

Appendix 4

Categories 1, 2/3, and 4 Stockpiles and Ore Surge Pile Design and Category 1 Stockpile Groundwater Containment System Permit Application Support Drawings

Errata Sheet

Poly Met Mining, Inc. NorthMet Project

Permit Application Support Drawings: Categories 1, 2/3, and 4 Stockpiles and Ore Surge Pile Design

August 2017 (version 3)

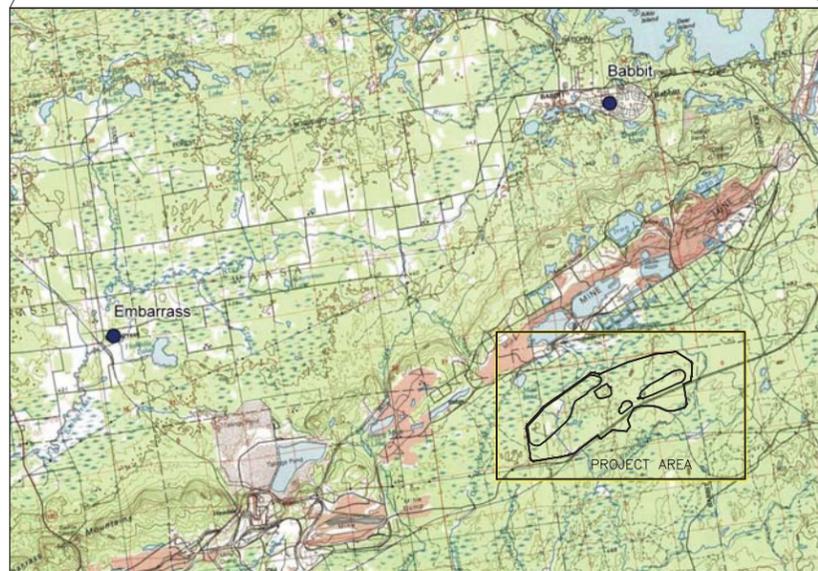
Engineering design is currently in progress. The table below lists changes that have been identified to-date and have not yet been incorporated in the attached permit application support drawings within this set. Final design will incorporate these changes along with additional site-specific information (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".
SKP-002, SKP-003, SKP-004, SKP-005, SKP-006, SKP-007, SKP-008, SKP-009, SKP-010, SKP-011, SKP-012, SKP-014, SKP-015, SKP-016, SKP-017, SKP-018, SKP-026, SKP-027, SKP-028, SKP-029, SKP-030	The "Mine Site Boundary" will be replaced by the "Mining Area Boundary" as shown on figures included in the Permit to Mine Application.

POLY MET MINING, INC. NORTHMET PROJECT PERMIT APPLICATION SUPPORT DRAWINGS CATEGORIES 1, 2/3, AND 4 STOCKPILES AND ORE SURGE PILE DESIGN HOYT LAKES, MINNESOTA



PROJECT LOCATION MAP



SITE LOCATION

DRAWING LIST		
SHEET NUMBER	REVISION	SHEET TITLE
SKP-001	G	TITLE SHEET AND LOCATION MAP
SKP-002	G	LEGEND, GENERAL NOTES AND SPECIFICATIONS
SKP-003	G	STOCKPILE LAYOUTS - MINE YEAR 1 LIMITS
SKP-004	G	STOCKPILE LAYOUTS - MINE YEAR 2 LIMITS
SKP-005	G	STOCKPILE LAYOUTS - AT PLANNED UTILIZATION LIMITS
SKP-006	G	STOCKPILE LAYOUTS - MINE YEAR 21 LIMITS CLOSURE CONFIGURATION
SKP-007	G	EXISTING SITE CONDITIONS
SKP-008	G	SITE LAYOUT AND LOCATION OF FIELD INVESTIGATIONS
SKP-009	G	DEPTH TO BEDROCK ISOPACH MAP
SKP-010	G	CATEGORY 1 STOCKPILE SUBGRADE EXCAVATION PLAN
SKP-011	G	CATEGORY 1 STOCKPILE MINE YEAR 1 CONTINGENCY CLOSURE CONFIGURATION
SKP-012	G	CATEGORY 1 STOCKPILE FINAL GRADES AND SUB-BASIN DELINEATION
SKP-013	G	CATEGORY 1 STOCKPILE DESIGN SECTIONS
SKP-014	G	CATEGORY 2/3 STOCKPILE SUBGRADE EXCAVATION PLAN
SKP-015	G	CATEGORY 2/3 STOCKPILE FOUNDATION GRADING PLAN - MINE YEAR 1 AND MAXIMUM
SKP-016	G	CATEGORY 2/3 STOCKPILE UNDERDRAIN PIPING PLAN - MINE YEAR 1 AND MAXIMUM
SKP-017	G	CATEGORY 2/3 STOCKPILE OVERLINER DRAINAGE PIPING PLAN - MINE YEAR 1 AND MAXIMUM
SKP-018	G	CATEGORY 2/3 STOCKPILE MAXIMUM CAPACITY CONFIGURATION
SKP-019	G	CATEGORY 2/3 STOCKPILE DESIGN SECTIONS
SKP-020	G	CATEGORY 4 STOCKPILE SUBGRADE EXCAVATION PLAN
SKP-021	G	CATEGORY 4 STOCKPILE FOUNDATION GRADING PLAN - MINE YEAR 1 AND MAXIMUM
SKP-022	G	CATEGORY 4 STOCKPILE UNDERDRAIN PIPING PLAN - MINE YEAR 1 AND MAXIMUM
SKP-023	G	CATEGORY 4 STOCKPILE OVERLINER DRAINAGE PIPING PLAN - MINE YEAR 1 AND MAXIMUM
SKP-024	G	CATEGORY 4 STOCKPILE MAXIMUM CAPACITY CONFIGURATION
SKP-025	G	CATEGORY 4 STOCKPILE DESIGN SECTIONS
SKP-026	G	ORE SURGE PILE SUBGRADE EXCAVATION PLAN
SKP-027	G	ORE SURGE PILE FOUNDATION GRADING PLAN
SKP-028	G	ORE SURGE PILE UNDERDRAIN PIPING PLAN
SKP-029	G	ORE SURGE PILE OVERLINER DRAINAGE PIPING PLAN
SKP-030	G	ORE SURGE PILE TYPICAL CONFIGURATION
SKP-031	G	ORE SURGE PILE DESIGN SECTIONS
SKP-032	G	CATEGORY 1 STOCKPILE RECLAMATION AND OPERATIONS SURFACE WATER - MANAGEMENT DETAILS - SHEET 1 OF 2
SKP-033	G	CATEGORY 1 STOCKPILE RECLAMATION AND OPERATIONS SURFACE WATER - MANAGEMENT DETAILS - SHEET 2 OF 2
SKP-034	G	CATEGORY 1 STOCKPILE PHASED COVER DESIGN
SKP-035	G	CONSTRUCTION DETAILS

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED	VERSION	DATE
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP			
D	1/14/14	ISSUED FOR AGENCY REVIEW			
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	FOR CONSTRUCTION		
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
			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.

SIGNATURE *B. Bronson*
 PRINTED NAME BRENT R. BRONSON
 DATE 8/21/17 LICENSE # 46492

DRAWN: MTM
 CHECKED: *gg*
 GOLDR PROJECT NO.: 113-2209
 SCALE: AS SHOWN

PLANT DRAWING NUMBER:
 TITLE SHEET AND LOCATION MAP

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

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DWG. NO. SKP-001
 REV

CADD USER: Jenkins, Crystal FILE: N:\11\113-2209\1132209\H_SKP_FEB2013\1132209H002.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 10:17 AM

LEGEND

MAJOR FEATURE

EXISTING GROUND TOPOGRAPHY (SEE NOTE 2)

PROPOSED FINISHED GRADE TOPOGRAPHY

SLOPE DIRECTION

CROSS SECTION IDENTIFIER

SHEET WHERE SECTION IS LOCATED

SLOPE

HAUL ROADS

MINE SITE BOUNDARY

PIT BOUNDARY

MINE YEAR 1 ORE, WASTE ROCK STOCKPILE LIMITS

MAXIMUM ORE, WASTE ROCK STOCKPILE LIMITS

GEOMEMBRANE BARRIER LAYER

PREPARED SUBGRADE

SOIL LINER 1

SOIL LINER 2

WASTE ROCK OR ORE

STRUCTURAL FILL

GRANULAR DRAINAGE MATERIAL 1

COMMON FILL 1

DRAIN ROCK

RIPRAP

RANDOM FILL

OVERBURDEN MATERIAL

VERTICAL PERCOLATION LAYER (USCS - ML)

LATERAL DRAINAGE LAYER (USCS - SP OR SM)

GATP-06-7 GOLDER ASSOC. TEST PIT (2006)

SB-05-01 BARR ENGINEERING BOREHOLES (2005)

RS-11 BARR ENGINEERING BOREHOLES (2008)

J003 AMERICAN ENGINEERING TESTING, INC. BOREHOLES (2010)

SHALLOW MARSH

CONIFEROUS SWAMP

HARDWOOD SWAMP

SHRUB SWAMP

CONIFEROUS BOG

OPEN BOG

SEDGE MEADOW

LIST OF ABBREVIATIONS

AMSL	ABOVE MEAN SEA LEVEL
CY	CUBIC YARD
DIA.	DIAMETER
EL.	ELEVATION
ET	EVAPOTRANSPIRATION
FEET	FEET
HDPE	HIGH DENSITY POLYETHYLENE
ID	INSIDE DIAMETER
IN.	INCH
LLDPE	LINEAR LOW DENSITY POLYETHYLENE
LCRS	LEAK COLLECTION AND RECOVERY SYSTEM
MAX.	MAXIMUM
MIN.	MINIMUM
N.T.S.	NOT TO SCALE
OD	OUTSIDE DIAMETER
SY	SQUARE YARD
TYP.	TYPICAL
ROMP	ROCK AND OVERBURDEN MANAGEMENT PLAN
USCS	UNIFIED SOIL CLASSIFICATION SYSTEM
CPEP	PERFORATED CORRUGATED POLYETHYLENE

GENERAL NOTES:

- THIS DRAWING SET REPRESENTS THE DESIGN FOR PERMITTING FOR CATEGORY 1 STOCKPILE, CATEGORY 2/3 STOCKPILE, CATEGORY 4 STOCKPILE AND ORE SURGE PILE FOR THE POLYMET NORTHMET PROJECT IN HOYT LAKES, MINNESOTA, PREPARED IN SUPPORT OF A PERMIT TO MINE. THE DRAWING SET ONLY INCLUDES INFRASTRUCTURE ASSOCIATED WITH THE MOVEMENT OF ROCK (STOCKPILES, PITS, HAUL ROADS, AND RAIL TRANSFER HOPPER) AND NOT OTHER SUPPORT FACILITIES.
- BASE TOPOGRAPHY PROVIDED BY BARR ENGINEERING IN AUGUST 2011.
- GOLDER ASSOCIATES INC. (GOLDER) IS RESPONSIBLE FOR STOCKPILE DESIGNS WITH BATTERY LIMITS DEFINED BY THE PERIMETER/LINER BERMS AND THE UNDERDRAIN SUMPS.
- AT THE BASIC ENGINEERING LEVEL, LIMITED GEOTECHNICAL DATA EXISTS, PARTICULARLY IN LOWLAND AREAS. ADDITIONAL DATA WILL BE OBTAINED FROM THESE AREAS AFTER THE PERMIT TO MINE IS APPROVED. SUBGRADE EXCAVATION PLANS WERE DEVELOPED USING AVAILABLE INFORMATION, AND WILL BE UPDATED FOR FINAL DESIGN BASED ON RESULTS OF PHASE II GEOTECHNICAL INVESTIGATION.
- EARTHWORK QUANTITIES BASED ON NEAT LINE (I.E., NET CUT/ FILL SHRINKAGE FACTOR = 1.0).
- PREPARED SUBGRADE, AS DEFINED ON THE DRAWINGS, INCLUDES CLEARING, GRUBBING, TOPSOIL REMOVAL, REMOVAL OF GEOTECHNICALLY-UNSUITABLE MATERIALS, MOISTURE CONDITIONING, AND SUBGRADE COMPACTION AS DEFINED IN THE SPECIFICATIONS.
- FOUNDATION PREPARATION ASSUMES THE FOLLOWING GENERAL CONSTRUCTION SEQUENCE: (i) EXCAVATE TO BEDROCK WITHIN LOWLAND AREAS ASSUMING A MAXIMUM DEPTH OF OVER-EXCAVATION OF 20 FEET, OR UNTIL REACHING GEOTECHNICALLY-SUITABLE FOUNDATION SOILS AS DETERMINED BY THE PHASE II GEOTECHNICAL INVESTIGATION. STOCKPILE ORGANIC SOILS AND MINERAL OVERBURDEN SEPARATELY FOR FUTURE APPROVED USE; (ii) PLACE STRUCTURAL FILL AS REQUIRED TO MEET THE FOUNDATION GRADE REQUIREMENTS WITH GRANULAR SOILS, E.G., DULUTH COMPLEX CONSTRUCTION ROCK, BIWABIK IRON FORMATION CONSTRUCTION ROCK, AND UNSATURATED MINERAL OVERBURDEN; (iii) ESTABLISH FOUNDATION DRAINAGE AS REQUIRED TO PREVENT EXCESS PORE PRESSURES DURING OPERATION; AND (iv) CONSTRUCT LINER SYSTEM DEPENDENT UPON THE REACTIVITY CATEGORY OF THE STOCKPILE MATERIAL.
- AREAS WITH UNSUITABLE SOILS (LOWLAND AREAS) ARE ASSUMED TO COINCIDE WITH THE PREVIOUSLY IDENTIFIED WETLAND AREAS. HORIZONTAL AND VERTICAL EXTENTS OF LOWLAND AREAS ARE EXPECTED TO BE REVISED BASED ON RESULTS OF PHASE II GEOTECHNICAL INVESTIGATION.
- POST-CONSOLIDATION STOCKPILE SETTLEMENTS WERE ESTIMATED BASED ON LIMITED INFORMATION ON THE CONSOLIDATION PROPERTIES OF SUBGRADE MATERIALS. HENCE, FOUNDATION EXCAVATION AND GRADING PLANS ARE ANTICIPATED TO UNDERGO MINOR MODIFICATIONS BASED ON THE RESULTS OF THE PHASE II GEOTECHNICAL INVESTIGATION TO ENSURE SUFFICIENT DRAINAGE.
- CATEGORY 1 WASTE ROCK STOCKPILE WILL BE RECLAIMED BY PLACEMENT OF A GEOMEMBRANE COVER AT CLOSURE. PRIOR TO CLOSURE, WASTE ROCK CATEGORY 2, 3 AND 4 WILL BE USED FOR PIT BACKFILL.
- LIMITS OF DISTURBANCE (I.E., CLEARING LIMITS) ASSUMED TO BE 40 FEET FROM THE FACILITY LIMITS.
- INTERIM STOCKPILE FILL SLOPES SHOWN WITH WASTE ROCK SLOPES AT ANGLE OF REPOSE. FINAL/CLOSURE STOCKPILE FILL SLOPES SHOWN WITH WASTE ROCK SLOPES REGRADED TO FINAL SLOPE ANGLES.

SPECIFICATIONS:

- FOR EARTHWORKS COMPONENTS OF THE STOCKPILE DESIGN, REFER TO SECTION 2300 OF THE PROJECT SPECIFICATIONS.
- FOR GEOSYNTHETIC AND PIPING COMPONENTS OF THE STOCKPILE DESIGN, REFER TO SECTION 2272 FOR GEOTEXTILE, 2273 FOR POLYETHYLENE GEOMEMBRANE LINERS, AND SECTION 2610 FOR PIPING.
- QUALITY ASSURANCE REQUIREMENTS FOR STOCKPILE CONSTRUCTION ARE DEFINED IN THE CONSTRUCTION QUALITY ASSURANCE PLAN.
- SPECIFICATION SECTION NUMBERING IS PRELIMINARY.

TERTIARY COLLECTION PIPING

4-INCH

PRIMARY AND SECONDARY COLLECTION PIPING

4-INCH

6-INCH

8-INCH

10-INCH

12-INCH

PLANT DRAWING NUMBER:

LEGEND, GENERAL NOTES AND SPECIFICATIONS

POLYMET MINING

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Golder Associates

GOLDER PROJECT NO.: 113-2209

SCALE: AS SHOWN

DWG. NO. SKP-002

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VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED		
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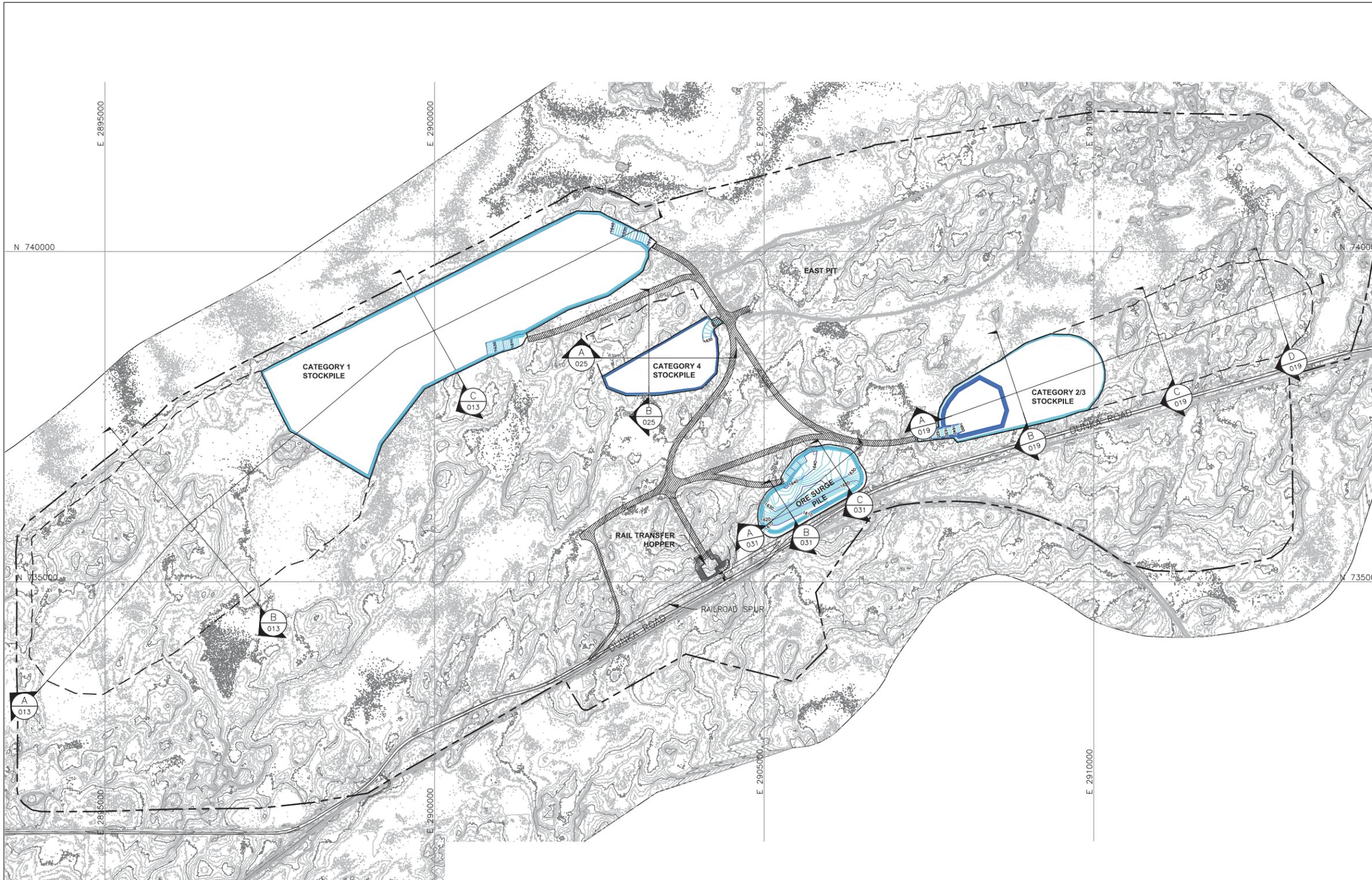
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SIGNATURE

PRINTED NAME BRENT R. BRONSON

DATE 8/21/17 LICENSE # 46492

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LEGEND

- EXISTING GROUND TOPOGRAPHY
- PROPOSED STOCKPILE LAYOUTS
- HAUL ROADS
- MINE SITE BOUNDARY
- MINE YEAR 1 PIT BOUNDARY (SEE NOTE 1)
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- CROSS SECTION IDENTIFIER
- SHEET WHERE SECTION IS LOCATED

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
4. CATEGORY 2/3 AND CATEGORY 4 STOCKPILES SHOWN BASED ON WASTE ROCK SCHEDULE ONLY, I.E. WITHOUT OVERBURDEN. SEE DRAWINGS 018 AND 024 SHOWING MAXIMUM CAPACITY LAYOUTS FOR THESE STOCKPILES.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:

STOCKPILE LAYOUTS – MINE YEAR 1 LIMITS

INCHES



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SIGNATURE *Brent R. Bronson*

PRINTED NAME BRENT R. BRONSON
DATE 8/21/17 LICENSE # 46492

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CHECKED: *gg*

GOLDER PROJECT NO.: 113-2209

SCALE: AS SHOWN



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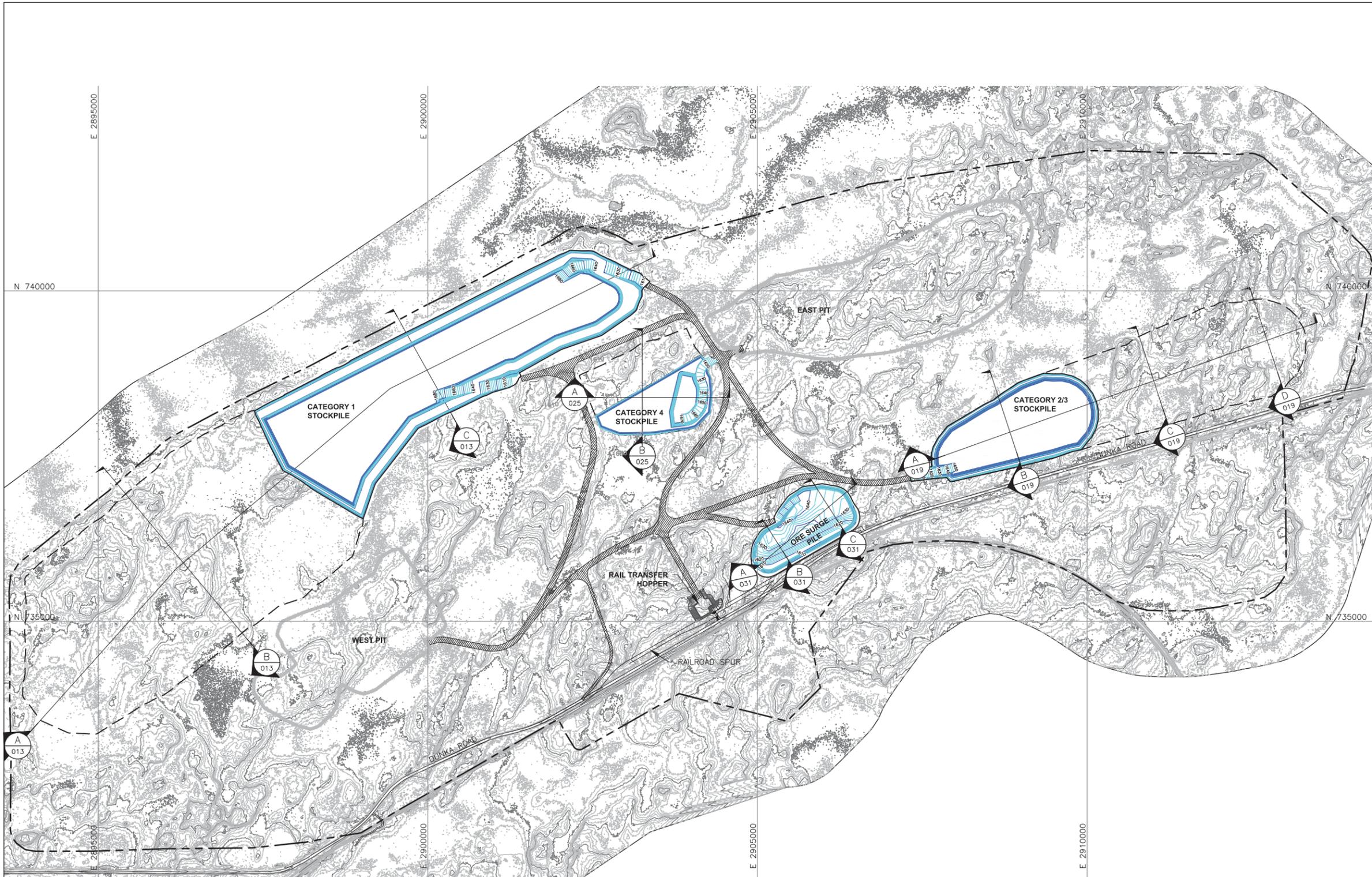
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LEGEND

- EXISTING GROUND TOPOGRAPHY
- PROPOSED GRADING TOPOGRAPHY
- HAUL ROADS
- MINE SITE BOUNDARY
- PIT BOUNDARIES AT MINE YEAR 2 (SEE NOTE 1)
- MINE YEAR 1 AND 2 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- CROSS SECTION IDENTIFIER
- SHEET WHERE SECTION IS LOCATED

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
4. CATEGORY 2/3 AND CATEGORY 4 STOCKPILES SHOWN BASED ON WASTE ROCK SCHEDULE ONLY, I.E. WITHOUT OVERBURDEN. SEE DRAWINGS 018 AND 024 SHOWING MAXIMUM CAPACITY LAYOUTS FOR THESE STOCKPILES.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:

STOCKPILE LAYOUTS – MINE YEAR 2 LIMITS

INCHES



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SIGNATURE *B. Bronson*

PRINTED NAME BRENT R. BRONSON

DATE 8/21/17 LICENSE # 46492

DRAWN: MTM

CHECKED: *gg*

GOLDER PROJECT NO.: 113-2209

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POLYMET MINING

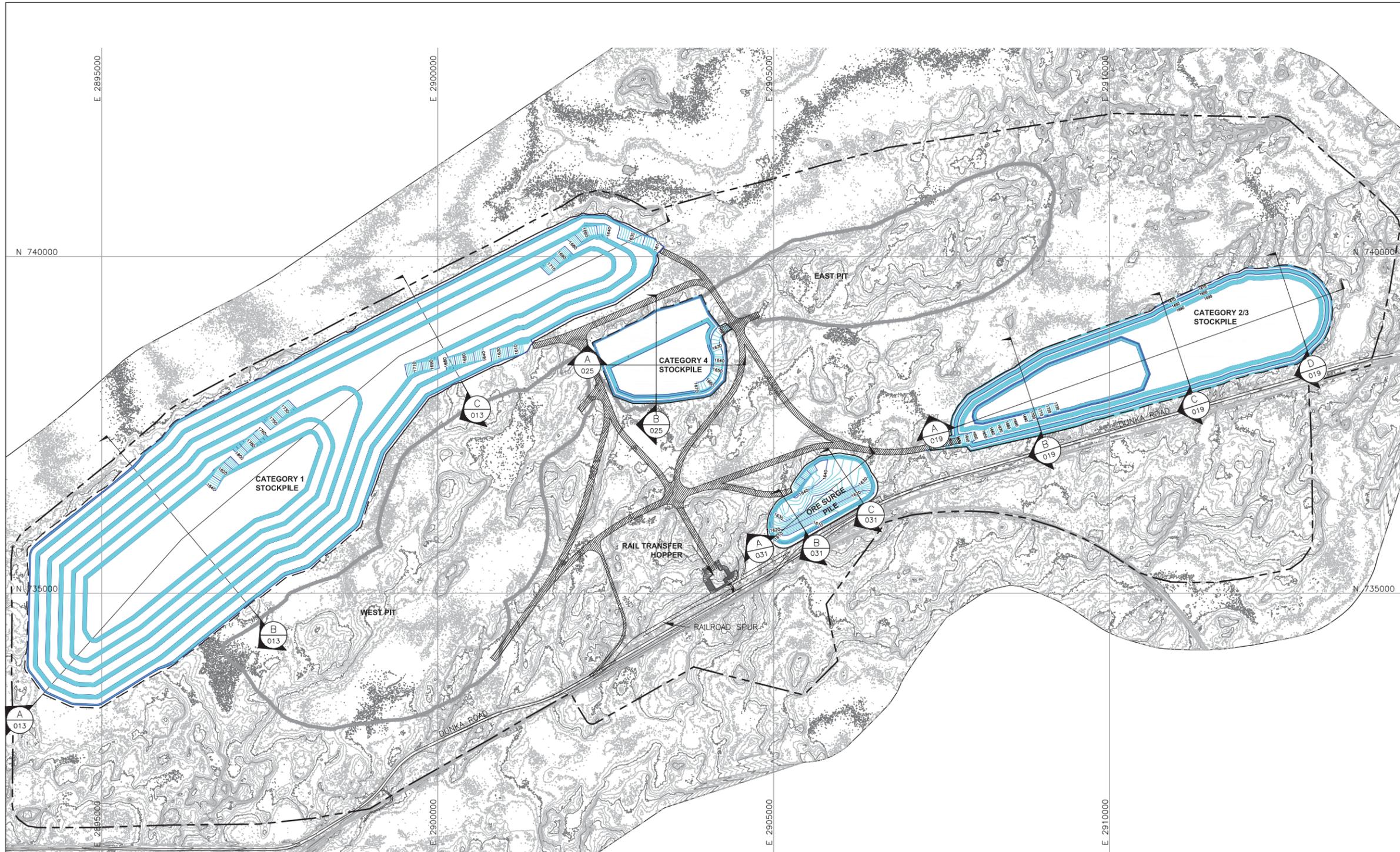
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LEGEND

- EXISTING GROUND TOPOGRAPHY
- PROPOSED LAYOUTS
- HAUL ROADS
- MINE SITE BOUNDARY
- PIT BOUNDARIES AT MINE YEAR 11 (SEE NOTE 1)
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- CROSS SECTION IDENTIFIER
- SHEET WHERE SECTION IS LOCATED

- ### NOTES
1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
 2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDR.
 3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
 4. CATEGORY 2/3 AND CATEGORY 4 STOCKPILES SHOWN BASED ON WASTE ROCK SCHEDULE ONLY, I.E. WITHOUT OVERBURDEN. SEE DRAWINGS 018 AND 024 SHOWING MAXIMUM CAPACITY LAYOUTS FOR THESE STOCKPILES.
 5. PLANNED UTILIZATION LIMITS FOR CATEGORY 1 STOCKPILE REACHED IN MINE YEAR 13, PLANNED UTILIZATION LIMITS FOR CATEGORY 2/3 AND CATEGORY 4 STOCKPILES REACHED IN MINE YEAR 11.

