

Appendix 8

Mechanical Infrastructure Permit Application Support Drawings

Errata Sheet

Poly Met Mining, Inc. NorthMet Project

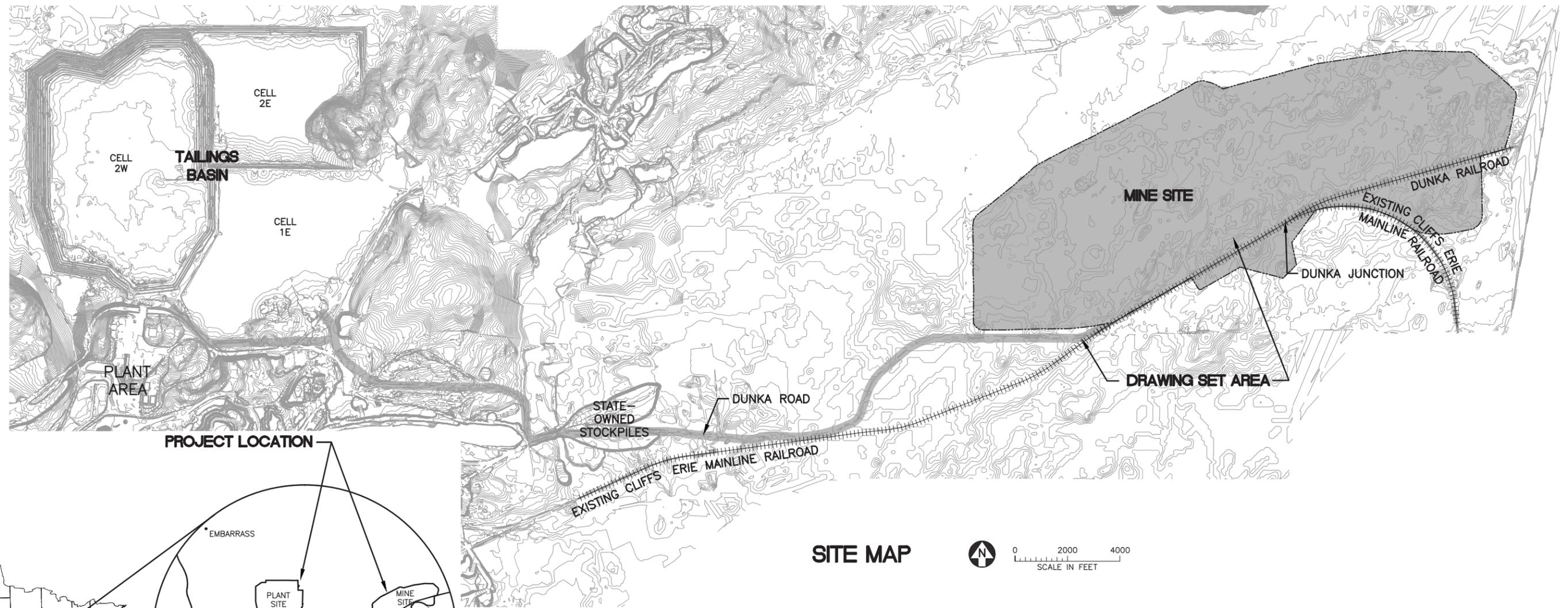
Permit Application Support Drawings: Mechanical Infrastructure

November 2017 (version 4)

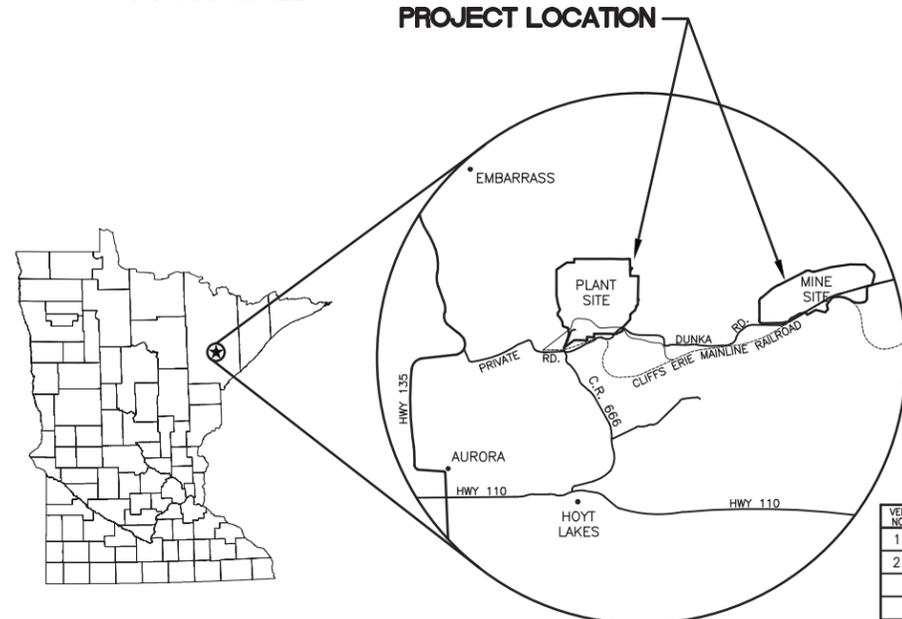
Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (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".
MPP-009	The berm over the MPP will be revised to match the contours of the road where it crosses the proposed access road near the Equalization Basin Area.
MPP-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.
MW-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).
MW-003	The grading for the access road from the Mine Site Fueling and Maintenance Facility (MSFMF) to Pond MW-SOSP & Sump SOSP will be revised to optimize drainage.
ME-002, MPP-001, MPP-007, MPP-008, MPP-009, MW-001, MW-002, MW-007, MW-008, MW-016	The "Mine Site Boundary" will be replaced by the "Mining Area Boundary" as shown on figures included in the Permit to Mine Application.
MW-016	Note 4 will be changed to: "Reclamation of the mine water sumps and ponds will require cleanout and removal of the geomembrane liner. Sediment removed from the ponds will be disposed of in the East Pit. The geomembrane liners will be recycled or properly disposed of at a permitted solid waste facility."
MW-016	Note 6 will be added: "Mine water pipes and pumps needed in the reclamation, closure and postclosure maintenance phases include those used by the Category 1 Stockpile Groundwater Containment System and those used for the flooding of the West Pit or cycling of the East Pit water."
ME-003	All references to "pre-stripping" will be changed to "stripping"

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		
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1	5/18/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	ISSUED		
2	6/07/17	PERMIT APPLICATION UPDATES	FOR PERMITTING	2	6/07/17
			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 [Signature]
DATE 6/07/17 LICENSE# 25080

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

PLANT DRAWING NUMBER:
**MECHANICAL INFRASTRUCTURE GENERAL DWGS
LOCATION MAP AND SITE MAP**

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

BARR
BARR ENGINEERING CO.
4300 MARKETPOINTE DRIVE
SUITE 200
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. **ME-001** REV **B**

