

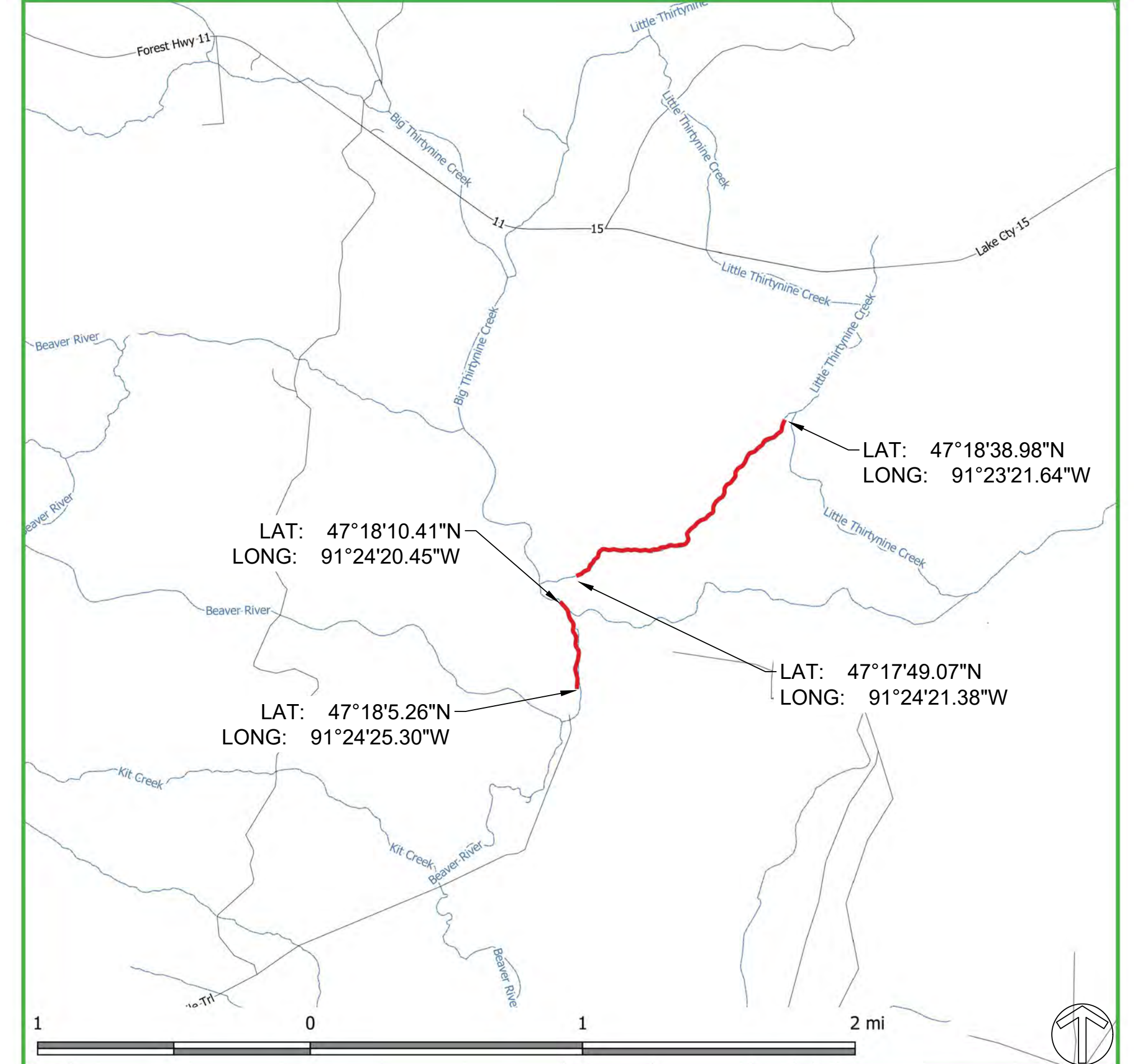
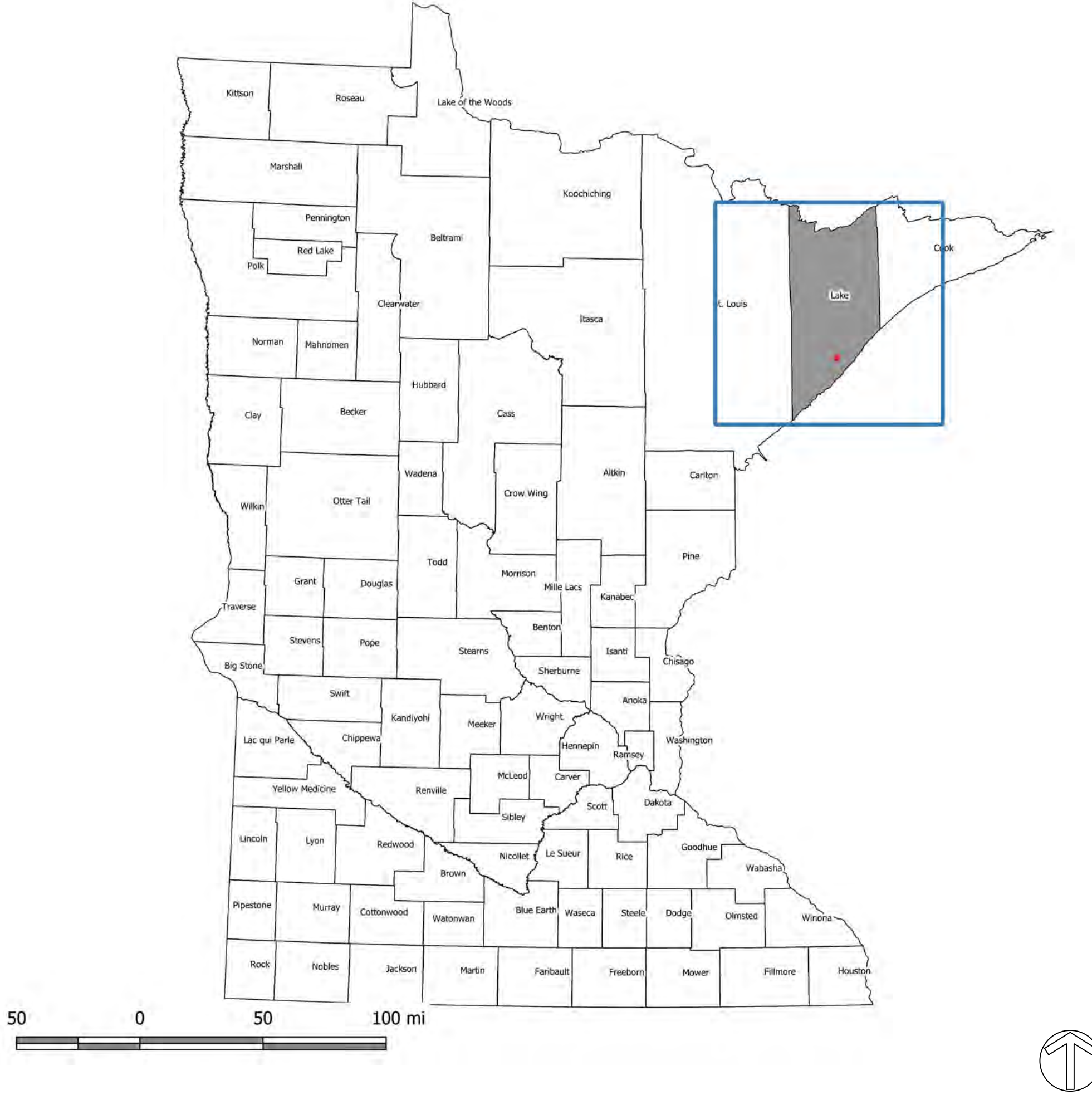
Appendix A, Big 39 and Little 39 Stream Restoration Site Plans

BID SET - NOT FOR CONSTRUCTION

BIG AND LITTLE 39

STREAM RESTORATION

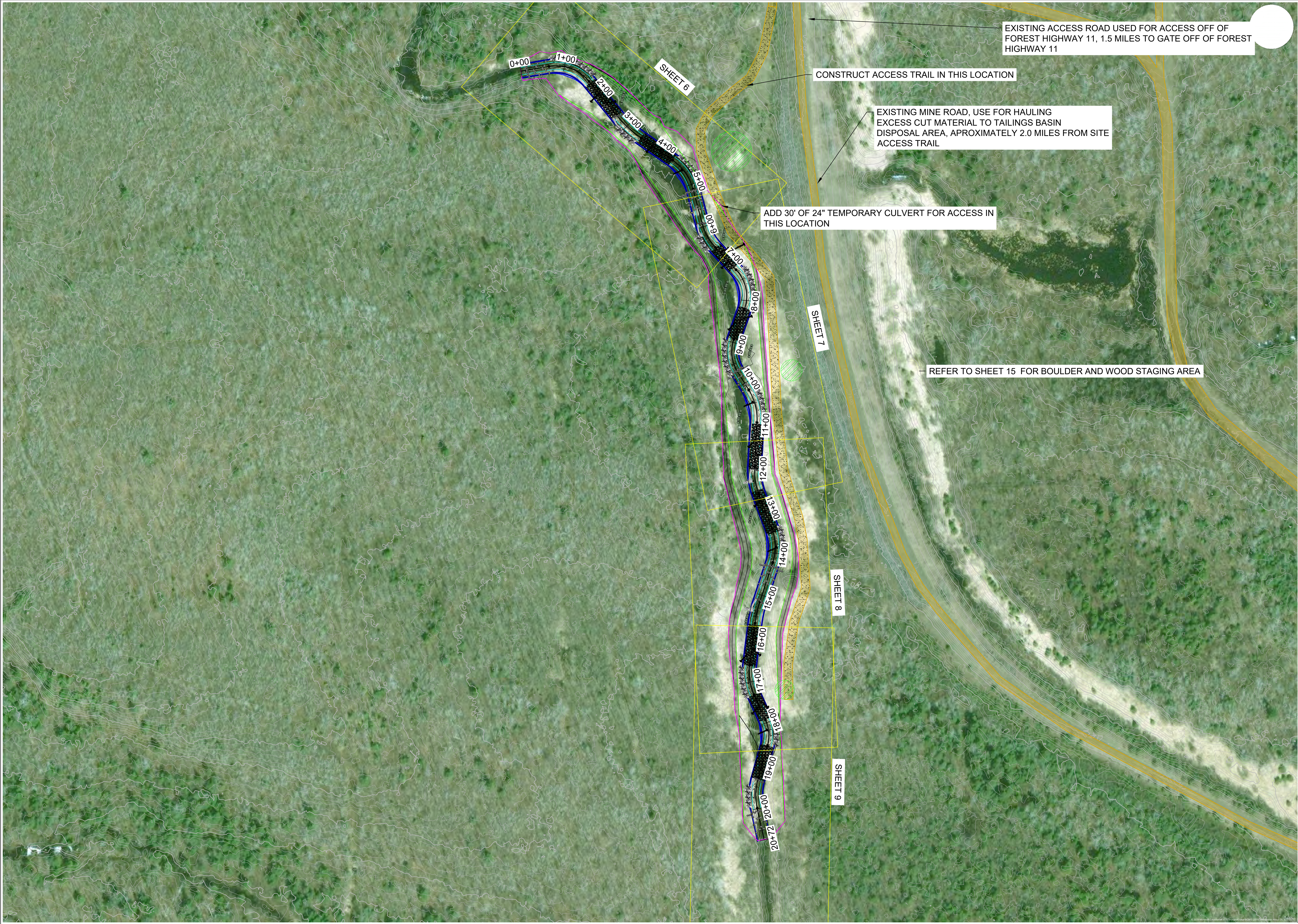
NEAR SILVER BAY
LAKE COUNTY, MN
10/15/2021



C:\USERS\OWNER\DESKTOP\NORTHSHOREMINING\CD\SHEETS\NORTHSHORE\BID\NOTES.DWG | REIDE | SAVED: Friday, October 15, 2021 4:21:08 PM | ACAD.CTB | | PLOTTED: Monday, October 18, 2021 10:27:03 AM

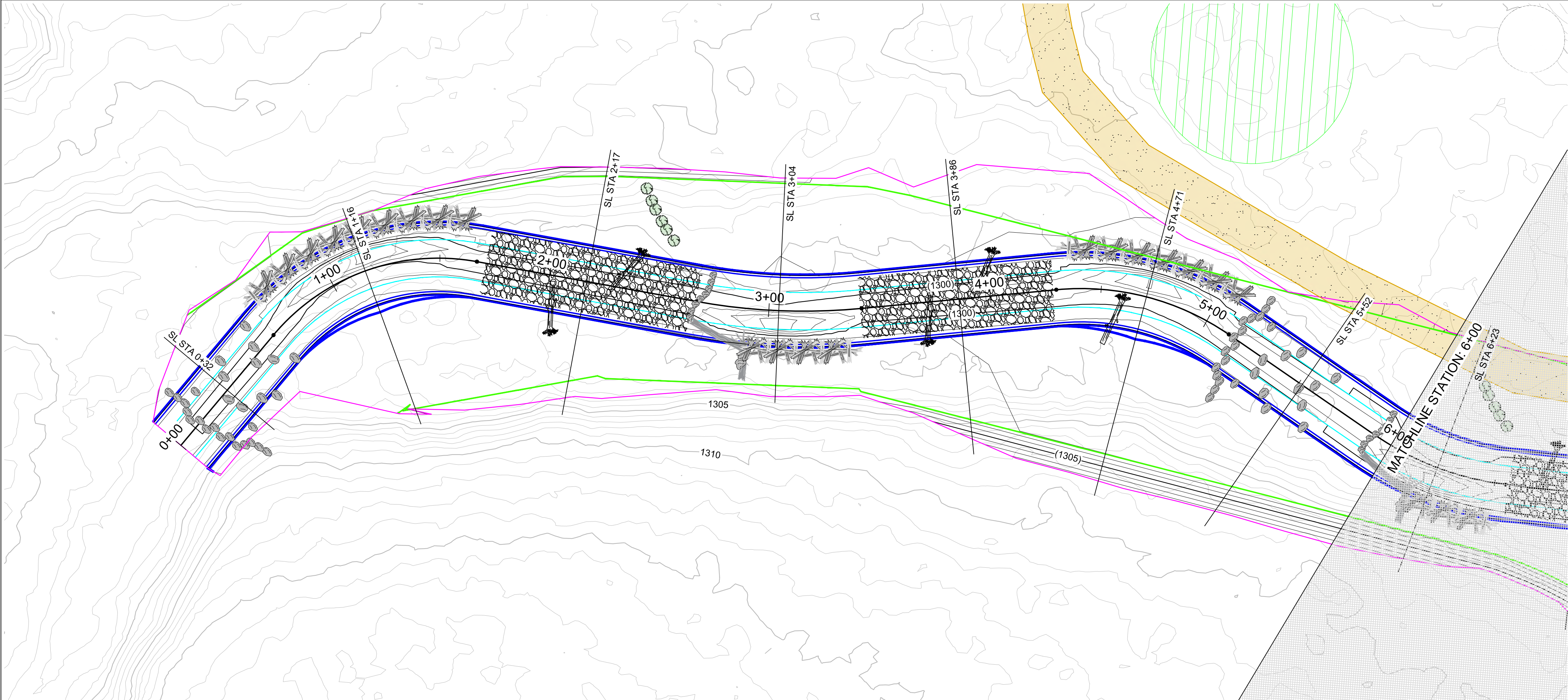
NOTES:				APPROVED BY: KA				CHECKED BY: JMG				DRAWN BY: GET			
GENERAL CONSTRUCTION NOTES:				REV				DESCRIPTION				APPRV			
1. THE WORK ON THIS PROJECT SHALL ADHERE TO THE FOLLOWING SPECIFICATIONS, STANDARDS AND/OR REGULATIONS: MN DOT STANDARD SPECIFICATIONS FOR CONSTRUCTION, 2018 EDITION, THE FOLLOWING SPECIFICATIONS EITHER MODIFY OR REPLACE APPROPRIATE MN DOT SPECIFICATIONS.				1				DRAFT 30% DESIGN				KA			
2. INSTREAM STRUCTURES SHALL BE INSTALLED AS THE CHANNEL IS BEING CONSTRUCTED AND NOT POST CONSTRUCTION.				2				DRAFT 60%				KA			
3. WHERE PRACTICABLE, EXISTING TREES AND VEGETATION SHOULD BE LEFT IN PLACE TO FACILITATE NATURAL REGENERATION AND SOIL STABILIZATION.				3				DRAFT 90%				KA			
4. DEFINITIONS:				4				BID SET				KA			
A. BANKFULL ELEVATION IS THE POINT OF INCIPIENT FLOODING IN AN ALLUVIAL CHANNEL. THIS ELEVATION IS THE REFERENCE FOR DEPTHS ON OR ALONG THE CHANNEL PROFILE AND STRUCTURES DESCRIBED IN THESE SHEETS.				XX				XX				XX			
B. THE BANKFULL BENCH IS A CONSTRUCTED FLOODPLAIN ADJACENT TO THE CHANNEL. THE BANKFULL BENCH IS CONSTRUCTED AT THE BANKFULL ELEVATION.				XX				XX				XX			
C. THE THALWEG IS THE LOWEST PORTION OF THE CHANNEL.				XX				XX				XX			
D. THE VANE LENGTH IS THE STRAIGHT LINE DISTANCE BETWEEN THE VANE ARM AND A LINE TANGENT TO THE STREAMBANK AT THE POINT WHERE THE VANE ARM INTERSECTS THE STREAMBANK.				XX				XX				XX			
E. THE VANE ANGLE IS THE ANGLE BETWEEN THE VANE ARM AND A LINE TANGENT TO THE STREAMBANK AT THE POINT WHERE THE VANE ARM INTERSECTS THE STREAMBANK.				XX				XX				XX			
F. SOD MATS ARE GRASS AND WILLOW TRANSPLANTS THAT STILL CONTAIN ROOTING DEPTH. APPROXIMATELY 9-12IN OF DEPTH WILL BE NEEDED WHEN HARVESTING THE SOD MATS.				XX				XX				XX			
6. THE CONTRACTOR SHALL HAVE AT LEAST ONE GPS ASSISTED EXCAVATOR ON SITE FOR SETTING STRUCTURES AND GRADING. THE ENGINEER WILL PROVIDE A TIN FILE FOR LOADING INTO GPS OPERATED EQUIPMENT. DEPENDING ON ENCOUNTERED CONDITIONS SOME SHIFTING OF THE STREAM CHANNEL MAY BE NECESSARY. ANY COST ASSOCIATED WITH CHANGING STRUCTURE LOCATIONS OR ALIGNMENT SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION. STAKING MAY BE OMITTED FOR PORTIONS OF THE STREAM WHEN SURVEY-GRADE GPS IS USED TO CONSTRUCT THE CHANNEL. IF GPS IS USED IN LIEU OF STAKING THE CHANNEL IN THE FIELD, THE CONTRACTOR ASSUMES ALL RESPONSIBILITY FOR THE STREAM BEING CONSTRUCTED AS DESIGNED, INCLUDING ANY ISSUES RELATED TO PROJECTIONS, BASE POINTS OR CONVERSION OF DIGITAL TERRAIN MODELS.															
7. PRIOR TO CLEARING AND GRUBBING, CONTRACTOR SHALL MARK THE LIMITS OF CLEARING NEAR TREES FOR VERIFICATION OF INTENT BY THE ENGINEER. SOME MINOR ADJUSTMENT OF CHANNEL ALIGNMENT MAY BE REQUIRED TO PRESERVE TREES OR MINIMIZE IMPACT TO TREES.															
8. CONTRACTOR SHALL MINIMIZE, TO THE MAXIMUM EXTENT POSSIBLE, IMPACTS TO THE ADJACENT TREES. CONSTRUCTION EQUIPMENT TRACKS AND PATHWAYS SHALL BE GRADED AND RECONTOURED AFTER CONSTRUCTION TO PREVENT RILL AND GULLY EROSION.															
9. THE PROPOSED GRADING IS SHOWN ON THESE PLAN SHEETS. THE CONTRACTOR MAY EXTEND THE LIMITS OF DISTURBANCE ONLY WITH THE APPROVAL OF THE ENGINEER.															
10. CONTRACTOR SHALL USE AN EXCAVATOR WITH A HYDRAULIC THUMB TO INSTALL INSTREAM STRUCTURES.															
11. CHANNEL RELOCATION WORK SHALL BE COMPLETED AND STABILIZED PRIOR TO ALLOWING FLOW TO ENTER INTO THE NEWLY CONSTRUCTED STREAM CHANNEL. THE CONTRACTOR SHALL NOT OPEN UP MORE THAN 200 FEET OF CHANNEL WITHOUT EROSION CONTROL BLANKET IN PLACE OR BY APPROVAL OF THE ENGINEER.															
12. THE PROPOSED STREAM CHANNEL SHALL BE CONSTRUCTED BY FIRST GRADING THE FLOODPLAIN ADJACENT TO THE CHANNEL TO THE ELEVATION INDICATED ON THESE PLANS. THIS MAY BE DONE AS GENERAL EXCAVATION. THE PROPOSED STREAM CHANNEL SHALL THEN BE EXCAVATED TO THE PROPER DEPTHS INDICATED ON THE PROFILE AND PROPOSED CONTOURS. THIS SHALL BE DONE AS SPECIALIZED EXCAVATION AND IS TYPICALLY ACCOMPLISHED WITH A TRACK EXCAVATOR. THE PROFILES AND CONTOURS SHOWN PROVIDE WIDTHS AND SLOPES FOR AID IN CONSTRUCTING THE CHANNEL TO THE APPROPRIATE DIMENSIONS. THE THALWEG CAN FIRST BE EXCAVATED TO THE POINT INDICATED ON THE PROFILE. EXCAVATION AND FINE GRADING OF THE CROSS SECTIONS SHALL THEN BE PERFORMED AS SHOWN ON THE TYPICAL CROSS SECTIONS AND PROPOSED CONTOURS. ANY STOCKPILING OF MATERIALS OR "DOUBLE HANDLING" NECESSARY TO BUILD THE CHANNEL SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.															
13. IF THE EXISTING GROUND IS LESS THAN 0.2 FEET HIGHER THAN															
THE PROPOSED BANKFULL ELEVATION, IT IS NOT NECESSARY TO EXCAVATE MATERIAL TO THE PROPOSED ELEVATION SHOWN ON THE PROFILE.															
14. THE SURFACE OF ALL INSTREAM STRUCTURES SHALL BE FINISHED TO A SMOOTH LINE IN ACCORDANCE WITH THE LINES, GRADES, AND CROSS SECTIONS OR ELEVATIONS SHOWN ON THE DRAWINGS. THE DEGREE OF FINISH FOR THE VANE SLOPES AND INVERT ELEVATIONS SHALL BE WITHIN 0.1 VERTICAL FEET OF THE GRADES AND ELEVATIONS INDICATED. ALL GAPS OR VOIDS BETWEEN THE ROCKS SHALL BE PLUGGED WITH SMALL GRAVEL TO FORM A TIGHT-FITTING SEAL.															
15. CONSTRUCTION SPECIFICATIONS FOR BANKFULL CHANNEL DIMENSIONS OR CROSS SECTIONS WILL BE HELD TO THE DIMENSIONS SHOWN ON THE TYPICAL CROSS SECTIONS. ELEVATIONS SHALL BE CONSTRUCTED WITHIN 0.1 VERTICAL FEET; WIDTHS AND MEAN DEPTHS MUST FALL WITHIN THE RANGES SHOWN IN THE DRAWINGS.															
16. THE IN-STRUCTURE BID ITEMS SHALL INCLUDE ALL LABOR AND MATERIALS NECESSARY TO CONSTRUCT THE STRUCTURE. BID ITEMS INCLUDE SEEDING, PLANTING, AND MULCH AND EROSION CONTROL BLANKETS AND INCLUDE ALL LABOR AND MATERIALS NECESSARY TO STABILIZE AREAS DISTURBED DURING CONSTRUCTION OF STRUCTURES. AFTER THE STRUCTURE IS COMPLETE AND FLOW IS RESTORED TO THE CHANNEL, SOME ADJUSTMENT TO THE STRUCTURE OR ADDITIONAL STABILIZATION MEASURES MAY BE NECESSARY TO ACHIEVE DESIRED EFFECT. ANY COSTS ASSOCIATED WITH THESE ADJUSTMENTS SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.															
17. THE CONSTRUCTED STREAM CHANNEL SHALL BE STABILIZED AS SOON AS POSSIBLE. SEE EROSION CONTROL BLANKET DETAIL. THE BLANKET SHALL BE ROLLED OUT IN THE DIRECTION OF THE ANTICIPATED RUN-OFF FLOW. INSTALL BLANKET IN ACCORDANCE WITH DETAIL SHOWN HEREIN. REWORKING OF AREAS THAT DO NOT ESTABLISH VEGETATION OR BECOME UNSTABLE SHALL BE NECESSARY IF THE EROSION CONTROL BLANKET SEPARATES FROM THE SOIL. SEE SEEDING AND PLANTING DETAIL FOR BLANKET SPECIFICATIONS. SEEDING OF THE BANKFULL BENCH SHALL BE IN ACCORDANCE WITH THE PLANTING TABLE.															
18. THE HARVESTING AND INSTALLATION OF LIVE STAKES SHALL BE PERFORMED ONLY DURING THE DORMANT SEASON TYPICALLY BETWEEN NOVEMBER 1 AND APRIL 15. CONTRACTOR SHALL NOTIFY ENGINEER 7 DAYS PRIOR TO HARVESTING TO REVIEW AND APPROVE ALL HARVESTING SITES. UPON APPROVAL BY ENGINEER, THE CONTRACTOR SHALL BE RESPONSIBLE FOR HARVESTING AND TRANSPORTING THE LIVE STAKE CUTTINGS TO THE JOB SITE.															
19. LIVE STAKES SHALL BE INSTALLED ALONG THE OUTSIDE MEANDER BEND AND ALONG RIFFLES WHERE INDICATED ON THE DRAWINGS AND DETAILS. LIVE STAKES SHALL BE INSTALLED INTO THE EROSION CONTROL BLANKET IN ADDITION TO THE DEAD STAKES.															
20. EXCESS SPOIL MATERIAL MAY BE SPREAD AND GRADED ONSITE OR IN THE ONSITE PIT AS APPROVED BY THE ENGINEER. PLACEMENT OF ANY ON-SITE OR OFF-SITE SPOIL MATERIAL SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.															
21. CONTRACTOR SHALL CALL GOPHER STATE ONE CALL FOR UTILITY MARKING AT LEAST 48 HOURS PRIOR TO START OF CONSTRUCTION. THE LOCATIONS OF THE UTILITIES SHOWN ON THESE DRAWINGS ARE APPROXIMATE ONLY (UTILITY QUALITY LEVEL D) AND MAY NOT BE ACCURATE. LOCATING UTILITIES IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE ENGINEER AND PROJECT OWNER WILL NOT BE RESPONSIBLE FOR ANY DAMAGES TO UTILITIES.															
22. AFTER CONSTRUCTION, THE ACCESS ROADS LEADING TO THE PROJECT SITE SHALL BE RESTORED TO AS GOOD OR BETTER CONDITION THAN BEFORE CONSTRUCTION AT THE ENGINEER'S DISCRETION.															
SURVEY NOTES:															
THE ELEVATIONS SHOWN HEREIN ARE BASED ON DATA SURVEY THAT ENCOMPASSES THE EXISTING GROUND SURFACE FROM WHICH ALL COMPUTATIONS FOR CUT/FILL ARE BASED. SLIGHT DISCREPANCIES BETWEEN THE EXISTING GROUND DIGITAL SURFACE AND FIELD CONDITIONS CAN RESULT IN SIGNIFICANT VARIATIONS IN TOTAL EXCAVATED QUANTITIES. THUS, THE CONTRACTOR SHALL COMPARE QUANTITIES OF MATERIAL EXCAVATED TO THOSE SHOWN ON THE DRAWINGS TO MANAGE THE MOVEMENT OF MATERIAL ACROSS THE SITE.															