- ### REFERENCES
1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
 2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
 3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:
**STOCKPILE LAYOUTS –
AT PLANNED UTILIZATION LIMITS**

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 GOLDR PROJECT NO.: 113-2209
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DWG. NO. SKP-005

INCHES

0 800 1600
SCALE IN FEET

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LEGEND

- EXISTING GROUND TOPOGRAPHY
- PROPOSED LAYOUT CONTOURS
- HAUL ROADS
- MINE SITE BOUNDARY
- ULTIMATE PIT BOUNDARIES (SEE NOTE 1)
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- CROSS SECTION IDENTIFIER
- SHEET WHERE SECTION IS LOCATED

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:

STOCKPILE LAYOUTS
MINE YEAR 21 LIMITS
CLOSURE CONFIGURATION

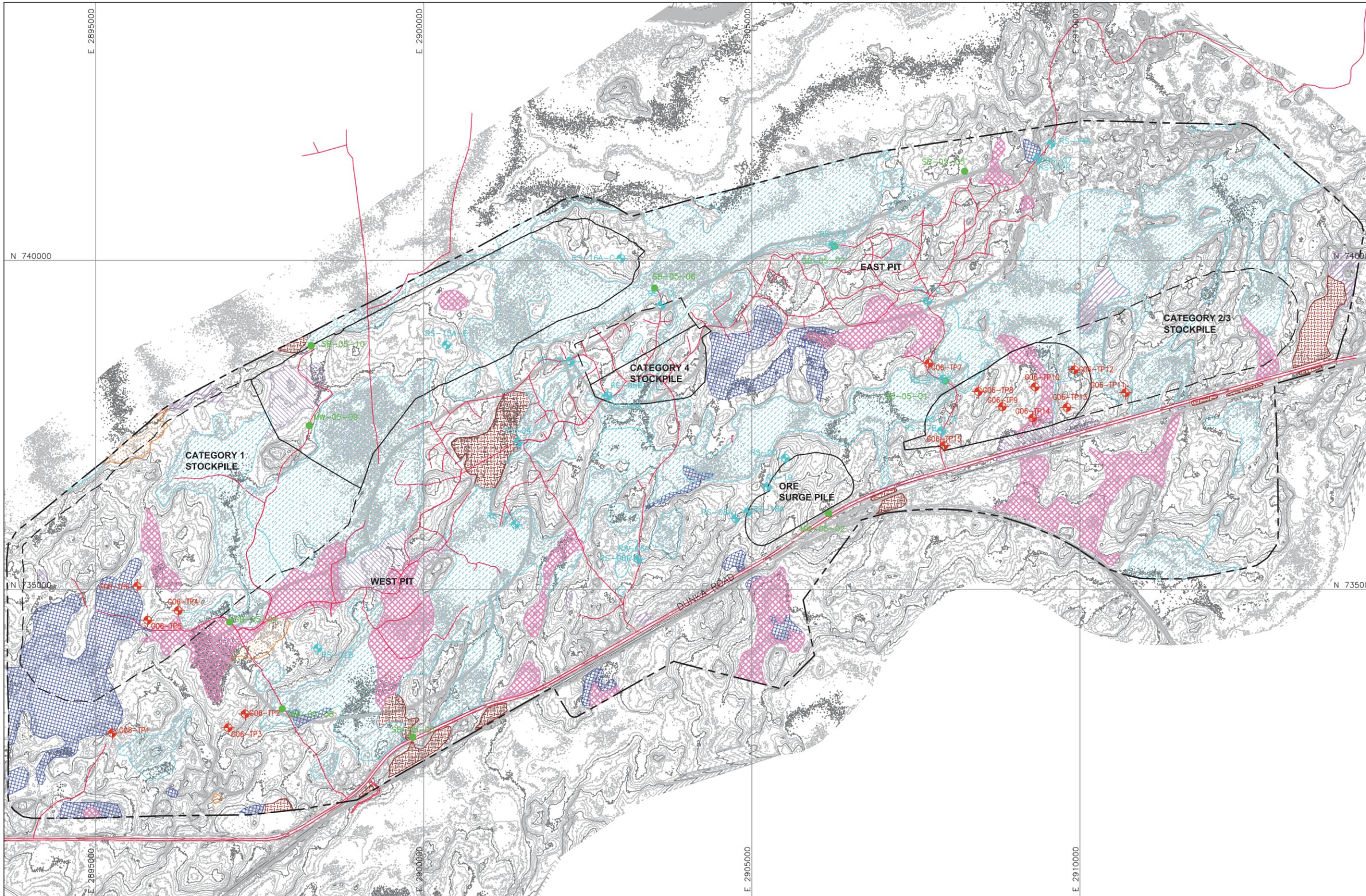
	POLY MET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA	
	GOLDER ASSOCIATES INC. 44 UNION BOULEVARD, SUITE 300 LAKEWOOD, CO USA 80233 Ph: (303) 980-0540 Fax: (303) 985-2080 www.golder.com	GOLDER PROJECT NO.: 113-2209
DRAWN: MTM	CHECKED: 	SCALE: AS SHOWN
SIGNATURE 	PRINTED NAME BRENT R. BRONSON DATE 8/21/17 LICENSE # 46492	DWG. NO. SKP-006

VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED	VERSION	DATE
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP			
D	1/14/14	ISSUED FOR AGENCY REVIEW	FOR CONSTRUCTION		
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	NOT APPROVED FOR CONSTRUCTION.		

INCHES

0 800 1600
SCALE IN FEET

CADD USER: Jenkins, Crystal FILE: N:\11\113-2209\H_SKP FEB2013\1132209HD22.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 10:28 AM



LEGEND

- EXISTING GROUND TOPOGRAPHY (SEE REFERENCE 1)
- MINE SITE BOUNDARY
- G06-TP11 GOLDER ASSOC. TEST PIT (2006)
- SB-05-01 BARR ENGINEERING BOREHOLES (2005)
- RS-11 BARR ENGINEERING BOREHOLES (2008)
- SHALLOW MARSH
- SHRUB SWAMP
- CONIFEROUS SWAMP
- HARDWOOD SWAMP
- SEDGE MEADOW
- CONIFEROUS BOG
- OPEN BOG
- EXISTING TRAIL OR ROAD
- MINE YEAR 11 PIT BOUNDARIES (SEE NOTE 2)
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 3)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 3)

- ### NOTES
1. WETLAND DELINEATION CHARACTERIZATION PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
 2. OPEN PIT LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
 3. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
 4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

- ### REFERENCES
1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
 2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH,
 3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:

EXISTING SITE CONDITIONS

2
1

INCHES

SCALE IN FEET

VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED		
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C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
D	1/14/14	ISSUED FOR AGENCY REVIEW			
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	FOR CONSTRUCTION		
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	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.

SIGNATURE

PRINTED NAME BRENT R. BRONSON
DATE 8/21/17 LICENSE # 46492

DRAWN: MTM

CHECKED:

GOLDER PROJECT NO.: 113-2209

SCALE: AS SHOWN

POLYMET MINING

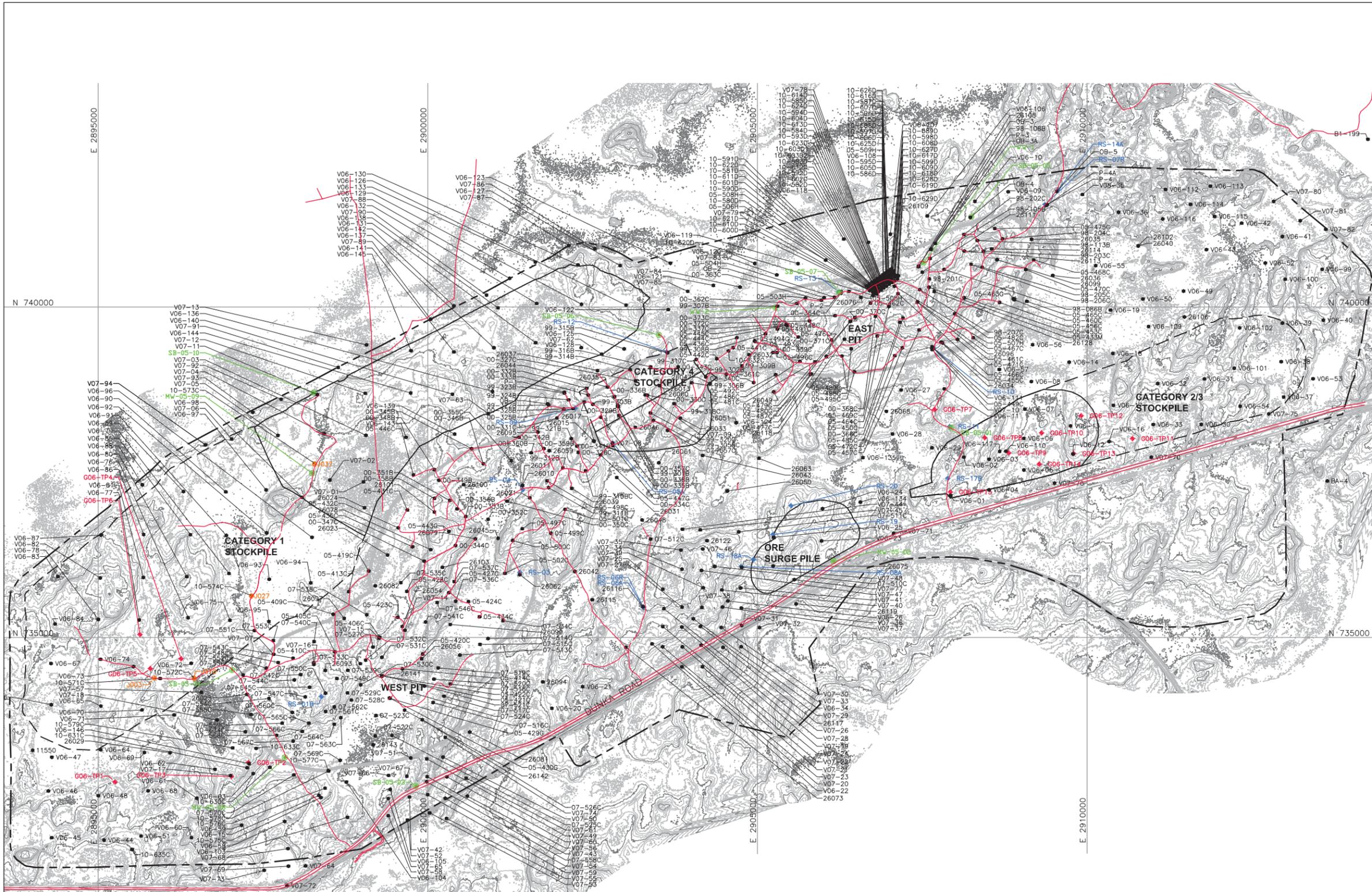
POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
Ph: (303) 980-0540
Fax: (303) 985-2080
www.golder.com

DWG. NO. SKP-007

REV

CADD USER: Jenkins, Crystal FILE: N:\11\11-2209\H_SKP_FEB2013\1132209H023.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 10:30 AM



LEGEND

- EXISTING GROUND TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 11 PIT BOUNDARIES (SEE NOTE 1)
- MINE YEAR 1 ORE, AND WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, AND WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- G06-TP11 GOLDER ASSOC. TEST PIT (2006)
- SB-05-01 BARR ENGINEERING BOREHOLES (2005)
- RS-07R BARR ENGINEERING BOREHOLES (2008)
- 05-444PM BORING OR GEOPHYSICAL SURVEY LOCATION
- J003 AMERICAN ENGINEERING TESTING, INC. BOREHOLES (2010)

NOTES

1. OPEN PIT LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
4. SEE GEOTECHNICAL DATA PACKAGE VOLUME 3 FOR DETAILS ON TEST PITS, BOREHOLES AND GEOPHYSICAL SURVEYS.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:

SITE LAYOUT AND LOCATION OF FIELD INVESTIGATIONS

INCHES



VER	DATE	DESCRIPTION	ISSUE STATUS		
NO			ISSUED	VERSION	DATE
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED		
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D	1/14/14	ISSUED FOR AGENCY REVIEW			
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	FOR CONSTRUCTION		
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	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.

SIGNATURE: *B. Bronson*
 PRINTED NAME: BRENT R. BRONSON
 DATE: 8/21/17 LICENSE #: 46492

DRAWN: MTM
 CHECKED: *gg*
 GOLDER PROJECT NO.: 113-2209
 SCALE: AS SHOWN

POLYMET MINING

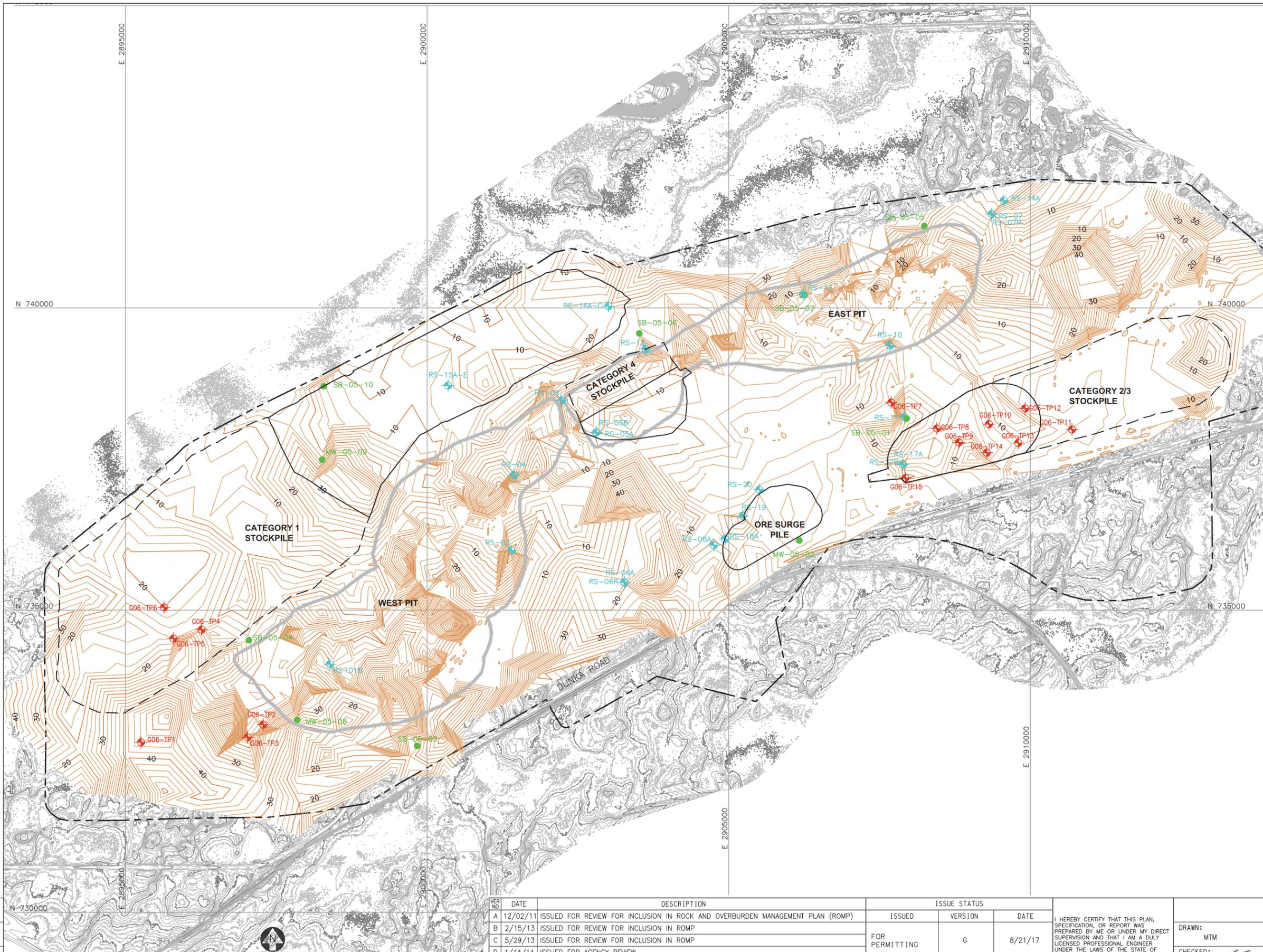
POLY MET MINING, INC.
 NORTHMET PROJECT
 HOYT LAKES, MINNESOTA

Golder Associates

GOLDER ASSOCIATES INC.
 44 UNION BOULEVARD, SUITE 300
 LAKEWOOD, CO USA 80233
 Ph: (303) 980-0540
 Fax: (303) 985-2080
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DWG. NO. SKP-008

CADD USER: Jenkins, Crystal FILE: N:\11\113-2209\H_SKP_FEB2013\1132209H024.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 10:32 AM



LEGEND	
	EXISTING GROUND TOPOGRAPHY
	MINE SITE BOUNDARY
	ESTIMATED DEPTH TO BEDROCK CONTOURS
	MINE YEAR 11 PIT BOUNDARIES (SEE NOTE 1)
	MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
	MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
	GOLDER ASSOC. TEST PIT (2006)
	BARR ENGINEERING BOREHOLES (2005)
	BARR ENGINEERING BOREHOLES (2008)

- NOTES**
- OPEN PIT BOUNDARIES PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
 - STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
 - SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
- REFERENCES**
- EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
 - COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH
 - VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:

DEPTH TO BEDROCK ISOPACH MAP

INCHES



VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED		
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP			
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
D	1/14/14	ISSUED FOR AGENCY REVIEW			
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	FOR CONSTRUCTION		
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	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.

SIGNATURE

PRINTED NAME BRENT R. BRONSON
DATE 8/21/17 LICENSE # 46492

DRAWN: MTM

CHECKED:

GOLDER PROJECT NO.: 113-2209

SCALE: AS SHOWN

	POLY MET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA
	GOLDER ASSOCIATES INC. 44 UNION BOULEVARD, SUITE 300 LAKEWOOD, CO USA 80233 Ph: (303) 980-0540 Fax: (303) 985-2080 www.golder.com
DWG. NO.	SKP-009
REV	

CADD USER: Jenkins, Crystal FILE: N:\11\113-2209\H_SKP_FEB2013\1132209H025.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 10:35 AM



LEGEND

- EXISTING GROUND TOPOGRAPHY (SEE REFERENCE 1)
- PROPOSED MINE YEAR 1 EXCAVATION TOPOGRAPHY
- MINE YEAR 11 AND ULTIMATE EXCAVATION TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 11 PIT BOUNDARIES (SEE NOTE 1)
- MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
- CROSS SECTION IDENTIFIER
- SHEET WHERE SECTION IS LOCATED

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. UNSUITABLE SOILS TO BE EXCAVATED WITHIN FIRST 100 FEET FROM THE ULTIMATE STOCKPILE BOUNDARIES. GEOTECHNICAL PROPERTIES OF THE FOUNDATION SOILS WILL BE CONFIRMED PRIOR TO FINAL DESIGN.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:

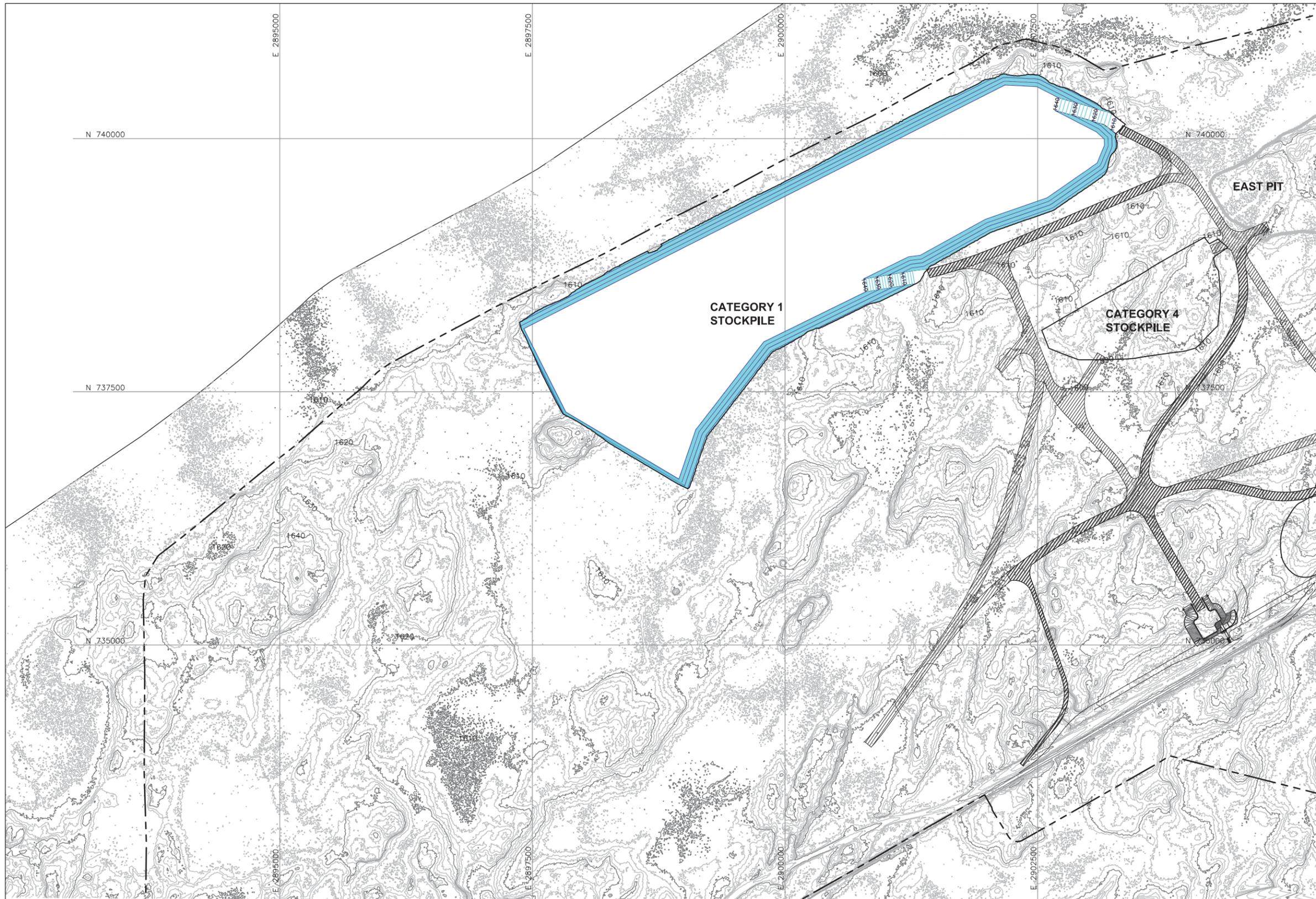
**CATEGORY 1 STOCKPILE
SUBGRADE EXCAVATION PLAN**

	<p>POLY MET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA</p>
	<p>GOLDER ASSOCIATES INC. 44 UNION BOULEVARD, SUITE 300 LAKEWOOD, CO USA 80233 Ph: (303) 980-0540 Fax: (303) 985-2080 www.golder.com</p>
DRAWN: MTM	<p>SIGNATURE: PRINTED NAME: BRENT R. BRONSON DATE: 8/21/17 LICENSE # 46492</p>
CHECKED:	<p>GOLDER PROJECT NO.: 113-2209</p>
SCALE: AS SHOWN	<p>DWG. NO. SKP-010</p>

VER. NO.	DATE	DESCRIPTION	ISSUE STATUS	VERSION	DATE
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED		
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP			
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
D	1/14/14	ISSUED FOR AGENCY REVIEW			
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	FOR CONSTRUCTION		
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	NOT APPROVED FOR CONSTRUCTION.		

INCHES

CADD USER: Jenkins, Crystal FILE: N:\11\113-2209\H_SMP_FEB2013\1132209H021.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 10:37 AM



LEGEND

- EXISTING GROUND TOPOGRAPHY
- PROPOSED GRADING TOPOGRAPHY
- HAUL ROADS
- MINE SITE BOUNDARY
- PIT BOUNDARIES AT MINE YEAR 2 (SEE NOTE 1)
- MINE YEAR 1 AND 2 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
4. IF CLOSURE OCCURS AFTER 1 YEAR OF MINING, STOCKPILE DRAINAGE WILL BE AS SHOWN ON DRAWING 012 FOR THIS PORTION OF THE STOCKPILE.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:

**CATEGORY 1 STOCKPILE
MINE YEAR 1 CONTINGENCY
CLOSURE CONFIGURATION**

	<p>POLY MET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA</p>
DRAWN: MTM	
CHECKED: <i>gg</i>	
GOLDER PROJECT NO.: 113-2209	
SCALE: AS SHOWN	
<p></p> <p>GOLDER ASSOCIATES INC. 44 UNION BOULEVARD, SUITE 300 LAKEWOOD, CO USA 80233 Ph: (303) 980-0540 Fax: (303) 985-2080 www.golder.com</p>	
DWG. NO. SKP-011	
	REV

VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED	VERSION	DATE
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP			
D	1/14/14	ISSUED FOR AGENCY REVIEW	FOR CONSTRUCTION		
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	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.

SIGNATURE *Brent R. Bronson*
 PRINTED NAME BRENT R. BRONSON
 DATE 8/21/17 LICENSE # 46492

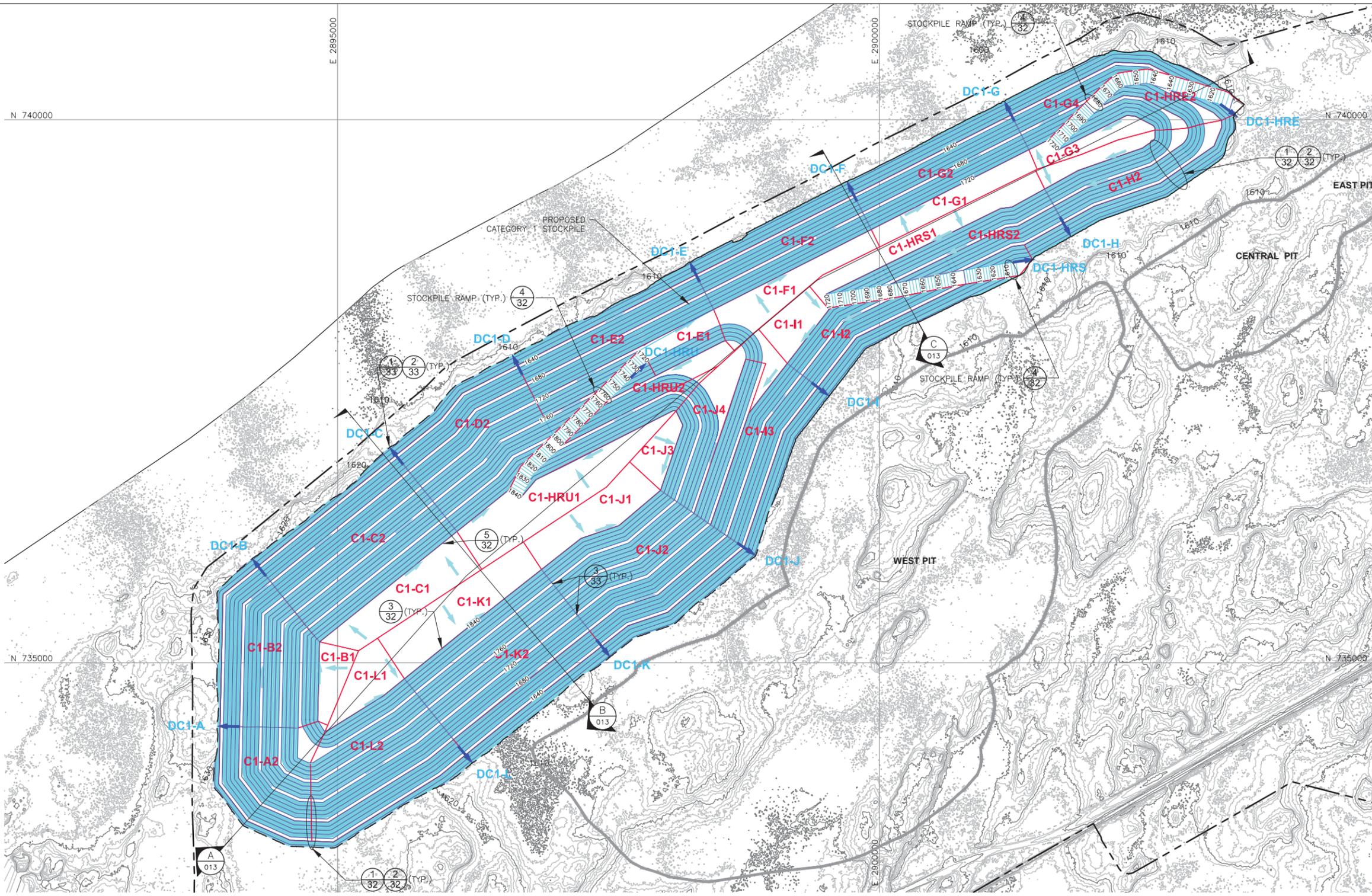
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CADD USER: Jenkins, Crystal FILE: N:\11\113-2209\H_SKP_FEB2013\1132209H027.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 10:39 AM



LEGEND

- EXISTING GROUND TOPOGRAPHY
- GRADING TOPOGRAPHY AT MAXIMUM STOCKPILE CAPACITY
- HAUL ROADS
- MINE SITE BOUNDARY
- PIT BOUNDARIES AT MINE YEAR 2 (SEE NOTE 1)
- MINE YEAR 1 AND 2 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- DOWNCHUTE/DRAINAGE DIRECTION
- WATERSHED DIVIDES
- C1-H1** WATERSHED ID
- DC1-H** DOWNCHUTE ID
- GENERAL DRAINAGE DIRECTION
- CROSS SECTION IDENTIFIER
- SHEET WHERE SECTION IS LOCATED

- ### NOTES
1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
 2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
 3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002 AND NOTES ON DRAWING 013.
 4. FINAL GRADES SHOWN ARE WITH STOCKPILE AT MAXIMUM CAPACITY. SEE CROSS-SECTIONS AND NOTES ON DRAWING 013.
 5. SEE DRAWINGS 003 THROUGH 005 FOR INTERIM STOCKPILE FILL CONTOURS.
- ### REFERENCES
1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
 2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
 3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).



VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
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G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
			NOT APPROVED FOR CONSTRUCTION.		