SHEET INDEX

MECHANICAL INFRASTRUCTURE LEGEND

GENERAL		MINE WATER DRAWINGS	
—1000—	EXISTING CONTOUR – MAJOR	—>—	PROPOSED MINE WATER PIPE
— — —	EXISTING CONTOUR – MINOR	— —	TOP OF DIKE BENCH
—1000—	PROPOSED CONTOUR – MAJOR	—>—	PROPOSED MINE WATER CULVERT
— — —	PROPOSED CONTOUR – MINOR	—●—	PROPOSED SUMP MANHOLE
—1000—	OTHER FACILITY PROPOSED CONTOUR – MAJOR	—MPP—	PROPOSED MINE TO PLANT PIPELINES
— — —	OTHER FACILITY PROPOSED CONTOUR – MINOR	—<<—	PROPOSED HAUL ROAD MINE WATER DITCH
+++++	PROPOSED RAILROAD	—+—+—+—	PROPOSED STOCKPILE LINER OUTLET PIPE
+++++	EXISTING RAILROAD	— · · —	PROPOSED MINE WATER WATERSHED
=====	PROPOSED ACCESS ROADS		
=====	EXISTING ROAD		
— · · —	MINE SITE BOUNDARY		
— · · —	WETLAND BOUNDARY		
=====	HAUL ROAD		
MINE TO PLANT PIPELINES DRAWINGS			
⊗	EXISTING POWER POLE		
-----	EXISTING TRAIL		
-----	EXISTING UNIMPROVED TRAIL		
—R/W—	RIGHT OF WAY		
□	EXISTING STRUCTURES		
~~~~~	TREE LINE		
—OE—OE—	EXISTING OVERHEAD ELECTRIC		
—UE—UE—	EXISTING UNDERGROUND ELECTRIC		
—MPP—MPP—	PROPOSED MINE TO PLANT PIPELINES		
—>—	PROPOSED CULVERT (NON-MINE WATER)		
—>—	PROPOSED MINE WATER 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.

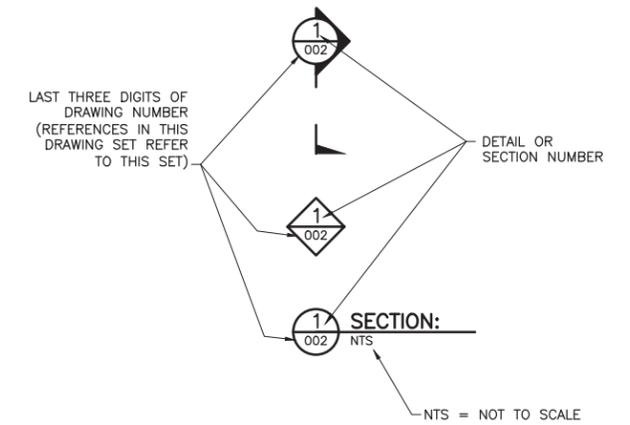
## SHEET NO. TITLE

MECHANICAL INFRASTRUCTURE GENERAL DRAWINGS	
ME-001	LOCATION MAP AND SITE MAP
ME-002	LEGEND & SHEET INDEX
ME-003	MINE SITE – MINE WATER FLOW DIAGRAM
ME-004	MINE SITE – SUMP, POND AND PIPE DETAIL TABLES
MINE TO PLANT PIPELINES DRAWINGS	
MPP-001	GENERAL LAYOUT AND SHEET INDEX
MPP-002A	PLAN STATION 10+00 TO 77+68
MPP-002B	PLAN & PROFILE STATION 113+70 TO 130+00
MPP-003	PLAN & PROFILE STATION 130+00 TO 190+00
MPP-004	PLAN & PROFILE STATION 190+00 TO 250+00
MPP-005	PLAN & PROFILE STATION 250+00 TO 310+00
MPP-006	PLAN & PROFILE STATION 310+00 TO 370+00
MPP-007	PLAN & PROFILE STATION 370+00 TO 430+00
MPP-008	PLAN & PROFILE STATION 430+00 TO 490+00
MPP-009	PLAN & PROFILE STATION 490+00 TO 512+50
MPP-010	PIPELINE INSTALLATION TYPICAL SECTIONS
MPP-011	DETAILS
MPP-012	DETAILS IN CLOSURE

## SHEET NO. TITLE

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

### DRAWING NUMBERING



### ABBREVIATIONS

AC-FT	—	ACRE—FEET
AVE	—	AVERAGE
CAT	—	CATEGORY
CL	—	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
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
MPP	—	MINE TO PLANT PIPELINES
MW	—	MINE WATER
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
TYP	—	TYPICAL
V/A	—	VACUUM/AIR RELIEF
WWTS	—	WASTE WATER TREATMENT SYSTEM

PLANT DRAWING NUMBER:  
**MECHANICAL INFRASTRUCTURE GENERAL DWGS  
 LEGEND AND SHEET INDEX**

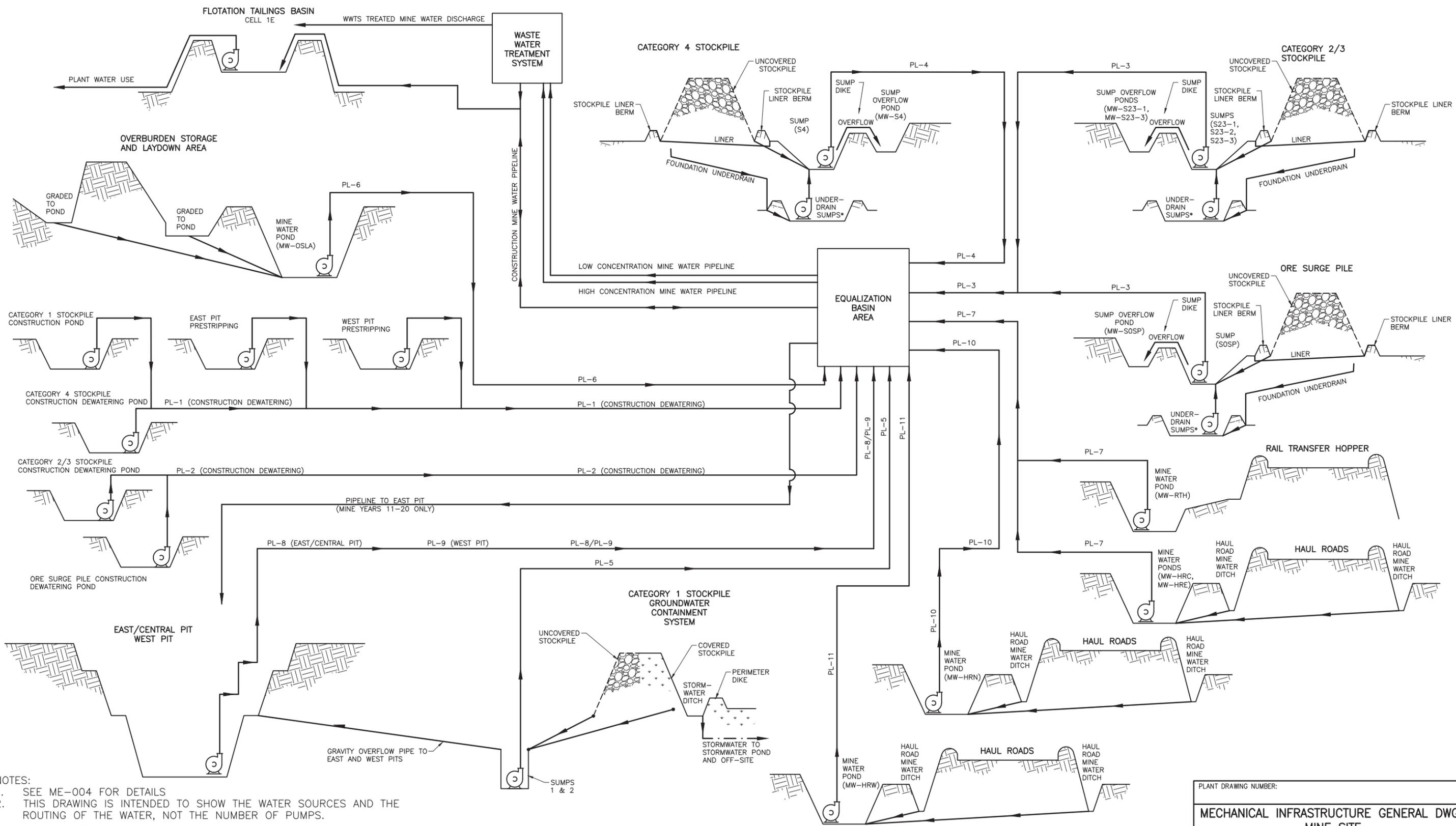
 <b>POLYMET MINING</b>	<b>POLY MET MINING, INC.</b> <b>NORTHMET PROJECT</b> <b>HOYT LAKES, MINNESOTA</b>
	 <b>BARR</b>
DRAWN: VJS CHECKED: JMM3 BARR PROJECT NO.: 23/69-0C29 SCALE: AS SHOWN	BARR ENGINEERING CO. 4300 MARKETPOINTE DRIVE SUITE 200 MINNEAPOLIS, MN. Ph: 1-800-632-2277
DWG. NO. <b>ME-002</b>	REV <b>B</b>

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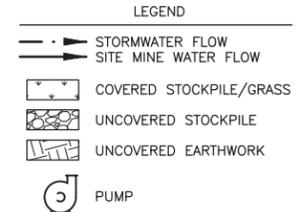
PRINTED NAME JON M. MINNE  
 SIGNATURE   
 DATE 6/07/17 LICENSE# 25080

CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29-10\PERMIT_NMM-50-MF-500.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 9:07 AM



**NOTES:**  
 1. SEE ME-004 FOR DETAILS  
 2. 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 WWTs OR CPS DEPENDING ON WATER QUALITY TESTING RESULTS.



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 DATE: 6/07/17 LICENSE# 25080

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

PLANT DRAWING NUMBER:  
**MECHANICAL INFRASTRUCTURE GENERAL DWGS**  
**MINE SITE**  
**MINE WATER FLOW DIAGRAM**

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

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DWG. NO. **ME-003** REV **B**

INCHES

**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 WATER SUMP LINER	4,855,000	MW-S23-1	MW-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 WATER SUMP LINER	3,910,000	MW-S23-1	MW-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 WATER SUMP LINER	2,151,000	MW-S23-3	MW-007
S4	CATEGORY 4 STOCKPILE SUMP	PROVIDE RUNOFF STORAGE FOR THE 10 YEAR 24 HOUR EVENT	1-11	3,291,000	130	50	MINE WATER SUMP LINER	4,073,000	MW-S4	MW-004
SOSP	ORE SURGE PILE SUMP	PROVIDE RUNOFF STORAGE FOR THE 10 YEAR 24 HOUR EVENT	1-20	2,770,000	80	90	MINE WATER SUMP LINER	2,835,000	MW-SOSP	MW-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. MINE WATER SUMP LINER IS SHOWN IN DETAIL 1 ON SHEET MW-014
4. MINE WATER POND LINER IS SHOWN IN DETAIL 2 ON SHEET MW-014
5. ALL PUMP CAPACITY FLOWS AND TDH VALUES HAVE BEEN ROUNDED

**MINE WATER 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)				
MW-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 WATER POND LINER	7,006,000	NONE	MW-005/ MW-006