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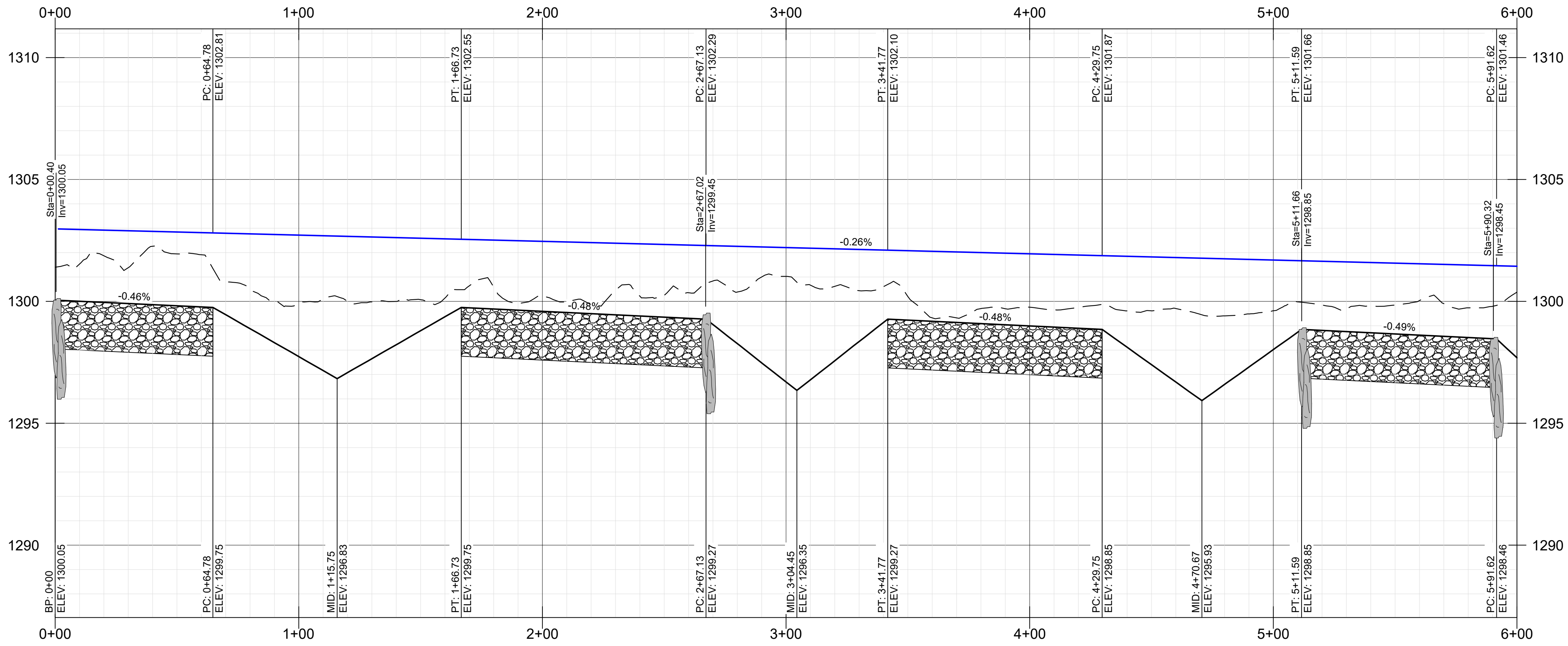
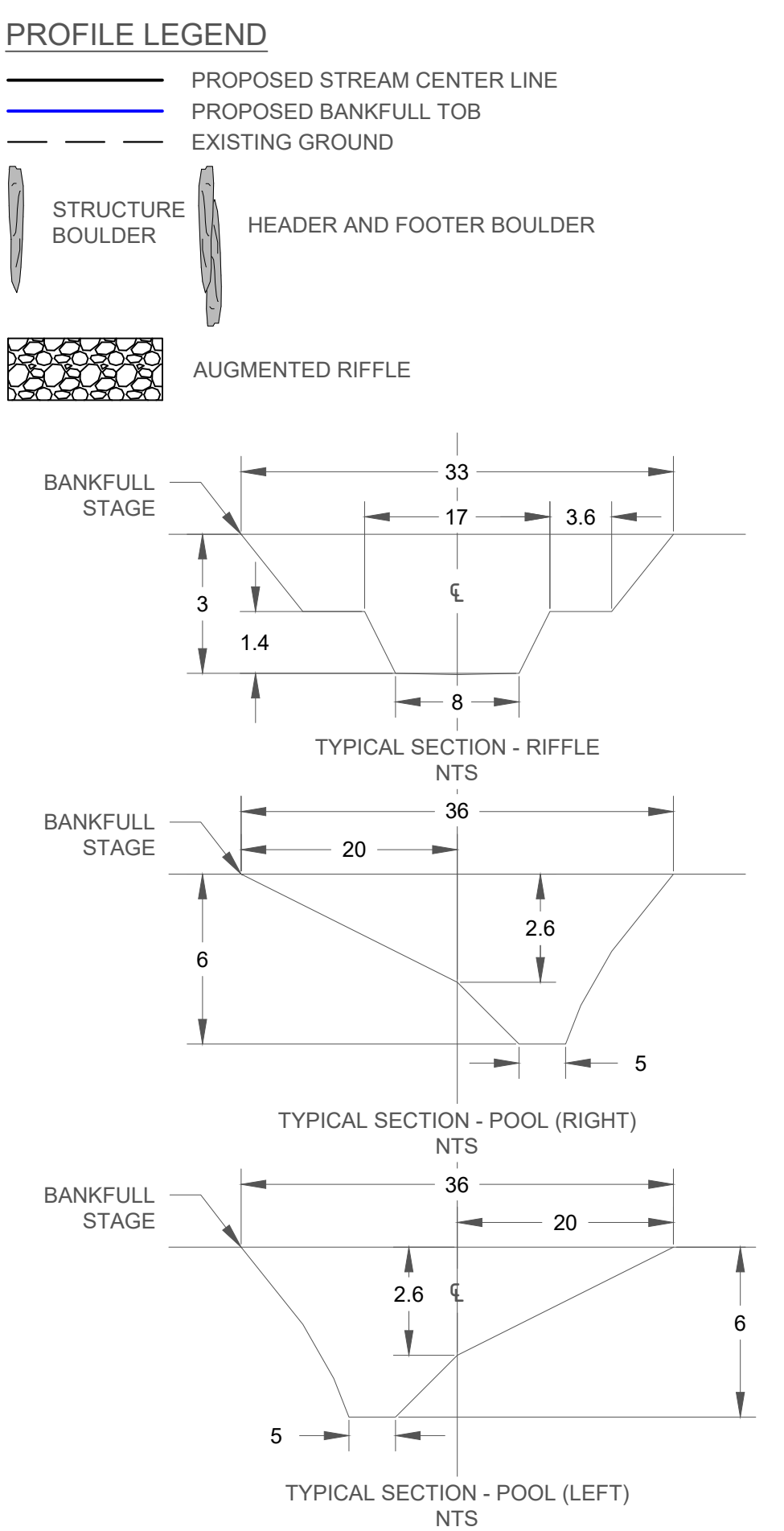


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				DESCRIPTION									
				DRAFT 30% DESIGN									
				DRAFT 60%									
STREAM RESTORATION NEAR SILVER BAY LAKE COUNTY, MN		BIG 39 OVERVIEW											
		BID SET - NOT FOR CONSTRUCTION											
		CLIFFS											
		NORTHSHORE MINING CO 10 OUTER DR SILVER BAY, MN 55614											
		BEAVER RIVER CONSULTING, LLC. 5752 EAGLE VIEW DRIVE DULUTH, MN 55803											
BID SET NOT FOR CONSTRUCTION													
DATE: 10/15/2021 SCALE (34"X22"): 1" = 100' SCALE (17"X11"): 1" = 200'													
<div>0 100 200 SCALE IN FEET</div>													
SHEET NUMBER 5 OF 50													

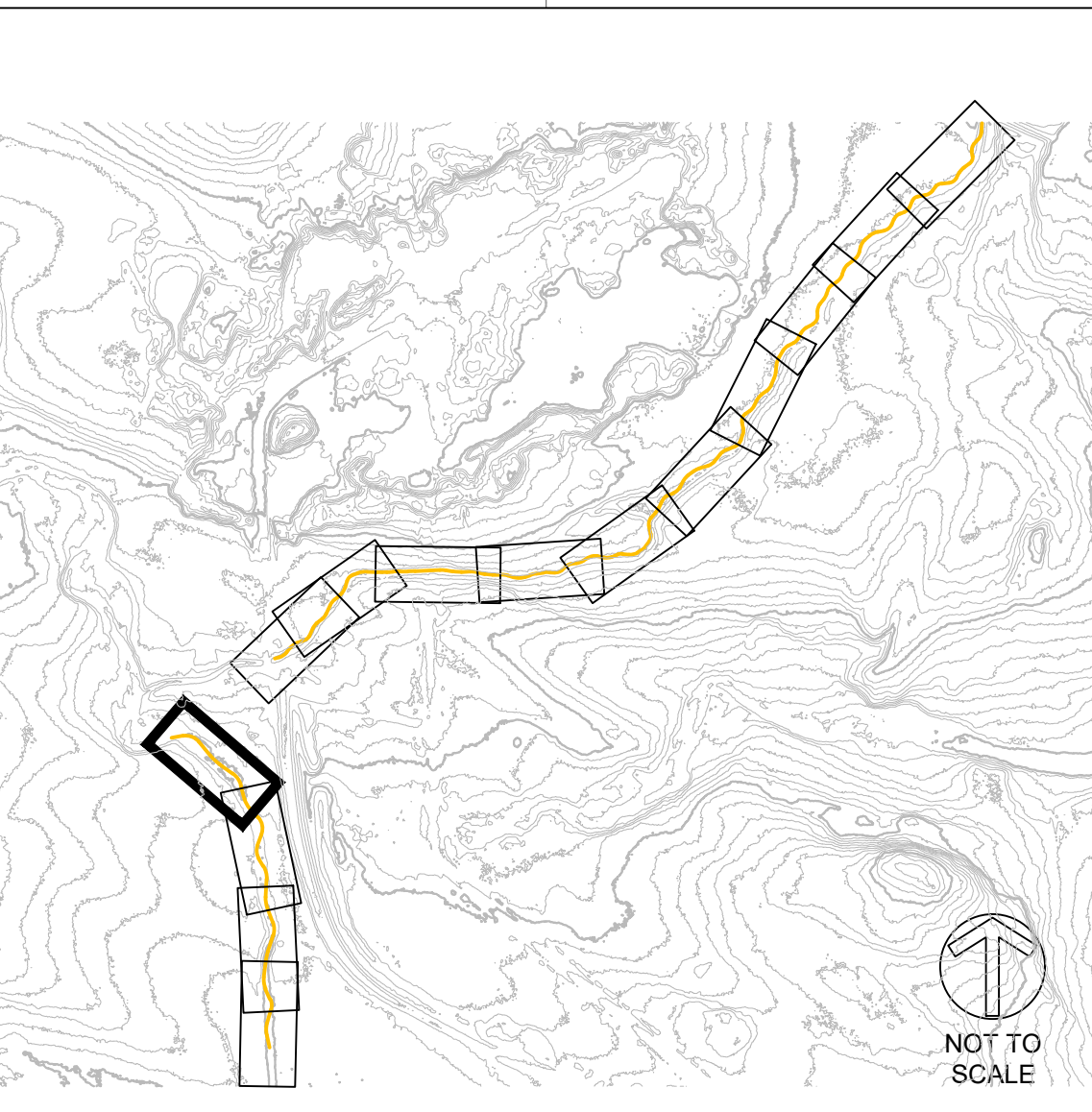
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- PLAN LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED INNER BERM
 - PROPOSED GEOMORPHIC CHANNEL TOB
 - PROPOSED FLOODPLAIN TOE
 - LIMITS OF DISTURBANCE
 - PROPOSED MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR
 - GRAVEL RIFFLE SEE SHEET 38
 - CONSTRUCTION ACCESS
 - STOCKPILE AREA SEE SHEET 49
 - LOG J-HOOK SEE SHEET 39
 - TOE WOOD SEE SHEET 41
 - TRANSPLANTS SEE SHEET 42
 - BOULDER CONSTRUCTED RIFFLE SEE SHEET 43
 - HABITAT LOG SEE SHEET 46
 - ROCK GLIDE RIFFLE SEE SHEET 44
- PROFILE LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED BANKFULL TOB
 - EXISTING GROUND
 - STRUCTURE BOULDER
 - HEADER AND FOOTER BOULDER
 - AUGMENTED RIFFLE



SCALE: HOR 1" = 1'; VERT 1" = 0'



<div><div><div>BIG AND LITTLE 39 STREAM RESTORATION NEAR SILVER BAY LAKE COUNTY, MN</div></div><div><div>BID SET - NOT FOR CONSTRUCTION BIG 39 PLAN AND PROFILE - (1) STA 0+00 TO 6+00</div></div></div>	APPROVED BY: KA	CHECKED BY: MJG	DRAWN BY: GET	APPRV
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	2	DRAFT 60%		
	3	DRAFT 90%		
	4	BID SET		
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	XX	XX		
	XX	XX		
	XX	XX		
<div><div><div><div><div>NORTHSHORE MINING CO 10 OUTER DR SILVER BAY, MN 55614</div><div>----</div><div><div><div>BEAVER RIVER CONSULTING</div><div>BEAVER RIVER CONSULTING, LLC. 5752 EAGLE VIEW DRIVE DULUTH, MN 55803</div><div>----</div></div></div></div></div></div></div>				
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<div><div><div>0</div><div>30</div><div>60</div></div><div>SCALE IN FEET</div></div>				
<div>SHEET NUMBER</div> <div>6 OF 50</div>				

CLIFFS

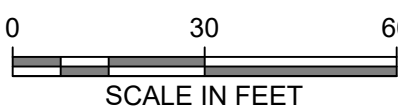
NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614

BEAVER RIVER CONSULTING

BEAVER RIVER CONSULTING, LLC
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

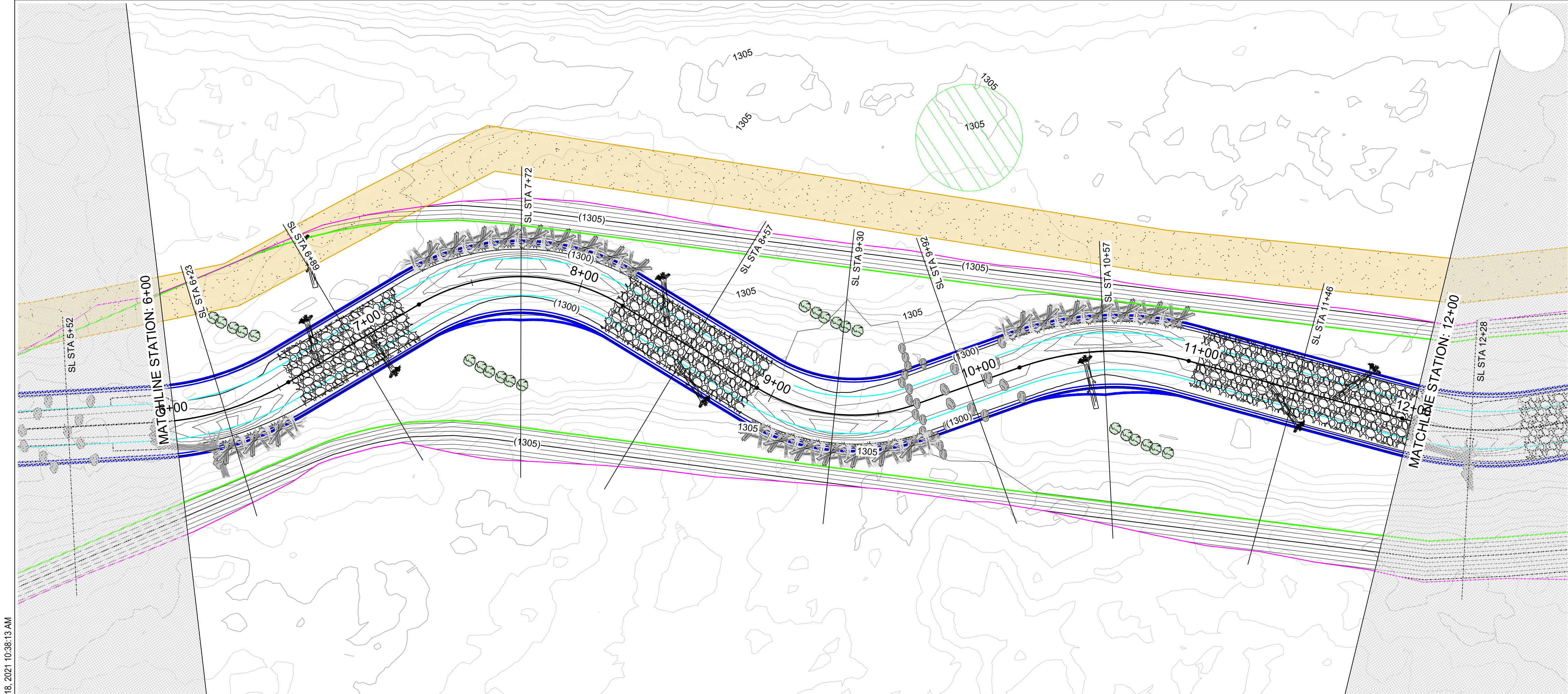
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NOT FOR
CONSTRUCTION

DATE: 10/15/2021
SCALE (34"x22"): 1" = 30'
SCALE (17"x11"): 1" = 60'



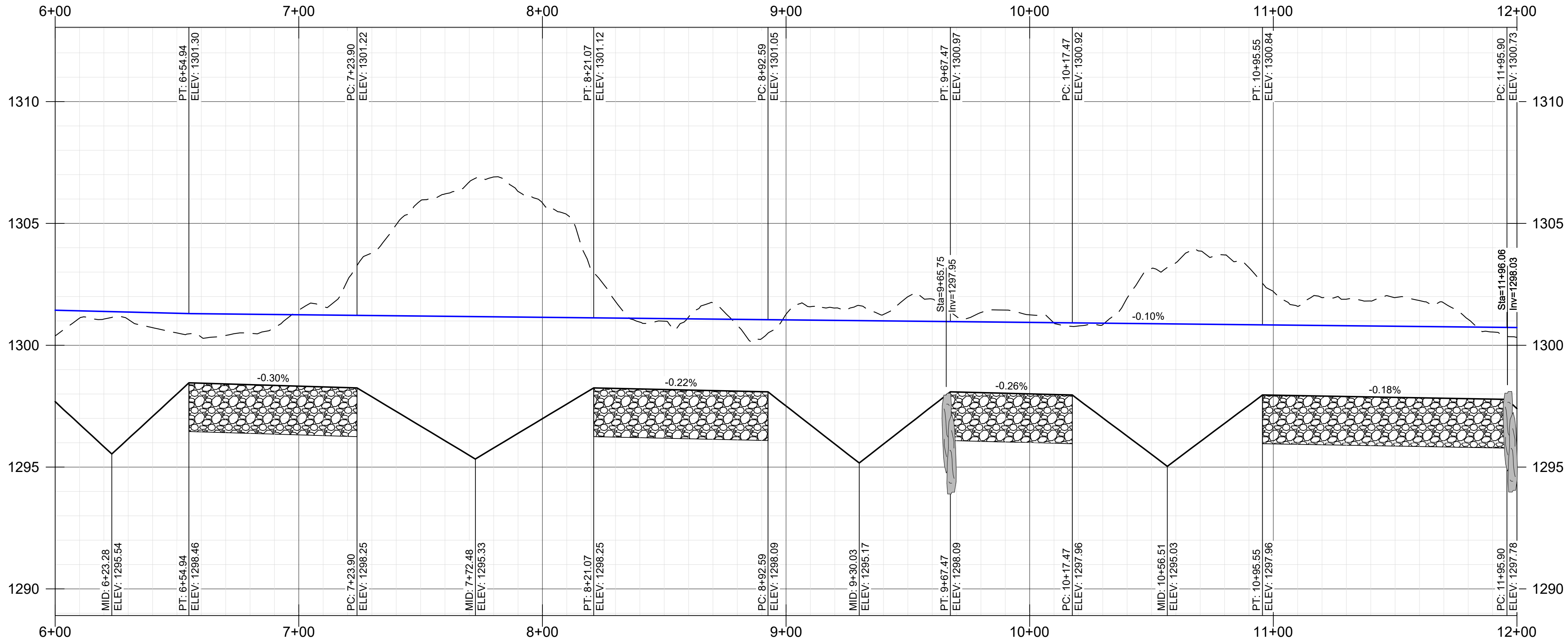
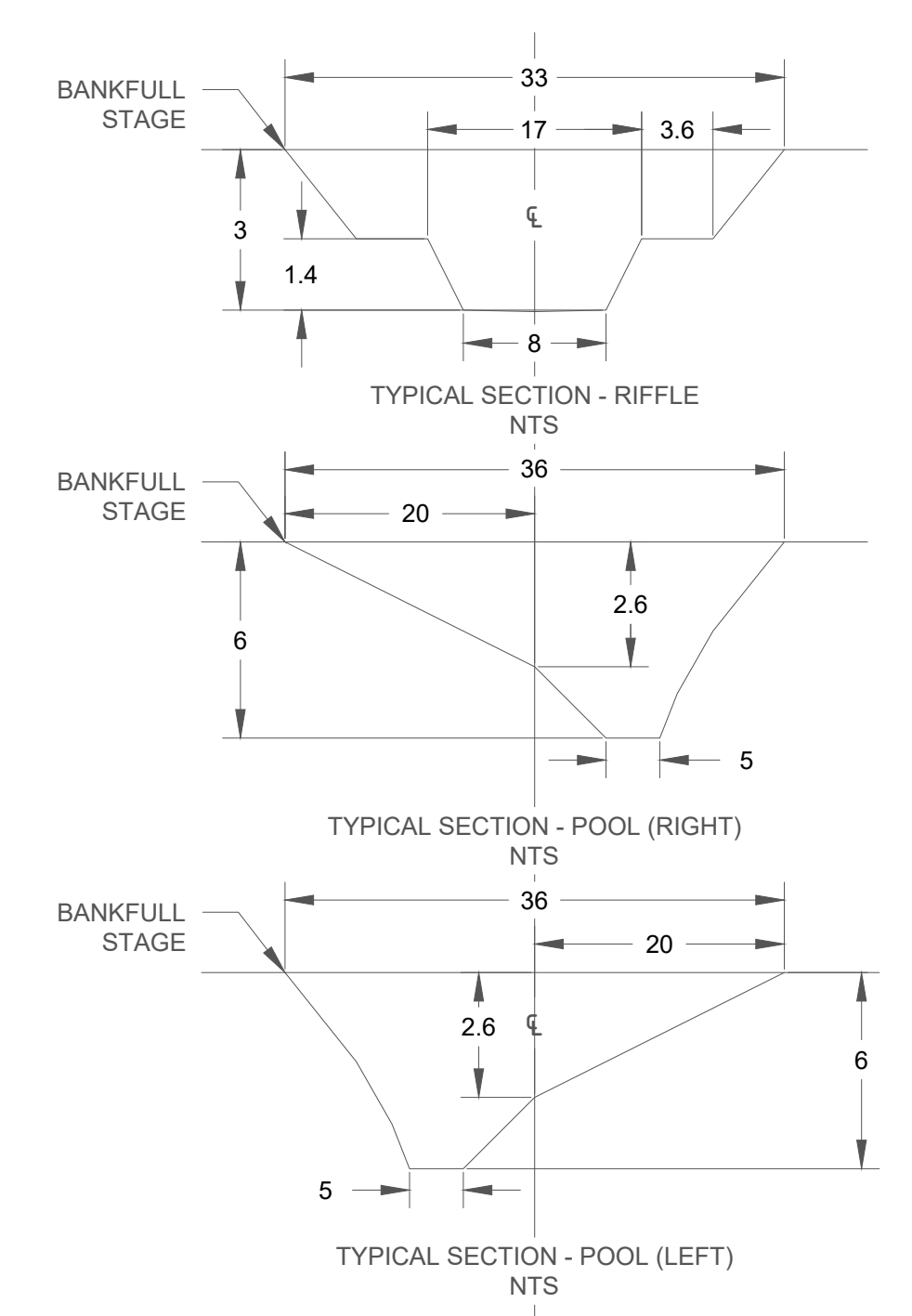
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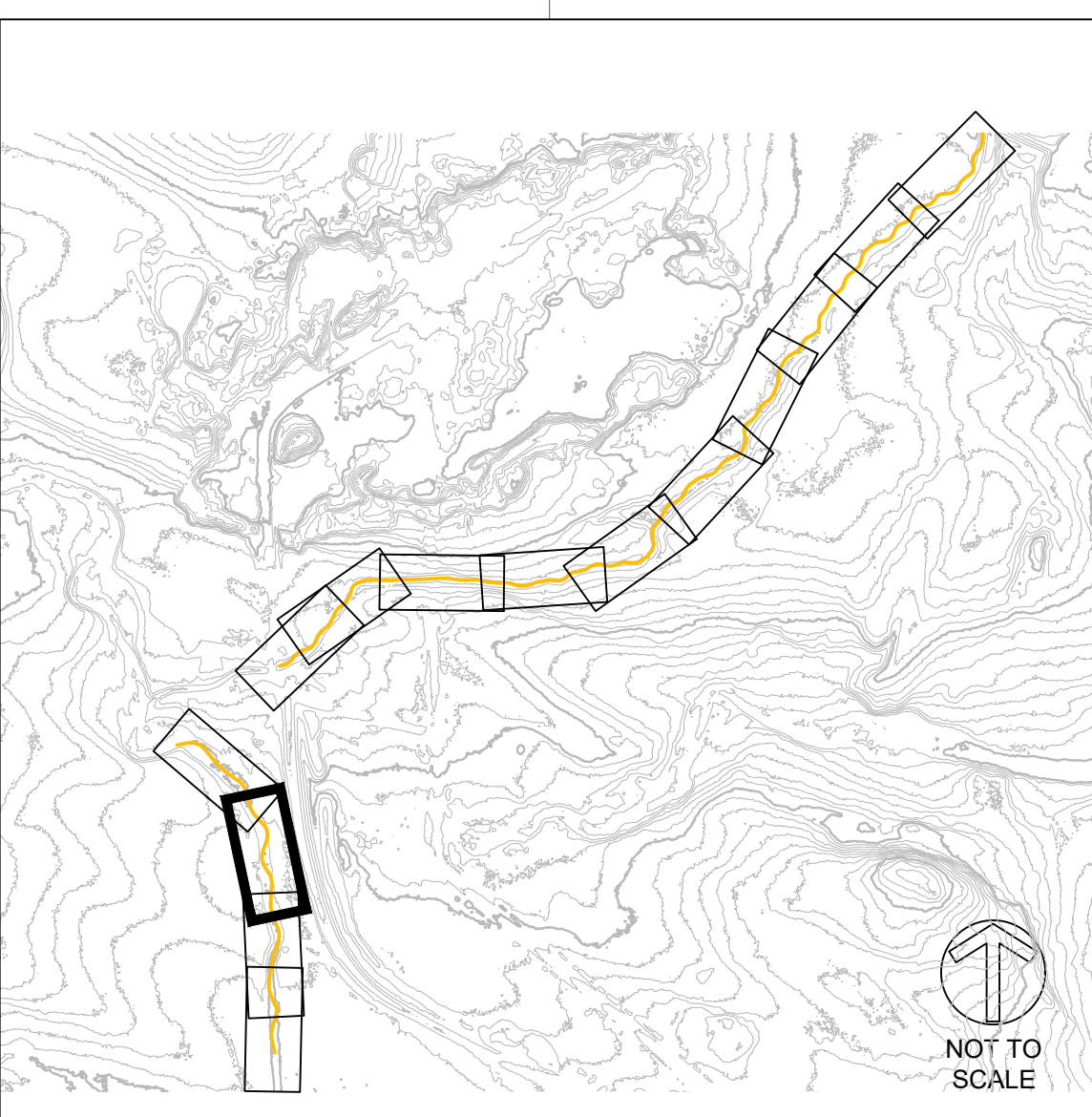


- PLAN LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED INNER BERM
 - PROPOSED GEOMORPHIC CHANNEL TOB
 - PROPOSED FLOODPLAIN TOE
 - LIMITS OF DISTURBANCE
 - PROPOSED MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR
 - GRAVEL RIFFLE SEE SHEET 38
 - CONSTRUCTION ACCESS
 - STOCKPILE AREA SEE SHEET 49
 - LOG J-HOOK SEE SHEET 39
 - TOE WOOD SEE SHEET 41
 - TRANSPLANTS SEE SHEET 42
 - BOULDER CONSTRUCTED RIFFLE SEE SHEET 43
 - HABITAT LOG SEE SHEET 46
 - ROCK GLIDE RIFFLE SEE SHEET 44

- PROFILE LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED BANKFULL TOB
 - EXISTING GROUND
 - STRUCTURE BOULDER
 - HEADER AND FOOTER BOULDER
 - AUGMENTED RIFFLE



SCALE: HOR 1" = 1'; VERT 1" = 0'



APPROVED BY: KA	REV	DESCRIPTION	CHECKED BY: MJG	DRAWN BY: GET	APPRV
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	2	DRAFT 60%			KA
	3	DRAFT 90%			KA
	4	BID SET			KA
	XX				XX
	XX				XX
	XX				XX
	XX				XX

