckee River body is from 1952 as documented by the CNDDB. The LTBMU conducts annual surveys for herpetofauna, including SNYLF, throughout the Lake Tahoe basin. However, LTBMU has not conducted surveys on the Upper Truckee River near the Project area. Representative photographs of the Project area and habitats are included in **Attachment B** and lists of plants and wildlife observed during the survey are included in **Tables 1** and **2**, respectively.

Disturbances in the Project area include urbanization at the west and east ends, low-flying aircraft, forest thinning, and the unvegetated, single-track foot paths and utility access routes through the Project area that connects to the washed-out pedestrian bridge. Pedestrians and mountain bikers were frequently observed crossing a shallow span of the Upper Truckee River in the Project area, south of the washed-out bridge.

Table 1. Plant species observed during the reconnaissance-level field surveys.

Species Name	Common Name	Native; Y, N
Abies concolor	White fir	Y
Achillea millefolium	Common yarrow	Y
Agropyron cristatum	Crested wheatgrass	N
Agrostis gigantea	Creeping bentgrass	N
Agrostis idahoensis	Idaho bentgrass	Y
Allium campanulatum	Dusky onion	Y
Aquilegia formosa	Western columbine	Y
Arctostaphylos nevadensis	Pinemat manzanita	Y
Arctostaphylos patula	Greenleaf manzanita	Y
Artemisia douglasiana	California mugwort	Y
Artemisia tridentata	Big sagebrush	Y
Astragalus cicer	Chickpea milkvetch	N
Berberis aquifolium	Mountain grape	Y
Bromus inermis	Smooth brome	N

Species Name	Common Name	Native; Y, N
Bromus tectorum	Cheatgrass	N
Carex athrostachya	Slender beak sedge	Y
Carex aquatilis	Water sedge	Y
Carex utriculata	Northwest territory sedge	Y
Castilleja miniata	Great red paintbrush	Y
Ceanothus cordulatus	Mountain whitethorn	Y
Chamerion angustifolium	Fireweed	Y
Chrysothamnus viscidiflorus	Yellow rabbitbrush	Y
Cirsium andersonii	Anderson's thistle	Y
Eleocharis macrostachya	Common spikerush	Y
Elymus elymoides	Squirreltail	Y
Elymus glaucus	Blue wild rye	Y
Elymus triticoides	Beardless wild rye	Y
Epilobium ciliatum	Fringed willowherb	Y
Equisetum arvense	Field horsetail	Y
Eriogonum nudum	Naked buckwheat	Y
Eriogonum umbellatum	Sulphur buckwheat	Y
Erythranthe guttata	Seep monkey flower	Y
Fragaria virginiana	Mountain strawberry	Y

Species Name	Common Name	Native; Y, N
Galium triflorum	Fragrant bedstraw	Y
Gayophytum diffusum	Spreading groundsmoke	Y
Geum macrophyllum	Large leaved avens	Y
Gnaphalium palustre	Western marsh cudweed	Y
Ipomopsis aggregata	Scarlet gilia	Y
Juncus articulates	Jointleaf rush	Y
Juncus balticus	Baltic rush	Y
Juncus ensifolius	Sword leaved rush	Y
Kelloggia galioides	Milk kelloggia	Y
Lactuca serriola	Prickly lettuce	N
Letharia vulpina	Wolf lichen	Y
Lotus corniculatus	Bird's foot trefoil	Y
Lupinus sp.	Lupine	Y
Madia glomerata	Mountain tarweed	Y
Oreostemma alpigenum	Tundra aster	Y
Paeonia brownii	Brown's peony	Y
Pedicularis semibarbata	Pinewoods lousewort	Y
Penstemon speciosus	Royal beardtongue	Y
Phacelia hastata	Silverleaf phacelia	Y

Species Name	Common Name	Native; Y, N
Phleum alpinum	Timothy grass	Y
Phleum pratense	Common timothy	N
Phlox diffusa	Spreading phlox	Y
Pinus contorta	Lodgepole pine	Y
Plantago major	Common plantain	N
Platanthera leucostachys	Sierra bog orchid	Y
Poa bulbosa	Bulbous blue grass	N
Poa secunda	One-sided blue grass	Y
Populus tremuloides	Quaking aspen	Y
Populus trichocarpa	Black cottonwood	Y
Potentilla gracilis	Northwest cinquefoil	Y
Prunella vulgaris	Common selfheal	Y
Pterospora andromedea	Woodland pinedrops	Y
Purshia tridentata	Antelope bitterbrush	Y
Pyrola asarifolia	Bog wintergreen	Y
Ribes cereum	Wax currant	Y
Rosa woodsii	Woods' rose	Y
Rumex acetosella	Common sheep sorrel	N
Rumex salicifolius	Willow dock	Y

Species Name	Common Name	Native; Y, N
Salix lasiandra	Pacific willow	Y
Salix lemmonii	Lemmon's willow	Y
Scirpus microcarpus	Panicled bulrush	Y
Sidalcea oregana	Oregon checker mallow	Y
Solidago canadensis	Canada goldenrod	Y
Sphenosciadium capitellatum	Ranger's button	Y
Thalictrum fendleri	Fendler's meadow rue	Y
Tragopogon dubius	Yellow salsify	N
Trifolium longipes	Long stalked clover	Y
Veratrum californicum var. *californicum*	California corn lily	Y
Wyethia mollis	Woolly mule ears	Y

Table 2. Wildlife species observed during the reconnaissance-level field surveys.

Species Name	Common Name	Native; Y, N
Birds		
Branta canadensis	Canada goose	Y
Buteo jamaicensis	Red-tailed hawk	Y
Coccothraustes vespertinus	Evening grosbeak	Y
Colaptes auratus	Northern flicker	Y
Contopus sordidulus	Western wood-pewee	Y

Species Name	Common Name	Native; Y, N
Cyanocitta stelleri	Steller's jay	Y
Dryobates albolarvatus	White-headed woodpecker	Y
Hirundo rustica	Barn swallow	Y
Leuconotopicus villosus	Hairy woodpecker	Y
Passerina amoena	Lazuli bunting	Y
Poecile gambeli	Mountain chickadee	Y
Selasphorus rufus	Rufous hummingbird	Y
Sialia mexicana	Western bluebird	Y
Sitta canadensis	Red-breasted nuthatch	Y
Sitta carolinensis	White-breasted nuthatch	Y
Sitta pygmaea	Pygmy nuthatch	Y
Streptopelia decaocto	Eurasian collared-dove	N
Turdus migratorius	American robin	Y
Reptiles		
Sceloporus occidentalis	Fence lizard	Y
Thamnophis elegans	Garter snake	Y
Crustaceans		
Pacifastacus sp.	Crayfish	N
Fish		
Catostomus sp.	Sucker	Y

Species Name	Common Name	Native; Y, N
Salmo trutta	Brown trout	N
Insects		
Colias eurytheme	Orange sulphur	Y
Hemileuca hera	Hera moth	Y
Hyles lineata	White-lined sphinx moth	Y
Limenitis lorquini	Lorquin's admiral	Y
Lycaena editha	Edith's copper	Y
Neophasia menapia	Pine white	Y
Mammals		
Sciurus griseus	Western gray squirrel	Y
Tamias sp.	Chipmunk	Y
Tamiasciurus douglasii	Douglas squirrel	Y
Ursus americanus	Black bear	Y

Discussion and Recommendations

There is no federal critical habitat in the Project area, and the closest critical habitat area is approximately five miles west of the Project in the Desolation Wilderness. Although no SNYLFs were observed during the VES, low-quality suitable habitat is present for this species, consistent with the LTBMU suitable habitat in **Attachment A, Figure 3**.

Permanent and temporary impacts to SNYLF habitat are the same as the permanent and temporary impacts to CDFW and USACE jurisdictional aquatic resources identified by the aquatic resources determination for the Project. There will be 0.15 acres of permanent impacts to freshwater emergent wetlands, 0.16 acres of permanent impacts to freshwater forested/shrub wetlands, and 0.02 acres of permanent impacts to the Upper Truckee River resulting from the bridge and boardwalk construction. In addition, construction of the boardwalk, bridge, and the removal of the existing bridge will result in 0.23 acres of temporary impacts to freshwater emergent wetlands, 0.25 acres of temporary impacts to freshwater forested/shrub wetlands, and 0.02 acres of temporary impacts to the Upper Truckee River. The total permanent impact to wetlands is 0.33 acres, and the

total temporary impact to wetlands is 0.5 acres. Removal of the old bridge will result in the gain of 0.01 acres of SNYLF habitat.

Despite suitable habitat in the Project area, the potential for SNYLF occurrence is low considering the presence of predatory species (trout, crayfish, garter snakes, etc.) in the Upper Truckee River and surrounding ponds and wet meadows and the lack of low flow streams and quality lentic backwaters. SNYLF suitable habitat in the Johnson Meadow has been reduced by the channelization/diversion of the river, reduction of backwater pools, and previous land use over the past century. However, various reaches of the Upper Truckee River have been subject to restoration projects, some of which are ongoing or in the planning process. These projects have addressed restoring flow to relict channels, improving bank stability, reducing sediment flow to Lake Tahoe, and ultimately improving wetland and special status species habitat.

There is no SNYLF occurrence data in the South Lake Tahoe region, and the nearest, most recent occurrences are approximately a decade old at much higher alpine elevations of the Desolation Wilderness. Other historical occurrences are also reported, however these date as far back as 1863, with the only historical occurrence associated with the Upper Truckee River body being from 1952 (CNDDB 2023). Considering low-quality suitable habitat is present, the Project is within the species' historic range, and suitable lentic conditions are variable year to year, NCE recommends an additional pre-construction VES to ensure no SNYLF have occupied habitat in the Project area vicinity prior to construction. NCE anticipates the California Department of Fish and Wildlife (CDFW), and TRPA, will include pre-construction biological survey and monitoring requirements for special status species as part of permit conditions for the Project, which may include additional avoidance and minimization measures for SNYLF and its habitat.

In conclusion, there is a low probability of SNYLF occurrence within suitable habitat in the Project area and informal Section 7 consultation with USFWS is recommended. Formal Section 7 consultation will likely not be required assuming the USFWS concurs with a "may affect, not likely to adversely affect" determination and the avoidance and minimization measures described in this site assessment report, the Natural Environment Study, and Biological Assessment. If SNYLF are detected during pre-construction surveys or during Project construction, activities will cease and consultation with USFWS will be reinitiated.

References

United States Fish and Wildlife Service. 2014. Endangered and Threatened Wildlife and Plants; Endangered Species Status for Sierra Nevada Yellow-Legged Frog and Northern Distinct Population Segment of the Mountain Yellow-Legged Frog, and Threatened species Status for Yosemite Toad. https://www.federalregister.gov/documents/2014/04/29/2014-09488/endangered-and-threatened-wildlife-and-plants-endangered-species-status-for-sierra-nevada. Accessed 9/18/23.

United States Fish and Wildlife Service. 2016. Designation of Critical Habitat for the Sierra Nevada Yellow-Legged Frog, the Northern DPS of the Mountain Yellow-Legged Frog, and the Yosemite Toad; Final Rule. Federal Register 81 (166):59046-59119.

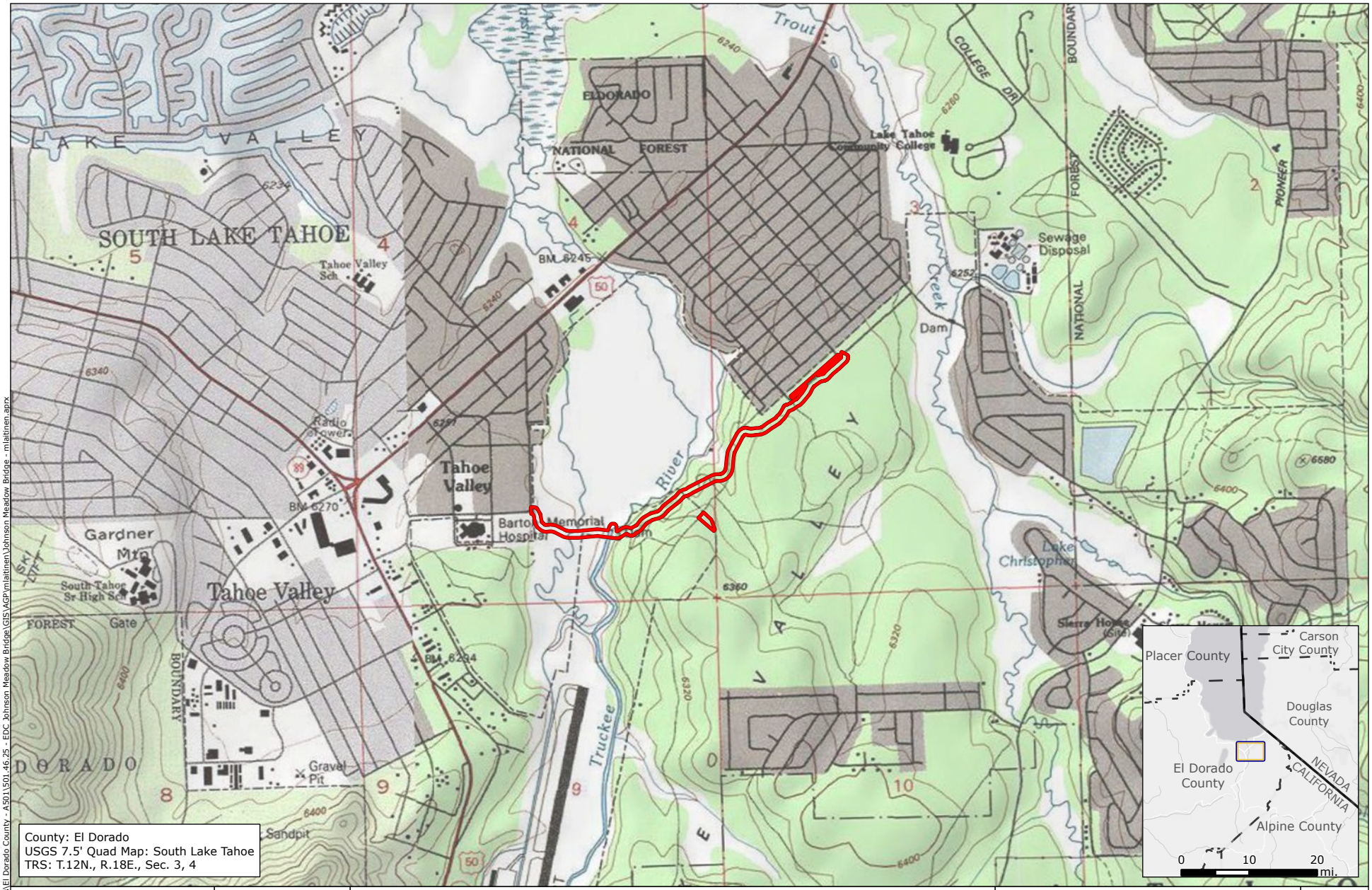
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Attachment A

Figures

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(775) 588-2505
www.ncenet.com

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Legend

Project Area

NCE

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow

Project Area Location Map

N

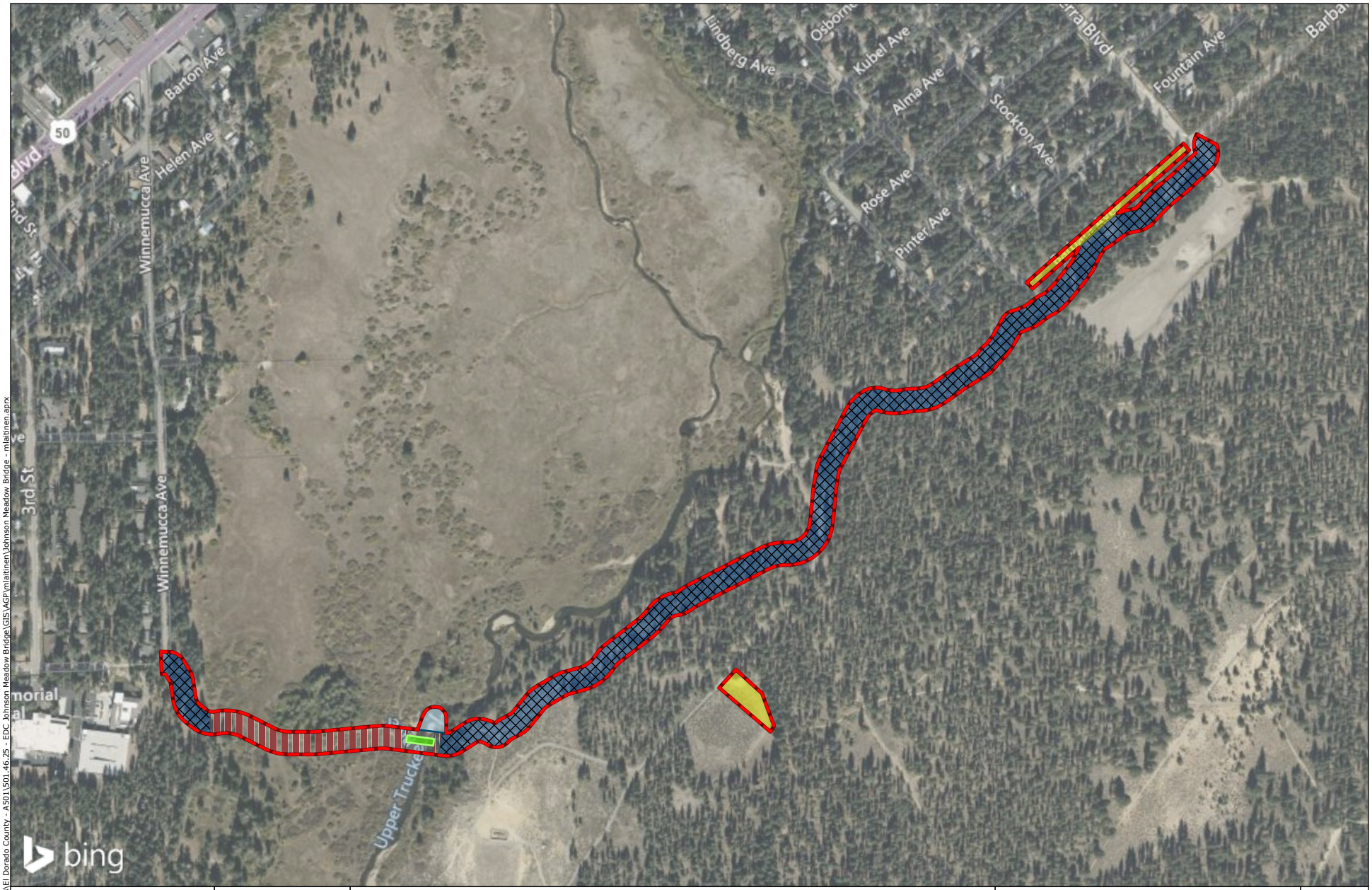
1 : 24,000

0 1,000 2,000 ft.

FIGURE 1

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
ESRI USGS Topo Maps	501.46.25	mlaitinen	5/25/2023	-	jhall

Document Path: P:\Active Projects\El Dorado County - A501\501.46.25 - EDC Johnson Meadow Bridge\GIS\AGP\mlaitinen\Johnson Meadow Bridge - mlaitinen.aprx



Project Area
Class 1 Shared Used Path
Boardwalk
New Bridge
Bridge Removal
Staging Area

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow

Project Area Detail Map

N

1 in. = 600 ft.

0 600 ft.

FIGURE 2

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Basemap	501.46.25	mlaitinen	5/25/2023	-	jhall

Document Path: P:\Active Projects\El Dorado County - A501\501.46.25 - EDC Johnson Meadow Bridge\GIS\AGP\mlaitinen\Johnson Meadow Bridge - mlaitinen.aprx



Project Area
0.5-mile Buffer
Staging Area
SNYLF Suitable Habitat

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow
Lake Tahoe Basin Management Unit (LTMBU)
Sierra Nevada Yellow-legged Frog (SNYLF) Suitable Habitat

N

1 in. = 1,500 ft.

0 1,500 ft.

FIGURE 3

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Basemap, El Dorado County, NCE, LTBMU	501.46.25	dkarlowicz	9/8/2023	-	drios

Document Path: P:\Active Projects\El Dorado County - A501\501.46.25 - EDC Johnson Meadow Bridge\GIS\AGP\dkarlowicz\Johnson Meadow Bridge - dkarlowicz.aprx

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Attachment B

Photo Log

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Engineering & Environmental Services



Photograph 1. South-facing view of Upper Truckee River and willow shrub habitat.



Photograph 2. North-facing view of Upper Truckee River and washed-out pedestrian bridge.



Photograph 3. East-facing view of proposed bridge replacement crossing location.



Photograph 4. North-facing view of representative forested/willow shrub wetland and wet meadow habitat.



Photograph 5. Representative photo of small ponds in the forested/willow shrub wetland.



Photograph 6. East-facing view of the trail and wet meadow habitat in the western portion of the Project area.

Appendix F

Invasive Plant Risk Assessment

INVASIVE PLANT RISK ASSESSMENT
SOUTH TAHOE GREENWAY – UPPER TRUCKEE RIVER BRIDGE AT JOHNSON MEADOW

LAKE TAHOE BASIN MANAGEMENT UNIT
USDA FOREST SERVICE

Prepared by: _____ Date: 2/20/2024
Dylan Karlowicz, NCE

Approved by: _____ Date: _____
Quinn Young, Forest Botanist

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1 INTRODUCTION

In 2003, the United States Forest Service (USFS) identified invasive species as one of four critical threats to the nation's ecosystems (Bosworth 2003). Invasive plants pose a significant threat to ecological function due to their ability to displace native species, alter nutrient and fire cycles, decrease the availability of forage for wildlife, and degrade soil structure (Bossard et al. 2000). Infestations can also reduce the recreational or aesthetic value of native habitats.

Forest management activities can contribute to the introduction and spread of invasive plants by creating suitable environmental conditions for establishment and by acting as vectors for spread. The following risk assessment has been prepared to evaluate the risk associated with invasive plant introduction and spread as a result of the proposed Project.

1.1 ANALYSIS FRAMEWORK: PERTINENT LAWS, POLICIES, AND DIRECTION

A comprehensive summary of principal statutes governing the management of invasive plants on the National Forest System (NFS) is available in Forest Service Manual (FSM) 2900. A brief summary of the pertinent laws, policies, and direction is provided below.

1.1.1 Federal Laws and Executive Orders

Executive Order 13112 (1999) and 13751 (2016)—directs federal agencies to safeguard the nation from the impacts of invasive species through the prevention of the introduction of invasive species and detection and rapid response to control such species, and to minimize the economic, ecological, and human health impacts from invasive species on public land.

1.1.2 Forest Service Policies and Direction

Forest Service Manual 2080 (USDA Forest Service 1995)—Was replaced by FSM 2900 in 2011. FSM 2080 revised USFS national policy on noxious weed management to emphasize integrated weed management, which includes prevention and control measures, cooperation, and information collection and reporting.

Forest Service Manual 2900 (USDA Forest Service 2011)—directs the Forest Service to manage invasive species with an emphasis on integrated pest management and collaboration with stakeholders, to prioritize prevention and early detection and rapid response actions, and ensure that all Forest Service management activities are designed to minimize or eliminate the possibility of establishment or spread of invasive species on the NFS or to adjacent areas.

Forest Service Manual 2070 (USDA Forest Service 2008)—provides guidelines for the use of native material on National Forest System lands. It restricts the use of persistent, non-native, non-invasive plant materials and prohibits the use of noxious weeds for revegetation, rehabilitation and restoration projects. It also requires that all revegetation projects be reviewed by a trained or certified plant material specialist for consistency with national, regional, and forest policies for the use of native plant materials.

USFS National Strategy and Implementation Plan for Invasive Species Management (USDA Forest Service 2004a)—identifies for all Forest Service programs the most significant strategic actions for

addressing invasive species. It emphasizes prevention, early detection and rapid response, prioritization in control and management, and restoration or rehabilitation of degraded areas.

Region 5 Noxious Weed Management Strategy (USDA Forest Service 2000)—guides regional Forest Service goals and objectives for invasive plant management, emphasizing actions necessary to: promote the overall management of noxious weeds; to prevent the spread of weeds; control existing stands of weed infestations; and promote the integration of weed issues into all forest service activities.

1.1.3 Forest Plan Direction

LTBMU Land Management Plan (LTBMU 2016)—The LMP specifically addresses invasive plants through the development of desired conditions:

DC69. Invasive species do not adversely affect native species, human health, ecosystem processes, or other NFS resources.

DC70. Aquatic and terrestrial ecosystems are self-sustaining and resistant to the establishment of invasive species.

DC71. Invasive species management prioritizes prevention and early detection and rapid response actions.

The LMP also addresses Invasive Species Management Strategies for both aquatic and terrestrial species. Please refer to Standards and Guidelines below:

SG73. Incorporate prevention and control measures into project planning, management activities and operations to prevent new introductions or contribute to spreading of invasive species, and reduce impacts from existing infestations on NFS lands, or to adjacent lands and water bodies. [Standard]

SG74. When feasible, employ the following control measures, such as: [Guideline]

a) Use contract and permit clauses to require that the activities of contractors and permittees (including but not limited to special use permits, utility permits, pack stock operators) are conducted to prevent and control the introduction, establishment, and spread of aquatic and terrestrial invasive species.
b) Include invasive species prevention and control measures in mining plans of operation and reclamation plans.
c) When working in known invasive species infestations during project implementation, equipment and vehicles shall be cleaned before moving to other NFS lands.
d) Support partner agencies and their programs.
e) Use on-site materials where feasible, unless contaminated with invasive species.

SG75. Gravel, fill, topsoil, mulch, and other materials should be free of invasive species. [Guideline]

SG76. New infestations are inventoried, and known infestations are prioritized and contained, controlled, or eradicated using an integrated management approach. [Standard]

Aquatic

SG77. Ensure that all motorized watercraft launching from staffed Forest Service facility have required documentation of AIS inspection. [Standard]

SG78. All equipment and vehicles (Forest Service and contracted) used in a waterbody during project implementation shall be inspected and free of invasive species prior to implementation. [Guideline]

SG79. Take actions as needed to minimize the risk of spreading Bd fungus and other potential aquatic pathogens and/or diseases through aquatic systems. [Guideline]

SG80. Ensure that field gear (waders, float tubes, etc.) is cleaned, decontaminated, and/or fully dried prior to entering or moving between aquatic habitats. [Guideline]

SG81. Establish non-motorized watercraft risk screening for AIS at staffed entry points for both Forest Service boat launches and recreation facilities adjacent to Lake Tahoe water bodies, including campgrounds, resorts, and day use areas. [Guideline]
SG82. Following emergency response guidelines, implement prevention measures to decrease the potential for aquatic invasive species transference. [Guideline]

Terrestrial
SG83. For projects involving ground disturbance, inventory project areas and adjacent areas (particularly access routes) for invasive plants. [Guideline]
SG84. If supplemental fodder (such as hay, straw, or silage) is required for permitted livestock, including horses and other pack animals, it shall be weed-free as certified by state or local certification programs. [Standard]
SG85. Screen plant materials used in revegetation, rehabilitation, and restoration (seed, cuttings, whole plants) for invasive plant risks. Avoid the use of persistent non-native plants unless justified in project documentation. [Guideline]
SG86. All equipment and vehicles (Forest Service and contracted) used off-road during project implementation shall be cleaned and free of invasive plant material before moving into the project area. [Guideline]
SG87. Following emergency response guidelines, utilize washing stations at staging areas, base camps, or other incident locations, to clean soil, seeds, vegetative material, or other debris that could contain invasive plant material from off-road equipment and vehicles. [Guideline]
SG88. Avoid locating landings or staging areas within areas infested by invasive plants, including during project implementation, fire management activities, and other ongoing management and maintenance activities. If infested areas are the only feasible landing/staging areas, then treat infestations prior to use, except in emergency situations. [Guideline]
SG89. Minimize the size of staging and construction areas. Where feasible, reestablish vegetation on disturbed bare ground to reduce invasive species establishment. [Guideline]
Sierra Nevada Forest Plan Amendment (USDA 2004)—Establishes goals, standards, and guidelines for invasive plant (noxious weed) management for the Sierra Nevada forests. It emphasizes prevention and integrated weed management. It establishes the following invasive plant management prioritization: 1) prevent the introduction of new invaders; 2) conduct early treatment of new infestations; 3) contain and control established infestations. It also requires forests to conduct an invasive plant risk assessment to determine risks for weed spread (high, moderate, or low) associated with different types of proposed management activities and develop mitigation measures for high and moderate risk activities with reference to the weed prevention practices in the Regional Noxious Weed Management Strategy.

2 PROJECT DESCRIPTION

2.1 PROPOSED ACTIVITIES

El Dorado County (County), in cooperation with the California Department of Transportation (Caltrans), proposes to implement the South Lake Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow Project (Project). The Project is one in a series of erosion control/water quality, environmental restoration, and shared-use path projects implemented by the El Dorado County Department of Transportation and an extension to the Dennis T. Machida Memorial Greenway. It is identified within the Tahoe Regional Planning Agency's (TRPA) Environmental Improvement Program as Project #03.02.02.0085 and Federal Aid Project # STPL-5925(183). The Project supports the Linking Tahoe:

Active Transportation Plan, approved by the Tahoe Metropolitan Planning Organization and the Tahoe Valley Area Plan.

The Project proposes to build upon the overall shared-use path network on the south shore of Lake Tahoe by constructing approximately 1.2 miles of Class 1 shared-use path and replacing a heavily trafficked bridge over the Upper Truckee River damaged by the 2017 winter storms. The Project is intended to establish a needed active transportation link between the Barton Hospital area (west of the Upper Truckee River) and the Tahoe Sierra neighborhood/Lake Tahoe Community College area (east of the Upper Truckee River). The shared-use path would begin at the south terminus of Winnemucca Avenue near Barton Memorial Hospital then extend east on public lands owned by the Tahoe Resource Conservation District (known as Johnson Meadow), cross the Upper Truckee River, then follow existing user-created trails to the intersection of Sierra Boulevard and Barbara Avenue. The shared-use path would provide connections to existing Class 1 facilities in the area, such as the short Class 1 segment between South Avenue and Winnemucca Avenue. The Project also builds upon the Sierra Boulevard Complete Streets Project (completed in 2019) and the South Tahoe Greenway Shared Use Trail Phase 2 Project (completed in 2021) at the corner of Sierra Boulevard and Barbara Avenue.

Most of the path (approximately 5,075 linear feet) would be constructed atop the existing ground surface, while the remainder (approximately 935 linear feet) would consist of an elevated boardwalk. The surface path would consist of a three-inch layer of asphalt atop an eight-inch-thick aggregate base. The Project area is relatively flat, and limited cut and fill would be required. The path surface would be ten feet wide with a two-foot-wide aggregate base shoulder to either side. Where necessary, the surface of the path would be crowned to facilitate drainage. Excavation conducted during construction of the surface path would be approximately one-and-a half feet in depth, or within the approximate prism of previous disturbance. Where appropriate, 6-foot by 12-foot rest area pullouts would be constructed on either side of the path.

Where appropriate, roadway signage would be installed to inform users of nearby bicycle facilities, mostly at or near roadway intersections at either end of the Project corridor. Signposts would be set 36 inches into the ground and would be set three feet from the edge of the paved path, with a vertical height clearance of seven to eight feet. Signage will include warning (hill, pedestrian crosswalk, stop ahead, etc.) and regulatory (stop, no motor vehicles) signs. There may also be future wayfinding signs to show distances/direction to common destinations (hospital, river, college, etc.).

The boardwalk section of the path would rest atop a structure consisting of 14-inch diameter steel pipe piles and 11-inch by 14-inch beams. The boardwalk surface would be approximately 13 feet in width and would be elevated one to four feet above the ground surface, and higher at the bridge approach to match the bridge elevation. Portions of the boardwalk deck close to the ground would have curbs along the outer edge, while elevated portions would have tubular steel railing with wire strands installed along both edges. Where boardwalk heigh is greater than 30 inches, rails along the boardwalk would extend three feet above the boardwalk deck.

A new bridge would be constructed to entirely span the Upper Truckee River and the old concrete bridge, including abutments, wingwalls, and piers, would be demolished and removed. Bridge demolition would involve jackhammering, ramming (with a mechanical ram, mounted on a backhoe or excavator), and removal of debris by a haul or dump truck. Existing abutments and wingwalls would be cut below final stream grade and covered with native river substrate, if not entirely removed. All debris generated by bridge demolition would be removed from the streambed and disposed of at a County-

approved facility, consistent with local laws and regulations. Bridge removal work would likely occur when the flow of the Upper Truckee River is low, such as in late summer or fall. BMPs would be implemented during construction to contain debris within the work area during bridge demolition. The existing bridge demolition work area would be surrounded by a cofferdam system, constructed of gravel bags and visqueen plastic sheets (or approved allowable alternative materials), to convey and maintain flow around the work area. Upon completion of the bridge demolition activity, the temporary coffer dam would be removed.

The new pedestrian bridge would be approximately nine feet in height and 140 feet in length with a 146-inch-wide reinforced concrete deck. The structure would consist of an unpainted weathered steel half-through underhung Pratt truss with one diagonal per truss panel and plumb end vertical members. Parallel chords with diagonal web members slanting toward the center of the span would define either edge. The top of the chords would be about 54 inches above the finish deck. Safety rails would be established along either edge of the bridge deck. The foundation would consist of poured in place concrete abutments on either bank of the river. Approximately three to five feet of the abutment on the east side of the river would be exposed, while up to nine feet of the abutment on the west side of the river could be exposed. Excavation of footings would be required, each from five to ten feet in depth. The proposed bridge is similar in type and form to the San Bernardino Bike Trail bridge constructed in 2023, the Trout Creek Bridge (north of Martin Avenue) constructed in 2021, and the Upper Truckee Bridge (Sawmill Road and U.S. 50) constructed in 2008.

2.2 Location and Extent

The Project is located in Township 12 north, Range 18 east, and Sections 3 and 4 of the South Lake Tahoe U. S. Geological Survey (USGS) 7.5-minute quadrangle map. The Project is bound by South Avenue and Barton Memorial Hospital to the west, U.S. Highway 50/Lake Tahoe Boulevard (US 50) to the north, Lake Tahoe Airport to the south, and Sierra Boulevard to the east (**Appendix A, Figure 1**). The current total Project area is 15.52 acres and encompasses City of South Lake Tahoe and County Right-of-Way (ROW) and public parcels owned by City of South Lake Tahoe, South Tahoe Public Utility District (STPUD), California Tahoe Conservancy, Caltrans, and the USFS (APN 025-061-24). The Project area includes two staging areas in a previously disturbed forest clearing and along Barbara Avenue, which are 0.6 and 0.8 acres, respectively (**Appendix A, Figure 2**).

3 Non-Project Dependent Factors

3.1 Inventory

3.1.1 Surveys and existing data

A literature and database review were conducted to identify documented invasive plants/noxious weed species within and adjacent to the Project area. All references utilized for this assessment are listed in Section 6.0. The most relevant searches, reviews, and requests are listed below. For the purposes of this assessment, “invasive plants” are those of management concern on LTBMU, while “noxious weeds” refer to state or federally designated noxious weed species per FSM2900. An “infestation” is an occurrence of an invasive plant.

Table 1. Database and Literature Review Summary

Agency/Entity	Date	Information Received/Reviewed
California Department of Food and Agriculture (CDFA)	Accessed 8/11/2023	• Noxious Weed Species List (CDFA 2021)
Lake Tahoe Basin Weed Coordinating Group (LTBWCG)	Accessed 8/11/2023	• Priority Invasive Weeds of the Lake Tahoe Basin (LTBWCG 2018)
USFS	Accessed 8/11/2023	• USFS Invasive Plants in the United States feature layer updated May 30, 2023 (USFS 2023) • LTBMU 2023 Invasive Plants of Management Concern (**Appendix B**)
California Invasive Plant Council (Cal-IPC)	8/11/2023	• Cal-IPC Invasive Plant Inventory (Cal-IPC 2023)

A field investigation was conducted to identify the presence of invasive plants on Forest Service and non-Forest Service land by an NCE biologist on August 14, 2023. The methods used for the NCE survey included walking meandering transects of the Project area to identify invasive plants to the extent necessary to determine listing status. The survey area was equivalent to the Project area boundary in **Figure 1**. Infestations were mapped as necessary in the field using a smartphone and ESRI Field Maps (used to collect photographs, spatial, and attribute information). Weather conditions during the survey were 62 to 80 degrees Fahrenheit, 25 to 50 percent cloud cover, and zero to five mile-per-hour winds. The survey took place between 0734 and 1405.

3.1.2 Assessment summary

During the field survey, phenology of vegetation in the Project area was appropriate for identification of invasive plants. It was therefore concluded that the timing was appropriate for presence/absence surveys of the invasive plant species evaluated in this assessment. This survey, in conjunction with the review of existing data of known infestations, is sufficient to complete this Invasive Plant Risk Assessment.

3.2 KNOWN INVASIVE PLANTS IN ANALYSIS AREA

The USFS 2023 Current Invasive Plant Locations GIS data identified one broadleaved pepperweed (*Lepidium latifolium*) infestation within a half-mile buffer of the Project area (**Appendix A, Figure 3**). Other mapped invasives in the vicinity (outside of the half-mile buffer) include Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), cheatgrass (*Bromus tectorum*), oxeye daisy (*Leucanthemum vulgare*), and tall tumblemustard (*Sisymbrium altissimum*). No infestations are mapped within the boundary of USFS parcel 025-061-24.

During the field survey, one invasive plant species, cheatgrass, was identified in the Project area southwest of parcel 025-061-24 on the existing shared-use trail, east of the Upper Truckee River.

3.2.1 Cheatgrass *(Bromus tectorum)*

3.2.1.1 Species description and summary of management options

Cheatgrass is an introduced annual in the grass family (Poaceae) native to southern Europe, northern Africa, and southwestern Asia. It is an aggressive invader of sagebrush and ponderosa pine, and other rangeland and forest communities because of its ability to rapidly grow and seed before native grasses. It can alter normal fire pattern in vegetated areas and thrives after wildfire. Cheatgrass grows in a variety of climates and habitats in moist soil types. It commonly invades disturbed areas including roadsides, rangelands, utility ROWs, and cleared areas (USFS 2017).

Cheatgrass is an LTBMU low priority invasive plant of management concern and has a California Department of Food and Agriculture (CDFA) rating of C (requires eradication or containment only when found in a nursery or at the discretion of the County Agricultural Commissioner), a Cal-IPC rating of high (species having severe ecological impacts on physical processes, plant and animal communities, and vegetation structure), and is a LTBWCG Group 4 species (manage locally based on impact and funding; prevent spread of existing infestations).

Various management options are described in the USFS Field Guide for Managing Cheatgrass in the Southwest including manual, mechanical, prescribed fire, cultural, biological, and chemical controls (USFS 2017). However, many of these options are limited in terms of practical use for the Project and setting. Hand pulling, cutting, or digging is recommended and most feasible for small, localized infestations.

3.2.1.2 Infestations in project area [botany analysis area]

The extent of the infestation was a small, isolated occurrence along the existing trail alignment which the Project proposes to improve to Class 1 standards with pavement and boardwalk. The particular threat and concern of this small infestation is spreading individuals across the Project area during construction. Cheatgrass is mapped extensively in the South Lake Tahoe region by the USFS 2023 Current Invasive Plant Locations GIS data, primarily in disturbed areas and along ROWs.

Treatment goals include prevention by ensuring equipment is clean prior to arrival on site and control/eradication during construction by manual removal of any cheatgrass infestations and new growth observed during construction in disturbed areas.

The Project proponent will adhere to Invasive Species Management Strategies as specified in the LMP with the goal of preventing introduction of invasive plants. Prevention is the most effective method for managing invasive plants. This can be achieved by ensuring mowers, vehicles, and other Project equipment are clean before and after operation in the Project area. Certified weed-free seed and mulch will be used as needed to ensure that cheatgrass or other invasive plant seeds are not being introduced to the site. Establishment of invasive plants in natural areas can be prevented by maintaining healthy natural communities and restoration and monitoring in disturbed areas.

3.2.2 Assessment summary

The field survey resulted in ten non-native plant detections. Of these species, only cheatgrass is considered an invasive species. A list of all plant species observed during the survey is included in **Appendix C**. Within the Project area, invasive plants are most likely to establish along roadsides and trails, on stockpiles or spoils, and in disturbed areas due to parking, staging, and construction.

3.3 HABITAT VULNERABILITY

The dominant plant species in the Project area varies by vegetation community. The Jeffrey pine-dominated forest contains a mixed understory of big sagebrush, antelope bitterbrush (*Purshia tridentata*

var. *tridentata*), *Eriogonum* spp., *Elymus* spp., and manzanita (*Arctostaphylos* spp.). The Jeffrey pine forest habitat in the Project area has been subject to fuel reduction and mechanical thinning resulting in mature stands of forest with reduced canopy cover, complexity, and woody debris that would otherwise increase biological diversity and suitable habitat for various wildlife species. However, there are patchy, dense stands of trees that remain along the transition to the Upper Truckee River and Johnson Meadow. The wet meadow, Upper Truckee riverbanks, and riparian habitats are dominated by bentgrass (*Agrostis* spp.), timothy grass (*Phleum* spp.), sedges, rushes, *Bromus* spp., *Poa* spp., willows, and patches of quaking aspen groves.

Johnson Meadow has been impacted by various historical land uses and hydrological events resulting in altered wetland and riparian habitat conditions and quality. The channelization of the Upper Truckee River and formation of the east gully channel has led to dry soil conditions throughout the meadow resulting in dominant grass species tolerant of xeric conditions, reduced overbank flow, and reduced lentic and surface backwater conditions which would provide herpetofauna refuge from predator fish species in the river. Other disturbances in the Project area include sewer utilities and access routes, recreational trails, and the washed-out bridge crossing which has resulted in bank instability and erosion in the Upper Truckee River. No erosion issues were observed in the upland areas. Historic land use in the Project area includes logging and cattle ranching, and aside from forest fuel reduction, these activities no longer occur. There is no evidence of recent fire activity in the Project area vicinity.

Representative photographs of habitats and site conditions are included in **Appendix D**.

3.3.1 Assessment summary

Considering the existing site conditions, current and future recreational use, the stream environment zone (SEZ) associated with the Johnson Meadow and Upper Truckee River, and the linear nature of the Project, the overall habitat vulnerability is moderate.

3.4 NON-PROJECT DEPENDENT VECTORS

The Project proposes to install a Class 1 trail and boardwalk between the existing and future Class 1 trails in the area. Currently, there is an unpaved trail/travel route between Barbara Avenue and South Avenue, which the proposed alignment generally follows. There are existing STPUD facilities in the Project vicinity including manholes, sewer lines, and a lift station on the east side of the river. STPUD service vehicles may occasionally drive over the meadow to access the manholes, which do not have paved access from South Avenue.

The Project area is located between urban and residential areas. For example, Barbara Avenue is a residential street with overhead and underground utility lines that will be used as a temporary staging area. Another staging area will be in a previously disturbed clearing which is accessible by pavement. In addition, there is a Caltrans snow storage yard located just southeast of the Project area. Tahoe Valley Campground is located just southwest of the Project area, and the Lake Tahoe Airport is located directly south of the Project.

The Upper Truckee River provides passage and connectivity to Lake Tahoe for the federally threatened LCT and two CDFW species of special concern, the Lahontan mountain sucker and mountain whitefish. The Upper Truckee River SEZ provides an important avenue for terrestrial and aquatic wildlife to access Lake Tahoe and the Truckee Marsh.

3.4.1 Assessment summary

Considering the unvegetated trails in the Project area vicinity, recreational use, staging/stockpile yards, paved and unpaved utility access, and residential/urban development, the non-project vectors are high.

4 PROJECT-DEPENDENT FACTORS

4.1 HABITAT ALTERATION EXPECTED AS A RESULT OF THE PROJECT

The Project involves widening the existing unpaved path/trail to a Class 1 standard, which will be ten feet wide. Vegetation removal on the proposed alignment will involve removal of sagebrush and 97 trees ranging in size from 6 to 40 inches diameter at breast height (dbh). Tree removal is not concentrated in a particular segment, but rather will be conducted as needed for the alignment while avoiding late-stage growth (30-inch dbh or greater) and snags, as feasible, to comply with TRPA threshold requirements. The boardwalk will be constructed in the SEZ so grass and wetland species can establish post-construction and trail users can maintain access during times of elevated groundwater.

Ground disturbance will include installation of the Class 1 path pavement (approximately 5,075 linear feet) constructed atop the existing ground surface in the upland, while the remainder (approximately 935 linear feet) will consist of an elevated boardwalk in the SEZ. The surface path will consist of a three-inch layer of asphalt atop an eight-inch-thick aggregate base. The Project area is relatively flat, and limited cut and fill will be required. The path surface will be ten feet wide with a two-foot-wide aggregate base shoulder to either side. Where necessary, the surface of the path will be crowned to facilitate drainage. Excavation conducted during construction of the surface path will be approximately one and a half feet in depth, or within the approximate prism of previous disturbance. Where appropriate, 6-foot by 12-foot rest area pullouts will be constructed on either side of the path.

Where appropriate, roadway signs would be installed to inform users of nearby bicycle facilities, mostly at or near roadway intersections at either end of the Project corridor. Signposts will be set 36 inches into the ground and will be set three feet from the edge of the paved path, with a vertical height clearance of seven to eight feet.

A new bridge would be constructed to entirely span the Upper Truckee River and the old concrete bridge, including abutments, wingwalls, and piers, would be demolished and removed. Existing abutments and wingwalls would be cut below final stream grade and covered with native river substrate, if not entirely removed. The existing bridge demolition work area would be surrounded by a cofferdam system, constructed of gravel bags and visqueen plastic sheets (or approved allowable alternative materials), to convey and maintain flow around the work area. Upon completion of the bridge demolition activity, the temporary coffer dam would be removed.

The new pedestrian bridge would be approximately nine feet in height and 140 feet in length with a 146-inch-wide reinforced concrete deck. The foundation would consist of poured in place concrete abutments on either bank of the river. Excavation of footings would be required, each from five to ten feet in depth. The new bridge would entirely span the river.

The Project does not involve the use of fire including suppression activities, controlled burns, pile burning, or similar activities. However, these activities do occur in the vicinity of the Project but are unrelated to the scope and purpose of the Project.

4.2 INCREASED VECTORS AS A RESULT OF PROJECT IMPLEMENTATION

Travel management is expected to be implemented during the Project, including partial closure of the Barabara Avenue staging area and closure of the existing unpaved path. Considering the limited road closure required for the Project, a minor short-term increase in traffic due to construction equipment staging and parking during implementation is expected. Following completion, the Project is likely to increase non-motorized traffic, including pedestrians and bikes (and on occasion, emergency vehicle access) in the Project area. However, increasing non-motorized accessibility and reducing vehicle miles traveled is a goal of the Project. The amount of non-motorized traffic is expected to be comparable to levels prior to the bridge crossing being washed out in 2017. The Class 1 path, boardwalk, and bridge will also likely be subject to periodic monitoring and maintenance by County staff.

Construction equipment will be used throughout Project implementation but will adhere to the standard management measures identified in the following section to minimize introduction and spread of invasive plants. The Project does not involve the use of grazing or the maintenance or upgrades to utility corridors. The Project includes the use of mulches, compost, wood chips, soil, road base, asphalt, and seed mix. All materials imported to the site are required to be free of invasive plants (including seeds) as stated in the Project specifications and will be inspected prior to use. The only waterbody in the Project area is the Upper Truckee River, and there will be no movement between waterbodies.

4.3 MANAGEMENT MEASURES

4.3.1 Standard management measures for invasive plants

The following measures are designed to minimize risk of new weed introductions, minimize the spread of weeds within units, and minimize the spread of weeds between units. These measures are consistent with Forest Service policy and manual direction and the LTBMU LRMP as amended by the SNFPA.

1. **Inventory—**
   - ***a)*** *As part of site-specific planning, project areas and adjacent areas (particularly access roads) will be inventoried for invasive plants.*
   - ***b)*** *Any additional infestation discovered prior to or during project implementation should be flagged and avoided, then reported to the Forest Botanist or their designated appointee for prioritization and assessment for treatment.*
2. ***Equipment Cleaning—***
   - *a) All equipment and vehicles (Forest Service and contracted) used for project implementation must be free of invasive plant material before moving into the project area. Equipment will be considered clean when visual inspection does not reveal soil, seeds, plant material or other such debris. Cleaning shall occur at a vehicle washing station or steam-cleaning facility before the equipment and vehicles enter the project area.*
   - *b) When working in known invasive plant infestations or designated weed units, equipment shall be cleaned before moving to other National Forest Service system lands. These areas will be identified on project maps.*
3. ***Staging areas—****Do not stage equipment, materials, or crews in invasive plant-infested areas.*
4. ***Control Areas—****Where feasible, invasive plant infestations will be designated as Control Areas—areas where equipment traffic and soil-disturbing project activities would be excluded. If Control Areas are designated, they will be identified on project maps and delineated in the field with flagging.*

5. ***Project-related disturbance—****Minimize the amount of ground and vegetation disturbance in staging and construction areas. Where feasible, reestablish vegetation on disturbed bare ground to reduce invasive species establishment; revegetation is especially important in staging areas.*
6. ***Early Detection****—Any additional infestation discovered prior to or during project implementation should be reported to the Forest Botanist or their designated appointee for prioritization and assessment for treatment.*
7. ***Post Project Monitoring–****After the project is completed the Forest Botanist should be notified so that (as funding allows) the project area can be monitored for invasive plants subsequent to project implementation.*
8. ***Gravel, fill, and other materials—****All gravel, fill, or other materials are required to be weed-free. Use onsite sand, gravel, rock, or organic matter when possible. Otherwise, obtain weed-free materials from sources that have been certified as weed-free. If an LTBMU inspector is not available to inspect material source, then the project proponent will provide a weed-free certificate for its material source.*
9. ***Mulch and topsoil—****Use weed-free mulches and topsoil. Salvage topsoil from project area for use in onsite revegetation, unless contaminated with invasive species. Do not use material (or soil) from areas contaminated by cheatgrass.*
10. ***Revegetation—***
    a) *Seed and plant mixes must be approved by the Forest Botanist or their designated appointee who has knowledge of local flora.*
    b) *Invasive species will not be intentionally used in revegetation. Seed lots will be tested for weed seed and test results will be provided to the Forest Botanist or their designated appointee.*
    c) *Persistent non-natives, such as timothy (Phleum pretense), orchardgrass (Dactylis glomerata), ryegrass (Lolium spp.), or crested wheatgrass (Agropyron cristatum) will not be used in revegetation.*
    d) *Seed and plant material will be from native, high-elevation sources as much as possible. Plant and seed material should be collected from as close to the project area as possible, from within the same watershed, and at a similar elevation whenever possible.*

4.3.2 Project-specific management measures

The following measures are included either to a) address the specific risks identified in this assessment that are not addressed by the standard measures or b) to provide site-specific direction to implement the standard management measures:

There are no known USFS invasive plant occurrences on the USFS parcel in the Project area, and no invasive plants were observed on the parcel during the survey; therefore, no treatments are proposed. Any cheatgrass or other invasives observed during biological pre-constructions surveys of the trail alignment will be flagged for avoidance. The contractor will remove any cheatgrass with manual methods such as hand pulling or digging as feasible, prior to initiating ground disturbance. No control areas are proposed, and the Project will implement the standard management measures described above.

Any invasive plants observed during the Project on the USFS parcel will be reported and treated. Infestations prioritized for treatment will be treated in accordance with Forest Service management direction and the design features of the LTBMU 2010 Terrestrial Invasive Plant Species Treatment Project Environmental Assessment (USDA Forest Service 2010). The Project proponent will notify the Forest Botanist or their designated appointee prior to Project initiation to coordinate invasive plant treatment.

4.3.3 Assessment summary

Overall, there are minimal invasive species in the Project area with no occurrences on the USFS parcel. By following standard control and prevention methods SG73-SG76 of the LMP and revegetating disturbed areas with native species after construction, the Project will have a greatly reduced risk of new infestations of invasive plants. Any new infestations on USFS land will be immediately reported to the Forest Botanist and treated following approved methods.

5 ANTICIPATED WEED RESPONSE TO PROPOSED ACTION

Considering the risk factors summarized in Table 2, there is a moderate overall risk of invasive plant establishment because of the Project. This determination is based on the following:

- No invasive plants have been previously documented in the Project area or on the associated USFS parcel.
- An isolated occurrence of cheatgrass was observed during the August 14, 2023 survey along the existing trail in the Project area but outside of the associated USFS parcel.
- Cheatgrass is one of the most extensively mapped LTBMU invasives in the South Lake Tahoe region and has high potential to spread to disturbed areas.
- High non-project dependent vectors discussed in section 3.4.
- Management measures will be followed as a part of the proposed action (Section 4.3) which will be incorporated into the contract specifications including elements to address invasive plants before, during, and after construction.

Table 2. Summary of Risk Factors

	Factor	Risk	Assessment summary
NON-PROJECT DEPENDENT FACTORS	Inventory	N/A	Adequate. The August 14th, 2023, survey and review of current LTBMU invasive occurrence data were sufficient for the purposes of this assessment. The survey followed USFS requirements and provided complete coverage of the Project area for both documented and undocumented invasive plants. Existing LTBMU invasive plant data and Project plans provided by the County were used to target areas requiring additional focus during the survey.
	Known invasive plants	Low	There are no previously documented invasive plants in the Project area or on the associated USFS parcel. During the survey, a small, localized occurrence of cheatgrass was observed in the Project area but outside of the USFS parcel.
	Habitat vulnerability	Moderate	Considering the existing disturbances, current and future recreational use, SEZ associated with the Johnson Meadow and Upper Truckee River, and linear nature of the Project, the overall habitat vulnerability is moderate.
	Non-project dependent vectors	High	Considering the unvegetated trails in the Project area vicinity, recreational use, staging/stockpile yards, paved and unpaved utility access, and residential/urban development, the non-project vectors are high.

PROJECT-DEPENDENT FACTORS	Habitat alteration expected as a result of project	Moderate	Moderate alteration due to planned tree removal, ground disturbance due to Class 1 trail pavement and boardwalk construction, and the bridge replacement.
	Increased vectors as a result of project implementation	Low	The Project proposes to pave the unvegetated path and install an elevated boardwalk in the SEZ which would reduce invasive plant vectors resulting from trail use compared to existing conditions.
	Management measures	Greatly reduced risk	Project implementation will adhere to control measures SG73-SG76 of the Land Management Plan with the goal of preventing introduction of invasive plants.
ANTICIPATED WEED RESPONSE		**Moderate**	Moderate risk of new introduction; moderate risk of spread because of the project.

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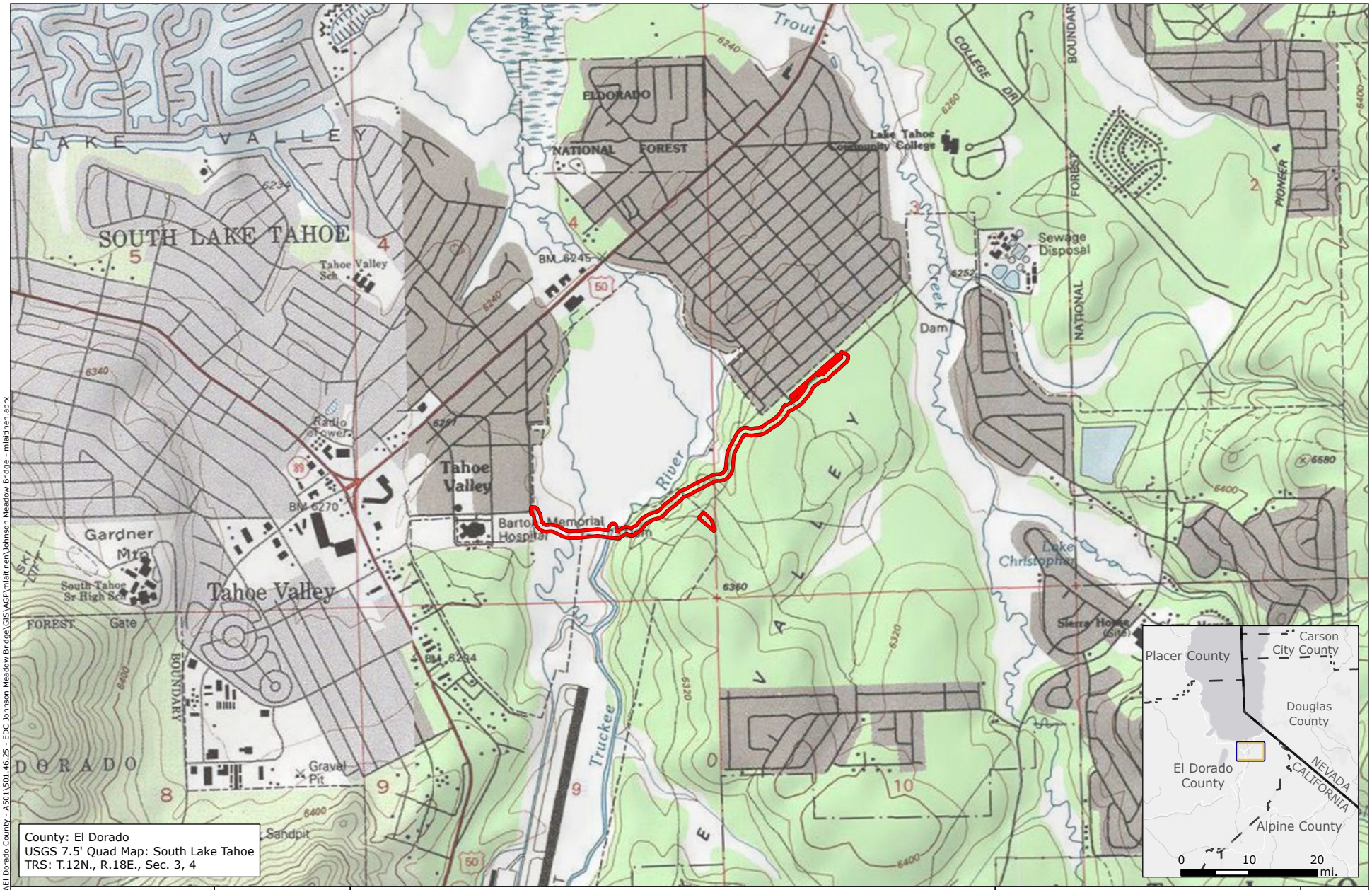
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APPENDIX A. Figures



Legend

Project Area

NCE

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow

Project Area Location Map

N

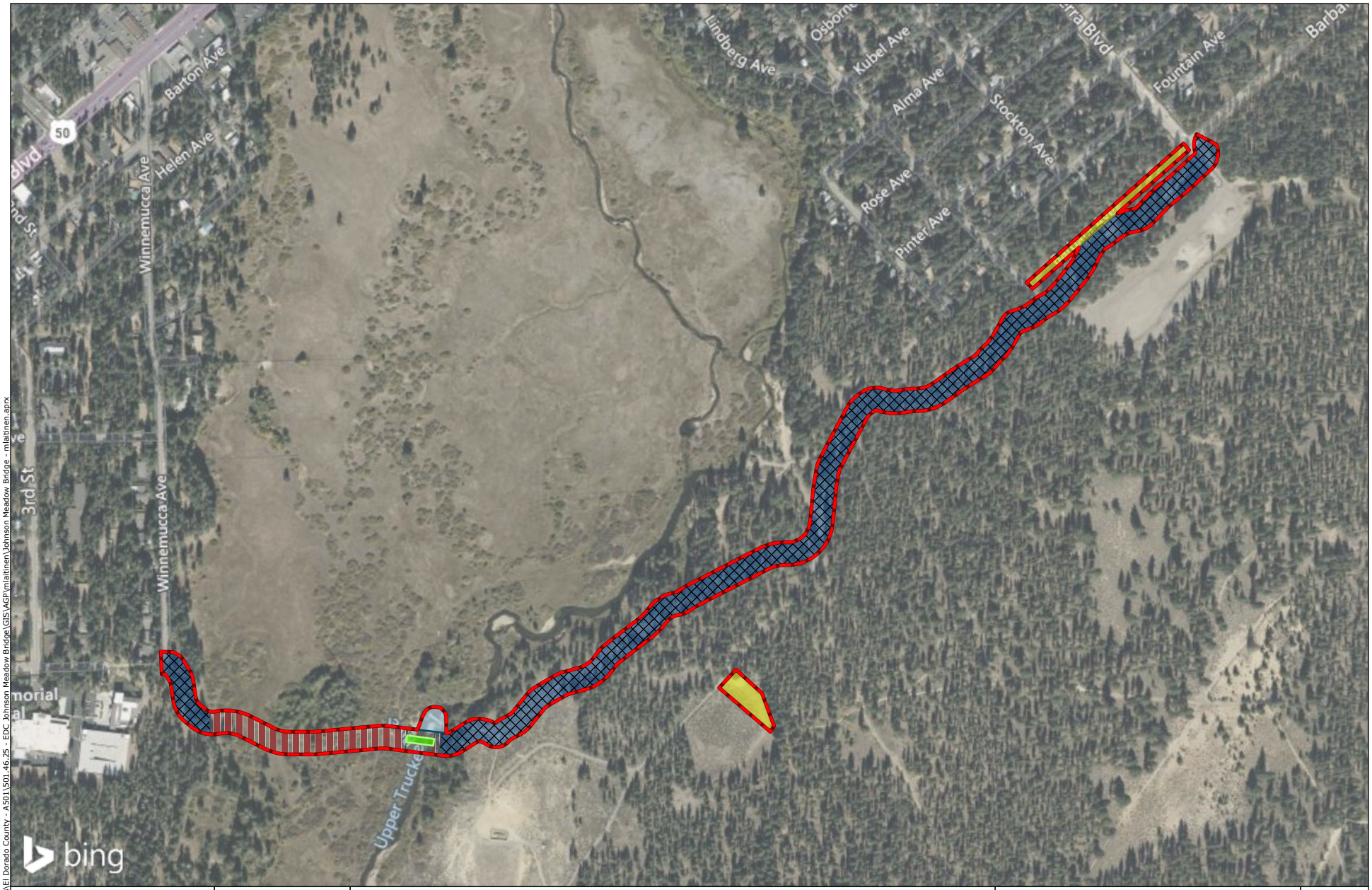
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0 1,000 2,000 ft.

FIGURE 1

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
ESRI USGS Topo Maps	501.46.25	mlaitinen	5/25/2023	-	jhall

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Project Area
Class 1 Shared Used Path
Boardwalk
New Bridge
Bridge Removal
Staging Area

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow

Project Area Detail Map

N

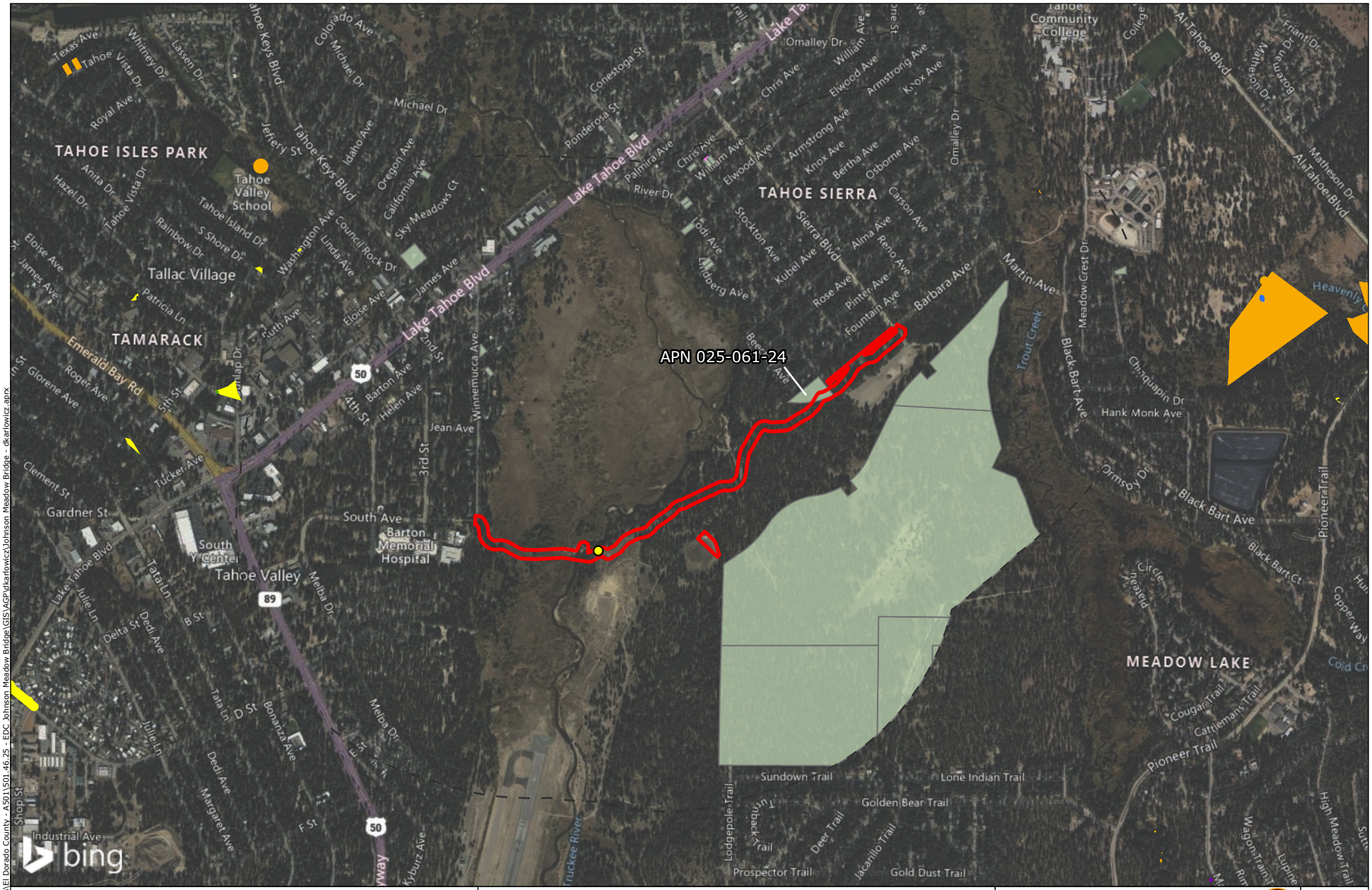
1 in. = 600 ft.

0 600 ft.

FIGURE 2

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Basemap	501.46.25	mlaitinen	5/25/2023	-	jhall

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Project Area
0.5-mile Buffer

Ownership
USFS

NCE-Mapped Invasives
cheatgrass

LTBMU-Mapped Invasives
Canada thistle
broadleaved pepperweed
oxeye daisy
bull thistle
cheatgrass
tall tumblemustard

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow
Invasive Plant Infestation and USFS Parcel Map

NCE

N

1 in. = 1,500 ft.

0 1,500 ft.

FIGURE 3

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Basemap, USFS, NCE	501.46.25	D. Karlowicz	2/16/2024	-	J. Hall

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APPENDIX B. Invasive Species of Management Concern on the Lake Tahoe Basin Management Unit

USDA FOREST SERVICE, LAKE TAHOE BASIN MANAGEMENT UNIT (LTBMU)

2023 INVASIVE PLANTS OF MANAGEMENT CONCERN

Table 1: 2023 Invasive Plants of Management Concern. All species from the Terrestrial Invasive Plant Species (TIPS) Environmental Assessment (EA) (2010) are included in this list regardless of observations in the on LTBMU. Species in bold are not included in the TIPS EA (2010) and therefore their treatment options on LTBMU land may be limited.

Scientific Name	Common Name	USDA Plant Code	LTBMU Priority	NDA	CDFA	Cal-IPC	LTBWCG
Acroptilon repens	Russian knapweed	ACRE3	Medium	B	4500	Moderate	Group 2
Ailanthus altissima	tree of heaven	AIAL	High	-	C, 4500	Moderate	Group 2
Berteroa incana	**Hoary alyssum**	**BEIN2**	**High**	**-**	**4500**	**Watch**	**Group 2**
Bromus tectorum	cheatgrass	BRTE	Low	-	C	High	Group 4
Carduus nutans	nodding plumeless thistle	CANU4	High	B	4500	Moderate	Group 2
Centaurea calcitrapa	purple starthistle	CECA2	Medium	A	4500	Moderate	Group 1
Centaurea diffusa	diffuse knapweed	CEDI3	High	B	4500	Moderate	Group 2
Centaurea solstitialis	yellow starthistle	CESO3	High	A	4500	High	Group 2
Centaurea stoebe ssp. *micranthos*	spotted knapweed	CESTM	High	A	4500	High	Group 2
Centaurea virgata ssp. *squarrosa*	squarrose knapweed	CEVIS2	High	A	4500	Moderate	Group 1
Chondrilla juncea	rush skeletonweed	CHJU	High	A	4500	Moderate	Group 2
Cirsium arvense	Canada thistle	CIAR4	High	C	4500	Moderate	Group 2
Cirsium vulgare	bull thistle	CIVU	Low	-	4500	Moderate	Group 3
Conium maculatum	poison hemlock	COMA2	Low	C	-	Moderate	Group 2
Convolvulus arvensis	Common bindweed	COAR4	Low	-	C, 4500		Group 3
Cytisus scoparius	Scotch broom	CYSC4	Medium	-	4500	High	Group 3
Dipsacus fullonum	teasel	DIFU2	Low	-	-	Moderate	Group 2
Dittrichia graveolens	stinkwort	DIGR3	Low	-	4500	Moderate; Alert	Group 1
Elymus caput-medusae	Medusa head	TACA8	High	B		High	Group 1
Elymus repens	quackgrass	ELRE4	Low	-	4500		Group 4
Fallopia japonica	Japanese knotweed	POCU6	High	-	A, 4500	**Moderate**	-
Hydrilla verticillata	**hydrilla**	**HYVE3**	N/A	**A**	**A, 4500**	**High**	-
Hypericum perforatum	common St. Johnswort	HYPE	Medium	A	C, 4500	Limited	Group 3
Isatis tinctoria	dyer's woad	ISTI	High	A	4500	Moderate	Group 2
Lathyrus latifolius	**sweat pea**	**LALA4**	**Medium**	**-**	**-**	**Watch**	**Group 2**
Lepidium appelianum	hairy whitetop	CAPU6 or LEAP7	Medium	-	4500		Group 2
Lepidium draba	whitetop	CADR or LEDR	Medium	-	4500	Moderate	Group 2
Lepidium latifolium	perennial pepperweed	LELA2	High	C	4500	High	Group 3
Leucanthemum vulgare	oxeye daisy	LEVU	Low	-	-	Moderate	Group 4
Linaria dalmatica ssp. *dalmatica*	Dalmatian toadflax	LIDAD	High	A	4500	Moderate	Group 3
Linaria vulgaris	yellow toadflax	LIVU2	High	A	-	Moderate	Group 3
Lythrum salicaria	purple loosestrife	LYSA2	High	A	4500	High	Group 2
Myriophyllum spicatum	**Eurasian watermilfoil**	**MYSP2**	N/A	**A**	-	**High**	-
Onopordum acanthium	Scotch thistle	ONAC	High	B	4500	High	Group 2
Phalaris arundinacea	Reed canary grass	PHAR3	Low	-	-		Group 2
Potamogeton crispus	**curly pondweed**	**POCR3**	N/A	-	-	**Moderate**	-
Potentilla recta	sulfur cinquefoil	PORE5	Medium	A	4500		Group 2
Rubus armeniacus	Himalayan blackberry	RUAR5	Medium	-	-	High	Group 2
Tamarix chinensis, T. ramosissima, and *T. parviflora*	tamarisk	TACH2, TARA and TAPA4	High	C	4500	High	Group 1

LTBMU: Lake Tahoe Basin Management Unit. High--Species that have a large ecological impact or invasive potential; species that are easily controlled. Medium--Species that have a moderate ecological impact or invasive potential; species that may be difficult to control. Low--Species that have a low ecological impact or invasive potential; species that require substantial effort to control. N/A--species not evaluated.

NDA: Nevada Department of Agriculture. Category A--Weeds not found or limited in distribution throughout the state; actively excluded from the state and actively eradicated wherever found, actively eradicated from nursery stock dealer premises. Category B--Weeds established in scattered populations in some counties of the state; actively excluded where possible, actively eradicated from nursery stock dealer premises. Category C--Weeds generally established and generally widespread in many counties of the state; actively eradicated from nursery stock dealer premises. Noxious Weed List (http://agri.nv.gov/Plant/Noxious_Weeds/Noxious_Weed_List/).

CDFA: California Department of Food and Agriculture. 4500: Listed as Noxious under California Code of Regulations 4500. A: Eradication or containment is required at the state or county level. B: Eradication or containment is at the discretion of the County Agricultural Commissioner. C: Require eradication or containment only when found in a nursery or at the discretion of the County Agricultural Commissioner. Q: Require temporary "A" action pending determination of a permanent rating. Noxious Weed List (2021) (https://www.cdfa.ca.gov/plant/ipc/encycloweedia/pdf/CaliforniaNoxiousWeeds.pdf).

Cal-IPC: California Invasive Plant Council High—Species having severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Moderate--Species having substantial and apparent-but generally not severe-ecological impacts on physical processes, plant and animal communities, and vegetation structure. Limited--Species that are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Alert--Species with High or Moderate impacts with limited distribution in California, but with potential to spread further. . Online Invasive Plant Inventory Database (2006-2017) (http://cal-ipc.org/paf/).

LTBWCG: Lake Tahoe Basin Weed Coordinating Group. 1: Not currently present in Basin or documented adjacent. Watch for, report, and eradicate immediately. Group 2: Present only as small, eradicable populations. Watch for, report, and eradicate immediately. Group 3: Manage infestations with the goal of preventing further spread. Eradicate where populations are isolated. Group 4: Manage locally based on impact and funding; prevent spread of existing infestations. Weed Priority List (2023) (http://tahoeinvasiveweeds.org/weeds/priority.php).

APPENDIX C: Plant Survey Species List

Species Name	Common Name	Native (Y, N)
Abies concolor	White fir	Y
Achillea millefolium	Common yarrow	Y
Agropyron cristatum	Crested wheatgrass	N
Agrostis gigantea	Creeping bentgrass	N
Agrostis idahoensis	Idaho bentgrass	Y
Allium campanulatum	Dusky onion	Y
Aquilegia formosa	Western columbine	Y
Arctostaphylos nevadensis	Pinemat manzanita	Y
Arctostaphylos patula	Greenleaf manzanita	Y
Artemisia douglasiana	California mugwort	Y
Artemisia tridentata	Big sagebrush	Y
Astragalus cicer	Chickpea milkvetch	N
Berberis aquifolium	Mountain grape	Y
Bromus inermis	Smooth brome	N
Bromus tectorum	Cheatgrass	N
Carex athrostachya	Slender beak sedge	Y
Carex aquatilis	Water sedge	Y
Carex utriculata	Northwest territory sedge	Y
Castilleja miniata	Great red paintbrush	Y

Species Name	Common Name	Native (Y, N)
Ceanothus cordulatus	Mountain whitethorn	Y
Chamerion angustifolium	Fireweed	Y
Chrysothamnus viscidiflorus	Yellow rabbitbrush	Y
Cirsium andersonii	Anderson's thistle	Y
Danthonia californica	California oatgrass	Y
Deschampsia cespitosa	Tufted hairgrass	Y
Eleocharis macrostachya	Common spikerush	Y
Elymus elymoides	Squirreltail	Y
Elymus glaucus	Blue wild rye	Y
Elymus triticoides	Beardless wild rye	Y
Epilobium ciliatum	Fringed willowherb	Y
Equisetum arvense	Field horsetail	Y
Eriogonum nudum	Naked buckwheat	Y
Eriogonum umbellatum	Sulphur buckwheat	Y
Erythranthe guttata	Seep monkey flower	Y
Fragaria virginiana	Mountain strawberry	Y
Galium triflorum	Fragrant bedstraw	Y
Gayophytum diffusum	Spreading groundsmoke	Y
Geum macrophyllum	Large leaved avens	Y
Gnaphalium palustre	Western marsh cudweed	Y
Ipomopsis aggregata	Scarlet gilia	Y

Species Name	Common Name	Native (Y, N)
Juncus articulates	Jointleaf rush	Y
Juncus balticus	Baltic rush	Y
Juncus ensifolius	Sword leaved rush	Y
Kelloggia galioides	Milk kelloggia	Y
Lactuca serriola	Prickly lettuce	N
Letharia vulpina	Wolf lichen	Y
Lotus corniculatus	Bird's foot trefoil	Y
Lupinus sp.	Lupine	Y
Madia glomerata	Mountain tarweed	Y
Oreostemma alpigenum	Tundra aster	Y
Paeonia brownii	Brown's peony	Y
Pedicularis semibarbata	Pinewoods lousewort	Y
Penstemon speciosus	Royal beardtongue	Y
Phacelia hastata	Silverleaf phacelia	Y
Phleum alpinum	Timothy grass	Y
Phleum pratense	Common timothy	N
Phlox diffusa	Spreading phlox	Y
Pinus contorta	Lodgepole pine	Y
Pinus jeffreyi	Jeffrey pine	Y
Plantago major	Common plantain	N
Platanthera leucostachys	Sierra bog orchid	Y

Species Name	Common Name	Native (Y, N)
Poa bulbosa	Bulbous blue grass	N
Poa secunda	One-sided blue grass	Y
Populus tremuloides	Quaking aspen	Y
Populus trichocarpa	Black cottonwood	Y
Potentilla gracilis	Northwest cinquefoil	Y
Prunella vulgaris	Common selfheal	Y
Pterospora andromedea	Woodland pinedrops	Y
Purshia tridentata var. *tridentata*	Antelope bitterbrush	Y
Pyrola asarifolia	Bog wintergreen	Y
Ribes cereum	Wax currant	Y
Rosa woodsii	Woods' rose	Y
Rumex salicifolius	Willow dock	Y
Salix lasiandra	Pacific willow	Y
Salix lemmonii	Lemmon's willow	Y
Scirpus microcarpus	Panicled bulrush	Y
Sidalcea oregana	Oregon checker mallow	Y
Solidago canadensis	Canada goldenrod	Y
Sphenosciadium capitellatum	Ranger's button	Y
Thalictrum fendleri	Fendler's meadow rue	Y
Tragopogon dubius	Yellow salsify	N
Trifolium longipes	Long stalked clover	Y

Species Name	Common Name	Native (Y, N)
Veratrum californicum var. *californicum*	California corn lily	Y
Wyethia mollis	Woolly mule ears	Y

APPENDIX D: Photographs



Photograph 1. North-facing view of Upper Truckee River and washed-out pedestrian bridge.



Photograph 2. East-facing view of proposed bridge replacement crossing location.



Photograph 3. East-facing view of existing path and meadow habitat west of the Upper Truckee River.



Photograph 4. North-facing view of USFS parcel 025-061-24.



Photograph 5. West-facing view of the existing trail on the east end of the Project.



Photograph 6. West-facing view of big sagebrush and conifer habitats east of the Upper Truckee River.



Photograph 7. Southwest-facing view of the Barbara Avenue staging area.



Photograph 8. South-facing view of the southern staging area.

Appendix G

Historic Property Survey Report and Archaeological Survey Report

HISTORIC PROPERTY SURVEY REPORT

1. UNDERTAKING DESCRIPTION AND LOCATION

District	*County*	*Federal Project. Number. (Prefix, Agency Code, Project No.)*	*Location*
3	ELD	STPL-5925(183)	Intersection of Winnemucca Avenue and Jean Avenue

The environmental review, consultation, and any other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by Caltrans pursuant to 23 U.S.C. 327 and the Memorandum of Understanding dated May 27, 2022 and executed by FHWA and Caltrans.

The studies for this undertaking were carried out in a manner consistent with Caltrans' regulatory responsibilities under Section 106 of the National Historic Preservation Act (36 CFR Part 800) and pursuant to the January 2014 *First Amended Programmatic Agreement among the Federal Highway Administration, the Advisory Council on Historic Preservation, the California State Historic Preservation Officer, and the California Department of Transportation Regarding Compliance with Section 106 of the National Historic Preservation Act* (Section 106 PA), as well as under Public Resources Code 5024 and pursuant to the January 2015 *Memorandum of Understanding Between the California Department of Transportation and the California State Historic Preservation Office Regarding Compliance with Public Resources Code Section 5024 and Governor's Executive Order W-26-92, addended 2019* (5024 MOU) as applicable.

Project Description:

El Dorado County (County), in cooperation with the California Department of Transportation (Caltrans), proposes to implement the South Lake Tahoe Greenway – Upper Truckee Bridge at Johnson Meadows Project. The Project's purpose is to enhance the hydrological dynamics of the Upper Truckee River, bolster the ecosystem functionality of Johnson Meadow, promote climate resilience, enhance water quality, and elevate habitat conditions, all while maintaining a commitment to sustainable recreational activities. This Project is one in a series of erosion control/water quality, environmental restoration and shared-use path projects implemented by the El Dorado County Department of Transportation.

The 1.2-mile-long Class I shared-use path begins at the south terminus of Winnemucca Avenue near Barton Memorial Hospital. It then extends east on public lands owned by the Tahoe Resource Conservation District (known as Johnson Meadow), crosses the Upper Truckee River, and then follows user trails to the intersection of Sierra Boulevard and Barbara Avenue. The Project area encompasses City of South Lake Tahoe and El Dorado County right-of-way (ROW) and public parcels owned by City of South Lake Tahoe, South Tahoe Public Utility District, California Tahoe Conservancy, and the USDA Forest Service. Most of the path (5,075 linear feet) will be constructed atop the existing ground surface, while the remainder (935 linear feet) will consist of an elevated boardwalk. A new pedestrian bridge will also be installed over the Upper Truckee River. Excavation conducted during construction of the surface path will be approximately 1.5 feet in depth, or within the approximate prism of previous disturbance. In three locations, rest area pullouts will be constructed. In each location a six by twelve footrest area will be present on either side of the path. The boardwalk section of the path will rest atop a structure consisting of 14-inch diameter steel piles and 11 by 14-inch beams. Excavation of the steel piles will be up to 35 feet deep. The boardwalk surface will be approximately 13 feet in width. Bridge footings will be excavated up to a depth of 10 feet.

The County is the project proponent and NCE was retained to conduct environmental reviews, including a cultural resources assessment of the APE, in support of NEPA environmental documents. The County will act as the CEQA lead agency. Caltrans, acting on behalf of the Federal Highway Administration (FHWA), will act as the federal lead agency for NEPA and Section 106 of the NHPA.

Please refer to the attached Archaeological Survey Report (ASR), Chapter 1 for the full project description. Hereafter, the ASR is referred to as Attachment 1. The figures referenced below are located in Appendix A of Attachment 1.

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2. AREA OF POTENTIAL EFFECTS

Following Section 106 PA Stipulation VIII.A, the APE for the Project was established in consultation with William Larson, Caltrans PQS: PI-Prehistoric Archaeology, and Jacky Vang, Environmental Branch Chief, on July 7, 2023. The APE map is Figure 2 located in Attachment 1, Appendix A.

The APE was established to include all potential impact areas and includes the full extent of the horizontal and vertical limits from construction activities described above, and the use of temporary staging areas as determined through discussion with Caltrans, the County, and construction engineers. The APE contains an Area of Direct Impact (ADI) and an Area of Indirect Impact (AII). The overall APE contains approximately 62 acres.

The ADI includes all potential ground disturbances including but not limited to the excavation of earth with heavy equipment, stockpiling of material, heavy equipment driving over the ground, vegetation removal, and staging associated with the Project. This includes a 30-meter corridor centered on the 1.2-mile pathway alignment, a small bump-out to include the area where the old bridge will be removed, and the two staging areas (see Figure 2). The maximum depth of ground disturbing activities is anticipated to be 10 feet.

Indirect impacts expected to occur within the AII include short-term indirect visual, audible, and atmospheric impacts. During construction, there will be a temporary increase in traffic levels, dust, equipment noise, and vibrations. On completion of construction activities, all project related disturbance will be restored and re- contoured to match the surrounding topography.

The Project includes comparatively few vertical elements. The boardwalk would be elevated from one to four feet above the ground surface. Where present, the rails along the boardwalk section of the path would extend three feet above the boardwalk deck. The bridge structure would be approximately nine feet in height. Approximately three to five feet of the abutment on the east side of the river would be exposed. In contrast, as much as nine feet of the abutment on the west side of the river could be exposed. Signage, most of which will be located at either end of the Project corridor in association with roadway intersections, will have a vertical height of seven to eight feet.

Subsurface vertical elements will include excavation associated with construction of the surface path (1.5 feet), the setting of piles associated with the boardwalk section of path (25 to 30 feet), the installation of footings associated with the bridge (five to ten feet), and the setting of signs (three feet).

Based on these considerations, the horizontal limits of the AII were defined to include the ADI and specific additional areas (i.e., the extent of the AII is captured within the ADI). Those areas include a segment of paved roadway extending southwest from the Project corridor to Staging Area 1, a segment of unpaved roadway extending northeast from the Project corridor, and the mapped limits of archaeological site P-09-006059 which is adjacent to the ADI (see Figure 2).

3. CONSULTING PARTIES / PUBLIC PARTICIPATION

☒ Native American Heritage Commission

- Please refer to Chapter 2 and Appendix C of Attachment 1 for all Native American correspondence.
- On 5/31/2023, a letter requesting a search of their Sacred Lands File (SLF) and a contact list for regional tribes was sent to NAHC.
- On 6/27/2023, a response was received from NAHC with tribe contacts and a positive SLF result.

☒ Native American Tribes, Groups and Individuals

- Please refer to Chapter 2 and Appendix B of Attachment 1 for all Native American correspondence.

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- On 7/18/2023, Inquiry letters were mailed and emailed on El Dorado County Department of Transportation letterhead to all individuals identified by NAHC.
- Individuals include: Sara Dutschke (Chairperson of the Ione Band of Miwok Indians); Don Ryberg (Chairperson of the Tsi Akim Maidu); Grayson Coney (Cultural Director of the Tsi Akim Maidu); Gene Whitehouse (Chairperson of the United Auburn Indian Community of the Auburn Rancheria); Patrick Burt (THPO of the Washoe Tribe of Nevada and California); Serrell Smokey (Chairperson of the Washoe Tribe of Nevada and California); Venesa Kremer (Cultural Resource Assistant of the Wilton Rancheria); Lou Griffin (Director of Cultural Preservation Department of the Wilton Rancheria); Steven Hutchason (Executive Department Director of the Wilton Rancheria); Pamela Cubbler (Vice Chairperson of the Colfax-Todds Valley Consolidated Tribe); Clyde Prout (Chairperson of the Colfax-Todds Valley Consolidated Tribe); and CTVCT Preservation (Cultural Preservation Department of the Colfax-Todds Valley Consolidated Tribe)
- On 8/2/2023, follow-up emails were sent to each individual identified by NAHC.
- On 8/11/2023, United Auburn Indian Community of the Auburn Rancheria deferred to the Washoe Tribe.
- A third outreach letter was sent to the Washoe Tribe on 8/28/23 requesting a meeting on 9/15/23. On 1/10/2024, the meeting was held and attended by Patrick Burtt, THPO, who requested Tribal monitoring for the project.
- The other tribes have not responded to the inquiry letters or follow-up emails to date.

4. SUMMARY OF IDENTIFICATION EFFORTS

☒ National Register of Historic Places (NRHP)

☒ California Register of Historical Resources (CRHR)

☒ National Historic Landmark (NHL)

☒ California Historical Landmarks (CHL)

☒ California Points of Historical Interest

☒ California Historical Resources Information System (CHRIS)

☒ Caltrans Historic Bridge Inventory

☒ Other Sources consulted:

- 1865, 1867, 1873, 1874, 1876, 1878, 1882, 1960, and 1962 General Land Office (GLO) plat maps for Township 12N., Range 18E; 1889, 1891, and 1893 Markleeville U.S. Geological Survey (USGS) topographic maps (1:125,000 scale); 1948, 1957, 1962, and 1964 Walker Lake USGS topographic map (1:125,000 scale); 1955, 1969, and 1974 South Lake Tahoe USGS topographic map (1:24,000 scale); 1955 Bijou USGS topographic map (1:24,000 scale); 1956 Freel Peak USGS topographic map (1:62,500 scale)
- 1940 historic aerial provided by NHC

☒ Results:

- Please refer to Chapter 3 and Appendix B of Attachment 1 for all information on archival research results.
- Please refer to Chapter 7 of Attachment 1 for the full summary of inventory results.
- Archival research indicates three cultural resources have been formally recorded within the APE – a historic road (P-09-4537), the historic Lakehouse Road (P-09-4529), and the Johnson Ranch Complex (P-09-6059). Five cultural resources have been previously recorded within a quarter mile of the APE – a historic habitation site with a refuse scatter (P-09-4535), a historic logging habitation site with an associated artifact scatter (P-09-3460), a historic artifact scatter with high-cut tree stumps, (P-09-4523), a historic mid-20th century artifact concentration (P-09-5751), and the HP9 sewage pump station (P-09-6148).

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- P-09-004529 is a two-mile long section of a Historic Road that has been improved with an excavated roadbed and subsequently graded and resurfaced. When recorded in 1994 it was identified as having experienced a "loss of historic integrity" due to improvements. The site was re-surveyed in 1999 and again found to be lacking in integrity. The historic road was not identifiable within the APE. NCE agree with prior integrity assessments. The site form was updated.
- P-09-004537 is a historic road dating to the early part of the 20th century or earlier. In the 1960s or 1970s the road alignment, including that portion in the APE was used for the construction of an effluent line, resulting in a significant loss of integrity. The site was recorded in 1994 and revisited in 1999. Only a short segment of the road running between Barton Dairy and Lakehouse Road was identified as retaining integrity. That segment lies outside of the APE. The historic road was not identifiable within the APE. NCE agrees with prior integrity assessments. The site form was updated.
- P-09-006059 documents the remains of two ranches, the early Johnson Ranch and a 1950s cattle ranch. Buildings once associated with the ranches were located some distance away from the APE. All the buildings once associated with those operations have been demolished. Two isolated, minor ranch- related features are present in the APE. They include a fence segment (Feature 1B) and a bridge (Feature 5). The features are located along the southern edge of fields once associated with the ranches.
- No new cultural resources were identified within the APE.

5. PROPERTIES IDENTIFIED

☒ Caltrans has determined there are cultural resources within the APE that were evaluated as a result of this project and are **not eligible** for inclusion in the NRHP. Under Section 106 PA Stipulation VIII.C.6, Caltrans requests SHPO's concurrence in this determination.

- P-09-006059

6. FINDING FOR THE UNDERTAKING

☒ Caltrans, pursuant to Section 106 PA Stipulation IX.A, has determined a Finding of **No Historic Properties Affected** is appropriate for this undertaking because the following historic properties will not be affected.

- P-09-006059

7. CEQA CONSIDERATIONS

☒ Not applicable; **Caltrans is not the lead agency under CEQA**.

8. LIST OF ATTACHED DOCUMENTATION

☒ Project Vicinity, Location, and APE Maps

- Maps located in Appendix A of Attachment 1
  - Figure 1: Project Area Location Map
  - Figure 2: Area of Potential Effect Map

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☒ Archaeological Survey Report (ASR)

- Attachment 1 prepared by Christina Rathbone, Stuart Rathbone, Gena Pennanen, and Charles Zeier, June 2024, includes the following Appendixes:
  - Appendix A – Report Figures
  - Appendix B – Record Search Results
  - Appendix C – Native American Consultation
  - Appendix D – Project Photographs
  - Appendix E – DPR Site Forms

9. HPSR PREPARATION AND CALTRANS APPROVAL

Prepared by:

Genevieve Pennanen Date: 6/5/2024
NCE, Staff Archaeologist

Reviewed for
Approval by:
Danielle Claus
District 3 Caltrans PQS: Environmental Planner (Archaeologist) Date: 7/10/2024

Approval by: Veronica Wilson
Veronica Wilson
District 3 EBC: Environmental Branch Chief Date: 7/10/2024

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Attachment 1

Archaeological Survey Report

Archaeological Survey Report

South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow

South Lake Tahoe, California

Danielle Claus
District 3, North Region Local Assistance
703 B Street
Marysville, CA 95901



June 2024

NCE
300 E. 2nd Street, Suite 1210
Reno, NV 89501

NCE Project No. 501.46.25

Collaboration. Commitment. Confidence.℠

Archaeological Survey Report

South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow

South Lake Tahoe, California

June 2024

Environmental Improvement Program #: 03.02.02.0085

South Lake Tahoe USGS 7.5' Topographic Quadrangle: Standard at T.12N., R.18E., Sec. 3, 4, 9 Project Acreage: 62 acres

Approved by:

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NCE Project No. 501.46.25

Executive Summary

El Dorado County, in cooperation with the California Department of Transportation (Caltrans), proposes to implement the South Lake Tahoe Greenway – Upper Truckee Bridge at Johnson Meadows Project. The 1.2 mile long Class I shared-use path begins at the south terminus of Winnemucca Avenue near Barton Memorial Hospital. It then extends east on public lands owned by the Tahoe Resource Conservation District (known as Johnson Meadow), crosses the Upper Truckee River, and then follows user trails to the intersection of Sierra Boulevard and Barbara Avenue. The Project area encompasses City of South Lake Tahoe and El Dorado County right-of-way (ROW) and public parcels owned by City of South Lake Tahoe, South Tahoe Public Utility District, California Tahoe Conservancy, and the USDA Forest Service. The shared-use path will provide connections to existing and future Class I facilities in the area. For example, on the west end, there is a short Class I segment between South Avenue and Winnemucca Avenue. The Project also builds upon the Sierra Boulevard Complete Streets Project (completed in 2019) and the South Tahoe Greenway Shared Use Trail Phase 2 (completed in 2021) at the corner of Sierra Boulevard and Barbara Avenue.

Purpose and Scope of the Survey

The proposed undertaking requires compliance with Sections 21083.2 and 21084.1 of the California Environmental Quality Act (CEQA), the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act (NHPA) (36 CFR Part 800). The County will act as the CEQA lead agency. Caltrans, acting on behalf of the Federal Highway Administration (FHWA), will act as the federal lead agency for NEPA and Section 106 of the NHPA. The studies for this undertaking were carried out in a manner consistent with Caltrans' regulatory responsibilities under Section 106 and according to the January 2014 First Amended Programmatic Agreement among the Federal Highway Administration, the Advisory Council on Historic Preservation, the California State Historic Preservation Officer, and the California Department of Transportation Regarding Compliance with Section 106 of the National Historic Preservation Act (Section 106 PA).

The County is the project proponent and NCE was retained to conduct environmental reviews, including a cultural resources assessment of the APE, in support of CEQA and NEPA environmental documents. The scope of the present archaeological survey is intended to demonstrate project compliance with Section 106 of the NHPA, NEPA, CEQA, and TRPA. All work was designed to comply with current standards and guidelines outlined in Volume 2: Cultural Resources of the Caltrans Standard Environmental Reference (SER). Key objectives include:

- Establish an APE, and
- Identify prehistoric, ethnographic, and/or historic period archaeological resources within or immediately adjacent to the APE.

Constraints to the Survey Effort

An intensive pedestrian survey was conducted by NCE Staff Archaeologist, Christina Rathbone, between August 28 and 30, 2023, within the approximately 62 acre APE. The general APE consists of shared use paths that are situated in between two urban residential settings. Most of the APE has been disturbed at some point by recreational use or historic logging, farming, and cattle grazing. On May 22, 2024, NCE Architectural Historian Stuart Rathbone performed additional recording of historical features to the immediate north of the APE. The proposed improvements related to the Class 1 shared-use path will occur largely within this previous

disturbance. Surface visibility was good. Vegetation and leaf litter were limited to the outer, less disturbed portions of the APE. Sufficient clear ground was present to

ensure survey adequacy. The probability of buried archaeological resources present within the APE is considered low and subsurface archaeological sampling is not recommended.

Identified Archaeological Resources

Every reasonable effort was made to identify cultural resources within the APE. This inventory resulted in the following:

- P-09-004529 is a two mile section of a Historic Road that has been improved with an excavated roadbed and subsequently graded and resurfaced. When recorded in 1994 it was identified as having experienced a “loss of historic integrity” due to improvements. The site was re-surveyed in 1999 and again found to be lacking in integrity. The historic road was not identified within the APE. NCE agree with prior integrity assessments. The site form was updated.
- P-09-004537 is a historic road dating to the early part of the 20th century or earlier. In the 1960s or 1970s the road alignment, including that portion in the APE was used for the construction of an effluent line, resulting in a significant loss of integrity. The site was recorded in 1994 and revisited in 1999. Only a short segment of the road running between Barton Dairy and Lakehouse Road was identified as retaining integrity. That segment lies outside of the APE. The historic road was not identifiable within the APE. NCE agrees with prior integrity assessments. The site form was updated.
- P-09-006059 represents the remains of the Johnson Ranch that was operated in the middle of the 20th century by the Johnson family, the children and grandchildren of Chris Johnson Sr. who acquired the property as part of his purchase of the Sierra House in 1912. The site was previously documented by Stapleton (2019). Although identified by Stapleton as a ranch complex, the site is best regarded as a series of grazing management structures, used to control cattle access to different parts of the Johnson Meadow pasture. This site consists of a large, fenced area of pasture, with a corral at the northwest corner. The corral was accessed via a curved driveway leading to Winnemucca Avenue to the immediate west and it enclosed a marginally improved area of pasture. Discrete features and structures within the corral were a cattle chute, a wooden bridge, a wooden barrel type water tank, an earth and riprap-lined dam, and a series of trees that have been fenced off to protect them from grazing animals, and a hitching rail. A single-lane bridge with a concrete foundation and a plywood deck was recorded crossing the Upper Truckee River is located towards the southeast corner of the larger fenced area of pasture, and an irrigation ditch with the remnants of a concrete water control gate are located at the north of the larger fenced area of pasture. NCE identified two previously unrecorded structures within P-09-006059, a hitching rail, and an irrigation ditch with a water control gate. Neither of the newly recorded structures are located within the APE.

Caltrans Disclaimer

It is Caltrans' policy to avoid cultural resources whenever possible. If buried cultural materials are encountered during construction, it is Caltrans' policy that work stop in that area until a qualified archaeologist can evaluate the nature and significance of the find. An additional survey will be required if the project changes to include areas not previously surveyed.

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List of Abbreviations

Abbreviation	Definition
ADI	Area of Direct Impact
AII	Area of Indirect Impact
BP	Before Present
BLM	Bureau of Land Management
Caltrans	California Department of Transportation
DPR	Department of Recreation
FHWA	Federal Highway Administration
GLO	General Land Office
LVRR	Lake Valley Railroad
NAHC	Native American Heritage Commission
National Register	National Register of Historic Places
NHPA	National Historic Preservation Act
NHPA	National Historic Preservation Act
NCIC	North Central Information Center
PQS	Professionally Qualified Staff
ROW	Right-of-Way
SNWLC	Sierra Nevada Wood and Lumber Company
SLF	Sacred Lands File
STPUD	South Tahoe Public Utility District
SOI	Secretary of Interior
SER	Standard Environmental Reference
TRPA	Tahoe Regional Planning Agency
UTR	Upper Truckee River
USDA	United States Department of Agriculture
USGS	United State Geological Survey

1 Introduction

1.1 Project Description

El Dorado County, in cooperation with the California Department of Transportation (Caltrans), proposes to implement the South Lake Tahoe Greenway – Upper Truckee Bridge at Johnson Meadows Project. The Project's purpose is to enhance the hydrological dynamics of the Upper Truckee River, bolster the ecosystem functionality of Johnson Meadow, promote climate resilience, enhance water quality, and elevate habitat conditions, all while maintaining a commitment to sustainable recreational activities. This Project is one in a series of erosion control/water quality, environmental restoration and shared-use path projects implemented by the El Dorado County Department of Transportation. It is identified within the Tahoe Regional Planning Agency's (TRPA) Environmental Improvement Program as Project #03.02.02.0085 and Federal Aid Project # STPL-5925(183). The Project supports the Linking Tahoe: Active Transportation Plan, approved by the Tahoe Metropolitan Planning Organization and the Tahoe Valley Area Plan. **Figures 1 2**, located in **Appendix A** of this report, depict the location of the Project and the APE.

The 1.2 mile Class I shared-use path begins at the south terminus of Winnemucca Avenue near Barton Memorial Hospital. It then extends east on public lands owned by the Tahoe Resource Conservation District (known as Johnson Meadow), crosses the Upper Truckee River, and then follows user trails to the intersection of Sierra Boulevard and Barbara Avenue. The Project area encompasses City of South Lake Tahoe and El Dorado County right-of-way (ROW) and public parcels owned by City of South Lake Tahoe, South Tahoe Public Utility District, California Tahoe Conservancy, and the USDA Forest Service. The shared-use path will provide connections to existing and future Class I facilities in the area. For example, on the west end, there is a short Class I segment between South Avenue and Winnemucca Avenue. The Project also builds upon the Sierra Boulevard Complete Streets Project (completed in 2019) and the South Tahoe Greenway Shared Use Trail Phase 2 (completed in 2021) at the corner of Sierra Boulevard and Barbara Avenue.

The proposed undertaking requires compliance with the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act (NHPA) (36 CFR Part 800). The County will act as the CEQA lead agency. Caltrans, acting on behalf of the Federal Highway Administration (FHWA), will act as the federal lead agency for NEPA and Section 106 of the NHPA. The studies for this undertaking were carried out in a manner consistent with Caltrans' regulatory responsibilities under Section 106 and according to the January 2014 First Amended Programmatic Agreement among the Federal Highway Administration, the Advisory Council on Historic Preservation, the California State Historic Preservation Officer, and the California Department of Transportation Regarding Compliance with Section 106 of the National Historic Preservation Act (Section 106 PA).

The County is the project proponent and NCE was retained to conduct environmental reviews, including a cultural resources assessment of the APE, in support of NEPA environmental documents. The scope of the present archaeological survey is intended to demonstrate project compliance with Section 106 of the NHPA, NEPA, and TRPA. All work was designed to comply with current standards and guidelines outlined in Volume 2: Cultural Resources of the Caltrans Standard Environmental Reference (SER). Key objectives include:

- Establish an APE, and

- Identify prehistoric, ethnographic, and/or historic period archaeological resources within or immediately adjacent to the APE.

The pedestrian archaeological survey was conducted by Christina Rathbone over three days between August 28th through the 30th, 2023. Ms. Rathbone has experience equivalent to the Professionally Qualified Staff (PQS) standards outlined in Section 106 PA Attachment 1 as a Co-Principal Investigator. She meets the Secretary of Interior's (SOI) Standards for Archaeology and Historic Preservation (36 CFR Part 61). She has 15 years of experience in historic preservation, archaeological investigation, and cultural resource evaluation as part of State, Federal, and professional standards in compliance with Section 106 of the NHPA.

1.2 Definition of Undertaking

The Project is located within Sections 3, 4, and 9 of Township 12 North, Range 18 East as depicted on the USGS South Lake Tahoe 7.5-minute quadrangle map. The elevation within the Project area is approximately 6,245 feet above mean sea level. Topography in the area consists of a flat wet meadow along the Upper Truckee River corridor within the western portion, and gentle to moderate upland slopes on the east edge of the meadow. The hills in the northeastern section are approximately 6,270 feet above mean sea level.

Most of the path (5,075 linear feet) will be constructed atop the existing ground surface, while the remainder (935 linear feet) will consist of an elevated boardwalk. The surface path will consist of a three-inch layer of asphalt atop an eight-inch-thick aggregate base. The project area is relatively flat and limited cut and fill will be required. The path surface will be ten feet wide with a two food wide aggregate base shoulder to either side. Where necessary, the surface of the path will be crowned to facilitate drainage. Excavation conducted during construction of the surface path will be approximately 1.5 feet in depth, or within the approximate prism of previous disturbance. In three locations, rest area pullouts will be constructed. In each location a six by twelve footrest area will be present on either side of the path. The boardwalk section of the path will rest atop a structure consisting of 14-inch diameter steel piles and 11 by 14-inch beams. Excavation of the steel piles will be up to 35 feet deep. The boardwalk surface will be approximately 13 feet in width. Bridge footings will be excavated up to a depth of 10 feet. Where close to the ground, the deck will have curbs along the outer edge. Where elevated, tubular steel railing with wire strands will be installed along either edge of the boardwalk. Approximately 20 Class 3 bike route roadway signs will be installed, mostly at or near roadway intersections. Signposts will be set 36 inches into the ground and will be set three feet from the edge of the paved path.

A new pedestrian bridge will be installed over the Upper Truckee River. The bridge will be 140 feet long and will have a deck that is 12 feet two inches wide. The bridge will consist of a half-through underhung Pratt truss with one diagonal per truss panel and plumb end vertical members. Parallel chords with diagonal web members slanting toward the center of the span will define either edge. The top of the chord will be about 54-inches above the finish deck. The structure will consist of unpainted weathered steel with a reinforced concrete deck. Safety rails will be established along either edge of the bridge deck. The foundation will consist of poured in place concrete abutments on either bank of the river. Excavation of footings will be required, each from five to ten feet in depth. An existing derelict bridge will be removed. The proposed bridge is similar in type and form to the recently constructed San Bernardino Bike Trail bridge.

Two staging areas have been identified. Staging Area 1 is positioned roughly 350 feet south of the Project corridor. It is accessible via a paved segment of the Lakehouse Road (P-09-004529). Staging Area 2 is situated along Barbara Road, adjacent to the eastern end of the Project.

1.3 Area of Potential Effect

Following Section 106 PA Stipulation VIII.A, the APE for the Project was established in consultation with William Larson, Caltrans PQS: PI-Prehistoric Archaeology, and Jacky Vang, Environmental Branch Chief, on July 7, 2023 (see **Figure 2** in **Appendix A**). The APE was established to include all potential impact areas and includes the full extent of the horizontal and vertical limits from construction activities described above, and the use of temporary staging areas as determined through discussion with Caltrans, the County, and construction engineers. The APE contains an Area of Direct Impact (ADI) and an Area of Indirect Impact (AII). The overall APE contains approximately 62 acres.

1.3.1 Area of Direct Impact

The ADI includes all potential ground disturbances (see Definition of Undertaking above for details) including but not limited to the excavation of earth with heavy equipment, stockpiling of material, heavy equipment driving over the ground, vegetation removal, and staging associated with the Project. This includes a 30 meter corridor centered on the 1.2 mile pathway alignment, a small bump-out to include the area where the old bridge will be removed, and the two staging areas (see **Figure 2**)**.** The maximum depth of ground disturbing activities is anticipated to be 10 feet.

1.3.2 Area of Indirect Impact

Indirect impacts expected to occur within the AII include short-term indirect visual, audible, and atmospheric impacts. During construction, there will be a temporary increase in traffic levels, dust, equipment noise, and vibrations. On completion of construction activities, all project related disturbance will be restored and re-contoured to match the surrounding topography.

The Project includes comparatively few vertical elements. The boardwalk would be elevated from one to four feet above the ground surface. Where present, the rails along the boardwalk section of the path would extend three feet above the boardwalk deck. The bridge structure would be approximately nine feet in height. Approximately three to five feet of the abutment on the east side of the river would be exposed. In contrast, as much as nine feet of the abutment on the west side of the river could be exposed. Signage, most of which will be located at either end of the Project corridor in association with roadway intersections, will have a vertical height of seven to eight feet.

Subsurface vertical elements will include excavation associated with construction of the surface path (1.5 feet), the setting of piles associated with the boardwalk section of path (25 to 30 feet), the installation of footings associated with the bridge (five to ten feet), and the setting of signs (three feet).

Based on these considerations, the horizontal limits of the AII were defined to include the ADI and specific additional areas (i.e., the extent of the AII is captured within the ADI). Those areas include a segment of paved roadway extending southwest from the Project corridor to Staging Area 1, a segment of unpaved roadway extending northeast from the Project corridor, and the mapped limits of archaeological site P-09-006059 which is adjacent to the ADI (see **Figure 2**).

2 Consultation Communications

2.1 Native American Coordination

Native American tribes identified by the Native American Heritage Commission (NAHC) must be invited to consult on projects. Native American correspondence was initiated with a letter to the NAHC. The letter requested a search of their Sacred Lands File (SLF) and a contact list for regional tribes that may have knowledge of tribal cultural resources within or immediately adjacent to the APE. A response was received from the NAHC on June 27, 2023, which indicated positive SLF results within the vicinity of the APE. Inquiry letters were mailed and emailed on El Dorado County Department of Transportation letterhead to all tribes identified by NAHC (**Table 1**) on July 18, 2023. Follow-up letters were sent to all tribes listed on August 2, 2023. On January 10, a meeting was held and attended by Patrick Burtt, Washoe Tribe of Nevada and California THPO, who requested Tribal monitoring for the project. The other tribes have not responded to the inquiry letters or follow-up emails to date.

Table 1. Tribal Representatives Identified by the NAHC.

Tribal Affiliation	Representative	Title
Ione Band of Miwok Indians	Sara Dutschke	Chairperson
Tsi Akim Maidu	Don Ryberg Grayson Coney	Chairperson Cultural Director
United Auburn Indian Community of the Auburn Rancheria	Gene Whitehouse	Chairperson
Washoe Tribe of Nevada and California	Patrick Burt Serrell Smokey	Tribal Historic Preservation Officer Chairperson
Wilton Rancheria	Venesa Kremer Lou Griffin Steven Hutchason	Cultural Resource Assistant Executive Director of Cultural Preservation Dept Department Director
Colfax-Todds Valley Consolidated Tribe	Pamela Cubbler, Clyde Prout CTVCT Preservation	Vice Chairperson Chairperson Cultural Preservation Department

Table 2 provides a summary of correspondence with all tribes identified by the NAHC.

Table 2. Summary of Tribe Consultation Correspondence.

Tribal Affiliation	Representative	Inquiry Letters Sent	Follow Up Letters	Communications
Ione Band of Miwok Indians	Sara Dutschke	7/18/23	8/2/23	Hard copy received 7/19/23. No response to date.
Tsi Akim Maidu	Don Ryberg Grayson Coney	7/18/23	8/2/23	No response to date.
United Auburn Indian Community of the Auburn Rancheria	Gene Whitehouse	7/18/23	8/2/23	Hard copy received 7/19/23. UAIC defers to Washoe Tribe 8/11/23.

Tribal Affiliation	Representative	Inquiry Letters Sent	Follow Up Letters	Communications
Washoe Tribe of Nevada and California	Patrick Burtt Serrell Smokey	7/18/23	8/2/23	Hard copy received. Third outreach letter was sent 8/28/23. Requested meeting on 9/15/23. On 1/10/2024, the meeting was held and attended by Patrick Burtt, THPO, who requested Tribal monitoring for the project.
Wilton Rancheria	Venesa Kremer	7/18/23	8/2/23	Hard copy received 7/19/23. No response to date.
Colfax-Todds Valley Consolidated Tribe	Pamela Cubbler Clyde Prout CTVCT Preservation	7/18/23	8/2/23	No response to date.

Consultation-related material, including NAHC letters and responses, an example of the tribal consultation letter sent, certified mail receipts, and email correspondence are provided in Appendix C.

3 Literature Review

The purpose of archival research is to create an understanding of work that has occurred in the area previously and the types of cultural resources present in the area to build a historic context with a broad enough scope to substantiate resource evaluations. Historic contexts are those patterns or trends in history by which a specific occurrence, property, or site is understood and its meaning (and ultimately its significance) within history is made clear. Prior to conducting field inventory activities, NCE conducted sufficient archival research to inform expectations in the field and to develop an understanding of the historical context of the region. The archival research included a records search request from the North Central Information Center (NCIC), land-use records and various historic maps (e.g., General Land Office [GLO] plat maps and U.S. Geological Survey [USGS] topographic maps). Emphasis was placed on the identification of previous archaeological inventories and sites within a quarter mile of the APE, known as the archival study area. The records search result received from the CHRIS (File No. ELD-23-53) is provided in **Appendix B.**

3.1 Previous Inventories

Archival research indicates five previous inventories intersect the APE (**Table 3**), and 13 inventories have been conducted within the larger quarter mile archival study area (**Table 4**).

Table 3. Previous Inventories Intersecting the APE.

Report Number	Title	Author	Year
0007042	Cultural Resource Assessment of the South Lake Tahoe Airport Expansion Project, El Dorado County, CA	Peters, Mary and Peak, Melinda	1984
009219	Upper Truckee River Middle Reach Preliminary Restoration Alternative, South Lake Tahoe, El Dorado County, California	Judith Marvin and Linda Thorpe	2007
009388	Heritage Resource Inventory South Tahoe Public Utilities District A-Line Export Pipeline Relocation Project	Lindström, Susan	1994
012181	An Archaeological Survey Report for the Airport Hazardous Fuels Reduction Project, El Dorado County, California	Harcourt, Steven	2015
012972	Cultural Resources Inventory and Effects Assessment for Phase I of the Johnson Meadow Restoration Project, South Lake Tahoe, El Dorado County, California	Spillane, Tim	2019

Table 4. Previous Inventories within the 0.25 Mile Archival Study Area.

Report Number	Title	Author	Year
000027	Archeological Investigations within the City of South Lake Tahoe	Donald Storm and Gloria Caddell	1975
002213	Cultural Resource Investigations of the Proposed Emerald Bay Apartments Project Site, South Lake Tahoe, El Dorado County, California	Napton, L. Kyle	1995
002865	Martin Ave. Culvert Replacement Project: Historic and Archaeological Survey Report- Negative findings	Bartholomew, Harland	1995
007055	Heritage Resource Inventory Sierra Tract Project Erosion Control Project	Lindström, Susan	2004

Report Number	Title	Author	Year
007088	A Cultural Resource Inventory of Golden Bear Park (303 Acres) South Lake Tahoe, El Dorado County, California U.S. Forest Service CRR #05-19-218	Lindström, Susan	1993
010733	An Archaeological Survey Report for the City of South Lake Tahoe "Lake Christopher" Hazardous Fuels Reduction Project El Dorado County, California	Banchio, Danielle	2010
010954	An Archaeological Survey Report for the City of South Lake Tahoe "Lake Christopher II" Hazardous Fuels Reduction Project El Dorado County, California	Banchio, Danielle	2011
011878	South Tahoe Public Utility District Fire Hydrant Service Expansion Project Cultural Resource Inventory	Lindström, Susan	2015
012188	South Tahoe Public Utility District Water Meter Installations Project Cultural Resource Inventory	Lindström, Susan	2016
012554	South Lake Tahoe Public Utility District Fire Hydrant Service Expansion Project Cultural Resource Inventory Addendum 2	Lindström, Susan	2017
012625	South Tahoe Public Utility 2018 Improvements Project, Sierra Boulevard Water Line Cultural Resource Inventory	Lindström, Susan	2018
012753	South Tahoe Public Utility District Tahoe Keys and Upper Truckee Pump Station Rehabilitation Project Cultural Resource Inventory	Lindström, Susan	2018
013276	South Lake Tahoe Public Utility District, Tahoe Keys and Upper Truckee Pump Station Rehabilitation Project,	Marvin, Judith	2020

3.2 Previously Recorded Resources

Archival research indicates three cultural resources have been recorded that are partially within the APE (**Table 5**), and five cultural resources have been recorded within the quarter mile archival study area (**Table 6**). All eight resources are historic sites that consist of roads, a ranch complex, logging, habitation sites, a pump station, and artifact scatters.

Table 5. Previously Recorded Resources within the APE.

Site Number	Age	Description	Last Recorded	NRHP	Proximity to APE
P-09-4529	Historic	Historic Lakehouse Road	1999	Unevaluated	Within
P-09-4537	Historic	Historic road	1999	Unevaluated	Within
P-09-6059	Historic	Historic Johnson Ranch Complex	2019	Ineligible	Within

Table 6. Previously Recorded Resources within the 0.25 Mile Archival Study Area.

Site Number	Age	Description	Last Recorded	NRHP	Proximity to APE
P-09-3460	Historic	Historic logging habitation site with a scatter of associated artifacts	1994	Unevaluated	Outside
P-09-4523	Historic	Historic artifact scatter and high-cut tree stumps	1994	Unevaluated	Outside
P-09-4535	Historic	Historic habitation site with artifact refuse scatter	1994	Unevaluated	Outside
P-09-5751	Historic	Historic mid-20th century artifact concentration	2014	Unevaluated	Outside

Site Number	Age	Description	Last Recorded	NRHP	Proximity to APE
P-09-6148	Historic	Historic HP9 sewage pump station	2020	Ineligible	Outside

Lakehouse Road (P-09-004529)

Lakehouse Road (P-09-004529) is a historic graded road, which traverses and aligns with the APE for a span of approximately 670 feet. The road extends for two miles, connecting to the intersection of Beecher Avenue and Pinter Avenue in the north, and transitioning into Muskwaki Drive in the south. This road first appeared on the 1865 GLO plat map. Lakehouse Road once served as the dog-leg alternative to the Pioneer Trail. The road extended from the Meyers area to the Lakehouse Way Station and then on to Stateline. The site was documented by Susan Lindstrom (1994) and was revisited by Drews (1999). Neither found any artifacts or features associated with the road. Neither recorder provided a particularly robust description of the road or its condition at the time.

Historic Road (P-09-004537)

Historic Road (P-09-004537) runs roughly parallel to and south and east of the Upper Truckee River. At its northeast end, it connects to the Lakehouse Road (P-09-004529). The south end of the road connects with a paved city street that is a vestige of the same Lakehouse Road (P-09-004529). The road was first recorded by Susan Lindstrom (1994) and it was revisited by Drews (1999). Neither recorder provided a particularly robust description of the road or its condition at the time. The age of this road is unknown, but Lindstrom suggested that it dates to the early part of the 20th century based on a historic habitation and/or dump site located to the south and outside of the APE. The road was noted as being in poor condition, apart from a short segment between Barton Dairy and Lakehouse that was relativity intact (Lindstrom 1994).

Johnson Ranch Complex (P-09-006059)

Johnson Ranch Complex (P-09-006059) represents the remains of a summer pasture grazing operation from the middle part of the 20th century. The pasture was managed by the Johnson family, the children and grandchildren of Chris Johnson Sr. who purchased the Sierra House in 1912. The site was documented by Stapleton in 2019. Although identified by Stapleton as a ranch complex, the site is best regarded as a series of grazing management structures, used to control cattle access to different parts of the Johnson Meadow pasture. This site consists of a large, fenced area of pasture (Feature 1b), with a corral at the northwest corner (Feature 1a). The corral was accessed via a curved driveway (Feature 1c) leading to Winnemucca Avenue to the immediate west and it enclosed a marginally improved area of pasture. Discrete features and structures within the corral were a cattle chute, a wooden bridge (Feature 2); a rain barrel or small cistern (Feature 3); an earth and riprap-lined dam (Feature 4), and a series of trees that have been fenced off to protect them from grazing animals (Feature 1d). A single-lane bridge with a concrete foundation and a plywood deck was recorded crossing the Upper Truckee River is located towards the southeast corner of the enclosed pasture (Feature 1b). Stapelton indicated that this lay within the enclosed area (Stapleton 2019).

The location of the original Johnson Ranch is approximately 0.5 miles northeast of the APE. The location of the 1950s cattle ranch is located approximately 0.28 miles north of the APE.

3.3 Historic Maps and Aerial Images Consulted

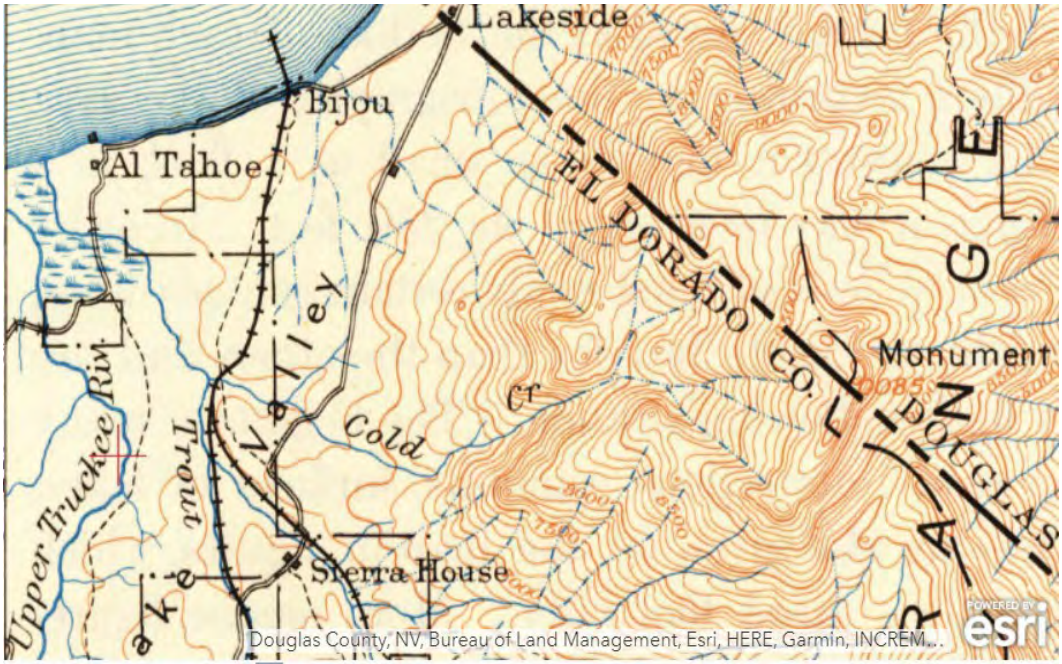
Various historic maps accessible in the National Geologic Map Database (USGS 2023) and Bureau of Land Management General Land Office (GLO) Records (BLM 2023) were reviewed as part of the present study. The historic road, P-9-4529, was first documented on the 1865 GLO plat map and was last noted on the reprinted 1893 map in 1948. The unnamed road, P-9-4537, first appears on the 1948 USGS topographic quadrangle map for Walker Lake Map. Both roads are in close vicinity to one another and eventually overlap in the central portion and again in the eastern portion of the APE. The historic maps depicted the road alignments continuing to evolve and be modified to correspond with surrounding urbanization in the County. Historic maps reviewed as part of the present study included the following:

- 1865 GLO plat map for Township 12N., Range 18E.
- 1873 GLO plat map for Township 12N., Range 18E.
- 1874 GLO plat map for Township 12N., Range 18E.
- 1876 GLO plat map for Township 12N., Range 18E.
- 1878 GLO plat map for Township 12N., Range 18E.
- 1882 GLO plat map for Township 12N., Range 18E.
- 1889 (reprinted 1954) USGS topographic quadrangle map for Markleeville Map at 1:125,000 scale
- 1891 USGS topographic quadrangle map for Markleeville Map at 1:125,000 scale
- 1893 (reprinted 1948) USGS topographic quadrangle map for Markleeville Map at 1:125,000 scale
- 1948 USGS topographic quadrangle map for Walker Lake Map at 1:125,000 scale
- 1955 (reprinted 1974) USGS topographic quadrangle map for South Lake Tahoe Map at 1:24,000 scale
- 1955 (reprinted 1963) USGS topographic quadrangle map for Bijou Map at 1:24,000 scale
- 1956 (reprinted 1967) USGS topographic quadrangle map for Freel Peak Map at 1:62,500 scale
- 1957 (reprinted 1974) USGS topographic quadrangle map for Walker Lake Map at 1:125,000 scale
- 1960 GLO plat map for Township 12N., Range 18E.
- 1962 GLO plat map for Township 12N., Range 18E.
- 1962 USGS topographic quadrangle map for Walker Lake Map at 1:125,000 scale
- 1964 USGS topographic quadrangle map for Walker Lake Map at 1:125,000 scale
- 1867 GLO plat map for Township 12N., Range 18E.
- 1969 (reprinted 1975) USGS topographic quadrangle map for South Lake Tahoe Map at 1:24,000 scale
- 1974 (reprinted 1977) USGS topographic quadrangle map for South Lake Tahoe Map at 1:24,000 scale



Image provided by NHC, 1940 to 2018 Aerial Photo Comparison - Johnson Meadow.

The historic maps and aerial imagery reviewed as part of the archival research effort showed the historic Lakehouse Road that once connected Pioneer Trial (the old Placerville Road between Placerville and the Comstock Mines) with the historic Lakehouse Way Station (P-09-004529). The road was first noted on the 1865 General Land Office (GLO) survey plat and later the 1893 United States Geological Survey (USGS) Map, which was reprinted in 1948. A portion of this road also become the 1913 Lincoln Highway Pioneer Branch which then became part of Highway 50.



1948 (original 1893) Markleeville, California USGS 15' topographic map; scale 1:25,000 feet, showing Lakehouse Road to the right of the red plus.

4 Environmental Setting

4.1 Paleoclimate

Fundamental issues concerning the nature and timing of cultural/environmental associations stem from a three-part model of climatic change during the 10,000-year Holocene period (Antevs 1925; Davis 1982). This period is subdivided into the Early, Middle, and Late Holocene. Its internal details are not without controversy, especially as they apply to the timing, magnitude, and course of paleoenvironmental change in the Tahoe Sierra. Current reconstructions lack resolution, and climatic trends are presented as broad time brackets. Changing aspects of the natural environment, which were of special importance to prehistoric populations inhabiting the Tahoe Sierra, are highlighted below.

4.1.1 Early Holocene

Prior to 10,000 years ago, glaciers occupied much of the Sierra Nevada and Carson Range, and a vast Lake Lahontan flooded much of the Western Great Basin. During the Early Holocene, 10,000-7,000 years before present (BP), the climate warmed and dried rapidly, which caused glaciers to melt and Lake Lahontan to shrink. However, climates remained relatively cool and moist with an increased winter precipitation. Pollen studies at Osgood Swamp near Meyers, South Lake Tahoe (Adam 1967) indicate that a cold-dry sagebrush steppe prevailed until about l0,000 BP, when there was a shift to a coniferous forest.

4.1.2 Middle Holocene

The Early Holocene was followed by a much warmer and dryer Middle Holocene period from approximately 7,000 to 4,000 BP. This resulted in the desiccation of Great Basin lakes, including Walker Lake and lakes in the Carson Sink. Lake Tahoe and Pyramid Lake declined but did not dry up completely during this time. In the early part of the Middle Holocene, around 7,000-5,000 BP, the seasonal precipitation changed to increased summer moisture and reduced winter moisture, favoring a completely different suite of plant communities. Middle Holocene aridity in the Tahoe Sierra is documented by the remains of tree stumps, which stand rooted on the lake floor up to 20 feet below Lake Tahoe's present sill. These ancient forests date between 6,300-4,800 cal BP (Lindström 1990; 1997). Seismic surveys of Lake Tahoe have detected more rooted stumps in 30 to 40 feet of water.

4.1.3 Late Holocene

Climates returned to a cooler and moister condition by approximately 4,000 BP causing the rebirth of Great Basin lakes and minor glacial advances. After about 4,000 BP there was a shift from more xeric vegetation to the dominant conifer species present in the Tahoe Sierra today (Adam 1967). Palynological evidence from Taylor Marsh (South Lake Tahoe) indicates the formation of a marsh along the lower reaches of Taylor Creek due to a rise in ground water levels from about 5,000-4,000 BP to 2,900 BP (Lindström 1985). Pyramid Lake did not rise considerably until about 3,200 BP (Born 1972). At Olympic (formerly Squaw) Valley, small stream deposits became coarser, indicating increased flows (Elston et al. 1977).

The Late Holocene record since 3,200 BP is unclear and appears to be punctuated by alternating intervals of cool- moist and warm-dry periods. A winter-wet climate prevailed with the renewal of cirque glaciers in the Sierra Nevada between 3,200-2,000 BP (Born 1972). Pyramid Lake rose (Born 1972) and the Walker River filled

Walker Lake. A diatomite deposit, indicative of an open water environment, is documented at Taylor Marsh around 2,800 BP (Lindström 1985). A subsequent dry interval may have persisted from 2,200-1,600 BP. Pyramid Lake receded (Born 1972) and Eagle Lake fell after 2,000 BP. Continuing dry conditions are indicated from 1,345-1,145 BP, as trees grew on Ralston Ridge Bog (south of Lake Tahoe) due to low water tables (Serelj and Adam 1975). A brief wet interval is suggested within the last 1,100 years by the presence of buried A-horizon soils in association with a sand lens near Taylor Creek, indicating a rise in the level of Lake Tahoe and deposition of lake deposits (Lindström 1985).

A period of substantial drought from 1,100-900 BP (AD 900-1100) and again around 700-500 BP (AD 1300-1500) is suggested by several lines of evidence. The relationship between tree growth and stream flow in the upper Truckee River watershed indicates that intermittent drought conditions prevailed around 675 BP (AD 1275; Hardman and Reil 1936). A dry period around 669 BP (AD 1281) is suggested by a series of submerged tree stumps (Beta-32857, 690+/-50 BP, 669 calibrated years BP), which indicates a substantial drop in Independence Lake, a tributary to Lake Tahoe (Lindström 1990). Relict Jeffrey pine stumps rooted on the Walker River stream bed near Chris Flat have been dated by radiocarbon assay to 920 BP (AD 1030) and 660 BP (AD 1290; Stine 1992, 1994). The low stream flows inferred from these stumps instigated a drop in Walker Lake, as evidenced by exposed stumps rooted on the Walker Lake shorelands yielding carbon-14 ages of 980+/- 40 BP (Stine 1994).

During the last 500 years, a wet climate, punctuated by intermittent but substantial droughts, began to dominate the region. Lake levels rose and cirque glaciers reformed in the Sierra. Pyramid Lake rose to an historic high stand at the "white line" at 1,181 meters (3874 ft.) and waters in the Carson Sink and Walker Lake rose. A sediment core from Lake Tahoe, dated to AD 1500 (Goldman and Byron 1986:4), may detect a period of greater precipitation and/or stormier winters. A series of substantial droughts are also documented during this period. Another warm period appears between AD 1579-1585, and again around AD 1630 (Hardman and Reil 1936). The detection of dozens of submerged tree stumps located up to 30 feet below the present-day sill of Donner Lake offers further evidence of a pronounced drought about 500 years ago (AD 1433-1440; Beta-70013, 490 +/- 50 BP, calibrated age 517 BP; Beta-70014, 460 +/- 60 BP, calibrated age 510 BP; Lindström and Bloomer 1994). During the 100-year period between AD 1750-1850, the level of Lake Tahoe may have been below its rim, with no flow of water from it into the Truckee River. It is possible that Lake Tahoe contributed relatively little water to the Truckee River during the last 200 years. However, the 40 years between AD 1875-1915 were the longest period during which the flow of the Truckee River was above the average. This moist period co-occurs with, and directly follows Comstock logging in the Lake Tahoe Basin. During the AD 1930s drought, Lake Tahoe ceased to flow over its rim for six consecutive years. Drought during the last few years has either stopped Tahoe's flow into the Truckee River or reduced it to a mere trickle.

DeQuille (1877:179), a contemporary observer, comments on the negative impacts on local climate due to Comstock logging:

> ...In passing over the fields of snow on the summit of the Sierras, the breezes are cooled [by snow fields] and the summer weather in Nevada is thus rendered delightful...But when once the mountains shall have been denuded of their timber, all the snow on both slopes will be swept away by the first warm weather of spring - as it is now swept away on the eastern slope - when a marked increase in the heat of the summers in Nevada is likely to be experienced...

DeQuille's statements are provocative, suggesting that Comstock Era lumbering activities could have exerted influence at the regional climatic level. Similarly, the degree to which more subtle and low-intensity activities by

prehistoric populations (i.e., increased burning, vegetation removal), also induced profound accumulative influences on climate is an avenue for further research.

4.2 Geologic Setting

Information on local geology was derived from Moore (1969), Bonham and Burnett (1976), Stewart (1980), and Fiero (1986). The Sierra batholith was formed during the late Jurassic and early Cretaceous periods due to the collision of tectonic plates. Materials from the subducting oceanic plate melted as it moved under the continental margin, forming volcanic or plutonic masses that slowly worked their way toward the surface. Intrusions and compressions caused a composite plutonic mass to form that was 75 miles wide running the entire length of California. The continental margin swelled upward, and large amounts of overlying rock were removed by erosion. In time, the uplifted roof of the batholith was exposed and subjected to erosion.

The Lake Tahoe Basin is an intermountain basin formed by faulting within the Sierra batholith. In the Lake Tahoe Basin and nearby areas, major landforms developed due to faulting, warping, or a combination of both processes. Lake Tahoe occupies a down-dropped block bordered by steeply dipping faults. Mountains on the east and west shores of the lake are predominantly granitic rock, with areas of metamorphic rock. The northern part of the Lake Tahoe Basin is covered by volcanic rock, while much of the southern and western portions have been modified by glacial activity. The southern end consists of glacial moraines and outwash deposits, while the northeast end of the basin is a large alluvial fan.

The study area, Johnson Meadow, is in the interior of the Sierra Nevada Geologic Province and is a range of tectonically active uplifting mountains with intervening valleys and basins, which include Lake Tahoe. Structurally, Johnson Meadow lies within a basin formed by vertical faulting along the Sierra Front Fault, which trends along the western side of the Upper Truckee River watershed and continues northward along the west shore of Lake Tahoe (Saucedo 2005). This Sierra Front Fault divides the Sierra Nevada Block from the Carson Range and Basin and Range Province where extensional forces created down-dropping valleys, including Lake Tahoe. Over time, downward movement along this fault created Christmas Valley south of Meyers, and Lake Valley through which the Upper Truckee River flows. Over the past two million years the landscape was sculpted by glaciers which further carved valleys, mountains, and left morainal and outwash deposits that underlay much of the South Lake Tahoe area. During the last 12,000 years, Johnson Meadow emerged as surface waters of the Upper Truckee River carved through the glacial and lacustrine deposits left by previous high stands of Lake Tahoe (Lewandowski 2020).

4.2.1 Soils

The South Lake Tahoe/Stateline aquifer extends from Emerald Bay on the southwest side of Lake Tahoe to north of Stateline, Nevada, on the southeast side. Younger alluvium, and glacial till and outwash deposits generally range from 200 to 800 feet in thickness. These sediments can be as thick as 1,200 feet between Fallen Leaf Lake and Tahoe Mountain; however, this thickness includes a morainal ridge of glacial till that rises about 500 feet above the surrounding area (Woodling, 1987). At land surface, aquifer materials consist of glacial outwash and till and younger alluvium. At depth, the aquifer materials consist of three sand and gravel beds separated by laterally extensive clay beds between Tahoe Mountain and the Upper Truckee River. Between Tahoe Mountain and Stateline, the deposits consist of interbedded sand, gravel, and clay. Sand and gravel beds range from ten to 150 feet thick and clay beds from ten to 100 feet thick. Interbedded coarse- and fine-grained deposits likely

result in a multi-layered aquifer system that includes a shallow, unconfined (water-table) aquifer and one or more deeper confined aquifers.

The landscape around Johnson Meadow was formed during three glacial periods that occurred within the past 600,000 years. The older periods, Donner Lake and Tahoe, were more extensive than the more recent Tioga period. The lake level was higher during these periods and Johnson Meadow was periodically submerged forming a bay (Birkeland, 1964; Saucedo 2005). Glacial ice reached the vicinity of the Lake Tahoe golf course (situated on an old glacial lake or tarn) below which an outwash of gravel and sand developed through the area of Johnson Meadow. When glacial outwash flowed into Lake Tahoe, the deposits were intermixed with dense clay deposits that underlie the Meadow; these sequences have been exposed by erosion of the Upper Truckee Rive channel. As lake levels lowered to present day elevations Johnson Meadow slowly became a marsh. Later there was a buildup of alluvium deposited by the Upper Truckee River which created an alluvial valley. This flatter floodplain was colonized by vegetation and became a meadow. Relict erosional cuts found in glacial outwash terrace deposits along the edge of the Meadow indicate the geologically recent (approximately last 12,000 years) flushing of outwash sediments from the valley floor lowered the meadow surface by ten or more feet (Lewandowski, 2020). Soils found in the immediate project areas fall within categories as defined by the Natural Resources Conservation Service (NRCS 2023) below.

- Pits and dumps (Map Unit 7031)
- Tahoe mucky silt loam, 0 to 5 percent slope, very poorly drained (Map Unit 7043)
- Watch peat, 0 to 2 percent slopes, valley flats, flood plains, fens (Map Unit 7071)
- Christopher loamy coarse sand, 0 to 9 percent slopes, loamy coarse sand (Map Unit 7441)
- Christopher loamy coarse sand, 9 to 30 percent slopes, loamy coarse sand (Map Unit 7442)
- Christopher-Gefo complex, 0 to 5 percent slopes, gravely loamy coarse sand (Map Unit 7444)
- Jabu coarse sandy loam, 0 to 9 percent slopes (Map Unit 7461)
- Marla loamy coarse sand, 0 to 5 percent slopes (Map Unit 7471)
- Ubaj sandy loam, 0 to 9 percent slopes (Map Unit 7541)

4.3 Flora and Fauna

4.3.1 Flora

Information on local flora and fauna was derived from Lewandowski (2020), Jepson (1923, 1960), Munz and Keck (1959), Storer and Usinger (1963), and Stanton et al. (2012). Vegetation and habitat types in the study area are typical of disturbed montane meadows and adjacent uplands of the Sierra Nevada. Vegetation types in the study area consist of Sierran mixed conifer, aspen, Jeffrey pine, sage, montane riparian, annual grassland, perennial grassland, fresh emergent wetland, wet meadow, and riverine habitat as documented by the California Wildlife Habitat Relationships system.

Within the study area, Sierran mixed conifer is located on the margins of the meadow, separated from wet habitats by a distinct rise in elevation. This relatively open forest is dominated by a mix of white fir (*Abies concolor*), Jeffrey pine (*Pinus jeffreyi*), and lodgepole pine (*Pinus contorta*). Canopy cover varies from approximately 25 to 60

percent. In open areas, the understory consists of a variety of shrubs, grasses, and forbs, including woods rose (*Rosa woodsii*) and sagebrush (*Artemesia tridentata*).

One quaking aspen (*Populus tremuloides*) stand is present in the meadow. The stand has relatively open canopies and a height of approximately 40-60 ft. The open nature of the stand results in substantial light penetration to the ground. The aspen stand in Johnson Meadow has an understory of crimson columbine (*Aquilegia formosa*) and straight leaved rush (*Juncus orthophyllus*).

Jeffrey pine covers drier, upland regions of the study area with a single tree layer. The layer ranges from approximately 50 to 150 ft in height. The stand typically has between 40 and 70 percent crown cover in the tree layer. The understory consists of greenleaf manzanita (*Arctostaphylos patula*), rabbitbrush (*Chrysothamnus nauseosa*), sagebrush, sulfur buckwheat (*Eriogonum umbellatum*), and antelope bitter brush (*Purshia tridentata*).

The sagebrush habitat is dominated by mountain sagebrush (*Artemisia tridentata*), often in association with rabbitbrush and antelope bitterbrush. Deciduous shrubs and small trees are sparsely scattered within this type. A sparse cover of grasses and forbs is present beneath the shrub layer. A rich variety of forbs are usually present. The abundance and distribution of associated plants is highly influenced by soil type and precipitation.

Within the montane riparian the dominant species is Lemon's willow (*Salix lemmonii*) which consists of an extensive understory of a wide variety of herbaceous vegetation. In the study area, this community commonly occurs in relict channels and floodplains where the Upper Truckee River used to flow prior to human disturbance.

Annual Grassland habitats are open grasslands composed primarily of annual plant species, and within the study area are associated with disturbed areas. Introduced annual grasses are the dominant plant species in this habitat. These include wild oats (*Avena fatua*) and meadow barley (*Hordeum brachyantherum*). Common forbs include true clovers (*Trifolium* sp.) and others. Perennial grassland habitat in Johnson Meadow is dominated by perennial grasses and sedges such as Idaho bentgrass (*Agrostis idahoensis*) and Lakeshore sedge (*Carex lenticularis*) and is associated with the herbs hairy arnica (*Arnica mollis*) and slender phlox (*Microsteris gracilis*).

Fresh emergent wetlands are characterized by erect, rooted herbaceous hydrophytes. Emergent wetlands are flooded often enough that the roots of the vegetation prosper in an anaerobic environment. The vegetation may vary in size from small clumps to vast areas covering several kilometers. On the upper margins of fresh emergent wetlands, saturated or periodically flooded soils support moist soil plant species including California oatgrass (*Danthonia californica*), baltic rush (*Juncus balticus*), longstyle rush (*Juncus longistylis*), and Idaho bentgrass (*Agrostis idahoensis*).

Wet meadow habitat has a simple structure consisting of a layer of herbaceous plants. Species may differ, but several genera are common to wet meadows throughout the state. They include *Agrostis* spp., *Carex* spp., *Danthonia* spp., *Juncus* spp., and *Scirpus* spp. Important grass and grasslike species in the study area include slender-beaked sedge (*Carex athrostachya*), tufted hairgrass (*Deschampsia cespitosa*), and baltic rush (*Juncus balticus*). Willow (*Salix* spp.) is the only shrub genus found in abundance. Wet meadows usually occur as ecotones between fresh emergent wetlands and perennial grassland. The Upper Truckee River flows through Johnson Meadow in two channels known as the Upper Truckee River (further east) and the Gully Channel (more central). The Upper Truckee River Channel was excavated to accommodate grazing and is incised and largely disconnected from the floodplain. The Gully Channel formed during a flood event in 1997 and is also incised and disconnected from the floodplain. Flow in the channel's transitions from a rapid, surging stream in the spring during snowmelt to a slow river with little flow in the fall.

4.3.2 Fauna

Mammals that might utilize the Jeffrey pine and riparian communities include chipmunks, golden-mantled ground squirrels, Douglas squirrel, gray squirrel, mice, gopher, vole, marmot, snowshoe hare, porcupine, coyote, Sierra Nevada Mountain Beaver, mountain lion, mule deer, and brown bear, Pale Townsend's big-eared bat, Western red bat, Spotted bat, American badger. Amphibian and reptile species include the Sierra Nevada yellow-legged frog, Fence lizard and Garter snakes. Birds that might be associated with this habitat include goshawk, Pallid bat sharp-shinned hawk, blue grouse, flammulated owl, California spotted owl, great gray owl, poor-will, common flicker, hairy woodpecker, Northern goshawk, Northern harrier, Bald eagle, Golden eagle, Osprey, Peregrine falcon, Long-eared owl, Willow flycatcher, Olive-sided flycatcher, Yellow warbler, Yellow-headed blackbird violet- green swallow, Steller's Jay, mountain chickadee, white-breasted nuthatch, American robin, Townsend's warbler, pine siskin, dark-eyed junco, and chipping sparrow. Insects and crustaceans may include orange sulphur, Hera moth, White-lined sphinx moth, Lorquin's admiral, Edith's copper, white pine and crayfish. Further description of local fauna can be found in Grinnell (1933), Hall (1946), Orr (1946), Linsdale (1936), Grinnell and Miller (1944), Storer and Usinger (1963), Lewandowski (2020) and Orr and Moffitt (1971).

5 Cultural Setting

This section provides a brief historic context for the immediate, project-related APE and a more expansive archival study area, comprising the whole of Lake Valley and extending from the northern end of the valley around the southwestern shore of Lake Tahoe to include Cascade Lake, Emerald Bay, and parts of D. L. Bliss State Park. This expansive approach was taken in recognition that Lake Valley is a distinct geographic entity, and that restricting research of prehistoric and historic activity to only limited areas adjacent to the project activity areas risked creating an artificially limited account, with the potential for related areas of activity to be unrealistically excluded. The extension of the archival study area around the southwest shore of Lake Tahoe beyond Lake Valley reflects the continuation of project related activities beyond the limits of Lake Valley. As appropriate, the context is organized by behavioral themes applicable to this area (Laitinen et al. 2023).

5.1 Prehistoric Overview

Human beings have been an integral part of the Lake Tahoe ecosystem for at least 8,000 years. In broadest terms, the archaeological signature of the Tahoe Sierra marks a trend from hunting-based societies in earlier times to populations that were increasingly reliant upon diverse resources by the time of historic contact (Bettinger et al. 1995; Elston 1982; Elston et al. 1977, 1994, 1995). The shift in lifeways may be attributed partially to factors involving paleoclimate, a shifting subsistence base, and demographic change.

Elston (1982, 1986) and Lindström (2000) provide recent summaries of western Great Basin and eastern Sierra prehistory. These studies focus on adaptive strategies consisting of technological, subsistence, settlement, and ideological elements expressed over broad regions. Four such strategies are recognized for the region, including eastern Sierra basins such as the Lake Tahoe Basin. Those strategies include the Pre-Archaic (prior to 8,000 B.P.), the Early Archaic (5,000 to 8,000 B.P.), the Middle Archaic (1,300 to 5,000 B.P.), and the Late Archaic (time of historic contact to 1300 B.P.).

5.1.1 Pre-Archaic (prior to 8,000 B.P.)

Within the Lake Tahoe Basin, Sierran glaciers retreated between 8,000 and 9,000 B.P. making it possible for people to occupy the area. Climates warmed and dried rapidly, although conditions remained relatively cool and moist. Sparse prehistoric populations have been equated with a Pre-Archaic foraging economy based on high residential mobility, large game hunting, and non-intensive plant food processing and storage. Pre-Archaic sites are nearly absent in the Tahoe highlands; those that do exist may reflect the incipient influx of people entering the area soon after the retreat of Sierran glaciers. The oldest finds reported for the Lake Tahoe Basin are included in the Tahoe Reach Phase as defined by Elston et al. (1977). Lindström (2000) suggests that during Pre-Archaic and Early Archaic times, the level of Lake Tahoe may have been considerably lower than at present; upper reaches of the Truckee River may have been dry for centuries at a time. If this were indeed the case, Pre-Archaic and Early Archaic sites would have been located adjacent to the lake then present but were subsequently submerged as the lake level increased.

5.1.2 Early Archaic (5,000 to 8,000 B.P.)

During the succeeding Archaic lifeway, prehistoric populations increasingly exerted their influence in altering the landscape and affecting fauna and flora through a gradual decrease in overall mobility, increased land-use diversity, a broadened diet, and intensified resource procurement. The Early Archaic period ("Spooner Phase") is

correlated with a marked warming and drying climatic trend. It dates from 8,000-5,000 years ago, with the onset of more mesic conditions around Lake Tahoe beginning about 6,000 years ago. The prehistoric economy was focused on hunting, but seed-processing tools made their first appearance in large numbers. Fishing in highlands lakes and streams was a likely subsistence pursuit, but little trace is left of this perishable technology (Lindström 1992). The prospects for longer-term encampments and year-round use of the high country during this drought have been proposed (Lindström 1978; 1992). Like Pre-Archaic sites, Early Archaic sites are sparsely represented in the Tahoe Sierra. It is conceivable that both Pre-Archaic and Early Archaic archaeological sites, located on the lower and older shorelines of Lake Tahoe and its tributary lakes and streams, may now be lost by erosion, buried by marsh deposits, or inundated by historic, artificially high-water levels.

5.1.3 Middle Archaic (1,300 to 5,000 B.P.)

During the Middle Archaic, dating from about 5,000-1,300 years ago, climates became more mesic. Increases in effective precipitation caused the expansion of resources associated with lakes and marshes. For example, Lake Tahoe presumably returned to its current configuration. This period is regionally represented by the "Martis Phase" and is marked by Martis Series projectile points. Population densities were on the rise, with a return to more optimal conditions in the lowlands. The Middle Archaic strategy entailed a decrease in overall mobility, increased land-use diversity, and a broadened diet. More intensive prehistoric use of the Tahoe Sierra began during this period, as mixed-mode foragers-collectors ventured into the highlands on seasonal gathering, fishing, and hunting forays. Middle Archaic occupations are well represented in the archaeological record of the Tahoe Sierra. It is likely that this greater archaeological visibility reflects increasing seasonal use of highlands environments by larger populations staging from more permanent base camps at lower elevations.

5.1.4 Late Archaic (time of historic contact to 1,300 B.P.)

The Late Archaic period, about 1,300 years ago to historic contact, is characterized archaeologically by the "Kings Beach Phase." The earlier part of the phase is marked by Eastgate point types, the latter half by the Desert Series point types. Changes in prehistoric technology are profound and are understood to reflect more intensive use of all parts of the environment, with a corresponding increase in dietary variety. This period is marked by an overall xeric trend, punctuated by cool/moist periods alternating with periods of severe drought. Throughout the Late Archaic, prehistoric populations continued to increase, with dramatic rises occurring during the early, more mesic, part of the period ("Early Kings Beach Phase"; Elston et al. 1994; Moore and Burke 1992). Such extreme climatic fluctuations may have allowed for year-round residence in the Tahoe highlands at times and prohibited even seasonal occupation at other times. Such population shifts or expansions are reflected archaeologically in the location and composition of upland sites. More intensive and long-term use of the Tahoe uplands during xeric intervals within the last 1,000 years is tentatively documented at a site near Mt. Rose (Lindström 1982; Lindström and Bloomer 1994). In the crest zone (between 8,000- and 9,000 feet of elevation) above Lake Tahoe and near Donner Pass, house rings and storage facilities are reported, and bedrock mortars and slab milling features are inventoried, well outside the contemporary range of oak and grass resources (Lindström 1978).

5.2 Ethnographic Overview

As of the mid-1800s, the Washoe inhabited the study area. A Hokan-speaking hunting and gathering group, the Washoe inhabited the chain of valleys along the eastern slope of the Sierra Nevada, from Honey Lake to Antelope Valley. The Pine Nut Mountains and the Virginia Range formed the eastern boundary of Washoe territory, while

the western boundary extended several miles beyond the Sierra crest. A great deal has been written about Washoe land use in the Lake Tahoe Basin and their use of the region's resources. Lake Tahoe is the center of the Washoe world, both geographically and socially. Legendary and mythological associations to places within the basin are common. Ethnographic data on the Washoe are contained in d'Azevedo (1956, 1963, and 1986), Barrett (1917), Dangberg (1968), Downs (1966), Fowler et al. (1981), Freed and Freed (1963), Lowie (1939), Nevers (1976), Price (1962, 1980), and Siskin (1941).

While they were an informal and flexible political collectivity, Washoe ethnography hints at a level of technological specialization and social complexity uncharacteristic of their neighbors in the Great Basin. Semi-sedentism and higher population densities, concepts of private property, and communal labor and ownership are reported and may have developed in conjunction with their residential and subsistence resource stability.

There was a tendency for Washoe groups to move from lower to higher elevations during the mild seasons, and to return to lower elevations the remainder of the year (Downs 1966). With the coming of spring, small bands or individual families left their winter base camps to take advantage of ripening plant foods in low-lying valleys. As soon as travel became possible in the spring, able-bodied Washoe began leaving winter villages for the lake. White fish and early plants sustained these early arrivals. Later, other family members followed. Extended kin groups returned to established camps located along streams from which they fished, harvested plants, and hunted game. Winter camps were not abandoned. Families at the lake would walk back and forth several times over the summer, bringing fish and other provisions to those that had stayed behind.

By early June, Washoe were encamped around the shores of Lake Tahoe. Camps of five or six windbreaks (gadu) appeared adjacent to the lake's tributaries. Each gadu housed a family. From these encampments, the Washoe took trout, sucker, and white fish that spawned in the streams. Stores of dried fish were developed for later use.

In the late summer and early fall, Washoe began leaving Lake Tahoe and dispersed in small groups to valleys east of the Sierra. Antelope and rabbit were hunted in early fall, both by individuals and in communal drives. Rabbits were dried for winter use. Late fall found the Washoe collecting pine nuts along the east face of the Sierra and in the Pine Nut Hills; deer hunting was an important activity in these locations. With the coming of heavy winter storms, Washoe families returned to their favored base camps, sustained by stored pine nuts, seeds, and dried meat.

This general seasonal round was not rigidly adhered to by all Washoe (d'Azevedo 1986:472-473). Some trekked to distant places for desired resources, while most circulated in the vicinity of their traditional habitation sites. They were not compelled to cover large expanses of land in their subsistence pursuits, a pattern common to other Great Basin groups. This was due to the large variety of predictable resources that were nearby. Their relatively rich environment afforded the Washoe a degree of independence and may account for their long tenure in their known area of historic occupancy.

Washoe use of the Lake Tahoe Basin changed radically after the 1850s. The development of transportation corridors, intensive logging, recreational uses, and commercial fishing all affected the resource base on which the Washoe had depended. Traditional lifeways changed. With the decline or demise of their traditional food sources, the Washoe became increasingly dependent upon European resources and means of procurement. Many Washoe individuals and family groups retained links to their ancestral lands around Lake Tahoe by working for loggers, dairymen, fishermen, ranchers, and resort owners. These enterprises made extensive use of Indian labor, and in exchange, the Washoe were paid wages or were given food. Washoe men worked on roads and cut and hauled

firewood and Christmas trees for ranchers and lumbermen. Women performed domestic chores and made baskets to sell to tourists. Over time, some Washoe developed close relationships with their employers.

5.3 Historical Overview

Lake Valley was first encountered by Euro-American explorers in 1844 during John C. Fremont's second expedition. Late in January 1844 the party followed the Carson River up into the Sierra. On February 14, 1844, Frémont and his cartographer Charles Preuss climbed Red Lake Peak and made the first documented siting of Lake Tahoe, which they could see beyond Lake valley (Fremont 1845:229). Fremont and his party subsequently located and made their way over the Carson Pass on February 21 and then followed the American River down to Sutter's Fort (Stewart 1962:103-4; Goetzmann 1966:244-8; Lankford 2010:33-6; Farquhar 1965:53-57).

Later in 1844, six members of the Stevens-Murphy-Townsend emigrant party became the first Euro-Americans to stand on the shores of Lake Tahoe. While the main party headed for Donner Pass, this small group traveled up the Truckee River to the outlet. From there, they traveled south along the lakeshore and crossed the Sierran divide above Blackwood Creek traveling along a trail later known as the Georgetown Trail or the Georgetown-Lake Bigler Trail.

While the direct impact of exploration on the Lake Valley and the Lake Tahoe Basin was negligible, the indirect impact was immense in that these parties demonstrated a potential travel route over the Sierra Nevada.

5.3.1 Establishing Transportation Routes

For the 15 years following Fremont's first viewing, the Lake Tahoe Basin remained relatively undisturbed. While the 1840s saw the onset of the great westward migration, the two primary routes of travel were the Truckee River Route to the north and the Carson River Route to the south of Lake Tahoe (Fey 2019: 12-3). The Lake Tahoe Basin was largely avoided because it did not lie directly on either the northern or southern route.

The first gold strikes in California in 1848 created an instant demand for trans-Sierra freight and travel routes across the Sierra Range. Thousands of Americans trekked westward. Repeated improvements were made to the Truckee Route, including the Dog Valley Road (est. 1845), Roller Pass (est. 1846) and Cold Stream Pass (est.1846) but the route remained difficult (Harris 2002:100-110).

With the onset of the Gold Rush, the Carson River Route would become the principal route into California. It was used by thousands of miners and other fortune seekers. The Carson River Route ascended the Carson Range through the canyon of the west branch of the Carson River in the vicinity of Woodfords, California, then to Hope Valley. From Hope Valley the route headed west to Red Lake and then to Carson Pass to the southwest. The route then descends to Caples Lake and then over West or Emigrant Pass (Harris 2002:127-136; Fey 2019:157-170). From there the route ran southwest to Mud Lake, then headed northwest to Pollock Pines following Iron Mountain Ridge, before terminating at Placerville (Fey 2019:170-172).

In 1849, a young attorney from Oho, John "Cock-Eyed" Johnson, moved to the Camino area to the east of Placerville where he claimed 320 acres. He operated a ranch, a boarding house, and a small sawmill (Fey 2019:173). In 1852, Johnson searched for a more direct route over the central Sierra. He blazed a new route first known as Johnson's Cut-Off or Johnson's Pass Road, and later as the Placerville Road. The new route ran from Placerville to the western side of Lake Valley via Johnson's Pass, and then along the eastern side of Lake Tahoe before descending into Carson Valley via Spooner Pass. As shown on the 1866 GLO plat map, the road cuts across the mountain face from Johnson Pass, and then passed along the southern end of Lake Valley to Meyers.

From there, the road headed northeast along what is today the Pioneer Trail. Modern US 50 subsumes much of the alignment of the old Placerville Road through Lake Valley.

Within Lake Valley, two branches of Johnson's Cut-Off became established. The Lake House Dog-Leg branched northward from Meyers to Lake House, then eastward through Taylor's Landing and on to Lakeside. The second branch headed northeast from Meyers, reconnecting with the Lake House Dog-Leg near Lakeside. Present day Pioneer Trail approximates this branch, which was often referred to as the Back Road. Freighters preferred this branch. Its location at the base of the hills meant that there was less sand to haul through than was encountered on the Lake House Dog-Leg.

In 1854, Ira M. Luther discovered a short connection from Hope Valley via Luther's Pass to Johnson's Pass, providing a connection from the original Carson River Route to Johnson's Cut-off. Johnson's Cut-Off was to become the main transportation corridor that connected California and the Comstock Lode area between the late 1850s and the early 1870s.

Both Johnson's Cut-Off and the Luther Pass branch of the Carson River Trans-Sierra Routes were subject to revisions and improvements, including the County Road opened in 1858, the Hawley Grade also opened in 1858, and Osgood's Grade opened in 1860. The first regular all year postal service was established along Johnson's Cut-off in 1856, along which John "Snowshoe" Thompson would carry mail from Genoa to Placerville for 20 years. The Pony Express would use the Carson River Route then Luther's Pass to Johnson's Cut-off in 1860 through 1861 (Nevada BLM 1996:7-9; Fey 2019:175-7).

5.3.2 Early Settlement in Lake Valley

The Placerville Road began as a route by which those from the east could access the west coast. From its establishment through to 1859 most traffic flowed from east to west. In 1859, rich mineral deposits were discovered on the Comstock in western Nevada, this initiated the use of the Placerville Road as a two-way thoroughfare. Men and material for the mines flowed from west to east. Empty wagons and despondent would-have-been miners flowed from east to west. This interstate highway would remain a primary route across the Sierra until 1868, when the transcontinental railroad relegated it to a secondary status.

Throughout the period from the 1850s through the 1860s, way stations were built fronting onto the Placerville Road, including Yank's Station (which would ultimately become Meyers), which was established by Martin Smith in 1851, Lake House (a.k.a. Lake Bigler House, an Wagener's Hotel, Dean and Martin's Station, Rowland's Station etc.), which was established by Seneca Dean and William Lapham in 1859, and roughly halfway between Yank's Station and Lake House, the Sierra House, which was established in 1859 by Robert Garwood Dean. They provided services to the wagons, teams, and teamsters traveling the road.

5.3.3 Logging

Following the Comstock discoveries prospectors began to scour the Lake Tahoe Basin and surrounding peaks for ore deposits and short-lived mining districts were established without any becoming major producers (Wilson 1992:11). The true value of the Lake Tahoe Basin to the mining industry was soon realized to be in timber needed to construct mine props and railroad ties, and as a source for both industrial and domestic fuel requirements. During the early 1860s, individuals began to stake small timber claims. They supplied a handful of sawmills established to satisfy local needs. Loggers at this early date engaged in small-scale cutting of easily

accessible timber stands. At first, they worked within the Virginia Range and along the east front of the Sierra Range. These areas were soon exhausted of usable timber, yet the demand persisted.

By the mid-1860s, forests in the Lake Tahoe Basin became the primary source of lumber and cordwood for the mines of the Comstock. Cutting began on the east side of the basin, continued to the north and south shores, and finally along the west shore. Large-scale logging commenced in earnest in 1873 with the arrival of lumber and fluming companies financially capable of establishing large mills and an elaborate transportation network designed to cut and move the lumber over the Tahoe divide to the Comstock mines or markets served by the Central Pacific Railroad.

The centers of the Tahoe lumber industry would be the large lumber mills established by Augustus Pray at Glenbrook in 1863 but bought out by H.M Yerington and D.L Bliss and their Carson and Tahoe Lumber and Fluming Company (CTLFC) in 1873, and the large mill established in 1879 at Incline owned by Walter Hobart and Seneca "Sam" Marlette and their Sierra Nevada Wood and Lumber Company (SNWLC). The CTLFC and the SNWLC dominated the lumber industry in the Lake Tahoe Basin during the 1870s through to the late 1890s. Despite the dominance of the two large lumber companies a number of smaller sawmills and independent lumber companies were able to operate on land not controlled by their larger rivals, although the larger firms were quite relentless in their pursuit of timber and practiced a policy of purchasing as many of the smaller firms as they could (Chung 2003:9).

Lindström and Hall (1998) provide a detailed discussion of logging in Lake Valley. The first lumber mill in Lake Valley was a water-powered mill constructed in 1860 by Robert Woodburn. Woodburn's Mill was located about two miles northeast of Meyers on the Back Road (Pioneer Trail). The mill had a vertical saw blade powered by an undershot waterwheel and produced 24-inch boards (Lucas 1977). Woodburn supplied lumber for local hostelries, barns, and stables that were built along the Old Placerville Road, and his focus remained on the local construction industry rather than providing lumber for the Comstock (Lindström and Hall 1998). The main departure point for lumber from Lake Valley was a pier at Taylor's Landing, which was constructed in 1864 by Almon M. Taylor. Taylor had homesteaded a 160 acre ranch in the early 1860s but quickly diversified into logging (Goin 2010:24).

M. C. Gardner acquired a timber holding of several thousand acres from the government in 1872 and produced lumber for local construction, with his logs being processed at Glenbrook, after being hauled to the lake shore by oxen. In 1875, he entered into a six-year contract to provide logs to the CTLFC, which induced him to construct a short railroad. Gardner skidded his logs overland using bull teams and horse to reach short standard gauge railroads, which would deliver the lumber to a pier to the west of the Truckee Marsh, where Camp Richardson is now located. Gardner continued producing logs for the CTLFC for ten years but then went into bankruptcy. He sold his holdings to Elias Baldwin and relocated to a ranch in Carson Valley. The town of Gardnerville is named after M. C. Gardner (Wilson 1977:16-7; Wilson 1992:39).

By 1884, George Chubbuck had acquired timber rights to 1,200 acres of forestland in Lake Valley. Chubbuck built an oxen-pulled narrow-gauged tramway that ran along Cold Creek and Trout Creek, from Taylor's Landing to Sierra House and beyond (Myrick 1962:424). At its shoreline terminus, Chubbuck built a log ramp that was used to roll logs from the rail cars into the lake. In 1886, Chubbuck was forced into bankruptcy. The CTLFC with whom Chubbuck had contracted to sell his timber bought out the operation following the bankruptcy (Galloway 1947:90). The CTLFC upgraded the tramway to steam engines, and after acquiring timber rights from the Meyers and Barton families, extended the line first to Meyers and then further south into Upper Lake Valley (Lindström

and Hall 1998). French-Canadian lumberjacks were hired to fell the timber and more than one hundred Chinese and Portuguese cut cordwood (Scott 1957:213).

Subsequently, the CTLFC built two railroads into Lake Valley. The first was a standard gauge line from Camp Richardson. This line was abandoned and replaced by the narrow-gauge Lake Valley Railroad (LVRR) that extended along the east and south edges of the valley, to Meyers, and on into the upper watershed of the Upper Truckee River. Railroad construction activities began in late 1887 and continued to occur intermittently until 1897. The mainline, spurs, and sidings covered about 13 miles and ran along portions of the Trout Creek drainage and southwest to Meyers.

During the early years of operation, the northern terminus of the LVRR was a log ramp at Taylor's Landing. This ramp was used to move logs from the railroad cars into the Lake. From there, large floats of logs were transported to the mills at Glenbrook. In 1888, the name of Taylor's Landing was changed to Bijou, apparently derived from a French word meaning gem, jewel, or treasure, when the small settlement around the pier gained a post-office. That same year, the 1,800 foot Bijou pier was built to replace the earlier ramp.

The railroad continued to deliver lumber to the pier and then across the lake to Glenbrook until around 1897 or 1898 (Lake Tahoe Historical Society Newsletter 1975). The pier was removed in the fall of 1976 (Wilson 1977:18).

During the peak of Comstock era logging, the Celio family had large ranch holdings in upper Lake Valley. Apparently, the patriarch of the family, Carlo Celio, refused to sell lumber to the CTLFC, or timber rights to land he controlled (Lake Tahoe Historical Society Newsletter 1974:3-4). Rather, the family decided to cut timber on their own holdings. The Celios subsequently incorporated as a lumber company in 1905 and built a sawmill at their main ranch. In 1926, the Celios built a second and larger sawmill near the junction of present-day Lake Tahoe Boulevard and Sawmill Road. Celio and Sons sold out to the Placerville Lumber Company in 1942, ending 47 years in the lumber business. Operations at the old Celio Sawmill ceased in 1952 when it burned down.

5.3.4 Tourism

With the gradual decline in the volume of traffic along Placerville Road, stations began catering to seasonal tourists. Tourists came to Tahoe City by train and were then transported by steamer to one of several resorts located around the margins of Lake Tahoe. Lodges designed with the tourist in mind were constructed facing Lake Tahoe as the lakefront became the focus of resort development. In 1873, Ephraim "Yank" Clements relocated from Yank's Station to the lake shore and built a three-story, 40 room hotel. Cabin and tent facilities also were available. Other accoutrements included a store, livery, barns, salon, and a dance floor (Goin 2010:29).

In 1871 Nathan Gilmore filed a deed for 10,000 acres extending from Fallen Leaf to Mt. Tallac in Devil's Valley Wilderness, and filed for water rights (Scott 1957:147-150). Gilmore developed the Glen Alpine Springs resort in 1873 as a "health resort" but it became a popular place for middle-class recreation. Guests enjoyed nature hikes, bonfires and fishing in streams stocked with trout. During the peak years in the early 1900s, the resort consisted of twenty five buildings, a two story sixteen room hotel, dining hall, kitchen, icehouse, and a post office. Up to 120 guests slept in tent cabins bought as surplus from the Civil and Spanish-American Wars and stayed weeks and months at a time.

In 1880 Elias J. "Lucky" Baldwin purchased Clement's resort on the lake shore and renamed the lodge the Tallac Hotel. Baldwin would turn the resort into one of three early luxury hotels built on the lake, alongside the Glenbrook House on the east side, and the Grand Central Hotel in Tahoe City (Strong 1999:10-11).

After selling his first resort to Elias Baldwin in 1880, Clement's still owned 167 acres with 300 feet of beach frontage about one mile east of the Tallac. He and his wife ranched there for several years. In 1886, they built a pier with a clubhouse and a saloon out over the water. They also built a small two-story resort called the Cascade House. Unlike the Tallac, the Cascade catered to tourists of more modest means. A few short years later, the Cascade House burned to the ground. Three years later he erected a new, less substantial structure.

5.3.5 Agriculture

Seasonal agriculture and fishing came to serve the resorts and settlement increasingly became centered round the lodges. Hay was sold by the pound and fresh food was at a premium. Meadowlands were quickly preempted wherever wild hay could be harvested and beef and dairy cattle could be grazed. Irrigation works were established to channel runoff into meadows, enhancing hay production. Many of the early ranches were directly associated with the larger way stations. In 1862, 400 tons of hay were cut in the valley (Scott 1957:185). Many independent lumbermen cut wood during the winter and ran small agricultural operations during the summer. Lake Valley was used as summer range for herds of cattle and sheep driven to the valley from the Gold Country or Sacramento Valley. Cattle tended to remain on the valley floor, while sheep could use not only the valley floor but also the steep hillsides. The development of resort hotels and the onset of commercial logging in Lake Valley in the mid- 1870s offered new markets to the local ranchers. Many shifted to being dairymen. By the 1870s, at least 13 commercial dairies were in operation around the basin, producing butter and milk for both local consumption and export to Carson Valley and the Comstock. In 1870, only 228 tons of hay were baled, but 100,600 pounds of butter had been produced. The productive season was from June to November. During this time, butter was kegged, eggs crocked, beef cattle fattened, and hay baled (Scott 1957:186). By 1875, increased logging activities had allowed the hay industry to recuperate. In that year, commercial hay production reached over 800 tons. Lake Valley saw an increased use as a summer range. Ever larger herds of cattle and sheep were driven to the valley from both California and Nevada. Lumber companies often leased or sold cutover lands for as little as 50 cents per acre, usually to grazing interests for use as summer pasture. Ranchers in the valley as of the mid-1880s included George Meyer, William Lyons, William Rantz, Samuel Kyburz, Charles Lukens, Ruben Jewell, Carlo Celio, Asa Hawley, William Green, Henry and Charles Dixon, Charles Winstanley, Timothy Burton, and Hiram Barton (Scott 1957:195).

5.4 The Sierra House, Johnson Meadows, and the Johnson Family

Johnson Meadows was part of extensive holdings associated with the Sierra House and which was eventually split off from the other holdings by the Johnson family in the mid-20th century. The Sierra House was an early establishment in Lake Valley, and had a complex history. It was originally built by Robert Garwood Dean in 1859. At that time Dean was a resident of Genoa, Nevada, and having decided to establish a Way Station in Lake Valley he began scouting for a location during the winter of 1858, with construction work commencing in the Spring of 1859. The Sierra House was located along the back alignment (Pioneer Trail) of the Placerville Road, overlooking Cold Creek, and had extensive meadows that could be used for pasture and hay production (Scott 1957:198). The closest neighbors would be located along the Placerville Road, with River House (built by William DeCastle in 1862) approximately 0.3 miles to the southwest, Miller House (built by John G. Miller in 1862) located approximately 1.25 miles to the northeast, and Dixon's House (constructed by R. P. Rainey in 1862), located 1.85 miles to the northeast (Scott 1957:382-383).

Later in 1859 Robert Dean sold the new way station to William Mack, who added onto the house built by Dean. By the summer of 1861 'Mac's Station' incorporated five rooms downstairs, including a saloon, and additional accommodations on the second floor. Mack also added a covered porch that ran the length of the building, which fronted the Placerville Road. Four large barns were constructed, and herds of cattle and relays of horses were maintained. Over 300 tons of hay were mowed in the surrounding meadows each year (Scott 1957:199). Mack sold the house in 1867 to A. Tryon who operated the place for only a few years. Tryon sold the property to Haskin Swain in 1871, who raised hay, ran cattle, ran a dairy operation with a water wheel powered butter churn, and took in the occasional guest. Swain would preempt additional land, taking the holdings associated with the Sierra House to over 2,000 acres (Scott 1957:199-200). Swain leased his timber rights to Thomas B. Rowland and others involved in the local lumber industry. Swain sold the property to two local lumber men, S. D. Weyan and W. A. Chittenden, in 1884 (Scott 1957:200). Weyan and Chittenden began the practice of leasing the property, with the lease being taken on by George Washington Chubbuck for seven years. Weyan and Chittenden then sold the property to James Henry Martin and Judge Seneca Dean in 1891, who leased the property to Robert Lucius Bence in the late 1890s. Bence operated the property for many years before it was obtained by Chris Johnson Sr. in 1912 by foreclosing on an $800 note (Scott 1957:200).

Compared to other nearby locations, Sierra House did not become the hub of a substantial settlement. Owners and leases developed the agricultural potential of the area. Hay from the adjacent meadows and dairy products were an important adjunct to their subsistence. Other nearby places, such as Meyers and Bijou/Al Tahoe would become the kernels for substantial developments. This was due largely to their location at the intersection of transportation corridors. Simple way stations such as Sierra House began their decline in the 1870s and few survived through the turn of the century.

Chris Johnson Sr. died in 1913, the year following his acquisition of the Sierra House. Chris Johnson never took up residence at the Sierra House, but his son, Knox William Johnson operated the property for several years before leasing it to Robert Dixon's family. When Mrs. Dixon died in 1918 the property was leased to Ray Smith's family, after whom the property seems to have been operated by various members of the Johnson family (Scott 1957:201).

By the 1920s, the Sierra House had gone into decline and the buildings fell into disrepair (Scott 1957:200-201). By the 1950s, only one barn remained and by the mid-1950s the area had been developed as a small sub-division. The Sierra House Elementary School was built in the 1970s close to the original site of the Sierra House.

Knox William Johnson and his wife Stella Van Dyke Johnson made their home base in the Carson Valley, at the J Lazy J Ranch near Mottsville, to the west of Gardnerville. Knox William Johnson died in 1931 at the age of just 43, when his eldest son, Knox Van Dyke Johnson was just six years old, his daughter Marjorie was ten, and his youngest son, William, was only a year old. By the age of 12 Knox Van Dyke Johnson was seemingly taking charge of the Carson Ranch and his mother, Stella, would summer the cattle up at their Lake Tahoe holdings. After serving for two years in the US Army during the Korean War, William Van Dyke Johnson became involved in property management in South Lake Tahoe, throughout the 1950s and 1960s. In 1969 he was elected to the El Dorado County Board of Supervisors, with whom he served for 12 years, before moving to the Apple Hill/Camino area of California, where he ran an Orchard until his death in 2016 (Mountain Democrat 2017). In 1945 Marjorie married Melvin Frederick 'Buzz' Springmeyer, whose family were also ranchers in the Carson Valley. Marjorie had a particular affinity for the Bijou area where she had spent her childhood summers, where the family were seemingly based after the Sierra House became dilapidated. Marjorie and Buzz established a gas station and auto repair shop at 2605 Lake Tahoe Blvd, where an AutoZone is now located. After inheriting part of her

parent's estate the family moved back to the Carson Valley and resided at the J Lazy J ranch house (Nevada Appeal 2016). Marjorie and Buzz's son, Jon Knox Springmeyer, continued the family tradition and summered cattle up at Lake Tahoe during his childhood (Tahoe Daily Tribune 2020). All three of Knox William Johnson's children had philanthropic inclinations and donated much of the Tahoe holdings to good causes, with the aim of seeing South Lake Tahoe develop in a sustainable and responsible fashion (Nevada Appeal 2016).

6 Field Methodology

6.1 Expectations

Based on archival research findings, the archaeological record within the study area is somewhat limited. The primary cultural resources expected to be discovered include remnants from the historic logging and ranching periods, as well as prehistoric lithic scatters. The highest likelihood of encountering prehistoric sites will be in proximity to water sources, such as slight elevations along the Upper Truckee River, above the floodplain, or where mountain tributaries feed into the glacial valley floor.

Given the APE's location and the historical context of the region, there is an expectation of identifying historical sites linked to transportation (early roadways) and logging activities. Furthermore, due to the project's proximity to local roadways and regional highways, it is highly likely that remains from the historic period, such as debris scatters, will be encountered.

Upon entering the field, the NCE field staff recognized the necessity of revisiting three previously documented heritage resources. Time was dedicated to relocating these pre-documented resources, evaluating their present state, and assessing their spatial relationship to the APE.

6.2 Inventory Areas and Field Methods

The archaeological survey was conducted over three days by Christina Rathbone on August 29 through the 31st, 2023. The objective of the field inventory was to locate, describe, and evaluate archaeological resources present within the project area and to update previously recorded sites. Fieldwork was performed in accordance with applicable accepted Federal and State standards. An intensive pedestrian survey was completed for the 24.4 acres of the APE in the location of the proposed Class I shared-use path. The APE was surveyed utilizing 15 meter transect spacing and using a zig-zag pattern (identified as the survey area in Figure 2). Much of the area has experienced previous disturbance due to the high use of recreational trails. Emphasis was placed on the examination of the undisturbed, or relatively undisturbed ground. Surface visibility varied considerably across the APE. Previously disturbed areas along the rights-of-way were often essentially void of vegetation. To varying degrees, thick vegetation and pine needle litter was present throughout the APE, restricting ground visibility. As such, periodically leaf and needle litter was cleared to expose the ground surface. Overall, sufficient clear ground was present to ensure survey adequacy. When identified, cultural resources were described in field notebooks, photographed using 10 megapixels or better cameras, and plotted using a mapping grade Trimble Geo7x Series GPS receiver. Sufficient information was collected to allow for the completion of California Department of Recreation (DPR) forms.

On May 22, 2024 an additional day of fieldwork being undertaken by Stuart Rathbone, NCE Architectural Historian, who examined architectural resources located in the Johnson Meadow area of the APE and the previously recorded Johnson Ranch property (P-09-006059).

When a cultural resource was encountered, field personnel more thoroughly examined the immediate area to determine the type and extent of cultural material. At least two overview photographs were taken to capture the general surroundings with attention paid to capturing the horizon (if possible) to aid in future relocation. Upon completion of the inventory, Trimble field data were differentially corrected using the nearest local base station and then converted to GIS shapefiles projected to NAD83, UTM Zone 10 North. Resources were plotted

on both USGS 7.5-minute base maps and aerial imagery for resource form maps. Field personnel collected descriptive data useful in the evaluation of a site's eligibility for listing on the National Register. No artifacts were collected during the inventory. If applicable, photos of artifacts contained a scale, and all photographs would have been GPS- plotted. Upon completion of the inventory, field data was converted to GIS shapefiles projected to NAD83

California State Plane 2. Applicable sites were recorded or updated on California Department of Parks and Recreation (DPR) 523 site forms and plotted on USGS 7.5-minute maps and aerial imagery. Isolates were mapped and photographed (if diagnostic). No artifacts were collected during the field survey and no subsurface investigation was conducted. Survey photos taken within the APE are in **Appendix D** and DPR site forms are in **Appendix E**.

6.3 Professional Qualifications

Christina Rathbone, M.A., Project Archaeologist at NCE, meets the Secretary of Interior's Standards for Archaeology and Historic Preservation (36 CFR Part 61). Ms. Rathbone has experience equivalent to the Professionally Qualified Staff (PQS) standards outlined in Section 106 PA Attachment 1 as a Co-Principal Investigator. She meets the Secretary of Interior's (SOI) Standards for Archaeology and Historic Preservation (36 CFR Part 61). She has 15 years of experience in historic preservation, archaeological investigation, and cultural resource evaluation as part of State, Federal, and professional standards in compliance with Section 106 of the NHPA.

Stuart Rathbone, PhD, has 25 years of experience in archaeology and architectural history. Dr Rathbone undertook the fieldwork for this fieldwork and prepared the various reports. Dr Rathbone meets the Secretary of the Interior's Professional Qualification Standards for Archaeology and Architectural History.

Jeremy Hall, NCE Cultural Resources Manager, oversaw inventory activities. Mr. Hall meets the Secretary of Interior's Standards for Archaeology and Historic Preservation (36 CFR Part 61) and is a Registered Professional Archaeologist. He has over 20 years of experience in historic preservation, archaeological investigation, and cultural resource evaluation as part of State, Federal, and professional standards in compliance with Section 106 of the NHPA.

Genevieve Pennanen, NCE Staff Archaeologist, has three years of experience conducting archaeological inventories, preparing detailed site records, and GIS mapping tasks. Ms. Pennanen assisted with report mapping, site form preparation, and preparation of the Historic Properties Survey Report.

Charles Zeier, NCE Senior Archaeologist, assisted with report preparation. Mr. Zeier has over 46 years of experience in historic preservation, archaeological and architectural surveys and evaluations, cultural resource management, Section 106 of the NHPA, and the National Environmental Policy Act (NEPA). Mr. Zeier meets the Secretary of Interior's Standards for Archaeology and is a Registered Professional Archaeologist.

7 Inventory Results

7.1 Project Area Observations

Approximately 19 acres underwent a comprehensive survey during the inventory process. This effort resulted in the revisitation of three previously documented cultural resources (see **Appendix E**) that intersect with the APE. Subsequent site updates were deemed necessary for the following sites: P-09-004529 (Lakehouse Road), P-09-004537 (Historic Road), and P-09-006059 (Johnson Ranch Complex). Emphasis was placed on reviewing portions of the revisited sites within the APE. For linear sites that extend away from the Project corridor, site review was limited to 100 meters beyond the APE perimeter. All recorded features at the P-09-006059 (Johnson Ranch Complex) were revisited. Two newly identified historic features were recorded within P-09-006059 (Johnson Ranch Complex). No new prehistoric sites, features, or artifacts were found either within the APE or its immediate vicinity. Staging Area 1 is positioned roughly 350 feet south of the APE. Staging Area 2 is situated on Barbara Road in the eastern portion of the APE. Both staging areas were examined. Most of the studied area has experienced some degree of prior disruption, primarily attributable to recreational trails, road maintenance activities, or historical logging and ranching operations. No new cultural resources were identified within the APE.

7.2 Summary of Results

Three previously recorded resources potentially extend into or through the APE (see **Appendix E**). Intensive inventory of the ADI, including segments of existing dirt roads associated with the project did not result in the identification of new prehistoric or historic resources within the APE.

7.2.1 P-09-004529 – Lakehouse Road

The portion of the road within the APE is approximately 400 feet in length and consists of a largely denuded swath comprised of decomposed granite. The road within the APE varies from ten to 15 feet in width in different sections. Southwest of Staging Area 1 the road has been paved and is about 15 feet in width. As noted by Drews, a portion of this road has undergone excavation and restoration as part of a South Tahoe Public Utility District (STPUD) effluent line project. Northeast of Staging Area 1, the road continues to be used as a recreational path. In this area the road corridor is ten feet wide and unpaved. No evidence of an original paved or prepared roadway was noted. No roadway-related artifacts or features were observed.

7.2.2 P-09-004537 – Historic Road

The portion of the road within the APE is 1,317 feet in length and consists of a largely denuded swath comprised of decomposed granite. The road enters the APE approximately 250 feet east of the washed-out bridge (P-09-006059) and about 400 feet northwest of Staging Area 1. The road varies from eight to ten feet in width. No evidence of an original paved or prepared surface observed. A wire rope, approximately 15 feet in length and one inch thick, was identified immediately north of the road within the APE. This artifact is presumed to relate to logging operations that occurred in this vicinity. Many logged stumps were also noted in the vicinity of the road.

7.2.3 P-09-006059 – Johnson Ranch Complex

The APE passes through the southern portion of the previously recorded site identified as the Johnson Ranch Complex (P-09-006059). None of the discrete features within the site boundary are located within the APE. During the inventory the site was re-examined, and new descriptions of the individual features were prepared, a revised site map was developed, and two new features were recorded and added to the site record.

- Feature 1a is a rectangular corral located at the northwest corner of the site boundary. The corral is defined by a white painted post-and-rail fence. The main entrance to the corral is located at the northwest, where access was provided from the adjacent house on Winnemucca Avenue via a small paddock (1c). The corral measures up to 490 feet across from east to west and up to 420 feet across from north to south, giving an area of just under 5 acres. A channel or the Upper Truckee River runs through the central part of the corral, although modern management of the river means that this channel likely remains dry throughout most of the year. The cattle chute at the northwest corner consists of a small rectangular enclosure with a wide gate on the southern side, a smaller gate on the western side, and a simple loading ramp at the west. The loading ramp would have been accessed by trucks entering the corral through a now missing gate immediately north of the paddock.
- Feature 1b is fence that encloses a large rectangular area within the Johnson Meadows pasture, and which contains the corral at the northwest corner. The enclosed area measures approximately 1,500 feet from north to south, 1000 feet from east to west, and has a total area (including Feature 1a) of approximately 36 acres. Along the northwest the fence consists of a white wooden post and rail fence, and along the northeast, east, and south it consists of a post-and-wire fence that is largely reduced to just intermittent posts and occasional fragments of wire. Along the western side the boundary is defined by sections of fence associated with the adjacent properties, including sections of metal fence railing, timber post-and-rail fencing, and post-and-wire fencing. The northern and eastern sides of the enclosure are thought to be an original alignment and are clearly visible on a 1969 aerial image available on Google Earth. The southern boundary does not become visible on aerial imagery until much later and it seems that the southern boundary was originally just the northern bank of the Upper Truckee River and that the pasture was unimpeded down to the northern boundary of what would become the Tahoe Airport. In the early 2000s a tall chain link fence was extended to the south of the western approach to the southern bridge (Feature 5). This fence runs roughly parallel to the river, but because of the sinuous course of the river the gap between the fence and the western bank varies between 50 and 215 feet. Following the construction of this fence, the southern portion of the pasture was further sub-divided. The alterations of the southern portion of the pasture are clearly not of historic age and will not be considered further here.
- Feature 1c is a small paddock that extends into the corral area and is associated with the road access to the corral. The paddock has a roughly semi-circular form and is enclosed only along the eastern side by a continuation of the white painted post-and-rail fence. The paddock measures 130 feet from northeast to southwest and up to 70 feet from northwest to southeast, providing an area of approximately 0.15 acres. The purpose of this paddock is unclear, but it was either an original component of the corral or an early addition as it is visible in the 1969 aerial image. In more recent times the paddock has included a well-manicured lawn and may have become an extension of the garden of the property to the immediate west of the corral.
- Feature 1d is a series of five white painted post-and-rail fences that have been used to protect young trees from grazing. These tree-fences are first visible on a 1987 aerial photograph accessible via Google Earth.

When first visible, the corral appears to be largely devoid of trees. By the early 2000s, significant tree growth had occurred along the line of the Upper Truckee River as it passed through the corral, and in the northwest corner where the cattle chute is located.

- Feature 1e is a small section of fence aligned northwest to southeast to the east of the large rectangular enclosure Feature 1b. This isolated section of fence was included in the site boundary by Stapleton (2019). However, the 1969 aerial imagery does not indicate any fencing being present to either the north or east of Feature 1b. Several sections of fence seem to have been erected in the areas north, east, and south of Feature 1b during the 1990s and 2000s, and NCE recommends that Feature 1e is a non-historic section of fence that should not be included as a component of the Johnson Ranch Complex (P-09-006059).
- Feature 1f is described by D. Stapleton (2019) as follows; "This fence remnant marks the norther boundary of Johnson Meadow. Much of the fence line is missing and numerous gaps are present in between the few remaining standing wooden posts. The posts are in varying degrees of decay. Standing posts measure roughly 6 inches wide by 4.5 feet tall. The partially intact segment extends approximately 690 feet. The fence line parallels the modern property fence lines present separating residential houses from the meadow." The fence is not depicted on the accompanying maps and no photographs of the fence are provided. The fence was not relocated by NCE.
- Feature 2 is a bridge located within the corral Feature 1a. The bridge crosses the widest part of the now mostly dry channel of the Upper Truckee River and is located in the dense stand of trees that have encroached upon the channel. The current condition of the bridge is markedly worse than when it was recorded by Stapleton (2019). Most of the deck and large parts of the substructure have now collapsed into the channel. Stapelton (2019) suggests the bridge is a footbridge, but the solid nature of its construction suggests the bridge was specifically designed to allow cattle to cross the channel of the Upper Truckee River during periods of high flow.

  The bridge measures 38 feet long by 10 feet wide. It has a wooden and concrete substructure consisting simple concrete abutments on either side of the channel that are up to 10 feet wide, 1.5 feet wide, and 10 inches tall. As the deck crosses the channel it is supported by a series of four-inch square-cut timber posts that are around three feet tall. Some of the posts are set in concrete pier bases. The bridge deck consists of a mixture of round and square longitudinal timber beams and transverse wooden boards that are approximately 10 feet long, one foot wide, and four-inches thick.

