

# **BUCKS LAKE TRAIL SYSTEM**



## **FEASIBILITY STUDY**

PREPARED FOR:

**PLUMAS COUNTY**

PREPARED BY:

**SIERRA BUTTES TRAIL STEWARDSHIP**

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### **Sierra Buttes Trail Stewardship:**

Formed in 2003, the Sierra Buttes Trail Stewardship (SBTS) is a volunteer driven 501c3 non-profit whose primary goal is the maintenance and enhancement of trails throughout the Sierra. SBTS employs as many as 15 full-time, seasonal employees, most of which are Plumas and Sierra County residents, with an annual payroll of right around \$400,000. In addition to a paid trail crew, SBTS has donated over 40,000 hours of volunteer labor to National Forests and State Parks, maintaining over 150 miles of shared use trails, including the creation of 50+ miles of new trails. While these trails see over 200,000 users per year, they continue to maintain a level “A” standing due to all the hard work of SBTS staff and volunteers. This organization is not only a shining example of what a small group of dedicated, passionate people can do for an area, it is a demonstration of economic efficiency when no alternatives exist.

Members of the SBTS have extensive trail building experience, working within the Tahoe and Plumas National Forests for nearly 20 years, and utilizing close relationships with the recreating public and land managers. Volunteerism has played, and will continue to play, a vital role in all of our projects.

# SUMMARY



## **Bucks Lake Trail System:**

This is a feasibility study for the Bucks Lake Trail System; a proposed non-motorized trail system, approximately 6.19-miles in length, located in the Bucks Lake area on Pacific Gas and Electric (PG&E) property, and developed and managed by Plumas County. The proposed trail system would provide access to incredible places and create connectivity to the surrounding Plumas National Forest. The proposed network of trails would be built with an eye towards sustainability and user enjoyment, and would consist of the following trail segments: Lakeshore, Rocky Ridge, Inspiration Point, Lower Traverse, Upper Traverse and Big Trees.

This document outlines the existing conditions, alignment options and design options for a non-motorized trail system.

## **Location:**

Bucks Lake is located 20 miles west of Quincy and 45 miles east of Oroville at an elevation of 5,200' in the Sierra Nevada Mountains. The Bucks Lake area hosts vacation resorts, privately owned campgrounds, PG&E owned campground, Forest Service campgrounds (Whitehorse, Lower Bucks Lake, Mill Creek, Sundew and Grizzly Creek), a full-service marina and numerous rental and privately owned recreation cabins.

## **Landscape and Terrain:**

The elevation of the property ranges from 5,200' to over 5600' and features gentle to steepened side slopes, rugged granite outcroppings that rise from decomposed granitic soil, towering pine and fir trees, seasonal streams with willow forests, and diverse flora and fauna. The natural beauty of the area provides a dramatic backdrop to Bucks Lake.

## **Recreational Opportunities (Current):**

Spring through fall, the Bucks Lake area is a popular destination for boating, fishing, swimming, camping, backpacking, birding and hunting. During the winter months, visitors enjoy snowmobiling, ice fishing, snowshoeing and backcountry skiing.

## **Recreational Opportunities (Absent):**

The majority of Forest Service trails in the area are set-aside for equestrian and hiking only (Bucks Wilderness and Pacific Crest Trail) and are located outside the immediate Bucks Lake area.

### **Solution – Proposed Project:**

The proposed Bucks Lake Trail System (BLTS) would be constructed near the southeast region of Bucks Lake basin, and would provide:

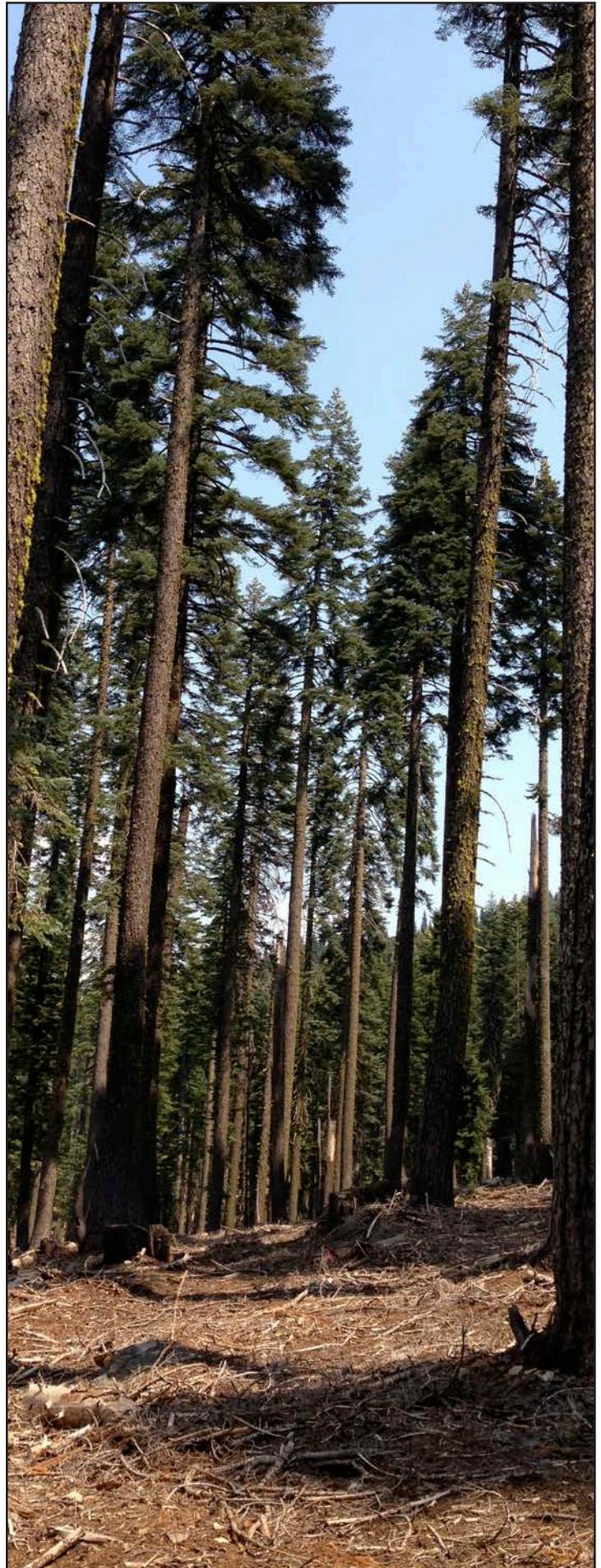
- Connectivity to already popular destinations, local businesses and points of interest
- Linkages to existing area Forest Service trail-heads
- A safe, non-motorized alternative to travelling Bucks Lake Road (narrow two-lane road carrying over \*480 vehicles per day, during summer months, with no shoulder for non motorized travel). *\*Average Daily Traffic statistics from Plumas Co. Dept. of Public Works*
- A high-quality non-motorized trail system that would be available to the public for outdoor recreation.

### **Expected Use:**

There are currently no trail opportunities in the immediate Bucks Lake area, with the exception of Bucks Creek Loop Trail. Pamphlets highlighting the trail system would help to attract visitors and would also allow users to safely navigate the trail system. These same pamphlets could be used as an educational tool, making visitors aware of the various user types they may experience on the trail, and providing information on proper trail etiquette and any “rules of the trail”. Equestrian use was not considered, as there is insufficient parking available for vehicles with trailers. Motorized use was not considered due to the close proximity of residents and campgrounds, as well as the limited amount of proposed trail mileage.

### **Who Will Benefit:**

Residents and visitors would benefit from a shared use trail system that offers a quality recreational experience and is available to a variety of users groups. Businesses in the Bucks Lake area would benefit by being able to offer tourists an extended recreation season (spring thru fall), a wider range of recreational activities and connectivity from their businesses to area trailheads. Cabin owners would benefit, as they would have immediate access to the trail system and \*shared use trails are proven to increase property values, encourage an active lifestyle and reduce crime in surrounding neighborhoods. *\*Outdoor Industry Association*