MW-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 WATER POND LINER	1,727,000	NONE	MW-007
MW-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 WATER POND LINER	3,226,000	NONE	MW-004
MW-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 WATER POND LINER	1,727,000	NONE	MW-003
MW-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 WATER POND LINER	2,248,000	NONE	MW-011
MW-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 WATER POND LINER	3,487,000	NONE	MW-010
MW-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 WATER POND LINER	1,303,000	NONE	MW-012
MW-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 WATER POND LINER	1,499,000	NONE	MW-013
MW-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 WATER SUMP LINER	228,000	NONE	MW-009
MW-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	MW-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)
MPP	MINE TO PLANT PIPELINES	TRANSPORT WATER FROM THE CPS TO FLOTATION TAILINGS BASIN	CPS	20
PL-1	PIPELINE NUMBER 1	TRANSPORT CONSTRUCTION WATER TO THE WWTS	TEMP – CAT 1, CAT 4, EAST PIT & WEST PIT	2 TO 8
PL-2	PIPELINE NUMBER 2	TRANSPORT CONSTRUCTION WATER TO THE WWTS	TEMP – CAT 2/3 + OSP	2 TO 8
PL-3	PIPELINE NUMBER 3	TRANSPORT MINE WATER TO THE WWTS	CAT 2/3 & OSP	3 TO 8
PL-4	PIPELINE NUMBER 4	TRANSPORT MINE WATER TO THE WWTS	CAT 4	4
PL-5	PIPELINE NUMBER 5	TRANSPORT MINE WATER TO THE WWTS	CAT 1	28 TO 42
PL-6	PIPELINE NUMBER 6	TRANSPORT MINE WATER TO THE CPS	OSLA	3
PL-7	PIPELINE NUMBER 7	TRANSPORT MINE WATER TO THE WWTS	RTH, MW-HRE & MW-HRC	2 TO 6
PL-8	PIPELINE NUMBER 8	TRANSPORT MINE WATER TO THE WWTS	EAST PIT & CENTRAL PIT	12 TO 20
PL-9	PIPELINE NUMBER 9	TRANSPORT MINE WATER TO THE WWTS	WEST PIT	10 TO 22
PL-10	PIPELINE NUMBER 10	TRANSPORT MINE WATER TO THE WWTS	MW-HRN	2
PL-11	PIPELINE NUMBER 11	TRANSPORT MINE WATER TO THE WWTS	MW-HRW	2

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

PLANT DRAWING NUMBER:

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

**POLYMET MINING**  
NORTHMET PROJECT  
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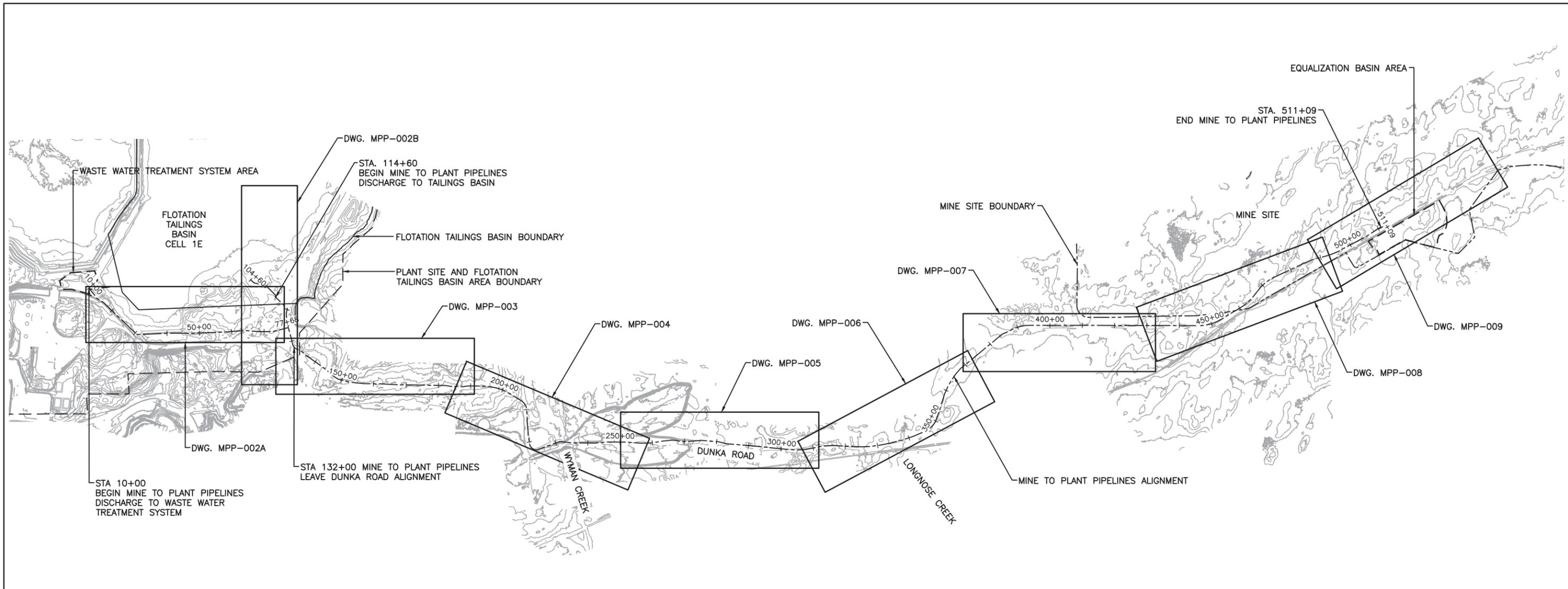
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PRINTED NAME JON M. MINNE  
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DRAWN: VJS  
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SCALE: AS SHOWN

CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29-10\PERMIT_NMD-51-CU-100.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 9:20 AM



1 PLAN: SHEET INDEX



INCHES

PLANT DRAWING NUMBER:

**MINE TO PLANT PIPELINES  
GENERAL LAYOUT AND SHEET INDEX**

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HOYT LAKES, MINNESOTA

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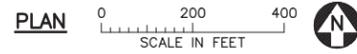
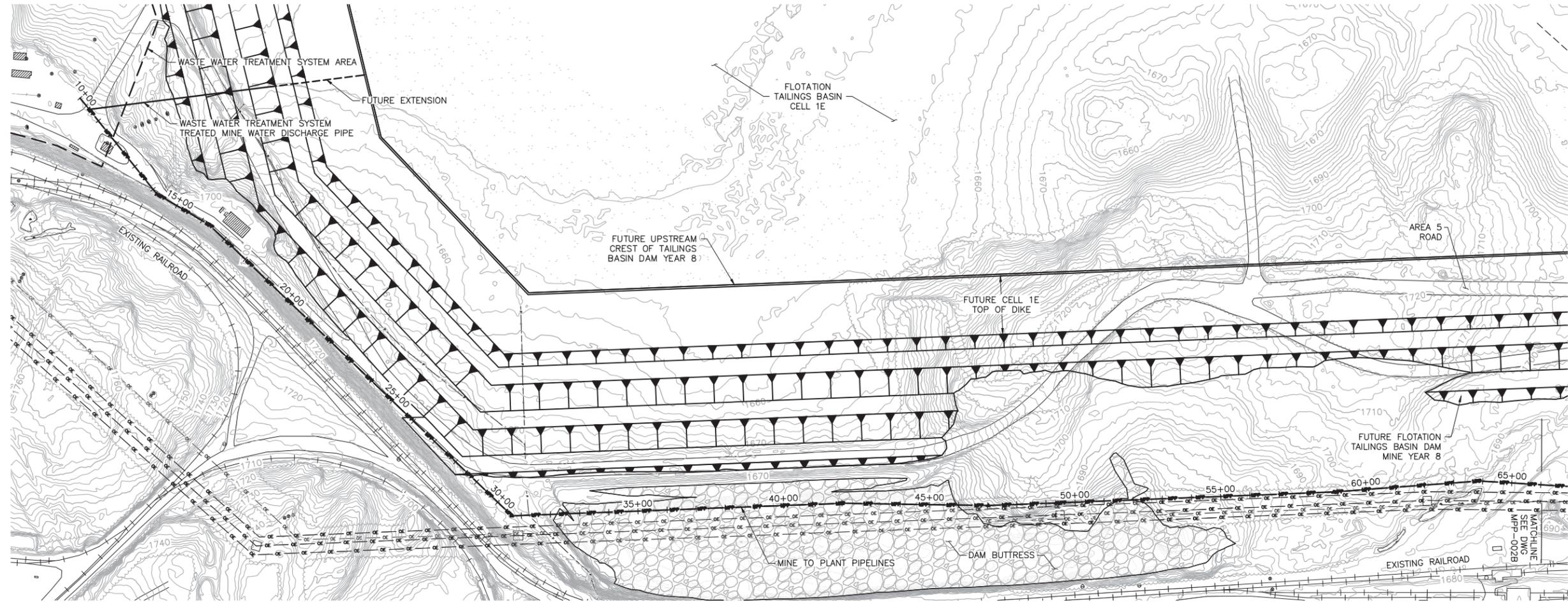
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PRINTED NAME JON M. MINNE  
SIGNATURE [Signature]  
DATE 6/07/17 LICENSE# 25080

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

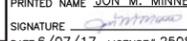
DWG. NO. **MPP-001** REV **B**



PROFILES TO BE DEVELOPED ONCE ROUTE IS FINALIZED DURING FINAL DESIGN.

NOTES:  
 1. PIPELINE SHALL BE CONSTRUCTED PER  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		
2	6/07/17	PERMIT APPLICATION UPDATES	FOR PERMITTING	2	6/07/17
			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 6/07/17 LICENSE# 25080

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

PLANT DRAWING NUMBER:  
**MINE TO PLANT PIPELINES  
 PLAN  
 STATION 10+00 TO 66+00**

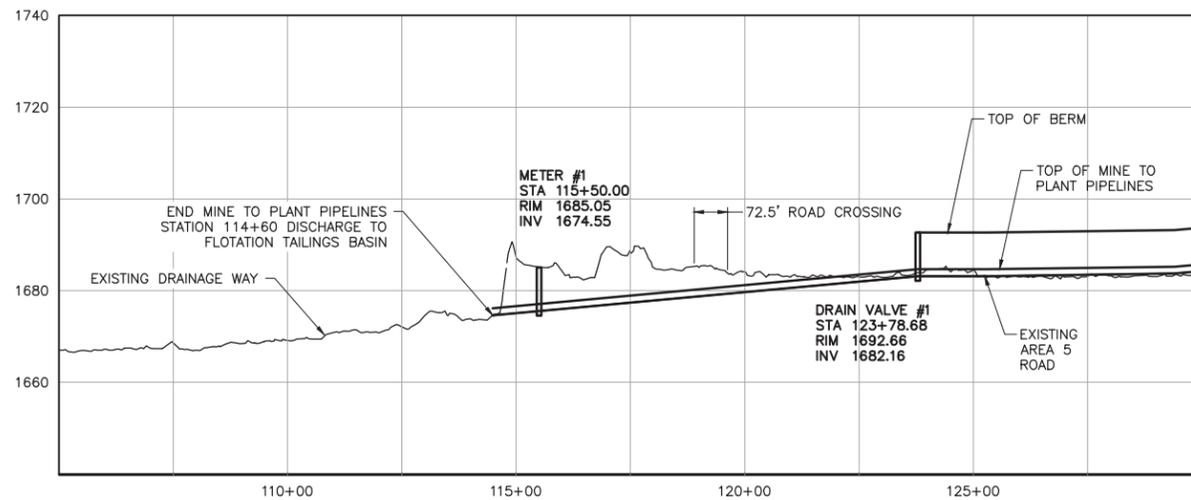
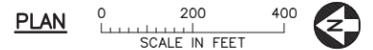
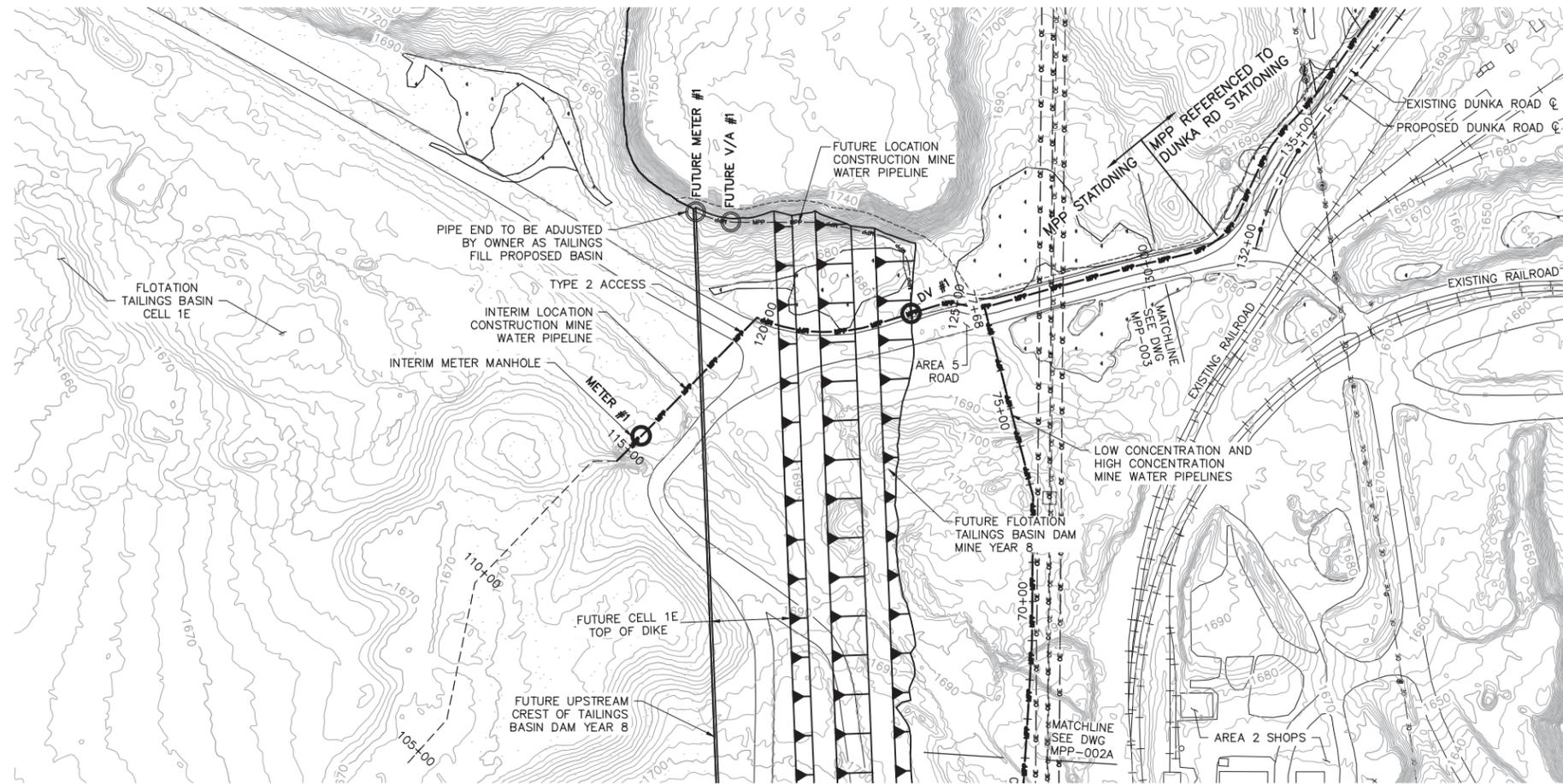
 **POLYMET MINING**  
**POLY MET MINING, INC.**  
**NORTHMET PROJECT**  
**HOYT LAKES, MINNESOTA**

 **BARR**  
 BARR ENGINEERING CO.  
 4300 MARKETPOINTE DRIVE  
 SUITE 200  
 MINNEAPOLIS, MN.  
 Ph: 1-800-632-2277

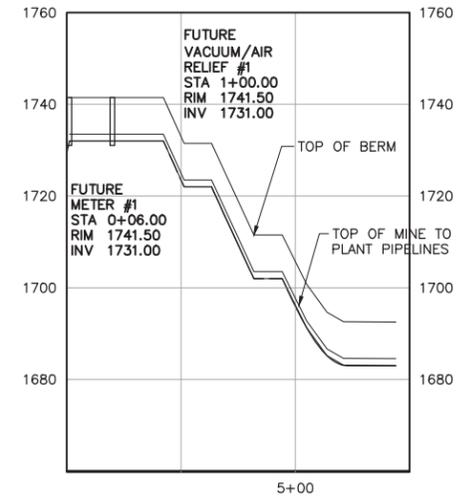
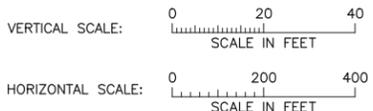
DWG. NO. **MPP-002A** REV **B**

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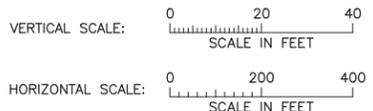
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**PROFILE: INTERIM**



**PROFILE: FUTURE**



NOTES:  
 1. PIPELINE SHALL BE CONSTRUCTED PER ¹ MPP-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		
2	6/07/17	PERMIT APPLICATION UPDATES	FOR PERMITTING	2	6/07/17
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

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 PRINTED NAME: JON M. MINNE  
 SIGNATURE: *[Signature]*  
 DATE: 6/07/17 LICENSE # 25080

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

PLANT DRAWING NUMBER:

**MINE TO PLANT PIPELINES  
 PLAN AND PROFILE  
