

Nomination Category:
Remediation of Physical and Safety Hazards
Project:
Red Hill Mine Safeguarding Project
Sierra County, New Mexico

Submitted by:	
Matthew Peralta	Mike Tompson
AML Project Manager	AML Program Manager
505-819-1955	505-690-8063
<u>matthew.peralta@emnrd.nm.gov</u>	<u>mike.tompson@emnrd.nm.gov</u>

New Mexico Mining and Minerals Division
Abandoned Mine Land Program (AMLPL)
1220 S St Francis Dr
Santa Fe, NM 87505

Partners, Consultants, and Contractors
Bat Conservation International (BCI)
Brick LLC
Bureau of Land Management (BLM)
Chronicle Heritage (formerly PaleoWest)
New Mexico State Land Office (NMSLO)
Office of Surface Mining Reclamation and Enforcement (OSMRE)
Runyan Construction, LLC

Project Duration
9/24/24 – 01/06/25

Construction Cost:	
BLM Funding	\$538,625.22
OSMRE Fee Based Funding	\$212,979.21
Total Cost of Construction	\$751,604.43

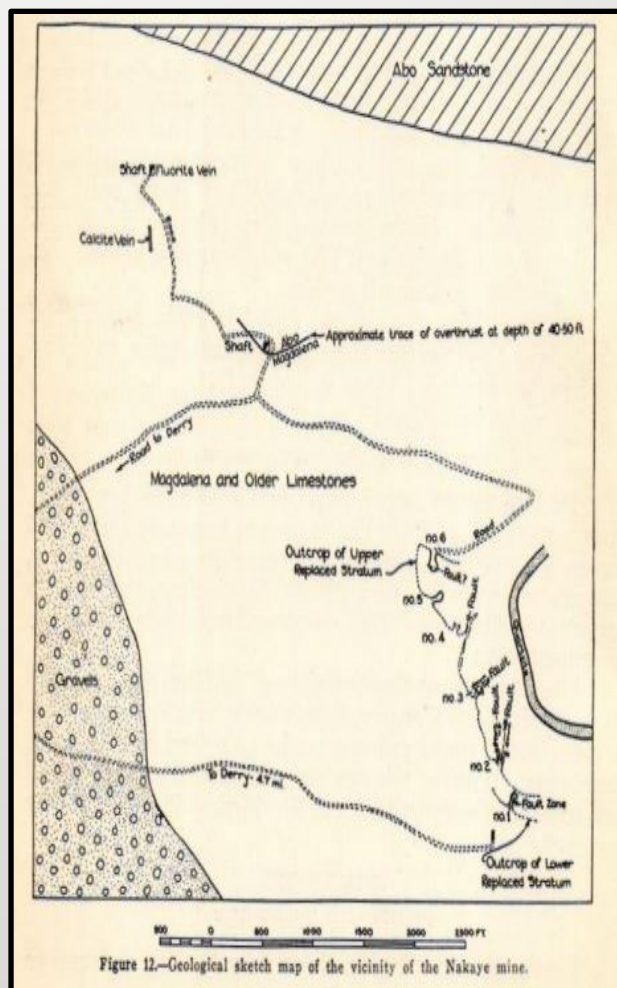
Project Summary

The Red Hill safeguarding project in Sierra County, New Mexico consisted of safeguarding 29 abandoned hard-rock mine features in a heavily-used outdoor recreational trail area and was completed by the New Mexico Abandoned Mine Land Program (NM AMLP) in January of 2025. The Area of Potential Effects (APE) consisted of 862 acres with a mix of Bureau of Land Management (BLM) and state of New Mexico land. Construction took place from October 2024 to January 2025 in extremely rugged terrain. During project development and construction, extreme weather conditions with seasonal temperature swings up to 78 degrees Fahrenheit (F) were experienced. Observed temperatures ranged from 28F (November 9, 2024) to 106F (July 9-11, 2023). A variety of safeguarding techniques were utilized including vertical application of polyurethane foam plugs, horizontal and vertical bat gates/grates, a bat cupola, a boulder barrier, and large culvert closures to maintain wildlife habitat access into the workings. The project area serves as an extremely popular offroad destination with thousands of visitors from all over the United States visiting each year, especially during the Chile Challenge 4x4 off-highway vehicle (OHV) event every fall which has been continuously held for the last 34 years.

Mining History

Mining in the project area dates to the late nineteenth and early 20th centuries with Sierra County known as the third largest producer of mineral wealth in New Mexico. The area largely was mined for fluorite and manganese, which was used as a fluxing agent in metal production during war time. In 1918, the Nakaye mining company established the first seven claims in the project area, with the first notable production of 300 tons of ore occurring in 1941 from the Alamo No.1 mine. By 1949, Blanchard Hanson and B.A. Luchini located an additional five claims in the project area. Altogether, from 1920-23 and intermittently from 1941-1952, a total of 5,471 tons of fluorine-fluorite were produced. Limited room and pillar mining occurred in the district with most of the mines being located immediately adjacent to the Nakaye Fault. In 1974, a fluorspar beneficiation mill was identified in the project area, suggesting on site processing.

Several freshwater springs that flowed year-round existed during the mining operations and served as a critical water source in the dry desert climate. However long periods of drought occurred resulting in the springs drying up and ultimately lead to the demise of mining efforts in the project area in the early 1970's. Since the mining operations ceased, several current claims exist within the project area with gem quality fluorite being the main commodity sought after.



Project Development and NEPA Process

In preparation for safeguarding, project development was initiated by the Bureau of Land Management (BLM) in 2013 by conducting inventory surveys of abandoned mine features in the Rincon/Red Hill mining district located in the project area. Over 85 abandoned mine features with a variety of hazard priorities were identified that included an assortment of shafts, portals/adits, trenches, and high walls. By 2014, BLM began the environmental compliance process which included bat habitat assessment surveys by Bat Conservation International (BCI). This effort was initiated to steer the safeguarding design and to assess the bat habitat due to the complexity and connectivity of the mine workings. Due to funding limitations and other project priorities, the Red Hill project did not progress until 2022 leaving the abandoned mine features unabated and accessible to the public. Project development began in earnest in 2022 with the development of an Environmental Assessment (EA) for the project area, and a comprehensive full coverage cultural resource pedestrian survey and inventory of the APE. An additional bat habitat assessment was completed by BCI in 2023 to reexamine the suitability of the abandoned mine features and bat use over almost a decade. Additionally, an extensive Tribal consultation occurred with nine tribes as well as consultations with the State Historic Preservation Office (SHPO) in compliance with Section 106 of the National Historic Preservation Act (NHPA).



Site Conditions

The project area is located within the Sierra de Los Caballo mountains, and the Chihuahuan desert footprint range at approximately 750 feet above the Rio Grande valley floor at an elevation of 4930 feet above sea level. The project area is located halfway up a west facing fault scarp which is characteristic of the mountain range. Access to the project area was difficult and required four-wheel drive vehicles, UTV's, and construction equipment. The hillside where the project area is located is heavily eroded with multiple flat terraces extending into a large deeply eroded drainage to the south.

Vegetation in the area is extremely sparse with approximately 76-99% ground visibility. The existing vegetation is mostly composed of creosote, mesquite, nopal, barrel cactus, sotol, agave, and some western rangeland grasses.



Safeguarding Methods

Construction occurred from October 2024 to December 2024 with a final demobilization occurring in January 2025. Based on the bat habitat and occupancy surveys that were conducted during the environmental compliance process, it was determined the project area provides critical habitat for bat hibernaculum (winter hibernation) and bat maternity colonies. A variety of safeguarding techniques were utilized during this project to safeguard the public from the physical hazards associated with mines and to maintain the connectivity of the workings to the surface so bats can continue to utilize



the habitat. The safeguarding design included vertical ingress gates, horizontal bat grates, underground culverts, vertical and horizontal Polyurethane foam plugs, rock bulkhead culverts with bat gates, and a bat cupola. Safeguarding designs were developed in-house by NM AMLP engineers.

Innovative use of current Technology

A unique vertical application of polyurethane foam (PUF) without the use of a spray applicator, using a series of 2x4 supports and a tarp was utilized on the “headache” adit. The feature was extremely problematic due to the historic load out structure that needed to be preserved, and the extremely friable and fractured rock making traditional safeguard methods impractical. Initial PUF application on this feature occurred on a tarp in a cross hatch/zigzag pattern horizontally on the ground and was allowed to set up. Once cured, the tarp was then propped up with 2x4 timber to support it vertically and serve

as a backstop for horizontal PUF application to the mine opening. The PUF plug was then able to support the fractured rock near the rear of the adit opening. This safeguarding technique turned out to be very successful at this feature and may be utilized in future applications.

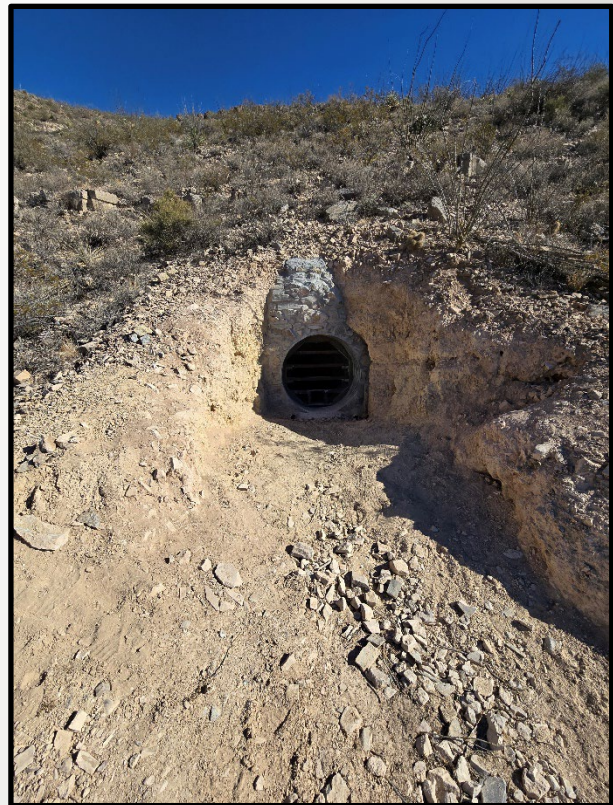


Many of the safeguarding techniques of the physical hazards utilized locally sourced rock and mortar bulkheads with culverts that have bat accessible gates that blended into the landscape seamlessly. Additionally, during field fabrication several of the large steel structures were recessed into the features to further assimilate into the landscape and provide some structural stability for each feature.

Difficulty of Achieving

Reclamation under Existing Conditions

Several unique challenges were encountered during project development, reconnaissance, design, and during construction. Overall, the community supported the project with little to no opposition during the public involvement process. However, leading up to the public meeting, one claimant threatened legal action stating that the AMLP and BLM did not have the jurisdiction to close or safeguard the mine citing it would cause a negative economic impact and threatened legal action. The BLM, who is the land manager of the project area, subsequently requested the claimant provide bonding for the cost of reclamation within an allotted timeline. After much discussion with BLM's legal team and the NM AMLP legal team, and no response from the claimant after the BLM's demand, the project progressed to engineer design without further opposition.



Special and unique considerations

During engineer design, cultural and biological considerations drove the safeguarding methods utilized on the project. The main Nakaye mine complex has a historical loadout structure that is an iconic feature of the landscape and was the main structure that was of concern. Further, the mining complex served as excellent bat habitat, and special considerations were taken to preserve wildlife access to the mine features while safeguarding the public from the hazards associated with openings. Several other features that had excellent bat habitat but poor rock quality required rock and mortar bulkheads with culverts to stabilize the openings for future bat use.

On-site difficulty of the project

Access proved to be difficult due to site location and accessibility. Extreme seasonal temperature swings up to 78 degrees Fahrenheit(F) were experienced during the project development and construction. Observed temperatures ranged from 28F (November 9, 2024) to 106F (July 9-11, 2023). As a result of the location, seasonality, and access, site conditions posed many challenges during reconnaissance and construction in the extreme conditions. Mine feature reconnaissance in these conditions proved to be extremely difficult and dangerous. Special considerations for heat exhaustion and exposure were ever present during project development and construction.

