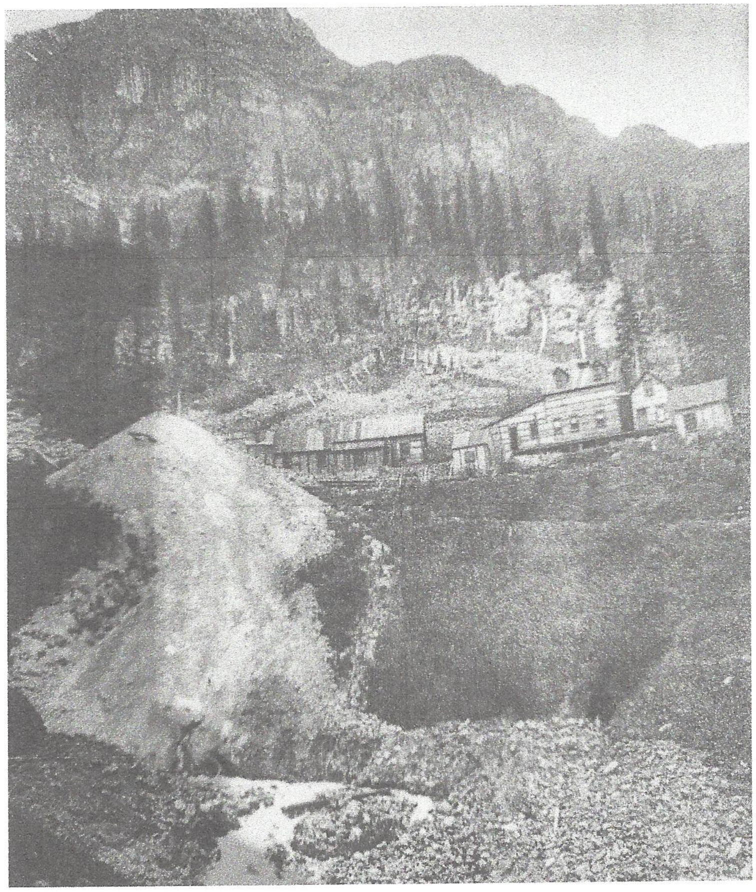
6. Scenic/Historic

SCENIC QUALITY REPORT ADDENDUM

Proposed Silver Cloud Lodge/PUD

Shelbyville Lode USMS No. 18168 et al
Mill Creek near Chattanooga
Highway 550, San Juan County, Colorado



Applicant:
Bonanza Boy LLC
Attn: Mr. Colby Barrett
PO Box 992
Montrose, Colorado 81402
(303) 909-6083

Prepared By:
Engineer Mountain, Inc.
Attn: Lisa Adair PE
962 Reese Street
PO Box 526
Silverton, Colorado 81433
(970) 387-0500

Job No. 2023-101

Submitted:
May 14, 2024

SCENIC QUALITY REPORT ADDENDUM
Silver Cloud Lodge/PUD
Prepared By Engineer Mountain, Inc.

A Scenic Quality Report was submitted to San Juan County on June 26, 2023. This is an updated, abbreviated addition (or "addendum") to that report. Please refer to the report submitted on June 26, 2023, for additional/background information.

This is a Scenic Quality Report Addendum for the Proposed Silver Cloud Lodge/Planned Unit Development (PUD) prepared by Engineer Mountain Inc.

The proposed Silver Cloud Lodge/PUD is located in Mill Creek, near Chattanooga, accessed via Highway 550 between Silverton and Ouray. The proposed lodge building will be on the Shelbyville Lode on Mill Creek Road (USFS Road 821/County Road 15), which is an existing dirt road located at the Mule Shoe Curve of Highway 550, north of Chattanooga.

A nearby mining claim which is also part of this Proposed PUD is named the Bonanza Boy Mill Site, located at Chattanooga, on Highway 550. The Bonanza Boy Mill Site is a flat, vacant parcel, near the existing Artist Cabin vacation rental structure (which is a building owned by the Stern family). The Bonanza Boy Mill Site is approximately across Highway 550 from the existing historic Silver Ledge Mill Building. A garage/employee housing structure is proposed on the Bonanza Boy Mill Site.

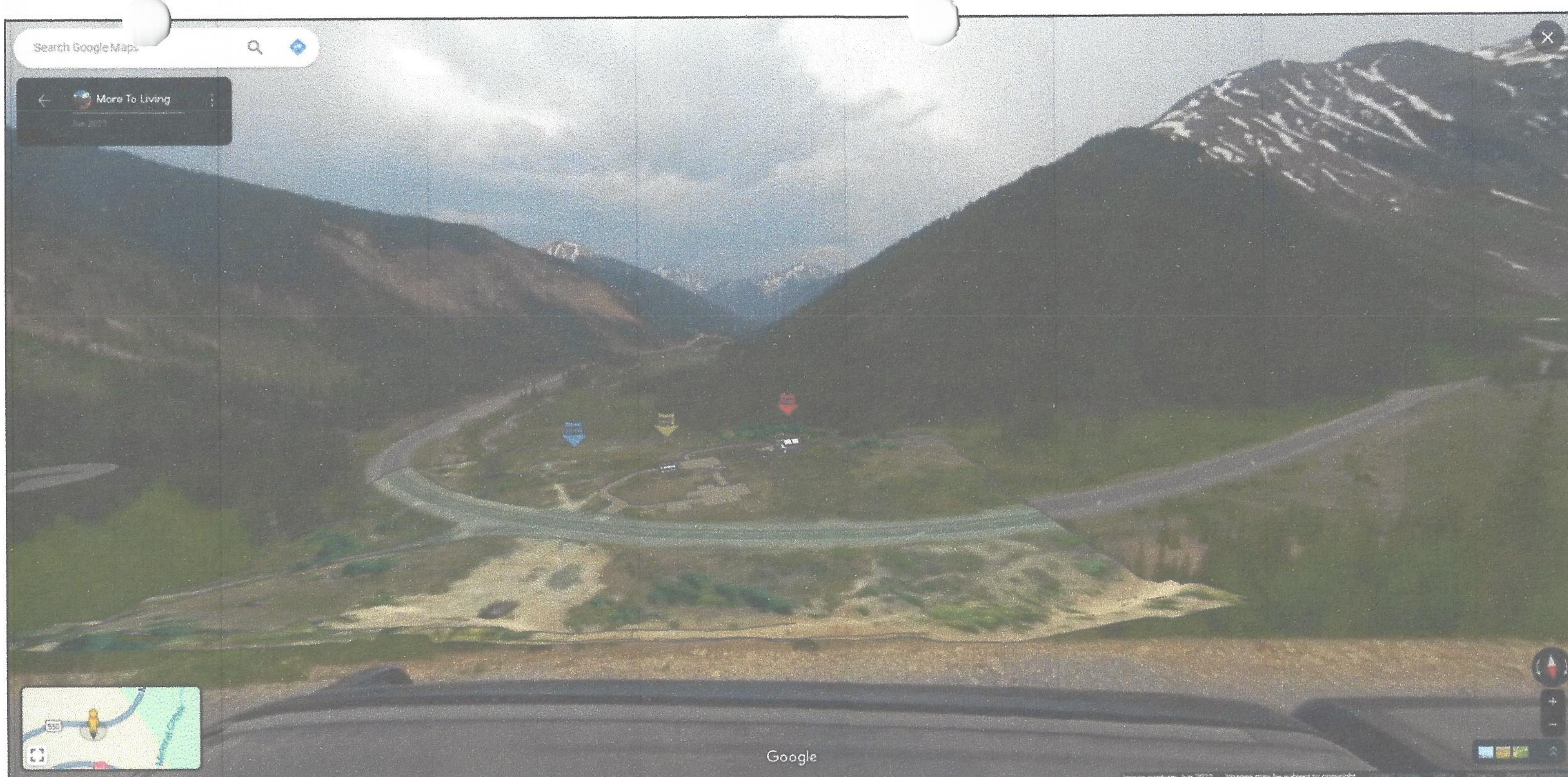
The Proposed Silver Cloud Lodge/PUD also includes proposed recreation and environmental site improvements, such as trail work/maintenance, a summer-only campground with eight designated tent platforms, some summer-only walk-in dispersed primitive tent camping, a fixed cable trail hiking system (called a "via ferrata"), stream restoration, wetlands enhancement, rock/ice climbing. The proposed vehicle parking for this project is designed to include a centralized parking area on the Bonanza Boy Mill Site at Chattanooga, with lodge guests, employees, and campers being transported up to the lodge building (and nearby summer-only campground) in Mill Creek using a shuttle van.

County regulations require that this Scenic Quality Report include the following information:

Graphic depictions of the proposed structure's impact on these views shall be submitted to allow staff, the Planning Commission, and the Board of County Commissioners to assess the impacts of the project and the effectiveness of proposed mitigation measures.

The proposed structures which could be visible from Highway 550 include the following:
(1) Proposed Lodge Structure on the Shelbyville Lode in Mill Creek.
(2) Proposed Garage/Employee Housing Structure on the Bonanza Boy Mill Site.

The following page is labelled "**View #1**." It was prepared by the project Architects to depict the anticipated view of the **proposed garage/employee housing structure on the Bonanza Boy Mill Site, as viewed from far above the Chattanooga townsite**, looking south from Highway 550. The anticipated view of the proposed centralized guest/employee parking areas (and some proposed grading/walkways) is also shown, as requested.



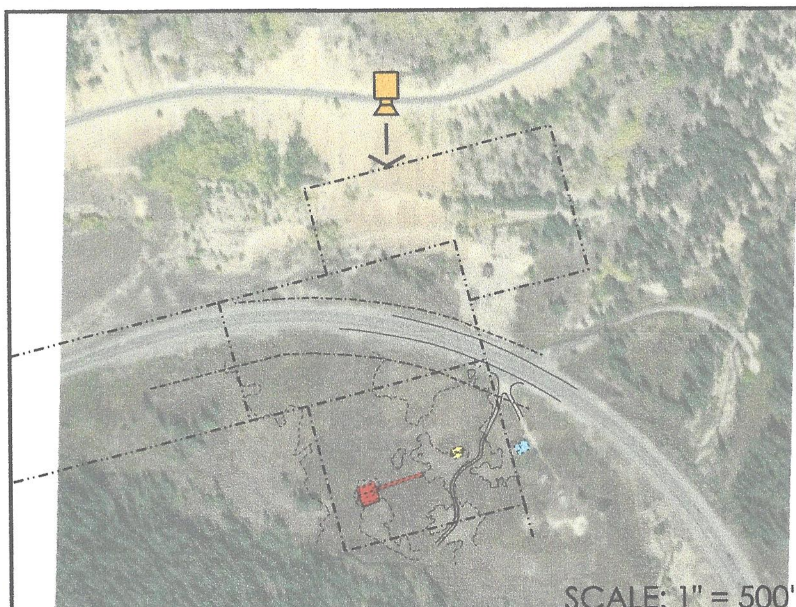
VIEW #1 FROM NORTH BOUND LANE AT CLEARING IN TREES FROM UPPER HWY 550

LEGEND:

(light blue)	EXISTING ARTIST'S CABIN LOCATION
(red)	PROPOSED MAIN BUILDING
(yellow)	PROPOSED SHOWER BUILDING

IMAGERY GENERAL NOTES

THE PROVIDED IMAGERY WAS GATHERED FROM GOOGLE STREETVIEW FROM THE NORTH-BOUND LANE. THE IMAGERY IS ALIGNED TO SURVEYOR'S 3D POINT CLOUD FROM AN AERIAL DRONE SCAN AND THE 3D ARCHITECTURAL CONCEPT MODEL



VICINITY MAP AND CAMERA LOCATION

Tommy Hein
ARCHITECTS
Box 3327 108 S. Oak St.
Penthouse
Telluride, CO | 81435
970.728.1220
www.TommyHein.com

SUBMISSIONS

DATE	SUBMISSION
12.15.2023	PRELIM. PUD

BONANZA BO VISUAL IMPACT FROM HWY. 550

VIEW #1

SCENIC QUALITY REPORT ADDENDUM
Silver Cloud Lodge/PUD
Prepared By Engineer Mountain, Inc.

The following pages are labelled "View #2," "View #3," and View #4." They were prepared by the project Architects, to depict the anticipated view of the proposed garage/employee housing structure on the Bonanza Boy Mill Site.

The existing nearby Artist Cabin structure, which is a vacation rental owned by the Stern family, is also visible in the pictures on the following three pages.

"View #2," "View #3," and View #4," on the following three pages, depict the visibility of the **proposed garage/employee housing structure**, as viewed by a person in a vehicle looking towards the south/southeast, looking towards the Bonanza Boy Mill Site, from Highway 550 The existing Artist Cabin is on the adjacent property, and although it is not affiliated with this project, it is also shown on the following three pages.

VIEW #2 NORTH-BOUND LANE LOOKING SOUTHEAST ON HWY 550

LEGEND:

(light blue)	EXISTING ARTIST'S CABIN LOCATION
(red)	PROPOSED MAIN BUILDING
(yellow)	PROPOSED SHOWER BUILDING

IMAGERY GENERAL NOTES

THE PROVIDED IMAGERY WAS GATHERED FROM GOOGLE STREETVIEW FROM THE NORTH-BOUND LANE. THE IMAGERY IS ALIGNED TO SURVEYOR'S 3D POINT CLOUD FROM AN AERIAL DRONE SCAN AND THE 3D ARCHITECTURAL CONCEPT MODEL

VICINITY MAP AND CAMERA LOCATION

Tommy Hein
ARCHITECTS
Box 3327 108 S. Oak St.
Penthouse
Telluride, CO | 81435
970.728.1220
www.TommyHein.com

SUBMISSIONS

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12.15.2023	PRELIM. PUD

BONANZA BO VISUAL IMPACT FROM HWY. 550

VIEW #2

VIEW #3 NORTH-BOUND LANE LOOKING SOUTHEAST ON HWY 550

LEGEND:

- EXISTING ARTIST'S CABIN LOCATION
- PROPOSED MAIN BUILDING
- PROPOSED SHOWER BUILDING

IMAGERY GENERAL NOTES

THE PROVIDED IMAGERY WAS GATHERED FROM GOOGLE STREETVIEW FROM THE NORTH-BOUND LANE. THE IMAGERY IS ALIGNED TO SURVEYOR'S 3D POINT CLOUD FROM AN AERIAL DRONE SCAN AND THE 3D ARCHITECTURAL CONCEPT MODEL

VICINITY MAP AND CAMERA LOCATION

Tommy Hein
ARCHITECTS
Box 3327 108 S. Oak St.
Penthouse
Telluride, CO | 81435
970.728.1220
www.TommyHein.com

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BONANZA BO VISUAL IMPACT FROM HWY. 550

VIEW #3

VIEW #4 NORTH-BOUND LANE LOOKING SOUTH ON HWY 550

LEGEND:

(blue)	EXISTING ARTIST'S CABIN LOCATION
(red)	PROPOSED MAIN BUILDING
(yellow)	PROPOSED SHOWER BUILDING

IMAGERY GENERAL NOTES

THE PROVIDED IMAGERY WAS GATHERED FROM GOOGLE STREETVIEW FROM THE NORTH-BOUND LANE. THE IMAGERY IS ALIGNED TO SURVEYOR'S 3D POINT CLOUD FROM AN AERIAL DRONE SCAN AND THE 3D ARCHITECTURAL CONCEPT MODEL

SCALE: 1" = 500'

VICINITY MAP AND CAMERA LOCATION

Tommy Hein ARCHITECTS
Box 3327 108 S. Oak St.
Penthouse
Telluride, CO | 81435
970.728.1220
www.TommyHein.com

SUBMISSIONS

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12.15.2023	PRELIM. PUD

BONANZA BO VISUAL IMPACT FROM HWY. 550

VIEW #4

SCENIC QUALITY REPORT ADDENDUM
Silver Cloud Lodge/PUD
Prepared By Engineer Mountain, Inc.

The following pages are labelled **"View #5" and "View #6."** They were prepared by the project Architects to depict the anticipated view of the **proposed garage/employee housing structure on the Bonanza Boy Mill Site**, as viewed by a driver in a vehicle heading north on Highway 550 towards Red Mountain Pass. The existing Artist Cabin is on the adjacent property, and although it is not affiliated with this project, it is also shown on the following two pages.

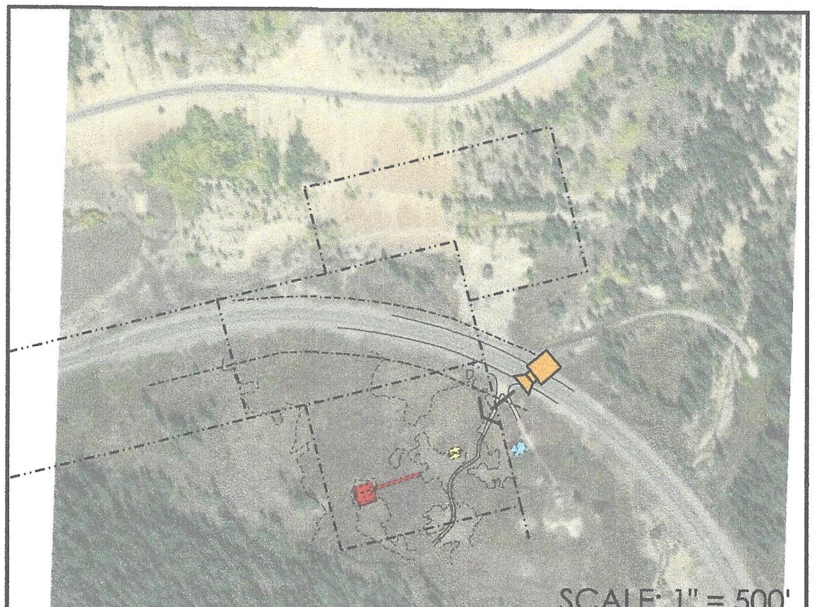
VIEW #5 NORTH-BOUND LANE LOOKING SOUTHWEST ON HWY 550

LEGEND:

- EXISTING ARTIST'S CABIN LOCATION
- PROPOSED MAIN BUILDING
- PROPOSED SHOWER BUILDING

IMAGERY GENERAL NOTES

THE PROVIDED IMAGERY WAS GATHERED FROM GOOGLE STREETVIEW FROM THE NORTH-BOUND LANE. THE IMAGERY IS ALIGNED TO SURVEYOR'S 3D POINT CLOUD FROM AN AERIAL DRONE SCAN AND THE 3D ARCHITECTURAL CONCEPT MODEL



VICINITY MAP AND CAMERA LOCATION

Tommy Hein
ARCHITECTS
Box 3327 108 S. Oak St.
Penthouse
Telluride, CO | 81435
970.728.1220
www.TommyHein.com

SUBMISSIONS

DATE	SUBMISSION
12.15.2023	PRELIM. PUD

BONANZA BO VISUAL IMPACT FROM HWY. 550

VIEW #5

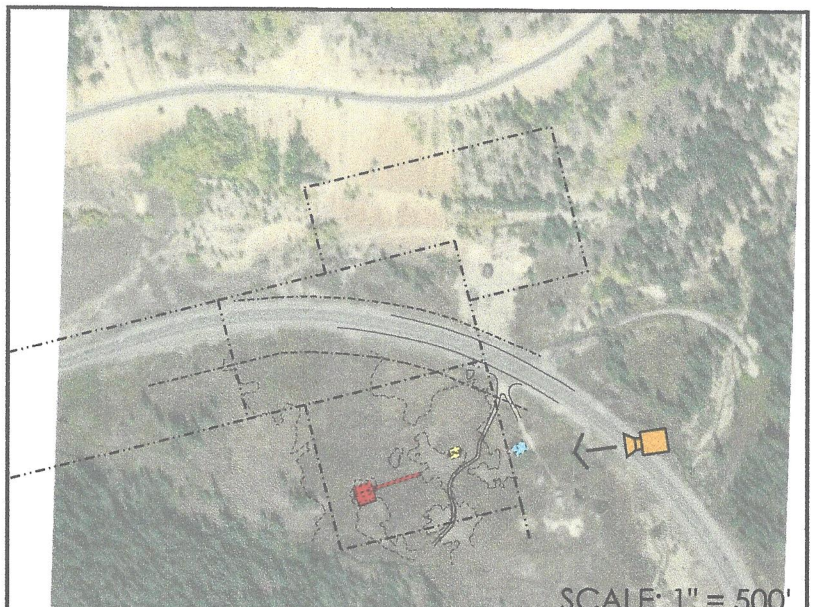
VIEW #6 NORTH-BOUND LANE LOOKING WEST ON HWY 550

LEGEND:

- EXISTING ARTIST'S CABIN LOCATION
- PROPOSED MAIN BUILDING
- PROPOSED SHOWER BUILDING

IMAGERY GENERAL NOTES

THE PROVIDED IMAGERY WAS GATHERED FROM GOOGLE STREETVIEW FROM THE NORTH-BOUND LANE. THE IMAGERY IS ALIGNED TO SURVEYOR'S 3D POINT CLOUD FROM AN AERIAL DRONE SCAN AND THE 3D ARCHITECTURAL CONCEPT MODEL



VICINITY MAP AND CAMERA LOCATION

Tommy Hein ARCHITECTS
Box 3327 108 S. Oak St.
Penthouse
Telluride, CO | 81435
970.728.1220
www.TommyHein.com

SUBMISSIONS

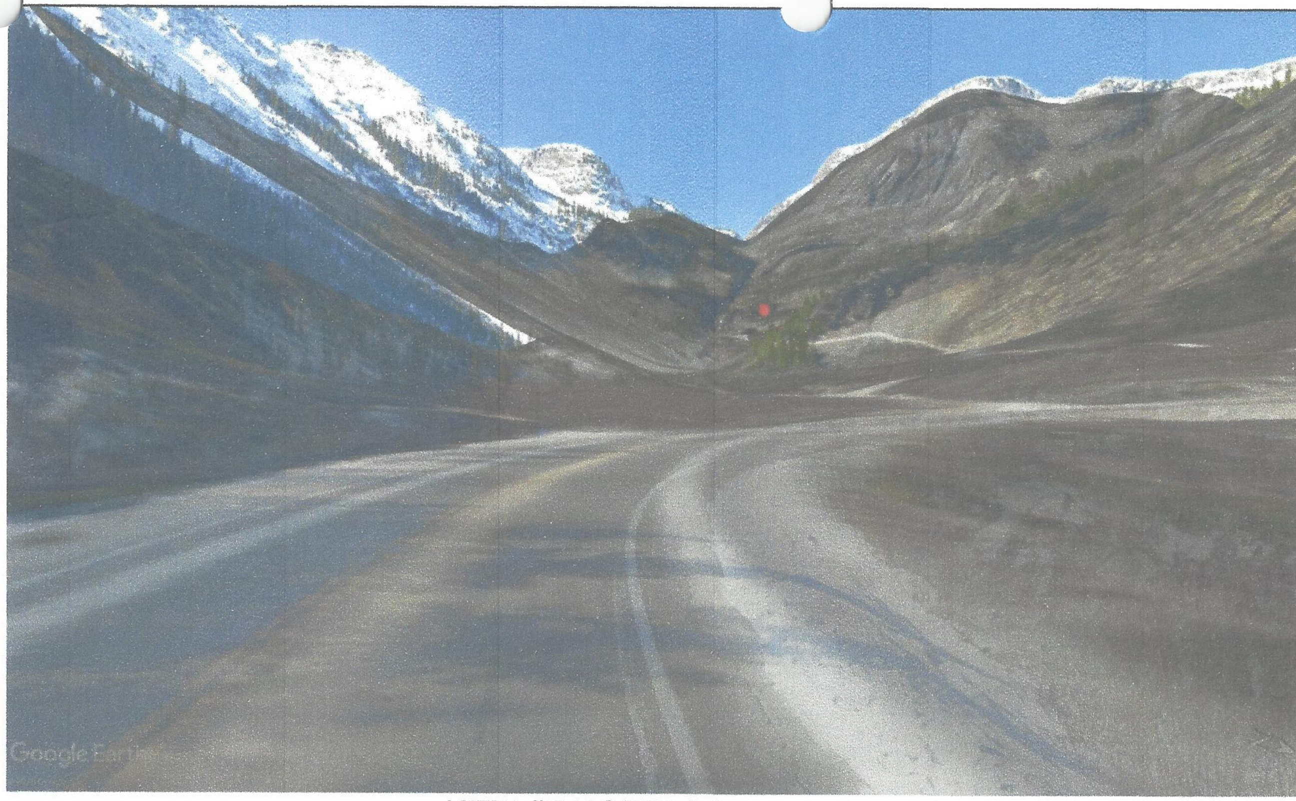
DATE	SUBMISSION
12.15.2023	PRELIM. PUD

BONANZA BO VISUAL IMPACT FROM HWY. 550

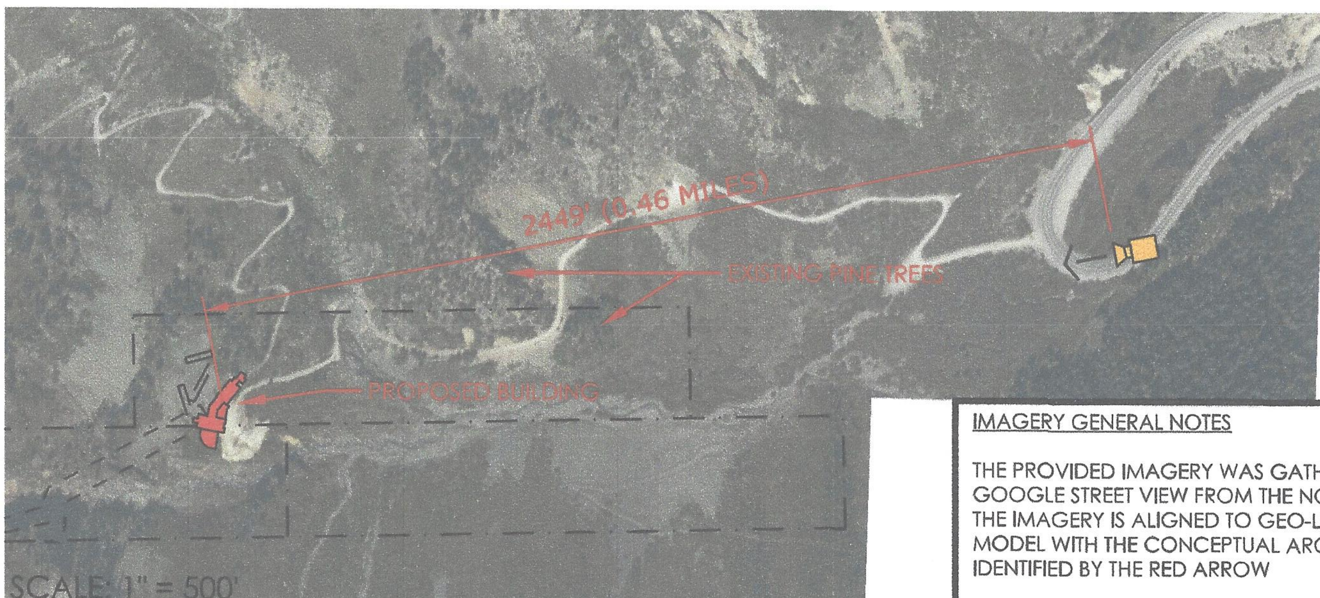
VIEW #6

SCENIC QUALITY REPORT ADDENDUM
Silver Cloud Lodge/PUD
Prepared By Engineer Mountain, Inc.

The following pages are labelled **"View #7," "View #8," and "View #9."** These visual aids were prepared by the project Architects to depict the anticipated view of the **proposed Lodge Structure in Mill Creek**, as viewed by a driver in a vehicle (at three different locations) from the tight, hairpin curve called Mule Shoe Curve on Highway 550. The proposed lodge structure is approximately 1/2 mile up the existing 4WD gravel 4WD road called Mill Creek Road (USFS Rd. 821/County Road 15).



VIEW #7 NORTH-BOUND LANE LOOKING WEST ON HWY 550



VICINITY MAP AND CAMERA LOCATION

IMAGERY GENERAL NOTES

THE PROVIDED IMAGERY WAS GATHERED FROM GOOGLE STREET VIEW FROM THE NORTH-BOUND LANE. THE IMAGERY IS ALIGNED TO GEO-LOCATED TERRAIN MODEL WITH THE CONCEPTUAL ARCHITECTURE IDENTIFIED BY THE RED ARROW

Tommy Hein ARCHITECTS
Box 3327 108 S. Oak St.
Penthouse
Telluride, CO | 81435
970.728.1220
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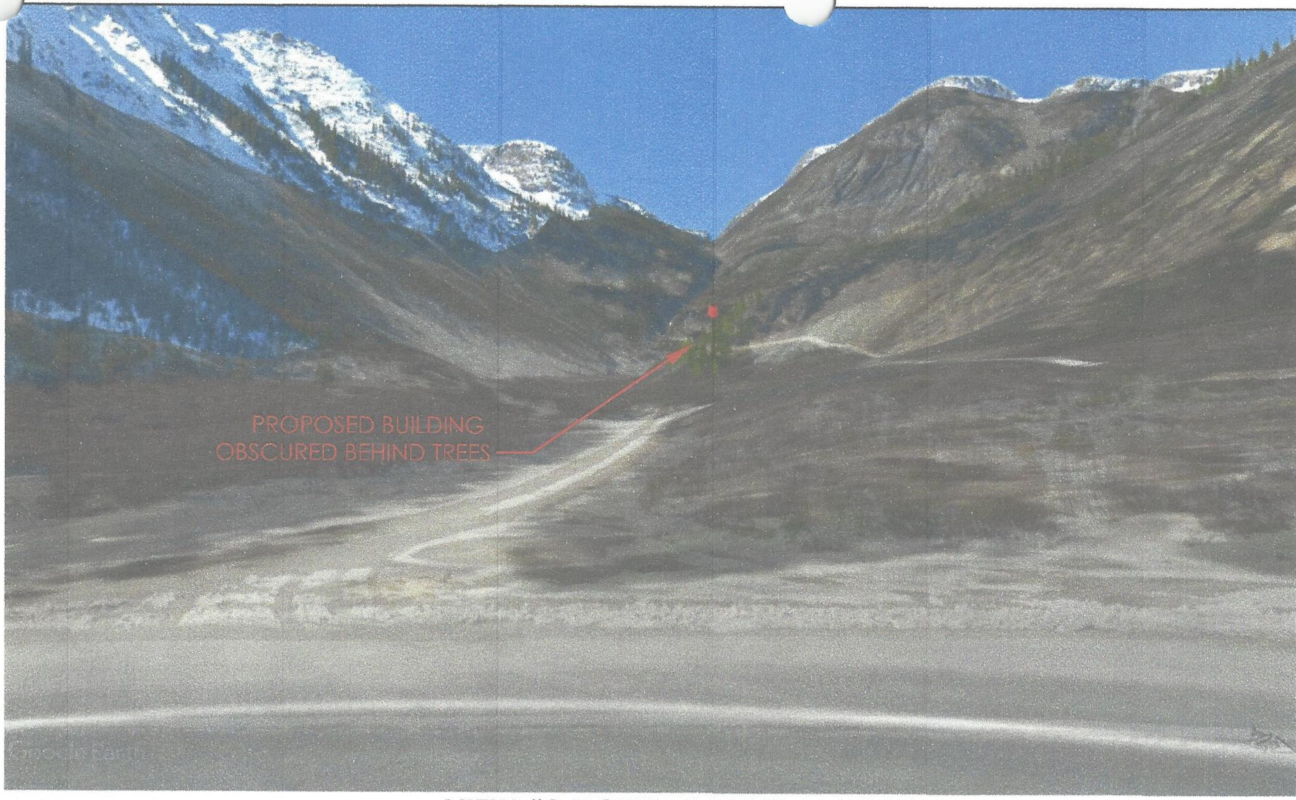
SUBMISSIONS

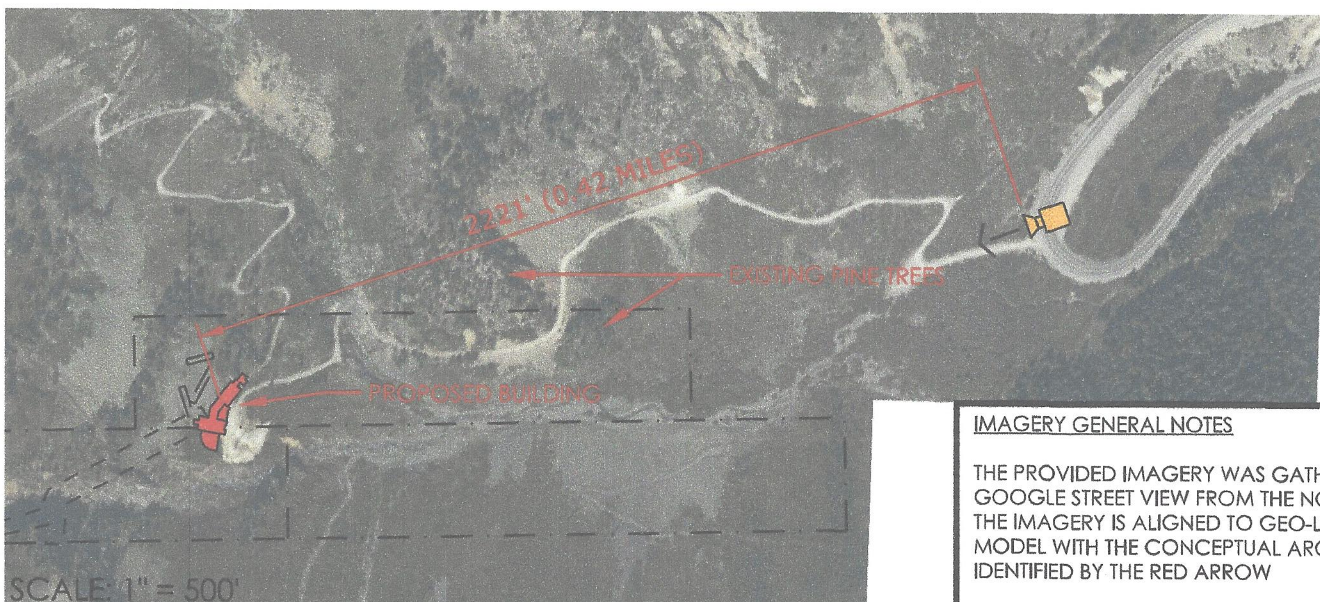
DATE	SUBMISSION
12.15.2023	PRELIM. PUD

SILVER CLOUD VISUAL IMPACT FROM HWY. 550

VIEW #7



VIEW #8 NORTH-BOUND LANE LOOKING WEST ON HWY 550



VICINITY MAP AND CAMERA LOCATION

IMAGERY GENERAL NOTES

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Tommy Hein
ARCHITECTS
Box 3327 108 S. Oak St.
Penthouse
Telluride, CO | 81435
970.728.1220
www.TommyHein.com

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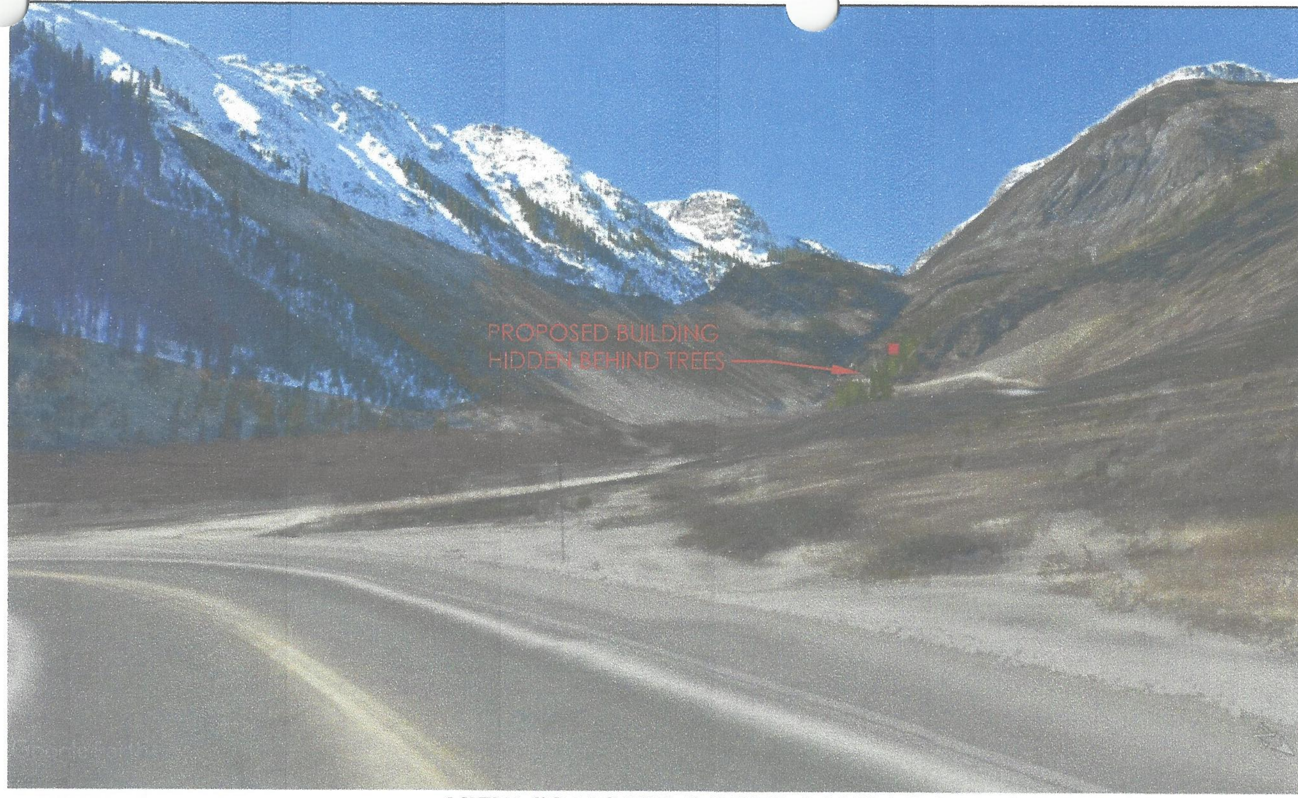
12.15.2023	PRELIM. PUD

SILVER CLOUD VISUAL IMPACT FROM HWY. 550

VIEW #8



VIEW #9 NORTH-BOUND LANE LOOKING WEST ON HWY 550

VICINITY MAP AND CAMERA LOCATION

IMAGERY GENERAL NOTES

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Penthouse
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SILVER CLOUD VISUAL IMPACT FROM HWY. 550

VIEW #9

SCENIC QUALITY REPORT ADDENDUM
Silver Cloud Lodge/PUD
Prepared By Engineer Mountain, Inc.

The Project Architects have put a lot of work into developing draft building plans along with the Applicant Colby Barrett of Bonanza Boy LLC. The Architectural plans depict the proposed lodge structure, which has been designed to closely match the former mining buildings which once existed at the project site. The proposed lodge structure is designed to have the existing mine portal incorporated into the back of the building. The Architectural plans are printed in color at 11x17, stapled and attached to this report/application binder, for your review. The Architectural plans depict the building design concepts, proposed building materials, site layout plans, proposed parking, camping. They include 3D aerial photography, for visualizing the proposed development associated with the Proposed Silver Cloud Lodge/PUD.

Please refer to the attached 11x17 Architectural Plans (which are stapled and folded, and enclosed within this binder/application).

This report is an abbreviated, update/addition (an "addendum") to the Scenic Quality Report which was previously submitted to San Juan County on June 26, 2023. Please refer to the full Scenic Quality Report submitted in June 2023 for additional/background information. A copy of the previously submitted Scenic Quality Report is available upon request from Engineer Mountain, Inc.

Thank you for allowing us to present this information to you regarding the Proposed Silver Cloud Lodge/PUD, located on the Shelbyville Lode in Mill Creek, and on the Bonanza Boy Mill Site at Chattanooga. If you would like additional information, please contact Engineer Mountain, Inc. at (970) 387-0500 or the Applicant Colby Barrett at (303) 909-6083.

CONTAINS PRIVILEGED INFORMATION – DO NOT DISTRIBUTE

RECORDATION AND EVALUATION OF THE SILVER CROWN MINE (5SA407), SAN JUAN COUNTY, COLORADO

by

Jonathon C. Horn
Principal Investigator

Alpine Archaeological Consultants, Inc.
P.O. Box 2075
Montrose, Colorado 81402-2075

Prepared for

Bonanza Boy, LLC
PO Box 3387
Telluride, Colorado 81435

Under the conditions of
Colorado State Archaeological Permit No. 80929
(expires February 29, 2024)

June 2023

ABSTRACT

Alpine Archaeological Consultants, Inc. (Alpine) was hired by Bonanza Boy, LLC of Telluride, Colorado, to record and evaluate the Silver Crown Mine (5SA407) in San Juan County, Colorado. The site is on private land owned by Bonanza Boy, LLC. The work was done in advance of Bonanza Boy, LLC's anticipated filing for an Army Corps of Engineers 404 permit, as they plan to develop the property. The Area of Potential Effect (APE) for the project is the site. The Silver Crown Mine is recommended as eligible for inclusion in the National Register of Historic Places (NRHP) under Criteria A and C because the mine was an important mine in the area during the early 1900s (Criterion A) and because its highly visible waste rock pile is an important element of the mining landscape of the area and the avalanche deflectors built to protect the mine buildings were innovative and are a rare feature type on mines of the region (Criterion C). It is not recommended as eligible under Criterion D because what intact archaeological deposits were present at the site from the mine's primary period of use have been completely displaced and disturbed by subsequent road building.

History Colorado-Office of Archaeology and Historic Preservation
COLORADO CULTURAL RESOURCE SURVEY
Cultural Resource Survey Management Information Form

I. PROJECT SIZE

Federal acres of potential effect/project:	0	Acres surveyed:	0
State acres of potential effect/project:	0	Acres surveyed:	0
Private acres of potential effect/project:	1.9	Acres surveyed:	1.9
TOTAL:	1.9	TOTAL:	1.9

II. PROJECT LOCATION

County(ies): San Juan
USGS Quad Map(s): Ironton, Colo. 1955 (1984)
Principal Meridian(s): NM
Unsurveyed

Township	42N	Range	8W	Section		¼		¼		¼		¼
Township		Range		Section		¼		¼		¼		¼
Township		Range		Section		¼		¼		¼		¼
Township		Range		Section		¼		¼		¼		¼

III. SITES

Smithsonian Number	Resource Type				Eligibility					Effect			Management Recommendations						
	Prehistoric	Historic	Paleontological	Unknown	Eligible	Not Eligible	Need Data	Contributes to a District	Supporting Segment	N/A (not a hist. prop.)	No Adverse Effect	Adverse Effect	No Further Work	Preserve/ Avoid	Monitor	Test	Excavate	Archival Research	Other
5SA407		X			X									X					

IV. ISOLATED FINDS

Smithsonian Number	Resource Type			
	Prehistoric	Historic	Paleontological	Unknown

Smithsonian Number	Resource Type			
	Prehistoric	Historic	Paleontological	Unknown

See Appendix A Map

CONTENTS

Appendices

Figures

INTRODUCTION

Bonanza Boy, LLC of Telluride, Colorado, is planning the recreational development on the site of the Silver Crown Mine (site 5SA407) in San Juan County, Colorado. As part of their permitting for the project, the company may be required to obtain a 404 Permit from the Army Corps of Engineers. The Area of Potential Effect (APE) for the project is the site. Alpine Archaeological Consultants, Inc. (Alpine) of Montrose, Colorado, was hired by Bonanza Boy, LLC to rerecord the Silver Crown Mine and evaluate its significance relative to the National Register of Historic Places (NRHP) criteria. The site had been previously recorded in 1993 and 2000 and a new recordation was in order. Fieldwork was conducted by Jonathon C. Horn, Principal Investigator, assisted by Heather Prosser on June 20, 2023. No artifacts were collected during the project.

PROJECT LOCATION AND ENVIRONMENTAL SETTING

The Silver Crown Mine (5SA407) is within the southern Rocky Mountains physiographic province of western Colorado (Figure 1). It is on a steep, rocky, east-southeast-facing slope on the northern side of Mill Creek, a tributary of Mineral Creek just west of the former town of Chattanooga. The site is accessed by a dirt road from the western end of a major curve on U.S. Highway 550 at the southern base of Red Mountain Pass (Figure 2). This is 6 miles northwest of Silverton and 2.5 miles southwest of Red Mountain Pass at 10,800 ft. Geologically, the project area is heavily mineralized tertiary igneous rocks of intra ash flow andesitic lavas within the Silverton caldera (Tweto 1979). The majority of the site is waste rock deposited from the mine. Above the mine, the area is mostly barren rock outcrops and angular rubble and with little soil. Sparse vegetation of willow, spruce, strawberry, corn lily, currant, thistle, raspberry, elderberry, columbine, dandelion, and other forbs are present.

HISTORICAL BACKGROUND

With the San Juan Mountains legally opened to prospecting in 1873, Baker's Park became the focus of mining activity that spread throughout the San Juan Mountains; the town of Silverton was established in 1874. Mining rapidly expanded to the Telluride, Ouray, Rico, and Lake City areas and was quickly connected by toll roads. The success of the San Juan mines spurred railroad construction to the Animas Valley in 1880 where the town of Durango was established. In 1882, the Denver & Rio Grande (D&RG) extended their rail line to Silverton. The completion of the railroad to Silverton solidified the town's position as the principal mining center of the San Juans and stimulated mining in the surrounding area. A wagon road from Ouray to Ironton was completed by Otto Mears in 1883 that continued over Red Mountain Pass to Silverton. In 1887, Otto Mears constructed the Silverton Railroad over Red Mountain Pass to the Red Mountain Mining District. The D&RG extended a rail line to Ouray from Montrose in 1887, but the Red Mountain Mining District was never connected by rail to Ouray because of the difficulties constructing a suitable grade to surmount the upper Uncompahgre Canyon. In 1890 and 1891, the Rio Grande Southern Railroad was constructed through the San Juan Mountains between Durango and Ridgway. It provided much-needed rail service to the important mining centers of Rico and Telluride, further stimulating mining and commercial development in the San Juan Mountains. Hard times in the mining industry began with the Panic of 1893 and continued into the new century with labor unrest that centered on the town of Telluride. Gold-producing mines in the region were not nearly so hard hit by the depression as those that produced mainly silver (Henderson 1926). Ouray was fortunate to have several gold-producing mines that kept its economy alive, particularly the Camp Bird.

Initial Establishment of the Silver Crown Group of Mining Claims

Five mining claims—the Silver Crown, Mountain Chief, Giant King, Wonderful, and Pride lodes—were initially located by R. J. Penoyer, J. S. Tharp, J. D. Crain, F. G. Barnett, Ed Finch, and Adelbert Parsell on September 15, 1879. These became known as the Silver Crown Group of claims. The locators sold the group of claims to E. E. Norton of Pennsylvania for $100,000 in November 1879 (Condry 2000; Curtis 2003). Norton involved Luther H. Buell in establishing the Silver Crown Mining Company, which was incorporated in New York on March 3, 1880, with $5,000,000 capital (San Juan County Courthouse, County Clerk's Office,, Records of Incorporation, Book 1 Page 127). Company

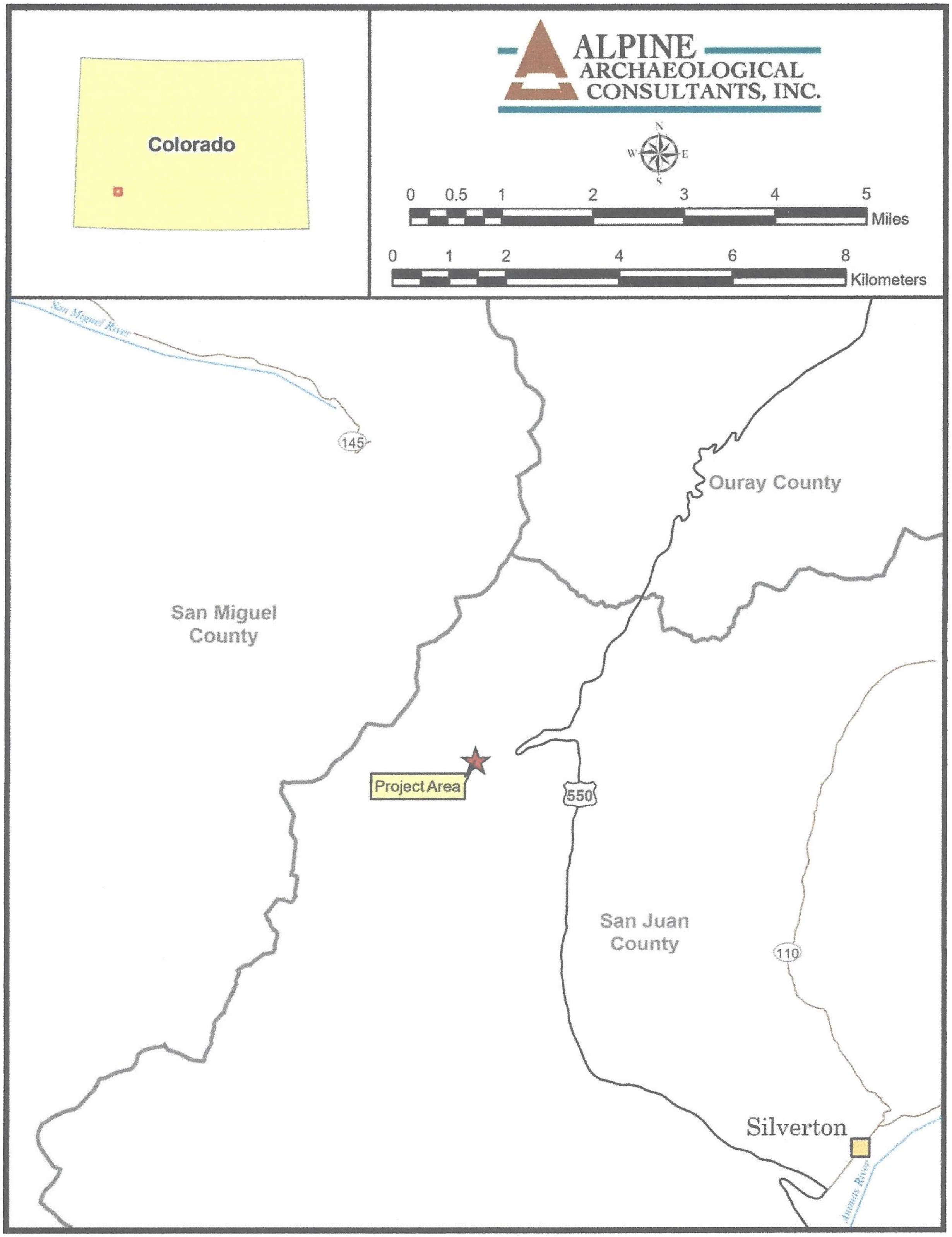

Figure 1. Project area location.

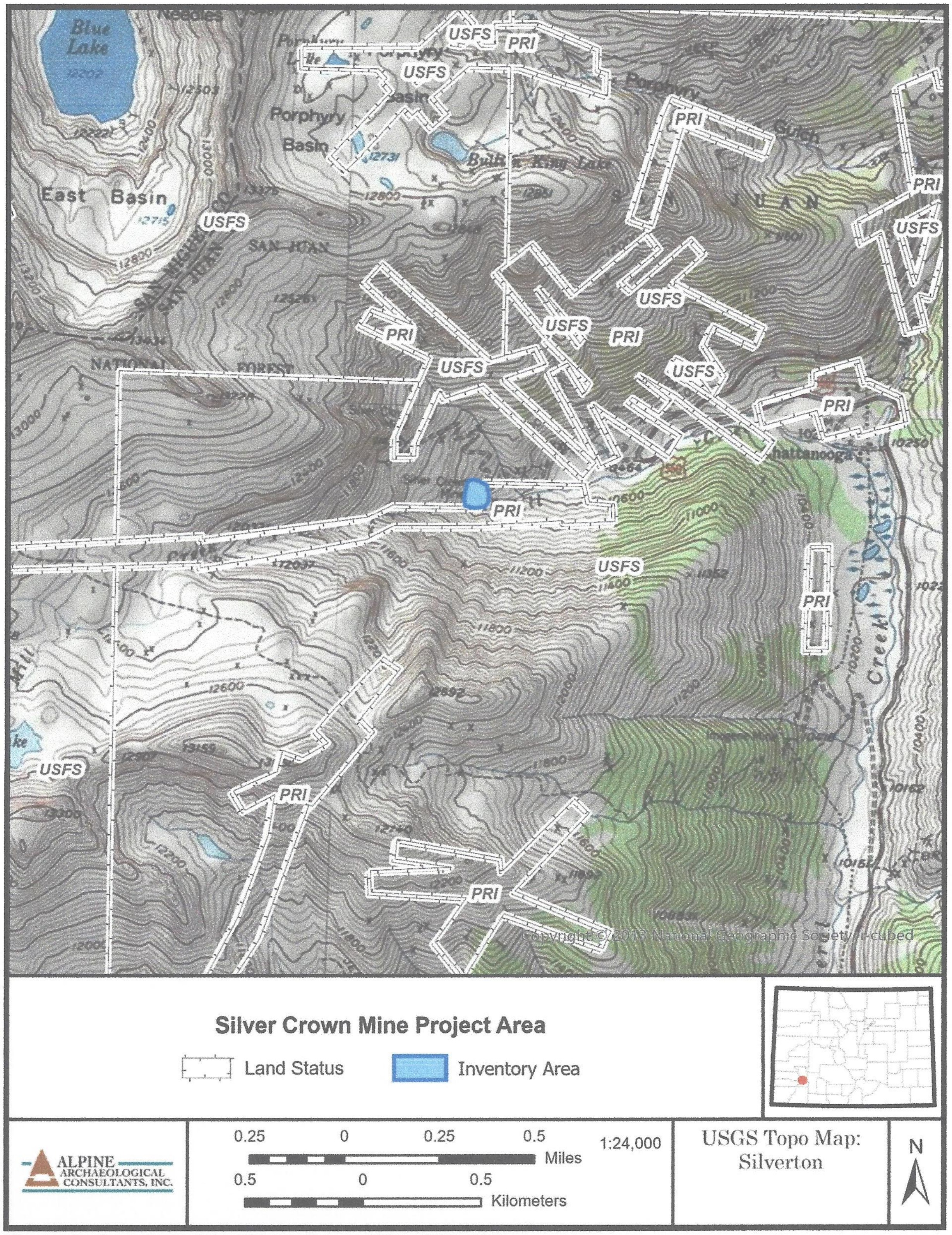

Figure 2. Location of the Silver Crown Mine (5SA407).

officers were Norton as president, Buell as vice president, Gilbert L Cornell as treasurer, and R. A. Olmstead as secretary. The company owned five mining claims: the Silver Crown, Giant King, Mountain Chief, Wonderful, and Pride. Work was initiated during the summer of 1880 by mine superintendent E. T. Booth of New York to demonstrate the property's value prior to stock being offered for sale (*Lake City Mining Register*, July 2, 1880:2). In 1881, Buell became the president with Olmstead continuing as secretary. This appears to have been Buell's first investment in mining properties in the San Juan Mountains, and was probably the result of two of his brothers, Jonathan and Willard, being involved with mining in the area beginning in 1875 as principals in the Buffalo & San Juan Mining Company to operate mining properties in Poughkeepsie Gulch. That company was succeeded by the Colorado Mining & Land Company in 1877, which Jonathan Buell and others had also formed (Welles 1881:292-293; *Rocky Mountain News* [Denver], September 21, 1876:4; December 21, 1877:4; *Ouray Times,* December 29, 1877:1; *Silver World* [Lake City], October 15, 1881:3). The initial work on the claims of the Silver Crown Mining Company showed the vein on which the claims were situated to be quite valuable, so work continued over the winter under the direction of contractor Gus Crawford. Two development tunnels were dug: Development Tunnel 1 was on the western end of the Valley Lode, and Development Tunnel No. 2 was on the western end of the Mountain King Lode, which cut the Silver Crown vein on February 25, 1881 at a distance of 110 ft. from the tunnel mouth and 25 ft. below the surface. By October 1881, the two tunnels had a total length of 260 ft., but it was expected that an additional 200 ft. of tunnel would be necessary before the desired quantity and quality of ore would be reached (*Lake City Mining Register,* August 27, 1880:3; *Silver World* [Lake City], March 26, 1881:3; May 28, 1881:3; October 22, 1881:3).

By the end of 1882, the company felt certain enough of the value of their mining claims to have Mineral Survey plats prepared and to initiate the process of obtaining Mineral Entry Patents for their six claims. Luther Buell's nephew, Herbert L. Buell, the son of Willard, was the Deputy Mineral Surveyor that prepared the Mineral Survey plats for the claims in 1882 and 1883 (Table 1). Luther H. Buell was succeeded as president by G. L. Cromwell in 1882 and by James A. Bostwick in 1884. Olmstead continued as the secretary all of those years. In 1883, the *Colorado Mining Directory* noted that the property was developed by two tunnels. One was 115 ft. long that intersected the vein at a depth of 60 ft. and the other 180 ft. long that intersected the vein at a depth of 80 ft. In addition, the vein was exposed by five open cuts with 10-ft.-wide exposures. Ore was described as galena and arsenical copper in quartz that assayed at 45 percent lead and 40 oz. of silver per ton (Corregan and Lingane 1883:671). In the summer of 1884, it was reported that the main mine tunnel struck the vein at a distance of 200 ft. and had a 145-ft.-long drift along the vein (*Silver World* [Lake City], July 26, 1884:4).

Table 1. Mineral Surveys of Mining Claims of the Silver Crown Group.

MS No.*	Name	Survey Date	Patent Date	Patentee
558	Pride	11/28/1882	10/15/1884	Silver Crown Mining Co.
559	Wonderful	11/28/1882	10/15/1884	Silver Crown Mining Co.
560	Mountain Chief	11/28/1882	10/15/1884	Silver Crown Mining Co.
570	Valley	1/9/1883	10/15/1884	Silver Crown Mining Co.
1788	Silver Crown	10/3/1883	2/6/1889	Silver Crown Mining Co.
1789	Giant King	10/2/1883	2/6/1889	Silver Crown Mining Co.
18168	Shelbyville	11/10/1906	12/16/1907	Precious Metals Corp.

*Mineral Survey Number

Chattanooga

Each of the Silver Crown Group of mining claims had an associated mill site that were separate from the mining claims, being long Mill Creek and Mineral Creek north of the confluence of the two streams. Cabins were constructed on these mill site claims for accommodations for miners at the Silver Crown Group of claims and other mining claims in the area. Initially known as Silver

Crown Camp, the growing community was also known as Sweetville and, in 1882, was named for promoter and Silverton assayer Edmund Sweet. With the growth of mining on upper Mineral Creek and over the divide toward Ouray, the Red Mountain Mining District was formed. The junction of Mineral and Mill creeks was aptly situated to act as a point of transfer of supplies and equipment from the end of the wagon road from Silverton onto pack animals that took them on their final leg to the more heavily developed part of the mining district on the Ouray side of the pass. Packer John C. Burnett established a livery and stables at Sweetville in 1882, and Sweet kept a saloon. Quickly, the settlement on the Silver Crown mill sites came to be more developed and the name of Chattanooga was attached to the post office when it was established there on April 4, 1883 (Nossaman 1998; Archimede 2004; Bauer 2007:9-10). Among those engaged in packing in the area was John "Jack" Dolan from Lawrence, Kansas. He and two companions were swept 50 ft. downhill with their pack animals by an avalanche at 3:30 in the afternoon on December 20, 1883, while packing supplies to the Silver Crown Mine. Dolan was killed. He was buried adjacent to Chattanooga, but his grave was unmarked until it was done so by the San Juan National Forest in 1994 (Peterson 1996:D-25; Find a Grave Memorial 6060697).

Chattanooga was platted with Main, First, and Second streets running east to west, and Water and Silver streets running north to south, Town lots sold for between $100 and $250 in 1883, and many mining supply and construction businesses, markets, dry goods stores, hotels, and saloons sprang up. The *Chattanooga Enterprise* newspaper printed a single issue in June 1883. By the end of 1883, a concentration mill was constructed by the Red Mountain Sampling and Concentrating Company at the junction of Mill Creek with Mineral Creek. The company was incorporated on May 7, 1883 by J. E. Downy, George W. Brown, M. J. McCloskey, and Henry B. Adsit with $50,000 in capital stock (*Rocky Mountain News* [Denver], May 8, 1883:3). Known as the Mineral Creek Concentrator or the Chattanooga Concentrator, it was a custom 30-ton-per-day mill operated by superintendent Richard A. Parker, formerly of Georgetown. The concentrator turned Chattanooga into a regional industrial destination for mixed and low-grade ores. It handled ore from nearby mines, but was a first destination for ore packed down from the Ouray side of the Red Mountain Mining District. Initially, the concentrator ran only on water power, but had a steam engine installed in summer 1884 so that it could operate when Mineral Creek did not provide sufficient water power. The upper levels of the Silver Crown Mine were leased to the owners of the concentrator, who ran the ore through their mill. The growth of the Red Mountain Mining District led Otto Mears to extend his toll road from Silverton to Chattanooga over Red Mountain Pass to Ouray. It made wagon transportation possible through the precipitous upper Uncompahgre Canyon in 1884. The improved road ran north from Silverton, crossed a bridge westward over Mineral Creek onto Main Street in Chattanooga, and then turned north on what may have been Silver Street before making a large horseshoe curve in its initial ascent toward Red Mountain Pass. With completion of the toll road, miners could choose whether to freight to Ouray or Silverton, but Silverton still had the upper hand because of the completion of the Denver & Rio Grande Railroad there in 1882, whereas the nearest railroad connection to Ouray was Montrose, another 35 miles away (*Colorado Daily Chieftain* [Pueblo], December 9, 1883:6; *San Juan Herald* [Silverton], May 22, 1884:3; *Silver World* [Lake City], May 24, 1884:3; Archimede 2004).

Most of the Red Mountain Mining District produced an abundance of silver ore throughout the 1880s that led Otto Mears to construct the Silverton Railroad beginning in the summer of 1887. The first six miles of the line was completed to Burro Bridge by January 28, 1888. The line continued through Chattanooga and over Red Mountain Pass to Ironton with its terminus reached at Albany at the head of the Uncompahgre Canyon on September 20, 1889. With completion of the railroad, Chattanooga's main purpose as a transfer and supply point for the mines of the Red Mountain Mining District was greatly diminished. Avalanches in 1888 and a devastating fire in 1892 resulted in considerable loss to the town. The Panic of 1893 and crash of the price of silver resulted in a near cessation of mining at the Red Mountain mines through the rest of the 1890s, near abandonment of Chattanooga, and closing of its post office in June 1894. Another avalanche in 1898 left little standing in the town (Nossaman 1974; Archimede 2004; Bauer 2007:9-10).

The town saw a brief resurgence beginning in the early 1900s, mostly with mining that resumed at the Silver Ledge and Silver Crown mines and construction of a new mill by the Ledge Mining and Milling Company in 1902. This was not enough to prevent the Silverton Railroad from failing on November 3, 1904 and being reorganized as the Silverton Railway. Otto Mears regained control of the railway in 1909, but, after World War I, mining never resumed in the Red Mountain Mining District to the point of making the railroad profitable. The Silver Ledge Mill was destroyed by fire in 1917 and was replaced by ore loading facility on the railroad. The railroad ceased operations in in 1921 and was abandoned on June 17, 1922 (Nossaman 1974; Archimede 2004).

Silver Crown Group 1887–1910

The Silver Crown Mining Company was bankrupt by late 1887, and the receiver, Charles B. Safford, sold the Silver Crown Group of lode and mill sites to James H. Everett of Kingston, New York, in May 1888 for $100 (San Juan County Courthouse, County Clerk's Office, Deed Book 79, Page 524). Despite Otto Mears constructing the Silverton Railroad through Chattanooga at the time, the Silver Crown Group did not benefit. Everett leased the claims to John Bergin and others for one year in 1891 on a $25,000 bond (San Juan County Courthouse, County Clerk's Office, Deed Book 84, Page 507). All of the mining claims of the Silver Crown Group failed to have their 1890 taxes paid for them in 1891, suggesting that mining on the properties was not very productive (*Silverton Standard*, November 14, 1891:14). High transportation costs and the economic Panic of 1893 with its precipitous decline in silver prices resulted in the Silver Crown Group of claims remaining idle until 1900 with taxes unpaid through at least 1898 (*Silverton Standard*, September 2, 1899:11). Despite having the taxes on the properties going unpaid, Everett retained ownership. He let a contract on 200 ft. of tunnel in May 1900 to the owners of the Silver Ledge Mining & Milling Company, with the actual mining done by Miles McCue. Work continued through the summer of 1901 with supplies delivered by John Glanville (*Silverton Standard*, May 26, 1900:1; *Silverite-Plaindealer* [Ouray], August 24, 1900:4; *Plaindealer* [Ouray], August 2, 1901:1).

In May 1901, Everett sold portions of the Mountain Chief and Wonderful mill sites to the Ledge Mining and Milling Co. for $500 (San Juan County Courthouse, County Clerk's Office, Book 85, Page 481) of which R. D. Thompson and T. E. Schwarz were principals. The reason for the sale was to provide sufficient space for a new Silver Ledge Mill to be constructed in May 1902, the earlier mill having been destroyed by fire (*Durango Semi-Weekly Herald*, January 6, 1902:1; *Silverton Standard*, March 22, 1902:1; May 7, 1902:1). The completed mill and its associated buildings extended onto portions of the two claims from the north. The company then had a Mineral Survey Plat (MS 16099) prepared for the Columbine Mill Site (and associated Oriental Lode) on December 7, 1902 in preparation for obtaining a Mineral Entry Patent for the claims. The Silver Ledge Mill was mostly on the Columbine Mill Site, which fit like a puzzle piece along the northern sides of the Mountain Chief and Wonderful Mill sites; it was patented on June 30, 1904.

In February 1905, Thomas J. Hurley purchased the Silver Crown Group of lode claims and their associated mill sites from Everett, less the mill sites that Everett had already sold. He also purchased the John and Forest Mines near Animas Forks from Everett (*Silverton Standard*, February 25, 1905:1). Thomas Jefferson Hurley was born May 2, 1847, in Peterborough, Canada, and moved to Rochester, New York, as a child with his parents. He reportedly enlisted as a private in the 8th New York Cavalry in 1861 and served until 1864. From 1868–1875, he was the Color Sergeant of the New York National Guard. His wife, Sarah Jane Walker, was born in New York in about 1850; they were married about 1871. They had several children, and their son, Thomas Jay Hurley, was born in Rochester in 1878. Sara reportedly died in 1885, and Hurley married widow Ann March Field on June 13, 1894; she was from Newton, Massachusetts. Hurley worked in wholesale clothing and dry goods businesses prior to 1880 when he became a stock broker and insurance salesman. He made sufficient money to begin investing in mining properties in the late 1890s. This enabled his son, Thomas Jay Hurley, the opportunity to work as a mine manager and superintendent at the mining properties he invested in (*Silverton Standard*, December 28, 1907:2).

Hurley's first mining experience in the San Juan Mountains was when he arranged with and English syndicate to invest in the Occidental Mine and its associated concentration mill near Gladstone as the Exploration Syndicate in 1898, of which he was the president. The company also had holdings in Mexico. By 1900, he was also the president of the Natalie Mining and Milling Company, which operated the Natalie Mine adjoining the Occidental; that company was incorporated in January 1901. The Hurley Tunnel on the Natalie Mine was named for him (*Silverton Standard*, May 28, 1898:1; July 30, 1898:1; October 27, 1900:2; January 19, 1901:6; *Silverton Weekly Miner & San Juan Democrat*, September 21, 1900:1). Later in 1901, the Ruby Basin Mining and Tunnel Company was formed with $1,000,000 capital to acquire the Ruby Group of claims on Lookout Mountain up Mineral Creek and the associated Ruby Basin Mill. Incorporators included George W. Bausman, Joseph Bordeleau, and Frank B. Brown, and Thomas J. Hurley's son, T. Jay Hurley, was secretary (*Silverton Standard*, October 12, 1901:1; September 13, 1902:10; May 2, 1903:1, May 27, 1905:1; *Silverton Weekly Miner & San Juan Democrat*, October 23, 1903:1). The Hurleys began considering purchasing the Ruby Basin Group of claims as early as 1902 (*Silverton Standard*, May 7, 1904:1). In order to do so, Thomas J. Hurley formed the Mines Securities Corporation in New York in 1905. T. Jay Hurley was made manager of the mine and mill (*Silverton Standard*, May 7, 1904:1; *Rocky Mountain News* [Denver], November 18, 1905:12).

In order to operate the Silver Crown Group, Hurley formed the Precious Metals Corporation with Silverton attorney William A. Way and San Juan County Treasurer Thomas Annear with $3,000,000 in capital stock in November 1905. Way invested in other mining properties in the Silverton area and was later made a trustee of the Colorado School of Mines. Annear was a local businessman in Silverton who was elected to the Colorado State legislature as the representative from San Juan County from 1899–1902 and ran unsuccessfully for Lieutenant Governor in 1902. He moved to Denver in 1906 where he was the state Treasurer in the 1930s The three subsequently formed the Fifty Associates Mines Corporation in September 1906 to lease the Ruby Group and the Ruby Mill (*Rocky Mountain News* [Denver], November 18, 1905:12; September 22, 1906:10; *Steamboat Pilot* [Steamboat Springs], July 17, 1941:4). Both of these companies seem to have been operating prior to their incorporations. Hurley's son, T. Jay Hurley, was made the superintendent of both of the mining operations, and was largely responsible for managing his father's mining investments, particularly as Thomas J. Hurley spent much of 1905–1907 on trips to Europe, Egypt, and Britain. Initially, he was in charge of the Ruby Basin properties for the Mines Securities Corporation and continued in that position in 1904 when they were leased to the Fifty Associates Mines Corporation. With the formation of the Precious Metals Corporation, T. Jay Hurley split his time between the Ruby Group and the Silver Crown Group. By June 1906, the corporation had purchased all of the holdings of the Mine Securities Corporation and took over management of the Ruby Basin Mines (*Silverton Standard*, May 7, 1904:1; January 14, 1905:1; *Silverton Weekly Miner & San Juan Democrat*, June 1, 1906:1). The Ruby Group was a fully functioning mining property, but the Silver Crown Group was to be tackled entirely afresh. Though earlier mining had shown a large vein of valuable ore, it was considered to have been little developed, and the older workings had seen little work since initial mining in the early 1880s.

To help T. Jay Hurley at both of the mining properties, Robert McCart, Jr., a graduate of the Colorado School of Mines, was hired to be the engineer and metallurgist at both of the mines. McCart was later the mine superintendent at the Silver Lake Mine in 1907 and 1908 (*Silverton Standard*, June 3, 1905:2; May 11, 1907:1; January 7, 1908:3). Hurley had four mining engineers examine the 8–20-ft.-wide that ran for 9,000 ft. parallel to the gulch along Mill Creek on the Silver Crown Group of claims. According to assays done by Ricketts & Banks of New York, the ore contained 53.33% lead, 6.75% zinc, 1.07% copper, 0.05 oz. of gold per ton, and 12 oz. of silver per ton.

Another assay on the mineral values was reported to show 15 per cent lead, 6 oz. of silver per ton, 0.25 oz. of gold per ton, and slight values of copper (*Silverton Standard*, August 25, 1906:1; *Silverton Weekly Miner & San Juan Democrat*, September 27, 1907:3). Once analysis of the ore was complete, Hurley began preparations for mining. Rather than use the earlier tunnels to access the vein, an entirely new tunnel was planned just north of the junction of the Mountain Chief and Valley lodes that became known as the Silver Crown Mine. It was expected to reach the vein at a substantial depth to facilitate mining as the tunnel proceeded westward. The tunnel was in the eastern portion of the linear arrangement of claims and provided close access to a spur that was being run from the Silverton Railroad up Mill Creek to within 1,000 ft. of the operation. Jessie Kramer, formerly the superintendent of the Silver Ledge Mine, was hired as the superintendent. Lumber and other materials were ordered and construction of the mine buildings started in June 1906 (*Silverton Standard*, May 19, 1906:1; *Durango Democrat*, June 10, 1906:1; *Silverton Weekly Miner & San Juan Democrat*, June 22, 1906:1). By August, the new office, compressor house, shops, and boarding house were ready for occupancy (Figure 3). One of the safety precautions that Hurley took in siting the mine buildings was the construction of rock and board berms on the slope above the mine to deflect avalanches. According to the *Silverton Standard*, (August 25, 1906:1):

> These buildings are all situated in a pleasant little nook in the mountain side a short distance from the track of the Silverton railroad, and absolutely safe from danger of snow slides, the careful manager taking special precaution as to their locations and construction for protection and comfort of his employes [sic].

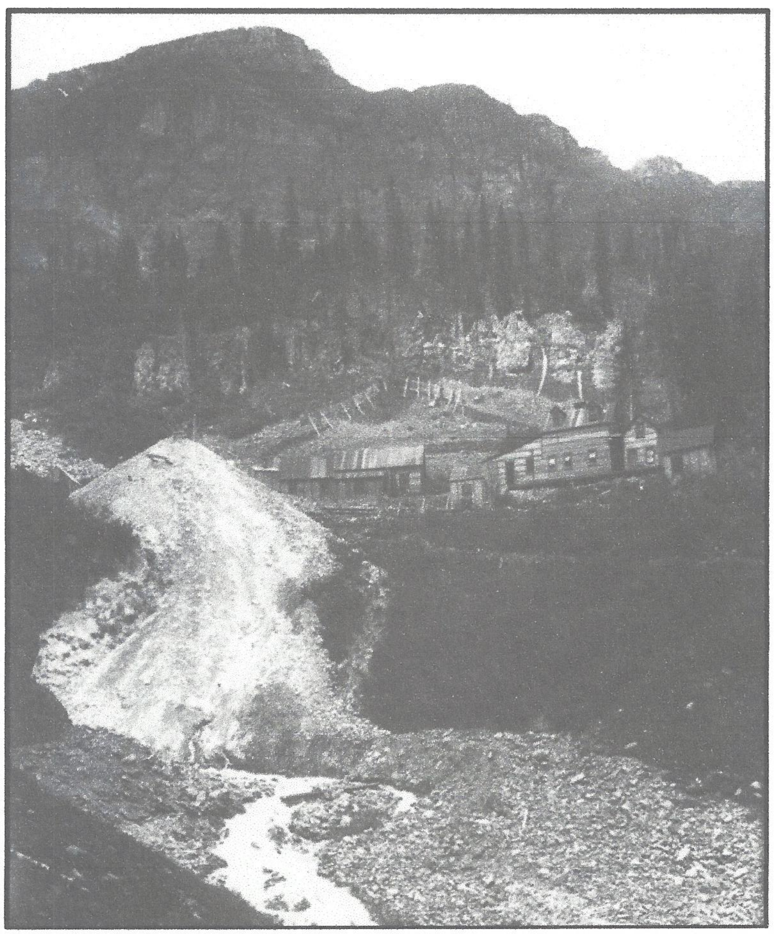

Figure 3. Silver Crown Mine showing the buildings constructed in 1906 with the avalanche splitting berms on the slope above.

Considering the ore values of the vein, Hurley planned to concentrate the ore coming from the mine. He negotiated unsuccessfully for the purchase of the Silver Ledge Mill in 1906 and 1907. His backup plan was to construct a mill of his own along the railroad spur that could be served by an aerial tramway from the mine. This failed to materialize, too. Neither of these plans mattered until mining was underway. The company installed electric motors to furnish power for the mine from the recently completed Tacoma Power Plant of the Animas Power and Water Company in the Animas River Canyon. The most important piece of equipment was a Rand air compressor with capacity to run 10 drills. The compressor arrived at the railroad station in Silverton in August 1906 and was waiting completion of the spur to the mine for delivery to the mine where the new compressor house awaited its arrival. With the arrival of the compressor and drills, it was expected that the number of men at work at the mine would increase and that about 300 ft. of tunnel could be dug per month. Once the vein was cut, every 1,000 ft. of tunnel was expected to expose 400,000 tons of ore for stoping (*Silverton Standard*, August 25, 1906:1; *Silverton Weekly Miner & San Juan Democrat*, September 27, 1907:3).

John Kramer was hired as the mine superintendent. He supervised the digging of a 500-ft.-long crosscut tunnel with a double ore-car track. Once the vein was struck, the course of the tunnel was planned to turn to follow the vein. The vein was struck in February 1907. Because the tunnel portal and the new mine buildings were not on the company mining claims, the Shelbyville Lode was located adjacent to the north of the Valley and Mountain Chief Lodes to encompass the improvements (Figure 4 and Figure 5). A Mineral Survey Plat was prepared on November 10, 1906 and the Mineral Entry Patent was granted on December 16, 1907 (Table 1). The name was taken from Shelbyville, Indiana, which was the home town of T. Jay Hurley's wife, Julia. They had married there on May 14, 1902 and came to Silverton to live while he oversaw his father's mining properties (*Silverton Standard*, December 29, 1906:1; February 16, 1907:1; *Silverton Weekly Miner & San Juan Democrat*, February 8, 1907:1; May 17, 1907:4). After the vein was reached by tunnel, two additional 500-ft.-long sections of tunnel were awarded to Jesse H. Kramer: the first in late April 1907 and the other in late May (*Silverton Standard*, April 27, 1907:1; June 1, 1907:1).

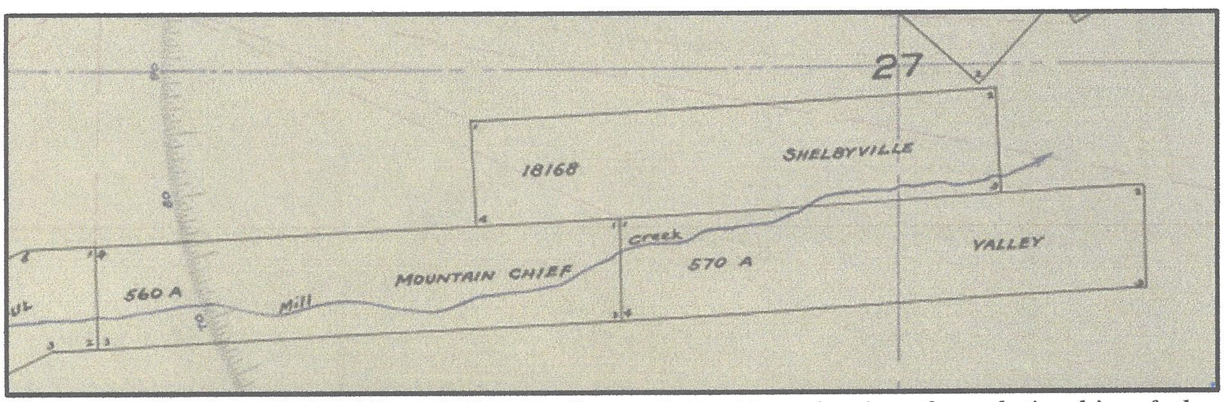

Figure 4. Portion of the Mineral Survey Connectivity Map showing the relationship of the Shelbyville Lode to the Mountain Chief and Valley lodes.

Everyone expected the Silver Crown Group to be highly productive in 1908. Unfortunately, Thomas J. Hurley died at his home in Brooklyn, New York, on December 15, 1907. His cause of death was reported to have been the result of an illness caused by exposure to a fire at the Long Beach Hotel, a resort hotel on the Atlantic shore of New York, on July 28, 1907 (*Silverton Standard*, December 28, 1907:2; January 18, 1908:1). T. Jay Hurley and his wife departed Silverton for New York in mid-January 1908 to settle his father's estate. They returned to Silverton for a month in March, at which time Hurley reportedly sold the holdings of the Precious Metals Corporation to John R. Allen of Brooklyn, New York. W. G. Clark was made the new mine superintendent. It is likely that the sale was only of Thomas J. Hurley's interest in the corporation, as the Precious Metals Corporation continued as the owner of the property. With completion of the sale, Hurley and his wife went to New Mexico to work on the Tri-Bullion Mine. By 1909, they were living in Albemarle, North Carolina, where he died on June 24, 1910 (*Silverton Weekly Miner & San Juan Democrat*, January 17, 1908:3; March 20, 1908:3; July 30, 1909:3; *Silverton Standard*, March 14, 1908:3; March 21, 1908:1; July 9, 1910:2).

