

## **Appendix 8      Mechanical Infrastructure Permit Application Support Drawings**

## Errata Sheet

### Poly Met Mining, Inc. NorthMet Project

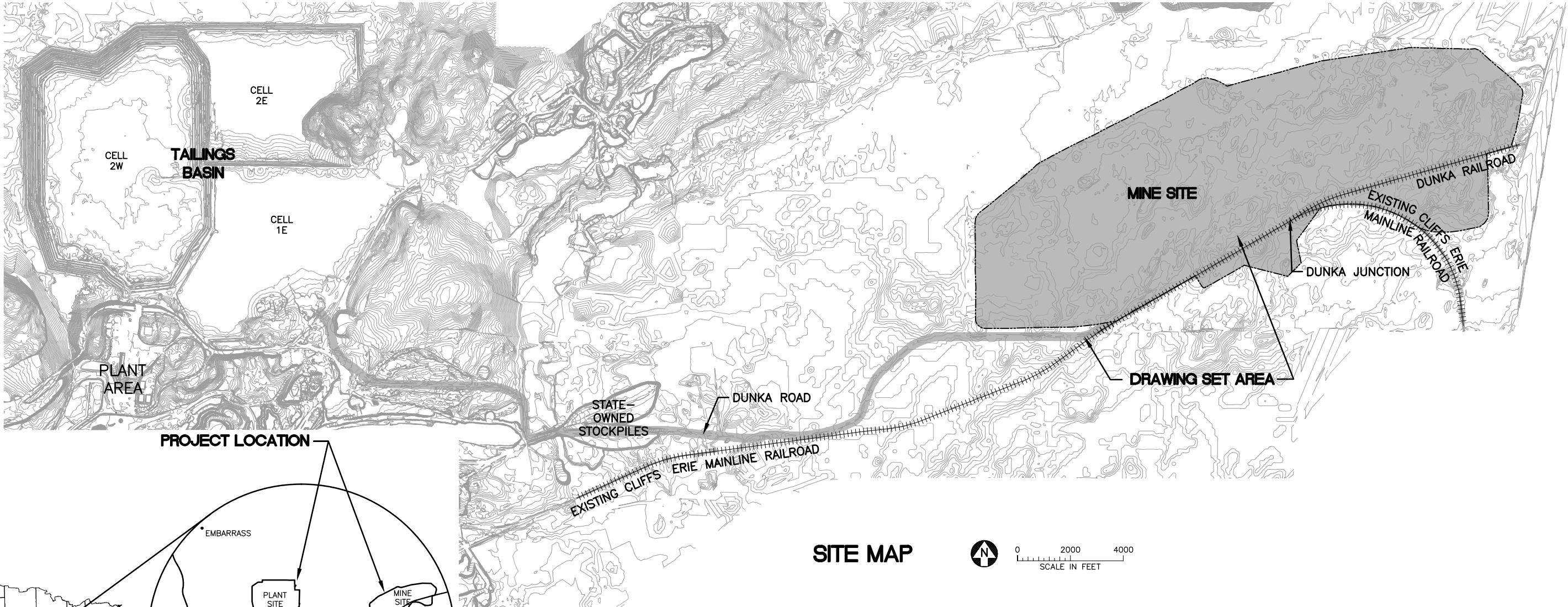
### Permit Application Support Drawings: Mechanical Infrastructure

July 2016 (version 2)

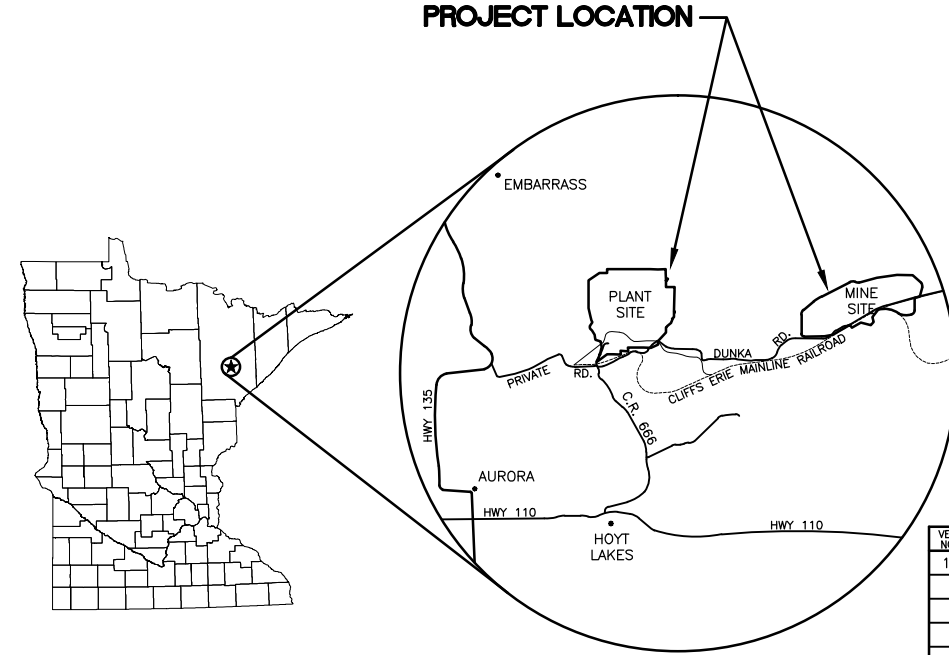
Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (e.g., supplementary geotechnical data); therefore, additional adjustments may be made during final design that will be incorporated into the final design drawing set.

Drawing Sheet(s)	Change
Global change to all sheets, as needed	The terminology "mine drainage" as noted in these drawings will be changed to "mine water".
TWP-009	The berm over the TWP will be revised to match the contours of the road where it crosses the proposed access road near the CPS.
TWP-010	The option of 1" minus rock as the top berm surface was eliminated to minimize additional impervious surfaces. Remove "or 1" minus rock" text on Sections 1, 2, 4, & 5.
MD-001	An access road will be added adjacent to a Mine Water pipe for construction and maintenance purposes. This access road will follow the Mine Water pipe that connects the Category 1 Stockpile and Haul Road F (in a general north-south orientation).
MD-003	The grading for the access road from the Fueling and Maintenance Facility to Pond MD-SOSP & Sump SOSP will be revised to optimize drainage.

POLY MET MINING, INC. NORTHMET PROJECT  
PERMIT APPLICATION SUPPORT DRAWINGS  
MECHANICAL INFRASTRUCTURE  
HOYT LAKES, MINNESOTA



SITE MAP



LOCATION MAP  
NOT TO SCALE



VICINITY MAP  
NOT TO SCALE

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	ISSUED		
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			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINTED NAME: CHRISTIE KEARNEY  
SIGNATURE: *Christie Kearney*  
DATE: 5/18/15 LICENSE# 48864

DRAWN: VJS  
CHECKED: CMK2  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:	
MECHANICAL INFRASTRUCTURE GENERAL DWGS LOCATION MAP AND SITE MAP	
	POLY MET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA
	BARR ENGINEERING COMPANY 4700 WEST 77TH STREET MINNEAPOLIS, MN. Ph: 1-800-632-2277
DWG. NO. ME-001	REV

CADD USER: Veronica Sackett FILE: K:\DESIGN\238900C29.10\PERMIT\_NMM-50-TS-002.DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 12:49 PM

INCHES

1

2

SHEET INDEX

MECHANICAL INFRASTRUCTURE LEGEND

GENERAL

	EXISTING CONTOUR - MAJOR
	EXISTING CONTOUR - MINOR
	PROPOSED CONTOUR - MAJOR
	PROPOSED CONTOUR - MINOR
	OTHER FACILITY PROPOSED CONTOUR - MAJOR
	OTHER FACILITY PROPOSED CONTOUR - MINOR
	PROPOSED RAILROAD
	EXISTING RAILROAD
	PROPOSED ACCESS ROADS
	EXISTING ROAD
	MINE SITE BOUNDARY
	WETLAND BOUNDARY
	HAUL ROAD

TREATED WATER PIPELINE

	EXISTING POWER POLE
	EXISTING TRAIL
	EXISTING UNIMPROVED TRAIL
	RIGHT OF WAY
	EXISTING STRUCTURES
	TREE LINE
	EXISTING OVERHEAD ELECTRIC
	EXISTING UNDERGROUND ELECTRIC
	PROPOSED TREATED WATER PIPELINE
	PROPOSED CULVERT (NON-MINE DRAINAGE)
	PROPOSED MINE DRAINAGE PIPE

NOTES

- COORDINATE SYSTEM IS MINNESOTA STATE PLANE NORTH ZONE, NAD83.
- ELEVATIONS ARE MEAN SEA LEVEL (MSL), NAVD88.
- EXISTING TOPOGRAPHIC INFORMATION SHOWN ON THE DRAWINGS WAS PREPARED BY AEROMETRIC, INC. FROM LIDAR DATA COLLECTED ON MARCH 17, 2010.

CENTRAL PUMPING STATION

	PROPOSED TREATED WATER PIPELINE
	PROPOSED CULVERT (NON-MINE DRAINAGE)
	PROPOSED MINE DRAINAGE PIPE

MINE DRAINAGE

	PROPOSED MINE DRAINAGE PIPE
	TOP OF DIKE BENCH
	PROPOSED MINE DRAINAGE CULVERT
	PROPOSED SUMP MANHOLE
	PROPOSED TREATED WATER PIPELINE
	PROPOSED HAUL ROAD MINE DRAINAGE DITCH
	PROPOSED STOCKPILE LINER OUTLET PIPE
	PROPOSED MINE DRAINAGE WATERSHED

SHEET NO. TITLE

MECHANICAL INFRASTRUCTURE GENERAL DRAWINGS

ME-001	LOCATION MAP AND SITE MAP
ME-002	LEGEND & SHEET INDEX
ME-003	MINE SITE - MINE DRAINAGE FLOW DIAGRAM
ME-004	MINE SITE - SUMP, POND AND PIPE DETAIL TABLES

TREATED WATER PIPELINE DRAWINGS

TWP-001	GENERAL LAYOUT AND SHEET INDEX
TWP-002	PLAN & PROFILE STATION 113+70 TO 130+00
TWP-003	PLAN & PROFILE STATION 130+00 TO 190+00
TWP-004	PLAN & PROFILE STATION 190+00 TO 250+00
TWP-005	PLAN & PROFILE STATION 250+00 TO 310+00
TWP-006	PLAN & PROFILE STATION 310+00 TO 370+00
TWP-007	PLAN & PROFILE STATION 370+00 TO 430+00
TWP-008	PLAN & PROFILE STATION 430+00 TO 490+00
TWP-009	PLAN & PROFILE STATION 490+00 TO 512+50
TWP-010	PIPELINE INSTALLATION TYPICAL SECTIONS
TWP-011	DETAILS
TWP-012	DETAILS IN CLOSURE

CENTRAL PUMPING STATION (CPS) DRAWINGS

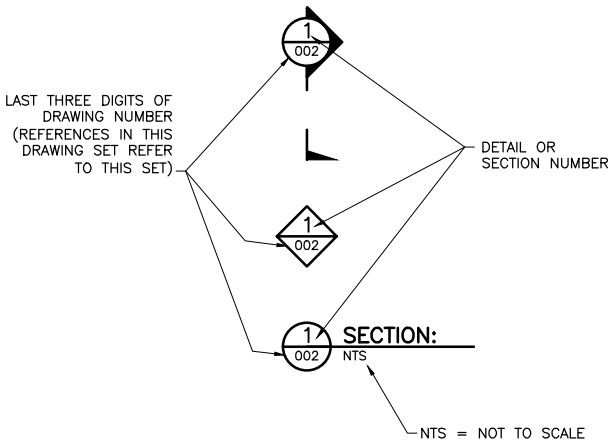
CPS-001	SITE PLAN
CPS-002	PUMP STATION PLAN
CPS-003	PROCESS FLOW DIAGRAM

SHEET NO. TITLE

MINE DRAINAGE DRAWINGS

MD-001	YEAR 1 GENERAL LAYOUT
MD-002	YEAR 11 GENERAL LAYOUT
MD-003	SUMP SOSP & MD-SOSP GRADING PLAN
MD-004	SUMP S4 & MD-S4 GRADING PLAN
MD-005	SUMP S23-1 & MD-S23-1 GRADING PLAN
MD-006	SUMP S23-2 GRADING PLAN
MD-007	SUMP S23-3 & MD-S23-3 GRADING PLAN
MD-008	POND MD-OSLA GRADING PLAN
MD-009	POND MD-RTH GRADING PLAN
MD-010	POND MD-HRE GRADING PLAN
MD-011	POND MD-HRC GRADING PLAN
MD-012	POND MD-HRW GRADING PLAN
MD-013	POND MD-HRN GRADING PLAN
MD-014	SUMP/POND TYPICAL DETAILS
MD-015	PIPE TYPICAL DETAILS
MD-016	CLOSURE PLAN

DRAWING NUMBERING



ABBREVIATIONS

AC-FT	-	ACRE-FEET
AVE	-	AVERAGE
CAT	-	CATEGORY
C	-	CENTERLINE
CMP	-	CORRUGATED METAL PIPE
CPS	-	CENTRAL PUMPING STATION
DIP	-	DUCTILE IRON PIPE
DV	-	DRAIN VALVE
DWG	-	DRAWING
EL.	-	ELEVATION
GAL	-	GALLONS
GCL	-	GEOSYNTHETIC CLAY LINER
GPM	-	GALLONS PER MINUTE
HDPE	-	HIGH-DENSITY POLYETHYLENE
HRC	-	HAUL ROAD CENTRAL
HRE	-	HAUL ROAD EAST
HRN	-	HAUL ROAD NORTH
HRW	-	HAUL ROAD WEST
INV	-	INVERT
LF	-	LINEAR FEET
MD	-	MINE DRAINAGE
MG	-	MILLION GALLONS
MH	-	MANHOLE
MIL	-	MEASUREMENT OF LINER THICKNESS; A MIL IS A THOUSANDTH OF AN INCH
MIN	-	MINIMUM
MnDOT	-	MINNESOTA DEPARTMENT OF TRANSPORTATION
OSLA	-	OVERBURDEN STORAGE AND LAYDOWN AREA
OSP	-	ORE SURGE PILE
PL	-	PIPELINE
PSI	-	POUNDS PER SQUARE INCH
RTH	-	RAIL TRANSFER HOPPER
SDR	-	STANDARD DIMENSION RATIO
STA	-	STATION
STOCKPILE	-	WASTE ROCK STOCKPILE
TDH	-	TOTAL DESIGN HEAD
TWP	-	TREATED WATER PIPELINE
TYP	-	TYPICAL
V/A	-	VACUUM/AIR RELIEF
WWTF	-	WASTE WATER TREATMENT FACILITY

PLANT DRAWING NUMBER:

MECHANICAL INFRASTRUCTURE GENERAL DWGS  
LEGEND AND SHEET INDEX



POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA



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DRAWN:  
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BARR PROJECT NO.:  
23/69-0C29

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DWG. NO.  
ME-002

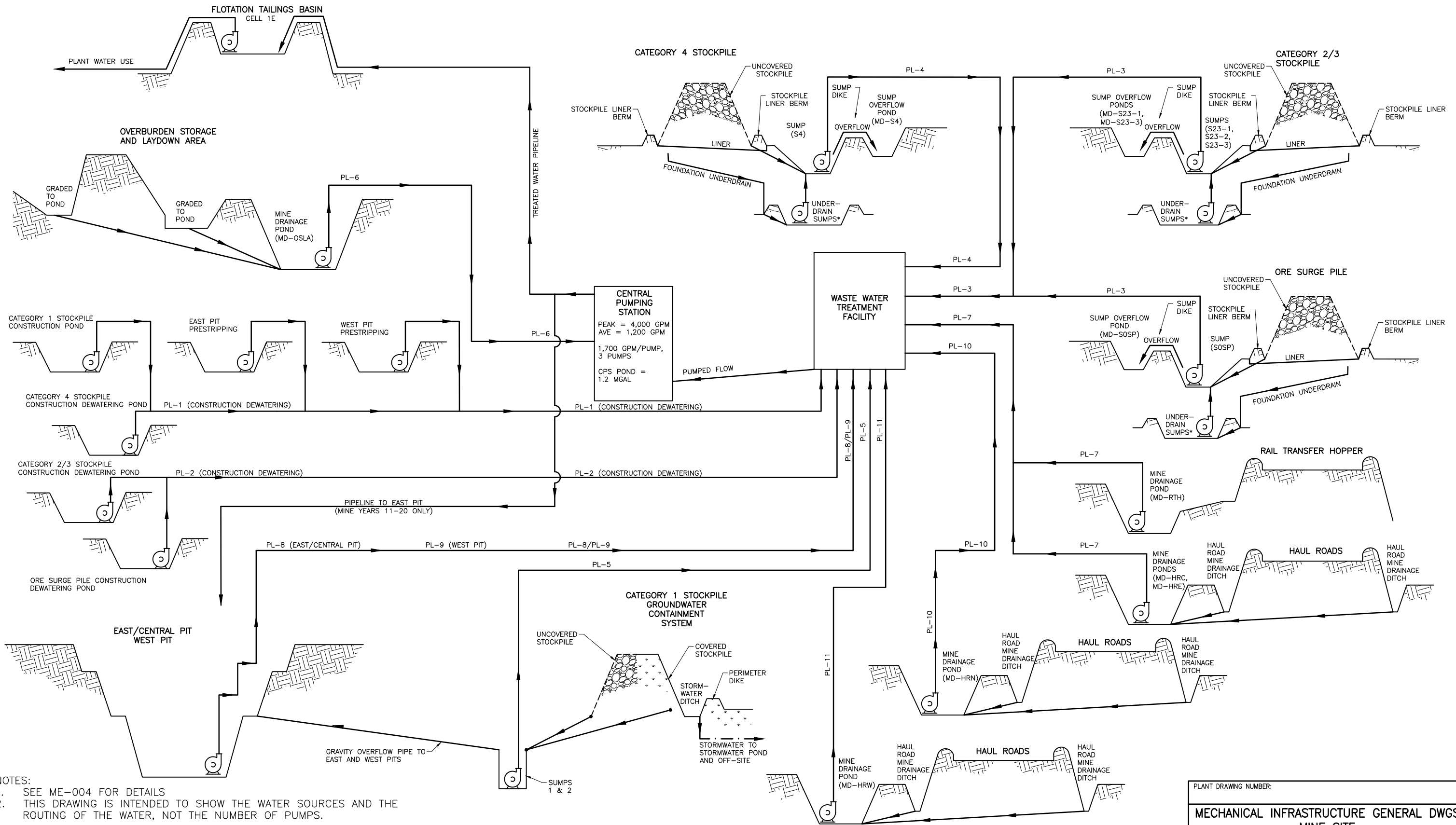
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1  
INCHES



- NOTES:
- SEE ME-004 FOR DETAILS
  - THIS DRAWING IS INTENDED TO SHOW THE WATER SOURCES AND THE ROUTING OF THE WATER, NOT THE NUMBER OF PUMPS.

\* ROUTING OF THIS WATER WILL BE TO THE WWTF OR CPS DEPENDING ON WATER QUALITY TESTING RESULTS.

LEGEND

- STORMWATER FLOW
- SITE MINE DRAINAGE FLOW
- COVERED STOCKPILE/GRASS
- UNCOVERED STOCKPILE
- UNCOVERED EARTHWORK
- PUMP

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PLANT DRAWING NUMBER:

MECHANICAL INFRASTRUCTURE GENERAL DWGS  
MINE SITE  
MINE DRAINAGE FLOW DIAGRAM



POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA



BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO.

ME-003

REV

SUMPS – TEMPORARY

ID	DESCRIPTION	OBJECTIVES	MINE YEARS	DESIGN VOLUME* (GAL)	APPROXIMATE PUMP CAPACITY		LINER TYPE	ACTUAL VOLUME* (GAL)	OVERFLOWS TO	SHOWN ON SHEET #
					GPM	TDH (FT)				
S23-1	CATEGORY 2/3 STOCKPILE SUMP	PROVIDE RUNOFF STORAGE FOR THE 10 YEAR 24 HOUR EVENT	1-19	4,855,000	190	210	MINE DRAINAGE SUMP LINER	4,855,000	MD-S23-1	MD-005
S23-2	CATEGORY 2/3 STOCKPILE SUMP	PROVIDE RUNOFF STORAGE FOR THE 10 YEAR 24 HOUR EVENT	3-17	3,878,000	150	230	MINE DRAINAGE SUMP LINER	3,910,000	MD-S23-1	MD-006
S23-3	CATEGORY 2/3 STOCKPILE SUMP	PROVIDE RUNOFF STORAGE FOR THE 10 YEAR 24 HOUR EVENT	6-16	2,151,000	90	270	MINE DRAINAGE SUMP LINER	2,151,000	MD-S23-3	MD-007
S4	CATEGORY 4 STOCKPILE SUMP	PROVIDE RUNOFF STORAGE FOR THE 10 YEAR 24 HOUR EVENT	1-11	3,291,000	130	50	MINE DRAINAGE SUMP LINER	4,073,000	MD-S4	MD-004
SOSP	ORE SURGE PILE SUMP	PROVIDE RUNOFF STORAGE FOR THE 10 YEAR 24 HOUR EVENT	1-20	2,770,000	80	90	MINE DRAINAGE SUMP LINER	2,835,000	MD-SOSP	MD-003

\* DESIGN VOLUME REFLECTS THE VOLUME REQUIRED BASED ON THE DESIGN NEEDS; WHEREAS ACTUAL VOLUME REFLECTS THE VOLUME SHOWN IN THE ATTACHED DRAWING SET. ACTUAL VOLUME DOES NOT INCLUDE ADDITIONAL VOLUME FROM 3 FEET OF FREEBOARD

MINE PIT SUMPS

ID	DESCRIPTION	OBJECTIVES	MINE YEARS	INITIAL SUMP CAPACITY (AC-FT)	MAXIMUM SUMP CAPACITY (AC-FT)	APPROXIMATE PUMP CAPACITY – INITIAL YEAR AND MAXIMUM YEAR		OVERFLOWS TO
						GPM	TDH (FT)	
WP-W	WEST PIT – WEST SUMP	*COLLECTION IN PIT	2-20	6.6	14.0	YEAR 2: 820 YEAR 20: 1,590	YEAR 2: 120 YEAR 20: 740	NONE
WP-E	WEST PIT – EAST SUMP	*COLLECTION IN PIT	10-20	4.7	9.4	YEAR 10: 530 YEAR 20: 1,050	YEAR 10: 110 YEAR 20: 350	NONE
EP	EAST PIT	*COLLECTION IN PIT	1-20	11.6	19.5	YEAR 1: 1,520 YEAR 11: 2,340	YEAR 1: 120 YEAR 11: 750	NONE
CP	CENTRAL PIT	*COLLECTION IN PIT	11-20	3.8	3.8	YEAR 11: 440 YEAR 16: 440	YEAR 1: 60 YEAR 16: 390	NONE

\* PIT COLLECTION IS BASED ON 40% OF THE AVERAGE ANNUAL SNOW MELT OCCURRING WITHIN ONE DAY AND THE PUMP CAPACITY DESIGNED TO REMOVE THAT SNOW MELT EVENT WITHIN 3 DAYS

SUMPS – PERMANENT

ID	DESCRIPTION	OBJECTIVES	MINE YEARS	MINIMUM CAPACITY (GAL)	APPROXIMATE PUMP CAPACITY		LINER TYPE	OVERFLOWS TO	SHOWN ON SHEET #
					GPM	TDH (FT)			
SUMP 1	CATEGORY 1 STOCKPILE SUMP – EAST	COLLECTION FOR GROUNDWATER CONTAINMENT SYSTEM	1-20+	NA – MANHOLE	7,200	50	NA – MANHOLE	EAST PIT	SEE CATEGORY 1 STOCKPILE CONTAINMENT SYSTEM DRAWING SET
SUMP 2	CATEGORY 1 STOCKPILE SUMP – WEST	COLLECTION FOR GROUNDWATER CONTAINMENT SYSTEM	1-20+	NA – MANHOLE	7,200	50	NA – MANHOLE	WEST PIT	

NOTES:

1. ACTUAL PUMP, PIPE, AND POND SIZES WILL BE OPTIMIZED IN FINAL DESIGN
2. STANDARDIZED PUMP SIZE TO BE DETERMINED DURING FINAL DESIGN
3. SOIL LINER 2 IS SHOWN IN DETAIL 2 ON SHEET CPS-002
4. MINE DRAINAGE SUMP LINER IS SHOWN IN DETAIL 1 ON SHEET MD-014
5. MINE DRAINAGE POND LINER IS SHOWN IN DETAIL 2 ON SHEET MD-014
6. ALL PUMP CAPACITY FLOWS AND TDH VALUES HAVE BEEN ROUNDED

MINE DRAINAGE PONDS

ID	DESCRIPTION	OBJECTIVES	MINE YEARS	DESIGN VOLUME* (GAL)	APPROXIMATE PUMP CAPACITY		LINER TYPE	ACTUAL VOLUME* (GAL)	OVERFLOWS TO	SHOWN ON SHEET #
					GPM	TDH (FT)				
CPS	CENTRAL PUMPING STATION POND	STORE WATER FOR CPS CONVEYANCE	1-20+	1,200,000	4,000	450	SOIL LINER 2	1,200,000	NONE	CPS-001
MD-S23-1	CATEGORY 2/3 STOCKPILE SUMP OVERFLOW POND	PROVIDE SUMP OVERFLOW STORAGE UP TO THE 100 YEAR 24 HOUR EVENT	1-19	6,973,000	NA	NA	MINE DRAINAGE POND LINER	7,006,000	NONE	MD-005/ MD-006
MD-S23-3	CATEGORY 2/3 STOCKPILE SUMP OVERFLOW POND	PROVIDE SUMP OVERFLOW STORAGE UP TO THE 100 YEAR 24 HOUR EVENT	6-16	1,727,000	NA	NA	MINE DRAINAGE POND LINER	1,727,000	NONE	MD-007
MD-S4	CATEGORY 4 STOCKPILE SUMP OVERFLOW POND	PROVIDE SUMP OVERFLOW STORAGE UP TO THE 100 YEAR 24 HOUR EVENT	1-11	2,639,000	NA	NA	MINE DRAINAGE POND LINER	3,226,000	NONE	MD-004
MD-SOSP	ORE SURGE PILE SUMP OVERFLOW POND	PROVIDE SUMP OVERFLOW STORAGE UP TO THE 100 YEAR 24 HOUR EVENT	1-20	1,564,000	NA	NA	MINE DRAINAGE POND LINER	1,727,000	NONE	MD-003
MD-HRC	HAUL ROAD RUNOFF POND	PROVIDE FLOOD STORAGE UP TO THE 100 YEAR 24 HOUR EVENT AND REDUCE TSS	1-20	1,988,000	40	80	MINE DRAINAGE POND LINER	2,248,000	NONE	MD-011
MD-HRE	HAUL ROAD RUNOFF POND	PROVIDE FLOOD STORAGE UP TO THE 100 YEAR 24 HOUR EVENT AND REDUCE TSS	1-20	3,487,000	70	110	MINE DRAINAGE POND LINER	3,487,000	NONE	MD-010
MD-HRW	HAUL ROAD RUNOFF POND	PROVIDE FLOOD STORAGE UP TO THE 100 YEAR 24 HOUR EVENT AND REDUCE TSS	2-20	1,206,000	30	70	MINE DRAINAGE POND LINER	1,303,000	NONE	MD-012
MD-HRN	HAUL ROAD RUNOFF POND	PROVIDE FLOOD STORAGE UP TO THE 100 YEAR 24 HOUR EVENT AND REDUCE TSS	2-20	1,434,000	30	110	MINE DRAINAGE POND LINER	1,499,000	NONE	MD-013
MD-RTH	RAIL TRANSFER HOPPER RUNOFF POND	PROVIDE FLOOD STORAGE UP TO THE 100 YEAR 24 HOUR EVENT AND REDUCE TSS	1-20	228,000	200	60	MINE DRAINAGE SUMP LINER	228,000	NONE	MD-009
MD-OSLA	OVERBURDEN STORAGE & LAYDOWN AREA RUNOFF POND	PROVIDE FLOOD STORAGE UP TO THE 25 YEAR 24 HOUR EVENT AND REDUCE TSS	1-20	3,487,000	100	90	NONE	4,725,000	NONE	MD-008
TEMP (VARIOUS)	STOCKPILE CONSTRUCTION RUNOFF PONDS AND PIT STRIPPING	TEMPORARY POND TO COLLECT RUNOFF DURING CONSTRUCTION	VARIES	VARIES	VARIES	VARIES	NONE	VARIES	NONE	NONE