 STATION 113+70 TO 130+00**

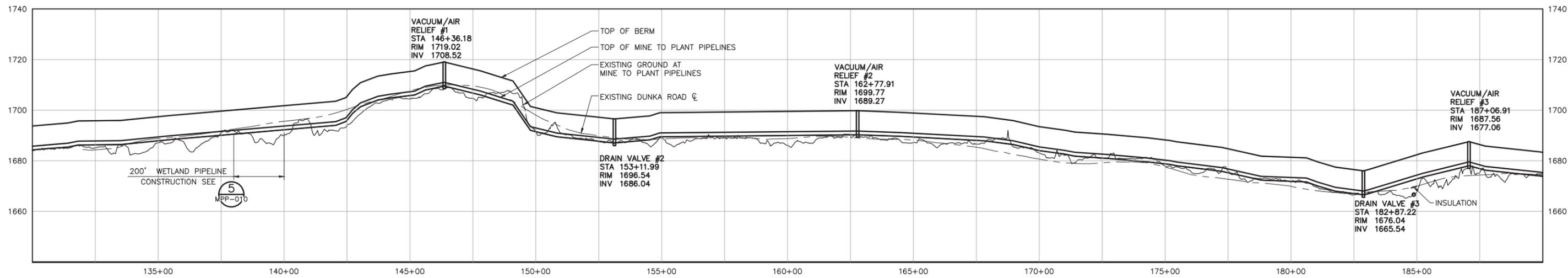
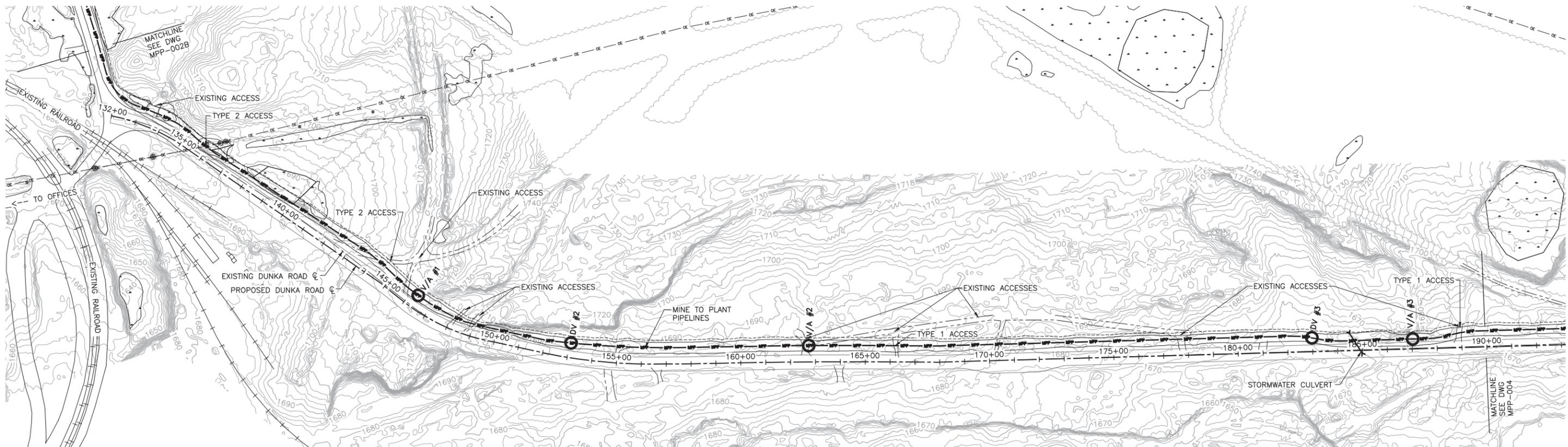
**POLYMET MINING**  
 POLY MET MINING, INC.  
 NORTHMET PROJECT  
 HOYT LAKES, MINNESOTA

**BARR**  
 BARR ENGINEERING CO.  
 4300 MARKETPOINTE DRIVE  
 SUITE 200  
 MINNEAPOLIS, MN.  
 Ph: 1-800-632-2277

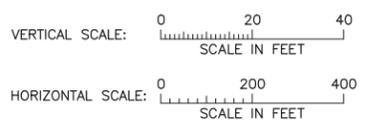
DWG. NO. **MPP-002B** REV **B**

INCHES

CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29\10\PERMIT_NMD-51-CU-104.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 10:19 AM



**PROFILE**



NOTES:  
 1. PIPELINE SHALL BE CONSTRUCTED PER , 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		
2	6/07/17	PERMIT APPLICATION UPDATES	FOR PERMITTING	2	6/07/17
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

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PRINTED NAME: JON M. MINNE  
 SIGNATURE:   
 DATE: 6/07/17 LICENSE# 25080

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

PLANT DRAWING NUMBER:

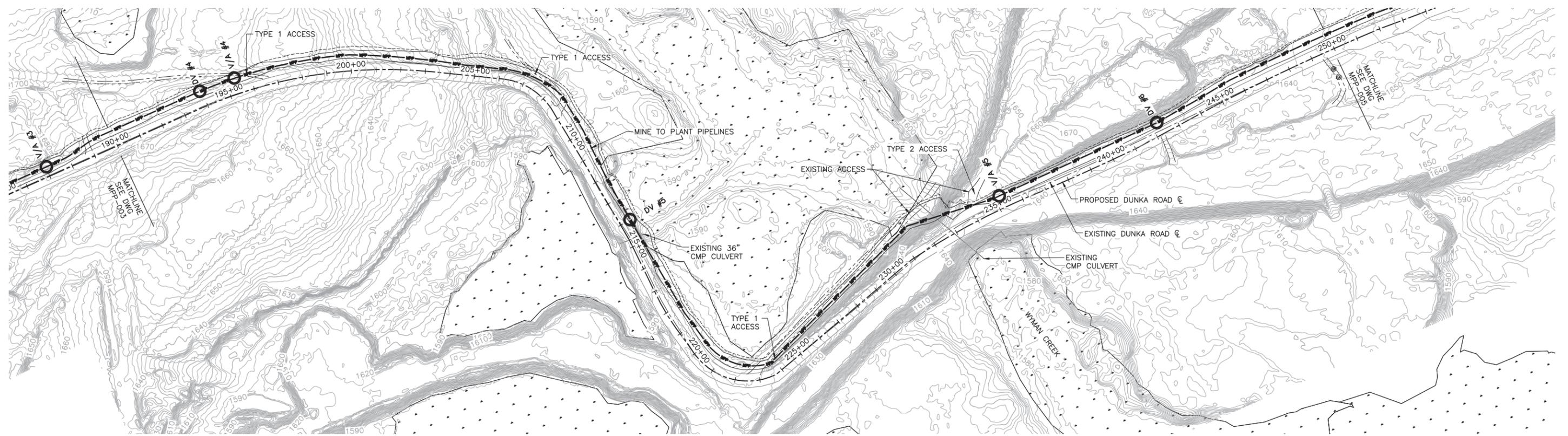
**MINE TO PLANT PIPELINES  
 PLAN AND PROFILE  
 STATION 130+00 TO 190+00**

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

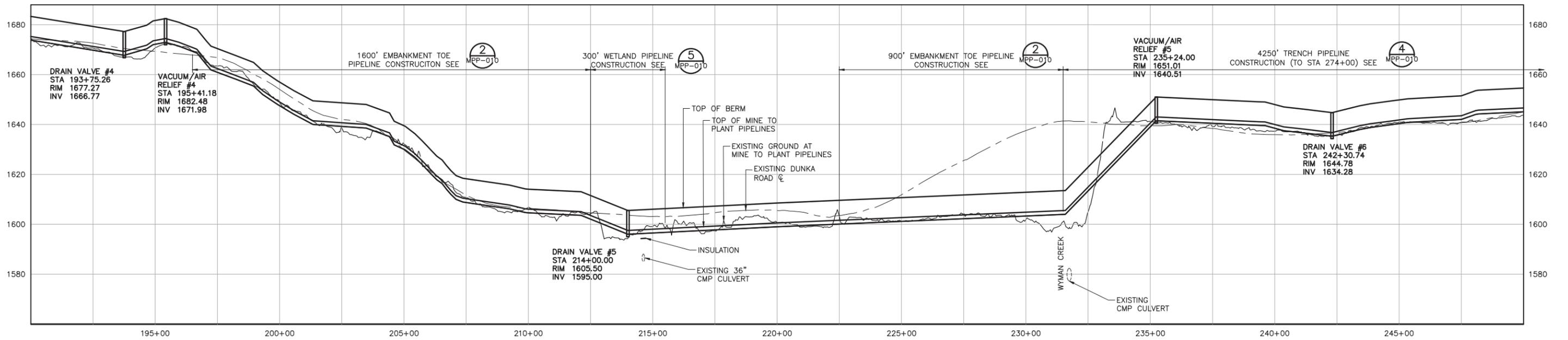
**BARR**  
 BARR ENGINEERING CO.  
 4300 MARKETPOINTE DRIVE  
 SUITE 200  
 MINNEAPOLIS, MN.  
 Ph: 1-800-632-2277

DWG. NO. **MPP-003** REV **B**

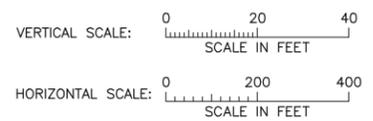
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**PLAN**  
SCALE IN FEET



**PROFILE**



NOTES:  
1. PIPELINE SHALL BE CONSTRUCTED PER **MPP-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		
2	6/07/17	PERMIT APPLICATION UPDATES	FOR PERMITTING	2	6/07/17
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

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PRINTED NAME: JON M. MINNE  
SIGNATURE: [Signature]  
DATE: 6/07/17 LICENSE# 25080

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

PLANT DRAWING NUMBER:

**MINE TO PLANT PIPELINES  
PLAN AND PROFILE  
STATION 190+00 TO 250+00**

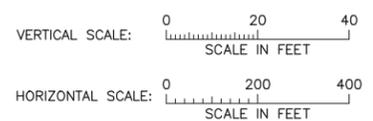
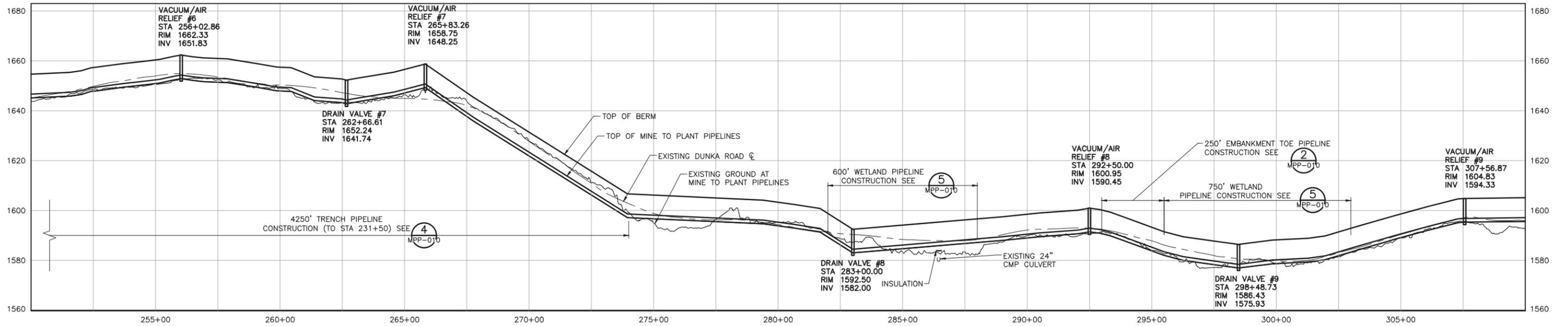
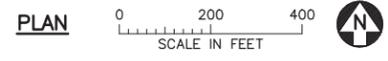
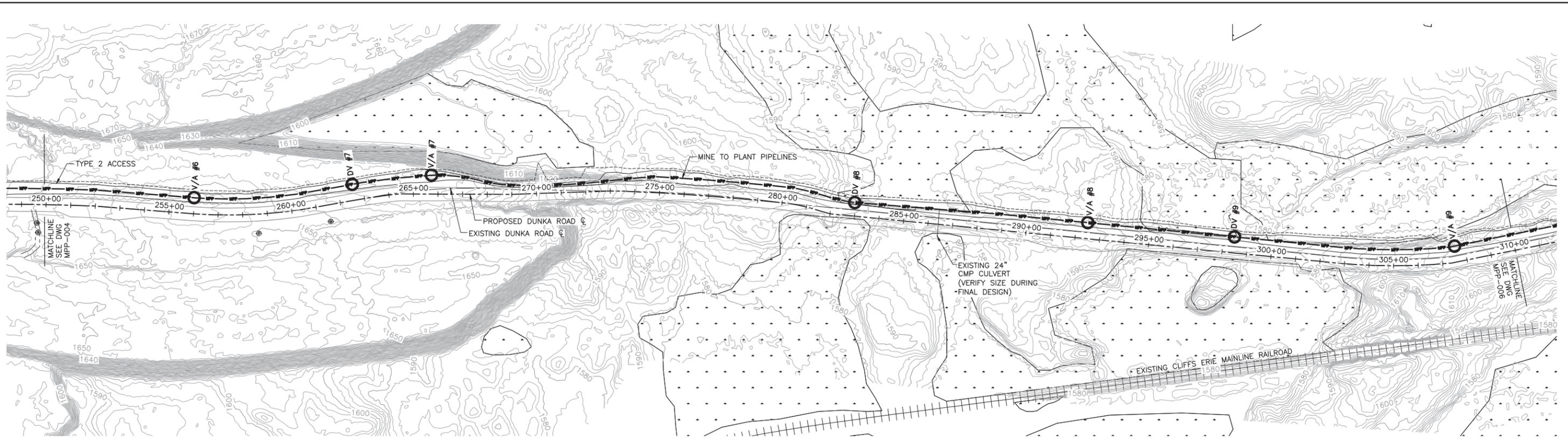
**POLYMET MINING**  
POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

**BARR**  
BARR ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO. **MPP-004** REV **B**

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NOTES:  
1. PIPELINE SHALL BE CONSTRUCTED PER **1** MPP-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		
2	6/07/17	PERMIT APPLICATION UPDATES	FOR PERMITTING	2	6/07/17
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

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PRINTED NAME: JON M. MINNE  
SIGNATURE: *[Signature]*  
DATE: 6/07/17 LICENSE # 25080

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

PLANT DRAWING NUMBER:

**MINE TO PLANT PIPELINES  
PLAN AND PROFILE  
STATION 250+00 TO 310+00**

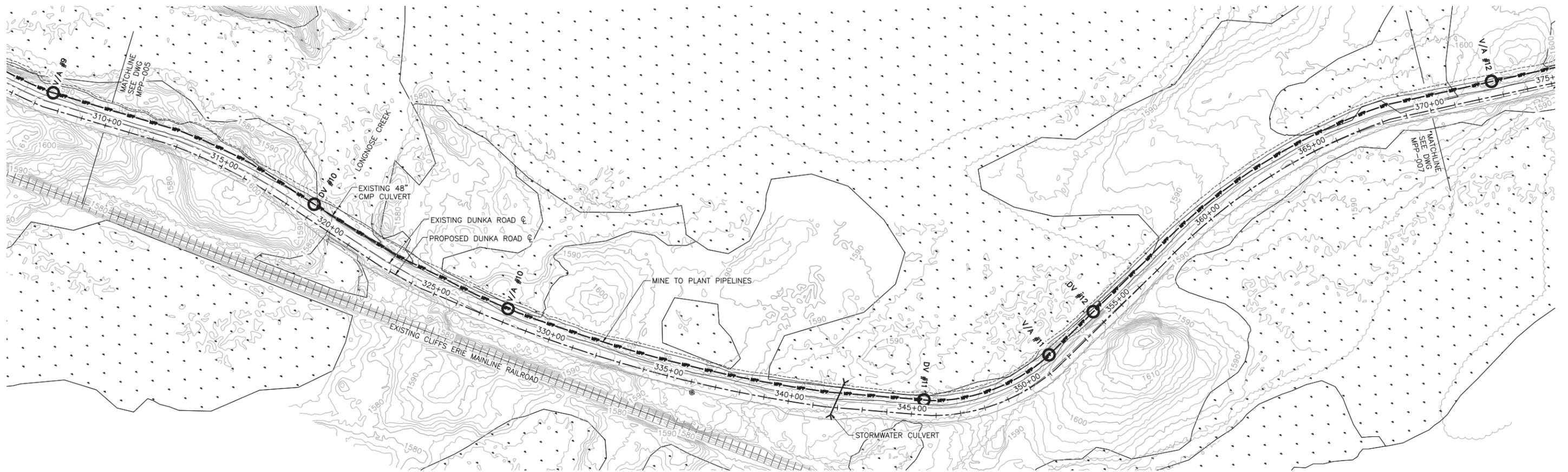
**POLYMET MINING**  
POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

**BARR**  
BARR ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

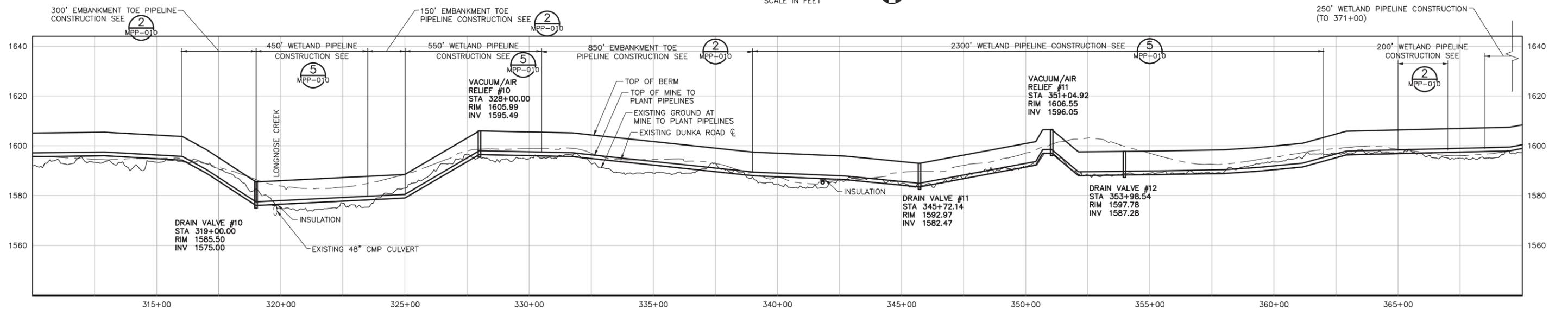
DWG. NO. **MPP-005** REV **B**

INCHES

CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29-10\PERMIT_NMD-51-CU-107.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 10:52 AM



**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:  
1. PIPELINE SHALL BE CONSTRUCTED PER **1** MPP-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			
2	6/07/17	PERMIT APPLICATION UPDATES	FOR PERMITTING	2	6/07/17
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

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PRINTED NAME: JON M. MINNE  
SIGNATURE: *[Signature]*  
DATE: 6/07/17 LICENSE# 25080

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

PLANT DRAWING NUMBER:  
**MINE TO PLANT PIPELINES  
PLAN AND PROFILE  
STATION 310+00 TO 370+00**

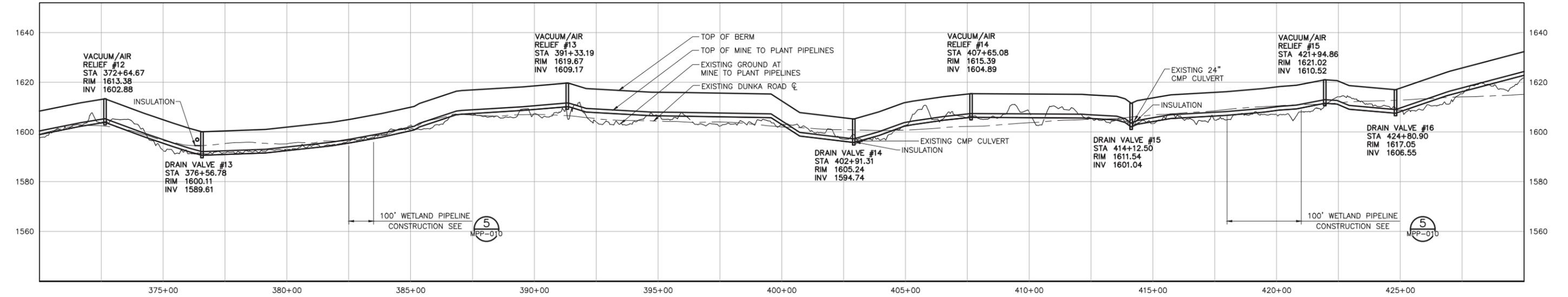
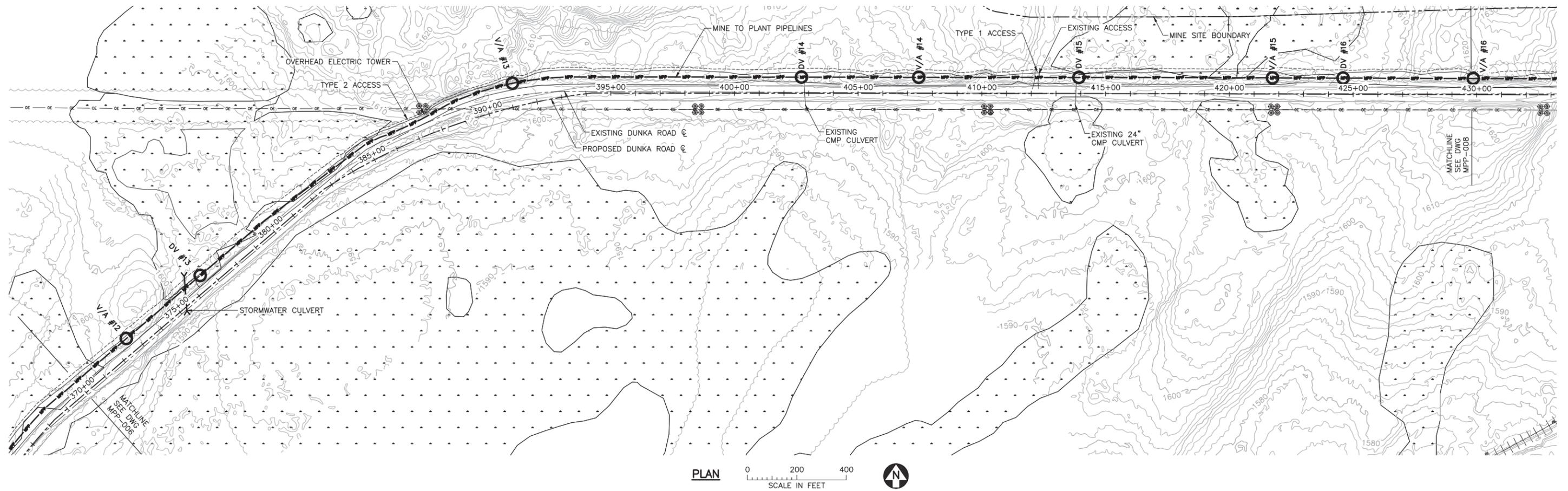
**POLYMET MINING**  
POLY MET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

**BARR**  
BARR ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO. **MPP-006** REV **B**

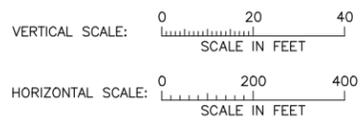
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CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29-10\PERMIT_NMD-51-CU-108.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 11:06 AM



NOTES:  
 1. PIPELINE SHALL BE CONSTRUCTED PER 1 MPP-010, 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
2	6/07/17	PERMIT APPLICATION UPDATES	FOR PERMITTING	2	6/07/17
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

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PRINTED NAME: JON M. MINNE  