BIG AND LITTLE 39
STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION
BIG 39
PLAN AND PROFILE - (2)
STA 6+00 TO 12+00

CLIFFS

NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614

BEAVER RIVER CONSULTING

BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

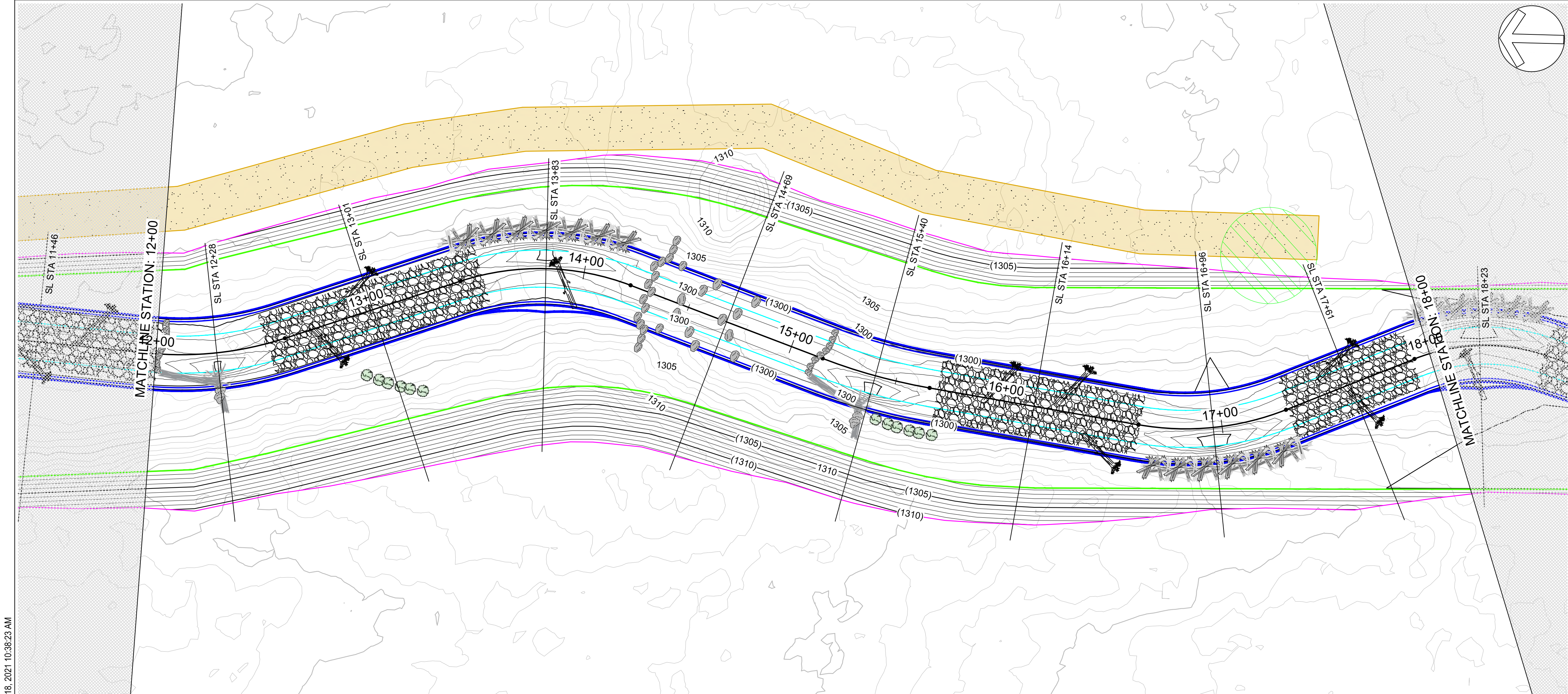
BID SET
NOT FOR
CONSTRUCTION

DATE: 10/15/2021
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SCALE (17"x11"): 1" = 60'

0 30 60
SCALE IN FEET

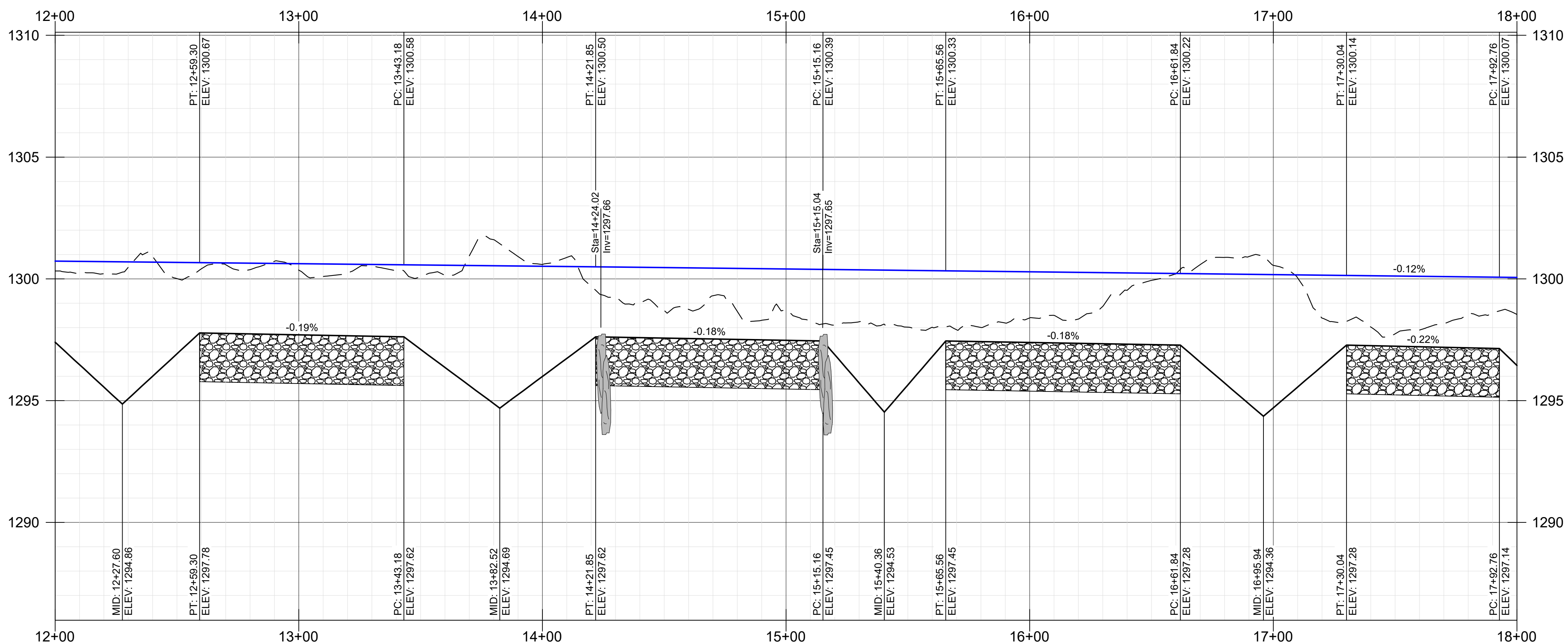
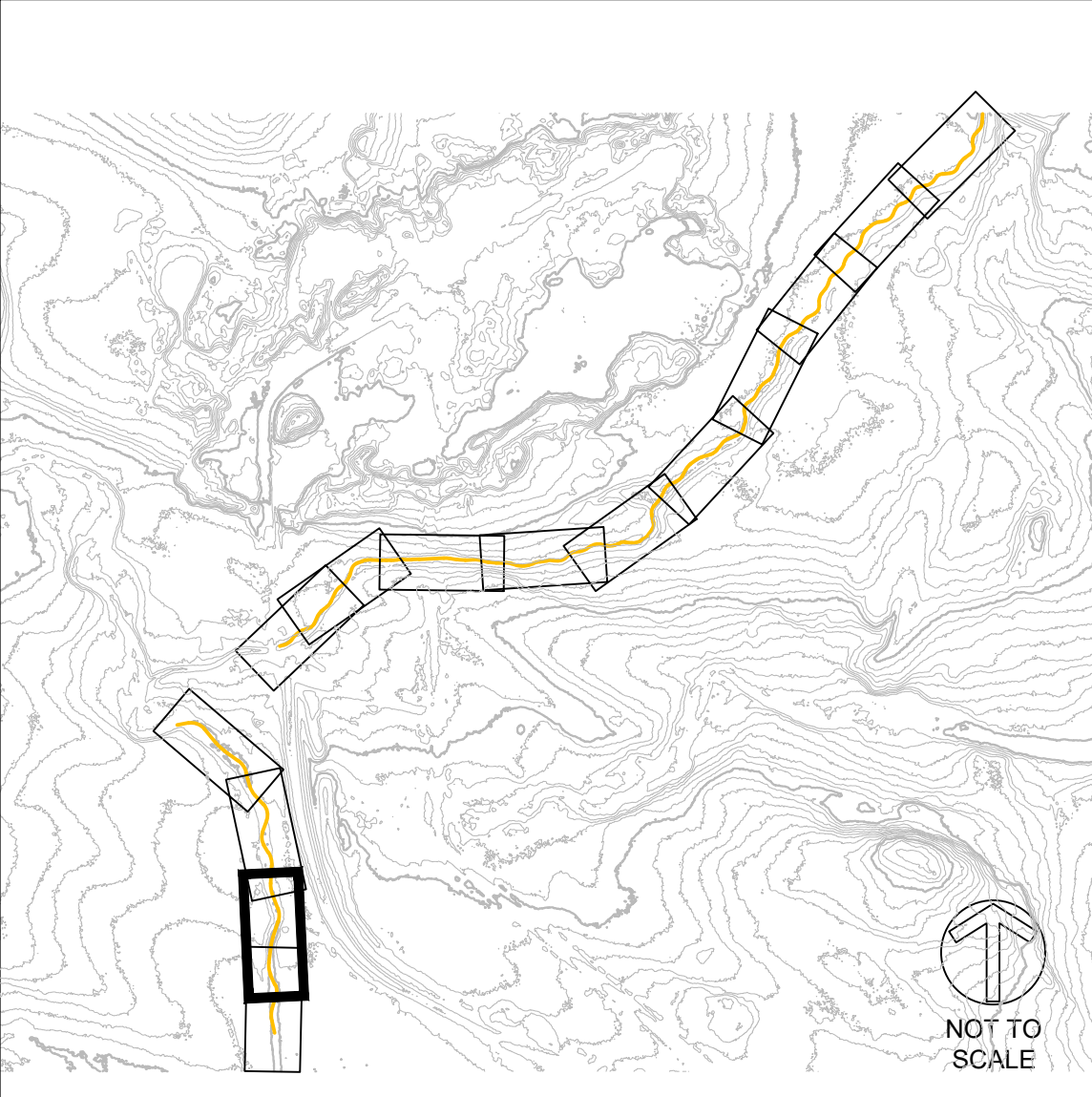
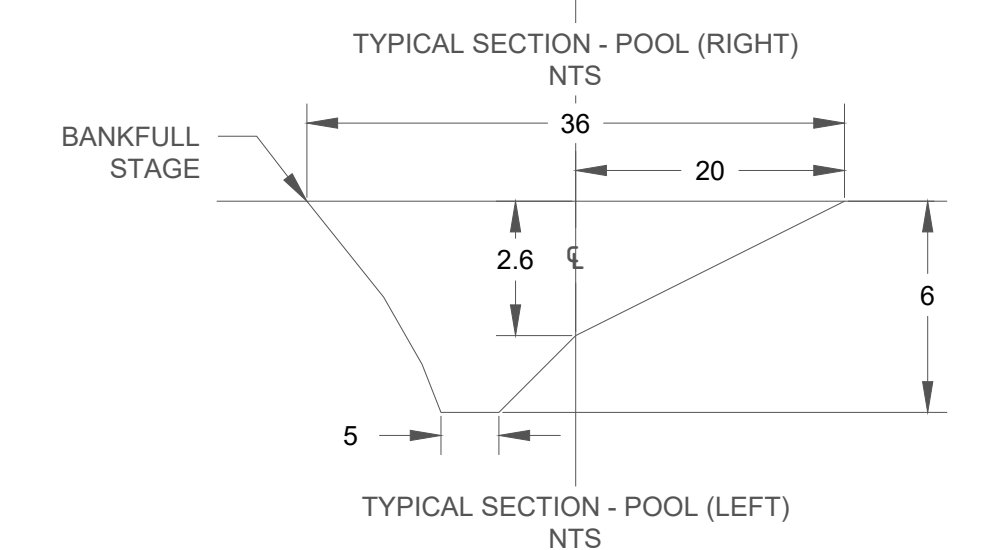
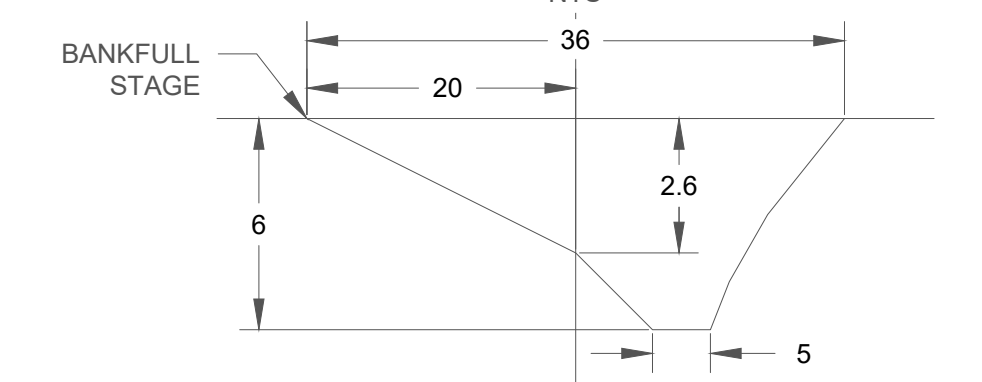
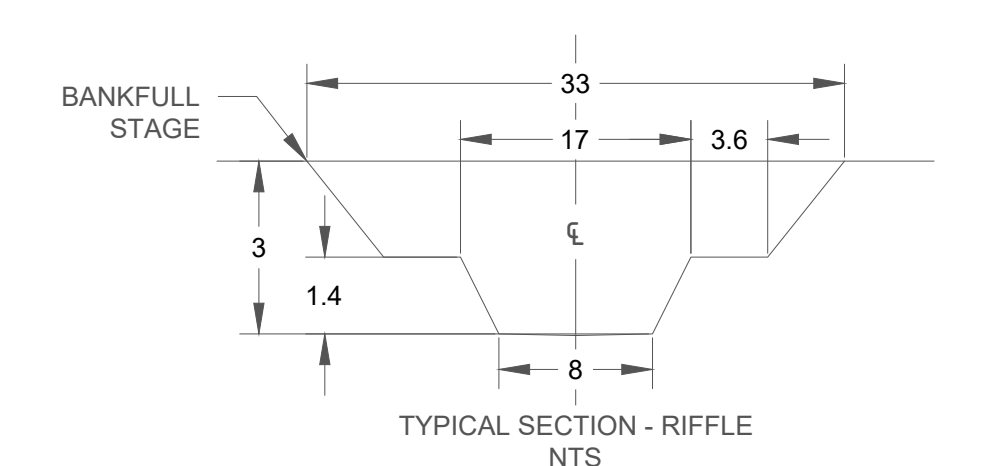
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SCALE: HOR 1" = 1'; VERT 1" = 0'

APPROVED BY: KA	REV	CHECKED BY: MJG		DRAWN BY: GET	
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	2	DRAFT 60%		KA	KA
	3	DRAFT 90%		KA	KA
	4	BID SET		XX	XX
	XX			XX	XX
	XX			XX	XX
	XX			XX	XX
	XX			XX	XX

**BIG AND LITTLE 39
STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN**

BID SET - NOT FOR CONSTRUCTION

**BIG 39
PLAN AND PROFILE - (3)
STA 12+00 TO 18+00**

CLIFFS

NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614

BEAVER RIVER CONSULTING

BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

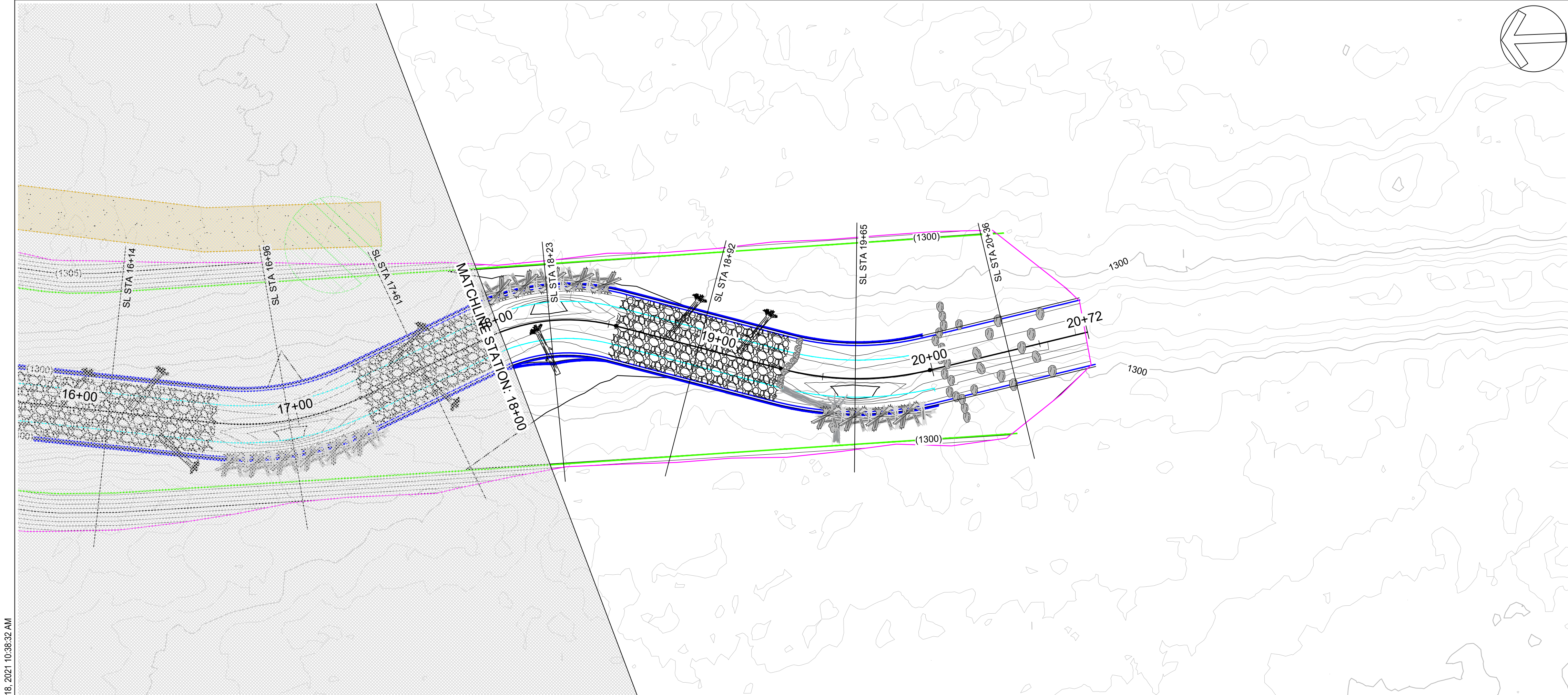
**BID SET
NOT FOR
CONSTRUCTION**

DATE: 10/15/2021
SCALE (34"x22"): 1" = 30'
SCALE (17"x11"): 1" = 60'

0 30 60
SCALE IN FEET

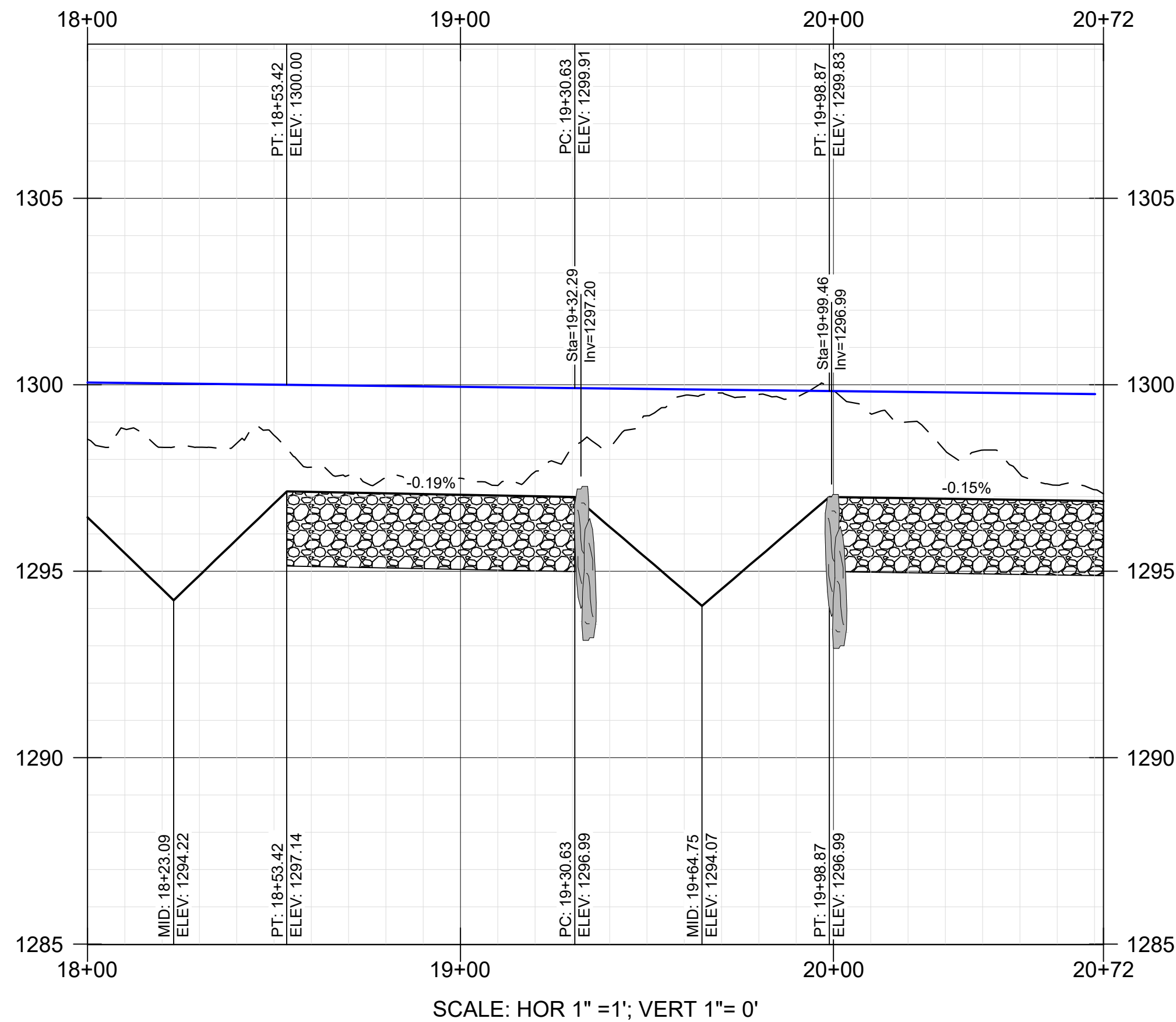
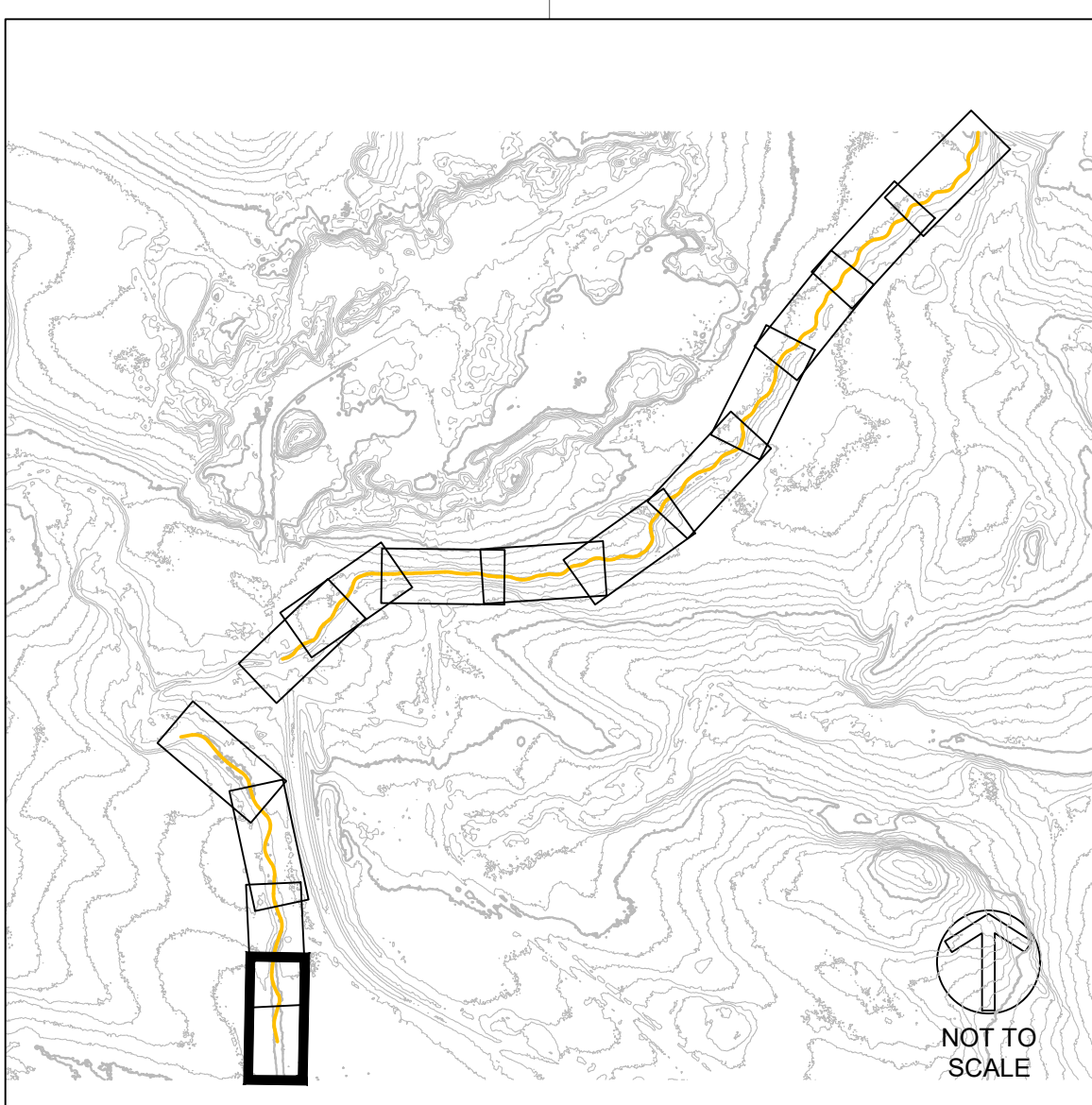
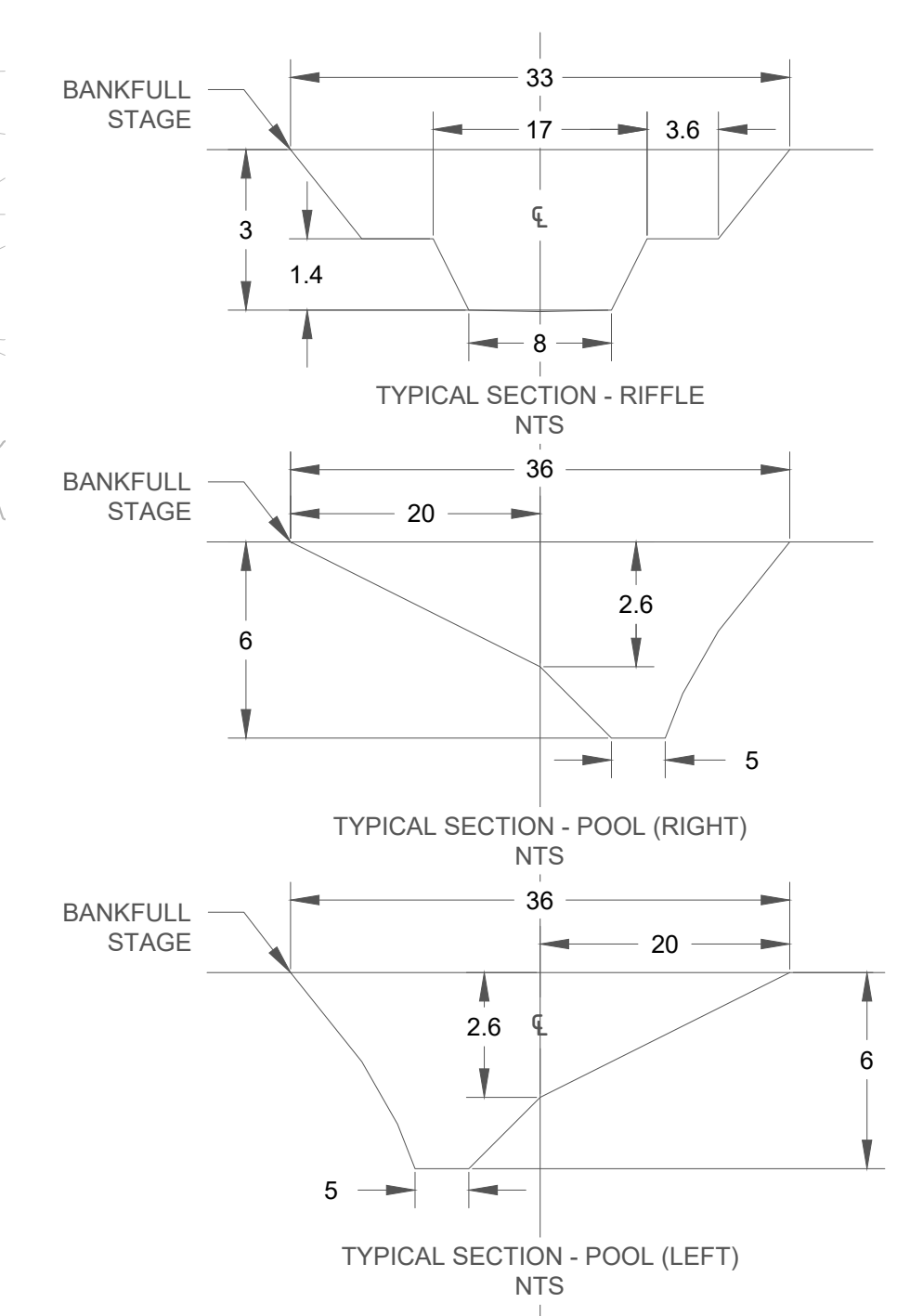
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 - TRANSPLANTS
SEE SHEET 42
 - BOULDER CONSTRUCTED
RIFFLE
SEE SHEET 43
 - HABITAT LOG
SEE SHEET 46
 - ROCK GLIDE RIFFLE
SEE SHEET 44