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PIPING


ID	DESCRIPTION	OBJECTIVES	WATER SOURCE	NOMINAL PIPE SIZES* (IN)
TWP	TREATED WATER PIPELINE	TRANSPORT WATER FROM THE CPS TO FLOTATION TAILINGS BASIN	CPS	20
PL-1	PIPELINE NUMBER 1	TRANSPORT CONSTRUCTION WATER TO THE WWTF	TEMP – CAT 1, CAT 4, EAST PIT & WEST PIT	2 TO 8
PL-2	PIPELINE NUMBER 2	TRANSPORT CONSTRUCTION WATER TO THE WWTF	TEMP – CAT 2/3 + OSP	2 TO 8
PL-3	PIPELINE NUMBER 3	TRANSPORT MINE DRAINAGE TO THE WWTF	CAT 2/3 & OSP	3 TO 8
PL-4	PIPELINE NUMBER 4	TRANSPORT MINE DRAINAGE TO THE WWTF	CAT 4	4
PL-5	PIPELINE NUMBER 5	TRANSPORT MINE DRAINAGE TO THE WWTF	CAT 1	28 TO 42
PL-6	PIPELINE NUMBER 6	TRANSPORT MINE DRAINAGE TO THE CPS	OSLA	3
PL-7	PIPELINE NUMBER 7	TRANSPORT MINE DRAINAGE TO THE WWTF	RTH, MD-HRE & MD-HRC	2 TO 6
PL-8	PIPELINE NUMBER 8	TRANSPORT MINE DRAINAGE TO THE WWTF	EAST PIT & CENTRAL PIT	12 TO 20
PL-9	PIPELINE NUMBER 9	TRANSPORT MINE DRAINAGE TO THE WWTF	WEST PIT	10 TO 22
PL-10	PIPELINE NUMBER 10	TRANSPORT MINE DRAINAGE TO THE WWTF	MD-HRN	2
PL-11	PIPELINE NUMBER 11	TRANSPORT MINE DRAINAGE TO THE WWTF	MD-HRW	2

\*ALL PIPES ARE SIZED BASED ON THE USE OF HDPE SDR 11 PIPE

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PRINTED NAME CHRISTIE KEARNEY

SIGNATURE 

DATE 5/18/15 LICENSE# 48864

DRAWN: VJS


CHECKED: CMK2

BARR PROJECT NO.: 23/69-0C29


SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MECHANICAL INFRASTRUCTURE GENERAL DWGS  
MINE SITE  
SUMP, POND AND PIPE DETAIL TABLES



POLY MET MINING, INC.  
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HOYT LAKES, MINNESOTA



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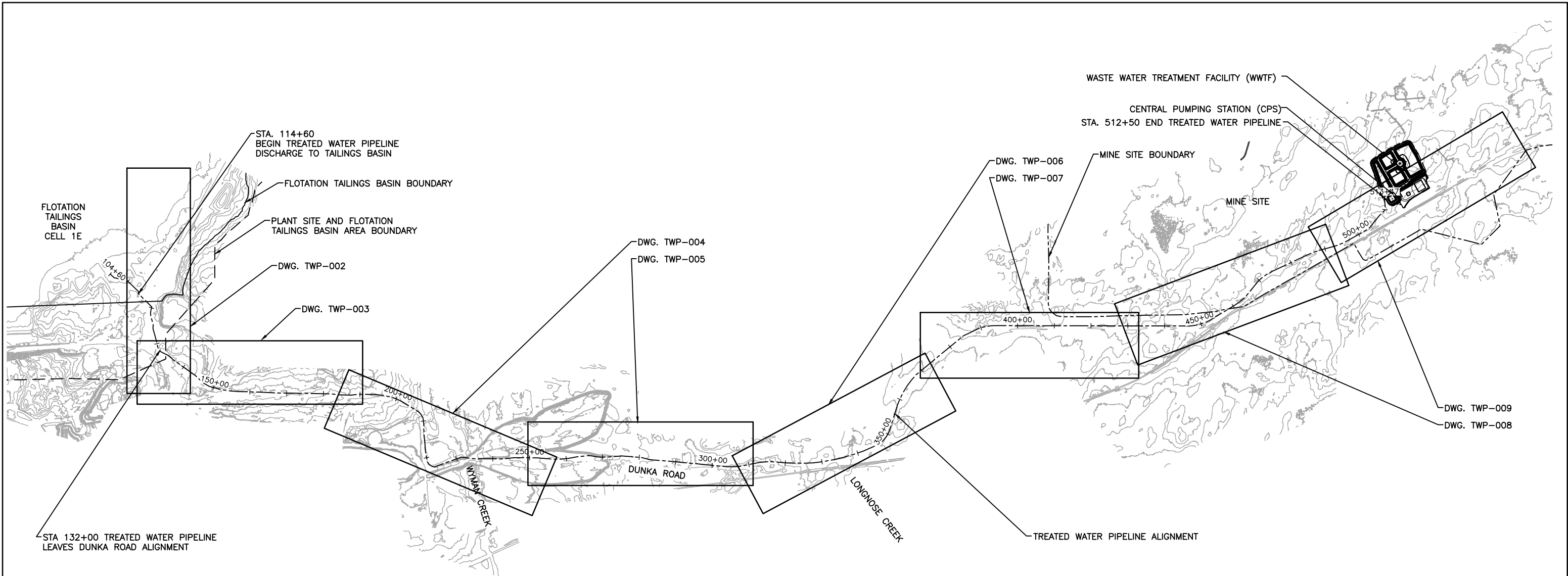
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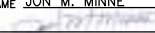
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1 PLAN: SHEET INDEX

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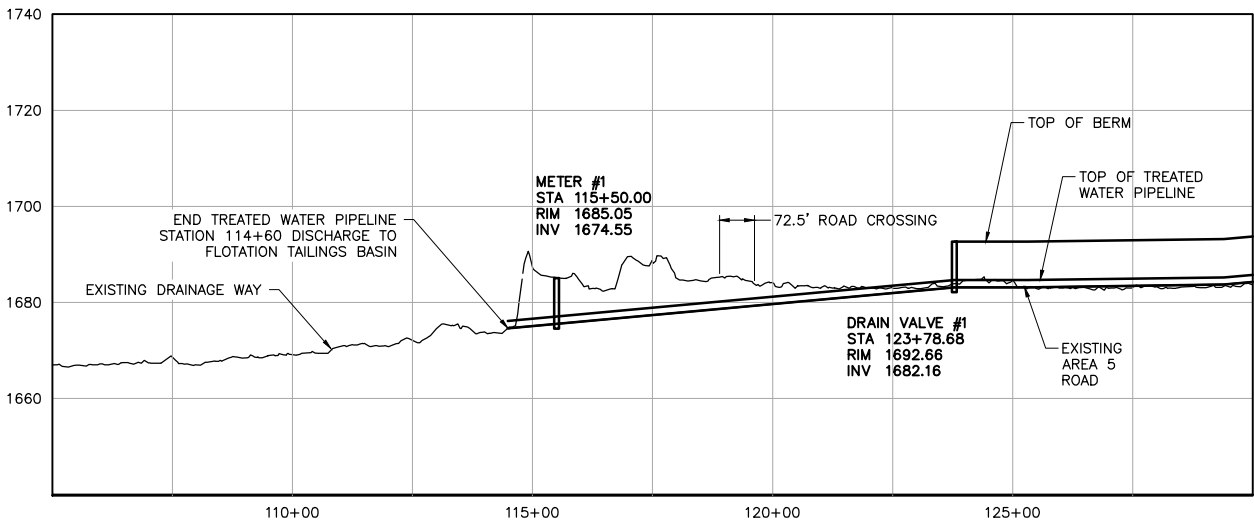
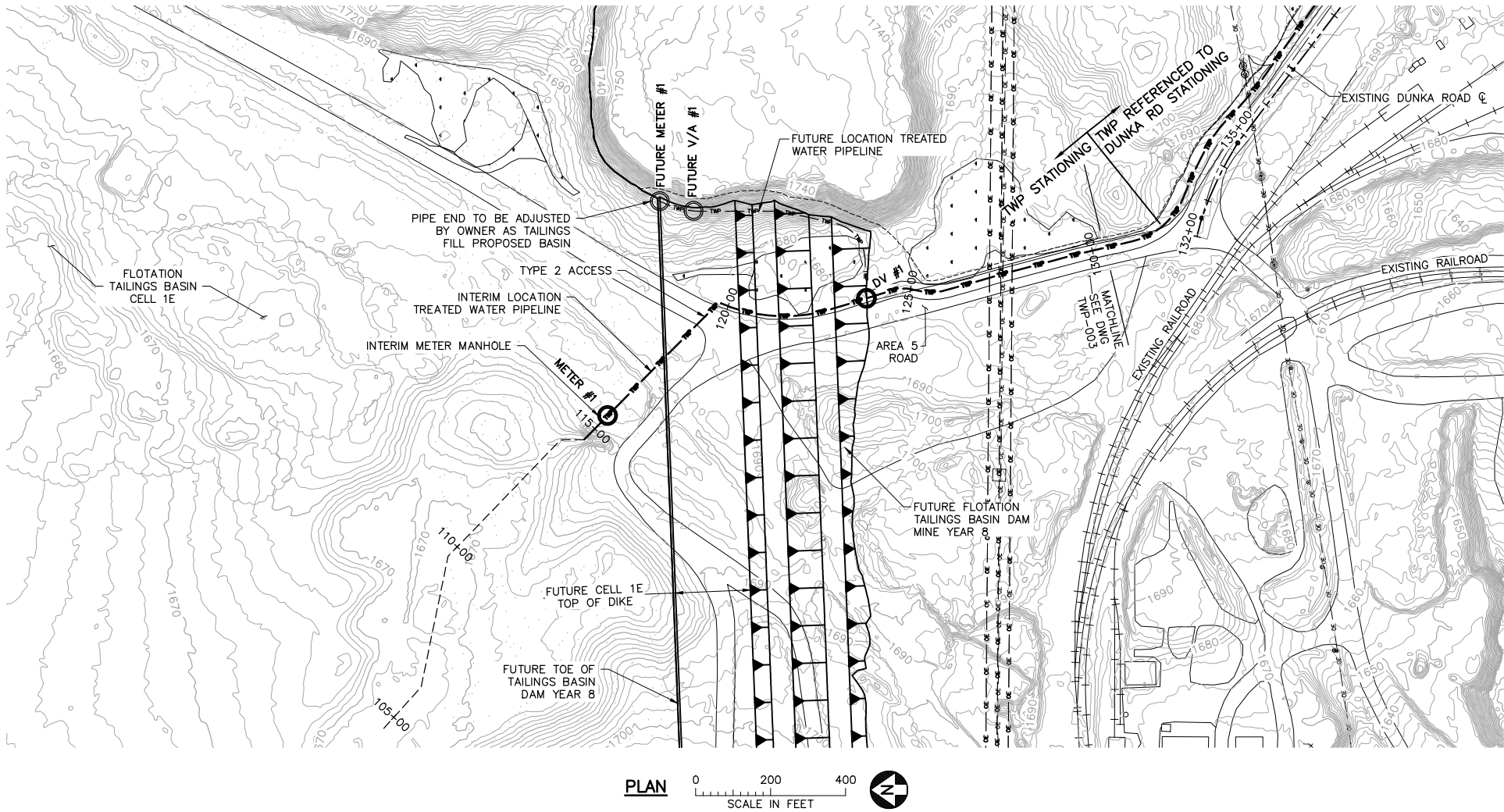
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DWG. NO. TWP-001	REV

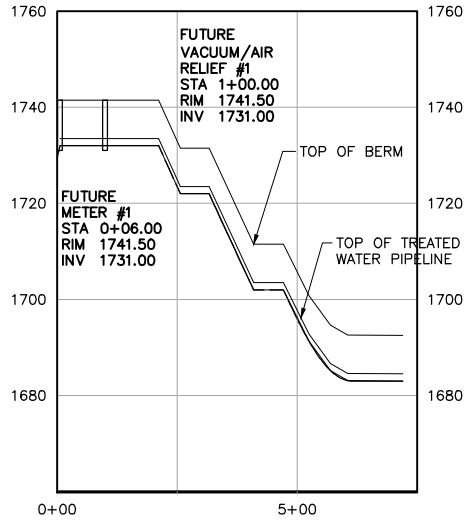
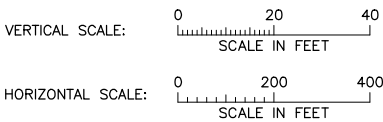


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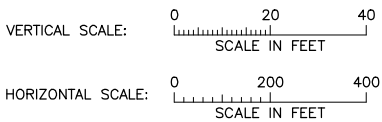
INCHES  
1  
2



PROFILE: INTERIM



PROFILE: FUTURE



NOTES:  
1. PIPELINE SHALL BE CONSTRUCTED PER TWP-010, NORMAL PIPELINE CONSTRUCTION, UNLESS NOTED OTHERWISE.

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	ISSUED	VERSION	DATE
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			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

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PRINTED NAME JON M. MINNE  
SIGNATURE  
DATE 5/18/15 LICENSE# 25080

DRAWN: VJS  
CHECKED: JMM3  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

TREATED WATER PIPELINE  
PLAN AND PROFILE  
STATION 113+70 TO 130+00

POLYMET MINING

BARR

POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

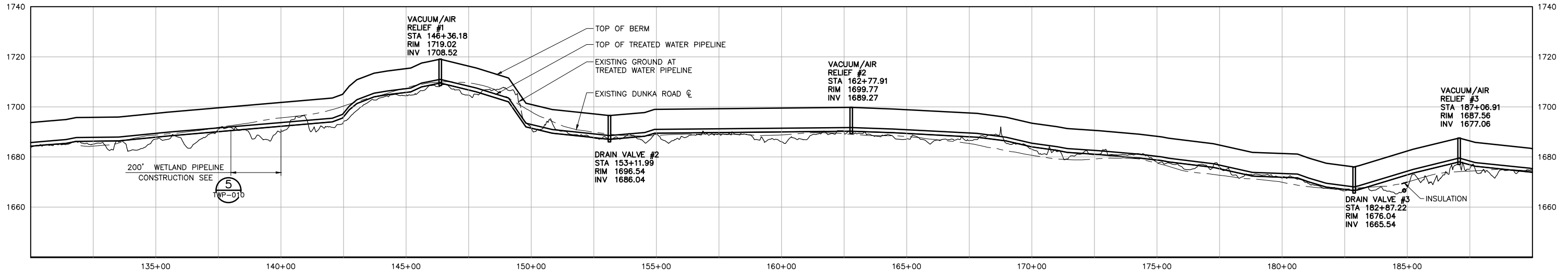
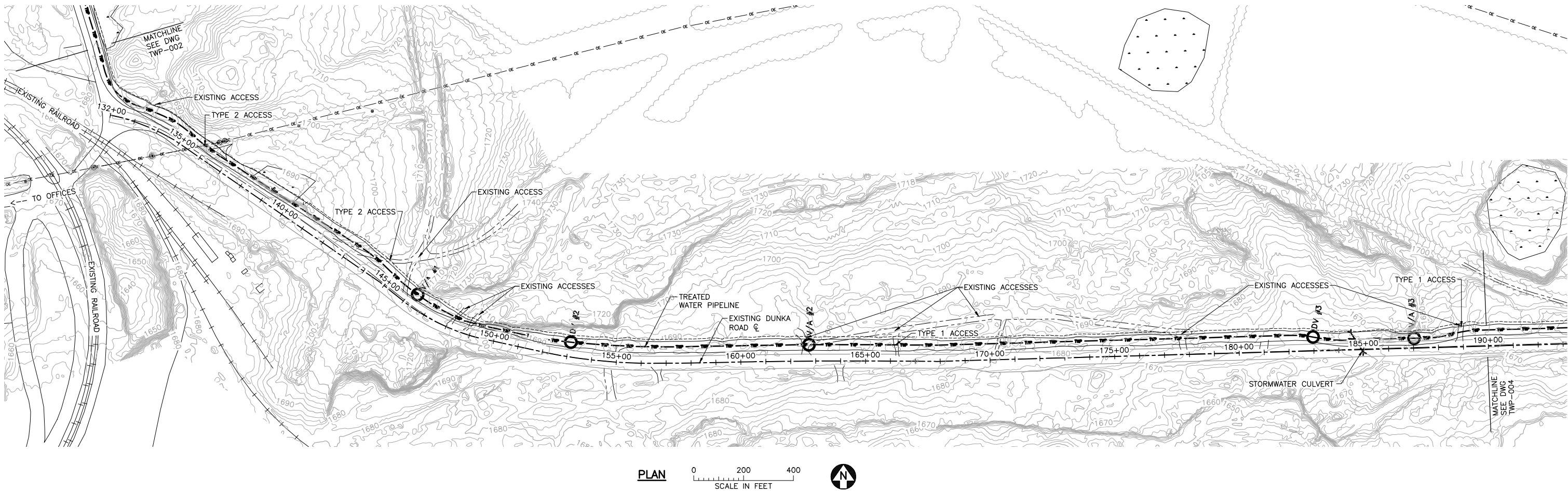
DWG. NO. TWP-002

REV



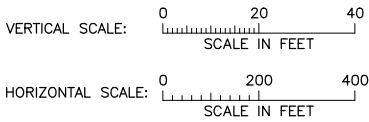
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2  
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INCHES



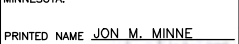
NOTES:  
1. PIPELINE SHALL BE CONSTRUCTED PER , NORMAL PIPELINE CONSTRUCTION, UNLESS NOTED OTHERWISE.

**PROFILE**



VER NO	DATE	DESCRIPTION	ISSUE STATUS		
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	ISSUED	VERSION	DATE
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SIGNATURE   
DATE 5/18/15 LICENSE# 25080

DRAWN: VJS  
CHECKED: JMM3  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

TREATED WATER PIPELINE  
PLAN AND PROFILE  
STATION 130+00 TO 190+00

POLYMET MINING  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

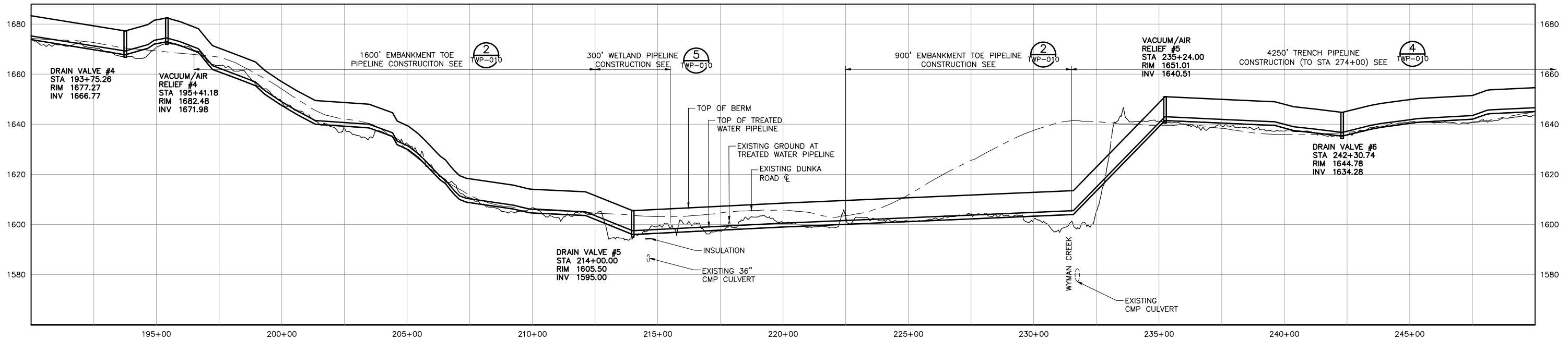
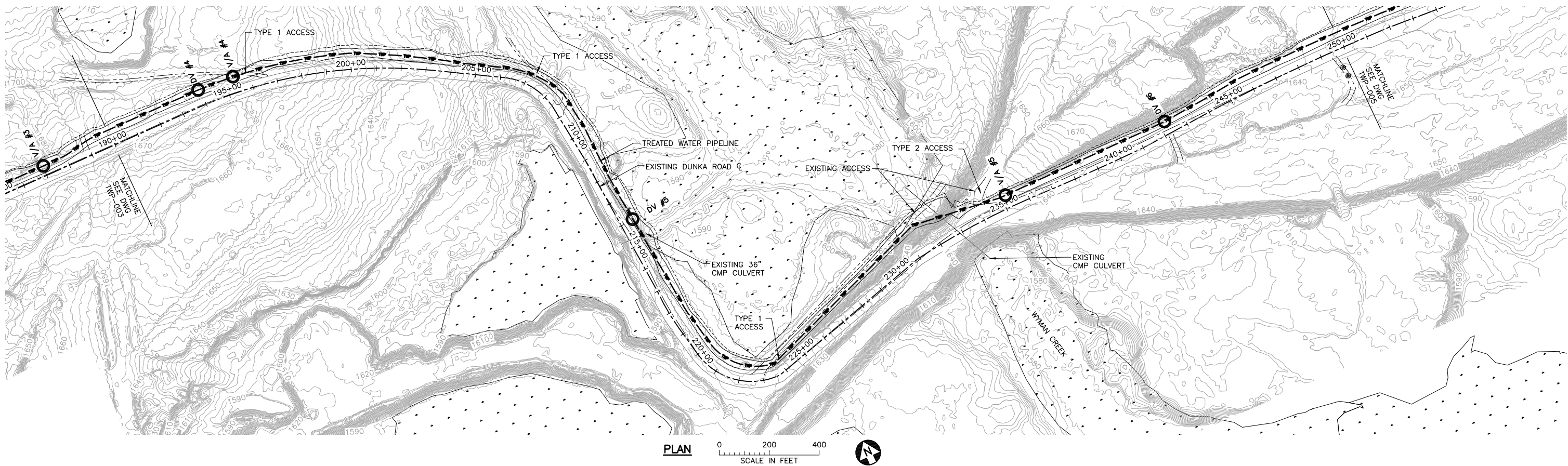
BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO. TWP-003  
REV



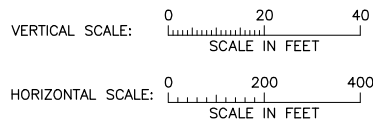
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2  
1  
INCHES



NOTES:  
1. PIPELINE SHALL BE CONSTRUCTED PER 1 TWP-010, NORMAL PIPELINE CONSTRUCTION, UNLESS NOTED OTHERWISE.

PROFILE



VER NO	DATE	DESCRIPTION	ISSUE STATUS		
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SIGNATURE  
DATE 5/18/15 LICENSE# 25080

DRAWN: VJS  
CHECKED: JMM3  
BARR PROJECT NO.: 23/69-OC29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

TREATED WATER PIPELINE  
PLAN AND PROFILE  
STATION 190+00 TO 250+00

**POLYMET**  
MINING

**POLY MET MINING, INC.**  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

**BARR**

BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

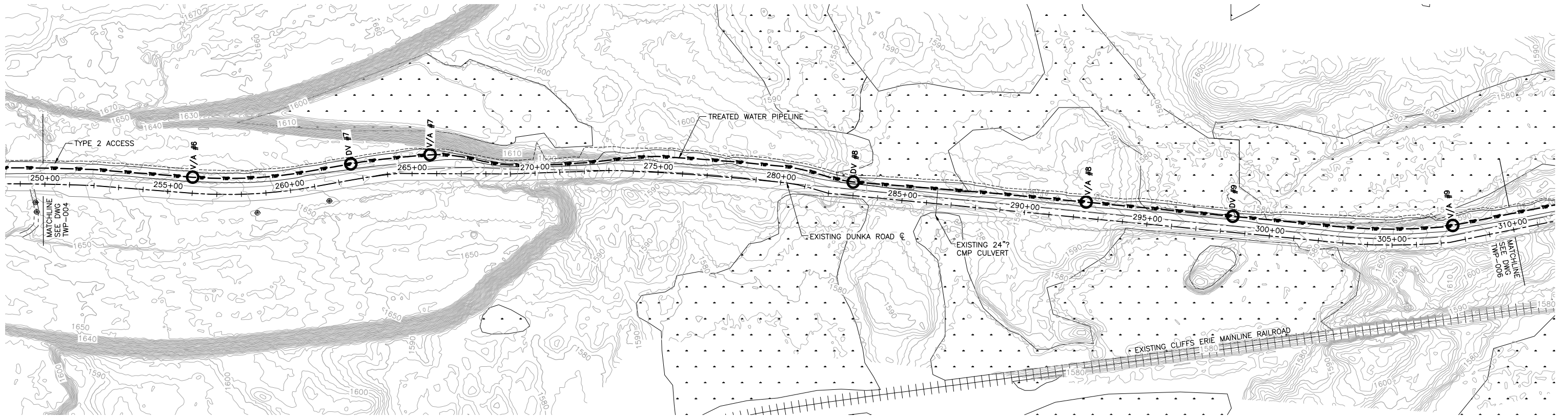
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REV

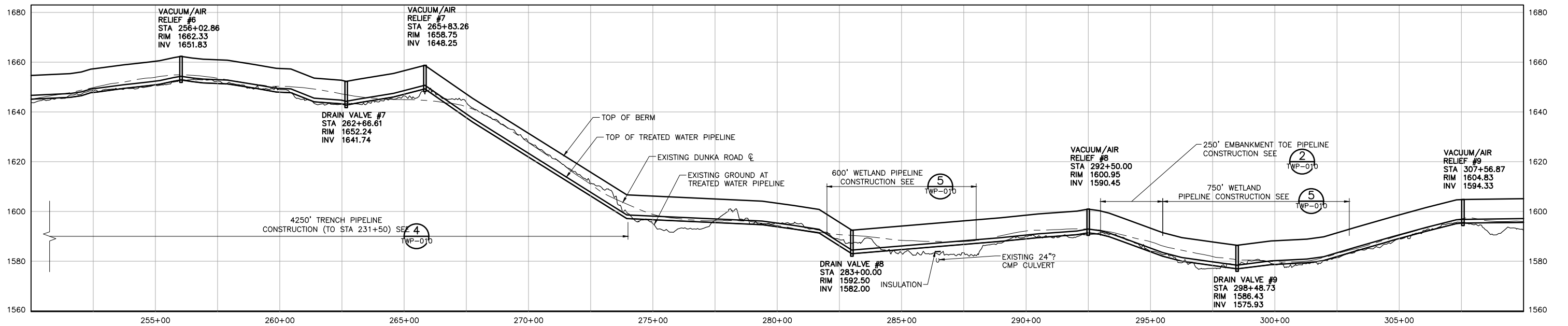


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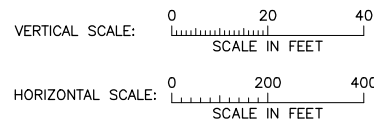
2  
1  
INCHES



PLAN



NOTES:  
1. PIPELINE SHALL BE CONSTRUCTED PER 1 TWP-010, NORMAL PIPELINE CONSTRUCTION, UNLESS NOTED OTHERWISE.