 SIGNATURE: *[Signature]*  
 DATE: 6/07/17 LICENSE# 25080

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

PLANT DRAWING NUMBER:

**MINE TO PLANT PIPELINES  
 PLAN AND PROFILE  
 STATION 370+00 TO 430+00**

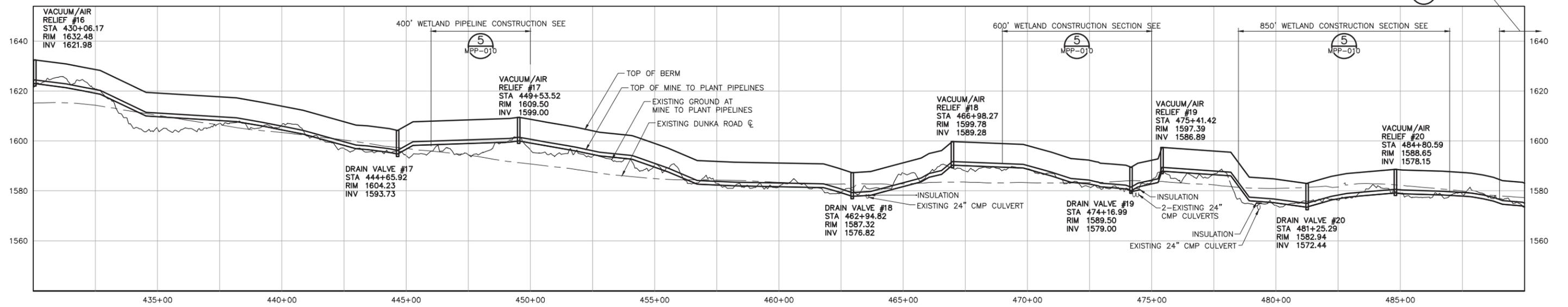
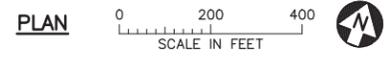
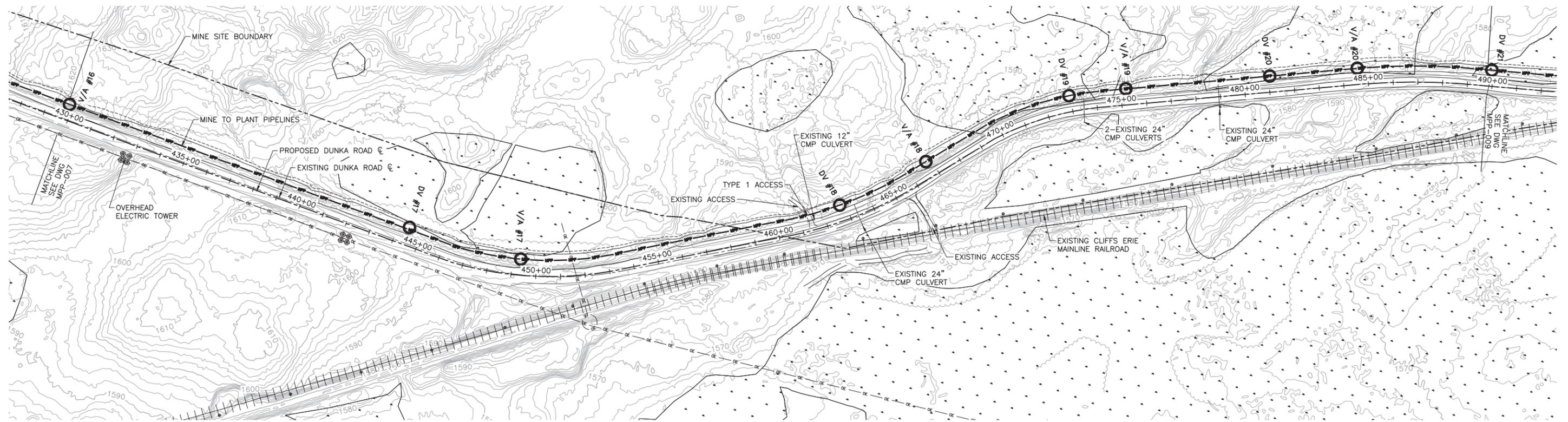
**POLY MET MINING, INC.  
 NORTHMET PROJECT  
 HOYT LAKES, MINNESOTA**

**BARR**  
 BARR ENGINEERING CO.  
 4300 MARKETPOINTE DRIVE  
 SUITE 200  
 MINNEAPOLIS, MN.  
 Ph: 1-800-632-2277

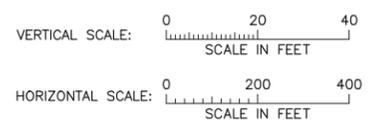
DWG. NO. **MPP-007** REV **B**

INCHES 2 1

CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29\10\PERMIT_NMD-51-CU-109.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 11:14 AM



**PROFILE**



NOTES:  
1. PIPELINE SHALL BE CONSTRUCTED PER 1 MPP-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
2	6/07/17	PERMIT APPLICATION UPDATES	FOR PERMITTING	2	6/07/17
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

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PRINTED NAME: JON M. MINNE  
SIGNATURE: *[Signature]*  
DATE: 6/07/17 LICENSE# 25080

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

PLANT DRAWING NUMBER:

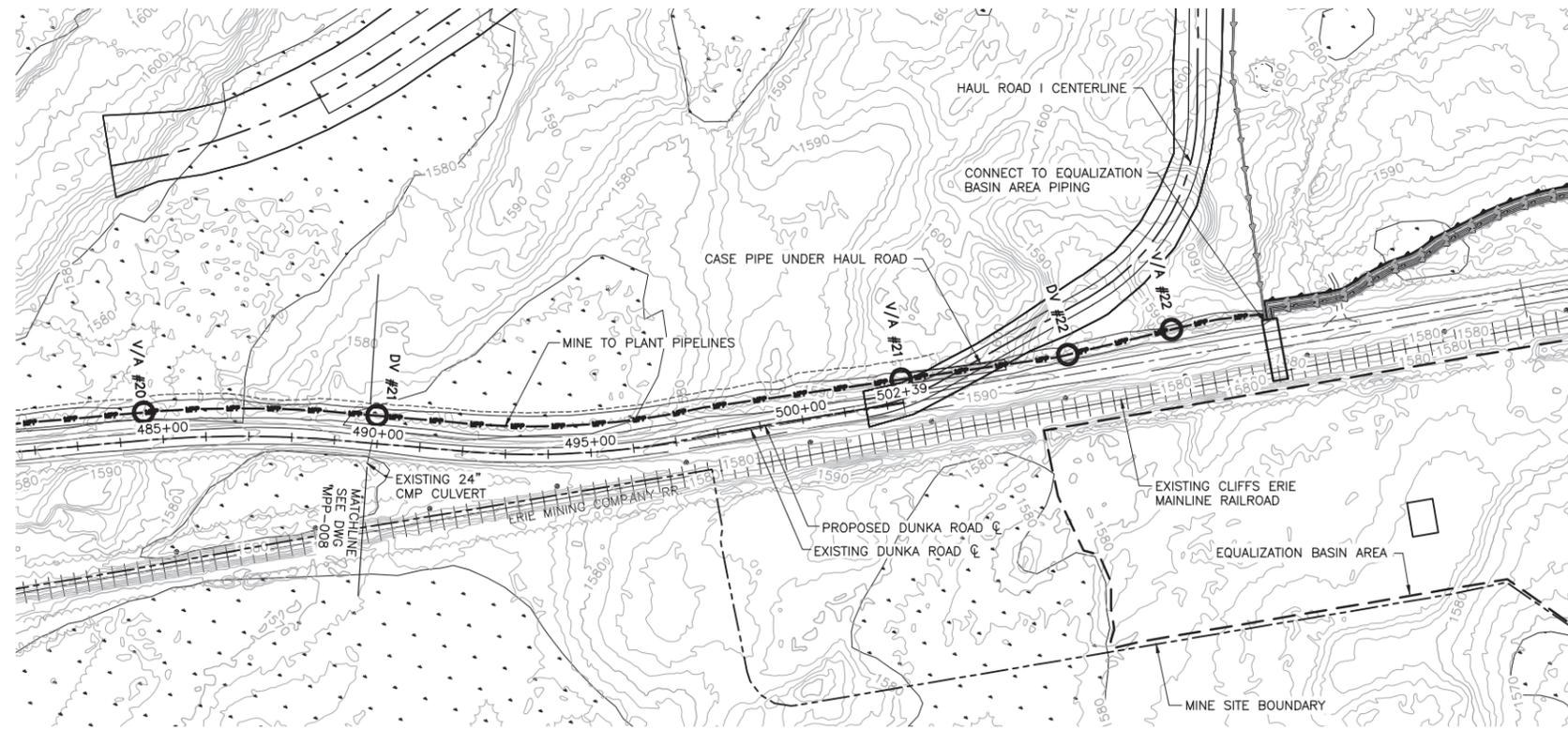
**MINE TO PLANT PIPELINES  
PLAN AND PROFILE  
STATION 430+00 TO 490+00**

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

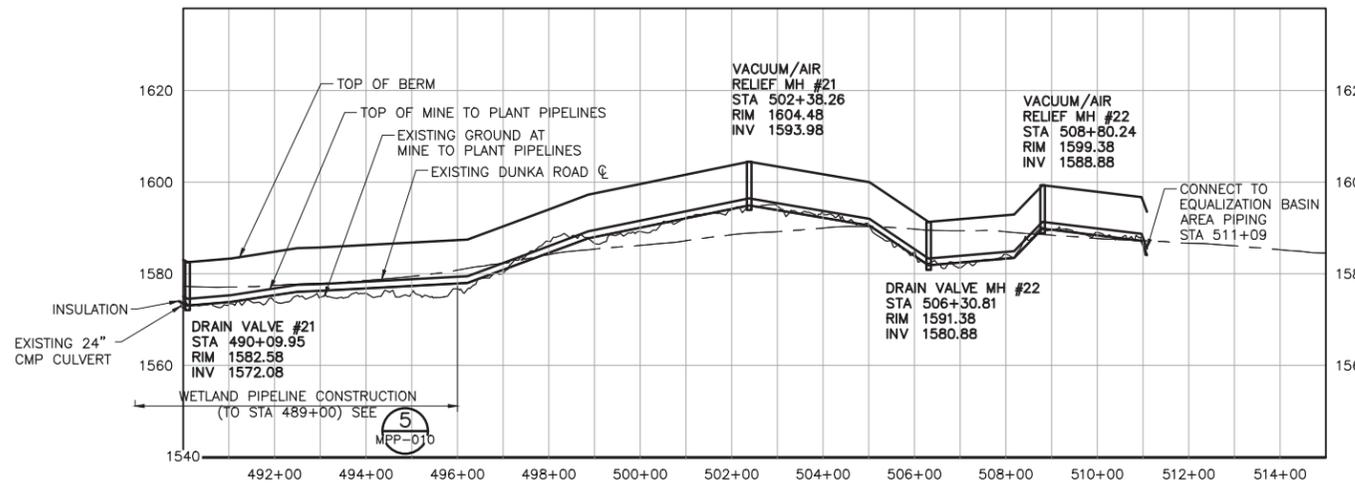
**BARR**  
BARR ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO. **MPP-008** REV **B**

INCHES  
2  
1



**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:  
1. PIPELINE SHALL BE CONSTRUCTED PER **1** MPP-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			
2	6/07/17	PERMIT APPLICATION UPDATES	FOR PERMITTING	2	6/07/17
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION		

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PRINTED NAME: JON M. MINNE  
SIGNATURE: [Signature]  
DATE: 6/07/17 LICENSE# 25080

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

PLANT DRAWING NUMBER:  
**MINE TO PLANT PIPELINES  
PLAN AND PROFILE  
STATION 490+00 TO 511+09**

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

**BARR**  
BARR ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

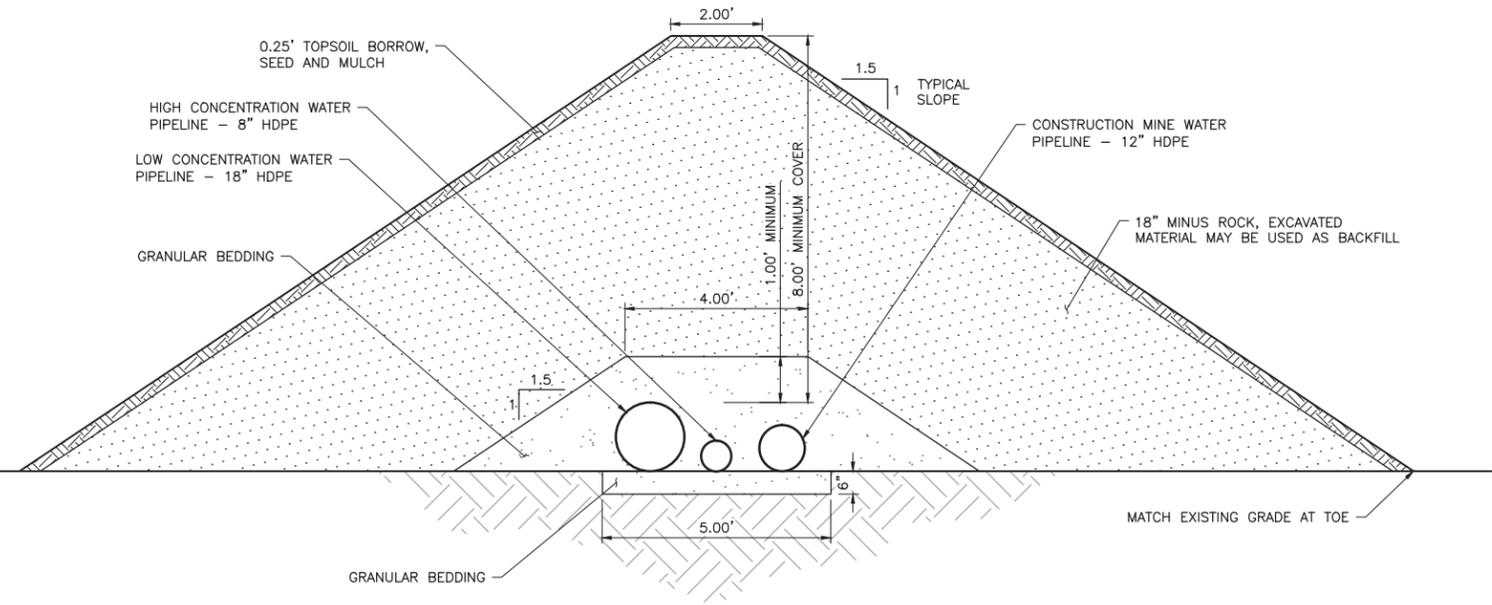
DWG. NO. **MPP-009** REV **B**

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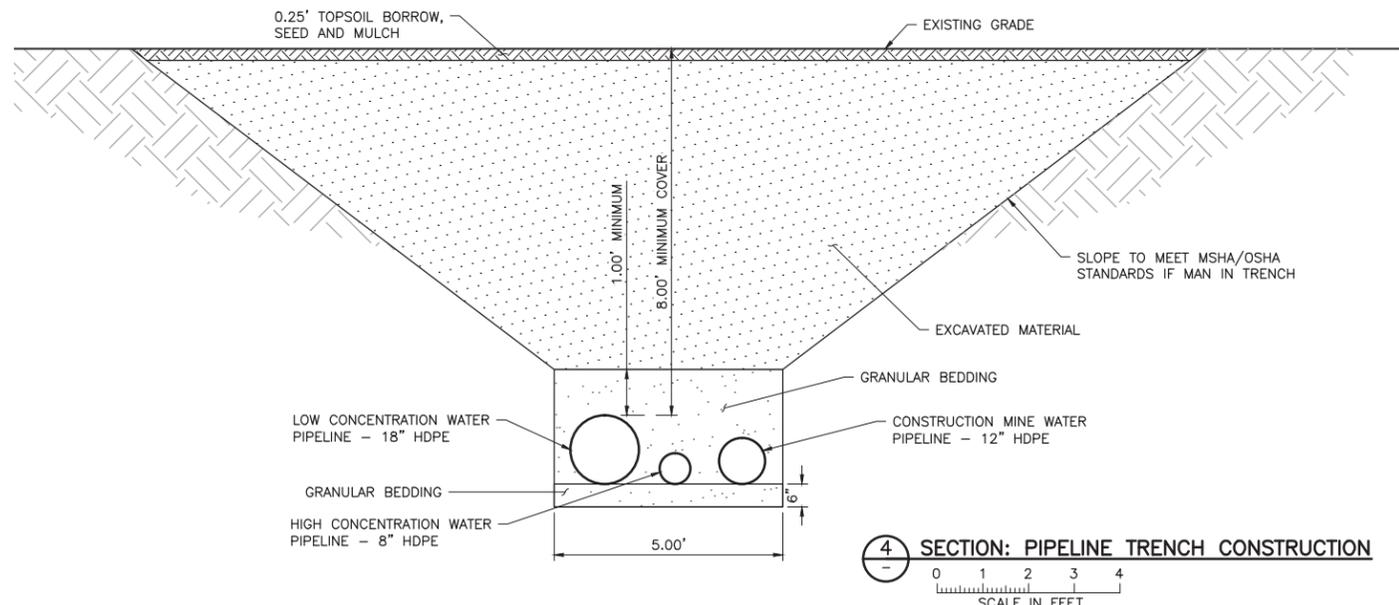
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INCHES

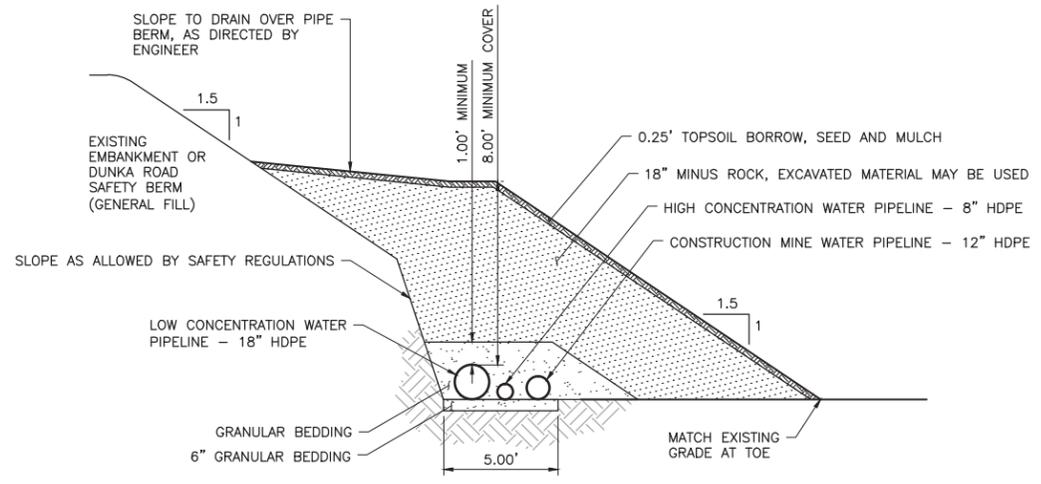
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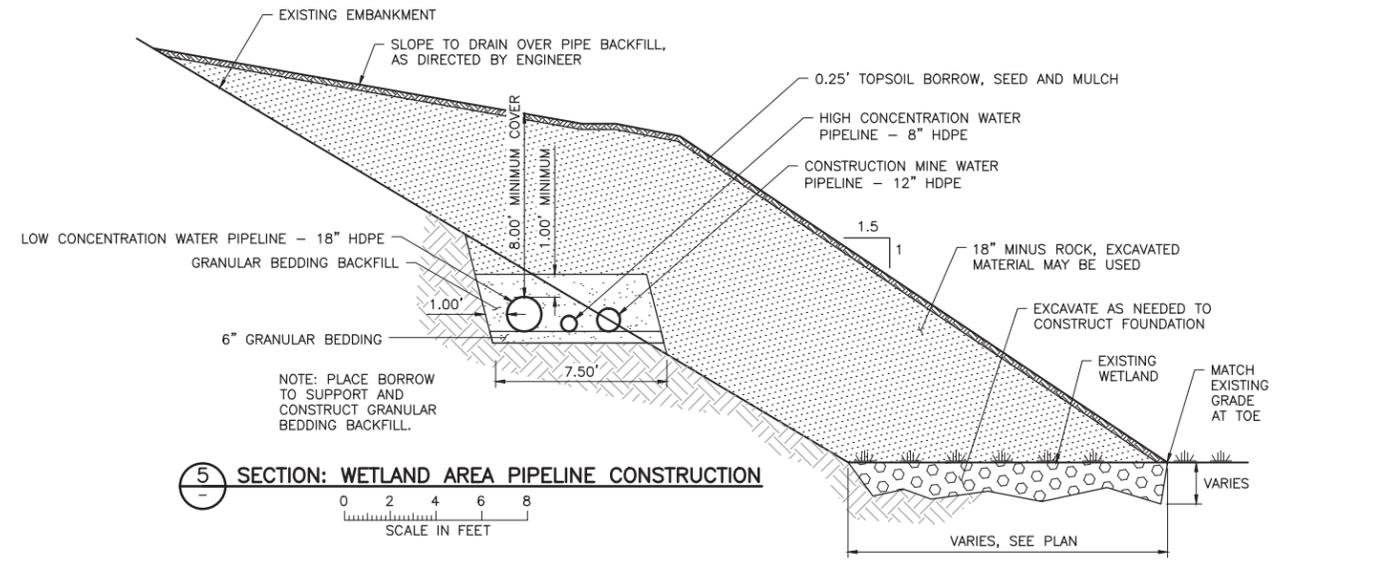
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 SCALE IN FEET



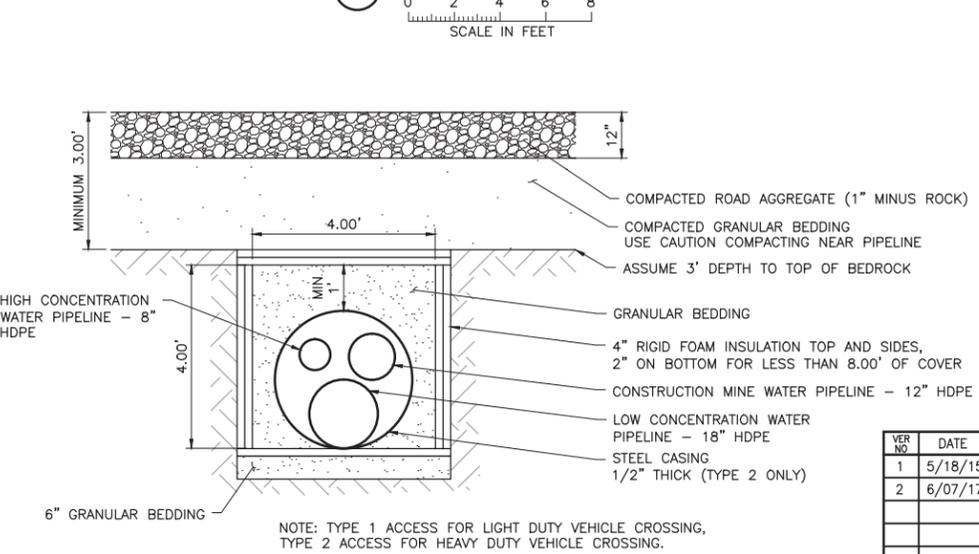
**4 SECTION: PIPELINE TRENCH CONSTRUCTION**  
 0 1 2 3 4  
 SCALE IN FEET



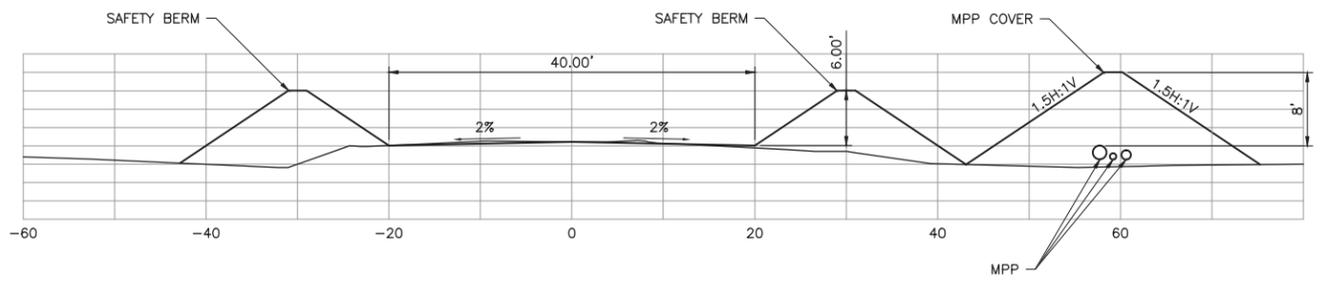
**2 SECTION: EMBANKMENT TOE PIPELINE CONSTRUCTION**  
 0 2 4 6 8  
 SCALE IN FEET



**5 SECTION: WETLAND AREA PIPELINE CONSTRUCTION**  
 0 2 4 6 8  
 SCALE IN FEET



**3 SECTION: ACCESS ROAD CROSSING - TYPE 1 OR 2**  
 0 1 2 3 4  
 SCALE IN FEET



**6 SECTION: DUNKA ROAD/MPP TYPICAL SECTION**  
 0 10 20  
 SCALE IN FEET

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
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 PRINTED NAME: JON M. MINNE  
 SIGNATURE: [Signature]  
 DATE: 6/07/17 LICENSE# 25080

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

PLANT DRAWING NUMBER:  
**MINE TO PLANT PIPELINES  
 PIPELINE INSTALLATION TYPICAL SECTIONS**

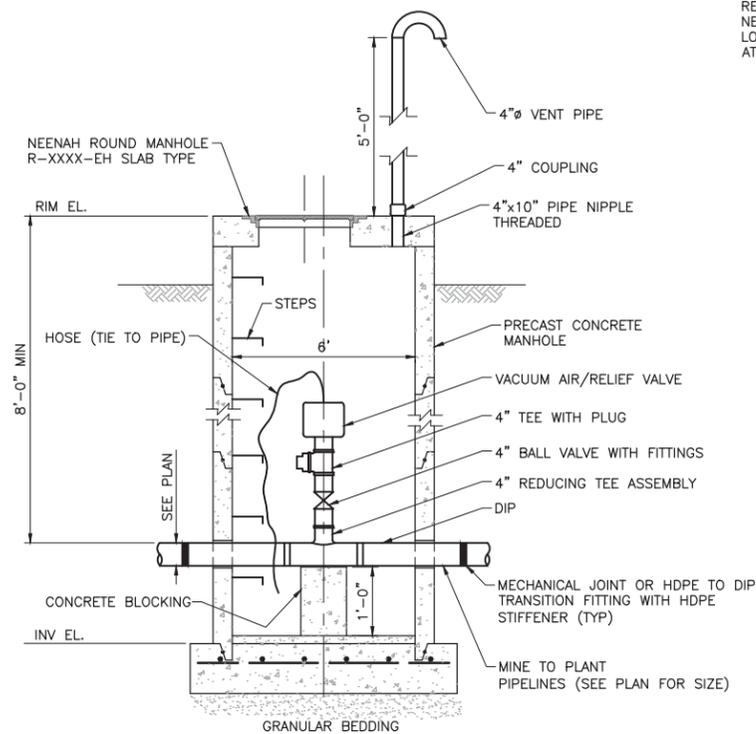
**POLYMET MINING**  
 POLY MET MINING, INC.  
 NORTHMET PROJECT  
 HOYT LAKES, MINNESOTA

**BARR**  
 BARR ENGINEERING CO.  
 4300 MARKETPOINTE DRIVE  
 SUITE 200  
 MINNEAPOLIS, MN.  
 Ph: 1-800-632-2277

DWG. NO. **MPP-010** REV **B**

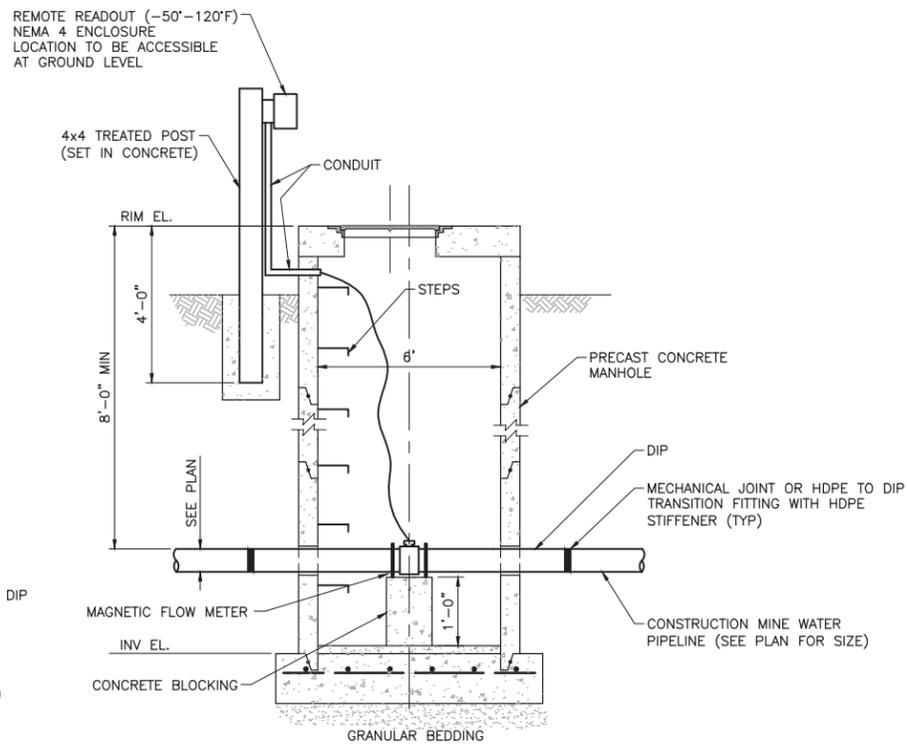
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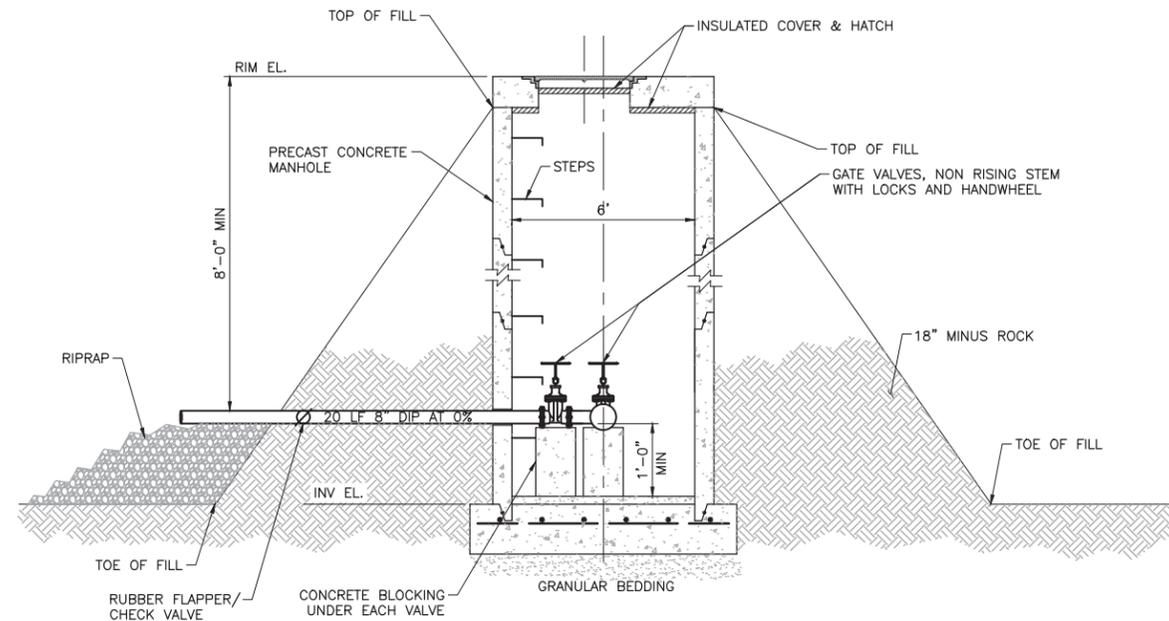
NOTE: SEAL MANHOLE OPENINGS AND JOINTS TO PROVIDE LEAK PROTECTION FOR MANHOLES TO ACT AS SECONDARY CONTAINMENT.

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



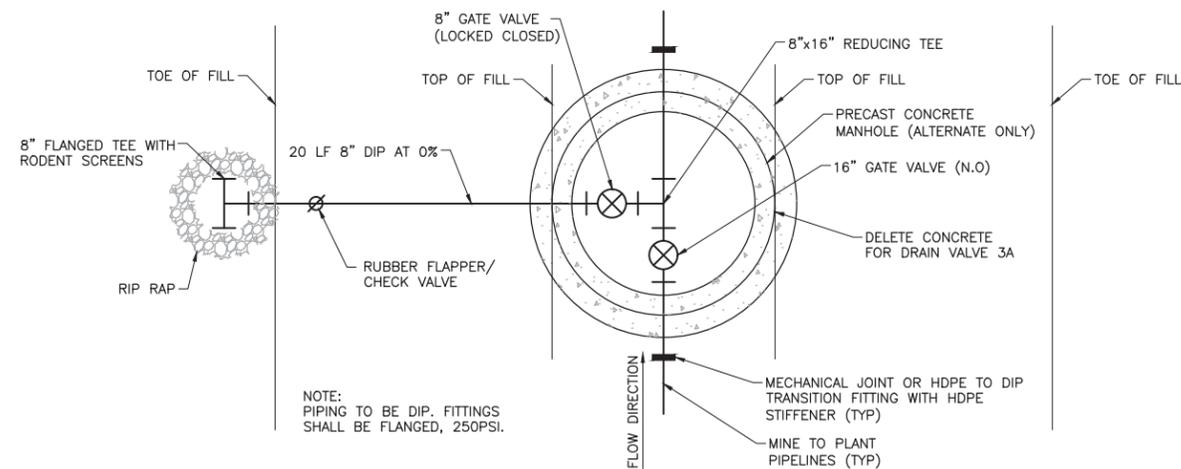
NOTE: SEAL MANHOLE OPENINGS AND JOINTS TO PROVIDE LEAK PROTECTION FOR MANHOLES TO ACT AS SECONDARY CONTAINMENT.

**2 ELEVATION: METER MANHOLE**  
NOT TO SCALE



NOTE: SEAL MANHOLE OPENINGS AND JOINTS TO PROVIDE LEAK PROTECTION FOR MANHOLES TO ACT AS SECONDARY CONTAINMENT.

**3 ELEVATION: ALTERNATE DRAIN VALVE MANHOLE**  
NOT TO SCALE



NOTE: PIPING TO BE DIP. FITTINGS SHALL BE FLANGED, 250PSI.

**4 PLAN: DRAIN VALVE**  
NOT TO SCALE

INCHES

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PRINTED NAME: JON M. MINNE  
SIGNATURE: *[Signature]*  