  The upstream, southern, side of the bridge is connected to a simple earthen dam that also crosses the channel. This feature was not noted by Stapleton (2019) but is unlikely to have been constructed since 2019. The dam is around 10 feet wide and 30 feet long. It fills the channel up to the height of the banks. The dam does not appear to be visible on the 1969 aerial imagery, but it is visible on a 1987 aerial image, also accessible through Google Earth. This 1987 image also shows the earthen dam at the north of the corral, Feature 4, which appears to be newly constructed. It may be that both dams were added during the 1980s.
- Feature 3 is a small, timber-built water tank located immediately south of the paddock. The water tank is constructed with timber staves and retained by metal tension hoops with tensioning lugs. The tank has a diameter of four feet and is two feet tall above the surrounding ground surface, although the base is set into the ground and the total height may be somewhat taller. A vertical spigot is located to the immediate west of the water tank, accessed via a short wooden walkway.

- Feature 4 is an earthen dam that crosses the channel of the Upper Truckee River at the northern edge of the corral. The dam measures 30 feet from east to west, and 28 feet from north to south, although the flat upper surface is only around 18 feet wide. The dam is constructed from a boulder base with gravelly fill forming the upper surface. The dam does not appear to be visible on the 1969 aerial imagery, but it is visible on the 1987 aerial image, where it appears to be in recently built condition. The 1987 image also shows the earthen dam to the south of the footbridge (Feature 2). It may be that both dams were added during the 1980s.

- Feature 5 is the southern bridge over the Upper Truckee River. The southern bridge is aligned from northwest to southeast and provides access to and from the Johnson Ranch Complex to the southeast side of the river. The bank to the northwest of the bridge fully eroded during 2017 and the river formed a new channel running around the bridge and rendering it inaccessible from the northwest. The bridge deck measures 34 feet long by 11 feet wide.

  The bridge substructure consists of three narrow concrete wall type piers and a pair of wing wall abutments. Each board-formed concrete pier measures seven feet tall by eight inches thick and 11 feet wide. The piers are protected on their upstream sides by vertically set metal I-beams. The bridge has board-formed concrete abutments at either end with integral wingwalls (i.e., there is no expansion joint between the abutment and the wing wall). The wing walls measure six feet long and are 9.5 inches wide. Earthen backfill is present behind the southeast abutment, but there is a stack of concrete rubble behind the northwest abutment, assumed to be part of a temporary stabilization measure, and clearly not an original component of the bridge.

  The bridge superstructure consists of a set of longitudinal timber beams supporting a composite board deck. Two-inch-wide metal brackets secure the longitudinal beams to the piers. The bridge deck is covered with modern composite boards which are clearly a relatively recent replacement. Each plank is fastened to the wooden frame with decking screws. Very low timber rails run along the edges of the deck. Although the deck is clearly a replacement, it is unclear if any of the superstructure is original.

  The bridge is currently connected to a network of trails, but none of them appear to ever have been formal roads. Some sections of these trails are up to six feet wide, but their typically width is between three and four feet. An aerial photograph from 1969 available on Google Earth shows that the trails in the project area were simple drove-ways used for moving stock between different pastures. Vehicular use may have been limited to only very occasional farm vehicles, but horses were probably the typical mode of transportation used in this area. Both this southern bridge and the northern bridge inside the corral are visible in the 1969 aerial image, in seemingly new-built condition. Neither bridge is connected to a formal road and their purpose appears to have been primarily to provide locations where cattle could cross the Upper Truckee River.

As part of the current project an updated description of the Johnson Ranch Complex (P-09-006059) was prepared. This update included more detailed accounts of the corral (Feature 1a), the bridge located within the corral (Feature 2), The update also includes descriptions of two newly recorded features at the northern end of the site, a hitching rail within the corral, an irrigation ditch that runs parallel to the northeast section of the fence enclosing the pasture (Feature 1b). The irrigation ditch features the concrete remnants of a water control gate at its western end. The new descriptions are included in an updated DPR Form.

- Feature 6 is a newly recorded hitching rail located in the northwest corner of the corral. This consists of an approximately 18 feet long roundwood rail supported at either end by short posts. The rail is only around 18 inches tall. Two metal harrows are set on top of the rail.
- Feature 7 is a newly recorded irrigation ditch. The ditch runs from east to west, parallel to and just north of the northeastern section of the large enclosure fence (Feature 1b). The ditch runs for approximately 300 feet but its eastern end is very indistinct and difficult to determine its exact terminus. The ditch is around six feet wide but is only two to three feet deep. It has a very shallow sided U-shaped profile. The ditch is overgrown with tall bushes along most of its length. The remains of a small concrete water gate are located at the western end of the ditch, which is around six feet long from east to west, and around five feet wide from north to south, although wing walls at the western end extend that width to around nine feet. The narrow slots for a single water gate are visible on either side of the mid-point of the structure.

8 Management Summary

8.1 Summary

El Dorado County, in cooperation with Caltrans, proposes to implement the South Lake Tahoe Greenway – Upper Truckee Bridge at Johnson Meadows Project. The 1.2 mile- long Class I shared-use path begins at the south terminus of Winnemucca Avenue near Barton Memorial Hospital. It then extends east on public lands owned by the Tahoe Resource Conservation District (known as Johnson Meadow), crosses the Upper Truckee River, and then follows user trails to the intersection of Sierra Boulevard and Barbara Avenue. The Project area encompasses City of South Lake Tahoe and El Dorado County ROW and public parcels owned by City of South Lake Tahoe, South Tahoe Public Utility District, California Tahoe Conservancy, and the USDA Forest Service. The shared-use path will provide connections to existing and future Class I facilities in the area. For example, on the west end, there is a short Class I segment between South Avenue and Winnemucca Avenue. The Project also builds upon the Sierra Boulevard Complete Streets Project (completed in 2019) and the South Tahoe Greenway Shared Use Trail Phase 2 (completed in 2021) at the corner of Sierra Boulevard and Barbara Avenue.

Following Section 106 PA Stipulation VIII.A, the APE for the Project was established in consultation with William Larson, Caltrans PQS: PI-Prehistoric Archaeology, and Jacky Vang, Environmental Branch Chief, on July 7, 2023 (**Figure 2**). The APE was established to include all potential impact areas and includes the full extent of the horizontal and vertical limits from construction activities, and the use of temporary staging areas as determined through discussion with Caltrans, the County, and construction engineers. The APE contains ADI and an AII. The ADI includes a 30 meter corridor centered on the 1.2 mile pathway alignment, a small bump-out to include the area where the old bridge will be removed, and the two staging areas. Subsurface vertical elements will include excavation associated with construction of the surface path (1.5 feet), the setting of piles associated with the boardwalk section of path (up to 3530 feet), the installation of footings associated with the bridge (up to 10 feet), and the setting of signs (three feet).

The AII considers project elements that have a visual presence. The Project includes comparatively few vertical elements. They include the boardwalk, rails along the boardwalk, the bridge structure, and signage. The horizontal limits of the AII were defined to include the ADI, a segment of paved roadway extending southwest from the Project corridor to Staging Area 1, a segment of unpaved roadway extending northeast from the Project corridor, and the mapped limits of archaeological site P-09-006059 which is adjacent to the ADI.

The 62 acre APE was surveyed on August 28th through the 30th, 2023. Every reasonable effort was made to identify any cultural resources within the APE. This inventory resulted in the following:

- P-09-004529 is a two mile section of a Historic Road that has been improved with an excavated roadbed and subsequently graded and resurfaced. When recorded in 1994 it was identified as having experienced a “loss of historic integrity” due to improvements. The site was re-surveyed in 1999 and again found to be lacking in integrity. The historic road was not identifiable within the APE. NCE agree with prior integrity assessments. The site form was updated.
- P-09-004537 is a historic road dating to the early part of the 20th century or earlier. In the 1960s or 1970s the road alignment, including that portion in the APE was used for the construction of an effluent line, resulting in a significant loss of integrity. The site was recorded in 1994 and revisited in 1999. Only a short segment of the road running between Barton Dairy and Lakehouse Road was identified as

retaining integrity. That segment lies outside of the APE. The historic road was not identifiable within the APE. NCE agrees with prior integrity assessments. The site form was updated.

- P-09-006059 documents the remains of the Johnson Ranch Complex, a mid-20th century cattle grazing operation associated with the Johnson family. The Johnsons were a prominent family in Lake Valley in the early 20th century, but by the 1950s they had shifted their focus to a home ranch near Mottsville in the Carson Valley. The recorded features relate specifically to the Johnson family using this wetland area for summer grazing of cattle. It is unclear when exactly the complex of features was developed, but it was after 1940 and prior to 1969. The site was originally recorded in 2019 and NCE provided updates to several features and recorded two previously unrecorded components of the site. The site form was updated. No discrete features associated with this site are located within the APE, but the APE was included in the enclosed area of pasture. The site has a good level of integrity but lacks historic importance.
- NCE did not identify any previously unrecorded resources within the APE.

8.2 Other Considerations

Every reasonable effort was made to identify cultural resources within or adjacent to the APE. If buried cultural material is discovered during construction, all Project-related activities should cease within 100 feet of the discovery and El Dorado County Department of Transportation staff, and a qualified archaeologist should be contacted immediately. If the discovery is prehistoric, identified tribal representatives should also be contacted.

The Johnson Ranch Complex (P-09-006059) was previously noted to have had a residential component dating from “the 1850s to the 1930s on the eastern side of the property” (Stapleton 2019). Extensive historic resource by NCE identified that this as a somewhat misleading statement. The Johnson Meadows were part of a large land holding associated with the Sierra House some 1.5 miles to the southeast. The Johnson Ranch Complex located on the Johnson Meadows was constructed at some point after 1940 and prior to 1969 and has never had a residential component. Indeed, the Johnson Meadows is a wetland environment entirely unsuited to construction, as evidenced by the total lack of construction between the Lake Tahoe Airport and Lake Tahoe Boulevard. NCE recommends that the potential for buried historic-era archaeological features in the APE is extremely low, and likely limited exclusively to postholes associated with the relatively recent and now incomplete fences cross the area and are not believed to be of historic—age.

Prehistoric burials might be found in the APE (none were apparent based on an examination of the ground surface). In the event human remains are discovered, all work shall cease immediately, and all measures shall be made to secure and protect areas in which human remains and funeral objects are discovered. No photographs of human remains, or funeral objects will be permitted by construction workers and/or contract or subcontractors on the job site. In the event human remains are discovered, the County Coroner and local law enforcement shall be notified within 24 hours of the discovery to conduct proper evaluation and treatment of remains. The coroner and law enforcement agency with jurisdiction will evaluate the finding to determine whether it is a crime scene or a burial. If human remains are determined to be associated with an archaeological site (burial), SHPO will be notified. The El Dorado County Department of Transportation will work with SHPO to determine measures to take. That office will contact the appropriate tribal representatives and consult on the disposition of the remains and any associated artifacts.

NCE prepared this report for use by the El Dorado County Department of Transportation as the intended beneficiary of this work. Interpretations, conclusions, and recommendations contained within the report are based in part on the information presented in other reports that are cited in the text and listed in the references. This report is subject to limitations and qualifications inherent in the referenced documents.

8.3 Caltrans Disclaimer

It is Caltrans' policy to avoid cultural resources whenever possible. Further investigations may be needed if the site(s) cannot be avoided by the project. If buried cultural materials are encountered during construction, it is Caltrans' policy that work stop in that area until a qualified archaeologist can evaluate the nature and significance of the find. An additional survey will be required if the project changes to include areas not previously surveyed.

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Distribution and Quality Control

Archaeological Survey Report

South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow

South Lake Tahoe, California

June 2024

Copy 1: To Charles Zeier

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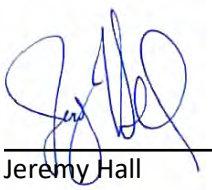
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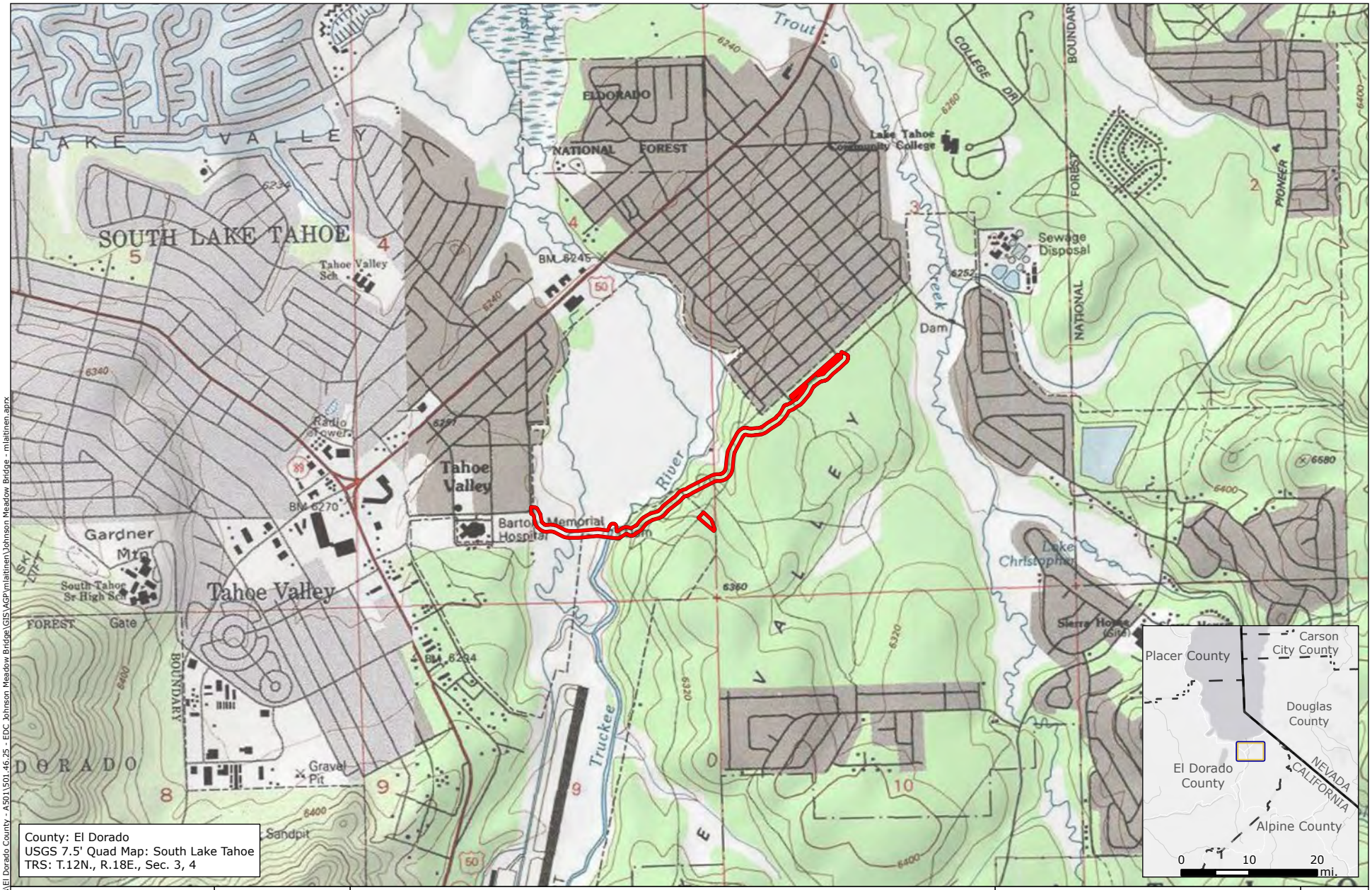


Jeremy Hall
Cultural Resources Manager

NCE Project No. 501.46.25

Appendix A

Report Figures
(sensitive info redacted)



County: El Dorado
USGS 7.5' Quad Map: South Lake Tahoe
TRS: T.12N., R.18E., Sec. 3, 4

Legend

Project Area

NCE

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow

Project Area Location Map

N

1 : 24,000

0 1,000 2,000 ft.

FIGURE 1

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
ESRI USGS Topo Maps	501.46.25	mlaitinen	5/25/2023	-	jhall

Document Path: P:\Active Projects\El Dorado County - A501\501.46.25 - EDC Johnson Meadow Bridge\GIS\AGP\mlaitinen\Johnson Meadow Bridge - mlaitinen.aprx



William E Larson 6/30/23
Caltrans Professionally Qualified Staff Date

7/2/23
Caltrans District Local Assistance Engineer Date

07/07/23
County of El Dorado Engineer Date

Area of Potential Effect
- Area of Direct Impact
- Area of Indirect Impact
- Parcel Boundary
- Resource Boundary
- Linear Resource

Proposed Improvements
- Class 1 Shared Used Path
- Boardwalk
- New Bridge
- Bridge Removal
- Staging Area

South Tahoe Greenway Upper Truckee Bridge at Johnson Meadow
El Dorado County, California
STPL 5925(183)
Area of Potential Effect Map

N

1 in. = 600 ft.

0 600 ft.

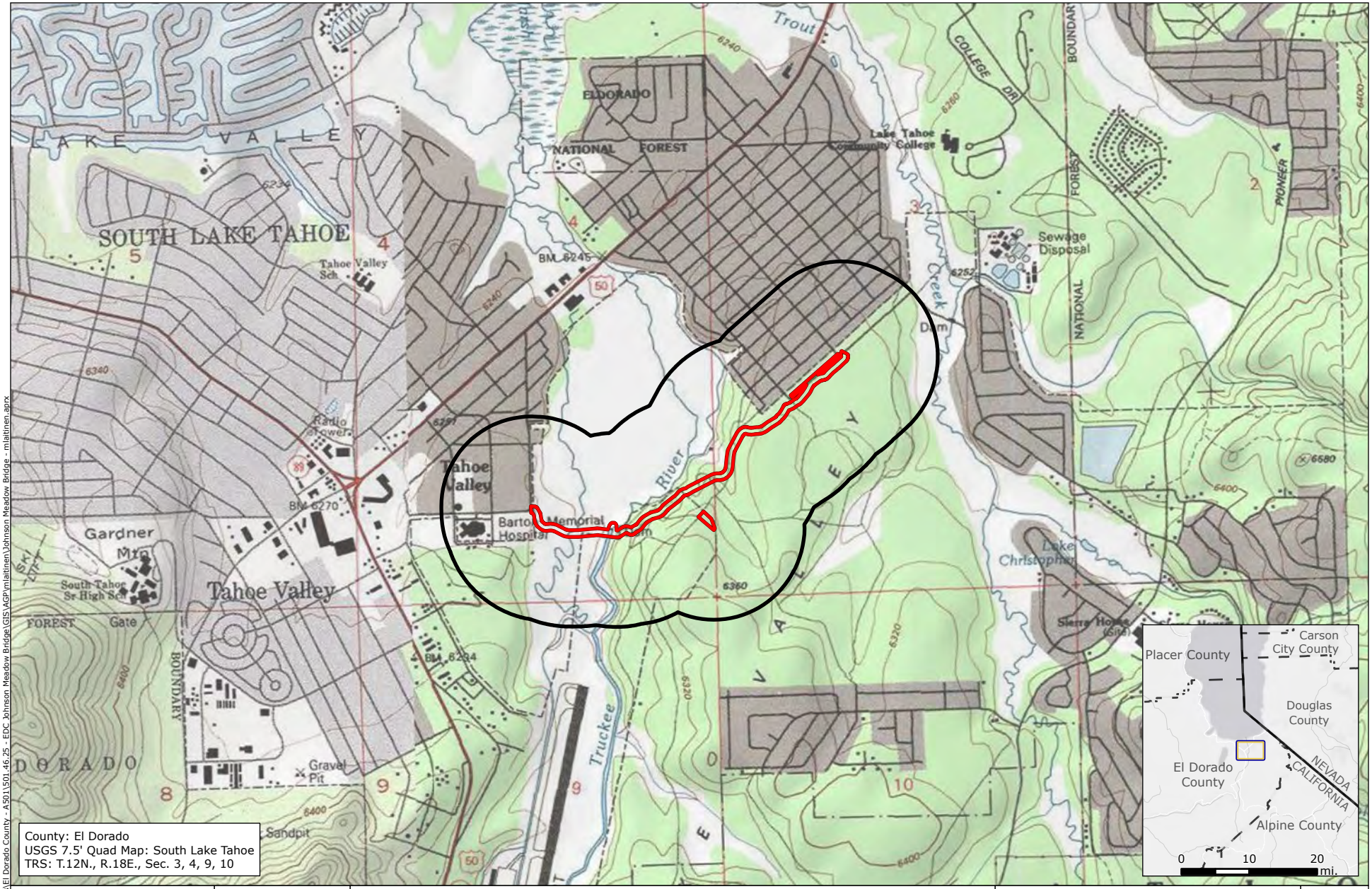
FIGURE 2

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Basemap	501.46.25	dkarlowicz/mlaitinen	5/16/2023	6/5/2023	jhall

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Appendix B

Records Search Results
(sensitive info redacted)



Legend

- Project Area
- Records Search (0.25 mile buffer)

NCE

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow

Project Area Location Map

N

1 : 24,000

0 1,000 2,000 ft.

FIGURE 1

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
ESRI USGS Topo Maps	501.46.25	mlaitinen	5/25/2023	-	jhall

Document Path: P:\Active Projects\El Dorado County - A501\501.46.25 - EDC Johnson Meadow Bridge\GIS\AGP\mlaitinen\Johnson Meadow Bridge - mlaitinen.aprx

California Historical Resources Information System

NORTH CENTRAL INFORMATION CENTER

AMADOR
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PLACER
SACRAMENTO
YUBA

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5/26/2023 NCIC File No.: ELD-23-53

Molly Laitinen
NCE
501 Canal Blvd. Suite I
Richmond, CA 94804

Re: Upper Truckee Bridge at Johnson Meadow

The North Central Information Center (NCIC) received your records search request for the project area referenced above, located on the South Lake Tahoe USGS 7.5' quad. The following reflects the results of the records search for the project area and a ¼-mi radius.

As indicated on the data request form, the locations of resources and reports are provided in the following format: ☒ custom GIS maps ☒ GIS data

Recorded resources within project area:	P-09-4529 P-09-4537 P-09-6059
Recorded resources outside project area, within radius:	P-09-3460 P-09-4523 P-09-4535 P-09-5751 P-09-6148
Known reports within project area:	7042 9219 9388 12181 12972
Known reports outside project area, within radius:	See list below

Resource Database Printout (list): ☒ enclosed ☐ not requested ☐ nothing listed/NA

Resource Database Printout (details): ☒ enclosed ☐ not requested ☐ nothing listed/NA

Resource Digital Database Records: ☒ enclosed ☐ not requested ☐ nothing listed/NA

Report Database Printout (list): ☒ enclosed ☐ not requested ☐ nothing listed/NA

Report Database Printout (details): ☒ enclosed ☐ not requested ☐ nothing listed/NA

Report Digital Database Records: ☒ enclosed ☐ not requested ☐ nothing listed/NA

Resource Record Copies: ☒ enclosed ☐ not requested ☐ nothing listed/NA

Report Copies: ☐ enclosed ☒ not requested ☐ nothing listed/NA

Built Environment Resources Directory: ☐ enclosed ☐ not requested ☒ nothing listed/NA

Archaeological Resources Directory: ☐ enclosed ☐ not requested ☒ nothing listed/NA

CA Inventory of Historic Resources (1976): ☐ enclosed ☐ not requested ☒ nothing listed/NA

Caltrans Bridge Survey:	☐ enclosed	☒ not requested	☐ nothing listed/NA
Ethnographic Information:	☐ enclosed	☒ not requested	☐ nothing listed/NA
Historical Literature:	☐ enclosed	☒ not requested	☐ nothing listed/NA
Historical Maps:	☐ enclosed	☒ not requested	☐ nothing listed/NA
Local Inventories:	☐ enclosed	☒ not requested	☐ nothing listed/NA
GLO and/or Rancho Plat Maps:	☐ enclosed	☒ not requested	☐ nothing listed/NA
Shipwreck Inventory:	☐ enclosed	☒ not requested	☐ nothing listed/NA
Soil Survey Maps:	☐ enclosed	☒ not requested	☐ nothing listed/NA

Please forward a copy of any resulting reports and resource records from this project to NCIC as soon as possible. The lead agency/authority and cultural resources consultant should coordinate sending documentation to NCIC. Digital materials are preferred and can be sent to our office via our file transfer system. Please contact NCIC for instructions. Due to the sensitive nature of archaeological site location data, we ask that you do not include resource location maps and resource location descriptions in your report if the report is for public distribution. If you have any questions regarding the results presented herein, please contact the office at the phone number listed above.

The provision of CHRIS Data via this records search response does not in any way constitute public disclosure of records otherwise exempt from disclosure under the California Public Records Act or any other law, including, but not limited to, records related to archeological site information maintained by or on behalf of, or in the possession of, the State of California, Department of Parks and Recreation, State Historic Preservation Officer, Office of Historic Preservation, or the State Historical Resources Commission.

Due to processing delays and other factors, it is possible that not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the California Historical Resources Information System (CHRIS) Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

Should you require any additional information for the above referenced project, reference the records search number listed above when making inquiries. Requests made after initial invoicing will result in the preparation of a separate invoice.

Sincerely,

Paul Rendes, Coordinator
North Central Information Center

Known reports outside project area, within radius:

000027
002213
002865
007055
007088
010733
010954
011878
012188
012554
012625
012753
013276

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
000027		1975	Donald Storm and Gloria Caddell	Archeological Investigations within the City of South Lake Tahoe		09-000254, 09-000255, 09-000256
002213		1995	Napton, L. Kyle	Cultural Resource Investigations of the Proposed Emerald Bay Apartments Project Site, South Lake Tahoe, El Dorado County, California.		
002865		1995	Bartholomew, Harland	Martin Ave. Culvert Replacement Project: Historic and Archaeological Survey Report-Negative findings	Harland Bartholomew & Associates, Inc.	
007042		1984	Peters, Mary and Peak, Melinda	Cultural Resource Assessment of the South Lake Tahoe Airport Expansion Project, El Dorado County, CA		09-003438
007055		2004	Lindström, Susan	Heritage Resource Inventory Sierra Tract Project Erosion Control Project	Consulting Archaeologist	09-000114, 09-003445, 09-003446, 09-003447, 09-003448, 09-003449, 09-003450
007088		1993	Lindström, Susan	A Cultural Resource Inventory of Golden Bear Park (303 Acres) South Lake Tahoe, El Dorado County, California U.S. Forest Service CRR #05-19-218		09-003457, 09-003458, 09-003459, 09-003460
009219		2007	Judith Marvin and Linda Thorpe	Upper Truckee River Middle Reach Preliminary Restoration Alternative, South Lake Tahoe, El Dorado County, California	Foothill Resources, Ltd.	09-004330, 09-004331, 09-004332
009388		1994	Susan Lindstrom	Heritage Resource Inventory South Tahoe Public Utilities District A-Line Export Pipeline Relocation Project	Consulting Archaeologist	09-004523, 09-004524, 09-004525, 09-004526, 09-004527, 09-004528, 09-004529, 09-004530, 09-004531, 09-004532, 09-004533, 09-004534, 09-004535, 09-004536, 09-004537, 09-004538
010733		2010	Banchio, Danielle	An Archaeological Survey Report for the City of South Lake Tahoe "Lake Christopher" Hazardous Fuels Reduction Project El Dorado County, California	North Valley Resource Management	09-000809, 09-001917, 09-001929, 09-003450, 09-003457, 09-004505, 09-004560
010954		2011	Danielle E. Branchio	An Archaeological Survey Report for the City of South Lake Tahoe "Lake Christopher II" Hazardous Fuels Reduction Project El Dorado County, California	North Valley Resource Management	
011878		2015	Susan Lindstrom	South Tahoe Public Utility District Fire Hydrant Service Expansion Project Cultural Resource Inventory		

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
012181		2015	Steven Harcourt	An Archaeological Survey Report for the Airport Hazardous Fuels Reduction Project, El Dorado County, California.	Consulting Forester, South Lake Tahoe	09-005814, 09-005815, 09-005816
012181B		2015	Steven Harcourt	An Archaeological Survey Report for the Airport Hazardous Fuels Reduction Project (Airport East)	Consulting Forester	
012188		2016	Susan Lindstrom	South Tahoe Public Utility District Water Meter Installations Project Cultural Resource Inventory	Consulting Archaeologist, Truckee, CA	
012554		2017	Susan Lindstrom	South Lake Tahoe Public Utility District Fire Hydrant Service Expansion Project Cultural Resource Inventory Addendum 2		
012625		2018	Susan Lindstrom	South Tahoe Public Utility 2018 Improvements Project, Sierra Boulevard Water Line Cultural Resource Inventory	Consulting Archaeologist	
012753		2018	Susan Lindstrom	South Tahoe Public Utlity District Tahoe Keys and Upper Truckee Pump Station Rehabilitation Project Cultural Resource Inventory	Consulting Archaeologist	
012972		2019	Tim Spillane	Cultural Resources Inventory and Effects Assessment for Phase I of the Johnson Meadow Restoration Project, South Lake Tahoe, El Dorado County, California	Natural Investigations Company	09-006059
013276		2020	Judith Marvin	South Lake Tahoe Public Utility District, Tahoe Keys and Upper Truckee Pump Station Rehablitation Project, Architectural Resources Survey and Evaluation	Foothill Resources, Ltd.	09-006147, 09-006148

Report Detail: 000027

Identifiers

Report No.: 000027
Other IDs:
Cross-refs:

Citation information

Author(s): Donald Storm and Gloria Caddell
Year: 1975 (May)
Title: Archeological Investigations within the City of South Lake Tahoe
Affliliation:
No. pages: 32
No. maps:
Attributes: Archaeological, Field study
Inventory size: Linear
Disclosure: Not for publication
Collections: Unknown

General notes

Associated resources

Primary No.	*Trinomial*	*Name*
P-09-000254	CA-ELD-000166H	Miller House Way Station
P-09-000255	CA-ELD-000167	SLTAS site no. 2
P-09-000256	CA-ELD-000168	

No. resources: 3
Has informals: No

Location information

County(ies): El Dorado
USGS quad(s): EMERALD BAY, SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E Sec. 1, 5 MDBM
T13N R18E Sec. 33, 35 MDBM

Database record metadata

	Date	*User*
Entered:	7/27/2000	Erin Snyder
Last modified:	6/27/2019	paulrendes

IC actions:	*Date*	*User*	*Action taken*
	11/8/2006	jay	Added records from old Library database
	1/12/2011	Monica	GIS
	8/7/2017	wagner	Verified
	6/27/2019	paulrendes	added additional database info

Record status: Verified

Report Detail: 002213

Identifiers

Report No.: 002213
Other IDs:
Cross-refs:

Citation information

Author(s): Napton, L. Kyle
Year: 1995
Title: Cultural Resource Investigations of the Proposed Emerald Bay Apartments Project Site, South Lake Tahoe, El Dorado County, California.
Affliliation:
No. pages:
No. maps:
Attributes: Archaeological, Field study
Inventory size: Approx. 4 acres
Disclosure:
Collections:

General notes

Associated resources

No. resources: 0
Has informals:

Location information

County(ies): El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS:

Database record metadata

	Date	*User*
Entered:	12/14/1999	Mike Thornton
Last modified:	11/28/2017	wagner

IC actions:	*Date*	*User*	*Action taken*
	11/8/2006	jay	Added records from old Library database
	3/14/2011	Monica	GIS
	11/28/2017	wagner	Verified

Record status: Verified

Report Detail: 002865

Identifiers

Report No.: 002865
Other IDs:
Cross-refs:

Citation information

Author(s): Bartholomew, Harland
Year: 1995 (Aug)
Title: Martin Ave. Culvert Replacement Project: Historic and Archaeological Survey Report- Negative findings
Affliliation: Harland Bartholomew & Associates, Inc.
No. pages: 24
No. maps:
Attributes: Archaeological, Architectural/historical, Field study
Inventory size: 2.5 acres
Disclosure: Not for publication
Collections: No

General notes

Associated resources

No. resources: 0
Has informals: No

Location information

County(ies): El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS:

Database record metadata

	Date	*User*
Entered:	8/22/2001	Kris Berry
Last modified:	6/27/2019	paulrendes

IC actions:	*Date*	*User*	*Action taken*
	11/8/2006	jay	Added records from old Library database
	3/14/2011	Monica	GIS
	12/13/2017	wagner	Verified
	6/27/2019	paulrendes	added additional database info

Record status: Verified

Report Detail: 007042

Identifiers

Report No.: 007042
Other IDs:
Cross-refs:

Citation information

Author(s): Peters, Mary and Peak, Melinda
Year: 1984 (Oct)
Title: Cultural Resource Assessment of the South Lake Tahoe Airport Expansion Project, El Dorado County, CA
Affliliation:
No. pages: 16
No. maps:
Attributes: Archaeological, Field study
Inventory size: ~200 acres
Disclosure:
Collections:

General notes

Associated resources

Primary No.	*Trinomial*	*Name*
P-09-003438		

No. resources: 1
Has informals:

Location information

County(ies): El Dorado
USGS quad(s): EMERALD BAY, SOUTH LAKE TAHOE
Address:
PLSS:

Database record metadata

	Date	*User*
Entered:	6/1/2006	Connor Welles
Last modified:	4/11/2018	nicoleallison

IC actions:	*Date*	*User*	*Action taken*
	11/8/2006	jay	Added records from old Library database
	1/19/2011	Monica	GIS
	4/11/2018	nicoleallison	Verified GIS

Record status: Verified

Report Detail: 007055

Identifiers

Report No.: 007055
Other IDs:
Cross-refs:

Citation information

Author(s): Lindström, Susan
Year: 2004 (Nov)
Title: Heritage Resource Inventory Sierra Tract Project Erosion Control Project
Affliliation: Consulting Archaeologist
No. pages: 54
No. maps:
Attributes: Archaeological, Field study
Inventory size: 400 acres
Disclosure: Not for publication
Collections: No

General notes

Associated resources

Primary No.	*Trinomial*	*Name*
P-09-000114	CA-ELD-000026/H	Imgiw O' tha
P-09-003445	CA-ELD-002223	Old Lake House Road
P-09-003446	CA-ELD-002224	
P-09-003447	CA-ELD-002225	
P-09-003448		
P-09-003449		
P-09-003450		

No. resources: 7
Has informals: No

Location information

County(ies): El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E Sec. 3, 4 MDBM

Database record metadata

	Date	*User*
Entered:	6/1/2006	Shawn Scarbor
Last modified:	10/24/2019	paulrendes

IC actions:	*Date*	*User*	*Action taken*
	11/8/2006	jay	Added records from old Library database
	3/16/2011	Monica	GIS
	4/11/2018	nicoleallison	Verified GIS
	10/24/2019	paulrendes	added additional database info

Record status: Verified

Report Detail: 007088

Identifiers

Report No.: 007088
Other IDs:
Cross-refs:

Citation information

Author(s): Lindström, Susan
Year: 1993 (Nov)
Title: A Cultural Resource Inventory of Golden Bear Park (303 Acres) South Lake Tahoe, El Dorado County, California U.S. Forest Service CRR #05-19-218
Affliliation:
No. pages: 59
No. maps:
Attributes: Archaeological, Field study
Inventory size: 303 Acres
Disclosure: Not for publication
Collections: No

General notes

Associated resources

Primary No.	*Trinomial*	*Name*
P-09-003457	CA-ELD-002231H	Spring Site
P-09-003458	CA-ELD-002232H	Lone Site
P-09-003459	CA-ELD-002233	Homestead
P-09-003460	CA-ELD-002234	

No. resources: 4
Has informals: No

Location information

County(ies): El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E Sec. 3, 10 MDBM

Database record metadata

	Date	*User*
Entered:	6/8/2006	Hibma
Last modified:	6/27/2019	paulrendes

IC actions:	*Date*	*User*	*Action taken*
	11/8/2006	jay	Added records from old Library database
	3/16/2011	Monica	GIS
	4/16/2018	nicoleallison	Scanned; Verified GIS
	6/27/2019	paulrendes	added additional database info

Record status: Verified

Report Detail: 009219

Identifiers

Report No.: 009219
Other IDs:
Cross-refs:

Citation information

Author(s): Judith Marvin and Linda Thorpe
Year: 2007 (Oct)
Title: Upper Truckee River Middle Reach Preliminary Restoration Alternative, South Lake Tahoe, El Dorado County, California
Affliliation: Foothill Resources, Ltd.
No. pages: 12
No. maps:
Attributes: Literature search
Inventory size:
Disclosure: Not for publication
Collections: No

General notes

Associated resources

Primary No.	*Trinomial*	*Name*
P-09-004330	CA-ELD-002753H	
P-09-004331	CA-ELD-002754H	
P-09-004332	CA-ELD-002755H	

No. resources: 3
Has informals: No

Location information

County(ies): El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E Sec. 3, 4, 9, 16 MDBM

Database record metadata

	Date	*User*
Entered:	2/13/2008	wilson
Last modified:	5/17/2023	paulrendes

IC actions:	*Date*	*User*	*Action taken*
	6/14/2018	paulrendes	verified gis

Record status: Verified

Report Detail: 009388

Identifiers

Report No.: 009388
Other IDs:
Cross-refs:

Citation information

Author(s): Susan Lindstrom
Year: 1994 (Sep)
Title: Heritage Resource Inventory South Tahoe Public Utilities District A-Line Export Pipeline Relocation Project
Affliliation: Consulting Archaeologist
No. pages: 57
No. maps:
Attributes: Archaeological, Field study
Inventory size: 6.5 miles
Disclosure: Not for publication
Collections: Unknown

General notes

Associated resources

Primary No.	*Trinomial*	*Name*
P-09-004523		
P-09-004524	CA-ELD-002778	
P-09-004525	CA-ELD-002779	
P-09-004526	CA-ELD-002780/H	
P-09-004527	CA-ELD-002781	
P-09-004528	CA-ELD-002782	
P-09-004529		Lakehouse Rd.
P-09-004530	CA-ELD-002783/H	W.D. Barton Dairy/Ranch
P-09-004531	CA-ELD-002784	Sunset Ranch
P-09-004532	CA-ELD-002785	
P-09-004533	CA-ELD-002786H	Pine Marten Trap
P-09-004534	CA-ELD-002787H	Pine Marten Trap
P-09-004535	CA-ELD-002788H	
P-09-004536	CA-ELD-002789H	Pine Marten Trap
P-09-004537		Historic Road
P-09-004538		Pine Carving

No. resources: 16
Has informals: No

Location information

County(ies): El Dorado
USGS quad(s): ECHO LAKE, EMERALD BAY, FREEL PEAK, SOUTH LAKE TAHOE
Address:
PLSS:

Database record metadata

	Date	*User*
Entered:	6/26/2008	melodi
Last modified:	6/7/2018	paulrendes

IC actions:	*Date*	*User*	*Action taken*
	1/17/2018	wagner	Verified
	6/7/2018	paulrendes	added additional database info

Record status: Verified

Report Detail: 010733

Identifiers

Report No.: 010733
Other IDs:
Cross-refs:

Citation information

Author(s): Banchio, Danielle
Year: 2010 (Nov)
Title: An Archaeological Survey Report for the City of South Lake Tahoe "Lake Christopher" Hazardous Fuels Reduction Project El Dorado County, California
Affliliation: North Valley Resource Management
No. pages: 30
No. maps:
Attributes: CF MOU
Inventory size: 34.0 acres
Disclosure: Not for publication
Collections: Unknown

General notes

Associated resources

Primary No.	*Trinomial*	*Name*
P-09-000809	CA-ELD-000721H	Lincoln Highway
P-09-001917	CA-ELD-001379H	Lake Valley Railroad
P-09-001929		Splash Board Dam
P-09-003450		
P-09-003457	CA-ELD-002231H	Spring Site
P-09-004505	CA-ELD-002772	
P-09-004560		

No. resources: 7
Has informals: No

Location information

County(ies): El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E Sec. 3, 10 MDBM

Database record metadata

	Date	*User*
Entered:	3/9/2011	Ellen
Last modified:	6/27/2019	paulrendes

IC actions:	*Date*	*User*	*Action taken*
	3/9/2011	Ellen	scanned
	3/9/2011	Ellen	GIS/map
	3/14/2018	nicoleallison	Verified GIS
	6/27/2019	paulrendes	added additional database info

Record status: Verified

Report Detail: 010954

Identifiers

Report No.: 010954
Other IDs:
Cross-refs:

Citation information

Author(s): Danielle E. Branchio
Year: 2011 (Mar)
Title: An Archaeological Survey Report for the City of South Lake Tahoe "Lake Christopher II" Hazardous Fuels Reduction Project El Dorado County, California
Affliliation: North Valley Resource Management
No. pages: 33
No. maps:
Attributes: CF MOU
Inventory size: 14 acres
Disclosure: Not for publication
Collections: Unknown

General notes

Associated resources

No. resources: 0
Has informals: No

Location information

County(ies): El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS:

Database record metadata

	Date	*User*
Entered:	2/27/2012	kate
Last modified:	5/16/2018	paulrendes

IC actions:	*Date*	*User*	*Action taken*
	2/28/2012	kate	GIS
	3/21/2018	nicoleallison	Verified GIS
	5/16/2018	paulrendes	added additional database info

Record status: Verified

Report Detail: 011878

Identifiers

Report No.: 011878
Other IDs:
Cross-refs: See also 012186

Citation information

Author(s): Susan Lindstrom
Year: 2015 (Aug)
Title: South Tahoe Public Utility District Fire Hydrant Service Expansion Project Cultural Resource Inventory
Affliliation:
No. pages: 51
No. maps:
Attributes: Archaeological, Field study
Inventory size:
Disclosure: Not for publication
Collections: No

General notes

Associated resources

No. resources: 0
Has informals: No

Location information

County(ies): El Dorado
USGS quad(s): ECHO LAKE, EMERALD BAY, SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E Sec. 1-5, 9-11, 29-32 MDBM
T13N R18E Sec. 27, 33-34 MDBM

Database record metadata

	Date	*User*
Entered:	10/29/2015	sydneyhinton
Last modified:	5/16/2018	paulrendes

IC actions:	*Date*	*User*	*Action taken*
	3/13/2017	paulrendes	gis. Incorporated report 12186 with 11878

Record status: Verified

Report Detail: 012181

Identifiers

Report No.: 012181
Other IDs:
Cross-refs: See also 012182
See also 012198

Citation information

Author(s): Steven Harcourt
Year: 2015 (Jun)
Title: An Archaeological Survey Report for the Airport Hazardous Fuels Reduction Project, El Dorado County, California.
Affliliation: Consulting Forester, South Lake Tahoe
No. pages: 14
No. maps:
Attributes: CF MOU
Inventory size:
Disclosure: Not for publication
Collections: No

Sub-desig.: B
Author(s): Steven Harcourt
Year: 2015 (Jul)
Title: An Archaeological Survey Report for the Airport Hazardous Fuels Reduction Project (Airport East)
Affiliation: Consulting Forester
Report type(s): CF MOU
Inventory size:
No. pages:
Disclosure: Not for publication
Collections: No
PDF Pages: -

General notes

Report also contains a July 2015 addition

Associated resources

Primary No.	*Trinomial*	*Name*
P-09-005814	CA-ELD-003060H	Camp Tawonga/Skylake Camp
P-09-005815		Airport Can Dump
P-09-005816	CA-ELD-003061H	Split Cedar Fence Linear Featur

No. resources: 3
Has informals: No

Location information

County(ies): El Dorado
USGS quad(s): EMERALD BAY, SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E Sec. 4, 9, 16 MDBM

Database record metadata

	Date	*User*
Entered:	9/22/2016	paulrendes
Last modified:	5/17/2023	paulrendes

IC actions:	*Date*	*User*	*Action taken*
	9/22/2016	paulrendes	scanned and GIS
	3/7/2017	paulrendes	Incorporated report 12182 with 12181
	5/17/2023	paulrendes	added additional database info

Record status: Verified

Report Detail: 012188

Identifiers

Report No.: 012188
Other IDs:
Cross-refs:

Citation information

Author(s): Susan Lindstrom
Year: 2016 (Jun)
Title: South Tahoe Public Utility District Water Meter Installations Project Cultural Resource Inventory
Affliliation: Consulting Archaeologist, Truckee, CA
No. pages: 100
No. maps: 1
Attributes: Archaeological, Field study
Inventory size:
Disclosure: Not for publication
Collections: No

General notes

Associated resources

No. resources: 0
Has informals: No

Location information

County(ies): El Dorado
USGS quad(s): ECHO LAKE, EMERALD BAY, SOUTH LAKE TAHOE
Address:
PLSS: T11N R18E Sec. 5, 6, 8, 17 MDBM
T12N R18E Sec. 1, 2, 3, 4, 5, 9, 10, 11, 15, 16, 19, 20, 21, 28, 30, 31, 32 MDB
T13N R18E Sec. 27, 32, 33, 34 MDBM

Database record metadata

	Date	*User*
Entered:	9/29/2016	paulrendes
Last modified:	3/12/2018	wilson2

IC actions:	*Date*	*User*	*Action taken*
	9/29/2016	paulrendes	scanned and GIS

Record status: Verified

Report Detail: 012554

Identifiers

Report No.: 012554
Other IDs:
Cross-refs:

Citation information

Author(s): Susan Lindstrom
Year: 2017 (Jun)
Title: South Lake Tahoe Public Utility District Fire Hydrant Service Expansion Project Cultural Resource Inventory Addendum 2
Affliliation:
No. pages:
No. maps:
Attributes: Archaeological, Field study
Inventory size:
Disclosure: Not for publication
Collections: No

General notes

Associated resources

No. resources: 0
Has informals: No

Location information

County(ies): El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E Sec. 3-4 MDBM

Database record metadata

	Date	*User*
Entered:	10/9/2018	skylarensbury
Last modified:	10/24/2019	paulrendes

IC actions:	*Date*	*User*	*Action taken*
	10/9/2018	skylarensbury	Plotted in GIS
	10/24/2019	paulrendes	verified gis

Record status: Verified

Report Detail: 012625

Identifiers

Report No.: 012625
Other IDs:
Cross-refs:

Citation information

Author(s): Susan Lindstrom
Year: 2018 (Feb)
Title: South Tahoe Public Utility 2018 Improvements Project, Sierra Boulevard Water Line Cultural Resource Inventory
Affliliation: Consulting Archaeologist
No. pages: 11
No. maps:
Attributes: Archaeological, Field study
Inventory size:
Disclosure: Not for publication
Collections: No

General notes

Associated resources

No. resources: 0
Has informals: No

Location information

County(ies): El Dorado
USGS quad(s): SOUTH LAKE TAHOE

Address:	*Address*	*City*	*Assessor's parcel no.*	*Zip code*
		South Lake Tahoe		

PLSS: T12N R18E Sec. 3 MDBM

Database record metadata

	Date	*User*
Entered:	12/5/2018	paulrendes
Last modified:	2/18/2019	paulrendes

IC actions:	*Date*	*User*	*Action taken*
	12/6/2018	paulrendes	plotted in gis
	2/18/2019	paulrendes	verified gis

Record status: Verified

Report Detail: 012753

Identifiers

Report No.: 012753
Other IDs:
Cross-refs:

Citation information

Author(s): Susan Lindstrom
Year: 2018 (Dec)
Title: South Tahoe Public Utlity District Tahoe Keys and Upper Truckee Pump Station Rehabilitation Project Cultural Resource Inventory
Affliliation: Consulting Archaeologist
No. pages:
No. maps:
Attributes: Archaeological, Field study
Inventory size:
Disclosure: Not for publication
Collections: No

General notes

Associated resources

No. resources: 0
Has informals: No

Location information

County(ies): El Dorado
USGS quad(s): EMERALD BAY, SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E Sec. 5 MDBM
T12N R18E Sec. 4 MDBM

Database record metadata

	Date	*User*
Entered:	3/12/2019	kristenutley
Last modified:	11/5/2019	paulrendes

IC actions:	*Date*	*User*	*Action taken*
	3/12/2019	kristenutley	Plotted in GIS
	11/5/2019	paulrendes	verified gis

Record status: Verified

Report Detail: 012972

Identifiers

Report No.: 012972
Other IDs:
Cross-refs:

Citation information

Author(s): Tim Spillane
Year: 2019 (Nov)
Title: Cultural Resources Inventory and Effects Assessment for Phase I of the Johnson Meadow Restoration Project, South Lake Tahoe, El Dorado County, California
Affliliation: Natural Investigations Company
No. pages: 47
No. maps:
Attributes: Archaeological, Architectural/Historical, Evaluation, Field study
Inventory size: 201 acres
Disclosure: Not for publication
Collections: No

General notes

Associated resources

	Primary No.	*Trinomial*	*Name*
	P-09-006059	CA-ELD-003140H	NIC-2019-Johnson-01

No. resources: 1
Has informals: No

Location information

County(ies): El Dorado
USGS quad(s): SOUTH LAKE TAHOE

Address:	*Address*	*City*	*Assessor's parcel no.*	*Zip code*
			031-020-23	
			031-020-46	
			031-020-49	
			031-020-50	
			032-090-09	

PLSS: T12N R18E Sec. 3, 4, 9 MDBM

Database record metadata

	Date	*User*
Entered:	3/5/2020	paulrendes
Last modified:	3/5/2020	paulrendes

IC actions:	*Date*	*User*	*Action taken*
	3/5/2020	paulrendes	plotted in gis

Record status:

Report Detail: 013276

Identifiers

Report No.: 013276
Other IDs:
Cross-refs:

Citation information

Author(s): Judith Marvin
Year: 2020 (Sep)
Title: South Lake Tahoe Public Utility District, Tahoe Keys and Upper Truckee Pump Station Rehablitation Project, Architectural Resources Survey and Evaluation
Affliliation: Foothill Resources, Ltd.
No. pages: 3
No. maps:
Attributes: Architectural/Historical, Evaluation, Field study
Inventory size:
Disclosure: Unrestricted
Collections: No

General notes

Associated resources

Primary No.	*Trinomial*	*Name*
P-09-006147		Tahoe Keys Pump Station
P-09-006148		Upper Truckee Pump Station

No. resources: 2
Has informals: No

Location information

County(ies): El Dorado
USGS quad(s): EMERALD BAY, SOUTH LAKE TAHOE
Address:
PLSS:

Database record metadata

	Date	*User*
Entered:	9/9/2021	paulrendes
Last modified:	9/9/2021	paulrendes

IC actions:	*Date*	*User*	*Action taken*
	9/9/2021	paulrendes	plotted in gis

Record status:

Resource List

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-09-003460	CA-ELD-002234	USFS - 05-19-592	Site	Historic	AP15	1992 (G. Berrien, R. Kraushaar, S.G. Lindstrom, Unknown)	007088
P-09-004523		Other - STPUD Ifs; Other - IF-1; Other - IF-2; Other - IF-3; Other - IF-4	Other	Historic	AH04	1994 (S. G. Lindstrom, State of California - The Resources Agency, Department of Parks and Recreation)	009388
P-09-004529		Resource Name - Lakehouse Rd.; Other - STPUD-6	Site	Historic	AH07	1994 (S. G. Lindstrom, State of California - The Resources Agency, Department of Parks and Recreation); 1999 (Mike Drews, Unknown)	009388
P-09-004535	CA-ELD-002788H	Other - STPUD-12	Site	Historic	AH04	1994 (S.G. Lindstrom, Consulting Archaeologist)	009388
P-09-004537		Resource Name - Historic Road; Other - STPUD-14	Site	Historic	AH07	1994 (S.G. Lindstrom, Unknown); 1999 (Mike Drews, DPR)	009388
P-09-005751		Resource Name - Historic Site of Excellence	Site	Historic	AH04	2015 (Jesse Krautkramer, Nicole Zaborksy)	
P-09-006059	CA-ELD-003140H	Resource Name - NIC-2019-Johnson-01; Other - Johnson Ranch Complex	Site	Historic	AH08; AH11; HP21; HP33	2019 (D. Stapleton, Natural Investigations Company, Inc.)	012972
P-09-006148		Resource Name - Upper Truckee Pump Station; Other - South Tahoe PUD Upper Truckee Pump Station	Building	Historic	HP09	2020 (Judith Marvin, Foothill Resources, Ltd.)	013276

Resource Detail: P-09-003460

Identifying information

Primary No.: P-09-003460
Trinomial: CA-ELD-002234
Name:
Other IDs:

Type	*Name*
USFS	05-19-592

Cross-refs:

Attributes

Resource type: Site
Age: Historic
Information base: Survey
Attribute codes: AP15 (Habitation debris)
Disclosure: Not for publication
Collections: Unknown
Accession no(s):
Facility:

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
11/2/1992	G. Berrien, R. Kraushaar, S.G. Lindstrom	Unknown	

Associated reports

Report No.	*Year*	*Title*	*Affiliation*
007088	1993	A Cultural Resource Inventory of Golden Bear Park (303 Acres) South Lake Tahoe, El Dorado County, California U.S. Forest Service CRR #05-19-218	

Location information

County: El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E SW¼ of SW¼ of Sec. 3 MDBM
UTMs: Zone 10 241360mE 4310740mN NAD27

Management status

Database record metadata

	Date	*User*	
Entered:	11/13/2006	jay	
Last modified:	4/26/2017	wagner	
IC actions:	*Date*	*User*	*Action taken*
	11/13/2006		Added additional primary numbers listed in old Library database
	9/30/2010	Machiel	Imported data from resource record and plotted in GIS
	4/26/2017	wagner	Verified

Record status: Verified

Resource Detail: P-09-004523

Identifying information

Primary No.: P-09-004523
Trinomial:
Name:
Other IDs:

Type	*Name*
Other	STPUD Ifs
Other	IF-1
Other	IF-2
Other	IF-3
Other	IF-4

Cross-refs:

Attributes

Resource type: Other
Age: Historic
Information base: Survey
Attribute codes: AH04 (Privies/dumps/trash scatters)
Disclosure: Not for publication
Collections: Unknown
Accession no(s):
Facility:

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
8/28/1994	S. G. Lindstrom	State of California - The Resources Agency, Department of Parks and Recreation	

Associated reports

Report No.	*Year*	*Title*	*Affiliation*
009388	1994	Heritage Resource Inventory South Tahoe Public Utilities District A-Line Export Pipeline Relocation Project	Consulting Archaeologist

Location information

County: El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E Sec. MDBM
UTMs:

Management status

Database record metadata

	Date	*User*	
Entered:	6/26/2008	melodi	
Last modified:	5/10/2017	wagner	
IC actions:	*Date*	*User*	*Action taken*
	6/26/2008	Machiel	Imported data from resource record
	5/10/2017	wagner	Verified

Record status: Verified

Resource Detail: P-09-004529

Identifying information

Primary No.: P-09-004529
Trinomial:
Name: Lakehouse Rd.
Other IDs:

Type	*Name*
Resource Name	Lakehouse Rd.
Other	STPUD-6

Cross-refs:

Attributes

Resource type: Site
Age: Historic
Information base: Survey
Attribute codes: AH07 (Roads/trails/railroad grades)
Disclosure: Not for publication
Collections: Unknown
Accession no(s):
Facility:

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
8/28/1994	S. G. Lindstrom	State of California - The Resources Agency, Department of Parks and Recreation	
12/5/1999	Mike Drews	Unknown	

Associated reports

Report No.	*Year*	*Title*	*Affiliation*
009388	1994	Heritage Resource Inventory South Tahoe Public Utilities District A-Line Export Pipeline Relocation Project	Consulting Archaeologist

Location information

County: El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E NE¼ of NE¼ of Sec. 16 MDBM
T12N R18E NW¼ of SW¼ of Sec. 3 MDBM
T12N R18E SE¼ of NE¼ of Sec. 9 MDBM
UTMs: Zone 10 241180mE 4308920mN NAD27 (S end)
Zone 10 241410mE 4311420mN NAD27 (N end)

Management status

Database record metadata

	Date	*User*	
Entered:	6/26/2008	melodi	
Last modified:	5/10/2017	wagner	
IC actions:	*Date*	*User*	*Action taken*
	6/27/2008	Machiel	Imported data from resource record
	5/10/2017	wagner	Verified

Record status: Verified

Resource Detail: P-09-004535

Identifying information

Primary No.: P-09-004535
Trinomial: CA-ELD-002788H
Name:
Other IDs:

Type	*Name*
Other	STPUD-12

Cross-refs:

Attributes

Resource type: Site
Age: Historic
Information base: Survey
Attribute codes: AH04 (Privies/dumps/trash scatters)
Disclosure: Not for publication
Collections: Unknown
Accession no(s):
Facility:

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
8/15/1994	S.G. Lindstrom	Consulting Archaeologist	

Associated reports

Report No.	*Year*	*Title*	*Affiliation*
009388	1994	Heritage Resource Inventory South Tahoe Public Utilities District A-Line Export Pipeline Relocation Project	Consulting Archaeologist

Location information

County: El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E NW¼ of NE¼ of Sec. 9 MDBM
UTMs: Zone 10 240820mE 4310560mN NAD27

Management status

Database record metadata

	Date	*User*	
Entered:	6/26/2008	melodi	
Last modified:	5/10/2017	wagner	
IC actions:	*Date*	*User*	*Action taken*
	6/27/2008	Machiel	Imported data from resource record
	5/10/2017	wagner	Verified

Record status: Verified

Resource Detail: P-09-004537

Identifying information

Primary No.: P-09-004537
Trinomial:
Name: Historic Road
Other IDs:

Type	*Name*
Resource Name	Historic Road
Other	STPUD-14

Cross-refs:

Attributes

Resource type: Site
Age: Historic
Information base: Survey
Attribute codes: AH07 (Roads/trails/railroad grades)
Disclosure: Not for publication
Collections: Unknown
Accession no(s):
Facility:

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
8/14/1994	S.G. Lindstrom	Unknown	
12/5/1999	Mike Drews	DPR	Update

Associated reports

Report No.	*Year*	*Title*	*Affiliation*
009388	1994	Heritage Resource Inventory South Tahoe Public Utilities District A-Line Export Pipeline Relocation Project	Consulting Archaeologist

Location information

County: El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E SW¼ of SW¼ of Sec. 3 MDBM
T12N R18E NW¼ of NE¼ of Sec. 9 MDBM
UTMs: Zone 10 241330mE 4322220mN NAD27 (N end)
Zone 10 240810mE 4310340mN NAD27 (S end)

Management status

Database record metadata

	Date	*User*	
Entered:	6/26/2008	melodi	
Last modified:	5/10/2017	wagner	
IC actions:	*Date*	*User*	*Action taken*
	6/27/2008	Machiel	Imported data from resource record
	5/10/2017	wagner	Verified

Record status: Verified

Resource Detail: P-09-005751

Identifying information

Primary No.: P-09-005751
Trinomial:
Name: Historic Site of Excellence
Other IDs:

Type	*Name*
Resource Name	Historic Site of Excellence

Cross-refs:

Attributes

Resource type: Site
Age: Historic
Information base: Survey
Attribute codes: AH04 (Privies/dumps/trash scatters)
Disclosure: Not for publication
Collections: No
Accession no(s):
Facility:

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
9/28/2015	Jesse Krautkramer, Nicole Zaborksy		

Associated reports

Location information

County: El Dorado
USGS quad(s): EMERALD BAY, SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E SE¼ of SW¼ of Sec. 4 MDBM
UTMs: Zone 10 760549mE 4311244mN NAD83

Management status

Database record metadata

	Date	*User*	
Entered:	11/5/2015	amandaberkson-b	
Last modified:	6/5/2017	wagner	
IC actions:	*Date*	*User*	*Action taken*
	6/5/2017	wagner	Verified

Record status: Verified

Resource Detail: P-09-006059

Identifying information

Primary No.: P-09-006059
Trinomial: CA-ELD-003140H
Name: NIC-2019-Johnson-01
Other IDs:

Type	*Name*
Resource Name	NIC-2019-Johnson-01
Other	Johnson Ranch Complex

Cross-refs:

Attributes

Resource type: Site
Age: Historic
Information base: Survey
Attribute codes: AH08 (Dams); AH11 (Walls/fences); HP21 (Dam); HP33 (Farm/ranch)
Disclosure: Unrestricted
Collections: No
Accession no(s):
Facility:

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
10/21/2019	D. Stapleton	Natural Investigations Company, Inc.	

Associated reports

Report No.	*Year*	*Title*	*Affiliation*
012972	2019	Cultural Resources Inventory and Effects Assessment for Phase I of the Johnson Meadow Restoration Project, South Lake Tahoe, El Dorado County, California	Natural Investigations Company

Location information

County: El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:

Address	*City*	*Assessor's parcel no.*	*Zip code*
Johnson Meadow	South Lake Tahoe		96150

PLSS: T12N R18E S½ of S½ of Sec. 4 MDBM
UTMs: Zone 11 240444mE 4311683mN NAD83

Management status

Database record metadata

	Date	*User*	
Entered:	3/5/2020	paulrendes	
Last modified:	3/5/2020	paulrendes	
IC actions:	*Date*	*User*	*Action taken*
	3/5/2020	paulrendes	plotted in gis

Record status:

Resource Detail: P-09-006148

Identifying information

Primary No.: P-09-006148
Trinomial:
Name: Upper Truckee Pump Station
Other IDs:

Type	Name
Resource Name	Upper Truckee Pump Station
Other	South Tahoe PUD Upper Truckee Pump Station

Cross-refs:

Attributes

Resource type: Building
Age: Historic
Information base: Survey
Attribute codes: HP09 (Public utility building)
Disclosure: Unrestricted
Collections: No
Accession no(s):
Facility:

General notes

Recording events

Date	Recorder(s)	Affiliation	Notes
9/2/2020	Judith Marvin	Foothill Resources, Ltd.	

Associated reports

Report No.	Year	Title	Affiliation
013276	2020	South Lake Tahoe Public Utility District, Tahoe Keys and Upper Truckee Pump Station Rehablitation Project, Architectural Resources Survey and Evaluation	Foothill Resources, Ltd.

Location information

County: El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:

Address	City	Assessor's parcel no.	Zip code
east bank of Upper TruckeeRiver, north of Lake Tahoe Airport, southwest of Tahoe Sierra Subdivision	South Lake Tahoe		96150

PLSS: T12N R18E SE¼ of Sec. 4 MDBM
UTMs:

Management status

Database record metadata

	Date	User	
Entered:	9/9/2021	paulrendes	
Last modified:	9/9/2021	paulrendes	
IC actions:	*Date*	*User*	*Action taken*
	9/9/2021	paulrendes	plotted in gis

Record status:

Resource List

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-09-003460	CA-ELD-002234	USFS - 05-19-592	Site	Historic	AP15	1992 (G. Berrien, R. Kraushaar, S.G. Lindstrom, Unknown)	007088
P-09-004523		Other - STPUD Ifs; Other - IF-1; Other - IF-2; Other - IF-3; Other - IF-4	Other	Historic	AH04	1994 (S. G. Lindstrom, State of California - The Resources Agency, Department of Parks and Recreation)	009388
P-09-004529		Resource Name - Lakehouse Rd.; Other - STPUD-6	Site	Historic	AH07	1994 (S. G. Lindstrom, State of California - The Resources Agency, Department of Parks and Recreation); 1999 (Mike Drews, Unknown)	009388
P-09-004535	CA-ELD-002788H	Other - STPUD-12	Site	Historic	AH04	1994 (S.G. Lindstrom, Consulting Archaeologist)	009388
P-09-004537		Resource Name - Historic Road; Other - STPUD-14	Site	Historic	AH07	1994 (S.G. Lindstrom, Unknown); 1999 (Mike Drews, DPR)	009388
P-09-005751		Resource Name - Historic Site of Excellence	Site	Historic	AH04	2015 (Jesse Krautkramer, Nicole Zaborksy)	
P-09-006059	CA-ELD-003140H	Resource Name - NIC-2019-Johnson-01; Other - Johnson Ranch Complex	Site	Historic	AH08; AH11; HP21; HP33	2019 (D. Stapleton, Natural Investigations Company, Inc.)	012972
P-09-006148		Resource Name - Upper Truckee Pump Station; Other - South Tahoe PUD Upper Truckee Pump Station	Building	Historic	HP09	2020 (Judith Marvin, Foothill Resources, Ltd.)	013276

Resource Detail: P-09-003460

Identifying information

Primary No.: P-09-003460
Trinomial: CA-ELD-002234
Name:
Other IDs:

Type	*Name*
USFS	05-19-592

Cross-refs:

Attributes

Resource type: Site
Age: Historic
Information base: Survey
Attribute codes: AP15 (Habitation debris)
Disclosure: Not for publication
Collections: Unknown
Accession no(s):
Facility:

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
11/2/1992	G. Berrien, R. Kraushaar, S.G. Lindstrom	Unknown	

Associated reports

Report No.	*Year*	*Title*	*Affiliation*
007088	1993	A Cultural Resource Inventory of Golden Bear Park (303 Acres) South Lake Tahoe, El Dorado County, California U.S. Forest Service CRR #05-19-218	

Location information

County: El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E SW¼ of SW¼ of Sec. 3 MDBM
UTMs: Zone 10 241360mE 4310740mN NAD27

Management status

Database record metadata

	Date	*User*	
Entered:	11/13/2006	jay	
Last modified:	4/26/2017	wagner	
IC actions:	*Date*	*User*	*Action taken*
	11/13/2006		Added additional primary numbers listed in old Library database
	9/30/2010	Machiel	Imported data from resource record and plotted in GIS
	4/26/2017	wagner	Verified

Record status: Verified

Resource Detail: P-09-004523

Identifying information

Primary No.: P-09-004523
Trinomial:
Name:
Other IDs:

Type	*Name*
Other	STPUD Ifs
Other	IF-1
Other	IF-2
Other	IF-3
Other	IF-4

Cross-refs:

Attributes

Resource type: Other
Age: Historic
Information base: Survey
Attribute codes: AH04 (Privies/dumps/trash scatters)
Disclosure: Not for publication
Collections: Unknown
Accession no(s):
Facility:

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
8/28/1994	S. G. Lindstrom	State of California - The Resources Agency, Department of Parks and Recreation	

Associated reports

Report No.	*Year*	*Title*	*Affiliation*
009388	1994	Heritage Resource Inventory South Tahoe Public Utilities District A-Line Export Pipeline Relocation Project	Consulting Archaeologist

Location information

County: El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E Sec. MDBM
UTMs:

Management status

Database record metadata

	Date	*User*	
Entered:	6/26/2008	melodi	
Last modified:	5/10/2017	wagner	
IC actions:	*Date*	*User*	*Action taken*
	6/26/2008	Machiel	Imported data from resource record
	5/10/2017	wagner	Verified

Record status: Verified

Resource Detail: P-09-004529

Identifying information

Primary No.: P-09-004529
Trinomial:
Name: Lakehouse Rd.
Other IDs:

Type	*Name*
Resource Name	Lakehouse Rd.
Other	STPUD-6

Cross-refs:

Attributes

Resource type: Site
Age: Historic
Information base: Survey
Attribute codes: AH07 (Roads/trails/railroad grades)
Disclosure: Not for publication
Collections: Unknown
Accession no(s):
Facility:

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
8/28/1994	S. G. Lindstrom	State of California - The Resources Agency, Department of Parks and Recreation	
12/5/1999	Mike Drews	Unknown	

Associated reports

Report No.	*Year*	*Title*	*Affiliation*
009388	1994	Heritage Resource Inventory South Tahoe Public Utilities District A-Line Export Pipeline Relocation Project	Consulting Archaeologist

Location information

County: El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E NE¼ of NE¼ of Sec. 16 MDBM
T12N R18E NW¼ of SW¼ of Sec. 3 MDBM
T12N R18E SE¼ of NE¼ of Sec. 9 MDBM
UTMs: Zone 10 241180mE 4308920mN NAD27 (S end)
Zone 10 241410mE 4311420mN NAD27 (N end)

Management status

Database record metadata

	Date	*User*	
Entered:	6/26/2008	melodi	
Last modified:	5/10/2017	wagner	
IC actions:	*Date*	*User*	*Action taken*
	6/27/2008	Machiel	Imported data from resource record
	5/10/2017	wagner	Verified

Record status: Verified

Resource Detail: P-09-004535

Identifying information

Primary No.: P-09-004535
Trinomial: CA-ELD-002788H
Name:
Other IDs:

Type	*Name*
Other	STPUD-12

Cross-refs:

Attributes

Resource type: Site
Age: Historic
Information base: Survey
Attribute codes: AH04 (Privies/dumps/trash scatters)
Disclosure: Not for publication
Collections: Unknown
Accession no(s):
Facility:

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
8/15/1994	S.G. Lindstrom	Consulting Archaeologist	

Associated reports

Report No.	*Year*	*Title*	*Affiliation*
009388	1994	Heritage Resource Inventory South Tahoe Public Utilities District A-Line Export Pipeline Relocation Project	Consulting Archaeologist

Location information

County: El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E NW¼ of NE¼ of Sec. 9 MDBM
UTMs: Zone 10 240820mE 4310560mN NAD27

Management status

Database record metadata

	Date	*User*	
Entered:	6/26/2008	melodi	
Last modified:	5/10/2017	wagner	
IC actions:	*Date*	*User*	*Action taken*
	6/27/2008	Machiel	Imported data from resource record
	5/10/2017	wagner	Verified

Record status: Verified

Resource Detail: P-09-004537

Identifying information

Primary No.: P-09-004537
Trinomial:
Name: Historic Road
Other IDs:

Type	*Name*
Resource Name	Historic Road
Other	STPUD-14

Cross-refs:

Attributes

Resource type: Site
Age: Historic
Information base: Survey
Attribute codes: AH07 (Roads/trails/railroad grades)
Disclosure: Not for publication
Collections: Unknown
Accession no(s):
Facility:

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
8/14/1994	S.G. Lindstrom	Unknown	
12/5/1999	Mike Drews	DPR	Update

Associated reports

Report No.	*Year*	*Title*	*Affiliation*
009388	1994	Heritage Resource Inventory South Tahoe Public Utilities District A-Line Export Pipeline Relocation Project	Consulting Archaeologist

Location information

County: El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E SW¼ of SW¼ of Sec. 3 MDBM
T12N R18E NW¼ of NE¼ of Sec. 9 MDBM
UTMs: Zone 10 241330mE 4322220mN NAD27 (N end)
Zone 10 240810mE 4310340mN NAD27 (S end)

Management status

Database record metadata

	Date	*User*	
Entered:	6/26/2008	melodi	
Last modified:	5/10/2017	wagner	
IC actions:	*Date*	*User*	*Action taken*
	6/27/2008	Machiel	Imported data from resource record
	5/10/2017	wagner	Verified

Record status: Verified

Resource Detail: P-09-005751

Identifying information

Primary No.: P-09-005751
Trinomial:
Name: Historic Site of Excellence
Other IDs:

Type	*Name*
Resource Name	Historic Site of Excellence

Cross-refs:

Attributes

Resource type: Site
Age: Historic
Information base: Survey
Attribute codes: AH04 (Privies/dumps/trash scatters)
Disclosure: Not for publication
Collections: No
Accession no(s):
Facility:

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
9/28/2015	Jesse Krautkramer, Nicole Zaborksy		

Associated reports

Location information

County: El Dorado
USGS quad(s): EMERALD BAY, SOUTH LAKE TAHOE
Address:
PLSS: T12N R18E SE¼ of SW¼ of Sec. 4 MDBM
UTMs: Zone 10 760549mE 4311244mN NAD83

Management status

Database record metadata

	Date	*User*	
Entered:	11/5/2015	amandaberkson-b	
Last modified:	6/5/2017	wagner	
IC actions:	*Date*	*User*	*Action taken*
	6/5/2017	wagner	Verified

Record status: Verified

Resource Detail: P-09-006059

Identifying information

Primary No.: P-09-006059
Trinomial: CA-ELD-003140H
Name: NIC-2019-Johnson-01
Other IDs:

Type	*Name*
Resource Name	NIC-2019-Johnson-01
Other	Johnson Ranch Complex

Cross-refs:

Attributes

Resource type: Site
Age: Historic
Information base: Survey
Attribute codes: AH08 (Dams); AH11 (Walls/fences); HP21 (Dam); HP33 (Farm/ranch)
Disclosure: Unrestricted
Collections: No
Accession no(s):
Facility:

General notes

Recording events

Date	*Recorder(s)*	*Affiliation*	*Notes*
10/21/2019	D. Stapleton	Natural Investigations Company, Inc.	

Associated reports

Report No.	*Year*	*Title*	*Affiliation*
012972	2019	Cultural Resources Inventory and Effects Assessment for Phase I of the Johnson Meadow Restoration Project, South Lake Tahoe, El Dorado County, California	Natural Investigations Company

Location information

County: El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:

Address	*City*	*Assessor's parcel no.*	*Zip code*
Johnson Meadow	South Lake Tahoe		96150

PLSS: T12N R18E S½ of S½ of Sec. 4 MDBM
UTMs: Zone 11 240444mE 4311683mN NAD83

Management status

Database record metadata

	Date	*User*	
Entered:	3/5/2020	paulrendes	
Last modified:	3/5/2020	paulrendes	
IC actions:	*Date*	*User*	*Action taken*
	3/5/2020	paulrendes	plotted in gis

Record status:

Resource Detail: P-09-006148

Identifying information

Primary No.: P-09-006148
Trinomial:
Name: Upper Truckee Pump Station
Other IDs:

Type	Name
Resource Name	Upper Truckee Pump Station
Other	South Tahoe PUD Upper Truckee Pump Station

Cross-refs:

Attributes

Resource type: Building
Age: Historic
Information base: Survey
Attribute codes: HP09 (Public utility building)
Disclosure: Unrestricted
Collections: No
Accession no(s):
Facility:

General notes

Recording events

Date	Recorder(s)	Affiliation	Notes
9/2/2020	Judith Marvin	Foothill Resources, Ltd.	

Associated reports

Report No.	Year	Title	Affiliation
013276	2020	South Lake Tahoe Public Utility District, Tahoe Keys and Upper Truckee Pump Station Rehablitation Project, Architectural Resources Survey and Evaluation	Foothill Resources, Ltd.

Location information

County: El Dorado
USGS quad(s): SOUTH LAKE TAHOE
Address:

Address	City	Assessor's parcel no.	Zip code
east bank of Upper TruckeeRiver, north of Lake Tahoe Airport, southwest of Tahoe Sierra Subdivision	South Lake Tahoe		96150

PLSS: T12N R18E SE¼ of Sec. 4 MDBM
UTMs:

Management status

Database record metadata

	Date	User	
Entered:	9/9/2021	paulrendes	
Last modified:	9/9/2021	paulrendes	
IC actions:	*Date*	*User*	*Action taken*
	9/9/2021	paulrendes	plotted in gis

Record status:

Appendix C

Native American Consultation

NCE Collaboration. Commitment. Confidence.℠

Date:	May 31, 2023
To:	California Native American Heritage Commission
From:	NCE
Subject:	South Lake Tahoe Greenway – Upper Truckee Bridge at Johnson Meadows, El Dorado County

Ms. Christina Snider, Executive Secretary
California Native American Heritage Commission
1550 Harbor Boulevard, Suite 100
West Sacramento, California 95691

Dear Ms. Snider:

The El Dorado County of Transportation proposes to implement the South Lake Greenway – Upper Truckee Bridge at Johnson Meadows, located on public land managed by the Tahoe Resource Conservation District. The project area includes over a mile of the Upper Truckee River (APNs 031-020-046, -049, -051, -052, and 032-090-015), within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd.

The South Lake Tahoe Greenway – Upper Truckee Bridge at Johnson Meadows Project intends to improve the hydrologic function of the Upper Truckee River, ecosystem function of Johnson Meadow, climate resilience, water quality, and habitat conditions while continuing to support sustainable recreation. The Project proposes to install a pedestrian bridge over the Upper Truckee River to replace the old concrete bridge and will construct approximately 1.2 miles of a shared-use path.

Two maps are enclosed for your review. Figure 1 is a location map of the Project area at a 1:24,000 scale with a USGS 7.5' quadrangle background (South Lake Tahoe). Figure 2 is a detailed map with aerial imagery.

NCE has been retained to assist the County with the Project's requirements to comply with Assembly Bill 52 (AB-52) of the California Environmental Quality Act (CEQA). To initiate Native American consultation, please provide a contact list for Tribes that may have an interest in this Project. We also request that you conduct a search of your Sacred Lands database for any places of concern that may be located within the vicinity of the Project.

If you have any questions, please feel free to contact me via email at crathbone@ncenet.com or by telephone (414-526-3413). I appreciate your assistance and look forward to hearing from you soon.

Sincerely,

Christina Rathbone

Enclosed: Tribal Consultation List Request Form; Figure 1 – Location Map; Figure 2 – Detail Map

Local Government Tribal Consultation List Request

Native American Heritage Commission
1550 Harbor Blvd, Suite 100
West Sacramento, CA 95691
916-373-3710
916-373-5471 – Fax
nahc@nahc.ca.gov

Type of List Requested

☑ **CEQA Tribal Consultation List (AB 52)** – ***Per Public Resources Code § 21080.3.1, subs. (b), (d), (e) and 21080.3.2***

☐ **General Plan (SB 18)** - ***Per Government Code § 65352.3.***
Local Action Type:
___ General Plan ___ General Plan Element ___ General Plan Amendment
___ Specific Plan ___ Specific Plan Amendment ___ Pre-planning Outreach Activity

Required Information

Project Title: South Lake Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow

Local Government/Lead Agency: El Dorado County Department of Transportation

Contact Person: Christina Rathbone, NCE

Street Address: 1150 Broadway Blvd

City: Reno, NV **Zip:** 89502

Phone: 414-526-3413 **Fax:** 510-215-2898

Email: crathbone@ncenet.com

Specific Area Subject to Proposed Action

County: El Dorado **City/Community:** South Lake Tahoe

Project Description:
The El Dorado County of Transportation proposes to implement the South Lake Greenway – Upper Truckee Bridge at Johnson Meadows, located on public land managed by the Tahoe Resource Conservation District. The project area includes over a mile of the Upper Truckee River (APNs 031-020-046, -049, -051, -052, and 032-090-015), within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd.
The Project proposes to install a pedestrian bridge over the Upper Truckee River to replace the old concrete bridge and will construct approximately 1.2 miles of a shared-use path.

Additional Request

☑ **Sacred Lands File Search** - ***Required Information:***

USGS Quadrangle Name(s): South Lake Tahoe 7.5'

Township: 12N **Range:** 18E **Section(s):** 3, 4, 9,

NCE Collaboration. Commitment. Confidence.℠

Date:	May 31, 2023
To:	California Native American Heritage Commission
From:	NCE
Subject:	South Lake Tahoe Greenway – Upper Truckee Bridge at Johnson Meadows, El Dorado County

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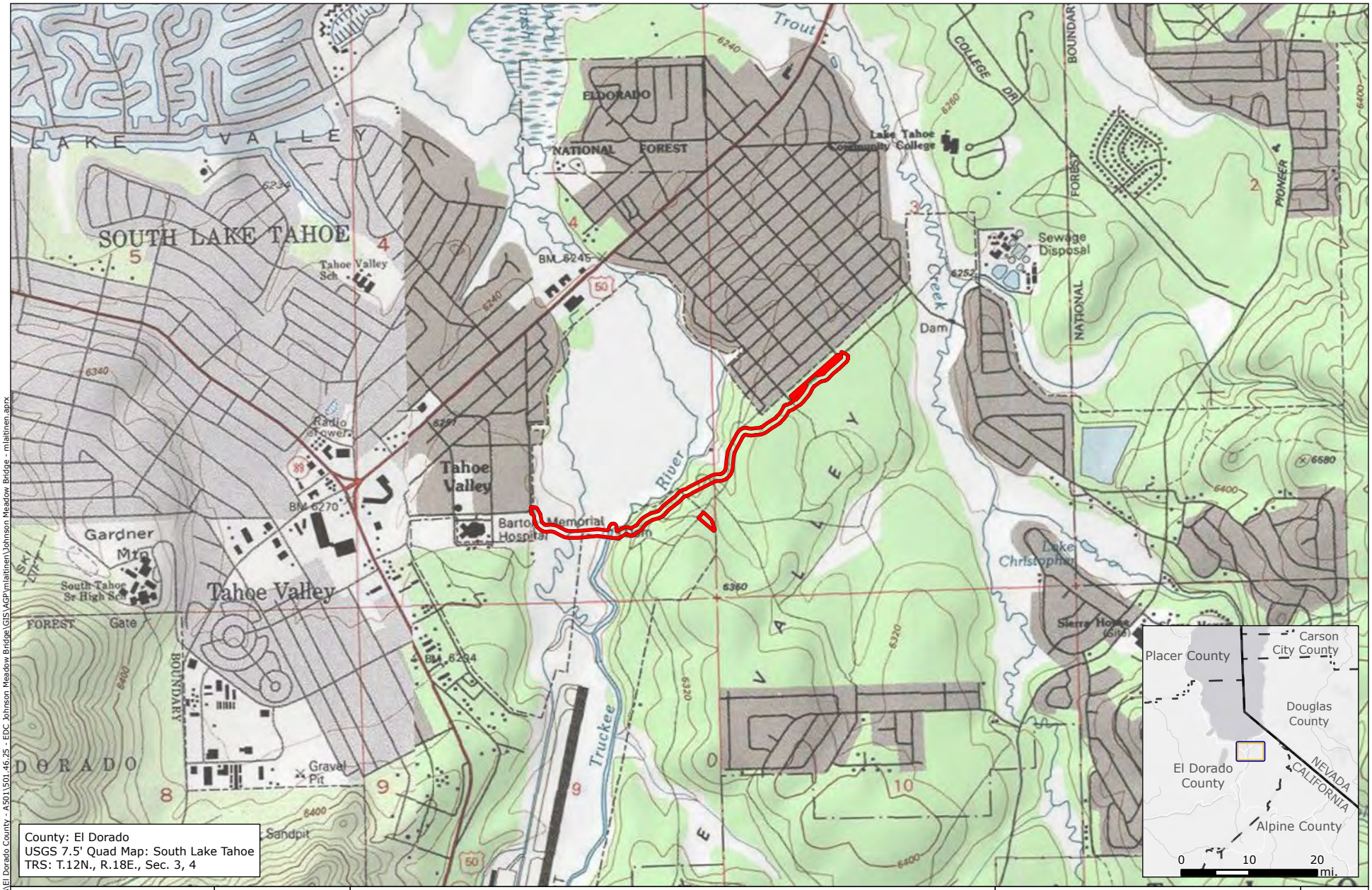
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Christina Rathbone

Enclosed: Tribal Consultation List Request Form; Figure 1 – Location Map; Figure 2 – Detail Map



County: El Dorado
USGS 7.5' Quad Map: South Lake Tahoe
TRS: T.12N., R.18E., Sec. 3, 4

Legend

Project Area

NCE

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow

Project Area Location Map

N

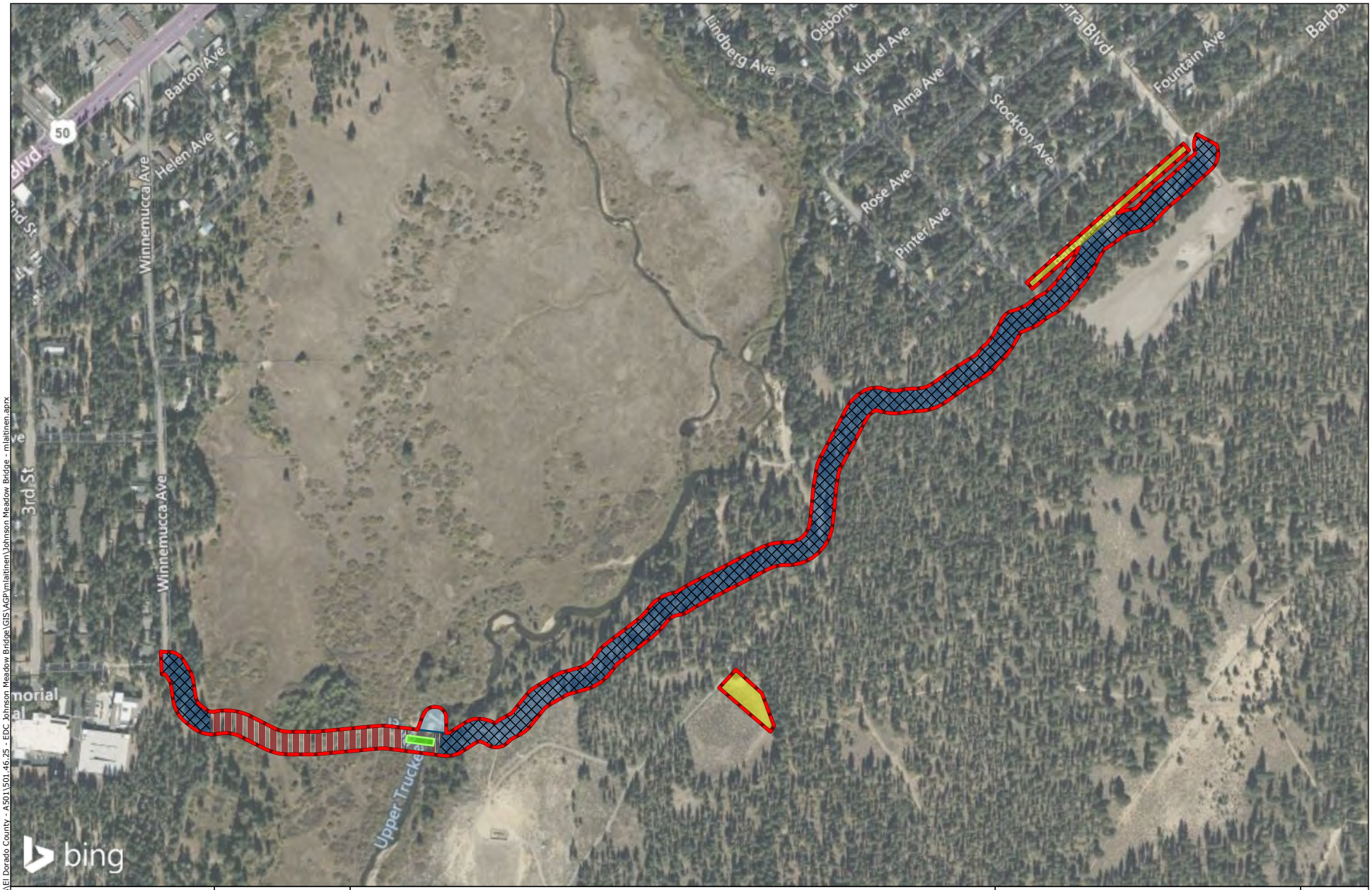
1 : 24,000

0 1,000 2,000 ft.

FIGURE 1

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
ESRI USGS Topo Maps	501.46.25	mlaitinen	5/25/2023	-	jhall

Document Path: P:\Active Projects\El Dorado County - A501\501.46.25 - EDC Johnson Meadow Bridge\GIS\AGP\mlaitinen\Johnson Meadow Bridge - mlaitinen.aprx



Project Area
Class 1 Shared Used Path
Boardwalk
New Bridge
Bridge Removal
Staging Area

South Tahoe Greenway
Upper Truckee Bridge at Johnson Meadow

Project Area Detail Map

N

1 in. = 600 ft.

0 600 ft.

FIGURE 2

SOURCE	JOB NUMBER	DRAWN	DATE	REVISED	APPROVED
Bing Aerial Basemap	501.46.25	mlaitinen	5/25/2023	-	jhall

Document Path: P:\Active Projects\El Dorado County - A501\501.46.25 - EDC Johnson Meadow Bridge\GIS\AGP\mlaitinen\Johnson Meadow Bridge - mlaitinen.aprx

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Township: 12N **Range:** 18E **Section(s):** 3, 4, 9,

NATIVE AMERICAN HERITAGE COMMISSION

CHAIRPERSON
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Kumeyaay

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[VACANT]

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Hitchcock
Miwok/Nisenan

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

June 27, 2023

Christina Rathbone
NCE

Via Email to: crathbone@ncenet.com

Re: Native American Tribal Consultation, Pursuant to the Assembly Bill 52 (AB 52), Amendments to the California Environmental Quality Act (CEQA) (Chapter 532, Statutes of 2014), Public Resources Code Sections 5097.94 (m), 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2 and 21084.3, South Lake Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow Project, El Dorado County

Dear Ms. Rathbone:

Pursuant to Public Resources Code section 21080.3.1 (c), attached is a consultation list of tribes that are traditionally and culturally affiliated with the geographic area of the above-listed project. Please note that the intent of the AB 52 amendments to CEQA is to avoid and/or mitigate impacts to tribal cultural resources, (Pub. Resources Code §21084.3 (a)) ("Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource.")

Public Resources Code sections 21080.3.1 and 21084.3(c) require CEQA lead agencies to consult with California Native American tribes that have requested notice from such agencies of proposed projects in the geographic area that are traditionally and culturally affiliated with the tribes on projects for which a Notice of Preparation or Notice of Negative Declaration or Mitigated Negative Declaration has been filed on or after July 1, 2015. Specifically, Public Resources Code section 21080.3.1 (d) provides:

Within 14 days of determining that an application for a project is complete or a decision by a public agency to undertake a project, the lead agency shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, which shall be accomplished by means of at least one written notification that includes a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation pursuant to this section.

The AB 52 amendments to CEQA law does not preclude initiating consultation with the tribes that are culturally and traditionally affiliated within your jurisdiction prior to receiving requests for notification of projects in the tribe's areas of traditional and cultural affiliation. The Native American Heritage Commission (NAHC) recommends, but does not require, early consultation as a best practice to ensure that lead agencies receive sufficient information about cultural resources in a project area to avoid damaging effects to tribal cultural resources.

The NAHC also recommends, but does not require that agencies should also include with their notification letters, information regarding any cultural resources assessment that has been completed on the area of potential effect (APE), such as:

1. The results of any record search that may have been conducted at an Information Center of the California Historical Resources Information System (CHRIS), including, but not limited to:

- A listing of any and all known cultural resources that have already been recorded on or adjacent to the APE, such as known archaeological sites;
- Copies of any and all cultural resource records and study reports that may have been provided by the Information Center as part of the records search response;
- Whether the records search indicates a low, moderate, or high probability that unrecorded cultural resources are located in the APE; and
- If a survey is recommended by the Information Center to determine whether previously unrecorded cultural resources are present.

2. The results of any archaeological inventory survey that was conducted, including:

    - Any report that may contain site forms, site significance, and suggested mitigation measures.

      All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure in accordance with Government Code section 6254.10.

3. The result of any Sacred Lands File (SLF) check conducted through the Native American Heritage Commission was positive. Please contact the tribes on the attached list for more information.

4. Any ethnographic studies conducted for any area including all or part of the APE; and

5. Any geotechnical reports regarding all or part of the APE.

Lead agencies should be aware that records maintained by the NAHC and CHRIS are not exhaustive and a negative response to these searches does not preclude the existence of a tribal cultural resource. A tribe may be the only source of information regarding the existence of a tribal cultural resource.

This information will aid tribes in determining whether to request formal consultation. In the event that they do, having the information beforehand will help to facilitate the consultation process.

If you receive notification of change of addresses and phone numbers from tribes, please notify the NAHC. With your assistance, we can assure that our consultation list remains current.

If you have any questions, please contact me at my email address: Pricilla.Torres-Fuentes@nahc.ca.gov.

Sincerely,

Pricilla Torres-Fuentes

Pricilla Torres-Fuentes
Cultural Resources Analyst

Attachment

Native American Heritage Commission
Tribal Consultation List
El Dorado County
6/27/2023
*Federally Recognized Tribe

Ione Band of Miwok Indians
Sara Dutschke, Chairperson
9252 Bush Street — Miwok
Plymouth, CA, 95669
Phone: (209) 245 - 5800
consultation@ionemiwok.net

Tsi Akim Maidu
Don Ryberg, Chairperson
P.O. Box 510 — Maidu
Browns Valley, CA, 95918
Phone: (530) 383 - 7234
tsi-akim-maidu@att.net

Tsi Akim Maidu
Grayson Coney, Cultural Director
P.O. Box 510 — Maidu
Browns Valley, CA, 95918
Phone: (530) 383 - 7234
tsi-akim-maidu@att.net

United Auburn Indian Community of the Auburn Rancheria
Gene Whitehouse, Chairperson
10720 Indian Hill Road — Maidu
Auburn, CA, 95603 — Miwok
Phone: (530) 883 - 2390
Fax: (530) 883-2380
bguth@auburnrancheria.com

Washoe Tribe of Nevada and California
Serrell Smokey, Chairperson
919 Highway 395 North — Washoe
Gardnerville, NV, 89410
Phone: (775) 265 - 8600
serrell.smokey@washoetribe.us

Washoe Tribe of Nevada and California
Darrel Cruz, Cultural Resources Department
919 Highway 395 North — Washoe
Gardnerville, NV, 89410
Phone: (775) 265 - 8600
darrel.cruz@washoetribe.us

Wilton Rancheria
Jesus Tarango, Chairperson
9728 Kent Street — Miwok
Elk Grove, CA, 95624
Phone: (916) 683 - 6000
Fax: (916) 683-6015
jtarango@wiltonrancheria-nsn.gov

Wilton Rancheria
Dahlton Brown, Director of Administration
9728 Kent Street — Miwok
Elk Grove, CA, 95624
Phone: (916) 683 - 6000
dbrown@wiltonrancheria-nsn.gov

Wilton Rancheria
Steven Hutchason, THPO
9728 Kent Street — Miwok
Elk Grove, CA, 95624
Phone: (916) 683 - 6000
Fax: (916) 863-6015
shutchason@wiltonrancheria-nsn.gov

Colfax-Todds Valley Consolidated Tribe
Pamela Cubbler, Vice Chairperson
P.O. Box 4884 — Maidu
Auburn, CA, 95604 — Miwok
Phone: (530) 320 - 3943
pcubbler@colfaxrancheria.com

Colfax-Todds Valley Consolidated Tribe
Clyde Prout, Chairperson
P.O. Box 4884 — Maidu
Auburn, CA, 95604 — Miwok
Phone: (916) 577 - 3558
cprout@colfaxrancheria.com

Colfax-Todds Valley Consolidated Tribe
CTVCT Preservation, Cultural Preservation Dept.
P.O. Box 4884 — Maidu
Auburn, CA, 95604 — Miwok
Phone: (530) 320 - 6032
ctvctpreservation@gmail.com

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and section 5097.98 of the Public Resources Code.

This list is only applicable for consultation with Native American tribes under Public Resources Code Sections 21080.3.1 for the proposed South Lake Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow Project, El Dorado County.

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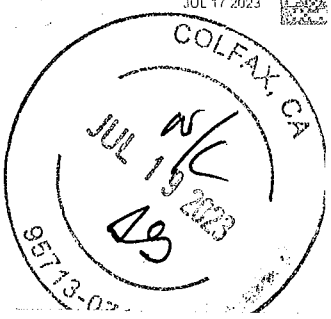
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Colfax, CA

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August 8, 2023, 10:47 am

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July 24, 2023

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COLFAX CA 95713-9998
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Arrived at Post Office
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Arrived at USPS Regional Facility
SACRAMENTO CA DISTRIBUTION CENTER
July 18, 2023, 11:37 am

Arrived at USPS Regional Facility
RENO NV DISTRIBUTION CENTER
July 17, 2023, 11:02 pm

Hide Tracking History

What Do USPS Tracking Statuses Mean? (https://faq.usps.com/s/article/Where-is-my-package?_gl=1*1l2jeml*_gcl_au*NTIxMDYzMzc3LjE2ODU2NDQ3NjU.*_ga*NjgxMzU4NjYwLjE2NTM0MTc1Njc.*

Text & Email Updates

USPS Tracking Plus®

Product Information

See Less ^

Track Another Package

Enter tracking or barcode numbers

Need More Help?

Contact USPS Tracking support for further assistance.

Feedback

7021 0950 0000 0315 8720

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For delivery information, visit our website at *www.usps.com®*.

OFFICIAL USE

Certified Mail Fee
$

Extra Services & Fees *(check box, add fee as appropriate)*
- ☐ Return Receipt (hardcopy) $ _____
- ☐ Return Receipt (electronic) $ _____
- ☐ Certified Mail Restricted Delivery $ _____
- ☐ Adult Signature Required $ _____
- ☐ Adult Signature Restricted Delivery $ _____

Postage
$

Total Postage and Fees
$

Postmark Here

Sent To Cubbler + Prout
Street and Apt. No., or PO Box No. P.O. Box 4884
City, State, ZIP+4® Auburn, CA 95604

PS Form **3800**, April 2015 PSN 7530-02-000-9047 — See Reverse for Instructions

---

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:
Cubbler + Prout
(Johnson Meadow Bridge)
P.O. Box 4884
Auburn, CA 95604

9590 9402 6507 0346 1790 48

2. Article Number *(Transfer from service label)*
7021 0950 0000 0315 8720

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☑ Agent ☐ Addressee

B. Received by *(Printed Name)* S. Hicks
C. Date of Delivery 8/8/23

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ [illegible]ail
- ☐ [illegible]ail Restricted Delivery
- ☐ [illegible]0)
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

PS Form **3811**, July 2020 PSN 7530-02-000-9053 — Domestic Return Receipt

Tracking Number:

70210950000003158720

Copy Add to Informed Delivery (https://informeddelivery.usps.com/)

Latest Update

Your item was delivered to the front desk, reception area, or mail room at 2:08 pm on August 2, 2023 in AUBURN, CA 95603.

Get More Out of USPS Tracking:

USPS Tracking Plus®

Delivered

Delivered, Front Desk/Reception/Mail Roo

AUBURN, CA 95603
August 2, 2023, 2:08 pm

Reminder to pick up your item before August 3, 2023

AUBURN, CA 95604
July 25, 2023

Available for Pickup

AUBURN
371 NEVADA ST
AUBURN CA 95603-9998
M-F 0930-1700
July 20, 2023, 6:44 pm

In Transit to Next Facility

July 20, 2023

Departed USPS Regional Facility

SACRAMENTO CA DISTRIBUTION CENTER
July 19, 2023, 5:03 pm

Arrived at USPS Regional Facility

SACRAMENTO CA DISTRIBUTION CENTER
July 19, 2023, 12:34 pm

Arrived at USPS Regional Facility

RENO NV DISTRIBUTION CENTER
July 17, 2023, 10:10 pm

Hide Tracking History

What Do USPS Tracking Statuses Mean? **(https://faq.usps.com/s/article/Where-is-my-package)**

Feedback

7021 0950 0000 0315 8713

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- ☐ Return Receipt (hardcopy) $
- ☐ Return Receipt (electronic) $
- ☐ Certified Mail Restricted Delivery $
- ☐ Adult Signature Required $
- ☐ Adult Signature Restricted Delivery $

Postage
$

Total Postage and Fees
$

Postmark Here

Sent To Sara Dutschke
Street and Apt. No., or PO Box No. 9252 Bush St
City, State, ZIP+4® Plymouth, CA 95669

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:
Sara Dutschke
(Johnson Meadow Bridge)
9252 Bush St.
Plymouth, CA 95669

9590 9402 6507 0346 1790 31

2. Article Number *(Transfer from service label)*
7021 0950 0000 0315 8713

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Barbara Miller ☐ Agent ☑ Addressee

B. Received by *(Printed Name)* Barbara Miller
C. Date of Delivery 7-19-23

D. Is delivery address different from item 1? ☑ Yes
If YES, enter delivery address below: ☐ No
Box 699
Plymouth CA 95669

3. Service Type
- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ Insured Mail
- ☐ Mail Restricted Delivery (00)
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

PS Form 3811, July 2020 PSN 7530-02-000-9053 Domestic Return Receipt

Tracking Number:

70210950000003158713

Copy Add to Informed Delivery (https://informeddelivery.usps.com/)

Latest Update

Your item was picked up at the post office at 12:37 pm on July 19, 2023 in PLYMOUTH, CA 95669.

Get More Out of USPS Tracking:

USPS Tracking Plus®

Delivered

Delivered, Individual Picked Up at Post Offi

PLYMOUTH, CA 95669
July 19, 2023, 12:37 pm

Available for Pickup

PLYMOUTH, CA 95669
July 19, 2023, 9:09 am

Out for Delivery

PLYMOUTH, CA 95669
July 19, 2023, 8:22 am

Arrived at Post Office

PLYMOUTH, CA 95669
July 19, 2023, 8:11 am

Departed USPS Regional Facility

SACRAMENTO CA DISTRIBUTION CENTER
July 18, 2023, 4:22 pm

Arrived at USPS Regional Facility

SACRAMENTO CA DISTRIBUTION CENTER
July 18, 2023, 11:46 am

Arrived at USPS Regional Facility

RENO NV DISTRIBUTION CENTER
July 17, 2023, 10:13 pm

Hide Tracking History

Feedback

Text & Email Updates

USPS Tracking Plus®

7021 0950 0000 0315 8690

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Certified Mail Fee
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Extra Services & Fees *(check box, add fee as appropriate)*
- ☐ Return Receipt (hardcopy) $ _____
- ☐ Return Receipt (electronic) $ _____
- ☐ Certified Mail Restricted Delivery $ _____
- ☐ Adult Signature Required $ _____
- ☐ Adult Signature Restricted Delivery $ _____

Postage
$

Total Postage and Fees
$

Postmark Here

Sent To Venesa Kremer
Street and Apt. No., or PO Box No. 9728 Kent St.
City, State, ZIP+4® EIK Grove, CA 95624

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

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SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Venesa Kremer
(Johnson Meadow Bridge)
9728 Kent St.
EIK Grove, CA 95624

9590 9402 6507 0346 1790 17

2. Article Number *(Transfer from service label)*
7021 0950 0000 0315 8690

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X
☐ Agent
☐ Addressee

B. Received by *(Printed Name)* C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ [illegible]ail
- ☐ [illegible]ail Restricted Delivery
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

PS Form 3811, July 2020 PSN 7530-02-000-9053 Domestic Return Receipt

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(https://reg.usps.com/xsell?app=UspsTools&ref=homepageBanner&appURL=https%3A%2F%2Finformeddelivery.usps.com/box/pages/intro/start.action)

Remove ×

Tracking Number:

70210950000003158690

Copy Add to Informed Delivery (https://informeddelivery.usps.com/)

Latest Update

Your item was delivered to the front desk, reception area, or mail room at 3:00 pm on July 19, 2023 in ELK GROVE, CA 95624.

Get More Out of USPS Tracking:

USPS Tracking Plus®

Delivered
Delivered, Front Desk/Reception/Mail Room
ELK GROVE, CA 95624
July 19, 2023, 3:00 pm

Departed USPS Regional Facility
SACRAMENTO CA DISTRIBUTION CENTER
July 19, 2023, 12:44 am

Arrived at USPS Regional Facility
SACRAMENTO CA DISTRIBUTION CENTER
July 18, 2023, 11:37 am

Arrived at USPS Regional Facility
RENO NV DISTRIBUTION CENTER
July 17, 2023, 10:11 pm

Hide Tracking History

Feedback

Text & Email Updates

7021 0950 0000 0315 8737

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OFFICIAL USE

Certified Mail Fee
$

Extra Services & Fees *(check box, add fee as appropriate)*
- ☐ Return Receipt (hardcopy) $
- ☐ Return Receipt (electronic) $
- ☐ Certified Mail Restricted Delivery $
- ☐ Adult Signature Required $
- ☐ Adult Signature Restricted Delivery $

Postage
$

Total Postage and Fees
$

Postmark Here

Sent To Serrell Smokex
Street and Apt. No., or PO Box No. 919 HWY 395 No
City, State, ZIP+4® Gardnerville, NV 89410

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Serrell Smokex
(Johnson Meadow Bridge)
919 Highway 395 North
Gardnerville, NV 89410

9590 9402 6507 0346 1790 55

2. Article Number *(Transfer from service label)*
7021 0950 0000 0315 8737

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by *(Printed Name)* REBECCA PEREZ WSH
C. Date of Delivery 7/19/23

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ Insured Mail
- ☐ Insured Mail Restricted Delivery (over $500)
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

PS Form 3811, July 2020 PSN 7530-02-000-9053 Domestic Return Receipt

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Learn More

(https://reg.usps.com/xsell?app=UspsTools&ref=homepageBanner&appURL=https%3A%2F%2Finformeddelivery.usps.com/box/pages/intro/start.action)

Remove ×

Tracking Number:

70210950000003158737

Copy **Add to Informed Delivery (https://informeddelivery.usps.com/)**

Latest Update

Your item was delivered to an individual at the address at 12:04 pm on July 19, 2023 in GARDNERVILLE, NV 89410.

Get More Out of USPS Tracking:

USPS Tracking Plus®

Delivered
Delivered, Left with Individual
GARDNERVILLE, NV 89410
July 19, 2023, 12:04 pm

Departed USPS Regional Facility
RENO NV DISTRIBUTION CENTER
July 19, 2023, 2:42 am

In Transit to Next Facility
July 18, 2023

Arrived at USPS Regional Facility
RENO NV DISTRIBUTION CENTER
July 17, 2023, 10:13 pm

Hide Tracking History

Feedback

Text & Email Updates ⌄

USPS Tracking Plus® ⌄

7021 0950 0000 0315 8683

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Certified Mail Fee
$

Extra Services & Fees *(check box, add fee as appropriate)*
- ☐ Return Receipt (hardcopy) $
- ☐ Return Receipt (electronic) $
- ☐ Certified Mail Restricted Delivery $
- ☐ Adult Signature Required $
- ☐ Adult Signature Restricted Delivery $

Postage
$

Total Postage and Fees
$

Postmark Here

Sent To Gene Whitehouse

Street and Apt. No., or PO Box No. 10720 Indian Hill Rd

City, State, ZIP+4® Auburn, CA 95603

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

---

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Gene Whitehouse
(Johnson Meadow Bridge)
10720 Indian Hill Rd
Auburn, CA 95603

9590 9402 6507 0346 1790 00

2. Article Number *(Transfer from service label)*
7021 0950 0000 0315 8683

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X
☐ Agent
☐ Addressee

B. Received by *(Printed Name)* CAMPBELL
C. Date of Delivery

D. Is delivery address different from Item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ Insured Mail
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

...stricted Delivery

PS Form 3811, July 2020 PSN 7530-02-000-9053 Domestic Return Receipt

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Learn More

(https://reg.usps.com/xsell?app=UspsTools&ref=homepageBanner&appURL=https%3A%2F%2Finformeddelivery.usps.com/box/pages/intro/start.action)

Remove ×

Tracking Number:

70210950000003158683

Copy Add to Informed Delivery (https://informeddelivery.usps.com/)

Latest Update

Your item was delivered to an individual at the address at 2:33 pm on July 19, 2023 in AUBURN, CA 95603.

Get More Out of USPS Tracking:

USPS Tracking Plus®

Delivered

Delivered, Left with Individual

AUBURN, CA 95603
July 19, 2023, 2:33 pm

Departed USPS Regional Facility

SACRAMENTO CA DISTRIBUTION CENTER
July 18, 2023, 7:12 pm

Arrived at USPS Regional Facility

SACRAMENTO CA DISTRIBUTION CENTER
July 18, 2023, 11:46 am

Arrived at USPS Regional Facility

RENO NV DISTRIBUTION CENTER
July 17, 2023, 10:14 pm

Hide Tracking History

Feedback

Text & Email Updates

From:	Christina Rathbone
To:	pcubbler@colfaxrancheria.com; c.prout@colfaxrancheria.com; ctvctpreservation@gmail.com
Cc:	Dave Rios; Donaldo Palaroan; Larson, William@DOT
Subject:	Upper Truckee Bridge at Johnson Meadows - 501.46.25
Date:	Tuesday, July 18, 2023 5:16:00 PM
Attachments:	Colfax-Todds Valley Letter.pdf

Greetings:

On behalf of El Dorado County of Transportation, in cooperation with the California Department of Transportation, I am conducting initial outreach regarding the following proposed project (also see attached letter):

> South Lake Greenway – Upper Truckee Bridge at Johnson Meadows, located on public land managed by the Tahoe Resource Conservation District within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd.

We have received the Native American Heritage Commission response indicating a **positive** Sacred Lands File result.

Please note there will be an archaeological monitor present for all ground disturbing activities.

This project requires compliance with Section 106 of the National Historic Preservation Act (NHPA). If you have any questions or would like to consult under Section 106 of the NHPA, please respond to this email.

Thank you,

Christina Rathbone
Archaeologist
NCE
c (414) 526-3413
e crathbone@ncenet.com

1885 S Arlington Ave #111
Reno, NV 89509
www.ncenet.com

Collaboration. Commitment. Confidence.SM

From:	Christina Rathbone
To:	consultation@ionemiwok.net
Cc:	Dave Rios; Donaldo Palaroan; Larson, William@DOT
Subject:	Upper Truckee Bridge at Johnson Meadows - 501.46.25
Date:	Tuesday, July 18, 2023 5:07:00 PM
Attachments:	Ione Band of Miwok Letter.pdf

Greetings:

On behalf of El Dorado County of Transportation, in cooperation with the California Department of Transportation, I am conducting initial outreach regarding the following proposed project (also see attached letter):

South Lake Greenway – Upper Truckee Bridge at Johnson Meadows, located on public land managed by the Tahoe Resource Conservation District within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd.

We have received the Native American Heritage Commission response indicating a **positive** Sacred Lands File result.

Please note there will be an archaeological monitor present for all ground disturbing activities.

This project requires compliance with Section 106 of the National Historic Preservation Act (NHPA) . If you have any questions or would like to consult under Section 106 of the NHPA, please respond to this email.

Thank you,

Christina Rathbone
Archaeologist
NCE
c (414) 526-3413
e crathbone@ncenet.com

1885 S Arlington Ave #111
Reno, NV 89509
www.ncenet.com

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From:	Christina Rathbone
To:	tsi-akim-maidu@att.net
Cc:	Dave Rios; Donaldo Palaroan; Larson, William@DOT
Subject:	Upper Truckee Bridge at Johnson Meadows - 501.46.25
Date:	Tuesday, July 18, 2023 5:09:00 PM
Attachments:	Tsi Akim Maidu Letter.pdf

Greetings:

On behalf of El Dorado County of Transportation, in cooperation with the California Department of Transportation, I am conducting initial outreach regarding the following proposed project (also see attached letter):

> South Lake Greenway – Upper Truckee Bridge at Johnson Meadows, located on public land managed by the Tahoe Resource Conservation District within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd.

We have received the Native American Heritage Commission response indicating a **positive** Sacred Lands File result.

Please note there will be an archaeological monitor present for all ground disturbing activities.

This project requires compliance with Section 106 of the National Historic Preservation Act (NHPA). If you have any questions or would like to consult under Section 106 of the NHPA, please respond to this email.

Thank you,

Christina Rathbone
Archaeologist
NCE
c (414) 526-3413
e crathbone@ncenet.com

1885 S Arlington Ave #111
Reno, NV 89509
www.ncenet.com

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Thank you for consulting with the UAIC

Please complete one form for each notification.

How to submit a consultation notification or project update:

1. **One form must be completed for each project.**
2. **Forms cannot be saved and completed at a later time.**
3. Include all relevant project information.
4. Upload file attachments. Multiple files can be attached.
5. Submit form.
6. You will receive a submission receipt via email when submission is complete. UAIC prefers our online submission form over certified or hard copy letters.

Contact the Tribal Office at (530) 883-2390 for questions or concerns. Ask for Tribal Historic Preservation or use the contact form located on our website.

Contact Information

Consulting on Behalf of *
El Dorado County of Transportation
Lead Agency, Consulting Firm, Tribe

Mailing Address
Street Address
924 B Emerald Bay Road
Address Line 2
City
South Lake Tahoe
State / Province / Region
CA
Postal / Zip Code
96150

Point of Contact for Consultation *
Donaldo Palaroan
Primary Contact Name

Point of Contact Email *
donaldo.palaroan@edcgov.us

Second Point of Contact
Yes
Is there more than one point of contact for this project?

Second Point of Contact

Contact Name * Christina Rathbone

Organization NCE

Email Address * CRathbone@ncenet.com

Address is same as above? * ○ Yes ◉ No

Second Point of Contact Address

Street Address
1150 Broadway Blvd
Address Line 2
City
Reno
State / Province / Region
NV
Postal / Zip Code
89502

Regulatory

Consulting Under * This project fall under the following regulatory requirements:

◉ Federal ○ State of California ○ Federal and State
○ Other

Federal Regulations * Select all that apply

- ☑ National Env. Policy Act/National Historic Preservation Act (Section 106)
- ☐ 408 Permit
- ☐ 404 Permit
- ☐ PL84-99
- ☐ Native American Graves Protection and Repatriation Act (NAGPRA)
- ☐ Other

Project Notification Information

Project Name * South Lake Greenway – Upper Truckee Bridge at Johnson Meadows
Please include Name and Reference Number (if applicable)

This is a *

- (●) New Project
- ( ) Public Hearing
- ( ) Request for Information
- ( ) Notice of Preparation (NOP)
- ( ) Notice of Availability (NOA)
- ( ) Other

Project Description

The South Lake Tahoe Greenway – Upper Truckee Bridge at Johnson Meadows Project intends to improve the hydrologic function of the Upper Truckee River, ecosystem function of Johnson Meadow, climate resilience, water quality, and habitat conditions while continuing to support sustainable recreation. The project proposes to install a pedestrian bridge over the Upper Truckee River to replace the old concrete bridge and will construct approximately 1.2 miles of a shared-use path.

Please include a brief project description

Project/Construction Year *

2024

Please select the year your project will initiate

Project/Construction Season

Please select the season your project will initiate (if applicable)

Environmental Document Timeline

2024

Please share when your final environmental document is planned for public review

Location

located on public land managed by the Tahoe Resource Conservation District. The project area includes over a mile of the Upper Truckee River (APNs 031-020-046, -049, -051, -052, and 032-090-015), within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd.

Please include county, city, and address (if available)

Project Documents

Documents uploaded to this form are secure and only accessible by the Tribal Historic Preservation team

Notification *

Attach notification letters or announcement

UAIC Letter.pdf 2.42MB

50mb maximum upload size (per file)

Reports

Attach project reports, project descriptions, or supporting documents. Please add the following if available: Cultural, Biology, Arborist

50mb maximum upload size (per file)

Location Map

Attach maps and location files. Shape files are preferred

File extensions allowed: pdf, jpg, png, kmz, lpk, dbf, prj, shp, abn, sbx, xml, shx, cpg, .zip. NOTE: 50mb maximum upload size (per file).

Send Submission Receipt To

☐ Primary Contact ☑ Secondary Contact ☐ Different Email

***This form submission page is offered for the convenience of consulting agencies, developers, and their respective consultants. UAIC reviews all submissions received, but makes no guarantee that submission via this online form satisfies any particular consultation or notice requirement that exists under state or federal law.

From:	Christina Rathbone
To:	serrell.smokey@washoetribe.us; Patrick Burtt THPO
Cc:	Dave Rios; Donaldo Palaroan; Larson, William@DOT
Subject:	Upper Truckee Bridge at Johnson Meadows - 501.46.25
Date:	Tuesday, July 18, 2023 5:13:00 PM
Attachments:	Washoe Tribe Letter.pdf

Greetings:

On behalf of El Dorado County of Transportation, in cooperation with the California Department of Transportation, I am conducting initial outreach regarding the following proposed project (also see attached letter):

> South Lake Greenway – Upper Truckee Bridge at Johnson Meadows, located on public land managed by the Tahoe Resource Conservation District within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd.

We have received the Native American Heritage Commission response indicating a **positive** Sacred Lands File result.

Please note there will be an archaeological monitor present for all ground disturbing activities.

This project requires compliance with Section 106 of the National Historic Preservation Act (NHPA). If you have any questions or would like to consult under Section 106 of the NHPA, please respond to this email.

Thank you,

Christina Rathbone
Archaeologist
NCE
c (414) 526-3413
e crathbone@ncenet.com

1885 S Arlington Ave #111
Reno, NV 89509
www.ncenet.com

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From:	Christina Rathbone
To:	cpd@wiltonrancheria-nsn.gov; Venesa Kremer
Cc:	Dave Rios; Donaldo Palaroan; Larson, William@DOT
Subject:	Upper Truckee Bridge at Johnson Meadows - 501.46.25
Date:	Tuesday, July 18, 2023 5:14:00 PM
Attachments:	Wilton Rancheria Letter.pdf

Greetings:

On behalf of El Dorado County of Transportation, in cooperation with the California Department of Transportation, I am conducting initial outreach regarding the following proposed project (also see attached letter):

> South Lake Greenway – Upper Truckee Bridge at Johnson Meadows, located on public land managed by the Tahoe Resource Conservation District within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd.

We have received the Native American Heritage Commission response indicating a **positive** Sacred Lands File result.

Please note there will be an archaeological monitor present for all ground disturbing activities.

This project requires compliance with Section 106 of the National Historic Preservation Act (NHPA). If you have any questions or would like to consult under Section 106 of the NHPA, please respond to this email.

Thank you,

Christina Rathbone
Archaeologist
NCE
c (414) 526-3413
e crathbone@ncenet.com

1885 S Arlington Ave #111
Reno, NV 89509
www.ncenet.com

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From:	Christina Rathbone
To:	pcubbler@colfaxrancheria.com; c.prout@colfaxrancheria.com; ctvctpreservation@gmail.com
Cc:	Dave Rios; Donaldo Palaroan; Larson, William@DOT
Subject:	Upper Truckee Bridge at Johnson Meadows - 501.46.25
Date:	Wednesday, August 2, 2023 5:12:00 PM
Attachments:	Colfax-Todds Valley Letter.pdf

Greetings:

On behalf of El Dorado County of Transportation, in cooperation with the California Department of Transportation, I am conducting a two week follow up regarding the following proposed project (see attached letter):

> South Lake Greenway – Upper Truckee Bridge at Johnson Meadows, located on public land managed by the Tahoe Resource Conservation District within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd.

We have received the Native American Heritage Commission response indicating a **positive** Sacred Lands File result.

Please note there will be an archaeological monitor present for all ground disturbing activities.

This project requires compliance with Section 106 of the National Historic Preservation Act (NHPA). If you have any questions or would like to consult under Section 106 of the NHPA, please respond to this email.

Thank you,

Christina Rathbone
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c (414) 526-3413
e crathbone@ncenet.com

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Reno, NV 89509
www.ncenet.com

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From:	Christina Rathbone
To:	consultation@ionemiwok.net
Cc:	Dave Rios; Donaldo Palaroan; Larson, William@DOT
Subject:	Upper Truckee Bridge at Johnson Meadows - 501.46.25
Date:	Wednesday, August 2, 2023 5:13:00 PM
Attachments:	Ione Band_Upper Truckee Bridge at Johnson Meadows.pdf

Greetings:

On behalf of El Dorado County of Transportation, in cooperation with the California Department of Transportation, I am conducting a two week follow up regarding the following proposed project (see attached letter):

> South Lake Greenway – Upper Truckee Bridge at Johnson Meadows, located on public land managed by the Tahoe Resource Conservation District within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd.

We have received the Native American Heritage Commission response indicating a **positive** Sacred Lands File result.

Please note there will be an archaeological monitor present for all ground disturbing activities.

This project requires compliance with Section 106 of the National Historic Preservation Act (NHPA). If you have any questions or would like to consult under Section 106 of the NHPA, please respond to this email.

Thank you,

Christina Rathbone
Archaeologist
NCE
c (414) 526-3413
e crathbone@ncenet.com

1885 S Arlington Ave #111
Reno, NV 89509
www.ncenet.com

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From:	Christina Rathbone
To:	tsi-akim-maidu@att.net
Cc:	Dave Rios; Donaldo Palaroan; Larson, William@DOT
Subject:	Upper Truckee Bridge at Johnson Meadows - 501.46.25
Date:	Wednesday, August 2, 2023 5:14:00 PM
Attachments:	Tsi Akim Maidu_Upper Truckee Bridge at Johnson Meadows.pdf

Greetings:

On behalf of El Dorado County of Transportation, in cooperation with the California Department of Transportation, I am conducting a two week follow up regarding the following proposed project (see attached letter):

> South Lake Greenway – Upper Truckee Bridge at Johnson Meadows, located on public land managed by the Tahoe Resource Conservation District within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd.

We have received the Native American Heritage Commission response indicating a **positive** Sacred Lands File result.

Please note there will be an archaeological monitor present for all ground disturbing activities.

This project requires compliance with Section 106 of the National Historic Preservation Act (NHPA). If you have any questions or would like to consult under Section 106 of the NHPA, please respond to this email.

Thank you,

Christina Rathbone
Archaeologist
NCE
c (414) 526-3413
e crathbone@ncenet.com

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Reno, NV 89509
www.ncenet.com

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From: DoNotReply@auburnrancheria.com
To: Christina Rathbone
Subject: South Lake Greenway - Upper Truckee Bridge at Johnson Meadows Notification Confirmation
Date: Wednesday, August 2, 2023 5:24:04 PM
Attachments: Thank you for consulting with the UAIC.pdf

The United Auburn Indian Community thanks you for your commitment to consultation for the following project:

South Lake Greenway - Upper Truckee Bridge at Johnson Meadows
Submission Date: 8/2/2023 8/2/2023 5:23:45 PM

You will find a copy of your consultation submission attached for your records.

Our Tribal Historic Preservation Department will review the project and respond as soon as possible. If you need to speak with someone regarding the project or your submission, please contact the Tribal Office at (530) 883-2390.

The United Auburn Indian Community is now accepting electronic consultation requests and project notifications. To learn more, click here.

**This is an automated email. Replies to this address will not be received.

Nothing in this e-mail is intended to constitute an electronic signature for purposes of the Electronic Signatures in Global and National Commerce Act (E-Sign Act), 15, U.S.C. §§ 7001 to 7006 or the Uniform Electronic Transactions Act of any state or the federal government unless a specific statement to the contrary is included in this e-mail.

Thank you for consulting with the UAIC

Please complete one form for each notification.

How to submit a consultation notification or project update:

1. **One form must be completed for each project.**
2. **Forms cannot be saved and completed at a later time.**
3. Include all relevant project information.
4. Upload file attachments. Multiple files can be attached.
5. Submit form.
6. You will receive a submission receipt via email when submission is complete. UAIC prefers our online submission form over certified or hard copy letters.

Contact the Tribal Office at (530) 883-2390 for questions or concerns. Ask for Tribal Historic Preservation or use the contact form located on our website.

Contact Information

Consulting on Behalf of *
El Dorado County of Transportation
Lead Agency, Consulting Firm, Tribe

Mailing Address
Street Address
924 B Emerald Bay Road
Address Line 2
City
South Lake Tahoe
State / Province / Region
CA
Postal / Zip Code
96150

Point of Contact for Consultation *
Donaldo Palaroan
Primary Contact Name

Point of Contact Email *
donaldo.palaroan@edcgov.us

Second Point of Contact
Yes
Is there more than one point of contact for this project?

Second Point of Contact

Contact Name * Christina Rathbone

Organization NCE

Email Address * CRathbone@ncenet.com

Address is same as above? * ○ Yes ◉ No

Second Point of Contact Address

Street Address
1150 Broadway Blvd
Address Line 2
City
Reno
State / Province / Region
NV
Postal / Zip Code
89502

Regulatory

Consulting Under * This project fall under the following regulatory requirements:

◉ Federal ○ State of California ○ Federal and State
○ Other

Federal Regulations * Select all that apply

- ☑ National Env. Policy Act/National Historic Preservation Act (Section 106)
- ☐ 408 Permit
- ☐ 404 Permit
- ☐ PL84-99
- ☐ Native American Graves Protection and Repatriation Act (NAGPRA)
- ☐ Other

Project Notification Information

Project Name * South Lake Greenway - Upper Truckee Bridge at Johnson Meadows
Please include Name and Reference Number (if applicable)

This is a *

- (●) New Project
- ( ) Public Hearing
- ( ) Request for Information
- ( ) Notice of Preparation (NOP)
- ( ) Notice of Availability (NOA)
- ( ) Other

Project Description

The El Dorado County of Transportation, in cooperation with the California Department of Transportation (Caltrans), proposes to implement the South Lake Greenway – Upper Truckee Bridge at Johnson Meadows, located on public land managed by the Tahoe Resource Conservation District. The project area includes over a mile of the Upper Truckee River (APNs 031-020-046, -049, -051, -052, and 032-090-015), within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd.The South Lake Tahoe Greenway – Upper Truckee Bridge at Johnson Meadows Project intends to improve the hydrologic function of the Upper Truckee River, ecosystem function of Johnson Meadow, climate resilience, water quality, and habitat conditions while continuing to support sustainable recreation. The project proposes to install a pedestrian bridge over the Upper Truckee River to replace the old concrete bridge and will construct approximately 1.2 miles of a shared-use path

Please include a brief project description

Project/Construction Year *

2024

Please select the year your project will initiate

Project/Construction Season

Please select the season your project will initiate (if applicable)

Environmental Document Timeline

Please share when your final environmental document is planned for public review

Location

Located on public land managed by the Tahoe Resource Conservation District. The project area includes over a mile of the Upper Truckee River (APNs 031-020-046, -049, -051, -052, and 032-090-015), within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd.

Please include county, city, and address (if available)

Project Documents

Documents uploaded to this form are secure and only accessible by the Tribal Historic Preservation team

Notification *

Attach notification letters or announcement

UAIC Letter.pdf 2.42MB

50mb maximum upload size (per file)

Reports

Attach project reports, project descriptions, or supporting documents. Please add the following if available: Cultural, Biology, Arborist

50mb maximum upload size (per file)

Location Map

Attach maps and location files. Shape files are preferred

Attachments.pdf 2.73MB

File extensions allowed: pdf, jpg, png, kmz, lpk, dbf, prj, shp, abn, sbx, xml, shx, cpg, .zip. NOTE: 50mb maximum upload size (per file).

Send Submission Receipt To

☐ Primary Contact ☑ Secondary Contact ☐ Different Email

***This form submission page is offered for the convenience of consulting agencies, developers, and their respective consultants. UAIC reviews all submissions received, but makes no guarantee that submission via this online form satisfies any particular consultation or notice requirement that exists under state or federal law.

From:	Christina Rathbone
To:	serrell.smokey@washoetribe.us; Patrick Burtt THPO
Cc:	Dave Rios; Donaldo Palaroan; Larson, William@DOT
Subject:	Upper Truckee Bridge at Johnson Meadows - 501.46.25
Date:	Wednesday, August 2, 2023 5:15:00 PM
Attachments:	Washoe Tribe_Upper Truckee Bridge at Johnson Meadows.pdf

Greetings:

On behalf of El Dorado County of Transportation, in cooperation with the California Department of Transportation, I am conducting a two week follow up regarding the following proposed project (see attached letter):

> South Lake Greenway – Upper Truckee Bridge at Johnson Meadows, located on public land managed by the Tahoe Resource Conservation District within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd.

We have received the Native American Heritage Commission response indicating a **positive** Sacred Lands File result.

Please note there will be an archaeological monitor present for all ground disturbing activities.

This project requires compliance with Section 106 of the National Historic Preservation Act (NHPA). If you have any questions or would like to consult under Section 106 of the NHPA, please respond to this email.

Thank you,

Christina Rathbone
Archaeologist
NCE
c (414) 526-3413
e crathbone@ncenet.com

1885 S Arlington Ave #111
Reno, NV 89509
www.ncenet.com

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From:	Christina Rathbone
To:	Venesa Kremer; cpd@wiltonrancheria-nsn.gov
Cc:	Dave Rios; Donaldo Palaroan; Larson, William@DOT
Subject:	Upper Truckee Bridge at Johnson Meadows - 501.46.25
Date:	Wednesday, August 2, 2023 5:16:00 PM
Attachments:	Wilton Rancheria_Upper Truckee Bridge at Johnson Meadows.pdf

Greetings:

On behalf of El Dorado County of Transportation, in cooperation with the California Department of Transportation, I am conducting a two week follow up regarding the following proposed project (see attached letter):

> South Lake Greenway – Upper Truckee Bridge at Johnson Meadows, located on public land managed by the Tahoe Resource Conservation District within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd.

We have received the Native American Heritage Commission response indicating a **positive** Sacred Lands File result.

Please note there will be an archaeological monitor present for all ground disturbing activities.

This project requires compliance with Section 106 of the National Historic Preservation Act (NHPA). If you have any questions or would like to consult under Section 106 of the NHPA, please respond to this email.

Thank you,

Christina Rathbone
Archaeologist
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c (414) 526-3413
e crathbone@ncenet.com

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April 12, 2023 - Tsi Akim Maidu

Grayson Coney, Cultural Director has confirmed that the preferred mailing address is:

PO Box 316
Colfax, CA 95713

The follow up email letters should then be sent to tsi-akim-maidu@att.net (the same is on NAHC list)

The Native American Heritage Commission Tribal Consultation (NAHC) list for Sacramento County is no longer correct for:
P.O. Box 510
Browns Valley, CA, 95918

January 9, 2023 - Wilton Rancheria

Venesa Kremer of the Wilton Rancheria Tribe, confirmed that the preferred way of contact is to mail a hard copy letter to:

9728 Kent Street
Elk Grove CA 95624

The follow up email letters should then be sent to cpd@wiltonrancheria-nsn.gov and vkremer@wiltonrancheria-nsn.gov where Vanesa Kremer, Lou Griffin and/or the department director Steven Hutchason will review. Follow-ups and questions can always be directed via phone through Wilton Rancheria's office number or a mobile number you previously provided.

The Native American Heritage Commission Tribal Consultation (NAHC) list for Sacramento County is no longer correct for:
Jesus Tarango, Chairperson - jtarango@wiltonrancheria-nsn.gov
Steven Hutchason, THPO - shutchason@wiltonrancheriansn.
Dahlton Brown, Director of Administration - dbrown@wiltonrancheria-nsn.gov

From: Anna Starkey
To: "Donaldo Palaroan"
Cc: Christina Rathbone
Subject: South Lake Greenway - Upper Truckee Bridge at Johnson Meadows
Date: Friday, August 11, 2023 1:52:24 PM

Good afternoon,
Thank you for the notification and opportunity to consult on the project reference above. UAIC prefers to defer to the Washoe Tribe for all projects east of Truckee as they may have more information on cultural sensitivity the UAIC may.

Thank you,
Anna

Anna M. Starkey, M.A., RPA
Cultural Regulatory Specialist
Tribal Historic Preservation Department| UAIC
10720 Indian Hill Road
Auburn, CA 95603
Direct Line: (916) 251-1565 | Cell: (530) 863-6503
astarkey@auburnrancheria.com |www.auburnrancheria.com

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From:	Christina Rathbone
To:	serrell.smokey@washoetribe.us; Patrick.burtt@washoetribe.us; Bernadette Nieto
Cc:	Dave Rios; Jeremy Hall
Subject:	Johnson Meadow Bridge: 501.46.25
Date:	Monday, August 28, 2023 2:10:00 PM
Attachments:	Washoe Tribe Letter.pdf Bio Overveiw Photos.pdf
Importance:	High

Hi everyone,

I wanted to reach out one more time in order to discuss the Johnson Meadow Bridge project and would like to inquire if you would be interested in commenting on this proposed project.

> South Lake Greenway – Upper Truckee Bridge at Johnson Meadows, located on public land managed by the Tahoe Resource Conservation District within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd.

The results of the Sacred Lands File (SLF) check conducted through the Native American Heritage Commission was **positive** and there are several historic sites within the APE.

I have attached the initial outreach letter along with some photographs, to get a better since of the APE.

Please contact me with a comment as soon as you can. Feel free to email or call (414-526-3413).

Thank you,

Christina Rathbone
Archaeologist

c (414) 526-3413
e crathbone@ncenet.com

1885 S Arlington Ave #111
Reno, NV 89509
www.ncenet.com

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From:	Patrick Burtt
To:	Christina Rathbone
Cc:	Dave Rios; Donaldo Palaroan; Larson, William@DOT
Subject:	RE: Upper Truckee Bridge at Johnson Meadows - 501.46.25
Date:	Friday, September 8, 2023 11:21:34 AM

Hi Christina,

Thank you for reaching out to the Washoe Tribe of Nevada and California. I greatly apologize for the very tardy response. I am hoping we could set up a meeting to discuss this project further. Are you available to meet virtually either Monday, 9/11 or Friday, 9/15? Please let me know some times that work for you. Thank you again.

All the best,

Patrick Deʔilélegiʔ Burtt, M.A.
Tribal Historic Preservation Officer
Washoe Tribe of Nevada and California
THPO@washoetribe.us | (775) 781-1363
919 US Hwy 395 N
Gardnerville, NV 89410

From: Christina Rathbone <CRathbone@ncenet.com>
Sent: Wednesday, August 2, 2023 5:16 PM
To: Serrell Smokey <Serrell.Smokey@washoetribe.us>; Patrick Burtt <THPO@WashoeTribe.us>
Cc: Dave Rios <DRios@ncenet.com>; Donaldo Palaroan <donaldo.palaroan@edcgov.us>; Larson, William@DOT <william.larson@dot.ca.gov>
Subject: Upper Truckee Bridge at Johnson Meadows - 501.46.25

Greetings:

On behalf of El Dorado County of Transportation, in cooperation with the California Department of Transportation, I am conducting a two week follow up regarding the following proposed project (see attached letter):

> South Lake Greenway – Upper Truckee Bridge at Johnson Meadows, located on public land managed by the Tahoe Resource Conservation District within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd.

We have received the Native American Heritage Commission response indicating a **positive** Sacred Lands File result.

Please note there will be an archaeological monitor present for all ground disturbing activities.

This project requires compliance with Section 106 of the National Historic Preservation Act (NHPA). If you have any questions or would like to consult under Section 106 of the NHPA, please respond to

this email.

Thank you,

Christina Rathbone
Archaeologist



c (414) 526-3413
e crathbone@ncenet.com

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From:	Christina Rathbone
To:	Patrick Burtt THPO
Cc:	Jeremy Hall; Dave Rios; Donaldo Palaroan
Subject:	Johnson Meadow Bridge Project
Date:	Wednesday, January 10, 2024 4:32:00 PM
Attachments:	Washoe Tribe Letter.pdf All DPR Forms Reduced.pdf

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Hello Patrick,

Thank you again for the meeting. I have noted the request for Tribal monitoring on this project and will pass along the information to the County. Once we start work on the monitoring plan, we will communicate all steps with you in order to address your concerns regarding the environment and ground distributing actives.

I have attached the Tribal letter and site forms per your request, and I will send over the archaeology report once it is completed.

Please let me know if you have any further questions.

Thank you,

Christina Rathbone
Archaeologist
NCE
c (414) 526-3413
e crathbone@ncenet.com

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Tribal Summary Log - South Lake Greenway – Upper Truckee Bridge at Johnson Meadows Project

This summary pertains to Tribal Consultation and Correspondence for the South Lake Greenway – Upper Truckee Bridge at Johnson Meadows Project, located on public land managed by the Tahoe Resource Conservation District. The project area includes over a mile of the Upper Truckee River (APNs 031-020-046, -049, -051, -052, and 032-090-015), within the City of South Lake Tahoe and in the unincorporated area of El Dorado County between Winnemucca Avenue and Sierra Boulevard. The project is also adjacent to Grocery Outlet, Barton Hospital, the Tahoe Valley Campground and U.S. Highway 50/ Lake Tahoe Blvd. Native American correspondence was initiated by NCE with a letter and attached maps to the Native American Heritage Commission (NAHC) on August 23, 2022. The letter requested a record search of their Sacred Lands File (SLF) and a contact list for regional tribes that may have knowledge of cultural or tribal resources within or immediately adjacent to the project area. Inquiry letters were emailed and mailed to the tribes identified by NAHC on July 18, 2023, on County of El Dorado Department of Transportation letterhead. Follow-up emails were made to all tribes identified by the NAHC on August 2, 2023. On January 10, 2024, a meeting was held and attended by Patrick Burtt, Washoe Tribe of Nevada and California THPO, who requested Tribal monitoring for the project.

Tribal Affiliation	Representative	Title
Ione Band of Miwok Indians	Sara Dutschke	Chairperson
Tsi Akim Maidu	Don Ryberg	Chairperson
Tsi Akim Maidu	Grayson Coney	Cultural Director
United Auburn Indian Community of the Auburn Rancheria	Gene Whitehouse	Chairperson
Washoe Tribe of Nevada and California	Patrick Burtt	THPO
Washoe Tribe of Nevada and California	Serrell Smokey	Chairperson
Wilton Rancheria	Venesa Kremer	Chairperson
Colfax-Todds Valley Consolidated Tribe	Pamela Cubbler	Vice Chairperson
Colfax-Todds Valley Consolidated Tribe	Clyde Prout	Chairperson
Colfax-Todds Valley Consolidated Tribe	CTVCT Preservation	Cultural Preservation Dept.

The table below provides a summary of correspondence. Consultation-related material, including the NAHC request and an example of the tribal consultation letters sent, is located on the following page.

Tribal Affiliation	Representative	Sent Letters	Follow Up Letters	Communications
Ione Band of Miwok Indians	Sara Dutschke	7/18/23	8/2/23	Hard copy received 7/19/23. No response to date.
Tsi Akim Maidu	Don Ryberg Grayson Coney	7/18/23	8/2/23	No response to date.
United Auburn Indian Community of the Auburn Rancheria	Gene Whitehouse	7/18/23	8/2/23	Hard copy received 7/19/23. UAIC defers to Washoe Tribe 8/11/23

Pt. Richmond, CA
501 Canal Blvd., Suite I
Pt. Richmond, CA 94804
(510) 215-3620

Washoe Tribe of Nevada and California	Patrick Burtt Serrell Smokey	7/18/23	8/2/23	Hard copy received. Third outreach letter was sent 8/28/23. Requested meeting on 9/15/23. 1/10/24 – Meeting with Patrick where he requested Tribal monitoring. He would like to be included in the monitoring report and has concerns about equipment and environmentally friendly fluids being used in machinery so no harm will come to the environment.
Wilton Rancheria	Venesa Kremer	7/18/23	8/2/23	Hard copy received 7/19/23. No response to date.
Colfax-Todds Valley Consolidated Tribe	Pamela Cubbler Clyde Prout CTVCT Preservation	7/18/23	8/2/23	No response to date.

Pt. Richmond, CA
501 Canal Blvd., Suite I
Pt. Richmond, CA 94804
(510) 215-3620

Appendix D

Project Photographs

(sensitive info redacted)

Date	Frame	Site	Description	mE	mN	Direction
8/29/23	1	P-09-006059	Site overview	[redacted]		40°
8/29/23	2	P-09-006059	Bridge feature overview			50°
8/29/23	3	P-09-006059	Bridge feature overview			285°
8/29/23	4	P-09-006059	Site overview			260°
8/29/23	5	P-09-004537	One-inch-thick metal wire			Detail
8/30/23	6	P-09-004529	Historic road overview			190°
8/30/23	7	P-09-004537	Start of dirt road located in northeast portion of the road			240°
8/30/23	8	P-09-004537	Road overview			40°
8/30/23	9	P-09-004537	Site overview			220°
8/30/23	10	P-09-004537	Start of road within the APE			65°
8/30/23	11	P-09-004537	Site overview			230°
8/30/23	12	P-09-004537	Paved section of the road			260°
8/30/23	13	-	Staging area overview			150°
8/30/23	14	-	Staging area overview			350°
8/30/23	15	P-09-004529	Start of paved road section with staging are to the left			220°
8/30/23	16	P-09-004529	Site overview			40°
8/30/23	17	P-09-004529	Road overview			0°
8/30/23	18	-	Project area overview			30°
8/30/23	19	P-09-004529	Lakehouse Road overview			200°
8/30/23	20	P-09-004529	Site overview			60°
8/31/23	21	P-09-006059	Johnson Ranch overview			110°
8/31/23	22	P-09-006059	Ranch complex feature overview, fence with metal gate			90°
8/31/23	23	P-09-006059	Ranch complex feature overview, wood fencing			285°
8/31/23	24	P-09-006059	Bridge overview			150°
8/31/23	25	P-09-006059	Stump fence post feature overview			30°
8/31/23	26	P-09-006059	Stump fence post feature overview			90°
8/31/23	27	-	Project area overview			180°
8/31/23	28	-	Project area overview			300°
8/31/23	29	-	Project area overview			240°



Frame 1 - P-09-006059, Site overview, facing 40 degrees,
240654mE 4311194mN (8/29/2023)



Frame 2 - P-09-006059, Bridge feature overview, facing 50 degrees,
240696mE 4311206mN (8/29/2023)



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DPR Site Forms

(redacted for pubic distribution)

Appendix H

Geotechnical Report

Preliminary Geotechnical Investigation

Upper Truckee River Bridge at Johnson Meadow

El Dorado County, California

July 26, 2024

Prepared for
NCE

Prepared By

Corestone Engineering, Inc.

Mr. David Rios, CPESC, CPSWQ
NCE
P.O. Box 1760
Zephyr Cove, NV 89448

July 26, 2024
Project No.: 5012-05-1

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RE: Preliminary Geotechnical Investigation
Upper Truckee River Bridge at Johnson Meadow
El Dorado County, California

Dear Mr. Rios:

Corestone Engineering, Inc. is pleased to present the results of our preliminary geotechnical investigation for the above-referenced project. Our investigation consisted of research, field exploration, laboratory testing, and engineering analysis to allow formulation of geotechnical conclusions and preliminary recommendations for design and construction of the proposed bridge crossing at the Upper Truckee River and the boardwalk system associated with the overall South Tahoe Greenway shared use path project.

The proposed Upper Truckee River Bridge at Johnson Meadow project will include a bridge across the Upper Truckee River supported by seat-type end abutments on either side of the river as will several hundred feet of elevated boardwalk system for the path. The bridge and boardwalk structures will lie in about 1,000-foot-long segment of the overall approximately 1.2-mile-long overall shared use path project near the southern limits of the South Lake Tahoe community in El Dorado County of California.

Site exhibits mostly granular soils; however, near surface soils west of the Upper Truckee River (within Johnson Meadow area) are generally loose and the groundwater in this area is as shallow as 4 feet depth below existing ground surface. Shallow spread footings can be used at bridge abutments but a relatively shallow liquefiable soil layer at the west abutment location should be mitigated via the removal and replacement approach. The proposed 800+ feet long boardwalk west of the river should be supported by deep foundations due to the presence of liquefiable submerged soils to 12 feet depth. Driven steel pipe piles are appropriate for boardwalk foundations and will be utilized. Depending on final geotechnical design by others and structural design, driven steel pipe piles may also be utilized for bridge abutments.

We appreciate having the opportunity to work with you on this project. If you have any questions regarding the content of the attached report, please do not hesitate to contact us.

Sincerely,

Corestone Engineering, Inc



Vimal P. Vimalaraj, P.E., G.E.
President
PV:RVS:pv/lkv

Copies to: Addressee (PDF)
Mr. Donaldo Palaroan, P.E., County of El Dorado Transportation Department (PDF)

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1.0 Introduction

Presented herein are the results of Corestone Engineering, Inc.'s (CEI's) geotechnical investigation, laboratory testing, and associated preliminary geotechnical design recommendations for the proposed Upper Truckee River bridge crossing and boardwalk within and near Johnson Meadow area as part of the South Tahoe Greenway Class 1 shared use path project in South Lake Tahoe community area of El Dorado County, California. These recommendations are based on surface and subsurface conditions encountered in our explorations and on details of the proposed project as described in this report. The objectives of this study were to:

1. Determine general soil and groundwater conditions pertaining to design and construction of the proposed bridge and boardwalk improvements on the shared use path project.

2. Provide preliminary geotechnical recommendations for design and construction of the project as related to the geotechnical conditions encountered in our study.

The project area covered by this report generally includes the limits of the proposed bridge crossing at Upper Truckee River and boardwalk west and east of the river that are identified on Plate 1 (Location of Borings Map). Our investigation included field exploration, laboratory testing, and geotechnical engineering analysis to determine the physical and mechanical properties of the various on-site materials. Results of our field exploration and testing programs are included in this report and form the basis for all geotechnical data, conclusions, and recommendations.

The services described above were conducted in accordance with the Master Subconsultant Agreement No. SC344-21 between NCE and CEI dated August 13, 2021, and NCE's work authorization number 03 for the Johnson Meadows Bridge project dated May 5, 2023. Some additional geotechnical tasks based on the review comments by project design team on the draft geotechnical investigation report including the advancement of an additional 80-foot-deep geotechnical boring were completed per CEI proposal dated May 3. 2024.

2.0 Project Description

2.1 Project Location

The overall Class 1 shared use path project alignment spans from the south end of Winnemucca Avenue and to the intersection of Sierra Boulevard and Barbara Avenue and is approximately 1.2-mile-long. The path will include a bridge crossing and boardwalk system on either side of the bridge at the Upper Truckee River within the Johnson Meadow area; this approximately 1,000-foot-long segment of the proposed path is the project limit covered in this geotechnical study ("Project Site"). The site is entirely contained in Section 4, Township 12 North, Range 18 East, Mount Diablo Meridian in El Dorado County, California. The site is located within the forested land east of the river and meadow west of the river and lies within multiple publicly owned parcels. The approximate latitude and longitude of the proposed bridge crossing at the Upper Truckee River within the project site are 38.91134 degrees and -119.99076 degrees, respectively. Access to the site is obtained via the existing user trails from Winnemucca Avenue and Beecher Avenue.

2.2 Proposed Project Details

As noted above, the proposed bridge and boardwalk system will be located within an approximately 1,000-foot-long segment of the overall 1.2-mile-long Class 1 shared use path improvements. Outside the limits of bridge and boardwalk at and near the Upper Truckee River crossing, the project improvements will include relatively minor grading and including an asphalt concrete surfacing for the path. The at-grade path segments will include 10-foot-wide asphalt concrete pavement plus 2-foot-wide gravel shoulders on either side of the path. The bridge and boardwalk system on the proposed project are anticipated to be similar to those are being planned at the San Bernadino Class 1 Bike Trail Project in Meyers community area of El Dorado County, California. It is noted that CEI provided geotechnical investigation and design services for the San Bernadino Class 1 Bike Trail Project (CEI, 2019; 2021).

Based on the 30 percent preliminary project plans developed by El Dorado County Department of Transportation for the overall shared use path project, the bridge crossing at the Upper Truckee River will be an approximately 140-foot-long single span structure supported by two end abutments (west abutment and east abutment) located west and east of the river. The bridge will be a fabricated steel structure with cast-in-place Portland cement concrete (PCC) deck. The bridge will include 5+ feet tall rails and will be about 14-foot-wide with 12-foot-wide clearance between safety rails. The boardwalk system will extend approximately 100-foot east of the bridge and about 875-foot west of the bridge within the Johnson Meadow. The elevation of the boardwalk above existing ground surface along the path alignment will vary and the clearance will likely be highest near the bridge. The western segment of the boardwalk away from the bridge will likely be located just above the existing ground surface. Boardwalk is expected to include precast PCC tread placed on precast PCC beams.

The bridge abutments will be seat-type and will have the abutment stem walls extending from foundation to superstructure levels. Abutments will be located significantly outside the normal limits of the river and are expected to be supported by conventional PCC shallow spread foundations. The bridge scour information is yet to be determined; however, the shallow foundations will be founded at sufficient depths with additional rock slope protection to minimize the undermining of abutment footings.

Due to the significant numbers of foundation supports needed for the boardwalk system, driven pile foundations are expected to be utilized. A similar El Dorado County San Bernadino project includes driven fiberglass composite piles for the boardwalk system. However, bearing soil layers along the boardwalk alignment on this project consist of dense to very dense sand soils with some gravels; as such, fiberglass composite piles may be damaged during driving into very dense soils and might not reach the design tip elevations that should extend sufficiently into dense to very dense soils to provide the needed axial and lateral resistance. It is also understood that the fiberglass composite piles driven during recent test pile program at San Bernardino project encountered damages at relatively shallow depths in subsurface medium dense to dense sand soils. Therefore, driven steel pipe piles are considered appropriate for the dense to very dense bearing soils encountered in our exploration for this project and have been utilized in the preliminary geotechnical design included in this report.

2.3 Design Standards and Preliminary Structural Loads

The proposed bridge structure will be designed and constructed per the California Department of Transportation (Caltrans) standards utilizing Load resistance factor Design (LRFD) method. In particular, the American Association of State Highway and Transportation Officials (AASHTO) *LRFD Bridge Design Specifications, 8th Edition* (AASHTO, 2017) with latest Caltrans amendments will be followed in the design of the proposed bridge. It is our understanding that the final bridge structure design is also expected to follow the applicable *AASHTO Guide Specifications for Design of Pedestrian Bridges, 2nd Edition, with 2015 Interim Revisions*, as applicable. The seismic design will be completed in accordance with Caltrans *Seismic Design Criteria* Version 2.0 (Caltrans, 2019a).

At the time of this preliminary geotechnical report, bridge foundation design information was unavailable. Due to the same length, width, and structure type, we anticipate the foundations for the proposed Upper Truckee River bridge will be similar to the bridge planned on the San Bernadino project. We utilized the bridge design information and structural loads for San Bernadino project in the preliminary geotechnical design for shallow foundations of the proposed bridge. Table 1 (Preliminary Bridge Foundation Design Data) provides the summary of the anticipated shallow foundations at each abutment and were utilized in the geotechnical analyses. In addition, the controlling load combinations for service, strength, construction, and extreme event limits states provided by the bridge foundation designer for San Bernadino project are shown on Table 2 (LRFD Service-I Limit State Loads for Controlling Load Combinations) and Table 3 (LRFD Strength, Construction and Extreme Event Loads for Controlling Load Combinations). The

preliminary geotechnical analyses and recommendations included in this draft geotechnical investigation report should be updated once updates to the foundation information and structural loads in Table 1, Table 2, and Table 3 become available from the bridge design engineer. No foundation load information was available for boardwalk system at the time of this geotechnical investigation report.

Based on our coordination with the project design team and the County of El Dorado Transportation Department, it is our understanding that the geotechnical information and preliminary geotechnical analyses results and recommendations contained in this preliminary geotechnical report will be utilized by a geotechnical consultant to provide final foundation design for the proposed bridge and boardwalk structures. This geotechnical consultant will collaborate with the project structural design engineer regarding the final foundation details and structural loads to complete the final geotechnical design for the foundations and will ultimately prepare a standalone final foundation design report for the project.

TABLE 1 – PRELIMINARY BRIDGE FOUNDATION DESIGN DATA

Substructure No.	Finished Grade Elevation (feet)	Bottom of Footing Elevation (feet)	Estimated Footing Width, B (feet)	Estimated Footing Length, L (feet)	Permissible Settlement under Service-I Load, (inch)	Estimated Ratio of Permanent/ Total Service-I Load
West Abutment	TBD[1]	TBD[1]	12.0	18.0	2.0	0.4
East Abutment[2]	TBD[1]	TBD[1]	12.0	18.0	2.0	0.4

[1] To be Determined.
[2] Foundation width for east abutment is expected to be narrower than east abutment due to better bearing soil conditions.

TABLE 2 – LRFD SERVICE-I LIMIT STATE LOADS FOR CONTROLLING LOAD COMBINATION[1]

Design No.	Total Load					Permanent Load				
	P_{Total} (kips) Net	M_X (kip-ft)	M_Y (kip-ft)	V_X (kips)	V_Y (kips)	P_{Total} (kips) Net	M_X (kip-ft)	M_Y (kip-ft)	V_X (kips)	V_Y (kips)
West Abutment	669	-765	N/A	N/A	119	669	65	N/A	N/A	49
East Abutment	669	-765	N/A	N/A	119	669	65	N/A	N/A	49

[1] Controlling load combination is the one resulting in the highest ratio of $q_{g,u}/q_R$ for foundations on soil, or $q_{g,max}/q_R$ for foundation on rock.

TABLE 3 – LRFD STRENGTH, CONSTRUCTION AND EXTREME EVENT LOADS FOR CONTROLLING LOAD COMBINATIONS										
Design No.	**Strength/Construction Limit State (Controlling Group)[1]**					**Extreme Event Limit State (Controlling Group)[1]**				
	P_{Total} (kips) Net	**M_X (kip-ft)**	**M_Y (kip-ft)**	**V_X (kips)**	**V_Y (kips)**	**P_{Total} (kips) Net**	**M_X (kip-ft)**	**M_Y (kip-ft)**	**V_X (kips)**	**V_Y (kips)**
West Abutment	1,028	1,285	N/A	N/A	-51	N/A	N/A	N/A	N/A	N/A
East Abutment	1,028	1,285	N/A	N/A	-51	N/A	N/A	N/A	N/A	N/A

[1] Controlling load combination is the one resulting in the highest ratio of $q_{g,u}/q_R$ for foundations on soil, or $q_{g,max}/q_R$ for foundation on rock.

3.0 Site Conditions

The project site associated with the proposed bridge crossing and elevated boardwalk includes the limits of the Upper Truckee River, eastern and western bank/slope of the river, and the flat-lying meadow west of the river. The Upper Truckee River flows north within the eastern limits of the project site. The width of the river at the proposed bridge alignment is more than 50 feet and the river had about 1 to 2 feet of water during our site visit in September 2023. The western bank of the river is up to 4 feet tall and then the relatively flat area of Johnson Meadow extends westward for about 800 feet from the riverbank. The eastern riverbank rises moderately from the river and exhibits about 20 feet of vertical relief within the project area to host the eastern bridge abutment and the eastern boardwalk segment. The remaining portion of the damaged old bridge crossing is preset about 100 feet north of the proposed bridge crossing. The old bridge includes a wooden superstructure supported by PCC footings with stem walls. At the time of our July and September 2023 site visits, the river had two low flow channels east and west of the western abutment of the old bridge. On the east side of the river, the existing unimproved trail alignment is present about 100 feet north of the proposed trail alignment. On the west side of the river, existing unimproved trail alignment (includes gravel surfacing in some limited segments) generally follows the proposed trail alignment (elevated boardwalk) except within 150 feet of the river where trail is located north of the proposed bridge/boardwalk structures. An approximately north-south-trending sewer line easement with underground sewer pipe and manholes is present about 150 feet west of the river within the project limits.

The slope east of the Upper Truckee River exhibits mature pine trees and tall brush except for some localized flatter areas (including the area of the borings) where vegetation includes grass. Seepage from uphill area east of the project limits and standing water were observed within flat-lying portion of the project site east of the Upper Truckee River. Vegetation west of the river varies significantly from areas of short and tall grass to areas of heavy tall brush to areas of mature trees. Site drainage appears to occur via overland and sheet flow following native gradients (including towards the river.)



Upper Truckee River at Proposed Bridge Crossing – View to the Southeast

4.0 Exploration

4.1 Drilling

The Upper Truckee River Bridge project site was explored on September 11 and 12, 2023, by drilling 4 test borings (Borings B-01 through B-04) and on June 25, 2024 by drilling an additional boring B-02A. The locations of the borings are shown on Plate 1. A well/drilling permit was obtained from El Dorado County Environmental Management Department to complete the exploration borings. The borings were initially drilled using 6-inch-outside-diameter (O.D.), hollow stem augers and then continued using mud rotary drilling technique and 4-inch-O.D. tricone bit below groundwater table. A track-mounted CME 55 soils sampling drill rig was utilized in the exploration. The maximum depth of exploration was 81.5 feet below the existing ground surface.



Drilling Exploration (Boring B-02)

The native soils were sampled in-place every 2.5 to 10 feet by use of a standard, 2-inch-O.D., split-spoon sampler driven by a 140-pound automatic drive hammer with a 30-inch stroke. The number of blows to drive the sampler the final 12 inches of an 18-inch penetration (Standard Penetration Test [SPT] - American Society for Testing and Materials [ASTM] D 1586) into undisturbed soil is an indication of the density and consistency of the material. Sampling with the mud rotary drilling technique below groundwater table for the purpose of obtaining undisturbed number of blows to use in subsequent liquefaction evaluation of the submerged soils was performed in general accordance with ASTM D 6066.

A 3-inch-O.D., split-spoon sampler (modified California [MC] sampler) (ASTM D 3550) was also used to sample soils containing fine-grained soils, gravels, or where approximate in-place samples densities of subsurface materials were required. Sampling methods used were similar to the SPT but also included the use of 2-½-inch-diameter, 6-inch-long, brass sampling tubes placed inside the split-spoon sampler. Because of the larger diameter of the sampler, blow counts are typically higher than those obtained with the SPT and should not be directly equated to SPT blow counts. The logs indicate the type of sampler used for each sample. In general, the blow counts using the larger MC sampler can be converted to equivalent SPT blow counts via multiplying a factor of 0.65 for clays and a factor of 0.41 for sands.

Based on the calibration records, the auto hammers used in 2023 exploration and 2024 exploration have an efficiency of 79 percent. The field SPT blow counts (N values) reported in the boring logs may be multiplied by 1.32 to determine standard SPT blow counts using a hammer with the standard 60 percent efficiency (N_{60} values).

Groundwater was encountered in all 5 borings and groundwater levels were measured at the time of exploration.

4.2 Material Classification

A geotechnical engineer licensed in the State of California examined and identified all soils in the field in accordance with ASTM D 2488 and the Caltrans logging manual (Caltrans, 2023). During drilling exploration, representative bulk samples were placed in sealed plastic bags and returned to our Reno, Nevada, office for additional evaluation and laboratory testing assignments. Additional soil classification was subsequently performed in accordance with ASTM 2487 (Unified Soil Classification System [USCS]) upon completion of laboratory testing, as described in the **Laboratory Testing** section. A soil classification chart and other Caltrans (2023) logging manual information are included in Appendix A-1 (Boring Record Legend). Boring logs are presented as Appendix A-2 (Boring Records).

The boring records (Appendix A-2) show the approximate stations, offsets, and surface elevations for the boring locations estimated from 30 percent plans for the overall bike trail project. The elevations shown (in feet above mean sea level [msl]) are in terms of NAVD88.

4.3 Riverbank Sampling

In order to provide geotechnical information for scour and hydraulic design for the bridge abutments, CEI completed sampling of near surface soils on the east and west banks of the Upper Truckee River at the approximate bridge crossing alignment on May 21, 2024. Two shallow test holes (TH-01 and TH-02) were advanced via hand digging to about 1 foot below the existing ground surface to collect riverbank soil samples for gradation testing to allow for determination of median diameters of riverbank soils (D_{50} values). The approximate locations of test holes are shown on Plate 1. Laboratory gradation testing and results are discussed in the **Laboratory Testing** section. Based on the laboratory test results, D50 values for east and west riverbank soils are approximately 0.58 and 0.95 millimeters, respectively.

4.4 Shear Wave Velocity Surveys

A refraction microtremor (ReMi) shear wave velocity survey was performed to evaluate the average shear wave velocity within the upper 100 feet (30 meters) of subsurface materials (Vs30) within the project site to develop seismic design parameter for the seismic design of the project. The shear wave velocity survey was performed by Construction Materials Engineers, Inc. (CME) of Reno, Nevada geotechnical personnel in accordance with the specific instructions provided by CEI. Methodology and results of this analysis are

included in Appendix A-3 (Shear Wave Velocity Modeling Results.) The approximate location of the geophysical survey lines S1 and S2 east and west of the river, respectively, are shown on Plate 1. The Vs30 values from shear wave velocity surveys and seismic site class are discussed later under Section 8.2 **Seismic Design Criteria**.

5.0 Laboratory Testing

Corestone Engineering, Inc. subcontracted CME of Reno, Nevada to complete laboratory testing to analyze soil characteristics (detailed below) in general accordance with the standards and methodologies described in Volume 4.08 of the ASTM Standards. Chemical (corrosion) testing detailed below were performed per California Test Methods (CTM) by SGS Silver State Analytical Laboratories of Reno, Nevada.

5.1 Index Tests

Samples of each significant soil type were analyzed to determine their in-situ moisture content (ASTM D 2216), grain size distribution (ASTM D 422), and plasticity index (ASTM D 4318). The results of these tests are shown on Appendix B-1 (Index Test Results). Test results were used to classify the soils according to ASTM D 2487 and to verify field logs, which were then updated as appropriate. Classification in this manner provides an indication of the soil's mechanical properties and can be correlated with standard penetration testing and published charts (Bowles, 1996; Naval Facilities Engineering Command [NAVFAC], 1986a and b) to use in geotechnical analysis.

In addition, grain size distribution testing (ASTM D 422) was completed on riverbank samples collected east and west of the Upper Truckee River in test holes TH-01 and TH-02, respectively, to determine median diameter of riverbank materials (D_{50} values) for utilization by others in the scour and hydraulic design of bridge abutment foundations to evaluate any needed rock slope protection. These test results are also contained in Appendix B-1, specifically on sheet Appendix B-1.12.

5.2 Direct Shear Tests

Two direct shear tests (ASTM D 3080) were performed on representative samples of subsurface soils in the proposed bridge and boardwalk area. The tests were run on remolded, inundated samples under various normal loads in order to develop a Mohr's strength envelope. The samples were screened to remove particles larger than the number 4 sieve prior to testing. The samples were remolded to the approximate in place densities determined from MC samples. Results of these tests are shown on Appendix B-2 (Direct Shear Test Results) and were used in calculation of bearing capacities, friction factors, and lateral earth pressures.

5.3 Chemical Tests

Chemical testing was performed on a representative sample of site foundation soils at the proposed bridge crossing to evaluate the site materials' potential to corrode steel and PCC in contact with the ground. The sample was tested for pH, resistivity, redox potential, soluble sulfates, and chlorides. The results of the chemical tests are shown on Appendix B-3 (Chemical Test Results).

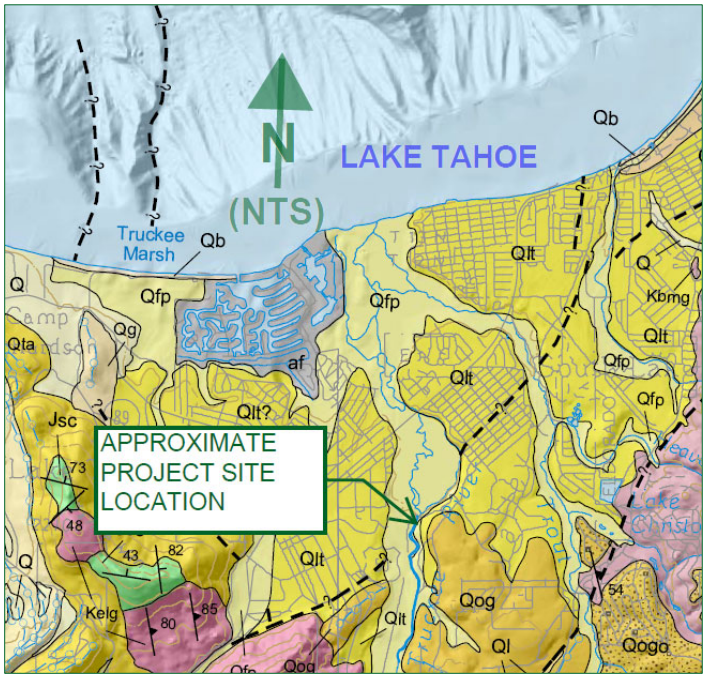
6.0 Site Geology and Subsurface Conditions

6.1 Regional Geology and Seismicity

The project site is in the Tahoe Basin of the Sierra Nevada mountains. The Tahoe Basin is within the Sierra Nevada Batholith consisting of mainly massive, Cretaceous age granitic rock subsequently overlain by Tertiary age volcanic and volcaniclastic rock. Within late Tertiary and Quaternary time, Basin and Range style extensional regional faulting has extended into the Sierra Nevada, and the Tahoe Basin is a fault-bounded basin at the western edge of Basin and Range faulting. The current landscape has been shaped by an extensive Pleistocene age glacial history and continues to be shaped by fluvial and lacustrine processes and active faulting. Because of its geological settings, the Tahoe Basin has a high potential for strong seismic shaking.

6.2 Site Geology

The project site lies within an area mapped by California Geological Survey (CGS) in a regional geological map as Holocene age *Flood-plain deposits* ([Qfp] Saucedo, 2005). The geological map for the South Lake Tahoe quadrangle associated with the project area (and referenced in the CGS regional geologic map) indicates that the site surficial soils consist of Holocene age *Flood plain and lacustrine deposits* that are described *as fluvial sediments in low-gradient flood plains; Typically dusky brown, poorly sorted, slightly gravelly medium sand, locally organic/rich; Deposited by low-gradient streams in march and back-beach environments; Lacustrine sediments are thin-bedded silt and clay present in the delta formed by the Upper Truckee River* (Bonham and Burnett, 1976). Pleistocene age (pre-Tahoe age) glacial outwash and till consisting of gravel, sand and silt deposited by glacial meltwater are mapped just east of the project site (Bonham and Burnett, 1976). Per the CGS regional geological map, the surficial soils along the moderately sloping eastern bank of the Upper Truckee River consist of Pleistocene age *lacustrine terraced deposits* ([Qlt] Saucedo, 2005). Native soils encountered west of the Upper Truckee River correspond with the geological map description for floodplain and possible lacustrine deposits. The eastern limits of the project (area of boring B-01 near east



Portion of Geologic Map (Saucedo, 2005)

abutment for the proposed bridge and the short eastern segment of the boardwalk) appear to lie in an area with surficial lacustrine terrace deposits underlain by well-compacted glacial till deposits.

6.3 Subsurface Soil Conditions

The soils profile west of the Upper Truckee River typically consists of very loose to medium dense silty sand to silty sand with gravel to poorly graded sand with silt or gravel soil layers through about 12 feet depth below existing ground surface underlain by dense to very dense silty sand and silty sand with gravel soils through maximum depth of exploration, approximately 81.5 feet below existing ground surface. Infrequent sandy silt surficial layers and interbeds also exist within the Johnson Meadow area west of the Upper Truckee River. The surficial sandy silt layer encountered in boring B-03 through 4 feet depth is medium stiff (firm) to stiff in consistency and the deeper sandy silt interbeds are hard. The site soils profile site west of the river consists of very stiff fat clay with sand soil layer through approximately 3.5 feet depth below existing ground surface underlain by dense to very dense silty sand and silty sand with gravel soils.

Native silty sand to silty sand with gravel soils west of the Upper Truckee River within deeper horizon generally contain up to about 25 percent non-plastic fines and up to about 30 percent subrounded fine to medium gravels. Shallow sand deposits show significant variation in percentages of non-plastic to low plasticity fines (from about 2 to 48 percent). Gravels are generally infrequent within the western floodplain deposits. Surficial and interbedded sandy silt and silt with sand soils within the western limits of the project site generally contain approximately 60 to 72 percent non-plastic to low plasticity fines. The surficial fat clay with sand encountered east of the Upper Truckee River exhibits about 80 percent high plasticity fines. The underlying dense to very dense silty sand soils encountered in the eastern boring B-01 contain approximately 15 to 26 percent non-plastic fines. Fine to medium subangular gravels were frequent within the deeper soils profile west of the Upper Truckee River but they vary in quantities from about 5 to 35 percent.

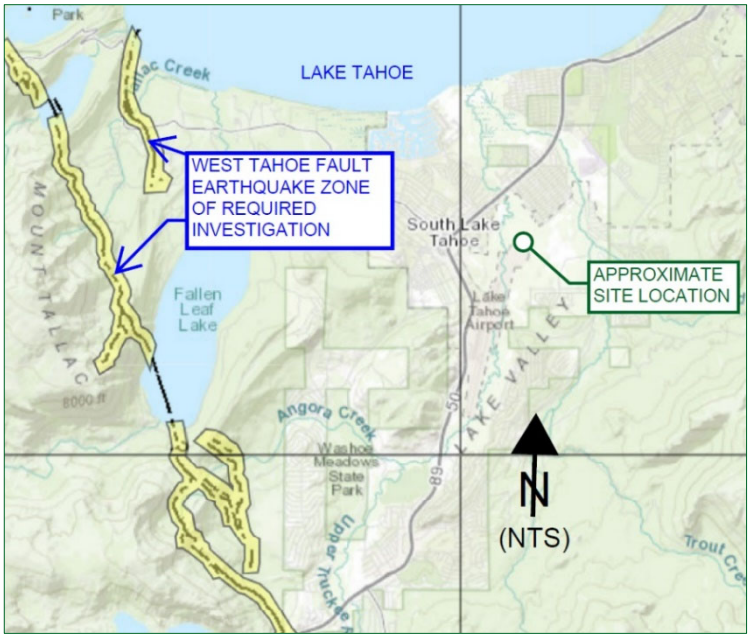
6.4 Groundwater

Groundwater was encountered in each boring at the time of exploration at varying depths of approximately 4 to 10 feet below existing ground surface. Groundwater was encountered at depths of 4 to 5.5 feet within the Johnson Meadow area west of Upper Truckee River. Eastern boring B-01 that was drilled from somewhat higher ground elevations than the river level and this boring encountered groundwater at 10 feet depth below existing ground surface. The measured groundwater depths correspond to approximate elevations of between 6,236 feet above msl and 6,238 feet above msl. Fluctuations in the groundwater table will occur due to rainfall, temperature, seasonal runoff, Upper Truckee River water level, and other factors. Groundwater near the Upper Truckee River will generally be controlled by the river water level. Groundwater is expected to affect the excavations for footings west of the river and will warrant dewatering and excavation bottom stabilization efforts. Surficial ponded and seepage water from the upslope east of the river will also complicate the project construction.

7.0 Geologic Hazards

7.1 Seismicity and Faults

The Lake Tahoe basin lies within an area with a high potential for earthquake shaking. It is generally accepted that a maximum credible earthquake in this area would be in the range of magnitude 7 to 7.5 along the Genoa fault system of the eastern Sierra Nevada. The most active segment of this fault system in the Tahoe area is located at the base of the eastern side of the mountains about 8 miles east of the project area.



Earthquake Fault Zones (CGS, 2023b)

Quaternary age concealed fault splays associated with the Tahoe Valley Fault Zone are mapped in the project vicinity (CGS, 2023a). These fault splays extend as close as about 400 feet south of the proposed project alignment and are identified by CGS as having undifferentiated Quaternary age with approximate locations. It is noted that these fault splays are not shown in the earthquake hazards map for the South Lake Tahoe quadrangle (Trexler and Bell, 1979). Holocene age (active within past 11,700 years) West Tahoe Fault is mapped by CGS at about 4 miles west of the project site (CGS, 2023a). This Holocene age fault is also a mapped Alquist-Priolo Earthquake Fault Zone (EFZ) with required investigation (CGS, 2023b) as shown on the figure. Because the site does not lie within an EFZ that are earthquake zones of required investigation and no unmapped faults were suggested within the site during our investigation, no additional fault investigation or mitigation is considered necessary for the proposed project.

7.2 Fault Rupture

There are no known ground rupture locations within or in the general area of the project site. The absence of ground faults passing through the site suggests the potential for ground rupture within the project site is negligible.

7.3 Ground Motion

The Caltrans *ARS Online* web-based tool was utilized in determining the design response spectrum for the site (Caltrans, 2024). Based on the analysis, the horizontal design peak ground acceleration for the site is

0.49 g. Additional information with respect to ground motion for the site is presented later in this report under **Seismic Design Criteria** (Section 8.2).

7.4 Liquefaction

The project site is identified by the earthquake hazards map for the South Lake Tahoe quadrangle to lie in area of greatest severity of shaking with possible severe liquefaction (Trexler and Bell, 1979). Based on our site exploration, the site area west of the Upper Truckee River is underlain by submerged very loose to medium dense sand layers through about 12 feet depth below existing ground surface. Therefore, a detailed liquefaction analysis is warranted to determine the liquefaction hazard at the site and to evaluate the liquefaction-induced settlement at the bridge and boardwalk footing grades.

7.4.1 Liquefaction Evaluation and Results

Liquefaction analysis of project site west of the Upper Truckee River was performed using subsurface information obtained from borings B-02 through B-04 that were advanced using mud rotary drilling techniques. It is noted that boring B-01 east of the river was also advanced using mud rotary drilling technique below groundwater table; however, this boring show dense to very dense submerged soils that will not liquefy. The analysis was performed using the methods and procedures recommended by ASTM D 6066 and the SPT based liquefaction analysis method recommended by Idriss and Boulanger (2008); these procedures are generally consistent with liquefaction evaluation guidelines of the Caltrans Geotechnical Manual *Liquefaction Evaluation* section (Caltrans, 2020). The peak ground acceleration used in the liquefaction analysis is 0.49 g, as noted earlier. This value is equal to the design peak horizontal acceleration value at zero period from the design spectrum for the site. The earthquake deaggregation analysis (United States Geological Survey, 2023) resulted in a maximum earthquake magnitude of 6.49 for the site, which is the magnitude that was used in the liquefaction analysis. The groundwater level during earthquake loading was considered 4 to 5 feet below existing ground surface, depending on the measured groundwater levels in the boring locations. Borings B-03 and B-04 included blow counts with the use of MC sampler and these blow counts in sand soils were reduced by a factor of 0.41 to calculate SPT N values for use in the liquefaction analysis. Summary of the liquefaction analysis results are shown on Table 4 (Liquefaction Analysis Summary) and detailed calculations are enclosed in Appendix C-1 (Liquefaction Analysis).

TABLE 4 – LIQUEFACTION ANALYSIS SUMMARY							
Boring No.	**Representative Structure /Substructure**	**Groundwater Table Depth (feet)[1]**	**Liquefiable Soil Layer Information and Results[3]**				**Total Liquefaction Induced Settlement at Layer Levels (inch)**
			Layer Depth Interval (feet)[2]	**Elevation (feet)[4]**	**"Clean Sand" SPT Blow Counts $(N_1)_{60, cs}$**	**Calculated Factor of Safety**	
B-01	Bridge East Abutment and East Boardwalk	10	Non-Liquefiable Dense to Very Dense Submerged Soils				
B-02	Bridge West Abutment	5	5.0 – 7.0	6,237 – 6,235	9.2	0.47	1.0
B-03	West Boardwalk	5	5.0 – 7.0	6,237 – 6,235	6.3	0.39	3.8
			7.0 – 9.5	6,235 – 6,232.5	14.7	0.56	
			9.5 – 12.0	6,232.5 – 6,230	3.8	0.26	
B-04	West Boardwalk	4	4.0 – 7.0	6,238 – 6,235	6.9	0.37	2.8
			7.0 – 9.5	6,235 – 6,232.5	24.9	0.97	
			9.5 – 12.0	6,232.5 – 6,230	13.8	0.46	

[1] Design groundwater depth below existing ground surface based on measured groundwater.
[2] Layer depth below existing ground surface.
[3] Liquefaction results for design level earthquake (PGA = 0.49g and M = 6.49).
[4] Above msl.

As shown on Table 4 above, there are submerged sand soil layers west of the Upper Truckee River with a potential to liquefy for a design level earthquake. These layers extend from groundwater levels (4 to 5 feet depth below existing ground surface) to as deep as 12 feet below existing ground surface within the meadow away from the river. At the west abutment location of the proposed bridge, liquefiable layer is about 2 feet in thickness and present from 5 feet depth below existing ground surface.

The liquefaction analysis further shows total liquefaction-induced settlements of approximately 1 inch at the west abutment location and approximately 2 to 4 inches along the west boardwalk alignment. These total

settlement values are at the horizons of the liquefiable soil layers (volumetric change in the liquefiable soil layers). However, the surface manifestation and liquefaction-induced damage at the ground level will depend on the peak ground acceleration, the thicknesses of liquefiable soil layers, thicknesses of non-liquefiable soil layers in between liquefiable soil layers, and the thickness of non-liquefiable deposits above the top of the first liquefiable soil layer. Based on the criteria developed by Ishihara (1985) and using the locations and thicknesses of liquefiable soil layers within the site, we expect majority of the liquefaction-induced settlement at the layer levels will reflect at the west abutment footing level and, if planned, levels of the shallow footings for the boardwalk.

It is noted that specific liquefaction analysis was not completed for the data obtained in additional boring B-02A that was advanced about 33 feet west of boring B-02A in the areas of west boardwalk. However, the SPT blowcounts suggest that the boring location includes potentially liquefiable soil layers between 5 feet and 12.5 feet depth below existing ground surface similar to borings B-03 and B-04 analyzed to represent the west boardwalk foundations.

7.4.2 Liquefaction-Induced Lateral Spread

Due to the flat nature of the Johnson Meadow area, the potential for liquefaction-induced lateral spread along the western boardwalk alignment will be minimal. West abutment foundation for the bridge will also be located considerably away from the relatively short western bank of the Upper Truckee River. Therefore, liquefaction-induced lateral spread of the site area to host west abutment will also be low.

7.4.3 Liquefaction Mitigation

If shallow spread foundations are to be utilized for west abutment and boardwalk support, liquefiable soils beneath these footings should be mitigated via ground improvement techniques. Driven piles are the preferred foundations for the boardwalk system and these piles should be designed to provide the needed axial and lateral resistance from dense to very dense soils as well as considering downdrag loads.

Native soils east of the river are not liquefiable and the east abutment of the bridge can be supported on shallow spread foundation underlain by native dense to very dense silty sand to silty sand with gravel soils. Therefore, shallow spread foundation is also preferred for west abutment support. Since the liquefiable soil layer is relatively thin and extends through a depth of 7 feet below existing ground surface, this layer may be over-excavated and replaced with densified structural fill (or stabilizing fill platform with geogrid layers or stabilizing rock fill). Even with the construction below groundwater that will likely require dewatering and/or stabilization efforts, a removal and replacement approach will likely be cost effective compared to other specialty ground improvement methods. The stabilization/improvement of liquefiable soil layer below west abutment foundation should horizontally extend a minimum 5 feet outside the footing edges on all sides except towards the river. On the river side, the mitigation area should horizontally extend a minimum of 10 feet from the footing edge to mitigate some potential for liquefaction-induced lateral spread that exists at the west abutment area.

7.5 Flood Plain and Scour Evaluation

The Federal Emergency Management Agency (FEMA) has identified the site as lying in floodway area of the Upper Truckee River in shaded Zone AE or special flood areas subject to inundation by 100-year flood with a base flood elevation of approximately 6,249 feet above msl (FEMA, 2012). Floodway areas in Zone AE are channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights.

Information with respect to the scour associated with the Upper Truckee River was not available at the time of this report. It is our understanding that hydraulic studies will be performed to determine the scour depths to establish final bridge foundation locations and depths near the Upper Truckee River.

7.6 Other Geologic Hazards

A moderate to high potential for dust generation is present if embankment construction and excavation are performed in dry weather.

The site is relatively flat; as such, no landslides should occur.

No other geologic hazards were identified.

8.0 Conclusions and Recommendations

8.1 Executive Summary

The site subsurface materials encountered in our exploration are predominantly sand soils with some minor presence of silt and clay soil layers. The following summarizes our conclusions:

- Due to the presence of submerged loose sand soils within the site area west of the Truckee River, a potential for soil liquefaction exists within Johnson Meadow area to host the path alignment. Liquefiable soil layers extend as deep as about 12 feet below existing ground surface.
- Conventional shallow spread foundations are suitable to support bridge abutments; however, a liquefiable sand soil layer at about 5 to 7 feet depth below existing ground surface will require mitigation via removal and replacement with densified structural fill beneath and a minimum 5 feet outside the west abutment spread foundation.
- Steel pipe piles driven to bear on dense to very dense sand soils are considered appropriate to support boardwalk system. Steel pipe piles within the Johnson Meadow area west of the Upper Truckee River should be driven to sufficient depth below potentially liquefiable soils to develop axial and lateral resistance within the dense to very dense sand soils. These piles should also be designed to support liquefaction-induced downdrag loads.
- Groundwater throughout the site is shallow and was encountered at depths of about 4 to 10 feet below the existing ground surface. The construction of west abutment shallow foundation will likely require dewatering. Submerged sand soils will be saturated and impossible to compact; stabilization measures should be anticipated. Construction should consider seasonal groundwater variations. Alternatively, final foundation design may consider driven pipe piles for west abutment to somewhat reduce the severity of dewatering and stabilization efforts. Depending on the depth of pile cap, west abutment supported on piles will still likely have construction concerns due to shallow groundwater.
- The proposed at-grade sections of the shared use path are anticipated to encounter variable subgrade soil conditions. Sufficient contingency should be incorporated in the project budget for removal of unsuitable subgrade soils and replacement with suitable structural fill materials within local to extensive areas of the path alignment.

Final bridge structural loads and substructure details were not available at the time of this report. Final details for the boardwalk system were also unavailable. We utilized structural loads information for a similar El Dorado County project in the preliminary geotechnical analysis. The geotechnical design and recommendations provided in this preliminary geotechnical report for the bridge and boardwalk foundations shall be considered preliminary. As detailed earlier, it is our understanding that another geotechnical consultant will utilize the geotechnical information and preliminary recommendations in this preliminary report as well as final structure details and load information to complete final geotechnical design for

structure foundations and then develop a final foundation report per Caltrans standards/requirements for the project.

Any evaluation of the site for the presence of surface or subsurface hazardous substances is beyond the scope of this investigation. When suspected hazardous substances are encountered during routine geotechnical investigations, they are noted in the exploration logs and immediately reported to the client. No such substances were revealed during our exploration.

8.2 Seismic Design Criteria

As noted earlier under **Ground Motion** (Section 7.3), the Caltrans *ARS Online* web-based tool was utilized in determining the design response spectrum for the site (Caltrans, 2024). Based on our ReMi shear wave velocity surveys and the geological setting of the project site, a Site class D soil profile is appropriate to develop seismic design criteria. The Site Class D soil profile is for stiff soils with a shear velocity between 600 and 1,200 feet per second ([fps] approximately 180 meters per second [m/s] to 360 m/s), or with an N (SPT) value between 15 and 50, or an undrained shear strength between 1,000 and 2,000 pounds per square foot (psf). Table 5 (Seismic Design Criteria Site Parameters) provides the site and soil parameters utilized in developing seismic criteria using the Caltrans *ARS Online* tool, and the developed design response spectrum is included as Plate 2 (Seismic Design Data). The measured average shear wave velocities for 100 feet (30 meters) of subsurface materials (Vs30 values) east and west of the river are shown on Table 5.

TABLE 5 – SEISMIC DESIGN CRITERIA SITE PARAMETERS

Parameters		Value	
		East of River	West of River
Site Location	Latitude	38.911292	38.911362
	Longitude	-119.990467	-119.990982
Site Class		D	
Shear Wave Velocity (Vs30)		280 m/s[1] (920 fps)	283 m/s[1] (929 fps)

[1] Based on ReMi Shear Wave Velocity Surveys. Refer to Appendix A-3 for Data Modeling and Results.

The seismic design criteria for the site utilizing the above parameters are also summarized in Table 6 (Design Ground Motion Parameters). It is noted that nearly all seismic design parameters are the same for site locations east and west of the river with the exception to design spectral acceleration at long period that shows a minor difference.

TABLE 6 – DESIGN GROUND MOTION PARAMETERS[1]		
Parameters		**Values**
Horizontal Peak Ground Acceleration (HPGA or PGA), g		0.49
Design Spectral Response at 0.2 Second, g		1.17
Design Spectral Response at 1.0 Second, g	East of River	0.80
	West of River	0.79
Mean Earthquake, M, Moment Magnitude		6.49
Mean Site-to-Fault Source Distance, R, kilometers		12.6

[1] Return Period = 975 Years; Based on Caltrans *ARS Online* tool (Caltrans, 2024).

8.3 Foundation Design

The project will include foundations to support the proposed bridge across the Upper Truckee River as well as the elevated boardwalk west and east of the river. Due to the similar span length, width, and type of the bridge, the foundation loads for the proposed bridge are expected to be similar to the loads associated with the bridge planned (and had been designed) for the El Dorado County San Bernardino Class 1 shared use path project. Foundation load information was unavailable at the time of this report for the proposed boardwalk system west and east of the river that will tie with the proposed Upper Truckee River Bridge on the project.

8.3.1 Foundation Type Selection

Based on the available structure type and assumed foundation loads, it is our opinion that the most economical way to support the proposed bridge is via shallow, spread foundations bearing on properly prepared native soils or densified structural fill. As discussed previously under **Liquefaction** (Section 7.4), an approximately 2-foot-thick loose sand layer with a potential for soil liquefaction is present at about 5 feet depth below existing ground surface in the site area to host the west abutment of the bridge. This relatively shallow liquefiable soil layer should be mitigated via removal and replacement with densified structural fill to support the west abutment shallow foundation.

Due to the large number of foundations as well as the presence of potentially liquefiable soils through about 12 feet depth below existing ground surface within the Johnson Meadow area, driven pile foundations to bear on dense to very dense soils at depth are considered appropriate to support the boardwalk system. The short boardwalk system east the Upper Truckee River may be founded on conventional shallow foundations; however, it is likely economical to use driven pile foundations for this eastern boardwalk also. Since the bearing soil layers include dense to very dense (often with refusal or near refusal SPT blow counts) and possible pile damage during driving, driven fiberglass piles are not considered appropriate. Driven piles may include steel pipe piles or H-piles. Based on the coordination with project design team, we have considered relatively small diameter steel pipe piles at this time in the preliminary geotechnical

analyses and design recommendations for the boardwalk system. Once final foundation layout and foundation loads become available, final geotechnical design for the pile foundations should be complete. It is noted that steel H-piles will generally have the advantage of relatively easy driving into dense to very dense soils and generally utilized in end bearing applications on a predefined bearing strata including weathered bedrock.

Cast-in-place drilled shafts (CIDH piles) were not considered economical to support the boardwalk system since drilling for CIDH piles will encounter groundwater and caving sand soils below groundwater level. These difficult drilling conditions for CIDH piles will warrant the use of slurry support or temporary casing that will generally cause a significant in construction cost for CIDH piles. It is also noted that CIDH piles for the west boardwalk system will need to be installed to develop resistance in the dense to very dense soils at 12 feet depth or more below existing ground surface.

8.3.2 Shallow Foundation Design for Bridge

The design of shallow foundations was performed using the methods provided in Section 10.6 of the AASHTO *LRFD Bridge Design Specifications* 8th Edition (AASHTO, 2017). The theoretical bearing resistance was computed per Section 10.6.3 of AASHTO for footings bearing on sand utilizing the SPT method, and a resistance factor of 0.45 was applied for Strength Limit State design. Bridge foundations will be located on relatively level grades and sufficiently away from the relatively short bank of the river. Therefore, bearing capacity factors for level adjacent grade conditions were utilized in the analyses. Based on the laboratory direct shear test results, native dense to very dense silty sand soils at the foundation grade for east abutment were assigned an angle of internal friction of 37 degrees. West abutment will be underlain by 2 feet of structural fill (liquefaction mitigation) followed by medium dense silty sand and silty sand with gravel soils and then dense to very dense sand soils from about 12 feet depth below existing ground surface. Based on the foundation soils profile below west abutment, these soils were assigned an average angle of internal friction of 34 degrees. The assigned strength parameters for foundation soils were also cross checked with the guidelines for soil correlations in Caltrans Geotechnical Manual (Caltrans, 2021).