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PRINTED NAME JON M. MINNE  
SIGNATURE   
DATE 5/18/15 LICENSE# 25080

DRAWN: VJS  
CHECKED: JMM3  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

TREATED WATER PIPELINE  
PLAN AND PROFILE  
STATION 250+00 TO 310+00

**POLYMET**  
MINING

**POLY MET MINING, INC.**  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

**BARR**

BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

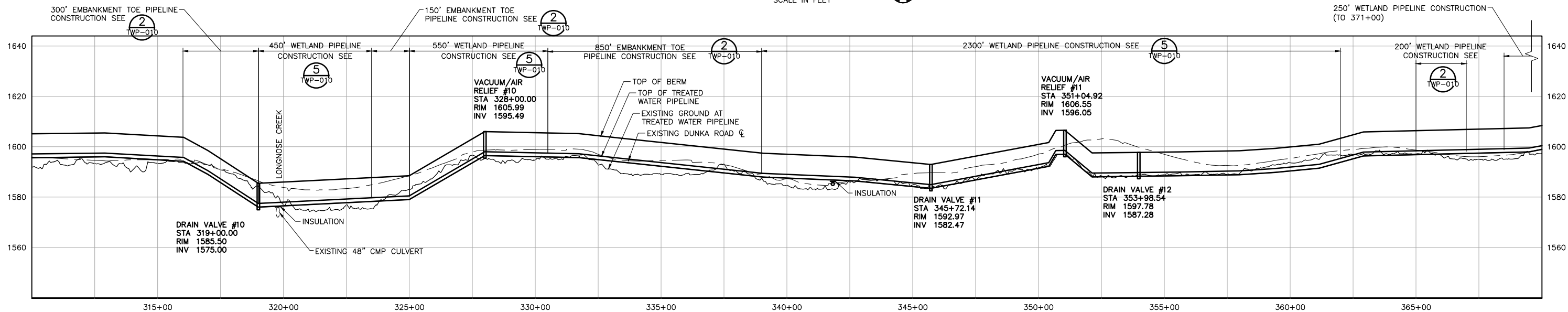
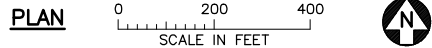
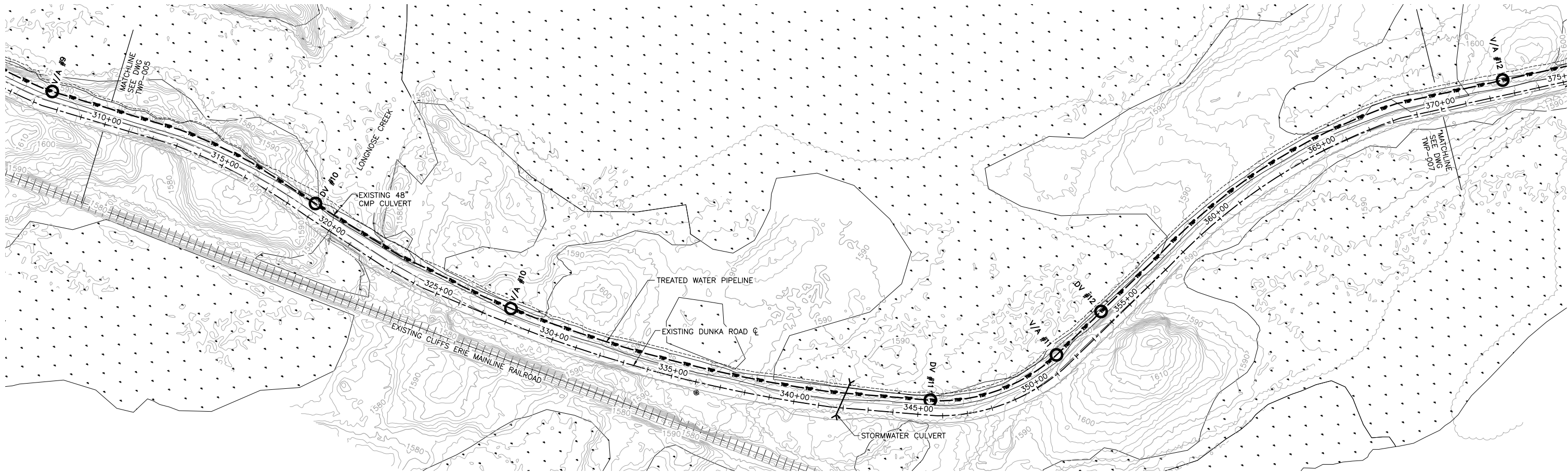
DWG. NO. **TWP-005**

REV



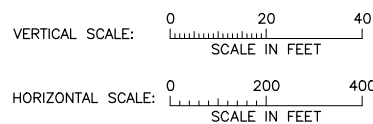
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INCHES  
1  
2



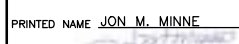
NOTES:  
1. PIPELINE SHALL BE CONSTRUCTED PER , NORMAL PIPELINE CONSTRUCTION, UNLESS NOTED OTHERWISE.

PROFILE



VER NO.	DATE	DESCRIPTION	ISSUE STATUS		
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	ISSUED	VERSION	DATE
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SIGNATURE   
DATE 5/18/15 LICENSE# 25080

DRAWN: VJS  
CHECKED: JMM3  
BARR PROJECT NO.: 23/69-OC29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

TREATED WATER PIPELINE  
PLAN AND PROFILE  
STATION 310+00 TO 370+00



POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA



BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO.

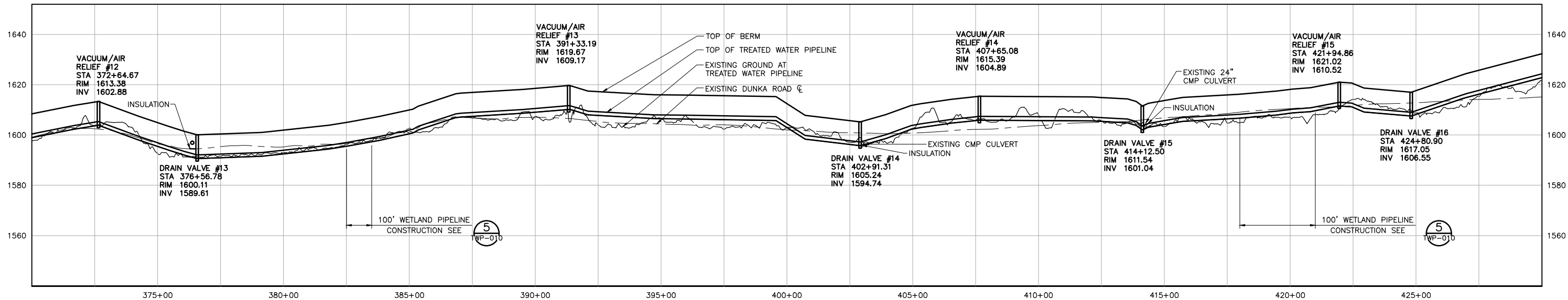
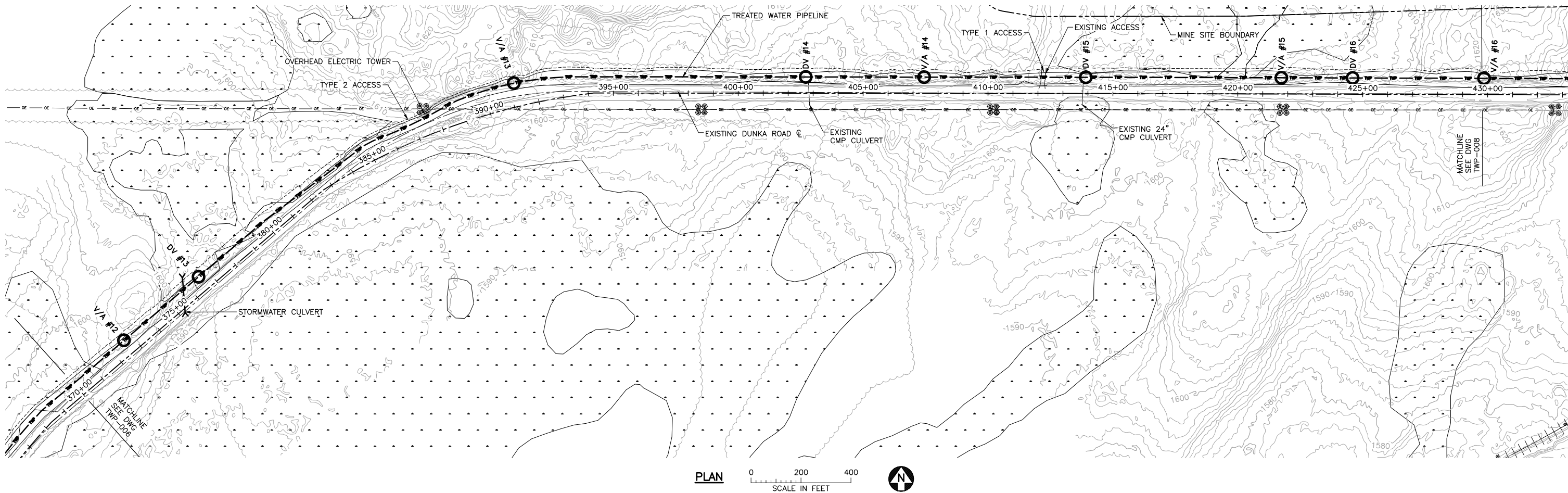
TWP-006

REV



CADD USER: Veronica Sackett FILE: K:\DESIGN\23890C29.10\PERMIT\_NMD-51-CU-108.DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 1:24 PM

2  
1  
INCHES



NOTES:  
1. PIPELINE SHALL BE CONSTRUCTED PER 1 TWP-010, NORMAL PIPELINE CONSTRUCTION, UNLESS NOTED OTHERWISE.

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	ISSUED	1	5/18/15
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			FOR CONSTRUCTION		
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SIGNATURE   
DATE 5/18/15 LICENSE# 25080

DRAWN: VJS  
CHECKED: JMM3  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

**TREATED WATER PIPELINE  
PLAN AND PROFILE  
STATION 370+00 TO 430+00**

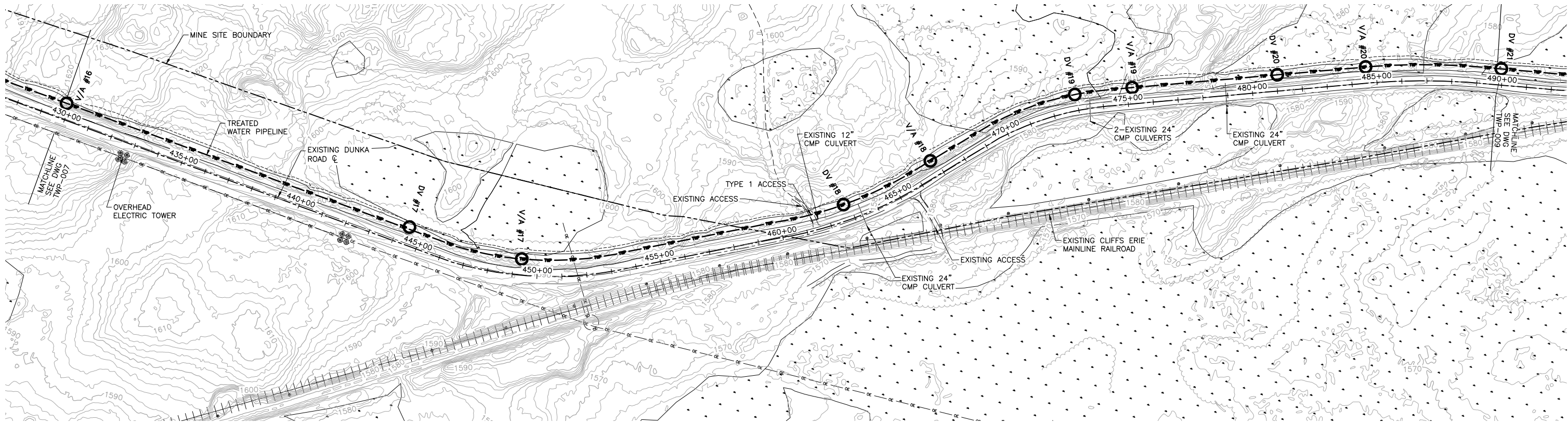
**POLYMET MINING**  
**POLY MET MINING, INC.**  
**NORTHMET PROJECT**  
**HOYT LAKES, MINNESOTA**

**BARR**  
BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

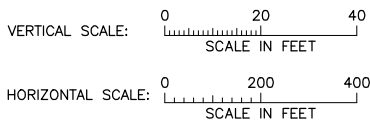
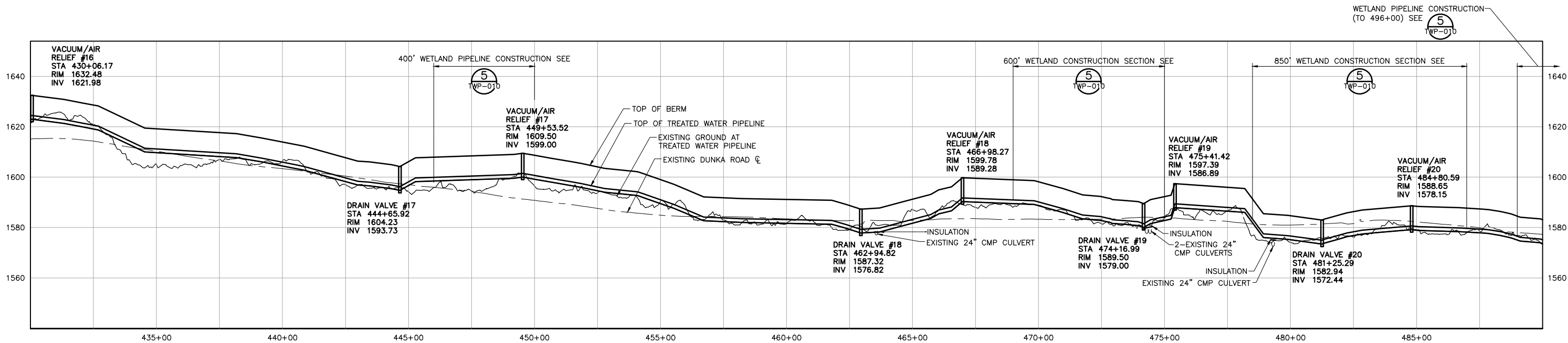
DWG. NO. **TWP-007** REV

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2  
1  
INCHES



PLAN



NOTES:  
1. PIPELINE SHALL BE CONSTRUCTED PER 1 TWP-010, NORMAL PIPELINE CONSTRUCTION, UNLESS NOTED OTHERWISE.

PROFILE

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
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SIGNATURE   
DATE 5/18/15 LICENSE# 25080

DRAWN: VJS  
CHECKED: JMM3  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

TREATED WATER PIPELINE  
PLAN AND PROFILE  
STATION 430+00 TO 490+00

**POLYMET**  
MINING

**POLY MET MINING, INC.**  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

**BARR**

BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO. **TWP-008**

REV

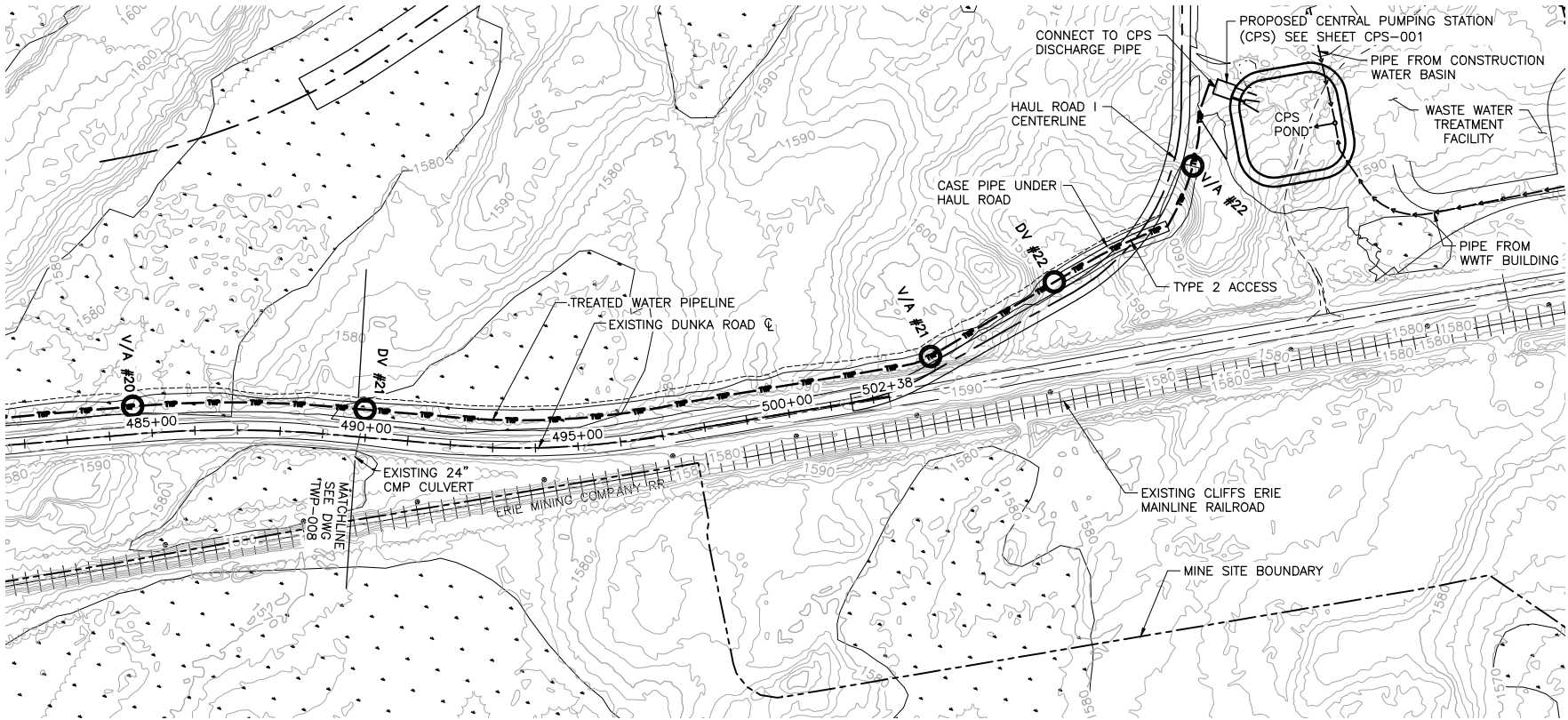


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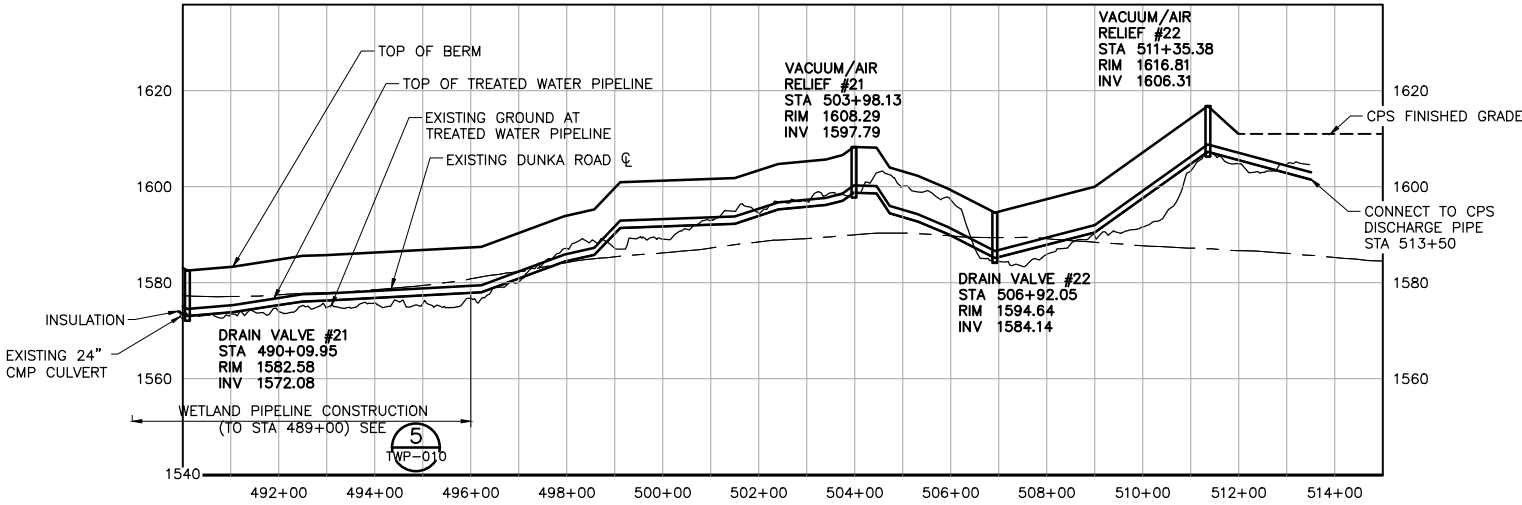
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INCHES



PLAN

0 200 400  
SCALE IN FEET



PROFILE

VERTICAL SCALE: 0 20 40  
SCALE IN FEET  
HORIZONTAL SCALE: 0 200 400  
SCALE IN FEET

NOTES:  
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SIGNATURE   
DATE 5/18/15 LICENSE# 25080


DRAWN: VJS  
CHECKED: JMM3  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

TREATED WATER PIPELINE  
PLAN AND PROFILE  
STATION 490+00 TO 512+50



POLYMET MINING



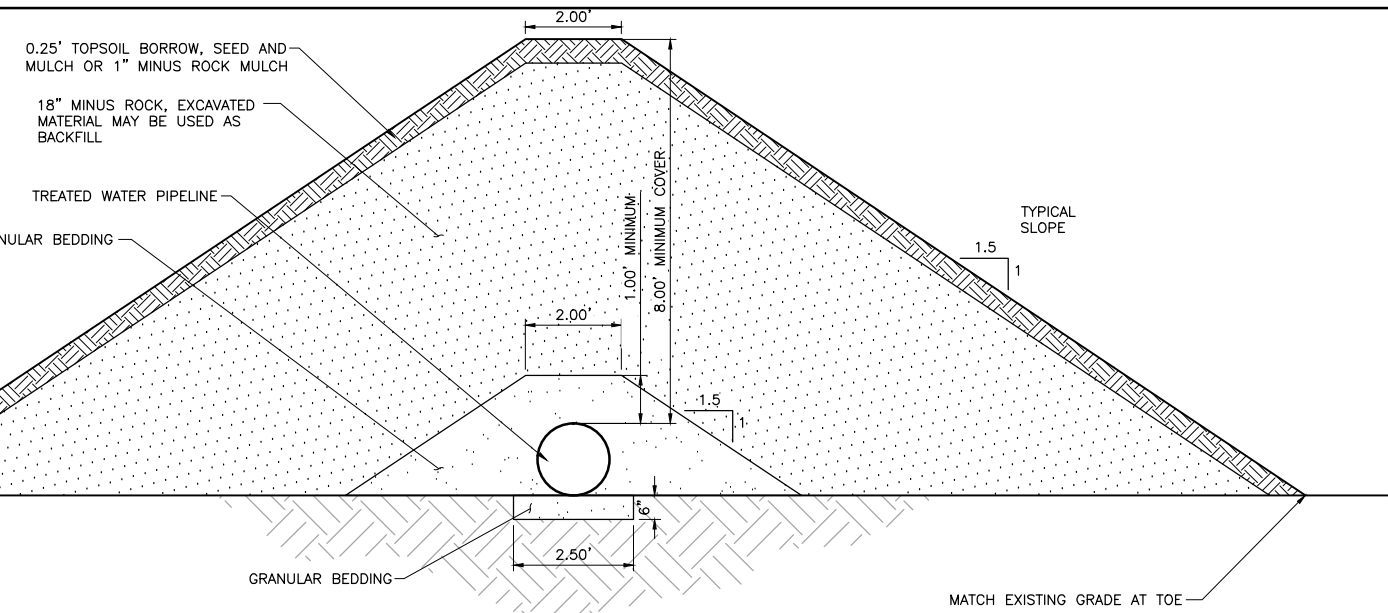
BARR

POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

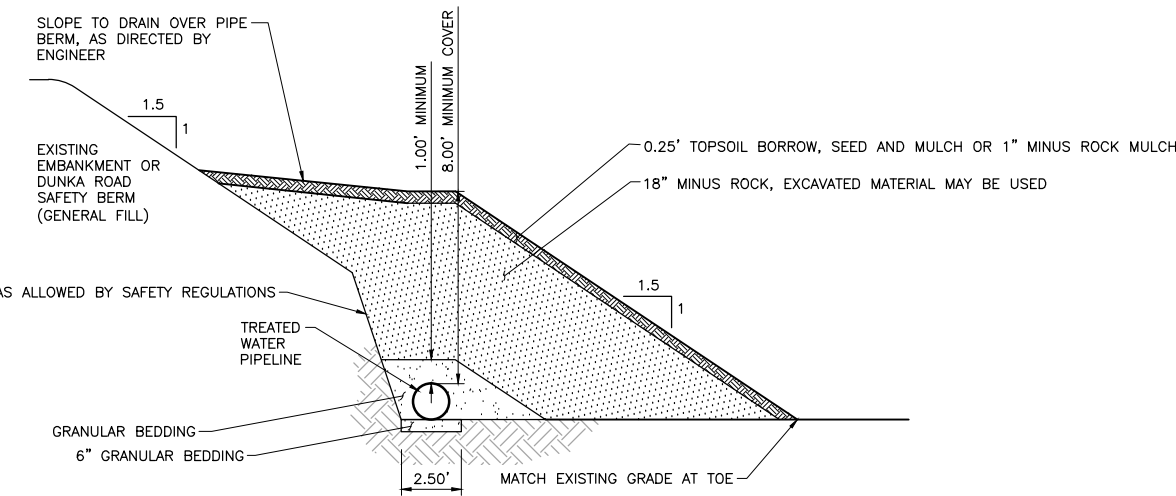
BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO. TWP-009

