



Memorandum

To: Neil Marsh, PM
David Shanight, PM

From: Dave Swanson, CM

Date: April 7, 2016

Subject: Susie Mine Portal Update

Following is a chronology of the events from the last few days as well as recommendations moving forward.

Saturday, April 2, 2016, 12:29 pm: I received a call from Rimini landowner Mark Poore that he noticed there had been some kind of “blowout” at the Susie tunnel on his property and he thought it was something I should take a look at to see what was going on. I drove to the site that afternoon, Mark was not around. It was evident that there had been a large volume of water, that had surged out of the mine portal as there was scouring of the mine access road for at least 200 ft. (see photos 016 and 018 in the photolog [Attachment A]) Upon inspection of the portal area, I noticed that there had been a collapse approximately 20 ft behind the portal door in the area of the wooden timber sets and the material/soils above the timbered opening had collapsed into the tunnel (see photos 011 and 013 in the phototlog). The portal door is still intact, but not accessible due to built up soil and rock that had ravelled down in front of the opening (see photo 010 in the photolog). I noticed that the drain pipe that had been installed to carry the mine drainage down to the settling pond at street level (see photo 015 in the photolog) had been inundated with rock/soil and was plugged near the portal, and the discharge was going across the mine access road and down the embankment, but did not appear to be flowing to the settling pond (see photo 012 in the photolog). The mine drainage flow volume did not appear to be any different than it has been historically, around less than 10 gpm. It was however, fairly clear, not the usual grayish orange color. It did not appear that there was anything that could be done at this point and there was a steady flow of water discharging from the tunnel so I left for the day and notified David Shanight via phone to inform him of this event and that we would need to address this sooner rather than later.

Sunday, April 3, 2016, 9:30 am: I drove to Rimini, met with Mark Poore for a few minutes, we walked up to the site and I was showing him what had happened. I used a sawzall to cut a small hole in the portal door, enough to get a camera in and take a couple photos (see photo 020 in the photolog, which shows sagging ceiling beam at second timber set in the photo as well as material from the collapse). It appeared that one or more of the timber sets installed in 2005 (see

photo 005 in the photolog – historic photo) that has been taking weight from the soils above and showing signs of stress over the last few years had finally collapsed, causing approximately 2-3 cy of soils directly above it to enter the mine tunnel. It appears the soil may have blocked the drainage flow temporarily and water was dammed up behind the collapse. Though it is unclear how long the water may have built up before discharging, it appears that when the water in the tunnel reached a certain point it breached through the soil dam on the tunnel floor and flowed out all at once. Mark asked what we, CDM Smith and U.S. Environmental Protection Agency (EPA), were going to do about this. I told Mark that we would inform EPA of this situation and that we would be putting a plan together to remedy the problem before it got any worse. He asked that we keep him in the loop as to what we were going to do and when. He also asked that we get the mine access road back to a usable condition as soon as possible, as he has plans, this spring, for hazard tree mitigation in the area around and upgradient of the portal. Before leaving, I took a few more photos of the area, and walked above the portal to check for subsidence further back from the portal but there was none. David Shanight called to check status, I told him all was ok, no change since yesterday and we should get together to look at the site Monday, he agreed and said he would set it up.

Monday, April 4, 2016, 8:00 am. Met up with David Shanight, Neil Marsh, Chapin Storrar all from CDM Smith, and Tillman McAdams from EPA at the Helena office and drove to the site. Lots of ideas kicked around on what to do next, but all parties agreed that something needs to be done in the short term to try and maintain good drainage in the event of another collapse in the portal area while the plan for the long term stabilization is finalized. **The agreed upon phased approach for short term (after EPA headquarters (HQ) approval) is as follows:**

Phase 1:

- Mobilize an excavator to the site, locate the existing drainage pipe outside the portal, expose and clean out the pipe for continued use. Reestablish adit drainage to this pipe to route flow to back to the settling pond on Rimini Road. Rebury the drainage pipe and reestablish the mine access road. **(within 30 days after EPA HQ approval)**
- Size, procure, and deliver suitable culvert materials to the site for insertion into the portal. Cut a hole in the portal door and push the culvert sections in past the point of the existing collapse. Place a grate on the outlet of the new culvert to prevent anything from getting into the mine tunnel via the culvert. These steps should provide some level of comfort in the short term, such that if the portal continues to collapse, there is something in place to prevent the build-up of water inside the tunnel. **(within 30 days after EPA HQ approval)**
- Expand the footprint of the existing settling pond at street level to accommodate more sludge volume. Clean out the existing culvert under Rimini road. Clean the sludge build-up out the existing step pools and settling basins on the west side of Rimini down to Tenmile creek. Haul contaminated soils from these excavations to a suitable area for staging until

transportation to the Luttrell repository is feasible. (within 100 days after EPA HQ approval)

Phase 2:

- Revisit, finalize, and implement the Susie mine portal stabilization and rehabilitation design that was last worked on in March 2015. The purpose of the March 2015 design effort was to ensure site safety in advance of the Rimini area adit discharge source control/treatment system activities. The general site information and project objectives are included in Attachment B, and the PDF drawings of this design in their current state are included in Attachment C.

Following is a bullet list of recommended tasks associated with implementation of the final rehabilitation and stabilization of the site. It is important to note this approach is to rehabilitate and stabilize only that portion of the entrance and first 200 feet into the tunnel that was originally started in 2005. This does not address any issues (i.e., historic mine collapse issues) or conditions that may exist beyond this point further into the original mine workings.

- Excavate slope around portal area and remove temporary drainage measures and existing portal entrance structure
- Stabilize entrance headwall
- Improve subgrade and install box culvert sections
- Backfill and regrade around portal
- Provide and install seed and erosion blanket on resurfaced slopes
- Remove existing steel and timber supports and lagging
- Clear out and dispose of timbers, steel, soils, rock, sludge, and concrete floor
- Install new roof and tunnel support systems
- Stabilize and fill overhead void near portal
- Install new concrete floor and drain system
- Install valve box and collection sump near portal
- Connect new drainage system to existing underground drain pipe

Conducting Phase 2 mentioned above would be required prior to implementing the next priority remedial action start which is the Rimini area adit discharge source control/treatment system. This remedial action start would include addressing adit discharge from the Redwater mine, Lee Mountain/Little Lily mine site complex, and the Susie mine portal.