On-Site Effectiveness

During construction several features required field-fit and design changes to make each safeguarding structure stable and to increase the longevity and connectivity of the closures. The NM AMLP responded to these challenges by modifying designs quickly to address the unexpected conditions encountered in the field. Overall, construction was successful only because of the active communication between the NM AMLP project manager, the NM AMLP engineering design team, and the contractor.

Effective/innovative use of technology

Special considerations when safeguarding the AML 15_24a adit were required to protect and preserve



the integrity of the historic structure and the waste rock present located immediately adjacent to the opening. On site construction observation by the NM AMLP Archeologist was required to ensure the structure and appearance or viewscape of the historic waste rock pile remained intact during safeguarding. With amount of Fill material required to cover the vertical PUF plug, a large excavator was required to place fill from above the feature with on the ground support personal precisely guiding the equipment to not destroy the historic structure. Landscape fabric was placed on the original waste pile to preserve its integrity, look, and feel of the legacy mining that occurred in the past. The innovative use of the vertical application of PUF used to safeguard the feature, and precise placement of the fill with on-ground support allowed the NM AMLP to effectively safeguard the feature while preserving the historical the structure simultaneously.

Landscape conforms to natural environment/elimination of health

safety problem

Considering the access to the site and unique cultural considerations, the contractor was able to safeguard the all the features without damage to the historic structures resulting in the closures blending into the landscape seamlessly. Considering the heavy visitation of the project area, the safeguarding completed in the project area has significantly reduced the hazards in the area associated with abandoned mines. Further, the safeguard designs created by the NM AMP staff engineers utilized on this project were designed with longevity in mind ensuring the safety of the public for many years.

Funding

Leveraging and effective use of funds

Several factors including funding and project priority resulted in the project not progressing for an extended period of time. Fortunately, as part of the end of a 5-year grant from the BLM, funding was allocated for the project in August 2024, with the grant period ending in December of 2024. The NM AMLP was able act quickly on this funding availability and expedite the development and design to utilize the funding prior to the grant expiration. Twenty-one features were selected to safeguard with the BLM funding which was based on extreme hazard priorities and further refined by bat habitat and occupancy.

Additionally, the NM AMLP utilized funding from our OSMRE fee-based grant to complete the Phase I portion of the project by safeguarding the remaining 8 features (29 in total) in the project area. The ability to leverage the available funding with the time constraints was instrumental to the project being completed and required a program-wide effort allowing the project to be completed on time and under budget.

Benefits to the Community

Community support and Long-term benefits

The location of the project area is an extremely popular off-roading area with heavy visitation throughout the year. Continuously for over 34 years the project area has served as part of the Chile Challenge 4x4 event with thousands of visitors from all over the country descending on the area each year. Numerous trails intersect the project area with some immediately adjacent to large shafts and adits that were unabated. Now that the project area has been safeguarded, the hazards associated with abandoned mines in the area have been significantly reduced and can continue to serve as an area of recreation for the public for many years to come.

Further, the project sparked the interest of the Santa Fe New Mexican, a local newspaper who published an article highlighting the need for more funding to safeguard abandoned hard rock mines across the United States and the process and challenges programs across the U. S. face while developing and executing similar projects.



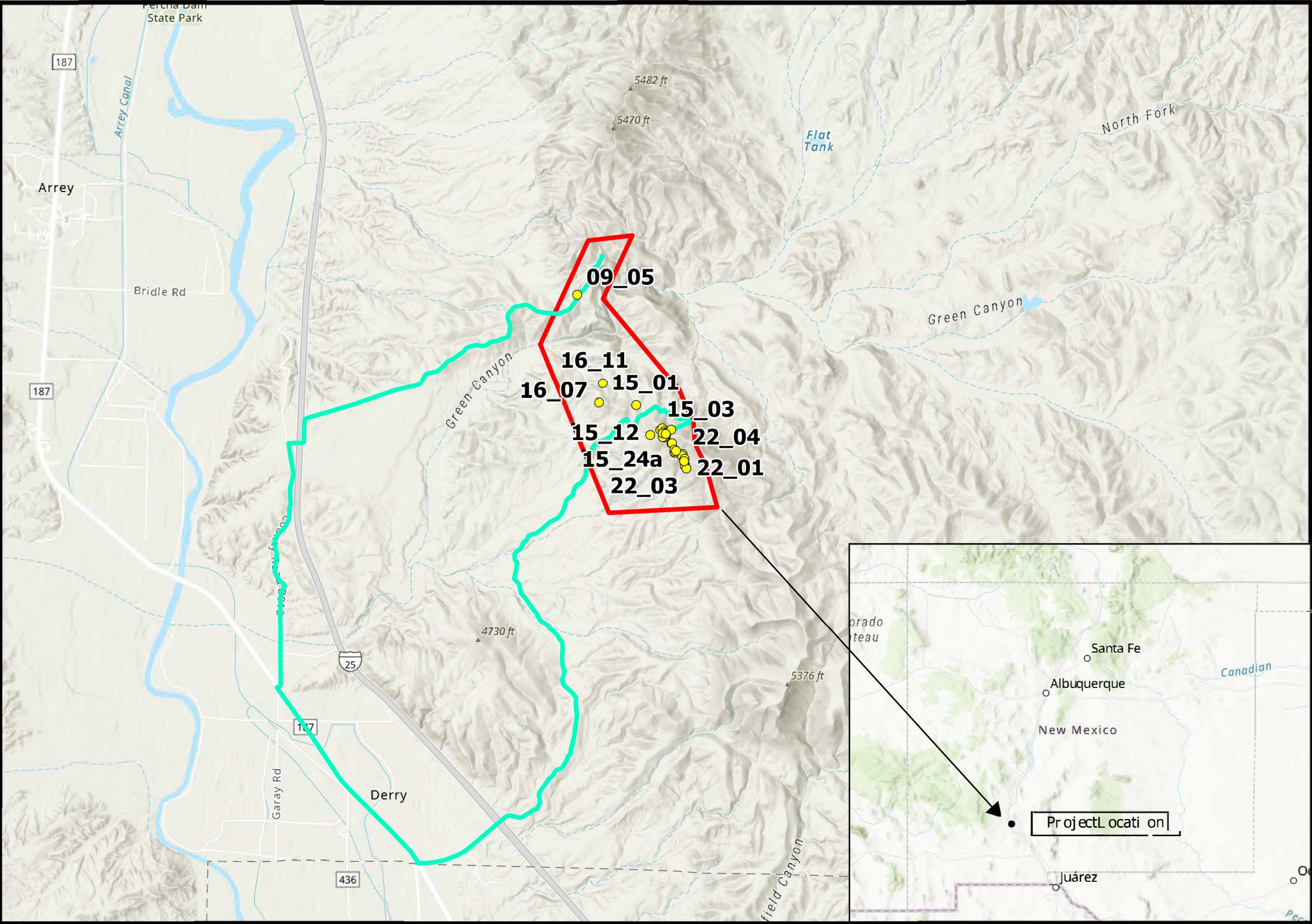
Summary

As a result of the AMLP efforts, the project demonstrated that a significant reduction in the hazards associated with the legacy mining can occur concurrently while preserving bat habitat and maintaining the historically significant aspects of the project area. The Red Hill Safeguarding Project required a multiagency collaboration including the NM AMLP, BLM, SLO, cultural and biological consultants, and the contractor to successfully safeguard the physical hazards associated with abandoned mines in the project area. Further, the Red Hill Safeguarding Project demonstrates how intra and interagency collaboration and the ability to utilize a variety of funding streams can make a successful safeguarding project a reality. Consequently, the safeguarding efforts put forth during this project will benefit future generations and wildlife for years to come.

Special thanks to all the partners and staff members who made this project a possibility.



Project Area Map



Map Legend

Area of Potential Effects (APE)

Access Routes

Red Hill Safeguarding Locations

Red Hill Mine Safeguarding Project Phase I

Map Credit: MF Peralta

Spatial Reference
Name: NAD 1983 UTM Zone 13N



Scale: 1:49,129



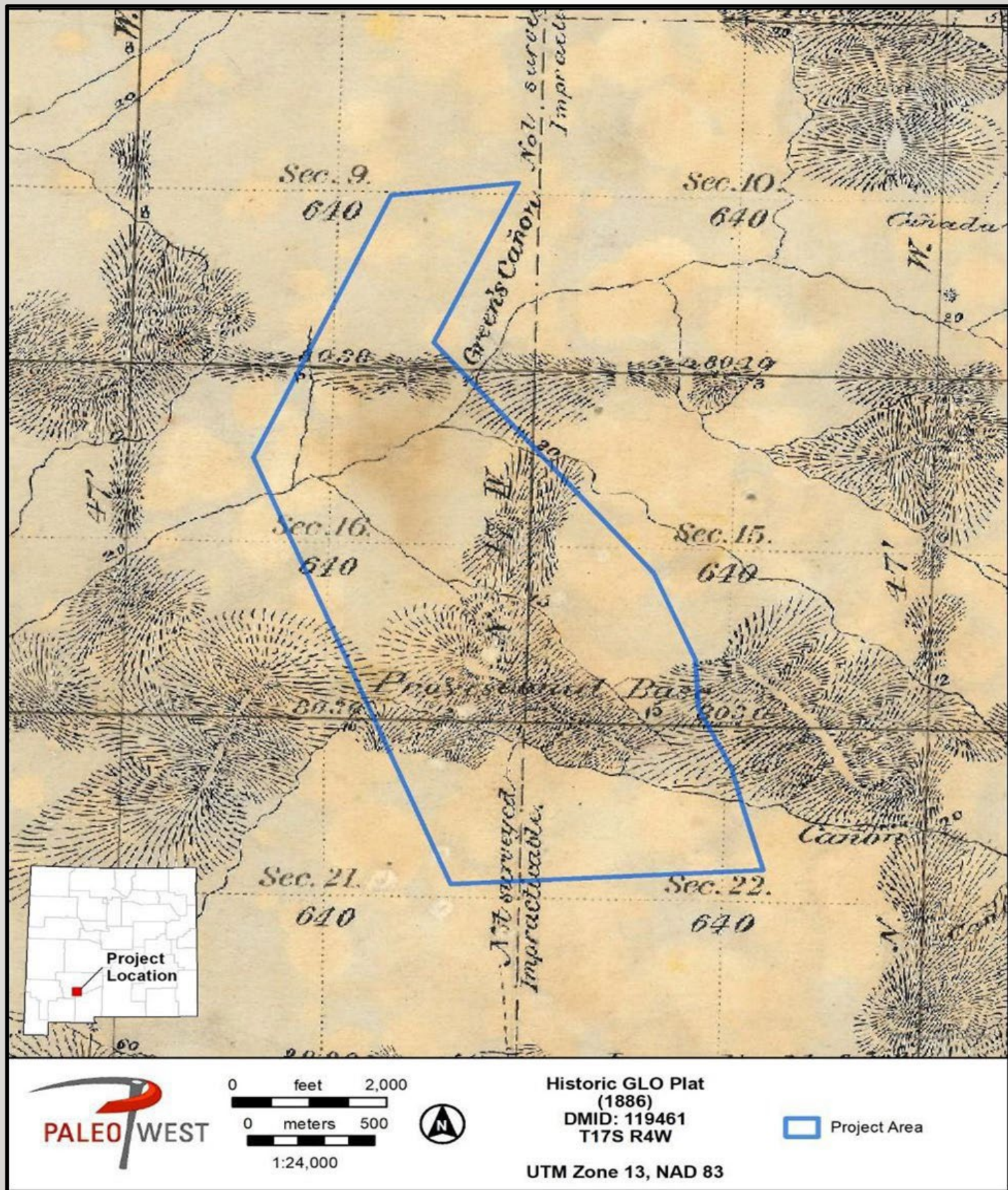


Figure 1: Historic General Land Office map from 1886 of the project area.