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SIGNATURE: *Brent R. Bronson*
 PRINTED NAME: BRENT R. BRONSON
 DATE: 8/21/17 LICENSE #: 46492

DRAWN: MTM
 CHECKED: *gg*
 GOLDER PROJECT NO.: 113-2209
 SCALE: AS SHOWN

PLANT DRAWING NUMBER:
**CATEGORY 1 STOCKPILE
 FINAL GRADES AND SUB-BASIN DELINEATION**

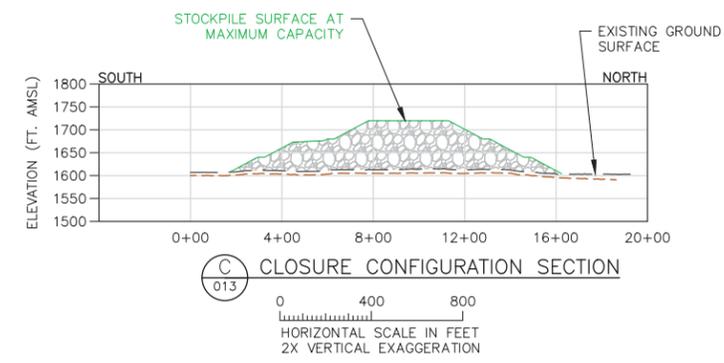
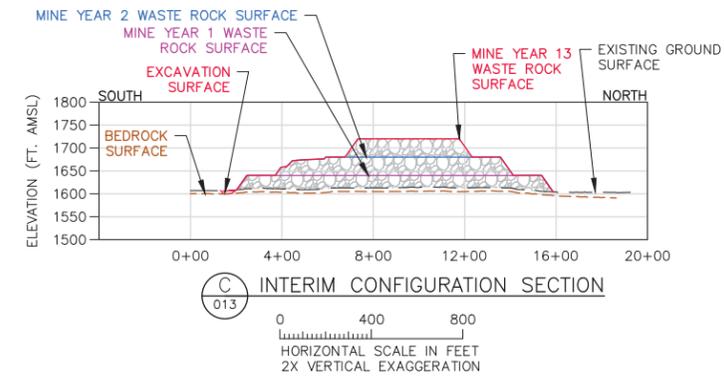
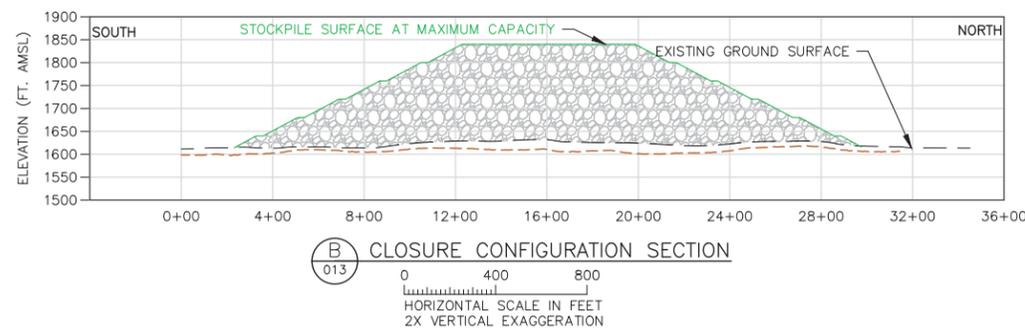
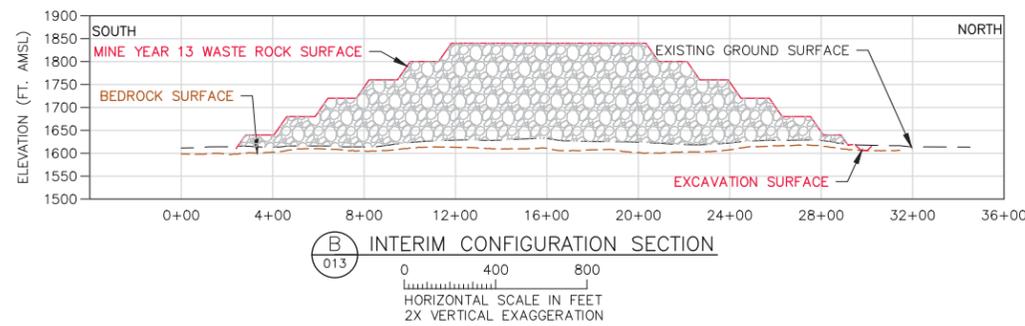
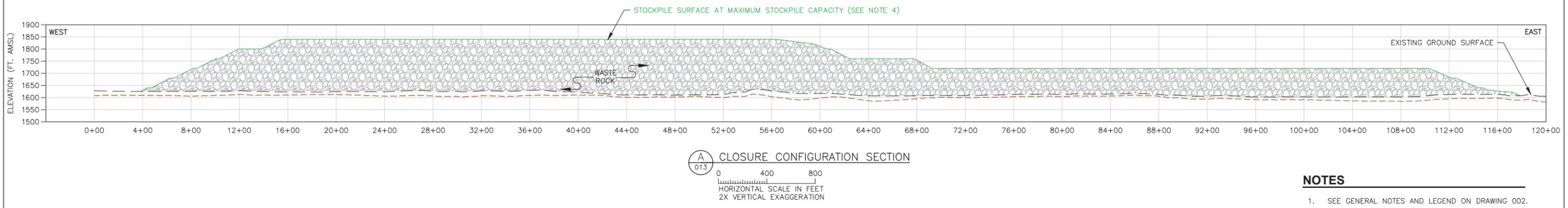
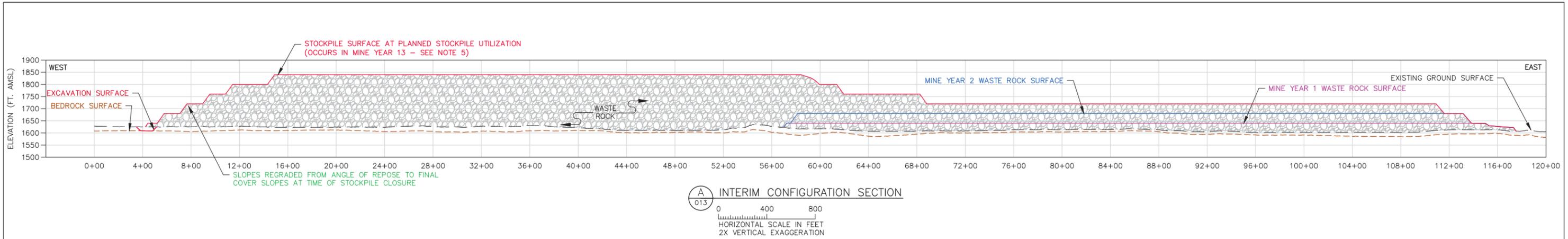
POLYMET MINING POLY MET MINING, INC.
 NORTHMET PROJECT
 HOYT LAKES, MINNESOTA

Golder Associates
 GOLDER ASSOCIATES INC.
 44 UNION BOULEVARD, SUITE 300
 LAKEWOOD, CO USA 80233
 Ph: (303) 980-0540
 Fax: (303) 985-2080
 www.golder.com

DWG. NO. SKP-012
 REV

INCHES

CADD USER: Jenkins, Crystal FILE: N:\11\1113-2209\H_SMP FEB2013\1132209H026.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 10:43 AM



NOTES

1. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
2. UNSUITABLE SOILS TO BE EXCAVATED WITHIN FIRST 100 FEET FROM THE ULTIMATE STOCKPILE BOUNDARIES. GEOTECHNICAL PROPERTIES OF THE FOUNDATION SOILS WILL BE CONFIRMED PRIOR TO FINAL DESIGN.
3. SEE CROSS SECTION LOCATIONS ON DRAWINGS 3, 4, 5, 6, 10, AND 12.
4. MAXIMUM STOCKPILE CAPACITY - THE TOTAL CAPACITY OF THE WASTE ROCK STOCKPILE IF FILLED TO THE MAXIMUM ELEVATIONS NOTED.
5. PLANNED STOCKPILE UTILIZATION - THE PORTION OF THE TOTAL WASTE ROCK STOCKPILE CAPACITY PLANNED TO BE UTILIZED.

LEGEND

- MINE YEAR 1 LIMITS
- MINE YEAR 2 LIMITS
- MINE YEAR 13 LIMITS
- MINE YEAR 21, ULTIMATE LIMITS
- EXISTING GROUND SURFACE
- BEDROCK SURFACE
- EXCAVATION SURFACE

PLANT DRAWING NUMBER:

DESIGN SECTIONS

VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED		
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SIGNATURE: *B. Bronson*
 PRINTED NAME: BRENT R. BRONSON
 DATE: 8/21/17 LICENSE #: 46492

DRAWN: MTM
 CHECKED: *gg*
 GOLDER PROJECT NO.: 113-2209
 SCALE: AS SHOWN

POLYMET MINING

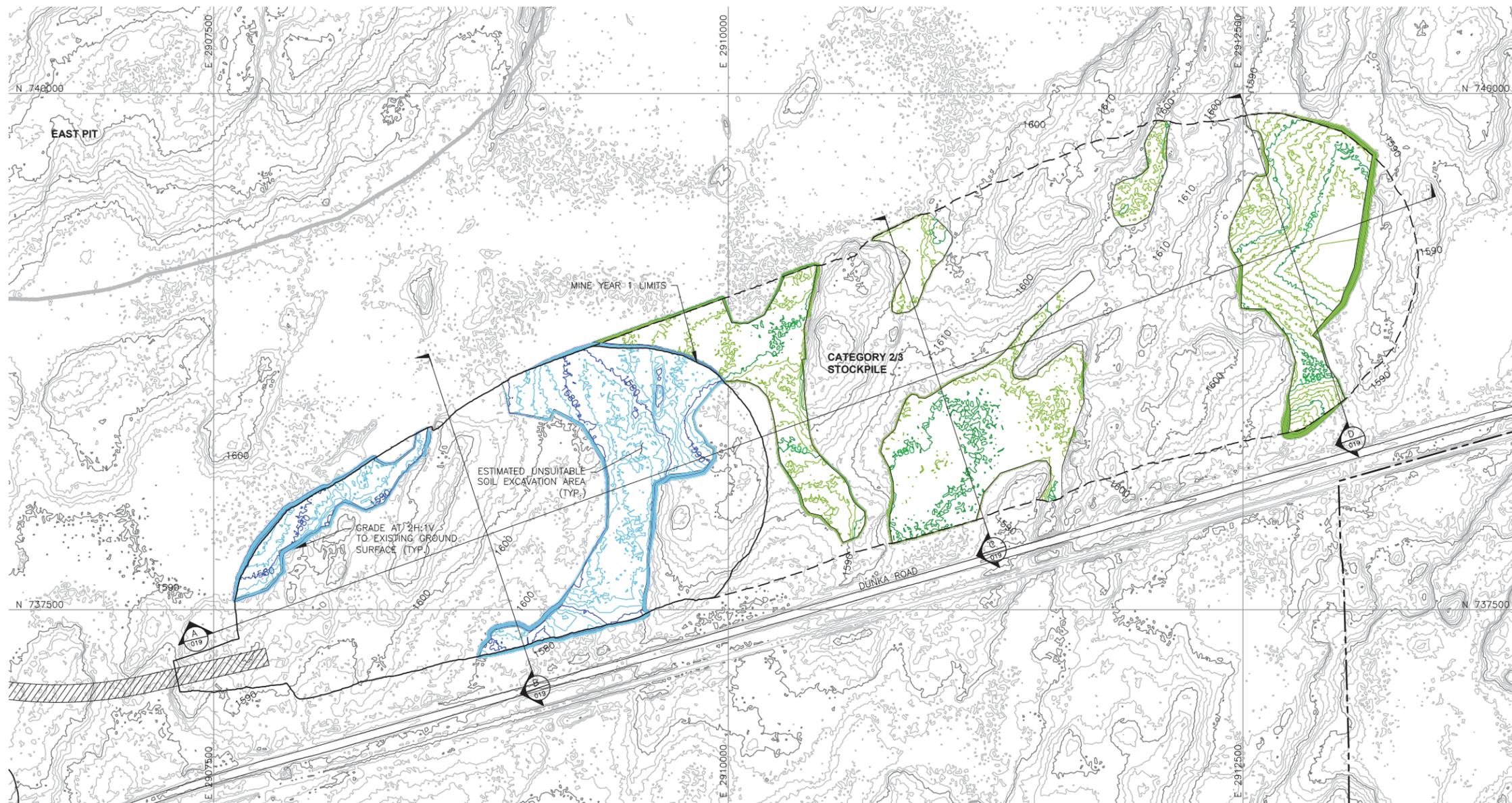
POLY MET MINING, INC.
 NORTHMET PROJECT
 HOYT LAKES, MINNESOTA

GOLDER ASSOCIATES INC.
 44 UNION BOULEVARD, SUITE 300
 LAKEWOOD, CO USA 80233
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 Fax: (303) 985-2080
 www.golder.com

DWG. NO. SKP-013 REV A

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INCHES

CADD USER: Jenkins, Crystal FILE: N:\11\113-2209\H_SKP_FEB2013\1132209H034.DWG PLOT SCALE: 1:1 PLOT DATE: 8/19/2017 10:45 AM



LEGEND

-  EXISTING GROUND TOPOGRAPHY (SEE REFERENCE 1)
-  PROPOSED MINE YEAR 1 EXCAVATION TOPOGRAPHY
-  PROPOSED MAXIMUM FOOTPRINT EXCAVATION TOPOGRAPHY
-  MINE SITE BOUNDARY
-  MINE YEAR 11 PIT BOUNDARIES (SEE NOTE 1)
-  MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
-  MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
-  HAUL ROADS
-  CROSS SECTION IDENTIFIER
-  SHEET WHERE SECTION IS LOCATED

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:

**CATEGORY 2/3 STOCKPILE
SUBGRADE EXCAVATION PLAN**



VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED	VERSION	DATE
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP			
D	1/14/14	ISSUED FOR AGENCY REVIEW			
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	FOR CONSTRUCTION		
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
			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.

SIGNATURE 

PRINTED NAME BRENT R. BRONSON
DATE 8/21/17 LICENSE # 46492

DRAWN: MTM

CHECKED: 

GOLDER PROJECT NO.: 113-2209

SCALE: AS SHOWN



POLYMET MINING

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



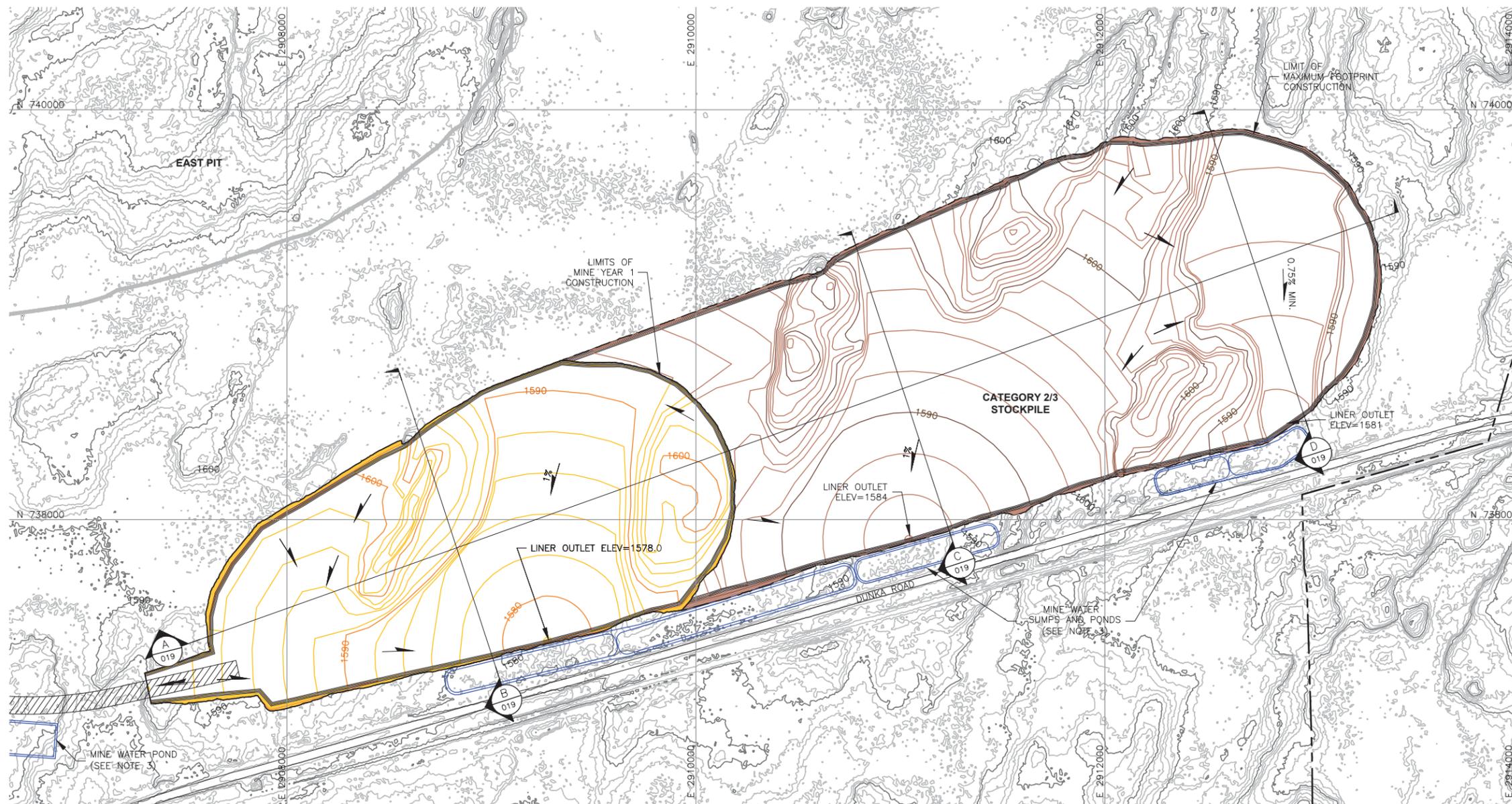
Golder Associates

GOLDER ASSOCIATES INC.
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DWG. NO. SKP-014

REV

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LEGEND	
	EXISTING GROUND TOPOGRAPHY (SEE REFERENCE 1)
	PROPOSED MINE YEAR 1 GRADING TOPOGRAPHY
	PROPOSED MAXIMUM FOOTPRINT GRADING TOPOGRAPHY
	MINE SITE BOUNDARY
	CROSS SECTION IDENTIFIER
	SHEET WHERE SECTION IS LOCATED
	SLOPE
	MINE YEAR 11 PIT BOUNDARIES (SEE NOTE 1)
	MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
	MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
	HAUL ROADS
	MINE WATER SUMP/POND (SEE NOTE 3)

- NOTES**
1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
 2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
 3. SEE MECHANICAL INFRASTRUCTURE PERMIT SUPPORT DRAWINGS.
 4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

- REFERENCES**
1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
 2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
 3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:

**CATEGORY 2/3 STOCKPILE
FOUNDATION GRADING PLAN
MINE YEAR 1 AND MAXIMUM**

	POLY MET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA
	GOLDER ASSOCIATES INC. 44 UNION BOULEVARD, SUITE 300 LAKEWOOD, CO USA 80233 Ph: (303) 980-0540 Fax: (303) 985-2080 www.golder.com

DRAWN:	MTM
CHECKED:	<i>gg</i>
GOLDER PROJECT NO.:	113-2209
SCALE:	AS SHOWN
DWG. NO.	SKP-015
REV	

VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED		
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP			
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
D	1/14/14	ISSUED FOR AGENCY REVIEW			
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	FOR CONSTRUCTION		
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	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.

SIGNATURE: *B. Bronson*

PRINTED NAME: BRENT R. BRONSON
DATE: 8/21/17 LICENSE #: 46492

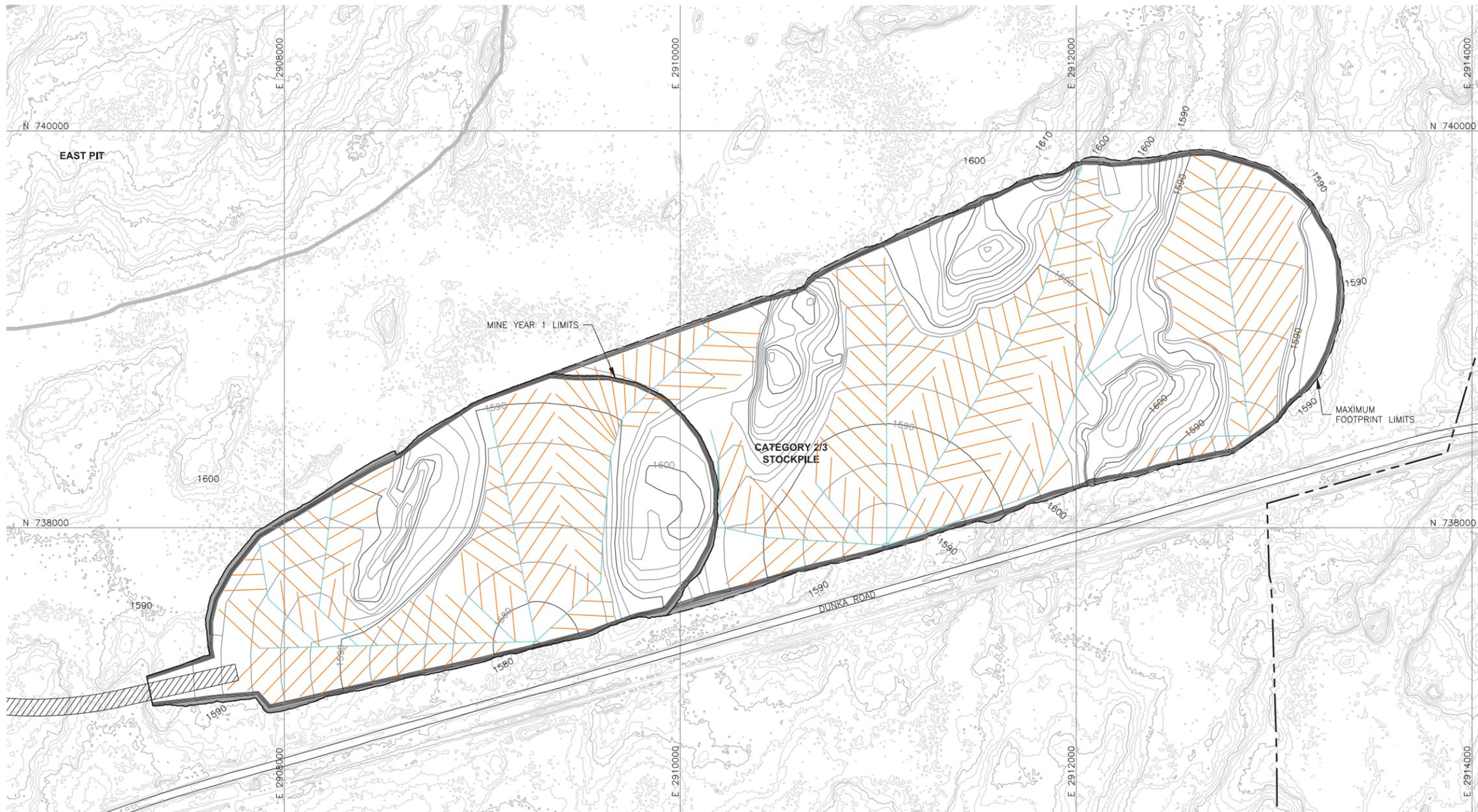
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2

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SCALE IN FEET

CADD USER: Jenkins, Crystal FILE: N:\11\113-2209_H_SKP_FEB2013\1132209H005.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 10:49 AM



LEGEND

- EXISTING GROUND TOPOGRAPHY
- PROPOSED GRADING TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 11 PIT BOUNDARIES (SEE NOTE 1)
- MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
- TERTIARY COLLECTION PIPING (SEE NOTE 3)
4-INCH
- SECONDARY COLLECTION PIPING (SEE NOTE 3)
6-INCH

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. ACTUAL NUMBER AND LOCATION OF UNDERDRAIN PIPES AND SUMPS WILL NEED TO BE DETERMINED DURING CONSTRUCTION BASED ON ENCOUNTERED FIELD CONDITIONS. SEE DETAIL 5 ON DRAWING 035 FOR UNDERDRAIN.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

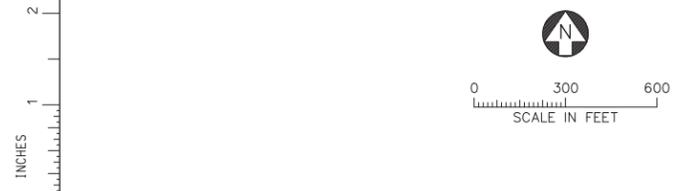
REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:
**CATEGORY 2/3 STOCKPILE
UNDERDRAIN PIPING PLAN
MINE YEAR 1 AND MAXIMUM**

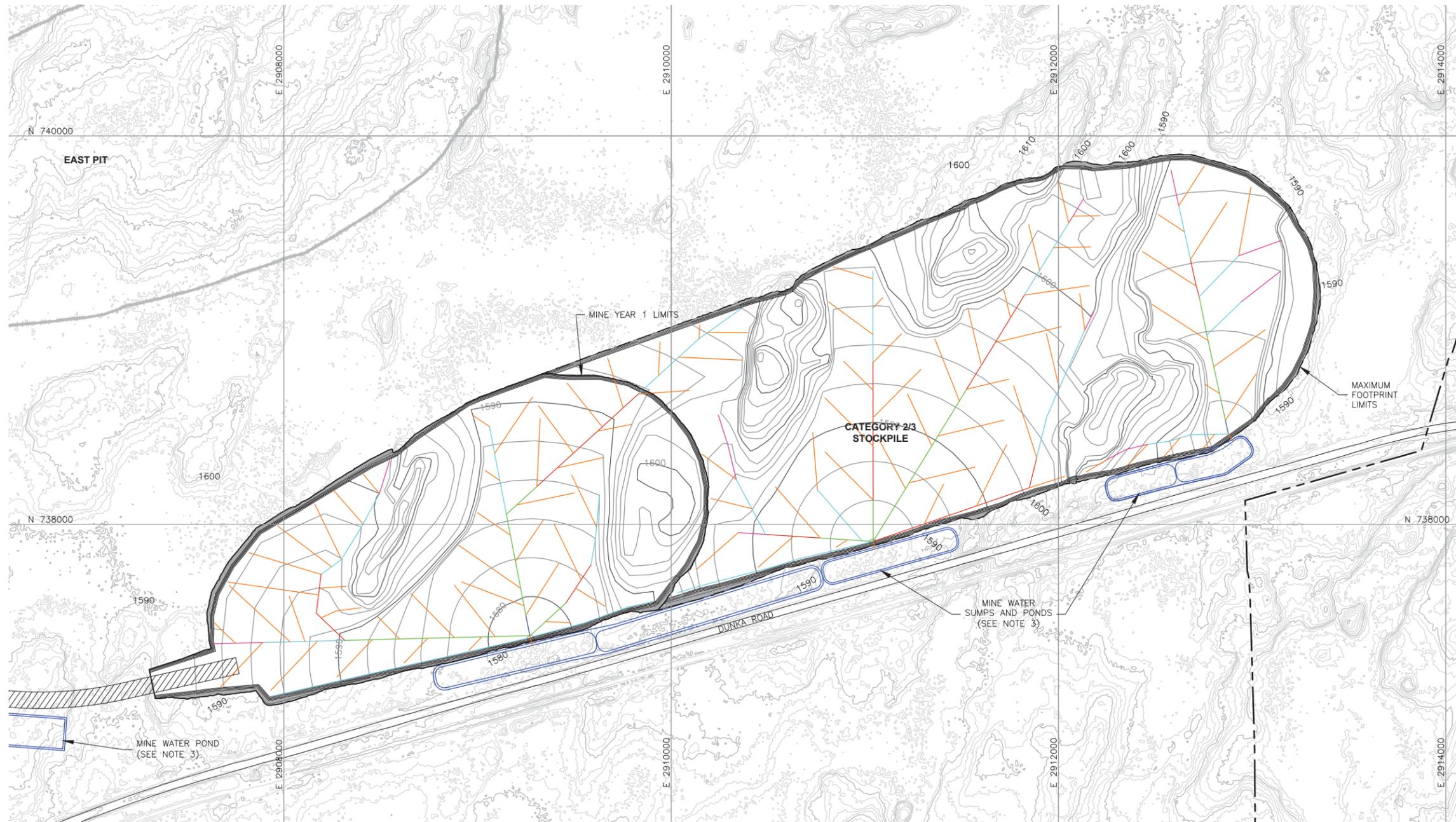
	POLYMET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA
	GOLDER ASSOCIATES INC. 44 UNION BOULEVARD, SUITE 300 LAKEWOOD, CO USA 80233 Ph: (303) 980-0540 Fax: (303) 985-2080 www.golder.com
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CHECKED: <i>gg</i>	SCALE: AS SHOWN
SIGNATURE <i>B. Bronson</i> PRINTED NAME BRENT R. BRONSON DATE 8/21/17 LICENSE # 46492	DWG. NO. SKP-016

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED	VERSION	DATE
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP			
D	1/14/14	ISSUED FOR AGENCY REVIEW	FOR CONSTRUCTION		
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	NOT APPROVED FOR CONSTRUCTION.		



INCHES

CADD USER: Jenkins, Crystal FILE: N:\11\113-2209_H_SKP FEB2013\1132209H01.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 10:51 AM



LEGEND

- EXISTING GROUND TOPOGRAPHY
- PROPOSED GRADING TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 11 PIT BOUNDARIES (SEE NOTE 1)
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
- MINE WATER SUMP/POND (SEE NOTE 3)

- TERTIARY COLLECTION PIPING
 - 4-INCH
- PRIMARY AND SECONDARY COLLECTION PIPING
 - 4-INCH
 - 6-INCH
 - 8-INCH
 - 10-INCH
 - 12-INCH

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE MECHANICAL INFRASTRUCTURE PERMIT SUPPORT DRAWINGS.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:

**CATEGORY 2/3 STOCKPILE
OVERLINER DRAINAGE PIPING PLAN
MINE YEAR 1 AND MAXIMUM**

**POLYMET
MINING**

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

DRAWN: MTM

CHECKED: *gg*

GOLDER PROJECT NO.: 113-2209

SCALE: AS SHOWN

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LAKEWOOD, CO USA 80233
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DWG. NO. SKP-017

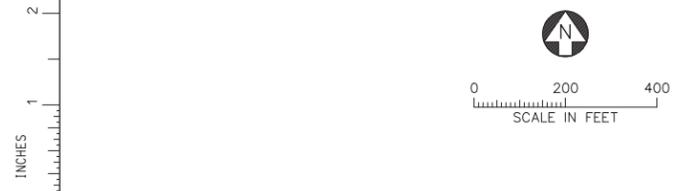
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VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED	VERSION	DATE
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
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E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	NOT APPROVED FOR CONSTRUCTION.		

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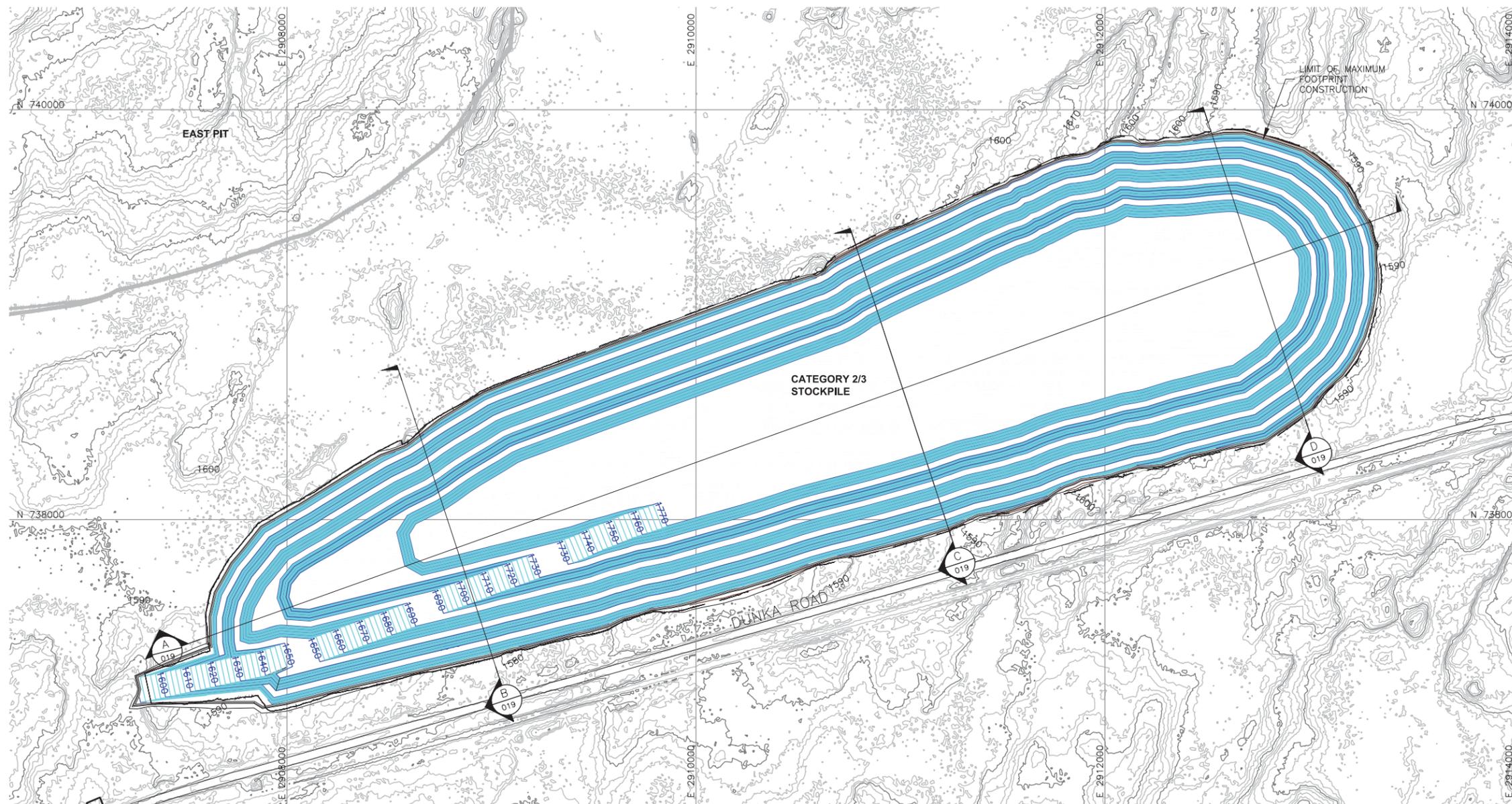
SIGNATURE: *B. Bronson*

PRINTED NAME: BRENT R. BRONSON
DATE: 8/21/17 LICENSE #: 46492



INCHES

CADD USER: Jenkins, Crystal FILE: N:\11\113-2209\H_SKP_FEB2013\1132209H04.DWG PLOT SCALE: 1:1 PLOT DATE: 8/19/2017 10:53 AM



LEGEND

	EXISTING GROUND TOPOGRAPHY (SEE REFERENCE 1)
	GRADING TOPOGRAPHY AT MAXIMUM STOCKPILE CAPACITY
	MINE SITE BOUNDARY
	CROSS SECTION IDENTIFIER SHEET WHERE SECTION IS LOCATED
	MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
	MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
	PROPOSED HAUL ROAD
	MINE YEAR 11 PIT BOUNDARIES (SEE NOTE 1)

- NOTES**
1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
 2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
 3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002 AND NOTES ON DRAWING 019.

- REFERENCES**
1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
 2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
 3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

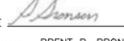
PLANT DRAWING NUMBER:
**CATEGORY 2/3 STOCKPILE
MAXIMUM CAPACITY CONFIGURATION**

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VER NO	DATE	DESCRIPTION	ISSUE STATUS		
VER NO	DATE	DESCRIPTION	ISSUED	VERSION	DATE
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED		
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E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	FOR CONSTRUCTION		
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	NOT APPROVED FOR CONSTRUCTION.		