# PROPOSED TRAIL DESIGN

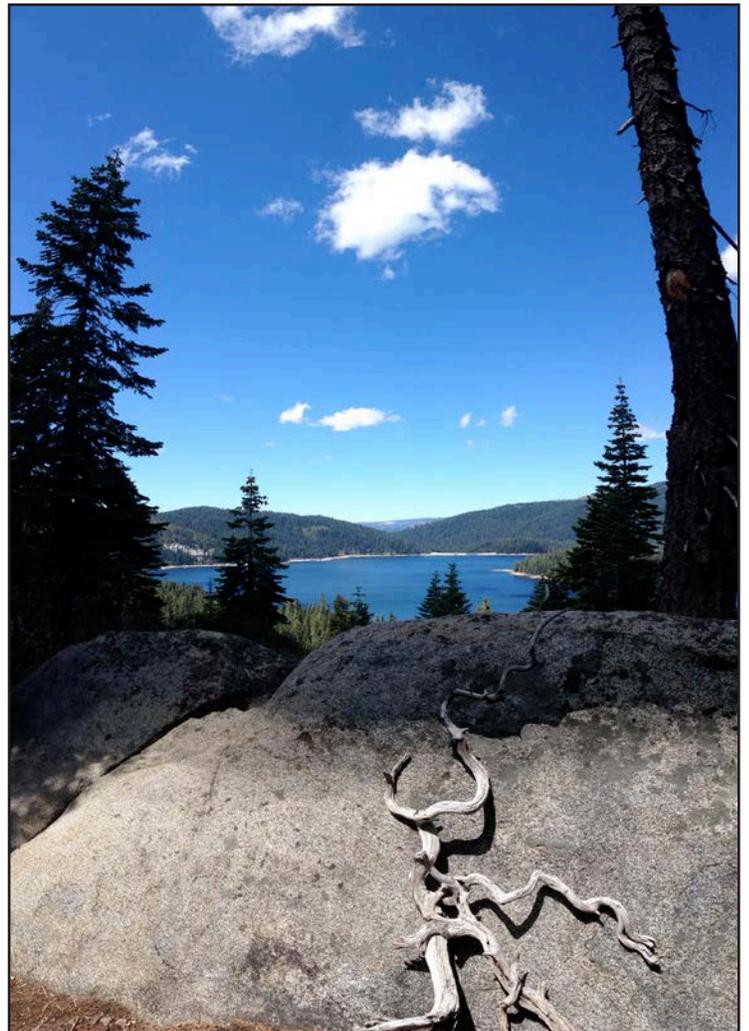


## **Proposed Trail Design:**

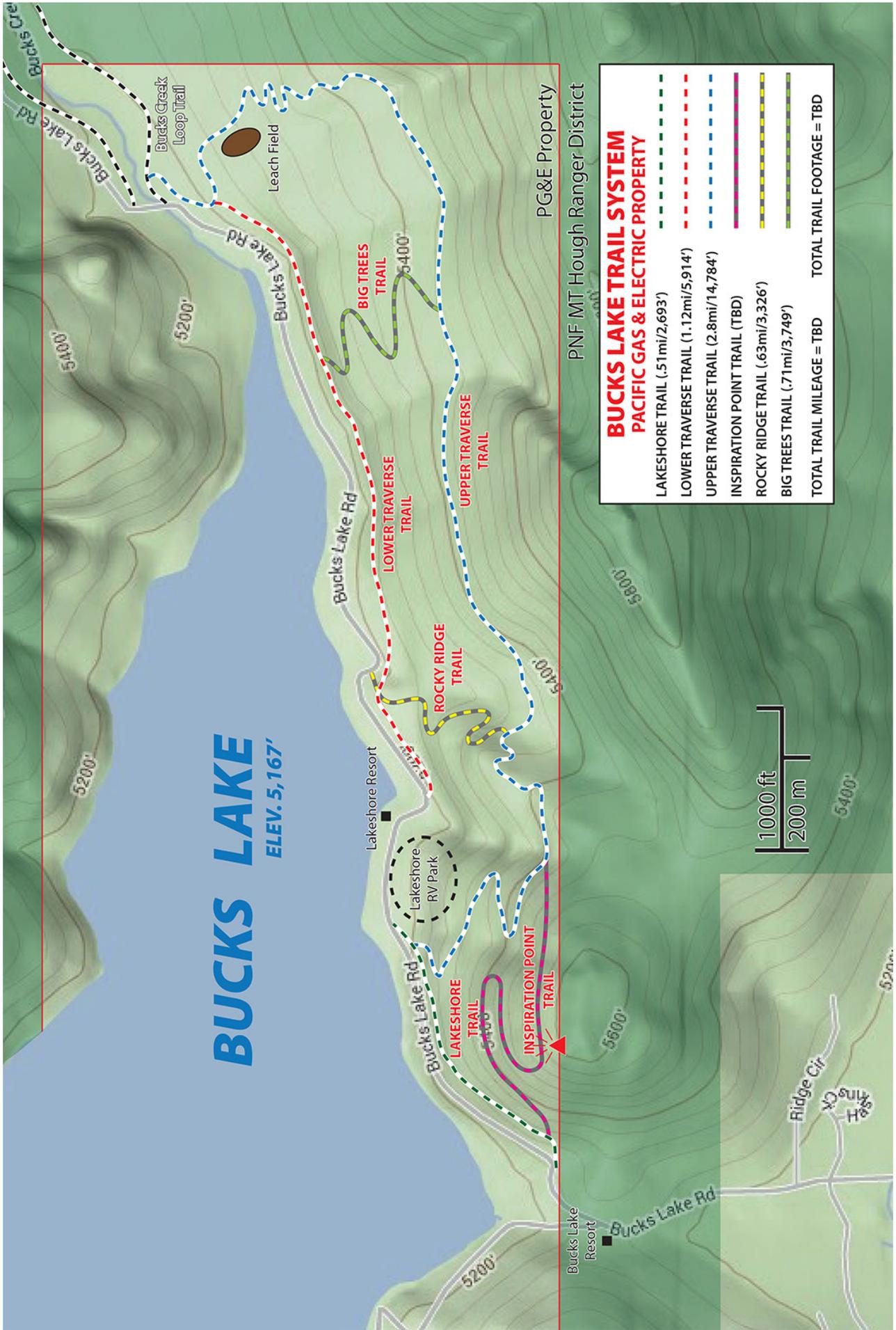
Forest Service EM-7720-103 specifications adapted to local conditions would guide trail design and construction of user and environmentally friendly trails. Forest Service Trail Accessibility Guidelines (FSTAG) would guide accessibility issues. Such construction would sustain high-use with minimal future maintenance requirements. Trail design would be aesthetically pleasing and enjoyable for all ages, skill and fitness levels.

## **General Description (Proposed):**

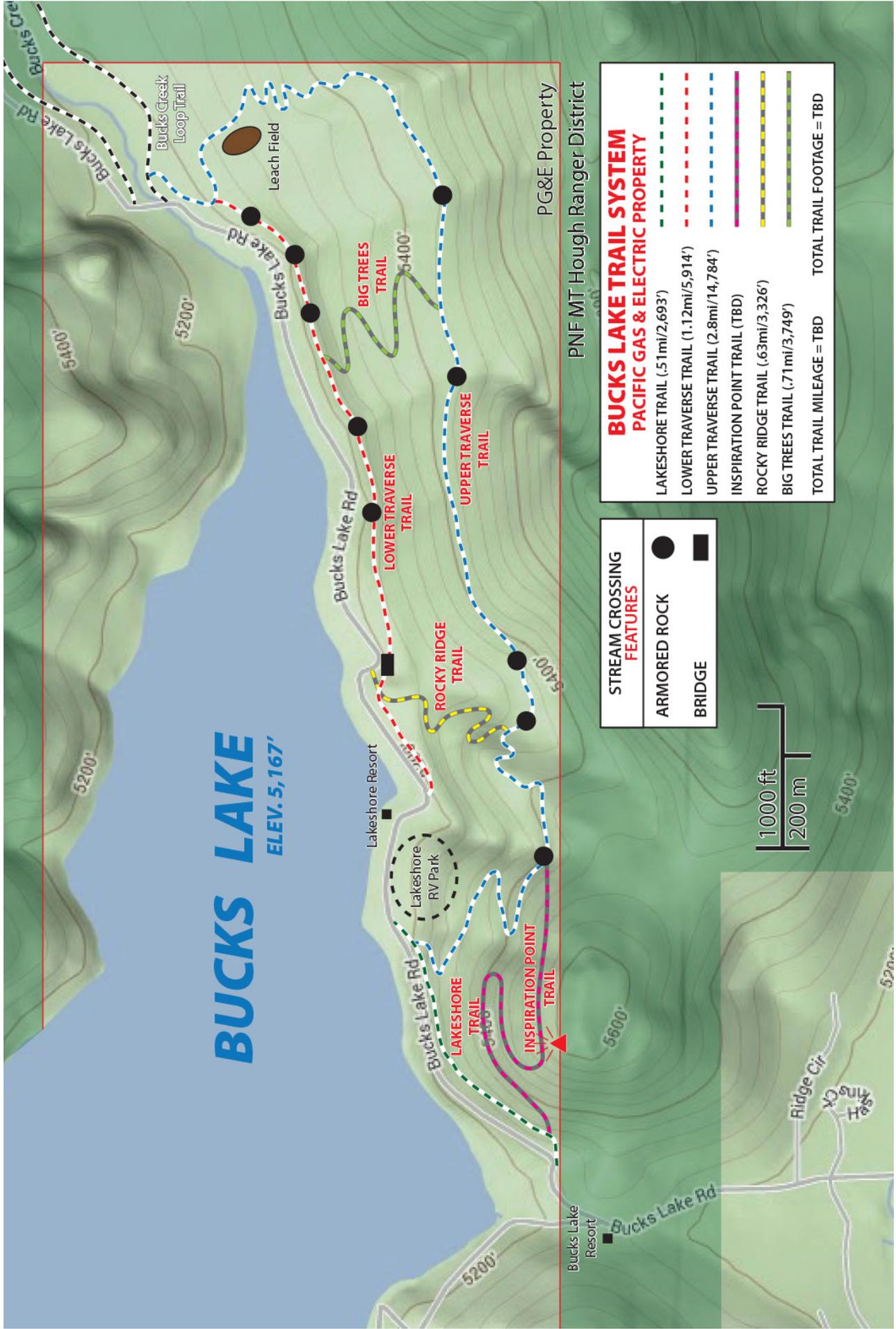
- Map: Attached
- GIS data and exact trail alignments will be produced prior to the CEQA process
- Proposed Length: approx 6.19miles(32,684')
- Trail Tread: Natural soil conditions
- Trail Design Parameters: Trail construction and maintenance would follow minimum design parameter guidelines for Non Wilderness (single lane) identified in Forest Service Handbook (FSH). Design tread width would be 18"-30" (may be up to 36" along steep side slopes and high-use areas). Design clearing height would be 8'-10' and clearing width would be 60" (light vegetation may encroach into clearing area). No trees larger than 6" diameter would be removed and all vegetation would either be removed by pulling the root wad or by cutting flush with ground.
- Running Grade: 0%-10% running grade, with an average 6%.
- Off-Slope: No less than 2% off-slope.
- Specification Standard: US Forest Service National Trail Drawings and Specifications (EM-7720-103) adapted to local conditions.
- User Group: Non-motorized.



