

**Appendix 7 Hydrometallurgical Residue Facility Permit Application Support
Drawings**

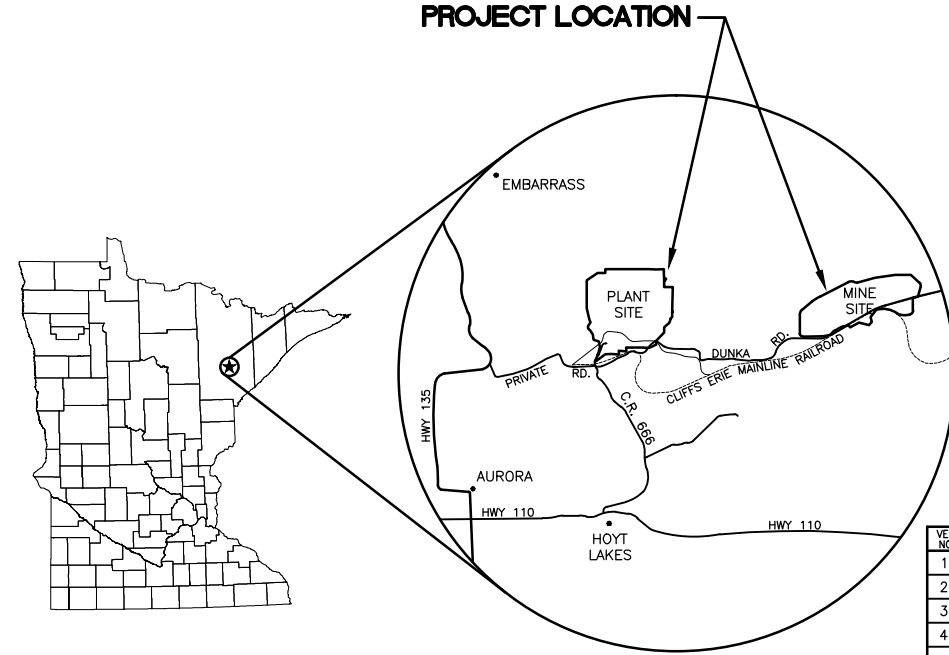
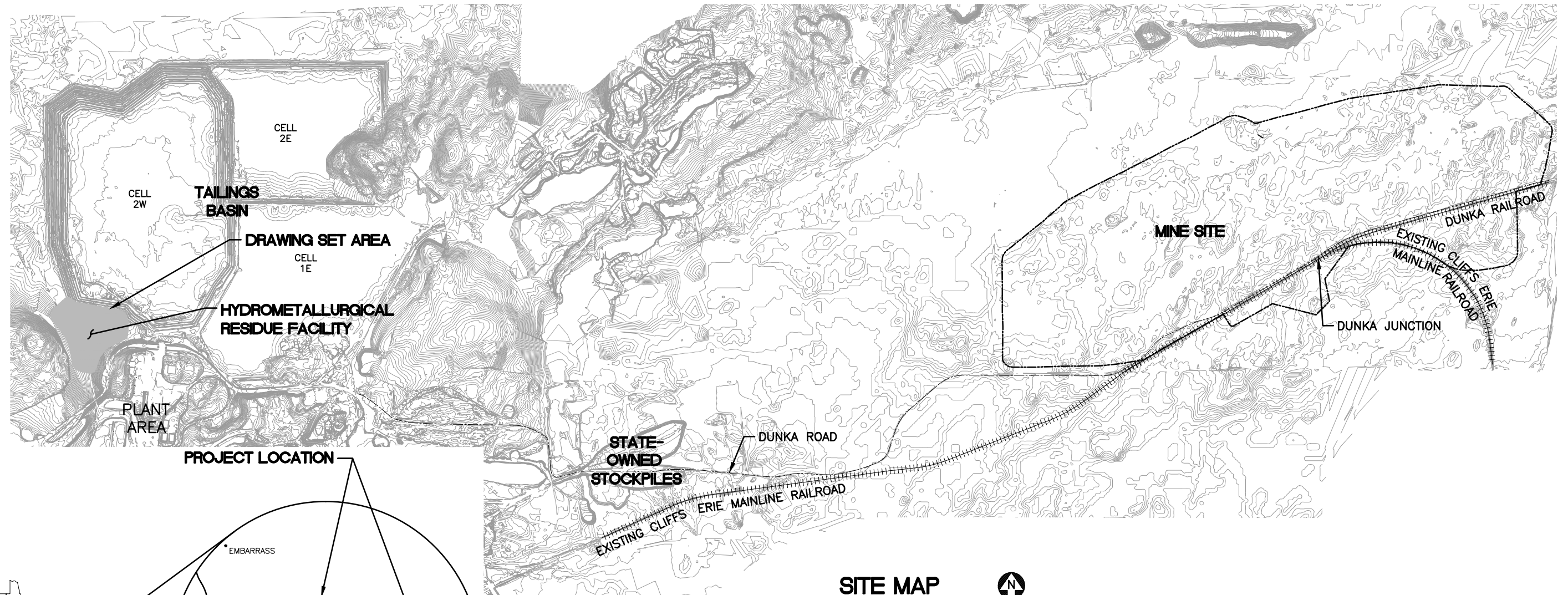
POLY MET MINING, INC. NORTHMET PROJECT

PERMIT SUPPORT DRAWINGS

HYDROMETALLURGICAL RESIDUE FACILITY

HOYT LAKES, MINNESOTA

CADD USER: Adepluser FILE: \\P\HIB\HIBING PW\HBB PW IN\BREA7EA-C05A-4CBA-9301-61D8B8B1A5B\184B4B3B-96F6-4F7E-99C5-D4F3D6A0FD14\PERMIT_NMT-01-CS-001.DWG PLOT SCALE: 1:2 PLOT DATE: 6/9/2015 3:52 PM
 INCHES 2 1



LOCATION MAP
NOT TO SCALE



VICINITY MAP
NOT TO SCALE

SITE MAP



0 2000 4000
SCALE IN FEET

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	10/14/11	RESIDUE MANAGEMENT PLAN - VERSION 1 - ATTACHMENT A	ISSUED		
2	06/29/12	RESIDUE MANAGEMENT PLAN - VERSION 1 - RESPONSE TO COMMENTS			
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			NOT APPROVED FOR CONSTRUCTION		

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PRINTED NAME THOMAS J. RADUE
SIGNATURE *Thomas J. Radue*
DATE 5/19/15 LICENSE# 20951

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

PLANT DRAWING NUMBER:
HYDROMETALLURGICAL RESIDUE FACILITY LOCATION MAP AND SITE MAP

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

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

DWG. NO. **HRF-001** REV

CADD USER: AdepUser FILE: \\PWHIB\HIBING PW\HIBB PW\IN\BREATA-C05A-4GBA-9301-61DB8B81A5R\49C408A-C10F-4749-9390-766001AD8499\FERMIT_NMT-01-CS-002.DWG PLOT SCALE: 1:2 PLOT DATE: 6/9/2015 3:53 PM

GENERAL LEGEND

- 1000 EXISTING CONTOUR - MAJOR
- EXISTING CONTOUR - MINOR
- 1000 PROPOSED CONTOUR - MAJOR
- PROPOSED CONTOUR - MINOR
- EXISTING POWER POLE
- EXISTING RAILROAD
- EXISTING ROAD
- EXISTING TRAIL
- EXISTING UNIMPROVED TRAIL
- EXISTING STRUCTURES
- TREE LINE
- WETLAND BOUNDARY
- EXISTING CULVERT
- EXISTING PIPELINE
- OVERHEAD ELECTRIC
- DISCHARGE POINT
- DEWATERING OUTLET POINT
- RETURN PUMP PAD
- DEWATERING PUMP
- SURFACE DRAINAGE
- DRAINAGE COLLECTION STRUCTURE AND PIPE
- DRAINAGE AREA BOUNDARY
- PROPOSED DAMS
- PROPOSED DEWATERING PIPE
- PROPOSED DISCHARGE PIPELINE
- PROPOSED RETURN PIPELINE
- PROPOSED CULVERT (NON-MINE DRAINAGE)
- PROPOSED SEEPAGE COLLECTION DRAIN
- PROPOSED STORMWATER DRAIN
- PROPOSED MANHOLE
- PROPOSED WICK DRAIN LATERAL PIPE
- PROPOSED RIP RAP
- FILL SLOPE
- CUT SLOPE

ABBREVIATIONS

- APPROX. - APPROXIMATE
- CDSM - CEMENT DEEP SOIL MIX
- CMP - CORRUGATED METAL PIPE
- CPEP - CORRUGATED POLYETHYLENE PIPE
- CY - CUBIC YARD
- DR - DIMENSION RATIO
- DWG - DRAWING
- EL. - ELEVATION
- F - DIAMETER
- FTB - FLOTATION TAILINGS BASIN
- GCL - GEOSYNTHETIC CLAY LINER
- HDPE - HIGH DENSITY POLYETHYLENE
- HRF - HYDROMETALLURGICAL RESIDUE FACILITY
- LDPE - LOW DENSITY POLYETHYLENE
- LF - LINER FEET
- LTVSMC - LTV STEEL MINING COMPANY
- MCY - MILLION CUBIC YARDS
- mil - one thousandth of an inch
- MIN - MINIMUM
- MSL - MEAN SEA LEVEL
- NTS - NOT TO SCALE
- SCH. - SCHEDULE
- DR - DIMENSION RATIO
- TYP. - TYPICAL

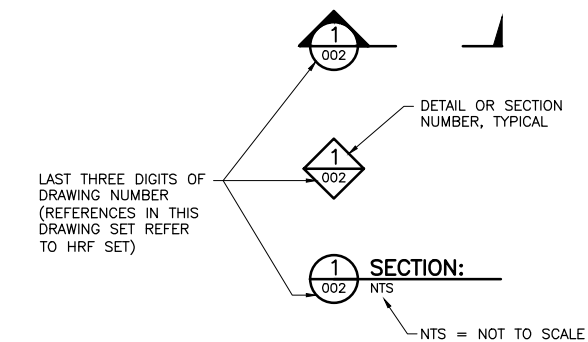
SHEET INDEX

SHEET NO. TITLE

GENERAL DRAWINGS

- HRF-001 LOCATION MAP AND SITE MAP
- HRF-002 LEGEND AND SHEET INDEX
- HRF-003 EXISTING CONDITIONS
- HRF-004 RESIDUE FACILITY LAYOUT - MINE YEAR 20
- HRF-005 EMERGENCY BASIN EXCAVATIONS AND REMOVALS
- HRF-006 SUBGRADE IMPROVEMENT AND SEEPAGE COLLECTION DRAIN LAYOUT
- HRF-007 EMERGENCY BASIN PRELOAD
- HRF-008 PHASE 1 LAYOUT
- HRF-009 PHASE 2 LAYOUT
- HRF-010 PHASE 3 LAYOUT
- HRF-011 CROSS SECTIONS
- HRF-012 CROSS SECTIONS
- HRF-013 SUMP AND SIDE WALL RISER PLAN LAYOUT
- HRF-014 SUMP AND SIDE WALL RISER SECTIONS
- HRF-015 SUMP AND PUMP DETAILS
- HRF-016 TYPICAL SECTIONS AND DETAILS
- HRF-017 PIPING PLAN AND PROFILE
- HRF-018 PIPING DETAILS
- HRF-019 RETURN WATER PUMP RAFT
- HRF-020 CLOSURE PREPARATION PLAN
- HRF-021 TEMPORARY COVER AND FINAL COVER GRADING
- HRF-022 FINAL CLOSURE GRADING AND DRAINAGE
- HRF-023 CLOSURE SECTIONS AND DETAILS
- HRF-024 GEOTECHNICAL INSTRUMENTATION DETAILS

DRAWING NUMBERING



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.

PLANT DRAWING NUMBER:

**HYDROMETALLURGICAL RESIDUE FACILITY
LEGEND AND SHEET INDEX**



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



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

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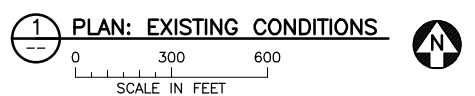
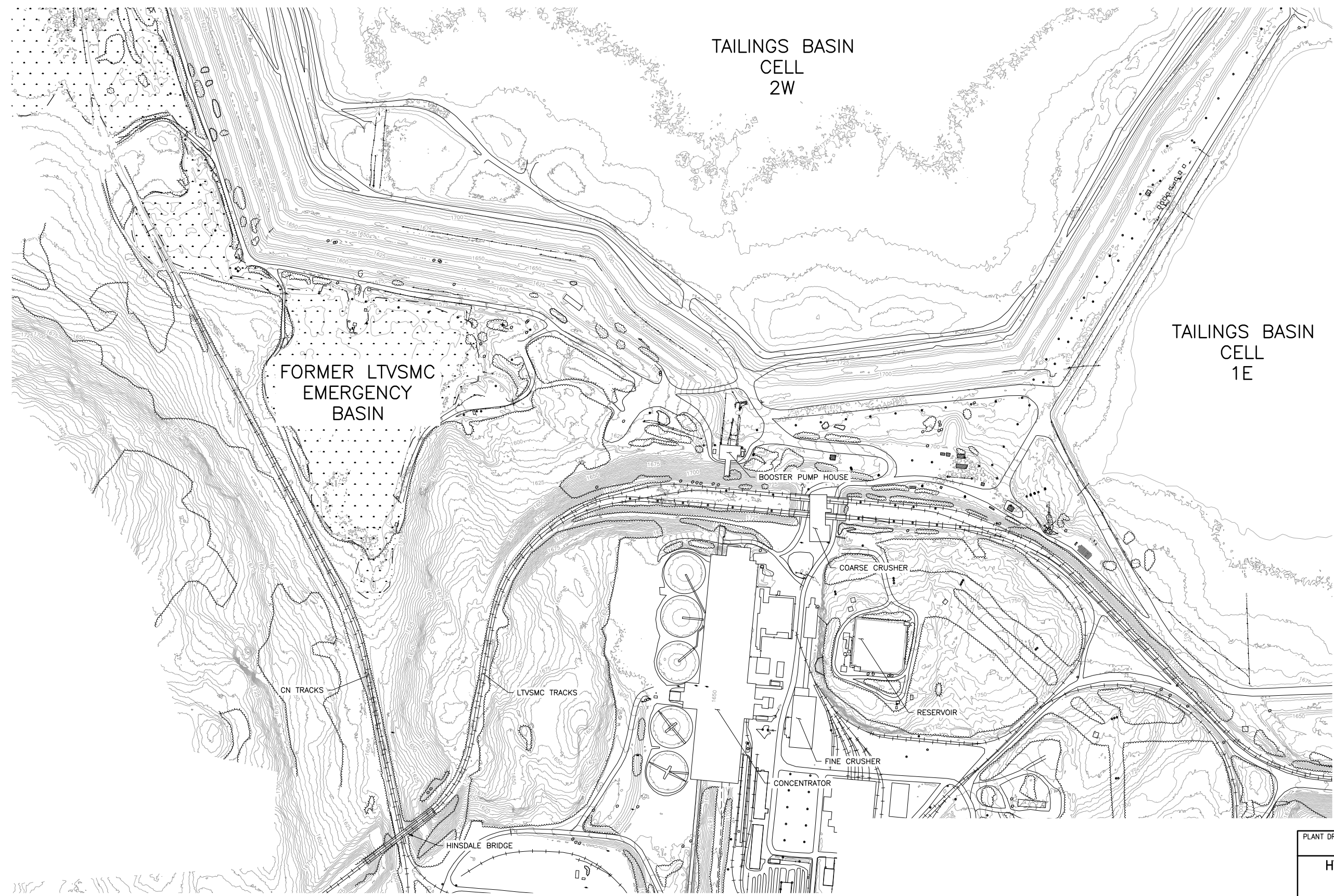
PRINTED NAME THOMAS J. RADUE
SIGNATURE *Thomas J. Radue*
DATE 5/19/15 LICENSE# 20951

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DWG. NO. **HRF-002** REV

INCHES

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

PLANT DRAWING NUMBER:
HYDROMETALLURGICAL RESIDUE FACILITY EXISTING CONDITIONS

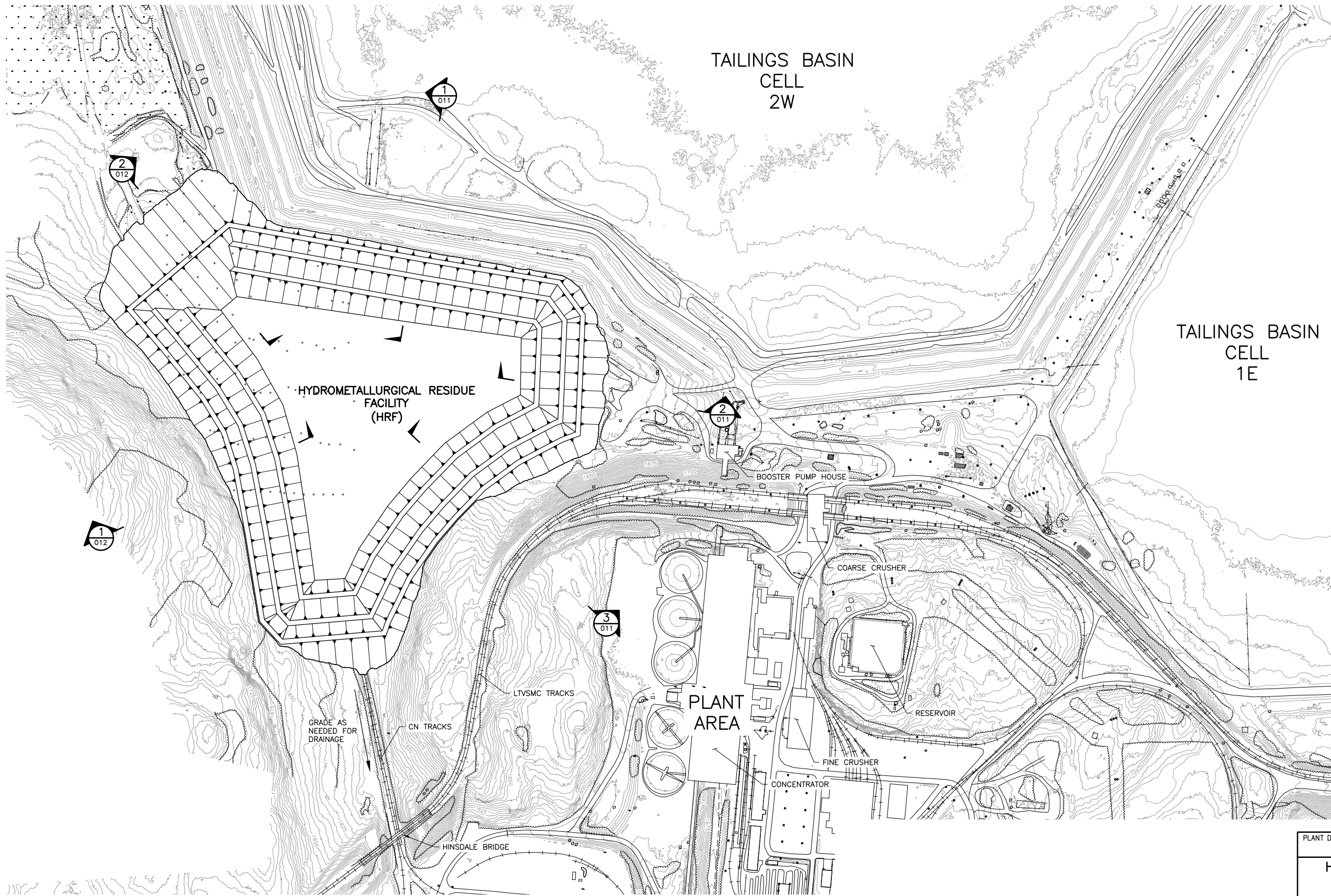
POLYMET MINING POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

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

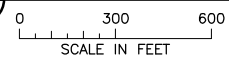
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1 PLAN: RESIDUE FACILITY LAYOUT



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

PLANT DRAWING NUMBER:

**HYDROMETALLURGICAL RESIDUE FACILITY
 RESIDUE FACILITY LAYOUT
 MINE YEAR 20**

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

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

DWG. NO. **HRF-004** REV

2
1
INCHES

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- NOTES:**
1. APPROXIMATE SOIL AND ROCK REMOVAL VOLUME = 329,000 CY
 2. DISPOSE OF DEMOLITION DEBRIS IN LTVSMC EXISTING INDUSTRIAL LANDFILL. APPROXIMATE DISTANCE TO LANDFILL IS 3 MILES.