The foundation soils are cohesionless granular sand soils and the settlement analysis was performed using the Hough method. There are some minor interbedded hard sandy silt layers with non-plastic to low plasticity fines and these soils will also exhibit settlement characteristics similar to cohesionless soils. The surficial fat clay with sand soils encountered at the location of east abutment foundation (in boring B-01) is not a concern for the proposed foundation since the foundation bottom grade will extend through sufficient depth to bear on native silty sand soils. Cohesive soils subject to long-term consolidation settlement were not encountered below the foundation bottom grade. Table 7 (Bearing Resistance for Bridge Abutments Spread Footings) provides geotechnical recommendations for spread foundations bearing on properly prepared native sand soils or densified structural fill. Analysis calculations for spread footings are included as Appendix C-2 (Shallow Foundation Analysis). Figures showing bearing resistance values for various footing widths are also included as Plate 3a (Bearing Resistance for West Abutment Spread Footing) and Plate 3b (Bearing Resistance for East Abutment Spread Footing)

TABLE 7 – BEARING RESISTANCE FOR BRIDGE ABUTMENTS SPREAD FOOTINGS							
Design Location and Conditions	**Footing Width, B (feet)[1]**	**Minimum Embedment Depth (feet)[2]**	**Factored Bearing Resistance (ksf[3])**		**Service Limit States Bearing Resistance (ksf[3])**		
			Extreme Event Limit States	**Strength or Construction Limit States**	**1-inch Permissible Settlement**	**1.5-inch Permissible Settlement**	**2-inch Permissible Settlement**
West Abutment Footing on Structural Fill	8.0	4.0	13.6	6.1	2.9	6.1	11
	10.0	4.0	15.2	6.8	2.5	5.1	9.1
	12.0	4.0	16.5	7.4	2.3	4.6	8.1
East Abutment Footing on Native Soils	8.0	4.0	19.8	8.9	6.9	17	41
	10.0	4.0	21.8	9.8	5.2	11	23
	12.0	4.0	23.6	10.6	4.4	9.4	17

[1] Analyses consider 18-foot-long rectangular footings.
[2] Recommended minimum embedment depth considering the riverbank at a relatively short distance away from footings.
[3] ksf – kips per square foot.

As discussed earlier, the west abutment area includes liquefiable loose sand layers from about 5 to 7 feet depth below existing ground surface (approximate bottom elevation is 6,235 feet above msl). This soil layer should be removed and replaced with densified structural fill. In addition, due to shallow groundwater conditions, the specifications for the bridge west abutment foundation may need to include the placement of a minimum 2-foot-thick geogrid reinforced, Class 2 aggregate base (Caltrans, 2022a) platform in lieu of or in addition to structural fill to replace the native soils. The west abutment footing may be deepened to lie at 5 feet depth below adjacent finished grade over a 2-foot-thick geogrid reinforced aggregate base stabilizing platform that should address both shallow groundwater and liquefaction concerns.

The foundation design for Service Limit States incorporates the bearing resistance values provided in Table 7 for permissible settlement of 2 inches. With this, the total foundation settlement should be 2 inch or less for Service Limit State loads. Differential movement between footings with similar loads, dimensions, and base elevations should not exceed two-thirds of the total settlement. Much of the anticipated movement will occur during the construction period as loads are applied.

For west abutment spread footing, factored sliding resistance factors of 0.67 and 0.54 are appropriate for cast-in-place spread footings for Extreme Event Limit State and Strength Limit State design conditions, respectively. For east abutment footing, factored sliding resistance factors of 0.75 and 0.60 are appropriate

for cast-in-place spread footings for Extreme Event Limit State and Strength Limit State design conditions, respectively. Resistance factors of 1.0 and 0.8 are considered for sliding resistance for Extreme Event Limit State and Strength Limit State, respectively.

A passive lateral earth pressure value (equivalent fluid pressure) of 480 pounds per cubic foot (pcf) is appropriate for design of footings to calculate the passive earth pressure component of sliding resistance against lateral loads. This value assumes footings are backfilled with densified structural fill that meets the structure backfill specifications of Caltrans *Standard Specifications* (Caltrans, 2022a). Passive earth pressure shall be neglected within 2 feet from the adjacent lowest grade. Further, shallow foundations located adjacent to downward slope should observe a minimum horizontal setback equal to 2 times the width of the foundation from slope face for the validity of lateral earth pressure. A resistance factor of 0.50 shall be applied to the passive earth pressure value for Strength Limit State design.

8.3.3 Driven Pile Foundation Design for Boardwalk

The boardwalk system can be supported by driven steel pipe piles. The precast PCC beams on each side of the boardwalk will be supported by a row of piles at a selected spacing on centers. The piles will extend up to the boardwalk level that vary in height above the existing ground surface.

The preliminary geotechnical design parameters contained in this section for driven pile foundations for boardwalk system may also be utilized in the evaluation of driven piles to support abutments, as appropriate. However, the geotechnical design parameters for boardwalk system west of the Upper Truckee River are likely conservative for pile foundations to support west abutment. If planned, final geotechnical design for pile foundations at west abutment may not need to consider liquefaction depending on the pile cap bottom elevation.

8.3.3.1 Geotechnical Axial Resistance for Driven Piles

Nominal axial side and tip resistance in the sand soils for driven pipe piles were analyzed using SPT blow count data and the Meyerhof methods provided in the AASHTO *LRFD Bridge Design Specifications, 8th Edition* (AASHTO, 2017). Driven piles for the eastern boardwalk utilized the data from boring B-01 and the driven piles to support western boardwalk utilized data from borings B-02 through B-04. Strength Limit State factored axial compressive and uplift resistances for 14-inch-diamaeter, and 18-inch-diameter driven steel pipe piles versus pile embedment depths below adjacent grade are shown in Plate 4a (Factored Axial Resistance for Driven Pipe Piles at West Boardwalk) and Plate 4b (Factored Axial Resistance for Driven Pipe Piles at East Boardwalk). Analyses consider a minimum shell thickness of 0.375 inches for pipe piles. Based on Caltrans amendments to Table 10.5.5.2.3.1 of AASHTO *LRFD Bridge Design Specifications, 8th Edition*, a resistance factor of 0.7 was considered when calculating the factored axial compressive and uplift resistances for Strength Limit Sate from nominal resistance values (Caltrans, 2019b). The factored axial compressive and uplift resistance values shown in Plate 4a and Plate 4b can be divided by 0.7 to calculate the factored resistance values for Extreme Event Limit State (resistance factor equal to 1.0). Geotechnical

analyses calculations for driven pipe pile foundations to support boardwalk are enclosed in Appendix C-3 (Driven Pile Foundation Analysis).

Applied axial loads are not available at the time of this report. However, the pile resistance values presented in Plate 4a and Plate 4b can be utilized to determine the appropriate preliminary embedment depths for the driven pipe piles to support the boardwalk system depending on the pile layout and the associated applied axial loads (and lateral loads discussed below). Our axial analyses neglect the skin/side resistance for piles to support west boardwalk system within the depth of 12 feet from the adjacent finished ground surface due to the presence of liquefiable, low strength soils. For the piles west of river, we calculate downdrag (negative skin friction) loads of approximately 10.5 and 12.4 kips for the segment of 14- and 18-inch-diameter piles, respectively, to be embedded within a depth of 12 feet below the existing ground surface. These downdrag loads should be considered in the Extreme Limit State design when determining the pile embedment depths for the driven pipe piles to support the boardwalk system west of the Upper Truckee River (within Johnson Meadow area).

For the applied axial service loads (not exceeding the factored resistance values shown on Plate 4a and Plate 4b), the driven piles will be subject to a maximum 1-inch vertical movement. Once pile top load information becomes available, final geotechnical design for pile foundations should include vertical settlement analyses for Service Limit State loading conditions.

8.3.3.2 Geotechnical Parameters for Driven Pile Lateral Load Analyses

The geotechnical design parameters for the representative subsurface soils profile to use in the lateral load analyses of drive piles using the LPILE computer program are presented in Table 8 (Geotechnical Parameters for LPILE Computer Program). Table 8 considers the worst-case soils profile based on borings B-03 and B-04 for west boardwalk segment within Johnson Meadows and the soils profile encountered boring B-01 for the east boardwalk, just east of the Upper Truckee River. As appropriate, the pile embedment depth and pile tip elevations should also consider the applied lateral loads. The values in Table 8 are suitable for Strength, Service, and Extreme Event Limit States without Liquefaction. For Extreme Event Limit State with Liquefaction, the liquified soils profile should be modelled using the values provided in the footnotes of Table 8.

TABLE 8 – GEOTECHNICAL PARAMETERS FOR LPILE COMPUTER PROGRAM							
Boardwalk Segment /Parameters	**West of River**				**East of River**		
	Depths of Soil Layers Below Existing Ground Surface (feet)						
	0 - 4	**4 - 7[4]**	**7 - 12[4]**	**12 - 80**	**0 – 3.5**	**3.5 - 10**	**10 - 40**
Soil Type/Model	Sand (Reese)				Stiff Clay	Sand (Reese)	
Effective Unit Weight (pcf)	120	58	58	58	110	120	58
Angle of Internal Friction (Degree)	28	27	31	38	NA[2]	38	41
Soil Modulus Parameter k (pci[1])	20	20	40	125	NA[2]	125	125
Undrained Shear Strength (psf)	NA[2]	NA[2, 4]	NA[2.4]	NA[2]	2,500	NA[2]	NA[2]
ε_{50}[3]	NA[2]	NA[2, 4]	NA[2.4]	NA[2]	0.004	NA[2]	NA[2]

[1] pci – pounds per cubic inch.
[2] NA - Not Applicable.
[3] Strain value at 50 percent stress level.
[4] For non-liquefied soils. For lateral analysis case with liquefaction (liquefied soils), use soft clay model with 0 pci soil modulus, an average undrained shear strength of 50 psf and ε_{50} of 0.01 for potentially liquefiable sand soil layer from 5 to 12 feet depth below existing ground surface.

8.3.3.3 Minimum and Design Tip Elevations

The preliminary design tip elevations for the driven pipe piles shall be established utilizing the axial resistance values in this report to support the axial loads including downdrag loads as well as using lateral load analyses to be completed by others. Regardless, the piles should be driven based on the final capacity determined for the test piles and the established driving criteria using wave equation analysis. Based on the presence of liquefiable sand soils layers west of the Upper Truckee River, we recommend a minimum embedment depth of 15 feet for the piles to support the western boardwalk segment. It is noted that the piles will have variable extension above existing ground surface. Driven piles with tall above ground segments will be subject to relatively high lateral moment due to the applied lateral shear at the boardwalk level.

8.3.3.4 Pile Drivability

The subsurface soils along boardwalk alignment include sand soils with localized layers of sandy silt and gravelly sand generally with fine to medium gravels. Sand soils are dense to very dense below an approximate depth of 12 feet below existing ground surface west of the Upper Truckee River and from relatively shallow depths east of the river. In general, somewhat difficult driving conditions for steel pipe piles may be encountered in the dense to very dense sand soils. Typically, pile driving will become difficult when the pile bottom section is plugged with subsurface soils. Regardless, it is recommended that the pile testing for the driven pile foundations should include wave equation analyses to verify the drivability of the

piles at the site using the intended hammer to be used in the pile driving. In general, hammer types and strokes can be selected to determine the drive blow count criteria for the proposed piles.

8.3.3.5 Construction Considerations

Driving of the steel pipe piles to desired strata should generally be possible at the project site. We should review the design and minimum pile tip elevations to provide additional construction considerations with respect to pile driving conditions. Groundwater will be encountered at shallow depths at the project site and the construction planning should account for shallow groundwater levels.

Pile dynamic testing with signal matching is recommended on a minimum of 3 percent of the total piles. Qualified personnel/firm shall perform dynamic pile tests using pile dynamic analyzer. The pile dynamic analysis should include signal matching to estimate final driving resistance and to define the driving criteria for all other piles. As a minimum, 1 pile each should be tested on the piles east and west of the Upper Truckee River.

8.4 Structural Section Design for Class 1 Path

A traffic index of 5.0 is appropriate for the design of the proposed Class 1 shared use path which will be subject to light loads from occasional maintenance vehicles. Subgrade soil conditions were not determined beyond the limits of the proposed bridge and boardwalk system on the overall project. The at-grade path segment west of the boardwalk within Johnson Meadow is expected to include silty sand soils with possible areas of sandy silt soils. The long path segments east of the Upper Truckee River will mostly follow existing trail alignment that appears to be stable and includes adequate quality subgrade soils.

Based on these anticipated subgrade conditions, the structural section for the pathway may consist of 3 inches of asphalt concrete pavement underlain by at least 6 inches of Class to aggregate base (Caltrans, 2022a). The aggregate base should be densified to a minimum 95 percent relative compaction as determined per CTM 216. If unsuitable subgrade soils are encountered (fine-grained silt or clay soils containing greater than 50 percent particles passing No.200 sieve or soils with resistance value [R-value per CTM 301] less than 40), they should be over-excavated through at least 12 inches depth and replaced with densified structural fill that meets the specifications of Caltrans (2022a). In non-expansive silt soils, as an alternative to over-excavation, the thickness of aggregate base associated with the structural section of the path may be increased to 12 inches to provide sufficient long-term performance.

8.5 Slope Stability and Erosion Control

The project may involve minor embankment slopes. Based on our investigation, new embankment side slopes constructed at 2H:1V (horizontal to vertical) or flatter will be globally stable at the site up to a maximum vertical height of 5 feet. Erosion protection via riprap or other methods should be considered for slopes steeper than 3H:1V.

8.6 Site Preparation and Stabilization

Site and subgrade preparation as well as any needed subgrade stabilization shall follow the applicable sections of the Caltrans *Standard Specifications* (Caltrans, 2022c) where not explicitly addressed in the following sections.

8.6.1 Site Preparation

All vegetation shall be stripped and grubbed from structural areas and removed from the site. Trees and associated roots greater than ½ inch in diameter shall be removed, where necessary, to a minimum depth of 12 inches below finished grade. Large roots (greater than 6 inches in diameter) shall be removed to the maximum depth possible. Resulting excavations shall be backfilled with embankment fills compacted to 90 percent relative compaction per CTM 216.

All areas to receive embankment fills or structural loading shall be densified to at least 90 percent relative compaction per CTM 216.

8.6.2 Stabilization

If wet weather construction is anticipated or for excavations nearing and below the groundwater table, soils will be well above optimum moisture and impossible to compact. In some situations, moisture conditioning may be possible by scarifying the top 12 inches of subgrade and allowing it to air-dry to near-optimum moisture prior to compaction. Where this procedure is ineffective or where construction schedules preclude delays, mechanical stabilization will be necessary.

Mechanical stabilization can generally be achieved by removal of unstable soils through 12 inches depth, placing a geogrid layer, and then placement of Class 2 or Class 3 aggregate base (Caltrans, 2022a). Aggregate base shall be placed in a single lift within 12 inches of over-excavation and densified to at least 90 percent relative compaction per CTM 216. Geogrid shall consist of a triaxial geogrid such as Tensar® TX160 or a biaxial geogrid such as Tencate Miragrid® 7XT or an approved equivalent. In some cases where pumping of soils is significant, an intermediate, second geogrid layer may be necessary. A geogrid reinforced geogrid platform is expected for the support of west abutment footing considering the required removal of loose sand soils (liquefiable soils) and shallow groundwater conditions.

8.7 Grading and Embankment Construction

Where not explicitly indicated below, site grading and earthwork shall follow the applicable sections of the Caltrans *Standard Specifications* (Caltrans, 2022a).

The proposed at-grade path segments west and east of the Upper Truckee River will require some cuts and fills. Based on the preliminary project plans, any fill embankment for the path will be a maximum of 3 feet in vertical height. Excavated native granular sand and/or gravel materials may be utilized in the embankment

construction. Fine-grained silt or clay soils should not be used as embankment fills within 12 inches of subgrade elevations. All embankment fills shall be placed in maximum 8-inch-thick loose lifts each densified to at least 90 percent relative compaction per CTM 216.

8.8 Cuts and Excavation

The at-grade path segments outside the limits of bridge and boardwalk will require minor cuts. Excavations extending to as deep as 7 feet below existing ground surface are anticipated for the construction of bridge abutment footings. Temporary trenches and excavations with near-vertical sidewalls should be stable to a depth of approximately 3 feet below the adjacent ground surface. Temporary trenches are defined as those that will be open for less than 24 hours. Excavations below groundwater levels or to greater depths should be sloped or shored in accordance with the State of California, Division of Occupational Safety and Health (Cal/OSHA) requirements. All site soils are Type C and shall be sloped at 1.5H:1V or flatter in temporary excavations. All trenching should be performed and stabilized in accordance with local, state and Cal/OSHA standards.

8.9 Concrete Flatwork

Minor concrete flatwork sections are anticipated in the overall path project. All PCC flatwork on the project shall be per the Caltrans *Standard Plans* (Caltrans, 2022b) and should be directly underlain by Class 2 aggregate base (Caltrans, 2022a) that is densified to at least 95 percent relative compaction per CTM 216.

All placement and curing of concrete shall be performed in accordance with procedures outlined by the American Concrete Institute (2011). Special considerations should be given to concrete placed and cured during hot or cold weather conditions. Proper control joints and reinforcement should be provided to minimize any damage resulting from shrinkage.

Concrete shall not be placed on frozen in-place soils.

8.10 Corrosion Evaluation

Corrosion testing was completed on the worst-case-selected clay soil sample obtained from test borings at the site. Corrosion test results are summarized in Table 9 (Corrosion Test Results Summary), and detailed results are contained in Appendix B-3.

TABLE 9 – CORROSION TEST RESULTS SUMMARY					
Sample Identification	**Depth (feet)**	**pH**	**Minimum Resistivity (ohm-cm)**	**Sulfate Content (ppm)**	**Chloride Content (ppm)**
B-01 A	2.5	7.3	2,200	22	12

Based on the test results and Caltrans *Corrosion Evaluation* Guidelines (Caltrans, 2022c), the representative sample of soils tested at the depth/elevation are not corrosive to structural steel and concrete foundation elements. It is noted that the test results are only an indicator of soil corrosivity, and a corrosion engineer may need to be consulted if the values in Table 9 signify such a need.

9.0 Construction Considerations

It is recommended that the geotechnical investigation report and subsequent addenda be included with project documents during the bidding process for reference purposes. The following items are provided for addition to any needed special specifications for the project.

- Depending on the season of construction, soft, wet surface soils will make it difficult for construction equipment to travel and operate.
- Soils below groundwater level will be wet and unstable, and shallow footings that extend below groundwater level will likely require dewatering and stabilization measures to establish foundation grade. The contractor will be responsible for dewatering design and construction methods.
- Existing underground utilities are present within the project site. The project construction will require coordination of these existing utilities.
- Driving pipe piles may encounter difficulties depending on contractor's driving equipment and setup. A qualified and experienced pile driving contractor should be utilized on the project. Pile dynamic testing should be included in the project.
- All excavations required on this project should be achievable using typical construction equipment. Onsite soils shall be sloped at 1.5H:1V or flatter in temporary excavations (Type C soils). Any excavations below groundwater will require shoring. The contractor will be responsible for design and construction of excavation sloping and shoring in accordance with Cal/OSHA requirements, including the protection of existing structures, utilities, and other facilities during construction.

10.0 Quality Control

All plans and specifications should be reviewed by the geotechnical engineer for conformance with this geotechnical report.

The recommendations presented in this report assume that sufficient field testing and construction review will be provided during all phases of construction. We should review the final plans and specifications to check for conformance with the intent of our recommendations.

During construction, we should have the opportunity to provide sufficient on-site observation of preparation and grading, over-excavation, fill placement, foundation installation, and paving. These observations would allow us to verify that the geotechnical conditions are as anticipated. As a minimum, we should observe excavations for bridge foundations and the proposed path segments when unsuitable or unstable subgrade soils are encountered.

11.0 Standard Limitations

This report has been prepared in accordance with generally accepted geotechnical practices. The analyses and recommendations submitted are based on field exploration performed at the locations shown on Plate 1. This report does not reflect soils variations that may become evident during the construction period, at which time re-evaluation of the recommendations may be necessary. We recommend our firm be retained to perform construction observation in all phases of the project related to geotechnical factors to ensure compliance with our recommendations.

Equilibrium water level readings were made on the date shown on the boring logs included as Appendix A-2. Fluctuations in the water table may occur due to rainfall, temperature and seasonal runoff, and water level in the Upper Truckee River. Construction planning should be based on assumptions of possible variations in the water table.

This report has been produced to provide information allowing the architect or engineer to design the project. The client is responsible for distributing this report to all designers and contractors whose work is affected by geotechnical aspects. In the event there are changes in the design, location, or ownership of the project from the time this report is issued, recommendations should be reviewed and possibly modified by the engineer. If the engineer is not granted the opportunity to make this recommended review, he or she can assume no responsibility for misinterpretation or misapplication of his or her recommendations or their validity in the event changes have been made in the original design concept without his or her prior review. The engineer makes no other warranties, either express or implied, as to the professional advice provided under the terms of this agreement and included in this report.

12.0 References

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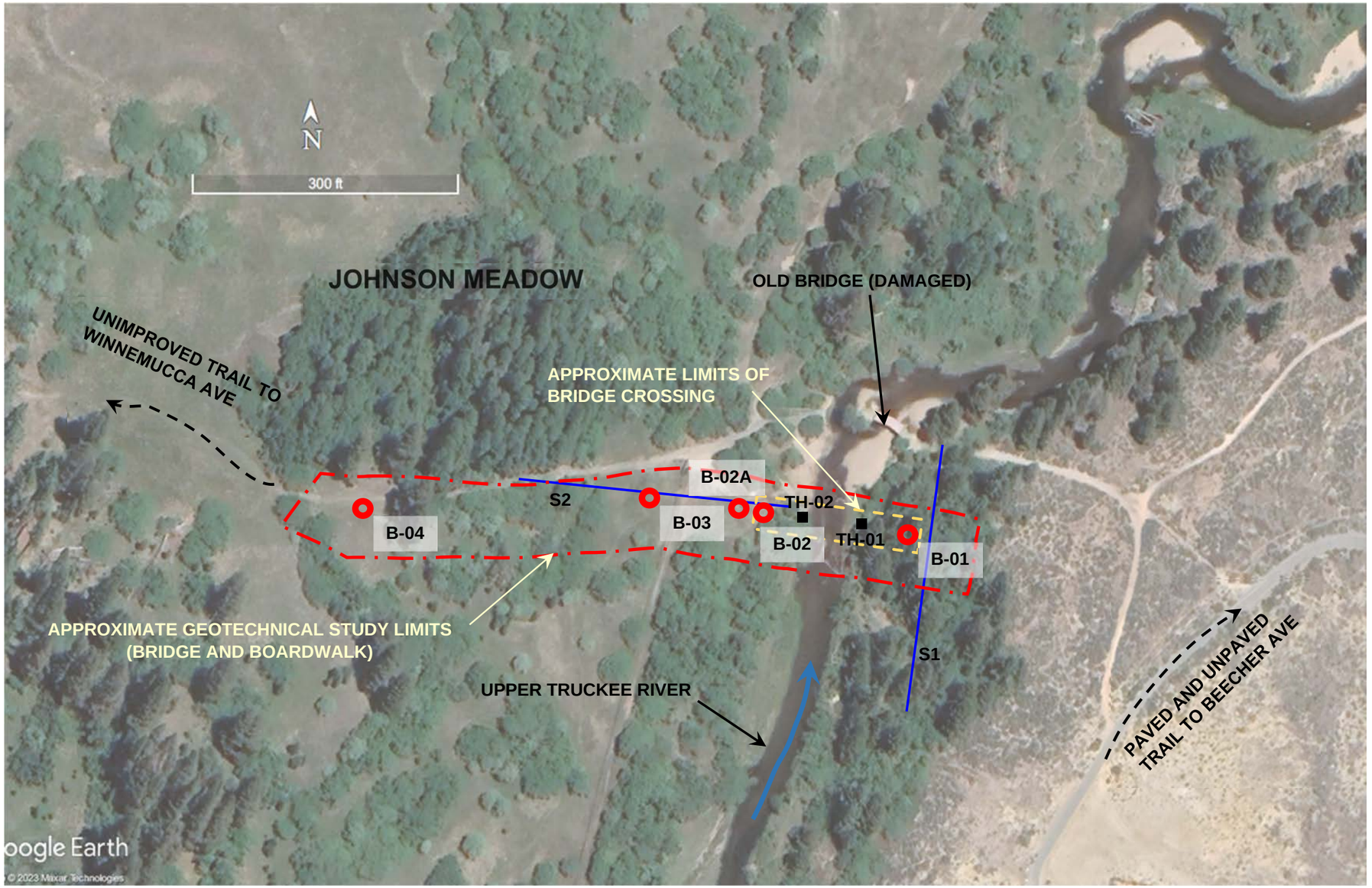
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PLATES



NORTH
SCALE: 1" ≈ 125'

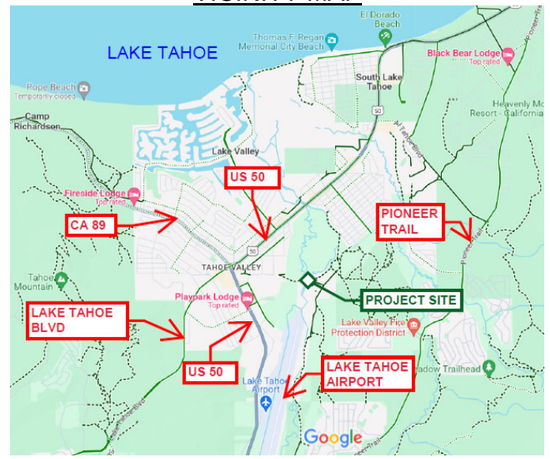
LEGEND

B-01	APPROXIMATE BORING LOCATION
TH-02	APPROXIMATE TEST HOLE LOCATION
S1	APPROXIMATE SHEAR WAVE VELOCITY SURVEY LINE

NOTES

1. BASE MAP PROVIDED BY GOOGLE EARTH™.
2. APPROXIMATE LIMITS OF BRIDGE AND BOARDWALK FROM 30% PLANS DEVELOPED BY EL DORADO COUNTY.

VICINITY MAP



NOT TO SCALE

NCE

LOCATION OF BORINGS MAP

UPPER TRUCKEE RIVER BRIDGE AT JOHNSON MEADOW
EL DORADO COUNTY, CALIFORNIA

Corestone Engineering, Inc.
Project No. 5012-05-1

Plate 1

SEISMIC DESIGN DATA

UPPER TRUCKEE RIVER BRIDGE AT JOHNSON MEADOW, EL DORADO COUNTY, CALIFORNIA
STRUCTURE FOUNDATIONS EAST OF RIVER

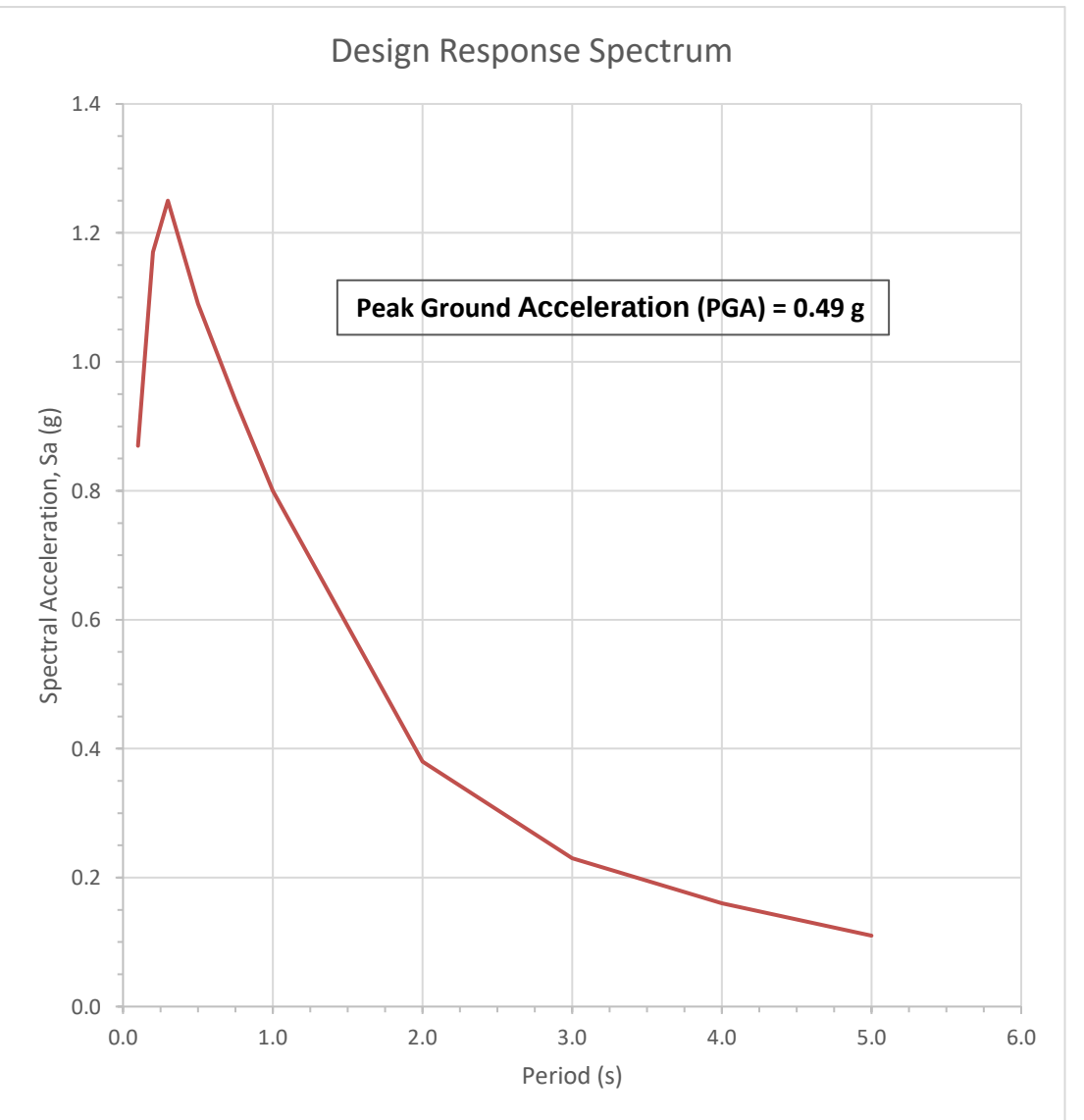
CEI Project No. 5012-05-1

Caltrans ARS Online Version V3.1.0
Accessed Date: June 2024

Site Lattitude:	38.911292
Site Longitude:	-119.990467

Soils Profile:	Class D
Vs30 =	280 m/s

Period (s)	Design Spectral Acceleration, Sa (g)
0.10	0.87
0.20	1.17
0.30	1.25
0.50	1.09
0.75	0.94
1.00	0.80
2.00	0.38
3.00	0.23
4.00	0.16
5.00	0.11



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SEISMIC DESIGN DATA

UPPER TRUCKEE RIVER BRIDGE AT JOHNSON MEADOW, EL DORADO COUNTY, CALIFORNIA
STRUCTURE FOUNDATIONS WEST OF RIVER

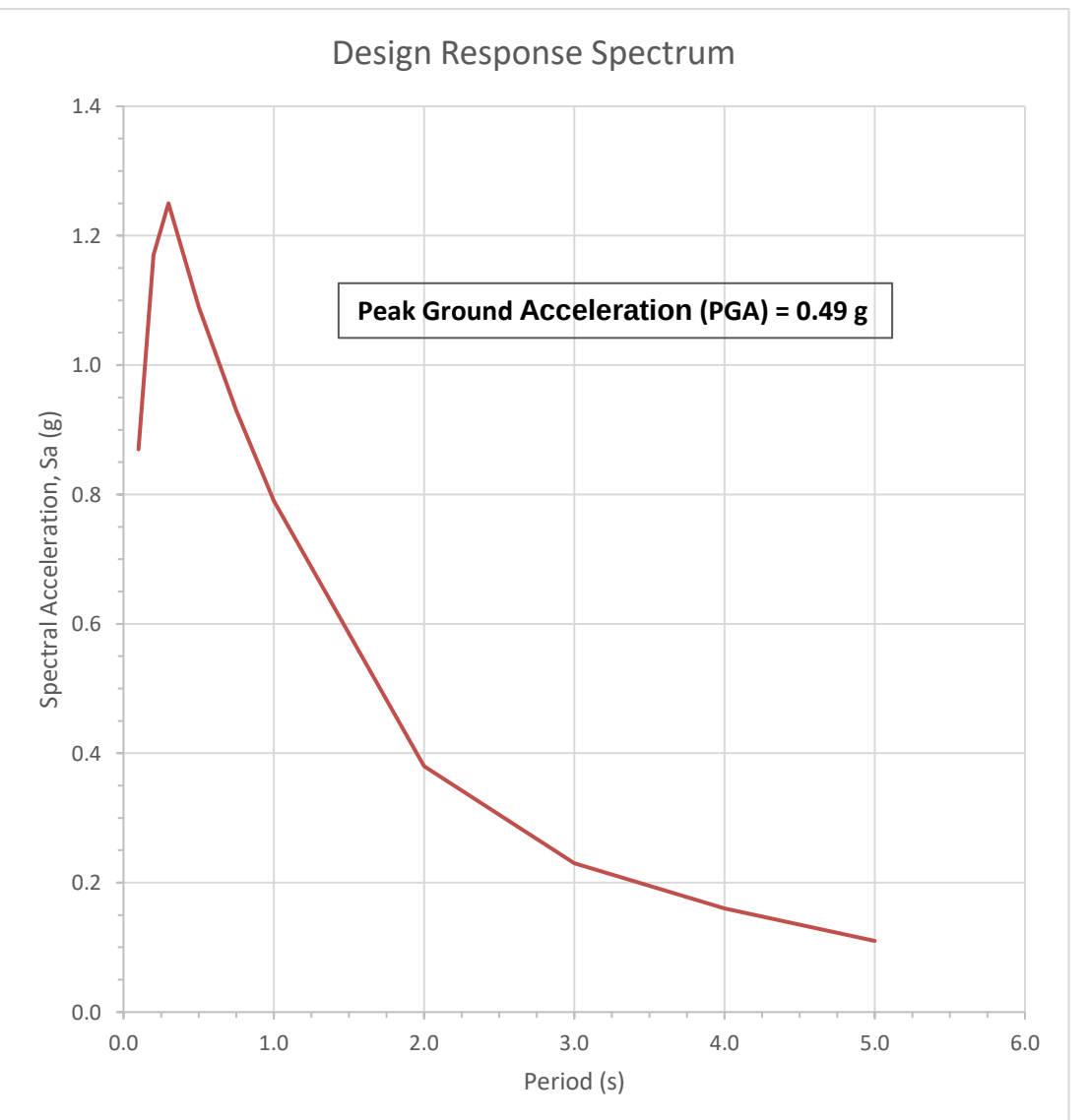
CEI Project No. 5012-05-1

Caltrans ARS Online Version V3.1.0
Accessed Date: June 2024

Site Lattitude:	38.911362
Site Longitude:	-119.990982

Soils Profile:	Class D
Vs30 =	283 m/s

Period (s)	Design Spectral Acceleration, Sa (g)
0.10	0.87
0.20	1.17
0.30	1.25
0.50	1.09
0.75	0.93
1.00	0.79
2.00	0.38
3.00	0.23
4.00	0.16
5.00	0.11

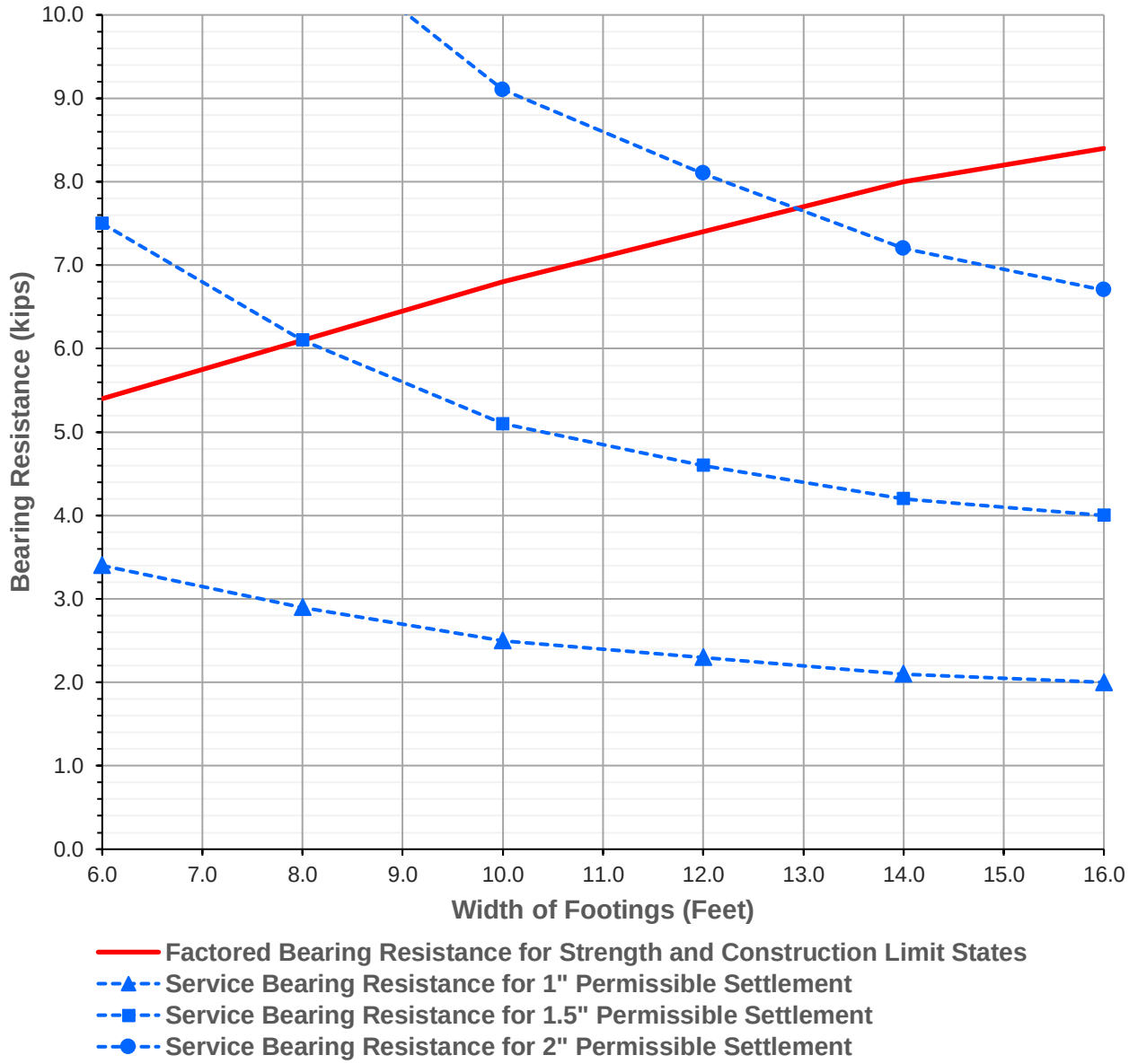


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BEARING RESISTANCE FOR WEST ABUTMENT SPREAD FOOTING

UPPER TRUCKEE RIVER BRIDGE, EL DORADO COUNTY, CALIFORNIA

CEI Project No. 5012-05-1



NOTES:

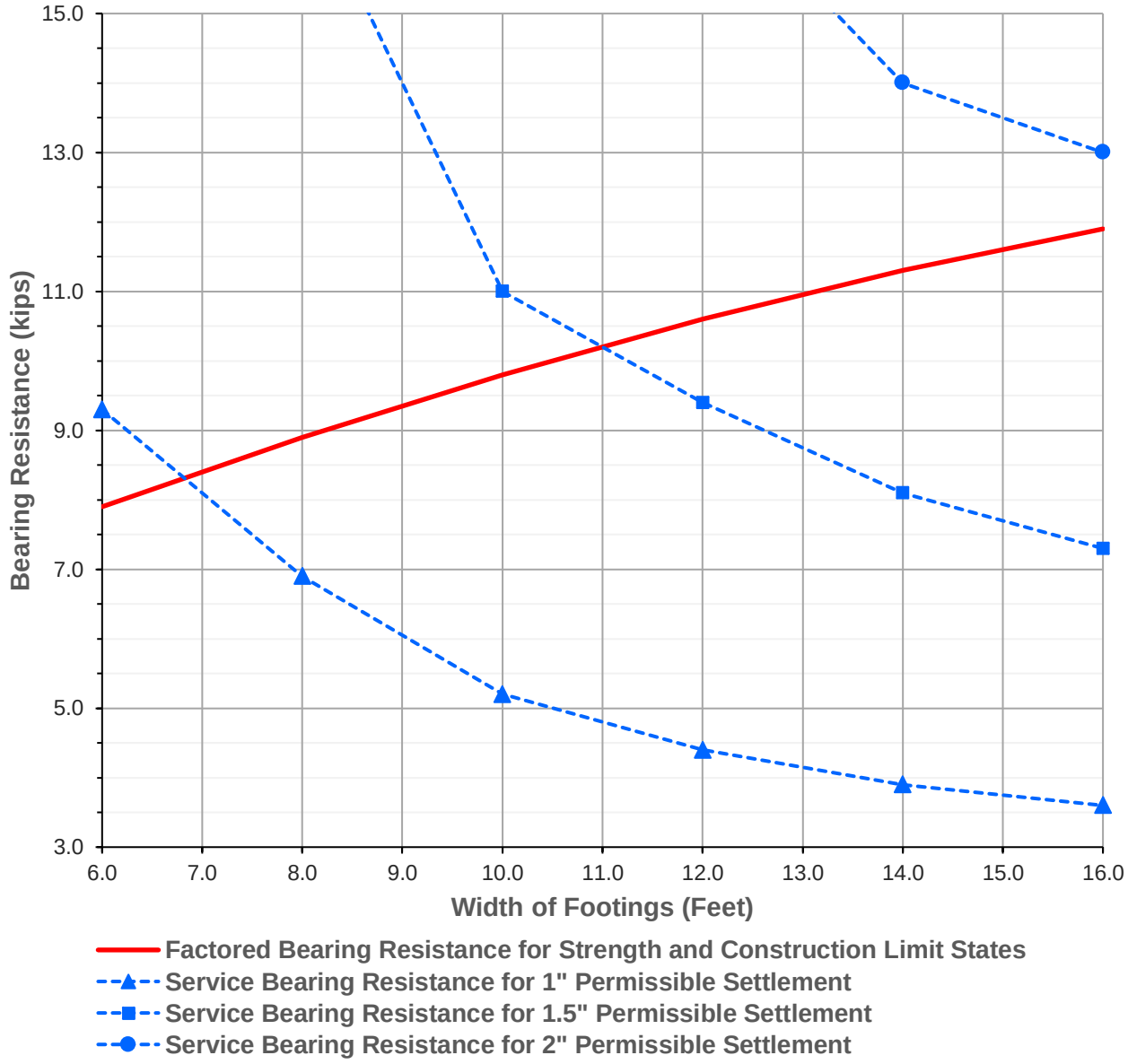
1. Footing length of 18 feet was utilized in the analyses.
2. Factored bearing resistance for strength and construction limit states incorporate a resistance factor of 0.45. To calculate factored bearing resistance for extreme event limit states, divide the factor resistance shown by 0.45.
2. Settlement analysis consider removal of liquefiable soils through 7 feet depth below existing ground surface and replacement with densified structural fill or geogrid reinforced fill platform.

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BEARING RESISTANCE FOR EAST ABUTMENT SPREAD FOOTING

UPPER TRUCKEE RIVER BRIDGE, EL DORADO COUNTY, CALIFORNIA

CEI Project No. 5012-05-1



NOTES:

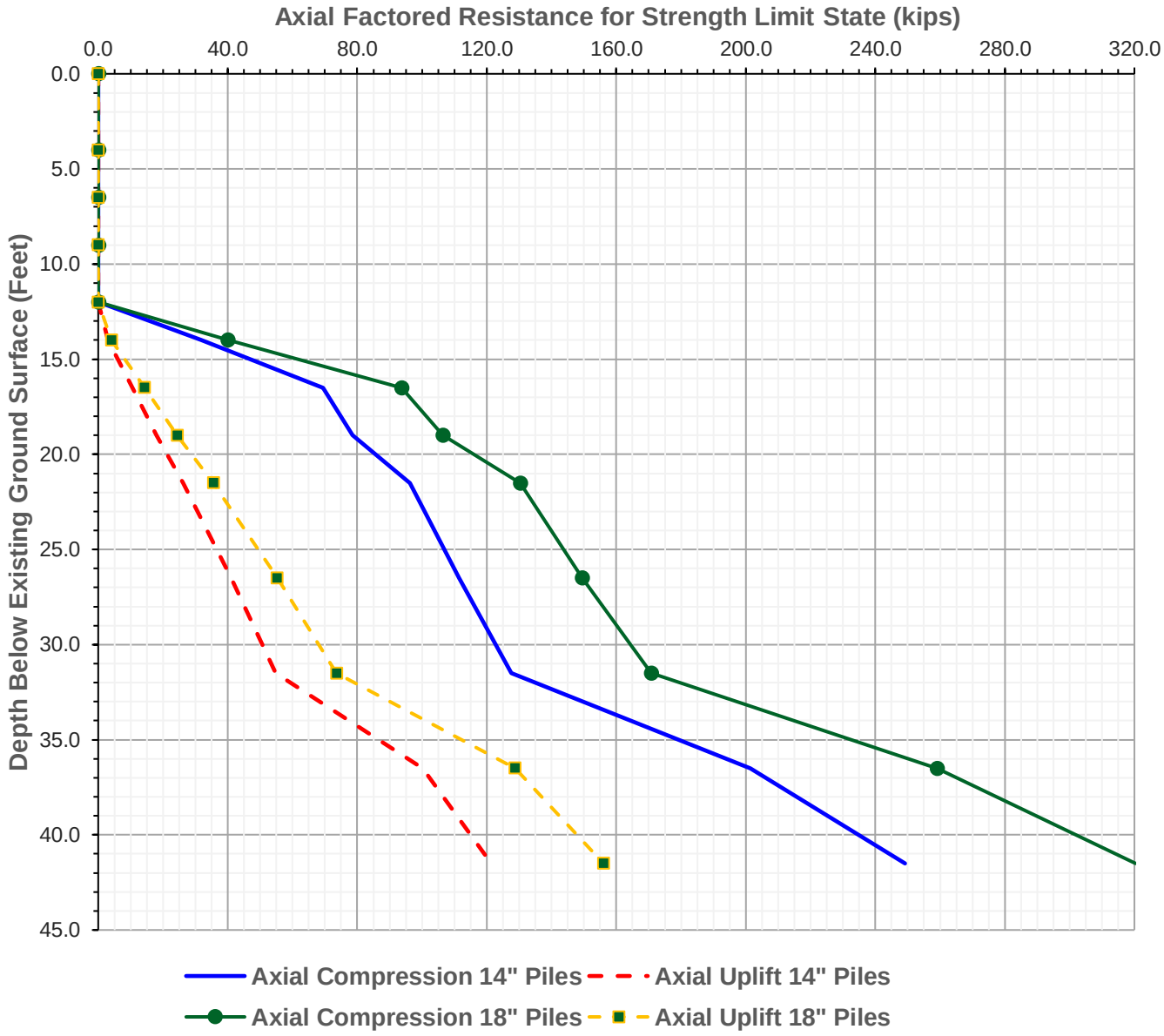
1. Footing length of 18 feet was utilized in the analyses.
2. Factored bearing resistance for strength and construction limit states incorporate a resistance factor of 0.45. To calculate factored bearing resistance for extreme event limit states, divide the factor resistance shown by 0.45.

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FACTORED AXIAL RESISTANCE FOR DRIVEN STEEL PIPE PILES AT WEST BOARDWALK

UPPER TRUCKEE RIVER BRIDGE AT JOHNSON MEADOW, EL DORADO COUNTY, CA

CEI Project No. 5012-05-1



NOTES:

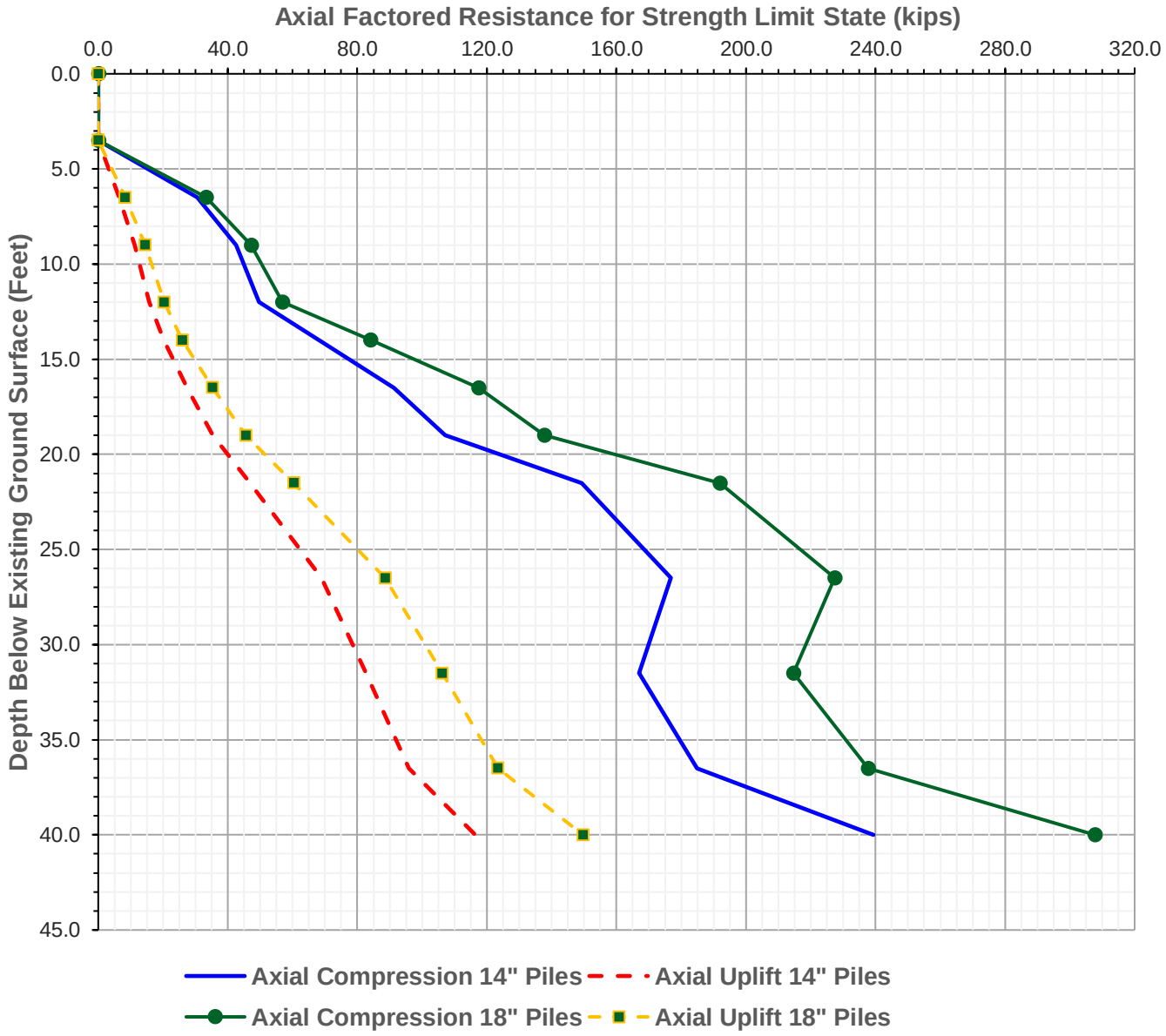
1. Steel Pipe Piles with Minimum 0.375" Wall Thickness.
2. Downdrag loads of 10.5 and 12.4 kips should be considered in the extreme event limit state design for 14" and 18" diameter piles, respectively.
3. Factored compressive/uplift resistance can be divided by 0.7 to calculate nominal compressive/uplift resistance.
4. No soil plug is considered in the axial compressive resistance calculations.

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FACTORED AXIAL RESISTANCE FOR DRIVEN STEEL PIPE PILES AT EAST BOARDWALK

UPPER TRUCKEE RIVER BRIDGE AT JOHNSON MEADOW, EL DORADO COUNTY, CA

CEI Project No. 5012-05-1



NOTES:

1. Steel Pipe Piles with Minimum 0.375" Wall Thickness.
2. Side resistance in the upper clay soils were neglected in the analyses.
3. Factored compressive/uplift resistance can be divided by 0.7 to calculate nominal compressive/uplift resistance.
4. No soil plug is considered in the axial compressive resistance calculations.

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APPENDIX A

A-1 BORING RECORD LEGEND

A-2 BORING RECORDS

A-3 SHEAR WAVE VELOCITY MODELING RESULTS

GROUP SYMBOLS AND NAMES

Graphic / Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic / Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTS

C	Consolidation (ASTM D 2435-04)
CL	Collapse Potential (ASTM D 5333-03)
CP	Compaction Curve (CTM 216 - 06)
CR	Corrosion, Sulfates, Chlorides (CTM 643 - 99; CTM 417 - 06; CTM 422 - 06)
CU	Consolidated Undrained Triaxial (ASTM D 4767-02)
DS	Direct Shear (ASTM D 3080-04)
EI	Expansion Index (ASTM D 4829-03)
M	Moisture Content (ASTM D 2216-05)
OC	Organic Content (ASTM D 2974-07)
P	Permeability (CTM 220 - 05)
PA	Particle Size Analysis (ASTM D 422-63 [2002])
PI	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89-02, AASHTO T 90-00)
PL	Point Load Index (ASTM D 5731-05)
PM	Pressure Meter
PP	Pocket Penetrometer
R	R-Value (CTM 301 - 00)
SE	Sand Equivalent (CTM 217 - 99)
SG	Specific Gravity (AASHTO T 100-06)
SL	Shrinkage Limit (ASTM D 427-04)
SW	Swell Potential (ASTM D 4546-03)
TV	Pocket Torvane
UC	Unconfined Compression - Soil (ASTM D 2166-06) Unconfined Compression - Rock (ASTM D 2938-95)
UU	Unconsolidated Undrained Triaxial (ASTM D 2850-03)
UW	Unit Weight (ASTM D 4767-04)
VS	Vane Shear (AASHTO T 223-96 [2004])

SAMPLER GRAPHIC SYMBOLS

- Standard Penetration Test (SPT)
- Standard California Sampler
- Modified California Sampler
- Shelby Tube
- Piston Sampler
- NX Rock Core
- HQ Rock Core
- Bulk Sample
- Other (see remarks)

DRILLING METHOD SYMBOLS

- Auger Drilling
- Rotary Drilling
- Dynamic Cone or Hand Driven
- Diamond Core

WATER LEVEL SYMBOLS

- First Water Level Reading (during drilling)
- Static Water Level Reading (short-term)
- Static Water Level Reading (long-term)

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REPORT TITLE: **BORING RECORD LEGEND**

DIST.	COUNTY	ROUTE	POSTMILE	EA
03	ED	NA		5012-05-1

PROJECT OR BRIDGE NAME: **Upper Truckee River Bridge at Johnson Meadow**

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
NA	Vimal		1 of 2

CONSISTENCY OF COHESIVE SOILS

Descriptor	Unconfined Compressive Strength (tsf)	Pocket Penetrometer (tsf)	Torvane (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 - 0.50	0.25 - 0.50	0.12 - 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 - 1.0	0.50 - 1.0	0.25 - 0.50	Can be penetrated several inches by thumb with moderate effort
Stiff	1.0 - 2.0	1.0 - 2.0	0.50 - 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2.0 - 4.0	2.0 - 4.0	1.0 - 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

APPARENT DENSITY OF COHESIONLESS SOILS

Descriptor	SPT N_{60} - Value (blows / foot)
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Descriptor	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Descriptor	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

SOIL PARTICLE SIZE

Descriptor		Size
Boulder		> 12 inches
Cobble		3 to 12 inches
Gravel	Coarse	3/4 inch to 3 inches
	Fine	No. 4 Sieve to 3/4 inch
Sand	Coarse	No. 10 Sieve to No. 4 Sieve
	Medium	No. 40 Sieve to No. 10 Sieve
	Fine	No. 200 Sieve to No. 40 Sieve
Silt and Clay		Passing No. 200 Sieve

PLASTICITY OF FINE-GRAINED SOILS

Descriptor	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll, and not much time is required to reach the plastic limit; it cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

CEMENTATION

Descriptor	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

NOTE: This legend sheet provides descriptors and associated criteria for required soil description components only. Refer to Caltrans Soil and Rock Logging, Classification , and Presentation Manual (2022), Section 2, for tables of additional soil description components and discussion of soil description and identification.

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REPORT TITLE: **BORING RECORD LEGEND**

DIST.	COUNTY	ROUTE	POSTMILE	EA
03	NA	NA		5012-05-1

PROJECT OR BRIDGE NAME: **Upper Truckee River Bridge at Johnson Meadow**

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
NA	Vimal		2 of 2

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
PV	**9-12-23**	**9-12-23**	**38° 54' 40.65" / -119° 59' 25.4"**	**B-01**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Taber			**~0.00' Rt Sta ~14+90PVI**	**~6246.0 ft**
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash			**CME 55**	**4 in**
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT & Mod Cal			**Automatic Hammer**	**79%**
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Backfilled with Neat Cement Grout			**10.0 ft**	**41.0 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		Fat CLAY with SAND (CH); very stiff; brown; moist; about 20% coarse to fine SAND; about 80% high plasticity fines.												Hollow Stem Auger Drilling to 10' Depth and then Mud Rotary Drilling.
6244.00	2														
	3				A	6 8 21	29			36		PP = 2.5			Lab Tests: M, PA, PI, CR
6242.00	4		SILTY SAND (SM); dense to very dense; orange, brown, gray; moist; about 0 to 10% subangular GRAVEL, max. 0.25 in. dia.; about 70 to 80% coarse to fine SAND; about 15 to 26% nonplastic fines.												
	5				B	42 34 37	71			14					Lab Tests: M, PA, PI
6240.00	6														
	7														
6238.00	8				C	17 22 23	45								
	9														
6236.00	10				D	12 16 17	33			19	108				Lab Tests: M, UW, PA, PI, DS
	11														
6234.00	12		SANDY SILT (ML); hard; brown; moist to wet; about 40% medium to fine SAND; about 60% low plasticity fines.												
	13		SILTY SAND (SM); very dense; gray, brown; wet; about 75 to 80% coarse to fine SAND; about 20 to 25% nonplastic to low plasticity fines.		E	18 22 27	49								
6232.00	14														
	15		A few less than 2" thick SANDY SILT interbeds with 50% nonplastic fines below 15' depth.		F	22 31 36	67								
6230.00	16														
	17														
6228.00	18														
	19		SILTY SAND with GRAVEL (SM); very dense; gray, brown; wet; about 35% subangular GRAVEL, max. 0.5 in. dia.; about 50% coarse to fine SAND; about 15% nonplastic fines.												Layer contact based on drilling response.
6226.00	20				G	50/6"	REF								
	21														
	22														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**B-01**
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	**ED**	**NA**		**03-5012-05-1**
PROJECT OR BRIDGE NAME				
Upper Truckee River Bridge at Johnson Meadows				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
NA	**Vimal**		**12-1-23**	**1 of 2**

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ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method / Casing Depth	Remarks
	22		SILTY SAND (SM); very dense; dark gray; wet; about 10% subangular GRAVEL, max. 0.5 in. dia.; about 75% coarse to fine SAND; about 15% nonplastic fines.											
6222.00	24													
	25				H	46 50/6"	50/6							
6220.00	26													
	27													
6218.00	28		SILTY SAND (SM); very dense; dark gray; wet; about 0 to 5% subangular GRAVEL, max. 0.25 in. dia.; about 75 to 80% coarse to fine SAND; about 15 to 20% nonplastic fines.											
	29													
6216.00	30				I	26 30 32	62							
	31													
6214.00	32													
	33													
6212.00	34													
	35				J	26 28 35	63							
6210.00	36													
	37													
6208.00	38													
	39													
6206.00	40				K	43 50/6"	50/6							
	41		Bottom of borehole at 41.0 ft bgs											
6204.00	42													
	43		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2022 Edition) except as noted on the Soil or Rock Legend or below.											
6202.00	44													
	45													
6200.00	46													
	47													
6198.00	48													

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REPORT TITLE				HOLE ID
BORING RECORD				**B-01**
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	**ED**	**NA**		**03-5012-05-1**
PROJECT OR BRIDGE NAME				
Upper Truckee River Bridge at Johnson Meadows				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
NA	**Vimal**		**12-1-23**	**2 of 2**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
PV	**9-11-23**	**9-11-23**	**38° 54' 40.85" / -119° 59' 27.5"**	**B-02**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Taber			**~0.00' Rt Sta ~13+50PVI**	**~6242.0 ft**
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash			**CME 55**	**4 in**
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT			**Automatic Hammer**	**79%**
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Backfilled with Neat Cement Grout			**5.5 ft**	**41.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SILTY SAND (SM); very loose to loose; dark brown, dark gray; moist to wet; about 52% medium to fine SAND; about 48% low plasticity fines; Dry to moist soils with roots at and near the surface.												Hollow Stem Auger Drilling to 5' Depth and then Mud Rotary Drilling.
6240.00	2														
	3				A	2 2 3	5			40					
6238.00	4														
	5				B	1 1 1	2								Lab Tests: M, PA, PI
6236.00	6														
	7		SILTY SAND (SM); medium dense; dark gray; wet; about 2% subangular GRAVEL, max. 0.5 in. dia.; about 77% coarse to fine SAND; about 21% nonplastic fines.												
6234.00	8				C	6 3 9	12			44					Lab Tests: M, PA Organic smell.
	9		SILTY SAND with GRAVEL (SM); medium dense; dark gray, gray; wet; about 35% subangular GRAVEL, max. 0.75 in. dia.; about 45% coarse to fine SAND; about 20% nonplastic fines.												Coarse gravels indicated by drlling response.
6232.00	10				D	8 6 9	15								
	11		SILTY SAND with GRAVEL (SM); medium dense; dark gray, white; wet; about 15% subrounded GRAVEL, max. 0.5 in. dia.; about 65% coarse to fine SAND; about 20% nonplastic fines.							30					Lab Tests: M, PA
6230.00	12		SILTY SAND (SM); medium dense; dark gray; wet; about 54% fine SAND; about 46% nonplastic fines.												
	13		SILT with SAND (ML); hard; dark gray; wet; about 72% fine SAND; about 28% nonplastic fines.		E	12 14 23	37			31					Lab Tests: M, PA, PI
6228.00	14														
	15		SILTY SAND (SM); very dense; dark gray, gray; wet; about 10 to 15% subrounded GRAVEL, max. 0.5 in. dia.; about 70 to 75% coarse to fine SAND; about 15 to 20% nonplastic fines.		F	31 43 50/4"	93/10					PP = >4.5			
6226.00	16														
	17														
6224.00	18				G	34 42 42	84								
	19														
6222.00	20				H	40 47 50/5"	97/11								
	21														
	22														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**B-02**
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	**ED**	**NA**		**03-5012-05-1**
PROJECT OR BRIDGE NAME				
Upper Truckee River Bridge at Johnson Meadows				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
NA	**Vimal**		**12-1-23**	**1 of 2**

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ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	22		SILTY SAND (SM) *(continued)*.												
	23														
6218.00	24		SANDY SILT (ML); hard; gray; wet; about 10% fine, subrounded GRAVEL; about 40% coarse to fine SAND; about 60% low plasticity fines.												
	25				I	50/6"	REF					PP = >4.5			
6216.00	26														
	27														
6214.00	28														
	29		SILTY SAND (SM); very dense; gray, greenish gray; wet; about 10% fine, subrounded GRAVEL; about 70% coarse to fine SAND; about 20% nonplastic to low plasticity fines.												
6212.00	30				J	33 50/6"	50/6								
	31														
6210.00	32														
	33														
6208.00	34		SILTY SAND with GRAVEL (SM); very dense; gray; wet; about 20% subrounded GRAVEL, max. 0.75 in. dia.; about 55% coarse to fine SAND; about 25% nonplastic to low plasticity fines.												
	35				K	22 38 36	74								
6206.00	36														
	37														
6204.00	38														
	39		SILTY SAND (SM); very dense; gray; wet; about 10% fine, subrounded GRAVEL; about 70% coarse to fine SAND; about 20% nonplastic to low plasticity fines.												
6202.00	40				L	22 38 39	77								
	41														
6200.00	42		Bottom of borehole at 41.5 ft bgs												
	43		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2022 Edition) except as noted on the Soil or Rock Legend or below.												
6198.00	44														
	45														
6196.00	46														
	47														
6194.00	48														

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REPORT TITLE				HOLE ID
BORING RECORD				**B-02**
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	**ED**	**NA**		**03-5012-05-1**
PROJECT OR BRIDGE NAME				
Upper Truckee River Bridge at Johnson Meadows				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
NA	**Vimal**		**12-1-23**	**2 of 2**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
PV	**6-25-24**	**6-25-24**	**38° 54' 40.88" / -119° 59' 27.8"**	**B-02A**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Taber			**~0.00' Rt Sta ~13+20PVI**	**~6242.0 ft**
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash			**CME 55**	**4 in**
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT			**Automatic Hammer**	**79%**
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING **5.0 ft** AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Backfilled with Neat Cement Grout				**81.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SILTY SAND (SM); very loose to loose; dark brown, dark gray; moist to wet; about 55 to 65% medium to fine SAND; about 35 to 45% nonplastic to low plasticity fines; Roots in the upper 6 inches of soils profile..		A	5 4 5	9								Hollow Stem Auger Drilling to 5' Depth and then Mud Rotary Drilling.
6240.00	2														
	3				B	2 2 1	3			34					Lab Tests: M, PA, PI
6238.00	4														
	5				C	1 0 2	2			41					Lab Tests: M, PA, PI
6236.00	6														
	7		Poorly graded SAND with SILT (SP-SM); medium dense; dark gray; wet; about 3% fine, subangular GRAVEL; about 91% coarse to fine SAND; about 6% low plasticity fines.												
6234.00	8				D	4 4 4	8			24					Lab Tests: M, PA, PI
	9														
6232.00	10		Poorly graded SAND with SILT and GRAVEL (SP-SM); medium dense; dark gray, white; wet; about 32% subangular GRAVEL, max. 0.75 in. dia.; about 62% coarse to fine SAND; about 6% nonplastic fines.		E	6 5 10	15			14					Lab Tests: M, PA
	11														
6230.00	12		SANDY SILT (ML); hard; dark gray; wet; about 30% fine SAND; about 70% nonplastic fines.												
	13				F	11 13 21	34					PP = 3.5-4.5			
6228.00	14														
	15		SILTY SAND with GRAVEL (SM); very dense; dark gray, gray; wet; about 15 to 20% subrounded GRAVEL, max. 0.5 in. dia.; about 60 to 70% coarse to fine SAND; about 15 to 20% nonplastic fines.		G	30 32 34	66								
6226.00	16														
	17														
6224.00	18				H	35 31 36	67								
	19														
6222.00	20				I	31 50/5"	50/5								
	21														
	22														

(continued)

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REPORT TITLE				HOLE ID
BORING RECORD				**B-02A**
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	**ED**	**NA**		**03-5012-05-1**
PROJECT OR BRIDGE NAME				
Upper Truckee River Bridge at Johnson Meadows				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
NA	**Vimal**		**7-26-24**	**1 of 4**

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ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method / Casing Depth	Remarks
	22		SILTY SAND with GRAVEL (SM) *(continued)*.											
	23													
			SILTY SAND (SM); very dense; dark gray; wet; about 4% fine, subrounded GRAVEL; about 50% coarse to fine SAND; about 46% nonplastic fines.											
6218.00	24													
	25				J	32 50/6"	50/6			20				Lab Tests: M, PA, PI
6216.00	26													
	27													
6214.00	28													
			SILTY SAND (SM); very dense; gray; wet; about 5% fine, subrounded GRAVEL; about 70% coarse to fine SAND; about 25% nonplastic to low plasticity fines.											
	29													
6212.00	30				K	34 50/6"	50/6							
	31													
6210.00	32													
	33													
			SILTY SAND with GRAVEL (SM); very dense; brown, gray; wet; about 15% subrounded GRAVEL, max. 0.5 in. dia.; about 60% coarse to fine SAND; about 25% nonplastic to low plasticity fines.											
6208.00	34													
	35				L	31 50/6"	50/6							
6206.00	36													
	37													
6204.00	38													
			SILTY SAND (SM); very dense; gray; wet; about 1% subrounded GRAVEL, max. 0.25 in. dia.; about 87% coarse to fine SAND; about 12% nonplastic fines.											
	39													
6202.00	40				M	35 38 42	80			24				Lab Tests: M, PA
	41													
6200.00	42													
	43													
			SILTY SAND with GRAVEL (SM); very dense; gray, dark gray; wet; about 20 to 25% subrounded to rounded GRAVEL, max. 0.5 in. dia.; about 55 to 65% coarse to fine SAND; about 15 to 20% nonplastic fines.											
6198.00	44													
	45				N	34 50/6"	50/6							
6196.00	46													
	47													
6194.00	48													

(continued)

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ph. 775-636-5916

REPORT TITLE				HOLE ID
BORING RECORD				**B-02A**
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	**ED**	**NA**		**03-5012-05-1**
PROJECT OR BRIDGE NAME				
Upper Truckee River Bridge at Johnson Meadows				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
NA	**Vimal**		**7-26-24**	**2 of 4**

CORESTONE - 5 BR 5012051.GPJ CALTRANS LIBRARY DEC09-UNLOCK.GLB 7/26/24

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method / Casing Depth	Remarks
	49		SILTY SAND with GRAVEL (SM) *(continued)*.											
6192.00	50				O	50/6"	REF							
	51													
6190.00	52													
	53													
6188.00	54													
	55													
6186.00	56													
	57													
6184.00	58													
	59													
6182.00	60				P	32	81							
	61					31								
						50								
6180.00	62													
	63													
6178.00	64													
	65		SILTY SAND (SM); very dense; dark gray, gray; wet; about 0 to 5% subrounded GRAVEL, max. 0.5 in. dia.; about 75 to 80% coarse to fine SAND; about 15 to 20% nonplastic fines.											
6176.00	66													
	67													
6174.00	68													
	69													
6172.00	70				Q	30	66							
	71					30								
						36								
6170.00	72													
	73													
6168.00	74													

(continued)

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Reno, NV 89521
ph. 775-636-5916

REPORT TITLE				HOLE ID
BORING RECORD				**B-02A**
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	**ED**	**NA**		**03-5012-05-1**
PROJECT OR BRIDGE NAME				
Upper Truckee River Bridge at Johnson Meadows				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
NA	**Vimal**		**7-26-24**	**3 of 4**

CORESTONE - 5 BR 5012051.GPJ CALTRANS LIBRARY DEC09-UNLOCK.GLB 7/26/24

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	75		SILTY SAND (SM) *(continued)*.												
6166.00	76														
	77														
6164.00	78														
	79														
6162.00	80				R	34	88								
	81					41									
						47									
6160.00	82		Bottom of borehole at 81.5 ft bgs												
	83														
6158.00	84		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2022 Edition) except as noted on the Soil or Rock Legend or below.												
	85														
6156.00	86														
	87														
6154.00	88														
	89														
6152.00	90														
	91														
6150.00	92														
	93														
6148.00	94														
	95														
6146.00	96														
	97														
6144.00	98														
	99														
6142.00	100														
	101														

CORESTONE - 5 BR 5012051.GPJ CALTRANS LIBRARY DEC09-UNLOCK.GLB 7/26/24

Corestone Engineering, Inc.
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ph. 775-636-5916

REPORT TITLE				HOLE ID
BORING RECORD				**B-02A**
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	**ED**	**NA**		**03-5012-05-1**
PROJECT OR BRIDGE NAME				
Upper Truckee River Bridge at Johnson Meadows				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
NA	**Vimal**		**7-26-24**	**4 of 4**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
PV	**9-11-23**	**9-11-23**	**38° 54' 41.01" / -119° 59' 29"**	**B-03**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Taber			**~0.00' Rt Sta ~12+25PVI**	**~6242.0 ft**
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash			**CME 55**	**4 in**
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT & Mod Cal			**Automatic Hammer**	**79%**
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING **5.5 ft** AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Backfilled with Neat Cement Grout				**31.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SANDY SILT (ML); medium stiff to stiff; dark gray, brown; moist; about 40% medium to fine SAND; about 60% low plasticity fines; fine roots.												Hollow Stem Auger Drilling to 5' Depth and then Mud Rotary Drilling.
6240.00	2														
	3				A	3 2 3	5					PP = 1.0			
6238.00	4		SILTY SAND (SM); very loose; dark gray; moist to wet; about 64% medium to fine SAND; about 36% nonplastic fines.												
	5				B	0 0 1	1			37					Lab Tests: M, PA, PI
6236.00	6														
	7														
	8		Poorly graded SAND with GRAVEL (SP); medium dense; gray, dark gray; wet; about 22% subrounded GRAVEL, max. 1.5 in. dia.; about 73% coarse to fine SAND; about 5% nonplastic fines.		C	12 11 9	20			11	117				Lab Tests: M, UW, PA, PI, DS
6234.00	9														
6232.00	10		Becomes very loose. No sample recovery.		D	0 1 1	2	0							
	11														
6230.00	12		SILTY SAND (SM); dense; gray, dark gray; wet; about 62% medium to fine SAND; about 38% nonplastic fines.		E	10 13 16	29			28					Lab Tests: M, PA, PI
	13														
6228.00	14														
	15		SANDY SILT (ML); hard; gray, dark gray; wet; about 35% fine SAND; about 65% nonplastic fines.		F	17 32 37	69					PP = >4.5			
6226.00	16		SILTY SAND with GRAVEL (SM); very dense; gray, dark gray; wet; about 15 to 20% subrounded GRAVEL, max. 1 in. dia.; about 60 to 65% coarse to fine SAND; about 15 to 20% nonplastic fines.												
	17														
6224.00	18														
	19														
6222.00	20				G	28 41 37	78								
	21		2" thick SANDY SILT interbed.												
	22														

(continued)

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Reno, NV 89521
ph. 775-636-5916

REPORT TITLE				HOLE ID
BORING RECORD				**B-03**
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	**ED**	**NA**		**03-5012-05-1**
PROJECT OR BRIDGE NAME				
Upper Truckee River Bridge at Johnson Meadows				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
NA	**Vimal**		**12-1-23**	**1 of 2**

CORESTONE - 5 BR 5012051.GPJ CALTRANS LIBRARY DEC09-UNLOCK.GLB 12/1/23

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	22		SILTY SAND with GRAVEL (SM) *(continued)*.												
	23														
6218.00	24		SILTY SAND (SM); very dense; dark gray, gray; wet; about 5 to 10% subrounded GRAVEL, max. 0.5 in. dia.; about 75 to 80% coarse to fine SAND; about 15 to 20% nonplastic fines.												
	25				H	25	52								
6216.00	26					25 27									
	27														
6214.00	28														
	29														
6212.00	30				I	29	45								
	31					20 25									
6210.00	32		Bottom of borehole at 31.5 ft bgs												
	33		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2022 Edition) except as noted on the Soil or Rock Legend or below.												
6208.00	34														
	35														
6206.00	36														
	37														
6204.00	38														
	39														
6202.00	40														
	41														
6200.00	42														
	43														
6198.00	44														
	45														
6196.00	46														
	47														
6194.00	48														

CORESTONE - 5 BR 5012051.GPJ CALTRANS LIBRARY DEC09-UNLOCK.GLB 12/1/23

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ph. 775-636-5916

REPORT TITLE				HOLE ID
BORING RECORD				**B-03**
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	**ED**	**NA**		**03-5012-05-1**
PROJECT OR BRIDGE NAME				
Upper Truckee River Bridge at Johnson Meadows				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
NA	**Vimal**		**12-1-23**	**2 of 2**

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
PV	9-12-23	9-12-23	38° 54' 40.94" / -119° 59' 33.1"	B-04
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Taber			~0.00' Rt Sta ~9+00PVI	~6242.0 ft
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash			CME 55	4 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT & Mod Cal			Automatic Hammer	79%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING 4.0 ft AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Backfilled with Neat Cement Grout				31.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SILTY SAND (SM); medium dense; brown, gray; dry to moist; about 60% medium to fine SAND; about 40% low plasticity fines; Field classification based on auger cuttings.												Hollow Stem Auger Drilling to 2.5' Depth and then Mud Rotary Drilling.
6240.00	2		SILTY SAND (SM); very loose; gray , brown; moist to wet; about 77 to 85% medium to fine SAND; about 15 to 23% nonplastic fines.		A	2 1 2	3			33					Lab Tests: M, PA, PI
6238.00	4														
	5				B	2 2 3	5			36					Lab Tests: M, PA, PI
6236.00	6														
	7		Poorly graded SAND with SILT (SP-SM); medium dense; light gray, brown; wet; about 6% fine, subrounded GRAVEL; about 88% coarse to fine SAND; about 6% nonplastic fines.												
6234.00	8				C	4 6 9	15			18					Lab Tests: M, PA
	9														
6232.00	10		Poorly graded SAND (SP); medium dense; brown, gray; wet; about 13% subrounded GRAVEL, max. 0.5 in. dia.; about 85% coarse to fine SAND; about 2% nonplastic fines.		D	3 5 3	8			16					Lab Tests: M, PA
	11														
6230.00	12		SILTY SAND with GRAVEL (SM); dense; brown, gray; wet; about 25 to 30% subrounded GRAVEL, max. 0.75 in. dia.; about 55 to 60% coarse to fine SAND; about 10 to 15% nonplastic fines.												Layer contact based on drilling response.
	13														
6228.00	14														
	15				E	12 15 17	32								
6226.00	16														
	17														
6224.00	18														
	19														
6222.00	20				F	14 16 18	34								
	21														
	22														

(continued)

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Reno, NV 89521
ph. 775-636-5916

REPORT TITLE				HOLE ID
BORING RECORD				B-04
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	ED	NA		03-5012-05-1
PROJECT OR BRIDGE NAME				
Upper Truckee River Bridge at Johnson Meadows				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
NA	Vimal		12-1-23	1 of 2

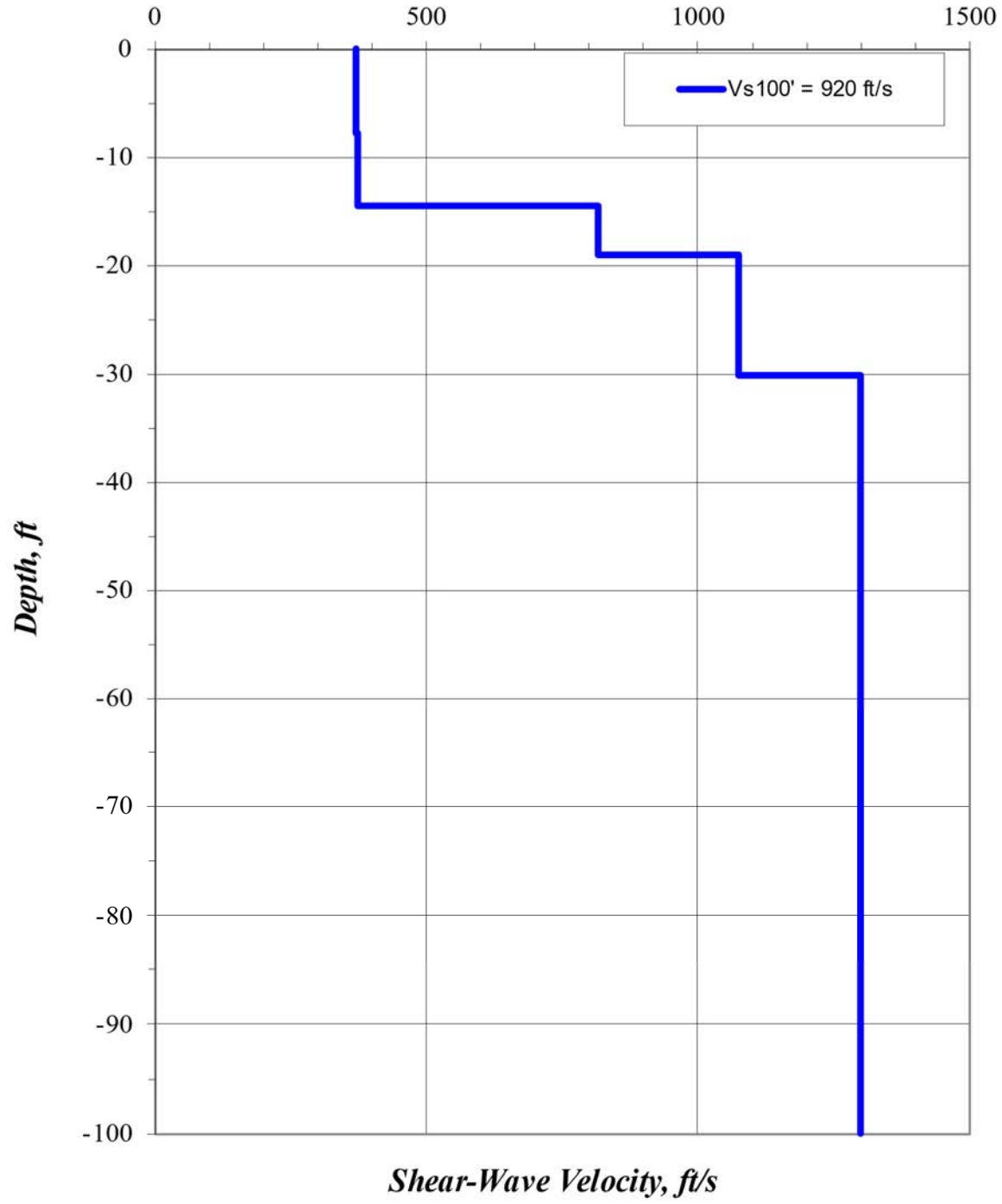
CORESTONE - 5 BR 5012051.GPJ CALTRANS LIBRARY DEC09-UNLOCK.GLB 12/1/23

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	22		SILTY SAND with GRAVEL (SM) *(continued)*.												Coarse gravels and possible small cobbles indicated by drilling response from 22' to 24' depth.
	23														
6218.00	24		SILTY SAND (SM); very dense; brown; wet; about 5 to 10% subrounded GRAVEL, max. 0.5 in. dia.; about 65 to 70% coarse to fine SAND; about 20 to 25% nonplastic to low plasticity fines.												
	25				G	27	45								
6216.00	26					20 25									
	27														
6214.00	28														
	29														
6212.00	30				H	17	38								
	31					19 19									
6210.00	32		Bottom of borehole at 31.5 ft bgs												
	33		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2022 Edition) except as noted on the Soil or Rock Legend or below.												
6208.00	34														
	35														
6206.00	36														
	37														
6204.00	38														
	39														
6202.00	40														
	41														
6200.00	42														
	43														
6198.00	44														
	45														
6196.00	46														
	47														
6194.00	48														

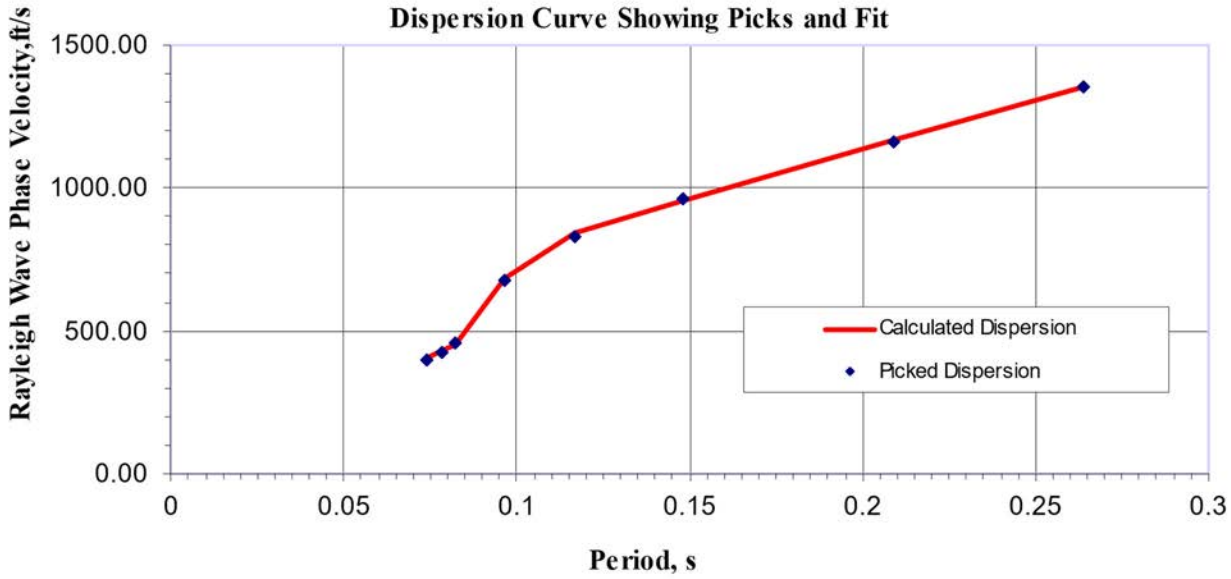
CORESTONE - 5 BR 5012051.GPJ CALTRANS LIBRARY DEC09-UNLOCK.GLB 12/1/23

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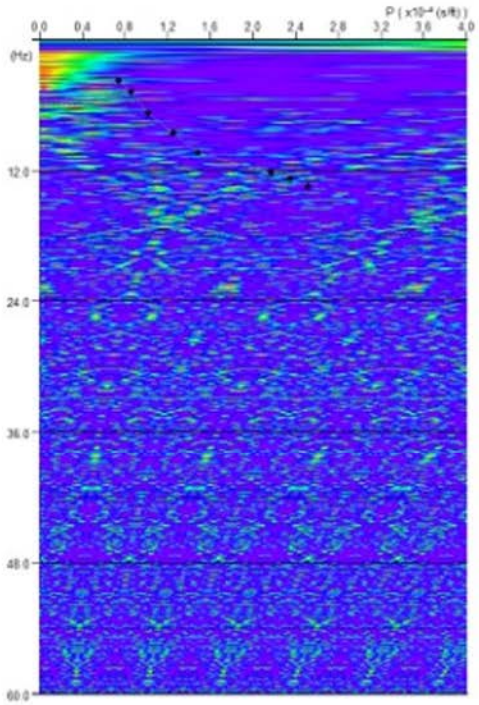
REPORT TITLE				HOLE ID
BORING RECORD				**B-04**
DIST.	COUNTY	ROUTE	POSTMILE	EA
03	**ED**	**NA**		**03-5012-05-1**
PROJECT OR BRIDGE NAME				
Upper Truckee River Bridge at Johnson Meadows				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET
NA	**Vimal**		**12-1-23**	**2 of 2**



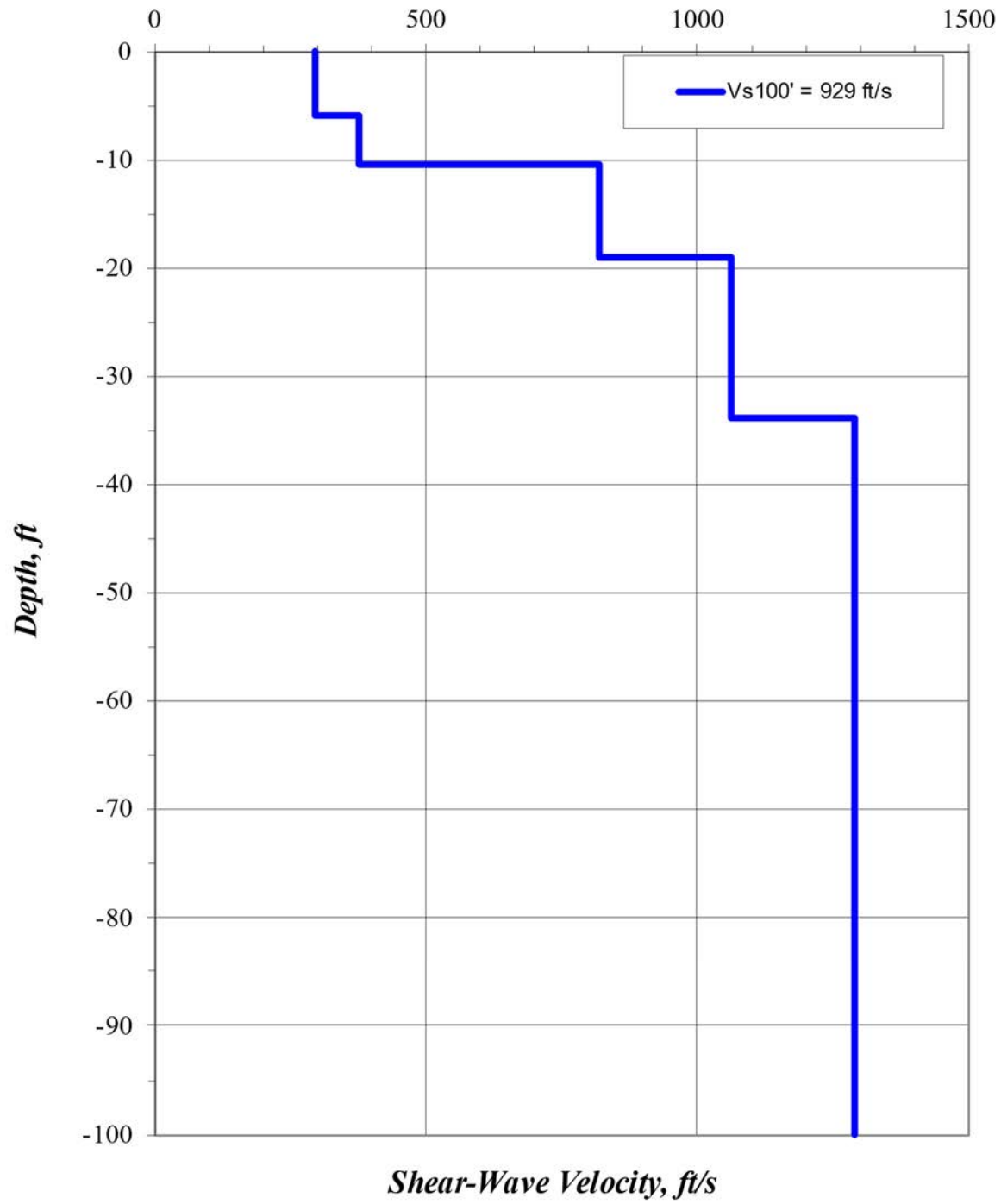
Shear Wave Velocity Profile for Line S1



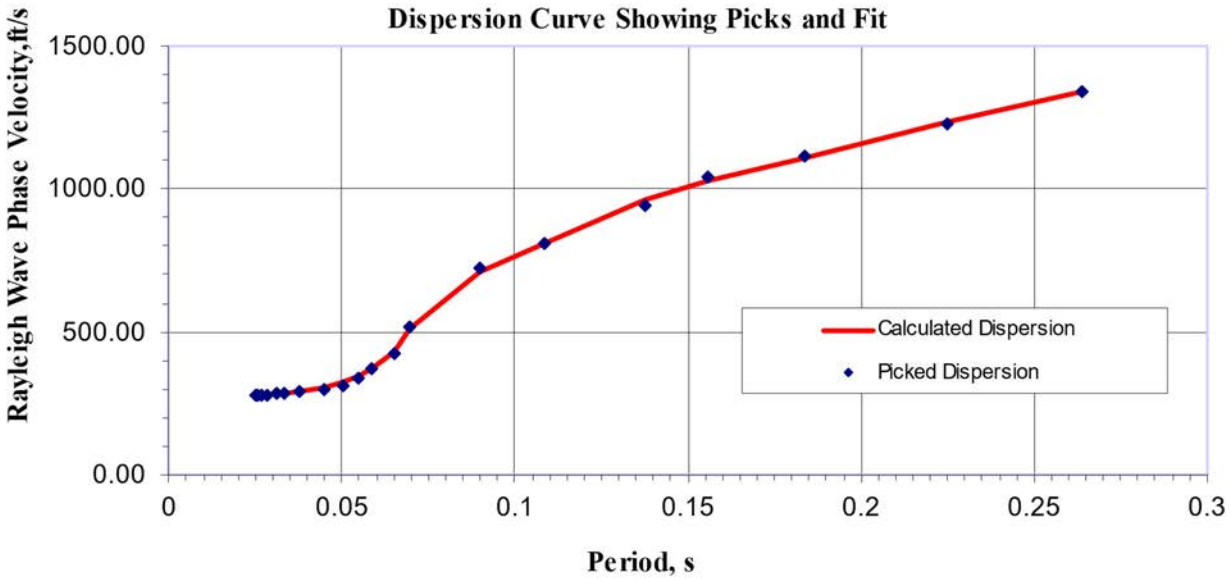
p-f Image with Dispersion Modeling Picks



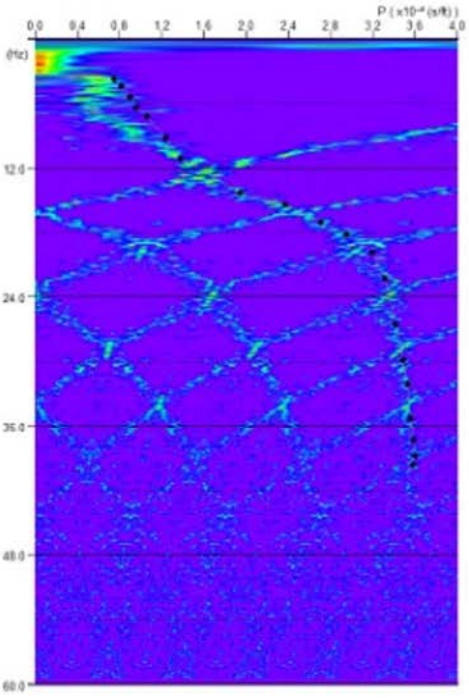
Dispersion Modeling Picks and Curve for Line S1



Shear Wave Velocity Profile for Line S2



p-f Image with Dispersion Modeling Picks



Dispersion Modeling Picks and Curve for Line S2

MICROTREMOR SHEAR WAVE ANALYSIS

Shear wave velocities for subsurface strata were collected using a multiple channel digital acquisition data logger and geophone system. A DAQLink 4 24-bit acquisition system (Seismic Source/Optim) utilizing a multichannel geophone cable with 12 geophones placed at an approximate spacings of 25 feet was used to record background micro tremor refraction data. Vertical geophones with resonant frequencies of 10 Hz measure surface wave energy from broad band ambient site noise across the geophone array for multiple 30-second iterations. SeisOpt ReMi® software was then used to model the digital refraction data using a wave field transformation data processing technique and an interactive Rayleigh-wave dispersion model. Model output after data processing is presented as a spectral solution of wave frequency vs. slowness, the modeled Rayleigh-wave phase-velocity dispersion curve, and a graphical representation of shear wave velocity vs. depth at the modeled location.

The Raleigh-wave dispersion curve and slowness-frequency wave dispersion are contained in this Appendix. For standard 25-foot geophone spacing, estimation of Rayleigh-wave phase-velocity dispersion curves by slowness-frequency wave field transformation have been shown to be an effective method for estimation of 30-meter (100-foot) average shear wave velocities and one-dimensional shear-wave profile within 20 percent accuracy to 100 meters depth[1]. The shear-wave velocity versus depth models are also contained in this Appendix.

[1] Louie, John N., April 2001, *Faster, Better: Shear-Wave Velocity to 100 Meters Depth for Refraction Microtremor Arrays*, Bulletin of the Seismological Society of America, v. 91, n. 2, p. 347-396.

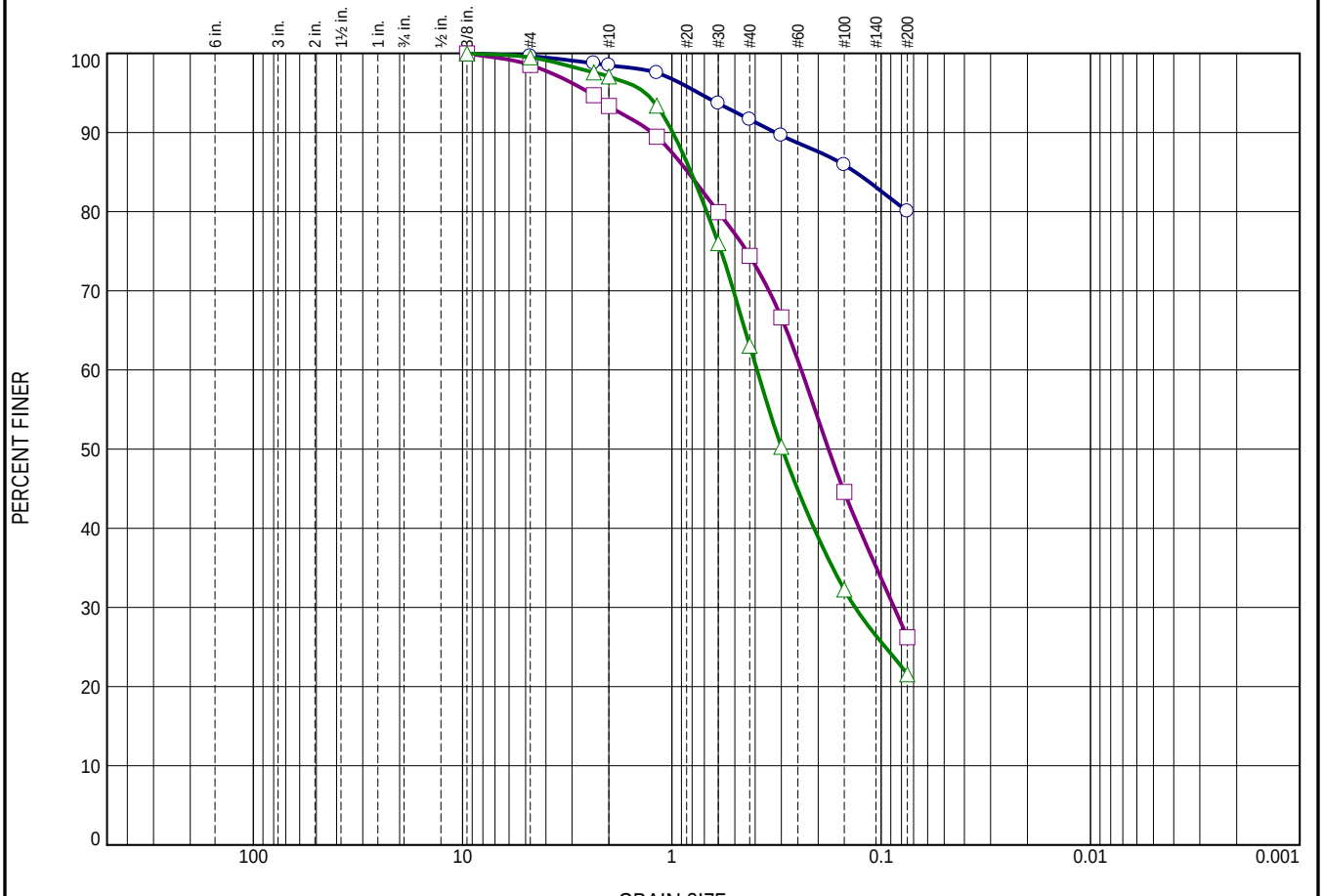
APPENDIX B

B-1 INDEX TEST RESULTS

B-2 DIRECT SHEAR TEST RESULTS

B-3 CHEMICAL TEST RESULTS

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.4	1.1	6.8	11.6	80.1	
□	0.0	0.0	1.5	5.1	19.0	48.2	26.2	
△	0.0	0.0	0.5	2.4	34.0	41.5	21.6	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	54	22	0.1328							
□	NV	NP	0.8373	0.2407	0.1784	0.0867				
△	NV	NP	0.8105	0.3919	0.2972	0.1332				

	MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○	fat clay with sand	9/25/2023	CH	35.6
□	silty sand	9/25/2023	SM	13.9
△	silty sand	9/28/2023	SM	18.6

Project No. 2961 Client: CORESTONE ENGINEERING, INC.

Project: CORESTONE ENGINEERING, INC. - TESTING AS ORDERED

○ Source of Sample: 5012-05-1 B-01 Depth: 2.5' Sample Number: A

□ Source of Sample: 5012-05-1 B-01 Depth: 5' Sample Number: B

△ Source of Sample: 5012-05-1 B-01 Depth: 10' Sample Number: D

Remarks:

○ RECEIVED ON 9/21/2023

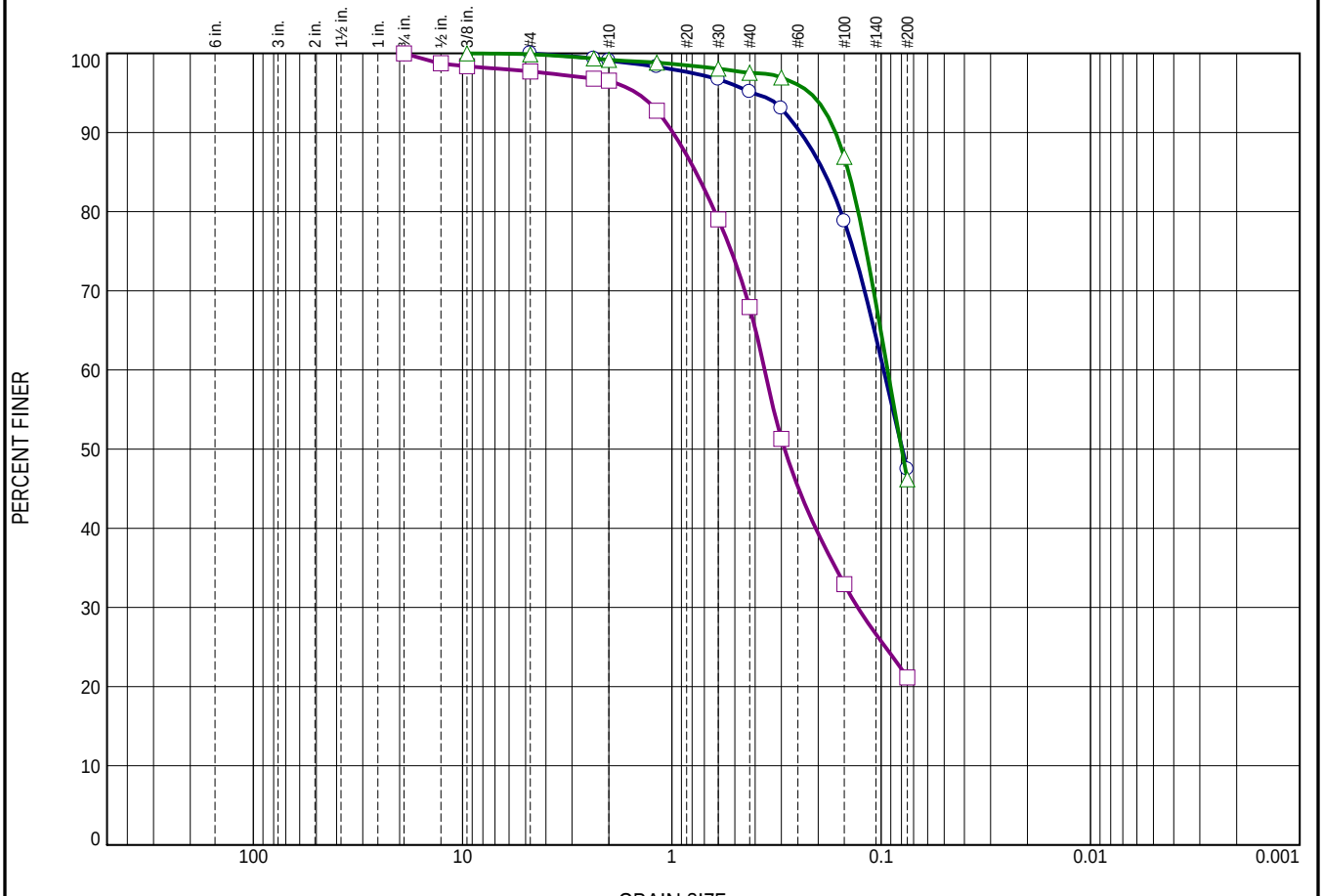
□ RECEIVED ON 9/21/2023

△ RECEIVED ON 9/21/2023

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Tested By: ○ T. WILL □ T. WILL △ J. MILLER Checked By: S. SCHWEITZER

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.9	4.0	47.6	47.5	
□	0.0	0.0	2.3	1.1	28.7	46.7	21.2	
△	0.0	0.0	0.1	0.7	1.7	51.3	46.2	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	33	29	0.1874	0.0973	0.0792					
□			0.7680	0.3605	0.2895	0.1294				
△			0.1429	0.0932	0.0799					

	MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○	silty sand	9/28/2023	SM	39.5
□		9/27/2023		43.5
△		9/28/2023		30.4

Project No. 2961 Client: CORESTONE ENGINEERING, INC.

Project: CORESTONE ENGINEERING, INC. - TESTING AS ORDERED

○ Source of Sample: 5012-05-1 B-02 Depth: 5' Sample Number: B

□ Source of Sample: 5012-05-1 B-02 Depth: 7.5' Sample Number: C

△ Source of Sample: 5012-05-1 B-02 Depth: 10' Sample Number: D

Remarks:

○ RECEIVED ON 9/21/2023

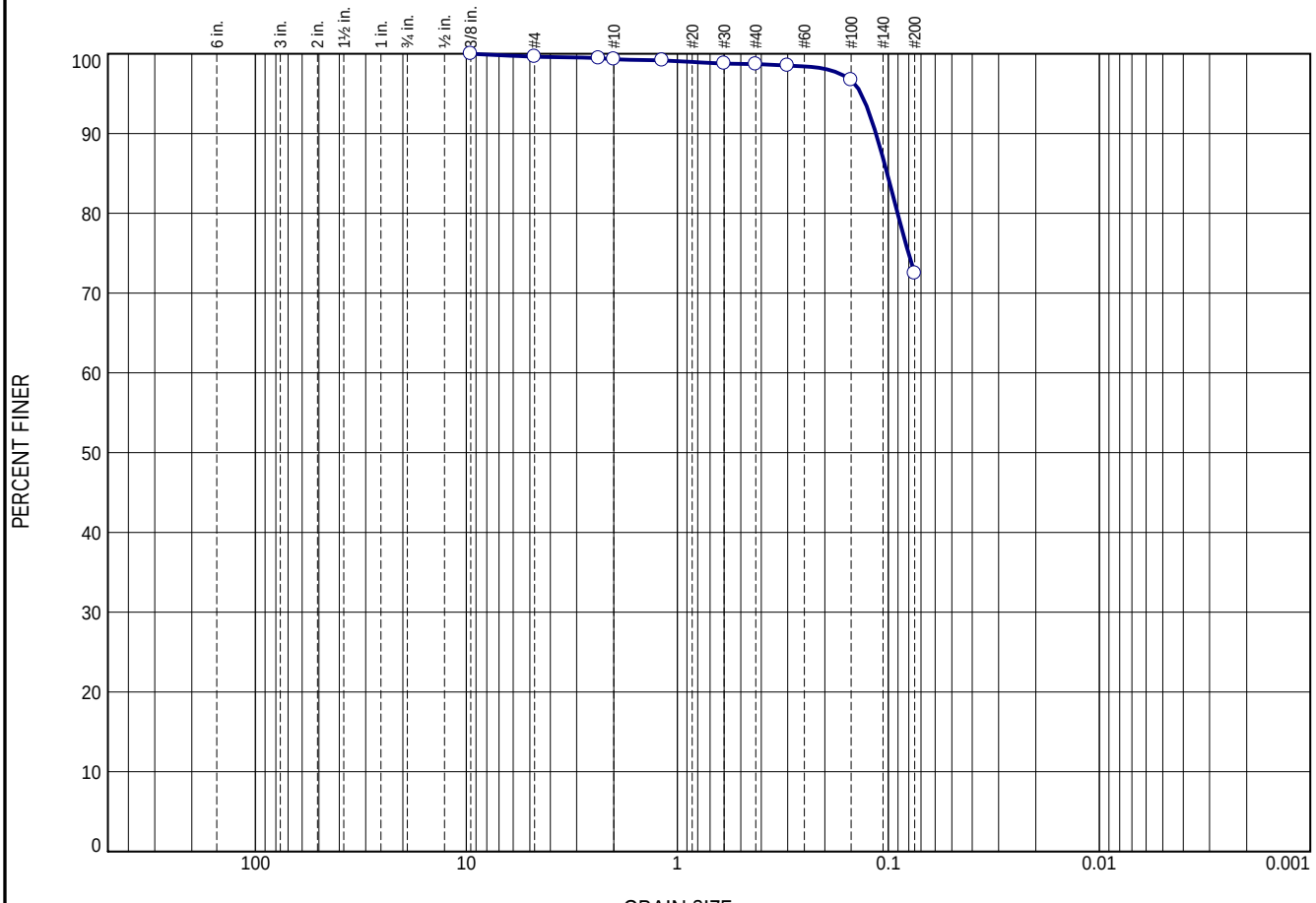
□ RECEIVED ON 9/21/2023

△ RECEIVED ON 9/21/2023

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Tested By: ○ J. MILLER □ R. VELARDEZ △ J. MILLER Checked By: S. SCHWEITZER

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.4	0.3	0.6	26.2	72.5	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NV	NP	0.1013							

MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○ silt with sand	9/25/2023	ML	30.4

Project No. 2961 Client: CORESTONE ENGINEERING, INC.

Project: CORESTONE ENGINEERING, INC. - TESTING AS ORDERED

○ Source of Sample: 5012-05-1 B-02 Depth: 12.5' Sample Number: E

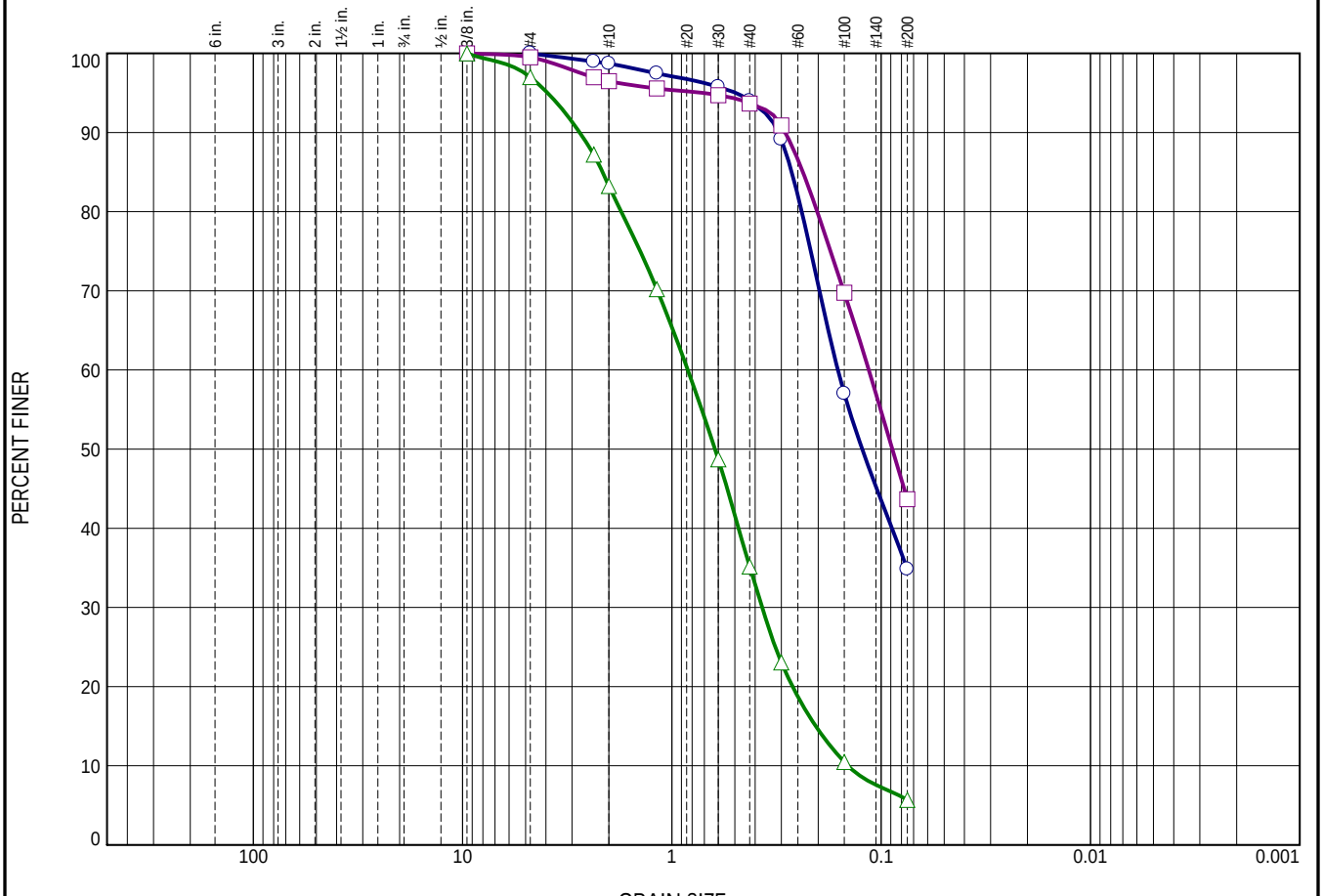
Remarks:

○RECEIVED ON 9/25/2023

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Tested By: T. WILL Checked By: S. SCHWEITZER

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0.0	0.0	0.0	1.3	4.7	59.2	34.8
□	0.0	0.0	0.5	3.0	2.8	50.0	43.7
△	0.0	0.0	3.0	13.8	48.0	29.5	5.7

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NV	NP	0.2675	0.1611	0.1233					
□	NV	NP	0.2366	0.1146	0.0885					
△	30	27	2.1439	0.8394	0.6223	0.3704	0.2054	0.1441	1.13	5.82

	MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○	silty sand	6/27/2024	SM	34.4
□	silty sand	6/27/2024	SM	40.9
△	poorly graded sand with silt	6/27/2024	SP-SM	24.4

Project No. 2961 Client: CORESTONE ENGINEERING, INC.

Project: CORESTONE ENGINEERING, INC. - TESTING AS ORDERED

○ Source of Sample: 5012-05-1 B-02A Depth: 2.5' Sample Number: B

□ Source of Sample: 5012-05-1 B-02A Depth: 5' Sample Number: C

△ Source of Sample: 5012-05-1 B-02A Depth: 7.5' Sample Number: D

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Remarks:

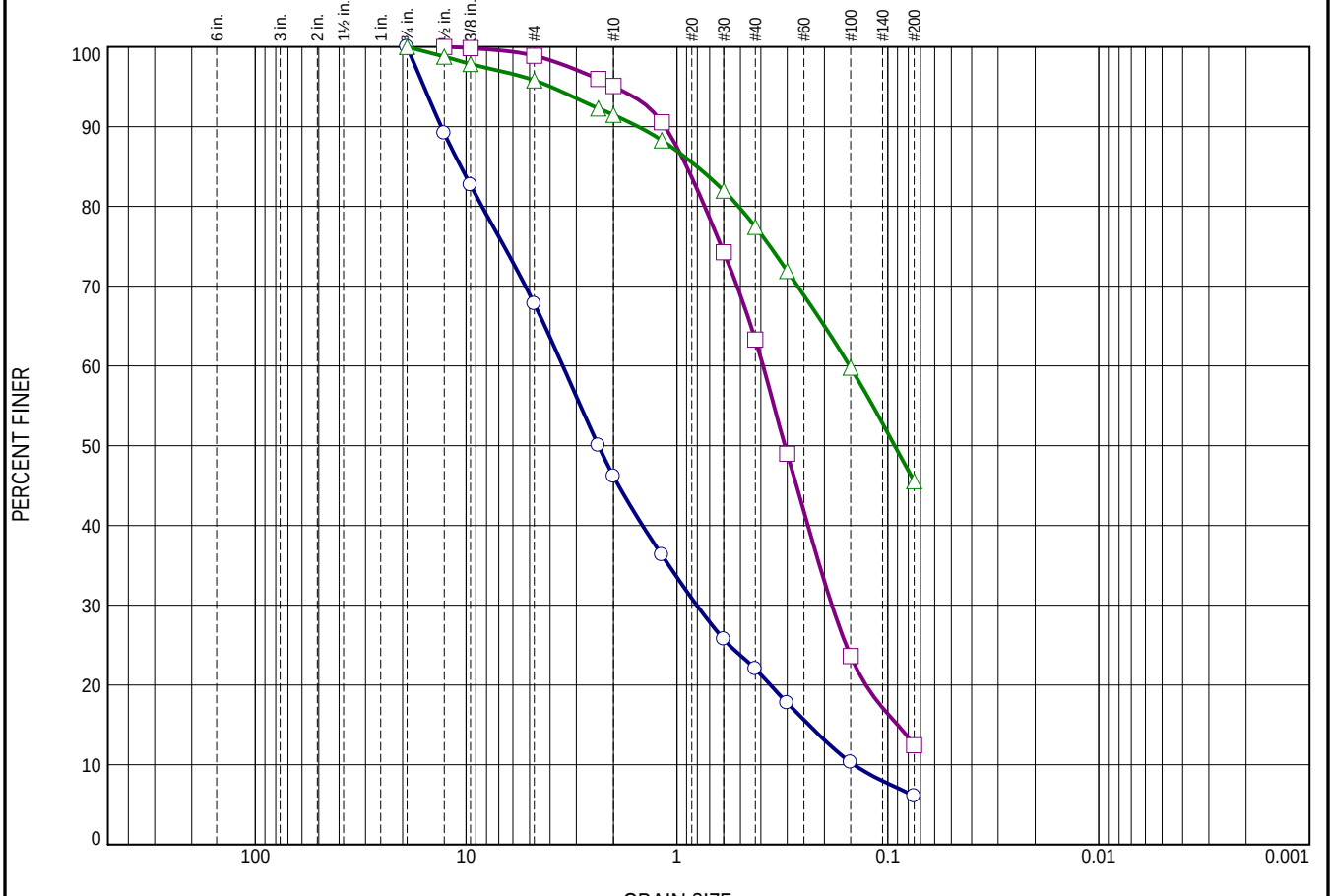
○RECEIVED ON 6/26/2024

□RECEIVED ON 6/26/2024

△RECEIVED ON 6/26/2024

Tested By: M. DAY Checked By: S. SCHWEITZER

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0.0	0.0	32.2	21.6	24.2	15.9	6.1
□	0.0	0.0	1.1	3.8	31.8	50.9	12.4
△	0.0	0.0	4.2	4.3	14.1	31.8	45.6

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			10.5873	3.4779	2.3559	0.8055	0.2367	0.1447	1.29	24.03
□			0.8992	0.3903	0.3078	0.1842	0.0898			
△	NV	NP	0.8035	0.1516	0.0928					

	MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○		6/27/2024		13.8
□		6/28/2024		23.7
△	silty sand	6/27/2024	SM	20.4

Project No. 2961 Client: CORESTONE ENGINEERING, INC.

Project: CORESTONE ENGINEERING, INC. - TESTING AS ORDERED

○ Source of Sample: 5012-05-1 B-02A Depth: 10' Sample Number: E

□ Source of Sample: 5012-05-1 B-02A Depth: 40' Sample Number: M

△ Source of Sample: 5012-05-1 B-02A Depth: 25' Sample Number: J

Remarks:

○RECEIVED ON 6/26/2024

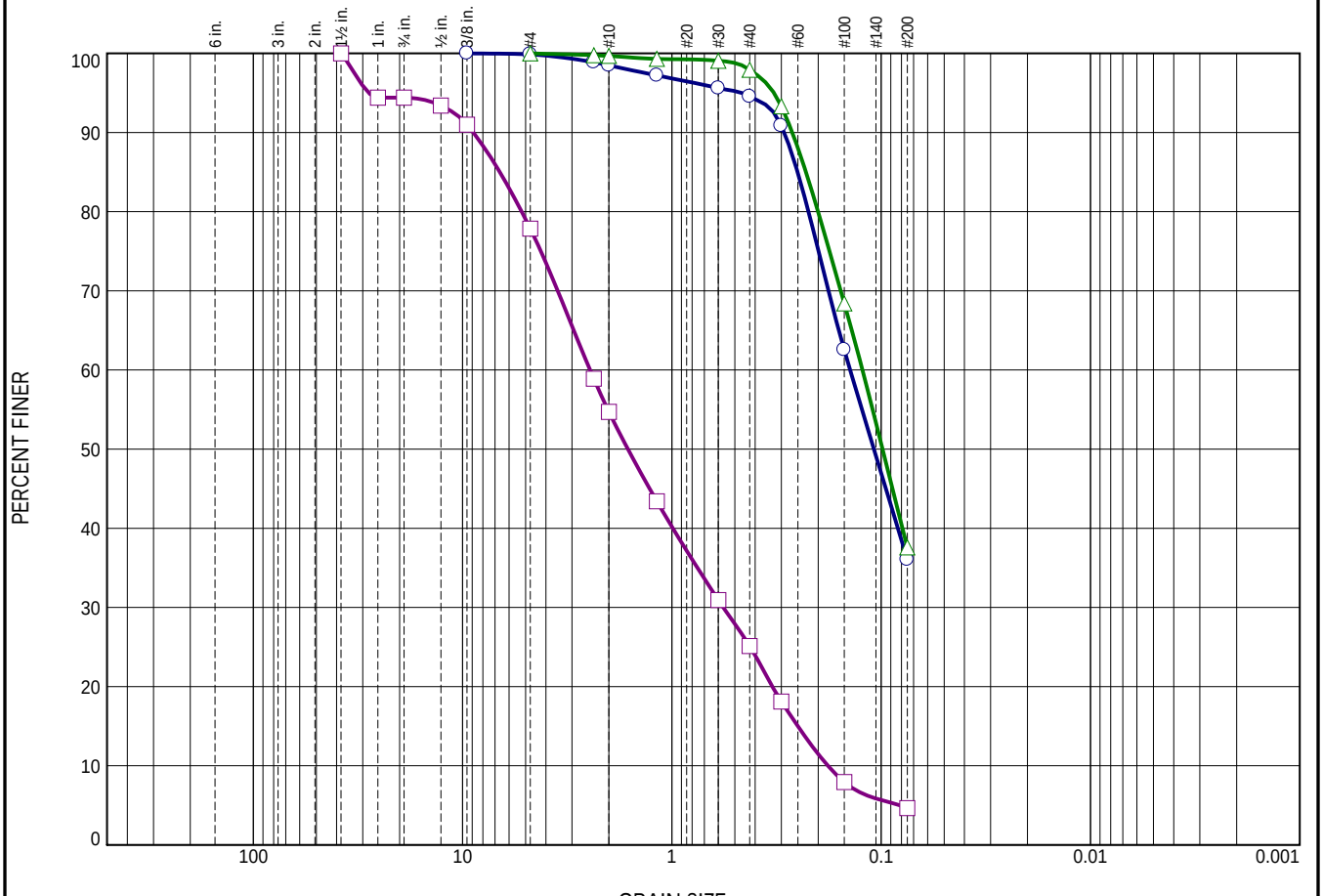
□RECEIVED ON 6/26/2024

△RECEIVED ON 6/26/2024

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Tested By: M. DAY Checked By: S. SCHWEITZER

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.1	1.4	4.0	58.5	36.0	
□	0.0	5.6	16.5	23.2	29.6	20.4	4.7	
△	0.0	0.0	0.0	0.3	1.8	60.3	37.6	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NV	NP	0.2509	0.1406	0.1084					
□	NV	NP	6.6444	2.4608	1.6218	0.5684	0.2501	0.1796	0.73	13.70
△	NV	NP	0.2288	0.1229	0.0985					

	MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○	silty sand	9/30/2023	SM	37.3
□	poorly graded sand with gravel	9/28/2023	SP	10.5
△	silty sand	9/30/2023	SM	28.1

Project No. 2961 Client: CORESTONE ENGINEERING, INC.

Project: CORESTONE ENGINEERING, INC. - TESTING AS ORDERED

○ Source of Sample: 5012-05-1 B-03 Depth: 5' Sample Number: B

□ Source of Sample: 5012-05-1 B-03 Depth: 7.5' Sample Number: C

△ Source of Sample: 5012-05-1 B-03 Depth: 12.5' Sample Number: E

Remarks:

○ RECEIVED ON 9/21/2023

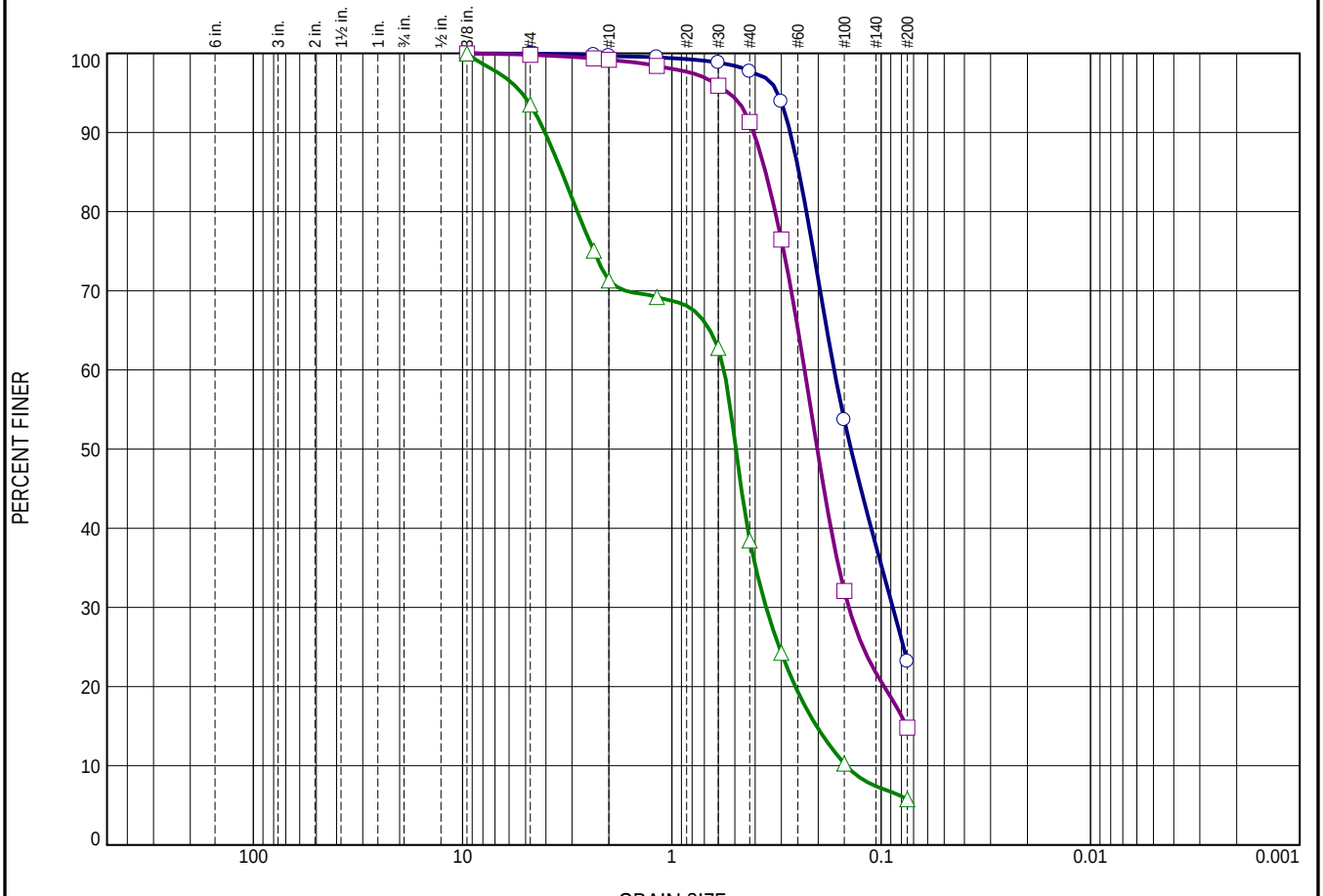
□ RECEIVED ON 9/21/2023

△ RECEIVED ON 9/21/2023

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Tested By: ○ T. WILL □ R. VELARDEZ △ A. DIXON Checked By: S. SCHWEITZER

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.3	2.0	74.5	23.2	
□	0.0	0.0	0.2	0.6	7.9	76.5	14.8	
△	0.0	0.0	6.5	22.2	32.8	32.7	5.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NV	NP	0.2471	0.1677	0.1393	0.0880				
□	NV	NP	0.3569	0.2322	0.2019	0.1427	0.0756			
△			3.3605	0.5635	0.4944	0.3547	0.2034	0.1468	1.52	3.84

	MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○	silty sand	9/28/2023	SM	32.7
□	silty sand	9/28/2023	SM	36.3
△		9/28/2023		17.9

Project No. 2961 Client: CORESTONE ENGINEERING, INC.

Project: CORESTONE ENGINEERING, INC. - TESTING AS ORDERED

○ Source of Sample: 5012-05-1 B-04 Depth: 2.5' Sample Number: A

□ Source of Sample: 5012-05-1 B-04 Depth: 5' Sample Number: B

△ Source of Sample: 5012-05-1 B-04 Depth: 7.5' Sample Number: C

Remarks:

○RECEIVED ON 9/21/2023

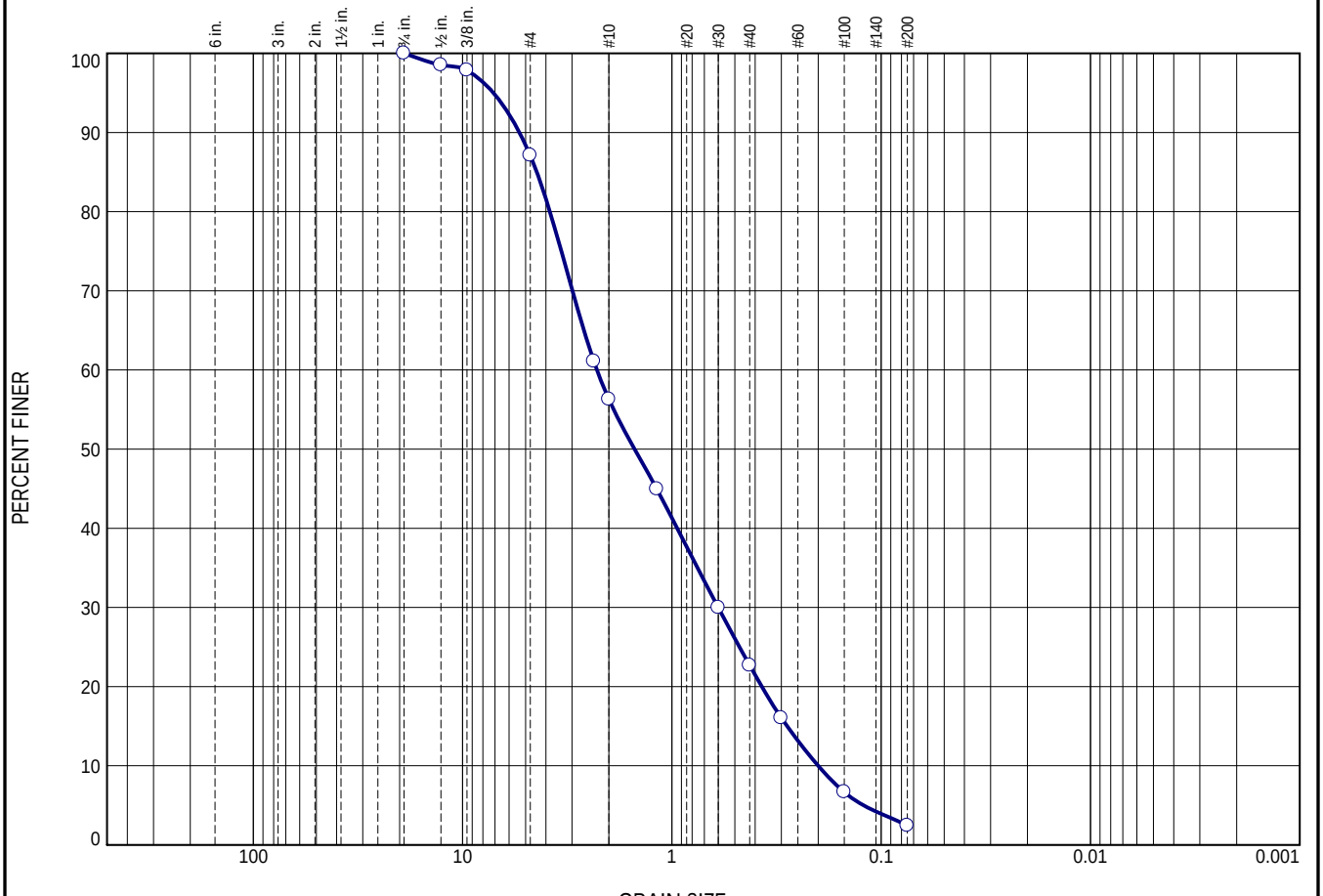
□RECEIVED ON 9/21/2023

△RECEIVED ON 9/21/2023

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Tested By: ○ R. VELARDEZ □ T. WILL △ T. WILL Checked By: S. SCHWEITZER

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	12.9	30.8	33.6	20.3	2.4	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			4.4145	2.2820	1.5071	0.6008	0.2812	0.2000	0.79	11.41

MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○ poorly graded sand	9/28/2023	SP	15.6

Project No. 2961 Client: CORESTONE ENGINEERING, INC.

Project: CORESTONE ENGINEERING, INC. - TESTING AS ORDERED

○ Source of Sample: 5012-05-1 B-04 Depth: 10' Sample Number: D

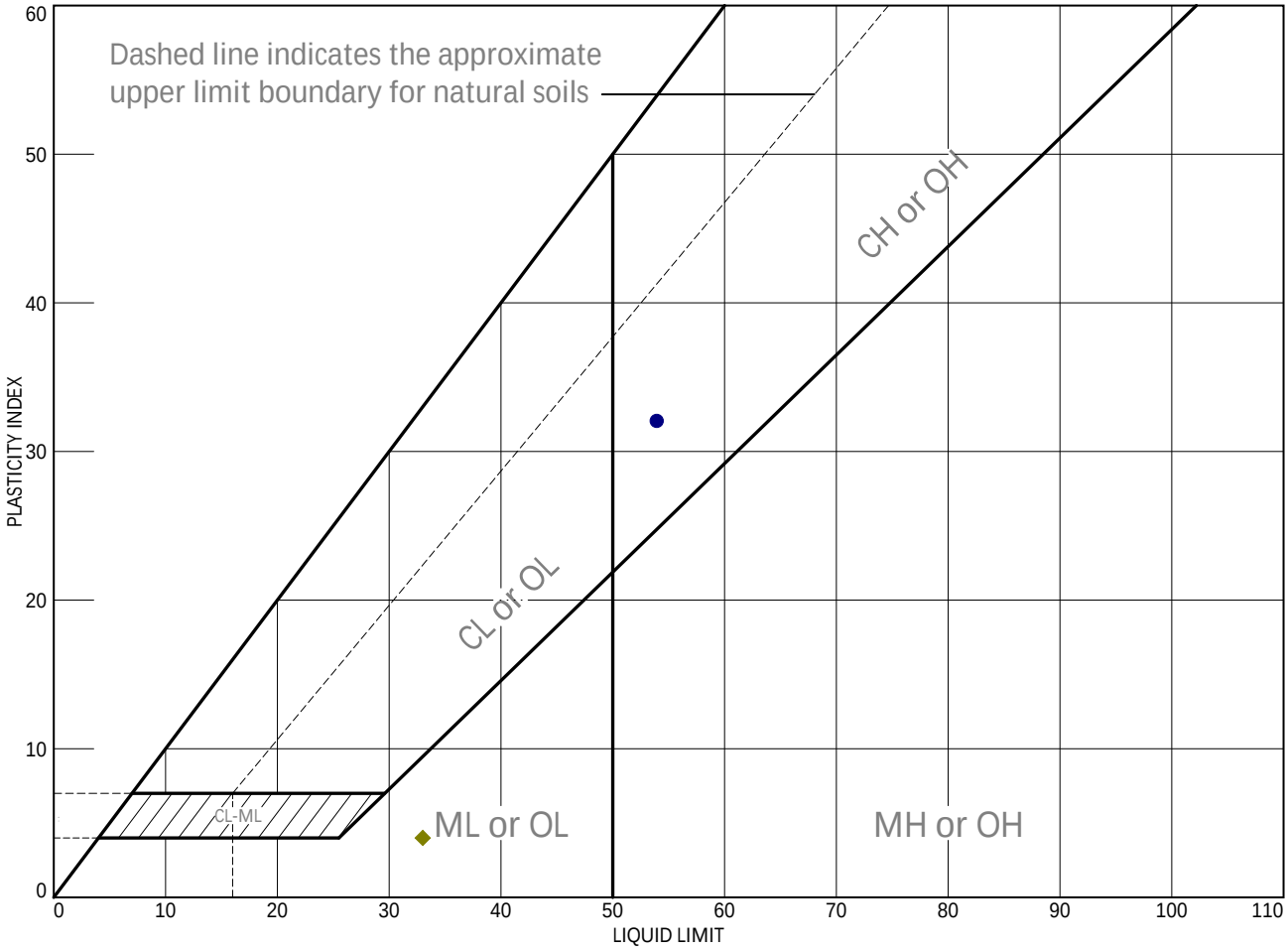
Remarks:

○RECEIVED ON 9/21/2023

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Tested By: R. VELARDEZ Checked By: S. SCHWEITZER

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	fat clay with sand	54	22	32	91.7	80.1	CH
■	silty sand	NV	NP	NP	74.4	26.2	SM
▲	silty sand	NV	NP	NP	63.1	21.6	SM
◆	silty sand	33	29	4	95.1	47.5	SM
▼	silt with sand	NV	NP	NP	98.7	72.5	ML

Project No. 2961 Client: CORESTONE ENGINEERING, INC.

Project: CORESTONE ENGINEERING, INC. - TESTING AS ORDERED

●	Source of Sample: 5012-05-1 B-01	Depth: 2.5'	Sample Number: A
■	Source of Sample: 5012-05-1 B-01	Depth: 5'	Sample Number: B
▲	Source of Sample: 5012-05-1 B-01	Depth: 10'	Sample Number: D
◆	Source of Sample: 5012-05-1 B-02	Depth: 5'	Sample Number: B
▼	Source of Sample: 5012-05-1 B-02	Depth: 12.5'	Sample Number: E

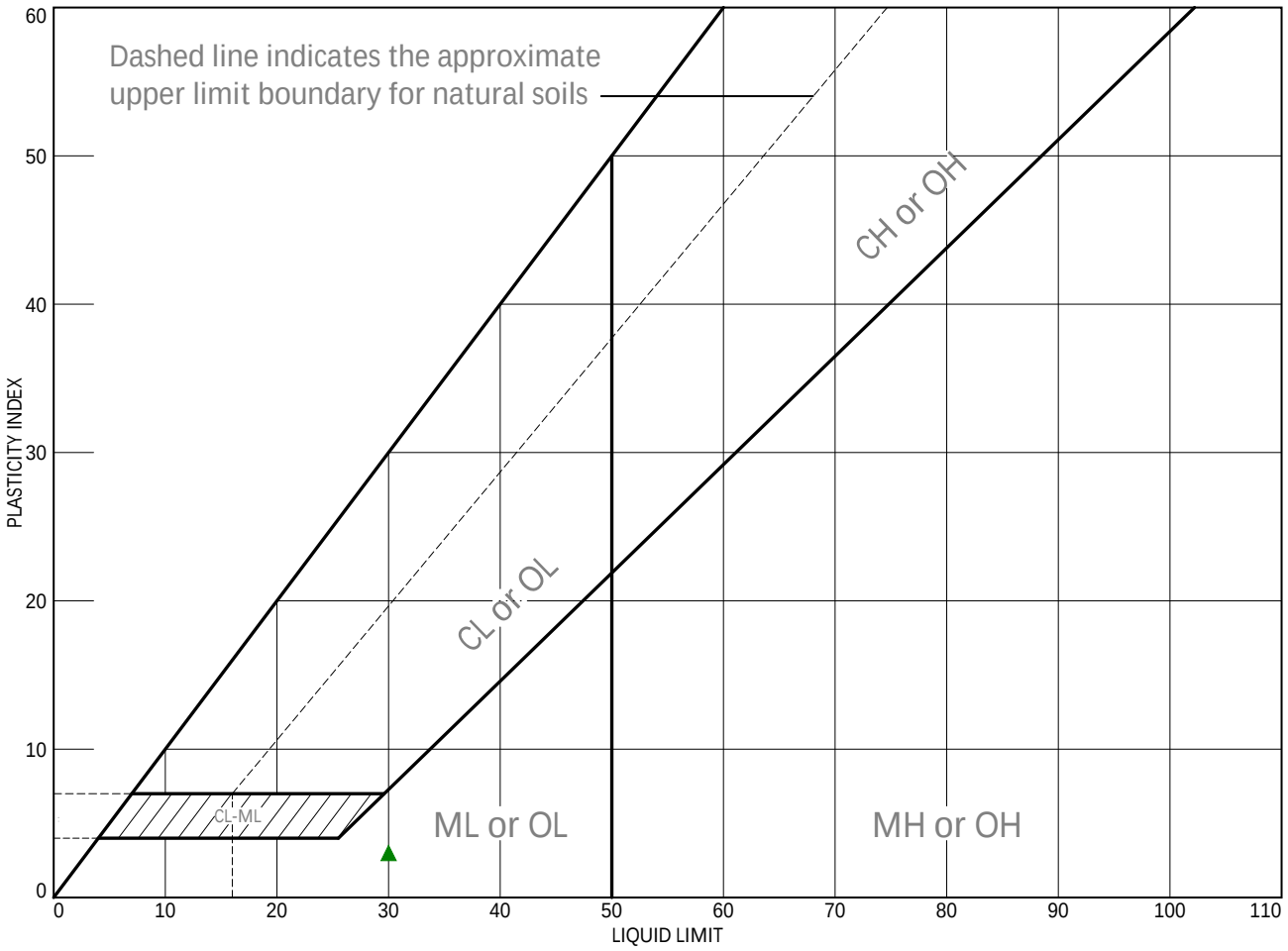
CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Remarks:

● RECEIVED ON 9/21/2023
■ RECEIVED ON 9/21/2023
▲ RECEIVED ON 9/21/2023
◆ RECEIVED ON 9/21/2023
▼ RECEIVED ON 9/21/2023

Tested By: A. DIXON Checked By: S. SCHWEITZER

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty sand	NV	NP	NP	94.0	34.8	SM
■	silty sand	NV	NP	NP	93.7	43.7	SM
▲	poorly graded sand with silt	30	27	3	35.2	5.7	SP-SM
◆	silty sand	NV	NP	NP	77.4	45.6	SM

Project No. 2961 Client: CORESTONE ENGINEERING, INC.

Project: CORESTONE ENGINEERING, INC. - TESTING AS ORDERED

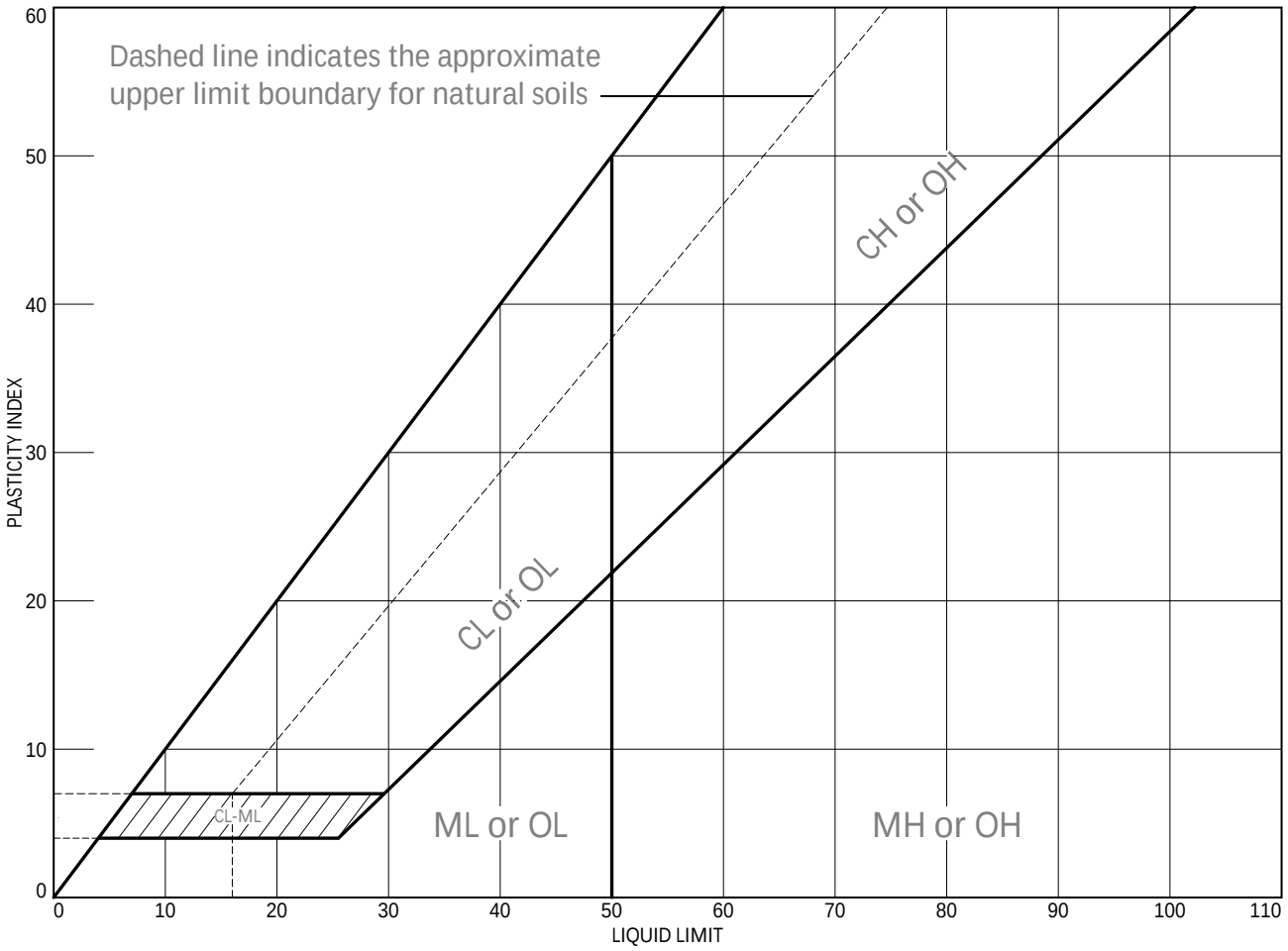
●	Source of Sample: 5012-05-1 B-02A	Depth: 2.5'	Sample Number: B
■	Source of Sample: 5012-05-1 B-02A	Depth: 5'	Sample Number: C
▲	Source of Sample: 5012-05-1 B-02A	Depth: 7.5'	Sample Number: D
◆	Source of Sample: 5012-05-1 B-02A	Depth: 25'	Sample Number: J

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Remarks:
- ● RECEIVED ON 6/26/2024
- ■ RECEIVED ON 6/26/2024
- ▲ RECEIVED ON 6/26/2024
- ◆ RECEIVED ON 6/26/2024

Tested By: E. MILLIKEN Checked By: S. SCHWEITZER

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	silty sand	NV	NP	NP	94.5	36.0	SM
■	poorly graded sand with gravel	NV	NP	NP	25.1	4.7	SP
▲	silty sand	NV	NP	NP	97.9	37.6	SM
◆	silty sand	NV	NP	NP	97.7	23.2	SM
▼	silty sand	NV	NP	NP	91.3	14.8	SM

Project No. 2961 Client: CORESTONE ENGINEERING, INC.

Project: CORESTONE ENGINEERING, INC. - TESTING AS ORDERED

● Source of Sample: 5012-05-1 B-03	Depth: 5'	Sample Number: B
■ Source of Sample: 5012-05-1 B-03	Depth: 7.5'	Sample Number: C
▲ Source of Sample: 5012-05-1 B-03	Depth: 12.5'	Sample Number: E
◆ Source of Sample: 5012-05-1 B-04	Depth: 2.5'	Sample Number: A
▼ Source of Sample: 5012-05-1 B-04	Depth: 5'	Sample Number: B

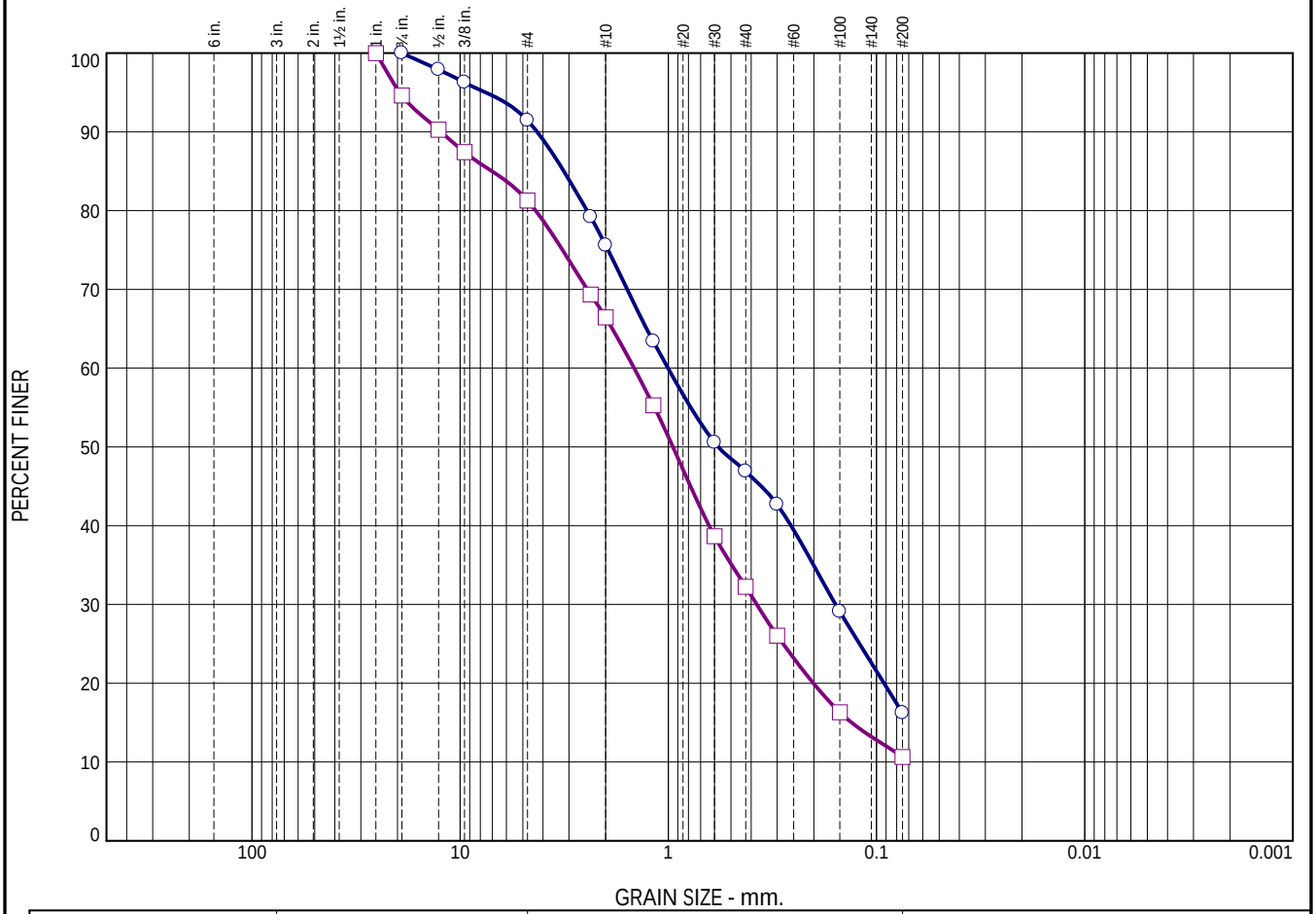
CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Remarks:

● RECEIVED ON 9/21/2023
■ RECEIVED ON 9/21/2023
▲ RECEIVED ON 9/21/2023
◆ RECEIVED ON 9/21/2023
▼ RECEIVED ON 9/21/2023

Tested By: A. DIXON Checked By: S. SCHWEITZER

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0.0	0.0	8.5	15.9	28.7	30.7	16.2
□	0.0	5.4	13.3	14.8	34.2	21.7	10.6

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			3.1775	1.0038	0.5761	0.1571				
□			7.0283	1.4587	0.9504	0.3761	0.1317			

	MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○		5/23/2024		
□		5/23/2024		

Project No. 2961 Client: CORESTONE ENGINEERING, INC.

Project: CORESTONE ENGINEERING, INC. - TESTING AS ORDERED

○ Source of Sample: 5102-05-1 TH-01 Depth: 1' Sample Number: A

□ Source of Sample: 5102-05-1 TH-02 Depth: 1' Sample Number: A

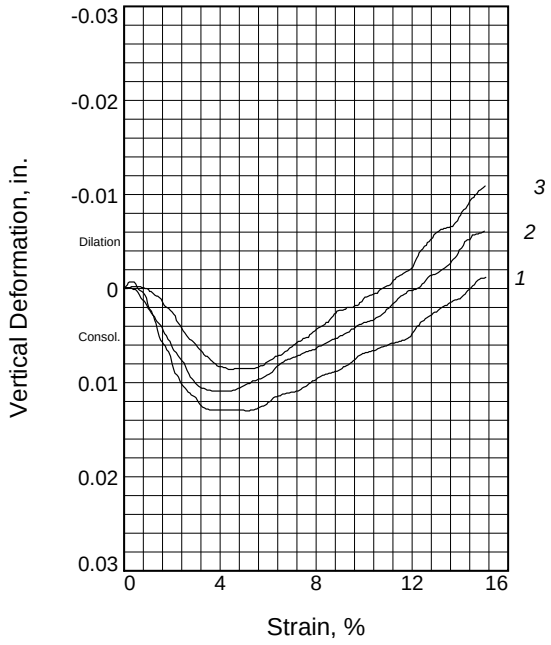
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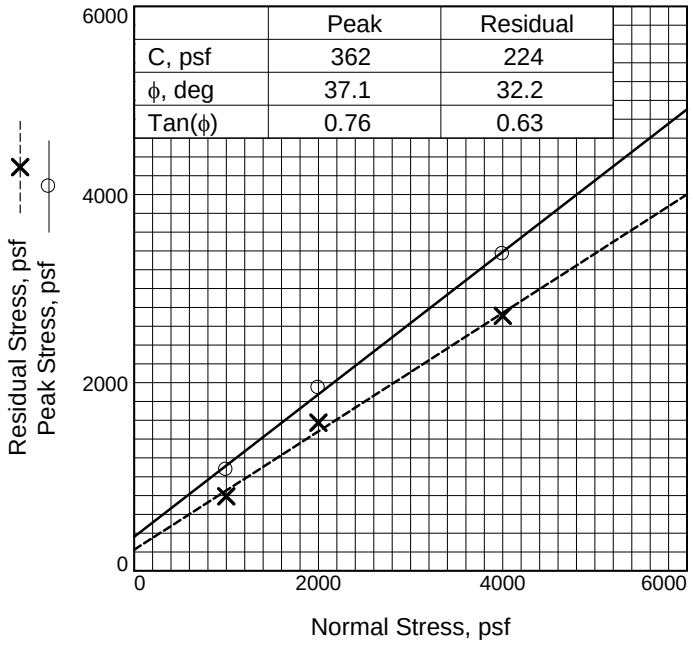
○ RECEIVED ON 5/21/2024

□ RECEIVED ON 5/21/2024

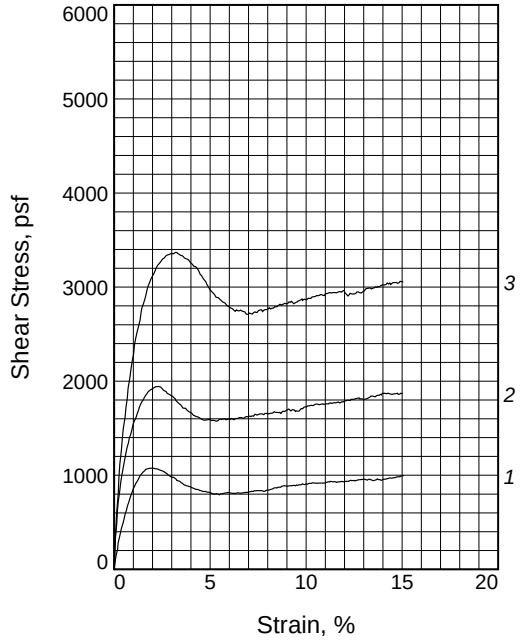
CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Tested By: T. WILL Checked By: S. SCHWEITZER





	Peak	Residual
C, psf	362	224
ϕ, deg	37.1	32.2
Tan(ϕ)	0.76	0.63



	Sample No.	1	2	3
Initial	Water Content, %	9.4	9.4	9.4
	Dry Density, pcf	108.7	108.7	108.7
	Saturation, %	46.2	46.2	46.2
	Void Ratio	0.5502	0.5509	0.5506
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	19.1	18.8	18.9
	Dry Density, pcf	109.3	109.9	110.3
	Saturation, %	94.9	95.0	97.0
	Void Ratio	0.5423	0.5336	0.5275
	Diameter, in.	2.42	2.42	2.42
	Height, in.	0.99	0.99	0.99
Normal Stress, psf		1000	2000	4000
Peak Stress, psf		1074	1944	3369
Strain, %		1.9	2.3	3.2
Residual Stress, psf		792	1575	2711
Strain, %		5.5	5.4	6.9
Strain rate, in./min.		0.003	0.003	0.003

Sample Type: REMOLDED
Description: silty sand

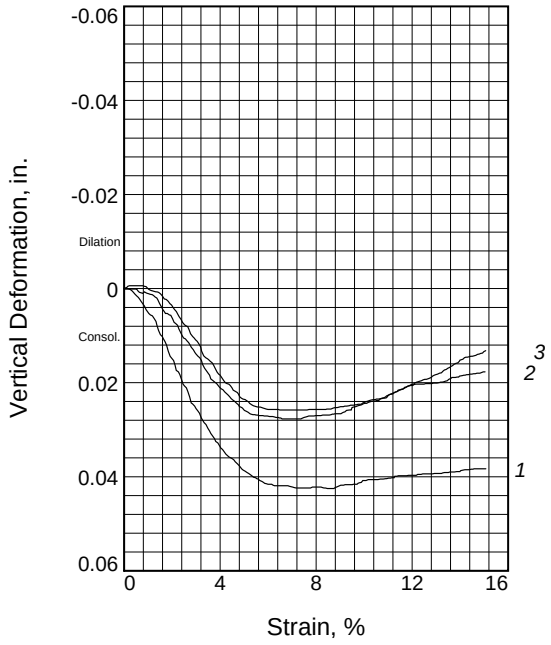
LL= NV **PI=** NP
Assumed Specific Gravity= 2.70
Remarks: MINUS #4 MATERIAL REMOLDED TO THE AVERAGE AS-RECEIVED WET DENSITY OF 119.2 PCF.

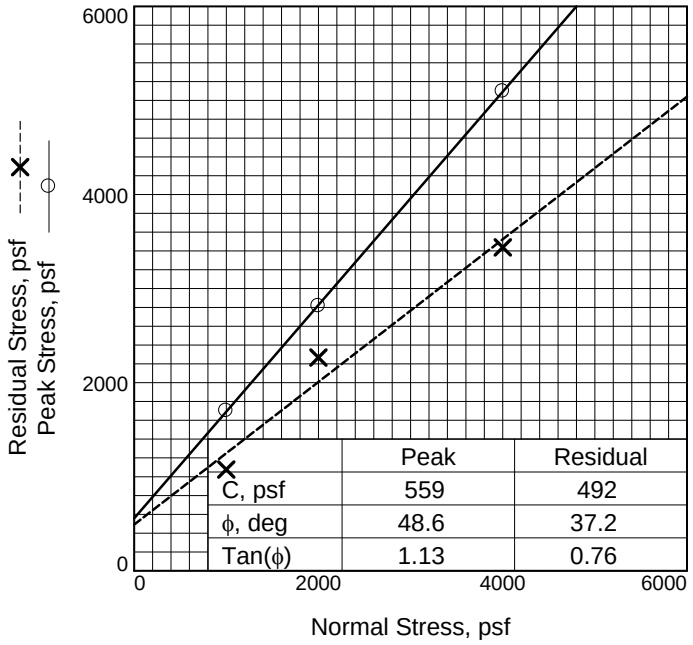
Client: CORESTONE ENGINEERING, INC.

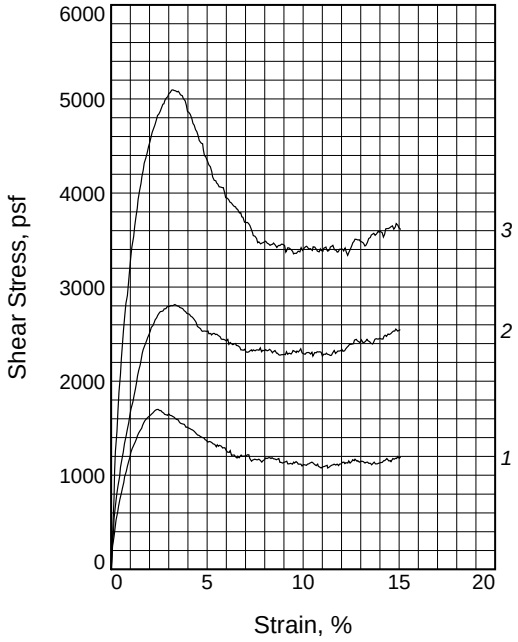
Project: CORESTONE ENGINEERING, INC. - TESTING AS ORDERED
Source of Sample: 5012-05-1 B-01 **Depth:** 5'
Sample Number: B
Proj. No.: 2961 **Date Sampled:** 9/11/2023

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Tested By: M. PONTONI **Checked By:** N. ANDERSON







Sample No.		1	2	3
Initial	Water Content, %	11.5	11.5	11.5
	Dry Density, pcf	117.0	117.0	116.9
	Saturation, %	70.5	70.5	70.4
	Void Ratio	0.4413	0.4413	0.4419
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	15.6	15.6	15.8
	Dry Density, pcf	117.3	117.6	117.9
	Saturation, %	96.3	97.5	99.0
	Void Ratio	0.4374	0.4335	0.4301
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	0.99	0.99
Normal Stress, psf		1000	2000	4000
Peak Stress, psf		1700	2815	5097
Strain, %		2.4	3.3	3.2
Residual Stress, psf		1077	2267	3438
Strain, %		10.9	11.0	13.2
Strain rate, in./min.		0.020	0.020	0.020

Sample Type: REMOLDED
Description: poorly graded sand with gravel

LL= NV **PI=** NP
Assumed Specific Gravity= 2.70
Remarks: MINUS #4 MATERIAL REMOLDED TO THE AS-RECEIVED AVERAGE WET DENSITY OF 130.9 PCF.

Client: CORESTONE ENGINEERING, INC.

Project: CORESTONE ENGINEERING, INC. - TESTING AS ORDERED
Source of Sample: 5012-05-1 B-03 **Depth:** 7.5'
Sample Number: C
Proj. No.: 2961 **Date Sampled:** 9/11/2023

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Tested By: M. PONTONI **Checked By:** M. PONTONI

SGS Silver State Analytical Laboratories
1135 Financial Blvd
Reno, NV 89502
(775) 857-2400
www.ssalabs.com

Analytical Report

Workorder#: **23090832**
Date Reported: **11/6/2023**

Client: Corestone Engineering, Inc.
Project Name: 5012-05-1; B-01 A 2.5'
PO #:

Sampled By: Vimal

Laboratory Accreditation Number: NV930/CA3029

Laboratory ID	Client Sample ID	Date/Time Sampled	Date Received
23090832-01	5012-05-1; B-01 A 2.5'	09/12/2023 8:30	9/18/2023

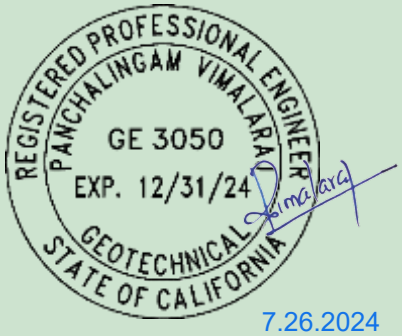
Parameter	Method	Result	Units	PQL	Analyst	Date/Time Analyzed	Data Flag
Chloride	Cal-Trans 422	12	mg/Kg	0.3	JG	11/02/2023 21:38	
Hydrogen Ion (pH)	Cal-Trans 643	7.3	pH Units	0.1	LJ	11/03/2023 11:32	H
Oxidation-Reduction Potential	SM 2580 B	380	mV	1	LJ	10/05/2023 8:29	
Resistivity	CTM 643 4F	2200	mg/Kg		LJ	11/01/2023 8:39	
Sulfate	Cal-Trans 417	22	mg/Kg	0.3	JG	11/02/2023 21:38	
Temperature	Cal-Trans 643	22	pH Units	0.1	LJ	11/03/2023 11:32	H

APPENDIX C

C-1 LIQUEFACTION ANALYSIS

C-2 SHALLOW FOUNDATION ANALYSIS

C-3 DRIVEN PILE FOUNDATION ANALYSIS



7.26.2024

Project Name:	Upper Truckee River Bridge at Johnson Meadow	Developed By:	PV
Project No:	5012-05-1	Calculated By:	PV
Boring No:	B-02 Mud Rotary Boring	Checked By:	xl
Analyzed Case:	Selected low blow counts sand layers	Date:	11/30/2023
	West Bridge Abutment	Version:	Jan-14

Liquefaction Potential of a Single Layer Using Idriss and Boulanger (2008) SPT Method

Input Parameters

Earthquake Input Parameters

Peak Ground Acceleration, a_{max} =	0.49	g	S_{DS}/2.5 or PGA
Earthquake Magnitude, M =	6.49		USGS Deaggregation Analysis
			(or known/active nearby fault's $M_{probable}$)

Layer and SPT Test Data

Depth to Layer Top =	5	feet	
Thickness of the Layer =	2	feet	
SPT Sample Depth =	5	feet	
Measured SPT N-Value =	2		
Depth to Ground Water Table =	5	feet	
Hammer Energy Efficiency ER =	79	%	
Borehole Diameter =	4	inch	101.6 mm
Standard SPT Sampler? (Yes/No)	Yes	(Yes: 1-3/8" inside dia - No room for liner)	

Soil Parameters

USCS Soil Type =	SM		
% Fines =	48	%	Non-Liq if >35% & PI >7
Plasticity Index, PI =	4	(Info only)	
Average unit weight above GW =	120	pcf	
Average unit weight below GW =	120	pcf	

Void redistribution effect? (Yes/No) No (Only for shear strength calcs)
(Select yes only for thick liquefiable layer that is underlain by low permeable deposits)

Calculations

Total and Effective Stress

Mid depth to SPT sample, z =	6	feet	1.8288 m
Total Stress at Mid Depth, σ_{vo} =	720	psf	
Effective Stress at Mid Depth σ_{v0}' =	658	psf	

SPT Corrections

C_E =	1.317	C_B =	1.00	C_S =	1.00	C_R =	0.8
C_N =	1.700	or	1.700	(alternative equation)			
$(N_1)_{60}$ =	3.6		3.6	corrected SPT blow count			
ΔN =	5.6			correction for percent of fines (add)			
$(N_1)_{60\,CS}$ =	9.2			Clean-sand equivalent corrected SPT blow count			

Cyclic Stress Ratio

rd =	0.984	stress reduction coefficient
CSR =	0.343	Cyclic stress ratio for design EQ

Cyclic Resistance Ratio

$CRR_{M7.5,\ 1}$ =	0.113	Cyclic resistance ratio for M=7.5 & σ_{vc}' =1atm
MSF =	1.304	EQ magnitude scaling factor
K_σ =	1.100	Overburden correction factor
CRR =	0.161	Cyclic resistance ratio for M & σ_{v0}'

Factor of Safety

FS_{liq} =	**0.470**	Factor of Safety Against Soil Liquefaction

Limit maximum to 2.0 (for plotting purpose)

Lateral Spread

γ_{lim} =	50.0%	Limiting shear strain
F_α =	0.929	Parameter F_α
γ_{max} =	50.0%	Maximum shear strain
LDI =	1.000 feet	Lateral displacement index (displacement in the subject layer)

1-D Reconsolidation Settlement (Liquefaction Induced Vertical Settlement)

εv =	3.92%	volumetric strain
S =	0.94 inches	Liquefaction vertical settlement (at the considered layer)

Residual Shear Strength

$\Delta(N_1)_{60\text{-}Sr}$ =	3.9	Fine correction for residual strength by Seed (1987)
$(N_1)_{60\ CS\text{-}Sr}$ =	7.4	Clean-sand equivalent SPT blow count for S_r
S_r/σ_{v0}' =	0.076	Residual Shear Strength Ratio
S_r =	50 psf	Residual Shear Strength

Results Summary:

Boring	Top Depth (feet)	Thickness (feet)	USCS Type	N	$(N_1)_{60\ CS}$	CSR	CRR	FS_{liq}	LDI (feet)	S (inches)	S_r (psf)
B-02	5.0	2.0	SM	2	9.2	0.343	0.161	0.470	1.000	0.94	50

Notes:

1. FS_{liq} - Factor of safety with respect to soil liquefaction; <1.0 potential exists, <1.1 marginal
2. LDI -Lateral spread index/displacement. If the liquefiable layer is at a depth deeper than twice the vertical height of the free-face, potential for lateral spread would be minimal (for free-face height of less than 10 feet).
3. S - Liquefaction induced vertical settlement at the layer. Surface manifestation would be smaller and will depend on the thickness of the non-liquefiable cap above.
4. S_r - Estimated residual strength of the liquefied soils.

Saved Results:

Boring	Top Depth (feet)	Thickness (feet)	USCS Soil	N	$(N_1)_{60\ CS}$	CSR	CRR	FS_{liq}	LDI (feet)	S (inches)	S_r (psf)
B-02	5.0	2.0	SM	2	9.2	0.343	0.161	0.470	1.000	0.94	50
B-02	7.5	2.5	SM	12	25.9	0.394	0.449	1.139			
B-02	10.0	2.5	SM	15	27.6	0.427	0.529	1.239			
B-02	12.0	2.5	ML	37	54.9	0.449	2.869	2.000			
								Σ	1.000	0.94	

PW: liq

Project Name:	Upper Truckee River Bridge at Johnson Meadow	Developed By:	PV
Project No:	5012-05-1	Calculated By:	PV
Boring No:	B-03 Mud Rotary Boring	Checked By:	xl
Analyzed Case:	Selected low blow counts sand layers	Date:	6/6/2024
	Boardwalk	Version:	Jan-14

Liquefaction Potential of a Single Layer Using Idriss and Boulanger (2008) SPT Method

Input Parameters

Earthquake Input Parameters

Peak Ground Acceleration, a_{max} =	0.49	g	S_{DS}/2.5 or PGA
Earthquake Magnitude, M =	6.49		USGS Deaggregation Analysis
			(or known/active nearby fault's $M_{probable}$)

Layer and SPT Test Data

Depth to Layer Top =	9.5	feet	
Thickness of the Layer =	2.5	feet	
SPT Sample Depth =	10	feet	
Measured SPT N-Value =	2		
Depth to Ground Water Table =	5	feet	
Hammer Energy Efficiency ER =	79	%	
Borehole Diameter =	4	inch	101.6 mm
Standard SPT Sampler? (Yes/No)	Yes	(Yes: 1-3/8" inside dia - No room for liner)	

Soil Parameters

USCS Soil Type =	SP		
% Fines =	5	%	Non-Liq if >35% & PI >7
Plasticity Index, PI =	NP	(Info only)	
Average unit weight above GW =	120	pcf	
Average unit weight below GW =	120	pcf	

Void redistribution effect? (Yes/No) **No** Only for shear strength calcs)
(Select yes only for thick liquefiable layer that is underlain by low permeable deposits)

Calculations

Total and Effective Stress

Mid depth to SPT sample, z =	11	feet	3.3528 m
Total Stress at Mid Depth, σ_{vo} =	1320	psf	
Effective Stress at Mid Depth σ_{v0}' =	946	psf	

SPT Corrections

C_E = 1.317 C_B = 1.00 C_S = 1.00 C_R = 0.85

C_N = 1.679 or 1.496 (alternative equation)

$(N_1)_{60}$ =	3.8	3.3 corrected SPT blow count
ΔN =	0.0	correction for percent of fines (add)
$(N_{1})_{60\,CS}$ =	3.8	Clean-sand equivalent corrected SPT blow count

Cyclic Stress Ratio

rd =	0.961	stress reduction coefficient
CSR =	0.427	Cyclic stress ratio for design EQ

Cyclic Resistance Ratio

$CRR_{M7.5,\ 1}$ =	0.079	Cyclic resistance ratio for M=7.5 & σ_{vc}' =1atm
MSF =	1.304	EQ magnitude scaling factor
K_σ =	1.058	Overburden correction factor
CRR =	0.109	Cyclic resistance ratio for M & σ_{v0}'

Factor of Safety

FS_{liq} =	**0.256**	Factor of Safety Against Soil Liquefaction

Limit maximum to 2.0 (for plotting purpose)

Lateral Spread

γ_{lim} =	50.0%	Limiting shear strain
F_α =	0.948	Parameter F_α
γ_{max} =	50.0%	Maximum shear strain
LDI =	1.250 feet	Lateral displacement index (displacement in the subject layer)

1-D Reconsolidation Settlement (Liquefaction Induced Vertical Settlement)

εv =	5.87%	volumetric strain
S =	1.76 inches	Liquefaction vertical settlement (at the considered layer)

Residual Shear Strength

$\Delta(N_1)_{60\text{-}Sr}$ =	0.8	Fine correction for residual strength by Seed (1987)
$(N_1)_{60\ CS\text{-}Sr}$ =	4.5	Clean-sand equivalent SPT blow count for S_r
S_r/σ_{v0}' =	0.057	Residual Shear Strength Ratio
S_r =	50 psf	Residual Shear Strength

Results Summary:

Boring	Top Depth (feet)	Thickness (feet)	USCS Type	N	$(N_1)_{60\ CS}$	CSR	CRR	FS_{liq}	LDI (feet)	S (inches)	S_r (psf)
B-03	9.5	2.5	SP	2	3.8	0.427	0.109	0.256	1.250	1.76	50

Notes:

1. FS_{liq} - Factor of safety with respect to soil liquefaction; <1.0 potential exists, <1.1 marginal
2. LDI -Lateral spread index/displacement. If the liquefiable layer is at a depth deeper than twice the vertical height of the free-face, potential for lateral spread would be minimal (for free-face height of less than 10 feet).
3. S - Liquefaction induced vertical settlement at the layer. Surface manifestation would be smaller and will depend on the thickness of the non-liquefiable cap above.
4. S_r - Estimated residual strength of the liquefied soils.

Saved Results:

Boring	Top Depth (feet)	Thickness (feet)	USCS Soil	N	$(N_1)_{60\ CS}$	CSR	CRR	FS_{liq}	LDI (feet)	S (inches)	S_r (psf)
B-03	5.0	2.0	SM	0.4	6.3	0.343	0.133	0.389	1.000	1.14	30
B-03	7.0	2.5	SP	8.2	14.7	0.394	0.221	0.560	0.708	0.87	200
B-03	9.5	2.5	SP	2	3.8	0.427	0.109	0.256	1.250	1.76	50
B-03	12.0	2.5	SM	29	44.3	0.449	2.869	2.000			
B-03	27.0	4.5	SM	45	62.6	0.475	2.614	2.000			
								$\sum$	2.958	3.78	

PW: liq

Project Name:	Upper Truckee River Bridge at Johnson Meadow	Developed By:	PV
Project No:	5012-05-1	Calculated By:	PV
Boring No:	B-04 Mud Rotary Boring	Checked By:	xl
Analyzed Case:	Selected low blow counts sand layers	Date:	6/6/2024
	Boardwalk	Version:	Jan-14

Liquefaction Potential of a Single Layer Using Idriss and Boulanger (2008) SPT Method

Input Parameters

Earthquake Input Parameters

Peak Ground Acceleration, a_{max} =	0.49	g	S_{DS}/2.5 or PGA
Earthquake Magnitude, M =	6.49		USGS Deaggregation Analysis (or known/active nearby fault's $M_{probable}$)

Layer and SPT Test Data

Depth to Layer Top =	9.5	feet	
Thickness of the Layer =	2.5	feet	
SPT Sample Depth =	10	feet	
Measured SPT N-Value =	8		
Depth to Ground Water Table =	4	feet	
Hammer Energy Efficiency ER =	79	%	
Borehole Diameter =	4	inch	101.6 mm
Standard SPT Sampler? (Yes/No)	Yes	(Yes: 1-3/8" inside dia - No room for liner)	

Soil Parameters

USCS Soil Type =	SP		
% Fines =	2	%	Non-Liq if >35% & PI >7
Plasticity Index, PI =	NP	(Info only)	
Average unit weight above GW =	120	pcf	
Average unit weight below GW =	120	pcf	

Void redistribution effect? (Yes/No)	No	Only for shear strength calcs)

(Select yes only for thick liquefiable layer that is underlain by low permeable deposits)

Calculations

Total and Effective Stress

Mid depth to SPT sample, z =	11	feet	3.3528	m
Total Stress at Mid Depth, σ_{vo} =	1320	psf		
Effective Stress at Mid Depth σ_{v0}' =	883	psf		

SPT Corrections

C_E = 1.317 C_B = 1.00 C_S = 1.00 C_R = 0.85

C_N = 1.545 or 1.548 (alternative equation)

$(N_1)_{60}$ =	13.8	13.9 corrected SPT blow count
ΔN =	0.0	correction for percent of fines (add)
$(N_{1})_{60\,CS}$ =	13.8	Clean-sand equivalent corrected SPT blow count

Cyclic Stress Ratio

rd =	0.961	stress reduction coefficient
CSR =	0.457	Cyclic stress ratio for design EQ

Cyclic Resistance Ratio

$CRR_{M7.5,\ 1}$ =	0.147	Cyclic resistance ratio for M=7.5 & σ_{vc}' =1atm
MSF =	1.304	EQ magnitude scaling factor
K_σ =	1.093	Overburden correction factor
CRR =	0.209	Cyclic resistance ratio for M & σ_{v0}'

Factor of Safety

FS_{liq} =	**0.457**	Factor of Safety Against Soil Liquefaction

Limit maximum to 2.0 (for plotting purpose)

Lateral Spread

γ_{lim} =	31.2%	Limiting shear strain
F_α =	0.800	Parameter F_α
γ_{max} =	31.2%	Maximum shear strain
LDI =	0.780 feet	Lateral displacement index (displacement in the subject layer)

1-D Reconsolidation Settlement (Liquefaction Induced Vertical Settlement)

εv =	3.04%	volumetric strain
S =	0.91 inches	Liquefaction vertical settlement (at the considered layer)

Residual Shear Strength

$\Delta(N_1)_{60\text{-}Sr}$ =	0.7	Fine correction for residual strength by Seed (1987)
$(N_1)_{60\ CS\text{-}Sr}$ =	14.5	Clean-sand equivalent SPT blow count for S_r
S_r/σ_{v0}' =	0.194	Residual Shear Strength Ratio
S_r =	170 psf	Residual Shear Strength

Results Summary:

Boring	Top Depth (feet)	Thickness (feet)	USCS Type	N	$(N_1)_{60\ CS}$	CSR	CRR	FS_{liq}	LDI (feet)	S (inches)	S_r (psf)
B-04	9.5	2.5	SP	8	13.8	0.457	0.209	0.457	0.780	0.91	170

Notes:

1. FS_{liq} - Factor of safety with respect to soil liquefaction; <1.0 potential exists, <1.1 marginal
2. LDI -Lateral spread index/displacement. If the liquefiable layer is at a depth deeper than twice the vertical height of the free-face, potential for lateral spread would be minimal (for free-face height of less than 10 feet).
3. S - Liquefaction induced vertical settlement at the layer. Surface manifestation would be smaller and will depend on the thickness of the non-liquefiable cap above.
4. S_r - Estimated residual strength of the liquefied soils.

Saved Results:

Boring	Top Depth (feet)	Thickness (feet)	USCS Soil	N	$(N_1)_{60\ CS}$	CSR	CRR	FS_{liq}	LDI (feet)	S (inches)	S_r (psf)
B-04	4.0	3.0	SM	2.1	6.9	0.379	0.140	0.370	1.500	1.64	40
B-04	7.0	2.5	SP-SM	15	24.9	0.428	0.413	0.967	0.095	0.27	300
B-04	9.5	2.5	SP	8	13.8	0.457	0.209	0.457	0.780	0.91	170
B-04	12.0	12.0	SM	32	50.0	0.488	2.869	2.000			
								$\sum$	2.374	2.82	

PW: liq

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Date: 12/1/2023
Revision Number: 0319
Developed By: JWP/PV
Calculated By: PV
Checked By: mcd

Project Name: Upper Truckee River Bridge at Johnson Meadow
Project Number: 5012-05-1

CALCULATION OF LRFD 8TH EDITION (2017) BEARING CAPACITY

Location: Native Ground Seat Abutments - West Abutment Footing
Foundation: 8 feet Wide Footing

Footing Embedment Depth is considered 2 feet without scour data (conservative)
Groundwater was encountered at 5.5 feet depth below ground surface
Design Assumes GW at 2 feet Depth

References

1. AASHTO, 2017, AASHTO LRFD Bridge Design Specifications, 8th Edition, American Association of State Highway and Transportation Officials.

Assumptions

1. Bearing capacity calculations account for foundation shape, possibility of local or punching shear, inclined load, eccentric loading, sloping ground, and ground water.
2. Calculations assume one, homogeneous soil unit. Two-layer soil systems not supported.

Unit Conversions

$psf := \frac{lbf}{ft^2}$ $pcf := \frac{lbf}{ft^3}$ $kip := 1000 \cdot lbf$ $ksf := \frac{kip}{ft^2}$ $kPa := 1000 \cdot Pa$ $kN := 1000 \cdot N$

$kJ := 1000 \cdot J$ $g = 32.174 \ \frac{ft}{s^2}$

Input Data

Soil Friction Angle: $\phi := 35 \cdot deg$

Soil Cohesion: $c := 0 \cdot psf$

Total Soil Unit Weight: $\gamma := 120 \ pcf$

Depth of Foundation Base below Ground Surface: $D_f := 2 \cdot ft$

Foundation Width B (For Circular Footings B = L): $B := 8 \cdot ft$

Foundation Length L: $L := 18 \cdot ft$

Depth of Ground Water from Ground Surface: $D_w := 2 \cdot ft$

Slope of Adjacent Ground (if j>0, the modified Nγ and Nc apply below, Nq=0): $j := 0 \cdot deg$

Calculate estimate reduction factor from Table 10.6.3.1.2c-1 or -2 and calculate the reduced bearing capacity factors: $N_{\gamma slope} := 19$ $N_{cslope} := 0$ for β = 20.6 deg.