Attachments

- A) Photolog of site photographs
- B) General site information and project objectives taken from the draft 2015 Design Basis Report
- C) Preliminary PDF drawings of the rehabilitation design of this project (Not approved for construction)

Cc: project files

Attachment A – Photolog

Date: 4/3/2016

Filename: April 2016 008.JPG

Location: Susie Mine, Rimini, MT

Photo Location: Susie Mine Portal

Photo Description:
008 - Looking out from mine portal door

Direction: West



Date: 4/3/2016

Filename: April 2016 010.JPG

Location: Susie Mine, Rimini, MT

Photo Location: Susie Mine Portal

Photo Description:
010 - Mine portal door

Direction: Southeast



Attachment A – Photolog

Date: 4/3/2016

Filename: April 2016 011.JPG

Location: Susie Mine, Rimini, MT

Photo Location: Susie Mine Portal

Photo Description:
011 - Collapse hole above portal door

Direction: Southeast



Date: 4/3/2016

Filename: April 2016 012.JPG

Location: Susie Mine, Rimini, MT

Photo Location: Susie Mine Portal

Photo Description:
012 - Discharge running from portal

Direction: Southwest



Attachment A – Photolog

Date: 4/3/2016

Filename: April 2016 013.JPG

Location: Susie Mine, Rimini, MT

Photo Location: Susie Mine Portal

Photo Description:
013 - Collapse hole above portal door

Direction: South



Date: 4/3/2016

Filename: April 2016 015.JPG

Location: Susie Mine, Rimini, MT

Photo Location: Susie Mine

Photo Description:
015 - Existing settling/sludge ponds next to Rimini Road

Direction: West



Attachment A – Photolog

Date: 4/3/2016

Filename: April 2016 016.JPG

Location: Susie Mine, Rimini, MT

Photo Location: Susie Mine Portal

Photo Description:
016 - Evidence of erosion due to release from mine portal

Direction: East



Date: 4/3/2016

Filename: April 2016 018.JPG

Location: Susie Mine, Rimini, MT

Photo Location: Susie Mine

Photo Description:
018 - Evidence of erosion down access road

Direction: South



Attachment A – Photolog

Date: 4/3/2016

Filename: April 2016 019.JPG

Location: Susie Mine, Rimini, MT

Photo Location: Susie Mine

Photo Description:

019 - Evidence of erosion down embankment on access road

Direction: West



Date: 4/3/2016

Filename: April 2016 020.JPG

Location: Susie Mine, Rimini, MT

Photo Location: Susie Mine Portal

Photo Description:

020 - Interior of Susie portal just inside door showing evidence of collapse.

Direction: East



Attachment A – Photolog

Date: 8/8/2008

Filename: Susie Mine January 2010 005.jpg

Location: Susie Mine, Rimini, MT

Photo Location: Susie Mine Portal

Photo Description:
005 - Interior of Susie portal from just inside door from 2008.

Direction: East



Excerpt from existing draft 2015 Design Basis Report

Project Objectives:

The purpose of this remedial design is to create a permanent, long-term access to the Susie Mine to allow future remedial action at the mine site in coordination with other discharging mines within the town of Rimini. Currently, the roof of the treatment room as well as the back and ribs of the entrance tunnel that was reopened in 2005, and supported with wood timbers and rock bolts, is in need of rehabilitation with more permanent ground support systems as well as adit drainage control for long term access and maintenance. The objective of this work is to remedy these conditions and permit future work around and within the mine to proceed safely.

As indicated in the ROD (EPA 2002), all discharging adits will be evaluated in a four-phase program to develop and implement practicable cost-effective control measures to eliminate acid mine drainage (AMD) from existing mine adits and attain compliance with state water quality standards in Tenmile Creek and its tributaries. Prior remedial activities at the Susie Mine to treat the adit drainage inside the adit were unsuccessful as a result of safety concerns. As stated in the ROD, after all appropriate efforts to implement source controls and flow reduction have been implemented, EPA, in consultation with DEQ, will evaluate and select appropriate facilities to treat residual mine adit discharges based on specific flow rates and water chemistries. EPA will then design and build the AMD treatment facilities necessary to meet state ambient water quality standards. In the interim, while treatment alternatives are considered by EPA and DEQ, the adit structure will be upgraded to ensure that adit discharge is controlled and accessible. This will provide more flexibility in addressing adit discharge long-term from a treatment and O&M standpoint (i.e., sludge management and disposal).

General Site Information

The Susie Mine is located centrally within the Community of Rimini, in Lewis and Clark County near Helena, Montana. The Susie Mine adit discharges acidic water containing heavy metals and arsenic at a rate of 4-6 gallons per minute (gpm). Based on flow monitoring, the flowrate remains relatively consistent throughout the year, and does not vary significantly based on the seasons or precipitation events. Prior to this most recent event, water flowed in a 4-inch PVC drain pipe from inside the mine portal under Rimini and discharges to a series of small settling ponds on the west side Rimini Road, before flowing into Tenmile Creek. The water currently flows out the portal entrance and enters a drain pipe that routes it to a settling pond just east of Rimini Road. From the pond, the water flows through a culvert under the road and then passes through the settling ponds west and then on to Tenmile Creek.