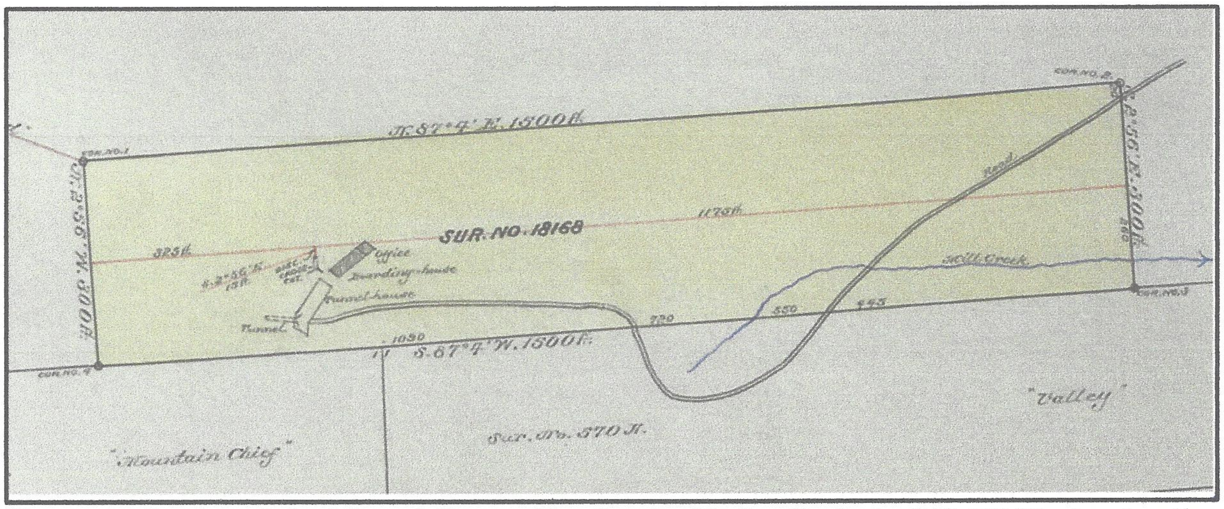

Figure 5. Portion of the Mineral Survey Plat for the Shelbyville Lode (MS 18168) showing the improvements made at the Silver Crown Lode as of November 1906.

With the departure of Hurley, Ralph L. Clark was made the manager and George C. Hill took over as superintendent of the mine. He had previously been the superintendent of the Shenandoah-Dives Mine in Cunningham Gulch. Hill put 15 men to work getting the mine ready for development work. By late April, it was reported that the tunnel on the property had reached the first ore of importance, and, by early June, work was being done around the clock by three shifts of miners (*Silverton Standard*, September 27, 1907:1; March 28, 1908:1; April 25, 1908:1; June 6, 1908:1; *Silverton Weekly Miner & San Juan Democrat*, February 19, 1909:1).

Fred Kuntz and Bob Reed were given a contract to dig 500 ft. of tunnel in late December 1908 and took out a second contract for the same amount of tunnel that they completed in July 1909. They spent 85 days working two shifts with power drills making 6 ft. per day on the second contract. By April 1909, the tunnel was reported to have been 3,000 ft. long (*Silverton Standard*, March 20, 1909:3; April 10, 1909:3; July 24, 1909:1; *Silverton Weekly Miner & San Juan Democrat*, April 9. 1909:1). During this time, Hill resigned as superintendent in April 1909 and was replaced by Ellery W. Hunt. Hunt was a mining and civil engineer who had moved to Silverton from Rico early 1901 and was involved with several mining properties in the Silverton area. He had been hired as the consulting engineer for the Silver Crown property just before his appointment as superintendent, but does not seem to have served in that position for long (*Silverton Standard*, January 5, 1901:6; April 24, 1909:3). In July 1909, the company advertised for bids for a contract to dig 2,000 ft. of tunnel and for drifting from the tunnel. At that time, the tunnel was specified to be 6 ft. wide and 7 ft. tall. Specifications for the project were available at the law office of William N. Searcy and William A. Way and bids were to be delivered to George E. Purdy, the bookkeeper and assistant manager of the company (*Silverton Standard*, July 24, 1909:1). It does not appear that a contract was awarded, and the property went onto the delinquent tax rolls when the taxes for 1909 went unpaid (*Silverton Standard*, October 1, 1910:3).

Silver Crown Mines & Ore Treatment Company

On December 5, 1921, taxes on all of the property of the Precious Metals Corporation in Mill Gulch and elsewhere were paid for by Dorothy J. Force. The deed was requested and was to be issued on June 29, 1925. Dorothy Force was the wife of Charles E. Force, who formed the Silver Crown Mines & Ore Treatment Company to own, operate, and treat ores of the Silver Crown group in Mill Gulch. A contract for 200 ft. of tunnel was let on the Silver Crown Group in May 1924 to cut the vein. With the vein exposed, J. S. Coupal, a mining engineer from Boston, did an extensive examination of the ore in June and July 1925 and oversaw the installation of a compressor in August so that mining could proceed. Force hoped to open stoping stations in the tunnel and deliver ore to a planned 100-ton concentration mill near the mine with a hydro-metallurgical leaching plant in connection. The leaching plant was to use the Lindley Universal Process developed by Mrs. M. B. Lindley, a well-known research chemist and metallurgist of New York City. The process was marketed by the Lindley Reduction Corporation of Keyport, New Jersey, incorporated in Delaware on April 22, 1926 with $2,000,000 in capital stock (*Silverton Standard*, May 24, 1924:4; March 14, 1925:2; June 6, 1925:1; June 27, 1925:3; July 11, 1925:1; August 1, 1925:1, 2; August 8, 1925:1; January 9, 1926:2; Poor's Publishing Company 1926:314). Except for the initial investigative work, the project failed to materialize, taxes due for 1925 went unpaid, and the Silver Crown Mines & Ore Treatment Corporation was dissolved with the forfeiture of their charter (*Silverton Standard and the Miner*, July 27, 1935:2).

Later Ownership and Mining

Charles W. Jordan was issued a Certificate of Purchase when he paid the 1925 taxes and a deed was to be issued to him on October 18, 1935 (*Silverton Standard and the Miner*, June 29, 1935:2). This evidently did not take place, and Charles C. Goulding stepped in and paid the 1925 taxes with a Treasurer's Deed to be issued to him on February 23, 1943 (*Silverton Standard and the Miner*, October 30, 1942:5). Goulding then cleaned up the property and planned to do an inspection of the ore bodies once he got air into the workings (*Silverton Standard and the Miner*, May 14, 1943:1). This transfer seems to have taken place and Goulding took steps to clear the title to the claims in 1946 (*Silverton Standard and the Miner*, April 14, 1946:4). A 1946 Colorado Bureau of Mines report noted that Smith Crane had a lease on the property and that a compressor was operated by a gasoline engine within a one-story wooden building. Housing of employees and the mine office was in Chattanooga, suggesting that the original boarding house/office at the mine was no longer present. It is likely that the access to the mine was improved with the construction of the current road to and beyond the site and that the boarding house/office were demolished with the construction of the road. C. A. Baker was reported as the mine operator in 1948 and Frank Ashcroft and A. J. Bennet as Silver Crown Mines, Inc. in 1949 (Bureau of Mines 1946; 1949; King and Allsman 1950:47). James Moffit and Herb Culp worked at the mine during the summer of 1948, both of whom moved to Chattanooga with their families. Strangely, Culp's car was stolen and plunged 60 ft. off an embankment at the mine. It landed on its wheels and was driven away (*Silverton Standard and the Miner*, May 14, 1948:3; June 18, 1948:1). Taxes continued to go unpaid through the 1950s, and the county attempted to sell the property in 1958 with no success. Grant Gifford purchased the tax certificate for the 1958 taxes and assigned it to H. C. Sprinkle, who requested that a Treasurer's Deed be issued, which was planned to take place on June 27, 1963. Sprinkle evidently paid taxes on the property until 1968, when the property again was placed on the delinquent tax rolls (*Silverton Standard and the Miner*, July 20, 1951:3; February 21, 1958:2; August 1, 1958:2; December 11, 1959:3; March 8, 1963:3). Bonanza Boy, LLC obtained the Silver Crown Group of claims in 2020.

PREVIOUS WORK

The Silver Crown Mine (5SA407) was initially recorded in 1993 by Martha Poley and Paul Krabacher of the Colorado Division of Minerals and Geology's Inactive Mines Program. They mistakenly identified the mine as the Mountain Chief and recommended that the site not be considered eligible for listing in the NRHP. They noted that the mine adit was secured by some sort of door and recommended that a more permanent bulkhead be installed (Poley and Krabacher 1993). The site was then recorded in 2000 by Durango Archaeological Consultants as part of the inventory of mines in the Red Mountain Mining District. They properly identified the site as the Silver Crown Mine, but recorded it as 5SA838, rather than using the original site number. They recommended the site as NRHP eligible under Criteria A and D, noting that the site was a representative small mine in the Red Mountain Mining District (Criterion A) and concluded that the artifacts present on the site were sufficient to provide important information about the mining district's history (Criterion D) (Condrey et al. 2000;Curtis 2003).

PROJECT OBJECTIVES

The primary objectives of the rerecordation of the Silver Crown Mine (5SA407) were to update the recording of the site and provide a current evaluation of significance under applicable federal cultural resource laws. This process is intended to aid in the preservation of significant cultural resources, either by avoidance or by facilitating adequate mitigative strategies. The objectives were accomplished, first, by conducting a literature review and, second, by fully documenting the site. Recommendations regarding the significance of the site are made using the criteria for determining eligibility for inclusion on the NRHP. The historic preservation laws mandating the cultural resource study specifically identify eligibility for inclusion in the NRHP as the key factor in determining preservation needs.

The criteria for assessing site significance, as published in the U.S. Government Code of Federal Regulations (36 CFR 60) read as follows:

National Register Criteria for Evaluation

The quality of significance in American history, architecture, archaeology, engineering and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and

A) that are associated with events that have made a significant contribution to the broad patterns of our history; or
B) that are associated with the lives of persons significant in our past; or
C) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
D) that have yielded, or may be likely to yield, information important in prehistory or history.

PROJECT METHODS

The Silver Crown Mine (5SA407) was fully recorded on the appropriate Colorado state site forms. A complete set of digital photographs were taken, the site was described, and elements of the site mapped using a Trimble GeoXT Global Positioning System (GPS) unit capable of submeter accuracy. A map showing the site location is included as Appendix A and the site form is in Appendix B.

SITE DESCRIPTION

5SA407 – Silver Crown Mine

The Silver Crown Mine (5SA407) is a 1.9-acre mining complex on private land at an elevation of 10,800 ft. The site includes a moderate-sized waste rock pile, a collapsed adit, stone retaining walls on the upslope side of a leveled area that at one time contained a large wooden tunnel house, a heavily disturbed area that contains artifacts from an adjacent boarding house and office building, and stone wall avalanche deflectors. The tunnel house at one time contained the adit opening and an electric motor and a compressor, the mounts of which are still in place. The boarding house/office appears to have been demolished and displaced by later road building. The avalanche deflectors consist of a single large wall on the southwestern end of the site and a large, complex, A-shaped configuration of stone walls on the steep slope in the western portion of the site (Figure 6). The site is on a steep, rocky, southeast-facing slope above Mill Creek (Figure 7 and Figure 8). Its most prominent element is an irregularly shaped, flat-topped, yellowish waste rock pile that measures 14 x 155 ft., oriented north to south (Figure 9). A northeast-facing cleft in the waste rock between lobes of waste rock may have provided access onto the top of the waste rock from below, the base of which appears to correlate with a road shown on the 1906 Mineral Survey Plat for the Shelbyville Lode (Figure 5 and Figure 10). The current access to the site is by way of a 10–12-ft.-wide winding dirt road that climbs westward along a steep, south-facing slope from the apex of a major curve on U.S. Highway 550 0.55 miles away. This road was evidently constructed using heavy equipment in the 1940s and made the earlier access route to the site obsolete, resulting in the upper portion of it that aligned with the mine portal being covered by waste rock by later mining.

The adit appears as a collapsed trench about 6 ft. wide and 16 ft. long that enters the steep east-facing slope in a west-southwest direction (240 degrees) (Figure 11). Large boulders and cobbles comprised the fill. Mixed in are 8-x-8-in. posts and 3-x-8-in. and 3-x-12-in. planks that were used to frame the adit opening (Figure 12). Lying near the southeastern end of the adit trench is an 8-x-8-ft. expanded-metal gate with a welded angle-iron frame (Figure 13). Photos from the 2000 recording show the gate standing, but the collapse behind was underway. Water emanates from the adit. After about 30 ft., it runs southward along the western edge of the waste rock pile to a pool that evidently drains into the waste rock (Figure 14).

Three sections of stone retaining walls stabilized the slope above the waste rock and provided a northwestern edge of a leveled area for the tunnel house depicted in the historic photo and on the Shelbyville Lode Mineral Survey Plat. Except for a small remnant of floor on the northeastern end of the area, no evidence of the structure has survived except for a somewhat level overgrown area about 16 ft. wide. The southwesternmost retaining wall is southwest of the adit; it is a 16-ft.-long and up to 4-ft.-tall uncoursed wall of uncoursed boulders and cobbles (Figure 15). Some waste rock has been deposited in small piles southeast of the wall and artifacts scattered in the area include some 2-x-12-in. board fragments, wooden plank remnants, 1½-in.-diameter iron pipe, 1½-in.-diameter reinforced rubber hose, a rubber V-belt, and corrugated sheet metal fragments. Another section of retaining wall is northeast of the adit and stands 4–4½ ft. tall (Figure 16). The final section of wall is at the far northeaster end of the area, is 2½–3 ft. tall, and ends at what was likely the northeastern corner of the leveled area (Figure 17). It terminates at a berm that does not quite form a right angle. In the northeastern end of the leveled area are two machinery mounts (Figure 18). The southwestern mount is an 8-x-8 ft., U-shaped compressor mount that has a 5-ft.-long, 26-in.-wide cement-lined opening on the northeastern side (Figure 19). It has a base of native stone set in cement mortar on top of which seven courses of common brick were laid, standing 20 in. tall. Projecting through the top of the brick are 11 1-in-diameter iron mounting bolts within 2-in.-diameter iron pipe sleeves that probably were set flush with the top of the brick. The brick has seen considerable deterioration leaving the pipe sleeves quite exposed. Seven ft. away and offset to the northwest is a second machinery mount that measures 7 ft. long by 6 ft. wide, oriented northeast to southwest, probably for the 75-horsepower electric motor that was known to have powered the compressor (Figure 20). It was probably offset to enable it to turn the compressor with a belt on pulleys. The mount is divided lengthwise into two parts by a 42-in. gap through the center. The northwestern side has a native stone and cement base on top of which seven courses of brick were laid, giving it a total height of 42 in., though it is highly deteriorated. Two ¾-in.-diameter mounting bolts extend through its top. The southeastern side is a stone and cement base on top if which is a

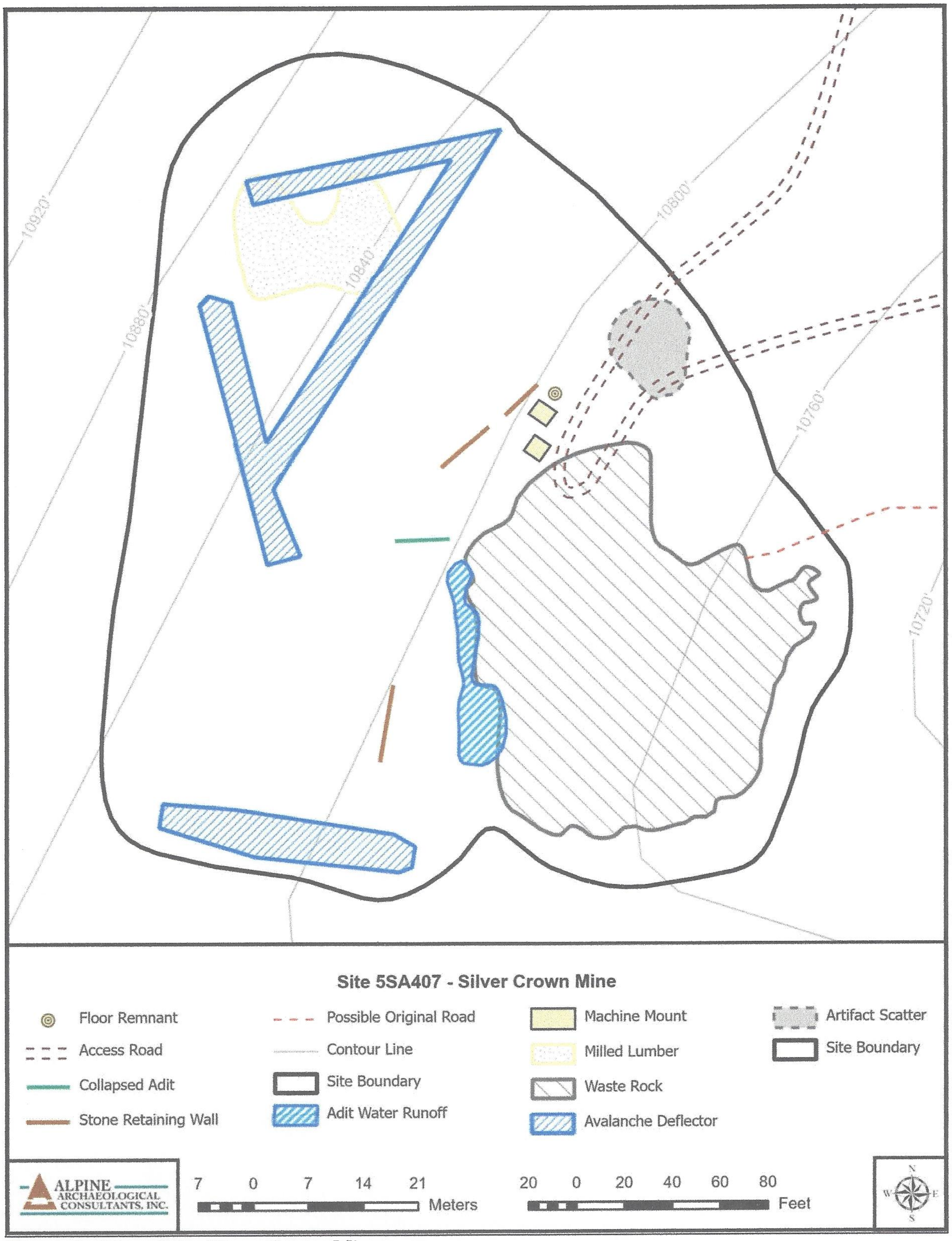

Figure 6. Map of the Silver Crown Mine.

Figure 7. View of the site from the major bend on U.S. Highway 550 with Mill Creek to the right. View is to the west.

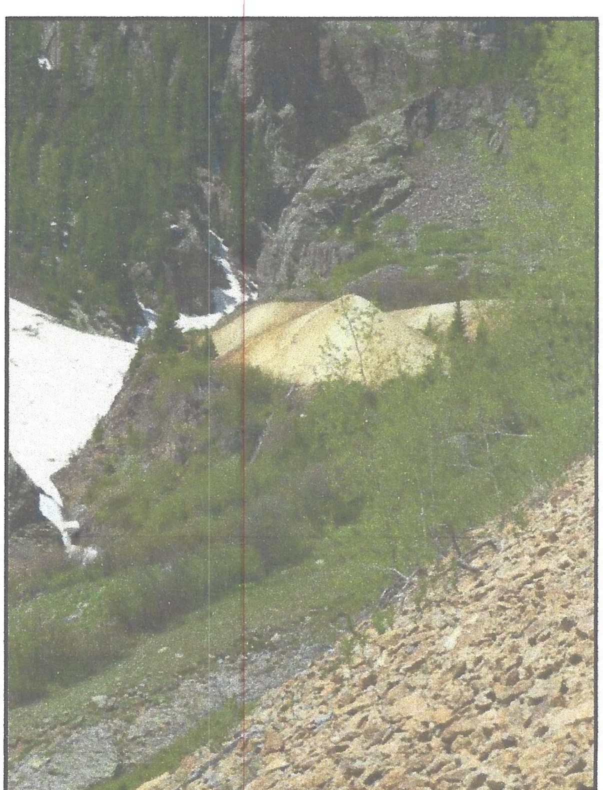

Figure 8. Looking west-southwest at the site from the road leading to the site.

Figure 9. Looking north across the top of the waste rock with the A-shaped avalanche deflector on the slope to the left. The distant vehicle is on the upper portion of the road switchback.

Figure 10. Cleft through the waste rock at the top of the probable original route to the mine, looking southwest.

Figure 11. Collapsed adit with exclusion gate and post and plank framing debris, looking west.

Figure 12. Looking west at the collapsed adit with post and plank framing debris.

Figure 13. Exclusion gate disposed of below the adit. View is to the west.

Figure 14. Water from the adit ending in a small pond at the upper southwestern edge of the waste rock. View is to the west.

Figure 15. Looking west at the southernmost retaining wall.

Figure 16. Looking west at the central retaining wall remnant with ore car rail and compressed air pipe disposed on it.

Figure 17. Northernmost stone retaining wall remnant behind probable electric motor mount. View is to the north.

Figure 18. Compressor mount to the left with the probable electric motor mount to the right, looking north-northwest.

Figure 19. Stone, cement, and brick compressor mount, looking south-southwest.

Figure 20. Looking north-northeast at the probable electric motor mount with the building floor remnant behind.

concrete cap. Two 1-in.-diameter mounting bolts have been cut off flush with the top of the cap. Immediately northeast of the second machinery mount is a remnant of building floor (Figure 21). This is diagonal 1-x-6-in. board subfloor over which 1-x-4-in. tongue-and-groove flooring has been laid, all resting on a 3-x-8-in. floor joist.

Adjacent and to the southwest of the machinery mounts are sections of ore car rail and 4-in.-diameter compressed air iron pipe (Figure 22). Sections of the pipe are connected with pipe couplers marked "4XXX/5TGR/VICT/AULIC" (Figure 23) According to the U.S. Patent Office, the Victaulic trademark was first used in 1920 for pipes and pipe fittings. It is a live trademark last renewed in 2015 by the Victaulic Company of America, Easton, Pennsylvania. It is likely that the pipe and rail represents the last period of mining at the site in the late 1940s. Other artifacts found in the area include window glass fragments, wire nails, a cast-iron stove top marked "No. 30" with an oval stove pipe opening, rotary-opened sanitary food cans, galvanized sheet metal, rolled galvanized sheet metal that has been soldered to form a pipe or nozzle, 2-in.-diamter iron pipe, white porcelain insulator fragments, and a light green rectangular bottle fragment.

The Shelbyville Mineral Survey Plat from 1906 and historic photos show a combination boarding house and office building in line and northeast of the tunnel house. This building has been completely destroyed by the construction of the current road to the site that has an apex of a switchback curve on the northeastern edge of the waste rock pile and continues upslope (Figure 24). The building was situated at the upper portion of the switchback and remnants are evident only as structural debris and artifacts from its residents in the road cut bank (Figure 25). These include wire nails, lumber fragments including from 8-x-8-in. posts, corrugated sheet metal, window glass fragments, coal cinders, stoneware sewer pipe, coal-burning stove parts, heavy-gauge sheet metal, corrugated sheet metal, common brick, galvanized 1-in.diameter threaded pipe, 3-in.-diameter threaded iron pipe with an elbow, plain white earthenware dishware, enamelware cooking vessel, and purple vessel glass fragments, including one round bottle base marked "S. B. M." The manufacturer of this bottle is unknown, but dates from about 1885–1920 based on the purple glass.

The most innovative elements of the site are native stone walls built to deflect avalanches with the intention of protecting the mining buildings. The simplest of these is on the southwestern end of the site. It is a 15-ft.-wide, 110-ft.-long wall, made of angular native cobbles that is generally 5–6 ft. tall and rounded on the top, but is up to 10 ft. tall in a dip of the topography (Figure 26 and Figure 27). The wall is situated on a ridgeline so that an avalanche running northward down the steep slope on the southern side of Mill Creek, crossing the creek, and running up the opposite side would be deflected upward and loose its impetus before reaching the mine buildings. The other deflector is more complex. It is situated on the steep, rocky, southeast-facing slope above and northwest of the mine complex (Figure 28 to Figure 31). It consists of cobble walls in an A-shape configuration with its apex to the northwest and its 110-ft.-long legs spreading outward to the south and east and having a 170-ft.-long connecting wall low between the legs. The walls are generally rectangular in cross-section, flat on top, 4–14 ft. wide, and stand up to 5 ft. in height. The walls of the legs decrease in height on their upper ends. Where the two outer legs are at ground level near their tops, a historic photo shows that board walls were constructed that were braced from below to extend the walls 30–40 ft. to their apex. Remnants of that board construction is scattered on the slope.

National Register Recommendation

The Silver Crown Mine (5SA407) is recommended eligible for inclusion in the NRHP under Criteria A and C. Under Criterion A, the site is significant as an important mine in the development of the Red Mountain Mining District from 1906–1909, though some work seems to have taken place in 1924 and 1925, and more consequential mining took place from 1946–1949. In addition, the Silver Crown Group of claims were important in the development of the nearby town of Chattanooga in the

Figure 21. Building floor remnant showing diagonal 1-x-6-in. subfloor topped by 1-x 4-in. tongue and groove flooring set on 3-x-6-in. joist. View is to the north.

Figure 22. Looking northwest at 4-in.-diameter iron compressed air pipe and ore car rail adjacent to the compressor mount.

Figure 23. Victaulic pipe coupler on 4-in.-diameter iron compressed air pipe.

Figure 24. Road switchback that has removed the boarding house/office and pushed it and artifacts downslope. View is to the north.

Figure 25. Looking southwest at the cut bank below the road switchback that contains heavily disturbed artifacts.

Figure 26. Looking west along the southern avalanche deflector wall.

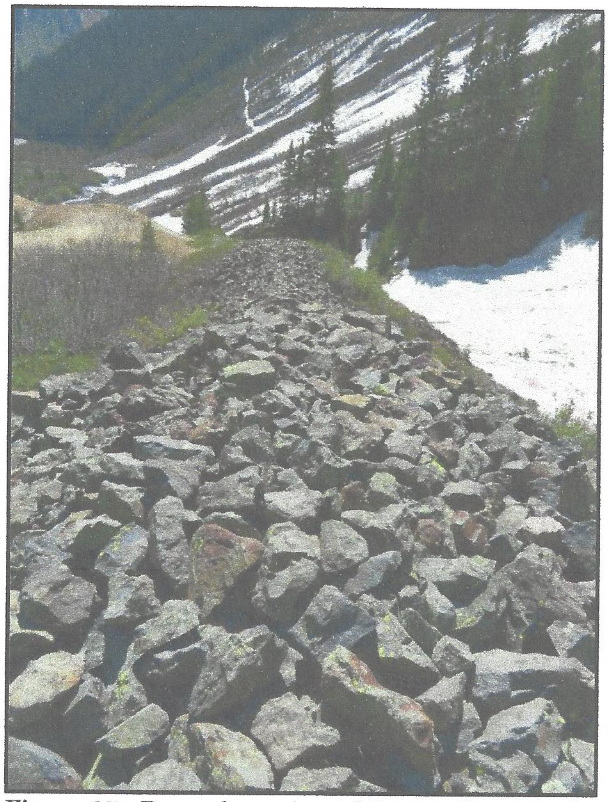

Figure 27. Downslope view of the southern avalanche deflector wall, looking east-southeast.

Figure 28. View of the A-shaped avalanche deflector walls on the rocky slope west of the mine. View is to the west.

Figure 29. A-shaped avalanche deflector walls looking north-northeast from the southern avalanche deflector wall.

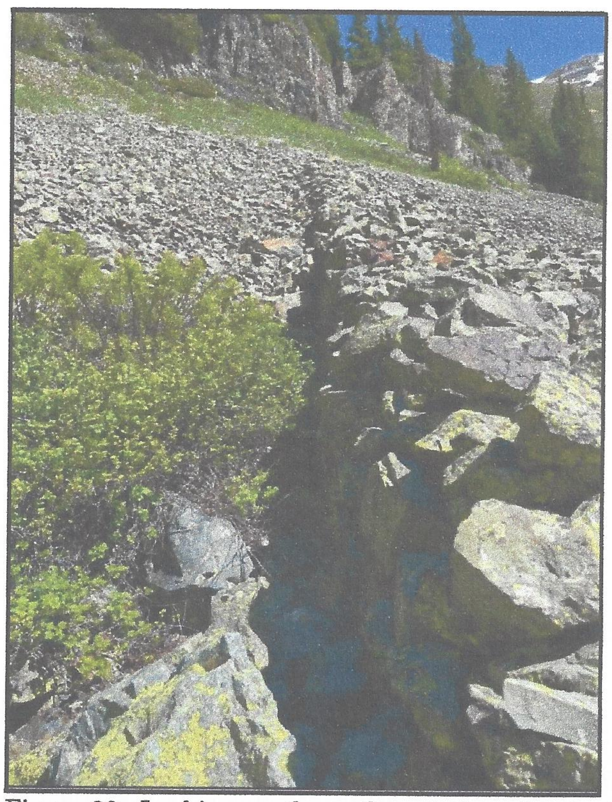

Figure 30. Looking north-northwest along the western leg of the A-shaped avalanche deflector.

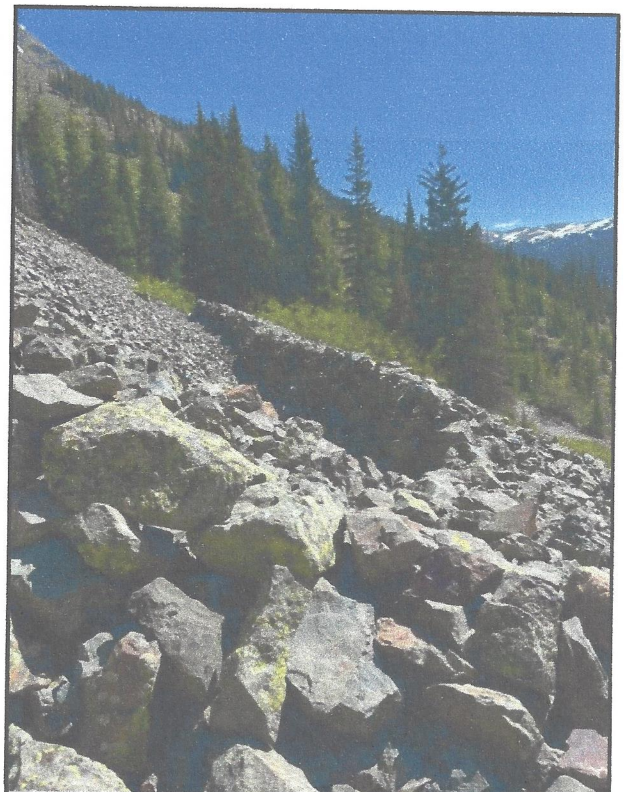

Figure 31. The crossing wall of the A-shaped avalanche deflector, looking northeast.

1880s, though this is earlier than the mining that took place at the site. Under Criterion C, the site is important because its waste rock pile is a highly visible element of the mining landscape of the area, particularly from the major curve on U.S. Highway 550 east of the site. In addition, the avalanche deflectors on the site are excellent and intact examples of an innovative approach to protecting mining buildings at high elevation where devastating avalanches were a common occurrence. When the site was initially recorded by the Colorado Division of Minerals and Geology's Inactive Mines Program, theyrecommended that the site not be considered eligible for listing in the NRHP, but did not demonstrate a real understanding of the site (Poley and Krabacher 1993). Durango Archaeological Consultants recommended the site as NRHP eligible under Criteria A and D in 2000, noting that the site was a representative small mine in the Red Mountain Mining District (Criterion A) and concluded that the artifacts present on the site were sufficient to provide important information about the mining district's history (Criterion D) (Condrey et al. 2000;Curtis 2003). We disagree that the site has archaeological potential because artifacts from the 1906–1909 period have been disturbed and displaced and few artifacts remain from the later mining periods.

The site has excellent integrity of location and setting as it is an unmovable mine and the area has seen virtually no change since mining ceased in the late 1940s. The design of the mine has fairly good integrity because the adit is still evident, though collapsed, and the waste rock that came from below ground is still present. The former mine building placements are not readily evident with remnants of retaining walls, two machinery mounts, and a remnant of a board floor being the only remaining evidence of improvements. The boarding house/office has been completely obliterated. The stone avalanche deflectors on the southwestern edge of the site and on the slope above to the northwest have excellent integrity. They are rare feature types, and their design is readily evident. The avalanche deflectors retain excellent integrity of materials and workmanship, though the remainder of the site lacks such integrity. The site retains its integrity of feeling, as it is readily identifiable as a mine, mostly because of the large, flt-topped waste rock pile. Integrity of association is very good because no other activities have taken place at the site except for mining.

Management Recommendations

Future activities at the Silver Crown Mine (5SA407) should endeavor to maintain the visual integrity of the waste rock pile as a part of the historic mining landscape of the area. The principal view from U.S. Highway 550 is most important. In addition, the rock avalanche deflector walls above and on the southwestern side of the site should be left intact. The former locations of the two buildings on the site—the tunnel house and the boarding house/office—have poor to no integrity and require no further consideration as cultural resource elements of the site. The collapsed adit also has poor integrity and requires no preservation consideration. In addition, although some artifacts are present from the 1906–1909 period in the former area of the boarding house/office, these have been thoroughly disturbed by construction of the road to and beyond the site, probably in the 1940s. Because the context of the artifacts has been destroyed, they do not provide an opportunity for the recovery of important information about occupation and use of the site. No protective or preservation measures are necessary where these artifacts are present.

SUMMARY

Alpine revisited and rerecorded the Silver Crown Mine (5SA407). The project was conducted in advance of ground disturbance expected with development of the site for recreational purposes and in anticipation of the need to obtain a 404 Permit from the Army Corps of Engineers. Alpine recommends that the site is eligible for inclusion in the NRHP under Criteria A and C. Retention of the visual qualities of the waste rock pile as part of the historic mining landscape should be maintained, and disturbance of the rock avalanche deflector walls should be avoided. If preservation and avoidance of these elements is not possible, appropriate mitigation is recommended that should include Level II photographic documentation to the standards in Colorado Historical Society Publication No. 1595 (Colorado Historical Society 2007).

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1908 January 7:3; January 18:1; March 14:3; March 21:1; March 28:1; April 25:1; June 6:1
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1910 July 9:2
1924 May 24:4
1925 March 14:2; June 6:1; June 27:3; July 11:1; August 1:1, 2; August 8:1
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1905 January 14:1; May 27:1
1906 June 1:1; June 22:1
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COLORADO CULTURAL RESOURCE SURVEY

Management Data Form

OAHP1400
Rev. 11/10

A *Management Data Form* should be completed for each cultural resource recorded during an archaeological survey. Isolated finds and revisits are the exception and they do not require a *Management Data Form*. Please attach the appropriate component forms and use continuation pages if necessary. Fields can be expanded or compressed as necessary.

1. **Resource Number**: 5SA407

2. **Temporary Resource Number**:

3. **Attachments (check as many as apply)**
- ☐ Prehistoric Archaeological Component
- ☒ Historic Archaeological Component
- ☐ Historic Architectural Component Form
- ☐ Linear Component
- ☒ Sketch/Instrument Map (required)
- ☒ U.S.G.S. Map Photocopy (required)
- ☒ Photograph(s) (required)
- ☐ Other, specify:

4. **Official determination (OAHP use only)**
- ☐ Determined Eligible NR\SR ____
- ☐ Determined Not Eligible NR\SR ____
- ☐ Nominated ____
- ☐ Need Data NR\SR ____
- ☐ Contributing to NR Dist.\SR Dist. ____
- ☐ Not Contributing to NR Dist.\SR Dist. ____
- ☐ Supports overall linear eligibility NR\SR ____
- ☐ Does not support overall linear eligibility NR\SR ____

I. IDENTIFICATION

5. **Resource Name**: Silver Crown Mine

6. **Project Name/Number**: Silver Crown Mine

7. **Government Involvement**: ☐ Local ☐ State ☒ Federal

Agency: FERC

8. **Site Categories** (check as many as apply):

Prehistoric: ☐ archaeological site ☐ paleontological site ☐ In existing National Register District

National Register District name:

Historic: ☒ archaeology site ☐ building(s) ☒ structure(s) ☐ object(s) ☐ In existing National Register District

National Register District name:

9. **Owner(s) Name and Address**: Bonanza Boy, LLC, PO Box 3387, Telluride, Colorado 81435

10. **Boundary Description and Justification**: Extent of observed site elements and artifacts.

11. **Site/Property Dimensions** Length: 92 m Width: 92 m Area: 2,914m^2 Acres (m^2/4047): 1.72

Area was calculated as: ☐ Length x Width (rectangle/square) ☐ Length x Width x 0.785 (Ellipse) ☒ GIS

II. LOCATION

12. **Legal Location**

PM	NM	Township	42N	Range	8W	Section	___	_	¼	_	¼
PM	___	Township	_____	Range	_____	Section	___	_	¼	_	¼
PM	___	Township	_____	Range	_____	Section	___	_	¼	_	¼
PM	___	Township	_____	Range	_____	Section	___	_	¼	_	¼

If section is irregular, explain alignment method: Unsectioned land

13. **USGS Quad**: Silverton, Colo. 1955 (1984)

14. **County**: San Juan

15. **UTM Coordinates**: Datum used ☐ NAD 27 ☒ NAD 83 ☐ WGS 84 Other:

A. Zone	13;	258622	mE	4195124	mN
B. Zone	_;	_____	mE	_____	mN
C. Zone	_;	_____	mE	_____	mN
D. Zone	_;	_____	mE	_____	mN

16. **UTM Source**: ☒ Corrected GPS/rectified survey (<5m error) ☐ Uncorrected GPS ☐ Map template

Other (explain):

17. **Site elevation** (feet): 10,800

18. **Address**: Lot: Block: Addition:

19. **Location/Access**: The site is on the northern side of Mill Creek west of Chattanooga on the southern side of Red Mountain Pass. The site is visible to the west from U.S. Highway 550. From the muleshoe curve just above Chattanooga on U.S. Highway 550, take a dirt road west for 0.55 miles to the site.

III. NATURAL ENVIRONMENT/SITE CONDITION

20. **General Description** (should include both on site as well as geographical setting with aspect, landforms, vegetation, soils, depositional environment, water, ground visibility): The mine is on a steep, rocky southeastern slope on the northern side of Mill Creek above its confluence with Mineral Creek at the former town of Chattanooga. The majority of the site is waste rock deposited from the mine. Above the mine, the area is mostly barren rock outcrops and angular rubble and with little soil. Sparse vegetation of willow, spruce, strawberry, corn lily, currant, thistle, raspberry, elderberry, columbine, dandelion, and other forbs are present. Gro9und visibility is very good except in the willows.

21. **Soil depth (cm) and description**: 0-20 cm dark brown rocky silt loam.

22. **Condition**

a. Architectural/Structural
- ☐ Excellent
- ☐ Good
- ☐ Fair
- ☒ Deteriorated
- ☐ Ruin

b. Archaeological/Paleontological
- ☐ Undisturbed
- ☐ Light disturbance
- ☐ Moderate disturbance
- ☒ Heavy disturbance
- ☐ Total disturbance

23. **Describe condition**: No buildings remain standing on the site. Deteriorated stone retaining walls are presnt at the base of the slope above the top of the waste rock that provided space for mine buildings. Two machinery mounts are present and a remnant of a board floor has survived. The mine adit has collapsed. Two rock wall avalanche deflectors remain in very good condition.

24. **Vandalism**: ☐Yes ☒ No
Describe:

IV. NATIONAL/STATE REGISTER ELIGIBILITY ASSESSMENT

25. **Context or Theme**: Industry: Precious Metal Mining 1880s-1940s

26. **Applicable National Register Criteria**:
- ☒ A. Associated with events that have made a significant contribution to the broad pattern of our history
- ☐ B. Associated with the lives of persons significant in our past
- ☒ C. Embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction
- ☐ D. Has yielded, or may be likely to yield, information important in history or prehistory
- ☐ Does not meet any of the National Register criteria
- ☐ Qualifies under exceptions A through G. List exception(s):

27. **Applicable State Register Criteria**:
- ☒ A. Property is associated with events that have made a significant contribution to history
- ☐ B. Property is connected with persons significant in history
- ☒ C. Property has distinctive characteristics of a type, period, method of construction or artisan
- ☐ D. Property is of geographic importance
- ☐ E. Property contains the possibility of important discoveries related to prehistory or history
- ☐ Does not meet any of the State Register criteria

28. **Area(s) of significance**: Mining

29. **Period(s) of significance**: 1906-1940s

30. **Level of significance:** ☐ National ☐ State ☒ Local

31. **Statement of significance**: The Silver Crown Mine (5SA407) is recommended eligible for inclusion in the NRHP under Criterion A and C. Under Criteria A, the site is significant as an important mine in the development of the Red Mountain Mining District from 1906–1909, though some work seems to have taken place in 1924 and 1925, and more consequential mining took place from 1946–1949. In addition, the Silver Crown Group of claims were important in the development of the nearby town of Chattanooga in the 1880s, though this is earlier than the mining that took place at the site. Under Criteria C, the site is important because its waste rock pile is a highly visible element of the mining landscape of the area, particularly from the major curve on U.S. Highway 550 east of the site. In addition, the avalanche deflectors on the site are excellent and intact examples of an innovative approach to protecting mining buildings at high elevation where devastating avalanches were a common occurrence.

32. **Statement of historic integrity related to significance**: The site has excellent integrity of location and setting, as it is an unmovable mine, and the area has seen virtually no change since mining ceased in the late 1940s. The design of the mine has fairly good integrity because the adit is still evident, though collapsed, and the waste rock that came from below ground is still present. The former mine buildings are not readily evident with remnants of retaining walls, two machinery mounts, and a remnant of a board floor being the only remaining evidence of improvements. The boarding house/office has been completely obliterated. The stone avalanche deflectors on the southwestern edge of the site and on the slope above to the northwest have excellent integrity. They are rare feature types, and their design is readily evident. The avalanche deflectors retain excellent integrity of materials and workmanship, though the remainder of the site lacks such integrity. The site retains its integrity of feeling, as it is readily identifiable as a mine, mostly because of the large, flt-topped waste rock pile. Integrity of association is very good because no other activities have taken place at the site except for mining.

33. **National Register Eligibility Field Assessment**: ☒ Eligible ☐ Not eligible ☐ Need data
Linear Segment Evaluation (if applicable): ☐ Supporting ☐ Non Supporting
34. **Status in an Existing National Register District**: ☐ Contributing ☐ Non-contributing
35. **State Register Eligibility Field Assessment**: ☒ Eligible ☐ Not eligible ☐ Need data
36. **Status in an Existing State Register District**: ☐ Contributing ☐ Non-contributing
37. **National/State Register District Potential**: ☒ Yes ☐ No Describe: Red Mountain Mining District

38. **Cultural Landscape Potential**: ☒ Yes ☐ No Describe: The wast rock of the mine is highly visible from U.S. Highway 550 and is an improtant element of the area's mining landscape.

39. **If Yes to either 37 or 38, is this site**: ☒ Contributing ☐ Non-contributing Explain:

V. MANAGEMENT AND ADMINISTRATIVE DATA

40. **Threats to Resource**: ☐ Water erosion ☐ Wind erosion ☐ Grazing ☐ Neglect ☐ Vandalism
☒ Recreation ☒ Construction ☐ Other (explain):

41. **Existing protection** ☐ None ☐ Marked ☐ Fenced ☐ Patrolled ☐ Access controlled
Other (specify):
Comments:

42. **Local landmark designation**: 43. **Easement**:

44. **Recorder's Management Recommendations**: Future activities at the Silver Crown Mine (5SA407) should endeavor to maintain the visual integrity of the waste rock pile as a part of the historic mining landscape of the area. The principal

view from U.S. Highway 550 is most important. In addition, the rock avalanche deflector walls above and on the southwestern side of the site should be left intact. The former locations of the two buildings on the site–the tunnel house and the boarding house/office–have poor to no integrity and require no further consideration as cultural resource elements of the site. The collapsed adit also has poor integrity and requires no preservation consideration. In addition, although some artifacts are present from the 1906–1909 period in the former area of the boarding house/office, these have been thoroughly disturbed by construction of the road to and beyond the site, probably in the 1940s. Because the context of the artifacts has been destroyed, they do not provide an opportunity for the recovery of important information about occupation and use of the site. No protective or preservation measures are necessary where these artifacts are present.

VI. DOCUMENTATION

45. **Previous actions accomplished at the site**: ☐ Tested ☐ Partial excavation ☐ Complete excavation

Date(s):

a. Excavations:

b. Stabilization: Date(s):

c. HABS/HAER documentation [date(s) and numbers]:

d. Other:

46. **Known collections/reports/interviews and other references (list)**: Curtis 2003 (Red Mountain Mining District}

47. **Primary location of additional data**: San Juan County Courthouse, Silverton, Colorado

48. **State or Federal Permit number**: Colorado State Archaeological Permit No. 80929

49. **Collection**: Artifact collection authorized: ☐ Yes ☒ No Were artifacts collected: ☐ Yes ☒ No
Artifact repository:

Collection method: ☐ Diagnostics ☐ Grab Sample ☐ Random Sample
Other (specify):

50. **Photograph Numbers**: SC-JH-1 #1-31

Files or negatives stored at: Alpine Archaeological Consultants, Inc., Montrose, Colorado

51. **Report title**: Recordation and Evaluation of the Silver Crown Mine (5SA407), San Juan County, Colorado

52. **Recorder(s)**: Jon Horn and Heather Prosser Date: 6/20/2023

53. **Recorder affiliation**: Alpine Archaeological Consultants, Inc.

Phone number/Email: (970) 249-6761 sites@alpinearchaeology.com

NOTE: Please attach a site map, a photocopy of the USGS 1:24000 map indicating resource location, and photographs.

Colorado Historical Society - Office of Archaeology & Historic Preservation
1560 Broadway, Suite 400 Denver, CO 80202
303-866-3395

1. **Resource Number:** 5SA407 2. **Temporary Resource Number:**
3. **Site Name:** Silver Crown Mine
4. **Does this form pertain to the site in general?** ☒ Yes ☐ No
If no, please supply a feature/structure number or name:
5. **Site, Component or Feature Type:** Historic Mine
6. **Narrative History** (based on archival research, expand as necessary):

Initial Establishment of the Silver Crown Group of Mining Claims

Five mining claims – the Silver Crown, Mountain Chief, Giant King, Wonderful, and Pride lodes – were initially located by R. J. Penoyer, J. S. Tharp, J. D. Crain, F. G. Barnett, Ed Finch, and Adelbert Parsell on September 15, 1879. These became known as the Silver Crown Group of claims. The locators sold the group of claims to E. E., Norton of Pennsylvania for $100,000 in November 1879 (Condry 2000; Curtis 2003). Norton involved Luther H. Buell in establishing the Silver Crown Mining Company, which was incorporated in New York on March 3, 1880, with $5,000,000 capital in $50 shares (San Juan County Clerk's Office, Records of Incorporation, Book 1 Page 127). Company officers were Norton as president, Buell as vice president, Gilbert L Cornell as treasurer, and R. A. Olmstead as secretary. The company owned five mining claims: the Silver Crown, Giant King, Mountain Chief, Wonderful, and Pride. Work was initiated during the summer of 1880 by mine superintendent E. T. Booth of New York to demonstrate the property's value prior to stock being offered for sale (*Lake City Mining Register*, July 2, 1880:2). In 1881, Buell became the president with Olmstead continuing as secretary. This appears to have been Buell's first investment in mining properties in the San Juan Mountains, and was probably the result of two of his brothers, Jonathan and Willard, being involved with mining in the area beginning in 1875 as principals in the Buffalo & San Juan Mining Company to operate mining properties in Poughkeepsie Gulch. That company was succeeded by the Colorado Mining & Land Company in 1877, which Jonathan Buell and others had also formed (Welles 1881:292-293; *Rocky Mountain News* [Denver], September 21, 1876:4; December 21, 1877:4; *Ouray Times*, December 29, 1877:1; *Silver World* [Lake City], October 15, 1881:3). The initial work on the claims of the Silver Crown Mining Company showed the vein on which the claims were situated to be quite valuable, so work continued over the winter under the direction of contractor Gus Crawford. Two development tunnels were dug: Development Tunnel 1 was on the western end of the Valley Lode, and Development Tunnel No. 2 was on the western end of the Mountain King Lode, which cut the Silver Crown vein on February 25, 1881 at a distance of 110 ft. from the tunnel mouth and 25 ft. below the surface. By October 1881, the two tunnels had a total length of 260 ft., but it was expected that an additional 200 ft. of tunnel would be necessary before the desired quantity and quality of ore would be reached (*Lake City Mining Register*, August 27, 1880:3; *Silver World* [Lake City], March 26, 1881:3; May 28, 1881:3; October 22, 1881:3).

By the end of 1882, the company felt certain enough of the value of their mining claims to have Mineral Survey plats prepared and to initiate the process of obtaining Mineral Entry Patents for their six claims. Luther Buell's nephew, Herbert L. Buell, the son of Willard, was the Deputy Mineral Surveyor that prepared the Mineral Survey plats for the claims in 1882 and 1883 (Table 1). Luther H. Buell was succeeded as president by G. L. Cromwell in 1882 and by James A. Bostwick in 1884. Olmstead continued as the secretary all of those years. In 1883, the *Colorado Mining Directory* noted that the property was developed by two tunnels. One was 115 ft. long that intersected the vein at a depth of 60 ft. and the other 180 ft. long that intersected the vein at a depth of 80 ft. In addition, the vein was exposed by five open cuts with 10-ft.-wide exposures. Ore was described as galena and arsenical copper in quartz that assayed at 45 percent lead and 40 oz. of silver per ton (Corregan and Lingane 1883:671). In the summer of 1884, it was reported that the main mine tunnel struck the vein at a distance of 200 ft. and had a 145-ft.-long drift along the vein (*Silver World* [Lake City], July 26, 1884:4).

Table 1. Mineral Surveys of Mining Claims of the Silver Crown Group.

MS No.*	Name	Survey Date	Patent Date	Patentee
558	Pride	11/28/1882	10/15/1884	Silver Crown Mining Co.
559	Wonderful	11/28/1882	10/15/1884	Silver Crown Mining Co.
560	Mountain Chief	11/28/1882	10/15/1884	Silver Crown Mining Co.
570	Valley	1/9/1883	10/15/1884	Silver Crown Mining Co.
1788	Silver Crown	10/3/1883	2/6/1889	Silver Crown Mining Co.
1789	Giant King	10/2/1883	2/6/1889	Silver Crown Mining Co.
18168	Shelbyville	11/10/1906	12/16/1907	Precious Metals Corp.

*Mineral Survey Number

Chattanooga

Each of the Silver Crown Group of mining claims had an associated mill site that were separate from the mining claims, being long Mill Creek and Mineral Creek north of the confluence of the two streams. Cabins were constructed on these mill site claims for accommodations for miners at the Silver Crown Group of claims and other mining claims in the area. Initially known as Silver Crown Camp, the growing community was also known as Sweetville, in 1882, named for promoter and Silverton assayer Edmund Sweet. With the growth of mining on upper Mineral Creek and over the divide toward Ouray, the Red Mountain Mining District was formed. The junction of Mineral and Mill creeks was aptly situated to act as a point of transfer of supplies and equipment from the end of the wagon road from Silverton onto pack animals that took them on their final leg to the more heavily developed part of the mining district on the Ouray side of the pass. Packer John C. Burnett established a livery and stables at Sweetville in 1882, and Sweet kept a saloon. Quickly, the settlement on the Silver Crown mill sites came to be more developed and the name of Chattanooga was attached to the post office when it was established there on April 4, 1883 (Nossaman 1998; Archimede 2004; Bauer 2007:9-10). Among those engaged in packing in the area was John "Jack" Dolan from Lawrence, Kansas. He and two companions were swept 50 ft. downhill with their pack animals by an avalanche at 3:30 in the afternoon on December 20, 1883, while packing supplies to the Silver Crown Mine. Dolan was killed. He was buried adjacent to Chattanooga, but his grave was unmarked until done so by the San Juan National Forest in 1994 (Peterson 1996:D-25; Find a Grave Memorial 6060697).

Chattanooga was platted with Main, First, and Second streets running east to west, and Water and Silver streets running north to south, Town lots sold for between $100 and $250 in 1883, and many mining supply and construction businesses, markets, dry goods stores, hotels, and saloons sprang up. The *Chattanooga Enterprise* newspaper printed a single issue in June 1883. By the end of 1883, a concentration mill was constructed by the Red Mountain Sampling and Concentrating Company at the junction of Mill Creek with Mineral Creek. The company was incorporated on May 7, 1883 by J. E. Downy, George W. Brown, M. J. McCloskey, and Henry B. Adsit with $50,000 in capital stock (*Rocky Mountain News* [Denver], May 8, 1883:3). Known as the Mineral Creek Concentrator or the Chattanooga Concentrator, it was a custom 30-ton-per-day mill operated by superintendent Richard A. Parker, formerly of Georgetown. The concentrator turned Chattanooga into a regional industrial destination for mixed and low-grade ores. It handled ore from nearby mines, but was a first destination for ore packed down from the Ouray side of the Red Mountain Mining District. Initially, the concentrator ran only on water power, but had a steam engine installed in summer 1884 so that it could operate when Mineral Creek did not provide sufficient water power. The upper levels of the Silver Crown Mine were leased to the owners of the concentrator, who ran the ore through their mill. The growth of the Red Mountain Mining District led Otto Mears to extend his toll road from Silverton to Chattanooga over Red Mountain Pass to Ouray. It made wagon transportation possible through the precipitous upper Uncompahgre Canyon in 1884. The improved road ran north from Silverton, crossed a bridge westward over Mineral Creek onto Main Street in Chattanooga, and then turned north on what may have been Silver Street before making a large horseshoe curve in its initial ascent toward Red Mountain Pass. With completion of the toll road, miners could choose whether to freight to Ouray or Silverton, but Silverton still had the upper hand because of the completion of the Denver & Rio Grande Railroad there in 1882, whereas the nearest railroad connection to Ouray was Montrose, another 35 miles away (*Colorado Daily Chieftain* [Pueblo], December 9, 1883:6; *San Juan Herald* [Silverton], May 22, 1884:3; *Silver World* [Lake City], May 24, 1884:3; Archimede 2004).

Most of the Red Mountain Mining District produced an abundance of silver ore throughout the 1880s that led Otto Mears to construct the Silverton Railroad beginning in the summer of 1887. The first six miles of the line was completed to Burro Bridge by January 28, 1888. The line continued through Chattanooga and over Red Mountain Pass to Ironton with its terminus reached at Albany at the head of the Uncompahgre Canyon on September 20, 1889. With completion of the railroad, Chattanooga's main purpose as a transfer and supply point for the mines of the Red Mountain Mining District was greatly diminished. Avalanches in 1888 and a devastating fire in 1892 resulted in considerable loss to the town. The

Panic of 1893 and crash of the price of silver resulted in a near cessation of mining at the Red Mountain mines through the rest of the 1890s, near abandonment of Chattanooga, and closing of its post office in June 1894. Another avalanche in 1898 left little standing in the town (Nossaman 1974; Archimede 2004; Bauer 2007:9-10).

The town saw a brief resurgence beginning in the early 1900s, mostly with mining that resumed at the Silver Ledge and Silver Crown mines and construction of a new mill by the Ledge Mining and Milling Company in 1902. This was not enough to prevent the Silverton Railroad from failing on November 3, 1904 and being reorganized as the Silverton Railway. Otto Mears regained control of the railway in 1909, but, after World War I, mining never resumed in the Red Mountain Mining District to the point of making the railroad profitable. The Silver Ledge Mill was destroyed by fire in 1917 and was replaced by ore loading facility on the railroad. The railroad ceased operations in in 1921 and was abandoned on June 17, 1922 (Nossaman 1974; Archimede 2004).

Silver Crown Group 1887-1910

The Silver Crown Mining Company was bankrupt by late 1887, and the receiver, Charles B. Safford, sold the Silver Crown Group of lode and mill sites to James H. Everett of Kingston, New York, in May 1888 for $100 (San Juan County Courthouse, County Clerk's Office, Deed Book 79, Page 524). Despite Otto Mears constructing the Silverton Railroad through Chattanooga at the time, the Silver Crown Group did not benefit. Everett leased the claims to John Bergin and others for one year in 1891 on a $25,000 bond (San Juan County Courthouse, County Clerk's Office, Deed Book 84, Page 507). All of the mining claims of the Silver Crown Group failed to have their 1890 taxes paid for them in 1891, suggesting that mining on the properties was not very productive (*Silverton Standard*, November 14, 1891:14). High transportation costs and the economic Panic of 1893 with its precipitous decline in silver prices resulted in the Silver Crown Group of claims remaining idle until 1900 with taxes unpaid through at least 1898 (*Silverton Standard*, September 2, 1899:11). Despite having the taxes on the properties going unpaid, Everett retained ownership. He let a contract on 200 ft. of tunnel in May 1900 to the owners of the Silver Ledge Mining & Milling Company, with the actual mining done by Miles McCue. Work continued through the summer of 1901 with supplies delivered by John Glanville (*Silverton Standard*, May 26, 1900:1; *Silverite-Plaindealer* [Ouray], August 24, 1900:4; *Plaindealer* [Ouray], Augusts 2, 1901:1).

In May 1901, Everett sold portions of the Mountain Chief and Wonderful mill sites to the Ledge Mining and Milling Co. for $500 (San Juan County Courthouse, County Clerk's Office, Book 85, Page 481) of which R. D. Thompson and T. E. Schwarz were principals. The reason for the sale was to provide sufficient space for a new Silver Ledge Mill to be constructed in May 1902, the earlier mill having been destroyed by fire (*Durango Semi-Weekly Herald,* January 6, 1902:1; *Silverton Standard*, March 22, 1902:1; May 7, 1902:1). The completed mill and its associated buildings extended onto portions of the two claims from the north. The company then had a Mineral Survey Plat (MS 16099) prepared for the Columbine Mill Site (and associated Oriental Lode) on December 7, 1902 in preparation for obtaining a Mineral Entry Patent for the claims. The Silver Ledge Mill was mostly on the Columbine Mill Site, which fit like a puzzle piece along the northern sides of the Mountain Chief and Wonderful Mill sites; it was patented on June 30, 1904.

In February 1905, Thomas J. Hurley purchased the Silver Crown Group of lode claims and their associated mill sites from Everett, less the mill sites that Everett had already sold. He also purchased the John and Forest Mines near Animas Forks from Everett (*Silverton Standard*, February 25, 1905:1). Thomas Jefferson Hurley was born May 2, 1847, in Peterborough, Canada, and moved to Rochester, New York, as a child with his parents. He reportedly enlisted as a private in the 8th New York Cavalry in 1861 and served until 1864. From 1868-1875, he was the Color Sergeant of the New York National Guard. His wife, Sarah Jane Walker, was born in New York in about 1850; they were married about 1871. They had several children, and their son, Thomas Jay Hurley, was born in Rochester in 1878. Sara reportedly died in 1885, and Hurley married widow Ann March Field on June 13, 1894; she was from Newton, Massachusetts. Hurley worked in wholesale clothing and dry goods businesses prior to 1880 when he became a stock broker and insurance salesman. He made sufficient money to begin investing in mining properties in the late 1890s. This enabled his son, Thomas Jay Hurley, the opportunity to work as a mine manager and superintendent at the mining properties he invested in (*Silverton Standard*, December 28, 1907:2).

Hurley's first mining experience in the San Juan Mountains was when he arranged with and English syndicate to invest in the Occidental Mine and its associated concentration mill near Gladstone as the Exploration Syndicate in 1898, of which he was the president. The company also had holdings in Mexico. By 1900, he was also the president of the Natalie Mining and Milling Company, which operated the Natalie Mine adjoining the Occidental; that company was incorporated in January 1901. The Hurley Tunnel on the Natalie Mine was named for him (*Silverton Standard*, May 28, 1898:1; July 30, 1898:1; October 27, 1900:2; January 19, 1901:6; *Silverton Weekly Miner & San Juan Democrat*, September 21, 1900:1). Later in 1901, the Ruby Basin Mining and Tunnel Company was formed with $1,000,000 capital to acquire the Ruby Group of claims on Lookout Mountain up Mineral Creek and the associated Ruby Basin Mill.

Incorporators included George W. Bausman, Joseph Bordeleau, and Frank B. Brown, and Thomas J. Hurley's son, T. Jay Hurley, was secretary (*Silverton Standard*, October 12, 1901:1; September 13, 1902:10; May 2, 1903:1, May 27, 1905:1; *Silverton Weekly Miner & San Juan Democrat*, October 23, 1903:1). The Hurleys began considering purchasing the Ruby Basin Group of claims as early as 1902 (*Silverton Standard*, May 7, 1904:1). In order to do so, Thomas J. Hurley formed the Mines Securities Corporation in New York in 1905. T. Jay Hurley was made manager of the mine and mill (*Silverton Standard*, May 7, 1904:1; *Rocky Mountain News* [Denver], November 18, 1905:12).

In order to operate the Silver Crown Group, Hurley formed the Precious Metals Corporation with Silverton attorney William A. Way and San Juan County Treasurer Thomas Annear with $3,000,000 in capital stock in November 1905. Way invested in other mining properties in the Silverton area and was later made a trustee of the Colorado School of Mines. Annear was a local businessman in Silverton who was elected to the Colorado State legislature as the representative from San Juan County from 1899-1902 and ran unsuccessfully for Lieutenant Governor in 1902. He moved to Denver in 1906 where he was the state Treasurer in the 1930s The three subsequently formed the Fifty Associates Mines Corporation in September 1906 to lease the Ruby Group and the Ruby Mill (*Rocky Mountain News* [Denver], November 18, 1905:12; September 22, 1906:10; *Steamboat Pilot* [Steamboat Springs], July 17, 1941:4). Both of these companies seem to have been operating prior to their incorporations. Hurley's son, T. Jay Hurley, was made the superintendent of both of the mining operations, and was largely responsible for managing his father's mining investments, particularly as Thomas J. Hurley spent much of 1905–1907 on trips to Europe, Egypt, and Britain. Initially, he was in charge of the Ruby Basin properties for the Mines Securities Corporation and continued in that position in 1904 when they were leased to the Fifty Associates Mines Corporation. With the formation of the Precious Metals Corporation, T. Jay Hurley split his time between the Ruby Group and the Silver Crown Group. By June 1906, the corporation had purchased all of the holdings of the Mine Securities Corporation and took over management of the Ruby Basin Mines (*Silverton Standard*, May 7, 1904:1; January 14, 1905:1; *Silverton Weekly Miner & San Juan Democrat*, June 1, 1906:1). The Ruby Group was a fully functioning mining property, but the Silver Crown Group was to be tackled entirely afresh. Though earlier mining had shown a large vein of valuable ore, it was considered to have been little developed, and the older workings had seen little work since initial mining in the early 1880s.

To help T. Jay Hurley at both of the mining properties, Robert McCart, Jr., a graduate of the Colorado School of Mines, was hired to be the engineer and metallurgist at both of the mines. McCart was later the mine superintendent at the Silver Lake Mine in 1907 and 1908 (*Silverton Standard*, June 3, 1905:2; May 11, 1907:1; January 7, 1908:3). Hurley had four mining engineers examine the 8–20-ft.-wide that ran for 9,000 ft. parallel to the gulch along Mill Creek on the Silver Crown Group of claims. According to assays done by Ricketts & Banks of New York, the ore contained 53.33% lead, 6.75% zinc, 1.07% copper, 0.05 oz. of gold per ton, and 12 oz. of silver per ton. Another assay on the mineral values was reported to show 15 per cent lead, 6 oz. of silver per ton, 0.25 oz. of gold per ton, and slight values of copper (*Silverton Standard*, August 25, 1906:1; *Silverton Weekly Miner & San Juan Democrat*, September 27, 1907:37). Once analysis of the ore was complete, Hurley began preparations for mining. Rather than use the earlier tunnels to access the vein, an entirely new tunnel was planned just north of the junction of the Mountain Chief and Valley lodes that became known as the Silver Crown Mine. It was expected to reach the vein at a substantial depth to facilitate mining as the tunnel proceeded westward. The tunnel was in the eastern portion of the linear arrangement of claims and provided close access to a spur that was being run from the Silverton Railroad up Mill Creek to within 1,000 ft. of the operation. Jessie Kramer, formerly the superintendent of the Silver Ledge Mine, was hired as the superintendent. Lumber and other materials were ordered and construction of the mine buildings started in June 1906 (*Silverton Standard*, May 19, 1906:1; *Durango Democrat*, June 10, 1906:1; *Silverton Weekly Miner & San Juan Democrat*, June 22, 1906:1). By August, the new office, compressor house, shops, and boarding house were ready for occupancy (Figure 1). "These buildings are all situated in a pleasant little nook in the mountain side a short distance from the track of the Silverton railroad, and absolutely safe from danger of snow slides, the careful manager taking special precaution as to their locations and construction for protection and comfort of his employes [sic]" (*Silverton Standard*, August 25, 1906:1). One of the safety precautions that Hurley took in siting the mine buildings was the construction of rock and board berms on the slope above the mine to deflect avalanches.

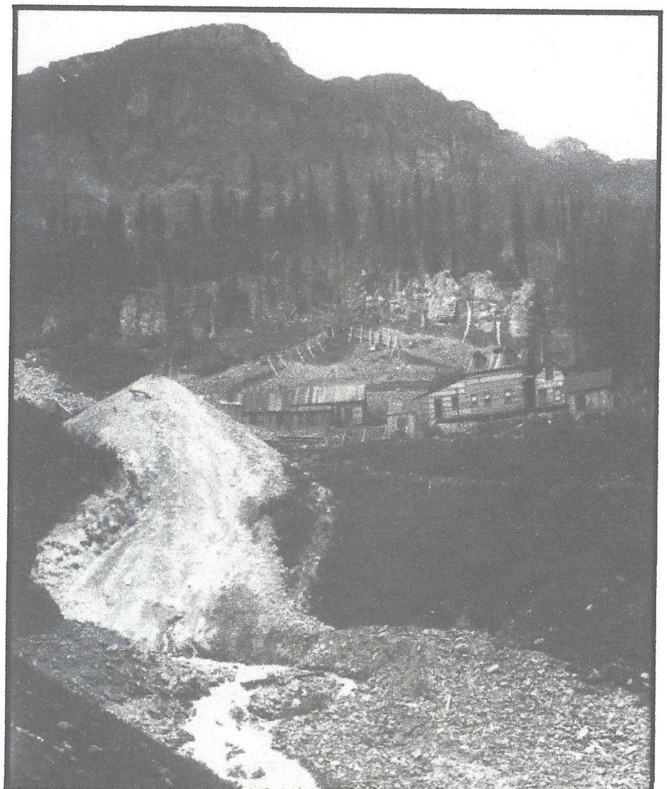

Figure 1. Silver Crown Mine showing the buildings constructed in 1906 with the avalanche splitting berms on the slope above.

Considering the ore values of the vein, Hurley planned to concentrate the ore coming from the mine. He negotiated unsuccessfully for the purchase of the Silver Ledge Mill in 1906 and 1907. His backup plan was to construct a mill of his own along the railroad spur that could be served by an aerial tramway from the mine. This failed to materialize, too. Neither of these plans mattered until mining was underway. The company installed electric motors to furnish power for the mine from the recently completed Tacoma Power Plant of the Animas Power and Water Company in the Animas River Canyon. The most important piece of equipment was a Rand air compressor with capacity to run 10 drills. The compressor arrived at the railroad station in Silverton in August 1906 and was waiting completion of the spur to the mine for delivery to the mine where the new compressor house awaited its arrival. With the arrival of the compressor and drills, it was expected that the number of men at work at the mine would increase and that about 300 ft. of tunnel could be dug per month. Once the vein was cut, every 1,000 ft. of tunnel was expected to expose 400,000 tons of ore for stoping (*Silverton Standard*, August 25, 1906:1; *Silverton Weekly Miner & San Juan Democrat*, September 27, 1907:37).

John Kramer was hired as the mine superintendent. He supervised the digging of a 500-ft.-long crosscut tunnel with a double ore-car track. Once the vein was struck, the course of the tunnel was planned to turn to follow the vein. The vein was struck in February 1907. Because the tunnel portal and the new mine buildings were not on the company mining claims, the Shelbyville Lode was located adjacent to the north of the Valley and Mountain Chief Lodes to encompass the improvements (Figure 2 and Figure 3). A Mineral Survey Plat was prepared on November 10, 1906 and the Mineral Entry Patent was granted on December 16, 1907 (Table 1). The name was taken from Shelbyville, Indiana, which was the home town of T. Jay Hurley's wife, Julia. They had married there on May 14, 1902 and came to Silverton to live while he oversaw his father's mining properties (*Silverton Standard*, December 29, 1906:1; February 16, 1907:1; *Silverton Weekly Miner & San Juan Democrat*, February 8, 1907:1; May 17, 1907:4). After the vein was reached by tunnel, two additional 500-ft.-long sections of tunnel were awarded to Jesse H. Kramer: the first in late April 1907 and the other in late May (*Silverton Standard*, April 27, 1907:1; June 1, 1907:1).

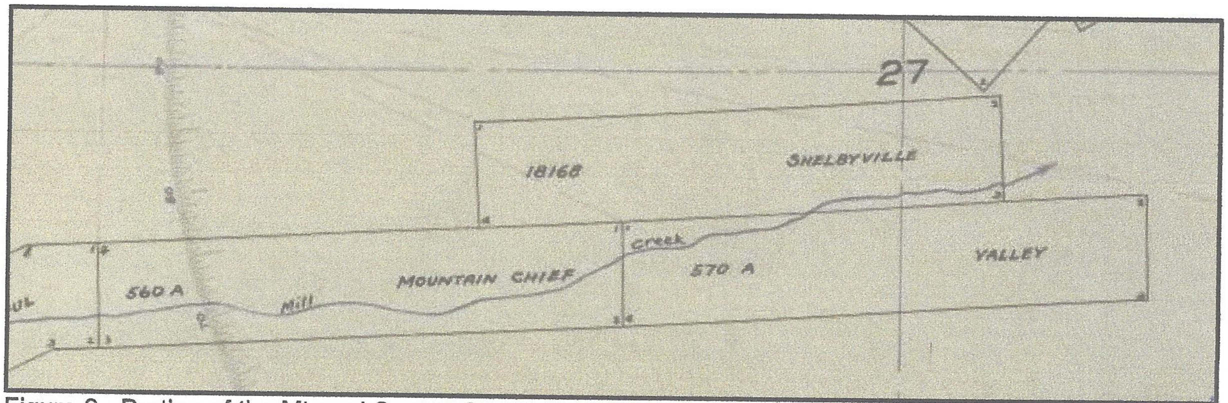

Figure 2. Portion of the Mineral Survey Connectivity Map showing the relationship of the Shelbyville Lode to the Mountain Chief and Valley lodes.

Everyone expected the Silver Crown Group to be highly productive in 1908. Unfortunately, Thomas J. Hurley died at his home in Brooklyn, New York, on December 15, 1907. His cause of death was reported to have been the result of an illness caused by exposure to a fire at the Long Beach Hotel, a resort hotel on the Atlantic shore of New York, on July 28, 1907 (*Silverton Standard*, December 28, 1907:2; January 18, 1908:1). T. Jay Hurley and his wife departed Silverton for New York in mid-January 1908 to settle his father's estate. They returned to Silverton for a month in March, at which time Hurley reportedly sold the holdings of the Precious Metals Corporation to John R. Allen of Brooklyn, New York. W. G. Clark was made the new mine superintendent. It is likely that the sale was only of Thomas J. Hurley's interest in the corporation, as the Precious Metals Corporation continued as the owner of the property. With completion of the sale, Hurley and his wife went to New Mexico to work on the Tri-Bullion Mine. By 1909, they were living in Albemarle, North Carolina, where he died on June 24, 1910 (*Silverton Weekly Miner & San Juan Democrat*, January 17, 1908:3; March 20, 1908:3; July 30, 1909:3; *Silverton Standard*, March 14, 1908:3; March 21, 1908:1; July 9, 1910:2).

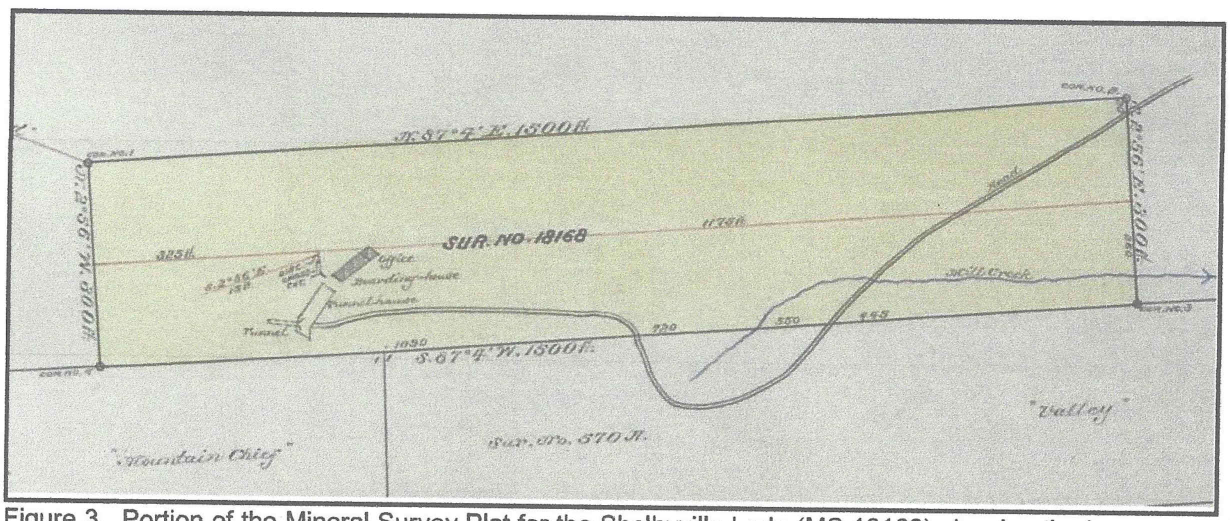

Figure 3. Portion of the Mineral Survey Plat for the Shelbyville Lode (MS 18168) showing the improvements made at the Silver Crown Lode as of November 1906.

With the departure of Hurley, Ralph L. Clark was made the manager and George C. Hill took over as superintendent of the mine. He had previously been the superintendent of the Shenandoah-Dives Mine in Cunningham Gulch. Hill put 15 men to work getting the mine ready for development work. By late April, it was reported that the tunnel on the property had reached the first ore of importance, and, by early June, work was being done around the clock by three shifts of miners (*Silverton Standard*, September 27, 1907:1; March 28, 1908:1; April 25, 1908:1; June 6, 1908:1; *Silverton Weekly Miner & San Juan Democrat*, February 19, 1909:1).

Fred Kuntz and Bob Reed were given a contract to dig 500 ft. of tunnel in late December 1908 and took out a second contract for the same amount of tunnel that they completed in July 1909. They spent 85 days working two shifts with power drills making 6 ft. per day on the second contract. By April 1909, the tunnel was reported to have been 3,000 ft. long (*Silverton Standard*, March 20, 1909:3; April 10, 1909:3; July 24, 1909:1; *Silverton Weekly Miner & San Juan*

Democrat, April 9. 1909:1). During this time, Hill resigned as superintendent in April 1909 and was replaced by Ellery W. Hunt. Hunt was a mining and civil engineer who had moved to Silverton from Rico early 1901 and was involved with several mining properties in the Silverton area. He had been hired as the consulting engineer for the Silver Crown property just before his appointment as superintendent, but does not seem to have served in that position for long (*Silverton Standar*d, January 5, 1901:6; April 24, 1909:3). In July 1909, the company advertised for bids for a contract to dig 2,000 ft. of tunnel and for drifting from the tunnel. At that time, the tunnel was specified to be 6 ft. wide and 7 ft. tall. Specifications for the project were available at the law office of William N. Searcy and William A. Way and bids were to be delivered to George E. Purdy, the bookkeeper and assistant manager of the company (*Silverton Standard*, July 24, 1909:1). It does not appear that a contract was awarded, and the property went onto the delinquent tax rolls when the taxes for 1909 went unpaid (*Silverton Standard*, October 1, 1910:3).

Silver Crown Mines & Ore Treatment Company

On December 5, 1921, taxes on all of the property of the Precious Metals Corporation in Mill Gulch and elsewhere were paid for by Dorothy J. Force. The deed was requested and was to be issued on June 29, 1925. Dorothy Force was the wife of Charles E. Force, who formed the Silver Crown Mines & Ore Treatment Company to own, operate, and treat ores of the Silver Crown group in Mill Gulch. A contract for 200 ft. of tunnel was let on the Silver Crown Group in May 1924 to cut the vein. With the vein exposed, J. S. Coupal, a mining engineer from Boston, did an extensive examination of the ore in June and July 1925 and oversaw the installation of a compressor in August so that mining could proceed. Force hoped to open stoping stations in the tunnel and deliver ore to a planned 100-ton concentration mill near the mine with a hydro-metallurgical leaching plant in connection. The leaching plant was to use the Lindley Universal Process developed by Mrs. M. B. Lindley, a well-known research chemist and metallurgist of New York City. The process was marketed by the Lindley Reduction Corporation of Keyport, New Jersey, incorporated in Delaware on April 22, 1926 with $2,000,000 in capital stock (*Silverton Standard*, May 24, 1924:4; March 14, 1925:2; June 6, 1925:1; June 27, 1925:3; July 11, 1925:1; August 1, 1925:1, 2; August 8, 1925:1; January 9, 1926:2; Poor's Publishing Company 1926:314). Except for the initial investigative work, the project failed to materialize, taxes due for 1925 went unpaid, and the Silver Crown Mines & Ore Treatment Corporation was dissolved with the forfeiture of their charter (*Silverton Standard and the Miner*, July 27, 1935:2).

Later Ownership and Mining

Charles W. Jordan was issued a Certificate of Purchase when he paid the 1925 taxes and a deed was to be issued to him on October 18, 1935 (*Silverton Standard and the Miner*, June 29, 1935:2). This evidently did not take place, and Charles C. Goulding stepped in and paid the 1925 taxes with a Treasurer's Deed to be issued to him on February 23, 1943 (*Silverton Standard and the Miner*, October 30, 1942:5). Goulding then cleaned up the property and planned to do an inspection of the ore bodies once he got air into the workings (*Silverton Standard and the Miner*, May 14, 1943:1). This transfer seems to have taken place and Goulding took steps to quiet the title to the claims in 1946 (*Silverton Standard and the Miner*, April 14, 1946:4). A 1946 Colorado Bureau of Mines report noted that Smith Crane had a lease on the property and that a compressor was operated by a gasoline engine within a one-story wooden building. Housing of employees and the mine office was in Chattanooga, suggesting that the original boarding house/office at the mine was no longer present. It is likely that the access to the mine was improved with the construction of the current road to and beyond the site and that the boarding house/office were demolished with the construction of the road. C. A. Baker was reported as the mine operator in 1948 and Frank Ashcroft and A. J. Bennet as Silver Crown Mines, Inc. in 1949 (Bureau of Mines 1946; 1949; King and Allsman 1950:47). James Moffit and Herb Culp worked at the mine during the summer of 1948, both of whom moved to Chattanooga with their families. Strangely, Culp's car was stolen and plunged 60 ft. off an embankment at the mine. It landed on its wheels and was driven away (*Silverton Standard and the Miner*, May 14, 1948:3; June 18, 1948:1). Taxes continued to go unpaid through the 1950s, and the county attempted to sell the property in 1958 with no success. Grant Gifford purchased the tax certificate for the 1958 taxes and assigned it to H. C. Sprinkle, who requested that a Treasurers Deed be issued, which was planned to take place on June 27, 1963. Sprinkle evidently paid taxes on the property until 1968, when the property again was placed on the delinquent tax rolls (*Silverton Standard and the Miner*, July 20, 1951:3; February 21, 1958:2; August 1, 1958:2; December 11, 1959:3; March 8, 1963:3). Bonanza Boy, LLC obtained the Silver Crown Group of claims in 2020.