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 - AUGMENTED RIFFLE



APPROVED BY: KA		CHECKED BY: MJG	DRAWN BY: GET	APPRV
REV	DESCRIPTION			
1	DRAFT 30% DESIGN			
2	DRAFT 60%			
3	DRAFT 90%			
4	BID SET			
XX	XX			
XX	XX			
XX	XX			
XX	XX			
XX	XX			

BIG AND LITTLE 39
STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION
BIG 39
PLAN AND PROFILE - (4)
STA 18+00 TO 20+72



NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614



BEAVER
RIVER
CONSULTING

BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

BID SET
NOT FOR
CONSTRUCTION

DATE:10/15/2021

SCALE (34"X22"):1" = 30'

SCALE (17"X11"):1" = 60'

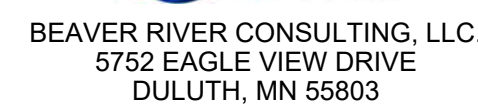
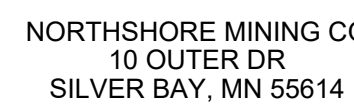
03060

SCALE IN FEET

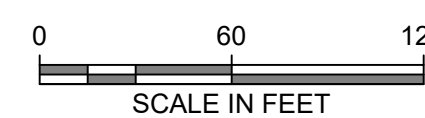
SHEET NUMBER

9OF50

BID SET - NOT FOR CONSTRUCTION
BIG 39
OVERVIEW - SWPPP

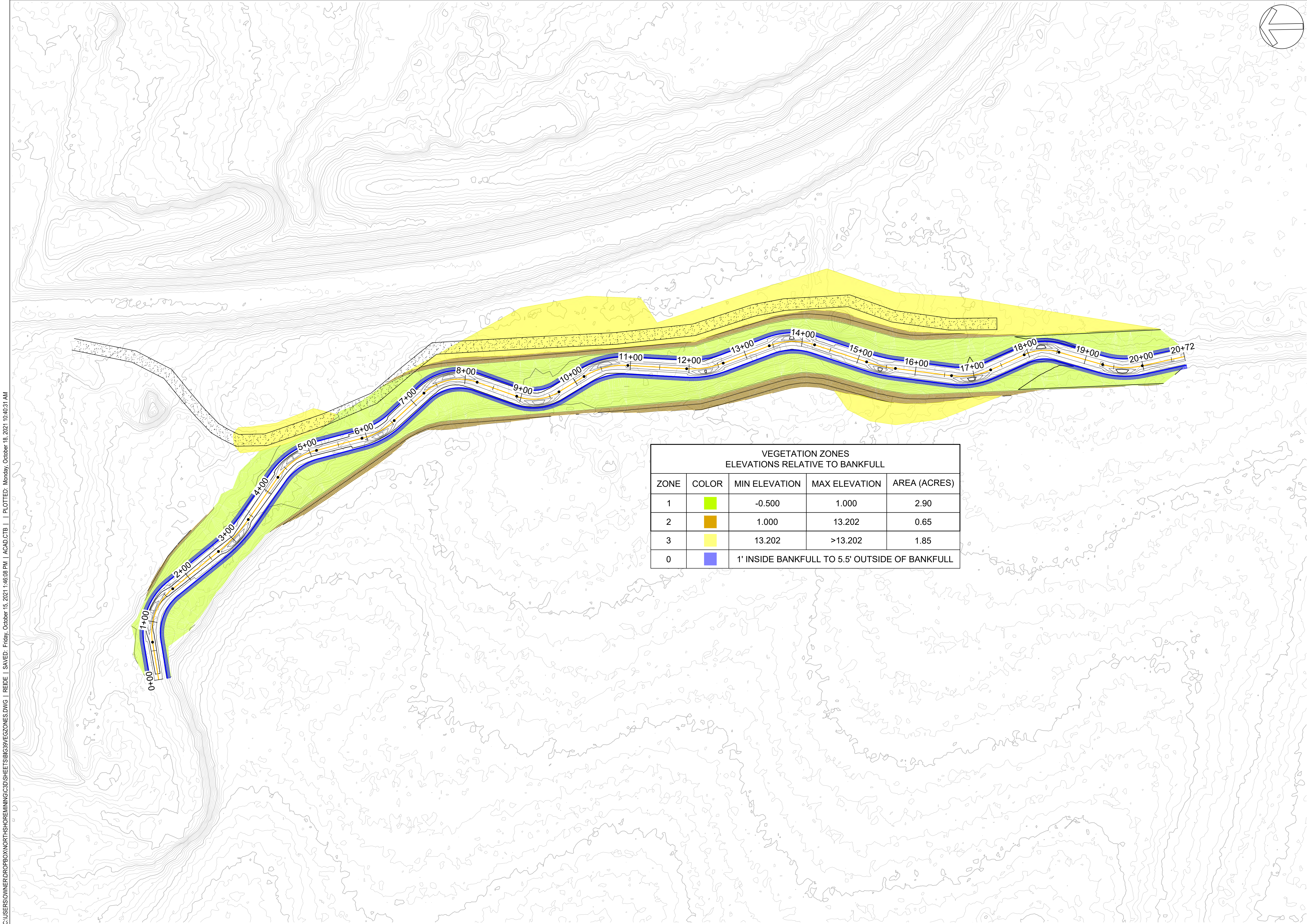


DATE: 10/15/2021
SCALE (34"X22"): 1" = 60'
SCALE (17"X11"): 1" = 120'

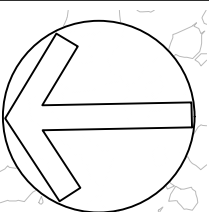


SHEET NUMBER
12 OF 50

C:\USERS\OWNER\PROJ\NORTHSHOREMINING\CD\SHEETS\BIG39\VEGZONES.DWG | REIDE | SAVED: Friday, October 15, 2021 1:46:28 PM | ACAD.CTB | PLOTTED: Monday, October 18, 2021 10:40:31 AM



VEGETATION ZONES ELEVATIONS RELATIVE TO BANKFULL				
ZONE	COLOR	MIN ELEVATION	MAX ELEVATION	AREA (ACRES)
1		-0.500	1.000	2.90
2		1.000	13.202	0.65
3		13.202	>13.202	1.85
0		1' INSIDE BANKFULL TO 5.5' OUTSIDE OF BANKFULL		



APPROVED BY: KA

REV

CHECKED BY: KA

DESCRIPTION

DRAWN BY: GET

APPRV

1

DRAFT 30% DESIGN

KA

2

DRAFT 60%

KA

3

DRAFT 90%

KA

4

BID SET

KA

XX

XX

XX

XX

BIG AND LITTLE 39

STREAM RESTORATION

NEAR SILVER BAY

LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION

BIG 39

OVERVIEW - VEGETATION

NORTHSHORE MINING CO

10 OUTER DR

SILVER BAY, MN 55614

BEAVER RIVER CONSULTING

BEAVER RIVER CONSULTING, LLC.

5752 EAGLE VIEW DRIVE

DULUTH, MN 55803

BID SET

NOT FOR

CONSTRUCTION

DATE: 10/15/2021

SCALE (34"x22"): 1" = 75'

SCALE (17"x11"): 1" = 150'

0

75

150

SCALE IN FEET

SHEET NUMBER

13 OF 50

C:\USERS\OWNER\PROJECTS\NORTHSHORE MINING\CD\SHEETS\BIG39_NW.DWG | REDE | SAVE: Friday, October 15, 2021 1:49:00 PM | ACAD.CTB | PLOTTED: Monday, October 18, 2021 10:41:15 AM



LEGEND

(483)

PROPOSED MAJOR CONTOUR (10')

479

PROPOSED MINOR CONTOUR (2')

EXISTING MAJOR CONTOUR (10')

EXISTING MINOR CONTOUR (2')

PROPOSED CHANNEL CENTERLINE

PROPOSED BANKFULL

LIMITS OF DISTURBANCE

FRESHWATER - FORESTED AND SHRUB WETLAND

FRESHWATER EMERGENT WETLAND

FRESHWATER POND

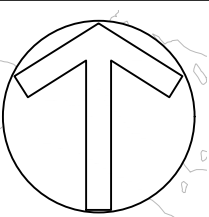
ESTUARINE AND MARINE WETLAND

RIVERINE

LAKES

ESTUARINE AND MARINE DEEPWATER

OTHER FRESHWATER WETLAND



APPROVED BY: KA

CHECKED BY: MJG

DRAWN BY: GET

REV

DESCRIPTION

APPROV

1

DRAFT 30% DESIGN

KA

2

DRAFT 60%

KA

3

DRAFT 90%

KA

4

BID SET

KA

XX

XX

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XX


BIG AND LITTLE 39
STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION

OVERLAY - NATIONAL WETLAND INVENTORY



NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614



BEAVER RIVER CONSULTING
BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

BID SET
NOT FOR
CONSTRUCTION

DATE: 10/15/2021
SCALE (34"x22"): 1" = 100'
SCALE (17"x11"): 1" = 200'

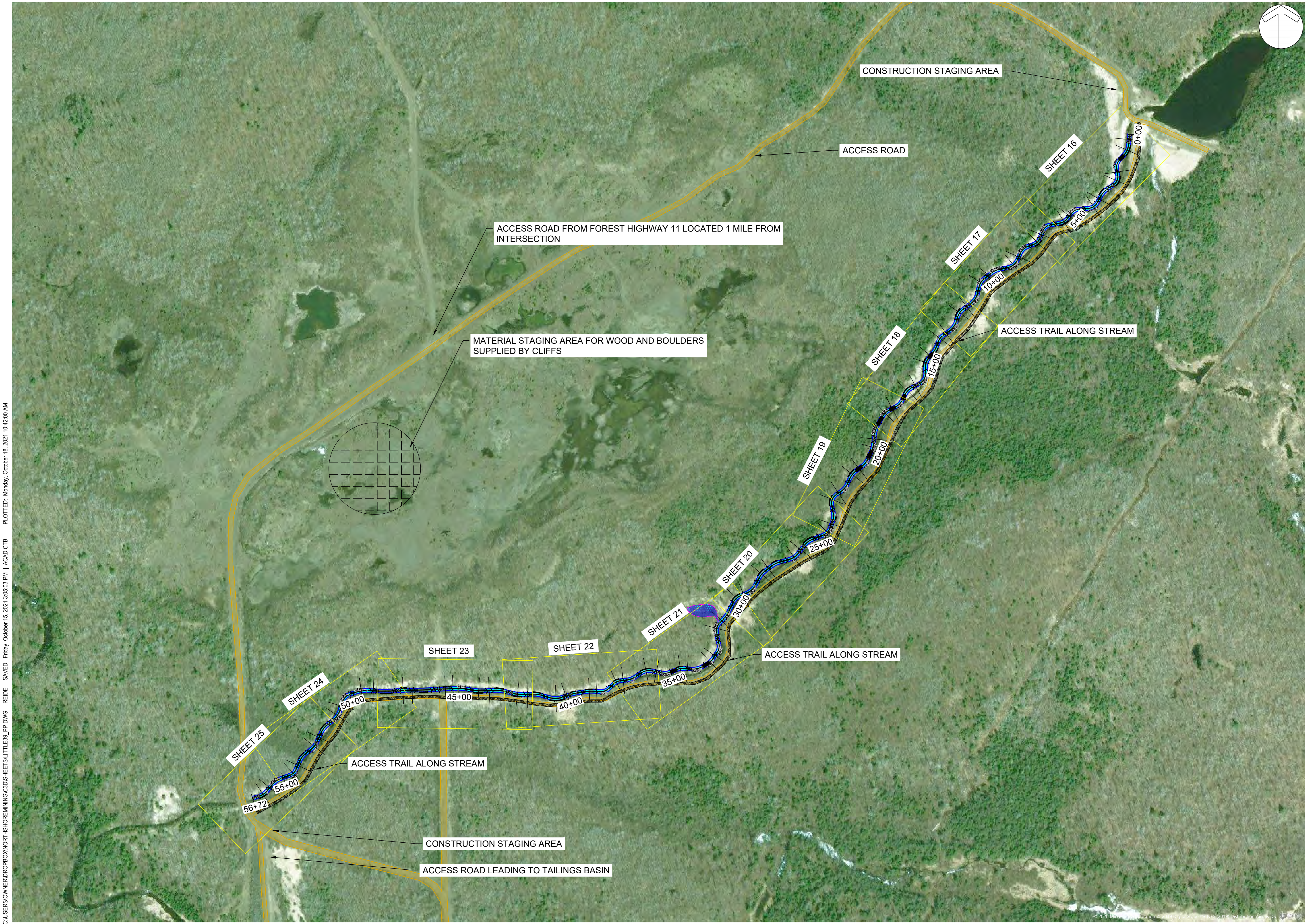
0 100 200

SCALE IN FEET

SHEET NUMBER

14 OF 50

C:\USERS\OWNER\PROBOX\NORTHSHOREMINING\CD\SHEETS\LITTLE39_PP.DWG | REIDE | SAVE | Friday, October 15, 2021 3:05:03 PM | ACAD.CTB | | PLOTTED: Monday, October 18, 2021 10:42:00 AM



APPROVED BY: KA
REV
1
2
3
4
XX
XX
XX
XX

CHECKED BY: MUG
DESCRIPTION
DRAFT 30% DESIGN
DRAFT 60%
DRAFT 90%
BID SET
XX
XX
XX
XX

DRAWN BY: GET
APPRV
KA
KA
KA
KA
KA
XX
XX
XX
XX

STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION

LITTLE 39
OVERVIEW

CLIFFS

NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614

BEAVER RIVER CONSULTING
BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

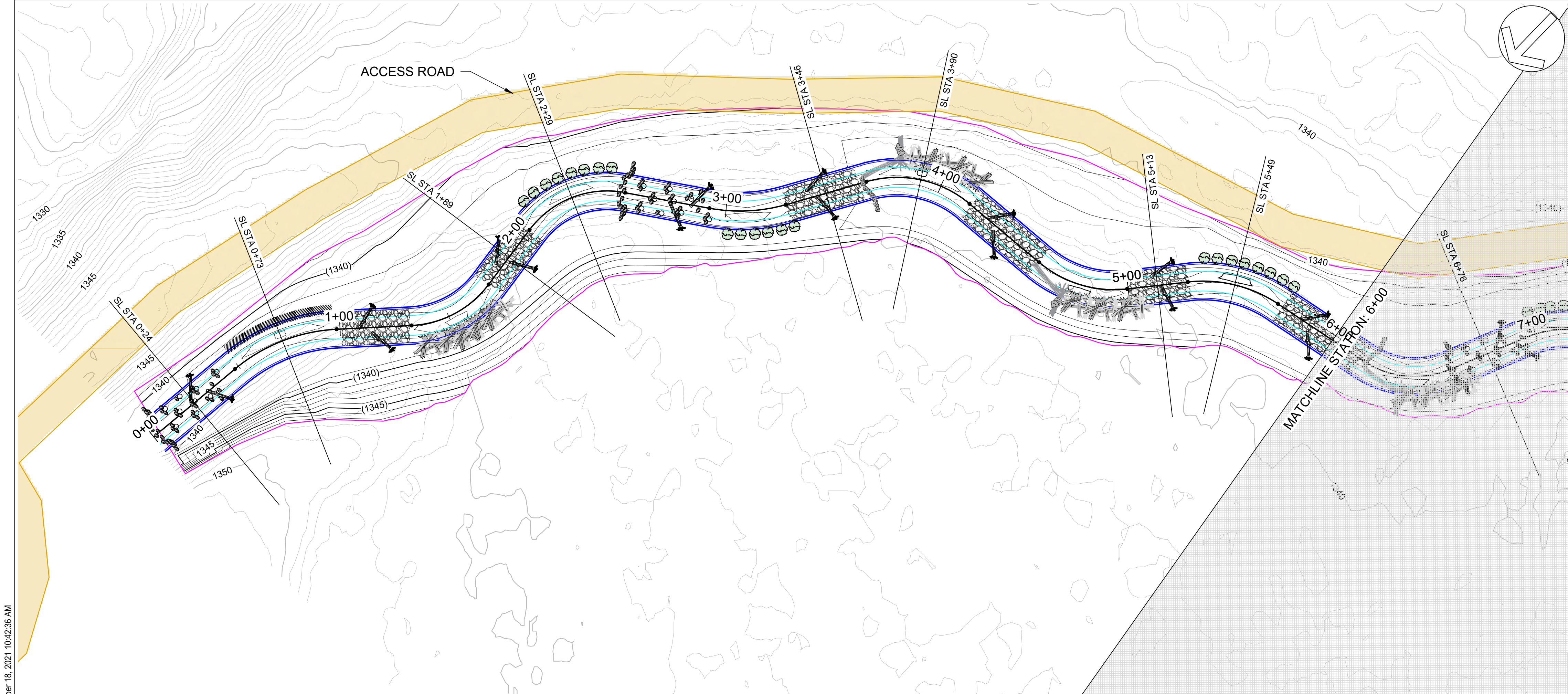
BID SET
NOT FOR
CONSTRUCTION

DATE: 10/15/2021
SCALE (34"x22"): 1" = 200'
SCALE (17"x11"): 1" = 400'

0 200 400
SCALE IN FEET

SHEET NUMBER
15 OF 50

C:\USERS\WINER\PRO\NORTHSHOREMINING\CD\SHEETS\LITTLE39_PP.DWG | REIDE | SAVERD: Friday, October 15, 2021 3:05:03 PM | ACAD.CTB | | PLOTTED: Monday, October 18, 2021 10:42:36 AM



PLAN LEGEND

- PROPOSED STREAM CENTER LINE
- PROPOSED INNER BERM
- PROPOSED GEOMORPHIC CHANNEL TOB
- PROPOSED FLOODPLAIN TOE
- LIMITS OF DISTURBANCE
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR

PROFILE LEGEND

- PROPOSED STREAM CENTER LINE
- PROPOSED BANKFULL TOB
- EXISTING GROUND

STRUCTURE

- BOULDER
- AUGMENTED RIFFLE
- HEADER AND FOOTER BOULDER

TRANSPLANTS SEE SHEET 47

CONSTRUCTED RIFFLE SEE SHEET 43

HABITAT LOG SEE SHEET 46

ROCK GLIDE RIFFLE SEE SHEET 44

BOULDER J-HOOK SEE SHEET 45

LOG VANE SEE SHEET 40

GRAVEL RIFFLE SEE SHEET 38

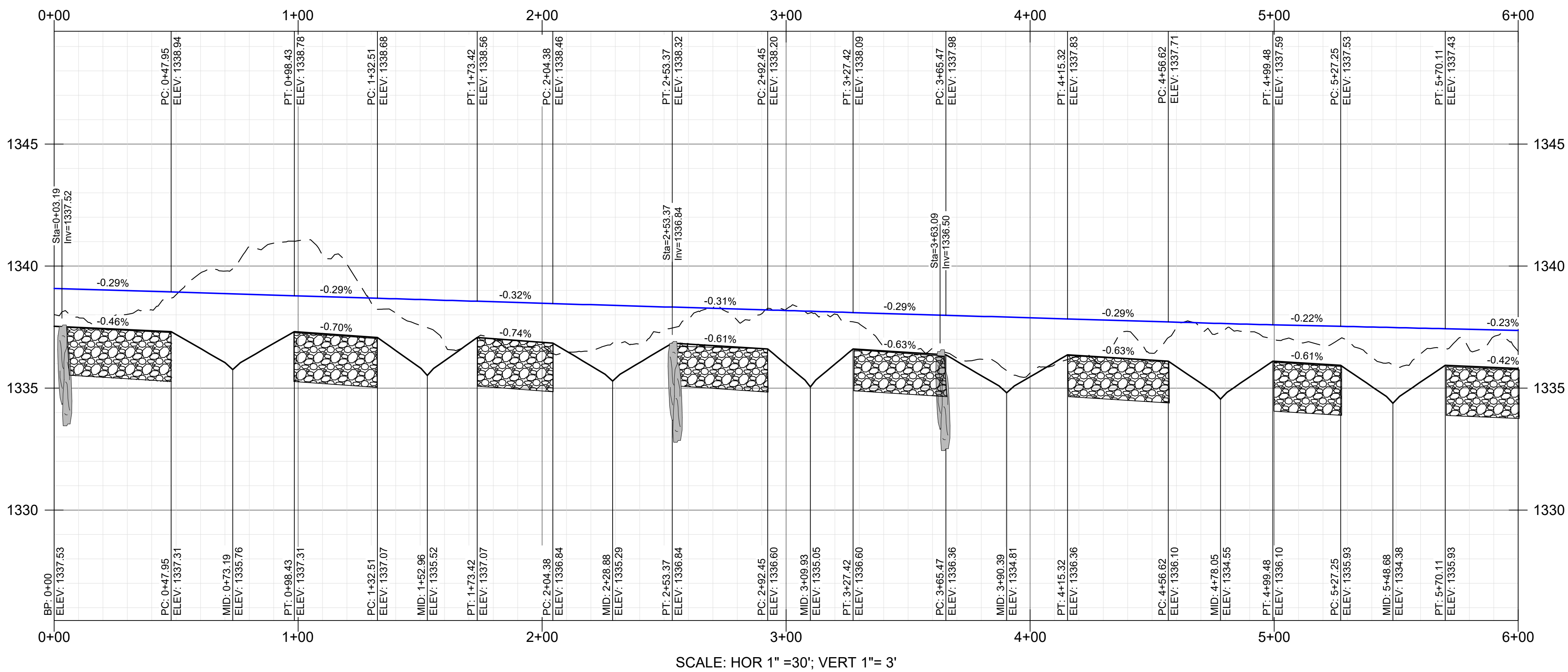
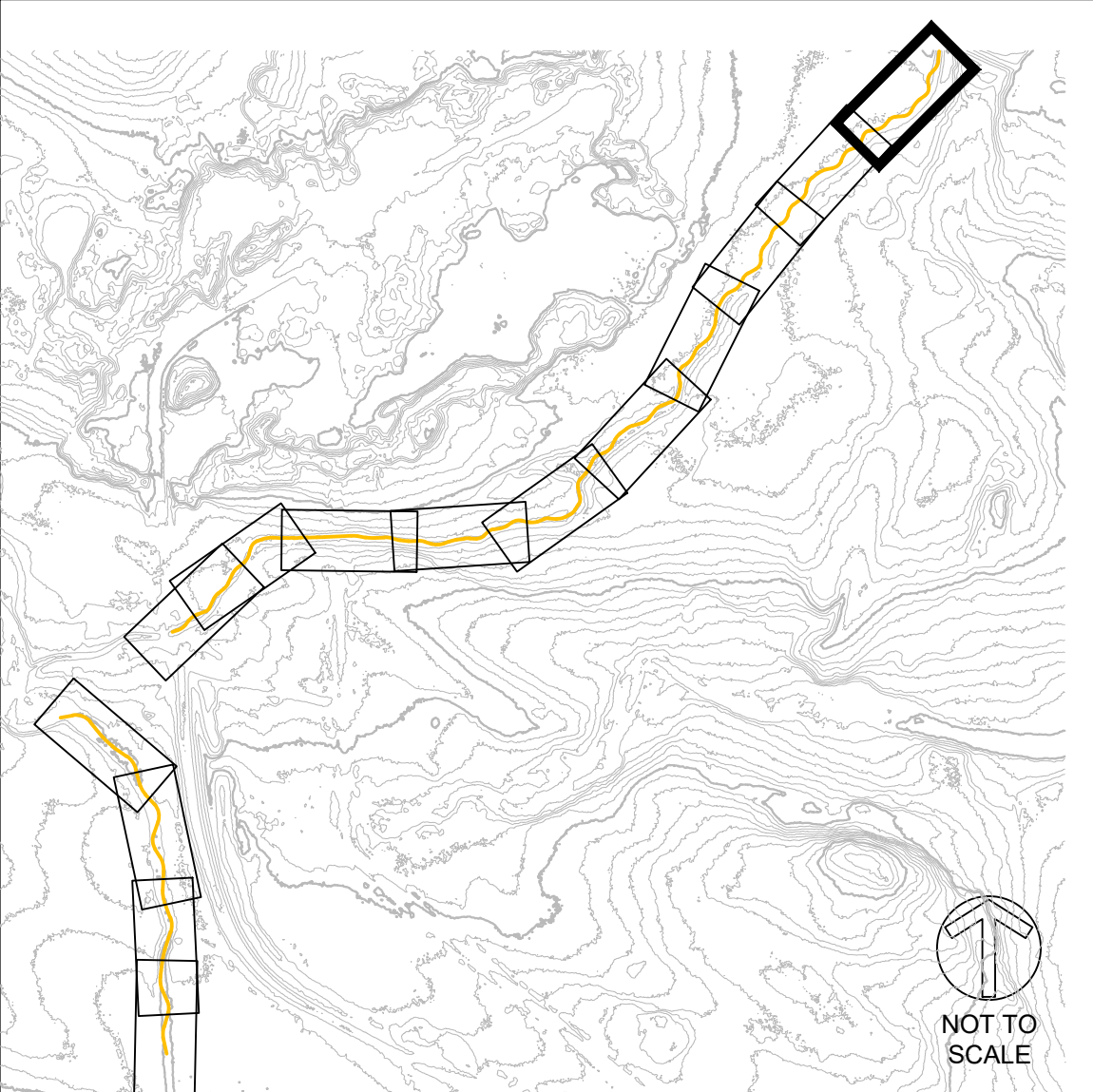
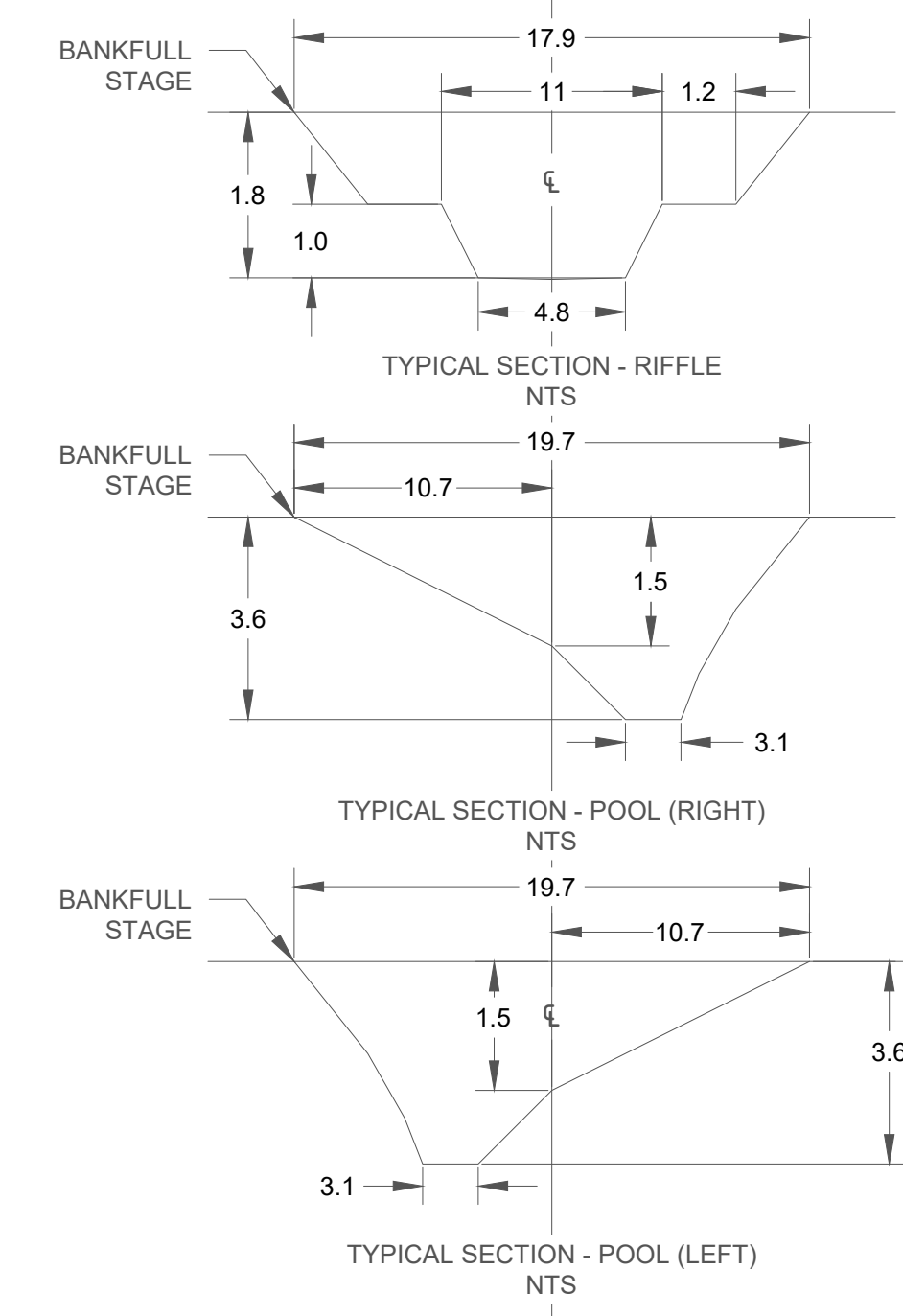
CONSTRUCTION ACCESS