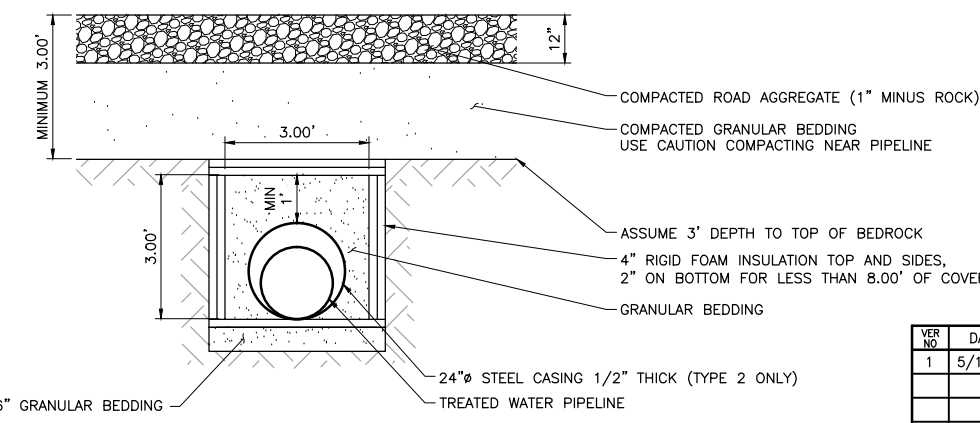
REV



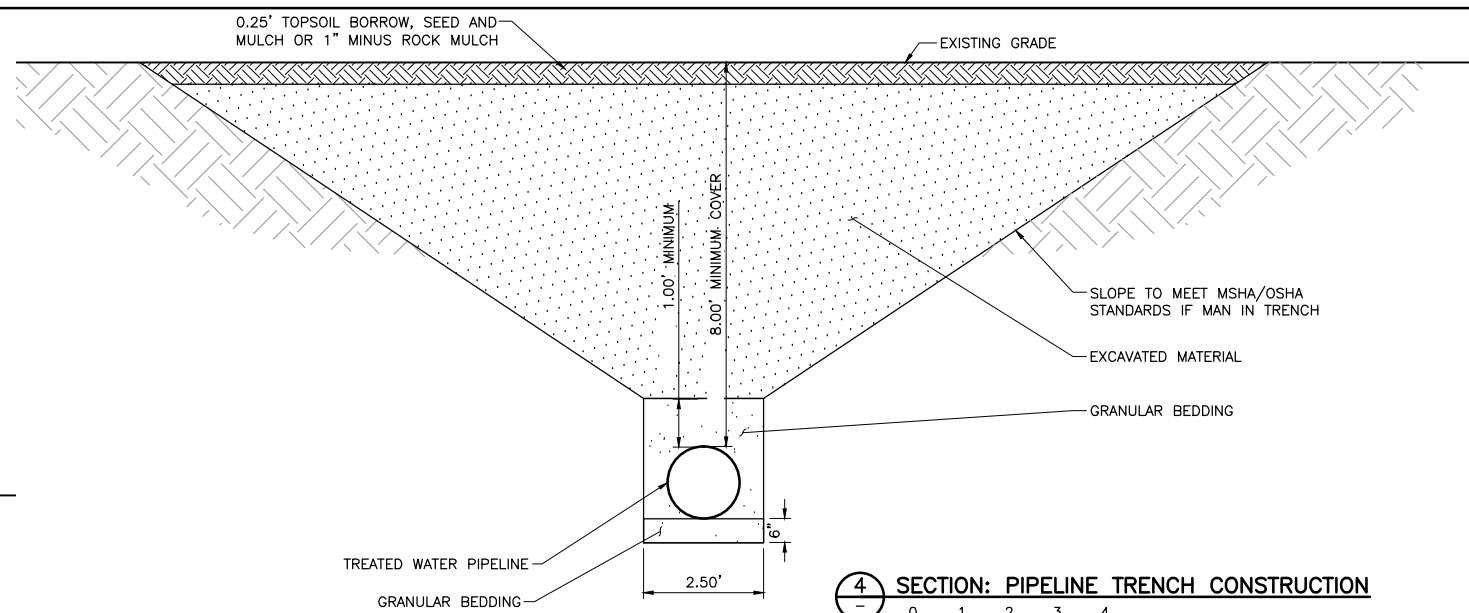
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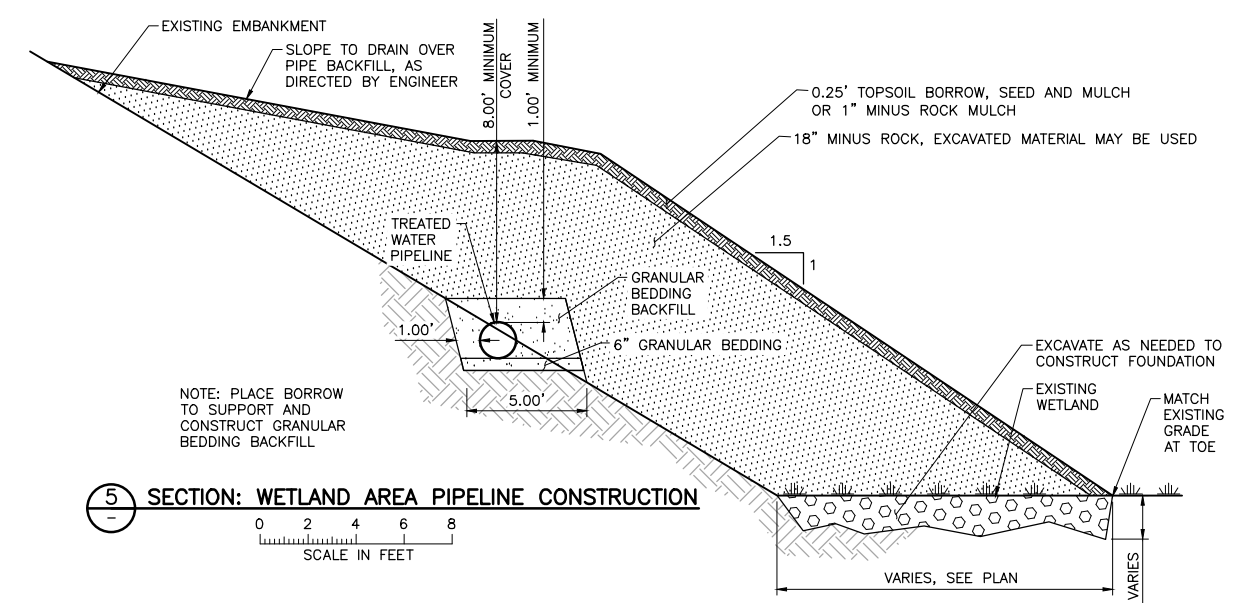
2 SECTION: EMBANKMENT TOE PIPELINE CONSTRUCTION



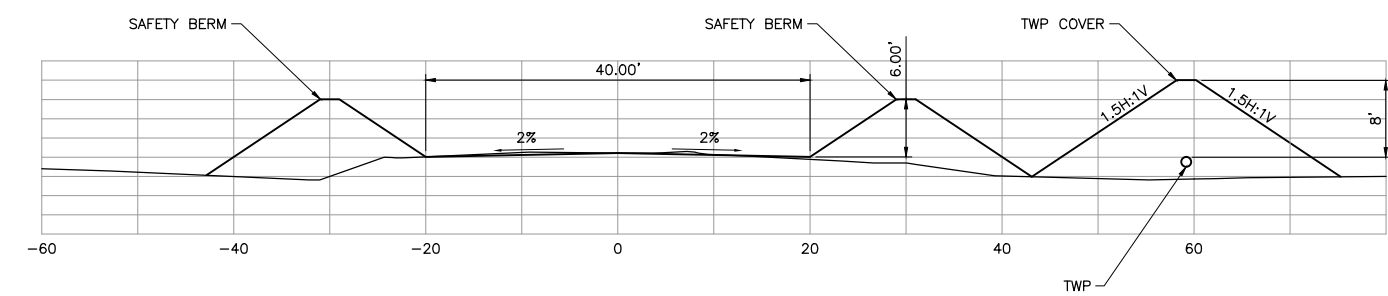
3 SECTION: ACCESS ROAD CROSSING - TYPE 1 OR 2



4 SECTION: PIPELINE TRENCH CONSTRUCTION



5 SECTION: WETLAND AREA PIPELINE CONSTRUCTION



6 SECTION: DUNKA ROAD/TWP TYPICAL SECTION

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
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SIGNATURE  
DATE 5/18/15 LICENSE# 25080

DRAWN: VJS  
CHECKED: JMM3  
BARR PROJECT NO.: 23/69-OC29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

TREATED WATER PIPELINE  
PIPELINE INSTALLATION TYPICAL SECTIONS

POLYMET MINING

POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

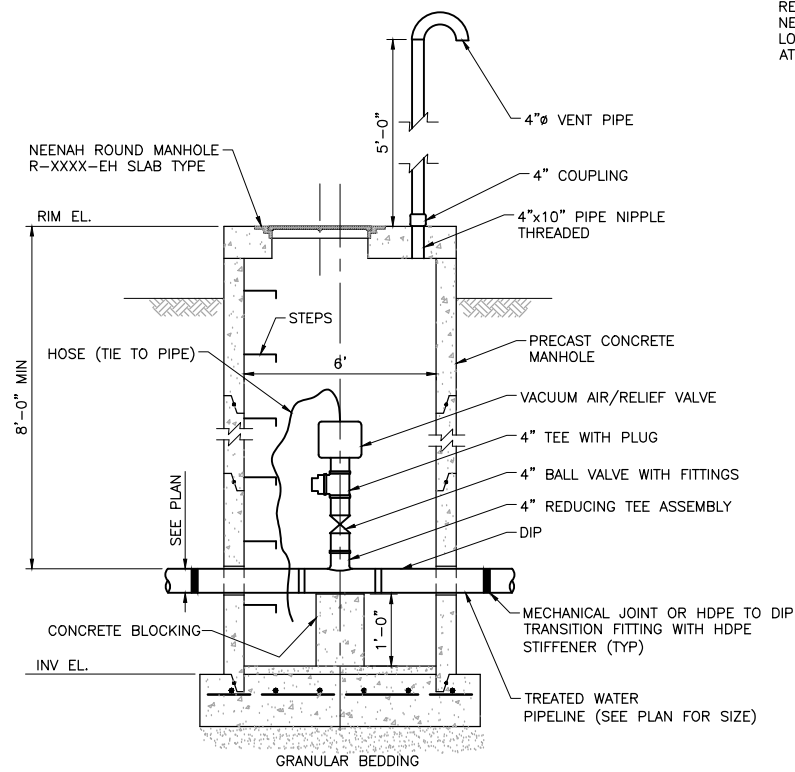
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REV

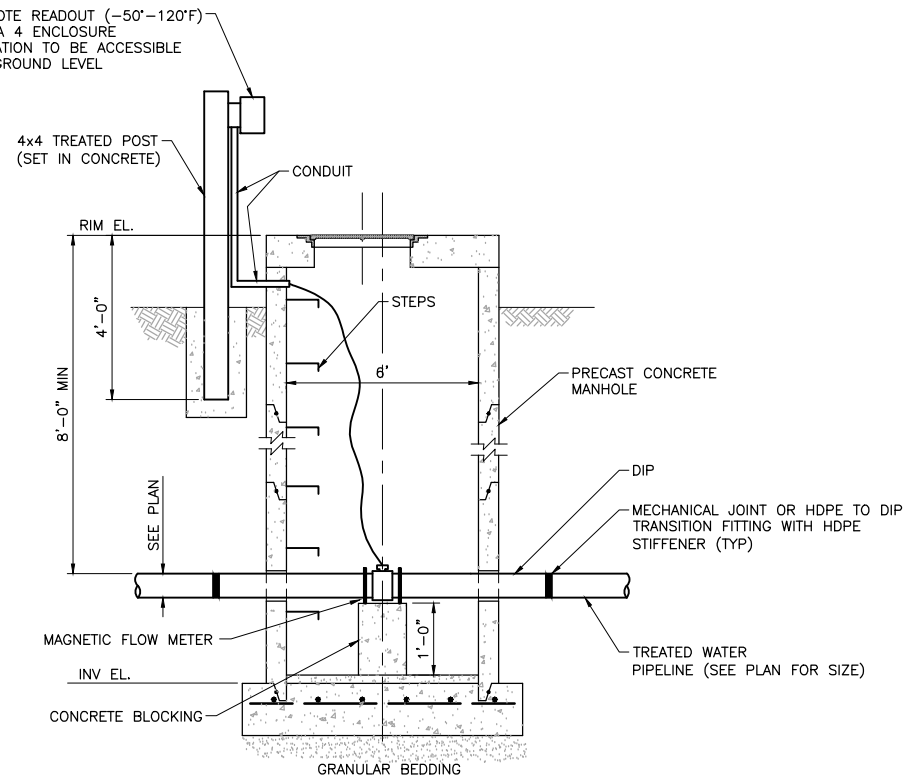


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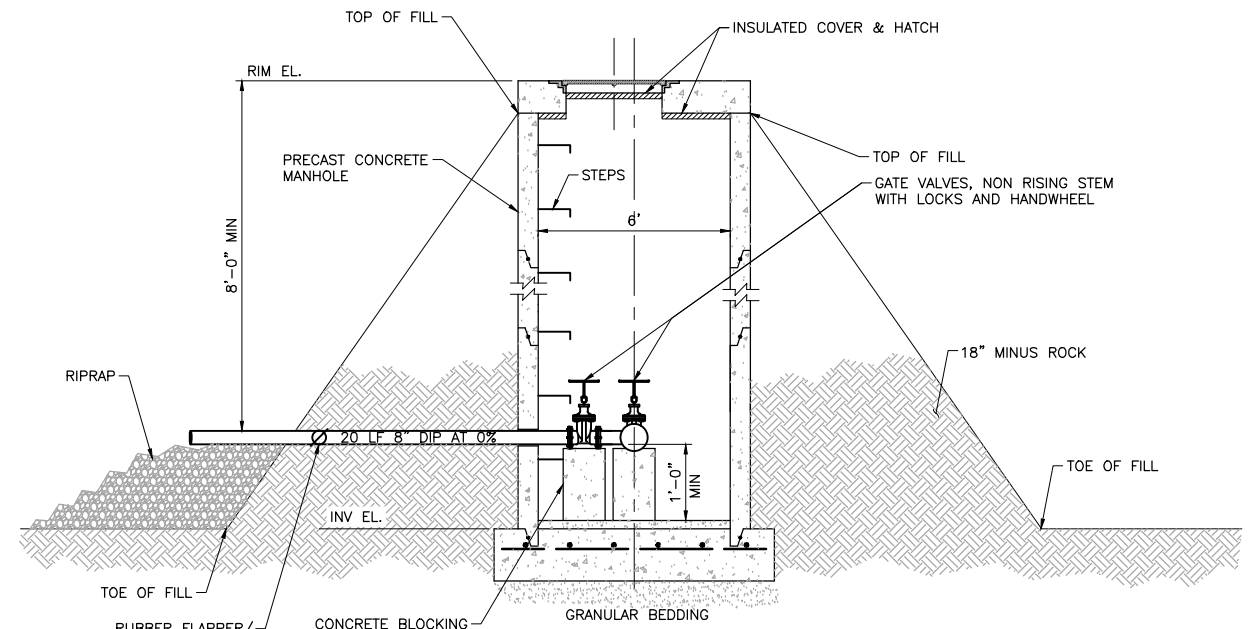
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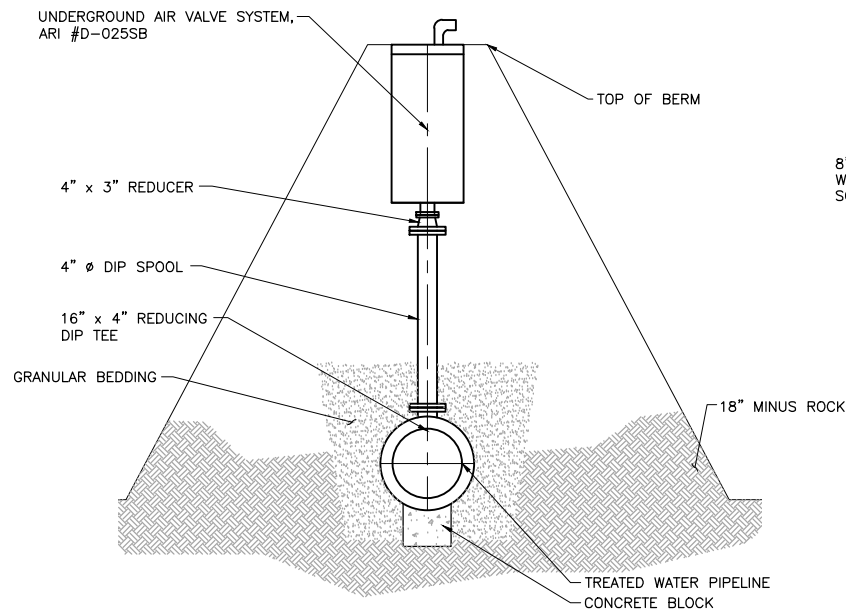
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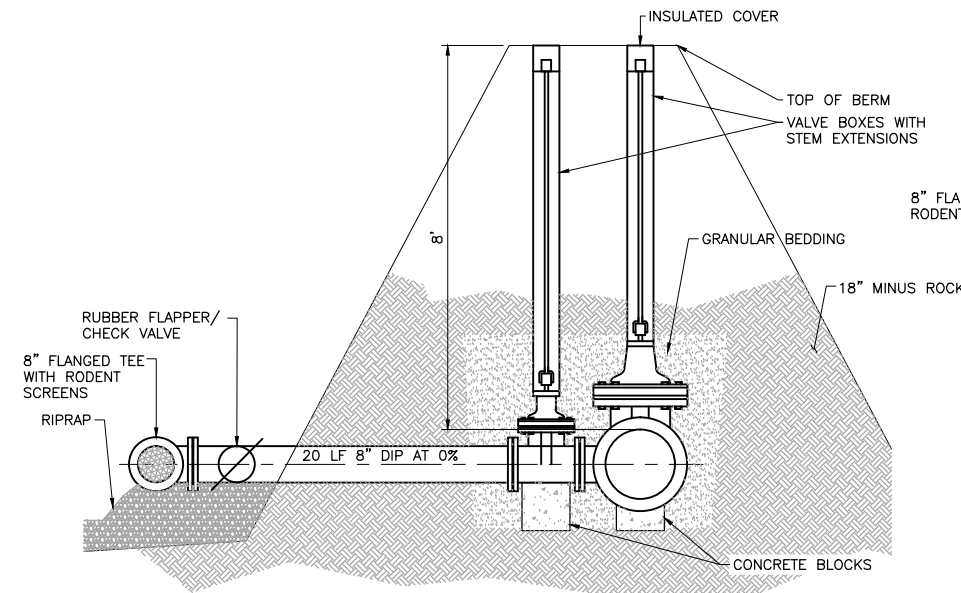
2 ELEVATION: METER MANHOLE  
NOT TO SCALE



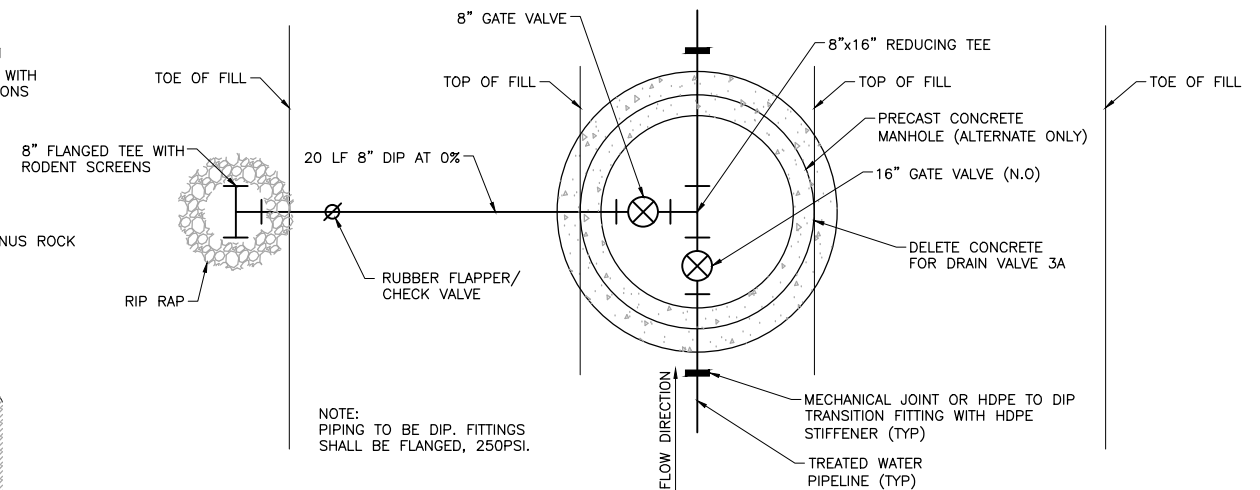
3 ELEVATION: ALTERNATE DRAIN VALVE MANHOLE  
NOT TO SCALE



1A ELEVATION: VACUUM/AIR RELIEF  
NOT TO SCALE



3A ELEVATION: DRAIN VALVE  
NOT TO SCALE



4 PLAN: DRAIN VALVE  
NOT TO SCALE

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
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SIGNATURE  
DATE 5/18/15 LICENSE# 25080

DRAWN: VJS  
CHECKED: JMM3  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

TREATED WATER PIPELINE DETAILS

POLYMET MINING

POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

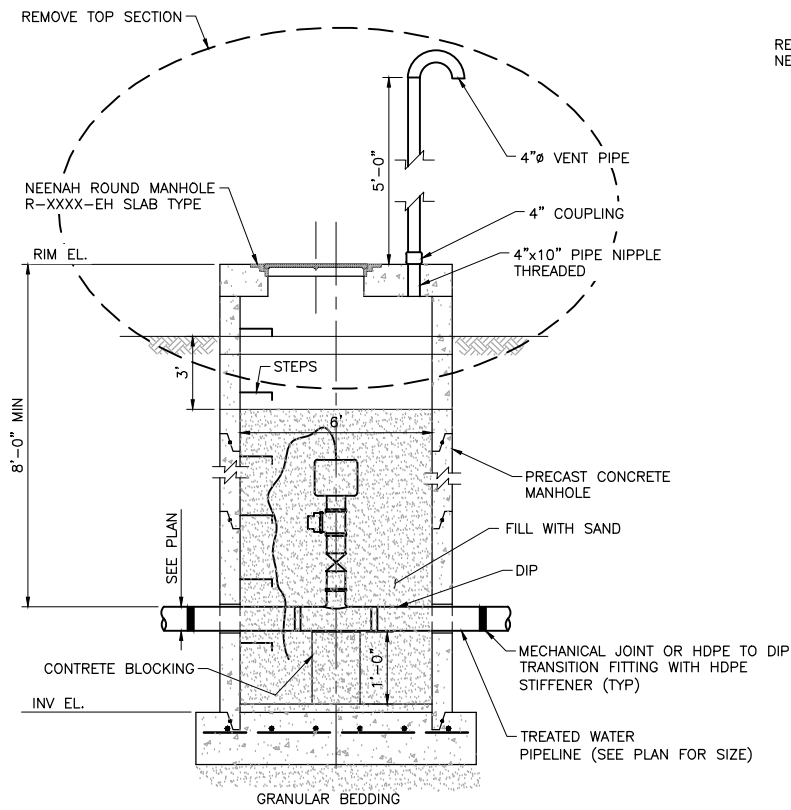
BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO. TWP-011

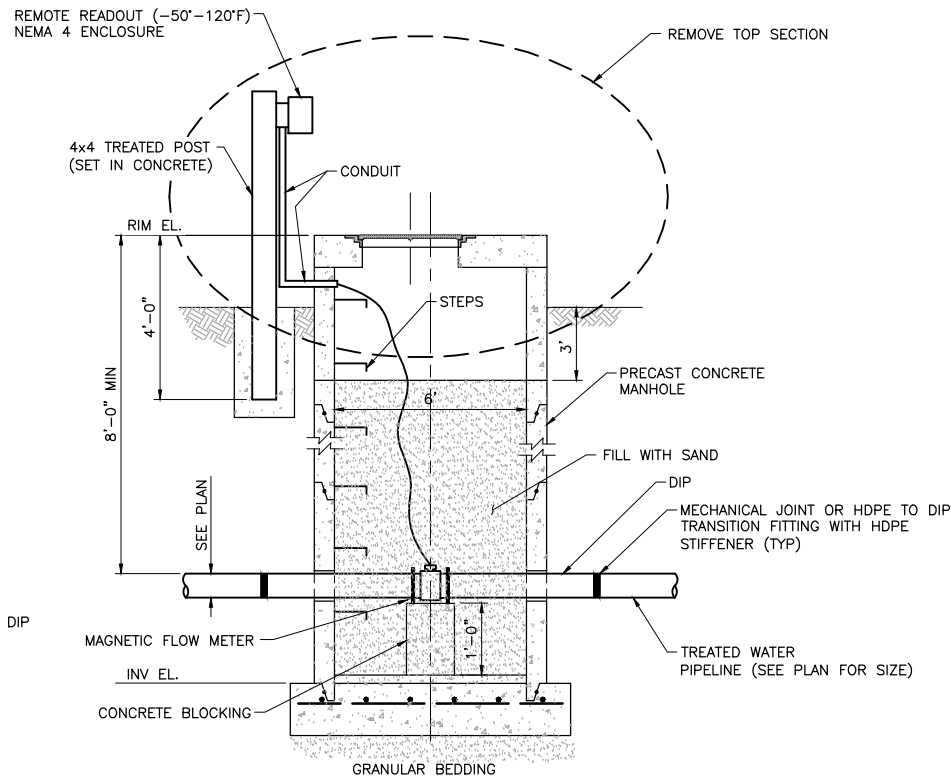
REV

CADD USER: Veronica Sackett FILE: K:\DESIGN\23890C29.10\PERMIT\_NMD-51-CU-305.DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 1:34 PM