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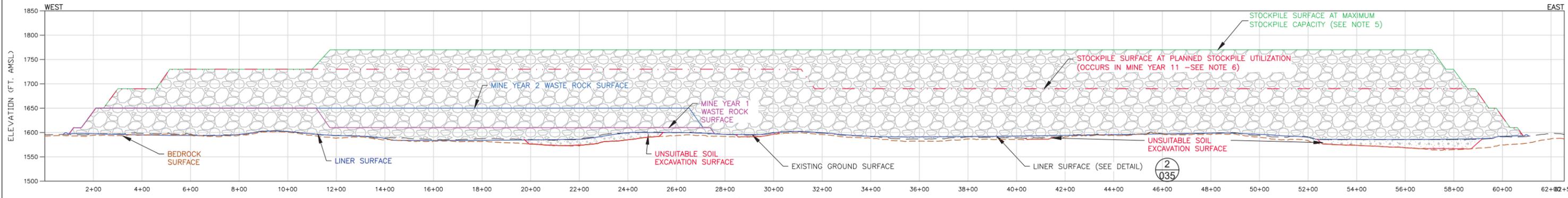
SIGNATURE 
 PRINTED NAME BRENT R. BRONSON
 DATE 8/21/17 LICENSE # 46492

DRAWN: MTM
 CHECKED: 
 GOLDER PROJECT NO.: 113-2209
 SCALE: AS SHOWN

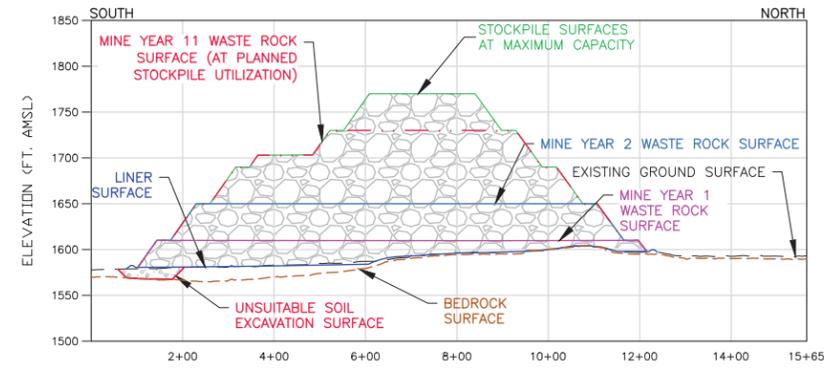
POLYMET MINING POLY MET MINING, INC.
 NORTHMET PROJECT
 HOYT LAKES, MINNESOTA

Golder Associates
 GOLDER ASSOCIATES INC.
 44 UNION BOULEVARD, SUITE 300
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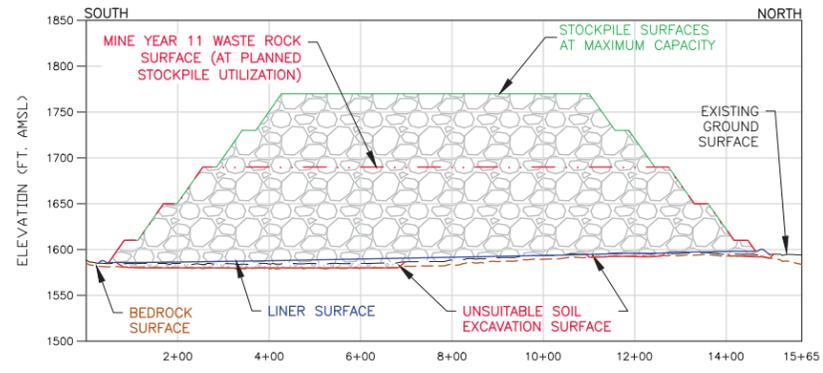
DWG. NO. SKP-018
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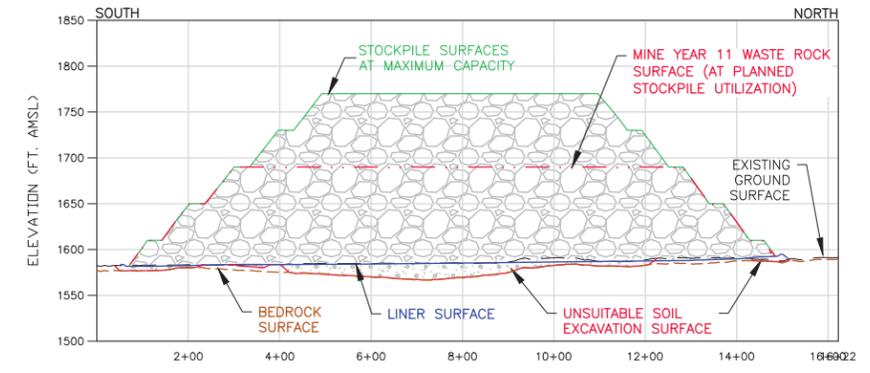
(A) SECTION
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 HORIZONTAL SCALE IN FEET
 2X VERTICAL EXAGGERATION



(B) SECTION
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 HORIZONTAL SCALE IN FEET
 2X VERTICAL EXAGGERATION



(C) SECTION
 0 200 400
 HORIZONTAL SCALE IN FEET
 2X VERTICAL EXAGGERATION



(D) SECTION
 0 200 400
 HORIZONTAL SCALE IN FEET
 2X VERTICAL EXAGGERATION

NOTES

1. STOCKPILE INTERBENCH SLOPES AT ANGLE OF REPOSE.
2. THIS DESIGN CONSERVATIVELY ASSUMES THAT ALL LOWLAND/WETLAND SOILS ARE GEOTECHNICALLY UNSUITABLE AND WILL REQUIRE EXCAVATION AND REPLACEMENT WITH STRUCTURAL FILL TO THE DESIGN FOUNDATION BASE GRADE. GEOTECHNICAL PROPERTIES OF THE FOUNDATION SOILS WILL BE CONFIRMED PRIOR TO FINAL DESIGN.
3. MAXIMUM DEPTH OF UNSUITABLE MATERIAL SUBGRADE EXCAVATION LIMITED TO 20 FEET FOR THIS DESIGN. THE ACTUAL DEPTH OF UNSUITABLE SOIL EXCAVATION WILL BE CONFIRMED BY PHASE II GEOTECHNICAL INVESTIGATION.
4. SEE CROSS SECTION LOCATIONS ON DRAWINGS 3, 4, 5, 14, 15 AND 18.
5. MAXIMUM STOCKPILE CAPACITY - THE TOTAL CAPACITY OF THE WASTE ROCK STOCKPILE IF FILLED TO THE MAXIMUM ELEVATIONS NOTED.
6. PLANNED STOCKPILE UTILIZATION - THE PORTION OF THE TOTAL WASTE ROCK STOCKPILE CAPACITY PLANNED TO BE UTILIZED.

LEGEND

- MINE YEAR 1 LIMITS
- MINE YEAR 2 LIMITS
- MINE YEAR 11 LIMITS
- MAXIMUM CAPACITY
- LINER SURFACE
- EXISTING GROUND SURFACE
- UNSUITABLE SOIL EXCAVATION SURFACE
- BEDROCK SURFACE

PLANT DRAWING NUMBER:
CATEGORY 2/3 STOCKPILE DESIGN SECTIONS

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED		
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C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
D	1/14/14	ISSUED FOR AGENCY REVIEW			
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
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			NOT APPROVED FOR CONSTRUCTION.		

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SIGNATURE: *B. Bronson*
 PRINTED NAME: BRENT R. BRONSON
 DATE: 8/21/17 LICENSE #: 46492

DRAWN: MTM
 CHECKED: *gg*
 GOLDER PROJECT NO.: 113-2209
 SCALE: AS SHOWN

POLYMET MINING

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

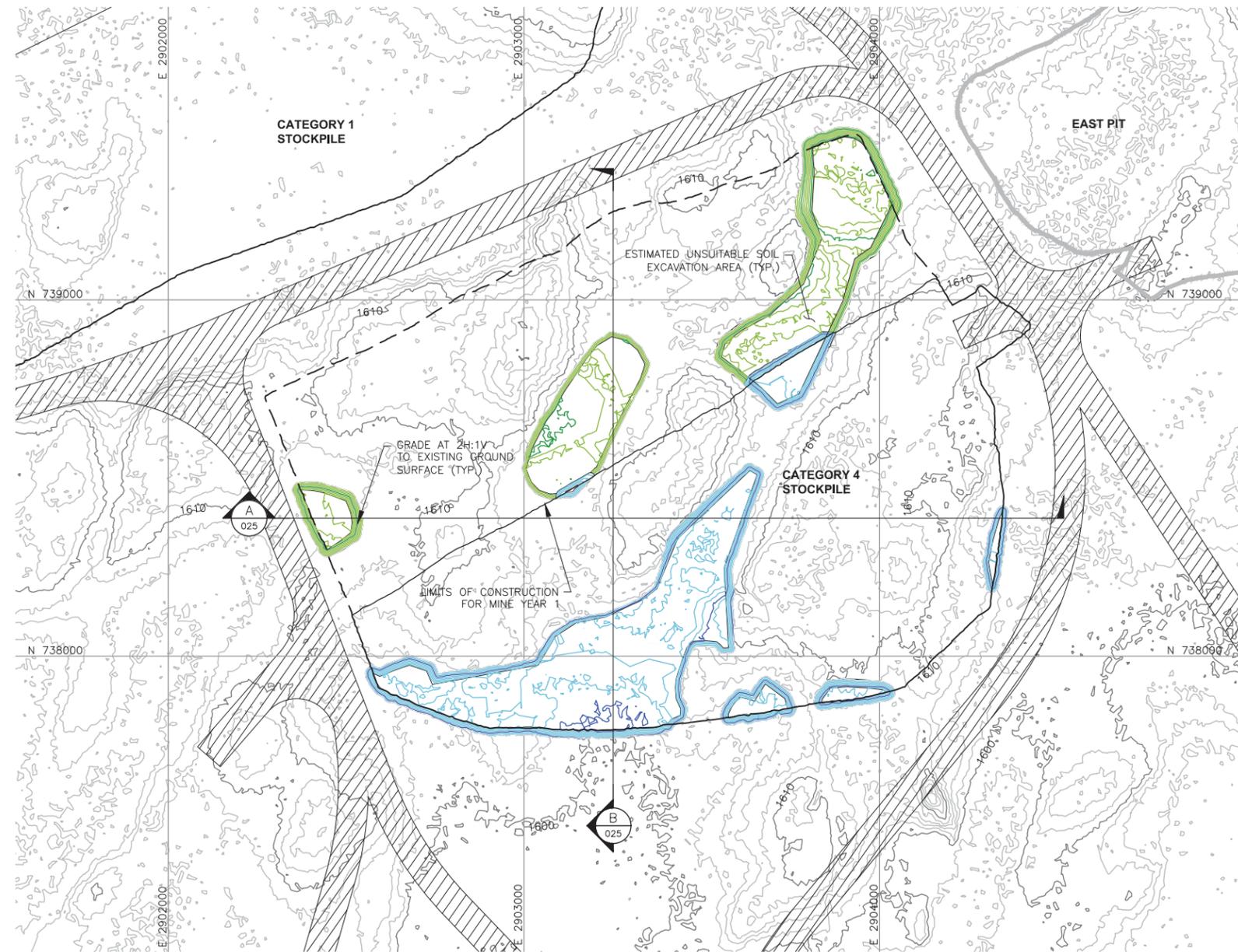
GOLDER ASSOCIATES INC.
 44 UNION BOULEVARD, SUITE 300
 LAKEWOOD, CO USA 80233
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DWG. NO. **SKP-019**

CADD USER: Jenkins, Crystal FILE: N:\11\113-2209\1132209H011.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 10:56 AM
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CADD USER: Jenkins, Crystal FILE: N:\11\113-2209\H_SKP_FEB2013\1132209H012.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 10:58 AM

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2
1



LEGEND

- EXISTING GROUND TOPOGRAPHY (SEE REFERENCE 1)
- PROPOSED MINE YEAR 1 EXCAVATION TOPOGRAPHY
- PROPOSED MAXIMUM FOOTPRINT EXCAVATION TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
- MINE YEAR 2 PIT BOUNDARIES (SEE NOTE 1)
- CROSS SECTION IDENTIFIER
- SHEET WHERE SECTION IS LOCATED

- ### NOTES
- OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
 - STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
 - SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

- ### REFERENCES
- EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
 - COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
 - VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:
**CATEGORY 4 STOCKPILE
SUBGRADE EXCAVATION PLAN**



VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED	VERSION	DATE
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D	1/14/14	ISSUED FOR AGENCY REVIEW			
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	FOR CONSTRUCTION		
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SIGNATURE

PRINTED NAME BRENT R. BRONSON
DATE 8/21/17 LICENSE # 46492

DRAWN: MTM
CHECKED:

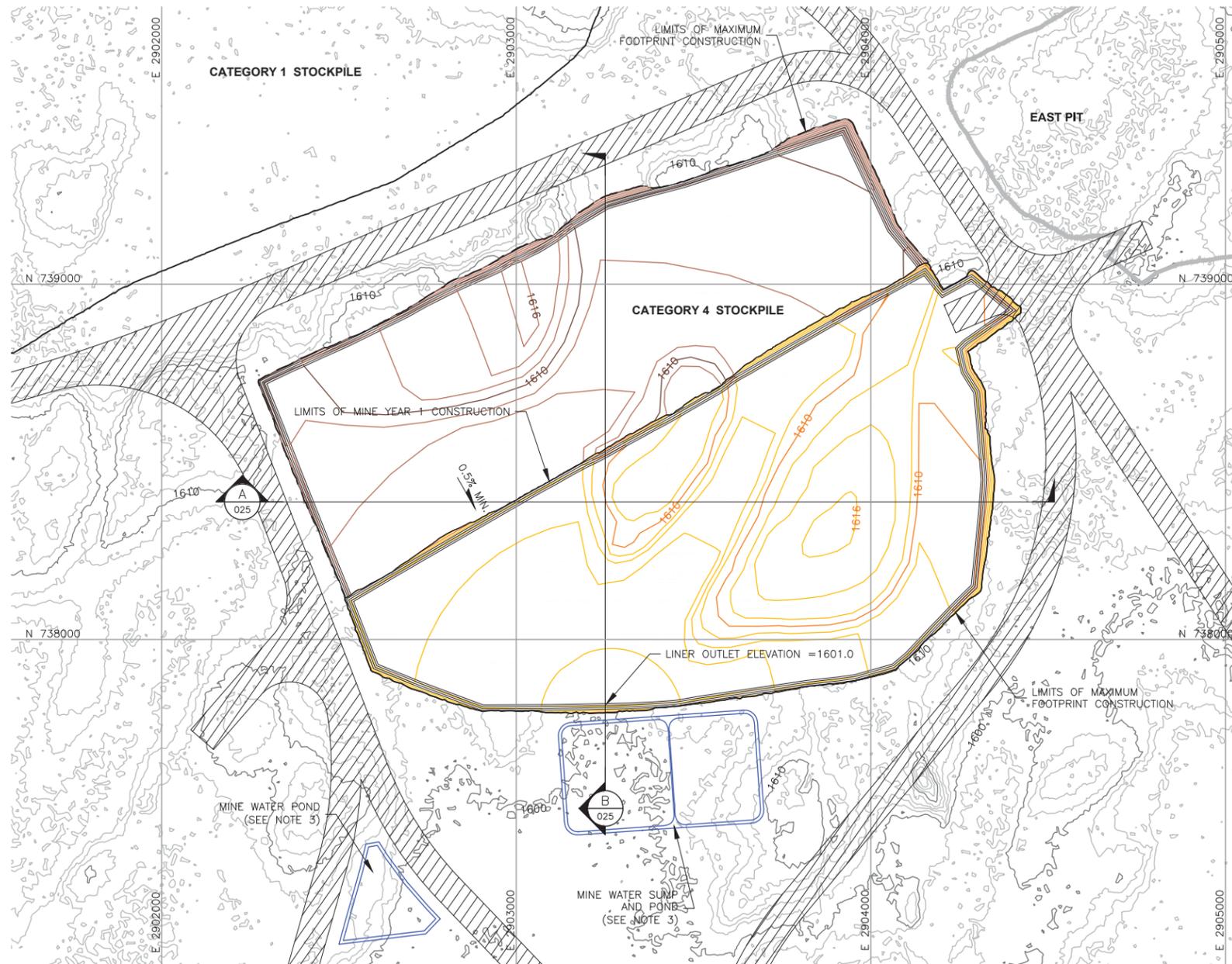
GOLDER PROJECT NO.: 113-2209
SCALE: AS SHOWN

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

Golder Associates
GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
Ph: (303) 980-0540
Fax: (303) 985-2080
www.golder.com

DWG. NO. SKP-020
REV

CADD USER: Jenkins, Crystal FILE: N:\11\113-2209\H_SKP_FEB2013\1132209H013.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 11:01 AM



LEGEND

- EXISTING GROUND TOPOGRAPHY (SEE REFERENCE 1)
- PROPOSED MINE YEAR 1 GRADING TOPOGRAPHY
- PROPOSED MAXIMUM FOOTPRINT GRADING TOPOGRAPHY
- MINE SITE BOUNDARY
- CROSS SECTION IDENTIFIER
- SHEET WHERE SECTION IS LOCATED
- SLOPE
- MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROAD
- MINE YEAR 2 PIT BOUNDARIES (SEE NOTE 1)
- MINE WATER SUMP/POND (SEE NOTE 3)

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDBER.
3. SEE MECHANICAL INFRASTRUCTURE PERMIT SUPPORT DRAWINGS.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:

**CATEGORY 4 STOCKPILE
FOUNDATION GRADING PLAN
MINE YEAR 1 AND MAXIMUM**

	<p>POLY MET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA</p>
DRAWN: MTM	
CHECKED: <i>gg</i>	
GOLDER PROJECT NO.: 113-2209	
SCALE: AS SHOWN	
<p>DWG. NO. SKP-021</p>	
	REV

VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED	VERSION	DATE
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP			
D	1/14/14	ISSUED FOR AGENCY REVIEW	FOR CONSTRUCTION		
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	NOT APPROVED FOR CONSTRUCTION.		

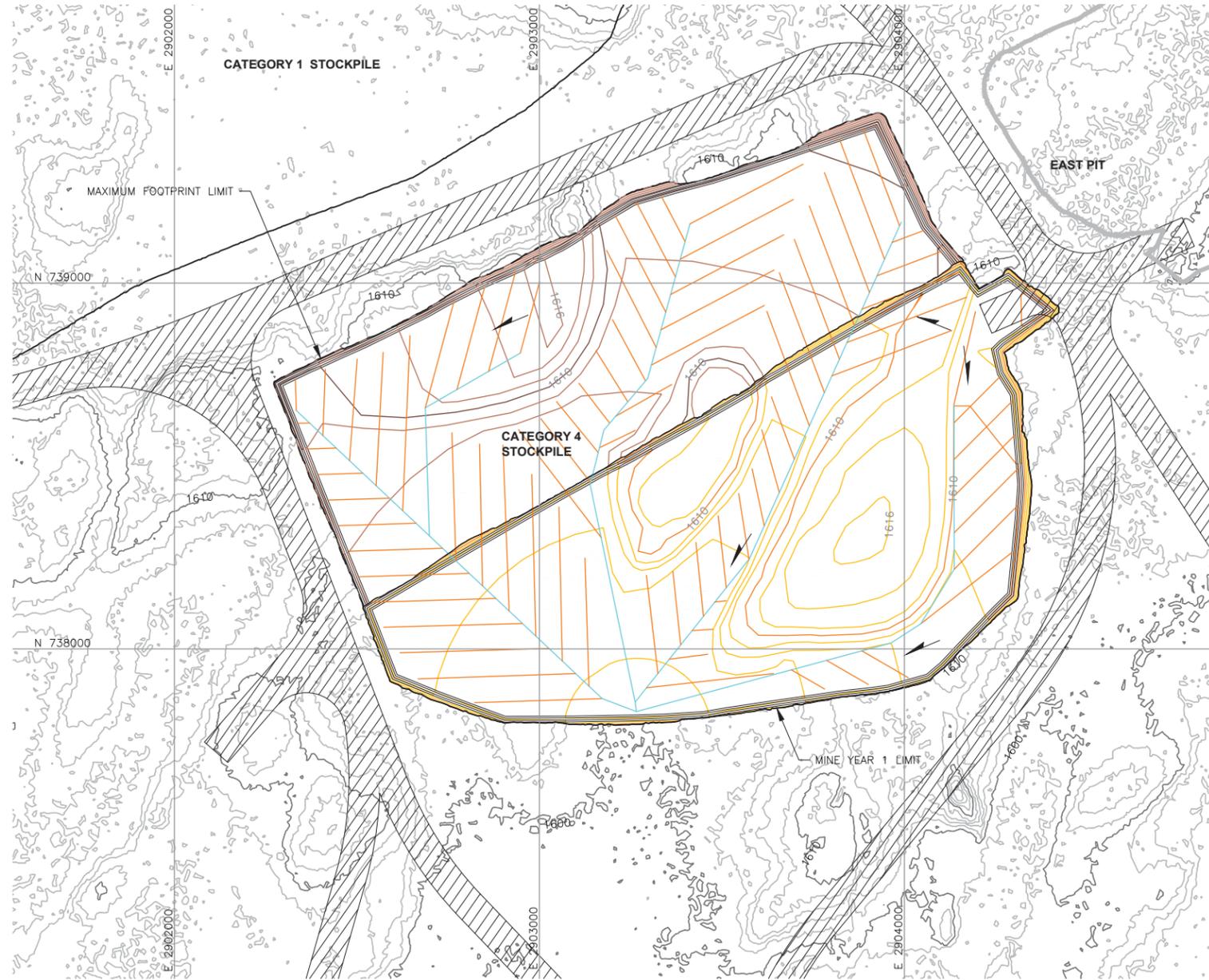
I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

SIGNATURE *Bronson*
 PRINTED NAME BRENT R. BRONSON
 DATE 8/21/17 LICENSE # 46492



INCHES

2 CADD USER: Jenkins, Crystal FILE: N:\11\13-2209\H_SKP_FEB2013\132209HD14.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 11:03 AM



LEGEND

- EXISTING GROUND TOPOGRAPHY
- PROPOSED MINE YEAR 1 GRADING TOPOGRAPHY
- PROPOSED MAXIMUM FOOTPRINT GRADING TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 2 PIT BOUNDARIES (SEE NOTE 1)
- SLOPE
- MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS

- TERTIARY COLLECTION PIPING (SEE NOTE 3)
- 4-INCH
- SECONDARY COLLECTION PIPING (SEE NOTE 3)
- 6-INCH

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. ACTUAL NUMBER AND LOCATION OF UNDERDRAIN PIPES AND SUMPS WILL NEED TO BE DETERMINED DURING CONSTRUCTION BASED ON ENCOUNTERED FIELD CONDITIONS. SEE DETAIL 5 ON DRAWING 035 FOR UNDERDRAIN.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).



VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED		
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP			
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
D	1/14/14	ISSUED FOR AGENCY REVIEW			
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	FOR CONSTRUCTION		
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
			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.

SIGNATURE

PRINTED NAME BRENT R. BRONSON
DATE 8/21/17 LICENSE # 46492

DRAWN: MTM

CHECKED:

GOLDER PROJECT NO.: 113-2209

SCALE: AS SHOWN

PLANT DRAWING NUMBER:

**CATEGORY 4 STOCKPILE
UNDERDRAIN PIPING PLAN
MINE YEAR 1 AND MAXIMUM**

POLYMET MINING

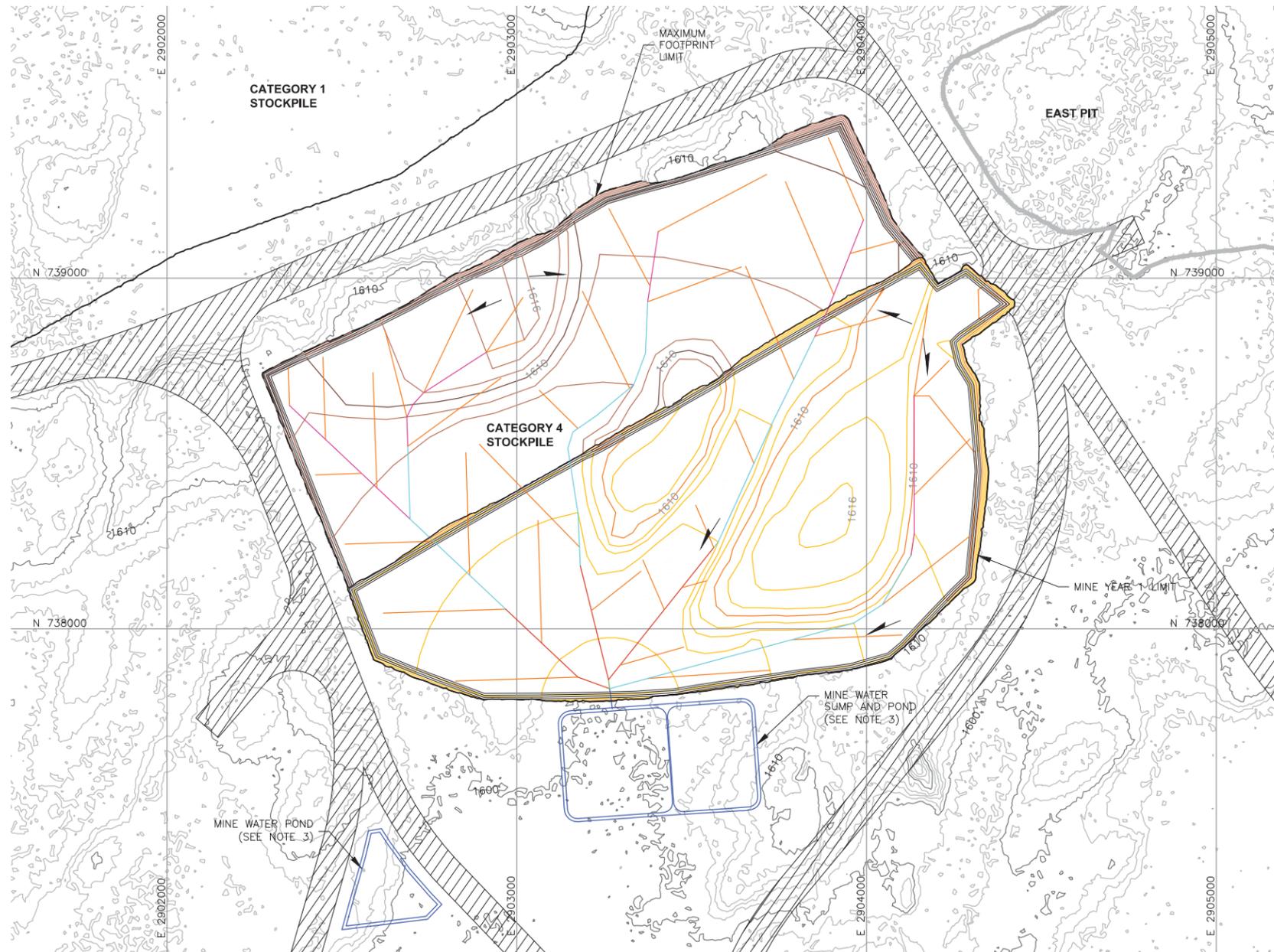
POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
Ph: (303) 980-0540
Fax: (303) 985-2080
www.golder.com

DWG. NO. SKP-022

REV

2 CADD USER: Jenkins, Crystal FILE: N:\11\13-2209\H_SKP FEB2013\132209HD15.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 4:40 PM



LEGEND

- EXISTING GROUND TOPOGRAPHY
- PROPOSED MINE YEAR 1 GRADING TOPOGRAPHY
- PROPOSED MAXIMUM FOOTPRINT GRADING TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 2 PIT BOUNDARIES (SEE NOTE 1)
- SLOPE
- MINE YEAR 1 WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
- MINE WATER SUMP/POND (SEE NOTE 3)

- MINE YEAR 1 – TERTIARY COLLECTION PIPING
 - 4-INCH

- MINE YEAR 1 – PRIMARY AND SECONDARY COLLECTION PIPING
 - 4-INCH
 - 6-INCH
 - 8-INCH
 - 10-INCH
 - 12-INCH

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE MECHANICAL INFRASTRUCTURE PERMIT SUPPORT DRAWINGS.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:	
CATEGORY 4 STOCKPILE OVERLINER DRAINAGE PIPING PLAN MINE YEAR 1 AND MAXIMUM	
 POLYMET MINING	POLY MET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA
DRAWN: MTM CHECKED: GOLDER PROJECT NO.: 113-2209 SCALE: AS SHOWN	 GOLDER ASSOCIATES INC. 44 UNION BOULEVARD, SUITE 300 LAKEWOOD, CO USA 80233 Ph: (303) 980-0540 Fax: (303) 985-2080 www.golder.com
DWG. NO. SKP-023	REV



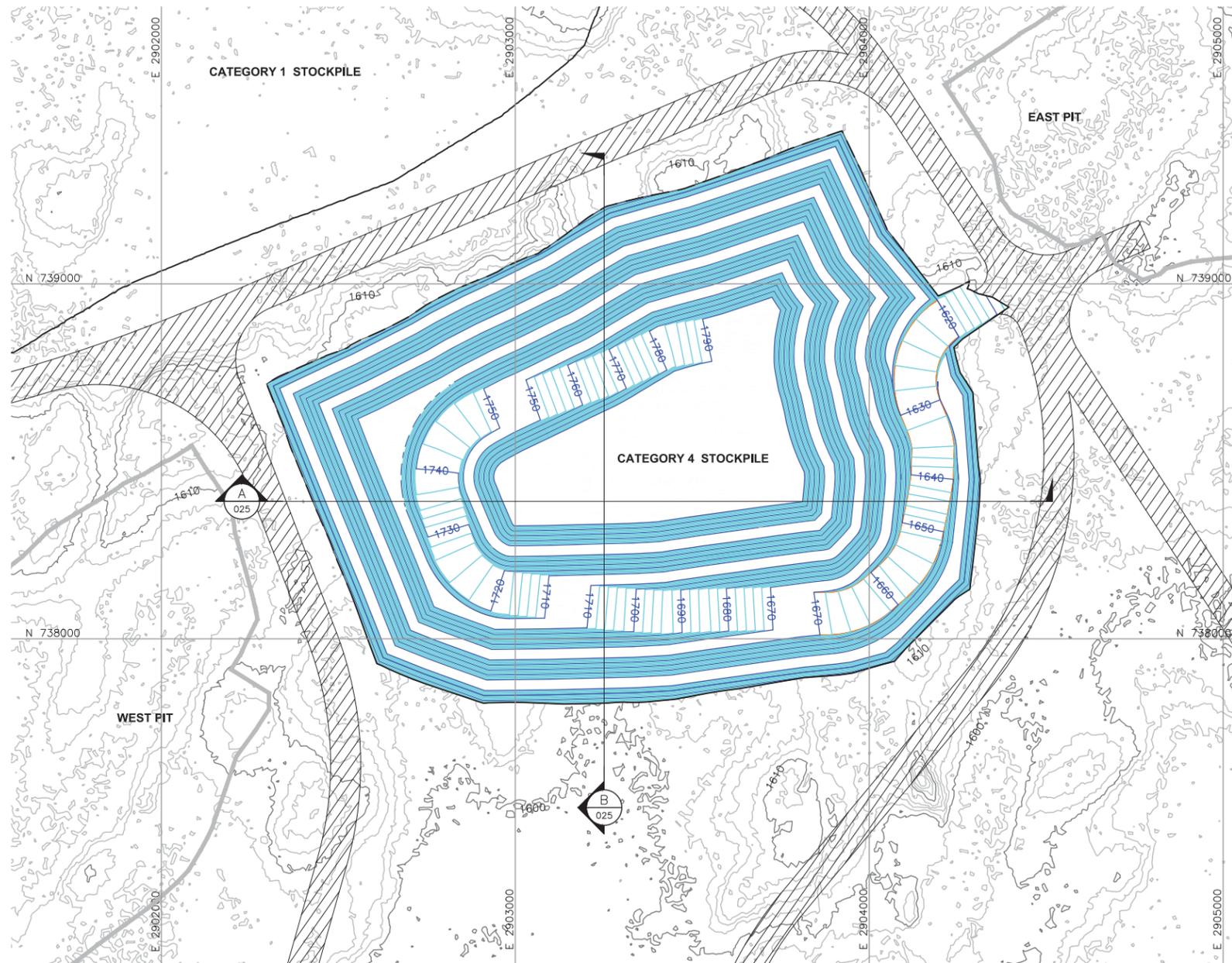
VER NO	DATE	DESCRIPTION	ISSUE STATUS		
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED	VERSION	DATE
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP			
D	1/14/14	ISSUED FOR AGENCY REVIEW			
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	FOR CONSTRUCTION		
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
			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.