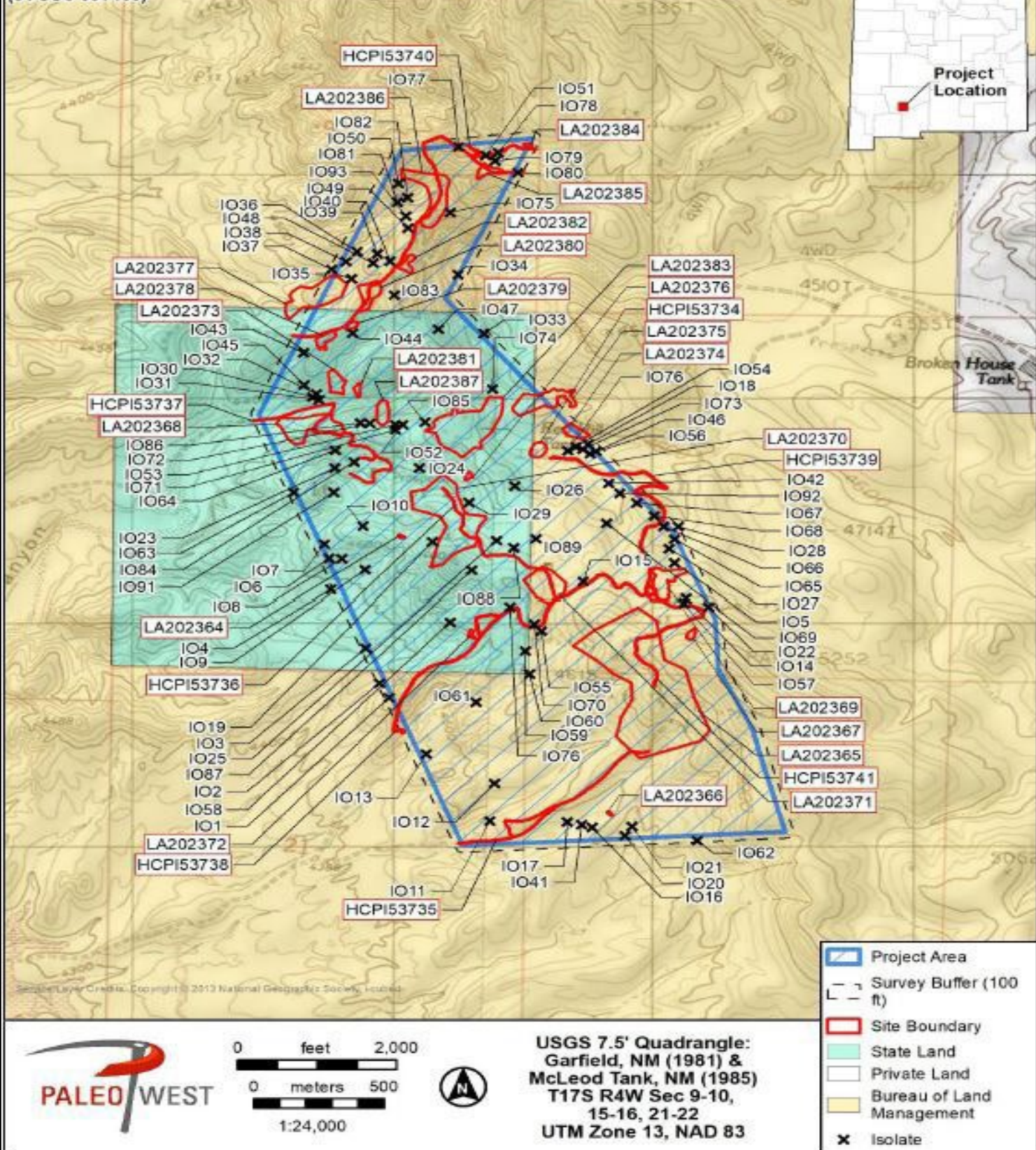


Figure 4. Survey results map.

Figure 2: Project area map depicting the abundance of archaeological and historical features.



Figure 7: Map of the “Chile Challenge” off-road event routes. Note “The shaft” trail and the legacy mining disturbances located on or near the established recreation routes within the project area.



Figure 3: Typical site conditions of the project area.

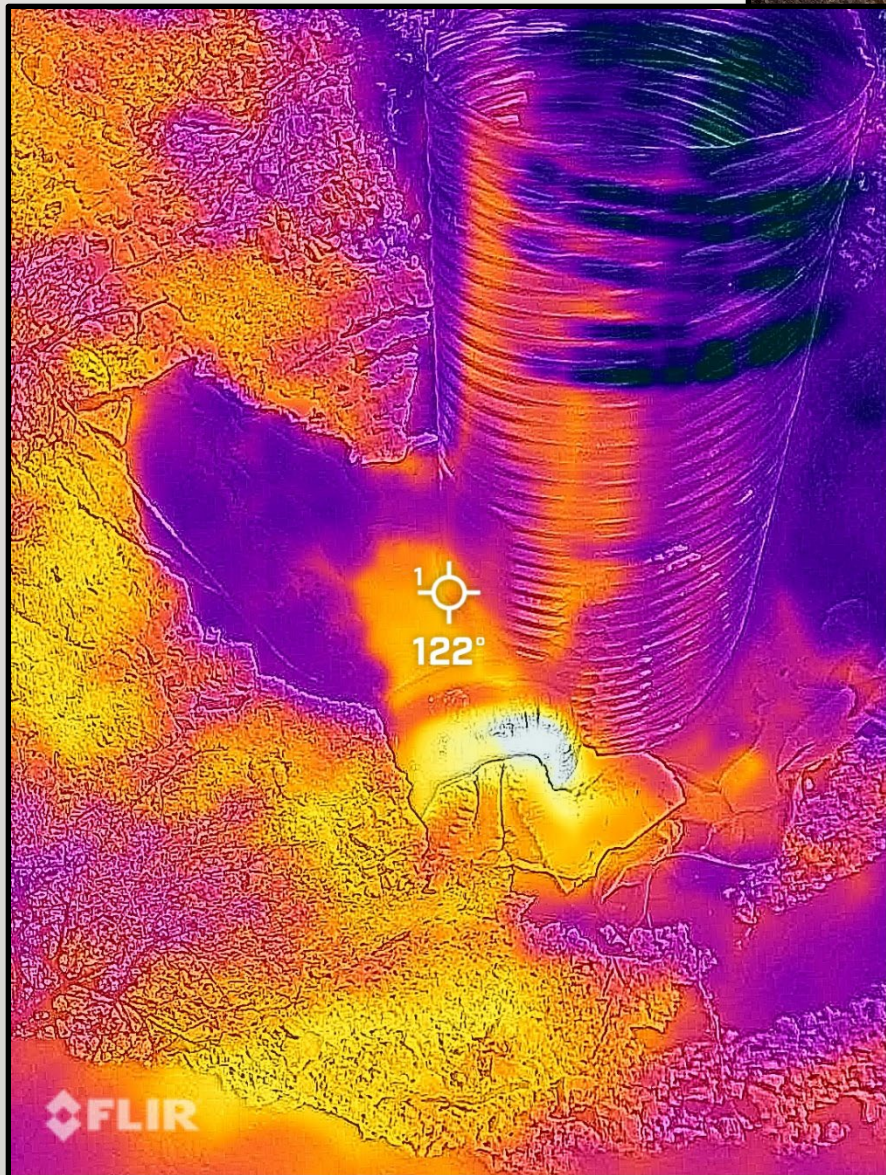


Figure 4: Another day on the “hill”, another safeguarded feature.



Figure 5: The untold story of a project located in a remote area. Stuff breaks and you fix it.

Innovative use of a FLIR thermal camera to monitor the temperature of PUF during the curing process for proper application. PUF "lifts" must remain shorter than 18-24" of thickness to ensure the exothermic reaction that occurs during curing does not compromise the integrity of the material.



Daily Observations

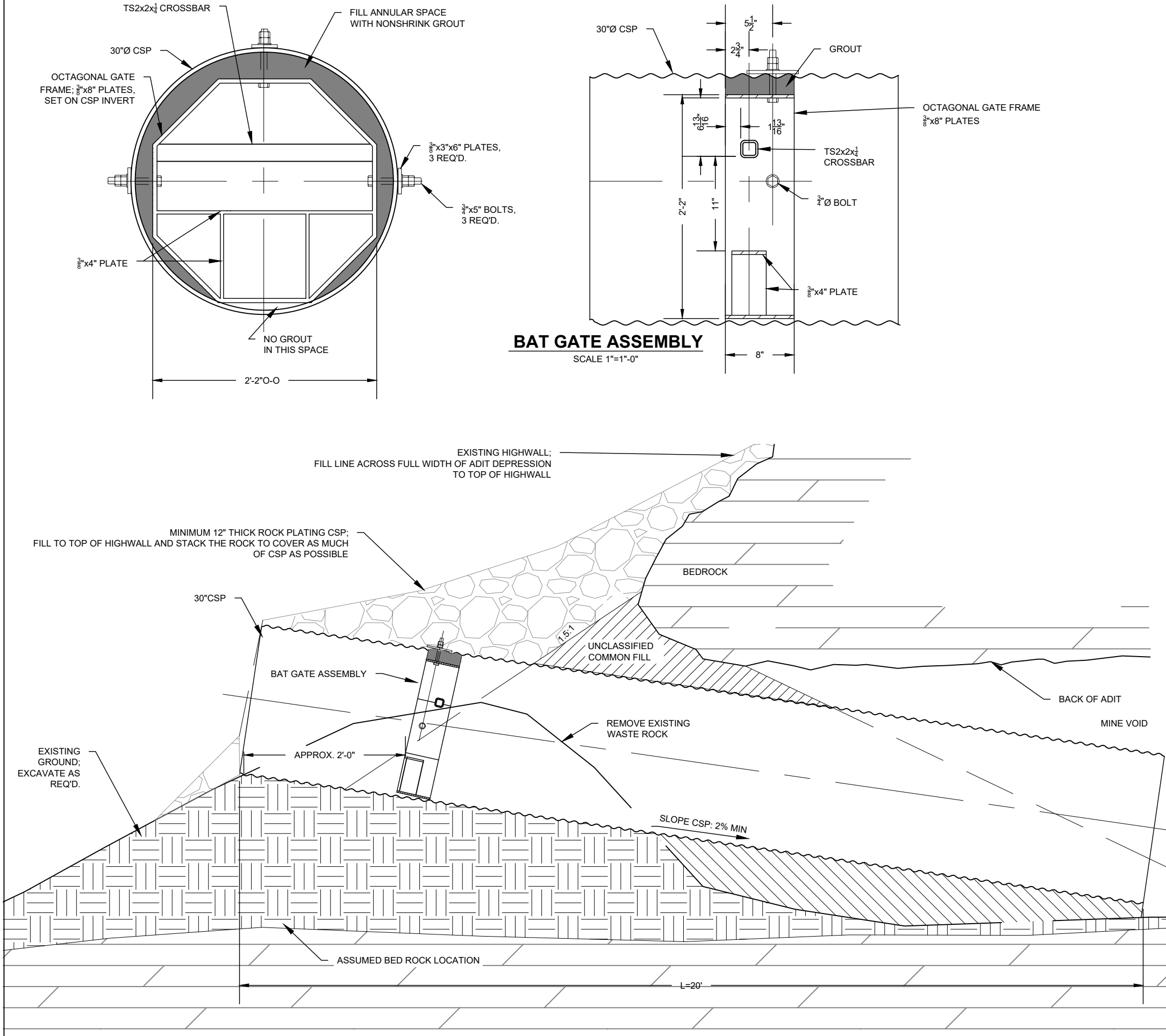
Time	Temperature (°F)			Dew Point (°F)			Humidity (%)			Wind Speed (mph)			Pressure (in)			Precipitation
Jul	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Total
9	106	90.5	74	51	47.1	38	39	24.0	10	18	6.6	0	25.5	25.5	25.4	0.00
10	106	92.1	79	56	48.1	39	39	23.7	12	25	5.9	0	25.6	25.5	25.5	0.00
11	106	91.0	75	63	52.3	46	55	29.2	14	21	6.3	0	25.6	25.6	25.5	0.00
12	103	88.9	75	65	57.0	49	68	37.5	17	28	13.4	0	25.6	25.6	25.5	0.00
13	104	88.7	74	60	52.6	46	47	31.1	16	28	7.1	0	25.6	25.5	25.4	0.00
14	106	90.3	79	61	53.9	46	51	31.3	14	22	6.6	0	25.5	25.5	25.4	0.00
15	102	88.6	77	58	52.2	47	49	30.0	15	24	8.6	0	25.6	25.5	25.5	0.01

Daily Observations

Time	Temperature (°F)			Dew Point (°F)			Humidity (%)			Wind Speed (mph)			Pressure (in)			Precipitation
Nov	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Total
3	65	54.4	44	46	34.9	20	81	50.8	27	26	11.4	0	25.4	25.3	25.2	0.00
4	57	47.6	37	39	32.3	24	86	58.0	34	32	16.1	0	25.5	25.4	25.3	0.01
5	62	46.9	30	31	22.2	16	74	42.5	18	14	5.4	0	25.5	25.5	25.4	0.00
6	67	50.6	33	37	28.2	17	71	43.9	30	20	7.1	0	25.5	25.4	25.4	0.00
7	53	44.7	39	44	38.0	30	100	78.8	51	15	5.8	0	25.6	25.5	25.4	0.00
8	53	42.7	33	36	28.1	19	96	60.0	27	10	3.0	0	25.6	25.6	25.6	0.13
9	63	45.7	28	28	22.8	13	86	47.1	15	9	0.8	0	25.6	25.6	25.5	0.00

Figure 6: Observed temperature differences during project development and construction in the project area.