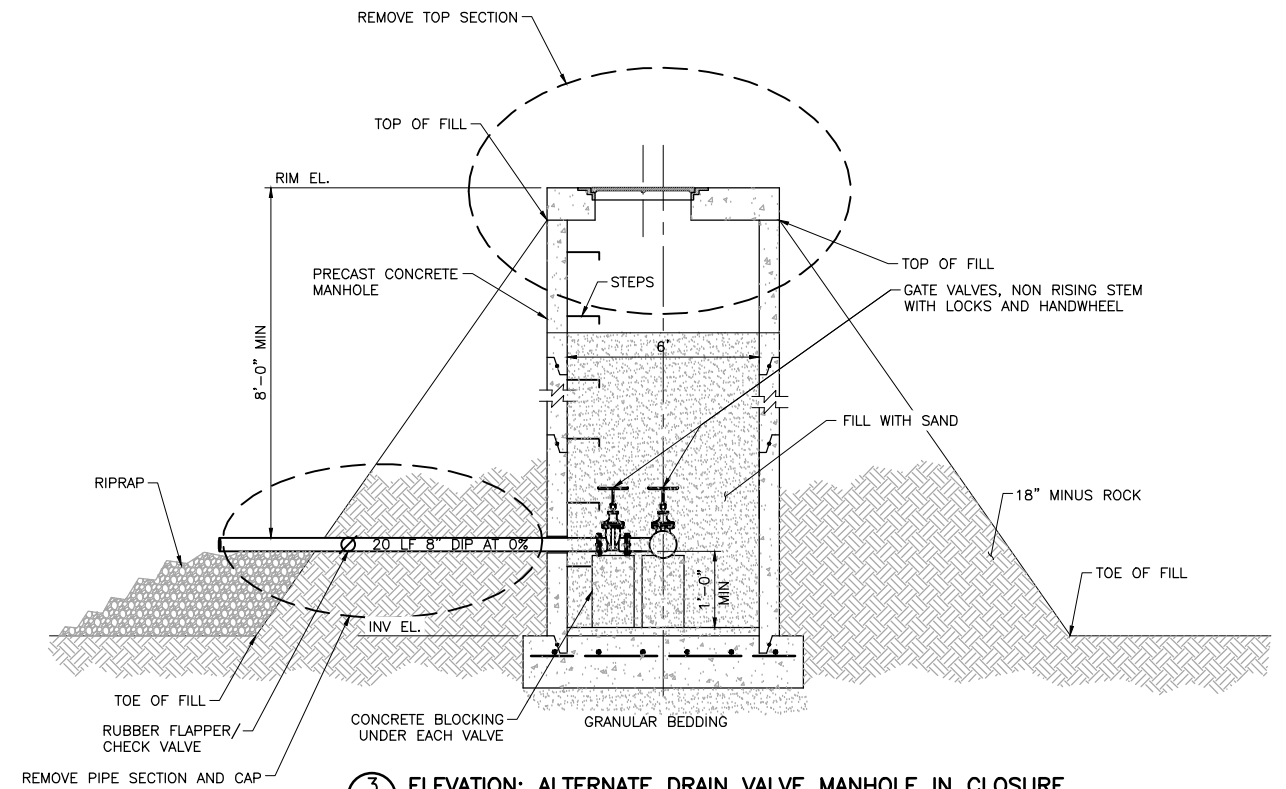
INCHES  
1  
2



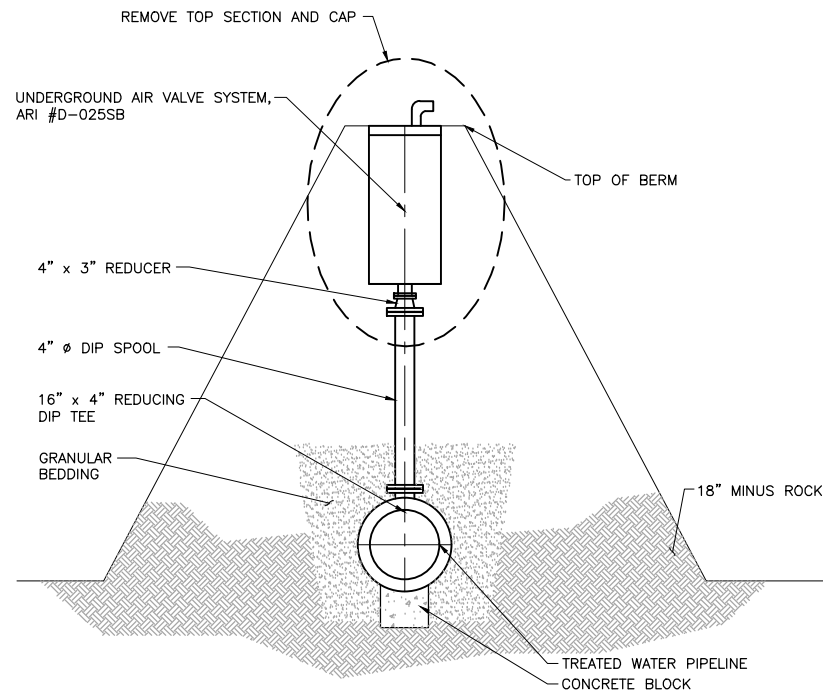
1 ELEVATION: ALTERNATE VACUUM/AIR RELIEF MANHOLE IN CLOSURE  
NOT TO SCALE



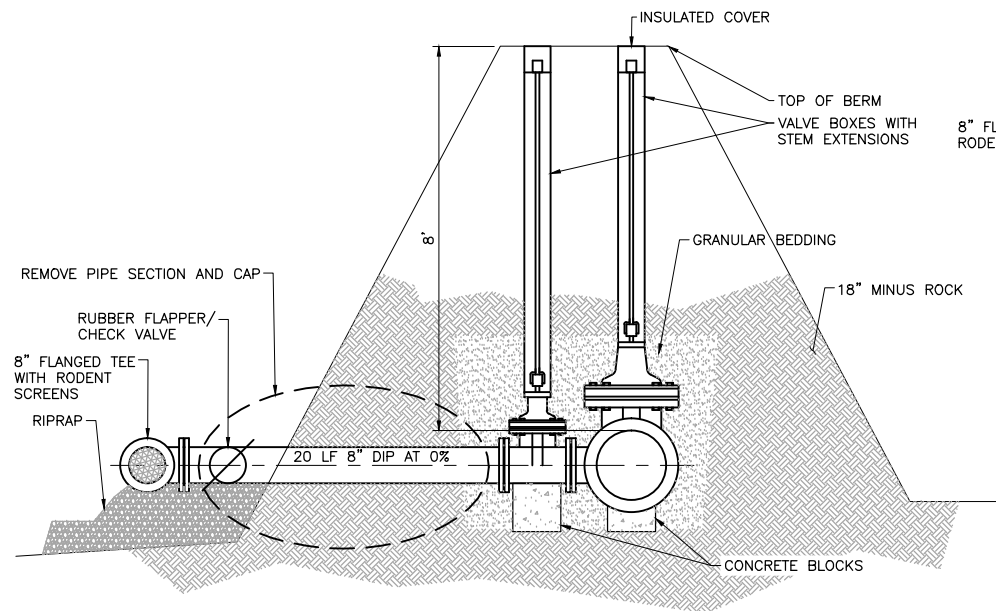
2 ELEVATION: METER MANHOLE IN CLOSURE  
NOT TO SCALE



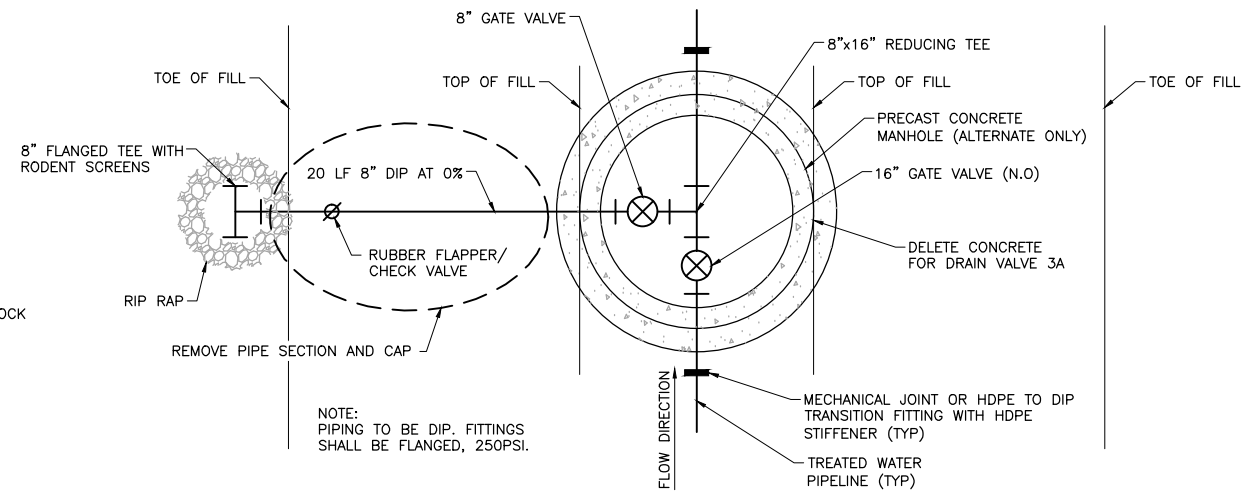
3 ELEVATION: ALTERNATE DRAIN VALVE MANHOLE IN CLOSURE  
NOT TO SCALE



1A ELEVATION: VACUUM/AIR RELIEF IN CLOSURE  
NOT TO SCALE



3A ELEVATION: DRAIN VALVE IN CLOSURE  
NOT TO SCALE





4 PLAN: DRAIN VALVE IN CLOSURE  
NOT TO SCALE

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	ISSUED	VERSION	DATE
			FOR PERMITTING	1	5/18/15
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINTED NAME JON M. MINNE  
SIGNATURE  
DATE 5/18/15 LICENSE# 25080

DRAWN: VJS  
CHECKED: JMM3  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:	
TREATED WATER PIPELINE DETAILS IN CLOSURE	
 POLYMET MINING	POLY MET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA
 BARR	BARR ENGINEERING COMPANY 4700 WEST 77TH STREET MINNEAPOLIS, MN. Ph: 1-800-632-2277
DWG. NO. TWP-012	REV

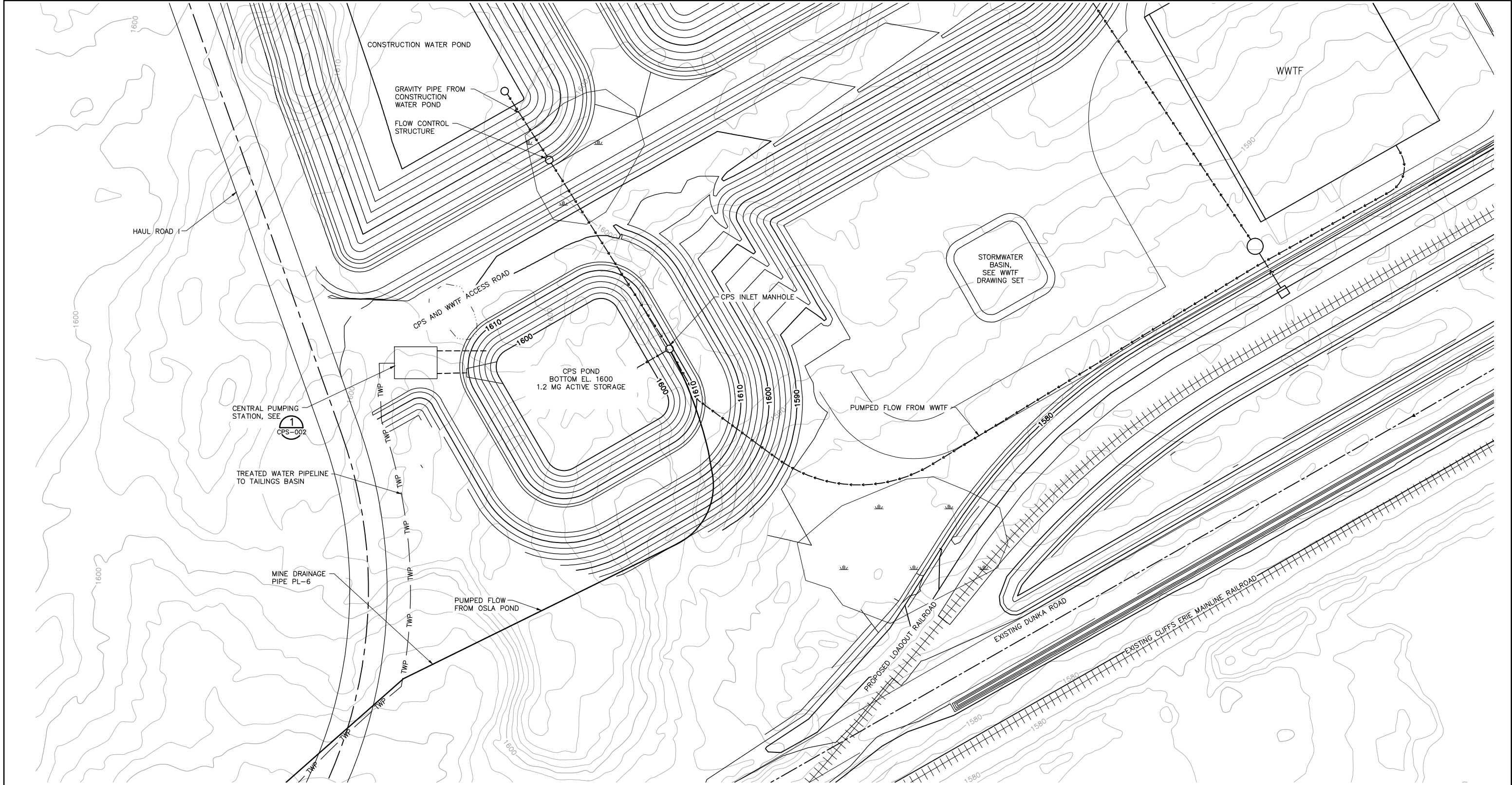


CADD USER: Veronica Sackett FILE: K:\DESIGN\23890C29.10\PERMIT\_NNM-52-CS-101.DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 1:37 PM

2

1



INCHES



1 PLAN: CENTRAL PUMPING STATION

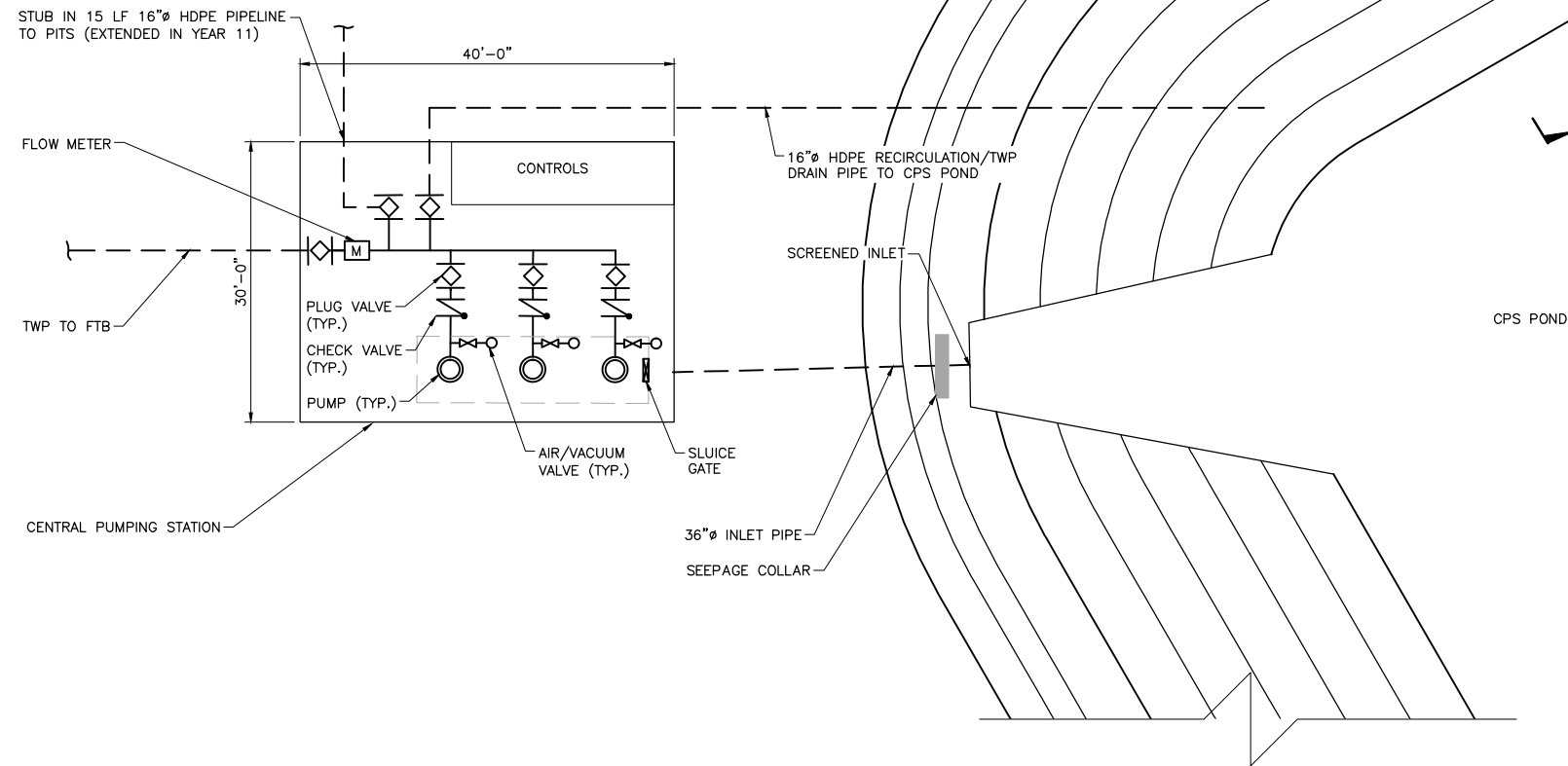
0 50 100

SCALE IN FEET

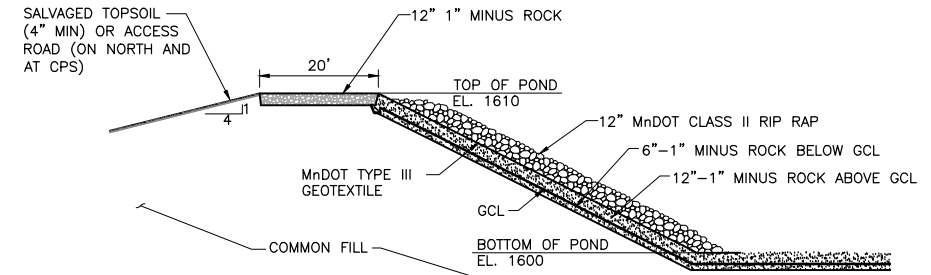
VER. NO.		DATE	DESCRIPTION	ISSUE STATUS			I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.	DRAWN:  CSB2	CHECKED:  AMP	BARR PROJECT NO.: 23/69-OC29	SCALE:  AS SHOWN	POLY MET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA				
				ISSUED	VERSION	DATE						POLYMET MINING			BARR ENGINEERING COMPANY 4700 WEST 77TH STREET MINNEAPOLIS, MN. Ph: 1-800-632-2277	REV
1		5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	FOR PERMITTING	1	5/18/15										
				FOR CONSTRUCTION												
				NOT APPROVED FOR CONSTRUCTION												
							PRINTED NAME <u>ANNE M. PHARES</u>									
							SIGNATURE 									
							DATE <u>5/18/15</u> LICENSE# <u>42022</u>									

CADD USER: Veronica Sackett FILE: K:\DESIGN\23890C29.10\PERMIT\_NMM-52-FE-100.DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 1:42 PM

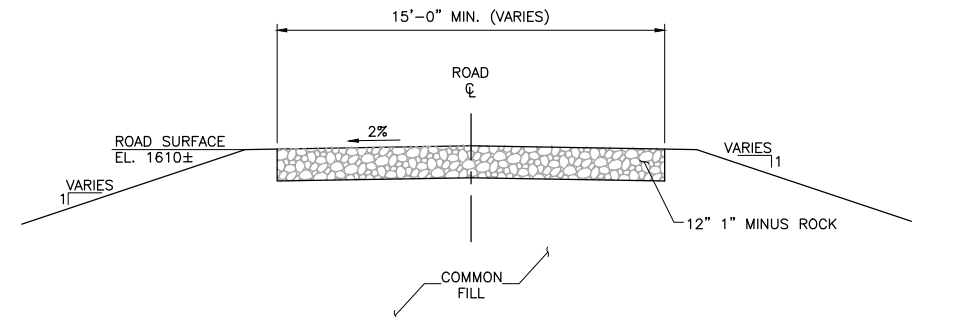
INCHES  
1  
2



**1 PLAN: CPS AND SITE SCHEMATIC DIAGRAM**  
CPS-001  
0 10 20  
SCALE IN FEET



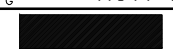


**2 DETAIL: POND CONSTRUCTION**  
NOT TO SCALE



**3 DETAIL: TYPICAL ACCESS ROAD**  
NOT TO SCALE

- NOTES:**
1. REFER TO PROJECT SPECIFICATIONS FOR SOIL TYPE INFORMATION.

VER NO	DATE	DESCRIPTION	ISSUE STATUS			<div>I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.</div> <div>PRINTED NAME <u>ANNE M. PHARES</u></div> <div>SIGNATURE <u></u></div> <div>DATE <u>5/18/15</u> LICENSE# <u>42022</u></div>	<div><div>POLYMET MINING</div></div> <div><div>POLY MET MINING, INC.</div><div>NORTHMET PROJECT</div><div>HOYT LAKES, MINNESOTA</div></div>		<div><div>BARR</div></div> <div><div>BARR ENGINEERING COMPANY</div><div>4700 WEST 77TH STREET</div><div>MINNEAPOLIS, MN.</div><div>Ph: 1-800-632-2277</div></div>		DWG. NO.	REV			
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	ISSUED	VERSION	DATE		DRAWN: AMP		CHECKED: AMP		BARR PROJECT NO.: 23/69-0C29		SCALE: AS SHOWN	CPS-002	
			FOR PERMITTING	1	5/18/15										
			FOR CONSTRUCTION												
			NOT APPROVED FOR CONSTRUCTION												

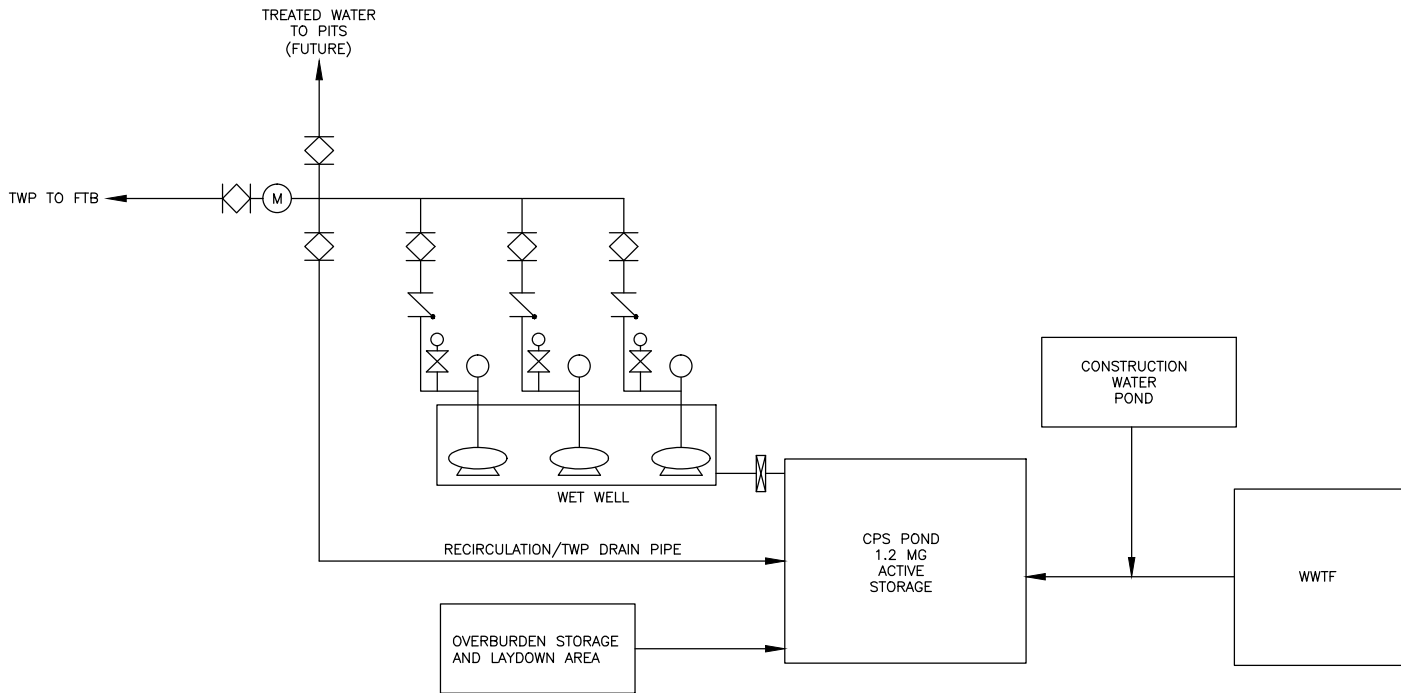


CADD USER: Veronica Sackett FILE: K:\DESIGN\23890C29.10\PERMIT\_NMM-52-MF-500.DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 1:39 PM

2

1

INCHES




LEGEND


- PIPE
- VERTICAL TURBINE PUMP AND MOTOR
- CHECK VALVE
- MAGNETIC FLOWMETER
- PLUG VALVE
- AIR/VACUUM VALVE
- SLUICE GATE

PLANT DRAWING NUMBER:

CENTRAL PUMPING STATION  
PROCESS FLOW DIAGRAM  
MINE YEARS 1–20



POLYMET  
MINING



BARR

POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1–800–632–2277

DRAWN: CSB2

CHECKED: AMP

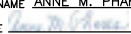
BARR PROJECT NO.: 23/69–0C29

SCALE: AS SHOWN

DWG. NO. CPS–003

REV

VER NO	DATE	DESCRIPTION	ISSUE STATUS			I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
			ISSUED	VERSION	DATE	
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS				
			FOR PERMITTING	1	5/18/15	
			FOR CONSTRUCTION			
			NOT APPROVED FOR CONSTRUCTION			