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7. Is this site located in a NRHP historic landscape? ☐ **Yes** ☒ **No; If yes, please describe**:

8. Component or Feature Description (expand as necessary): The Silver Crown Mine (5SA407) is a small mining complex on private land at an elevation of 10,800 ft. The site includes a moderate-sized waste rock pile, a collapsed adit, stone retaining walls on the upslope side of a leveled area that at one time contained a large wooden tunnel house at the adit opening wherein an electric motor and compressor was situated, a heavily disturbed area that contains artifacts from an adjacent boarding house and office building that appears to have been demolished and displaced by later road building, and stone wall avalanche deflectors consisting of a single large wall on the southwestern end of the site and a large, complex, A-shaped configuration of stone walls on the steep slope in the western portion of the site. The site is on a steep, rocky, southeast-facing slope above Mill Creek. Its most prominent element is an irregularly shaped, flat-topped, yellowish waste rock pile that measures 14 x 155 ft., oriented north to south. A northeast-facing cleft in the waste rock between lobes of waste rock may have provided access onto the top of the waste rock from below, the base of which appears to correlate with a road shown on the 1906 Mineral Survey Plat for the Shelbyville Lode. The current access to the site is by way of a 10–12-ft.-wide winding dirt road that climbs westward along a steep, south-facing slope from the apex of a major curve on U.S. Highway 550 0.55 miles away. This road was evidently constructed using heavy equipment in the 1940s and made the earlier access obsolete, resulting in the upper portion of it that aligned with the mine portal being covered by waste rock by later mining.

The adit appears as a collapsed trench about 6 ft. wide and 16 ft. long that enters the steep east-facing slope in a west-southwest direction (240 degrees). Large boulders and cobbles comprised the fill. Mixed in are 8-x-8-in. posts and 3-x-8-in. and 3-x-12-in. planks that were used to frame the adit opening. Lying near the southeastern end of the adit trench is an 8-x-8-ft. expanded-metal gate with a welded angle-iron frame. Photos from the 2000 recording show the gate to have been standing, but the collapse behind underway. Water emanates from the adit.

After about 30 ft., it runs southward along the western edge of the waste rock pile to a pool that evidently drains into the waste rock.

Three sections of stone retaining walls stabilized the slope above the waste rock and provided a northwestern edge of a leveled area for the tunnel house depicted in the historic photo and on the Shelbyville Lode Mineral Survey Plat. Except for a small remnant of floor on the northeastern end of the area, no evidence of the structure has survived except for a somewhat level overgrown area about 16 ft. wide. The southwesternmost retaining wall is southwest of the adit; it is a 16-ft.-long and up to 4-ft.-tall uncoursed wall of uncoursed boulders and cobbles. Some waste rock has been deposited in small piles southeast of the wall and artifacts scattered in the area include some 2-x-12-in. board fragments, wooden plank remnants, 1½-in.-diameter iron pipe, 1½-in.-diameter reinforced rubber hose, a rubber V-belt, and corrugated sheet metal fragments. Another section of retaining wall is northeast of the adit and stands 4–4½ ft. tall. The final section of wall is at the far northeaster end of the area, is 2½–3 ft. tall, and ends at what was likely the northeastern corner of the leveled area. It terminates at a berm that does not quite form a right angle. In the northeastern end of the leveled area are two machinery mounts. The southwestern mount is an 8-x-8 ft., U-shaped compressor mount that has a 5-ft.-long, 26-in.-wide cement-lined opening on the northeast side. It has a base of native stone set in cement mortar on top of which seven courses of common brick were laid, standing 20 in. tall. Projecting through the top of the brick are eleven 1-in-diameter iron mounting bolts within 2-in.-diameter iron pipe sleeves that probably were set flush with the top of the brick. The brick has seen considerable deterioration leaving the pipe sleeves quite exposed. Seven ft. away and offset to the northwest is a second machinery mount that measures 6-x-7-ft., oriented northeast to southwest, probably for the 75-horsepower electric motor that was known to have powered the compressor. It was probably offset to enable it to turn the compressor with a belt on pulleys. The mount is divided lengthwise into two parts by a 42-in. gap through the center. The northwestern side has a native stone and cement base on top of which seven courses of brick were laid, giving it a total height of 42 in., though it is highly deteriorated. Two ¾-in.-diameter mounting bolts extend through its top. The southeastern side is a stone and cement base on top if which is a concrete cap. Two 1-in.-diameter mounting bolts have been cut off flush with the top of the cap. Immediately northeast of the second machinery mount is a remnant of building floor. This is diagonal 1-x-6-in. board subfloor over which 1-x-4-in. tongue-and-groove flooring has been laid, all resting on a 3-x-8-in. floor joist.

Adjacent and to the southwest of the machinery mounts are sections of ore car rail and 4-in.-diameter compressed air iron pipe. Sections of the pipe are connected with pipe couplers marked "4XXX/5TGR/VICT/AULIC." According to the U.S. Patent Office, the Victaulic trademark was first used in 1920 for pipes and pipe fittings. It is a live trademark last renewed in 2015 by the Victaulic Company of America, Easton, Pennsylvania. It is likely that the pipe and rail represents the last period of mining at the site in the late 1940s. Other artifacts found in the area include window glass fragments, wire nails, a cast-iron stove top marked "No. 30" with an oval stove pipe opening, rotary-opened sanitary food cans, galvanized sheet metal, rolled galvanized sheet metal that has been soldered to form a pipe or nozzle, 2-in.-diamter iron pipe, white porcelain insulator fragments, and a light green rectangular bottle fragment.

The Shelbyville Mineral Survey Plat from 1906 and historic photos show a combination boarding house and office building in line and northeast of the tunnel house. This building has been completely destroyed by the construction of the current road to the site that has an apex of a switchback curve on the northeastern edge of the waste rock pile and continues upslope. The building was situated at the upper portion of the switchback and remnants are evident only as structural debris and artifacts from its residents in the road cut bank. These include wire nails, lumber fragments including from 8-x-8-in posts, corrugated sheet metal, window glass fragments, coal cinders, stoneware sewer pipe, coal-burning stove parts, heavy-gauge sheet metal, corrugated sheet metal, common brick, galvanized 1-in.diameter threaded pipe, 3-in.-diameter threaded iron pipe with an elbow, plain white earthenware dishware, enamelware cooking vessel, and purple vessel glass fragments, including one round bottle base marked "S. B. M." The manufacturer of this bottle is unknown, but dates between about 1885 and 1920 based on the purple glass.

The most innovative elements of the site are native stone walls built to deflect avalanches with the intention of protecting the mining buildings. The simplest of these is on the southwestern end of the site. It is a 15-ft.-wide, 110-ft.-long wall, made of angular native cobbles that is generally 5–6 ft. tall and rounded on the top, but is up to 10 ft. tall in a dip of the topography. The wall is situated on a ridgeline so that an avalanche running northward down the steep slope on the southern side of Mill Creek, crossing the creek, and running up the opposite side would be deflected upward and loose its impetus before reaching the mine buildings. The other deflector is more complex. It is situated on the steep, rocky, southeast-facing slope above and northwest of the mine complex. It consists of cobble walls in an A-shape configuration with its apex to the northwest and its 110-ft.-long legs spreading outward to the south and east and having a 170-ft.-long connecting wall low between the legs. The walls are generally rectangular in cross-section, flat on top, 4–14 ft. wide, and stand up to 5 ft. in height. The walls of the legs decrease in height on their upper ends. Where the two outer legs are at ground level near their tops, a historic photo shows that board walls were constructed that were braced from below to extend the walls 30–40 ft. to their apex. Remnants of that board construction is scattered on the slope.

9. **Historic Component Date(s)**: 1906-1949
Justification and Sources Consulted: See historical narrative

10. **Component Function(s)**:

Original Use: Mine
Present Use: None

11. **Ethnic affiliation of occupants**: EuroAmerican

Justification and Sources Consulted: See historical narrative

12. **Historic Boundary Description**:

Justification and Sources Consulted: Extent of observed features and artifacts

13. **NRHP Area of Significance**: Industry - Mining
Justification and Sources Consulted: See historical narrative

14. **NRHP Period of Significance**: 1906-1949
Justification and Sources Consulted: See historical narrative

15. **Site, Component, or Feature Theme (use the Historic Archaeology Lexicon)**:

16. **Does this component or feature support the NRHP eligibility of the entire resource?**
☐ Yes ☐ No ☐ Undetermined ☒ N/A

Justification:

17. **Recorder(s)**: Jon Horn and Heather Prosser 18. **Date**: 6/20/2023

19. **Presence and Quantity of Artifacts** (add types as necessary)

a. Vessel Glass	Quantity	e. Cans	Quantity
Amber (1860s-present)		Beverage: all aluminum (post-1970)	
Purple (1885-1920)	4	Beverage: aluminum ends (post-1953)	
Aqua (ca. 1870-1920s)		Beverage: cone-top (1935-1960)	
Cobalt		Beverage: flat top, all-steel (1935-1970s)	
Colorless (ca. 1920s-present)		Beverage: pull tab (1962-1983)	
Light green (1860s-present)	1	Beverage: UPC code (post-1980)	
Milk/White (1890s-present)		Hole-in-cap: double-locked side seam (1890-1915)	
Olive green (early 1860s)		Hole-in-cap: lapped side seam (ca. 1880s-1900)	
Yellowish (1918-1950s)		Round quart motor oil: all metal (1933-1970s)	
		Round quart motor oil: paper-sided (late 1940s-late 1980s)	
		Sanitary can (1904 +)	2
		Sanitary ends, lapped side seam (1904+; very rare)	
		Sardine tin: lapped and soldered (pre-1910)	
b. Ceramics	**Quantity**	Sardine tin: one piece bottom (early 1900s +)	
Earthenware	2	Tobacco tin: complex friction lid (post 1948)	
Porcelain		Tobacco tin: simple friction lid (1907-1948)	
Refined Earthenware		Tobacco tin: upright pocket (late 1890s-1988)	
Stoneware		Tobacco tin: hinged lid (ca. 1910-present)	
		Vent hole (hole-in-top) (1900-1980s)	
		Vent hole with two solder dots (hole-in-top) (1890s-early 1900s)	

Historic Archaeology Component Form

Resource Number: 5SA407

Temporary Resource Number:

c. Nails	Quantity
Hand-made cut (wrought)	
Machine-made cut	
Railroad Spike	
Wire	20

d. Industrial Artifacts	Quantity
55-gallon drum	
Animal shoe	
Automobile/Truck Part	
Bailing wire	
Barbed wire	
Barrel hoop	
Bracket	
Bucket	
Cable/Wire rope	
Cartridge: centerfire	
Cartridge: rimfire	
Cartridge: pin fire	
Cartridge: shotgun shell	
Clinker	
Coal cinders	20
Electric light fixture	
Electrical wire	
Forge-cut iron scrap	
Horse tack/harness	
Iron scrap: cut sheet metal	
Iron scrap: forge-cut	
Lag bolt	
Machine bolt	
Machine part	
Mine rail	
Nut: hex	
Nut: jamb	
Pipe	14
Wagon parts	
Washer	

f. Structural Artifacts	Quantity
Adobe	
Brick, common	100
Brick, fire	
Concrete: natural lime (pre-1915)	
Concrete: Portland (post-1910)	
Corrugated sheet iron (post-1890)	
Dimensional lumber	20
Fieldstone	
Hinge	
Log: hewn	
Log: peeled	
Log: raw	
Sheet iron	
Stovepipe	
Tarpaper	
Timber bolt	
Timber spike	
Window glass: aqua (pre-1920)	10
Window glass: colorless	
Window glass: yellowish tint (1918-1950s)	

g. Domestic Artifacts	Quantity
Beads	
Bed frame/springs	
Buttons	
Clothing	
Cookware	1
Doll head	
Stove/parts (cast iron/tin)	1

20. **Total assemblage size:** Or estimate: ☐ 0-10 ☐ 11-100 ☒ 101-1000 ☐ 1001-10,000 ☐ >10,000

21. **Artifact density:** ☐ High ☐ Medium ☒ Low Describe: See attached Historic Artifact Tables.

22. **Unique Artifact Descriptions.** Particularly important attributes are listed following the artifact class and standardized terminology can be found in the Appendix to the instructions. Expand or contract tables as necessary. All of these items should be included in the counts of the Artifact table above.

a. Glass: type, function, color, bottle part, manufacturing method, vessel style/contents, embossing/marking, dimensions, worked or modified?
Purple round bottle base marked "S. B. M." manufacturer unknown
b. Ceramics: type, function, surface treatment/glaze, color, shape, trademarks, decorations, dimensions.
c. Nails: type, function, dimensions.
d. Industrial: type, function, manufacturing method, marking, dimensions.
4" dia. Compressed air pipe with Victaulic coupler marked "4XXX/5TGR/VICT/AULIC"
Ore car rail
White porcelain insulator fragments
e. Cans: material type, side-seam, opening, vessel style/contents, embossing/marking, dimensions.
f. Structural: type, function, manufacturing method, marking, dimensions.
Milled lumber 8x8", 3x6", 1x6", 1x4"
Corrugated sheet metal

g. Domestic: type, function, manufacturing method, marking, dimensions.
h. Other/miscellaneous: type, function, manufacturing method, marking, dimensions.

23. **Are standing structures present on the site?** Yes ☐ No ☐

If yes, please complete Architectural Inventory Form(s)(1403)

24. **Feature Descriptions** Include a site map, to scale, with each feature listed below depicted on it. Please use the Historic Archaeology Lexicon for feature types. Insert rows and feature types into table as necessary. If desired, sort table by feature number.

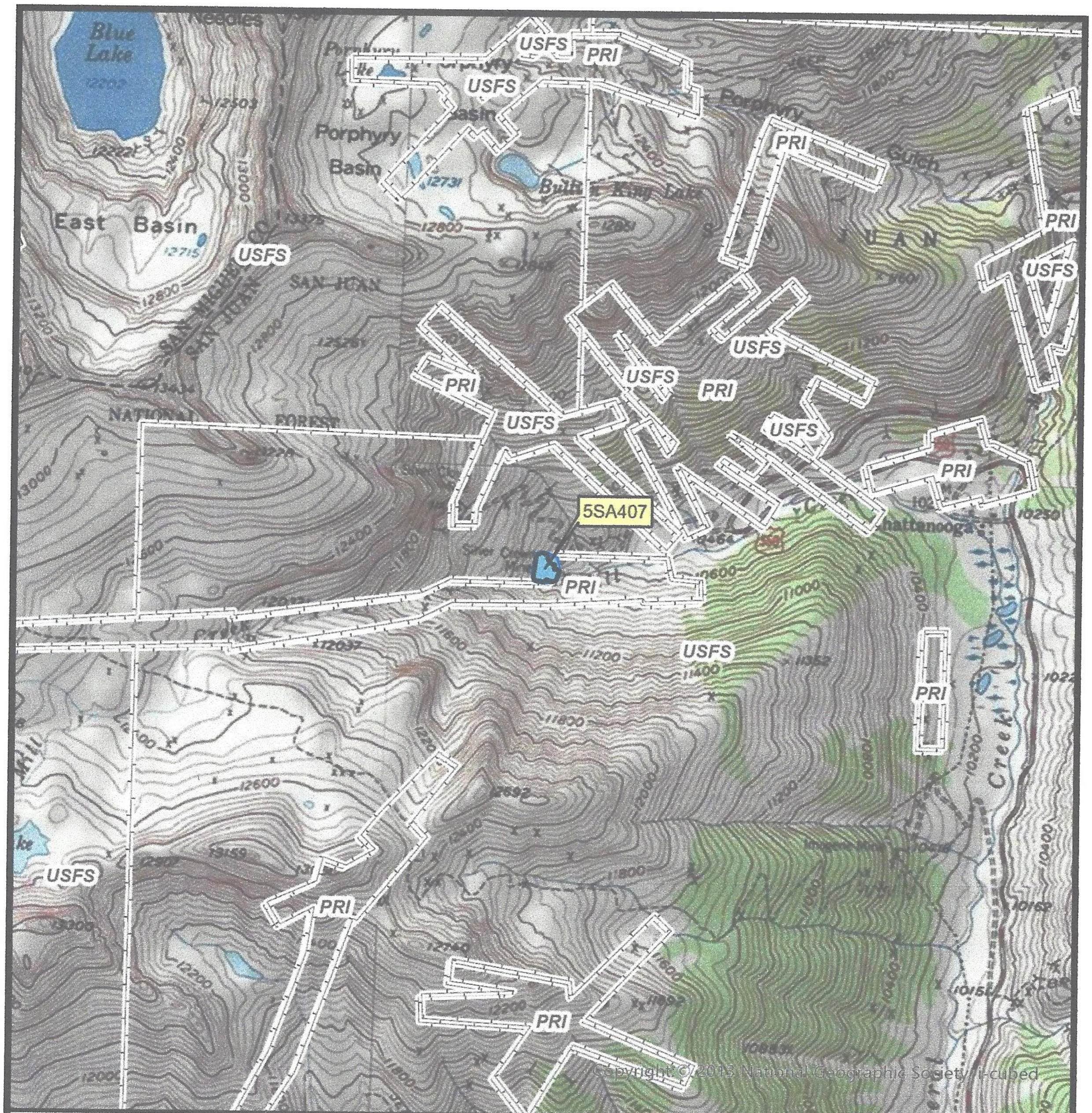
Feature Type (add others as necessary)	Feature Number/Name	Dimensions (feet / inches)	Description
Adit	Adit	6 x 16'	Collapsed with remnants of timbering
Trash scatter	Artifact Concentration	20' dia.	Disturbed artifact area
Waste rock pile	Waste Rock	145 x 200'	Waste rock pile
Machinery mount	Machinery Mount	8 x 8'	Stone, cement, brick compressor mount
Machinery mount	Machinery Mount	6 x 7'	Stone, cement, brick motor mount
Retaining walls	Retaining Wall	16', 25', and 35' long	Three remnants of retaining walls
Avalanche deflector	Avalanche Deflector	15 x 110'	Stone wall
Avalanche deflector	Avalanche Deflector	110', 110', and 170' long	Three stone walls in A-shaped configuration

25. **Potential for Additional Archaeological Information**

Is there potential for additional information? ☐ Yes ☒ No ☐ Unknown If yes or unknown describe below.

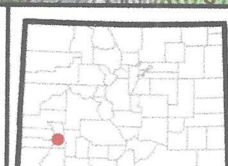
Potential Within:	Describe
a. Subsurface deposits within a structural feature	
b. Subsurface deposits outside a structural feature	
c. Trash area	
d. Privy pits	
e. Other	

CONTAINS PRIVILEGED INFORMATION – DO NOT DISTRIBUTE



Silver Crown Mine Project Results

Site Boundary | Project Area | Land Status



ALPINE ARCHAEOLOGICAL CONSULTANTS, INC.

0.25 0 0.25 0.5 Miles

0.5 0 0.5 Kilometers

1:24,000

USGS Topo Map: Silverton

N

CONTAINS PRIVILEGED INFORMATION – DO NOT DISTRIBUTE

CULTURAL RESOURCE INVENTORY OF THE BONANZA BOY MILL SITE, SAN JUAN COUNTY, COLORADO

by

Jonathon C. Horn
Principal Investigator

Alpine Archaeological Consultants, Inc.
P.O. Box 2075
Montrose, Colorado 81402-2075

Prepared for

Bonanza Boy, LLC
PO Box 3387
Telluride, Colorado 81435

Under the conditions of
Colorado State Archaeological Permit No. 80929
(expires February 29, 2024)

December 2023

ABSTRACT

Alpine Archaeological Consultants, Inc. (Alpine) was hired by Bonanza Boy, LLC of Telluride, Colorado, to conduct a cultural resource inventory of the Bonanza Boy Mill Site (Mineral Survey 16677B) in San Juan County, Colorado. The property is on private land owned by Bonanza Boy, LLC. The work was done in advance of Bonanza Boy, LLC's anticipated filing for an U.S. Army Corps of Engineers Nationwide 404 permit, as they plan to develop the property. The Area of Potential Effect for the project is the mill site parcel, which covers 4.35 acres of private land, and was fully inventoried. One site was encountered during the inventory, a section of the Silverton and Red Mountain Toll Road (5SA823.3). The segment of the road is considered a contributing segment of the toll road as a whole and is eligible for inclusion in the National Register of Historic Places.

History Colorado-Office of Archaeology and Historic Preservation
COLORADO CULTURAL RESOURCE SURVEY
Cultural Resource Survey Management Information Form

I. Project Size

Federal acres of potential effect/project:	0	Acres surveyed:	0
State acres of potential effect/project:	0	Acres surveyed:	0
Private acres of potential effect/project:	4.35	Acres surveyed:	4.35
TOTAL:	4.35	TOTAL:	4.35

II. Project Location

County(ies):	San Juan
USGS Quad Map(s):	Ironton, Colo. 1955 (1984)
Principal Meridian(s):	NM
	Unsurveyed

Township	42N	Range	8W	Section			¼		¼		¼		¼
Township		Range		Section			¼		¼		¼		¼
Township		Range		Section			¼		¼		¼		¼
Township		Range		Section			¼		¼		¼		¼

III. Sites

Smithsonian Number	Resource Type				Eligibility					Effect			Management Recommendations						
	Prehistoric	Historic	Paleontological	Unknown	Eligible	Not Eligible	Need Data	Contributes to a District	Supporting Segment	N/A (not a hist. prop.)	No Adverse Effect	Adverse Effect	No Further Work	Preserve/ Avoid	Monitor	Test	Excavate	Archival Research	Other
5SA823.3		X			X								X	X					

IV. Isolated Finds

Smithsonian Number	Resource Type			
	Prehistoric	Historic	Paleontological	Unknown

Smithsonian Number	Resource Type			
	Prehistoric	Historic	Paleontological	Unknown

See Appendix A Map

CONTENTS

Appendices

Figures

INTRODUCTION

Bonanza Boy, LLC of Telluride, Colorado, is planning recreational development on the Bonanza Boy Mill Site (Mineral Survey [MS] 16677B) in San Juan County, Colorado. As part of their permitting for the project, the company may be required to obtain a Nationwide 404 Permit from the U.S. Army Corps of Engineers. The Area of Potential Effect (APE) for the project is the boundaries of the 4.35-acre mill site parcel. Because the project requires a federal permit, various cultural resource laws apply. Federal mandates for the examination of the project area include the Section 106 (54 U.S.C. § 306108) of the National Historic Preservation Act of 1966 (54 U.S.C. § 300101 et seq.) (as amended), the Archaeological and Historic Preservation Act of 1974, the Federal Land Policy and Management Act of 1976, the Archaeological Resource Protection Act of 1979 (as amended), the Native American Graves and Repatriation Act, and the procedures of the Advisory Council on Historic Preservation (36 CFR 800). These laws require that all cultural resources be identified prior to planned development and are intended to ensure that significant prehistoric and historical cultural resources important to our national heritage are not inadvertently harmed or destroyed by federally initiated or authorized actions. To meet the historic preservation law requirements, Alpine Archaeological Consultants, Inc. (Alpine) was hired by Bonanza Boy, LLC to conduct a conduct a file search and Class III cultural resource inventory of the parcel. Fieldwork was conducted by Jonathon C. Horn, Principal Investigator, assisted by Charlie Seevers on October 18, 2023. No artifacts were collected during the project.

PROJECT LOCATION AND ENVIRONMENTAL SETTING

The Bonanza Boy Mill Site (MS 16677B) is within the southern Rocky Mountains physiographic province of western Colorado (Figure 2). It is in rolling, frequently marshy terrain between Mineral Creek and Mill Creek just north of and perhaps west of the former town of Chattanooga immediately south and east of a bend in US Highway 50 (Figure 3). This is about 5.5 miles northwest of Silverton and 1.75 miles southwest of Red Mountain Pass at elevations from 10,260 to 10,280 ft. Geologically, the mill site is on Quaternary gravels of Pinedale and Bull Lake age on the floodplains of Mineral and Mill creeks and surrounded by high mountain peaks of heavily mineralized tertiary igneous rocks of intra ash flow andesitic lavas within the Silverton caldera (Tweto 1979). Soils vary from barren, gravelly rises to dark brown silt loam in marshy areas. The area is covered by thick grasses, sedges, and reeds with considerable willow thickets. Other vegetation includes moss, common juniper, strawberry, currant, thistle, columbine, dandelion, and other forbs.

Figure 1. Looking south-southwest across project area showing willow growth with areas of grass and sedge openings and rocky uplands.

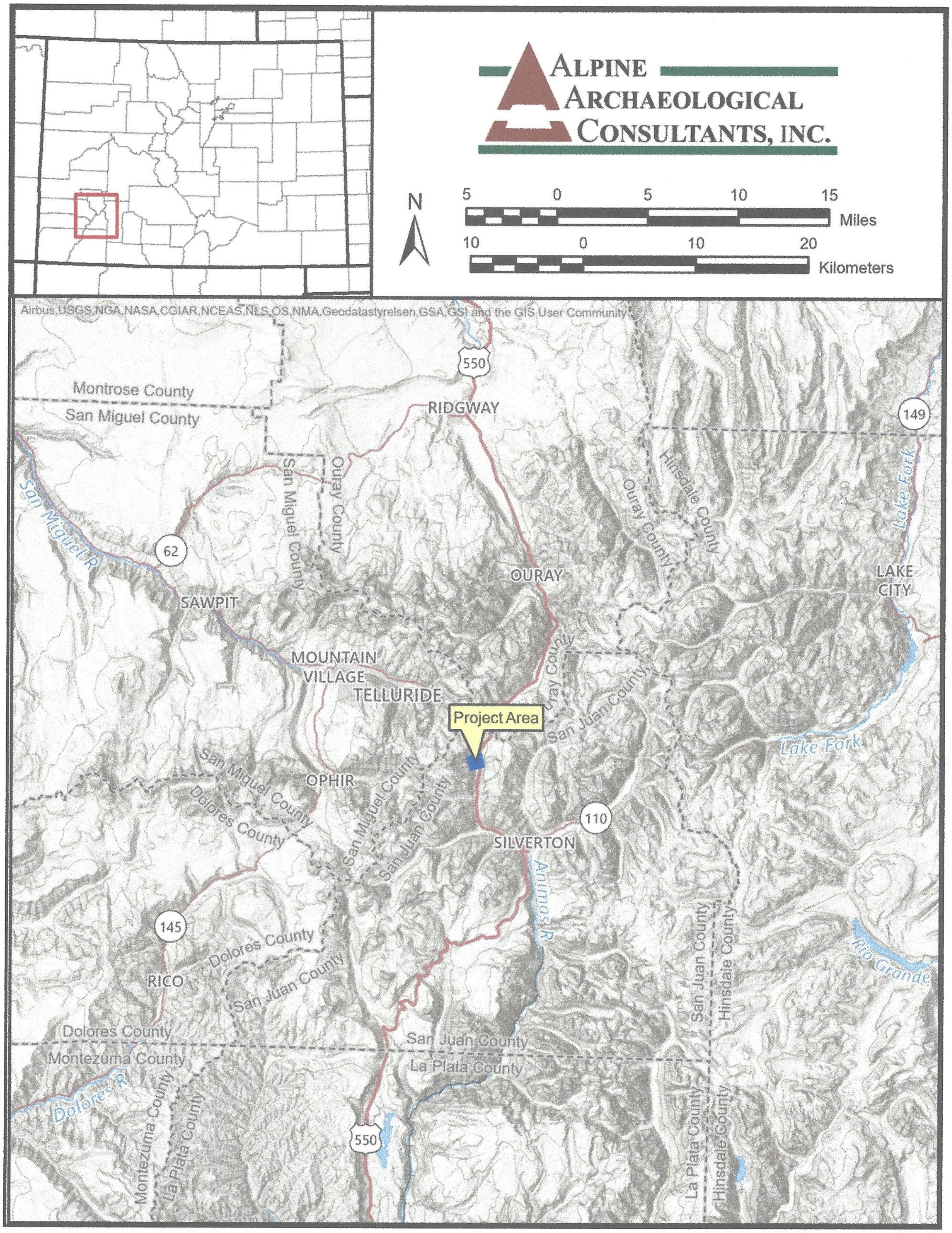


Figure 2. Project area location.

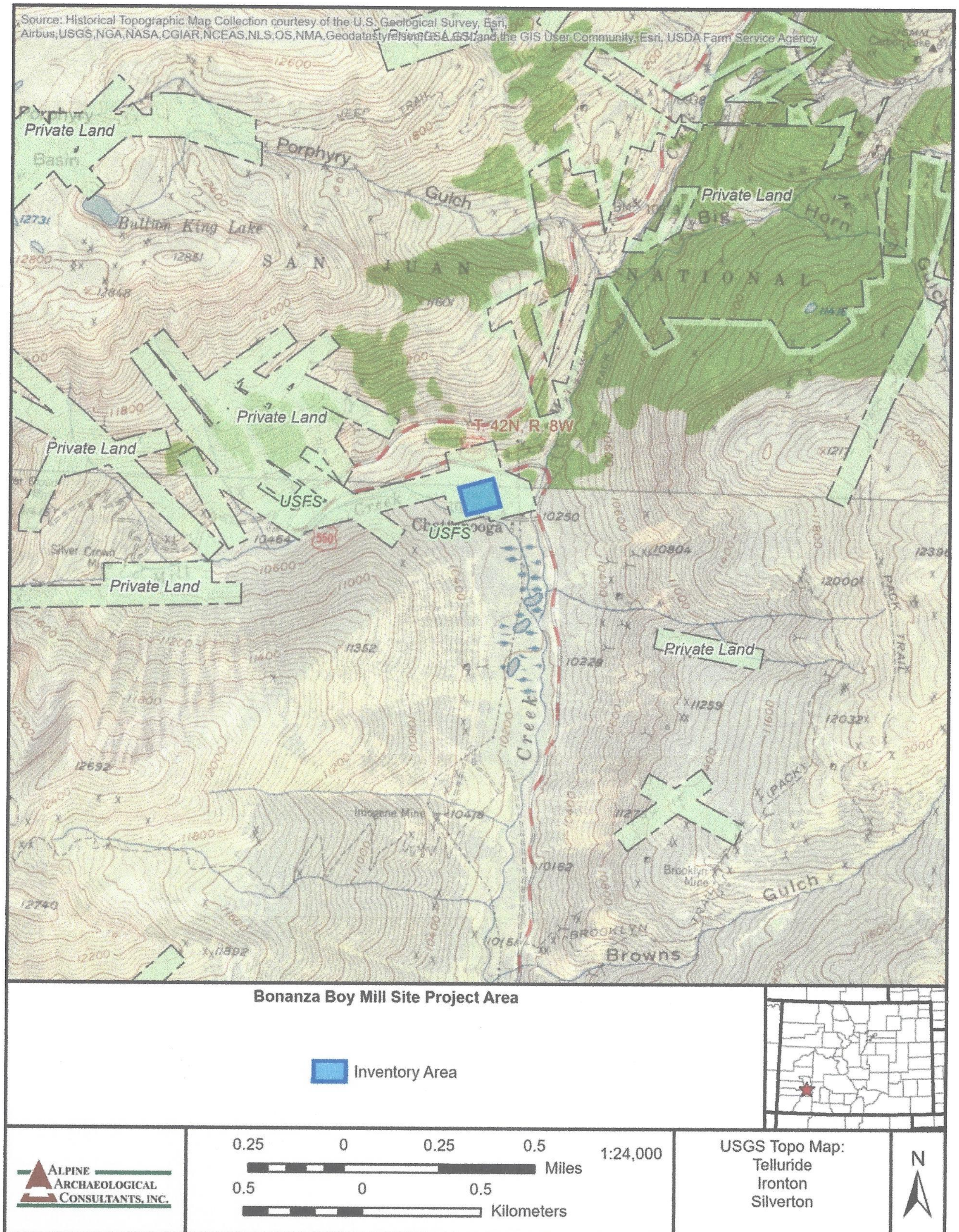


Figure 3. Location of the Bonanza Boy Mill Site (MS 16677).

PREHISTORIC AND HISTORICAL BACKGROUND

The earliest inhabitants of western Colorado were representatives of the Paleoindian era, who inhabited North America during the period of transition from the Pleistocene to the Holocene between 13,400 and 7,500 BP. The era has traditionally been identified by a number of distinctive, diagnostic lanceolate projectile points and tool assemblages indicative of a big game hunting economy by what have been termed the Clovis, Goshen, Folsom, and Plano traditions. The subsequent Archaic stage represents an adaptation to an essentially modern environment, mainly by efficiently focusing on a more diverse subsistence base. Reed and Metcalf (1999) have suggested that the Archaic stage of the region be divided into four stages: Pioneer period (8350–6450 BP) is the transition from the Paleoindian period. This is followed by the Settled period (6450–4450 BP), the Transitional period (4450–2950 BP), and the Terminal period (2950–1950 BP [A.D. 1]). In southwestern Colorado, just south of the project area, the Formative stage (400 B.C.-A.D. 1300) is represented by the Anasazi culture.

The Late Prehistoric period in western Colorado is generally associated with the Ute. Whether the Ute culture evolved from indigenous groups or emigrated from the Great Basin is currently a topic of debate, but most archaeologists now seem to accept the hypothesis of immigration by about A.D. 1400. The Ute were the primary inhabitants of western Colorado, including the San Juan Mountains, at the time of European contact. The upper Animas River drainage was within the range of the Tabeguache band during historic times. With the acquisition of the horse, the Tabeguache extended their range and made seasonal forays onto the Plains of southeastern Colorado in search of buffalo (Callaway et al. 1986:337-339). Adoption of an equestrian lifestyle, as a result of contact with Euroamerican groups, resulted in a more complex society. Extended family groups were replaced by band organizations more suited to a more mobile lifestyle. The horse enabled the Ute to expand their sphere of influence and interaction, thereby exposing themselves to previously unknown outside cultural influences. Acquisition of the horse resulted in new trade relationships between the Ute and other Indian groups. The most influential interaction was between the Ute and Spanish traders. Most of the early Spanish trading expeditions were unauthorized and are, therefore, virtually undocumented. It is clear, though, that trade was conducted and that European-manufactured goods began to be assimilated into the Ute culture (Malouf and Findlay 1986:500). Historic period Ute sites are characterized by Euroamerican goods such as early tin cans, glass, cartridge cases, glass beads, sheet metal cone tinklers, and metal arrow points.

The Juan Maria de Rivera expedition of 1765 was the first officially sanctioned exploration of the northern reaches of Spanish territory into western Colorado. The expedition explored the La Plata Mountains for mineral wealth and continued northward into the Uncompahgre Valley, reaching as far north as the Gunnison River at present-day Delta, Colorado. The Escalante-Dominguez Expedition passed through the region in 1776, searching for a travel route between settlements of California. The knowledge of the northern frontier provided by the Rivera and Escalante-Dominguez expeditions apparently stimulated expansion of trade with the Ute. As trade with the Utes developed, two major travel routes from New Mexico into Utah developed: the main Spanish Trail and the northern branch of the Spanish Trail, neither of which passed through the San Juan Mountains.

In 1821, Spain was overthrown, and Mexico gained its independence. Remaining restrictions on trade were terminated, and trade with the Ute expanded. Coincident with these events were expansion of the fur trade in the southern Rocky Mountains and the inclusion of numerous Americans in the fur trade. Fur trappers were active in the mountains of Colorado beginning in the 1820s and 1830s. Fur trappers led by Col. William G. Walton evidently trapped the lakes in the vicinity of Cascade Creek and at Trout Lake in 1833 (*Durango Wage Earner,* March 14, 1907:2). The Ute were active participants in the fur and hide trade, and their finely tanned deer hides were a valuable and much sought after commodity. The fur industry lasted until over-trapping and failing fur prices in the late 1830s made fur trapping unprofitable (O'Rourke 1992). As a result of the close association with fur trapper and traders, the Ute became particularly well-armed. During the fur trade period, the Old Spanish Trail was extended to California. The highly mobile Utes were able to provide both horses and slaves to the Mexicans by raiding widely, from the eastern Plains to California and into New Mexico and Arizona. Intertwined with the raiding, Ute prosperity was tied to control of the Utah-Colorado portion of the Old Spanish Trail (Sprague 1957:68).

The sporadic presence of Euroamericans in the region changed radically with the discovery of gold on Cherry Creek near present-day Denver in 1858. By 1860, gold miners led by Charles Baker had reached Baker's Park on the upper Animas River at present Silverton. Being far from points of supply and with meager results from their mining, a major rush to the area did not take place immediately. It was not until after the Civil War and a change in approach in mining from placer to hard rock mining that the San Juan Mountains again came to the attention of miners. The influx of miners elsewhere in Colorado brought conflict with the Ute. The Treaty of 1868 between the Utes and the federal government was an attempt to alleviate these conflicts by forming a large reservation on the Western Slope of Colorado, away from the primary mining area. However, by the early 1870s, large bodies of ore had been found in the San Juan Mountains. Miners returned to the San Juan Mountains in 1869 and resumed mining in the vicinity of Baker's Park by 1870. It was these trespasses onto the Ute Reservation that alarmed the Ute, resulted in the discovery of rich gold and silver deposits, and led to the ceding of the San Juan Mountains by the Ute under the Brunot Agreement in 1873. The Brunot Treaty increased hostilities between the Ute and Euroamericans over disputes where the boundaries of the ceded lands were. Although the Tabeguache (Uncompahgre) Utes maintained peace under difficult circumstances, the White River Ute killed their agent, Nathan Meeker, and several agency employees and overwhelmed U.S. troops sent to intervene in 1879. The "Meeker Massacre" served as the catalyst for removing the White River and Uncompahgre Utes from western Colorado to reservations in northeastern Utah in late 1881. The Weeminuche, Capote, and Muache Utes were settled on a reservation on a strip of land along the Colorado-New Mexico border.

With the San Juan Mountains legally opened to prospecting in 1873, Baker's Park became the focus of mining activity that spread throughout the San Juan Mountains; the town of Silverton was established in 1874. Mining rapidly expanded to the Telluride, Ouray, Rico, and Lake City areas and was quickly connected by toll roads. The success of the San Juan mines spurred railroad construction to the Animas Valley in 1880 where the town of Durango was established. In 1882, the Denver & Rio Grande (D&RG) extended their rail line to Silverton. The completion of the railroad to Silverton solidified the town's position as the principal mining center of the San Juans and stimulated mining in the surrounding area. A wagon road from Ouray to Ironton was completed by Otto Mears in 1883 that continued over Red Mountain Pass to Silverton. In 1887, Otto Mears constructed the Silverton Railroad over Red Mountain Pass to the Red Mountain Mining District. The D&RG extended a rail line to Ouray from Montrose in 1887, but the Red Mountain Mining District was never connected by rail to Ouray because of the difficulties constructing a suitable grade to surmount the upper Uncompahgre Canyon. In 1890 and 1891, the Rio Grande Southern Railroad was constructed through the San Juan Mountains between Durango and Ridgway. It provided much-needed rail service to the important mining centers of Rico and Telluride, further stimulating mining and commercial development in the San Juan Mountains. Hard times in the mining industry began with the Panic of 1893 and continued into the new century with labor unrest that centered on the town of Telluride. Gold-producing mines in the region were not nearly so hard hit by the depression as those that produced mainly silver (Henderson 1926). Ouray was fortunate to have several gold-producing mines that kept its economy alive, particularly the Camp Bird.

Early Mining and the Establishment of Chattanooga

Initial mining in the area centered on five mining claims on Mill Creek, a tributary of Mineral Creek on the southern side of Red Mountain Pass—the Silver Crown, Mountain Chief, Giant King, Wonderful, and Pride lodes. These were initially located by R. J. Penoyer, J. S. Tharp, J. D. Crain, F. G. Barnett, Ed Finch, and Adelbert Parsell on September 15, 1879 and were known as the Silver Crown Group of claims. The locators sold the group of claims to E. E. Norton of Pennsylvania for $100,000 in November 1879 (Condry 2000; Curtis 2003). Norton involved Luther H. Buell in establishing the Silver Crown Mining Company, which was incorporated in New York on March 3, 1880, with $5,000,000 capital (San Juan County Courthouse, County Clerk's Office, Records of Incorporation, Book 1 Page 127). Initial work on the claims of the Silver Crown Mining Company showed the vein on which the claims were situated to be quite valuable, so work continued over the winter of 1880–1881. By the end of 1882, the company felt certain enough of the value of their mining claims to have Mineral Survey plats prepared in 1882 and 1883. This included plats for the Wonderful Mill Site (MS 559B) and the Mountain Chief Mill Site (MS560B) in the valley bottom north of the confluence of Mineral and Mill creeks.

Cabins were constructed on these mill site claims for accommodations for miners at the Silver Crown Group of claims and other mining claims in the area. Initially known as Silver Crown Camp, the growing community was also known as Sweetville, named for promoter and Silverton assayer Edmund Sweet. With the growth of mining on upper Mineral Creek and over the divide toward Ouray, the Red Mountain Mining District was formed. A wagon road was built to the fledgling town because the junction of Mineral and Mill creeks was aptly situated to act as a point of transfer of supplies and equipment from the end of the wagon road from Silverton onto pack animals that took them on their final leg to the more heavily developed part of the mining district on the Ouray side of the pass. Packer John C. Burnett established a livery and stables at Sweetville in 1882, and Sweet kept a saloon. Quickly, the settlement on the Silver Crown mill sites came to be more developed and the name of Chattanooga was attached to the post office when it was established there on April 4, 1883 (Nossaman 1998; Archimede 2004; Bauer 2007:9-10). Among those engaged in packing in the area was John "Jack" Dolan from Lawrence, Kansas. He and two companions were swept 50 ft. downhill with their pack animals by an avalanche at 3:30 in the afternoon on December 20, 1883, while packing supplies to the Silver Crown Mine. Dolan was killed. He was buried adjacent to Chattanooga, but his grave was unmarked until it was done so by the San Juan National Forest in 1994 (Peterson 1996:D-25; Find a Grave Memorial 6060697).

Chattanooga was platted with Main, First, and Second streets running east to west, and Water and Silver streets running north to south, Town lots sold for between $100 and $250 in 1883, and many mining supply and construction businesses, markets, dry goods stores, hotels, and saloons sprang up. The *Chattanooga Enterprise* newspaper printed a single issue in June 1883. By the end of 1883, a concentration mill was constructed by the Red Mountain Sampling and Concentrating Company at the junction of Mill Creek with Mineral Creek. The company was incorporated on May 7, 1883 by J. E. Downy, George W. Brown, M. J. McCloskey, and Henry B. Adsit with $50,000 in capital stock (*Rocky Mountain News* [Denver], May 8, 1883:3). Known as the Mineral Creek Concentrator or the Chattanooga Concentrator, it was a custom 30-ton-per-day mill operated by superintendent Richard A. Parker, formerly of Georgetown. The concentrator turned Chattanooga into a regional industrial destination for mixed and low-grade ores. It handled ore from nearby mines, but was a first destination for ore packed down from the Ouray side of the Red Mountain Mining District. Initially, the concentrator ran only on water power, but had a steam engine installed in summer 1884 so that it could operate when Mineral Creek did not provide sufficient water power. The upper levels of the Silver Crown Mine were leased to the owners of the concentrator, who ran the ore through their mill. The growth of the Red Mountain Mining District led Otto Mears to extend what was known as the Silverton and Red Mountain Toll Road from Silverton to Chattanooga over Red Mountain Pass to Ouray. It made wagon transportation possible through the precipitous upper Uncompahgre Canyon in 1884. The improved road ran north from Silverton, crossed a bridge westward over Mineral Creek onto Main Street in Chattanooga, and then turned north on what may have been Silver Street before making a large horseshoe curve in its initial ascent toward Red Mountain Pass. With completion of the toll road, miners could choose whether to freight to Ouray or Silverton, but Silverton still had the upper hand because of the completion of the Denver & Rio Grande Railroad there in 1882, whereas the nearest railroad connection to Ouray was Montrose, another 35 miles away (*Colorado Daily Chieftain* [Pueblo], December 9, 1883:6; *San Juan Herald* [Silverton], May 22, 1884:3; *Silver World* [Lake City], May 24, 1884:3; Archimede 2004).

Most of the Red Mountain Mining District produced an abundance of silver ore throughout the 1880s that led Otto Mears to construct the Silverton & Red Mountain Railroad beginning in the summer of 1887. The first six miles of the line was completed to Burro Bridge by January 28, 1888. The line continued through Chattanooga and over Red Mountain Pass to Ironton with its terminus reached at Albany at the head of the Uncompahgre Canyon on September 20, 1889. With completion of the railroad, Chattanooga's main purpose as a transfer and supply point for the mines of the Red Mountain Mining District was greatly diminished. Avalanches in 1888 and a devastating fire in 1892 resulted in considerable loss to the town. The Panic of 1893 and crash of the price of silver resulted in a near cessation of mining at the Red Mountain mines through the rest of the 1890s, near abandonment of Chattanooga, and closing of its post office in June 1894. Another avalanche in 1898 left little standing in the town (Nossaman 1974; Archimede 2004; Bauer 2007:9-10).

The construction of the railroad through the area stimulated additional mining, including what was initially known as the Silver King group of claims, comprised of the Silver King, Lady Helen, Bonanza Boy, Marchie, and Marchie No. 2 lodes. Initially worked in the late 1880s, they came into the ownership of William Fiegel, a successful carpenter in Silverton, who decided to speculate in mining properties. Portions of the claims were leased to George Bradley and Gregory and Butterfield in 1890 that demonstrated the presence of valuable ore. He leased the mining claims to Gregory and Keets of Ouray, who planned to market shares in their mining company to English investors in 1891 after having shipped 800 tons of ore from the Margie claim the prior year (*Silverton Standard,* July 26, 1890:2; January 24, 1891:3; *Silverton Weekly Miner and San Juan Democrat,* January 3, 1891:3; *Herald Democrat* [Leadville], February 23, 1892:2). With the decline of mining in the area after the Panic of 1893, work was not resumed on the claims until 1900, when a two-year lease was made to Smith and Jarvis, who shipped four carloads of silver-lead ore from the claims. Another 30 car loads of ore was also reportedly shipped from the group of claims that year (*Silverton Standard,* December 29, 1900:8; *Silverton Standard and the Miner*, November 29, 1940:6). Work resumed in earnest in early 1903 when a contract was given to the Reilly Brothers of Chattanooga to drive a 75-ft.-long tunnel on what was then known as the Bonanza Boy group of claims from a point along the Silverton & Red Mountain Railroad (*Silverton Standard*, February 21, 1903:1; *Silverton Standard and the Miner*, February 19, 1943:3). The tunnel was intended to intersect the vein passing through several of the mining claims of the group, which by that time were the Bonanza Boy, Independence, Pinto, Margie and Silver King lodes. Looking to sell the claims, Fiegel filed Amended Locations Certificates for the claim from July 2–5, 1903. To make the properties more desirable to a purchaser, he located the Bonanza Boy Mill Site in the valley bottom near Chattanooga on July 10, 1903. He then had a Mineral Survey done of all of the claims (MS 16677) on August 5, 1903 and filed a Mineral Patent Application for the claims on October 21, 1903 (*Silverton Weekly Miner and San Juan Democrat*, December 18, 1903:4). The Mineral Patent for the claims was granted on December 13, 1904. The Bonanza Boy Mill Site was adjacent to the Wonderful and the Mountain Chief mill sites on the edge of Chattanooga, and distant from the patented mining claims of the Bonanza Boy group.

Chattanooga saw a brief resurgence beginning in the early 1900s, mostly with mining that resumed at the Silver Ledge, Silver Crown, and Bonanza Boy groups of mines and construction of a new mill by the Ledge Mining and Milling Company in 1902. Construction of the mill was made possible when portions of the Mountain Chief and Wonderful mill sites were sold to the Ledge Mining and Milling Co. for $500 (San Juan County Courthouse, County Clerk's Office, Book 85, Page 481). This provided sufficient space for the new Silver Ledge Mill to be constructed in May 1902, the earlier mill having been destroyed by fire (*Durango Semi-Weekly Herald,* January 6, 1902:1; *Silverton Standard*, March 22, 1902:1; May 7, 1902:1). The completed mill and its associated buildings extended onto portions of the two claims from the north. The company then had a Mineral Survey Plat (MS 16099) prepared for the Columbine Mill Site (and associated Oriental Lode) on December 7, 1902 in preparation for obtaining a Mineral Entry Patent for the claims. The Silver Ledge Mill was mostly on the Columbine Mill Site (patented on June 30, 1904), which fit like a puzzle piece along the northern sides of the Mountain Chief and Wonderful Mill sites. Construction of the mill was not enough to prevent the Silverton Railroad from failing on November 3, 1904 and being reorganized as the Silverton Railway (Nossaman 1974; Archimede 2004).

Work continued on the Bonanza Boy group of claims under lease to Edward Fiant in 1905, which shipped a carload of high-grade lead ore to the smelter in Durango (*Silverton Standard*, July 22, 1905:1; December 16, 1905:1; *Rocky Mountain News* [Denver], December 21, 1905:6). The Telescope Mountain Mining Company appeared in the area in 1905. They were a group of investors from Colorado Springs headed by M. A and T. E. Norton (*Silverton Weekly Miner and San Juan Democrat*, December 29, 1907:1). They filed Amended Location Certificates for several mining claims near those of the Bonanza Boy Group in July and August 1905. They had a Mineral Survey done for those claims on October 31, 1906 (MS 18179) and were granted a Mineral Patent for them on October 8, 1908. To further consolidate their holdings in the area, they acquired the Bonanza Boy group of claims from Fiegle in 1906 or 1907, giving them 16 patented mining claims and the Bonanza Boy Mill Site. Work on the claims was done under the supervision of H. A. Miller of Silverton into the summer of 1908 (*Silverton Weekly Miner and San Juan Democrat*, May 3, 1907:4; *Silverton Standard*, December 21, 1907:1; April 18, 1908:3; May 16, 1908:1, June 6, 1908:1). The economic downturn of 1907 and reduced mineral prices resulted in most of the mines of the area shutting down, including those owned by the Telescope Mining Company. Some mining resumed in late 1912, but it was not until mineral prices rebounded with the onset of World War I that mining resumed. Manager C. B. Sheehan, assisted by F. B. Shinkle began doing development work on the claims in preparation for a lease to Pete Olsen and associates and Robert Sawyer and associates. Mining continued into 1918, but ceased at the end of the war when mineral prices dropped again (*Silverton Weekly Miner and San Juan Democrat*, December 22, 1912:1; *Silverton Weekly Miner*, July 20, 1917:1; *Silverton Standard*, July 21, 1917:1; *Rocky Mountain News* [Denver], May 12, 1918:13).

Otto Mears regained control of the Silverton Railway in 1909, but, after World War I, mining never resumed in the Red Mountain Mining District to the point of making the railroad profitable. The Silver Ledge Mill was destroyed by fire in 1917 and was replaced by ore loading facility on the railroad. The railroad ceased operations in 1921 and was abandoned on June 17, 1922 (Nossaman 1974; Archimede 2004).

The Telescope Mountain Mining Company group of claims passed to the Mineral Creek Mining Company in 1926. The new company was also investors from Colorado Springs. N. R. Taylor was president, F. B. Shinkle was vice president and M. J. Griffin was the secretary-treasurer; Shinkle served as the mine manager (*Silverton Standard*, October 2, 1926:1; May 12, 1928:1). The new company took out a loan to finance mining of the property on February 1, 1930, but was unable to make payments on the loan and also failed to make tax payments for the property for 1929 and 1930. As a result, Raymond H. Doud, the public trustee for San Juan County planned to sell the property to cover the debts on January 11, 1932 (*Silverton Standard*, December 12, 1931:2). The company seems to have come up with sufficient payments to avoid loss of the property, but then failed to pay taxes from 1932 to 1938 (*Silverton Standard and the Miner*, December 15, 1939:6). No work seems to have been attempted at the claims of the Mineral Creek Mining Company after the early 1930s, and no development ever took place on the Bonanza Boy Mill Site.

PREVIOUS WORK

A file search was requested from Office of Archaeology and Historic Preseravation for the Bonanza Boy Mill Site area on October 9, 2023. Numerous previous projects and cultural resources sites have been recorded in the vicinity of the project area, but only two projects and one site are pertinent to the current project. In 2003, Alpine conducted an inventory for a transmission line realignment in the Chattanooga area for the San Miguel Power Association (Archimede 2004). This resulted in the recordation of the alignment of the Silverton and Red Mountain Toll Road through the Bonanza Boy Mill Site as 5SA1089.1. It was subsequently renumbered as 5SA113.3, and recorded with its proper number (5SA823.3) by ERO Resources during their 2020 inventory of the Red Mountain 44-kV Transmission Line for San Miguel Power Association (Croll and Larmore 2020). No other archaeological work has been done within the boundaries of the Bonanza Boy Mill Site.

PROJECT OBJECTIVES

The primary objective of the cultural resource inventory was to locate and assess the significance of historical and archaeological properties in the project areas so that significant sites can be adequately considered under the various applicable cultural resource laws. This step is intended to aid in the preservation of significant cultural resources or to facilitate the formation of appropriate mitigative strategies. This objective was accomplished, first, by conducting site file searches and literature reviews and, second, by conducting an intensive pedestrian survey of the project area. Recommendations regarding the significance of the cultural resources found during the project are made using the criteria for determining eligibility for inclusion on the National Register of Historic Places (NRHP). The historic preservation laws mandating this cultural resource study specifically identify eligibility for inclusion on the NRHP as the key factor in determining preservation needs. The criteria for assessing site significance, as published in the U.S. Government Code of Federal Regulations (36 CFR 60) read as follows:

National Register criteria for evaluation. The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and

A. that are associated with events that have made a significant contribution to the broad patterns of our history; or

B. that are associated with the lives of persons significant in our past; or

C. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. that has yielded, or may be likely to yield, information important in prehistory or history.

Identification and evaluation of cultural resources in the project area permit formulation of management recommendations (Church et al. 2007; Reed and Metcalf 1999). Isolated finds do not meet the criteria for inclusion on the NRHP and are not recommended for further archaeological treatment. Management options for significant sites include site avoidance and data recovery.

PROJECT METHODS

The entire Bonanza Boy Mill Site area was inventoried by two archaeologist walking parallel transects spaced no more than 50 ft. (15 m) apart. When artifacts or cultural features were encountered, the surrounding area was examined to determine whether a site or an isolated find was represented. Sites were defined as five or more artifacts, in relatively close proximity to one another, exceeding 50 years old. Sites may also encompass features, structures, rock art, or facilities that lack artifacts, exceeding 50 years old. Loci with four or fewer artifacts were classified as isolated finds. All cultural resources were evaluated for eligibility for the NRHP in terms of the specific criteria presented in the preceding section. Discovered cultural resources were recorded with a Minno Android tablet paired with a high accuracy geode Global Positioning System (GPS) receiver unit, and locations were plotted on a USGS quadrangle map. The same tablet and GPS unit was used to collect points used to create site maps. The single recorded site was photographed with a digital camera to illustrate its condition and augment descriptions. No artifacts were collected during the project. A map showing the site location is included as Appendix A and the site form is in Appendix B.

SITE DESCRIPTION

5SA823.3 – Silverton and Red Mountain Toll Road

Site 5SA823.3 is a 4,530-ft.-long (1,380-m-long; 0.86-mile-long) section of the Silverton and Red Mountain Toll Road; 1,200 ft. (375 m; 0.2 miles) of which passes through the Bonanza Boy Mill Site (Figure 4). The linear resource has been recorded previously on two other occasions. It was initially recorded by Alpine in 2002 (Archimede 2003) as site 5SA1089.1 and noted as the Silverton San Juan Toll Road. It was subsequently renumbered by History Colorado as 5SA113.3. The 5SA113 number is for the Million Dollar Highway, US Highway 550, which it is not. In 2020, ERO Resources rerecorded the entire segment and gave it its appropriate site number of 5SA823.3 (Croll et al. 2020). The 1903 Mineral Survey Plat for the Bonanza Boy Mill Site (Figure 5) and USGS maps from 1897, 1902, and 1955 (Figure 6 to Figure 8) show the road on the same route as 5SA823.3. The segment begins on the western side of US Highway 550 where it crosses at a historic bridge and runs westward, turns northward, and then winds north-northeastward to where it again intersects US Highway 550. On this north-northeastern leg through the Bonanza Boy Mill Site the road appears as a 16-ft.-wide, cut-and-fill dirt road with cuts up to 3 ft. deep and fill up to 1–3 ft. high (Figure 9 to Figure 15). The route is on a gentle grade that is mostly overgrown with grass a variety of forbs, including yarrow and strawberry, and moss where persistent moisture exists. As a result of disuse, willows are reclaiming the roadbed and cover the road in places. As the road approaches US Highway 550 on its northern end, the road serves as a turnoff from the highway that accesses a dirt driveway heading southeast to some rental cabins outside the boundaries of the Bonanza Boy Mill Site. Before reaching the highway, the road crosses a filled and partly flattened former culvert made of a 16-ft.-long section of riveted steel pipe. The road has clearly been widened and graded in the distant pass, probably for use by automobiles prior to the existence of the Million Dollar Highway and US Highway 550.

National Register Recommendation

No changes have taken place to the section of the Silverton and Red Mountain Toll Road since it was last recorded as 5SA823.3 in 2020 (Croll et al. 2020). The segment was officially determined to be a contributing element of the Silverton and Red Mountain Toll Road as a whole in October 2020. Alpine agrees with the determination.

Management Recommendations

The north-northeastern portion of the road is being used as a turnoff from US Highway 550. Its continued use as such would not be an adverse effect. The road within the Bonanza Boy Mill Site was widened and graded at some time in its past, prior to the existence of the Million Dollar Highway/US Highway 550. Removal of vegetation along its route and use of the roadbed as a road on private land within the mill site boundaries without further widening would also not be an adverse impact to the route. Outside of the mill site, on land administered by the San Juan National Forest, the southern portion of the road, including the bridge across Mineral Creek, should be avoided. As a result, no further work is recommended for the portion of the Silverton and Red Mountain Toll Road within the boundaries of the Bonanza Boy Mill Site.

SUMMARY

The inventory of the Bonanza Boy Mill site resulted in the documentation of one previously recorded section of the historic Silverton and Red Mountain Toll Road (5SA823.3). The toll road section has been previously determined to be officially eligible for inclusion in the NRHP. Because the northern portion of the road is being used as a turnoff from US Highway 550, its continued use as such would not be an adverse effect. The road through the Bonanza Boy Mill Site was widened and graded at some time in its past, prior to the existence of the Million Dollar Highway/US Highway 550. Removal of vegetation along its route and use of the roadbed as a road without further widening would also not be an adverse impact to the route. As a result, no further work is recommended for the portion of the Silverton and Red Mountain Toll Road within the boundaries of the Bonanza Boy Mill Site.

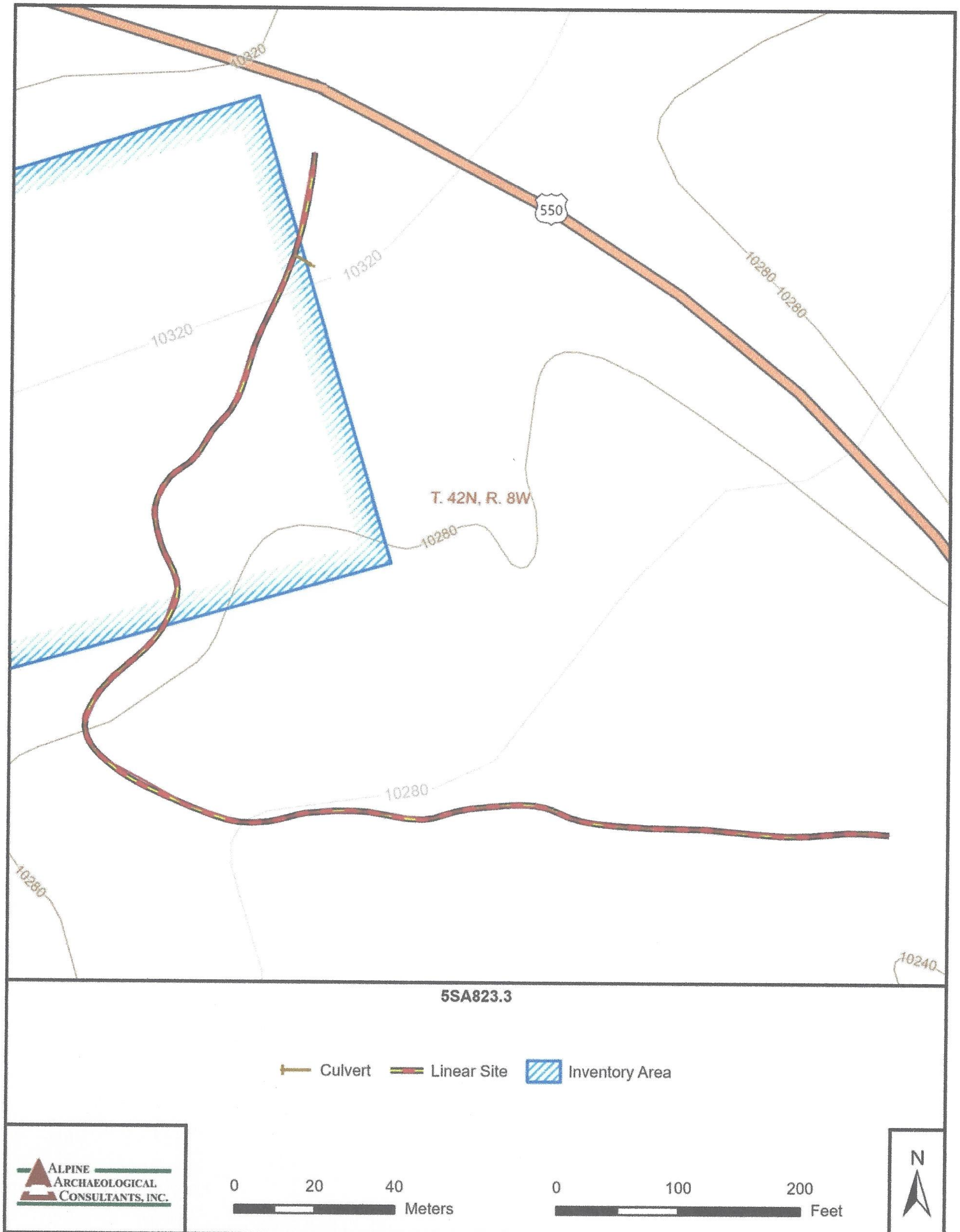


Figure 4. Map of the Silverton and Red Mountain Toll Road (5SA823.3).

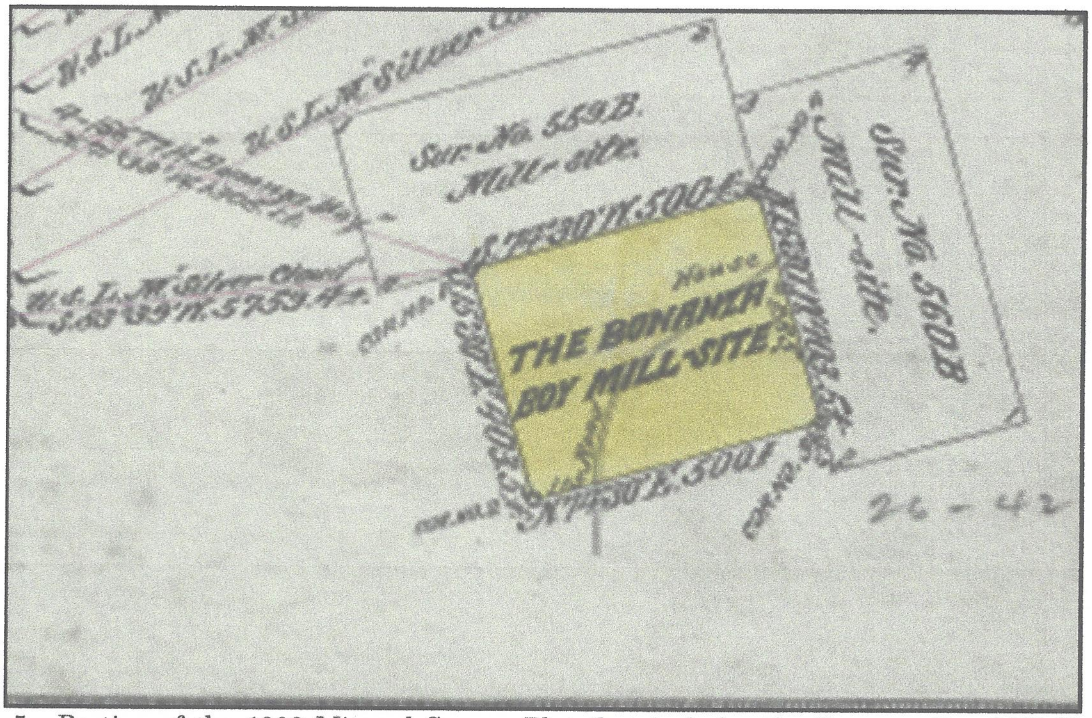


Figure 5. Portion of the 1903 Mineral Survey Plat that includes the Bonanza Boy Mill Site (MS 16677B) showing the Silverton and Red Mountain Toll Road passing through the property. Note the adjacent mill sites: MS 559B (Wonderful Mill Site) and MS 560B (Mountain Chief). The "House" label is for a building on the Mountain Chief Mill Site.

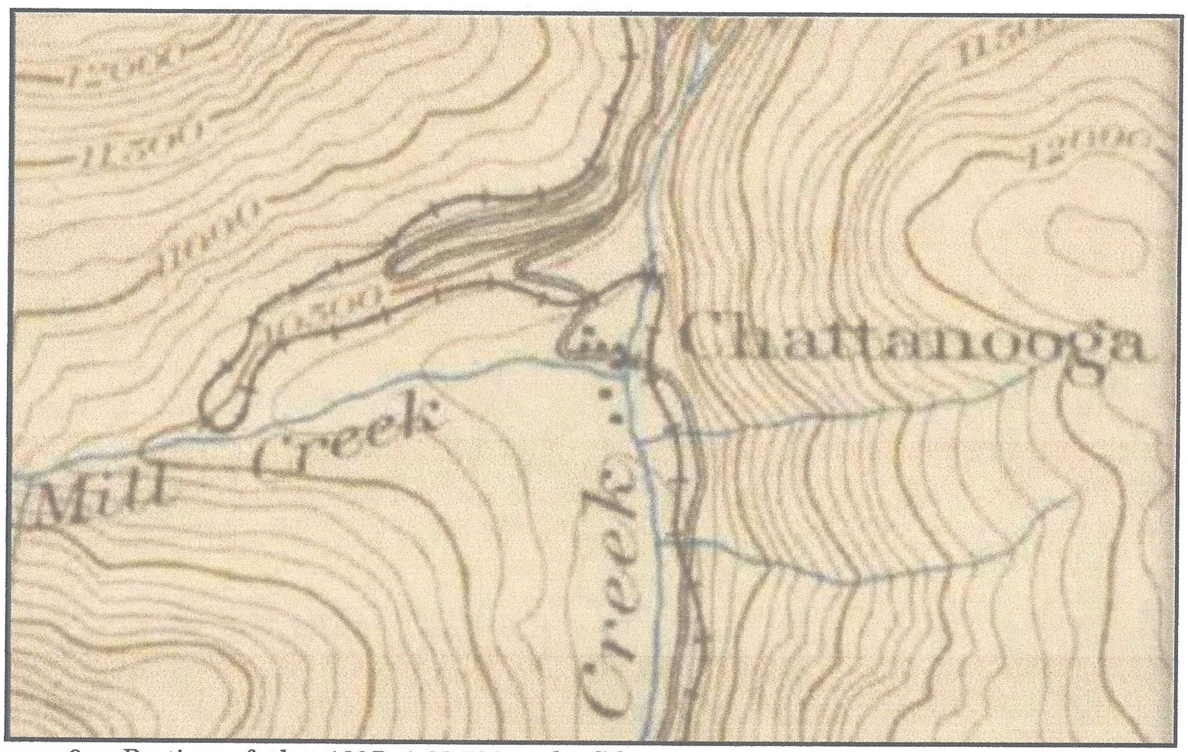


Figure 6. Portion of the 1897 1:62,500-scale Silverton map, showing the section of road at Chattanooga.

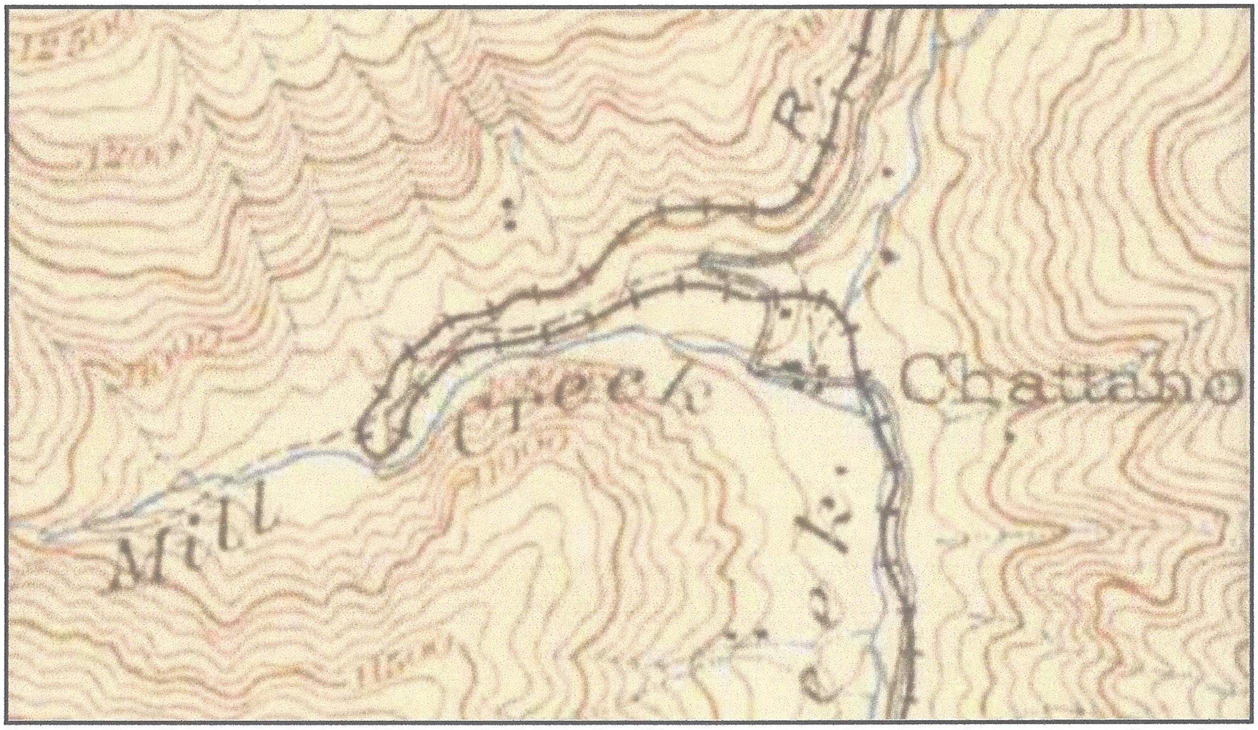


Figure 7. Portion of the 1902 1:62,500-scale Silverton map showing the section of road at Chattanooga.

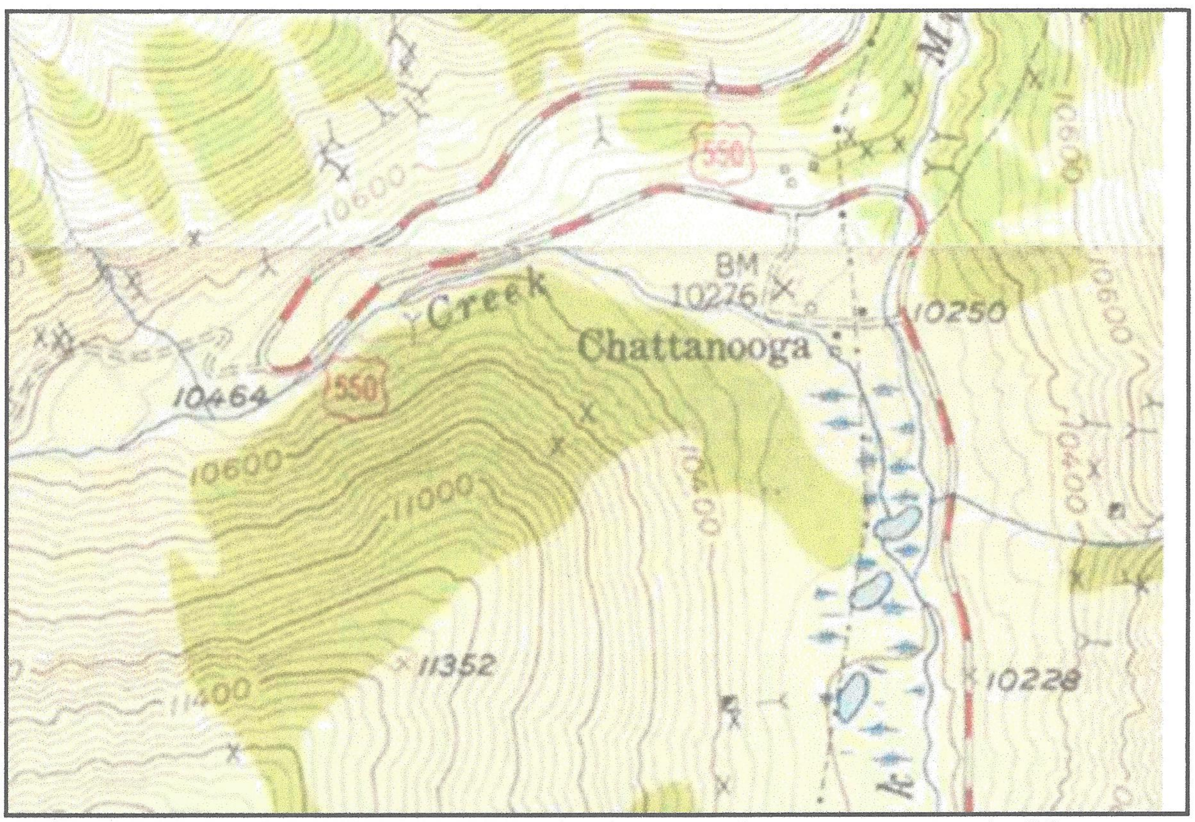


Figure 8. Portions of the 1955 1:24,000-scale Ironton and 1955 1:24,000-scale Silverton maps showing the section of road at Chattanooga with US Highway 550 bypassing it.

Figure 9. Southern end of the road section within the Bonanza Boy Mill Site, looking southwest. Note willows and grasses growing up through roadbed.

Figure 10. Curve in the southern portion of the road segment within the Bonanza Boy Mill Site showing the cut-and-fill construction, looking north-northeast.

Figure 11. The central portion of the road segment within the Bonanza Boy Mill Site passing through a gap in the willows. View is to the south.

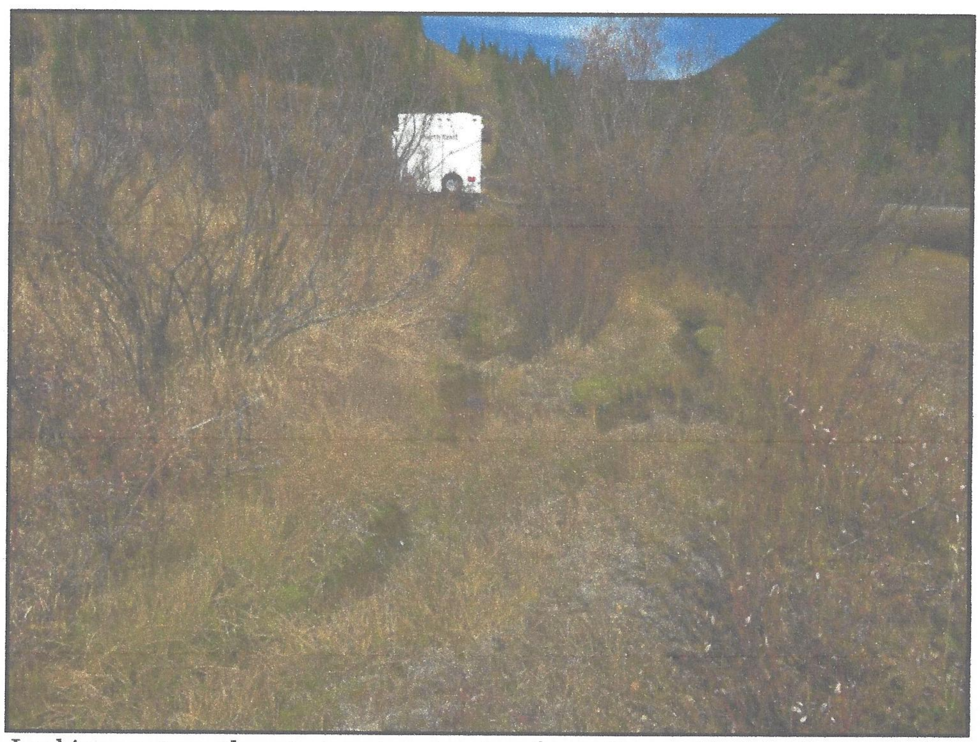


Figure 12. Looking east northeast at water running down the roadbed in the central portion of the road section in the Bonanza Boy Mill Site.

Figure 13. Looking south from US Highway 50 along the northern portion of the recorded road section. The trailer is on the road route and a driveway to the cabins is to the left.

Figure 14. The northern end of the road segment in the Bonanza Boy Mill Site looking north toward US Highway 550 with the Silver Ledge Mill ore tipple across the highway to the left. The culvert is visible on the right side of the road.

Figure 15. Riveted pipe culvert in the northern portion of the recorded road, looking northwest.

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1940 November 29:6
1943 February 19:3

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1891 January 24:3
1900 December 29:8

1902 March 22:1; May 7:1
1903 February 21:1
1905 July 22:1; December 16:1
1907 December 21:1
1908 April 18:3; May 16:1; June 6:1
1917 July 21:1
1926 October 2:1
1928 May 12:1
1931 December 12:2

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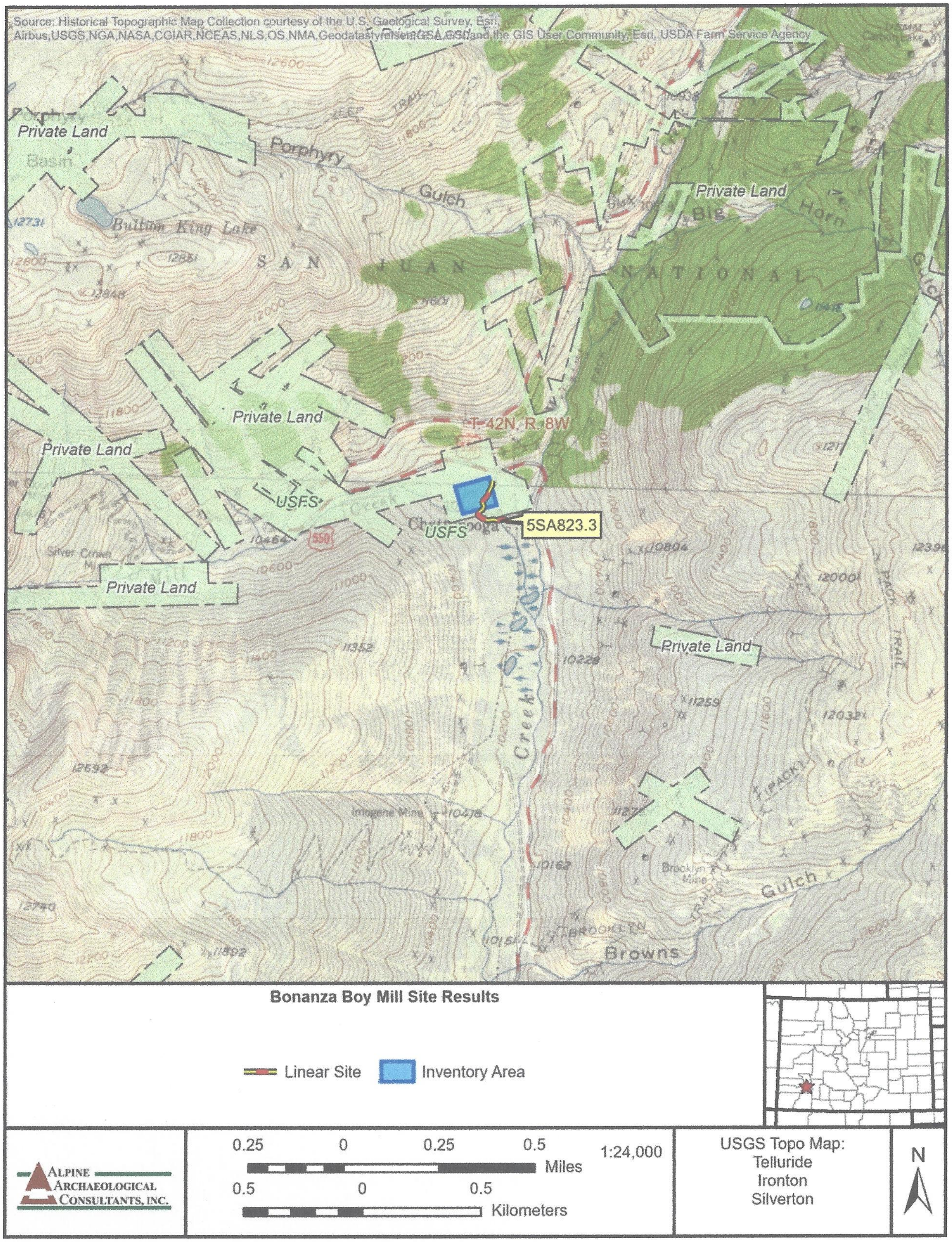

Source: Historical Topographic Map Collection courtesy of the U.S. Geological Survey, Esri, Airbus,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,Geodatastyrelsen,GSA,GSI and the GIS User Community, Esri, USDA Farm Service Agency
Private Land
Private Land
Private Land
Private Land
Private Land
Private Land
Porphyry
Gulch
Bullion King Lake
SAN JUAN NATIONAL
Big Horn
T 42N, R. 8W
USFS
USFS
5SA823.3
Imogene Mine
Brooklyn Mine
Browns Gulch
Creek
Silver Crown Mi
Bonanza Boy Mill Site Results
Linear Site
Inventory Area
0.25 0 0.25 0.5 Miles
0.5 0 0.5 Kilometers
1:24,000
USGS Topo Map:
Telluride
Ironton
Silverton
N
ALPINE ARCHAEOLOGICAL CONSULTANTS, INC.