1 PLAN: EMERGENCY BASIN REMOVALS

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

PLANT DRAWING NUMBER:

**HYDROMETALLURGICAL RESIDUE FACILITY
 EMERGENCY BASIN EXCAVATIONS
 AND REMOVALS**

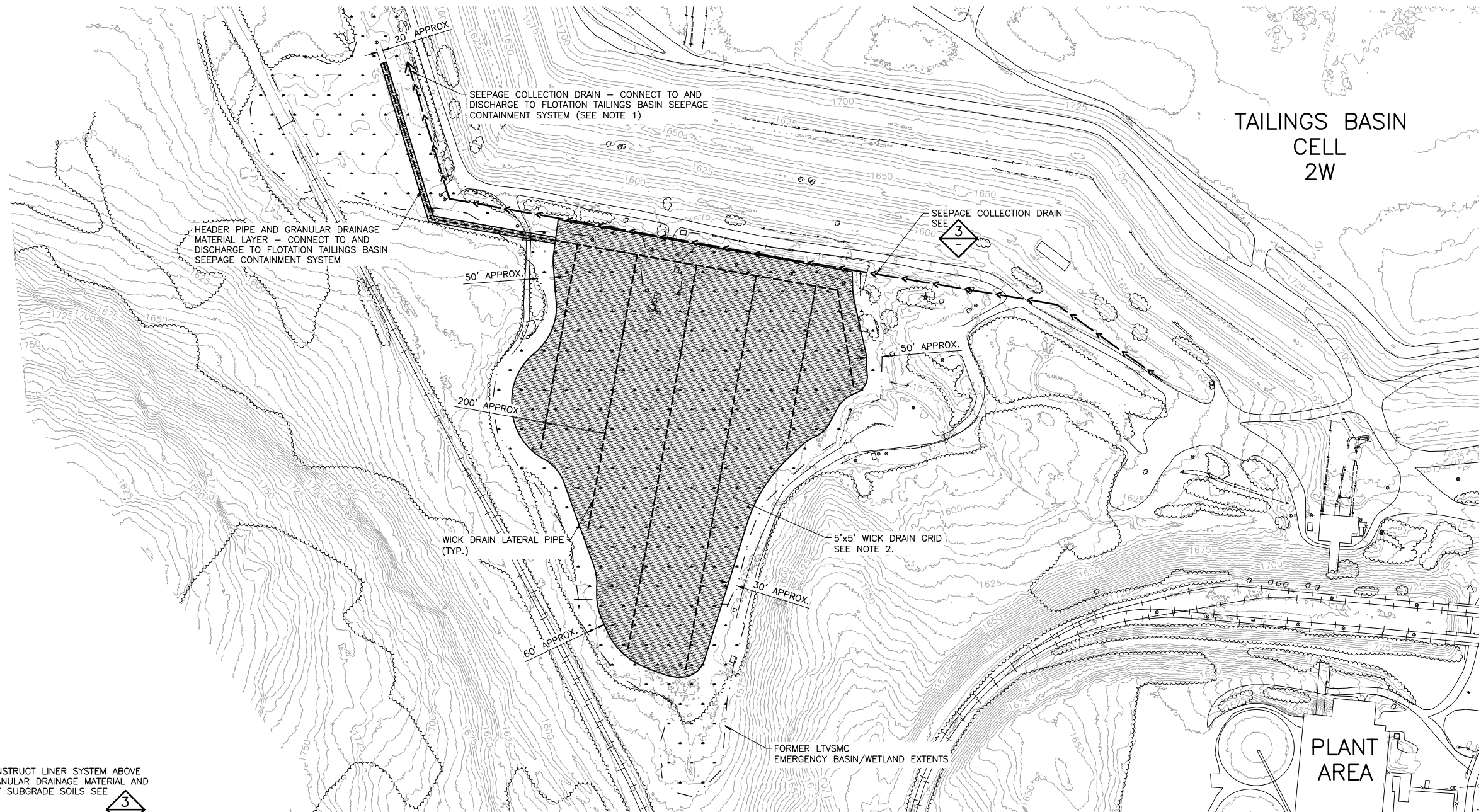
POLYMET MINING POLY MET MINING, INC.
 NORTHMET PROJECT
 HOYT LAKES, MINNESOTA

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

DWG. NO. **HRF-005** REV

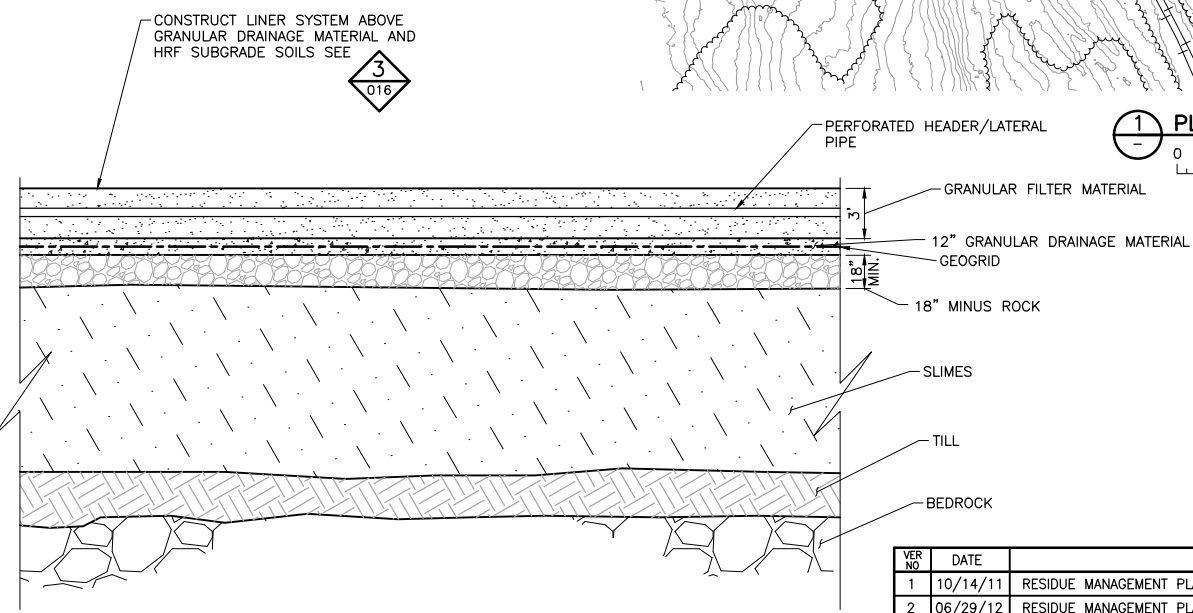
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1
INCHES

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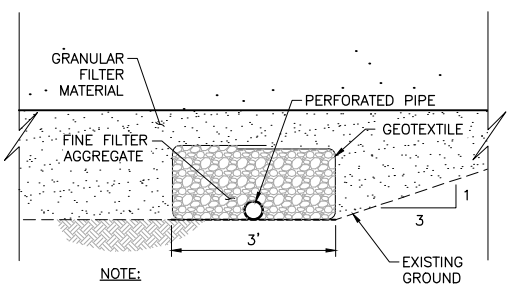


TAILINGS BASIN
CELL
2W

1 PLAN: SEEPAGE COLLECTION LAYOUT



2 DETAIL: DRAIN INSTALLATION



3 DETAIL: SEEPAGE COLLECTION DRAIN

- NOTES:**
- SEE FLOTATION TAILINGS BASIN SEEPAGE CONTAINMENT SYSTEM DRAWINGS FOR CONTAINMENT SYSTEM LOCATION AND DESIGN.
 - WICK DRAINS MAY BE INSTALLED TO IMPROVE THE CONSOLIDATION.

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

PLANT DRAWING NUMBER:

**HYDROMETALLURGICAL RESIDUE FACILITY
SUBGRADE IMPROVEMENT AND SEEPAGE
COLLECTION DRAIN LAYOUT**

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

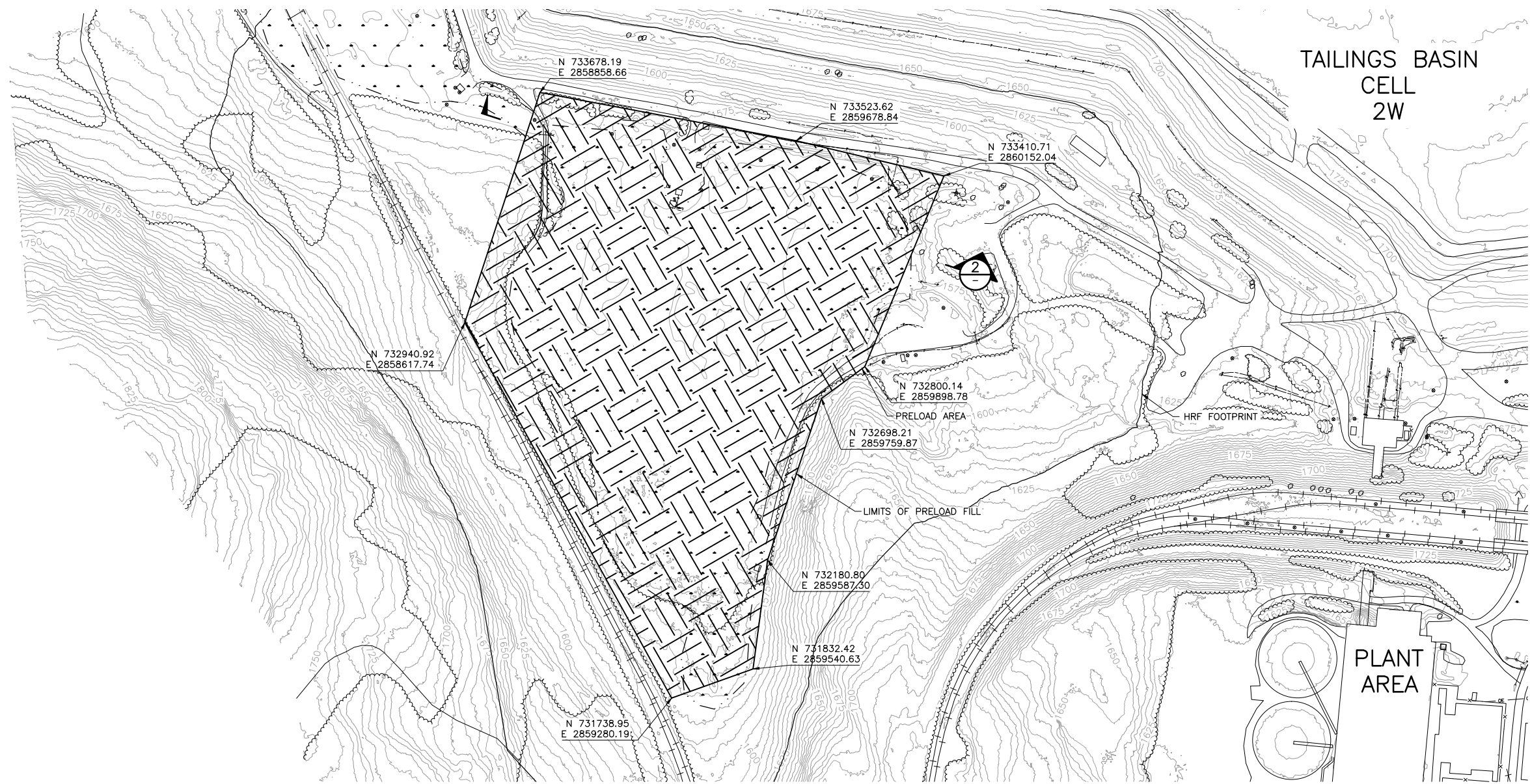
BARR ENGINEERING COMPANY
4700 WEST 77TH STREET
MINNEAPOLIS, MN.
Ph: 1-800-632-2277

DWG. NO. **HRF-006**

REV

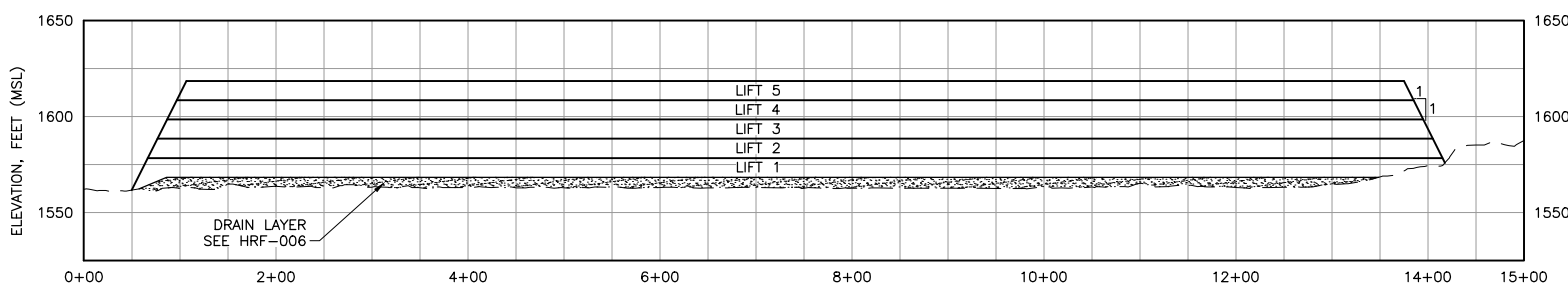
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1 PLAN: PRELOAD LAYOUT
 0 200 400
 SCALE IN FEET

- NOTES:**
1. PRELOAD AREA USING SOIL AND ROCK REMOVED FOR HRF (SEE DWG. HRF-005).
 2. SOIL AND ROCK PRELOAD MATERIAL TO BE REMOVED TO HRF LINER GRADE AND UTILIZED FOR HRF DAM CONSTRUCTION.
 3. NUMBER OF PRELOAD LIFTS IS PRELIMINARY.



2 SECTION: PRELOAD LIFTS
 0 100 200
 HORIZONTAL SCALE IN FEET

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

PLANT DRAWING NUMBER:

**HYDROMETALLURGICAL RESIDUE FACILITY
 EMERGENCY BASIN PRELOAD**

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

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

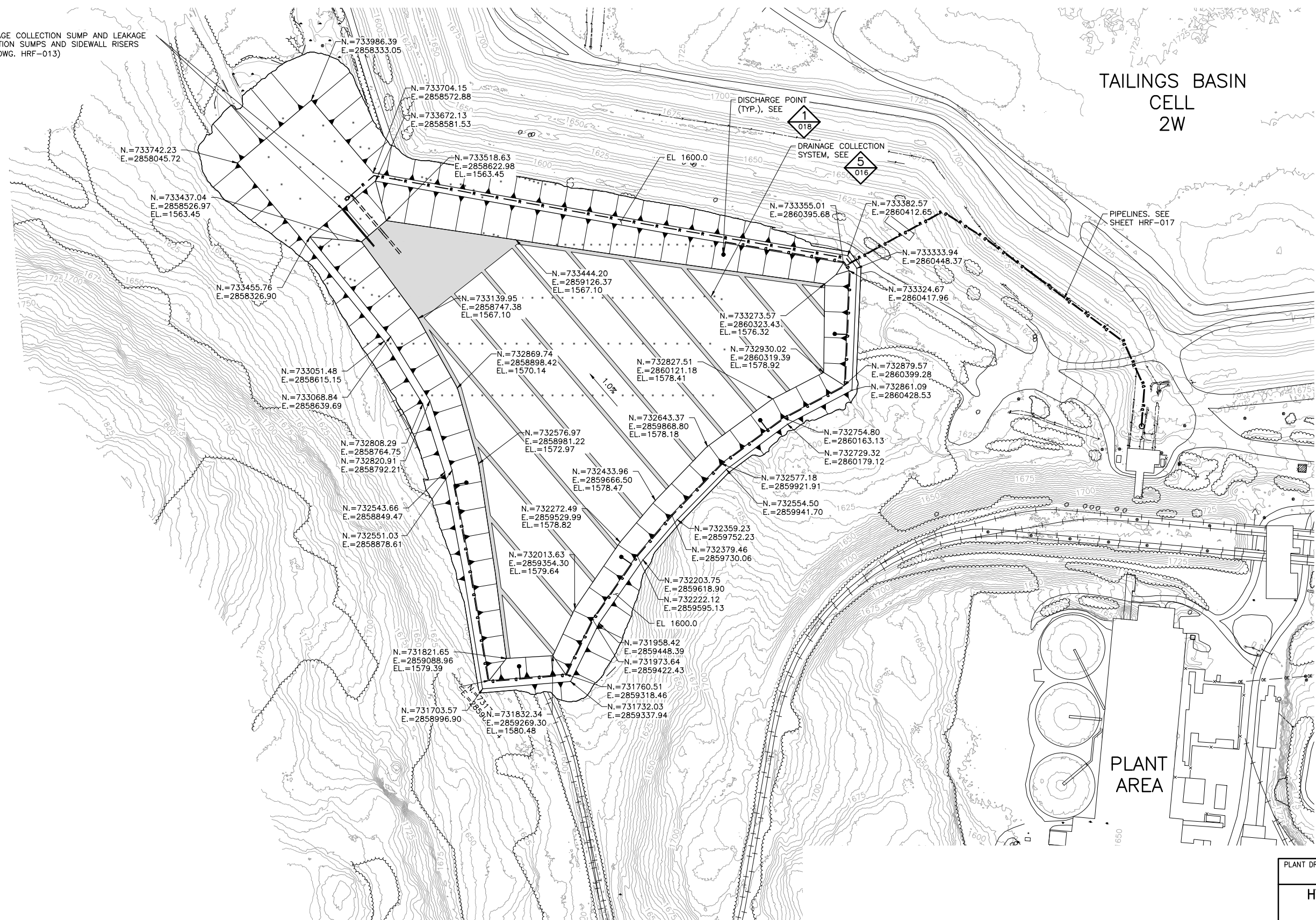
DWG. NO. **HRF-007** REV

INCHES

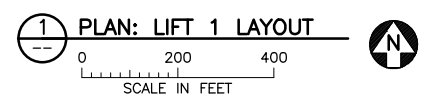
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DRAINAGE COLLECTION SUMP AND LEAKAGE DETECTION SUMPS AND SIDEWALL RISERS (SEE DWG. HRF-013)

TAILINGS BASIN CELL 2W



- NOTES:**
1. UPPER LINER SURFACE SHOWN.
 2. DRAINAGE COLLECTION GEOCOMPOSITE SHOWN (SHADED AREA).
 3. PLACE HRF LINER OVER BASE AND INTERIOR SLOPES OF CELL. SEE DWG. HRF-016.