In 2005, in support of an EPA Office of Environmental Research and Development to test the treatability of the adit discharge within the mine portal, CDM Smith performed rehabilitation work in the first 180 feet of the adit to allow construction of a demonstration water treatment system within the mine. The entrance, which had been closed by the Montana Abandoned Mine Reclamation Bureau in 1989, was cleared and the roof was supported with timbers. In addition, timber sets and lagging were placed for the initial 75 feet of the adit. At this point, a room about 65 feet long and up to 30 feet wide was blasted to accommodate the treatment system. A concrete walkway was constructed from the portal entrance

Attachment B

to the end of the large room. Discharge water from the treatment system was then conveyed to the 4-inch PVC pipe for final discharge to the settling ponds down gradient from the mine entrance. After the demonstration project was completed, the equipment was removed from the mine in 2010. Due to deteriorating conditions and safety considerations, interior inspections and maintenance within the existing portal are not being performed.

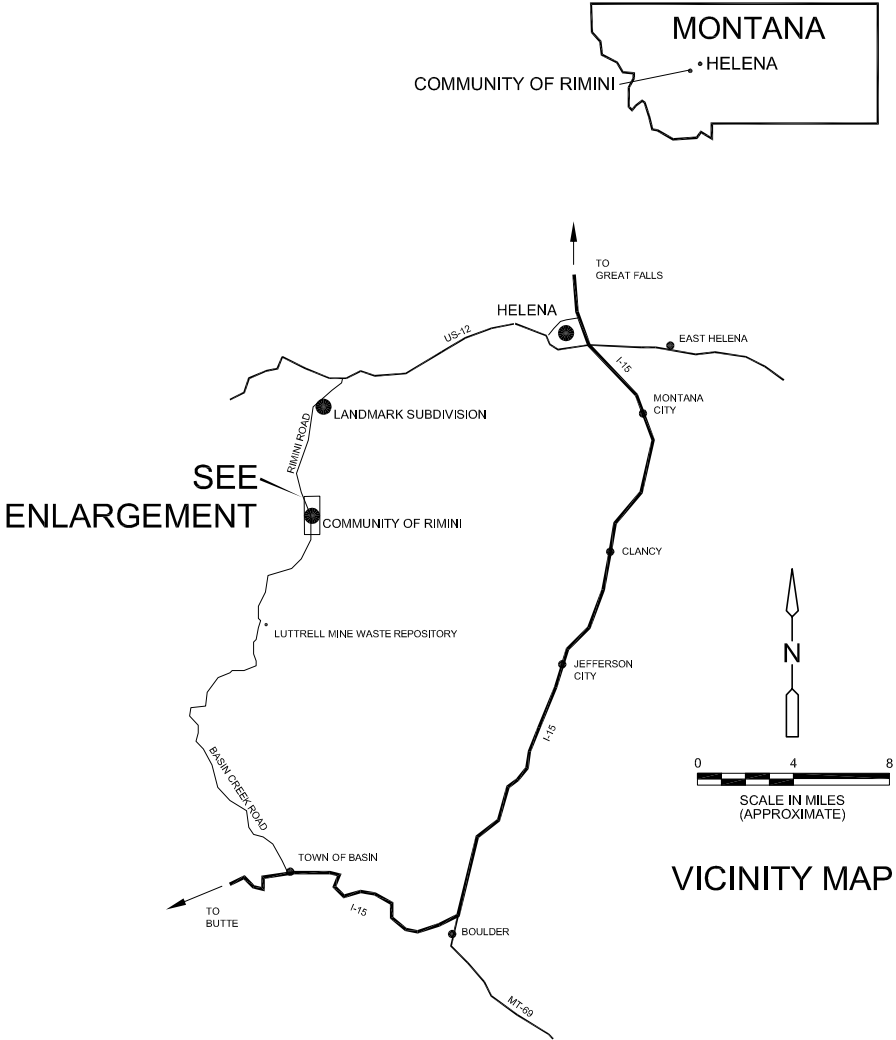
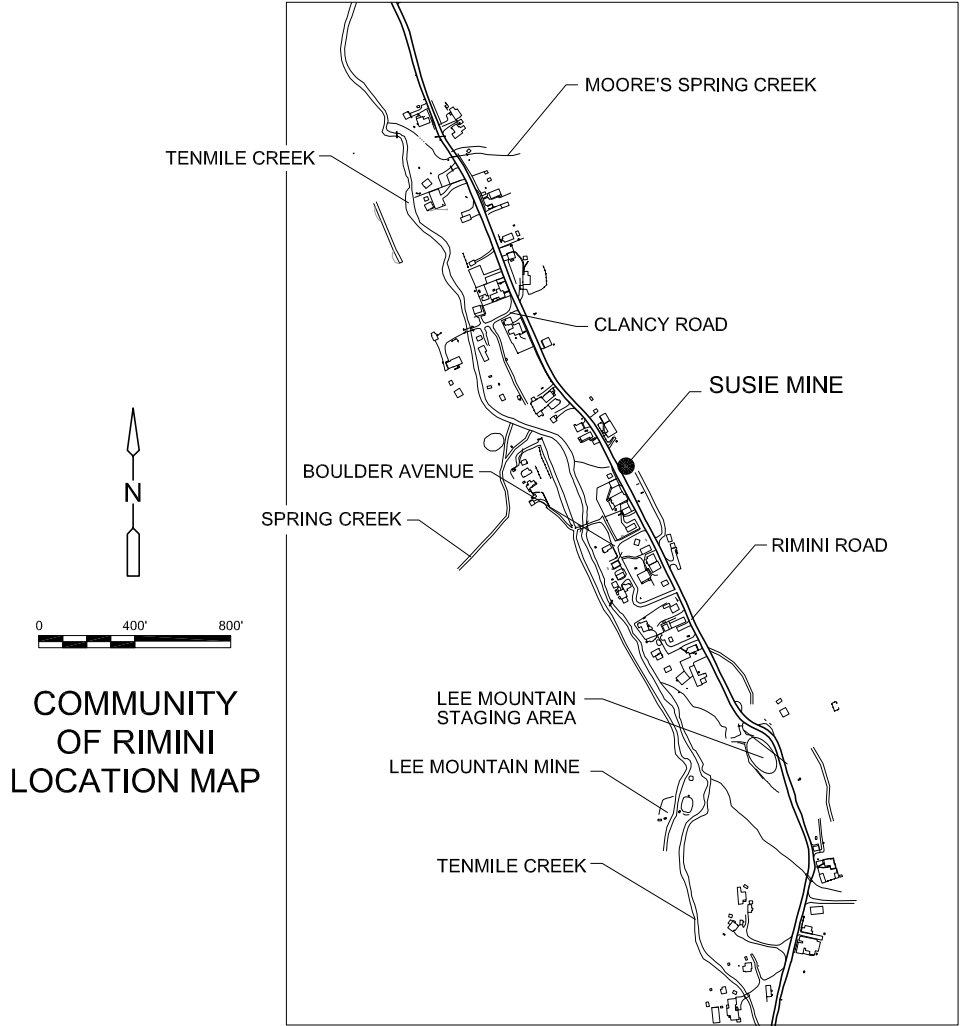
UPPER TENMILE CREEK MINING AREA SITE