COLORADO CULTURAL RESOURCE SURVEY

Cultural Resource Re-Visitation Form

A Re-Visitation Form can only be used when a Management Data Form and component forms have been previously filed with the land managing agency and/or the Colorado Office of Archaeology and Historic Preservation and no substantive changes to the character of the site are required as a result of the current re-visitation. Please use the Management Data Form and supporting forms (archaeological component, linear, vandalism, etc.) when changes are required to:

- Site type
- Linear resources
- Additional artifact assemblages and/or features
- Boundary size
- Vandalism
- NRHP recommendations

Official determination (OAHP use only)

☐ Determined Eligible NR\SR
☐ Determined Not Eligible NR\SR
☐ Nominated
☐ Need Data NR\SR
☐ Contributing to NR Dist.\SR Dist.
☐ Not Contributing to NR Dist.\SR Dist.
☐ Supports overall linear eligibility NR\SR
☐ Does not support overall linear eligibility NR\SR

1. **Resource Number**: 5SA823.3 2. **Temporary Resource Number**: NA
3. **Resource Name**: Silverton and Red Mountain Toll Road
4. **Project Name/Number**: Bonanza Boy Mill Site
5. **Government Involvement**: ☐ Local ☐ State ☒ Federal
   Agency: US Army Corps of Engineers
6. **Site Categories**: (Check as many as apply)
   Prehistoric: ☐ Archaeological site ☐ Paleontological site
   In existing National Register District? ☐ Yes ☐ No Name:
   Local Landmark? ☐ Yes ☐ No Name:
   Historic: ☐ Archaeological site ☐ Building (s) ☒ Structure(s) ☐ Object(s)
   In existing National Register District? ☐ Yes ☒ No Name:
   Local Landmark? ☐ Yes ☒ No Name:
7. **Owner(s) Name and Address**: Bonanza Boy, LLC, PO Box 3387, Telluride, Colorado 81435 and San Juan National Forest, 15 Burnett Court, Durango, Colorado 81302
8. **Was the site relocated?** ☒ Yes ☐ No If no, why? (100% collected in previous recording, ground disturbance, etc.)
9. **Previous recordings**: Archimede 2003 as 5SA1089.1, changed to 5SA113.3 and correctly identified and rerecorded as 5SA323.3 by ERO Resources Corporation in 2020.
10. **Most recent National Register Eligibility Assessment**: ☒ Eligible ☐ Not Eligible ☐ Need Data
    Explain: Contributing segment of the Silverton and Red Mountain Toll Road as a whole.
11. **Listed on Register**: ☐ National ☐ State ☒ None
    Date Listed:
12. **Condition (describe)**: Good. Overgrown with willow and other low vegetation.
13. **Threats to Resource**: ☐ Water Erosion ☐ Wind Erosion ☐ Grazing ☐ Neglect ☐ Vandalism ☐ Recreation ☒ Construction ☐ Other (specify):
14. **Existing Protection**: ☒ None ☐ Marked ☐ Fenced ☐ Patrolled ☐ Access controlled ☐ Other (specify):
    Comments:
15. **Recorder's Management Recommendations**: No further historical or archaeological work.

Cultural Resource Re-Visitation Form

Resource Number: 5SA823.3 **Temporary Resource Number:** NA

16. **Known Collections, Reports, or Interviews:**

Archimede, Gianfranco
2004 Cultural Resource Inventory of a Proposed Power Transmission Line Realignment in the Chattanooga Vicinity, San Juan National Forest, Columbine Ranger District, San Juan County, Colorado. Prepared by Alpine Archaeological Consultants, Inc., Montrose, Colorado. Prepared for San Miguel Power Association, Inc., Telluride, Colorado. On file at the Office of Archaeology and Historic Preservation, History Colorado, Denver.

Croll, Kathy, and Sean Larmore
2020 Cultural Resource Survey, Red Mountain 44 kV Transmission Line Rebuild Project, San Juan and Ouray Counties, Colorado. ERO Resources Corporation, Denver and Durango, Colorado. Prepared for San Miguel Power Association, Telluride, Colorado. On file at the Office of Archaeology and Historic Preservation, History Colorado, Denver.

17. **Site Description/Update:** Site 5SA823.3 is a 4,530-ft.-long (1,380-m-long; 0.86-mile-long) section of the Silverton and Red Mountain Toll Road, 1,200 ft. (375 m; 0.2 miles) of which passes through the Bonanza Boy Mill Site; it has been recorded previously on two other occasions. It was initially recorded by Alpine in 2002 (Archimede 2003) as site 5SA1089.1 and noted as the Silverton San Juan Toll Road. It was subsequently renumbered as 5SA113.3. The 5SA113 number is for the Million Dollar Highway, US Highway 550, which it is not. In 2022, ERO Resources rerecorded the entire segment and gave it its appropriate site number of 5SA823.3 (Croll et al. 2020). The 1903 Mineral Survey Plat for the Bonanza Boy Mill Site and USGS maps from 1897, 1902, and 1955 show the road on the same route as 5SA823.3. The segment begins on the western side of US Highway 550 at a historic bridge crossing and runs westward, turns northward, and then winds north-northeastward to where it again intersects US Highway 550. On this north-northeastern leg through the Bonanza Boy Mill Site the road appears as a 16-ft.-wide cut-and-fill dirt road with cuts up to 3 ft. deep and fill up to 1–3 ft. high. The route is on a gentle grade that is mostly overgrown with grass a variety of forbs, including yarrow and strawberry, and moss where persistent moisture exists. As a result of disuse, willows are reclaiming the roadbed and cover the road in places. As the road approaches US Highway 550 on its northern end, the road serves as a turnoff from the highway that access a dirt driveway heading southeast to some rental cabins outside the boundaries of the Bonanza Boy Mill Site. Before reaching the highway, the road crosses a filled and partly flattened former culvert made of a 16-ft.-long section of riveted steel pipe. The road has clearly been widened and graded in the distant pass, probably for use by automobiles prior to the existence of the Million Dollar Highway and US Highway 550.

18. **Photograph Numbers:** BB-JH-1: exp. 1-7
Digital files at: Alpine Archaeological Consultants, Inc.

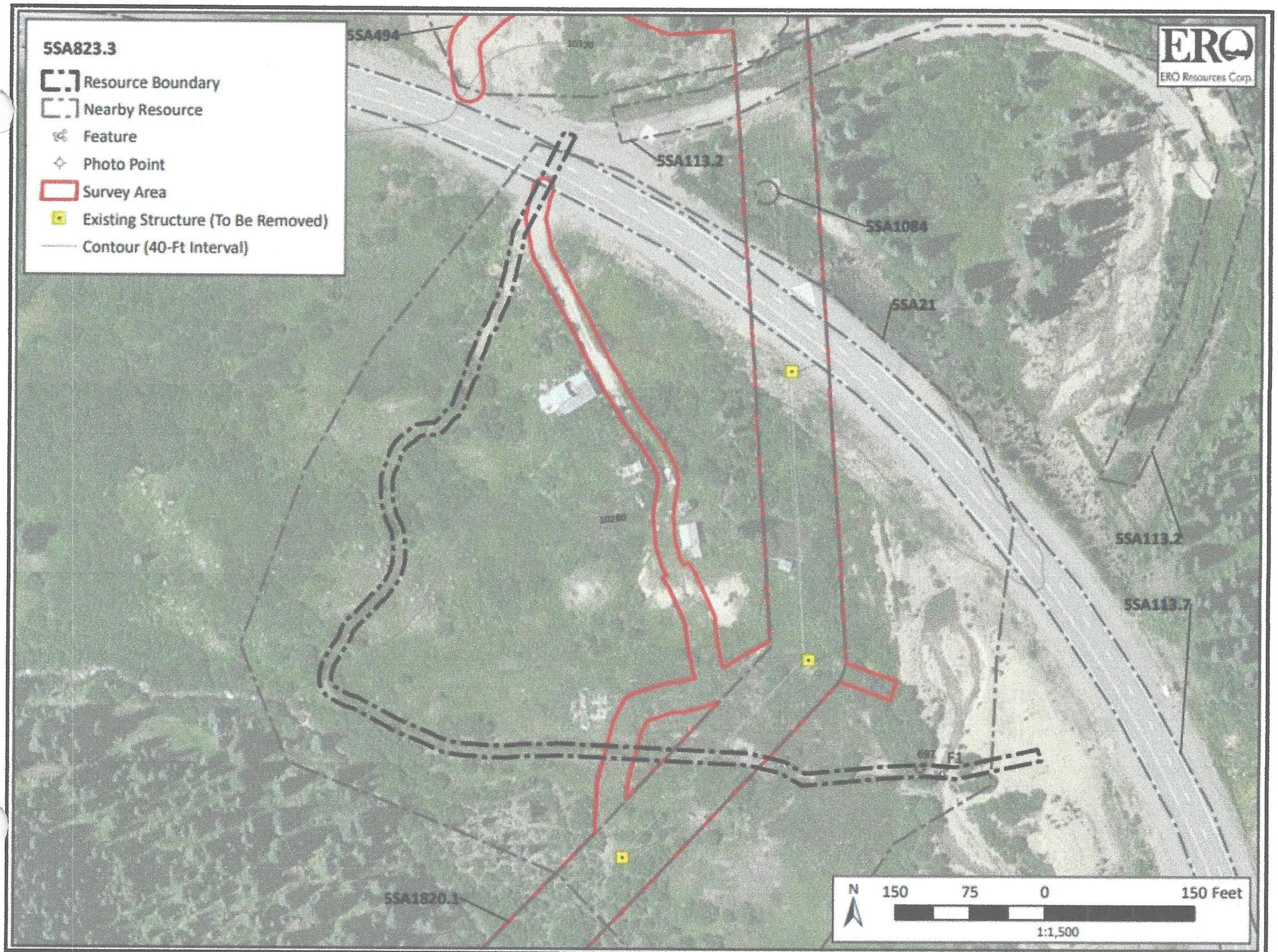
19. **Artifact and Field Documentation Storage Location:** Field notes on file at Alpine Archaeological Consultants, Inc.

20. **Report Title:** Horn, Jonathon C.
2023 Cultural Resource Inventory of the Bonanza Boy Mill Site, San Juan County, Colorado. Alpine Archaeological Consultants, Inc., Montrose, Colorado.

21. **Recorder(s):** Jon Horn and Charlie Seevers
Date: 10/18/2023

22. **Recorder Affiliation:** Alpine Archaeological Consultants, Inc.
Phone Number/Email: (970) 249-6761/sites@alpinearchaeology.com

Note: Please attach a sketch map, a photocopy of the USGS quad. map indicating resource location, and photographs.



Map of 5SA823.3 by ERO from their 2020 recording.

Bonanza Boy Mill Site Results

Linear Site   Inventory Area

0.25 0 0.25 0.5 Miles

0.5 0 0.5 Kilometers

1:24,000

USGS Topo Map:
Telluride
Ironton
Silverton

N

ALPINE ARCHAEOLOGICAL CONSULTANTS, INC.

CONTAINS PRIVILEGED INFORMATION – DO NOT DISTRIBUTE

San Juan National Forest Project No. 24-08003
OAHP Project No. SA.FS.R34

CULTURAL RESOURCE INVENTORY OF FOREST SERVICE ROAD 821, SAN JUAN COUNTY, COLORADO

by

Jonathon C. Horn
Principal Investigator

Alpine Archaeological Consultants, Inc.
P.O. Box 2075
Montrose, Colorado 81402-2075

Prepared for

Bonanza Boy, LLC
PO Box 3387
Telluride, Colorado 81435

Under the conditions of
U.S. Forest Service Permit No. R2CRM029
(expires December 31, 2026)

December 2023

ABSTRACT

Alpine Archaeological Consultants, Inc. (Alpine) was hired by Bonanza Boy, LLC of Telluride, Colorado, to conduct a cultural resource inventory of the Forest Service Road 821 from US Highway 550 to and just beyond the Silver Crown Mine (5SA407) in San Juan County, Colorado. The project is on San Juan National Forest and private land. The work was done because Bonanza Boy, LLC is planning to develop the Silver Crown Mine. They will use the road to access the mine, plan to do a short reroute of the road past the mine, and will make some minor road improvements, such as water bars on a section of the road above the mine. Although changes to the road will take place on private land in close proximity to the mine, the US Forest Service requested that the road be inventoried from its point of beginning from US Highway 550 to a point above the mine where water bars will be dug. The road was inventoried to a width of 50 ft. on either side of the road for 3,505 ft. (0.66 miles) plus a small area at the road reroute just north of the mine. In all, 10.3 acres were inventoried: 7.7 acres of USFS land and 2.6 acres of private land. At the request of the USFS, the road was recorded as site 5SA1876. All of the sites encountered in the project area were recorded on appropriate Colorado State Site Forms. The Silver Crown Mine (5SA407) has been previously determined to be officially eligible for inclusion in the National Register of Historic Places (NRHP); Alpine's rerecordation in June 2023 confirmed this status, and the current visit did not change this recommendation. Mine sites 5SA406 and 5SA468 had been previously determined not NRHP eligible, and the revisitation to those sites confirms that status. The Silverton & Red Mountain Railroad grade (5SA112) has been previously determined to be NRHP eligible. The newly recorded sections of grade (5SA112.15 and .16) are considered to contribute to the overall eligibility of the site. A newly recorded mine prospect (5SA1875) was also recorded and is recommended as not NRHP eligible. Finally, the segment of Forest Service Road 821 (5SA1876.1) was newly recorded and is not recommended as NRHP eligible. No further historical or archaeological work is recommended for any of the sites revisited or newly recorded for the project.

History Colorado-Office of Archaeology and Historic Preservation
COLORADO CULTURAL RESOURCE SURVEY
Cultural Resource Survey Management Information Form

I. PROJECT SIZE

Federal acres of potential effect/project:	7.7	Acres surveyed:	7.7
State acres of potential effect/project:	0	Acres surveyed:	0
Private acres of potential effect/project:	2.6	Acres surveyed:	2.6
TOTAL:	10.3	TOTAL:	10.3

II. PROJECT LOCATION

County(ies):	San Juan
USGS Quad Map(s):	Ironton, Colo. 1955 (1984)
Principal Meridian(s):	NM
	Unsurveyed

Township	42N	Range	8W	Section		¼	¼	¼	¼		
Township		Range		Section		¼	¼	¼	¼		
Township		Range		Section		¼	¼	¼	¼		
Township		Range		Section		¼	¼	¼	¼		

III. SITES

Smithsonian Number	Resource Type				Eligibility					Effect			Management Recommendations						
	Prehistoric	Historic	Paleontological	Unknown	Eligible	Not Eligible	Need Data	Contributes to a District	Supporting Segment	N/A (not a hist. prop.)	No Adverse Effect	Adverse Effect	No Further Work	Preserve/ Avoid	Monitor	Test	Excavate	Archival Research	Other
5SA406		X				X				X			X						
5SA407		X			X						X		X	X					
5SA468		X				X				X			X						
5SA112.15		X			X				X		X		X	X					
5SA112.16		X			X				X		X		X	X					
5SA1875		X				X				X			X						
5SA1876.1		X				X				X			X						

IV. ISOLATED FINDS

Smithsonian Number	Resource Type			
	Prehistoric	Historic	Paleontological	Unknown

Smithsonian Number	Resource Type			
	Prehistoric	Historic	Paleontological	Unknown

See Appendix A Map

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INTRODUCTION

Bonanza Boy, LLC of Telluride, Colorado, is planning the recreational development on the site of the Silver Crown Mine (site 5SA407) in San Juan County, Colorado. The mine is accessed from US Highway 550 westward on Forest Service Road 821, which continues beyond the mine to the Silver Cloud Mine. As part of the project, a section of the road immediately north of the Silver Crown Mine will be rerouted so that road traffic intending to continue beyond the mine can do so without entering the area where the new development will occur. This reroute is on private land. A short distance beyond the mine, the road will be improved with water bars to prevent erosion. These improvements will be on land administered by the San Juan National Forest. Because Forest Service Road 821 is part of the US Forest Service travel system and winds in and out of private and US Forest Service land, Bonanza Boy, LLC was asked to have an archaeological inventory done of the road from its point of origin on the western side of US Highway 550 to a point beyond the Silver Crown Mine where road improvements will be made. The Area of Potential Effect (APE) for the project is a corridor 50 ft. on either side of the road centerline. Because the road is part of the US Forest Service travel system and crosses federal land, various cultural resource laws apply. Federal mandates for the examination of the project area include the Section 106 (54 U.S.C. § 306108) of the National Historic Preservation Act of 1966 (54 U.S.C. § 300101 et seq.) (as amended), the Archaeological and Historic Preservation Act of 1974, the Federal Land Policy and Management Act of 1976, the Archaeological Resource Protection Act of 1979 (as amended), the Native American Graves and Repatriation Act, and the procedures of the Advisory Council on Historic Preservation (36 CFR 800). These laws require that all cultural resources be identified prior to planned development and are intended to ensure that significant prehistoric and historical cultural resources important to our national heritage are not inadvertently harmed or destroyed by federally initiated or authorized actions. To meet the historic preservation law requirements, Alpine Archaeological Consultants, Inc. (Alpine) was hired by Bonanza Boy, LLC to conduct a conduct a file search and Class III cultural resource inventory of the parcel. The San Juan National Forest Archaeologist specifically requested that the road be recorded as a historical site. Fieldwork was conducted by Jonathon C. Horn, Principal Investigator, assisted by Charlie Seevers on October 18, 2023. Horn returned to the project area on November 12, 2023 to do additional photography and further investigate the Silverton & Red Mountain Railroad grade. The work was done under the auspices of U.S. Forest Service Permit No. R2CRM029. No artifacts were collected during the project.

PROJECT LOCATION AND ENVIRONMENTAL SETTING

The project area is within the southern Rocky Mountains physiographic province of western Colorado (Figure 1). It is mostly on a steep, rocky, southeast-facing slope on the northern side of Mill Creek, a tributary of Mineral Creek just west of the former town of Chattanooga. Forest Service Road 821 is a dirt road that begins on the western end of a major curve on US Highway 550 at the southern base of Red Mountain Pass (Figure 2). This is 6 miles northwest of Silverton and 2.5 miles southwest of Red Mountain Pass. At its point of origin at US Highway 550, the road is at an elevation of 10,250 ft. It climbs on a consistent moderately steep grade in a winding westerly direction to an elevation of 10,800 ft. at the Silver Crown Mine and continues northward for a short distance to the end of the inventory area at 10,900 ft. Geologically, the project area is heavily mineralized tertiary igneous rocks of intra ash flow andesitic lavas within the Silverton caldera (Tweto 1979). Vegetation includes willow, spruce, aspen, common juniper, strawberry, corn lily, currant, thistle, raspberry, elderberry, columbine, dandelion, and other forbs.

PREHISTORIC AND HISTORICAL BACKGROUND

The earliest inhabitants of western Colorado were representatives of the Paleoindian era, who inhabited North America during the period of transition from the Pleistocene to the Holocene between 13,400 and 7,500 BP. The era has traditionally been identified by a number of distinctive, diagnostic lanceolate projectile points and tool assemblages indicative of a big game hunting economy by what have been termed the Clovis, Goshen, Folsom, and Plano traditions. The subsequent Archaic stage

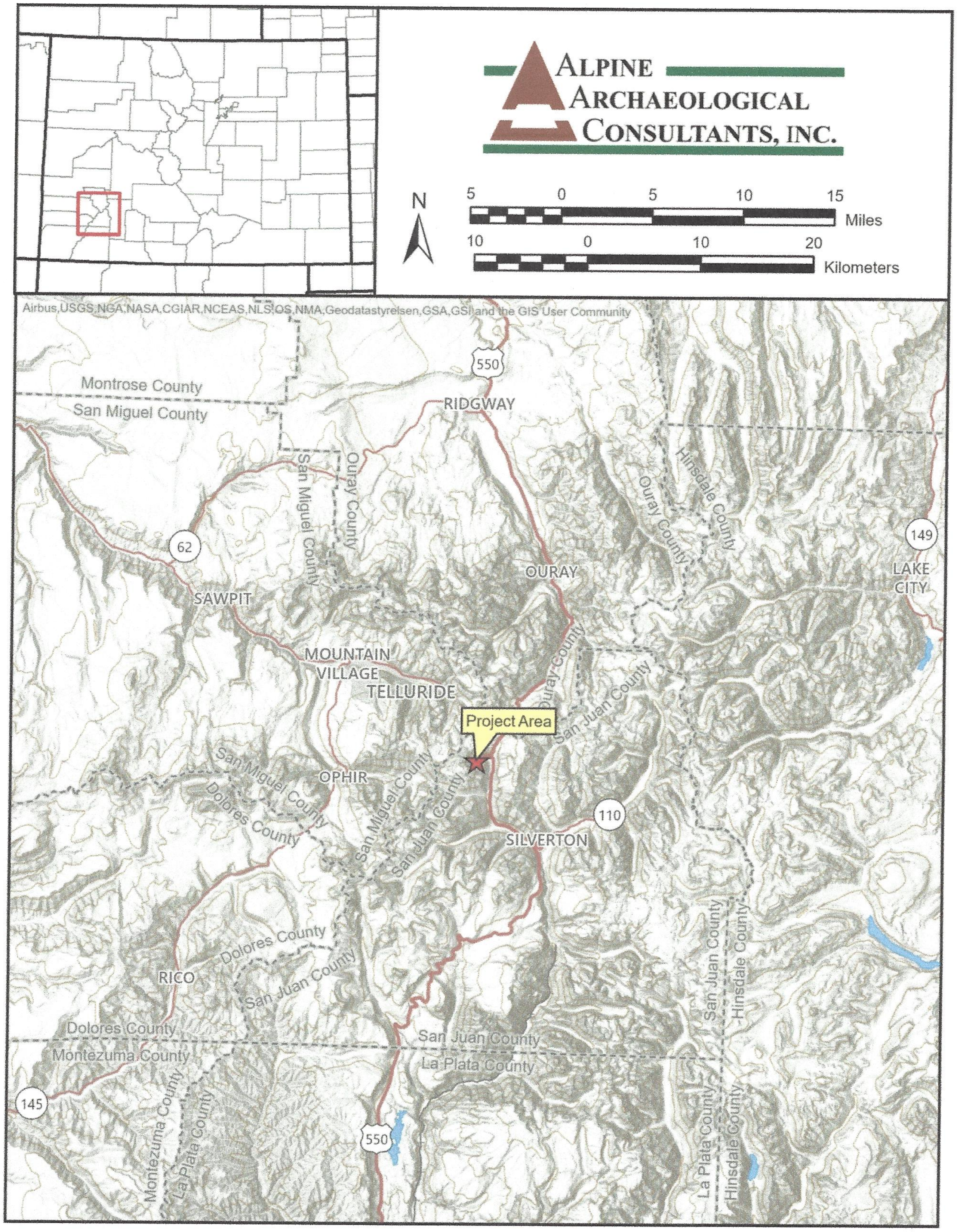

Figure 1. Project area location.

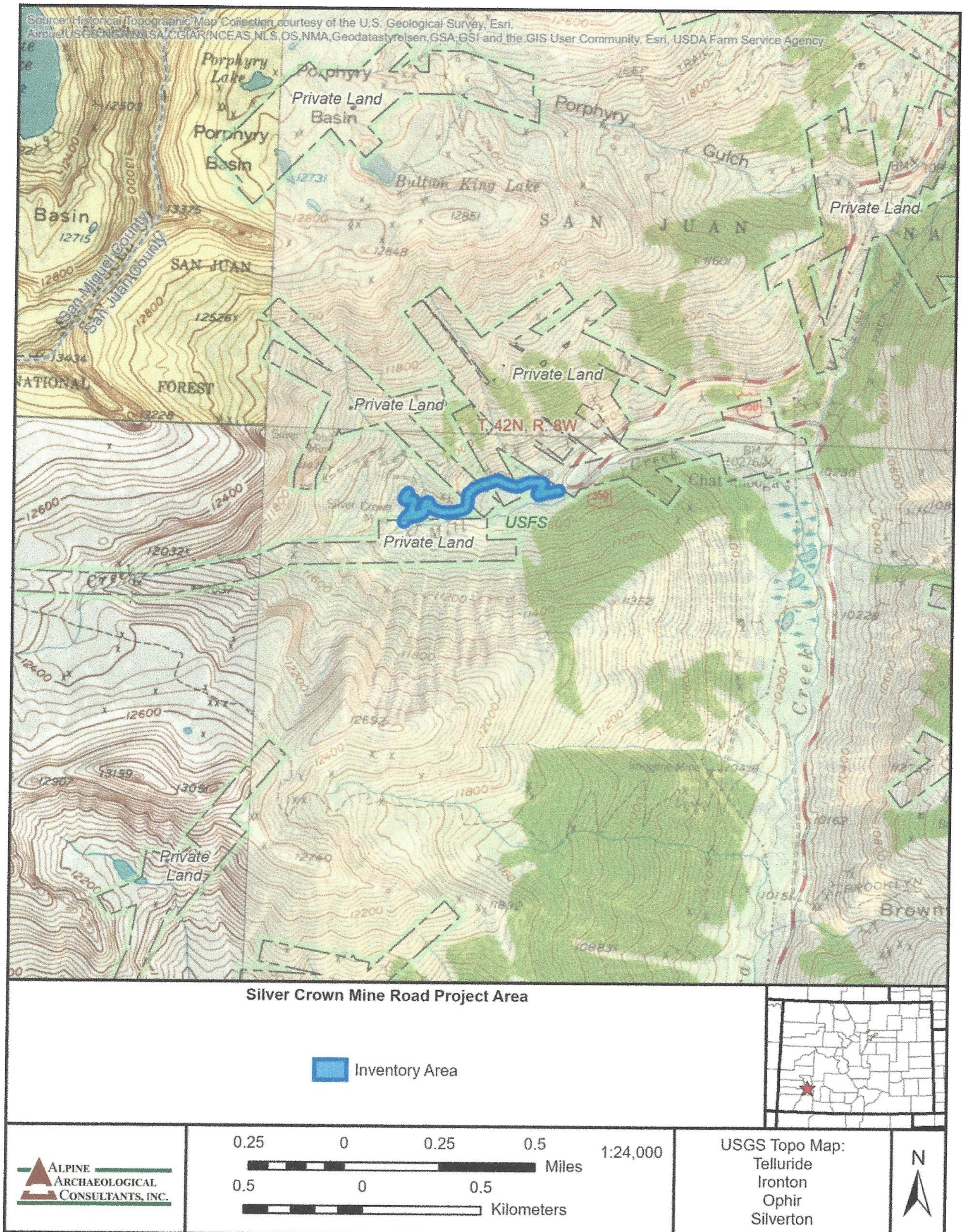

Figure 2. Location of the Forest Service Road 821 inventory area.

represents an adaptation to an essentially modern environment, mainly by efficiently focusing on a more diverse subsistence base. Reed and Metcalf (1999) have suggested that the Archaic stage of the region be divided into four stages: Pioneer period (8350–6450 BP) is the transition from the Paleoindian period. This is followed by the Settled period (6450–4450 BP), the Transitional period (4450–2950 BP), and the Terminal period (2950–1950 BP [A.D. 1]). In southwestern Colorado, just south of the project area, the Formative stage (400 B.C.-A.D. 1300) is represented by the Ancestral Puebloan culture.

The Late Prehistoric period in western Colorado is generally associated with the Ute. Whether the Ute culture evolved from indigenous groups or emigrated from the Great Basin is currently a topic of debate, but most archaeologists now seem to accept the hypothesis of immigration by about A.D. 1400. The Ute were the primary inhabitants of western Colorado, including the San Juan Mountains, at the time of European contact. The upper Animas River drainage was within the range of the Tabeguache band during historic times. With the acquisition of the horse, the Tabeguache extended their range and made seasonal forays onto the Plains of southeastern Colorado in search of buffalo (Callaway et al. 1986:337-339). Adoption of an equestrian lifestyle, as a result of contact with Euroamerican groups, resulted in a more complex society. Extended family groups were replaced by band organizations more suited to a more mobile lifestyle. The horse enabled the Ute to expand their sphere of influence and interaction, thereby exposing themselves to previously unknown outside cultural influences. Acquisition of the horse resulted in new trade relationships between the Ute and other Indian groups. The most influential interaction was between the Ute and Spanish traders. Most of the early Spanish trading expeditions were unauthorized and are, therefore, virtually undocumented. It is clear, though, that trade was conducted and that European-manufactured goods began to be assimilated into the Ute culture (Malouf and Findlay 1986:500). Historic period Ute sites are characterized by Euroamerican goods such as early tin cans, glass, cartridge cases, glass beads, sheet metal cone tinklers, and metal arrow points.

The Juan Maria de Rivera expedition of 1765 was the first officially sanctioned exploration of the northern reaches of Spanish territory into western Colorado. The expedition explored the La Plata Mountains for mineral wealth and continued northward into the Uncompahgre Valley, reaching as far north as the Gunnison River at present-day Delta, Colorado. The Escalante-Dominguez Expedition passed through the region in 1776, searching for a travel route between settlements of California. The knowledge of the northern frontier provided by the Rivera and Escalante-Dominguez expeditions apparently stimulated expansion of trade with the Ute. As trade with the Utes developed, two major travel routes from New Mexico into Utah developed: the main Spanish Trail and the northern branch of the Spanish Trail, neither of which passed through the San Juan Mountains.

In 1821, Spain was overthrown, and Mexico gained its independence. Remaining restrictions on trade were terminated, and trade with the Ute expanded. Coincident with these events were expansion of the fur trade in the southern Rocky Mountains and the inclusion of numerous Americans in the fur trade. Fur trappers were active in the mountains of Colorado beginning in the 1820s and 1830s. Fur trappers led by Col. William G. Walton evidently trapped the lakes in the vicinity of Cascade Creek and at Trout Lake in 1833 (*Durango Wage Earner,* March 14, 1907:2). The Ute were active participants in the fur and hide trade, and their finely tanned deer hides were a valuable and much sought after commodity. The fur industry lasted until over-trapping and failing fur prices in the late 1830s made fur trapping unprofitable (O'Rourke 1992). As a result of the close association with fur trapper and traders, the Ute became particularly well-armed. During the fur trade period, the Old Spanish Trail was extended to California. The highly mobile Utes were able to provide both horses and slaves to the Mexicans by raiding widely, from the eastern Plains to California and into New Mexico and Arizona. Intertwined with the raiding, Ute prosperity was tied to control of the Utah-Colorado portion of the Old Spanish Trail (Sprague 1957:68).

The sporadic presence of Euroamericans in the region changed radically with the discovery of gold on Cherry Creek near present-day Denver in 1858. By 1860, gold miners led by Charles Baker had reached Baker's Park on the upper Animas River at present Silverton. Being far from points of supply and with meager results from their mining, a major rush to the area did not take place immediately. It was not until after the Civil War and a change in approach in mining from placer to hard rock mining that the San Juan Mountains again came to the attention of miners. The influx of miners elsewhere in Colorado brought conflict with the Ute. The Treaty of 1868 between the Utes and the federal government was an attempt to alleviate these conflicts by forming a large reservation on the Western Slope of Colorado, away from the primary mining area. However, by the early 1870s, large bodies of ore had been found in the San Juan Mountains. Miners returned to the San Juan Mountains in 1869 and resumed mining in the vicinity of Baker's Park by 1870. It was these trespasses onto the Ute Reservation that alarmed the Ute, resulted in the discovery of rich gold and silver deposits, and led to the ceding of the San Juan Mountains by the Ute under the Brunot Agreement in 1873. The Brunot Treaty increased hostilities between the Ute and Euroamericans over disputes where the boundaries of the ceded lands were. Although the Tabeguache (Uncompahgre) Utes maintained peace under difficult circumstances, the White River Ute killed their agent, Nathan Meeker, and several agency employees and overwhelmed U.S. troops sent to intervene in 1879. The "Meeker Massacre" served as the catalyst for removing the White River and Uncompahgre Utes from western Colorado to reservations in northeastern Utah in late 1881. The Weeminuche, Capote, and Muache Utes were settled on a reservation on a strip of land along the Colorado-New Mexico border.

With the San Juan Mountains legally opened to prospecting in 1873, Baker's Park became the focus of mining activity that spread throughout the San Juan Mountains; the town of Silverton was established in 1874. Mining rapidly expanded to the Telluride, Ouray, Rico, and Lake City areas and was quickly connected by toll roads. The success of the San Juan mines spurred railroad construction to the Animas Valley in 1880 where the town of Durango was established. In 1882, the Denver & Rio Grande (D&RG) extended their rail line to Silverton. The completion of the railroad to Silverton solidified the town's position as the principal mining center of the San Juans and stimulated mining in the surrounding area. A wagon road from Ouray to Ironton was completed by Otto Mears in 1883 that continued over Red Mountain Pass to Silverton. In 1887, Otto Mears constructed the Silverton & Red Mountain Railroad over Red Mountain Pass to the Red Mountain Mining District. The D&RG extended a rail line to Ouray from Montrose in 1887, but the Red Mountain Mining District was never connected by rail to Ouray because of the difficulties constructing a suitable grade to surmount the upper Uncompahgre Canyon. In 1890 and 1891, the Rio Grande Southern Railroad was constructed through the San Juan Mountains between Durango and Ridgway. It provided much-needed rail service to the important mining centers of Rico and Telluride, further stimulating mining and commercial development in the San Juan Mountains. Hard times in the mining industry began with the Panic of 1893 and continued into the new century with labor unrest that centered on the town of Telluride. Gold-producing mines in the region were not nearly so hard hit by the depression as those that produced mainly silver (Henderson 1926). Ouray was fortunate to have several gold-producing mines that kept its economy alive, particularly the Camp Bird.

Early Mining and the Establishment of Chattanooga

Initial mining in the area centered on five mining claims on Mill Creek, a tributary of Mineral Creek on the southern side of Red Mountain Pass—the Silver Crown, Mountain Chief, Giant King, Wonderful, and Pride lodes. These were initially located by R. J. Penoyer, J. S. Tharp, J. D. Crain, F. G. Barnett, Ed Finch, and Adelbert Parsell on September 15, 1879 and were known as the Silver Crown Group of claims. The locators sold the group of claims to E. E. Norton of Pennsylvania for $100,000 in November 1879 (Condry 2000; Curtis 2003). Norton involved Luther H. Buell in establishing the Silver Crown Mining Company, which was incorporated in New York on

March 3, 1880, with $5,000,000 capital (San Juan County Courthouse, County Clerk's Office, Records of Incorporation, Book 1 Page 127). Initial work on the claims of the Silver Crown Mining Company showed the vein on which the claims were situated to be quite valuable, so work continued over the winter of 1880-1881. By the end of 1882, the company felt certain enough of the value of their mining claims to have Mineral Survey plats prepared in 1882 and 1883. This included plats for the Wonderful Mill Site (MS 559B) and the Mountain Chief Mill Site (MS560B) in the valley bottom north of the confluence of Mineral and Mill creeks.

Cabins were constructed on these mill site claims for accommodations for miners at the Silver Crown Group of claims and other mining claims in the area. Initially known as Silver Crown Camp, the growing community was also known as Sweetville, named for promoter and Silverton assayer Edmund Sweet. With the growth of mining on upper Mineral Creek and over the divide toward Ouray, the Red Mountain Mining District was formed. A wagon road was built to the fledgling town because the junction of Mineral and Mill creeks was aptly situated to act as a point of transfer of supplies and equipment from the end of the wagon road from Silverton onto pack animals that took them on their final leg to the more heavily developed part of the mining district on the Ouray side of the pass. Packer John C. Burnett established a livery and stables at Sweetville in 1882, and Sweet kept a saloon. Quickly, the settlement on the Silver Crown mill sites came to be more developed and the name of Chattanooga was attached to the post office when it was established there on April 4, 1883 (Nossaman 1998; Archimede 2004; Bauer 2007:9-10). Among those engaged in packing in the area was John "Jack" Dolan from Lawrence, Kansas. He and two companions were swept 50 ft. downhill with their pack animals by an avalanche at 3:30 in the afternoon on December 20, 1883, while packing supplies to the Silver Crown Mine. Dolan was killed. He was buried adjacent to Chattanooga, but his grave was unmarked until it was done so by the San Juan National Forest in 1994 (Peterson 1996:D-25; Find a Grave Memorial 6060697).

Chattanooga was platted with Main, First, and Second streets running east to west, and Water and Silver streets running north to south, Town lots sold for between $100 and $250 in 1883, and many mining supply and construction businesses, markets, dry goods stores, hotels, and saloons sprang up. The *Chattanooga Enterprise* newspaper printed a single issue in June 1883. By the end of 1883, a concentration mill was constructed by the Red Mountain Sampling and Concentrating Company at the junction of Mill Creek with Mineral Creek. The company was incorporated on May 7, 1883 by J. E. Downy, George W. Brown, M. J. McCloskey, and Henry B. Adsit with $50,000 in capital stock (*Rocky Mountain News* [Denver], May 8, 1883:3). Known as the Mineral Creek Concentrator or the Chattanooga Concentrator, it was a custom 30-ton-per-day mill operated by superintendent Richard A. Parker, formerly of Georgetown. The concentrator turned Chattanooga into a regional industrial destination for mixed and low-grade ores. It handled ore from nearby mines, but was a first destination for ore packed down from the Ouray side of the Red Mountain Mining District. Initially, the concentrator ran only on water power, but had a steam engine installed in summer 1884 so that it could operate when Mineral Creek did not provide sufficient water power. The upper levels of the Silver Crown Mine were leased to the owners of the concentrator, who ran the ore through their mill. The growth of the Red Mountain Mining District led Otto Mears to extend what was known as the Silverton and Red Mountain Toll Road from Silverton to Chattanooga over Red Mountain Pass to Ouray. It made wagon transportation possible through the precipitous upper Uncompahgre Canyon in 1884. The improved road ran north from Silverton, crossed a bridge westward over Mineral Creek onto Main Street in Chattanooga, and then turned north on what may have been Silver Street before making a large horseshoe curve in its initial ascent toward Red Mountain Pass. With completion of the toll road, miners could choose whether to freight to Ouray or Silverton, but Silverton still had the upper hand because of the completion of the Denver & Rio Grande Railroad there in 1882, whereas the nearest railroad connection to Ouray was Montrose, another 35 miles away (*Colorado Daily Chieftain* [Pueblo], December 9, 1883:6; *San Juan Herald* [Silverton], May 22, 1884:3; *Silver World* [Lake City], May 24, 1884:3; Archimede 2004).

Most of the Red Mountain Mining District produced an abundance of silver ore throughout the 1880s that led Otto Mears to construct the Silverton & Red Mountain Railroad beginning in the summer of 1887. The first six miles of the line was completed to Burro Bridge by January 28, 1888. The line continued through Chattanooga and over Red Mountain Pass to Ironton with its terminus reached at Albany at the head of the Uncompahgre Canyon on September 20, 1889. With completion of the railroad, Chattanooga's main purpose as a transfer and supply point for the mines of the Red Mountain Mining District was greatly diminished. Avalanches in 1888 and a devastating fire in 1892 resulted in considerable loss to the town. The Panic of 1893 and crash of the price of silver resulted in a near cessation of mining at the Red Mountain mines through the rest of the 1890s, near abandonment of Chattanooga, and closing of its post office in June 1894. Another avalanche in 1898 left little standing in the town (Nossaman 1974; Archimede 2004; Bauer 2007:9-10).

Initial Establishment of the Silver Crown Group of Mining Claims

Five mining claims—the Silver Crown, Mountain Chief, Giant King, Wonderful, and Pride lodes—were initially located by R. J. Penoyer, J. S. Tharp, J. D. Crain, F. G. Barnett, Ed Finch, and Adelbert Parsell on September 15, 1879. These became known as the Silver Crown Group of claims. The locators sold the group of claims to E. E. Norton of Pennsylvania for $100,000 in November 1879 (Condry 2000; Curtis 2003). Norton involved Luther H. Buell in establishing the Silver Crown Mining Company, which was incorporated in New York on March 3, 1880, with $5,000,000 capital (San Juan County Courthouse, County Clerk's Office, Records of Incorporation, Book 1 Page 127). Company officers were Norton as president, Buell as vice president, Gilbert L Cornell as treasurer, and R. A. Olmstead as secretary. The company owned five mining claims: the Silver Crown, Giant King, Mountain Chief, Wonderful, and Pride. Work was initiated during the summer of 1880 by mine superintendent E. T. Booth of New York to demonstrate the property's value prior to stock being offered for sale (*Lake City Mining Register*, July 2, 1880:2). In 1881, Buell became the president with Olmstead continuing as secretary. This appears to have been Buell's first investment in mining properties in the San Juan Mountains, and was probably the result of two of his brothers, Jonathan and Willard, being involved with mining in the area beginning in 1875 as principals in the Buffalo & San Juan Mining Company to operate mining properties in Poughkeepsie Gulch. That company was succeeded by the Colorado Mining & Land Company in 1877, which Jonathan Buell and others had also formed (Welles 1881:292-293; *Rocky Mountain News* [Denver], September 21, 1876:4; December 21, 1877:4; *Ouray Times,* December 29, 1877:1; *Silver World* [Lake City], October 15, 1881:3). The initial work on the claims of the Silver Crown Mining Company showed the vein on which the claims were situated to be quite valuable, so work continued over the winter under the direction of contractor Gus Crawford. Two development tunnels were dug: Development Tunnel 1 was on the western end of the Valley Lode, and Development Tunnel No. 2 was on the western end of the Mountain King Lode, which cut the Silver Crown vein on February 25, 1881 at a distance of 110 ft. from the tunnel mouth and 25 ft. below the surface. By October 1881, the two tunnels had a total length of 260 ft., but it was expected that an additional 200 ft. of tunnel would be necessary before the desired quantity and quality of ore would be reached (*Lake City Mining Register,* August 27, 1880:3; *Silver World* [Lake City], March 26, 1881:3; May 28, 1881:3; October 22, 1881:3).

By the end of 1882, the company felt certain enough of the value of their mining claims to have Mineral Survey plats prepared and to initiate the process of obtaining Mineral Entry Patents for their six claims. Luther Buell's nephew, Herbert L. Buell, the son of Willard, was the Deputy Mineral Surveyor that prepared the Mineral Survey plats for the claims in 1882 and 1883.

Emergence of the Bonanza Boy Group of Claims

The construction of the railroad through the area stimulated additional mining, including what was initially known as the Silver King group of claims, comprised of the Silver King, Lady Helen, Bonanza Boy, Marchie, and Marchie No. 2 lodes. Initially worked in the late 1880s, they came into the ownership of William Fiegel, a successful carpenter in Silverton, who decided to speculate in mining properties. Portions of the claims were leased to George Bradley and Gregory and Butterfield in 1890 that demonstrated the presence of valuable ore. He leased the mining claims to Gregory and Keets of Ouray, who planned to market shares in their mining company to English investors in 1891 after having shipped 800 tons of ore from the Margie claim the prior year (*Silverton Standard,* July 26, 1890:2; January 24, 1891:3; *Silverton Weekly Miner and San Juan Democrat,* January 3, 1891:3; *Herald Democrat* [Leadville], February 23, 1892:2). With the decline of mining in the area after the Panic of 1893, work was not resumed on the claims until 1900, when a two-year lease was made to Smith and Jarvis, who shipped four carloads of silver-lead ore from the claims. Another 30 car loads of ore was also reportedly shipped from the group of claims that year (*Silverton Standard,* December 29, 1900:8; *Silverton Standard and the Miner,* November 29, 1940:6). Work resumed in earnest in early 1903 when a contract was given to the Reilly Brothers of Chattanooga to drive a 75-ft.-long tunnel on what was then known as the Bonanza Boy group of claims from a point along the Silverton & Red Mountain Railroad (*Silverton Standard,* February 21, 1903:1; *Silverton Standard and the Miner,* February 19, 1943:3). The tunnel was intended to intersect the vein passing through several of the mining claims of the group, which by that time were the Bonanza Boy, Independence, Pinto, Margie and Silver King lodes. Looking to sell the claims, Fiegel filed Amended Locations Certificates for the claim from July 2-5, 1903. To make the properties more desirable to a purchaser, he located the Bonanza Boy Mill Site in the valley bottom near Chattanooga on July 10, 1903. He then had a Mineral Survey done of all of the claims (MS 16677) on August 5, 1903 and filed a Mineral Patent Application for the claims on October 21, 1903 (*Silverton Weekly Miner and San Juan Democrat,* December 18, 1903:4). The Mineral Patent for the claims was granted on December 13, 1904. The Bonanza Boy Mill Site was adjacent to the Wonderful and the Mountain Chief mill sites on the edge of Chattanooga, and distant from the patented mining claims of the Bonanza Boy group.

Chattanooga saw a brief resurgence beginning in the early 1900s, mostly with mining that resumed at the Silver Ledge, Silver Crown, and Bonanza Boy groups of mines and construction of a new mill by the Ledge Mining and Milling Company in 1902. Construction of the mill was made possible when portions of the Mountain Chief and Wonderful mill sites were sold to the Ledge Mining and Milling Co. for $500 (San Juan County Courthouse, County Clerk's Office, Book 85, Page 481). This provided sufficient space for the new Silver Ledge Mill to be constructed in May 1902, the earlier mill having been destroyed by fire (*Durango Semi-Weekly Herald,* January 6, 1902:1; *Silverton Standard,* March 22, 1902:1; May 7, 1902:1). The completed mill and its associated buildings extended onto portions of the two claims from the north. The company then had a Mineral Survey Plat (MS 16099) prepared for the Columbine Mill Site (and associated Oriental Lode) on December 7, 1902 in preparation for obtaining a Mineral Entry Patent for the claims. The Silver Ledge Mill was mostly on the Columbine Mill Site (patented on June 30, 1904), which fit like a puzzle piece along the northern sides of the Mountain Chief and Wonderful Mill sites. Construction of the mill was not enough to prevent the Silverton Railroad from failing on November 3, 1904 and being reorganized as the Silverton Railway (Nossaman 1974; Archimede 2004).

Silver Crown Group of Claims 1887–1910

The Silver Crown Mining Company was bankrupt by late 1887, and the receiver, Charles B. Safford, sold the Silver Crown Group of lode and mill sites to James H. Everett of Kingston, New York, in May 1888 for $100 (San Juan County Courthouse, County Clerk's Office, Deed Book 79, Page 524). Despite Otto Mears constructing the Silverton Railroad through Chattanooga at the time, the Silver Crown Group did not benefit. Everett leased the claims to John Bergin and others for one year in 1891 on a $25,000 bond (San Juan County Courthouse, County Clerk's Office, Deed Book 84, Page 507). All of the mining claims of the Silver Crown Group failed to have their 1890 taxes paid for them in 1891, suggesting that mining on the properties was not very productive (*Silverton Standard,* November 14, 1891:14). High transportation costs and the economic Panic of 1893 with its precipitous decline in silver prices resulted in the Silver Crown Group of claims remaining idle until 1900 with taxes unpaid through at least 1898 (*Silverton Standard,* September 2, 1899:11). Despite having the taxes on the properties going unpaid, Everett retained ownership. He let a contract on 200 ft. of tunnel in May 1900 to the owners of the Silver Ledge Mining & Milling Company, with the actual mining done by Miles McCue. Work continued through the summer of 1901 with supplies delivered by John Glanville (*Silverton Standard,* May 26, 1900:1; *Silverite-Plaindealer* [Ouray], August 24, 1900:4; August 2, 1901:1).

In May 1901, Everett sold portions of the Mountain Chief and Wonderful mill sites to the Ledge Mining and Milling Co. for $500 (San Juan County Courthouse, County Clerk's Office, Book 85, Page 481) of which R. D. Thompson and T. E. Schwarz were principals. The reason for the sale was to provide sufficient space for a new Silver Ledge Mill to be constructed in May 1902, the earlier mill having been destroyed by fire (*Durango Semi-Weekly Herald,* January 6, 1902:1; *Silverton Standard,* March 22, 1902:1; May 7, 1902:1). The completed mill and its associated buildings extended onto portions of the two claims from the north. The company then had a Mineral Survey Plat (MS 16099) prepared for the Columbine Mill Site (and associated Oriental Lode) on December 7, 1902 in preparation for obtaining a Mineral Entry Patent for the claims. The Silver Ledge Mill was mostly on the Columbine Mill Site, which fit like a puzzle piece along the northern sides of the Mountain Chief and Wonderful Mill sites; it was patented on June 30, 1904.

In February 1905, Thomas J. Hurley purchased the Silver Crown Group of lode claims and their associated mill sites from Everett, less the mill sites that Everett had already sold. He also purchased the John and Forest Mines near Animas Forks from Everett (*Silverton Standard,* February 25, 1905:1). Thomas Jefferson Hurley was born May 2, 1847, in Peterborough, Canada, and moved to Rochester, New York, as a child with his parents. He reportedly enlisted as a private in the 8th New York Cavalry in 1861 and served until 1864. From 1868–1875, he was the Color Sergeant of the New York National Guard. His wife, Sarah Jane Walker, was born in New York in about 1850; they were married about 1871. They had several children, and their son, Thomas Jay Hurley, was born in Rochester in 1878. Sara reportedly died in 1885, and Hurley married widow Ann March Field on June 13, 1894; she was from Newton, Massachusetts. Hurley worked in wholesale clothing and dry goods businesses prior to 1880 when he became a stock broker and insurance salesman. He made sufficient money to begin investing in mining properties in the late 1890s. This enabled his son, Thomas Jay Hurley, the opportunity to work as a mine manager and superintendent at the mining properties he invested in (*Silverton Standard,* December 28, 1907:2).

Hurley's first mining experience in the San Juan Mountains was when he arranged with and English syndicate to invest in the Occidental Mine and its associated concentration mill near Gladstone as the Exploration Syndicate in 1898, of which he was the president. The company also had holdings in Mexico. By 1900, he was also the president of the Natalie Mining and Milling Company, which operated the Natalie Mine adjoining the Occidental; that company was incorporated in January 1901. The Hurley Tunnel on the Natalie Mine was named for him (*Silverton Standard,* May 28, 1898:1; July 30, 1898:1; October 27, 1900:2; January 19, 1901:6; *Silverton Weekly Miner and San Juan Democrat,* September 21, 1900:1). Later in 1901, the Ruby Basin Mining and Tunnel Company was formed with $1,000,000 capital to acquire the Ruby Group of claims on Lookout Mountain up Mineral Creek and the associated Ruby Basin Mill. Incorporators included George W. Bausman, Joseph Bordeleau, and Frank B. Brown, and Thomas J. Hurley's son, T. Jay Hurley, was secretary (*Silverton Standard,* October 12, 1901:1; September 13, 1902:10; May 2, 1903:1, May 27, 1905:1; *Silverton Weekly Miner and San Juan Democrat,* October 23, 1903:1). The Hurleys began considering purchasing the Ruby Basin Group of claims as early as 1902 (*Silverton Standard,* May 7, 1904:1). In order to do so, Thomas J. Hurley formed the Mines Securities Corporation in New York in 1905. T. Jay Hurley was made manager of the mine and mill (*Silverton Standard,* May 7, 1904:1; *Rocky Mountain News* [Denver], November 18, 1905:12).

Precious Metals Corporation

In order to operate the Silver Crown Group, Hurley formed the Precious Metals Corporation with Silverton attorney William A. Way and San Juan County Treasurer Thomas Annear with $3,000,000 in capital stock in November 1905. Way invested in other mining properties in the Silverton area and was later made a trustee of the Colorado School of Mines. Annear was a local businessman in Silverton who was elected to the Colorado State legislature as the representative from San Juan County from 1899–1902 and ran unsuccessfully for Lieutenant Governor in 1902. He moved to Denver in 1906 where he was the state Treasurer in the 1930s The three subsequently formed the Fifty Associates Mines Corporation in September 1906 to lease the Ruby Group and the Ruby Mill (*Rocky Mountain News* [Denver], November 18, 1905:12; September 22, 1906:10; *Steamboat Pilot* [Steamboat Springs], July 17, 1941:4). Both of these companies seem to have been operating prior to their incorporations. Hurley's son, T. Jay Hurley, was made the superintendent of both of the mining operations, and was largely responsible for managing his father's mining investments, particularly as Thomas J. Hurley spent much of 1905–1907 on trips to Europe, Egypt, and Britain. Initially, he was in charge of the Ruby Basin properties for the Mines Securities Corporation and continued in that position in 1904 when they were leased to the Fifty Associates Mines Corporation. With the formation of the Precious Metals Corporation, T. Jay Hurley split his time between the Ruby Group and the Silver Crown Group. By June 1906, the corporation had purchased all of the holdings of the Mine Securities Corporation and took over management of the Ruby Basin Mines (*Silverton Standard,* May 7, 1904:1; January 14, 1905:1; *Silverton Weekly Miner and San Juan Democrat,* June 1, 1906:1). The Ruby Group was a fully functioning mining property, but the Silver Crown Group was to be tackled entirely afresh. Though earlier mining had shown a large vein of valuable ore, it was considered to have been little developed, and the older workings had seen little work since initial mining in the early 1880s.

To help T. Jay Hurley at both of the mining properties, Robert McCart, Jr., a graduate of the Colorado School of Mines, was hired to be the engineer and metallurgist at both of the mines. McCart was later the mine superintendent at the Silver Lake Mine in 1907 and 1908 (*Silverton Standard,* June 3, 1905:2; May 11, 1907:1; January 7, 1908:3). Hurley had four mining engineers examine the 8–20-ft.-wide that ran for 9,000 ft. parallel to the gulch along Mill Creek on the Silver Crown Group of claims. According to assays done by Ricketts & Banks of New York, the ore contained 53.33% lead, 6.75% zinc, 1.07% copper, 0.05 oz. of gold per ton, and 12 oz. of silver per ton. Another assay on the mineral values was reported to show 15 per cent lead, 6 oz. of silver per ton, 0.25 oz. of gold per ton, and slight values of copper (*Silverton Standard,* August 25, 1906:1; *Silverton Weekly Miner and San Juan Democrat,* September 27, 1907:3). Once analysis of the ore was complete, Hurley began preparations for mining. Rather than use the earlier tunnels to access the vein, an entirely new tunnel was planned just north of the junction of the Mountain Chief and Valley lodes that became known as the Silver Crown Mine. It was expected to reach the vein at a substantial depth to facilitate mining as the tunnel proceeded westward. The tunnel was in the eastern portion of the linear arrangement of claims and provided close access to a spur that was reportedly being run from the Silverton Railroad up Mill Creek to within 1,000 ft. of the operation. Jessie Kramer, formerly the superintendent of the Silver Ledge Mine, was hired as the superintendent. Lumber and other materials were ordered and construction of the mine buildings started in June 1906 (*Silverton Standard,* May 19, 1906:1; *Durango Democrat,* June 10, 1906:1; *Silverton Weekly Miner and San Juan Democrat,* June 22, 1906:1). By August, the new office, compressor house, shops, and boarding house were ready for occupancy (Figure 3). One of the safety precautions that Hurley took in siting the mine buildings was the construction of rock and board berms on the slope above the mine to deflect avalanches. According to the *Silverton Standard,* (August 25, 1906:1):

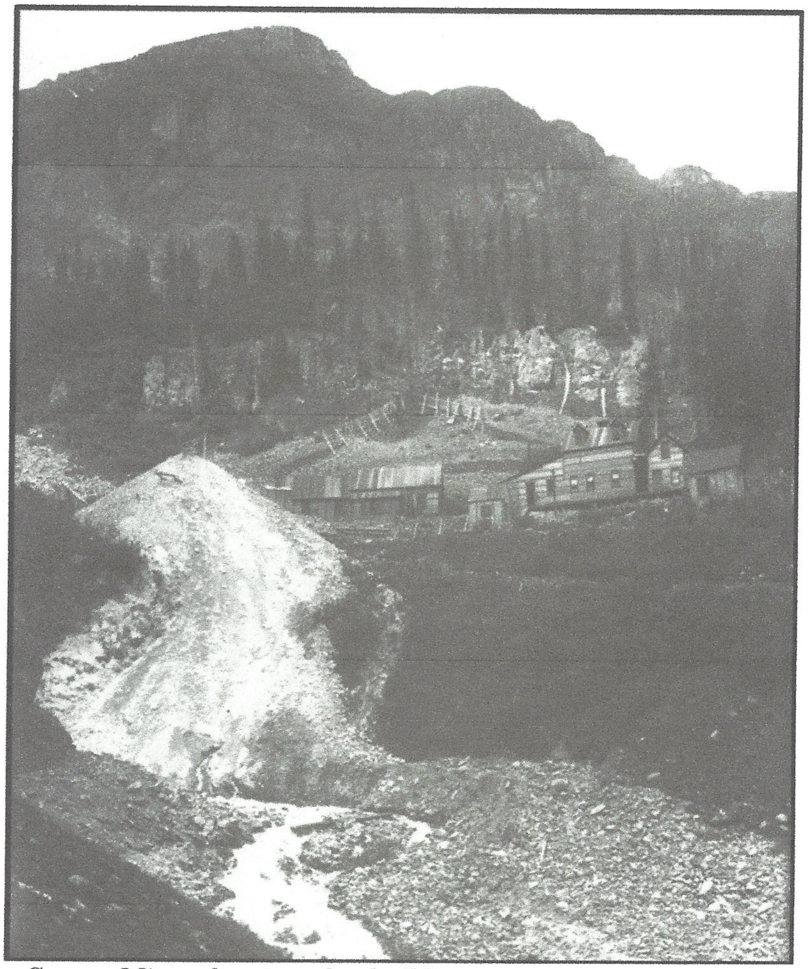

Figure 3. Silver Crown Mine showing the buildings constructed in 1906 with the avalanche splitting berms on the slope above.

> These buildings are all situated in a pleasant little nook in the mountain side a short distance from the track of the Silverton railroad, and absolutely safe from danger of snow slides, the careful manager taking special precaution as to their locations and construction for protection and comfort of his employes [sic].

Considering the ore values of the vein, Hurley planned to concentrate the ore coming from the mine. He negotiated unsuccessfully for the purchase of the Silver Ledge Mill in 1906 and 1907. His backup plan was to construct a mill of his own along the railroad spur that could be served by an aerial tramway from the mine. This failed to materialize, too. Neither of these plans mattered until mining was underway. The company installed electric motors to furnish power for the mine from the recently completed Tacoma Power Plant of the Animas Power and Water Company in the Animas River Canyon. The most important piece of equipment was a Rand air compressor with capacity to run 10 drills. The compressor arrived at the railroad station in Silverton in August 1906 and was waiting completion of the spur to the mine for delivery to the mine where the new compressor house awaited its arrival. With the arrival of the compressor and drills, it was expected that the number of men at work at the mine would increase and that about 300 ft. of tunnel could be dug per month. Once the vein was cut, every 1,000 ft. of tunnel was expected to expose 400,000 tons of ore for stoping (*Silverton Standard*, August 25, 1906:1; *Silverton Weekly Miner and San Juan Democrat*, September 27, 1907:3).

John Kramer was hired as the mine superintendent. He supervised the digging of a 500-ft.-long crosscut tunnel with a double ore-car track. Once the vein was struck, the course of the tunnel was planned to turn to follow the vein. The vein was struck in February 1907. Because the tunnel portal and the new mine buildings were not on the company mining claims, the Shelbyville Lode was located adjacent to the north of the Valley and Mountain Chief Lodes to encompass the improvements (Figure 4 and Figure 5). A Mineral Survey Plat was prepared on November 10, 1906 and the Mineral Entry Patent was granted on December 16, 1907 (Table 1). The name was taken from Shelbyville, Indiana, which was the home town of T. Jay Hurley's wife, Julia. They had married there on May 14, 1902 and came to Silverton to live while he oversaw his father's mining properties (*Silverton Standard*, December 29, 1906:1; February 16, 1907:1; *Silverton Weekly Miner and San Juan Democrat*, February 8, 1907:1; May 17, 1907:4). After the vein was reached by tunnel, two additional 500-ft.-long sections of tunnel were awarded to Jesse H. Kramer: the first in late April 1907 and the other in late May (*Silverton Standard*, April 27, 1907:1; June 1, 1907:1).

Everyone expected the Silver Crown Group to be highly productive in 1908. Unfortunately, Thomas J. Hurley died at his home in Brooklyn, New York, on December 15, 1907. His cause of death was reported to have been the result of an illness caused by exposure to a fire at the Long Beach Hotel, a resort hotel on the Atlantic shore of New York, on July 28, 1907 (*Silverton Standard*, December 28, 1907:2; January 18, 1908:1). T. Jay Hurley and his wife departed Silverton for New York in mid-January 1908 to settle his father's estate. They returned to Silverton for a month in March, at which time Hurley reportedly sold the holdings of the Precious Metals Corporation to John R. Allen of Brooklyn, New York. W. G. Clark was made the new mine superintendent. It is likely that the sale was only of Thomas J. Hurley's interest in the corporation, as the Precious Metals Corporation continued as the owner of the property. With completion of the sale, Hurley and his wife went to New Mexico to work on the Tri-Bullion Mine. By 1909, they were living in Albemarle, North Carolina, where he died on June 24, 1910 (*Silverton Weekly Miner and San Juan Democrat*, January 17, 1908:3; March 20, 1908:3; July 30, 1909:3; *Silverton Standard*, March 14, 1908:3; March 21, 1908:1; July 9, 1910:2).

With the departure of Hurley, Ralph L. Clark was made the manager and George C. Hill took over as superintendent of the mine. He had previously been the superintendent of the Shenandoah-Dives Mine in Cunningham Gulch. Hill put 15 men to work getting the mine ready for development work. By late April, it was reported that the tunnel on the property had reached the first ore of importance, and, by early June, work was being done around the clock by three shifts of miners (*Silverton Standard*, September 27, 1907:1; March 28, 1908:1; April 25, 1908:1; June 6, 1908:1; *Silverton Weekly Miner and San Juan Democrat*, February 19, 1909:1).

Fred Kuntz and Bob Reed were given a contract to dig 500 ft. of tunnel in late December 1908 and took out a second contract for the same amount of tunnel that they completed in July 1909. They spent 85 days working two shifts with power drills making 6 ft. per day on the second contract. By April 1909, the tunnel was reported to have been 3,000 ft. long (*Silverton Standard*, March 20, 1909:3; April 10, 1909:3; July 24, 1909:1; *Silverton Weekly Miner and San Juan Democrat*, April 9. 1909:1). During this time, Hill resigned as superintendent in April 1909 and was replaced by Ellery W. Hunt. Hunt was a mining and civil engineer who had moved to Silverton from Rico early 1901 and was involved with several mining properties in the Silverton area. He had been hired as the consulting engineer for the Silver Crown property just before his appointment as superintendent, but does not seem to have served in that position for long (*Silverton Standard*, January 5, 1901:6; April 24, 1909:3). In July 1909, the company advertised for bids for a contract to dig 2,000 ft. of tunnel and for drifting from the tunnel. At that time, the tunnel was specified to be 6 ft. wide and 7 ft. tall. Specifications for the project were available at the law office of William N. Searcy and William A. Way and bids were to be delivered to George E. Purdy, the bookkeeper and assistant manager of the company (*Silverton Standard*, July 24, 1909:1). It does not appear that a contract was awarded, and

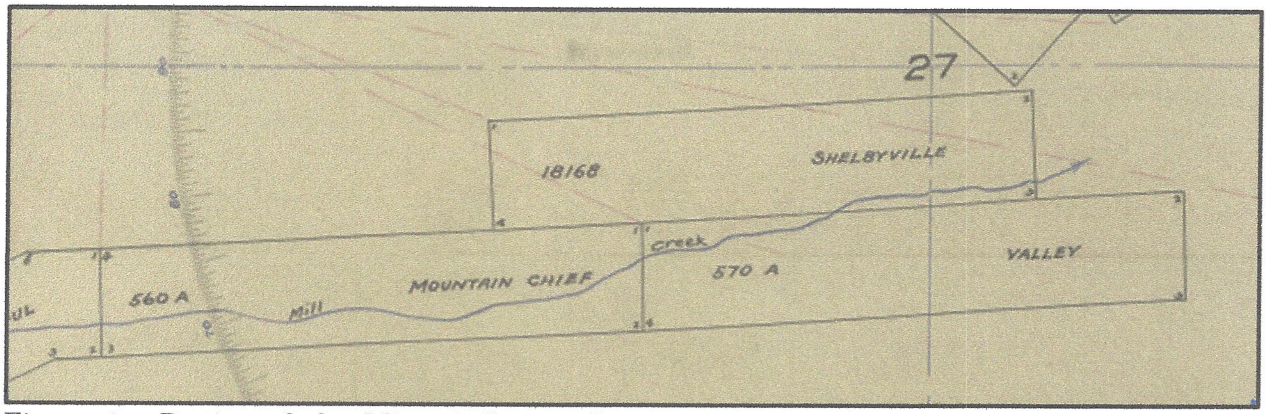

Figure 4. Portion of the Mineral Survey Connectivity Map showing the relationship of the Shelbyville Lode to the Mountain Chief and Valley lodes.

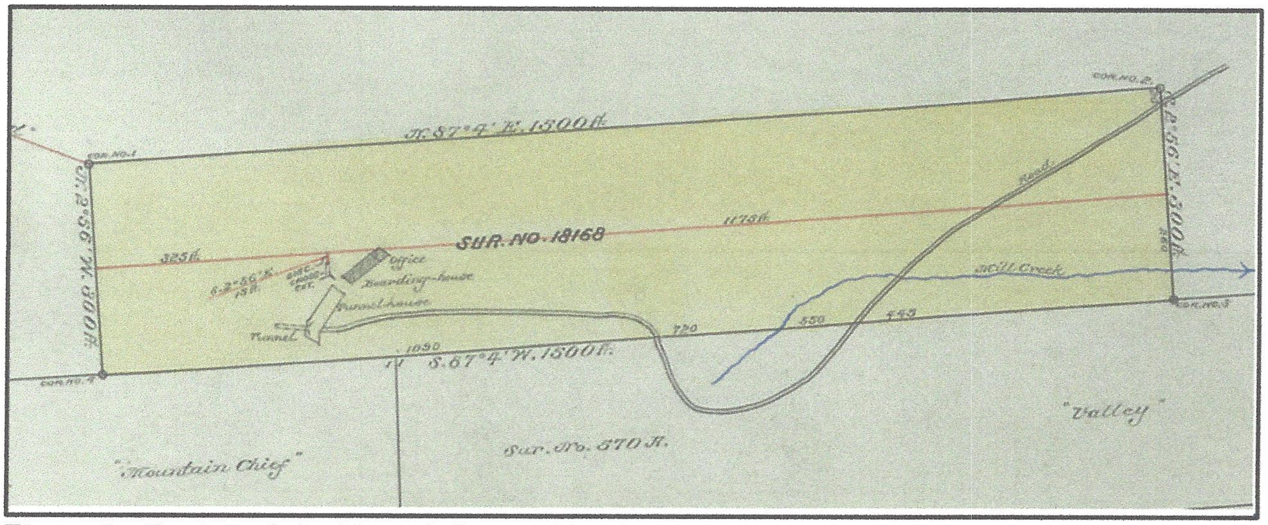

Figure 5. Portion of the Mineral Survey Plat for the Shelbyville Lode (MS 18168) showing the improvements made at the Silver Crown Lode as of November 1906. Note that the road to the site enters by way of Mill Creek, south of the current road.

the property went onto the delinquent tax rolls when the taxes for 1909 went unpaid (*Silverton Standard,* October 1, 1910:3).

The Telescope Mountain Mining Company and the Bonanza Boy Group of Claims

Work continued on the Bonanza Boy group of claims under lease to Edward Fiant in 1905, which shipped a carload of high-grade lead ore to the smelter in Durango (*Silverton Standard,* July 22, 1905:1; December 16, 1905:1; *Rocky Mountain News* [Denver], December 21, 1905:6). The Telescope Mountain Mining Company appeared in the area in 1905. They were a group of investors from Colorado Springs headed by M. A and T. E. Norton (*Silverton Weekly Miner and San Juan Democrat,* December 29, 1907:1). They filed Amended Location Certificates for several mining claims near those of the Bonanza Boy Group in July and August 1905. They had a Mineral Survey done for those claims on October 31, 1906 (MS 18179) and were granted a Mineral Patent for them on October 8, 1908. To further consolidate their holdings in the area, they acquired the Bonanza Boy group of claims from Fiegle in 1906 or 1907, giving them 16 patented mining claims and the Bonanza Boy Mill Site. Work on the claims was done under the supervision of H. A. Miller of Silverton into the summer of 1908 (*Silverton Weekly Miner and San Juan Democrat,* May 3, 1907:4; *Silverton*

Standard, December 21, 1907:1; April 18, 1908:3; May 16, 1908:1; June 6, 1908:1). The economic downturn of 1907 and reduced mineral prices resulted in most of the mines of the area shutting down, including those owned by the Telescope Mining Company. Some mining resumed in late 1912, but it was not until mineral prices rebounded with the onset of World War I that mining resumed. Manager C. B. Sheehan, assisted by F. B. Shinkle began doing development work on the claims in preparation for a lease to Pete Olsen and associates and Robert Sawyer and associates. A railroad spur was run to the mine in 1918 to facilitate loading ore into railcars. Mining continued into 1918, but ceased at the end of the war when mineral prices dropped again (*Silverton Weekly Miner and San Juan Democrat*, December 22, 1912:1; *Silverton Weekly Miner*, July 20, 1917:1; *Silverton Standard*, July 21, 1917:1; *Rocky Mountain News* [Denver], May 12, 1918:13).

Otto Mears regained control of the Silverton Railway in 1909, but, after World War I, mining never resumed in the Red Mountain Mining District to the point of making the railroad profitable. The Silver Ledge Mill was destroyed by fire in 1917 and was replaced by ore loading facility on the railroad. The railroad ceased operations in 1921 and was abandoned on June 17, 1922 (Nossaman 1974; Archimede 2004).

The Telescope Mountain Mining Company group of claims passed to the Mineral Creek Mining Company in 1926. The new company was also investors from Colorado Springs. N. R. Taylor was president, F. B. Shinkle was vice president and M. J. Griffin was the secretary-treasurer; Shinkle served as the mine manager (*Silverton Standard*, October 2, 1926:1; May 12, 1928:1). The new company took out a loan to finance mining of the property on February 1, 1930, but was unable to make payments on the loan and also failed to make tax payments for the property for 1929 and 1930. As a result, Raymond H. Doud, the public trustee for San Juan County planned to sell the property to cover the debts on January 11, 1932 (*Silverton Standard*, December 12, 1931:2). The company seems to have come up with sufficient payments to avoid loss of the property, but then failed to pay taxes from 1932 to 1938 (*Silverton Standard and the Miner*, December 15, 1939:6). No work seems to have been attempted at the claims of the Mineral Creek Mining Company after the early 1930s.

Silver Crown Mines & Ore Treatment Company

On December 5, 1921, taxes on all of the property of the Precious Metals Corporation in Mill Gulch and elsewhere were paid for by Dorothy J. Force. The deed was requested and was to be issued on June 29, 1925. Dorothy Force was the wife of Charles E. Force, who formed the Silver Crown Mines & Ore Treatment Company to own, operate, and treat ores of the Silver Crown group in Mill Gulch. A contract for 200 ft. of tunnel was let on the Silver Crown Group in May 1924 to cut the vein. With the vein exposed, J. S. Coupal, a mining engineer from Boston, did an extensive examination of the ore in June and July 1925 and oversaw the installation of a compressor in August so that mining could proceed. Force hoped to open stoping stations in the tunnel and deliver ore to a planned 100-ton concentration mill near the mine with a hydro-metallurgical leaching plant in connection. The leaching plant was to use the Lindley Universal Process developed by Mrs. M. B. Lindley, a well-known research chemist and metallurgist of New York City. The process was marketed by the Lindley Reduction Corporation of Keyport, New Jersey, incorporated in Delaware on April 22, 1926 with $2,000,000 in capital stock (*Silverton Standard*, May 24, 1924:4; March 14, 1925:2; June 6, 1925:1; June 27, 1925:3; July 11, 1925:1; August 1, 1925:1, 2; August 8, 1925:1; January 9, 1926:2; Poor's Publishing Company 1926:314). Except for the initial investigative work, the project failed to materialize, taxes due for 1925 went unpaid, and the Silver Crown Mines & Ore Treatment Corporation was dissolved with the forfeiture of their charter (*Silverton Standard and the Miner*, July 27, 1935:2).

Later Ownership and Mining on the Silver Crown Group of Claims

Charles W. Jordan was issued a Certificate of Purchase for the Silver Crown Group of claims when he paid the 1925 taxes and a deed was to be issued to him on October 18, 1935 (*Silverton Standard and the Miner*, June 29, 1935:2). This evidently did not take place, and Charles C. Goulding stepped in and paid the 1925 taxes with a Treasurer's Deed to be issued to him on February 23, 1943 (*Silverton Standard and the Miner*, October 30, 1942:5). Goulding then cleaned up the property and planned to do an inspection of the ore bodies once he got air into the workings (*Silverton Standard and the Miner*, May 14, 1943:1). This transfer seems to have taken place and Goulding took steps to clear the title to the claims in 1946 (*Silverton Standard and the Miner*, April 14, 1946:4). A 1946 Colorado Bureau of Mines report noted that Smith Crane had a lease on the property and that a compressor was operated by a gasoline engine within a one-story wooden building at the Silver Crown Mine. Housing of employees and the mine office was in Chattanooga, suggesting that the original boarding house/office at the mine was no longer present. It is likely that the access to the mine was improved with the construction of the current road (Forest Service Road 821) to and beyond the site and that the boarding house/office were demolished with the construction of the road. C. A. Baker was reported as the mine operator in 1948 and Frank Ashcroft and A. J. Bennet as Silver Crown Mines, Inc. in 1949 (Bureau of Mines 1946; 1949; King and Allsman 1950:47). James Moffit and Herb Culp worked at the mine during the summer of 1948, both of whom moved to Chattanooga with their families. Strangely, Culp's car was stolen and plunged 60 ft. off an embankment at the mine. It landed on its wheels and was driven away (*Silverton Standard and the Miner*, May 14, 1948:3; June 18, 1948:1). Taxes continued to go unpaid through the 1950s, and the county attempted to sell the property in 1958 with no success. Grant Gifford purchased the tax certificate for the 1958 taxes and assigned it to H. C. Sprinkle, who requested that a Treasurer's Deed be issued, which was planned to take place on June 27, 1963. Sprinkle evidently paid taxes on the property until 1968, when the property again was placed on the delinquent tax rolls (*Silverton Standard and the Miner*, July 20, 1951:3; February 21, 1958:2; August 1, 1958:2; December 11, 1959:3; March 8, 1963:3). Bonanza Boy, LLC obtained the Silver Crown Group of claims in 2020.

PREVIOUS WORK AND EXPECTED RESULTS

A file search was conducted by Meghan Grizzle of Alpine for the project area and its vicinity on October 2, 2023. Several projects have been carried out in the vicinity of the project area. Initial periodic work was by the Colorado Division of Minerals and Geology's Inactive Mines Program in the early 1990s that recorded mine openings that they planned to close for safety reasons. They invariably recorded only the mine openings and not the mines as a whole, which resulted in consistent recommendations that the mines were insignificant sites. Because of their limited recordings, it is often difficult to ascertain exactly where they were. Sites 5SA406, 5SA407, and 5SA468 were all initially recorded by them, considered insignificant, and were expected to be encountered by the inventory of Forest Service Road 821. In 2000, Durango Archaeological Consultants recorded many historic mining properties in their inventory of the Red Mountain Mining District Site (Curtis 2003). In the current project area, they rerecorded the Silver Crown Mine (5SA407) with a complete recording as 5SA468 and determined that the site was significant. At that time, they also recorded a portion of the Silverton & Red Mountain Railroad (5SA112.1) in close proximity to the current project area. Mountain States Historical conducted a large project that recorded numerous sites in the San Juan Mountains slated for closure of their adits in 2008. Without realizing that it had been recorded previously, Eric Twitty rerecorded site 5SA468 with a detailed recording as 5SA1220. In June 2023, Alpine rerecorded the Silver Crown Mine (5SA407) in anticipation of recreational development of the site. Prehistoric sites are rarely found in the San Juan Mountains and none have been previously recorded in the project area vicinity.

Based on the site file search and previous experience in the area, it was expected that the previously recorded mining sites 5SA406, 5SA407, 5SA468, and 5SA1220 would fall within the project area. Of particular interest was determining if sites 5SA468 and 5SA1220 were the same site. It was also expected that a portion of the Silverton & Red Mountain Railroad would be encountered. It was also expected that at least one new historic mine site would be recorded, as what appeared to be waste rock was visible on aerial photos. It was not expected that any prehistoric sites would be encountered.

PROJECT OBJECTIVES

The primary objective of the cultural resource inventory was to locate and assess the significance of historical and archaeological properties in the project areas so that significant sites can be adequately considered under the various applicable cultural resource laws. This step is intended to aid in the preservation of significant cultural resources or to facilitate the formation of appropriate mitigative strategies. This objective was accomplished, first, by conducting site file searches and literature reviews and, second, by conducting an intensive pedestrian survey of the project area. Recommendations regarding the significance of the cultural resources found during the project are made using the criteria for determining eligibility for inclusion on the National Register of Historic Places (NRHP). The historic preservation laws mandating this cultural resource study specifically identify eligibility for inclusion on the NRHP as the key factor in determining preservation needs. The criteria for assessing site significance, as published in the U.S. Government Code of Federal Regulations (36 CFR 60) read as follows:

National Register criteria for evaluation. The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and

A. that are associated with events that have made a significant contribution to the broad patterns of our history; or

B. that are associated with the lives of persons significant in our past; or

C. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. that has yielded, or may be likely to yield, information important in prehistory or history.

Identification and evaluation of cultural resources in the project area permit formulation of management recommendations (Church et al. 2007; Reed and Metcalf 1999). Isolated finds do not meet the criteria for inclusion on the NRHP and are not recommended for further archaeological treatment. Management options for significant sites include site avoidance and data recovery.

PROJECT METHODS

The entire length of Forest Service Road 821 from its point of origin at US Highway 550 westward to a point north of the Silver Crown Mine (5SA407) was inventoried by two archaeologists walking parallel transects for a distance of 50 ft. on either side of the road centerline. Much of the route was on extremely steep and rocky slopes unsafe to walk upon that were inspected from above or below. In the area of the proposed road reroute north of the Silver Crown Mine, additional area was examined to accommodate road construction. Except for recording the route of Forest Service Road 821 as a site, no new sites were identified during the inventory. The Silver Crown Mine (5SA407) had been recorded by Alpine in June 2023, so no additional recording was necessary there. Previously recorded site 5SA406, a small mine exploration adit with waste rock, was found to fall within the inventory area and rerecorded. Site 5SA468, a small mine exploration adit with waste rock, was found to have been rerecorded as 5SA1220 in 2008, and a revisitation form was prepared. In addition, portions of the Silverton & Red Mountain Railroad grade (5SA112.15 and .16) were intersected by Forest Service Road 821 and newly recorded. All cultural resources were evaluated for eligibility for inclusion in the NRHP in terms of the specific criteria presented in the preceding section. The inventory area and maps of the documented cultural resources were recorded with a Minno Android tablet paired with a high accuracy geode Global Positioning System (GPS) receiver unit and plotted on a USGS quadrangle map. The sites and project area were photographed with a digital camera to illustrate conditions and augment descriptions. No artifacts were collected during the project.