Safeguard Design

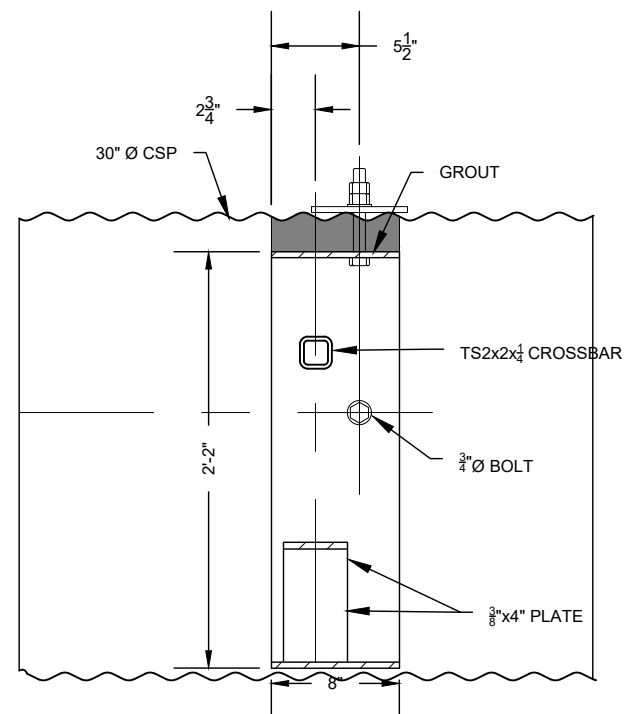
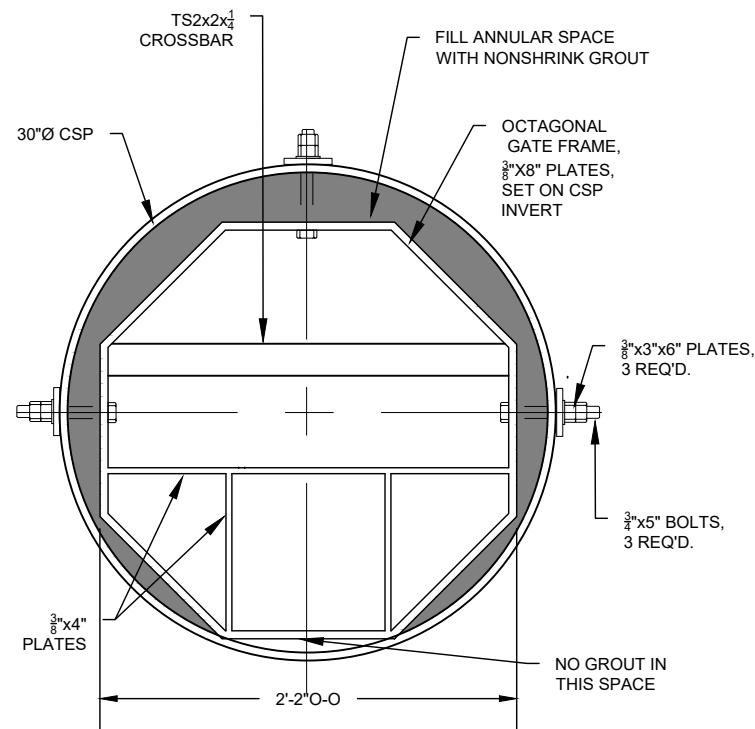


- GENERAL NOTES:**
1. THE SHAPE AND DIMENSIONS SHOWN FOR THE EXISTING ADIT OPENINGS ARE APPROXIMATE. FIELD VERIFY ALL DIMENSIONS BEFORE FABRICATION.
 2. STEEL PLATES AND SHAPES SHALL BE WEATHERING STEEL. WELD ALL JOINTS. CONSTRUCT THE BAT GATE TO ELIMINATE SURFACES ON WHICH MOISTURE OR DEBRIS CAN BE TRAPPED. ALL TUBULAR MEMBERS SHALL BE HERMETICALLY SEALED TO PREVENT THE INCURSION OF MOISTURE, EXCEPT AS OTHERWISE NOTED. ROUND OR CHAMFER ALL EXPOSED SHARP CORNERS AND EDGES.
 3. DOUBLE-NUT ALL BOLTS.
 4. THE CONTRACTOR HAS THE OPTION OF USING 8" STEEL PLATE WHERE 4" STEEL PLATE IS SHOWN IN THE DRAWINGS.
 5. VERIFY THAT THE OPENINGS OF THE CSP ARE NOT OBSTRUCTED BY FILL OR ROCK.
 6. THE FINISH GRADE ON THE OUTSIDE OF THE CULVERT SHALL HAVE POSITIVE DRAINAGE AWAY FROM THE STRUCTURE.
 7. NATINA STAIN EXPOSED CULVERT AT DIRECTION OF PROJECT MANAGER.
 8. ADD ROCK BERM AND FILL ON SLOPE ABOVE AML 22_05c TO DIRECT STORMWATER SOUTHWARDS AWAY FROM TOP OF THE FEATURE.
 9. UP TO THREE PVC DRAINS TO BE INSTALLED AT LOCATION DETERMINED BY PROJECT MANAGER.
 10. WEATHERING STEEL SHALL BE USED FOR ALL STEEL TUBING AND PLATING.
 11. MINE OPENING DIMENSIONS 4'5" WIDE BY 5' HIGH AND 20' CULVERT LENGTH.
 12. INSTALL SURVEY MARKER (SUPPLIED BY AML PROGRAM) INTO ADJACENT COMPETENT ROCK AS DIRECTED BY THE AML PROJECT MANAGER.

CAUTION - THIS PROJECT REQUIRES CONSTRUCTION WORK IN, AROUND, AND OVER HAZARDOUS AND UNPROTECTED MINE SHAFTS, STOPES, ADITS, AND OTHER OPENINGS WHICH MAY BE OPEN TO THE SURFACE OR HIDDEN FROM VIEW BY TRASH, DEBRIS, OR THIN AND UNSTABLE LAYERS OF SURFACE MATERIALS OR ROCK. THE CONSTRUCTOR SHALL BE RESPONSIBLE FOR THOROUGHLY INVESTIGATING THE SITE CONDITIONS AND SCHEDULING EQUIPMENT, EQUIPMENT OPERATIONS, PERSONNEL AND SAFETY PROCEDURES TO PREVENT ACCIDENTS AND INJURIES.

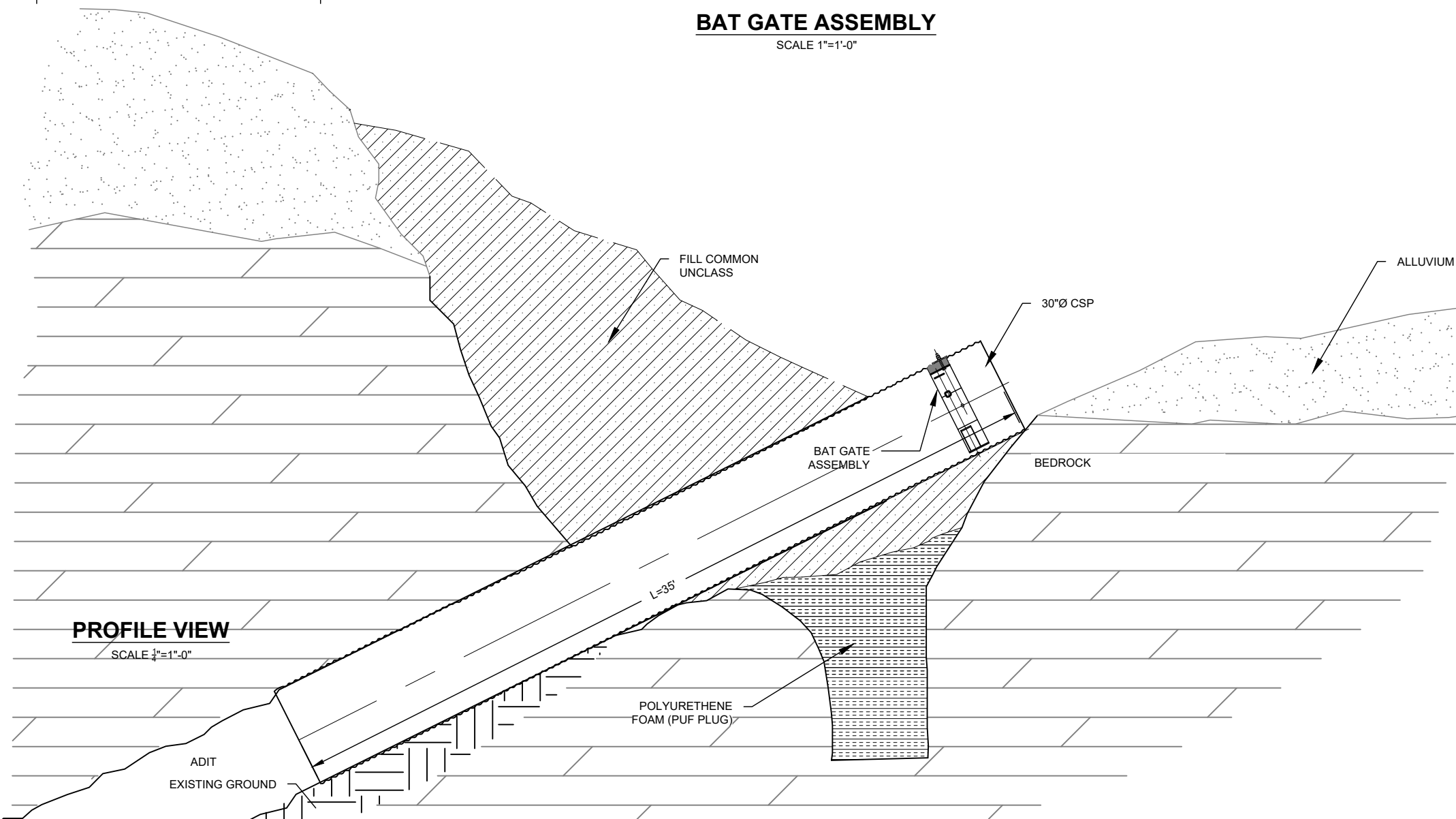
ABANDONED MINE LAND PROGRAM MINING AND MINERALS DIVISION NEW MEXICO ENERGY, MINERALS, AND NATURAL RESOURCES DEPARTMENT			
SCALE: AS SHOWN	AML22_05c	DRAWN BY: MWT	
DATE: 05/15/2024		REVISED BY: LDV	
30"Ø BAT GATE IN ROCK FILL			
FILE:	RED HILL MINE SAFEGUARD PROJECT PHASE I	FIGURE: 4	

Safeguard Design



BAT GATE ASSEMBLY

SCALE 1"=1'-0"



GENERAL NOTES:

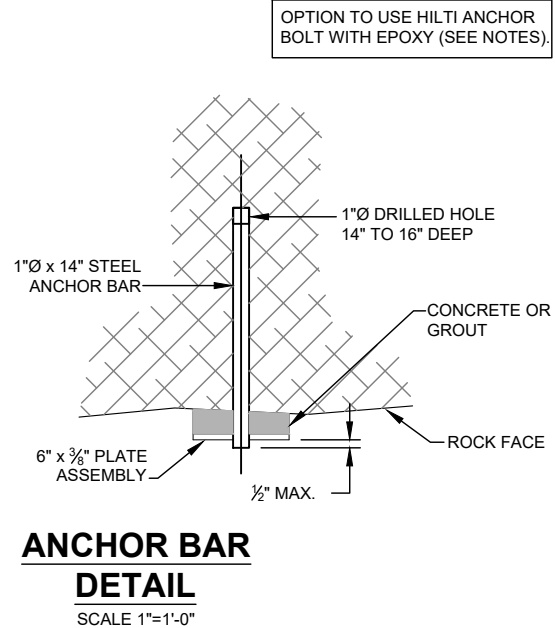
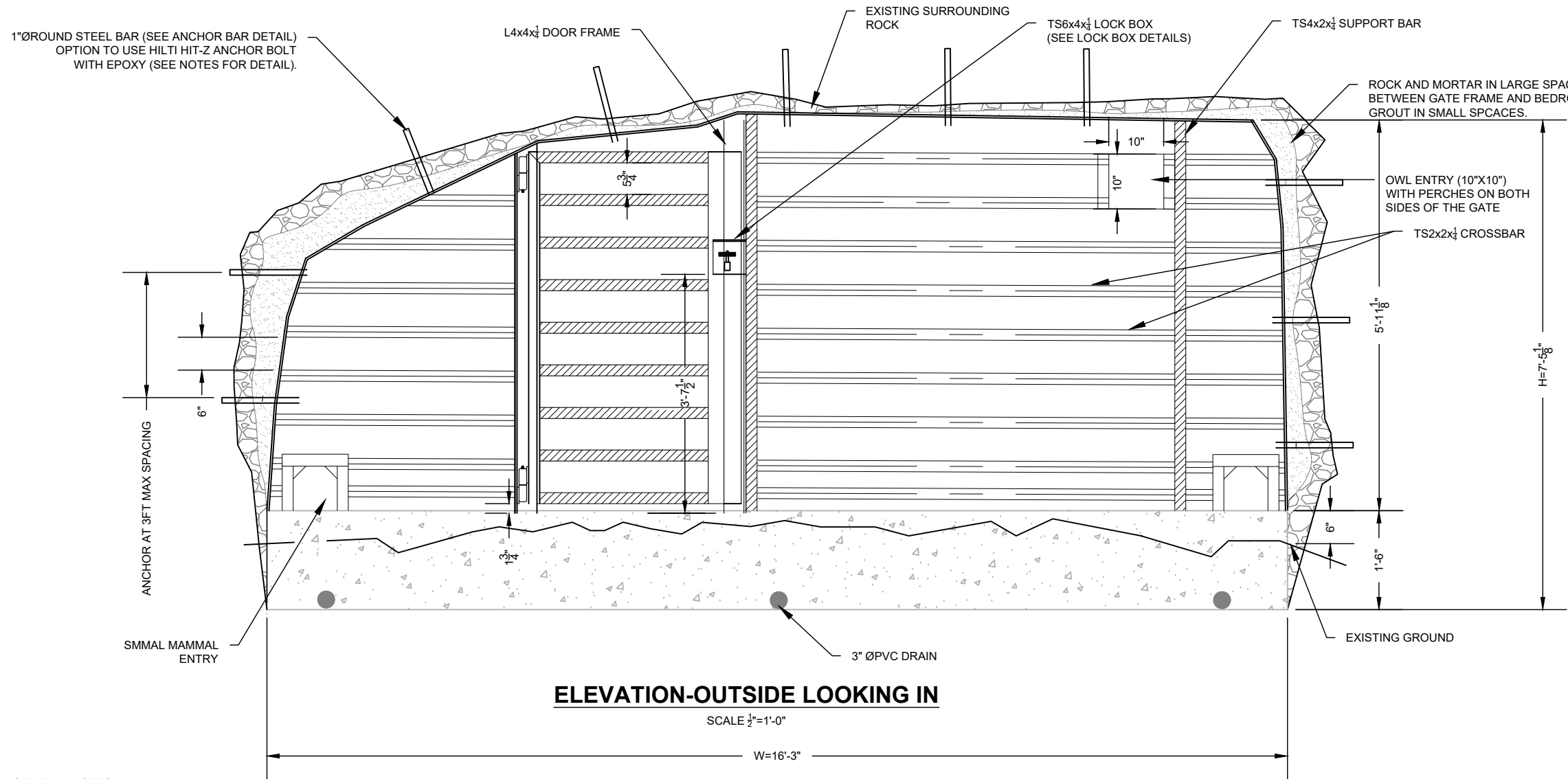
1. THE SHAPE AND DIMENSIONS SHOWN FOR THE EXISTING ADIT OPENINGS ARE APPROXIMATE. FIELD VERIFY ALL DIMENSIONS BEFORE FABRICATION.
2. STEEL PLATES AND SHAPES SHALL BE WEATHERING STEEL. WELD ALL JOINTS. CONSTRUCT THE BAT GATE TO ELIMINATE SURFACES ON WHICH MOISTURE OR DEBRIS CAN BE TRAPPED. ALL TUBULAR MEMBERS SHALL BE HERMETICALLY SEALED TO PREVENT THE INCURSION OF MOISTURE, EXCEPT AS OTHERWISE NOTED. ROUND OR CHAMFER ALL EXPOSED SHARP CORNERS AND EDGES.
3. DOUBLE-NUT ALL BOLTS.
4. THE CONTRACTOR HAS THE OPTION OF USING 8" STEEL PLATE WHERE 4" STEEL PLATE IS SHOWN IN THE DRAWINGS.
5. VERIFY THAT THE OPENINGS OF THE CSP ARE NOT OBSTRUCTED BY FILL OR ROCK.
6. THE FINISH GRADE ON THE OUTSIDE OF THE CULVERT SHALL HAVE POSITIVE DRAINAGE AWAY FROM THE STRUCTURE.
7. BAND CULVERT SECTIONS TOGETHER.
8. GRADE CONSTRUCT HALF-MOON-SHAPED COMMON FILL FEATURE TO DIRECT UPHILL WATER AWAY FROM MINE FEATURE.
9. WEATHERING STEEL SHALL BE USED FOR ALL STEEL TUBING AND PLATING.
10. INSTALL SURVEY MARKER (SUPPLIED BY AML PROGRAM) INTO ADJACENT COMPETENT ROCK AS DIRECTED BY PROJECT MANAGER.



CAUTION - THIS PROJECT REQUIRES CONSTRUCTION WORK IN, AROUND, AND OVER HAZARDOUS AND UNPROTECTED MINE SHAFTS, STOPES, ADITS, AND OTHER OPENINGS WHICH MAY BE OPEN TO THE SURFACE OR HIDDEN FROM VIEW BY TRASH, DEBRIS, OR THIN AND UNSTABLE LAYERS OF SURFACE MATERIALS OR ROCK. THE CONSTRUCTOR SHALL BE RESPONSIBLE FOR THOROUGHLY INVESTIGATING THE SITE CONDITIONS AND SCHEDULING EQUIPMENT, EQUIPMENT OPERATIONS, PERSONNEL AND SAFETY PROCEDURES TO PREVENT ACCIDENTS AND INJURIES.

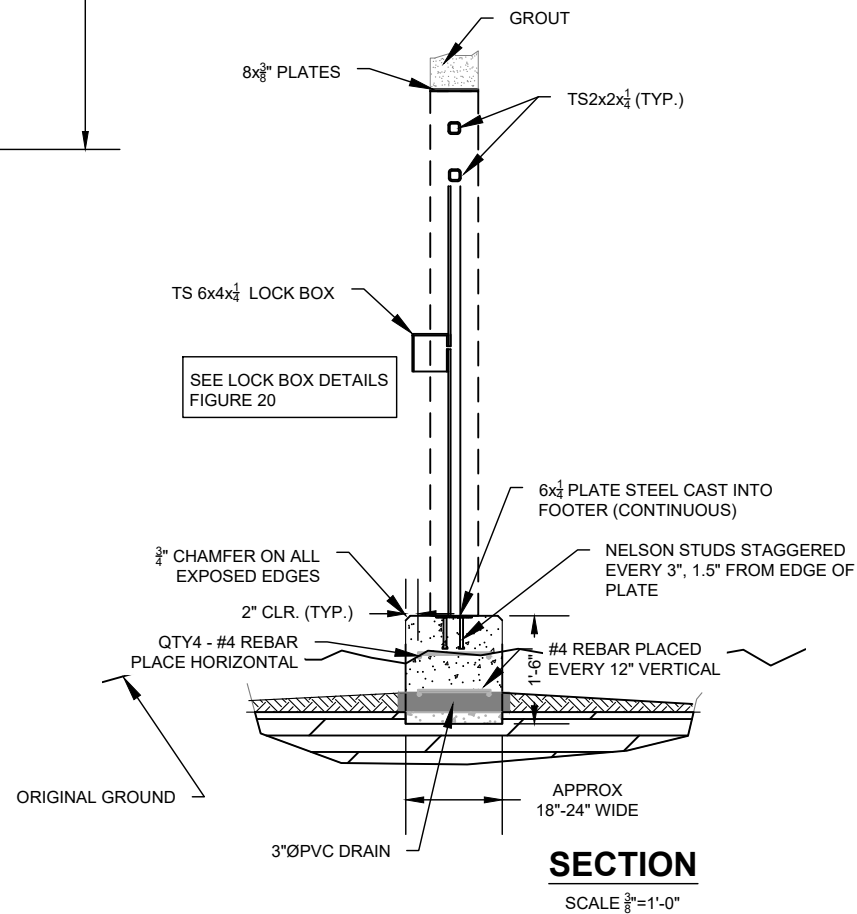
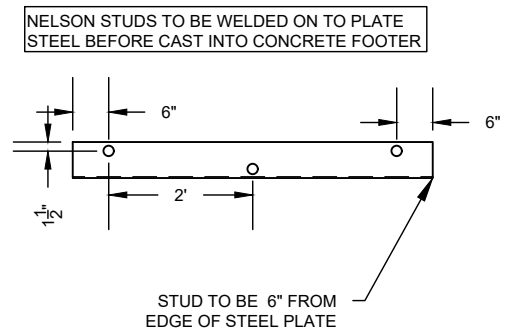
ABANDONED MINE LAND PROGRAM MINING AND MINERALS DIVISION NEW MEXICO ENERGY, MINERALS, AND NATURAL RESOURCES DEPARTMENT		
SCALE: AS SHOWN	AML22_13	DRAWN BY: MWT
DATE: 05/15/2024		REVISED BY: LDV
30"Ø DECLINE CULVERT WITH BAT GATE		
FILE:	RED HILL MINE SAFEGUARD PROJECT PHASE I	FIGURE: 10

Safeguard Design



GENERAL NOTES:

1. THIS DRAWING SHOWS THE GENERAL SHAPE AND APPROXIMATE PROFILE OF THE EGRESS ADIT AT THE INTENDED LOCATION OF THE CLOSURE. USE THE DRAWING AS A GUIDE FOR FIELD LAYOUT OF THE CLOSURE. FIELD VERIFY DIMENSIONS PRIOR TO FABRICATION.
2. TUBULAR STEEL PLATES, AND SHAPES SHALL BE WEATHERING STEEL AS SPECIFIED. WELD ALL JOINTS. JOINTS SHALL BE TIGHT SO THAT MOISTURE CANNOT ENTER BETWEEN PILES OF MATERIAL. ROUND OR CHAMFER ALL SHARP EDGES AND CORNERS.
3. PRIOR TO CONSTRUCTING THE FOOTER, REMOVE RUBBLE AND LEVEL THE FLOOR IN THE AREA OF THE CLOSURE AS SHOWN IN THE DRAWING AND AS DIRECTED BY THE AML PROGRAM MANAGER. COMPACT THE FOOTER BASE TO THE SATISFACTION OF THE PROJECT MANAGER, PRIOR TO POURING CONCRETE FOOTER.
4. INSTALL HEAVY DUTY BARREL WELD-ON PIVOT HINGES (1,000lb/PAIR CAPACITY) AS SHOWN AND AS SPECIFIED. BOTH HINGES SHALL BE INSTALLED TO SUPPORT THE DOOR AND SHALL BE IN-LINE AND OPERATE SMOOTHLY WHEN THE DOOR IS HUNG.
5. CONSTRUCT AND INSTALL THE DOOR AND DOOR FRAME TRUE, SQUARE AND PLUMB. THE DOOR SHALL CLOSE SNUGLY AGAINST THE FRONT FACE OF THE DOOR FRAME WITH NO MORE THAN A $\frac{3}{8}$ " GAP AT ANY POINT ALONG THE FRONT FACE OF BOTH SIDES OF THE DOOR AND FRAME WHEN THE DOOR IS CLOSED.
6. GROUT AND MORTAR SHALL BE CONSTRUCTION GRADE.
7. PLACE A $\frac{3}{4}$ " CHAMFER ON ALL EXPOSED EDGES OF CONCRETE FOOTER.
8. TOLERANCE ON THE CENTER-TO-CENTER DIMENSIONS BETWEEN POSTS SHALL BE $\pm \frac{1}{16}$ ".
9. PLACE A SURVEY MARKER, PROVIDED BY AML PROGRAM, INTO ADJACENT COMPETENT ROCK AS DIRECTED BY PROJECT MANAGER.
10. ROCK AND MORTAR LARGE GAPS AROUND GATE FRAME.
11. REMOVE WASTE ROCK IN FRONT OF FEATURE.
12. INSTALL TS 2X2X $\frac{1}{4}$ CLOSURE BARS ON GAPS BETWEEN ROCK AND PLATE STEEL.
13. WEATHERING STEEL SHALL BE USED FOR ALL THE STEEL TUBING AND PLATING.
14. GATES SHALL BE SECURED IN PLACE WITH 1" DIAMETER ROUND STEEL BAR DRIVEN INTO 1" DIAMETER HOLE (SEE ANCHOR BAR DETAIL). CONTRACTOR HAS OPTION TO USE $\frac{3}{4}$ " x 9 $\frac{3}{4}$ " HILTI HIT-Z ANCHOR BOLT WITH EPOXY OR APPROVED EQUIVALENT IN PLACE OF ROUND STEEL BAR. FOR WEAK ROCK AND WITH APPROVAL OF PROJECT ENGINEER, CONTRACTOR HAS OPTION TO USE $\frac{1}{2}$ " x 7 $\frac{3}{4}$ " HILTI HIT-Z ANCHOR BOLT WITH EPOXY OR APPROVED EQUIVALENT. DRILL HOLE FOR HILTI ANCHORS SHALL BE $\frac{1}{8}$ " INCH LARGER THAN ANCHOR DIAMETER.



CAUTION - THIS PROJECT REQUIRES CONSTRUCTION WORK IN, AROUND, AND OVER HAZARDOUS AND UNPROTECTED MINE SHAFTS, STOPES, ADITS, AND OTHER OPENINGS WHICH MAY BE OPEN TO THE SURFACE OR HIDDEN FROM VIEW BY TRASH, DEBRIS, OR THIN AND UNSTABLE LAYERS OF SURFACE MATERIALS OR ROCK. THE CONSTRUCTOR SHALL BE RESPONSIBLE FOR THOROUGHLY INVESTIGATING THE SITE CONDITIONS AND SCHEDULING EQUIPMENT, EQUIPMENT OPERATIONS, PERSONNEL AND SAFETY PROCEDURES TO PREVENT ACCIDENTS AND INJURIES.

ABANDONED MINE LAND PROGRAM
MINING AND MINERALS DIVISION
NEW MEXICO ENERGY, MINERALS, AND NATURAL RESOURCES DEPARTMENT



SCALE: AS SHOWN

AML 15_23

DRAWN BY: MWT

DATE: 05/15/2024

REVISED BY: LDV

VERTICAL EGRESS CLOSURE ON ADIT

FILE:

RED HILL MINE SAFEGUARD PROJECT PHASE I

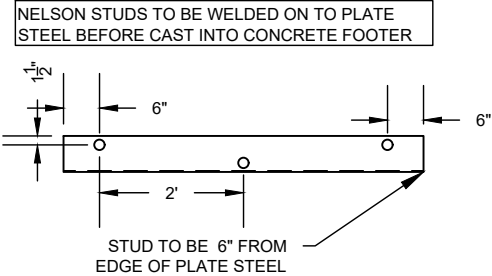
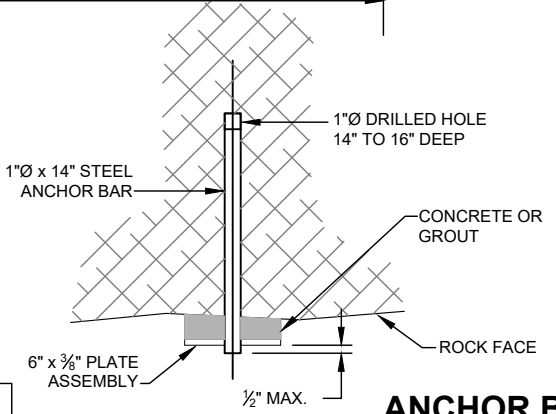
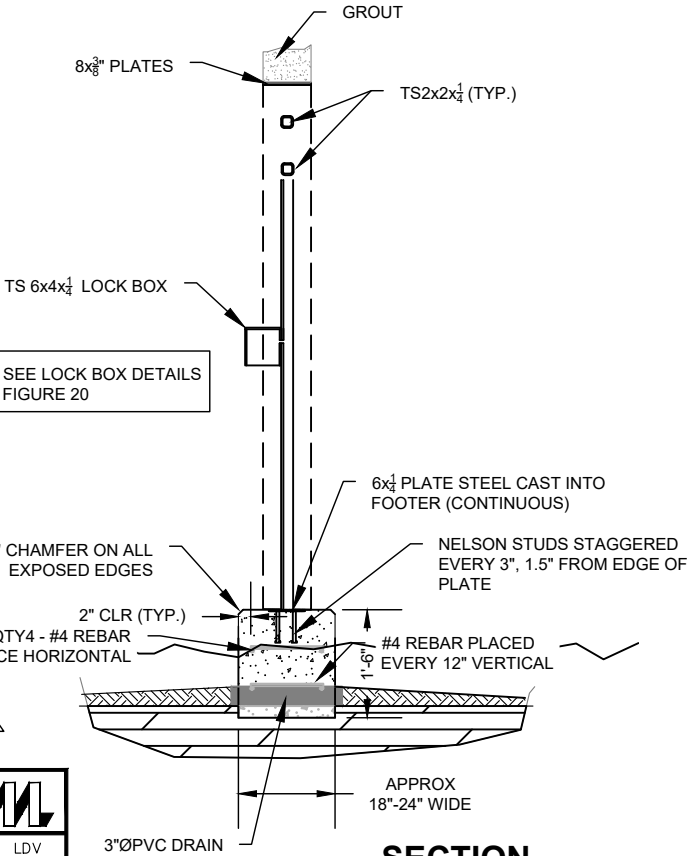
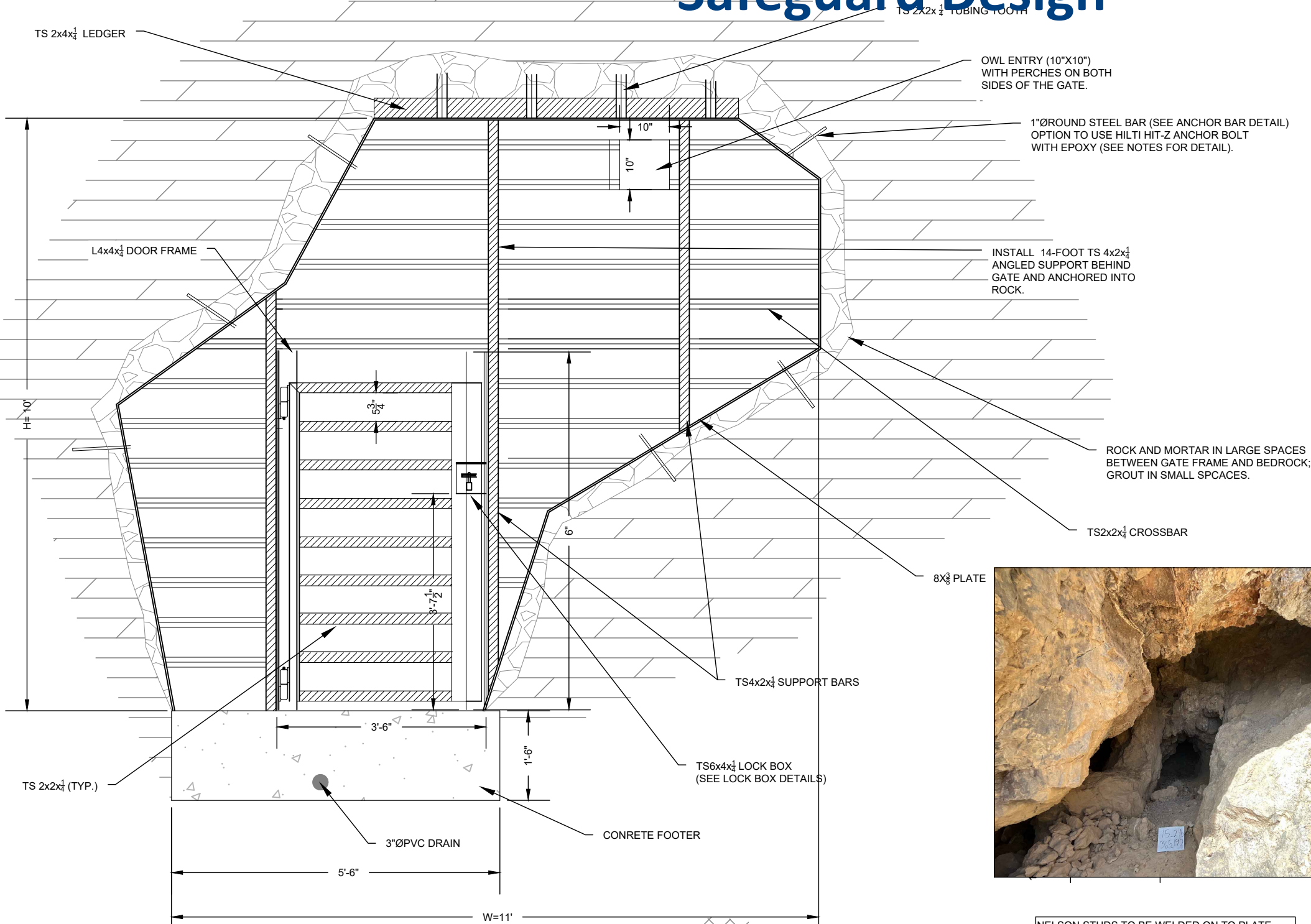
FIGURE: 15

Safeguard Design

CAUTION — THIS PROJECT REQUIRES CONSTRUCTION WORK IN, AROUND, AND OVER HAZARDOUS AND UNPROTECTED MINE SHAFTS, STOPS, ADITS, AND OTHER OPENINGS WHICH MAY BE OPEN TO THE SURFACE OR HIDDEN FROM VIEW BY TRASH, DEBRIS, OR THIN AND UNSTABLE LAYERS OF SURFACE MATERIALS OR ROCK. THE CONSTRUCTOR SHALL BE RESPONSIBLE FOR THOROUGHLY INVESTIGATING THE SITE CONDITIONS AND SCHEDULING EQUIPMENT, EQUIPMENT OPERATIONS, PERSONNEL AND SAFETY PROCEDURES TO PREVENT ACCIDENTS AND INJURIES.