2015 SUSIE MINE

REHABILITATION PROJECT

CONTRACT NO. EP-W-05-049
WORK ASSIGNMENT NO. 307-RDRD-081Y

DRAFT DESIGN DRAWINGS
MARCH 2015



Sheet Index:

G1	COVER SHEET
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D2	ADIT REHABILITATION DETAILS
D3	EROSION CONTROL DETAILS
D4	DRAIN DETAILS



US EPA
Region 8
Helena, Montana

**CDM
Smith**

consulting
engineering
construction
operations

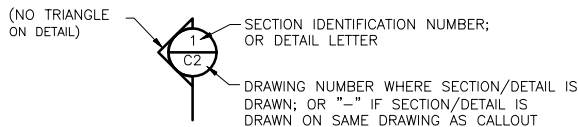
50 West 14th Street, Suite 200
Helena, Montana 59601
ph. 406-441-1400
fax 406-449-7725

Federal Programs Corporation

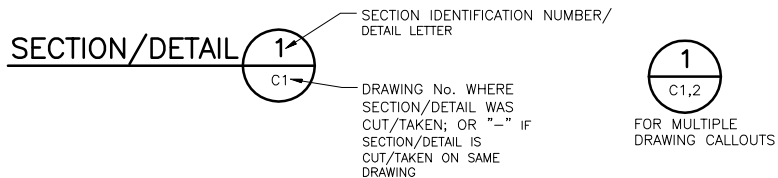
LEGEND

SYMBOL	FEATURE
	OVERHEAD ELECTRIC
	UNDERGROUND ELECTRIC
	FENCE (EXISTING, NEW)
	PROPERTY LINE
	EDGE OF ROAD
	SURVEY CONTROL POINT
	SAMPLING LOCATION AND DESIGNATION
	BRIDGE
	CULVERT OR PIPELINE (EXISTING)
	EXISTING INDEX CONTOUR LINE AND ELEVATION DESIGNATION
	EXISTING INTERMEDIATE CONTOUR LINE
	PROPOSED INDEX CONTOUR LINE AND ELEVATION DESIGNATION
	PROPOSED INTERMEDIATE CONTOUR LINE
	BUILDING OR STRUCTURE FOOTPRINT
	SHRUBBERY OR TREE
	NATURAL WATER COURSE
	DITCH
	POND
	SLUMP

SECTION AND DETAIL DESIGNATION



SECTION CUT/DETAIL CALLOUT SYMBOL



TITLE FOR SECTION/DETAIL

ABBREVIATIONS

NUMBER
% AND
Ø DIAMETER
⊙ AT
% PERCENT
Δ DEFLECTION ANGLE IN DEGREES

ASTM AMERICAN SOCIETY FOR TESTING AND MATERIALS
CLR CLEARANCE
CF CUBIC FEET
CMP CORRUGATED METAL PIPE
CMPA CORRUGATED METAL PIPE ARCH
CO CLEAN OUT
COR CONTRACTING OFFICER'S REPRESENTATIVE
DI DUCTILE IRON
DIA DIAMETER
DWG DRAWING
E EAST
EG EXISTING GROUND
ENGR ENGINEER
EPA U.S. ENVIRONMENTAL PROTECTION AGENCY
E.W. EACH WAY
FG FINAL GROUND
FT FEET
GR GRADE
GALV. GALVANIZED
GCL GEOSYNTHETIC CLAY LINER
I.D. INSIDE DIAMETER
MAT'L MATERIAL
MAX. MAXIMUM
MIN. MINIMUM
N.C. NOMINAL CROWN
NOM. DIA NOMINAL DIAMETER
HDPE HIGH DENSITY POLYETHYLENE
LDPE LINEAR LOW DENSITY POLYETHYLENE
L LENGTH OF CURVE
LF LINEAR FEET
MDEQ MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY
MISC MISCELLANEOUS
MH MANHOLE
MPWSS MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS
N NORTH
N/S NOT TO SCALE
O.D. OUTSIDE DIAMETER
OZ. OUNCES
PC POINT OF CURVATURE
PI POINT OF INTERSECTION
PRCST PRECAST
PRV PRESSURE RELEASE VALVE
PVC POLYVINYL CHLORIDE
PT POINT OF TANGENCY (END OF CURVE)
PVC POINT OF VERTICAL CURVATURE
PVI POINT OF VERTICAL INTERSECTION
PVT POINT OF VERTICAL TANGENT
QTY QUANTITY
R RADIUS OF CURVATURE
RED REDUCER
REQ'D REQUIRED
RD ROAD
RR RAILROAD
RCP REINFORCED CONCRETE PIPE
ROW RIGHT OF WAY
S SOUTH
S SUPERELEVATION
SDR STANDARD DIMENSION RATIO
STA STATION
SPA SPAN
SL SLOPE
SS SANITARY SEWERS
STD STANDARD
SY SQUARE YARDS
T TANGENT DISTANCE (FROM PI TO PT AND FROM PT TO PC)
TYP TYPICAL
UP UTILITY POLE
UG UNDERGROUND
UW UNTREATED WATER
W WEST
PW POTABLE WATER
YH YARD HYDRANT

EXISTING CONTROL POINTS:


#	NORTHING (FT)	EASTING (FT)	ELEVATION (FT)	DESCRIPTION
1	828675.571	1276850.998	5248.868	SUSIE1, 5/8" REBAR
2	828850.614	1276808.749	5260.550	SUSIE2, 5/8" REBAR

CONTROL BASED ON STATE PLANE COORDINATES FOR MONTANA NAD 83, NAVD 88.