SITE DESCRIPTION

The inventory of Forest Service Road 821 resulted in the recordation of the road (5SA1876.1), two segments of the Silverton & Red Mountain Railroad (5SA112.15 and .16), and new recordations or completion of revisitation forms for the Silver Crown Mine (5SA407) and three mine exploration adits and their waste rock (5SA406, 5SA468, and5SA1875). A map showing the inventory area and site locations are included as Appendix A, and site forms are in Appendix B.

5SA112.15 and .16 – Silverton & Red Mountain Railroad

Two segments of the Silverton & Red Mountain Railroad, site 5SA112, were recorded on San Juan National Forest land on the northern side of Forest Service Road 821 (5SA1876.1) at an elevation of about 10,520 ft. (Figure 6 to Figure 10) These were only recorded north-northeastward as far as the southwestern boundary of the Happy Jim Lode (part of MS 18179), which is private land. Nearby segment 5SA112.1 appears to have been recorded entirely northwest of the current segments, though they did record the Happy Jim Mine (5SA405) with its associated rail spur. Those recordings were done in 2000 by Durango Archaeological Consultants as part of their inventory of the Red Mountain Mining District (Curtis 2003). The lower and most distinct of the two sections of grade (5SA112.16) is the main line of the railroad grade. The upper and less distinct section of grade (5SA112.15) is a spur that leads to what has been recorded as the Happy Jim Mine (5SA405), which was the primary operating tunnel of the Telescope Mountain Mining Company. The intersection of the main grade and the spur has been obliterated by Forest Service Road 821 (Figure 11). The grade southwest of the southwestern ends of the two sections has also been obliterated by Forest Service Road 821, which may actually be running on top of the former grade route, but is no longer distinguishable as a railroad grade (Figure 12).

Segment 5SA112.15 is the spur to the main working tunnel of the Telescope Mountain Mining Company, recorded as the Happy Jim Mine (5SA405) (Figure 13 and Figure 14). The spur is a 285-ft.-long, 16-ft.-wide, cut-and-fill grade that is cut to a depth up to 4½ ft. into the east-facing mountainside with fill extending to the main grade below, which it parallels. The cut of the grade becomes shallower as it approaches its intersection with Forest Service Road 821 and is covered by dense willows for most of the recorded route. The spur is on a slightly steeper grade than the main line that it parallels. No ties, hardware, or cinders were observed on the grade.

Segment 5SA112.16 is a 292-ft.-long section of the main line of the Silverton & Red Mountain Railroad grade as it descended southward from Red Mountain to the floodplain of Mill Creek (Figure 15 to Figure 17). It is a 16-ft.-wide cut-and-fill grade with the fill of the upper grade on one side and substantial fill on the slope below. The grade is open on its southwestern end at its intersection with Forest Service Road 821 where it is used for camping and vehicle parking. Farther northeast, it becomes partly covered with willows and other vegetation. No ties, hardware, or cinders were observed on the grade.

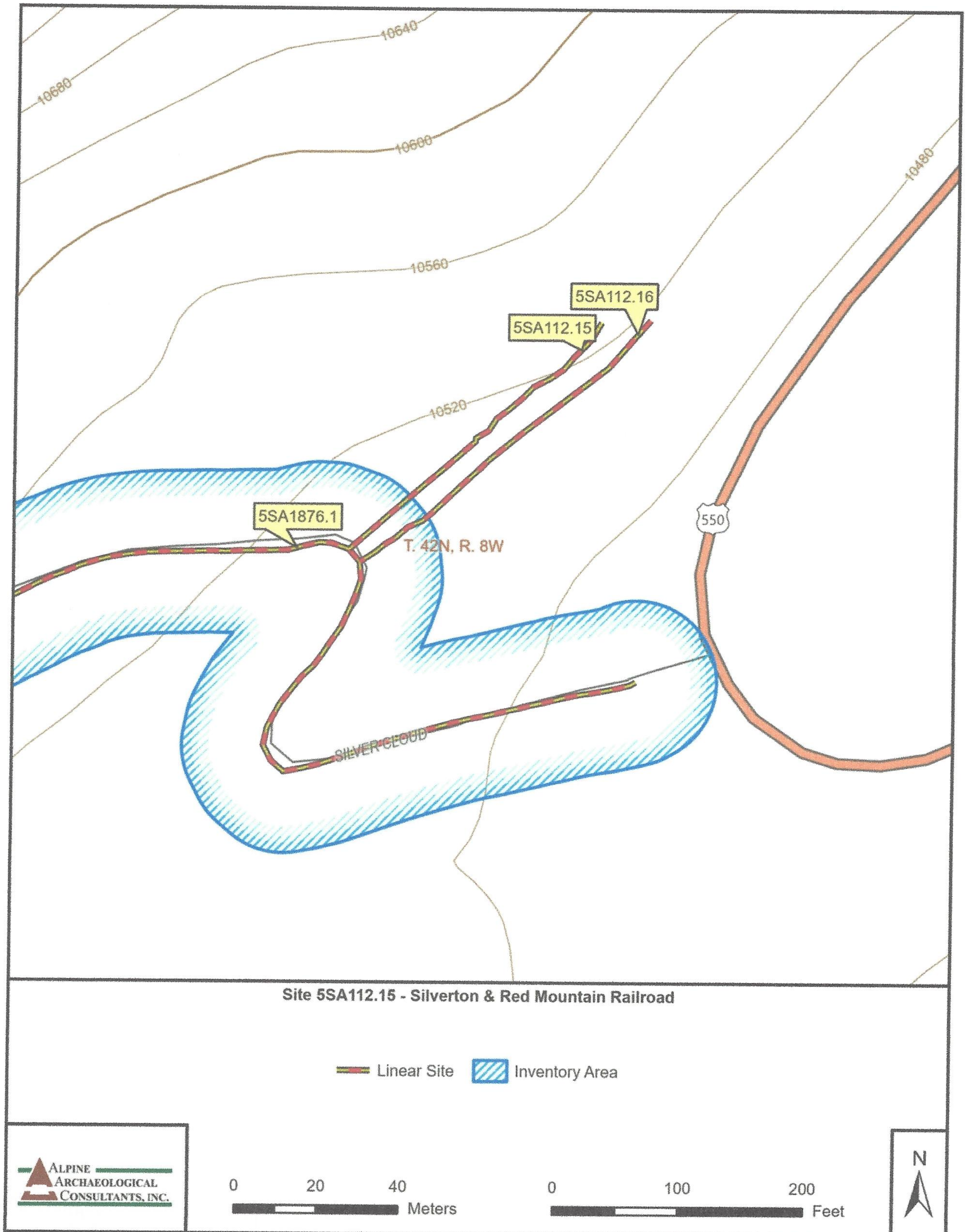

Figure 6. Map of the Silverton & Red Mountain Railroad segments 5SA112.15 and .16).

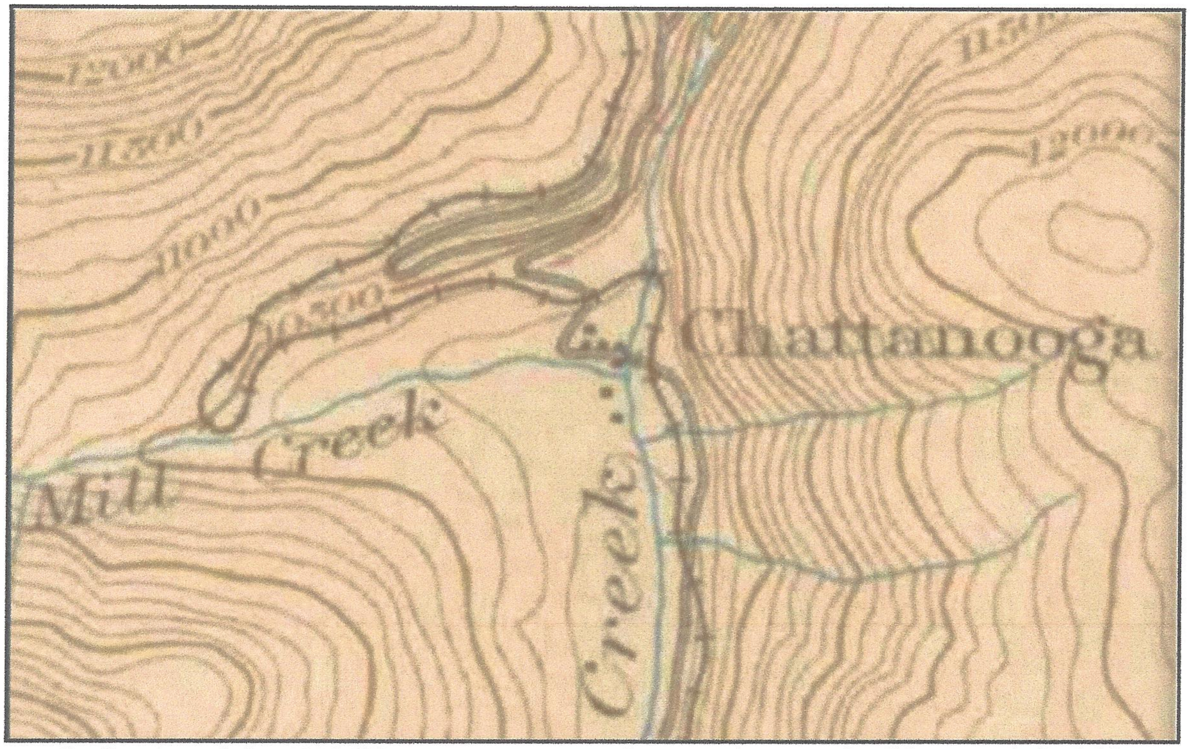

Figure 7. Portion of the 1897 Silverton 1:62,500-scale map showing the Silverton & Red Mountain Railroad making its tight loop north of Mill Creek.

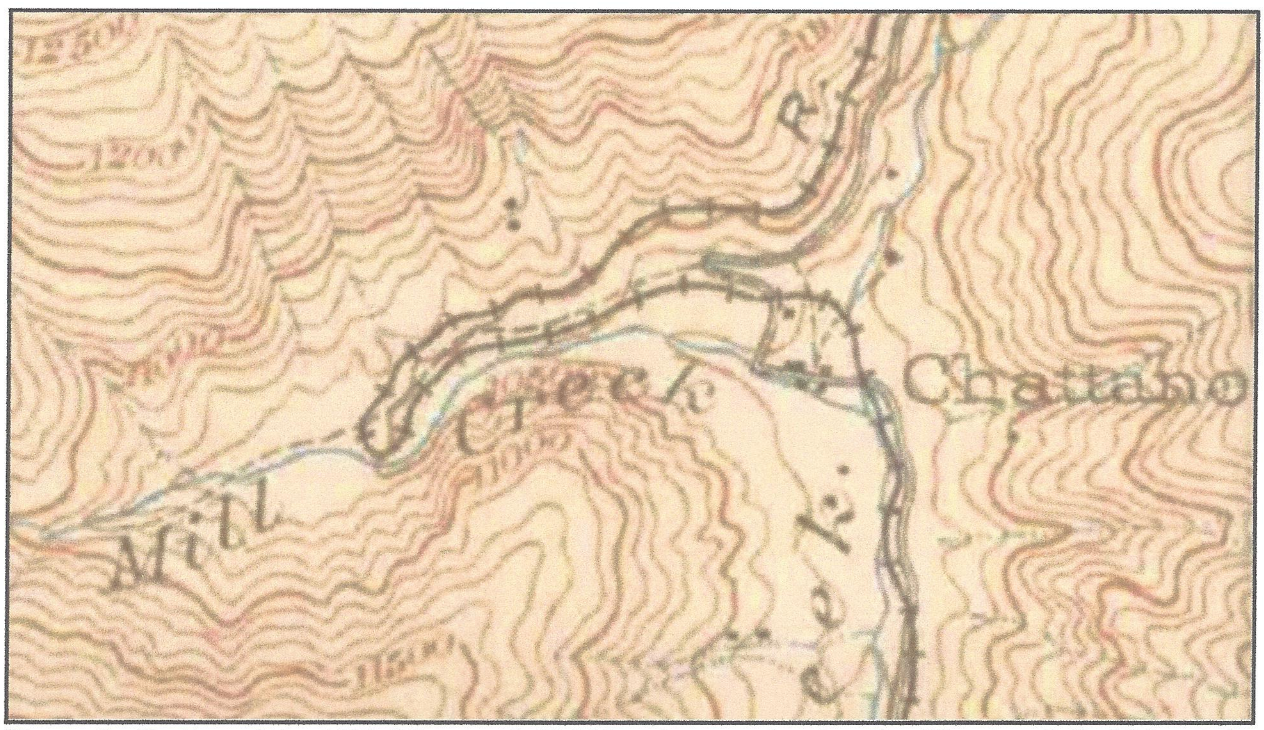

Figure 8. Portion of the 1902 Silverton 1:62,500-scale map showing the Silverton & Red Mountain Railroad making its tight loop north of Mill Creek.

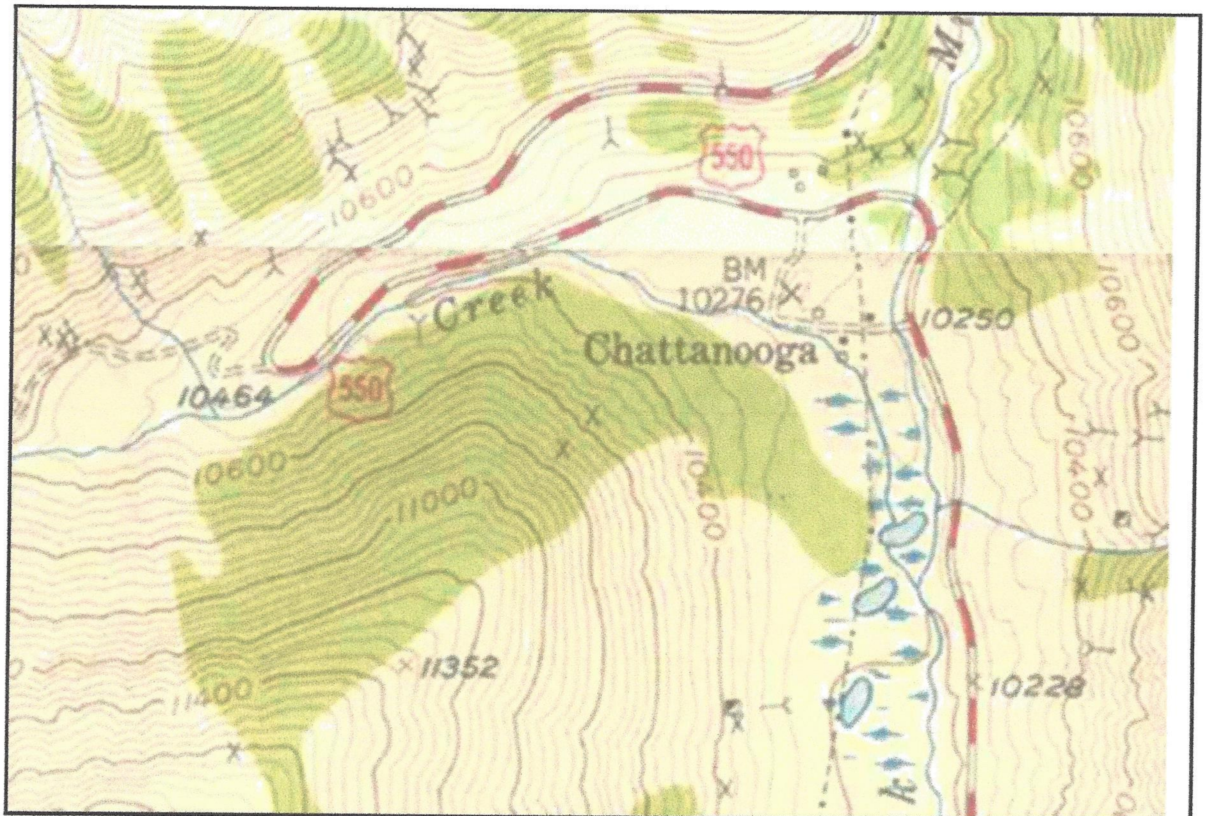

Figure 9. Portions of the 1955 Ironton and 1955 Silverton 1:24,000-scale USGS maps showing Forest Service Road 821 beginning on the horseshoe curve of US Highway 550 with the railroad grade no longer depicted.

Figure 10. Portion of the Mineral Survey plat of the properties of the Telescope Mountain Mining Company from October 1906 showing the route of the Silverton & Red Mountain Railroad through their Happy Jim and Golden Eagle Extension mining claims.

Figure 11. Intersection of Forest Service Road 821 with the Silverton & Red Mountain Railroad grades, looking east. The spur to the Happy Jim Mine (5SA112.15) is emerging from the willows to the left and the Jeep is parked on the main line grade (5SA112.16).

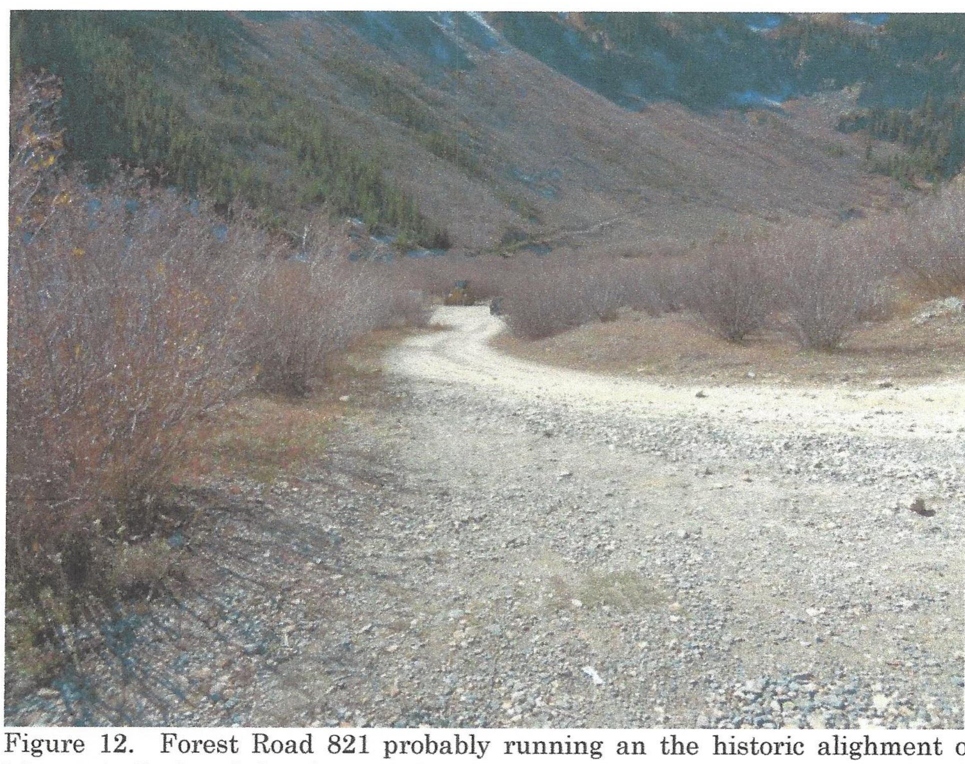

Figure 12. Forest Road 821 probably running an the historic alighment of the Silverton & Red Mountain Railroad, but has so altered it that it no longer clearly a railroad grade. View is to the southwest.

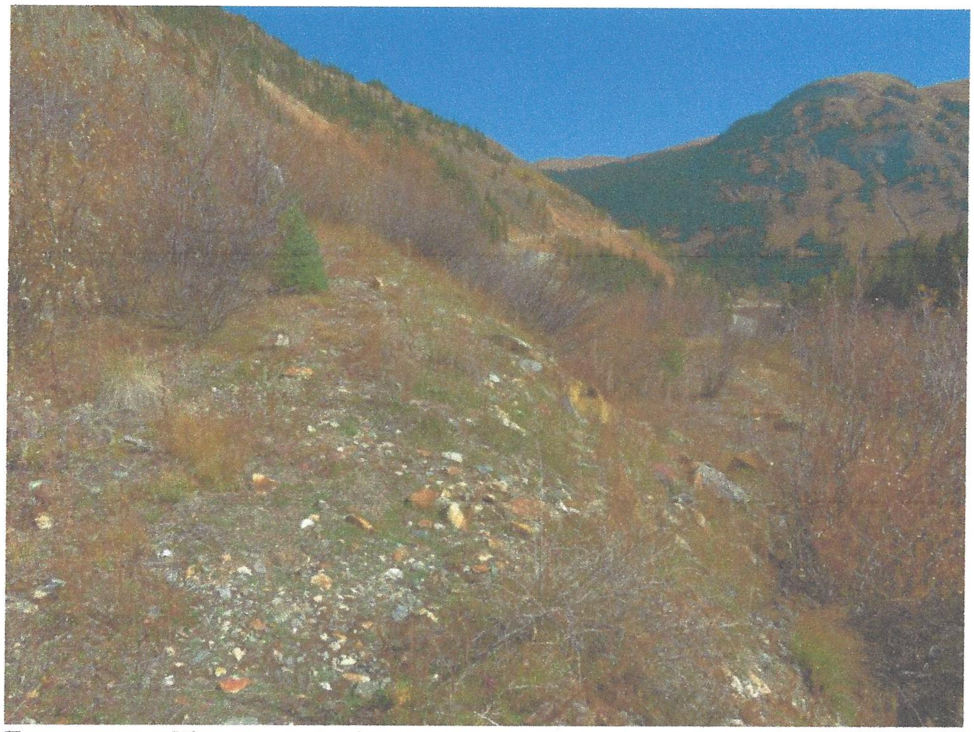

Figure 13. The spur grade to the Happy Jim Mine (5SA112.15) above the main line grade (5SA112.16), visible below to the right. View is to the northeast.

Figure 14. Looking southwest along the spur grade from the Happy Jim Mine (5SA112.15) as it disappears into the willows.

Figure 15. The main line grade (5SA112.16) partly covered with willows, looking southwest. Note the fill of the grade extending downslope to the left.

Figure 16. Looking west at the cut-and-fill main line grade (5SA112.16) with the fill from the spur above (5SA112.15) extending to the lower grade.

Figure 17. Route of the northeastern end of the recorded section of the main grade (5SA112.16) extending to the Forest Service/private land boundary on the southwestern side of the Happy Jim Lode (MS 18179).

Historical Background

See the information about the Silverton & Red Mountain Railroad in the Prehistoric and Historical Background section above. USGS maps are included above (Figure 7 to Figure 9) that show the railroad grade in 1897 and 1902, but not present in 1955, when transportation through the area was superseded by US Highway 550.

National Register Recommendation

Site 5SA112, the Silverton & Red Mountain Railroad grade, has been officially determined to be eligible for inclusion in the NRHP. Both segments 5SA112.15 and 5SA112.16 are recommended as contributing elements of the linear site as a whole.

Management Recommendations

No further historical or archaeological work is recommended for 5SA112.15 and 5SA112.16. The resources will not be impacted by continued use of Forest Service Road 821. Future activity in the area should avoid impacting the two segments of grade. The portion of the grade immeditaely south of the two recorded segments has been thoroughly obliterated so that the junction of the two segments and its course of travel is no longer evident because of the construction of Forest Service Road 821 and a large pullout area. It is conjectured that Forest Road 821 has been built on the original railroad grade alignment, but there is no physical evidence of it, so was not recorded there. Because the grade has already been obliterated in that area, continued use of the road and pullout will not cause any further damage.

5SA406 – Mine Prospect

Site 5SA406 is a small mine prospect at an elevation of 10,680 ft. on land managed by the San Juan National Forest (Figure 18 to Figure 20). It was initially recorded in 1993 by the Colorado Division of Minerals and Geology's Inactive Mines Program (Poley and Krabacher 1993). It was mistakenly called the "Shelleyville," as they evidently thought it was on the Shelbyville Lode (MS 18168), which it is not. Without evidence, the recorders reported that the adit was opened sometime between 1945 and 1950 and appeared as an eroded 6-by-6-ft. opening. Alpine's recording of the site shows that the site is a completely filled adit at the base of a rock outcrop on a very steep slope above and north of Forest Service Road 821. The rock outcrop was reached by a 16-ft.-long, 5-ft.-wide trench up to 4 ft. deep that extends southward from the filled adit at 185 degrees. The trench and adit are filled by up to 4 ft. of soil and rock from the slopes above and to the sides. Waste rock was deposited down the very steep slope from the southern end of the trench forming a thin veneer of waste rock over a 30-by-40-ft area, oriented north to south, above the road. The waste rock is unvegetated, but vegetation around the adit includes spruce, aspen, columbine, yarrow, currant, and grasses. Less than 2 cm of dark brown rocky sandy silt has developed over the reddish-brown rocky sandy silt subsoil.

Historical Background

The original recorders reported that site was on the Shelleyville Lode (actually Shelbyville), which it is not, and thought it was a prospect associated with work done by Frank Ashcroft and A. J. Bennet when the Silver Crown group of claim property was owned by Charles C. Goulding. The site is not on a patented mining claim, so no information about the prospecting adit is known.

National Register Recommendation

The original recorders recommended that site 5SA406 was not eligible for listing in the NRHP, and it was officially determined not NRHP eligible on June 17, 1993. The site exhibits limited mine exploration that did not result in productive mining and has no artifacts in association that can aid in dating or provide additional information of importance. Alpine concurs with the not eligible determination.

Management Recommendations

No further historical or archaeological work is recommended for 5SA406.

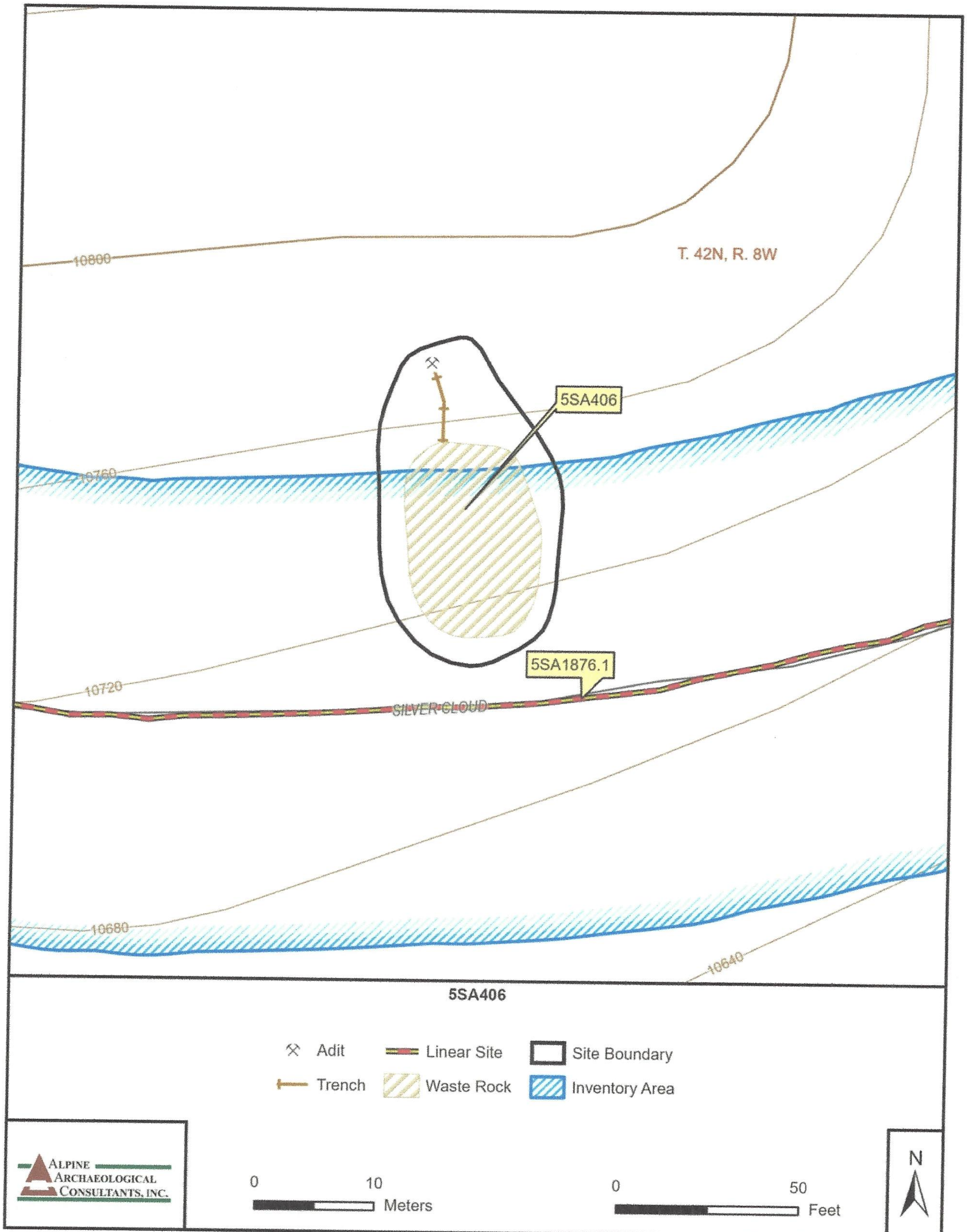

Figure 18. Map of Site 5SA406.

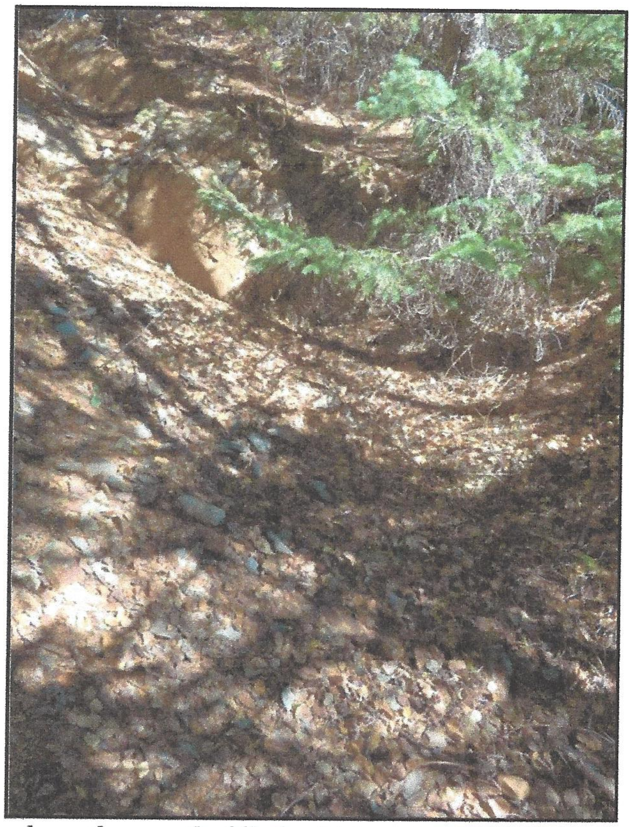

Figure 19. Looking north along the mostly filled adit trench of 5SA406 below the rock outcrop where the adit extended below ground.

Figure 20. Waste rock of 5SA406 extending downslope to Forest Service Road 821 below the adit trench of 5SA406. View is to the south.

5SA407 – Silver Crown Mine

The Silver Crown Mine (5SA407) is a 1.9-acre mining complex on private land at an elevation of 10,800 ft. (Figure 21). The site was initially recorded in 1993 by Martha Poley and Paul Krabacher of the Colorado Division of Minerals and Geology's Inactive Mines Program. They mistakenly identified the mine as the Mountain Chief (Poley and Krabacher 1993). The site was then recorded in 2000 by Durango Archaeological Consultants as part of the inventory of mines in the Red Mountain Mining District. They properly identified the site as the Silver Crown Mine, but recorded it as 5SA838, rather than using the original site number (Condrey et al. 2000; Curtis 2003). Alpine rerecorded the mine in June 2023 for Bonanza Boy, LLC in anticipation of acquiring an Army Corps of Engineers 404 Permit in the course of developing the site for recreation (Horn 2023).

The site includes a moderate-sized waste rock pile, a collapsed adit, stone retaining walls on the upslope side of a leveled area that at one time contained a large wooden tunnel house, a heavily disturbed area that contains artifacts from an adjacent boarding house and office building, and stone wall avalanche deflectors. The tunnel house at one time contained the adit opening and an electric motor and a compressor, the mounts of which are still in place. The boarding house/office appears to have been demolished and displaced by later road building. The avalanche deflectors consist of a single large wall on the southwestern end of the site and a large, complex, A-shaped configuration of stone walls on the steep slope in the western portion of the site (Figure 6). The site is on a steep, rocky, southeast-facing slope above Mill Creek (Figure 22 and Figure 23). Its most prominent element is an irregularly shaped, flat-topped, yellowish waste rock pile that measures 14 x 155 ft., oriented north to south (Figure 24). A northeast-facing cleft in the waste rock between lobes of waste rock may have provided access onto the top of the waste rock from below, the base of which appears to correlate with a road shown on the 1906 Mineral Survey Plat for the Shelbyville Lode (Figure 5 and Figure 25). The current access to the site is by way of a 10–12-ft.-wide winding dirt road that climbs westward along a steep, south-facing slope from the apex of a major curve on U.S. Highway 550 0.55 miles away. This road was evidently constructed using heavy equipment in the 1940s and made the earlier access route to the site obsolete, resulting in the upper portion of it that aligned with the mine portal being covered by waste rock by later mining.

The adit appears as a collapsed trench about 6 ft. wide and 16 ft. long that enters the steep east-facing slope in a west-southwest direction (240 degrees) (Figure 26). Large boulders and cobbles comprised the fill. Mixed in are 8-x-8-in. posts and 3-x-8-in. and 3-x-12-in. planks that were used to frame the adit opening (Figure 27). Lying near the southeastern end of the adit trench is an 8-x-8-ft. expanded-metal gate with a welded angle-iron frame (Figure 28). Photos from the 2000 recording show the gate standing, but the collapse behind was underway. Water emanates from the adit. After about 30 ft., it runs southward along the western edge of the waste rock pile to a pool that evidently drains into the waste rock (Figure 29).

Three sections of stone retaining walls stabilized the slope above the waste rock and provided a northwestern edge of a leveled area for the tunnel house depicted in the historic photo and on the Shelbyville Lode Mineral Survey Plat. Except for a small remnant of floor on the northeastern end of the area, no evidence of the structure has survived except for a somewhat level overgrown area about 16 ft. wide. The southwesternmost retaining wall is southwest of the adit; it is a 16-ft.-long and up to 4-ft.-tall uncoursed wall of uncoursed boulders and cobbles (Figure 30). Some waste rock has been deposited in small piles southeast of the wall and artifacts scattered in the area include some 2-x-12-in. board fragments, wooden plank remnants, 1½-in.-diameter iron pipe, 1½-in.-diameter reinforced rubber hose, a rubber V-belt, and corrugated sheet metal fragments. Another section of retaining wall is northeast of the adit and stands 4–4½ ft. tall (Figure 31). The final section of wall is at the far northeaster end of the area, is 2½–3 ft. tall, and ends at what was likely the northeastern corner of the leveled area (Figure 32). It terminates at a berm that does not quite form a right angle. In the northeastern end of the leveled area are two machinery mounts (Figure 33). The southwestern mount is an 8-x-8 ft., U-shaped compressor mount that has a 5-ft.-long, 26-

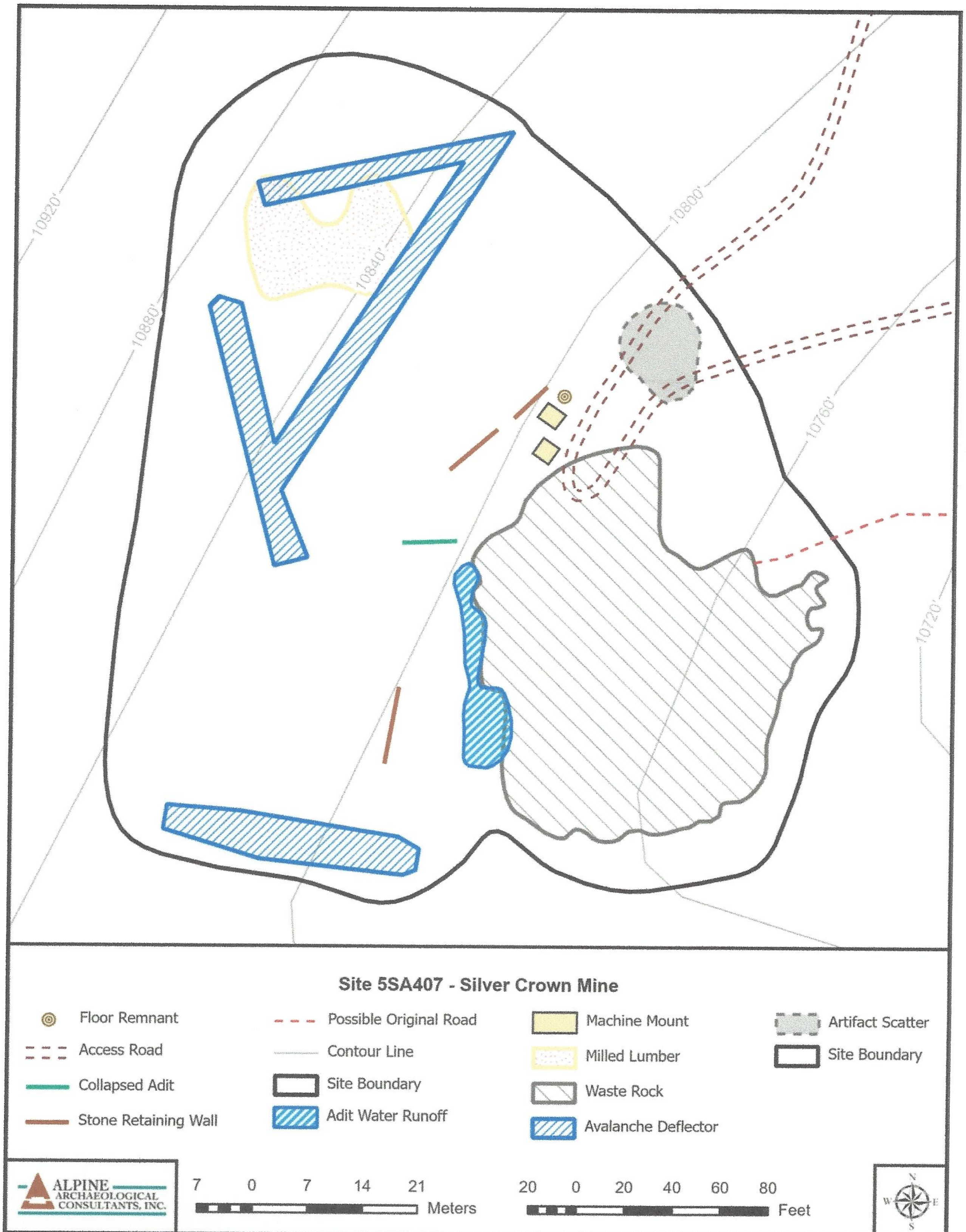

Figure 21. Map of the Silver Crown Mine (5SA407).

Figure 22. View of the Silver Crown Mine (5SA407) from the major bend on U.S. Highway 550 with Mill Creek to the right. View is to the west.

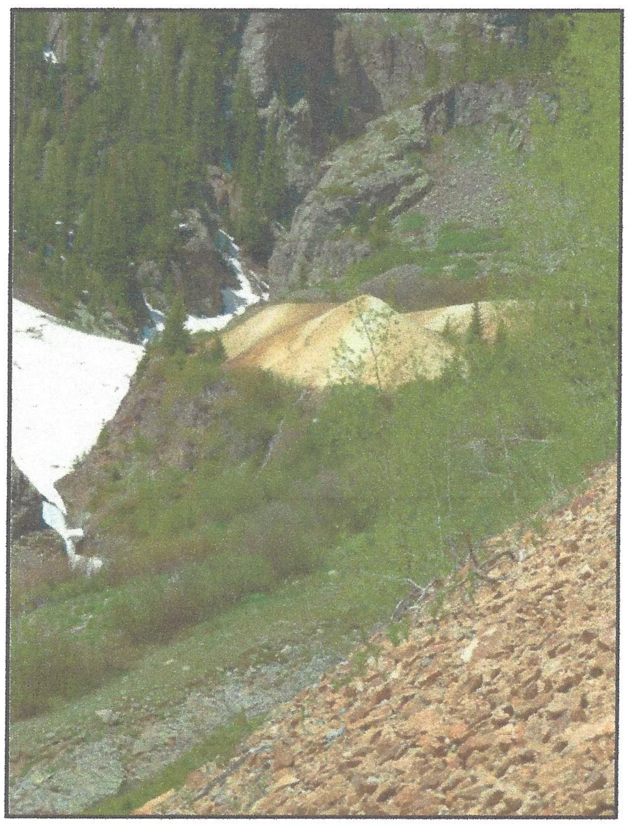

Figure 23. Looking west-southwest at the Silver Crown Mine (5SA407) from the road leading to the site.

Figure 24. Looking north across the top of the waste rock of the Silver Crown Mine (5SA407) with the A-shaped avalanche deflector on the slope to the left. The distant vehicle is on the upper portion of the road switchback.

Figure 25. Cleft through the waste rock at the top of the probable original route to the Silver Crown Mine (5SA407), looking southwest.

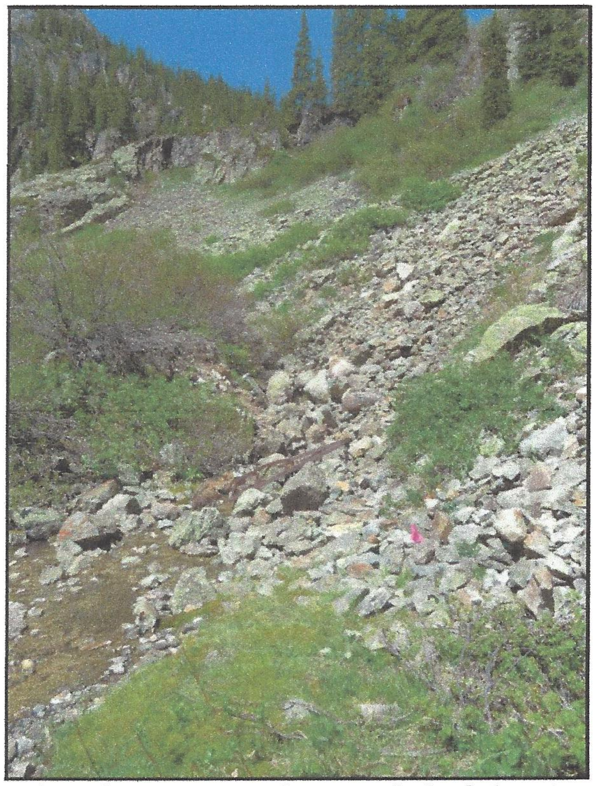

Figure 26. Collapsed adit with exclusion gate and post and plank framing debris at the Silver Crown Mine (5SA407), looking west.

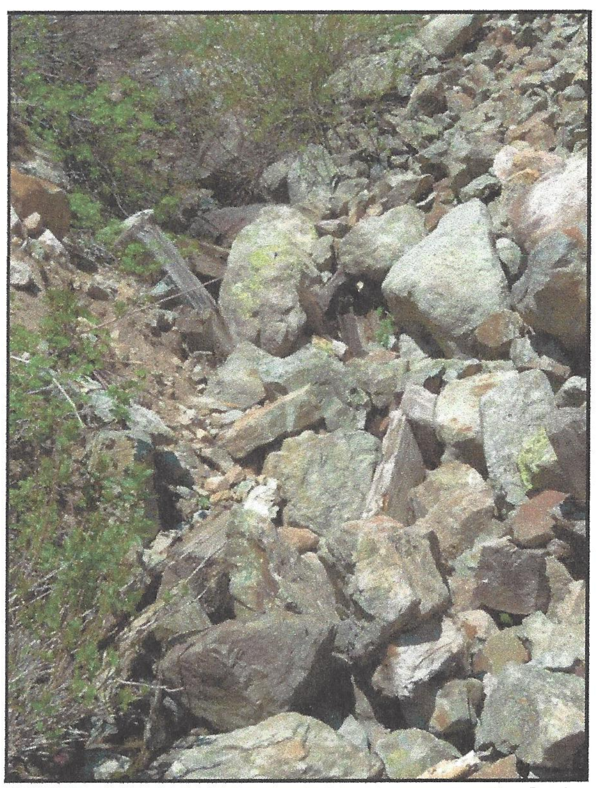

Figure 27. Looking west at the collapsed adit with post and plank framing debris at the Silver Crown Mine (5SA407).

Figure 28. Exclusion gate disposed of below the adit of the Silver Crown Mine (5SA407). View is to the west.

Figure 29. Water from the adit ending in a small pond at the upper southwestern edge of the waste rock of the Silver Crown Mine (5SA407). View is to the west.

Figure 30. Looking west at the southernmost retaining wall at the Silver Crown Mine (5SA407).

Figure 31. Looking west at the central retaining wall remnant with ore car rail and compressed air pipe disposed on it at the Silver Crown Mine (5SA407).

Figure 32. Northernmost stone retaining wall remnant behind probable electric motor mount at the Silver Crown Mine (5SA407). View is to the north.

Figure 33. Compressor mount to the left with the probable electric motor mount to the right at the Silver Crown Mine (5SA407), looking north-northwest.

in.-wide cement-lined opening on the northeastern side (Figure 34). It has a base of native stone set in cement mortar on top of which seven courses of common brick were laid, standing 20 in. tall. Projecting through the top of the brick are 11 1-in-diameter iron mounting bolts within 2-in.-diameter iron pipe sleeves that probably were set flush with the top of the brick. The brick has seen considerable deterioration leaving the pipe sleeves quite exposed. Seven ft. away and offset to the northwest is a second machinery mount that measures 7 ft. long by 6 ft. wide, oriented northeast to southwest, probably for the 75-horsepower electric motor that was known to have powered the compressor (Figure 35). It was probably offset to enable it to turn the compressor with a belt on pulleys. The mount is divided lengthwise into two parts by a 42-in. gap through the center. The northwestern side has a native stone and cement base on top of which seven courses of brick were laid, giving it a total height of 42 in., though it is highly deteriorated. Two ¾-in.-diameter mounting bolts extend through its top. The southeastern side is a stone and cement base on top if which is a concrete cap. Two 1-in.-diameter mounting bolts have been cut off flush with the top of the cap. Immediately northeast of the second machinery mount is a remnant of building floor (Figure 36). This is diagonal 1-x-6-in. board subfloor over which 1-x-4-in. tongue-and-groove flooring has been laid, all resting on a 3-x-8-in. floor joist.

Adjacent and to the southwest of the machinery mounts are sections of ore car rail and 4-in.-diameter compressed air iron pipe (Figure 37). Sections of the pipe are connected with pipe couplers marked "4XXX/5TGR/VICT/AULIC" (Figure 38). According to the U.S. Patent Office, the Victaulic trademark was first used in 1920 for pipes and pipe fittings. It is a live trademark last renewed in 2015 by the Victaulic Company of America, Easton, Pennsylvania. It is likely that the pipe and rail represents the last period of mining at the site in the late 1940s. Other artifacts found in the area include window glass fragments, wire nails, a cast-iron stove top marked "No. 30" with an oval stove pipe opening, rotary-opened sanitary food cans, galvanized sheet metal, rolled galvanized sheet metal that has been soldered to form a pipe or nozzle, 2-in.-diamter iron pipe, white porcelain insulator fragments, and a light green rectangular bottle fragment.

The Shelbyville Mineral Survey Plat from 1906 and historic photos show a combination boarding house and office building in line and northeast of the tunnel house (Figure 5). This building has been completely destroyed by the construction of the current road to the site that has an apex of a switchback curve on the northeastern edge of the waste rock pile and continues upslope (Figure 39). The building was situated at the upper portion of the switchback and remnants are evident only as structural debris and artifacts from its residents in the road cut bank (Figure 40). These include wire nails, lumber fragments including from 8-x-8-in. posts, corrugated sheet metal, window glass fragments, coal cinders, stoneware sewer pipe, coal-burning stove parts, heavy-gauge sheet metal, corrugated sheet metal, common brick, galvanized 1-in.diameter threaded pipe, 3-in.-diameter threaded iron pipe with an elbow, plain white earthenware dishware, enamelware cooking vessel, and purple vessel glass fragments, including one round bottle base marked "S. B. M." The manufacturer of this bottle is unknown, but dates from about 1885–1920 based on the purple glass.

The most innovative elements of the site are native stone walls built to deflect avalanches with the intention of protecting the mining buildings. The simplest of these is on the southwestern end of the site. It is a 15-ft.-wide, 110-ft.-long wall, made of angular native cobbles that is generally 5–6 ft. tall and rounded on the top, but is up to 10 ft. tall in a dip of the topography (Figure 41 and Figure 42). The wall is situated on a ridgeline so that an avalanche running northward down the steep slope on the southern side of Mill Creek, crossing the creek, and running up the opposite side would be deflected upward and loose its impetus before reaching the mine buildings. The other deflector is more complex. It is situated on the steep, rocky, southeast-facing slope above and northwest of the mine complex (Figure 43 to Figure 46). It consists of cobble walls in an A-shape configuration with its apex to the northwest and its 110-ft.-long legs spreading outward to the south and east and having a 170-ft.-long connecting wall low between the legs. The walls are generally rectangular in

Figure 34. Stone, cement, and brick compressor mount at the Silver Crown Mine (5SA407), looking south-southwest.

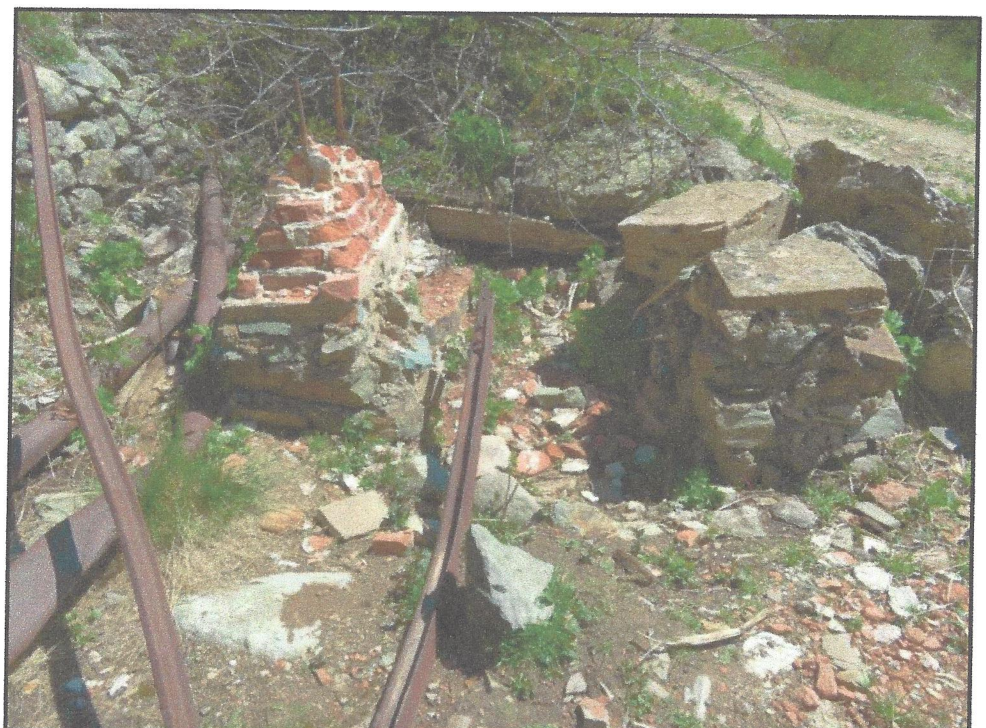

Figure 35. Looking north-northeast at the probable electric motor mount with the building floor remnant behind at the Silver Crown Mine (5SA407).

Figure 36. Building floor remnant showing diagonal 1-x-6-in. subfloor topped by 1-x 4-in. tongue and groove flooring set on 3-x-6-in. joist at the Silver Crown Mine (5SA407). View is to the north.

Figure 37. Looking northwest at 4-in.-diameter iron compressed air pipe and ore car rail adjacent to the compressor mount at the Silver Crown Mine (5SA407).

Figure 38. Victaulic pipe coupler on 4-in.-diameter iron compressed air pipe at the Silver Crown Mine (5SA407).

Figure 39. Road switchback that has removed the boarding house/office and pushed it and artifacts downslope at the Silver Crown Mine (5SA407). View is to the north.

Figure 40. Looking southwest at the cut bank below the road switchback that contains heavily disturbed artifacts at the Silver Crown Mine (5SA407).

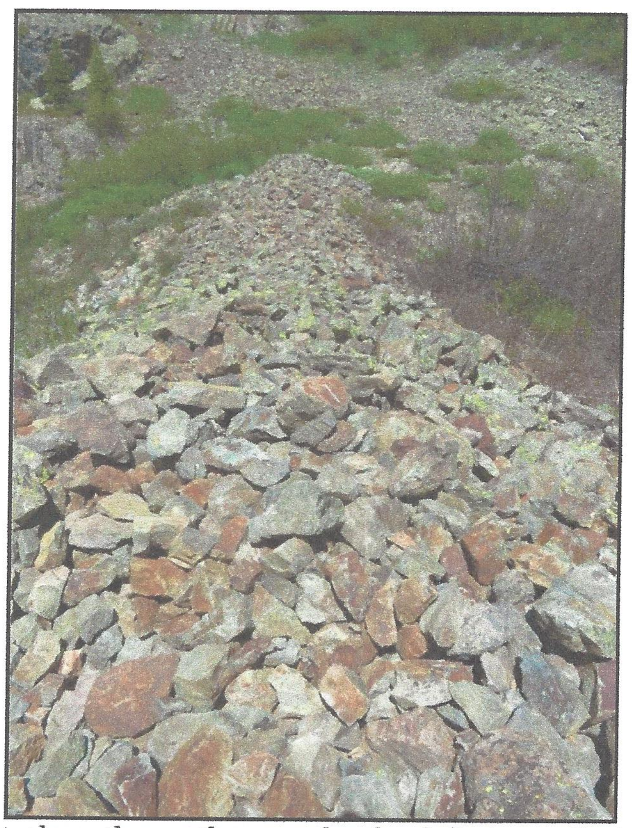

Figure 41. Looking west along the southern avalanche deflector wall at the Silver Crown Mine (5SA407).

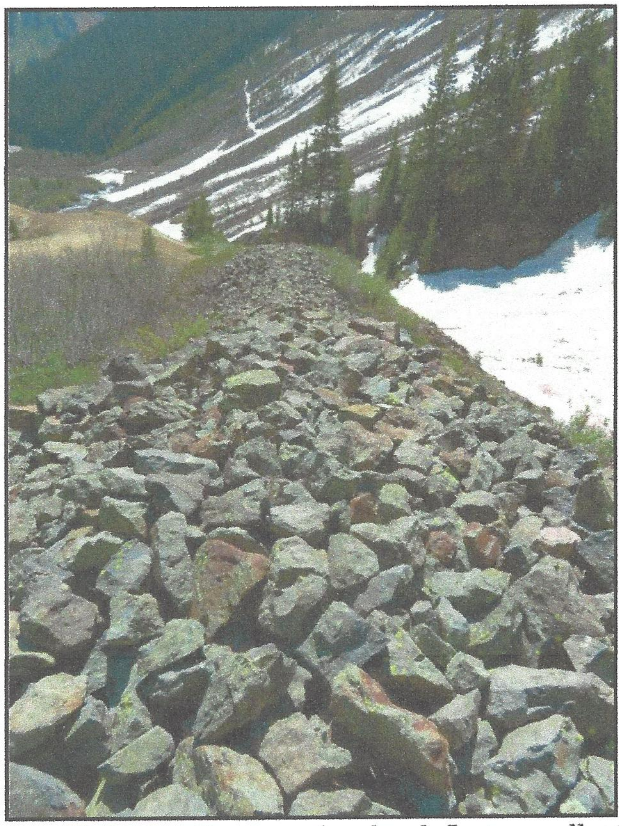

Figure 42. Downslope view of the southern avalanche deflector wall at the Silver Crown Mine (5SA407), looking east-southeast.

Figure 43. View of the A-shaped avalanche deflector walls on the rocky slope west of the Silver Crown Mine (5SA407). View is to the west.

Figure 44. A-shaped avalanche deflector walls looking north-northeast from the southern avalanche deflector wall at the Silver Crown Mine (5SA407).

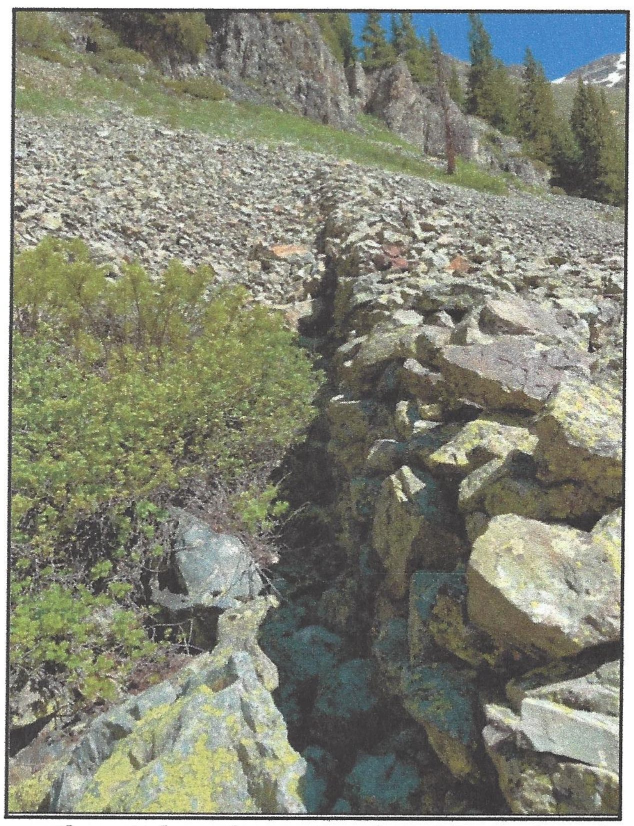

Figure 45. Looking north-northwest along the western leg of the A-shaped avalanche deflector at the Silver Crown Mine (5SA407).

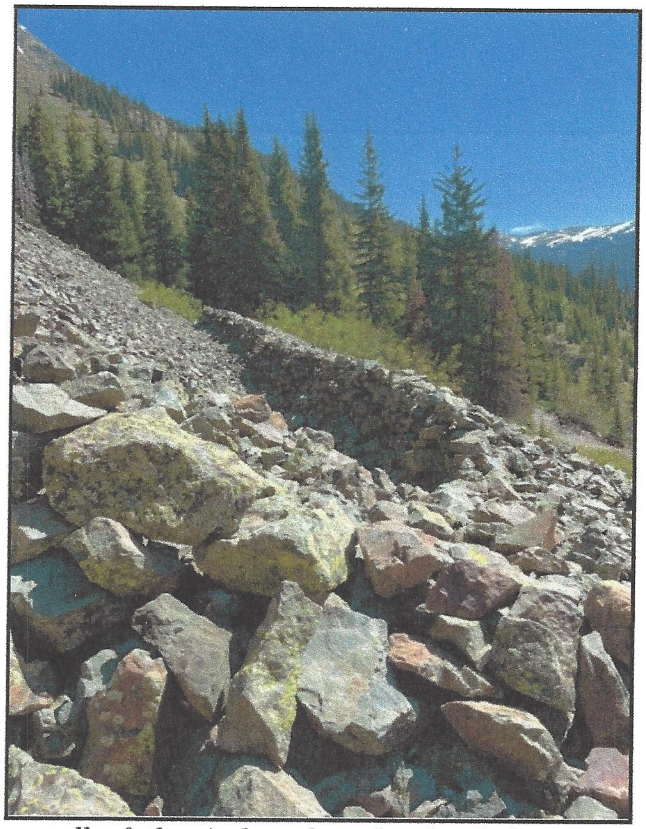

Figure 46. The crossing wall of the A-shaped avalanche deflector at the Silver Crown Mine (5SA407), looking northeast.

cross-section, flat on top, 4–14 ft. wide, and stand up to 5 ft. in height. The walls of the legs decrease in height on their upper ends. Where the two outer legs are at ground level near their tops, a historic photo shows that board walls were constructed that were braced from below to extend the walls 30–40 ft. to their apex. Remnants of that board construction is scattered on the slope.

Historical Background

See the detailed information about the Silver Crown Mine in the Prehistoric and Historical Background section above.

National Register Recommendation

When initially recorded in 1993 by the Colorado Division of Minerals and Geology's Inactive Mines Program, the Silver Crown Mine (5SA407) was mistakenly identified as the Mountain Chief and recommended not eligible for listing in the NRHP (Poley and Krabacher 1993). The site was then recorded in 2000 by Durango Archaeological Consultants as part of the inventory of mines in the Red Mountain Mining District. They properly identified the site as the Silver Crown Mine and recommended the site as NRHP eligible under Criteria A and D, noting that the site was a representative small mine in the Red Mountain Mining District (Criterion A) and concluded that the artifacts present on the site were sufficient to provide important information about the mining district's history (Criterion D) (Condrey et al. 2000; Curtis 2003). The most current recording of the site by Alpine in June 2023 recommended the site eligible for inclusion in the NRHP under Criteria A and C, but that Criterion D was not pertinent because few artifacts were present at the site, features with archaeological potential were not present or, in the case of the boarding house/office, were highly disturbed with their artifacts out of context. The following eligibility statement from 2023 is still valid (Horn 2023):

> Under Criterion A, the site is significant as an important mine in the development of the Red Mountain Mining District from 1906–1909, though some work seems to have taken place in 1924 and 1925, and more consequential mining took place from 1946–1949. In addition, the Silver Crown Group of claims was important in the development of the nearby town of Chattanooga in the 1880s, though this is earlier than the mining that took place at the site. Under Criterion C, the site is important because its waste rock pile is a highly visible element of the mining landscape of the area, particularly from the major curve on U.S. Highway 550 east of the site. In addition, the avalanche deflectors on the site are excellent and intact examples of an innovative approach to protecting mining buildings at high elevation where devastating avalanches were a common occurrence.
>
> The site has excellent integrity of location and setting as it is an unmovable mine and the area has seen virtually no change since mining ceased in the late 1940s. The design of the mine has fairly good integrity because the adit is still evident, though collapsed, and the waste rock that came from below ground is still present. The former mine building placements are not readily evident with remnants of retaining walls, two machinery mounts, and a remnant of a board floor being the only remaining evidence of improvements. The boarding house/office has been completely obliterated. The stone avalanche deflectors on the southwestern edge of the site and on the slope above to the northwest have excellent integrity. They are rare feature types, and their design is readily evident. The avalanche deflectors retain excellent integrity of materials and workmanship, though the remainder of the site lacks such integrity. The site retains its integrity of feeling, as it is readily identifiable as a mine, mostly because of the large, flat-topped waste rock pile. Integrity of association is very good because no other activities have taken place at the site except for mining.

Although some work has taken place on the waste rock since the site was recorded in June, the work has not resulted in a change in the NRHP recommendation. The work on the waste rock is being done under the auspices of an agreement with the US Army Corps of Engineers to remediate acid drainage from the waste rock pile. The change of the route of Forest Service Road 821 off of the site does not affect the eligibility of the site, particularly because the road was likely built to provide access to the mine during its last phase of mining from 1946–1949.

Management Recommendations

As was stated in Horn (2023):

> Future activities at the Silver Crown Mine (5SA407) should endeavor to maintain the visual integrity of the waste rock pile as a part of the historic mining landscape of the area. The principal view from U.S. Highway 550 is most important. In addition, the rock avalanche deflector walls above and on the southwestern side of the site should be left intact. The former locations of the two buildings on the site—the tunnel house and the boarding house/office—have poor to no integrity and require no further consideration as cultural resource elements of the site. The collapsed adit also has poor integrity and requires no preservation consideration. In addition, although some artifacts are present from the 1906–1909 period in the former area of the boarding house/office, these have been thoroughly disturbed by construction of the road to and beyond the site, probably in the 1940s. Because the context of the artifacts has been destroyed, they do not provide an opportunity for the recovery of important information about occupation and use of the site. No protective or preservation measures are necessary where these artifacts are present.

5SA468 – Mine Exploration Adit

Site 5SA468 is a small mine exploration adit on private land at the base of a rock outcrop above and to the west of Forest Service Road 821 at an elevation of 10,680 ft. (Figure 47to Figure 53). It is on the patented Chattanooga Lode (part of MS 18163). The mine adit was initially recorded in May 1996 by the Colorado Division of Minerals and Geology as Location 10 as part of their Inactive Mines Program (Krabacher and Poley 1996). This recording only documented the adit and none of the other features of the site. Mountain States Historical returned to the site in 2008 and recorded it in its entirety (Twitty 2009). This work was done as part of the Argentine-Blaine Mine Closure Project. Twitty evidently did not know that the site had been partly recorded in 1996, and the site was designated 5SA1220. Twitty's recordation of the property was very complete and has not changed since his recording except that the adit was filled by cobble-sized waste rock and soil from the surrounding area and marked with a pipe with a brass cap marked: "STATE OF COLORADO/ID 10/PROJECT 239/08/DATE 20/DIVISION OF RECLAMATION, MINING, & SAFETY." The Number 10 ID number on the cap confirms that it is the same site originally recorded as 5SA468. Twitty accurately described the site as "a simple prospect adit driven into an east-facing cliff," but described it as being on the Silver Crown claim, which is considerably distant. The mine adit included a 5-ft.-wide, 30-ft.-long entrance trench running westward through the loose scree slope to the bedrock face into which the adit was dug. Before being filled, the adit was 3 ft. wide and 5 ft. tall. South of the end of the adit trench is a 12-x-15-ft. leveled area, oriented north to south, that has an uncoursed stone wall about 2 ft. tall on its north side and a partial wall at its southeast corner. Because unburned coal was found on the leveled area, Twitty interpreted it as a blacksmith shop. In addition of the coal, cut and wire nails and numerous pieces of window glass are present indicating that a wood-frame building was built there. A rather informal 8-ft.-long, 2-ft.-tall wall to hold the angular waste rock below the platform is about 6 ft. east of the southeast corner of the leveled area. Waste rock extends down the steep slope below the eastern end of the adit trench that covers an area about 30 ft. wide and 45 ft. long down to the road below. This is of a finer, reddish material than the angular cobble scree that it shallowly covers to a depth of up to 2 ft.

Historical Background

The site is the discovery cut and tunnel of the Chattanooga Lode (Figure 54). The claim was originally owned by August and Andrew P. Johnson. Andrew did the annual assessment work on the claim from 1898-1900, for which August failed to pay his share, so Andrew took steps to acquire full ownership. The Johnson had ownership of the claims as early as 1896 (*Silverton Weekly Miner,* November 20, 1896:2; *Silverton Standard,* August 9, 1901:9). Andrew Johnson then passed the claim to James Reilly in September 1904 (*Silverton Standard,* September 24, 1904:1). It is likely that the discovery tunnel and cut on the Mineral Survey Plat was the result of work done annually by Andrew P. Johnson from the middle 1890s to the early 1900s. Once James Reilly obtained the claim from Johnson, he evidently got his brother, Thomas Reilly, and E. J. Ritter, William Par, and C. J. Renahan interested in investing in the claim in late 1905, with Ritter of Pueblo probably being the financial leader of the group. Ritter had been involved with mining in the area as early as 1900, when he was the owner and operator of the Ruby Trust group of claims on Mineral Creek (*Silverton Weekly Miner,* June 14, 1901:1; *Silverton Weekly Miner and San Juan Democrat,* November 3, 1905:1). They had a Mineral Survey Plat prepared for the Chattanooga Lode and adjoining Rebeca [Rebecca], Pueblo, and Sunnyside lodes as MS 18163 on October 18, 1906 and filed for a Mineral Patent for the claims on August 9, 1907 (*Silverton Weekly Miner and San Juan Democrat,* August 30, 1907:4). They obtained the patent on the claims on June 21, 1909. No further work seems to have taken place on the Chattanooga Lode and it is not known if any productive work was ever done on the other claims. The Occidental Mining Company acquired the four mining claims, including the Chattanooga Lode, probably to further the holdings of Thomas J. Hurley around the Silver Crown Mine soon after the claims were patented, all under the umbrella of the Mines Securities Corporation. The acquisition probably took place soon after the 1908 taxes for the claims went unpaid by Ritter, Parr, Renahan, and Reilly. Taxes went unpaid on the properties again beginning

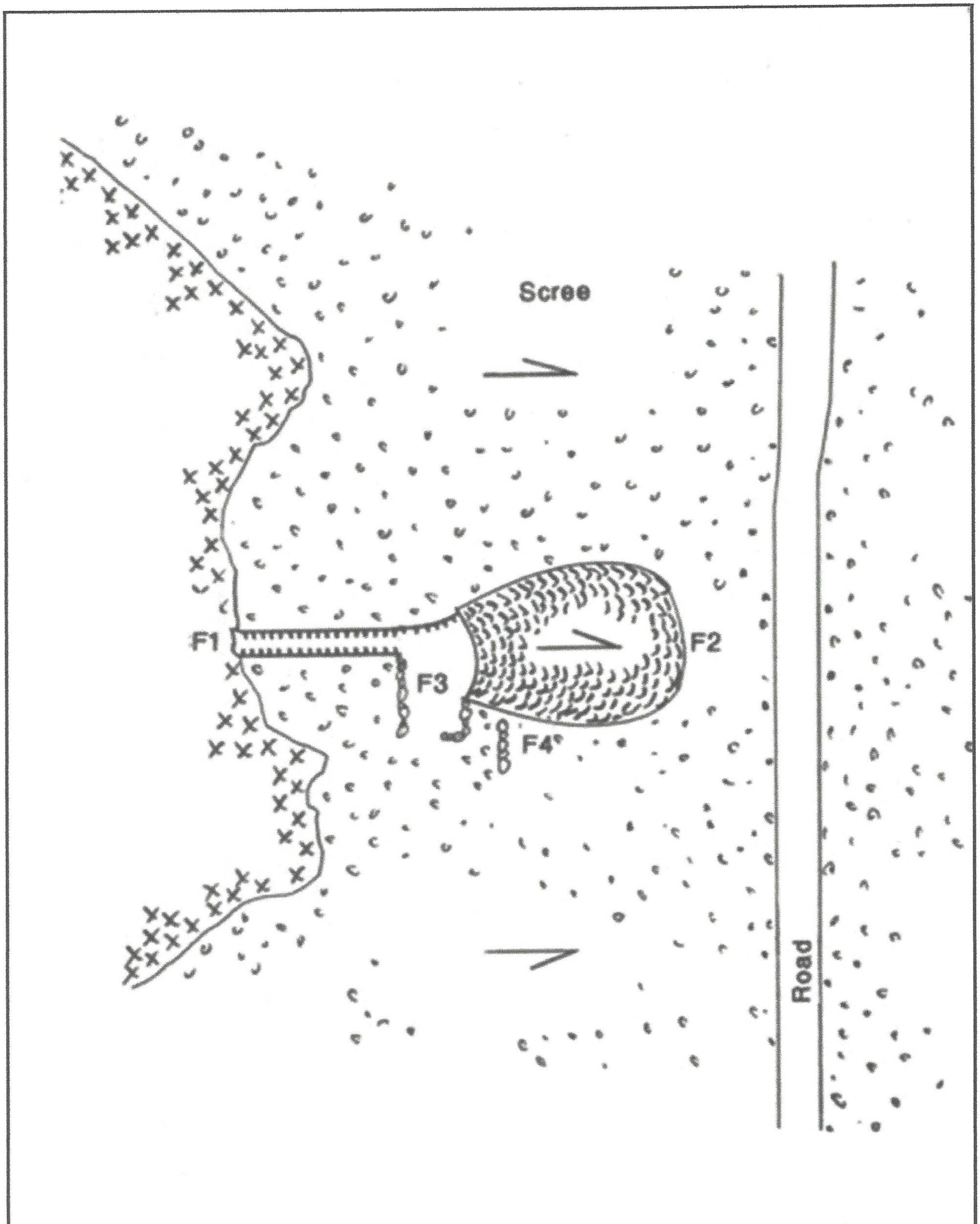

Figure 47. Map of 5SA468 from the 2008 recording by Eric Twitty of Mountain States Historical.

Figure 48. Reddish-brown fine waste rock down slope of the mine adit of 5SA468 at base of the rock outcrop above Forest Service Road 821, looking southwest.

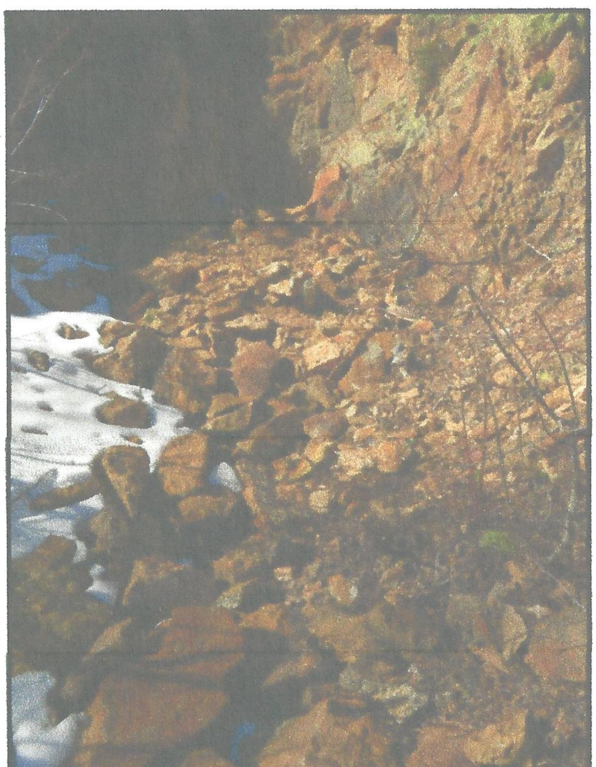

Figure 49. Mine adit of 5SA468 closed by filling with large angular cobbles and soil. Note the pipe with a brass cap on the end marking closure of opening No. 10 near the top of the cobble fill. View is up the adit trench to the west.

Figure 50. Looking west at the brass cap on end of pipe in cobble and soil fill of the adit of 5SA468.

Figure 51. Looking southwest across the leveled area of 5SA469 with an uncoursed native stone wall to the left.

Figure 52. Small leveled platform at site 5SA468 with rock wall above and remnant of rock wall on lower edge to the right. View is to the north-northwest.

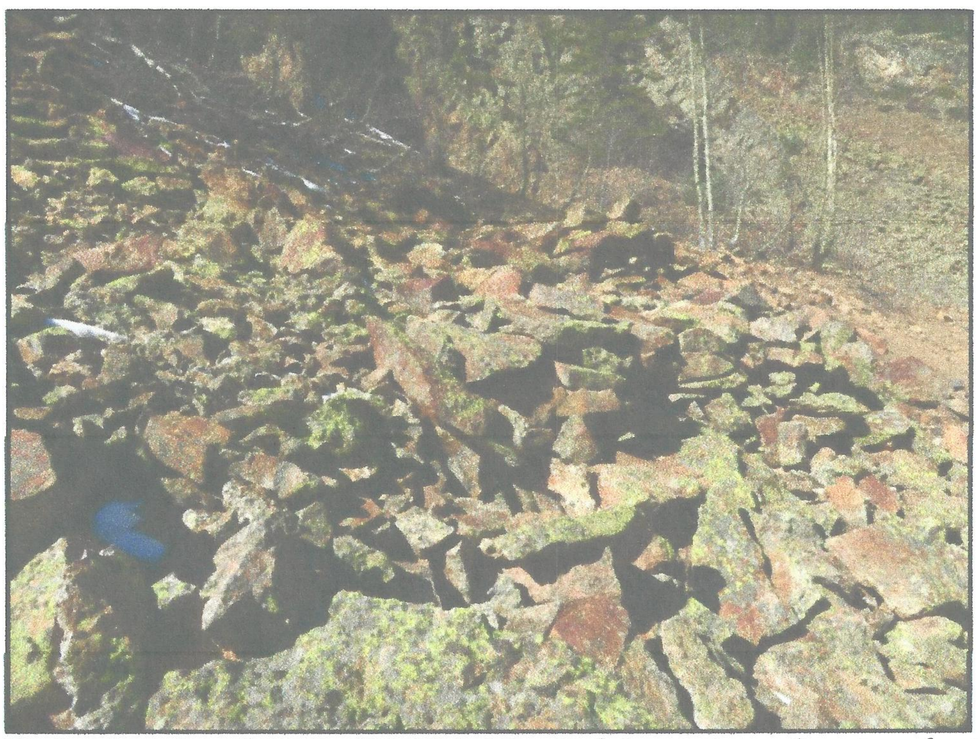

Figure 53. Lower rock wall at site 5SA468 holding back large pieces of waste rock with other walls of platform above, looking northwest.

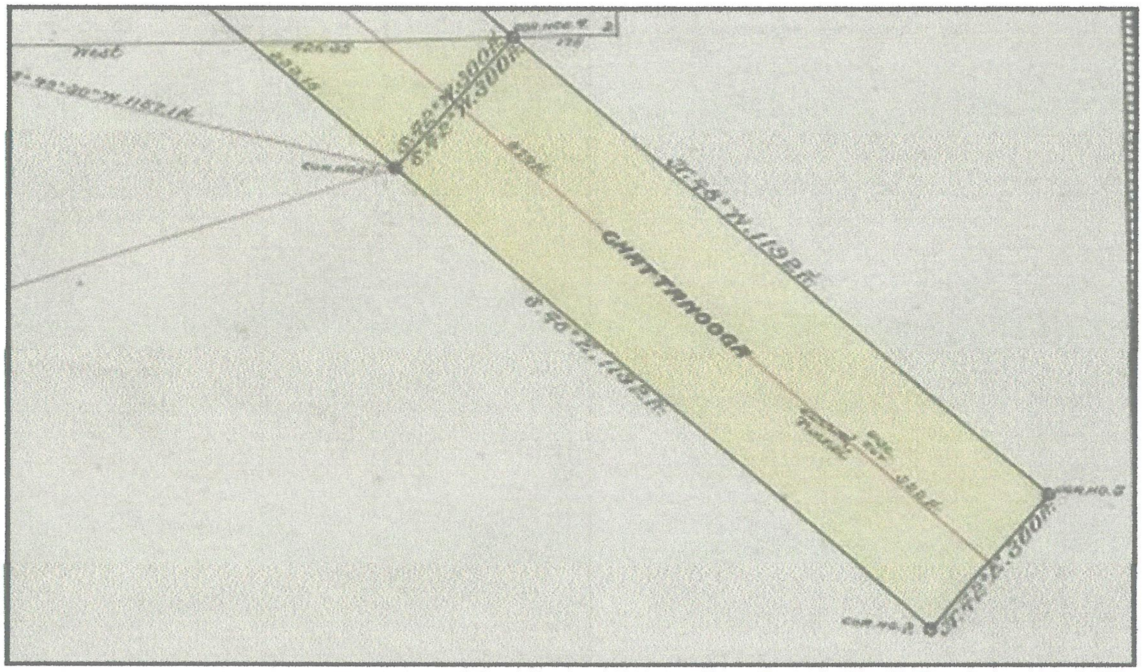

Figure 54. Portion of the plat for MS 18163 from October 1906 showing the Chattanooga Lode and its discovery cut and tunnel near the southwestern end of the claim. Note that no road is shown crossing the claim.

in 1914, and the holdings of the Occidental Mining Company were transferred to Mrs. M. M. McDermott by a San Juan County Treasurers Deed that was to be issued on April 15, 1927 (*Silverton Standard*, October 2, 1909:3; December 4, 1915:4; December 25, 1926:2). McDermott failed to pay taxes on the claims beginning in 1929. It appears that the county sold the property to Harry Schade in 1954, who also failed to pay taxes on the properties beginning in 1957 (*Silverton Standard*, December 6, 1930:3; *Silverton Standard & the Miner*, August 13, 1954:4; November 21, 1958:3).