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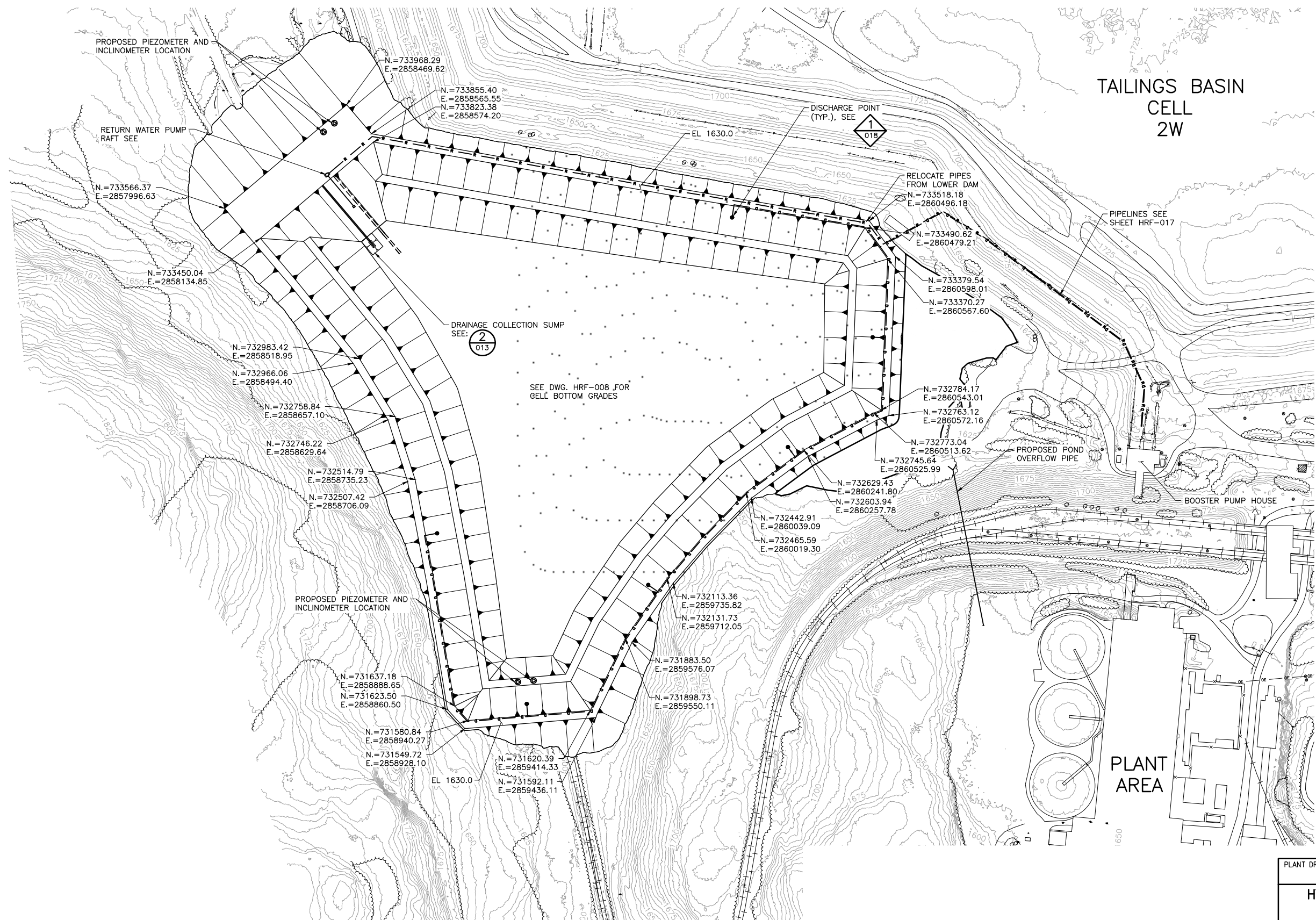
PLANT DRAWING NUMBER:
HYDROMETALLURGICAL RESIDUE FACILITY LIFT 1 LAYOUT

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

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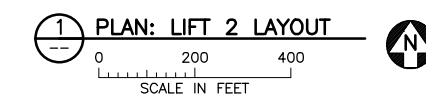
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**TAILINGS BASIN
CELL
2W**

- NOTES:**
- LIFT 2 CONSTRUCTION YEAR TO BE BASED ON HRF CAPACITY CONSUMPTION RATE.
 - UPPER LINER SURFACE SHOWN.
 - FOR LEAKAGE DETECTION SUMP SEE 1
013
 - PLACE HRF LINER OVER BASE AND INTERIOR SLOPES OF CELL. SEE DWG. HRF-016.



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PRINTED NAME THOMAS J. RADUE
SIGNATURE *Thomas J. Radue*
DATE 5/19/15 LICENSE# 20951

PLANT DRAWING NUMBER:

**HYDROMETALLURGICAL RESIDUE FACILITY
LIFT 2 LAYOUT**

POLYMET MINING

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

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

BARR

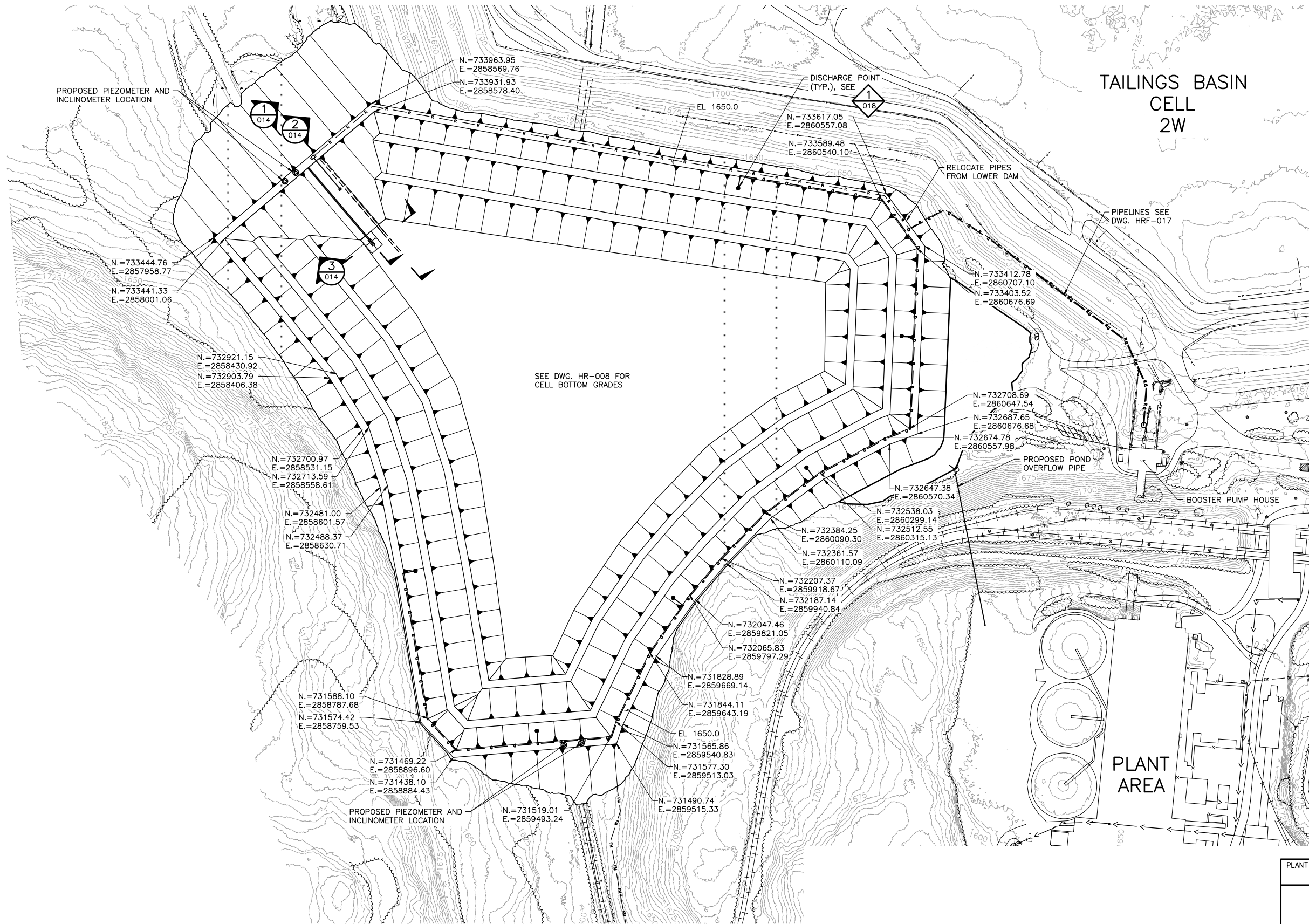
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CHECKED: TJR
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

DWG. NO. **HRF-009**

REV

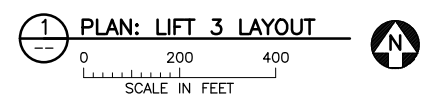
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**TAILINGS BASIN
CELL
2W**

- NOTES:**
- LIFT 3 CONSTRUCTION YEAR TO BE BASED ON HRF CAPACITY CONSUMPTION RATE.
 - UPPER LINER SURFACE SHOWN.
 - PLACE HRF LINER OVER BASE AND INTERIOR SLOPES OF CELL. SEE DWG. HRF-016.



1 PLAN: LIFT 3 LAYOUT

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	10/14/11	RESIDUE MANAGEMENT PLAN - VERSION 1 - ATTACHMENT A	ISSUED		
2	06/29/12	RESIDUE MANAGEMENT PLAN - VERSION 1 - RESPONSE TO COMMENTS			
3	12/14/12	RESIDUE MANAGEMENT PLAN - VERSION 2 - ATTACHMENT A	FOR PERMITTING	4	5/19/15
4	5/19/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS	FOR CONSTRUCTION		
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PRINTED NAME THOMAS J. RADUE
SIGNATURE *Thomas J. Radue*
DATE 5/19/15 LICENSE# 20951

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

PLANT DRAWING NUMBER:
**HYDROMETALLURGICAL RESIDUE FACILITY
LIFT 3 LAYOUT**

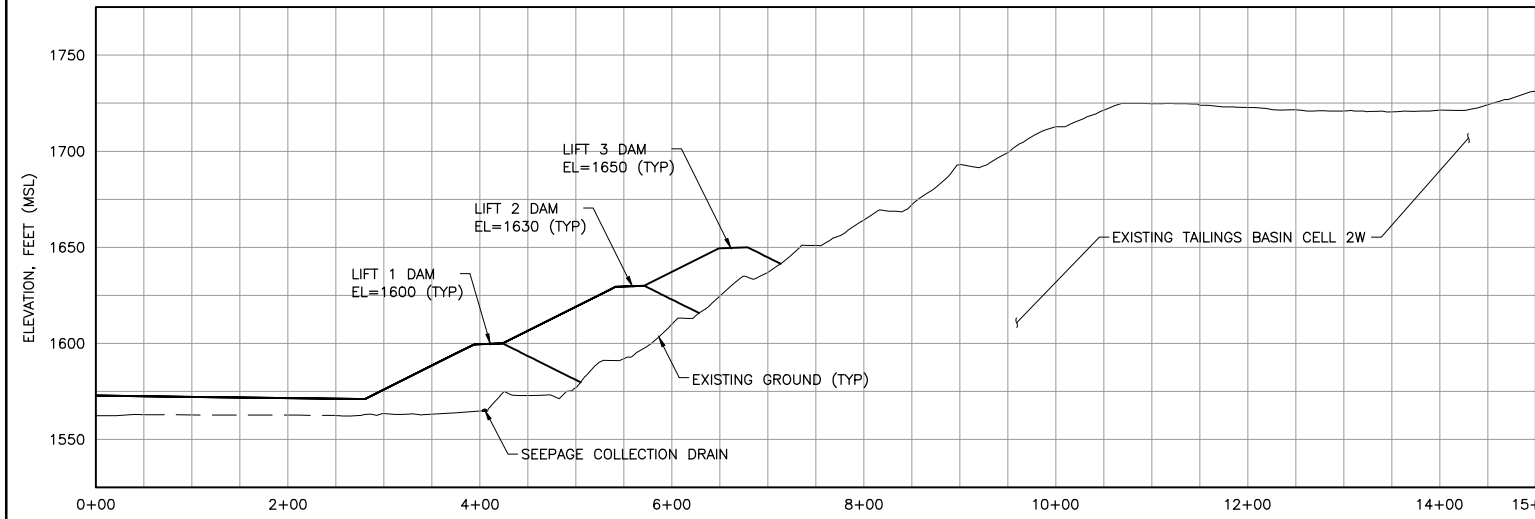
POLYMET MINING POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

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

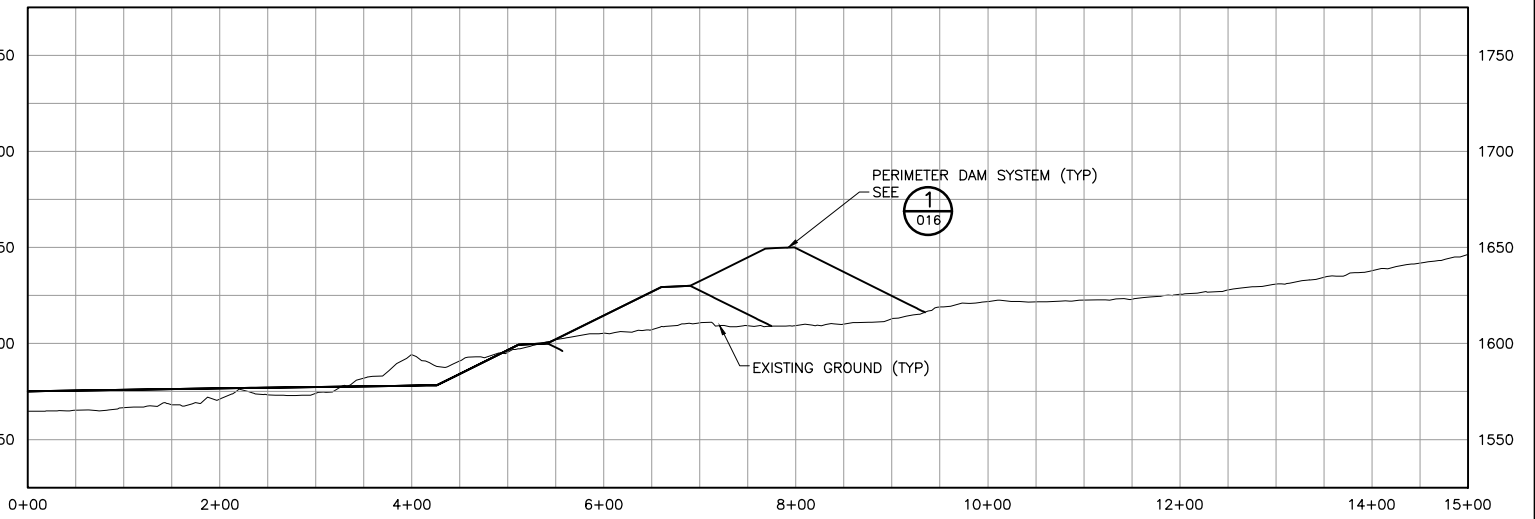
DWG. NO. **HRF-010** REV

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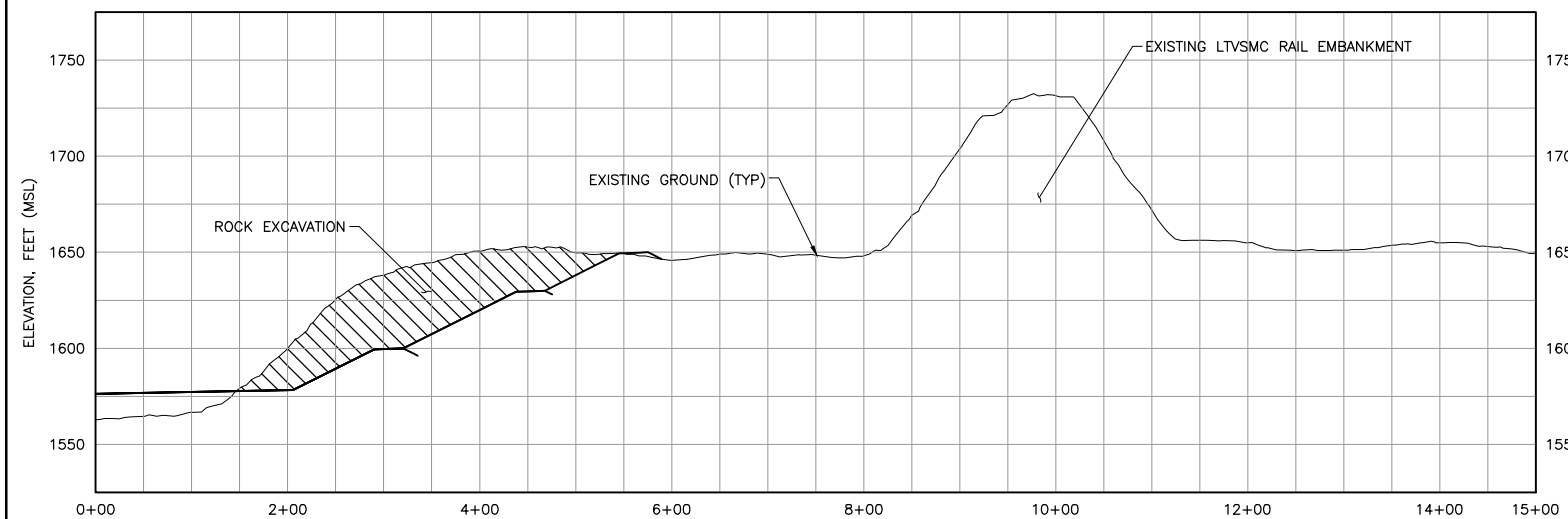
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1 SECTION: HRF NORTH DAM
 0 100 200
 HORIZONTAL SCALE IN FEET



2 SECTION: HRF EAST DAM
 0 100 200
 HORIZONTAL SCALE IN FEET



3 SECTION: HRF SOUTH EAST DAM
 0 100 200
 HORIZONTAL SCALE IN FEET

NOTES:
 1. SEE DWG. HRF-004 FOR SECTION LOCATIONS.