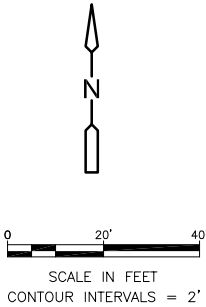
STATE PLANE COORDINATES COMBINED SCALE FACTOR FOR CONVERSION TO GROUND: 1.0002649

EXISTING CONDITIONS GENERAL NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF CURRENT CONDITIONS AND LOCATIONS OF ALL THE EXISTING ITEMS WITHIN OR ADJACENT TO THE WORK, OR THAT MAY BE DISTURBED BY THE WORK.
2. THE LOCATIONS OF ALL SUBSURFACE SOIL OR ROCK CONDITIONS ARE BASED ON THE BEST AVAILABLE INFORMATION AND SHOWN LOCATIONS MAY NOT BE EXACT.
3. THE CONTRACTOR SHALL VERIFY LOCATIONS OF ALL EXISTING SURFACE FEATURES, AND OTHER EXISTING ITEMS.
4. SURVEY CONTROL POINTS, TOPOGRAPHY, AND PROPERTY BOUNDARY LOCATIONS WERE PROVIDED BY OTHERS.

					DESIGNED BY: <u>B.LAMBETH</u>	 50 West 14th Street Helena, Montana 59601 Tel: (406) 441-1400	U.S. EPA - REGION 8 CONTRACT NO. EP-W-05-049 WORK ASSIGNMENT NO. 307-RDRD-081Y UPPER TENMILE CREEK MINING AREA SITE 2015 SUSIE MINE REHABILITATION PROJECT	GENERAL CIVIL LEGEND AND ABBREVIATIONS	PROJECT NO.
				DRAWN BY: <u>M. WAINWRIGHT</u>	FILE NAME: <u>G2-LEGEND</u>				
				SHEET CHK'D BY: <u>D. SHANIGHT</u>	SHEET NO.				
				CROSS CHK'D BY: <u>D.STORDAHL</u>	G2				
REV. NO.	DATE	DRWN	CHKD	REMARKS	APPROVED BY: <u>B.BUCHER</u>				
					DATE: <u>MARCH 2015</u>				

K:\Tennile Susie Adit\dwg\ C1 -EXISTING CONDITION 10/26/11 07:07 nyeba XREES: 79171_TB, CSTPL-SUSIE
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PRELIMINARY SUBMITTAL - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. LAMBETH
DRAWN BY: M. WAINWRIGHT
SHEET CHK'D BY: D. SHANIGHT
CROSS CHK'D BY: D.STORDAHL
APPROVED BY: B.BUCHER
DATE: MARCH 2015