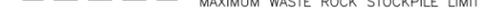
SIGNATURE:

PRINTED NAME: BRENT R. BRONSON
 DATE: 8/21/17 LICENSE #: 46492

CADD USER: Jenkins, Crystal FILE: N:\11\113-2209\H_SMP_FEB2013\1132209H006.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 11:08 AM



LEGEND

-  EXISTING GROUND TOPOGRAPHY (SEE REFERENCE 1)
-  GRADING TOPOGRAPHY AT MAXIMUM STOCKPILE CAPACITY
-  MINE SITE BOUNDARY
-  CROSS SECTION IDENTIFIER
-  SHEET WHERE SECTION IS LOCATED
-  MINE YEAR 1 WASTE ROCK STOCKPILE LIMIT (SEE NOTE 1)
-  MAXIMUM WASTE ROCK STOCKPILE LIMIT
-  PROPOSED HAUL ROAD
-  MINE YEAR 11 PIT BOUNDARIES (SEE NOTE 1)

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002 AND NOTES ON DRAWING 025.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:

**CATEGORY 4 STOCKPILE
MAXIMUM CAPACITY CONFIGURATION**

	<p>POLY MET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA</p>
DRAWN: MTM	
CHECKED: <i>gg</i>	
GOLDER PROJECT NO.: 113-2209	
SCALE: AS SHOWN	
DWG. NO. SKP-024	
	<p>GOLDER ASSOCIATES INC. 44 UNION BOULEVARD, SUITE 300 LAKEWOOD, CO USA 80233 Ph: (303) 980-0540 Fax: (303) 985-2080 www.golder.com</p>
	REV

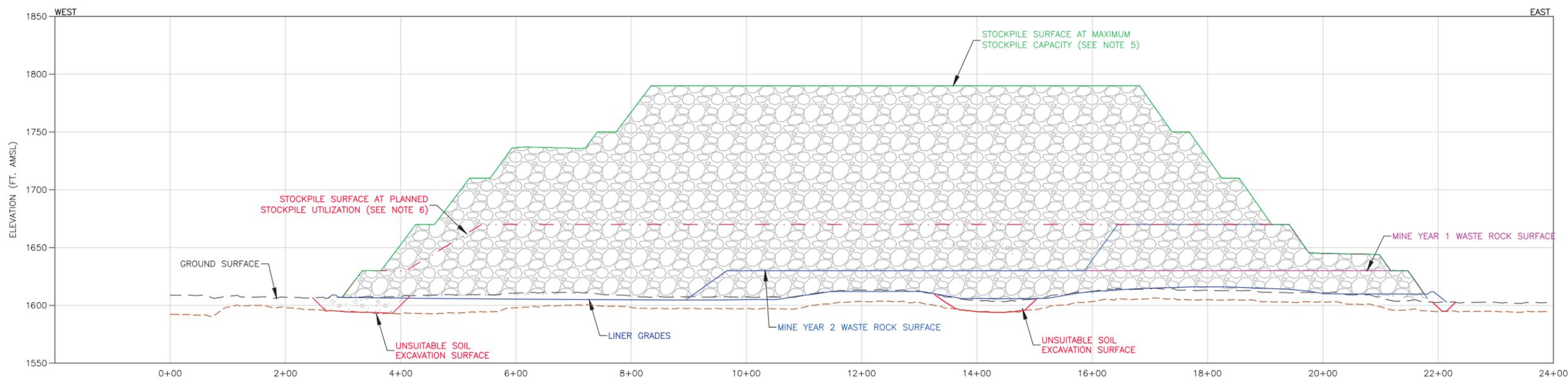
VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED		
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP			
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
D	1/14/14	ISSUED FOR AGENCY REVIEW			
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	FOR CONSTRUCTION		
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	NOT APPROVED FOR CONSTRUCTION.		

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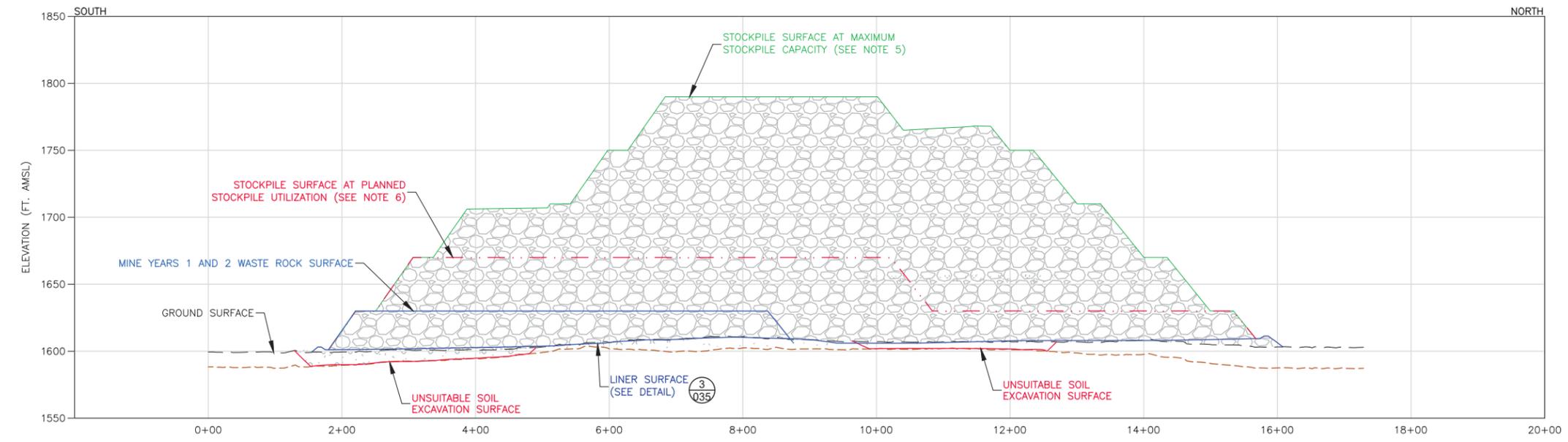
SIGNATURE *Bronson*
 PRINTED NAME BRENT R. BRONSON
 DATE 8/21/17 LICENSE # 46492



INCHES



A SECTION
 0 100 200
 HORIZONTAL SCALE IN FEET
 2X VERTICAL EXAGGERATION



B SECTION
 0 100 200
 HORIZONTAL SCALE IN FEET
 2X VERTICAL EXAGGERATION

- LEGEND**
- MINE YEAR 1 LIMITS
 - MINE YEAR 2 LIMITS
 - - - - MINE YEAR 11 LIMITS
 - MAXIMUM CAPACITY
 - LINER SURFACE
 - - - - EXISTING GROUND SURFACE
 - UNSUITABLE SOIL EXCAVATION SURFACE
 - - - - BEDROCK SURFACE

- NOTES**
1. STOCKPILE INTERBENCH SLOPES AT ANGLE OF REPOSE.
 2. THIS DESIGN CONSERVATIVELY ASSUMES THAT ALL LOWLAND/WETLAND SOILS ARE GEOTECHNICALLY UNSUITABLE AND WILL REQUIRE EXCAVATION AND REPLACEMENT WITH STRUCTURAL FILL TO THE DESIGN FOUNDATION BASE GRADE. GEOTECHNICAL PROPERTIES OF THE FOUNDATION SOILS WILL BE CONFIRMED PRIOR TO FINAL DESIGN.
 3. MAXIMUM DEPTH OF UNSUITABLE MATERIAL SUBGRADE EXCAVATION LIMITED TO 20 FEET FOR THIS DESIGN. THE ACTUAL DEPTH OF UNSUITABLE SOIL EXCAVATION WILL BE CONFIRMED BY PHASE II GEOTECHNICAL INVESTIGATION.
 4. SEE CROSS SECTION LOCATIONS ON DRAWINGS 3, 4, 5, 20, 21 AND 24.
 5. MAXIMUM STOCKPILE CAPACITY – THE TOTAL CAPACITY OF THE WASTE ROCK STOCKPILE IF FILLED TO THE MAXIMUM ELEVATIONS NOTED.
 6. PLANNED STOCKPILE UTILIZATION – THE PORTION OF THE TOTAL WASTE ROCK STOCKPILE CAPACITY PLANNED TO BE UTILIZED.

PLANT DRAWING NUMBER:
**CATEGORY 4 STOCKPILE
 DESIGN SECTIONS**

VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED	VERSION	DATE
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP			
D	1/14/14	ISSUED FOR AGENCY REVIEW			
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	FOR CONSTRUCTION		
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
			NOT APPROVED FOR CONSTRUCTION.		

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SIGNATURE: *Bronson*
 PRINTED NAME: BRENT R. BRONSON
 DATE: 8/21/17 LICENSE #: 46492

DRAWN: MTM
 CHECKED: *gg*
 GOLDER PROJECT NO.: 113-2209
 SCALE: AS SHOWN

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

Golder Associates
 GOLDER ASSOCIATES INC.
 44 UNION BOULEVARD, SUITE 300
 LAKEWOOD, CO USA 80233
 Ph: (303) 980-0540
 Fax: (303) 985-2080
 www.golder.com

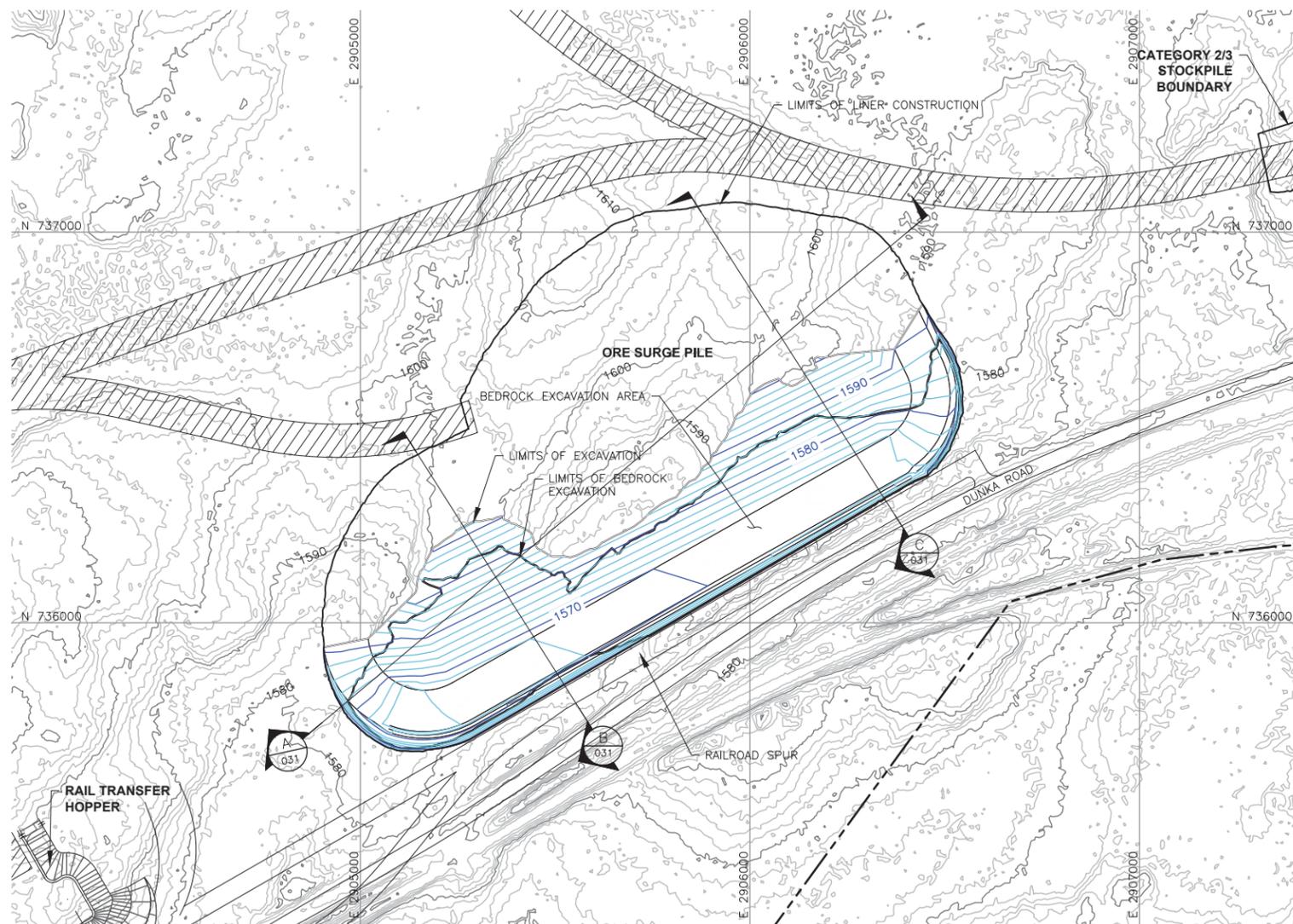
DWG. NO. SKP-025
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CADD USER: Jenkins, Crystal FILE: N:\11\113-2209\1132209\H_SKP_FEB2013\1132209\H016.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 11:09 AM

INCHES

CADD USER: Jenkins, Crystal FILE: N:\11\113-2209\H_SKP_FEB2013\1132209H017.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 11:12 AM

INCHES



LEGEND

- EXISTING GROUND TOPOGRAPHY (SEE REFERENCE 1)
- PROPOSED MINE YEAR 1 EXCAVATION TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 1 ORE STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
- CROSS SECTION IDENTIFIER
- SHEET WHERE SECTION IS LOCATED

- NOTES**
1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
 2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
 3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

- REFERENCES**
1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
 2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
 3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:
**ORE SURGE PILE
SUBGRADE EXCAVATION PLAN**



VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED		
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP			
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
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SIGNATURE: *Bronson*
 PRINTED NAME: BRENT R. BRONSON
 DATE: 8/21/17 LICENSE #: 46492

DRAWN: MTM
 CHECKED: *gg*
 GOLDER PROJECT NO.: 113-2209
 SCALE: AS SHOWN

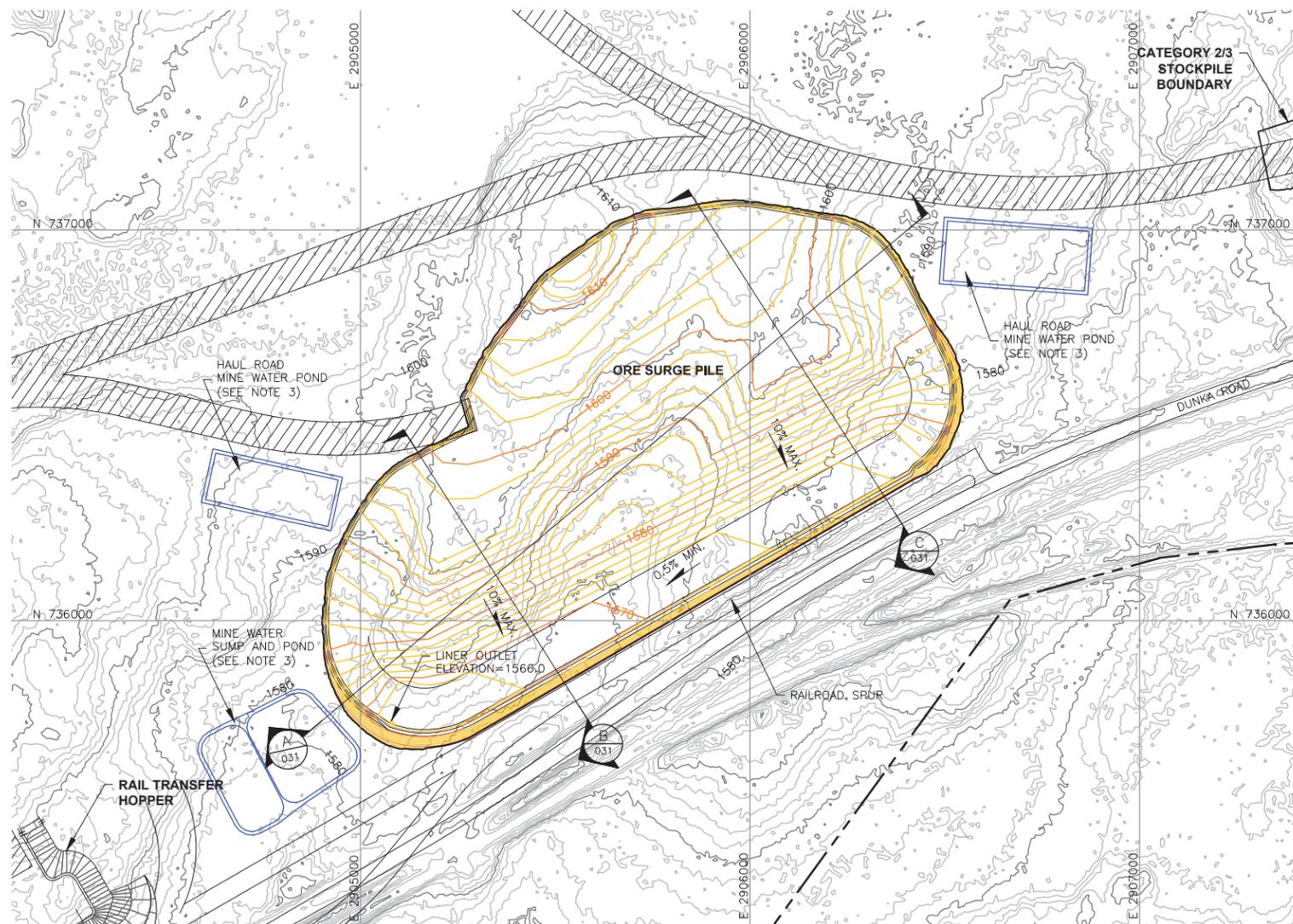
POLYMET MINING POLY MET MINING, INC.
 NORTHMET PROJECT
 HOYT LAKES, MINNESOTA

Golder Associates
 GOLDER ASSOCIATES INC.
 44 UNION BOULEVARD, SUITE 300
 LAKEWOOD, CO USA 80233
 Ph: (303) 980-0540
 Fax: (303) 985-2080
 www.golder.com

DWG. NO. SKP-026
 REV

CADD USER: Jenkins, Crystal FILE: N:\11\113-2209\H_SKP_FEB2013\1132209H01B.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 11:15 AM

INCHES



LEGEND

- EXISTING GROUND TOPOGRAPHY (SEE REFERENCE 1)
- PROPOSED MINE YEAR 1 GRADING TOPOGRAPHY
- MINE SITE BOUNDARY
- CROSS SECTION IDENTIFIER
- SHEET WHERE SECTION IS LOCATED
- SLOPE
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
- MINE WATER SUMP/POND (SEE NOTE 3)

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE MECHANICAL INFRASTRUCTURE PERMIT SUPPORT DRAWINGS.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS MINNESOTA STATE PLANE.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:

**ORE SURGE PILE
FOUNDATION GRADING PLAN**



VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED		
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			NOT APPROVED FOR CONSTRUCTION.		

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SIGNATURE *Bronson*

PRINTED NAME BRENT R. BRONSON
DATE 8/21/17 LICENSE # 46492

DRAWN: MTM

CHECKED: *gg*

GOLDER PROJECT NO.: 113-2209

SCALE: AS SHOWN

**POLYMET
MINING**

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

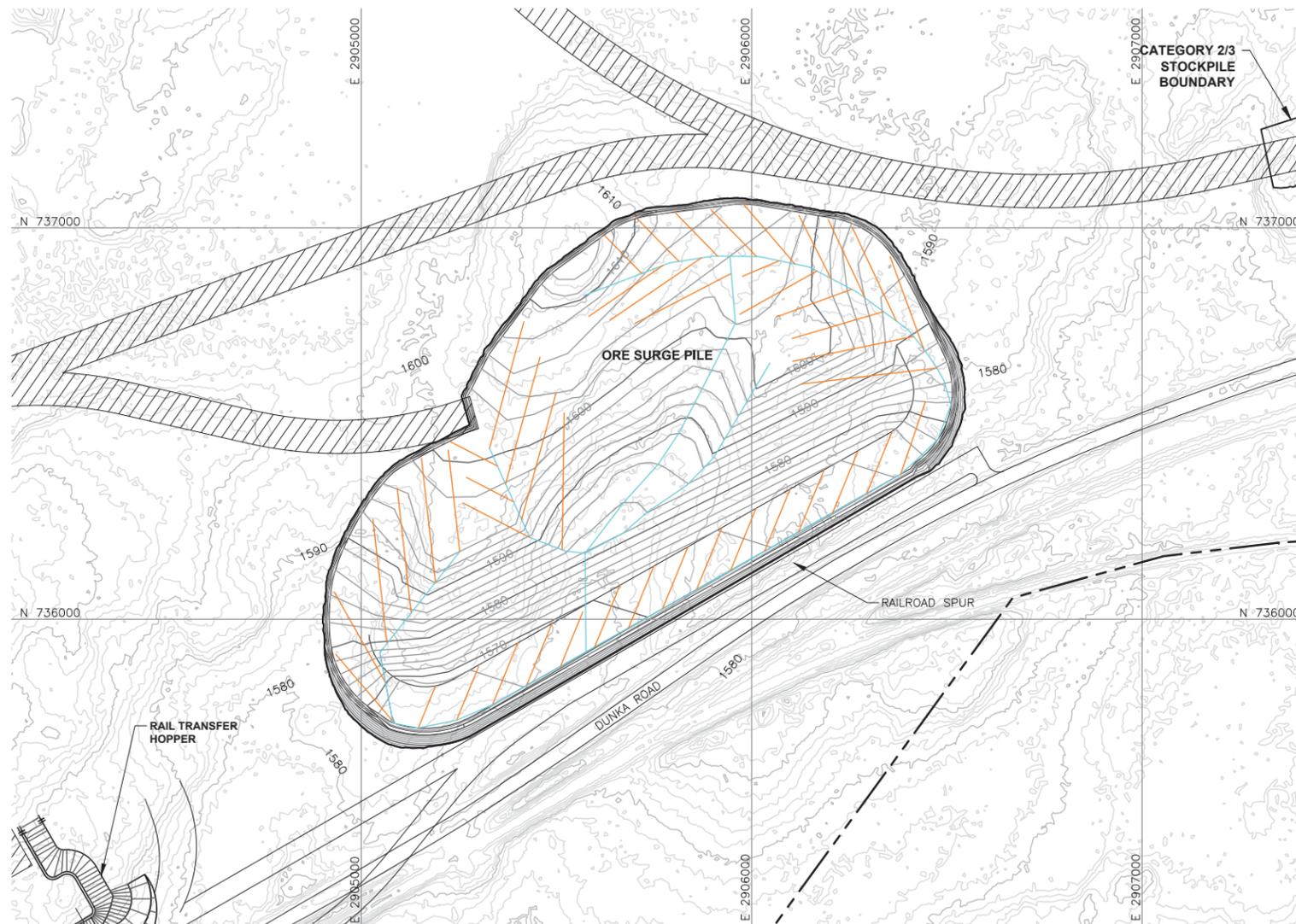
GOLDER ASSOCIATES INC.
44 UNION BOULEVARD, SUITE 300
LAKEWOOD, CO USA 80233
Ph: (303) 980-0540
Fax: (303) 985-2080
www.golder.com

DWG. NO. SKP-027

REV

CADD USER: Jenkins, Crystal FILE: N:\1113-2209_LH_SRP FEB2013\1132209\019.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 11:17 AM

INCHES
1
2



LEGEND

- EXISTING GROUND TOPOGRAPHY
- PROPOSED GRADING TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
-
- TERTIARY COLLECTION PIPING (SEE NOTE 3)
- 4-INCH
- SECONDARY COLLECTION PIPING (SEE NOTE 3)
- 6-INCH

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
 2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
 3. ACTUAL NUMBER AND LOCATION OF UNDERDRAIN PIPES AND SUMPS WILL NEED TO BE DETERMINED DURING CONSTRUCTION BASED ON ENCOUNTERED FIELD CONDITIONS. SEE DETAIL 5 ON DRAWING 035 FOR UNDERDRAIN.
2. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:
**ORE SURGE PILE
UNDERDRAIN PIPING PLAN**



VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
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SIGNATURE
 PRINTED NAME BRENT R. BRONSON
 DATE 8/21/17 LICENSE # 46492

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 CHECKED:
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 SCALE: AS SHOWN

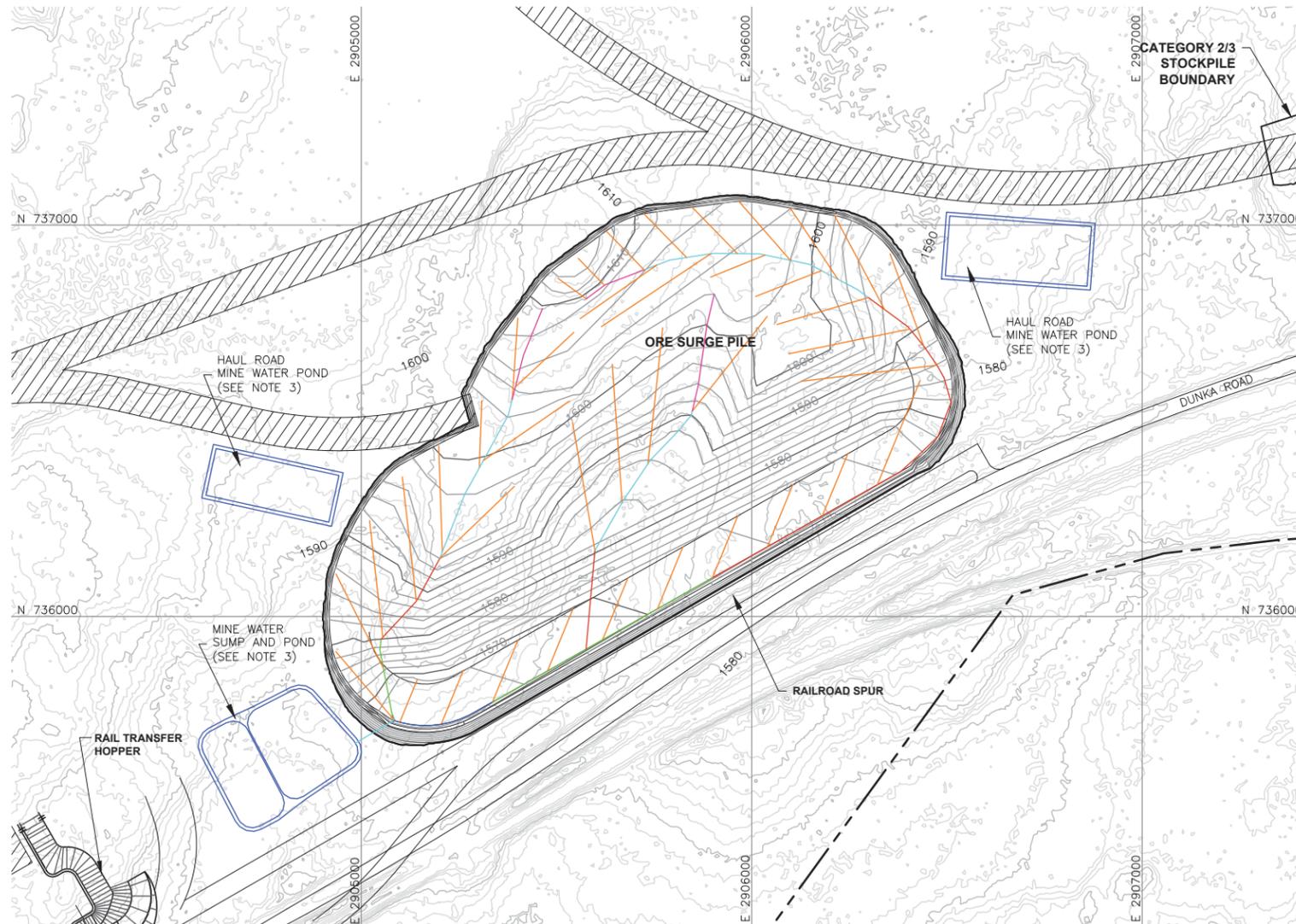
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NORTHMET PROJECT
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CADD USER: Jenkins, Crystal FILE: N:\113-2209\LH SKP FEB2013\1132209H020.DWG PLOT SCALE: 1:1 PLOT DATE: 8/18/2017 11:20 AM

INCHES
1
2



LEGEND

- EXISTING GROUND TOPOGRAPHY
- PROPOSED GRADING TOPOGRAPHY
- MINE SITE BOUNDARY
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- HAUL ROADS
- MINE WATER SUMP/POND (SEE NOTE 3)

- MINE YEAR 1 - TERTIARY COLLECTION PIPING
 - 4-INCH
- MINE YEAR 1 - PRIMARY AND SECONDARY COLLECTION PIPING
 - 4-INCH
 - 6-INCH
 - 8-INCH
 - 10-INCH
 - 12-INCH

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE MECHANICAL INFRASTRUCTURE PERMIT SUPPORT DRAWINGS.
4. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

1. EXISTING GROUND TOPOGRAPHY PROVIDED BY BARR ENGINEERING, AUGUST 2011.
2. COORDINATE SYSTEM REFERENCE IS NAD83 MINNESOTA STATE PLANE NORTH.
3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:
**ORE SURGE PILE
OVERLINER DRAINAGE PIPING PLAN**



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DATE 8/21/17 LICENSE # 46492

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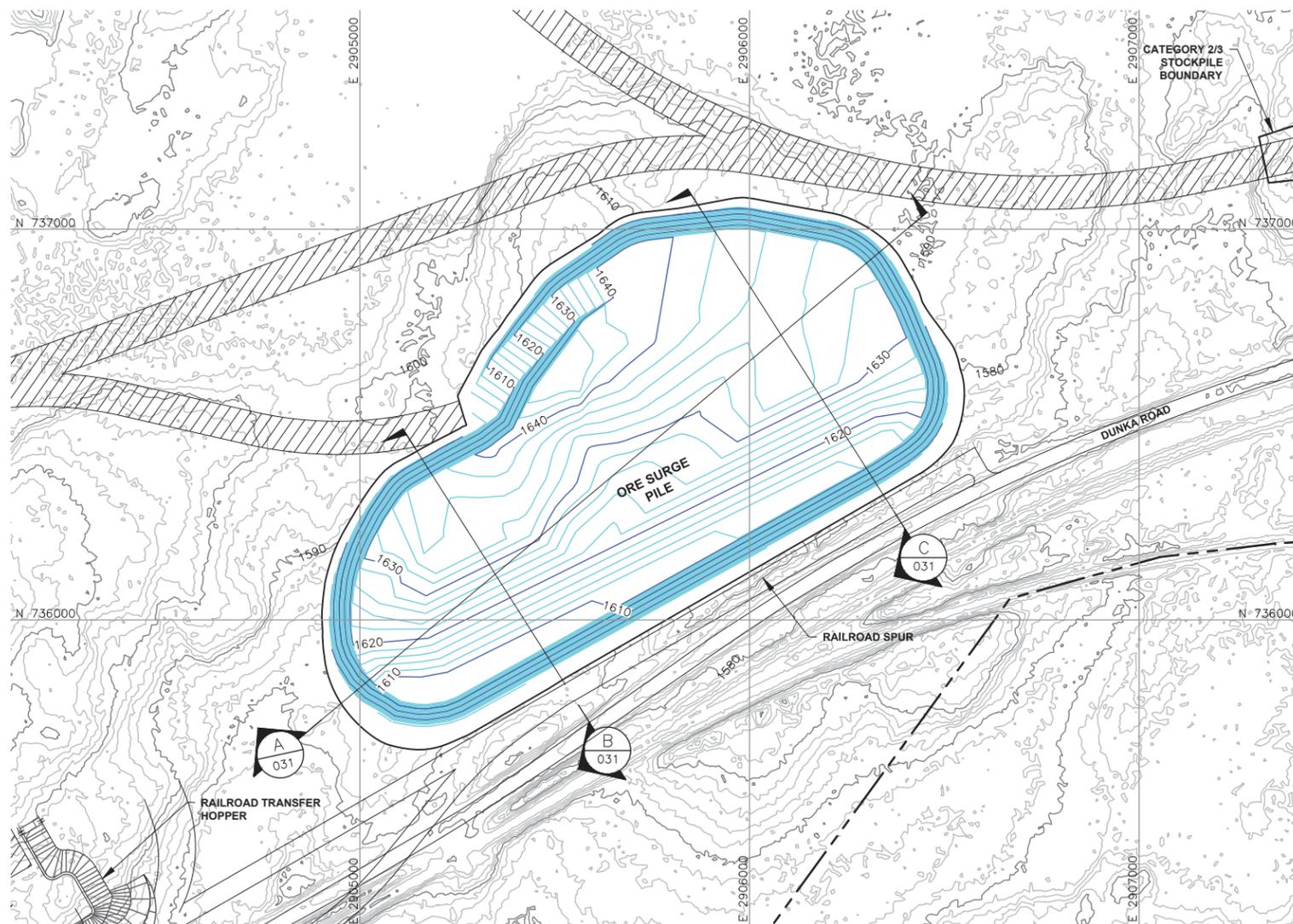
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REV

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INCHES



LEGEND

- EXISTING GROUND TOPOGRAPHY
- PROPOSED STOCKPILE LAYOUTS
- HAUL ROADS
- MINE SITE BOUNDARY
- MINE YEAR 1 PIT BOUNDARY (SEE NOTE 1)
- MINE YEAR 1 ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- MAXIMUM ORE, WASTE ROCK STOCKPILE OUTLINES (SEE NOTE 2)
- CROSS SECTION IDENTIFIER
- SHEET WHERE SECTION IS LOCATED

NOTES

1. OPEN PIT AND HAUL ROAD LAYOUTS PROVIDED BY BARR ENGINEERING IN OCTOBER 2011.
2. STOCKPILE LAYOUTS PROVIDED BY BARR ENGINEERING IN APRIL 2011 AND MODIFIED BY GOLDER.
3. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

REFERENCES

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3. VERTICAL DATUM REFERENCE IS FEET ABOVE MEAN SEA LEVEL (AMSL).