Is Local or Punching Shear Possible (Yes = "Y" and No = "N")? $F_{ps} := \text{“N”}$

Unfactored Vertical Load on Footing (Vertical): $V := 670 \cdot kip$

Unfactored Horizontal Load on Footing (Enter 0 for vertical load only): $H := 49 \cdot kip$

Orientation of Horizontal Load (Enter 0 for parallel to long axis L): $\theta := 0 \cdot deg$

Moment in x-Dimension (Footing Width): $M_x := 65 \cdot kip \cdot ft$

Moment in y-Dimension (Footing Length): $M_y := 0 \cdot kip \cdot ft$

Adhesion Between Footing and Foundation Soil for Sliding: $c_a := 0 \cdot psf$

Angle of Friction Between Footing and Foundation Soil for Sliding: $\delta := 0.8 \cdot \phi$ $\delta = 28 \ deg$

Sliding Resistance Factor for the Strength Limit State: $\phi_\tau := 0.80$ CIP on sand

Bearing Resistance Factor for the Strength Limit State: $\phi_b := 0.45$ This is a the Munfakh (2001) approach, ϕb varies from 0.45 to 0.5
Bearing Resistance Factor for Extreme State(scour, EQ, ice, impacts = 1.0)
Bearing Resistance Factor for Service State (Settlements and Serviceability = 1.0)

An exception for service limit state 1 is that overall stability shall use resistance factors in Article 11.6.2.3

Calculations Section 1: Bearing Pressures, Eccentricity Reduction

Calculate Eccentricity in Footing "B" Direction:

$$e_B := \frac{M_y}{V} \qquad e_B = 0.0\ ft$$

Calculate Eccentricity in Footing "L" Direction:

$$e_L := \frac{M_x}{V} \qquad e_L = 0.1\ ft$$

Calculate Eccentric Loading Reduced Footing Dimensions:

$$B' := B - 2 \cdot e_B \qquad B' = 8.0\ ft$$

$$L' := L - 2 \cdot e_L \qquad L' = 17.8\ ft$$

Determine Effective Footing Dimensions based on any Eccentricity:

$$B' := \begin{cases} \text{if } e_B > 0 \cdot ft \\ \quad B' \\ \text{else} \\ \quad B \end{cases} \qquad B' = 8.0\ ft$$

$$L' := \begin{cases} \text{if } e_L > 0 \cdot ft \\ \quad L' \\ \text{else} \\ \quad L' \end{cases} \qquad L' = 17.8\ ft$$

Calculate the Eccentric Loading Effective Footing Area:

$$A' := |B' \cdot L'| \qquad A' = 142.4\ ft^2$$

Calculations Section 2: Bearing Capacity Coefficients

Calculate Reduced Shear Strength Parameters if Local or Punching Shear is Possible:

$$c := \begin{cases} \text{if } F_{ps} = \text{“Y”} \\ \quad 0.67 \cdot c \\ \text{else} \\ \quad c \end{cases} \qquad c = 0.0\ psf$$

$$\phi := \begin{cases} \text{if } F_{ps} = \text{“Y”} \\ \quad \operatorname{atan}(0.67 \cdot \tan(\phi)) \\ \text{else} \\ \quad \phi \end{cases} \qquad \phi = 35\ deg$$

Calculate Bearing Capacity Factors:

$$N_q := \exp(\pi \cdot \tan(\phi)) \cdot \tan\left(45 \cdot deg + \frac{\phi}{2}\right)^2 \qquad N_q = 33.296$$

$$N_c := \max\left(\left(N_q - 1\right) \cdot \cot\left(\max\left(\phi, 0.01 \cdot deg\right)\right), 5.14\right) \qquad \phi = 0.611 \qquad N_c = 46.124$$

$$N_\gamma := 2 \cdot \left(N_q + 1\right) \cdot \tan(\phi) \qquad N_\gamma = 48.029$$

Calculate the Ground Water Factors Cwy and Cwq:

$$C_{wq} := \begin{cases} \text{if } D_w = 0 \\ \quad 0.5 \\ \text{also if } D_w > 1.5 \cdot B + D_f \\ \quad 1 \\ \text{else} \\ \quad 0.5 + 0.5 \cdot \dfrac{D_w}{1.5 \cdot B + D_f} \end{cases} \qquad C_{wq} = 0.571$$

$$C_{w\gamma} := \begin{cases} \text{if } D_w \le D_f \\ \quad 0.5 \\ \text{also if } D_w > 1.5 \cdot B + D_f \\ \quad 1 \\ \text{else} \\ \quad 0.5 + 0.5 \cdot \dfrac{D_w - D_f}{1.5 \cdot B} \end{cases} \qquad C_{w\gamma} = 0.5$$

Calculate Depth Factors:

$$\phi = 35\ deg$$

$$min\left(\frac{D_f}{B}, 8\right) = 0.25$$

$$dq_{42} := \begin{bmatrix} 0 & 1 \\ 1 & 1.15 \\ 2 & 1.20 \\ 4 & 1.25 \\ 8 & 1.30 \end{bmatrix} \qquad dq_{37} := \begin{bmatrix} 0 & 1 \\ 1 & 1.20 \\ 2 & 1.25 \\ 4 & 1.30 \\ 8 & 1.35 \end{bmatrix} \qquad dq_{32} := \begin{bmatrix} 0 & 1 \\ 1 & 1.20 \\ 2 & 1.30 \\ 4 & 1.35 \\ 8 & 1.40 \end{bmatrix}$$

The first columns of vectors above is Df/B. Correlation only valid for friction angles of 32 to 42 degrees; above 42 degrees,value for 42 degrees is considered conservative.

$$d_q := \begin{cases} \text{if } \phi \ge 42 \cdot deg \\ \quad \text{linterp}\left(dq_{42}^{\langle 0 \rangle}, dq_{42}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{also if } 42 \cdot deg > \phi \ge 37 \cdot deg \\ \quad \text{linterp}\left(dq_{37}^{\langle 0 \rangle}, dq_{37}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{also if } 37 \cdot deg > \phi \ge 32 \cdot deg \\ \quad \text{linterp}\left(dq_{32}^{\langle 0 \rangle}, dq_{32}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{else} \\ \quad 1 \end{cases} \qquad d_q = 1.05$$

Calculate Footing Shape Factors:

$$s_c := \begin{cases} \text{if } \phi > 0 \\ \quad 1 + \left(\frac{B'}{L'}\right) \cdot \left(\frac{N_q}{N_c}\right) \\ \text{else} \\ \quad 1 + \frac{B'}{5 \cdot L'} \end{cases}$$

(all terms to go 1.0 for strip footing)

$s_c = 1.324$

$$s_q := \begin{cases} \text{if } \phi > 0 \\ \quad 1 + \left(\frac{B'}{L'}\right) \cdot \tan(\phi) \\ \text{else} \\ \quad 1 \end{cases}$$

$s_q = 1.315$

$$s_\gamma := \begin{cases} \text{if } \phi > 0 \\ \quad 1 - 0.4 \cdot \left(\frac{B'}{L'}\right) \\ \text{else} \\ \quad 1 \end{cases}$$

$s_\gamma = 0.820$

Calculate Inclined Loading Factors:

$$n := \left(\frac{2 + \frac{L'}{B'}}{1 + \frac{L'}{B'}}\right) \cdot \cos(\theta)^2 + \left(\frac{2 + \frac{B'}{L'}}{1 + \frac{B'}{L'}}\right) \cdot \sin(\theta)^2$$

$n = 1.31$

$$i_q := \left(1 - \frac{H}{V + c \cdot B' \cdot L' \cdot \cot(\phi)}\right)^n$$

$i_q = 0.905$

$$i_c := \begin{cases} \text{if } \phi > 0 \cdot \textit{deg} \\ \quad i_q - \left(\frac{1 - i_q}{N_q - 1}\right) \\ \text{else} \\ \quad 1 - \left(\frac{n \cdot H}{c \cdot B' \cdot L' \cdot N_c}\right) \end{cases}$$

$i_c = 0.902$

$$i_\gamma := \left(1 - \frac{H}{V + B' \cdot L' \cdot c \cdot \cot(\phi)}\right)^{n+1}$$

$i_\gamma = 0.839$

$j = 0 \ \textit{deg}$

Calculate Modified Bearing Capacity Coefficients:

$$N_{cm} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_c \cdot s_c \cdot i_c \\ \text{else} \\ \quad N_{cslope} \cdot s_c \cdot i_c \end{cases}$$

$$N_{qm} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_q \cdot s_q \cdot d_q \cdot i_q \\ \text{else} \\ \quad 0 \end{cases}$$

$N_{cm} = 55.119$

$N_{qm} = 41.607$

$$N_{\gamma m} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_\gamma \cdot s_\gamma \cdot i_\gamma \\ \text{else} \\ \quad N_{\gamma slope} \cdot s_\gamma \cdot i_\gamma \end{cases}$$

$N_{\gamma m} = 33.058$

Calculations Section 3: Sliding Check

Calculate the Maximum Resistance Force Between Footing and Foundation Soil for Sliding Failure:

$P_{max} := V \cdot \tan(\delta) + B \cdot L \cdot c_a$ $\quad P_{max} = 356.2\ kip$

Calculate the Factored Resistance Against Sliding Failure:

$P_{fres} := P_{max} \cdot \phi_\tau$ $\quad P_{fres} = 284.996\ kip$

Check Sliding Factor of Safety:

$$Check_1 := \begin{cases} \text{if } H < P_{fres} \\ \quad 1 \\ \text{else} \\ \quad 0 \end{cases}$$ $\quad Check_1 = 1$

If Check1 = 0, sliding factor of safety below acceptable value.

Calculations Section 4: Bearing Capacity

Calculate Ultimate Bearing Capacity: Eq. 10.6.3.1.2a-1 Note that g term is included in unit weight

$q_n := c \cdot N_{cm} + \gamma \cdot D_f \cdot N_{qm} \cdot C_{wq} + 0.5 \cdot \gamma \cdot B' \cdot N_{\gamma m} \cdot C_{w\gamma}$ $\quad q_n = 13.6\ ksf$

Calculate Unfactored Bearing Capacity:

$q_R := q_n \cdot \phi_b$ $\quad q_R = 6.1\ ksf$

Bearing Pressure: $q_L := \frac{V}{A'}$ $\quad q_L = 4.703\ ksf$

$$Check_2 := \begin{cases} \text{if } q_L < q_n \\ \quad 1 \\ \text{else} \\ \quad 0 \end{cases}$$ $\quad Check_2 = 1$

RESULTS

Nominal (ultimate) bearing capacity:	**Ultimate sliding resistance**	**Sliding OK (1) or not OK (0)?**
$q_n = 13.6\ ksf$	$P_{max} = 356\ kip$	$Check_1 = 1$
Strength I factored bearing capacity	**Factored Sliding Resistance**	**Ultimate Bearing OK (1) or not OK (0)?**
$q_R = 6.1\ ksf$	$P_{fres} = 285\ kip$	$Check_2 = 1$

CORESTONE ENGINEERING, INC.
10751 Grayslake Dr, Reno, NV 89521

Date: 12/1/2023
Revision No: 2019 March - 1
Developed by: JWP/PV
Calculated by: PV
Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - West Abutment (B=8 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

Only cells with blue background and blue text should be modified

AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

Foundation Load	1866	kN	419.4	kips			
Foundation Depth	0.9144	m	3.0	ft			
Foundation Width	2.4384	**m**	8	ft	**2912.7 psf**		
Foundation Length	5.4864	**m**	18	ft	For 1 inch settlement (Service Value)		
Depth of Influence (3B)	8.2296	m	27.0	ft	check	1.00	inch
Depth to Water Table	1	m					

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	117.4	150	0.00381	5
2.286	20.0	46	33	96.8	60	0.00754	7.5
3.048	20.0	61	41	81.2	60	0.00604	10
3.810	20.0	76	49	69.2	75	0.00391	12.5
4.572	20.0	91	56	59.8	175	0.00137	15
5.334	20.0	107	64	52.2	225	0.00087	17.5
6.096	20.0	122	72	45.9	225	0.00073	20
6.858	20.0	137	80	40.8	225	0.00061	22.5
7.620	20.0	152	87	36.4	225	0.00051	25
8.382	20.0	168	95	32.8	225	0.00000	27.5
9.144	20.0	183	103	29.7	225	0.00000	30
9.906	20.0	198	111	27.0	225	0.00000	32.5
10.668	20.0	213	119	24.6	225	0.00000	35
11.430	20.0	229	126	22.6	225	0.00000	37.5
12.192	20.0	244	134	20.8	225	0.00000	40
12.954	20.0	259	142	19.2	225	0.00000	42.5
13.716	20.0	274	150	17.8	225	0.00000	45
14.478	20.0	290	157	16.5	225	0.00000	47.5
15.240	20.0	305	165	15.4	225	0.00000	50
16.002	20.0	320	173	14.3	225	0.00000	52.5
16.764	20.0	335	181	13.4	225	0.00000	55
17.526	20.0	351	188	12.6	225	0.00000	57.5
18.288	20.0	366	196	11.8	225	0.00000	60
19.050	20.0	381	204	11.1	225	0.00000	62.5
19.812	20.0	396	212	10.5	225	0.00000	65
20.574	20.0	411	219	9.9	225	0.00000	67.5
21.336	20.0	427	227	9.4	225	0.00000	70
22.098	20.0	442	235	8.9	225	0.00000	72.5
22.860	20.0	457	243	8.5	225	0.00000	75
23.622	20.0	472	251	8.0	225	0.00000	77.5
24.384	20.0	488	258	7.6	225	0.00000	80

0.91 Df, m
2.4 B, m
5.5 L, m
139.5 q, kN/m^2

0.0254 m
25 mm
1.00 inches

CORESTONE ENGINEERING, INC.
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Revision No: 2019 March - 1
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Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - West Abutment (B=8 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

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AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

Foundation Load	3899	kN	876.5	kips		
Foundation Depth	0.9144	m	3.0	ft		
Foundation Width	2.4384	**m**	8	ft	**6086.6 psf**	
Foundation Length	5.4864	**m**	18	ft	For 1.5 inch settlement (Service Value)	
Depth of Influence (3B)	8.2296	m	27.0	ft	check	1.50 inch
Depth to Water Table	1	m				

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	245.4	150	0.00523	5
2.286	20.0	46	33	202.2	60	0.01082	7.5
3.048	20.0	61	41	169.7	60	0.00904	10
3.810	20.0	76	49	144.7	75	0.00609	12.5
4.572	20.0	91	56	124.9	175	0.00221	15
5.334	20.0	107	64	109.0	225	0.00146	17.5
6.096	20.0	122	72	96.0	225	0.00125	20
6.858	20.0	137	80	85.2	225	0.00107	22.5
7.620	20.0	152	87	76.2	225	0.00092	25
8.382	20.0	168	95	68.5	225	0.00000	27.5
9.144	20.0	183	103	62.0	225	0.00000	30
9.906	20.0	198	111	56.3	225	0.00000	32.5
10.668	20.0	213	119	51.4	225	0.00000	35
11.430	20.0	229	126	47.1	225	0.00000	37.5
12.192	20.0	244	134	43.4	225	0.00000	40
12.954	20.0	259	142	40.1	225	0.00000	42.5
13.716	20.0	274	150	37.1	225	0.00000	45
14.478	20.0	290	157	34.5	225	0.00000	47.5
15.240	20.0	305	165	32.1	225	0.00000	50
16.002	20.0	320	173	30.0	225	0.00000	52.5
16.764	20.0	335	181	28.1	225	0.00000	55
17.526	20.0	351	188	26.3	225	0.00000	57.5
18.288	20.0	366	196	24.7	225	0.00000	60
19.050	20.0	381	204	23.3	225	0.00000	62.5
19.812	20.0	396	212	22.0	225	0.00000	65
20.574	20.0	411	219	20.7	225	0.00000	67.5
21.336	20.0	427	227	19.6	225	0.00000	70
22.098	20.0	442	235	18.6	225	0.00000	72.5
22.860	20.0	457	243	17.7	225	0.00000	75
23.622	20.0	472	251	16.8	225	0.00000	77.5
24.384	20.0	488	258	16.0	225	0.00000	80

0.91 Df, m
2.4 B, m
5.5 L, m
291.4 q, kN/m^2

0.0381 m
38 mm
1.50 inches

CORESTONE ENGINEERING, INC.
10751 Grayslake Dr, Reno, NV 89521

Date: 12/1/2023
Revision No: 2019 March - 1
Developed by: JWP/PV
Calculated by: PV
Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - West Abutment (B=8 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

Only cells with blue background and blue text should be modified

AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

Foundation Load	7297	kN	1640.5	kips			
Foundation Depth	0.9144	m	3.0	ft			
Foundation Width	2.4384	**m**	8	ft	**11392.4 psf**		
Foundation Length	5.4864	**m**	18	ft	For 2 inch settlement (Service Value)		
Depth of Influence (3B)	8.2296	m	27.0	ft	check	2.00	inch
Depth to Water Table	1	m					

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	459.3	150	0.00651	5
2.286	20.0	46	33	378.4	60	0.01390	7.5
3.048	20.0	61	41	317.7	60	0.01198	10
3.810	20.0	76	49	270.8	75	0.00831	12.5
4.572	20.0	91	56	233.8	175	0.00310	15
5.334	20.0	107	64	204.0	225	0.00210	17.5
6.096	20.0	122	72	179.6	225	0.00184	20
6.858	20.0	137	80	159.5	225	0.00162	22.5
7.620	20.0	152	87	142.6	225	0.00142	25
8.382	20.0	168	95	128.2	225	0.00000	27.5
9.144	20.0	183	103	116.0	225	0.00000	30
9.906	20.0	198	111	105.4	225	0.00000	32.5
10.668	20.0	213	119	96.3	225	0.00000	35
11.430	20.0	229	126	88.2	225	0.00000	37.5
12.192	20.0	244	134	81.2	225	0.00000	40
12.954	20.0	259	142	75.0	225	0.00000	42.5
13.716	20.0	274	150	69.4	225	0.00000	45
14.478	20.0	290	157	64.5	225	0.00000	47.5
15.240	20.0	305	165	60.1	225	0.00000	50
16.002	20.0	320	173	56.1	225	0.00000	52.5
16.764	20.0	335	181	52.5	225	0.00000	55
17.526	20.0	351	188	49.2	225	0.00000	57.5
18.288	20.0	366	196	46.3	225	0.00000	60
19.050	20.0	381	204	43.6	225	0.00000	62.5
19.812	20.0	396	212	41.1	225	0.00000	65
20.574	20.0	411	219	38.8	225	0.00000	67.5
21.336	20.0	427	227	36.8	225	0.00000	70
22.098	20.0	442	235	34.8	225	0.00000	72.5
22.860	20.0	457	243	33.1	225	0.00000	75
23.622	20.0	472	251	31.4	225	0.00000	77.5
24.384	20.0	488	258	29.9	225	0.00000	80

0.91 Df, m
2.4 B, m
5.5 L, m
545.5 q, kN/m^2

0.0508 m
51 mm
2.00 inches

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Date: 12/1/2023
Revision Number: 0319
Developed By: JWP/PV
Calculated By: PV
Checked By: mcd

Project Name: Upper Truckee River Bridge at Johnson Meadow
Project Number: 5012-05-1

CALCULATION OF LRFD 8TH EDITION (2017) BEARING CAPACITY

Location: Native Ground Seat Abutments - East Abutment Footing
Foundation: 10 feet Wide Footing

Footing Embedment Depth is considered 2 feet without scour data (conservative)
Groundwater was encountered at 5.5 feet depth below ground surface
Design Assumes GW at 2 feet Depth

References

1. AASHTO, 2017, AASHTO LRFD Bridge Design Specifications, 8th Edition, American Association of State Highway and Transportation Officials.

Assumptions

1. Bearing capacity calculations account for foundation shape, possibility of local or punching shear, inclined load, eccentric loading, sloping ground, and ground water.
2. Calculations assume one, homogeneous soil unit. Two-layer soil systems not supported.

Unit Conversions

$psf := \frac{lbf}{ft^2}$ $pcf := \frac{lbf}{ft^3}$ $kip := 1000 \cdot lbf$ $ksf := \frac{kip}{ft^2}$ $kPa := 1000 \cdot Pa$ $kN := 1000 \cdot N$

$kJ := 1000 \cdot J$ $g = 32.174 \frac{ft}{s^2}$

Input Data

Soil Friction Angle: $\phi := 35 \cdot deg$

Soil Cohesion: $c := 0 \cdot psf$

Total Soil Unit Weight: $\gamma := 120\ pcf$

Depth of Foundation Base below Ground Surface: $D_f := 2 \cdot ft$

Foundation Width B (For Circular Footings B = L): $B := 10 \cdot ft$

Foundation Length L: $L := 18 \cdot ft$

Depth of Ground Water from Ground Surface: $D_w := 2 \cdot ft$

Slope of Adjacent Ground (if j>0, the modified Nγ and Nc apply below, Nq=0): $j := 0 \cdot deg$

Calculate estimate reduction factor from Table 10.6.3.1.2c-1 or -2 and calculate the reduced bearing capacity factors: $N_{\gamma slope} := 19$ $N_{cslope} := 0$ for β = 20.6 deg.

Is Local or Punching Shear Possible (Yes = "Y" and No = "N")? $F_{ps} := \text{“N”}$

Unfactored Vertical Load on Footing (Vertical): $V := 670 \cdot kip$

Unfactored Horizontal Load on Footing (Enter 0 for vertical load only): $H := 49 \cdot kip$

Orientation of Horizontal Load (Enter 0 for parallel to long axis L): $\theta := 0 \cdot deg$

Moment in x-Dimension (Footing Width): $M_x := 65 \cdot kip \cdot ft$

Moment in y-Dimension (Footing Length): $M_y := 0 \cdot kip \cdot ft$

Adhesion Between Footing and Foundation Soil for Sliding: $c_a := 0 \cdot psf$

Angle of Friction Between Footing and Foundation Soil for Sliding: $\delta := 0.8 \cdot \phi$ $\delta = 28\ deg$

Sliding Resistance Factor for the Strength Limit State: $\phi_\tau := 0.80$ CIP on sand

Bearing Resistance Factor for the Strength Limit State: $\phi_b := 0.45$ This is a the Munfakh (2001) approach, ϕb varies from 0.45 to 0.5
Bearing Resistance Factor for Extreme State(scour, EQ, ice, impacts = 1.0)
Bearing Resistance Factor for Service State (Settlements and Serviceability = 1.0)

An exception for service limit state 1 is that overall stability shall use resistance factors in Article 11.6.2.3

Calculations Section 1: Bearing Pressures, Eccentricity Reduction

Calculate Eccentricity in Footing "B" Direction:

$e_B := \frac{M_y}{V}$ $e_B = 0.0\ ft$

Calculate Eccentricity in Footing "L" Direction:

$e_L := \frac{M_x}{V}$ $e_L = 0.1\ ft$

Calculate Eccentric Loading Reduced Footing Dimensions:

$B' := B - 2 \cdot e_B$ $B' = 10.0\ ft$

$L' := L - 2 \cdot e_L$ $L' = 17.8\ ft$

Determine Effective Footing Dimensions based on any Eccentricity:

$B' := \left\| \begin{array}{l} \text{if } e_B > 0 \cdot ft \\ \quad \| B' \\ \text{else} \\ \quad \| B \end{array} \right\|$ $B' = 10.0\ ft$

$L' := \left\| \begin{array}{l} \text{if } e_L > 0 \cdot ft \\ \quad \| L' \\ \text{else} \\ \quad \| L' \end{array} \right\|$ $L' = 17.8\ ft$

Calculate the Eccentric Loading Effective Footing Area:

$A' := |B' \cdot L'|$ $A' = 178.1\ ft^2$

Calculations Section 2: Bearing Capacity Coefficients

Calculate Reduced Shear Strength Parameters if Local or Punching Shear is Possible:

$c := \left\| \begin{array}{l} \text{if } F_{ps} = \text{“Y”} \\ \quad \| 0.67 \cdot c \\ \text{else} \\ \quad \| c \end{array} \right\|$ $c = 0.0\ psf$

$\phi := \left\| \begin{array}{l} \text{if } F_{ps} = \text{“Y”} \\ \quad \| \operatorname{atan}(0.67 \cdot \tan(\phi)) \\ \text{else} \\ \quad \| \phi \end{array} \right\|$ $\phi = 35\ deg$

Calculate Bearing Capacity Factors:

$$N_q := \exp(\pi \cdot \tan(\phi)) \cdot \tan\left(45 \cdot deg + \frac{\phi}{2}\right)^2 \qquad N_q = 33.296$$

$$N_c := \max\left(\left(N_q - 1\right) \cdot \cot\left(\max\left(\phi, 0.01 \cdot deg\right)\right), 5.14\right) \qquad \phi = 0.611 \qquad N_c = 46.124$$

$$N_\gamma := 2 \cdot \left(N_q + 1\right) \cdot \tan(\phi) \qquad N_\gamma = 48.029$$

Calculate the Ground Water Factors Cwy and Cwq:

$$C_{wq} := \begin{cases} \text{if } D_w = 0 \\ \quad 0.5 \\ \text{also if } D_w > 1.5 \cdot B + D_f \\ \quad 1 \\ \text{else} \\ \quad 0.5 + 0.5 \cdot \dfrac{D_w}{1.5 \cdot B + D_f} \end{cases} \qquad C_{wq} = 0.559$$

$$C_{w\gamma} := \begin{cases} \text{if } D_w \le D_f \\ \quad 0.5 \\ \text{also if } D_w > 1.5 \cdot B + D_f \\ \quad 1 \\ \text{else} \\ \quad 0.5 + 0.5 \cdot \dfrac{D_w - D_f}{1.5 \cdot B} \end{cases} \qquad C_{w\gamma} = 0.5$$

Calculate Depth Factors:

$$\phi = 35\ deg$$

$$min\left(\frac{D_f}{B}, 8\right) = 0.2$$

$$dq_{42} := \begin{bmatrix} 0 & 1 \\ 1 & 1.15 \\ 2 & 1.20 \\ 4 & 1.25 \\ 8 & 1.30 \end{bmatrix} \qquad dq_{37} := \begin{bmatrix} 0 & 1 \\ 1 & 1.20 \\ 2 & 1.25 \\ 4 & 1.30 \\ 8 & 1.35 \end{bmatrix} \qquad dq_{32} := \begin{bmatrix} 0 & 1 \\ 1 & 1.20 \\ 2 & 1.30 \\ 4 & 1.35 \\ 8 & 1.40 \end{bmatrix}$$

The first columns of vectors above is Df/B. Correlation only valid for friction angles of 32 to 42 degrees; above 42 degrees,value for 42 degrees is considered conservative.

$$d_q := \begin{cases} \text{if } \phi \ge 42 \cdot deg \\ \quad \text{linterp}\left(dq_{42}^{\langle 0 \rangle}, dq_{42}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{also if } 42 \cdot deg > \phi \ge 37 \cdot deg \\ \quad \text{linterp}\left(dq_{37}^{\langle 0 \rangle}, dq_{37}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{also if } 37 \cdot deg > \phi \ge 32 \cdot deg \\ \quad \text{linterp}\left(dq_{32}^{\langle 0 \rangle}, dq_{32}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{else} \\ \quad 1 \end{cases} \qquad d_q = 1.04$$

Calculate Footing Shape Factors:

$$s_c := \begin{cases} \text{if } \phi > 0 \\ \quad 1 + \left(\frac{B'}{L'}\right) \cdot \left(\frac{N_q}{N_c}\right) \\ \text{else} \\ \quad 1 + \frac{B'}{5 \cdot L'} \end{cases}$$

(all terms to go 1.0 for strip footing)

$s_c = 1.405$

$$s_q := \begin{cases} \text{if } \phi > 0 \\ \quad 1 + \left(\frac{B'}{L'}\right) \cdot \tan(\phi) \\ \text{else} \\ \quad 1 \end{cases}$$

$s_q = 1.393$

$$s_\gamma := \begin{cases} \text{if } \phi > 0 \\ \quad 1 - 0.4 \cdot \left(\frac{B'}{L'}\right) \\ \text{else} \\ \quad 1 \end{cases}$$

$s_\gamma = 0.775$

Calculate Inclined Loading Factors:

$$n := \left(\frac{2 + \frac{L'}{B'}}{1 + \frac{L'}{B'}}\right) \cdot \cos(\theta)^2 + \left(\frac{2 + \frac{B'}{L'}}{1 + \frac{B'}{L'}}\right) \cdot \sin(\theta)^2$$

$n = 1.36$

$$i_q := \left(1 - \frac{H}{V + c \cdot B' \cdot L' \cdot \cot(\phi)}\right)^n$$

$i_q = 0.902$

$$i_c := \begin{cases} \text{if } \phi > 0 \cdot \textit{deg} \\ \quad i_q - \left(\frac{1 - i_q}{N_q - 1}\right) \\ \text{else} \\ \quad 1 - \left(\frac{n \cdot H}{c \cdot B' \cdot L' \cdot N_c}\right) \end{cases}$$

$i_c = 0.899$

$$i_\gamma := \left(1 - \frac{H}{V + B' \cdot L' \cdot c \cdot \cot(\phi)}\right)^{n+1}$$

$i_\gamma = 0.836$

$j = 0 \ \textit{deg}$

Calculate Modified Bearing Capacity Coefficients:

$$N_{cm} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_c \cdot s_c \cdot i_c \\ \text{else} \\ \quad N_{cslope} \cdot s_c \cdot i_c \end{cases}$$

$$N_{qm} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_q \cdot s_q \cdot d_q \cdot i_q \\ \text{else} \\ \quad 0 \end{cases}$$

$N_{cm} = 58.266$

$N_{qm} = 43.512$

$$N_{\gamma m} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_\gamma \cdot s_\gamma \cdot i_\gamma \\ \text{else} \\ \quad N_{\gamma slope} \cdot s_\gamma \cdot i_\gamma \end{cases}$$

$N_{\gamma m} = 31.13$

Calculations Section 3: Sliding Check

Calculate the Maximum Resistance Force Between Footing and Foundation Soil for Sliding Failure:

$P_{max} := V \cdot \tan(\delta) + B \cdot L \cdot c_a$ $\quad P_{max} = 356.2\ kip$

Calculate the Factored Resistance Against Sliding Failure:

$P_{fres} := P_{max} \cdot \phi_\tau$ $\quad P_{fres} = 284.996\ kip$

Check Sliding Factor of Safety:

$Check_1 :=$ if $H < P_{fres}$ then 1 else 0 $\quad Check_1 = 1$

If Check1 = 0, sliding factor of safety below acceptable value.

Calculations Section 4: Bearing Capacity

Calculate Ultimate Bearing Capacity: Eq. 10.6.3.1.2a-1 Note that g term is included in unit weight

$q_n := c \cdot N_{cm} + \gamma \cdot D_f \cdot N_{qm} \cdot C_{wq} + 0.5 \cdot \gamma \cdot B' \cdot N_{\gamma m} \cdot C_{w\gamma}$ $\quad q_n = 15.2\ ksf$

Calculate Unfactored Bearing Capacity:

$q_R := q_n \cdot \phi_b$ $\quad q_R = 6.8\ ksf$

Bearing Pressure: $q_L := \frac{V}{A'}$ $\quad q_L = 3.763\ ksf$

$Check_2 :=$ if $q_L < q_n$ then 1 else 0 $\quad Check_2 = 1$

RESULTS

Nominal (ultimate) bearing capacity:	**Ultimate sliding resistance**	**Sliding OK (1) or not OK (0)?**
$q_n = 15.2\ ksf$	$P_{max} = 356\ kip$	$Check_1 = 1$
Strength I factored bearing capacity	**Factored Sliding Resistance**	**Ultimate Bearing OK (1) or not OK (0)?**
$q_R = 6.8\ ksf$	$P_{fres} = 285\ kip$	$Check_2 = 1$

CORESTONE ENGINEERING, INC.
10751 Grayslake Dr, Reno, NV 89521

Date: 12/1/2023
Revision No: 2019 March - 1
Developed by: JWP/PV
Calculated by: PV
Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - West Abutment (B=10 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

Only cells with blue background and blue text should be modified

AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

Foundation Load	2032	kN	456.8	kips			
Foundation Depth	0.9144	m	3.0	ft			
Foundation Width	3.048	**m**	10	ft	**2537.6 psf**		
Foundation Length	5.4864	**m**	18	ft	For 1 inch settlement (Service Value)		
Depth of Influence (3B)	10.0584	m	33.0	ft	check	1.00	inch
Depth to Water Table	1	m					

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	104.6	150	0.00361	5
2.286	20.0	46	33	88.2	60	0.00716	7.5
3.048	20.0	61	41	75.3	60	0.00576	10
3.810	20.0	76	49	65.2	75	0.00375	12.5
4.572	20.0	91	56	57.0	175	0.00132	15
5.334	20.0	107	64	50.2	225	0.00085	17.5
6.096	20.0	122	72	44.6	225	0.00071	20
6.858	20.0	137	80	39.9	225	0.00060	22.5
7.620	20.0	152	87	35.9	225	0.00051	25
8.382	20.0	168	95	32.5	225	0.00043	27.5
9.144	20.0	183	103	29.5	225	0.00037	30
9.906	20.0	198	111	27.0	225	0.00032	32.5
10.668	20.0	213	119	24.7	225	0.00000	35
11.430	20.0	229	126	22.8	225	0.00000	37.5
12.192	20.0	244	134	21.0	225	0.00000	40
12.954	20.0	259	142	19.5	225	0.00000	42.5
13.716	20.0	274	150	18.1	225	0.00000	45
14.478	20.0	290	157	16.8	225	0.00000	47.5
15.240	20.0	305	165	15.7	225	0.00000	50
16.002	20.0	320	173	14.7	225	0.00000	52.5
16.764	20.0	335	181	13.8	225	0.00000	55
17.526	20.0	351	188	13.0	225	0.00000	57.5
18.288	20.0	366	196	12.2	225	0.00000	60
19.050	20.0	381	204	11.5	225	0.00000	62.5
19.812	20.0	396	212	10.9	225	0.00000	65
20.574	20.0	411	219	10.3	225	0.00000	67.5
21.336	20.0	427	227	9.8	225	0.00000	70
22.098	20.0	442	235	9.3	225	0.00000	72.5
22.860	20.0	457	243	8.8	225	0.00000	75
23.622	20.0	472	251	8.4	225	0.00000	77.5
24.384	20.0	488	258	8.0	225	0.00000	80

0.91 Df, m
3.0 B, m
5.5 L, m
121.5 q, kN/m^2

0.0254 m
25 mm
1.00 inches

CORESTONE ENGINEERING, INC.
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Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - West Abutment (B=10 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

Only cells with blue background and blue text should be modified

AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

Foundation Load	4094	kN	920.4	kips			
Foundation Depth	0.9144	m	3.0	ft			
Foundation Width	3.048	**m**	10	ft	**5113.2 psf**		
Foundation Length	5.4864	**m**	18	ft	For 1.5 inch settlement (Service Value)		
Depth of Influence (3B)	10.0584	m	33.0	ft	check	1.50	inch
Depth to Water Table	1	m					

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	210.8	150	0.00492	5
2.286	20.0	46	33	177.6	60	0.01021	7.5
3.048	20.0	61	41	151.8	60	0.00855	10
3.810	20.0	76	49	131.3	75	0.00577	12.5
4.572	20.0	91	56	114.8	175	0.00210	15
5.334	20.0	107	64	101.2	225	0.00139	17.5
6.096	20.0	122	72	89.9	225	0.00119	20
6.858	20.0	137	80	80.4	225	0.00103	22.5
7.620	20.0	152	87	72.4	225	0.00089	25
8.382	20.0	168	95	65.5	225	0.00077	27.5
9.144	20.0	183	103	59.5	225	0.00067	30
9.906	20.0	198	111	54.4	225	0.00059	32.5
10.668	20.0	213	119	49.8	225	0.00000	35
11.430	20.0	229	126	45.9	225	0.00000	37.5
12.192	20.0	244	134	42.4	225	0.00000	40
12.954	20.0	259	142	39.2	225	0.00000	42.5
13.716	20.0	274	150	36.4	225	0.00000	45
14.478	20.0	290	157	33.9	225	0.00000	47.5
15.240	20.0	305	165	31.7	225	0.00000	50
16.002	20.0	320	173	29.7	225	0.00000	52.5
16.764	20.0	335	181	27.8	225	0.00000	55
17.526	20.0	351	188	26.1	225	0.00000	57.5
18.288	20.0	366	196	24.6	225	0.00000	60
19.050	20.0	381	204	23.2	225	0.00000	62.5
19.812	20.0	396	212	21.9	225	0.00000	65
20.574	20.0	411	219	20.8	225	0.00000	67.5
21.336	20.0	427	227	19.7	225	0.00000	70
22.098	20.0	442	235	18.7	225	0.00000	72.5
22.860	20.0	457	243	17.7	225	0.00000	75
23.622	20.0	472	251	16.9	225	0.00000	77.5
24.384	20.0	488	258	16.1	225	0.00000	80

0.91 Df, m
3.0 B, m
5.5 L, m
244.8 q, kN/m^2

0.0381 m
38 mm
1.50 inches

CORESTONE ENGINEERING, INC.
10751 Grayslake Dr, Reno, NV 89521

Date: 12/1/2023
Revision No: 2019 March - 1
Developed by: JWP/PV
Calculated by: PV
Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - West Abutment (B=10 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

Only cells with blue background and blue text should be modified

AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

Foundation Load	7341	kN	1650.4	kips			
Foundation Depth	0.9144	m	3.0	ft			
Foundation Width	3.048	**m**	10	ft	**9169.0 psf**		
Foundation Length	5.4864	**m**	18	ft	For 2 inch settlement (Service Value)		
Depth of Influence (3B)	10.0584	m	33.0	ft	check	2.00	inch
Depth to Water Table	1	m					

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	378.1	150	0.00611	5
2.286	20.0	46	33	318.6	60	0.01303	7.5
3.048	20.0	61	41	272.3	60	0.01123	10
3.810	20.0	76	49	235.5	75	0.00779	12.5
4.572	20.0	91	56	205.8	175	0.00291	15
5.334	20.0	107	64	181.4	225	0.00197	17.5
6.096	20.0	122	72	161.2	225	0.00173	20
6.858	20.0	137	80	144.2	225	0.00152	22.5
7.620	20.0	152	87	129.8	225	0.00134	25
8.382	20.0	168	95	117.4	225	0.00118	27.5
9.144	20.0	183	103	106.8	225	0.00105	30
9.906	20.0	198	111	97.5	225	0.00093	32.5
10.668	20.0	213	119	89.4	225	0.00000	35
11.430	20.0	229	126	82.3	225	0.00000	37.5
12.192	20.0	244	134	76.0	225	0.00000	40
12.954	20.0	259	142	70.4	225	0.00000	42.5
13.716	20.0	274	150	65.4	225	0.00000	45
14.478	20.0	290	157	60.9	225	0.00000	47.5
15.240	20.0	305	165	56.8	225	0.00000	50
16.002	20.0	320	173	53.2	225	0.00000	52.5
16.764	20.0	335	181	49.9	225	0.00000	55
17.526	20.0	351	188	46.9	225	0.00000	57.5
18.288	20.0	366	196	44.1	225	0.00000	60
19.050	20.0	381	204	41.6	225	0.00000	62.5
19.812	20.0	396	212	39.3	225	0.00000	65
20.574	20.0	411	219	37.2	225	0.00000	67.5
21.336	20.0	427	227	35.3	225	0.00000	70
22.098	20.0	442	235	33.5	225	0.00000	72.5
22.860	20.0	457	243	31.8	225	0.00000	75
23.622	20.0	472	251	30.3	225	0.00000	77.5
24.384	20.0	488	258	28.8	225	0.00000	80

0.91 Df, m
3.0 B, m
5.5 L, m
439 q, kN/m^2

0.0508 m
51 mm
2.00 inches

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Date: 12/1/2023
Revision Number: 0319
Developed By: JWP/PV
Calculated By: PV
Checked By: mcd

Project Name: Upper Truckee River Bridge at Johnson Meadow
Project Number: 5012-05-1

CALCULATION OF LRFD 8TH EDITION (2017) BEARING CAPACITY

Location: Native Ground Seat Abutments - East Abutment Footing
Foundation: 12 feet Wide Footing

Footing Embedment Depth is considered 2 feet without scour data (conservative)
Groundwater was encountered at 5.5 feet depth below ground surface
Design Assumes GW at 2 feet Depth

References

1. AASHTO, 2017, AASHTO LRFD Bridge Design Specifications, 8th Edition, American Association of State Highway and Transportation Officials.

Assumptions

1. Bearing capacity calculations account for foundation shape, possibility of local or punching shear, inclined load, eccentric loading, sloping ground, and ground water.
2. Calculations assume one, homogeneous soil unit. Two-layer soil systems not supported.

Unit Conversions

$psf := \frac{lbf}{ft^2}$ $pcf := \frac{lbf}{ft^3}$ $kip := 1000 \cdot lbf$ $ksf := \frac{kip}{ft^2}$ $kPa := 1000 \cdot Pa$ $kN := 1000 \cdot N$

$kJ := 1000 \cdot J$ $g = 32.174 \frac{ft}{s^2}$

Input Data

Soil Friction Angle: $\phi := 35 \cdot deg$

Soil Cohesion: $c := 0 \cdot psf$

Total Soil Unit Weight: $\gamma := 120\ pcf$

Depth of Foundation Base below Ground Surface: $D_f := 2 \cdot ft$

Foundation Width B (For Circular Footings B = L): $B := 12 \cdot ft$

Foundation Length L: $L := 18 \cdot ft$

Depth of Ground Water from Ground Surface: $D_w := 2 \cdot ft$

Slope of Adjacent Ground (if j>0, the modified Nγ and Nc apply below, Nq=0): $j := 0 \cdot deg$

Calculate estimate reduction factor from Table 10.6.3.1.2c-1 or -2 and calculate the reduced bearing capacity factors: $N_{\gamma slope} := 19$ $N_{cslope} := 0$ for β = 20.6 deg.

Is Local or Punching Shear Possible (Yes = "Y" and No = "N")? $F_{ps} := \text{“N”}$

Unfactored Vertical Load on Footing (Vertical): $V := 670 \cdot kip$

Unfactored Horizontal Load on Footing (Enter 0 for vertical load only): $H := 49 \cdot kip$

Orientation of Horizontal Load (Enter 0 for parallel to long axis L): $\theta := 0 \cdot deg$

Moment in x-Dimension (Footing Width): $M_x := 65 \cdot kip \cdot ft$

Moment in y-Dimension (Footing Length): $M_y := 0 \cdot kip \cdot ft$

Adhesion Between Footing and Foundation Soil for Sliding: $c_a := 0 \cdot psf$

Angle of Friction Between Footing and Foundation Soil for Sliding: $\delta := 0.8 \cdot \phi$ $\delta = 28\ deg$

Sliding Resistance Factor for the Strength Limit State: $\phi_\tau := 0.80$ CIP on sand

Bearing Resistance Factor for the Strength Limit State: $\phi_b := 0.45$ This is a the Munfakh (2001) approach, ϕb varies from 0.45 to 0.5
Bearing Resistance Factor for Extreme State(scour, EQ, ice, impacts = 1.0)
Bearing Resistance Factor for Service State (Settlements and Serviceability = 1.0)

An exception for service limit state 1 is that overall stability shall use resistance factors in Article 11.6.2.3

Calculations Section 1: Bearing Pressures, Eccentricity Reduction

Calculate Eccentricity in Footing "B" Direction:

$e_B := \frac{M_y}{V}$ $e_B = 0.0\ ft$

Calculate Eccentricity in Footing "L" Direction:

$e_L := \frac{M_x}{V}$ $e_L = 0.1\ ft$

Calculate Eccentric Loading Reduced Footing Dimensions:

$B' := B - 2 \cdot e_B$ $B' = 12.0\ ft$

$L' := L - 2 \cdot e_L$ $L' = 17.8\ ft$

Determine Effective Footing Dimensions based on any Eccentricity:

$B' := \left\| \begin{array}{l} \text{if } e_B > 0 \cdot ft \\ \quad \| B' \\ \text{else} \\ \quad \| B \end{array} \right\|$ $B' = 12.0\ ft$

$L' := \left\| \begin{array}{l} \text{if } e_L > 0 \cdot ft \\ \quad \| L' \\ \text{else} \\ \quad \| L' \end{array} \right\|$ $L' = 17.8\ ft$

Calculate the Eccentric Loading Effective Footing Area:

$A' := |B' \cdot L'|$ $A' = 213.7\ ft^2$

Calculations Section 2: Bearing Capacity Coefficients

Calculate Reduced Shear Strength Parameters if Local or Punching Shear is Possible:

$c := \left\| \begin{array}{l} \text{if } F_{ps} = \text{“Y”} \\ \quad \| 0.67 \cdot c \\ \text{else} \\ \quad \| c \end{array} \right\|$ $c = 0.0\ psf$

$\phi := \left\| \begin{array}{l} \text{if } F_{ps} = \text{“Y”} \\ \quad \| \operatorname{atan}(0.67 \cdot \tan(\phi)) \\ \text{else} \\ \quad \| \phi \end{array} \right\|$ $\phi = 35\ deg$

Calculate Bearing Capacity Factors:

$$N_q := \exp(\pi \cdot \tan(\phi)) \cdot \tan\left(45 \cdot deg + \frac{\phi}{2}\right)^2 \qquad N_q = 33.296$$

$$N_c := \max\left(\left(N_q - 1\right) \cdot \cot\left(\max\left(\phi, 0.01 \cdot deg\right)\right), 5.14\right) \qquad \phi = 0.611 \qquad N_c = 46.124$$

$$N_\gamma := 2 \cdot \left(N_q + 1\right) \cdot \tan(\phi) \qquad N_\gamma = 48.029$$

Calculate the Ground Water Factors Cwy and Cwq:

$$C_{wq} := \begin{cases} \text{if } D_w = 0 \\ \quad 0.5 \\ \text{also if } D_w > 1.5 \cdot B + D_f \\ \quad 1 \\ \text{else} \\ \quad 0.5 + 0.5 \cdot \dfrac{D_w}{1.5 \cdot B + D_f} \end{cases} \qquad C_{wq} = 0.55$$

$$C_{w\gamma} := \begin{cases} \text{if } D_w \le D_f \\ \quad 0.5 \\ \text{also if } D_w > 1.5 \cdot B + D_f \\ \quad 1 \\ \text{else} \\ \quad 0.5 + 0.5 \cdot \dfrac{D_w - D_f}{1.5 \cdot B} \end{cases} \qquad C_{w\gamma} = 0.5$$

Calculate Depth Factors:

$$\phi = 35\ deg$$

$$min\left(\frac{D_f}{B}, 8\right) = 0.167$$

$$dq_{42} := \begin{bmatrix} 0 & 1 \\ 1 & 1.15 \\ 2 & 1.20 \\ 4 & 1.25 \\ 8 & 1.30 \end{bmatrix} \qquad dq_{37} := \begin{bmatrix} 0 & 1 \\ 1 & 1.20 \\ 2 & 1.25 \\ 4 & 1.30 \\ 8 & 1.35 \end{bmatrix} \qquad dq_{32} := \begin{bmatrix} 0 & 1 \\ 1 & 1.20 \\ 2 & 1.30 \\ 4 & 1.35 \\ 8 & 1.40 \end{bmatrix}$$

The first columns of vectors above is Df/B. Correlation only valid for friction angles of 32 to 42 degrees; above 42 degrees,value for 42 degrees is considered conservative.

$$d_q := \begin{cases} \text{if } \phi \ge 42 \cdot deg \\ \quad \text{linterp}\left(dq_{42}^{\langle 0 \rangle}, dq_{42}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{also if } 42 \cdot deg > \phi \ge 37 \cdot deg \\ \quad \text{linterp}\left(dq_{37}^{\langle 0 \rangle}, dq_{37}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{also if } 37 \cdot deg > \phi \ge 32 \cdot deg \\ \quad \text{linterp}\left(dq_{32}^{\langle 0 \rangle}, dq_{32}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{else} \\ \quad 1 \end{cases} \qquad d_q = 1.033$$

Calculate Footing Shape Factors:

$$s_c := \begin{cases} \text{if } \phi > 0 \\ \quad 1 + \left(\frac{B'}{L'}\right) \cdot \left(\frac{N_q}{N_c}\right) \\ \text{else} \\ \quad 1 + \frac{B'}{5 \cdot L'} \end{cases}$$

(all terms to go 1.0 for strip footing)

$s_c = 1.487$

$$s_q := \begin{cases} \text{if } \phi > 0 \\ \quad 1 + \left(\frac{B'}{L'}\right) \cdot \tan(\phi) \\ \text{else} \\ \quad 1 \end{cases}$$

$s_q = 1.472$

$$s_\gamma := \begin{cases} \text{if } \phi > 0 \\ \quad 1 - 0.4 \cdot \left(\frac{B'}{L'}\right) \\ \text{else} \\ \quad 1 \end{cases}$$

$s_\gamma = 0.730$

Calculate Inclined Loading Factors:

$$n := \left(\frac{2 + \frac{L'}{B'}}{1 + \frac{L'}{B'}}\right) \cdot \cos(\theta)^2 + \left(\frac{2 + \frac{B'}{L'}}{1 + \frac{B'}{L'}}\right) \cdot \sin(\theta)^2$$

$n = 1.403$

$$i_q := \left(1 - \frac{H}{V + c \cdot B' \cdot L' \cdot \cot(\phi)}\right)^n$$

$i_q = 0.899$

$$i_c := \begin{cases} \text{if } \phi > 0 \cdot \textit{deg} \\ \quad i_q - \left(\frac{1 - i_q}{N_q - 1}\right) \\ \text{else} \\ \quad 1 - \left(\frac{n \cdot H}{c \cdot B' \cdot L' \cdot N_c}\right) \end{cases}$$

$i_c = 0.896$

$$i_\gamma := \left(1 - \frac{H}{V + B' \cdot L' \cdot c \cdot \cot(\phi)}\right)^{n+1}$$

$i_\gamma = 0.833$

$j = 0 \ \textit{deg}$

Calculate Modified Bearing Capacity Coefficients:

$$N_{cm} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_c \cdot s_c \cdot i_c \\ \text{else} \\ \quad N_{cslope} \cdot s_c \cdot i_c \end{cases}$$

$$N_{qm} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_q \cdot s_q \cdot d_q \cdot i_q \\ \text{else} \\ \quad 0 \end{cases}$$

$N_{cm} = 61.42$

$N_{qm} = 45.525$

$$N_{\gamma m} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_\gamma \cdot s_\gamma \cdot i_\gamma \\ \text{else} \\ \quad N_{\gamma slope} \cdot s_\gamma \cdot i_\gamma \end{cases}$$

$N_{\gamma m} = 29.23$

Calculations Section 3: Sliding Check

Calculate the Maximum Resistance Force Between Footing and Foundation Soil for Sliding Failure:

$P_{max} := V \cdot \tan(\delta) + B \cdot L \cdot c_a$ $\quad P_{max} = 356.2\ kip$

Calculate the Factored Resistance Against Sliding Failure:

$P_{fres} := P_{max} \cdot \phi_\tau$ $\quad P_{fres} = 284.996\ kip$

Check Sliding Factor of Safety:

$Check_1 := \left\| \begin{array}{l} \text{if } H < P_{fres} \\ \quad \| 1 \\ \text{else} \\ \quad \| 0 \end{array} \right.$ $\quad Check_1 = 1$

If Check1 = 0, sliding factor of safety below acceptable value.

Calculations Section 4: Bearing Capacity

Calculate Ultimate Bearing Capacity: Eq. 10.6.3.1.2a-1 Note that g term is included in unit weight

$q_n := c \cdot N_{cm} + \gamma \cdot D_f \cdot N_{qm} \cdot C_{wq} + 0.5 \cdot \gamma \cdot B' \cdot N_{\gamma m} \cdot C_{w\gamma}$ $\quad q_n = 16.5\ ksf$

Calculate Unfactored Bearing Capacity:

$q_R := q_n \cdot \phi_b$ $\quad q_R = 7.4\ ksf$

Bearing Pressure: $q_L := \frac{V}{A'}$ $\quad q_L = 3.136\ ksf$

$Check_2 := \left\| \begin{array}{l} \text{if } q_L < q_n \\ \quad \| 1 \\ \text{else} \\ \quad \| 0 \end{array} \right.$ $\quad Check_2 = 1$

RESULTS

Nominal (ultimate) bearing capacity:	**Ultimate sliding resistance**	**Sliding OK (1) or not OK (0)?**
$q_n = 16.5\ ksf$	$P_{max} = 356\ kip$	$Check_1 = 1$
Strength I factored bearing capacity	**Factored Sliding Resistance**	**Ultimate Bearing OK (1) or not OK (0)?**
$q_R = 7.4\ ksf$	$P_{fres} = 285\ kip$	$Check_2 = 1$

CORESTONE ENGINEERING, INC.
10751 Grayslake Dr, Reno, NV 89521

Date: 12/1/2023
Revision No: 2019 March - 1
Developed by: JWP/PV
Calculated by: PV
Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - West Abutment (B=12 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

Only cells with blue background and blue text should be modified

AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

Foundation Load	2244	kN	504.6	kips			
Foundation Depth	0.9144	m	3.0	ft			
Foundation Width	3.6576	**m**	12	ft	**2336.0 psf**		
Foundation Length	5.4864	**m**	18	ft	For 1 inch settlement (Service Value)		
Depth of Influence (3B)	11.8872	m	39.0	ft	check	1.00	inch
Depth to Water Table	1	m					

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	97.8	150	0.00349	5
2.286	20.0	46	33	83.7	60	0.00696	7.5
3.048	20.0	61	41	72.5	60	0.00563	10
3.810	20.0	76	49	63.4	75	0.00368	12.5
4.572	20.0	91	56	55.9	175	0.00130	15
5.334	20.0	107	64	49.7	225	0.00084	17.5
6.096	20.0	122	72	44.5	225	0.00071	20
6.858	20.0	137	80	40.0	225	0.00060	22.5
7.620	20.0	152	87	36.2	225	0.00051	25
8.382	20.0	168	95	32.9	225	0.00044	27.5
9.144	20.0	183	103	30.1	225	0.00038	30
9.906	20.0	198	111	27.6	225	0.00033	32.5
10.668	20.0	213	119	25.4	225	0.00029	35
11.430	20.0	229	126	23.4	225	0.00025	37.5
12.192	20.0	244	134	21.7	225	0.00000	40
12.954	20.0	259	142	20.2	225	0.00000	42.5
13.716	20.0	274	150	18.8	225	0.00000	45
14.478	20.0	290	157	17.5	225	0.00000	47.5
15.240	20.0	305	165	16.4	225	0.00000	50
16.002	20.0	320	173	15.4	225	0.00000	52.5
16.764	20.0	335	181	14.4	225	0.00000	55
17.526	20.0	351	188	13.6	225	0.00000	57.5
18.288	20.0	366	196	12.8	225	0.00000	60
19.050	20.0	381	204	12.1	225	0.00000	62.5
19.812	20.0	396	212	11.5	225	0.00000	65
20.574	20.0	411	219	10.9	225	0.00000	67.5
21.336	20.0	427	227	10.3	225	0.00000	70
22.098	20.0	442	235	9.8	225	0.00000	72.5
22.860	20.0	457	243	9.3	225	0.00000	75
23.622	20.0	472	251	8.9	225	0.00000	77.5
24.384	20.0	488	258	8.5	225	0.00000	80

0.91 Df, m
3.7 B, m
5.5 L, m
111.8 q, kN/m^2

0.0254 m
25 mm
1.00 inches

CORESTONE ENGINEERING, INC.
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Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - West Abutment (B=12 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

Only cells with blue background and blue text should be modified

AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

Foundation Load	4444	kN	999.0	kips			
Foundation Depth	0.9144	m	3.0	ft			
Foundation Width	3.6576	**m**	12	ft	**4624.9 psf**		
Foundation Length	5.4864	**m**	18	ft	For 1.5 inch settlement (Service Value)		
Depth of Influence (3B)	11.8872	m	39.0	ft	check	1.50	inch
Depth to Water Table	1	m					

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	193.6	150	0.00476	5
2.286	20.0	46	33	165.8	60	0.00989	7.5
3.048	20.0	61	41	143.5	60	0.00831	10
3.810	20.0	76	49	125.5	75	0.00563	12.5
4.572	20.0	91	56	110.7	175	0.00205	15
5.334	20.0	107	64	98.4	225	0.00137	17.5
6.096	20.0	122	72	88.0	225	0.00118	20
6.858	20.0	137	80	79.2	225	0.00102	22.5
7.620	20.0	152	87	71.7	225	0.00088	25
8.382	20.0	168	95	65.2	225	0.00077	27.5
9.144	20.0	183	103	59.5	225	0.00067	30
9.906	20.0	198	111	54.6	225	0.00059	32.5
10.668	20.0	213	119	50.2	225	0.00052	35
11.430	20.0	229	126	46.4	225	0.00046	37.5
12.192	20.0	244	134	43.0	225	0.00000	40
12.954	20.0	259	142	39.9	225	0.00000	42.5
13.716	20.0	274	150	37.2	225	0.00000	45
14.478	20.0	290	157	34.7	225	0.00000	47.5
15.240	20.0	305	165	32.5	225	0.00000	50
16.002	20.0	320	173	30.4	225	0.00000	52.5
16.764	20.0	335	181	28.6	225	0.00000	55
17.526	20.0	351	188	26.9	225	0.00000	57.5
18.288	20.0	366	196	25.4	225	0.00000	60
19.050	20.0	381	204	24.0	225	0.00000	62.5
19.812	20.0	396	212	22.7	225	0.00000	65
20.574	20.0	411	219	21.5	225	0.00000	67.5
21.336	20.0	427	227	20.4	225	0.00000	70
22.098	20.0	442	235	19.4	225	0.00000	72.5
22.860	20.0	457	243	18.5	225	0.00000	75
23.622	20.0	472	251	17.6	225	0.00000	77.5
24.384	20.0	488	258	16.8	225	0.00000	80

0.91 Df, m
3.7 B, m
5.5 L, m
221.4 q, kN/m^2

0.0381 m
38 mm
1.50 inches

CORESTONE ENGINEERING, INC.
10751 Grayslake Dr, Reno, NV 89521

Date: 12/1/2023
Revision No: 2019 March - 1
Developed by: JWP/PV
Calculated by: PV
Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - West Abutment (B=12 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

Only cells with blue background and blue text should be modified

AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

Foundation Load	7807	kN	1755.2	kips			
Foundation Depth	0.9144	m	3.0	ft			
Foundation Width	3.6576	**m**	12	ft	**8125.9 psf**		
Foundation Length	5.4864	**m**	18	ft	For 2 inch settlement (Service Value)		
Depth of Influence (3B)	11.8872	m	39.0	ft	check	2.00	inch
Depth to Water Table	1	m					

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	340.2	150	0.00589	5
2.286	20.0	46	33	291.2	60	0.01259	7.5
3.048	20.0	61	41	252.2	60	0.01087	10
3.810	20.0	76	49	220.5	75	0.00755	12.5
4.572	20.0	91	56	194.5	175	0.00282	15
5.334	20.0	107	64	172.9	225	0.00192	17.5
6.096	20.0	122	72	154.7	225	0.00169	20
6.858	20.0	137	80	139.2	225	0.00149	22.5
7.620	20.0	152	87	126.0	225	0.00131	25
8.382	20.0	168	95	114.6	225	0.00116	27.5
9.144	20.0	183	103	104.6	225	0.00103	30
9.906	20.0	198	111	95.9	225	0.00092	32.5
10.668	20.0	213	119	88.3	225	0.00082	35
11.430	20.0	229	126	81.5	225	0.00073	37.5
12.192	20.0	244	134	75.5	225	0.00000	40
12.954	20.0	259	142	70.1	225	0.00000	42.5
13.716	20.0	274	150	65.3	225	0.00000	45
14.478	20.0	290	157	61.0	225	0.00000	47.5
15.240	20.0	305	165	57.0	225	0.00000	50
16.002	20.0	320	173	53.5	225	0.00000	52.5
16.764	20.0	335	181	50.3	225	0.00000	55
17.526	20.0	351	188	47.3	225	0.00000	57.5
18.288	20.0	366	196	44.6	225	0.00000	60
19.050	20.0	381	204	42.2	225	0.00000	62.5
19.812	20.0	396	212	39.9	225	0.00000	65
20.574	20.0	411	219	37.8	225	0.00000	67.5
21.336	20.0	427	227	35.9	225	0.00000	70
22.098	20.0	442	235	34.1	225	0.00000	72.5
22.860	20.0	457	243	32.4	225	0.00000	75
23.622	20.0	472	251	30.9	225	0.00000	77.5
24.384	20.0	488	258	29.5	225	0.00000	80

0.91 Df, m
3.7 B, m
5.5 L, m
389.1 q, kN/m^2

0.0508 m
51 mm
2.00 inches

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Date: 12/1/2023
Revision Number: 0319
Developed By: JWP/PV
Calculated By: PV
Checked By: mcd

Project Name: Upper Truckee River Bridge at Johnson Meadow
Project Number: 5012-05-1

CALCULATION OF LRFD 8TH EDITION (2017) BEARING CAPACITY

Location: Native Ground Seat Abutments - East Abutment Footing
Foundation: 8 feet Wide Footing

Footing Embedment Depth is considered 2 feet without scour data (conservative)
Groundwater was encountered at 10 feet depth below ground surface
Design Assumes GW at 3 feet Depth

References

1. AASHTO, 2017, AASHTO LRFD Bridge Design Specifications, 8th Edition, American Association of State Highway and Transportation Officials.

Assumptions

1. Bearing capacity calculations account for foundation shape, possibility of local or punching shear, inclined load, eccentric loading, sloping ground, and ground water.
2. Calculations assume one, homogeneous soil unit. Two-layer soil systems not supported.

Unit Conversions

$psf := \frac{lbf}{ft^2}$ $pcf := \frac{lbf}{ft^3}$ $kip := 1000 \cdot lbf$ $ksf := \frac{kip}{ft^2}$ $kPa := 1000 \cdot Pa$ $kN := 1000 \cdot N$

$kJ := 1000 \cdot J$ $g = 32.174 \ \frac{ft}{s^2}$

Input Data

Soil Friction Angle: $\phi := 37 \cdot deg$

Soil Cohesion: $c := 0 \cdot psf$

Total Soil Unit Weight: $\gamma := 120 \ pcf$

Depth of Foundation Base below Ground Surface: $D_f := 2 \cdot ft$

Foundation Width B (For Circular Footings B = L): $B := 8 \cdot ft$

Foundation Length L: $L := 18 \cdot ft$

Depth of Ground Water from Ground Surface: $D_w := 3 \cdot ft$

Slope of Adjacent Ground (if j>0, the modified Nγ and Nc apply below, Nq=0): $j := 0 \cdot deg$

Calculate estimate reduction factor from Table 10.6.3.1.2c-1 or -2 and calculate the reduced bearing capacity factors: $N_{\gamma slope} := 19$ $N_{cslope} := 0$ for β = 20.6 deg.

Is Local or Punching Shear Possible (Yes = "Y" and No = "N")? $F_{ps} := \text{“N”}$

Unfactored Vertical Load on Footing (Vertical): $V := 670 \cdot kip$

Unfactored Horizontal Load on Footing (Enter 0 for vertical load only): $H := 49 \cdot kip$

Orientation of Horizontal Load (Enter 0 for parallel to long axis L): $\theta := 0 \cdot deg$

Moment in x-Dimension (Footing Width): $M_x := 65 \cdot kip \cdot ft$

Moment in y-Dimension (Footing Length): $M_y := 0 \cdot kip \cdot ft$

Adhesion Between Footing and Foundation Soil for Sliding: $c_a := 0 \cdot psf$

Angle of Friction Between Footing and Foundation Soil for Sliding: $\delta := 0.8 \cdot \phi$ $\delta = 29.6 \ deg$

Sliding Resistance Factor for the Strength Limit State: $\phi_\tau := 0.80$ CIP on sand

Bearing Resistance Factor for the Strength Limit State: $\phi_b := 0.45$ This is a the Munfakh (2001) approach, ϕb varies from 0.45 to 0.5
Bearing Resistance Factor for Extreme State(scour, EQ, ice, impacts = 1.0)
Bearing Resistance Factor for Service State (Settlements and Serviceability = 1.0)

An exception for service limit state 1 is that overall stability shall use resistance factors in Article 11.6.2.3

Calculations Section 1: Bearing Pressures, Eccentricity Reduction

Calculate Eccentricity in Footing "B" Direction:

$$e_B := \frac{M_y}{V} \qquad e_B = 0.0\ ft$$

Calculate Eccentricity in Footing "L" Direction:

$$e_L := \frac{M_x}{V} \qquad e_L = 0.1\ ft$$

Calculate Eccentric Loading Reduced Footing Dimensions:

$$B' := B - 2 \cdot e_B \qquad B' = 8.0\ ft$$

$$L' := L - 2 \cdot e_L \qquad L' = 17.8\ ft$$

Determine Effective Footing Dimensions based on any Eccentricity:

$$B' := \begin{cases} \text{if } e_B > 0 \cdot ft \\ \quad B' \\ \text{else} \\ \quad B \end{cases} \qquad B' = 8.0\ ft$$

$$L' := \begin{cases} \text{if } e_L > 0 \cdot ft \\ \quad L' \\ \text{else} \\ \quad L' \end{cases} \qquad L' = 17.8\ ft$$

Calculate the Eccentric Loading Effective Footing Area:

$$A' := |B' \cdot L'| \qquad A' = 142.4\ ft^2$$

Calculations Section 2: Bearing Capacity Coefficients

Calculate Reduced Shear Strength Parameters if Local or Punching Shear is Possible:

$$c := \begin{cases} \text{if } F_{ps} = \text{“Y”} \\ \quad 0.67 \cdot c \\ \text{else} \\ \quad c \end{cases} \qquad c = 0.0\ psf$$

$$\phi := \begin{cases} \text{if } F_{ps} = \text{“Y”} \\ \quad \operatorname{atan}(0.67 \cdot \tan(\phi)) \\ \text{else} \\ \quad \phi \end{cases} \qquad \phi = 37\ deg$$

Calculate Bearing Capacity Factors:

$$N_q := \exp(\pi \cdot \tan(\phi)) \cdot \tan\left(45 \cdot deg + \frac{\phi}{2}\right)^2 \qquad N_q = 42.92$$

$$N_c := \max\left(\left(N_q - 1\right) \cdot \cot\left(\max\left(\phi, 0.01 \cdot deg\right)\right), 5.14\right) \qquad \phi = 0.646 \qquad N_c = 55.63$$

$$N_\gamma := 2 \cdot \left(N_q + 1\right) \cdot \tan(\phi) \qquad N_\gamma = 66.192$$

Calculate the Ground Water Factors Cwy and Cwq:

$$C_{wq} := \begin{cases} \text{if } D_w = 0 \\ \quad 0.5 \\ \text{also if } D_w > 1.5 \cdot B + D_f \\ \quad 1 \\ \text{else} \\ \quad 0.5 + 0.5 \cdot \dfrac{D_w}{1.5 \cdot B + D_f} \end{cases} \qquad C_{wq} = 0.607$$

$$C_{w\gamma} := \begin{cases} \text{if } D_w \le D_f \\ \quad 0.5 \\ \text{also if } D_w > 1.5 \cdot B + D_f \\ \quad 1 \\ \text{else} \\ \quad 0.5 + 0.5 \cdot \dfrac{D_w - D_f}{1.5 \cdot B} \end{cases} \qquad C_{w\gamma} = 0.542$$

Calculate Depth Factors:

$$\phi = 37\ deg$$

$$min\left(\frac{D_f}{B}, 8\right) = 0.25$$

$$dq_{42} := \begin{bmatrix} 0 & 1 \\ 1 & 1.15 \\ 2 & 1.20 \\ 4 & 1.25 \\ 8 & 1.30 \end{bmatrix} \qquad dq_{37} := \begin{bmatrix} 0 & 1 \\ 1 & 1.20 \\ 2 & 1.25 \\ 4 & 1.30 \\ 8 & 1.35 \end{bmatrix} \qquad dq_{32} := \begin{bmatrix} 0 & 1 \\ 1 & 1.20 \\ 2 & 1.30 \\ 4 & 1.35 \\ 8 & 1.40 \end{bmatrix}$$

The first columns of vectors above is Df/B. Correlation only valid for friction angles of 32 to 42 degrees; above 42 degrees,value for 42 degrees is considered conservative.

$$d_q := \begin{cases} \text{if } \phi \ge 42 \cdot deg \\ \quad \text{linterp}\left(dq_{42}^{\langle 0 \rangle}, dq_{42}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{also if } 42 \cdot deg > \phi \ge 37 \cdot deg \\ \quad \text{linterp}\left(dq_{37}^{\langle 0 \rangle}, dq_{37}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{also if } 37 \cdot deg > \phi \ge 32 \cdot deg \\ \quad \text{linterp}\left(dq_{32}^{\langle 0 \rangle}, dq_{32}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{else} \\ \quad 1 \end{cases} \qquad d_q = 1.05$$

Calculate Footing Shape Factors:

$$s_c := \begin{cases} \text{if } \phi > 0 \\ \quad 1 + \left(\frac{B'}{L'}\right) \cdot \left(\frac{N_q}{N_c}\right) \\ \text{else} \\ \quad 1 + \frac{B'}{5 \cdot L'} \end{cases}$$

(all terms to go 1.0 for strip footing)

$s_c = 1.347$

$$s_q := \begin{cases} \text{if } \phi > 0 \\ \quad 1 + \left(\frac{B'}{L'}\right) \cdot \tan(\phi) \\ \text{else} \\ \quad 1 \end{cases}$$

$s_q = 1.339$

$$s_\gamma := \begin{cases} \text{if } \phi > 0 \\ \quad 1 - 0.4 \cdot \left(\frac{B'}{L'}\right) \\ \text{else} \\ \quad 1 \end{cases}$$

$s_\gamma = 0.820$

Calculate Inclined Loading Factors:

$$n := \left(\frac{2 + \frac{L'}{B'}}{1 + \frac{L'}{B'}}\right) \cdot \cos(\theta)^2 + \left(\frac{2 + \frac{B'}{L'}}{1 + \frac{B'}{L'}}\right) \cdot \sin(\theta)^2$$

$n = 1.31$

$$i_q := \left(1 - \frac{H}{V + c \cdot B' \cdot L' \cdot \cot(\phi)}\right)^n$$

$i_q = 0.905$

$$i_c := \begin{cases} \text{if } \phi > 0 \cdot \textit{deg} \\ \quad i_q - \left(\frac{1 - i_q}{N_q - 1}\right) \\ \text{else} \\ \quad 1 - \left(\frac{n \cdot H}{c \cdot B' \cdot L' \cdot N_c}\right) \end{cases}$$

$i_c = 0.903$

$$i_\gamma := \left(1 - \frac{H}{V + B' \cdot L' \cdot c \cdot \cot(\phi)}\right)^{n+1}$$

$i_\gamma = 0.839$

$j = 0 \ \textit{deg}$

Calculate Modified Bearing Capacity Coefficients:

$$N_{cm} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_c \cdot s_c \cdot i_c \\ \text{else} \\ \quad N_{cslope} \cdot s_c \cdot i_c \end{cases}$$

$$N_{qm} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_q \cdot s_q \cdot d_q \cdot i_q \\ \text{else} \\ \quad 0 \end{cases}$$

$N_{cm} = 67.649$

$N_{qm} = 54.611$

$$N_{\gamma m} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_\gamma \cdot s_\gamma \cdot i_\gamma \\ \text{else} \\ \quad N_{\gamma slope} \cdot s_\gamma \cdot i_\gamma \end{cases}$$

$N_{\gamma m} = 45.56$

Calculations Section 3: Sliding Check

Calculate the Maximum Resistance Force Between Footing and Foundation Soil for Sliding Failure:

$P_{max} := V \cdot \tan(\delta) + B \cdot L \cdot c_a$ $\quad P_{max} = 380.6\ kip$

Calculate the Factored Resistance Against Sliding Failure:

$P_{fres} := P_{max} \cdot \phi_\tau$ $\quad P_{fres} = 304.49\ kip$

Check Sliding Factor of Safety:

$Check_1 := \left\| \begin{array}{l} \text{if } H < P_{fres} \\ \quad \| 1 \\ \text{else} \\ \quad \| 0 \end{array} \right.$ $\quad Check_1 = 1$

If Check1 = 0, sliding factor of safety below acceptable value.

Calculations Section 4: Bearing Capacity

Calculate Ultimate Bearing Capacity: Eq. 10.6.3.1.2a-1 Note that g term is included in unit weight

$q_n := c \cdot N_{cm} + \gamma \cdot D_f \cdot N_{qm} \cdot C_{wq} + 0.5 \cdot \gamma \cdot B' \cdot N_{\gamma m} \cdot C_{w\gamma}$ $\quad q_n = 19.8\ ksf$

Calculate Unfactored Bearing Capacity:

$q_R := q_n \cdot \phi_b$ $\quad q_R = 8.9\ ksf$

Bearing Pressure: $q_L := \frac{V}{A'}$ $\quad q_L = 4.703\ ksf$

$Check_2 := \left\| \begin{array}{l} \text{if } q_L < q_n \\ \quad \| 1 \\ \text{else} \\ \quad \| 0 \end{array} \right.$ $\quad Check_2 = 1$

RESULTS

Nominal (ultimate) bearing capacity:	**Ultimate sliding resistance**	**Sliding OK (1) or not OK (0)?**
$q_n = 19.8\ ksf$	$P_{max} = 381\ kip$	$Check_1 = 1$
Strength I factored bearing capacity	**Factored Sliding Resistance**	**Ultimate Bearing OK (1) or not OK (0)?**
$q_R = 8.9\ ksf$	$P_{fres} = 304\ kip$	$Check_2 = 1$

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Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - East Abutment (B=8 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

Only cells with blue background and blue text should be modified

AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

Foundation Load	4473	kN	1005.6	kips			
Foundation Depth	0.9144	m	3.0	ft			
Foundation Width	2.4384	**m**	8	ft	**6983.3 psf**		
Foundation Length	5.4864	**m**	18	ft	For 1 inch settlement (Service Value)		
Depth of Influence (3B)	8.2296	m	27.0	ft	check	1.00	inch
Depth to Water Table	1	m					

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	281.6	140	0.00590	5
2.286	20.0	46	33	232.0	120	0.00574	7.5
3.048	20.0	61	41	194.7	150	0.00386	10
3.810	20.0	76	49	166.0	200	0.00246	12.5
4.572	20.0	91	56	143.3	200	0.00209	15
5.334	20.0	107	64	125.0	200	0.00179	17.5
6.096	20.0	122	72	110.1	225	0.00137	20
6.858	20.0	137	80	97.7	225	0.00118	22.5
7.620	20.0	152	87	87.4	225	0.00102	25
8.382	20.0	168	95	78.6	225	0.00000	27.5
9.144	20.0	183	103	71.1	150	0.00000	30
9.906	20.0	198	111	64.6	150	0.00000	32.5
10.668	20.0	213	119	59.0	150	0.00000	35
11.430	20.0	229	126	54.1	150	0.00000	37.5
12.192	20.0	244	134	49.8	225	0.00000	40
12.954	20.0	259	142	46.0	225	0.00000	42.5
13.716	20.0	274	150	42.6	225	0.00000	45
14.478	20.0	290	157	39.5	225	0.00000	47.5
15.240	20.0	305	165	36.8	225	0.00000	50
16.002	20.0	320	173	34.4	225	0.00000	52.5
16.764	20.0	335	181	32.2	225	0.00000	55
17.526	20.0	351	188	30.2	225	0.00000	57.5
18.288	20.0	366	196	28.4	225	0.00000	60
19.050	20.0	381	204	26.7	225	0.00000	62.5
19.812	20.0	396	212	25.2	225	0.00000	65
20.574	20.0	411	219	23.8	225	0.00000	67.5
21.336	20.0	427	227	22.5	225	0.00000	70
22.098	20.0	442	235	21.4	225	0.00000	72.5
22.860	20.0	457	243	20.3	225	0.00000	75
23.622	20.0	472	251	19.3	225	0.00000	77.5
24.384	20.0	488	258	18.3	225	0.00000	80

0.91 Df, m

2.4 B, m

5.5 L, m

334.4 q, kN/m^2

0.0254 m
25 mm

1.00 inches

CORESTONE ENGINEERING, INC.
10751 Grayslake Dr, Reno, NV 89521

Date: 12/1/2023
Revision No: 2019 March - 1
Developed by: JWP/PV
Calculated by: PV
Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - East Abutment (B=8 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

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AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

Foundation Load	11402	kN	2563.2	kips			
Foundation Depth	0.9144	m	3.0	ft			
Foundation Width	2.4384	**m**	8	ft	**17799.9 psf**		
Foundation Length	5.4864	**m**	18	ft	For 1.5 inch settlement (Service Value)		
Depth of Influence (3B)	8.2296	m	27.0	ft	check	1.50	inch
Depth to Water Table	1	m					

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	717.7	140	0.00799	5
2.286	20.0	46	33	591.3	120	0.00810	7.5
3.048	20.0	61	41	496.4	150	0.00568	10
3.810	20.0	76	49	423.1	200	0.00376	12.5
4.572	20.0	91	56	365.3	200	0.00333	15
5.334	20.0	107	64	318.7	200	0.00296	17.5
6.096	20.0	122	72	280.7	225	0.00234	20
6.858	20.0	137	80	249.2	225	0.00208	22.5
7.620	20.0	152	87	222.7	225	0.00186	25
8.382	20.0	168	95	200.3	225	0.00000	27.5
9.144	20.0	183	103	181.2	150	0.00000	30
9.906	20.0	198	111	164.7	150	0.00000	32.5
10.668	20.0	213	119	150.4	150	0.00000	35
11.430	20.0	229	126	137.9	150	0.00000	37.5
12.192	20.0	244	134	126.9	225	0.00000	40
12.954	20.0	259	142	117.2	225	0.00000	42.5
13.716	20.0	274	150	108.5	225	0.00000	45
14.478	20.0	290	157	100.8	225	0.00000	47.5
15.240	20.0	305	165	93.9	225	0.00000	50
16.002	20.0	320	173	87.7	225	0.00000	52.5
16.764	20.0	335	181	82.0	225	0.00000	55
17.526	20.0	351	188	76.9	225	0.00000	57.5
18.288	20.0	366	196	72.3	225	0.00000	60
19.050	20.0	381	204	68.1	225	0.00000	62.5
19.812	20.0	396	212	64.2	225	0.00000	65
20.574	20.0	411	219	60.7	225	0.00000	67.5
21.336	20.0	427	227	57.4	225	0.00000	70
22.098	20.0	442	235	54.4	225	0.00000	72.5
22.860	20.0	457	243	51.7	225	0.00000	75
23.622	20.0	472	251	49.1	225	0.00000	77.5
24.384	20.0	488	258	46.7	225	0.00000	80

0.91 Df, m
2.4 B, m
5.5 L, m
852.3 q, kN/m^2

0.0381 m
38 mm
1.50 inches

CORESTONE ENGINEERING, INC.
10751 Grayslake Dr, Reno, NV 89521

Date: 12/1/2023
Revision No: 2019 March - 1
Developed by: JWP/PV
Calculated by: PV
Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - East Abutment (B=8 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

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AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

Foundation Load	26313	kN	5915.4	kips			
Foundation Depth	0.9144	m	3.0	ft			
Foundation Width	2.4384	**m**	8	ft	**41079.1 psf**		
Foundation Length	5.4864	**m**	18	ft	For 2 inch settlement (Service Value)		
Depth of Influence (3B)	8.2296	m	27.0	ft	check	2.00	inch
Depth to Water Table	1	m					

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	1656.3	140	0.00992	5
2.286	20.0	46	33	1364.5	120	0.01032	7.5
3.048	20.0	61	41	1145.5	150	0.00743	10
3.810	20.0	76	49	976.4	200	0.00504	12.5
4.572	20.0	91	56	842.9	200	0.00458	15
5.334	20.0	107	64	735.5	200	0.00417	17.5
6.096	20.0	122	72	647.8	225	0.00339	20
6.858	20.0	137	80	575.0	225	0.00310	22.5
7.620	20.0	152	87	514.0	225	0.00284	25
8.382	20.0	168	95	462.4	225	0.00000	27.5
9.144	20.0	183	103	418.2	150	0.00000	30
9.906	20.0	198	111	380.1	150	0.00000	32.5
10.668	20.0	213	119	347.1	150	0.00000	35
11.430	20.0	229	126	318.2	150	0.00000	37.5
12.192	20.0	244	134	292.8	225	0.00000	40
12.954	20.0	259	142	270.4	225	0.00000	42.5
13.716	20.0	274	150	250.4	225	0.00000	45
14.478	20.0	290	157	232.6	225	0.00000	47.5
15.240	20.0	305	165	216.7	225	0.00000	50
16.002	20.0	320	173	202.3	225	0.00000	52.5
16.764	20.0	335	181	189.3	225	0.00000	55
17.526	20.0	351	188	177.6	225	0.00000	57.5
18.288	20.0	366	196	166.9	225	0.00000	60
19.050	20.0	381	204	157.1	225	0.00000	62.5
19.812	20.0	396	212	148.2	225	0.00000	65
20.574	20.0	411	219	140.0	225	0.00000	67.5
21.336	20.0	427	227	132.5	225	0.00000	70
22.098	20.0	442	235	125.6	225	0.00000	72.5
22.860	20.0	457	243	119.2	225	0.00000	75
23.622	20.0	472	251	113.3	225	0.00000	77.5
24.384	20.0	488	258	107.8	225	0.00000	80

0.91 Df, m
2.4 B, m
5.5 L, m
1967 q, kN/m^2

0.0508 m
51 mm
2.00 inches

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Date: 12/1/2023
Revision Number: 0319
Developed By: JWP/PV
Calculated By: PV
Checked By: mcd

Project Name: Upper Truckee River Bridge at Johnson Meadow
Project Number: 5012-05-1

CALCULATION OF LRFD 8TH EDITION (2017) BEARING CAPACITY

Location: Native Ground Seat Abutments - East Abutment Footing
Foundation: 10 feet Wide Footing

Footing Embedment Depth is considered 2 feet without scour data (conservative)
Groundwater was encountered at 10 feet depth below ground surface
Design Assumes GW at 3 feet Depth

References

1. AASHTO, 2017, AASHTO LRFD Bridge Design Specifications, 8th Edition, American Association of State Highway and Transportation Officials.

Assumptions

1. Bearing capacity calculations account for foundation shape, possibility of local or punching shear, inclined load, eccentric loading, sloping ground, and ground water.
2. Calculations assume one, homogeneous soil unit. Two-layer soil systems not supported.

Unit Conversions

$psf := \frac{lbf}{ft^2}$ $pcf := \frac{lbf}{ft^3}$ $kip := 1000 \cdot lbf$ $ksf := \frac{kip}{ft^2}$ $kPa := 1000 \cdot Pa$ $kN := 1000 \cdot N$

$kJ := 1000 \cdot J$ $g = 32.174 \ \frac{ft}{s^2}$

Input Data

Soil Friction Angle: $\phi := 37 \cdot deg$

Soil Cohesion: $c := 0 \cdot psf$

Total Soil Unit Weight: $\gamma := 120 \ pcf$

Depth of Foundation Base below Ground Surface: $D_f := 2 \cdot ft$

Foundation Width B (For Circular Footings B = L): $B := 10 \cdot ft$

Foundation Length L: $L := 18 \cdot ft$

Depth of Ground Water from Ground Surface: $D_w := 3 \cdot ft$

Slope of Adjacent Ground (if j>0, the modified Nγ and Nc apply below, Nq=0): $j := 0 \cdot deg$

Calculate estimate reduction factor from Table 10.6.3.1.2c-1 or -2 and calculate the reduced bearing capacity factors: $N_{\gamma slope} := 19$ $N_{cslope} := 0$ for β = 20.6 deg.

Is Local or Punching Shear Possible (Yes = "Y" and No = "N")? $F_{ps} := \text{“N”}$

Unfactored Vertical Load on Footing (Vertical): $V := 670 \cdot kip$

Unfactored Horizontal Load on Footing (Enter 0 for vertical load only): $H := 49 \cdot kip$

Orientation of Horizontal Load (Enter 0 for parallel to long axis L): $\theta := 0 \cdot deg$

Moment in x-Dimension (Footing Width): $M_x := 65 \cdot kip \cdot ft$

Moment in y-Dimension (Footing Length): $M_y := 0 \cdot kip \cdot ft$

Adhesion Between Footing and Foundation Soil for Sliding: $c_a := 0 \cdot psf$

Angle of Friction Between Footing and Foundation Soil for Sliding: $\delta := 0.8 \cdot \phi$ $\delta = 29.6 \ deg$

Sliding Resistance Factor for the Strength Limit State: $\phi_\tau := 0.80$ CIP on sand

Bearing Resistance Factor for the Strength Limit State: $\phi_b := 0.45$ This is a the Munfakh (2001) approach, ϕb varies from 0.45 to 0.5
Bearing Resistance Factor for Extreme State(scour, EQ, ice, impacts = 1.0)
Bearing Resistance Factor for Service State (Settlements and Serviceability = 1.0)

An exception for service limit state 1 is that overall stability shall use resistance factors in Article 11.6.2.3

Calculations Section 1: Bearing Pressures, Eccentricity Reduction

Calculate Eccentricity in Footing "B" Direction:

$e_B := \frac{M_y}{V}$ $e_B = 0.0\ ft$

Calculate Eccentricity in Footing "L" Direction:

$e_L := \frac{M_x}{V}$ $e_L = 0.1\ ft$

Calculate Eccentric Loading Reduced Footing Dimensions:

$B' := B - 2 \cdot e_B$ $B' = 10.0\ ft$

$L' := L - 2 \cdot e_L$ $L' = 17.8\ ft$

Determine Effective Footing Dimensions based on any Eccentricity:

$B' := \left\| \begin{array}{l} \text{if } e_B > 0 \cdot ft \\ \quad \| B' \\ \text{else} \\ \quad \| B \end{array} \right\|$ $B' = 10.0\ ft$

$L' := \left\| \begin{array}{l} \text{if } e_L > 0 \cdot ft \\ \quad \| L' \\ \text{else} \\ \quad \| L' \end{array} \right\|$ $L' = 17.8\ ft$

Calculate the Eccentric Loading Effective Footing Area:

$A' := |B' \cdot L'|$ $A' = 178.1\ ft^2$

Calculations Section 2: Bearing Capacity Coefficients

Calculate Reduced Shear Strength Parameters if Local or Punching Shear is Possible:

$c := \left\| \begin{array}{l} \text{if } F_{ps} = \text{“Y”} \\ \quad \| 0.67 \cdot c \\ \text{else} \\ \quad \| c \end{array} \right\|$ $c = 0.0\ psf$

$\phi := \left\| \begin{array}{l} \text{if } F_{ps} = \text{“Y”} \\ \quad \| \operatorname{atan}(0.67 \cdot \tan(\phi)) \\ \text{else} \\ \quad \| \phi \end{array} \right\|$ $\phi = 37\ deg$

Calculate Bearing Capacity Factors:

$$N_q := \exp(\pi \cdot \tan(\phi)) \cdot \tan\left(45 \cdot deg + \frac{\phi}{2}\right)^2 \qquad N_q = 42.92$$

$$N_c := \max\left(\left(N_q - 1\right) \cdot \cot\left(\max\left(\phi, 0.01 \cdot deg\right)\right), 5.14\right) \qquad \phi = 0.646 \qquad N_c = 55.63$$

$$N_\gamma := 2 \cdot \left(N_q + 1\right) \cdot \tan(\phi) \qquad N_\gamma = 66.192$$

Calculate the Ground Water Factors Cwy and Cwq:

$$C_{wq} := \begin{cases} \text{if } D_w = 0 \\ \quad 0.5 \\ \text{also if } D_w > 1.5 \cdot B + D_f \\ \quad 1 \\ \text{else} \\ \quad 0.5 + 0.5 \cdot \dfrac{D_w}{1.5 \cdot B + D_f} \end{cases} \qquad C_{wq} = 0.588$$

$$C_{w\gamma} := \begin{cases} \text{if } D_w \le D_f \\ \quad 0.5 \\ \text{also if } D_w > 1.5 \cdot B + D_f \\ \quad 1 \\ \text{else} \\ \quad 0.5 + 0.5 \cdot \dfrac{D_w - D_f}{1.5 \cdot B} \end{cases} \qquad C_{w\gamma} = 0.533$$

Calculate Depth Factors:

$$\phi = 37\ deg$$

$$min\left(\frac{D_f}{B}, 8\right) = 0.2$$

$$dq_{42} := \begin{bmatrix} 0 & 1 \\ 1 & 1.15 \\ 2 & 1.20 \\ 4 & 1.25 \\ 8 & 1.30 \end{bmatrix} \qquad dq_{37} := \begin{bmatrix} 0 & 1 \\ 1 & 1.20 \\ 2 & 1.25 \\ 4 & 1.30 \\ 8 & 1.35 \end{bmatrix} \qquad dq_{32} := \begin{bmatrix} 0 & 1 \\ 1 & 1.20 \\ 2 & 1.30 \\ 4 & 1.35 \\ 8 & 1.40 \end{bmatrix}$$

The first columns of vectors above is Df/B. Correlation only valid for friction angles of 32 to 42 degrees; above 42 degrees,value for 42 degrees is considered conservative.

$$d_q := \begin{cases} \text{if } \phi \ge 42 \cdot deg \\ \quad \text{linterp}\left(dq_{42}^{\langle 0 \rangle}, dq_{42}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{also if } 42 \cdot deg > \phi \ge 37 \cdot deg \\ \quad \text{linterp}\left(dq_{37}^{\langle 0 \rangle}, dq_{37}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{also if } 37 \cdot deg > \phi \ge 32 \cdot deg \\ \quad \text{linterp}\left(dq_{32}^{\langle 0 \rangle}, dq_{32}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{else} \\ \quad 1 \end{cases} \qquad d_q = 1.04$$

Calculate Footing Shape Factors:

$$s_c := \begin{cases} \text{if } \phi > 0 \\ \quad 1 + \left(\frac{B'}{L'}\right) \cdot \left(\frac{N_q}{N_c}\right) \\ \text{else} \\ \quad 1 + \frac{B'}{5 \cdot L'} \end{cases}$$

(all terms to go 1.0 for strip footing)

$s_c = 1.433$

$$s_q := \begin{cases} \text{if } \phi > 0 \\ \quad 1 + \left(\frac{B'}{L'}\right) \cdot \tan(\phi) \\ \text{else} \\ \quad 1 \end{cases}$$

$s_q = 1.423$

$$s_\gamma := \begin{cases} \text{if } \phi > 0 \\ \quad 1 - 0.4 \cdot \left(\frac{B'}{L'}\right) \\ \text{else} \\ \quad 1 \end{cases}$$

$s_\gamma = 0.775$

Calculate Inclined Loading Factors:

$$n := \left(\frac{2 + \frac{L'}{B'}}{1 + \frac{L'}{B'}}\right) \cdot \cos(\theta)^2 + \left(\frac{2 + \frac{B'}{L'}}{1 + \frac{B'}{L'}}\right) \cdot \sin(\theta)^2$$

$n = 1.36$

$$i_q := \left(1 - \frac{H}{V + c \cdot B' \cdot L' \cdot \cot(\phi)}\right)^n$$

$i_q = 0.902$

$$i_c := \begin{cases} \text{if } \phi > 0 \cdot \textit{deg} \\ \quad i_q - \left(\frac{1 - i_q}{N_q - 1}\right) \\ \text{else} \\ \quad 1 - \left(\frac{n \cdot H}{c \cdot B' \cdot L' \cdot N_c}\right) \end{cases}$$

$i_c = 0.9$

$$i_\gamma := \left(1 - \frac{H}{V + B' \cdot L' \cdot c \cdot \cot(\phi)}\right)^{n+1}$$

$i_\gamma = 0.836$

$j = 0 \ \textit{deg}$

Calculate Modified Bearing Capacity Coefficients:

$$N_{cm} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_c \cdot s_c \cdot i_c \\ \text{else} \\ \quad N_{cslope} \cdot s_c \cdot i_c \end{cases}$$

$$N_{qm} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_q \cdot s_q \cdot d_q \cdot i_q \\ \text{else} \\ \quad 0 \end{cases}$$

$N_{cm} = 71.725$

$N_{qm} = 57.295$

$$N_{\gamma m} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_\gamma \cdot s_\gamma \cdot i_\gamma \\ \text{else} \\ \quad N_{\gamma slope} \cdot s_\gamma \cdot i_\gamma \end{cases}$$

$N_{\gamma m} = 42.902$

Calculations Section 3: Sliding Check

Calculate the Maximum Resistance Force Between Footing and Foundation Soil for Sliding Failure:

$P_{max} := V \cdot \tan(\delta) + B \cdot L \cdot c_a$ $\quad P_{max} = 380.6\ kip$

Calculate the Factored Resistance Against Sliding Failure:

$P_{fres} := P_{max} \cdot \phi_\tau$ $\quad P_{fres} = 304.49\ kip$

Check Sliding Factor of Safety:

$$Check_1 := \begin{cases} 1 & \text{if } H < P_{fres} \\ 0 & \text{else} \end{cases} \qquad Check_1 = 1$$

If Check1 = 0, sliding factor of safety below acceptable value.

Calculations Section 4: Bearing Capacity

Calculate Ultimate Bearing Capacity: Eq. 10.6.3.1.2a-1 Note that g term is included in unit weight

$q_n := c \cdot N_{cm} + \gamma \cdot D_f \cdot N_{qm} \cdot C_{wq} + 0.5 \cdot \gamma \cdot B' \cdot N_{\gamma m} \cdot C_{w\gamma}$ $\quad q_n = 21.8\ ksf$

Calculate Unfactored Bearing Capacity:

$q_R := q_n \cdot \phi_b$ $\quad q_R = 9.8\ ksf$

Bearing Pressure: $q_L := \frac{V}{A'}$ $\quad q_L = 3.763\ ksf$

$$Check_2 := \begin{cases} 1 & \text{if } q_L < q_n \\ 0 & \text{else} \end{cases} \qquad Check_2 = 1$$

RESULTS

Nominal (ultimate) bearing capacity:	**Ultimate sliding resistance**	**Sliding OK (1) or not OK (0)?**
$q_n = 21.8\ ksf$	$P_{max} = 381\ kip$	$Check_1 = 1$
Strength I factored bearing capacity	**Factored Sliding Resistance**	**Ultimate Bearing OK (1) or not OK (0)?**
$q_R = 9.8\ ksf$	$P_{fres} = 304\ kip$	$Check_2 = 1$

CORESTONE ENGINEERING, INC.
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Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - East Abutment (B=10 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

Only cells with blue background and blue text should be modified

AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

Foundation Load	4180	kN	939.7	kips			
Foundation Depth	0.9144	m	3.0	ft			
Foundation Width	3.048	**m**	10	ft	**5220.3 psf**		
Foundation Length	5.4864	**m**	18	ft	For 1 inch settlement (Service Value)		
Depth of Influence (3B)	10.0584	m	33.0	ft	check	1.00	inch
Depth to Water Table	1	m					

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	215.3	140	0.00532	5
2.286	20.0	46	33	181.4	120	0.00515	7.5
3.048	20.0	61	41	155.0	150	0.00346	10
3.810	20.0	76	49	134.1	200	0.00219	12.5
4.572	20.0	91	56	117.2	200	0.00186	15
5.334	20.0	107	64	103.3	200	0.00159	17.5
6.096	20.0	122	72	91.8	225	0.00121	20
6.858	20.0	137	80	82.1	225	0.00104	22.5
7.620	20.0	152	87	73.9	225	0.00090	25
8.382	20.0	168	95	66.8	225	0.00078	27.5
9.144	20.0	183	103	60.8	150	0.00102	30
9.906	20.0	198	111	55.5	150	0.00090	32.5
10.668	20.0	213	119	50.9	150	0.00000	35
11.430	20.0	229	126	46.8	150	0.00000	37.5
12.192	20.0	244	134	43.2	225	0.00000	40
12.954	20.0	259	142	40.1	225	0.00000	42.5
13.716	20.0	274	150	37.2	225	0.00000	45
14.478	20.0	290	157	34.7	225	0.00000	47.5
15.240	20.0	305	165	32.4	225	0.00000	50
16.002	20.0	320	173	30.3	225	0.00000	52.5
16.764	20.0	335	181	28.4	225	0.00000	55
17.526	20.0	351	188	26.7	225	0.00000	57.5
18.288	20.0	366	196	25.1	225	0.00000	60
19.050	20.0	381	204	23.7	225	0.00000	62.5
19.812	20.0	396	212	22.4	225	0.00000	65
20.574	20.0	411	219	21.2	225	0.00000	67.5
21.336	20.0	427	227	20.1	225	0.00000	70
22.098	20.0	442	235	19.1	225	0.00000	72.5
22.860	20.0	457	243	18.1	225	0.00000	75
23.622	20.0	472	251	17.2	225	0.00000	77.5
24.384	20.0	488	258	16.4	225	0.00000	80

0.91 Df, m
3.0 B, m
5.5 L, m
249.9 q, kN/m^2

0.0254 m
25 mm
1.00 inches

CORESTONE ENGINEERING, INC.
10751 Grayslake Dr, Reno, NV 89521

Date: 12/1/2023
Revision No: 2019 March - 1
Developed by: JWP/PV
Calculated by: PV
Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - East Abutment (B=10 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

Only cells with blue background and blue text should be modified

AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

Foundation Load	9394	kN	2112.0	kips			
Foundation Depth	0.9144	m	3.0	ft			
Foundation Width	3.048	**m**	10	ft	**11733.2 psf**		
Foundation Length	5.4864	**m**	18	ft	For 1.5 inch settlement (Service Value)		
Depth of Influence (3B)	10.0584	m	33.0	ft	check	1.50	inch
Depth to Water Table	1	m					

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	483.8	140	0.00709	5
2.286	20.0	46	33	407.6	120	0.00714	7.5
3.048	20.0	61	41	348.4	150	0.00497	10
3.810	20.0	76	49	301.3	200	0.00327	12.5
4.572	20.0	91	56	263.3	200	0.00287	15
5.334	20.0	107	64	232.2	200	0.00253	17.5
6.096	20.0	122	72	206.3	225	0.00199	20
6.858	20.0	137	80	184.5	225	0.00176	22.5
7.620	20.0	152	87	166.0	225	0.00157	25
8.382	20.0	168	95	150.2	225	0.00139	27.5
9.144	20.0	183	103	136.6	150	0.00186	30
9.906	20.0	198	111	124.8	150	0.00166	32.5
10.668	20.0	213	119	114.4	150	0.00000	35
11.430	20.0	229	126	105.3	150	0.00000	37.5
12.192	20.0	244	134	97.2	225	0.00000	40
12.954	20.0	259	142	90.0	225	0.00000	42.5
13.716	20.0	274	150	83.6	225	0.00000	45
14.478	20.0	290	157	77.9	225	0.00000	47.5
15.240	20.0	305	165	72.7	225	0.00000	50
16.002	20.0	320	173	68.1	225	0.00000	52.5
16.764	20.0	335	181	63.8	225	0.00000	55
17.526	20.0	351	188	60.0	225	0.00000	57.5
18.288	20.0	366	196	56.5	225	0.00000	60
19.050	20.0	381	204	53.3	225	0.00000	62.5
19.812	20.0	396	212	50.3	225	0.00000	65
20.574	20.0	411	219	47.6	225	0.00000	67.5
21.336	20.0	427	227	45.1	225	0.00000	70
22.098	20.0	442	235	42.8	225	0.00000	72.5
22.860	20.0	457	243	40.7	225	0.00000	75
23.622	20.0	472	251	38.7	225	0.00000	77.5
24.384	20.0	488	258	36.9	225	0.00000	80

0.91 Df, m
3.0 B, m
5.5 L, m
561.8 q, kN/m^2

0.0381 m
38 mm
1.50 inches

CORESTONE ENGINEERING, INC.
10751 Grayslake Dr, Reno, NV 89521

Date: 12/1/2023
Revision No: 2019 March - 1
Developed by: JWP/PV
Calculated by: PV
Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - East Abutment (B=10 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

Only cells with blue background and blue text should be modified

AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

Foundation Load	18727	kN	4209.9	kips			
Foundation Depth	0.9144	m	3.0	ft			
Foundation Width	3.048	**m**	10	ft	**23388.5 psf**		
Foundation Length	5.4864	**m**	18	ft	For 2 inch settlement (Service Value)		
Depth of Influence (3B)	10.0584	m	33.0	ft	check	2.00	inch
Depth to Water Table	1	m					

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	964.5	140	0.00866	5
2.286	20.0	46	33	812.6	120	0.00894	7.5
3.048	20.0	61	41	694.5	150	0.00638	10
3.810	20.0	76	49	600.7	200	0.00429	12.5
4.572	20.0	91	56	524.9	200	0.00386	15
5.334	20.0	107	64	462.8	200	0.00348	17.5
6.096	20.0	122	72	411.2	225	0.00280	20
6.858	20.0	137	80	367.8	225	0.00254	22.5
7.620	20.0	152	87	331.0	225	0.00230	25
8.382	20.0	168	95	299.5	225	0.00209	27.5
9.144	20.0	183	103	272.3	150	0.00285	30
9.906	20.0	198	111	248.7	150	0.00260	32.5
10.668	20.0	213	119	228.0	150	0.00000	35
11.430	20.0	229	126	209.8	150	0.00000	37.5
12.192	20.0	244	134	193.8	225	0.00000	40
12.954	20.0	259	142	179.5	225	0.00000	42.5
13.716	20.0	274	150	166.7	225	0.00000	45
14.478	20.0	290	157	155.3	225	0.00000	47.5
15.240	20.0	305	165	145.0	225	0.00000	50
16.002	20.0	320	173	135.7	225	0.00000	52.5
16.764	20.0	335	181	127.3	225	0.00000	55
17.526	20.0	351	188	119.6	225	0.00000	57.5
18.288	20.0	366	196	112.6	225	0.00000	60
19.050	20.0	381	204	106.2	225	0.00000	62.5
19.812	20.0	396	212	100.3	225	0.00000	65
20.574	20.0	411	219	94.9	225	0.00000	67.5
21.336	20.0	427	227	90.0	225	0.00000	70
22.098	20.0	442	235	85.4	225	0.00000	72.5
22.860	20.0	457	243	81.1	225	0.00000	75
23.622	20.0	472	251	77.2	225	0.00000	77.5
24.384	20.0	488	258	73.6	225	0.00000	80

0.91 Df, m
3.0 B, m
5.5 L, m
1120 q, kN/m^2

0.0508 m
51 mm
2.00 inches

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Date: 12/1/2023
Revision Number: 0319
Developed By: JWP/PV
Calculated By: PV
Checked By: mcd

Project Name: Upper Truckee River Bridge at Johnson Meadow
Project Number: 5012-05-1

CALCULATION OF LRFD 8TH EDITION (2017) BEARING CAPACITY

Location: Native Ground Seat Abutments - East Abutment Footing
Foundation: 12 feet Wide Footing

Footing Embedment Depth is considered 2 feet without scour data (conservative)
Groundwater was encountered at 10 feet depth below ground surface
Design Assumes GW at 5 feet Depth

References

1. AASHTO, 2017, AASHTO LRFD Bridge Design Specifications, 8th Edition, American Association of State Highway and Transportation Officials.

Assumptions

1. Bearing capacity calculations account for foundation shape, possibility of local or punching shear, inclined load, eccentric loading, sloping ground, and ground water.
2. Calculations assume one, homogeneous soil unit. Two-layer soil systems not supported.

Unit Conversions

$psf := \frac{lbf}{ft^2}$ $pcf := \frac{lbf}{ft^3}$ $kip := 1000 \cdot lbf$ $ksf := \frac{kip}{ft^2}$ $kPa := 1000 \cdot Pa$ $kN := 1000 \cdot N$

$kJ := 1000 \cdot J$ $g = 32.174 \frac{ft}{s^2}$

Input Data

Soil Friction Angle: $\phi := 37 \cdot deg$

Soil Cohesion: $c := 0 \cdot psf$

Total Soil Unit Weight: $\gamma := 120\ pcf$

Depth of Foundation Base below Ground Surface: $D_f := 2 \cdot ft$

Foundation Width B (For Circular Footings B = L): $B := 12 \cdot ft$

Foundation Length L: $L := 18 \cdot ft$

Depth of Ground Water from Ground Surface: $D_w := 5 \cdot ft$

Slope of Adjacent Ground (if j>0, the modified Nγ and Nc apply below, Nq=0): $j := 0 \cdot deg$

Calculate estimate reduction factor from Table 10.6.3.1.2c-1 or -2 and calculate the reduced bearing capacity factors: $N_{\gamma slope} := 19$ $N_{cslope} := 0$ for β = 20.6 deg.

Is Local or Punching Shear Possible (Yes = "Y" and No = "N")? $F_{ps} := \text{“N”}$

Unfactored Vertical Load on Footing (Vertical): $V := 670 \cdot kip$

Unfactored Horizontal Load on Footing (Enter 0 for vertical load only): $H := 49 \cdot kip$

Orientation of Horizontal Load (Enter 0 for parallel to long axis L): $\theta := 0 \cdot deg$

Moment in x-Dimension (Footing Width): $M_x := 65 \cdot kip \cdot ft$

Moment in y-Dimension (Footing Length): $M_y := 0 \cdot kip \cdot ft$

Adhesion Between Footing and Foundation Soil for Sliding: $c_a := 0 \cdot psf$

Angle of Friction Between Footing and Foundation Soil for Sliding: $\delta := 0.8 \cdot \phi$ $\delta = 29.6\ deg$

Sliding Resistance Factor for the Strength Limit State: $\phi_\tau := 0.80$ CIP on sand

Bearing Resistance Factor for the Strength Limit State: $\phi_b := 0.45$ This is a the Munfakh (2001) approach, ϕb varies from 0.45 to 0.5
Bearing Resistance Factor for Extreme State(scour, EQ, ice, impacts = 1.0)
Bearing Resistance Factor for Service State (Settlements and Serviceability = 1.0)

An exception for service limit state 1 is that overall stability shall use resistance factors in Article 11.6.2.3

Calculations Section 1: Bearing Pressures, Eccentricity Reduction

Calculate Eccentricity in Footing "B" Direction:

$$e_B := \frac{M_y}{V} \qquad e_B = 0.0\ ft$$

Calculate Eccentricity in Footing "L" Direction:

$$e_L := \frac{M_x}{V} \qquad e_L = 0.1\ ft$$

Calculate Eccentric Loading Reduced Footing Dimensions:

$$B' := B - 2 \cdot e_B \qquad B' = 12.0\ ft$$

$$L' := L - 2 \cdot e_L \qquad L' = 17.8\ ft$$

Determine Effective Footing Dimensions based on any Eccentricity:

$$B' := \begin{cases} \text{if } e_B > 0 \cdot ft \\ \quad B' \\ \text{else} \\ \quad B \end{cases} \qquad B' = 12.0\ ft$$

$$L' := \begin{cases} \text{if } e_L > 0 \cdot ft \\ \quad L' \\ \text{else} \\ \quad L' \end{cases} \qquad L' = 17.8\ ft$$

Calculate the Eccentric Loading Effective Footing Area:

$$A' := |B' \cdot L'| \qquad A' = 213.7\ ft^2$$

Calculations Section 2: Bearing Capacity Coefficients

Calculate Reduced Shear Strength Parameters if Local or Punching Shear is Possible:

$$c := \begin{cases} \text{if } F_{ps} = \text{“Y”} \\ \quad 0.67 \cdot c \\ \text{else} \\ \quad c \end{cases} \qquad c = 0.0\ psf$$

$$\phi := \begin{cases} \text{if } F_{ps} = \text{“Y”} \\ \quad \operatorname{atan}(0.67 \cdot \tan(\phi)) \\ \text{else} \\ \quad \phi \end{cases} \qquad \phi = 37\ deg$$

Calculate Bearing Capacity Factors:

$$N_q := \exp(\pi \cdot \tan(\phi)) \cdot \tan\left(45 \cdot deg + \frac{\phi}{2}\right)^2 \qquad N_q = 42.92$$

$$N_c := \max\left(\left(N_q - 1\right) \cdot \cot\left(\max\left(\phi, 0.01 \cdot deg\right)\right), 5.14\right) \qquad \phi = 0.646 \qquad N_c = 55.63$$

$$N_\gamma := 2 \cdot \left(N_q + 1\right) \cdot \tan(\phi) \qquad N_\gamma = 66.192$$

Calculate the Ground Water Factors Cwy and Cwq:

$$C_{wq} := \begin{cases} \text{if } D_w = 0 \\ \quad 0.5 \\ \text{also if } D_w > 1.5 \cdot B + D_f \\ \quad 1 \\ \text{else} \\ \quad 0.5 + 0.5 \cdot \dfrac{D_w}{1.5 \cdot B + D_f} \end{cases} \qquad C_{wq} = 0.625$$

$$C_{w\gamma} := \begin{cases} \text{if } D_w \le D_f \\ \quad 0.5 \\ \text{also if } D_w > 1.5 \cdot B + D_f \\ \quad 1 \\ \text{else} \\ \quad 0.5 + 0.5 \cdot \dfrac{D_w - D_f}{1.5 \cdot B} \end{cases} \qquad C_{w\gamma} = 0.583$$

Calculate Depth Factors:

$$\phi = 37\ deg$$

$$min\left(\frac{D_f}{B}, 8\right) = 0.167$$

$$dq_{42} := \begin{bmatrix} 0 & 1 \\ 1 & 1.15 \\ 2 & 1.20 \\ 4 & 1.25 \\ 8 & 1.30 \end{bmatrix} \qquad dq_{37} := \begin{bmatrix} 0 & 1 \\ 1 & 1.20 \\ 2 & 1.25 \\ 4 & 1.30 \\ 8 & 1.35 \end{bmatrix} \qquad dq_{32} := \begin{bmatrix} 0 & 1 \\ 1 & 1.20 \\ 2 & 1.30 \\ 4 & 1.35 \\ 8 & 1.40 \end{bmatrix}$$

The first columns of vectors above is Df/B. Correlation only valid for friction angles of 32 to 42 degrees; above 42 degrees,value for 42 degrees is considered conservative.

$$d_q := \begin{cases} \text{if } \phi \ge 42 \cdot deg \\ \quad \text{linterp}\left(dq_{42}^{\langle 0 \rangle}, dq_{42}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{also if } 42 \cdot deg > \phi \ge 37 \cdot deg \\ \quad \text{linterp}\left(dq_{37}^{\langle 0 \rangle}, dq_{37}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{also if } 37 \cdot deg > \phi \ge 32 \cdot deg \\ \quad \text{linterp}\left(dq_{32}^{\langle 0 \rangle}, dq_{32}^{\langle 1 \rangle}, min\left(\dfrac{D_f}{B}, 8\right)\right) \\ \text{else} \\ \quad 1 \end{cases} \qquad d_q = 1.033$$

Calculate Footing Shape Factors:

$$s_c := \begin{cases} \text{if } \phi > 0 \\ \quad 1 + \left(\frac{B'}{L'}\right) \cdot \left(\frac{N_q}{N_c}\right) \\ \text{else} \\ \quad 1 + \frac{B'}{5 \cdot L'} \end{cases}$$

(all terms to go 1.0 for strip footing)

$s_c = 1.520$

$$s_q := \begin{cases} \text{if } \phi > 0 \\ \quad 1 + \left(\frac{B'}{L'}\right) \cdot \tan(\phi) \\ \text{else} \\ \quad 1 \end{cases}$$

$s_q = 1.508$

$$s_\gamma := \begin{cases} \text{if } \phi > 0 \\ \quad 1 - 0.4 \cdot \left(\frac{B'}{L'}\right) \\ \text{else} \\ \quad 1 \end{cases}$$

$s_\gamma = 0.730$

Calculate Inclined Loading Factors:

$$n := \left(\frac{2 + \frac{L'}{B'}}{1 + \frac{L'}{B'}}\right) \cdot \cos(\theta)^2 + \left(\frac{2 + \frac{B'}{L'}}{1 + \frac{B'}{L'}}\right) \cdot \sin(\theta)^2$$

$n = 1.403$

$$i_q := \left(1 - \frac{H}{V + c \cdot B' \cdot L' \cdot \cot(\phi)}\right)^n$$

$i_q = 0.899$

$$i_c := \begin{cases} \text{if } \phi > 0 \cdot \textit{deg} \\ \quad i_q - \left(\frac{1 - i_q}{N_q - 1}\right) \\ \text{else} \\ \quad 1 - \left(\frac{n \cdot H}{c \cdot B' \cdot L' \cdot N_c}\right) \end{cases}$$

$i_c = 0.897$

$$i_\gamma := \left(1 - \frac{H}{V + B' \cdot L' \cdot c \cdot \cot(\phi)}\right)^{n+1}$$

$i_\gamma = 0.833$

$j = 0 \ \textit{deg}$

Calculate Modified Bearing Capacity Coefficients:

$$N_{cm} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_c \cdot s_c \cdot i_c \\ \text{else} \\ \quad N_{cslope} \cdot s_c \cdot i_c \end{cases}$$

$$N_{qm} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_q \cdot s_q \cdot d_q \cdot i_q \\ \text{else} \\ \quad 0 \end{cases}$$

$N_{cm} = 75.807$

$N_{qm} = 60.116$

$$N_{\gamma m} := \begin{cases} \text{if } j = 0 \cdot \textit{deg} \\ \quad N_\gamma \cdot s_\gamma \cdot i_\gamma \\ \text{else} \\ \quad N_{\gamma slope} \cdot s_\gamma \cdot i_\gamma \end{cases}$$

$N_{\gamma m} = 40.284$

Calculations Section 3: Sliding Check

Calculate the Maximum Resistance Force Between Footing and Foundation Soil for Sliding Failure:

$P_{max} := V \cdot \tan(\delta) + B \cdot L \cdot c_a$ $\quad P_{max} = 380.6\ kip$

Calculate the Factored Resistance Against Sliding Failure:

$P_{fres} := P_{max} \cdot \phi_\tau$ $\quad P_{fres} = 304.49\ kip$

Check Sliding Factor of Safety:

$Check_1 := \left\| \begin{array}{l} \text{if } H < P_{fres} \\ \quad \| 1 \\ \text{else} \\ \quad \| 0 \end{array} \right.$ $\quad Check_1 = 1$

If Check1 = 0, sliding factor of safety below acceptable value.

Calculations Section 4: Bearing Capacity

Calculate Ultimate Bearing Capacity: Eq. 10.6.3.1.2a-1 Note that g term is included in unit weight

$q_n := c \cdot N_{cm} + \gamma \cdot D_f \cdot N_{qm} \cdot C_{wq} + 0.5 \cdot \gamma \cdot B' \cdot N_{\gamma m} \cdot C_{w\gamma}$ $\quad q_n = 25.9\ ksf$

Calculate Unfactored Bearing Capacity:

$q_R := q_n \cdot \phi_b$ $\quad q_R = 11.7\ ksf$

Bearing Pressure: $q_L := \frac{V}{A'}$ $\quad q_L = 3.136\ ksf$

$Check_2 := \left\| \begin{array}{l} \text{if } q_L < q_n \\ \quad \| 1 \\ \text{else} \\ \quad \| 0 \end{array} \right.$ $\quad Check_2 = 1$

RESULTS

Nominal (ultimate) bearing capacity:	**Ultimate sliding resistance**	**Sliding OK (1) or not OK (0)?**
$q_n = 25.9\ ksf$	$P_{max} = 381\ kip$	$Check_1 = 1$
Strength I factored bearing capacity	**Factored Sliding Resistance**	**Ultimate Bearing OK (1) or not OK (0)?**
$q_R = 11.7\ ksf$	$P_{fres} = 304\ kip$	$Check_2 = 1$

CORESTONE ENGINEERING, INC.
10751 Grayslake Dr, Reno, NV 89521

Date: 12/1/2023
Revision No: 2019 March - 1
Developed by: JWP/PV
Calculated by: PV
Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - East Abutment (B=12 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

Only cells with blue background and blue text should be modified

AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

Foundation Load	4267	kN	959.2	kips			
Foundation Depth	0.9144	m	3.0	ft			
Foundation Width	3.6576	**m**	12	ft	**4440.8 psf**		
Foundation Length	5.4864	**m**	18	ft	For 1 inch settlement (Service Value)		
Depth of Influence (3B)	11.8872	m	39.0	ft	check	1.00	inch
Depth to Water Table	1	m					

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	185.9	140	0.00501	5
2.286	20.0	46	33	159.2	120	0.00485	7.5
3.048	20.0	61	41	137.8	150	0.00325	10
3.810	20.0	76	49	120.5	200	0.00206	12.5
4.572	20.0	91	56	106.3	200	0.00175	15
5.334	20.0	107	64	94.5	200	0.00150	17.5
6.096	20.0	122	72	84.5	225	0.00114	20
6.858	20.0	137	80	76.1	225	0.00099	22.5
7.620	20.0	152	87	68.9	225	0.00085	25
8.382	20.0	168	95	62.6	225	0.00074	27.5
9.144	20.0	183	103	57.2	150	0.00097	30
9.906	20.0	198	111	52.4	150	0.00085	32.5
10.668	20.0	213	119	48.2	150	0.00075	35
11.430	20.0	229	126	44.5	150	0.00067	37.5
12.192	20.0	244	134	41.3	225	0.00000	40
12.954	20.0	259	142	38.3	225	0.00000	42.5
13.716	20.0	274	150	35.7	225	0.00000	45
14.478	20.0	290	157	33.3	225	0.00000	47.5
15.240	20.0	305	165	31.2	225	0.00000	50
16.002	20.0	320	173	29.2	225	0.00000	52.5
16.764	20.0	335	181	27.5	225	0.00000	55
17.526	20.0	351	188	25.9	225	0.00000	57.5
18.288	20.0	366	196	24.4	225	0.00000	60
19.050	20.0	381	204	23.0	225	0.00000	62.5
19.812	20.0	396	212	21.8	225	0.00000	65
20.574	20.0	411	219	20.7	225	0.00000	67.5
21.336	20.0	427	227	19.6	225	0.00000	70
22.098	20.0	442	235	18.6	225	0.00000	72.5
22.860	20.0	457	243	17.7	225	0.00000	75
23.622	20.0	472	251	16.9	225	0.00000	77.5
24.384	20.0	488	258	16.1	225	0.00000	80

0.91 Df, m
3.7 B, m
5.5 L, m
212.6 q, kN/m^2

0.0254 m
25 mm
1.00 inches

CORESTONE ENGINEERING, INC.
10751 Grayslake Dr, Reno, NV 89521

Date: 12/1/2023
Revision No: 2019 March - 1
Developed by: JWP/PV
Calculated by: PV
Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - East Abutment (B=12 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

Only cells with blue background and blue text should be modified

AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

Foundation Load	9090	kN	2043.6	kips			
Foundation Depth	0.9144	m	3.0	ft			
Foundation Width	3.6576	**m**	12	ft	**9461.0 psf**		
Foundation Length	5.4864	**m**	18	ft	For 1.5 inch settlement (Service Value)		
Depth of Influence (3B)	11.8872	m	39.0	ft	check	1.50	inch
Depth to Water Table	1	m					

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	396.1	140	0.00665	5
2.286	20.0	46	33	339.1	120	0.00667	7.5
3.048	20.0	61	41	293.6	150	0.00464	10
3.810	20.0	76	49	256.8	200	0.00304	12.5
4.572	20.0	91	56	226.5	200	0.00267	15
5.334	20.0	107	64	201.3	200	0.00235	17.5
6.096	20.0	122	72	180.1	225	0.00184	20
6.858	20.0	137	80	162.1	225	0.00163	22.5
7.620	20.0	152	87	146.7	225	0.00145	25
8.382	20.0	168	95	133.4	225	0.00129	27.5
9.144	20.0	183	103	121.8	150	0.00172	30
9.906	20.0	198	111	111.7	150	0.00154	32.5
10.668	20.0	213	119	102.8	150	0.00138	35
11.430	20.0	229	126	94.9	150	0.00124	37.5
12.192	20.0	244	134	87.9	225	0.00000	40
12.954	20.0	259	142	81.6	225	0.00000	42.5
13.716	20.0	274	150	76.0	225	0.00000	45
14.478	20.0	290	157	71.0	225	0.00000	47.5
15.240	20.0	305	165	66.4	225	0.00000	50
16.002	20.0	320	173	62.3	225	0.00000	52.5
16.764	20.0	335	181	58.5	225	0.00000	55
17.526	20.0	351	188	55.1	225	0.00000	57.5
18.288	20.0	366	196	52.0	225	0.00000	60
19.050	20.0	381	204	49.1	225	0.00000	62.5
19.812	20.0	396	212	46.4	225	0.00000	65
20.574	20.0	411	219	44.0	225	0.00000	67.5
21.336	20.0	427	227	41.8	225	0.00000	70
22.098	20.0	442	235	39.7	225	0.00000	72.5
22.860	20.0	457	243	37.7	225	0.00000	75
23.622	20.0	472	251	36.0	225	0.00000	77.5
24.384	20.0	488	258	34.3	225	0.00000	80

0.91 Df, m

3.7 B, m

5.5 L, m

453 q, kN/m^2

0.0381 m
38 mm

1.50 inches

CORESTONE ENGINEERING, INC.
10751 Grayslake Dr, Reno, NV 89521

Date: 12/1/2023
Revision No: 2019 March - 1
Developed by: JWP/PV
Calculated by: PV
Checked by: pv

Project Name: Upper Truckee River Pathway Bridge
Project Number: 5012-05-1 B-02 Data
Design Case: Bridge - East Abutment (B=12 ft)

SETTLEMENT USING AASHTO-MODIFIED "HOUGH METHOD"

Only cells with blue background and blue text should be modified

AASHTO, 2007, LRFD Design Manual 4th Edition p 10-55 Same for AASHTO 2017

Hough, 1959, Compressibility as the Basis for Soil Bearing Value, Journal of the Soil Mechanics and Foundations Division, ASCE SM4, August 1959

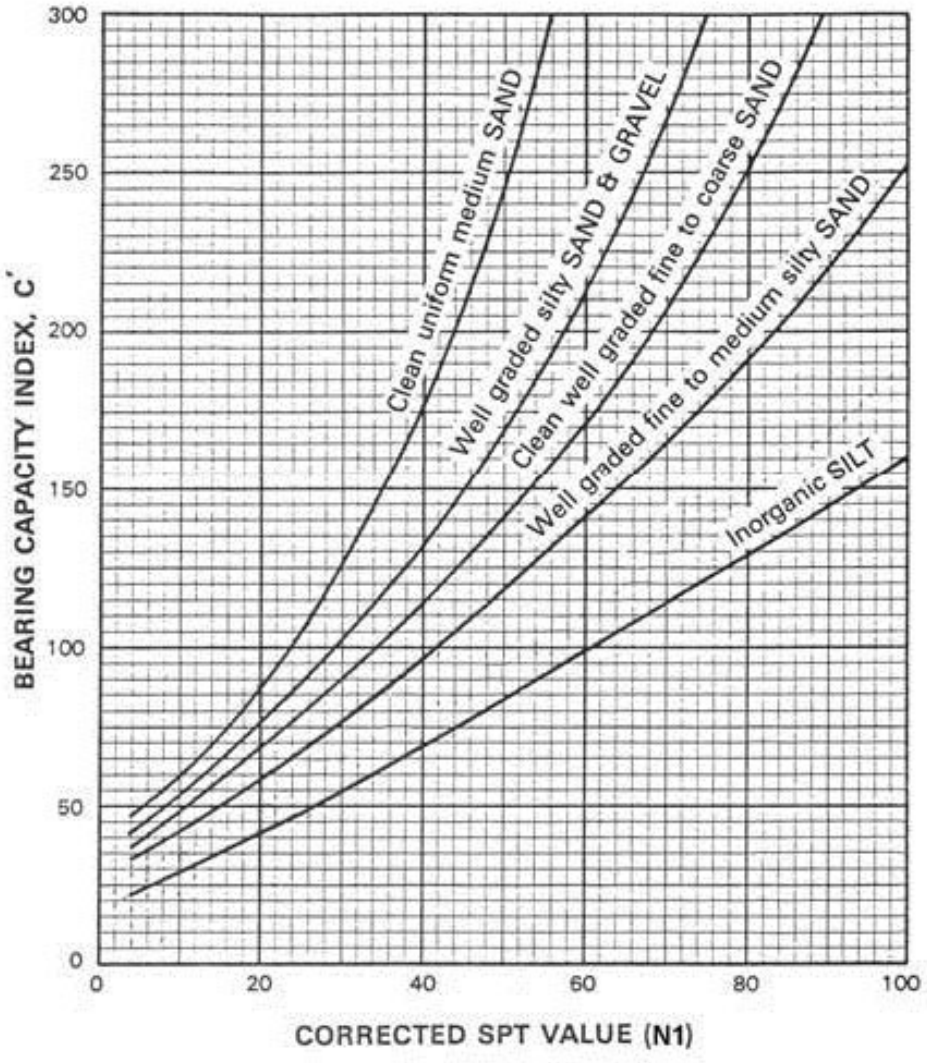
Foundation Load	17054	kN	3833.8	kips			
Foundation Depth	0.9144	m	3.0	ft			
Foundation Width	3.6576	**m**	12	ft	**17749.1 psf**		
Foundation Length	5.4864	**m**	18	ft	For 2 inch settlement (Service Value)		
Depth of Influence (3B)	11.8872	m	39.0	ft	check	2.00	inch
Depth to Water Table	1	m					

Depth m	Unit Weight kN/m^3	Total Stress kPa	Eff Stress kPa	Inc Stress kPa	Hough C'	Settlement m	depth ft
0.000	20.0	0	0	NA	NA	NA	0
0.762	20.0	15	15	0.0	150	0.00000	2.5
1.524	20.0	30	25	743.2	140	0.00807	5
2.286	20.0	46	33	636.1	120	0.00829	7.5
3.048	20.0	61	41	550.8	150	0.00590	10
3.810	20.0	76	49	481.7	200	0.00395	12.5
4.572	20.0	91	56	424.9	200	0.00355	15
5.334	20.0	107	64	377.7	200	0.00319	17.5
6.096	20.0	122	72	337.9	225	0.00256	20
6.858	20.0	137	80	304.1	225	0.00231	22.5
7.620	20.0	152	87	275.2	225	0.00209	25
8.382	20.0	168	95	250.2	225	0.00190	27.5
9.144	20.0	183	103	228.5	150	0.00258	30
9.906	20.0	198	111	209.5	150	0.00234	32.5
10.668	20.0	213	119	192.8	150	0.00213	35
11.430	20.0	229	126	178.0	150	0.00194	37.5
12.192	20.0	244	134	164.9	225	0.00000	40
12.954	20.0	259	142	153.2	225	0.00000	42.5
13.716	20.0	274	150	142.6	225	0.00000	45
14.478	20.0	290	157	133.2	225	0.00000	47.5
15.240	20.0	305	165	124.6	225	0.00000	50
16.002	20.0	320	173	116.8	225	0.00000	52.5
16.764	20.0	335	181	109.8	225	0.00000	55
17.526	20.0	351	188	103.4	225	0.00000	57.5
18.288	20.0	366	196	97.5	225	0.00000	60
19.050	20.0	381	204	92.1	225	0.00000	62.5
19.812	20.0	396	212	87.1	225	0.00000	65
20.574	20.0	411	219	82.6	225	0.00000	67.5
21.336	20.0	427	227	78.3	225	0.00000	70
22.098	20.0	442	235	74.4	225	0.00000	72.5
22.860	20.0	457	243	70.8	225	0.00000	75
23.622	20.0	472	251	67.5	225	0.00000	77.5
24.384	20.0	488	258	64.3	225	0.00000	80

0.91 Df, m
3.7 B, m
5.5 L, m
849.8 q, kN/m^2

0.0508 m
51 mm
2.00 inches

Bearing Capacity Index
(per AASHTO, Figure 10.6.2.4.2-1)



- *N1 shall be taken as $N1_{60}$ (SPT blow count corrected for both overburden and hammer efficiency).*

Boardwalk Driven Pipe Piles - Factored Resistance Summary (Strength Limit State)

West of Upper Truckee River (West Boardwalk)

Depth (ft)	B-02 (14" Pile)		B-03 (14" Pile)		B-04 (14" Pile)		Average 14" Pile		B-02 (18" Pile)		B-03 (18" Pile)		B-04 (18" Pile)		Average 18" Pile	
	comp	uplift	comp	uplift	comp	uplift	comp	uplift	comp	uplift	comp	uplift	comp	uplift	comp	uplift
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	36.6	3.5	24.6	2.4	34.0	3.3	31.7	3.1	44.3	4.5	34.7	3.6	41.2	4.2	40.1	4.1
16.5	103.9	15.1	61.8	9.2	42.6	7.7	69.5	10.7	133.6	19.4	92.8	13.8	54.8	9.9	93.7	14.4
19	111.5	25.6	76.5	16.6	47.7	12.0	78.5	18.0	143.3	32.9	114.7	24.9	61.4	15.4	106.5	24.4
21.5	140.5	37.7	93.2	24.7	55.0	16.4	96.2	26.3	180.7	48.5	139.8	37.0	70.7	21.1	130.4	35.5
26.5	168.9	60.7	86.6	34.9	78.7	27.5	111.4	41.0	217.2	78.0	129.8	52.4	101.2	35.3	149.4	55.3
31.5	202.2	83.8	94.5	43.9	86.0	36.8	127.5	54.8	259.9	107.7	141.7	65.8	110.6	47.3	170.7	73.6
36.5	201.5	100.1					201.5	100.1	259.0	128.8					259.0	128.8
41.5	249.2	121.4					249.2	121.4	320.3	156.0					320.3	156.0

East of Upper Truckee River (East Boardwalk) *Only Using B-01 Data (Short Boardwalk Segment near East Abutment)*

Depth (ft)	14" Pile		18" Pile	
	comp	uplift	comp	uplift
0	0.0	0.0	0.0	0.0
3.5	0.0	0.0	0.0	0.0
6.5	30.6	6.4	33.2	8.3
9	42.7	11.3	47.2	14.5
12	49.6	15.8	56.9	20.3
14	68.0	20.2	84.1	26.0
16.5	91.3	27.5	117.4	35.3
19	107.2	35.4	137.8	45.5
21.5	149.3	46.9	192.0	60.3
26.5	176.8	68.9	227.4	88.6
31.5	167.0	82.6	214.7	106.2
36.5	184.9	96.0	237.7	123.4
40	239.3	116.4	307.7	149.7

CORESTONE ENGINEERING, INC.
Geotechnical Engineering and Construction Materials Testing Services

Developed By: PV
Calculated By: PV
Checked By:
Date: 6/6/2024

Project Name: Upper Truckee River Bridge at Johnson Meadows
Project Number: 5012-05-1
Native Sand Soils **Using Boring B-02 Data**

Design Location: Boardwalk Pipe Piles West of River
Case: Single Pile at 2.5B or more apart

DRIVEN PILE AXIAL CAPACITY COHESIONLESS SOILS (AASHTO LRFD 2017)

Only cells with blue background and blue text should be modified

Diameter of the Pile, B = **1.17** ft (14 inches)
Open-end piles **(Non-displacement piles)** No soil plug assumed

Location: B-02
Depth to Groundwater during Exploration (ft): **5.5**
Borehole Diameter (4, 6, 8 in): **4**
Length of Drill Rod above GS to Hammer (ft): **3**
Sampler Type(standard 1-3/8" ID=1, Sampler without Liners 1-1/2" ID = 2, With liners ID=3): **1**
Hammer Type (Cathead=1, Trip Hammer=2, Correction Data=3, Donut Hammer=4): **3**
Corrected Hammer Efficiency as % of Theoretical Energy (if 3 above): **79%**

Elimination Codes:
EL Layer Elimination (Scour/Down Drag Zone)
SG Cohesionless Soils (Sand or Sand & Gravel)

Pile thickness = **0.375** inch
Pile tip area = 16.49 sq. inch (for tip resistance calcs)

Input Profile Data								Normalization to 60% energy & overburden						Side & Tip Resistance		Nominal Side Resist. R_S kips	Nominal Tip Resist. R_P kips	Nominal Axial Capacity R_n (kips)		Strength I Factored Resistance R_R (kips) Resistance Factor = 0.7 for Comp & Uplift*	
Boring ID	Bottom Depth ft	Description	Soil Total Unit Wt (pcf)	Total Stress (psf)	Effective Stress (psf)	N field	Des-ign Meth-od	Normalized for 1atm CN	Hammer Cer	Brg Diam Cb	Sampler ID Cs	Rod Length Cr	$N1_{60}$	Cohesionless Soils Meyerhof SPT Method Unit Resistance Based on SPT N1 60							
	0			0										f_{si} psf	q_p ksf	0		Comp	Tension*	Comp	Tension
B-02	4	Native Sand Soils	120	480	480	5	EL	1.48	1.32	1	1	0.75	7.3	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-02	6.5	Native Sand Soils	120	780	718	2	EL	1.34	1.32	1	1	0.75	2.7	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-02	9	Native Sand Soils	120	1,080	862	12	EL	1.28	1.32	1	1	0.75	15.2	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-02	12	Native Sand Soils	120	1,440	1,034	15	EL	1.22	1.32	1	1	0.85	20.5	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-02	14	Native Sand Soils	120	1,680	1,150	37	SG	1.19	1.32	1	1	0.85	49.2	983	393	7.2	45.0	52.2	5.0	36.6	3.5
B-02	16.5	Native Sand Soils	120	1,980	1,294	100	SG	1.15	1.32	1	1	0.85	128.4	2568	1027	30.7	117.7	148.4	21.5	103.9	15.1
B-02	19	Native Sand Soils	120	2,280	1,438	84	SG	1.11	1.32	1	1	0.95	116.9	2337	935	52.2	107.1	159.2	36.5	111.5	25.6
B-02	21.5	Native Sand Soils	120	2,580	1,582	100	SG	1.08	1.32	1	1	0.95	135.1	2703	1081	76.9	123.8	200.7	53.8	140.5	37.7
B-02	26.5	Native Sand Soils	120	3,180	1,870	100	SG	1.02	1.32	1	1	0.95	128.1	2563	1025	123.9	117.4	241.3	86.7	168.9	60.7
B-02	31.5	Native Sand Soils	120	3,780	2,158	100	SG	0.98	1.32	1	1	1.00	128.6	2571	1029	171.0	117.8	288.8	119.7	202.2	83.8
B-02	36.5	Native Sand Soils	120	4,380	2,446	74	SG	0.93	1.32	1	1	1.00	91.1	1821	728	204.4	83.4	287.8	143.1	201.5	100.1
B-02	41.5	Native Sand Soils	120	4,980	2,734	100	SG	0.90	1.32	1	1	1.00	118.1	2363	945	247.7	108.3	355.9	173.4	249.2	121.4

* RESISTANCE FACTOR OF 0.7 FOR BOTH AXIAL COMPRESSION AND UPLIFT PER CALTRANS AMENDMENTS TO 2017 AASHTO.

DownDrag Load = 10.5 kips

Liquefaction-Induced (Max for 3 Borings West of River). Only Consider for Extreme Even Limit State.

CORESTONE ENGINEERING, INC.
Geotechnical Engineering and Construction Materials Testing Services

Developed By: PV
Calculated By: PV
Checked By:
Date: 6/6/2024

Project Name: Upper Truckee River Bridge at Johnson Meadows
Project Number: 5012-05-1
Native Sand Soils **Using Boring B-03 Data**

Design Location: Boardwalk Pipe Piles West of River
Case: Single Pile at 2.5B or more apart

DRIVEN PILE AXIAL CAPACITY COHESIONLESS SOILS (AASHTO LRFD 2017)

Only cells with blue background and blue text should be modified

Diameter of the Pile, B = **1.00** ft (12 inches)
Open-end piles **(Non-displacement piles)** No soil plug assumed

Location: B-03
Depth to Groundwater during Exploration (ft): **5.5**
Borehole Diameter (4, 6, 8 in): **4**
Length of Drill Rod above GS to Hammer (ft): **3**
Sampler Type(standard 1-3/8" ID=1, Sampler without Liners 1-1/2" ID = 2, With liners ID=3): **1**
Hammer Type (Cathead=1, Trip Hammer=2, Correction Data=3, Donut Hammer=4): **3**
Corrected Hammer Efficiency as % of Theoretical Energy (if 3 above): **79%**

Elimination Codes:
EL Layer Elimination (Scour/Down Drag Zone)
SG Cohesionless Soils (Sand or Sand & Gravel)

Pile thickness = **0.375** inch
Pile tip area = 14.14 sq. inch (for tip resistance calcs)

Input Profile Data								Normalization to 60% energy & overburden						Side & Tip Resistance		Nominal Side Resist. R_S kips	Nominal Tip Resist. R_P kips	Nominal Axial Capacity R_n (kips)		Strength I Factored Resistance R_R (kips) Resistance Factor = 0.7 for Comp & Uplift*	
Boring ID	Bottom Depth ft	Description	Soil Total Unit Wt (pcf)	Total Stress (psf)	Effective Stress (psf)	N field	Des-ign Meth-od	Normalized for 1atm CN	Hammer Cer	Brg Diam Cb	Sampler ID Cs	Rod Length Cr	$N1_{60}$	Cohesionless Soils Meyerhof SPT Method Unit Resistance Based on SPT N1 60							
	0			0										f_{si} psf	q_p ksf	0		Comp	Tension*	Comp	Tension
B-03	4	Native Sand Soils	120	480	480	3	EL	1.48	1.32	1	1	0.75	4.4	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-03	6.5	Native Sand Soils	120	780	718	1	EL	1.34	1.32	1	1	0.75	1.3	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-03	9	Native Sand Soils	120	1,080	862	12	EL	1.28	1.32	1	1	0.75	15.2	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-03	12	Native Sand Soils	120	1,440	1,034	2	EL	1.22	1.32	1	1	0.85	2.7	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-03	14	Native Sand Soils	120	1,680	1,150	29	SG	1.19	1.32	1	1	0.85	38.5	770	308	4.8	30.3	35.1	3.4	24.6	2.4
B-03	16.5	Native Sand Soils	120	1,980	1,294	69	SG	1.15	1.32	1	1	0.85	88.6	1772	709	18.8	69.6	88.4	13.1	61.8	9.2
B-03	19	Native Sand Soils	120	2,280	1,438	69	SG	1.11	1.32	1	1	0.95	96.0	1920	768	33.8	75.4	109.2	23.7	76.5	16.6
B-03	21.5	Native Sand Soils	120	2,580	1,582	78	SG	1.08	1.32	1	1	0.95	105.4	2108	843	50.4	82.8	133.2	35.3	93.2	24.7
B-03	26.5	Native Sand Soils	120	3,180	1,870	52	SG	1.02	1.32	1	1	0.95	66.6	1333	533	71.3	52.3	123.7	49.9	86.6	34.9
B-03	31.5	Native Sand Soils	120	3,780	2,158	45	SG	0.98	1.32	1	1	1.00	57.9	1157	463	89.5	45.4	134.9	62.7	94.5	43.9

* RESISTANCE FACTOR OF 0.7 FOR BOTH AXIAL COMPRESSION AND UPLIFT PER CALTRANS AMENDMENTS TO 2017 AASHTO.

DownDrag Load = 10.5 kips

Liquefaction-Induced (Max for 3 Borings West of River). Only Consider for Extreme Even Limit State.

CORESTONE ENGINEERING, INC.
Geotechnical Engineering and Construction Materials Testing Services

Developed By: PV
Calculated By: PV
Checked By:
Date: 6/6/2024

Project Name: Upper Truckee River Bridge at Johnson Meadows
Project Number: 5012-05-1
Native Sand Soils **Using Boring B-04 Data**

Design Location: Boardwalk Pipe Piles West of River
Case: Single Pile at 2.5B or more apart

DRIVEN PILE AXIAL CAPACITY COHESIONLESS SOILS (AASHTO LRFD 2017)

Only cells with blue background and blue text should be modified

Diameter of the Pile, B = **1.17** ft (14 inches)
Open-end piles **(Non-displacement piles)** No soil plug assumed

Location: B-04
Depth to Groundwater during Exploration (ft): 4
Borehole Diameter (4, 6, 8 in): 6
Length of Drill Rod above GS to Hammer (ft): 4
Sampler Type(standard 1-3/8" ID=1, Sampler without Liners 1-1/2" ID = 2, With liners ID=3): 1
Hammer Type (Cathead=1, Trip Hammer=2, Correction Data=3, Donut Hammer=4): 3
Corrected Hammer Efficiency as % of Theoretical Energy (if 3 above): 79%

Elimination Codes:
EL Layer Elimination (Scour/Down Drag Zone)
SG Cohesionless Soils (Sand or Sand & Gravel)

Pile thickness = 0.375 inch
Pile tip area = 16.49 sq. inch
(for tip resistance calcs)

Input Profile Data								Normalization to 60% energy & overburden						Side & Tip Resistance		Nominal Side Resist. R_S kips	Nominal Tip Resist. R_P kips	Nominal Axial Capacity R_n (kips)		Strength I Factored Resistance R_R (kips) Resistance Factor = 0.7 for Comp & Uplift*	
Boring ID	Bottom Depth ft	Description	Soil Total Unit Wt (pcf)	Total Stress (psf)	Effective Stress (psf)	N field	Des-ign Meth-od	Normalized for 1atm CN	Hammer Cer	Brg Diam Cb	Sampler ID Cs	Rod Length Cr	$N1_{60}$	Cohesionless Soils Meyerhof SPT Method Unit Resistance Based on SPT N1 60							
	0			0										f_{si} psf	q_p ksf	0		Comp	Tension*	Comp	Tension
B-04	4	Native Sand Soils	120	480	480	3	EL	1.48	1.32	1.05	1	0.75	4.6	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-04	6.5	Native Sand Soils	120	780	624	3	EL	1.39	1.32	1.05	1	0.75	4.3	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-04	9	Native Sand Soils	120	1,080	768	15	EL	1.32	1.32	1.05	1	0.75	20.6	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-04	12	Native Sand Soils	120	1,440	941	8	EL	1.25	1.32	1.05	1	0.85	11.8	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-04	14	Native Sand Soils	120	1,680	1,056	32	SG	1.22	1.32	1.05	1	0.85	45.7	914	366	6.7	41.9	48.6	4.7	34.0	3.3
B-04	16.5	Native Sand Soils	120	1,980	1,200	32	SG	1.17	1.32	1.05	1	0.95	49.3	986	394	15.7	45.2	60.9	11.0	42.6	7.7
B-04	19	Native Sand Soils	120	2,280	1,344	32	SG	1.13	1.32	1.05	1	0.95	47.7	954	382	24.5	43.7	68.2	17.1	47.7	12.0
B-04	21.5	Native Sand Soils	120	2,580	1,488	34	SG	1.10	1.32	1.05	1	0.95	49.2	983	393	33.5	45.0	78.5	23.4	55.0	16.4
B-04	26.5	Native Sand Soils	120	3,180	1,776	45	SG	1.04	1.32	1.05	1	0.95	61.6	1231	492	56.0	56.4	112.4	39.2	78.7	27.5
B-04	31.5	Native Sand Soils	120	3,780	2,064	38	SG	0.99	1.32	1.05	1	1.00	52.1	1042	417	75.1	47.7	122.8	52.6	86.0	36.8

* RESISTANCE FACTOR OF 0.7 FOR BOTH AXIAL COMPRESSION AND UPLIFT PER CALTRANS AMENDMENTS TO 2017 AASHTO.

DownDrag Load = 10.5 kips

Liquefaction-Induced (Max for 3 Borings West of River). Only Consider for Extreme Even Limit State.

CORESTONE ENGINEERING, INC.
Geotechnical Engineering and Construction Materials Testing Services

Developed By: PV
Calculated By: PV
Checked By:
Date: 6/6/2024

Project Name: Upper Truckee River Bridge at Johnson Meadows
Project Number: 5012-05-1
Native Sand Soils **Using Boring B-02 Data**

Design Location: Boardwalk Pipe Piles West of River
Case: Single Pile at 2.5B or more apart

DRIVEN PILE AXIAL CAPACITY COHESIONLESS SOILS (AASHTO LRFD 2017)

Only cells with blue background and blue text should be modified

Diameter of the Pile, B = **1.50** ft (18 inches)
Open-end piles **(Non-displacement piles)** No soil plug assumed

Location: B-02

Depth to Groundwater during Exploration (ft): **5.5**

Borehole Diameter (4, 6, 8 in): **4**
Length of Drill Rod above GS to Hammer (ft): **3**
Sampler Type(standard 1-3/8" ID=1, Sampler without Liners 1-1/2" ID = 2, With liners ID=3): **1**
Hammer Type (Cathead=1, Trip Hammer=2, Correction Data=3, Donut Hammer=4): **3**
Corrected Hammer Efficiency as % of Theoretical Energy (if 3 above): **79%**

Elimination Codes:
EL Layer Elimination (Scour/Down Drag Zone)
SG Cohesionless Soils (Sand or Sand & Gravel)

Pile thickness = **0.375** inch
Pile tip area = 21.21 sq. inch (for tip resistance calcs)

Input Profile Data								Normalization to 60% energy & overburden						Side & Tip Resistance		Nominal Side Resist. R_S kips	Nominal Tip Resist. R_P kips	Nominal Axial Capacity R_n (kips)		Strength I Factored Resistance R_R (kips) Resistance Factor = 0.7 for Comp & Uplift*	
Boring ID	Bottom Depth ft	Description	Soil Total Unit Wt (pcf)	Total Stress (psf)	Effective Stress (psf)	N field	Des-ign Meth-od	Normalized for 1atm CN	Ham-mer Cer	Brg Diam Cb	Sam-pler ID Cs	Rod Length Cr	$N1_{60}$	Cohesionless Soils Meyerhof SPT Method Unit Resistance Based on SPT N1 60							
	0			0										f_{si} psf	q_p ksf	0		Comp	Tension*	Comp	Tension
B-02	4	Native Sand Soils	120	480	480	5	EL	1.48	1.32	1	1	0.75	7.3	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-02	6.5	Native Sand Soils	120	780	718	2	EL	1.34	1.32	1	1	0.75	2.7	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-02	9	Native Sand Soils	120	1,080	862	12	EL	1.28	1.32	1	1	0.75	15.2	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-02	12	Native Sand Soils	120	1,440	1,034	15	EL	1.22	1.32	1	1	0.85	20.5	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-02	14	Native Sand Soils	120	1,680	1,150	37	SG	1.19	1.32	1	1	0.85	49.2	983	367	9.3	54.0	63.3	6.5	44.3	4.5
B-02	16.5	Native Sand Soils	120	1,980	1,294	100	SG	1.15	1.32	1	1	0.85	128.4	2568	1027	39.5	151.3	190.8	27.7	133.6	19.4
B-02	19	Native Sand Soils	120	2,280	1,438	84	SG	1.11	1.32	1	1	0.95	116.9	2337	935	67.1	137.7	204.7	46.9	143.3	32.9
B-02	21.5	Native Sand Soils	120	2,580	1,582	100	SG	1.08	1.32	1	1	0.95	135.1	2703	1081	98.9	159.2	258.1	69.2	180.7	48.5
B-02	26.5	Native Sand Soils	120	3,180	1,870	100	SG	1.02	1.32	1	1	0.95	128.1	2563	1025	159.3	150.9	310.2	111.5	217.2	78.0
B-02	31.5	Native Sand Soils	120	3,780	2,158	100	SG	0.98	1.32	1	1	1.00	128.6	2571	1029	219.9	151.5	371.3	153.9	259.9	107.7
B-02	36.5	Native Sand Soils	120	4,380	2,446	74	SG	0.93	1.32	1	1	1.00	91.1	1821	728	262.8	107.3	370.0	183.9	259.0	128.8
B-02	41.5	Native Sand Soils	120	4,980	2,734	100	SG	0.90	1.32	1	1	1.00	118.1	2363	945	318.4	139.2	457.6	222.9	320.3	156.0

* RESISTANCE FACTOR OF 0.7 FOR BOTH AXIAL COMPRESSION AND UPLIFT PER CALTRANS AMENDMENTS TO 2017 AASHTO.

DownDrag Load = 12.4 kips

Liquefaction-Induced (Max for 3 Borings West of River). Only Consider for Extreme Even Limit State.

CORESTONE ENGINEERING, INC.
Geotechnical Engineering and Construction Materials Testing Services

Developed By: PV
Calculated By: PV
Checked By:
Date: 6/6/2024

Project Name: Upper Truckee River Bridge at Johnson Meadows
Project Number: 5012-05-1
Native Sand Soils **Using Boring B-03 Data**

Design Location: Boardwalk Pipe Piles West of River
Case: Single Pile at 2.5B or more apart

DRIVEN PILE AXIAL CAPACITY COHESIONLESS SOILS (AASHTO LRFD 2017)

Only cells with blue background and blue text should be modified

Diameter of the Pile, B = **1.50** ft (18 inches)
Open-end piles **(Non-displacement piles)** No soil plug assumed

Location: B-03
Depth to Groundwater during Exploration (ft): **5.5**
Borehole Diameter (4, 6, 8 in): **4**
Length of Drill Rod above GS to Hammer (ft): **3**
Sampler Type(standard 1-3/8" ID=1, Sampler without Liners 1-1/2" ID = 2, With liners ID=3): **1**
Hammer Type (Cathead=1, Trip Hammer=2, Correction Data=3, Donut Hammer=4): **3**
Corrected Hammer Efficiency as % of Theoretical Energy (if 3 above): **79%**

Elimination Codes:
EL Layer Elimination (Scour/Down Drag Zone)
SG Cohesionless Soils (Sand or Sand & Gravel)

Pile thickness = **0.375** inch
Pile tip area = 21.21 sq. inch (for tip resistance calcs)

Input Profile Data								Normalization to 60% energy & overburden						Side & Tip Resistance		Nominal Side Resist. R_S kips	Nominal Tip Resist. R_P kips	Nominal Axial Capacity R_n (kips)		Strength I Factored Resistance R_R (kips) Resistance Factor = 0.7 for Comp & Uplift*	
Boring ID	Bottom Depth ft	Description	Soil Total Unit Wt (pcf)	Total Stress (psf)	Effective Stress (psf)	N field	Des-ign Meth-od	Normalized for 1atm CN	Ham-mer Cer	Brg Diam Cb	Sam-pler ID Cs	Rod Length Cr	$N1_{60}$	Cohesionless Soils Meyerhof SPT Method Unit Resistance Based on SPT N1 60							
	0			0										f_{si} psf	q_p ksf	0		Comp	Tension*	Comp	Tension
B-03	4	Native Sand Soils	120	480	480	3	EL	1.48	1.32	1	1	0.75	**4.4**	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-03	6.5	Native Sand Soils	120	780	718	1	EL	1.34	1.32	1	1	0.75	**1.3**	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-03	9	Native Sand Soils	120	1,080	862	12	EL	1.28	1.32	1	1	0.75	**15.2**	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-03	12	Native Sand Soils	120	1,440	1,034	2	EL	1.22	1.32	1	1	0.85	**2.7**	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-03	14	Native Sand Soils	120	1,680	1,150	29	SG	1.19	1.32	1	1	0.85	**38.5**	770	288	7.3	42.4	49.6	5.1	34.7	3.6
B-03	16.5	Native Sand Soils	120	1,980	1,294	69	SG	1.15	1.32	1	1	0.85	**88.6**	1772	709	28.1	104.4	132.5	19.7	92.8	13.8
B-03	19	Native Sand Soils	120	2,280	1,438	69	SG	1.11	1.32	1	1	0.95	**96.0**	1920	768	50.8	113.1	163.8	35.5	114.7	24.9
B-03	21.5	Native Sand Soils	120	2,580	1,582	78	SG	1.08	1.32	1	1	0.95	**105.4**	2108	843	75.6	124.2	199.8	52.9	139.8	37.0
B-03	26.5	Native Sand Soils	120	3,180	1,870	52	SG	1.02	1.32	1	1	0.95	**66.6**	1333	533	107.0	78.5	185.5	74.9	129.8	52.4
B-03	31.5	Native Sand Soils	120	3,780	2,158	45	SG	0.98	1.32	1	1	1.00	**57.9**	1157	463	134.3	68.2	202.4	94.0	141.7	65.8

* RESISTANCE FACTOR OF 0.7 FOR BOTH AXIAL COMPRESSION AND UPLIFT PER CALTRANS AMENDMENTS TO 2017 AASHTO.

DownDrag Load = 12.4 kips

Liquefaction-Induced (Max for 3 Borings West of River). Only Consider for Extreme Even Limit State.

CORESTONE ENGINEERING, INC.
Geotechnical Engineering and Construction Materials Testing Services

Developed By: PV
Calculated By: PV
Checked By:
Date: 6/6/2024

Project Name: Upper Truckee River Bridge at Johnson Meadows
Project Number: 5012-05-1
Native Sand Soils **Using Boring B-04 Data**

Design Location: Boardwalk Pipe Piles West of River
Case: Single Pile at 2.5B or more apart

DRIVEN PILE AXIAL CAPACITY COHESIONLESS SOILS (AASHTO LRFD 2017)

Only cells with blue background and blue text should be modified

Diameter of the Pile, B = **1.50** ft (18 inches)
Open-end piles **(Non-displacement piles)** No soil plug assumed

Location: B-04
Depth to Groundwater during Exploration (ft): 4
Borehole Diameter (4, 6, 8 in): 6
Length of Drill Rod above GS to Hammer (ft): 4
Sampler Type(standard 1-3/8" ID=1, Sampler without Liners 1-1/2" ID = 2, With liners ID=3): 1
Hammer Type (Cathead=1, Trip Hammer=2, Correction Data=3, Donut Hammer=4): 3
Corrected Hammer Efficiency as % of Theoretical Energy (if 3 above): 79%

Elimination Codes:
EL Layer Elimination (Scour/Down Drag Zone)
SG Cohesionless Soils (Sand or Sand & Gravel)

Pile thickness = 0.375 inch
Pile tip area = 21.21 sq. inch
(for tip resistance calcs)

Input Profile Data								Normalization to 60% energy & overburden						Side & Tip Resistance		Nominal	Nominal	Nominal Axial Capacity		Strength I Factored Resistance	
Boring ID	Bottom Depth ft	Description	Soil Total Unit Wt (pcf)	Total Stress (psf)	Effective Stress (psf)	N field	Des-ign Meth-od	Normali zed for 1atm CN	Ham-mer Cer	Brg Diam Cb	Sam-pler ID Cs	Rod Length Cr	$N1_{60}$	Cohesionless Soils Meyerhof SPT Method Unit Resistance Based on SPT N1 60		Side Resist. R_S kips	Tip Resist. R_P kips	R_n (kips)		R_R (kips) Resistance Factor = 0.7 for Comp & Uplift*	
	0			0										f_{si} psf	q_p ksf	0		Comp	Tension*	Comp	Tension
B-04	4	Native Sand Soils	120	480	480	3	EL	1.48	1.32	1.05	1	0.75	**4.6**	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-04	6.5	Native Sand Soils	120	780	624	3	EL	1.39	1.32	1.05	1	0.75	**4.3**	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-04	9	Native Sand Soils	120	1,080	768	15	EL	1.32	1.32	1.05	1	0.75	**20.6**	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-04	12	Native Sand Soils	120	1,440	941	8	EL	1.25	1.32	1.05	1	0.85	**11.8**	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-04	14	Native Sand Soils	120	1,680	1,056	32	SG	1.22	1.32	1.05	1	0.85	**45.7**	914	341	8.6	50.3	58.9	6.0	41.2	4.2
B-04	16.5	Native Sand Soils	120	1,980	1,200	32	SG	1.17	1.32	1.05	1	0.95	**49.3**	986	394	20.2	58.1	78.3	14.2	54.8	9.9
B-04	19	Native Sand Soils	120	2,280	1,344	32	SG	1.13	1.32	1.05	1	0.95	**47.7**	954	382	31.5	56.2	87.6	22.0	61.4	15.4
B-04	21.5	Native Sand Soils	120	2,580	1,488	34	SG	1.10	1.32	1.05	1	0.95	**49.2**	983	393	43.0	57.9	100.9	30.1	70.7	21.1
B-04	26.5	Native Sand Soils	120	3,180	1,776	45	SG	1.04	1.32	1.05	1	0.95	**61.6**	1231	492	72.1	72.5	144.6	50.4	101.2	35.3
B-04	31.5	Native Sand Soils	120	3,780	2,064	38	SG	0.99	1.32	1.05	1	1.00	**52.1**	1042	417	96.6	61.4	157.9	67.6	110.6	47.3

* RESISTANCE FACTOR OF 0.7 FOR BOTH AXIAL COMPRESSION AND UPLIFT PER CALTRANS AMENDMENTS TO 2017 AASHTO.

DownDrag Load = 12.4 kips

Liquefaction-Induced (Max for 3 Borings West of River). Only Consider for Extreme Even Limit State.

CORESTONE ENGINEERING, INC.
Geotechnical Engineering and Construction Materials Testing Services

Developed By: PV
Calculated By: PV
Checked By:
Date: 6/6/2024

Project Name: Upper Truckee River Bridge at Johnson Meadows
Project Number: 5012-05-1
Native Sand Soils **Using Boring B-01 Data**

Design Location: Boardwalk Pipe Piles East of River
Case: Single Pile at 2.5B or more apart

DRIVEN PILE AXIAL CAPACITY COHESIONLESS SOILS (AASHTO LRFD 2017)

Only cells with blue background and blue text should be modified

Diameter of the Pile, B = **1.17** ft 14 inches
Open-end piles **(Non-displacement piles)** No soil plug assumed

Location: B-01
Depth to Groundwater during Exploration (ft): **10**
Borehole Diameter (4, 6, 8 in): **4**
Length of Drill Rod above GS to Hammer (ft): **3**
Sampler Type(standard 1-3/8" ID=1, Sampler without Liners 1-1/2" ID = 2, With liners ID=3): **1**
Hammer Type (Cathead=1, Trip Hammer=2, Correction Data=3, Donut Hammer=4): **3**
Corrected Hammer Efficiency as % of Theoretical Energy (if 3 above): **79%**

Elimination Codes:
EL Layer Elimination (Scour/Down Drag Zone)
SG Cohesionless Soils (Sand or Sand & Gravel)

Pile thickness = **0.375** inch
Pile tip area = 16.49 sq. inch
(for tip resistance calcs)

Input Profile Data								Normalization to 60% energy & overburden						Side & Tip Resistance		Nominal Side Resist. R_S kips	Nominal Tip Resist. R_P kips	Nominal Axial Capacity R_n (kips)		Strength I Factored Resistance R_R (kips) Resistance Factor = 0.7 for Comp & Uplift*	
Boring ID	Bottom Depth ft	Description	Soil Total Unit Wt (pcf)	Total Stress (psf)	Effective Stress (psf)	N field	Des-ign Meth-od	Normali zed for 1atm CN	Ham-mer Cer	Brg Diam Cb	Sam-pler ID Cs	Rod Length Cr	$N1_{60}$	Cohesionless Soils Meyerhof SPT Method Unit Resistance Based on SPT N1 60							
	0			0										f_{si} psf	q_p ksf	0		Comp	Tension*	Comp	Tension
B-01	3.5	Native Sand Soils	120	420	420	16	EL	1.52	1.32	1	1	0.75	24.1	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-01	6.5	Native Sand Soils	120	780	780	46	SG	1.32	1.32	1	1	0.75	59.8	1196	267	13.2	30.5	43.7	9.2	30.6	6.4
B-01	9	Native Sand Soils	120	1,080	1,080	45	SG	1.21	1.32	1	1	0.75	53.7	1073	331	23.0	37.9	60.9	16.1	42.7	11.3
B-01	12	Native Sand Soils	120	1,440	1,315	33	SG	1.14	1.32	1	1	0.85	42.2	844	337	32.3	38.6	70.9	22.6	49.6	15.8
B-01	14	Native Sand Soils	120	1,680	1,430	49	SG	1.11	1.32	1	1	0.85	61.1	1222	489	41.2	56.0	97.2	28.9	68.0	20.2
B-01	16.5	Native Sand Soils	120	1,980	1,574	67	SG	1.08	1.32	1	1	0.85	81.1	1622	649	56.1	74.3	130.4	39.3	91.3	27.5
B-01	19	Native Sand Soils	120	2,280	1,718	67	SG	1.05	1.32	1	1	0.95	88.2	1764	706	72.3	80.8	153.1	50.6	107.2	35.4
B-01	21.5	Native Sand Soils	120	2,580	1,862	100	SG	1.03	1.32	1	1	0.95	128.3	2566	1026	95.8	117.6	213.3	67.0	149.3	46.9
B-01	26.5	Native Sand Soils	120	3,180	2,150	100	SG	0.98	1.32	1	1	0.95	122.3	2445	978	140.6	112.0	252.6	98.4	176.8	68.9
B-01	31.5	Native Sand Soils	120	3,780	2,438	62	SG	0.94	1.32	1	1	1.00	76.4	1527	611	168.6	70.0	238.5	118.0	167.0	82.6
B-01	36.5	Native Sand Soils	120	4,380	2,726	63	SG	0.90	1.32	1	1	1.00	74.5	1490	596	195.9	68.3	264.1	137.1	184.9	96.0
B-01	41.5	Native Sand Soils	120	4,980	3,014	100	SG	0.86	1.32	1	1	1.00	113.8	2277	911	237.6	104.3	341.9	166.3	239.3	116.4

* RESISTANCE FACTOR OF 0.7 FOR BOTH AXIAL COMPRESSION AND UPLIFT PER CALTRANS AMENDMENTS TO 2017 AASHTO.

CORESTONE ENGINEERING, INC.
Geotechnical Engineering and Construction Materials Testing Services

Developed By: PV
Calculated By: PV
Checked By:
Date: 6/6/2024

Project Name: Upper Truckee River Bridge at Johnson Meadows
Project Number: 5012-05-1
Native Sand Soils **Using Boring B-01 Data**

Design Location: Boardwalk Pipe Piles East of River
Case: Single Pile at 2.5B or more apart

DRIVEN PILE AXIAL CAPACITY COHESIONLESS SOILS (AASHTO LRFD 2017)

Only cells with blue background and blue text should be modified

Diameter of the Pile, B = **1.50** ft (18 inches)
Open-end piles **(Non-displacement piles)** No soil plug assumed

Location: B-01
Depth to Groundwater during Exploration (ft): 10
Borehole Diameter (4, 6, 8 in): 4
Length of Drill Rod above GS to Hammer (ft): 3
Sampler Type(standard 1-3/8" ID=1, Sampler without Liners 1-1/2" ID = 2, With liners ID=3): 1
Hammer Type (Cathead=1, Trip Hammer=2, Correction Data=3, Donut Hammer=4): 3
Corrected Hammer Efficiency as % of Theoretical Energy (if 3 above): 79%

Elimination Codes:
EL Layer Elimination (Scour/Down Drag Zone)
SG Cohesionless Soils (Sand or Sand & Gravel)

Pile thickness = 0.375 inch
Pile tip area = 21.21 sq. inch
(for tip resistance calcs)

Input Profile Data								Normalization to 60% energy & overburden						Side & Tip Resistance		Nominal Side Resist. R_S kips	Nominal Tip Resist. R_P kips	Nominal Axial Capacity R_n (kips)		Strength I Factored Resistance R_R (kips) Resistance Factor = 0.7 for Comp & Uplift*	
Boring ID	Bottom Depth ft	Description	Soil Total Unit Wt (pcf)	Total Stress (psf)	Effective Stress (psf)	N field	Des-ign Meth-od	Normalized for 1atm CN	Hammer Cer	Brg Diam Cb	Sampler ID Cs	Rod Length Cr	$N1_{60}$	Cohesionless Soils Meyerhof SPT Method Unit Resistance Based on SPT N1 60							
														f_{si} psf	q_p ksf	0		Comp	Tension*	Comp	Tension
	0			0																	
B-01	3.5	Native Sand Soils	120	420	420	16	EL	1.52	1.32	1	1	0.75	24.1	0	0	0.0	0.0	0.0	0.0	0.0	0.0
B-01	6.5	Native Sand Soils	120	780	780	46	SG	1.32	1.32	1	1	0.75	59.8	1196	207	16.9	30.5	47.4	11.8	33.2	8.3
B-01	9	Native Sand Soils	120	1,080	1,080	45	SG	1.21	1.32	1	1	0.75	53.7	1073	258	29.6	37.9	67.5	20.7	47.2	14.5
B-01	12	Native Sand Soils	120	1,440	1,315	33	SG	1.14	1.32	1	1	0.85	42.2	844	270	41.5	39.7	81.2	29.0	56.9	20.3
B-01	14	Native Sand Soils	120	1,680	1,430	49	SG	1.11	1.32	1	1	0.85	61.1	1222	456	53.0	67.2	120.2	37.1	84.1	26.0
B-01	16.5	Native Sand Soils	120	1,980	1,574	67	SG	1.08	1.32	1	1	0.85	81.1	1622	649	72.1	95.6	167.7	50.5	117.4	35.3
B-01	19	Native Sand Soils	120	2,280	1,718	67	SG	1.05	1.32	1	1	0.95	88.2	1764	706	92.9	103.9	196.8	65.0	137.8	45.5
B-01	21.5	Native Sand Soils	120	2,580	1,862	100	SG	1.03	1.32	1	1	0.95	128.3	2566	1026	123.1	151.1	274.3	86.2	192.0	60.3
B-01	26.5	Native Sand Soils	120	3,180	2,150	100	SG	0.98	1.32	1	1	0.95	122.3	2445	978	180.7	144.1	324.8	126.5	227.4	88.6
B-01	31.5	Native Sand Soils	120	3,780	2,438	62	SG	0.94	1.32	1	1	1.00	76.4	1527	611	216.7	90.0	306.7	151.7	214.7	106.2
B-01	36.5	Native Sand Soils	120	4,380	2,726	63	SG	0.90	1.32	1	1	1.00	74.5	1490	596	251.8	87.8	339.6	176.3	237.7	123.4
B-01	41.5	Native Sand Soils	120	4,980	3,014	100	SG	0.86	1.32	1	1	1.00	113.8	2277	911	305.5	134.1	439.6	213.8	307.7	149.7

* RESISTANCE FACTOR OF 0.7 FOR BOTH AXIAL COMPRESSION AND UPLIFT PER CALTRANS AMENDMENTS TO 2017 AASHTO.

Appendix I

Feasibility Report

South Tahoe Greenway - Upper Truckee River Bridge at Johnson Meadow



Feasibility Report

Prepared by:

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EIP #03.02.02.0085
June 2022

South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow Final Feasibility Report

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South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow Final Feasibility Report

EXECUTIVE SUMMARY

Background

The **South Tahoe Greenway - Upper Truckee River Bridge at Johnson Meadow** (Project) is identified as Environmental Improvement Program Project #03.02.02.0085 and will construct approximately 1.2 miles of Class 1 shared use path. The Class 1 shared use path begins at the south end terminus of Winnemucca Avenue, to the east on public lands owned by the Tahoe Resource Conservation District (commonly known as Johnson Meadow) towards the Upper Truckee River, crossing the river and following the user trails towards the intersection of Sierra Boulevard and Barbara Avenue, crossing publicly-owned parcels by the City of South Lake Tahoe, South Tahoe Public Utility District, California Tahoe Conservancy, and the United States Department of Agriculture (USDA) Forest Service.

The proposed shared use path will provide connections to existing and future Class 1 facilities in the area. For example on the west end, there exists an existing short Class 1 segment between South Avenue and Winnemucca Avenue.

The Project builds upon the Sierra Boulevard Complete Streets Project (completed in 2019) and the South Tahoe Greenway Shared Use Trail Phase 2 (completed in 2021) at the corner of Sierra Blvd and Barbara Ave. This Project provides a critical link to the bicycle network between the Tahoe Valley Area Plan and bicycle network near the Tahoe Sierra neighborhood. The Project supports the *Linking Tahoe: Active Transportation Plan*[1] and the *Tahoe Valley Area Plan*. The Project proposes to install a pedestrian bridge over the Upper Truckee River to replace the old, unusable concrete bridge washed out during the winter in late 2017.

This Project is part of a series of active transportation projects implemented by the El Dorado County Department of Transportation. This Feasibility Report (Report) is the first phase within the Project Delivery Process (PDP) for the Project and is intended to describe the background on existing information concerning the Project area. Additionally, this Report is also intended to further define the scope of work as it relates to potential alternative solutions that might be implemented to address problems identified in order to achieve the project's goals and objectives.

This executive summary serves to summarize main points, constraints, and opportunities outlined in detail in the Report.

[1] *Linking Tahoe: Active Transportation Plan* (Tahoe Regional Planning Agency/ Tahoe Metropolitan Planning Organization, 2016), 4-45.

Project Goals and Objectives

The goals and objectives for each component of the Project are listed in the table below.

No.	Goal	Objective
1	Build upon the existing bicycle network and continue the momentum of the recently constructed projects nearby.	❑ Providing an active transportation link supporting TRPA's *Active Transportation Plan*. ❑ Providing access to local businesses, schools, and employment for bicyclists and pedestrians to reduce vehicle miles traveled (VMT). ❑ Enhancing recreational opportunities within the Tahoe Basin.
2	Provide connectivity to recreational opportunities on a regional scale and maximize access to recreational resources throughout the Basin and to the *Tahoe Valley Area Plan* via a shared use path.	
3	Implementation of the Project shall be consistent with General Plans, Master Plans, Area Plans, and other applicable Tahoe Regional Planning Agency (TRPA) Plans.	
4	Implementation of the Project should minimize the impacts to the scenic quality of the area.	❑ Hardscape improvements shall blend into the scenic environment to the maximum extent practicable.
5	Provide drainage improvements resulting in a reduction in fine (less than 20 microns) and coarse sediment, and reduction in stormwater runoff volume and peak flows.	❑ Reduce fine and coarse sediment, stormwater runoff volume, and peak flows by 33%, to the maximum extent practicable. ❑ Stabilize eroding cut slopes, roadside ditches, and capture road abrasives utilizing source control Best Management Practices (BMPs).

General Site Description

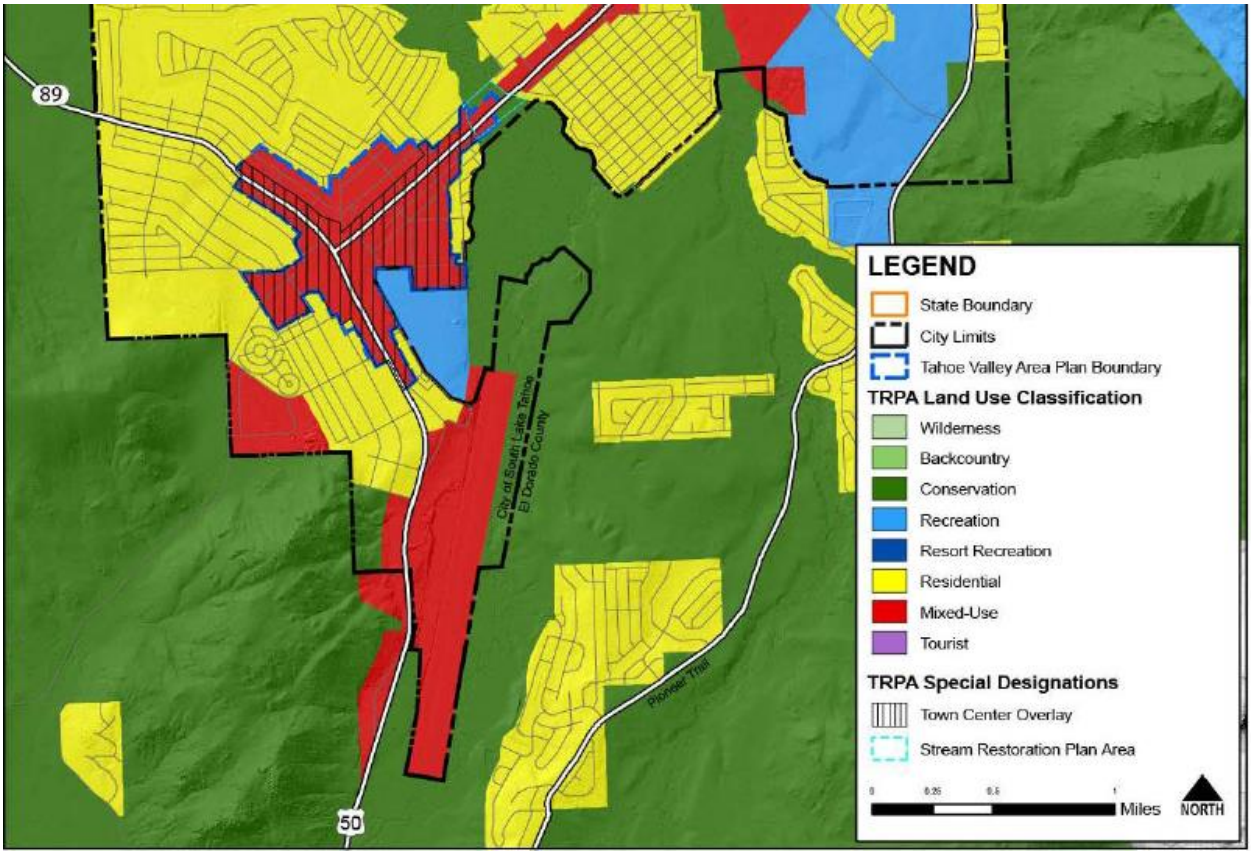
The Project is located in the southern section of the Lake Tahoe Basin in Section 30 of Township 12 North, Range 18 East, Mount Diablo Meridian. The Project is bordered by South Avenue and Barton Memorial Hospital on the west, U.S. Highway 50 (US 50) on the north and Lake Tahoe Airport on the south and Sierra Boulevard on the east. The current total Project area is approximately 24.4 acres and encompasses City of South Lake Tahoe (City) and County road Right-of-Way (ROW) and public parcels owned by City of South Lake Tahoe, South Tahoe Public Utility District, California Tahoe Conservancy, and the USDA Forest Service.

Site Topography

Glaciers are responsible for much of the area's current topography. The Project area is surrounded by steep mountainous terrain. The approximate elevation range of the Project site is from 6,238 to 6,307 feet above mean sea level, with the elevation of the watersheds conveying runoff into the area exceeding 7,600 feet above mean sea level. Project area topography mostly consists of flat terrain with isolated slopes exceeding 15%.

Land Use

Majority of the Project area lies within the designated conservation[2] area along with residential area at Winnemucca Avenue and Barbara Avenue.



Land Capability

The Project corridor primarily includes land capability Class 1b in Johnson Meadow. The 1b classification corresponds to the stream environment zone (SEZ) associated with environmentally sensitive areas near and around the Upper Truckee River. Classes 1c, 4, 5, 6, and 7 exist primarily to the east.

[2] *Tahoe Valley Area Plan* (City of South Lake Tahoe, 2015), 12

Utilities

There are various utilities presently located in and serving the Project area. These utilities include dry utilities: electrical power (above ground), natural gas, telephone, and wet utilities: potable water, storm drainage, and sanitary sewer. Any utility conflicts will be addressed with the appropriate utility owner.

Cultural Resources

A records search of the Project area has not been performed. Future field survey will be performed during the environmental document development phase of the Project.

Natural Environment Resources

In addition to future records searches, the Project area will be field surveyed as early as Spring 2022 to assess the condition of the vegetation, presence of threatened and endangered species, and the presence of noxious weeds. The field survey will be done at a reconnaissance-level and may include protocol surveys. Among the vegetation communities identified in the Project corridor are urban, forests, chaparral, grassland, riparian, and sagebrush communities. Two noxious weeds, sulphur cinquefoil (*Potentilla recta*) and wooly mullein (*Verbascum thapsus*), are anticipated due to its typical vegetative environment. Confirmation of several special-status biological species known to occupy the Lake Tahoe Basin are needed through literature review or field surveys.

Hydrologic Conditions

Future calculations using the Rational Method will be used for onsite hydrologic calculations following the guidelines outlined in the *El Dorado County Drainage Manual*.

Results for watersheds along the proposed alignments will show that the highest peak flows for the existing conditions are anticipated to be associated with the 100-year 24-hour storm, and lowest peak flows were associated with the 10-year 6-hour storm.

Hydraulic Summary

The roadway culverts in the residential areas are not anticipated to be impacted by the proposed improvements of the Project.

Standard drainage design considerations will take place and use the Manning's equation to calculate flows under normal flow conditions after a topographic survey is conducted and more data is available.

Alternatives

In order to effectively develop and evaluate alternatives, a determination must be made as to what project elements are feasible that meet the goals and objectives. As a result, three primary alternatives have been defined for the Project; with variations for each of the three primary alternatives. In addition to the alternatives discussed below, the No-build Alternative is listed.

The summary of the alternatives is further described under Section 2.1. Connections are described at Winnemucca Avenue near Barton Hospital from the west and the connection at Sierra Boulevard/Barbara Avenue intersection from the northeast. In general, the alignments west of the Upper Truckee River follow the existing utility access road and the historic user trail access. The differences between the three alignments are described related to connection(s) to either South Avenue and/or Winnemucca Avenue and the alignment of the proposed bridge crossing at the river.

1.0 Existing Conditions

This Feasibility Report (Report) has been developed pursuant to the Storm Water Quality Improvement Committee (SWQIC) guidelines for environmental improvement project[i] in the Lake Tahoe Basin (Basin) and has been prepared by the County of El Dorado Department of Transportation (County). This Report includes analysis of the existing conditions and an analysis of potential alternatives for the **South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow Project** (Project).

1.1 Introduction

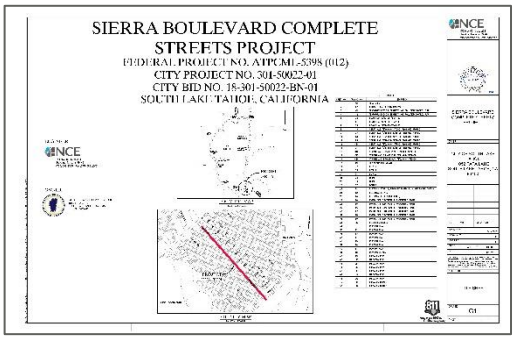
The County is introducing and evaluating the feasibility of this Project. This Report is funded by Tahoe Regional Planning Agency (TRPA) Air Quality Mitigation Funds and the Surface Transportation Block Grant (STBG) Program. The Project's stakeholders include the general public and visitors of the Basin, County representatives, public agencies within the Basin, and other technical representatives which make up the Project Development Team (PDT).

1.1.1 Project Goals and Project Objectives

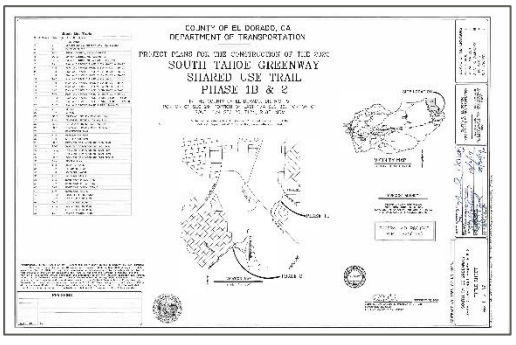
Project Goals

The Project aims to build upon and provide connectivity to two recent projects:

- Sierra Boulevard Complete Streets Project[ii], completed in 2019 by the City of South Lake Tahoe (City); and,



- South Tahoe Greenway Shared Use Trail Phase 2[iii], completed in 2021 by the County of El Dorado.

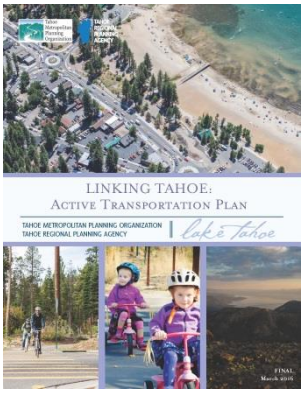


The Project supports and will be consistent with TRPA's *Linking Tahoe: Active Transportation Plan*[iv] to provide access to local businesses, schools, and offices for bicyclists and pedestrians, to reduce vehicular transportation, and to enhance recreational opportunities within the Tahoe Basin.

Project Objective

The Project objectives represent physical conditions that can be measured to assess the success of the Project in achieving the Project goal. The Project will conform to the Preferred Design Approach as detailed in the SWQIC process.

The objectives of the Project include:



- Providing a pathway link supporting TRPA's *Linking Tahoe: Active Transportation Plan*;
- Providing access to local businesses, schools, and employment for bicyclists and pedestrians to reduce vehicle miles traveled (VMT);
- Enhancing recreational opportunities within the Basin;
- Hardscape improvements shall blend into the scenic environment to the maximum extent practicable;
- Reduce fine and coarse sediment, stormwater runoff volume, and peak flows by 33%, to the maximum extent practicable; and,
- Stabilize eroding cut slopes, roadside ditches, and capture road abrasives utilizing source control Best Management Practices (BMPs).

1.2 Project Area Information

The Project is located in eastern El Dorado County, in the Tahoe Basin, within the City (see Figure 1). It follows a potential alignment roughly matching a compacted dirt user-created trail that starts at the south end terminus of Winnemucca Avenue, to the east onto public lands owned by the Tahoe Resource Conservation District (TRCD) towards the Upper Truckee River, crossing the river and following user trails towards the intersection of Sierra Boulevard and Barbara Avenue, crossing publicly-owned parcels by the City, California Tahoe Conservancy, and the USDA Forest Service (USFS). The Project involves the evaluation of a Class 1 shared use trail linking Barton Memorial Hospital at South Avenue within the eastern limits of the Tahoe Valley Area Plan[v] and the Tahoe Sierra (formerly Sierra Tract) subdivision, crossing the Upper Truckee River just north of the Lake Tahoe Airport. Proposed alignment alternatives will generally follow existing disturbed user trails/ access roads wherever possible, to minimize disturbance to vegetation and impact to current land uses.

The alignment will likely be contained within a 25-foot wide corridor through undeveloped public parcels through easements, special use permit(s), and over the Upper Truckee River. Existing land uses includes residential neighborhoods, forested, and recreational use through the undeveloped public parcels. Mature vegetation is present along the alignment in clusters and wetland vegetation species along the corridor, particularly surrounding the alignment of the Upper Truckee River. Existing paved and unpaved utility access roads, roadways and trails currently provide public access for dispersed recreational opportunities such as river activities (canoeing, kayaking, tubing, etc.), hiking and cycling in the Project area.

The following sections provide further detail regarding the Project area's existing conditions with respect to topography, soils and geology, land use and land capabilities, land ownership, utilities, environmental resources, Federal Emergency Management Agency (FEMA) floodplain, and monitoring information.

1.2.1 Topography

The Basin straddles the border of California and Nevada with about one-third of the Basin in Nevada and two-thirds in California. The Basin is a north trending basin bounded by the Sierra Nevada to the west and the Carson Range to the east.

The Basin was formed by geologic block (normal) faulting about 5 to 10 million years ago. Resulting mountain peaks rise to more than 10,000 feet (3,048 m) above sea level. Volcanic activity about 2 million years ago blocked the northern end of the Basin and ultimately filled the lake. The original surface of the lake was over 600 feet higher than it is today. The Truckee River flowed through the lava dam, eventually lowering the surface of Lake Tahoe to an average elevation of about 6,225 feet (1,897 m) above mean sea level (US Geological Survey 1927 datum). Glaciers formed in the last Ice Age (10,000 years ago) are responsible for much of the area's current topography

The Project is located on the South Lake Tahoe USGS 7.5-minute quadrangle map. In general, the topography of the area west of the Upper Truckee River is relatively mild due to the meadow/riparian habitat with steeper slopes just east of Winnemucca Avenue. Slopes east of the Upper Truckee River range from relatively flat/level (0% to 5%) to moderately steep (10% to 15%). An existing dirt path/trail along with a utility access road is present in some areas of the proposed shared use alignment alternatives. The proposed pathway will cross the Upper Truckee River replacing the existing concrete bridge washed out during the winter of 2017.

1.2.2 Soils and Geology

Soils

The 2007 National Resource Conservation Service (NRCS) soil survey data for the El Dorado County Tahoe Basin Area[vi] indicates the primary soils units within the Project area as described below. The soils found within the Project boundaries are presented on Figure 4 and are described as follows:

- Christopher-Gefo Complex, 0 to 5 percent slopes (7444); Christopher Loamy Coarse Sand, 9 to 30 percent slopes (7442); and, Christopher Loamy Coarse Sand, 0 to 9 percent slopes (7441). This series consists of very deep, somewhat excessively drained soils that formed in glacial outwash derived from granodiorite; glacial outwash terraces.

- Tahoe Mucky Silt Loam, Drained, 0 to 5 percent slopes (7043). Part of a series consisting of very deep, very poorly drained soils that formed in alluvium derived from mixed material, predominantly andesitic and granodiorite; typically in floodplains.

Table 1 - Distribution by Hydrologic Soil Group

NRCS Series	Hydrologic Group	Drainage	Permeability	% of Area
7444	A	excessively drained; very low to medium runoff	rapid	13
7043	A/D	very poorly drained, very high runoff	moderately slow to rapid	14
7541	B	excessively drained; very low to medium runoff	rapid	18
7442	A			21
7441	A			34

A Geotechnical Investigation Report will be part of the next steps in the project development process. The report will document field exploration, laboratory testing, subsurface investigation, and engineering soil analysis to allow for formulation of geotechnical conclusions and recommendations for design and construction of the proposed project.

Geology

The geology of the Project area primarily consists of Pleistocene age Quaternary alluvial and fluvial deposits forming glacial moraines. The alluvium is composed of very poorly sorted, sandy small pebble gravel that has been deposited on an erosion surface cut on granodiorite. The runoff from the Project area flows into floodplain and lacustrine deposits that border the Upper Truckee River.

1.2.3 Land Use and Land Capability

Land Use

Per the Tahoe Valley Area Plan[vii]: "*The plan area is made up of a variety of existing land uses, including residential, commercial, tourist accommodation, industrial, and public service… Tahoe Valley is the gateway neighborhood for South Lake Tahoe, and includes various commercial uses such as clothing stores, factory outlets, automotive supply stores and dealerships, drug and liquor stores, restaurants, and supermarkets.*"

Outside of the Tahoe Valley Area Plan, immediately adjacent to the east lies residential (Winnemucca - Plan Area Statement 108) then continuing east exists public lands designated as conservation, commonly known as Johnson Meadow (Truckee Marsh - Plan Area Statement 100 and to the east is Trout/Cold Creek - Plan Area Statement 095) and residential (Sierra Tract - Plan Area Statement 105).

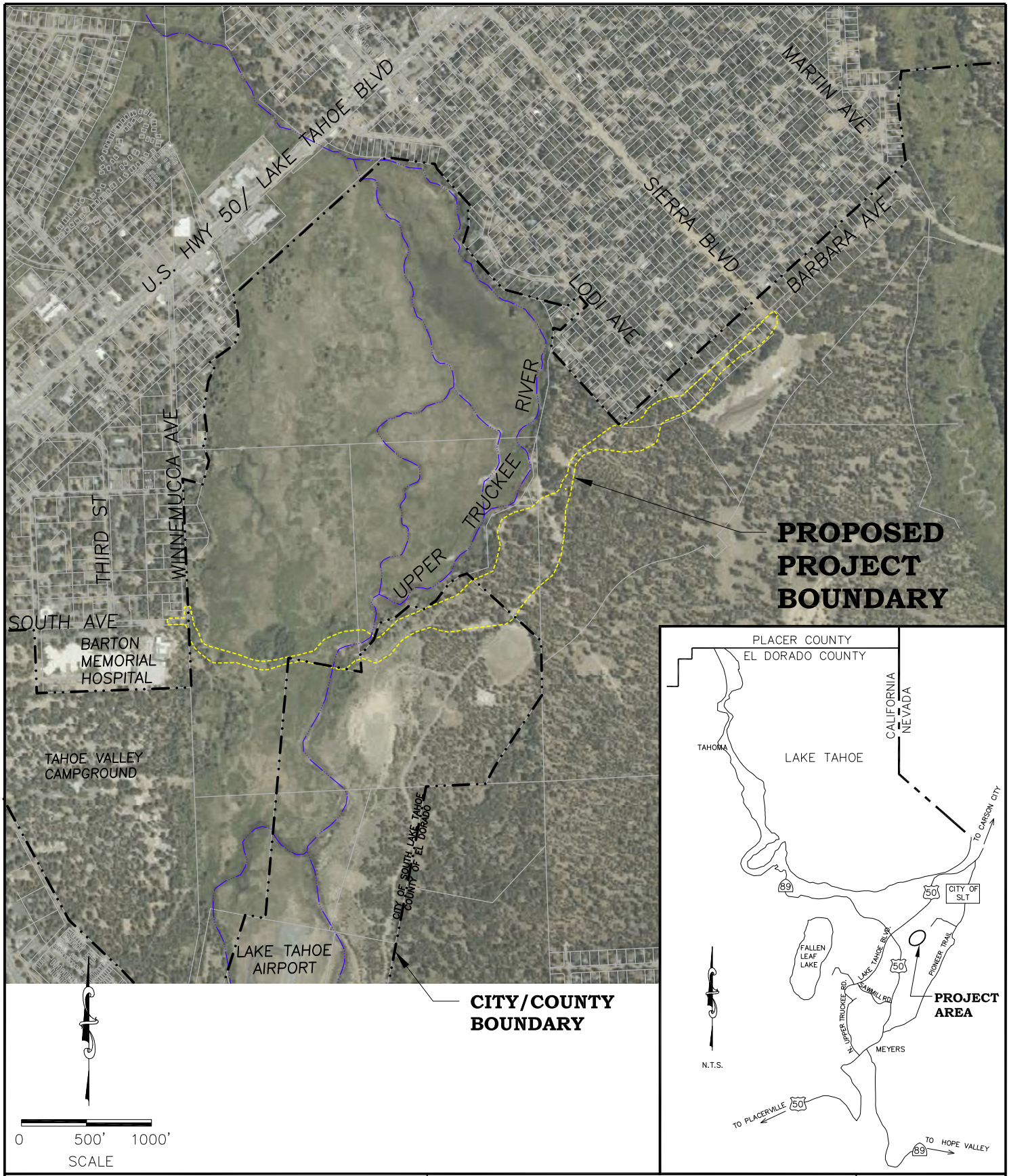
Land Capability

The USFS, in cooperation with TRPA, developed the land capability system currently used in the Basin. Lands within the Basin are divided into seven classes based on soil types, potential for erosion, and other related characteristics. Lands with a ranking of 1 have the highest potential for erosion and 7 have the lowest. Class 1 is also subdivided into 3 categories (1a, 1b, and 1c), all of which are high hazard. The land near the river is Class 1b, while areas outside of the riparian areas are 1c, 4, 5, 6 and 7 (see Table 2 and Figure 8). Class 5 has a lower potential for erosion than Class 1b. The land capability shown on Figure 8 is preliminary and will require field verification.