DATE: 6/07/17 LICENSE# 25080

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

PLANT DRAWING NUMBER:

**MINE TO PLANT PIPELINES DETAILS**

**POLYMET MINING**

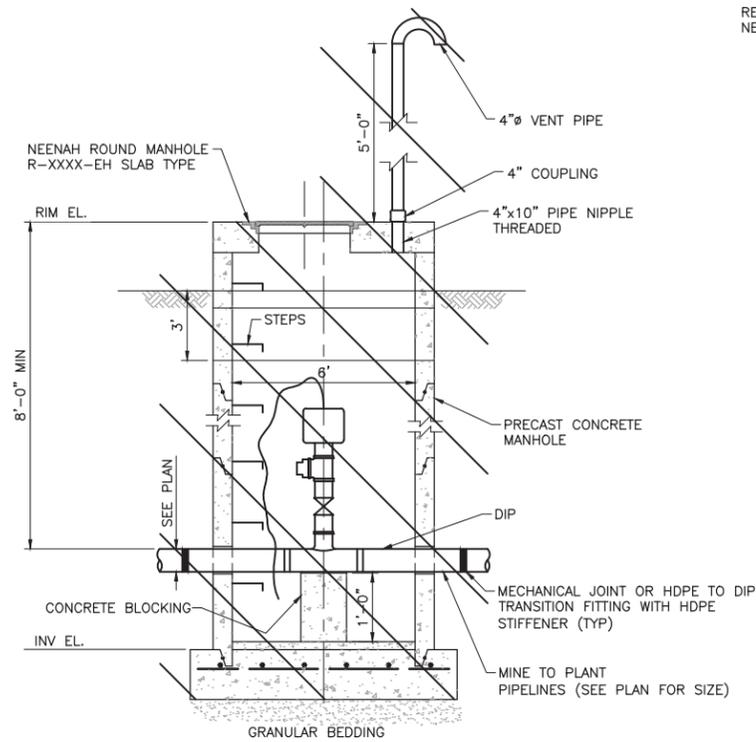
**POLY MET MINING, INC.**  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

**BARR** ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

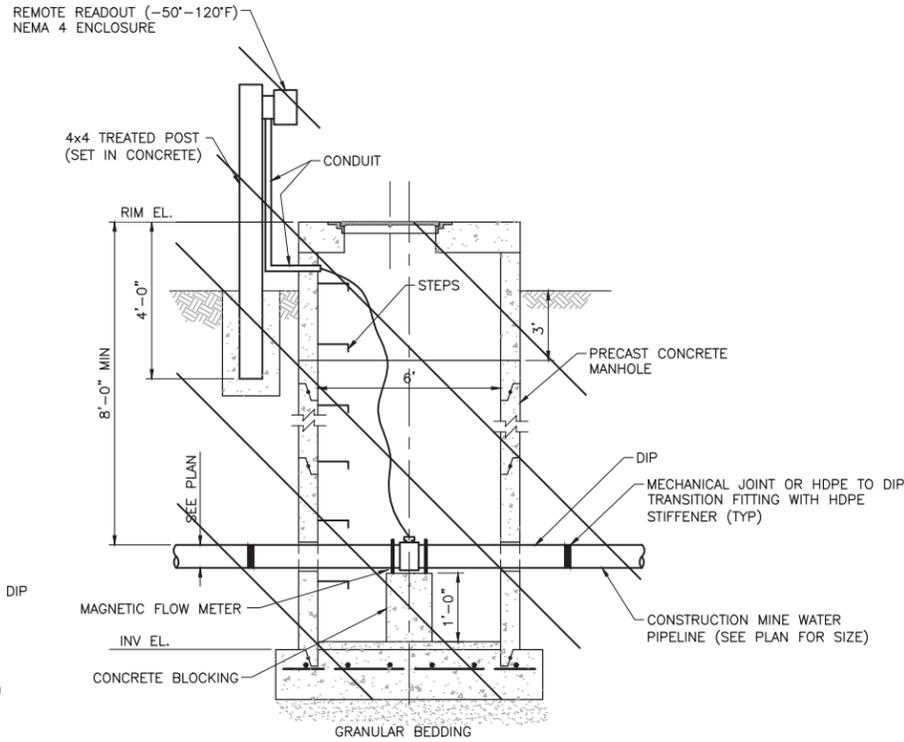
DWG. NO. **MPP-011**

REV **B**

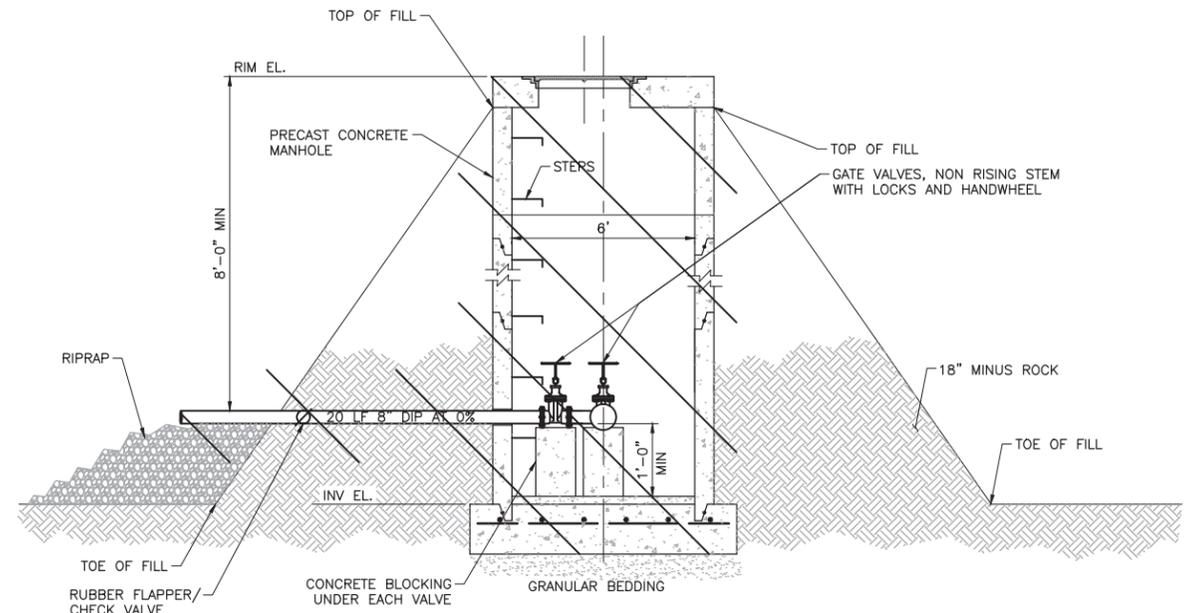
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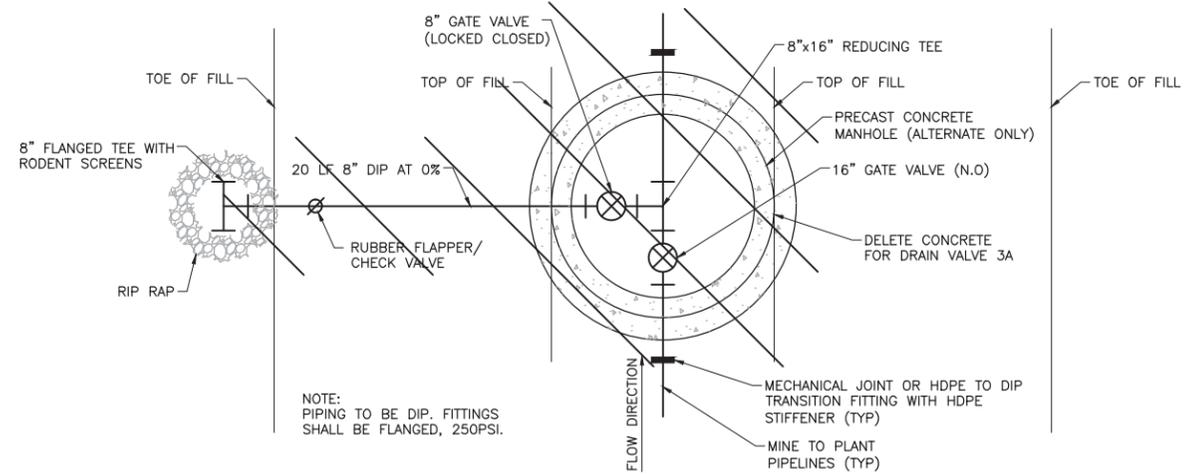
**1 ELEVATION: ALTERNATE VACUUM/AIR RELIEF MANHOLE IN CLOSURE**  
NOT TO SCALE



**2 ELEVATION: METER MANHOLE IN CLOSURE**  
NOT TO SCALE



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



**4 PLAN: DRAIN VALVE IN CLOSURE**  
NOT TO SCALE

PLANT DRAWING NUMBER:

**MINE TO PLANT PIPELINES  
DETAILS IN CLOSURE**

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

**BARR**

BARR ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

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

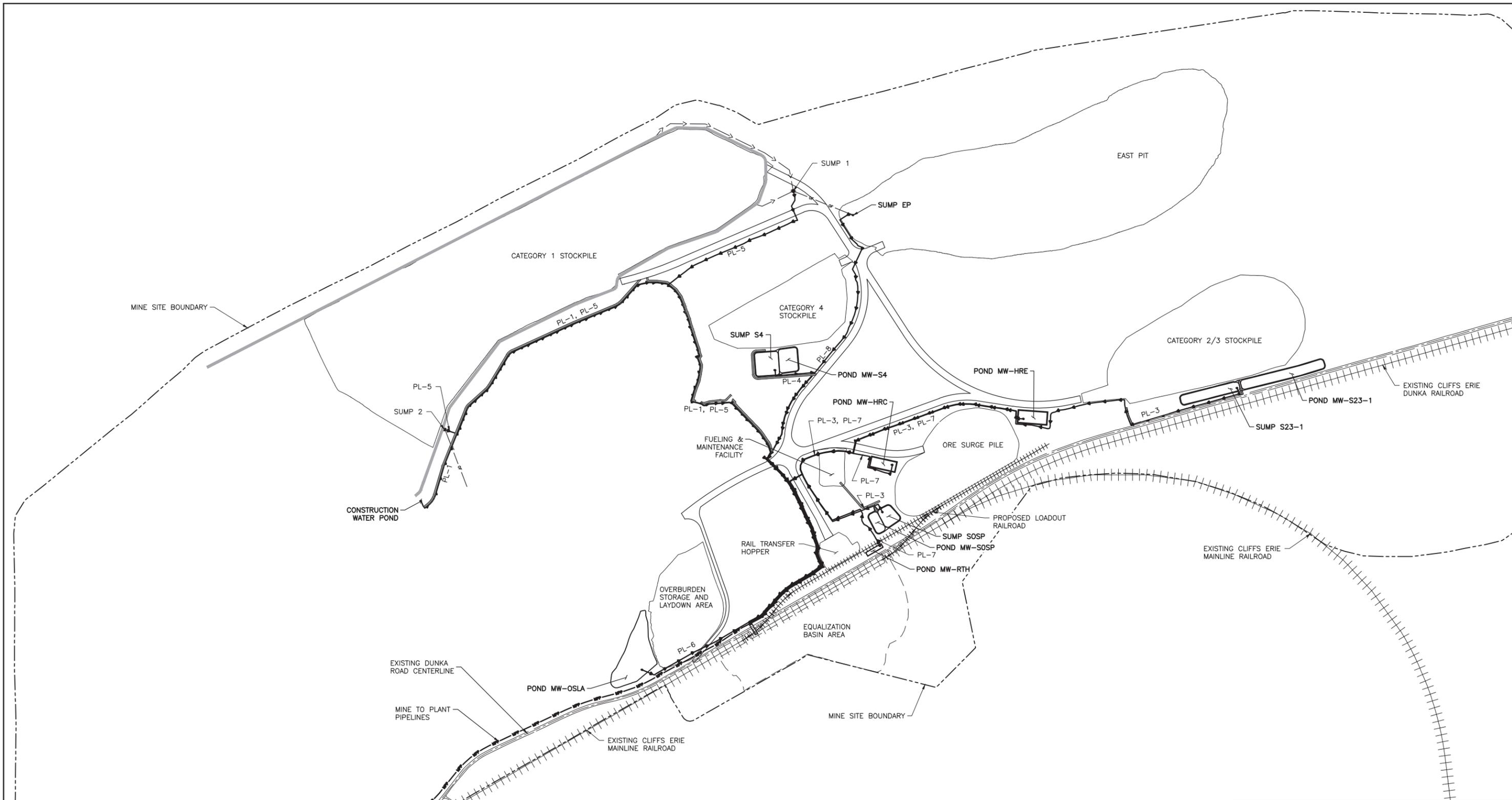
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VER NO	DATE	DESCRIPTION	ISSUE STATUS		
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PRINTED NAME JON M. MINNE  
SIGNATURE *[Signature]*  
DATE 6/07/17 LICENSE# 25080

INCHES

CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29-10\PERMIT_NM-55-CS-100.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 2:58 PM



1 PLAN: GENERAL LAYOUT MINE YEAR 1

0 600 1200  
SCALE IN FEET

PLANT DRAWING NUMBER:

MINE WATER INFRASTRUCTURE  
MINE YEAR 1 GENERAL LAYOUT

**POLYMET** MINING

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

BARR ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

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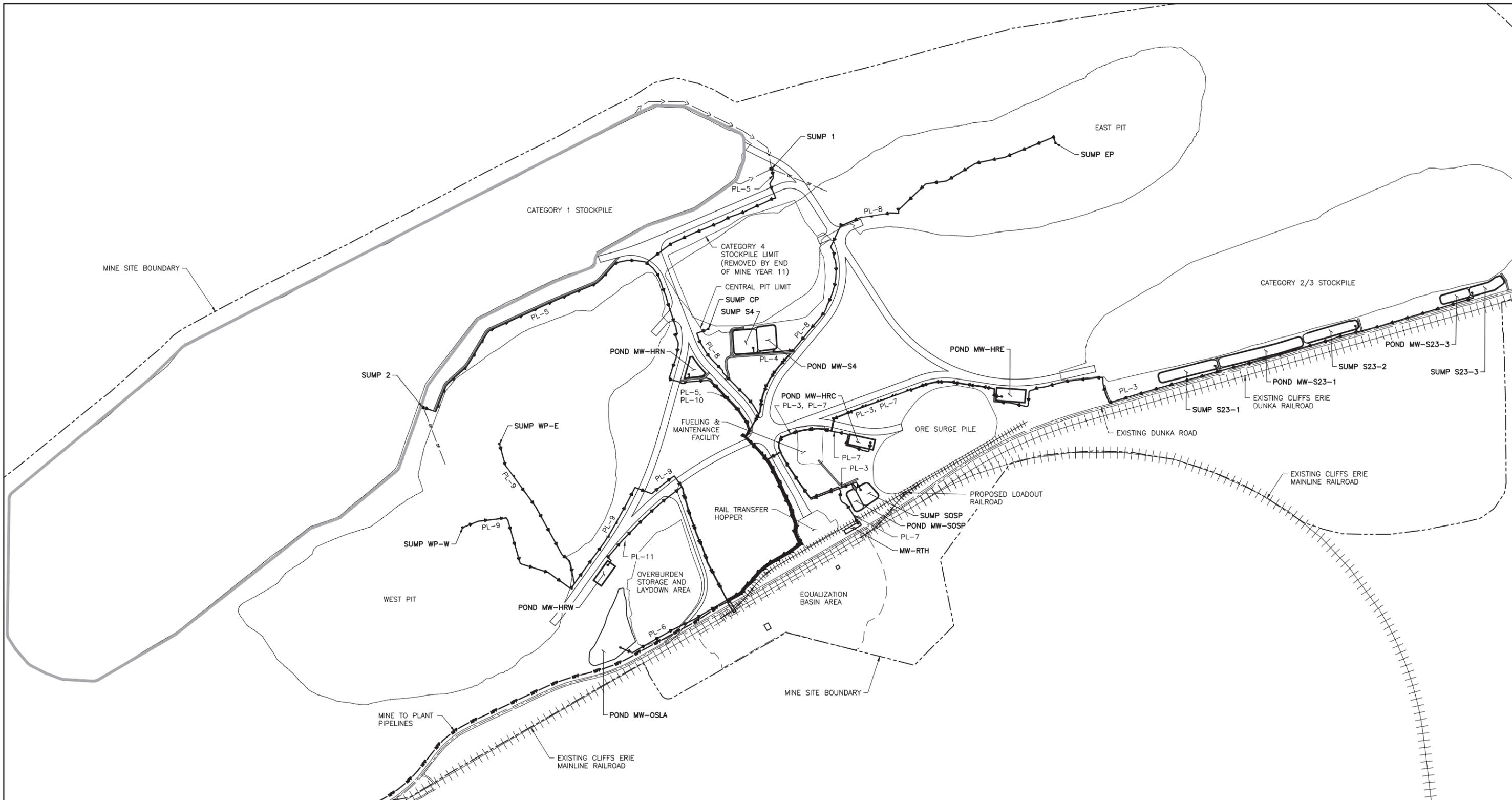
PRINTED NAME JON M. MINNE  
SIGNATURE *[Signature]*  
DATE 6/07/17 LICENSE# 25080

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

DWG. NO. MW-001  
REV B

INCHES  
1  
2

CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29-10\PERMIT_NMM-55-CS-101.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 3:09 PM



1 PLAN: GENERAL LAYOUT MINE YEAR 11

0 600 1200  
SCALE IN FEET

PLANT DRAWING NUMBER:

MINE WATER INFRASTRUCTURE  
MINE YEAR 11 GENERAL LAYOUT

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

**BARR**  
BARR ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

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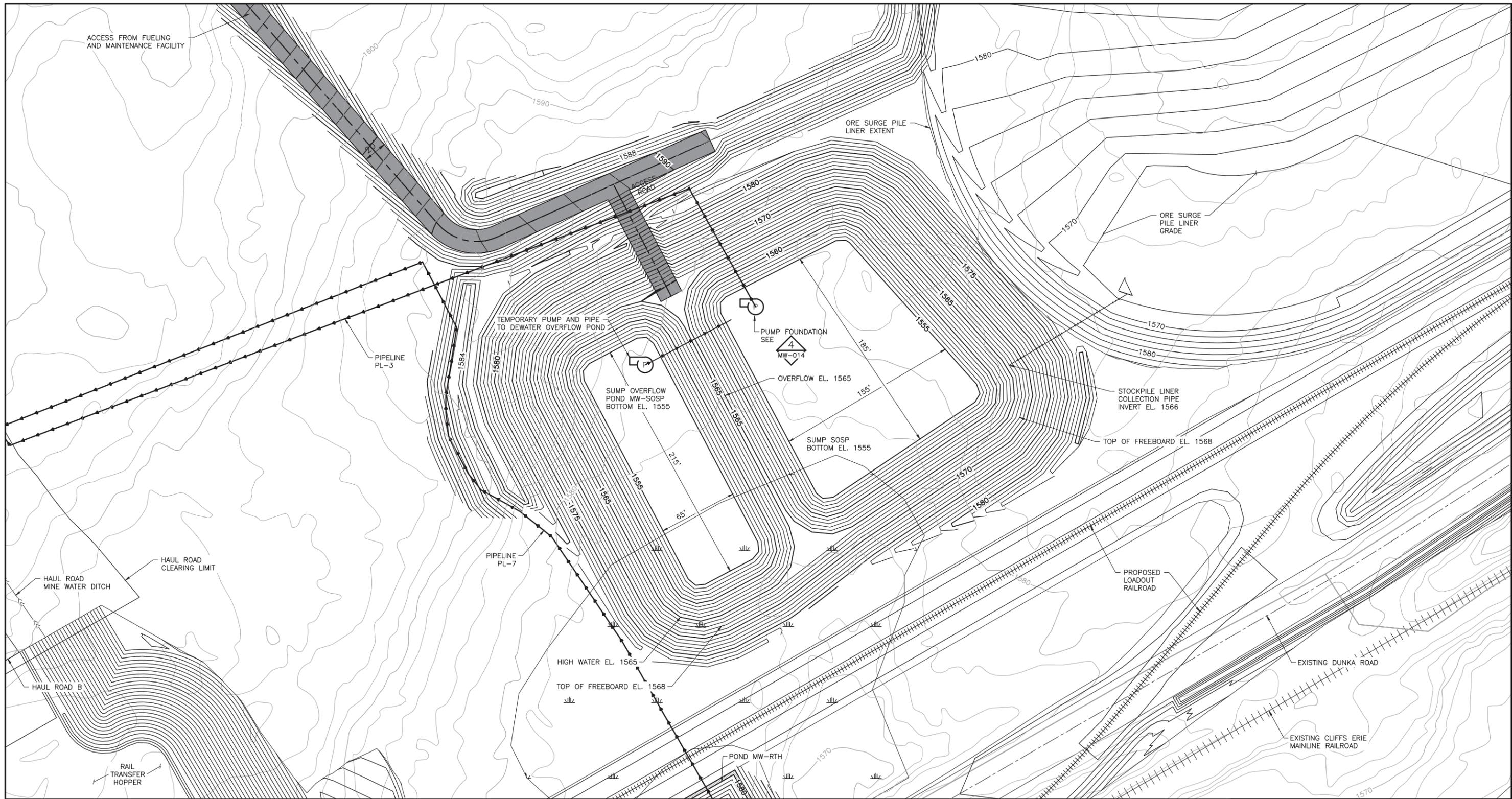
PRINTED NAME: JON M. MINNE  
SIGNATURE: *[Signature]*  
DATE: 6/07/17 LICENSE# 25080

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

DWG. NO. MW-002  
REV B

2  
1  
INCHES

CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29.10\PERMIT_NMM-55-CS-125.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 3:31 PM



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

**1 PLAN: SUMP SOSP AND MW-SOSP**

SCALE IN FEET

PLANT DRAWING NUMBER:

**MINE WATER INFRASTRUCTURE  
MINE WATER SUMP DESIGN  
SUMP SOSP & MW-SOSP GRADING PLAN**

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

**BARR**  
BARR ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

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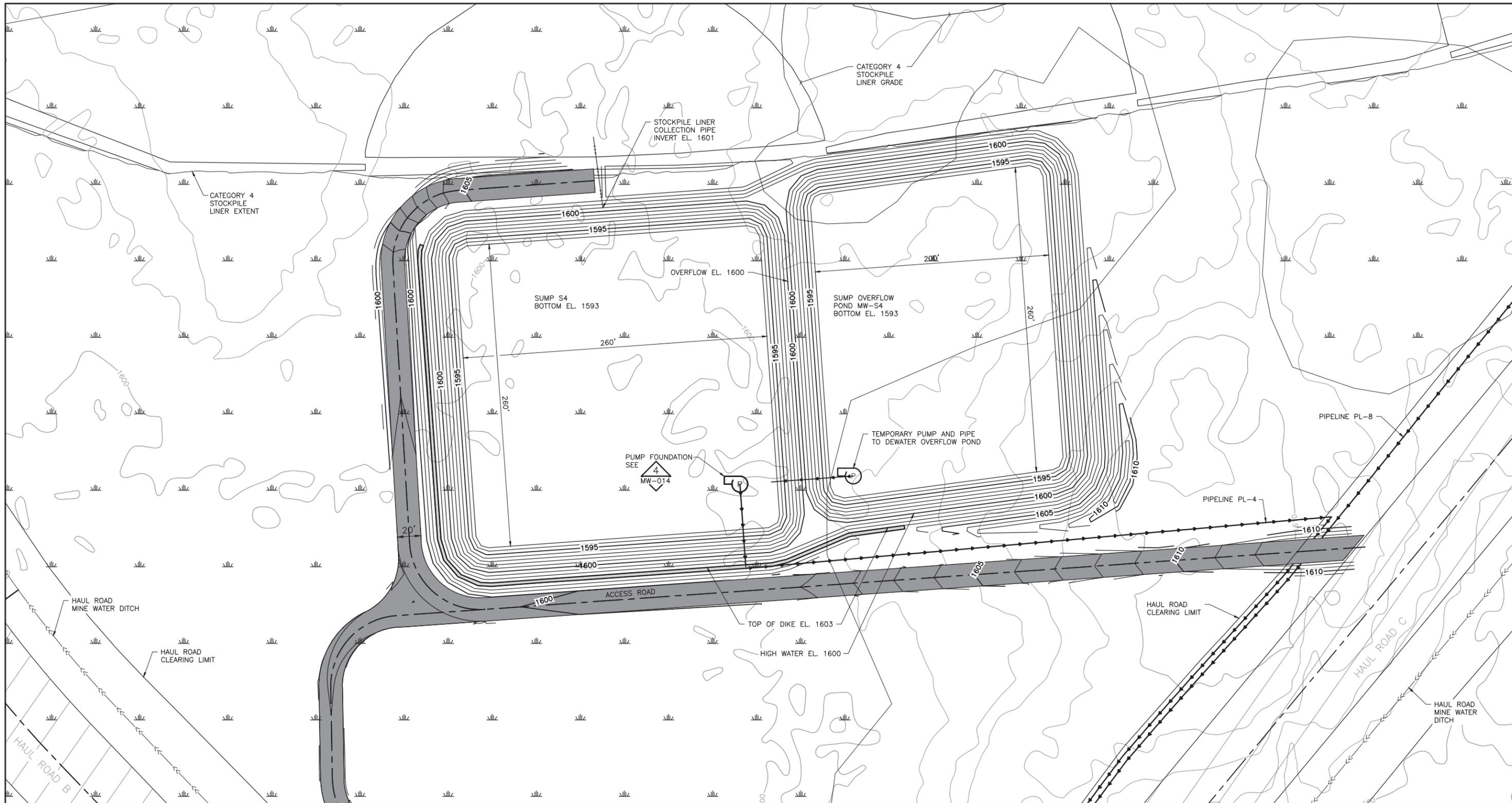
PRINTED NAME: JON M. MINNE  
SIGNATURE:   
DATE: 6/07/17 LICENSE# 25080

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

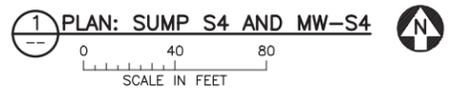
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CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29\10\PERMIT_NMM-55-CS-126.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 3:44 PM



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



PLANT DRAWING NUMBER:

**MINE WATER INFRASTRUCTURE  
MINE WATER SUMP DESIGN  
SUMP S4 AND MW-S4 GRADING PLAN**

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

**BARR**  
BARR ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

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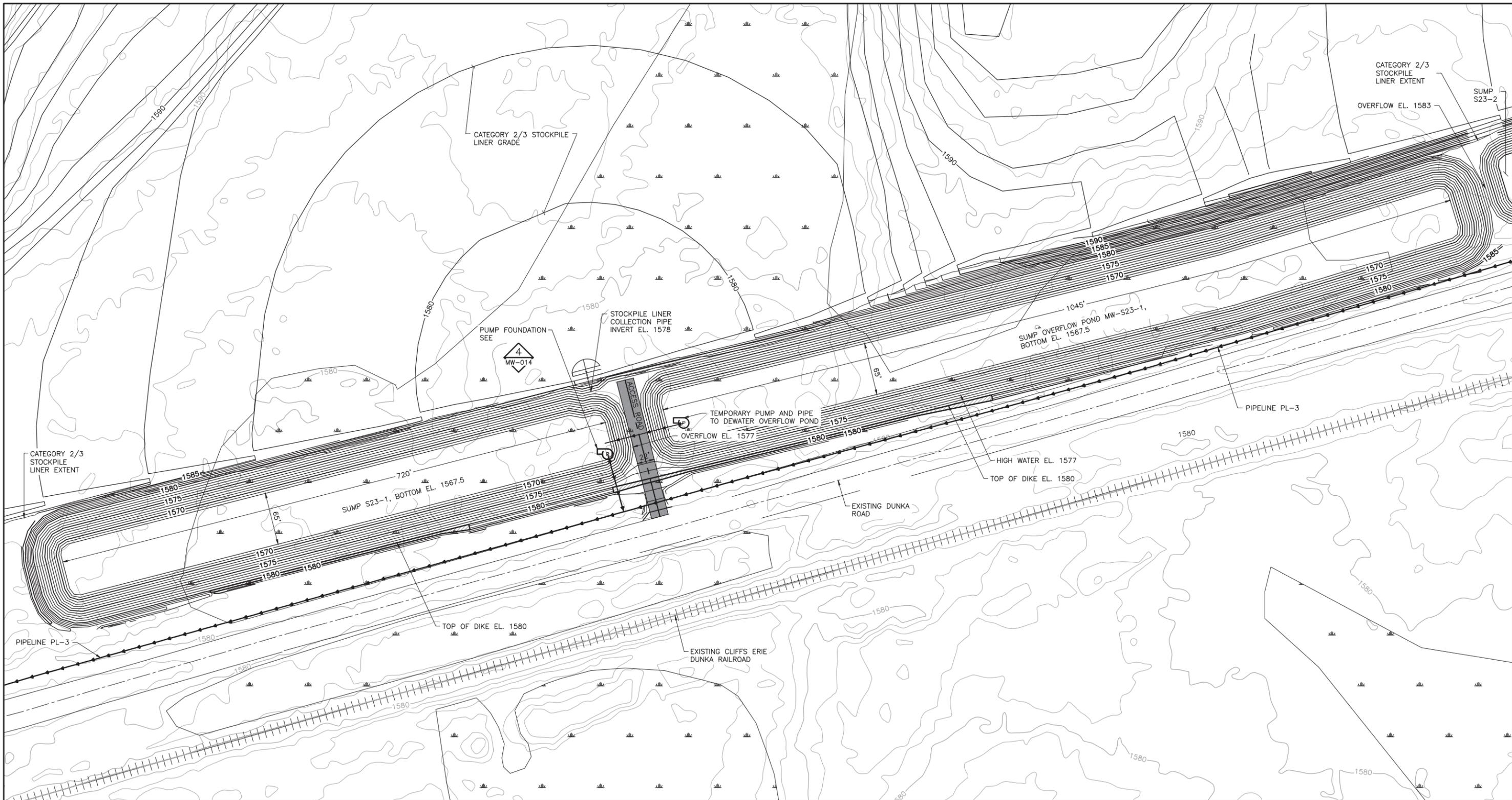
PRINTED NAME JON M. MINNE  
SIGNATURE *[Signature]*  
DATE 6/07/17 LICENSE# 25080

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

DWG. NO. **MW-004** REV **B**

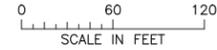
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CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29-10\PERMIT_INM-55-CS-127.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 4:10 PM



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

**1 PLAN: SUMP S23-1 AND MW-S23-1**



PLANT DRAWING NUMBER:

**MINE WATER INFRASTRUCTURE  
MINE WATER SUMP DESIGN  
SUMP S23-1 AND MW-S23-1 GRADING PLAN**