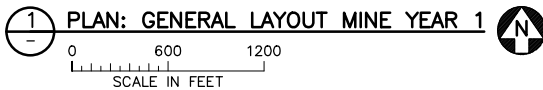
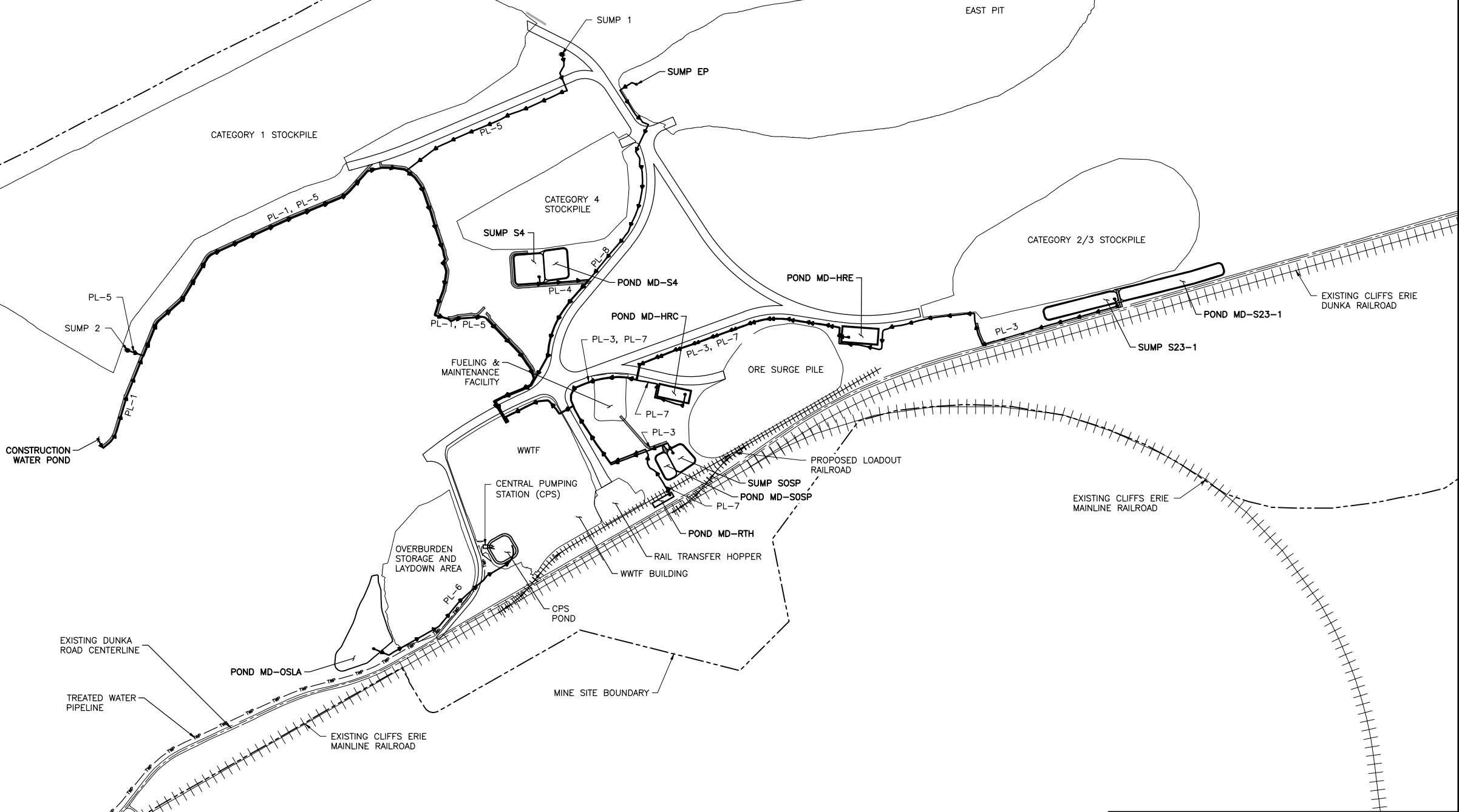
PRINTED NAME ANNE M. PHARES  
SIGNATURE   
DATE 5/18/15 LICENSE# 42022

DRAWN: CSB2  
CHECKED: AMP  
BARR PROJECT NO.: 23/69–0C29  
SCALE: AS SHOWN

CADD USER: Veronica Sackett FILE: K:\DESIGN\23890C29.10\PERMIT\_NMM-55-CS-100-DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 1:46 PM

INCHES  
1  
2

MINE SITE BOUNDARY



VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
			FOR PERMITTING	1	5/18/15
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		


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PRINTED NAME CHRISTIE KEARNEY  
SIGNATURE *Christie Kearney*  
DATE 5/18/15 LICENSE# 48864


DRAWN: KRM  
CHECKED: CMK2  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE DRAINAGE INFRASTRUCTURE  
MINE YEAR 1 GENERAL LAYOUT



POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA



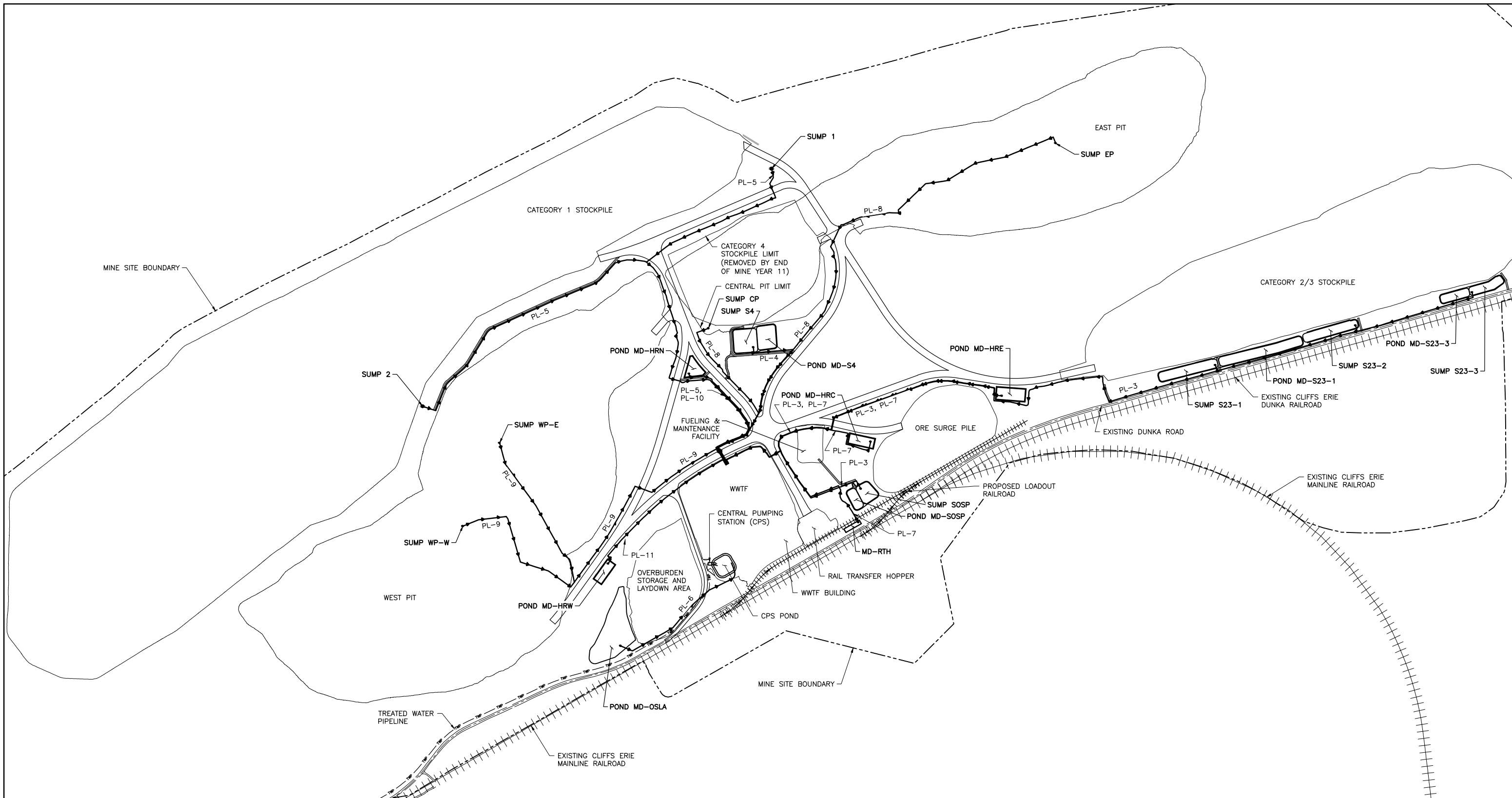
BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO. MD-001

REV

CADD USER: Veronica Sackett FILE: K:\DESIGN\23890C29.10\PERMIT\_NMM-55-CS-101-DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 1:48 PM

INCHES  
1  
2



1 PLAN: GENERAL LAYOUT MINE YEAR 11

0 600 1200  
SCALE IN FEET



N

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
			FOR PERMITTING	1	5/18/15
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

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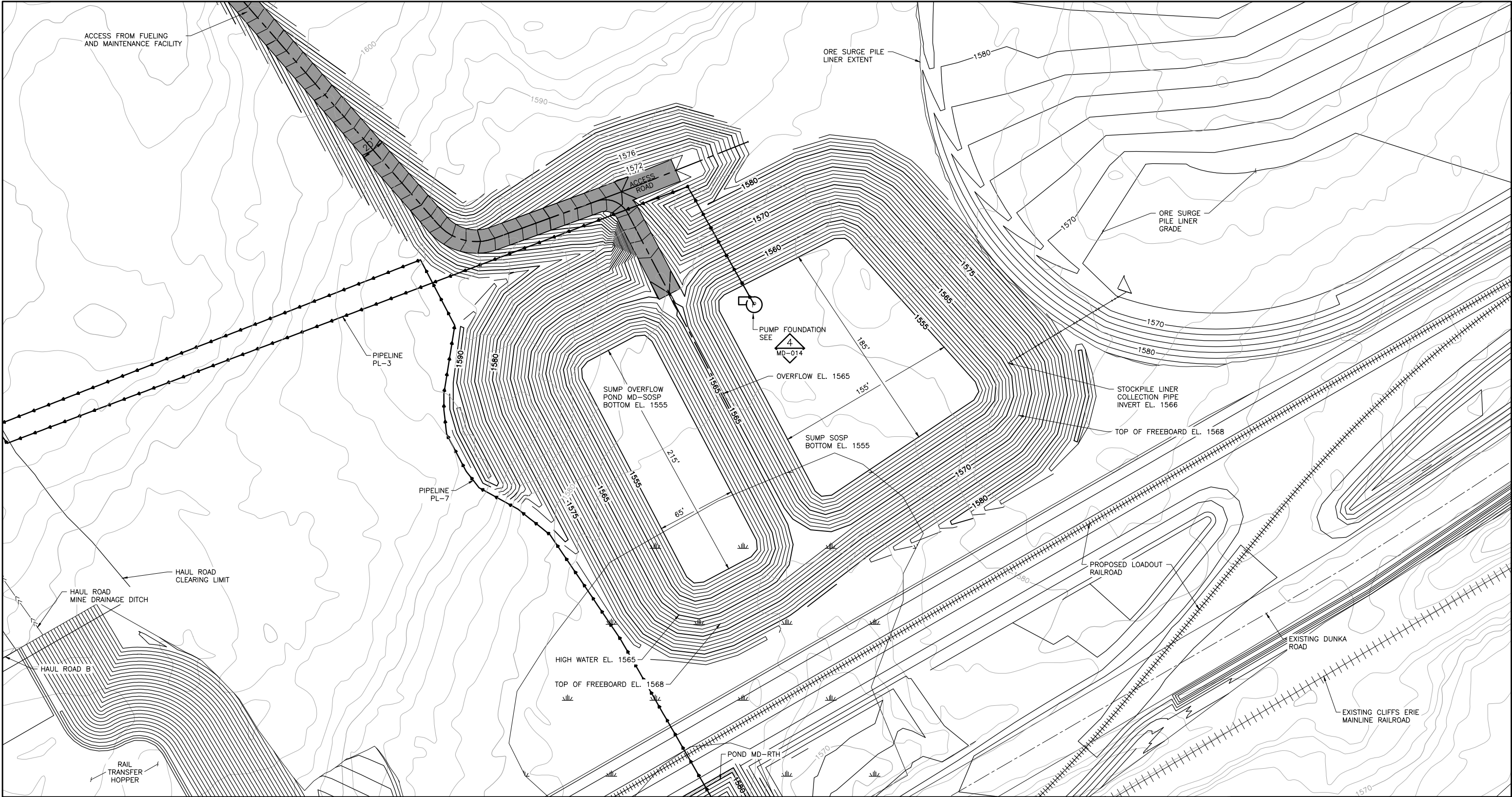
PRINTED NAME CHRISTIE KEARNEY  
SIGNATURE *Christie Kearney*  
DATE 5/18/15 LICENSE# 48864

DRAWN: KRM  
CHECKED: CMK2  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

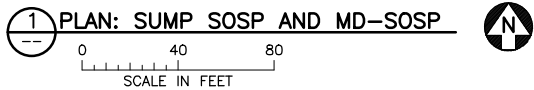
PLANT DRAWING NUMBER:	
MINE DRAINAGE INFRASTRUCTURE MINE YEAR 11 GENERAL LAYOUT	
	POLY MET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA
	BARR ENGINEERING COMPANY 4700 WEST 77TH STREET MINNEAPOLIS, MN. Ph: 1-800-632-2277
DWG. NO. MD-002	REV



CADD USER: Veronica Sackett FILE: K:\DESIGN\23890C29.10\PERMIT\_NNM-55-CS-125.DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 1:52 PM



NOTE:  
1. THE SUMP SOSP OVERFLOWS TO THE SUMP OVERFLOW POND MD-SOSP IN EVENTS GREATER THAN THE 10-YEAR 24 HOUR STORM.



1 PLAN: SUMP SOSP AND MD-SOSP

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	ISSUED		
			FOR PERMITTING	1	5/18/15
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

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PRINTED NAME CHRISTIE KEARNEY  
SIGNATURE   
DATE 5/18/15 LICENSE# 48864

DRAWN: VJS  
CHECKED: CMK2  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE DRAINAGE INFRASTRUCTURE  
MINE DRAINAGE SUMP DESIGN  
SUMP SOSP & MD-SOSP GRADING PLAN

POLYMET MINING  
POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

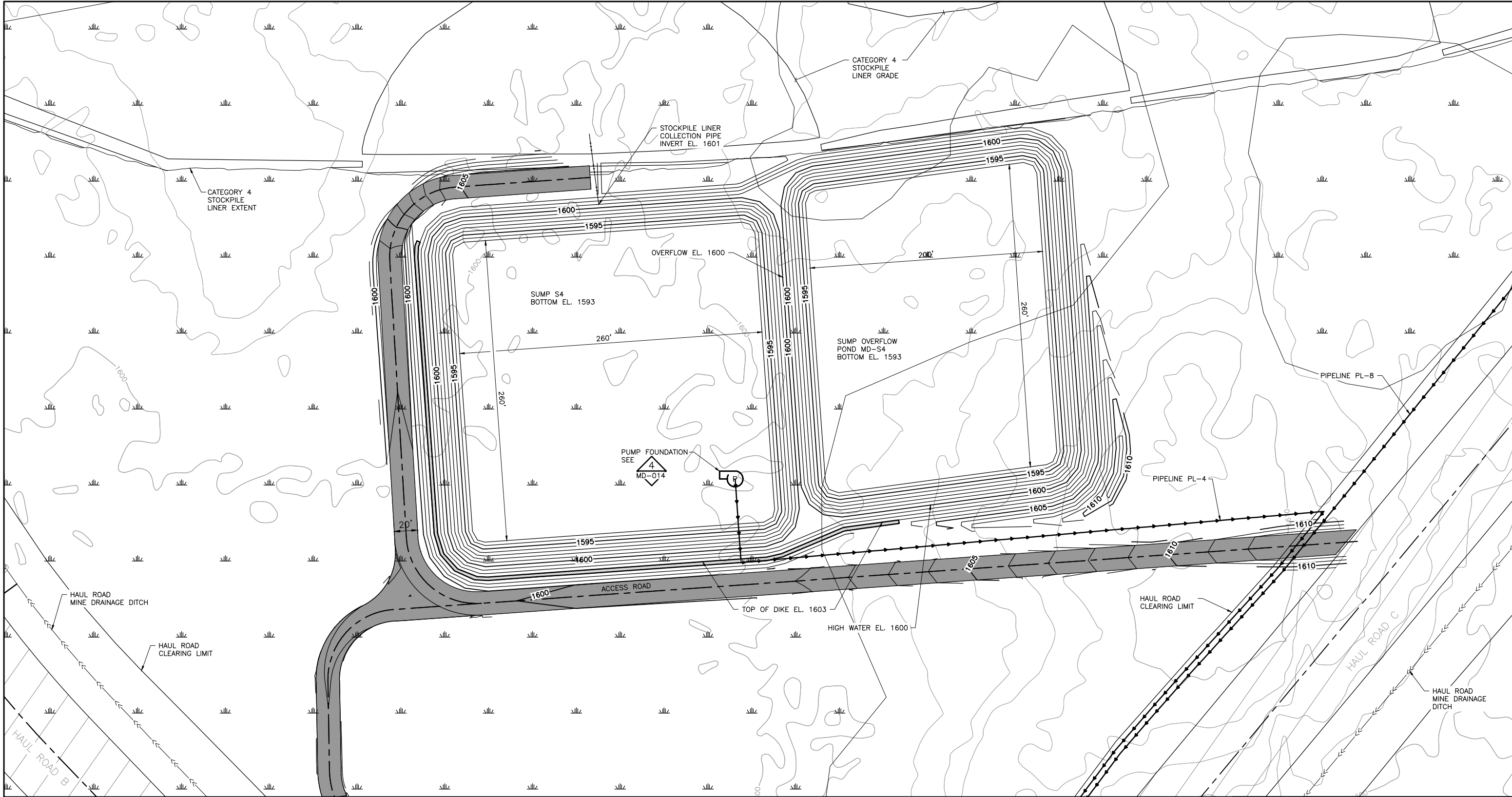
BARR  
BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO. MD-003

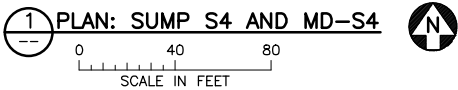
REV

CADD USER: Veronica Sackett FILE: K:\DESIGN 23890C29.10\PERMIT\_NMM-55-CS-126.DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 1:56 PM

INCHES  
1  
2



NOTE:  
1. THE SUMP S4 OVERFLOWS TO THE SUMP OVERFLOW POND MD-S4 IN EVENTS GREATER THAN THE 10-YEAR 24 HOUR STORM.



VER NO	DATE	DESCRIPTION	ISSUE STATUS		
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	ISSUED	VERSION	DATE
			FOR PERMITTING	1	5/18/15
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

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PRINTED NAME CHRISTIE KEARNEY  
SIGNATURE *Christie Kearney*  
DATE 5/18/15 LICENSE# 48864

DRAWN: VJS  
CHECKED: CMK2  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

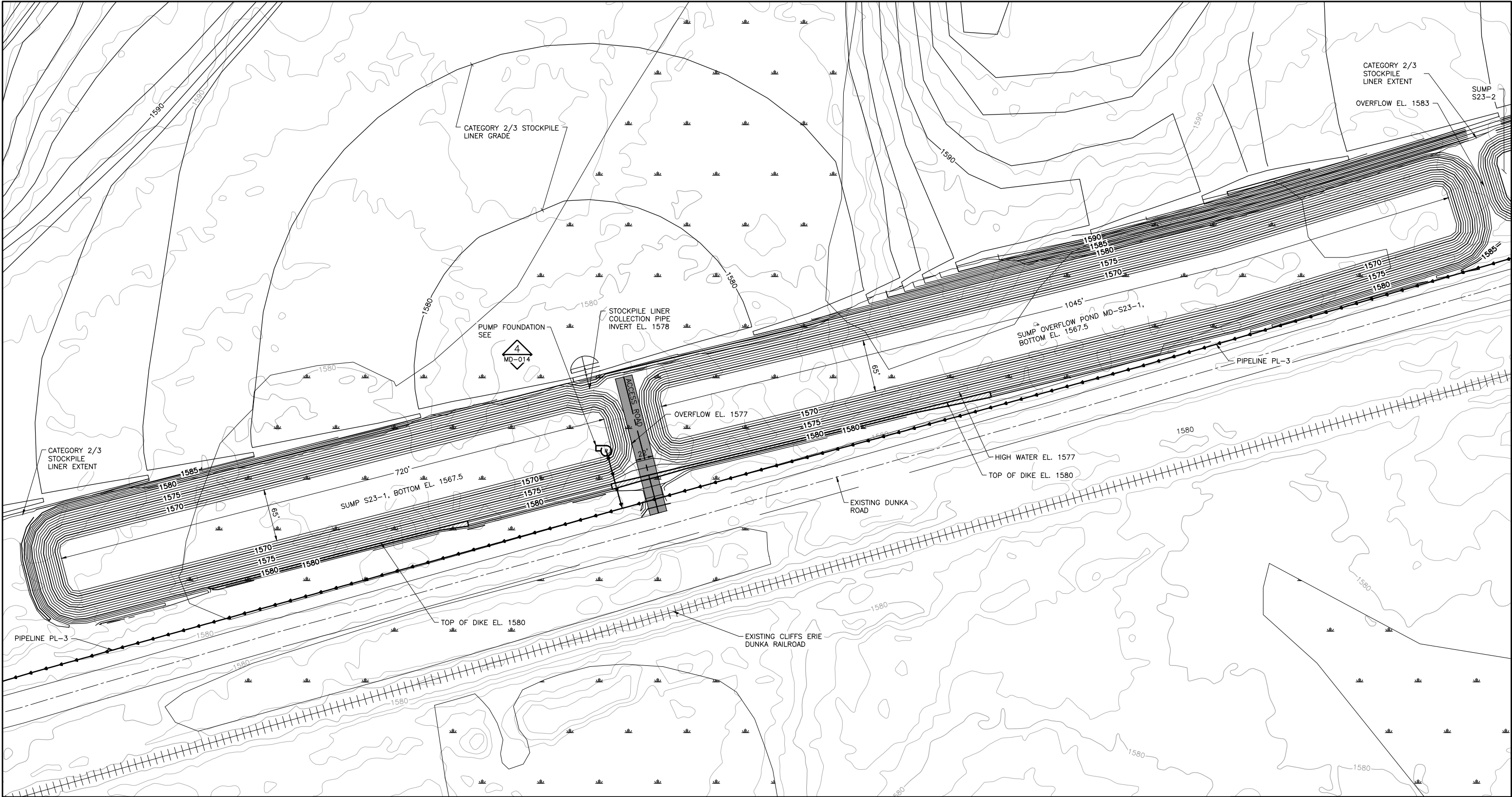
MINE DRAINAGE INFRASTRUCTURE  
MINE DRAINAGE SUMP DESIGN  
SUMP S4 AND MD-S4 GRADING PLAN

**POLYMET** MINING  
POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

**BARR**  
BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO. MD-004  
REV





NOTE:  
1. THE SUMP S23-1 OVERFLOWS TO THE SUMP OVERFLOW POND MD-S23-1 IN EVENTS GREATER THAN THE 10-YEAR 24 HOUR STORM.

1 PLAN: SUMP S23-1 AND MD-S23-1

060120

SCALE IN FEET

N

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	ISSUED		
			FOR PERMITTING	1	5/18/15
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

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PRINTED NAME CHRISTIE KEARNEY  
SIGNATURE   
DATE 5/18/15 LICENSE# 48864

DRAWN: VJS  
CHECKED: CMK2  
BARR PROJECT NO.: 23/69-OC29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE DRAINAGE INFRASTRUCTURE  
MINE DRAINAGE SUMP DESIGN  
SUMP S23-1 AND MD-S23-1 GRADING PLAN

POLYMET MINING

POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

BARR

BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO. MD-005

REV

CADD USER: Veronica Sackett FILE: K:\DESIGN 23690C29.10\PERMIT\_NNM-55-CS-127.DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 1:58 PM

2

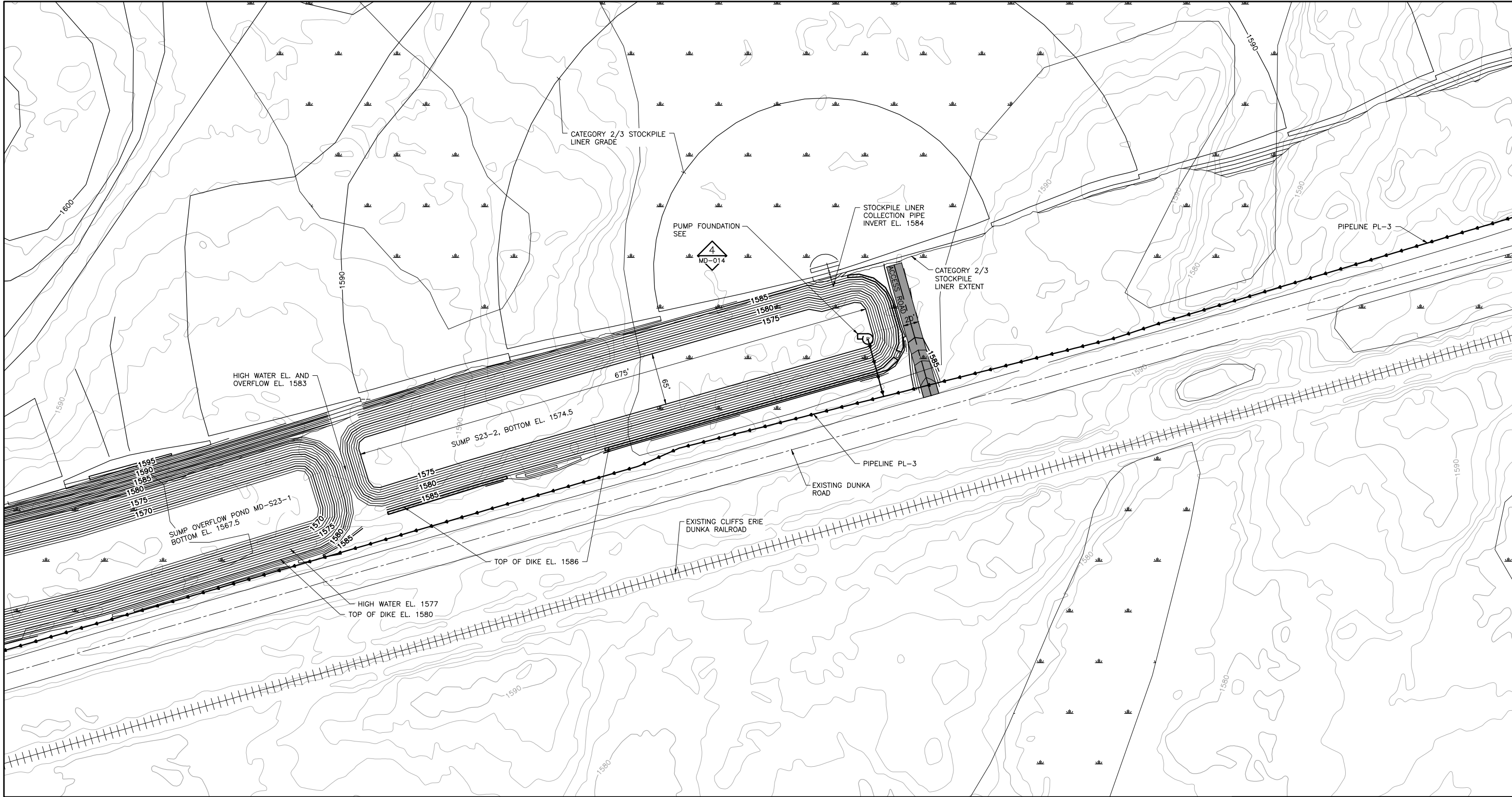
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INCHES



CADD USER: Veronica Sackett FILE: K:\DESIGN\23890C29.10\PERMIT\_NNM-55-CS-128.DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 2:00 PM

INCHES  
1  
2



NOTE:  
1. THE SUMP S23-2 OVERFLOWS TO THE SUMP OVERFLOW POND MD-S23-1 IN EVENTS GREATER THAN THE 10-YEAR 24 HOUR STORM.



1 PLAN: SUMP S23-2  
0 60 120  
SCALE IN FEET



PLANT DRAWING NUMBER:

MINE DRAINAGE INFRASTRUCTURE  
MINE DRAINAGE SUMP DESIGN  
SUMP S23-2 GRADING PLAN



POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA



BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	ISSUED		
			FOR PERMITTING	1	5/18/15
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

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SPECIFICATION, OR REPORT WAS  
PREPARED BY ME OR UNDER MY DIRECT  
SUPERVISION AND THAT I AM A DULY  
LICENSED PROFESSIONAL ENGINEER  
UNDER THE LAWS OF THE STATE OF  
MINNESOTA.