STOCKPILE AREA SEE SHEET 49

LOG J-HOOK SEE SHEET 39

TOE WOOD SEE SHEET 41

SOIL LIFT SEE SHEET 42



BIG AND LITTLE 39
STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION
LITTLE 39
PLAN AND PROFILE - (1)
STA 0+00 TO 6+00

CLIFFS

NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614

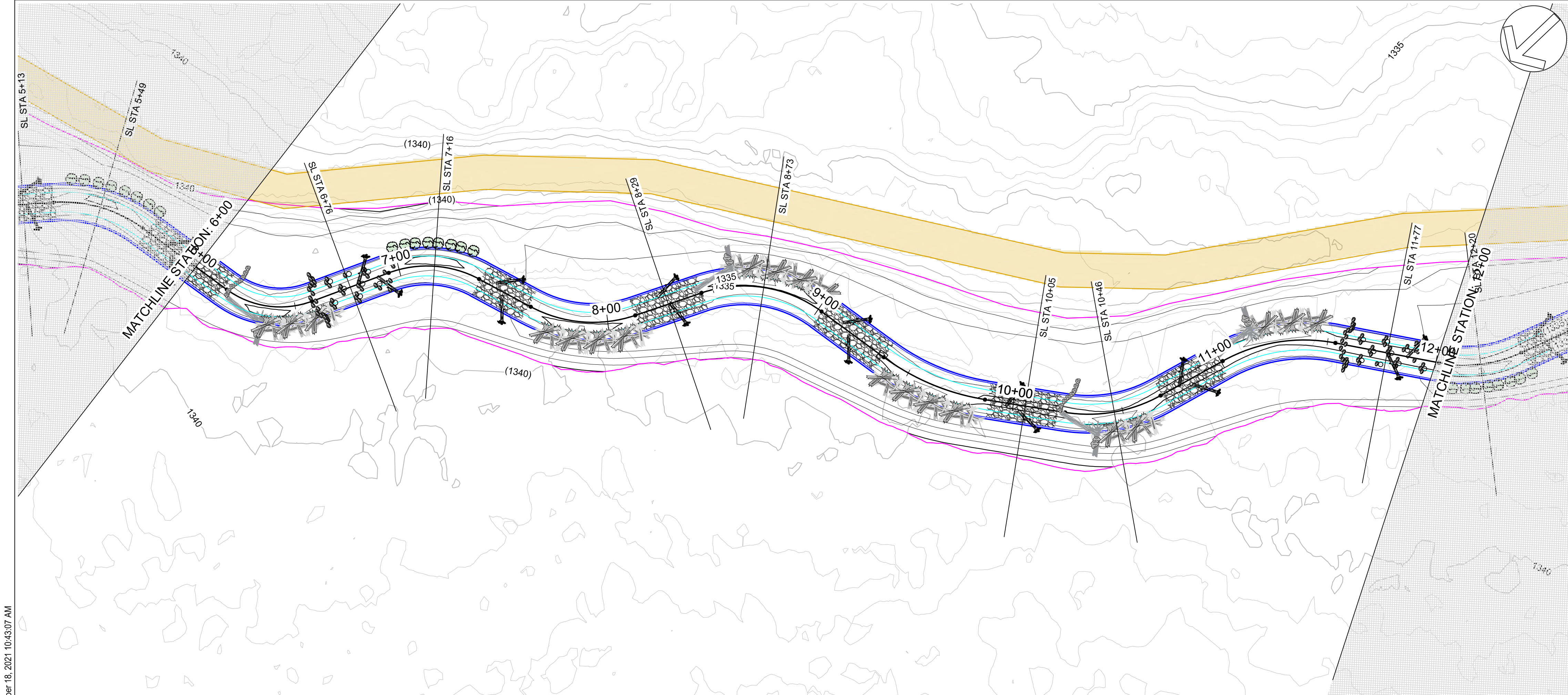
BEAVER RIVER CONSULTING
BEAVER RIVER CONSULTING, LLC
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

BID SET NOT FOR CONSTRUCTION

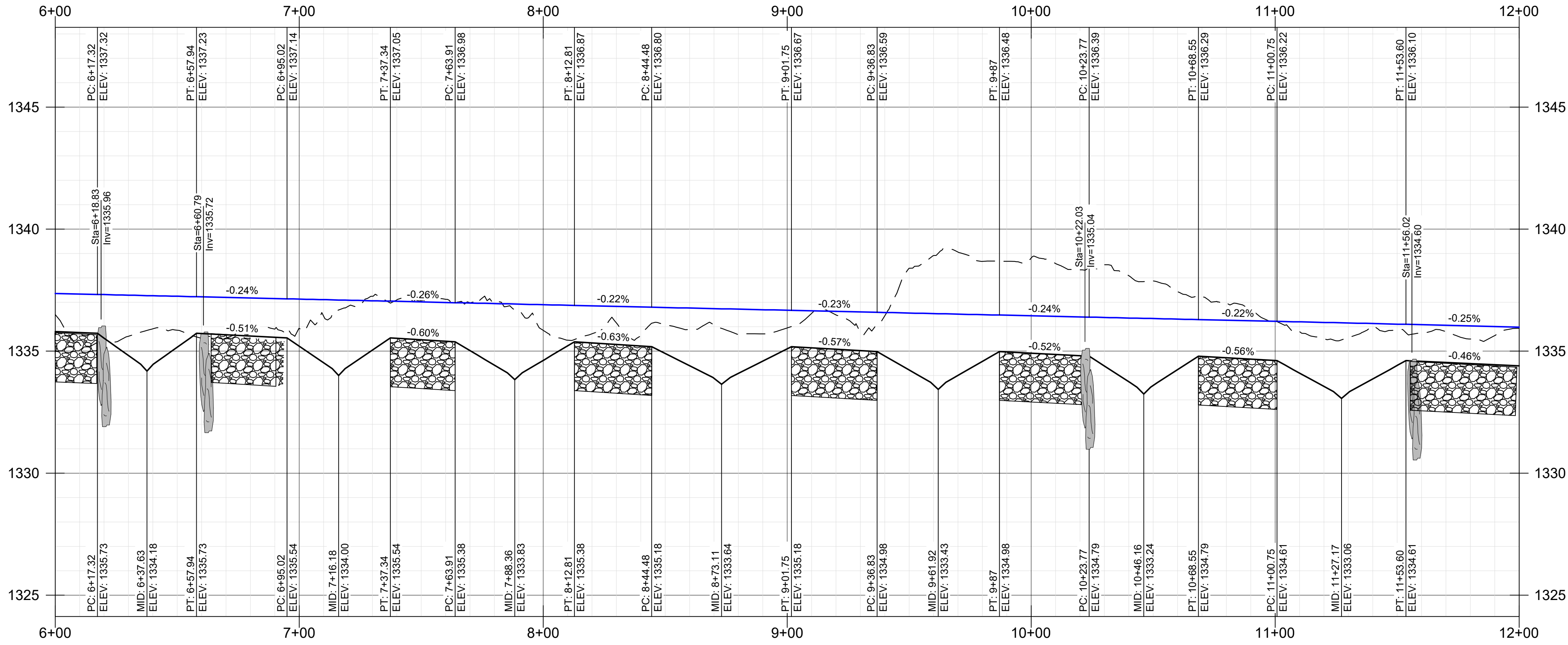
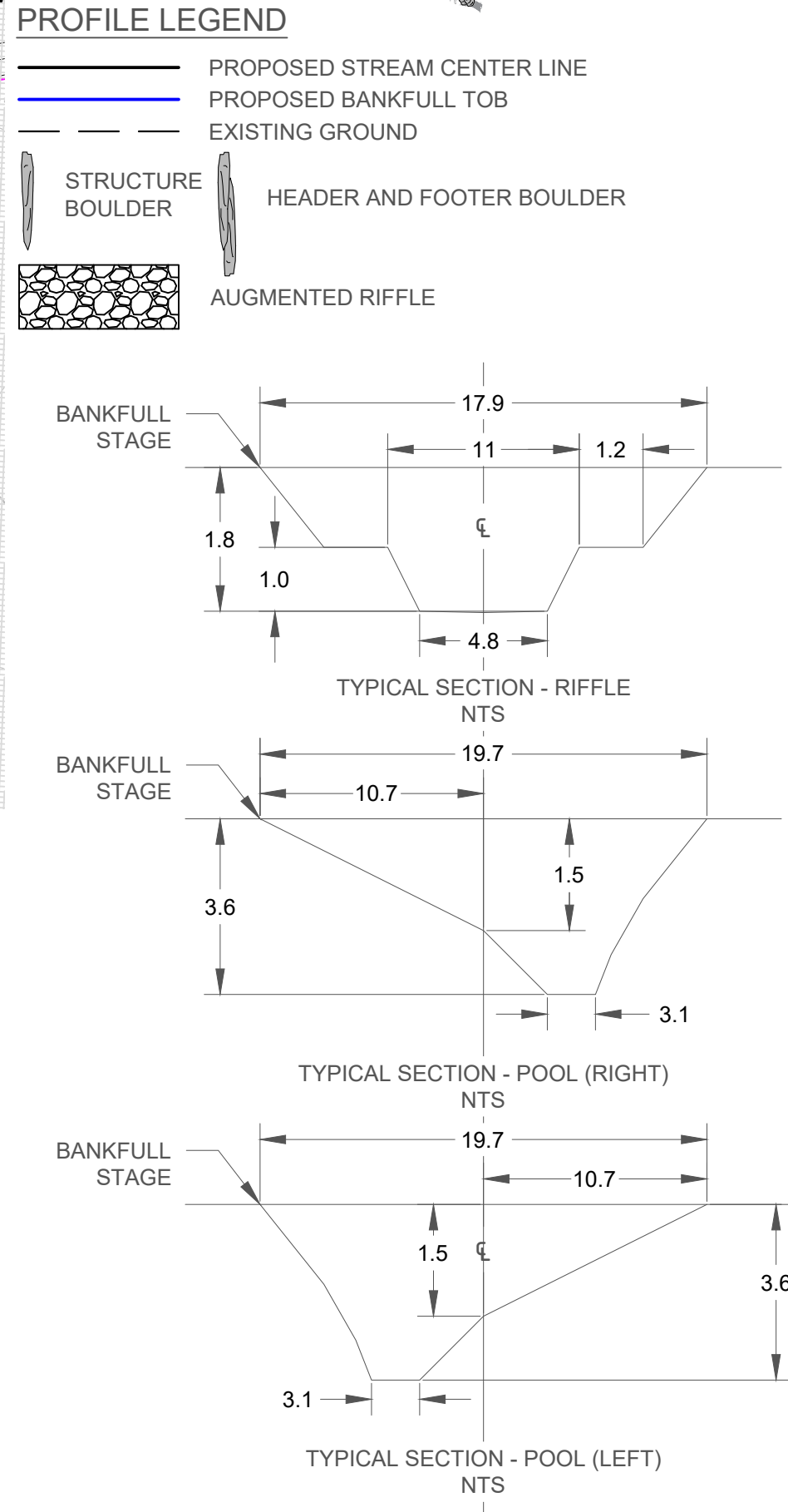
DATE: 10/15/2021
SCALE (34"x22"): 1" = 30'
SCALE (17"x11"): 1" = 60'

SHEET NUMBER
16 OF 50

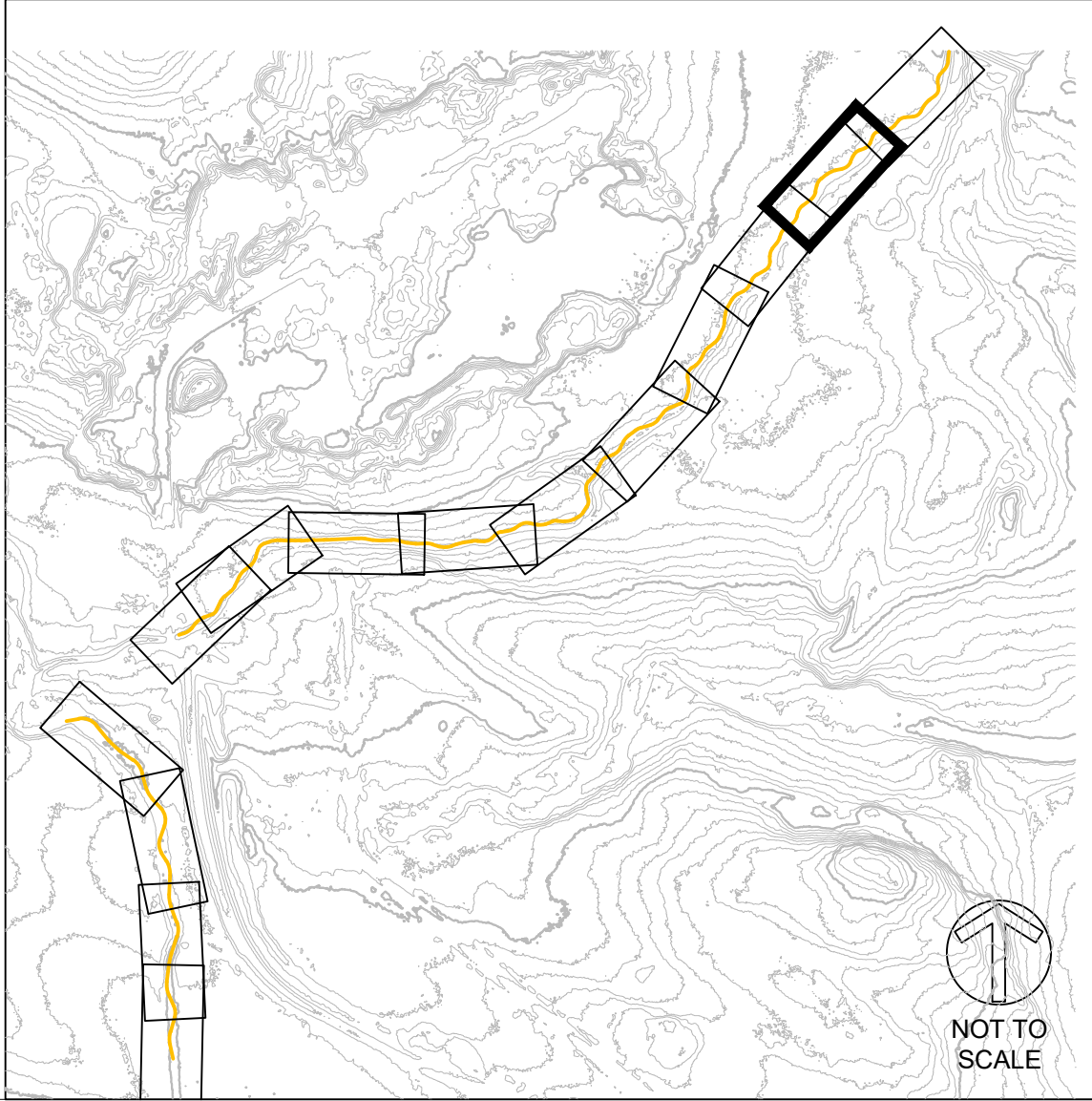
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- PLAN LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED INNER BERM
 - PROPOSED GEOMORPHIC CHANNEL TOB
 - PROPOSED FLOODPLAIN TOE
 - LIMITS OF DISTURBANCE
 - PROPOSED MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR
 - GRAVEL RIFFLE (SEE SHEET 38)
 - CONSTRUCTION ACCESS
 - STOCKPILE AREA (SEE SHEET 49)
 - LOG J-HOOK (SEE SHEET 39)
 - TOE WOOD (SEE SHEET 41)
 - SOIL LIFT (SEE SHEET 42)
 - TRANSPLANTS (SEE SHEET 47)
 - CONSTRUCTED RIFFLE (SEE SHEET 43)
 - HABITAT LOG (SEE SHEET 46)
 - ROCK GLIDE RIFFLE (SEE SHEET 44)
 - BOULDER J-HOOK (SEE SHEET 45)
 - LOG VANE (SEE SHEET 40)
- PROFILE LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED BANKFULL TOB
 - EXISTING GROUND
 - STRUCTURE BOULDER
 - AUGMENTED RIFFLE
 - HEADER AND FOOTER BOULDER



SCALE: HOR 1" = 30'; VERT 1" = 3'



APPROVED BY: KA

CHECKED BY: MAG

DRAWN BY: GET

REV

DESCRIPTION

1

DRAFT 30% DESIGN

2

DRAFT 60%

3

DRAFT 90%

4

BID SET

XX

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BIG AND LITTLE 39

STREAM RESTORATION

NEAR SILVER BAY

LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION

LITTLE 39

PLAN AND PROFILE - (2)

STA 6+00 TO 12+00

CLIFFS

NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614

BEAVER RIVER CONSULTING

BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

DATE: 10/15/2021

SCALE (34"x22"): 1" = 30'

SCALE (17"x11"): 1" = 60'

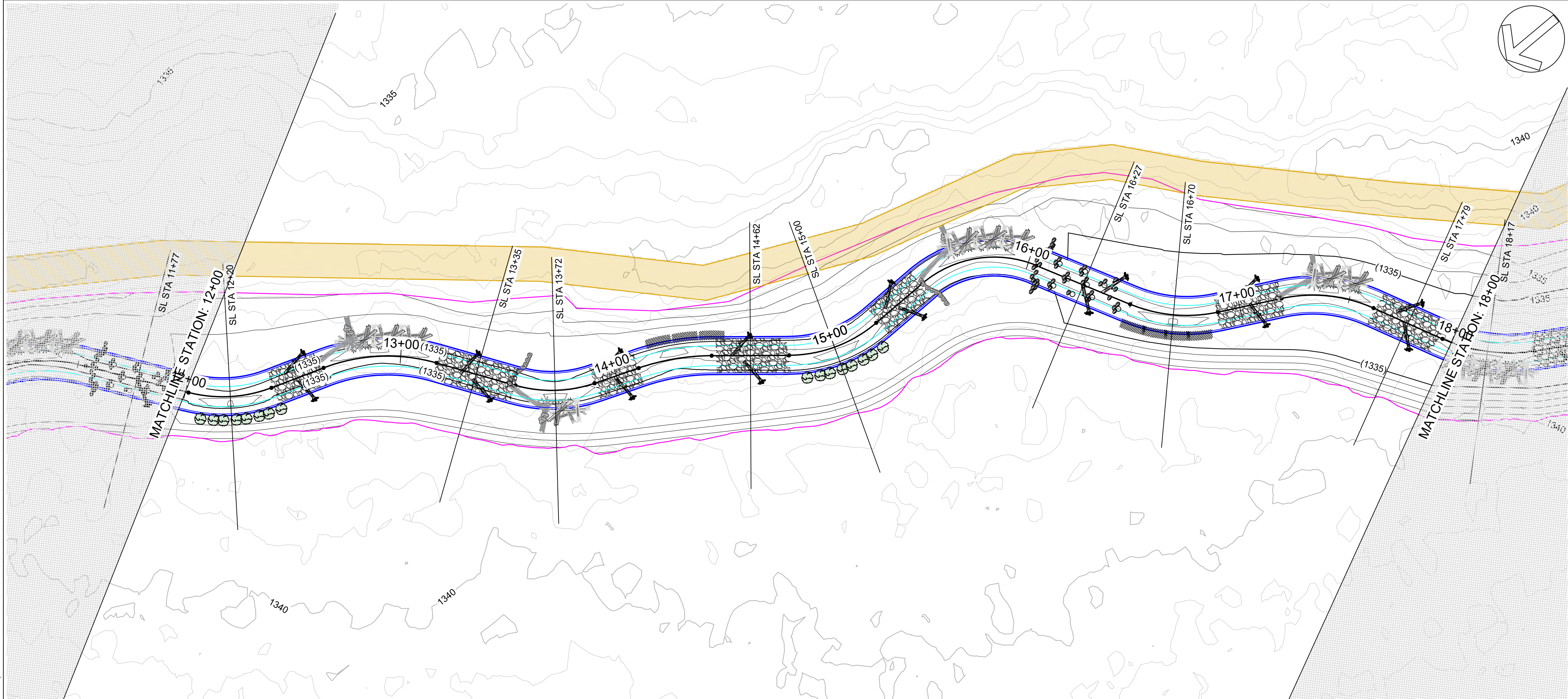
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SCALE IN FEET

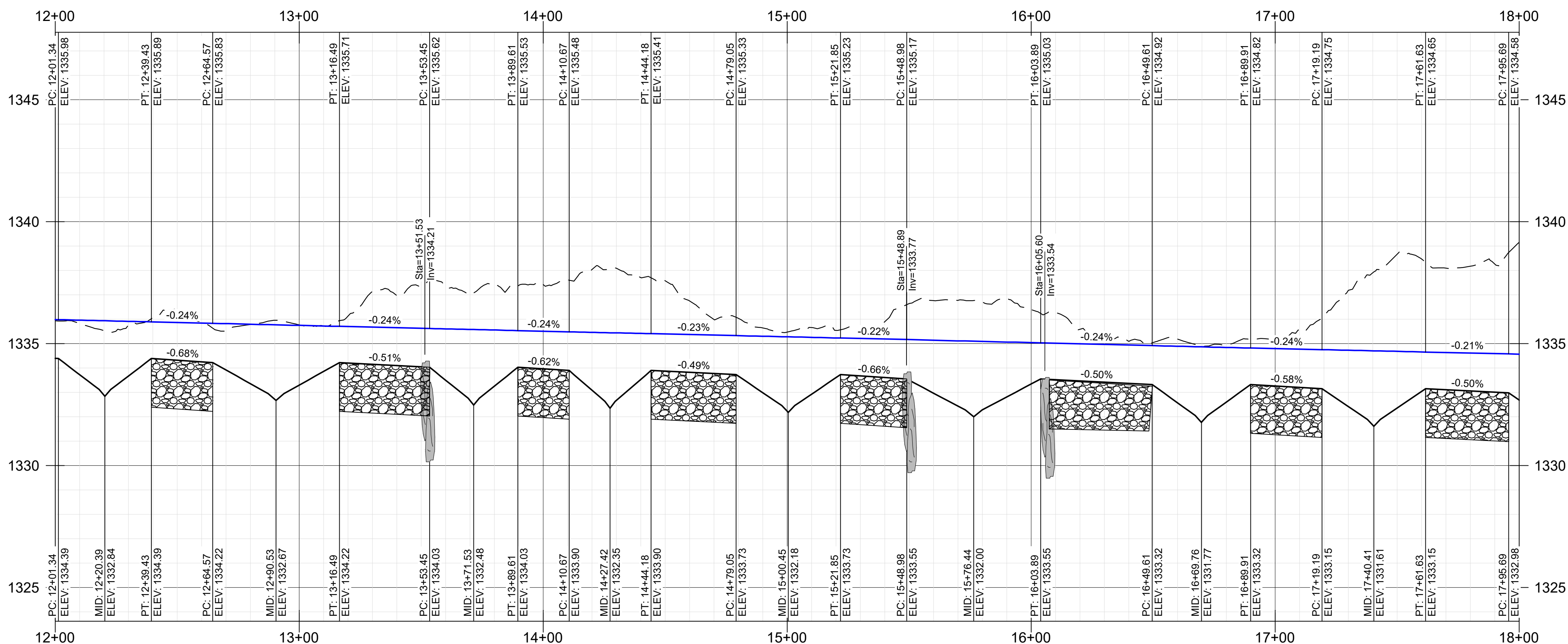
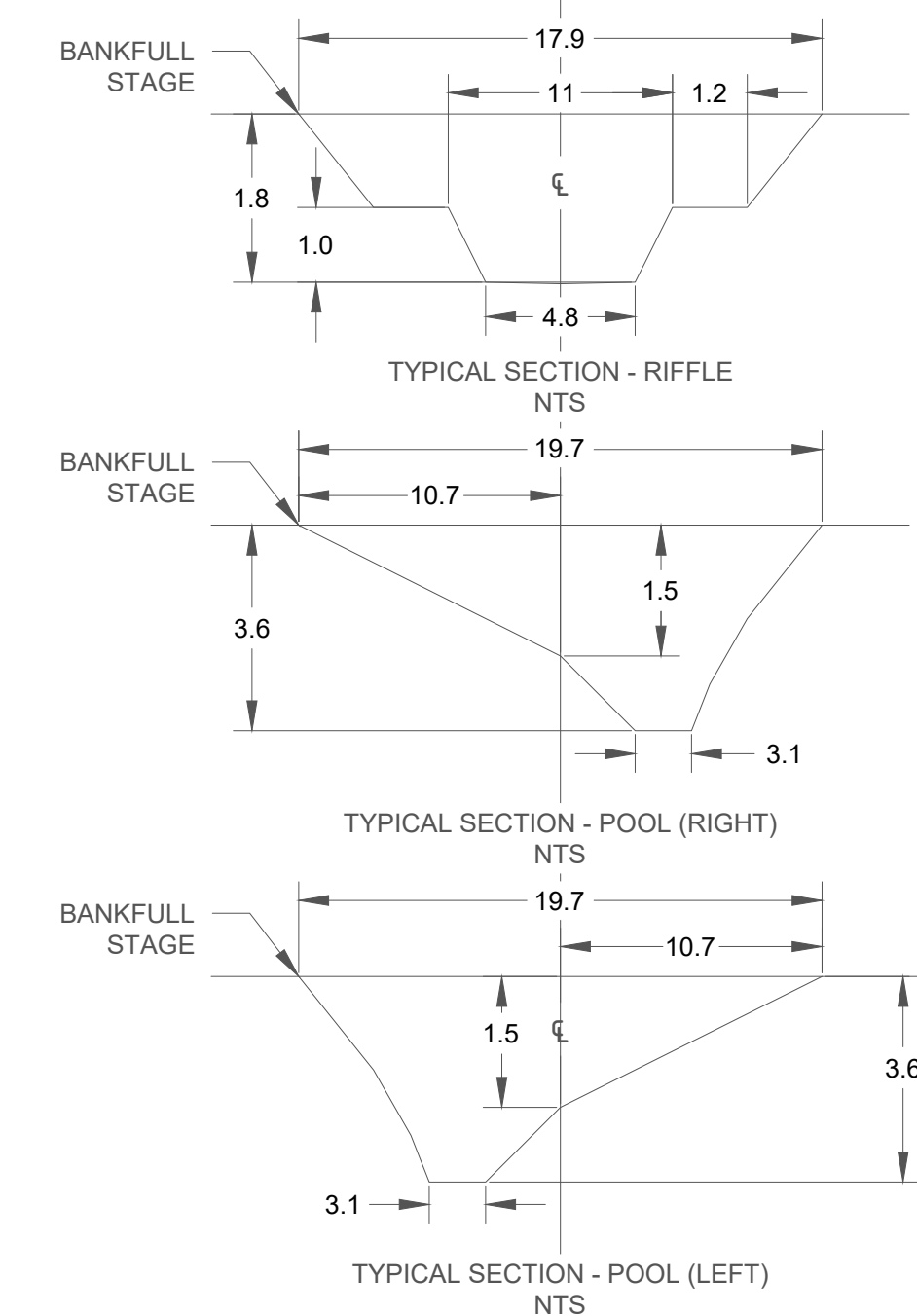
SHEET NUMBER