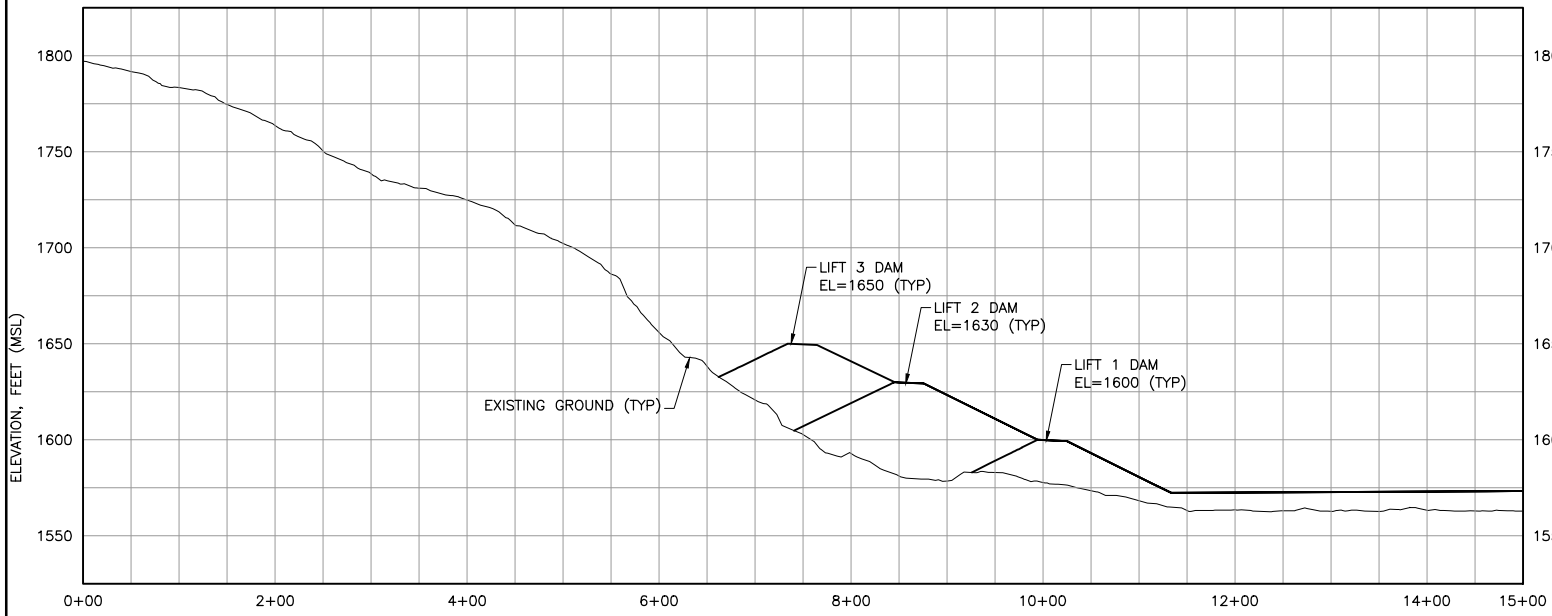
PLANT DRAWING NUMBER:	
HYDROMETALLURGICAL RESIDUE FACILITY CROSS SECTIONS	
 POLYMET MINING	POLY MET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA
 BARR	BARR ENGINEERING COMPANY 4700 WEST 77TH STREET MINNEAPOLIS, MN. Ph: 1-800-632-2277
DRAWN: CAD CHECKED: TJR BARR PROJECT NO.: 23/69-0C29 SCALE: AS SHOWN	DWG. NO. HRF-011 REV

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
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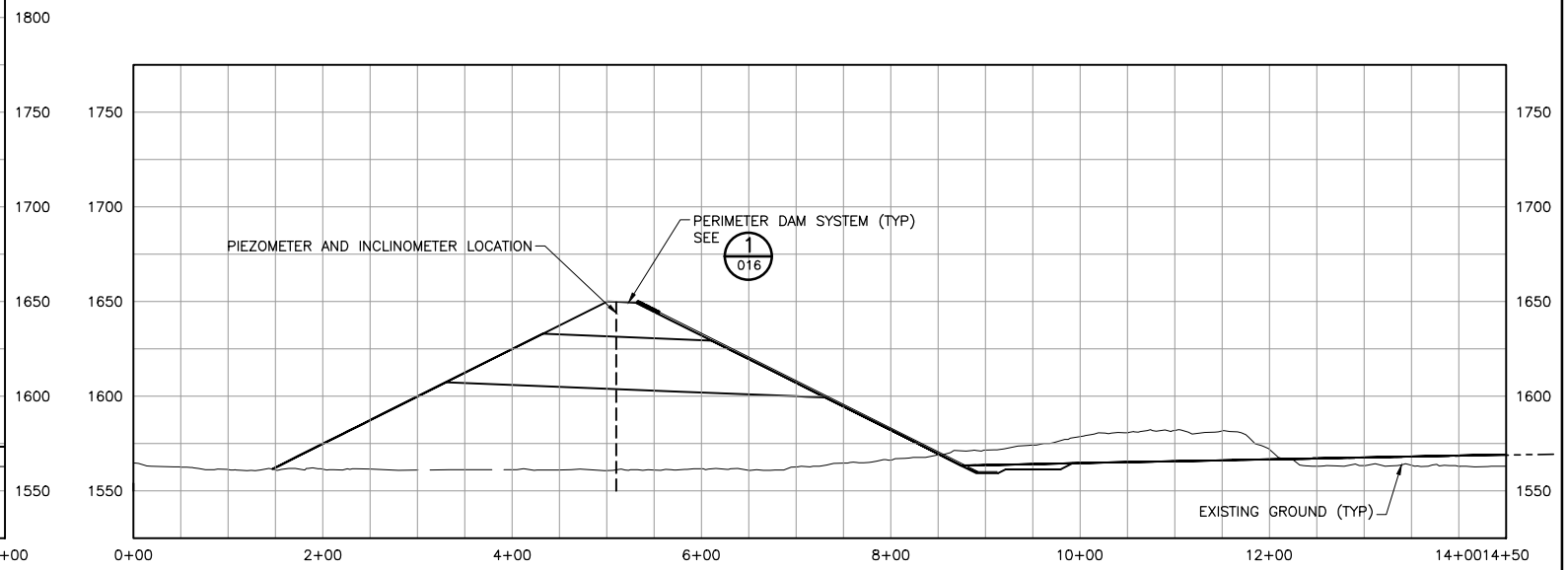
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 PRINTED NAME THOMAS J. RADUE
 SIGNATURE *Thomas J. Radue*
 DATE 5/19/15 LICENSE# 20951

2
1
INCHES

CADD USER: Adepluser FILE: \\PWHIB\HIBBING PW\HIBB PW\IN\BREATA\COBA-4GBA-9301-61050801\ASB\ASB709F-5877-4734-8C28-E779F3984C1\PERMIT_NMT-01-CS-012.DWG PLOT SCALE: 1:2 PLOT DATE: 6/9/2015 4:06 PM



1 SECTION: HRF SOUTH WEST DAM
 0 100 200
 SCALE IN FEET
 HORIZONTAL



2 SECTION: HRF NORTH WEST DAM
 0 100 200
 SCALE IN FEET
 HORIZONTAL

NOTES:
 1. SEE DWG. HRF-004 FOR SECTION LOCATIONS.

PLANT DRAWING NUMBER:
**HYDROMETALLURGICAL RESIDUE FACILITY
 CROSS SECTIONS**

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

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

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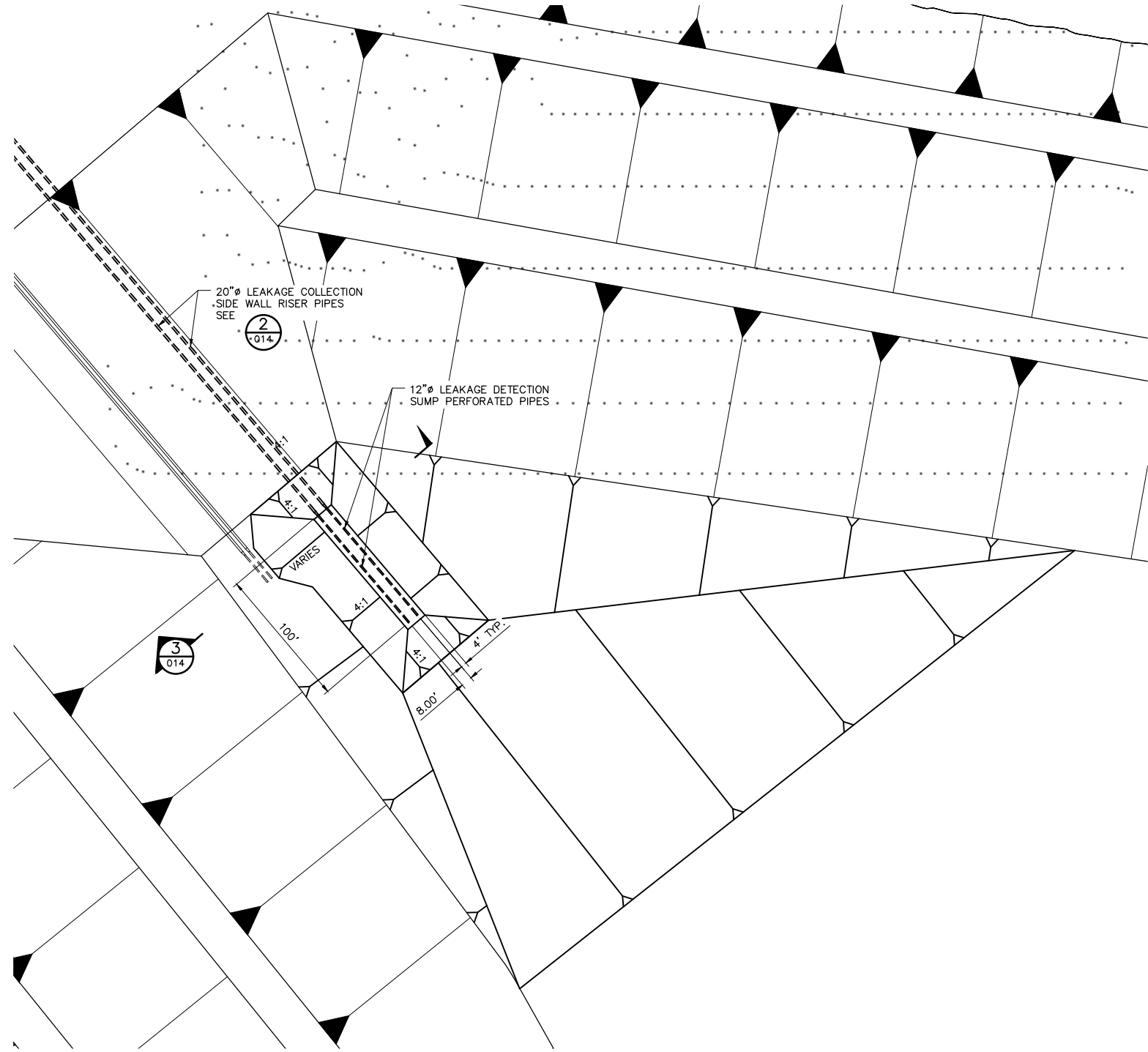
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DRAWN: CAD
 CHECKED: TJR
 BARR PROJECT NO.: 23/69-0C29
 SCALE: AS SHOWN

DWG. NO. **HRF-012** REV

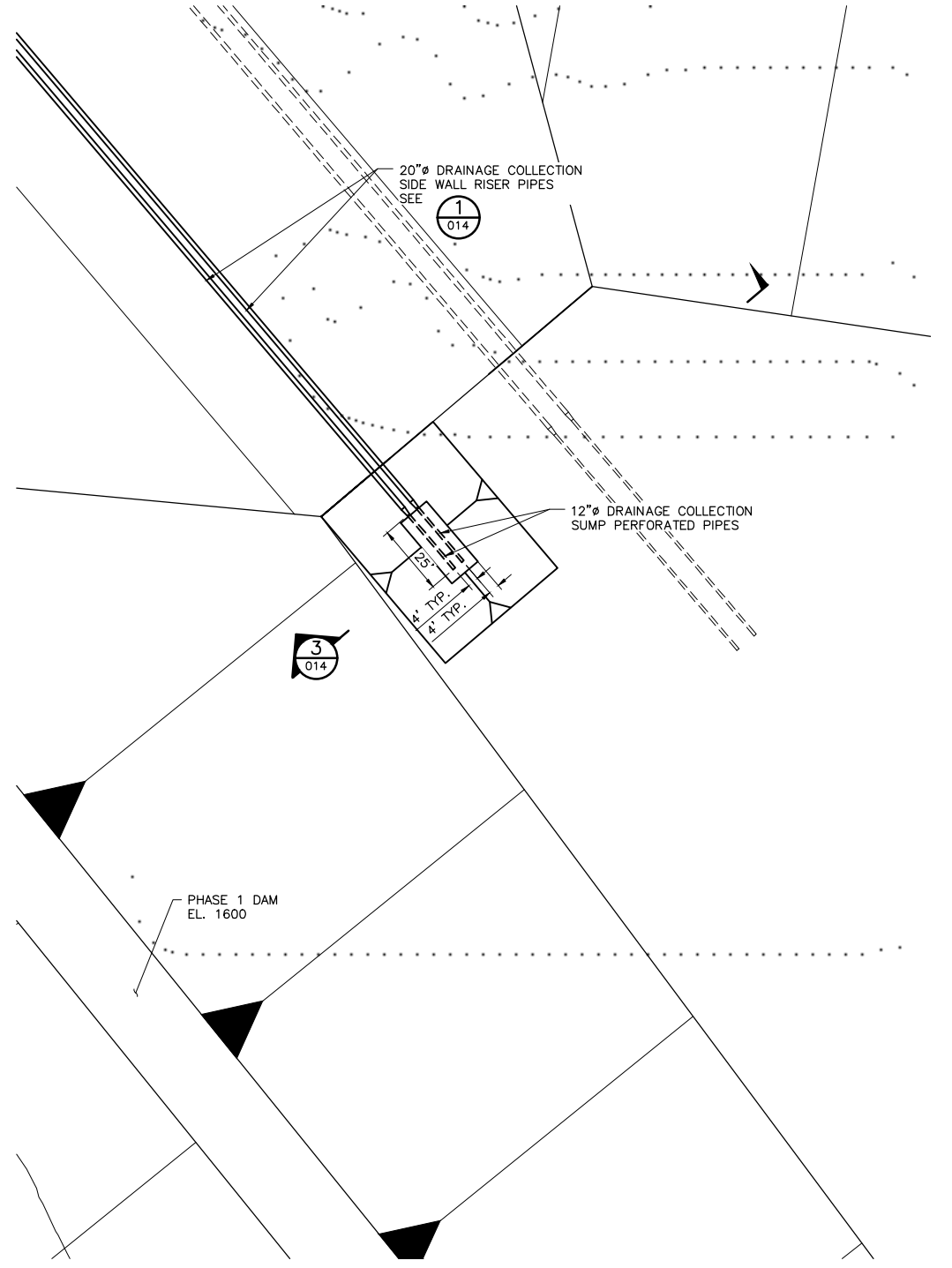
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1 PLAN: LEAKAGE DETECTION SUMP AND SIDEWALL RISER

0 50 100
SCALE IN FEET



2 PLAN: DRAINAGE COLLECTION SUMP AND SIDEWALL RISER

0 30 60
SCALE IN FEET

INCHES

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
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SIGNATURE *Thomas J. Radue*
DATE 5/19/15 LICENSE# 20951

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

PLANT DRAWING NUMBER:

**HYDROMETALLURGICAL RESIDUE FACILITY
SUMP AND SIDEWALL RISER PLAN LAYOUT**

POLYMET MINING

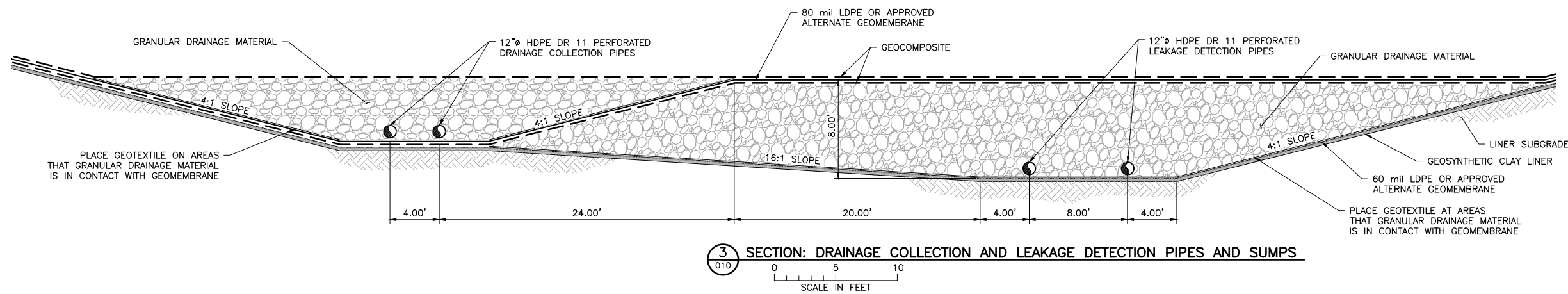
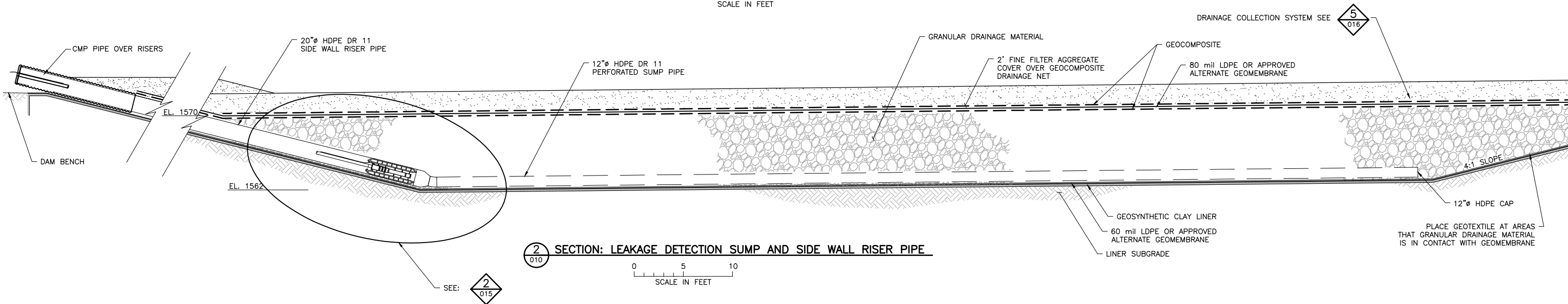
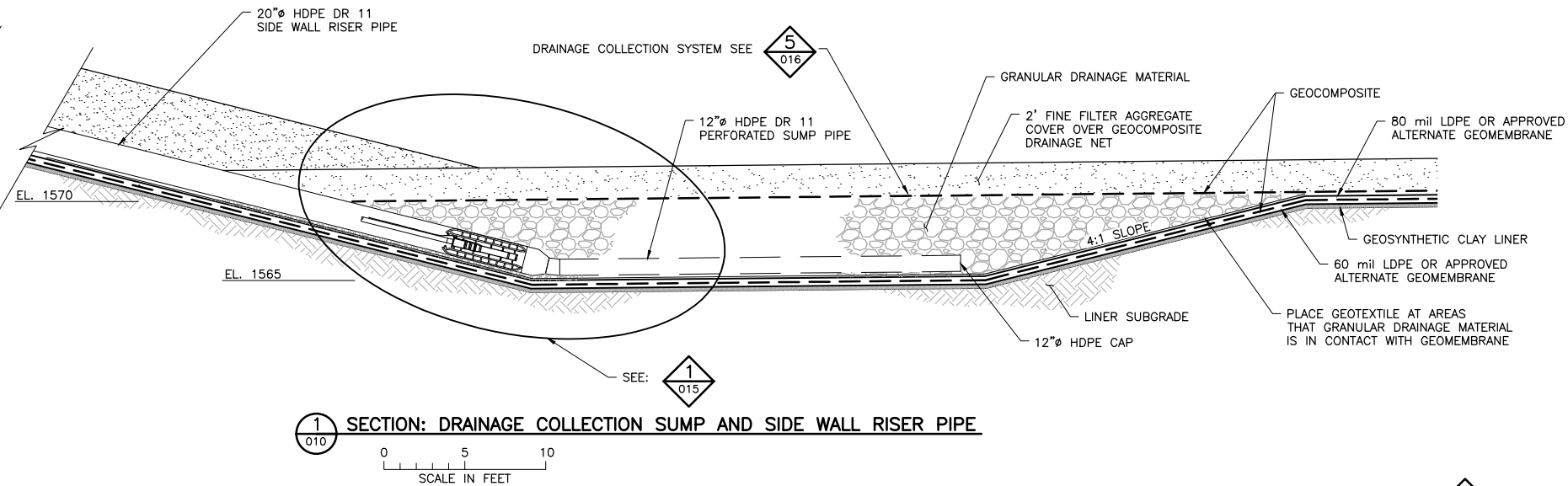
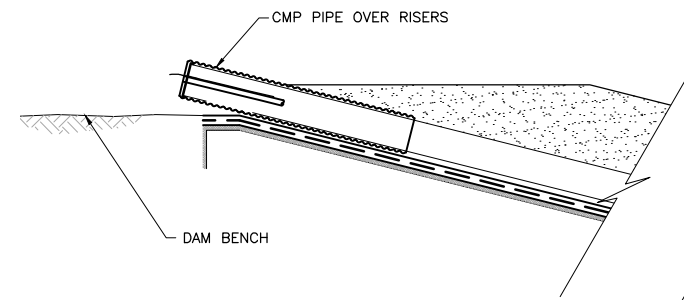
**POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA**

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

DWG. NO. **HRF-013**

REV

CADD USER: Adepluser; FILE: \\PWHIB\HIBING\PW\HBB\PW\IN\BFEATEA-C05A-4GBA-9301-61DB8B81A58\397CE6C6B-EFE3-450D-B02C-5E4063A210D\FERMIT_NMT-01-CS-014.DWG; PLOT SCALE: 1:2; PLOT DATE: 6/9/2015 4:08 PM



- NOTES:**
- SEE DWG. HRF-010 FOR SECTION LOCATIONS.
 - DIFFERENCE IN GRANULAR DRAINAGE MATERIAL PATTERN SHOWN FOR VISUAL CLARITY PURPOSES ONLY. BOTH LEAKAGE DETECTION AND DRAINAGE COLLECTION AGGREGATES ARE THE SAME.
 - GEOMEMBRANE TYPE AND GEOCOMPOSITE TYPE REQUIRES APPROVAL BY DESIGN ENGINEER.
 - LINER SEPARATION NOT SHOWN TO SCALE FOR CLARITY.

PLANT DRAWING NUMBER:
**HYDROMETALLURGICAL RESIDUE FACILITY
SUMP AND SIDEWALL RISER SECTIONS**

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

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

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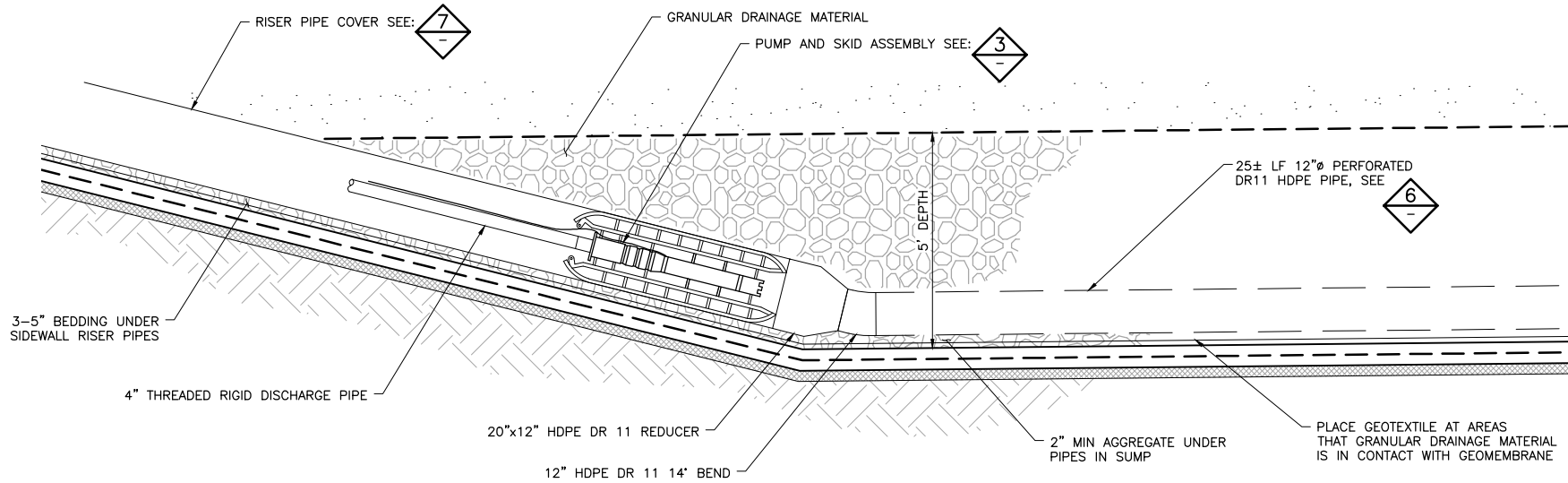
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SIGNATURE *Thomas J. Radue*
DATE 5/19/15 LICENSE# 20951

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

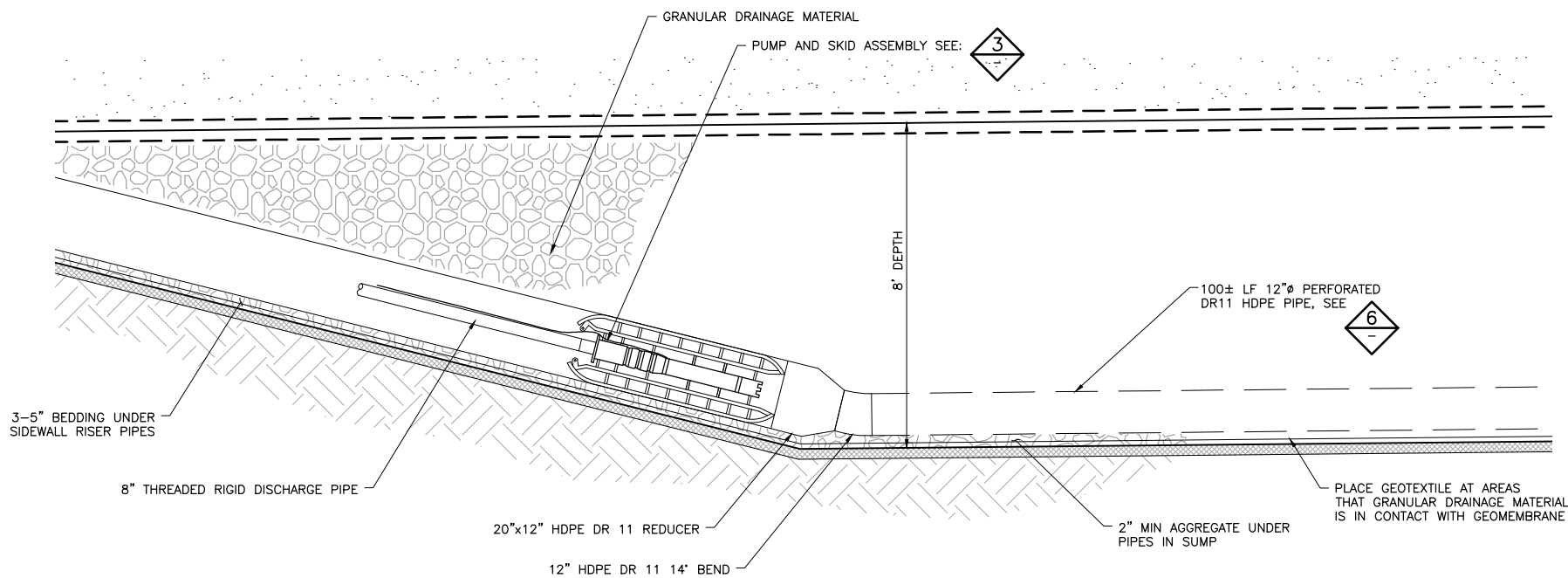
DWG. NO. **HRF-014** REV

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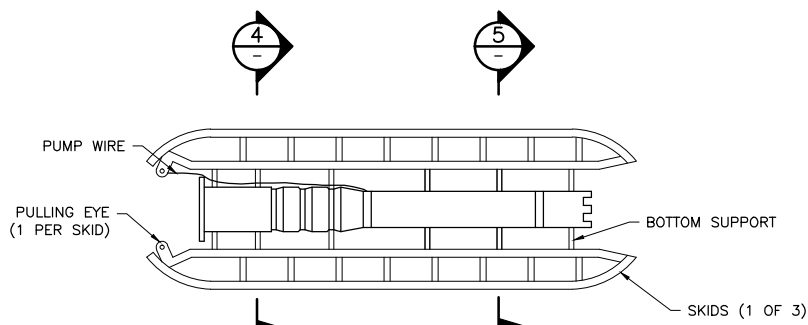
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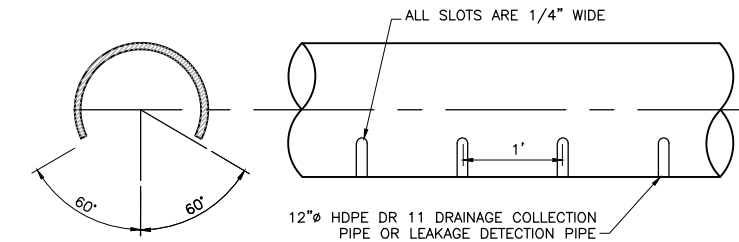
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015
NTS
DETAIL: DRAINAGE COLLECTION SUMP



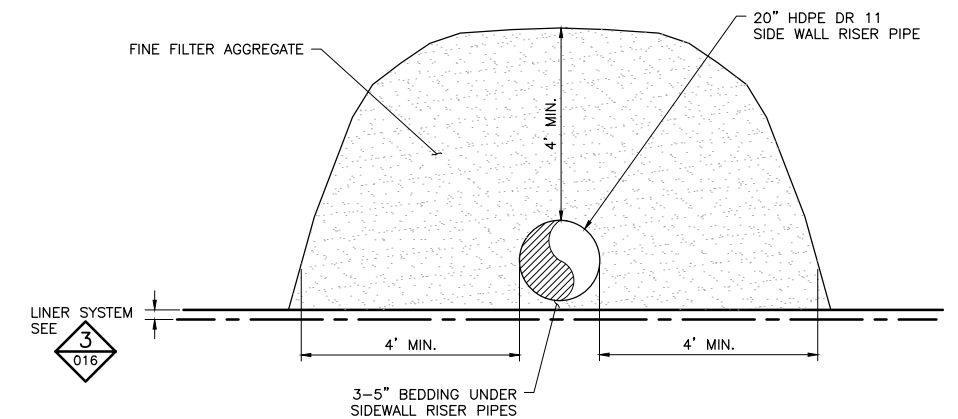
2
015
NTS
DETAIL: LEAKAGE DETECTION SUMP



3
NTS
DETAIL: PUMP AND SKID ASSEMBLY



6
NTS
DETAIL: DRAINAGE COLLECTION AND LEAKAGE DETECTION PIPE PERFORATION



3
016
NTS
LINER SYSTEM SEE

7
NTS
DETAIL: RISER PIPE COVER

PLANT DRAWING NUMBER:
**HYDROMETALLURGICAL RESIDUE FACILITY
SUMP AND PUMP DETAILS**

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

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

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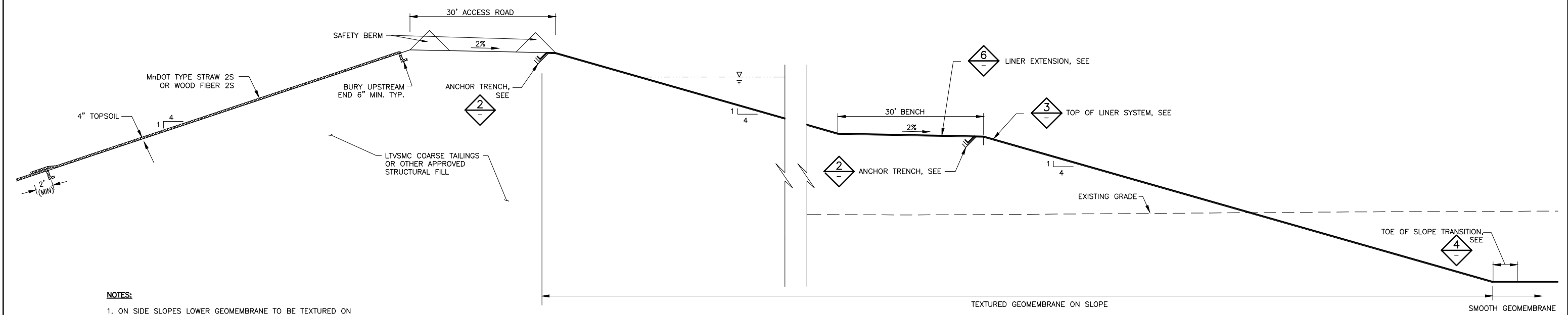
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PRINTED NAME THOMAS J. RADUE
SIGNATURE *Thomas J. Radue*
DATE 5/19/15 LICENSE# 20951

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

DWG. NO. **HRF-015** REV

INCHES

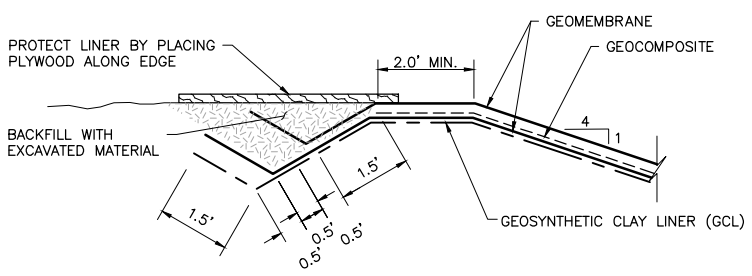
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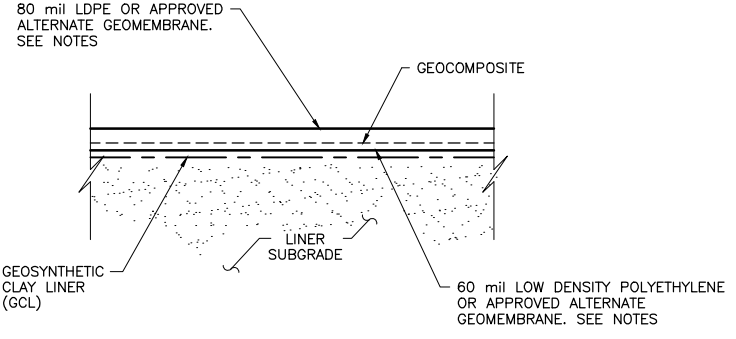
NOTES:

1. ON SIDE SLOPES LOWER GEOMEMBRANE TO BE TEXTURED ON BOTH SIDES, UPPER GEOMEMBRANE TO BE TEXTURED ON BOTTOM SIDE ONLY.
2. GEOMEMBRANE TYPE AND THICKNESS IS PRELIMINARY, TYPE AND THICKNESS MUST BE APPROVED BY DESIGN ENGINEER.