PLANT DRAWING NUMBER:
**ORE SURGE PILE
TYPICAL CONFIGURATION**



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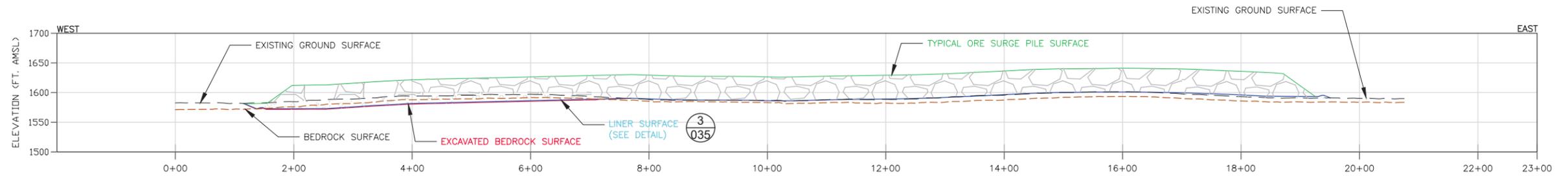
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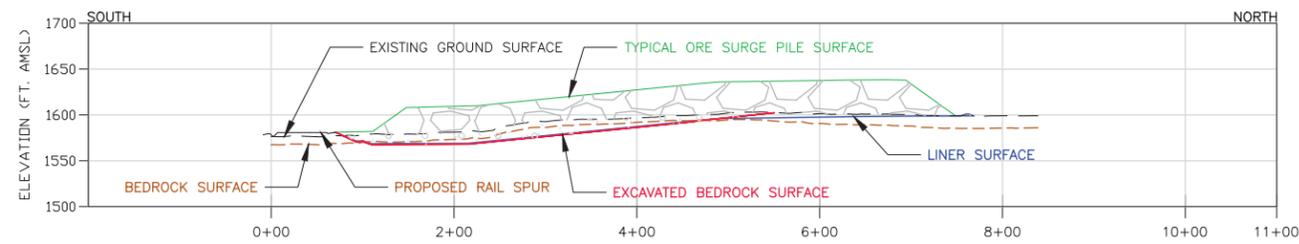
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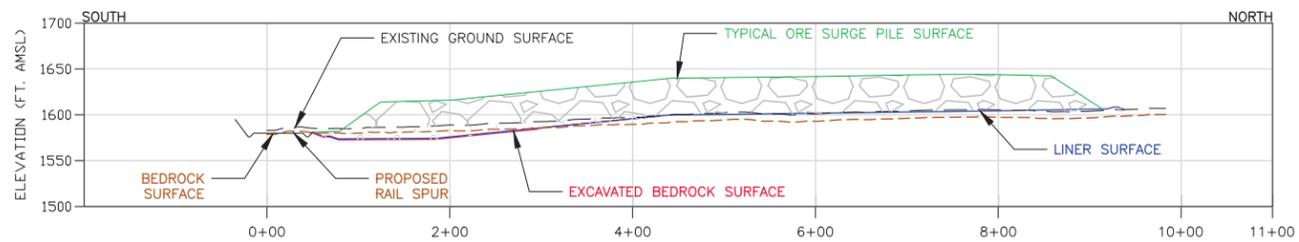
A SECTION
031

0 100 200
HORIZONTAL SCALE IN FEET
2X VERTICAL EXAGGERATION



B SECTION
031

0 100 200
HORIZONTAL SCALE IN FEET
2X VERTICAL EXAGGERATION



C SECTION
031

0 100 200
HORIZONTAL SCALE IN FEET
2X VERTICAL EXAGGERATION

LEGEND

- ORE LIMITS AT TYPICAL CAPACITY
- LINER SURFACE
- EXISTING GROUND SURFACE
- OVERBURDEN SOIL AND BEDROCK EXCAVATION SURFACE
- BEDROCK SURFACE

NOTES

1. STOCKPILE SIDE SLOPES AT ANGLE OF REPOSE.
2. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
3. SEE CROSS SECTION LOCATIONS ON DRAWINGS 3, 4, 5, 26, AND 27.

PLANT DRAWING NUMBER:
ORE SURGE PILE DESIGN SECTIONS

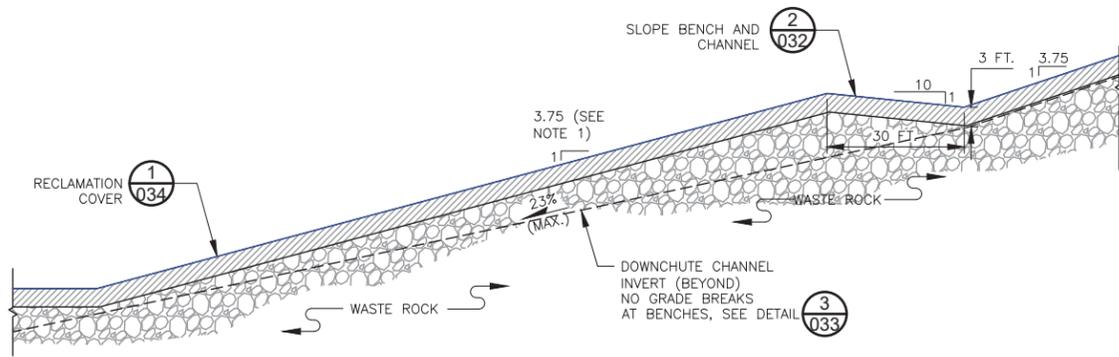
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DRAWN: MTM CHECKED: <i>gg</i> GOLDER PROJECT NO.: 113-2209 SCALE: AS SHOWN	SIGNATURE: <i>Bronson</i> PRINTED NAME: BRENT R. BRONSON DATE: 8/21/17 LICENSE #: 46492 DWG. NO. SKP-031 REV

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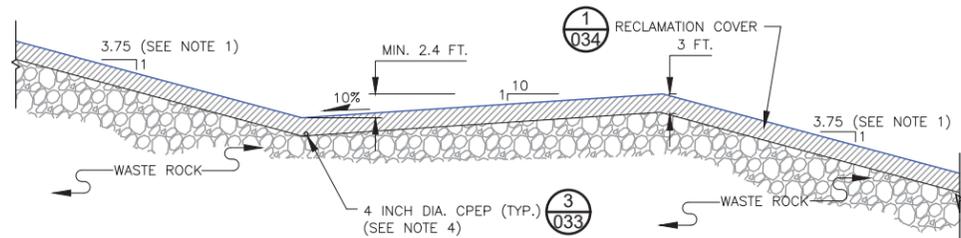
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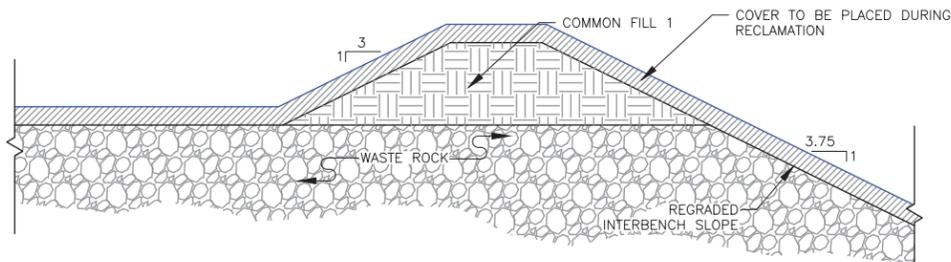
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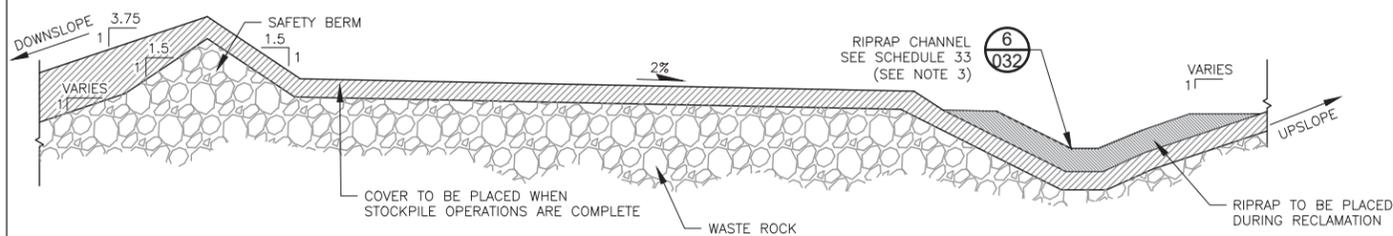
1 TYPICAL SLOPE AND DOWNCHUTE GRADING DETAIL
032 N.T.S.



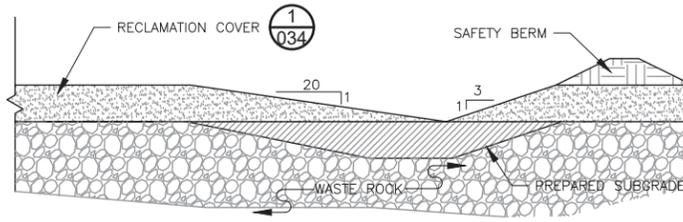
2 TYPICAL SLOPE BENCH AND CHANNEL RECLAMATION DETAIL
032 N.T.S.



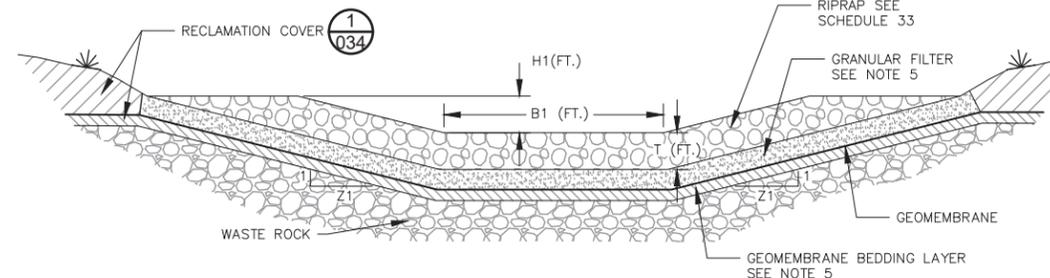
3 TYPICAL STOCKPILE CREST BERM DETAIL
032 N.T.S.



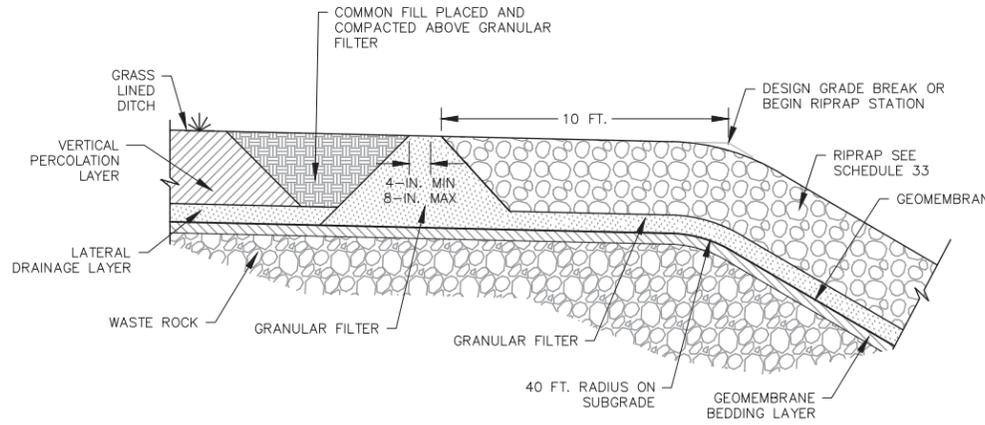
4 STOCKPILE RAMP TYPICAL DETAIL
032 N.T.S.



5 TYPICAL TOP SURFACE CHANNEL SECTION
032 N.T.S.



6 TYPICAL RIPRAP-LINED CHANNEL AND DOWNCHUTE
032 N.T.S. (SEE SCHEDULE 33 FOR DIMENSIONS - SKP-033)



7 UPSTREAM END OF RIPRAP CHANNEL
032 N.T.S.

NOTES

1. THE MAXIMUM SLOPE GRADES ARE 3.75H:1V FOR RECLAIMED STOCKPILE AREAS.
2. ASSUME 1.4H:1V INTERBENCH SLOPES FOR ACTIVE AREAS (EQUAL TO NOMINAL ANGLE OF REPOSE FOR WASTE ROCK MATERIAL). REGRADE PRIOR TO PLACEMENT OF RECLAMATION COVER.
3. SEE SCHEDULE 33 ON DRAWING SKP-033.
4. AT BASE OF COVER SYSTEM GRANULAR DRAINAGE LAYER PLACE DRAIN PIPE AT SLOPE-BENCH INTERSECTION. PIPE TO BE CONTINUOUS ALONG BENCHES BETWEEN DOWNCHUTE CHANNELS.
5. RIPRAP-LINED CHANNEL AND DOWNCHUTE DETAILS REPRESENT PRELIMINARY DESIGNS. DETAILED DIMENSIONS AND TECHNICAL SPECIFICATIONS TO BE PROVIDED PRIOR TO CONSTRUCTION, I.E. AS A PART OF FINAL DESIGN.
6. SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

PLANT DRAWING NUMBER:
CATEGORY 1 STOCKPILE RECLAMATION AND OPERATIONS SURFACE WATER MANAGEMENT DETAILS - SHEET 1 OF 2

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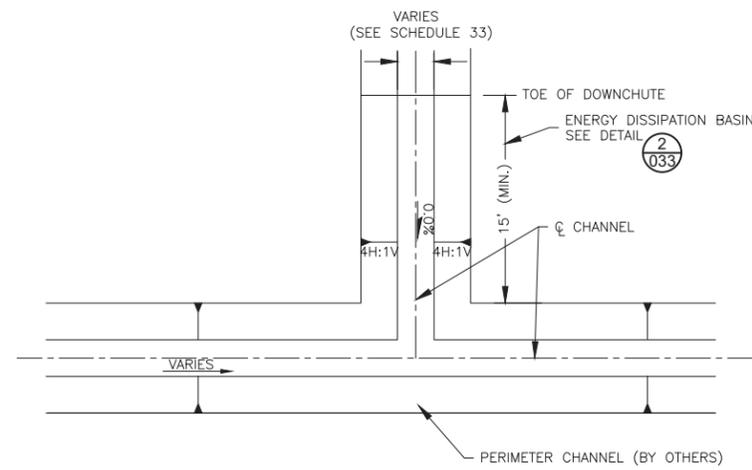
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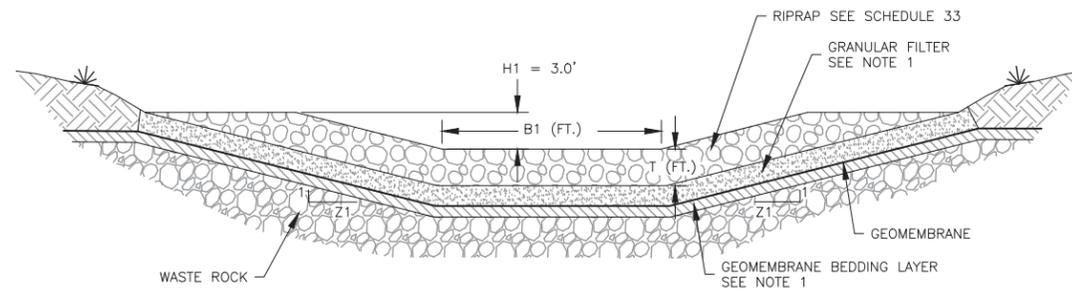
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SIGNATURE *Brent R. Bronson*
PRINTED NAME BRENT R. BRONSON
DATE 8/21/17 LICENSE # 46492

DRAWN: MTM
CHECKED: *gg*
GOLDER PROJECT NO.: 113-2209
SCALE: AS SHOWN

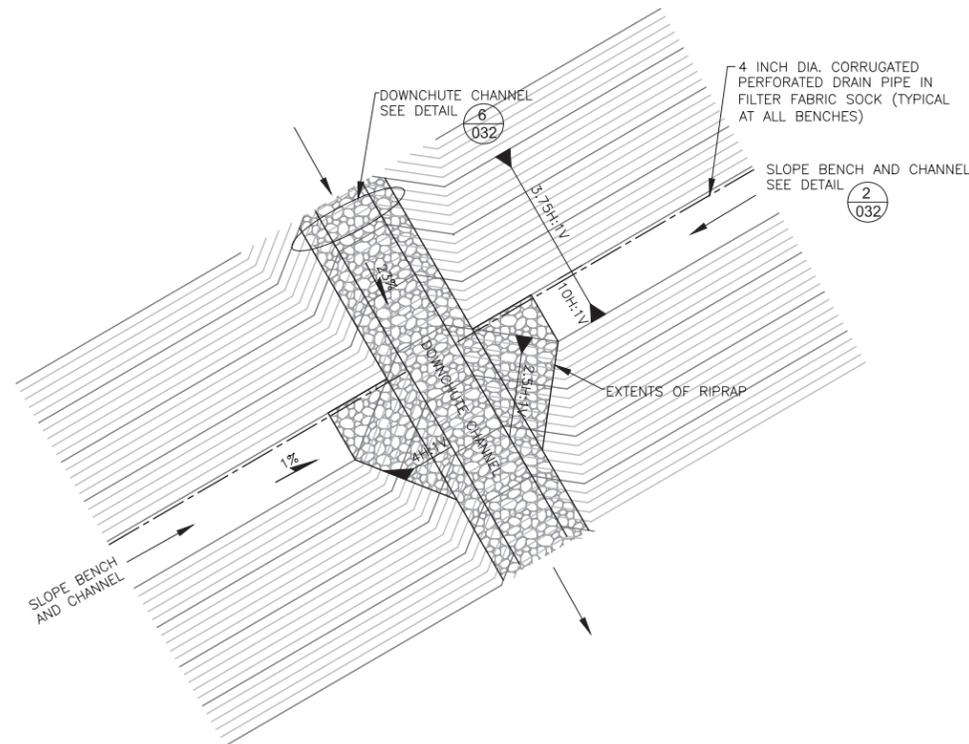
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1
033 N.T.S.
DOWNCHUTE CHANNEL CONFLUENCE DETAIL



2
033 N.T.S.
TYPICAL ENERGY DISSIPATION BASIN
(SEE SCHEDULE 33 FOR DIMENSIONS)



3
033 N.T.S.
SLOPE BENCH AND CHANNEL TO DOWNCHUTE TRANSITION

SCHEDULE 33: RIPRAP-LINED CHANNEL DIMENSIONS

CHANNEL ID	BOTTOM WIDTH, B1 (FT)	SIDE SLOPE, Z1 (H:1V)	MIN. DEPTH, H1 (FT)	RIPRAP SIZE, D ₅₀ (IN)	RIPRAP LAYER THICKNESS, T (FT)	MAX SLOPE, (FT/FT)
DC1-A	20	4	3	12	2	0.23
DC1-B	20	4	3	12	2	0.23
DC1-C	25	4	3	12	2	0.23
DC1-D	20	4	3	12	2	0.23
DC1-E	25	4	3	12	2	0.23
DC1-F	20	4	3	9	1.5	0.23
DC1-G	20	4	3	12	2	0.23
DC1-HRE	8	4	3	9	1.5	0.06
DC1-H	20	4	3	9	1.5	0.23
DC1-HRS	8	4	3	9	1.5	0.06
DC1-HRU	8	4	3	9	1.5	0.07
DC1-I	20	4	3	12	2	0.23
DC1-J	20	4	3	18	3	0.23
DC1-K	25	4	3	12	2	0.23
DC1-L	25	4	3	12	2	0.23

NOTES

- ENERGY DISSIPATION BASIN DETAIL REPRESENTS PRELIMINARY DESIGN. DETAILED DIMENSIONS AND TECHNICAL SPECIFICATIONS TO BE PROVIDED PRIOR TO CONSTRUCTION, I.E. AS A PART OF FINAL DESIGN.
- SEE GENERAL NOTES AND LEGEND ON DRAWING 002.

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 DATE: 8/21/17 LICENSE #: 46492

DRAWN: MTM
 CHECKED: *gg*
 GOLDER PROJECT NO.: 113-2209
 SCALE: AS SHOWN

PLANT DRAWING NUMBER:

CATEGORY 1 STOCKPILE RECLAMATION AND OPERATIONS SURFACE WATER MANAGEMENT DETAILS – SHEET 2 OF 2

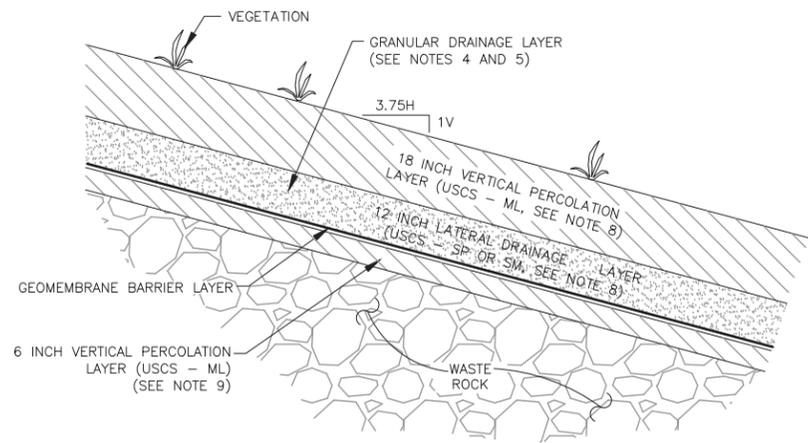
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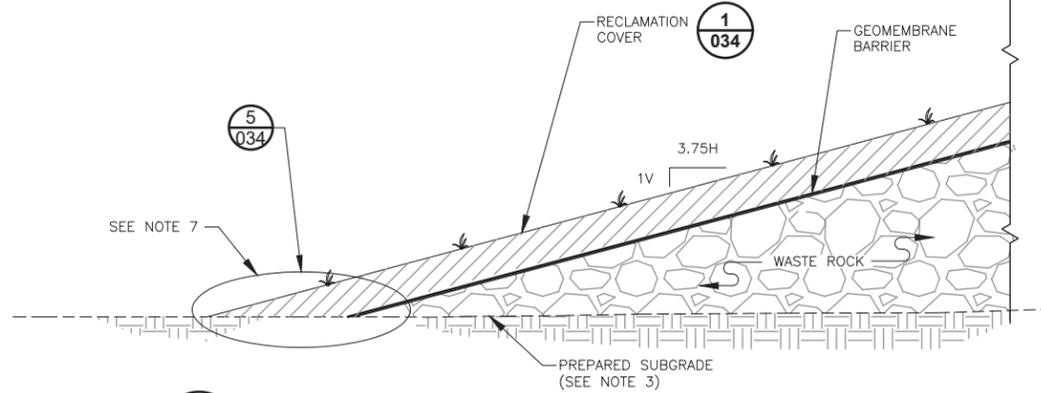
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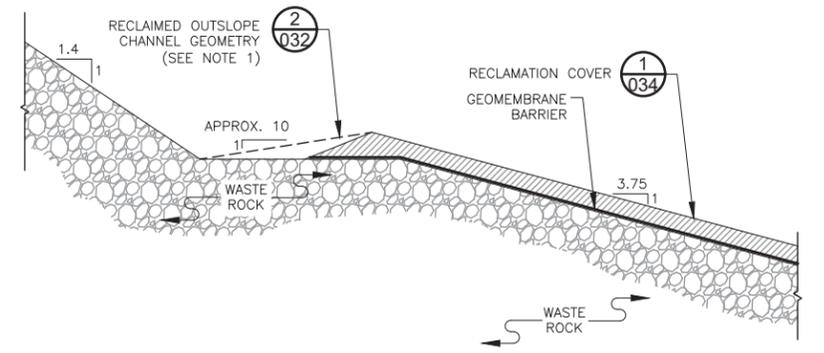
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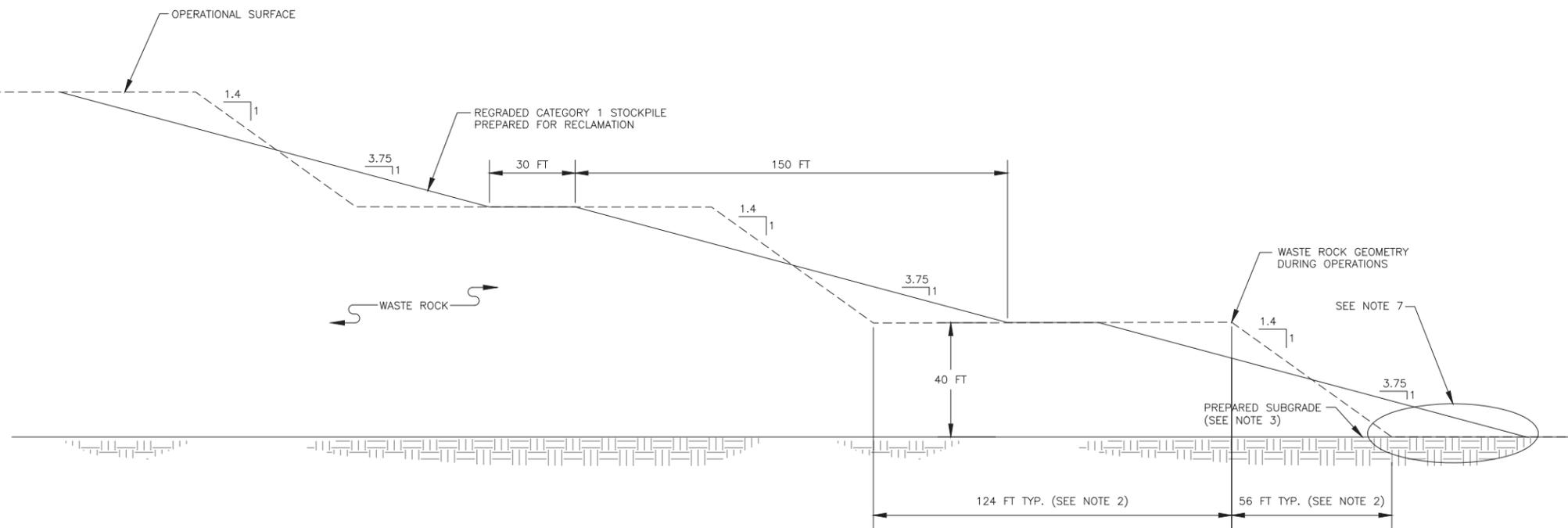
1 TYPICAL CATEGORY 1 RECLAMATION COVER DETAIL
034 N.T.S.



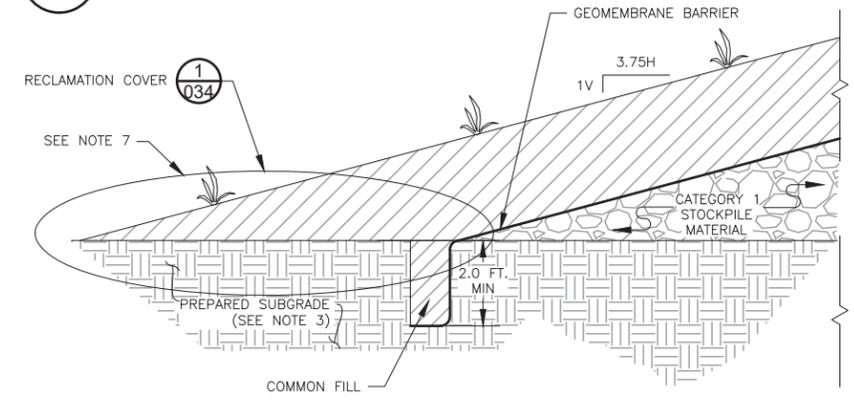
2 CATEGORY 1 RECLAMATION COVER DESIGN SECTION
034 N.T.S.



3 RECLAMATION TO OPERATIONAL AREA TIE IN DETAIL
034 N.T.S.



4 CATEGORY 1 STOCKPILE TYPICAL GEOMETRY DURING OPERATIONS AND REGRADED FOR RECLAMATION
034 N.T.S.



5 GEOMEMBRANE COVER ANCHOR TRENCH DETAIL
034 N.T.S.

NOTES

- TEMPORARY SLOPE BENCH CHANNEL SHOULD BE CONSTRUCTED WITH MINIMUM DEPTH OF 2.4 FT. ON THE BENCHES BY GRADING CHANNEL SIDE SLOPES TO 10H:1V ON 30 FT. WIDE BENCHES.
- STOCKPILE GEOMETRY DURING OPERATIONS BASED ON ASSUMED WASTE ROCK ANGLE OF REPOSE OF 35.5 DEGREES (1.4H:1V).
- GEOTECHNICALLY UNSUITABLE SOILS TO BE REMOVED AND REPLACED WITH COMPACTED STRUCTURAL FILL WITHIN 100 FT. OF CATEGORY 1 STOCKPILE PERIMETER LIMITS.
- ON TOP OF STOCKPILE ON 1% SLOPE AREAS, PLACE 4 INCH DIAMETER PERFORATED CORRUGATED POLYETHYLENE PIPE (CPEP) WITH FILTER FABRIC SOCK AT 75 FOOT SPACING TO FACILITATE DRAINAGE OF GRANULAR DRAINAGE LAYER TO TOP SURFACE CHANNEL. PIPE LOCATION TO BE FIELD FIT.
- AT STOCKPILE BENCHES, PLACE 4 INCH PERFORATED CPEP DRAIN PIPE WITH FILTER FABRIC SOCK AT BASE OF COVER SYSTEM GRANULAR DRAINAGE LAYER AT SLOPE-BENCH INTERSECTION WITH OUTFLOW DIRECTED TO DOWNCHUTE CHANNELS.
- SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
- EDGE OF LINER TO TIE IN TO CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM.
- REFER TO UNIFIED SOIL CLASSIFICATION SYSTEM FOR COVER SOIL DESCRIPTION.
- PLACE ADDITIONAL SOIL FILL AS NEEDED TO FILL VOIDS ON WASTE ROCK SURFACE/FINAL SLOPE PRIOR TO PLACEMENT OF 6-INCH VERTICAL PERCOLATION LAYER. THIS SOIL FILL IS NOT SHOWN ON THE TYPICAL COVER DETAIL.