17 OF 50

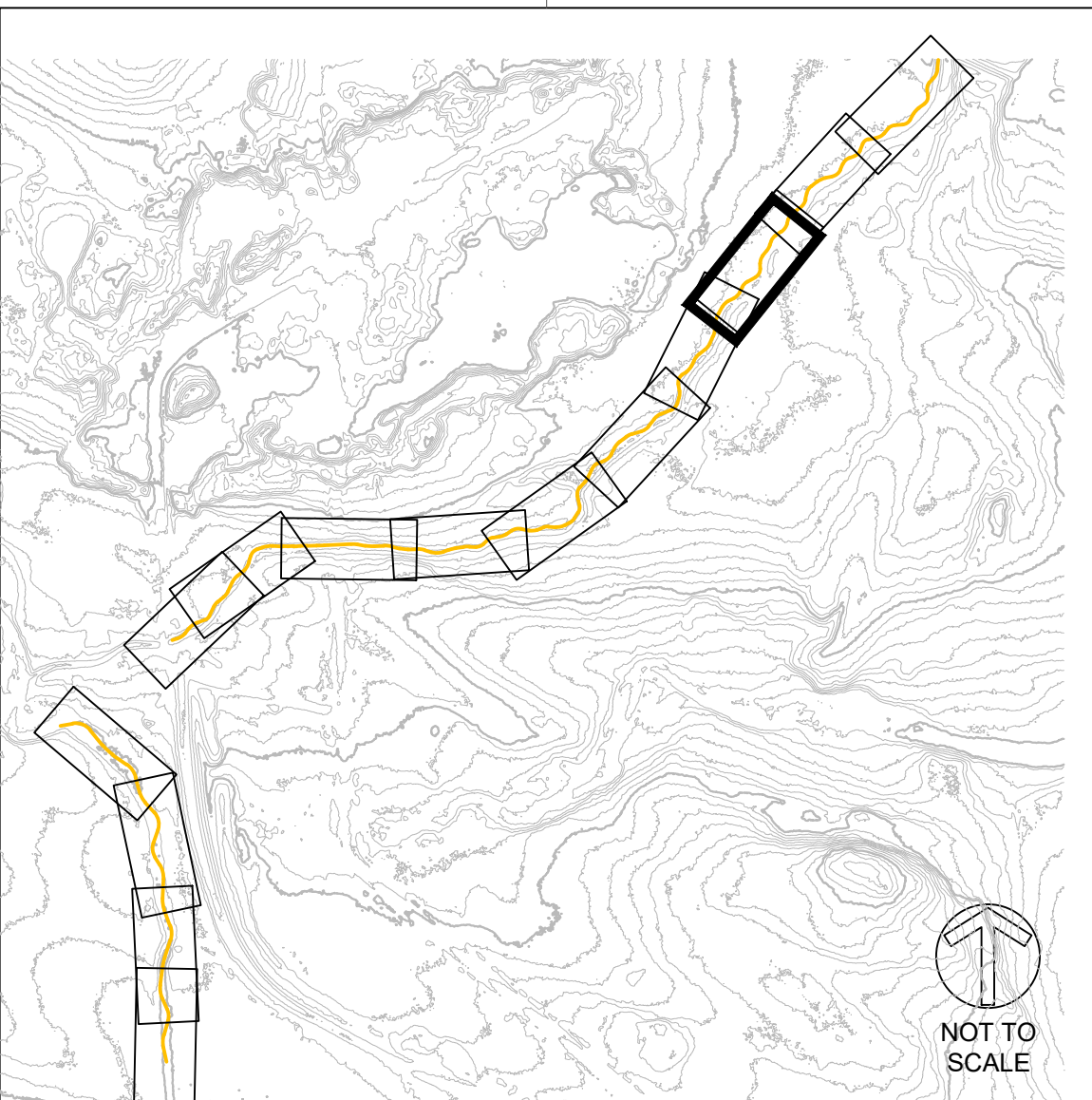
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- PLAN LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED INNER BERM
 - PROPOSED GEOMORPHIC CHANNEL TOB
 - PROPOSED FLOODPLAIN TOE
 - LIMITS OF DISTURBANCE
 - PROPOSED MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR
 - GRAVEL RIFFLE SEE SHEET 38
 - CONSTRUCTION ACCESS
 - STOCKPILE AREA SEE SHEET 49
 - LOG J-HOOK SEE SHEET 39
 - TOE WOOD SEE SHEET 41
 - SOIL LIFT SEE SHEET 42
 - TRANSPLANTS SEE SHEET 47
 - CONSTRUCTED RIFFLE SEE SHEET 43
 - HABITAT LOG SEE SHEET 46
 - ROCK GLIDE RIFFLE SEE SHEET 44
 - BOULDER J-HOOK SEE SHEET 45
 - LOG VANE SEE SHEET 40
- PROFILE LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED BANKFULL TOB
 - EXISTING GROUND
 - STRUCTURE BOULDER
 - AUGMENTED RIFFLE
 - HEADER AND FOOTER BOULDER



SCALE: HOR 1" = 30'; VERT 1" = 3'



APPROVED BY: KA		CHECKED BY: MAG	DRAWN BY: GET
REV	DESCRIPTION	APPRV	
1	DRAFT 30% DESIGN	KA	
2	DRAFT 60%	KA	
3	DRAFT 90%	KA	
4	BID SET	KA	
XX		XX	
XX		XX	
XX		XX	
XX		XX	

**BIG AND LITTLE 39
STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN**

**BID SET - NOT FOR CONSTRUCTION
LITTLE 39
PLAN AND PROFILE - (3)
STA 12+00 TO 18+00**

CLIFFS

NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614

BEAVER RIVER CONSULTING

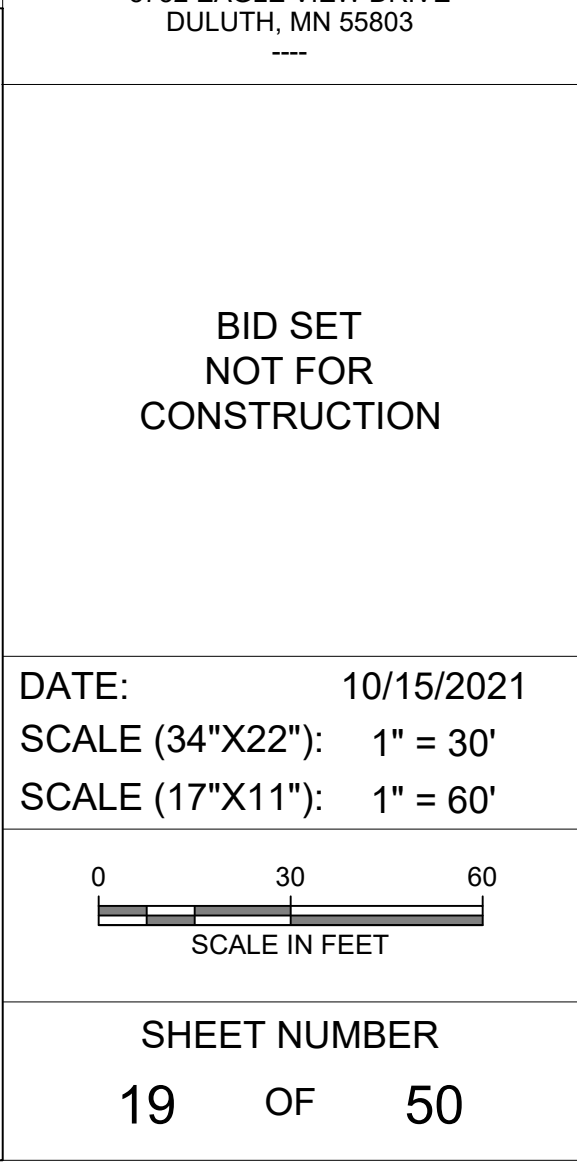
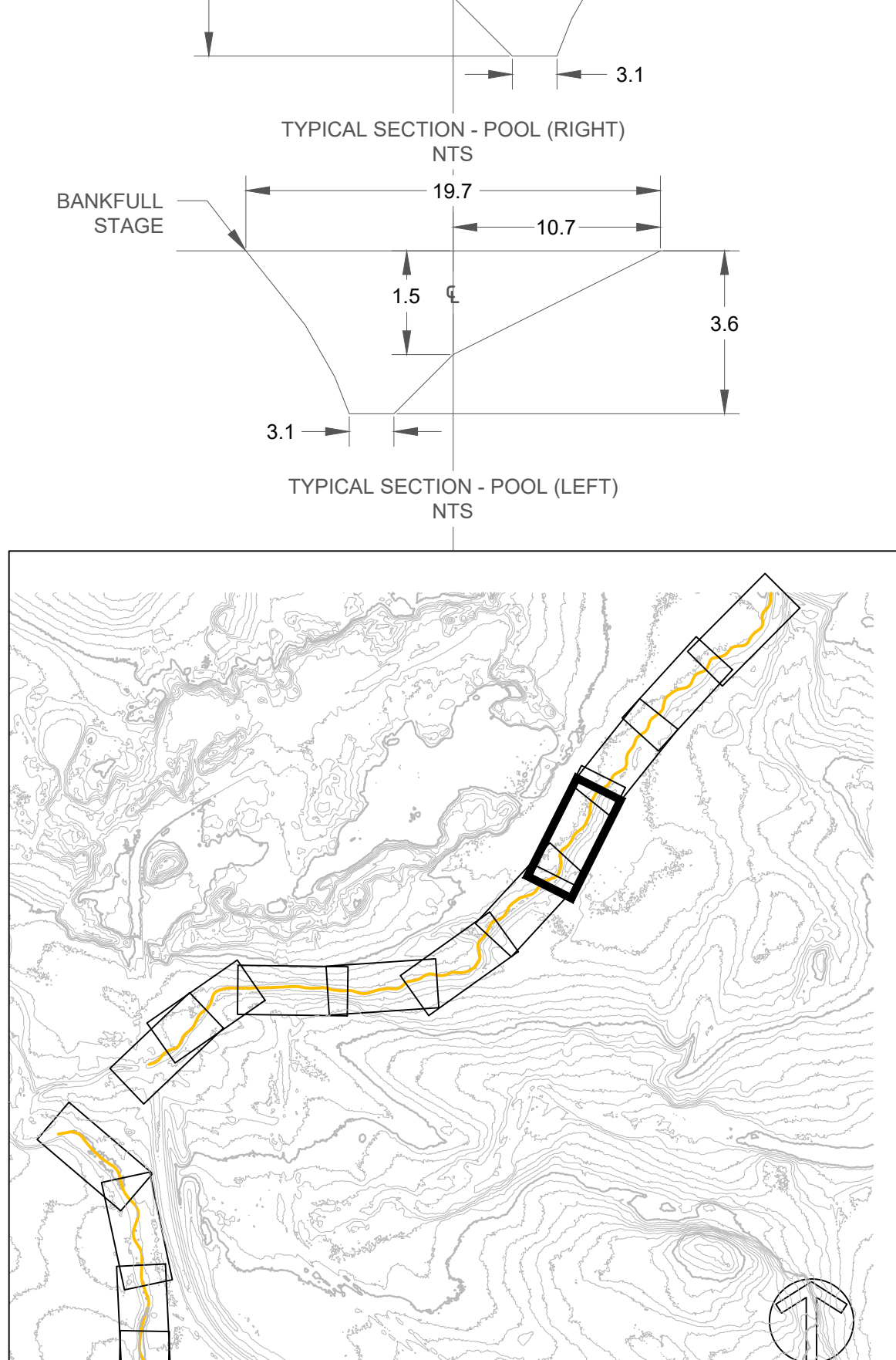
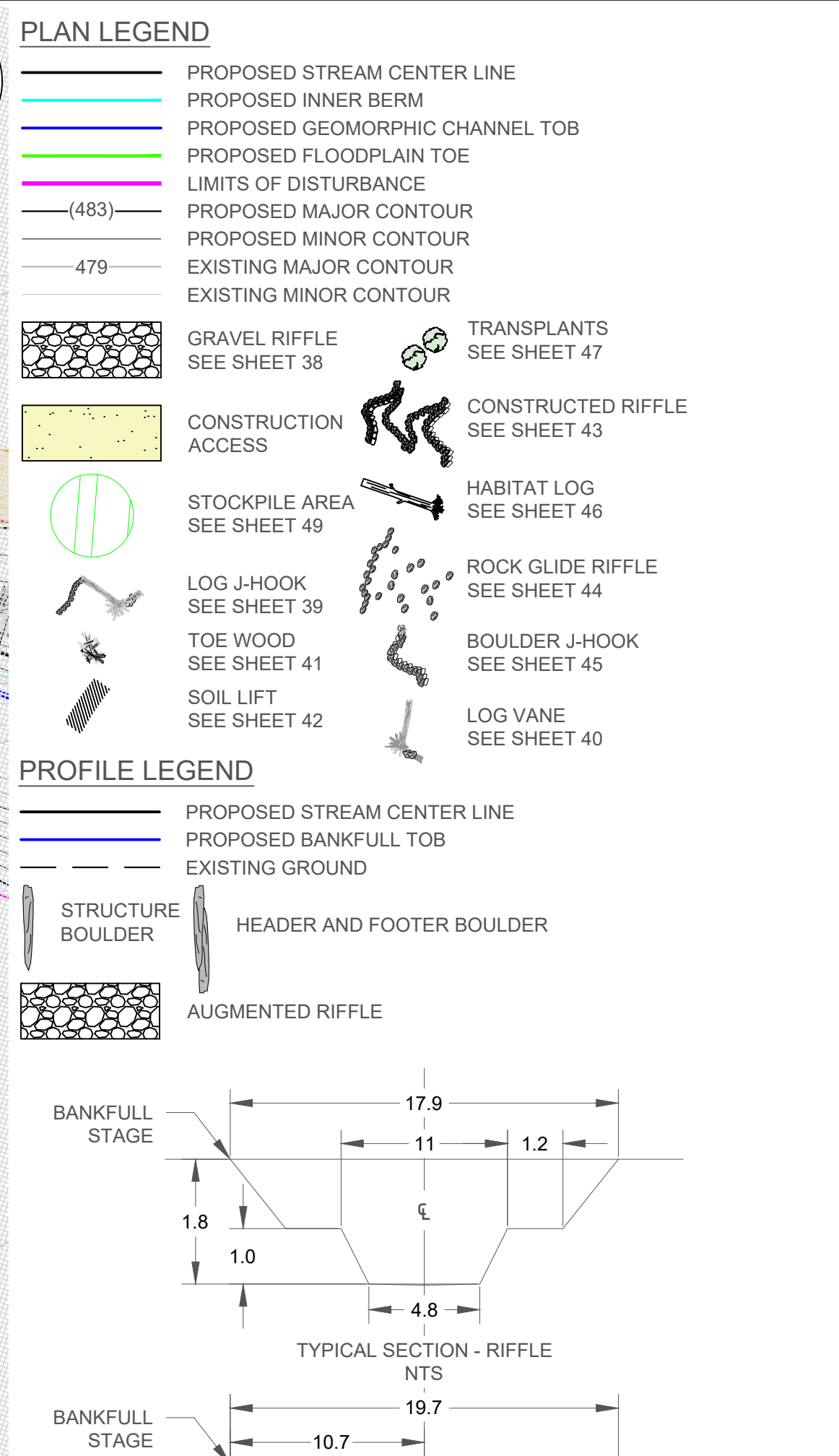
BEAVER RIVER CONSULTING, LLC
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

**BID SET
NOT FOR
CONSTRUCTION**

DATE: 10/15/2021
SCALE (34"x22"): 1" = 30'
SCALE (17"x11"): 1" = 60'

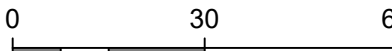
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SCALE IN FEET

SHEET NUMBER
18 OF 50

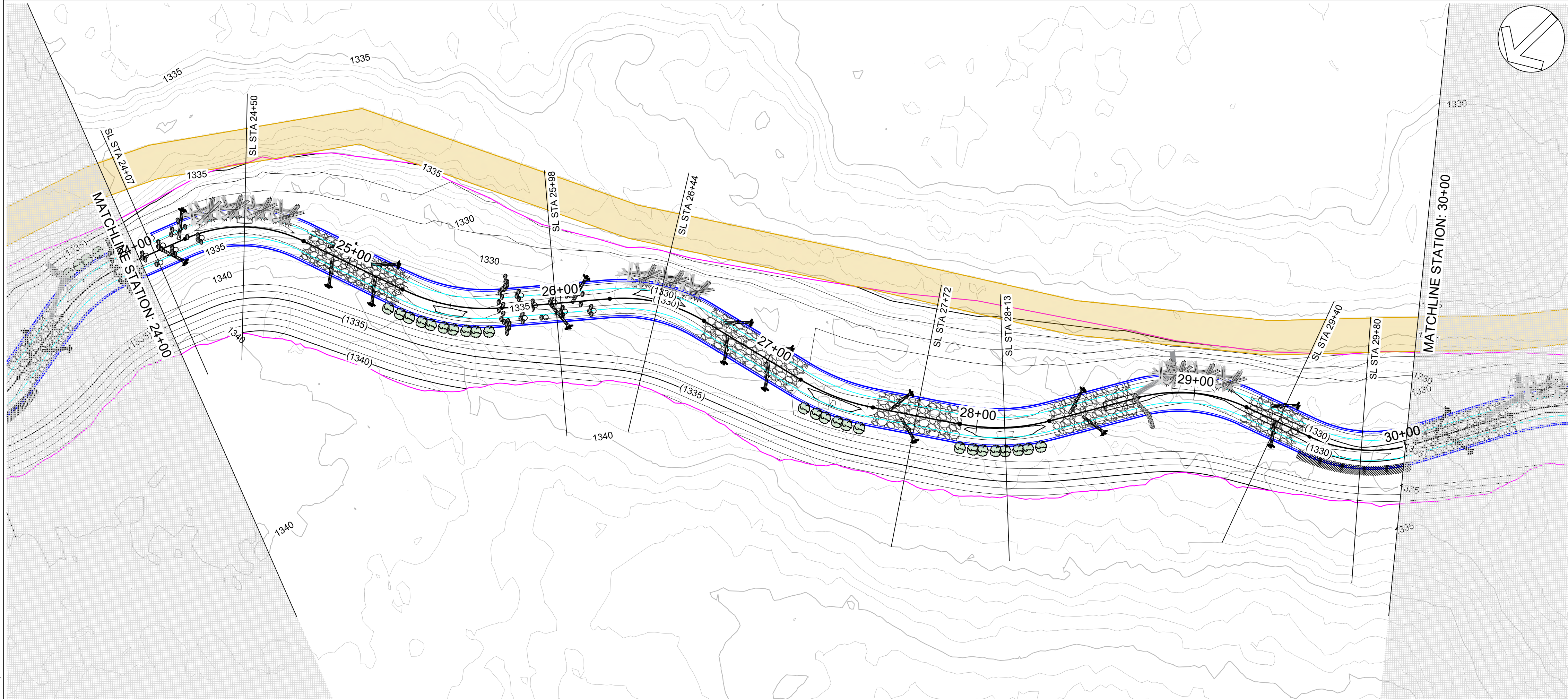


<p>BIG AND LITTLE 39 STREAM RESTORATION NEAR SILVER BAY LAKE COUNTY, MN</p>	<p>BID SET - NOT FOR CONSTRUCTION LITTLE 39 PLAN AND PROFILE - (4) STA 18+00 TO 24+00</p>
--	--

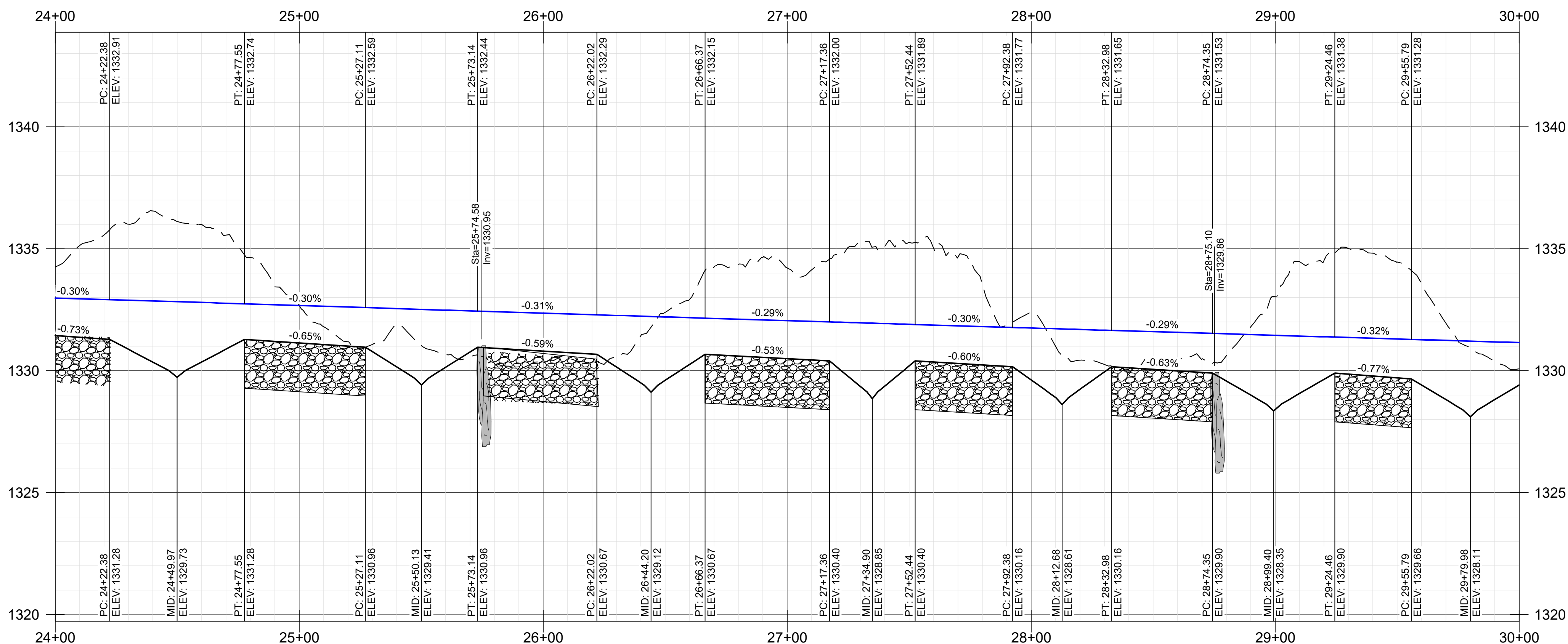
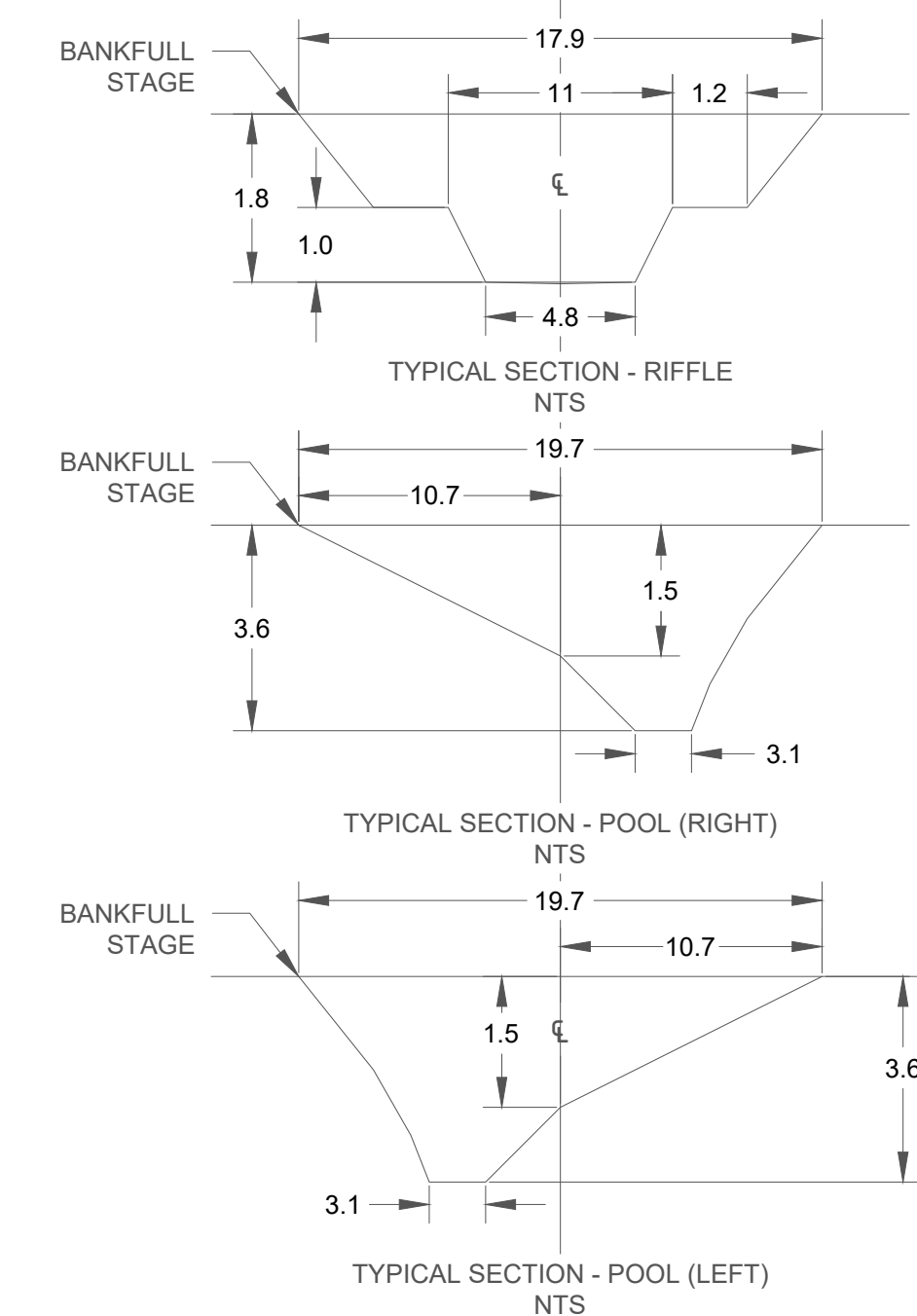
BID SET
NOT FOR
CONSTRUCTION

DATE: 10/15/2021	
SCALE (34"x22"): 1" = 30'	
SCALE (17"x11"): 1" = 60'	
 <p>A horizontal scale bar with a black outline. It is divided into three equal segments by two vertical tick marks. The first segment is labeled '0' at its left end, the second segment is labeled '30' at its right end, and the third segment is labeled '60' at its right end. Below the bar, the text 'SCALE IN FEET' is centered.</p>	
SHEET NUMBER	
19	OF 50