PRINTED NAME CHRISTIE KEARNEY  
SIGNATURE   
DATE 5/18/15 LICENSE# 48864

DRAWN: VJS  
CHECKED: CMK2  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

DWG. NO. MD-006

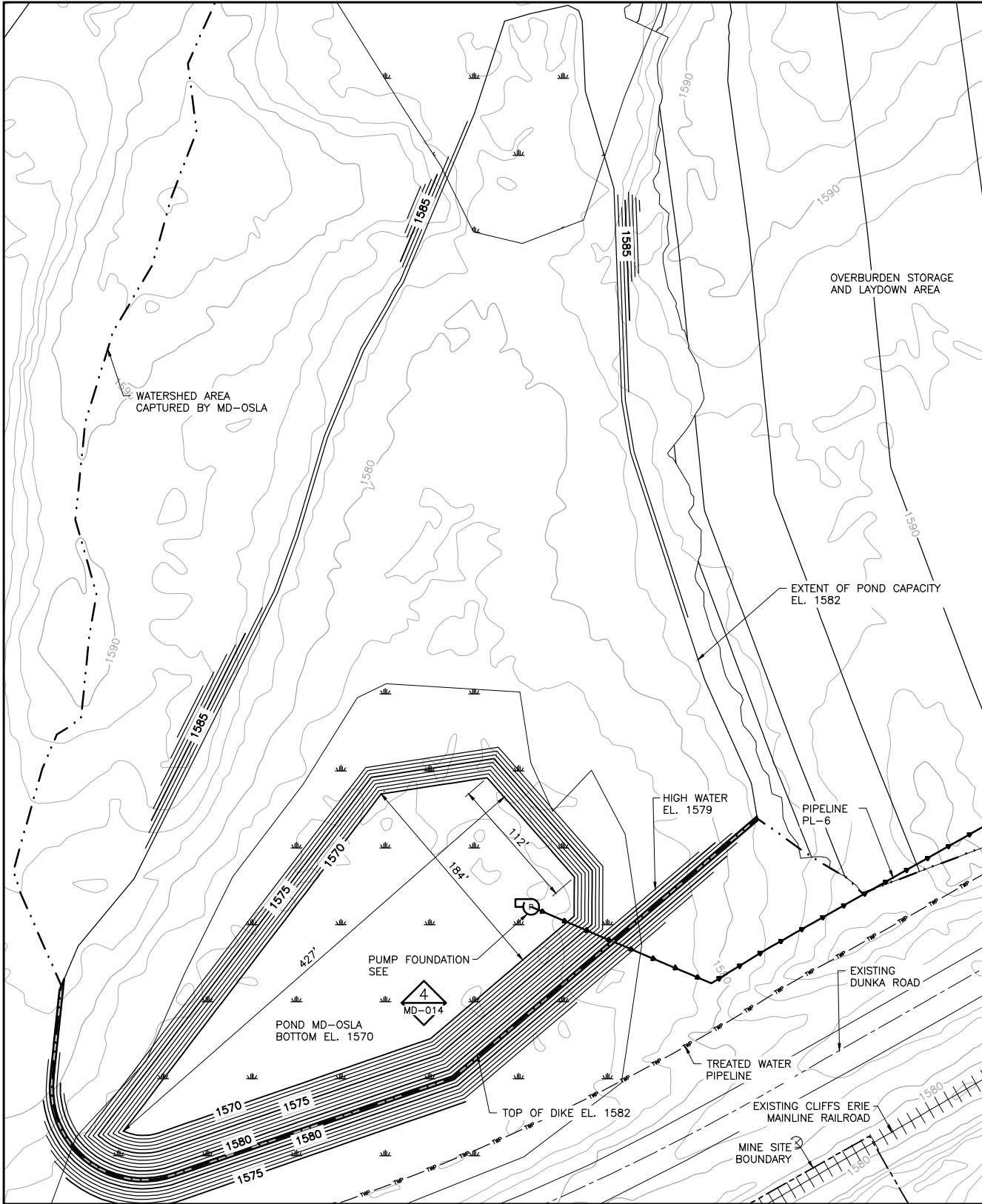
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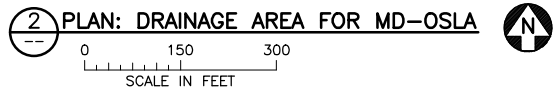
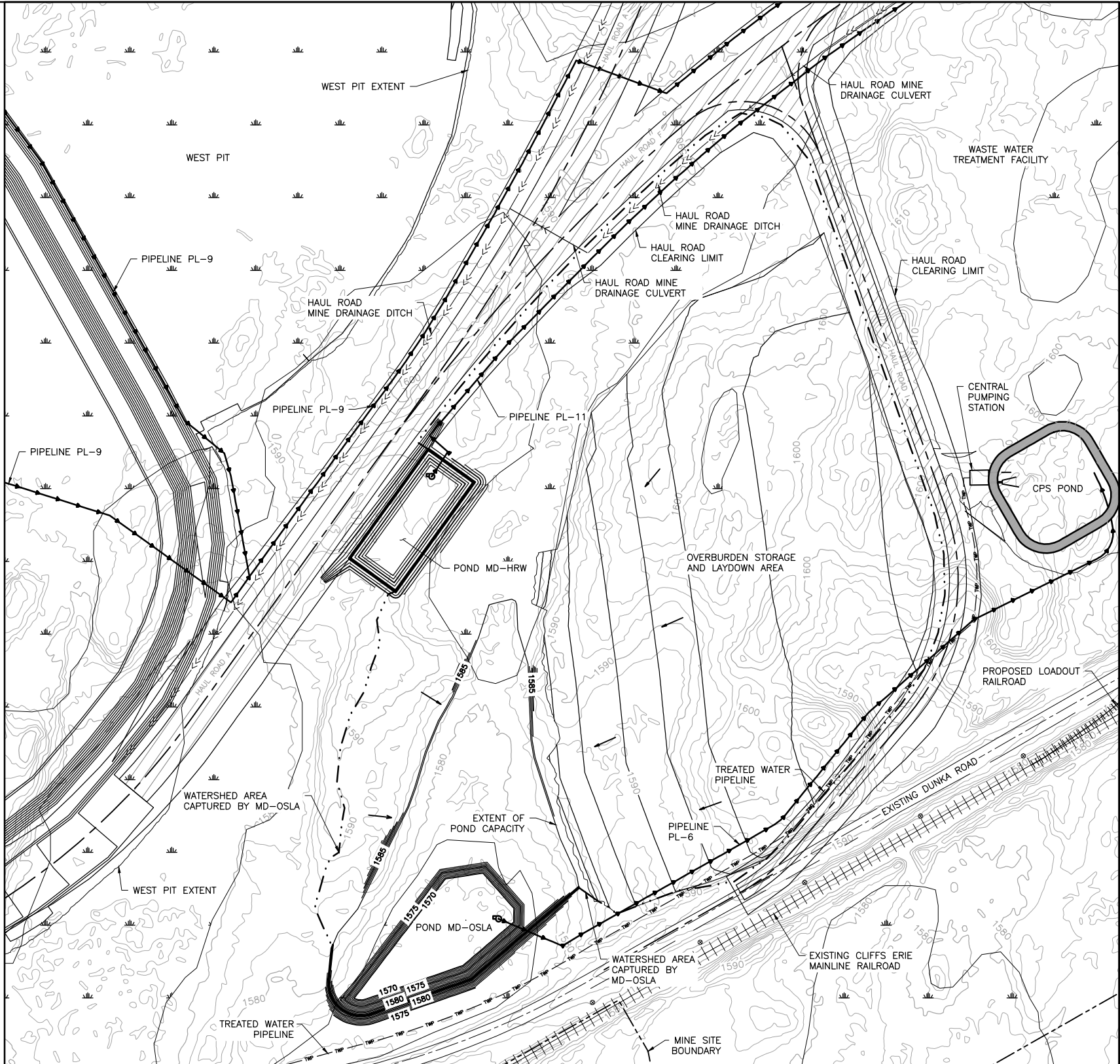
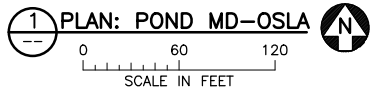




CADD USER: Veronica Sackett FILE: K:\DESIGN 23890C29.10\PERMIT\_NNM-55-CS-140.DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 2:06 PM



NOTE:  
1. MINE YEAR 11 CONTOURS ARE SHOWN FOR THE WEST PIT.



PLANT DRAWING NUMBER:

MINE DRAINAGE INFRASTRUCTURE  
MINE DRAINAGE POND DESIGN  
POND MD-OSLA GRADING PLAN



POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA



BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

I HEREBY CERTIFY THAT THIS PLAN,  
SPECIFICATION, OR REPORT WAS  
PREPARED BY ME OR UNDER MY DIRECT  
SUPERVISION AND THAT I AM A DULY  
LICENSED PROFESSIONAL ENGINEER  
UNDER THE LAWS OF THE STATE OF  
MINNESOTA.  
  
PRINTED NAME CHRISTIE KEARNEY  
SIGNATURE   
DATE 5/18/15 LICENSE# 48864

DRAWN: VJS  
  
CHECKED: CMK2  
  
BARR PROJECT NO.: 23/69-OC29  
  
SCALE: AS SHOWN

DWG. NO. MD-008

REV

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	ISSUED	1	5/18/15
			FOR PERMITTING		
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

INCHES  
1  
2

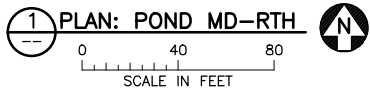
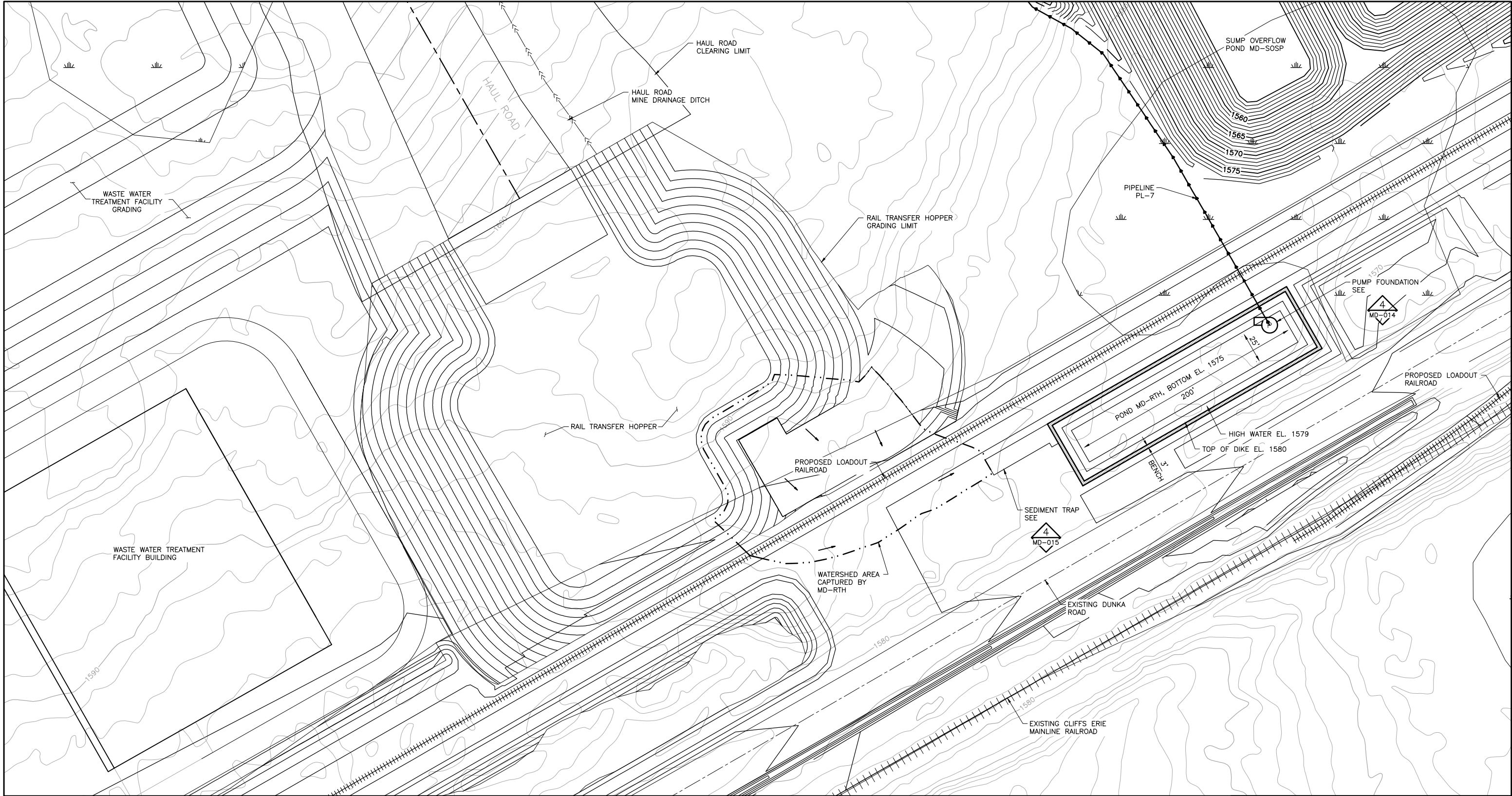


CADD USER: Veronica Sackett FILE: K:\DESIGN\23890C29.10\PERMIT\_NMM-55-CS-141.DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 2:07 PM

2


1

INCHES




PLANT DRAWING NUMBER:

MINE DRAINAGE INFRASTRUCTURE  
MINE DRAINAGE POND DESIGN  
POND MD-RTH GRADING PLAN



POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA




BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO.  
**MD-009**

REV

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	ISSUED		
			FOR PERMITTING	1	5/18/15
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

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PRINTED NAME: CHRISTIE KEARNEY  
SIGNATURE:   
DATE: 5/18/15 LICENSE# 48864

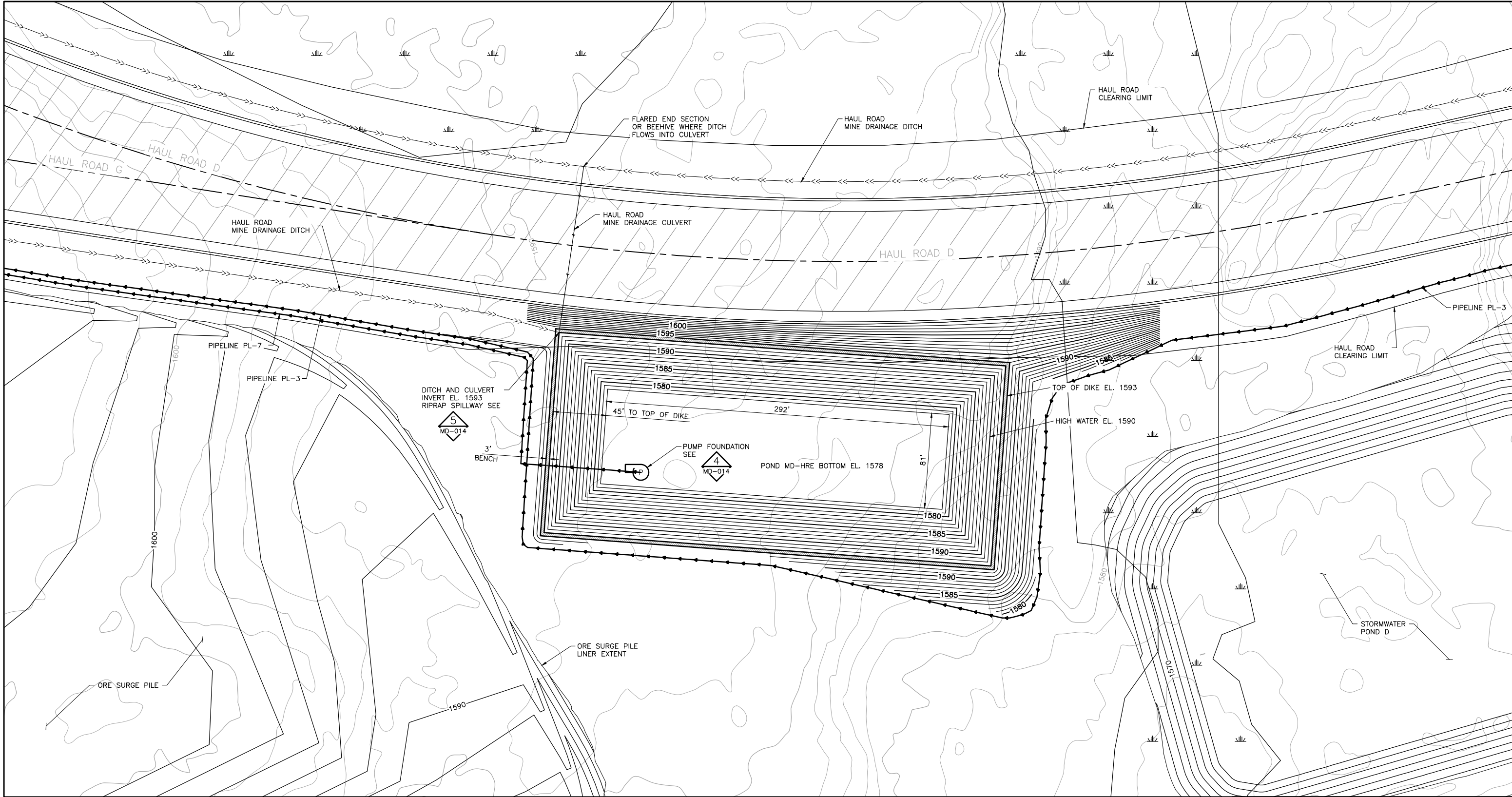
DRAWN: VJS  
CHECKED: CMK2  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

CADD USER: Veronica Sackett FILE: K:\DESIGN\23890C29.10\PERMIT\_NMM-55-CS-142.DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 2:08 PM

2

1

INCHES



1 PLAN: POND MD-HRE  
0 40 80  
SCALE IN FEET



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DATE 5/18/15 LICENSE# 48864

DRAWN: VJS  
CHECKED: CMK2  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE DRAINAGE INFRASTRUCTURE  
MINE DRAINAGE POND DESIGN  
POND MD-HRE GRADING PLAN

POLYMET MINING  
POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

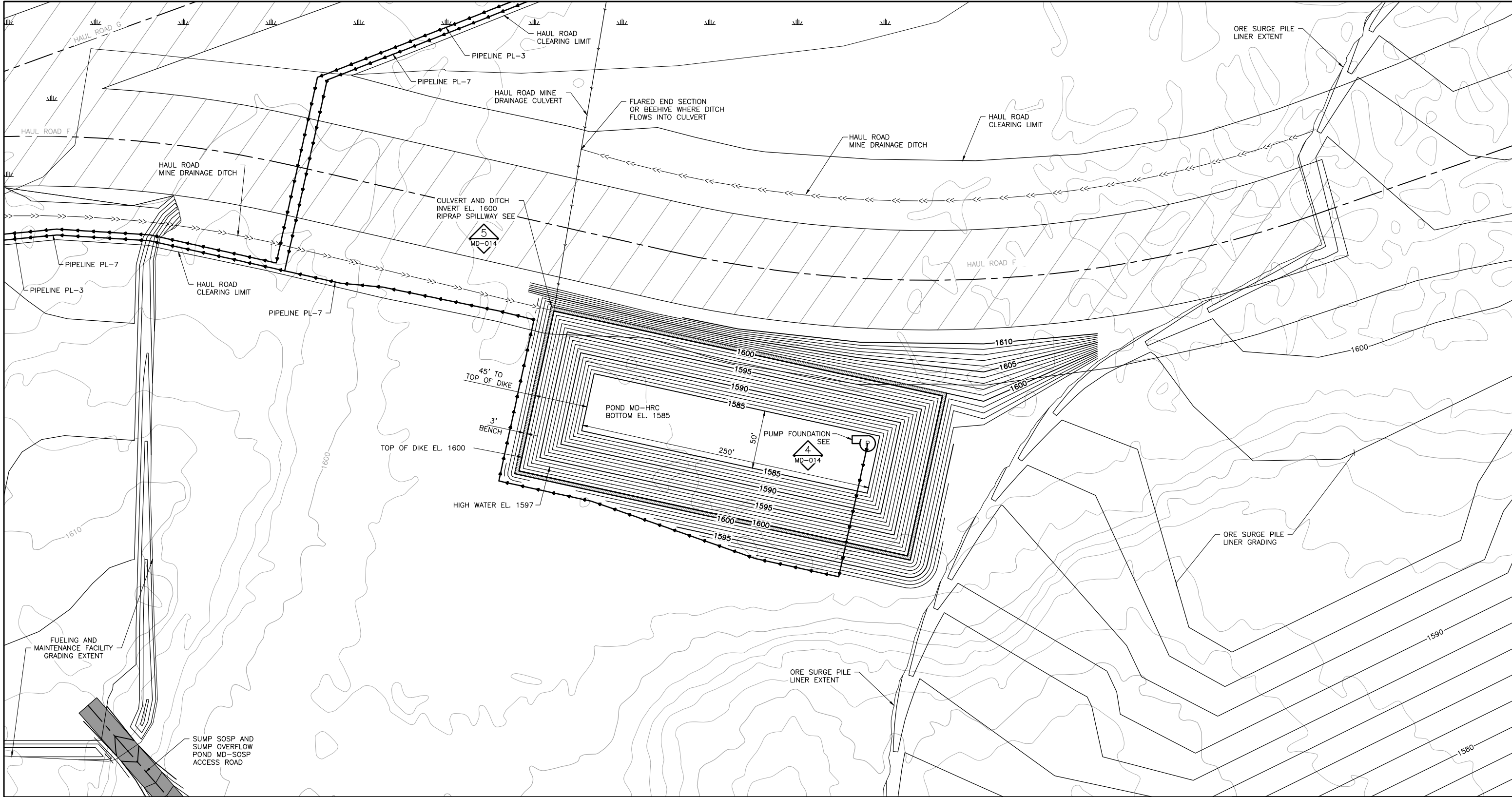
BARR  
BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO. MD-010  
REV



CADD USER: Veronica Sackett FILE: K:\DESIGN\23690C29.10\PERMIT\_NMM-55-CS-143.DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 2:18 PM

INCHES  
1  
2



1 PLAN: POND MD-HRC  
0 40 80  
SCALE IN FEET

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PRINTED NAME CHRISTIE KEARNEY  
SIGNATURE *Christie Kearney*  
DATE 5/18/15 LICENSE# 48864

DRAWN: VJS  
CHECKED: CMK2  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE DRAINAGE INFRASTRUCTURE  
MINE DRAINAGE POND DESIGN  
POND MD-HRC GRADING PLAN

POLYMET MINING

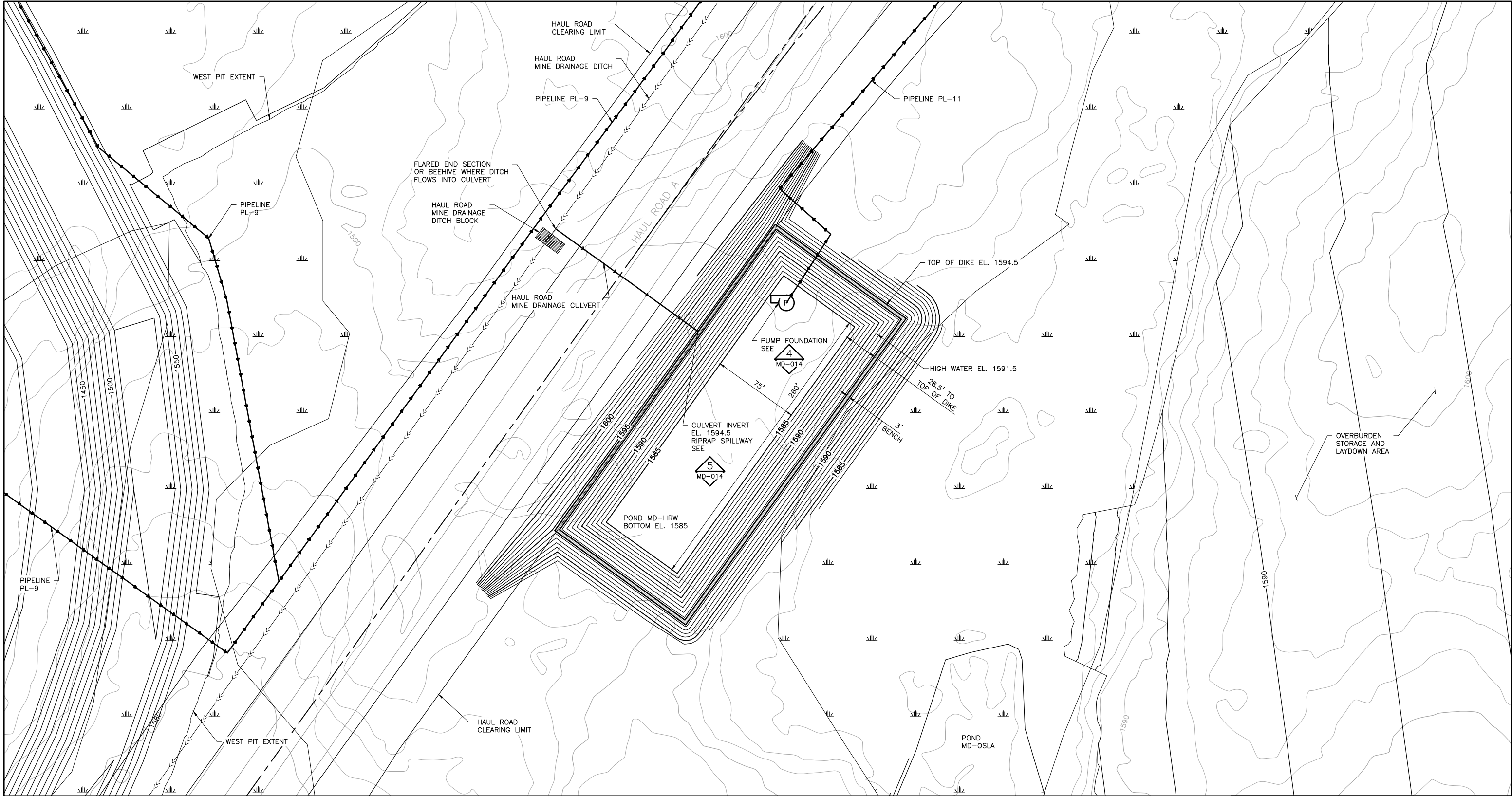
POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

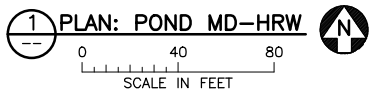
DWG. NO. MD-011

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CADD USER: Veronica Sackett FILE: K:\DESIGN\23890C29.10\PERMIT\_NMM-55-CS-144.DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 2:22 PM



NOTE:  
1. MINE YEAR 11 CONTOURS ARE SHOWN FOR THE WEST PIT.