Table 2 - Area Distribution by Land Capability Class

Land Capability Class	NRCS Series				
	7444	7043	7541	7442	7441
1b		☑	☑		
1c			☑		
4				☑	☑
5			☑		
6					☑
7	☑				☑

Figure 8 represents the preliminary land capability information. Per TRPA staff, the current mapped land capability can be used to determine the amount of coverage across different land capability classes.

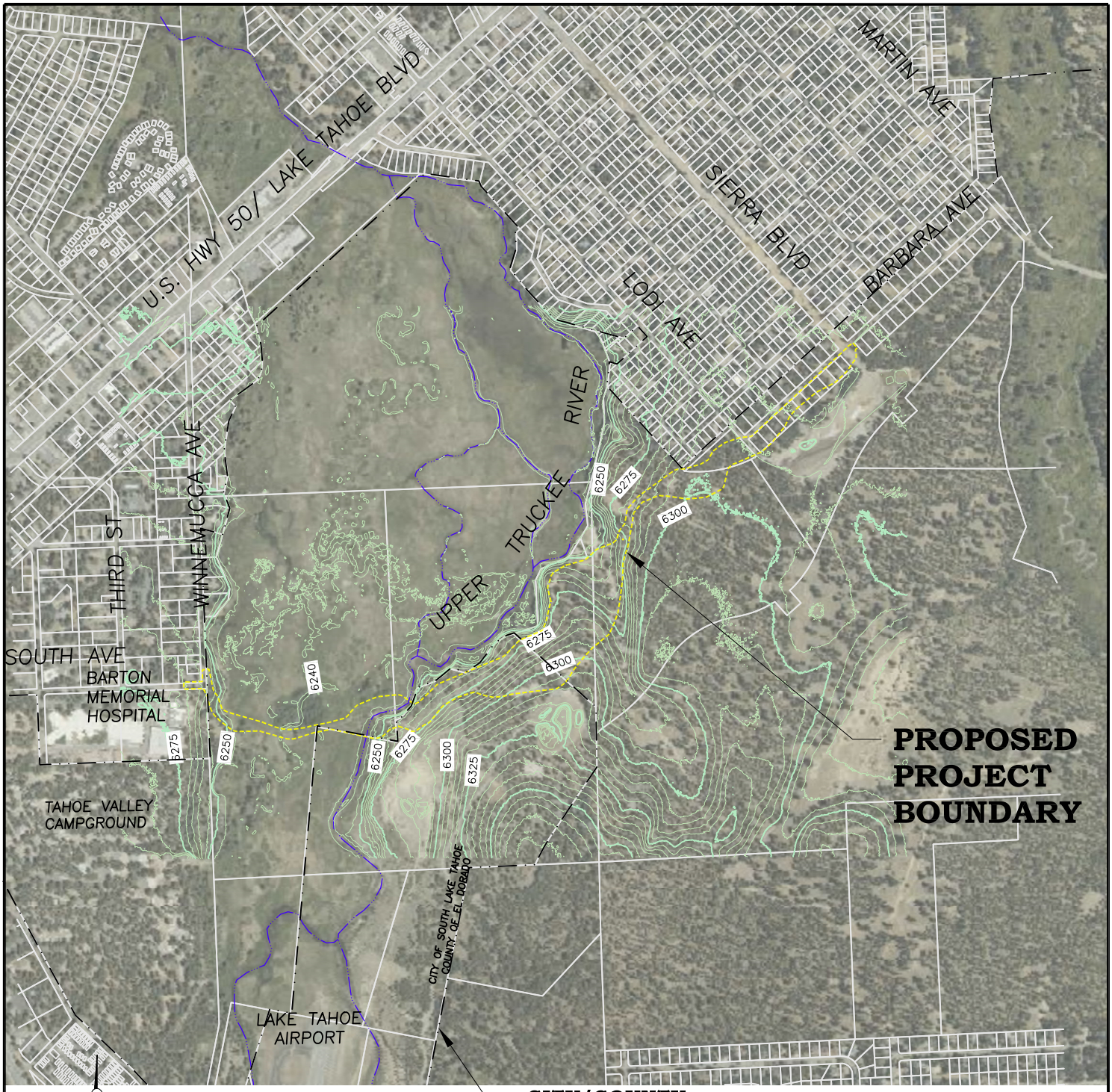


COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT JOHNSON MEADOW PROJECT LOCATION MAP

FIGURE 1

DATE:	PROJECT NO.:	BY:
12/21	95201	dsp

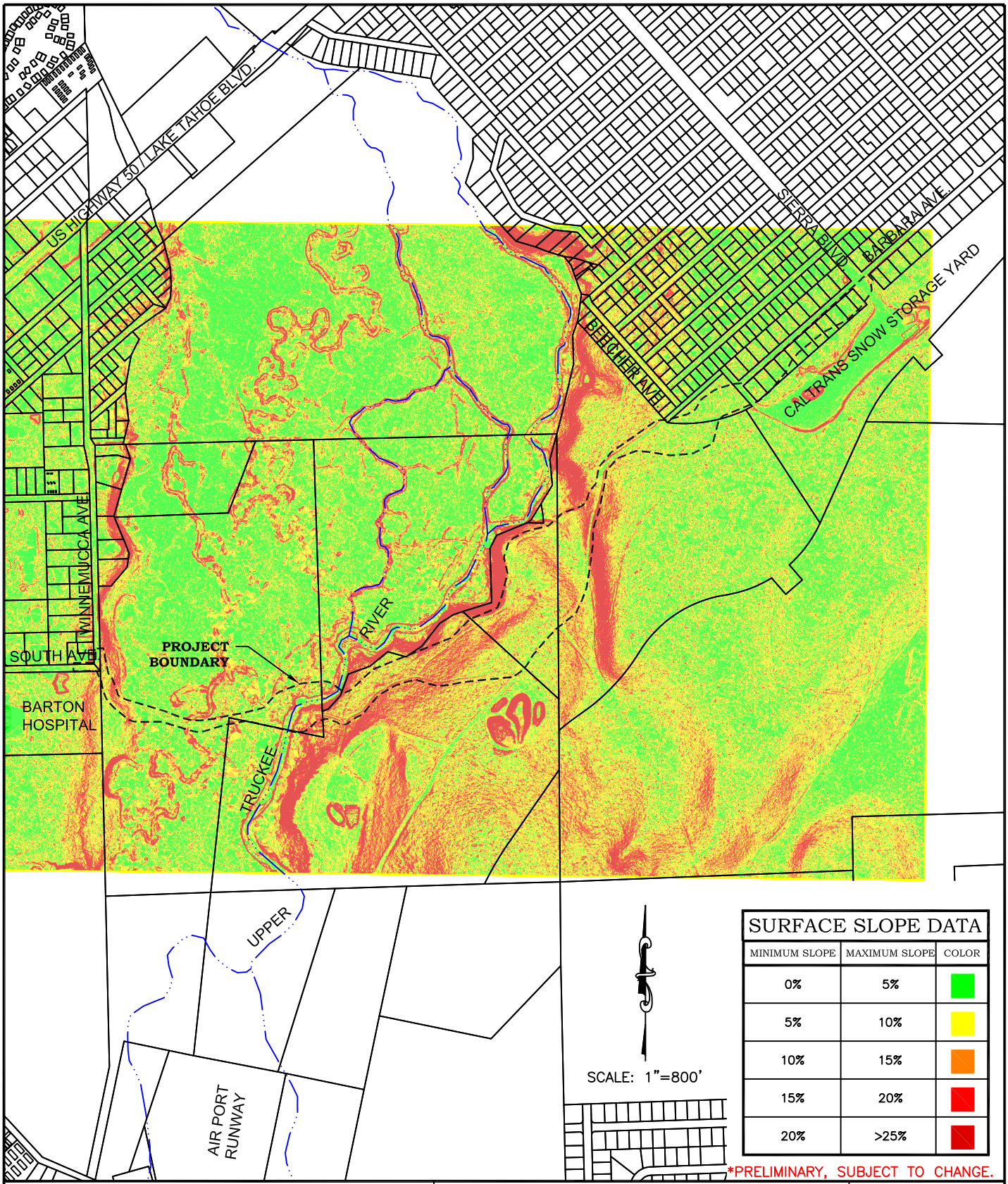


COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT JOHNSON MEADOW TOPOGRAPHIC MAP

FIGURE 2

DATE:	PROJECT NO.:	BY:
12/21	95201	dsp



SURFACE SLOPE DATA		
MINIMUM SLOPE	MAXIMUM SLOPE	COLOR
0%	5%	
5%	10%	
10%	15%	
15%	20%	
20%	>25%	

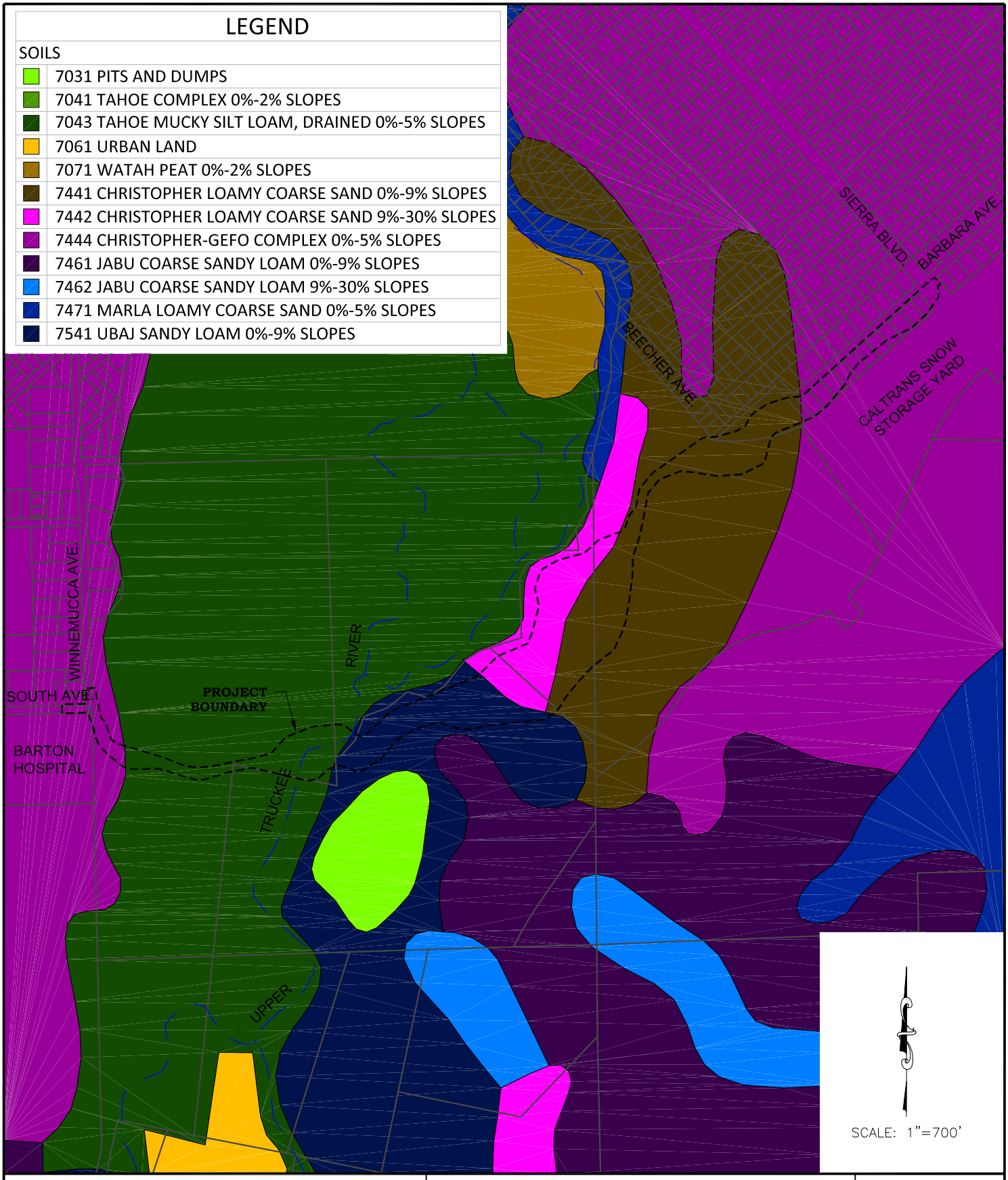
*PRELIMINARY, SUBJECT TO CHANGE.

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT JOHNSON MEADOW
SLOPE MAP

FIGURE 3

DATE:	PROJECT NO.:	BY:
02/21	95201	KIS

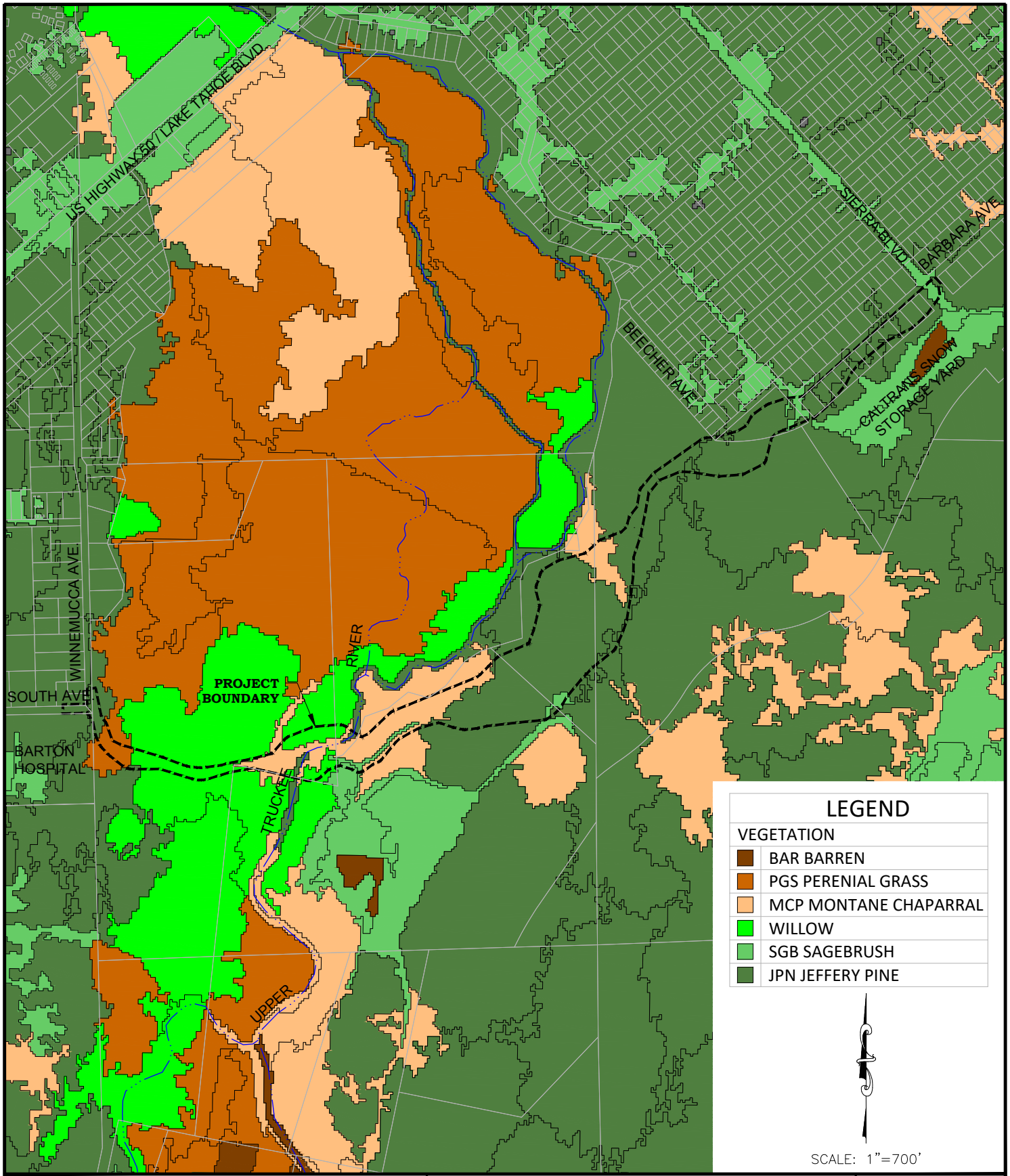


COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT JOHNSON MEADOW SOILS MAP

FIGURE 4

DATE:	PROJECT NO.:	BY:
2/21	95201	KIS

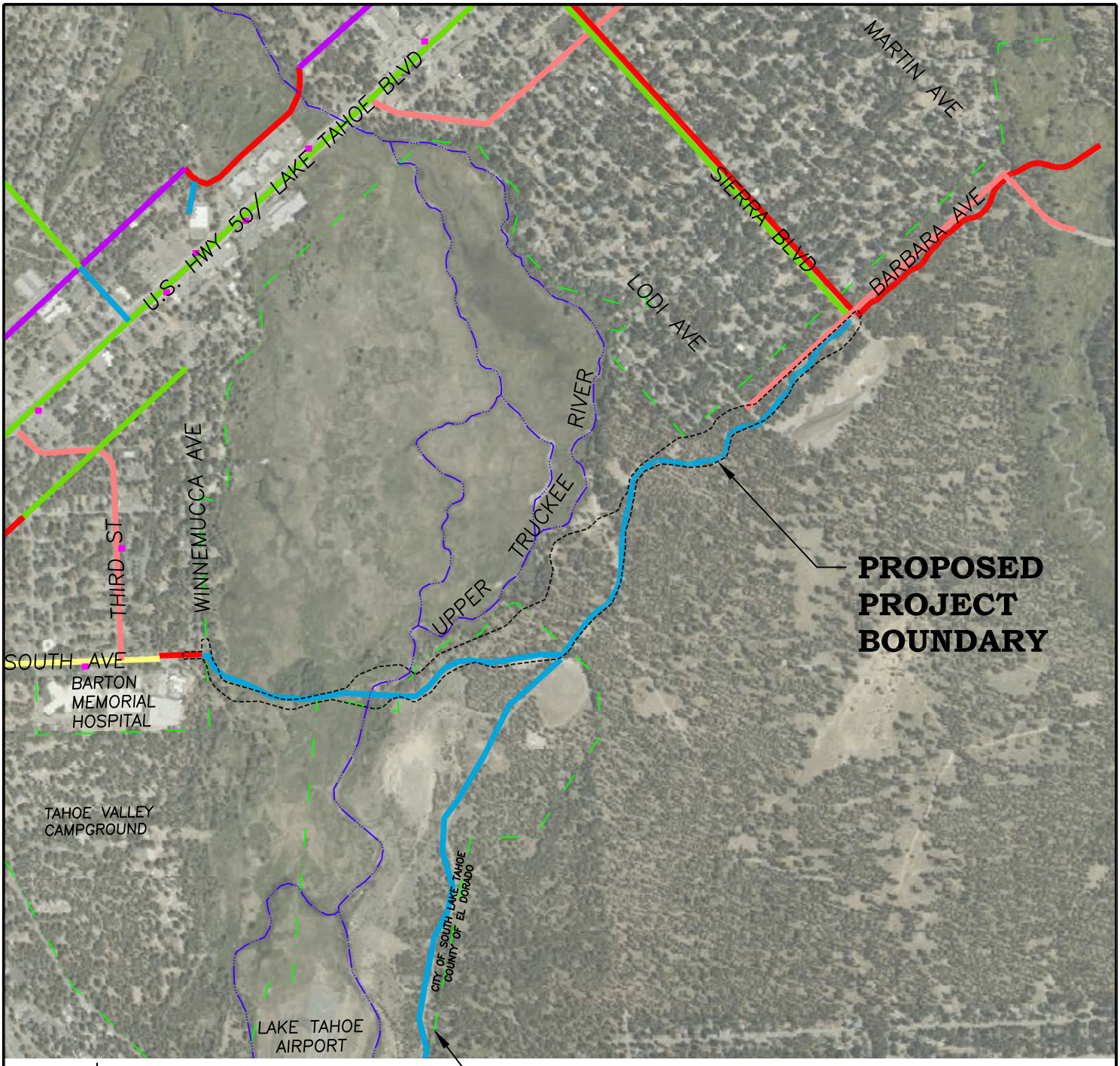


COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT JOHNSON MEADOW VEGETATION MAP

FIGURE 5

DATE:	PROJECT NO.:	BY:
2/21	95201	KIS

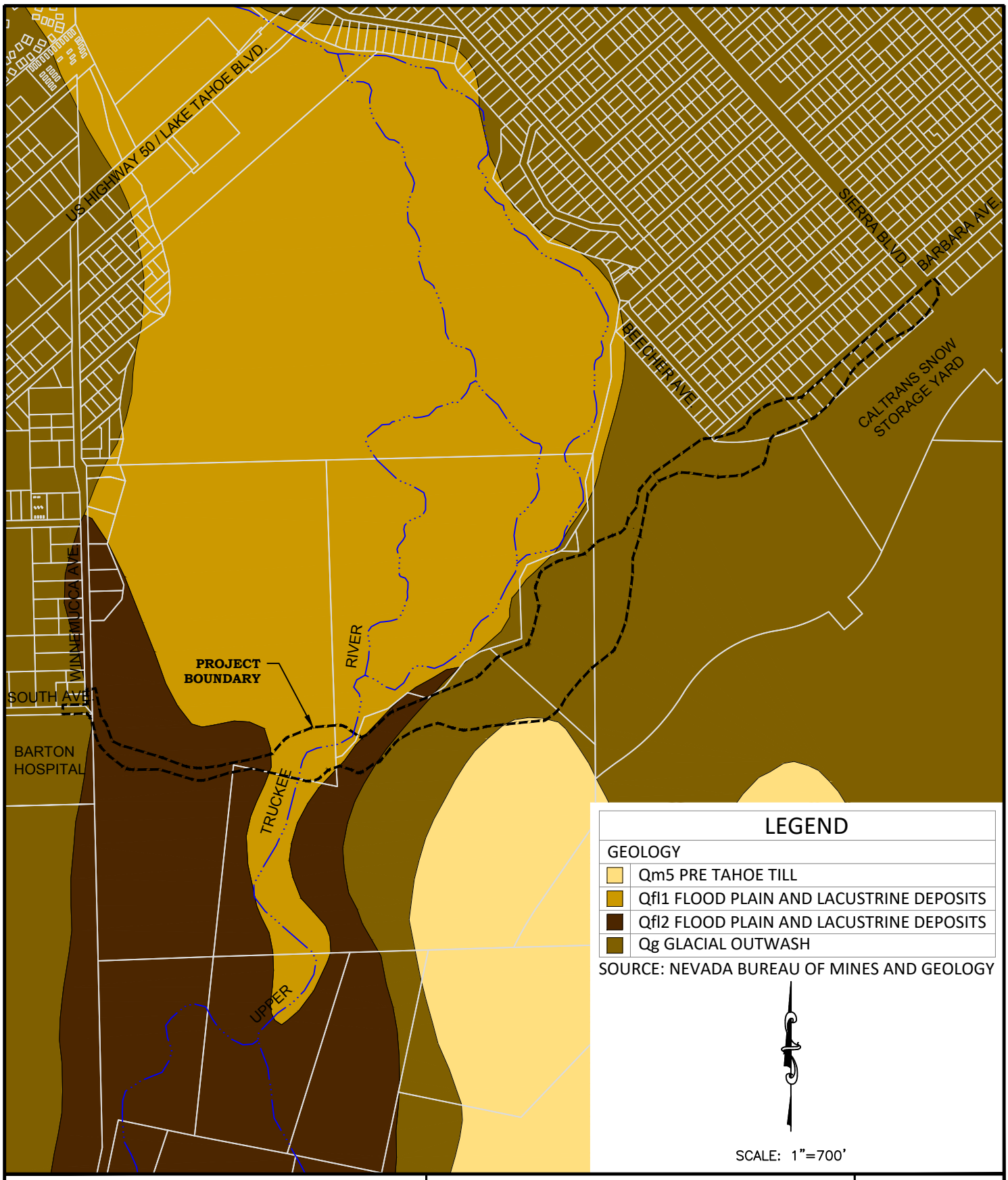


COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT JOHNSON MEADOW BIKE NETWORK MAP

FIGURE 6

DATE:	PROJECT NO.:	BY:
12/21	95201	dsp

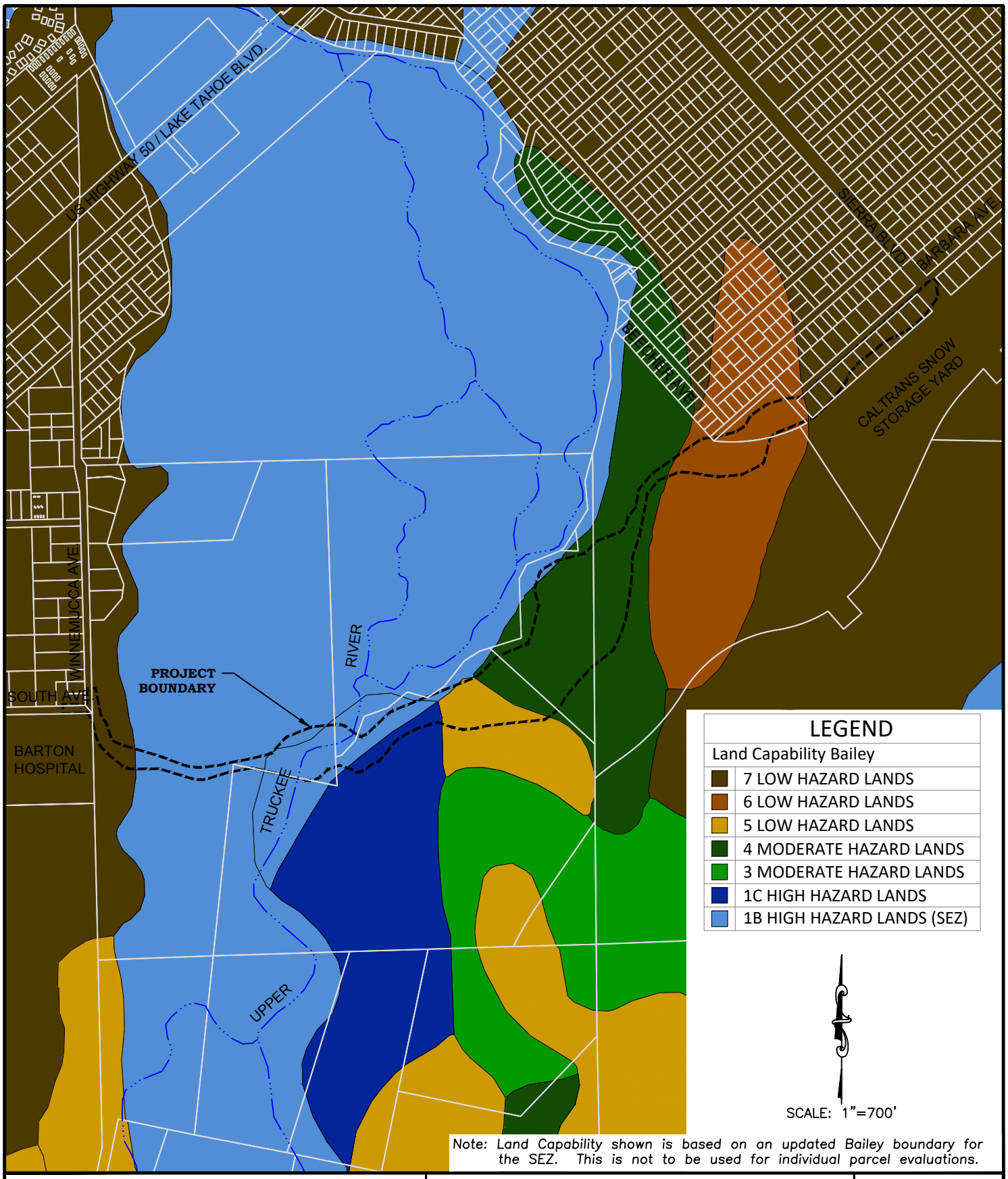


COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT JOHNSON MEADOW GEOLOGY MAP

FIGURE 7

DATE:	PROJECT NO.:	BY:
2/21	95201	KIS



Note: *Land Capability shown is based on an updated Bailey boundary for the SEZ. This is not to be used for individual parcel evaluations.*

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT JOHNSON MEADOW LAND CAPABILITY MAP

FIGURE 8

DATE:	PROJECT NO.:	BY:
2/21	95201	KIS

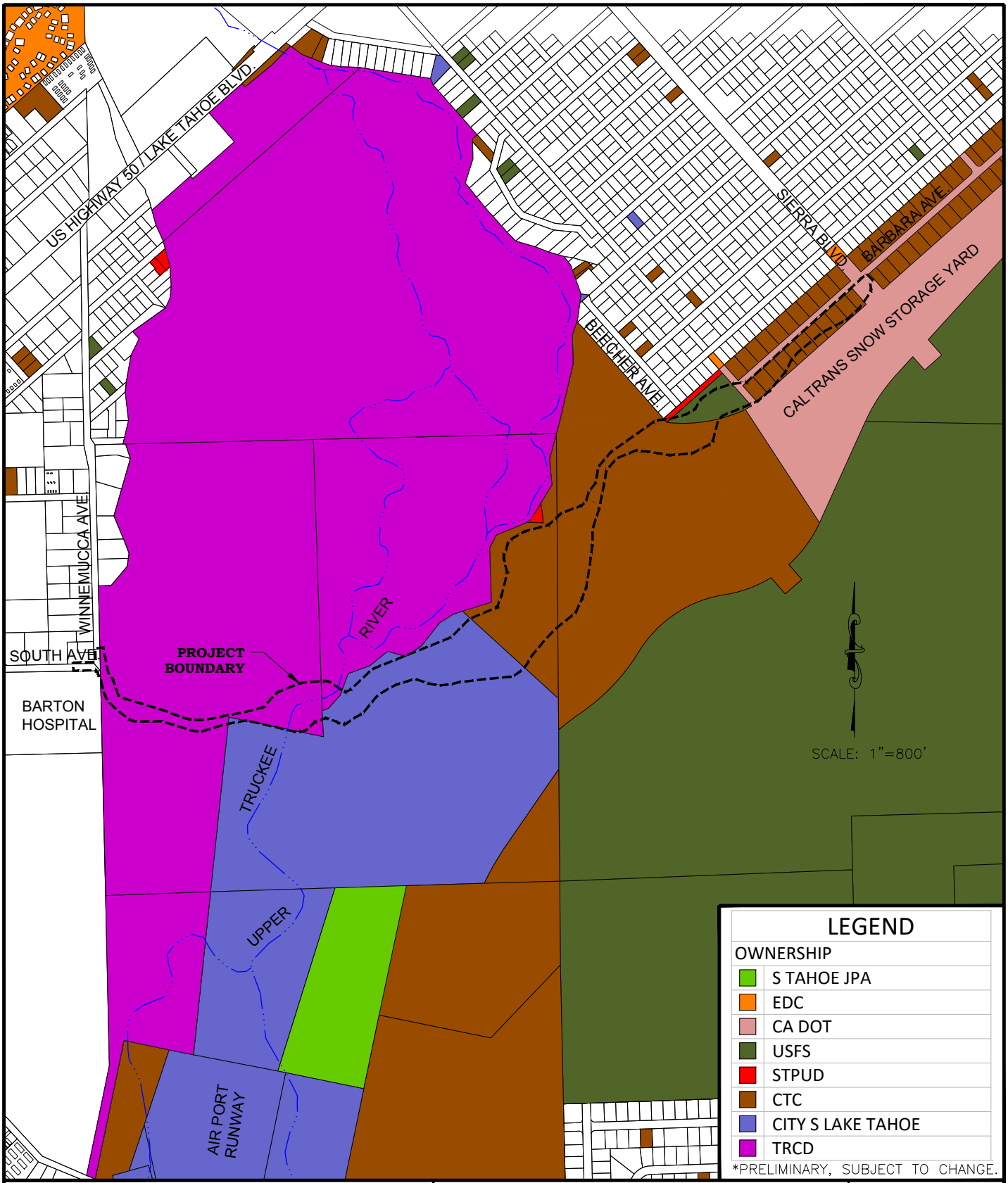
1.2.4 Land Ownership

Land ownership is summarized in Table 3 and depicted in Figure 9, which was developed from record parcel maps, subdivision maps, deed information, and assessors documents and shows County road right-of-way, CSLT road right-of-way, property lines, and publicly owned properties. In addition to road right-of-way, the Project is mostly on public parcels, with the public parcels owned by the TRCD (1), CSLT (1), California Tahoe Conservancy (13), South Tahoe Public Utility District (STPUD) (2), USFS (1), and the California Department of Transportation (1). County will pursue the necessary easements, special use permits, and/or rights of entry for any affected parcels during the development of the preferred project alignment.

Table 3 - Land Ownership

APN	Owner
031-020-023	Tahoe Resource Conservation District
031-020-042	City of South Lake Tahoe
031-020-033	California Tahoe Conservancy
031-020-034	South Tahoe Public Utility District
031-020-045	California Tahoe Conservancy
025-061-025	South Tahoe Public Utility District
025-061-024	Unites States Forest Service
025-472-011	California Tahoe Conservancy
025-472-010	California Tahoe Conservancy
025-472-009	California Tahoe Conservancy
025-472-008	California Tahoe Conservancy
025-472-007	California Tahoe Conservancy
025-472-006	California Tahoe Conservancy
025-472-005	California Tahoe Conservancy
025-472-004	California Tahoe Conservancy
025-472-003	California Tahoe Conservancy
025-472-002	California Tahoe Conservancy
025-472-012	California Tahoe Conservancy
UN16420	Caltrans

- As of December 2021.



COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT JOHNSON MEADOW
LAND OWNERSHIP MAP

DATE:	PROJECT NO.:	BY:
02/21	95201	KIS

FIGURE
9

1.2.5 Utilities

Numerous utilities are situated underground and overhead within the Project. In order to better define these utilities, a utilities base map has been developed and will be coordinated with each owner (see Figure 10). Utility owners are listed below in Table 4. Any potential conflicts will be addressed with the appropriate utility owner and their representative.

Table 4 - Utilities Representative List

Utility	Owner	Owner Address	Contact
Natural Gas	Southwest Gas	1740 D St, Unit No. 4 S Lake Tahoe, CA 96150	Jake Manzo
Telephone	AT&T	12824 Earhart Avenue Auburn, CA 95602	Astrid Willard
Electricity	Liberty Utilities	933 Eloise Avenue S Lake Tahoe, CA 96150	Andrew Gregorich
Water & Sewer	South Tahoe PUD	1275 Meadow Crest Drive S Lake Tahoe, CA 96150	Adrian Combes
Cable Television	Charter Communications	9335 Prototype Drive Reno, NV 89521	Anthony Lefanto

1.2.6 Environmental Resources

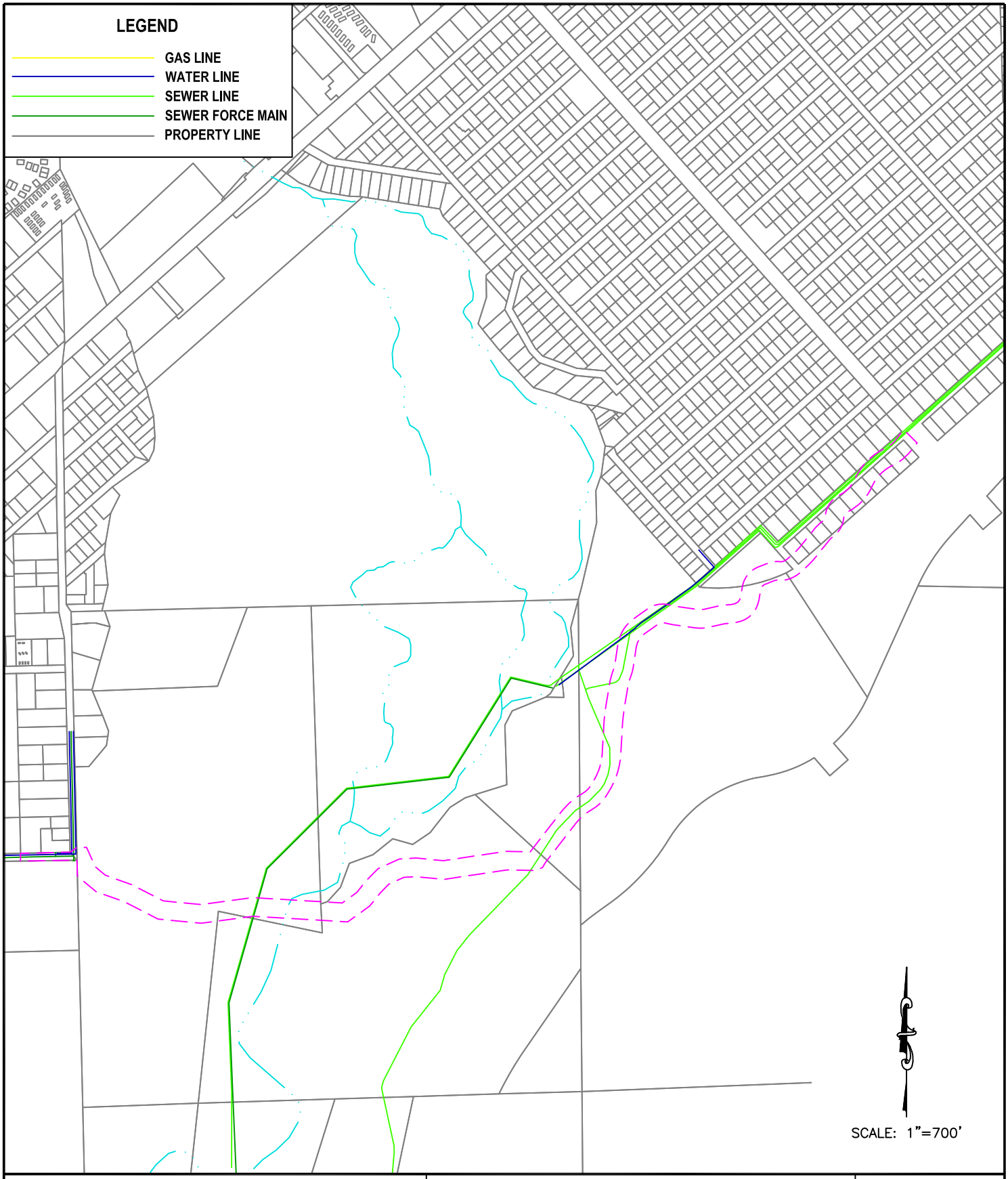
The environmental resources investigated as part of this Project include cultural/archaeological, biological, vegetation, and wetlands. Each is described below.

Cultural/Archaeological Resources

An Archaeological Survey Report will be as part of environmental documentation process to document and evaluate the cultural resources present in the Project area. This investigation will result in the identification of archaeological resources within the Area of Potential Effect on archival research or the archaeological survey.

Biological Resources

The Lake Tahoe Basin is suitable habitat for over 290 bird, animal and fish species of animals and more than a thousand different plant species[viii]. In order to characterize the existing biological conditions present within the Project area, an inventory and evaluation of the Project area's vegetation and wildlife communities and a Biological Assessment will be conducted. This report will also identify the potential occurrence of special status plant and animal species within the Project area. Typical special status species identified in similar environments are summarized in Table 5. The environmental documentation will positively list and identify these species further.



COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT JOHNSON MEADOW UTILITY MAP

FIGURE 10

DATE:	PROJECT NO.:	BY:
4/21	95201	KIS

Table 5 - Special Status Wildlife and Plant Species with Suitable Habitat Availability in the Project Area

Common Name	Scientific Name	Status	Suitable Habitat
Mammals			
California Wolverine	*Gulo gulo luscus*	PT, ST, FP	Absent
Birds			
Northern goshawk	*Accipter gentilis*	SSC, SI	Unlikely
Amphibians			
Sierra Nevada yellow-legged frog	*Rana sierrae*	FE, ST, WL	Unlikely
Fishes			
Lahontan Cutthroat Trout	*Oncorhynchus clarki henshawi*	FT	Unlikely

Agency Codes

CDFW	CA Dept of Fish and Wildlife
USFWS	US Fish and Wildlife Service
TRPA	Tahoe Regional Planning Agency

Status Codes

FE	Federally Endangered
FP	CDFW Fully Protected
FT	Federally Threatened
PT	Federally Proposed Threatened
SI	TRPA Special Interest Species
SSC	CDFW Species of Special Concern
ST	State Threatened
WL	CDFW Watch List

Vegetation

Several vegetation types will also be identified within the Project area during a future field survey for the Biological Assessment. Typical vegetation types may include: Jeffrey pine, Lodegepole pine, perennial grassland, sagebrush alliance, Sierran mixed conifer, as shown in Figure 5.

The Project area is primarily bordered by pine trees, with the immediate alignment containing plant species tolerant of disturbed areas.

- Jeffrey Pine Forest: Composed of Jeffrey pine (*Pinus jeffreyi*) and white fir (*Abies concolor*), occurs throughout the Sierra Nevada mountains raised stream benches, ridges, and plateaus on all slopes and aspects.

- Lodgepole Pine Forest (*Pinus contorta* ssp. *murrayana*): Grows in a variety of conditions and occurs in terraces, lake and meadow margins, and depressions that flood seasonally; upland slopes and ridges to the tree line.

- Perennial Grassland: Occurs on ridges and south facing slopes, alternating with forest and scrub in valleys and north facing slopes. Key grasses include Idaho fescue (*Fescue idahoensis*), Red fescue (*Festuca rubra*), and Italian wild rye (*Festuca perennis*).

- Sagebrush Alliance (*Artemesia tridentata*): Dominant or codominant in the shrub canopy and is associated with Jeffrey pine at low cover, usually found in many vegetation types. Many forests and woodlands in the ponderosa pine, Jeffery pine, single-leaf pinyon, lodgepole pine may have sagebrush as an understory component. Stands without trees

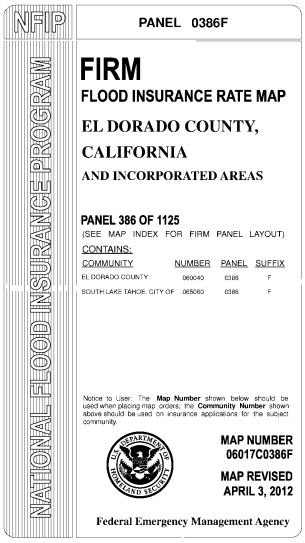
occur as openings in these forests. Stands occur in drier portions and microsites throughout most of the Sierra Nevada range.

- Sierran Mixed Conifer: The Sierran mixed conifer is a mix of hardwood and conifer species that forms a multilayered forest. Historically burning and logging have caused a wide variability in stand structure. Five conifers and one hardwood typify the mixed conifer forest. White fir tends to be the most common species due to its shade tolerance and ability to survive long periods in brush fields. Jefferey pine dominates at high elevations and on cold sites with incense cedar (*Calocedrus decurens*), ponderosa pine (*Pinus ponderosa*), and sugar pine (*Pinus lambertiana*) and California black oak (*Quercus kellogii*).

- Urban or Developed: Developed urban land areas are characterized by built infrastructure and impermeable surfaces. Vegetated areas are landscaped. Developed areas include the paved roadways of Winnemucca Avenue, South Avenue and Barbara Avenue as well as developed private lots. Often these developed areas are located adjacent to disturbed natural communities.

Wetlands

An Aquatic Resources Delineation Report will also be completed to identify the potential presence of wetlands and other jurisdictional waters. Based on the required wetland parameters, potential jurisdictional waters will most likely be identified within the Project area. If present, a field survey area will identify drainages that are potential jurisdictional waters of the United States showing presence of ordinary high-water mark indicators and any connections to the Upper Truckee River. The Upper Truckee River is potentially jurisdictional waters of the United States due to the presence of ordinary high-water mark indicators and the river is a tributary to Lake Tahoe. A wetland determination will be issued by the Army Corps of Engineers.


PANEL 0386F

FIRM
FLOOD INSURANCE RATE MAP
EL DORADO COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 386 OF 1125
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL DORADO COUNTY	060040	0386	F
SOUTH LAKE TAHOE, CITY OF	065060	0386	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06017C0386F
MAP REVISED
APRIL 3, 2012

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

Federal Emergency Management Agency Floodplain

FEMA has designated a floodplain associated with the Upper Truckee River. The floodplain designation is identified on FEMA Flood Insurance Rate Map:

- 06017C0386F revised April 3, 2012.

The floodplains designated include:

- Zone AE: Areas of 100-year flood, including base flood elevations
- Zone X: Areas between limits of the 100-year and 500-year flood

A Hydrologic Analysis Report will be prepared by the County as the project development process continues. Per the FEMA Flood Insurance Rate Map near the existing concrete bridge, the base flood elevation is between 6249 and 6250.

There are varying regulatory requirements for freeboard between the water surface elevation of the design flow and the bridge soffit elevation. The different requirements will be investigated as well as the freeboard during the preferred alternative phase of the Project. A goal of this Project is to minimize the impacts to the floodplain.

1.2.7 Monitoring Information

A pre-construction photo inventory was completed and is included as Appendix B to this Report. The photographs were utilized to identify potential physical and environmental constraints and evaluate Project alternatives as discussed in Section 2 of this Report. A more detailed photo inventory will be conducted once the final alignment is determined.

1.3 Hydrologic Conditions

The Basin has been divided into 63 Watersheds, all of which drain into Lake Tahoe. The Project area falls within the largest watershed in the Basin, the Upper Truckee River (USGS Basin #73).

1.3.1 Watershed, Drainage Area and Sub-area Boundaries

The Upper Truckee River sub-basin continues through the Project and the proposed bridge location. The Upper Truckee River watershed is approximately 10 miles in length and 6.5 miles in width with a slightly elongated shape and a spur in the northwest region encompassing the Echo Lake drainage. In general, the basin consists of mountainous terrain within the unincorporated area of El Dorado County at elevation ranges from 6320 feet to 9590 feet. This basin is roughly aligned south-north and east-west with an average slope of the watershed of approximately 8 percent.

1.3.2 Storm Frequency

The County utilizes the 1995 County of El Dorado Drainage Manual[ix] (Drainage Manual) as a guidance document for hydrologic design within the Basin. The Drainage Manual requires utilizing the 100-year storm event, which has the probability of occurrence of 0.01 in any given year, for drainage areas greater than 100 acres, to design drainage facility conveyance structures. All drainage facilities for areas less than 100 acres need to be designed to safely convey the 10-year event, probability of 0.10 in any given year, without the headwater depth exceeding the culvert barrel height.

TRPA's Lake Tahoe Water Quality Management Plan[x] (also known as the 208 Plan or WQMP) requires that the 10-yr, 24-hr storm event be used to design stormwater conveyance facilities and the 50-year storm event be used when designing the conveyance facility through a Stream Environment Zone (SEZ).

The Lahontan Regional Water Quality Control Board (Lahontan) Basin Plan[xi] requires that the minimum "design storm" for storm water treatment facilities in the Basin is the 20-year, 1-hour storm event. Based on several reports completed by Lahontan, this event equates to approximately 1 inch of rainfall within 1 hour.

Based on various areal historical precipitation data within the Basin, the Drainage Manual requirements, the regulatory requirements mentioned, and the observed events, the hydrologic storm frequencies utilized for this Project design are as follows:

10-year, 6 hour

Conveyance facilities for areas less than 100 acres and not in an SEZ. The 10-year, 6-hour storms tend to be associated with Fall/Spring frontal systems with resultant peak spring snow melt.

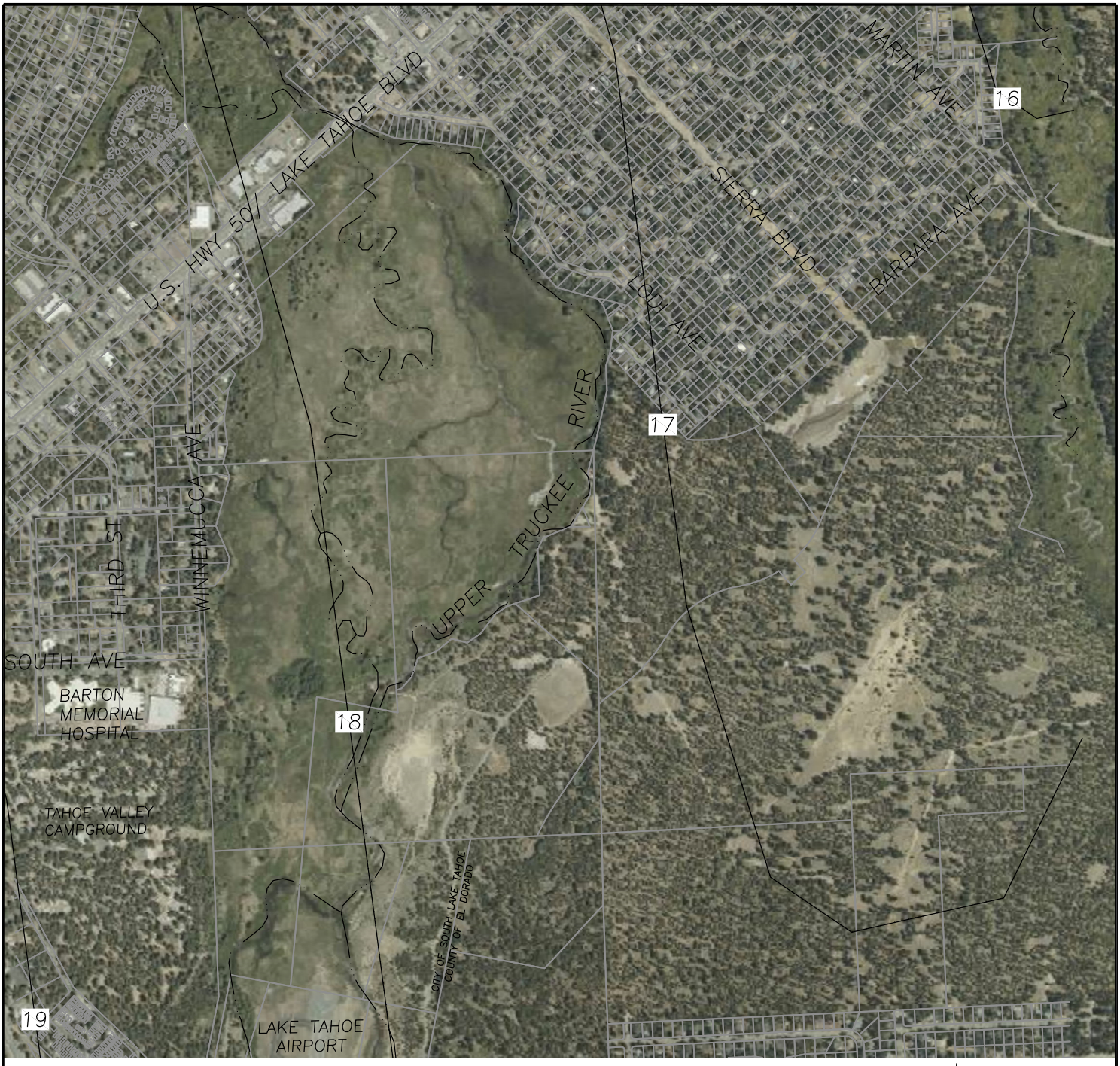
20-year, 1 hour

Conveyance facilities discharging to storm water treatment facilities for County right-of-way drainage tributary areas; storm water treatment capacity for County right-of-way drainage tributary areas for all impound/detention facilities. Typically, this event occurs in summer as localized thundershowers, or convective storm systems.

100 –year, 24 hour

Conveyance within the County right-of-way; all outfall structures from impound/detention facilities which discharge through an SEZ, or directly to a tributary of Lake Tahoe, or Lake Tahoe; conveyance facilities for drainage areas greater than 100 acres within the County right-of-way; conveyance facilities downstream of the impound facilities for hydrologic wave control. Events in this category may be characterized as warm frontal systems producing a rain-on-snow event.

For floodplain and river drainage analysis, a Hydrologic Analysis Report was developed, see Appendix A. The purpose of the drainage analysis is to develop 10-year, 25-year, 50-year, and 100-year peak flows to provide a hydraulic evaluation to assist in the selection of the proposed bridge location. The report details and documents the hydrologic parameters and assumptions used to forecast the flows applicable to design the elevated boardwalk system and bridge at the Upper Truckee River.



REFERENCE: REPORT ON EL DORADO COUNTY DESIGN RAINFALL BY JIM GOODRIDGE, 2008

18 MEAN ANNUAL PRECIPITATION, INCHES PER YEAR

0 500' 1000'
SCALE

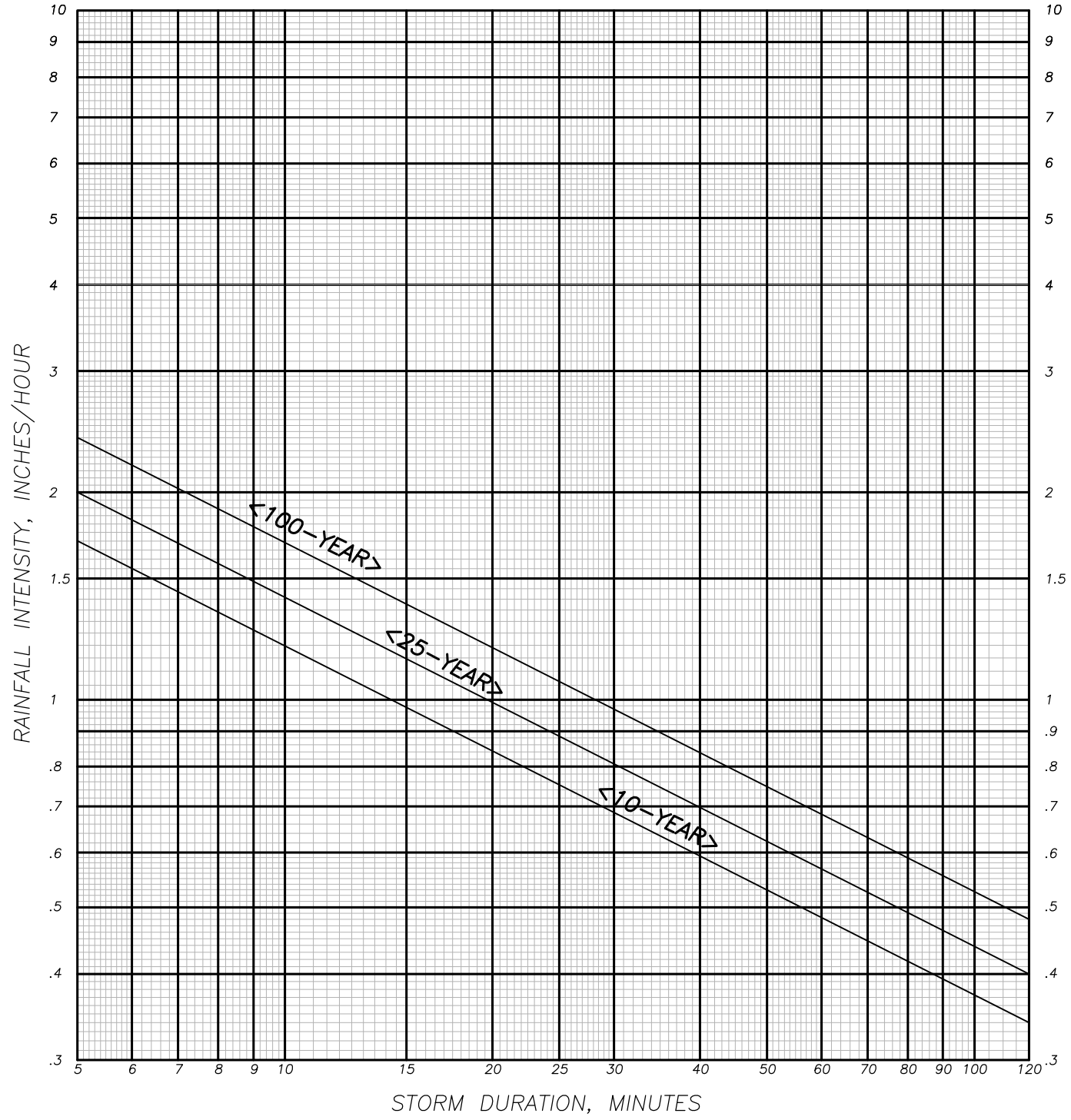
COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT JOHNSON MEADOW ISOHYETAL MAP

FIGURE 11

DATE:	PROJECT NO.:	BY:
12/21	95201	dsp

RAINFALL INTENSITY DURATION FREQUENCY CURVE



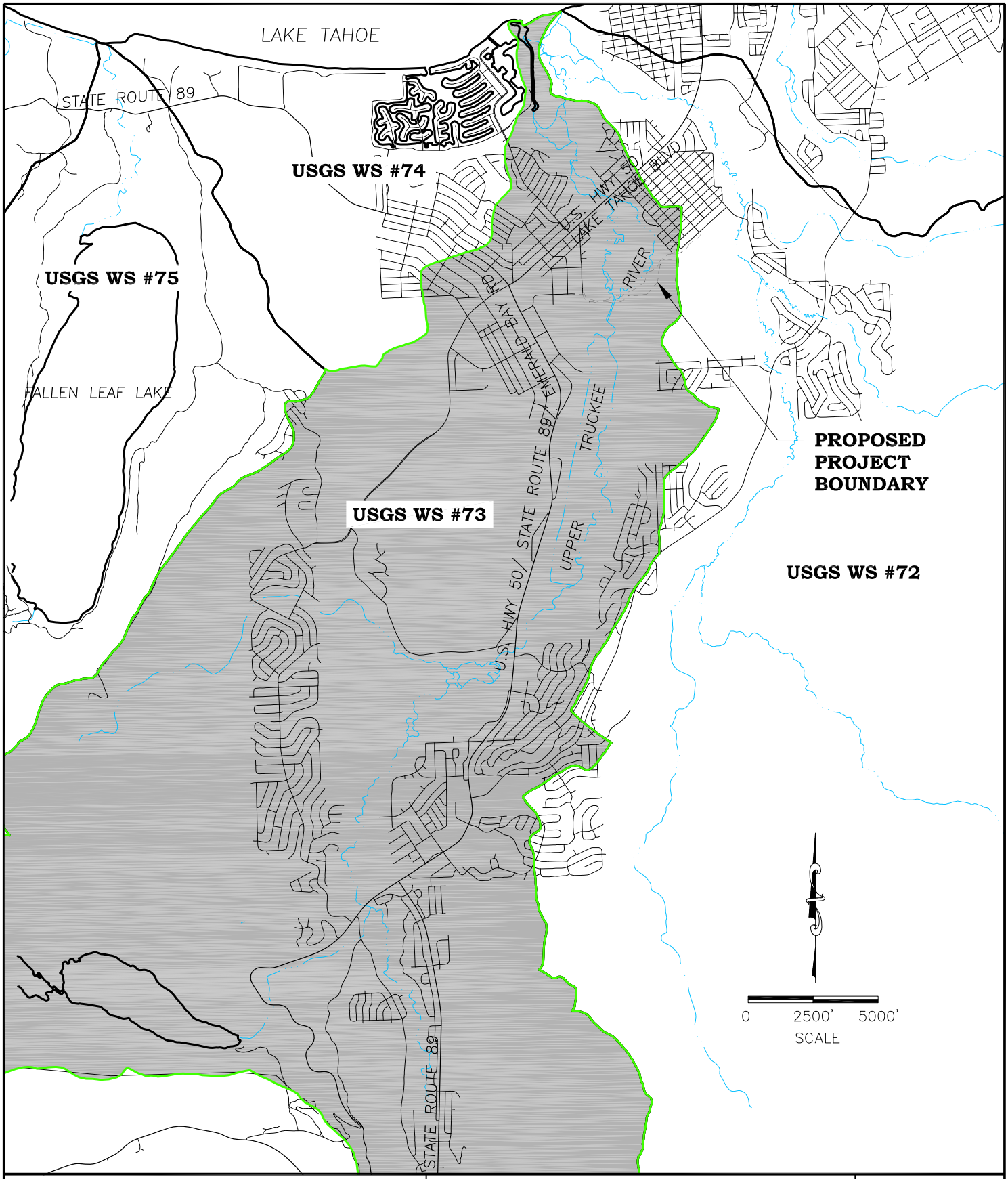
SOURCE: COUNTY OF EL DORADO DRAINAGE MANUAL, 1995
UPDATED FROM EL DORADO COUNTY DESIGN RAINFALL, GOODRIDGE 2008
MEAN ANNUAL RAINFALL – ISOHYET 18 IN.

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

SOUTH TAHOE GREENWAY -
UPPER TRUCKEE BRIDGE AT
JOHNSON MEADOW
18" RAINFALL INTENSITY - DURATION -
FREQUENCY CURVES

FIGURE
12

DATE: 3/21	PROJECT NO.: 95201	BY: KIS



COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT USGS WATERSHED

FIGURE 13

DATE:	PROJECT NO.:	BY:
12/21	95201	dsp

1.3.3 Precipitation

The precipitation depth for the design storm frequency was obtained from the Drainage Manual. Based on the mean annual precipitation (MAP) depth isohyetal maps, and the value of 18 inches for the Project area, the following precipitation depths were selected from the Rainfall Depth tables.

Design Storm	Rainfall Depth (inches)
10-year, 6-hour	1.5
25-year, 1-hour	0.7
100-year, 24-hour	4.4

- Rainfall depth values shown reflect a MAP minimum value of 20 inches.

1.3.4 Hydrologic Method

The Rational Method will be used to calculate estimated peak flows within the Project area. The Rational Method was selected because the sub-basins within the Project area are less than one acre. This method is commonly used to determine peak flow when the watershed is small (less than 100 acres). Generally, the Rational Method is used when the watershed is less than one acre.

1.4 Hydraulics Summary

The hydraulic analysis consisted of two main portions, the cross drainage culverts and the proposed bridge structure hydraulics. Each is discussed below.

1.4.1 Cross Drainage Hydraulics

There are no existing culverts within the proposed Project area other than the cross-drainage culverts under the existing roadways. The proposed shared use path will likely provide cross drainage culverts according to topographic features and vertical profile alignment of the path.

1.4.2 Bridge Hydraulics

The new bridge will be designed to handle scour according to Caltrans design standards. Caltrans performs a bridge inspection every two years. Data and input parameters modeling the Upper Truckee River drainage analysis can be found in Appendix A.

The proposed bridge will conform to design criteria and guidelines identified in the County of El Dorado Drainage Manual[xii], Caltrans Local Assistance Procedures Manual[xiii], and the Caltrans Highway Design Manual[xiv].

1.5 Stormwater Quality

The Lake Tahoe Watershed Assessment[xv] provides a synthesis of water quality data and analysis with an emphasis on watershed sediment and nutrient loadings and their effects on Lake Tahoe. According to the report, research has shown the onset of cultural eutrophication of oligotrophic Lake Tahoe, and a corresponding decline in the lake's exceptional clarity at the rate

of approximately one foot per year. Research has also shown a fundamental shift in the limiting nutrient for biostimulation in Lake Tahoe from nitrogen to phosphorous.

1.5.1 Priority Pollutants

It has been shown that a large portion of the total phosphorous load is transported with sediment; therefore, current research and management efforts in the Basin focus on the management of watershed sediment and erosion control. The long-term average nutrient flux from watersheds in the Basin has been significantly related to disturbance and land use, leading to sediment and the associated nutrients being the primary pollutants of concern.

1.5.2 Priority Pollutant Sources

Sediment Sources

In general, land disturbance is a primary cause of elevated sediment supply. However, the effects of land disturbance on sediment supply are manifested in different ways and may result in changes in sediment supply that vary by orders of magnitude. Because sediment transport is an exponential function of drainage discharge, identification of increased sediment supply is clearly linked to drainage or stream flows. In addition, changes in hydrologic characteristics may initiate geomorphic changes in a project area or watershed that have the potential to modify land surface or channel characteristics, thereby increasing historical sediment supply by one or more orders of magnitude.

Nutrient Sources

The primary nutrients of concern with respect to Lake Tahoe clarity are phosphorous and nitrogen. Research over the past few decades has shown that primary productivity in Lake Tahoe is predominately phosphorous-limited. However, co-limitation by nitrogen and phosphorous still occurs, especially in summer months, so control of both nutrients is important. A nutrient-loading budget for Lake Tahoe indicates that atmospheric deposition, stream loading, direct runoff, and groundwater are major contributors of nutrients to Lake Tahoe. Most water quality improvement projects have little opportunity to affect atmospheric deposition. However, runoff from the Project area may contribute significantly to stream loading.

Total nutrient and sediment loads are related because a portion of the nutrient loads occur as particulates or adsorbed onto particulates. However, only a portion of the total nutrient loads may be in biologically available form. The biologically available fraction has the largest potential impact on water quality and is therefore of greatest concern in water quality projects. The atmosphere is the dominant global source of nitrogen as N_2, while rock weathering is the dominant source of phosphorous. Both nutrients are recycled and retained within the biosphere at rates that are much higher than contributions from original sources. Their uptake, retention, and recycling, in biomass is highly sensitive to landscape disturbance. Mobilization due to disturbance causes a loss of nutrients from the local biological or physical system, and transport downstream in particulate and dissolved forms.

1.5.3 Other Pollutant Sources

In addition to the priority pollutants described in Section 1.5.1 of this document, other potential pollutants have been identified based on Project area characteristics. These pollutants include typical materials used during construction such as oil and grease from equipment, vehicles, road base, concrete, and other construction materials. In order to mitigate the possibility of potential pollutants being discharged from the site, an aggressive Storm Water Pollution Prevention Plan (SWPPP) or Water Pollution Control Plan (WPCP), as applicable, will be developed and implemented. The SWPPP/WPCP will identify specific erosion control measures to be implemented, both during and after construction.

1.5.4 Pollutant Transport Processes

In addition to the identification of pollutant sources as described in Sections 1.5.2 and 1.5.3 of this document, key pollutant transport processes must be considered in order to formulate and evaluate potential control strategies in subsequent project phases. For this Project, it is anticipated that the pollutant transport process will be closely linked to the hydrology, thus increasing the necessity of good stormwater management.

1.6 Project Opportunities and Constraints

Opportunities

With the completion of this Project, greater opportunities exist for improvement by implementing a continuous transportation/ recreation trail for bicyclists and pedestrians alike. The corridor for the proposed shared use path is also part of TRPA's *Linking Tahoe: Active Transportation Plan*, with the goals of providing access to local businesses, schools, and offices for bicyclists and pedestrians, reducing vehicular transportation, and enhancing recreational opportunities within the Basin.

One of the main opportunities of this Project, in addition to providing recreational links, is to provide traffic mitigation and potential air quality improvement. The Project will also aid in general water quality improvement by providing alternative transportation opportunities, thereby reducing vehicle emissions, and providing additional permanent vegetation to filter stormwater runoff. Furthermore, this Project is consistent with the California Level of Service Initiative, Senate Bill (SB) 743. Signed in September 2013, the overall initiative of SB 743[xvi] is to encourage infill developments, reduce greenhouse gases, and support multimodal transportation networks.

Constraints

The Project faces several challenges, primarily in regard to the alignment of the proposed shared use path. Easement challenges, river crossing, and the presence of sensitive environmental resources each represent a consideration in determining the proposed alignment.

For much of the alignment, the shared use path will likely be contained within the existing disturbed, compacted trail. The advantages with following the existing user trail system, proposed improvements will:

- minimize the overall environmental impacts, therefore also minimizing the mitigation requirements associated with permanent improvements;
- preserve existing vegetation;
- minimize the amount/ cost of tree removal; and,
- minimize the amount/ cost of revegetation and restoration.

The County is continuing its coordination with TRCD's Upper Truckee River Johnson Meadow Restoration Project. This coordination is important in order for both projects to be successful and not conflict with their respective goals and objectives.

More analysis and coordination may be required related to the Lake Tahoe Airport and Federal Aviation Administration requirements related to height requirements for the proposed bridge and potential increased public use north of the airport.

Impacts to the existing SEZ/floodplain areas near the river will need to be minimized to the maximum extent practicable. Additionally, Lahontan's Basin Plan requires SEZ/floodplain impacts be fully mitigated at a 1.5:1 ratio[xvii]. It is anticipated TRPA will make the findings this Project is classified as a Public Outdoor Recreation Facility which will exempt the Project and allow SEZ disturbance.

Finally, sensitive environmental resources in the Project area would necessitate avoidance where possible. Specifically, the locations of wetlands, existing vegetation and mature trees, and Waters of the US should be considered and avoided to the maximum extent practicable.

Careful thought and analysis will be required to remove and demolish the existing concrete bridge structure. This may include, but not limited to:

- Minimize environmental impacts to the live channel;
- Protection measures to prevent debris falling into the river during removal operations; and,
- Type of restoration efforts needed to stabilize the channel bed and banks once the bridge is removed.

Crossing the river presents a constraint, as the construction of the foundations will have to take into account the sensitive environment, scour potential of the river, as well as the potential lateral migration of the channel.

In addition, to avoid any further disturbance to the river itself, the bridge will have to span the entire width of the river without any intermediate supports. Moreover, when the option exists, the proposed alignment should be located in areas with a land capability of Class 5, rather than the more sensitive lands designated in the Project area as Class 1b due to potential erosion.

2.0 Formulating Alternatives

2.1 Alignment Alternatives

Three alignment alternatives were identified and evaluated for this Report. The alternatives discussed in this section describes the connection at Winnemucca Avenue near Barton Hospital from the west and the connection at Sierra Boulevard/Barbara Avenue intersection from the northeast. In general, the alignments west of the Upper Truckee River follow the existing utility access road and the historic user trail access. The differences between the three alignments are described related to connection(s) to either South Avenue and/or Winnemucca Avenue and the alignment of the proposed bridge crossing at the river. It also worth noting that roadway connections are flexible for each alternative and will be explored more in detail during the design phase.

- Alternative 1 – Proposed bridge location approximately 60 feet upstream of existing concrete bridge; location chosen to minimize the overall length; approximate bridge length is 125 feet long. Alignment continues to the northeast following current user trails.
- Alternative 2 – Proposed bridge location approximately 250 feet downstream of existing concrete bridge; location chosen to optimally reduce the potential of structure foundation scour or location within the floodplain on the east side of the river bank; approximate bridge length is 150 feet long. Then, approximately 750 lineal feet of new trail disturbance created before tying into existing user trail alignment. Alignment continues to the northeast.
- Alternative 3 – Proposed bridge location approximately 120 feet upstream of existing concrete bridge; location chosen to take advantage of the tangent (straight) section of the river alignment potentially reducing the overall length of the proposed bridge; approximate bridge length is 115 feet long. Alignment to the east is similar to Alternative 1.
- Alternative 4 – No-build alternative.

ALT1 – Bridge 60 feet upstream of existing bridge

Alignment 1 features:

Area	*Description*	*Advantage*	*Disadvantage*
Winnemucca Avenue	Direct connection at roadway terminus.	▫ Most direct connection to roadway, shorter alignment. ▫ Minimal roadway improvements.	▫ Doesn't address poor pavement condition. ▫ Steep grade (5% to 12 %) to tie-in

		▫ Direct connection to existing Class 1 at/near 1212 Winnemucca Avenue via a crosswalk. ▫ Minimizes disturbance, utilizes existing disturbed trails.	to existing roadway.
Proximity to existing bridge	60 feet upstream; crosses river immediately south of a bend.	▫ Close to existing bridge; smaller construction boundary/ footprint.	▫ River is wide; bridge would be longer at this location.
East, upland trail alignment	continues east, diverts away from existing trail closer to the river	Utilizes existing disturbed trail.	▫ Grade immediately east of the bridge is very steep, approximately 7% to 10% for at least 250 feet; would require pullout/rest area due to steep grades.
Tahoe Sierra (formerly and commonly known as Sierra Tract subdivision)	follows along an existing, wide user trail closer to fence line of Caltrans snow storage parcel	▫ Utilizes existing disturbed trail. ▫ Minimal tree removal.	

ALT2 – Bridge 250 downstream of existing bridge

Alignment 2 features:

Area	*Description*	*Advantage*	*Disadvantage*
Winnemucca Avenue	Direct connection at roadway terminus.	❑ Similar to Alternative 1.	❑ Longer alignment.
Proximity to existing bridge	Crossing point over the river is downstream of the existing bridge along an area where the river bends to the left (northeast to north river flow).	❑ Pending field survey, maybe the shortest river crossing alignment.	❑ Considerable grade difference from the east bank of river to the west, approximately 17 feet vertically. ❑ Not ideal bridge crossing due to river alignment. ❑ More disturbance on the west of the river to tie back to utility access road.
East, upland trail alignment	Follows existing user trail at top of slope closes to the river; follows paved utility access road.	❑ Grade immediately east of the bridge would be gentle, approximately 1%. ❑ May cost less due to less paving by utilizing existing utility access road. ❑ Takes advantage of already disturbed areas.	❑ Not ideal to share pathway with a vehicle access road, potential vehicle conflicts and cause safety concerns. ❑ Steep grade along STPUD access road newer sewer pump station, grades exceed 10%.

Tahoe Sierra (formerly and commonly known as Sierra Tract subdivision)	Alignment is sinuous.	▫ More enjoyable alignment due to its nonlinear alignment.	▫ Potentially more tree removal; close to Barbara Avenue and vehicles.

ALT3 – Bridge 120 feet upstream of existing bridge

Area	*Description*	*Advantage*	*Disadvantage*
Winnemucca Avenue	Direct connection at roadway terminus.	▫ Similar to Alternatives 1 and 2.	
Proximity to existing bridge	Crossing point over the river is 120 feet upstream of the existing bridge.	▫ Most favorable river crossing due to river alignment and predictability of flows.	▫ Doesn't utilize existing disturbed trail. ▫ More disturbance (vegetation and excavation/grading) to tie-in to existing disturbed trail.
East, upland trail alignment	Remains along existing user trail system.	▫ Stays along the river provides for a more scenic and enjoyable user experience.	▫ Grade immediately east of the bridge would be steep, approximately 5% to 8%, before flattening out to 2% approximately 350 feet east. ▫ Longer alignment, can be more costly and tiresome for inexperienced users due to multiple grade differences.

Tahoe Sierra (formerly and commonly known as Sierra Tract subdivision)	Closer alignment along Barbara Avenue.	❑ Clear visibility along roadway, provides more awareness to vehicles. ❑ Direct connection to existing Class 1 segments at Sierra Boulevard and Barbara Avenue.	❑ More disturbance, does not take advantage of existing user-created trail system along Barbara Avenue.

ALT4 – No-build

Alignment 4 is self-explanatory; project proposes to keep the existing condition. This alternative does not meet the goals and objective of the project. Review and analysis of this alternative is not required.

2.2 Roadway Alternatives

Associated roadway improvements are proposed at locations where the pathway will interface with potential vehicular traffic. These include, but not limited to:

- Americans with Disabilities Act of 1990 (ADA) curb ramps and grades;
- High visibility crosswalk;
- Pavement markings; and,
- Advanced warning signage.

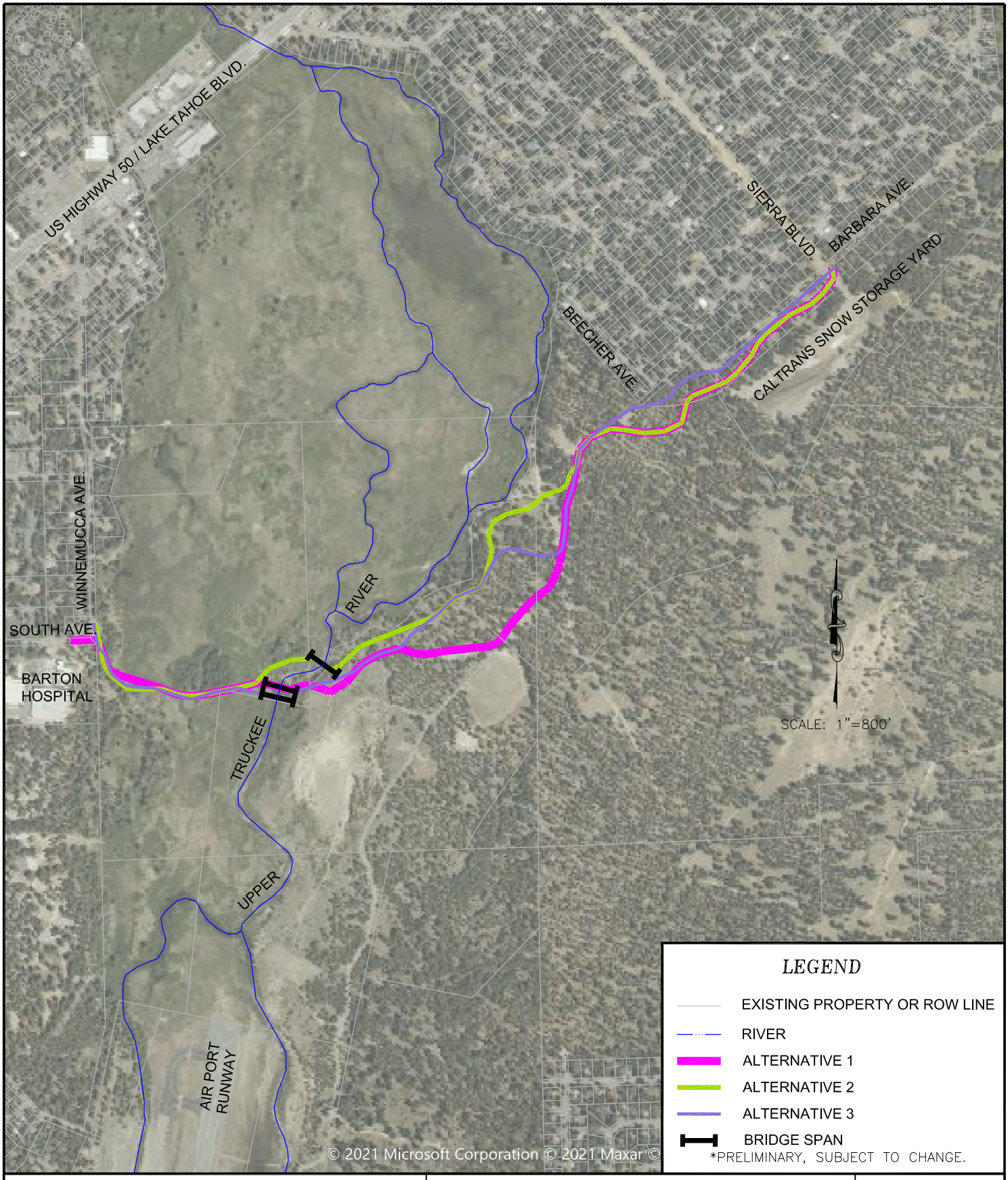
2.3 Bridge Alternatives

The proposed shared use path would cross the Upper Truckee River via a new bridge. The bridge alternatives will follow Basin standards and best practices.

The proposed shared use path bridge will be chosen after reviewing various bridge type options. The structure type will take into account that the bridge will need to be one simple clear span between the abutments. The bridge will be designed for the capacity of carrying pedestrian, bicycle, and standard H10 truck loads (20,000 pound vehicle). The various alternatives have spans ranging in length from 100 feet to 250 feet. Pre-fabricated steel bridges carrying H10 truckloads typically have a maximum clear span of 170 feet.

The location of the shared use path bridge abutments will need to consider the sensitive environmental areas to minimize disturbance of wetlands, vegetation, and trees. The abutment foundations will likely be standard, friction or end bearing, driven concrete piles or steel H-section piles similar to those recently designed and constructed in the Basin.

There are varying regulatory requirements for freeboard between the water surface elevation of the design flow and the bridge soffit elevation from agencies such as the Bureau of Reclamation. The different requirements will be investigated as the Project progresses. Typical bridges are designed to take into account the 50-year design flood requirement of a two-foot minimum freeboard while the 100-year base flood requirement allows for no freeboard.



COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT JOHNSON MEADOW ALIGNMENT ALTERNATIVES

DATE:	PROJECT NO.:	BY:
12/21	95201	dsp

FIGURE 14

3.0 Summary

3.1 Existing Conditions

This Report has sought to describe the existing conditions of the Project area in which a new bike path is proposed. These conditions include the following:

- **Topography**. The topography of the Project area varies, ranging from relatively flat/level to hilly in the forested area.
- **User Trail**. An existing natural ground trail/path/access road is present along the sections of the Upper Truckee River. The alternatives provided are proposed to follow this existing trail to minimize impact to existing land use.
- **Soils**. The Project area soils fall primarily within group A, signifying a moderate to low runoff potential.
- **Land Use**. It is expected that the proposed shared use path would be located within an existing disturbed, compacted area, and therefore the Project would likely not conflict with existing land uses in the area.
- **Land Capability**. The land within the Project area fits into various land capability classifications, while also recognizing the Johnson Meadow area having the most environmentally challenging constraints. TRPA is anticipated to make the findings the Project is considered a Public Outdoor Recreation Facility per TRPA Code of Ordinances[xviii] Section 35.4.2, therefore, will be exempt from SEZ and floodplain impacts. Impacts will be minimized to the maximum extent practicable.
- **Land Ownership**. As discussed in the Report, the shared use path would likely require utilizing public lands; the County will pursue the needed easements and permits for any affected parcels during the development of the preferred project alignment.
- **Utilities**. Multiple utility access roads regularly used by STPUD lies within the general Project area and may pose as an opportunity, as well as a constraint as the Project moves forward. The County will consult with STPUD should any planned improvements conflict with this feature.
- **Environmental Resources**. Appropriate environmental inventories including, biological, wetland/Waters of the U.S. and cultural, will be conducted and sensitive resources identified. Generally, the proposed pathway will avoid these resources to the maximum extent practicable. Where the resources cannot be avoided (e.g., sensitive vegetation and wetlands areas), potential impacts will be mitigated to the maximum extent feasible.
- **Hydrology**. Water quality improvements, utilizing low impact development principles, will be part of the Project.

3.2 Formulating Alternatives

Three alignment alternatives were described and evaluated in this Report. In general from Winnemucca Avenue and west of the river, there is one proposed alignment alternative which follows the existing utility access road; while east of the river, the existing trail network diverges in different directions. By remaining close to the existing disturbed area, the proposed shared use trail would minimize its new disturbance, avoid landscaping on private property, and close proximity to residential land. However, disadvantages include the potential loss of dense groves of mature trees, grade issues, and potential disturbance to existing drainages. Following the any of the proposed alignment alternatives would be advantageous in that the alignment would remain within the existing disturbed trail; there would potentially be fewer disturbances to mature vegetation and trees, and the proposed alignment could make use of existing cleared trails.

Currently, there are three possible alternatives for the proposed bridge over the Upper Truckee River. The complexity of the design and constructability arises from the sensitive environment as well as various site constraints. In considering the alternatives, the design of the proposed bridge will need to account for overall bridge length for cost considerations, grade challenges for user comfort and ADA standards consistency, potential floodplain impacts, vegetation removal, and consideration of tree removal impacts.

4.0 References

4.1 References

[i] Storm Water Quality Improvement Committee, *Lake Tahoe Basin Storm Water Quality Improvement Committee (SWQIC), Formulating and Evaluating Alternatives for Water Quality Improvement Projects*, July 2004.

[ii] Tahoe Regional Planning Agency. *Sierra Boulevard Complete Streets Project (From US Highway 50 to Barbara Avenue)*. Retrieved January 19, 2021, from https://www.laketahoeinfo.org/Project/Detail/290

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[iv] Tahoe Regional Planning Agency and Tahoe Metropolitan Planning Organization, *Linking Tahoe: Active Transportation Plan*, March 2016, page 4-45.

[v] City of South Lake Tahoe. *Tahoe Valley Area Plan*. Retrieved January 19, 2021, from https://cityofslt.us/734/Tahoe-Valley-Area-Plan

[vi] United States Department of Agriculture, Natural Resources Conservation Service. 2007. *Soil Survey of the Tahoe Basin Area, California and Nevada*. Accessible online at: http://soils.usda.gov/survey/printed_surveys/.

[vii] *Tahoe Valley Area Plan*, page 16.

[viii] California Tahoe Conservancy. Wildlife Enhancement. Retrieved March 23, 2022, from https://tahoe.ca.gov/programs/water-quality-watersheds/wildlife-enhancement/

[ix] County of El Dorado, *Drainage Manual*, March 1995, Section 2.

[x] Tahoe Regional Planning Agency, *Lake Tahoe Water Quality Management Plan*, June 2013, page 20.

[xi] State of California Lahontan Regional Water Quality Control Board, *Water Quality Control Plan for the Lahontan Region* (Basin Plan), March 1995, page 4.3 - 3.

[xii] County of El Dorado, *Drainage Manual*, March 1995, Section 6.

[xiii] State of California Department of Transportation (Caltrans), *Local Assistance Procedures Manual*, January 2022, *Chapter 11*.

[xiv] State of California Department of Transportation (Caltrans), *Highway Design Manual*, December 2020, Chapter 820.

[xv] United States Department of Agriculture, Forest Service. 2000. *Lake Tahoe Watershed Assessment*.

[xvi] California Legislative Information. Senate Bill No. 743. Retrieved January 21, 2021, from http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB743

[xvii] State of California Lahontan Regional Water Quality Control Board, *Water Quality Control Plan for the Lahontan Region* (Basin Plan), March 1995, page 5.2 - 1.

[xviii] Tahoe Regional Planning Agency, *Code of Ordinances*, December 2012, amended February 2022, page 35-2.

Appendix A

HYDROLOGY AND HYDRAULICS

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

INTEROFFICE MEMORANDUM

Date: TBD

To: File

From: Donaldo Palaroan, PE

Subject: South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow Project Hydrologic Analysis Report, County Project 95201 (36107023)

1. Introduction

1.1. General

The South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow Project area lies in El Dorado County, California, within and between the boundaries of the Tamarack Subdivision Addition No. One and the Aram Subdivision Unit No. One. It follows a potential alignment roughly matching a compacted dirt user-created trail that starts at the south end terminus of Winnemucca Avenue, to the east onto public lands owned by the Tahoe Resource Conservation District (TRCD) towards the Upper Truckee River, crossing the river and following user trails towards the intersection of Sierra Boulevard and Barbara Avenue. The Project involves the evaluation of approximately 1.2 miles of Class 1 shared use pathway linking Barton Memorial Hospital at South Avenue within the eastern limits of the Tahoe Valley Area Plan and the Tahoe Sierra (formerly Sierra Tract) subdivision, crossing the Upper Truckee River just north of the Lake Tahoe Airport. The Project is located in the southern section of the Lake Tahoe Basin in Sections 3 and 4 of Township 12 North, Range 18 East, Mount Diablo Meridian. The Project is bordered by Winnemucca Avenue on the west, U.S. Highway 50 (US 50) on the north, the Lake Tahoe Airport on the south and Sierra Boulevard on the east. The total Project area is approximately 24.4 acres and encompasses City of South Lake Tahoe Right of Way (ROW), TRCD parcel, a City of South Lake Tahoe (CSLT) parcel, California Tahoe Conservancy (Conservancy) parcels, a South Tahoe Public Utility District (STPUD) parcel, a United States Department of Agriculture (USDA) Forest Service (USFS) parcel, and a California Department of Transportation (Caltrans) parcel, (see Figure 1). The South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow Project is funded through preliminary engineering from the Surface Transportation Block Grant (STBG) Program and Tahoe Regional Planning Agency (TRPA) Air Quality Mitigation funds.

The Project builds upon the Dennis T. Machida Memorial Greenway and provides a critical link to the bicycle network from Barton Memorial Hospital and the surrounding neighborhoods and provides a crossing of the Upper Truckee River without having to travel on US 50. The Project supports the *Linking Tahoe: Active Transportation Plan*, approved by the Tahoe Metropolitan Planning Organization in March 2016. The Project proposes to install a shared use path bridge

over the Upper Truckee River just north of the Lake Tahoe Airport and link to the extensive user-created trail system on the east side of the river. This portion of the Greenway Bikeway will terminate at the beginning of the phase of the Project completed in 2021 by the County of El Dorado and the Sierra Boulevard Complete Streets Project completed by the City of South Lake Tahoe.

1.2. Purpose

The purpose of this drainage analysis is to develop 10-year, 25-year, 50-year, and 100-year peak flows to provide a hydraulic evaluation to assist in the selection of the proposed bridge location. This report is intended to detail and document the hydrologic parameters and assumptions used to forecast the flows applicable to design the boardwalk and bridge at the Upper Truckee River. The final location of the proposed bridge is still unknown and this evaluation will be used to assist in selecting that location. For the purposes of this evaluation the analysis was done at a proposed location that is approximately 58 feet upstream of the existing crossing that was washed out by storms in the winter of 2017. There are two other alternative locations being evaluated. One is approximately 313' downstream of the evaluated location and one 68 feet upstream of the evaluated location. The differences in the analyses for the three proposed locations will be minimal so the results of the analysis for the chosen location will be used to design the bridge and boardwalk for the final location that is selected (see Figure1).

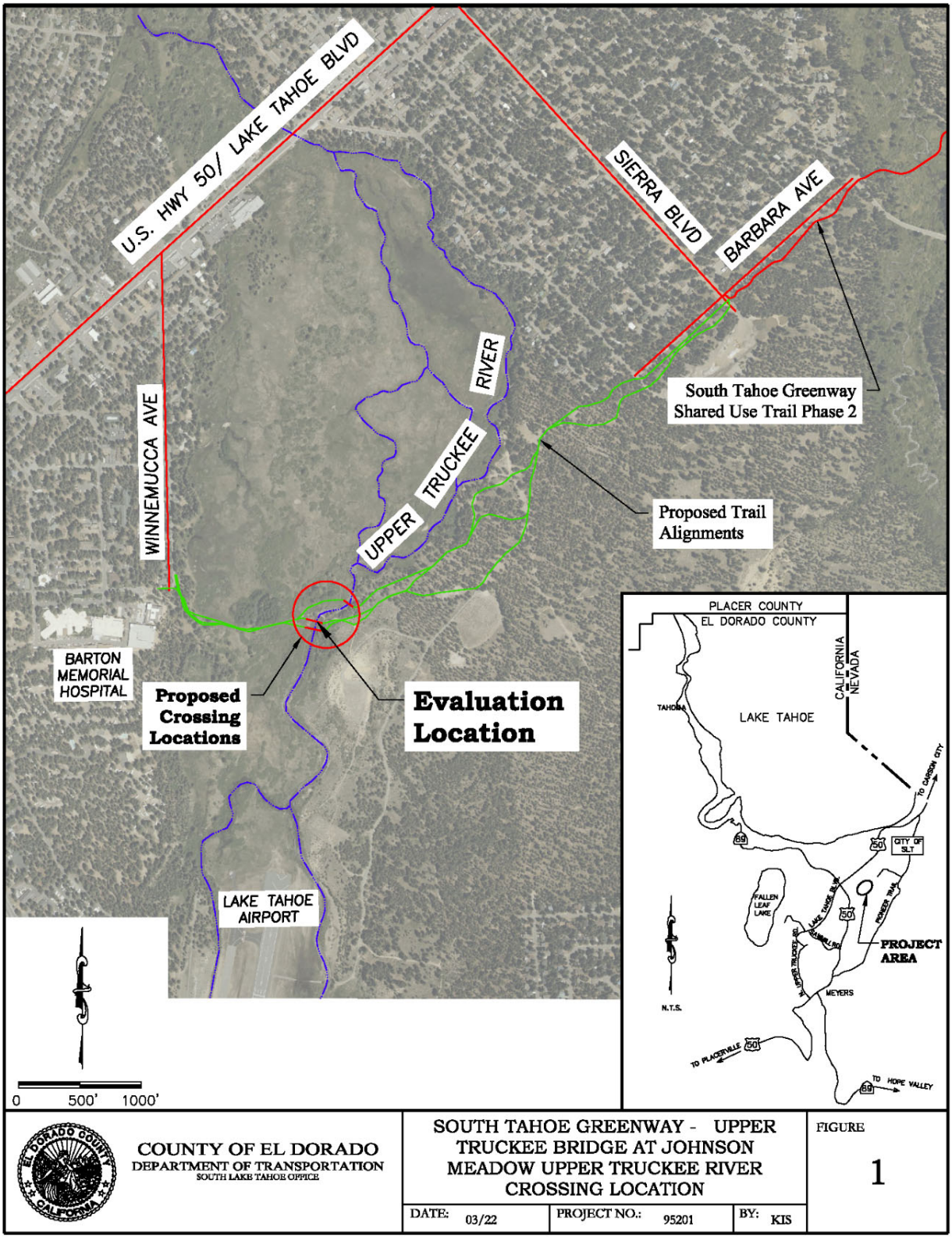


Figure 1: South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow Crossing Locations

2. Background

The drainage analysis is necessary to ensure that the proposed bridge will meet the specific design standards provided by El Dorado County, Department of Transportation (County) and California Department of Transportation (Caltrans). County does not provide specific freeboard design criteria. However, the County has a practice of designing freeboard based on Caltrans Highway Design Manual. The proposed bridge design will satisfy the following standards:

1. County of El Dorado Drainage Manual, dated March 1995[1]
2. Caltrans Local Assistance Procedure Manual, Chapter 11, dated July 23, 2006[2]
    - The basic rule for hydraulic design of bridges is that they should be designed to pass the two percent (2%) probability flood or tide (Q_{50}) or the flood-of-record, whichever is greater without causing objectionable backwater, excessive flow velocities, or encroaching on through traffic lanes. Sufficient freeboard, the vertical clearance between the lowest structural member, and the water surface elevation of the design flood should be provided. A minimum freeboard of 2 feet is often assumed for preliminary bridge design.
    - The final design should be able to convey the base flood, Q100.
    - The minimum design flood for foundation analysis should be the base flood (Q100). Bridges with scourable beds should withstand the effects of the base flood (Q100) without failure.
3. Caltrans Highway Design Manual dated December 2018[3]
    - The basic rule for the hydraulic design of bridges is that they should pass a 2% probability flood (50-year).
    - Freeboard, vertical clearance between the lowest structural member and the water surface elevation of the design flood, sufficient to accommodate the effects of the bedload and debris should be provided. Alternatively, a waterway area sufficient to pass the 1 percent probability flood without freeboard should be provided. Two feet of freeboard is often assumed for preliminary bridge design.

3. Previous Studies and Reference Documents

The USGS has been operating stream gauges at two locations that were used to get data for the analysis. Gauge 103366092 at the US 50 crossing in Meyers has data from 1990 to present day[4]. A frequency curve was developed using the recorded peak flows from this gauge site to get the flows at this point for analysis (Appendix C). Gauge 10336610 at the US 50 crossing in South Lake Tahoe has data from 1972 to present day[5]. A frequency curve was developed using the recorded peak flows from this gauge site to compare to results from the analysis (Appendix C).

According to Federal Emergency Management Agency (FEMA) maps 06017C0386F dated April 3, 2012 for the US 50 crossing, the proposed bridge and boardwalk locations carry flood zone designations[6]. The 100 year base flood is approximately 6242 feet near the proposed bike path crossing. This value was obtained by overlaying the FEMA 100 year base flood line as it relates to the project existing surface which uses the National Geodetic Vertical Datum of 1929 (NGVD29). This analysis will be used to calculate and refine this elevation.

4. Hydrology

4.1. Basin Characteristics

The analysis consists of seven Upper Truckee River sub-basins. Six are upstream of the proposed bridge location and one is downstream of the proposed bridge location. The six upstream are sub-basins A1 (UTR Above Meyers) (approximately 39.1 square miles), B1 (Chiapa) (approximately 0.36 square miles), B2 (Angora Creek) (approximately 4.8 square miles), B3 (Meyers Creek) (approximately 1.3 square miles), B4 (Apalachee/Golden Bear) (approximately 0.35 square miles), and B5 (UTR Below Meyers). These six sub-basins were used to get results at the proposed bridge location for design parameters. Sub-basin C1 (Johnson Meadow) (approximately 0.69 square miles) is upstream of the Upper Truckee River Crossing at South Lake Tahoe and was used to calculate flows at that point to compare to actual measurements at a USGS gauge that is located there. Sub-basin A-1 (UTR Above Meyers) is approximately 10 miles in length and 6.5 miles in width with a slightly elongated shape and a spur in the northwest region encompassing the Echo Lake drainage. In general, the basin consists of mountainous terrain within the unincorporated area of El Dorado County at elevation ranges from 6320 feet to 9590 feet. This basin is roughly aligned south-north and east-west with an average slope of the watershed of approximately 8 percent (see Figure 2). Sub-basin B1 (Chiapa) tributary area is approximately 1.0 mile in length and 0.5 miles in width with an elongated southwest-northeast shape. In general, the basin consists of a sparsely developed neighborhood within mountain terrain located within the unincorporated areas of El Dorado County at elevation range from 6310 feet to 6690 feet. This basin is roughly aligned southwest-northeast with an average watershed slope of 7 percent (see Figure 2). This watershed was delineated to calculate flows at the San Bernardino Bike Path Upper Truckee River crossing and was included in this project to be able to build upon the analysis that was done for that project. Sub-basin B2 (Angora Creek) is approximately 4.3 miles in length and 2.0 miles wide with an elongated southwest-northeast shape and encompasses Angora Creek and its tributary area's contribution to the Upper Truckee River. In general, the southwest portion of the basin consists of mountainous terrain within the unincorporated area of El Dorado County at elevation ranges from 6606 feet to 8811 feet and the remainder of the basin consists of sparsely developed neighborhoods within mountain and meadow terrain located within the unincorporated areas of El Dorado County at elevation range from 6276 feet to 6606 feet. This basin is roughly aligned southwest-northeast with an average watershed slope of 11 percent (see Figure 2). This watershed combines with the Upper Truckee River in the northern portion of the Lake Tahoe Golf Course. Sub-basin B3 (Meyers Creek) is approximately 2.1 miles in length and 1.1 miles wide and encompasses Meyers Creek and its tributary area's contribution to the Upper Truckee River. In general, the southern portion of the basin consists of mountainous terrain within the unincorporated area of El Dorado County at elevation ranges from 6470 feet to 7665 feet and the remainder of the basin consists of neighborhoods in Meyers off of US 50 and Pioneer Trail and includes Tahoe Paradise Golf Course and the southwest portion of Lake Tahoe Golf Course located within the unincorporated areas of El Dorado County at elevation range from 6268 feet to 6470 feet. This basin is roughly aligned south-north with an average watershed slope of 11 percent (see Figure 2). This watershed combines with the Upper Truckee River in the northwest portion of the Lake Tahoe Golf Course. Sub-basin B4 (Apalachee/Golden Bear) is approximately 0.8 miles in length and 0.7 miles wide and encompasses the Upper Truckee River tributary area between the northern portion of the Tahoe Paradise Addition Unit No.4 subdivision and the southwestern portion of the Montgomery Estates Unit No. 7 subdivision . In general, the basin consists of these wooded neighborhoods and the meadow drainage between them within the unincorporated area of El Dorado County at elevation ranges from 6247 feet to 6490 feet. This basin is roughly aligned south-north with an

average watershed slope of 3 percent (see Figure 2). This watershed combines with the Upper Truckee River in the northeast portion of the Lake Tahoe Airport. Sub-basin B5 (UTR Below Meyers) is approximately 5.8 miles in length and 0.7 miles wide and is the main watershed for the Upper Truckee River below the US 50 crossing in Meyers . In general, the southwest portion of the basin consists of mountainous terrain and the neighborhoods in Meyers west of US 50 and contains most of the Lake Tahoe Golf Course within the unincorporated area of El Dorado County at elevation ranges from 6268 feet to 8893 feet. The northeast portion of the basin consists of the neighborhoods just west of Pioneer Trail within the unincorporated area of El Dorado County and the Lake Tahoe Airport with in the city limits South Lake Tahoe at elevation ranges from 6242 feet to 6268 feet. This basin is roughly aligned southwest-northeast with an average watershed slope of 6 percent (see Figure 2). This watershed combines with the Upper Truckee River just northwest of Tahoe Paradise Park. Sub-basin C1 (Johnson Meadow) is approximately 0.9 miles in length and 0.9 miles wide and encompasses Johnson Meadow between the proposed bridge and the Upper Truckee River US 50 crossing in South Lake Tahoe. In general, the basin consists of Johnson Meadow and the surrounding neighborhoods. It also includes the wooded area east of Johnson Meadow where the proposed alignment of the trail is. The Meadow is within the unincorporated area of El Dorado County and the neighborhoods are in the City of South Lake Tahoe. The elevation ranges from 6234 feet to 6384 feet. This basin is roughly aligned south-north with an average watershed slope of 2 percent (see Figure 2).

4.2. Soil Characteristics

The County will have a geotechnical study done in the future that will provide a geotechnical report with soil borings located near the proposed Upper Truckee River crossing. This report will give detailed soil characteristics that will assist in the design of the proposed bridge and boardwalk.

4.3. Groundwater

The presence and depth of groundwater within the proposed alignment will be determined once a geotechnical study is completed and will assist in the design of the proposed bridge and boardwalk.

4.4. Climate

The average temperatures in the vicinity of the project are approximately 80ºF in August and approximately 18ºF in winter. The winter storm season typically extends from November to April, and storms generally moves from west to south-west and travels in a northeasterly to easterly direction.

4.5. Rainfall Data

Generally, the project area receives precipitation during winter months. Precipitation data used for model input was obtained from the County of El Dorado Drainage Manual. The Mean Annual Precipitation (MAP) for the watersheds that affect the project area can be found in Table 1 and Appendix A.

4.6. Time of Concentration

Time of concentration estimations were performed per the County of El Dorado Drainage Manual. Sheet flow is assumed to occur for maximum length of 300 ft and sheet flow travel time is calculated based on the following equation:

$$T_t = \frac{0.007(nL)^{0.08}}{(P_2)^{0.5} S^{0.4}}$$

Where:
T_t = sheet flow travel time, in hr
n = overland-flow roughness coefficient, 0.4 was chosen for this project
L = length of overland flow surface, in ft (maximum 300 ft.)
P_2 = 2-yr, 24-hr rainfall depth in inches
S = land slope, in ft/ft.

The velocity of shallow flow over an unpaved surface is estimated based on the following equation:

$V = 16.1345(\sqrt{S_o})$
Where, V = shallow-concentrated flow velocity, in ft/sec;
S_o = slope, in ft/ft.

The County of El Dorado Drainage Manual was used to obtain the 2-year event flow. The 2-year event flow was used to calculate the velocity. The flow travel time is the channel length divided by the flow velocity.

The velocity of channel flow is estimated based on the following equation derived from the Manning's Equation:

$$V = \frac{k}{n} R_h^{2/3} S^{1/2}$$

where:

- V is the cross-sectional average velocity (L/T; ft/s, m/s);
- n is the **Gauckler–Manning coefficient**. Units of n are often omitted, however n is not dimensionless, having units of: (T/[$L^{1/3}$]; s/[$ft^{1/3}$]; s/[$m^{1/3}$]).
- R_h is the hydraulic radius (L; ft, m);
- S is the slope of the hydraulic grade line or the linear hydraulic head loss (L/L), which is the same as the channel bed slope when the water depth is constant. ($S = h_f/L$).
- k is a conversion factor between SI and English units. It can be left off, as long as you make sure to note and correct the units in the n term. If you leave n in the traditional SI units, k is just the dimensional analysis to convert to English. $k = 1$ for SI units, and $k = 1.49$ for English units. (Note: $(1\ m)^{1/3}/s = (3.2808399\ ft)^{1/3}/s = 1.4859\ ft^{1/3}/s$)

This calculation was done for The Flood Insurance Study, El Dorado County, California and Incorporated Areas done by the Federal Emergency Management Agency (FEMA) Revised April 3, 2012[7]. In this study the Upper Truckee River, Angora Creek and other waterways in the county were evaluated at certain cross sections that are shown on the FEMA FIRMs where the inputs to the equation were field verified. This study also shows the length of the waterway that applies to the calculated velocities. Channel flow travel time is the sum of flow path lengths divided by the velocities for the channel reaches of interest.

Total time of concentration was computed as the sum of the sheet flow travel time, the shallow flow travel time and the channel flow travel time. A summary of the resulting time of concentration values for the sub-basins are listed in Table 1. Appendix A provides details of each time of concentrations. The measured data from the USGS gauge (USGS103366092) was used for the UTR Above Meyers sub-basin in place of modeled data.

5. Hydrologic Model Development

Mean Annual Precipitation data was obtained from the County of El Dorado Drainage Manual dated March 14, 1995 (see appendix A) which then was utilized with the USACE HEC-HMS Program Version 4.2 dated August, 2016[8] to develop a hydrologic model for the Upper Truckee River crossing tributary watersheds. The hydrologic model upstream of the bridge was divided into six sub-basins. Figure 2 shows the sub-basin delineations for the proposed bridge. There is also one sub-basin downstream of the bridge (Figure 2) that was delineated to be able to calculate flows at the Upper Truckee River crossing at US 50 in South Lake Tahoe. This was done so a comparison could be made between calculated flows and flow data from a USGS gauge (USGS10336610).

5.1. Hydrologic Parameters

Appendix A provides the HMS model diagram and Mean Annual Precipitation for the individual watersheds. Also included in Appendix A are the 24 hour precipitation, sheet and shallow concentrated flow travel time, channel flow travel time, and total time of concentration. Parameters used in the hydrologic model were based on concept of the Soil Conservation Service (SCS) Curve Number (CN) method. A unit hydrograph (UH), based on SCS type 1A temporal distribution consistent with the County of El Dorado Drainage Manual was used to simulate the runoff of excess precipitation. Guidelines given in the Drainage Manual recommend using type 1A temporal distribution for projects located at an elevation above 1640 ft in elevation.

The design model storms were based on 24-hour duration for a 10-year, 25-year, 50-year, and 100-year storm frequency using:

- Precipitation depth and hydrologic parameters provided by the County of El Dorado Drainage Manual, See Appendix A.

Table 1 summarizes the input parameters used for the HEC-HMS hydrologic modeling, including curve number, conveyance and rainfall.

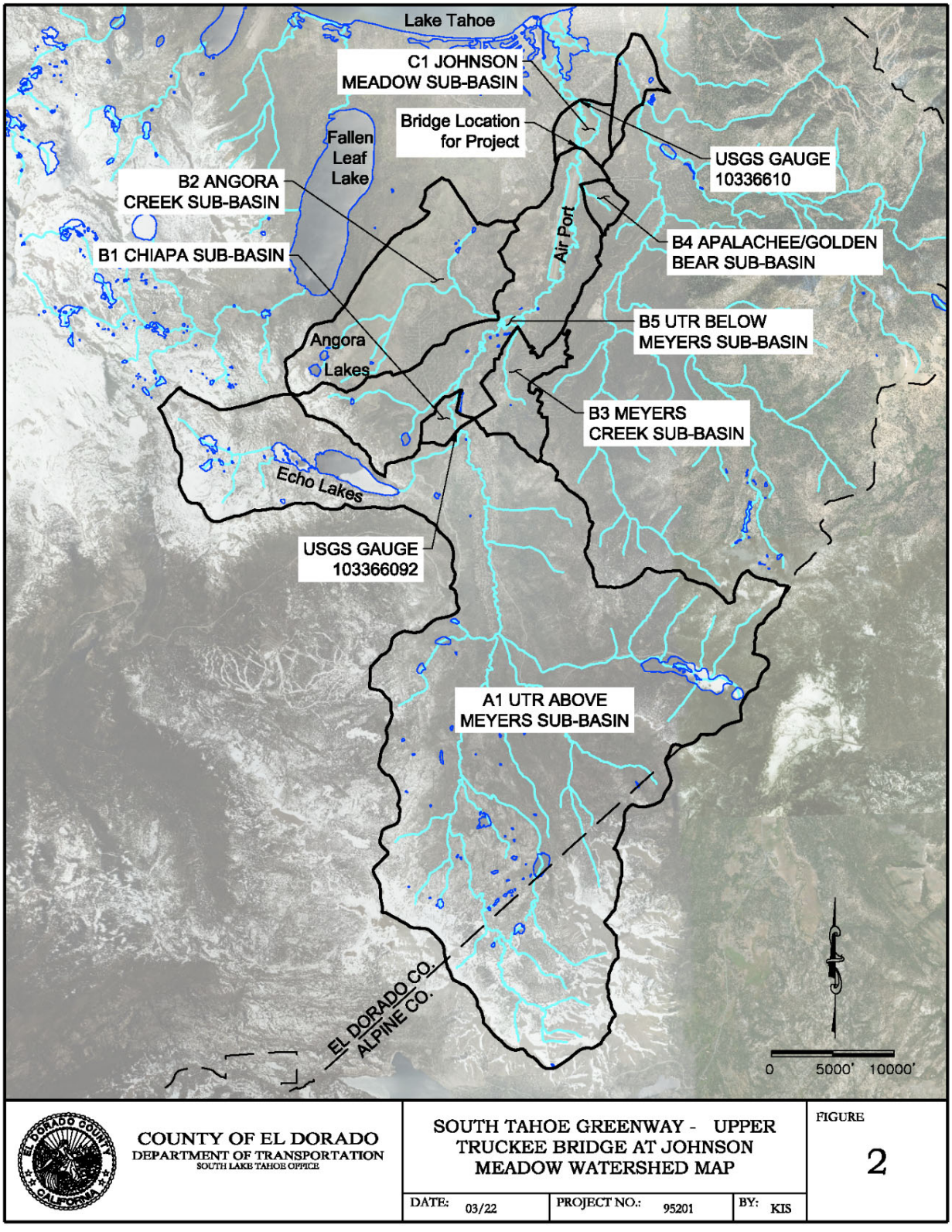


Figure 2: Upper Truckee River Sub-basin Delineations

Table 1: Hydrologic Model Summary Parameters for shared use bridge at Upper Truckee

Parameters	**Upper Truckee Crossing**						
Sub-basin	**A1**	**B1**	**B2**	**B3**	**B4**	**B5**	**C1**
Watershed Area (mi^2)	39.1	0.36	5.64	1.25	0.35	6.39	0.68
Loss Rate	-	SCS CN	SCS CN	SCS CN	SCS CN	SCS CN	SCS CN
Transform method	Log Pearson	SCS UH	SCS UH	SCS UH	SCS UH	SCS UH	SCS UH
Loss Rates							
Initial Abstraction (in)	-	4.67	3.24	3.49	4.24	2.65	4.51
Curve Number	-	30	38	36	32	43	31
Impervious Area (%)	-	7.54	4.94	14.89	4.84	9.18	11.28
Transformation							
Graph Type	-	Standard	Standard	Standard	Standard	Standard	Standard
Time of Concentration (min)	-	47.7	87.5	236.9	100.9	220.0	171.9
Lag Time (min)	-	28.6	52.5	142.1	60.6	132.0	103.1
Precipitation							
Hydrograph Duration	-	24 hour	24 hour	24 hour	24 hour	24 hour	24 hour
Temporal Distribution	-	Type 1A	Type 1A	Type 1A	Type 1A	Type 1A	Type 1A
Mean Annual Precipitation (in)	-	38	35	28	18	30	18
100-year precipitation (in/day)	-	6.94	6.39	5.11	3.29	5.48	3.29
50-year precipitation (in/day)	-	6.36	5.86	4.69	3.01	5.02	3.01
25-year precipitation (in/day)	-	5.76	5.30	4.24	2.73	4.55	2.73
10-year precipitation (in/day)	-	4.91	4.52	3.62	2.33	3.88	2.33

5.2. Land Use/Hydrologic Soil Type/Curve Number

Land use was determined using the Natural Resource Conservation Service (NRCS) web soil survey which indicates that the watershed partially consists of steep mountainsides, areas of less steep land that occur in riparian corridors, and meadows along with residential areas in the less steep land. The majority of the soils are Meeks gravelly and loamy coarse sand, Celio loamy coarse sand, and Tahoe complex. Weighted SCS curve numbers were used in the model and chosen from "runoff curve numbers for other agricultural lands". Appendix A provides the watershed hydrologic soil group data.

5.3. Peak Discharges

Peak discharges were analyzed using HEC-HMS. Appendix B provides the peak flow hydrographs developed from the HEC-HMS models for 10-year, 25-year, 50-year, and 100-year and peak flows. A combination of peak flows from HEC-HMS and from a frequency analysis of the US 50 USGS gauge data were combined to generate peak flows for input into the HEC-RAS model. Using the combined flows is a conservative approach with the assumption that peak flows from the gauged watershed (UTR Above Meyers Sub-basin) are present at the beginning of the modeled storms. Table 2 lists the HEC-HMS peak discharge data based on hydrologic model parameters listed in Table 1.

Table 2: Hydrograph Analysis Summary of Results

Upper Truckee River Crossing

HEC-HMS Node Location	Sub-basin Area (mi^2)	Cumulative Sub-basin Area (mi^2)	10-yr Peak Flow (cfs)	25-yr Peak Flow (cfs)	50-yr Peak Flow (cfs)	100-yr Peak Flow (cfs)
UTR Above Meyers[1]	*39.3*		*2104*	*3123*	*4054*	*5149*
Chiapa	0.36		16.1	18.8	20.8	22.7
Angora Creek	5.6		120.2	141.0	155.9	171.4
Meyers Creek	1.3		42.3	49.6	54.9	59.8
Apalachee/ Golden Bear	0.35		3.6	4.2	4.6	5.0
UTR Below Meyers	6.4		147.7	173.2	191.8	216.4
New Bridge[2,3]		53.2	2416.8	3489.7	4459.3	5594.9
Johnson Meadow	0.7		12.6	14.7	16.2	17.7
Combined Flows[3]		53.9	2428.6	3503.6	4474.6	5611.7
US 50 Gauge SLT[4]		53.9	2072	3155	4182	5428

1. USGS Gauge US 50 Meyers (USGS1033666092)
2. Flows at new bridge crossing were based on modeled peak flows for the delineated watersheds combined with gauge flows at US 50 in Meyers (USGS103366092).
3. Combined flows are a result of Combined Time Series Flows and may not necessarily be a numerical sum of the individual watershed flows because the peak may not all arrive at the same time.
4. USGS Gauge US 50 Meyers (USGS103366610) to compare modeled results to gauge measurements.

5.4. Model Reasonableness

There are two stream gauges that were used in this evaluation. One at the US 50 bridge in Meyers (USGS103366092) where data has been recorded from 1990 to present day. During this time, the maximum observed peak flow reached 5120 cfs on January 2, 1997, and the other one at the US 50 bridge in South Lake Tahoe (USGS10336610) where data has been recorded from 1972 to present day. During this time, the maximum observed peak flow reached 5480 cfs on January 2, 1997. Flood frequency curves for the data available from the gauges can be found in Appendix C. The frequency curves were generated from this data set using PeakFQ software, version 7.2, developed by the United States Geological Survey[9]. As a conservative approach the results from PeakFQ at the gauge in Meyers were added to the peak flows generated from the HEC-HMS model, at the specified recurrence intervals, to solve for peak flows at the new bridge crossing. As a check, the results from PeakFQ at the gauge in South Lake Tahoe were compared to the results of the HEC-HMS model at the specified recurrence intervals.

Appendix A: HEC-HMS Model Parameters

Appendix B: HEC-HMS Results

Appendix C: Flood Frequency Curve for US 50 Bridges at Meyers and at South Lake Tahoe

6. References

[1] County of El Dorado (March 1995), *Drainage Manual*.

[2] Caltrans (July 2006), *Local Assistance Procedure Manual Sixth Edition*, Page 11-18 and 11-19.

[3] Caltrans (December 2020), *Highway Design Manual Sixth Edition*, Page 820-2.

[4] https://waterdata.usgs.gov/ca/nwis/inventory/?site_no=103366092&agency_cd=USGS.

[5] https://waterdata.usgs.gov/ca/nwis/inventory/?site_no=10336610.

[6] FEMA Flood Control Maps. Available at https://msc.fema.gov/portal/home.

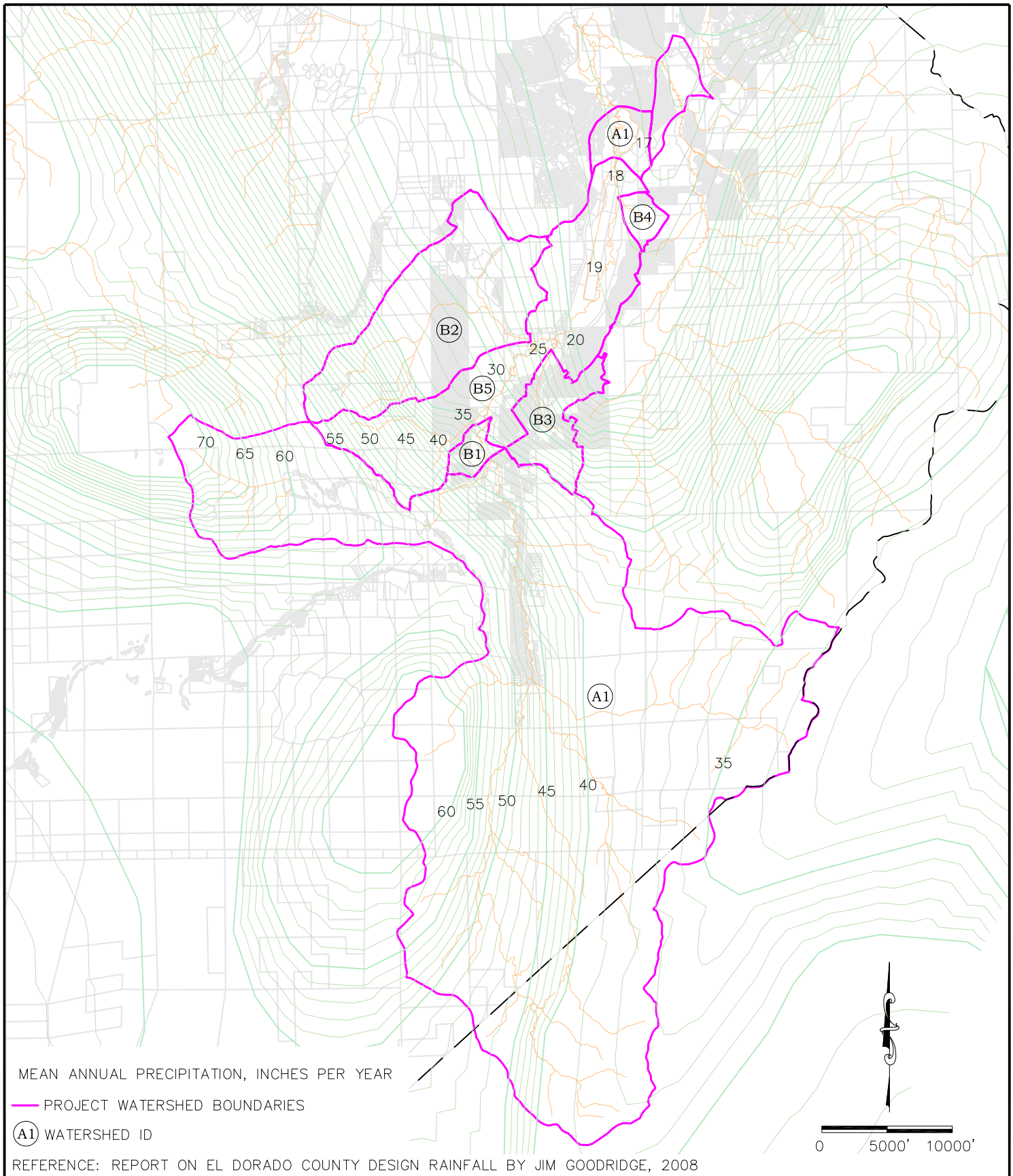
[7] FEMA (Revised April 2012) Flood Insurance Study, El Dorado County, California and Incorporated Areas

[8] USACE (August 2016), Hydrologic Engineering Center-Hydrologic Modeling System version 4.2.

[9] USGS (March 2018), PeakFQ – Annual Flood-Frequency Analysis Using Bulleting 17B Guidelines. Version 7.2.

Appendix A

HEC- HMS Parameters



REFERENCE: REPORT ON EL DORADO COUNTY DESIGN RAINFALL BY JIM GOODRIDGE, 2008

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT JOHNSON MEADOW MEAN ANNUAL RAINFALL MAP

FIGURE 1

DATE:	PROJECT NO.:	BY:
03/22	95201	KIS

Table A-1 Depth Duration Frequendcy (2008 Goodridge Tables)

24 Hour SCS Storm Type 1A

	2 YR	**10 YR**	**25 YR**	**50 YR**	**100 YR**
MAP	1 day	1 day	1 day	1 day	1 day
16	1.30	2.07	2.42	2.68	2.92
18	1.47	2.33	2.73	3.01	3.29
20	1.63	2.58	3.03	3.35	3.65
22	1.79	2.84	3.33	3.68	4.02
24	1.95	3.10	3.64	4.02	4.38
26	2.12	3.36	3.94	4.35	4.75
28	2.28	6.62	4.24	4.69	5.11
30	2.44	3.88	4.55	5.02	5.48
35	2.85	4.52	5.30	5.86	6.39
38	3.10	4.91	5.76	6.36	6.94
40	3.26	5.17	6.06	6.70	7.31
45	3.67	5.81	6.82	7.53	8.22
50	4.07	6.46	7.58	8.37	9.13

UTR Above Meyers Sub-basin: Average MAP 45"
Chiapa Sub-basin: Average MAP 38"
Angora Creek Sub-basin: Average MAP 35"
Meyers Creek Sub-basin: Average MAP 28"
Apalachee/Golden Bear Sub-basin: Average MAP 18"
UTR Below Meyers Sub-basin: Average MAP 30"
Johnson Meadow Sub-basin: Average MAP 18"

Time of Concentration and Lag Time

B1 Chiapa

Longest flowpath for watershed

	Overland Sheet Flow					Shallow Unpaved[2]						Channel Flow[3]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
CHIAPA	300	3.1	21.52%	0.4	20.3	3117	Varies	Varies	Varies	Varies	12.4	Varies	2946	Varies	9.0	47.7	**28.6**

1. Plus 6 minutes per TR-55 for watersheds that are not already concentrated (have Overland Sheet Flow Component).
2. Shallow Unpaved travel time based on multiple lengths at differing slopes (below).
3. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Shallow Unpaved						Channel Flow			
Length	High	Low	Slope	Velocity	Tt(min)	X-Section	Length	Velocity	Tt(min)
2284	6623.16	6323.45	13.12%	5.84	6.5	Q	1520	3.9	6.5
833	6323.45	6305.63	2.14%	2.36	5.9	P (Partial)	1426	9.4	2.5

B1 Chiapa

Flowpath coming from A1 (UTR Above Meyers)

	Overland Sheet Flow					Shallow Unpaved						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
CHIAPA				0.4	0.0						0.0	Varies	4246	Varies	11.1	11.1	**6.7**

1. 6 minutes not added for flows that are alrady conentrated (no Overland Sheet Flow).
2. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Channel Flow			
X-Section	Length	Velocity	Tt(min)
R (Partial)	1300	10.4	2.1
Q	1520	3.9	6.5
P (Partial)	1426	9.4	2.5

Average Mean Annual Precipitation (MAP) for watershed, in inches per year: 38

B2 Angora Creek

Longest flowpath for watershed

	Overland Sheet Flow					Shallow Unpaved[2]						Channel Flow[3]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
Angora Creek	300	2.85	68.99%	0.4	13.3	11776	Varies	Varies	Varies	Varies	32.7	Varies	10841	Varies	35.5	87.5	**52.5**

1. Plus 6 minutes per TR-55 for watersheds that are not already concentrated (have Overland Sheet Flow Component).
2. Shallow Unpaved travel time based on multiple lengths at differing slopes (below).
3. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Shallow Unpaved						Channel Flow			
Length	High	Low	Slope	Velocity	Tt(min)	X-Section	Length	Velocity	Tt(min)
2064	8604.07	7444.99	56.16%	12.09	2.8	I	1130	10.0	1.9
9712	7444.99	6350.19	11.27%	5.42	29.9	H	690	4.1	2.8
						G	1160	5.5	3.5
						F	1290	10.1	2.1
						E	1660	8.2	3.4
						D	1200	8.2	2.4
						C	1140	3.7	5.1
						B	1300	2.4	9.0
						A (Partial)	1271	4.1	5.2

Average Mean Annual Precipitation (MAP) for watershed, in inches per year: 35

B3 Meyers Creek

Longest flowpath for watershed

	Overland Sheet Flow					Shallow Unpaved						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	Legnth (ft)	High Elev (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
Meyers Creek	NA*	2.28	NA*	0.4	202.7	2563	6290.61	6267.94	0.88%	1.52	28.2				0.0	236.9	**142.1**

* Note: This Tt number was gotten from a detailed watershed analysis for Meyers ECP (95179) and includes overland flow and shallow unpaved flows. It is only to Country Club Dr. and the remaining distance to the end of the watershed for this project is shown in the Shallow Unpaved section above.

1. Plus 6 minutes per TR-55 for watersheds that are not already concentrated (have Overland Sheet Flow Component).

Average Mean Annual Precipitation (MAP) for watershed, in inches per year: 28

B4 Apalachee/Golden Bear

Longest flowpath for watershed

	Overland Sheet Flow					Shallow Unpaved						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	Legnth (ft)	High Elev (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
Apalachee/ Golden Bear	300	1.47	3.03%	0.4	64.6	5421					30.3				0.0	100.9	**60.6**

1. Plus 6 minutes per TR-55 for watersheds that are not already concentrated (have Overland Sheet Flow Component).
2. Shallow Unpaved travel time based on multiple lengths at differing slopes (below).

Shallow Unpaved					
Length	High	Low	Slope	Velocity	Tt(min)
536	6481.04	6469.53	2.15%	2.36	3.8
1094	6469.53	6357.07	10.28%	5.17	3.5
3791	6357.07	6247.24	2.90%	2.75	23.0

Average Mean Annual Precipitation (MAP) for watershed, in inches per year: 18

B5 UTR Below Meyers

Longest flowpath for watershed

	Overland Sheet Flow					Shallow Unpaved[2]						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length Total (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
UTR Below Meyers	300	2.44	23.98%	0.4	21.9	15620					59.1	Varies	31331	Varies	133.0	220.0	**132.0**

1. Plus 6 minutes per TR-55 for watersheds that are not already concentrated (have Overland Sheet Flow Component).
2. Shallow Unpaved travel time based on multiple lengths at differing slopes (below).
3. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Shallow Unpaved					
Length	High	Low	Slope	Velocity	Tt(min)
557	8821.57	8720.00	18.24%	6.89	1.3
7175	8720.00	6559.79	30.11%	8.85	13.5
7888	6557.51	6289.48	3.40%	2.97	44.2

Channel Flow			
X-Section	Length	Velocity	Tt(min)
O (Partial)	2793	6.2	7.5
N	4050	6.1	11.1
M	2010	5.5	6.1
L	3990	2.8	23.8
K	2310	3.9	9.9
J	2260	5.2	7.2
I	1640	4.0	6.8
H	5290	2.8	31.5
G	1516	3.0	8.4
F	2591	4.7	9.2
E	2725	4.3	10.6
D (Partial)	156	2.7	1.0

B5 UTR Below Meyers

Flowpath coming from B1 (Chiapa)

	Overland Sheet Flow					Shallow Unpaved						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length Total (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
UTR Below Meyers				0.4	0.0						0.0	Varies	32632	Varies	135.3	135.3	**81.2**

1. 6 minutes not added for flows that are alrady conentrated (no Overland Sheet Flow).
2. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Channel Flow			
X-Section	Length	Velocity	Tt(min)
P (Partial)	1254	9.4	2.2
O	2840	6.2	7.6
N	4050	6.1	11.1
M	2010	5.5	6.1
L	3990	2.8	23.8
K	2310	3.9	9.9
J	2260	5.2	7.2
I	1640	4.0	6.8
H	5290	2.8	31.5
G	1516	3.0	8.4
F	2591	4.7	9.2
E	2725	4.3	10.6
D (Partial)	156	2.7	1.0

B5 UTR Below Meyers

Flowpath coming from B2 (Angoa Creek)

	Overland Sheet Flow					Shallow Unpaved						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length Total (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
UTR Below Meyers				0.4	0.0						0.0	Varies	24405	Varies	114.3	114.3	**68.6**

1. 6 minutes not added for flows that are alrady conentrated (no Overland Sheet Flow).
2. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Channel Flow			
X-Section	Length	Velocity	Tt(min)
A (AC Partial)	159	4.1	0.6
M (UTR Partial)	1768	5.5	5.4
L (UTR)	3990	2.8	23.8
K (UTR)	2310	3.9	9.9
J (UTR)	2260	5.2	7.2
I (UTR)	1640	4.0	6.8
H (UTR)	5290	2.8	31.5
G (UTR)	1516	3.0	8.4
F (UTR)	2591	4.7	9.2
E (UTR)	2725	4.3	10.6
D (UTR Partial)	156	2.7	1.0

B5 UTR Below Meyers

Flowpath coming from B3 (Meyers Creek)

	Overland Sheet Flow					Shallow Unpaved						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length Total (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
UTR Below Meyers				0.4	0.0						0.0	Varies	22016	Varies	105.6	105.6	**63.3**

1. 6 minutes not added for flows that are alrady conentrated (no Overland Sheet Flow).
2. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Channel Flow			
X-Section	Length	Velocity	Tt(min)
L (Partial)	3528	2.8	21.0
K	2310	3.9	9.9
J	2260	5.2	7.2
I	1640	4.0	6.8
H	5290	2.8	31.5
G	1516	3.0	8.4
F	2591	4.7	9.2
E	2725	4.3	10.6
D (Partial)	156	2.7	1.0

B5 UTR Below Meyers

Flowpath coming from B4 (Apalachee/Golden Bear)

	Overland Sheet Flow					Shallow Unpaved						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length Total (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
UTR Below Meyers				0.4	0.0						0.0	Varies	3411	Varies	13.4	13.4	**8.0**

1. 6 minutes not added for flows that are alrady conentrated (no Overland Sheet Flow).
2. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Channel Flow			
X-Section	Length	Velocity	Tt(min)
F (Partial)	530	4.7	1.9
E	2725	4.3	10.6
D (Partial)	156	2.7	1.0

Average Mean Annual Precipitation (MAP) for watershed, in inches per year: 30

C1 Johnson Meadow

Longest flowpath for watershed

	Overland Sheet Flow					Shallow Unpaved[2]						Channel Flow[3]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length Total (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
Johnson Meadow	300	1.47	1.85%	0.4	78.7	2995					15.8	Varies	3932	Varies	71.4	171.9	**103.1**

1. Plus 6 minutes per TR-55 for watersheds that are not already concentrated (have Overland Sheet Flow Component).
2. Shallow Unpaved travel time based on multiple lengths at differing slopes (below).
3. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Shallow Unpaved						Channel Flow			
Length	High	Low	Slope	Velocity	Tt(min)	X-Section	Length	Velocity	Tt(min)
903	6378.79	6301.56	8.55%	4.72	3.2	D (Partial)	1752	2.7	10.8
2092	6301.56	6240.14	2.94%	2.76	12.6	C (Partial)	2180	0.6	60.6

C1 Johnson Meadow

Flowpath coming from B5 (UTR Below Meyers)

	Overland Sheet Flow					Shallow Unpaved						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length Total (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
UTR Below Meyers				0.4	0.0						0.0	Varies	6230	Varies	85.6	85.6	**51.3**

1. 6 minutes not added for flows that are alrady conentrated (no Overland Sheet Flow).
2. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Channel Flow			
X-Section	Length	Velocity	Tt(min)
C (Partial)	2180	0.6	60.6
D (Partial)	4050	2.7	25.0

Average Mean Annual Precipitation (MAP) for watershed, in inches per year: 18

Table 2-2c Runoff curve numbers for other agricultural lands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2/]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3/]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4/]	48	65	73
Woods—grass combination (orchard or tree farm). [5/]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6/]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4/]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.
2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.
3 *Poor*: <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.
4 Actual curve number is less than 30; use CN = 30 for runoff computations.
5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.
6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Assumed Woods, Good for all watersheds. Soil type A-D is based on results of the 2008 NRCS Soil Survey for the Tahoe Basin

Soils

B1	MUSYM	Soil Group	CN	Soil Area (SF)		
	7031	None Assigned[1]	30	606458		
	7042	A/D[2]	30	971769		
	7431	A/D[2]	30	2111530		
	7462	A	30	697500		
	7481	A	30	160971		
	7482	A	30	3487972		
	7484	A	30	619013		
	7487	A	30	1017118		
	7488	A	30	232895		
					Total Area=	9905226
					Weighted CN=	30.00

[1] Description is Pits and Dumps. Minimum CN (30) used.

[2] Reflects drained vs undrained conditions. For simplicity assumed drained conditions

B2	MUSYM	Soil Group	CN	Soil Area (SF)
	7041	C/D[1]	70	2961980
	7071	A/D[1]	30	3778471
	7231	B	50	332525
	7232	B	50	556349
	7411	B	50	14644672
	7412	B	50	7352225
	7413	B	50	4282539
	7421	A	30	857155
	7422	A	30	1872869
	7431	A/D[1]	30	8608810
	7444	A	30	2247833
	7451	A	30	111366
	7452	A	30	54791
	7461	A	30	11990325
	7462	A	30	5654130
	7482	A	30	2637363
	7483	A	30	5681531
	7484	A	30	4820847
	7485	A	30	11201832
	7486	A	30	2784323
	7487	A	30	14272661
	7488	A	30	2896461
	7489	A	30	5753276
	7500	None Assigned[2]	98	108133
	7501	D	77	29235
	7502	D	77	8167070
	7521	A	30	5227368
	7522	A	30	8963197
	7523	A	30	12425337
	7525	A	30	2618338

	7531	D	77	1556514		
	7532	D	77	994742		
	9443	D	77	721941		
	W	None Assigned[3]	100	1033288		
					TOTAL AREA=	157199497
					Weighted CN=	38.15

[1]Reflects drained vs undrained conditions. For simplicity assumed drained conditions

[2]Description is rock outrop. CN for impervious pavement used.

[3]Body of water CN 100

B3	MUSYM	Soil Group	CN	Soil Area (SF)		
	7041	C/D[1]	70	2047577		
	7412	B	50	729109		
	7413	B	50	1726357		
	7414	B	50	39363		
	7422	A	30	2054720		
	7423	A	30	1915399		
	7431	A/D[1]	30	4709831		
	7441	A	30	1097339		
	7442	A	30	4822600		
	7443	A	30	3322698		
	7451	A	30	371383		
	7461	A	30	2746424		
	7462	A	30	5793512		
	7481	A	30	5545674		
	7484	A	30	565184		
	7485	A	30	255901		
	7491	D	77	2673741		
	7531	D	77	69185		
					TOTAL AREA=	40485997
					Weighted CN=	36.44

[1]Reflects drained vs undrained conditions. For simplicity assumed drained conditions

B4	MUSYM	Soil Group	CN	Soil Area (SF)		
	7031	None Assigned[1]	30	1181763		
	7043	A/D[2]	30	850867		
	7441	A	30	603473		
	7442	A	30	2746007		
	7451	A	30	319042		
	7452	A	30	530184		
	7461	A	30	2106315		
	7462	A	30	439225		
	7541	B	50	1006462		
					TOTAL AREA=	9783338
					Weighted CN=	32.06

[1]Description is Pits and Dumps. Minimum CN (30) used.

[2]Reflects drained vs undrained conditions. For simplicity assumed drained conditions

B5	MUSYM	Soil Group	CN	Soil Area (SF)
	7031	None Assigned[1]	30	3636873
	7041	C/D[2]	70	8174124
	7042	A/D[2]	30	1302583
	7043	A/D[2]	30	3339169
	7061	None Assigned[3]	98	6301300
	7071	A/D[2]	30	945384
	7411	B	50	1822774
	7412	B	50	9623568
	7413	B	50	3541505
	7422	A	30	1274392
	7431	A/D[2]	30	24410616
	7441	A	30	3071810
	7442	A	30	10635136
	7444	A	30	1037205
	7451	A	30	3235584
	7452	A	30	395319
	7461	A	30	9390057
	7462	A	30	1606127
	7471	A/D[2]	30	1613567
	7481	A	30	2539921
	7482	A	30	8494860
	7483	A	30	11015731
	7484	A	30	2818489
	7485	A	30	3426868
	7486	A	30	560717
	7487	A	30	2364555
	7488	A	30	2923505
	7489	A	30	12204529
	7491	D	77	13853
	7492	D	77	296276
	7500	None Assigned[4]	98	449595
	7501	D	77	565849
	7502	D	77	12150177
	7531	D	77	1483030
	7532	D	77	3386804
	7541	B	50	14605552
	W	None Assigned[5]	100	1033980
				TOTAL AREA= 175691384
				Weighted CN= 43.04

[1]Description is Pits and Dumps. Minimum CN (30) used.

[2]Reflects drained vs undrained conditions. For simplicity assumed drained conditions

[3]Description is Urban Land. Area is Airport runway so used CN for impervious pavement.

[4]Description is rock outrop. CN for impervious pavement used.

[5]Body of water CN 100

C1	MUSYM	Soil Group	CN	Soil Area (SF)		
	7031	None Assigned[1]	30	61035		
	7041	C/D[2]	70	27320		
	7043	A/D[2]	30	7164300		
	7071	A/D[2]	30	656234		
	7441	A	30	2236097		
	7442	A	30	426597		
	7444	A	30	5480166		
	7461	A	30	1441283		
	7462	A	30	252304		
	7471	A/D[2]	30	560674		
	7541	B	50	620266		
					TOTAL AREA=	18926276
					Weighted CN=	30.71

[1]Description is Pits and Dumps. Minimum CN (30) used.

[2]Reflects drained vs undrained conditions. For simplicity assumed drained conditions

Johnson Meadow H&H Input Numbers

WS ID	Area (SF)	Area (acre)	Description
A1	1094273898	25121.07	(UTR Above Meyers). Total Upper Truckee River watershed before gauge at Hwy 50 crossing in Meyers (USGS103366092).
B1	9905226	227.39	(Chiapa). Contribution to Upper Truckee River watershed after gauge at Hwy 50 crossing in Meyers at new bridge at Tahoe Paradise Park for San Bernardino Project.
B2	157199495	3608.80	Angora Creek watershed
B3	34864144	800.37	Meyers Creek watershed
B4	9783338	224.59	(Apalachee/Golden Bear). Tributary watershed between Apalachee and Golden Bear neighborhoods
B5	178239942	4091.83	(UTR Below Meyers). Main Upper Truckee River watershed after gauge at Hwy 50 crossing in Meyers at new bridge for this project. Excludes all tributary watersheds.
C1	18926278	434.49	(Johnson Meadow). Upper Truckee River watershed after new bridge for this project before gauge at HWY 50 crossing in South Lake Tahoe (USGS10336610).
C2	19843803	455.55	(Trout Creek). Includes portion of path adjacent to Barbara Ave. Will be re-delineated once design identifies points of interest.

Impervious

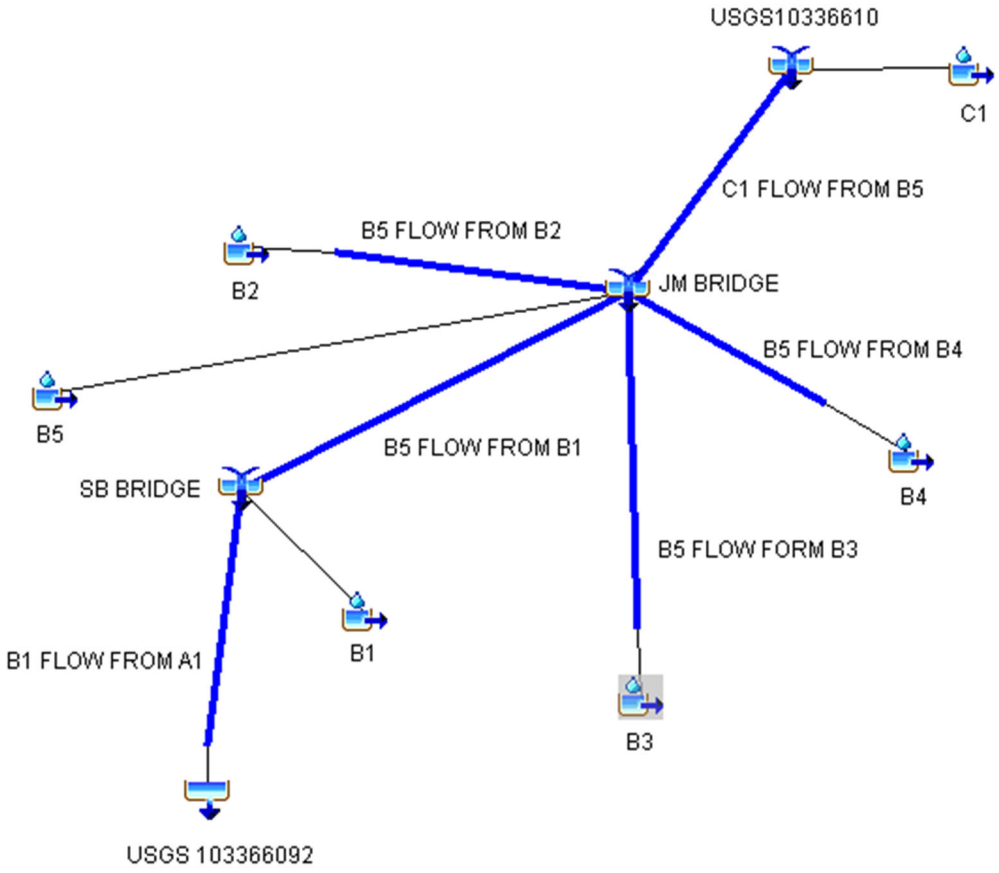
WS ID	Imp Area (sf)	Imp Area (acre)	% Impervious
A1	12693709	291.41	1.16%
B1	746716	17.14	7.54%
B2	7763713	178.23	4.94%
B3	5190896	119.17	14.89%
B4	473127	10.86	4.84%
B5	16360367	375.58	9.18%
C1	2134028	48.99	11.28%
C2	3867230	88.78	19.49%

Appendix B

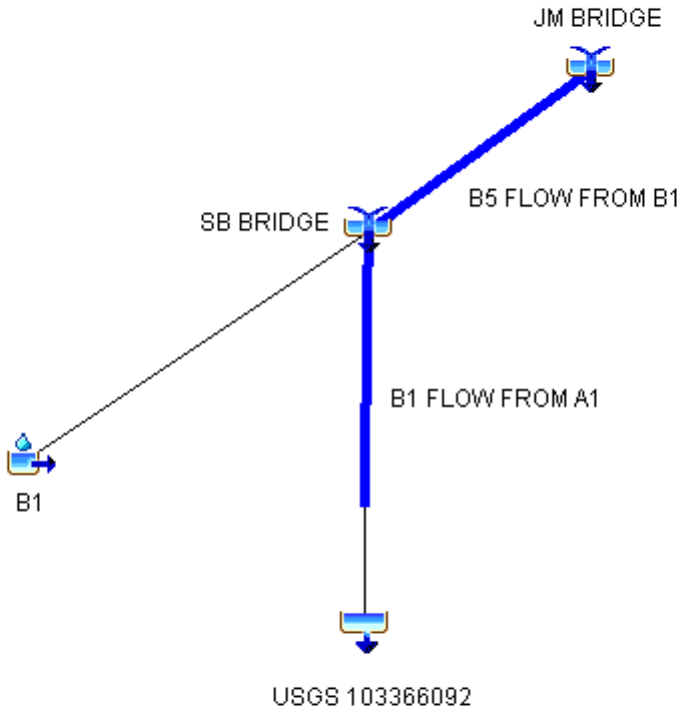
HEC- HMS Results

HEC-HMS Layout.

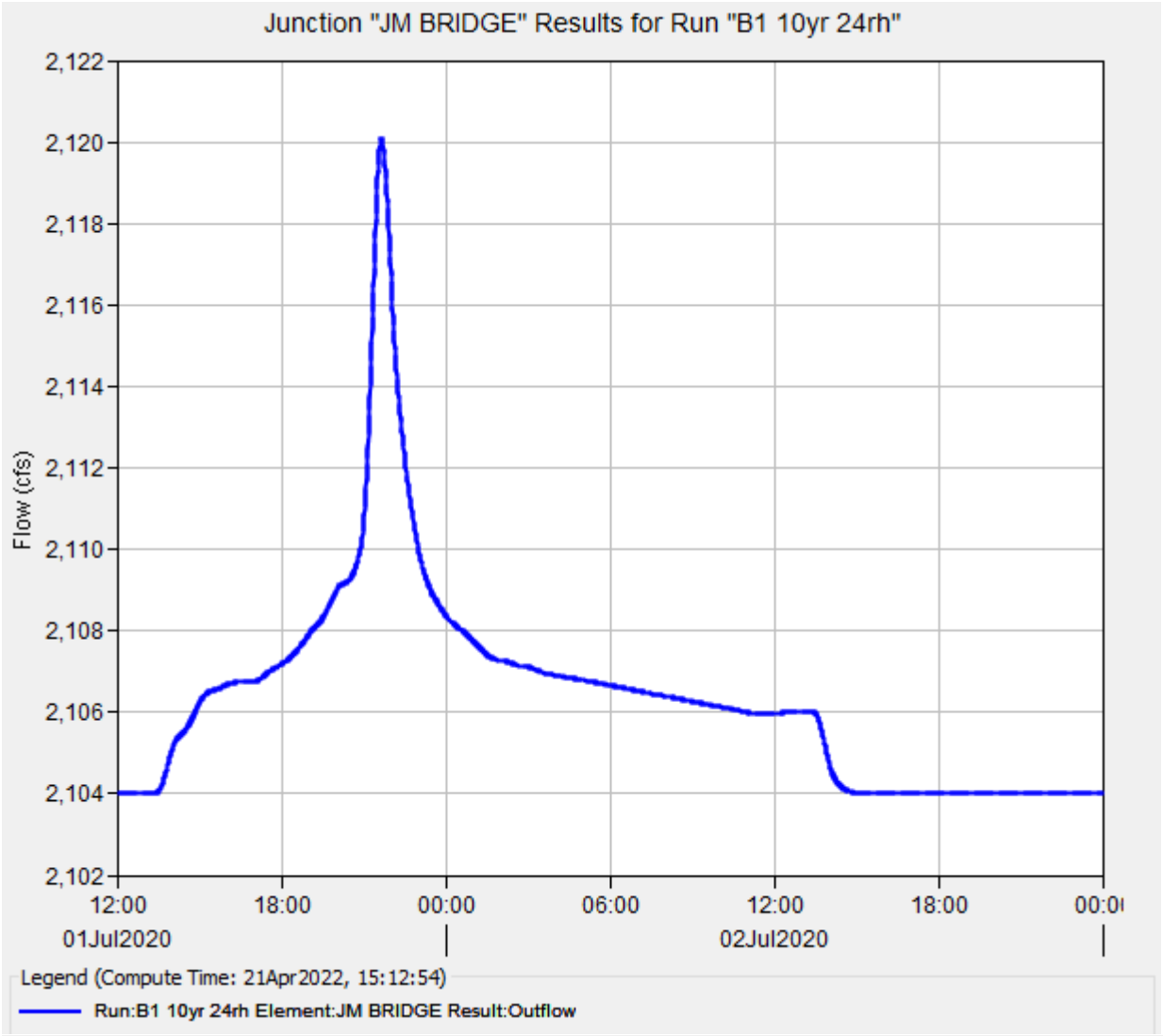
Note that the following results are reported for the contributions from the individual watersheds. This was done so that each watershed could use different Mean Annual Rainfall information. The watershed area is so expansive that it would be overly simplified if the same Mean Annual Rainfall information was applied to the entire model. The individual results were obtained from HEC-HMS and the time-series values were combined to obtain the final results.



B1 Layout. (Done Individually to apply 38” Mean Annual Rainfall numbers).



HEC-HMS B1 Results.



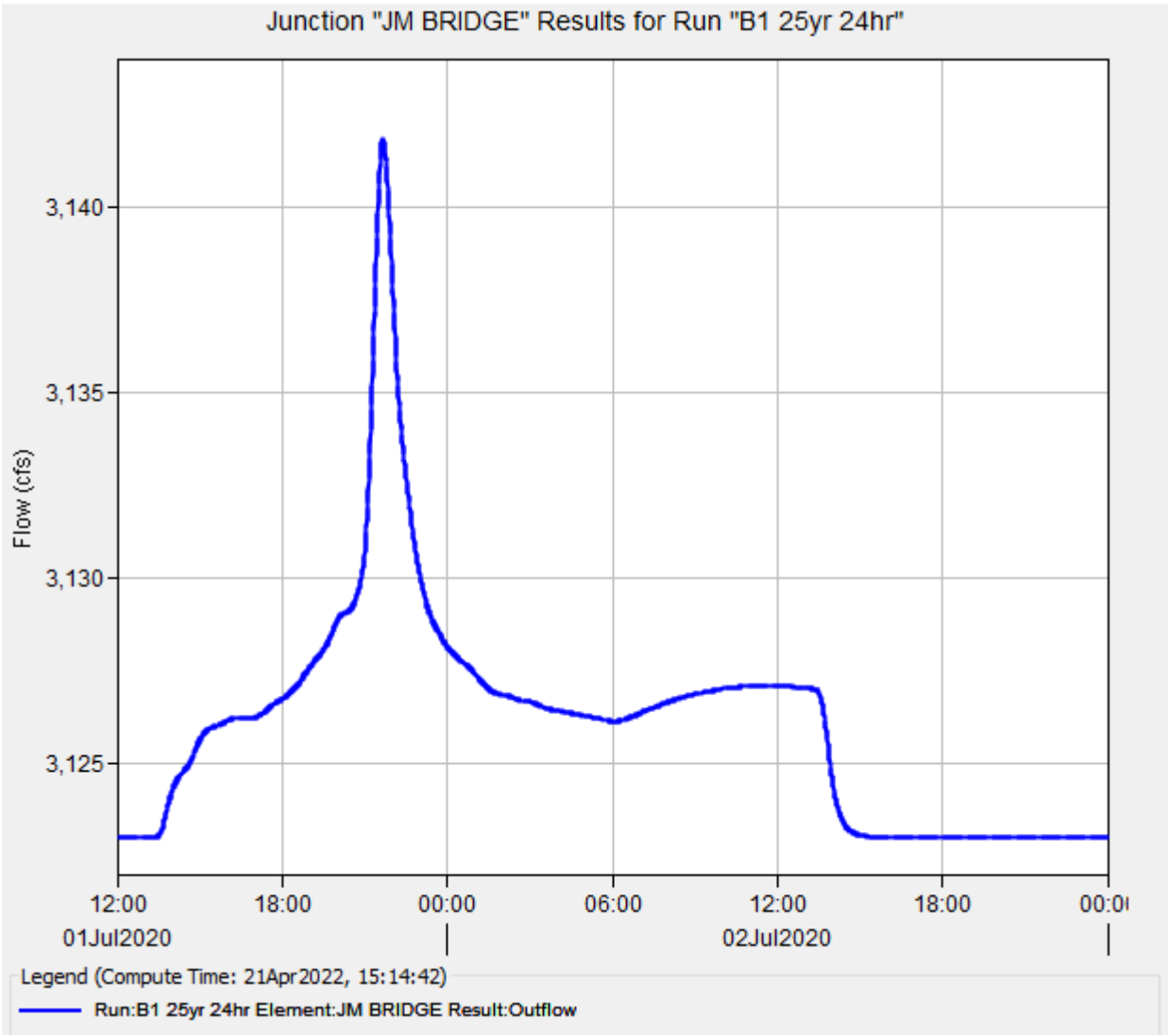
Project: JM_EWS Simulation Run: B1 10yr 24rh

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:12:54

Basin Model: B1 (38in)-Q10
Meteorologic Model: 10 YR 24 HR 38 IN
Control Specifications: 24 Hour

Show Elements: All Elements | Volume Units: IN / AC-FT | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
SB BRIDGE	39.66	2120.1	01Jul2020, 20:18	6267.0
USGS 103366092	39.30	2104.0	01Jul2020, 12:00	6259.8
B1 FROM USGS GUAGE	39.30	2104.0	01Jul2020, 12:00	6259.8
B1	0.36	16.1	01Jul2020, 20:18	7.2
B5 FROM B1	39.66	2120.1	01Jul2020, 21:39	6267.0
JM BRIDGE	39.66	2120.1	01Jul2020, 21:39	6267.0



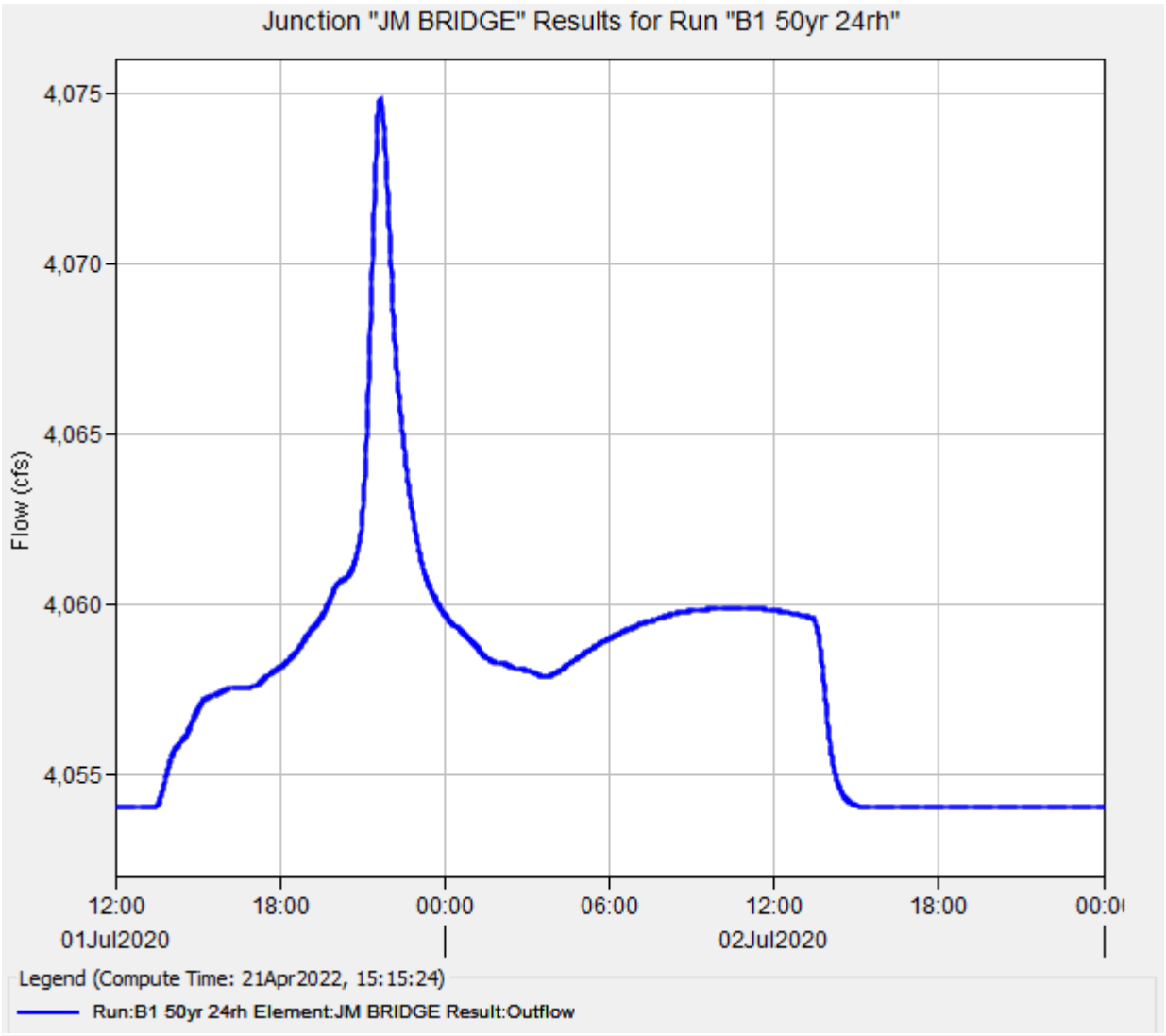
Project: JM_EWS Simulation Run: B1 25yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:14:42

Basin Model: B1 (38in)-Q25
Meteorologic Model: 25 YR 24 HR 38 IN
Control Specifications: 24 Hour

Show Elements: All Elements | Volume Units: IN / AC-FT | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B1 FROM USGS GUAGE	39.30	3123.0	01Jul2020, 12:00	9291.6
B1	0.36	18.8	01Jul2020, 20:18	9.2
JM BRIDGE	39.66	3141.8	01Jul2020, 21:39	9300.8
USGS 103366092	39.30	3123.0	01Jul2020, 12:00	9291.6
SB BRIDGE	39.66	3141.8	01Jul2020, 20:18	9300.8
B5 FROM B1	39.66	3141.8	01Jul2020, 21:39	9300.8



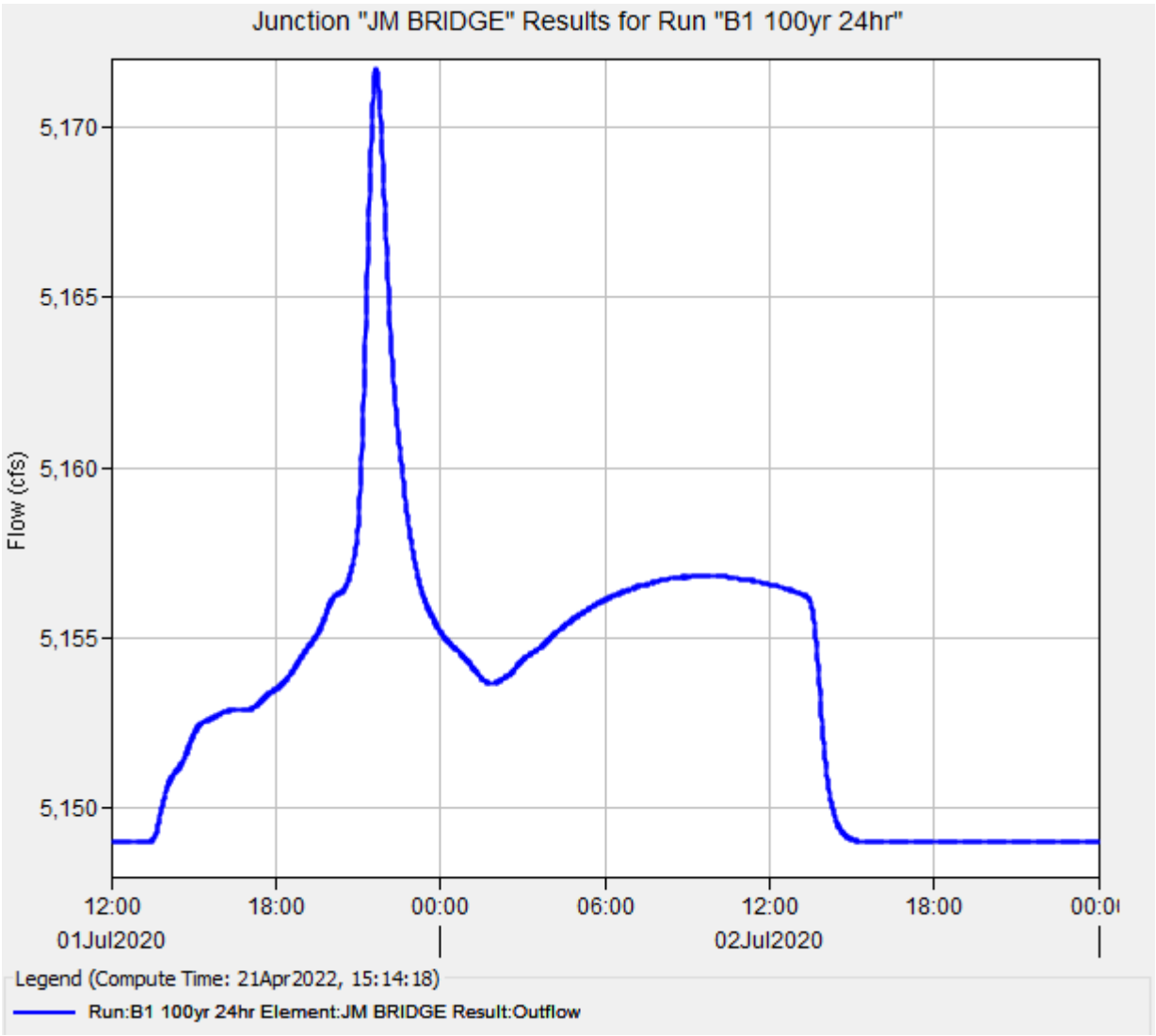
Project: JM_EWS Simulation Run: B1 50yr 24rh

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:15:24

Basin Model: B1 (38in)-Q50
Meteorologic Model: 50 YR 24 HR 38 IN
Control Specifications: 24 Hour

Show Elements: All Elements | Volume Units: IN (AC-FT) | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
SB BRIDGE	39.66	4074.8	01Jul2020, 20:18	12072.7
USGS 103366092	39.30	4054.0	01Jul2020, 12:00	12061.5
B1 FROM USGS GUAGE	39.30	4054.0	01Jul2020, 12:00	12061.5
B1	0.36	20.8	01Jul2020, 20:18	11.3
B5 FROM B1	39.66	4074.8	01Jul2020, 21:39	12072.7
JM BRIDGE	39.66	4074.8	01Jul2020, 21:39	12072.7



Project: JM_EWS Simulation Run: B1 100yr 24hr

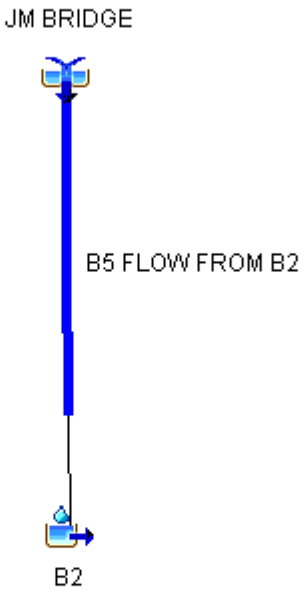
Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:14:18

Basin Model: B1 (38in)-Q100
Meteorologic Model: 100 YR 24 HR 38 IN
Control Specifications: 24 Hour

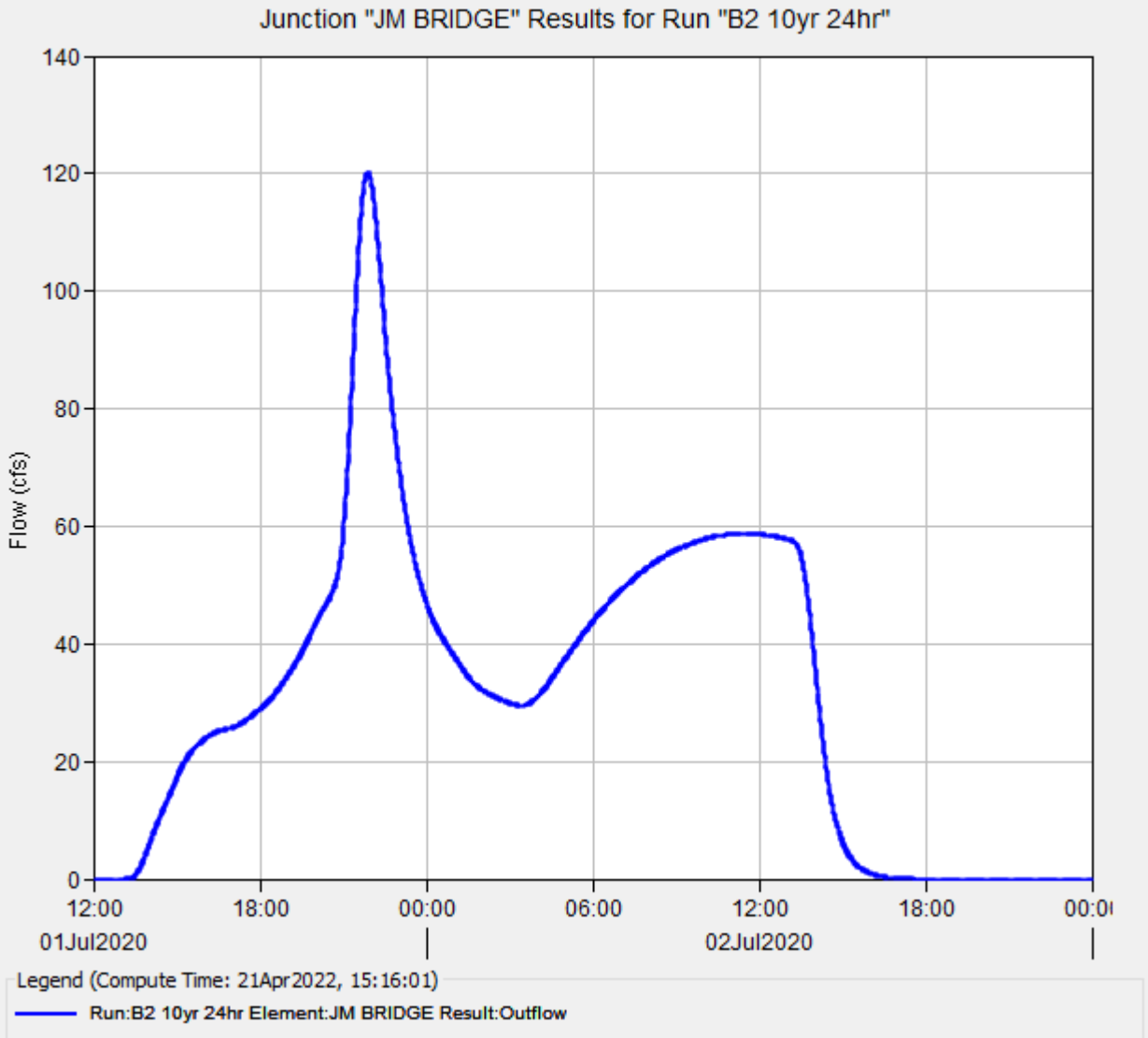
Show Elements: All Elements | Volume Units: IN / AC-FT | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
SB BRIDGE	39.66	5171.7	01Jul2020, 20:18	15333.0
USGS 103366092	39.30	5149.0	01Jul2020, 12:00	15319.3
B1 FROM USGS GUAGE	39.30	5149.0	01Jul2020, 12:00	15319.3
B1	0.36	22.7	01Jul2020, 20:18	13.6
B5 FROM B1	39.66	5171.7	01Jul2020, 21:39	15333.0
JM BRIDGE	39.66	5171.7	01Jul2020, 21:39	15333.0

B2 Layout. (Done individually to apply 35” Mean Annual Rainfall numbers)



HEC-HMS B2 Results.



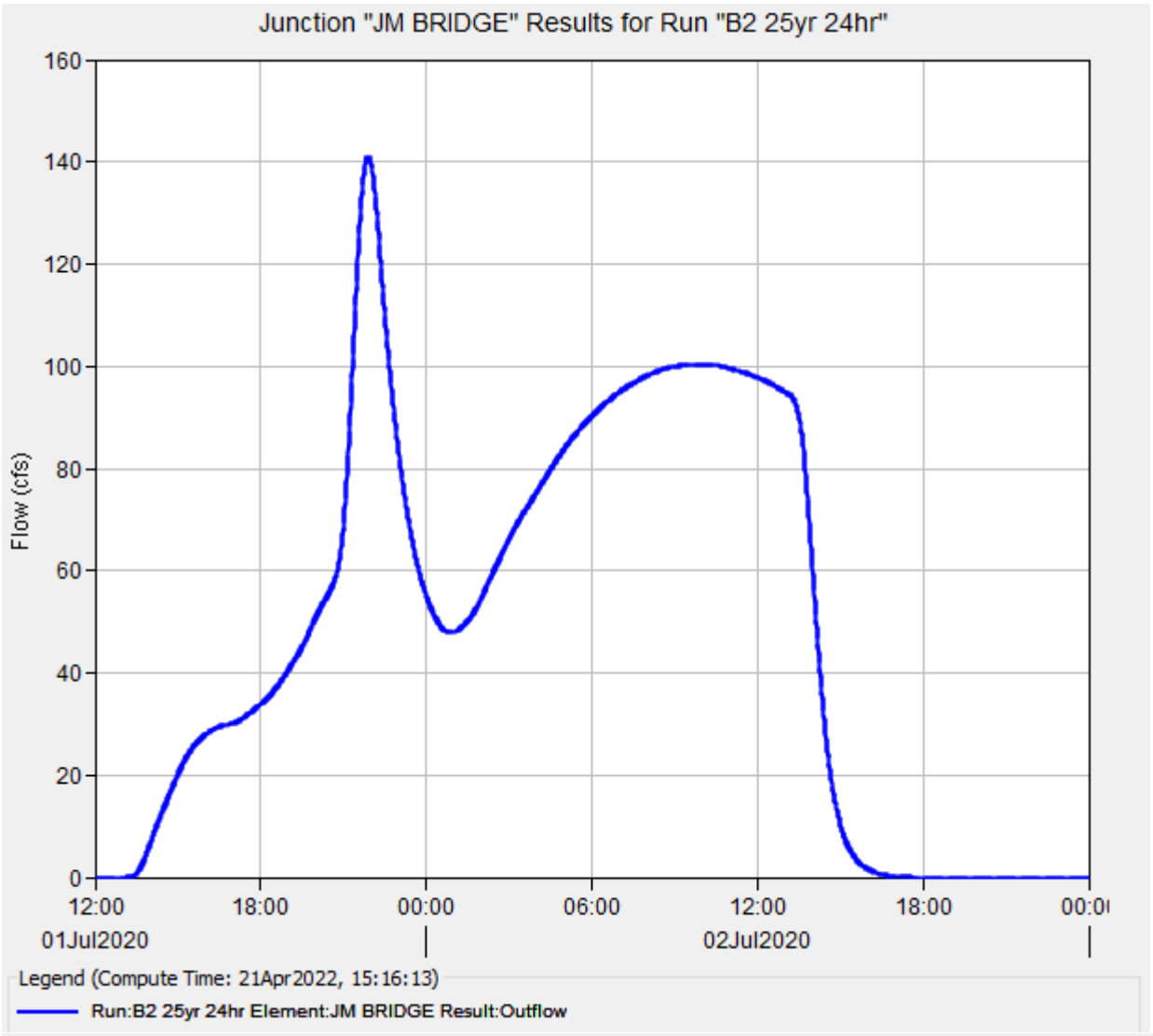
Project: JM_EWS Simulation Run: B2 10yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:16:01

Basin Model: B2 (35IN)
Meteorologic Model: 10 YR 24 HR 35 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B2	5.64	120.2	01Jul2020, 20:44	92.9
B5 FROM B2	5.64	120.2	01Jul2020, 21:53	92.9
JM BRIDGE	5.64	120.2	01Jul2020, 21:53	92.9



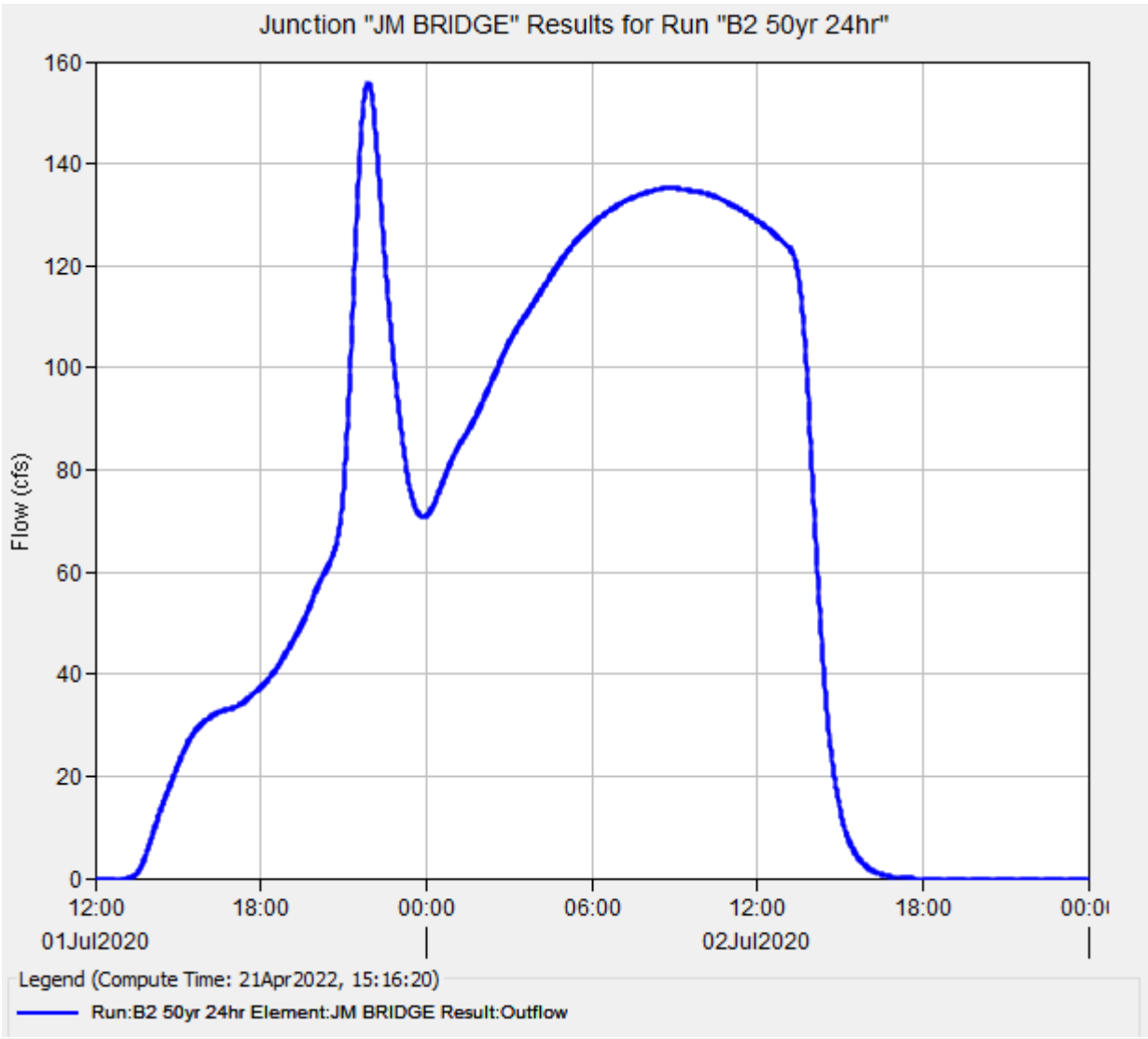
Project: JM_EWS Simulation Run: B2 25yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:16:13

Basin Model: B2 (35IN)
Meteorologic Model: 25 YR 24 HR 35 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B2	5.64	141.0	01Jul2020, 20:44	143.4
B5 FROM B2	5.64	141.0	01Jul2020, 21:53	143.4
JM BRIDGE	5.64	141.0	01Jul2020, 21:53	143.4



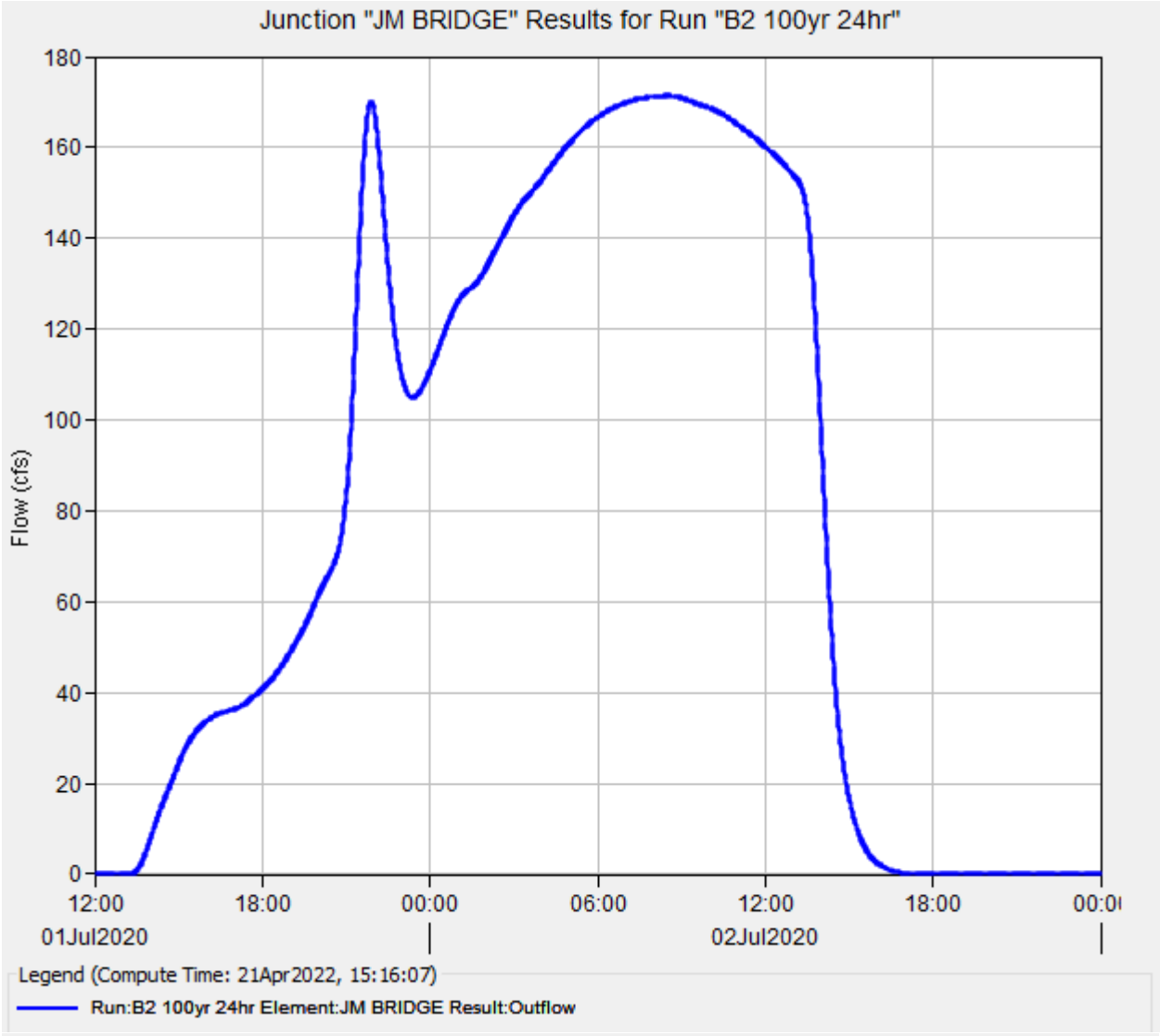
Project: JM_EWS Simulation Run: B2 50yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:16:20

Basin Model: B2 (35IN)
Meteorologic Model: 50 YR 24 HR 35 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B2	5.64	155.9	01Jul2020, 20:44	189.0
B5 FROM B2	5.64	155.9	01Jul2020, 21:53	189.0
JM BRIDGE	5.64	155.9	01Jul2020, 21:53	189.0



Project: JM_EWS Simulation Run: B2 100yr 24hr

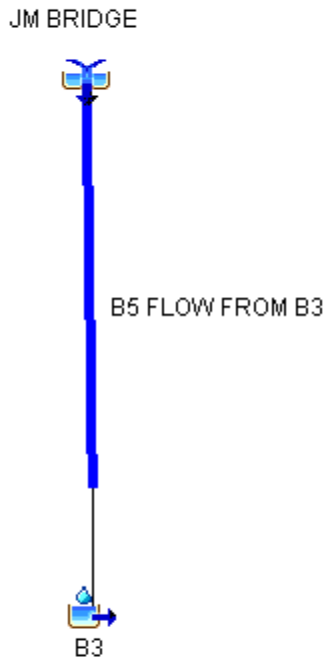
Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:16:07

Basin Model: B2 (35IN)
Meteorologic Model: 100 YR 24 HR 35 IN
Control Specifications: 24 Hour

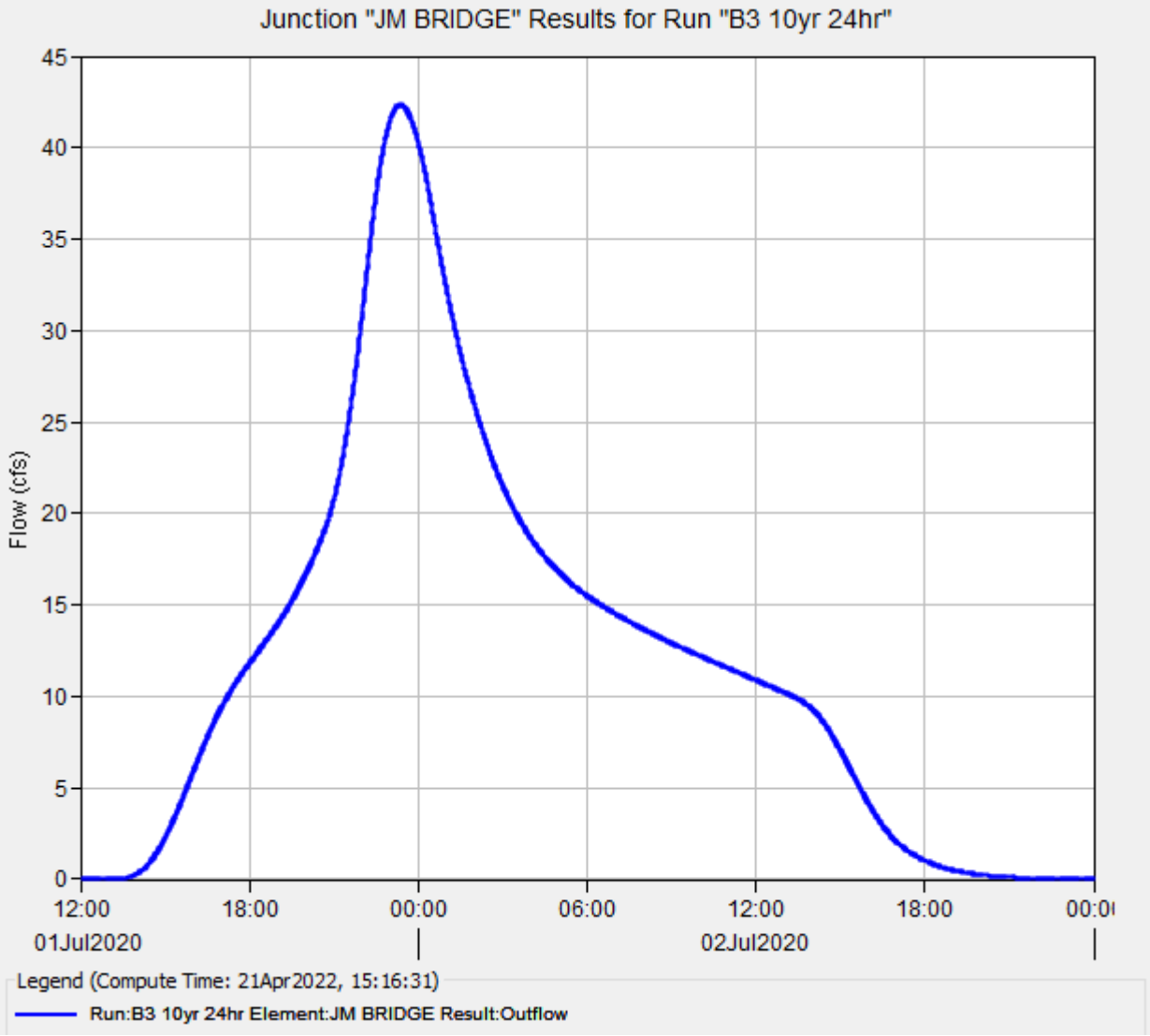
Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B2	5.64	171.4	02Jul2020, 07:20	238.7
B5 FROM B2	5.64	171.4	02Jul2020, 08:29	238.7
JM BRIDGE	5.64	171.4	02Jul2020, 08:29	238.7

B3 Layout. (Done individually to apply 28” Mean Annual Rainfall numbers)



HEC-HMS B3 Results.