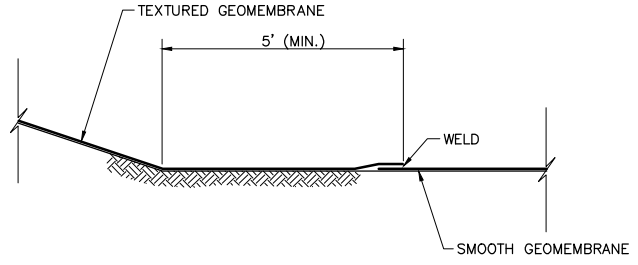
SECTION: PERIMETER DAM TYPICAL CROSS SECTION (1)
NTS



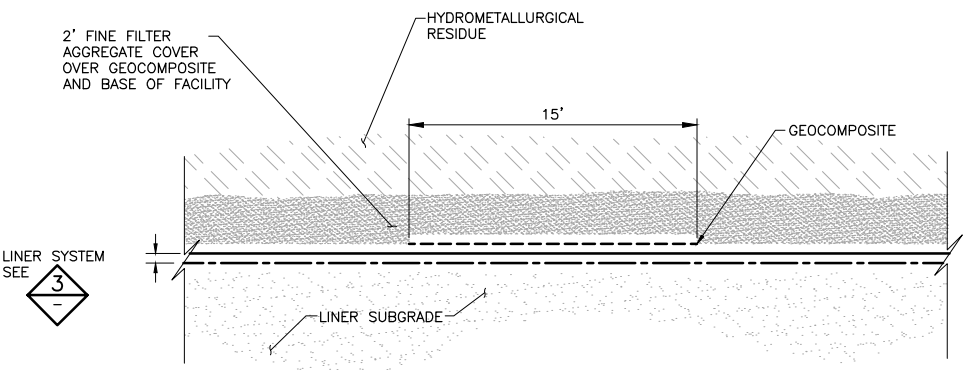
2 DETAIL: "V" ANCHOR TRENCH GCL/GEOMEMBRANE BARRIER LAYER
NTS



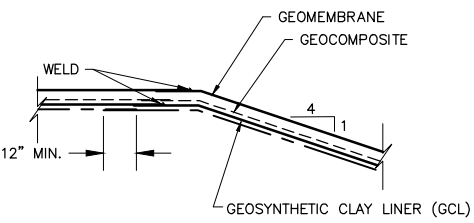
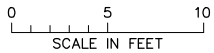
3 DETAIL: LINER SYSTEM
NTS



4 DETAIL: TOE OF SLOPE GEOMEMBRANE - TYPE TRANSITION
NTS



5 DETAIL: DRAINAGE COLLECTION SYSTEM



6 DETAIL: LINER SYSTEM EXTENSION
NTS

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
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SIGNATURE *Thomas J. Radue*
DATE 5/19/15 LICENSE# 20951

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

PLANT DRAWING NUMBER:

HYDROMETALLURGICAL RESIDUE FACILITY TYPICAL SECTIONS AND DETAILS

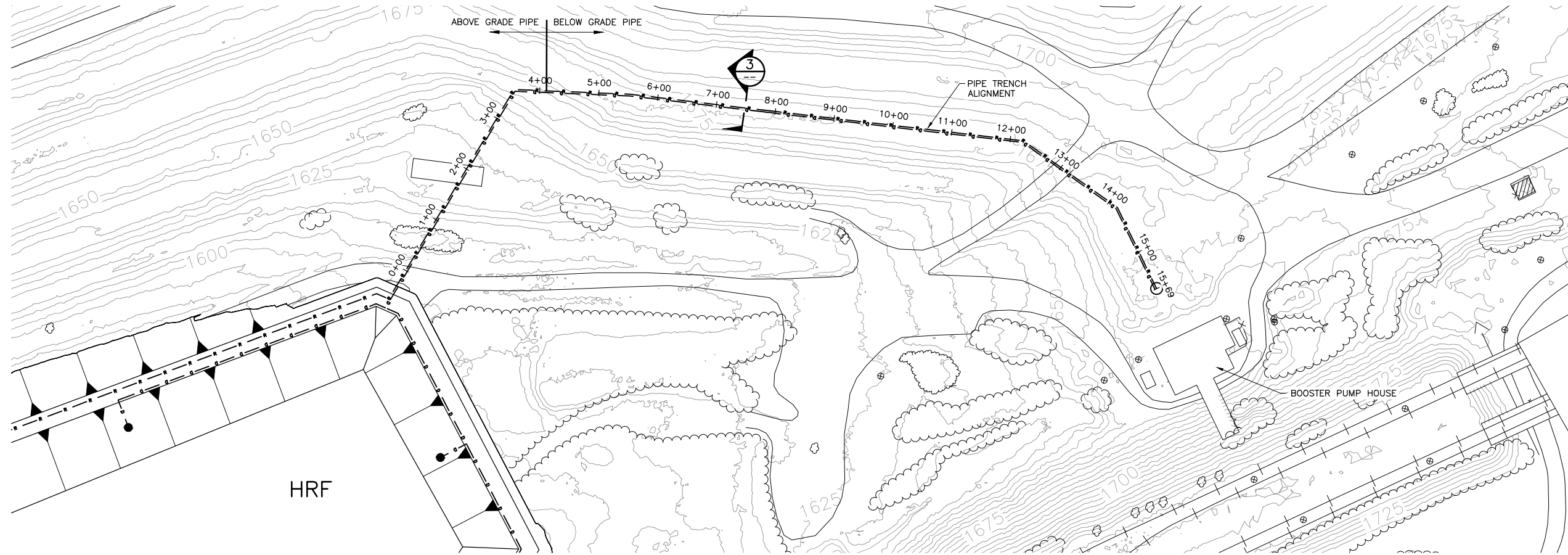
POLYMET MINING POLY MET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA

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

DWG. NO. **HRF-016** REV

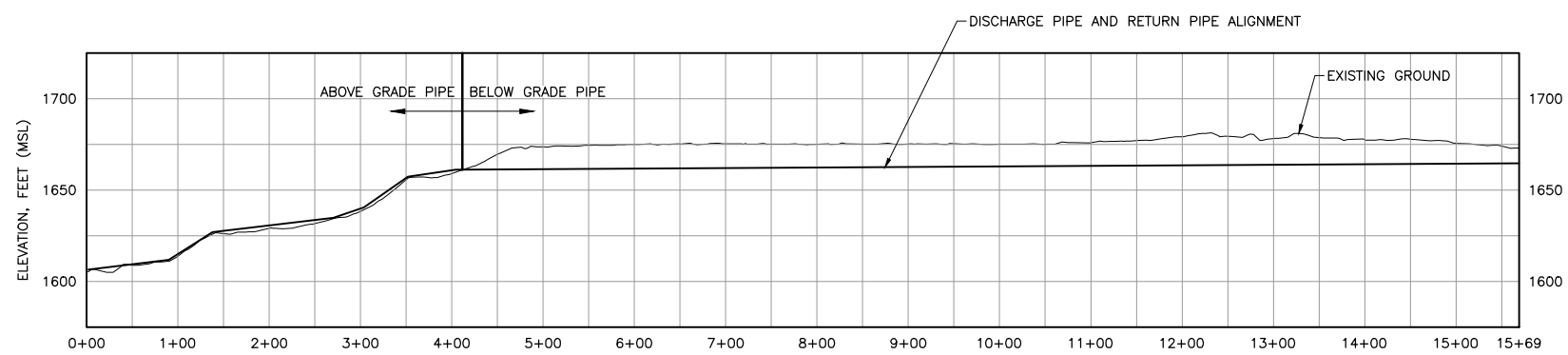
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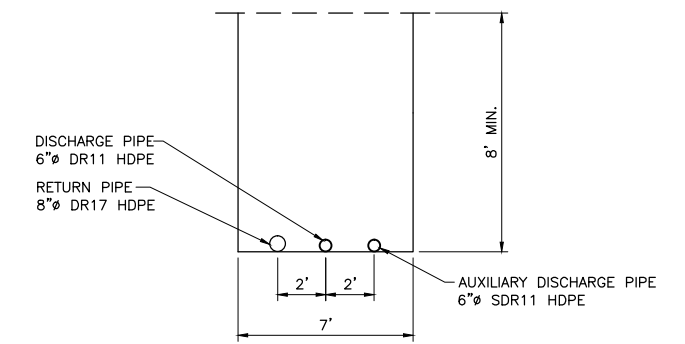


- NOTES:**
1. PIPE CLEAN-OUT AND PIG LAUNCHING ACCESS TO BE PROVIDED IN ABOVE-GRADE PORTIONS OF PIPE.
 2. PIPING LAYOUT (PLAN AND PROFILE) IS PRELIMINARY.
 3. PIPE SIZES ARE PRELIMINARY.

1 PLAN: PIPING LAYOUT
 0 100 200
 SCALE IN FEET



2 PROFILE: PIPING LAYOUT
 0 100 200
 HORIZONTAL SCALE IN FEET



3 SECTION: PIPE TRENCH (TYP.)
 0 2 4 6 8
 SCALE IN FEET

PLANT DRAWING NUMBER:	
HYDROMETALLURGICAL RESIDUE FACILITY PIPING PLAN AND PROFILE	
POLY MET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA	
DRAWN: CAD CHECKED: TJR BARR PROJECT NO.: 23/69-0C29 SCALE: AS SHOWN	BARR ENGINEERING COMPANY 4700 WEST 77TH STREET MINNEAPOLIS, MN. Ph: 1-800-632-2277
DWG. NO. HRF-017	REV

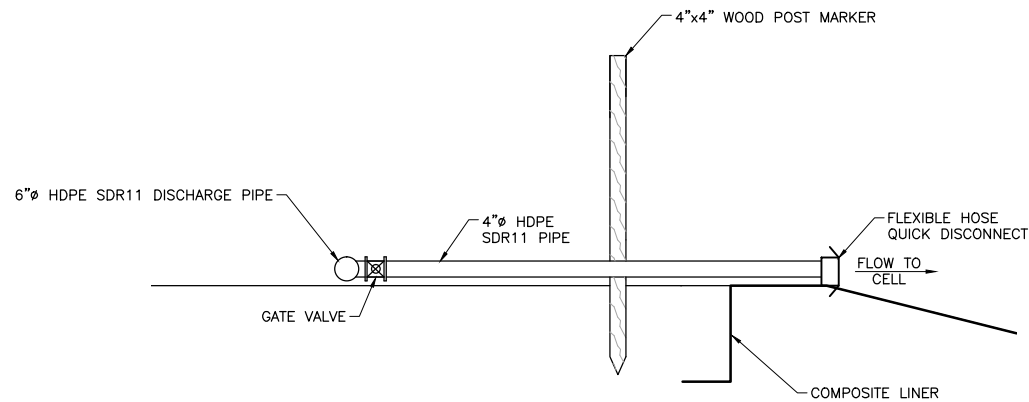
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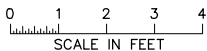
PRINTED NAME THOMAS J. RADUE
 SIGNATURE *Thomas J. Radue*
 DATE 5/19/15 LICENSE# 20951

INCHES

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1 **DETAIL: TYPICAL RESIDUE DISCHARGE POINT**



NOTES:
1. PIPE SIZES ARE PRELIMINARY.

PLANT DRAWING NUMBER:
**HYDROMETALLURGICAL RESIDUE FACILITY
PIPING DETAILS**

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

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

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	10/14/11	RESIDUE MANAGEMENT PLAN - VERSION 1 - ATTACHMENT A	ISSUED		
2	06/29/12	RESIDUE MANAGEMENT PLAN - VERSION 1 - RESPONSE TO COMMENTS			
3	12/14/12	RESIDUE MANAGEMENT PLAN - VERSION 2 - ATTACHMENT A	FOR PERMITTING	4	5/19/15
4	5/19/15	ISSUED FOR INCLUSION IN PERMIT APPLICATIONS			
			FOR CONSTRUCTION		
			NOT APPROVED FOR CONSTRUCTION.		

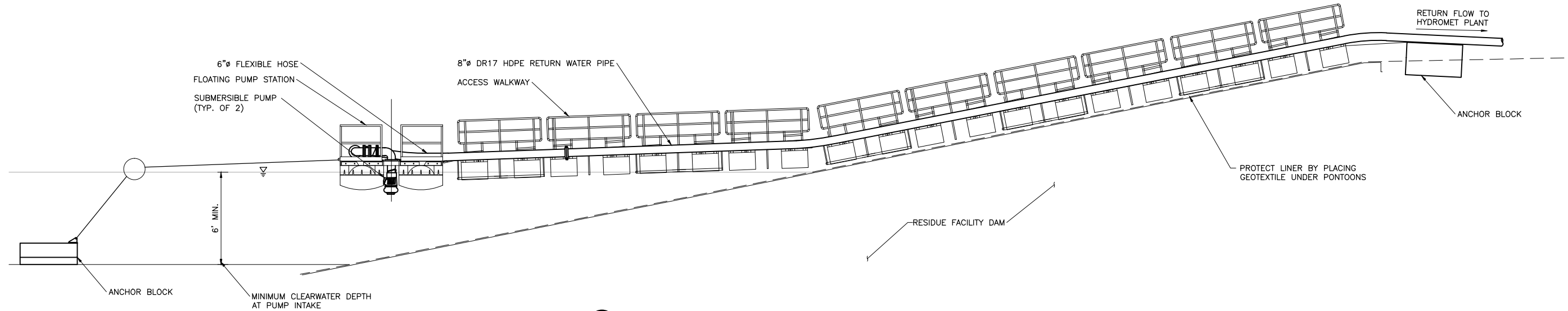
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PRINTED NAME **THOMAS J. RADUE**
SIGNATURE *Thomas J. Radue*
DATE **5/19/15** LICENSE# **20951**

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

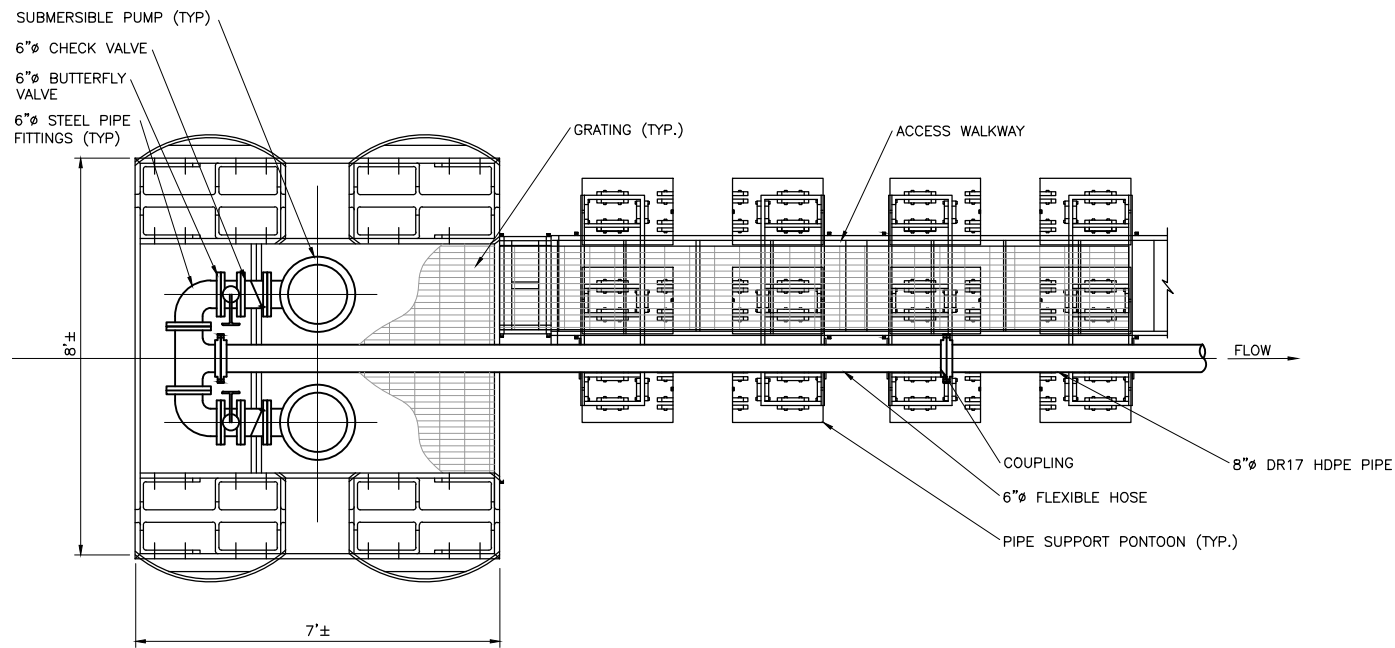
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1 ELEVATION: RETURN WATER PUMP RAFT
 0 2 4 6 8
 SCALE IN FEET



2 PLAN: RETURN WATER PUMP RAFT
 0 1 2 3 4
 SCALE IN FEET

PLANT DRAWING NUMBER:

**HYDROMETALLURGICAL RESIDUE FACILITY
 RETURN WATER PUMP RAFT**

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

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

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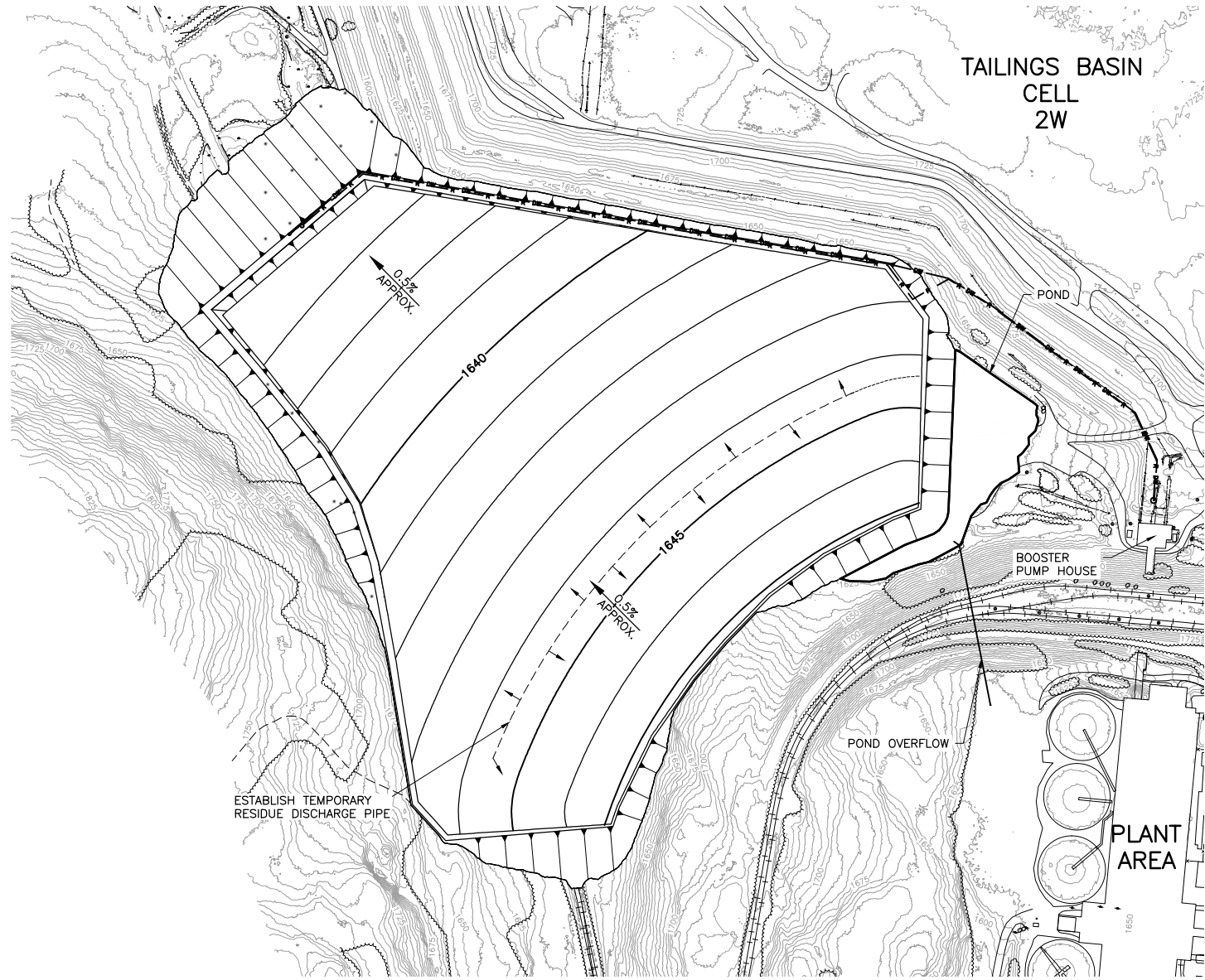
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 SIGNATURE *Thomas J. Radue*
 DATE 5/19/15 LICENSE# 20951