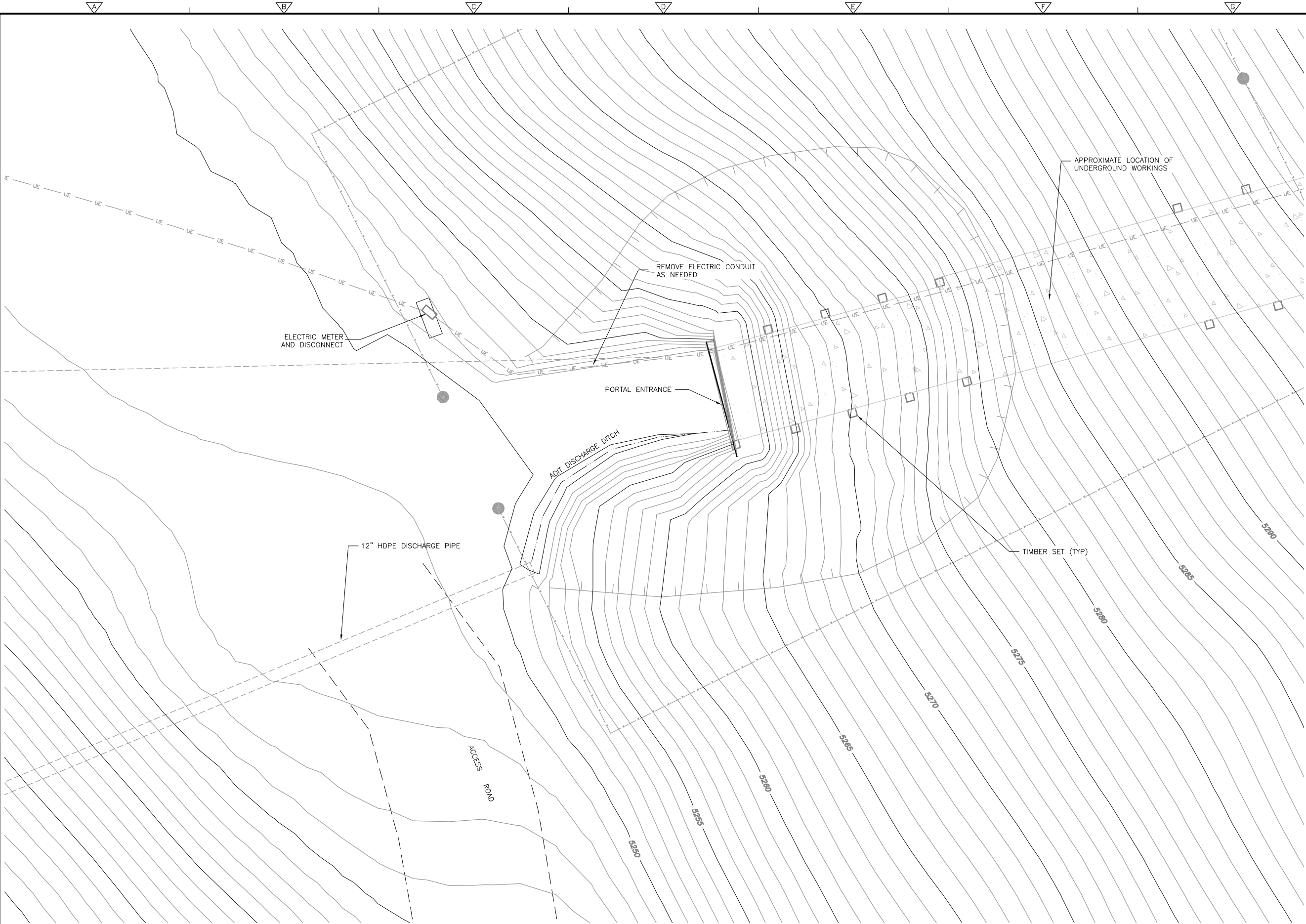


U.S. EPA - REGION 8
CONTRACT NO. EP-W-05-049
WORK ASSIGNMENT NO. 307-RDRD-081Y
UPPER TENMILE CREEK MINING AREA SITE
**2015 SUSIE MINE
REHABILITATION PROJECT**

**GENERAL SITE PLAN
WORK THIS CONTRACT**

PROJECT NO.
FILE NAME: CSTPL-SU-001
SHEET NO.
C1

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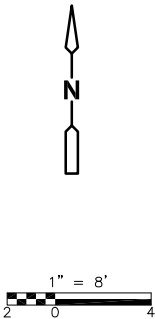
LEGEND:

- EXISTING SURFACE INDEX CONTOUR
- EXISTING SURFACE INTERMEDIATE CONTOUR
- EXCAVATION SURFACE INDEX CONTOUR
- EXCAVATION SURFACE INTERMEDIATE CONTOUR
- UE — UNDERGROUND ELECTRIC CONDUIT

NOTES:

- APPROXIMATE EXCAVATION AND BACKFILL QUANTITIES:

EXCAVATION	70 CY
BACKFILL	220 CY
- SALVAGE TOPSOIL FOR REAPPLICATION.



PRELIMINARY SUBMITTAL - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

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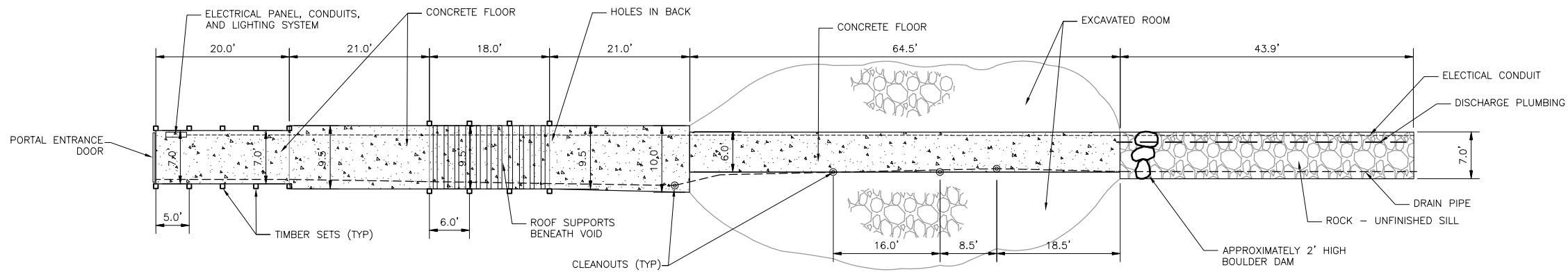
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WORK ASSIGNMENT NO. 307-RDRD-081Y
UPPER TENMILE CREEK MINING AREA SITE
**2015 SUSIE MINE
REHABILITATION PROJECT**

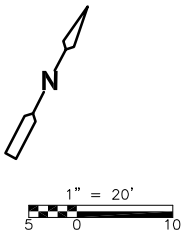
MINE PORTAL
EXCAVATION

PROJECT NO.
FILE NAME: CSTPL-SU-001
SHEET NO.
C2

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MINE ADIT EXISTING CONDITIONS
PLAN
1"=20'



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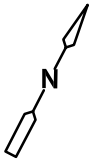
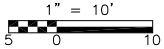
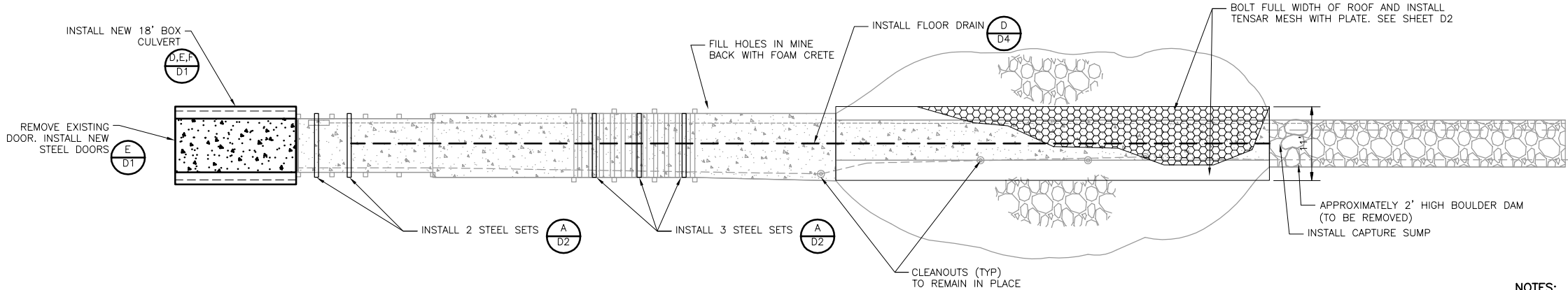
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UPPER TENMILE CREEK MINING AREA SITE
**2015 SUSIE MINE
REHABILITATION PROJECT**