GENERAL NOTES:

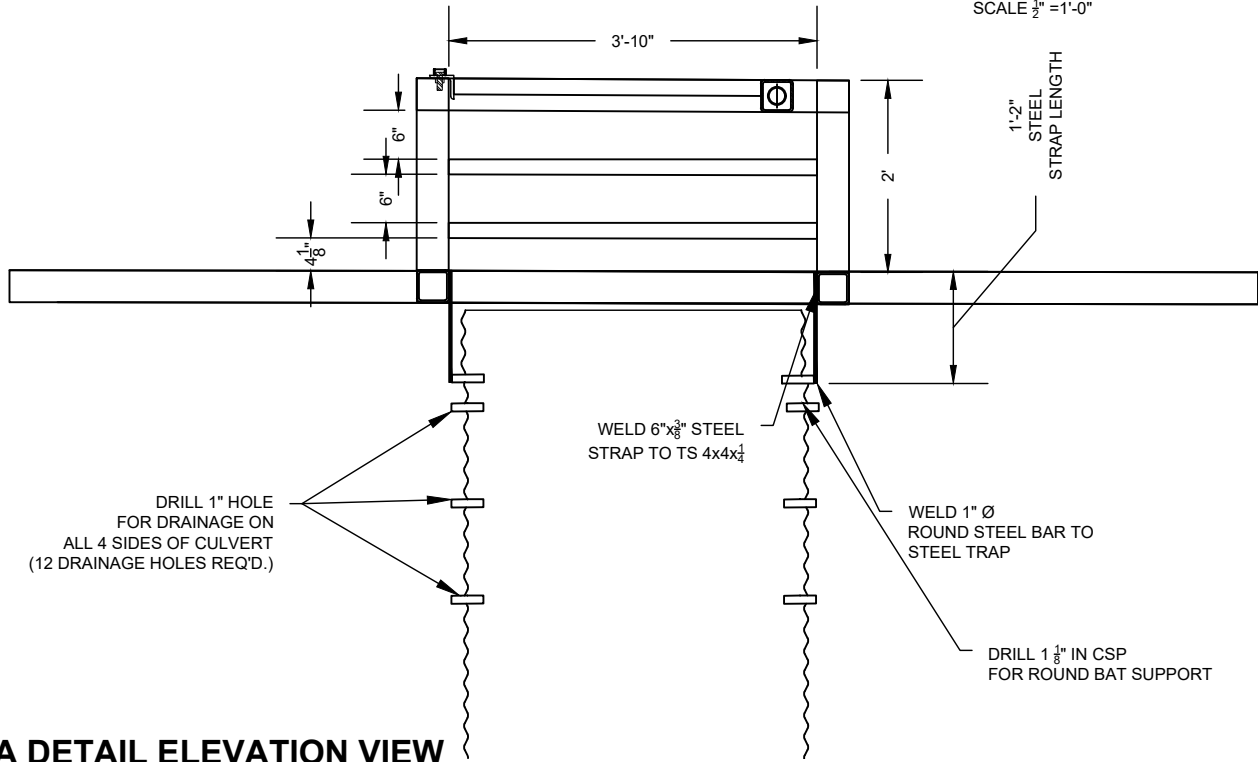
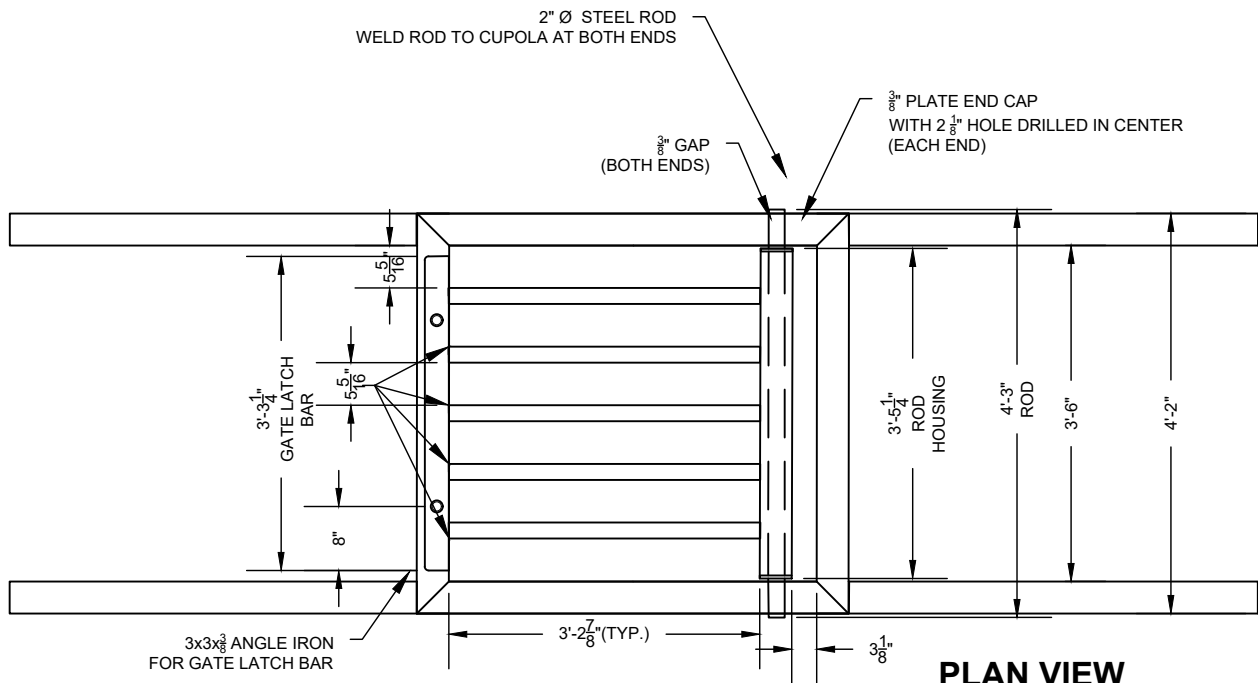
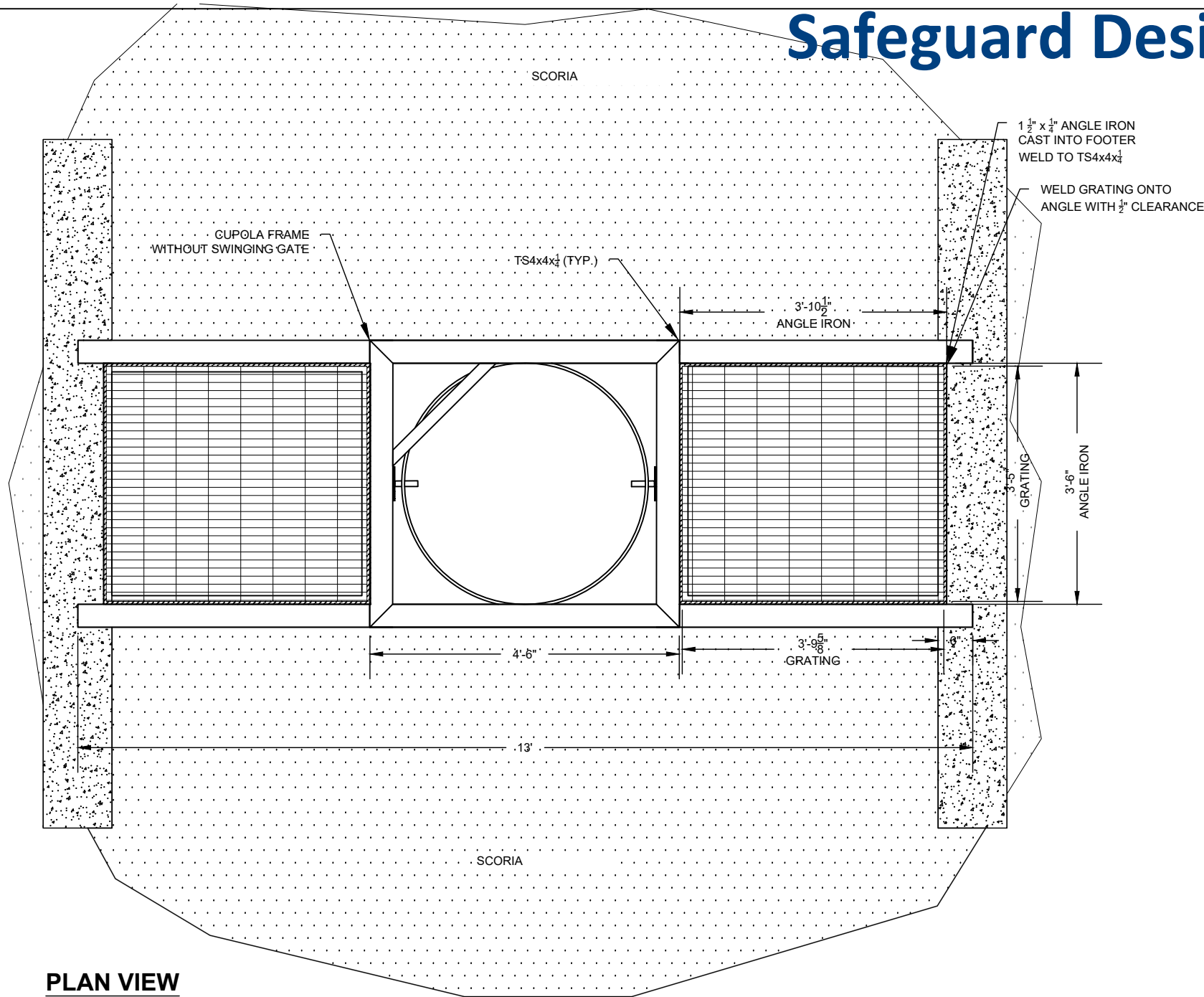
- THIS DRAWING SHOWS THE GENERAL SHAPE AND APPROXIMATE PROFILE OF THE EGRESS ADIT AT THE INTENDED LOCATION OF THE CLOSURE. USE THE DRAWING AS A GUIDE FOR FIELD LAYOUT OF THE CLOSURE. FIELD VERIFY DIMENSIONS PRIOR TO FABRICATION.
- TUBULAR STEEL PLATES, AND SHAPES SHALL BE WEATHERING STEEL AS SPECIFIED. WELD ALL JOINTS. JOINTS SHALL BE TIGHT SO THAT MOISTURE CANNOT ENTER BETWEEN PILES OF MATERIAL. ROUND OR CHAMFER ALL SHARP EDGES AND CORNERS.
- PRIOR TO CONSTRUCTING THE FOOTER, REMOVE RUBBLE AND LEVEL THE FLOOR IN THE AREA OF THE CLOSURE AS SHOWN IN THE DRAWING AND AS DIRECTED BY THE AML PROGRAM MANAGER. COMPACT THE FOOTER BASE TO THE SATISFACTION OF THE PROJECT MANAGER, PRIOR TO POURING CONCRETE FOOTER.
- INSTALL HEAVY DUTY BARREL WELD-ON PIVOT HINGES (1,000lb/PAIR CAPACITY) AS SHOWN AND AS SPECIFIED. BOTH HINGES SHALL BE INSTALLED TO SUPPORT THE DOOR AND SHALL BE IN-LINE AND OPERATE SMOOTHLY WHEN THE DOOR IS HUNG.
- CONSTRUCT AND INSTALL THE DOOR AND DOOR FRAME TRUE, SQUARE AND PLUMB. THE DOOR SHALL CLOSE SNUGGLY AGAINST THE FRONT FACE OF THE DOOR FRAME WITH NO MORE THAN A $\frac{3}{8}$ " GAP AT ANY POINT ALONG THE FRONT FACE OF BOTH SIDES OF THE DOOR AND FRAME WHEN THE DOOR IS CLOSED.
- GROUT AND MORTAR SHALL BE CONSTRUCTION GRADE.
- PLACE A $\frac{3}{4}$ " CHAMFER ON ALL EXPOSED EDGES OF CONCRETE FOOTER.
- TOLERANCE ON THE CENTER-TO-CENTER DIMENSIONS BETWEEN POSTS SHALL BE $\pm \frac{1}{16}$ ".
- PLACE A SURVEY MARKER, PROVIDED BY AML PROGRAM, INTO THE ADJACENT COMPETENT ROCK AS DIRECTED BY PROJECT MANAGER.
- ROCK AND MORTAR LARGE GAPS AROUND GATE FRAME.
- INSTALL ANGLED SUPPORT 12-14'.
- INSTALL TS 2X2X $\frac{1}{4}$ " CLOSURE BARS ON GAPS BETWEEN ROCK AND STEEL PLATE.
- WEATHERING STEEL SHALL BE USED FOR ALL THE STEEL TUBING AND PLATING.
- GATES SHALL BE SECURED IN PLACE WITH 1" DIAMETER ROUND STEEL BAR DRIVEN INTO 1" DIAMETER HOLE (SEE ANCHOR BAR DETAIL). CONTRACTOR HAS OPTION TO USE $\frac{3}{4}$ " x 9 $\frac{3}{4}$ " HILTI HIT-Z ANCHOR BOLT WITH EPOXY OR APPROVED EQUIVALENT IN PLACE OF ROUND STEEL BAR. FOR WEAK ROCK AND WITH APPROVAL OF PROJECT ENGINEER, CONTRACTOR HAS OPTION TO USE $\frac{1}{2}$ " x 7 $\frac{3}{4}$ " HILTI HIT-Z ANCHOR BOLT WITH EPOXY OR APPROVED EQUIVALENT. DRILL HOLE FOR HILTI ANCHORS SHALL BE $\frac{1}{8}$ " INCH LARGER THAN ANCHOR DIAMETER.