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 CHECKED: TJR
 BARR PROJECT NO.: 23/69-0C29
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DWG. NO. **HRF-019** REV

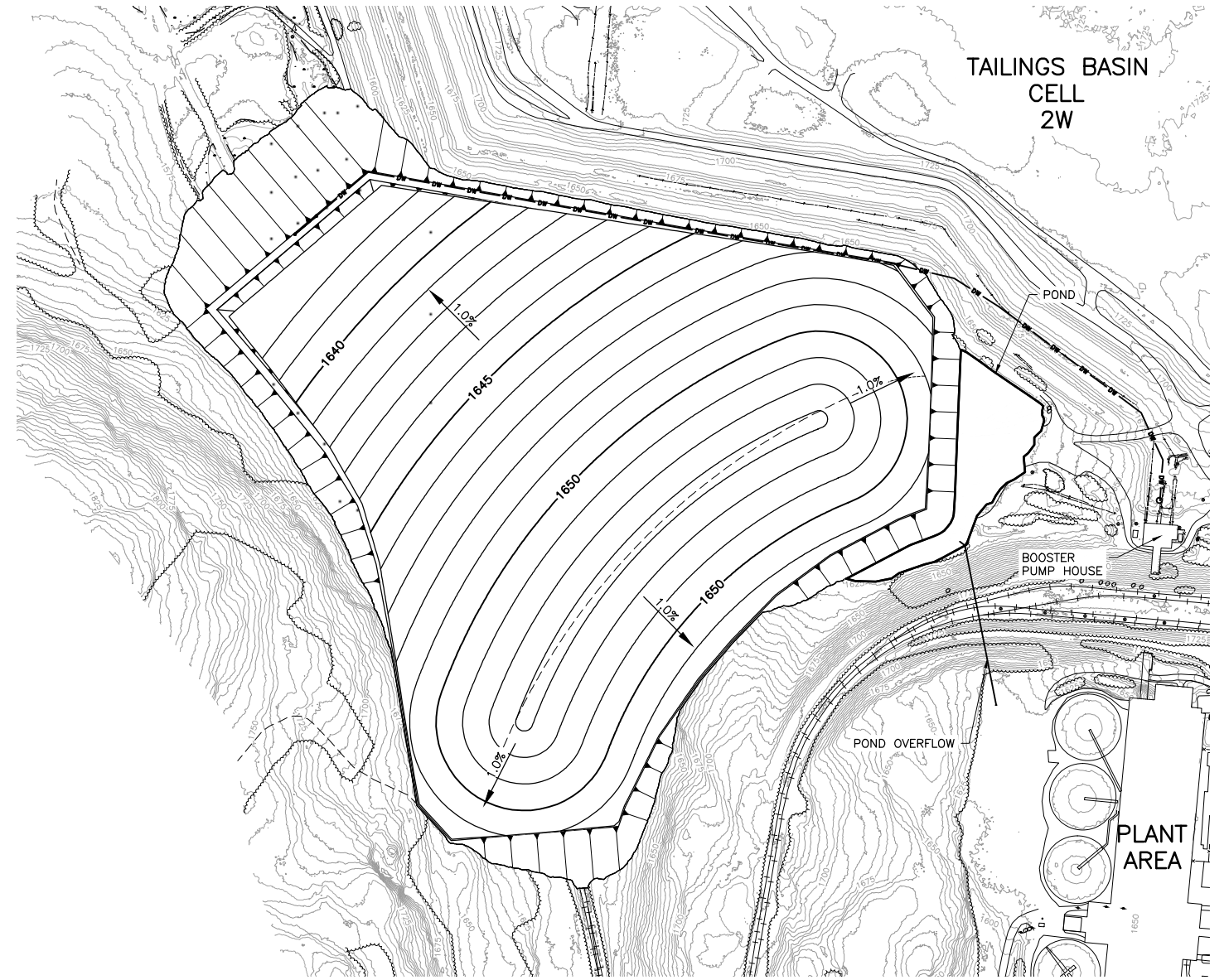
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1 PLAN: START OF MINE YEAR 20 RESIDUE GRADES

0 300 600
SCALE IN FEET

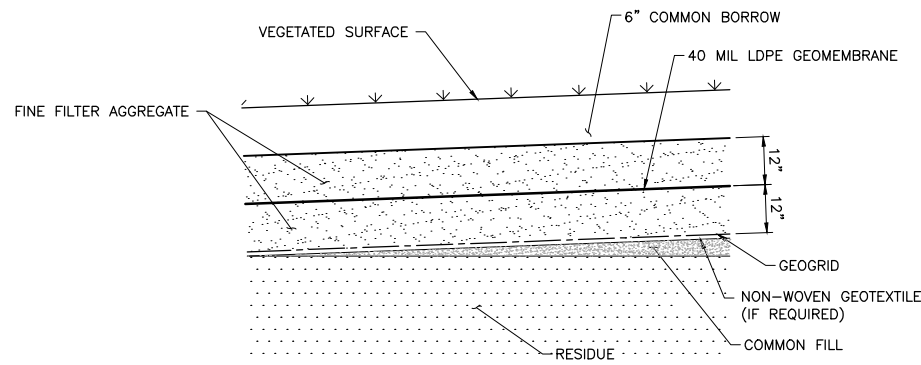


3 PLAN: END OF MINE YEAR 20 RESIDUE AND TEMPORARY COVER GRADES

0 300 600
SCALE IN FEET

NOTES:

1. PRIOR TO FINAL CLOSURE PLACE TEMPORARY COVER OVER NEWLY GRADED RESIDUE.
2. ALLOW FOR RESIDUE MATERIAL TO SETTLE PRIOR TO PLACEMENT OF FINAL COVER.
3. COMMON FILL AS NEEDED TO ACHIEVE SLOPES THAT FACILITATE SURFACE WATER RUNOFF.



2 DETAIL: TEMPORARY COVER SYSTEM

NTS

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	10/14/11	RESIDUE MANAGEMENT PLAN - VERSION 1 - ATTACHMENT A	ISSUED		
2	06/29/12	RESIDUE MANAGEMENT PLAN - VERSION 1 - RESPONSE TO COMMENTS			
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DATE 5/19/15 LICENSE# 20951

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

PLANT DRAWING NUMBER:

HYDROMETALLURGICAL RESIDUE FACILITY CLOSURE PREPARATION PLAN

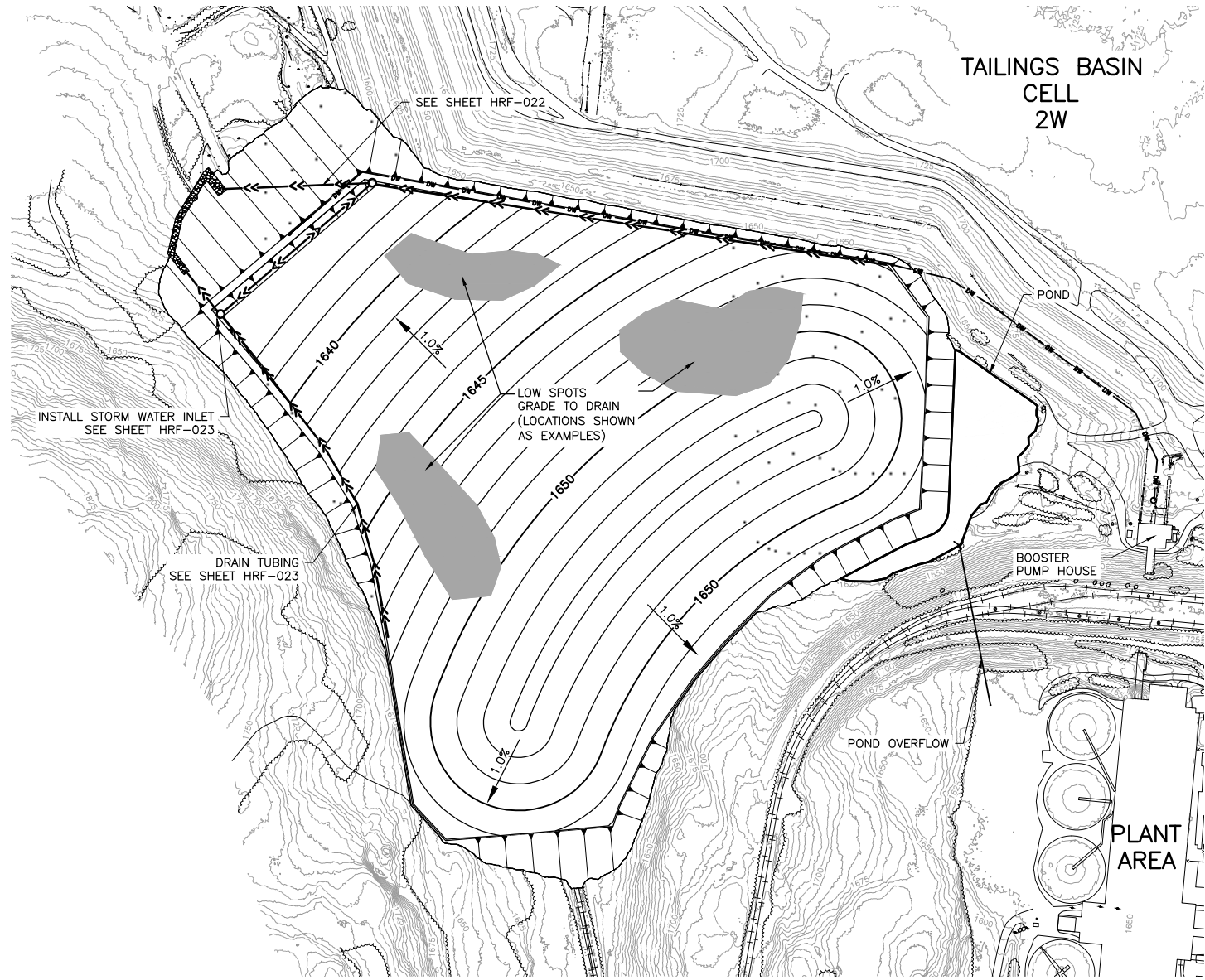
POLYMET MINING POLY MET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA

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DWG. NO. **HRF-020** REV

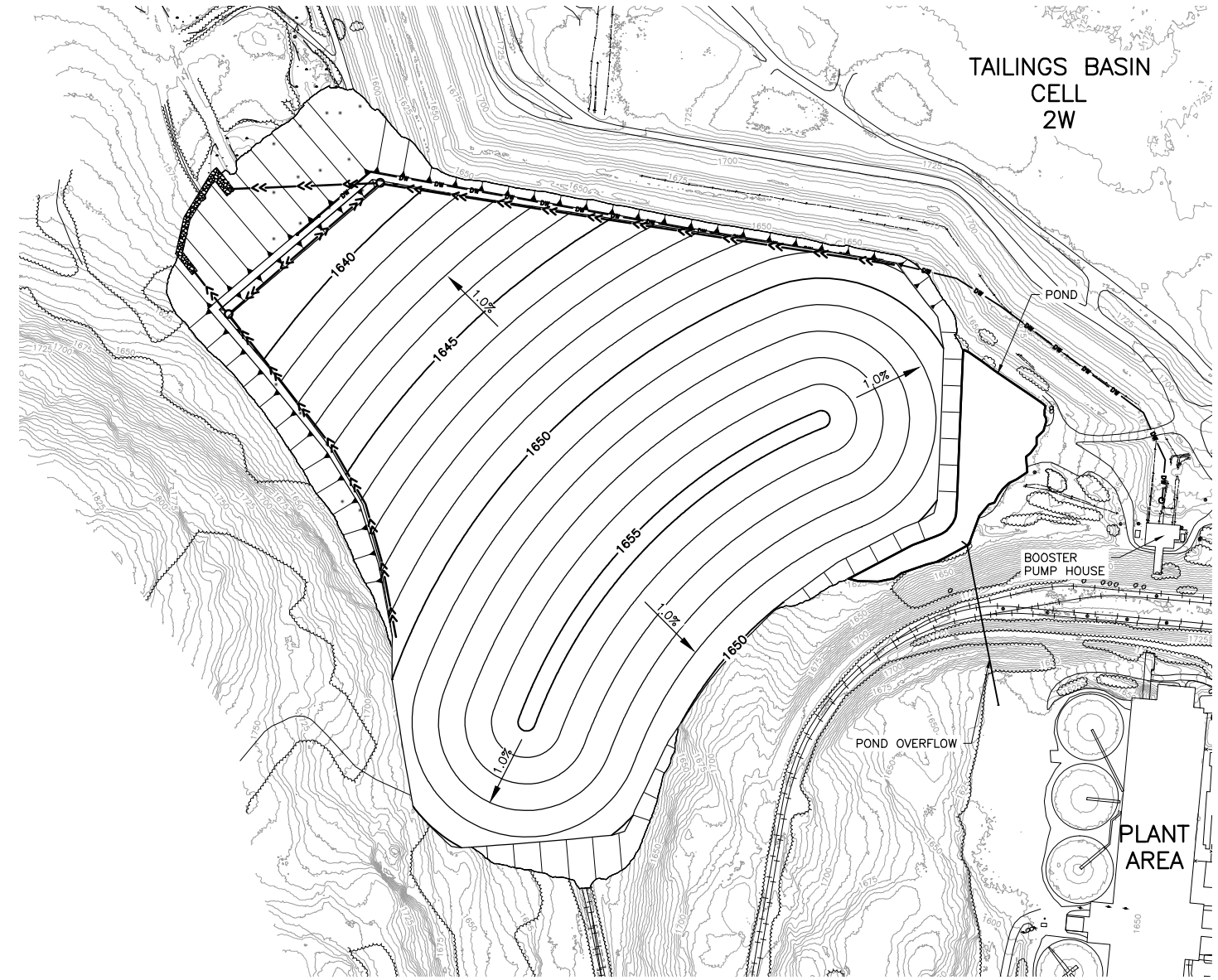
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3 PLAN: TEMPORARY COVER REGRADING

0 300 600
SCALE IN FEET



4 PLAN: FINAL COVER GRADES

0 300 600
SCALE IN FEET

- NOTES:**
1. PRIOR TO FINAL CLOSURE GRADE ANY LOW SPOTS CREATED DURING SETTLEMENT ALLOTMENT TIME.
 2. INSTALL DRAIN TUBING AND SURFACE WATER INLETS.