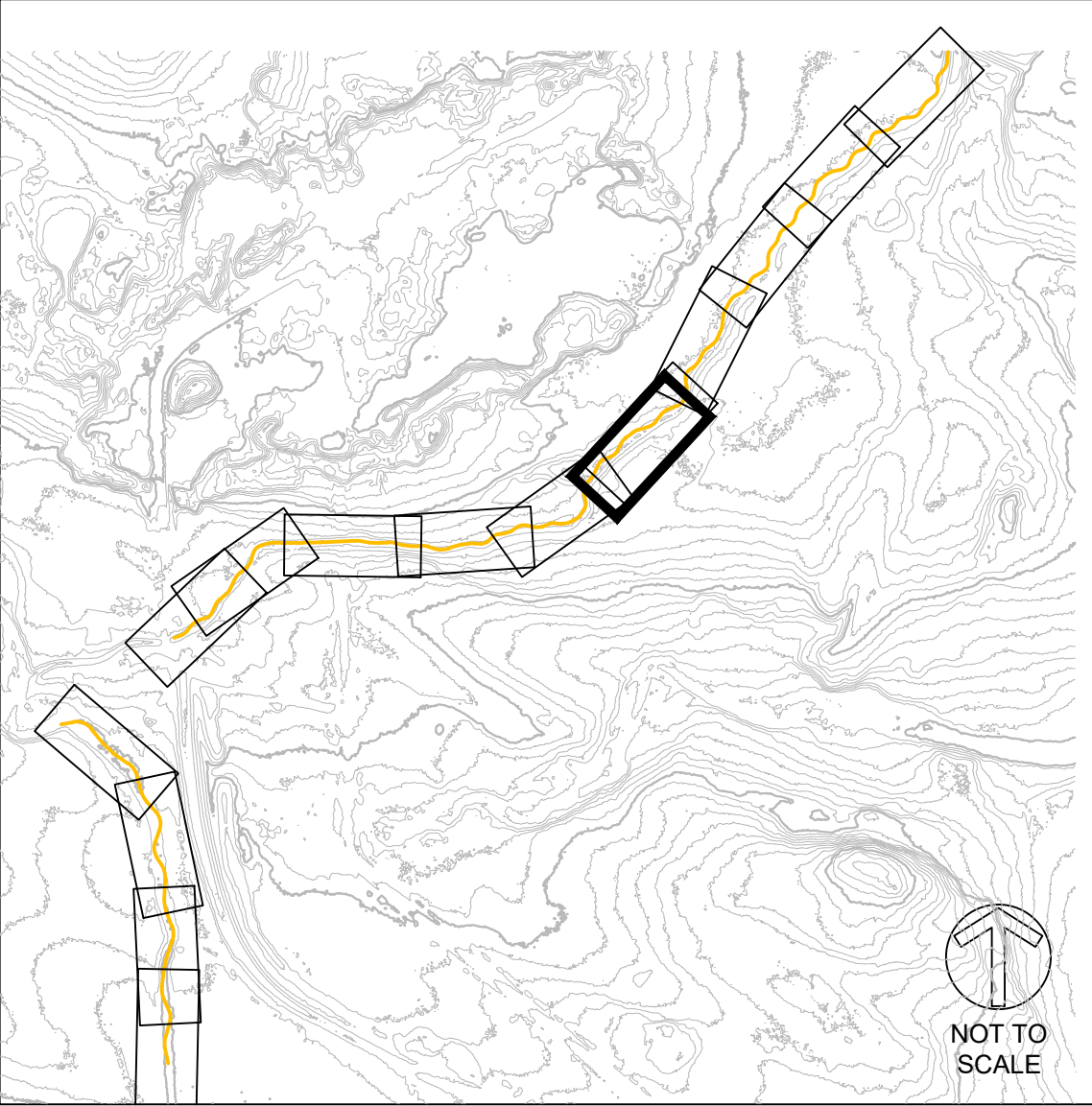
C:\USERS\OWNER\NORTHSHORE\MINING\CD\SHEETS\LITTLE39_PP.DWG | REIDE | SAVED: Friday, October 15, 2021 3:05:03 PM | ACAD.CTB | | PLOTTED: Monday, October 18, 2021 10:44:29 AM



- PLAN LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED INNER BERM
 - PROPOSED GEOMORPHIC CHANNEL TOB
 - PROPOSED FLOODPLAIN TOE
 - LIMITS OF DISTURBANCE
 - PROPOSED MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR
 - GRAVEL RIFFLE SEE SHEET 38
 - CONSTRUCTION ACCESS
 - STOCKPILE AREA SEE SHEET 49
 - LOG J-HOOK SEE SHEET 39
 - TOE WOOD SEE SHEET 41
 - SOIL LIFT SEE SHEET 42
 - TRANSPLANTS SEE SHEET 47
 - CONSTRUCTED RIFFLE SEE SHEET 43
 - HABITAT LOG SEE SHEET 46
 - ROCK GLIDE RIFFLE SEE SHEET 44
 - BOULDER J-HOOK SEE SHEET 45
 - LOG VANE SEE SHEET 40
- PROFILE LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED BANKFULL TOB
 - EXISTING GROUND
 - STRUCTURE BOULDER
 - AUGMENTED RIFFLE
 - HEADER AND FOOTER BOULDER



SCALE: HOR 1"=30'; VERT 1"= 3'



APPROVED BY: KA	CHECKED BY: MAG	DRAWN BY: GET
REV	DESCRIPTION	APPRV
1	DRAFT 30% DESIGN	KA
2	DRAFT 60%	KA
3	DRAFT 90%	KA
4	BID SET	KA
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX

**BIG AND LITTLE 39
STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN**

**BID SET - NOT FOR CONSTRUCTION
LITTLE 39
PLAN AND PROFILE - (6)
STA 24+00 TO 30+00**

CLIFFS

NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614

BEAVER RIVER CONSULTING

BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

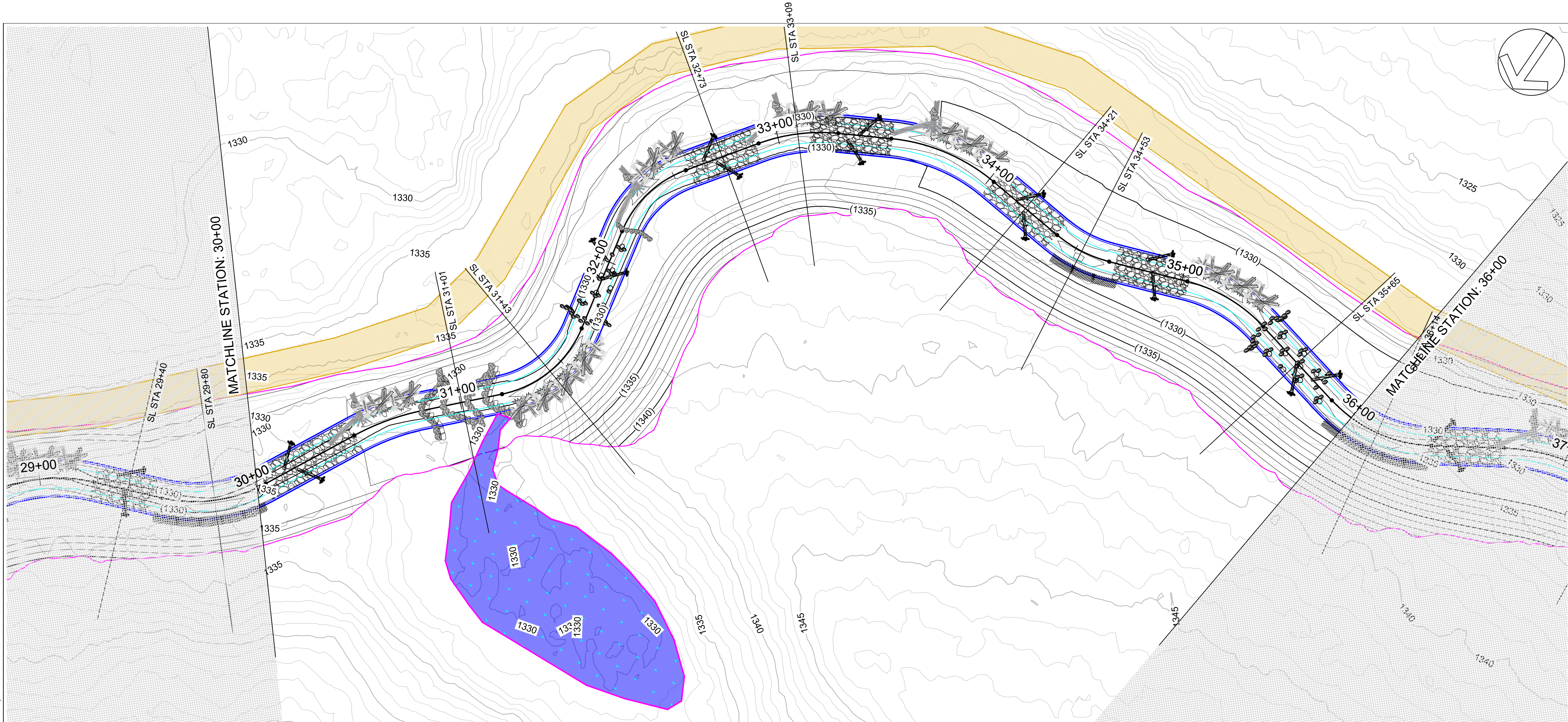
**BID SET
NOT FOR
CONSTRUCTION**

DATE: 10/15/2021
SCALE (34"x22"): 1" = 30'
SCALE (17"x11"): 1" = 60'

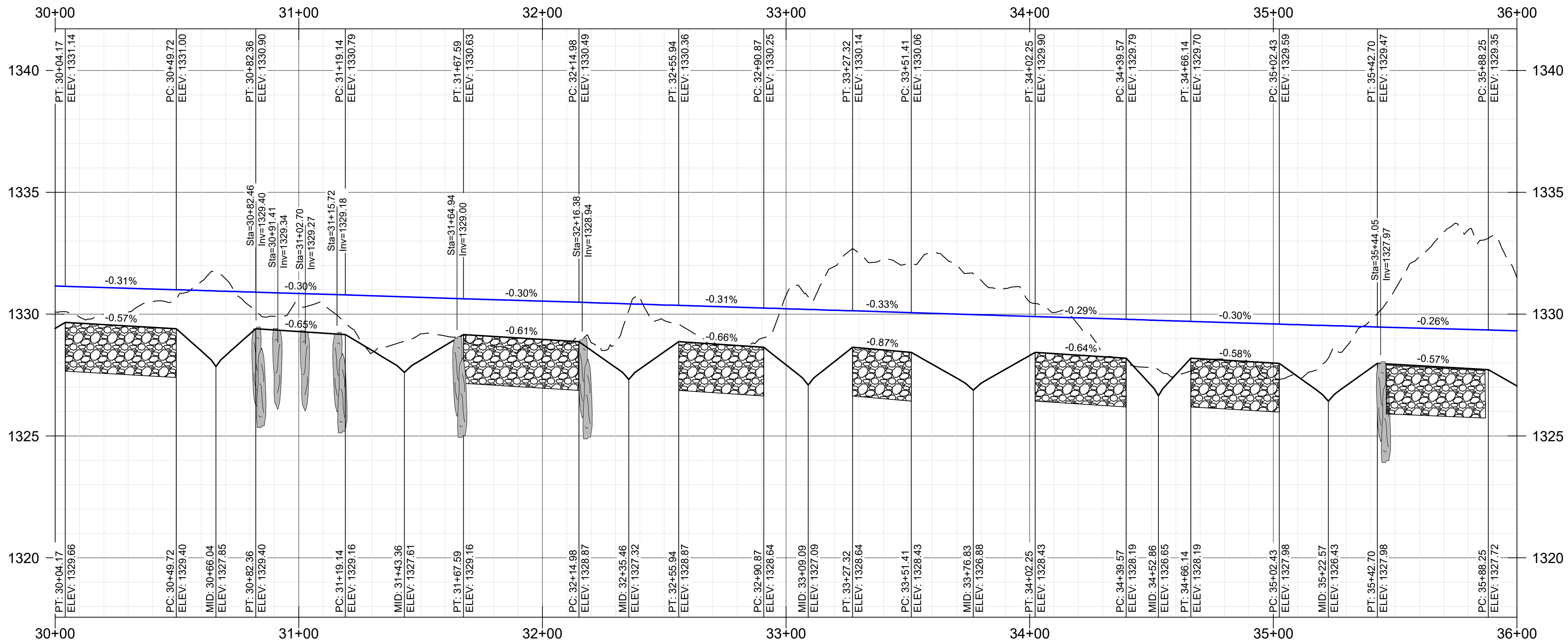
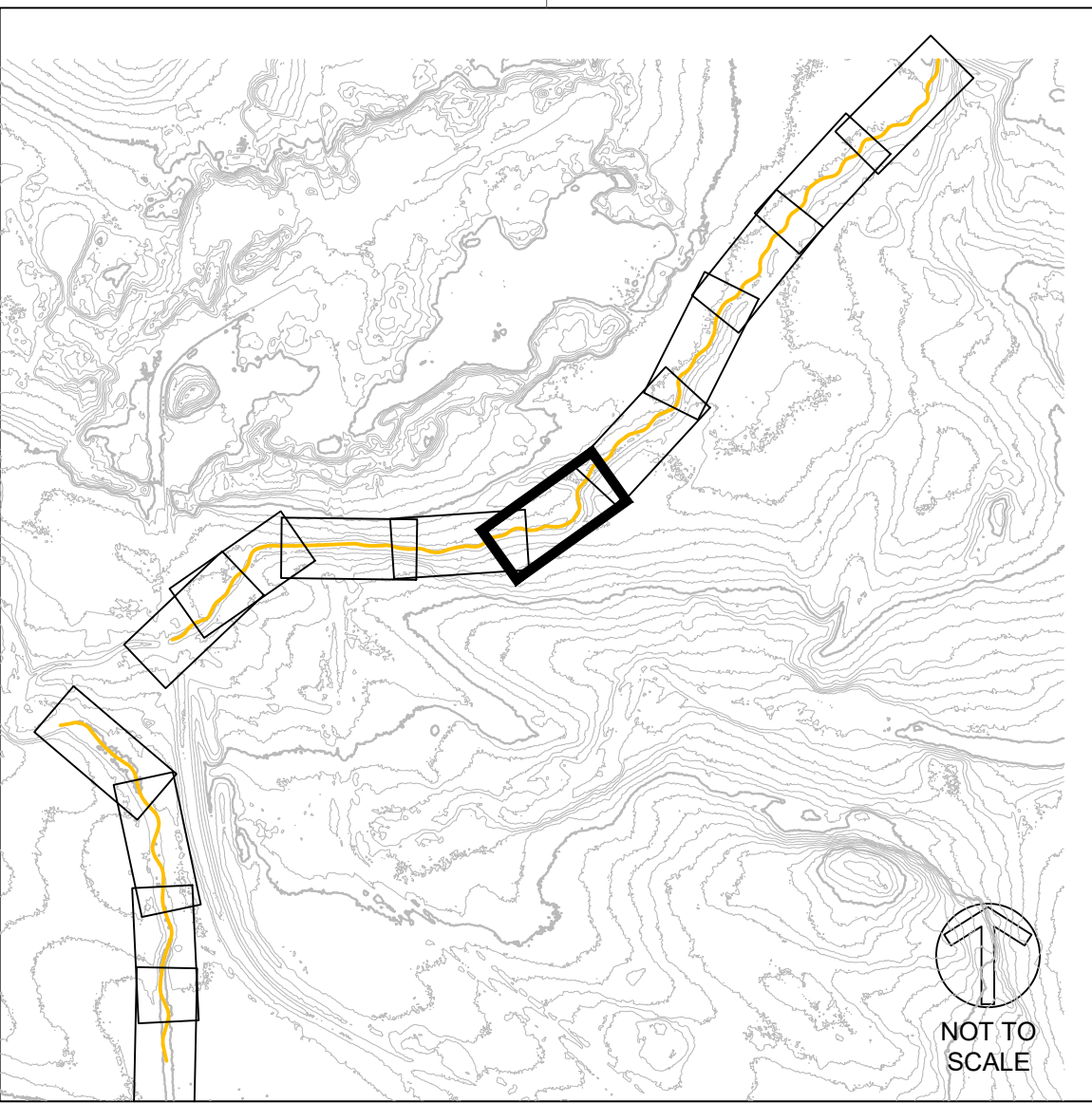
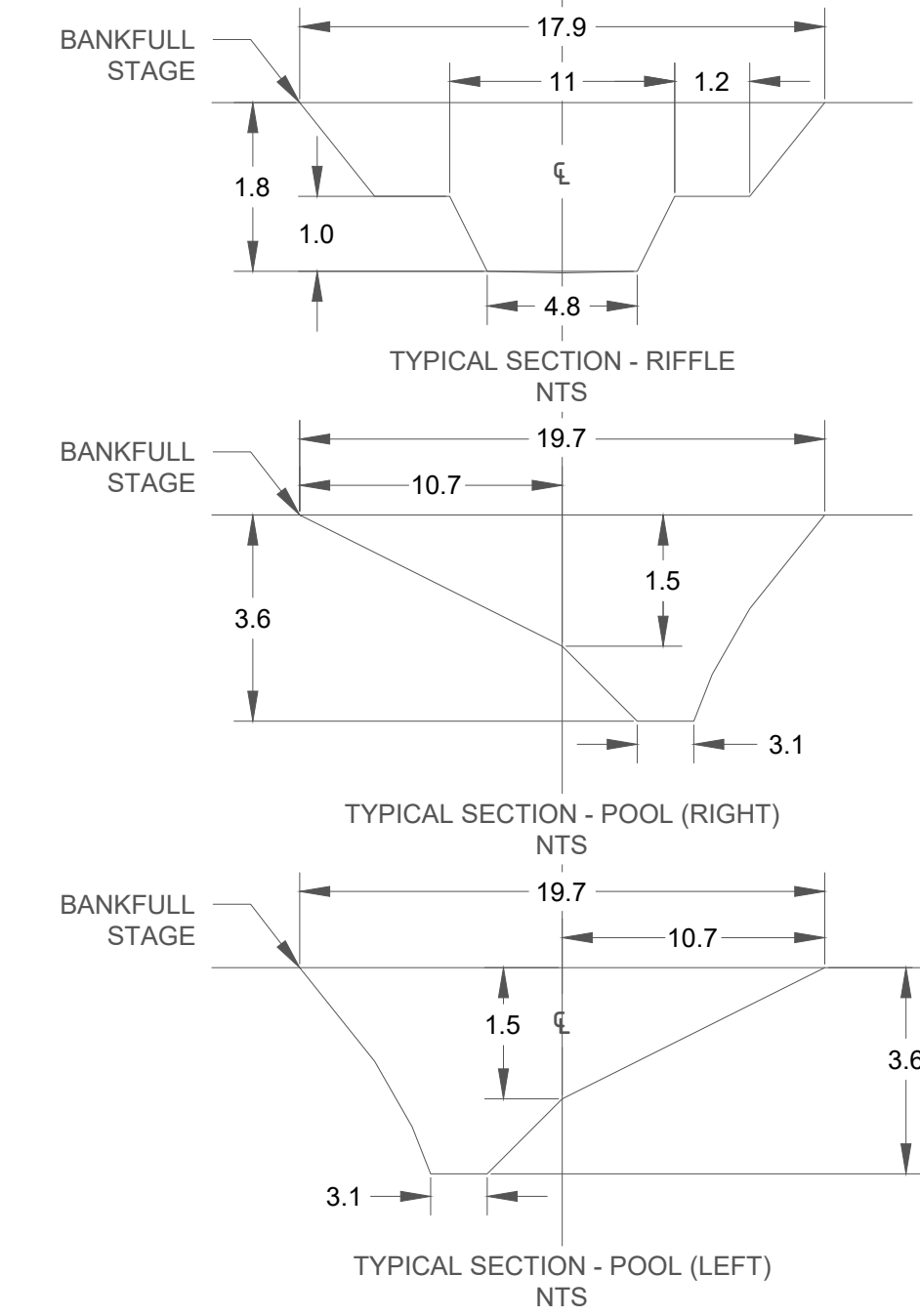
0 30 60
SCALE IN FEET

SHEET NUMBER
20 OF 50

C:\USERS\OWNER\PROJ\NORTHSHORE\MINING\CD\SHEETS\LITTLE39_PP.DWG | REIDE | SAVE | Friday, October 15, 2021 3:05:03 PM | ACAD.CTB | | PLOTTED: Monday, October 18, 2021 10:44:55 AM



- PLAN LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED INNER BERM
 - PROPOSED GEOMORPHIC CHANNEL TOB
 - PROPOSED FLOODPLAIN TOE
 - LIMITS OF DISTURBANCE
 - PROPOSED MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR
 - GRAVEL RIFFLE SEE SHEET 38
 - CONSTRUCTION ACCESS
 - STOCKPILE AREA SEE SHEET 49
 - LOG J-HOOK SEE SHEET 39
 - TOE WOOD SEE SHEET 41
 - SOIL LIFT SEE SHEET 42
 - TRANSPLANTS SEE SHEET 47
 - CONSTRUCTED RIFFLE SEE SHEET 43
 - HABITAT LOG SEE SHEET 46
 - ROCK GLIDE RIFFLE SEE SHEET 44
 - BOULDER J-HOOK SEE SHEET 45
 - LOG VANE SEE SHEET 40
- PROFILE LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED BANKFULL TOB
 - EXISTING GROUND
 - STRUCTURE BOULDER
 - AUGMENTED RIFFLE
 - HEADER AND FOOTER BOULDER



SCALE: HOR 1"=30'; VERT 1"= 3'

APPROVED BY: KA	REV	DESCRIPTION	CHECKED BY: M/JG	DRAWN BY: GET	APPRV
	1	DRAFT 30% DESIGN			KA
	2	DRAFT 60%			KA
	3	DRAFT 90%			KA
	4	BID SET			KA
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	XX	XX			XX
	XX	XX			XX
	XX	XX			XX

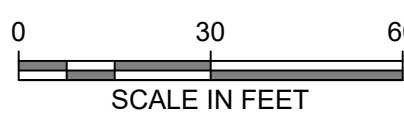
BIG AND LITTLE 39
STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION
LITTLE 39
PLAN AND PROFILE - (6)
STA 30+00 TO 36+00



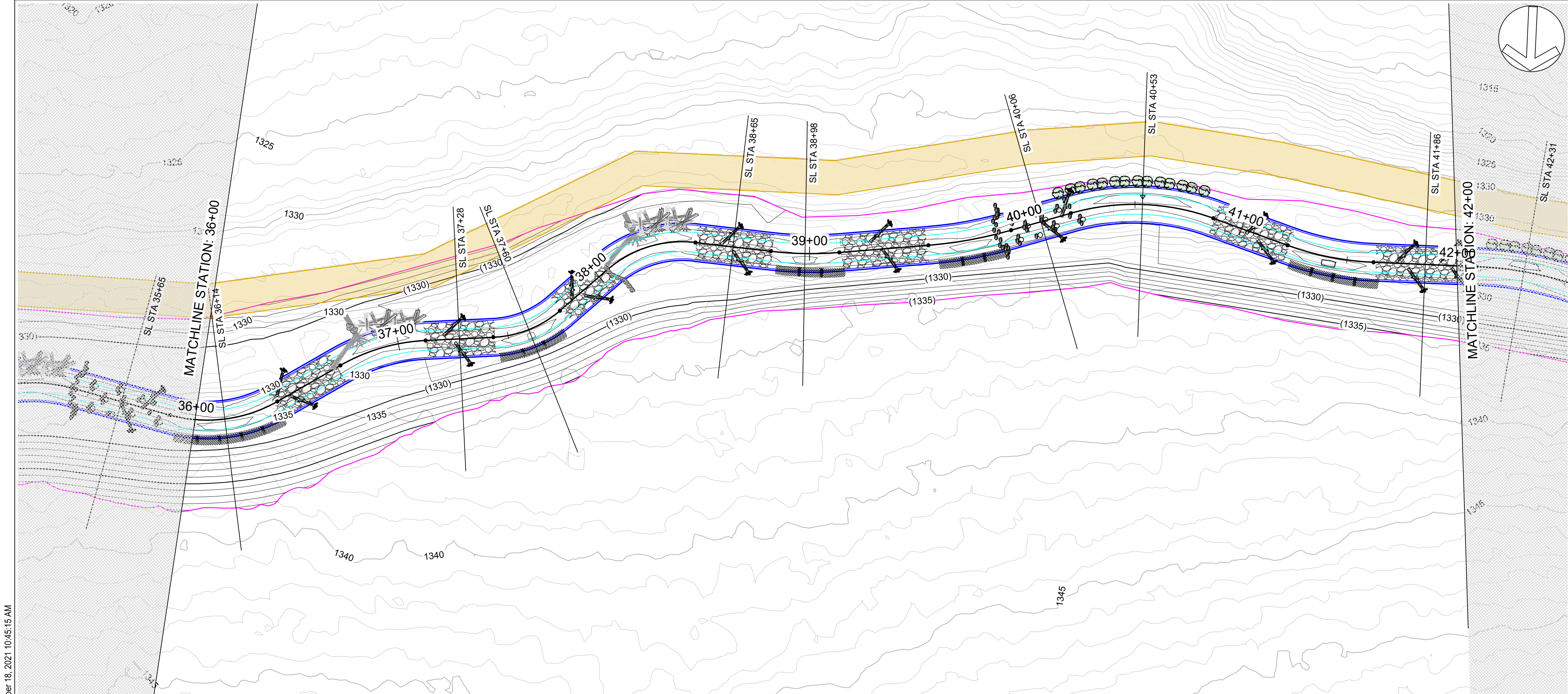
BID SET
NOT FOR
CONSTRUCTION

DATE: 10/15/2021
SCALE (34"X22"): 1" = 30'
SCALE (17"X11"): 1" = 60'

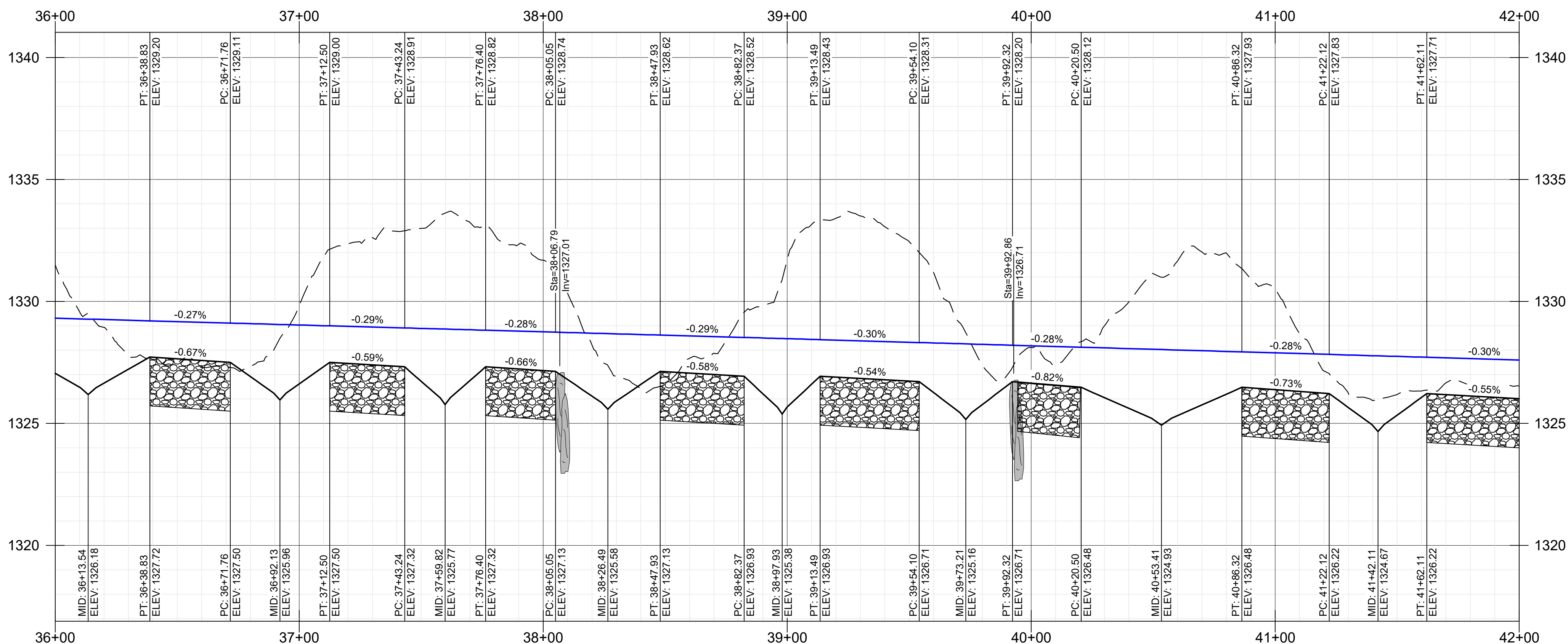
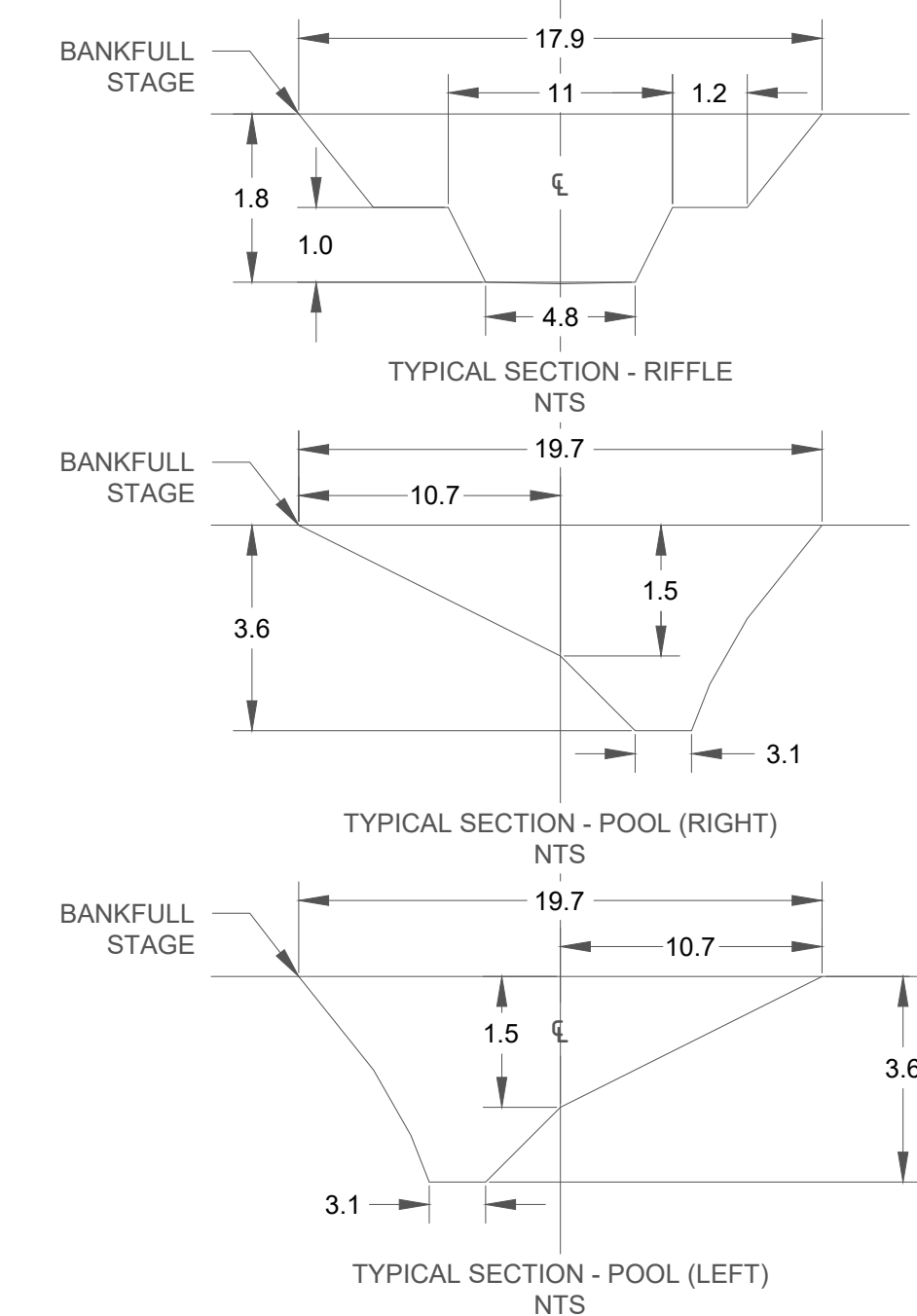