**BUCKS LAKE TRAIL SYSTEM, FEASIBILITY STUDY. DISCUSSION MAP.**



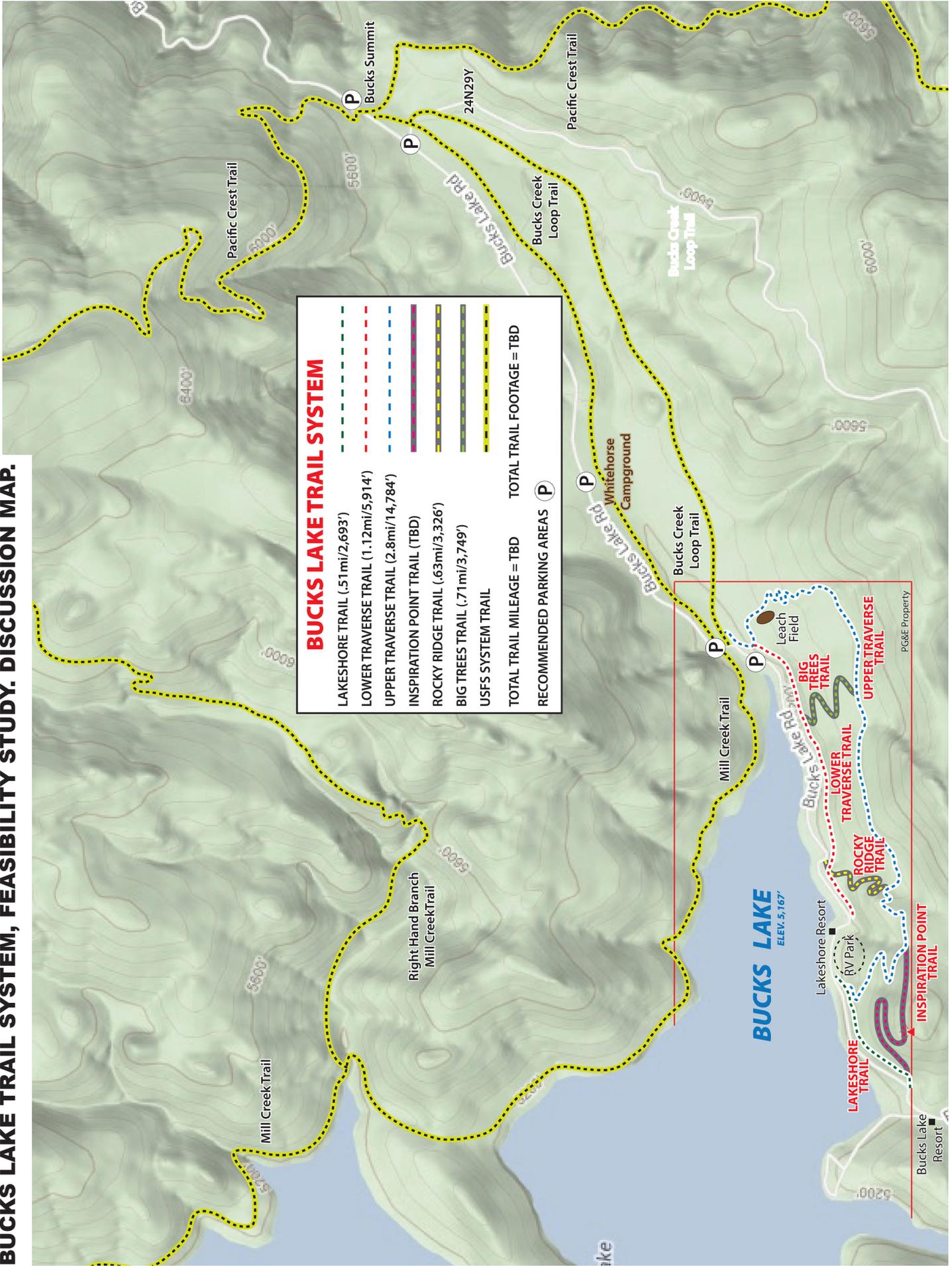
**BUCKS LAKE TRAIL SYSTEM, FEASIBILITY STUDY. DISCUSSION MAP.**



**BUCKS LAKE TRAIL SYSTEM, FEASIBILITY STUDY. DISCUSSION MAP.**



**BUCKS LAKE TRAIL SYSTEM, FEASIBILITY STUDY. DISCUSSION MAP.**



**BUCKS LAKE TRAIL SYSTEM**

- LAKESHORE TRAIL (.51mi/2,693')
- LOWER TRAVERSE TRAIL (1.12mi/5,914')
- UPPER TRAVERSE TRAIL (2.8mi/14,784')
- INSPIRATION POINT TRAIL (TBD)
- ROCKY RIDGE TRAIL (.63mi/3,326')
- BIG TREES TRAIL (.71mi/3,749')
- USFS SYSTEM TRAIL

TOTAL TRAIL MILEAGE = TBD      TOTAL TRAIL FOOTAGE = TBD

RECOMMENDED PARKING AREAS **P**

**BUCKS LAKE**  
ELEV. 5,167'

# PROPOSED CEQA DOCUMENTATION



## **CEQA Documentation:**

The proposed Bucks Lake Trail System would go through the California Environmental Quality Act (CEQA) process, before construction. Plumas County would either perform CEQA in-house using existing staff, or hire a licensed contractor(s), or a combination of both methods.

## **A Summary of the California Environmental Quality Act (CEQA)**

The California Environmental Quality Act (CEQA) is California's broadest environmental law. CEQA is a guide during the issuance of permits and approval of projects. Courts have interpreted CEQA to afford the fullest protection of the environment within the reasonable scope of the statutes. CEQA applies to all discretionary projects proposed to be conducted or approved by a California public agency, including private projects requiring discretionary government approval.

For more information about the Purpose of CEQA:  
<https://www.dfg.ca.gov/habcon/ceqa/ceqapolicy.html>



**PROPOSAL  
INITIAL STUDY  
BUCKS LAKE TRAIL SYSTEM  
BUCKS LAKE RECREATION AREA, CALIFORNIA**

Prepared for:

*LEAD AGENCY*  
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August 29, 2014

## PROJECT UNDERSTANDING

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Chico Environmental understands that Plumas County would like to develop recreational trails in the Bucks Lake Recreation Area. This project requires environmental analysis under CEQA, consisting of an Initial Study/Mitigated Negative Declaration (IS/MND).

The trail system is proposed for the south shore of the eastern portion of the lake. Plumas County would like to begin work on the project in the summer of 2015.

## SCOPE OF WORK

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### **Notice of Preparation**

Chico Environmental will prepare, per CEQA, a Notice of Preparation (NOP) to be distributed to responsible and trustee agencies and interested members of the public. The NOP will provide a brief description of the project and will be used to solicit comments and guidance regarding environmental information and analysis to be included in the IS/MND. Should Plumas County desire, Chico Environmental can also distribute the NOP to public and trustee agencies, the State Clearinghouse, and to private entities.

*Deliverables: One hard copy and one electronic copy of the Notice of Preparation; optional distribution of the NOP.*

### **Administrative Draft Initial Study/Environmental Assessment, Public Review Initial Study/Environmental Assessment and Public Notice, Mitigation Monitoring and Reporting Program**

An Administrative Draft Initial Study (IS) will be prepared in conformance with CEQA guidelines for the Bucks Lake Trail System Project. The IS will contain all required components and will address on-site and off-site impacts of the project. The major sections and areas of concern to be addressed are outline below.

#### **Project Description**

A complete project description will be included and will provide the basis for the environmental analysis in the IS. Chico Environmental will work closely with Plumas County to draft a complete project description, including specific trail routes; methods of trail construction, and major milestones/timelines for the project.

#### **Environmental Setting, Analysis, and Mitigation**

This is the main chapter of the IS, and will include separate sections for each environmental topic area. This chapter will be formatted so that the impact statements and corresponding mitigation measures will stand out from the text for clarity and easy reference. The affected environment, permanent impacts, temporary impacts, cumulative impacts, and mitigations measures for each resource would be analyzed. We note that previous studies have been conducted in the same general vicinity for Timber Harvest Plans. These studies may be used to conduct the analysis, and will be included in the environmental documentation.

An analysis will be prepared per the CEQA Environmental Checklists, which includes the following topics:

- Aesthetics
- Agriculture
- Air Quality
- Biological Resources
- Cultural Resources
- Environmental Justice
- Geology and Soils
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation and Traffic
- Utilities and Service Systems
- Mandatory Findings of Significance

Based on our current understanding of the project, Chico Environmental assumes that the impacts to the following environmental issue areas will be less than significant:

- Aesthetics
- Agriculture
- Air Quality
- Environmental Justice
- Hazards and Hazardous Materials
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation and Traffic
- Utilities and Service Systems

The environmental document will be consistent with CEQA requirements and formatted pursuant to CEQA specifications. Chico Environmental will submit the administrative draft environmental document to The Stewardship Council and Pacific Gas and Electric (PG&E). After review by the Stewardship and PG&E, Chico Environmental will make all necessary changes. Chico Environmental will be responsible for distribution of the document.

### **Public Notice/Notice of Completion**

Chico Environmental will prepare and post the Public Notice informing interested parties of the availability of the Draft Environmental Documentation. The Notice will be published in a local paper as identified by the Stewardship.

Chico Environmental will prepare the Notice of Completion (NOC) for the MND for submission to the State Clearinghouse. We will also prepare the Public Notice of Availability for the MND to be

distributed to responsible and trustee agencies, and any other persons or entities who have expressed an interest in reviewing the MND.

*Deliverables: Public Notice to be published in local paper, Notice of completion for the State Clearinghouse.*

### **Mitigation Monitoring and Reporting Program**

We will prepare a comprehensive Mitigation Monitoring and Reporting Program (MMP) pursuant to Section 21081.6 of the Public Resources Code. Chico Environmental will draft the MMP using the information contained within the environmental analysis, including the specific mitigation measures, assignments of responsibility, relationships to project implementation, and time frames for implementation. The MMP will be formatted in a matrix form, which defines each measure, specific actions, responsibilities, phasing/time frames, and identifies individuals or specific departments who must sign off on each measure. It is Chico Environmental's intent to produce a MMP that is easy to use and clearly monitors mitigation progress and status.

### **COST ESTIMATE:**

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CEQA Initial Study **\$6,000**

CEQA Initial Study (w/ Rocky Ridge and Big Trees Trail Connections) **\$1,000**

California Fish and Wildlife Filing Fee **\$2,181.25**

### **Subcontracting Cost Estimates**

Cultural Resources Survey **\$3,000-5,000**

Performed by Native X (Reno, California)

- Archival Record Search
- Sacred Land Search / Native American Consultation (5 hours)
- Recording of 1 prehistoric or historic resource
- Report of Findings (1 electronic).
- Copy of Report to Information Center

Wetland Survey and Delineation **\$3,000-5,000**

Performed by Gallaway Enterprises (Chico, California)

Botanical Survey **\$3,000-5,000**

Performed by American Valley Environmental, LLC (Quincy, California)

Conduct a biological resource assessment for the project area, including both biological and botanical survey per CDFG, California Native Plant Society (CNPS), and USFWS protocol. For the purposes of this survey special-status species are those that fall into one of the following categories:

- Designated as rare, threatened, or endangered by the state or federal governments (ESA, 50 CFR 17.12 for listed plants and various notices in the Federal Register, California ESA, 14 CCR 670.5)
- Proposed for rare, threatened, or endangered status
- Listed as Species of Concern by state or federal governments
- Included on the California Native Plant Society List 1A, 1B, and 2 (Skinner and Pavlik, 2002).