**MINE ADIT
EXISTING CONDITIONS**

PROJECT NO.
FILE NAME: SUSIE 20110831
SHEET NO.
C4

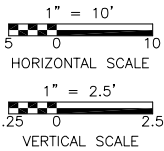
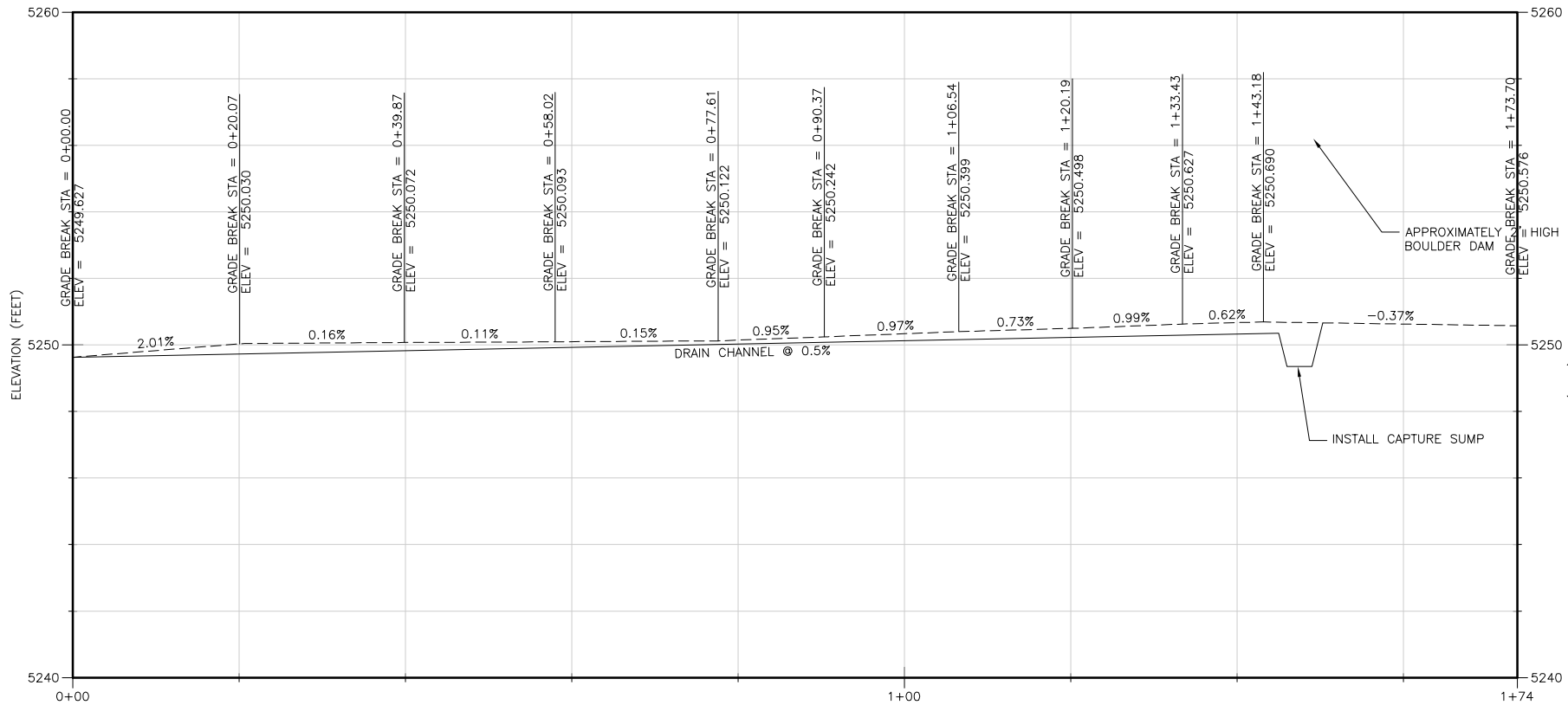
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NOTES:

1. REFER TO SPECIFICATION 02999 MINE ADIT REHABILITATION FOR ADDITIONAL INFORMATION.

MINE ADIT REHABILITATION
PLAN
1"=10'