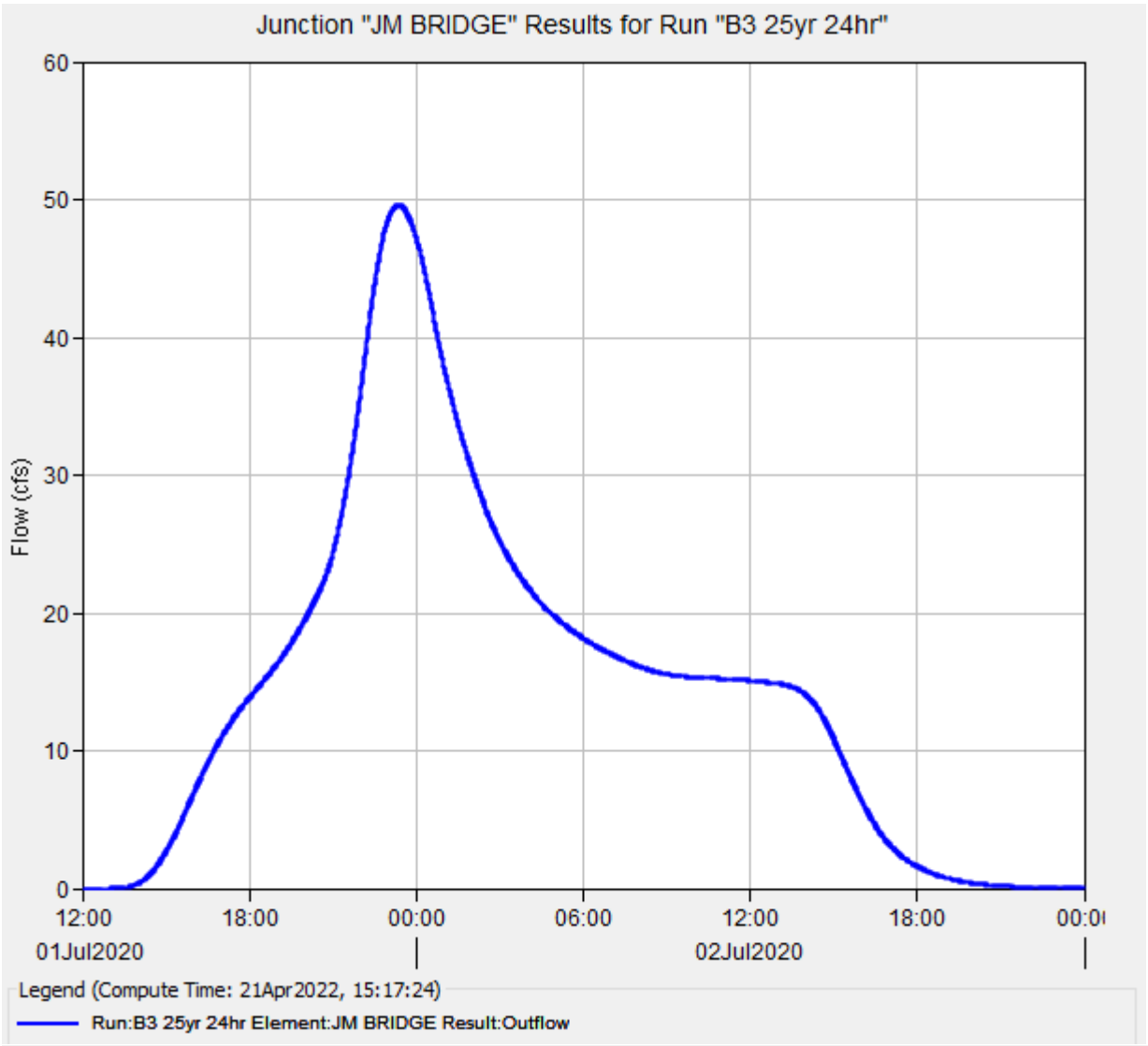
Project: JM_EWS Simulation Run: B3 10yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:16:31

Basin Model: B3 (28IN)
Meteorologic Model: 10 YR 24 HR 28 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: IN AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B3	1.25	42.3	01Jul2020, 22:19	35.9
B5 FROM B3	1.25	42.3	01Jul2020, 23:22	35.9
JM BRIDGE	1.25	42.3	01Jul2020, 23:22	35.9



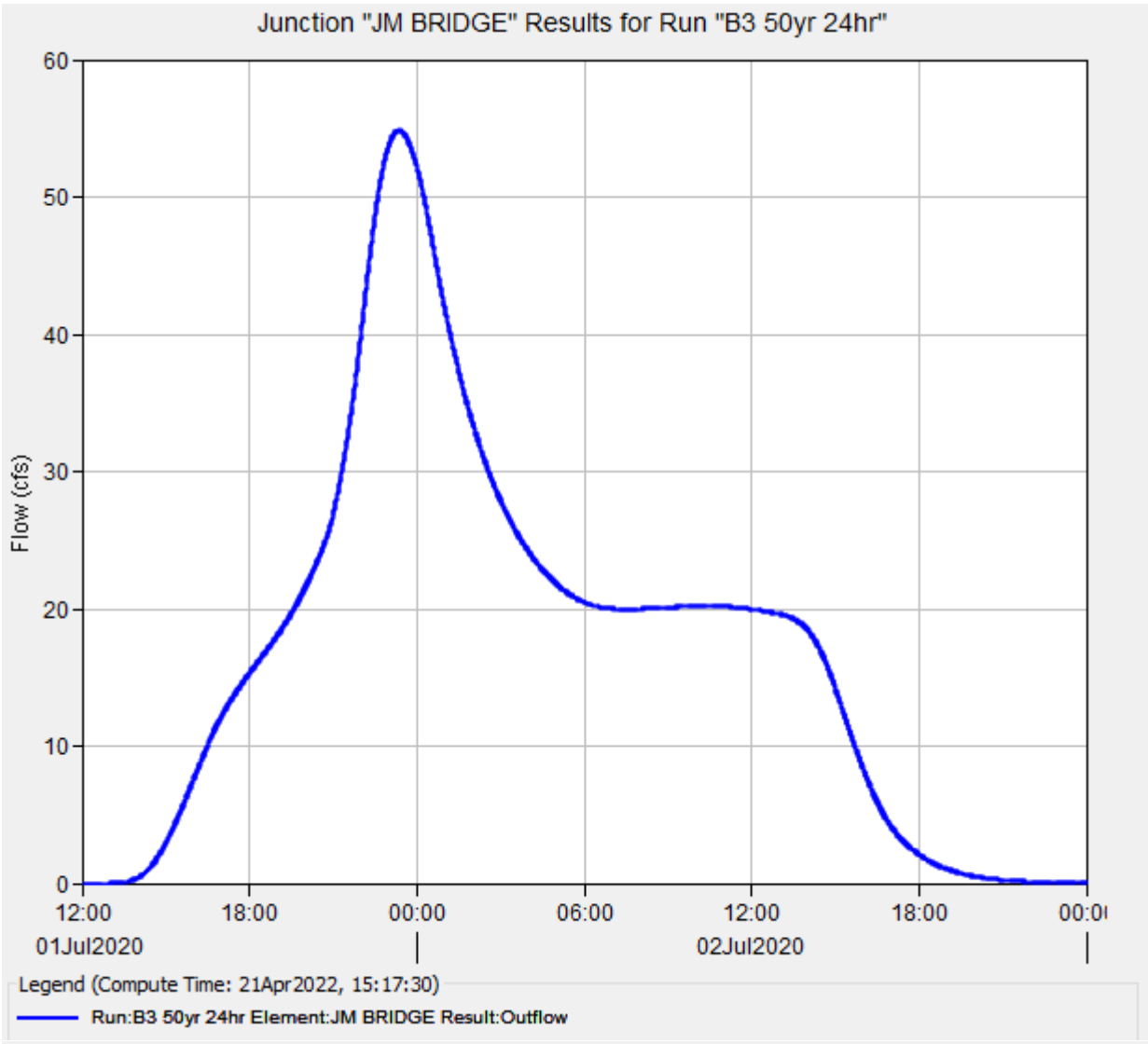
Project: JM_EWS Simulation Run: B3 25yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:17:24

Basin Model: B3 (28IN)
Meteorologic Model: 25 YR 24 HR 28 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B3	1.25	49.6	01Jul2020, 22:19	43.5
B5 FROM B3	1.25	49.6	01Jul2020, 23:22	43.5
JM BRIDGE	1.25	49.6	01Jul2020, 23:22	43.5



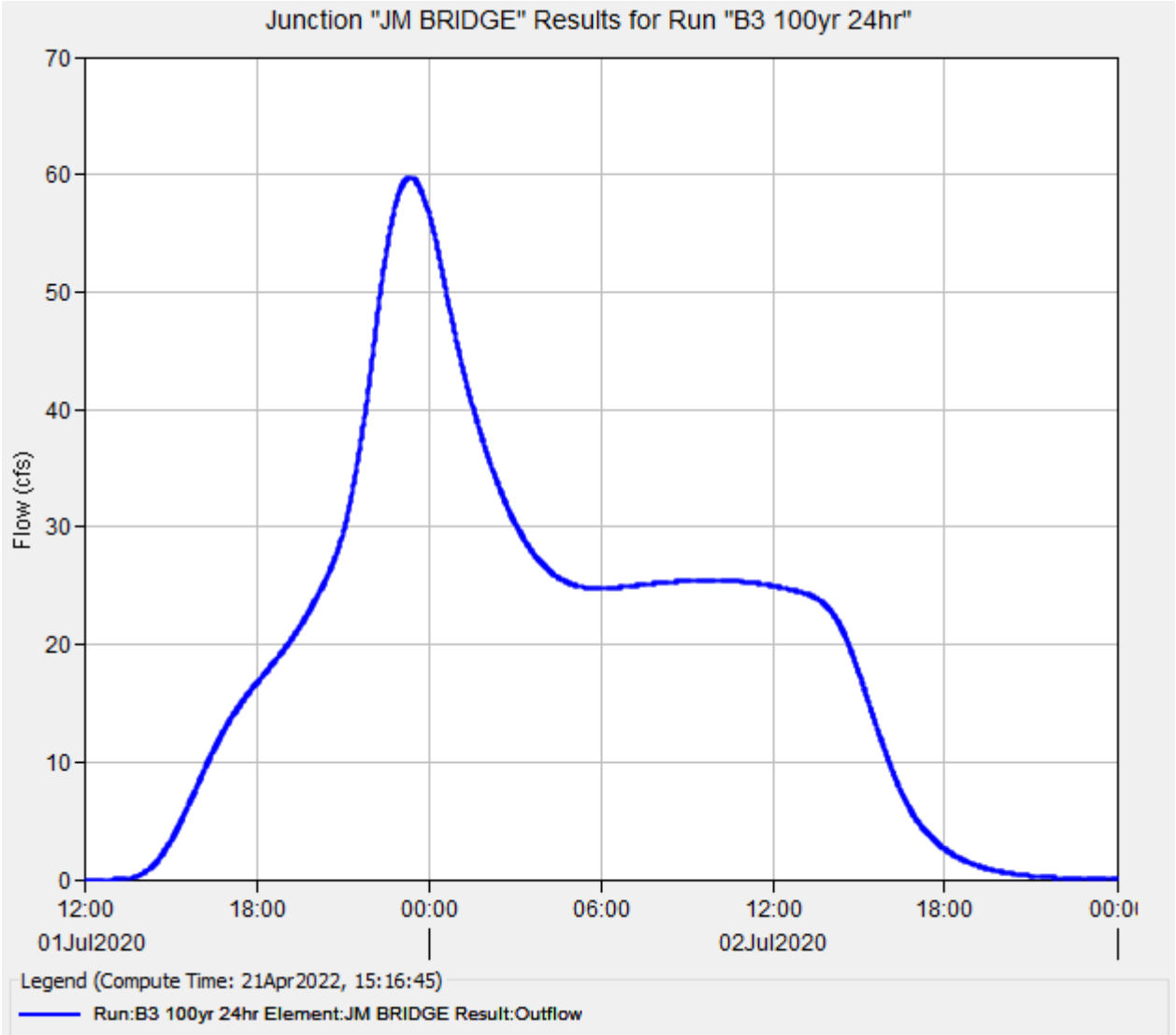
Project: JM_EWS Simulation Run: B3 50yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:17:30

Basin Model: B3 (28IN)
Meteorologic Model: 50 YR 24 HR 28 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B3	1.25	54.9	01Jul2020, 22:19	50.4
B5 FROM B3	1.25	54.9	01Jul2020, 23:22	50.4
JM BRIDGE	1.25	54.9	01Jul2020, 23:22	50.4



Project: JM_EWS Simulation Run: B3 100yr 24hr

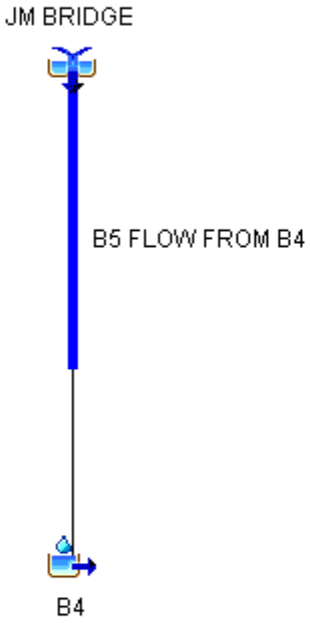
Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:16:45

Basin Model: B3 (28IN)
Meteorologic Model: 100 YR 24 HR 28 IN
Control Specifications: 24 Hour

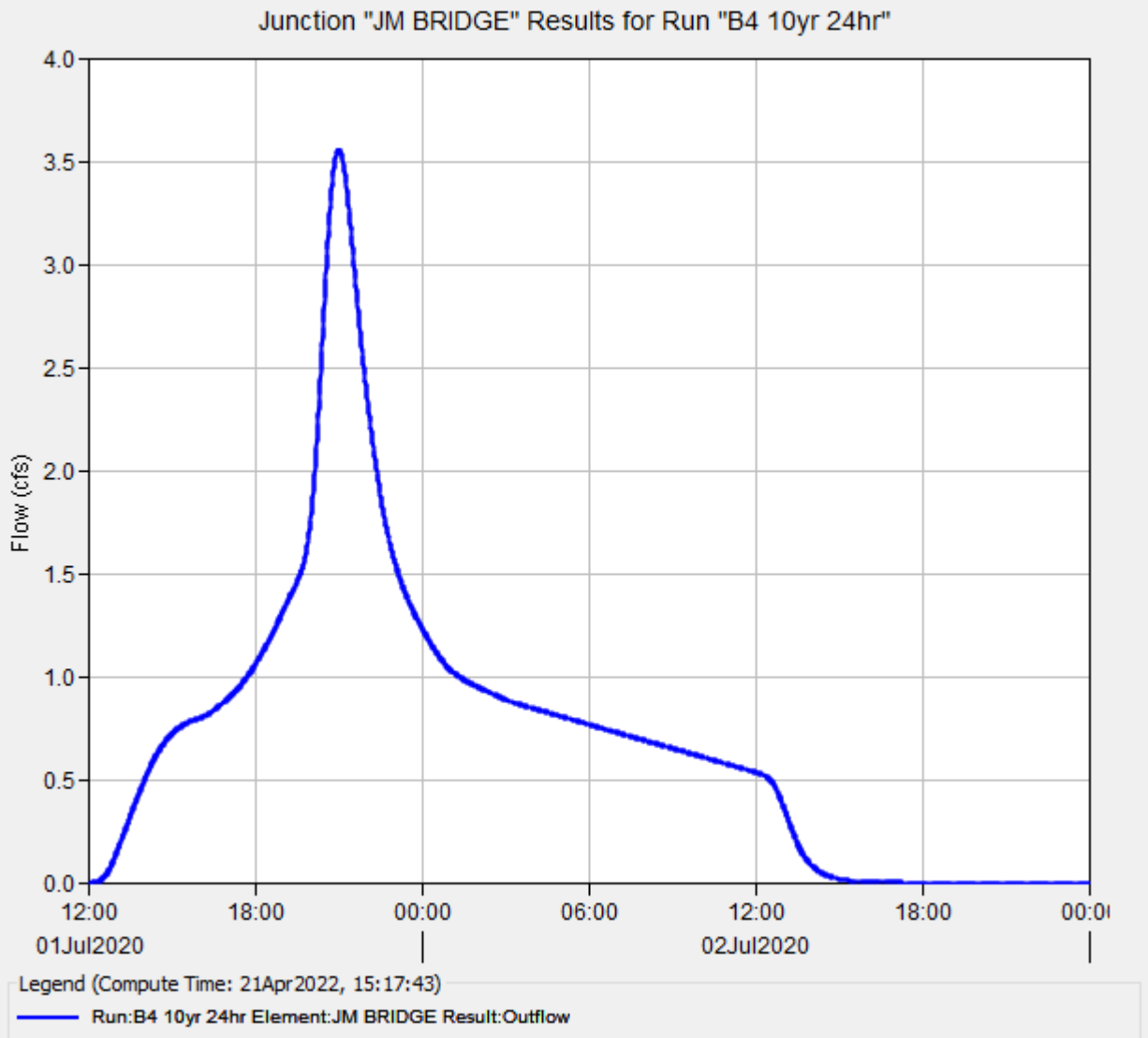
Show Elements: All Elements | Volume Units: ○ IN ◉ AC-FT | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B3	1.25	59.8	01Jul2020, 22:19	57.8
B5 FROM B3	1.25	59.8	01Jul2020, 23:22	57.8
JM BRIDGE	1.25	59.8	01Jul2020, 23:22	57.8

B4 Layout. (Done individually to apply 18” Mean Annual Rainfall numbers)



HEC-HMS B4 Results.



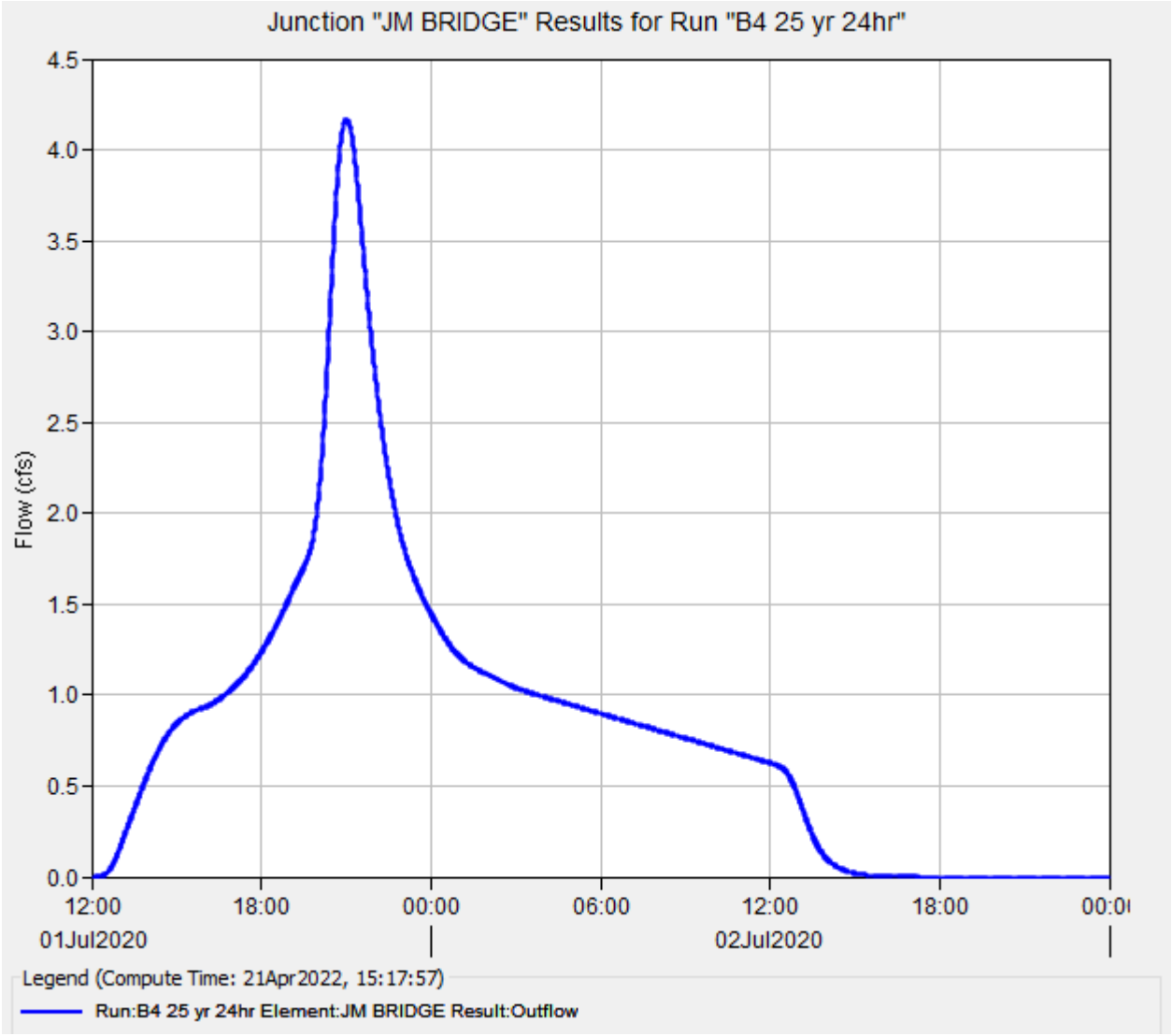
Project: JM_EWS Simulation Run: B4 10yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:17:43

Basin Model: B4 (18IN)
Meteorologic Model: 10 YR 24 HR 18 IN
Control Specifications: 24 Hour

Show Elements: All Elements | Volume Units: IN / AC-FT | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B4	0.35	3.6	01Jul2020, 20:53	2.1
B5 FROM B4	0.35	3.6	01Jul2020, 21:01	2.1
JM BRIDGE	0.35	3.6	01Jul2020, 21:01	2.1



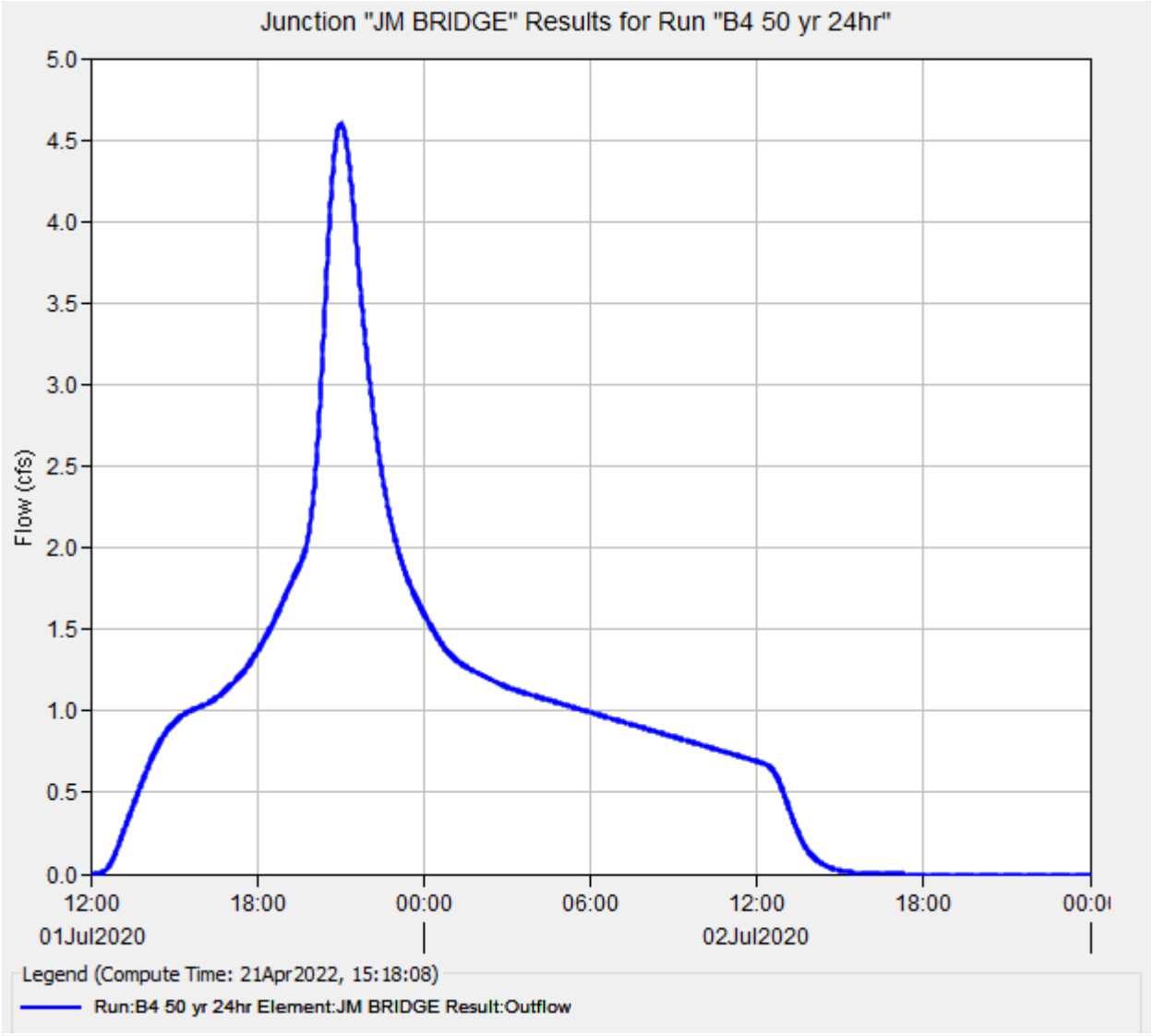
Project: JM_EWS Simulation Run: B4 25 yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:17:57

Basin Model: B4 (18IN)
Meteorologic Model: 25 YR 24 HR 18 IN
Control Specifications: 24 Hour

Show Elements: All Elements | Volume Units: IN (AC-FT) | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B4	0.35	4.2	01Jul2020, 20:53	2.5
B5 FROM B4	0.35	4.2	01Jul2020, 21:01	2.5
JM BRIDGE	0.35	4.2	01Jul2020, 21:01	2.5



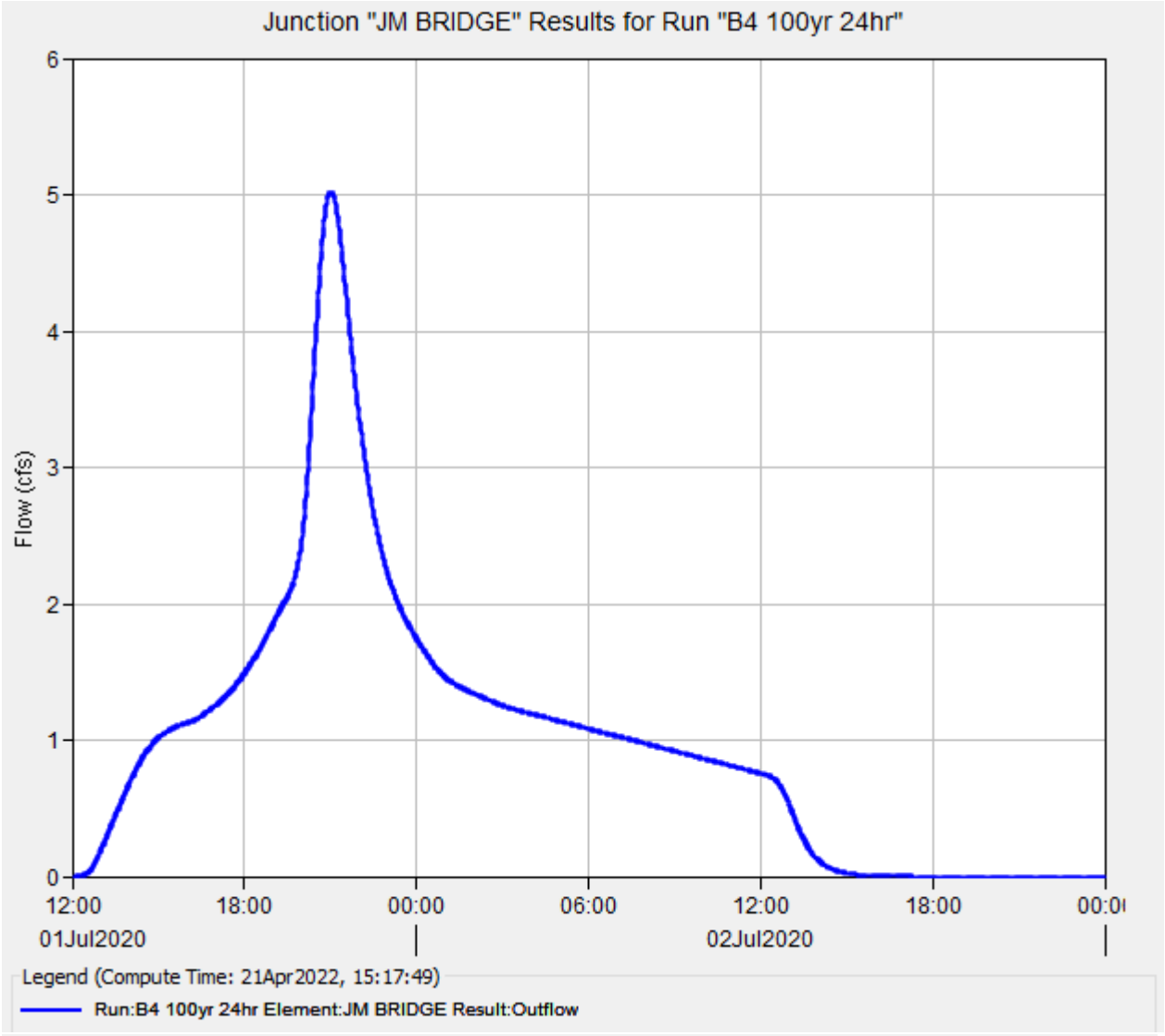
Project: JM_EWS Simulation Run: B4 50 yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:18:08

Basin Model: B4 (18IN)
Meteorologic Model: 50 YR 24 HR 18 IN
Control Specifications: 24 Hour

Show Elements: All Elements | Volume Units: ○ IN ◉ AC-FT | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B4	0.35	4.6	01Jul2020, 20:53	2.7
B5 FROM B4	0.35	4.6	01Jul2020, 21:01	2.7
JM BRIDGE	0.35	4.6	01Jul2020, 21:01	2.7



Project: JM_EWS Simulation Run: B4 100yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:17:49

Basin Model: B4 (18IN)
Meteorologic Model: 100 YR 24 HR 18 IN
Control Specifications: 24 Hour

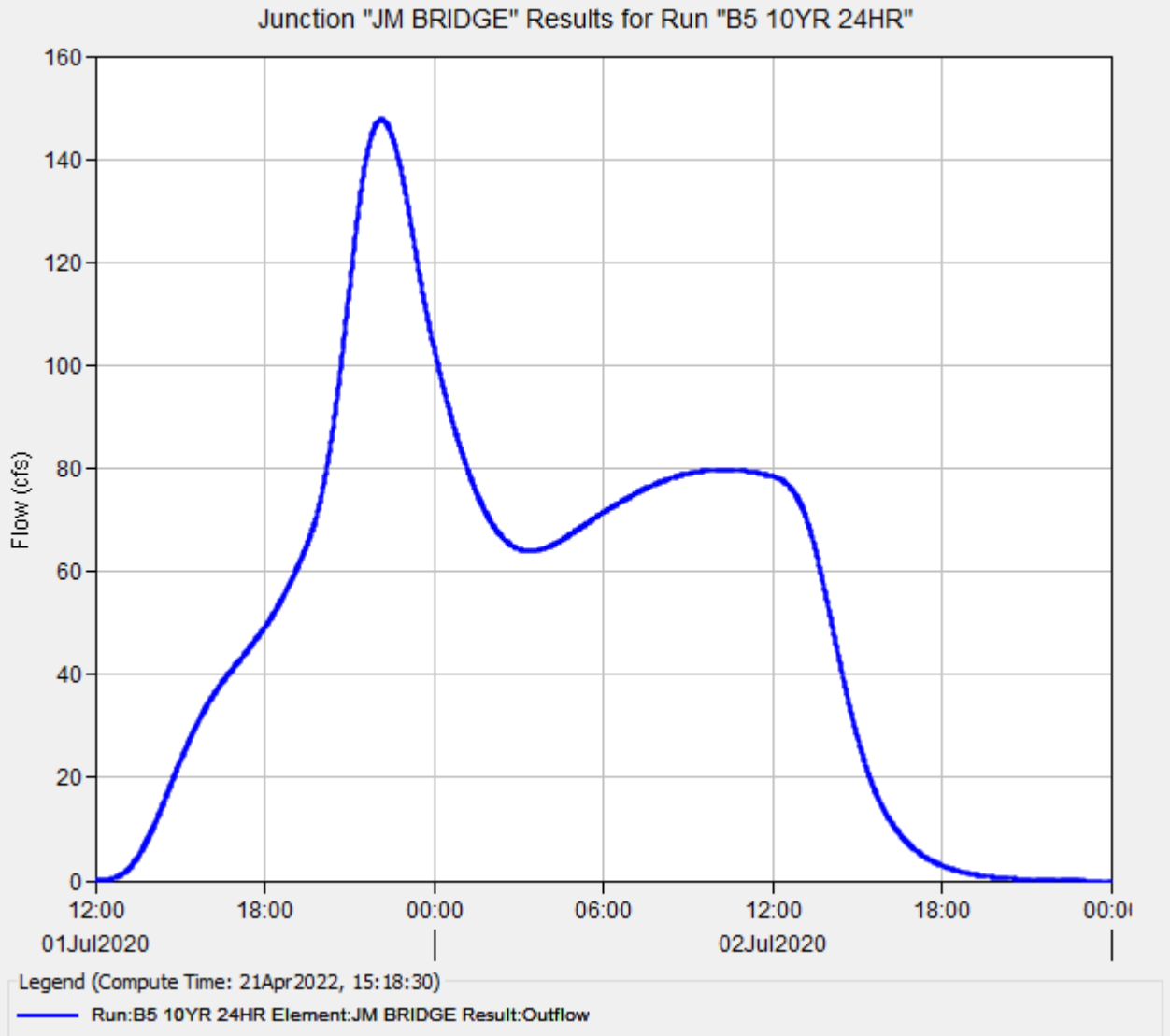
Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B4	0.35	5.0	01Jul2020, 20:53	3.0
B5 FROM B4	0.35	5.0	01Jul2020, 21:01	3.0
JM BRIDGE	0.35	5.0	01Jul2020, 21:01	3.0

B5 Layout. (Done individually to apply 30” Mean Annual Rainfall numbers)



HEC-HMS B5 Results.



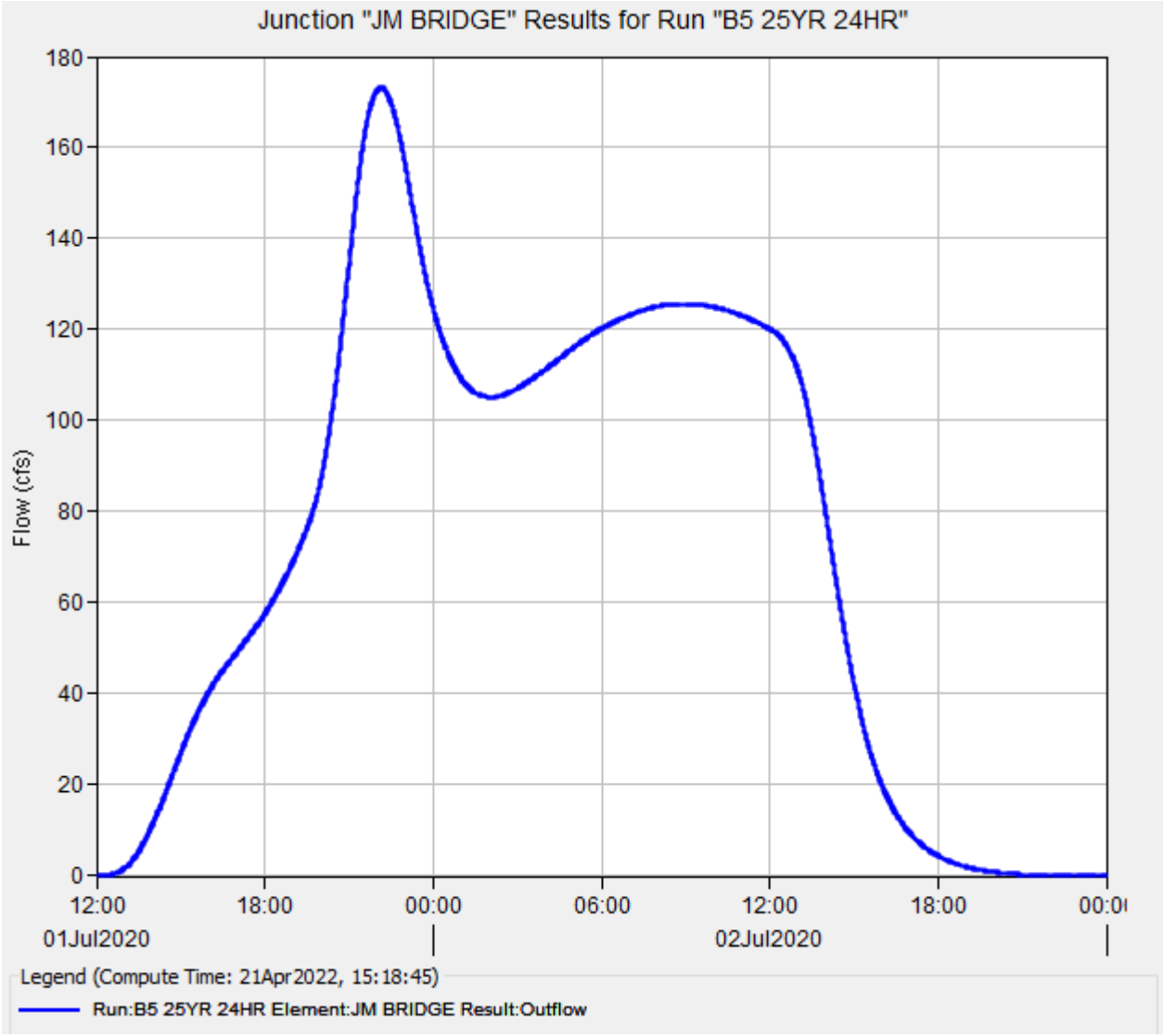
Project: JM_EWS Simulation Run: B5 10YR 24HR

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:18:30

Basin Model: B5 (30IN)
Meteorologic Model: 10 YR 24 HR 30 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B5	6.39	147.7	01Jul2020, 22:08	153.7
JM BRIDGE	6.39	147.7	01Jul2020, 22:08	153.7



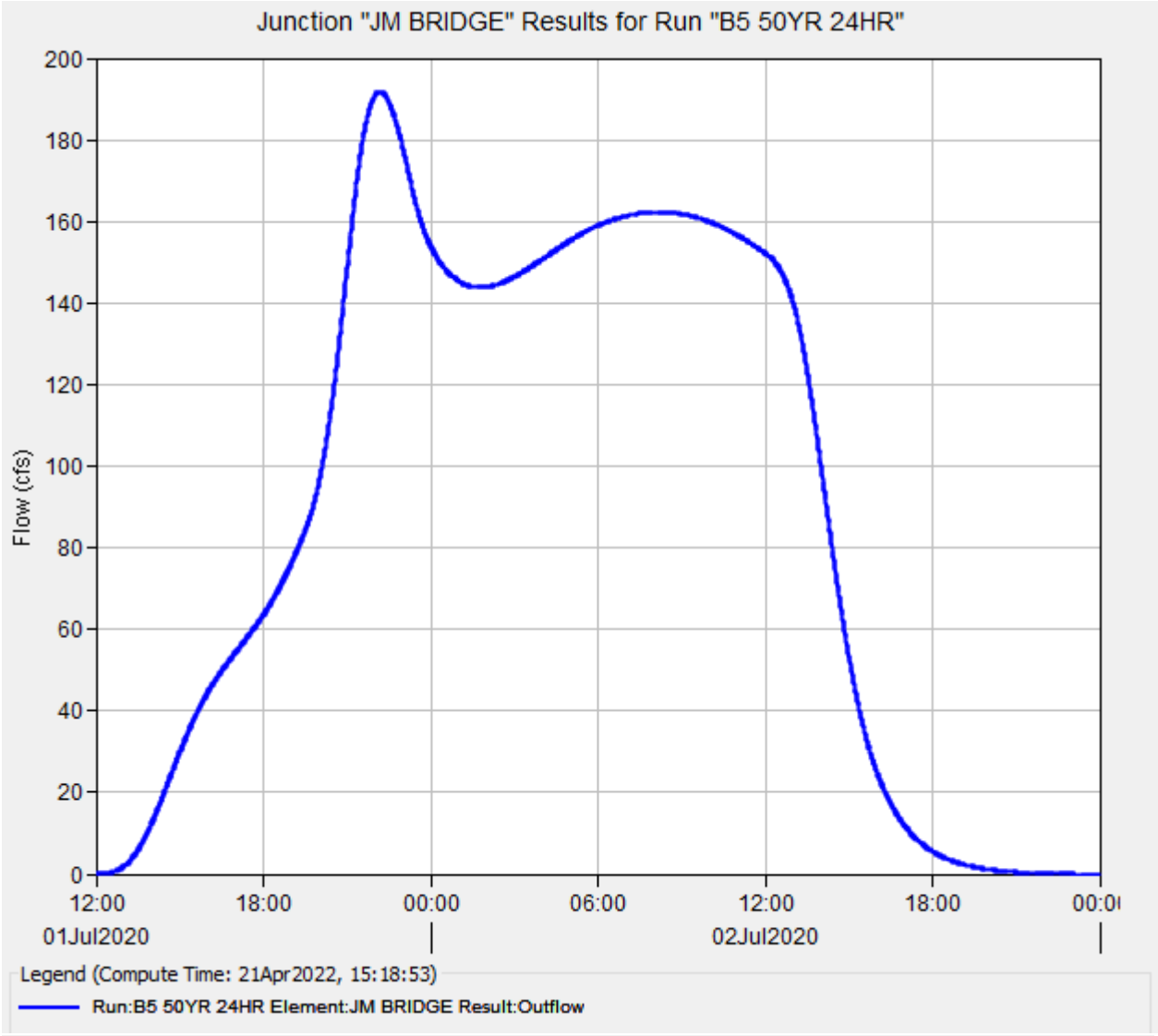
Project: JM_EWS Simulation Run: B5 25YR 24HR

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:18:45

Basin Model: B5 (30IN)
Meteorologic Model: 25 YR 24 HR 30 IN
Control Specifications: 24 Hour

Show Elements: All Elements | Volume Units: ○ IN ◉ AC-FT | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B5	6.39	173.2	01Jul2020, 22:08	216.0
JM BRIDGE	6.39	173.2	01Jul2020, 22:08	216.0



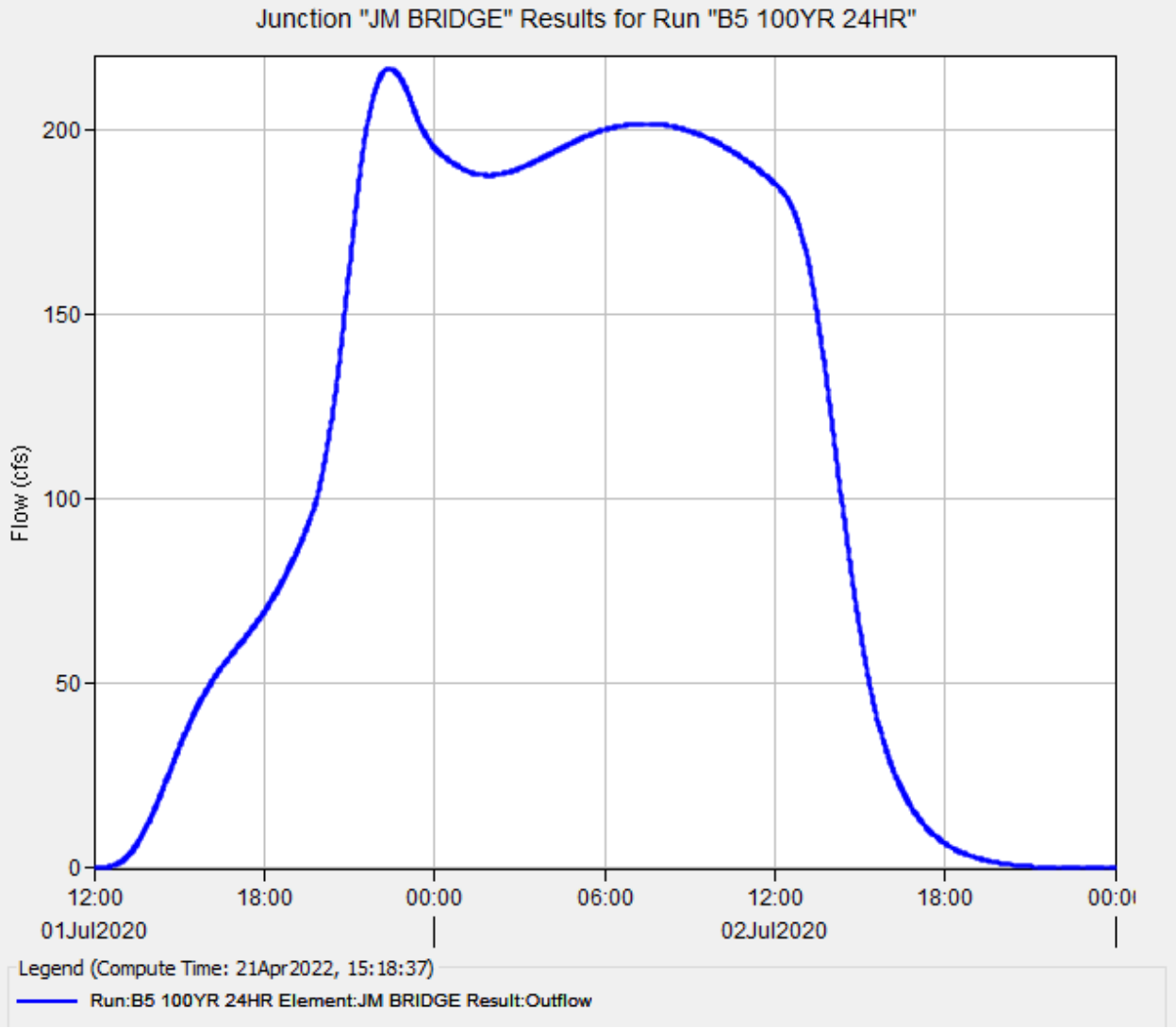
Project: JM_EWS Simulation Run: B5 50YR 24HR

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:18:53

Basin Model: B5 (30IN)
Meteorologic Model: 50 YR 24 HR 30 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B5	6.39	191.8	01Jul2020, 22:11	268.2
JM BRIDGE	6.39	191.8	01Jul2020, 22:11	268.2



Project: JM_EWS Simulation Run: B5 100YR 24HR

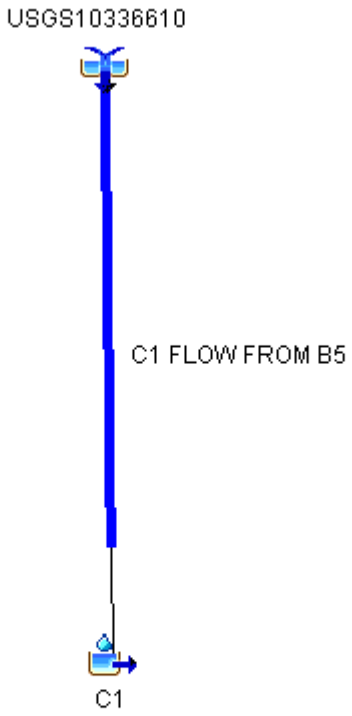
Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:18:37

Basin Model: B5 (30IN)
Meteorologic Model: 100 YR 24 HR 30 IN
Control Specifications: 24 Hour

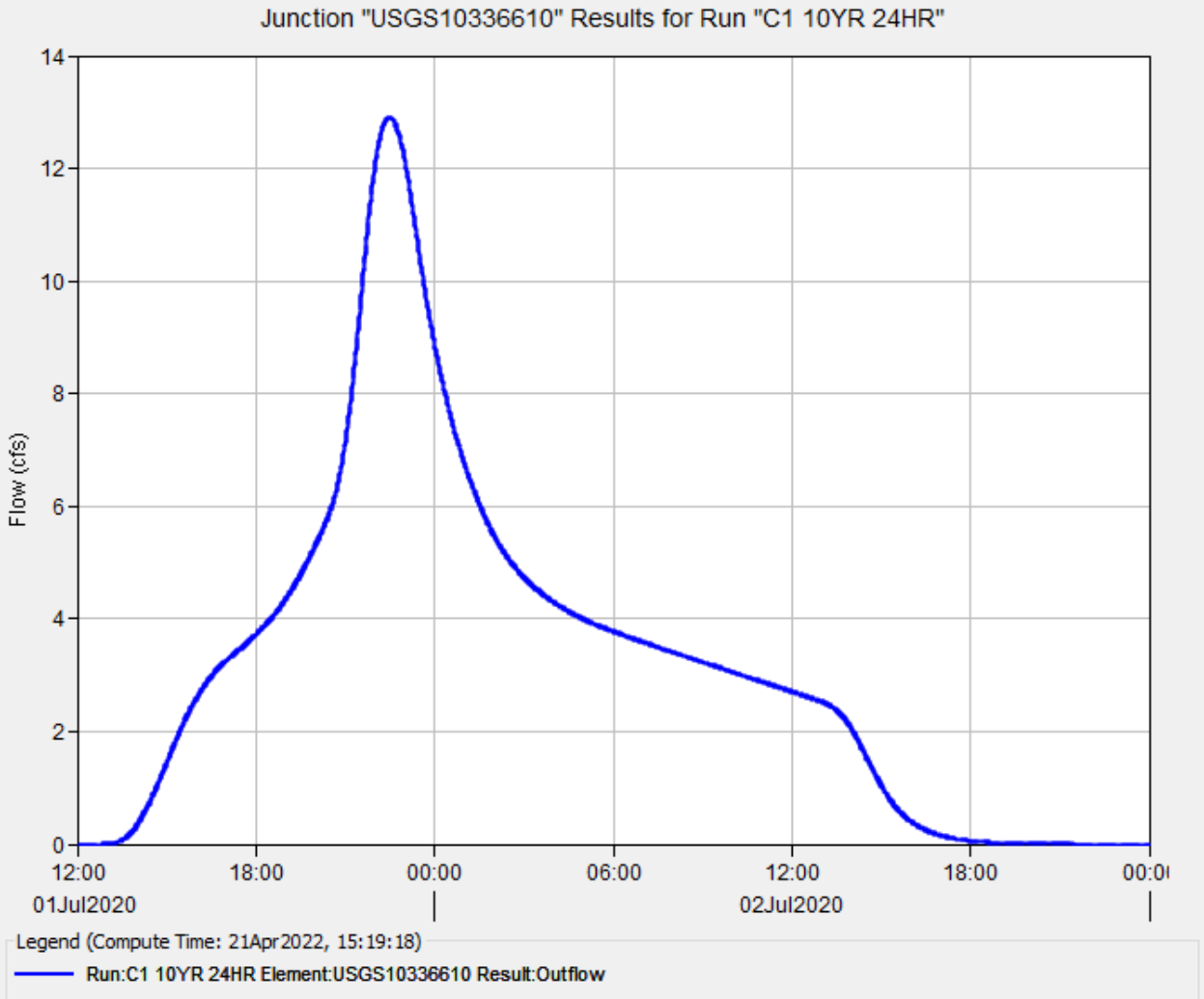
Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B5	6.39	216.4	01Jul2020, 22:24	325.4
JM BRIDGE	6.39	216.4	01Jul2020, 22:24	325.4

C1 Layout. (Done individually to apply 18” Mean Annual Rainfall numbers).



HEC-HMS C1 Results.



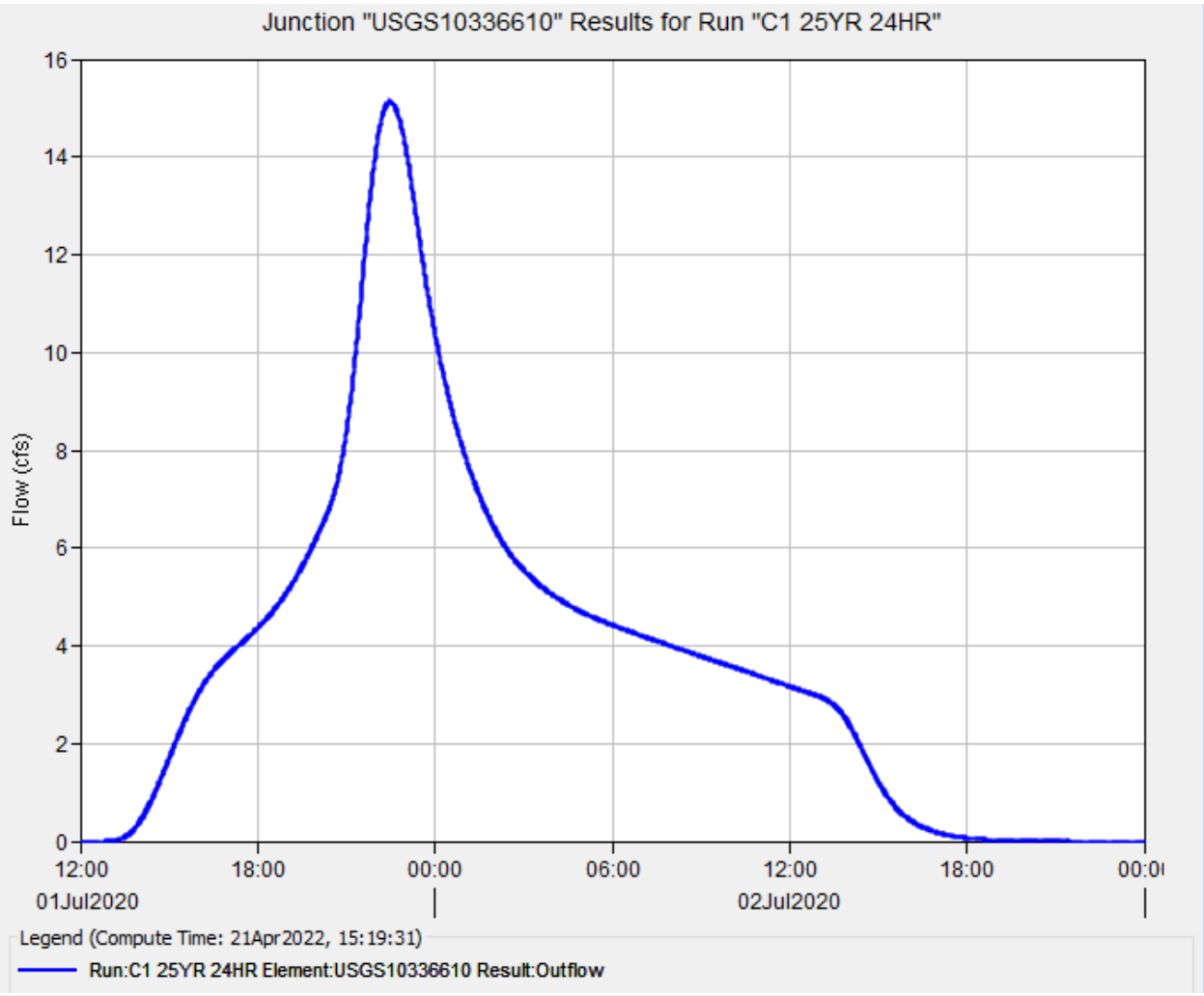
Project: JM_EWS Simulation Run: C1 10YR 24HR

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:19:18

Basin Model: C1 (18IN)
Meteorologic Model: 10 YR 24 HR 18 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
C1	0.68	12.9	01Jul2020, 21:38	9.5
C1 FROM B5	0.68	12.9	01Jul2020, 22:29	9.5
USGS10336610	0.68	12.9	01Jul2020, 22:29	9.5



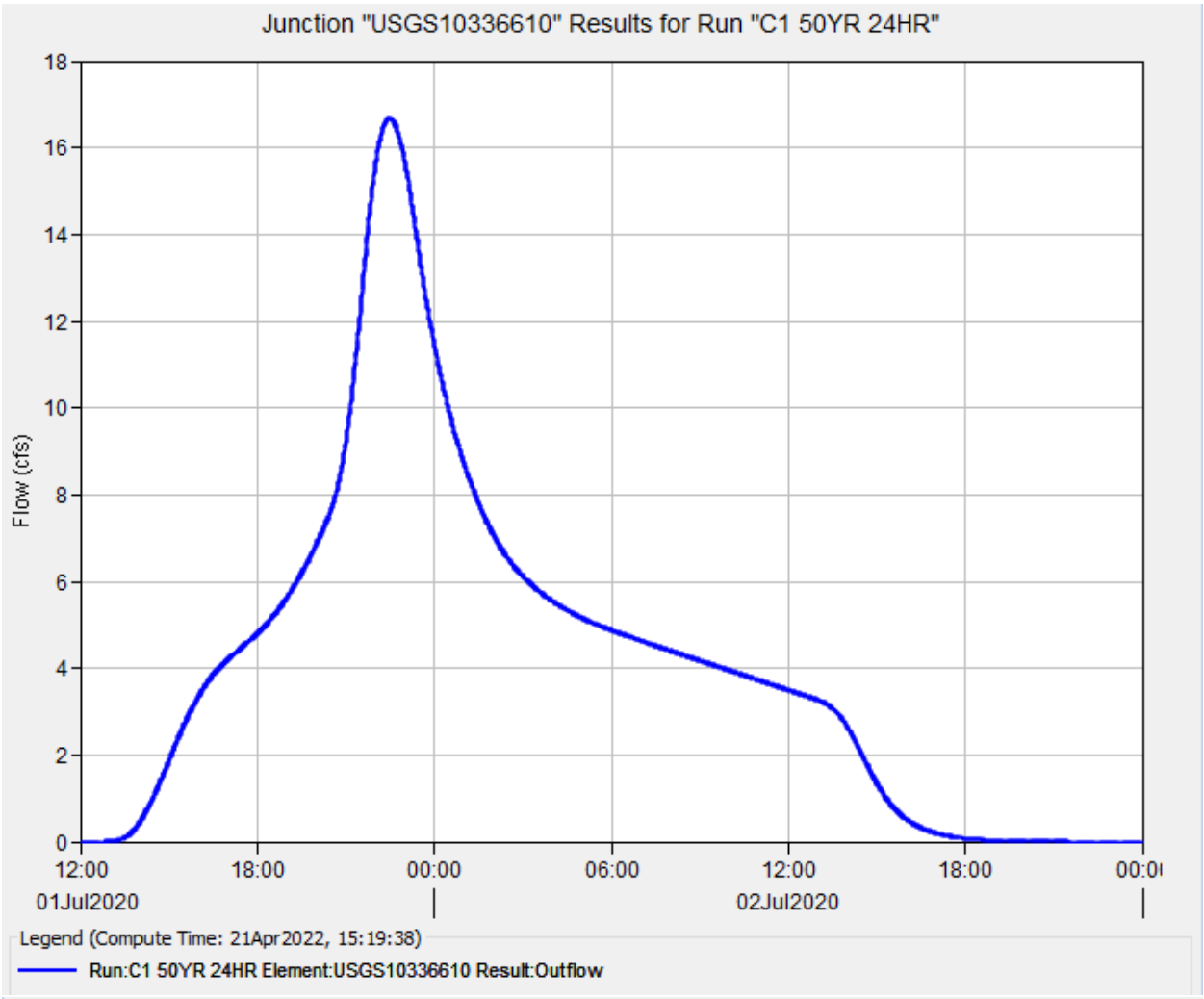
Project: JM_EWS Simulation Run: C1 25YR 24HR

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:19:31

Basin Model: C1 (18IN)
Meteorologic Model: 25 YR 24 HR 18 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
C1	0.68	15.1	01Jul2020, 21:38	11.2
C1 FROM B5	0.68	15.1	01Jul2020, 22:29	11.2
USGS10336610	0.68	15.1	01Jul2020, 22:29	11.2



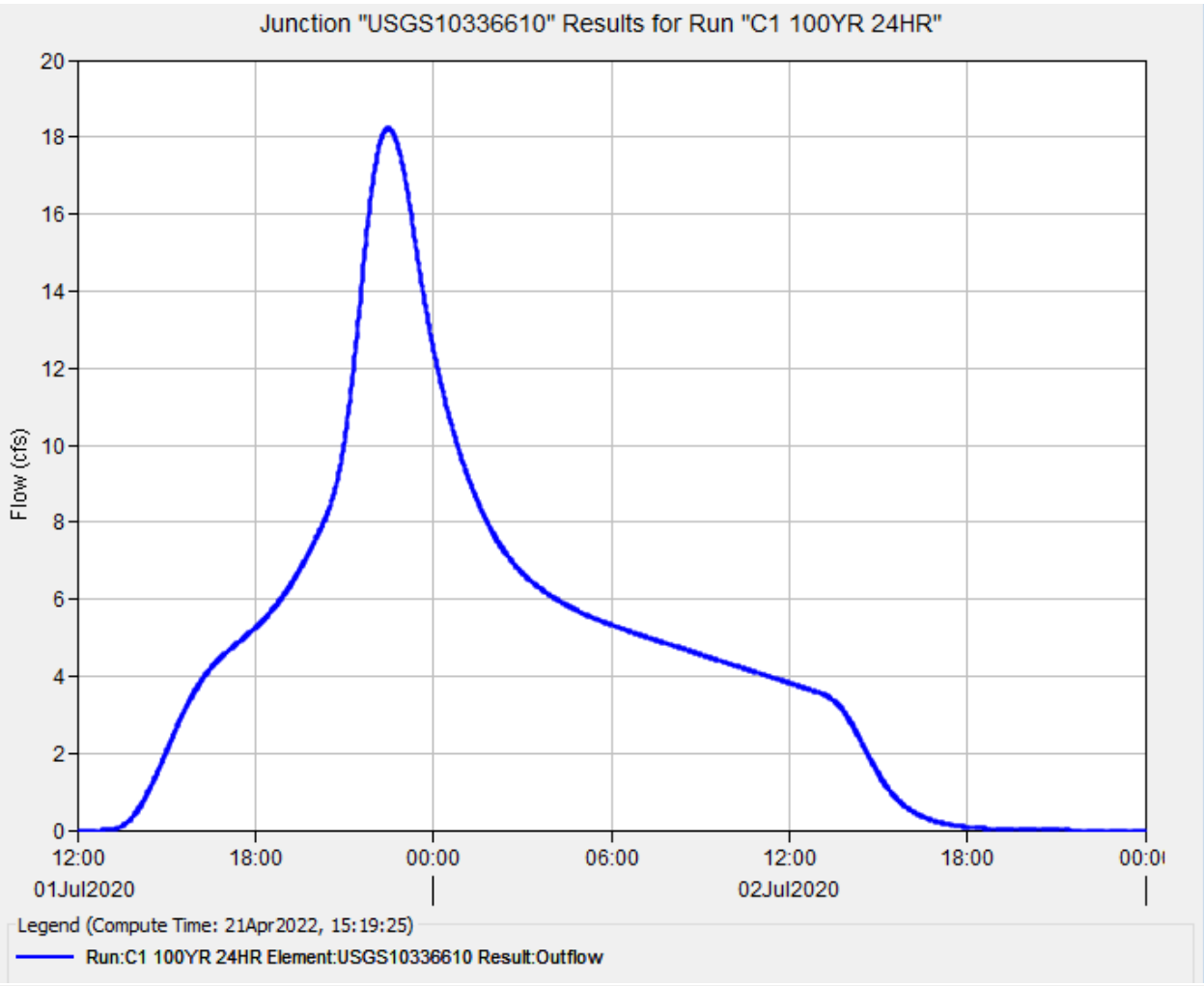
Project: JM_EWS Simulation Run: C1 50YR 24HR

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:19:38

Basin Model: C1 (18IN)
Meteorologic Model: 50 YR 24 HR 18 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
C1	0.68	16.7	01Jul2020, 21:38	12.3
C1 FROM B5	0.68	16.7	01Jul2020, 22:29	12.3
USGS10336610	0.68	16.7	01Jul2020, 22:29	12.3



Project: JM_EWS Simulation Run: C1 100YR 24HR

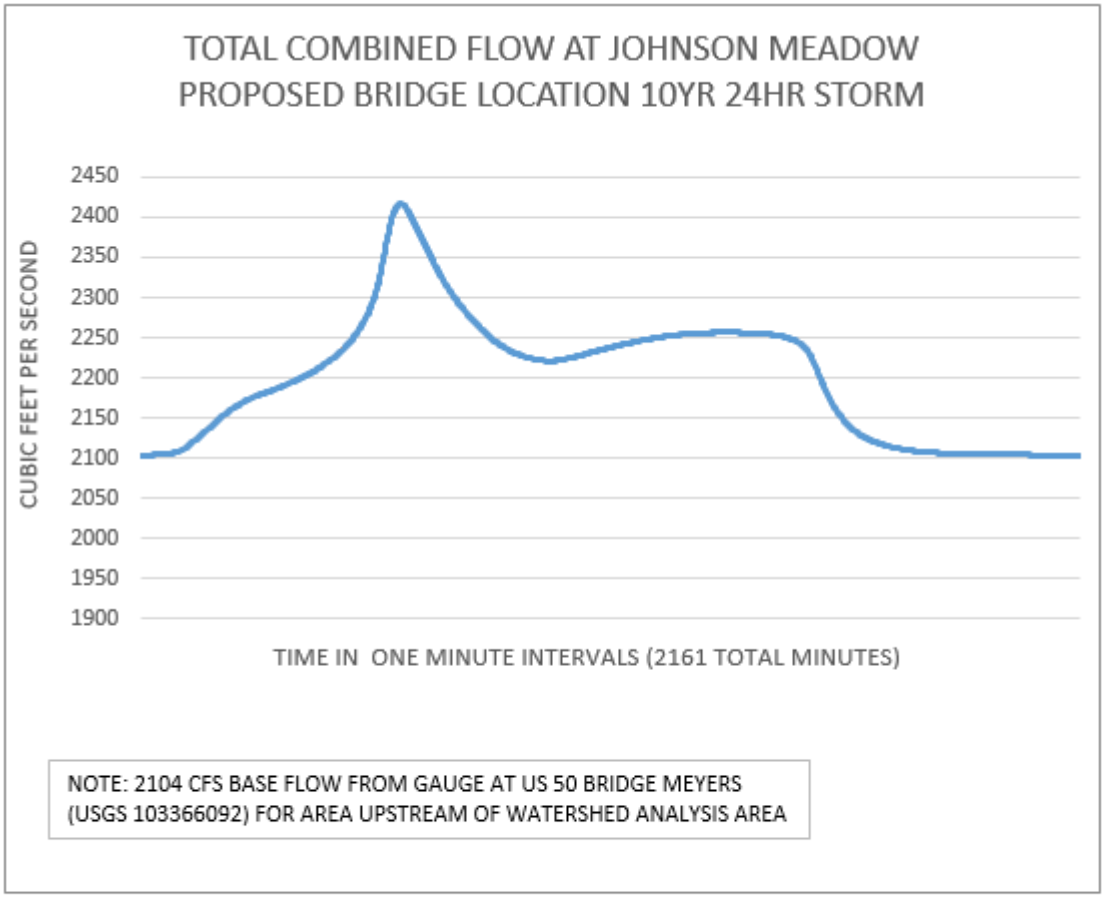
Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:19:25

Basin Model: C1 (18IN)
Meteorologic Model: 100 YR 24 HR 18 IN
Control Specifications: 24 Hour

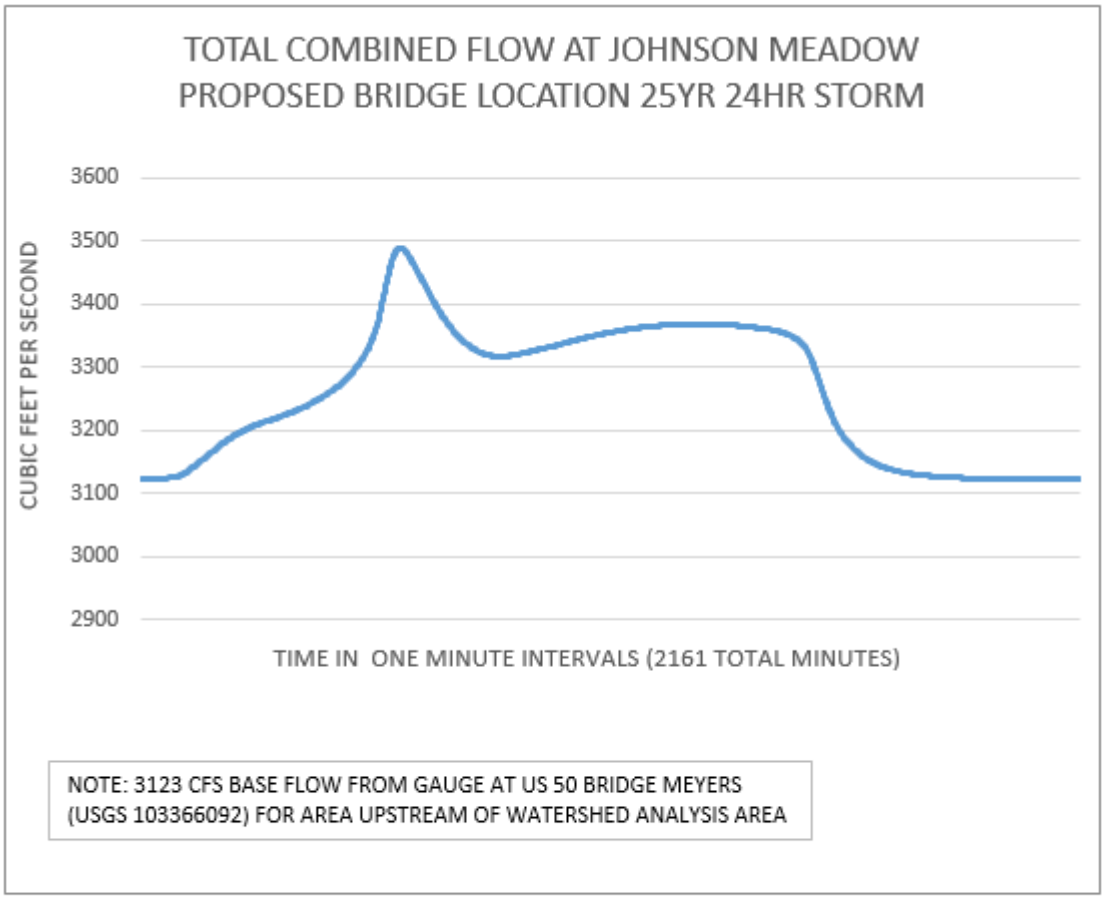
Show Elements: All Elements | Volume Units: IN (AC-FT) | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
C1	0.68	18.2	01Jul2020, 21:38	13.5
C1 FROM B5	0.68	18.2	01Jul2020, 22:29	13.5
USGS10336610	0.68	18.2	01Jul2020, 22:29	13.5

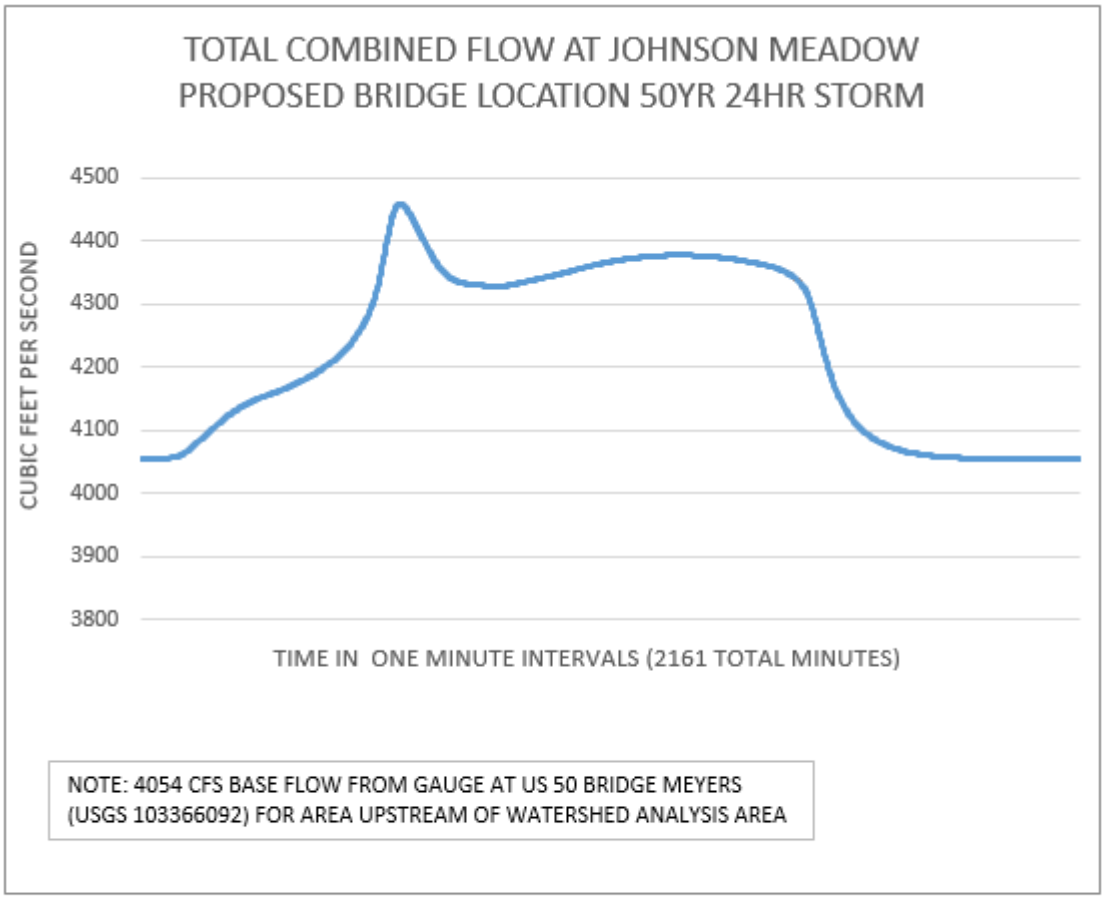
Total Combined Flow Results at Johnson Meadow Bridge and US 50 Bridge SLT (USGS10336610)



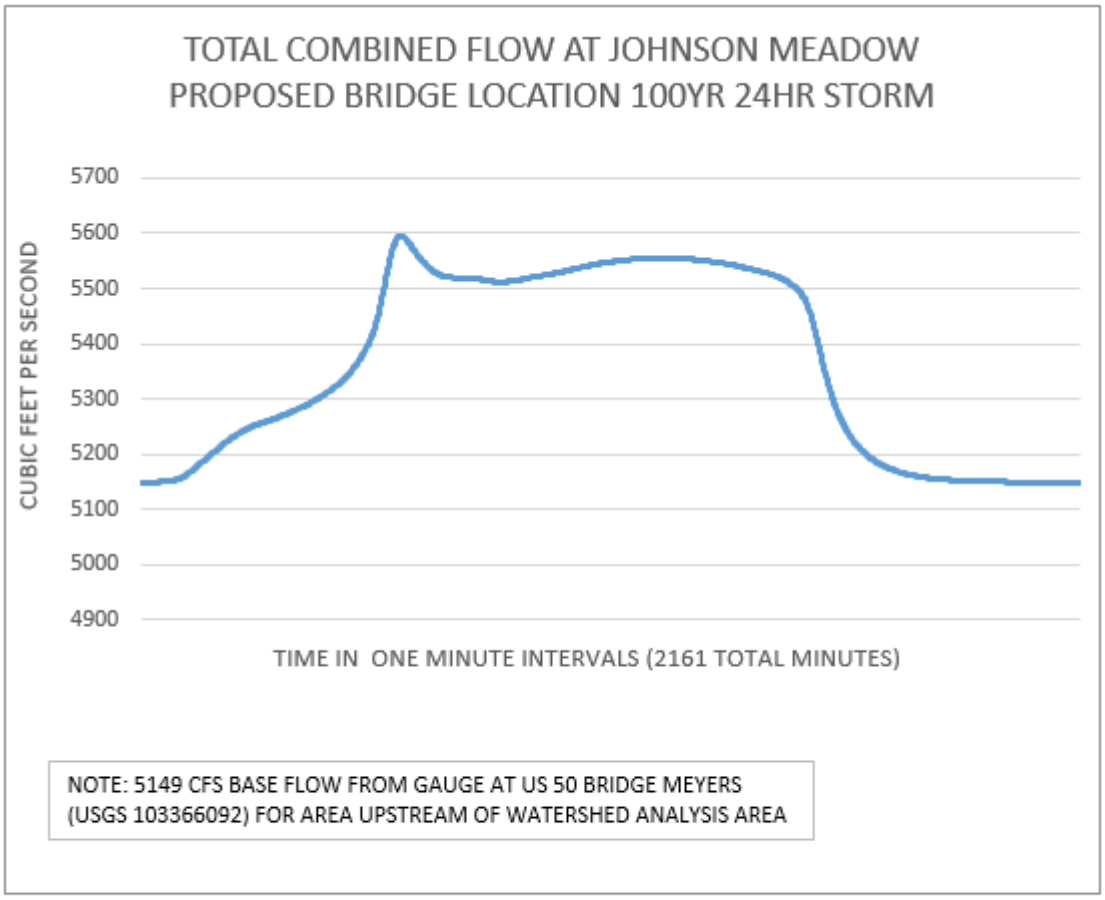
MAX COMBIND FLOW AT JOHNSON MEADOW BRIDGE	2416.8
MAX COMBIND FLOW AT US 50 BRIDGE SLT (USGS 10336610)	2428.6



MAX COMBIND FLOW AT JOHNSON MEADOW BRIDGE	3489.7
MAX COMBIND FLOW AT US 50 BRIDGE SLT (USGS 10336610)	3503.6



MAX COMBIND FLOW AT JOHNSON MEADOW BRIDGE	4459.3
MAX COMBIND FLOW AT US 50 BRIDGE SLT (USGS 10336610)	4474.6



MAX COMBIND FLOW AT JOHNSON MEADOW BRIDGE	5594.9
MAX COMBIND FLOW AT US 50 BRIDGE SLT (USGS 10336610)	5611.7

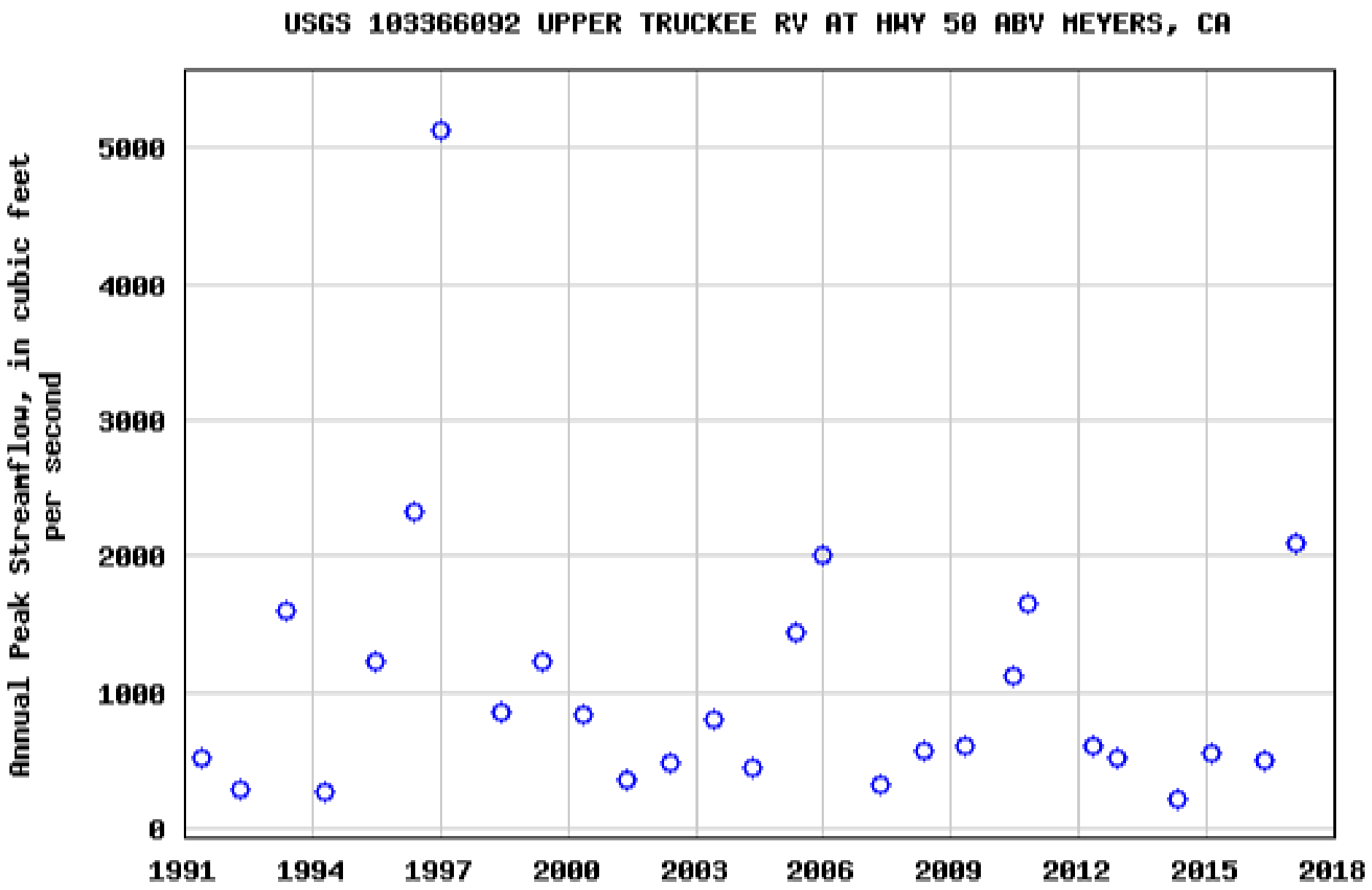
Appendix C

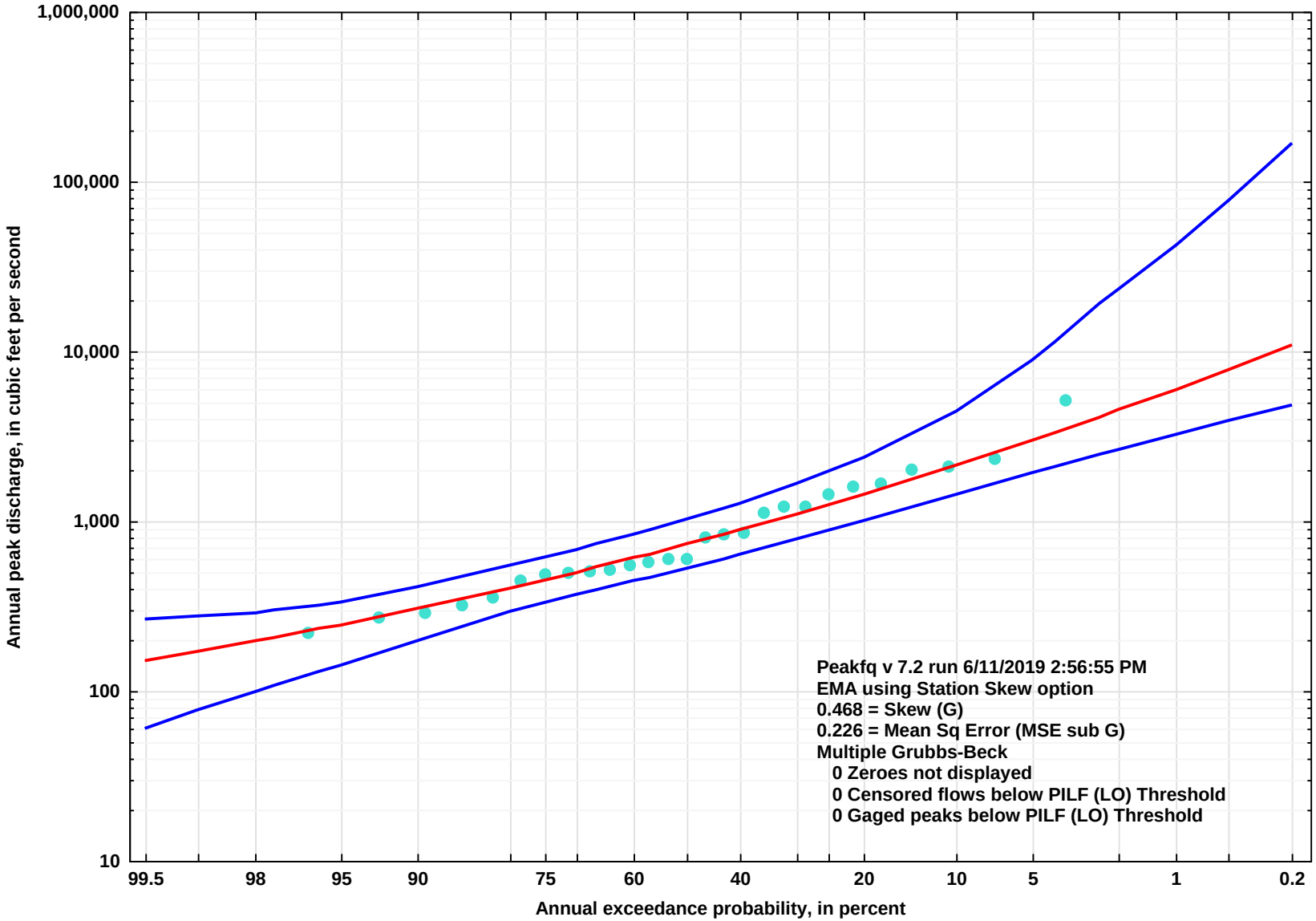
Flood Frequency Curve

USGS Station 103366092

And

USGS Station 10336610


USGS 103366092 UPPER TRUCKEE RV AT HWY 50 ABV MEYERS, CA
Annual Peak Streamflow, in cubic feet per second
5000
4000
3000
2000
1000
0
1991
1994
1997
2000
2003
2006
2009
2012
2015
2018


1,000,000
100,000
10,000
1,000
100
10
Annual peak discharge, in cubic feet per second
99.5
98
95
90
75
60
40
20
10
5
1
0.2
Annual exceedance probability, in percent
Peakfq v 7.2 run 6/11/2019 2:56:55 PM
EMA using Station Skew option
0.468 = Skew (G)
0.226 = Mean Sq Error (MSE sub G)
Multiple Grubbs-Beck
0 Zeroes not displayed
0 Censored flows below PILF (LO) Threshold
0 Gaged peaks below PILF (LO) Threshold

1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.002.000
Version 7.2 Annual peak flow frequency analysis Run Date / Time
3/28/2018 06/14/2019
14:53

--- PROCESSING OPTIONS ---

Plot option = Graphics device
Basin char output = None
Print option = Yes
Debug print = No
Input peaks listing = Long
Input peaks format = WATSTORE peak file

Input files used:
peaks (ascii) -
\\CDAData5\TD-SLT-Engineering\PROJECTS\95117 - San Bernardino\Agencies\USGS\PEAKDATA_103366092.TXT
specifications -
\\CDAData5\TD-SLT-Engineering\PROJECTS\95117 - San Bernardino\Agencies\USGS\PKFQWPSF.TMP
Output file(s):
main - \\CDAData5\TD-SLT-Engineering\PROJECTS\95117 - San Bernardino\Agencies\USGS\PEAKDATA_103366092.PRT

*** User responsible for assessment and interpretation of the following analysis ***

1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.001
Version 7.2 Annual peak flow frequency analysis Run Date / Time
3/28/2018 06/14/2019
14:53

Station - 103366092 UPPER TRUCKEE RV AT HWY 50 ABV MEYERS, CA

TABLE 1 - INPUT DATA SUMMARY

Number of peaks in record	=	27
Peaks not used in analysis	=	0
Gaged peaks in analysis	=	27
Historic peaks in analysis	=	0
Beginning Year	=	1991
Ending Year	=	2017
Historical Period Length	=	27
Skew option	=	REGIONAL
Regional skew	=	0.197
Standard error	=	0.550
Mean Square error	=	0.303
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied PILF (LO) criterion	=	--
Plotting position parameter	=	0.00
Type of analysis		EMA
PILF (LO) Test Method		MGBT

Perceptible Ranges:

Start Year	End Year	Lower Bound	Upper Bound	
1991	2017	0.0	INF	DEFAULT

Interval Data = None Specified

TABLE 2 - DIAGNOSTIC MESSAGE AND PILF RESULTS

```
   *WCF151I-17B WEIGHTED SKEW REPLACED BY USER OPTION.     0.352     0.197   1
  **WCF233W-EXPECTED PROB OUT OF RANGE AT TAB PROB.   0.00000   0.00000
    WCF002J-CALCS COMPLETED.  RETURN CODE =  2
    EMA002W-CONFIDENCE INTERVALS ARE NOT EXACT IF HISTORIC PERIOD > 0


    MULTIPLE GRUBBS-BECK TEST RESULTS
    MULTIPLE GRUBBS-BECK PILF THRESHOLD     N/A
    NUMBER OF PILFS IDENTIFIED                0
```

Kendall's Tau Parameters

	TAU	P-VALUE	MEDIAN SLOPE	No. of PEAKS
GAGED PEAKS	-0.060	0.677	-9.000	27

1

Program PeakFq — U. S. GEOLOGICAL SURVEY — Seq.001.002
Version 7.2 — Annual peak flow frequency analysis — Run Date / Time
3/28/2018 — 06/14/2019 14:53

Station - 103366092 UPPER TRUCKEE RV AT HWY 50 ABV MEYERS, CA

TABLE 3 - ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	LOGARITHMIC		
	MEAN	STANDARD DEVIATION	SKEW
EMA WITHOUT REG SKEW	2.8908	0.3324	0.468
EMA WITH REG SKEW	2.8908	0.3324	0.197

EMA ESTIMATE OF MSE OF SKEW WITHOUT REG SKEW	0.2262
EMA ESTIMATE OF MSE OF SKEW W/GAGED PEAKS ONLY (AT-SITE)	0.2262

TABLE 4 - ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	<- EMA ESTIMATE -> WITH REG SKEW	WITHOUT REG SKEW	<- FOR EMA ESTIMATE WITH REG SKEW -> LOG VARIANCE OF EST.	<-CONFIDENCE LIMITS-> 5% LOWER	95% UPPER
0.9950	124.8	151.5	0.0264	36.4	213.1
0.9900	146.5	171.1	0.0195	50.8	233.3
0.9500	230.8	246.5	0.0087	118.4	325.3
0.9000	296.8	305.4	0.0062	180.7	409.6
0.8000	405.8	403.8	0.0049	280.8	555.7

0.6667	548.2	534.6	0.0046	395.0	749.9
0.5000	758.3	732.7	0.0047	550.2	1051.0
0.4292	869.8	840.2	0.0048	630.9	1220.0
0.2000	1468.	1446.	0.0061	1054.0	2285.0
0.1000	2104.	2137.	0.0087	1469.0	3919.0
0.0400	3123.	3331.	0.0146	2058.0	8398.0
0.0200	4054.	4504.	0.0213	2525.0	15590.0
0.0100	5149.	5971.	0.0300	3009.0	26600.0
0.0050	6429.	7795.	0.0408	3509.0	42760.0
0.0020	8453.	10890.	0.0584	4188.0	79690.0

*Note: If Station Skew option is selected then EMA ESTIMATE WITH REG SKEW will
display values for and be equal to EMA ESTIMATE WITHOUT REG SKEW.
1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.003
Version 7.2 Annual peak flow frequency analysis Run Date / Time
3/28/2018 06/14/2019
14:53

Station - 103366092 UPPER TRUCKEE RV AT HWY 50 ABV MEYERS, CA

TABLE 5 - INPUT DATA LISTING

WATER YEAR	PEAK VALUE	PEAKFQ CODES	FLOW INTERVALS (WHERE LOWER BOUND NOT = UPPER BOUND) LOWER BOUND	UPPER BOUND	REMARKS
1991	511.0				
1992	289.0				
1993	1600.0				
1994	268.0				
1995	1230.0				
1996	2320.0				
1997	5120.0				
1998	853.0				
1999	1230.0				
2000	830.0				
2001	352.0				
2002	486.0				
2003	799.0				
2004	447.0				
2005	1440.0				
2006	2010.0				
2007	319.0				
2008	571.0				
2009	603.0				
2010	1120.0				
2011	1650.0				
2012	603.0				
2013	517.0				
2014	218.0				
2015	548.0				
2016	499.0				
2017	2090.0				

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION

D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
  -8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.004
Version 7.2 Annual peak flow frequency analysis Run Date / Time
3/28/2018 06/14/2019
14:53

Station - 103366092 UPPER TRUCKEE RV AT HWY 50 ABV MEYERS, CA

TABLE 6 - EMPIRICAL FREQUENCY CURVES -- HIRSCH-STEDINGER PLOTTING POSITIONS

WATER YEAR	RANKED DISCHARGE	EMA ESTIMATE	FLOW INTERVALS (WHERE LOWER BOUND NOT = UPPER BOUND) LOWER BOUND	UPPER BOUND
1997	5120.0	0.0356		
1996	2320.0	0.0713		
2017	2090.0	0.1070		
2006	2010.0	0.1427		
2011	1650.0	0.1785		
1993	1600.0	0.2142		
2005	1440.0	0.2499		
1995	1230.0	0.3214		
1999	1230.0	0.2856		
2010	1120.0	0.3571		
1998	853.0	0.3928		
2000	830.0	0.4285		
2003	799.0	0.4643		
2009	603.0	0.5357		
2012	603.0	0.5000		
2008	571.0	0.5715		
2015	548.0	0.6072		
2013	517.0	0.6429		
1991	511.0	0.6786		
2016	499.0	0.7144		
2002	486.0	0.7501		
2004	447.0	0.7858		
2001	352.0	0.8215		
2007	319.0	0.8573		
1992	289.0	0.8930		
1994	268.0	0.9287		
2014	218.0	0.9644		

1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.005
Version 7.2 Annual peak flow frequency analysis Run Date / Time
3/28/2018 06/14/2019
14:53

Station - 103366092 UPPER TRUCKEE RV AT HWY 50 ABV MEYERS, CA

TABLE 7 - EMA REPRESENTATION OF DATA

					<---- USER-ENTERED	
----><-------- FINAL ------->						
WATER <----- OBSERVED ----><-------- EMA -------><- PERCEPTIBLE RANGES -><- PERCEPTIBLE RANGES ->						
YEAR	Q_LOWER	Q_UPPER	Q_LOWER	Q_UPPER	LOWER	UPPER
1991	511.0	511.0	511.0	511.0	0.0	INF
0.0	INF					
1992	289.0	289.0	289.0	289.0	0.0	INF
0.0	INF					
1993	1600.0	1600.0	1600.0	1600.0	0.0	INF
0.0	INF					
1994	268.0	268.0	268.0	268.0	0.0	INF
0.0	INF					
1995	1230.0	1230.0	1230.0	1230.0	0.0	INF
0.0	INF					
1996	2320.0	2320.0	2320.0	2320.0	0.0	INF
0.0	INF					
1997	5120.0	5120.0	5120.0	5120.0	0.0	INF
0.0	INF					
1998	853.0	853.0	853.0	853.0	0.0	INF
0.0	INF					
1999	1230.0	1230.0	1230.0	1230.0	0.0	INF
0.0	INF					
2000	830.0	830.0	830.0	830.0	0.0	INF
0.0	INF					
2001	352.0	352.0	352.0	352.0	0.0	INF
0.0	INF					
2002	486.0	486.0	486.0	486.0	0.0	INF
0.0	INF					
2003	799.0	799.0	799.0	799.0	0.0	INF
0.0	INF					
2004	447.0	447.0	447.0	447.0	0.0	INF
0.0	INF					
2005	1440.0	1440.0	1440.0	1440.0	0.0	INF
0.0	INF					
2006	2010.0	2010.0	2010.0	2010.0	0.0	INF
0.0	INF					
2007	319.0	319.0	319.0	319.0	0.0	INF
0.0	INF					
2008	571.0	571.0	571.0	571.0	0.0	INF
0.0	INF					
2009	603.0	603.0	603.0	603.0	0.0	INF
0.0	INF					
2010	1120.0	1120.0	1120.0	1120.0	0.0	INF
0.0	INF					
2011	1650.0	1650.0	1650.0	1650.0	0.0	INF
0.0	INF					
2012	603.0	603.0	603.0	603.0	0.0	INF
0.0	INF					
2013	517.0	517.0	517.0	517.0	0.0	INF
0.0	INF					
2014	218.0	218.0	218.0	218.0	0.0	INF
0.0	INF					
2015	548.0	548.0	548.0	548.0	0.0	INF
0.0	INF					
2016	499.0	499.0	499.0	499.0	0.0	INF
0.0	INF					
2017	2090.0	2090.0	2090.0	2090.0	0.0	INF
0.0	INF					

1

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 27

Data records may have been ignored for the stations listed below.

(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)

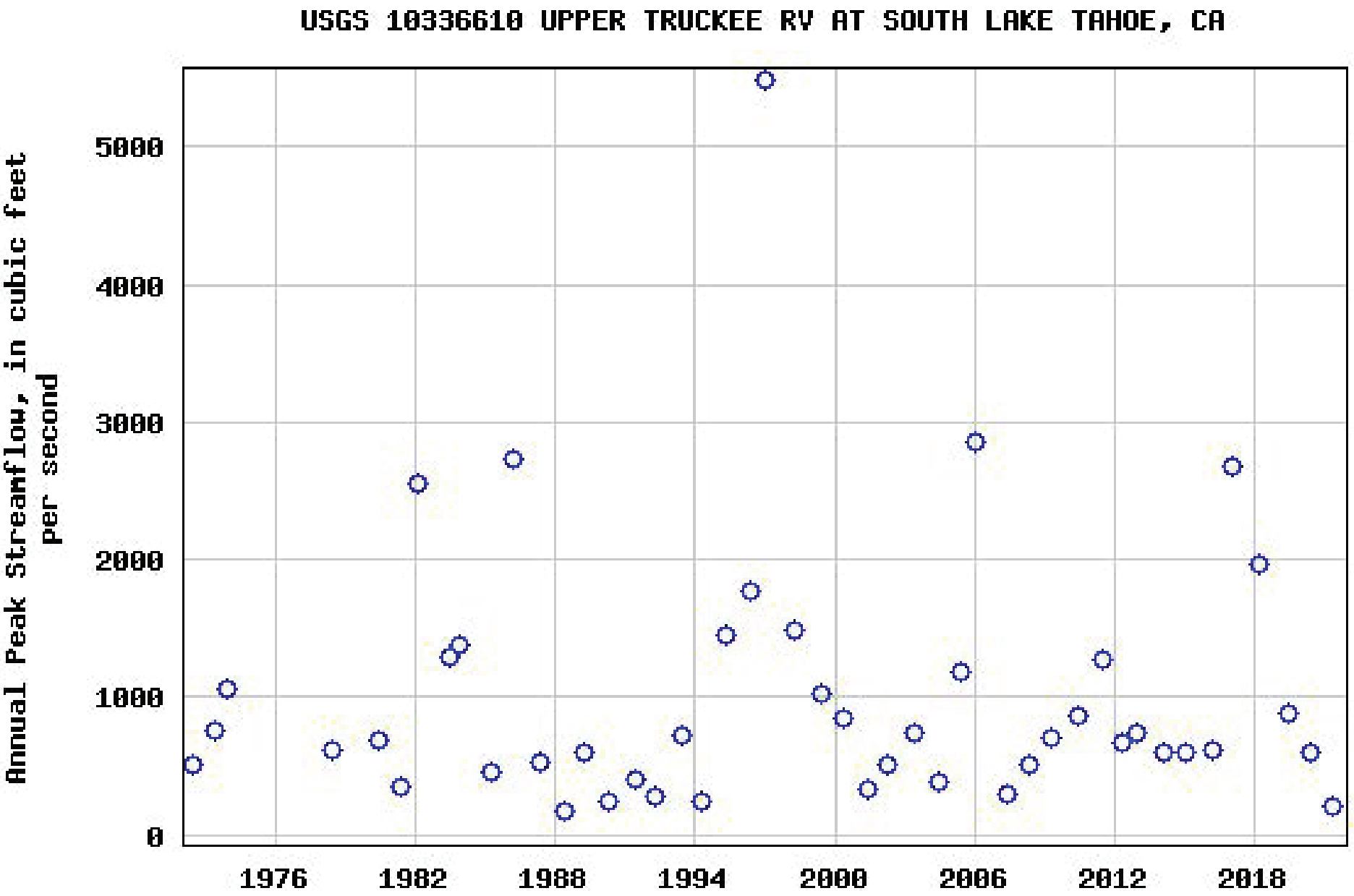
(2, 4, and * records are ignored.)

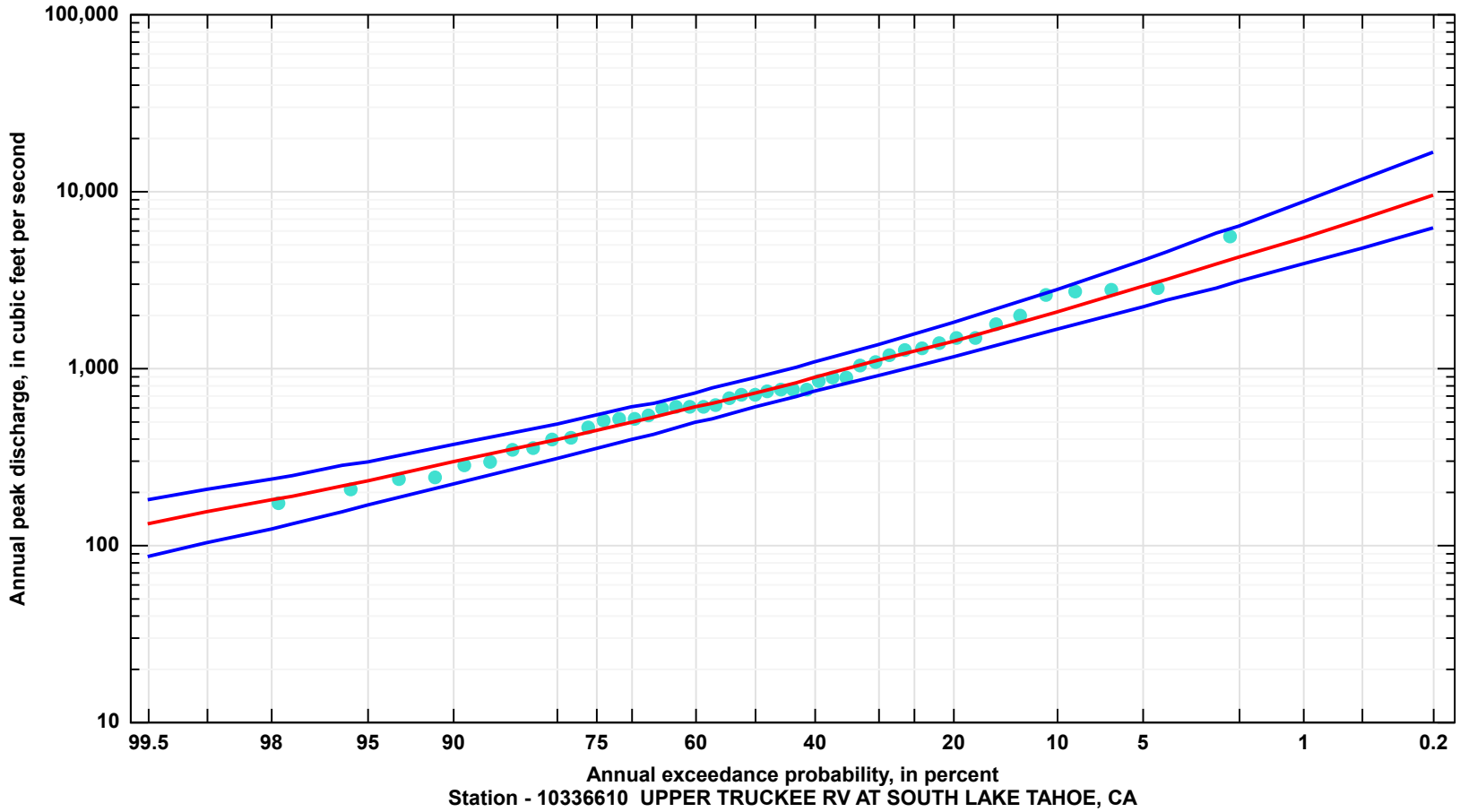
For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 103366092 USGS UPPER TRUCKEE RV AT HWY 50 AB

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:


USGS 10336610 UPPER TRUCKEE RV AT SOUTH LAKE TAHOE, CA
Annual Peak Streamflow, in cubic feet per second
5000
4000
3000
2000
1000
0
1976
1982
1988
1994
2000
2006
2012
2018



ANALYSIS INFO:
Peakfq v 7.3 run 3/22/2022 8:31:12 AM
B17B using Weighted Skew option
0.327 = Skew (G); Multiple Grubbs-Beck
0 Zeroes not displayed
0 Censored flows below PILF (LO) Threshold
0 Gaged peaks below PILF (LO) Threshold

1

```
  Program PeakFq           U. S. GEOLOGICAL SURVEY             Seq.002.000
  Version 7.3         Annual peak flow frequency analysis      Run Date / Time
  10/25/2019                                                    03/22/2022 08:31

                         --- PROCESSING OPTIONS ---

                      Plot option         = Graphics device
                      Basin char output   = None
                      Print option        = Yes
                      Debug print         = No
                      Input peaks listing = Long
                      Input peaks format  = WATSTORE peak file

                      Input files used:
                         peaks (ascii)  -
\\CDAData5\TD-SLT-Engineering\PROJECTS\95201\Hydrology\PeakFQ\UTR AT CARROWS
PEAK.TXT
                         specifications -
\\CDAData5\TD-SLT-Engineering\PROJECTS\95201\Hydrology\PeakFQ\PKFQWPSF.TMP

                      Output file(s):
                         main -
\\CDAData5\TD-SLT-Engineering\PROJECTS\95201\Hydrology\PeakFQ\UTR AT CARROWS
PEAK.PRT


  ***  User responsible for assessment and interpretation of the following analysis
 ***
```

1

```
  Program PeakFq           U. S. GEOLOGICAL SURVEY             Seq.001.001
  Version 7.3         Annual peak flow frequency analysis      Run Date / Time
  10/25/2019                                                    03/22/2022 08:31

          Station - 10336610  UPPER TRUCKEE RV AT SOUTH LAKE TAHOE, CA


                     TABLE 1 - INPUT DATA SUMMARY

                Number of peaks in record           =       46
                Peaks not used in analysis          =        1
                Gaged peaks in analysis             =       45
                Historic peaks in analysis          =        0
                Beginning Year                      =     1972
                Ending Year                         =     2021
                Historical Period Length            =       50
                Skew option                         =   WEIGHTED
```

```
Regional skew                          =    0.300
     Standard error                    =    0.550
     Mean Square error                 =    0.303
Gage base discharge                    =      0.0
User supplied high outlier threshold =   --
User supplied PILF (LO) criterion    =   --
Plotting position parameter            =     0.00
Type of analysis                         BULL.17B
PILF (LO) Test Method                        MGBT
Perceptible Ranges                 =   Not Applicable
Interval Data                      =   Not Applicable
```

TABLE 2 - DIAGNOSTIC MESSAGE AND PILF RESULTS

```
**WCF109W-PEAKS WITH MINUS-FLAGGED DISCHARGES WERE BYPASSED.       1
**WCF113W-NUMBER OF SYSTEMATIC PEAKS HAS BEEN REDUCED TO NSYS =   45
  WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE.                   0.0
  WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE.      6153.7
**WCF164W-HISTORIC PERIOD IGNORED.    50.0
**WCF233W-EXPECTED PROB OUT OF RANGE AT TAB PROB.   0.00000   0.00000
  WCF002J-CALCS COMPLETED.  RETURN CODE =  2
```

Kendall's Tau Parameters

	TAU	P-VALUE	MEDIAN SLOPE	No. of PEAKS
GAGED PEAKS	0.022	0.837	1.687	45

1

Program PeakFq — U. S. GEOLOGICAL SURVEY — Seq.001.002
Version 7.3 — Annual peak flow frequency analysis — Run Date / Time
10/25/2019 — 03/22/2022 08:31

Station - 10336610 UPPER TRUCKEE RV AT SOUTH LAKE TAHOE, CA

TABLE 3 - ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

FLOOD BASE		LOGARITHMIC		
DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW

SYSTEMATIC RECORD	0.0	1.0000	2.8784	0.3340	0.340
BULL.17B ESTIMATE	0.0	1.0000	2.8784	0.3340	0.327

BULL.17B ESTIMATE OF MSE OF AT-SITE SKEW 0.1383

TABLE 4 - ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	<-- FOR BULLETIN 17B ESTIMATES --> LOG VARIANCE OF EST.	CONFIDENCE INTERVALS 5.0% LOWER	95.0% UPPER
0.9950	132.0	133.2	----	86.4	180.7
0.9900	152.2	153.3	----	102.2	204.8
0.9500	230.1	230.8	----	166.1	295.5
0.9000	290.9	291.3	----	218.1	365.3
0.8000	392.0	391.9	----	306.5	481.0
0.6667	525.3	524.7	----	424.1	635.9
0.5000	724.8	723.6	----	597.5	876.8
0.4292	831.9	830.5	----	688.4	1011.0
0.2000	1422.	1421.	----	1161.0	1813.0
0.1000	2072.	2074.	----	1642.0	2787.0
0.0400	3155.	3164.	----	2393.0	4554.0
0.0200	4182.	4202.	----	3068.0	6354.0
0.0100	5428.	5465.	----	3854.0	8663.0
0.0050	6931.	6993.	----	4768.0	11600.0
0.0020	9394.	9505.	----	6205.0	16690.0

Station - 10336610 UPPER TRUCKEE RV AT SOUTH LAKE TAHOE, CA

TABLE 5 - INPUT DATA LISTING

WATER YEAR	PEAK VALUE	PEAKFQ CODES	REMARKS
1972	518.0		
1973	754.0		
1974	1070.0		
1978	-610.0	O	
1980	697.0		

1981	352.0
1982	2550.0
1983	1300.0
1984	1380.0
1985	459.0
1986	2740.0
1987	533.0
1988	170.0
1989	595.0
1990	236.0
1991	402.0
1992	284.0
1993	729.0
1994	240.0
1995	1460.0
1996	1780.0
1997	5480.0
1998	1480.0
1999	1020.0
2000	850.0
2001	340.0
2002	502.0
2003	750.0
2004	390.0
2005	1180.0
2006	2850.0
2007	292.0
2008	513.0
2009	706.0
2010	873.0
2011	1270.0
2012	678.0
2013	745.0
2014	596.0
2015	598.0
2016	612.0
2017	2680.0
2018	1970.0
2019	889.0
2020	592.0
2021	204.0

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value

X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
O	O	Opportunistic peak
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
  -8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.004
Version 7.3 Annual peak flow frequency analysis Run Date / Time
10/25/2019 03/22/2022 08:31

Station - 10336610 UPPER TRUCKEE RV AT SOUTH LAKE TAHOE, CA

TABLE 6 - EMPIRICAL FREQUENCY CURVES -- WEIBULL PLOTTING POSITIONS

WATER YEAR	RANKED DISCHARGE	SYSTEMATIC RECORD	B17B ESTIMATE
1997	5480.0	0.0217	0.0217
2006	2850.0	0.0435	0.0435
1986	2740.0	0.0652	0.0652
2017	2680.0	0.0870	0.0870
1982	2550.0	0.1087	0.1087
2018	1970.0	0.1304	0.1304
1996	1780.0	0.1522	0.1522
1998	1480.0	0.1739	0.1739
1995	1460.0	0.1957	0.1957
1984	1380.0	0.2174	0.2174
1983	1300.0	0.2391	0.2391
2011	1270.0	0.2609	0.2609
2005	1180.0	0.2826	0.2826
1974	1070.0	0.3043	0.3043
1999	1020.0	0.3261	0.3261
2019	889.0	0.3478	0.3478
2010	873.0	0.3696	0.3696
2000	850.0	0.3913	0.3913
1973	754.0	0.4130	0.4130
2003	750.0	0.4348	0.4348
2013	745.0	0.4565	0.4565
1993	729.0	0.4783	0.4783
2009	706.0	0.5000	0.5000
1980	697.0	0.5217	0.5217

2012	678.0	0.5435	0.5435
2016	612.0	0.5652	0.5652
2015	598.0	0.5870	0.5870
2014	596.0	0.6087	0.6087
1989	595.0	0.6304	0.6304
2020	592.0	0.6522	0.6522
1987	533.0	0.6739	0.6739
1972	518.0	0.6957	0.6957
2008	513.0	0.7174	0.7174
2002	502.0	0.7391	0.7391
1985	459.0	0.7609	0.7609
1991	402.0	0.7826	0.7826
2004	390.0	0.8043	0.8043
1981	352.0	0.8261	0.8261
2001	340.0	0.8478	0.8478
2007	292.0	0.8696	0.8696
1992	284.0	0.8913	0.8913
1994	240.0	0.9130	0.9130
1990	236.0	0.9348	0.9348
2021	204.0	0.9565	0.9565
1988	170.0	0.9783	0.9783
1978	-610.0	--	--

1

End PeakFQ analysis.

Stations processed	:	1
Number of errors	:	0
Stations skipped	:	0
Station years	:	46

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 10336610 USGS UPPER TRUCKEE RV AT SOUTH LAK

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

Appendix B

PHOTO INVENTORY



LEGEND

01 PHOTO POINT AND DIRECTION

0 500' 1000'
SCALE

EL DORADO COUNTY
DEPARTMENT OF TRANSPORTATION

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT JOHNSON MEADOW
PHOTO POINTS

FIGURE

DATE: 08/2020	PROJECT NO.: -	BY: DMG

South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow

Project Area Photographs



Pt #1: Intersection of Sierra Blvd and Barbara Ave. East toward existing Greenway Bike Path beginning



Pt #2: Close view of Greenway bike path beginning at intersection of Sierra Blvd and Barbara Ave.



Photo Pt #3: Southeast toward end of Sierra. New bike path begins across Sierra Blvd.



Photo Pt #4: South toward beginning of new bike path



Photo Pt #5: Closer view of beginning of new bike path, looking south



Photo Pt #6: South through shrubs

South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow

Project Area Photographs



Photo Pt #7: South, approaching existing dirt user trail



Photo Pt #8: looking southwest, existing user trail



Photo Pt #9: looking southwest, existing user trail



Photo Pt #10: looking southwest, existing user trail



Photo Pt #11: looking southwest, existing user trail



Photo Pt #12: southwest, approaching Lodi Ave

South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow

Project Area Photographs



Photo Pt #13: Lodi Ave crossing near Caltrans yard



Pt #14: Southwest, across Lodi Ave



Pt #15: Northeast, looking back at Lodi Ave



Pt #16: Southwest on existing user trail



Pt #17: user trail intersection, begin heading west



Pt #18: West on user trail

South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow

Project Area Photographs



Pt #19: West, heading toward paved utility service road



Pt #20: Intersecting the paved utility service road.



Photo Pt #21: West, open area near intersection of user path and paved utility



Photo Pt #22: Northeast, looking up paved utility service road



Photo Pt #23: Southwest looking down paved utility service road



Photo Pt #24: Southwest toward intersection of paved utility service road and gravel service road. Alignment heads left toward gravel road.

South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow

Project Area Photographs



Photo Pt #25: South on existing gravel service road



Photo Pt #26: looking southwest, existing gravel service road approaching incline.



Photo Pt #27: Looking southwest, existing service road



Photo Pt #28: looking southwest, existing service road incline



Photo Pt #29: looking southwest, existing service road, approaching airport service road



Photo Pt #30: southwest, approaching airport service road

South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow

Project Area Photographs



Photo Pt #31: southwest, approaching airport service road



Pt #32: Southwest, approaching existing user trail off airport service road.



Pt #33: West on existing user trail



Pt #34: West on user trail next to clearing



Pt #35: West on user trail



Pt #36: West approaching intersection of another existing dirt user trail.

South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow

Project Area Photographs



Pt #37: West, Intersection of existing user trails



Pt #38: Southwest on existing user trail



Photo Pt #39: Southwest on existing user trail



Photo Pt #40: Southwest approaching intersection of another user trail heading up toward airport



Photo Pt #41: Intersection of another user trail heading up toward airport. Alignment heads right (west) toward Upper Truckee River (UTR).



Photo Pt #42: Heading west at intersection towards UTR.

South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow

Project Area Photographs



Photo Pt #43: West toward UTR



Photo Pt #44: West toward UTR



Photo Pt #45: West approaching UTR



Photo Pt #46: Northwest approaching washed out bridge



Photo Pt #47: Northwest looking at old bridge



Photo Pt #48: Northwest looking at UTR bypassing bridge to the northwest.

South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow

Project Area Photographs



Photo Pt #49: On bridge, looking southwest toward new user created rock stepping path across UTR



Pt #50: West approaching user created stepping stone path across UTR



Pt #51: West, user created stepping stone path across UTR



Pt #52: East looking back at stepping stone path. Bicycle tire tracks visible along side



Pt #53: Northeast looking back at bridge



Pt #54: East looking at UTR bypassing old bridge to the northwest

South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow

Project Area Photographs



Pt #55: West on existing gravel service road which approaches bridge to the east



Pt #56: West along existing gravel service road.



Pt #57: West along existing gravel service road



Pt #58: West along existing gravel service road



Photo Pt #59: West along existing gravel service road



Photo Pt #60: West along existing gravel service road

South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow

Project Area Photographs



Photo Pt #61: West along existing gravel service road with bicycle user



Photo Pt #62: Northwest approaching meadow. User on trail.



Photo Pt #63: Northwest within meadow approaching incline up toward Barton Hospital



Photo Pt #64: Northwest approaching Barton Hospital and South Ave.



Photo Pt #65: Northwest approaching Barton Hospital and South Ave.

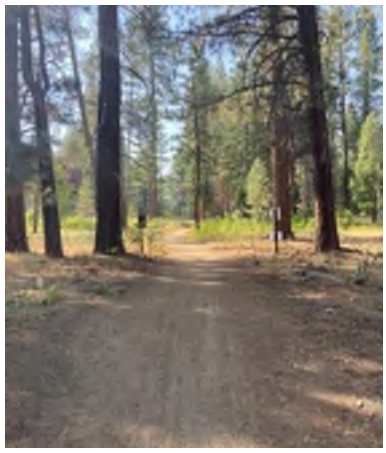


Photo Pt #66: Northwest approaching Barton Hospital and South Ave.

South Tahoe Greenway – Upper Truckee Bridge at Johnson Meadow

Project Area Photographs



Photo Pt #67: Northwest approaching Barton Hospital and South Ave.



Pt #68: Northwest approaching paved trail at end of South Ave.



Pt #69: Northwest approaching paved trail at end of South Ave.



Pt #70: West on paved trail heading toward South Ave



Pt #71: East on paved trail at intersection of dirt user trail



Pt #72: East at intersection of paved path and eastern end of South Ave

Appendix C

DRAFT FEASIBILITY REPORT COMMENTS AND RESPONSES

South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow Project Comments During Development of Feasibility Report			
#	**Date**	**Communication**	**Questions/Comments/Concerns**
1	1/25/2022	online comment form	*Awesome project, much needed. Ensure bridge is built to last with climate change.*
2	2/1/2022	email	*Hello* *I have been trying to load the public meeting notice for webinar on Feb 3. The web page crashes every time I try to load it.* *Please send me the info to join the webinar.* *Thanks*
3	2/3/2022	email & online comment form	*My questions:* *• what kind motorized vehicles will be allowed on Barbara, currently a very quiet street...* *• When we purchased the house, we picked this because of how quiet it was and how it backed up to the forest. How do I know that the forest land will stay with that ordinance? I don't want to see commercial land or anyone standing with a truck selling novelties, snacks, food, etc along this route.* *• How often will this road be maintained? by that, I mean the trail's fencing was ruined by cars and people climbing over it during the winter. it doesn't look the same as when we purchased the house 15 years ago.* *• Who is going to pick up the garbage and dog poop with the increase in traffic?* *• My garage door and driveway exits on Barbara, how will I be effected?* *• Will my property value go down with this venture?*
4			
5			
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7			
8			
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10			
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18			
19			
20			

From: Mark Gibbs <mgibbs@cityofslt.us>
Sent: Monday, February 7, 2022 10:28 AM
To: Donaldo Palaroan
Cc: Anush Nejad; Stan Hill
Subject: RE: Project Development Team (PDT) Meeting: South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow Project, El Dorado County
Attachments: 3.8 Hazards_admin.docx

Donaldo:

This contemplated project was routed to me for review by Stan Hill with the City of South Lake Tahoe. Thank you for allowing the Lake Tahoe Airport to comment on the proposed project: *Upper Truckee River Bridge at Johnson Meadow Feasibility Study* whose boundary bisects airport property and crosses several protected airspace aviation surfaces on the approach to Runway 18.

1. The Lake Tahoe Airport is required by the Federal Aviation Administration and Caltrans Division of Aeronautics to mitigate (remove or top) conifer trees which are penetrating protected airspace surfaces. Trees that will be treated include trees which currently penetrate or will penetrate the following:
    a. Precision Approach Path Indicator Obstacle Clearance Surface, Runway 36 40:1 Departure Surface, Runway 18 34:1 Non-Precision Approach Surface, Runway 18 20: 1 Visual Approach Surface, Runway 18 Medium Intensity Approach Lighting System -F Obstacle Clearance Surface, RWY 18 Localizer Directional Aid controlled area. This may affect the scenic quality and current state conditions.

   These may not have any appreciable effect on public access. The airport is making El Dorado County aware so that there are no surprises. The City will provide you the final study on what trees will be treated once a study is completed. City Council to decide funding the study at mid-year budget review March 1, 2022.
2. Any proposed trail and bridge alignment would need to ensure compatibility beneath protected airport airspace and air navigation imaginary airspace surfaces. If you need information on the airspace around airports please consult Airport Cooperative Research Board Publication 38: *Understanding Airspace, Objects, and Their Effects on Airports*. This includes analysis of any structure height and grading of trail in vicinity of RWY 18 Localizer Directional Aid (LDA) controlled area and location of equipment during construction. The LDA is a precision navigational aid that must radiate an accurate signal to landing aircraft. This requires a controlled area 2000-ft long x 400-ft wide in front of the LDA to be free of obstacles and have smooth surface terrain. This area is designated a localizer Critical Area and is more precisely defined in FAA Order 6750.16E, Chapter 1. Trees and other vegetation growing in this area must be controlled and/or removed to maintain an accurate navigational signal pattern to the aircraft from the antenna array. For more information regarding Critical Area terrain protection and maintenance, reference FAA Order 6750.16E; Chapter 2. This is a life of safety concern so has special focus from the airport.
3. El Dorado County would be required to complete an FAA 7460-1, Notice of Proposed Construction or Alteration and also submit the plans for review by the City of South Lake Tahoe Airport Land Use Commission even portions that lie within El Dorado County jurisdiction as the entire project lies within the airport's influence area. See Airport Land Use Compatibility Plan for more details.
4. Any change to or on airport property requires an amendment on the Airport Layout Plan (ALP) and approval by the Federal Aviation Administration. If you plan on creating any new trail other than the one that is already existing or paving the trail rather than leaving it dirt, the change needs to be reflected on the ALP. The Airport is undertaking an Airport Master Plan in 2023 and can easily incorporate any changes to airport property proposed by this project. I am adding you as a point of contact for the Airport Master Plan Stakeholder List so that you are aware how things being proposed at the Lake Tahoe Airport impact the Upper Truckee Bridge at Johnson Meadow Project.

5. Attached is the draft Hazards section from the TRCD Johnson Meadows Preliminary Joint Environmental Document. Note Section 3.8.1 State and Section 3.8.2 wildlife attractant hazards. The same sort of consideration that is required of the Johnson Meadows Restoration project will apply to the Upper Truckee Bridge at Johnson Meadow Project.

Thank you for allowing the Lake Tahoe Airport to consider your project and I am here to answer any questions you may have.

Mark Gibbs, A.A.E.
Airport Manager
Lake Tahoe Airport
City of South Lake Tahoe, CA
o/ (530) 542-6182
c/ (530) 208-8074
mgibbs@cityofslt.us



www.cityofslt.us

From: Stan Hill <shill@cityofslt.us>
Sent: Friday, February 4, 2022 2:54 PM
To: Mark Gibbs <mgibbs@cityofslt.us>
Cc: Donaldo Palaroan <donaldo.palaroan@edcgov.us>
Subject: FW: Project Development Team (PDT) Meeting: South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow Project, El Dorado County

Mark,
Donaldo Palaroan from El Dorado County DOT requested I forward the Upper Truckee River-Johnson Meadows draft Feasibility Study website links to you. The attached meeting notes are from a Project meeting EDOT conducted on January 12, 2022.

Links to the draft Feasibility Report are also listed below.

Thanks,
Stan Hill, PE
Engineering Division Manager
City of South Lake Tahoe
o/ 530.542.6039
Email: shill@cityofslt.us



www.cityofslt.us

From: Stan Hill
Sent: Friday, February 4, 2022 11:30 AM
To: Anush Nejad <anejad@cityofslt.us>
Cc: Jim Marino <jmarino@cityofslt.us>; Jason Burke <jburke@cityofslt.us>

Subject: FW: Project Development Team (PDT) Meeting: South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow Project, El Dorado County

Attached are meeting notes following a remote meeting. The draft feasibility report can be accessed below at the weblink listed in Donaldo's email.

Thanks,
Stan Hill, PE
Engineering Division Manager
City of South Lake Tahoe
o/ 530.542.6039
Email: shill@cityofslt.us

www.cityofslt.us

From: Donaldo Palaroan <donaldo.palaroan@edcgov.us>
Sent: Wednesday, January 12, 2022 12:33 PM
Subject: Re: Project Development Team (PDT) Meeting: South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow Project, El Dorado County

Please see attached draft meeting notes, feel free to respond if you have any suggested edits/comments to add.

Thank you.

Donaldo Palaroan, P.E.
Senior Civil Engineer

County of El Dorado
Department of Transportation
924 B Emerald Bay Road
So. Lake Tahoe, CA 96150
(530) 573-7920 / FAX (530) 541-7049
donaldo.palaroan@edcgov.us

On Wed, Jan 12, 2022 at 11:05 AM Donaldo Palaroan <donaldo.palaroan@edcgov.us> wrote:

> Hi All,
>
> Follow up to today's meeting:
>
> - Link to the Project webpage:
>
> https://www.edcgov.us/Government/dot/Pages/South-Tahoe-Greenway.aspx
>
> - Link to submit web based comment:

https://www.edcgov.us/Government/dot/Pages/Tahoe-Engineering-Public-Comments.aspx

- Direct link to the Draft Feasibility Report:

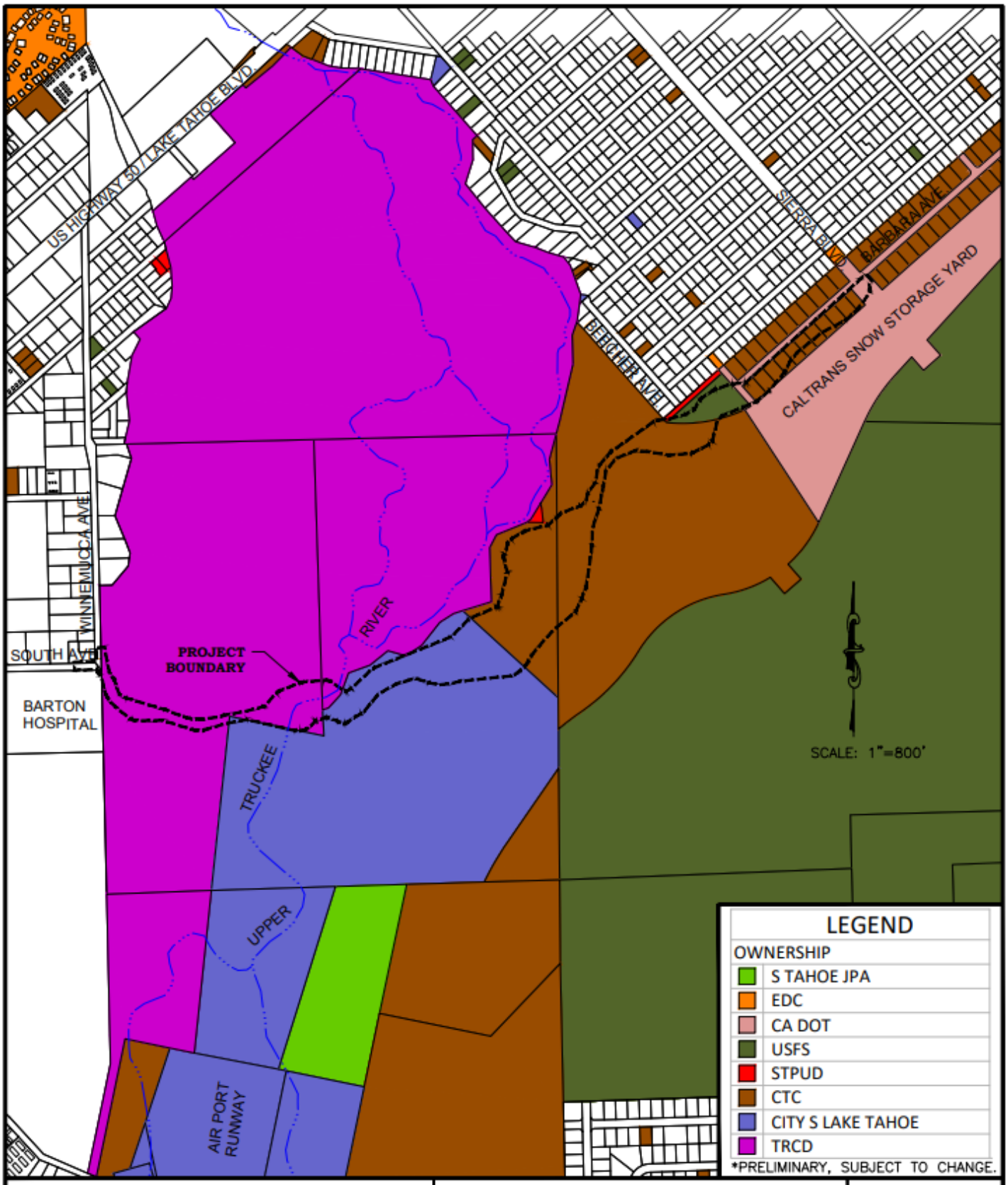
  https://www.edcgov.us/Government/dot/Documents/Tahoe-Engineering/95201%20Feasibility%20Rpt.pdf

Thank you all again for your participation. I look forward to engaging with you all as the project develops.

Donaldo Palaroan, P.E.
Senior Civil Engineer

County of El Dorado
Department of Transportation
924 B Emerald Bay Road
So. Lake Tahoe, CA 96150
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donaldo.palaroan@edcgov.us

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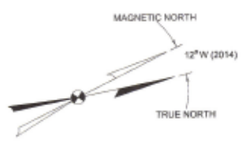
COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

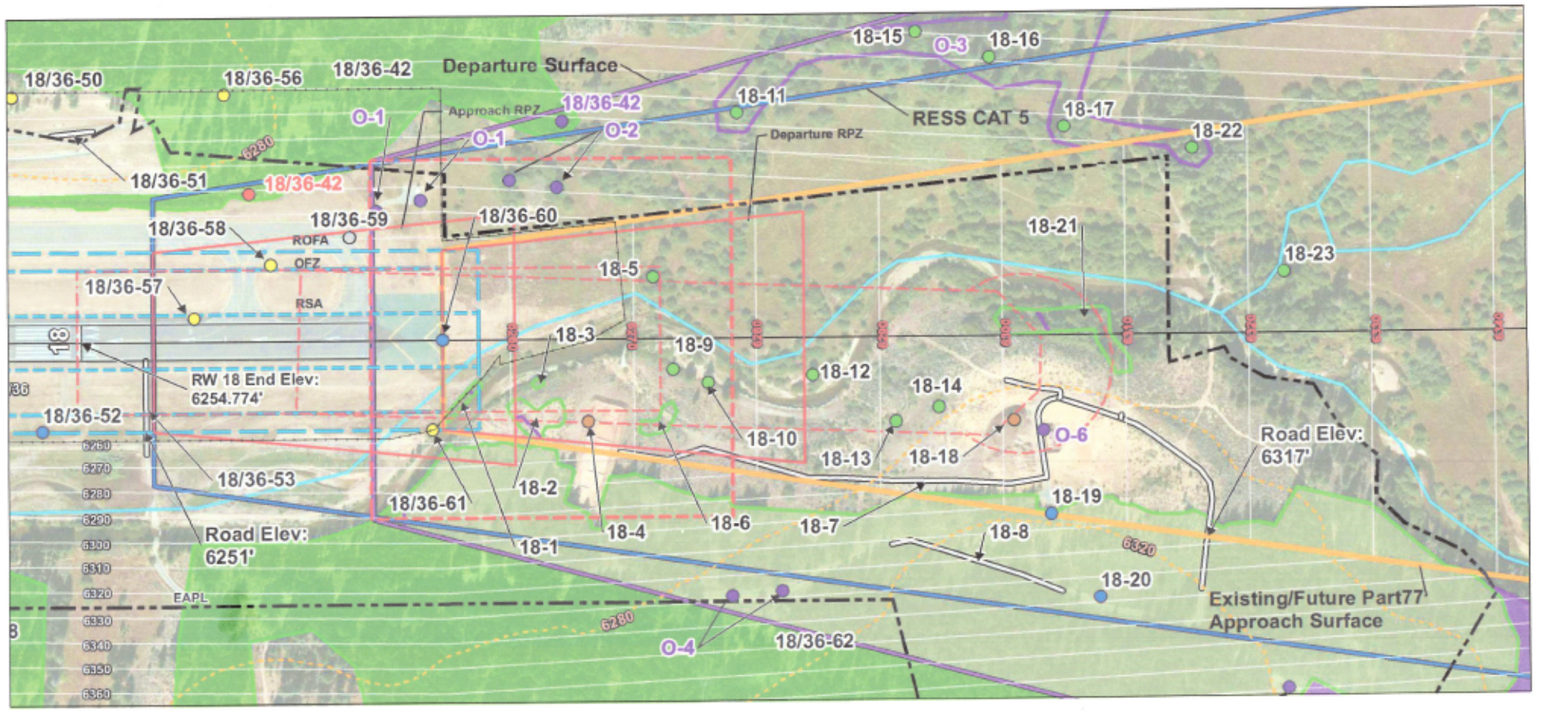
SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT JOHNSON MEADOW

LAND OWNERSHIP MAP

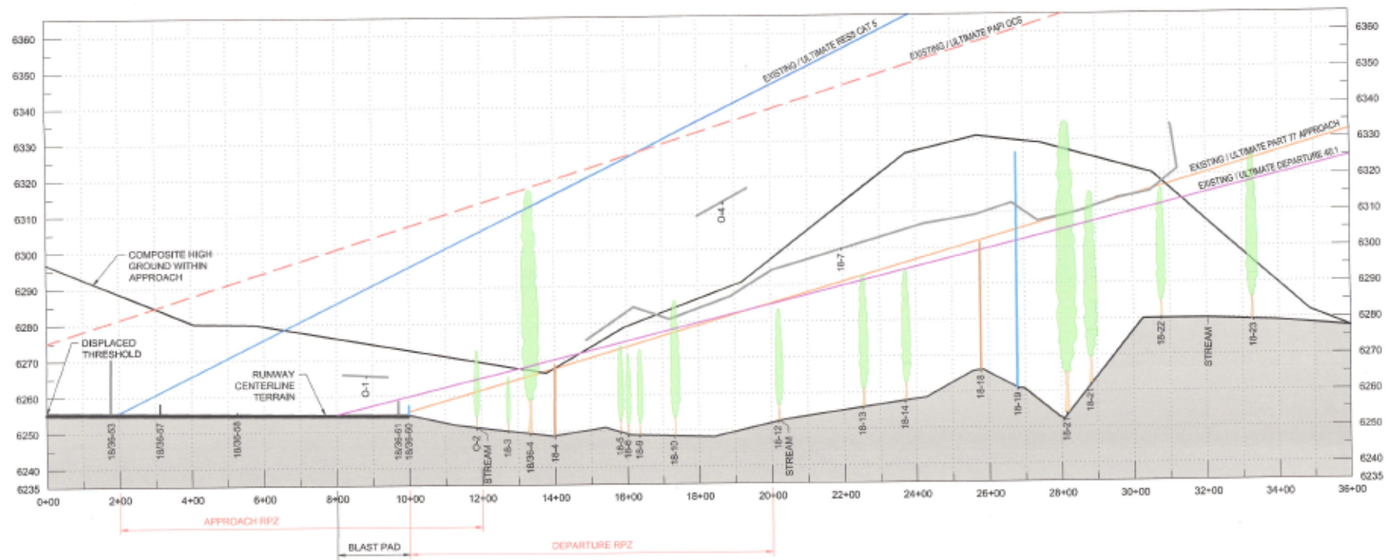
FIGURE 9

DATE:	PROJECT NO.:	BY:
02/21	95201	KIS





PROFILE VIEW: END 18
SCALE: V: 1"= 20', H: 1"=200'



PLAN & PROFILE LEGEND

EXISTING	ULTIMATE	DESCRIPTION
	SAME	RUNWAY SAFETY AREA (RSA)
	SAME	RUNWAY OBJECT FREE AREA (ROFA)
	SAME	OBSTACLE FREE ZONE (OFZ)
		PART 77 SURFACE
	NONE	RESS (CAT 3) SURFACE
	SAME	RESS (CAT 5) SURFACE
	SAME	DEPARTURE SURFACE
	SAME	RUNWAY PROTECTION ZONE (RPZ)
	SAME	NAVAID CRITICAL AREA
		PROPERTY LINE
		PERIMETER FENCE
		TREE CANOPY OBSTRUCTION
		TREE OBSTRUCTION
		POLE OBSTRUCTION
		FENCE OBSTRUCTION
		ROAD OBSTRUCTION
		NAVAID OBSTRUCTION

Note: 1. Obstruction survey completed in 2009

C&S COMPANIES
C&S Engineers, Inc.
2020 Camino Del Rio North
Suite 1000
San Diego, California 92108
Phone: 619-296-9373
Fax: 619-296-5683
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CITY OF SOUTH LAKE TAHOE 19 65 CALIFORNIA

AIRPORT MASTER PLAN UPDATE
LAKE TAHOE AIRPORT
SOUTH LAKE TAHOE
EL DORADO COUNTY, CALIFORNIA

MARK	DATE	DESCRIPTION
REVISIONS		

PROJECT NO:	N18001001
DATE:	AUGUST 2016
PROJ. PLANNER:	R. REDMAN
DRAWN BY:	M. EDELSTEIN
CHECKED BY:	C. SHANNON

RUNWAY END 18
INNER APPROACH
AND DEPARTURE
PLAN AND PROFILE

Copyright

3.8 PUBLIC SAFETY, HAZARDS, AND HAZARDOUS MATERIALS

This section describes the potential impacts of the Johnson Meadow Restoration Project related to public safety, hazards, and hazardous materials. The evaluation provided in this section is based, in part, on review of the State Water Resources Control Board (SWRCB) Geotracker Database, South Tahoe Public Utility District files, a Phase 1 Environmental Site Assessment (Tahoe RCD 2018), and the Lake Tahoe Airport Wildlife Hazard Management Plan (LTA 2017). Geologic hazards, including natural hazards associated with landslides, faulting, and seiches, are discussed in Section 3.7, "Geology and Soils." Risks associated with flooding are discussed in Section 3.10, "Hydrology and Water Quality." Risks associated with wildfire are discussed in Section 3.19, "Wildfire."

3.8.1 Regulatory Setting

FEDERAL

Management of Hazardous Materials

Various federal laws address the proper handling, use, storage, and disposal of hazardous materials, as well as requiring measures to prevent or mitigate injury to health or the environment if such materials are accidentally released. The U.S. Environmental Protection Agency (EPA) is the agency primarily responsible for enforcement and implementation of federal laws and regulations pertaining to hazardous materials. Applicable federal regulations pertaining to hazardous materials are primarily contained in Code of Federal Regulations (CFR) Titles 29, 40, and 49. Hazardous materials, as defined in the Code, are listed in 49 CFR 172.101. Management of hazardous materials is governed by the following laws.

- The Toxic Substances Control Act of 1976 (15 U.S. Code [USC] Section 2601 et seq.) regulates the manufacturing, inventory, and disposition of industrial chemicals, including hazardous materials. Section 403 of the Toxic Substances Control Act establishes standards for lead-based paint hazards in paint, dust, and soil.
- The Resource Conservation and Recovery Act of 1976 (42 USC 6901 et seq.) is the law under which EPA regulates hazardous waste from the time the waste is generated until its final disposal ("cradle to grave").
- The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (also called the Superfund Act or CERCLA) (42 USC 9601 et seq.) gives EPA authority to seek out parties responsible for releases of hazardous substances and ensure their cooperation in site remediation.
- The Superfund Amendments and Reauthorization Act of 1986 (Public Law 99-499; USC Title 42, Chapter 116), also known as SARA Title III or the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), imposes hazardous materials planning requirements to help protect local communities in the event of accidental release.
- The Spill Prevention, Control, and Countermeasure (SPCC) rule includes requirements for oil spill prevention, preparedness, and response to prevent oil discharges to navigable waters and adjoining shorelines. The rule requires specific facilities to prepare, amend, and implement SPCC Plans. The SPCC rule is part of the Oil Pollution Prevention regulation, which also includes the Facility Response Plan rule.

Transport of Hazardous Materials

The U.S. Department of Transportation regulates transport of hazardous materials between states and is responsible for protecting the public from dangers associated with such transport. The federal hazardous materials transportation law, 49 USC 5101 et seq. (formerly the Hazardous Materials Transportation Act 49 USC 1801 et seq.) is the basic statute regulating transport of hazardous materials in the United States. Hazardous materials transport regulations are enforced by the Federal Highway Administration, the U.S. Coast Guard, the Federal Railroad Administration, and the Federal Aviation Administration.

Worker Safety

The federal Occupational Safety and Health Administration (OSHA) is the agency responsible for assuring worker safety in the handling and use of chemicals identified in the Occupational Safety and Health Act of 1970 (Public Law 91-596, 9 USC 651 et seq.). OSHA has adopted numerous regulations pertaining to worker safety, contained

in CFR Title 29. These regulations set standards for safe workplaces and work practices, including standards relating to the handling of hazardous materials and those required for excavation and trenching.

Water Quality

The EPA is the lead federal agency responsible for water quality management. The Federal Water Pollution Control Act of 1977 (33 USC 1251 et seq.), commonly referred to as the Clean Water Act (CWA), is the primary federal law that governs and authorizes water quality control activities by EPA, as well as the states. The CWA employs a variety of regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff:

- Title 40 of the CFR contains water quality regulations. Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States.
- In accordance with Section 404 of the CWA, U.S. Army Corps of Engineers (USACE) regulates discharge of dredged or fill material into waters of the United States. Waters of the United States and their lateral limits are defined in Title 33, Part 328.3(a) of the CFR to include navigable waters of the United States, interstate waters, all other waters where the use or degradation or destruction of the waters could affect interstate or foreign commerce, tributaries to any of these waters, and wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries. “Fill” is defined as any material that replaces any portion of a water of the United States with dry land or that changes the bottom elevation of any portion of a water of the United States. Any activity resulting in the placement of dredged or fill material within waters of the United States requires a permit from USACE. In accordance with Section 401 of the CWA, projects that apply for a USACE permit for discharge of dredged or fill material must obtain water quality certification from the appropriate regional water quality control board (RWQCB) indicating that the project will uphold state water quality standards.
- Section 402 of the CWA creates the National Pollutant Discharge Elimination System (NPDES) regulatory program. Point sources must obtain a discharge permit from the proper authority (usually a state, sometimes EPA, a tribe, or a territory). NPDES permits cover various industrial and municipal discharges, including industrial activity, and runoff from construction sites disturbing more than 1 acre.
- Specific requirements for Spill Prevention, Control, and Countermeasure (SPCC) plans were developed as one of the regulations under the CWA. SPCC plans are described in CFR Title 40, Part 112 (Oil Spill Prevention) and are intended to reduce the threat of oil spills to navigable waters of the United States. The site-specific plan must identify the design, control, training, and response requirements of a facility. A SPCC plan is required for facilities that have an aggregate aboveground storage capacity (counting only total volumes of containers 55 gallons or larger) of oil of more than 1,320 gallons.

Federal Aviation Administration

The Federal Aviation Administration (FAA) is responsible for enforcing 14 CFR 139, which prescribes rules regarding the operation of airports used by aircraft with seating capacity of more than 30 passengers. FAA roles and responsibilities relating to wildlife hazards and their associated human health and safety concerns are addressed in 14 CFR 139.337, Wildlife Hazard Management. An ecological study must be prepared by the certificate holder and submitted to FAA when multiple birds or other wildlife are struck by aircraft or ingested into aircraft engines or if the number of birds or other wildlife in an airport flight pattern is sufficient to result in such hazards. FAA then determines whether a wildlife hazard management plan is needed. FAA’s Office of Airport Safety and Standards has published advisory circulars and program policy and guidance directives that further clarify this information. An advisory circular dated August 28, 2007 and titled “Hazardous Wildlife Attractants on or Near Airports” (Advisory Circular 150/5200-33B) provides guidance on locating certain land uses having the potential to attract hazardous wildlife to or to the vicinity of public-use airports. FAA recommends the following separations when siting wildlife attractants (e.g., waste disposal operations, wastewater treatment facilities, and wetlands) (FAA 2020):

- 5,000 feet from airports serving piston-powered aircraft,
- 10,000 feet from airports serving turbine-powered aircraft, and
- 5 miles from airports where the wildlife attractant may cause hazardous wildlife movement into or across the approach or departure airspace.

TAHOE REGIONAL PLANNING AGENCY

Tahoe Regional Plan

The Tahoe Regional Planning Agency (TRPA) Regional Plan contains goals and polices intended to help the region achieve and maintain adopted environmental threshold carrying capacities while providing for orderly growth and development consistent with such capacities. There are a variety of goals and policies related to public health and safety within the TRPA Regional Plan. Chapter 2, "Land Use Element," of the Goals and Policies document sets forth fundamental land use philosophies, which include the maintenance of the environmental, economic, social, and physical well-being of the Region. The Natural Hazards Subelement aims to minimize risks from natural hazards such as earthquakes, and seiches. The Water Quality Subelement aims to maintain thresholds for water quality by addressing point and non-point sources of pollution. Relevant polices include the following:

- **Policy NH-1.4.** TRPA will encourage public safety agencies to prepare disaster plans.
- **Policy WQ-2.3.** Underground storage tanks for sewage, fuel, or other potentially harmful substances shall meet standards set forth in TRPA ordinances, and shall be installed, maintained, and monitored in accordance with the Best Management Practices Handbook.
- **Policy WQ-2.5.** TRPA shall cooperate with other agencies with jurisdiction in the Lake Tahoe region in the preparation, evaluation, and implementation of toxic and hazardous spill control plans.
- **Policy WQ-2.6.** Liquid or solid wastes from recreational vehicles and boats shall be discharged at approved pump-out facilities. Pump-out facilities will be provided by public utility districts, marinas, campgrounds, and other relevant facilities in accordance with standards set forth in the Best Management Practices Handbook.

Chapter 6, "Public Services and Facilities Element," includes goals and policies related to the provision of adequate public services to meet the needs of existing and new development. Relevant policies include the following:

- **Policy PS-1.1.** Public services and facilities should be allowed to upgrade and expand consistent with the land use element of the Regional Plan and federal, state, and local standards.
- **Policy PS-4.1.** The impact on educational and public safety services shall be considered when reviewing projects and plan amendments proposed within the region. To the extent feasible, adverse impacts should be mitigated as part of the review process.
- **Policy PS-4.2.** Educational and emergency service organizations should anticipate and plan for projected demands and needs consistent with the regional plan and are encouraged to advise the agency when development potentials exceed current or anticipated service capabilities or capacities.

Code of Ordinances

The TRPA Code of Ordinances compiles all the laws and ordinances needed to implement the Tahoe Regional Plan goals and policies. The Code sections applicable to public health and safety for the project are summarized below in Table 3.8-1.

Table 3.8-1 Applicable TRPA Code Requirements Related to Public Safety and Hazards

Code Section	Summary of Requirements
Chapter 33	Applies to grading, excavation, filling, clearing of vegetation, and disturbance of the soil, and protection of vegetation during construction. In accordance with TRPA Code Section 33.3.4, the methods of disposal of solid or liquid materials, including soil, silt, clay, sand, or other organic or earthen materials, shall be reviewed and approved by TRPA. These methods of disposal shall include, but are not limited to: ► temporary stockpiling of all or some of the topsoil on the site for use on areas to be revegetated, ► disposal of the material at a location approved by TRPA, and ► export of the materials outside the region.
Chapter 60	This chapter implements the Water Quality Subelement of the Tahoe Regional Plan goals and policies to attain and maintain federal, state, and local water quality standards. It prohibits the discharge of toxic or hazardous wastes to Lake Tahoe and states that all persons handling, transporting, using, or storing toxic or hazardous substances shall comply with the applicable requirements of state and federal law regarding spill prevention, reporting, recovery, and clean-up.

Source: TRPA 2012

STATE

Management of Hazardous Materials

In California, both federal and state community right-to-know laws are coordinated through the Governor's Office of Emergency Services. The federal law, SARA Title III or EPCRA, described above, encourages and supports emergency planning efforts at the state and local levels and to provide local governments and the public with information about potential chemical hazards in their communities. Because of the community right-to-know laws, information is collected from facilities that handle (e.g., produce, use, store) hazardous materials above certain quantities. The provisions of EPCRA apply to four major categories:

- emergency planning,
- emergency release notification,
- reporting of hazardous chemical storage, and
- inventory of toxic chemical releases.

The corresponding state law is Chapter 6.95 of the California Health and Safety Code (Hazardous Materials Release Response Plans and Inventory). Under this law, qualifying businesses are required to prepare a Hazardous Materials Business Plan, which would include hazardous materials and hazardous waste management procedures and emergency response procedures, including emergency spill cleanup supplies and equipment. At such time as the applicant begins to use hazardous materials at levels that reach applicable state and/or federal thresholds, the plan is submitted to the administering agency.

The California Department of Toxic Substances Control (DTSC), a division of the California Environmental Protection Agency, has primary regulatory responsibility over hazardous materials in California, working in conjunction with EPA to enforce and implement hazardous materials laws and regulations. As required by Section 65962.5 of the California Government Code, DTSC maintains a hazardous waste and substances site list for the State, known as the Cortese List. Individual RWQCBs are the lead agencies responsible for identifying, monitoring, and cleaning up leaking underground storage tanks (USTs). The Lahontan RWQCB has jurisdiction over the Johnson Meadow Restoration Project site.

Transport of Hazardous Materials and Hazardous Materials Emergency Response Plan

The State of California has adopted U.S. Department of Transportation regulations for the movement of hazardous materials originating within the state and passing through the state; state regulations are contained in 26 California Code of Regulations (CCR). State agencies with primary responsibility for enforcing state regulations and responding to hazardous materials transportation emergencies are the California Highway Patrol and the California Department of Transportation. Together, these agencies determine container types used and license hazardous waste haulers to transport hazardous waste on public roads.

California has developed an emergency response plan to coordinate emergency services provided by federal, state, and local governments and private agencies. Response to hazardous materials incidents is one part of the plan. The plan is managed by the Governor's Office of Emergency Services, which coordinates the responses of other agencies in the project area.

Management of Construction Activities

Through the Porter-Cologne Water Quality Act and the NPDES program, RWQCBs have the authority to require proper management of hazardous materials during project construction. For a detailed description of the Porter-Cologne Water Quality Act, the NPDES program, and the role of the Lahontan RWQCB, see Section 3.10, "Hydrology and Water Quality."

The State Water Board adopted the statewide NPDES General Permit in August 1999. The Tahoe region has a unique General Permit with stricter requirements than the State General Permit (Order No. R6T-2016-0010). The state requires that projects disturbing more than one acre of land during construction file a Notice of Intent with the RWQCB to be covered under this permit. Construction activities subject to the General Permit include clearing, grading, stockpiling, and excavation. Dischargers are required to eliminate or reduce non-stormwater discharges to storm sewer systems and other waters. A stormwater pollution prevention plan (SWPPP) must be developed and implemented for each site covered by the permit. The SWPPP must include best management plans (BMPs) designed to prevent construction pollutants from contacting stormwater and keep products of

erosion from moving off-site into receiving waters throughout the construction and life of the project; the BMPs must address source control and, if necessary, pollutant control.

Worker Safety

The California Occupational Safety and Health Administration (Cal/OSHA) assumes primary responsibility for developing and enforcing workplace safety regulations within the state. Cal/OSHA standards are typically more stringent than federal OSHA regulations and are presented in Title 8 of the CCR. Cal/OSHA conducts onsite evaluations and issues notices of violation to enforce necessary improvements to health and safety practices.

Title 8 of the CCR also includes regulations that provide for worker safety when blasting and explosives are utilized during construction activities. These regulations identify licensing, safety, storage, and transportation requirements related to the use of explosives in construction.

Airport Safety and Regulations

The State regulates airports under the authority of the Airport Land Use Commission (ALUC) Law, Section 21670 et seq. of the California Public Utilities Code. The Airport Land Use Commission Law is implemented through ALUCs, which are required in every county with a public-use airport or with an airport served by a scheduled airline. Under the provisions of the law, the ALUC has certain responsibilities conferred upon it and specific duties to perform. Among these duties are preparing airport land-use plans for each of the airports in its jurisdiction (California Public Utilities Code Sections 21674[c] and 21675[a]). TRPA has been designated as the ALUC by El Dorado County. The City of South Lake Tahoe (CSLT) Planning Commission, when augmented with two additional commission members, has been designated as the ALUC for the CSLT.

LOCAL

El Dorado County Environmental Management Department

El Dorado County Environmental Management Department (EDCEMD) is responsible for promoting a safe and healthy environment in the county and for enforcing hazardous waste laws and regulations at a local level. EDCEMD, as the local Certified Unified Program Agency, monitors the proper use, storage, and cleanup of hazardous materials; monitoring wells; removal of leaking USTs; and permits for the collection, transport, use, or disposal of refuse.

City of South Lake Tahoe

The City utilizes an All Hazard Community Evacuation Plan to address hazards such as wildfire, drought, flooding, severe weather, winter snowstorms, and earthquakes (EDCS/OES n.d.). The City also has a community evacuation plan map directing residents which way they should evacuate during a disaster. The Johnson Meadow property is directed to evacuate towards the west along U.S. Highway 50 (Hwy 50).

South Tahoe Public Utility District

South Tahoe Public Utility District has a Local Hazard Mitigation Plan in order to protect life, safety, and property by reducing the potential for future damages and economic losses that result from natural hazards; to qualify for additional grant funding, in both the pre-disaster and post-disaster environment; to speed recovery and redevelopment following future disaster events; to demonstrate a firm commitment to hazard mitigation principles; and to comply with both state and federal legislative requirements for local hazard mitigation plans (STPUD 2019). The plan addresses low lying pump stations that could be impacted in a flood and a sewer system that could be inundated from stormwater leading into manholes such that exists in Johnson Meadow.

South Lake Tahoe Airport

Pursuant to the 14 CFR 139.337, the Lake Tahoe Airport (KTVL) developed a Wildlife Hazard Management Plan (LTA 2017). References to 14 CFR 139 standards, though not required because the airport does not accept commercial service, are utilized by this airport as a best-practices guide for reducing hazards caused through wildlife. Additionally, the Lake Tahoe Airport Land Use Compatibility Plan (ALUCP) establishes planning boundaries for the Lake Tahoe Airport and defines compatible types and patterns of future land uses that might occur in the area surround the airport (LTALUC 2019). The purpose of the ALUCP is to provide the Lake Tahoe Airport area with compatibility guidelines for height, noise, safety, airspace protection, and overflight notification. The ALUCP designates airport safety zones to the land surrounding the airport to minimize the number of people

exposed to aircraft crash hazards. This is accomplished by enforcing land use restrictions in the safety zones. The ALUCP designates three safety zones:

- the clear zone, which is near the runway and is the most restrictive;
- the approach/departure zone, which is located under the takeoff and landing slopes for each runway, extends outward for 5,000 feet from Runway 36 (with a width of 500–1,500 feet) and 10,000 feet from Runway 18 (with a width of 1,010–3,500 feet), and is less restrictive than the clear zone; and
- the overflight zone, which is the area overflown by aircraft during the normal traffic pattern, extends in all directions 5,000 feet from the center of each end of each runway, and is the least restrictive.

Johnson Meadow is within the overflight zone, and much of the project is within the approach/departure zone. Additionally, the entirety of the project area is within the Airport Influence Area – Review Area 1, which consists of the combined area within the noise contours and the six safety zones. However, the activities proposed by the project would not conflict with the guidelines and restrictions associated with these zones under the ALUCP.

3.8.2 Environmental Setting

HAZARDOUS MATERIALS IN THE PROJECT AREA

For purposes of this section, the term “hazardous materials” refers to both hazardous substances and hazardous wastes. A “hazardous material” is defined in the CFR as “a substance or material that … is capable of posing an unreasonable risk to health, safety, and property when transported in commerce” (49 CFR 171.8). California Health and Safety Code Section 25501 defines a hazardous material as follows:

> “Hazardous material” means any material that, because of its quantity, concentration, or physical, or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. “Hazardous materials” include, but are not limited to, hazardous substances, hazardous waste, and any material which a handler or the administering agency has a reasonable basis for believing that it would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment.

“Hazardous wastes” are defined in California Health and Safety Code Section 25141(b) as wastes that:

> … because of their quantity, concentration, or physical, chemical, or infectious characteristics, [may either] cause, or significantly contribute to an increase in mortality or an increase in serious illness [or] pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Hazardous materials in or near the project area are generally associated with the potential risk of accidents from the transport and use of hazardous materials and waste to support construction activities and various commercial and industrial land uses. Many chemicals used for household cleaning, construction, landscaping, and automotive or motorized boating maintenance and repair are considered to generate hazardous materials and waste.

A Phase I Environmental Site Assessment concluded that there are no recognized environmental conditions in the Johnson Meadow property (Tahoe RCD 2018). In the past, there were several leaking underground storage tanks adjacent or near the meadow at the South Lake Tahoe Airport, at Barton Hospital, and along Hwy 50 that have been remediated. No active cleanup sites are located adjacent to Johnson Meadow (SWRCB 2021).

EPA maintains records of small-and large-quantity generators of hazardous waste pursuant to the Resource Conservation and Recovery Act through a national program management and inventory system about hazardous waste handlers. Several small-quantity hazardous waste generators that produce between 220 and 2,200 pounds of hazardous waste per month are located in the vicinity of the project area. These include Barton Hospital, paint stores, gas stations, and automotive stores. No large-quantity hazardous waste generators are located near the project area.

Aerially Deposited Lead

Aerially deposited lead (ADL) refers to lead deposited along highway shoulders from past vehicle emissions. ADL is the result of tailpipe emissions during the years that lead was used as an additive in gasoline. Even though leaded fuel has been prohibited in California since the 1980s, ADL can still be found along the unpaved areas adjacent to highways that were in use before that time. ADL concentrations along highways can be high enough to cause the

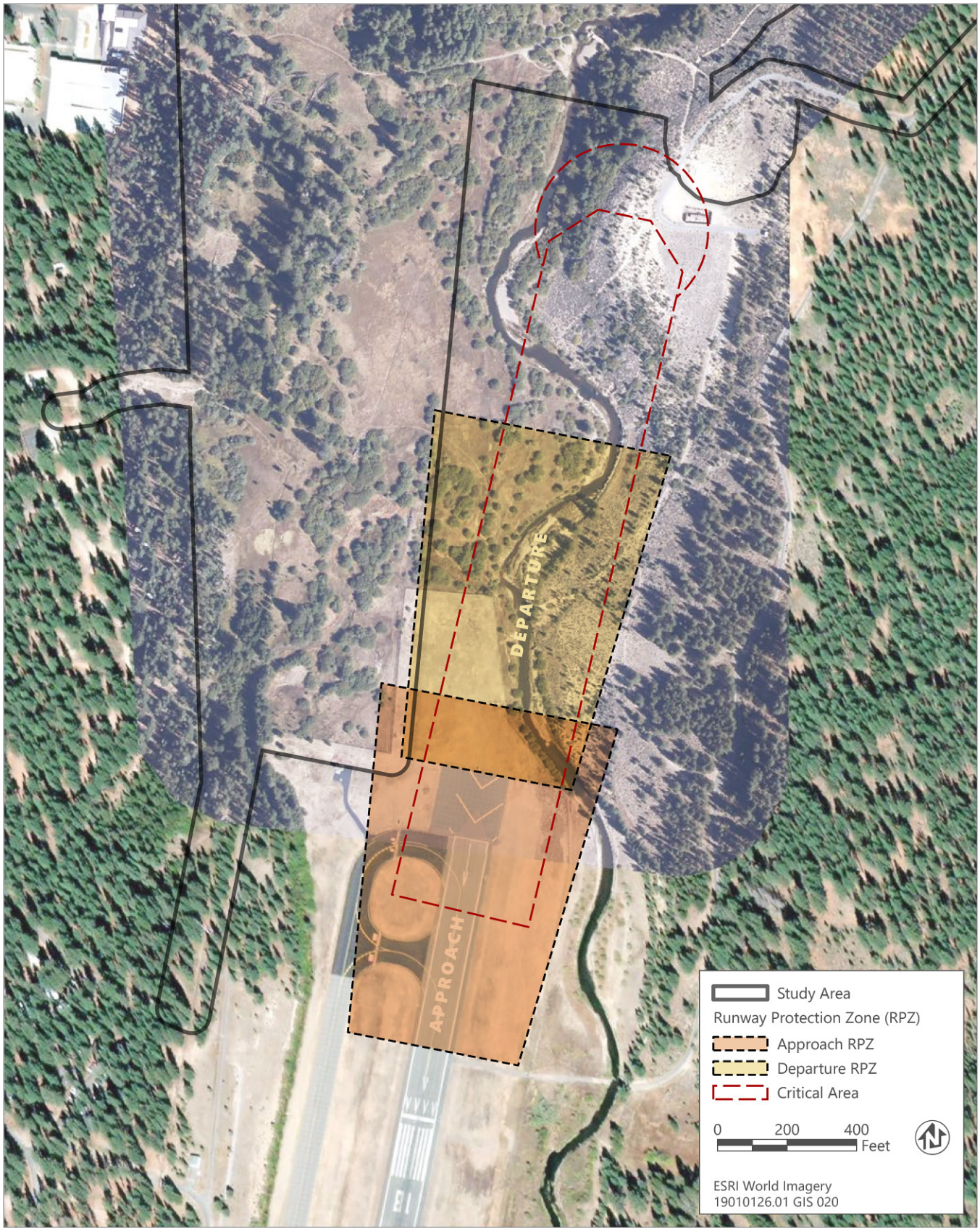
soil to be defined as a California hazardous waste. Hazardous waste law requires that this material is managed, transported, and disposed of at a Class I disposal facility (DTSC 2016).

Given the completion of roadway stormwater drainage improvements along Hwy 50, ADL is not likely to remain along Hwy 50 at the bridge over the Upper Truckee River.

WILDLIFE HAZARDS TO AVIATION

The Lake Tahoe Airport borders the southernmost edge of the project area. The airport is equipped to be a commercial air carrier/general-aviation airport owned and operated by the CSLT, although it does not currently support commercial flights and there is no commercial operator at the airport.

The Lake Tahoe Airport is adjacent to the Upper Truckee River and its corridor of aquatic, wetland, riparian, and upland habitats that extends from upstream of the airport through South Lake Tahoe to the lake. The airport's location in this corridor, its proximity to Lake Tahoe, and the extensive areas of natural vegetation nearby create the potential for hazardous wildlife movement through the airport's clear, approach/departure, and overflight zones (Figure 3.8-1).



Source: adapted by Ascent Environmental in 2021

Figure 3.8-1 Critical Area and the Departure-Approach Runway Protection Zone

The ten avian species with the highest strike risk observed at the Lake Tahoe Airport are, in descending order: mourning dove, American kestrel, killdeer, European starling, barn swallow, horned lark, rock pigeon, red-tailed hawk, Canada goose, and ring-billed gull (LTA 2017). Four wildlife strikes at the airport were reported in the early 1990s including a red-tailed hawk, one small unidentified bird, a flock of 2 to 10 mourning doves, and one duck in a flock of 11 to 100 birds. In 2015 one Canada goose, in a flock of 3, was struck. Coyotes were the second most frequent intruder on the Aircraft Operations Area (LTA 2017). In accordance with the current edition of FAA AC 150/5200-33B, all drainage ditches and detention basins on the airport property are monitored by the Wildlife Coordinator or designee for drainage within 48 hours of a rain event. The present storm water facilities do not conform to AC 150/5200-33B and are wildlife attractants to the airport throughout the year.

Section 3.5, "Biological Resources" provides additional information on the use by hazardous wildlife of land cover within the project area. Habitat for these species groups is provided not only in the project area, but also outside of the project area in a large portion of the clear, approach/departure, and overflight zones, and in most of the 10,000-foot-wide Critical Zone (within which FAA recommends minimizing attractants of hazardous wildlife).

MOSQUITO HAZARDS

All mosquito species are potential vectors of organisms that can cause disease to pets, domestic animals, wildlife, or humans. Public concern regarding West Nile virus, a disease transmitted to humans by mosquitoes (including *C. tarsalis*), has increased since the virus was first detected in the United States in 1999. A mosquito first acquires West Nile virus by feeding on a bird with the virus in its blood. Most people and animals that are infected with the virus have mild symptoms or none. In rare cases, the virus can cause encephalitis. West Nile Virus has been detected in the vicinity of the project area.

The project area is within El Dorado County Vector Control District's (EDCVCD's) monitoring zone, and most of the project area is recognized as a breeding ground for mosquitoes. EDCVCD technicians identify and monitor mosquito breeding sources from March through September. In years of especially heavy precipitation, some portions of the project area are especially prone to being inundated with standing water for long periods of time.

SENSITIVE RECEPTORS

There are no schools within one-quarter mile of the project area. Nearby schools include:

- Tahoe Valley Elementary School, approximately 0.6 miles from the project area.
- South Tahoe High School, approximately 1.25 miles from the project area.
- South Tahoe Middle School, 1.15 miles from the project area.
- Sierra House Elementary School, 1.5 miles from the project area.

Barton Hospital is a sensitive receptor directly adjacent to the meadow.

EMERGENCY PREPAREDNESS AND EVACUATION

Emergency evacuation routes from the project area are limited to Hwy 50 with the evacuation direction either to the east or to the west depending on the location of the incident (e.g., wildfire). The need to quickly execute a rapid evacuation requires detailed planning, de-confliction of response actions, and cooperation between first responders and supporting agencies. The El Dorado County Sheriff's Office utilizes Code Red alerts and Integrated Public Alert & Warning System, a local alerting system that provides emergency and life-saving information to the public through mobile phones, radio, and television) to notify the public of an emergency.

El Dorado County Local Hazard Mitigation Plan

The purpose of the *El Dorado County Local Hazard Mitigation Plan* (LHMP) is to reduce or eliminate long-term risk to people and property from natural hazards and their effects in Placer County (EDSO/OES 2018). The plan includes strategies, in the form of goals and actions, which the county and participating jurisdictions will use to decrease vulnerability and increase resiliency and sustainability. Under the LHMP, the County is responsible for implementing actions and programs that would help reduce wildfire hazards including, but not limited to, public education, defensible space programs, large strategic fuel breaks, and fuel breaks in the wildland urban interface.

The LHMP also summarizes the systems and procedures established to protect its residents and visitors to plan for, avoid, and respond to a hazard event including those associated with floods and wildfires. This includes pre-disaster public awareness and education information. Specific warning and evacuation systems and procedures include information relative to warning systems, Code Red alert system, evacuation recommendations, and sheltering in place.

Emergency Response in the Project Area

Fire Protection

In the Tahoe Basin, federal, state, and local fire districts participate in mutual aid agreements to provide and receive support and services during unplanned emergency events with other cooperating agencies. The majority of the project area is served by the Lake Valley Fire District with the closest Station, Six, located at 1286 Golden Bear Trail which is approximately 2.5 miles driving distance from the project area. The South Lake Tahoe Fire Rescue fire department assists other agencies in responding to wildland fires throughout the Tahoe Basin. The department currently operates with 36 fire fighters and three fire stations. Station Three, located at 2101 Lake Tahoe Boulevard, is the closest fire facility to the project area at approximately 0.6 mile west of the project area.

Police Protection

The El Dorado County Sheriff is the primary jurisdiction law enforcement agency in El Dorado County which includes the majority of the project area. The office has a lieutenant, four sergeants, and eleven deputies (EDCS 2020). South Lake Tahoe Police Department (SLTPD) could also provide law enforcement service(s) to the project area. As of 2020, the SLTPD consisted of approximately 73 personnel including 41 sworn officer positions and 30 civilian support positions, including dispatchers, evidence technicians, records technicians, community service officers, and administrative staff (CSLTPD 2020).

3.8.3 Environmental Impacts and Mitigation Measures

METHODOLOGY

Methods for the impact analysis included a review of applicable laws and regulations pertaining to public safety, hazards, and hazardous materials as applicable to the action alternatives and the project area. Within this framework, potential for navigational hazards, emergency response capacity, known locations of hazardous materials, and the potential for other safety or hazardous conditions were reviewed based on regulations, planning documents, goals, and policies. The impact analysis considered potential for changes in the nature, extent, or presence of hazardous conditions to occur as a result of construction and operation of the project alternatives, including increased potential for exposure to hazardous materials and conditions and increased boating accidents due to increased boating activity and navigation hazards. Compliance with applicable federal, state, and local health and safety laws and regulations would generally protect the health and safety of the public.

Potential effects associated with the project alternatives would be temporary or permanent. Temporary impacts generally include effects associated with construction activities, including the transport, storage, and use of potentially hazardous chemicals and the potential to encounter hazardous wastes during construction. Permanent impacts generally include effects associated with increased navigational hazards in the bay, which could lead to increased accidents and a corresponding need for emergency services and access to the lake.

THRESHOLDS OF SIGNIFICANCE

The thresholds of significance were developed in consideration of the State CEQA Guidelines, TRPA Thresholds, TRPA Initial Environmental Checklist, and other applicable policies and regulations. Under NEPA the significance of an effect must consider the context and intensity of the environmental effect. The factors that are taken into account under NEPA to determine the context and intensity of its effects are encompassed by the thresholds of significance. An impact related to hazards and hazardous materials is considered significant if implementation of the Johnson Meadow Restoration Project would do any of the following:

- create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;

- create a significant hazard to the public or the environment through reasonably foreseeable upset and/or accident conditions involving the release of hazardous materials into the environment;
- emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school;
- be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment;
- interfere with air traffic resulting in risks to public safety;
- implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or
- substantially increase the risk for vector-borne disease within a populated area.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 3.8-1: Interfere with implementation of an adopted emergency response plan or emergency evacuation plan

Impact 3.8-2: Increased demand for emergency response resources

Impact 3.8-3: Potential Hazardous Emissions or Handling of Hazardous or Acutely Hazardous Materials, Substances, or Waste within One-Quarter Mile of a sensitive receptor

Impact 3.8-4: Accidental release of hazardous substances

Impact 3.8-5: Potential Increase in Public Health Hazards from Mosquitoes Resulting from Increased Floodplain Inundation

Impact 3.8-6: Potential for Airspace Safety Hazards Associated with Restoration and Enhancement of Habitat for Hazardous Wildlife

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Ascent's Document Production Team will remove prior to publication.

File Contents

3.8 Public Safety, Hazards, and Hazardous Materials 3.8-1

Appendices

Figures

Figure 3.8-1 Critical Area and the Departure-Approach Runway Protection Zone 3.8-8

Tables

Table 3.8-1 Applicable TRPA Code Requirements Related to Public Safety and Hazards 3.8-4

Acronyms/Abbreviations

aerially deposited lead (ADL
Airport Land Use Commission (ALUC
Airport Land Use Compatibility Plan (ALUCP
best management plan (BMP
California Code of Regulations (CCR
California Department of Toxic Substances Control (DTSC
California Occupational Safety and Health Administration (Cal/OSHA
City of South Lake Tahoe (CSLT
Clean Water Act (CWA
Code of Federal Regulations (CFR
El Dorado County Environmental Management Department (EDCEMD
El Dorado County Local Hazard Mitigation Plan (LHMP
El Dorado County Vector Control District (EDCVCD
Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA
Emergency Planning and Community Right-to-Know Act of 1986 (SARA Title III
Federal Aviation Administration (FAA
federal Occupational Safety and Health Administration (OSHA
National Pollutant Discharge Elimination System (NPDES
regional water quality control board (RWQCB
South Lake Tahoe Police Department (SLTPD
Spill Prevention, Control, and Countermeasure (SPCC
State Water Resources Control Board (SWRCB
stormwater pollution prevention plan (SWPPP
Tahoe Regional Planning Agency (TRPA
U.S. Army Corps of Engineers (USACE
U.S. Code (USC
U.S. Environmental Protection Agency (EPA
U.S. Highway 50 (Hwy 50
underground storage tanks (UST

Citations

Yellow = confusing (sequential lettering doesn't match, years don't match, misspellings, etc.)
Green = matched reference
Aqua = missing full reference
Pink = no citation in text

CSLTPD 2020
DTSC 2016
EDCS 2020
EDCS/OES n.d.
EDSO/OES 2018
FAA 2020
LTA 2017
LTALUC 2019
STPUD 2019
SWRCB 2021
Tahoe RCD 2018
TRPA 2012

References

City of South Lake Tahoe Police Department. 2020. Annual Report.

CSLTPD. *See* City of South Lake Tahoe Police Department.

California Department of Toxic Substances Control. 2016 (October). DTSC-Caltrans Soil Management Agreement for Aerially Deposited Lead-Contaminated Soils.

DTSC. *See* California Department of Toxic Substances Control.

EDSO. *See* El Dorado County Sheriff's Office.

El Dorado County Sheriff and Office of Emergency Services. 2018 (July). *Local Hazard Mitigation Plan*. Adopted by FEMA, March 2019. Adopted by El Dorado County Board of Supervisor's April 2019.

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FAA. *See* Federal Aviation Administration.

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LTA. *See* Lake Tahoe Airport.

LTALUC. *See* Lake Tahoe Airport Land Use Commission.

OES. *See* Office of Emergency Services.

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STPUD. *See* South Tahoe Public Utility District.

SWRCB. *See* State Water Resources Control Board.

Tahoe Resource Conservation District. 2018 (January). *Phase I Environmental Site Assessment Johnson Meadows Property Winnemucca and Highway 50/Lake Tahoe Blvd. South Lake Tahoe, CA*. Prepared by Kaufman Edwards Planning & Consulting Services and David J. Herzog.

Tahoe RCD. *See* Tahoe Resource Conservation District.

Geographic Area or Project Name
South Tahoe Greenway - Upper Truckee River Bridge at Johnson Meadow Project

Full Name
Amanda Milici

Email Address:
amandamilici@gmail.com

Tahoe Street Address:
(no value entered)

Mailing Address:
(no value entered)

Comments:
Please find attached comments and a letter of support from the Lake Tahoe Bicycle Coalition.

File Attachments
LTBC_Upper Truckee.Bridge Project _LOS.pdf

LAKE TAHOE BICYCLE COALITION

PO Box 1147 | Zephyr Cove, NV 89448 | tahoebike.org

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Amanda Milici
Lake Tahoe Bicycle Advocate

Sara Monson
North Shore Bicycle Advocate

Robert Nealan
Designer + Software Engineer

Charles W. Nelson
Attorney at Law

Nick Speal
Software Engineer

El Dorado County
February 16, 2022
Department of Transportation
Attn: Donaldo Palaroan

Re: Letter of Support for the South Tahoe Greenway - Upper Truckee River Bridge at Johnson Meadow Project

Dear Mr. Palaroan,

The Lake Tahoe Bicycle Coalition is excited to express support for the South Tahoe Greenway - Upper Truckee River Bridge at Johnson Meadow project.

The Lake Tahoe Bicycle Coalition is a member-supported, all-volunteer nonprofit organization with a mission to help Tahoe become more bicycle friendly. We promote opportunities for more people to ride bikes in Tahoe, including providing free valet parking for bicycles at community events, co-hosting the annual Lake Tahoe Bicycle Challenge, and producing the Lake Tahoe Bikeways Map.

This project, and the extension of the South Tahoe Greenway, will provide much-needed bicycle connectivity from the Sierra Tract neighborhood to the Y. It is a key piece of the bicycle network in South Lake Tahoe, and will be incredibly useful for cyclists, pedestrians, and the community at large.

In addition to expressing our support for the project, we request that the county provide more information about how the project will connect to the existing South Tahoe Greenway at Sierra Boulevard. The Lake Tahoe Bicycle Coalition recommends that the county consider aligning entrances to the bicycle paths across Sierra Boulevard such that a bicyclist could bike continuously from one side to the other in a straight line. We propose adding a connection to the existing trail, as illustrated with one of the two green lines (Figure 1).



Figure 1: Project connectivity across Sierra Boulevard recommendation

If making changes on the east side of Sierra Boulevard is not possible or within the scope of this project, we recommend aligning the new trail to use the Alternative 3 trailhead regardless of which alignment is used for the rest of the trail.

Please extend our thanks to the project team for making safe and accessible bicycling and pedestrian infrastructure a priority and we look forward to remaining engaged as this important project moves forward.

Sincerely,
Lake Tahoe Bicycle Coalition Board of Directors

LAKE TAHOE
BICYCLE COALITION

KEEP TAHOE BLUE
League to Save Lake Tahoe

advocate | engage | create

February 17, 2022

Donaldo Palaroan, P.E., Senior Civil Engineer
El Dorado County, Department of Transportation, Tahoe Engineering Unit
Submitted via email - donaldo.palaroan@edcgov.us

Re: Comments on South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow Draft Feasibility Report

Mr. Palaroan,

Thank you for the opportunity to comment on the South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow Draft Feasibility Report dated December 2021 (Project).

The League is dedicated to protecting and restoring the environmental health, sustainability, and scenic beauty of the Lake Tahoe Basin. Fine sediment delivered from roadways and exacerbated by vehicle traffic, along with nitrogen deposited on the lake from vehicle emissions, are two of the largest contributors to lake clarity decline. In connection with our mission, we support transportation solutions for Tahoe and advocate for the implementation of projects and policies that reduce dependence on the private automobile.

The League supports this Project as the objectives outlined in the Feasibility Report help implement many projects and plans we endorse, including the Bi-State Compact, the 2012 Regional Plan Update, and related Area Plans, including the Tahoe Valley Area Plan (TVAP), the 2020 Regional Transportation Plan (RTP), the Lake Tahoe Region BPMP (TMPO 2010), the 2009 TRPA Environmental Improvement Program (EIP), and the ongoing Lake Tahoe Total Maximum Daily Load (TMDL) for fine sediment and nutrients.

The section of Greenway proposed by El Dorado County (County) would provide a key active transportation connection on the South Shore of Lake Tahoe. The now-destroyed bridge previously provided an unofficial connection across the Upper Truckee River and meadow. That connection has been missed by the community as demonstrated by public comment and the new social trails leading to lower-water crossings of the river. These social trails have the potential to increase erosion and impair water quality in the Upper Truckee River. This Greenway connection is even more important now as the Sierra Boulevard bike path and Greenway connection between the Sierra Tract and Bijou neighborhoods are both complete.

While we support all of the alternatives proposed, alternatives 1 and 3 are preferred as they minimize new trail construction and SEZ disturbance so are therefore more protective of short-term water quality impacts. For accessibility, we recommend an alternative with the least steep grades, even if the trail needs to be slightly longer to achieve that goal. Lastly, although it may require a partnership with the City of South Lake Tahoe, we encourage the County to include rehabilitation of the small section of multi-use trail between South Avenue and Winnemucca Avenue in the preferred alternative.

Our only concern about the project is the ongoing management/operations and maintenance (O&M) that will be required. There is no mention of O&M in the Feasibility Report, and recently constructed paths such as the South Tahoe Greenway section 1b and 2 and the East Shore Trail in Incline Village have experienced litter issues, creation of new social trails, increased parking demand, and graffiti. As the Project moves into environmental review, the League would like to see O&M addressed in a clear and comprehensive way, including but not limited to agency roles and responsibilities, the funding source for regular upkeep, including repairs, sweeping, and snow removal, how litter/waste will be addressed, and any plans to account for increased parking demand.

The East Shore Trail provides a good example of a management team (Corridor Management Team) which operates under a Memorandum of Understanding (MOU) to identify funding and roles and responsibilities for the path. A Greenway Management Team could be created to manage the entire path as it is completed, or the section proposed in this Project could be managed independently or with the larger Johnson Meadow Restoration Project.

Thank you again for the opportunity to provide our input, and please do not hesitate to reach out to me directly with any questions. We look forward to being an engaged stakeholder throughout the planning and implementation of this important Project.

Sincerely,



Gavin Feiger
On behalf of the League to Save Lake Tahoe
Senior Land Use Policy Analyst

TAHOE REGIONAL PLANNING AGENCY

Mail
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Stateline, NV 89449-5310

Location
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Stateline, NV 89449

Contact
Phone: 775-588-4547
Fax: 775-588-4527
trpa.gov

LAKE TAHOE ENVIRONMENTAL IMPROVEMENT PROGRAM

February 18, 2022

Donaldo Palaroan
Senior Civil Engineer
County of El Dorado
Department of Transportation
924 B Emerald Bay Rd.
South Lake Tahoe, CA 96150
Donaldo.palaroan@edcgov.us

TRPA COMMENTS ON SOUTH TAHOE GREENWAY – UPPER TRUCKEE RIVER BRIDGE AT JOHNSON MEADOW DEAFT FEASIBILITY REPORT, ENVIRONMENTAL IMPROVEMENT PROJECT # 03.02.02.0085

Dear Mr. Palaroan:

Thank you for the coordination on the South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow Project (Project) and the opportunity to comment on the Draft Feasibility Report. TRPA has reviewed the Project Draft Feasibility Report and has the following comments to consider when finalizing the report and future planning for the project.

General Comments

- The benefit of a feasibility study prior to the environmental analysis is to flush out concerns and constraints to design a project alternative that requires minimal mitigation. Any technical studies done at this stage now will be helpful (cultural record search, vegetation survey, sensitive species, etc) to inform readers of the trade- offs and impacts to various resources. We also recommend that the County consult with the Washoe Tribe prior to releasing the preferred alignment and environmental analysis.
- Please continue to coordinate with the Tahoe RCD on the Johnson Meadow Restoration Project including sharing modeling results and technical studies.
- Graphics at the beginning of the document would be helpful to orient the reader to the larger trail network and all phases of the South Tahoe Greenway project.
- Consider preparing visual simulations and graphics for the bridge and various trail alignments. Describe how the scenic environment would be changed. Provide images of the existing bridge location.
- Table 5 lists the California Wolverine as having a status of “PT” but the status codes do not define “PT”
- The Southernmost portion of the project area is mapped as a Goshawk Threshold Zone.

Alignment Descriptions & Analysis

- Since the trail will be exempt from the calculation of land coverage and therefore no mitigation will be required from TRPA, it is ok using the mapped land capability to determine the amount of coverage across land capabilities.
- Please show existing user trails, popular access points, and utility roads in relation to the proposed alignments. This is difficult to distinguish on the faded aerial base layer. The report should acknowledge that these access points will still be desired by the public. Designing alignments and crossings that recognize and possibly support this access will be important.
- The Bike Network Map should clarify that future alignments are conceptual. This segment being analyzed now should be distinguished from those future sections extending south (all in purple).
- Consider a fourth alignment that combines Alternatives 1 and 3 and uses existing utility roads. Please provide more information as to why a cooperative agreement with STPUD and the airport to use and maintain shared facilities is infeasible. (See attached alternative alignment graphic with notes). While this may be logistically more complicated, environmental impacts could be reduced.
- Are there estimates of how much vegetation and tree removal would be necessary for the various alignments?
- User impacts should be considered and described clearly for each alternative. Please describe how the steep slopes would make travel more difficult or inconvenient for different user types. Describe how the designs would address ADA and federal requirements for trail design.
- Please describe any grade difference on both sides of the river and how this affects the various alignments. It is not clear if grade is also an issue for the Winnemucca Ave. connection. and why the specific alignment was chosen.
- Please provide consistency between the alternatives when describing how they are similar or have the same advantages/disadvantages.
- Alt3 Proximity to Existing Bridge – does the creation of new trails reduce grade, erosion, or other environmental impacts, provide for a broader range of users, opportunity to formalize social trails to offset the new trail impact? The advantages of the new trail for this crossing could be clarified here.
- Alt3 East-Upland trail alignment description is confusing -states the advantage to stays along the river but also a disadvantage to diverts away from the river. What are the advantage and disadvantage of a longer alignment both from the user experience and to the environment?
- Alt3 Tahoe Sierra advantage could be that it directly links to existing greenway segment. Would the curvilinear alignments in Alt1 and Alt2 will need to be tied in through a

tangent through the access drive to the Caltrans snow storage area? That could be a disadvantage for those two alignments

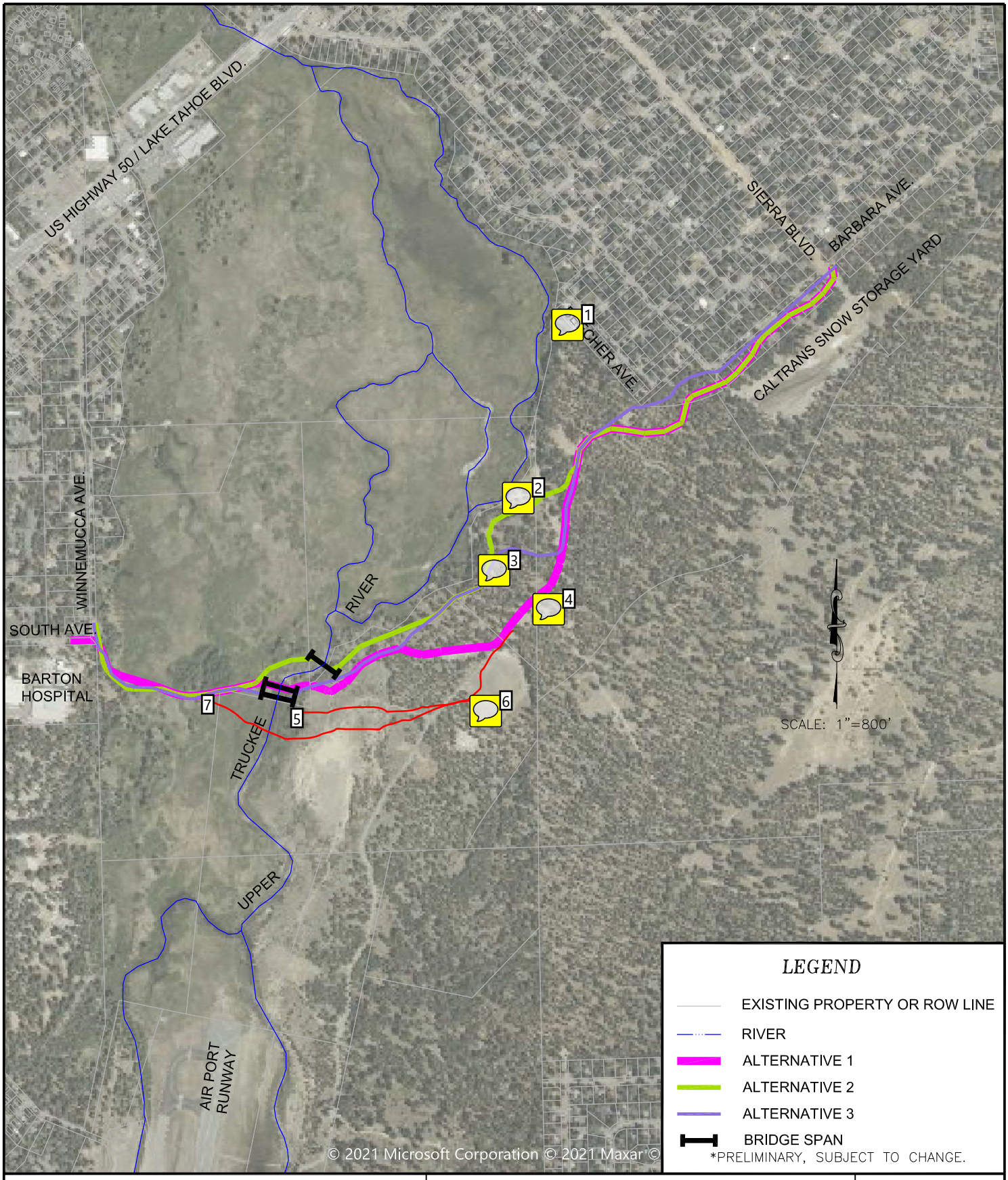
- Section 3.2 Formulating Alternatives is confusing because it speaks to "one proposed alignment" but it isn't clear what that is. This could be restated as key considerations for determining a proposed alignment which include utilizing existing disturbed areas, avoid landscaping on private property, etc.