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PRINTED NAME **CHRISTIE KEARNEY**  
SIGNATURE *Christie Kearney*  
DATE **5/18/15** LICENSE# **48864**

DRAWN: VJS  
CHECKED: CMK2  
BARR PROJECT NO.: 23/69-OC29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE DRAINAGE INFRASTRUCTURE  
MINE DRAINAGE POND DESIGN  
POND MD-HRW GRADING DESIGN

**POLYMET MINING**  
POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

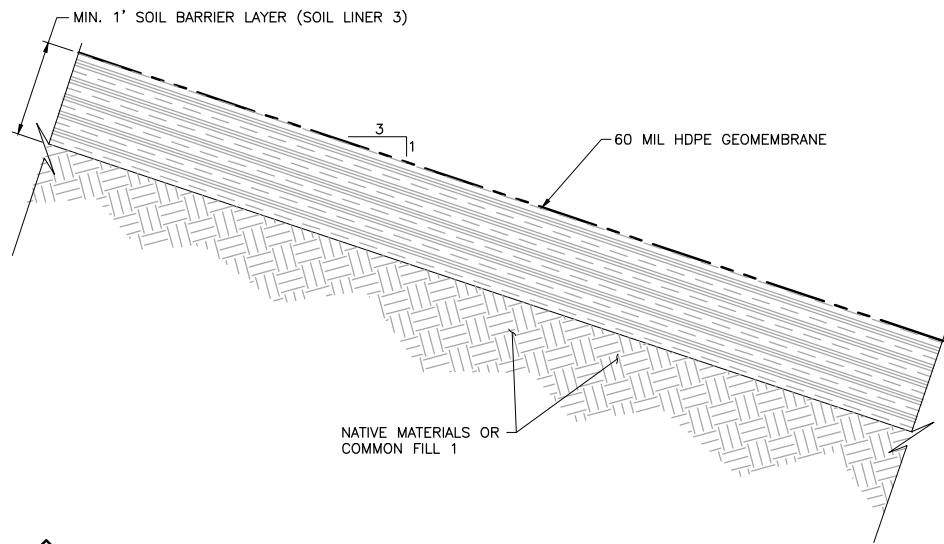
**BARR**  
BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO. **MD-012**

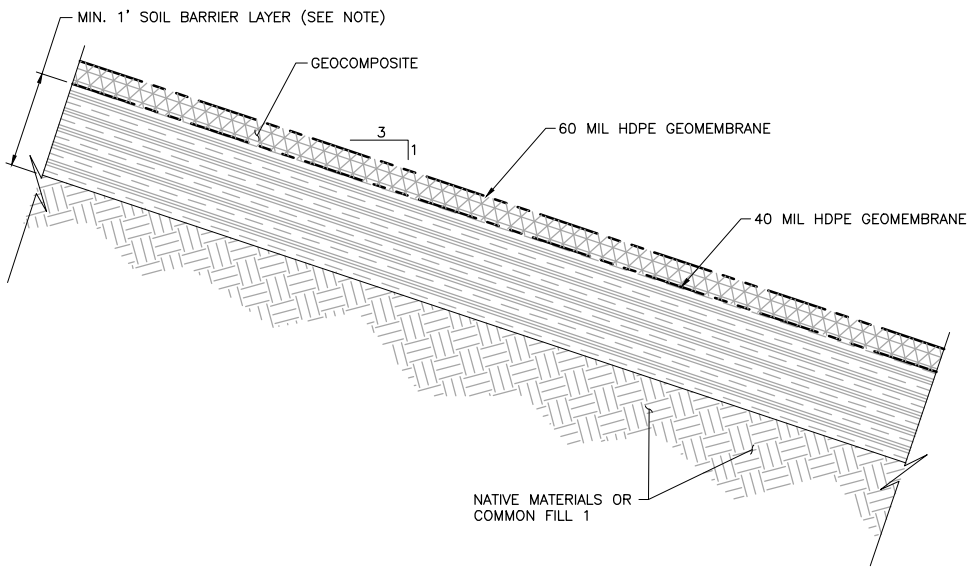
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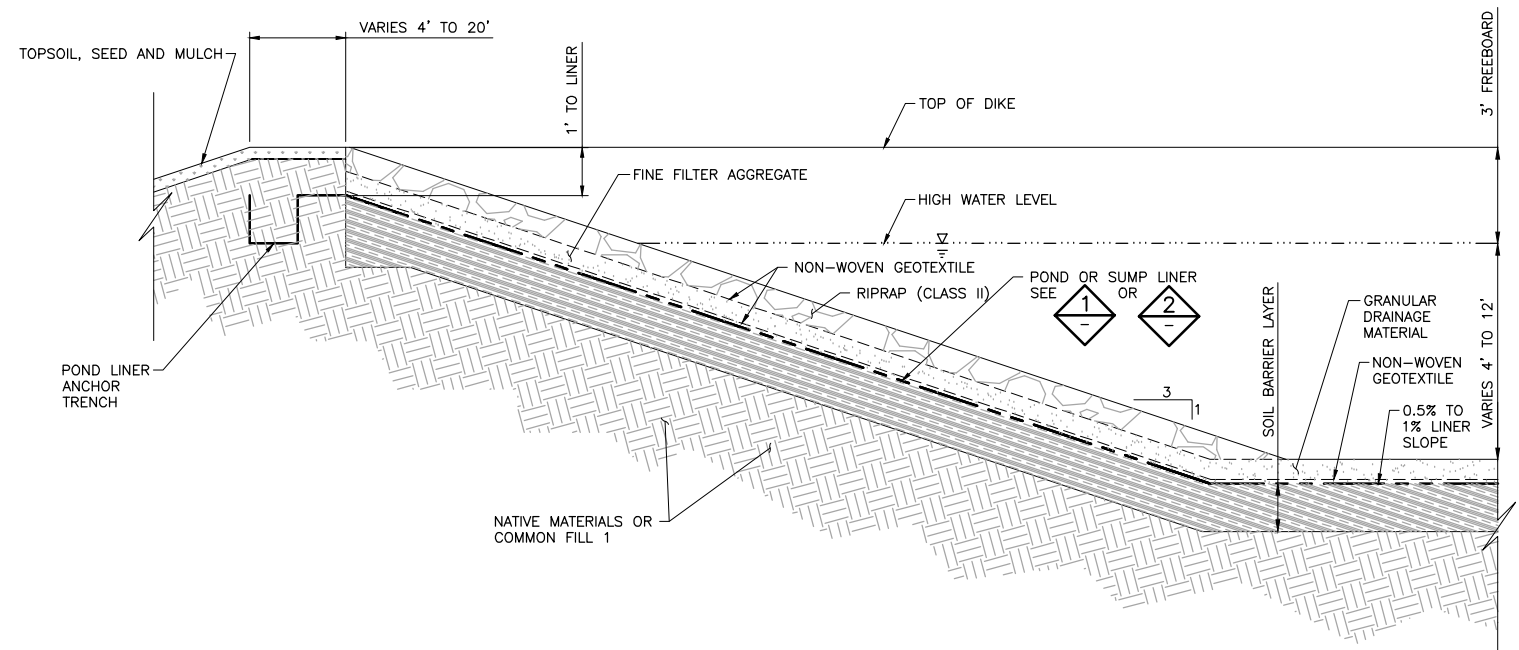




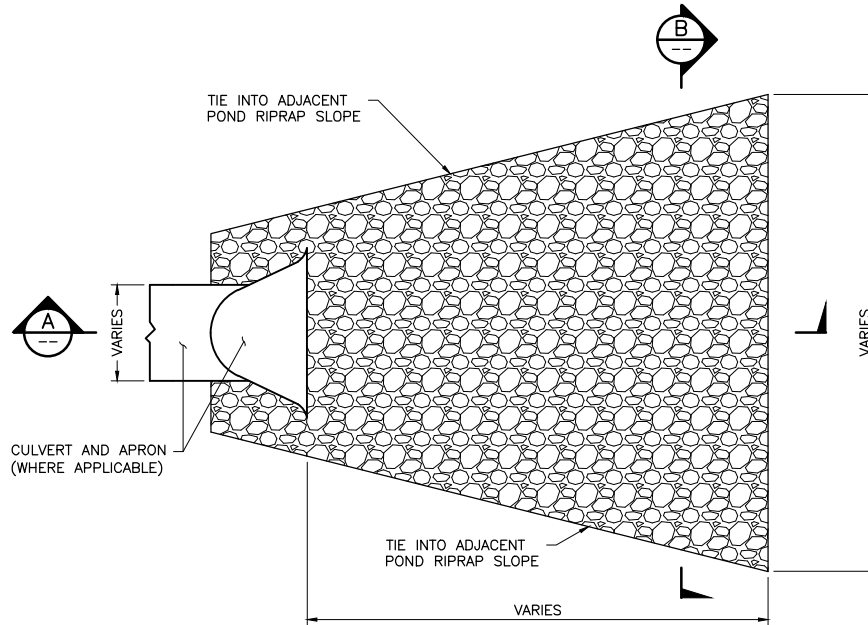
**1** DETAIL: TYPICAL MINE DRAINAGE POND AND SUMP OVERFLOW POND LINER  
NOT TO SCALE



**2** DETAIL: TYPICAL CATEGORY 2/3, 4 AND OSP SUMP AND MD-RTH LINER  
NOT TO SCALE  
NOTE: SOIL BARRIER LAYER TO MATCH THE ASSOCIATED STOCKPILE: CATEGORY 2/3 TO USE SOIL LINER 2; CATEGORY 4, OSP, AND RTH TO USE SOIL LINER 1

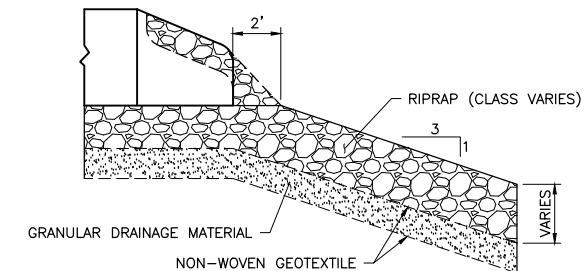


**3** SECTION: TYPICAL SUMP AND POND LINER SECTION  
NOT TO SCALE

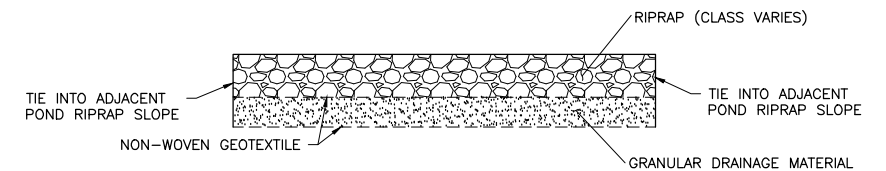


**5** DETAIL: RIPRAP SLOPE  
NOT TO SCALE

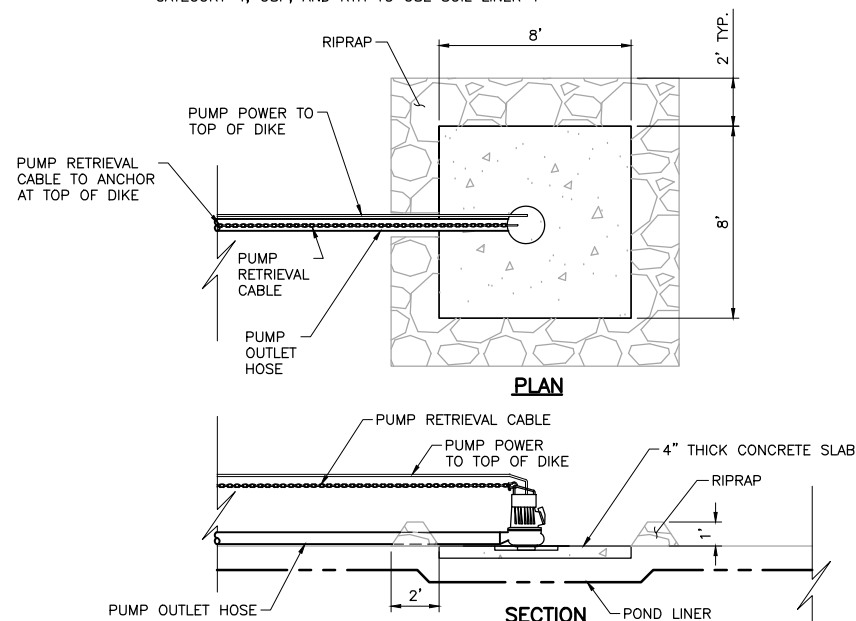
NOTES:  
1. RIPRAP GRADATION BASED ON EXPECTED VELOCITIES FROM 100 YEAR 24-HOUR STORM EVENT.  
2. CULVERT OUTLETS TO RIPRAP SLOPE.



**A** SECTION: RIPRAP SLOPE  
NOT TO SCALE



**B** SECTION: RIPRAP SLOPE  
NOT TO SCALE



**4** DETAIL: TYPICAL SUMP AND POND PUMP FOUNDATION STRUCTURE  
NOT TO SCALE

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SIGNATURE: *Christie Kearney*  
DATE: 5/18/15 LICENSE# 48864

DRAWN: VJS  
CHECKED: CMK2  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

MINE DRAINAGE INFRASTRUCTURE  
SUMP/POND TYPICAL DETAILS

**POLYMET MINING**  
POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

**BARR**  
BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

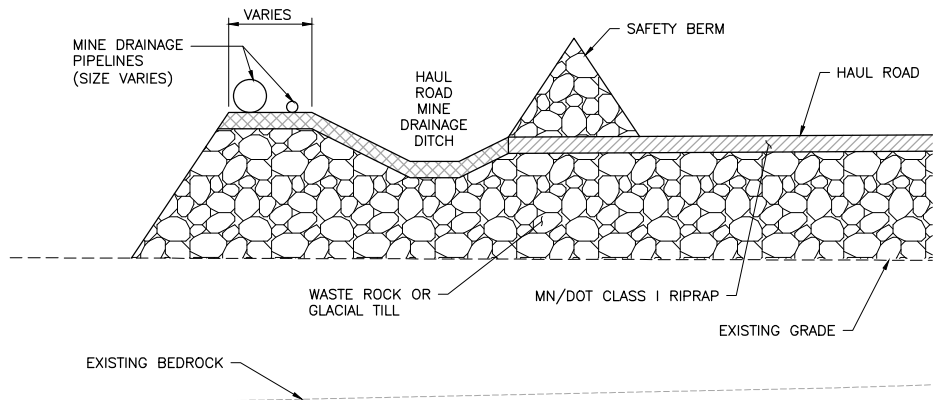
DWG. NO. **MD-014**

REV



CADD USER: Veronica Sackett FILE: K:\DESIGN\23890C29.10\PERMIT\_NMM-54-CU-300.DWG PLOT SCALE: 1:2 PLOT DATE: 5/18/2015 2:33 PM

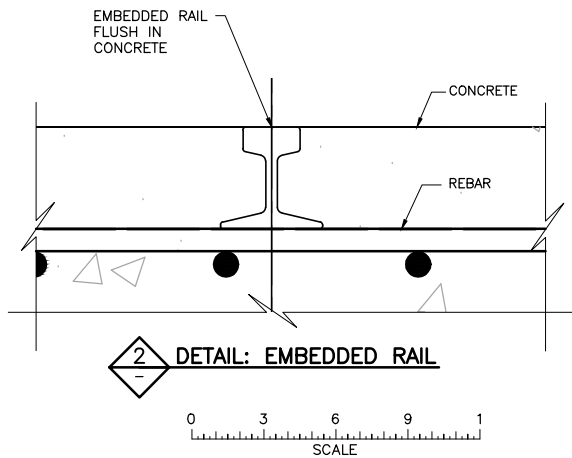
INCHES  
1  
2



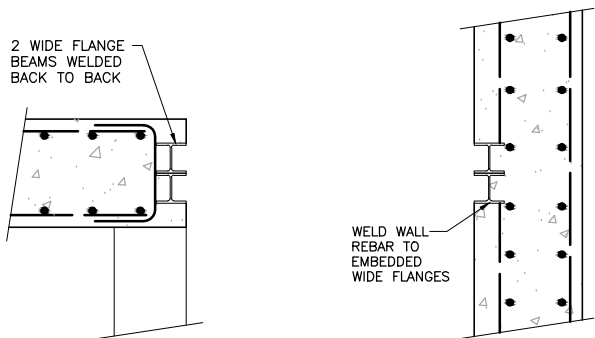
NOTES:

1. HAUL ROAD AND HAUL ROAD MINE DRAINAGE DITCH DESIGN IS SHOWN IN THE EARTHWORK DRAWINGS
2. MINE DRAINAGE PIPELINES WILL BE SECURED WITH COVER MATERIAL OVER THE PIPES EVERY 100'

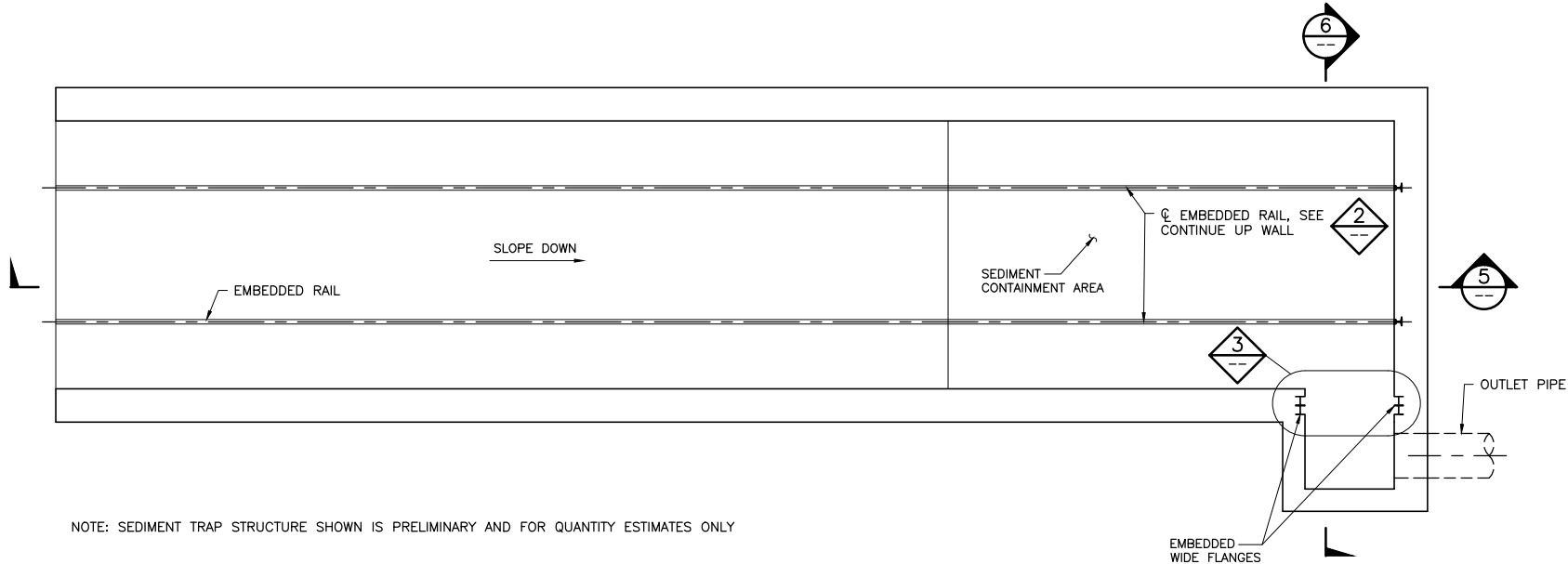
**1 SECTION: TYPICAL PIPE LOCATION**  
NOT TO SCALE



**2 DETAIL: EMBEDDED RAIL**

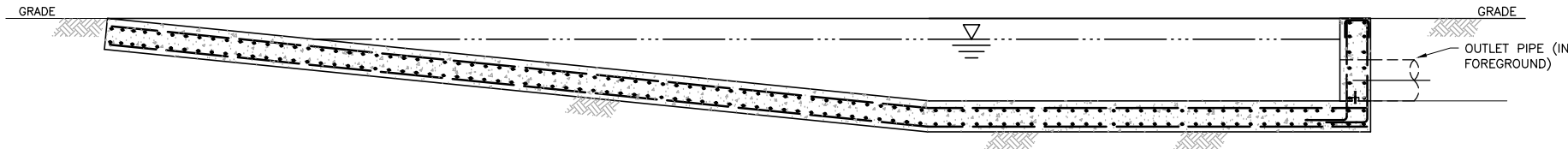


**3 DETAIL: EMBEDDED WIDE FLANGES**  
NOT TO SCALE

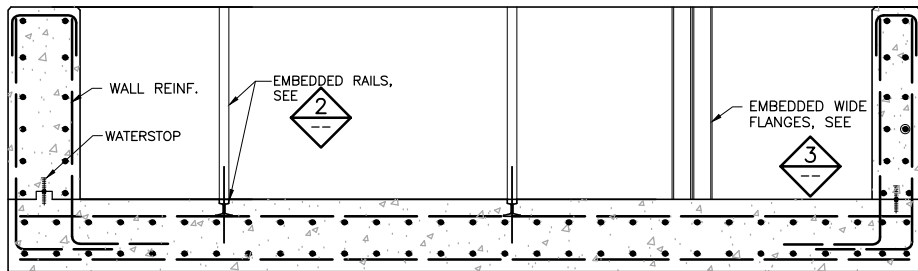


NOTE: SEDIMENT TRAP STRUCTURE SHOWN IS PRELIMINARY AND FOR QUANTITY ESTIMATES ONLY


**4 PLAN: SEDIMENT TRAP**  
MD-009  
0 1 5  
SCALE



**5 SECTION: SEDIMENT TRAP**  
0 1 5  
SCALE

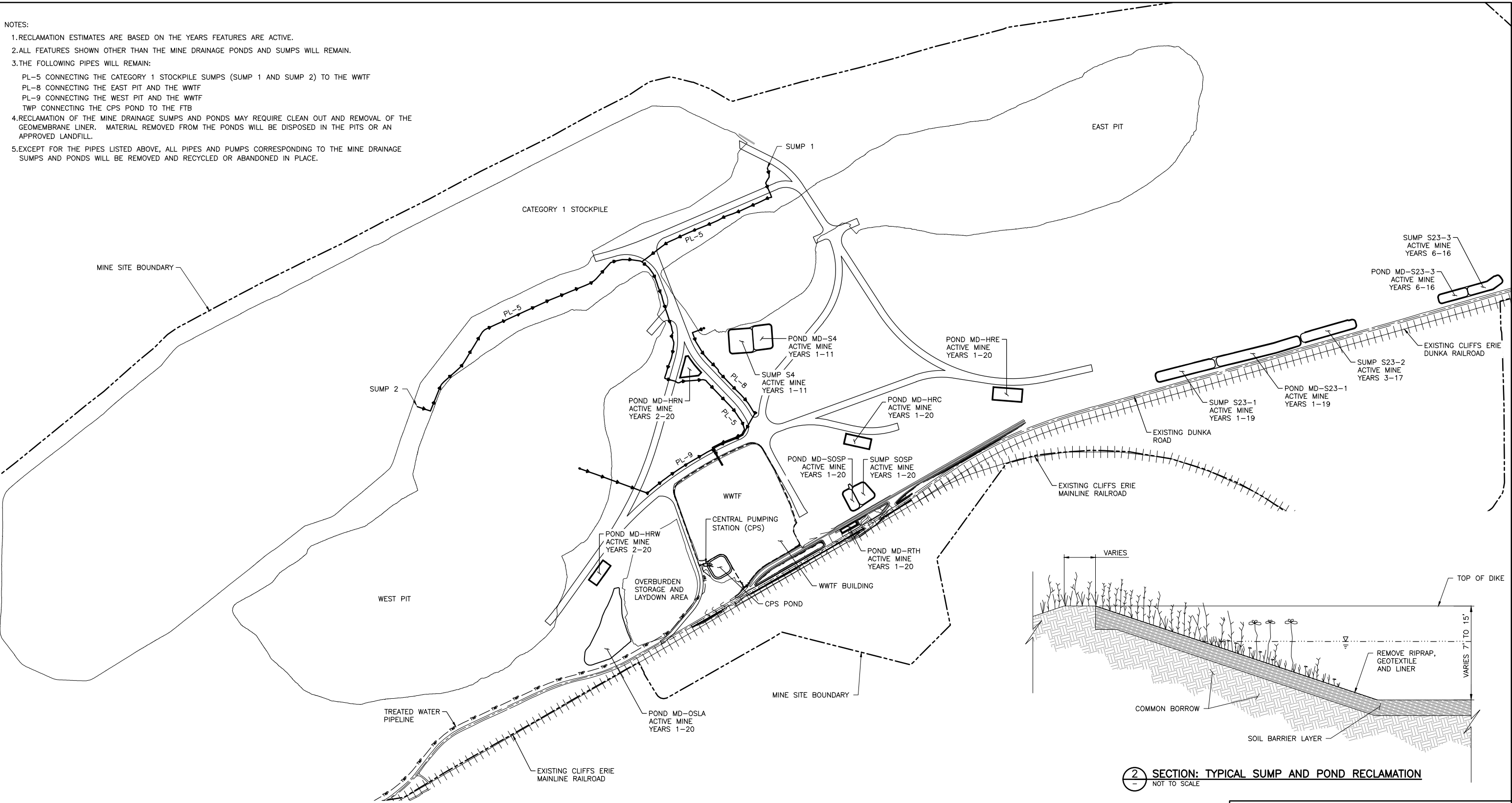


**6 SECTION: SEDIMENT TRAP**  
0 1 2 3 4 5  
SCALE

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1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	ISSUED	VERSION	DATE	MD-015							
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NOTES:

- 1.RECLAMATION ESTIMATES ARE BASED ON THE YEARS FEATURES ARE ACTIVE.
- 2.ALL FEATURES SHOWN OTHER THAN THE MINE DRAINAGE PONDS AND SUMPS WILL REMAIN.
- 3.THE FOLLOWING PIPES WILL REMAIN:
- PL-5 CONNECTING THE CATEGORY 1 STOCKPILE SUMPS (SUMP 1 AND SUMP 2) TO THE WWTF
- PL-8 CONNECTING THE EAST PIT AND THE WWTF
- PL-9 CONNECTING THE WEST PIT AND THE WWTF
- TWP CONNECTING THE CPS POND TO THE FTB
- 4.RECLAMATION OF THE MINE DRAINAGE SUMPS AND PONDS MAY REQUIRE CLEAN OUT AND REMOVAL OF THE GEOMEMBRANE LINER. MATERIAL REMOVED FROM THE PONDS WILL BE DISPOSED IN THE PITS OR AN APPROVED LANDFILL.
- 5.EXCEPT FOR THE PIPES LISTED ABOVE, ALL PIPES AND PUMPS CORRESPONDING TO THE MINE DRAINAGE SUMPS AND PONDS WILL BE REMOVED AND RECYCLED OR ABANDONED IN PLACE.



1 PLAN: GENERAL LAYOUT RECLAMATION

0 600 1200  
SCALE IN FEET



2 SECTION: TYPICAL SUMP AND POND RECLAMATION  
NOT TO SCALE

PLANT DRAWING NUMBER:

MINE DRAINAGE INFRASTRUCTURE  
RECLAMATION PLAN



POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA



BARR ENGINEERING COMPANY  
4700 WEST 77TH STREET  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DRAWN: VJS

CHECKED: CMK2

BARR PROJECT NO.: 23/69-0C29

SCALE: AS SHOWN

DWG. NO.

MD-016

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