PLANT DRAWING NUMBER:

CATEGORY 1 STOCKPILE PHASED COVER DESIGN

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SIGNATURE: *B. Bronson*
 PRINTED NAME: BRENT R. BRONSON
 DATE: 8/21/17 LICENSE #: 46492

DRAWN: MTM
 CHECKED: *gg*
 GOLDER PROJECT NO.: 113-2209
 SCALE: AS SHOWN

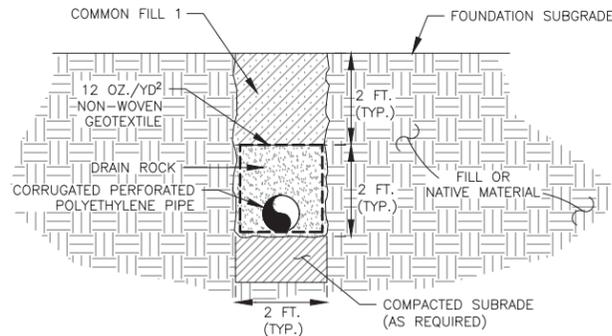
POLYMET MINING

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

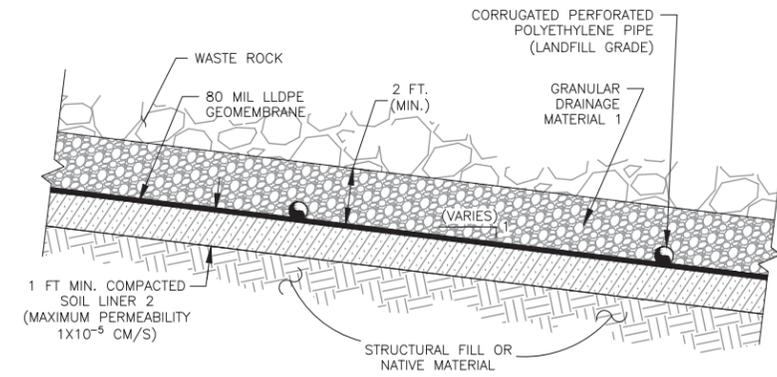
GOLDER ASSOCIATES INC.
 44 UNION BOULEVARD, SUITE 300
 LAKEWOOD, CO USA 80233
 Ph: (303) 980-0540
 Fax: (303) 985-2080
 www.golder.com

DWG. NO. SKP-034

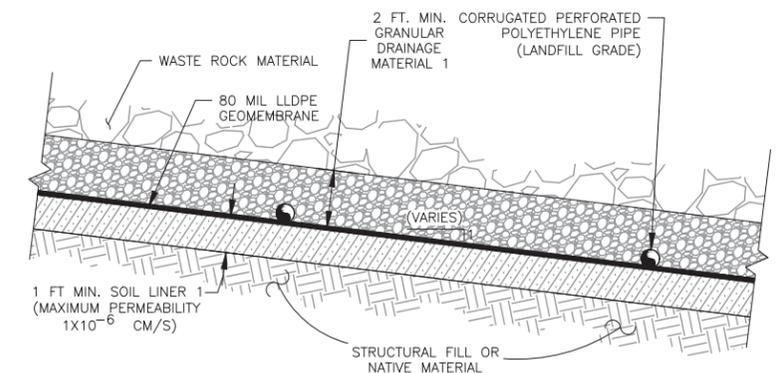
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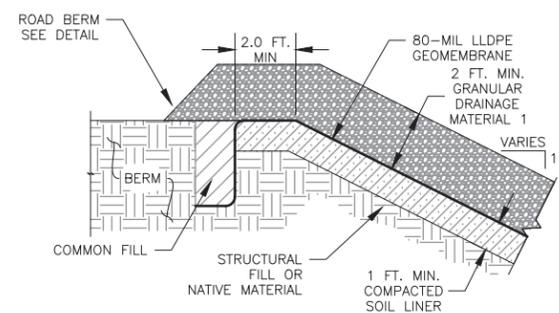
1 TYPICAL FOUNDATION UNDERDRAIN
035 N.T.S.



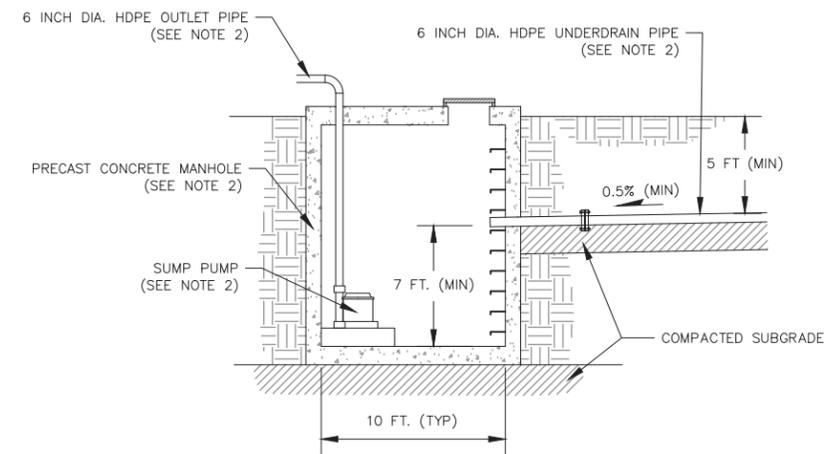
2 CATEGORY 2/3 STOCKPILE LINER
035 N.T.S.



3 CATEGORY 4 STOCKPILE AND ORE SURGE PILE LINER
035 N.T.S.



4 GEOMEMBRANE LINER ANCHOR TRENCH DETAIL
035 N.T.S.



5 UNDERDRAIN SUMP MANHOLE
035 N.T.S.

NOTES

- SEE GENERAL NOTES AND LEGEND ON DRAWING 002.
- UNDERDRAIN SUMP MANHOLE DIMENSIONS, SUMP PUMP CAPACITY AND PIPE DIMENSIONS ARE PRELIMINARY AND WILL BE SIZED BASED ON ENCOUNTERED FIELD CONDITIONS. UNDERDRAIN SUMPS WILL BE PUMPED TO MINE WATER SUMPS (SEE MECHANICAL INFRASTRUCTURE PERMIT SUPPORT DRAWINGS).

INCHES

VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
A	12/02/11	ISSUED FOR REVIEW FOR INCLUSION IN ROCK AND OVERBURDEN MANAGEMENT PLAN (ROMP)	ISSUED	VERSION	DATE
B	2/15/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP	FOR PERMITTING	G	8/21/17
C	5/29/13	ISSUED FOR REVIEW FOR INCLUSION IN ROMP			
D	1/14/14	ISSUED FOR AGENCY REVIEW	FOR CONSTRUCTION		
E	4/10/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
F	5/22/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
G	8/21/17	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	NOT APPROVED FOR CONSTRUCTION.		

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SIGNATURE: *Bronson*
 PRINTED NAME: BRENT R. BRONSON
 DATE: 8/21/17 LICENSE #: 46492

PLANT DRAWING NUMBER:

CONSTRUCTION DETAILS

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

Golder Associates
 GOLDER ASSOCIATES INC.
 44 UNION BOULEVARD, SUITE 300
 LAKEWOOD, CO USA 80233
 Ph: (303) 980-0540
 Fax: (303) 985-2080
 www.golder.com

DRAWN: MTM
 CHECKED: *gg*
 GOLDER PROJECT NO.: 113-2209
 SCALE: AS SHOWN
 DWG. NO. SKP-035
 REV

Errata Sheet

Poly Met Mining, Inc. NorthMet Project

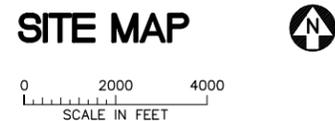
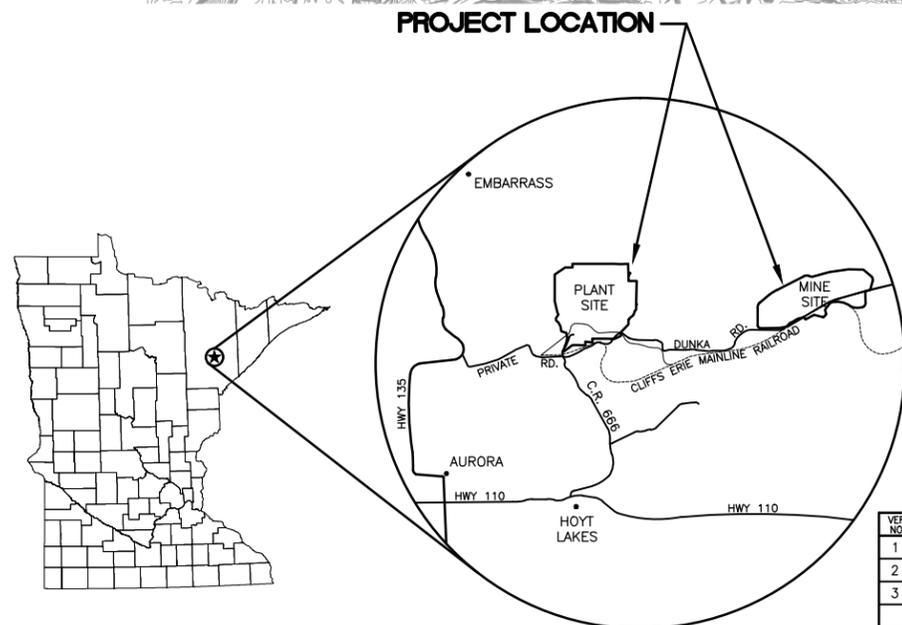
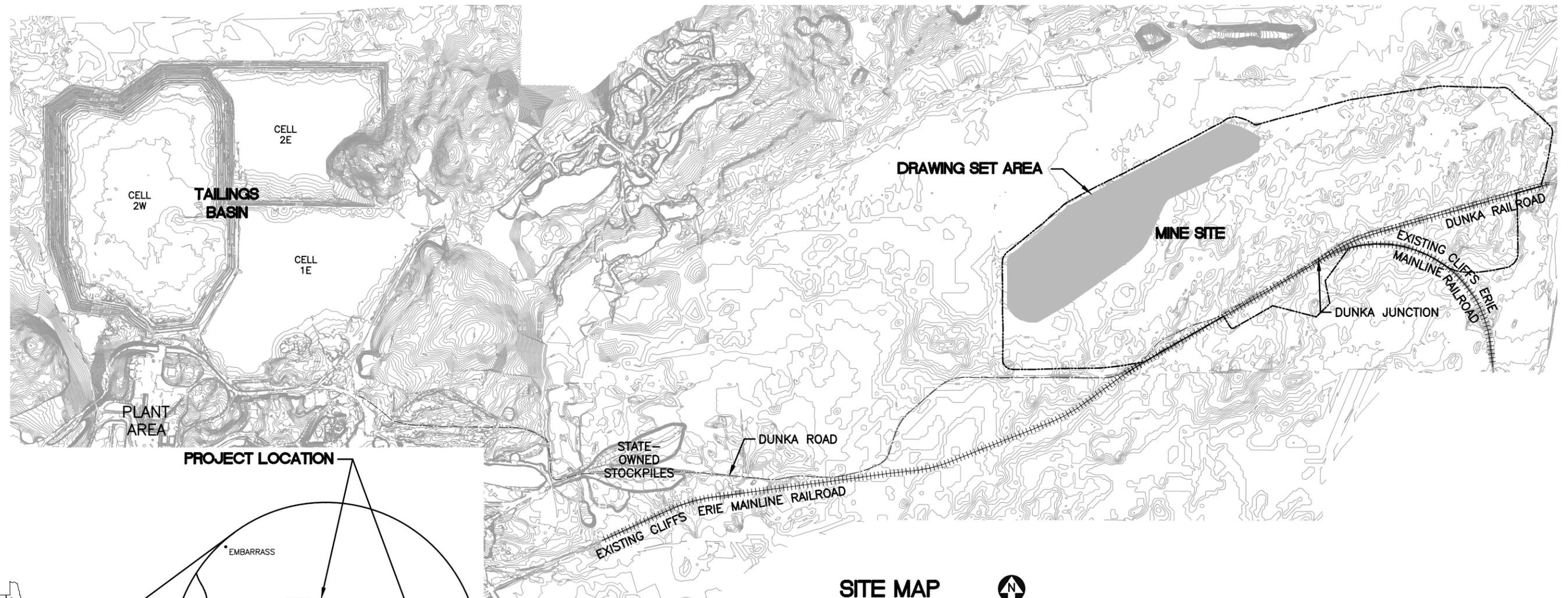
Permit Application Support Drawings: Category 1 Stockpile Groundwater Containment System

August 2017 (version 3)

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".
GCS-003	To meet construction stormwater requirements, a temporary berm will be added on the west side of the Mine Year 0 Category 1 Stockpile footprint to control mine water runoff as the stockpile is built out.
GCS-003, GCS-004, GCS-005, GCS-006, GCS-007, GCS-008, GCS-009	The "Mine Site Boundary" will be replaced by the "Mining Area Boundary" as shown on figures included in the Permit to Mine Application.

POLY MET MINING, INC. NORTHMET PROJECT PERMIT APPLICATION SUPPORT DRAWINGS CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM HOYT LAKES, MINNESOTA



VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN -- VERSIONS 5, 6, 7 -- ATTACHMENT C	ISSUED		
2	05/28/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
3	07/25/17	PERMIT APPLICATION UPDATES	FOR PERMITTING	3	7/25/17
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION.		

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PRINTED NAME: THOMAS J. RADUE
SIGNATURE: *Thomas J. Radue*
DATE: 7/25/17 LICENSE# 20951

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

PLANT DRAWING NUMBER:
CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM 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. **GCS-001** REV

CADD USER: Cristian A. Diaz FILE: K:\DESIGN\23690C29.10\PERMIT_NMM-21-CS-001.DWG PLOT SCALE: 1:2 PLOT DATE: 7/25/2017 11:01 AM

INCHES 1 2

LOCATION MAP
NOT TO SCALE



VICINITY MAP
NOT TO SCALE

CADD USER: Cristian A. Diaz FILE: K:\DESIGN\2369029.10\PERMIT_NMM-21-CS-002.DWG PLOT SCALE: 1:2 PLOT DATE: 7/25/2017 11:02 AM

GENERAL LEGEND

- 1000— EXISTING CONTOUR - MAJOR
- EXISTING CONTOUR - MINOR
- - - - MINE SITE BOUNDARY
- OF — PROPOSED SUMP OVERFLOW PIPE
- ▶— PROPOSED MINE WATER PIPE (PUMPED FLOW)
- >— PROPOSED MINE WATER PIPE (GRAVITY FLOW)
- PROPOSED SUMP MANHOLE
- ==== PROPOSED ACCESS ROADS
- ==== HAUL ROAD

ABBREVIATIONS

- CAT - CATEGORY
- DWG - DRAWING
- EL - ELEVATION
- GCS - GROUNDWATER CONTAINMENT SYSTEM
- MH - MANHOLE
- NTS - NOT TO SCALE
- PVI - PROFILE VERTICAL INTERSECTION
- STA - STATION
- WWTS - WASTE WATER TREATMENT SYSTEM

SHEET INDEX

SHEET NO. TITLE

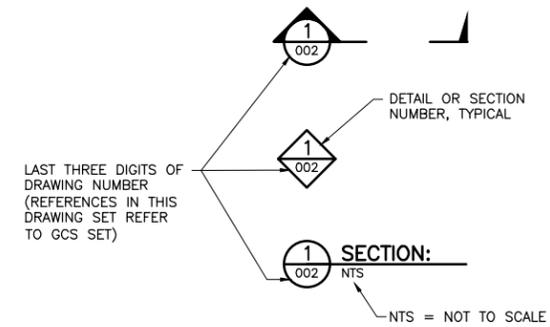
GENERAL DRAWINGS

- GCS-001 LOCATION MAP AND SITE MAP
- GCS-002 LEGEND AND SHEET INDEX
- GCS-003 MINE YEAR 0 LAYOUT
- GCS-004 MINE YEAR 2 LAYOUT
- GCS-005 MINE YEAR 3 LAYOUT
- GCS-006 MINE YEAR 5 LAYOUT
- GCS-007 MINE YEAR 6 LAYOUT
- GCS-008 MINE YEAR 20 LAYOUT
- GCS-009 CLOSURE CONFIGURATION
- GCS-010 TYPICAL CROSS SECTIONS
- GCS-011 TYPICAL CROSS SECTIONS
- GCS-012 NORTH PROFILES
- GCS-013 SOUTH PROFILES
- GCS-014 DISCHARGE PROFILES

NOTES

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

DRAWING NUMBERING



2
1
INCHES

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN - VERSIONS 5, 6, 7 - ATTACHMENT C	ISSUED		
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			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION.		

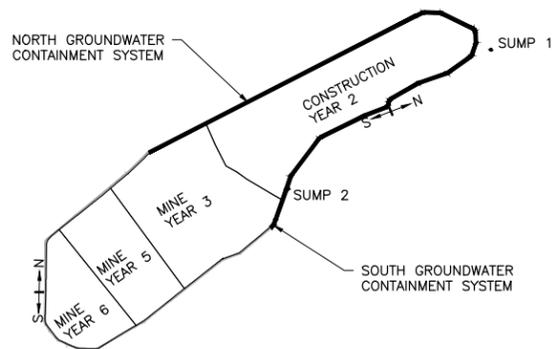
I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

PRINTED NAME THOMAS J. RADUE
SIGNATURE *Thomas J. Radue*
DATE 7/25/17 LICENSE# 20951

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

PLANT DRAWING NUMBER:	
CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM LEGEND AND SHEET INDEX	
	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. GCS-002	REV

CADD USER: Cristian A. Diaz FILE: K:\DESIGN\2369028.10\PERMIT_NMM-21-CS-003.DWG PLOT SCALE: 1:2 PLOT DATE: 7/25/2017 11:04 AM



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NTS



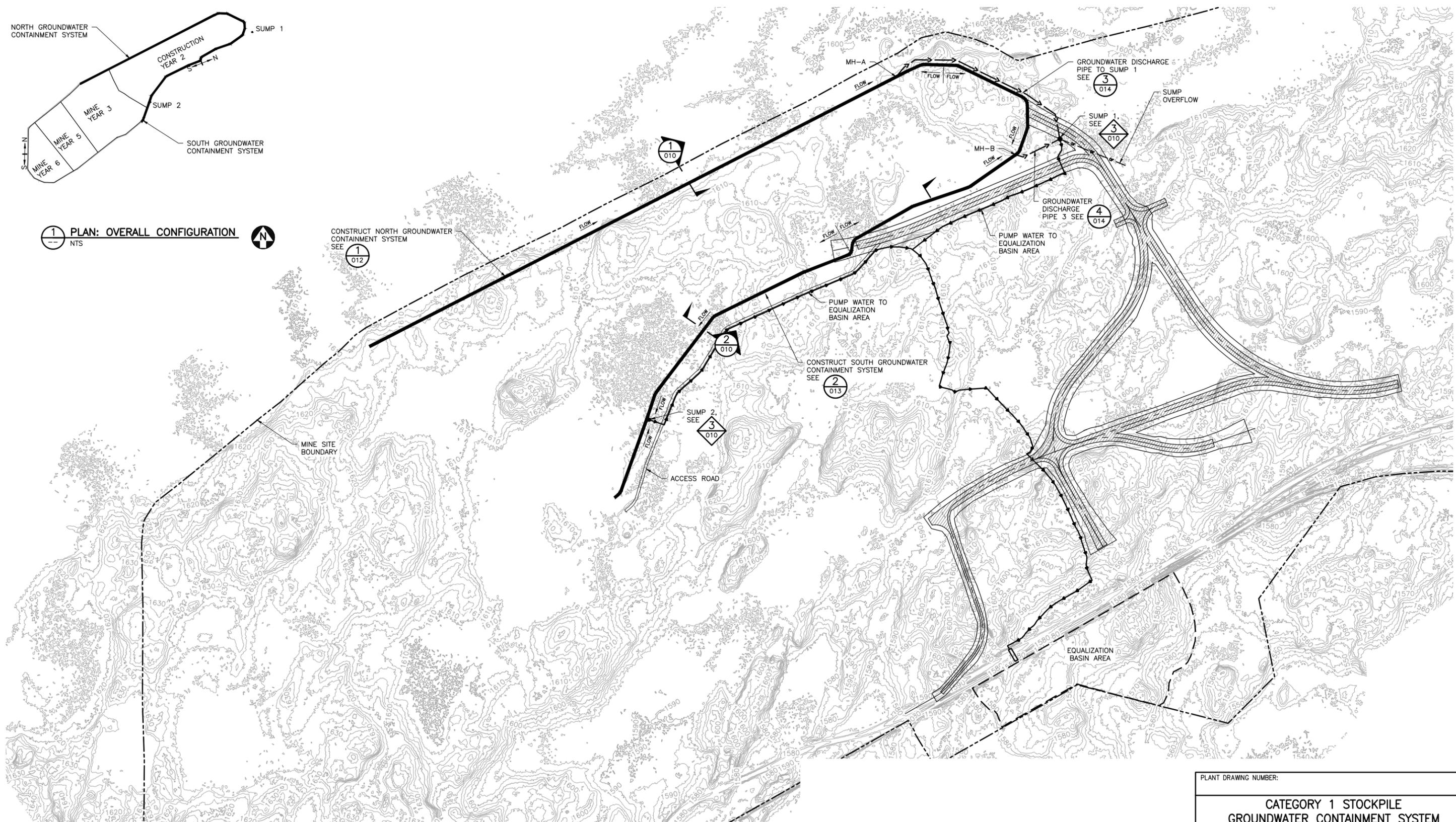
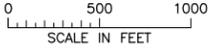
CONSTRUCT NORTH GROUNDWATER CONTAINMENT SYSTEM
SEE 1 012



CONSTRUCT SOUTH GROUNDWATER CONTAINMENT SYSTEM
SEE 2 013



2 PLAN: GCS - MINE YEAR 0 LAYOUT



PLANT DRAWING NUMBER:

**CATEGORY 1 STOCKPILE
GROUNDWATER CONTAINMENT SYSTEM
CONSTRUCTION YEAR 2**

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

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN - VERSIONS 5, 6, 7 - ATTACHMENT C	ISSUED		
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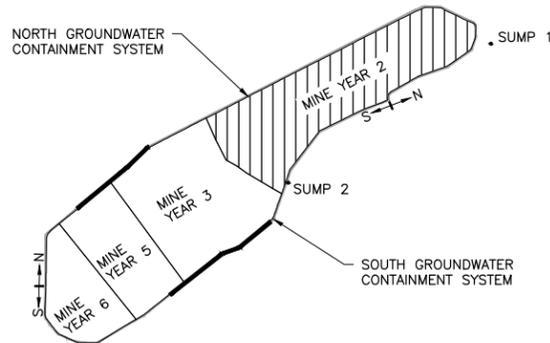
PRINTED NAME **THOMAS J. RADUE**
SIGNATURE *Thomas J. Radue*
DATE 7/25/17 LICENSE# 20951

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

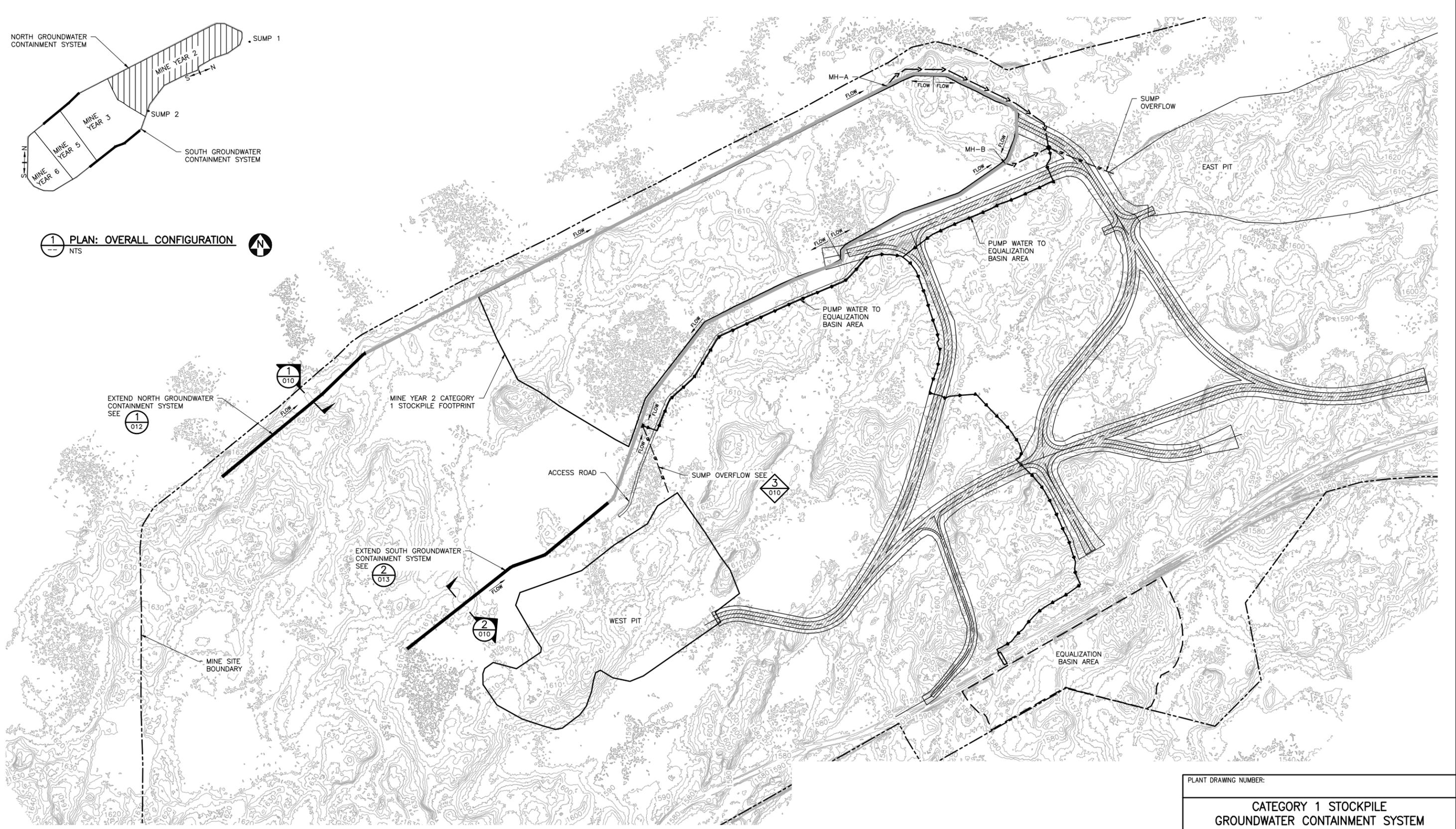
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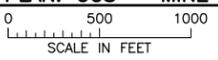
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1 PLAN: OVERALL CONFIGURATION
NTS



2 PLAN: GCS - MINE YEAR 2 LAYOUT



VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
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2	05/28/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
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PRINTED NAME THOMAS J. RADUE
SIGNATURE *Thomas J. Radue*
DATE 7/25/17 LICENSE# 20951

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

PLANT DRAWING NUMBER:

CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM MINE YEAR 2 LAYOUT

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

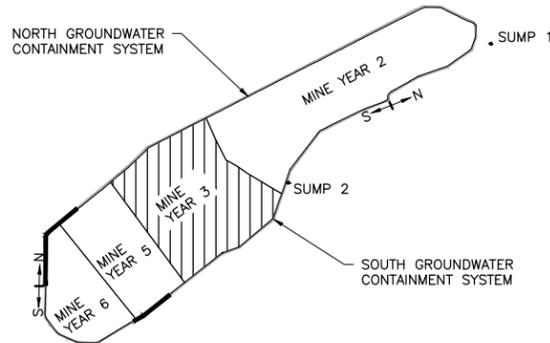
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MINNEAPOLIS, MN.
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DWG. NO. **GCS-004**

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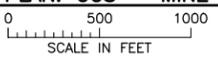
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1 PLAN: OVERALL CONFIGURATION
NTS



2 PLAN: GCS - MINE YEAR 3 LAYOUT



VER NO	DATE	DESCRIPTION	ISSUE STATUS		
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN - VERSIONS 5, 6, 7 - ATTACHMENT C	ISSUED	VERSION	DATE
2	05/28/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
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PRINTED NAME THOMAS J. RADUE
SIGNATURE *Thomas J. Radue*
DATE 7/25/17 LICENSE# 20951

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

PLANT DRAWING NUMBER:

CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM MINE YEAR 3 LAYOUT

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

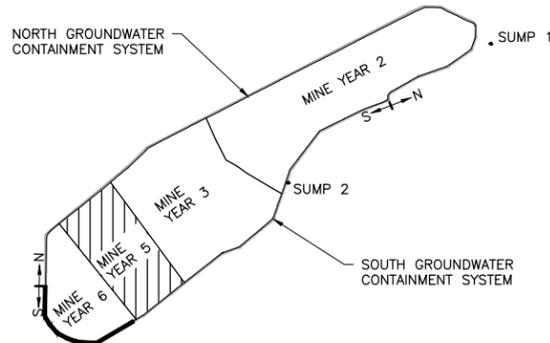
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MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. **GCS-005**

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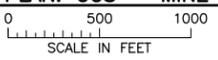
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1 PLAN: OVERALL CONFIGURATION
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2 PLAN: GCS - MINE YEAR 5 LAYOUT



VER. NO.	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN - VERSIONS 5, 6, 7 - ATTACHMENT C	ISSUED		
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SIGNATURE *Thomas J. Radue*
DATE 7/25/17 LICENSE# 20951

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

PLANT DRAWING NUMBER:

**CATEGORY 1 STOCKPILE
GROUNDWATER CONTAINMENT SYSTEM
MINE YEAR 5 LAYOUT**

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

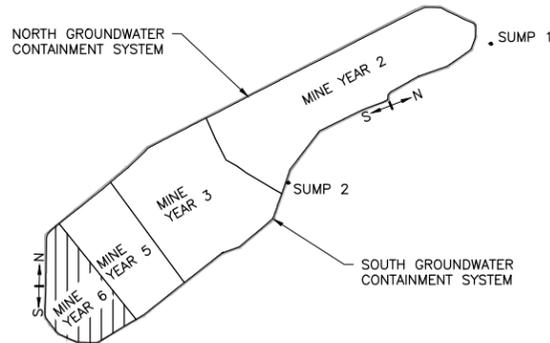
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BARR ENGINEERING CO.
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DWG. NO. **GCS-006**

REV

INCHES

CADD USER: Cristian A. Diaz FILE: K:\DESIGN\23690228.10\PERMIT_NMM-21-CS-007.DWG PLOT SCALE: 1:2 PLOT DATE: 7/25/2017 11:15 AM



1 PLAN: OVERALL CONFIGURATION
NTS



2 PLAN: GCS - MINE YEAR 6 LAYOUT
SCALE IN FEET
0 500 1000

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN - VERSIONS 5, 6, 7 - ATTACHMENT C	ISSUED		
2	05/28/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
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PRINTED NAME THOMAS J. RADUE
SIGNATURE *Thomas J. Radue*
DATE 7/25/17 LICENSE# 20951

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

PLANT DRAWING NUMBER:
CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM YEAR 6 LAYOUT

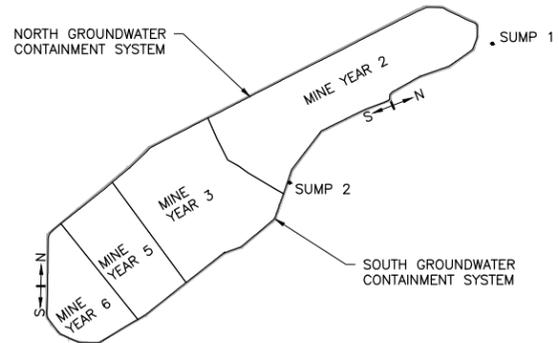
POLYMET MINING
POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

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

DWG. NO. **GCS-007**
REV

INCHES
1
2

CADD USER: Crisdon A. Diaz FILE: K:\DESIGN\23690C29.10\PERMIT_NMM-21-CS-008.DWG PLOT SCALE: 1:2 PLOT DATE: 7/25/2017 11:18 AM



1 PLAN: OVERALL CONFIGURATION
NTS



2 PLAN: GCS - MINE YEAR 20 LAYOUT

0 500 1000
SCALE IN FEET

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
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PRINTED NAME THOMAS J. RADUE
SIGNATURE *Thomas J. Radue*
DATE 7/25/17 LICENSE# 20951

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

PLANT DRAWING NUMBER:

**CATEGORY 1 STOCKPILE
GROUNDWATER CONTAINMENT SYSTEM
MINE YEAR 20 LAYOUT**

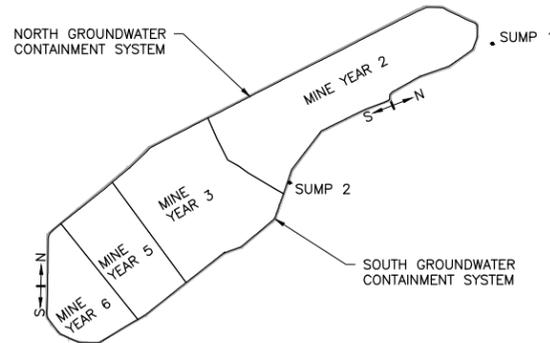
POLYMET MINING POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

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

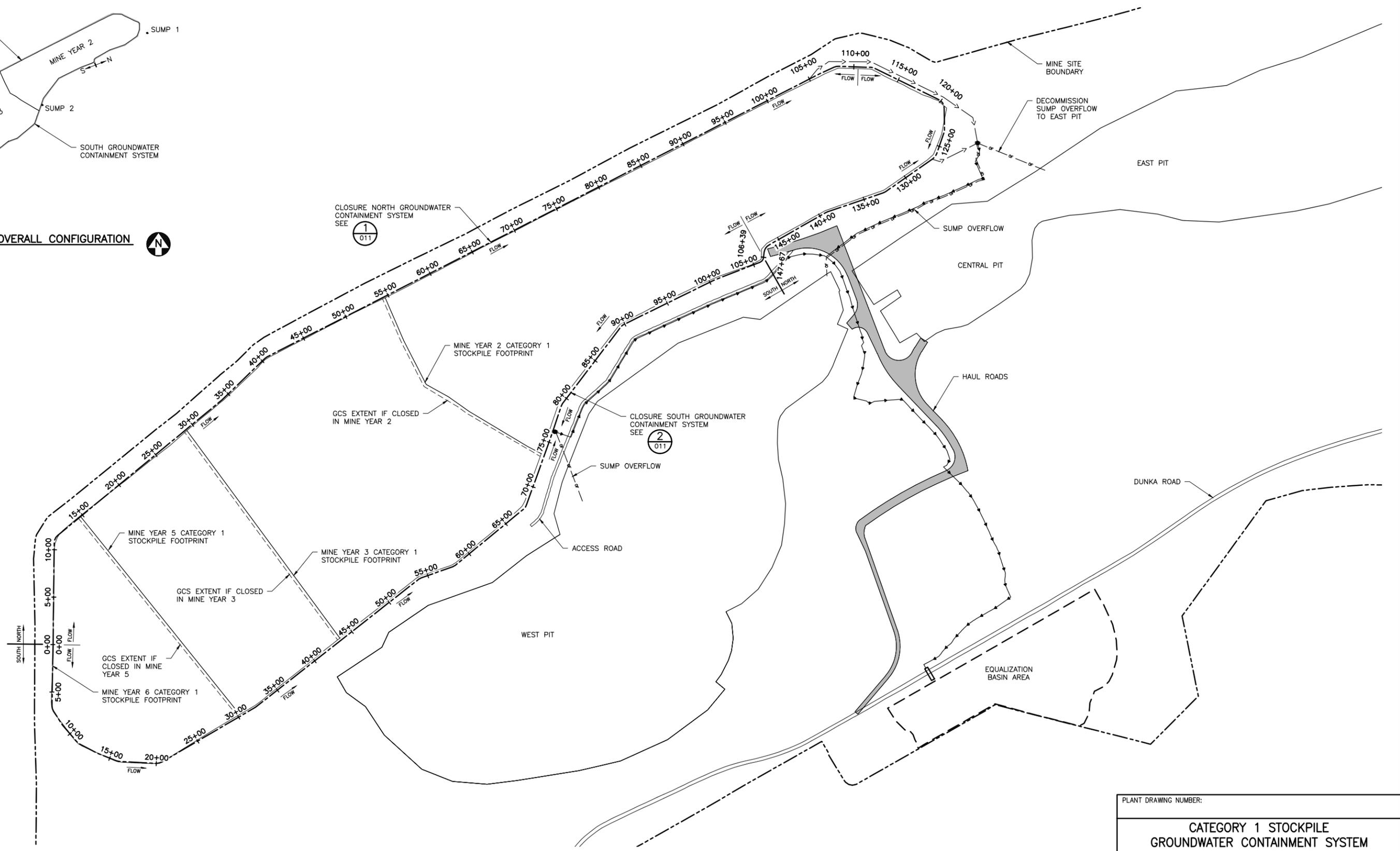
DWG. NO. **GCS-008** REV

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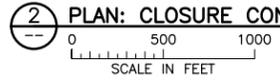
1 PLAN: OVERALL CONFIGURATION
NTS



1
011

2
011

2 PLAN: CLOSURE CONFIGURATION
SCALE IN FEET



VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	10/18/11	ROCK AND OVERBURDEN MANAGEMENT PLAN - VERSIONS 5, 6, 7 - ATTACHMENT C	ISSUED		
2	05/28/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
3	07/25/17	PERMIT APPLICATION UPDATES	FOR PERMITTING	3	7/25/17
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION.		

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PRINTED NAME THOMAS J. RADUE
SIGNATURE *Thomas J. Radue*
DATE 7/25/17 LICENSE# 20951

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

PLANT DRAWING NUMBER:

CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM CLOSURE CONFIGURATION

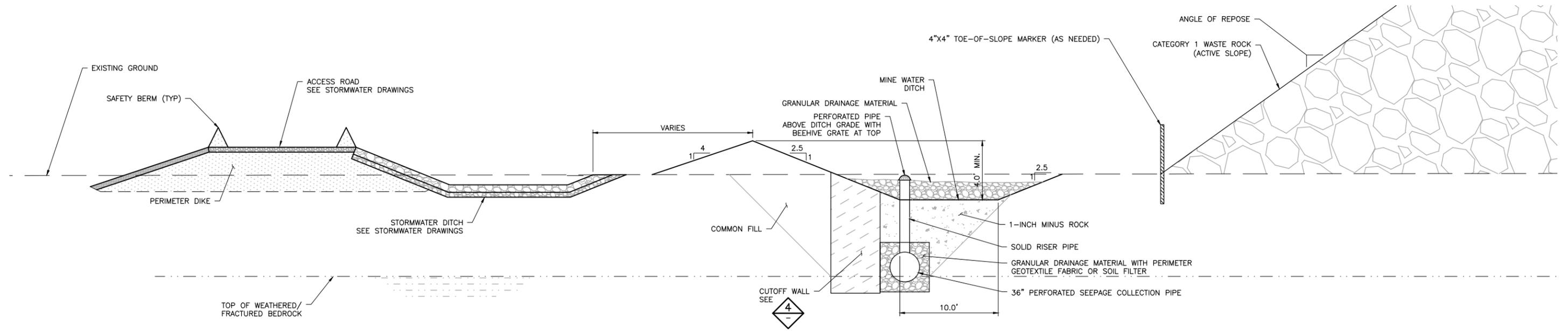
POLYMET MINING POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

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

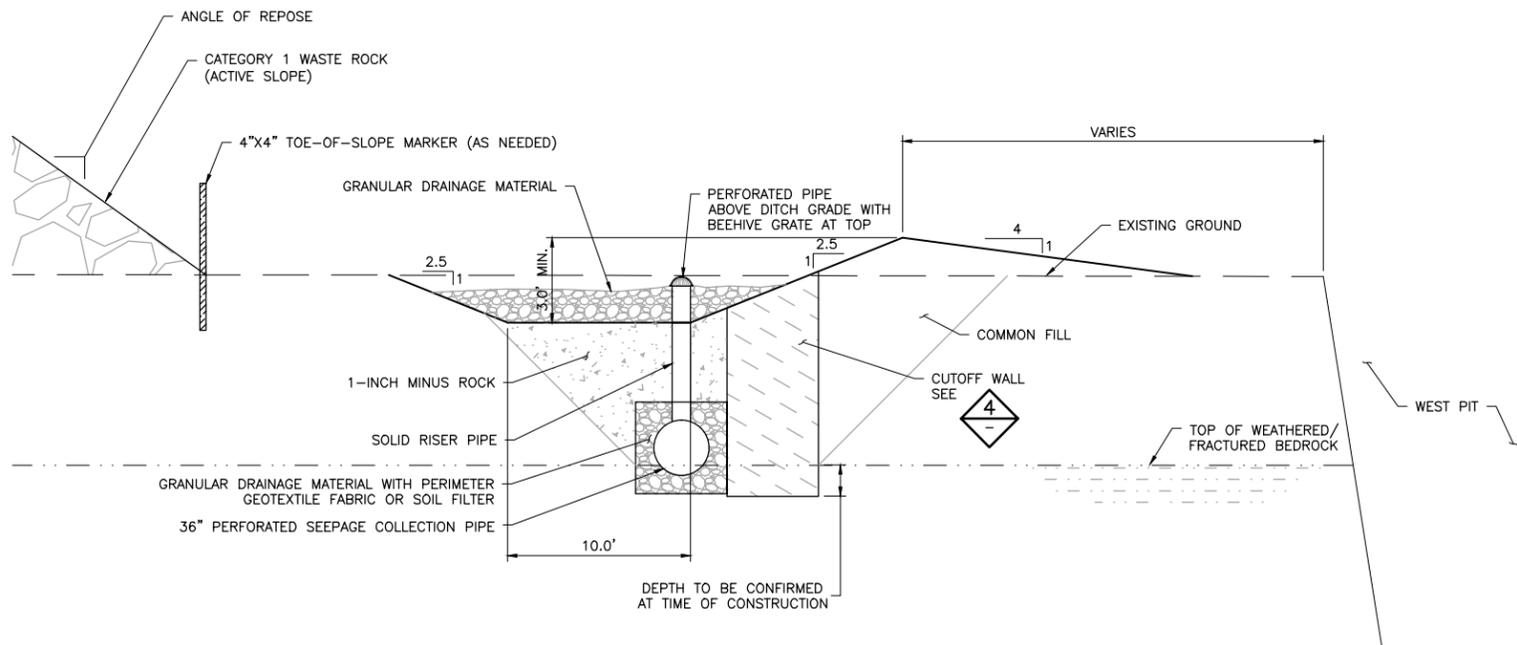
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INCHES

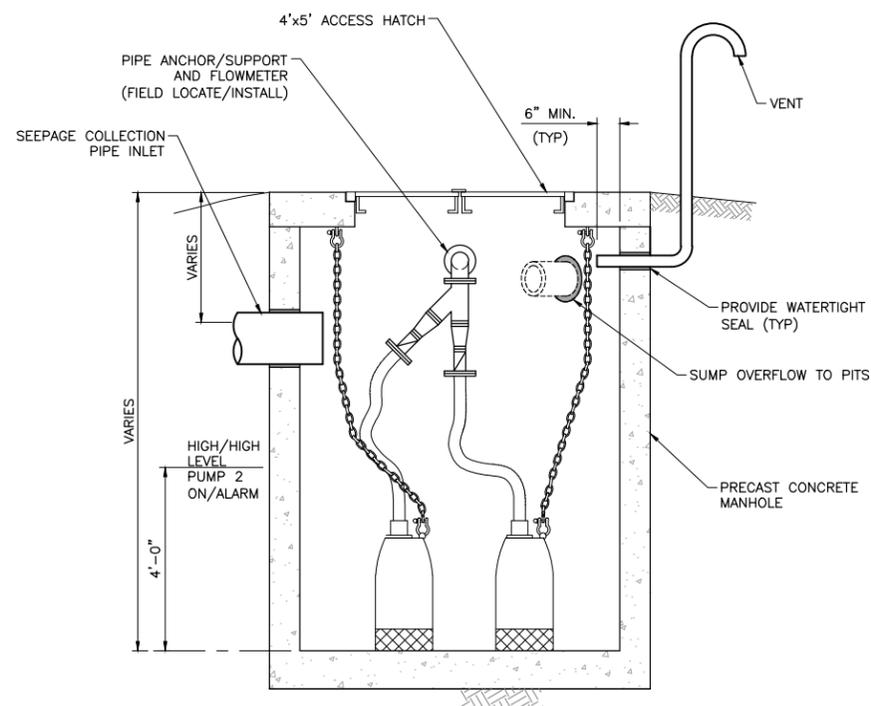
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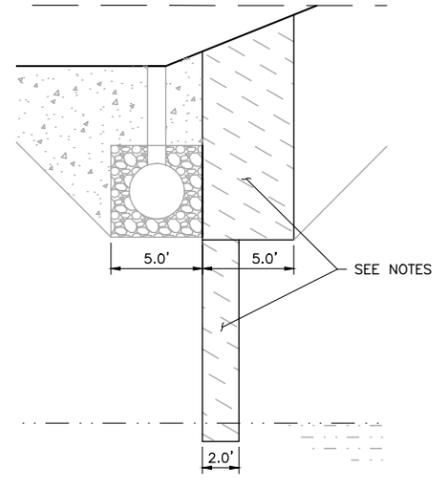
1 SECTION: NORTH GROUNDWATER CONTAINMENT SYSTEM TYPICAL SECTION - ADJACENT TO ACTIVE STOCKPILE
SCALE IN FEET



2 SECTION: SOUTH GROUNDWATER CONTAINMENT SYSTEM TYPICAL SECTION - ADJACENT TO ACTIVE STOCKPILE
SCALE IN FEET



3 SECTION: TYPICAL SUMP
NTS



4 SECTION: TYPICAL CUTOFF WALL
SCALE IN FEET

- NOTES:**
- CUTOFF WALL WILL BE A HYDRAULIC BARRIER CONSTRUCTED OF COMPACTED SOIL, GEOSYNTHETIC CLAY, OR APPROVED ALTERNATE.
 - USE TRENCHLESS TECHNOLOGY TO CONSTRUCT 2' WIDE TRENCH DOWN TO COMPETENT BEDROCK IN AREAS WHERE COLLECTION PIPE IS LOCATED ABOVE BEDROCK. SEE

PLANT DRAWING NUMBER:	
CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM TYPICAL CROSS SECTIONS	
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	
DRAWN: CAD	CHECKED: TJR
BARR PROJECT NO.: 23/69-0C29	SCALE: AS SHOWN
DWG. NO. GCS-010	REV

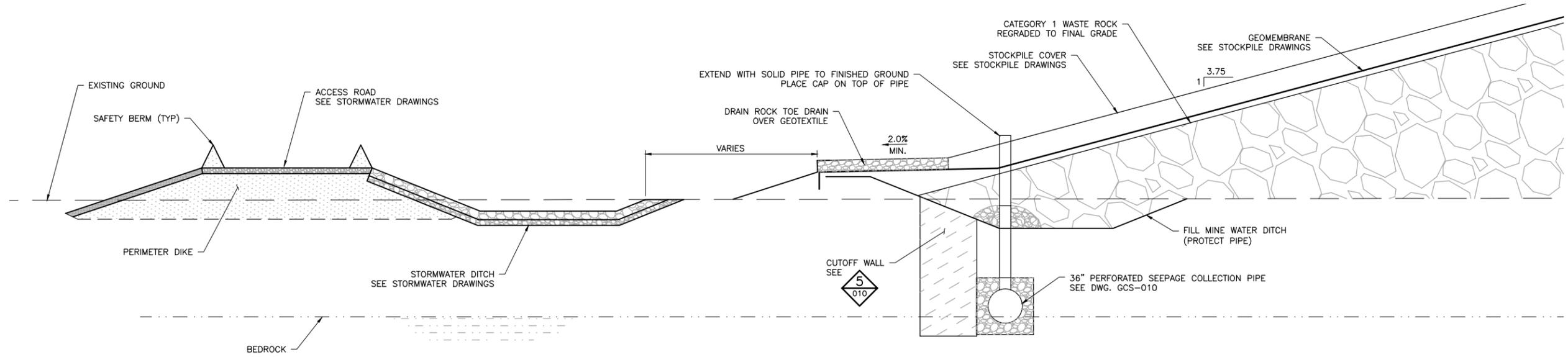
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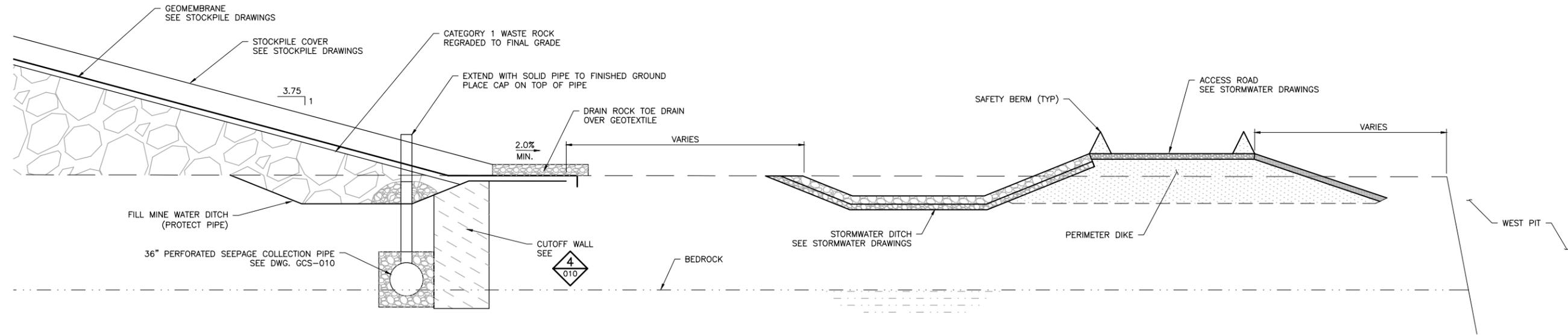
PRINTED NAME THOMAS J. RADUE
SIGNATURE *Thomas J. Radue*
DATE 7/25/17 LICENSE# 20951

2
1
INCHES

CADD USER: Cristian A. Diaz FILE: K:\DESIGN\2369029.10\PERMIT_NMM-21-CS-011.DWG PLOT SCALE: 1:2 PLOT DATE: 7/25/2017 11:50 AM



1 SECTION: CLOSURE NORTH GROUNDWATER CONTAINMENT SYSTEM TYPICAL SECTION - ADJACENT TO RECLAIMED STOCKPILE
 SCALE IN FEET



2 SECTION: CLOSURE SOUTH AND GROUNDWATER CONTAINMENT SYSTEM TYPICAL SECTION - ADJACENT TO RECLAIMED STOCKPILE
 SCALE IN FEET

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
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 DATE 7/25/17 LICENSE# 20951

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

PLANT DRAWING NUMBER:

CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM TYPICAL CROSS SECTIONS

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

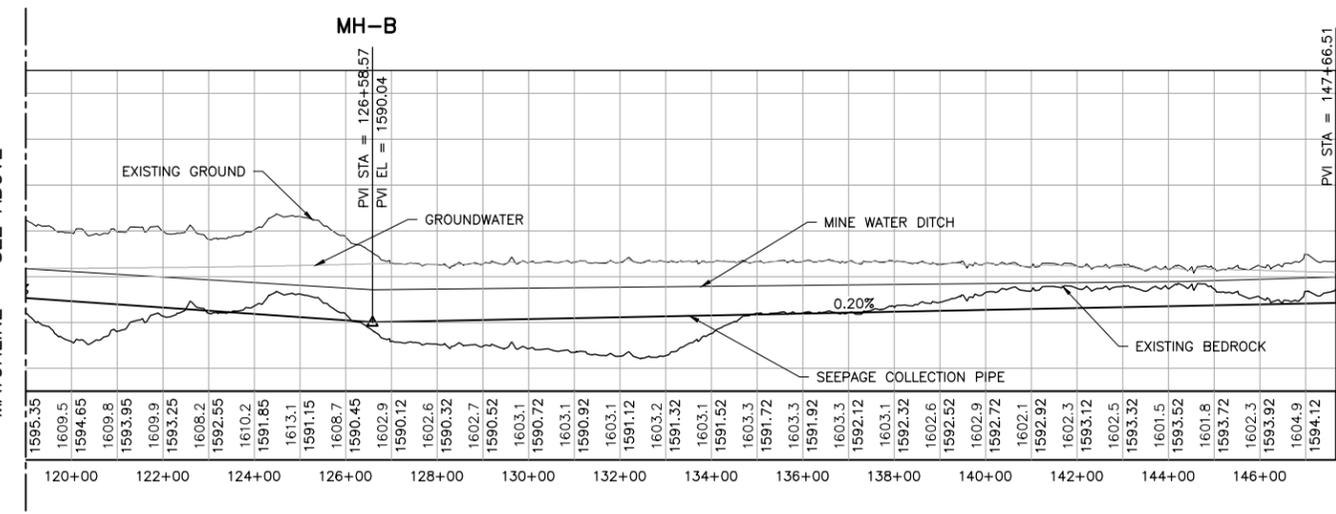
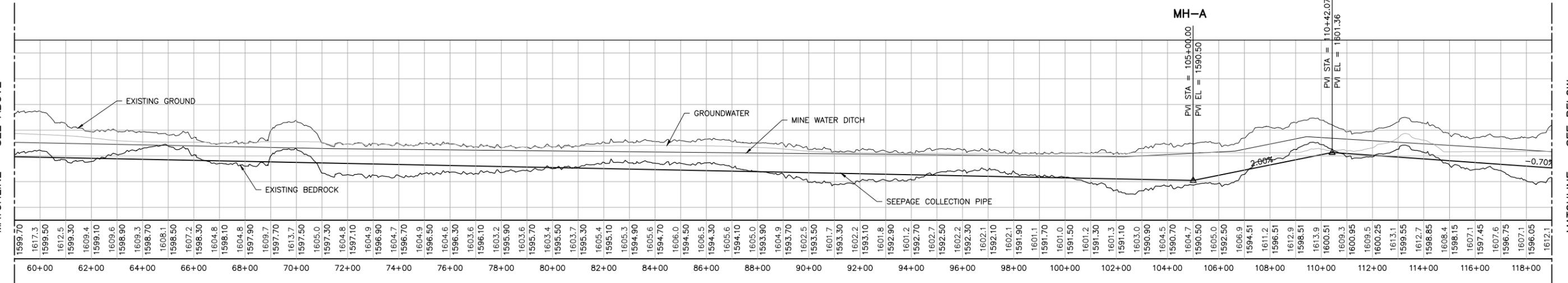
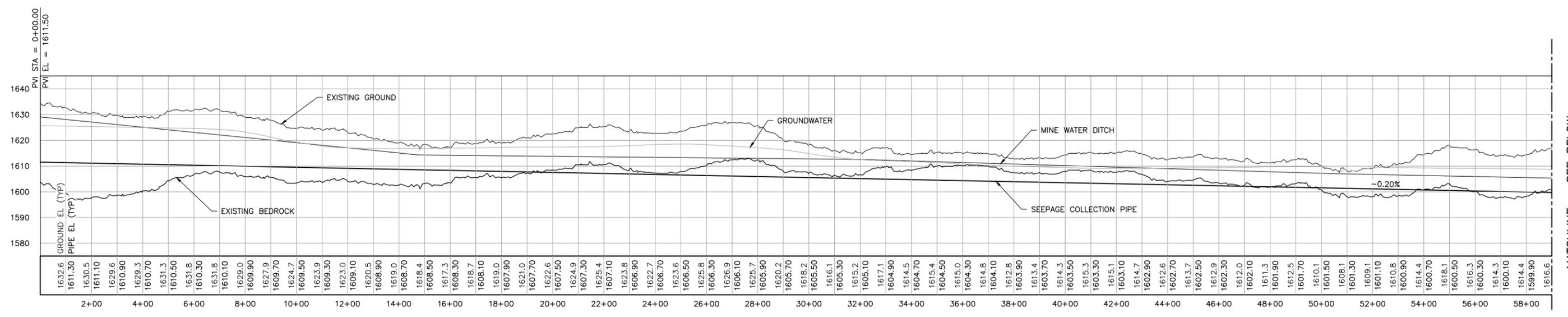
BARR BARR ENGINEERING CO. 4300 MARKETPOINTE DRIVE SUITE 200 MINNEAPOLIS, MN. Ph: 1-800-632-2277

DWG. NO. **GCS-011** REV

INCHES

MATCHLINE - SEE ABOVE

MATCHLINE - SEE ABOVE



1 PROFILE: NORTH GROUNDWATER CONTAINMENT SYSTEM

NOTE:
ALL GROUNDWATER AND BEDROCK PROFILES SHOWN ARE APPROXIMATE.

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
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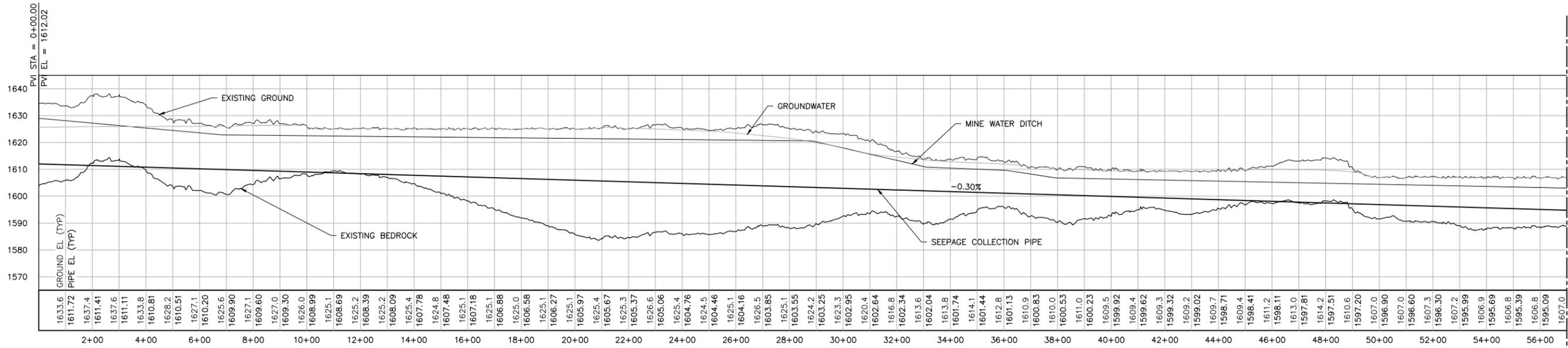
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CHECKED: TJR
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:
**CATEGORY 1 STOCKPILE
GROUNDWATER CONTAINMENT SYSTEM
NORTH PROFILES**

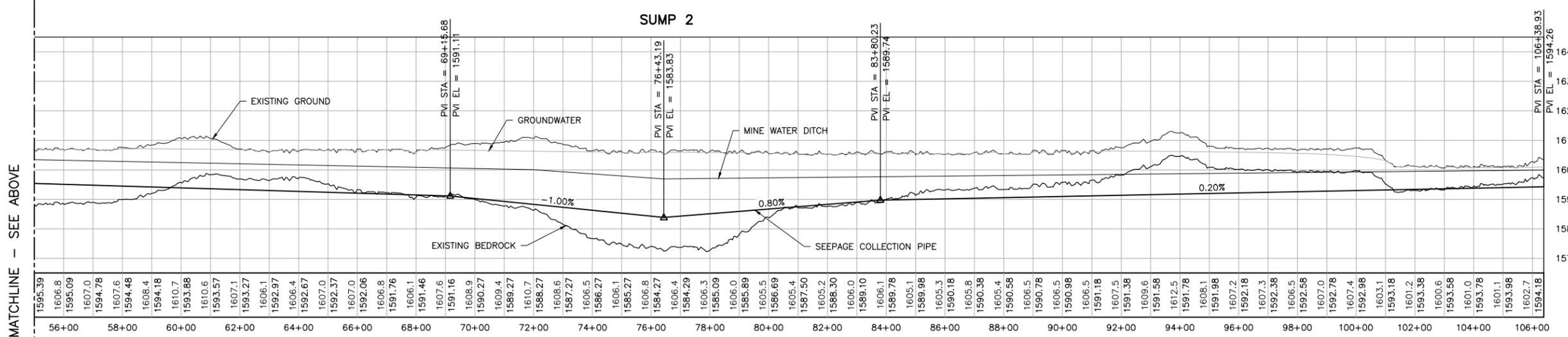
POLYMET MINING
POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

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

DWG. NO. **GCS-012**



MATCHLINE - SEE BELOW



MATCHLINE - SEE ABOVE

2 - PROFILE: SOUTH GROUNDWATER CONTAINMENT SYSTEM

NOTE:
ALL GROUNDWATER AND BEDROCK PROFILES SHOWN ARE APPROXIMATE.

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SIGNATURE *Thomas J. Radue*
DATE 7/25/17 LICENSE# 20951

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

PLANT DRAWING NUMBER:

CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM SOUTH PROFILES

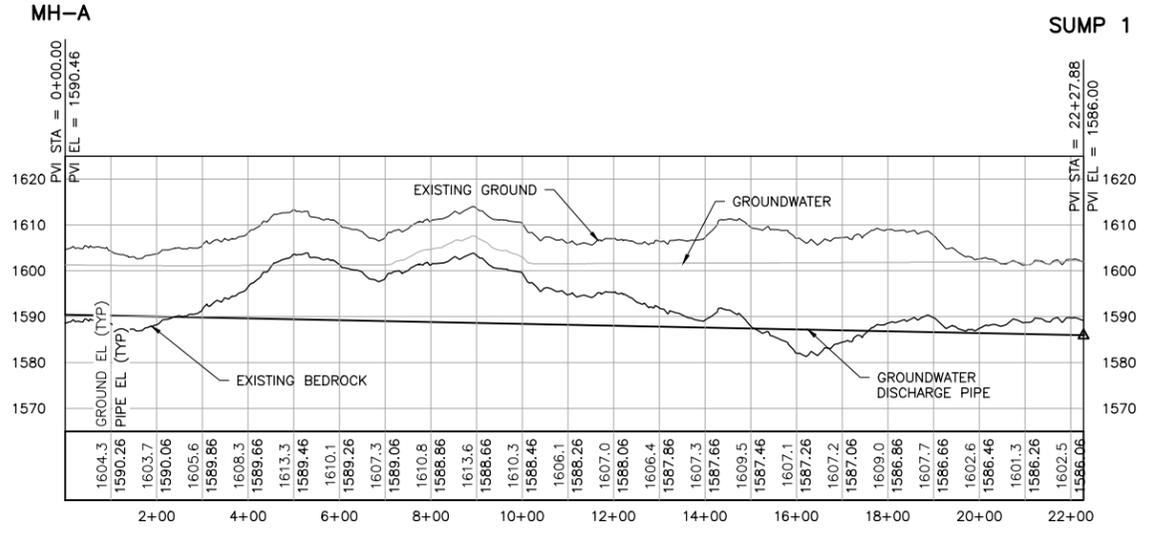
POLYMET MINING
POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

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

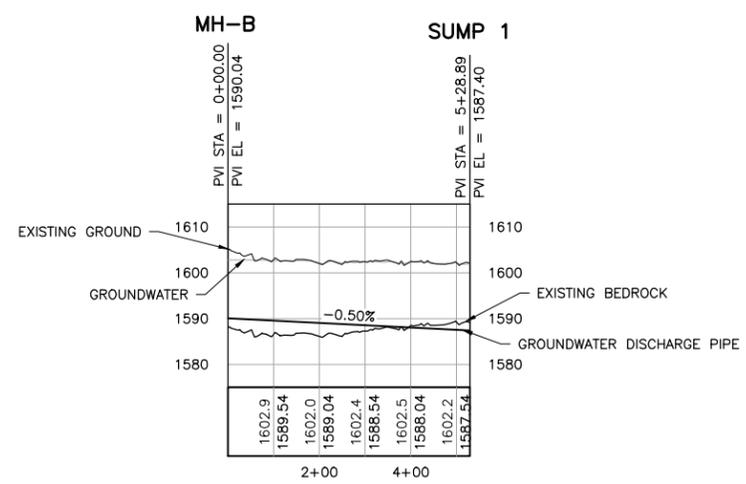
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REV

CADD USER: Cristian A. Diaz FILE: K:\DESIGN\23690229.10\PERMIT_NMM-21-CS-014.DWG PLOT SCALE: 1:2 PLOT DATE: 7/25/2017 11:22 AM



3 PROFILE: MANHOLE A GROUNDWATER DISCHARGE PIPE TO SUMP 1



4 PROFILE: MANHOLE B GROUNDWATER DISCHARGE PIPE TO SUMP 1

NOTE:
ALL GROUNDWATER AND BEDROCK PROFILES SHOWN ARE APPROXIMATE.

PLANT DRAWING NUMBER:	
CATEGORY 1 STOCKPILE GROUNDWATER CONTAINMENT SYSTEM DISCHARGE PROFILES	
	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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SCALE: AS SHOWN

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