ABANDONED MINE LAND PROGRAM		
MINING AND MINERALS DIVISION		
NEW MEXICO ENERGY, MINERALS, AND NATURAL RESOURCES DEPARTMENT		
SCALE: AS SHOWN	AML 15_24b	DRAWN BY: LDV
DATE: 05/15/2024		REVISED BY:
VERTICAL EGRESS CLOSURE ON ADIT		
FILE: 15	RED HILL MINE SAFEGUARD PROJECT PHASE I	FIGURE: 16

Safeguard Design

CUPOLA SWINGING GATE DETAILS



CAUTION — THIS PROJECT REQUIRES CONSTRUCTION WORK IN, AROUND, AND OVER HAZARDOUS AND UNPROTECTED MINE SHAFTS, STOPES, ADITS, AND OTHER OPENINGS WHICH MAY BE OPEN TO THE SURFACE OR HIDDEN FROM VIEW BY TRASH, DEBRIS, OR THIN AND UNSTABLE LAYERS OF SURFACE MATERIALS OR ROCK. THE CONSTRUCTOR SHALL BE RESPONSIBLE FOR THOROUGHLY INVESTIGATING THE SITE CONDITIONS AND SCHEDULING EQUIPMENT, EQUIPMENT OPERATIONS, PERSONNEL AND SAFETY PROCEDURES TO PREVENT ACCIDENTS AND INJURIES.

ABANDONED MINE LAND PROGRAM MINING AND MINERALS DIVISION NEW MEXICO ENERGY, MINERALS, AND NATURAL RESOURCES DEPARTMENT			
SCALE: AS SHOWN	AML 22_12	DRAWN BY: DMC	
DATE: 08/21/2024		REVISED BY:	
BAT CUPOLA DETAILS			
FILE:	RED HILL MINE SAFEGUARD PROJECT PHASE I	FIGURE: 22	

Safeguarding Process



Bat cupola installation on feature 22_12. A variety of large equipment was required to field fit the design to the feature.



Safeguarding Process



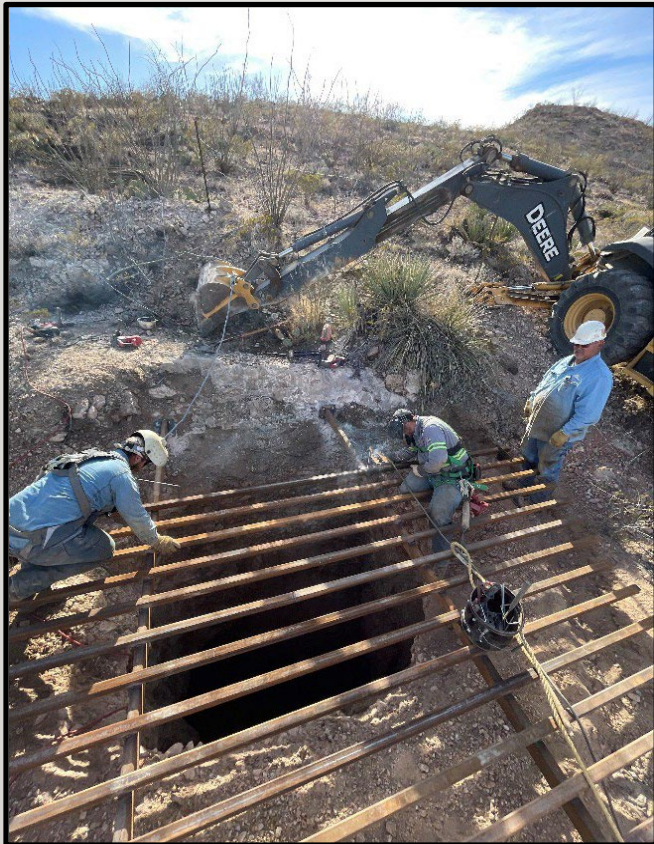
Vertical application of PUF without the utilization of a sprayer. PUF was manually applied to a tarp, allowed to cure and then propped up for a backstop.



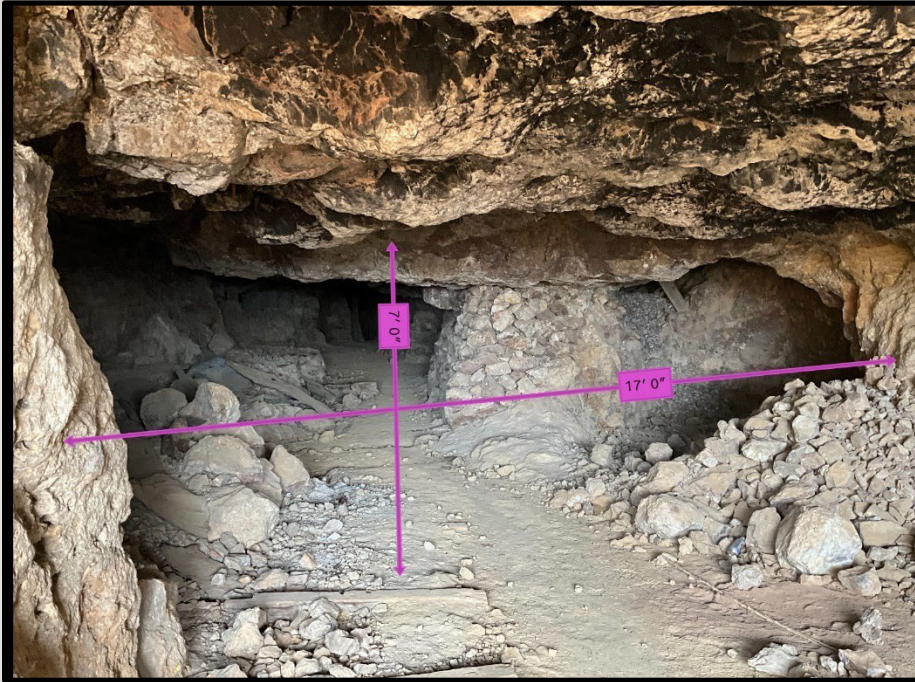
Safeguarding Process



Vertical shaft safeguarding located immediately adjacent to popular off-road trail.



Safeguarding Process



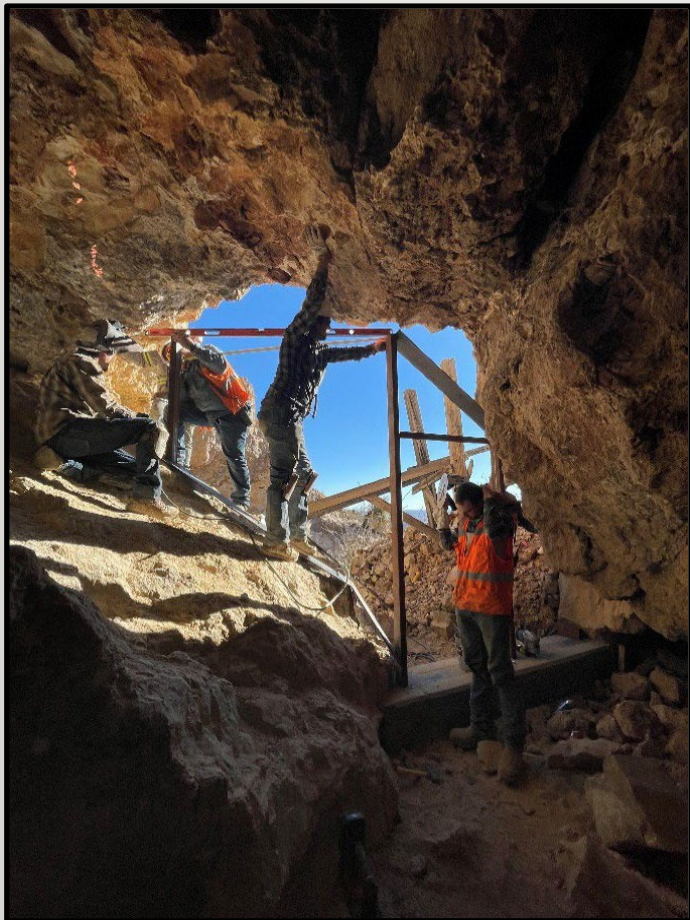
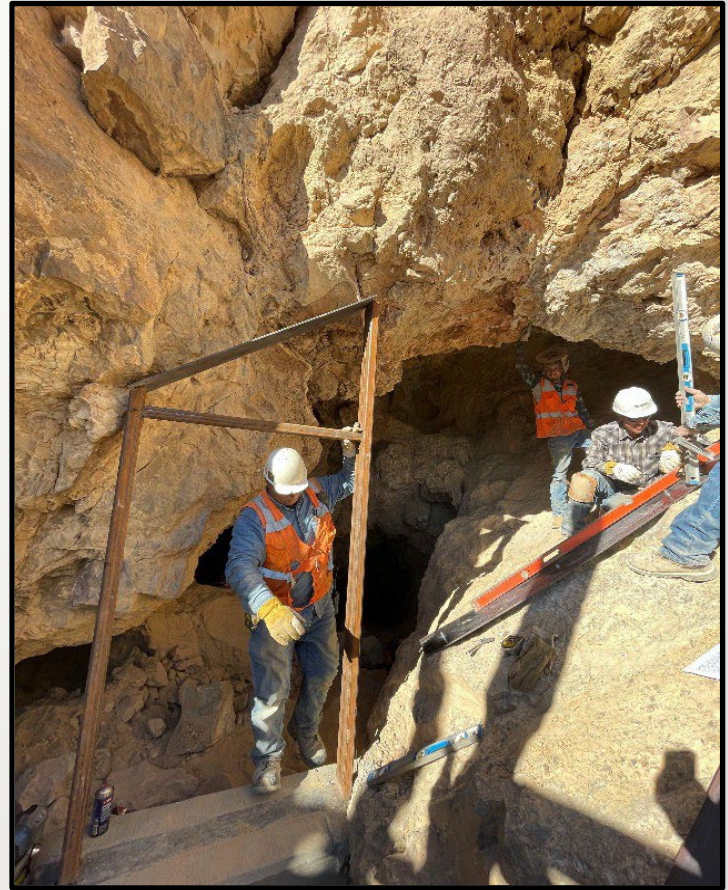
Construction of feature 15_25 or "Nakeye mine" adit. An ingress gate was added to the design to allow for future research of bat occupancy and habitat.



Safeguarding Process



Feature 15_24b adit safeguarding. Note the recession into the feature of the steel work minimize the appearance and conform to the natural environment.



Safeguarding Process



Construction of a culvert with bat gate in a rock bulkhead design. A 48" culvert was utilized on this feature to maximize the airflow for bats.



References

Drumm Johnston, Jr, W.. New Mexico School of Mines, State Bureau of Mines and Mineral Resources Bulletin No. 4, Fluorspar In New Mexico. 1928.

<https://www.motortrend.com/features/1912-wheeling-awesome-off-road-trails-new-mexico-2019-chile-challenge-event/photos/>

Seltzer-Rogers, Heather, Simon Goldstone, and Jacob Borchardt. A Class III Cultural Resource Inventory of 862.21 Acres for the Abandoned Mine Safeguarding Project, Sierra County, New Mexico. 2023.

<https://www.wunderground.com/history/weekly/us/nm/las-cruces/KLRU/date/2023-7-10>

Note: Archaeological data courtesy of the Archaeological Resource Management System (ARMS) of the NM State Historic Preservation Office. This information may be used only in compliance with applicable state and federal laws and regulations, including the New Mexico Cultural Properties Act of 1978 [NMSA 1978, §§18-6-1 to 18-6-17], and the Archaeological Resources Protection Act of 1979 [16 U.S.C. §470aa et. seq.]. Anyone misusing such information may be subject to prosecution under the Federal Computer Security Act of 1987 [15 U.S.C. §§271, 272, 278g-4, 278h].