Total Cost for FOUR Trails (4.85 Miles): \$14,181.25 - \$18,181.25

Total Cost for SIX Trails (6.19 Miles): \$15,181.25 - \$19,181.25

(Including Rocky Ridge and Big Trees Trail)

## BUCKS LAKE TRAIL SYSTEM INITIAL STUDY/ENVIRONMENTAL ASSESSMENT

Preparation of an Initial Study under CEQA to include a complete project description, analysis of all environmental topics for the proposed Bucks Lake Trail System. Cost for copying and distribution of reports are to be covered by the Lead Agency.

### COMPLETION SCHEDULE:

Chico Environmental shall complete all services referenced in this agreement by: June 1, 2015

### COST ESTIMATE:

Compensation to Chico Environmental shall be in an amount not to exceed: \$19,181.25

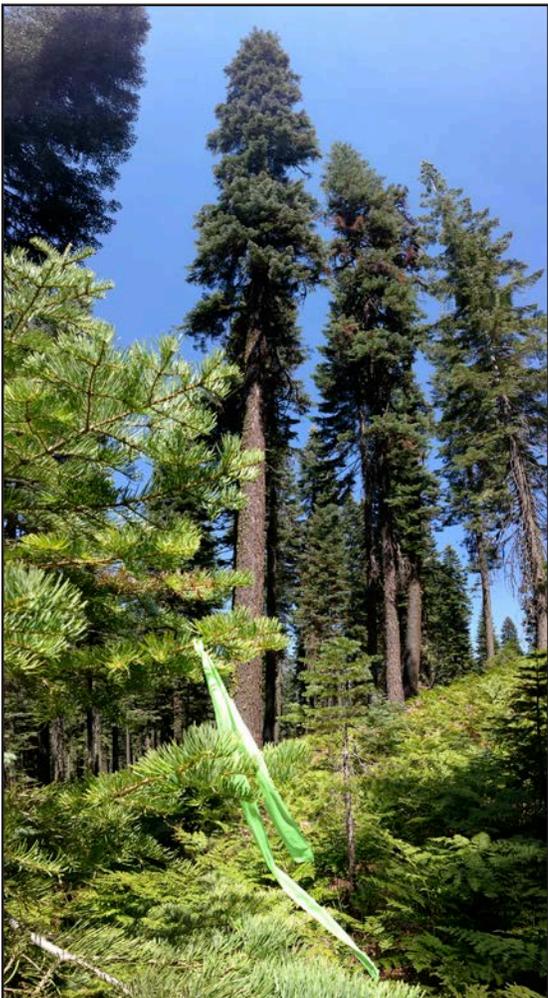
The scope of services, completion schedule, and cost estimate presented above are acceptable and Chico Environmental is authorized to proceed with the scope of services described herein.

# PROPOSED TRAIL CONSTRUCTION



## **Trail Construction:**

The proposed Bucks Lake Trail System would be built in an environmentally sensitive and ecologically responsible fashion – by using low impact and aesthetically considerate practices to reduce erosion and watershed contamination, so that it can withstand the demands of an increasing number of recreational users and the wrath of Mother Nature. State of the art trail construction techniques would control erosion, thus maximizing sediment control and providing a sustainable tread surface. Rock and other trail building materials are readily available, which would reduce haul need.



## **Estimated Trail Construction Costs:**

The cost estimates included in this feasibility study are for discussion purposes only. Final cost estimates will be determined as part of the CEQA process. (see construction cost attachment) Estimated construction costs are broken down, showing 3 potential methods (SBTS with In-Kind Match, SBTS without In-Kind Match, licensed contractor) for completing the Bucks Lake Trail System. Cost estimates include the following features:

- 10 armored stream crossings, up to 35' in length each (5 on Lower Traverse Trail, and 5 on Upper Traverse Trail)
- One 20' long “typical multi use trail bridge, without railings” on Lower Traverse Trail. (Included in this study are other bridge design options, along with photos and associated costs for each bridge type. Exact bridge type to be determined).

**1.** Estimated construction cost for the Sierra Buttes Trail Stewardship to construct the Bucks Lake Trail System, with an In-Kind Match, is estimated to be \*\$202,363.

\*Estimate includes a \$39,221.00 In-Kind Match through SBTS volunteers, contributed staff time and equipment.

**2.** Estimated construction cost for the Sierra Buttes Trail Stewardship to construct the Bucks Lake Trail System, without an In-Kind Match, is estimated to be \$241,584.

**3.** Estimated costs for a licensed contractor to construct the Bucks Lake Trail System is estimated to be \$284,727.

### **Development of Construction Costs:**

The cost estimates included in this feasibility study are for discussion purposes. Final cost estimates will be determined as part of the CEQA process. The cost estimates for the Bucks Lake Trail System were developed after several site visits, years of experience building trails in similar terrain, and by utilizing the following information:

**A.** By analyzing trail contracts issued during the past 5-years, the Plumas National Forest has developed an updated Cost Estimate Sheet for shared use trail construction (see attached). This Cost Estimate Sheet shows two approved rates for constructing remote mountainous single track (24" width):

- Without rock work - \$35,500 p/mile (\$6.72 p/foot)
- With rock work - \$45,000 p/mile (\$8.52 p/foot)

**B.** By collecting data from similar trail construction projects, the Sierra Buttes Trail Stewardship has developed it's own cost estimates for multi use trail construction, which factors in volunteer labor and equipment as an In-Kind Match towards the successful completion of the project (see attached).

- Without rock work - \$29,568 p/mile (\$5.60 p/foot)
- Without rock work, including In-Kind Match - \$26,400 p/mile (\$5 p/foot)
- With rock work - \$38,016 p/mile (\$7.20 p/foot)
- With rock work, including In-Kind Match - \$31,680 p/mile (\$6.00 p/foot)

### **Construction Equipment:**

The following is a list of possible hand tools and motorized equipment that could be utilized during the construction process:

- Takeuchi TB108 mini excavator, 28" track width
- Pionjar - motorized rock hammer
- Chainsaw(s)
- Wheelbarrow
- Griphoist with cable and pulley system
- Hand tools – shovel, rake, Mcleod, Pulaski, digging bar, loppers

### **Period of Construction:**

(see construction timeline attachment) Construction of the Bucks Lake Trail System is expected to begin upon completion of CEQA documentation and will take approximately 5 months (June – October) for a professional trail crew to complete.



**SAMPLE COST ESTIMATES FOR DISCUSSION**

BUCKS LAKE TRAIL SYSTEM  
CONSTRUCTION COSTS

<b>SBTS CONSTRUCTION COSTS (WITH IN-KIND MATCH)</b>						
<b>TRAIL NAME</b>	<b>MILES</b>	<b>FEET</b>	<b>ENGINEERED FEATURES</b>	<b>COST p/ft</b>	<b>COST (feature)</b>	<b>TOTAL COST</b>
LAKESHORE	0.51	2693		\$6.00		\$16,158.00
LOWER TRAVERSE	1.12	5914	20' bridge (typical no rail)	\$6.00	\$6,259.85	\$41,743.85
UPPER TRAVERSE	2.8	14784		\$6.00		\$88,704.00
INSPIRATION POINT	0.42	2218		\$6.00		\$13,308.00
ROCKY RIDGE	0.63	3326		\$6.00		\$19,956.00
BIG TREES	0.71	3749		\$6.00		\$22,494.00
<b>BUCKS LAKE TRAIL SYSTEM</b>	<b>6.19</b>	<b>32684</b>				<b>\$202,363.85</b>
<b>SBTS CONSTRUCTION COSTS (WITHOUT IN-KIND MATCH)</b>						
<b>TRAIL NAME</b>	<b>MILES</b>	<b>FEET</b>	<b>ENGINEERED FEATURES</b>	<b>COST p/ft</b>	<b>COST (feature)</b>	<b>TOTAL COST</b>
LAKESHORE	0.51	2693		\$7.20		\$19,389.60
LOWER TRAVERSE	1.12	5914	20' bridge (typical no rail)	\$7.20	\$6,259.85	\$48,840.65
UPPER TRAVERSE	2.8	14784		\$7.20		\$106,444.80
INSPIRATION POINT	0.42	2218		\$7.20		\$15,969.60
ROCKY RIDGE	0.63	3326		\$7.20		\$23,947.20
BIG TREES	0.71	3749		\$7.20		\$26,992.80
<b>BUCKS LAKE TRAIL SYSTEM</b>	<b>6.19</b>	<b>32684</b>				<b>\$241,584.65</b>
<b>CONSTRUCTION COSTS (CONTRACTED ESTIMATE)</b>						
<b>TRAIL NAME</b>	<b>MILES</b>	<b>FEET</b>	<b>ENGINEERED FEATURES</b>	<b>COST p/ft</b>	<b>COST (feature)</b>	<b>TOTAL COST</b>
LAKESHORE	0.51	2693		\$8.52		\$22,944.36
LOWER TRAVERSE	1.12	5914	20' bridge (typical no rail)	\$8.52	\$6,259.85	\$56,647.13
UPPER TRAVERSE	2.8	14784		\$8.52		\$125,959.68
INSPIRATION POINT	0.42	2218		\$8.52		\$18,897.36
ROCKY RIDGE	0.63	3326		\$8.52		\$28,337.52
BIG TREES	0.71	3749		\$8.52		\$31,941.48
<b>BUCKS LAKE TRAIL SYSTEM</b>	<b>6.19</b>	<b>32684</b>				<b>\$284,727.53</b>

BUCKS LAKE TRAIL SYSTEM  
CONSTRUCTION TIMELINE

<b>CONSTRUCTION TIMELINE</b>			
<b>TRAIL NAME</b>	<b>MILES</b>	<b>FEET</b>	<b>PERIOD OF CONSTRUCTION</b>
LAKESHORE	0.51	2693	June
LOWER TRAVERSE	1.12	5914	June
UPPER TRAVERSE	2.8	14784	July
INSPIRATION POINT	0.42	2218	August
ROCKY RIDGE	0.63	3326	September
BIG TREES	0.71	3749	October

## SUPPORTING DOCUMENT- CONSTRUCTION COST ESTIMATES



Information from PW contracts over the past five years...