TRPA looks forward to continued coordination with El Dorado County on this project. If you have questions or would like to discuss these comments, please reach out to Shannon Friedman at sfriedman@trpa.gov or at (775) 589-5205.

Sincerely,

Shannon Friedman

Senior Planner
Environmental Improvement Program Division
Tahoe Regional Planning Agency



COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT JOHNSON MEADOW ALIGNMENT ALTERNATIVES

DATE:	PROJECT NO.:	BY:
12/21	95201	dsp

FIGURE
14

Summary of Comments on South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow

Page: 1

Number: 1 Author: rcremeen Subject: Sticky Note Date: 2/17/2022 2:08:57 PM -08'00'
This is a highly used social trail access to the river. It is also where people take boats out.

Number: 2 Author: rcremeen Subject: Sticky Note Date: 2/17/2022 2:09:35 PM -08'00'
Popular swimming hole, deep area near STPUD utility road and bluff view point

Number: 3 Author: rcremeen Subject: Sticky Note Date: 2/17/2022 1:56:57 PM -08'00'
This is the most commonly used trail for views of the river

Number: 4 Author: rcremeen Subject: Sticky Note Date: 2/17/2022 1:56:18 PM -08'00'
Report and maps should distinguish between user trails and utility roads. It appears that Alt 3 does tie into the road here.

Number: 5 Author: rcremeen Subject: Pencil Date: 2/17/2022 1:52:46 PM -08'00'

Number: 6 Author: rcremeen Subject: Sticky Note Date: 2/17/2022 1:57:46 PM -08'00'
Consider connecting to utility road earlier at proposed bridge location or shift further south. Slopes may be steeper, but less veg removal and scenic impacts from river

Number: 7 Author: rcremeen Subject: Pencil Date: 2/17/2022 1:53:07 PM -08'00'

TAHOE
RESOURCE CONSERVATION DISTRICT

870 Emerald Bay Road Suite 108, South Lake Tahoe, CA 96150 • 530.543.1501 PH • 530.543.1660 FAX • TahoeRCD.org

Attn: Eldorado County
Department of Transportation
924 B Emerald Bay Rd.
South Lake Tahoe, CA 96150

Re: South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow Project

---

To Whom it May Concern:

Tahoe Resource Conservation District (Tahoe RCD), owner and manager of the Johnson Meadow property (Meadow), supports El Dorado County's (County) South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow project. As a public agency, land owner, and partner to El Dorado County; Tahoe RCD supports this important mobility project. Multi-modal non-motorized transportation is not only a key regional priority but also helps further Tahoe RCD's goals of environmental sustainability and community connection. As a key stakeholder in this project, Tahoe RCD looks forward to assisting the County where able and appropriate.

The Johnson Meadow Property is the subject of a large-scale restoration project being undertaken by Tahoe RCD. Currently it is in the planning phases. The goals of restoration are to improve water quality, soil conservation, vegetation, fisheries, wildlife habitat, recreation, and scenic resources. Future management plans for the Meadow include opportunities for interpretive signage, sustainable access and trailhead infrastructure, and other public access improvements. Tahoe RCD is committed to maintaining public access to the meadow and river while improving the quality of public open space in the community of South Lake Tahoe. Though they are separate projects, the South Tahoe Greenway and Upper Truckee River Bridge project will complement Johnson Meadow restoration by providing sustainable community access. In order to accommodate the most robust restoration possible it is Tahoe RCD's preference that alternatives 1 or 3 be selected as the preferred alternative due to bridge location. Placing the proposed bridge replacement in the most southern location possible (upstream of the current ruined bridge) both accommodates restoration plans and takes advantage of a more stable river channel alignment.

Please contact Restoration Program Manager Andrew Schurr with questions regarding Johnson Meadow management or restoration.

Sincerely,

Carl Ribaudo
President

Comments on South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow Feasibility Report December 2021

February, 2022

1. Page ii – Executive Summary, 1st Paragraph: "USDA Forest Service" rather than "US Forest Service"
2. Page i– Executive Summary, 3rd Paragraph: "washed out" in place of "wash out"
3. Page ii – Goal 5, add an "s" to "fine"
4. Page ii – Last paragraph – should it be 2.44 acres rather than 24.4?
5. Page ii – Last Paragraph: "USDA Forest Service" rather than "US Forest Service"
6. Page iv -Utilities and Figure 10, JMP1 team could share the utilities collected to date with the County if helpful for double checking against what they have already compiled.
7. Page iv , Page 16 and 18 -Cultural/Natural Resources, Could the cultural and botanical field survey efforts be shared between the two projects to save on costs and avoid duplicating efforts?
8. Page iv and 19– Hydrology & Hydraulic Summary - suggest mention of FEMA and the bridge designs being elevated above the 100-year BFE and clear span in the document and Executive summary since this will be a critical piece.
9. Page iv – Alternatives last paragraph, sentence confusing, add "of" between "variations for each" and "the three primary alternatives".
10. Page 1 – Last paragraph, Basin or basin? Just aiming for consistency
11. Page 2 – Section 1.2 first paragraph, Suggest" it" follows, instead of "with"
12. Page 2 – Section 1.2 first paragraph, remove duplicate "at the"
13. Page 2 – Section 1.2 first paragraph, "USDA Forest Service"-
14. Page 4 – Second paragraph, replace "which" with "it" or something similar
15. Page 14 – First paragraph, choose either "City" or "CSLT" but be consistent since it is "City" in the beginning of document then switches to "CSLT"
16. Page 14 – First paragraph, replace "and" with "on" following "Project is mostly.."
17. Figure 10 – Add in Proposed Project Boundary
18. Page 16 – Last paragraph, question relative to "250 animals" is this just animals in general? or terrestrial, avian and aquatic specifically or combined? Clarification would be helpful.
19. Page 16 – Last paragraph, add in "special status" between "Typical"…and "species"
20. Page 20 – Section 1.3.1 – Assuming the 39.1 square miles is to this location given the entire watershed is 54 square miles. Add "to this location"
21. Page 20 – Section 1.3.1 – Suggest adding average slope of river in general project area which should be less than 8%.
22. Page 25 – Section 1.4, Bridge structure hydraulics should have its own header since its just as important if not more than the cross-drainage hydraulics. There is a section above relative to FEMA so perhaps refer to that section or add in a brief hydraulics section to 1.4.
23. Page 25 – Section 1.4, Bridge hydraulics, should include mention of hydraulic analysis to include sediment/debris flows in addition to flood flows since it was large (log jam) debris that took out the existing bridge, at a minimum consideration of sufficient freeboard
24. Page 28 – Third paragraph, regarding mature tree removal, may want to check back with Airport to see if any are slated for removal due to FAA clearance requirements. Forest service had to clear out a ton of trees on the southern runway approach during Reach 5 construction due to airport requirements and requests.

Summary of Comments on 22-03-04 Comments_DraftBridgeFeasibilityReport_TahoeRCD_Feb.2022.pdf

Page: 1

Number: 1 Author: dpalaroan Subject: Sticky Note Date: 3/24/2022 10:36:27 AM
completed

Number: 2 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 2:32:15 PM
completed

Number: 3 Author: dpalaroan Subject: Sticky Note Date: 3/24/2022 3:20:20 PM
reading further... the term is correct, references fine sediment...no change made

Number: 4 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 2:33:48 PM
based on the project boundary linework, the area is 24.4 acres...no change

Number: 5 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 2:34:07 PM
completed

Number: 6 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 2:44:47 PM
Thank you for the offer. The County will also verify the utilities through field surveys and outreach to the utility companies.

Number: 7 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 2:46:39 PM
This is certainly a possibility depending on the area of coverage of the field and data analysis. The County will continue to coordinated with the RCD and share the information as things develop.

Number: 8 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 2:47:23 PM
Appendix A of the final document will have this data and information.

Number: 9 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 2:49:21 PM
completed

Number: 10 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 2:50:47 PM
changed to "Tahoe Basin"

Number: 11 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 2:57:05 PM
completed

Number: 12 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 2:53:22 PM
deleted

Number: 13 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 2:59:37 PM
completed

Number: 14 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 3:58:51 PM
paragraph has been rewritten

Number: 15 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 4:03:50 PM
first paragraph of 1.1.1 (page 1) defines City of South Lake Tahoe as CSLT, remains consistent throughout the document

Number: 16 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 4:04:45 PM
completed

Number: 17 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 4:06:11 PM
figure revised

Number: 18 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 4:17:52 PM
rewritten with referencing source provided

Number: 19 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 4:07:31 PM
completed

Number: 20 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 4:20:50 PM
removed reference to size of watershed

Number: 21 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 4:34:49 PM

Comments from page 1 continued on next page

Comments on South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow Feasibility Report December 2021

February, 2022

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added; 1.4.2 was in the original draft document but was not inserted in time for the public draft due to the lack of data and information at the time

Number: 22 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 4:35:27 PM

more detailed analysis of flood frequency and flows are included in Appendix A

Number: 23 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 4:35:59 PM

noted, will work closely with the Airport on this issue

25. Page 28 - The 2nd, 3rd and last paragraph in this section on page 28 make it sound like the project will have to avoid SEZ and floodplain areas, comply with a 25 ft setback from the channel, avoid wetlands, and be constructed on Land Capability Class 5 rather than Class 1b. None of these are possible with this project, this section will need to be revised accordingly. [1]
26. Page 28 – Third bullet, add in "to stabilize the channel bed and banks" after "type of restoration needed…" [2]
27. Page 28 – 2.1 Alignment Alternatives paragraph, don't the alternatives also differ by the approach paths from the east (i.e., Barbara Ave/Lodi) as they appear in Figure 14? [3]
28. Page 28- 2.1 Alignment Alternatives paragraph, are the alignment "ends" interchangeable to some degree with the bridge location alternatives? If so, it would be good to state so. [4]
29. Page 29 – Would be helpful to list the approximate span length under each alignment feature/description for quick comparison.
30. Page 32 – top of page, consider adding in requirement to demonstrate less than x.x' increase in BFE under a 100-year event [5]
31. Page 35 – Land Capability bullet, recommend including a statement regarding how the 25-foot setback can be addressed given portions of the trail and the bridge fall directly within the SEZ [6]
32. Page 36 – First paragraph, statement regarding "In general there is one proposed alignment alternative…" this is confusing, do you mean there is one proposed alignment within the meadow with variations on approach paths to the east and bridge crossings OR only one proposed alignment that has the two separate locations along existing trails? If the latter, suggest specifying which alignment that is. If the former it would help to clarify. [7]
33. General Comment – Agree that Alternatives 1 or 3 would be best suited and more compatible with the restoration efforts being led by TRCD by allowing for a larger area of increased floodplain activation downstream of the bridge that won't impact the bridge. If pursuing Alternative 1 recommend looking closely at the shear and velocities along the left (west) bank to make sure the crossing is not too close to the bend entrance where there could be the potential for future accelerated bank erosion threatening the abutment in that location. [8]
34. Figure 14, the line for Alt 3 is really hard to see on the figure. The 3 lines for the Alts should be the same thickness, and the color for the Alt 3 line should be changed to be more visible. [9]

AIRPORT COMMENTS [10]

(These comments were offered on Tahoe RCD's PJED but may be relevant to Greenway and Bridge Planning)

There are trees which are located on TRCD property in addition to Airport owned property that penetrate protected Airspace Obstacle Clearance surfaces. The City is undertaking both an Airport Master Plan in 2023 and a more narrowly defined Precision Approach Path Indicator (PAPI) Study in 2022. A PAPI is an air navigation aid which is currently offline due to tree growth penetrating minimum safety thresholds to operate this equipment. The area of concentration is around the proposed new bridge/boardwalk crossing at the UPPR. At some point in the near future, the airport will be required to mitigate tree growth through topping and/or removal. Of course all permitting will be completed and the City will use a RPF. The Airport will coordinate with TRCD on this effort and seek an

Page: 2

Number: 1 Author: dpalaroan Subject: Sticky Note Date: 3/24/2022 8:42:39 AM
revised

Number: 2 Author: dpalaroan Subject: Sticky Note Date: 3/24/2022 8:56:13 AM
completed

Number: 3 Author: dpalaroan Subject: Sticky Note Date: 3/24/2022 8:59:16 AM
yes, additional text added

Number: 4 Author: dpalaroan Subject: Sticky Note Date: 3/24/2022 9:23:53 AM
yes, additional text added

Number: 5 Author: dpalaroan Subject: Sticky Note Date: 3/24/2022 9:50:08 AM
this value can not be calculated at this early stage of the project, more detailed analysis would have to be performed to determine the increase in the BFE based on bridge foundation location and boardwalk foundation spacing; this analysis will be complete once foundation design is determined

Number: 6 Author: dpalaroan Subject: Sticky Note Date: 3/24/2022 10:14:15 AM
added additional text; setback requirement is exempt from TRPA Code of Ordinances because the project is a public service facility, i.e., bike trail/path, however, SEZ impacts would have to be fully mitigated per the Water Board's Basin Plan

Number: 7 Author: dpalaroan Subject: Sticky Note Date: 3/24/2022 10:27:38 AM
clarified

Number: 8 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 3:15:48 PM
noted

Number: 9 Author: dpalaroan Subject: Sticky Note Date: 3/23/2022 3:15:16 PM
noted... the intent of the wider ALT1 line is to emphasize there are overlaps in alignments between ALT1 and AL3 in certain locations, if the lines were the same thickness/width, one color will not be apparent when stacked on top of each other

Number: 10 Author: dpalaroan Subject: Sticky Note Date: 3/24/2022 10:36:02 AM
Airport Manager submitted comments specific to this project also, see Appedix C of the Final Feasibility Report.

access agreement onto TRCD land and possibly a longer term future avigational easement to prevent unwanted conifer vegetation in certain critical areas. This action may change the scenic quality of this proposed pedestrian right of way. This does not directly apply to your project at hand but has impacts to the forest quality in areas under study that you should be made aware of..

Appendix D

PREFERRED ALTERNATIVE ROUGH ORDER OF MAGNITUDE (ROM) CONSTRUCTION ESTIMATE

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE
AT JOHNSON MEADOW PROJECT

ITEM NO.	ITEM DESCRIPTION	UNIT OF MEASURE	ESTIMATED QUANTITY	UNIT PRICE	ITEM TOTAL
	EXCAVATION SAFETY	LS	1	$ 20,000	$ 20,000
	CONSTRUCTION AREA SIGNS	LS	1	$ 10,000	$ 10,000
	TRAFFIC CONTROL SYSTEM	LS	1	$ 35,000	$ 35,000
	TEMPORARY CONSTRUCTION ENTRANCE	EA	10	$ 7,500	$ 75,000
	JOB SITE MANAGEMENT	LS	1	$ 35,000	$ 35,000
	TEMPORARY REINFORCED SILT FENCE	LF	15,800	$ 4	$ 63,200
	STREET SWEEPING	LS	1	$ 15,000	$ 15,000
	TEMPORARY FENCE (TYPE ESA)	LF	47,500	$ 2	$ 95,000
	TREE REMOVAL	EA	200	$ 500	$ 100,000
	ROADWAY EXCAVATION	CY	1,000	$ 150	$ 150,000
	CLASS 2 AGGREGRATE BASE	CY	4,700	$ 75	$ 352,500
	HOT MIX ASPHALT (TYPE A)	TON	13,800	$ 190	$ 2,622,000
	FURNISH AND INSTALL PRECAST CONCRETE BOARDWALK SYSTEM	LS	1	$ 1,000,000	$ 1,000,000
	ROADSIDE SIGN - ONE POST	EA	50	$ 500	$ 25,000
	PLASTIC PIPE	LF	2,000	$ 50	$ 100,000
	STEEL FLARED END SECTION	EA	100	$ 50	$ 5,000
	ROCK SLOPE PROTECTION (20 LB, CLASS I, METHOD B)	CY	1,000	$ 90	$ 90,000
	DETECTABLE WARNING SURFACE	SQFT	720	$ 75	$ 54,000
	MINOR CONCRETE (CURB RAMP)	CY	240	$ 200	$ 48,000
	FURNISH SINGLE SHEET ALUMINUM SIGN (0.080" - UNFRAMED)	SQFT	100	$ 25	$ 2,500
	CROSSWALK PAVEMENT MARKING (RECESSED)	SQFT	300	$ 10	$ 3,000
	PAINT TRAFFIC STRIPE (1-COAT)	LF	31,700	$ 2	$ 63,400
	PAVEMENT MARKING (1-COAT)	SQFT	880	$ 10	$ 8,800
	MOBILIZATION	LS	1	$ 100,000	$ 100,000
				PRELIMINARY CONSTRUCTION TOTAL	**$ 5,072,400**

CONTINGENCY (30%)	**$ 1,521,720**
PRELIMINARY CONSTRUCTION GRAND TOTAL	**$ 6,594,120**
Construction Engineering (20%)	**$ 1,318,824**
CON PHASE TOTAL	**$ 7,912,944**

Appendix J

Final Hydrologic Analysis Report

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

INTEROFFICE MEMORANDUM

Date: August 27, 2024

To: File

From: Donaldo Palaroan, PE

Subject: South Tahoe Greenway - Upper Truckee River Bridge at Johnson Meadow Project Hydrologic Analysis Report, County Project 36107023

1. Introduction

1.1. General

The South Tahoe Greenway - Upper Truckee River Bridge at Johnson Meadow Project (Project) area lies in El Dorado County, California, within and between the boundaries of the Tamarack Subdivision Addition No. One and the Aram Subdivision Unit No. One. It follows a potential alignment roughly matching a compacted dirt user-created trail that starts at the south end terminus of Winnemucca Avenue, to the east onto public lands owned by the Tahoe Resource Conservation District (TRCD) towards the Upper Truckee River, crossing the river and following user trails towards the intersection of Sierra Boulevard and Barbara Avenue. The Project involves the evaluation of approximately 1.2 miles of Class 1 shared use pathway linking Barton Memorial Hospital at South Avenue within the eastern limits of the Tahoe Valley Area Plan and the Tahoe Sierra (formerly Sierra Tract) subdivision, crossing the Upper Truckee River just north of the Lake Tahoe Airport. The Project is located in the southern section of the Lake Tahoe Basin in Sections 3 and 4 of Township 12 North, Range 18 East, Mount Diablo Meridian. The Project is bordered by Winnemucca Avenue on the west, U.S. Highway 50 (US 50) on the north, the Lake Tahoe Airport on the south and Sierra Boulevard on the east. The total Project area is approximately 24.4 acres and encompasses City of South Lake Tahoe Right of Way (ROW), TRCD parcel, a City of South Lake Tahoe (CSLT) parcel, California Tahoe Conservancy (Conservancy) parcels, a South Tahoe Public Utility District (STPUD) parcel, a United States Department of Agriculture (USDA) Forest Service (USFS) parcel, and a California Department of Transportation (Caltrans) parcel, (see Figure 1). The Project is funded through preliminary engineering from the Surface Transportation Block Grant (STBG) Program and Tahoe Regional Planning Agency (TRPA) Air Quality Mitigation funds.

The Project builds upon the Dennis T. Machida Memorial Greenway (Greenway) and provides a critical link to the bicycle network from Barton Memorial Hospital and the surrounding neighborhoods and provides a crossing of the Upper Truckee River without having to travel on US 50. The Project supports the TRPA *2024 Active Transportation Plan*, approved by the Tahoe Metropolitan Planning Organization in April 2024. The Project proposes to install a shared use path bridge over the Upper Truckee River just north of the Lake Tahoe Airport and link to the

extensive informal user-created trail system on the east side of the river. This portion of the Greenway will terminate at the beginning of the phase of the project completed in 2021 by the County of El Dorado and the Sierra Boulevard Complete Streets Project completed in 2019 by the City of South Lake Tahoe.

1.2. Purpose

The purpose of this drainage analysis is to develop 10-year, 25-year, 50-year, and 100-year peak flows to provide a hydraulic evaluation to assist in the selection of the proposed bridge location. This report is intended to detail and document the hydrologic parameters and assumptions used to forecast the flows applicable to design the boardwalk and bridge at the Upper Truckee River. The preferred alignment of the proposed bridge has been determined. For the purposes of this evaluation, the analysis was completed at a proposed location approximately 110 feet upstream of the existing crossing which was washed out by storms during the winter of 2017.

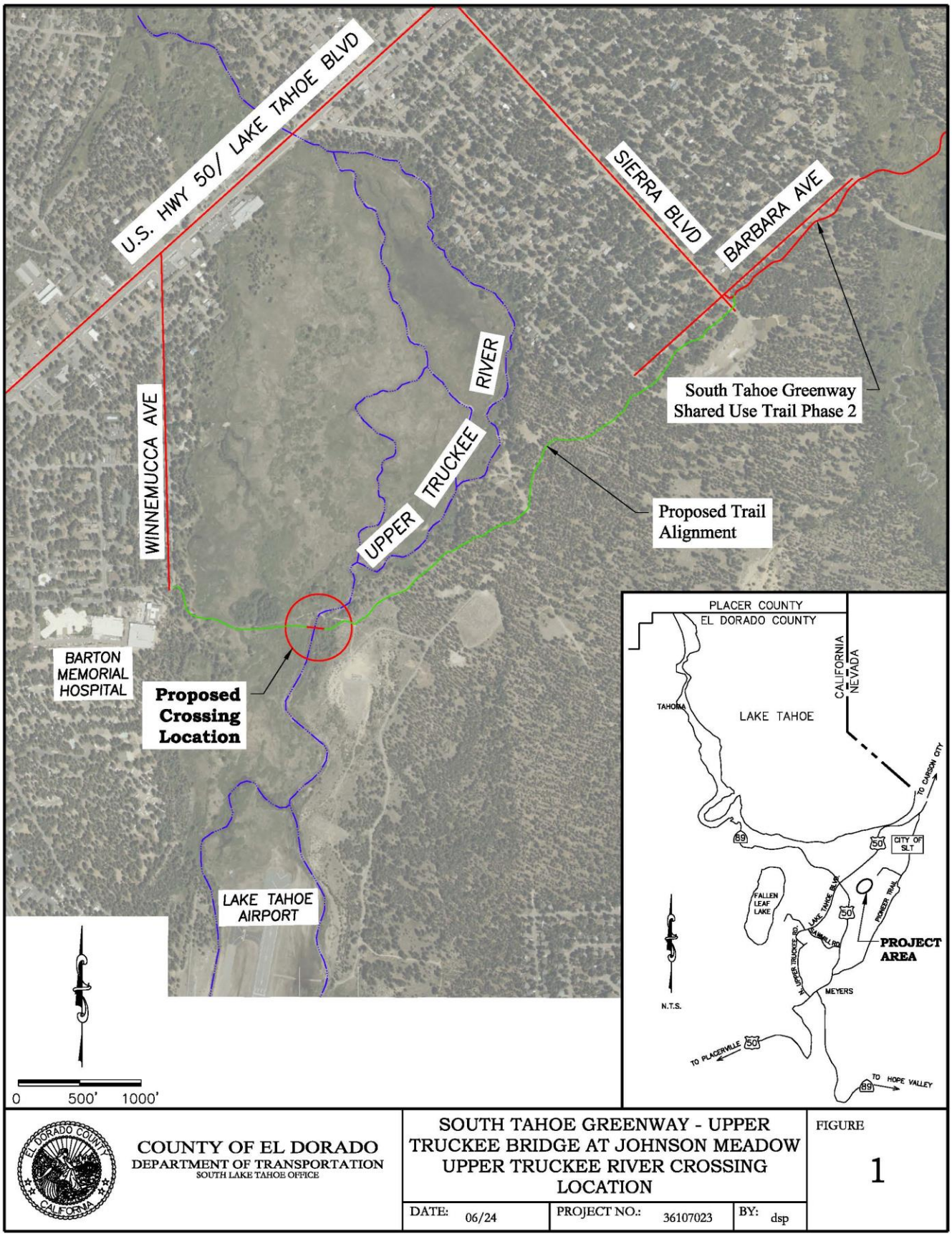


Figure 1: South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow Crossing

2. Background

The drainage analysis is necessary to ensure that the proposed bridge will meet the specific design standards provided by El Dorado County, Department of Transportation (County) and Caltrans. The County does not provide specific freeboard design criteria. However, the County has a practice of designing freeboard based on Caltrans Highway Design Manual. The proposed bridge design will satisfy the following standards:

1. County of El Dorado Drainage Manual, dated March 1995[1]
2. Caltrans Local Assistance Procedure Manual, Chapter 11, dated July 23, 2006[2]
    - The basic rule for hydraulic design of bridges is that they should be designed to pass the two percent (2%) probability flood or tide (Q_{50}) or the flood-of-record, whichever is greater without causing objectionable backwater, excessive flow velocities, or encroaching on through traffic lanes. Sufficient freeboard, the vertical clearance between the lowest structural member, and the water surface elevation of the design flood should be provided. A minimum freeboard of 2 feet is often assumed for preliminary bridge design.
    - The final design should be able to convey the base flood, Q100.
    - The minimum design flood for foundation analysis should be the base flood (Q100). Bridges with scourable beds should withstand the effects of the base flood (Q100) without failure.
3. Caltrans Highway Design Manual dated December 2018[3]
    - The basic rule for the hydraulic design of bridges is that they should pass a 2% probability flood (50-year).
    - Freeboard, vertical clearance between the lowest structural member and the water surface elevation of the design flood, sufficient to accommodate the effects of the bedload and debris should be provided. Alternatively, a waterway area sufficient to pass the 1 percent probability flood without freeboard should be provided. Two feet of freeboard is often assumed for preliminary bridge design.

3. Previous Studies and Reference Documents

The USGS has been operating stream gauges at two locations that were used to get data for the analysis. Gauge 103366092 at the US 50 crossing in Meyers has data from 1990 to present day[4]. A frequency curve was developed using the recorded peak flows from this gauge site to get the flows at this point for analysis (Appendix C). Gauge 10336610 at the US 50 crossing in South Lake Tahoe has data from 1972 to present day[5]. A frequency curve was developed using the recorded peak flows from this gauge site to compare to results from the analysis (Appendix C).

According to Federal Emergency Management Agency (FEMA) maps 06017C0386F dated April 3, 2012 for the US 50 crossing, the proposed bridge and boardwalk locations carry flood zone designations[6]. The 100-year base flood elevation is approximately 6242 feet near the proposed bike path crossing. This value was obtained by overlaying the FEMA 100 year base flood line as it relates to the project existing surface which uses the National Geodetic Vertical Datum of 1929 (NGVD29). This analysis will be used to calculate and refine this elevation.

4. Hydrology

4.1. Basin Characteristics

The analysis consists of seven Upper Truckee River sub-basins. Six are upstream of the proposed bridge location and one is downstream of the proposed bridge location. The six upstream are

sub-basins A1 (UTR Above Meyers) (approximately 39.1 square miles), B1 (Chiapa) (approximately 0.36 square miles), B2 (Angora Creek) (approximately 4.8 square miles), B3 (Meyers Creek) (approximately 1.3 square miles), B4 (Apalachee/Golden Bear) (approximately 0.35 square miles), and B5 (UTR Below Meyers). These six sub-basins were used to get results at the proposed bridge location for design parameters. Sub-basin C1 (Johnson Meadow) (approximately 0.69 square miles) is upstream of the Upper Truckee River Crossing at South Lake Tahoe and was used to calculate flows at that point to compare to actual measurements at a USGS gauge that is located there. Sub-basin A-1 (UTR Above Meyers) is approximately 10 miles in length and 6.5 miles in width with a slightly elongated shape and a spur in the northwest region encompassing the Echo Lake drainage. In general, the basin consists of mountainous terrain within the unincorporated area of El Dorado County at elevation ranges from 6320 feet to 9590 feet. This basin is roughly aligned south-north and east-west with an average slope of the watershed of approximately 8 percent (see Figure 2). Sub-basin B1 (Chiapa) tributary area is approximately 1.0 mile in length and 0.5 miles in width with an elongated southwest-northeast shape. In general, the basin consists of a sparsely developed neighborhood within mountain terrain located within the unincorporated areas of El Dorado County at elevation range from 6310 feet to 6690 feet. This basin is roughly aligned southwest-northeast with an average watershed slope of 7 percent (see Figure 2). This watershed was delineated to calculate flows at the San Bernardino Bike Path Upper Truckee River crossing and was included in this project to be able to build upon the analysis that completed for that project. Sub-basin B2 (Angora Creek) is approximately 4.3 miles in length and 2.0 miles wide with an elongated southwest-northeast shape and encompasses Angora Creek and its tributary area's contribution to the Upper Truckee River. In general, the southwest portion of the basin consists of mountainous terrain within the unincorporated area of El Dorado County at elevation ranges from 6606 feet to 8811 feet and the remainder of the basin consists of sparsely developed neighborhoods within mountain and meadow terrain located within the unincorporated areas of El Dorado County at elevation range from 6276 feet to 6606 feet. This basin is roughly aligned southwest-northeast with an average watershed slope of 11 percent (see Figure 2). This watershed combines with the Upper Truckee River in the northern portion of the Lake Tahoe Golf Course. Sub-basin B3 (Meyers Creek) is approximately 2.1 miles in length and 1.1 miles wide and encompasses Meyers Creek and its tributary area's contribution to the Upper Truckee River. In general, the southern portion of the basin consists of mountainous terrain within the unincorporated area of El Dorado County at elevation ranges from 6470 feet to 7665 feet and the remainder of the basin consists of neighborhoods in Meyers off of US 50 and Pioneer Trail and includes Tahoe Paradise Golf Course and the southwest portion of Lake Tahoe Golf Course located within the unincorporated areas of El Dorado County at elevation range from 6268 feet to 6470 feet. This basin is roughly aligned south-north with an average watershed slope of 11 percent (see Figure 2). This watershed combines with the Upper Truckee River in the northwest portion of the Lake Tahoe Golf Course. Sub-basin B4 (Apalachee/Golden Bear) is approximately 0.8 miles in length and 0.7 miles wide and encompasses the Upper Truckee River tributary area between the northern portion of the Tahoe Paradise Addition Unit No.4 subdivision and the southwestern portion of the Montgomery Estates Unit No. 7 subdivision . In general, the basin consists of these wooded neighborhoods and the meadow drainage between them within the unincorporated area of El Dorado County at elevation ranges from 6247 feet to 6490 feet. This basin is roughly aligned south-north with an average watershed slope of 3 percent (see Figure 2). This watershed combines with the Upper Truckee River in the northeast portion of the Lake Tahoe Airport. Sub-basin B5 (UTR Below Meyers) is approximately 5.8 miles in length and 0.7 miles wide and is the main watershed for the Upper Truckee River below the US 50 crossing in Meyers . In general, the southwest portion

of the basin consists of mountainous terrain and the neighborhoods in Meyers west of US 50 and contains most of the Lake Tahoe Golf Course within the unincorporated area of El Dorado County at elevation ranges from 6268 feet to 8893 feet. The northeast portion of the basin consists of the neighborhoods just west of Pioneer Trail within the unincorporated area of El Dorado County and the Lake Tahoe Airport with in the city limits South Lake Tahoe at elevation ranges from 6242 feet to 6268 feet. This basin is roughly aligned southwest-northeast with an average watershed slope of 6 percent (see Figure 2). This watershed combines with the Upper Truckee River just northwest of Tahoe Paradise Park. Sub-basin C1 (Johnson Meadow) is approximately 0.9 miles in length and 0.9 miles wide and encompasses Johnson Meadow between the proposed bridge and the Upper Truckee River US 50 crossing in South Lake Tahoe. In general, the basin consists of Johnson Meadow and the surrounding neighborhoods. It also includes the wooded area east of Johnson Meadow where the proposed alignment of the trail is. The meadow is within the unincorporated area of El Dorado County and the neighborhoods are in the City of South Lake Tahoe. The elevation ranges from 6234 feet to 6384 feet. This basin is roughly aligned south-north with an average watershed slope of 2 percent (see Figure 2).

4.2. Soil Characteristics

The Project's geotechnical report will provide information for soil borings located near the proposed Upper Truckee River crossing. This report will provide detailed soil characteristics that will assist in the design of the proposed bridge and boardwalk.

4.3. Groundwater

The presence and depth of groundwater within the proposed alignment will be determined once a geotechnical study is completed and will assist in the design of the proposed bridge and boardwalk.

4.4. Climate

The average temperatures in the vicinity of the project are approximately 80^{o}F in August and approximately 18^{o}F in winter. The winter storm season typically extends from November to April, and storms generally moves from west to south-west and travels in a northeasterly to easterly direction.

4.5. Rainfall Data

Generally, the project area receives precipitation during winter months. Precipitation data used for model input was obtained from the County of El Dorado Drainage Manual. The Mean Annual Precipitation (MAP) for the watersheds that affect the project area can be found in Table 1 and Appendix A.

4.6. Time of Concentration

Time of concentration estimations were performed per the County of El Dorado Drainage Manual. Sheet flow is assumed to occur for maximum length of 300 ft and sheet flow travel time is calculated based on the following equation:

$$T_t = \frac{0.007(nL)^{0.08}}{(P_2)^{0.5}S^{0.4}}$$

Where:

T_t = sheet flow travel time, in hr

n = overland-flow roughness coefficient, 0.4 was chosen for this project

L = length of overland flow surface, in ft (maximum 300 ft.)
P_2 = 2-yr, 24-hr rainfall depth in inches
S = land slope, in ft/ft.

The velocity of shallow flow over an unpaved surface is estimated based on the following equation:

$V = 16.1345(\sqrt{S_o})$
Where, V = shallow-concentrated flow velocity, in ft/sec;
S_o = slope, in ft/ft.

The County of El Dorado Drainage Manual was used to obtain the 2-year event flow. The 2-year event flow was used to calculate the velocity. The flow travel time is the channel length divided by the flow velocity.

The velocity of channel flow is estimated based on the following equation derived from the Manning's Equation:

$$V = \frac{k}{n} R_h^{2/3} S^{1/2}$$

where:

- *V* is the cross-sectional average velocity (L/T; ft/s, m/s);
- *n* is the Gauckler–Manning coefficient. Units of *n* are often omitted, however *n* is not dimensionless, having units of: (T/[$L^{1/3}$]; s/[$ft^{1/3}$]; s/[$m^{1/3}$]).
- R_h is the hydraulic radius (L; ft, m);
- *S* is the slope of the hydraulic grade line or the linear hydraulic head loss (L/L), which is the same as the channel bed slope when the water depth is constant. ($S = h_f/L$).
- *k* is a conversion factor between SI and English units. It can be left off, as long as you make sure to note and correct the units in the *n* term. If you leave *n* in the traditional SI units, *k* is just the dimensional analysis to convert to English. *k* = 1 for SI units, and *k* = 1.49 for English units. (Note: $(1\ m)^{1/3}/s = (3.2808399\ ft)^{1/3}/s = 1.4859\ ft^{1/3}/s$)

This calculation was completed for The Flood Insurance Study, El Dorado County, California and Incorporated Areas performed by the Federal Emergency Management Agency (FEMA) Revised April 3, 2012[7]. In this study the Upper Truckee River, Angora Creek and other waterways in the county were evaluated at certain cross sections that are shown on the FEMA FIRMs where the inputs to the equation were field verified. This study also shows the length of the waterway that applies to the calculated velocities. Channel flow travel time is the sum of flow path lengths divided by the velocities for the channel reaches of interest.

Total time of concentration was computed as the sum of the sheet flow travel time, the shallow flow travel time and the channel flow travel time. A summary of the resulting time of concentration values for the sub-basins are listed in Table 1. Appendix A provides details of each time of concentrations. The measured data from the USGS gauge (USGS103366092) was used for the UTR Above Meyers sub-basin in place of modeled data.

5. Hydrologic Model Development

Mean Annual Precipitation data was obtained from the County of El Dorado Drainage Manual dated March 14, 1995 (see Appendix A) which then was utilized with the USACE HEC-HMS Program Version 4.2 dated August, 2016[8] to develop a hydrologic model for the Upper Truckee River crossing tributary watersheds. The hydrologic model upstream of the bridge was divided into six sub-basins. Figure 2 shows the sub-basin delineations for the proposed bridge. There is also one sub-basin downstream of the bridge (Figure 2) that was delineated to be able to calculate flows at the Upper Truckee River crossing at US 50 in South Lake Tahoe. This was performed so a comparison could be made between calculated flows and flow data from a USGS gauge (USGS10336610).

5.1. Hydrologic Parameters

Appendix A provides the HMS model diagram and Mean Annual Precipitation for the individual watersheds. Also included in Appendix A are the 24 hour precipitation, sheet and shallow concentrated flow travel time, channel flow travel time, and total time of concentration. Parameters used in the hydrologic model were based on concept of the Soil Conservation Service (SCS) Curve Number (CN) method. A unit hydrograph (UH), based on SCS type 1A temporal distribution consistent with the County of El Dorado Drainage Manual was used to simulate the runoff of excess precipitation. Guidelines given in the Drainage Manual recommend using type 1A temporal distribution for projects located at an elevation above 1640 ft in elevation.

The design model storms were based on 24-hour duration for a 10-year, 25-year, 50-year, and 100-year storm frequency using:

- Precipitation depth and hydrologic parameters provided by the County of El Dorado Drainage Manual, See Appendix A.

Table 1 summarizes the input parameters used for the HEC-HMS hydrologic modeling, including curve number, conveyance and rainfall.

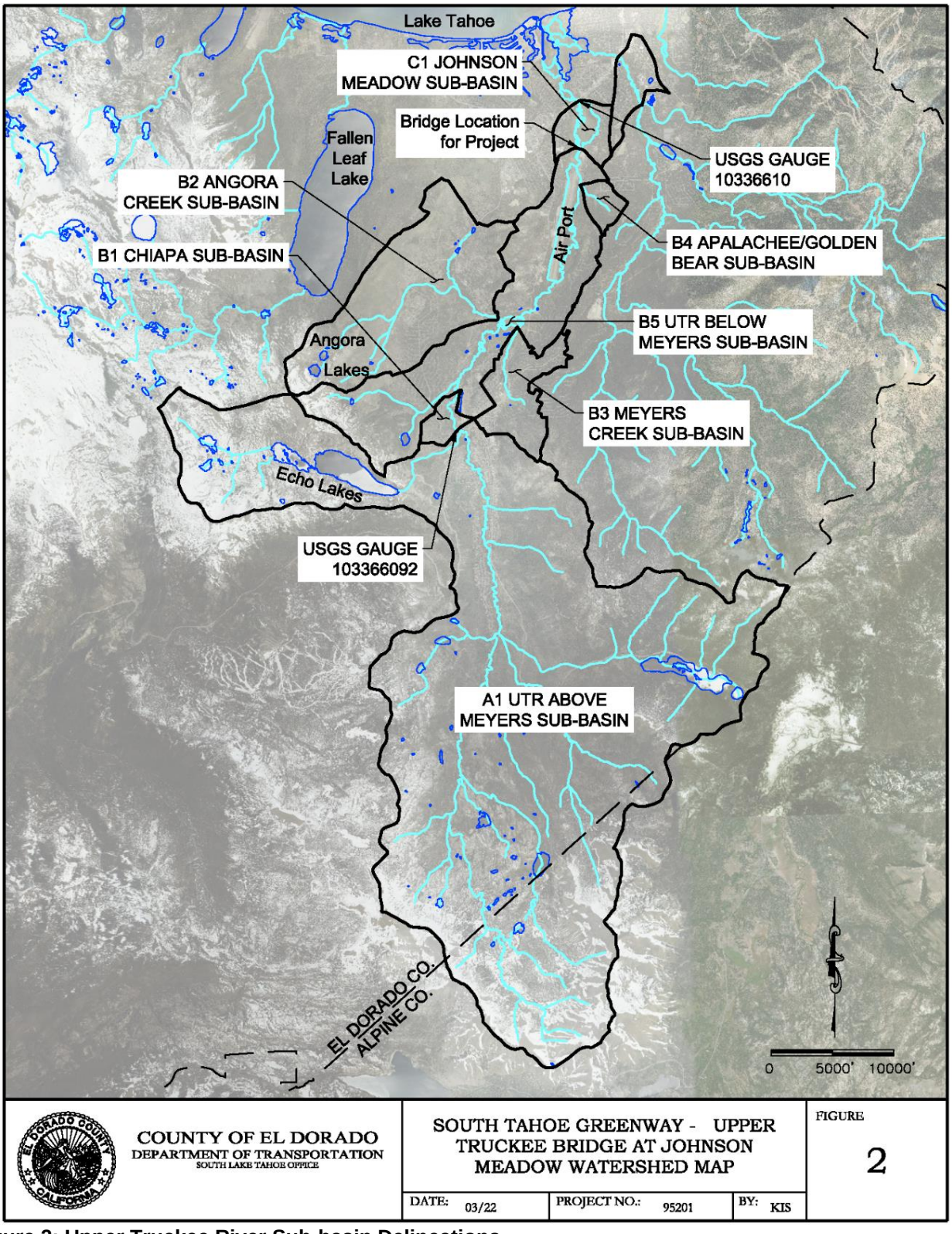


Figure 2: Upper Truckee River Sub-basin Delineations

Table 1: Hydrologic Model Summary Parameters for shared use bridge at Upper Truckee

Parameters	**Upper Truckee Crossing**						
Sub-basin	**A1**	**B1**	**B2**	**B3**	**B4**	**B5**	**C1**
Watershed Area (mi^2)	39.1	0.36	5.64	1.25	0.35	6.39	0.68
Loss Rate	-	SCS CN	SCS CN	SCS CN	SCS CN	SCS CN	SCS CN
Transform method	Log Pearson	SCS UH	SCS UH	SCS UH	SCS UH	SCS UH	SCS UH
Loss Rates							
Initial Abstraction (in)	-	4.67	3.24	3.49	4.24	2.65	4.51
Curve Number	-	30	38	36	32	43	31
Impervious Area (%)	-	7.54	4.94	14.89	4.84	9.18	11.28
Transformation							
Graph Type	-	Standard	Standard	Standard	Standard	Standard	Standard
Time of Concentration (min)	-	47.7	87.5	236.9	100.9	220.0	171.9
Lag Time (min)	-	28.6	52.5	142.1	60.6	132.0	103.1
Precipitation							
Hydrograph Duration	-	24 hour	24 hour	24 hour	24 hour	24 hour	24 hour
Temporal Distribution	-	Type 1A	Type 1A	Type 1A	Type 1A	Type 1A	Type 1A
Mean Annual Precipitation (in)	-	38	35	28	18	30	18
100-year precipitation (in/day)	-	6.94	6.39	5.11	3.29	5.48	3.29
50-year precipitation (in/day)	-	6.36	5.86	4.69	3.01	5.02	3.01
25-year precipitation (in/day)	-	5.76	5.30	4.24	2.73	4.55	2.73
10-year precipitation (in/day)	-	4.91	4.52	3.62	2.33	3.88	2.33

5.2. Land Use/Hydrologic Soil Type/Curve Number

Land use was determined using the Natural Resource Conservation Service (NRCS) web soil survey which indicates that the watershed partially consists of steep mountainsides, areas of less steep land that occur in riparian corridors, and meadows along with residential areas in the less steep land. The majority of the soils are Meeks gravelly and loamy coarse sand, Celio loamy coarse sand, and Tahoe complex. Weighted SCS curve numbers were used in the model and chosen from "runoff curve numbers for other agricultural lands". Appendix A provides the watershed hydrologic soil group data.

5.3. Peak Discharges

Peak discharges were analyzed using HEC-HMS. Appendix B provides the peak flow hydrographs developed from the HEC-HMS models for 10-year, 25-year, 50-year, and 100-year and peak flows. A combination of peak flows from HEC-HMS and from a frequency analysis of the US 50 USGS gauge data were combined to generate peak flows for input into the HEC-RAS model. Using the combined flows is a conservative approach with the assumption that peak flows from the gauged watershed (UTR Above Meyers Sub-basin) are present at the beginning of the modeled storms.

FEMA establishes Base Flood Elevations (BFEs) to identify areas at high risk of flooding. BFEs represent the height at which floodwaters are expected to rise during a base flood, which is typically a flood with a 1% annual chance of occurring, also known as a 100-year flood. These elevations are determined through detailed hydrologic and hydraulic analyses of historical flood data, topographic surveys, and watershed characteristics. In contrast, site-specific calculated elevations using hydrologic analysis take into account more localized factors such as gauge data. changes in land use, and specific rainfall-runoff relationships. While BFEs provide a standardized reference for floodplain management and insurance purposes, calculated elevations offer a tailored assessment that can reflect current conditions more accurately, potentially

revealing discrepancies between FEMA's broader estimations and the actual flood risk for a specific property or region. Therefore, the County assumes the FEMA calculated BFE is very conservative and will utilize this information as a basis for the proposed bridge design elevation. The County's calculated water surface elevations shown in the hydrologic analysis will be used for modeling potential scour at the bridge foundation and elevated boardwalk supports.

Table 2 below lists the HEC-HMS peak discharge data based on hydrologic model parameters listed in Table 1.

Table 2: Hydrograph Analysis Summary of Results

Upper Truckee River Crossing

HEC-HMS Node Location	Sub-basin Area (mi^2)	Cumulative Sub-basin Area (mi^2)	10-yr Peak Flow (cfs)	25-yr Peak Flow (cfs)	50-yr Peak Flow (cfs)	100-yr Peak Flow (cfs)
UTR Above Meyers[1]	*39.3*		*2104*	*3123*	*4054*	*5149*
Chiapa	0.36		16.1	18.8	20.8	22.7
Angora Creek	5.6		120.2	141.0	155.9	171.4
Meyers Creek	1.3		42.3	49.6	54.9	59.8
Apalachee/ Golden Bear	0.35		3.6	4.2	4.6	5.0
UTR Below Meyers	6.4		147.7	173.2	191.8	216.4
New Bridge[2,3]		53.2	2416.8	3489.7	4459.3	5594.9
Johnson Meadow	0.7		12.6	14.7	16.2	17.7
Combined Flows[3]		53.9	2428.6	3503.6	4474.6	5611.7
US 50 Gauge SLT[4]		53.9	2072	3155	4182	5428
FEMA[9]			2347		5389	7376

1. USGS Gauge US 50 Meyers (USGS1033666092)
2. Flows at new bridge crossing were based on modeled peak flows for the delineated watersheds combined with gauge flows at US 50 in Meyers (USGS103366092).
3. Combined flows are a result of Combined Time Series Flows and may not necessarily be a numerical sum of the individual watershed flows because the peak may not all arrive at the same time.
4. USGS Gauge US 50 Meyers (USGS103366610) to compare modeled results to gauge measurements. Peak frequency was determined using USGS PeakFQ software (Appendix C).

5.4. Model Reasonableness

There are two stream gauges that were used in this evaluation. One at the US 50 bridge in Meyers (USGS103366092) where data has been recorded from 1990 to present day. During this time, the maximum observed peak flow reached 5120 cfs on January 2, 1997, and the other one at the US 50 bridge in South Lake Tahoe (USGS10336610) where data has been recorded from 1972 to present day. During this time, the maximum observed peak flow reached 5480 cfs on January 2, 1997. Flood frequency curves for the data available from the gauges can be found in Appendix C. The frequency curves were generated from this data set using PeakFQ software, version 7.2, developed by the United States Geological Survey[10]. As a conservative approach the results from PeakFQ at the gauge in Meyers were added to the peak flows generated from the HEC-HMS model, at the specified recurrence intervals, to solve for peak flows at the new bridge

crossing. As a check, the results from PeakFQ at the gauge in South Lake Tahoe were compared to the results of the HEC-HMS model at the specified recurrence intervals.

Appendix A: HEC-HMS Model Parameters

Appendix B: HEC-HMS Results

Appendix C: Flood Frequency Curve for US 50 Bridges at Meyers and at South Lake Tahoe

6. References

[1] County of El Dorado (March 1995), *Drainage Manual*.

[2] Caltrans (July 2006), *Local Assistance Procedure Manual Sixth Edition*, Page 11-18 and 11-19.

[3] Caltrans (December 2020), *Highway Design Manual Sixth Edition*, Page 820-2.

[4] https://waterdata.usgs.gov/ca/nwis/inventory/?site_no=103366092&agency_cd=USGS.

[5] https://waterdata.usgs.gov/ca/nwis/inventory/?site_no=10336610.

[6] FEMA Flood Control Maps. Available at https://msc.fema.gov/portal/home.

[7] FEMA (Revised April 2012) Flood Insurance Study, El Dorado County, California and Incorporated Areas

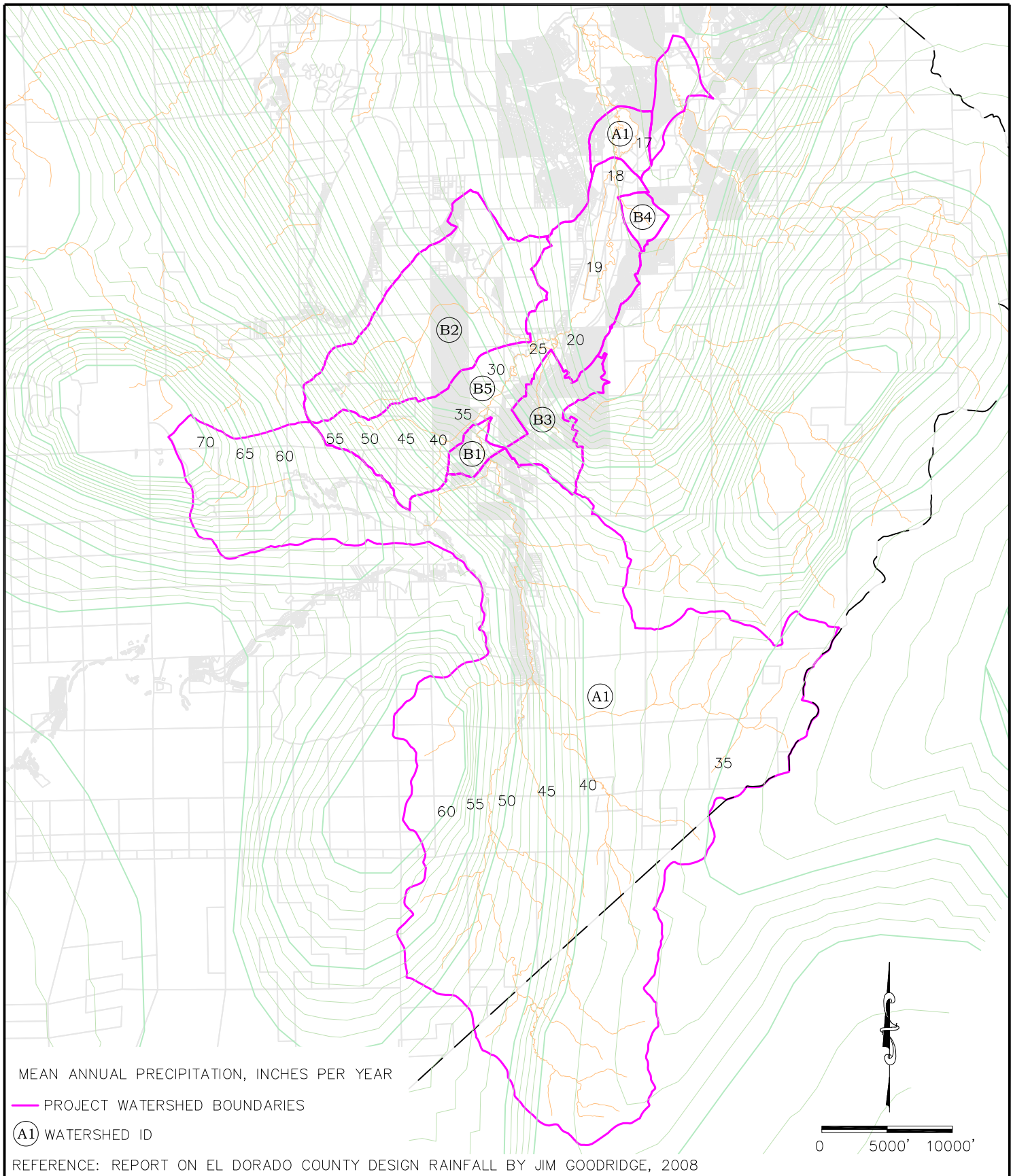
[8] USACE (August 2016), Hydrologic Engineering Center-Hydrologic Modeling System version 4.2.

[9] FEMA (2012), Flood Insurance Study, El Dorado County, Page 12.

[10] USGS (March 2018), PeakFQ – Annual Flood-Frequency Analysis Using Bulleting 17B Guidelines. Version 7.2.

Appendix A

HEC- HMS Parameters



REFERENCE: REPORT ON EL DORADO COUNTY DESIGN RAINFALL BY JIM GOODRIDGE, 2008

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION
SOUTH LAKE TAHOE OFFICE

SOUTH TAHOE GREENWAY - UPPER TRUCKEE BRIDGE AT JOHNSON MEADOW MEAN ANNUAL RAINFALL MAP

FIGURE 1

DATE:	PROJECT NO.:	BY:
03/22	95201	KIS

Table A-1 Depth Duration Frequendcy (2008 Goodridge Tables)

24 Hour SCS Storm Type 1A

	2 YR	**10 YR**	**25 YR**	**50 YR**	**100 YR**
MAP	1 day	1 day	1 day	1 day	1 day
16	1.30	2.07	2.42	2.68	2.92
18	1.47	2.33	2.73	3.01	3.29
20	1.63	2.58	3.03	3.35	3.65
22	1.79	2.84	3.33	3.68	4.02
24	1.95	3.10	3.64	4.02	4.38
26	2.12	3.36	3.94	4.35	4.75
28	2.28	6.62	4.24	4.69	5.11
30	2.44	3.88	4.55	5.02	5.48
35	2.85	4.52	5.30	5.86	6.39
38	3.10	4.91	5.76	6.36	6.94
40	3.26	5.17	6.06	6.70	7.31
45	3.67	5.81	6.82	7.53	8.22
50	4.07	6.46	7.58	8.37	9.13

UTR Above Meyers Sub-basin: Average MAP 45"
Chiapa Sub-basin: Average MAP 38"
Angora Creek Sub-basin: Average MAP 35"
Meyers Creek Sub-basin: Average MAP 28"
Apalachee/Golden Bear Sub-basin: Average MAP 18"
UTR Below Meyers Sub-basin: Average MAP 30"
Johnson Meadow Sub-basin: Average MAP 18"

Time of Concentration and Lag Time

B1 Chiapa

Longest flowpath for watershed

	Overland Sheet Flow					Shallow Unpaved[2]						Channel Flow[3]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length (ft)	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
CHIAPA	300	3.1	21.52%	0.4	20.3	3117	Varies	Varies	Varies	Varies	12.4	Varies	2946	Varies	9.0	47.7	**28.6**

1. Plus 6 minutes per TR-55 for watersheds that are not already concentrated (have Overland Sheet Flow Component).
2. Shallow Unpaved travel time based on multiple lengths at differing slopes (below).
3. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Shallow Unpaved						Channel Flow			
Length	High	Low	Slope	Velocity	Tt(min)	X-Section	Length	Velocity	Tt(min)
2284	6623.16	6323.45	13.12%	5.84	6.5	Q	1520	3.9	6.5
833	6323.45	6305.63	2.14%	2.36	5.9	P (Partial)	1426	9.4	2.5

B1 Chiapa

Flowpath coming from A1 (UTR Above Meyers)

	Overland Sheet Flow					Shallow Unpaved						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
CHIAPA				0.4	0.0						0.0	Varies	4246	Varies	11.1	11.1	**6.7**

1. 6 minutes not added for flows that are alrady conentrated (no Overland Sheet Flow).
2. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Channel Flow			
X-Section	Length	Velocity	Tt(min)
R (Partial)	1300	10.4	2.1
Q	1520	3.9	6.5
P (Partial)	1426	9.4	2.5

Average Mean Annual Precipitation (MAP) for watershed, in inches per year: 38

B2 Angora Creek

Longest flowpath for watershed

	Overland Sheet Flow					Shallow Unpaved[2]						Channel Flow[3]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
Angora Creek	300	2.85	68.99%	0.4	13.3	11776	Varies	Varies	Varies	Varies	32.7	Varies	10841	Varies	35.5	87.5	**52.5**

1. Plus 6 minutes per TR-55 for watersheds that are not already concentrated (have Overland Sheet Flow Component).
2. Shallow Unpaved travel time based on multiple lengths at differing slopes (below).
3. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Shallow Unpaved						Channel Flow			
Length	High	Low	Slope	Velocity	Tt(min)	X-Section	Length	Velocity	Tt(min)
2064	8604.07	7444.99	56.16%	12.09	2.8	I	1130	10.0	1.9
9712	7444.99	6350.19	11.27%	5.42	29.9	H	690	4.1	2.8
						G	1160	5.5	3.5
						F	1290	10.1	2.1
						E	1660	8.2	3.4
						D	1200	8.2	2.4
						C	1140	3.7	5.1
						B	1300	2.4	9.0
						A (Partial)	1271	4.1	5.2

Average Mean Annual Precipitation (MAP) for watershed, in inches per year: 35

B3 Meyers Creek

Longest flowpath for watershed

	Overland Sheet Flow					Shallow Unpaved						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	Legnth (ft)	High Elev (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
Meyers Creek	NA*	2.28	NA*	0.4	202.7	2563	6290.61	6267.94	0.88%	1.52	28.2				0.0	236.9	**142.1**

* Note: This Tt number was gotten from a detailed watershed analysis for Meyers ECP (95179) and includes overland flow and shallow unpaved flows. It is only to Country Club Dr. and the remaining distance to the end of the watershed for this project is shown in the Shallow Unpaved section above.

1. Plus 6 minutes per TR-55 for watersheds that are not already concentrated (have Overland Sheet Flow Component).

Average Mean Annual Precipitation (MAP) for watershed, in inches per year: 28

B4 Apalachee/Golden Bear

Longest flowpath for watershed

	Overland Sheet Flow					Shallow Unpaved						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	Legnth (ft)	High Elev (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
Apalachee/ Golden Bear	300	1.47	3.03%	0.4	64.6	5421					30.3				0.0	100.9	**60.6**

1. Plus 6 minutes per TR-55 for watersheds that are not already concentrated (have Overland Sheet Flow Component).
2. Shallow Unpaved travel time based on multiple lengths at differing slopes (below).

Shallow Unpaved					
Length	High	Low	Slope	Velocity	Tt(min)
536	6481.04	6469.53	2.15%	2.36	3.8
1094	6469.53	6357.07	10.28%	5.17	3.5
3791	6357.07	6247.24	2.90%	2.75	23.0

Average Mean Annual Precipitation (MAP) for watershed, in inches per year: 18

B5 UTR Below Meyers

Longest flowpath for watershed

	Overland Sheet Flow					Shallow Unpaved[2]						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length Total (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
UTR Below Meyers	300	2.44	23.98%	0.4	21.9	15620					59.1	Varies	31331	Varies	133.0	220.0	**132.0**

1. Plus 6 minutes per TR-55 for watersheds that are not already concentrated (have Overland Sheet Flow Component).
2. Shallow Unpaved travel time based on multiple lengths at differing slopes (below).
3. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Shallow Unpaved					
Length	High	Low	Slope	Velocity	Tt(min)
557	8821.57	8720.00	18.24%	6.89	1.3
7175	8720.00	6559.79	30.11%	8.85	13.5
7888	6557.51	6289.48	3.40%	2.97	44.2

Channel Flow			
X-Section	Length	Velocity	Tt(min)
O (Partial)	2793	6.2	7.5
N	4050	6.1	11.1
M	2010	5.5	6.1
L	3990	2.8	23.8
K	2310	3.9	9.9
J	2260	5.2	7.2
I	1640	4.0	6.8
H	5290	2.8	31.5
G	1516	3.0	8.4
F	2591	4.7	9.2
E	2725	4.3	10.6
D (Partial)	156	2.7	1.0

B5 UTR Below Meyers

Flowpath coming from B1 (Chiapa)

	Overland Sheet Flow					Shallow Unpaved						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length Total (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
UTR Below Meyers				0.4	0.0						0.0	Varies	32632	Varies	135.3	135.3	**81.2**

1. 6 minutes not added for flows that are alrady conentrated (no Overland Sheet Flow).
2. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Channel Flow			
X-Section	Length	Velocity	Tt(min)
P (Partial)	1254	9.4	2.2
O	2840	6.2	7.6
N	4050	6.1	11.1
M	2010	5.5	6.1
L	3990	2.8	23.8
K	2310	3.9	9.9
J	2260	5.2	7.2
I	1640	4.0	6.8
H	5290	2.8	31.5
G	1516	3.0	8.4
F	2591	4.7	9.2
E	2725	4.3	10.6
D (Partial)	156	2.7	1.0

B5 UTR Below Meyers

Flowpath coming from B2 (Angoa Creek)

	Overland Sheet Flow					Shallow Unpaved						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length Total (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
UTR Below Meyers				0.4	0.0						0.0	Varies	24405	Varies	114.3	114.3	**68.6**

1. 6 minutes not added for flows that are alrady conentrated (no Overland Sheet Flow).
2. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Channel Flow			
X-Section	Length	Velocity	Tt(min)
A (AC Partial)	159	4.1	0.6
M (UTR Partial)	1768	5.5	5.4
L (UTR)	3990	2.8	23.8
K (UTR)	2310	3.9	9.9
J (UTR)	2260	5.2	7.2
I (UTR)	1640	4.0	6.8
H (UTR)	5290	2.8	31.5
G (UTR)	1516	3.0	8.4
F (UTR)	2591	4.7	9.2
E (UTR)	2725	4.3	10.6
D (UTR Partial)	156	2.7	1.0

B5 UTR Below Meyers

Flowpath coming from B3 (Meyers Creek)

	Overland Sheet Flow					Shallow Unpaved						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length Total (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
UTR Below Meyers				0.4	0.0						0.0	Varies	22016	Varies	105.6	105.6	**63.3**

1. 6 minutes not added for flows that are alrady conentrated (no Overland Sheet Flow).
2. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Channel Flow			
X-Section	Length	Velocity	Tt(min)
L (Partial)	3528	2.8	21.0
K	2310	3.9	9.9
J	2260	5.2	7.2
I	1640	4.0	6.8
H	5290	2.8	31.5
G	1516	3.0	8.4
F	2591	4.7	9.2
E	2725	4.3	10.6
D (Partial)	156	2.7	1.0

B5 UTR Below Meyers

Flowpath coming from B4 (Apalachee/Golden Bear)

	Overland Sheet Flow					Shallow Unpaved						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length Total (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
UTR Below Meyers				0.4	0.0						0.0	Varies	3411	Varies	13.4	13.4	**8.0**

1. 6 minutes not added for flows that are alrady conentrated (no Overland Sheet Flow).
2. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Channel Flow			
X-Section	Length	Velocity	Tt(min)
F (Partial)	530	4.7	1.9
E	2725	4.3	10.6
D (Partial)	156	2.7	1.0

Average Mean Annual Precipitation (MAP) for watershed, in inches per year: 30

C1 Johnson Meadow

Longest flowpath for watershed

	Overland Sheet Flow					Shallow Unpaved[2]						Channel Flow[3]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length Total (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
Johnson Meadow	300	1.47	1.85%	0.4	78.7	2995					15.8	Varies	3932	Varies	71.4	171.9	**103.1**

1. Plus 6 minutes per TR-55 for watersheds that are not already concentrated (have Overland Sheet Flow Component).
2. Shallow Unpaved travel time based on multiple lengths at differing slopes (below).
3. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Shallow Unpaved						Channel Flow			
Length	High	Low	Slope	Velocity	Tt(min)	X-Section	Length	Velocity	Tt(min)
903	6378.79	6301.56	8.55%	4.72	3.2	D (Partial)	1752	2.7	10.8
2092	6301.56	6240.14	2.94%	2.76	12.6	C (Partial)	2180	0.6	60.6

C1 Johnson Meadow

Flowpath coming from B5 (UTR Below Meyers)

	Overland Sheet Flow					Shallow Unpaved						Channel Flow[2]				Total Time (min)	
Sub watershed	Sheet Flow Length	P2 (in)[1]	Slope (%)	n	Tt (min)	Length	High Elev (ft)	Low Elev (ft)	Slope (%)	Velocity ft/s)	Tt (min)	X-Section (FIRM)	Length Total (ft)	Velocity ft/s)	Tt (min)	Tc (min)[1]	Lag Time (min)
UTR Below Meyers				0.4	0.0						0.0	Varies	6230	Varies	85.6	85.6	**51.3**

1. 6 minutes not added for flows that are alrady conentrated (no Overland Sheet Flow).
2. Channel travel time based on multiple lengths at different velocities (below) from FEMA calculations for Mean Velocity between crossections shown on FIRMs.

Channel Flow			
X-Section	Length	Velocity	Tt(min)
C (Partial)	2180	0.6	60.6
D (Partial)	4050	2.7	25.0

Average Mean Annual Precipitation (MAP) for watershed, in inches per year: 18

Table 2-2c Runoff curve numbers for other agricultural lands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2/]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3/]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4/]	48	65	73
Woods—grass combination (orchard or tree farm). [5/]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6/]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4/]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.
2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.
3 *Poor*: <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.
4 Actual curve number is less than 30; use CN = 30 for runoff computations.
5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.
6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Assumed Woods, Good for all watersheds. Soil type A-D is based on results of the 2008 NRCS Soil Survey for the Tahoe Basin

Soils

B1	MUSYM	Soil Group	CN	Soil Area (SF)		
	7031	None Assigned[1]	30	606458		
	7042	A/D[2]	30	971769		
	7431	A/D[2]	30	2111530		
	7462	A	30	697500		
	7481	A	30	160971		
	7482	A	30	3487972		
	7484	A	30	619013		
	7487	A	30	1017118		
	7488	A	30	232895		
					Total Area=	9905226
					Weighted CN=	30.00

[1] Description is Pits and Dumps. Minimum CN (30) used.

[2] Reflects drained vs undrained conditions. For simplicity assumed drained conditions

B2	MUSYM	Soil Group	CN	Soil Area (SF)
	7041	C/D[1]	70	2961980
	7071	A/D[1]	30	3778471
	7231	B	50	332525
	7232	B	50	556349
	7411	B	50	14644672
	7412	B	50	7352225
	7413	B	50	4282539
	7421	A	30	857155
	7422	A	30	1872869
	7431	A/D[1]	30	8608810
	7444	A	30	2247833
	7451	A	30	111366
	7452	A	30	54791
	7461	A	30	11990325
	7462	A	30	5654130
	7482	A	30	2637363
	7483	A	30	5681531
	7484	A	30	4820847
	7485	A	30	11201832
	7486	A	30	2784323
	7487	A	30	14272661
	7488	A	30	2896461
	7489	A	30	5753276
	7500	None Assigned[2]	98	108133
	7501	D	77	29235
	7502	D	77	8167070
	7521	A	30	5227368
	7522	A	30	8963197
	7523	A	30	12425337
	7525	A	30	2618338

	7531	D	77	1556514		
	7532	D	77	994742		
	9443	D	77	721941		
	W	None Assigned[3]	100	1033288		
					TOTAL AREA=	157199497
					Weighted CN=	38.15

[1]Reflects drained vs undrained conditions. For simplicity assumed drained conditions

[2]Description is rock outrop. CN for impervious pavement used.

[3]Body of water CN 100

B3	MUSYM	Soil Group	CN	Soil Area (SF)		
	7041	C/D[1]	70	2047577		
	7412	B	50	729109		
	7413	B	50	1726357		
	7414	B	50	39363		
	7422	A	30	2054720		
	7423	A	30	1915399		
	7431	A/D[1]	30	4709831		
	7441	A	30	1097339		
	7442	A	30	4822600		
	7443	A	30	3322698		
	7451	A	30	371383		
	7461	A	30	2746424		
	7462	A	30	5793512		
	7481	A	30	5545674		
	7484	A	30	565184		
	7485	A	30	255901		
	7491	D	77	2673741		
	7531	D	77	69185		
					TOTAL AREA=	40485997
					Weighted CN=	36.44

[1]Reflects drained vs undrained conditions. For simplicity assumed drained conditions

B4	MUSYM	Soil Group	CN	Soil Area (SF)		
	7031	None Assigned[1]	30	1181763		
	7043	A/D[2]	30	850867		
	7441	A	30	603473		
	7442	A	30	2746007		
	7451	A	30	319042		
	7452	A	30	530184		
	7461	A	30	2106315		
	7462	A	30	439225		
	7541	B	50	1006462		
					TOTAL AREA=	9783338
					Weighted CN=	32.06

[1]Description is Pits and Dumps. Minimum CN (30) used.

[2]Reflects drained vs undrained conditions. For simplicity assumed drained conditions

B5	MUSYM	Soil Group	CN	Soil Area (SF)
	7031	None Assigned[1]	30	3636873
	7041	C/D[2]	70	8174124
	7042	A/D[2]	30	1302583
	7043	A/D[2]	30	3339169
	7061	None Assigned[3]	98	6301300
	7071	A/D[2]	30	945384
	7411	B	50	1822774
	7412	B	50	9623568
	7413	B	50	3541505
	7422	A	30	1274392
	7431	A/D[2]	30	24410616
	7441	A	30	3071810
	7442	A	30	10635136
	7444	A	30	1037205
	7451	A	30	3235584
	7452	A	30	395319
	7461	A	30	9390057
	7462	A	30	1606127
	7471	A/D[2]	30	1613567
	7481	A	30	2539921
	7482	A	30	8494860
	7483	A	30	11015731
	7484	A	30	2818489
	7485	A	30	3426868
	7486	A	30	560717
	7487	A	30	2364555
	7488	A	30	2923505
	7489	A	30	12204529
	7491	D	77	13853
	7492	D	77	296276
	7500	None Assigned[4]	98	449595
	7501	D	77	565849
	7502	D	77	12150177
	7531	D	77	1483030
	7532	D	77	3386804
	7541	B	50	14605552
	W	None Assigned[5]	100	1033980
				TOTAL AREA= 175691384
				Weighted CN= 43.04

[1]Description is Pits and Dumps. Minimum CN (30) used.

[2]Reflects drained vs undrained conditions. For simplicity assumed drained conditions

[3]Description is Urban Land. Area is Airport runway so used CN for impervious pavement.

[4]Description is rock outrop. CN for impervious pavement used.

[5]Body of water CN 100

C1	MUSYM	Soil Group	CN	Soil Area (SF)		
	7031	None Assigned[1]	30	61035		
	7041	C/D[2]	70	27320		
	7043	A/D[2]	30	7164300		
	7071	A/D[2]	30	656234		
	7441	A	30	2236097		
	7442	A	30	426597		
	7444	A	30	5480166		
	7461	A	30	1441283		
	7462	A	30	252304		
	7471	A/D[2]	30	560674		
	7541	B	50	620266		
					TOTAL AREA=	18926276
					Weighted CN=	30.71

[1]Description is Pits and Dumps. Minimum CN (30) used.

[2]Reflects drained vs undrained conditions. For simplicity assumed drained conditions

Johnson Meadow H&H Input Numbers

WS ID	Area (SF)	Area (acre)	Description
A1	1094273898	25121.07	(UTR Above Meyers). Total Upper Truckee River watershed before gauge at Hwy 50 crossing in Meyers (USGS103366092).
B1	9905226	227.39	(Chiapa). Contribution to Upper Truckee River watershed after gauge at Hwy 50 crossing in Meyers at new bridge at Tahoe Paradise Park for San Bernardino Project.
B2	157199495	3608.80	Angora Creek watershed
B3	34864144	800.37	Meyers Creek watershed
B4	9783338	224.59	(Apalachee/Golden Bear). Tributary watershed between Apalachee and Golden Bear neighborhoods
B5	178239942	4091.83	(UTR Below Meyers). Main Upper Truckee River watershed after gauge at Hwy 50 crossing in Meyers at new bridge for this project. Excludes all tributary watersheds.
C1	18926278	434.49	(Johnson Meadow). Upper Truckee River watershed after new bridge for this project before gauge at HWY 50 crossing in South Lake Tahoe (USGS10336610).
C2	19843803	455.55	(Trout Creek). Includes portion of path adjacent to Barbara Ave. Will be re-delineated once design identifies points of interest.

Impervious

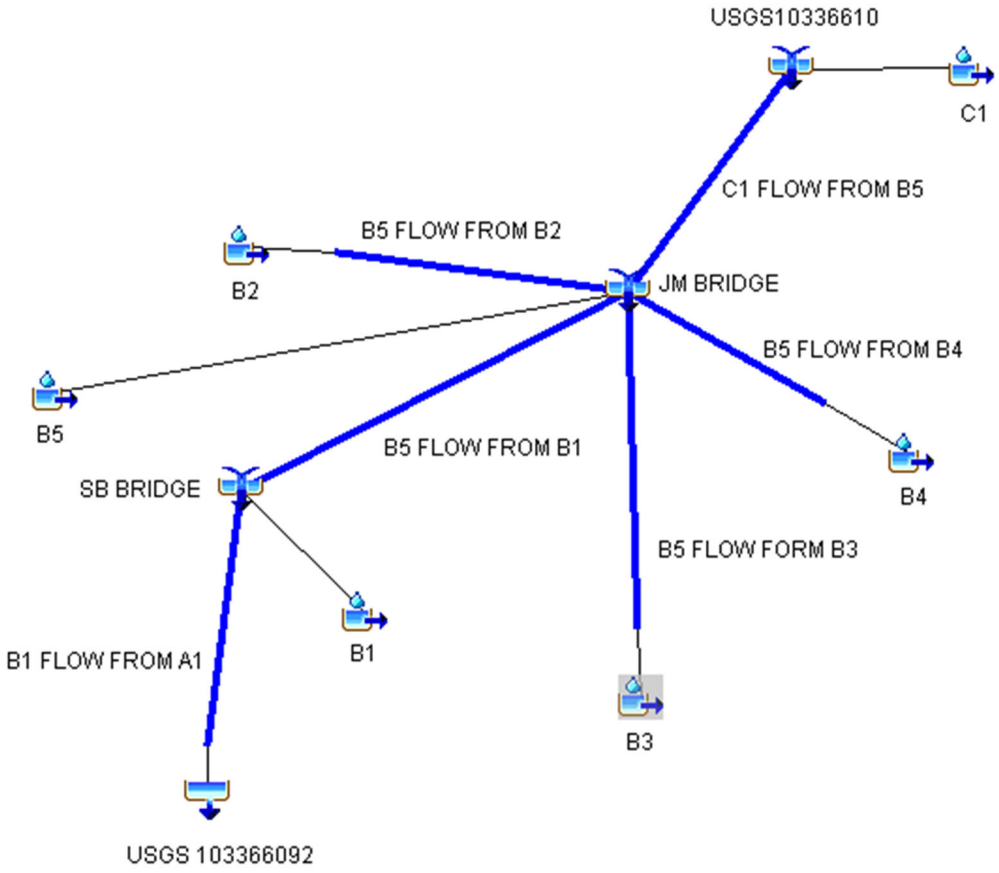
WS ID	Imp Area (sf)	Imp Area (acre)	% Impervious
A1	12693709	291.41	1.16%
B1	746716	17.14	7.54%
B2	7763713	178.23	4.94%
B3	5190896	119.17	14.89%
B4	473127	10.86	4.84%
B5	16360367	375.58	9.18%
C1	2134028	48.99	11.28%
C2	3867230	88.78	19.49%

Appendix B

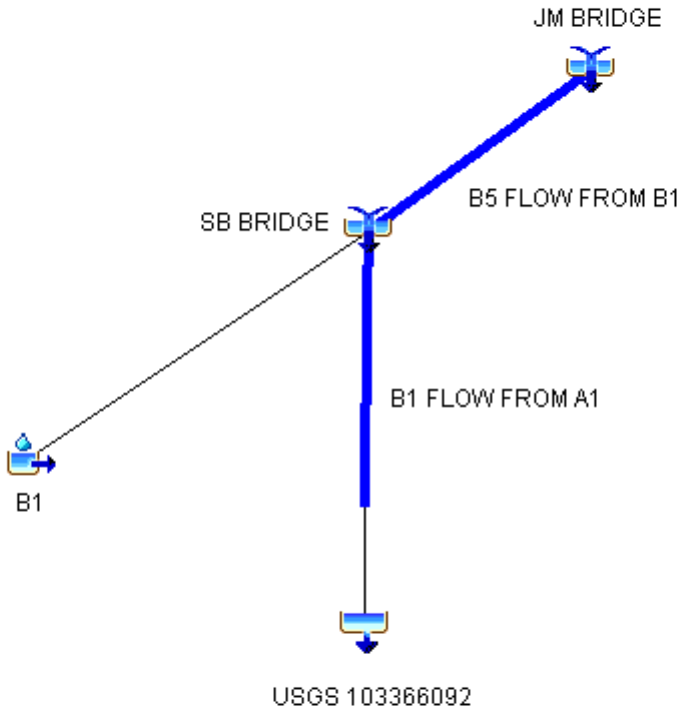
HEC- HMS Results

HEC-HMS Layout.

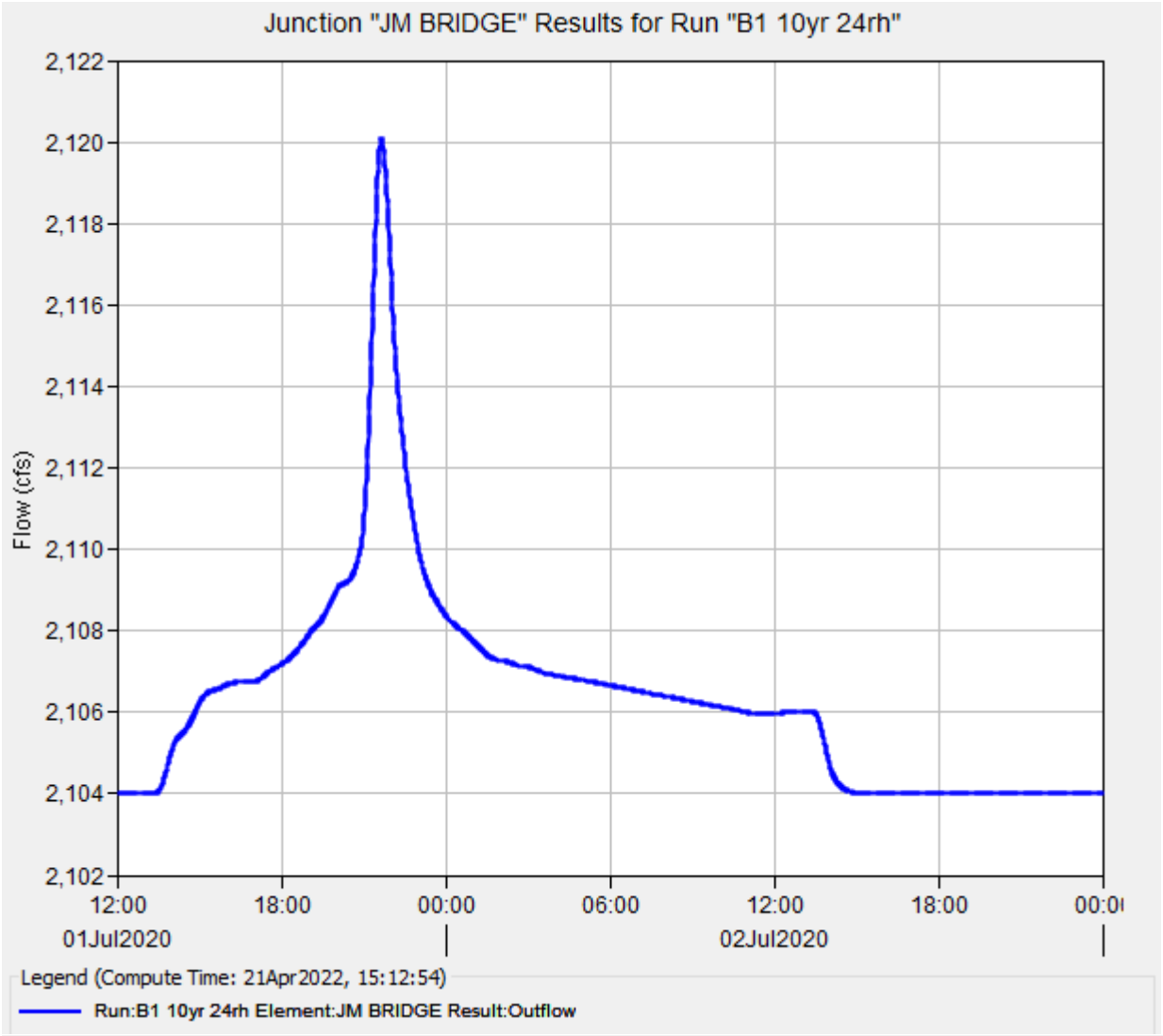
Note that the following results are reported for the contributions from the individual watersheds. This was done so that each watershed could use different Mean Annual Rainfall information. The watershed area is so expansive that it would be overly simplified if the same Mean Annual Rainfall information was applied to the entire model. The individual results were obtained from HEC-HMS and the time-series values were combined to obtain the final results.



B1 Layout. (Done Individually to apply 38” Mean Annual Rainfall numbers).



HEC-HMS B1 Results.



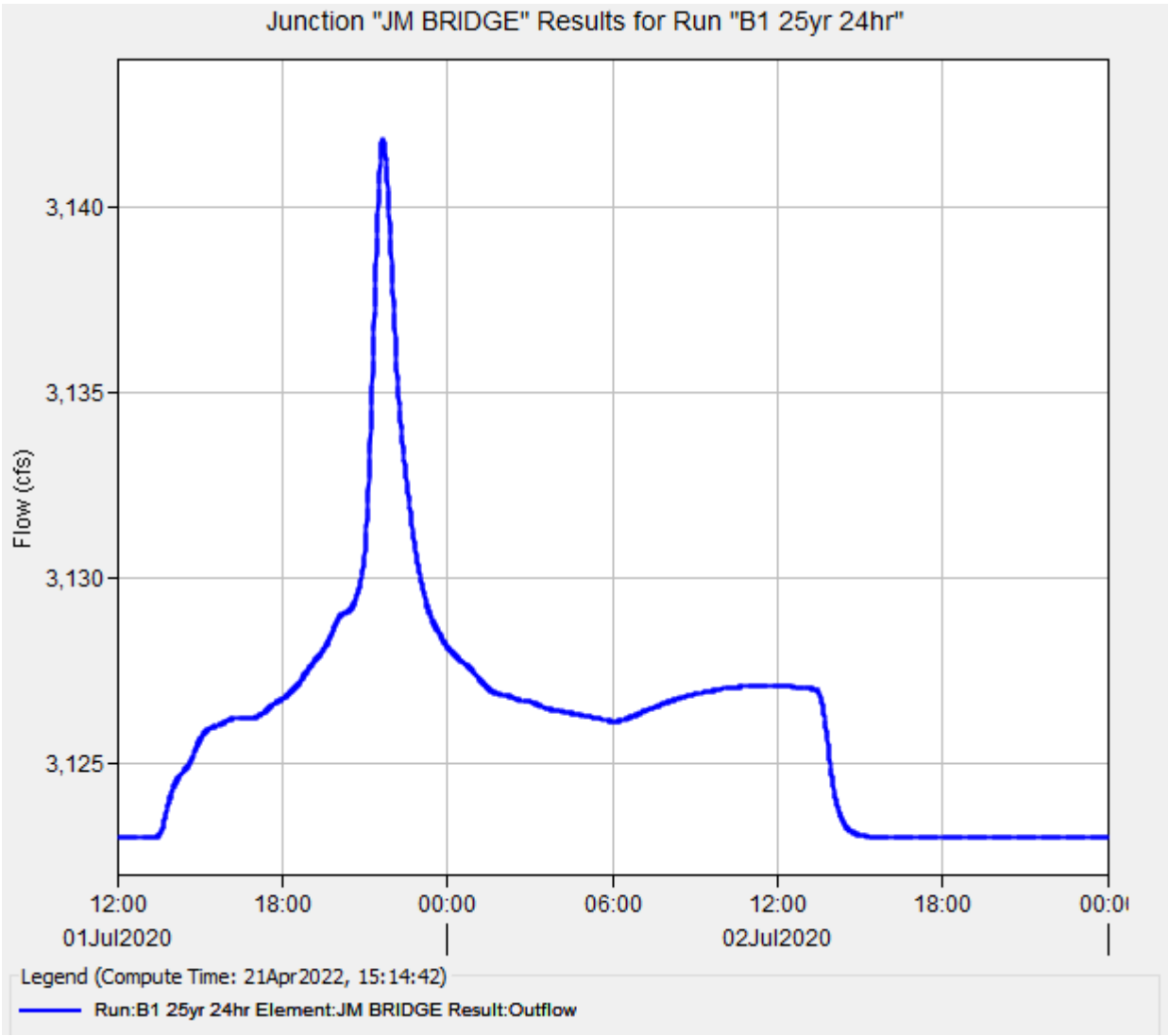
Project: JM_EWS Simulation Run: B1 10yr 24rh

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:12:54

Basin Model: B1 (38in)-Q10
Meteorologic Model: 10 YR 24 HR 38 IN
Control Specifications: 24 Hour

Show Elements: All Elements | Volume Units: IN / AC-FT | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
SB BRIDGE	39.66	2120.1	01Jul2020, 20:18	6267.0
USGS 103366092	39.30	2104.0	01Jul2020, 12:00	6259.8
B1 FROM USGS GUAGE	39.30	2104.0	01Jul2020, 12:00	6259.8
B1	0.36	16.1	01Jul2020, 20:18	7.2
B5 FROM B1	39.66	2120.1	01Jul2020, 21:39	6267.0
JM BRIDGE	39.66	2120.1	01Jul2020, 21:39	6267.0



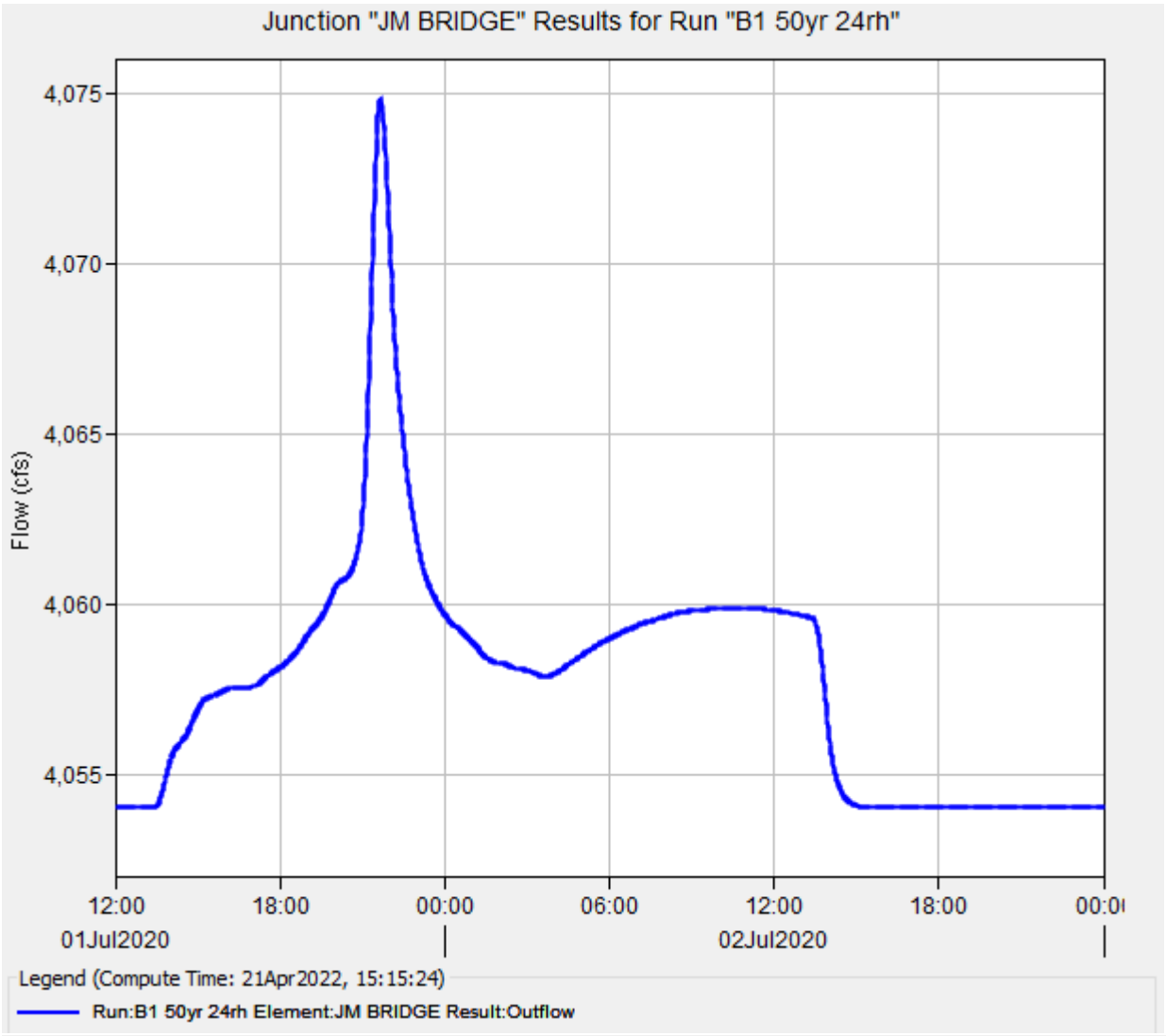
Project: JM_EWS Simulation Run: B1 25yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:14:42

Basin Model: B1 (38in)-Q25
Meteorologic Model: 25 YR 24 HR 38 IN
Control Specifications: 24 Hour

Show Elements: All Elements | Volume Units: IN / AC-FT | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B1 FROM USGS GUAGE	39.30	3123.0	01Jul2020, 12:00	9291.6
B1	0.36	18.8	01Jul2020, 20:18	9.2
JM BRIDGE	39.66	3141.8	01Jul2020, 21:39	9300.8
USGS 103366092	39.30	3123.0	01Jul2020, 12:00	9291.6
SB BRIDGE	39.66	3141.8	01Jul2020, 20:18	9300.8
B5 FROM B1	39.66	3141.8	01Jul2020, 21:39	9300.8



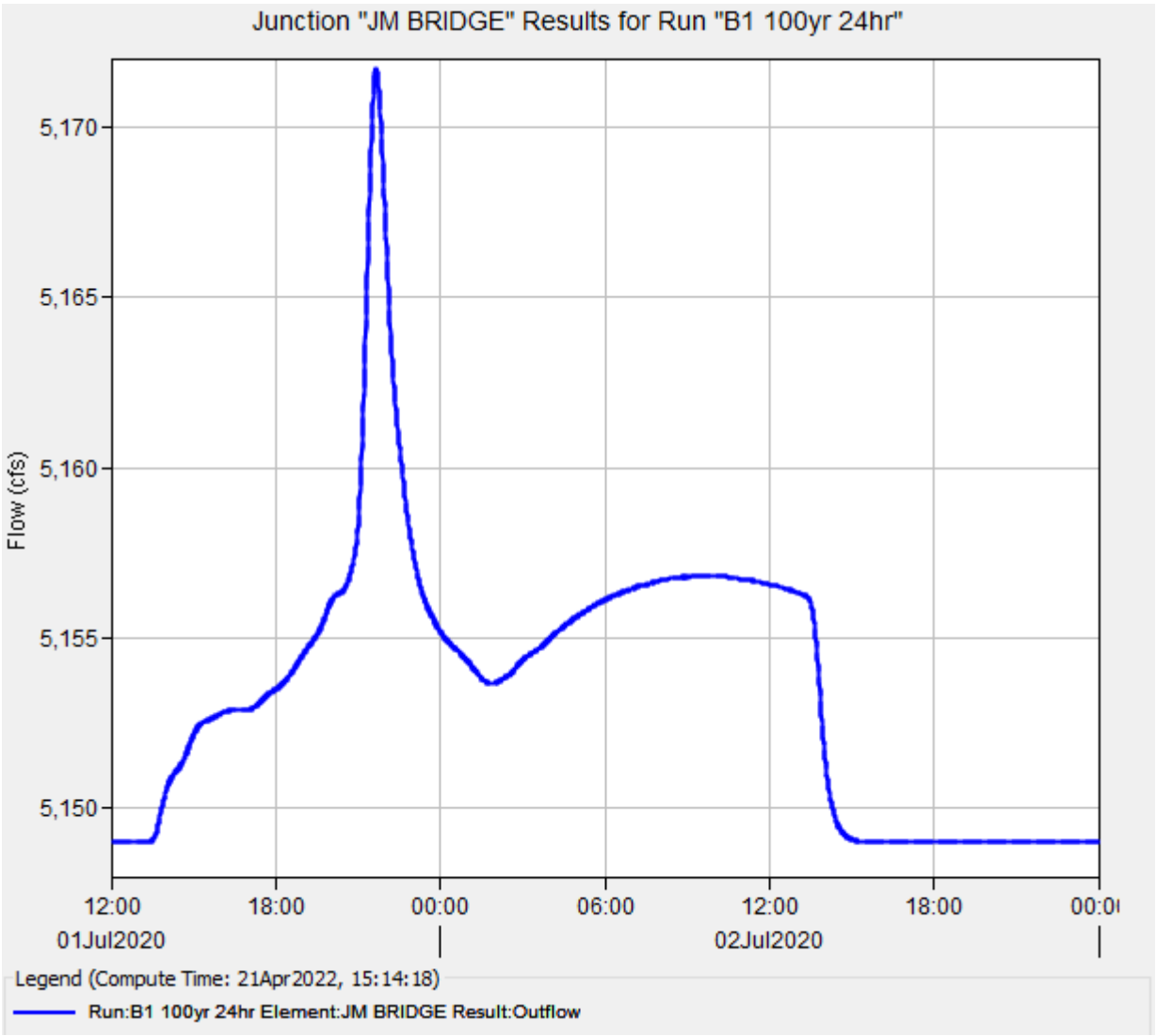
Project: JM_EWS Simulation Run: B1 50yr 24rh

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:15:24

Basin Model: B1 (38in)-Q50
Meteorologic Model: 50 YR 24 HR 38 IN
Control Specifications: 24 Hour

Show Elements: All Elements | Volume Units: IN (AC-FT) | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
SB BRIDGE	39.66	4074.8	01Jul2020, 20:18	12072.7
USGS 103366092	39.30	4054.0	01Jul2020, 12:00	12061.5
B1 FROM USGS GUAGE	39.30	4054.0	01Jul2020, 12:00	12061.5
B1	0.36	20.8	01Jul2020, 20:18	11.3
B5 FROM B1	39.66	4074.8	01Jul2020, 21:39	12072.7
JM BRIDGE	39.66	4074.8	01Jul2020, 21:39	12072.7



Project: JM_EWS Simulation Run: B1 100yr 24hr

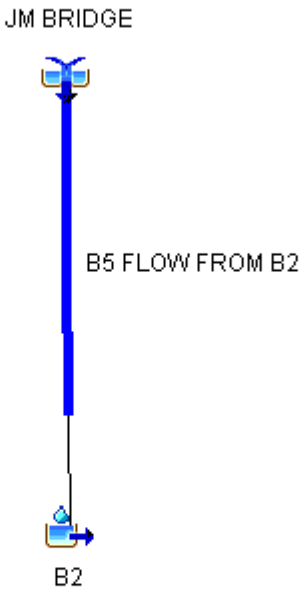
Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:14:18

Basin Model: B1 (38in)-Q100
Meteorologic Model: 100 YR 24 HR 38 IN
Control Specifications: 24 Hour

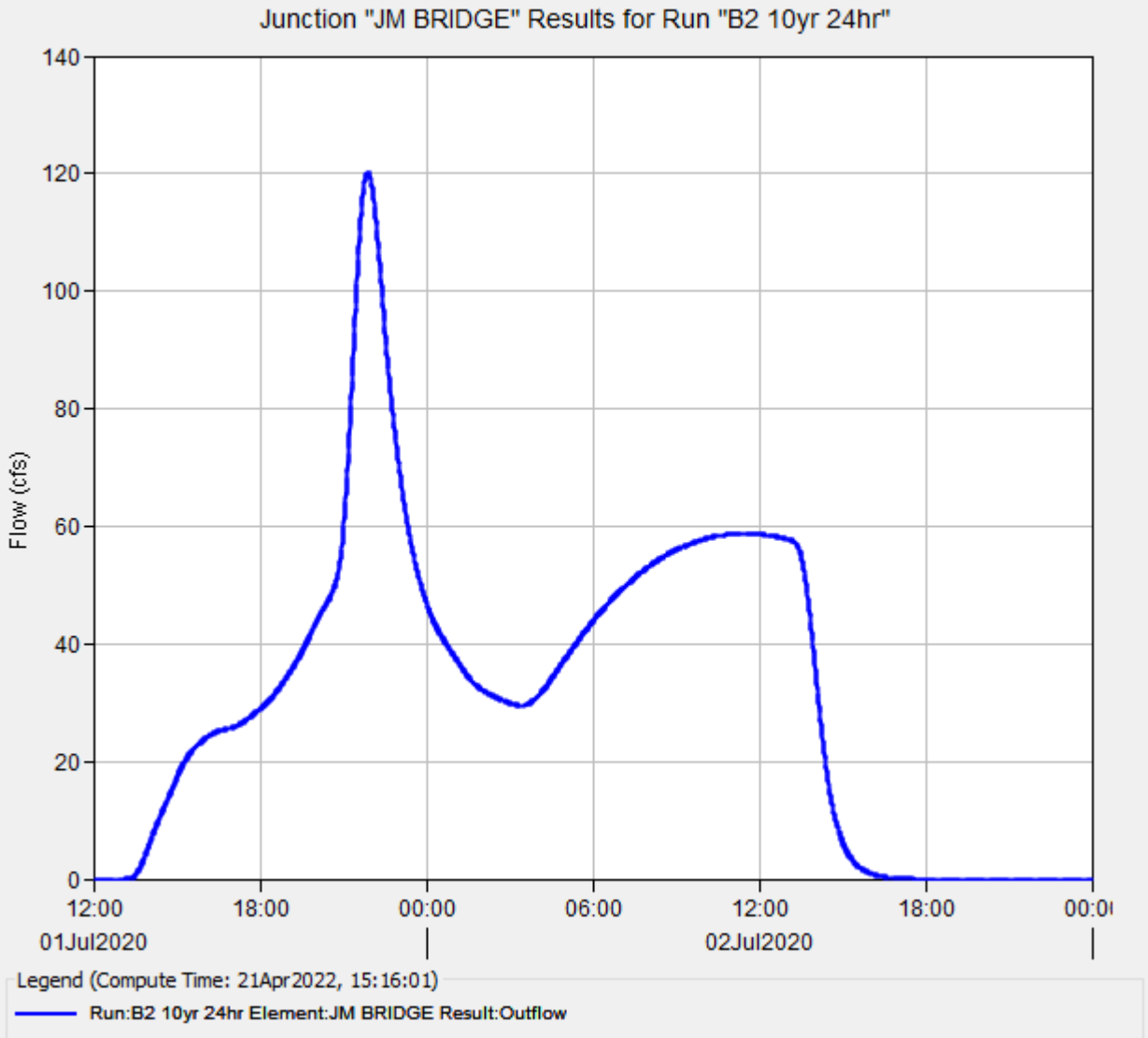
Show Elements: All Elements | Volume Units: IN / AC-FT | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
SB BRIDGE	39.66	5171.7	01Jul2020, 20:18	15333.0
USGS 103366092	39.30	5149.0	01Jul2020, 12:00	15319.3
B1 FROM USGS GUAGE	39.30	5149.0	01Jul2020, 12:00	15319.3
B1	0.36	22.7	01Jul2020, 20:18	13.6
B5 FROM B1	39.66	5171.7	01Jul2020, 21:39	15333.0
JM BRIDGE	39.66	5171.7	01Jul2020, 21:39	15333.0

B2 Layout. (Done individually to apply 35” Mean Annual Rainfall numbers)



HEC-HMS B2 Results.



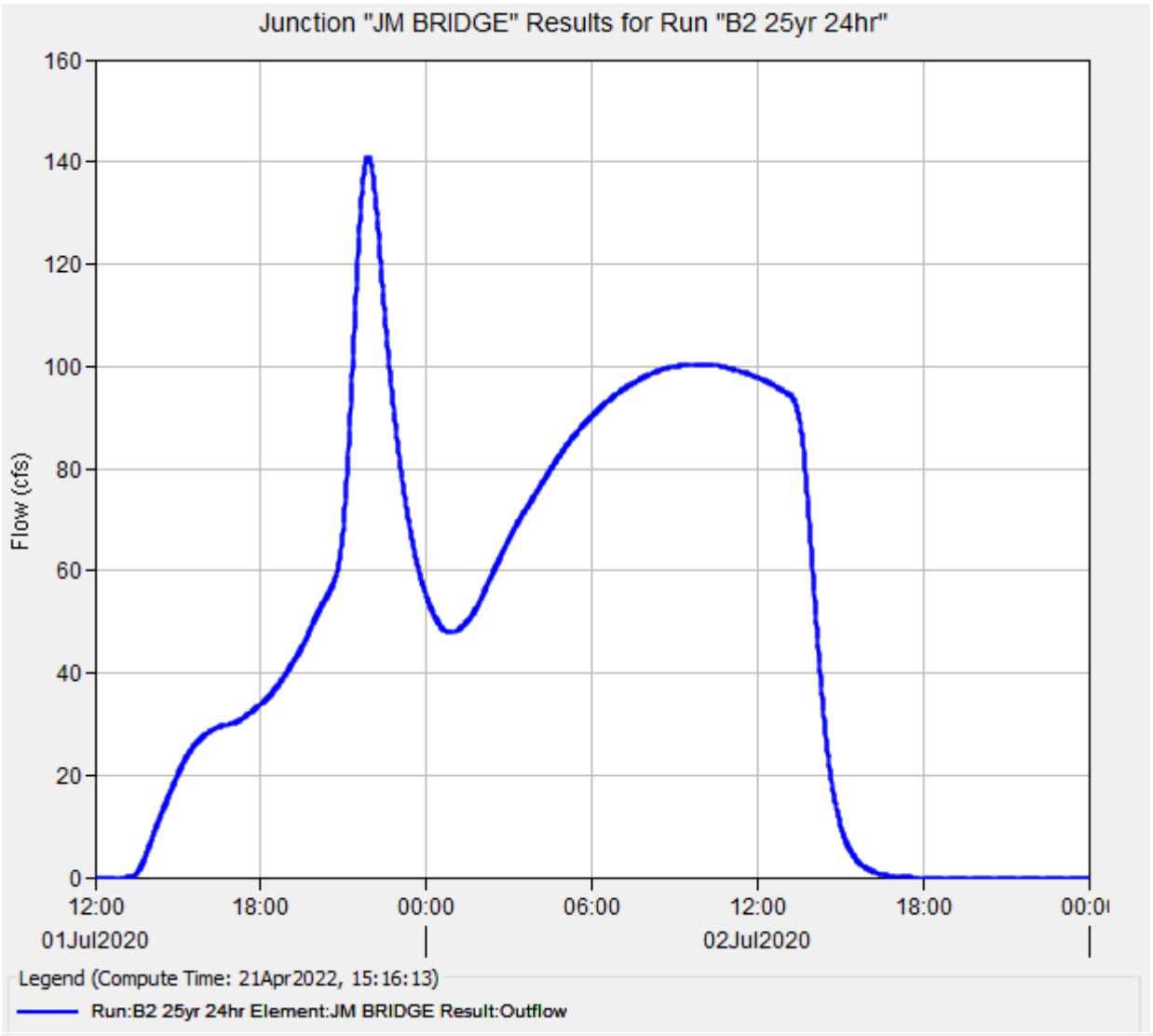
Project: JM_EWS Simulation Run: B2 10yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:16:01

Basin Model: B2 (35IN)
Meteorologic Model: 10 YR 24 HR 35 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B2	5.64	120.2	01Jul2020, 20:44	92.9
B5 FROM B2	5.64	120.2	01Jul2020, 21:53	92.9
JM BRIDGE	5.64	120.2	01Jul2020, 21:53	92.9



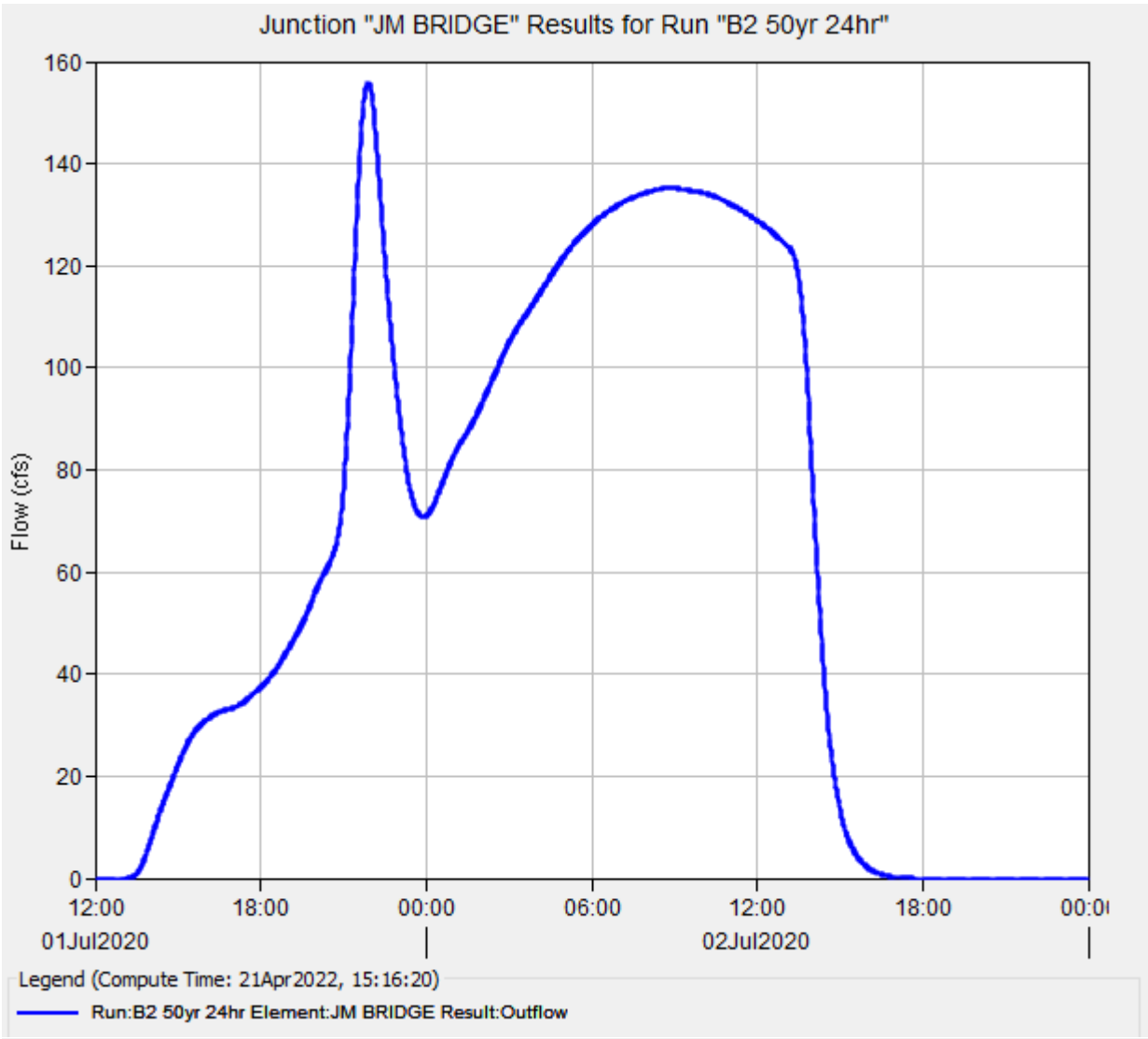
Project: JM_EWS Simulation Run: B2 25yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:16:13

Basin Model: B2 (35IN)
Meteorologic Model: 25 YR 24 HR 35 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B2	5.64	141.0	01Jul2020, 20:44	143.4
B5 FROM B2	5.64	141.0	01Jul2020, 21:53	143.4
JM BRIDGE	5.64	141.0	01Jul2020, 21:53	143.4



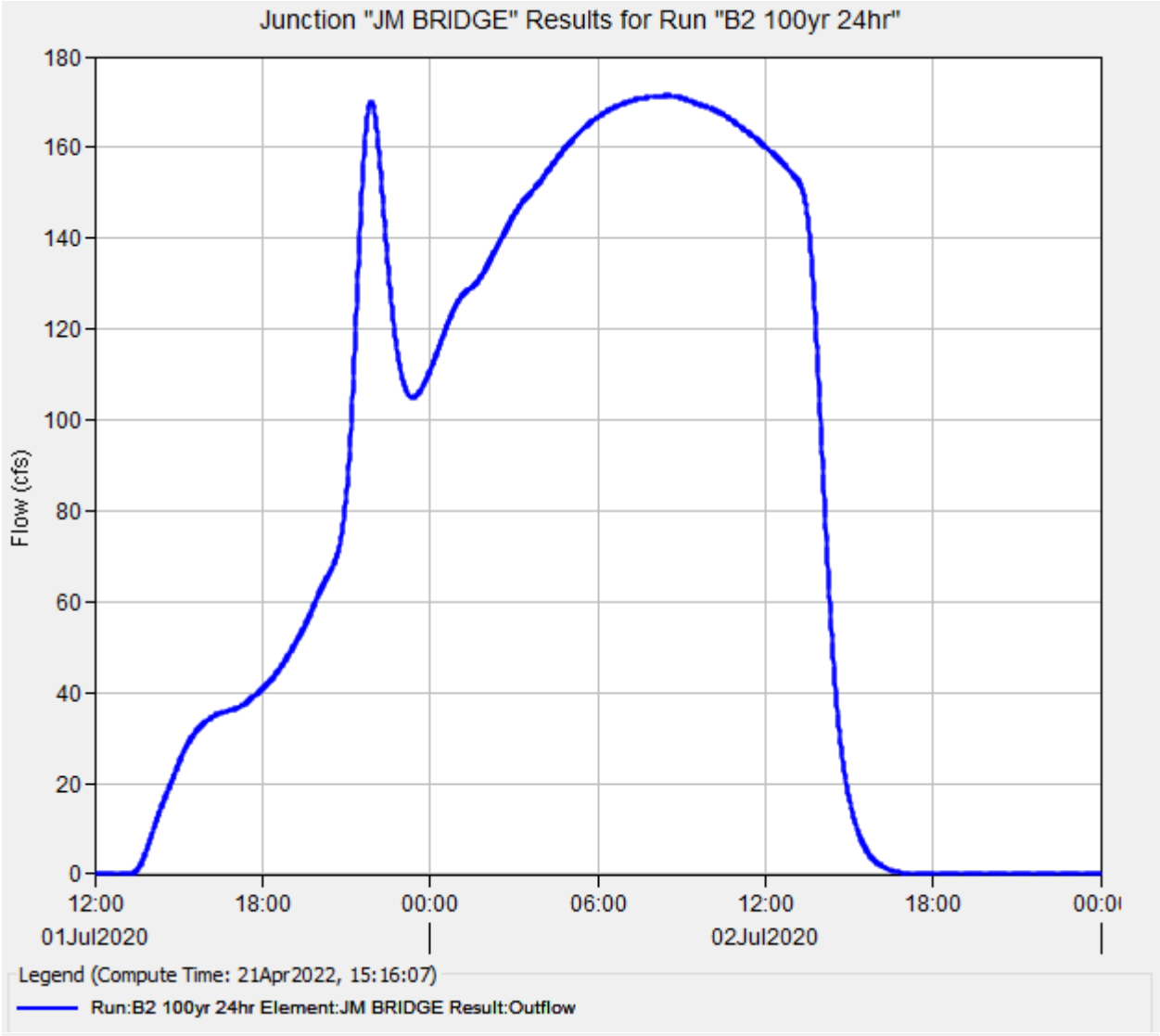
Project: JM_EWS Simulation Run: B2 50yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:16:20

Basin Model: B2 (35IN)
Meteorologic Model: 50 YR 24 HR 35 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B2	5.64	155.9	01Jul2020, 20:44	189.0
B5 FROM B2	5.64	155.9	01Jul2020, 21:53	189.0
JM BRIDGE	5.64	155.9	01Jul2020, 21:53	189.0



Project: JM_EWS Simulation Run: B2 100yr 24hr

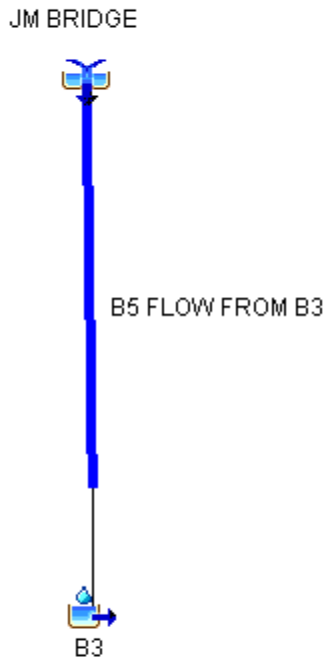
Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:16:07

Basin Model: B2 (35IN)
Meteorologic Model: 100 YR 24 HR 35 IN
Control Specifications: 24 Hour

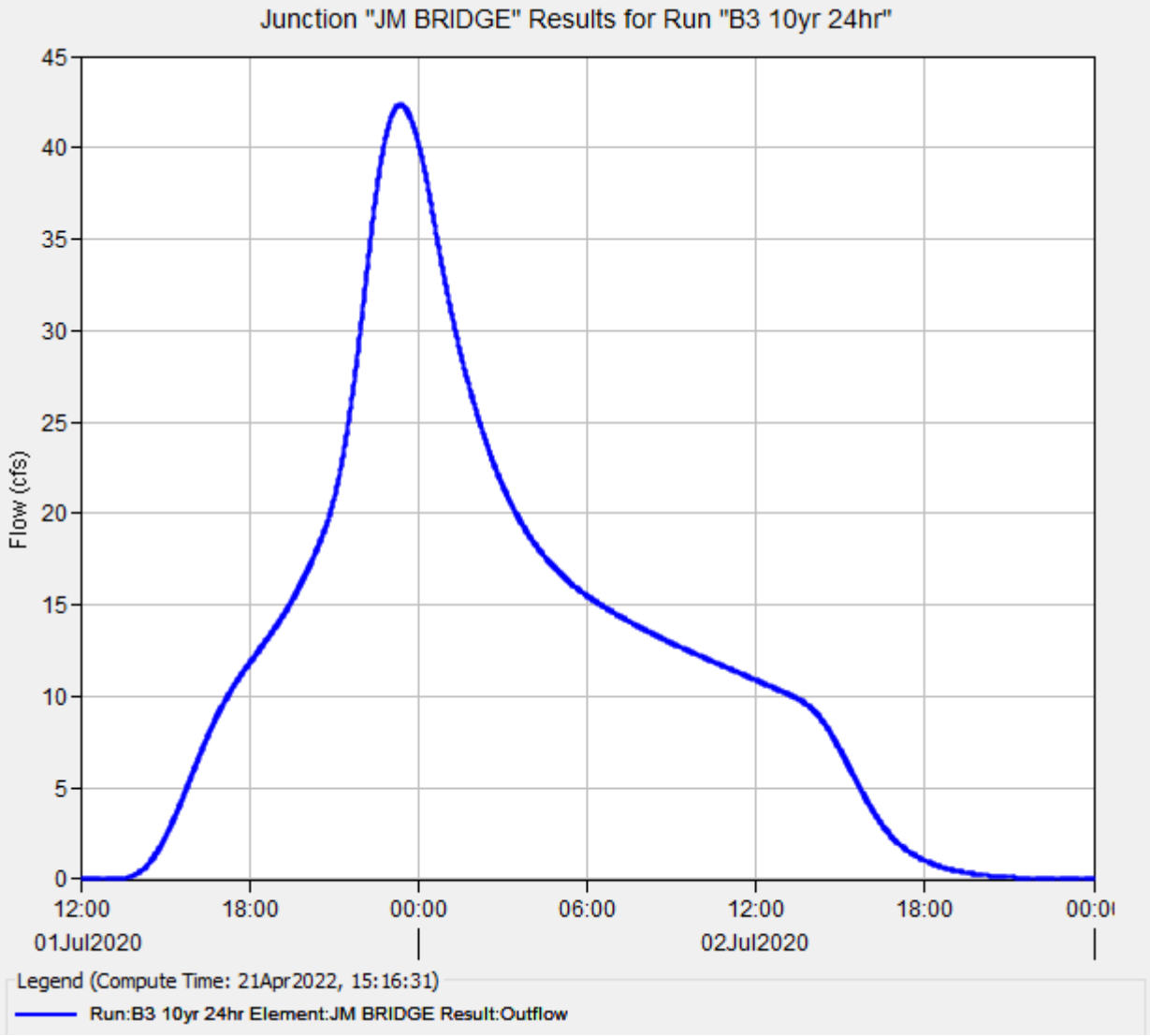
Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B2	5.64	171.4	02Jul2020, 07:20	238.7
B5 FROM B2	5.64	171.4	02Jul2020, 08:29	238.7
JM BRIDGE	5.64	171.4	02Jul2020, 08:29	238.7

B3 Layout. (Done individually to apply 28” Mean Annual Rainfall numbers)



HEC-HMS B3 Results.



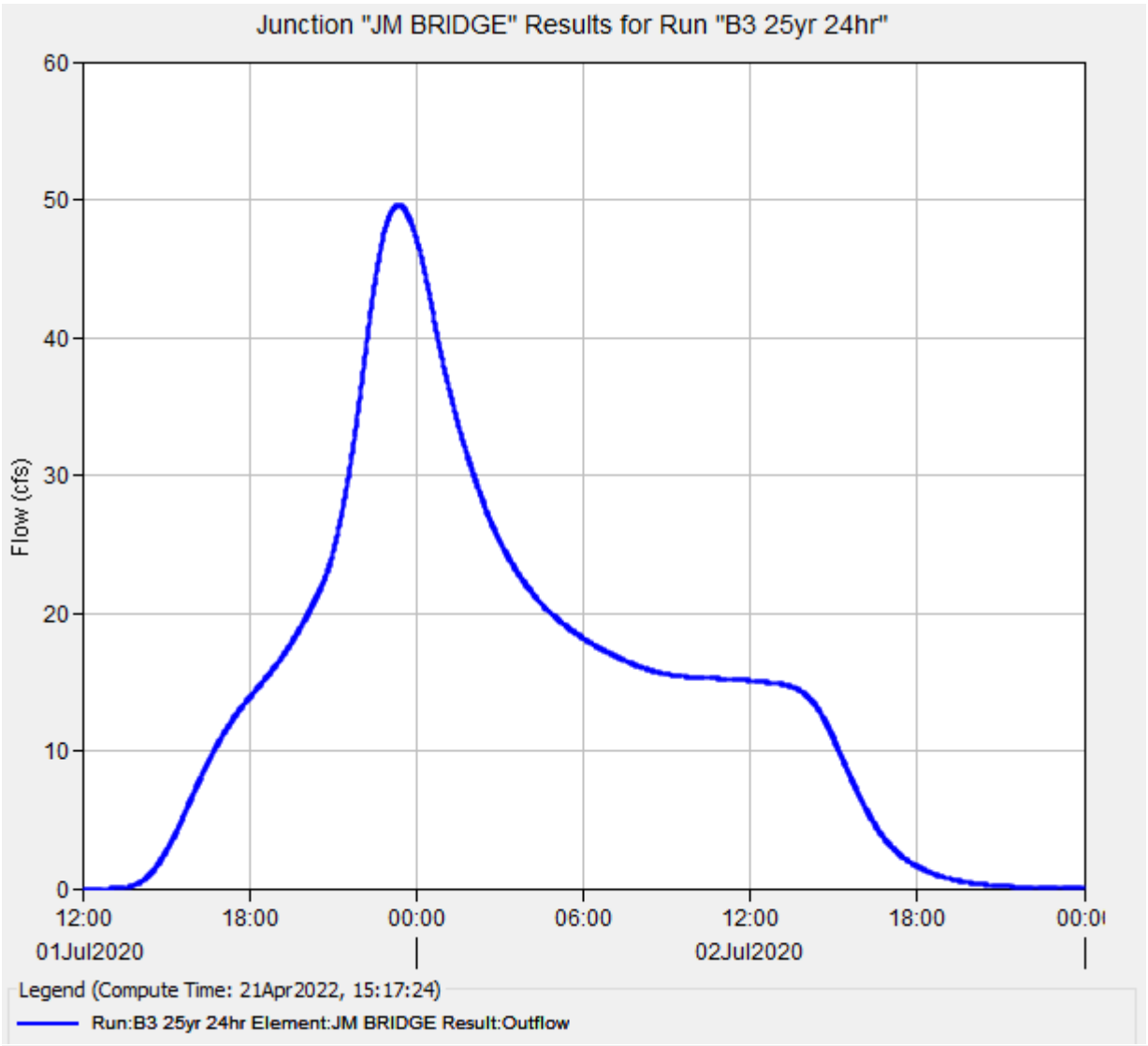
Project: JM_EWS Simulation Run: B3 10yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:16:31

Basin Model: B3 (28IN)
Meteorologic Model: 10 YR 24 HR 28 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: IN AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B3	1.25	42.3	01Jul2020, 22:19	35.9
B5 FROM B3	1.25	42.3	01Jul2020, 23:22	35.9
JM BRIDGE	1.25	42.3	01Jul2020, 23:22	35.9



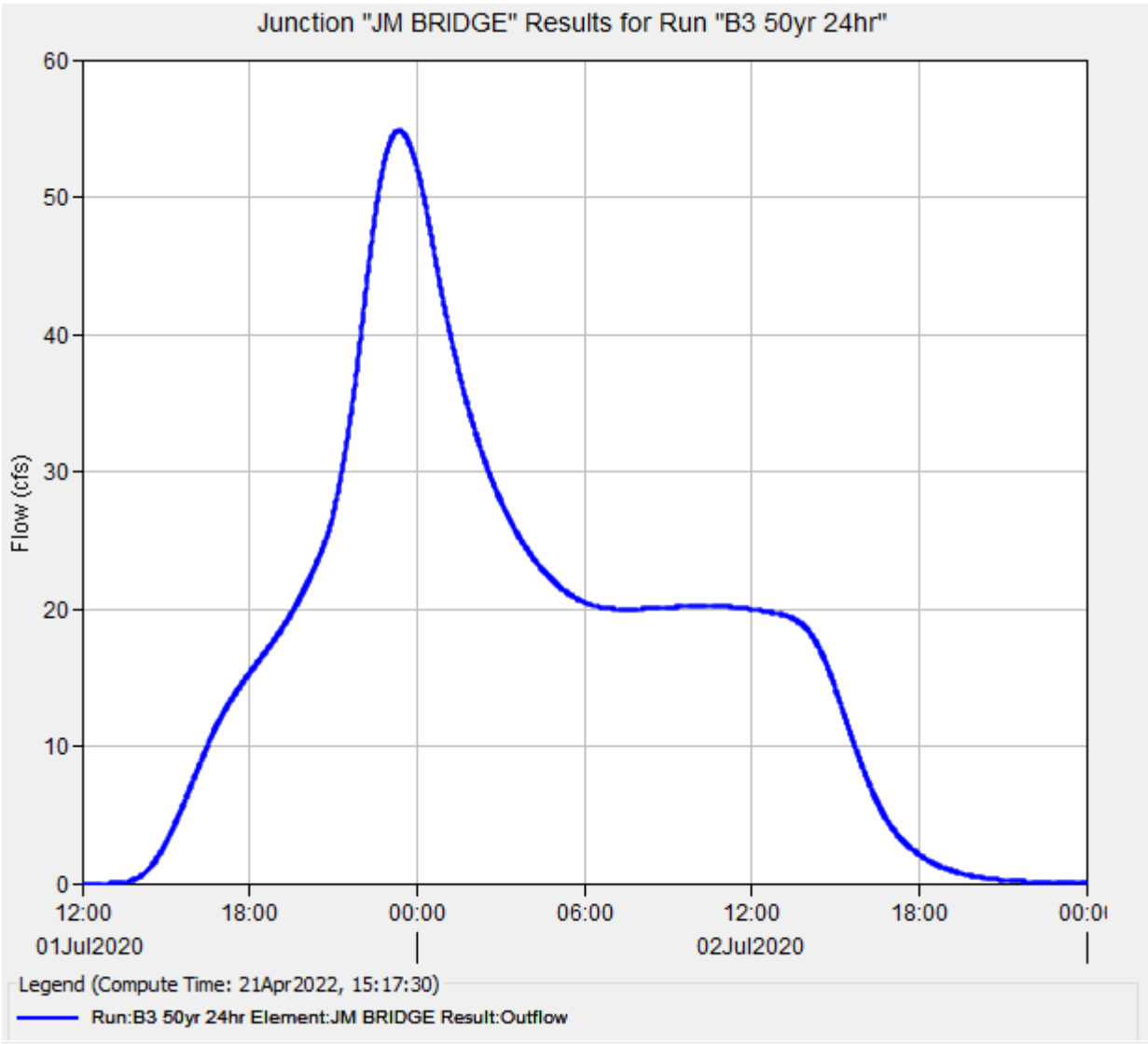
Project: JM_EWS Simulation Run: B3 25yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:17:24

Basin Model: B3 (28IN)
Meteorologic Model: 25 YR 24 HR 28 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B3	1.25	49.6	01Jul2020, 22:19	43.5
B5 FROM B3	1.25	49.6	01Jul2020, 23:22	43.5
JM BRIDGE	1.25	49.6	01Jul2020, 23:22	43.5



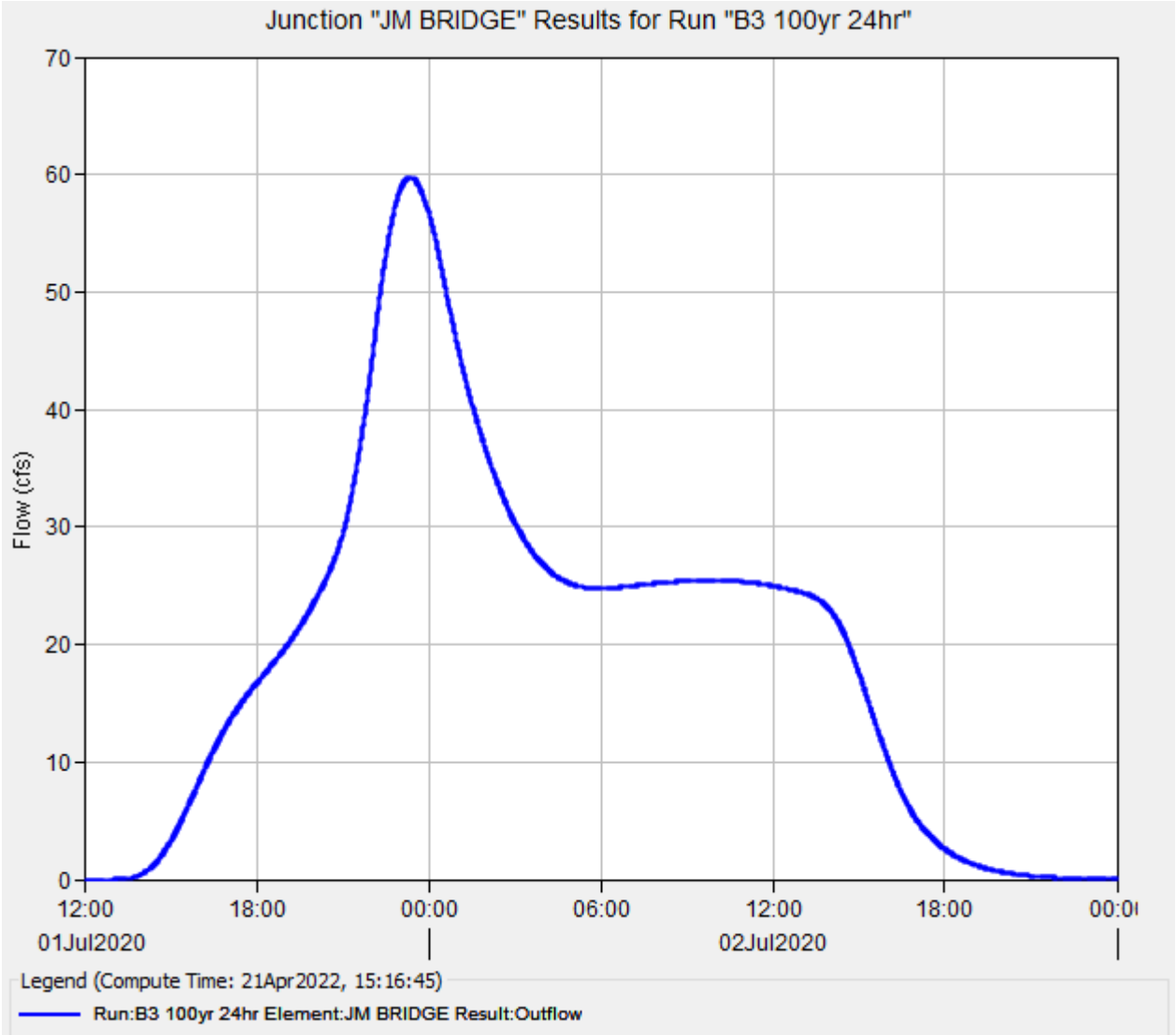
Project: JM_EWS Simulation Run: B3 50yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:17:30

Basin Model: B3 (28IN)
Meteorologic Model: 50 YR 24 HR 28 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B3	1.25	54.9	01Jul2020, 22:19	50.4
B5 FROM B3	1.25	54.9	01Jul2020, 23:22	50.4
JM BRIDGE	1.25	54.9	01Jul2020, 23:22	50.4



Project: JM_EWS Simulation Run: B3 100yr 24hr

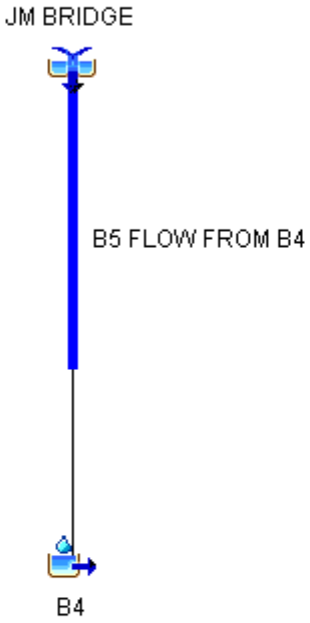
Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:16:45

Basin Model: B3 (28IN)
Meteorologic Model: 100 YR 24 HR 28 IN
Control Specifications: 24 Hour

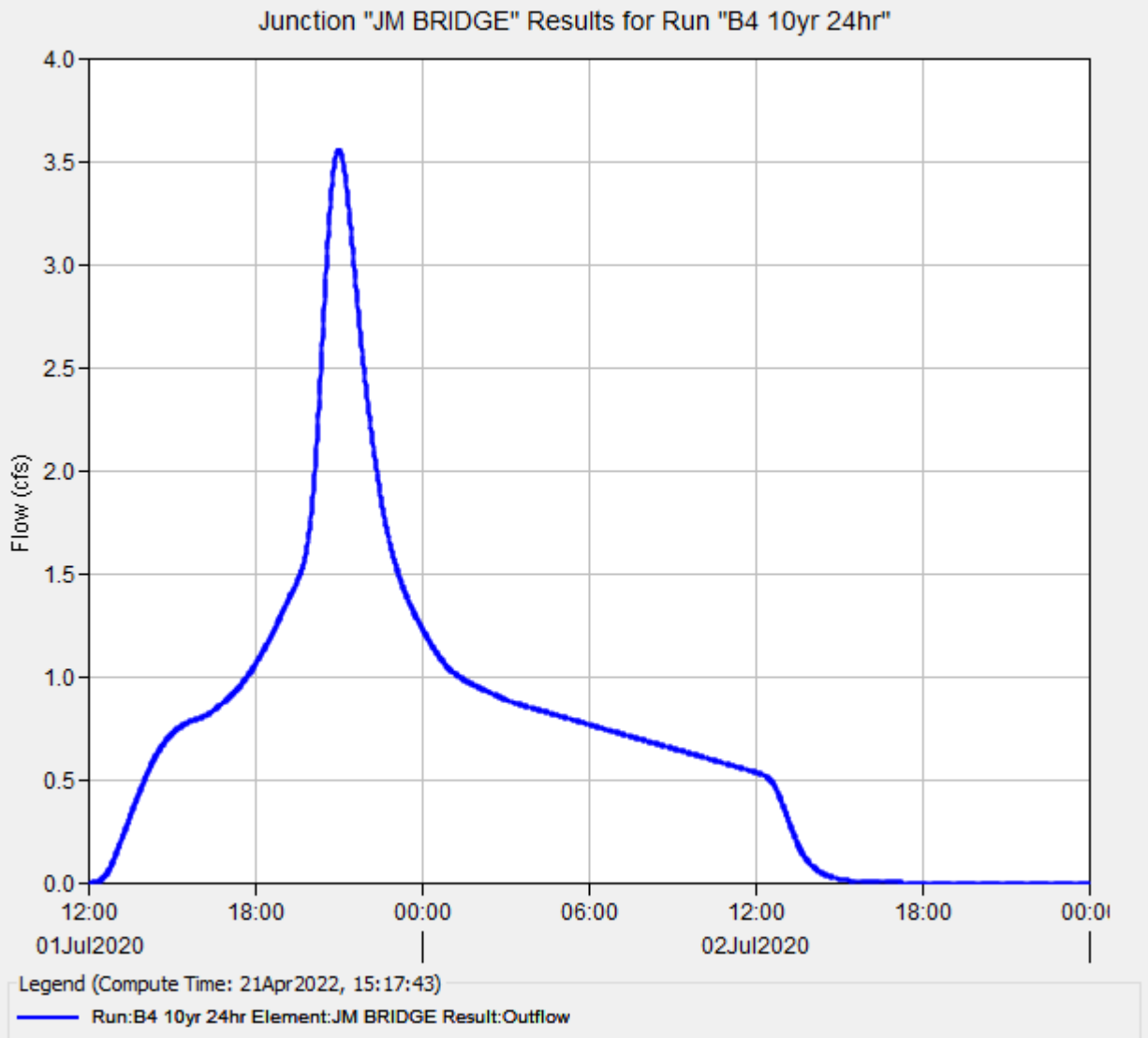
Show Elements: All Elements | Volume Units: ○ IN ◉ AC-FT | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B3	1.25	59.8	01Jul2020, 22:19	57.8
B5 FROM B3	1.25	59.8	01Jul2020, 23:22	57.8
JM BRIDGE	1.25	59.8	01Jul2020, 23:22	57.8

B4 Layout. (Done individually to apply 18” Mean Annual Rainfall numbers)



HEC-HMS B4 Results.



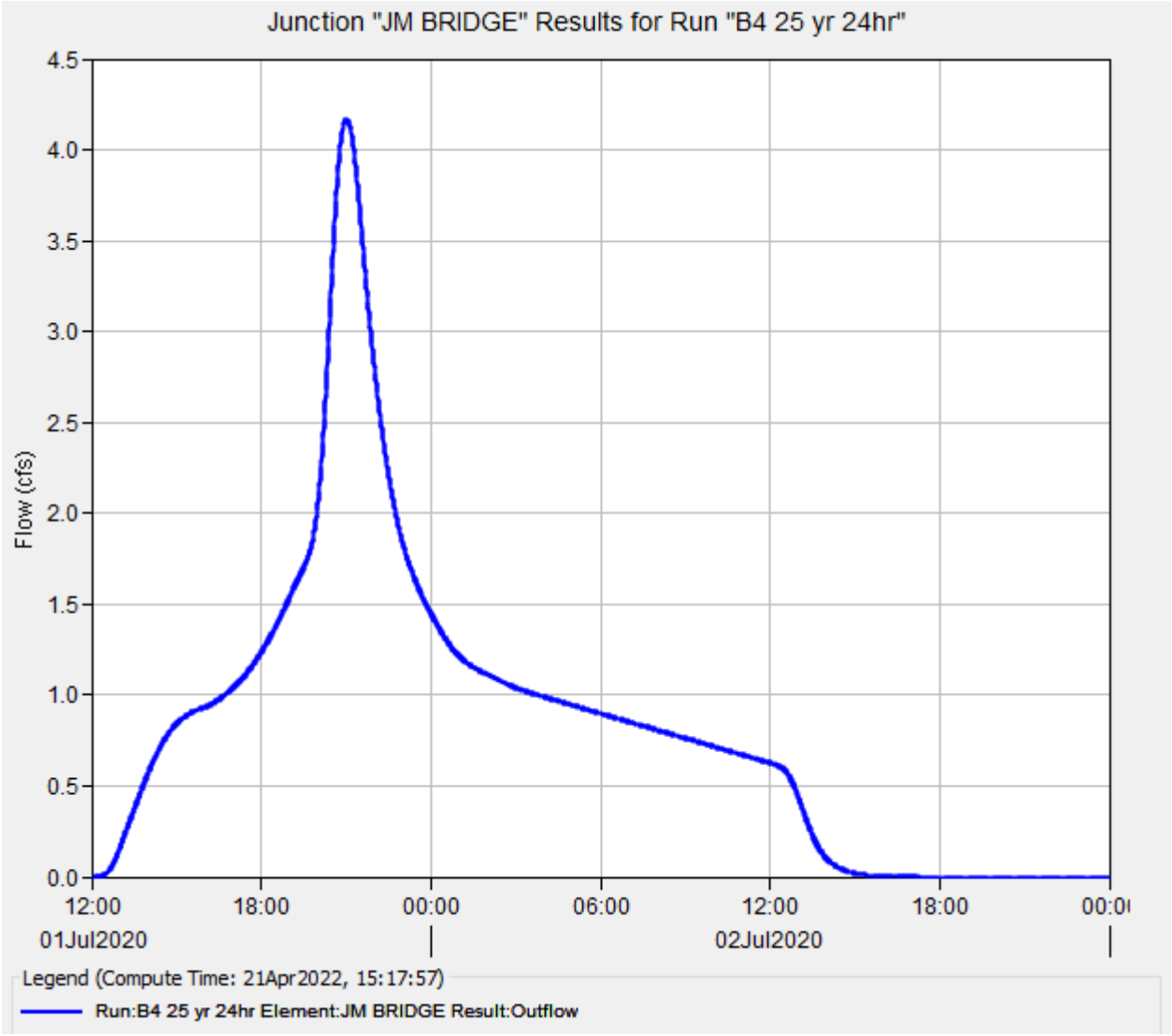
Project: JM_EWS Simulation Run: B4 10yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:17:43

Basin Model: B4 (18IN)
Meteorologic Model: 10 YR 24 HR 18 IN
Control Specifications: 24 Hour

Show Elements: All Elements | Volume Units: IN / AC-FT | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B4	0.35	3.6	01Jul2020, 20:53	2.1
B5 FROM B4	0.35	3.6	01Jul2020, 21:01	2.1
JM BRIDGE	0.35	3.6	01Jul2020, 21:01	2.1



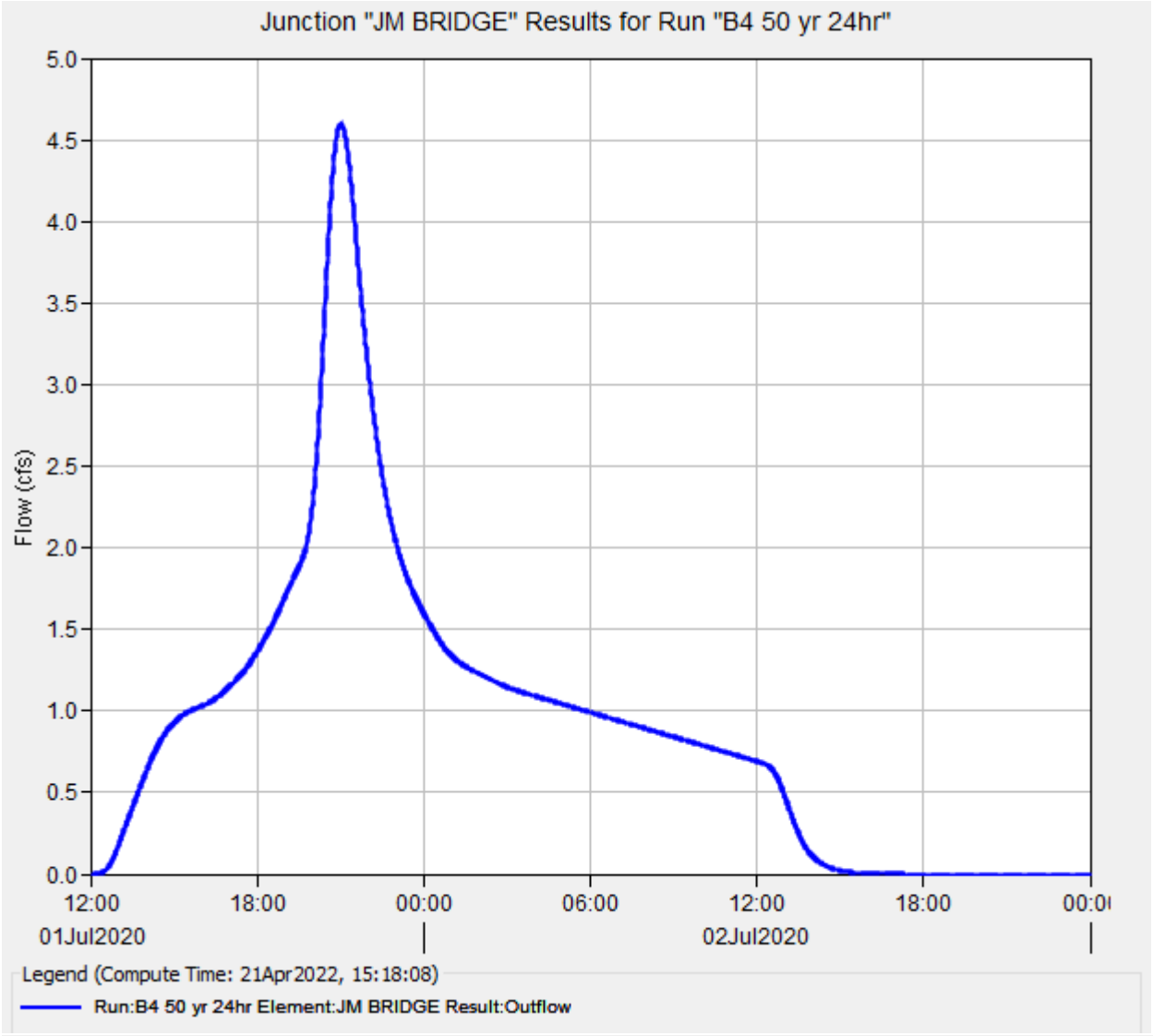
Project: JM_EWS Simulation Run: B4 25 yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:17:57

Basin Model: B4 (18IN)
Meteorologic Model: 25 YR 24 HR 18 IN
Control Specifications: 24 Hour

Show Elements: All Elements | Volume Units: IN (AC-FT) | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B4	0.35	4.2	01Jul2020, 20:53	2.5
B5 FROM B4	0.35	4.2	01Jul2020, 21:01	2.5
JM BRIDGE	0.35	4.2	01Jul2020, 21:01	2.5



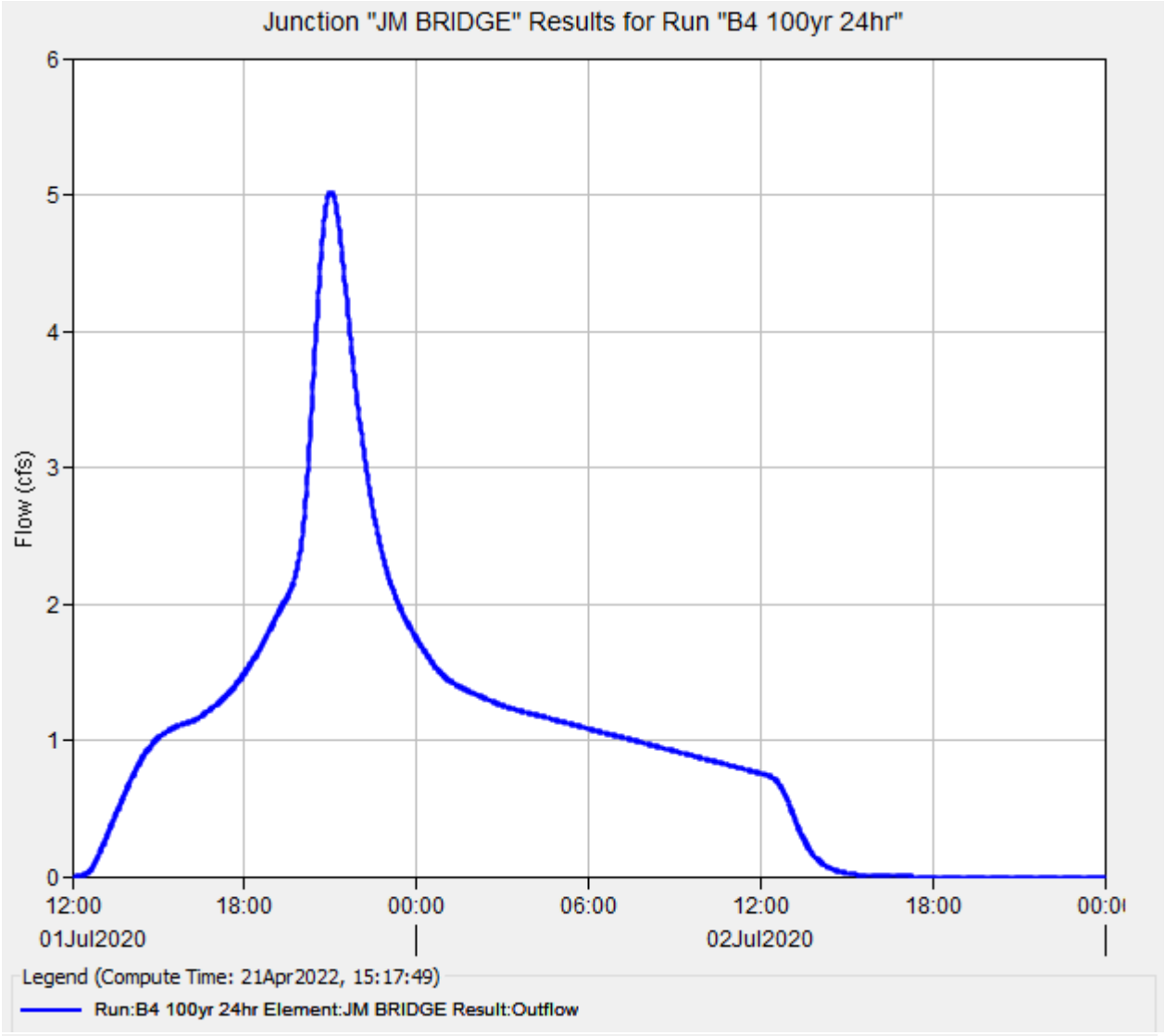
Project: JM_EWS Simulation Run: B4 50 yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:18:08

Basin Model: B4 (18IN)
Meteorologic Model: 50 YR 24 HR 18 IN
Control Specifications: 24 Hour

Show Elements: All Elements | Volume Units: ○ IN ◉ AC-FT | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B4	0.35	4.6	01Jul2020, 20:53	2.7
B5 FROM B4	0.35	4.6	01Jul2020, 21:01	2.7
JM BRIDGE	0.35	4.6	01Jul2020, 21:01	2.7



Project: JM_EWS Simulation Run: B4 100yr 24hr

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:17:49

Basin Model: B4 (18IN)
Meteorologic Model: 100 YR 24 HR 18 IN
Control Specifications: 24 Hour

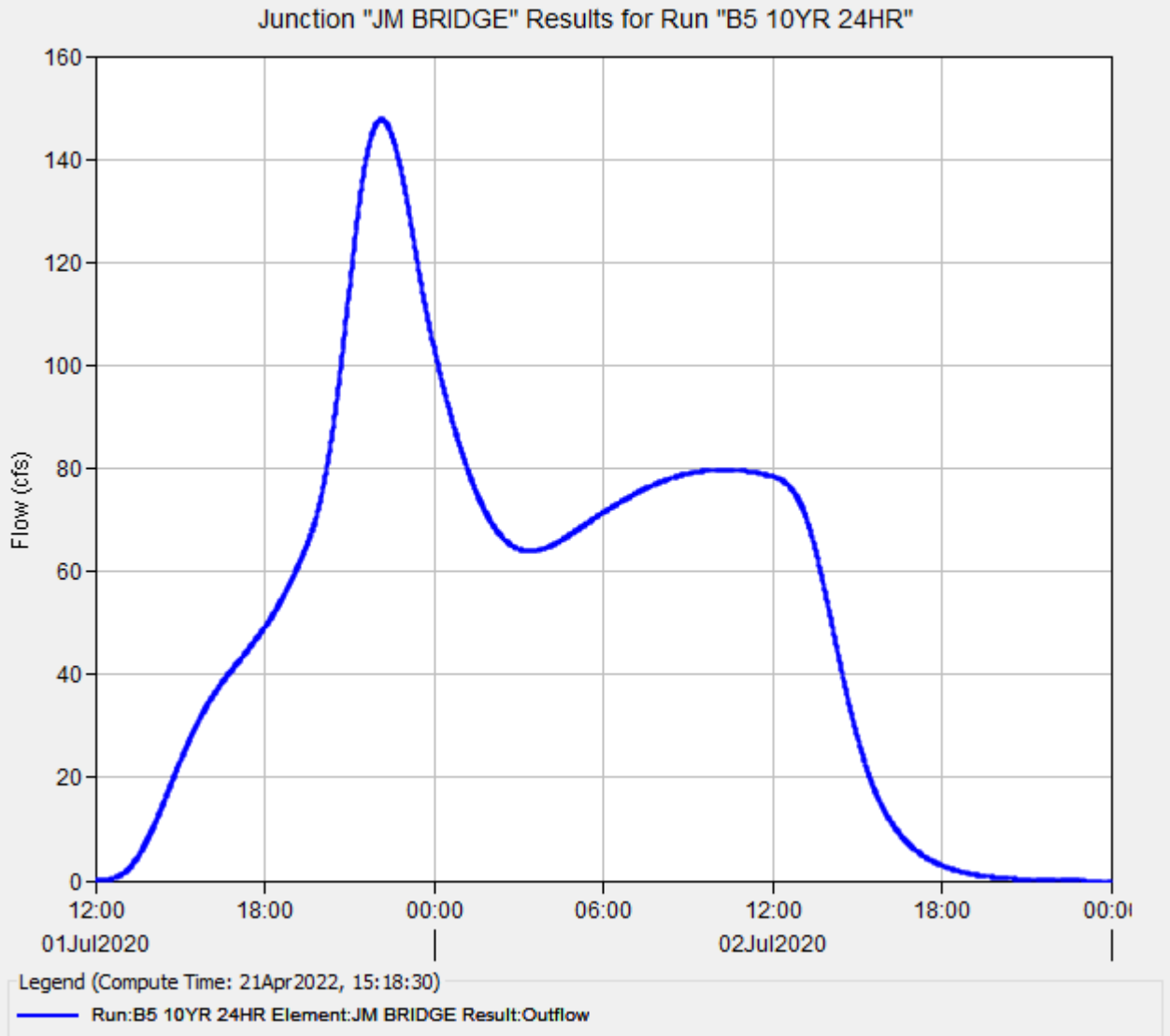
Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B4	0.35	5.0	01Jul2020, 20:53	3.0
B5 FROM B4	0.35	5.0	01Jul2020, 21:01	3.0
JM BRIDGE	0.35	5.0	01Jul2020, 21:01	3.0

B5 Layout. (Done individually to apply 30” Mean Annual Rainfall numbers)



HEC-HMS B5 Results.



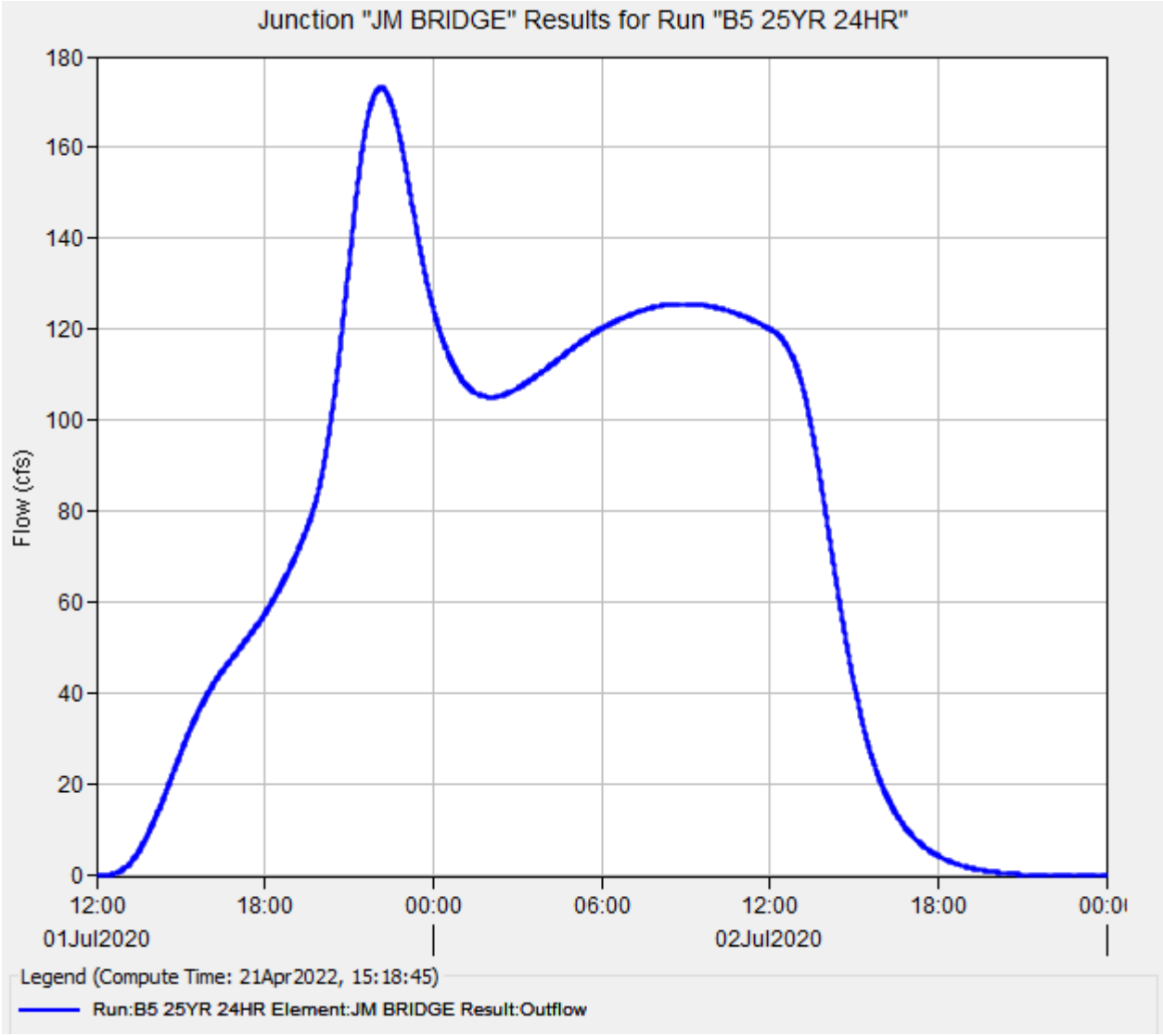
Project: JM_EWS Simulation Run: B5 10YR 24HR

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:18:30

Basin Model: B5 (30IN)
Meteorologic Model: 10 YR 24 HR 30 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B5	6.39	147.7	01Jul2020, 22:08	153.7
JM BRIDGE	6.39	147.7	01Jul2020, 22:08	153.7



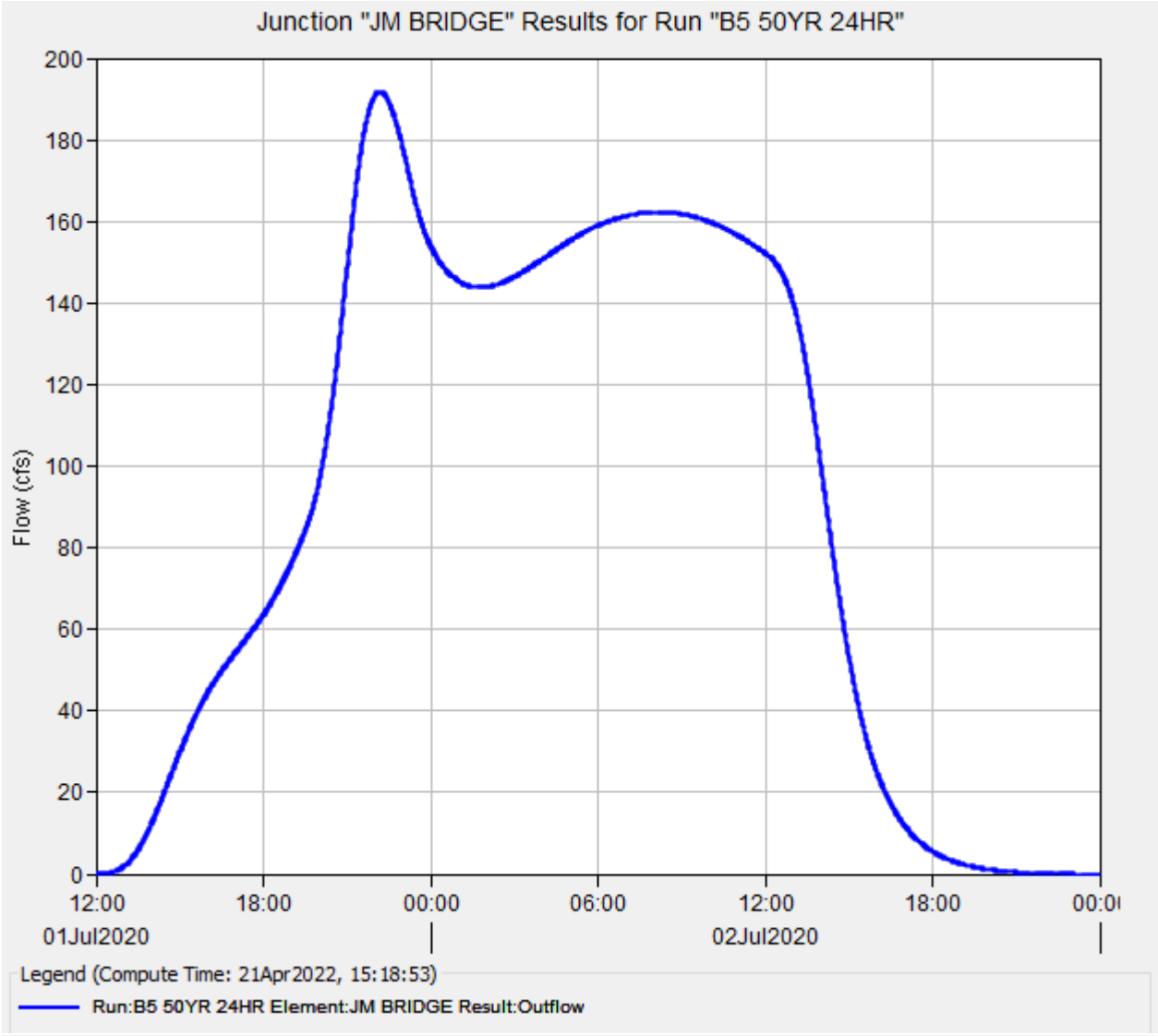
Project: JM_EWS Simulation Run: B5 25YR 24HR

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:18:45

Basin Model: B5 (30IN)
Meteorologic Model: 25 YR 24 HR 30 IN
Control Specifications: 24 Hour

Show Elements: All Elements | Volume Units: ○ IN ◉ AC-FT | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B5	6.39	173.2	01Jul2020, 22:08	216.0
JM BRIDGE	6.39	173.2	01Jul2020, 22:08	216.0



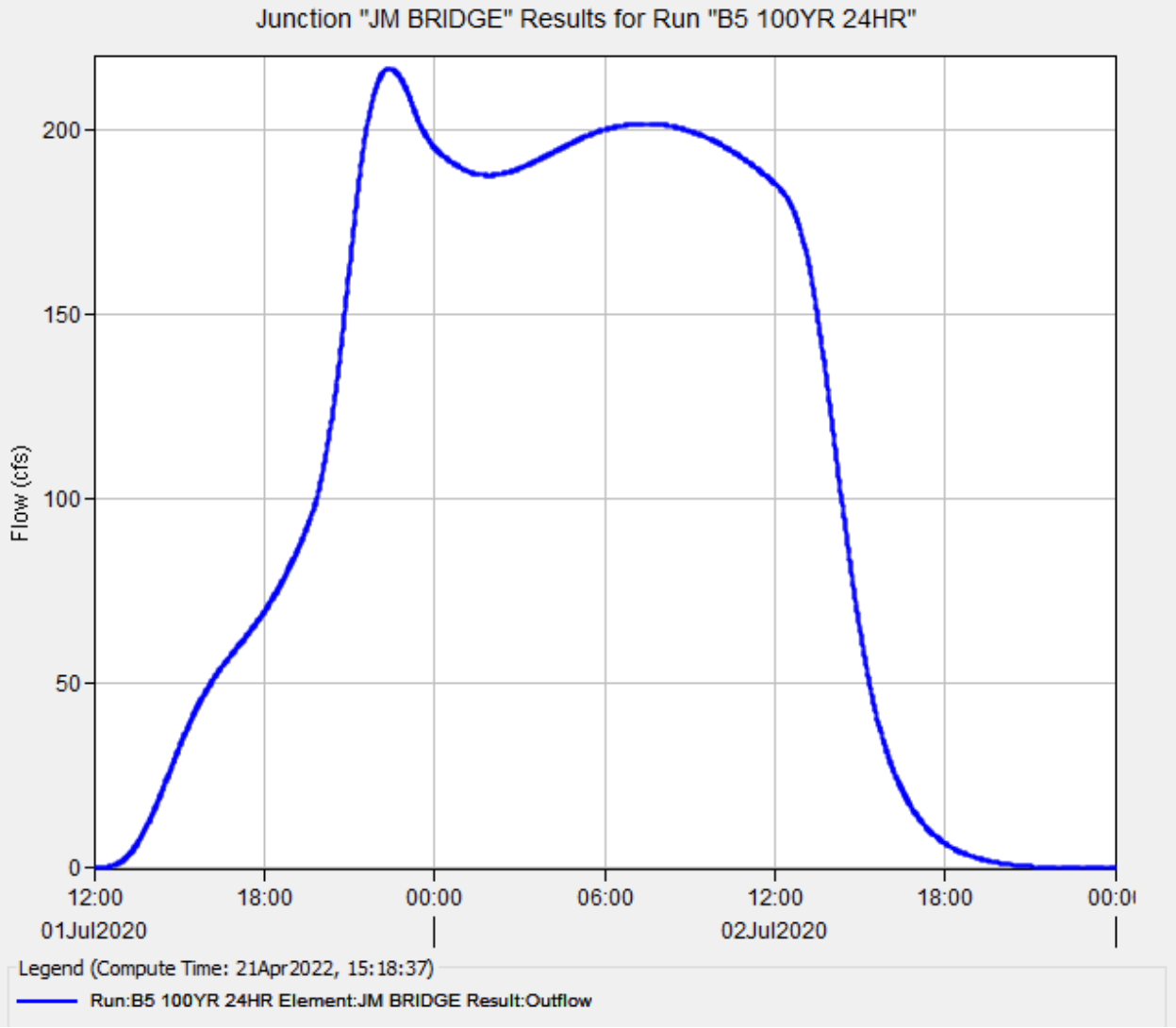
Project: JM_EWS Simulation Run: B5 50YR 24HR

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:18:53

Basin Model: B5 (30IN)
Meteorologic Model: 50 YR 24 HR 30 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B5	6.39	191.8	01Jul2020, 22:11	268.2
JM BRIDGE	6.39	191.8	01Jul2020, 22:11	268.2



Project: JM_EWS Simulation Run: B5 100YR 24HR

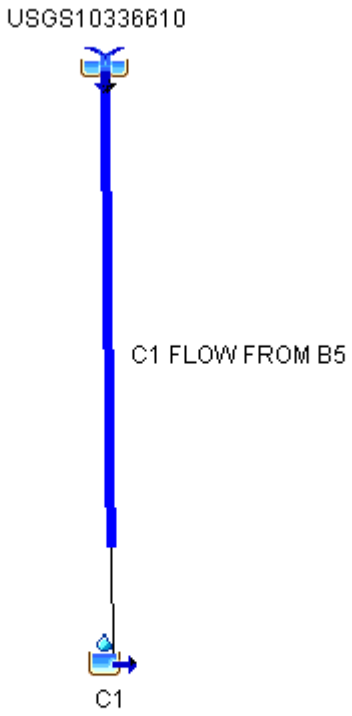
Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:18:37

Basin Model: B5 (30IN)
Meteorologic Model: 100 YR 24 HR 30 IN
Control Specifications: 24 Hour

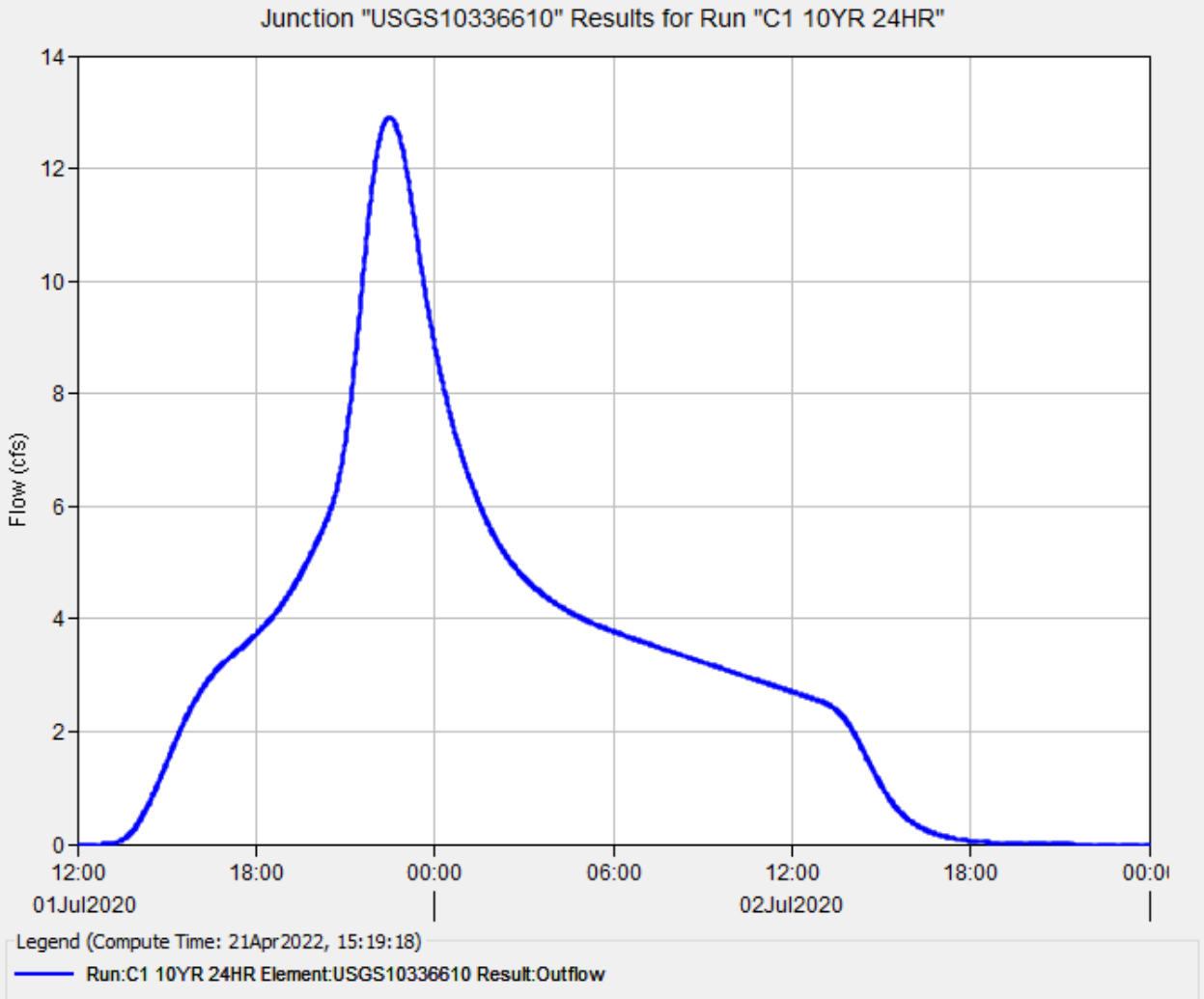
Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B5	6.39	216.4	01Jul2020, 22:24	325.4
JM BRIDGE	6.39	216.4	01Jul2020, 22:24	325.4

C1 Layout. (Done individually to apply 18” Mean Annual Rainfall numbers).



HEC-HMS C1 Results.