PRELIMINARY SUBMITTAL - NOT FOR CONSTRUCTION

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DATE: MARCH 2015

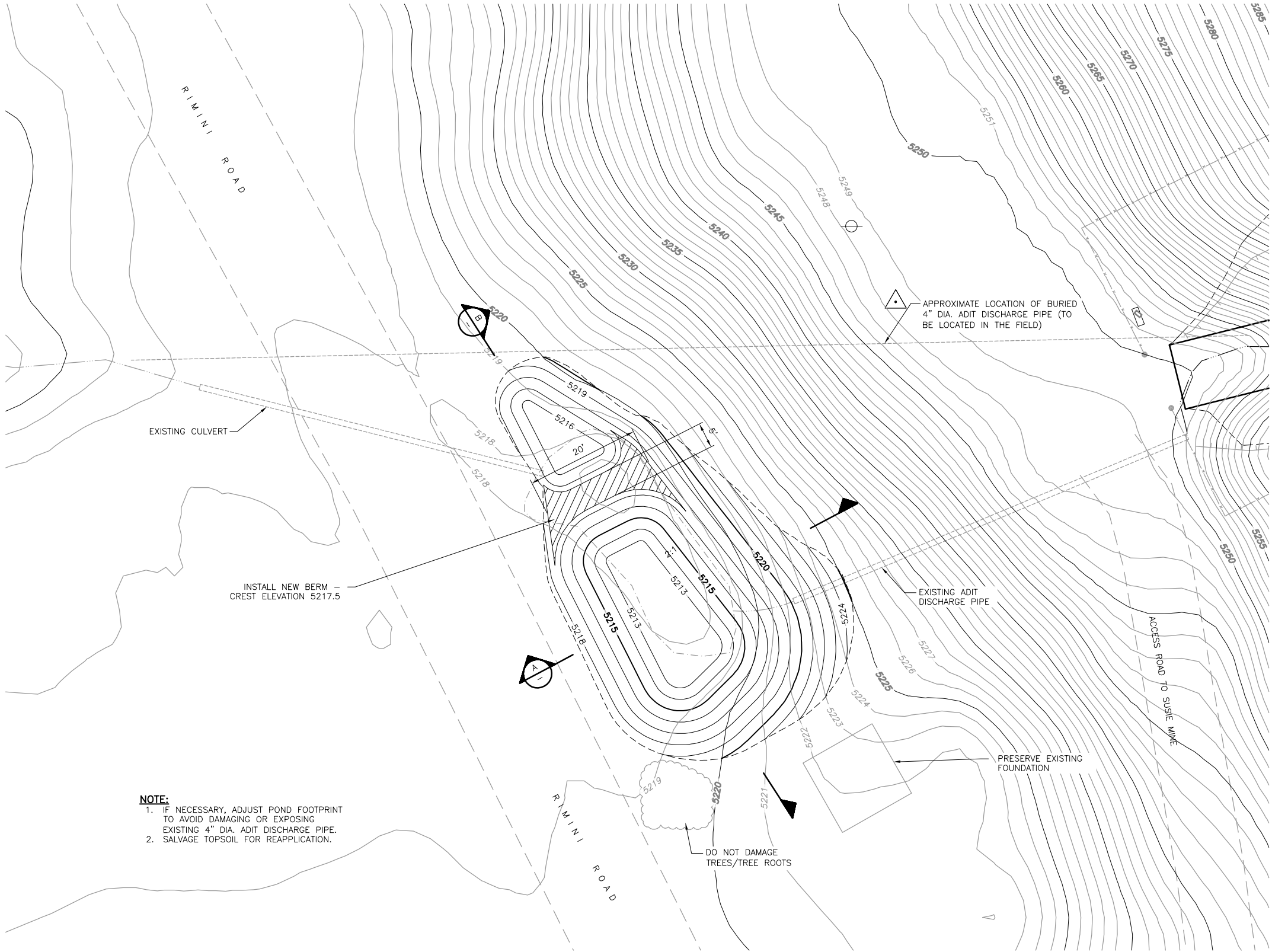
CDM Smith
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Helena, Montana 59601
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**2015 SUSIE MINE
REHABILITATION PROJECT**

**MINE ADIT
REHABILITATION**

PROJECT NO.
FILE NAME: SUSIE 20110831
SHEET NO.
C5

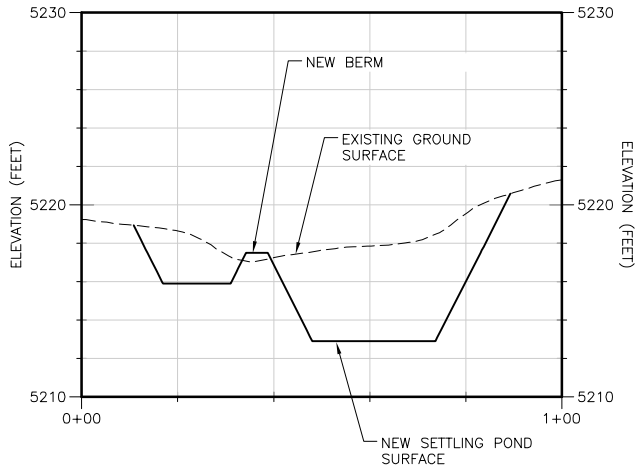
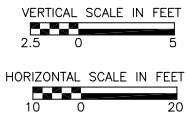
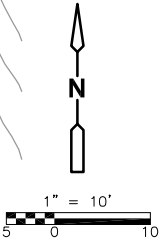
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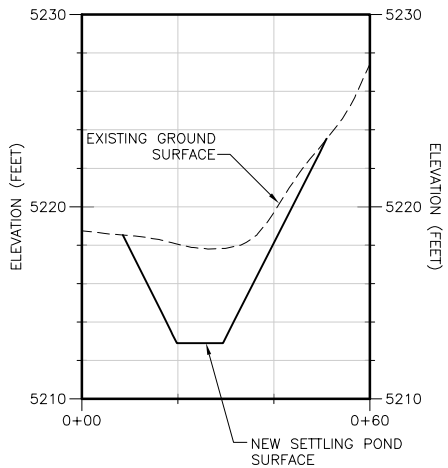
LEGEND:

- EXISTING SURFACE INDEX CONTOUR
- EXISTING SURFACE INTERMEDIATE CONTOUR
- EXCAVATION SURFACE INDEX CONTOUR
- EXCAVATION SURFACE INTERMEDIATE CONTOUR

SETTLING POND PLAN



**LONGITUDINAL SECTION - NORTH/SOUTH
SECTION B**



**CROSS SECTION - EAST/WEST
SECTION A**

PRELIMINARY SUBMITTAL - NOT FOR CONSTRUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY:	B. LAMBERT
DRAWN BY:	M. WAINWRIGHT
SHEET CHK'D BY:	D. SHANIGHT
CROSS CHK'D BY:	D. STORDAHL
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DATE:	MARCH 2015

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U.S. EPA - REGION 8
CONTRACT NO. EP-W-05-049
WORK ASSIGNMENT NO. 307-RDRD-081Y
UPPER TENMILE CREEK MINING AREA SITE
**2015 SUSIE MINE
REHABILITATION PROJECT**

**SETTLING POND
RECONSTRUCTION**

PROJECT NO.
FILE NAME: 6-SETTLING_POND
SHEET NO.
C6