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

**BARR** ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

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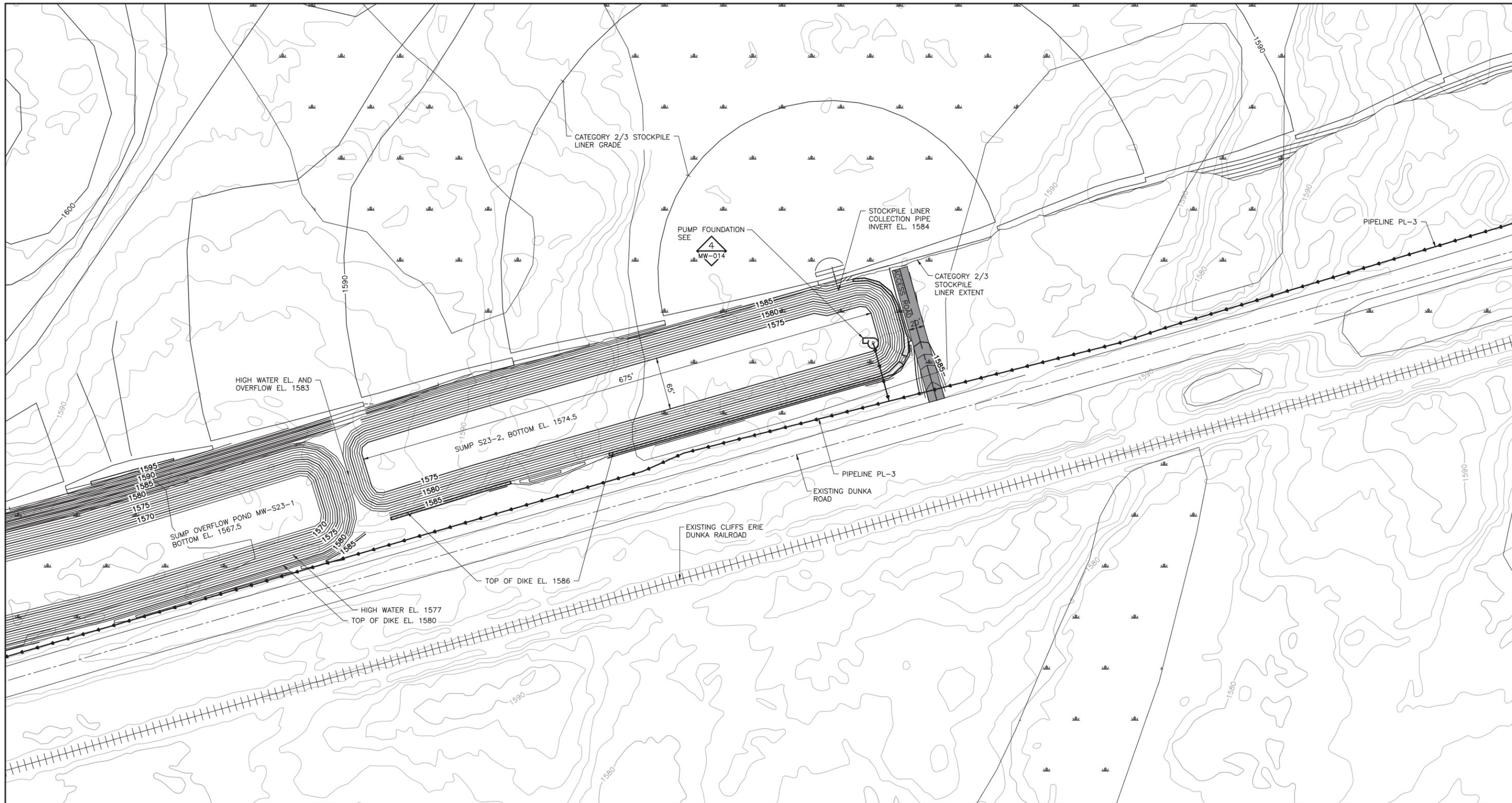
PRINTED NAME: JON M. MINNE  
SIGNATURE: *[Signature]*  
DATE: 6/07/17 LICENSE# 25080

DRAWN: VJS  
CHECKED: JMM3  
BARR PROJECT NO.: 23/69-0C29  
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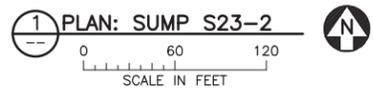
DWG. NO. **MW-005** REV **B**

INCHES

CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29-10\PERMIT_NMM-55-CS-126.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 4:15 PM



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



PLANT DRAWING NUMBER:

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

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

**BARR** ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

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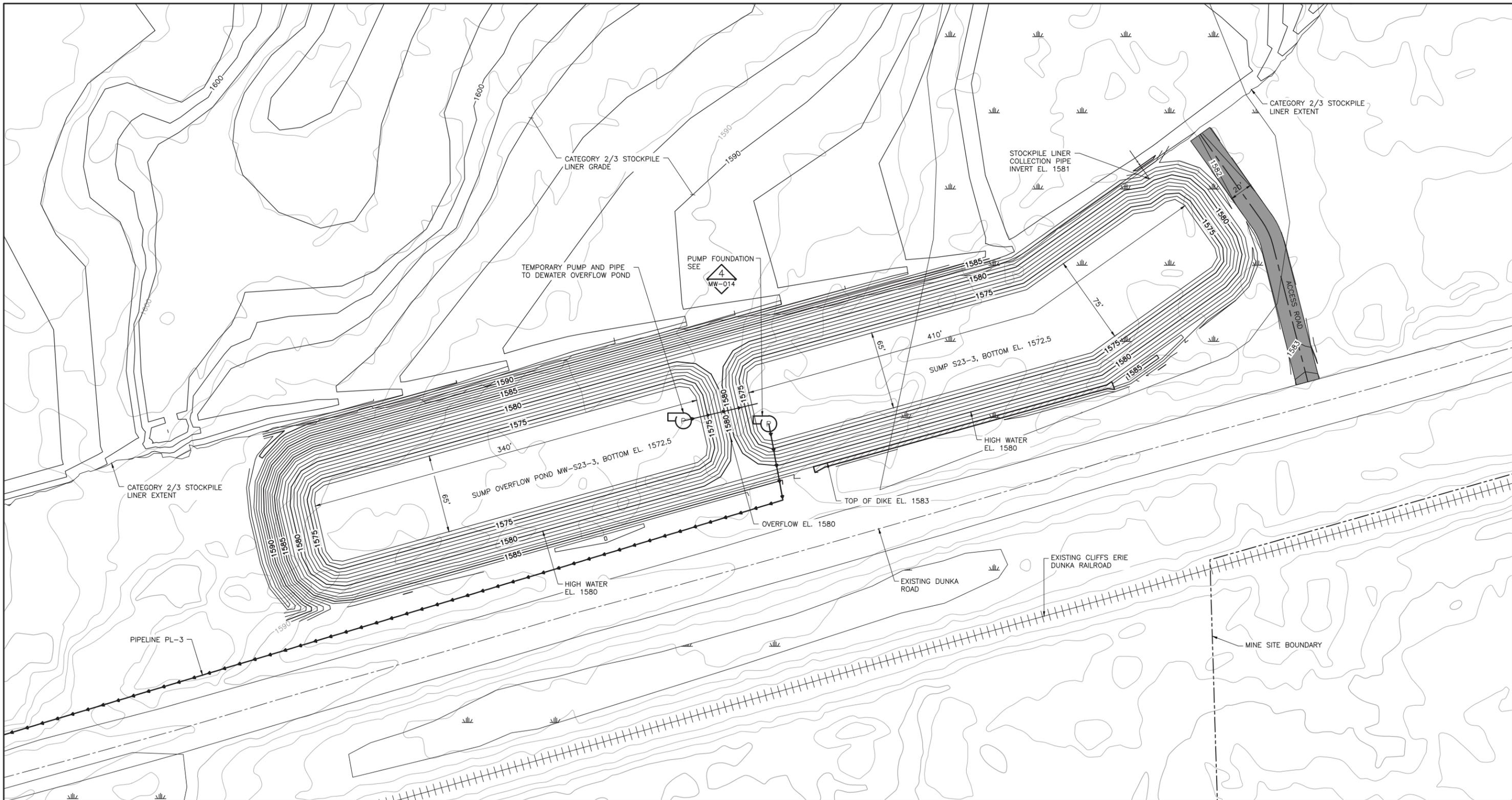
PRINTED NAME JON M. MINNE  
SIGNATURE *[Signature]*  
DATE 6/07/17 LICENSE# 25080

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

DWG. NO. MW-006  
REV B

INCHES

CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C23-10\PERMIT_NMM-55-CS-129.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 4:46 PM



NOTE:  
1. THE SUMP S23-3 OVERFLOWS TO THE SUMP OVERFLOW POND MW-S23-3 IN EVENTS GREATER THAN THE 10-YEAR 24 HOUR STORM.

**1 PLAN: SUMP S23-3 AND MW-23-3**

0 40 80  
SCALE IN FEET

PLANT DRAWING NUMBER:

**MINE WATER INFRASTRUCTURE  
MINE WATER SUMP DESIGN  
SUMP S23-3 AND MW-S23-3 GRADING PLAN**

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

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SIGNATURE *[Signature]*  
DATE 6/07/17 LICENSE# 25080

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

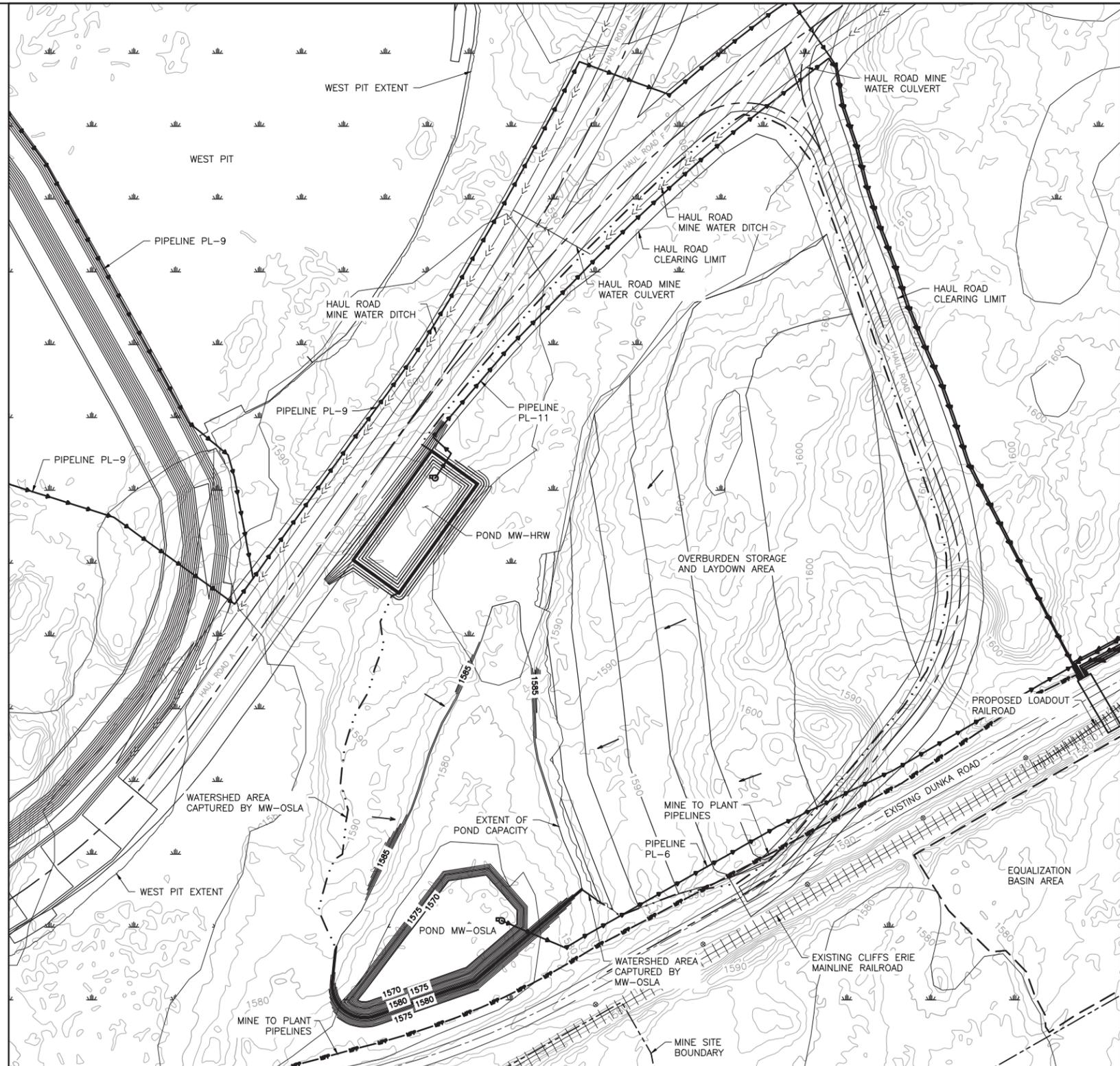
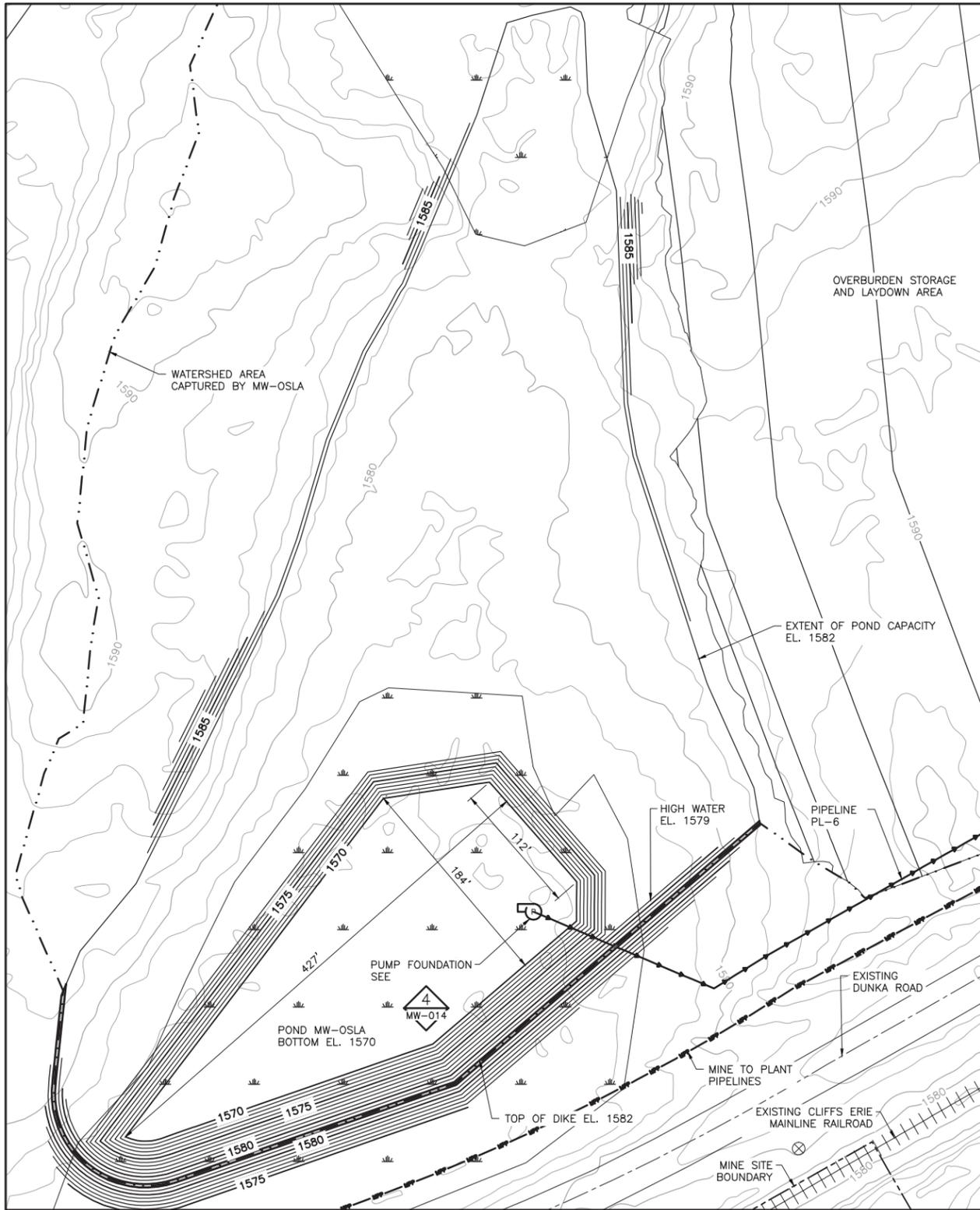
**BARR**  
BARR ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO. **MW-007**

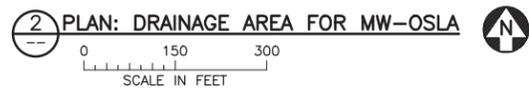
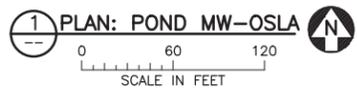
REV **B**

INCHES  
1  
2

CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29\10\PERMIT_NMM-55-CS-140.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 4:56 PM



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



PLANT DRAWING NUMBER:

MINE WATER INFRASTRUCTURE  
MINE WATER POND DESIGN  
POND MW-OSLA GRADING PLAN

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

**BARR** ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

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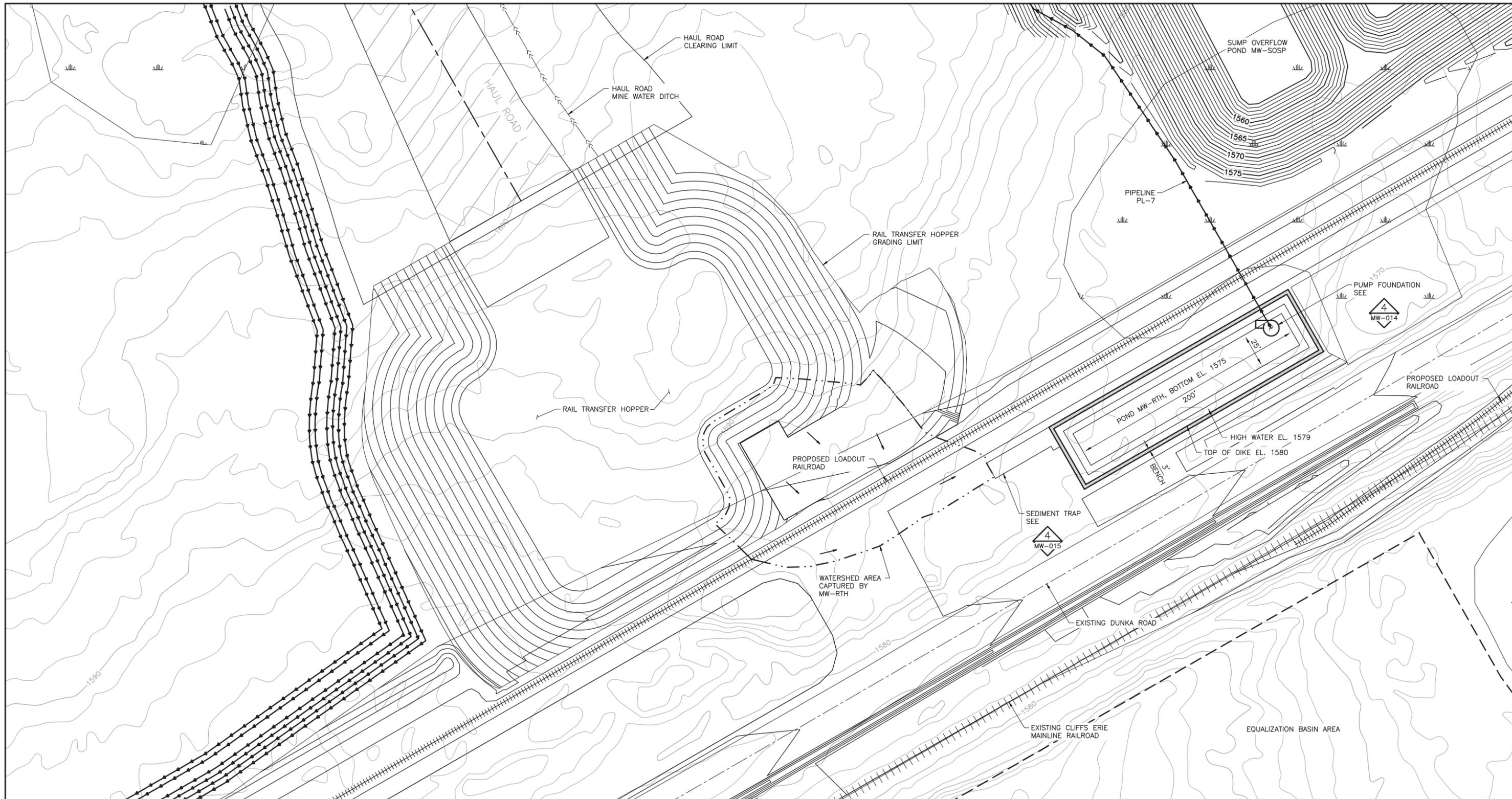
PRINTED NAME: JON M. MINNE  
SIGNATURE: *[Signature]*  
DATE: 6/07/17 LICENSE# 25080

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

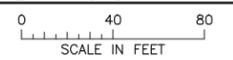
DWG. NO. MW-008  
REV B

INCHES 2 1

CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29\10\PERMIT_INM-55-CS-141.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 5:02 PM



1 PLAN: POND MW-RTH



PLANT DRAWING NUMBER:

MINE WATER INFRASTRUCTURE  
MINE WATER POND DESIGN  
POND MW-RTH GRADING PLAN

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

**BARR** ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

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PRINTED NAME JON M. MINNE  
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DRAWN: VJS  
CHECKED: JMM3  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

DWG. NO. MW-009  
REV B

2  
1  
INCHES

CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29\10\PERMIT_NM-55-CS-142.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 5:06 PM



1 PLAN: POND MW-HRE

0 40 80  
SCALE IN FEET

PLANT DRAWING NUMBER:

MINE WATER INFRASTRUCTURE  
MINE WATER POND DESIGN  
POND MW-HRE GRADING PLAN

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

**BARR** ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

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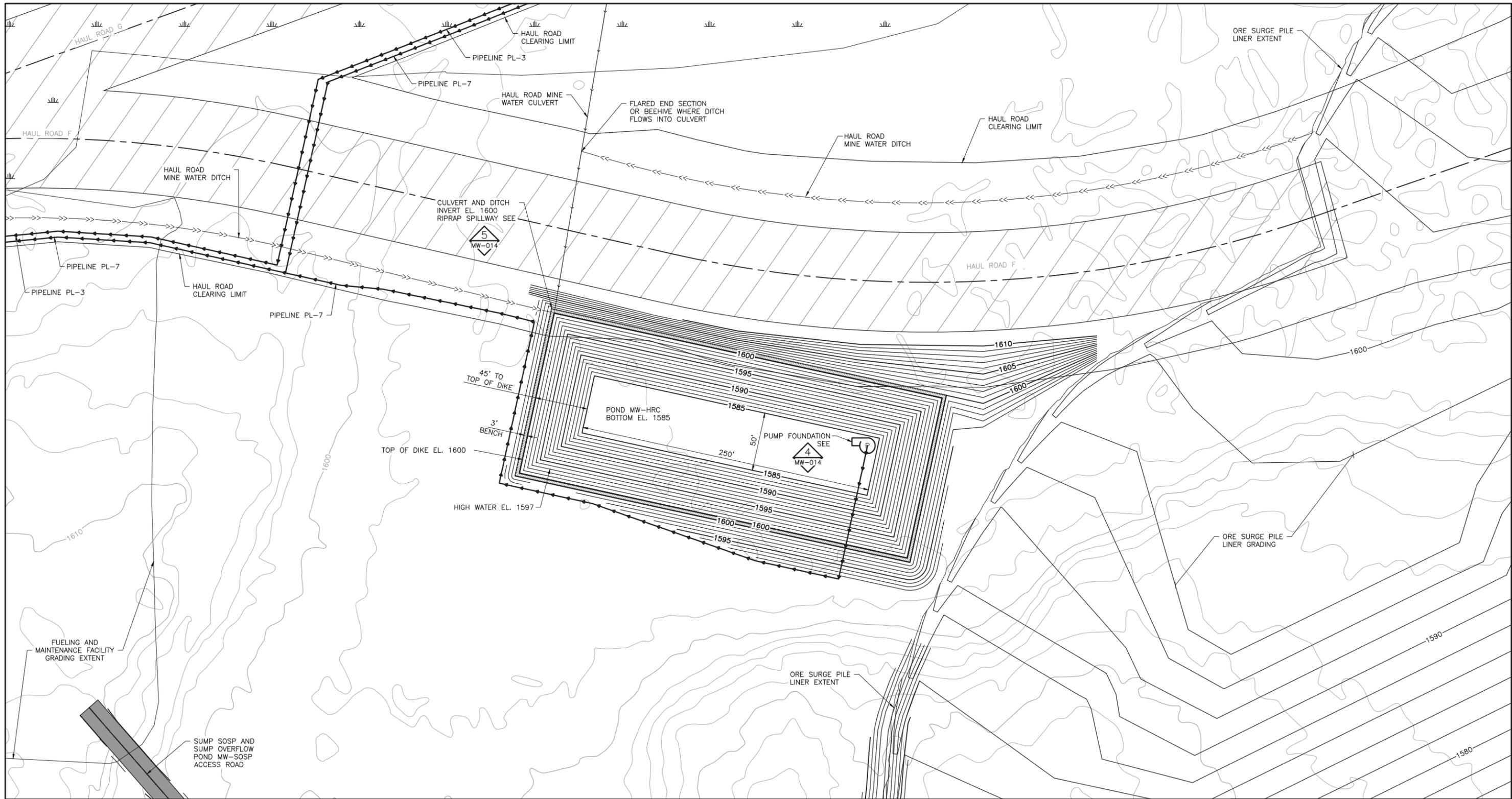
PRINTED NAME JON M. MINNE  
SIGNATURE *[Signature]*  
DATE 6/07/17 LICENSE# 25080

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

DWG. NO. MW-010  
REV B

INCHES  
1  
2

CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29\10\PERMIT_NMM-55-CS-143.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 5:16 PM



1 PLAN: POND MW-HRC

PLANT DRAWING NUMBER:

MINE WATER INFRASTRUCTURE  
MINE WATER POND DESIGN  
POND MW-HRC GRADING PLAN

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

**BARR** ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
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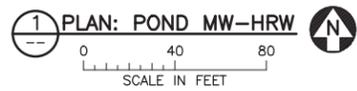
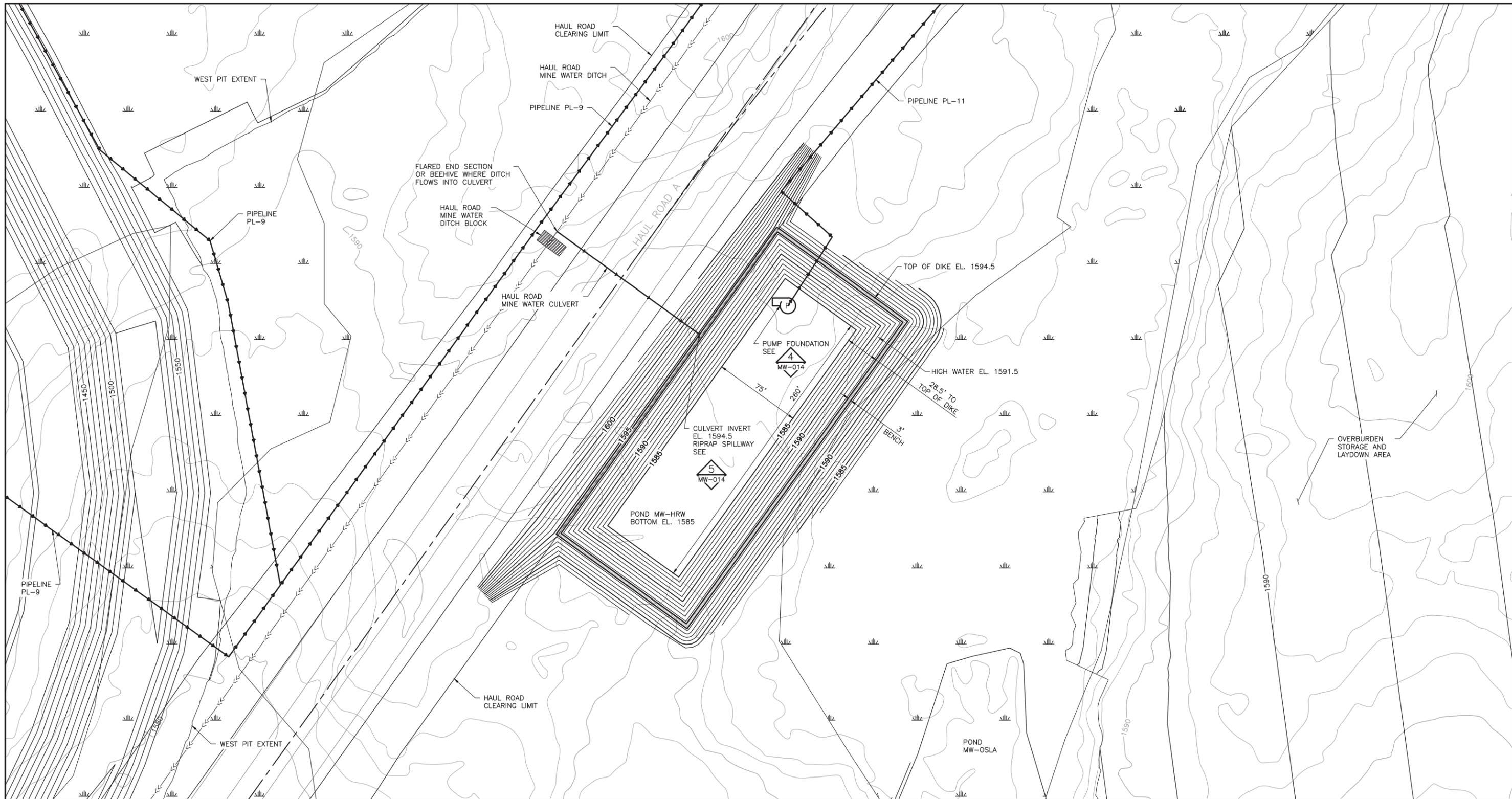
PRINTED NAME JON M. MINNE  