2006/07, Remote Trail Reconstruction with some rock work: \$18,000/KM - \$29,000/Mile (Manual/Machine construction)

2009, Rural Multi User Trail, New construction with rock work: \$28,000/KM - \$45,000/Mile (Manual/Machine construction)

2010, Remote Trail Reconstruction with some rock work: \$19,500/KM - \$31,500/Mile (Manual/Machine construction)

2011, Rural Accessible Trail, Polymer bonded surface: \$77,000/KM - \$124,000/Mile (Machine construction)

2011, Rural Accessible Trail, Asphalt bonded surface: \$48,000/KM - \$77,500/Mile (Machine construction)

2011, Rural Multi User Trail, New construction, 70% on existing level grades: \$14,000/KM – 22,500/Mile (Machine construction)

My current general estimates for native surface trail work are:

Remote mountainous single Track(600 mm/24" wide): \$22,000/KM - \$35,500/Mile

Remote lowland single Track: \$17,500/KM - \$28,000/Mile

Rural single track: \$15,000/KM - \$24,000/Mile

Remote lowland multi-user (1,550 mm/60" wide): \$29,500/KM – \$47,500/Mile

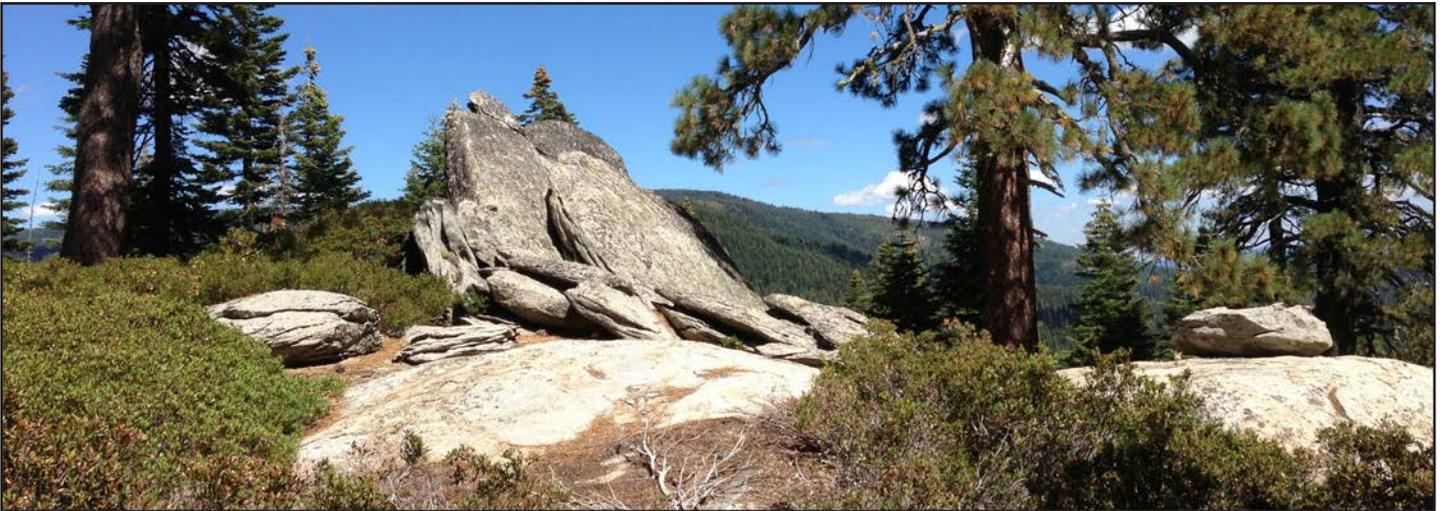
Rural multi-user trail: \$20,500/KM - \$33,000/Mile

These prices are for projects from 3.2KM/2Miles to 16KM/10Miles and do not include extensive rock work or retaining wall construction.

These are baseline estimates upon which I develop specific project cost estimates.

**GEORGE BUTLER**  
**PROJECT ENGINEER**  
**PLUMAS NATIONAL FOREST**  
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# PROPOSED LONG-TERM MAINTENANCE



## **Long-Term Maintenance Costs:**

Ongoing annual maintenance is expected to average \$2,500 per year. The amount of annual maintenance to keep the trail system healthy will depend almost entirely on severe weather events. Severe weather events that could potentially damage the trail tread and increase maintenance needs, include:

- Storms causing severe flash flooding
- High winds bringing down trees and deadfall
- Warm tropical storm causing rapid snowmelt

To cover the annual maintenance costs for the Bucks Lake Trail System, it is recommended that a Maintenance Account be created, with an annual deposit made in the amount of \$2500. In the event of a light maintenance year (requiring less than \$2500 in maintenance), funds will accrue and be used for future years' maintenance or to complete a desired trail enhancement. Annual maintenance needs will be assessed by Sierra Buttes Trail Stewardship staff, or by an experienced trail contractor. As part of the assessment, a cost estimate and timeline for completing the work will be provided for approval.

## **Trail Adoption Program:**

A successful Trail Adoption Program, led by the Sierra Buttes Trail Stewardship, could help to reduce financial impacts of ongoing maintenance. The Adopt-A-Trail Program is a way for individuals and businesses to take a leadership role in the maintenance of the trail system, through both a monetary and/or time commitment. Trail "sponsors" commit to helping to organize at least one volunteer trail workday per season, in partnership with the Sierra Buttes Trail Stewardship. As part of the volunteer workday, SBTS provides required tools and equipment, along with professional trail crew leaders to ensure quality of work, safety of volunteers and project productivity. Volunteers have a federally approved in-kind labor rate of \$22 p/hr.

The long-term maintenance of the Bucks Lake Trail System could be subsidized by involving the public through a Trail Adoption Program, using the three following adoption methods:

- Adopt-a-Trail
- Adopt-a-Mile
- Adopt-a-1/2 Mile

Sponsors receive a trailhead sign listing them as the trail sponsor, a certificate of recognition and a photo taken from the adopted trail. This is a yearly renewable program, and we ask that sponsors consider a multi-year contribution. Commitment amount can be a combination of cash, volunteer labor, needed materials and or equipment donation.

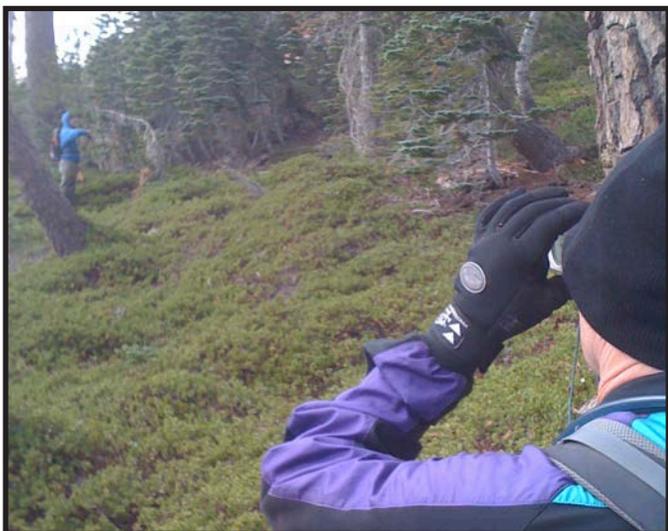
# PROPOSED METHODS & TECHNIQUES



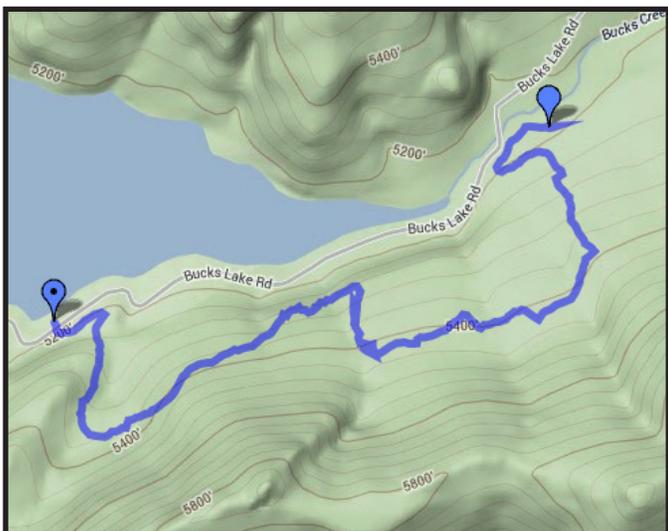
## TRAIL DESIGN & CONSTRUCTION FOR DISCUSSION PURPOSES



Collaboration with land managers

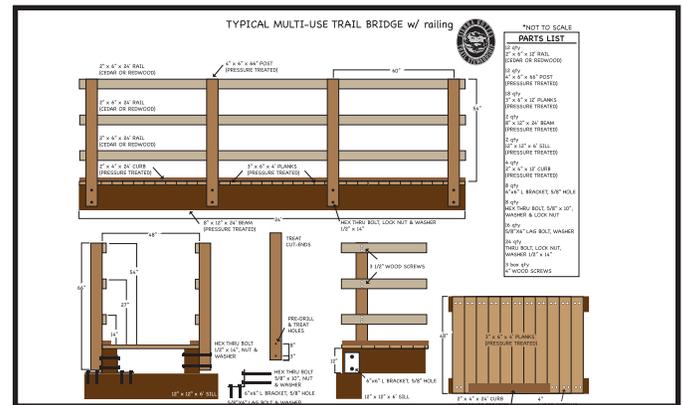
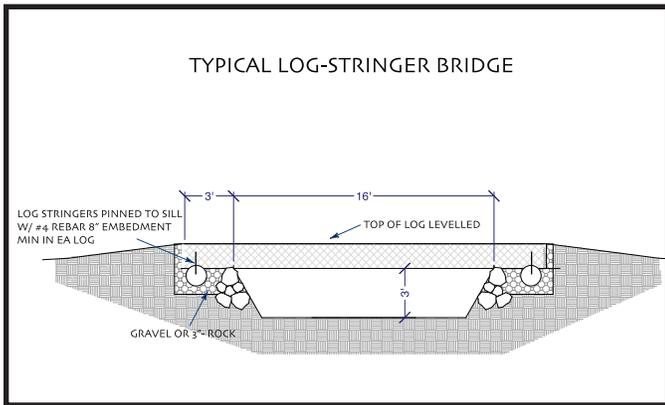