National Register Recommendation

Site 5SA468 has twice been officially determined not to be NRHP eligible. The first time was on June 17, 1993 after the site was initially recorded as 5SA468; and the second time was on May 5, 2009 after it was recorded as 5SA1220. Alpine concurs that the site is not eligible for inclusion in the NRHP. It was a discovery cut and tunnel on the Chattanooga Lode that saw only initial mineral exploration and no further development or productive mining after the claim went to patent in 1909.

Management Recommendations

No further historical or archaeological work is recommended for site 5SA468.

5SA1875 – Mine Exploration Adit

Site 5SA1875 is a small mine exploration adit at the base of a bedrock outcrop on a steep talus slope on private land above and immediately north-northwest of Forest Service Road 821 at an elevation of 10,640 ft. (Figure 55 to Figure 58) The site is on the Milwaukee Lode, part of MS 18179. The site consists of a 4-ft.-wide, 5-ft.-tall adit dug northwest into bedrock covered by a 3-by-3-ft. welded steel gate set in wet-laid stone masonry with a 3-ft.-diameter corrugated culvert in the adit behind the gate to allow water to drain from the adit. A brass cap has mounted on the gate that reads "MINED LAND RECLAMATION DIVISION OF STATE OF COLORADO/PROJECT 08 20 2."

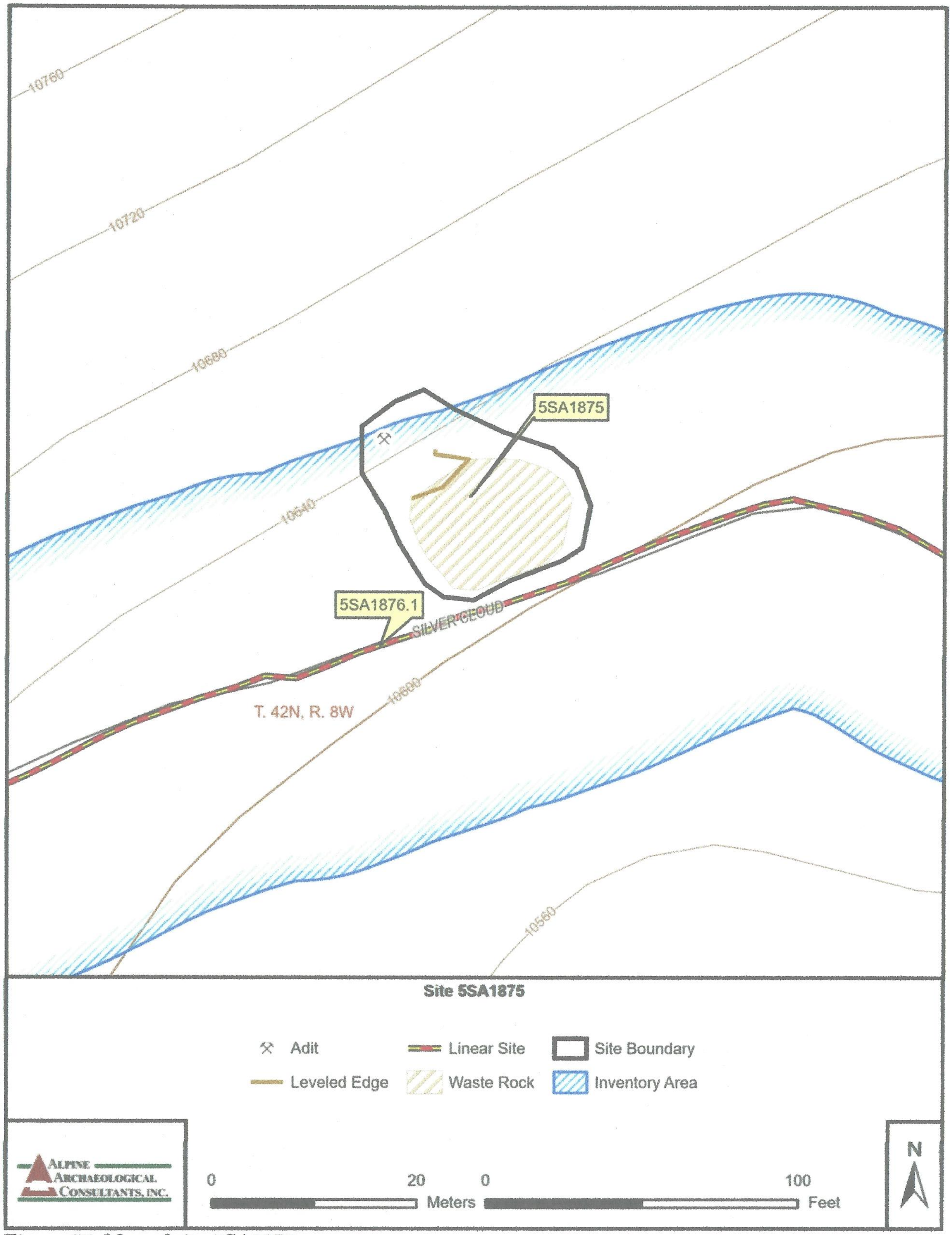

Figure 55. Map of site 5SA1875.

Figure 56. Adit of site 5SA1875 covered by a steel gate set in wet-laid stone masonry. View is to the northwest.

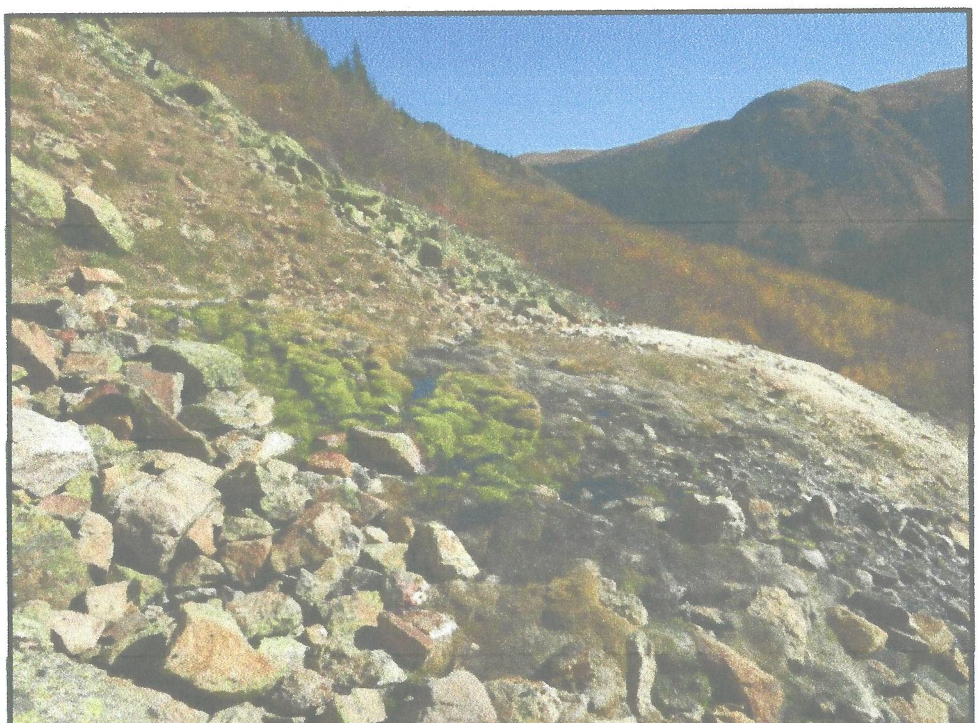

Figure 57. Looking east-northeast across the leveled area beyond the adit trench at 5SA1875. Note the white quartz waste rock disposed of from the leveled area at right.

Figure 58. White quartz waste rock from site 5SA1875 extending down to Forest Service Road 821. View is to the east-northeast.

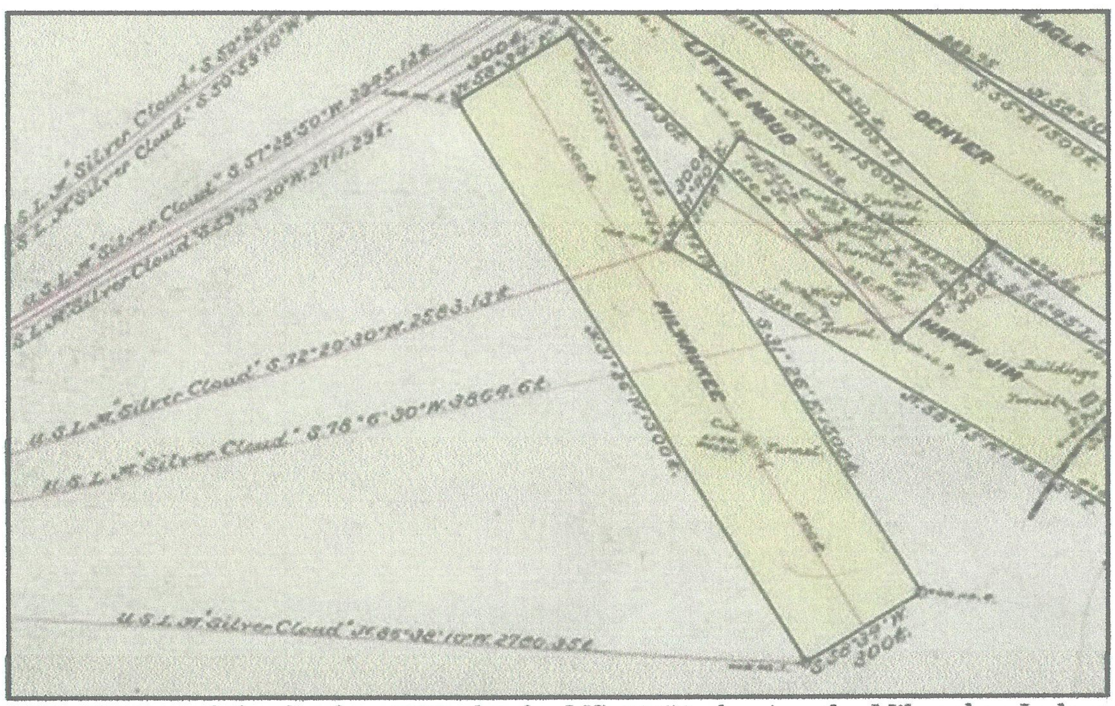

Figure 59. Portion of the October 1906 plat for MS 18179 showing the Milwaukee Lode and its discovery cut and tunnel. Note that no road is shown running through the claim.

Typically, mine openings closed by the Division of Reclamation, Mining and Safety are inventoried and recorded on Colorado state site forms. No record of this site having been recorded prior to the closure of the adit is known. The trench from the adit runs southwest (140 degrees), but has been completely obliterated and filled with large rock. A 10-by-20-ft. (oriented southwest-northeast) leveled area covered with cobbles was the working area of for the adit. At an eastern projection of the leveled area is a small area of light-colored quartz waste rock from where waste rock was dumped down the talus slope below, the bottom of which reaches the road. No artifacts are present at the site.

Historical Background

Site 5SA1875 is the discovery cut and tunnel on the Milwaukee Lode, part of MS 18179 (Figure 59). The Milwaukee Lode was one of nine mining claims that the Telescope Mountain Mining Company had a mineral survey done on October 31, 1906 for the preparation of the plat of MS 18179. The other claims included with MS 18179 were the Golden Eagle, Golden Eagle Extension, Silver Wedge, Denver, Little Maud, Maud Extension, Happy Jim and Milwaukee Extension. A Mineral Entry Patent was granted for the claims on October 8, 1908. The company filed a Location Certificate for the Milwaukee Lode on August 8, 1905. Except for the preliminary work on the claim no additional or productive mining took place. The Telescope Mountain Mining Company had difficulty paying taxes on their claims beginning in 1910 and the property was sold to N. R. Tyler by the San Juan County Treasurer on December 15, 1920 for taxes due in 1919; Tyler was to be issued a deed for the properties on My 20, 1926 (*Silverton Standard*, February 6, 1926:3). Tyler acquired the claims on behalf of the Mineral Creek Mining Company of which he was the president (*Silverton Standard*, October 2, 1926:1; May 12, 1928:1). After taking out a loan to finance mining of the property on February 1, 1930, the company was unable to make payments on the loan and also failed to make tax payments for the property from 1929 to 1938 (*Silverton Standard*, December 12, 1931:2; *Silverton Standard and the Miner*, December 15, 1939:6). No work seems to have been attempted at the claims of the Mineral Creek Mining Company after the early 1930s.

National Register Recommendation

Site 5SA1875 is not recommended as eligible for inclusion in the NRHP. The site is the discovery cut and closed tunnel of the Milwaukee Lode and did not result in productive mining through the opening. The minimal amount of work represented was simply verification that minerals existed probably in 1905-1906 so that the claim could be patented. The adit, platform, and waste rock are unremarkable and typical of initial mineral investigations on mining claims. The claim was one of hundreds of mining claims in the area that saw minimal exploration. It does not contribute in an important way to our understanding of the historic of mining in the area (Criterion A), is not associated with an important individual (Criterion B), does not have a layout that is important (Criterion C), and lacks artifacts that would add to our understanding of history (Criterion D).

Management Recommendations

No additional historical or archaeological work is recommended for 5SA1875.

5SA1876.1 - Forest Service Road 821

At the request of the San Juan National Forest, Forest Service Road 821 was recorded from its point of origin on the major curve on US Highway 550 near Chattanooga for a distance of 0.66 miles to a point 0.1 mile above the Silver Crown Mine (5SA407) (Figure 60 to Figure 70). The road continues to the Silver Cloud Mine, another 0.45 road miles to the northwest, which was not inventoried. The elevation of the road at US Highway 550 is 10,486 ft. At the end of the portion inventoried, the road is at an elevation of 10,880 ft., so climbs about 400 ft. At the Silver Cloud Mine, the road is at an elevation of about 11,380 ft., so has an additional 500 ft. of elevation gain in a

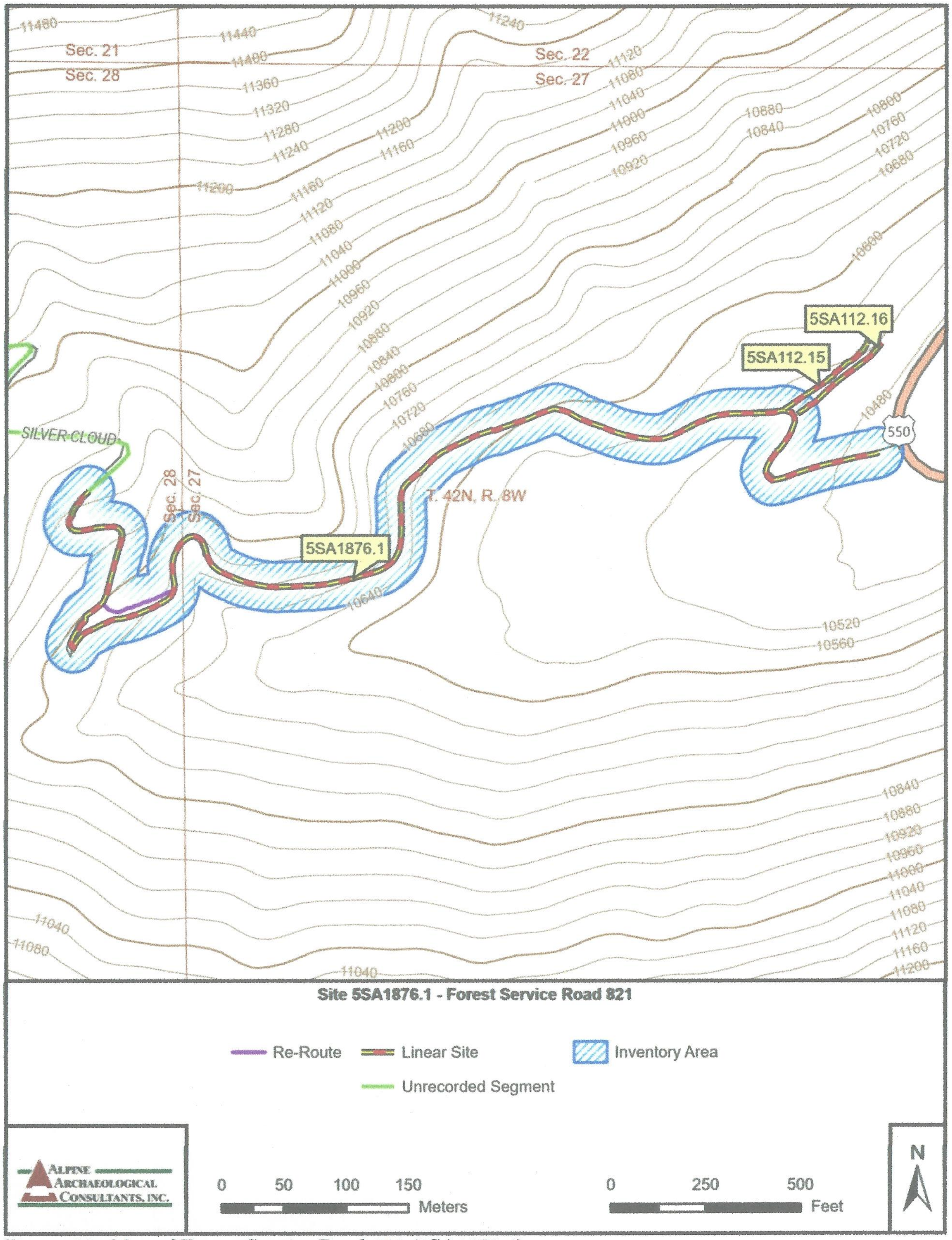

Figure 60. Map of Forest Service Road 821 (5SA1876.1).

Figure 61. The northeastern end of Forest Service Road 821 (5SA1876.1) to its intersection with US Highway 550. View is to the north-northeast.

Figure 62. Looking southwest at the curve of Forest Service Road 821 (5SA1876.1) above US Highway 550 used for parking and staging equipment, vehicles, and campers.

Figure 63. Forest Service Road 821 (5SA1876.1) from the intersection with the main grade of the Silverton & Red Mountain Railroad, looking southwest.

Figure 64. Cut and fill construction of Forest Serivce Road 821 (5SA1876.1) with the waste rock of site 5SA1875 visible near the center extending to the road. View is to the west.

Figure 65. Looking southwest at the cut and fill road construction of Forest Service Road 821 (5SA1876.1) above site 5SA1875 with the waste rock from site 5SA406/1220 left of center.

Figure 66. Looking northeast along Forest Service Road 821 (5SA1876.1) with the waste rock from site 5SA1875 visible near the center and US Highway 550 in the distance.

Figure 67. Cut and fill construction of Forest Service Road 821 (5SA1876.1) with the Silver Crown Mine (5SA407) in the distance. View is to the west.

Figure 68. Looking north along Forest Service Road 821 (5SA1876.1) toward the crossing of a small stream.

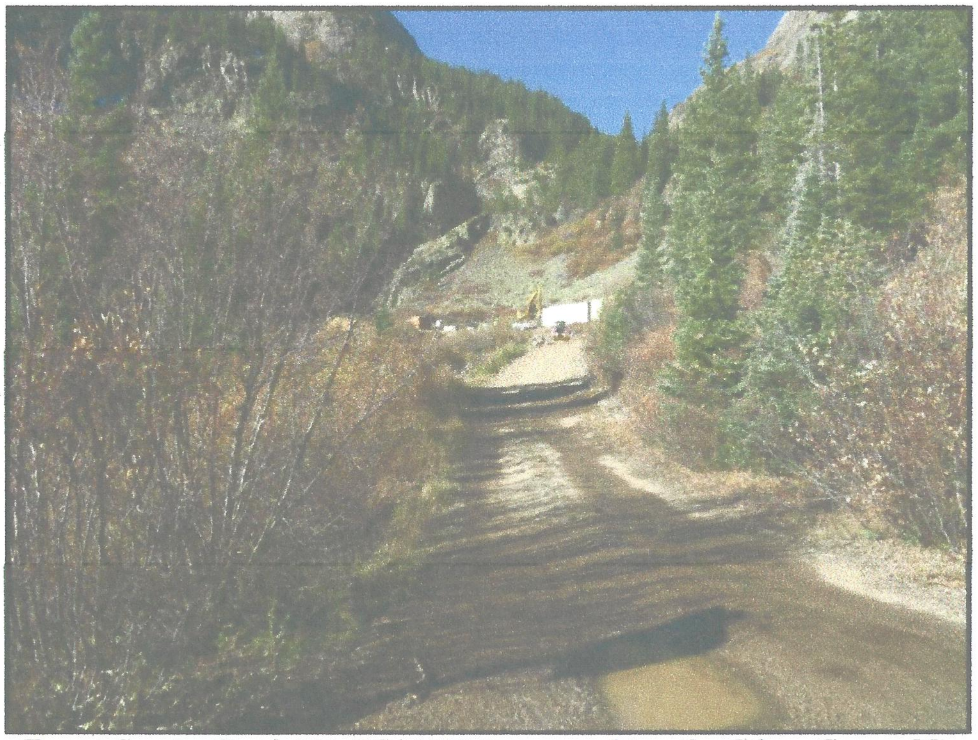

Figure 69. Forest Service Road 821 (5SA1876.1) approaching the Silver Crown Mine (5SA407), looking west-southwest.

Figure 70. Forest Service Road 821 (5SA1876.1) above the Silver Crown Mine (5SA407) at the end of the recorded segment. Note the rough, eroded condition of the road with a slightly narrower width. View is to the east-northeast.

shorter distance, which explains the greater number of switchbacks in that section. Forest Service Road 821 (5SA1876.1) begins as a 16-ft.-wide graded dirt and gravel road that heads west from Highway 550 for 400 ft. to a major curve that has been widened through use for parking and staging of equipment and turns sharply north-northeast for another 160 ft. where the Silverton & Red Mountain Railroad grade intersects it heading northeastward (Figure 61 to Figure 63). It then turns sharply westward and narrows to 12 ft. wide on a cut-and-fill grade that climbs gradually following the contours of a steep southeast-facing slope onto the northern portion of the flattened top of the waste rock pile of the Silver Crown Mine (5SA407) (Figure 64 to Figure 69). The road turns sharply northeastward on the waste rock and heads more steeply upslope as a 10-ft.-wide graded two-track dirt and rock road through two more switchbacks to the end of the recorded section of the road (Figure 70). The remainder of the road to the Silver Cloud Mine is depicted on the USGS map of the area and is visible on aerial photos.

Historical Background

Forest Service Road 821 (5SA1876.1) was not the original route to the mines in the Mill Creek drainage. The original route to the Silver Crown Mine was in the valley bottom and came onto the waste rock of the mine through a cleft in the waste rock (see write-up for the Silver Crown Mine (5SA407, above, and Figure 5 and Figure 8). It is also notable that the road does not appear crossing the Chattanooga or Milwaukee lodes on their Mineral Survey plats prepared in October 1906 (Figure 54 and Figure 59). Because the road was constructed using heavy equipment creating a cut-and-fill roadbed across steep terrain, it was likely built when mining resumed at the Silver Crown Mine in 1946. Charles C. Goulding acquired the property on February 23, 1943 and took steps to clear the title to the claims of the Silver Crown group in 1946 (*Silverton Standard and the Miner*, October 30, 1942:5; May 14, 1943:1; April 14, 1946:4). A 1946 Colorado Bureau of Mines report noted that Smith Crane had a lease on the property and that employees lived in Chattanooga, suggesting that the original boarding house/office at the mine was no longer present. It is likely that the construction of Forest Service Road 821 to the Silver Crown Mine and beyond demolished the boarding house/office in 1946. The last mining at the Silver Crown Mine was in 1949 (Colorado Bureau of Mines 1946; 1949; King and Allsman 1950:47). It is likely that the new road extended to the Silver Cloud Mine at the same time, but the history of that mine is not known. The Mineral Survey Plat of September 25, 1884 for the Silver Cloud Lode (MS 2096) does not show a road to it. In addition to being a Forest Service road, San Juan County routinely does annual basic maintenance on the road to the Silver Crown Mine, probably explaining why it is wider and better groomed than the portion above the mine.

National Register Recommendation

Forest Service Road 821 (5SA1876.1) is not recommended as eligible for inclusion in the NRHP. The road is basic infrastructure that was installed after the period of productive mining. It has no historical significance (Criterion A) and does not have any engineering elements that are important (Criterion C), which are the only two criterial that could be possible. The road is a good example of what Horn and Norton (2021:9-10) refer to as basic infrastructure that will never be significant because of its ubiquity and should be excluded from the necessity of recordation and evaluation. Important roads can usually be determined for a region through examination of historical maps and some basic research. Most roads in a region will fail a test of importance because they are basic and redundant infrastructure and should be excluded from recordation with a simple explanation.

Management Recommendations

No further historical or archaeological work is recommended for Forest Service Road 821 (5SA1876.1).

SUMMARY

The inventory of Forest Service Road 821 resulted in the new recording of two segments of the Silverton & Red Mountain Railroad grade (5SA112.15 and .16); a new recording of site 5SA406, a mine exploration adit; revisitation of the Silver Crown Mine (5SA407); confirmation that sites 5SA468 and 5SA1220 are the same site on the Chattanooga Lode and preparation of a revisitation form; and new recordings of a mine prospect on the Milwaukee Lode (5SA1875) and the lower portion of Forest Service Road 821 (5SA1876.1) See Table 1 for a summary of recorded site, ownership, National Register eligibility recommendations, and site management recommendtions. The railroad grade segments (5SA112.15 and .16), site 5SA406, and portions of Forest Service Road 821 (5SA1876.1) are on land managed by the San Juan National Forest. The remainder of the sites and portions of Forest Service Road 821 are on private land. The two segments of the Silverton & Red Mountain Railroad (5SA112.15 and .16) contribute to the significance of the site as a whole, and the Silver Crown Mine (5SA407) has previously been determined to be NRHP eligible. Sites 5SA406 and 5SA468 have previously been officially determined not to be NRHP eligible. Mine exploration site 5SA1875 and Forest Service Road 821 (5SA1876.1) are recommended as not eligible for inclusion on the NRHP. No further work is recommended for any of the sites relative to the use and improvement of Forest Service Road 821 for recreational development proposed by Bonanza Boy, LLC at the Silver Crown Mine.

The results of the inventory conformed to the expectations that several previously recorded mining sites would be encountered during the inventory, that one new mining site would be recorded, that the grade of the Silverton & Red Mountain Railroad would be encountered, and that Forest Service Road 821 would be recorded. That no prehistoric sites were found was not unexpected, as the inventory area is very steep and rocky, and no prehistoric sites have been recorded previously in the vicinity.

Table 1. Site Summary Table.

Site No.	Site Name	Owner	NR Eligibility	Management Recommendation
5SA112.15	Silverton & Red Mountain Railroad	USFS	Eligible	No further work; preserve/avoid
5SA112.16	Silverton & Red Mountain Railroad	USFS	Eligible	No further work; preserve/avoid
5SA406	Mine Prospect	USFS	Not Eligible	No further work
5SA407	Silver Crown Mine	Private	Eligible	No further work; preserve
5SA468	Mine Exploration Adit	Private	Not Eligible	No further work
5SA1875	Mine Exploration Adit	Private	Not Eligible	No further work
5SA1876.1	FS Road 821	USFS/Private	Not Eligible	No further work

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1902 March 22:1; May 7:1; Sept 13:10
1903 February 21:1; May 2:1
1904 May 7:1; September 24:1
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1906 May 19:1; August 25:1; December 29:1
1907 February 16:1; April 27:1; May 11:1; June 1:1; September 27:1; December 21:1; December 28:2
1908 January 7:3; January 18:1; March 14:3; March 21:1; March 28:1; April 18:3; April 25:1; May 16:1; June 6:1
1909 March 20:3; April 10:3; April 24:3; July 24:1; October 2:3
1910 July 9:2; October 1, 1910:3
1915 December 4:4
1917 July 21:1
1924 May 24:4
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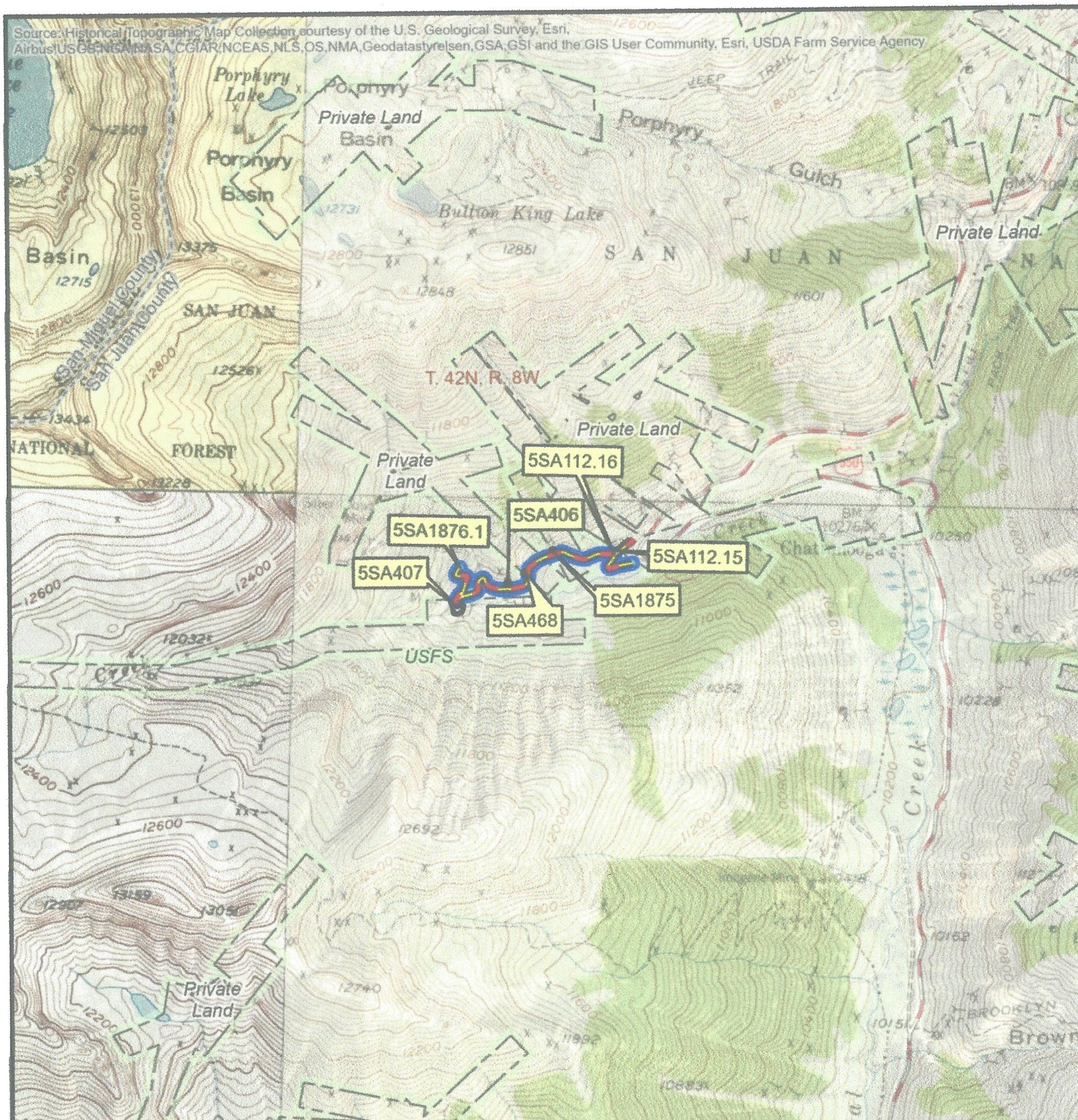
CONTAINS PRIVILEGED INFORMATION – DO NOT DISTRIBUTE



Silver Crown Mine Road Results

Linear Site | Site Boundary | Inventory Area

Alpine Archaeological Consultants, Inc.

0.25 0 0.25 0.5 Miles

0.5 0 0.5 Kilometers

1:24,000

USGS Topo Map:
Telluride
Ironton
Ophir
Silverton

N

ENGINEER MOUNTAIN, INC. *SOILS *RETAINING WALLS
*SEPTICS *FOUNDATIONS
*GRADING AND DRAINAGE
*SITE DEVELOPMENT

June 27, 2023

County Historic Impact Review Committee
Attn: David Singer, Scott Fetchenhier, Steve Rich
Cc: Alternate Beverly Rich
c/o Willy Tookey
1557 Greene Street
Silverton, Colorado 81433

EMI Job No. 2023-101

Subject: Proposed Silver Cloud Lodge/PUD, and Phase 1 2023/2024 Voluntary Clean Up (VCUP), Shelbyville Lode USMS No. 18168 et al, Mill Creek, near Chattanooga, Highway 550, San Juan County, Colorado.

Dear Willy and Members of the County Historic Impact Review Committee:

This letter is regarding proposed improvements on the Shelbyville Lode and adjacent mining claims, owned by Mr. Colby Barrett of Bonanza Boy LLC of Montrose. The project site is located on Mill Creek Road (County Road 15/US Forest Service Road 821) near Chattanooga on Highway 550 in San Juan County, Colorado.

The Applicant is requesting a letter of recommendations/requirements from the County Historic Impact Review Committee (HIRC).

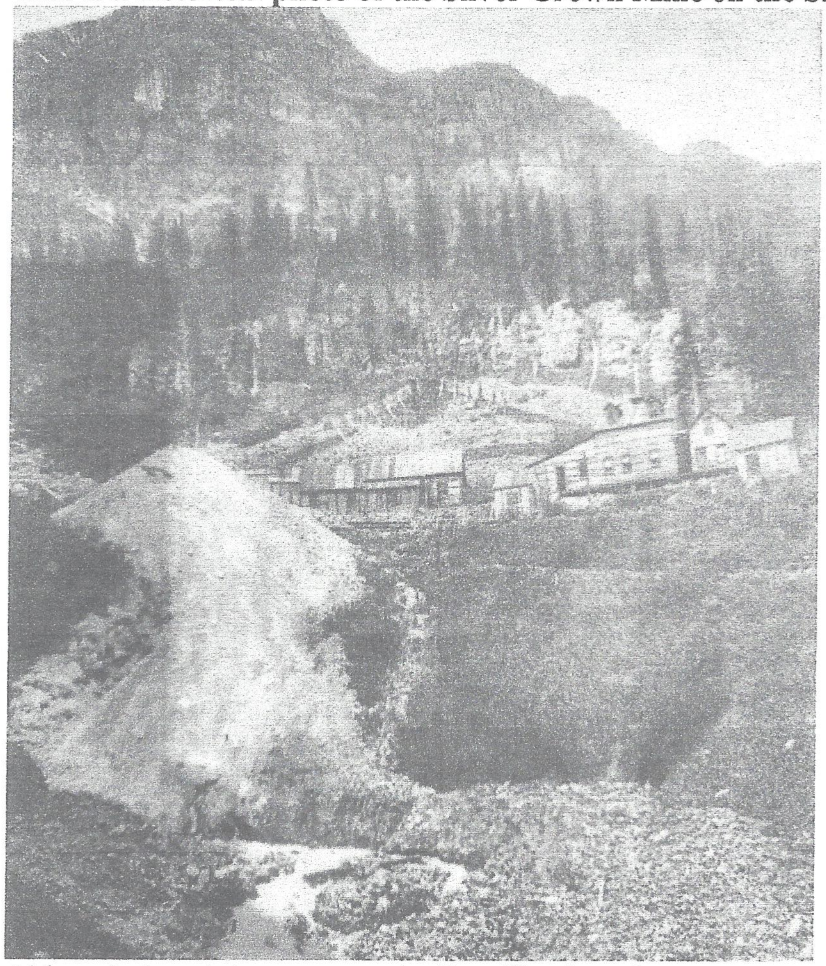
A future proposed lodge structure is located on the vacant **Shelbyville Lode**. The future proposed lodge is being designed to re-create the buildings that existed on the site approximately 100 years ago. The Applicant met with a few members of the San Juan County Historic Society in May, so you may already have some knowledge of this proposal. The Applicant has been thoroughly researching the site for the past few years through the local Archives. The Shelbyville Lode has a remnant of a historic brick foundation, which has been incorporated into the future lodge structure architectural design as an educational historic interpretive site. It is believed that the historic brick foundation may have once supported a metal boiler. The Shelbyville Lode also has a historic mine adit called the Silver Crown Mine, adjacent historic mine waste rock pile, and there are remnants of historic access roads/footpaths at/near the site.

A future proposed garage/employee housing structure is located on the vacant **Bonanza Boy Mill Site** at Chattanooga on Highway 550. The adjacent parcel has an existing structure known as the Artist Cabin, owned by the Stern family. There are no known historic features on the Bonanza Boy Mill Site. The original mineral survey plat for the Bonanza Boy Mill Site shows an old road going through it, which appears to currently serve as the existing driveway for the Bonanza Boy Mill Site and the adjacent Artist Cabin.

The Applicant has submitted a Sketch Plan Application for a proposed Planned Unit Development (PUD). The Applicant has also submitted a Land Use Permit Application, to request County permission to begin Phase 1 of the Proposed PUD, which is a proposed 2023/2024 mining reclamation Voluntary Clean Up (VCUP) project at the Silver Crown Mine on the Shelbyville Lode.

A **Cultural Resource Survey** is currently being prepared for these sites by Jon Horn of Alpine Archaeological Consultants Inc. of Montrose/Silverton. The Cultural Resource Survey is for submittal to the State Historic Preservation Office (SHPO). The Cultural Resource Survey will also be provided to you (County HIRC) and the San Juan County Historical Society (SJCHS).

This is a historical photo of the Silver Crown Mine on the Shelbyville Lode in Mill Creek:



Although the mining waste rock pile still exists, there are currently no buildings on the site. The Applicant is applying to rebuild the structures shown above, in the future, as part of a later phase of the Proposed PUD. At this time, **the immediate construction only includes a proposed mining reclamation VCUP project,** scheduled for summer 2023 and summer 2024.

Please refer to the attached plans and documents for additional information. The Owner/Applicant Colby Barrett of Bonanza Boy LLC can be reached at (303) 909-6083.

Please contact Engineer Mountain, Inc. if you have any questions.

Thank you,

Lisa M. Adair, PE
Engineer Mountain, Inc.

PO Box 526, 962 Reese Street, Silverton, Colorado 81433 - office (970) 387-0500 - cell (970) 946-2217

7. Hazards

Silver Cloud Resort

Avalanche Safety Plan

April 4, 2024 | Rev B | 23-0032-COL-02

Prepared By:
Dynamic Avalanche Consulting Ltd.
Box 2845
Suite 301, 306 1st St. W
Revelstoke, BC, V0E 2S0
250.837.4466

Prepared For:
Colby Barrett
Bonanza Boy, LLC
PO Box 3387
Telluride, Colorado
81435

ASP Review and Revision Records

This ASP must be reviewed annually.

Annual Review Record		
Date	By	Comment
2024-04-04	DR, KF, GS	Issued for Review

When this ASP is revised, the table below must be updated. Substantive changes should be described.

Revision Record			
Date	Revision	By	Description
2024-04-04	Rev B	DR, KF, GS	Issued for Review

Limitation Statement

This Avalanche Safety Plan (ASP) was prepared for the exclusive use of Bonanza Boy LLC for the operation of the Silver Cloud Resort (SCR). Use of this ASP is subject to the Contractual Terms and Conditions executed by Dynamic Avalanche Consulting Ltd. (DAC) and Bonanza Boy LLC.

Avalanches are complex natural phenomena and there is considerable uncertainty in the estimates of magnitude, frequency, runout, and potential snow avalanche effects described in this ASP. Under extremely unstable snow conditions, avalanches may be observed in terrain where they would not otherwise occur, such as forested areas or low-angle slopes. New avalanche paths may also be formed by forest harvesting, wildfire, or slope mass movement processes.

Table of Contents

1.0 Introduction

The Silver Cloud Resort (SCR) is a unique, year-round alpine lodging experience located in Mill Creek, ~6 miles northwest of Silverton, Colorado in the San Juan Mountains. SCR will be converted from a historic mining site into a modern lodging experience that combines above ground with underground facilities inside historic mine portals. The SCR also includes worker accommodation and a garage facility located below the lodge along Highway 550. Guests staying at the SCR will enjoy year-round outdoor recreation opportunities based from the main lodge site.

The SCR's entire access road and main lodge site are exposed to avalanche hazard. This Avalanche Safety Plan (ASP) describes the safety measures required to operate SCR during the avalanche season. Figure 1 identifies the location of the lodge, garage, and access between both facilities. It also identifies the mapped avalanche terrain in lower Mill Creek, which is nearly continuous on both sides of the valley. While this ASP outlines measures to manage avalanche risk to SCR operations, this risk cannot be fully eliminated. Even with a robust avalanche safety program, there will be inherent avalanche risk to SCR workers and clients. Clients need to be informed of this risk prior to booking.

To achieve an appropriate risk target, operational closures will be required during periods of elevated avalanche hazard. These closures typically can't be forecasted more than 48-72 hours in advance and may last for multiple days. Explosive avalanche control will be used to reduce the hazard; however, this may not always work. Closures could last until the snowpack has stabilized naturally. Clients need to be informed prior to booking of these potential closures, and planning for contingency accommodations will be important.

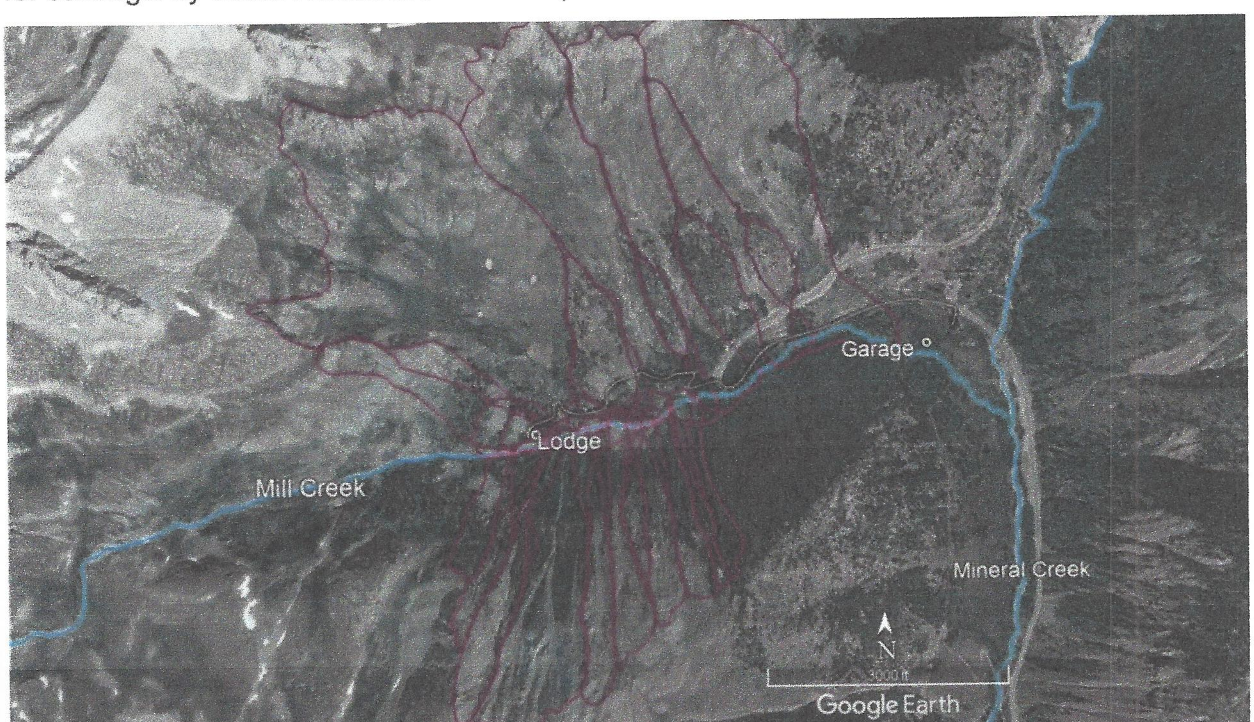


Figure 1. Overview of the SCR project area. The lodge and garage areas are identified. Access from the garage to the lodge (in yellow) runs west along Highway 550 to the bend in Mill Creek, at which point FSR 821 is followed. Mapped avalanche terrain affecting operations is identified in red.

1.1 Winter Operational Overview

SCR operations that will occur during the avalanche season include:

1. **Road Use:** Travel (multiple times daily) between the garage and the lodge via Highway 550 (road maintenance and avalanche safety managed by the state) and FSR 821 (road maintenance and avalanche safety managed by SCR). Travel along FSR 821 may be on foot, snowmobiles, enclosed passenger vehicles, or heavy equipment. Both workers and clients will travel this route, which is shown in yellow in Figure 1.
2. **Lodging:** Continuous (i.e., 24/7) occupation of the lodging facilities by clients and workers. While structural mitigation protects people within the structures, there is exposure to avalanche hazard in the immediate area outside of the structures. At full capacity, the SCR will have up to 36 guests and 3-4 workers on site.
3. **Worksites:** Workers may access additional areas that clients will not access. One example includes maintenance of the hydroelectric facility located downstream of the lodge on the north side of Mill Creek. Another example includes avalanche forecasting staff travelling through various locations in Mill Creek.
4. **Recreation:** Guided recreational activities for clients in Mill Creek and the surrounding area. Recreation will typically be backcountry skiing, however other activities such as ice climbing and use of a via ferrata may be done within Mill Creek.

1.2 Scope of ASP

1.2.1 Within the Scope

This ASP outlines the avalanche safety measures required to manage avalanche risk along FSR 821, at the lodge, and for worker safety at additional worksites (points 1 through 3 above).

1.2.2 Outside the Scope

Recreational activities: This ASP does not include the recreational component of SCR winter operations (point 4 above). It is assumed that all SCR recreational activities with exposure to avalanche hazards will be guided by qualified avalanche professionals with their own avalanche safety procedures in place. It should also be noted that this ASP does not apply to any members of the public or other professional operations (e.g., guiding operations) accessing the area.

Highway 550 operations: Avalanche hazard to travellers and workers on Highway 550 is managed by the Colorado Department of Transportation (CDOT) who have the authority to close the road. Therefore, the use of Highway 550 between the garage and turnoff to FSR 821 is dictated by CDOT. Highway closures must be adhered to unless specific arrangements have been agreed upon between SCR and CDOT.

2.0 Avalanche Background

2.1 Avalanche Magnitude and Frequency

Magnitude and frequency of avalanches depend on snow supply and terrain. Snow supply is determined by the frequency and depth of snowfalls and effects of wind transported snow. Important terrain characteristics include slope incline, elevation, aspect, size, and configuration of avalanche paths. Snowpack structure can also affect magnitude. For example, a weakness buried deeply in the snowpack can result in large avalanches.

An avalanche occurring every year at a specific location is described as high frequency, whereas one occurrence every 100 years is considered very low frequency (Table 1). Avalanche frequency is commonly communicated as a return period, which is the reciprocal of the frequency. Average avalanche return period is typically given in a range from 1 to 100 years. Return period estimates are provided with the generalized average return periods of 1, 3, 10, 30 and 100 years.

Table 1. Avalanche return periods and frequency descriptors.

Average Return Period (years)	Range (years)	Frequency Descriptor	Comments
1	≥1	Very High	Regular interruption of winter operations
3	2 to 5	High	Active during most winters
10	5 to 20	Moderate	Active during heavy snow winters
30	20 to 50	Low	Long return period avalanches
100	50 to 300	Very Low	Very long return period avalanches

Magnitude is related to return period in that large destructive avalanches will occur less often than smaller ones in a given avalanche path. The return period of avalanches reaching a location in a path increases (or frequency decreases) with increasing distance from the starting zone.

Magnitude estimates are described in Table 2 which are based on destructive potential. Scaling parameters of typical mass, path length and impact pressure are also included. The maximum size class (destructive effect) for a given avalanche path relates to the snow supply (depth of avalanches) and terrain (area, length, configuration, and incline of the avalanche path).

Table 2. Avalanche Size – Destructive Force (after CAA, 2007; Perla, 1980). From: (A3, 2016).

Size	Avalanche Destructive Potential	Typical mass (t)	Typical path length (m)
D1	Relatively harmless to people.	<10	10
D2	Could bury, injure, or kill a person.	10^2	100
D3	Could bury and destroy a car, damage a truck, destroy a wood frame house, or break a few trees.	10^3	1000
D4	Could destroy a railway car, large truck, several buildings, or substantial amount of forest.	10^4	2000
D5	Could gouge the landscape. Largest snow avalanches known.	10^5	3000

In this ASP, avalanche magnitude and frequency are estimated based on the size, incline, aspect, path configuration, and damage to vegetation in the runout zone of an avalanche path as well as snow supply estimates derived from snow climate data.

2.2 Avalanche Risk

Avalanche risk is determined by the exposure and vulnerability of an element at risk (life and property) to an avalanche hazard (Figure 2).

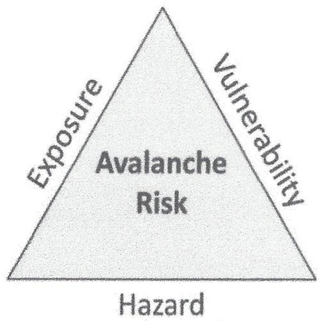


Figure 2. Avalanche risk triangle

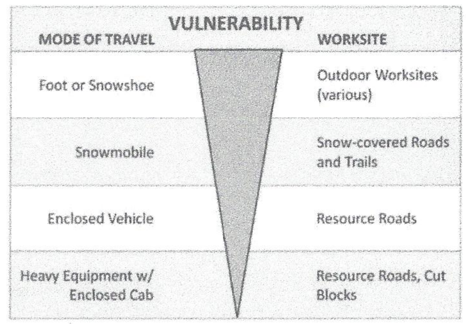


Figure 3. Vulnerability to avalanches by mode of travel.

Avalanche hazard is determined by the magnitude and frequency of avalanches, which are driven by terrain (slope incline, aspect, scale, and configuration), the location of worksites and roads in relation to avalanche paths and the seasonal weather patterns (which determine snowpack structure).

Exposure to avalanche hazard is measured in terms of location, time, as well as by the number of people and/or equipment exposed to the hazard. Exposure escalates as the number of people/equipment and the length of time spent in the hazard area increases.

Vulnerability is an expression of susceptibility to the consequences of avalanche involvement. Reduced vulnerability can result in risk reduction for a given avalanche hazard. Vulnerability of workers to avalanche hazard will vary depending on the mode of travel. Common modes of travel in avalanche terrain are ranked in order of vulnerability from most vulnerable (on foot) to least vulnerable (in enclosed heavy equipment) (Figure 3).

2.2.1 Avalanche Risk Guidelines

This ASP outlines operational procedures which meet acceptable avalanche risk thresholds as defined by Technical Aspects of Snow Avalanche Risk Management (TASARM) developed by the Canadian Avalanche Association (CAA, 2016). While equivalent guidelines are not published in the USA, TASARM guidelines are considered industry-standard and therefore sufficient for reference in this ASP. TASARM recommends mitigation when avalanche size and return periods exceed thresholds presented in Table 3.

Table 3. TASARM (CAA, 2016) avalanche assessment guidelines for elements at risk by threshold size and return period.

Element at Risk	Critical Avalanche Size	Typical Return Period (years)
Access Road (vehicles travelling along FSR 821)	≥ Size 2	≤ 30
Pedestrian Areas (people outside near the Lodge)	> Size 1	≤ 100
Outdoor Worksites (e.g., hydroelectric facility)	> Size 1	≤ 30

3.0 Project Background

3.1 Snow Climate Overview

The SCR is located within a high elevation, continental snow climate, which is characterized by relatively low snowfall (for its elevation) and cold temperatures. The project area benefits from nearby weather stations with long-duration historical snow depth (HS) and snow water equivalent (SWE) data. The Mineral Creek SNOTEL site is located ~1.5 miles south of Chattanooga and provides excellent valley bottom data. The Red Mountain Pass SNOTEL site is located ~2 miles North of Chattanooga and provides excellent mid-elevation data.

Statistical estimates for HS were calculated from the historical data. Annual maximum values from the two stations were fit to Gumbel extreme value distributions to obtain theoretical maximum HS values at given return periods (Table 4). Note that the maximum observed HS for both weather sites was from 2019, which was considered an extreme winter for snowfall and avalanche activity. Snow depths at the lodge are inferred from the two weather stations.

Table 4. Statistical Height of Snow (HS) in inches for various return periods.

Station Name	Mineral Creek	Red Mountain Pass	Inferred Lodge HS
Station ID	07M14S	07M33S	~
Elevation (ft)	10,040	11,200	10,800
N (years)	17	25	~
Mean Annual HS (in)	57	82	*74*
Maximum Observed HS (in)	93	127	~
Statistical HS $_{10\ year}$ (in)	73	103	*94*
Statistical HS $_{30\ year}$ (in)	84	117	*105*
Statistical HS $_{100\ year}$ (in)	96	133	*120*

The typical avalanche season is expected to begin in early November, and end in early May. However, it is possible to get enough early-season snowfall that an avalanche hazard develops in October. Also, an above average snowpack in winter or a prolonged cold spring may result in an avalanche hazard persisting into June. While the avalanche safety measures described in this ASP will typically only be required between November and early May, there is potential for an avalanche hazard to develop when snow depths in the project area exceed one foot (30 cm).

3.2 Geographic Overview

Mill Creek drains from Columbine Lake in the high alpine east into Mineral Creek. While upper Mill Creek is characterized by lower angle terrain, lower Mill Creek (where SCR operations are located) runs through a narrow valley with steep terrain on either side. Ridgetop elevations exceed 13,000 ft, with valley bottom elevations of 10,300 ft (at the garage area). There is steep terrain on both the north and south sides of the valley with minimal forest cover. Broad gullies run from ridgetop to valley bottom resulting in avalanche paths with over 2,000 ft of vertical fall.

3.3 Project Stakeholders

Avalanche safety for the SCR involves several stakeholders. While the SCR only manages avalanche safety for FSR 821 (and not Highway 550), successful winter operations require significant coordination with CDOT and the Colorado Avalanche Information Center (CAIC) for lodge access via the highway and explosive avalanche control.

Similarly, while SCR is not responsible for the avalanche safety of public backcountry users, appropriate notification will be required to inform the public of operational measures such as avalanche control within the Mill Creek drainage.

Finally, while SCR is responsible for avalanche forecasting, it may contract explosive avalanche control (AC) from nearby ski operations (referred to as “AC contractor” in this ASP). The roles and responsibilities from an avalanche safety perspective for the various stakeholders are outlined later in this ASP.

3.4 Project Infrastructure

This ASP includes the following SCR infrastructure which will be occupied or accessed during the avalanche season:

- **Lodge buildings:** Located at ~10,800 ft ASL in Mill Creek, the lodge area includes a number of buildings as well as facilities within the underground mine workings. This is where SCR guests will be sleeping and dining. The lodge has capacity for 36 guests as well as an Avalanche Forecaster.
- **Garage buildings:** Located downstream from the lodge area at ~10,300 ft ASL near the confluence of Mill Creek and Mineral Creek. Worker and client vehicles will be parked here, and SCR equipment and vehicles will be stored here. Worker accommodation will also be here.
- **FSR 821:** This is the ~0.6-mile-long access road between Highway 550 and the lodge area and is located on the north side of Mill Creek. During winter operations, SCR will clear the road with heavy equipment. Workers and clients will travel to the lodge in standard passenger vehicles. If snow clearing operations cannot keep up with snowfall, snowmobiles and enclosed snow vehicles may be used.
- **Hydroelectric facility:** The main power source for the SCR lodge buildings will be hydroelectric generation. This structure will be located ~1000 ft downstream from the lodge on the north side of Mill Creek at ~10,600 ft ASL, below FSR 821. Worker access (on foot or snowmobile) may be required for maintenance purposes during the avalanche season.

4.0 Avalanche Hazard Identification

The north and south slopes of lower Mill Creek consist of nearly continuous avalanche terrain. This combined with a snow climate which promotes fast-moving dry avalanches results in nearly the entire valley bottom of lower Mill Creek being exposed to avalanche hazard. Appendix A – Avalanche Hazard Maps outlines the approximate 100-year boundaries for each avalanche path. While dense flow is expected to terminate within the mapped polygons, the powder component may run farther. Appendix B – Magnitude Frequency Tables provides a brief description of each path. Appendix C – Terrain Photos provides an oblique photo of each path with the estimated 100-year extents overlaid.

Avalanche paths are named based on the drainage, the side of the valley, and the consecutive path number up-valley. For example, path MC-N-13 is located on the north side of Mill Creek and is the 13th path identified working upstream from Mineral Creek towards Columbine Lake. Many of these paths have other names as referenced by CDOT and previous avalanche studies.

4.1 Highway 550

While avalanche safety along the section of Highway 550 connecting the garage to FSR 821 is managed by CDOT, the avalanche paths are discussed here for completeness and because coordination with CDOT is essential. Three large south-facing paths run beyond the lower switchback of the highway. These are MC-N-04 (Eagle), MC-N-06 (Telescope), and MC-N-08 (Muleshoe). They frequently (every 1-3 years) produce large Size D3 avalanches with dense flow reaching the highway, and powder flow reaching the south side of the valley. See Figure 4 below.

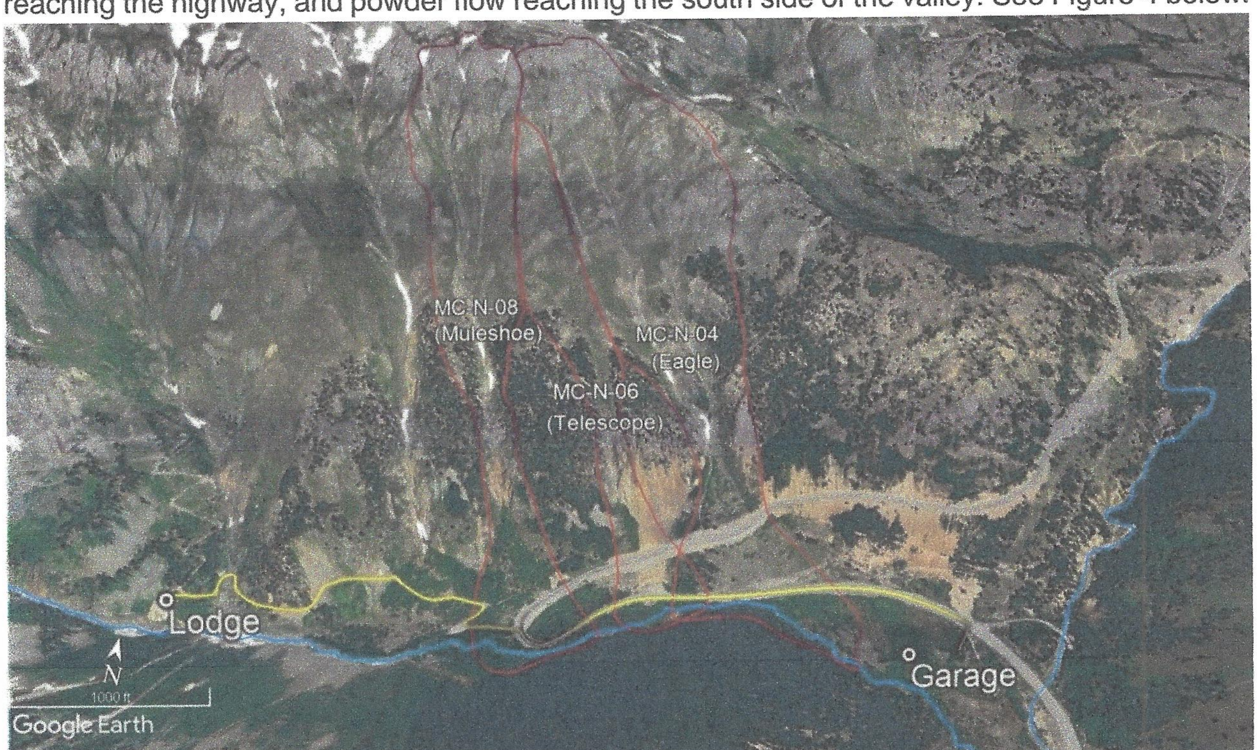


Figure 4. Three large avalanche paths which produce Size D3 avalanches which reach the lower switchback of Highway 550 every 1-3 years. Access between the garage and lodge in yellow.

4.2 FSR 821

Two large avalanche paths, two small avalanche paths, and one short-slope path on the north side of Mill Creek affect FSR 821. Path MC-N-10 (Bullion King) is similar in character to the paths above Highway 550, with Size D3 avalanches reaching the road almost annually. Path MC-N-13 (Silver Cloud) is the largest in the valley, with annual Size D3 avalanches and the potential for Size D4 avalanches with a frequency of 10- to 30-years. Both paths can produce large fast moving dry avalanches with dense flow reaching the other side of the valley and a powder component which can run up the opposite slope.

Path MC-N-09 is lower frequency, with 30-year Size D2's estimated. Path MC-N-11 is expected to produce 3-year Size D2's. Path MC-N-12 (Hydro Hill) is a steep short slope that will routinely slough onto the road, with the potential for Size D2 avalanches during large snowfall events. See Figure 5 below.

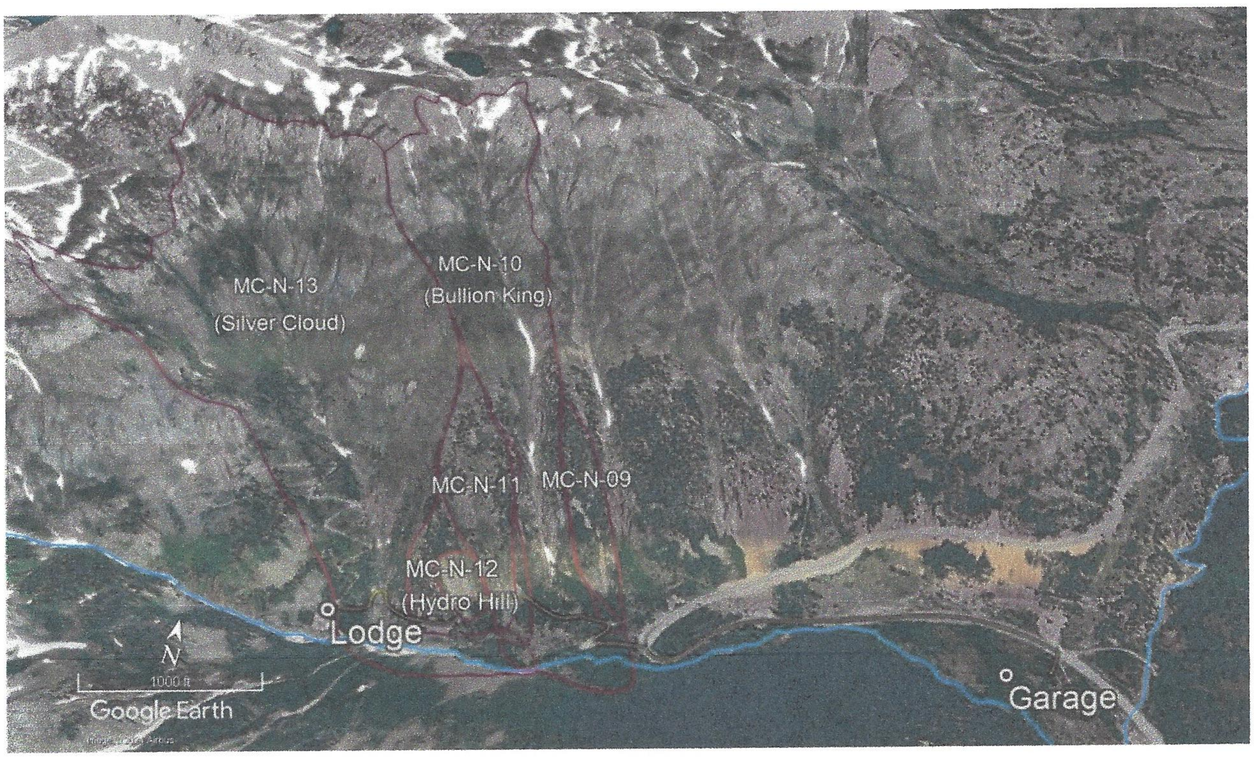


Figure 5. Avalanche terrain on the north side of Mill Creek affecting FSR 821. MC-N-10 (Bullion King) and MC-N-13 (Silver Cloud) frequently produce large destructive avalanches which reach the access road. The other three paths (MC-N-09, -11, and -12) are much smaller in scale.

The access road is also exposed to potential powder avalanche impacts from the south side of Mill Creek. Eight paths (MC-S-05 through -12) have been identified along the gullied north-facing terrain capable of producing Size D3 avalanches (Figure 6). These are also backcountry ski runs, locally known as the Chattanooga North zone. While dense flow is not expected to reach the access road, it is possible for powder flow to run up the north side of the valley, reaching the access road. After gaining experience operating in Mill Creek during the winter months it may be determined that only a subset of these paths present a hazard to the road.

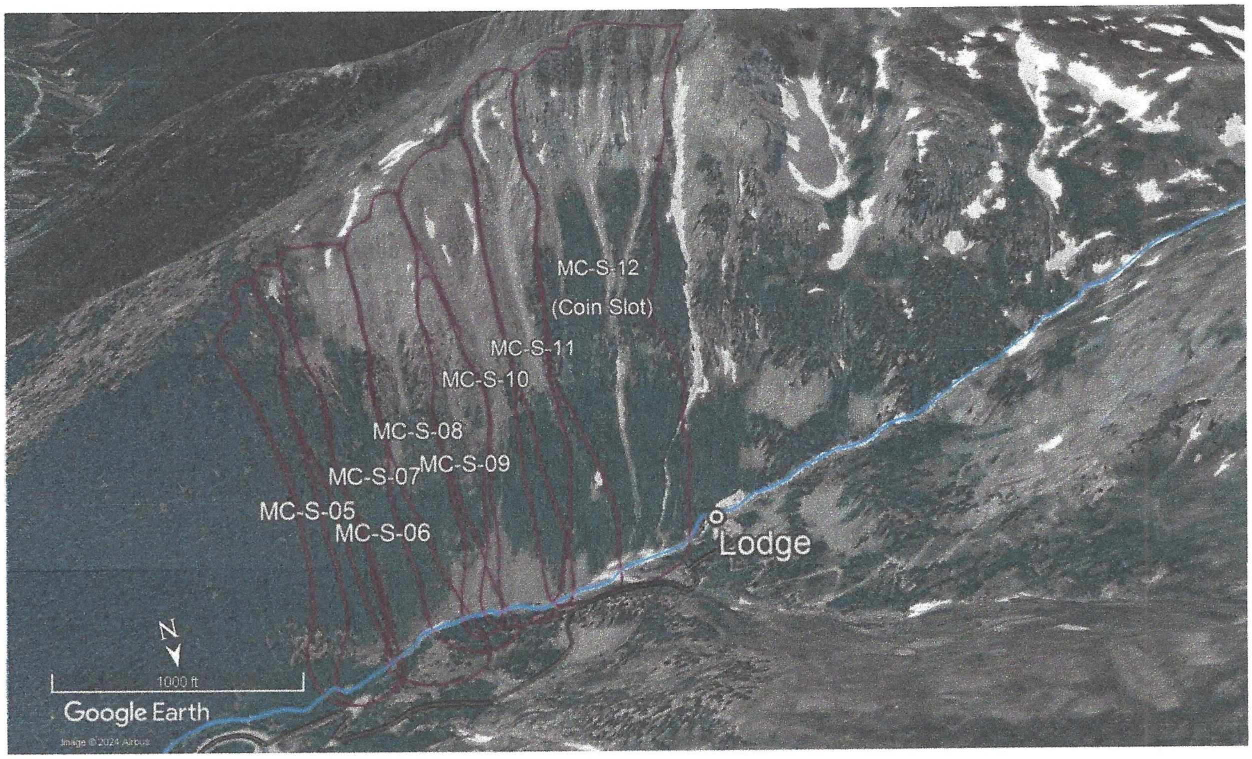


Figure 6. Avalanche terrain on the south side of Mill Creek with the potential for producing Size D3 avalanches with a powder component that could reach FSR 821. Locally known as the Chattanooga North backcountry ski zone.

4.3 Lodge Area

The lodge area is exposed to avalanche hazard from multiple paths on either side of the valley (Figure 7). While engineered structural mitigation protects the buildings (and occupants) from this hazard, people outside of the buildings are still exposed to avalanche hazard.

From the north side of the valley, the lodge area is exposed to powder impacts from path MC-N-13. Paths MC-N-17 and -19 present a short slope avalanche hazard to the lodge. A theoretical design avalanche could run-up over the engineered avalanche fence, over the lodge roof, and impact the area immediately east of the lodge. An extreme avalanche from MC-N-20 could impact the lodge area.

From the south side of the valley, the lodge area is exposed to impacts from paths MC-S-13 (Corner Pocket) through -15. Structural mitigation protects people inside the buildings, however the outdoor lodge area may still be exposed to avalanche impacts.

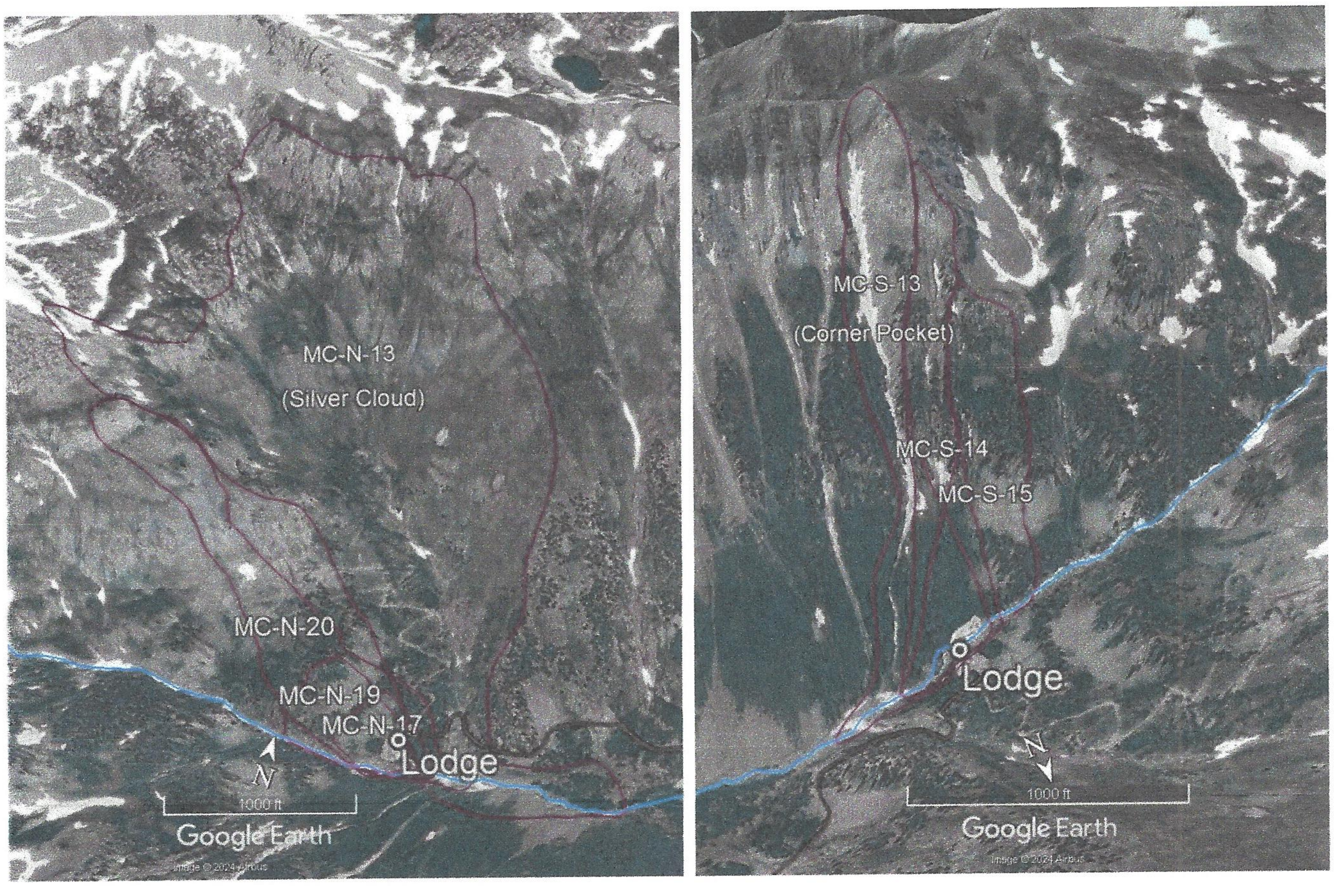


Figure 7. Avalanche paths affecting the lodge area from the north (left image) and south (right image). Impacts are possible from paths MC-N-13 (Silver Cloud), MC-S-13 (Corner Pocket), MC-S-14, MC-S-15, and MC-N-20. Design avalanches from MC-N-17, and -19 could result in dense flow overtopping the lodge and impacting the lodge area immediately to the east of the buildings.

4.4 Garage Area

The garage area is not exposed to avalanche hazard. A design avalanche from path MC-N-04 (Eagle) could produce a powder cloud large enough to come close to the garage. However, this event would not be expected to be destructive near the garage, and there would be no risk to people or property. See Figure 8 below.

Figure 8. The garage area is not exposed to destructive avalanche flow from path MC-N-04 (Eagle).

4.5 Hydroelectric Facility

The proposed hydroelectric facility is exposed to avalanche hazard from paths MC-N-13 (Silver Cloud) and MC-N-11 (Figure 9). The facility is located in the extreme runout of these paths and will therefore only rarely be impacted by avalanches. The most likely hazard is flow from path MC-S-10. The facility can either be accessed on foot from FSR 821, or by snowmobile from the lodge along the valley bottom. The point on FSR 821 directly upslope from the hydroelectric facility is the safest place to stop along the entire road (Figure 9). It is therefore reasonable in many conditions to park at this point and walk downslope to the hydroelectric facility. However, this work is at the discretion of the SCR Avalanche Forecaster.

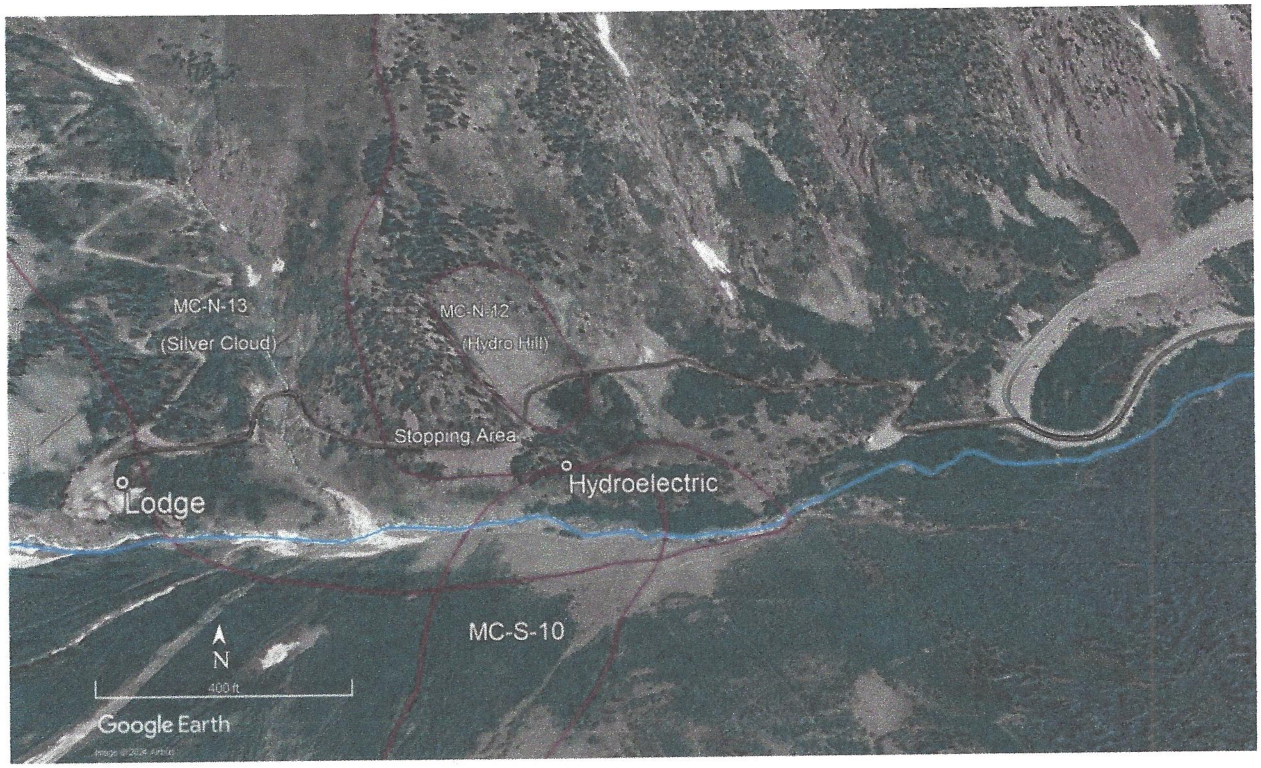


Figure 9. The hydroelectric facility will be located below FSR 821 on the north side of Mill Creek. The facility (and access to the facility) may be exposed to avalanche hazard with low frequency from either MC-N-13 (Silver Cloud) or MC-S-10. Note that the only section of road that is reasonable to stop in most conditions is identified between the path boundaries of MC-N-13 (Silver Cloud) and MC-N-12 (Hydro Hill). Note that during large avalanche cycles, this section of road is likely exposed to powder impacts from MC-S-11 through MC-S-12.

4.6 Additional Worksites

It is likely that any additional worksites located within the Mill Creek drainage would be exposed to avalanche hazard. Whether these worksites are for avalanche forecasting (e.g., study plots, weather stations), infrastructure/equipment maintenance, or any other purpose, these sites will need to be assessed by the SCR Avalanche Forecaster. Site specific procedures should be established for any routine worksites that are exposed to avalanche hazard. Standard access routes should be established for regular, high-elevation snow study sites that minimize worker exposure to avalanche hazards.

5.0 Avalanche Safety Program Overview

Based on the estimated avalanche sizes and return periods discussed above, SCR winter operations are exposed to avalanche hazards which exceed the TASARM thresholds presented previously. Therefore, an avalanche safety program with recommended avalanche safety measures should be implemented to appropriately manage avalanche risk for workers and clients.

5.1 Roles and Responsibilities

This section establishes responsibility for the elements in this ASP and the communication of avalanche hazard information. Specific roles and responsibilities are listed below.

SCR Owner:

- Ensure that the ASP meets SCR safety objectives and is implemented.
- Ensure that the avalanche forecasting team receives the support and resources required to effectively manage the avalanche safety program.
- Ensure that clients are made aware of the inherent avalanche risk and potential for last-minute operational closures prior to booking at SCR.

SCR Avalanche Forecaster:

- Execute pre- and post-season checklists.
- Maintain and collect data from the snow study plot.
- Maintain, inventory, and regularly inspect SCR avalanche safety equipment.
- Avalanche hazard monitoring (via weather, snowpack, and avalanche observations).
- Daily evaluation (forecasting) of avalanche hazard.
- Record keeping consistent with avalanche industry best practice.
- Implement appropriate risk reduction measures based on the avalanche hazard.
- Communicate the hazard (and risk reduction measures) via the daily advisory.
- Delivery of avalanche safety and rescue training to workers.
- Ensure that SCR clients receive a brief avalanche awareness presentation upon arrival.
- Provide avalanche rescue response capability.
- Determine the need for avalanche control and coordinate with CDOT and AC contractor.
- Determine the shot list for avalanche control to be completed by the AC contractor.
- Ensure that operations don't expose public to explosive risk or increased avalanche risk.
- Manage ongoing operational relationships with CDOT, CAIC and the AC Contractor.

Avalanche Control (AC) Contractor

- When contracted by SCR to complete avalanche control, do so according to best practices and strictly adhere to all applicable regulations.
- Provide all staff and explosives product to execute the mission.