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	10/14/11	RESIDUE MANAGEMENT PLAN - VERSION 1 - ATTACHMENT A			
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CHECKED: TJR
BARR PROJECT NO.: 23/69-0C29
SCALE: AS SHOWN

PLANT DRAWING NUMBER:

**HYDROMETALLURGICAL RESIDUE FACILITY
TEMPORARY COVER AND
FINAL COVER GRADING**

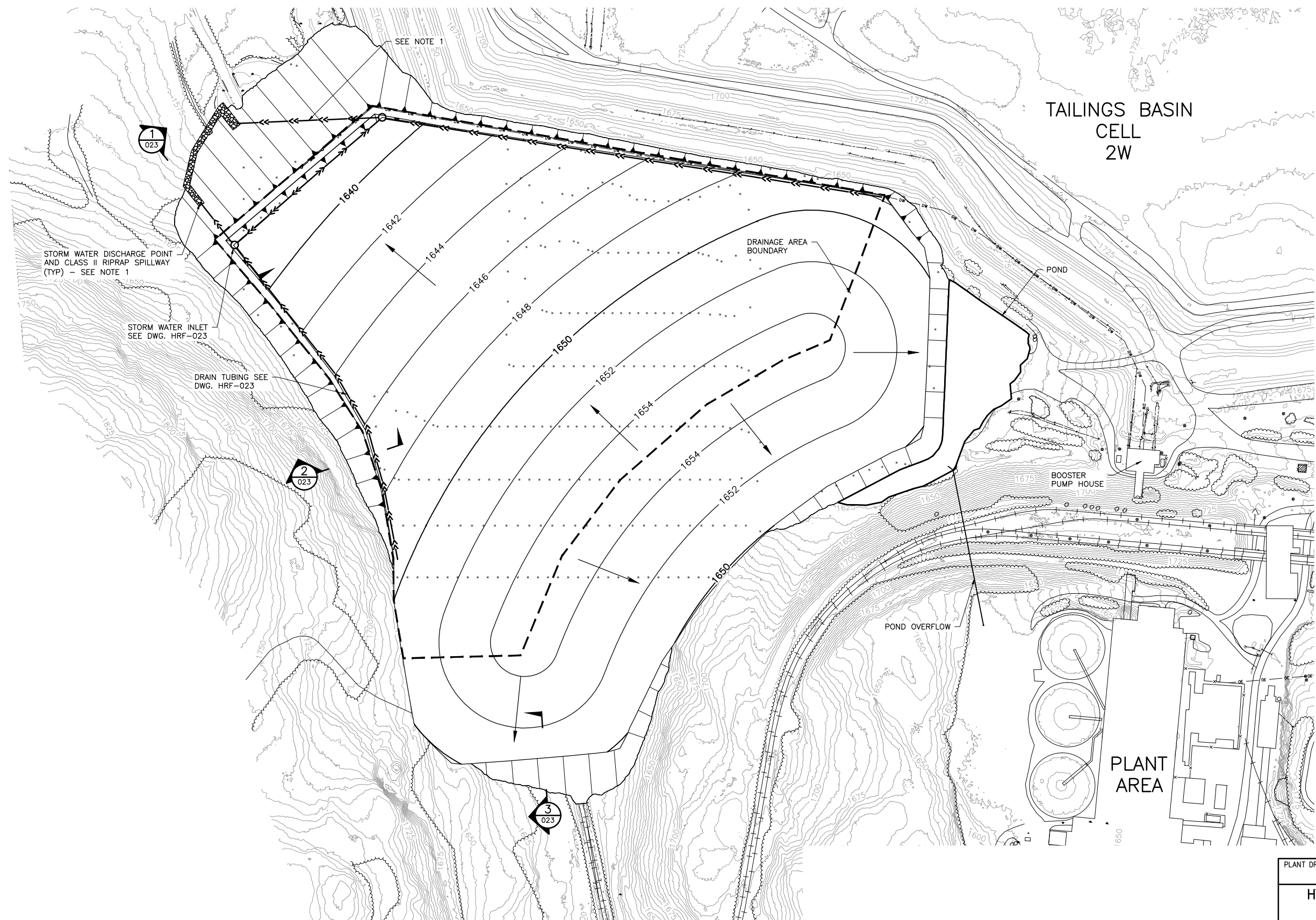
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NORTHMET PROJECT
HOYT LAKES, MINNESOTA

BARR BARR ENGINEERING COMPANY
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DWG. NO. **HRF-021** REV

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TAILINGS BASIN
CELL
2W

STORM WATER DISCHARGE POINT
AND CLASS II RIPRAP SPILLWAY
(TYP) - SEE NOTE 1

STORM WATER INLET
SEE DWG. HRF-023

DRAIN TUBING SEE
DWG. HRF-023

DRAINAGE AREA
BOUNDARY

POND

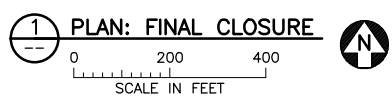
BOOSTER
PUMP HOUSE

POND OVERFLOW

PLANT AREA

NOTES:

1. FIELD-ALIGN SURFACE WATER DISCHARGE PIPES TO DISCHARGE CLEAN SURFACE RUNOFF TO LOCATION OUTSIDE OF GROUNDWATER CONTAINMENT SYSTEM. SEE FTB SEEPAGE CAPTURE AND STREAM AUGMENTATION SYSTEMS DRAWINGS.



VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	10/14/11	RESIDUE MANAGEMENT PLAN - VERSION 1 - ATTACHMENT A	ISSUED		
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DATE 5/19/15 LICENSE# 20951

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

PLANT DRAWING NUMBER:

HYDROMETALLURGICAL RESIDUE FACILITY
FINAL CLOSURE
GRADING AND DRAINAGE

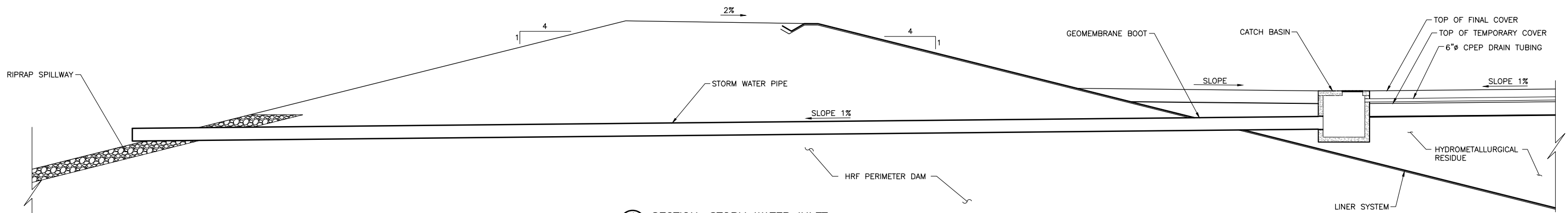
POLYMET MINING
POLY MET MINING, INC.
NORTHMET PROJECT
HOYT LAKES, MINNESOTA

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

DWG. NO. HRF-022
REV

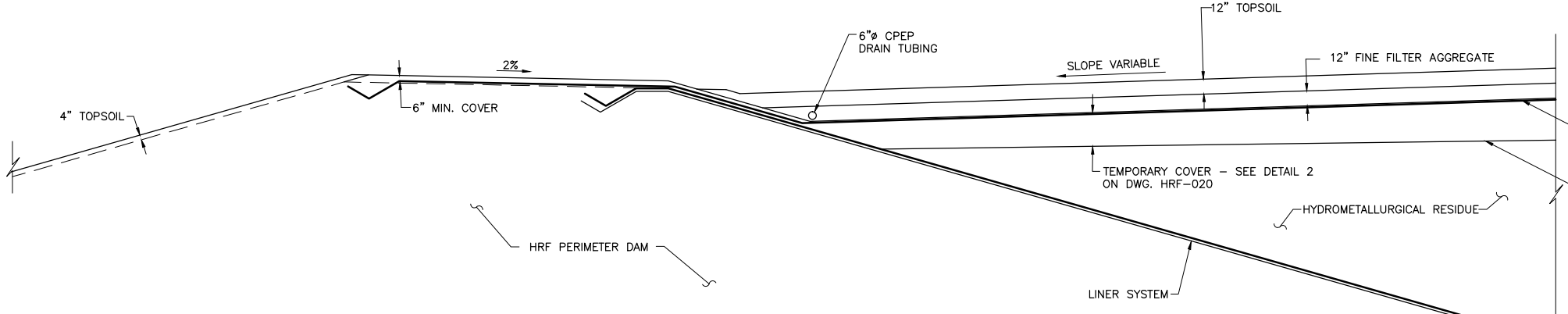
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INCHES

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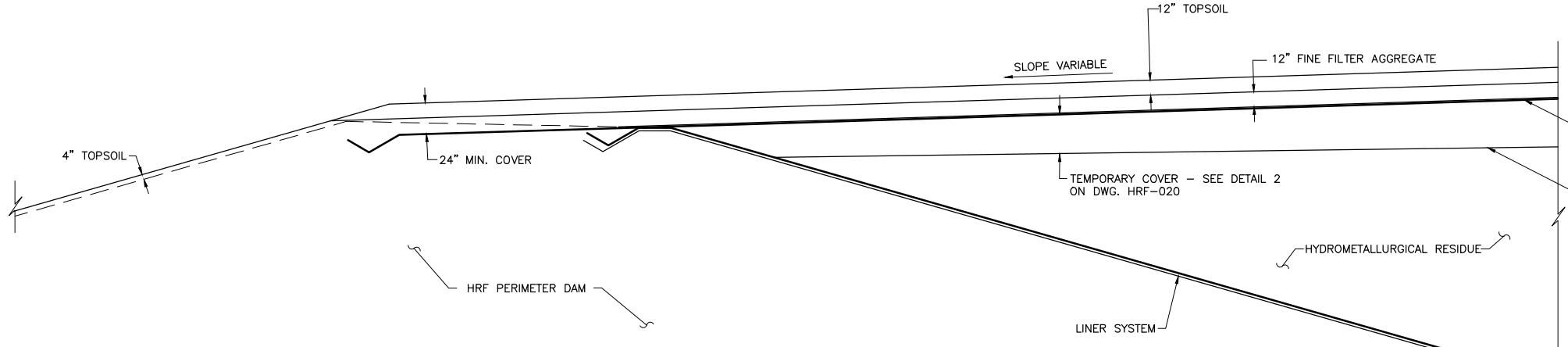


1 SECTION: STORM WATER INLET
NTS

NOTES:
1. TEMPORARY COVER MATERIALS NOT SHOWN ON THIS DRAWING. SEE DETAIL 3 ON DWG. HRF-020.



2 SECTION: FINAL COVER
NTS



3 SECTION: FINAL COVER OVER DIKE
NTS

PLANT DRAWING NUMBER:	
HYDROMETALLURGICAL RESIDUE FACILITY CLOSURE	
SECTIONS AND DETAILS	
 POLY MET MINING, INC. NORTHMET PROJECT HOYT LAKES, MINNESOTA	
DRAWN: CAD CHECKED: TJR BARR PROJECT NO.: 23/69-0C29 SCALE: AS SHOWN	BARR ENGINEERING COMPANY 4700 WEST 77TH STREET MINNEAPOLIS, MN. Ph: 1-800-632-2277
DWG. NO. HRF-023	REV

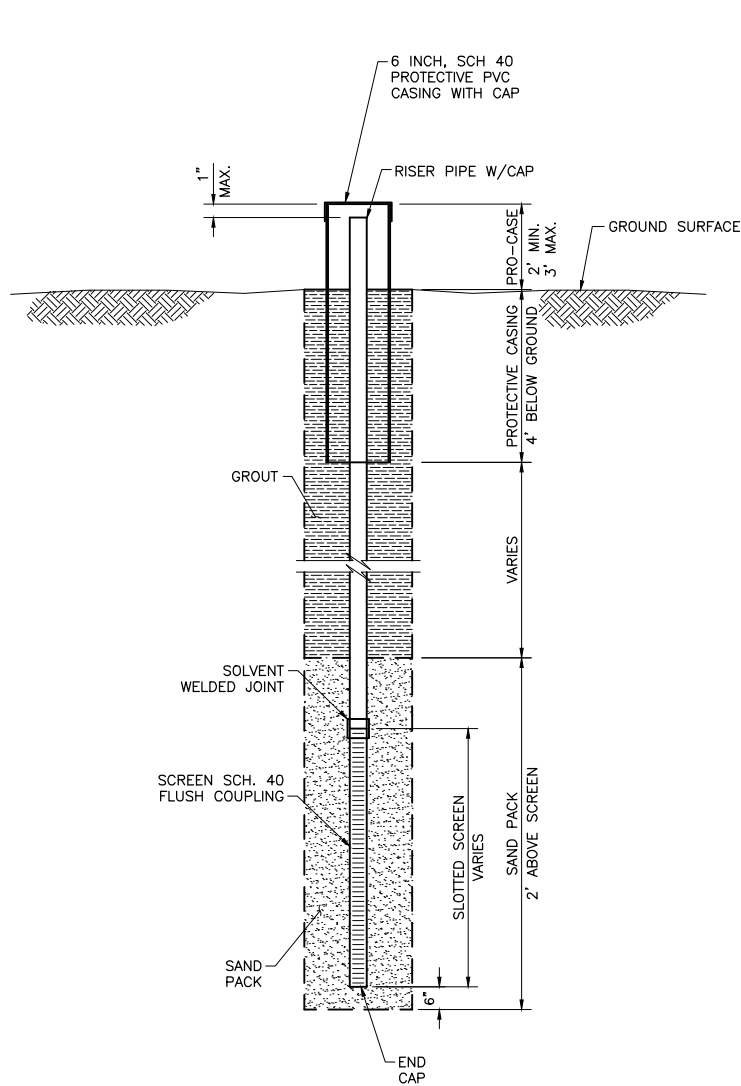
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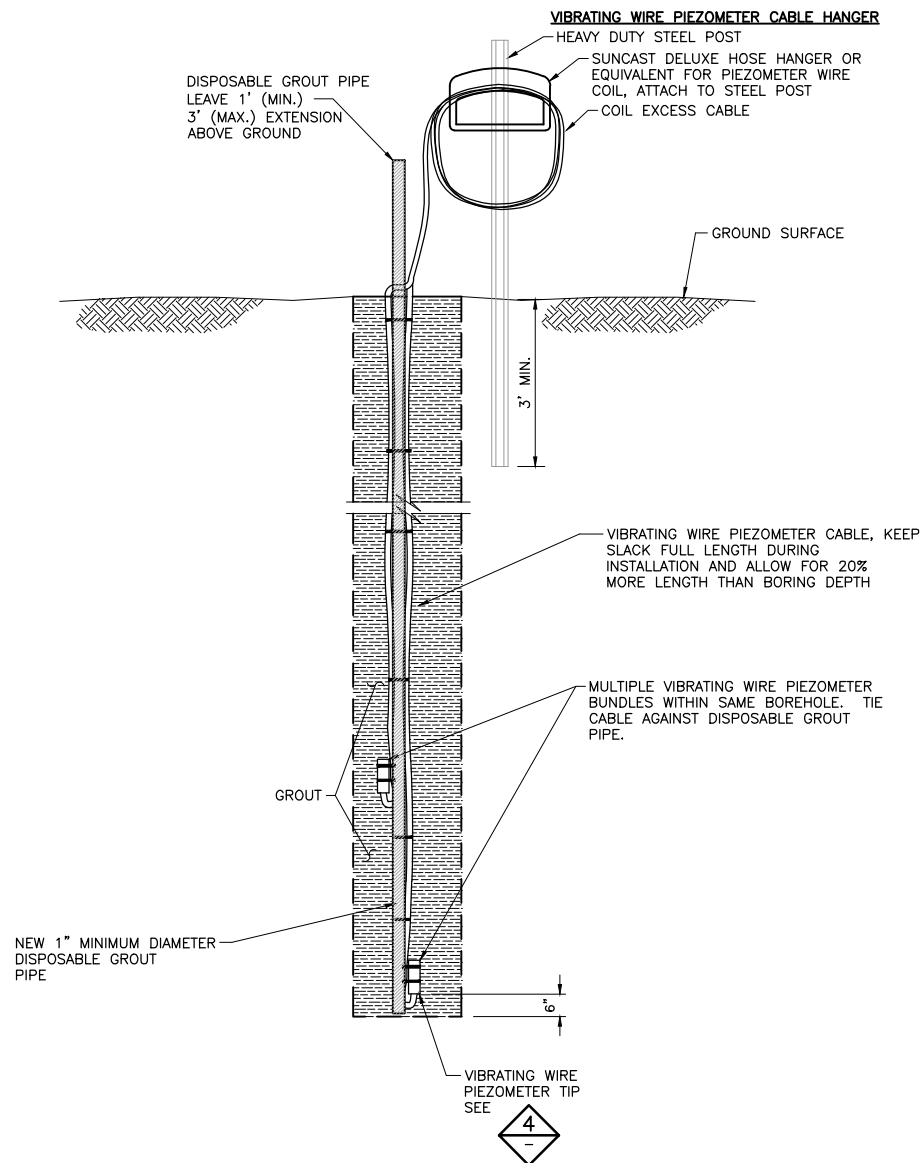
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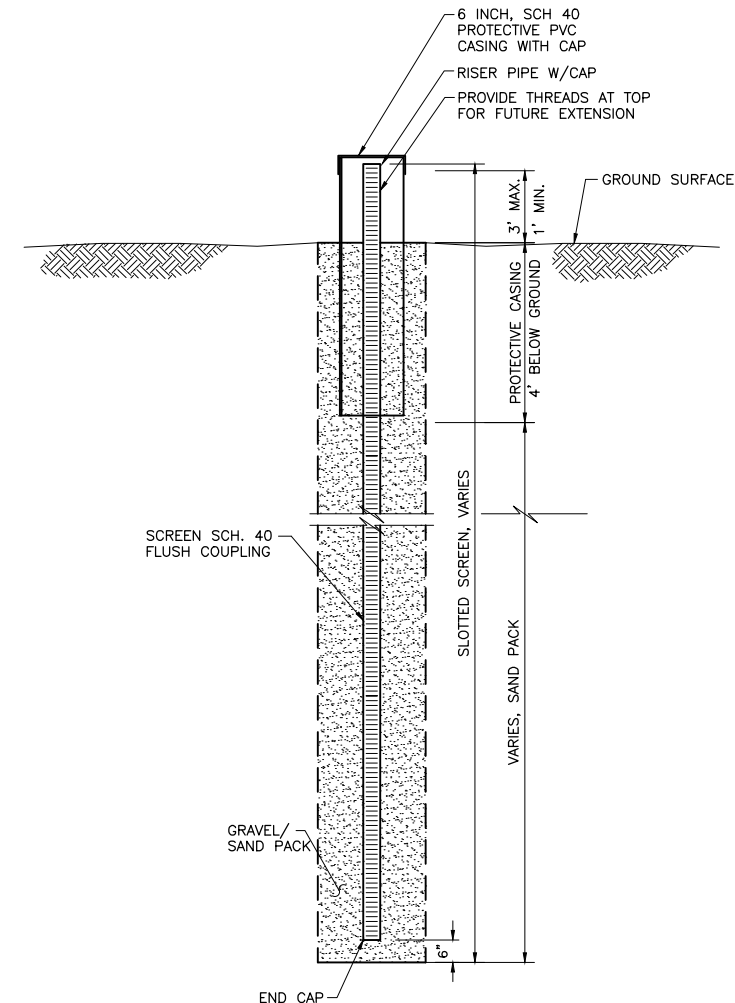
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1 DETAIL: TYPICAL (OP) SCREENED PIEZOMETER INSTALLATION
NTS

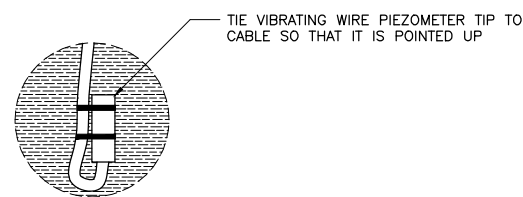


2 DETAIL: TYPICAL (VW) VIBRATING WIRE PIEZOMETER INSTALLATION
NTS



3 DETAIL: TYPICAL (MW) FULLY SCREENED PIEZOMETER INSTALLATION
NTS

NOTE:
SEE SPECIFICATIONS FOR MONITORING WELLS



4 DETAIL: TYPICAL VIBRATING WIRE PIEZOMETER TIP
NTS

VER NO	DATE	DESCRIPTION	ISSUE STATUS		
			ISSUED	VERSION	DATE
1	10/14/11	FLOTATION TAILINGS MANAGEMENT PLAN - VERSION 1 - ATTACHMENT	ISSUED		
2	06/29/12	FLOTATION TAILINGS MANAGEMENT PLAN - VERSION 2 - ATTACHMENT			
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DATE 5/19/15 LICENSE# 20951

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

PLANT DRAWING NUMBER:

**HYDROMETALLURGICAL RESIDUE FACILITY
GEOTECHNICAL
INSTRUMENTATION DETAILS**

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

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

DWG. NO. **HRF-024** REV

2
1
INCHES