Trail Design and Layout

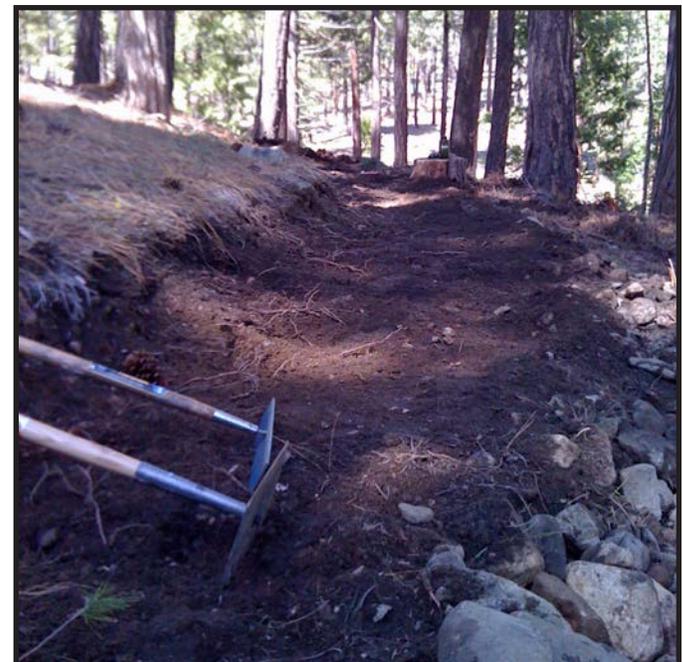


Trail Mapping

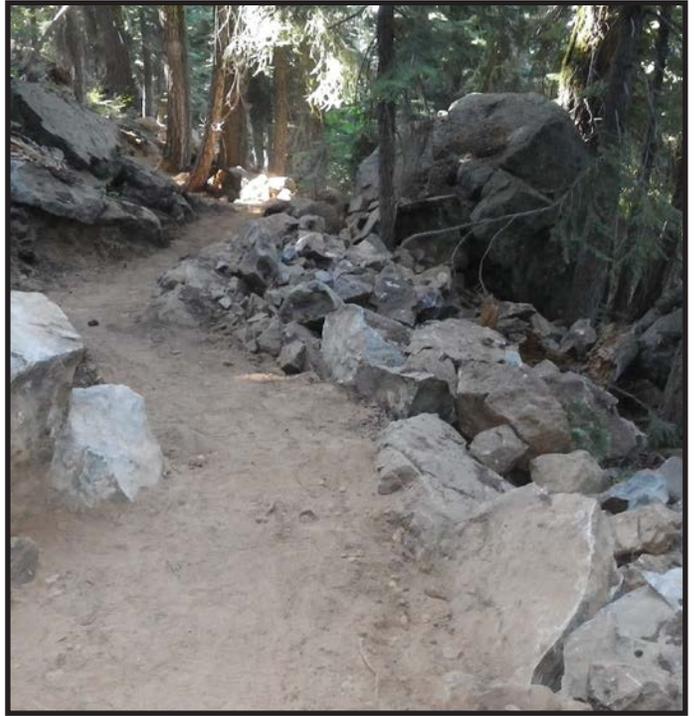




## Designed Features



Trail Construction, using Takeuchi TB108 mini excavator and hand tools



Completed tread, built to Federal and State multi-use trail specifications



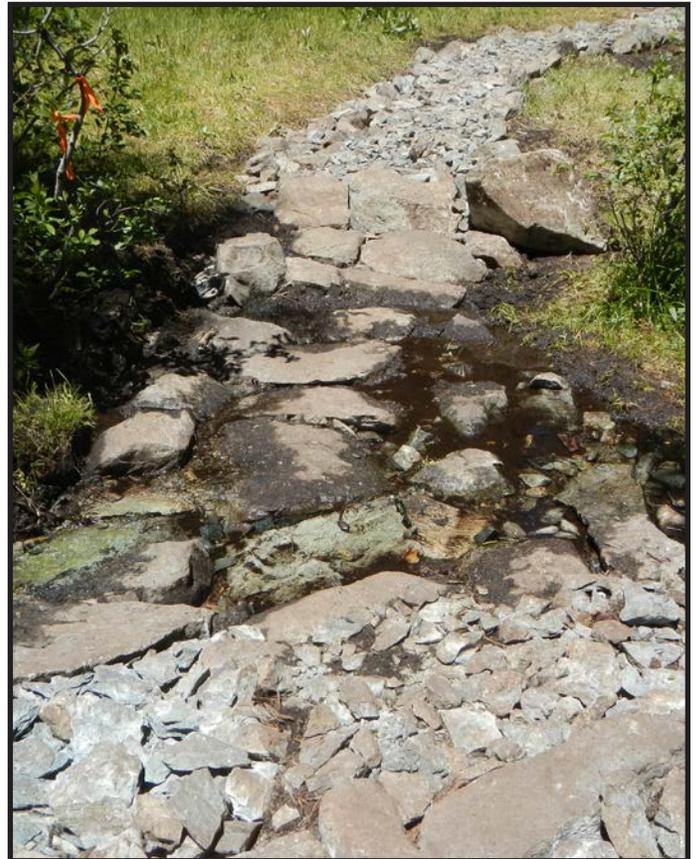
Attracting stewards to the project, and safely and effectively working with volunteer groups

# PROPOSED ENGINEERED FEATURES



## ARMORED ROCK STREAM CROSSINGS FOR DISCUSSION PURPOSES





# PROPOSED ENGINEERED FEATURES



## MULTI- USE TRAIL BRIDGES FOR DISCUSSION PURPOSES

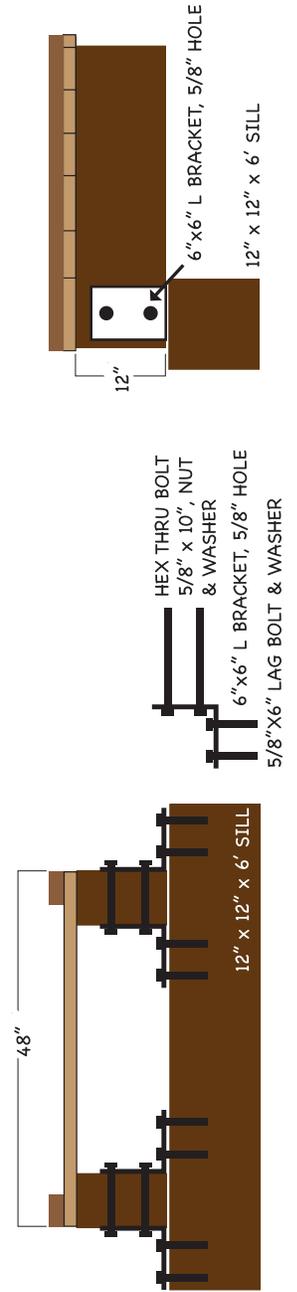
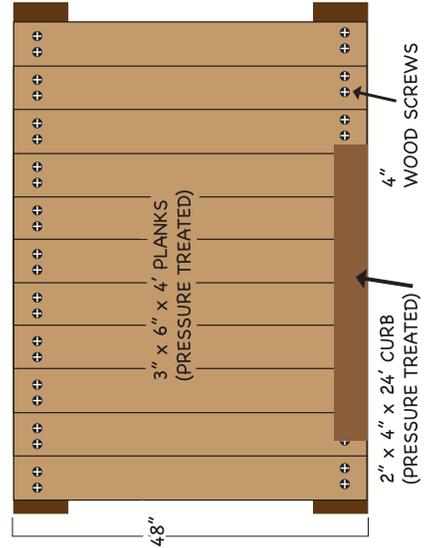
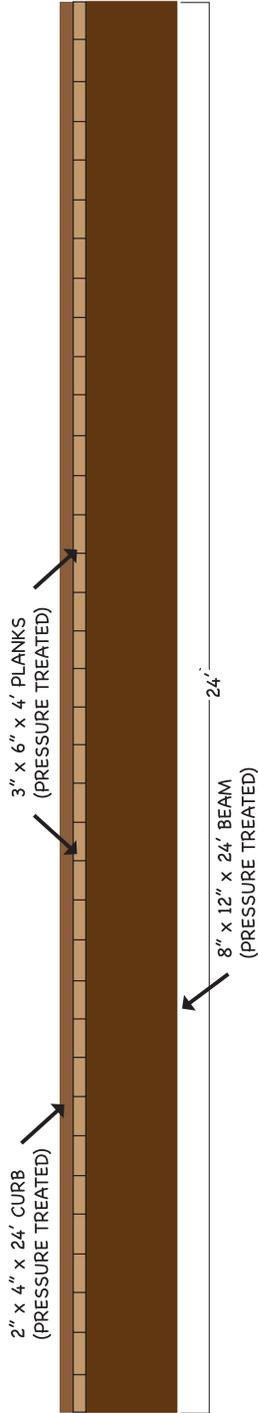
# TYPICAL MULTI-USE TRAIL BRIDGE



\*NOT TO SCALE

## PARTS LIST

- 18 qty 3" x 6" x 12' PLANKS (PRESSURE TREATED)
- 2 qty 8" x 12" x 24' BEAM (PRESSURE TREATED)
- 2 qty 12" x 12" x 6' SILL (PRESSURE TREATED)
- 4 qty 2" x 4" x 12' CURB (PRESSURE TREATED)
- 8 qty 6" x 6" L BRACKET, 5/8" HOLE
- 8 qty HEX THRU BOLT, 5/8" x 10", WASHER & LOCK NUT
- 16 qty 5/8" x 6" LAG BOLT, WASHER
- 3 box qty 4" WOOD SCREWS