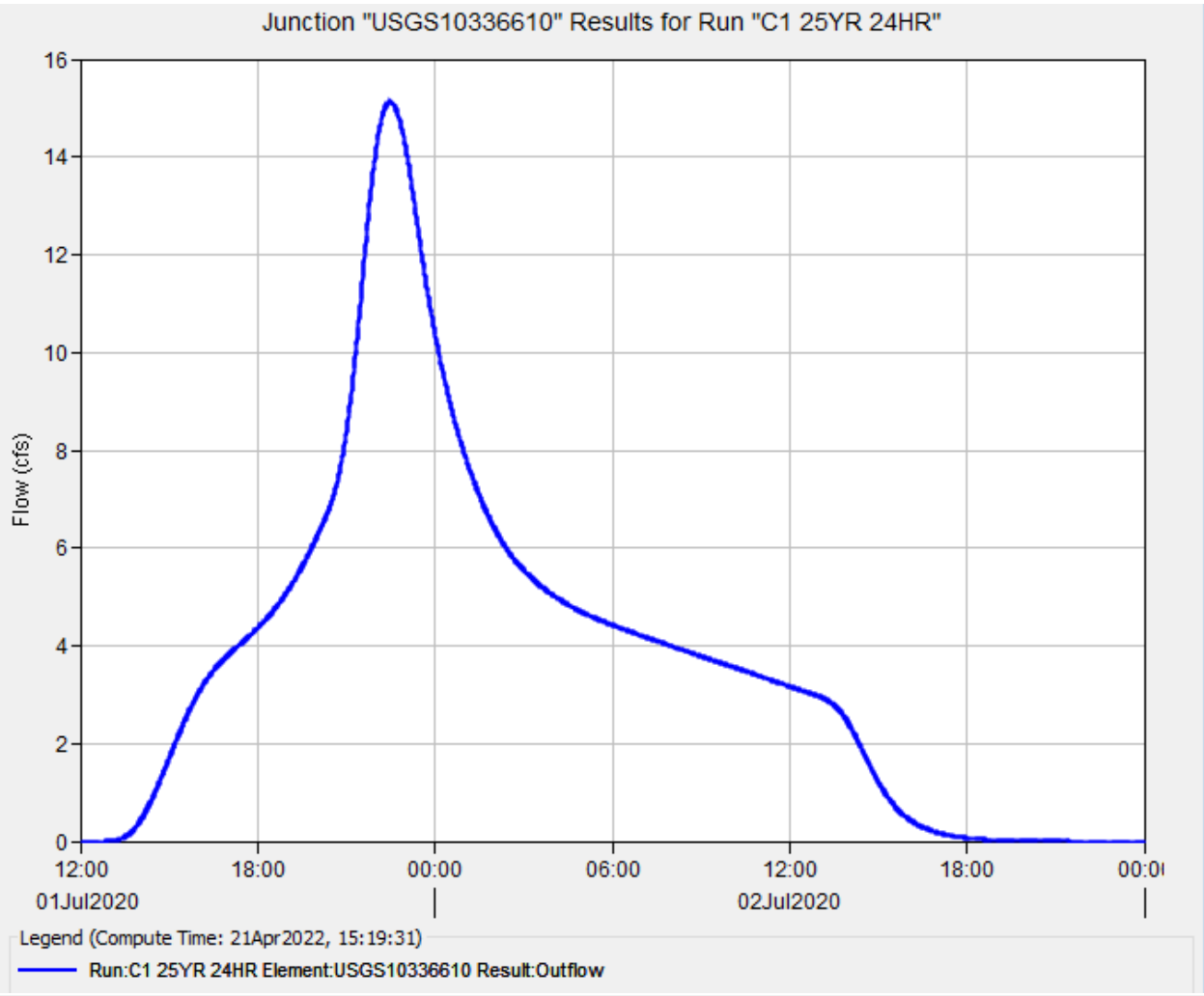
Project: JM_EWS Simulation Run: C1 10YR 24HR

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:19:18

Basin Model: C1 (18IN)
Meteorologic Model: 10 YR 24 HR 18 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
C1	0.68	12.9	01Jul2020, 21:38	9.5
C1 FROM B5	0.68	12.9	01Jul2020, 22:29	9.5
USGS10336610	0.68	12.9	01Jul2020, 22:29	9.5



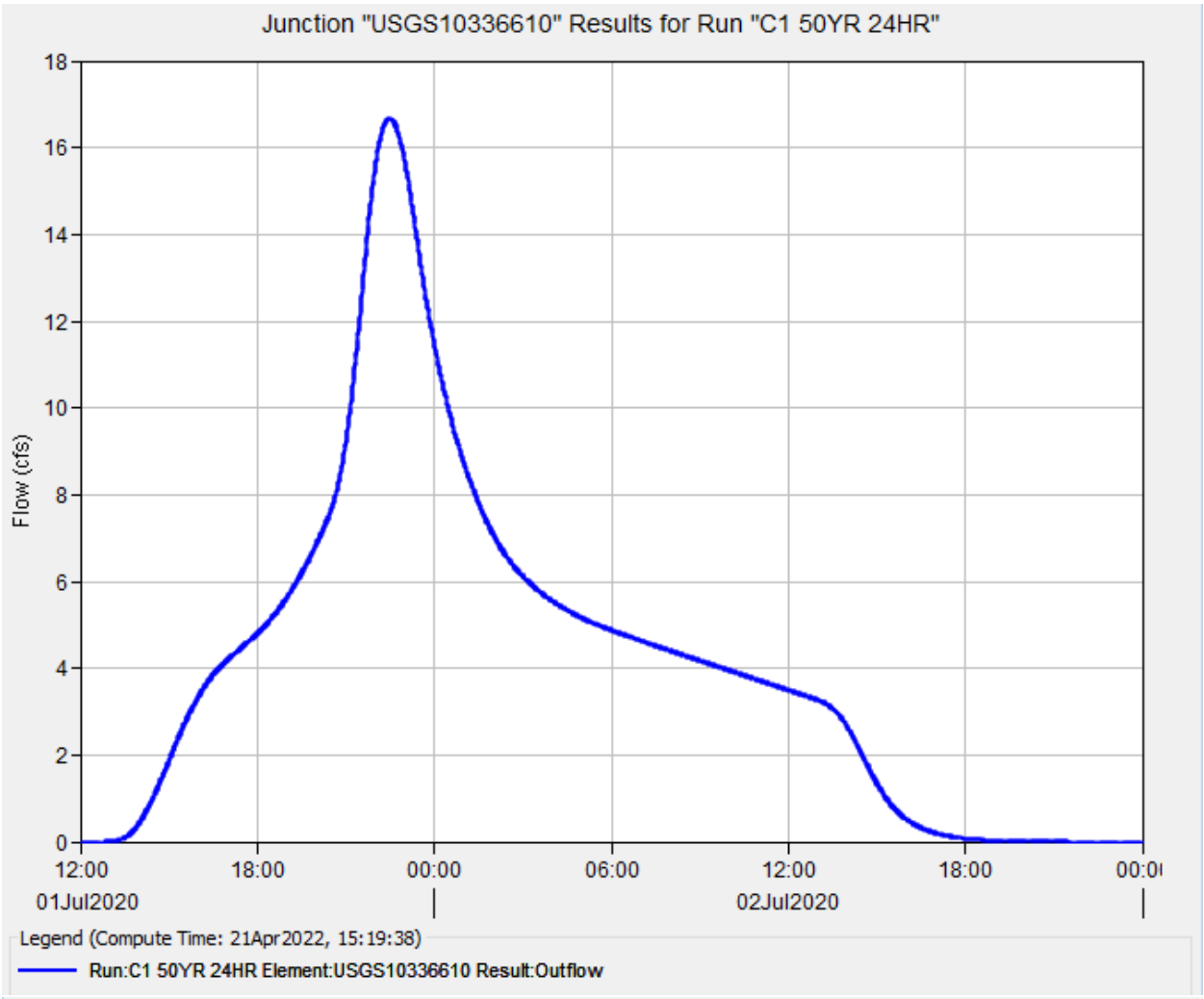
Project: JM_EWS Simulation Run: C1 25YR 24HR

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:19:31

Basin Model: C1 (18IN)
Meteorologic Model: 25 YR 24 HR 18 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
C1	0.68	15.1	01Jul2020, 21:38	11.2
C1 FROM B5	0.68	15.1	01Jul2020, 22:29	11.2
USGS10336610	0.68	15.1	01Jul2020, 22:29	11.2



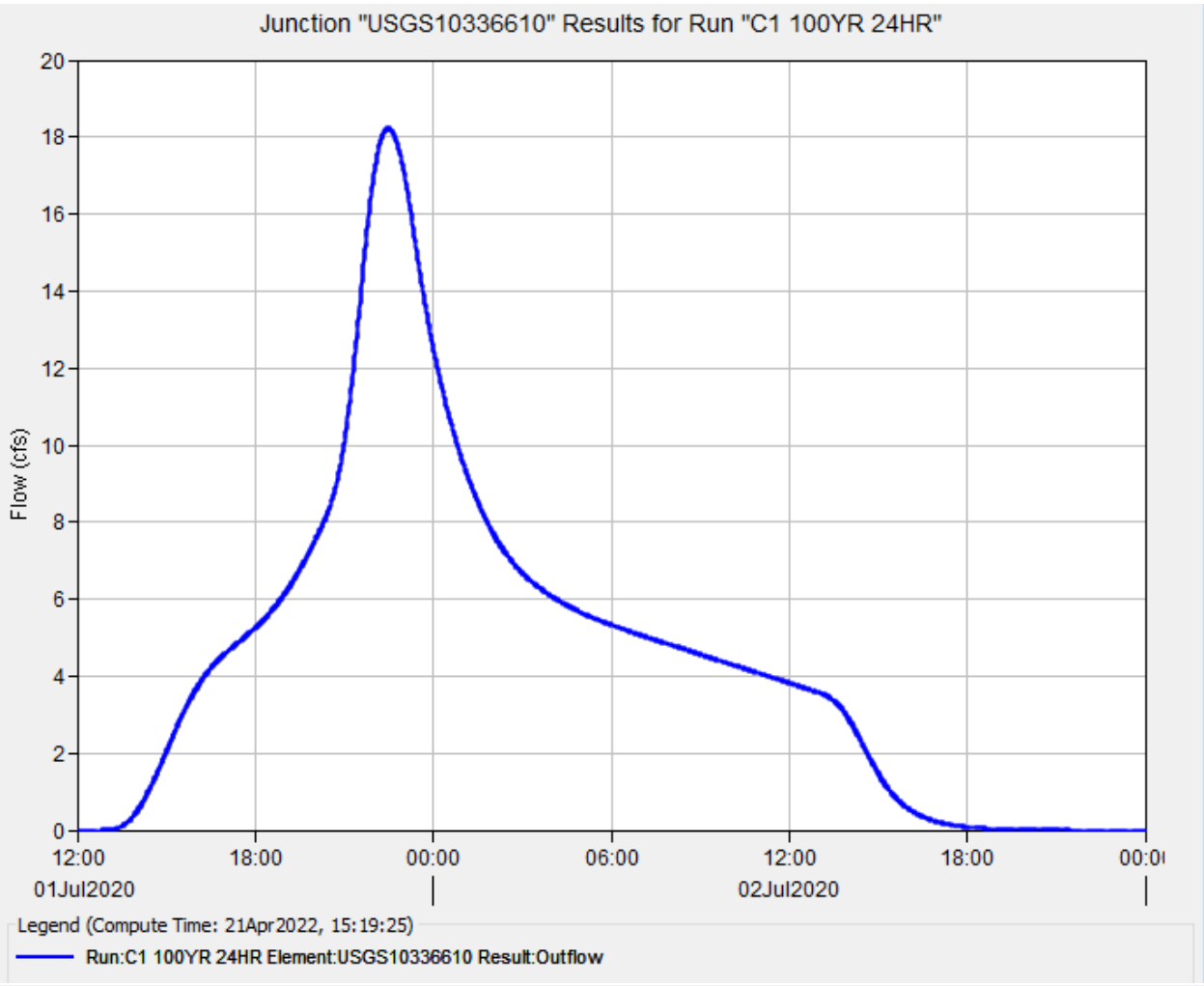
Project: JM_EWS Simulation Run: C1 50YR 24HR

Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:19:38

Basin Model: C1 (18IN)
Meteorologic Model: 50 YR 24 HR 18 IN
Control Specifications: 24 Hour

Show Elements: All Elements Volume Units: ○ IN ◉ AC-FT Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
C1	0.68	16.7	01Jul2020, 21:38	12.3
C1 FROM B5	0.68	16.7	01Jul2020, 22:29	12.3
USGS10336610	0.68	16.7	01Jul2020, 22:29	12.3



Project: JM_EWS Simulation Run: C1 100YR 24HR

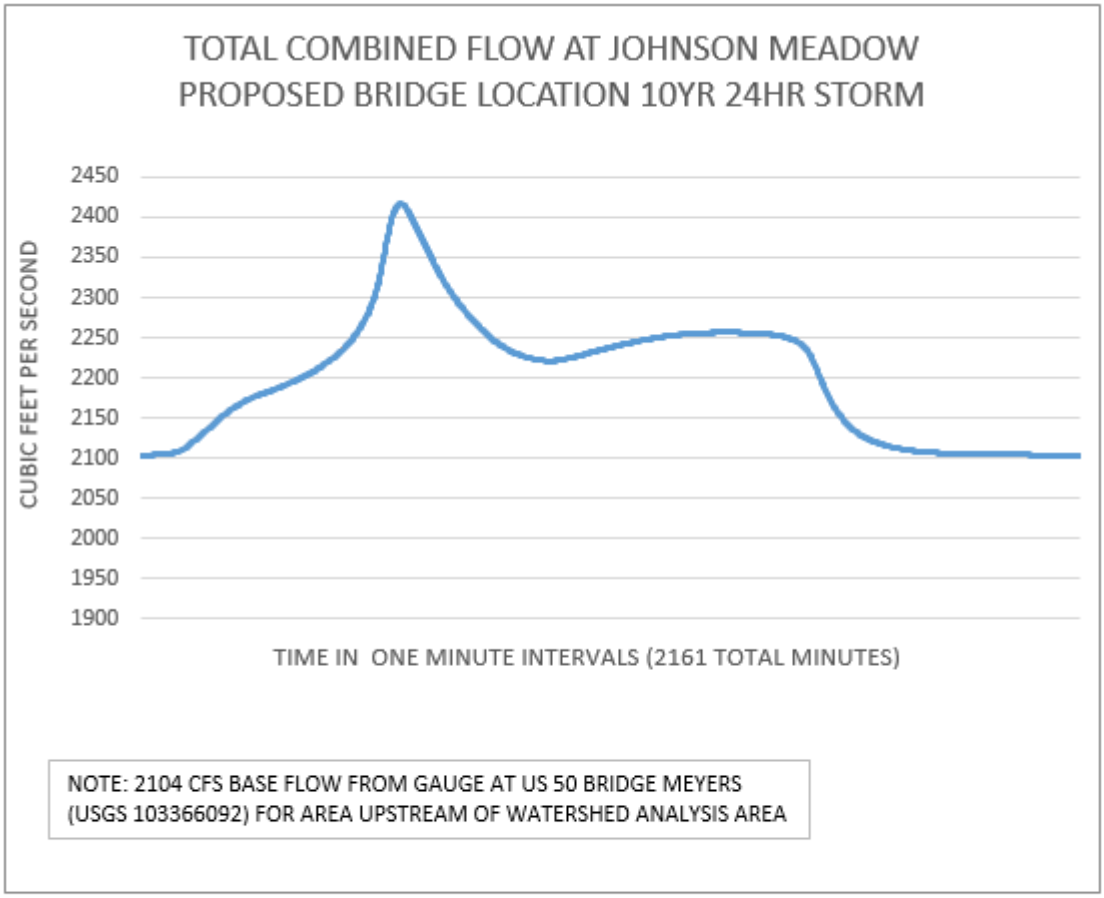
Start of Run: 01Jul2020, 12:00
End of Run: 03Jul2020, 00:00
Compute Time: 21Apr2022, 15:19:25

Basin Model: C1 (18IN)
Meteorologic Model: 100 YR 24 HR 18 IN
Control Specifications: 24 Hour

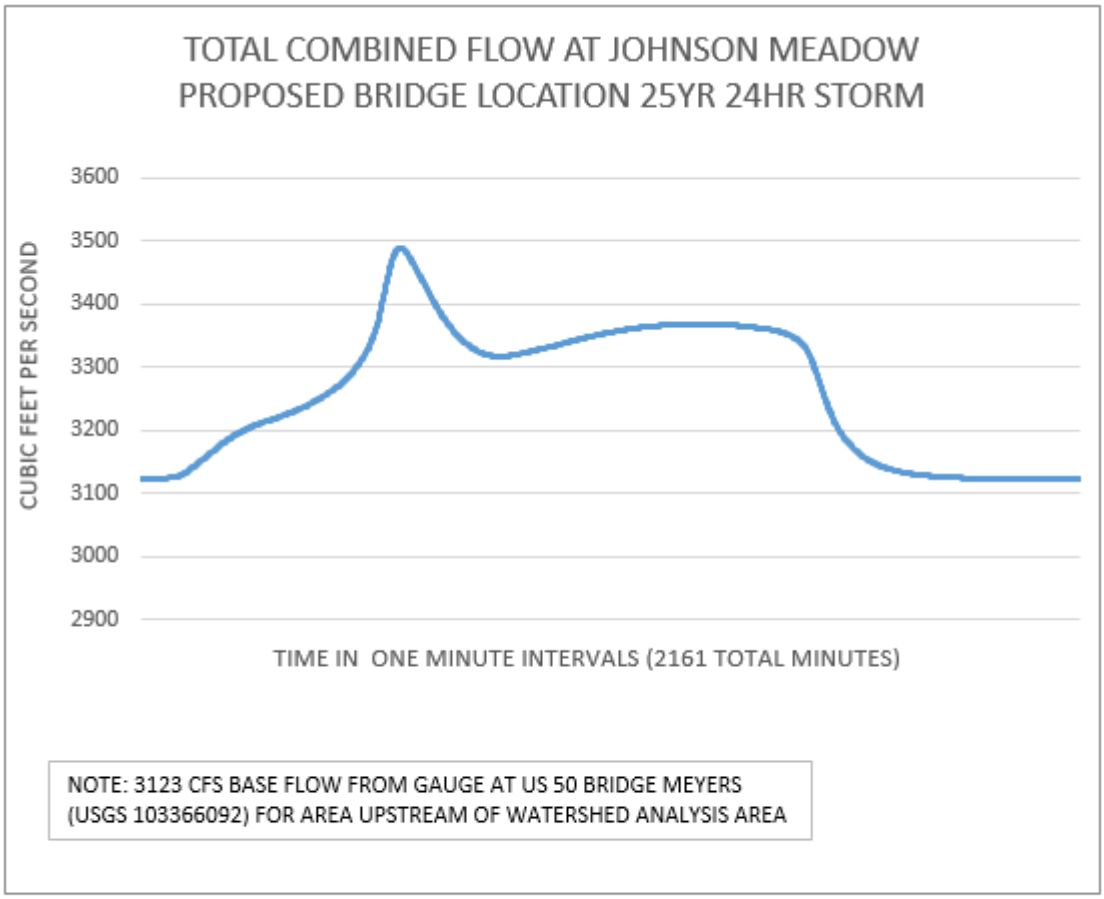
Show Elements: All Elements | Volume Units: IN (AC-FT) | Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
C1	0.68	18.2	01Jul2020, 21:38	13.5
C1 FROM B5	0.68	18.2	01Jul2020, 22:29	13.5
USGS10336610	0.68	18.2	01Jul2020, 22:29	13.5

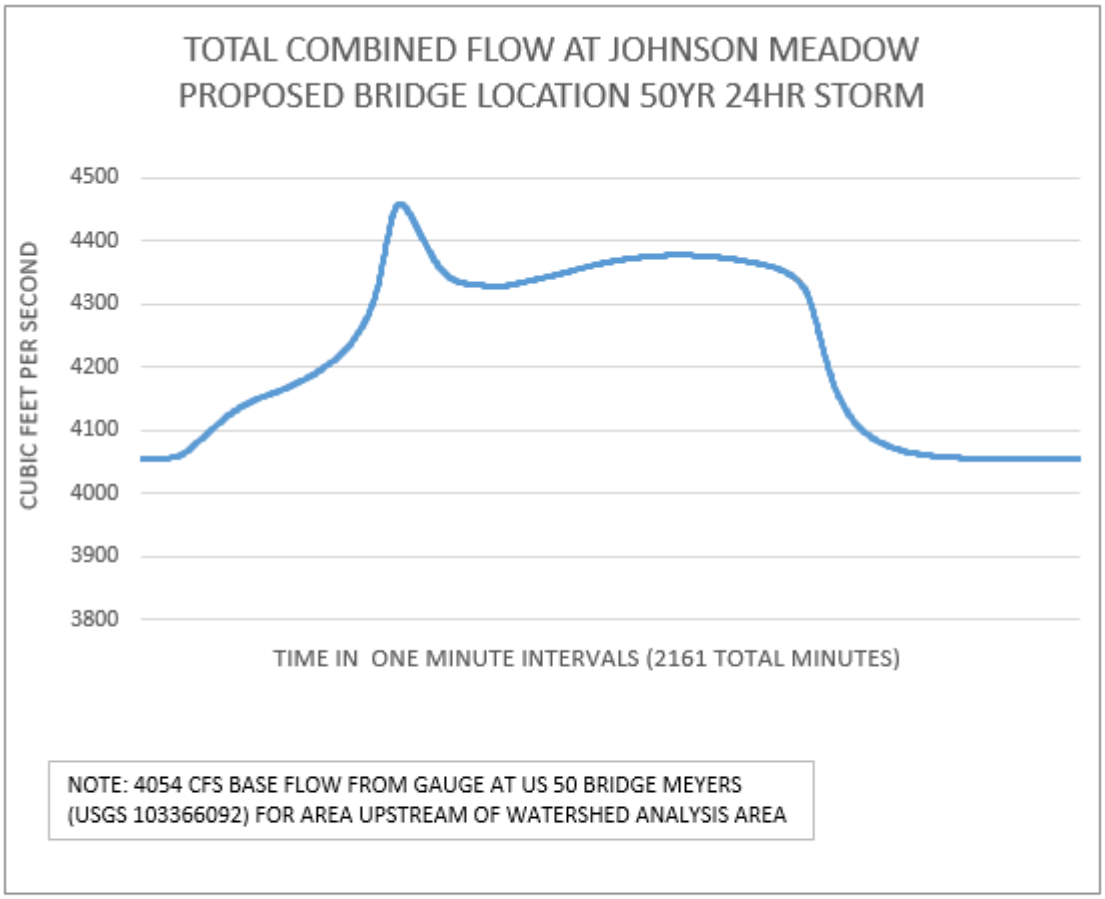
Total Combined Flow Results at Johnson Meadow Bridge and US 50 Bridge SLT (USGS10336610)



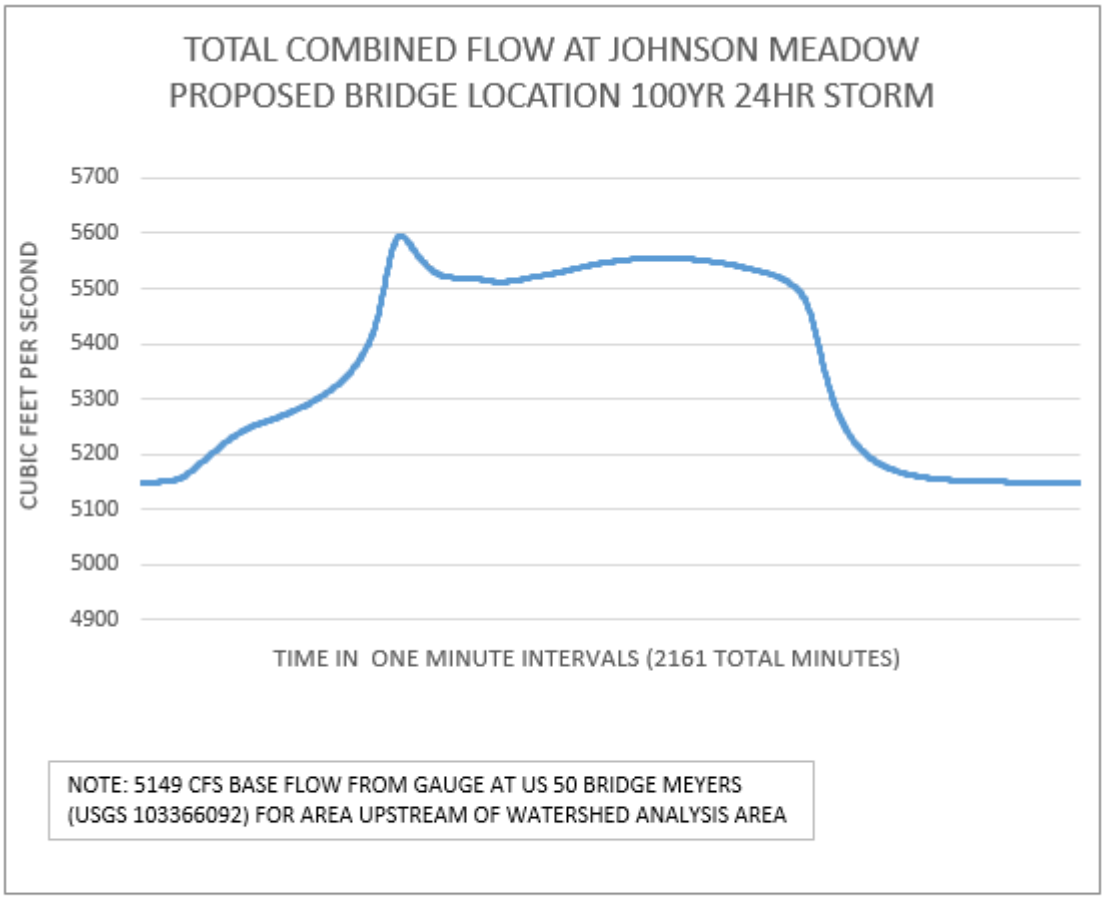
MAX COMBIND FLOW AT JOHNSON MEADOW BRIDGE	2416.8
MAX COMBIND FLOW AT US 50 BRIDGE SLT (USGS 10336610)	2428.6



MAX COMBIND FLOW AT JOHNSON MEADOW BRIDGE	3489.7
MAX COMBIND FLOW AT US 50 BRIDGE SLT (USGS 10336610)	3503.6



MAX COMBIND FLOW AT JOHNSON MEADOW BRIDGE	4459.3
MAX COMBIND FLOW AT US 50 BRIDGE SLT (USGS 10336610)	4474.6



MAX COMBIND FLOW AT JOHNSON MEADOW BRIDGE	5594.9
MAX COMBIND FLOW AT US 50 BRIDGE SLT (USGS 10336610)	5611.7

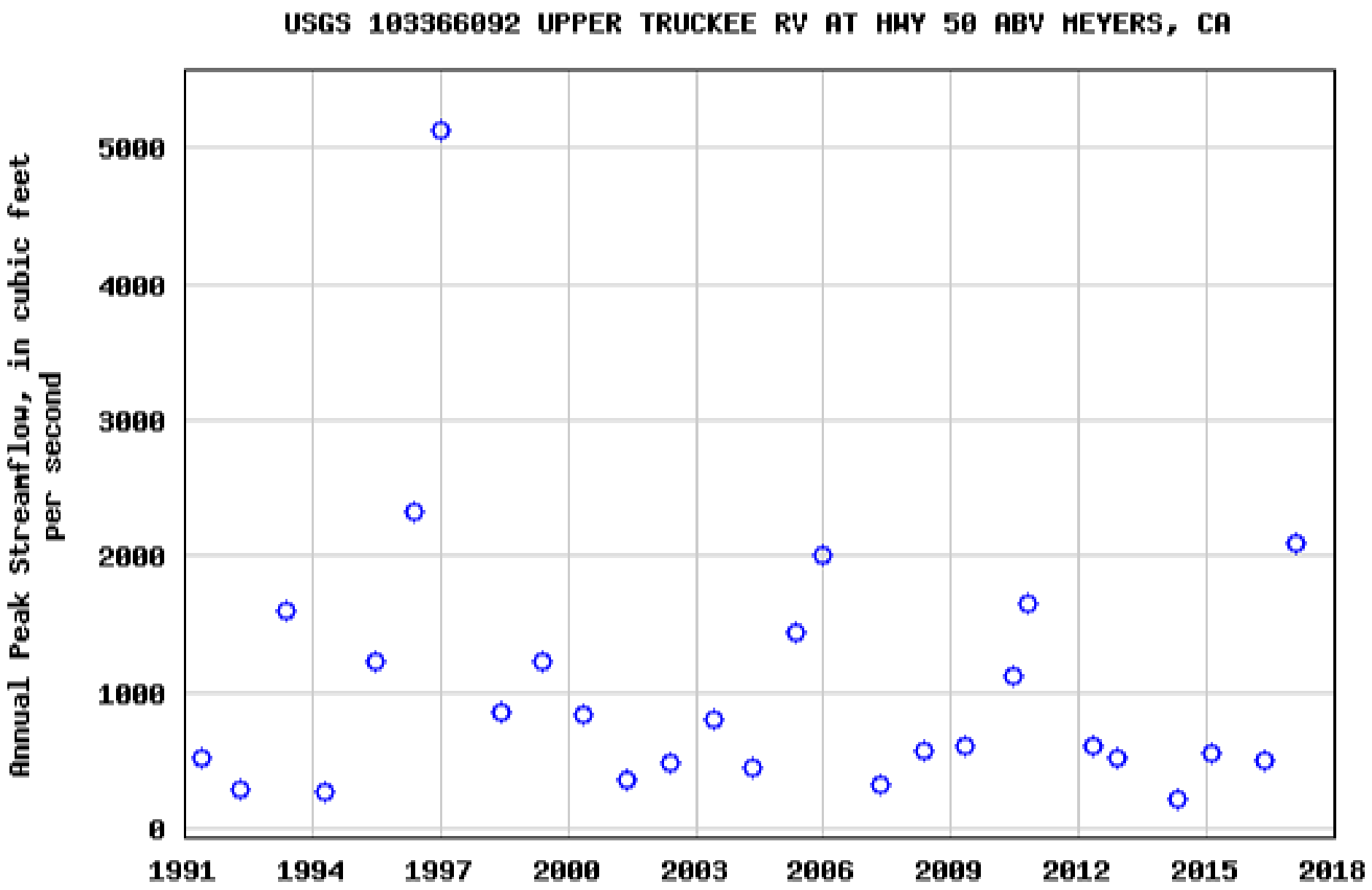
Appendix C

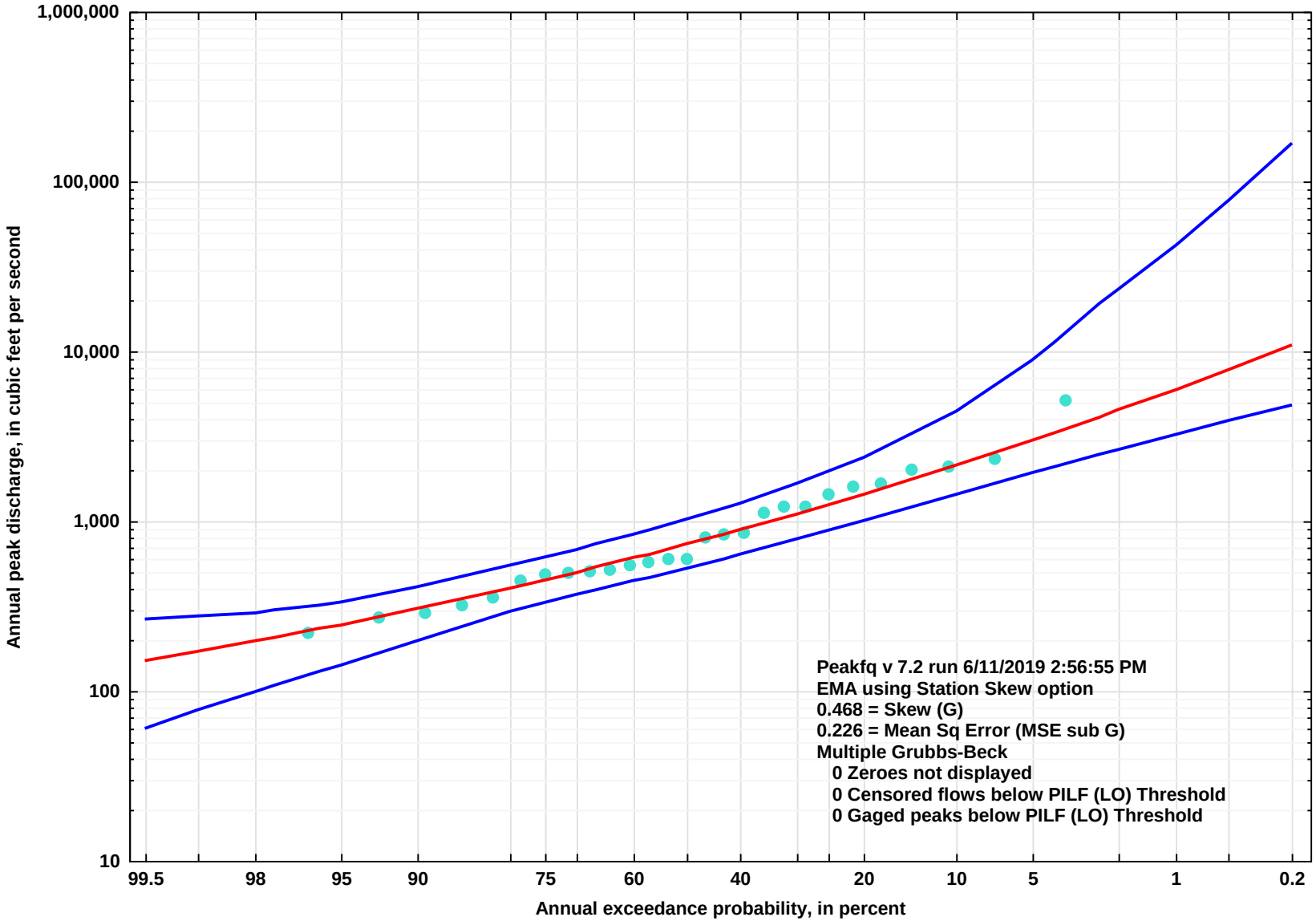
Flood Frequency Curve

USGS Station 103366092

And

USGS Station 10336610


USGS 103366092 UPPER TRUCKEE RV AT HWY 50 ABV MEYERS, CA
Annual Peak Streamflow, in cubic feet per second
5000
4000
3000
2000
1000
0
1991
1994
1997
2000
2003
2006
2009
2012
2015
2018


1,000,000
100,000
10,000
1,000
100
10
Annual peak discharge, in cubic feet per second
99.5
98
95
90
75
60
40
20
10
5
1
0.2
Annual exceedance probability, in percent
Peakfq v 7.2 run 6/11/2019 2:56:55 PM
EMA using Station Skew option
0.468 = Skew (G)
0.226 = Mean Sq Error (MSE sub G)
Multiple Grubbs-Beck
0 Zeroes not displayed
0 Censored flows below PILF (LO) Threshold
0 Gaged peaks below PILF (LO) Threshold

1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.002.000
Version 7.2 Annual peak flow frequency analysis Run Date / Time
3/28/2018 06/14/2019
14:53

--- PROCESSING OPTIONS ---

Plot option = Graphics device
Basin char output = None
Print option = Yes
Debug print = No
Input peaks listing = Long
Input peaks format = WATSTORE peak file

Input files used:
peaks (ascii) -
\\CDAData5\TD-SLT-Engineering\PROJECTS\95117 - San Bernardino\Agencies\USGS\PEAKDATA_103366092.TXT
specifications -
\\CDAData5\TD-SLT-Engineering\PROJECTS\95117 - San Bernardino\Agencies\USGS\PKFQWPSF.TMP
Output file(s):
main - \\CDAData5\TD-SLT-Engineering\PROJECTS\95117 - San Bernardino\Agencies\USGS\PEAKDATA_103366092.PRT

*** User responsible for assessment and interpretation of the following analysis ***

1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.001
Version 7.2 Annual peak flow frequency analysis Run Date / Time
3/28/2018 06/14/2019
14:53

Station - 103366092 UPPER TRUCKEE RV AT HWY 50 ABV MEYERS, CA

TABLE 1 - INPUT DATA SUMMARY

Number of peaks in record	=	27
Peaks not used in analysis	=	0
Gaged peaks in analysis	=	27
Historic peaks in analysis	=	0
Beginning Year	=	1991
Ending Year	=	2017
Historical Period Length	=	27
Skew option	=	REGIONAL
Regional skew	=	0.197
Standard error	=	0.550
Mean Square error	=	0.303
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied PILF (LO) criterion	=	--
Plotting position parameter	=	0.00
Type of analysis		EMA
PILF (LO) Test Method		MGBT

Perceptible Ranges:

Start Year	End Year	Lower Bound	Upper Bound	
1991	2017	0.0	INF	DEFAULT

Interval Data = None Specified

TABLE 2 - DIAGNOSTIC MESSAGE AND PILF RESULTS

```
   *WCF151I-17B WEIGHTED SKEW REPLACED BY USER OPTION.     0.352     0.197   1
  **WCF233W-EXPECTED PROB OUT OF RANGE AT TAB PROB.   0.00000   0.00000
    WCF002J-CALCS COMPLETED.  RETURN CODE =  2
    EMA002W-CONFIDENCE INTERVALS ARE NOT EXACT IF HISTORIC PERIOD > 0


    MULTIPLE GRUBBS-BECK TEST RESULTS
    MULTIPLE GRUBBS-BECK PILF THRESHOLD     N/A
    NUMBER OF PILFS IDENTIFIED                0
```

Kendall's Tau Parameters

	TAU	P-VALUE	MEDIAN SLOPE	No. of PEAKS
GAGED PEAKS	-0.060	0.677	-9.000	27

1

Program PeakFq — U. S. GEOLOGICAL SURVEY — Seq.001.002
Version 7.2 — Annual peak flow frequency analysis — Run Date / Time
3/28/2018 — 06/14/2019 14:53

Station - 103366092 UPPER TRUCKEE RV AT HWY 50 ABV MEYERS, CA

TABLE 3 - ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	LOGARITHMIC		
	MEAN	STANDARD DEVIATION	SKEW
EMA WITHOUT REG SKEW	2.8908	0.3324	0.468
EMA WITH REG SKEW	2.8908	0.3324	0.197

EMA ESTIMATE OF MSE OF SKEW WITHOUT REG SKEW	0.2262
EMA ESTIMATE OF MSE OF SKEW W/GAGED PEAKS ONLY (AT-SITE)	0.2262

TABLE 4 - ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	<- EMA ESTIMATE -> WITH REG SKEW	WITHOUT REG SKEW	<- FOR EMA ESTIMATE WITH REG SKEW -> LOG VARIANCE OF EST.	<-CONFIDENCE LIMITS-> 5% LOWER	95% UPPER
0.9950	124.8	151.5	0.0264	36.4	213.1
0.9900	146.5	171.1	0.0195	50.8	233.3
0.9500	230.8	246.5	0.0087	118.4	325.3
0.9000	296.8	305.4	0.0062	180.7	409.6
0.8000	405.8	403.8	0.0049	280.8	555.7

0.6667	548.2	534.6	0.0046	395.0	749.9
0.5000	758.3	732.7	0.0047	550.2	1051.0
0.4292	869.8	840.2	0.0048	630.9	1220.0
0.2000	1468.	1446.	0.0061	1054.0	2285.0
0.1000	2104.	2137.	0.0087	1469.0	3919.0
0.0400	3123.	3331.	0.0146	2058.0	8398.0
0.0200	4054.	4504.	0.0213	2525.0	15590.0
0.0100	5149.	5971.	0.0300	3009.0	26600.0
0.0050	6429.	7795.	0.0408	3509.0	42760.0
0.0020	8453.	10890.	0.0584	4188.0	79690.0

*Note: If Station Skew option is selected then EMA ESTIMATE WITH REG SKEW will
display values for and be equal to EMA ESTIMATE WITHOUT REG SKEW.
1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.003
Version 7.2 Annual peak flow frequency analysis Run Date / Time
3/28/2018 06/14/2019
14:53

Station - 103366092 UPPER TRUCKEE RV AT HWY 50 ABV MEYERS, CA

TABLE 5 - INPUT DATA LISTING

WATER YEAR	PEAK VALUE	PEAKFQ CODES	FLOW INTERVALS (WHERE LOWER BOUND NOT = UPPER BOUND) LOWER BOUND	UPPER BOUND	REMARKS
1991	511.0				
1992	289.0				
1993	1600.0				
1994	268.0				
1995	1230.0				
1996	2320.0				
1997	5120.0				
1998	853.0				
1999	1230.0				
2000	830.0				
2001	352.0				
2002	486.0				
2003	799.0				
2004	447.0				
2005	1440.0				
2006	2010.0				
2007	319.0				
2008	571.0				
2009	603.0				
2010	1120.0				
2011	1650.0				
2012	603.0				
2013	517.0				
2014	218.0				
2015	548.0				
2016	499.0				
2017	2090.0				

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION

D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
  -8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.004
Version 7.2 Annual peak flow frequency analysis Run Date / Time
3/28/2018 06/14/2019
14:53

Station - 103366092 UPPER TRUCKEE RV AT HWY 50 ABV MEYERS, CA

TABLE 6 - EMPIRICAL FREQUENCY CURVES -- HIRSCH-STEDINGER PLOTTING POSITIONS

WATER YEAR	RANKED DISCHARGE	EMA ESTIMATE	FLOW INTERVALS (WHERE LOWER BOUND NOT = UPPER BOUND) LOWER BOUND	UPPER BOUND
1997	5120.0	0.0356		
1996	2320.0	0.0713		
2017	2090.0	0.1070		
2006	2010.0	0.1427		
2011	1650.0	0.1785		
1993	1600.0	0.2142		
2005	1440.0	0.2499		
1995	1230.0	0.3214		
1999	1230.0	0.2856		
2010	1120.0	0.3571		
1998	853.0	0.3928		
2000	830.0	0.4285		
2003	799.0	0.4643		
2009	603.0	0.5357		
2012	603.0	0.5000		
2008	571.0	0.5715		
2015	548.0	0.6072		
2013	517.0	0.6429		
1991	511.0	0.6786		
2016	499.0	0.7144		
2002	486.0	0.7501		
2004	447.0	0.7858		
2001	352.0	0.8215		
2007	319.0	0.8573		
1992	289.0	0.8930		
1994	268.0	0.9287		
2014	218.0	0.9644		

1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.005
Version 7.2 Annual peak flow frequency analysis Run Date / Time
3/28/2018 06/14/2019
14:53

Station - 103366092 UPPER TRUCKEE RV AT HWY 50 ABV MEYERS, CA

TABLE 7 - EMA REPRESENTATION OF DATA

					<---- USER-ENTERED	
----><-------- FINAL ------->						
WATER <----- OBSERVED ----><-------- EMA -------><- PERCEPTIBLE RANGES -><- PERCEPTIBLE RANGES ->						
YEAR	Q_LOWER	Q_UPPER	Q_LOWER	Q_UPPER	LOWER	UPPER
1991	511.0	511.0	511.0	511.0	0.0	INF
0.0	INF					
1992	289.0	289.0	289.0	289.0	0.0	INF
0.0	INF					
1993	1600.0	1600.0	1600.0	1600.0	0.0	INF
0.0	INF					
1994	268.0	268.0	268.0	268.0	0.0	INF
0.0	INF					
1995	1230.0	1230.0	1230.0	1230.0	0.0	INF
0.0	INF					
1996	2320.0	2320.0	2320.0	2320.0	0.0	INF
0.0	INF					
1997	5120.0	5120.0	5120.0	5120.0	0.0	INF
0.0	INF					
1998	853.0	853.0	853.0	853.0	0.0	INF
0.0	INF					
1999	1230.0	1230.0	1230.0	1230.0	0.0	INF
0.0	INF					
2000	830.0	830.0	830.0	830.0	0.0	INF
0.0	INF					
2001	352.0	352.0	352.0	352.0	0.0	INF
0.0	INF					
2002	486.0	486.0	486.0	486.0	0.0	INF
0.0	INF					
2003	799.0	799.0	799.0	799.0	0.0	INF
0.0	INF					
2004	447.0	447.0	447.0	447.0	0.0	INF
0.0	INF					
2005	1440.0	1440.0	1440.0	1440.0	0.0	INF
0.0	INF					
2006	2010.0	2010.0	2010.0	2010.0	0.0	INF
0.0	INF					
2007	319.0	319.0	319.0	319.0	0.0	INF
0.0	INF					
2008	571.0	571.0	571.0	571.0	0.0	INF
0.0	INF					
2009	603.0	603.0	603.0	603.0	0.0	INF
0.0	INF					
2010	1120.0	1120.0	1120.0	1120.0	0.0	INF
0.0	INF					
2011	1650.0	1650.0	1650.0	1650.0	0.0	INF
0.0	INF					
2012	603.0	603.0	603.0	603.0	0.0	INF
0.0	INF					
2013	517.0	517.0	517.0	517.0	0.0	INF
0.0	INF					
2014	218.0	218.0	218.0	218.0	0.0	INF
0.0	INF					
2015	548.0	548.0	548.0	548.0	0.0	INF
0.0	INF					
2016	499.0	499.0	499.0	499.0	0.0	INF
0.0	INF					
2017	2090.0	2090.0	2090.0	2090.0	0.0	INF
0.0	INF					

1

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 27

Data records may have been ignored for the stations listed below.

(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)

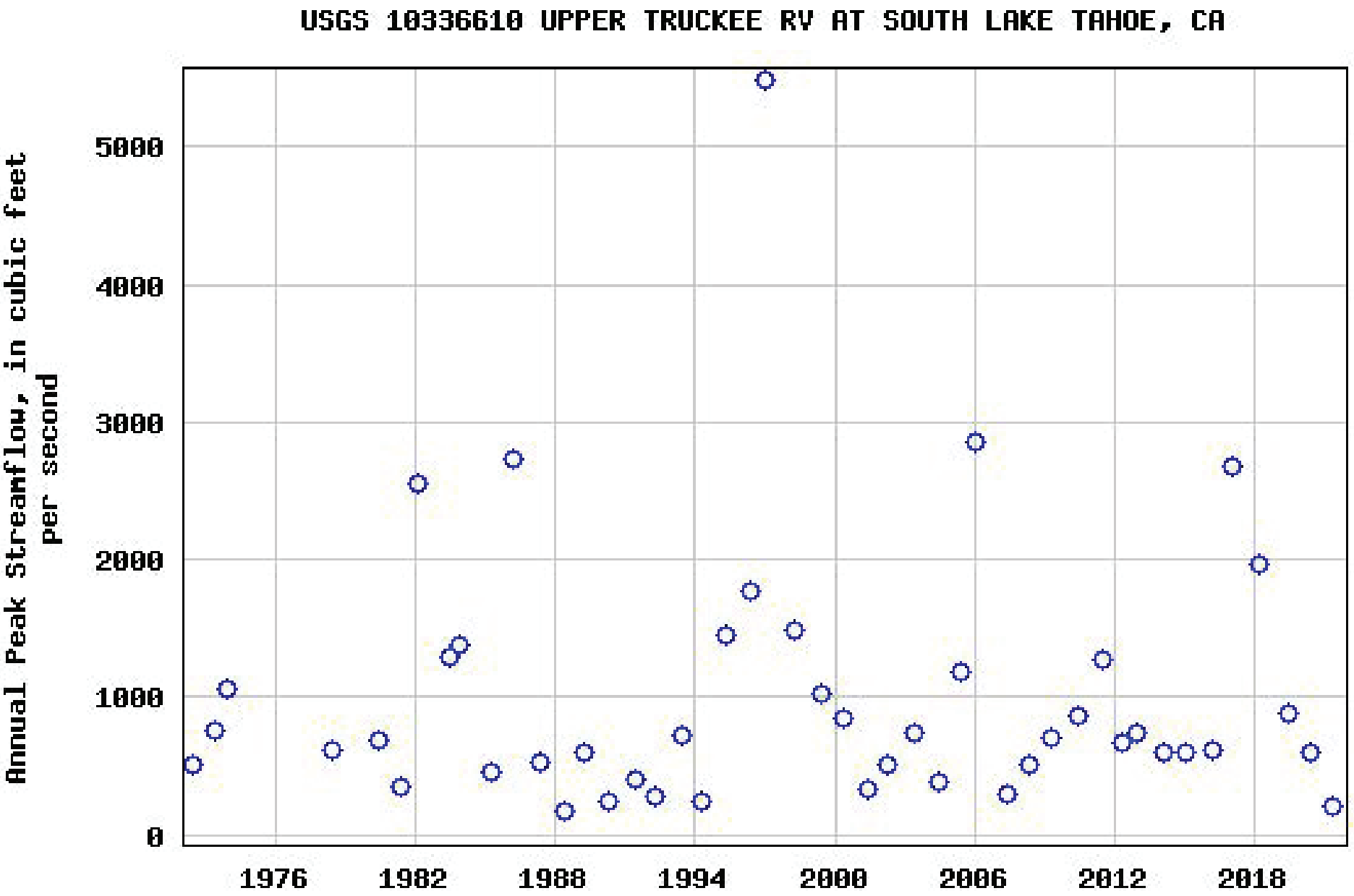
(2, 4, and * records are ignored.)

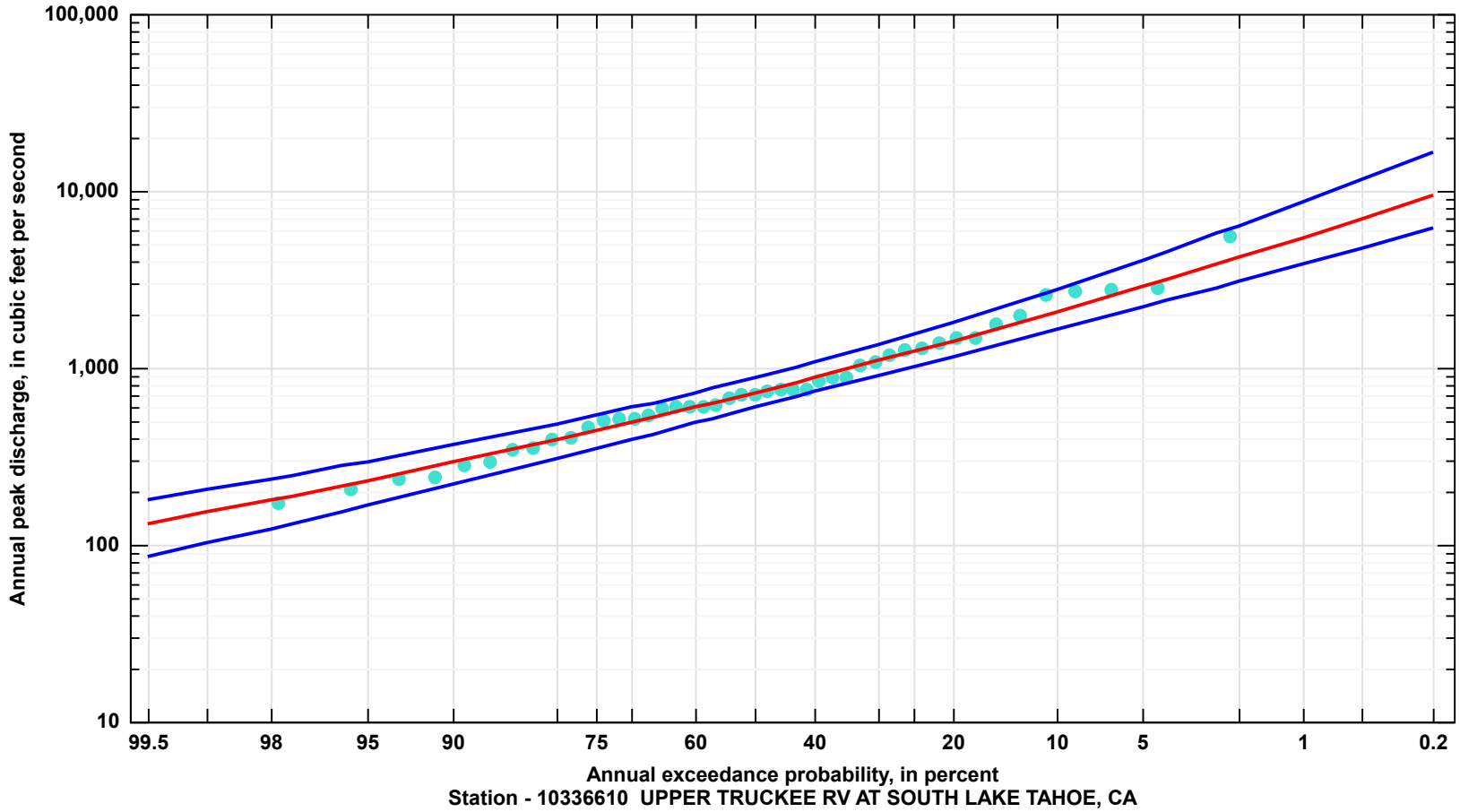
For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 103366092 USGS UPPER TRUCKEE RV AT HWY 50 AB

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:


USGS 10336610 UPPER TRUCKEE RV AT SOUTH LAKE TAHOE, CA
Annual Peak Streamflow, in cubic feet per second
5000
4000
3000
2000
1000
0
1976
1982
1988
1994
2000
2006
2012
2018



ANALYSIS INFO:
Peakfq v 7.3 run 3/22/2022 8:31:12 AM
B17B using Weighted Skew option
0.327 = Skew (G); Multiple Grubbs-Beck
0 Zeroes not displayed
0 Censored flows below PILF (LO) Threshold
0 Gaged peaks below PILF (LO) Threshold

1

```
  Program PeakFq           U. S. GEOLOGICAL SURVEY             Seq.002.000
  Version 7.3         Annual peak flow frequency analysis      Run Date / Time
  10/25/2019                                                    03/22/2022 08:31

                         --- PROCESSING OPTIONS ---

                      Plot option         = Graphics device
                      Basin char output   = None
                      Print option        = Yes
                      Debug print         = No
                      Input peaks listing = Long
                      Input peaks format  = WATSTORE peak file

                      Input files used:
                         peaks (ascii)  -
\\CDAData5\TD-SLT-Engineering\PROJECTS\95201\Hydrology\PeakFQ\UTR AT CARROWS
PEAK.TXT
                         specifications -
\\CDAData5\TD-SLT-Engineering\PROJECTS\95201\Hydrology\PeakFQ\PKFQWPSF.TMP

                      Output file(s):
                         main -
\\CDAData5\TD-SLT-Engineering\PROJECTS\95201\Hydrology\PeakFQ\UTR AT CARROWS
PEAK.PRT


  ***  User responsible for assessment and interpretation of the following analysis
 ***
```

1

```
  Program PeakFq           U. S. GEOLOGICAL SURVEY             Seq.001.001
  Version 7.3         Annual peak flow frequency analysis      Run Date / Time
  10/25/2019                                                    03/22/2022 08:31

          Station - 10336610  UPPER TRUCKEE RV AT SOUTH LAKE TAHOE, CA


                     TABLE 1 - INPUT DATA SUMMARY

                Number of peaks in record           =       46
                Peaks not used in analysis          =        1
                Gaged peaks in analysis             =       45
                Historic peaks in analysis          =        0
                Beginning Year                      =     1972
                Ending Year                         =     2021
                Historical Period Length            =       50
                Skew option                         =   WEIGHTED
```

```
Regional skew                          =    0.300
     Standard error                    =    0.550
     Mean Square error                 =    0.303
Gage base discharge                    =      0.0
User supplied high outlier threshold =   --
User supplied PILF (LO) criterion    =   --
Plotting position parameter            =     0.00
Type of analysis                         BULL.17B
PILF (LO) Test Method                        MGBT
Perceptible Ranges                 =   Not Applicable
Interval Data                      =   Not Applicable
```

TABLE 2 - DIAGNOSTIC MESSAGE AND PILF RESULTS

```
**WCF109W-PEAKS WITH MINUS-FLAGGED DISCHARGES WERE BYPASSED.       1
**WCF113W-NUMBER OF SYSTEMATIC PEAKS HAS BEEN REDUCED TO NSYS =   45
  WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE.                   0.0
  WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE.      6153.7
**WCF164W-HISTORIC PERIOD IGNORED.    50.0
**WCF233W-EXPECTED PROB OUT OF RANGE AT TAB PROB.   0.00000   0.00000
  WCF002J-CALCS COMPLETED.  RETURN CODE =  2
```

Kendall's Tau Parameters

	TAU	P-VALUE	MEDIAN SLOPE	No. of PEAKS
GAGED PEAKS	0.022	0.837	1.687	45

1

Program PeakFq — U. S. GEOLOGICAL SURVEY — Seq.001.002
Version 7.3 — Annual peak flow frequency analysis — Run Date / Time
10/25/2019 — 03/22/2022 08:31

Station - 10336610 UPPER TRUCKEE RV AT SOUTH LAKE TAHOE, CA

TABLE 3 - ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

FLOOD BASE		LOGARITHMIC		
DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW

SYSTEMATIC RECORD	0.0	1.0000	2.8784	0.3340	0.340
BULL.17B ESTIMATE	0.0	1.0000	2.8784	0.3340	0.327

BULL.17B ESTIMATE OF MSE OF AT-SITE SKEW 0.1383

TABLE 4 - ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	<-- FOR BULLETIN 17B ESTIMATES --> LOG VARIANCE OF EST.	CONFIDENCE INTERVALS 5.0% LOWER	95.0% UPPER
0.9950	132.0	133.2	----	86.4	180.7
0.9900	152.2	153.3	----	102.2	204.8
0.9500	230.1	230.8	----	166.1	295.5
0.9000	290.9	291.3	----	218.1	365.3
0.8000	392.0	391.9	----	306.5	481.0
0.6667	525.3	524.7	----	424.1	635.9
0.5000	724.8	723.6	----	597.5	876.8
0.4292	831.9	830.5	----	688.4	1011.0
0.2000	1422.	1421.	----	1161.0	1813.0
0.1000	2072.	2074.	----	1642.0	2787.0
0.0400	3155.	3164.	----	2393.0	4554.0
0.0200	4182.	4202.	----	3068.0	6354.0
0.0100	5428.	5465.	----	3854.0	8663.0
0.0050	6931.	6993.	----	4768.0	11600.0
0.0020	9394.	9505.	----	6205.0	16690.0

Station - 10336610 UPPER TRUCKEE RV AT SOUTH LAKE TAHOE, CA

TABLE 5 - INPUT DATA LISTING

WATER YEAR	PEAK VALUE	PEAKFQ CODES	REMARKS
1972	518.0		
1973	754.0		
1974	1070.0		
1978	-610.0	O	
1980	697.0		

1981	352.0
1982	2550.0
1983	1300.0
1984	1380.0
1985	459.0
1986	2740.0
1987	533.0
1988	170.0
1989	595.0
1990	236.0
1991	402.0
1992	284.0
1993	729.0
1994	240.0
1995	1460.0
1996	1780.0
1997	5480.0
1998	1480.0
1999	1020.0
2000	850.0
2001	340.0
2002	502.0
2003	750.0
2004	390.0
2005	1180.0
2006	2850.0
2007	292.0
2008	513.0
2009	706.0
2010	873.0
2011	1270.0
2012	678.0
2013	745.0
2014	596.0
2015	598.0
2016	612.0
2017	2680.0
2018	1970.0
2019	889.0
2020	592.0
2021	204.0

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value

X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
O	O	Opportunistic peak
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
  -8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.004
Version 7.3 Annual peak flow frequency analysis Run Date / Time
10/25/2019 03/22/2022 08:31

Station - 10336610 UPPER TRUCKEE RV AT SOUTH LAKE TAHOE, CA

TABLE 6 - EMPIRICAL FREQUENCY CURVES -- WEIBULL PLOTTING POSITIONS

WATER YEAR	RANKED DISCHARGE	SYSTEMATIC RECORD	B17B ESTIMATE
1997	5480.0	0.0217	0.0217
2006	2850.0	0.0435	0.0435
1986	2740.0	0.0652	0.0652
2017	2680.0	0.0870	0.0870
1982	2550.0	0.1087	0.1087
2018	1970.0	0.1304	0.1304
1996	1780.0	0.1522	0.1522
1998	1480.0	0.1739	0.1739
1995	1460.0	0.1957	0.1957
1984	1380.0	0.2174	0.2174
1983	1300.0	0.2391	0.2391
2011	1270.0	0.2609	0.2609
2005	1180.0	0.2826	0.2826
1974	1070.0	0.3043	0.3043
1999	1020.0	0.3261	0.3261
2019	889.0	0.3478	0.3478
2010	873.0	0.3696	0.3696
2000	850.0	0.3913	0.3913
1973	754.0	0.4130	0.4130
2003	750.0	0.4348	0.4348
2013	745.0	0.4565	0.4565
1993	729.0	0.4783	0.4783
2009	706.0	0.5000	0.5000
1980	697.0	0.5217	0.5217

2012	678.0	0.5435	0.5435
2016	612.0	0.5652	0.5652
2015	598.0	0.5870	0.5870
2014	596.0	0.6087	0.6087
1989	595.0	0.6304	0.6304
2020	592.0	0.6522	0.6522
1987	533.0	0.6739	0.6739
1972	518.0	0.6957	0.6957
2008	513.0	0.7174	0.7174
2002	502.0	0.7391	0.7391
1985	459.0	0.7609	0.7609
1991	402.0	0.7826	0.7826
2004	390.0	0.8043	0.8043
1981	352.0	0.8261	0.8261
2001	340.0	0.8478	0.8478
2007	292.0	0.8696	0.8696
1992	284.0	0.8913	0.8913
1994	240.0	0.9130	0.9130
1990	236.0	0.9348	0.9348
2021	204.0	0.9565	0.9565
1988	170.0	0.9783	0.9783
1978	-610.0	--	--

1

End PeakFQ analysis.

Stations processed	:	1
Number of errors	:	0
Stations skipped	:	0
Station years	:	46

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 10336610 USGS UPPER TRUCKEE RV AT SOUTH LAK

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

COUNTY OF EL DORADO
DEPARTMENT OF TRANSPORTATION

INTEROFFICE MEMORANDUM

Date: August 27, 2024

To: File

From: Daniel Kikkert, PE and Dave Goodell

Subject: South Tahoe Greenway - Upper Truckee Bridge at Johnson Meadow Project Hydrologic Analysis Report, County Project 95201 (36107023)

6. Hydraulic Model Development

The hydraulic model was extended approximately 605 feet upstream (Station 21+90) and 585 feet downstream (Station 10+00) of the proposed bridge location (Station 15+85). A steady-flow model was developed using HEC-RAS version 5.0.7[1]. Five water surface profiles, corresponding to 10-year, 25-year, 50-year, 100-year and 500-year peak discharges were developed.

6.1. Stream Channel Geometry Development

Cross section and alignment used for hydraulic modeling were derived using AutoCAD[2] surface data based on topographic surveys performed by the DOT. The terrain model was augmented with the Drone Airborne Lidar data collected by El Dorado County Department of Transportation in 2023. For each stream reach, four sets of data were used to develop HEC-RAS geometry: 1) stream centerline, 2) cross section cut lines, 3) lines representing left and right banks, and 4) flow paths. Cross sections were developed for the proposed project locations upstream and downstream of the bridge.

6.2. Bridge Modeling

Bridge scenarios were modeled using AutoCAD cross sections for computation of energy losses. Table 3 summarizes the proposed bridge dimensions used in the HEC-RAS model.

Table 3: Existing and Proposed Bridge Parameters

Upper Truckee River Bridge Crossing	HEC-RAS River Station	Possible Bridge Waterway (ft)	Total Bridge Width (ft)	No of Piers	No. of Abutments	Low Chord Elevation (ft)	Approx. Angle of Attack Against the Abutment (deg)
Proposed	15+85	135	14	100	2	6248.20	90

Proposed construction includes bridge abutments with rock armoring, see drawing included in Appendix D. Boardwalk piers have been included in the proposed condition.

6.3. Boundary Condition

Steady flow boundary condition was used for proposed bridge to represent the general channel hydraulics. For existing and proposed conditions and based on existing ground conditions, normal depth with a normal depth slope of 0.001069 ft/ft for the Upper Truckee River crossing was utilized for all profiles.

6.4. Losses

Selection of an appropriate value for Manning's *n* is very significant to the accuracy of the computed water surface profiles. The value of Manning's *n* is highly variable and depends on a number of factors including: surface roughness, vegetation, channel irregularities, channel alignment, scour and deposition, obstruction, sizes and shape of the channel, stage and discharge, seasonal changes, temperature, suspended materials, and bed load.

The most important factors that affect that selection of the channel *n* values are: 1) the type and size of the materials that compose the bed and banks of a channel, and 2) the shape of the channel. Manning's *n* values were estimated by analyzing existing land and site visits of the study area. The estimated roughness coefficients utilized for the Upper Truckee River and overbank reaches for this report are summarized in Table 4.

Table 4: Estimated Manning's *n* values for Upper Truckee River Hydraulic Model

Reach	East Overbank *n*	Channel *n*	West Overbank *n*
Upper Truckee Entire Study Reach-Existing Condition	0.055	0.04	0.055

In general, contraction and expansion coefficients used are 0.1 and 0.3, respectively. For the typical bridge section contraction and expansion coefficients used are 0.3 and 0.5 respectively.

6.5. Ineffective Flow Location

The ineffective area option for the proposed bridge is used to keep all the active flow in the area of the existing creek channel. No ineffective areas were modeled for the river crossing.

7. Bridge Hydraulic Analysis

Two hydraulic model scenarios were developed to evaluate the Upper Truckee River crossing hydrology study area. These scenarios represent the existing and proposed condition. Each condition has unique geometry and hydraulic circumstances.

- **Scenario 1: Existing – No Bridge -** Hydraulic Model for Scenario 1 represents the Upper Truckee River with no shared use trail bridge crossing the Upper Truckee River.
- **Scenario 2: Proposed Bridge-** Hydraulic Model for Scenario 2 represents the proposed bridge at or close to the proposed bridge location for the Upper Truckee River.

8. Hydraulic Model Results

8.1. General

The summary of HEC-RAS output table is included in Appendix E.

8.2. Hydraulic Findings

Table 5 summarizes the hydraulic model results.

Table 5: Summary of the Results at the Bridge Location.

Upper Truckee River Crossing (STA 15+85.00), low chord at 6248.20

Profile	Peak Flow (cfs)	WSE	U/S Velocity (ft/s)	Freeboard Requirement
10-year Existing	2416.8	6242.70	4.00	-
10-year Proposed		6242.70	4.00	
50-year Existing	4459.3	6243.52	4.28	-
50-year Proposed		6243.55	4.20	3 feet*, passes (4.65 feet)
100-year Existing	5594.9	6243.85	4.46	-
100-year Proposed		6243.88	4.36	Passes (4.32 feet)
100-year (FEMA**) Existing	7376	6244.27	4.82	-
100-year (FEMA**) Proposed		6244.32	4.70	Passes (3.88 feet)

U/S = upstream

* 3 feet recommended to mitigate potential for high debris flows[3].

** FEMA[4] peak flows are presented as a cross check against the HEC-HMS analysis[5].

Existing condition for the Upper Truckee River

The cross section provided in Appendix E from hydraulic modeling indicates that the 100-year and 50-year event water surfaces are 6243.84 feet and 6243.46 feet, respectively.

Proposed condition for the Upper Truckee River Bridge

The cross section provided in Appendix E from hydraulic modeling indicates that the 100-year and 50-year event water surfaces are 6243.84 feet and 6243.46 feet, respectively. To maintain minimum of 3 ft freeboard for design flood (50-year event), the low chord elevation of the bridge shall be located at or above an elevation of 6246.46 ft. The proposed preliminary design provides an approximate low chord elevation of 6248.2 ft, which meets freeboard requirements.

9. Scour Analysis

9.1. General

Flow velocities at the bridge location were reviewed for the purpose of determining scour potential. The minimum design standard for bridge scour is the base flood (100-year event). Bridge foundations were evaluated to ensure that they will not fail due to scour resulting from the occurrence of a 500-year flood. Scour analysis has been performed using the methodology described in Hydraulic Engineering Circular No 18, Evaluating Scour at Bridge (April 2012)[6].

Scour is the result of the erosive action of flowing water, excavating and carrying away materials from the bed and the bank of the stream and from around the piers and abutments of the bridges. The most common cause of the bridge failure is scouring of bed materials around bridge foundations. It should be noted that scour rates are dependent on the particular materials found adjacent to foundations. Loose granular soils are prone to rapid erosion by flowing water, while cohesive or cemented soils are more scour resistant.

9.2. Scour Analysis Methodology

No geologic hazards have been identified at the Upper Truckee River Bridge site. As mentioned before, the proposed Upper Truckee River bridge site upper layers consists of 8 feet of silty sand (East abutment - Boring B-02) and 3-1/2 feet of fat clay with sand and 8 feet for silty sand (West abutment – Boring B-01) [7]. No bedrock was encountered during the boring performed at the Upper Truckee River Bridge sites.

A preliminary scour analysis has been computed using the hydraulic model developed and available soil data. A particle size distribution test was completed by Corestone Engineering, Inc., for bed samples within 1 feet of the ground surface taken from Upper Truckee River at the proposed bridge crossing location. The resulting approximate value of mean size fraction of the bed material (D_{50}) was 0.9504 mm (West abutment TH-02) and 0.5761 mm (East abutment TH-01).

9.3. Long Term Aggradation and Degradation

Long-term aggradation and degradation may be the result of natural or anthropogenic forces. The streambed may be aggrading, degrading, or in relative equilibrium in the vicinity of the bridge crossing. No long term degradation and aggradation data is available at the Upper Truckee River bridge location. Therefore long term aggradation and degradation is assumed to be negligible.

9.4. Contraction Scour

Contraction scour occurs when the flow area of the stream is reduced by natural features or by constructed features, such as a bridge. The HEC-RAS program offer options to either manually input one these forms of contraction or to select the default option where the program automatically determines the form of contraction to be used based on critical velocities and mean flow velocities in the channel and overbanks.

As stated before, the values of 0.9504 mm and 0.5761 mm were assigned for D_{50} at the abutment locations and water temperature was assumed to be 60°F. Contraction scour was computed for the 100-year and scour evaluated for the 500-year flood event. Results of the contraction scour are presented in Table 6. The contraction scour was computed using the overall width of flood waters contracted by the total width of the piers and abutments.

Table 6: Summary of Contraction Scour at the Proposed Bridge

Parameters	100-year Flood		
	East Overbank	**Channel**	**West Overbank**
Contraction Scour			
Scour Depth Ys (ft)	0.00	0.22	0.00
Critical Velocity (ft/s)	1.11	0.92	1.53
Equation	Clear	Live	Live

9.5. Local Scour

Local scour consists of pier and abutment scour. In this case the abutments were modeled as piers due to their configuration. Potential local scour for the proposed boardwalk piers and at the bridge abutment is a concern. Local scour occurs where surface flows around the bridge and boardwalk supports.

Local scour was computed using the Colorado State University (CSU) equation. The CSU approach is known to provide conservative results. The user is required to enter the scour parameters including pier diameter and D_{50} & D_{95} of bed material. The program selects values for all of the other variables based on the hydraulic output and the default settings. The results of the local scour are presented in Table 7.

Table 7: Summary of Local Scour at the Piers for 100-year event

Modeled Pier # Pairs	Pier Width (ft)	Froude Number	Scour Depth (ft)	Contraction Scour (ft)
1	1.2	-	-	+0.00
2*	3.5	-	-	+0.22
3*	3.5	0.46	5.1	
4	1.2	0.65	2.32	
5	1.2	0.27	1.71	
6	1.2	0.23	1.79	
7	1.2	0.23	1.79	
8	1.2	0.24	1.76	
9	1.2	0.27	1.7	
10	1.2	0.28	1.7	
11	1.2	0.23	1.78	
12	1.2	0.23	1.79	
13	1.2	0.25	1.74	
14	1.2	0.24	1.76	
15	1.2	0.29	1.67	
16	1.2	0.30	1.66	
17	1.2	0.21	1.83	
18	1.2	0.16	1.98	
19	1.2	0.22	1.8	
20	1.2	0.29	1.68	
21	1.2	0.29	1.68	
22	1.2	0.28	1.69	
23	1.2	0.25	1.75	
24	1.2	0.28	1.7	
25	1.2	0.26	1.73	
26	1.2	0.35	1.59	+0.00
27	1.2	0.46	1.48	
28	1.2	0.37	1.57	
29	1.2	0.28	1.7	
30	1.2	0.36	1.58	
31	1.2	0.36	1.58	
32	1.2	0.35	1.6	
33	1.2	0.24	1.76	
34	1.2	0.17	1.94	
35	1.2	0.29	1.67	
36	1.2	0.27	1.71	
37	1.2	0.25	1.74	
38	1.2	0.24	1.76	
39	1.2	0.22	1.81	
40	1.2	0.22	1.8	
41	1.2	0.23	1.79	
42	1.2	0.23	1.79	
43	1.2	0.22	1.8	
44	1.2	0.23	1.79	
45	1.2	0.23	1.78	
46	1.2	0.23	1.79	
47	1.2	0.23	1.79	
48	1.2	0.24	1.76	

* Bridge Support Locations

9.6. Total Scour

Total scour is the combination of long-term elevation changes (aggradation and degradation), contraction scour, and local scour at each individual pier and abutment location. Long term bed elevation changes and contraction scour were assumed to be negligible. The total scour was computed as the local scour plus the minor contraction scour. The total scour of the proposed bridge is presented in Table 8. Figure 3 represents the total scour at the proposed bridge location.

Table 8: Summary of Total Scour at the Proposed Bridge*

	100-year Flood		
Parameters	**East Overbank**	**Channel****	**West Overbank**
Scour Depth (ft)	1.98	5.10	0.00

**Total scour does not consider other type of soil or metamorphic rock & competent rock present in the field and the type of foundations that are being proposed. Scour should not occur below the elevation of the competent rock.*
*** Channel scour is due to pier structures.*

Total scour is estimated in the order of 2 feet at the pier locations and order of 5 feet at the abutment location based on assumed sample which is erodible silty sand. Assumed soil does not represent fractured metamorphic rock, fresh rock or bedrock. Because of the scour potential on the Upper Truckee River during an extreme event, rip-rap or artificial armor is recommended at both bridge abutments. Based on the upstream velocity from the proposed bridge location and the maximum rip-rap placement slope 1.5:1, the minimum size of rock is 60 lb (Class No. 2) or equivalent consistent to the Caltrans Highway Design Manual and USACOE EM 1110-2-1601[8]. If Rock Slope Protection (RSP) is chosen it is recommended that the designed rip rap shall be placed by method B per Caltrans Standard Specifications[9].

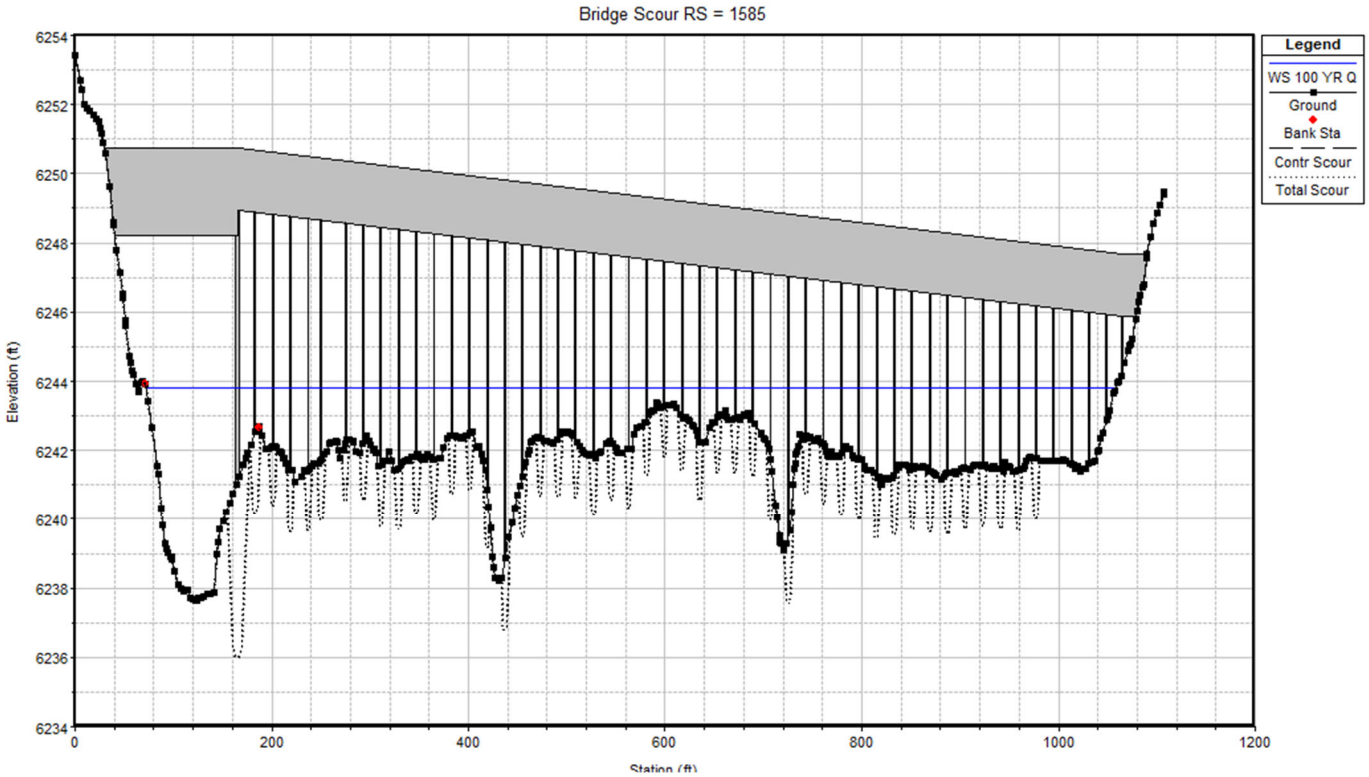


Figure 1: Contraction scour and total scour at the proposed bridge

10. Conclusion

To satisfy Caltrans hydraulic design requirements for 50-year peak flows, it is advised to follow the recommendations below. Table 9 summarizes the recommendations based on Caltrans and the County of El Dorado design criteria.

Table 9: Recommendations

Caltrans Requirement	Summary/Recommendations
• **The proposed bridge shall be able to pass the two percent (2%) probability flood or tide (Q_{50}) or the flood-of-record, whichever is greater without causing objectionable backwater, excessive flow velocities, or encroaching on through traffic lanes. Sufficient freeboard, the vertical clearance between the lowest structural member, and the water surface elevation of the design flood should be provided. A minimum freeboard of 2 feet is often assumed for preliminary bridge design. 3 foot is assumed in this scenario to account for any increase due to debris.**	• **To meet the minimum requirement of a 3-foot freeboard for 50-year event flood, the low chord elevation of the proposed bridge is recommended to be set at or above an elevation of 6246.46. Banks and abutments shall be protected with a minimum size 60 lb rip-rap, method B placement considering low turbulence condition.** • **The foundations of the bridge will be set to a sufficient depth or to competent rock in order to ensure scour protection and stability.** • **Foundation type should be consistent to the *Construction Consideration* section of the *Geotechnical Report.*** • **The transitions between proposed bridge section and adjacent sections, both downstream and upstream of the bridge, shall be smooth to prevent turbulent flows.**

Appendix D: Bridge Plans and Sections

Appendix E: Summary of HEC-RAS Output

11. References

[1] USACOE(September 2016), Hydrologic Engineering Center-River Analysis System version 5.03

[2] AutoCAD (2017) Civil3D

[3] FHWA (April 2012), Evaluating Scour at Bridges, Fifth Edition. Page 2.7.

[4] FEMA (2012), Flood Insurance Study, El Dorado County, Page 12

[5] El Dorado County (2024), South Tahoe Greenway – Upper Truckee River Bridge at Johnson Meadow Project Hydrologic Analysis Report, County Project 3610 7023, Interoffice Memorandum

[6] FHWA (April 2012), Evaluating Scour at Bridges, Fifth Edition

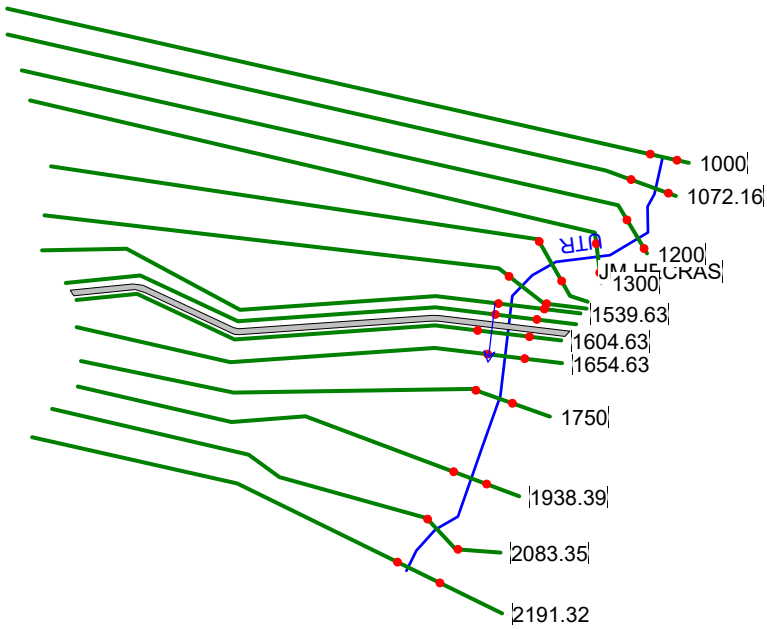
[7] Corestone Engineering Inc. (2023), Draft Geotechnical Investigation, Upper Truckee River Bridge at Johnson Meadow, El Dorado County

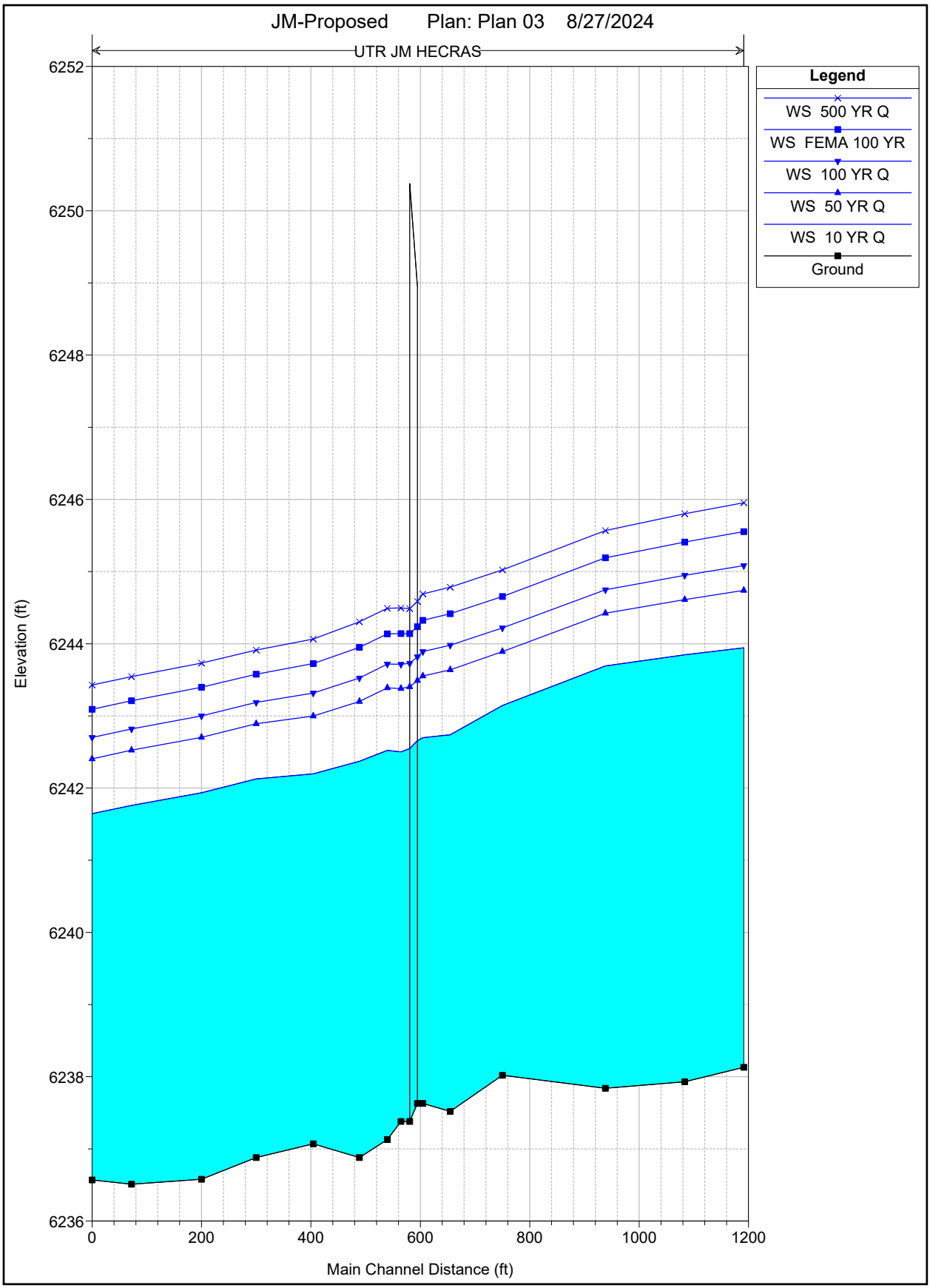
[8] USACOE (30 June 1994), Engineer Manual 1110-2-1601, Hydraulic Design of Flood Control Channels.

[9] Caltrans (2015), Standard Specifications

Appendix E

Summary of HEC- RAS Output


1000
1072.16
1200
1300
1539.63
1604.63
1654.63
1750
1938.39
2083.35
2191.32

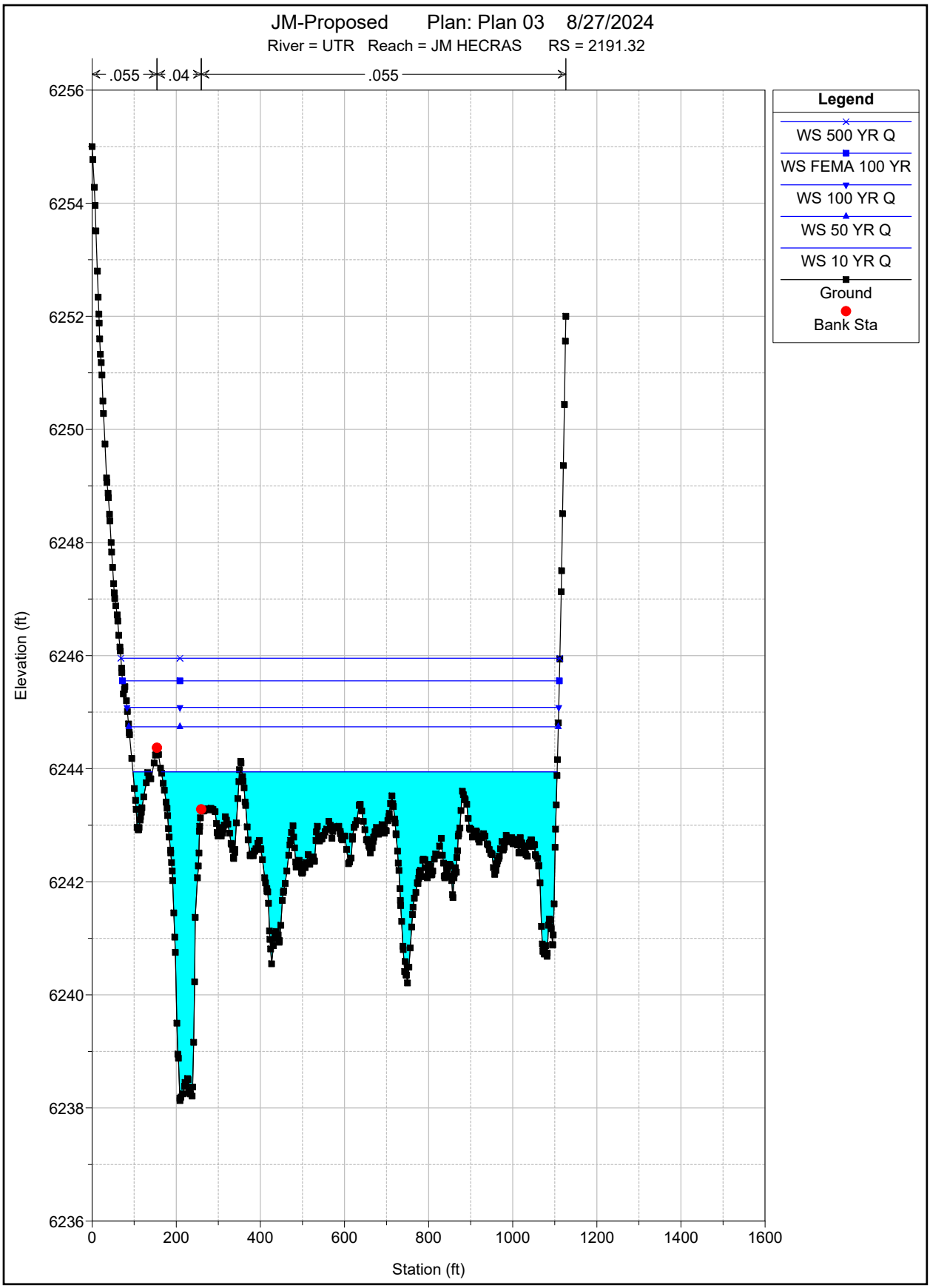

JM-Proposed Plan: Plan 03 8/27/2024
UTR JM HECRAS
Legend
WS 500 YR Q
WS FEMA 100 YR
WS 100 YR Q
WS 50 YR Q
WS 10 YR Q
Ground
Elevation (ft)
6252
6250
6248
6246
6244
6242
6240
6238
6236
0
200
400
600
800
1000
1200
Main Channel Distance (ft)

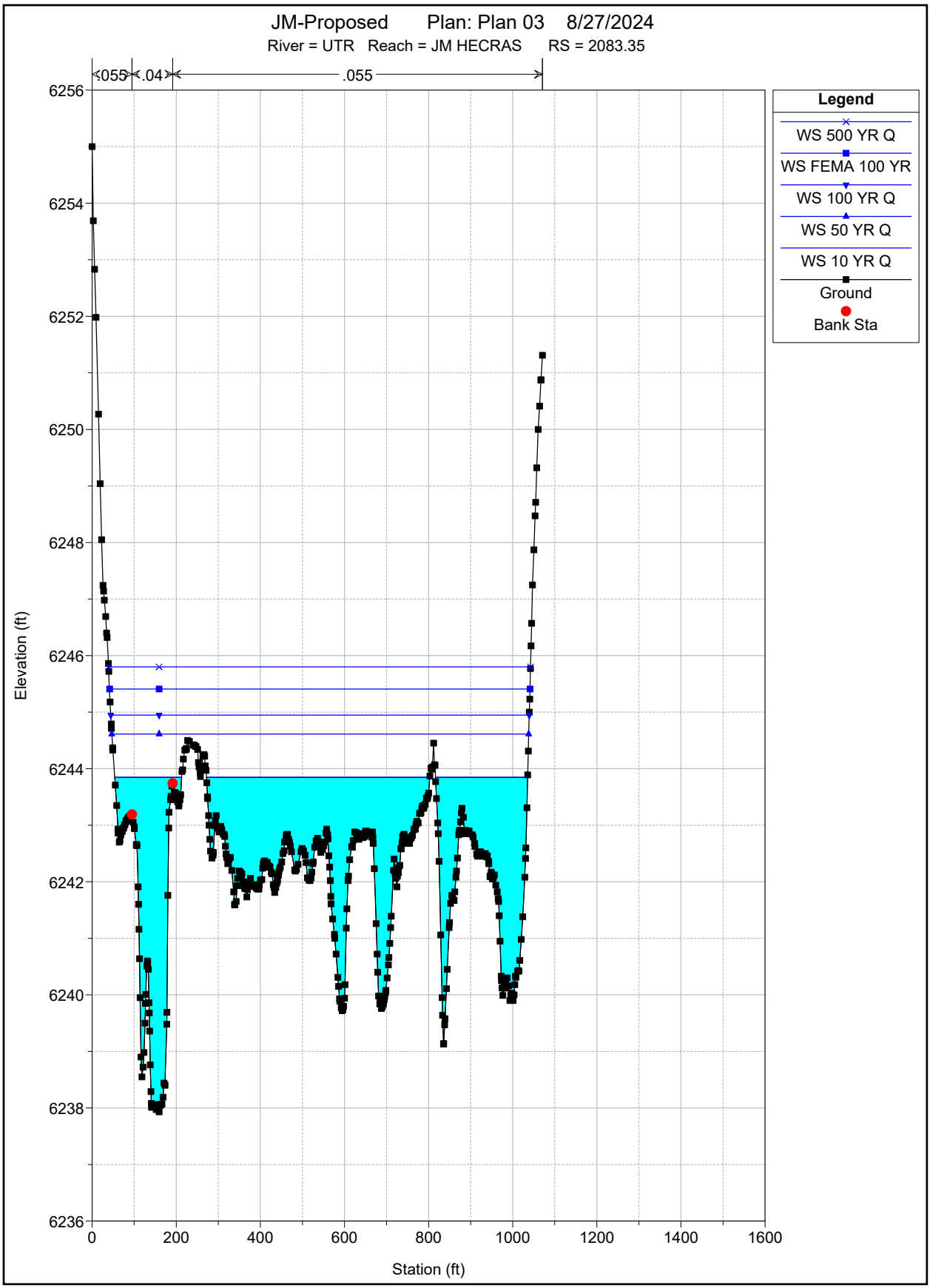
HEC-RAS Plan: Plan 03 River: UTR Reach: JM HECRAS

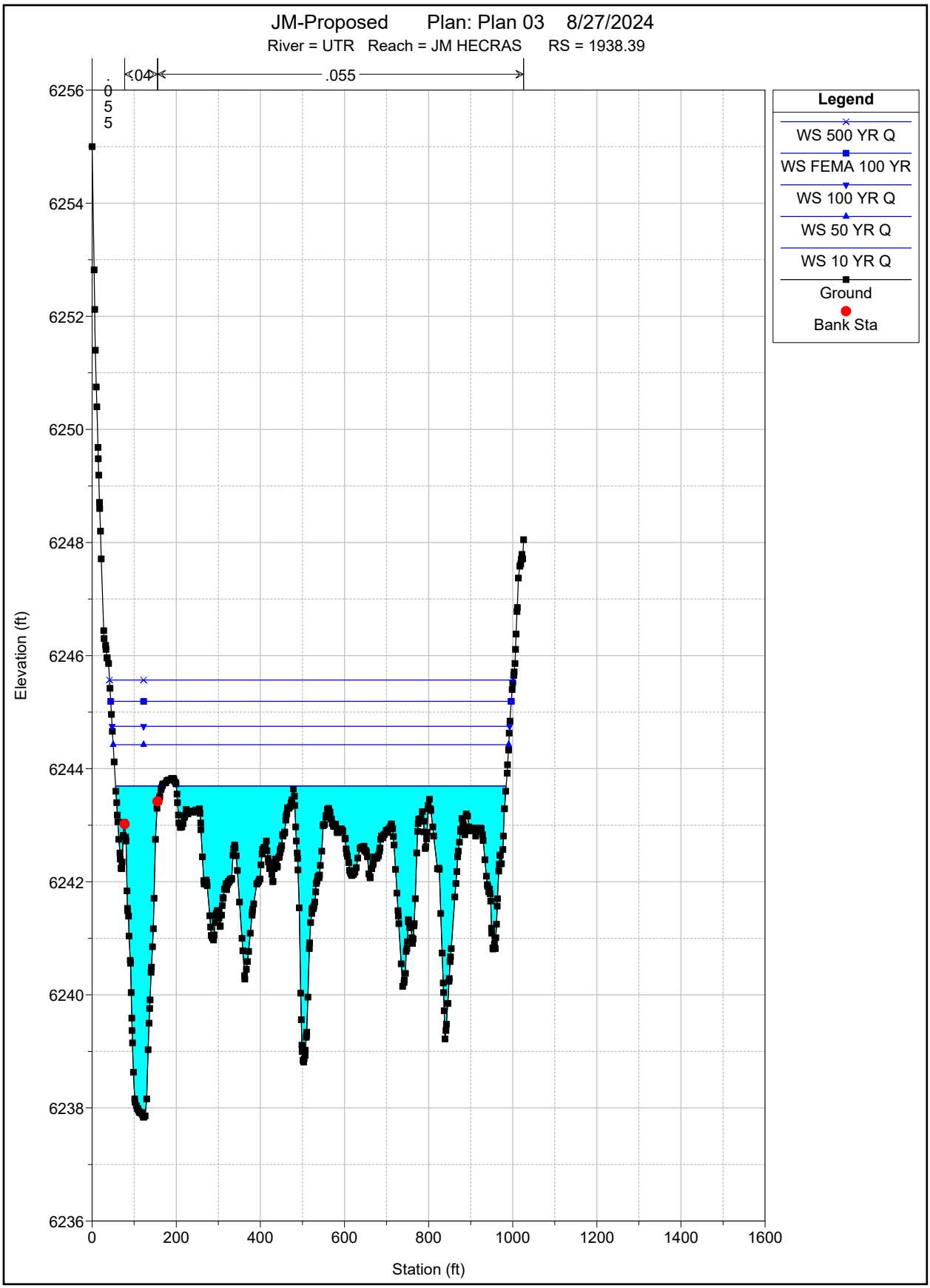
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
JM HECRAS	2191.32	10 YR Q	2416.80	6238.13	6243.94		6244.01	0.001270	2.87	1548.21	980.76	0.28
JM HECRAS	2191.32	50 YR Q	4459.30	6238.13	6244.74		6244.81	0.001307	3.18	2350.56	1021.11	0.29
JM HECRAS	2191.32	100 YR Q	5594.90	6238.13	6245.08		6245.17	0.001331	3.41	2702.45	1026.34	0.30
JM HECRAS	2191.32	500 YR Q	9076.70	6238.13	6245.95		6246.07	0.001416	4.00	3604.04	1043.64	0.32
JM HECRAS	2191.32	FEMA 100 YR	7376.00	6238.13	6245.55		6245.66	0.001380	3.73	3187.18	1038.65	0.31
JM HECRAS	2083.35	10 YR Q	2416.80	6237.93	6243.85		6243.89	0.000756	2.45	1755.66	908.70	0.22
JM HECRAS	2083.35	50 YR Q	4459.30	6237.93	6244.61		6244.69	0.001011	3.20	2482.50	991.31	0.26
JM HECRAS	2083.35	100 YR Q	5594.90	6237.93	6244.95		6245.04	0.001080	3.47	2816.62	994.87	0.28
JM HECRAS	2083.35	500 YR Q	9076.70	6237.93	6245.80		6245.92	0.001248	4.14	3668.36	1003.06	0.30
JM HECRAS	2083.35	FEMA 100 YR	7376.00	6237.93	6245.41		6245.51	0.001176	3.84	3275.30	999.42	0.29
JM HECRAS	1938.39	10 YR Q	2416.80	6237.84	6243.69		6243.77	0.001157	3.11	1519.08	895.22	0.28
JM HECRAS	1938.39	50 YR Q	4459.30	6237.84	6244.42		6244.53	0.001395	3.83	2198.95	940.52	0.31
JM HECRAS	1938.39	100 YR Q	5594.90	6237.84	6244.75		6244.86	0.001480	4.13	2504.57	945.02	0.33
JM HECRAS	1938.39	500 YR Q	9076.70	6237.84	6245.57		6245.73	0.001694	4.89	3284.84	959.64	0.36
JM HECRAS	1938.39	FEMA 100 YR	7376.00	6237.84	6245.19		6245.33	0.001600	4.54	2924.17	951.95	0.34
JM HECRAS	1750	10 YR Q	2416.80	6238.02	6243.14		6243.41	0.003192	5.10	951.03	860.07	0.46
JM HECRAS	1750	50 YR Q	4459.30	6238.02	6243.89		6244.13	0.003164	5.50	1612.27	926.12	0.46
JM HECRAS	1750	100 YR Q	5594.90	6238.02	6244.22		6244.46	0.003109	5.69	1916.67	930.20	0.46
JM HECRAS	1750	500 YR Q	9076.70	6238.02	6245.02		6245.30	0.003091	6.23	2669.02	939.13	0.47
JM HECRAS	1750	FEMA 100 YR	7376.00	6238.02	6244.66		6244.91	0.003091	5.98	2323.37	935.67	0.47
JM HECRAS	1654.63	10 YR Q	2416.80	6237.52	6242.74		6243.07	0.004107	5.67	871.34	857.98	0.51
JM HECRAS	1654.63	50 YR Q	4459.30	6237.52	6243.64		6243.84	0.003006	5.18	1692.03	944.07	0.45
JM HECRAS	1654.63	100 YR Q	5594.90	6237.52	6243.98		6244.18	0.002871	5.27	2015.48	952.09	0.44
JM HECRAS	1654.63	500 YR Q	9076.70	6237.52	6244.78		6245.02	0.002845	5.86	2791.85	982.18	0.45
JM HECRAS	1654.63	FEMA 100 YR	7376.00	6237.52	6244.42		6244.63	0.002841	5.58	2434.77	967.79	0.45
JM HECRAS	1604.63	10 YR Q	2416.80	6237.63	6242.70	6241.78	6242.85	0.002667	4.00	1099.56	869.22	0.40
JM HECRAS	1604.63	50 YR Q	4459.30	6237.63	6243.55	6242.67	6243.69	0.002218	4.20	1900.43	981.44	0.38
JM HECRAS	1604.63	100 YR Q	5594.90	6237.63	6243.89	6242.82	6244.04	0.002176	4.36	2234.58	992.69	0.38
JM HECRAS	1604.63	500 YR Q	9076.70	6237.63	6244.69	6243.39	6244.88	0.002250	4.99	3037.61	1013.11	0.40
JM HECRAS	1604.63	FEMA 100 YR	7376.00	6237.63	6244.33	6243.13	6244.49	0.002213	4.70	2668.82	1006.88	0.39
JM HECRAS	1585		Bridge									
JM HECRAS	1564.63	10 YR Q	2416.80	6237.38	6242.50		6242.73	0.002987	4.80	972.73	806.86	0.44
JM HECRAS	1564.63	50 YR Q	4459.30	6237.38	6243.38		6243.57	0.002564	4.98	1800.24	1009.72	0.42
JM HECRAS	1564.63	100 YR Q	5594.90	6237.38	6243.72		6243.90	0.002475	5.10	2141.30	1014.51	0.42
JM HECRAS	1564.63	500 YR Q	9076.70	6237.38	6244.50		6244.72	0.002553	5.64	2937.20	1022.57	0.43
JM HECRAS	1564.63	FEMA 100 YR	7376.00	6237.38	6244.14		6244.34	0.002509	5.39	2573.78	1019.26	0.42
JM HECRAS	1539.63	10 YR Q	2416.80	6237.13	6242.52		6242.64	0.001634	3.67	1337.27	989.60	0.33
JM HECRAS	1539.63	50 YR Q	4459.30	6237.13	6243.39		6243.50	0.001436	3.86	2237.26	1068.34	0.32
JM HECRAS	1539.63	100 YR Q	5594.90	6237.13	6243.72		6243.84	0.001486	4.09	2592.21	1085.69	0.32
JM HECRAS	1539.63	500 YR Q	9076.70	6237.13	6244.49		6244.64	0.001723	4.74	3443.68	1109.50	0.36
JM HECRAS	1539.63	FEMA 100 YR	7376.00	6237.13	6244.14		6244.27	0.001639	4.48	3050.75	1102.53	0.34
JM HECRAS	1488.67	10 YR Q	2416.80	6236.88	6242.37		6242.52	0.002113	4.14	1066.58	729.48	0.37
JM HECRAS	1488.67	50 YR Q	4459.30	6236.88	6243.20		6243.37	0.002495	4.83	1829.60	1043.65	0.41
JM HECRAS	1488.67	100 YR Q	5594.90	6236.88	6243.53		6243.71	0.002599	5.05	2174.37	1073.68	0.42
JM HECRAS	1488.67	500 YR Q	9076.70	6236.88	6244.31		6244.50	0.002637	5.38	3019.21	1100.82	0.43
JM HECRAS	1488.67	FEMA 100 YR	7376.00	6236.88	6243.95		6244.14	0.002600	5.22	2633.13	1083.99	0.43
JM HECRAS	1404.2	10 YR Q	2416.80	6237.07	6242.20		6242.33	0.001838	3.76	1162.72	825.74	0.35
JM HECRAS	1404.2	50 YR Q	4459.30	6237.07	6243.00		6243.14	0.002048	4.31	1958.56	1081.97	0.37
JM HECRAS	1404.2	100 YR Q	5594.90	6237.07	6243.32		6243.47	0.002064	4.52	2309.12	1119.28	0.38
JM HECRAS	1404.2	500 YR Q	9076.70	6237.07	6244.06		6244.26	0.002243	5.23	3163.43	1153.80	0.40
JM HECRAS	1404.2	FEMA 100 YR	7376.00	6237.07	6243.73		6243.90	0.002154	4.90	2772.55	1145.71	0.39
JM HECRAS	1300	10 YR Q	2416.80	6236.88	6242.13		6242.18	0.000763	2.72	1783.84	1024.23	0.23
JM HECRAS	1300	50 YR Q	4459.30	6236.88	6242.89		6242.96	0.001000	3.37	2619.10	1188.31	0.26
JM HECRAS	1300	100 YR Q	5594.90	6236.88	6243.19		6243.27	0.001189	3.81	2979.54	1251.62	0.29
JM HECRAS	1300	500 YR Q	9076.70	6236.88	6243.91		6244.03	0.001431	4.55	3927.85	1330.97	0.32
JM HECRAS	1300	FEMA 100 YR	7376.00	6236.88	6243.58		6243.68	0.001354	4.26	3487.29	1314.54	0.31
JM HECRAS	1200	10 YR Q	2416.80	6236.58	6241.94		6242.05	0.002074	3.99	1264.40	1022.50	0.36
JM HECRAS	1200	50 YR Q	4459.30	6236.58	6242.70		6242.82	0.002114	4.37	2231.41	1392.34	0.37
JM HECRAS	1200	100 YR Q	5594.90	6236.58	6243.00		6243.12	0.002129	4.43	2651.95	1425.12	0.38
JM HECRAS	1200	500 YR Q	9076.70	6236.58	6243.73		6243.86	0.002004	4.77	3697.33	1432.29	0.38
JM HECRAS	1200	FEMA 100 YR	7376.00	6236.58	6243.40		6243.52	0.002042	4.60	3217.62	1428.38	0.37
JM HECRAS	1072.16	10 YR Q	2416.80	6236.51	6241.76		6241.85	0.001502	3.51	1434.53	1060.46	0.31
JM HECRAS	1072.16	50 YR Q	4459.30	6236.51	6242.53		6242.61	0.001655	3.62	2391.45	1403.27	0.33
JM HECRAS	1072.16	100 YR Q	5594.90	6236.51	6242.82		6242.91	0.001663	3.76	2809.08	1426.37	0.33
JM HECRAS	1072.16	500 YR Q	9076.70	6236.51	6243.54		6243.66	0.001795	4.35	3855.63	1459.24	0.35
JM HECRAS	1072.16	FEMA 100 YR	7376.00	6236.51	6243.21		6243.31	0.001765	4.11	3369.74	1447.61	0.34
JM HECRAS	1000	10 YR Q	2416.80	6236.57	6241.65	6240.82	6241.74	0.001662	3.78	1470.88	1175.97	0.33
JM HECRAS	1000	50 YR Q	4459.30	6236.57	6242.40	6241.37	6242.49	0.001660	4.02	2489.83	1435.24	0.33
JM HECRAS	1000	100 YR Q	5594.90	6236.57	6242.70	6241.60	6242.79	0.001663	4.11	2921.71	1460.60	0.34

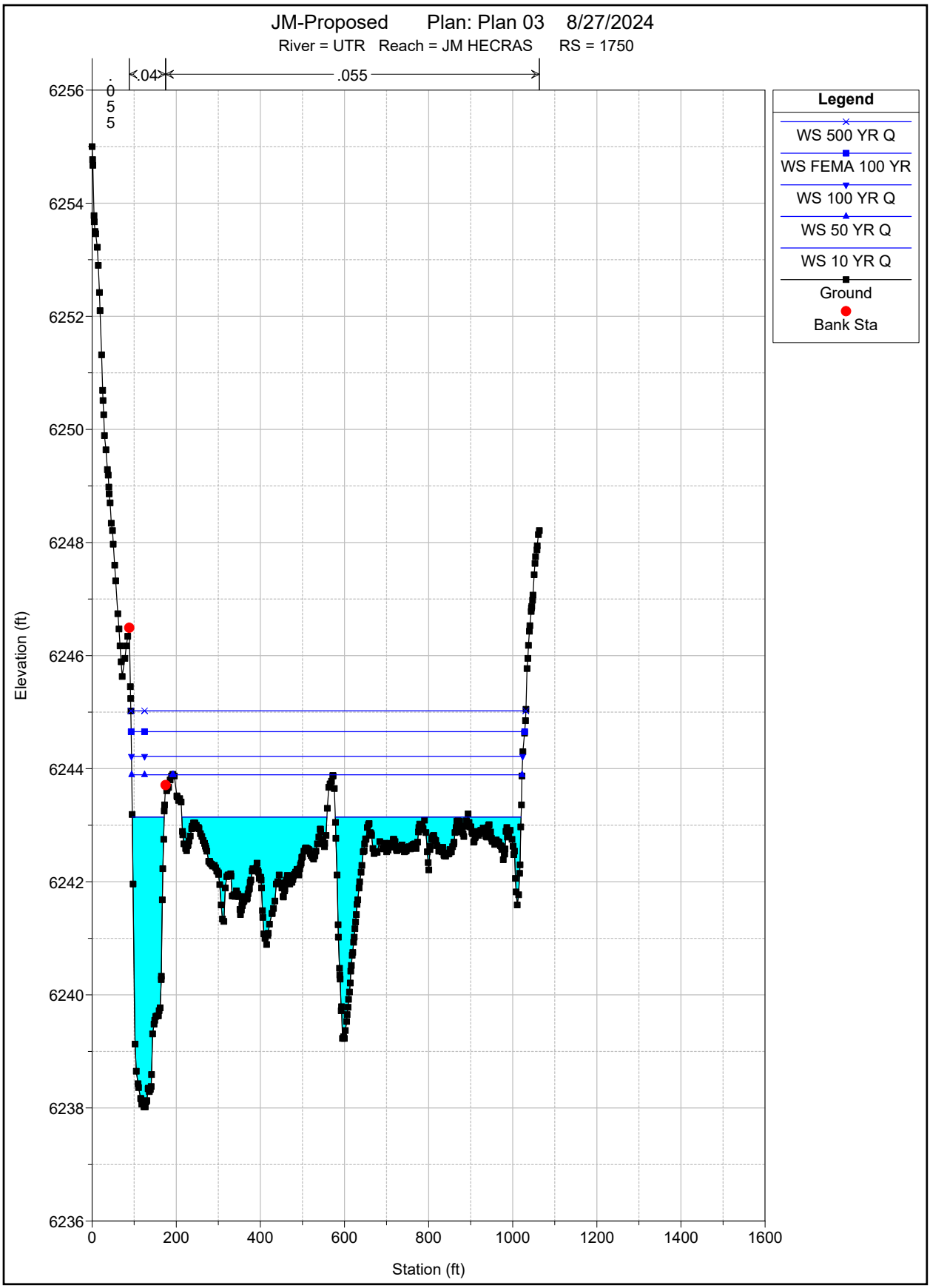
HEC-RAS Plan: Plan 03 River: UTR Reach: JM HECRAS (Continued)

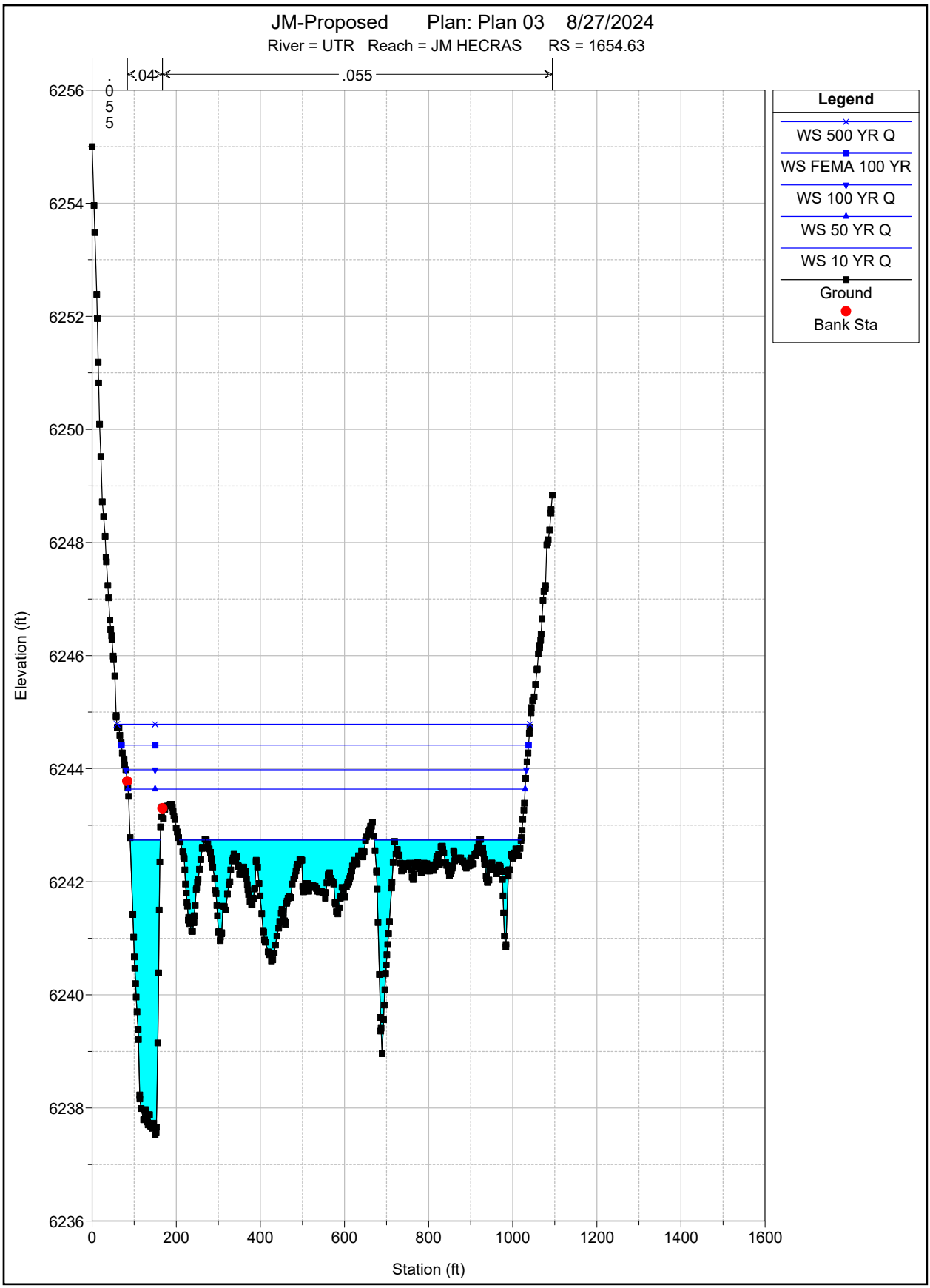
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
JM HECRAS	1000	500 YR Q	9076.70	6236.57	6243.43	6242.06	6243.54	0.001660	4.52	3986.82	1474.18	0.34
JM HECRAS	1000	FEMA 100 YR	7376.00	6236.57	6243.09	6241.89	6243.19	0.001660	4.33	3493.87	1469.12	0.34

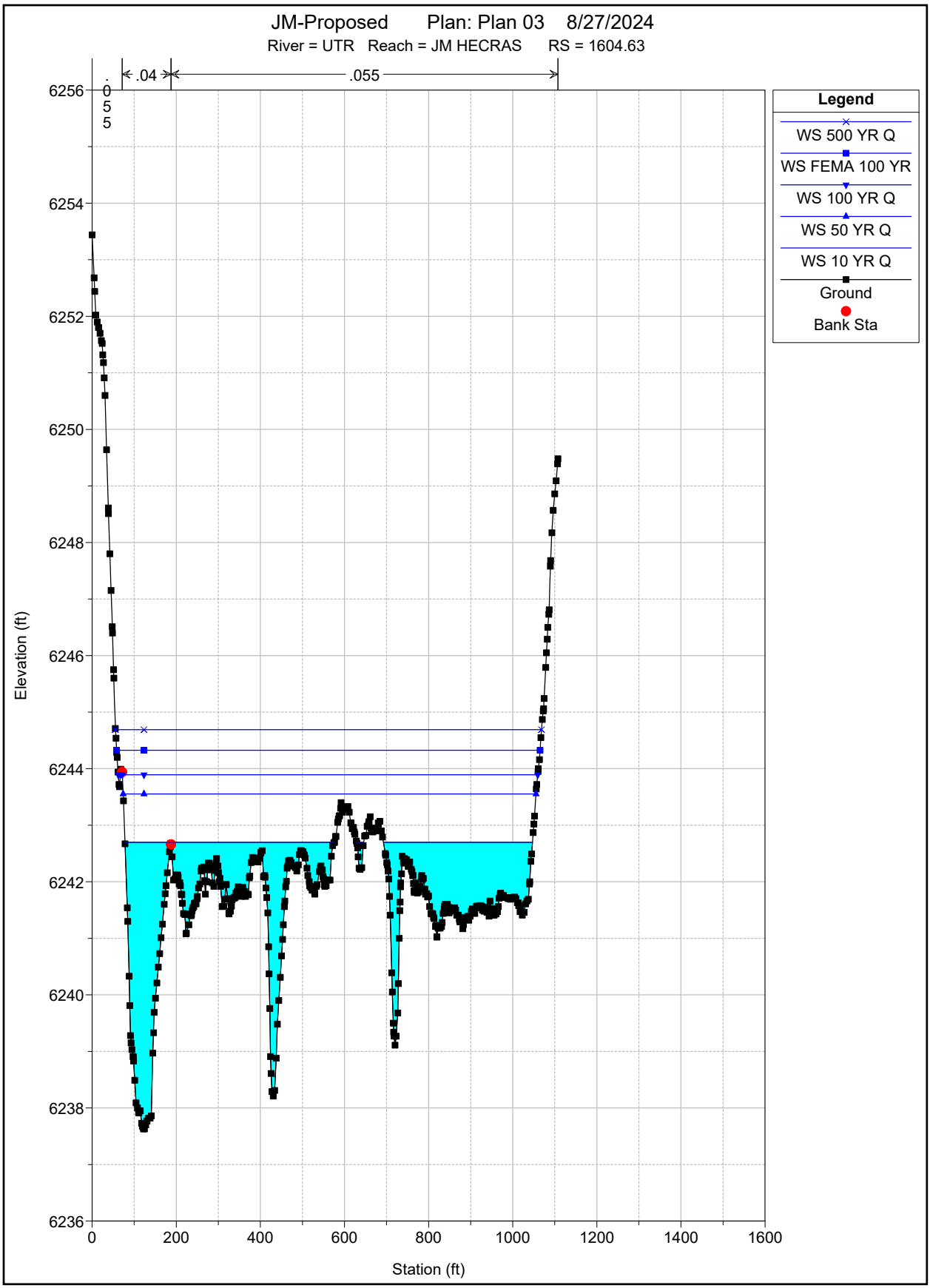

JM-Proposed Plan: Plan 03 8/27/2024
River = UTR Reach = JM HECRAS RS = 2191.32
.055
.04
.055
Legend
WS 500 YR Q
WS FEMA 100 YR
WS 100 YR Q
WS 50 YR Q
WS 10 YR Q
Ground
Bank Sta
Elevation (ft)
6256
6254
6252
6250
6248
6246
6244
6242
6240
6238
6236
0
200
400
600
800
1000
1200
1400
1600
Station (ft)

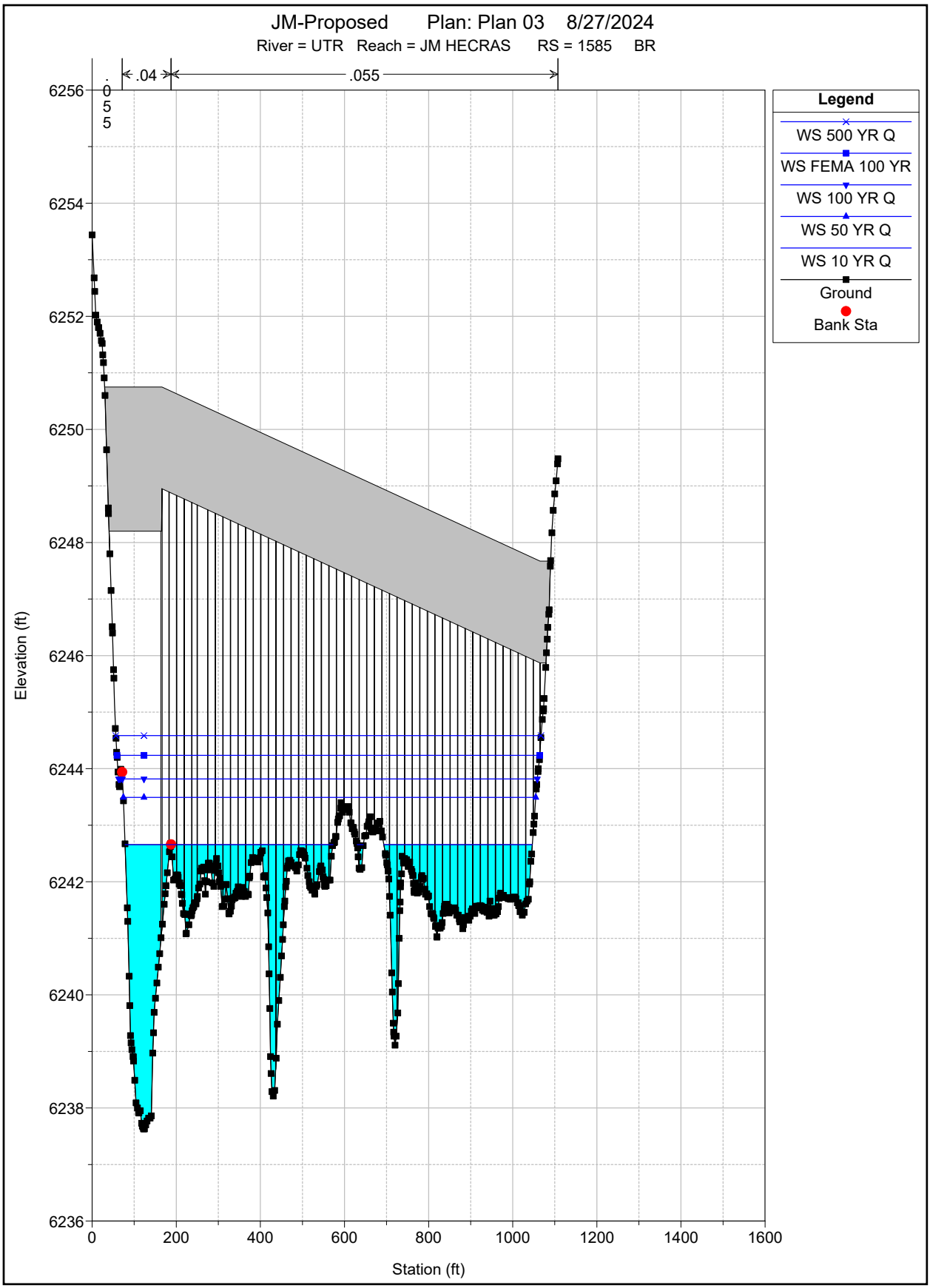

JM-Proposed Plan: Plan 03 8/27/2024
River = UTR Reach = JM HECRAS RS = 2083.35
.055
.04
.055
Legend
WS 500 YR Q
WS FEMA 100 YR
WS 100 YR Q
WS 50 YR Q
WS 10 YR Q
Ground
Bank Sta
Elevation (ft)
Station (ft)
6256
6254
6252
6250
6248
6246
6244
6242
6240
6238
6236
0
200
400
600
800
1000
1200
1400
1600

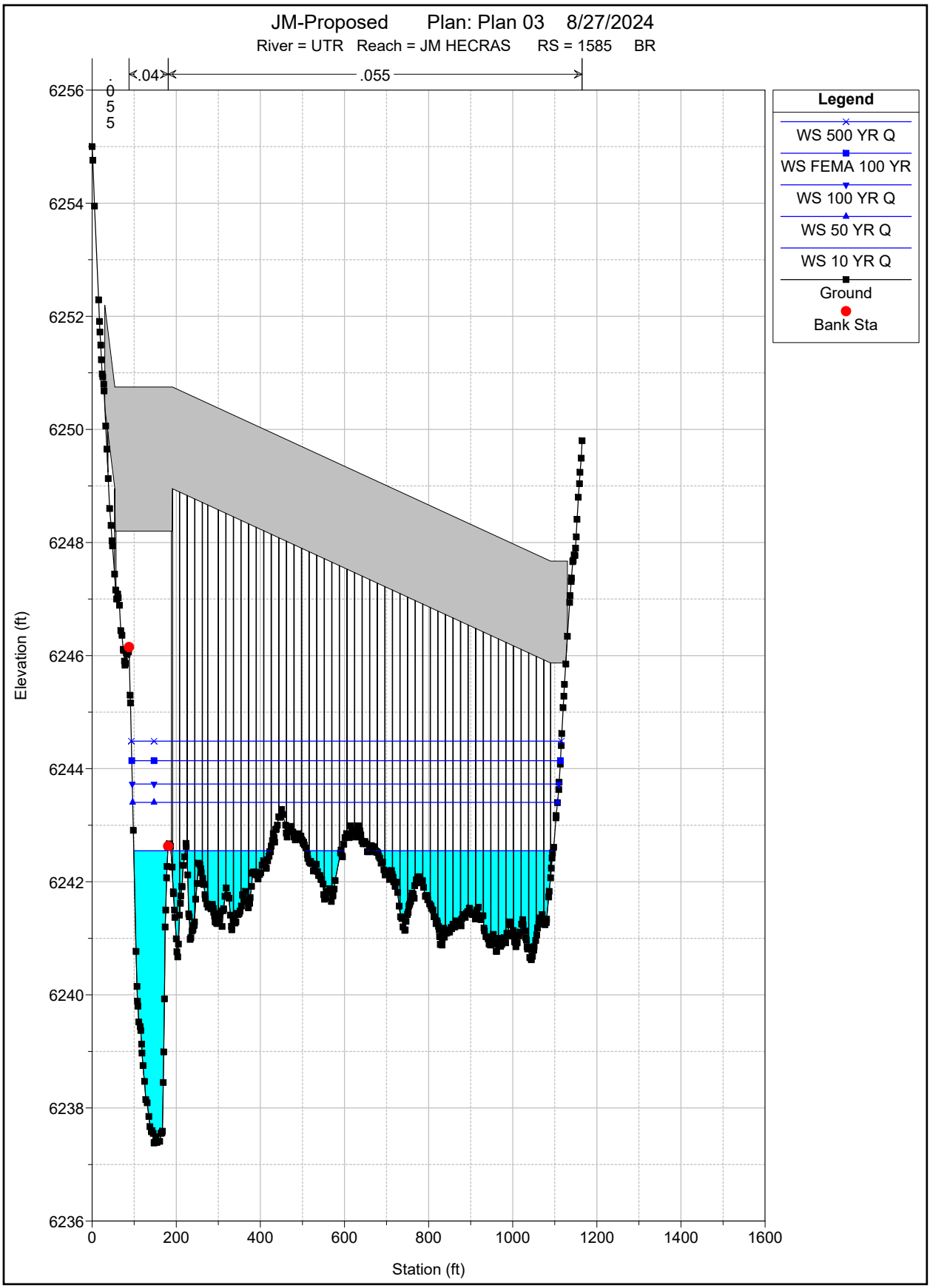

JM-Proposed Plan: Plan 03 8/27/2024
River = UTR Reach = JM HECRAS RS = 1938.39
.04
.055
.055
Legend
WS 500 YR Q
WS FEMA 100 YR
WS 100 YR Q
WS 50 YR Q
WS 10 YR Q
Ground
Bank Sta
Elevation (ft)
Station (ft)
6256
6254
6252
6250
6248
6246
6244
6242
6240
6238
6236
0
200
400
600
800
1000
1200
1400
1600

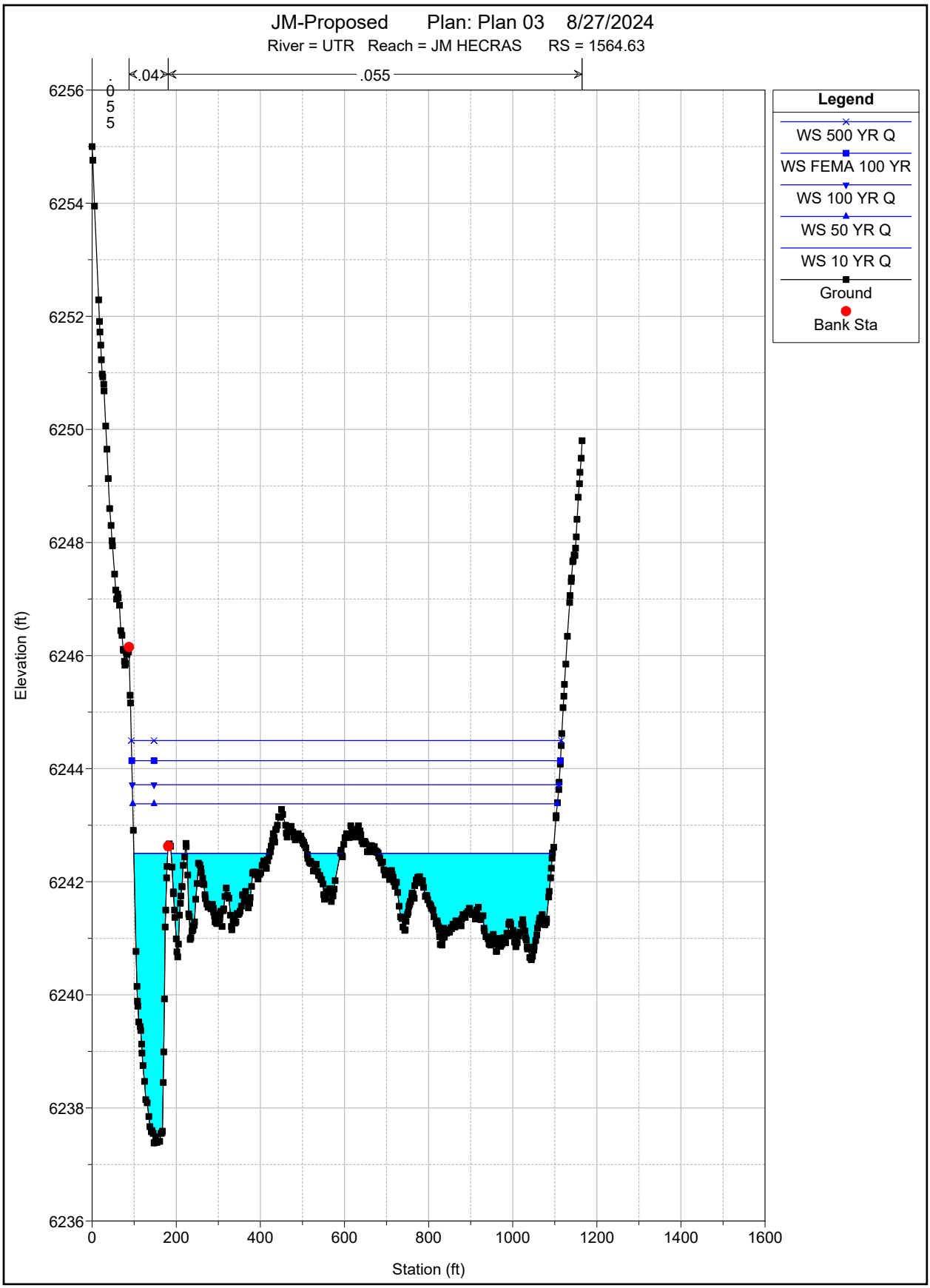

JM-Proposed Plan: Plan 03 8/27/2024
River = UTR Reach = JM HECRAS RS = 1750
.04
.055
.055
Legend
WS 500 YR Q
WS FEMA 100 YR
WS 100 YR Q
WS 50 YR Q
WS 10 YR Q
Ground
Bank Sta
Elevation (ft)
Station (ft)
6256
6254
6252
6250
6248
6246
6244
6242
6240
6238
6236
0
200
400
600
800
1000
1200
1400
1600

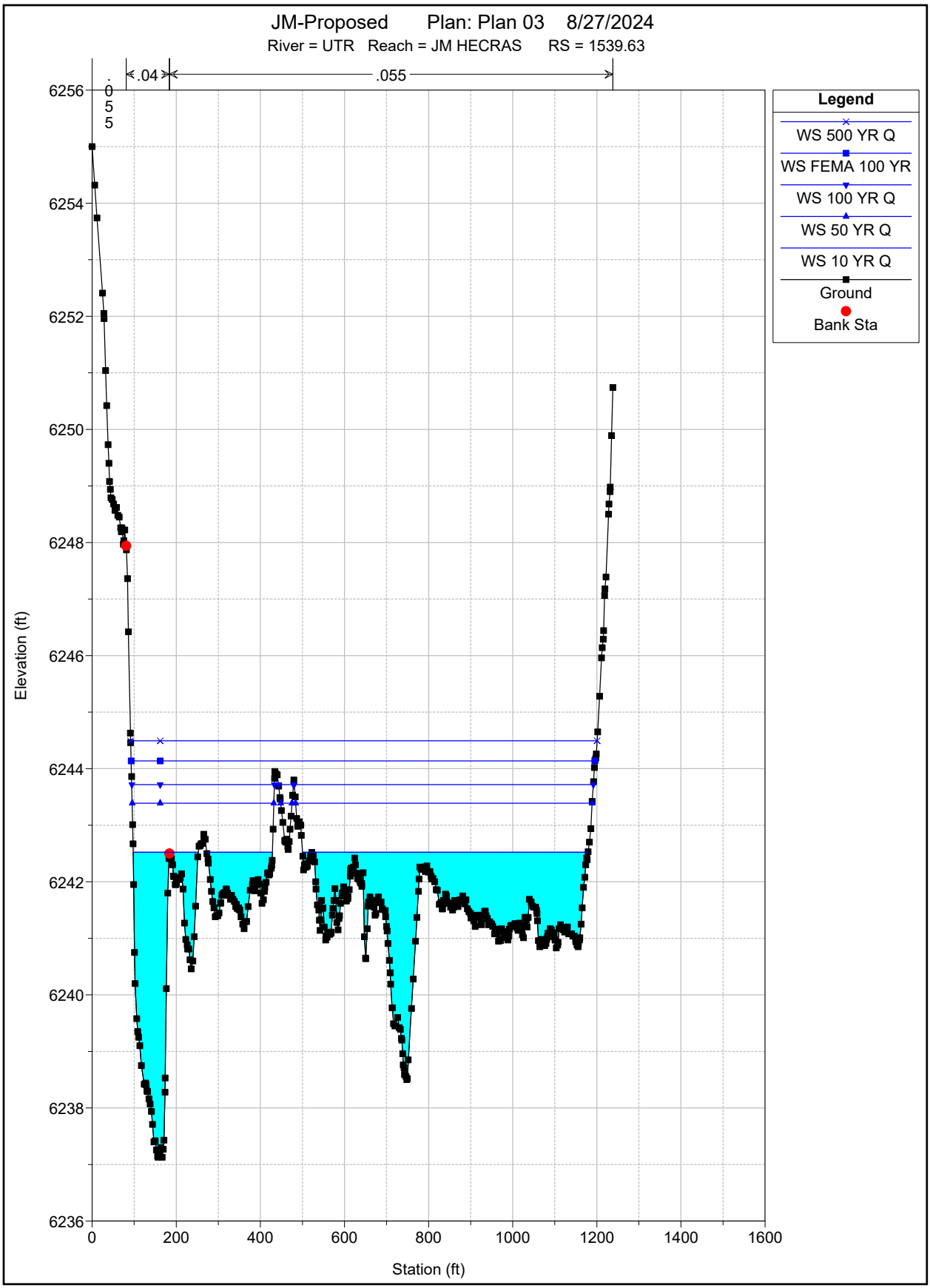

JM-Proposed Plan: Plan 03 8/27/2024
River = UTR Reach = JM HECRAS RS = 1654.63
.04
.055
.055
Legend
WS 500 YR Q
WS FEMA 100 YR
WS 100 YR Q
WS 50 YR Q
WS 10 YR Q
Ground
Bank Sta
Elevation (ft)
Station (ft)
6256
6254
6252
6250
6248
6246
6244
6242
6240
6238
6236
0
200
400
600
800
1000
1200
1400
1600

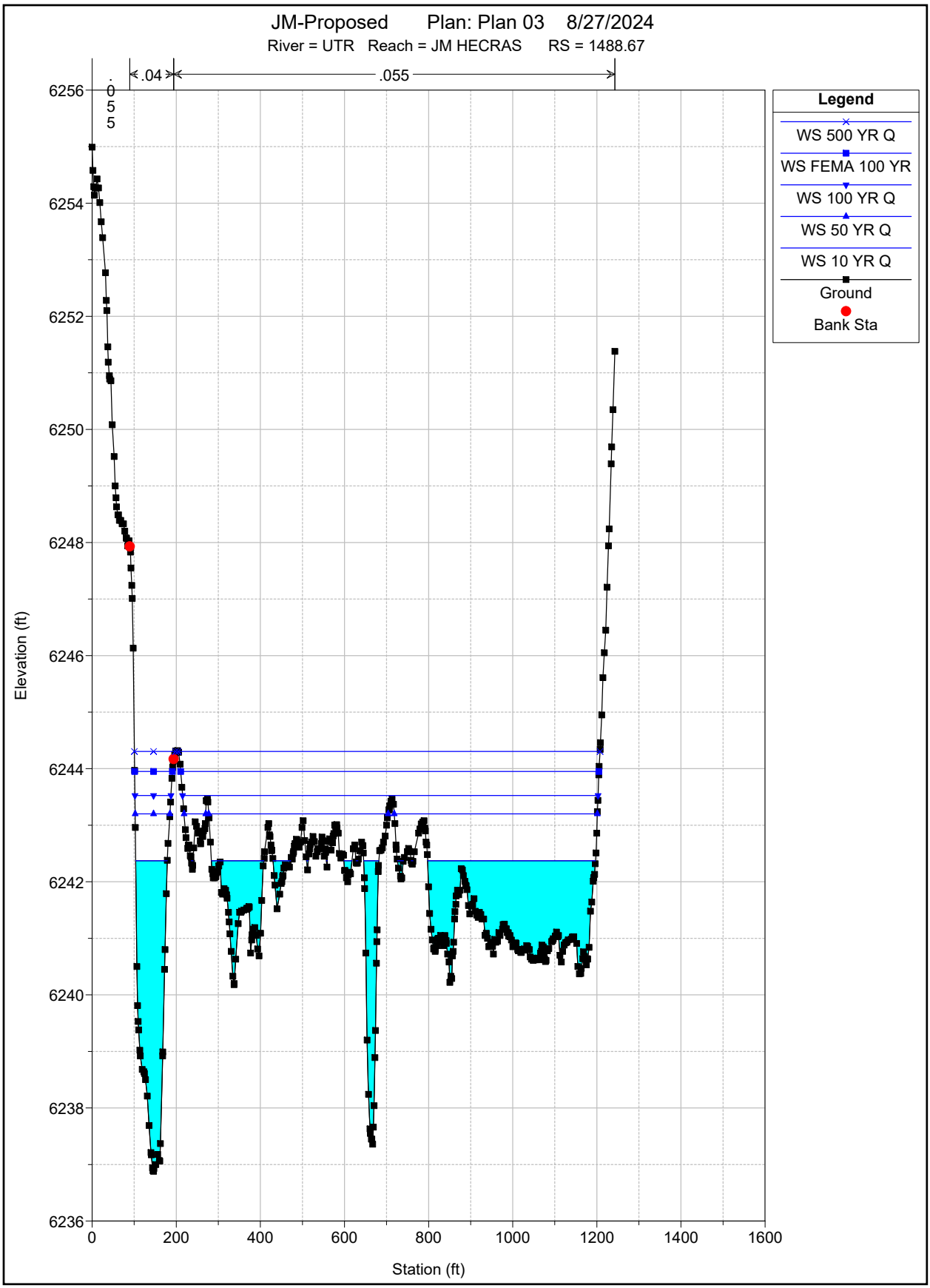

JM-Proposed Plan: Plan 03 8/27/2024
River = UTR Reach = JM HECRAS RS = 1604.63
.04
.055
.055
Legend
WS 500 YR Q
WS FEMA 100 YR
WS 100 YR Q
WS 50 YR Q
WS 10 YR Q
Ground
Bank Sta
Elevation (ft)
Station (ft)
6256
6254
6252
6250
6248
6246
6244
6242
6240
6238
6236
0
200
400
600
800
1000
1200
1400
1600

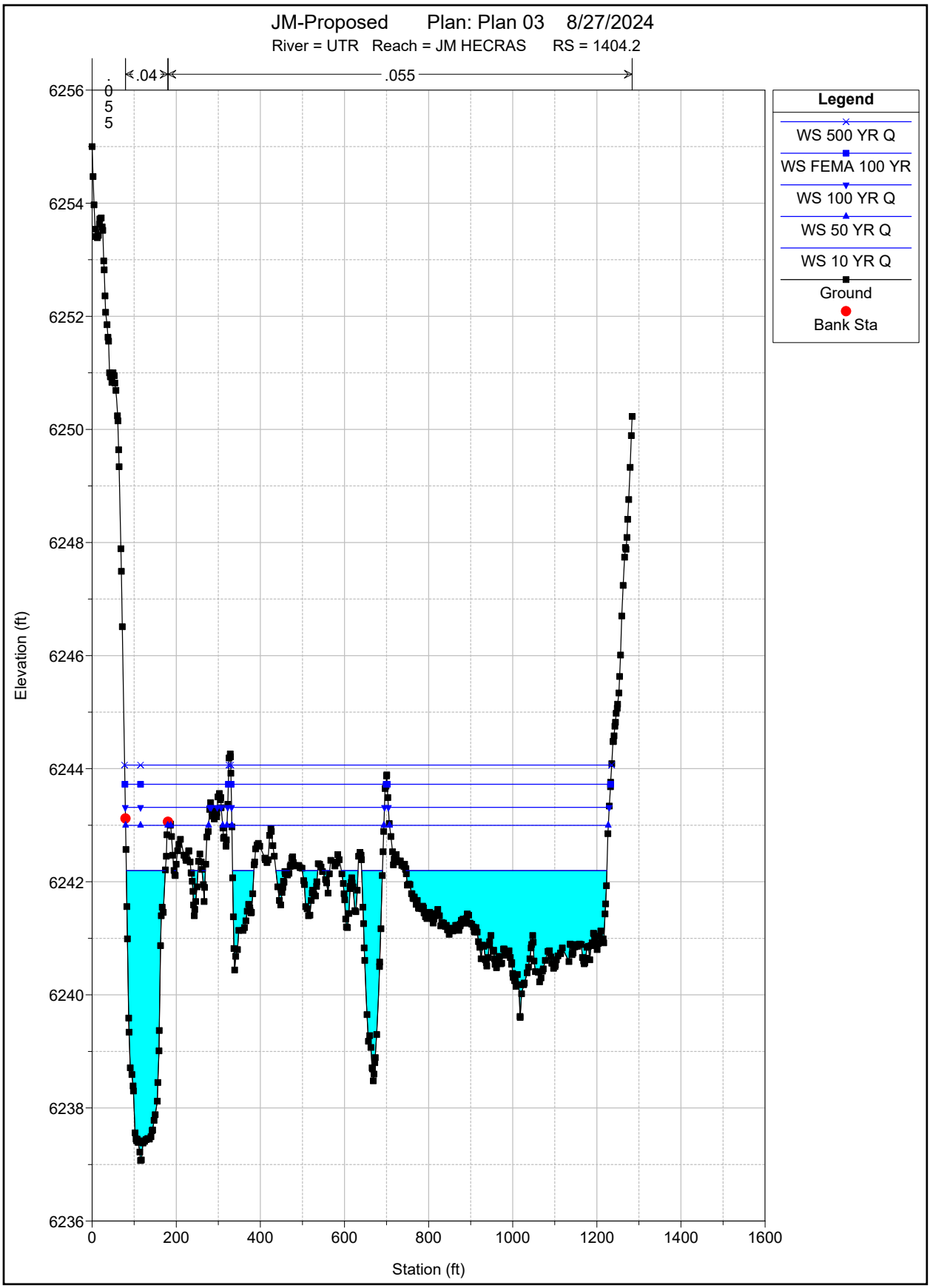

JM-Proposed Plan: Plan 03 8/27/2024
River = UTR Reach = JM HECRAS RS = 1585 BR
.04
.055
.055
Legend
WS 500 YR Q
WS FEMA 100 YR
WS 100 YR Q
WS 50 YR Q
WS 10 YR Q
Ground
Bank Sta
Elevation (ft)
Station (ft)
6256
6254
6252
6250
6248
6246
6244
6242
6240
6238
6236
0
200
400
600
800
1000
1200
1400
1600

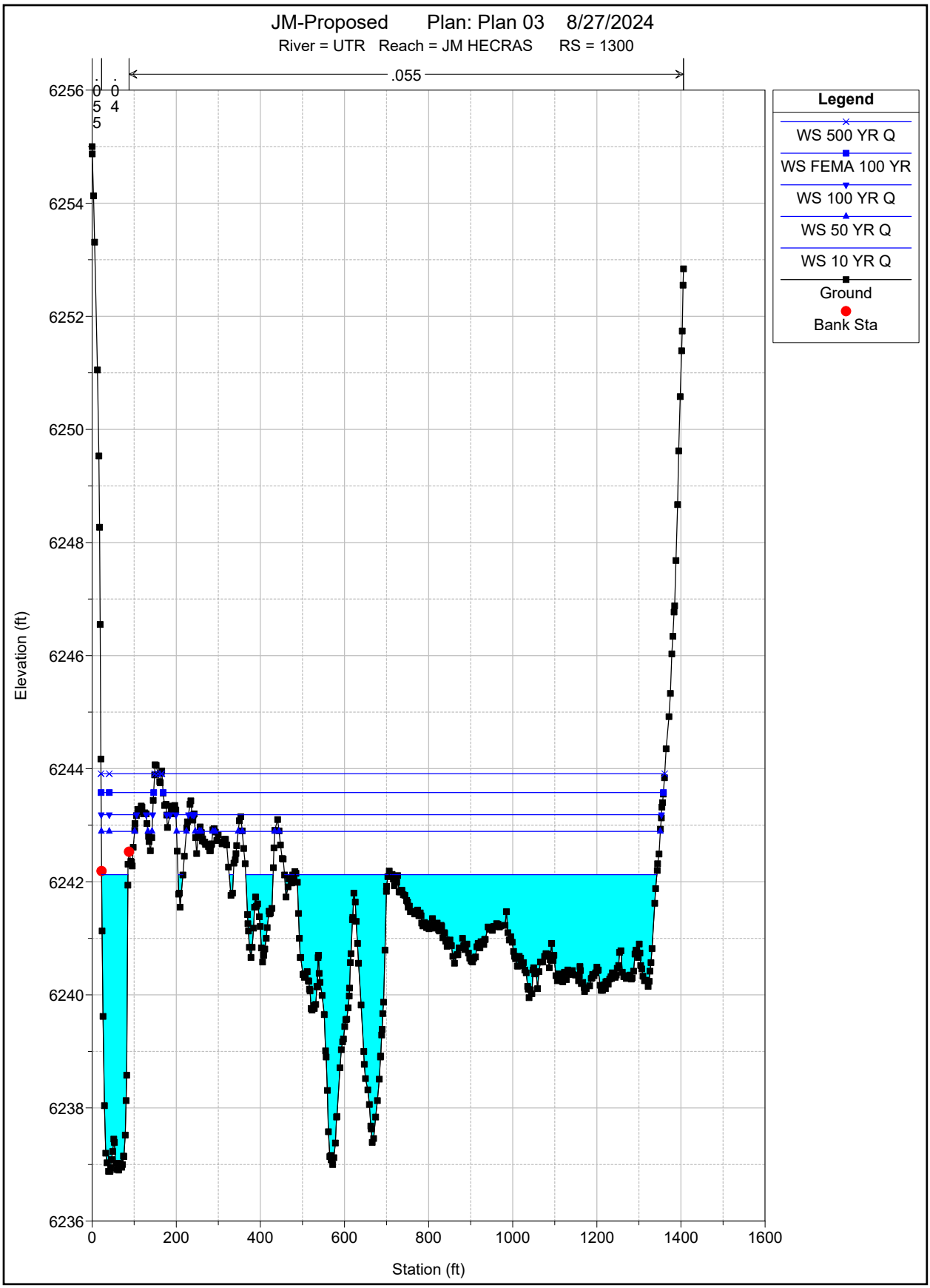

JM-Proposed Plan: Plan 03 8/27/2024
River = UTR Reach = JM HECRAS RS = 1585 BR
.04
.055
.055
Legend
WS 500 YR Q
WS FEMA 100 YR
WS 100 YR Q
WS 50 YR Q
WS 10 YR Q
Ground
Bank Sta
Elevation (ft)
Station (ft)
6256
6254
6252
6250
6248
6246
6244
6242
6240
6238
6236
0
200
400
600
800
1000
1200
1400
1600

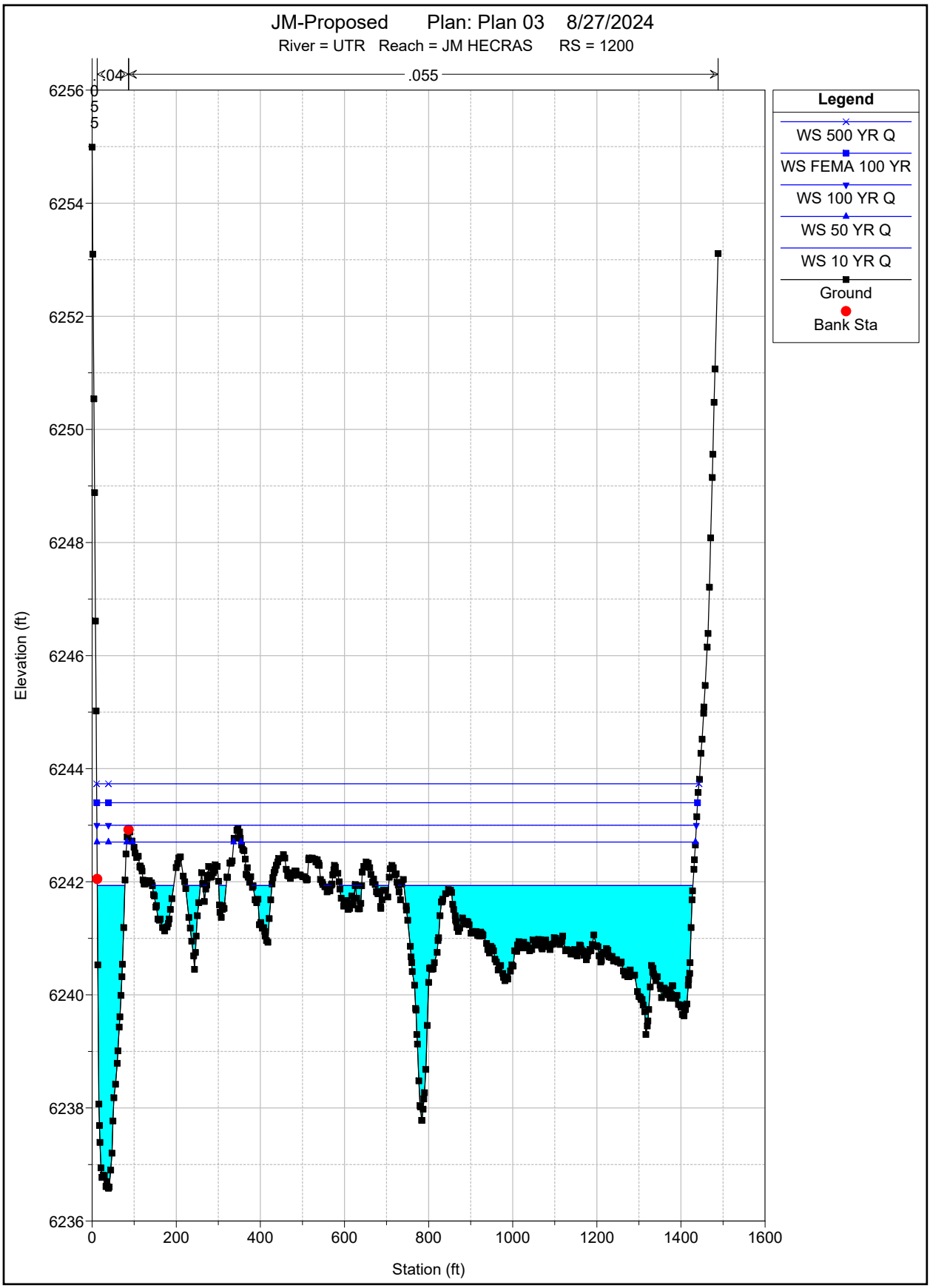

JM-Proposed Plan: Plan 03 8/27/2024
River = UTR Reach = JM HECRAS RS = 1564.63
.04
.055
.055
Legend
WS 500 YR Q
WS FEMA 100 YR
WS 100 YR Q
WS 50 YR Q
WS 10 YR Q
Ground
Bank Sta
Elevation (ft)
Station (ft)
6256
6254
6252
6250
6248
6246
6244
6242
6240
6238
6236
0
200
400
600
800
1000
1200
1400
1600

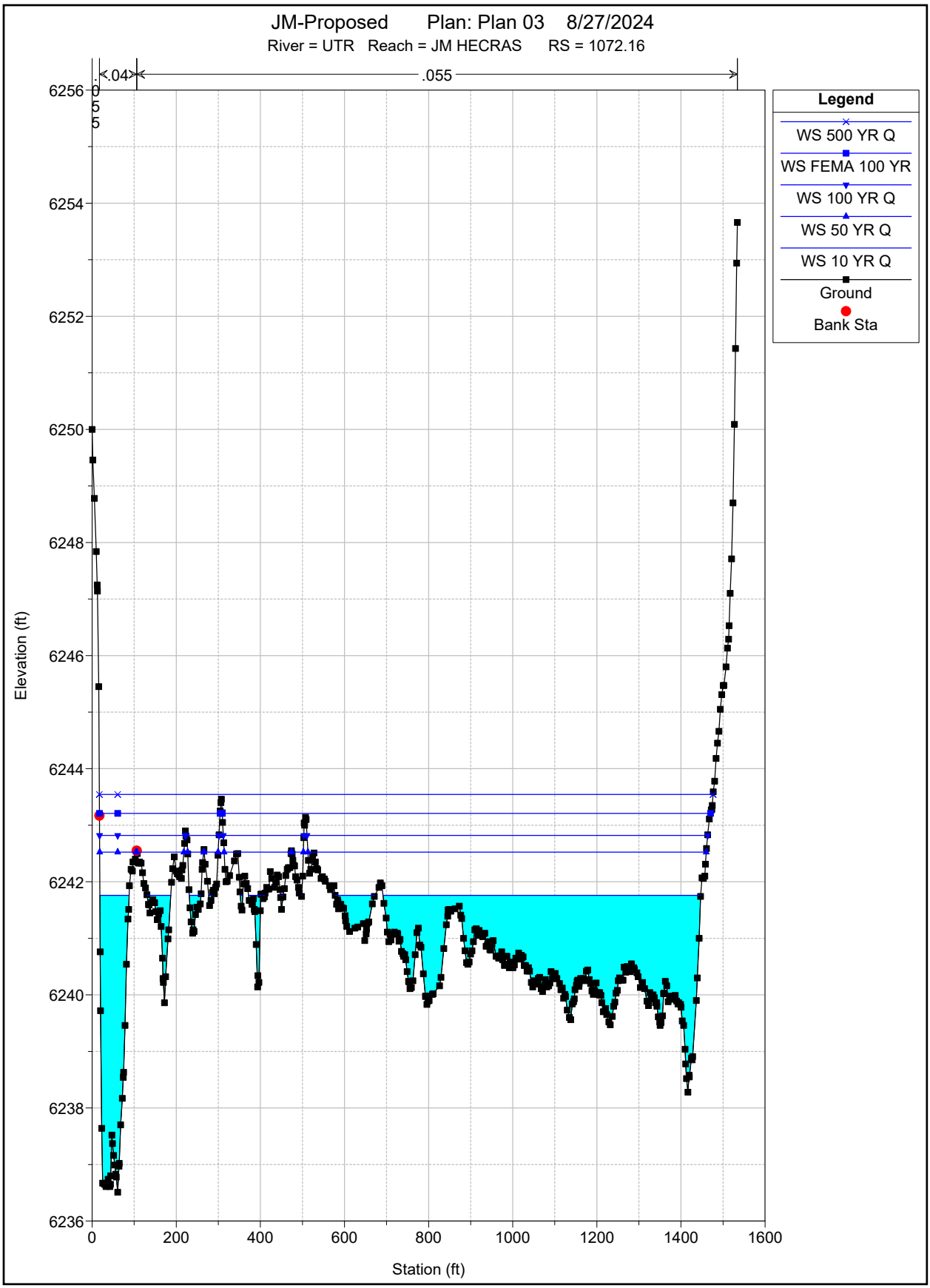

JM-Proposed Plan: Plan 03 8/27/2024
River = UTR Reach = JM HECRAS RS = 1539.63
.04
.055
.055
Legend
WS 500 YR Q
WS FEMA 100 YR
WS 100 YR Q
WS 50 YR Q
WS 10 YR Q
Ground
Bank Sta
Elevation (ft)
Station (ft)
6256
6254
6252
6250
6248
6246
6244
6242
6240
6238
6236
0
200
400
600
800
1000
1200
1400
1600

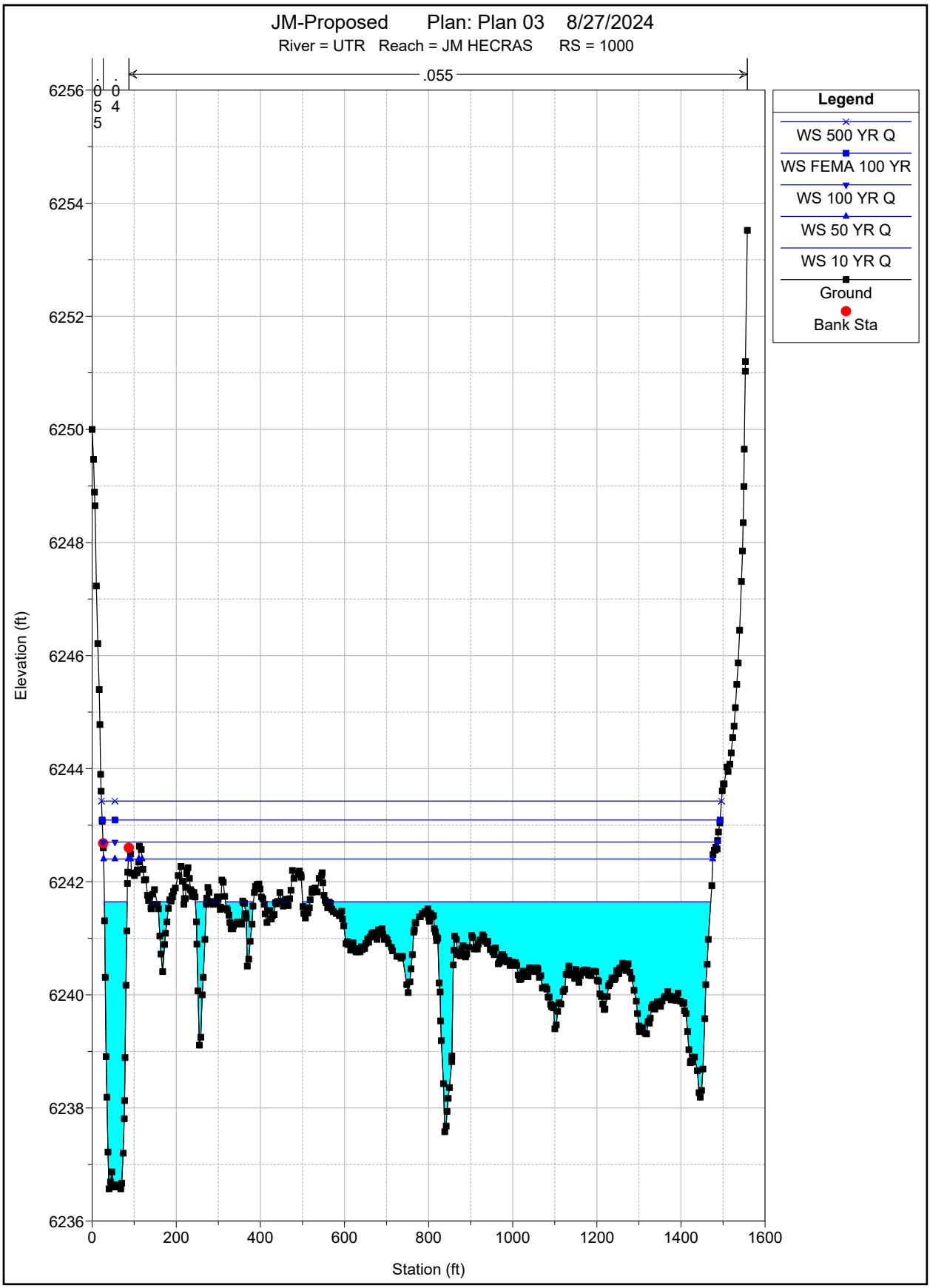

JM-Proposed Plan: Plan 03 8/27/2024
River = UTR Reach = JM HECRAS RS = 1488.67
.04
.055
.055
Legend
WS 500 YR Q
WS FEMA 100 YR
WS 100 YR Q
WS 50 YR Q
WS 10 YR Q
Ground
Bank Sta
Elevation (ft)
Station (ft)
6256
6254
6252
6250
6248
6246
6244
6242
6240
6238
6236
0
200
400
600
800
1000
1200
1400
1600

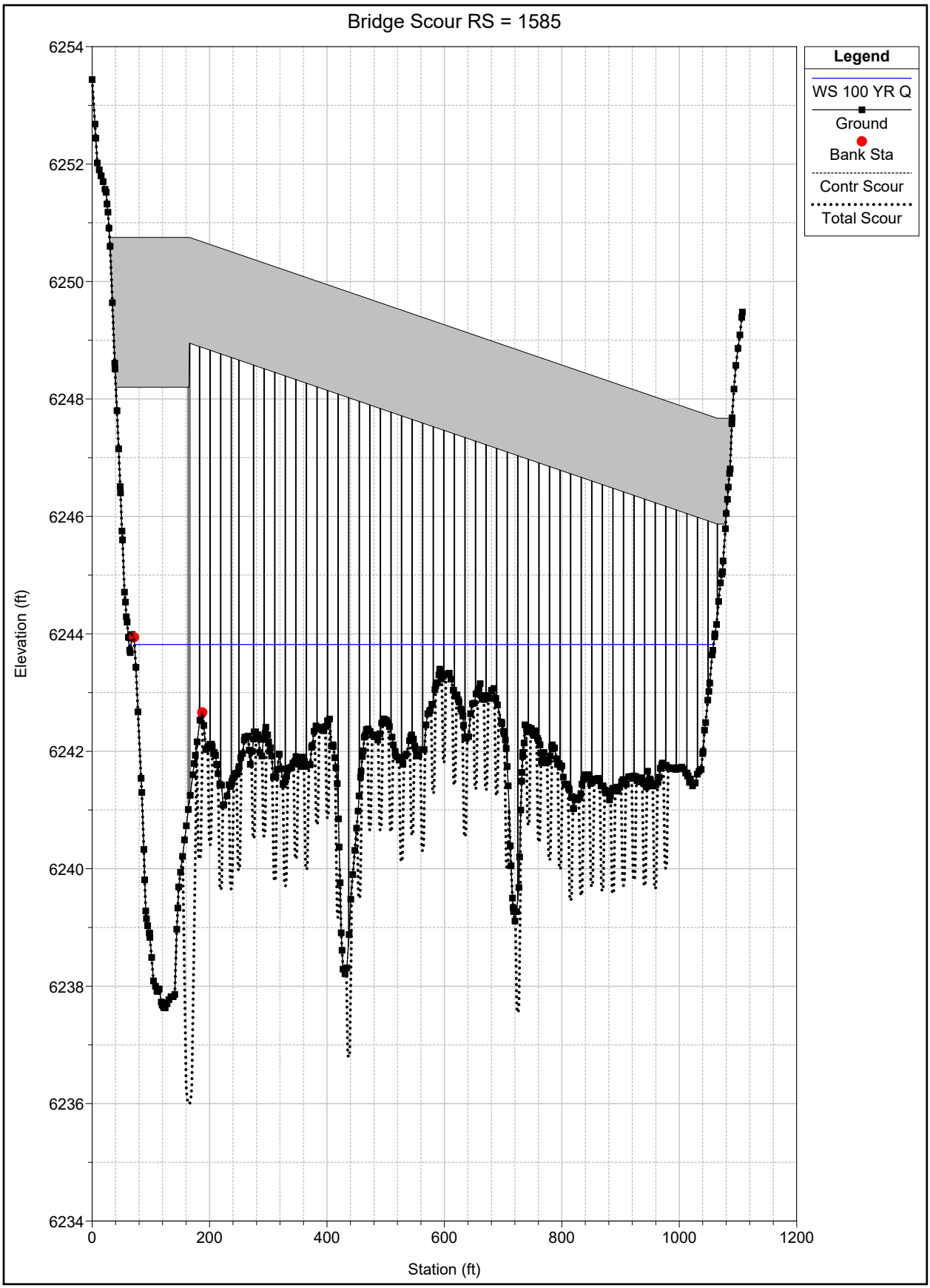

JM-Proposed Plan: Plan 03 8/27/2024
River = UTR Reach = JM HECRAS RS = 1404.2
.04
.055
.055
Legend
WS 500 YR Q
WS FEMA 100 YR
WS 100 YR Q
WS 50 YR Q
WS 10 YR Q
Ground
Bank Sta
Elevation (ft)
Station (ft)
6256
6254
6252
6250
6248
6246
6244
6242
6240
6238
6236
0
200
400
600
800
1000
1200
1400
1600


JM-Proposed Plan: Plan 03 8/27/2024
River = UTR Reach = JM HECRAS RS = 1300
.055
.055
.04
Legend
WS 500 YR Q
WS FEMA 100 YR
WS 100 YR Q
WS 50 YR Q
WS 10 YR Q
Ground
Bank Sta
Elevation (ft)
Station (ft)
6256
6254
6252
6250
6248
6246
6244
6242
6240
6238
6236
0
200
400
600
800
1000
1200
1400
1600


JM-Proposed Plan: Plan 03 8/27/2024
River = UTR Reach = JM HECRAS RS = 1200
.04
.055
Legend
WS 500 YR Q
WS FEMA 100 YR
WS 100 YR Q
WS 50 YR Q
WS 10 YR Q
Ground
Bank Sta
Elevation (ft)
Station (ft)
6256
6254
6252
6250
6248
6246
6244
6242
6240
6238
6236
0
200
400
600
800
1000
1200
1400
1600


JM-Proposed Plan: Plan 03 8/27/2024
River = UTR Reach = JM HECRAS RS = 1072.16
.04
.055
.055
Legend
WS 500 YR Q
WS FEMA 100 YR
WS 100 YR Q
WS 50 YR Q
WS 10 YR Q
Ground
Bank Sta
Elevation (ft)
Station (ft)
6256
6254
6252
6250
6248
6246
6244
6242
6240
6238
6236
0
200
400
600
800
1000
1200
1400
1600


JM-Proposed Plan: Plan 03 8/27/2024
River = UTR Reach = JM HECRAS RS = 1000
.055
.055
.045
Legend
WS 500 YR Q
WS FEMA 100 YR
WS 100 YR Q
WS 50 YR Q
WS 10 YR Q
Ground
Bank Sta
Elevation (ft)
Station (ft)
6256
6254
6252
6250
6248
6246
6244
6242
6240
6238
6236
0
200
400
600
800
1000
1200
1400
1600


Bridge Scour RS = 1585
Legend
WS 100 YR Q
Ground
Bank Sta
Contr Scour
Total Scour
Elevation (ft)
Station (ft)
6254
6252
6250
6248
6246
6244
6242
6240
6238
6236
6234
0
200
400
600
800
1000
1200

Contraction Scour

		Left	Channel	Right
Input Data				
	Average Depth (ft):	0.10	4.41	1.90
	Approach Velocity (ft/s):	0.31	5.27	2.22
	Br Average Depth (ft):	0.08	4.03	1.96
	BR Opening Flow (cfs):	0.07	2195.20	3399.63
	BR Top WD (ft):	3.41	110.79	813.16
	Grain Size D50 (mm):	0.95	0.08	0.57
	Approach Flow (cfs):	0.10	1938.17	3656.62
	Approach Top WD (ft):	3.30	83.43	865.36
	K1 Coefficient:	0.590	0.690	0.640
Results				
	Scour Depth Ys (ft):	0.00	0.00	0.00
	Critical Velocity (ft/s):	1.11	0.92	1.53
	Equation:	Clear	Live	Live

Pier Scour

Pier: #1 (CL = 12)

Input Data

	Pier Shape:	Circulare cylinder
	Pier Width (ft):	1.20
	Grain Size D50 (mm):	0.08000
	Depth Upstream (ft):	-8.01
	Velocity Upstream (ft/s):	0.30
	K1 Nose Shape:	1.00
	Pier Angle:	
	Pier Length (ft):	13.00
	K2 Angle Coef:	1.00
	K3 Bed Cond Coef:	1.10
	Grain Size D90 (mm):	0.20000
	K4 Armouring Coef:	1.00
	Set K1 value to 1.0 because angle > 5 degrees	

Results

	Scour Depth Ys (ft):	
	Froude #:	
	Equation:	CSU equation

Pier: #2 (CL = 30)

Input Data

	Pier Shape:	Circulare cylinder
	Pier Width (ft):	3.50
	Grain Size D50 (mm):	0.08000
	Depth Upstream (ft):	-6.81
	Velocity Upstream (ft/s):	0.30
	K1 Nose Shape:	1.00
	Pier Angle:	
	Pier Length (ft):	13.00
	K2 Angle Coef:	1.00
	K3 Bed Cond Coef:	1.10
	Grain Size D90 (mm):	0.20000
	K4 Armouring Coef:	1.00
	Set K1 value to 1.0 because angle > 5 degrees	

Results

	Scour Depth Ys (ft):	

Froude #:	
Equation:	CSU equation

Pier: #3 (CL = 165)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	3.50
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.80
Velocity Upstream (ft/s):	4.36
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft):	5.10
Froude #:	0.46
Equation:	CSU equation

Pier: #4 (CL = 183)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.41
Velocity Upstream (ft/s):	4.36
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft):	2.32
Froude #:	0.65
Equation:	CSU equation

Pier: #5 (CL = 201)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.77
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft):	1.71
Froude #:	0.27
Equation:	CSU equation

Pier: #6 (CL = 219)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.46
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft):	1.79
Froude #:	0.23
Equation:	CSU equation

Pier: #7 (CL = 237)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.45
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft):	1.79
Froude #:	0.23
Equation:	CSU equation

Pier: #8 (CL = 250)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.16
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00

K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.76
Froude #:	0.24
Equation:	CSU equation

Pier: #9 (CL = 275)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.68
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.70
Froude #:	0.27
Equation:	CSU equation

Pier: #10 (CL = 293)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.64
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.70
Froude #:	0.28
Equation:	CSU equation

Pier: #11 (CL = 311)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.33
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00

Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.78
Froude #:	0.23
Equation:	CSU equation

Pier: #12 (CL = 329)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.40
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.79
Froude #:	0.23
Equation:	CSU equation

Pier: #13 (CL = 347)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.99
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.74
Froude #:	0.25
Equation:	CSU equation

Pier: #14 (CL = 365)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000

Depth Upstream (ft):	2.15
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.76
Froude #:	0.24
Equation:	CSU equation

Pier: #15 (CL = 383)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.47
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.67
Froude #:	0.29
Equation:	CSU equation

Pier: #16 (CL = 401)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.37
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.66
Froude #:	0.30
Equation:	CSU equation

Pier: #17 (CL = 419)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.89
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.83
Froude #:	0.21
Equation:	CSU equation

Pier: #18 (CL = 437)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	5.12
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.98
Froude #:	0.16
Equation:	CSU equation

Pier: #19 (CL = 455)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.59
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.80
Froude #:	0.22

Equation:	CSU equation

Pier: #20 (CL = 473)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.55
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft):	1.68
Froude #:	0.29
Equation:	CSU equation

Pier: #21 (CL = 491)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.55
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft):	1.68
Froude #:	0.29
Equation:	CSU equation

Pier: #22 (CL = 509)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.58
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft):	1.69
Froude #:	0.28
Equation:	CSU equation

Pier: #23 (CL = 527)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.03
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft):	1.75
Froude #:	0.25
Equation:	CSU equation

Pier: #24 (CL = 545)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.63
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft):	1.70
Froude #:	0.28
Equation:	CSU equation

Pier: #25 (CL = 563)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.86
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10

Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.73
Froude #:	0.26
Equation:	CSU equation

Pier: #26 (CL = 581)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.02
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.59
Froude #:	0.35
Equation:	CSU equation

Pier: #27 (CL = 599)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	0.60
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.48
Froude #:	0.46
Equation:	CSU equation

Pier: #28 (CL = 617)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	0.90
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	

Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.57
Froude #:	0.37
Equation:	CSU equation

Pier: #29 (CL = 635)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.65
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.70
Froude #:	0.28
Equation:	CSU equation

Pier: #30 (CL = 653)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	0.96
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.58
Froude #:	0.36
Equation:	CSU equation

Pier: #31 (CL = 671)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	0.97

Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.58
Froude #:	0.36
Equation:	CSU equation

Pier: #32 (CL = 689)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.05
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.60
Froude #:	0.35
Equation:	CSU equation

Pier: #33 (CL = 707)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.15
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.76
Froude #:	0.24
Equation:	CSU equation

Pier: #34 (CL = 725)

Input Data

Pier Shape:	Circulare cylinder

Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	4.41
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.94
Froude #:	0.17
Equation:	CSU equation

Pier: #35 (CL = 743)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.48
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.67
Froude #:	0.29
Equation:	CSU equation

Pier: #36 (CL = 761)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.73
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.71
Froude #:	0.27
Equation:	CSU equation

Pier: #37 (CL = 779)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.01
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.74
Froude #:	0.25
Equation:	CSU equation

Pier: #38 (CL = 797)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.14
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.76
Froude #:	0.24
Equation:	CSU equation

Pier: #39 (CL = 815)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.63
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.81
Froude #:	0.22
Equation:	CSU equation

Pier: #40 (CL = 833)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.55
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft):	1.80
Froude #:	0.22
Equation:	CSU equation

Pier: #41 (CL = 851)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.41
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft):	1.79
Froude #:	0.23
Equation:	CSU equation

Pier: #42 (CL = 869)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.48
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000

K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.79
Froude #:	0.23
Equation:	CSU equation

Pier: #43 (CL = 887)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.52
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.80
Froude #:	0.22
Equation:	CSU equation

Pier: #44 (CL = 905)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.39
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.79
Froude #:	0.23
Equation:	CSU equation

Pier: #45 (CL = 923)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.31
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00

K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.78
Froude #:	0.23
Equation:	CSU equation

Pier: #46 (CL = 941)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.40
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.79
Froude #:	0.23
Equation:	CSU equation

Pier: #47 (CL = 959)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.45
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.79
Froude #:	0.23
Equation:	CSU equation

Pier: #48 (CL = 977)

Input Data

Pier Shape:	Circulare cylinder
Pier Width (ft):	1.20
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	2.13
Velocity Upstream (ft/s):	2.01

K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	13.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.20000
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	1.76
Froude #:	0.24
Equation:	CSU equation

Pier: #49 (CL = 995)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	1.20
Grain Size D50 (mm):	
Depth Upstream (ft):	2.19
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	14.00
K2 Angle Coef:	
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #50 (CL = 1013)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	1.20
Grain Size D50 (mm):	
Depth Upstream (ft):	2.26
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	14.00
K2 Angle Coef:	
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #51 (CL = 1031)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	1.20

Grain Size D50 (mm):	
Depth Upstream (ft):	2.27
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	14.00
K2 Angle Coef:	
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #52 (CL = 1049)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	1.20
Grain Size D50 (mm):	
Depth Upstream (ft):	0.99
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	14.00
K2 Angle Coef:	
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #53 (CL = 1065)

Input Data

Pier Shape:	Round nose
Pier Width (ft):	1.20
Grain Size D50 (mm):	
Depth Upstream (ft):	-0.43
Velocity Upstream (ft/s):	2.01
K1 Nose Shape:	1.00
Pier Angle:	
Pier Length (ft):	14.00
K2 Angle Coef:	
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	
K4 Armouring Coef:	1.00
Set K1 value to 1.0 because angle > 5 degrees	

Results

Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Contraction Scour

	Left	Channel	Right
Ys (ft):	0.00	0.00	0.00
Vc (ft/s):	1.11	0.92	1.53
Equation:	Clear	Live	Live

Pier Scour

#1 (CL = 12)	Ys (ft):	
#2 (CL = 30)	Ys (ft):	
#3 (CL = 165)	Ys (ft):	5.10
#4 (CL = 183)	Ys (ft):	2.32
#5 (CL = 201)	Ys (ft):	1.71
#6 (CL = 219)	Ys (ft):	1.79
#7 (CL = 237)	Ys (ft):	1.79
#8 (CL = 250)	Ys (ft):	1.76
#9 (CL = 275)	Ys (ft):	1.70
#10 (CL = 293)	Ys (ft):	1.70
#11 (CL = 311)	Ys (ft):	1.78
#12 (CL = 329)	Ys (ft):	1.79
#13 (CL = 347)	Ys (ft):	1.74
#14 (CL = 365)	Ys (ft):	1.76
#15 (CL = 383)	Ys (ft):	1.67
#16 (CL = 401)	Ys (ft):	1.66
#17 (CL = 419)	Ys (ft):	1.83
#18 (CL = 437)	Ys (ft):	1.98
#19 (CL = 455)	Ys (ft):	1.80
#20 (CL = 473)	Ys (ft):	1.68
#21 (CL = 491)	Ys (ft):	1.68
#22 (CL = 509)	Ys (ft):	1.69
#23 (CL = 527)	Ys (ft):	1.75
#24 (CL = 545)	Ys (ft):	1.70
#25 (CL = 563)	Ys (ft):	1.73
#26 (CL = 581)	Ys (ft):	1.59
#27 (CL = 599)	Ys (ft):	1.48
#28 (CL = 617)	Ys (ft):	1.57
#29 (CL = 635)	Ys (ft):	1.70
#30 (CL = 653)	Ys (ft):	1.58
#31 (CL = 671)	Ys (ft):	1.58
#32 (CL = 689)	Ys (ft):	1.60
#33 (CL = 707)	Ys (ft):	1.76
#34 (CL = 725)	Ys (ft):	1.94
#35 (CL = 743)	Ys (ft):	1.67
#36 (CL = 761)	Ys (ft):	1.71
#37 (CL = 779)	Ys (ft):	1.74
#38 (CL = 797)	Ys (ft):	1.76
#39 (CL = 815)	Ys (ft):	1.81
#40 (CL = 833)	Ys (ft):	1.80
#41 (CL = 851)	Ys (ft):	1.79
#42 (CL = 869)	Ys (ft):	1.79
#43 (CL = 887)	Ys (ft):	1.80
#44 (CL = 905)	Ys (ft):	1.79
#45 (CL = 923)	Ys (ft):	1.78
#46 (CL = 941)	Ys (ft):	1.79
#47 (CL = 959)	Ys (ft):	1.79

#48 (CL = 977)	Ys (ft):	1.76
#49 (CL = 995)	Ys (ft):	
#50 (CL = 1013)	Ys (ft):	
#51 (CL = 1031)	Ys (ft):	
#52 (CL = 1049)	Ys (ft):	
#53 (CL = 1065)	Ys (ft):	

Combined Scour Depths

Pier : #1 (CL = 12) (Contr + Pier) (ft):	
Pier : #2 (CL = 30) (Contr + Pier) (ft):	
Pier : #3 (CL = 165) (Contr + Pier) (ft):	5.10
Pier : #4 (CL = 183) (Contr + Pier) (ft):	2.32
Pier : #5 (CL = 201) (Contr + Pier) (ft):	1.71
Pier : #6 (CL = 219) (Contr + Pier) (ft):	1.79
Pier : #7 (CL = 237) (Contr + Pier) (ft):	1.79
Pier : #8 (CL = 250) (Contr + Pier) (ft):	1.76
Pier : #9 (CL = 275) (Contr + Pier) (ft):	1.70
Pier : #10 (CL = 293) (Contr + Pier) (ft):	1.70
Pier : #11 (CL = 311) (Contr + Pier) (ft):	1.78
Pier : #12 (CL = 329) (Contr + Pier) (ft):	1.79
Pier : #13 (CL = 347) (Contr + Pier) (ft):	1.74
Pier : #14 (CL = 365) (Contr + Pier) (ft):	1.76
Pier : #15 (CL = 383) (Contr + Pier) (ft):	1.67
Pier : #16 (CL = 401) (Contr + Pier) (ft):	1.66
Pier : #17 (CL = 419) (Contr + Pier) (ft):	1.83
Pier : #18 (CL = 437) (Contr + Pier) (ft):	1.98
Pier : #19 (CL = 455) (Contr + Pier) (ft):	1.80
Pier : #20 (CL = 473) (Contr + Pier) (ft):	1.68
Pier : #21 (CL = 491) (Contr + Pier) (ft):	1.68
Pier : #22 (CL = 509) (Contr + Pier) (ft):	1.69
Pier : #23 (CL = 527) (Contr + Pier) (ft):	1.75
Pier : #24 (CL = 545) (Contr + Pier) (ft):	1.70
Pier : #25 (CL = 563) (Contr + Pier) (ft):	1.73
Pier : #26 (CL = 581) (Contr + Pier) (ft):	1.59
Pier : #27 (CL = 599) (Contr + Pier) (ft):	1.48
Pier : #28 (CL = 617) (Contr + Pier) (ft):	1.57
Pier : #29 (CL = 635) (Contr + Pier) (ft):	1.70
Pier : #30 (CL = 653) (Contr + Pier) (ft):	1.58
Pier : #31 (CL = 671) (Contr + Pier) (ft):	1.58
Pier : #32 (CL = 689) (Contr + Pier) (ft):	1.60
Pier : #33 (CL = 707) (Contr + Pier) (ft):	1.76
Pier : #34 (CL = 725) (Contr + Pier) (ft):	1.94
Pier : #35 (CL = 743) (Contr + Pier) (ft):	1.67
Pier : #36 (CL = 761) (Contr + Pier) (ft):	1.71
Pier : #37 (CL = 779) (Contr + Pier) (ft):	1.74
Pier : #38 (CL = 797) (Contr + Pier) (ft):	1.76
Pier : #39 (CL = 815) (Contr + Pier) (ft):	1.81
Pier : #40 (CL = 833) (Contr + Pier) (ft):	1.80
Pier : #41 (CL = 851) (Contr + Pier) (ft):	1.79
Pier : #42 (CL = 869) (Contr + Pier) (ft):	1.79
Pier : #43 (CL = 887) (Contr + Pier) (ft):	1.80
Pier : #44 (CL = 905) (Contr + Pier) (ft):	1.79

Pier : #45 (CL = 923) (Contr + Pier) (ft):	1.78
Pier : #46 (CL = 941) (Contr + Pier) (ft):	1.79
Pier : #47 (CL = 959) (Contr + Pier) (ft):	1.79
Pier : #48 (CL = 977) (Contr + Pier) (ft):	1.76
Pier : #49 (CL = 995) (Contr + Pier) (ft):	
Pier : #50 (CL = 1013) (Contr + Pier) (ft):	
Pier : #51 (CL = 1031) (Contr + Pier) (ft):	
Pier : #52 (CL = 1049) (Contr + Pier) (ft):	
Pier : #53 (CL = 1065) (Contr + Pier) (ft):	

COUNTY OF EL DORADO — DEPARTMENT OF TRANSPORTATION

Tahoe Engineering
924B Emerald Bay Road
South Lake Tahoe, California 96150

Phone: (530) 573-7900
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Designer: DWK
Checked By:
Date: 31 May, 2024

Project Name: Johnson Meadow
Project #: 95201
Task Code: 1
Sheet: 1 of 3

HYDRAULIC CALCULATIONS

Johnson Meadow Scour Calculation

STA 1604.63, $Q_{100} = 5594$ cfs

$V_c = K_u Y^{1/2} D^{1/3}$

K_u = Constant = 11.17

y = upstream depth of flow = 6243.84 − 6237.63 = 6.21'

$V_c = (11.17)(6.21)^{1/6}(0.000259\,ft)^{1/3}$

$= 0.99$ ft/s

$D = D_{50} = 0.0792$ mm $= 0.000259$ ft

$V = 4.35$ ft/s

0.97 ft/s < 4.35 ft/s

$\therefore V_c < V \therefore$ Live bed scour

Live bed contract scour

$\frac{Y_2}{Y_1} = \left(\frac{Q_2}{Q_1}\right)^{6/7}\left(\frac{W_1}{W_2}\right)^{K_1}$ $\qquad Y_s = Y_2 - Y_o$

Assumptions: $Y_1 = Y_o$ (Note 7, HEC-18)

$W_1, W_2 \equiv$ Top widths (Note 4, HEC-18)

$W_2 = W_1$ − Pier widths + Abutment widths (Note 5, HEC-18)

Temp = 0°C

K_1

$V_* = (g Y_1 S_1)^{1/2}$

$= \left((32.2)(6.21)(0.001069)\right)^{1/2}$

$= 0.1462$

$g = 32.2$ ft/s/s

$Y_1 = 6.21'$

$S_1 = 0.001069$

$T = 0.025 * 3.28$

$= 0.082$

$\therefore \frac{V_*}{T} = \frac{0.1462}{0.082} = 1.78$

$\therefore K_1 = 0.64$

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Sheet: 2 of 3

HYDRAULIC CALCULATIONS

$$Y_2 = Y_1 \left(\frac{Q_2}{Q_1}\right)^{b/2} \left(\frac{W_1}{W_2}\right)^{k_1}$$

$$= 6.21' \left(\frac{5594}{5594}\right)^{6/2} \left(\frac{1100}{1041}\right)^{0.64}$$

$Y_2 = 6.43$

$\therefore Y_s = Y_2 - Y_0$

$= 6.43' - 6.21'$

$Y_s = 0.22'$ feet

Abutment width = 3.5 ft (one in flow path)

Pier Diameter = 14" = 1.2'

Assume 20' spacing

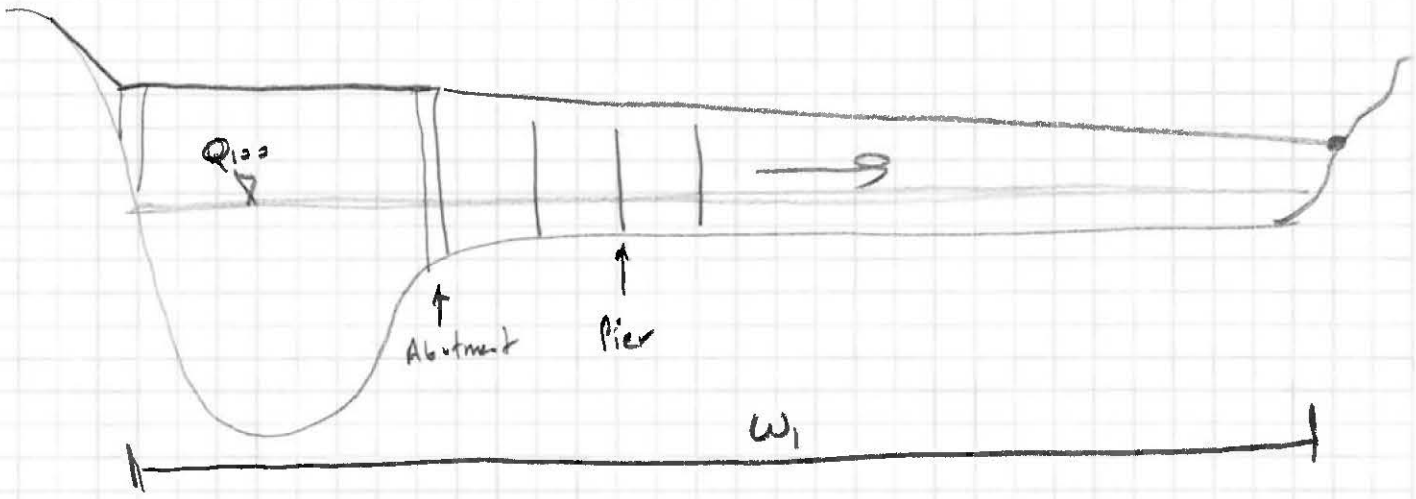
Abutment distance 145'

$1100 - (1 * 3.5) - (1.2 * 46)$

1041

$W_1 = 1100$

$W_2 = 1041$



$W_2 = W_1 - \text{Abutment} - \text{Piers}$

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Sheet: 3 of 3

HYDRAULIC CALCULATIONS

Johnson Meadow Pier & Abutment Scour

$$\frac{Y_s}{Y_1} = 2.0\, k_1\, k_2\, k_3 \left(\frac{a}{Y_1}\right)^{0.65} F_r^{0.43}$$

$$F_r = \left(\frac{V_1}{g Y_1}\right)^{1/2} = \left(\frac{4.35}{(32.2)(1)}\right)^{1/2} = 0.36$$

$V_1 = 4.35$ ft/s

$Y_1 = 1.0'$

$k_1 = 1.0$ (Pier)

$k_1 = 1.1$ (Abutment)

$k_2 = 1.0$

$k_3 = 1.1$

a = pier width = 14" = 1.2'

L = Abutment = 14'

Pier $Y_s = (1)\, 2.0\, (1.0)(1.0)(1.1)\left(\frac{1.2}{1}\right)^{0.65}(0.36)^{0.43}$

$= 1.6'$

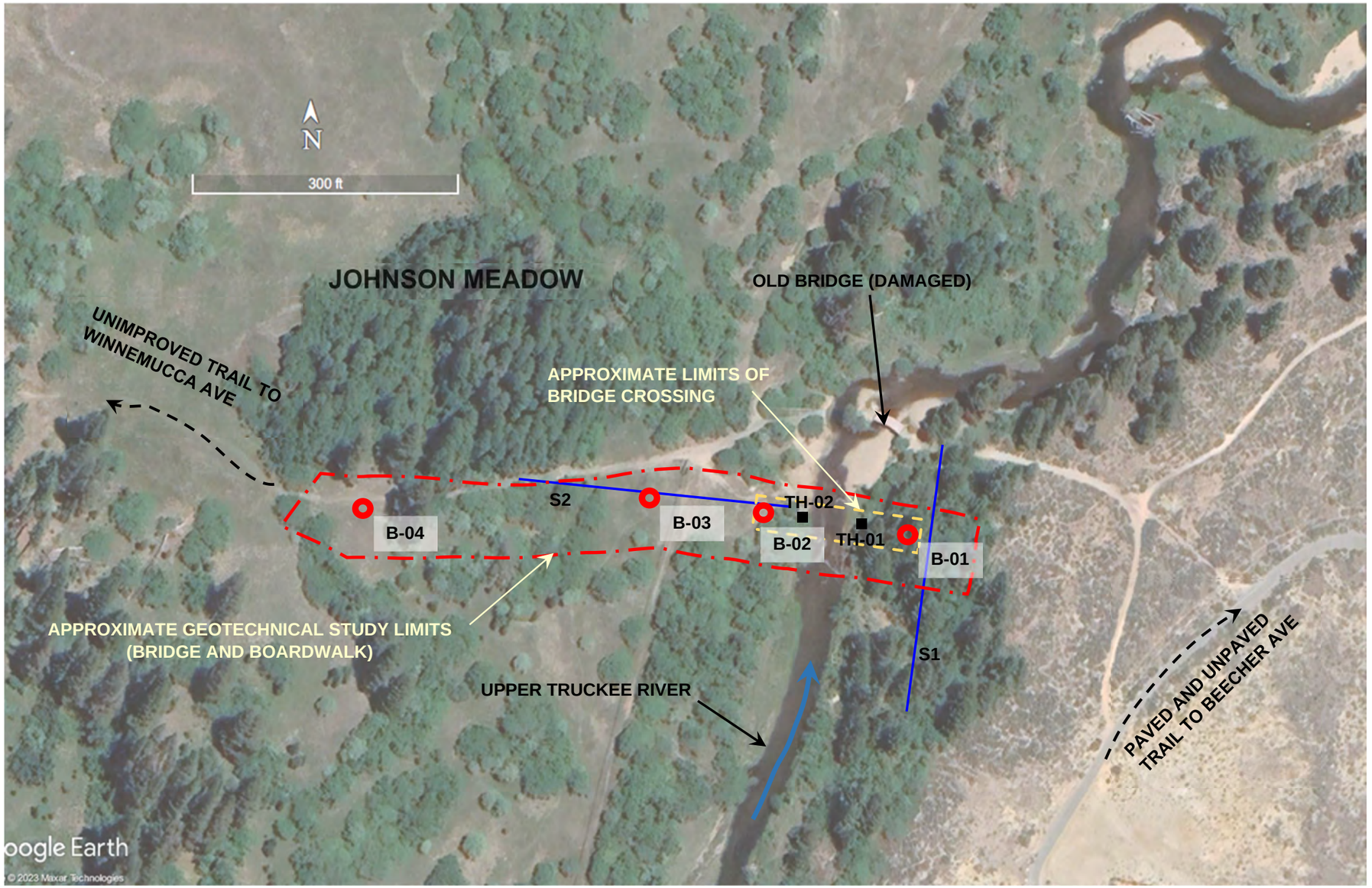
Pier Y_s = 1.6 feet

Abut $Y_s = (1)\, 2.0\, (1.1)(1.0)(1.1)\left(\frac{3.5}{1}\right)^{0.65}(0.36)^{0.43}$

Abutment Y_s = 3.5 feet

Pier Y_s max = 2.4 * 1.2
= 2.88 feet

Abutment Y_s max = 2.4 * 3.5
= 8.4 feet



NORTH
SCALE: 1" ≈ 125'

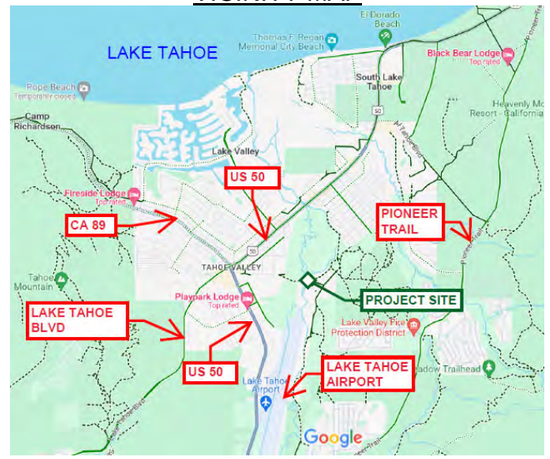
LEGEND

B-01	APPROXIMATE BORING LOCATION
TH-02	APPROXIMATE TEST HOLE LOCATION
S1	APPROXIMATE SHEAR WAVE VELOCITY SURVEY LINE

NOTES

1. BASE MAP PROVIDED BY GOOGLE EARTH™.
2. APPROXIMATE LIMITS OF BRIDGE AND BOARDWALK FROM 30% PLANS DEVELOPED BY EL DORADO COUNTY.

VICINITY MAP



NOT TO SCALE

NCE

LOCATION OF BORINGS MAP

UPPER TRUCKEE RIVER BRIDGE AT JOHNSON MEADOW
EL DORADO COUNTY, CALIFORNIA

Corestone Engineering, Inc.
Project No. 5012-05-1

Plate 1

Bridge STA on UTR		**15+85**
Bridge Length		**145**
Bridge Width		**13**
Abutment Width		**3.5**
Pier Width		**1.17**
Pier Separation		**20**
Pier Count		**100**
Bridge Surface		**6250.75**
Bridge Depth (deck-lowchord)		**3.05**
Low Chord Elev		**6247.7**
Angle of Attack (degrees)		**90**
Normal Depth Slope		**0.001068999**

14 inches

			HI Elev	**Low Elev**	X Max
Upstream Limit	**21+91.32**	**606.32**	6256	6238	1200
BRIDGE	**15+85**				
Downstream Limit	**10+00**	**585.00**	6254	6236	1600

Upstream Elev	**6237.71**
Downstream Elev	**6236.61**
Delta	**1.1**
Distance (ft)	**1029**
Slope	**0.001069**

Manning's Values	East	Channel	West
	0.055	**0.04**	**0.055**

	Contraction	Expansion
General Coefficients	0.1	0.3
Bridge Coefficients	0.3	0.5

Low Chord	**6247.70**	**DELTA**	
10 yr wse	6242.5	5.20	
50 yr wse	6243.46	4.24	**6246.46**
100 yr wse	6243.84	3.86	
500 yr wse	6244.22	3.48	

bed material (D_{50}) mm	**1.0'**	**2.5'**	**5.0'**	**7.5'**	**10.0'**	**12.5'**
B-01	-	clay w/sand	0.1784	-	0.2972	-
B-02	-	-	0.0792	0.2895	0.0799	-
B-03	-	-	0.1084	1.6218	-	0.0985
B-04	-	0.1393	0.2019	0.4944	1.5071	-
TH-01	0.5761					
TH-02	0.9504					

	HMS	*FEMA***
Q10	2416.8	*2347*
Q50	4459.3	*5389*
Q100	5594.9	*7376*
Q500	9076.7	*14390*

** For comparison

Upstream Section

	Trail Alignment				
30	**24+40**	6252.20	1.80	6250.40	
SLOPE		5.80%			-00+40
55	**24+00**	6250.75	1.80	6248.95	
BRIDGE					-01+45
190	**22+55**	6250.75	1.80	6248.95	
SLOPE		0.36%			-09+05
1065	**13+50**	6247.58	1.80	6245.78	

	Delta X (feet) (east to west)						
Pier Count	Upstream Section	DownStrm Section	Top Chrd		Bot Chrd	** Pile	Pile Tip
0	5	30	6252.2	1.8	6250.40	30.00	6220.40
1	12	37	6251.794	1.80	6249.99	30.00	6219.99
ABUT	30	55	6250.75	2.55	6248.20	30.00	6218.20
	BRIDGE						
ABUT	165	190	6250.75	2.55	6248.20	30.00	6218.20
1	183	208	6250.69	1.80	6248.89	30.00	6218.89
2	201	226	6250.63	1.80	6248.83	30.00	6218.83
3	219	244	6250.57	1.80	6248.77	30.00	6218.77
4	237	262	6250.51	1.80	6248.71	30.00	6218.71
1	250	275	6250.46	1.80	6248.66	30.00	6218.66
	STPUD EASEMENT						
1	275	300	6250.37	1.80	6248.57	30.00	6218.57
1	293	318	6250.31	1.80	6248.51	30.00	6218.51
2	311	336	6250.25	1.80	6248.45	30.00	6218.45
3	329	354	6250.19	1.80	6248.39	30.00	6218.39
4	347	372	6250.13	1.80	6248.33	30.00	6218.33
5	365	390	6250.07	1.80	6248.27	30.00	6218.27
6	383	408	6250.01	1.80	6248.21	30.00	6218.21
7	401	426	6249.95	1.80	6248.15	30.00	6218.15
8	419	444	6249.89	1.80	6248.09	30.00	6218.09
9	437	462	6249.83	1.80	6248.03	30.00	6218.03
10	455	480	6249.77	1.80	6247.97	30.00	6217.97
11	473	498	6249.71	1.80	6247.91	30.00	6217.91
12	491	516	6249.65	1.80	6247.85	30.00	6217.85
13	509	534	6249.59	1.80	6247.79	30.00	6217.79
14	527	552	6249.53	1.80	6247.73	30.00	6217.73
15	545	570	6249.47	1.80	6247.67	30.00	6217.67
16	563	588	6249.41	1.80	6247.61	30.00	6217.61
17	581	606	6249.35	1.80	6247.55	30.00	6217.55
18	599	624	6249.29	1.80	6247.49	30.00	6217.49
19	617	642	6249.23	1.80	6247.43	30.00	6217.43
20	635	660	6249.17	1.80	6247.37	30.00	6217.37
21	653	678	6249.11	1.80	6247.31	30.00	6217.31
22	671	696	6249.05	1.80	6247.25	30.00	6217.25
23	689	714	6248.99	1.80	6247.19	30.00	6217.19
24	707	732	6248.93	1.80	6247.13	30.00	6217.13
25	725	750	6248.87	1.80	6247.07	30.00	6217.07
26	743	768	6248.81	1.80	6247.01	30.00	6217.01
27	761	786	6248.75	1.80	6246.95	30.00	6216.95
28	779	804	6248.69	1.80	6246.89	30.00	6216.89
29	797	822	6248.63	1.80	6246.83	30.00	6216.83
30	815	840	6248.57	1.80	6246.77	30.00	6216.77
31	833	858	6248.51	1.80	6246.71	30.00	6216.71
32	851	876	6248.45	1.80	6246.65	30.00	6216.65
33	869	894	6248.39	1.80	6246.59	30.00	6216.59
34	887	912	6248.33	1.80	6246.53	30.00	6216.53
35	905	930	6248.27	1.80	6246.47	30.00	6216.47
36	923	948	6248.21	1.80	6246.41	30.00	6216.41
37	941	966	6248.15	1.80	6246.35	30.00	6216.35
38	959	984	6248.09	1.80	6246.29	30.00	6216.29
39	977	1002	6248.03	1.80	6246.23	31.00	6215.23
40	995	1020	6247.97	1.80	6246.17	32.00	6214.17
41	1013	1038	6247.91	1.80	6246.11	33.00	6213.11
42	1031	1056	6247.85	1.80	6246.05	34.00	6212.05
43	1049	1074	6247.79	1.80	6245.99	35.00	6210.99
0	1065	1090	6247.73	1.80	6245.93	36.00	6209.93

**** assumed 30 foot pile. Actual pile length TBD.**