SIGNATURE   
DATE 6/07/17 LICENSE# 25080

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

DWG. NO. MW-011  
REV B

INCHES

CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29-10\PERMIT_NMM-55-CS-144.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 5:20 PM



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

PLANT DRAWING NUMBER:

**MINE WATER INFRASTRUCTURE  
MINE WATER POND DESIGN  
POND MW-HRW GRADING PLAN**

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

**BARR**  
BARR ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

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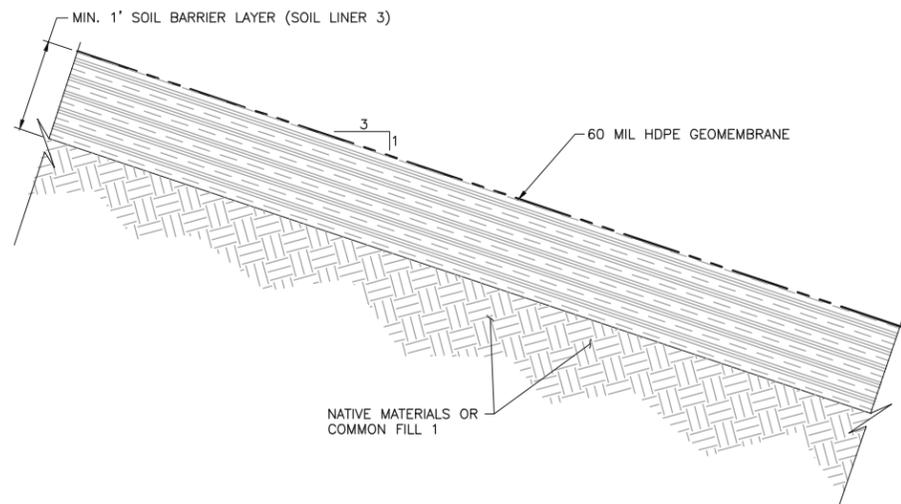
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CHECKED: JMM3  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

DWG. NO. **MW-012** REV **B**

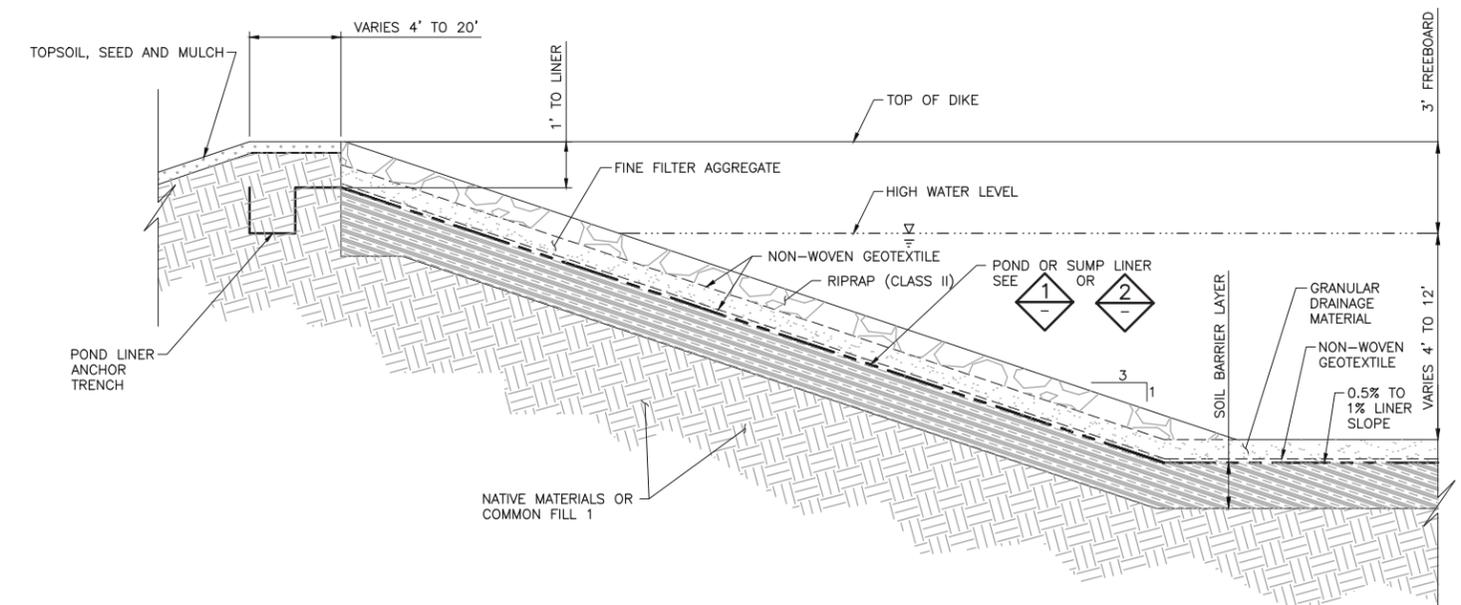
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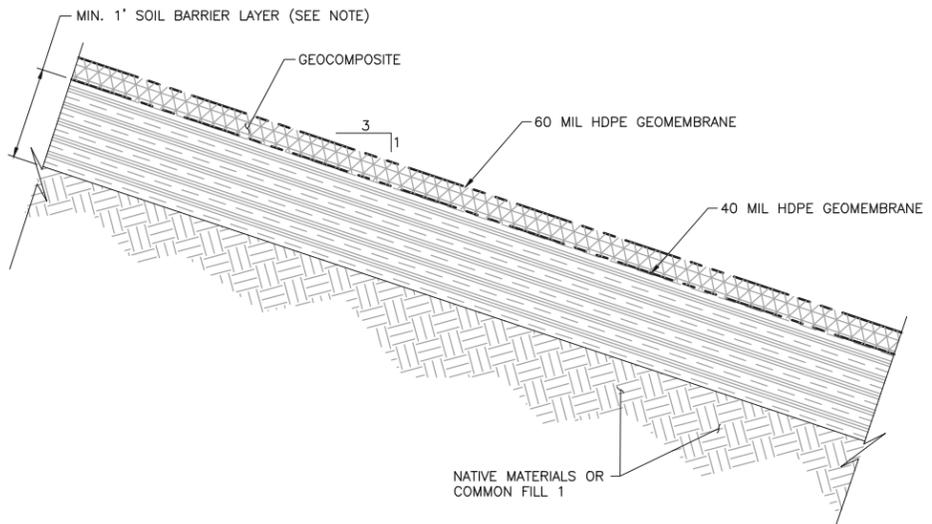
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**1** DETAIL: TYPICAL MINE WATER POND AND SUMP OVERFLOW POND LINER  
NOT TO SCALE

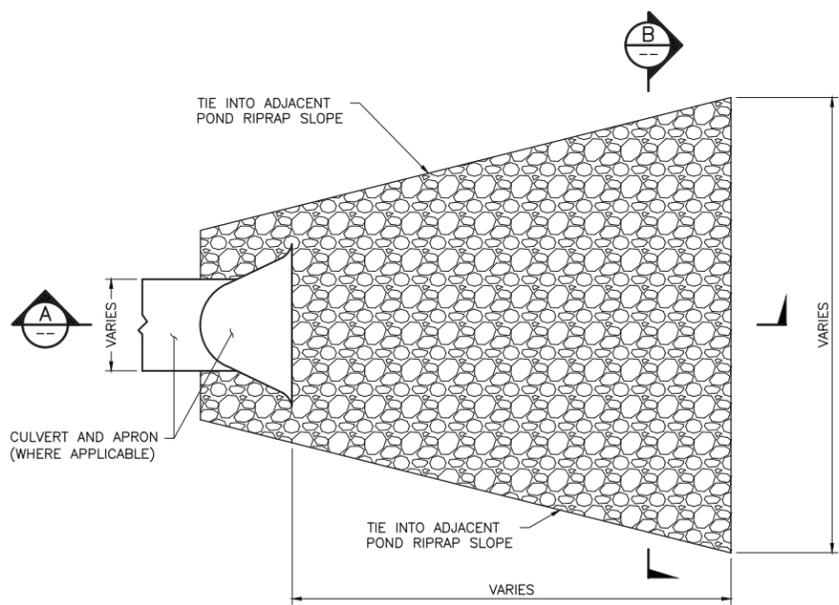


**3** SECTION: TYPICAL SUMP AND POND LINER SECTION  
NOT TO SCALE



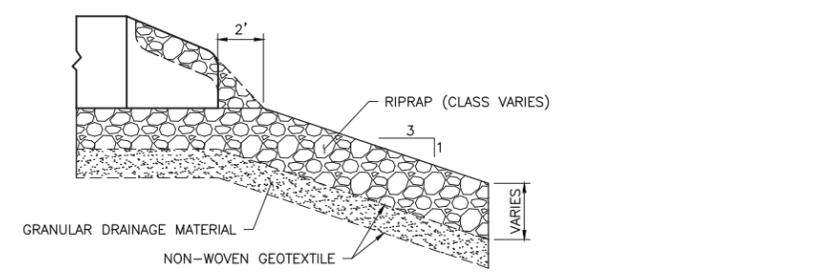
**2** DETAIL: TYPICAL CATEGORY 2/3, 4 AND OSP SUMP AND MW-RTH LINER  
NOT TO SCALE

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

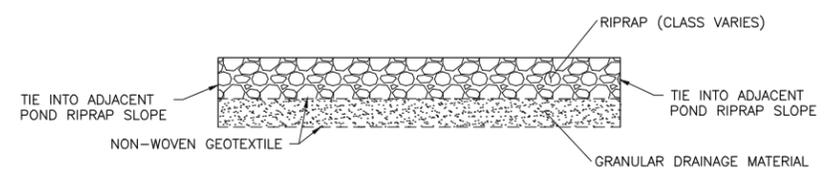


**5** DETAIL: RIPRAP SLOPE  
NOT TO SCALE

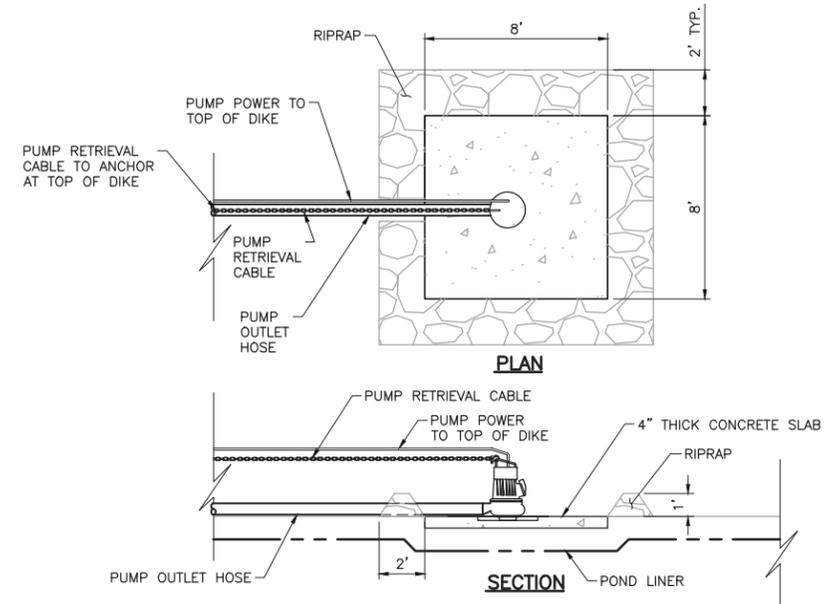
NOTES:  
1. RIPRAP GRADATION BASED ON EXPECTED VELOCITIES FROM 100 YEAR 24-HOUR STORM EVENT.  
2. CULVERT OUTLETS TO RIPRAP SLOPE.



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

PLANT DRAWING NUMBER:

**MINE WATER INFRASTRUCTURE  
SUMP/POND TYPICAL DETAILS**

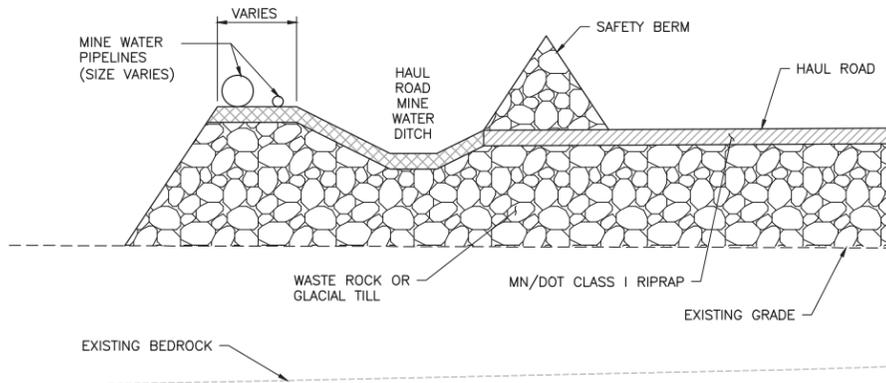
**POLYMET MINING** POLYMET MINING, INC.  
NORTHMET PROJECT  
HOYT LAKES, MINNESOTA

**BARR** BARR ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

DWG. NO. **MW-014** REV **B**

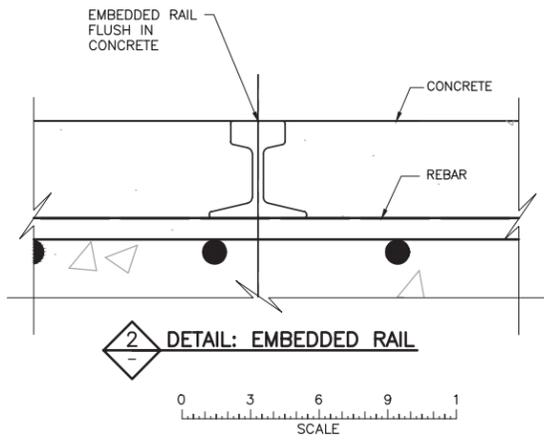
2  
1  
INCHES

CADD USER: Veronica Mourms FILE: K:\DESIGN\23690C29-10\PERMIT_NMM-54-CU-300.DWG PLOT SCALE: 1:2 PLOT DATE: 6/2/2017 5:35 PM

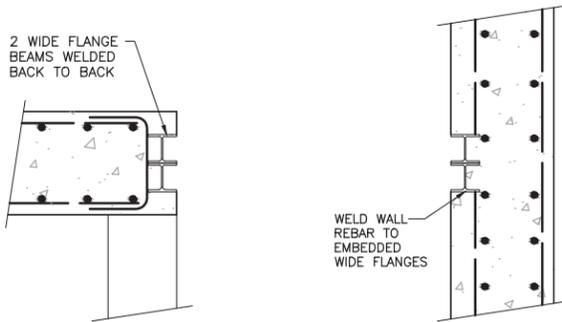


- NOTES:
- HAUL ROAD AND HAUL ROAD MINE WATER DITCH DESIGN IS SHOWN IN THE EARTHWORK DRAWINGS
  - MINE WATER PIPELINES WILL BE SECURED WITH COVER MATERIAL OVER THE PIPES EVERY 100'

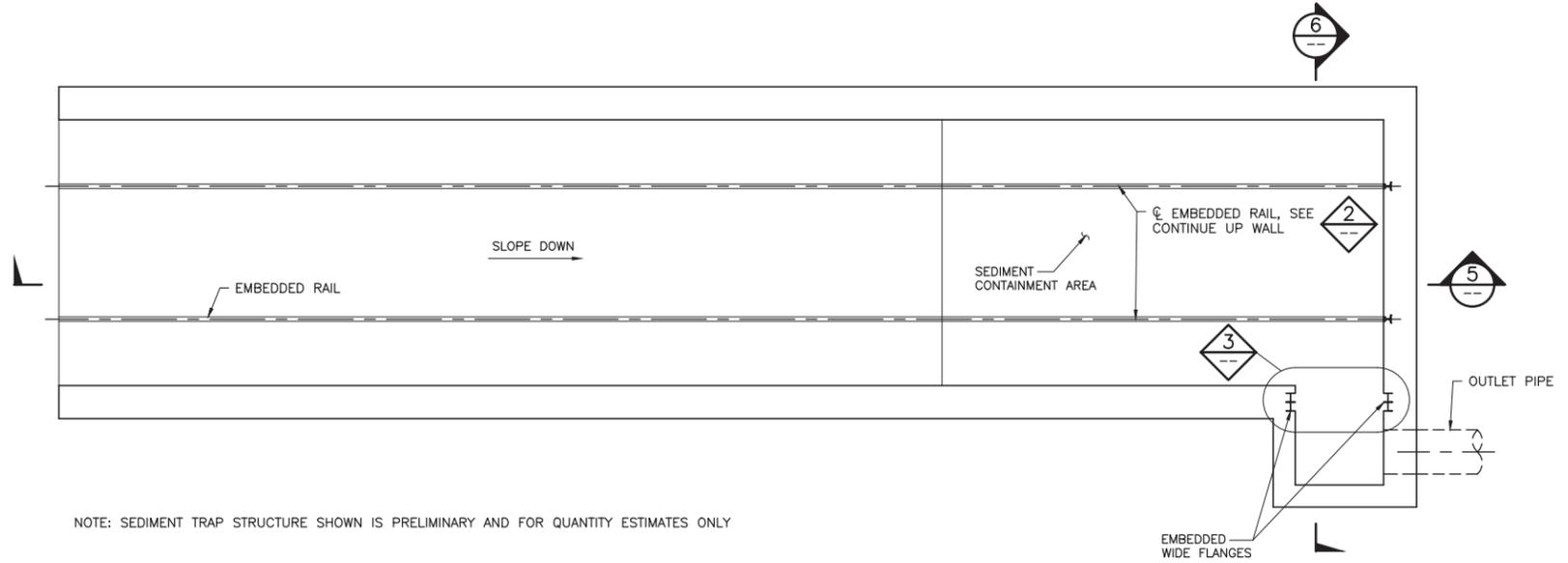
**1 SECTION: TYPICAL PIPE LOCATION**  
NOT TO SCALE



**2 DETAIL: EMBEDDED RAIL**



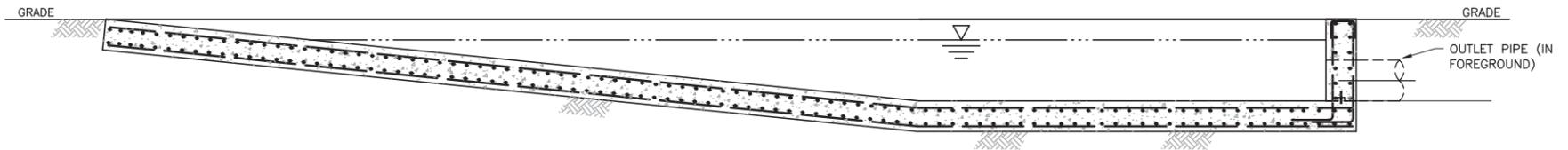
**3 DETAIL: EMBEDDED WIDE FLANGES**  
NOT TO SCALE



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

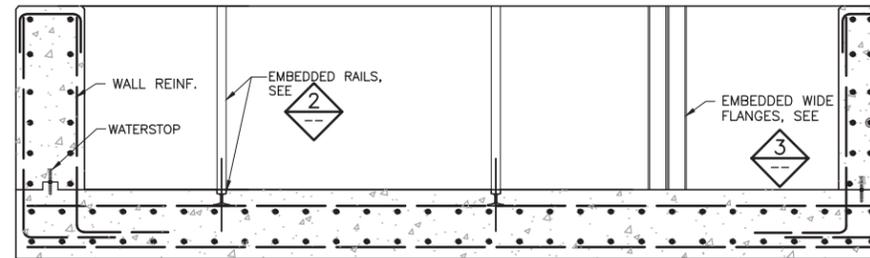
**4 PLAN: SEDIMENT TRAP**

0 1 5  
SCALE



**5 SECTION: SEDIMENT TRAP**

0 1 5  
SCALE



**6 SECTION: SEDIMENT TRAP**

0 1 2 3 4 5  
SCALE

PLANT DRAWING NUMBER:

**MINE WATER INFRASTRUCTURE SECTIONS AND DETAILS**

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

**BARR** BARR ENGINEERING CO.  
4300 MARKETPOINTE DRIVE  
SUITE 200  
MINNEAPOLIS, MN.  
Ph: 1-800-632-2277

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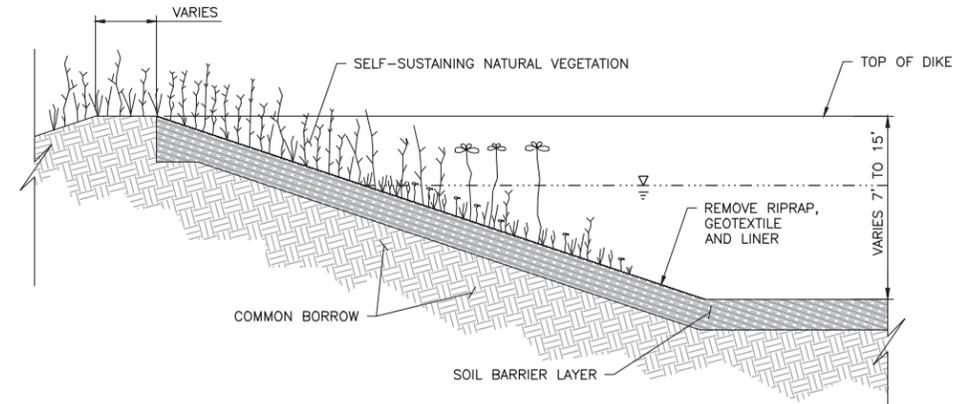
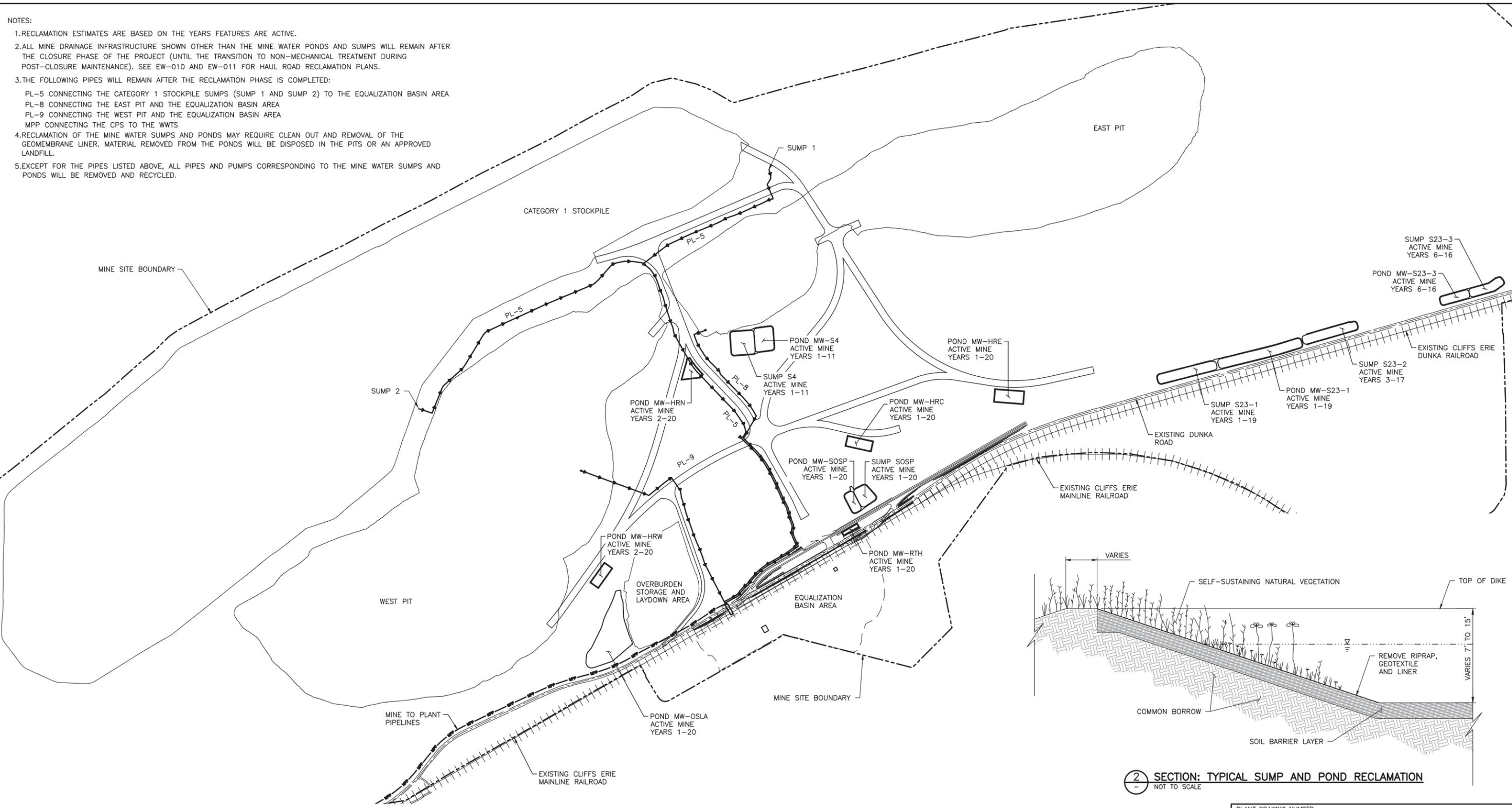
DRAWN: VJS  
CHECKED: JMM3  
BARR PROJECT NO.: 23/69-0C29  
SCALE: AS SHOWN

DWG. NO. **MW-015** REV **B**

INCHES

NOTES:

1. RECLAMATION ESTIMATES ARE BASED ON THE YEARS FEATURES ARE ACTIVE.
2. ALL MINE DRAINAGE INFRASTRUCTURE SHOWN OTHER THAN THE MINE WATER PONDS AND SUMPS WILL REMAIN AFTER THE CLOSURE PHASE OF THE PROJECT (UNTIL THE TRANSITION TO NON-MECHANICAL TREATMENT DURING POST-CLOSURE MAINTENANCE). SEE EW-010 AND EW-011 FOR HAUL ROAD RECLAMATION PLANS.
3. THE FOLLOWING PIPES WILL REMAIN AFTER THE RECLAMATION PHASE IS COMPLETED:  
 PL-5 CONNECTING THE CATEGORY 1 STOCKPILE SUMPS (SUMP 1 AND SUMP 2) TO THE EQUALIZATION BASIN AREA  
 PL-8 CONNECTING THE EAST PIT AND THE EQUALIZATION BASIN AREA  
 PL-9 CONNECTING THE WEST PIT AND THE EQUALIZATION BASIN AREA  
 MPP CONNECTING THE CPS TO THE WWTS
4. RECLAMATION OF THE MINE WATER 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 WATER SUMPS AND PONDS WILL BE REMOVED AND RECYCLED.



2 SECTION: TYPICAL SUMP AND POND RECLAMATION  
NOT TO SCALE

1 PLAN: GENERAL LAYOUT RECLAMATION  
0 600 1200  
SCALE IN FEET

PLANT DRAWING NUMBER:

MINE WATER INFRASTRUCTURE RECLAMATION PLAN

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

BARR ENGINEERING CO.  
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SUITE 200  
MINNEAPOLIS, MN.  
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 SCALE: AS SHOWN

DWG. NO. MW-016  
 REV B

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