**SAMPLE COST ESTIMATES FOR DISCUSSION**

Typical Multi-Use Trail Bridge Materials List  
without railing

<b>LABOR</b>	<b>HOURS</b>	<b>RATE</b>	<b>40% BURDEN</b>	<b>TOTAL</b>
JOURNEYMAN EMPLOYEE	80	\$31.00	\$43.40	\$3,472.00
<b>Materials Description</b>	<b>Quantity</b>	<b>Cost each</b>	<b>Extended</b>	
(3616 PT #2) 3" x 6" x 12' Planks	14	\$32.25	\$451.50	
(81224 PT #1) 8" x 12" x 24' Beam	2	\$540.00	\$1,080.00	
(121212 PT #1) 12" x 12" x 12' Sill	1	\$460.00	\$460.00	
(2412 PT) 2" x 4" x 12' Curb	4	\$9.02	\$36.08	
(HL53PC) L Bracket	8	\$24.00	\$192.00	
5/8" x 10" Hex Bolt	8	\$3.71	\$29.68	
5/8" Washer	32	\$0.18	\$5.76	
5/8" Nut	8	\$0.22	\$1.76	
5/8 x 6" Lages	16	\$2.30	\$36.80	
1/2" Washer	24	\$0.15	\$3.60	
1/2" Nut/Nylock	24	\$0.34	\$8.16	
4" GSB Screws	3	\$57.17	\$171.51	
			<b>\$2,476.85</b>	\$2,476.85
TAX 8.5%				\$211.00
DELIVERY				\$100.00
			<b>TOTAL</b>	<b>\$6,259.85</b>

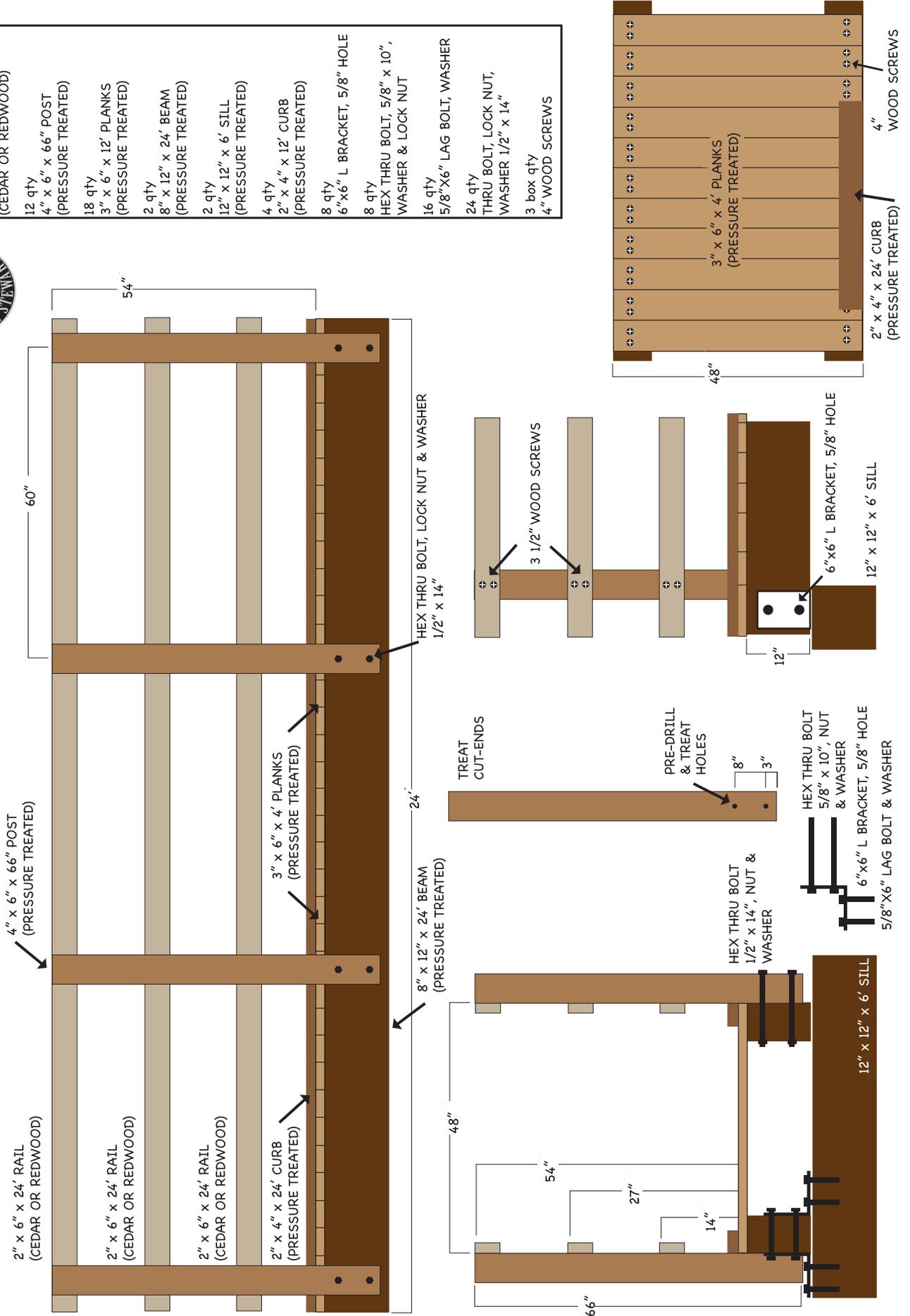
# TYPICAL MULTI-USE TRAIL BRIDGE w/ railing



\*NOT TO SCALE

## PARTS LIST

12 qty	2" x 6" x 12' RAIL (CEDAR OR REDWOOD)
12 qty	4" x 6" x 66" POST (PRESSURE TREATED)
18 qty	3" x 6" x 12' PLANKS (PRESSURE TREATED)
2 qty	8" x 12" x 24' BEAM (PRESSURE TREATED)
2 qty	12" x 12" x 6' STILL (PRESSURE TREATED)
4 qty	2" x 4" x 12' CURB (PRESSURE TREATED)
8 qty	6"x6" L BRACKET, 5/8" HOLE
8 qty	HEX THRU BOLT, 5/8" x 10", WASHER & LOCK NUT
16 qty	5/8"x6" LAG BOLT, WASHER
24 qty	THRU BOLT, LOCK NUT, WASHER 1/2" x 14"
3 box qty	4" WOOD SCREWS

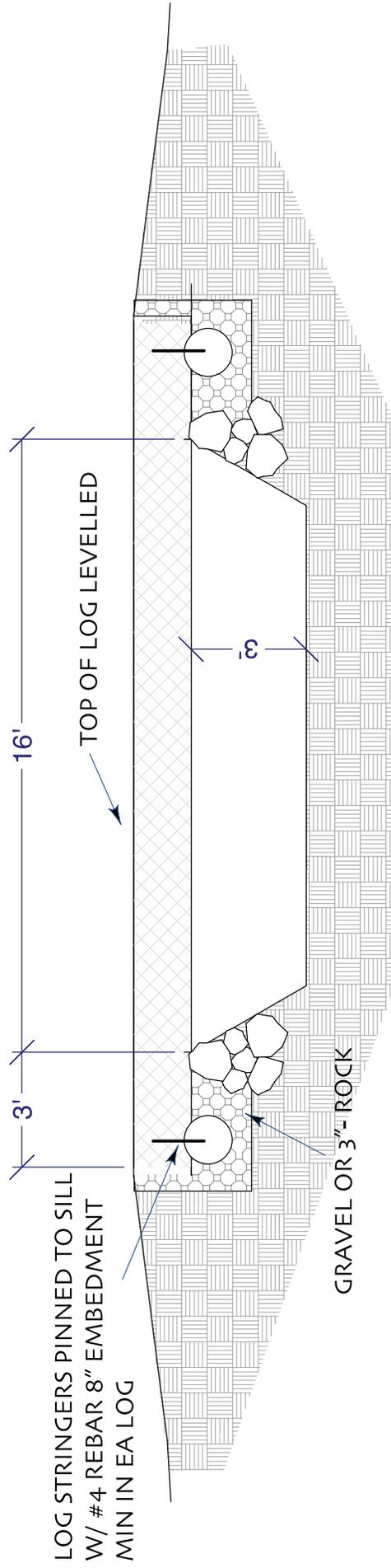


**SAMPLE COST ESTIMATES FOR DISCUSSION**

Typical Multi-Use Trail Bridge Materials List  
with railing

<b>LABOR</b>	<b>HOURS</b>	<b>RATE</b>	<b>10% BURDEN</b>	<b>TOTAL</b>
JOURNEYMAN EMPLOYEE	100	\$31.00	\$43.40	\$4,340.00
<b>Description</b>	<b>Quantity</b>	<b>Cost each</b>	<b>Extended</b>	
(2613 DCCR) 2" x 6" x 12' Redwood Rail	12	\$16.70	\$200.40	
(4620 PT #1) 4" x 6" x 66" Post for Rail	4	\$90.00	\$360.00	
(3616 PT #2) 3" x 6" x 12' Planks	14	\$32.25	\$451.50	
(81224 PT #1) 8" x 12" x 24' Beam	2	\$540.00	\$1,080.00	
(121212 PT #1) 12" x 12" x 12' Sill	1	\$460.00	\$460.00	
(2412 PT) 2" x 4" x 12' Curb	4	\$9.02	\$36.08	
(HL53PC) L Bracket	8	\$24.00	\$192.00	
5/8" x 10" Hex Bolt	8	\$3.71	\$29.68	
5/8" Washer	32	\$0.18	\$5.76	
5/8" Nut	8	\$0.22	\$1.76	
5/8 x 6" Lags	16	\$2.30	\$36.80	
1/2" x 14" Hex Bolt	24	\$4.99	\$119.76	
1/2" Washer	24	\$0.15	\$3.60	
1/2" Nut/Nylock	24	\$0.34	\$8.16	
4" GSB Screws	3	\$57.17	\$171.51	
			<b>\$3,157.01</b>	\$3,157.01
TAX 8.5%				\$268.35
DELIVERY				\$100.00
			<b>TOTAL</b>	<b>\$7,865.36</b>