- Plan to complete the mission as requested by the SCR Avalanche Forecaster. However, flight and worker safety are the priority, and weather conditions or pilot input may require alteration to the proposed control mission.
- Provide additional forecasting services (e.g., field observations) if available when requested by the SCR Avalanche Forecaster.
- Communicate AC results with the SCR Forecaster via radio immediately post-mission and deliver a follow-up report by the end of day.

5.2 SCR Avalanche Forecasting Team

Full-time avalanche forecasting personnel will be required to manage the avalanche safety program and to monitor/forecast the avalanche hazard for the duration of the avalanche season. One Avalanche Forecaster will be required to be on-site every day, and that forecaster will work closely (daily) with the AC Contractor to monitor weather, snowpack, and avalanche conditions. It is anticipated that, due to scheduling purposes, two individuals will need to be hired to ensure this role is filled 7 days per week. These individuals will be employed full-time through the avalanche season by SCR and will be responsible for ensuring that SCR operations are appropriate given the avalanche hazard. The forecaster position will be housed at the lodge, with office space provided to complete forecasting duties.

During extended periods of low avalanche hazard, the responsibilities of the avalanche forecaster may not fill a day. While there could be efficiencies gained by merging this role with other roles (such as first-aid attendant), managing the avalanche safety program must be the first priority. Conversely, during periods of elevated avalanche hazard, this role might become more than full time.

In the event that a winter ski guiding program is implemented, it should be noted that the roles of Guide and Avalanche Forecaster should not be combined, as guiding would make the individual unavailable for extended periods during the day. However, close communication and data sharing between the SCR Avalanche Forecaster and the contracted guides would benefit both operators from an avalanche safety perspective.

Guidance is provided below for recommended experience and qualifications (in decreasing order of importance) for the Avalanche Forecaster position.

5.2.1 Avalanche Forecaster

- Extensive avalanche forecasting experience in a continental snow climate (minimum of 10 years in a decision-making role), ideally with experience in a highway avalanche program.
- Extensive experience with explosive avalanche control, including heli-bombing.
- Professional Member of the American Avalanche Association (A3).
- Completed the Pro 2 certification process through A3 (or equivalent).
- Ski guiding experience would be an asset to better liaise with the local guides who would be taking SCR clients into the backcountry.
- Certification with the American Mountain Guides Association (AMGA) or International Federation of Mountain Guides Association (IFMGA) is an asset.

5.3 Avalanche Forecast Zones

SCR operations are exposed to avalanche hazard in two distinct avalanche terrain zones. Also, the activities in these two zones typically results in different exposure and vulnerability to people, resulting in a need for separate assessment.

5.3.1 FSR 821

The FSR 821 zone encompasses ~0.6 miles of access road between Highway 550 and the lodge. Exposure for lodge access along FSR 821 will usually be brief with people in enclosed vehicles (e.g., pickup truck). Road maintenance will have significantly increased exposure time for workers; however, vulnerability will be slightly reduced as they will be in heavy equipment (e.g., loader, grader).

5.3.2 Lodge Area

The Lodge Area zone includes all outdoor areas in the immediate vicinity of the lodge buildings. People outside of the lodge buildings will be on foot and often stationary. While this area will often be exposed to less avalanche hazard than the road (due to location and structural mitigation), there will still be potential exposure to hazard (primarily powder) during larger avalanche cycles.

5.4 Avalanche Hazard Monitoring

Monitoring of avalanche hazard is an essential element of the avalanche safety program. Avalanche hazard levels typically vary substantially over the course of each winter season and even during the day, depending on the nature of the weather patterns and snowpack characteristics. Snowpack, weather, and avalanche occurrence data used for monitoring purposes will come from a combination of on-site observations, data from electronic weather stations, regional snow and weather data, and data supplied regularly by the AC contractor. These are discussed separately below.

5.4.1 Weather Observations

Quality real-time weather data from nearby weather stations is a key input into an avalanche forecast. Nearby relevant weather stations are included in Table 5 below. This list is likely to change based on experience forecasting in the Mill Creek drainage. As the avalanche program evolves, there may be value in installing an additional weather station within the Mill Creek drainage that would be owned and maintained by SCR. This would increase station reliability and not depend on others to maintain stations for obtaining reliable data.

Table 5. Nearby relevant weather stations providing data for the avalanche hazard evaluation process.

Station	Provider	Elevation	Available Data
Mineral Creek	SNOTEL	10,040 ft	Temperature, precipitation, HS, SWE.
Red Mountain Pass	SNOTEL	11,200 ft	Temperature, precipitation, HS, SWE.
Eagle	CAIC	12,852 ft	Temperature, RH, wind.
Senator Beck	USGS	12,210 ft	Temperature, RH, wind, HS, SWE.
PHQ	Telluride	11,850 ft	Temperature, RH, wind, HN24, HS.

5.4.2 Weather Forecasts

While real-time weather data is important for understanding the current avalanche conditions, accurate weather forecasts are important for forecasting the trend in avalanche hazard. A variety of quality weather forecasting products are available. It is important for the Avalanche Forecaster to be able to interpret synoptic and regional (macro) scale weather patterns to best predict what will occur at the micro-scale within the Mill Creek drainage.

5.4.3 Weather, Snowpack and Avalanche Observations

Manual snow and weather observations are typically obtained by the Avalanche Forecaster from an established snow study plot at a frequency of twice per day. This study plot needs to be easily accessible. Ideally a location close to the lodge without exposure to avalanche hazard is chosen. A secondary study plot at the garage should be established so that data collection can continue when the lodge is closed. The study plot locations need to be undisturbed (no traffic beyond the forecaster), have a clear sky view, and should be relatively sheltered from wind.

Data obtained from the snow study plot typically includes air temperature, sky cover, wind, precipitation type and rate, total height of snow (HS) and several snowfall height measurements. These snowfall height measurements are made by placing wooden snow height boards on the surface of the snowpack and measuring the snow height on the board at regular intervals before clearing the snow from the boards. Typical snow height boards include a twice daily board (H2D), daily board (HN24), storm board (HST) and shoot board (HSB). It is standard at many operations to measure the density of the new snow when more than 2 inches of new snow has accumulated.

High elevation snowpack conditions will be observed by the Avalanche Forecaster as safety, access, and time allow, with the goal of regular updates of snowpack structure or as significant changes in the snowpack structure are expected. Access from the lodge to the upper elevation observation sites is difficult and can only be undertaken in good conditions via ski touring or by helicopter. Snowpack and weak-layer monitoring will also be required near the lodge snow study plot.

It is anticipated that the AC Contractor will be a local heliski company (HeliTrax) and that they will become an essential partner with SCR for collecting and sharing weather, snow, and avalanche observations from high elevation sites, where they operate every day. This will be essential information for the SCR Forecaster and the provision of this data by the AC Contractor should be written into the services agreement.

5.4.4 Information Exchange

The sharing of snowpack and avalanche observation data between operators is crucial for improving the quality of avalanche forecasts. In Canada, all operators subscribe to a platform called the InfoEx developed by the CAA. Once or twice daily, all avalanche operators (guiding, ski hills, highways, rescue teams, and industrial) submit weather, snowpack, and avalanche data along with their avalanche forecast. This allows the entire avalanche community to understand regional trends in avalanche activity, thereby improving the quality of their individual avalanche forecasts. The InfoEx also provides quality workflows for completing avalanche forecasts.

While the InfoEx is available in the USA, its use is not widespread in Colorado. Ideally, all local operators would subscribe to the InfoEx (or an equivalent). There are numerous operators collecting field data in the nearby San Juans such as the Telluride and Silverton ski resorts, CAIC, CDOT, Helitrax, and other guiding operations. While the InfoEx is preferred, the SCR Avalanche Forecaster needs to establish relationships with "nearest neighbours" to share daily observations.

5.4.5 Daily Hazard Evaluation

The Avalanche Forecaster will complete a daily avalanche hazard evaluation process each morning (even during lengthy periods of elevated avalanche hazard with operational closures). The process will consider all weather, snowpack, and avalanche data discussed above. The avalanche hazard evaluation process will follow best practices as described in (CAA, 2016) and in the Conceptual Model of Avalanche Hazard (Statham, et al., 2018). The objective of the hazard evaluation is to identify the likelihood of avalanches and their potential size and runout distance with respect to SCR facilities. A hazard rating is then assigned to both the lodge area and the road (FSR 821) based on these factors. It is important to note that this hazard rating will be specific to SCR operations, which are mitigated, and should not be confused with the CAIC backcountry avalanche danger ratings, which are unmitigated.

The hazard evaluation process for SCR should be well documented and is ideally completed through a standard online industry application such as the InfoEx. An example workflow alternative to InfoEx is provided in Appendix E - Sample Avalanche Hazard Evaluation.

Hazard ratings, their definitions, and the associated typical actions for each forecast zone are provided below in Table 6. Note that these are specific to the SCR project and will likely be different than public CAIC danger levels.

5.5 Avalanche Hazard Advisories

The SCR Avalanche Forecaster will issue a daily avalanche hazard advisory each morning which serves to inform all SCR workers of the forecasted avalanche hazard and any resulting restrictions or closures of FSR 821 and/or the Lodge Area. Advisories will also include a mountain weather forecast to assist in operational planning. A sample avalanche advisory is provided in Appendix F – Sample Avalanche Advisory.

If avalanche hazard levels are changing quickly due to dynamic weather patterns, hazard advisories may be updated during the course of the day, and also during the night if operations are occurring (e.g., road maintenance). If the avalanche hazard changes, the Avalanche Forecaster must ensure clear communication to all SCR personnel.

5.6 Safety Audits

Audits of the avalanche safety program should be conducted at regular intervals. During the first few winters of operation, audits should be completed annually by DAC to ensure all aspects of this ASP are being implemented appropriately. Once SCR winter operations have gained a few years of experience, audits could occur less frequently (e.g., every 3-5 years), and by other local avalanche professionals.

Table 6. Avalanche hazard definitions and typical actions to mitigate avalanche risk to workers and clients.

Hazard Levels	Hazard Definition	Status of SCR Paths	Typical Action FSR 821[2]	Typical Action Lodge Area[2]	
No hazard	There is insufficient snow for avalanche hazard to exist.	No hazard	No avalanche safety measures required.	No avalanche safety measures required.	**Normal operations**
Low	Avalanches are unlikely. **OR** Small avalanches are possible but are expected to terminate far above the road, lodge, or worksite.	SCR paths are generally cleaned out and minimal residual volume exists.	No avalanche PPE[1] required on the road. Stationary road maintenance permitted with 30-minute check-ins and avalanche PPE[1] required.	No avalanche PPE[1] required in designated lodge area. Avalanche PPE[1] required outside of lodge area.	
Moderate	Small avalanches are likely but are expected to terminate above the road, lodge, or worksite. **AND/OR** Large avalanches are possible but are expected to terminate far above the road, lodge, or worksite.	Hazard remains in specific SCR paths, but none are expected to release naturally.	No avalanche PPE[1] required on the road. Stationary road maintenance permitted with 15-minute check-ins and avalanche PPE[1] required. No travel on foot. No snowmobile travel without first contacting the Avalanche Forecaster.	No avalanche PPE[1] required in designated lodge area. Avalanche PPE[1] required outside of lodge area. No access outside of lodge area without first contacting the Avalanche Forecaster.	
Considerable	Small avalanches are very likely and may reach the road, lodge, or worksite. **AND/OR** Large avalanches are likely but are expected to terminate above the road, lodge, or worksite.	Hazard is building or residual in numerous SCR paths and natural releases may occur.	Avalanche PPE[1] required. No stationary road maintenance. Through-travel in enclosed vehicles only.	Avalanche PPE[1] required. Outdoor activity limited to egress from lodge.	**Evacuation and closure**
High	Numerous small avalanches are expected to affect the road, lodge, or worksite. **AND/OR** One or more large avalanches are expected to affect the road, lodge, or worksite.	Avalanche cycle in progress and many SCR paths can release naturally.	Road closed.	Lodge area closed.	

[1]Avalanche PPE required: Avalanche transceivers are worn, and there is immediate access to avalanche shovels and probes.

[2]SCR avalanche briefing is required for all clients, and pre-season training is required all workers prior to being exposed to any avalanche hazard.

6.0 Avalanche Safety Measures

6.1 Checklists

Preparation and planning are required to operate in accordance with this ASP. Several items must be addressed including acquiring and maintaining rescue equipment, continuous updating of the ASP and rescue plans, and avalanche training. Annual checklists are important in ensuring the avalanche program is kept up to date.

6.1.1 Pre-Season Checklist

Pre-season checklists outline tasks to be completed outside of the avalanche season to ensure that all program equipment and documentation are in proper order prior to the season.

- Ensure services agreement with AC contractor is established.
- Assemble and inspect avalanche rescue equipment.
- Test all avalanche rescue transceivers according to manufacturer's specifications.
- Setup the snow study plot.
- Inspect and maintain avalanche signage and gate.
- Contact adjacent operators to establish (or re-establish) regular data sharing.
- Review and update training program for SCR workers and clients.
- Review and update the ASP and avalanche rescue plan (ARP) as required.
    - Review contact lists in the ARP and update as required.
    - Meet with AC contractor to ensure procedures are up to date.
    - Meet with CDOT to review and update procedures.

6.1.2 Post-Season Checklist

Post-season items to be considered include:

- End of season debrief, keep records to update the ASP and Rescue Plan.
- Remove or cover up avalanche signage.
- Inventory rescue caches to ensure complete contents.
- Inventory and remove batteries from avalanche transceivers.
- Inventory and store snow and weather observation equipment as required.

6.2 Avalanche Training

All SCR workers and clients who are exposed to avalanche hazards will receive an SCR specific avalanche briefing or training delivered by the Avalanche Forecaster. The level of training differs between workers and clients, with a general outline of training for each described below.

6.2.1 Worker Training

Training is required on an annual basis for all SCR workers, typically at the start of the avalanche season. Due to the distance from SCR to emergency services, it is important to train all workers to a level where they can be effective members of an avalanche rescue response. Workers need to have a basic knowledge of avalanche theory, they must be aware of all avalanche hazard areas they may be exposed to, and they need to understand key components of the avalanche safety program. A brief outline of training for workers is provided in Table 7.

Table 7. Avalanche training outline for SCR workers.

Location	Avalanche Training Topics	Approximate Time
Indoor Presentation	Avalanche theory	30 min
	Overview of SCR avalanche terrain	30 min
	Overview of SCR avalanche program	30 min
Outdoor Practical	Introduce avalanche safety equipment	30 min
	Avalanche rescue scenarios	60 min

6.2.2 Client Briefing

All SCR clients must be made aware of avalanche risk prior to booking their trip, and then require an avalanche briefing at the start of their stay, prior to exposure to avalanche hazards. For this reason, briefings should take place at the garage before travelling to the lodge and this should be explained in any pre-trip information sent to clients. Client briefings are much less comprehensive than worker training with the main purpose of making them aware of the avalanche areas, avalanche safety equipment, and safety protocols along FSR 821 and the around the lodge. The briefing could take the form of a short video, or in-person by the avalanche forecaster. This training is not intended to prepare clients who will participate in guided backcountry trips (this should be provided by the contracted guides). It is intended for access and lodging at SCR. See Table 8 for a brief outline of client training.

Table 8. Avalanche training outline for clients.

Location	Avalanche Training Topics	Approximate Time
Indoor Presentation	Awareness of hazard areas and safety protocols	15 min

6.3 Avalanche Safety Equipment

Avalanche safety equipment (also referred to as Avalanche PPE) is a requirement of this ASP. The three key pieces of equipment for avalanche rescue are avalanche transceivers, shovels, and probes. Table 6 identifies when transceivers must be worn by clients and workers. Probes and shovels are found in rescue caches located in strategic locations. This equipment must be inspected annually as per the pre-season checklist. One important duty of the Avalanche Forecaster is to maintain, inventory, and regularly inspect SCR avalanche safety equipment.

6.3.1 Avalanche Transceivers

SCR needs to maintain a fleet of avalanche transceivers sufficient in quantity such that all workers and clients exposed to avalanche hazards can be equipped (e.g., approximately 40 units). Transceivers need to be modern three-antenna units that are maintained in excellent working condition. The Avalanche Forecaster should routinely check and document the battery level of all transceivers. Care and maintenance of avalanche transceivers are per the manufacturer's recommendations, including regular software updates. Batteries should be removed from the transceivers outside of the avalanche season to prevent corrosion.

6.3.2 Avalanche Rescue Caches

Comprehensive rescue caches should be established in easily accessible locations in the event of an avalanche involvement. There should be one cache at the lodge and another at the garage. These rescue caches will contain avalanche probes and shovels as well as first aid and survival equipment, all within large backpacks. Rescue cache contents are listed in Appendix G. It is recommended that all SCR vehicles which regularly travel FSR 821 carry some rescue equipment as well (also listed in Appendix G).

6.4 Operational Restrictions

To manage the avalanche risk to SCR workers and clients, various restrictions should be implemented. These have already been introduced in Table 6.

Restrictions at one hazard level include all restrictions from the previous (lower) hazard level. Note that High hazard is not discussed in this section as it implies operational closure.

6.4.1 Access Road

Low Hazard

Once an avalanche hazard develops along FSR 821 (Low hazard or higher), baseline avalanche safety measures require all travellers to have received the SCR avalanche training (worker or client). No stopping of passenger vehicles along FSR 821. Travel on foot along the access road needs consultation with the Avalanche Forecaster. Road maintenance permitted with 30-minute check-ins, and avalanche PPE is required.

Moderate Hazard

When the hazard increases to Moderate, no travel on foot is permitted along the access road, and travel on snowmobiles (or other open vehicles) needs consultation with the Avalanche Forecaster. Road maintenance is still permitted, however 15-minute check-ins with the operator should be completed.

Considerable Hazard

When the hazard increases to Considerable, travel along FSR 821 is limited to through-travel in enclosed vehicles only. Road maintenance is not permitted. An increase to Considerable hazard will often precede High hazard, so evacuating the lodge area in anticipation of a closure is recommended. No travel at night during periods of Considerable hazard unless necessary due to an emergency (i.e., medical condition requiring urgent, off-site care). Both workers and clients require avalanche PPE when travelling along the road.

6.4.2 Lodge Area

Low Hazard

Once an avalanche hazard develops at the Lodge Area (Low hazard or higher), baseline avalanche safety measures require all persons to have received the SCR avalanche training (worker or client). Signage should be placed in the immediate vicinity of the lodge buildings to identify the extent of the lodge area. This is the specific area that is being forecasted for. Outside of the identified lodge area and the road, avalanche transceivers are always required during the avalanche season. See Figure 10 below.

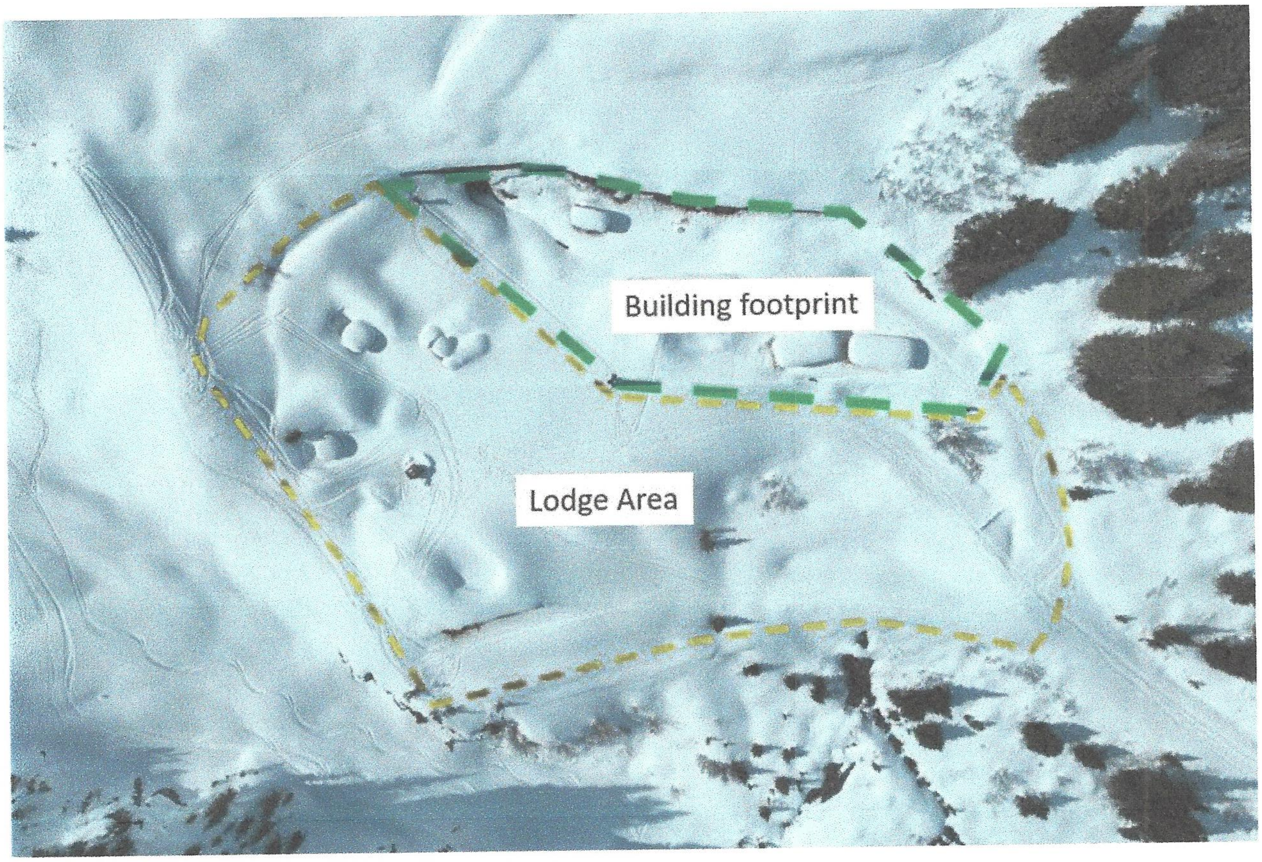


Figure 10. Overview photo highlighting the approximate outdoor "lodge area" (in yellow) outside of the lodge building (in green). Structural mitigation protects lodge occupants.

Moderate Hazard

When the hazard increases to Moderate, there should be no access outside of the designated lodge area without first contacting the Avalanche Forecaster. At their discretion, the Avalanche Forecaster may be away from the lodge completing other duties at Moderate (and Low) hazard.

Considerable Hazard

When the hazard increases to Considerable, outdoor activity should be limited to egress from the lodge buildings, and the Avalanche Forecaster needs to be at the lodge. No access outside of the designated lodge area. Like the access road, an increase to Considerable hazard indicates a trend towards High hazard (closure), and therefore evacuation from the Lodge area is recommended. Nobody should be outside of the buildings at night during Considerable hazard.

6.5 Avalanche Control

To mitigate elevated avalanche hazard, explosive avalanche control (AC) will be required with the objective of triggering regular, small avalanches that terminate above the road/lodge rather than less frequent large ones that block the road or affect the lodge with powder. Since most of the start zones (and therefore shot placements) are located near ridgeline (and usually inaccessible on foot), helicopter avalanche control (AH) will be the primary method. Certain avalanche paths may be controlled by roadside case-charging or hand-charging (AE); however, it will often be most practical to complete the entire control mission by helicopter.

Note that AH is not always possible due to weather. Also, AC may not successfully reduce the hazard. "Hang fire" may remain in the start zones and continue to threaten SCR operations. AC may not produce the anticipated avalanche results, and the Avalanche Forecaster may not have the confidence to resume SCR operations. These scenarios may result in extended operational closures.

6.5.1 Logistics

SCR will contract AC missions to an AC contractor. SCR's role in AC is to evacuate all personnel from the danger area (which means evacuating Mill Creek), to notify the public to ensure no conflict, to coordinate with CDOT and the AC contractor, and to develop the control plan with desired shot placements.

The AC contractor's role in AC is to supply and assemble the explosives, transport them to site, sweep the area for potential conflicts with recreational users, complete the mission as planned by the SCR Avalanche Forecaster as much as is safe/practical to do so and then follow-up and report the results to the SCR Forecaster. Flight safety is the top priority.

Based on the directive of CAIC Avalanche Forecasters, CDOT performs regular AC along Highway 550, with an average of 10 missions per year. It is assumed that SCR operations will require roughly the same number of missions, and it is assumed that both CDOT and SCR will need to complete AC at similar times. For this reason, coordination will be required between the SCR Avalanche Forecaster, CDOT/CAIC personnel, and the AC contractor. Ideally, AC missions for SCR can be completed at the same time as the CDOT control mission.

AC for Highway 550 is completed using artillery (AA) and Avalauncher (AL). These methods allow CDOT to perform AC in any weather condition. AH is not as reliable because favourable flying conditions are required. For this reason, it might not always be possible to complete a SCR mission at the same time as a CDOT mission. Should AC be required in the Bullion King path at a different time that CDOT, coordination will be required to close the highway prior to the mission, as Bullion King may threaten the highway or trigger avalanches in adjacent paths. AC missions farther up Mill Creek may be possible without highway closure with CDOT permission.

In some scenarios, CDOT may avoid AA/AL and choose to cost-share AH missions with SCR.

An AC procedure is provided in Appendix D which serves to highlight a recommended control mission sequence in coordination with CDOT and the AC contractor.

6.5.2 Avalanche Control for FSR 821

Avalanche paths MC-N-10 (Bullion King) and MC-N-13 (Silver Cloud) will require the most frequent AC to mitigate the hazard to FSR 821. During one mission, multiple shots will likely be required in each path. Less frequently, AC may be required in paths MC-N-09, -11, and -12 (and AE may be considered instead of AH). If the Avalanche Forecaster determines that powder impacts from paths across the valley (MC-S-05 through -12) may impact the road, the AH mission should be expanded to include shot placements there.

6.5.3 Avalanche Control for the Lodge Area

Avalanche Path MC-N-13 (Silver Cloud) threatens the lodge area with powder impacts, so it needs to be controlled to mitigate the avalanche hazard to the road and the lodge. The lodge area is also threatened by impacts from across the valley from paths MC-S-13 (Corner Pocket) through -15. Regular AC will be required in these three paths to ensure that persons outside of the lodge building are not exposed to avalanche hazards. In rare cases, the Avalanche Forecaster may determine that AC is also required in path MC-N-20. The two short slopes above the lodge (MC-N-17 and -19) will usually be maintained by regular ski cutting and skier traffic. In rare cases, hand charging may be warranted to control these slopes (with the lodge area evacuated).

6.6 Operational Closure

Operational closure during periods of High avalanche hazard is a simple and effective tool in avalanche risk reduction. This will be the primary avalanche safety measure at SCR when other measures such as operational restrictions and AC do not adequately reduce avalanche risk. The frequency of operational closures will depend on the avalanche season. The duration of closures will depend on the avalanche hazard, the weather, and the effectiveness/feasibility of other safety measures (for example, AH may not be possible due to weather). While the SCR Avalanche Forecaster should try and provide as much notice for closures as possible, they will potentially need to be implemented on a last-minute basis.

During periods of extended closure, the avalanche forecasting team will continue with their avalanche hazard monitoring responsibilities. Even if a closure is many weeks in duration, conditions must be continually assessed if SCR operations are planned to reopen later in the avalanche season.

6.6.1 Closure Procedure

The Avalanche Forecaster will monitor weather forecasts to anticipate required closures with as much notice as possible (but often with less than 48-72 hours notice). When the Avalanche Forecaster determines that a closure will likely be required, they will notify SCR management who are responsible for arranging the closure (manage client bookings, inform SCR workers, etc.). The standard procedure will be to evacuate all personnel (workers and clients) from Mill Creek before the closure is required. The closure will remain in place until the Avalanche Forecaster determines that the hazard has reduced sufficiently to resume operations. While this may occur naturally as the snowpack settles and strengthens over time, it will likely require explosive avalanche control to reduce the hazard.

6.6.2 Shelter in Place

In some circumstances, the avalanche hazard could increase unexpectedly over a short period of time. In this scenario, workers and clients will need to shelter in place at the lodge as it may be unsafe to travel along FSR 821 (or not possible if a large avalanche deposit blocks the road). They may also have to shelter in place due to last-minute highway closure. While people are safe inside the buildings, it may not be safe outside. This scenario should be avoided as much as possible. Evacuation via helicopter should be completed at the earliest opportunity, however it may not be possible immediately due to weather or the elevated avalanche hazard at the lodge.

AC in Mill Creek should be avoided while people are occupying the lodge buildings. The priority when people are sheltering in place at the lodge should be to evacuate them when the weather allows helicopter access. Once evacuation is complete, AC can commence. In rare and undesirable circumstances, AC may be required while people are sheltering in place. While the engineered mitigation is designed to protect the buildings from damaging avalanche impacts, it is recommended to shelter within the mine portal if AC is taking place.

During a shelter in place scenario, the consequences of other emergencies (e.g., fire, medical) are increased. Closures could be extended, which means the lodge buildings need to be equipped with up to one week's food and water rations. Heating and electrical systems need redundancy in case of this situation.

6.6.3 Minimizing Operational Pressure

It is important that closures are respected and that operational pressures do not cause the re-opening of SCR operations prematurely. To minimize operational pressures, clients should be made aware prior to booking that last-minute closures of the lodge due to elevated avalanche hazard are possible. There should be thorough contingency plans in place to house clients elsewhere during closure periods. During active avalanche winters, lodge closures (and therefore client booking cancellations) must be anticipated with greater frequency. It is the responsibility of SCR management to support the Avalanche Forecaster in their decision for closure.

6.7 Communications and Check-ins

It is important that personnel travelling or working in avalanche areas are equipped with at least one reliable means of communicating with other personnel and with outside resources. VHF radios are the standard communication tool. Satellite phones or satellite communication devices (i.e., SPOT, InReach) should be used as backup communication.

A check-in system is required for work and travel in avalanche areas. Vehicles should announce over the radio when they are beginning to travel along FSR 821, and they should again announce when they have reached the other end of the road. Maintenance equipment should check-in every 30 minutes during periods of Low hazard, and every 15 minutes during Moderate hazard (and for through-travel at Considerable hazard). For the check-in procedure to be effective, one SCR worker should be assigned a dispatch duty. This duty could rotate through staff members.

The frequency of check-ins for other tasks will depend on the level of risk. More frequent check-ins are recommended when workers are more vulnerable (i.e., work on foot), are more exposed (i.e., stationary work in avalanche terrain), or when the avalanche hazard is elevated.

6.8 Avalanche Gate and Signage

The entrance to FSR 821 from Highway 550 will be gated during the avalanche season. This is to ensure that public vehicles do not access the plowed FSR 821, thereby unknowingly exposing themselves to avalanche hazard. This will not stop ski tourers from accessing Mill Creek but will simply prevent public road traffic.

Avalanche signage will be installed on the gate notifying the public of the avalanche hazard along FSR 821 (and therefore the reason that access is closed). On days when avalanche control is planned, a notice will be posted on the gate and at the Columbine Lake Trailhead (and other common parking areas which access Mill Creek).

Signage should identify each avalanche path along FSR 821 such that avalanche observations can easily be reported by road traffic (e.g., road maintenance personnel) to the SCR dispatch and Avalanche Forecaster. These signs should be positioned at the boundaries between paths.

While clients will be informed of avalanche restrictions at the Lodge Area during their training, signage will also be installed to clearly mark the boundaries of the Lodge Area.

6.9 Working Alone in Avalanche Hazard Areas

For the purposes of this ASP, working alone means when one person (or multiple people in one vehicle) are working in an avalanche area. In general, working alone in avalanche areas should be avoided. If required, a check-in procedure should be implemented at intervals that increase with in frequency with the avalanche hazard, for example a 15-, 30- or 60-minute mandatory check-in (plan to be approved by the Avalanche Forecaster).

6.10 Procedures for Roads Blocked by Avalanche Deposit

In the scenario in which an avalanche deposit is encountered by SCR personnel on Highway 550 while it is open, CDOT will coordinate traffic control. Immediately turn on 4-way flashers and do not get out of the vehicle. Try to safely reverse back out of the avalanche path and into a safe area. Be aware of other highway traffic.

If an unexpected avalanche deposit is blocking FSR 821, workers and clients should stay in the vehicle and back out to a safe area. If a vehicle is struck by an avalanche and becomes stuck, do not exit the vehicle. Contact the Avalanche Forecaster and await direction. If avalanche deposits are on the road after a closure or explosive avalanche control, advice on deposit removal will be provided to equipment operators by the Avalanche Forecaster.

7.0 Avalanche Emergency Response

7.1 Avalanche Rescue Plan

In the event of an emergency, refer to the Avalanche Rescue Plan (Appendix H). This plan should be updated annually with any changes to the operations and contact lists. All SCR personnel must be familiar with its contents. It is intended to be a stand-alone document and should be printed and kept at the various locations described in Appendix H. Avalanche safety measures and rescue training should be conducted upon avalanche program implementation. Avalanche rescue follows best practice recommendations from the International Commission for Alpine Rescue (ICAR).

7.2 Incident and Near-Miss Reporting

A snow avalanche incident is defined as an avalanche-related event that can cause injury or death, or damage to infrastructure or property. All incidents which may have or do result in injury or loss should be reported immediately to SCR management and the Avalanche Forecaster.

Avalanche incidents resulting in loss should be investigated by an independent avalanche professional using standard investigation protocols. Technical site investigations should be conducted at the earliest opportunity when safe access can be gained. The Avalanche Forecaster will file avalanche accident reports internally and a technical summary will be reported to nearest neighbour operators as soon as possible. Appropriate OSHA workplace incident reporting should also be completed if SCR workers are involved in an avalanche incident.

A debriefing with personnel involved in the incident should be conducted at the earliest opportunity, which may include Critical Incident Stress Debriefing for serious incidents. An avalanche professional from outside the local operation should be brought in to assist as required.

8.0 Closure

This ASP has been developed to outline the elements of an avalanche safety program for SCR operations in the Mill Creek drainage. A thorough review of this ASP should be completed annually, or after any significant changes to SCR operations have occurred.

References

A3. (2016). *Snow, Weather, and Avalanches: Observation Guidelines for Avalanche Programs in the United States (3rd ed). American Avalanche Association.* Victor, ID.

CAA. (2016). *Technical Aspects of Snow Avalanche Risk Management - Resources and Guidelines for Avalanche Practitioners in Canada (Campbell, C.; Conger, S.; Gould, B.; Haegeli, P.; Jamieson, B.; Statham, G. Eds.).* Canada: Canadian Avalanche Association.

McClung, D., & Schaerer, P. (2006). *The Avalanche Handbook.* Seattle, WA. USA: The Mountaineers Books.

Statham, G., Haegeli, P., Greene, E., Birkeland, K., Israelson, C., Tremper, B., . . . Kelly, J. (2018). A Conceptual Model of Avalanche Hazard. *Nat Hazards 90,* 663-691.

Appendix A – Avalanche Hazard Maps

To be developed for the final ASP. Will consist of two map sheets with the same extents. One will illustrate the MC-N- paths, and the other will illustrate the MC-S- paths. Both maps will identify:

- Highway 550
- FSR 821
- Mill Creek
- Mineral Creek
- Lodge area facilities
- Garage area facilities
- Hydroelectric facility
- Avalanche gate location
- Columbine Lake Trailhead
- Location of avalanche defense structures
- Location of CAIC Eagle weather station

Appendix B – Magnitude Frequency Tables

Mill Creek North:

Path ID (Name)	Avalanche Return Period to Element(s) at Risk (years)			Avalanche Type	Element(s) at Risk	Comments
	Size 2	Size 3	Size 4			
MC-N-04 (Eagle)	1	1	N/A	Mixed	Highway 550	Managed by CDOT. Powder cloud from extreme event may dust the garage area; however, with no impact forces.
MC-N-06 (Telescope)	1	1	N/A	Mixed	Highway 550	Managed by CDOT.
MC-N-08 (Muleshoe)	1	1	N/A	Mixed	Highway 550	Managed by CDOT.
MC-N-09	10	30	N/A	Dense	FSR 821	Small sparsely forested rocky start zones, shallow gully in runout. Infrequently effects access road switchback.
MC-N-10 (Bullion King)	1	1	N/A	Mixed	FSR 821	Large gully with broad start zone, runs out onto debris fan, across the access road, and can cross the valley.
MC-N-11	3	10	N/A	Mixed	FSR 821	Sparsely forested starting zone, steep open slope below. Access road crosses through lower track.
MC-N-12 (Hydro Hill)	3	N/A	N/A	Dense	FSR 821	Short, open slope immediately upslope of the road near the hydroelectric facility.
MC-N-13 (Silver Cloud)	N/A N/A N/A	3 10 N/A	10 10 100	Mixed Powder Mixed	FSR 821 Lodge Area Hydroelectric	Very large, broad alpine bowl converges into narrow gully at the access road. Avalanches turn in valley bottom and runout towards the hydroelectric facility.
MC-N-17	30	100	N/A	Dense	Lodge Area	Short slope with avalanches starting at upper end of talus slope. Avalanche wall and fence will protect buildings from impacts. Potential for design event to run-up and over the buildings with deposits in the lodge area.
MC-N-19	N/A	100	N/A	Dense	Lodge Area	Short slope with small avalanches starting at upper end of talus slope. Theoretical design event could impact the Lodge area similarly to MC-N-17.
MC-N-20	N/A	100	N/A	Powder	Lodge Area	Dense flow will be diverted by topography from lodge buildings. Potential for powder impacts from design event.

Mill Creek South:

Path ID (Name)	Avalanche Return Period to Element(s) at Risk (years)			Avalanche Type	Element(s) at Risk	Comments
	Size 2	Size 3	Size 4			
MC-S-05	N/A	100	N/A	Mixed	FSR 821	Well-confined gully within forested slope, lower slope is without forest cover. Reaches valley bottom and may affect switchback on access road.
MC-S-06	N/A	100	N/A	Mixed	FSR 821	Narrow gully that merges runout with MC-S-05. Reaches valley bottom and may affect switchback on access road.
MC-S-07	N/A	N/A	N/A	Powder	FSR 821	Alpine starting zone converges into gully and open talus fan, reaches valley flats. Powder may reach access road.
MC-S-08	N/A	N/A	N/A	Powder	FSR 821	Steep, rocky start zone converges into gully. Reaches valley flats. Powder may reach access road.
MC-S-09	N/A	N/A	N/A	Powder	FSR 821	Small gully with rocky start zone, reaches valley bottom. Powder may reach access road.
MC-S-10	N/A	100 100	N/A	Mixed	FSR 821 Hydroelectric	Gully with rocky start zone, runs out onto talus fan and may reach hydroelectric facility. Powder may reach access road.
MC-S-11	N/A	N/A	N/A	Mixed	FSR 821	Gully with rocky start zone, runs out onto talus fan. Reaches valley bottom, powder may run up on north side of valley and affect access road.
MC-S-12 (Coin Slot)	100	100	N/A	Mixed	FSR 821	Large path with multiple rocky start zones and gullies converging into main gully and open fan. Reaches creek and turns towards the hydroelectric facility. Powder runs up opposite side of valley potentially affecting access road.
MC-S-13 (Corner Pocket)	N/A	30	N/A	Mixed	Lodge Area	Narrow gully with rocky start zone, avalanches spread on fan and reach Mill Creek. Impacts to lodge mitigated by structural protection.
MC-S-14	N/A	30	N/A	Powder	Lodge Area	Narrow gully with rocky start zone, avalanches spread on fan and reach Mill Creek. Dense flow diverted by deflection structure. Powder impacts to Lodge area.
MC-S-15	N/A	30	N/A	Powder	Lodge Area	Mid-elevation start zone on steep rock bluff, smaller avalanches expected to stop in Mill Creek and turn to flow downstream, runout merges with MC-S-14. Powder may run up opposite side of valley.

Appendix C – Terrain Photos

This appendix will be created for the final ASP after winter terrain photos have been collected during the field work. It will serve as an avalanche path atlas identifying each path individually and providing some path information below the photos.

Appendix D – Avalanche Control Procedure

1. SCR Avalanche Forecaster to coordinate with CDOT and CAIC when the need for avalanche control is anticipated. Ideally day(s) in advance.
    a. It is assumed that SCR and CDOT will often need control on the same day.
2. SCR requests control mission from AC contractor.
3. SCR undertakes messaging, sweeps, and closures ahead of time to ensure no workers, clients, or public are in any danger areas.
4. SCR to place signage at common trailheads and Mill Creek avalanche gate warning of the planned control mission.
5. Lodge area is evacuated. SCR workers and clients shelter at the garage.
6. SCR ceases operations while CDOT conducts their control mission.
    a. There is potential for a combined CDOT/SCR mission that only uses the helicopter for AC. In this scenario, CDOT does not use the howitzer or avalauncher.
7. If AC contractor helicopter was inbound prior to CDOT mission, an aerial sweep would be conducted prior to both missions.
8. AC contractor will arrive with shots prepared.
9. SCR will begin their mission immediately after CDOT mission is complete.
10. Take advantage of highway closure to control Bullion King.
11. Once control close to highway is complete, coordinate with CDOT to open highway and continue AH control mission up valley.
12. SCR and AC contractor continuously perform visual sweeps before shot placements to ensure no public (or wildlife) have entered danger area.
13. Typical sequence would be starting at east end of south-facing terrain (Bullion King), and working up valley to the lodge, ending with the north-facing terrain.
14. After AH is complete (and assuming the SCR forecaster is comfortable resuming operations), clear any deposits on road (but maintain closure for all other personnel).
15. Complete case charging and/or hand charging, if required.
16. Any additional deposits cleared, then avalanche forecasting/control team makes decision to reopen road and resume activity outside lodge.

Appendix E – Sample Avalanche Hazard Evaluation

Avalanche Hazard Worksheet

SILVER CLOUD RESORT

ISSUED		VALID UNTIL	
2024-06-14	6:00	2024-03-27	6:00

Lead Tech	Asst. Tech 1	Asst. Tech 2	Asst. Tech 3	Field Day	Tech Location
John Smith				Yes	On Site

WEATHER STATION OBSERVATIONS

Weather Site	Time	Temperature			Wind		Precipitation (in)				Snowfall (in)					Pressure		Cloud Cover
		Max	Min	Present	Speed	Direction	H2DW	HN24W	HSTW	Date Reset (HSTW)	H2D	HN24	HST	Date Reset (HST)	HS	mbar	Trend	
Mineral Cr. (10,040 ft)	5:00																	
Red Mtn (11,200 ft)	5:00																	
Eagle (12,852 ft)	5:00																	
PHQ Telluride (11,850 ft)	5:00																	

FIELD WEATHER OBSERVATIONS

Field Weather Site (Elevation)	Obs Date	Time	Present Temp	Wind		Precip Rate	Precipitation (in)				Snowfall (in)					Cloud Cover
				Speed	Direction		H2DW	HN 24W	HSTW	Date Reset (HSTW)	H2D	HN 24	HST	Date Reset (HST)	HS	
Eagle Plot 12,700ft	2024-02-06	13:00	25.0	M	SW	S2	-	-	-	-	3.0	8.0	15.0	1-Feb	110	OVC

WEATHER FORECAST

Synopsis (Internal)								
	Sky		Precipitation		Snow Level (snow above this point)	Lodge Temperature	Comments
Today	Icon	Clear - Day	Icon	Nil	No Precipitation	+28 °F *High*	
			Value	Nil			
Tonight	Icon	Overcast	Icon	Snow 11-25cm	Garage 10,300 ft	+15 °F *Low*	Snow is forecast to begin around 2am.
			Value	3-5 in			
Tomorrow	Icon	Overcast	Icon	Rain/Snow 26+mm	Lodge 10,800 ft	+30 °F *High*	Heavy snowfall.
			Value	5-10 in			
Outlook (Client-Facing)	A series of frontal systems will bring 20-30 inches of snow by the end of the week.						

Avalanche Hazard Worksheet

SILVER CLOUD RESORT

ISSUED		VALID UNTIL	
2024-06-14	6:00	2024-03-27	6:00

Lead Tech	Asst. Tech 1	Asst. Tech 2	Asst. Tech 3	Field Day	Tech Location
John Smith				Yes	On Site

INFLUENCE OF WEATHER ON AVALANCHE HAZARD

Factor	Effect on Hazard	Comment
Precipitation		
Wind		
Temp/ FL		
Solar		
Summary		

NEAR NEIGHBOUR INPUT

Helitrax	No submissions.
Telluride Resort	No submissions.
SJMG	No submissions.
Silverton Resort	No submissions.
Other:	No submissions.

AVALANCHE OBSERVATIONS (within project area during the past 24 hours)

Avalanche Size	Size 1	Size 2	≥ Size 3	Avalanche Control in past 24 hours?
Number of Avalanches	0	0	0	None

CAUTION, THE AVALANCHE OBSERVATION VALUES RESET TO ZERO EACH TIME YOU CLOSE THE SPREADSHEET

AVALANCHE SUMMARY

None.

SNOWPACK SUMMARY

A dusting of snow above 1500 m.

AVALANCHE PROBLEMS

Layer Name	Avalanche Character	Layer Description	Layer Depth (cm)	Sensitivity to Triggers	Size		Aspect (clockwise)		Elevation		Spatial Distribution
					From	To	From	To	From	To	
Jan-25	Persistent Slab	Jan 25 surface hoar.	100	Stubborn	2	3	ALL		ALL		Specific

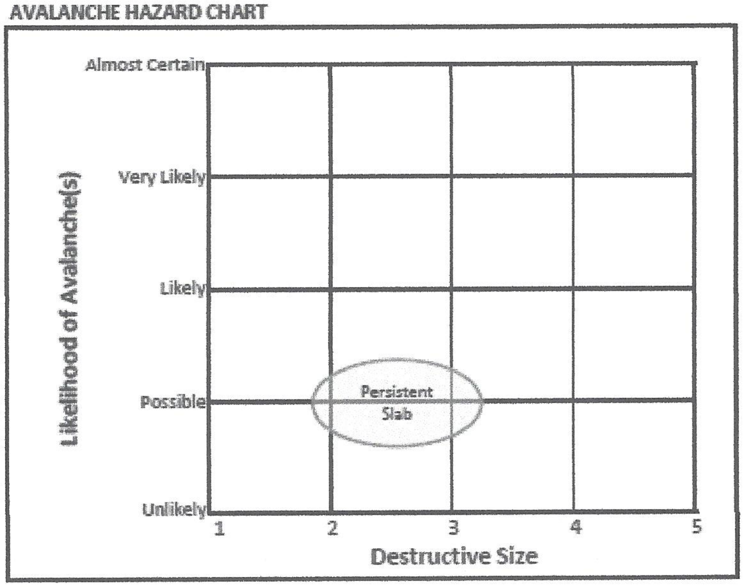
Avalanche Hazard Worksheet

SILVER CLOUD RESORT

ISSUED		VALID UNTIL	
2024-06-14	6:00	2024-03-27	6:00

Lead Tech	Asst. Tech 1	Asst. Tech 2	Asst. Tech 3	Field Day	Tech Location
John Smith				Yes	On Site

AVALANCHE HAZARD CHART



AVALANCHE HAZARD DISCUSSION

The Jan 25 interface is stubborn trending unreactive. No natural triggers expected today. Low Hazard at the lodge, and moderate hazard along CO Road 821. Significant snowfall in the forecast will elevate the hazard tomorrow.

AVALANCHE HAZARD RATINGS

Avalanche Area	Today	Comments and Restrictions	Tomorrow
Lodge Area	LOW	Avalanche PPE and training required.	CONSIDERABLE
CO Road 821	MODERATE	Avalanche PPE and training required. No work on foot without first contacting the avalanche technicians.	CONSIDERABLE

Avalanche Hazard Worksheet

SILVER CLOUD RESORT

ISSUED		VALID UNTIL	
2024-06-14	6:00	2024-03-27	6:00

Lead Tech	Asst. Tech 1	Asst. Tech 2	Asst. Tech 3	Field Day	Tech Location
John Smith				Yes	On Site

COMMENTS ON SOURCES OF UNCERTAINTY

Uncertainty amoung models around intensity of precipitation tonight.

NOTES

OPERATIONAL OBJECTIVES

AVALANCHE TECHNICIAN OBJECTIVES

Appendix F – Sample Avalanche Hazard Advisory

Avalanche Hazard Advisory

SILVER CLOUD RESORT

ISSUED		VALID UNTIL	
June 14, 2024	6:00	March 27, 2024	6:00

Avalanche Technician	Email	Phone	Tech Location
John Smith	john.smith@SCR.com	1-234-567-8910	On Site

AVALANCHE HAZARD RATINGS

Avalanche Area	Today	Comments and Restrictions	Tomorrow
Lodge Area	LOW	Avalanche PPE and training required.	CONSIDERABLE
CO Road 821	MODERATE	Avalanche PPE and training required. No work on foot without first contacting the avalanche technicians.	CONSIDERABLE

NOTES

WEATHER OBSERVATIONS *(previous 24 hours)*

Weather Site	Temperature (°F)			24 Hour Precipitation		Height of Snow *(in)*
	Max	Min	Present	Rain/Snow Water *(in)*	Snowfall *(in)*	
Mineral Cr. (10,040 ft)	0.0	0.0	0.0			
Red Mtn (11,200 ft)	0.0	0.0	0.0	0.0	0	0

WEATHER FORECAST

	Sky	Precipitation	Snow Level (snow above this point)	Lodge Temperature	Comments
Today	Clear	Nil	No Precipitation	+28 °F *High*	
Tonight	Overcast	3-5 in	Garage 10,300 ft	+15 °F *Low*	Snow is forecast to begin around 2am.
Tomorrow	Overcast	5-10 in	Lodge 10,800 ft	+30 °F *High*	Heavy snowfall.
Outlook	A series of frontal systems will bring 20-30 inches of snow by the end of the week.				

Avalanche Hazard Rating Scale

NO HAZARD	LOW	MODERATE	CONSIDERABLE	HIGH	NOT RATED

THIS ADVISORY IS SPECIFIC TO SCR OPERATIONS. SEE www.avalanche.state.co.us FOR BACKCONTRY CONDITIONS

Printed 2024/03/26 at 11:58
Page 1 of 1

Appendix G – Avalanche Rescue Cache Contents

Lodge and Garage Caches (in large back packs):

- 1 x copy of Avalanche Rescue Plan
- 6 x 3.2 m aluminum collapsible probes
- 6 x aluminum avalanche shovels
- 6 x headlamps
- 1 x basic level first aid kit
- 2 x thermal blanket/tarp
- 6 x chemical heat packs
- 1 x wool blanket
- 1 x air horn
- 1 x whistle

SCR Vehicles (in smaller back packs):

- 1 x copy of Avalanche Rescue Plan
- 2 x 3.2 m aluminum collapsible probes
- 2 x aluminum avalanche shovels
- 2 x headlamps
- 1 x basic level first aid kit
- 1 x thermal blanket/tarp
- 2 x chemical heat packs
- 1 x wool blanket

Appendix H – Avalanche Rescue Plan

The Avalanche Rescue Plan is intended to be a stand-alone document. It should be printed separately and be readily available in case of an avalanche incident. Copies should be available in rescue caches, SCR vehicles, and strategic locations at the Lodge and Garage.

Silver Cloud Resort

AVALANCHE RESCUE PLAN

Table of Contents

Rev B
April 2024

DYNAMIC
AVALANCHE CONSULTING LTD

When an Avalanche Emergency is reported to you

YOU are in charge (Incident Commander)

until a more experienced Incident Commander relieves you.

When at an Avalanche Emergency Scene

For ALL Avalanche Emergencies

- Use the Companion Rescue card on **Page 1**

For Buried Subjects NOT Wearing Transceivers

- Use the Probe Line Techniques card on **Page 2.**

For Vehicles Buried or Stuck in an Avalanche

- Use the Vehicles Buried or Stuck in an Avalanche card on **Page 3.**

Lodge Dispatch Actions

- Record initial details using the Avalanche Incident Report form on **Page 4.**
- Follow prompts and record actions on Incident Commander Checklist on **Page 5.**
- Call Primary Rescue Contacts on **Page 6.**

Avalanche Forecaster Actions

- Assume Incident Command until relieved by Search and Rescue or another agency.
- Record initial details using the Avalanche Incident Report form on **Page 4.**
- Confirm status of rescue and actions taken.
- Follow prompts and record actions on Incident Commander Checklist on **Page 5.**
- Call Primary Rescue Contacts on **Page 6.**
- Until relieved, record actions taken and details on appropriate forms.
- Assume the role of Avalanche Safety Officer once relieved of Incident Command.

References for On-Site Actions

Companion Rescue Card

Avalanche Emergency

1 - STOP, ASSESS SAFETY FOR RESCUERS!
Stay on debris, avoid adjacent slopes and avalanche paths.

2 - ASSIGN A LEADER
Delegate tasks below
Keep rescuers organized

3 - HEAD COUNT
How many people are missing?
How many people are onsite?

4 - IDENTIFY LAST SEEN POINT
Of missing workers, if known

5 - ACTIVATE AVALANCHE RESCUE PLAN
Call for help *(radio, sat phone, InReach, Zoleo)*

6 - SWITCH ALL TRANSCEIVERS TO SEARCH
Check that no rescuers are sending

7 - REQUEST RESCUE EQUIPMENT
From rescue cache or external help

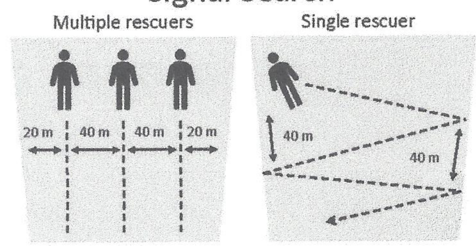
8 - TRANSCEIVER SEARCH (Fig. 1 & 2)
40 m apart for signal search
Move fast, watch for surface clues
At 10m, slow down
At 3m, get low, find lowest number

9 - PROBE (Fig. 3)
Expanding square pattern, 1 ft apart, perpendicular to snow
Leave probe in place on strike

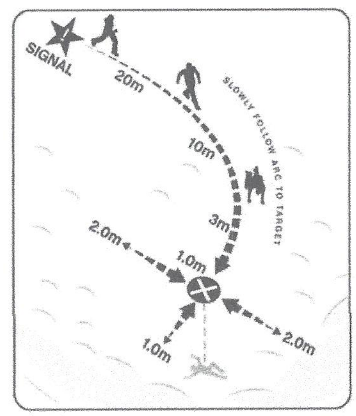
10 - DIG (Fig. 4)
In a line downhill from the probe
Rotate often

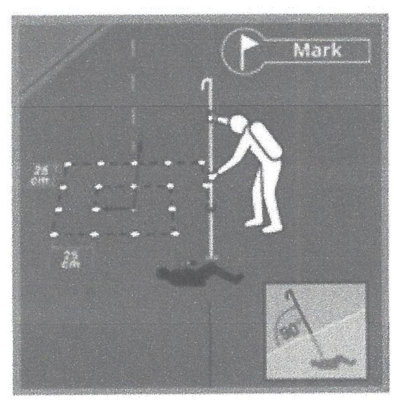
11 - FIRST AID
ABCD's of first aid, clear airway
Treat where found until help arrives

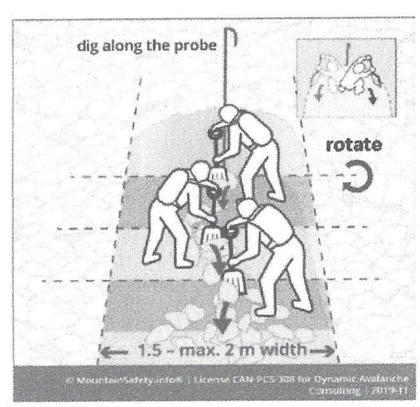
Signal Search



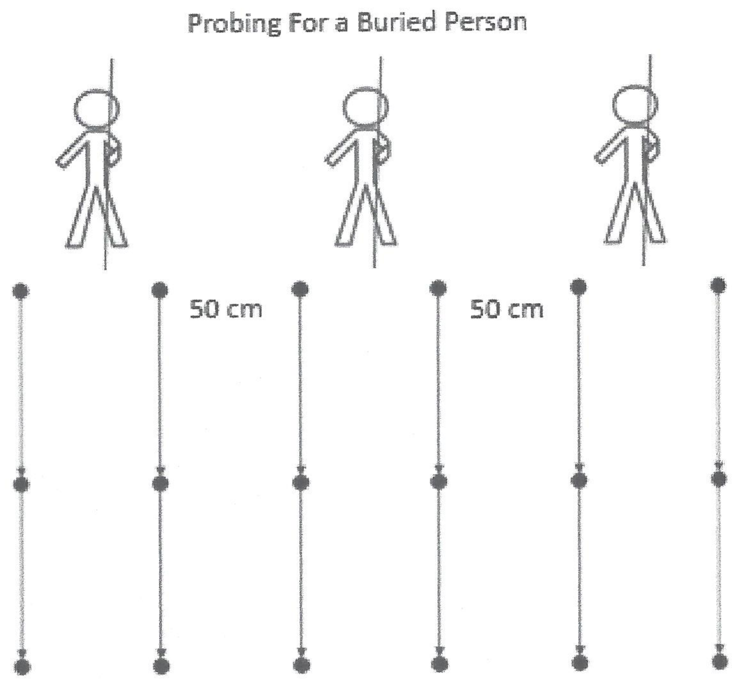
Coarse and Fine Search

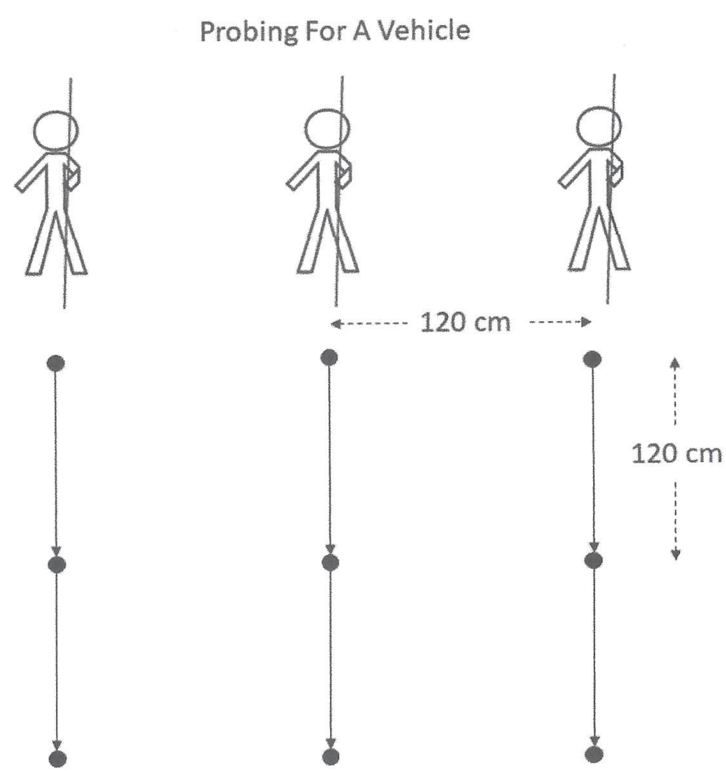






Probe Line Techniques





Procedures for Vehicles Buried or Stuck in an Avalanche

Avalanche deposit blocking the road (no vehicle involved):

1. **DO NOT EXIT VEHICLE.** Back out to a safe area.
2. Contact avalanche technician.
3. Heavy equipment will clear the debris from the road once clearance to do so is provided by the avalanche technician.

Vehicle struck by avalanche (stuck or buried):

1. **DO NOT EXIT VEHICLE.**
2. Turn engine off and activate hazard lights.
3. Radio for assistance and contact the avalanche technician.

Under direction from the avalanche technician, personnel may be directed to exit the vehicle and transition to the protection of another vehicle. Typically, this requires avalanche transceivers, and the use of a spotter watching from inside a separate vehicle.

Forms and Checklists

Avalanche Incident Report Form

Time:		**Time of Avalanche:**	
Initial Information:			
Name of Reporting Person & Witness(es):			
Location: *(Site Name, Road KM, Path ID, GPS Coords)*			
Involvement Details:			
Number of People Buried/Injured:			
Number of Vehicles Involved:			
Transceivers Worn?			
Trained Rescuers On-Site: ***(Move all untrained people to safe area)***			
INITIATE AVALANCHE RESCUE PLAN COMPLETE STEPS 2 THROUGH 13 OF THE INCIDENT COMMAND CHECKLIST UPDATE THIS FORM WITH ADDITIONAL INFORMATION AS IT BECOMES AVAILABLE			
Hazards:			
Site Description: *(terrain above/below, etc.)*			
Is there further avalanche hazard?			
Is the hazard assessment reliable?			
Spotter required? Name:			
Current Weather: *(precipitation type/intensity, visibility, wind)*			
Resources On-Site:			
Trained Rescuers:			
Untrained Personnel:			
Rescue Equipment: *(transceivers, shovels, probes)*			
First-Aid Supplies:			
Vehicles / Heavy Equipment:			
Resources Required On-Site:			
Trained Rescuers (internal):			
Trained Rescuers (external):			
Rescue Equipment: *(transceivers, shovels, probes)*			
First-Aid Supplies:			
Avalanche Dog Teams:			
Vehicles / Heavy Equipment:			
Helicopter Support:			
Other Information: *(avalanche size, deposit depth and width)*			

Incident Commander Response Checklist

Step	Action	Time Complete
1	Complete known information on **Avalanche Incident Report Form.**	
2	Initiate response and assign Rescue Leader. *(on-site commander).* Name: ____________________	
3	Record names of Rescue Team • Minimum team size **2 people**, including the Rescue Leader. • Dispatch second rescuer if a single rescuer is on scene 1. ____________ 4. ____________ 2. ____________ 5. ____________ 3. ____________ 6. ____________	
4	Close the road / area (protect the scene).	
5	Cease all non-critical activities	
6	Notify site workers of avalanche and road / area closure. Request they muster at Lodge/Garage and stay on radio channel.	
7	Mobilize Primary Rescue Resources using the Avalanche Rescue Call Out List	
8	Establish a safe muster location at the scene for the avalanche rescue team in consultation with the Rescue Leader. Record Location: ____________________	
9	Dispatch closest avalanche rescue pack to muster location. *(Avalanche rescue packs are located at the Lodge and Garage)*	
10	Dispatch first-aid team to avalanche rescue muster location, in coordination with the Rescue Leader.	
11	Status of Rescue: • Transceiver Search initiated: Yes / No Time: → • Probe line required: Yes / No Time: → • Subject(s) excavated: Record time and status in log	
12	Maintain communications log, resource log and medical log (below).	
13	Re-assess resource needs and response level. Activate additional resources as required in coordination with the Rescue Leader *(see Avalanche Rescue Call Out List)*.	
14	Re-assess hazard and risk control on-scene.	
15	Activate demobilisation checklist	

Rescue Call Out Lists

PRIMARY RESCUE CONTACTS			
Priority	Resource	Location	Contact Number
1	Helitrax	Telluride	970-728-8377
2	Silverton Medical Rescue	Silverton	911 970-387-5531
3	Vance Kelso (CDOT)	Ridgway	
4	Rebecca Hodgetts (CAIC)	Silverton	
5	Silverton Resort	Silverton	970-387-5706
6	Telluride Resort Patrol	Telluride	970-728-7585

Silver Cloud Resort Contacts			
Priority	Contact Name	Location	Contact Number
1	Colby Barrett	Telluride	
2			
3			
4			
5			

Secondary Resources

Secondary Rescue Resources *(Contact as needed)*			
Resource	Location	Contact	Details
Local Helicopters 1			
US Forces SAR (Night flight capabilities)			
Ambulance	Silverton		
Hospital	Silverton		

Radio Frequencies

Location	Receive	Transmit	Tone

Communication Log

Date:		**Date of Avalanche:**	
Operational Period:		**Time of Avalanche:**	
Page:	____ of ____	**Log Keeper:**	

Time	Call From	Call To	Subject

Resource Log

RESOURCE LOG	Date:		Opertional Period:	
	Page:	____ of ____	Log Keeper:	

Contact Name	Resource Type	Time Dispatched	Time On Scene	Time Returned

Medical Log

MEDICAL LOG	Date:		Opertional Period:	
	Page:	____ of ____	Log Keeper:	

Time	Rescuer Name	Subject Identifier	Subject Age/Sex	Subject Condtion / Injuries	Burial Type	Burial Duration	Air Pocket	Time Recovered	Transport Time/Type
					Full / Partial		Yes / No		
					Full / Partial		Yes / No		
					Full / Partial		Yes / No		
					Full / Partial		Yes / No		
					Full / Partial		Yes / No		
					Full / Partial		Yes / No		
					Full / Partial		Yes / No		
					Full / Partial		Yes / No		
					Full / Partial		Yes / No		
					Full / Partial		Yes / No		
					Full / Partial		Yes / No		
					Full / Partial		Yes / No		
					Full / Partial		Yes / No		
					Full / Partial		Yes / No		
					Full / Partial		Yes / No		
					Full / Partial		Yes / No		

Demobilization Checklist

Step	Action	Time Complete
1	Commencement of demobilization.	
2	Confirm all missing subjects are accounted for.	
3	Mark scene with flagged wands according to ICAR standard: • Avalanche deposit boundary. • Location of recovered subjects and articles. • Areas probed. *(See marking wand color guide below)*	
4	• Draw a map of avalanche deposit, indicating the location of recovered subjects, found articles and areas probed. • Take photographs.	
5	All equipment is accounted for and removed from the search area.	
6	All rescue personnel are accounted for and logged off the scene in Resource Tracking Log.	
7	Notify management groups, if not yet done.	
8	Check all equipment and restore to a state of readiness.	
9	Debrief with all personnel immediately following return to readiness.	
10	Determine if Critical Incident Stress Debrief is needed.	
11	Resume non-critical activities / work at site.	
12	Prepare incident report.	

Marking Wand Color Guide

SAFETY ACCESS / EGRESS
Indicates a route for subsequent teams to follow or as escape route

PERIMETER
Indicates perimeter of avalanche path and debris and line where sign cutting has been completed

AREAS PROBED
Indicates areas spot-probed and the boundaries of an area covered by a probe line

FINDS BY RESCUERS
Labeled wand flag or flagging tape indicating objects found, tracks and dog team indications

POINT LAST SEEN (ANY COLOUR)
Indicates the point where the subject was last seen, either before the avalanche or while being carried by the it

BODY OR LIVE FIND (ANY COLOUR)
Indicates where the subject was found – essential for multiple burials

From the International Commission for Alpine Rescue (ICAR).

MEMO

Memo to: Colby Barrett
Bonanza Boy, LLC

From: Dan Rohn, P.Eng. and Alan Jones, P. Eng., PE
Dynamic Avalanche Consulting Ltd.

Date: April 4, 2024

RE: Silver Cloud Resort
Avalanche Loading at the Lodge Area
23-0032-COL-01 Rev 0

Dynamic Avalanche Consulting Ltd. (DAC) is pleased to present the following map and associated loading diagrams for snow avalanche impacts at the lodge area for the Silver Cloud Resort (SCR). The design criterion that is used for determining avalanche loads on structures considers a 300-year return period avalanche event. Therefore, the loads provided are for very unlikely (i.e., extreme) avalanche events. During average winters, the lodge area will be expected to only be exposed to potential light powder flow avalanche impacts during large avalanche cycles.

Recommended lodge design loads include: (1) dense flow from the south (450 psf), (2) dense flow from the west (490 psf), (3) roof load (up to 175 psf), and (4) powder flow from all directions (50 psf). The loads for dense flow are only applied across the depth of avalanche flow at initial impact. A tapering load is then applied with height as the avalanche flow "runs-up" the structure until it dissipates to the value of the powder load (50 psf). These should all be applied as live loads. See Figure 1 on Page 3 for a plan view map illustrating the orientation of these loads.

South Loads

The load at the south wall of the lodge is 450 psf. It could be reduced by 50% (to 225 psf) with the installation of a 10-12 ft high avalanche fence stopping structure on the north side of Mill Creek. A fence structure would stop some flow (but not all flow), which would reduce the velocity of the remaining flow at the lodge and thus result in decreased loading.

Two endpoint loading scenarios are considered for the application of loads from the south. The first scenario considers the lodge to have been left unoccupied for the winter, in which case dense flow runs over the full, seasonal snowpack. The second scenario considers the lodge to be occupied during the winter, with the full snowpack cleared. In this scenario, dense flow would impact the base of the structure. The structure should be designed to withstand the dense flow impact at any intermediate height range between the two endpoint scenarios (varying the snow depth from 0 ft to 6 ft). Appendix A provides loading diagrams for these endpoint scenarios.

Loading diagrams are also provided for the optional avalanche fence which would be located adjacent to the north side of Mill Creek. This would reduce the loads at the south wall of the lodge. Note that loads at the fence location are higher than loads at the lodge location. Fence loads can be reduced by 20% if a flexible, wire mesh (net) design is used.

West Loads

The dense flow load at the west (uphill) side of the lodge is 490 psf. Note that this load is applied parallel to the slope (roughly 30°), therefore it is not normal to a vertical structure. These loads will need to be resolved for this geometry during structural design.

Two endpoint scenarios are considered for the application of loads from the west. The first scenario considers significant snow accumulation (10 ft) on the uphill side of the lodge from snowpack creep/glide and snow sloughing down the slope. The second scenario considers a springtime avalanche event, where snow has melted from behind the lodge. Like the south loads, the structure should be designed to withstand the dense flow impact at any intermediate height range between the two endpoint scenarios (varying the snow depth from 0 ft to 10 ft). Appendix A provides loading diagrams for these endpoint scenarios.

Roof Loads

Vertical uniform avalanche loads should be applied to the lodge roof in addition to the design snow load. This considers the potential for avalanching snow to run up against the back of the building and overtop the roof. Scenario 1 considers a roof steeper than 4/12 in pitch. In this case, any avalanche flow which overtops will continue over the roof and deposit on the other side of the lodge. The weight of the flowing avalanche (45 psf) is added to the design snow load. Scenario 2 considers a roof shallower than 4/12 in pitch. In this case, the design avalanche could stop and deposit on the roof, adding 175 psf to the design snow load. These are considered live loads. A small shear load (15 psf) is applied in either scenario.

Powder Loads

The SCR lodge location is exposed to powder impacts from many directions (when the extreme 300-year events from many avalanche paths are considered). For this reason, it is conservatively assumed that any height/aspect of the lodge could by impacted by a 50 psf powder load. All windows and exterior fixtures should be designed to withstand this load (at a minimum, assuming no higher avalanche loads are applied based on the above sections).

Closure

The loads provided are based on a preliminary lodge location and layout. Once a final lodge design is chosen, the avalanche loads will be refined, and a final engineering report will be issued. For any questions related to the provided avalanche loads, please contact the undersigned.

Dynamic Avalanche Consulting Ltd.

Prepared by:	Reviewed by:
Dan Rohn, P.Eng.	Alan Jones, P.Eng., PE

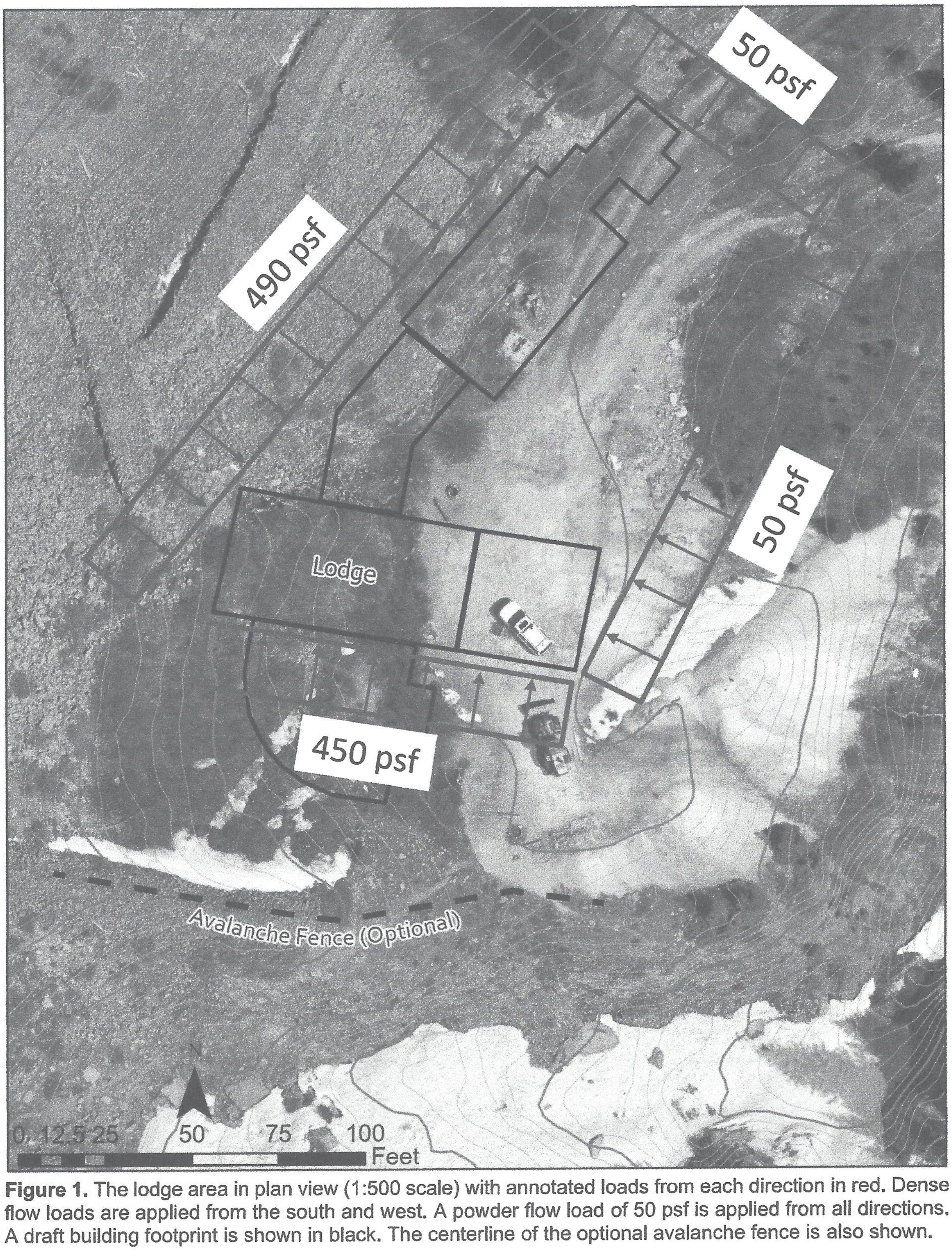


Figure 1. The lodge area in plan view (1:500 scale) with annotated loads from each direction in red. Dense flow loads are applied from the south and west. A powder flow load of 50 psf is applied from all directions. A draft building footprint is shown in black. The centerline of the optional avalanche fence is also shown.

Appendix A – Loading Diagrams

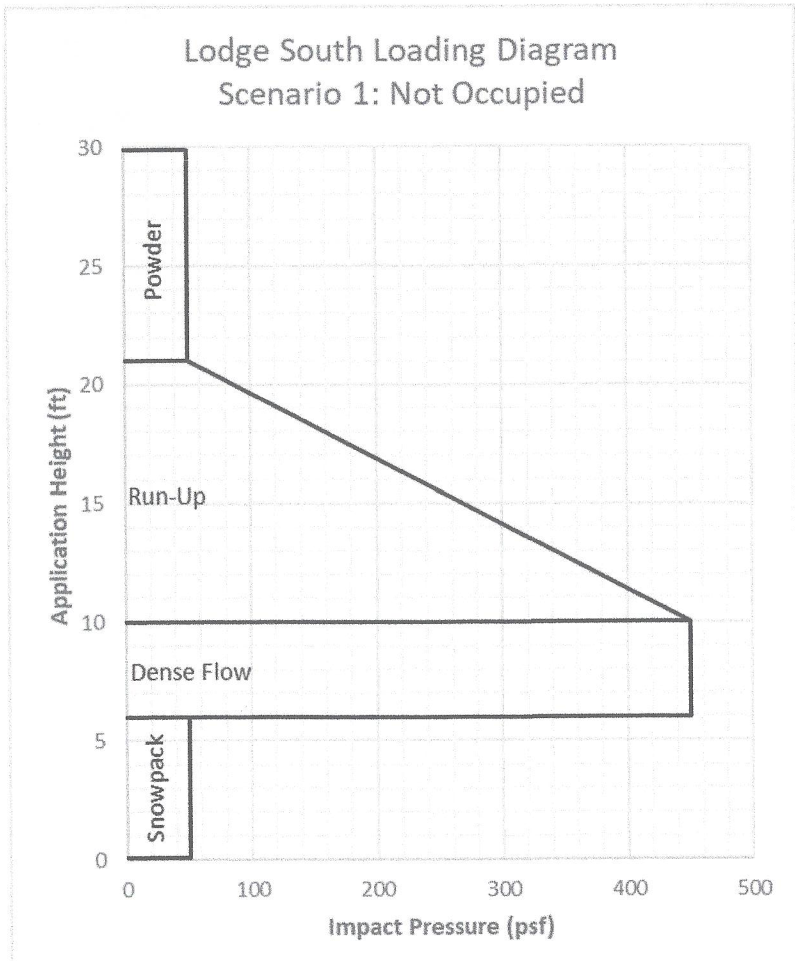


Figure A1. This scenario assumes the lodge has not been occupied for the winter, and no snow clearing has occurred. Dense flow runs over the settled snowpack. Apply 50 psf (0-6 ft), 450 psf (6-10 ft), 450 psf decreasing linearly to 50 psf (10-21 ft), and 50 psf above 21 ft. These are all live loads (except for snowpack, which is a dead load).

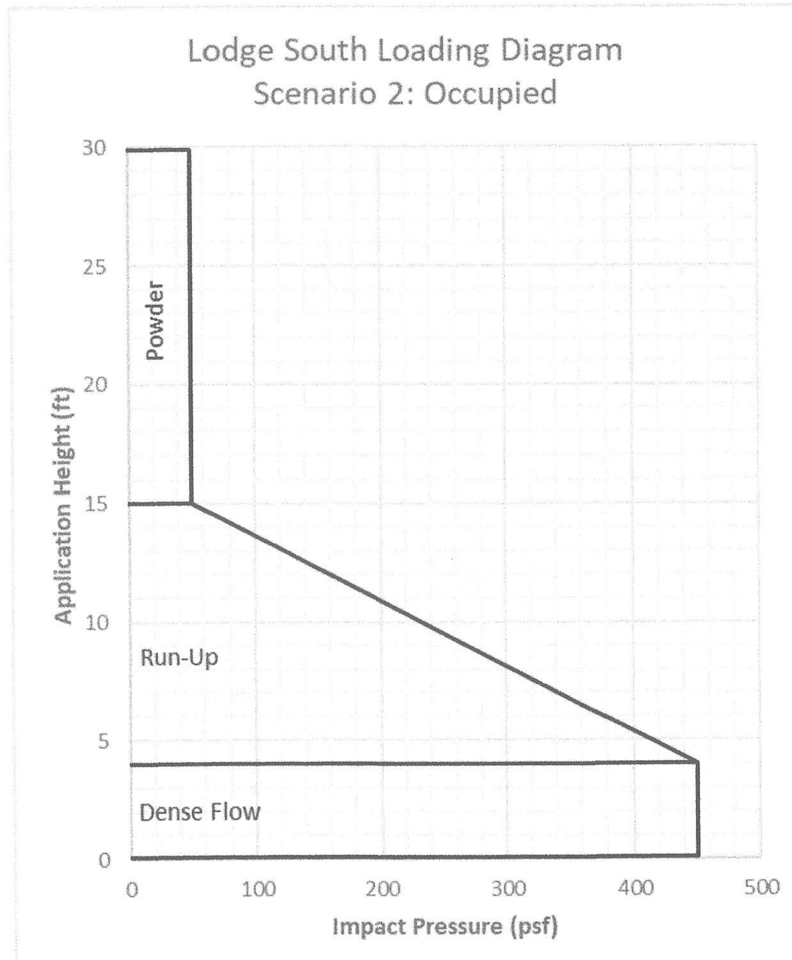


Figure A2. This scenario assumes the lodge has been occupied for the winter, and snow clearing has occurred. Dense flow impacts the base of the structure. Apply 450 psf (0-4 ft), 450 psf decreasing linearly to 50 psf (4-15 ft), and 50 psf above 15 ft. These are all live loads.