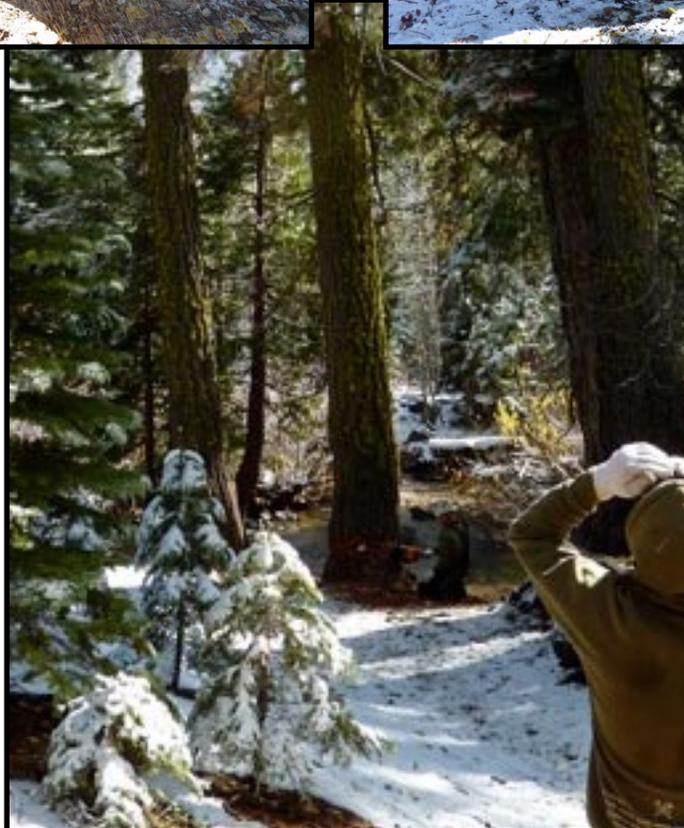
# TYPICAL LOG-STRINGER BRIDGE



**SAMPLE COST ESTIMATES FOR DISCUSSION**

<b>LOG STRINGER BRIDGE</b>					
<b>EMPLOYEE WAGES</b>	<b>HOURS</b>	<b>RATE</b>	<b>0% BURDEN</b>	<b>TOTAL</b>	
LABOR	140	\$31.00	\$43.40	\$6,076.00	
<b>EXPENSES MATERIALS</b>	<b>ITEM</b>		<b>COST</b>		
	CABLE TO HOLD STRINGER		\$135.20		
	REBAR PTNS		\$40.00		
			\$175.20	\$175.20	
<b>TRAVEL IN-KIND</b>	<b>MILES</b>	<b>RATE</b>	<b>TOTAL</b>		
EMPLOYEE TRAVEL	872	\$0.55	\$479.60	\$479.60	
<b>EQUIPMENT IN-KIND</b>	<b>DAYS</b>	<b>RATE</b>	<b>TOTAL</b>		
HAND TOOLS	36	\$10.10	\$363.60		
CHAIN SAW	5	\$63.13	\$315.65		
GRIPHOIST	6	\$31.56	\$189.36	\$868.61	
				<b>\$7,599.41</b>	<b>TOTAL PROJECT COST</b>



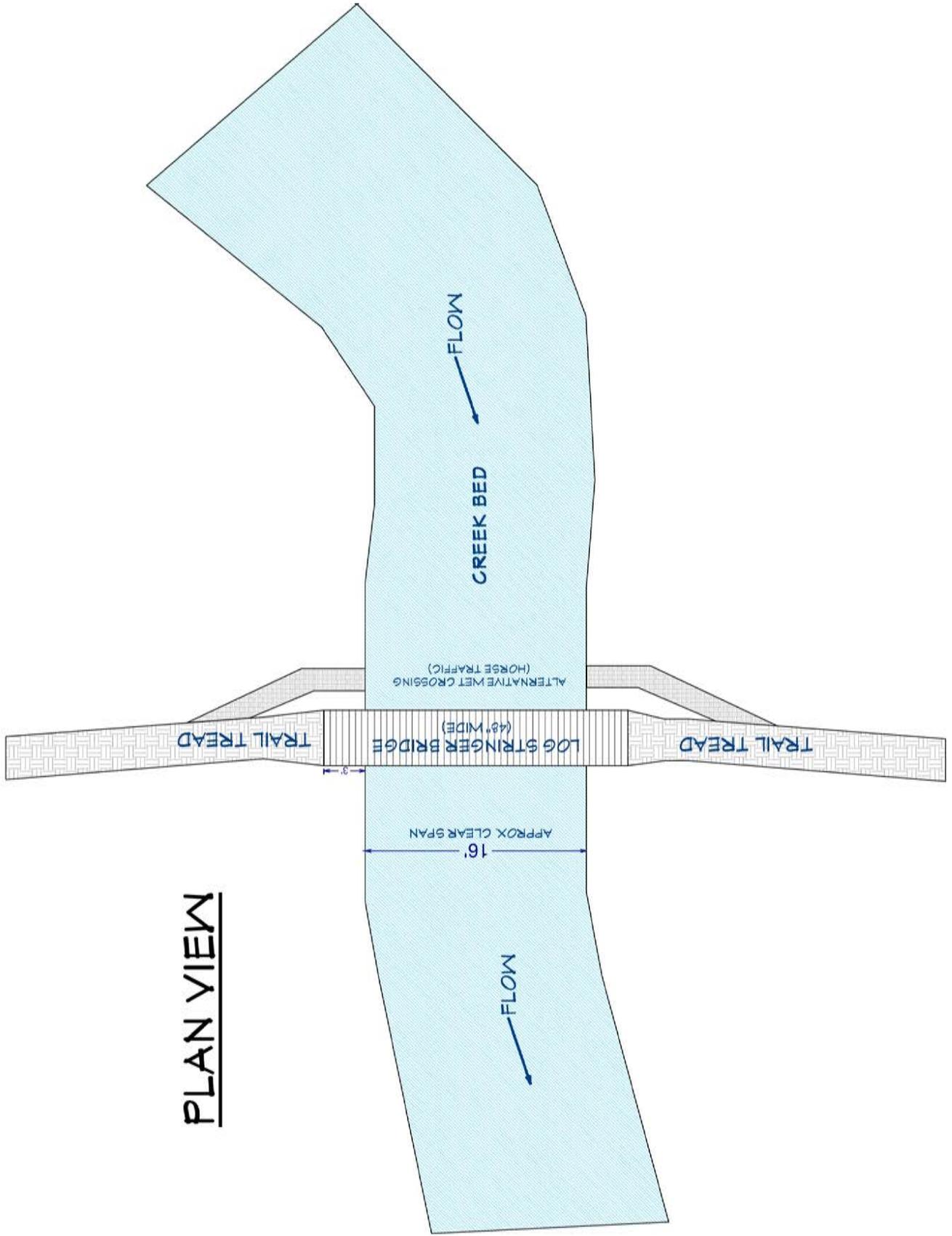


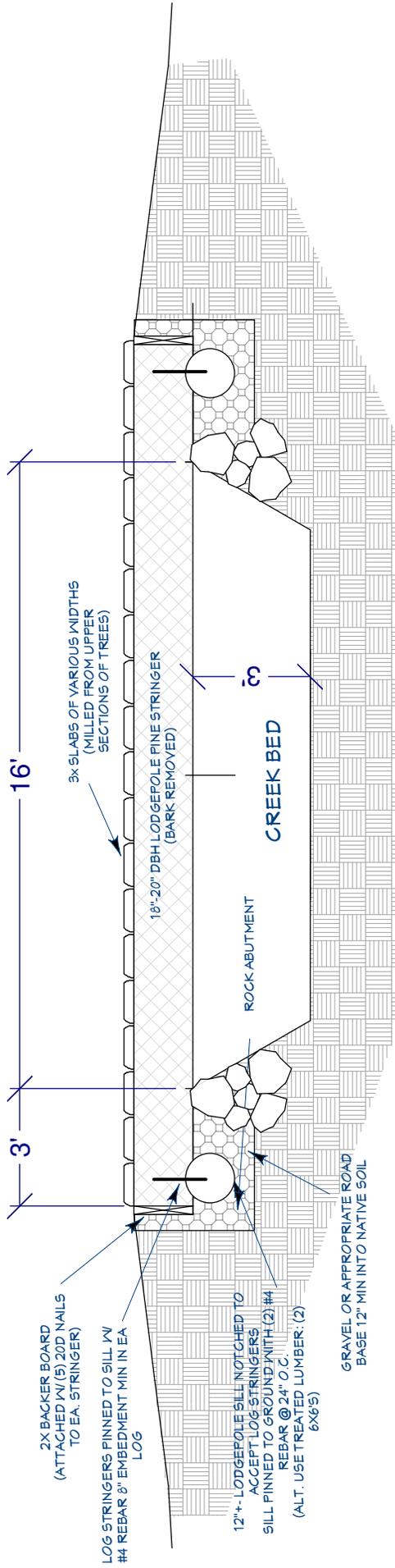




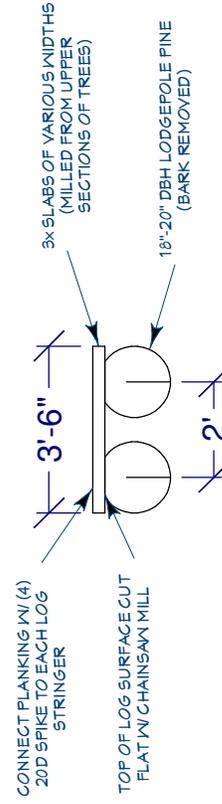
2- LOG STRINGER BRIDGE

PLAN VIEW





LONGITUDINAL SECTION VIEW



CROSS SECTION VIEW

**SAMPLE COST ESTIMATES FOR DISCUSSION**

<b>2- LOG STRINGER BRIDGE</b>						
<b>EMPLOYEE WAGES</b>	<b>HOURS</b>	<b>RATE</b>	<b>40% BURDEN</b>	<b>TOTAL</b>		
LABOR	150	\$31.00	\$43.40	\$6,510.00		
<b>EXPENSES MATERIALS</b>	<b>ITEM</b>		<b>COST</b>			
	CABLE TO HOLD STRINGER		\$135.20			
	8" X 1/2" LAGS & WASHERS		\$60.00			
	REBAR PINS		\$80.00			
			\$275.20	\$275.20		
<b>TRAVEL</b>	<b>MILES</b>	<b>RATE</b>	<b>TOTAL</b>			
EMPLOYEE TRAVEL	872	\$0.55	\$479.60	\$479.60		
<b>EQUIPMENT RENTAL</b>	<b>DAYS</b>	<b>RATE</b>	<b>TOTAL</b>			
HAND TOOLS	55	\$10.10	\$555.50			
CHAIN SAW	12	\$63.13	\$757.56			
GENERATOR & HILTI DRILL	6	\$110.00	\$660.00			
GRIPHOIST	6	\$31.56	\$189.36			
COMPRESSOR	6	\$31.56	\$189.36			
CROSS CUT SAW	3	\$21.00	\$63.00			
ALASKAN MILL	6	\$31.56	\$189.36			
			\$2,604.14	2604.14		
				<b>\$9,868.94</b>	<b>TOTAL PROJECT COST</b>	