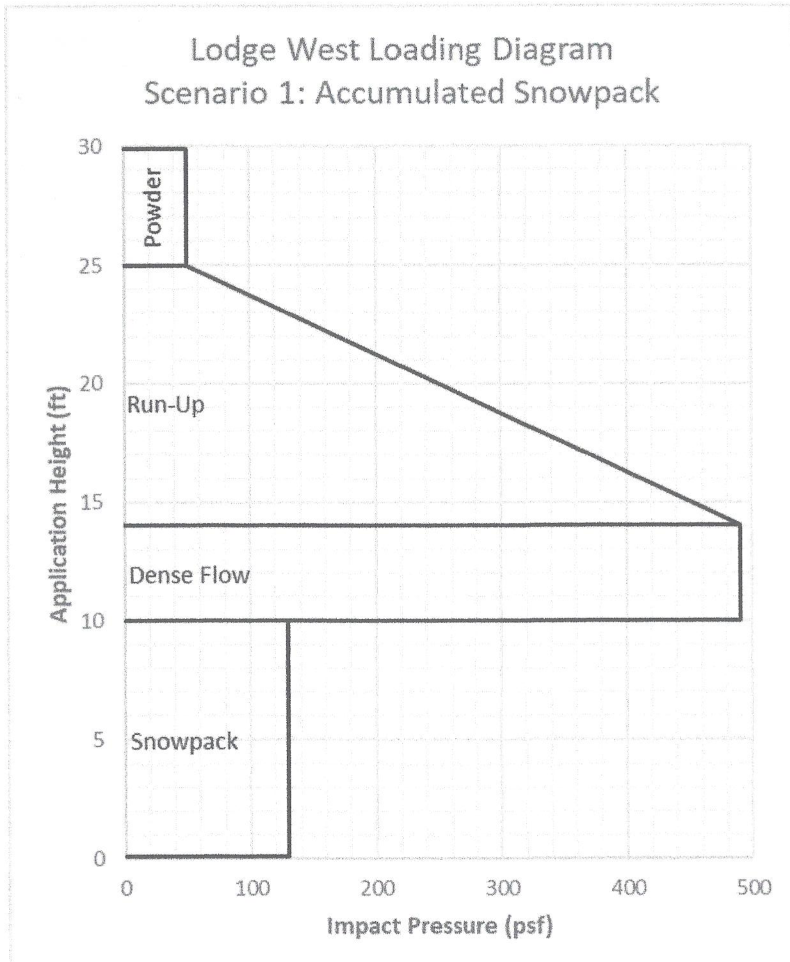


Figure A3. This scenario assumes significant snow has accumulated upslope of the lodge. Dense flow runs over the settled snowpack. Apply 130 psf (0-10 ft), 490 psf (10-14 ft), 490 psf decreasing linearly to 50 psf (14-25 ft), and 50 psf above 25 ft. These are all live loads (except for snowpack, which is a dead load). Note that these loads are parallel to the slope uphill of the lodge, which is roughly 30°.

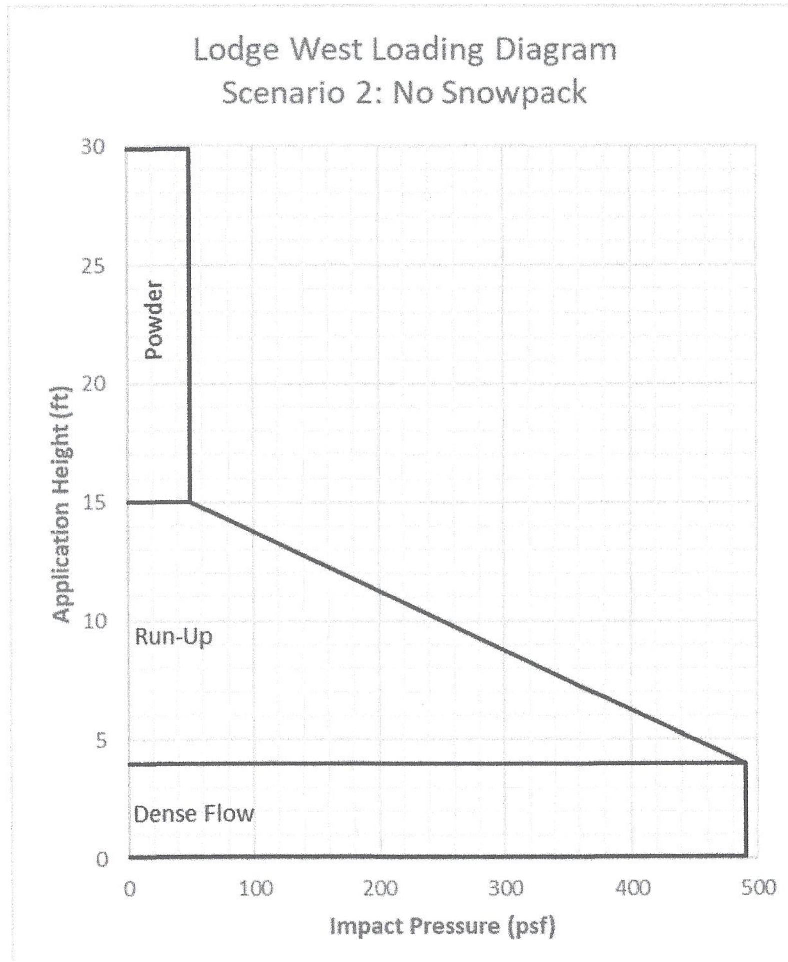


Figure A4. This scenario assumes no snow has accumulated upslope of the lodge. Dense flow impacts the base of the structure. Apply 490 psf (0-4 ft), 490 psf decreasing linearly to 50 psf (4-15 ft), and 50 psf above 15 ft. These are all live loads. Note that these loads are parallel to the slope uphill of the lodge, which is roughly 30°.

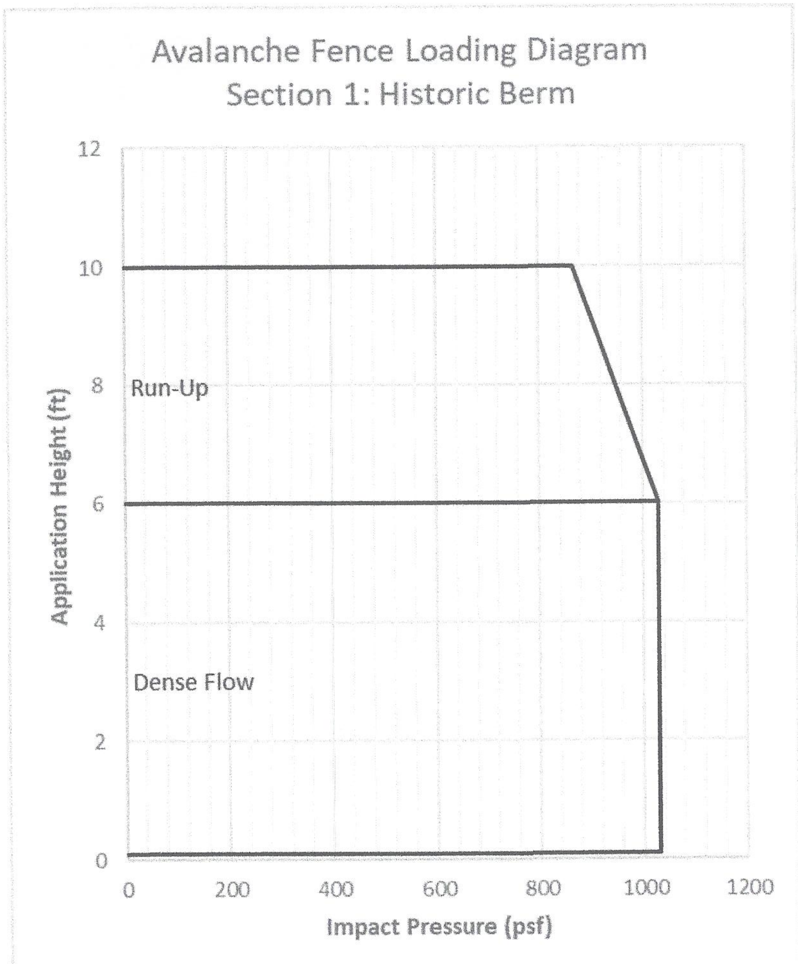


Figure A5. This section of fence would be installed on top of the existing historic berm and would add 10 ft of height. Apply 1030 psf from 0 ft ot 6 ft which then decreases linearly to 867 psf at 10 ft. These are all live loads.

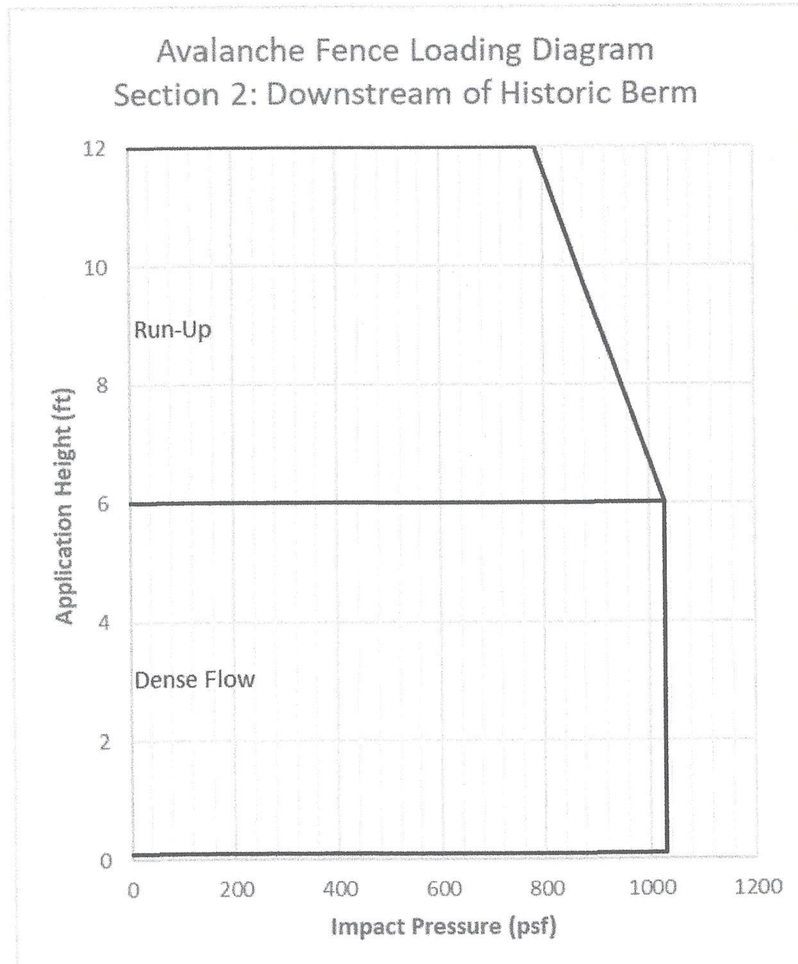


Figure A6. This section of fence would be located downstream (east) of the existing historic berm and would add 12 ft of height. Apply 1030 psf from 0 ft ot 6 ft which then decreases linearly to 785 psf at 12 ft. These are all live loads.

B.K. Briggs & Associates, LLC.
403 N. 1st Street
Montrose, CO 81401

P: 970.596.1982
E: bbriggs@bkbassoc.com

May 10, 2024 **Sent Via Email: cbarrett17@gmail.com**

Mr. Colby Barrett
Bonanza Boy LLC
P.O. Box 992
Montrose, CO 81402

RE: Structural Review of Estimated Avalanche Loads and Conceptual Design of Lodge Facilities and Avalanche Fence Anchorage and Foundations.

Dear Colby,

Pursuant to your request to evaluate conceptual building designs based on Avalanche loads generated by Dynamic Avalanche Consulting LTD (DAC), the following presents my initial conclusions and recommendations.

South Side Structural Wall Loads and Initial Design

In review of the report by DAC, the South loads seem to present the most significant challenge for structural stability. I have assumed initially that no avalanche fencing will be installed as the most conservative case and that the lodge is not occupied during the Winter. This case increases the height for impact loads and provides a larger moment on the lodge walls and foundations.

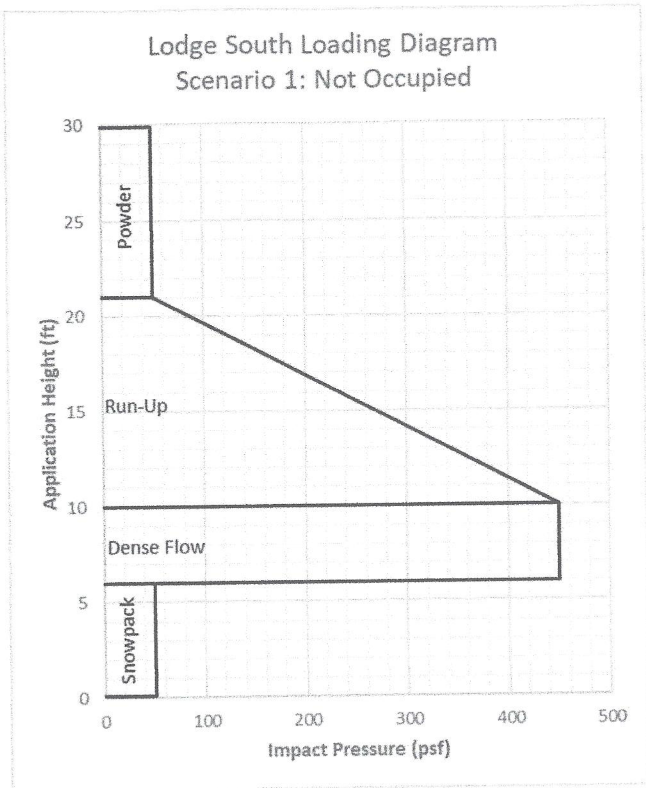
This loading case is given as Figure A1 in the DAC report on page 4 and is reproduced later in this section.

I recommend handling these loads in the South facing wall of the lodge by designing a retaining wall configuration under the expected high lateral loads. I have modeled the DAC Figure A1 load case for both the footer and retaining wall while also applying a 2000 lb/ft vertical load along the top wall to account for loading from accumulated snowpack on the roof.

Based on this modeling, a 24" thick concrete wall reinforced with #6 rebar horiz. on 12" centers and #8 vertical rebar on 6" centers is capable of withstanding these estimated loads. Final design should evaluate other rebar configurations and should be completed once initial architectural designs are complete. The results of the retaining wall modeling are given in Appendix A.

The retaining wall would then be anchored to a 60"x18" strip footer pinned to bedrock. The footer can be reduced in width depending on the depth of pinning and embedment.

403 N 1st Street, Montrose Colorado 81401
bbriggs@bkbassoc.com +1 970.596.1982



If bedrock is too deep for easy pinning, 24" concrete piers will need to be installed and reinforcing in the piers will need to be tied and lapped into the strip footer and up into the wall to create overturning resistance. The pinning or piers will need to be designed to resist at least 15,000 lbs of overturning force applied to the outside of the footer (higher forces will need to be resisted for less wide footings). Footer reinforcing should be a minimum of six #6 rebar long. and one #6 rebar horiz. on 1 ft centers. The proposed footer is also included in Appendix A and was modeled with a 15,000-point load to represent the resistance provided by pinning to bedrock.

It should be noted that during excavation last Fall, bedrock was found in most locations of the proposed lodge footprint so piers will probably not be required. The final structural design should take both options into account.

Any Penetrations through the wall for windows in the South wall will require heavy reinforcing along the edges. Modeling shows that for an 18"-24" wall and a penetration size of 4'x4' will require double #6 rebar with a 24" lap on every corner. Shutters will need to be designed to resist the impact load at the appropriate height. At a minimum, shutters will need to be comprised of ½" steel plate with 4" channel on the edges with a 2" lap over the concrete on the edges. Once Architectural plans for the lodge are available, specific wall reinforcement for wall penetrations and shutter design can be completed.

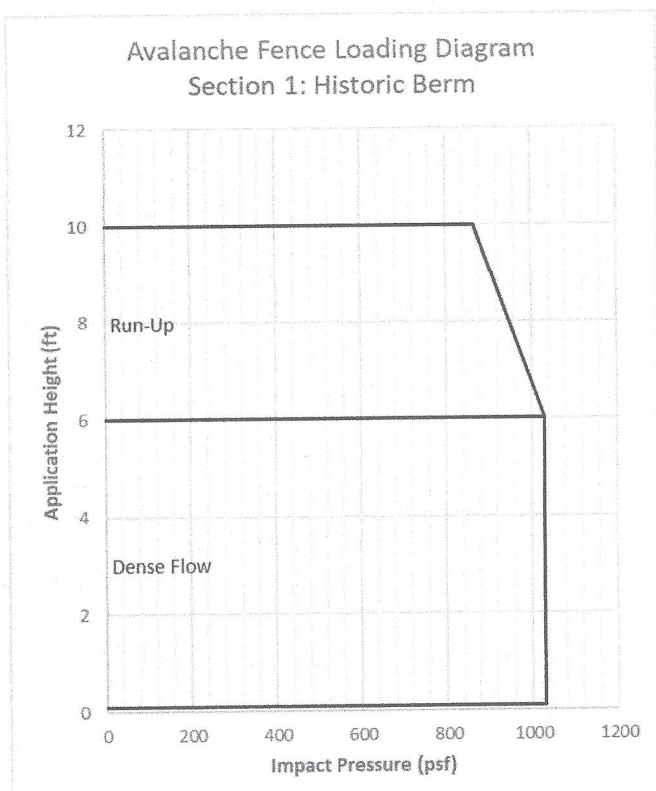
West Side Structural Wall Loads and Initial Design

Similar loads will be seen on the West side of the structure, however at roof pitches greater than 5:12 most of this load will essentially only double the expected ground snow load of 175 psf. A small amount of shear would be translated to the roof but is deemed immaterial to overall wall and footer design. Structural modeling used a wall vertical load from both ground snow load and deposition of avalanche loads which would translate to approximately 4000 plf along the wall. To resist these loads a minimum wall thickness of 12" is required with a minimum reinforcement of #6 rebar vertically and horizontally on 12" centers. Footer design will not require the same amount of resistance to overturning as the South side, however the footer should still be pinned into bedrock the entire wall length with a minimum width of 4 feet.

Avalanche Fence Initial Structural Design

Reducing the heavy reinforcement on both the West and South walls of the lodge would require the installation of avalanche fencing. To support an avalanche fence, twin T40 micro-piles will need to be installed to a depth of 10' along the optional South avalanche fence and soil nails will need to be installed with tieback locations on the West side of the proposed structure. Micropiles and soil nails will need to be designed to anchor fencing to bedrock.

Structural steel modeling to resist the loads given by DAC in Figure A5 of their report was completed to determine what size would be required with and without tiebacks or rear bracing. The A5 loading case can be found on page 6 of their report and is reproduced below for clarity.



Assuming structural steel posts spaced 8'-10' apart with a height up to 6' would require a minimum of W14x48 structural steel. Assuming no support by micropiles these would need to be embedded a minimum of 10' into the ground on a 4'x4' footer.

Conservatively, micropiles should provide up to 170 kips of compressive strength on the rear of the post and approximately 120 kips of tensile strength on the front of the post thus reducing the size and embedment of the footer to 4'x4'x4' or an equivalent. Modeling loads on the fence post structural steel resulted in a requirement of W14x48 columns for a 6' fence and W21x83 for a 10' high fence post.

Reducing the size of the structural steel for this location would require bracing on the back size of the post or tiebacks on the front. Such bracing would need to be translated to a footer or micropile capable of resisting the translated load. Such bracing would reduce the structural steel size to W8x48 for a 6' fence and W12x58 for the 10' high fence. Structural modeling without bracing is also given in Appendix A.

West Side Avalanche fencing is very similar to the South side though given the option of designing the roofline to shed the avalanche and the potential that the fences would be under the existing snowpack it is questionable whether the cost of fencing would provide real benefit. Using the steel size modeled for the South side with bracing would provide a competent fence post capable of withstanding the estimated loads by DAC.

Conclusions:

Based on the early design modeling completed for this report it is my professional opinion that a lodge can be structurally designed at Silver Cloud capable of withstanding the avalanche loads given by DAC without the benefits provided by avalanche fencing. Installation of avalanche fencing specifically on the South side would greatly benefit the lodge and significantly decrease the cost of the structural components.

Cost-benefit analysis is outside the scope of this report however it is expected that the cost of the South side avalanche fence will be more than made up for in the reduced cost of the South side of the structure. It is less apparent that the West side avalanche fence would provide the same benefit.

Roof design was not contemplated in this structural evaluation due to the lack of architectural drawings, however a number of options are available including the use of metal floor decking to install a concrete roof which would be structurally anchored into the top of the concrete walls using Simpson HST straps or equivalent. A concrete roof provides a number of benefits given the heavier dead loads transmitted by the concrete including additional resistance to wind uplift forces.

United Steel Deck Inc. produces a 16 gage Wide Rib Deck capable of carrying the loads given above over spans up to 6 feet. Such decking would require a truss system mounted into beam pockets in each wall and similarly tied into each wall with HST or equivalent straps to resist the uplift forces on the roofline. Truss and purlin spacing would be designed to carry the deck load plus snow loads. Additionally, the roofline on the South side should be designed to minimize uplift by eliminating any roof overhang on that side.

Should you have any questions or comments please feel free to contact me at (970) 596-1982 or bbriggs@bkbassoc.com .

Sincerely,

B.K. Briggs & Associates

Brian K. Briggs, P.E.
Managing Member

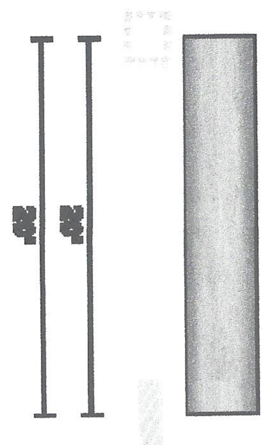
COLORADO REGISTERED
BRIAN KEITH BRIGGS
31956
PROFESSIONAL ENGINEER

APPENDIX A

PASS

DATE:	4/8/2024	COMPANY:	B.K. Briggs & Associates
STRUCALC BUILD:	StruCalc Pro	DESIGNED BY:	Brian Briggs
CUSTOMER:	Bonanza Boy LLC	REVIEWED BY:	--
OJ. ADDRESS:	--	PROJECT NAME:	Silver Cloud Av Fence
	--		
LEVEL:	Basement	LOADING:	LRFD
MEMBER NAME:	Bearing Wall	CODE:	2018 International Building Code
MEMBER TYPE:	Concrete Wall	ACI:	ACI 318-14
MATERIAL:	Concrete		

Bearing Wall DIAGRAM



WALL PROPERTIES

Thickness (in)	Gross Area (in^2)	Gross Moment of Inertia (in^4)	Cracked Moment of Inertia (in^4)	Live Load Deflection Limit	Total Load Deflection Limit
24	5760	276480	851428.49	180	180

REINFORCEMENT PROPERTIES

# Vert. Layers (in)	Vert. Size	Vert. Spacing (in)	fy (psi)	Vert. Cover (in)	Horiz. Size	Horiz. Spacing (in^2)
1	#8	6	60000	1.5	#6	12

CONCRETE PROPERTIES

f'c (psi)	Ec (psi)	Concrete Weight Type
4000	3604996.53	Normal weight

WALL DATA

Spans	Length (ft)	In Plane Unbraced Length (ft)	Out of Plane Unbraced Length (ft)
Span 1	20	0	20

PASS-FAIL

	PASS/FAIL	MAGNITUDE	STRENGTH	LOCATION (ft)	LOAD COMBO
f'c Min (psi)	PASS (37.5%)	4,000	2,500	N/A	
Axial Compression Limit (lb)	PASS (97.64%)	240,600	10,180,000	0	1.4D
Magnified Moment (lb-ft)	PASS (7.27%)	1,574,000	1,697,000	N/A	1.2D+1.6L
Shear (lb)	PASS (47.8%)	145,200	278,100	0	1.2D+1.6L
Horiz. Reinf. Max. Spacing (in)	PASS (33.33%)	12.00	18.00	N/A	
Horiz. Min. Reinf. Ratio ()	PASS (18.51%)	0.003068	0.002500	N/A	
Deflection (in)	PASS (93.9%)	0.1626	2.667 (=L/180)	20	1L

REACTIONS

A	LIVE	DEAD	TOTAL
Fy (lbs)	-	171,900	171,900
Fz (lbs)	90,740	0.000	90,740
Mx (lb-ft)	984,900	-10,000	974,900

Bearing Wall PLAN VIEW

LOAD LIST

Type	Name	Left Magnitude	Right Magnitude	Load Start (ft)	Load End (ft)	Load Type	Direction
Vertical (lb/ft)	LinearVertical	2000	-	-	-	Dead	Y
Trapezoidal (psf)	Trapezoidal	450	50	10	20	Live	Z
Uniform (psf)	Uniform	450	450	6	10	Live	Z
Uniform (psf)	Uniform	40	40	0	6	Live	Z
Self Weight (lbf/ft)	-	6600	6600	0	20	Dead	Y

PASS

DATE:	5/10/2024	COMPANY:	B.K. Briggs & Associates
STRUCALC BUILD:	StruCalc Pro	DESIGNED BY:	Brian Briggs
CUSTOMER:	Bonanza Boy LLC	REVIEWED BY:	--
OJ. ADDRESS:	--	PROJECT NAME:	Silver Cloud Av Fence
	--		
LEVEL:	Basement	LOADING:	ASD
MEMBER NAME:	Bearing Wall Footing	CODE:	2018 International Building Code
MEMBER TYPE:	CONTINUOUS FOOTING	ACI:	ACI 318-14
MATERIAL:	Concrete		

10 (ft) Wide X 18 (in) Deep	Soil Depth TOF: 10 (ft)	Long. (10) #6 Bars, Transv: #6 @2(in) O.C.

MATERIAL PROPERTIES

FOOTING

Width (ft)	Depth (in)	Footing Weight (lb/ft)	Stemwall Weight (lb/ft)
10	18	2175	1450

CONCRETE

fc' (psi)	Ec (psi)	Density (lbf/ft^3)	Agg. Dia. (in)
4500	3823676	145	0.75

STEM WALL

Width (in)	Height (in)	Material	Stemwall Offset (in)
24	60	Concrete	24

SOIL

Bearing Strength (lbf/ft^2)	Density (lbf/ft^3)	Cohesion	Friction Angle	Depth (ft)	Soil Weight (lbf)	Rankine Coefficient (Kp)
8000	130	0	30	10	10400	3

REBAR

Bottom Bar Size #	Bottom Bar Spacing (in.)	fy (psi)	Es (psi)
6	2	40000	2.9E+07

COVER

Top Cover (in.	Bottom Cover (in.	Side Cover (in.
3	3	3

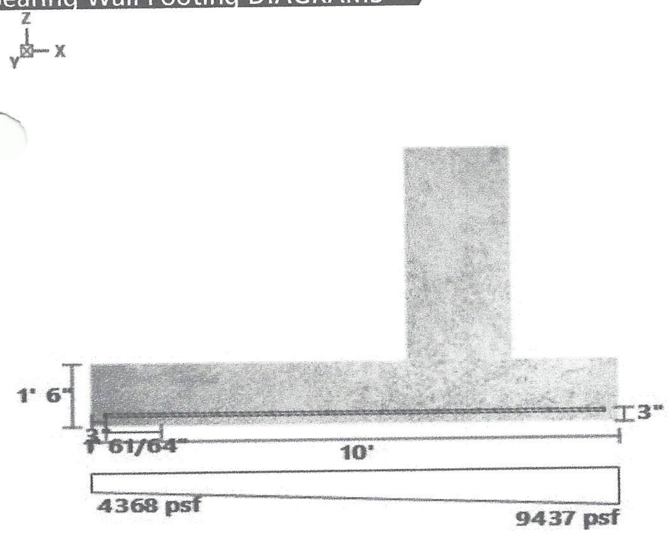
PASS-FAIL

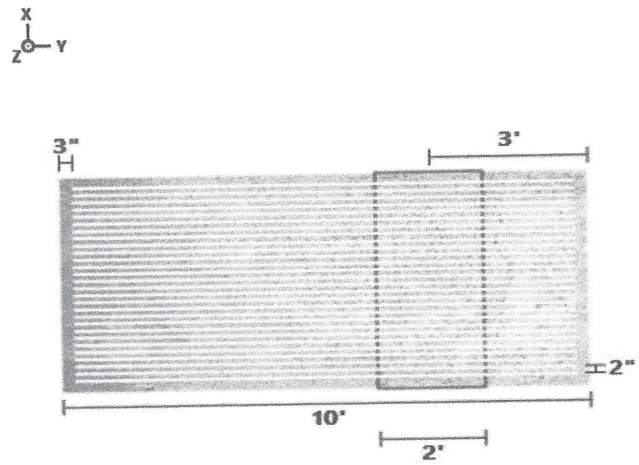
	PASS/FAIL	MAGNITUDE	STRENGTH	LOAD COMBO	CALCULATION TYPE
Soil Bearing Pressure (lbf/ft^2)	PASS (1.7%)	7865.1	8000.0	D+L	ASD
Overturning (lbf-ft)	PASS (68.9%)	53725.0	172562.5	D+L	ASD
One-Way Shear (lbf)	PASS (80.3%)	34795.1	176593.5	1.2D+1.6L+0.5Lr	LRFD
Moment (lbf-ft)	PASS (3.4%)	103449.6	107088.0	1.2D+1.6L+0.5Lr	LRFD
Compression (ft^2)	PASS (100.0%)	10.0	10.0	D	LRFD
Eccentricity (in)	PASS (63.3%)	7.3	20.0	D+L	ASD

LOAD LIST

Type	Name	Left Magnitude	Right Magnitude	Load Start (ft)	Load End (ft)	Load Type	Direction
Moment (lbf-ft)	Moment	59175	-	0	-	Live	Y
Uniform (lbf/ft)	Uniform	2000	2000	0	1	Live	Z
Point (lbf)	pinning resistance	38000	-	0	-	Live	Z
Point (lbf)	Pin Resistance	15000	-	0	-	Live	Z

Bearing Wall Footing DIAGRAMS



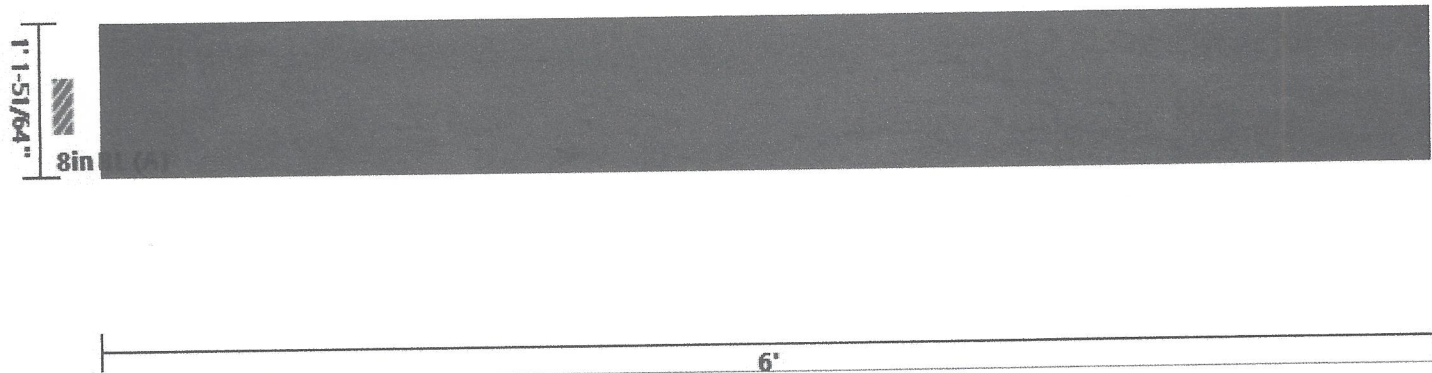


PASS

DATE:	4/8/2024	COMPANY:	B.K. Briggs & Associates
STRUCALC BUILD:	StruCalc Pro	DESIGNED BY:	Brian Briggs
CUSTOMER:	Bonanza Boy LLC	REVIEWED BY:	--
PROJ. ADDRESS:	--	PROJECT NAME:	Silver Cloud Av Fence
	--		
LEVEL:	Basement	LOADING:	ASD
MEMBER NAME:	S AV Post	CODE:	2018 International Building Code
MEMBER TYPE:	EMBEDDED POST	AISC:	AISC 360-16
MATERIAL:	Steel		

W Shapes	W14x48	A36-36			

S AV Post DIAGRAM



COLUMN PROPERTIES

Start(ft) 0 End(ft): 6 Length(ft) w/ Embedment: 16

Es x10³ (psi)	Fy x10³ (psi)	Fu x10³ (psi)	Area (in^2)	depth (in)	tw (in)	tf (in)	bf (in)	Ix (in^4)	Iy (in^4)	Zx (in^3)	Zy (in^3)	J (in^4)	Cw (in^6)
29000	36	58	14.1	13.8	0.34	0.595	8.03	484	51.4	78.4	19.6	1.45	2240

DESIGN PROPERTIES

Lp (in)	Lr (in)	Flange Flexure	Web Flexure	Flange Compression	Web Compression	Cv	Cv_WA
95	324	Compact	Compact	Non-Slender	Non-Slender	1	1

COLUMN DATA

		Unbraced Length		Column End								
Span	Length	Top	Bottom	Elev. Diff	Pnt/и	Pnc/и	Mn/и	Mn-OOP/и	Vn/и	Vn-OOP/и	Cb	Cb-OOP
1	6	0	0	0	0	0	0	0	0	0	2.326	1

EMBEDDED POST

Embedment Depth (ft)	Footing Length (ft)	Footing Width (ft)	Lateral Strength (lbf/ft^2)	Slab Restraint
10	4	4	300	Yes

PASS-FAIL

	PASS/FAIL	MAGNITUDE	STRENGTH	LOCATION (ft)	AISC CODE	LOAD COMBO
Shear Force Y (lbf)	PASS (37.5%)	42240.0	67564.8	0	G2-1	D+L
Moment Y (lbf-ft)	PASS (10.0%)	126720.0	140838.3	0	F2-1	D+L
Deflection Y (in)	PASS (88.3%)	0.141 (=L/511)	1.200 (=L/60)	6		L
Compressive Force (lbf)	PASS (99.9%)	288.0	218539.1	0	E3-1	D
Bending-Compression (Unit)	PASS (10.0%)	0.90	1.00	0	H1-1b	D+L
Bending-Tension (Unit)	PASS (10.0%)	0.90	1.00	0	H1-1b	D+L

REACTIONS

Units for V: lbf   Units for M: lbf-ft

Z axis	DEAD	LIVE	TOTAL
A	288	0	288
B	0	0	0
.	0	42240	42240
B	0	0	0
M@x			
A	0	126720	126720
B	0	0	0

Reaction Location

A B

LOAD LIST

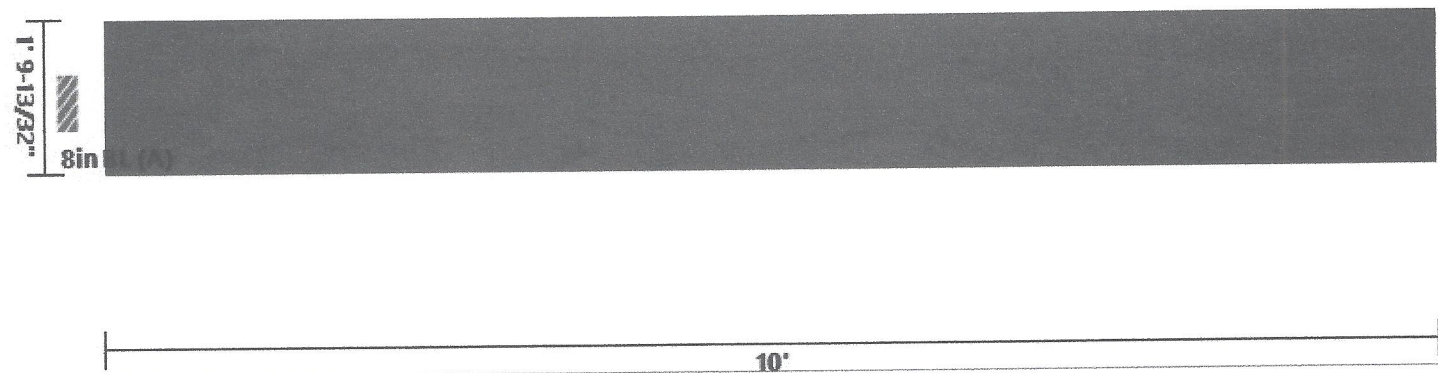
Type	Name	Left Magnitude	Right Magnitude	Load Start (ft)	Load End (ft)	Load Type	Direction
Uniform (lbf/ft)	Uniform	7040	7040	0	6	Live	Y
Trapezoidal (lbf/ft)	Trapezoidal	7040	5549	6	6	Live	Y
Self Weight (lbf/ft)	-	48	48	0	6	Dead	Z

PASS

DATE:	4/8/2024	COMPANY:	B.K. Briggs & Associates
STRUCALC BUILD:	StruCalc Pro	DESIGNED BY:	Brian Briggs
CUSTOMER:	Bonanza Boy LLC	REVIEWED BY:	--
ROJ. ADDRESS:	--	PROJECT NAME:	Silver Cloud Av Fence
	--		
LEVEL:	Basement	LOADING:	ASD
MEMBER NAME:	10 S AV Post	CODE:	2018 International Building Code
MEMBER TYPE:	EMBEDDED POST	AISC:	AISC 360-16
MATERIAL:	Steel		

W Shapes	W21x83	A36-36			

10 S AV Post DIAGRAM



COLUMN PROPERTIES

Start(ft) 0 End(ft): 10 Length(ft) w/ Embedment: 20

Es x10³ (psi)	Fy x10³ (psi)	Fu x10³ (psi)	Area (in^2)	depth (in)	tw (in)	tf (in)	bf (in)	Ix (in^4)	Iy (in^4)	Zx (in^3)	Zy (in^3)	J (in^4)	Cw (in^6)
29000	36	58	24.4	21.4	0.515	0.835	8.36	1830	81.4	196	30.5	4.34	8630

SIGN PROPERTIES

Lp (in)	Lr (in)	Flange Flexure	Web Flexure	Flange Compression	Web Compression	Cv	Cv_WA
91	306	Compact	Compact	Non-Slender	Non-Slender	1	1

COLUMN DATA

Span	Length	Unbraced Length Top	Bottom	Column End Elev. Diff	Pnt/и	Pnc/и	Mn/и	Mn-OOP/и	Vn/и	Vn-OOP/и	Cb	Cb-OOP
1	10	0	0	0	0	0	0	0	0	0	2.374	1

EMBEDDED POST

Embedment Depth (ft)	Footing Length (ft)	Footing Width (ft)	Lateral Strength (lbf/ft^2)	Slab Restraint
10	4	4	300	Yes

PASS-FAIL

	PASS/FAIL	MAGNITUDE	STRENGTH	LOCATION (ft)	AISC CODE	LOAD COMBO
Shear Force Y (lbf)	PASS (57.5%)	67417.8	158702.4	0	G2-1	D+L
Moment Y (lbf-ft)	PASS (7.4%)	326154.5	352095.8	0	F2-1	D+L
Deflection Y (in)	PASS (87.0%)	0.261 (=L/460)	2.000 (=L/60)	10		L
Compressive Force (lbf)	PASS (99.8%)	830.0	367197.0	0	E3-1	D
Bending-Compression (Unit)	PASS (7.3%)	0.93	1.00	0	H1-1b	D+L

REACTIONS

Units for V: lbf   Units for M: lbf-ft

Z axis	DEAD	LIVE	TOTAL
A	830	0	830
B	0	0	0
[illegible]			
[illegible]	0	67418	67418
B	0	0	0
M@x			
A	0	326154	326154
B	0	0	0

Reaction Location

A   B

LOAD LIST

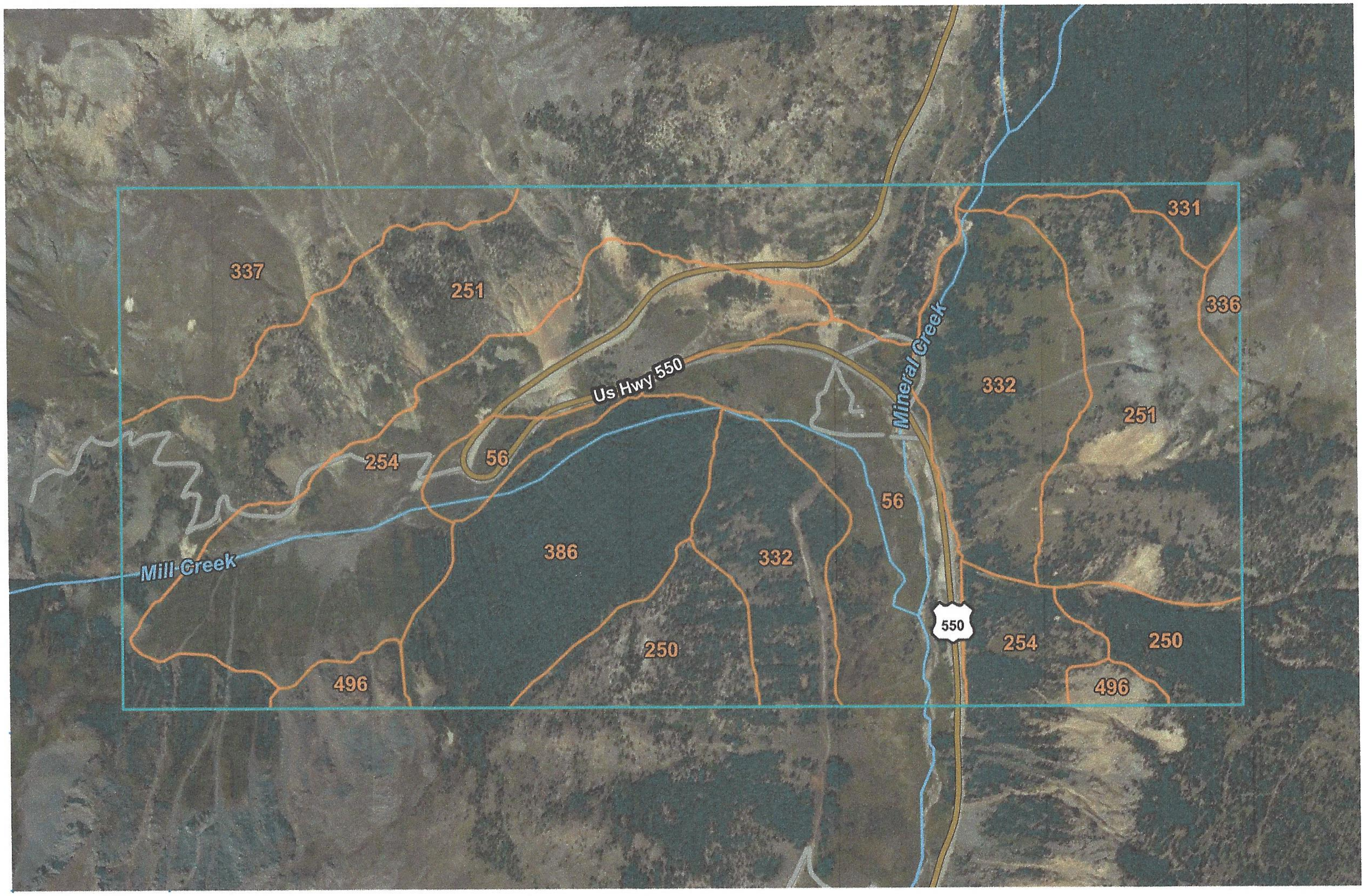
Type	Name	Left Magnitude	Right Magnitude	Load Start (ft)	Load End (ft)	Load Type	Direction
Uniform (lbf/ft)	Uniform	7040	7040	0	6	Live	Y
Trapezoidal (lbf/ft)	Trapezoidal	7040	5549	6	10	Live	Y
Self Weight (lbf/ft)	-	83	83	0	10	Dead	Z

107° 44' 54" W

107° 42' 44" W

37° 52' 58" N

37° 52' 58" N



37° 51' 51" N

37° 51' 51" N

107° 44' 54" W

107° 42' 44" W

N

Map Scale: 1:14,500 if printed on A landscape (11" x 8.5") sheet.

0 200 400 800 1200 Meters

0 500 1000 2000 3000 Feet

Map projection: Web Mercator Corner coordinates: WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Animas-Dolores Area, Colorado, Parts of Archuleta, Dolores, Hinsdale, La Plata, Montezuma, San Juan, and San Miguel Counties
Survey Area Data: Version 18, Aug 22, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 6, 2021—Sep 17, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
56	Typic Cryaquents-Cryaquolls-Cryofibrists complex, 0 to 5 percent slopes	87.7	11.0%
250	Snowdon-Rock outcrop complex, 30 to 65 percent slopes	51.3	6.4%
251	Rock outcrop-Snowdon complex, 45 to 75 percent slopes	248.0	31.1%
254	Cryorthents-Rubble land complex, 30 to 75 percent slopes	137.5	17.2%
331	Needleton stony loam, 30 to 65 percent slopes	11.3	1.4%
332	Horsethief-Needleton complex, 30 to 60 percent slopes	102.1	12.8%
336	Whitecross-Rock outcrop complex, south aspect, 30 to 75 percent slopes	5.3	0.7%
337	Whitecross-Rock outcrop complex, 45 to 75 percent slopes	64.6	8.1%
386	Needleton stony loam, 60 to 90 percent slopes	77.6	9.7%
496	Rock outcrop	13.2	1.6%
Totals for Area of Interest		**798.5**	**100.0%**

GOODRICH ENGINEERING LLC
Geotechnical Engineering, Soil, Rock, Concrete, Walls, Foundations, Tiebacks, Geology, Hydrology, Drilling-Consultant, Asphalt
Rex Goodrich, President
2338 Monument Road, Grand Junction CO 81507
970-250-3358
rex.goodrich48@gmail.com

Brian Briggs
President, B.K. Briggs, and Associates
2019 Otter Pond Circle
Montrose CO 81401

Job 133-4
May 11, 2024

RE: Preliminary Soil Investigation, Silver Crown Mine, Silverton CO

Brian,

Per your request, Goodrich Engineering LLC (GELLC) personnel have started a geotechnical study at the planned lodge on the south side of Red Mountain Pass at the location of the abandoned Silver Crown Mine. The mine site is located about 10 miles north of Silverton CO on SH 550. The location maps are shown in Figures 1 and 2.

Some outside structures will be built on the surface near the old portal to the mine but some of the facilities are to be constructed underground using a portion of the old mine workings.

Surface Facilities

The lodge will be constructed on the site of the abandoned Silver Crown Mine (see Figure 1). The mine waste on the site will be contained and capped a part of a Voluntary Cleanup (VCUP) action approved by the CDPHE. Surface facilities will be constructed near the mine portal. For construction of the surface facilities, the *in-situ* scree, rock and soil will be removed to bedrock. Ultimately the foundation will be attached to the rock via steel rebar and grout. These facilities are currently being designed.

Underground Facilities

Access, at least initially, will be via the old mine workings. The old mine was reopened in the fall of 2023 and after some fortification of the entrance and the scree slopes above, the existing tunnels were entered. Hundreds of feet of tunnel were explored in the fall of 2023 once temporary ventilation was installed. The mine tunnels are remarkably structurally stable given the age of the tunnels. Primary support noted during preliminary underground site visits include rock bolts, wood supports and a span and height design that was dimensionally appropriate to the rock-mass fabric and equipment designed for extraction of the ore.

This letter contains general recommendations for preliminary design of the outbuildings and underground tunnels and rooms. This report is not a foundation design for either, and cannot be used as such.

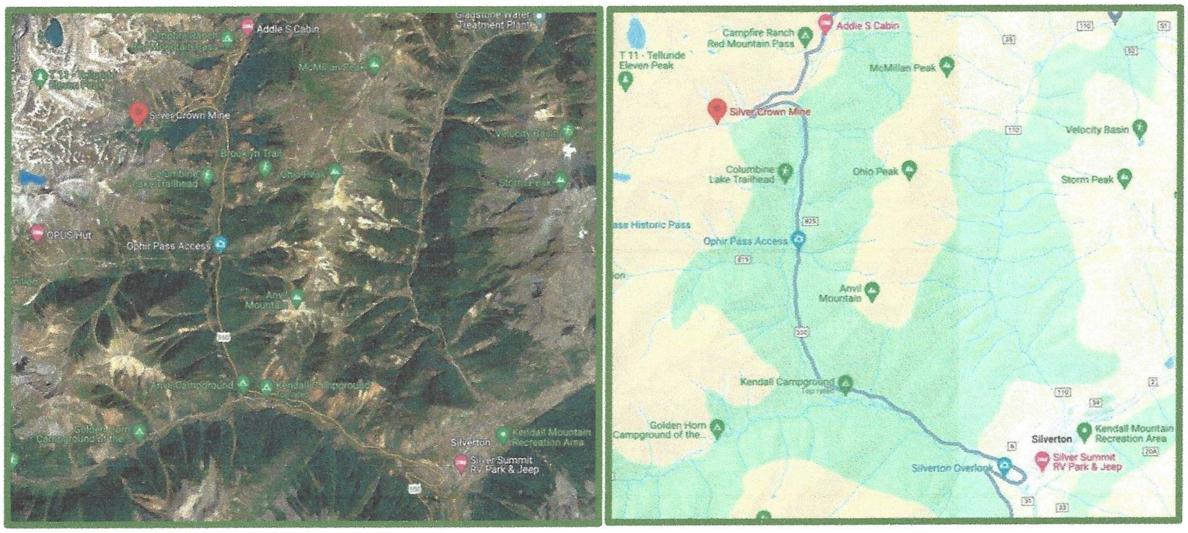


Figure 1. Location Map of the Silver Cloud Mine, SH 550 Near Silverton CO.

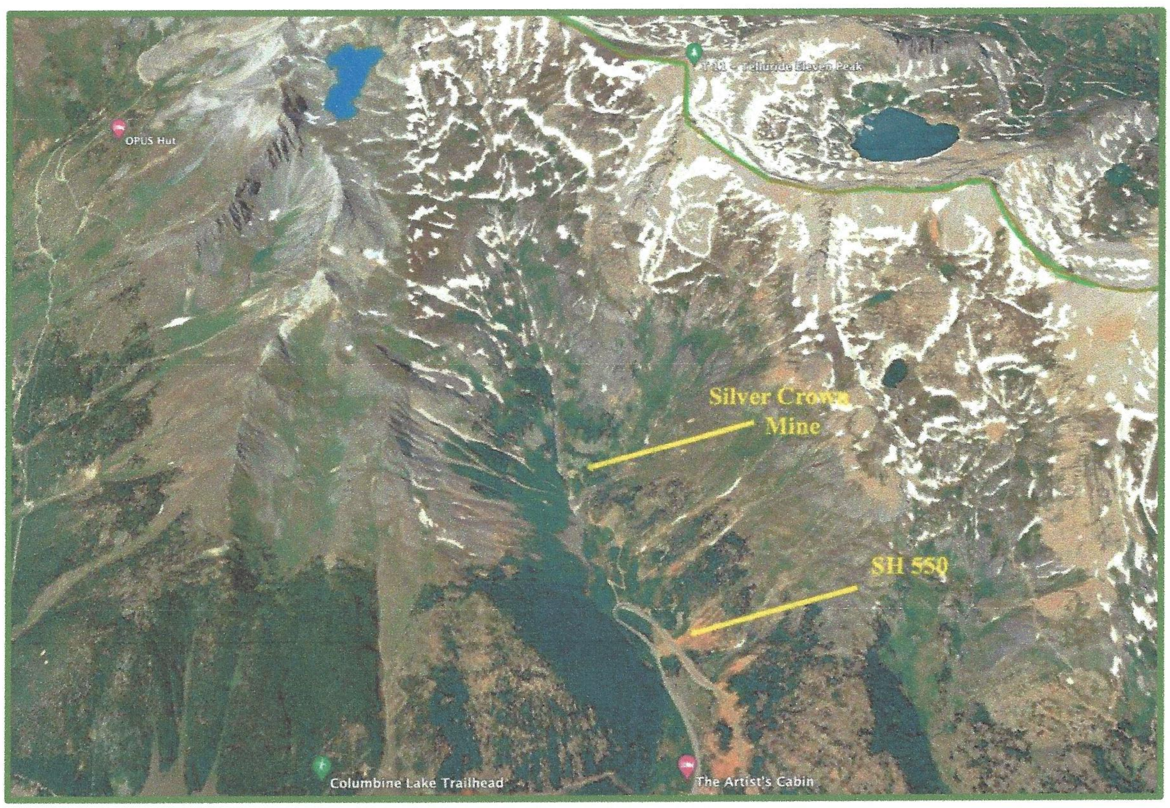


Figure 2. Location of the Silver Crown Mine. Situated at 10800 ft Elevation, SH 550, 10 Miles North of Silverton CO.

Geology:

The Silver Crown Mine is located on the south end of the Red Mountain Mining District of the San Juan Mts. The Red Mountain mining district is situated in the western margin of the Oligocene Southern Rocky Mountain volcanic field on the edge of the Silverton caldera which was superimposed on the older San Juan caldera creating a complex system of fractures in the Red Mountain district. Oligocene magmatism, including widespread eruption of andesitic lavas and breccias, began by ~32.5 Ma in the western San Juan Mountains. Major ash-flow eruptions were produced by the San Juan-Silverton caldera complex from 28.2 to 27.6 Ma during the extensive Oligocene magmatic "flare up".

The Silverton caldera is approximately 8 miles (~13 km) in diameter) within an area of positive uplift that subsided following tectonism and deposition of the Silverton volcanic series. The caldera margins are defined by numerous radial and concentric faults and fractures that provided avenues for emplacement of shallow plutons and hydrothermal fluids that would give rise to the Red Mountain breccia pipes.

Igneous and metamorphic rocks predominate at the mine site and underground. The mine site is covered with scree weathering from the quartz monzonite and breccia that underlies the scree and some soil overburden. The rocks observed both on the surface as well as the subsurface, in the mine, are generally hard with estimated strengths of 10,000 psi and greater. It will likely be the rock-mass (the physical character of the rock including the fractures and faults) that will dictate the design of the foundation footings of the surface facilities as well as the artificial support to be utilized in the underground portions of the lodge.

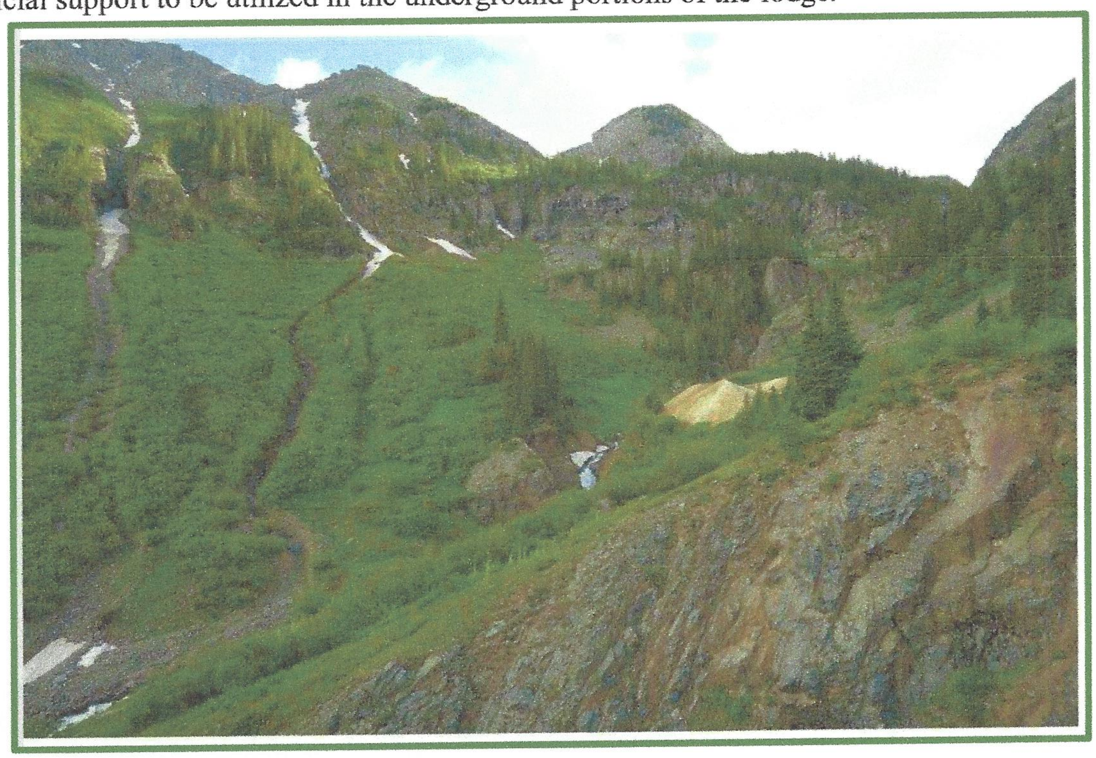
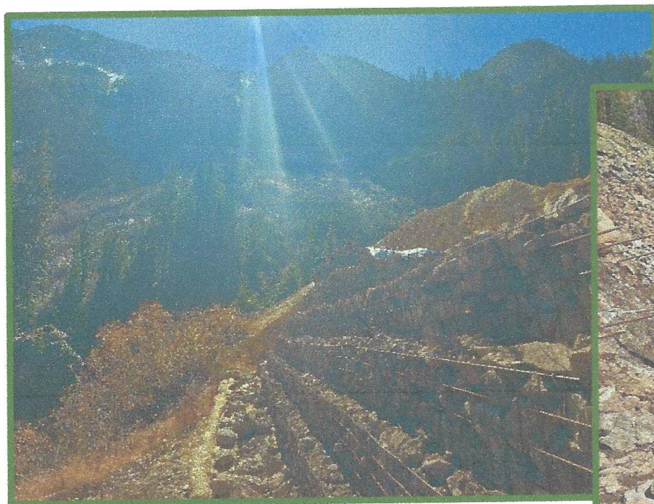
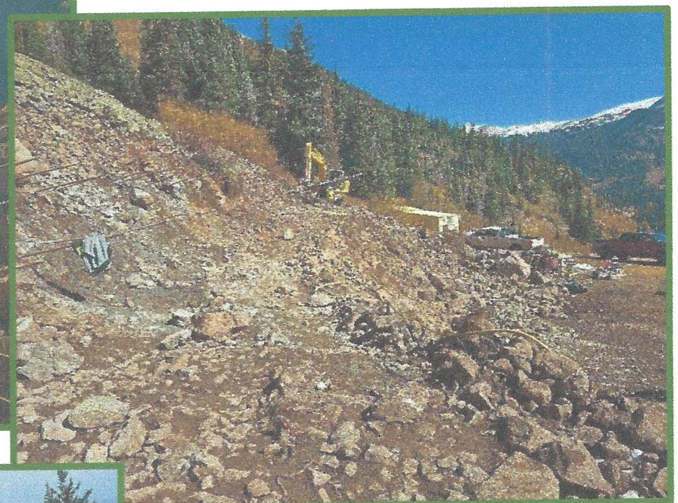
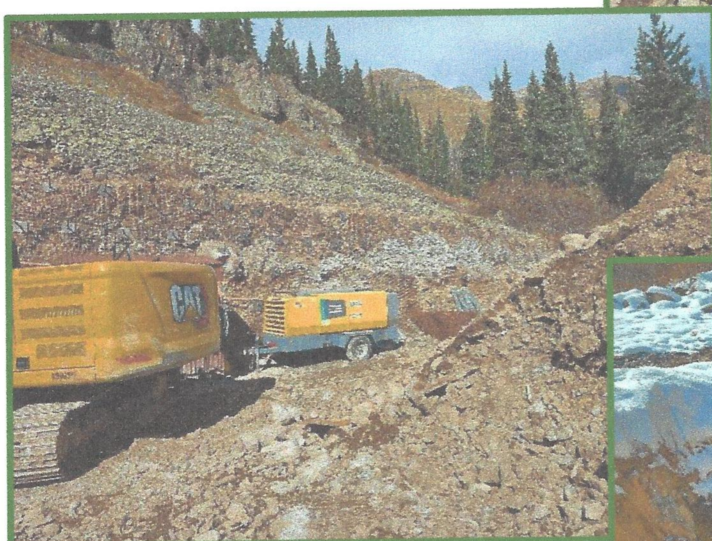
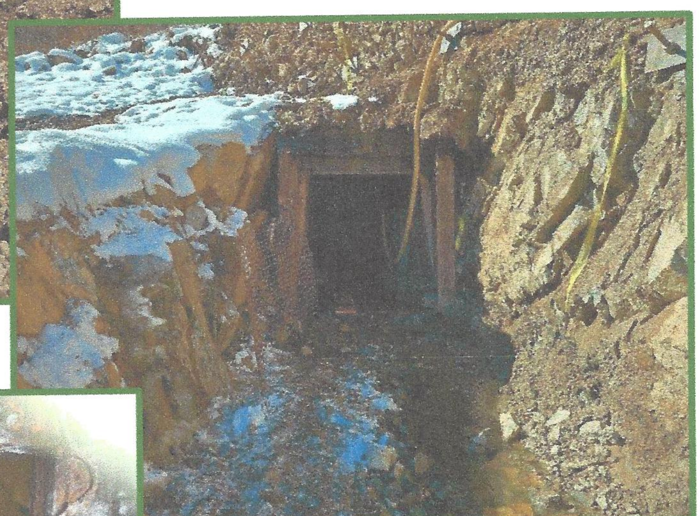


Figure 3. Photos of the Silver Crown Mine Waste Pile. Looking Southwest.









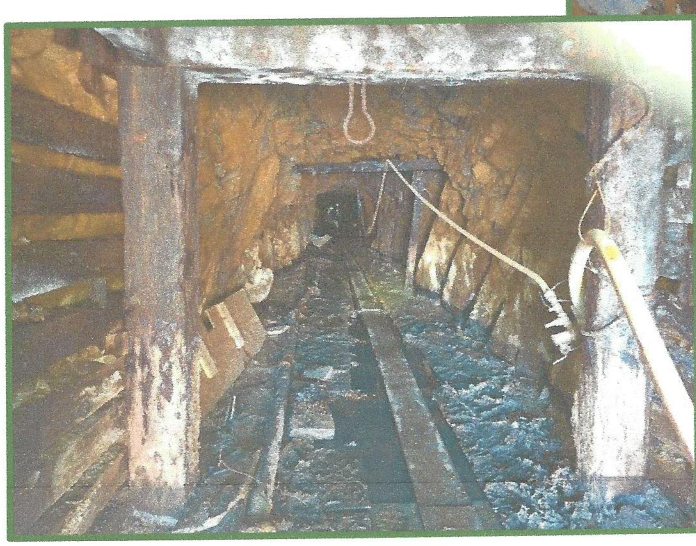


Figure 4. Photos of the Temporary Shoring, Mine Waste Containment MSE Wall, and Silver Crown Mine Portal and Underground During the Fall of 2023.

Surface Facility Foundation Preparation Recommendations:

The site is suitable for a 1) spread-footing-type foundation (footing and stem-wall) or a 2) slab-on- grade type foundation. Surface facilities foundations will be either placed on prepared rock mats or pinned to the bedrock will steel rods.

Figure 5 shows options for the areas where the building will be situated on fill or soil. The materials available on the site will provide strong rock and gravel for supporting the foundations.

Where bedrock is exposed, the concrete structures should be pinned to the rock with steel rebar and grout. Figure 6 shows a cross section example of this type of connection. Bearing capacities will be exceptionally large due to the mostly-rock and/or bedrock that exists at the site.

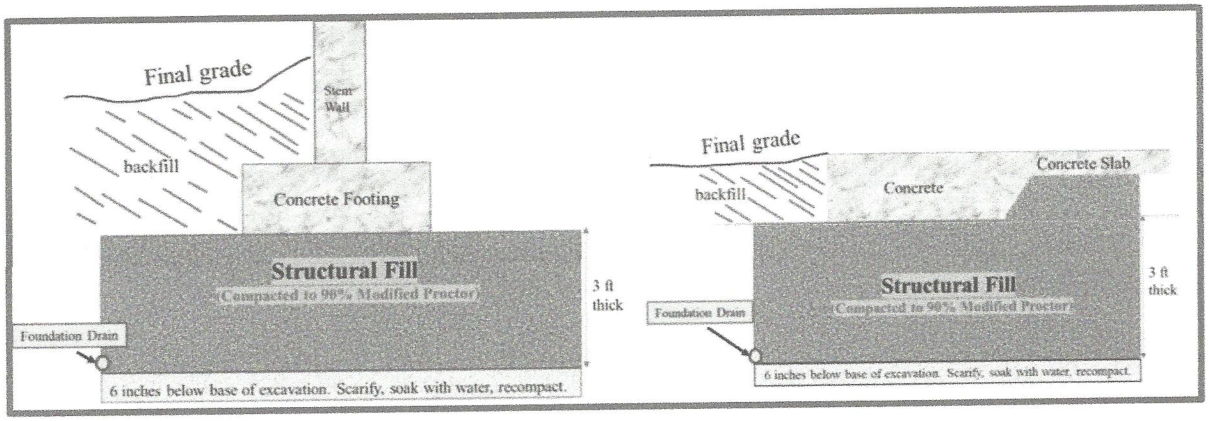


Figure 5. Schematic of the Foundation Designs for Surface Facilities. The Same Schematic Applies to Pads for Concrete Piers.

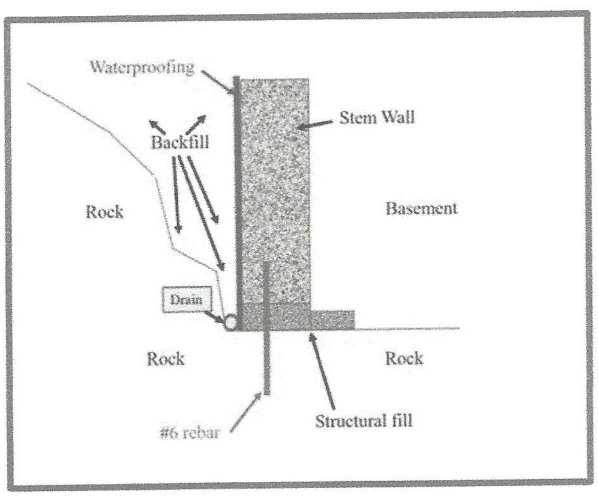


Figure 6. Schematic of the Surface Facilities Connection to Bedrock (where applicable).

Tunnel, Roof and Wall Support Design Recommendations

The primary support will be rock bolts and other support mechanisms as appropriate during the mining. Ultimately, the tunnel design will be derived from the rock strength and abundance of fractures and faults in the rock. Multiple designs will be developed from empirical design charts and methodologies utilized in the mining and tunneling industries.

Bolt type selection, length, spacing etc., will be determined based upon geologic mapping of the underground facilities, both existing and the newly cut once construction begins. There are many tools available to the rock mechanics engineer and the abundance of exposed rock underground together with data collected from new cuts will be utilized in the design of the support systems. In very poor ground fully supported tunnel designs will be developed and if needed steel arches and lagging will be installed to build a structurally sound lodge facility for the general public.

Other installed support may include steel matte, fencing, cables, and other support systems as deemed necessary.

Excavation Observation:

GELLC personnel should be contacted to observe the foundation soils after the excavation has been completed and prior to placing forms or concrete. The purpose of this is to observe the type and condition of the foundation soils throughout the excavation. If the soils are found to differ from those encountered in our exploration pit, or if they are unstable, additional recommendations may be required prior to construction of the foundations.

Surface Water and Groundwater:

Systems for handling the surface and groundwater at the site will be developed during construction. The underground portions of the lodge will be especially susceptible to seepage and robust groundwater controls will be designed to collect and reroute these waters to the discharge area on the surface.

Cement Type:

Type IT, Type I-II, or Type IT-V cement is recommended for all concrete in contact with the soils on this site. Calcium chloride should not be added to a Type II, Type I- IT, or Type II-V cement under any circumstances.

Remarks:

We recommend that the bottoms of all foundation components rest a minimum of 5 feet (?) below finished grade or as required by the high elevation and depth of frost at the site and County requirements. Foundation components must not be placed on frozen soils.

Senate Bill 13 (CRS 6-6.5-101) Discussion:

This residence is being constructed on foundation soils that do not possess a "potential for expansion." We recommend that the owner receives a copy of this summary report on our soil analysis and site recommendations.

Limitations:

This report is issued with the understanding that it is the responsibility of the owner or his representative to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and are incorporated into the plans. In addition, it is the owner's responsibility that the necessary steps are taken to see that the contractor and their subcontractors carry out these recommendations during construction. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. In addition, changes in acceptable or appropriate standards may occur or may result from legislation or the broadening of engineering knowledge. Accordingly, the findings of this report may be invalid, wholly, or partially, by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of 2 years.

The recommendations of this report pertain only to the site investigated and assume that the soil conditions do not deviate from those described in this report. If any variations or undesirable conditions are encountered during construction or the proposed construction will differ from that planned on the day of this report, GELLC should be notified so that supplemental recommendations can be provided, if appropriate.

GELLC makes no warranty, either expressed or implied, as to the findings, recommendations, specifications or professional advice, except that they were prepared in accordance with generally accepted professional engineering practices in the field of geotechnical engineering.

Please contact me if you have any concerns or questions.

Respectfully,

Rex Goodrich PE PG
Goodrich Engineering LLC
970-250-3358
www.goodrichengineering.net

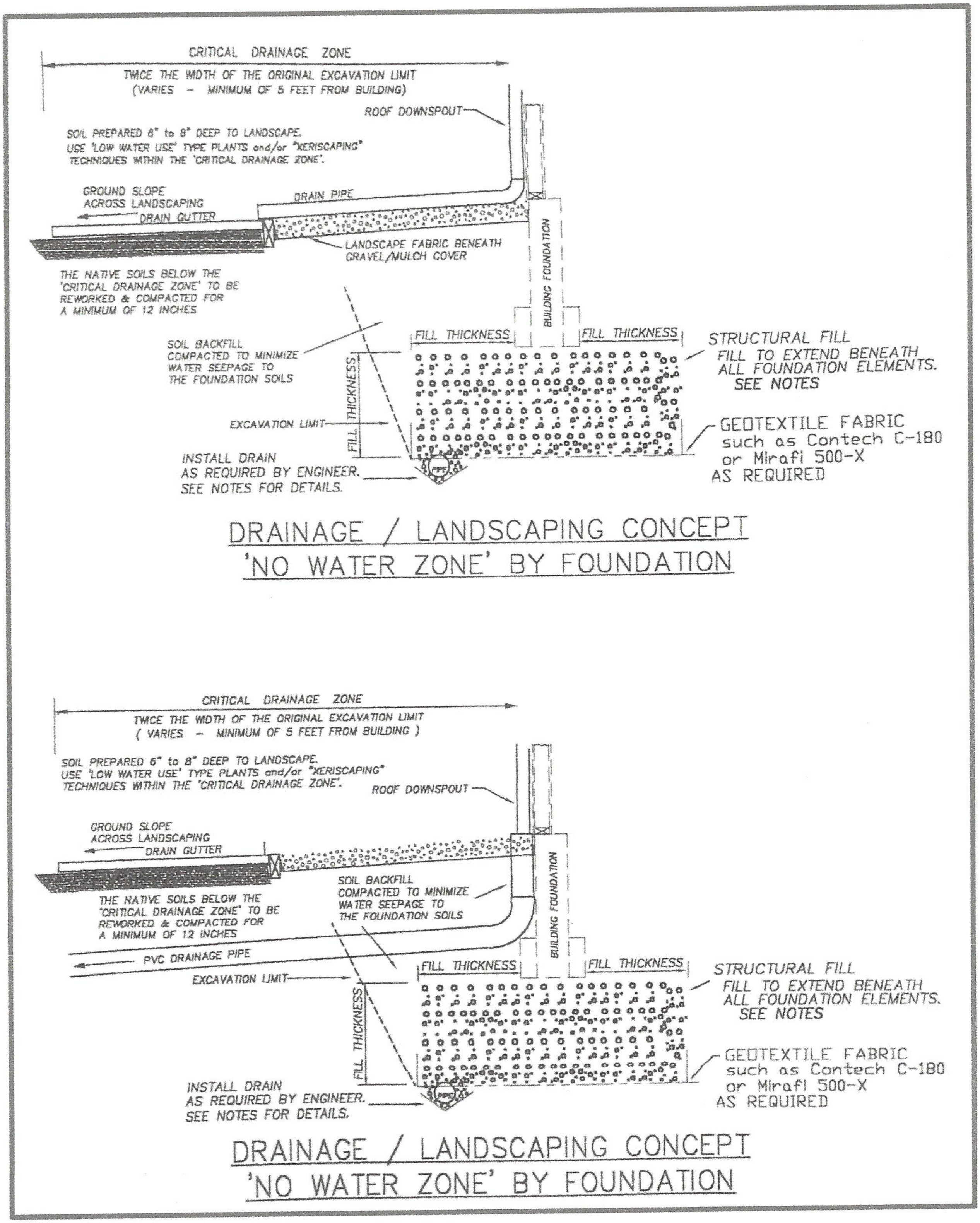


Figure 7. Example Downspout Drains to Carry Water Away from the Foundation.

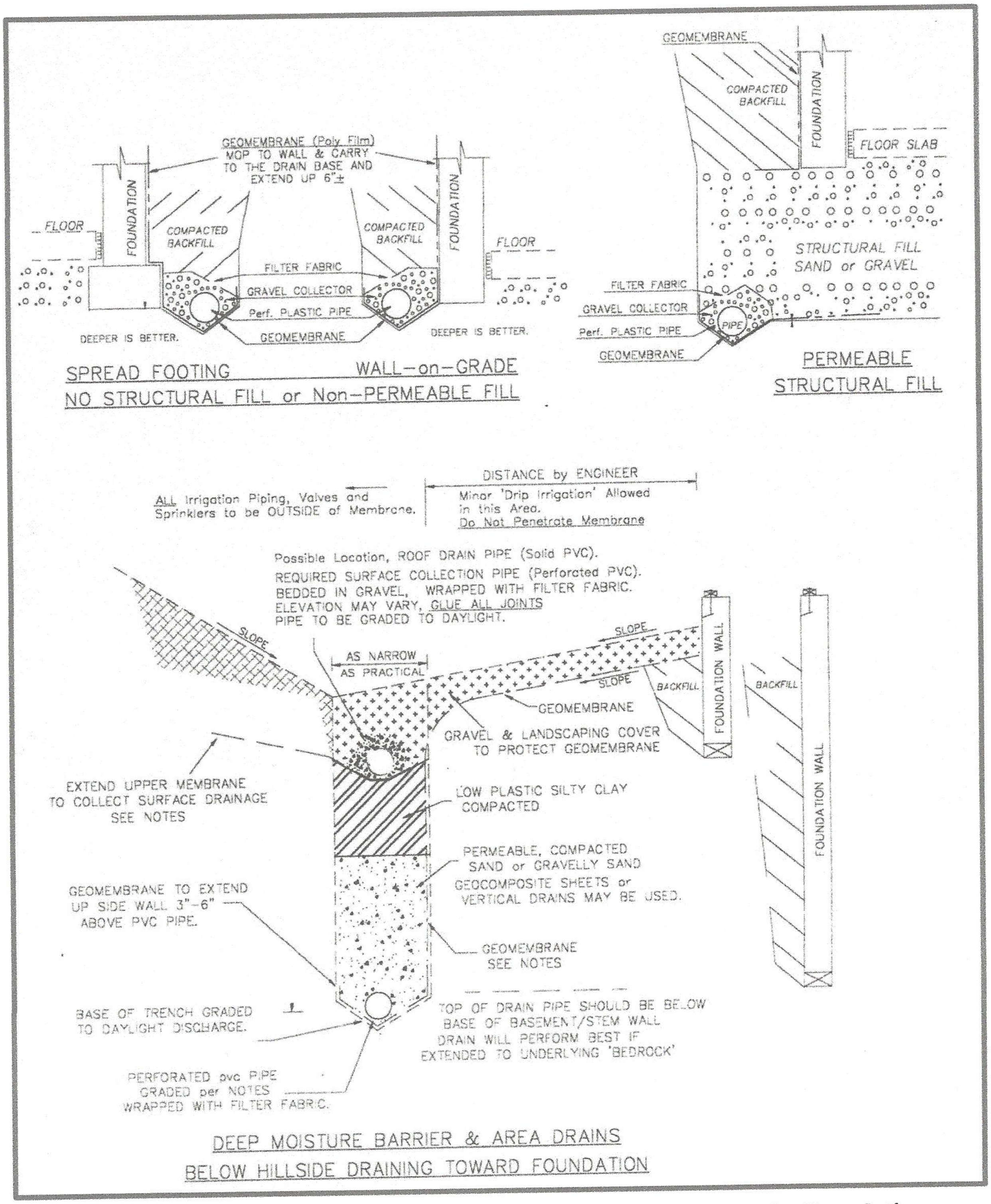


Figure 8. Example Foundation Drains to Carry Water Away from the Foundation.

Figure 9. General Notes for Drains and Compaction.

1. The drain trench to be located at the base and exterior limit of any structural fill or below the base of the exterior foundation's elements. Excavate any trenching as narrow as practical. Observe sloping or bracing, as required by the appropriate OSHA requirements.
2. The sides and bottom of the trench is to be smooth and must be graded to drain to "Daylight" discharge or Sump.
3. The minimum trench and pipe gradient is to be 1%. If daylight discharge is not possible a sump and pump must be used.
4. A geomembrane barrier is to be placed on the foundation side extended away from the foundation and toward the drain. The geomembrane barrier is to be placed beneath the drain as a water channel and extend up 3 inches to 6 inches above the drainpipe.
5. All cut and graded earth surfaces in contact with the geomembrane to be smooth, free of pockets, no loose rocks and have no sharp projections or a protective geotextile or sand cushion layer must be installed between the soil and the geomembrane.
6. In non-traffic areas, the geomembrane is to be a polyethylene or equal and to have the following characteristics: Minimum thickness ASTM D-5199 0.5mm (6-mils). In traffic areas, the geomembrane is to be a 10-mil polyethylene or equal.
7. All joints in the geomembrane shall be overlapped and glued with products and in such a manner that conforms to the manufacturer's recommendation. If glued joints are not used the membrane edges shall be overlapped a minimum of 32 inches (09.6 m). The overlaps shall be shingled so the exposed edges face in the same directions as the flow of water drainage.
8. A geosynthetic/composite clay liner may be substituted for the geomembrane. Confirm with the design engineer.
9. A perforated plastic pipe (PVC) is to be enclosed within the geomembrane at the base of the trench. Flexible piping may be used if the backfill is less than 5 ft deep or specifically approved by the design engineer. For critical applications, the use of flexible piping is not recommended.
10. The perforated plastic pipe is to be a minimum 3-inch diameter. But must be sized for the anticipated conditions if the length of perforated pipe run along gradient exceeds 200 ft. An additional perforated pipe is to be added in the trench or the pipe size increased to either 4 inch or 6-inch diameter. Confirm with the engineer.
11. The plastic pipe must be graded to drain to the daylight discharge or a sump discharge at a minimum 1% grade.
12. The perforated plastic pipe is to be protected from clogging. Such protection can be achieved by wrapping the pipe with a non-woven geotextile filter fabric (i.e., Amoco 4547, Contech C-50W, Mirafi 140N).
13. A permeable sand or gravel water drainage/collection medium is to be placed around and above the perforated pipe. This drainage collection medium to be compacted to at least 80% of maximum dry density, ASTM D-1557. Place geotextile fabric at the top surface of the permeable sand or gravel medium to prevent clogging.
14. The permeable water drainage/collection medium must be protected from clogging. Protection may be wrapping the medium with a non-woven geotextile fabric such as Amoco 4547, Contech C-50W, Mirafi 140N (Burrito drain).
15. All backfill cover over the sand or gravelly sand drain must be carefully placed and compacted . The backfill cover is to be placed in lifts and compacted to at least 85% of maximum dry density ASTM D-1557. Additional compaction (min. 90%) is recommended for backfill over 18 inches above the drainpipe.
16. With the approval of the design engineer, either geocomposite drains, board drains, and edge drains may be substituted for portions of the drain shown in this drawing.
17. Required observations by the design engineer:
    a. Completion of trench and surface excavation/preparation, prior to membrane installation. (compaction testing)
    b. Perforated drainpipe or other products in place to include protection from clogging.
    c. Top of water drainage/collection medium. (may require soil compaction testing)
    d. Top and intermediate backfill (soil compaction testing)
    e. Final soil cover, surface graded and prior to final landscaping.