SHEET NUMBER
21 OF 50

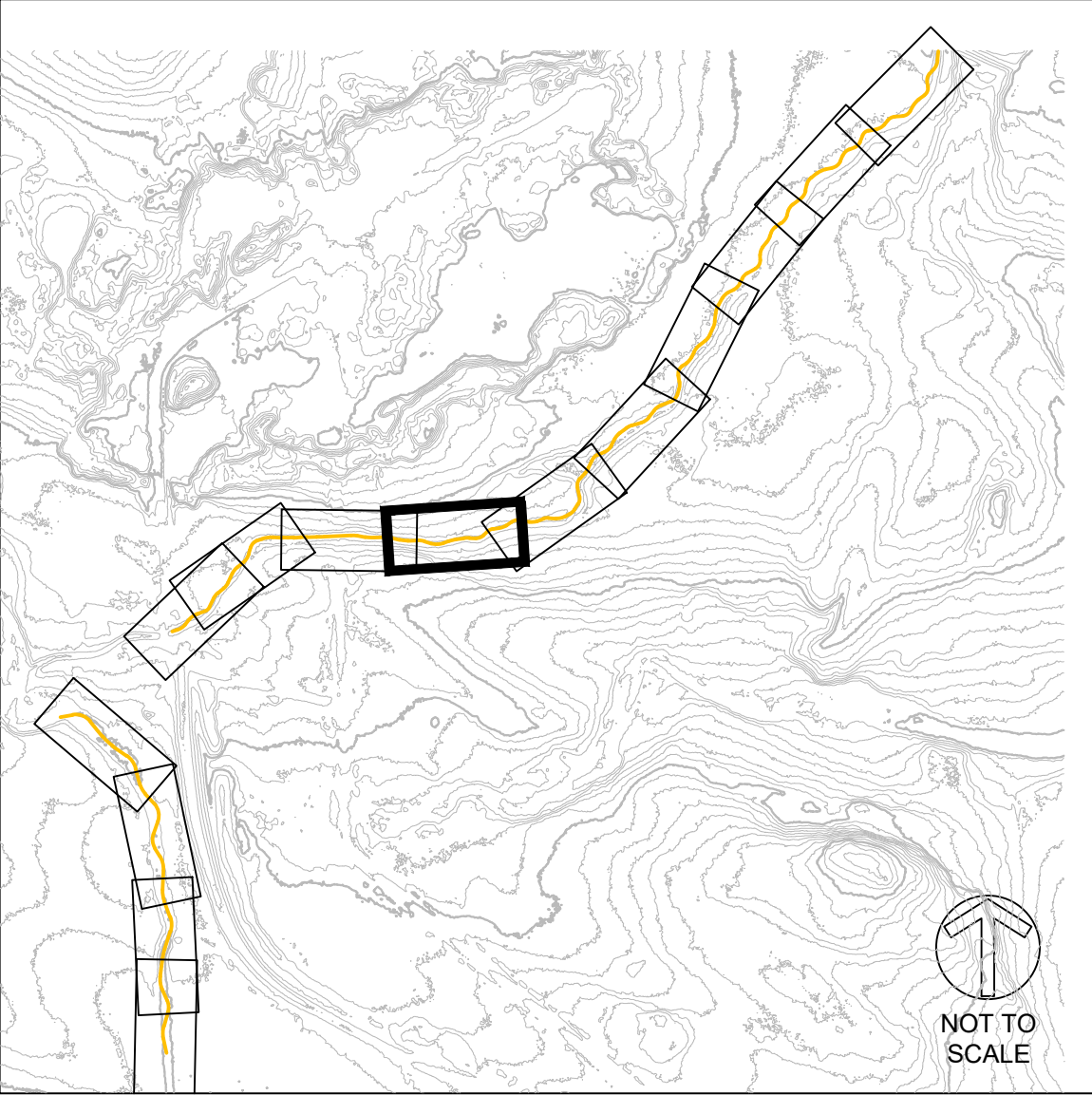
C:\USERS\OWNER\NORTHSHOREMINING\CD\SHEETS\LITTLE39_PP.DWG | REIDE | SAVED: Friday, October 15, 2021 3:05:03 PM | ACAD.CTB | | PLOTTED: Monday, October 18, 2021 10:45:15 AM



- PLAN LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED INNER BERM
 - PROPOSED GEOMORPHIC CHANNEL TOB
 - PROPOSED FLOODPLAIN TOE
 - LIMITS OF DISTURBANCE
 - PROPOSED MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR
 - GRAVEL RIFFLE SEE SHEET 38
 - CONSTRUCTION ACCESS
 - STOCKPILE AREA SEE SHEET 49
 - LOG J-HOOK SEE SHEET 39
 - TOE WOOD SEE SHEET 41
 - SOIL LIFT SEE SHEET 42
 - TRANSPLANTS SEE SHEET 47
 - CONSTRUCTED RIFFLE SEE SHEET 43
 - HABITAT LOG SEE SHEET 46
 - ROCK GLIDE RIFFLE SEE SHEET 44
 - BOULDER J-HOOK SEE SHEET 45
 - LOG VANE SEE SHEET 40
- PROFILE LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED BANKFULL TOB
 - EXISTING GROUND
 - STRUCTURE BOULDER
 - AUGMENTED RIFFLE
 - HEADER AND FOOTER BOULDER



SCALE: HOR 1"=30'; VERT 1"= 3'



APPROVED BY: KA		CHECKED BY: MJG	DRAWN BY: GET
REV	DESCRIPTION	APPROV	
1	DRAFT 30% DESIGN	KA	
2	DRAFT 60%	KA	
3	DRAFT 90%	KA	
4	BID SET	KA	
XX		XX	
XX		XX	
XX		XX	
XX		XX	

**BIG AND LITTLE 39
STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN**

**BID SET - NOT FOR CONSTRUCTION
LITTLE 39
PLAN AND PROFILE - (7)
STA 36+00 TO 42+00**

CLIFFS

NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614

BEAVER RIVER CONSULTING

BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

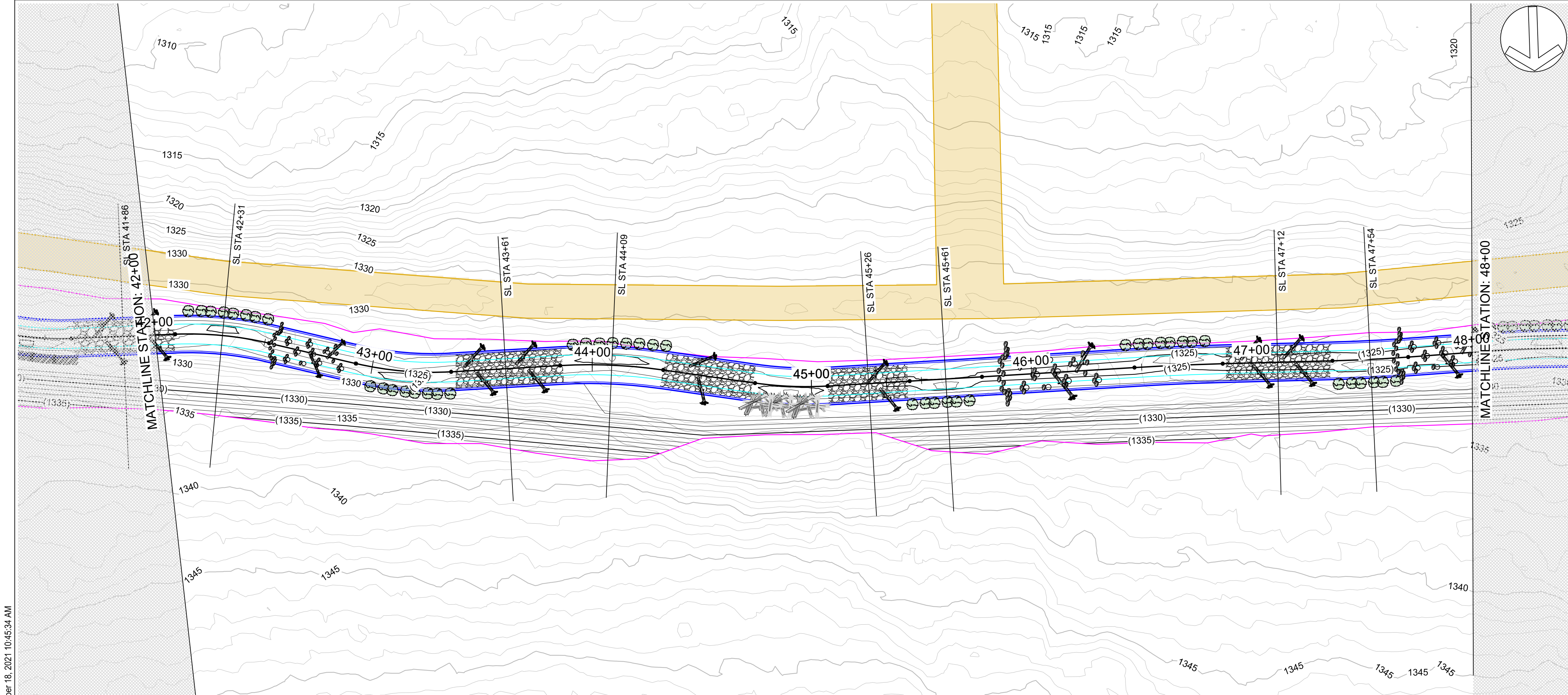
**BID SET
NOT FOR
CONSTRUCTION**

DATE: 10/15/2021
SCALE (34"x22"): 1" = 30'
SCALE (17"x11"): 1" = 60'

0 30 60
SCALE IN FEET

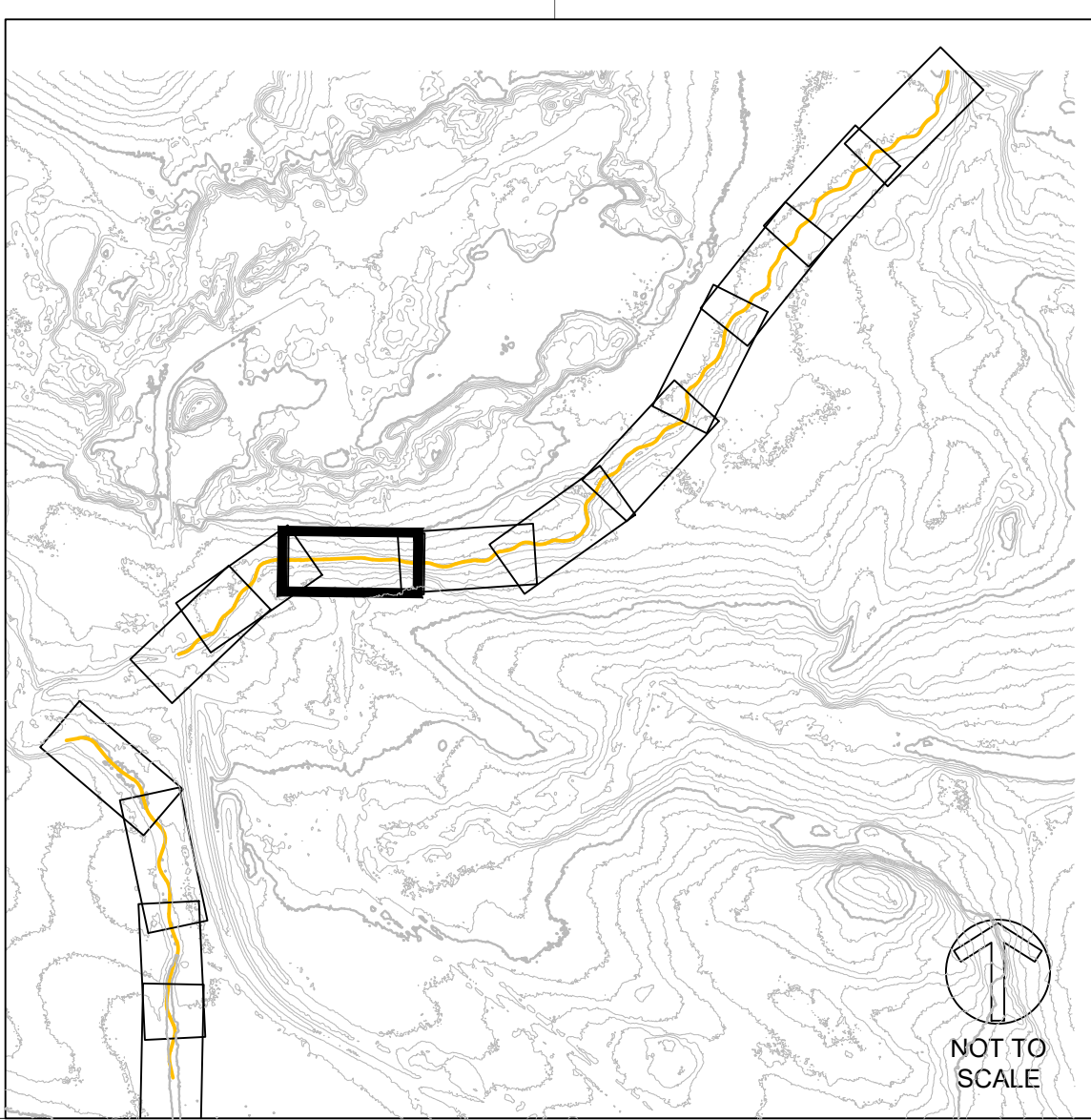
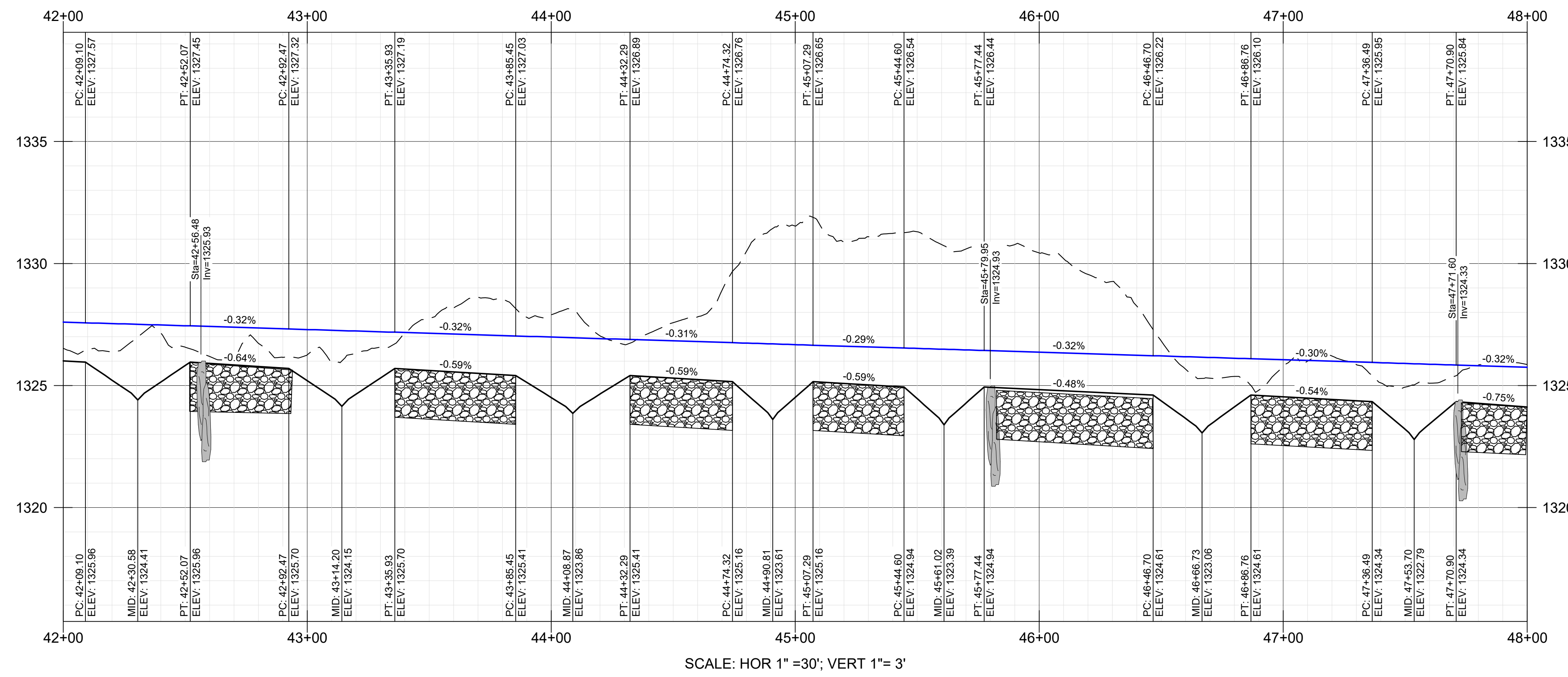
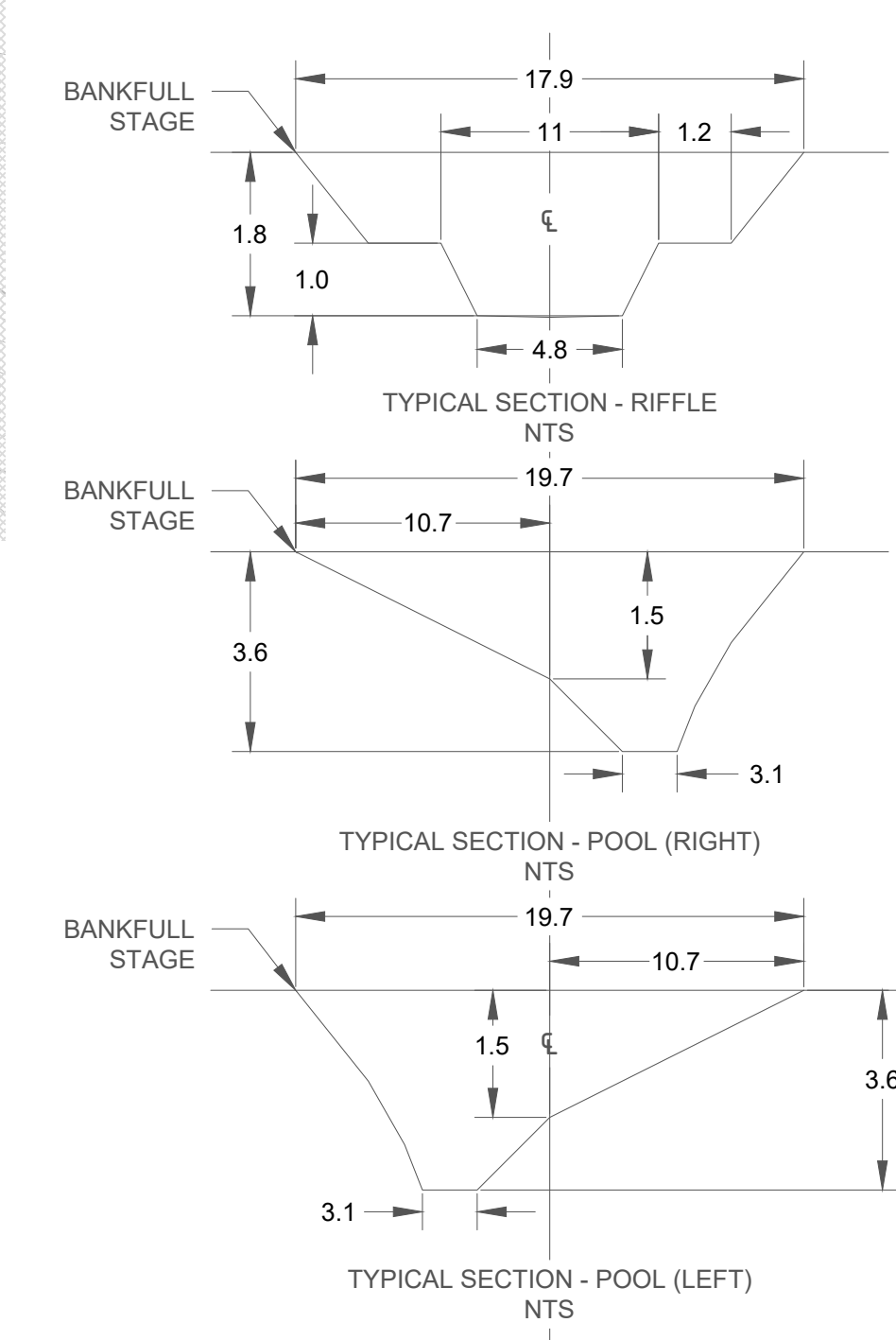
SHEET NUMBER
22 OF 50

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- PLAN LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED INNER BERM
 - PROPOSED GEOMORPHIC CHANNEL TOB
 - PROPOSED FLOODPLAIN TOE
 - LIMITS OF DISTURBANCE
 - PROPOSED MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR
 - GRAVEL RIFFLE SEE SHEET 38
 - CONSTRUCTION ACCESS
 - STOCKPILE AREA SEE SHEET 49
 - LOG J-HOOK SEE SHEET 39
 - TOE WOOD SEE SHEET 41
 - SOIL LIFT SEE SHEET 42
 - TRANSPLANTS SEE SHEET 47
 - CONSTRUCTED RIFFLE SEE SHEET 43
 - HABITAT LOG SEE SHEET 46
 - ROCK GLIDE RIFFLE SEE SHEET 44
 - BOULDER J-HOOK SEE SHEET 45
 - LOG VANE SEE SHEET 40

- PROFILE LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED BANKFULL TOB
 - EXISTING GROUND
 - STRUCTURE BOULDER
 - AUGMENTED RIFFLE
 - HEADER AND FOOTER BOULDER



APPROVED BY: KA	REV	DESCRIPTION	DRAWN BY: GET							
			APPRV	KA	KA	KA	KA	XX	XX	XX
BIG AND LITTLE 39 STREAM RESTORATION NEAR SILVER BAY LAKE COUNTY, MN	1	DRAFT 30% DESIGN	KA	KA	KA	KA	XX	XX	XX	
	2	DRAFT 60%	KA	KA	KA	KA	XX	XX	XX	
	3	DRAFT 90%	KA	KA	KA	KA	XX	XX	XX	
	4	BID SET	KA	KA	KA	KA	XX	XX	XX	

BID SET - NOT FOR CONSTRUCTION

LITTLE 39

PLAN AND PROFILE - (8)

STA 42+00 TO 48+00

CLIFFS

NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614

BEAVER RIVER CONSULTING

BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

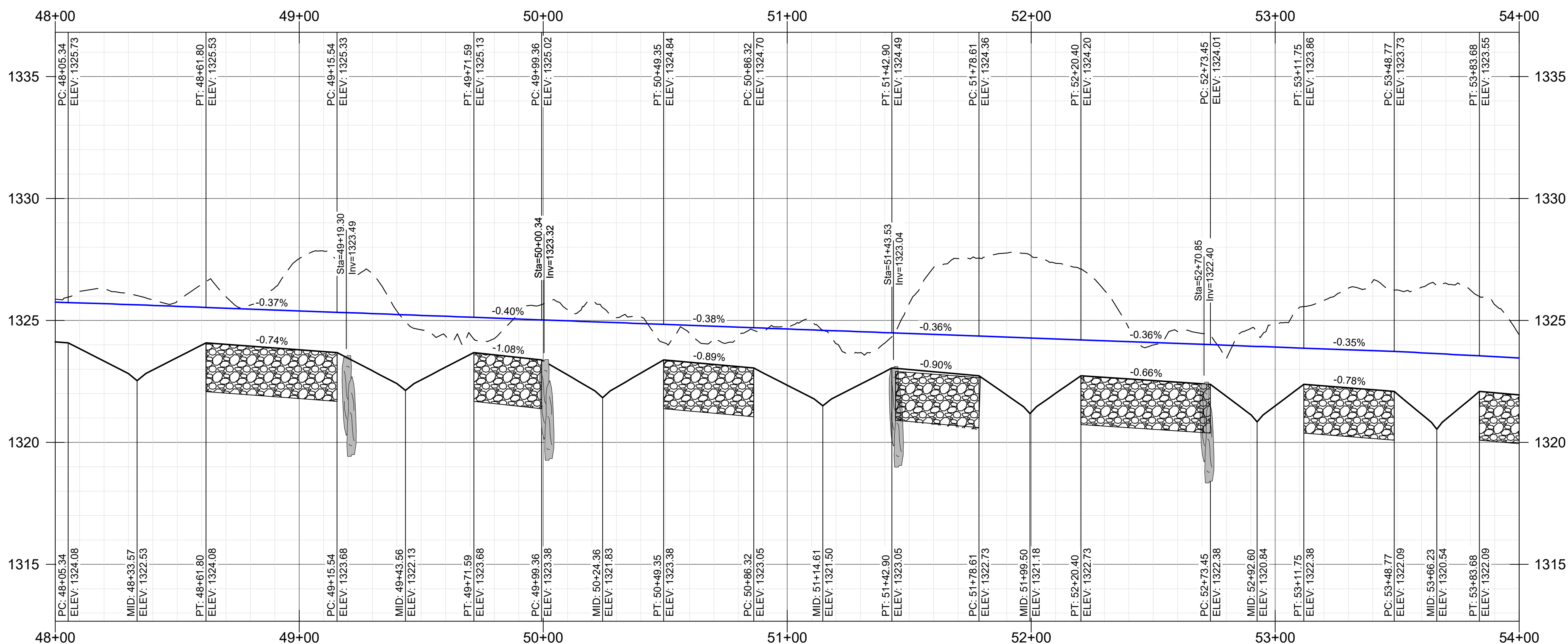
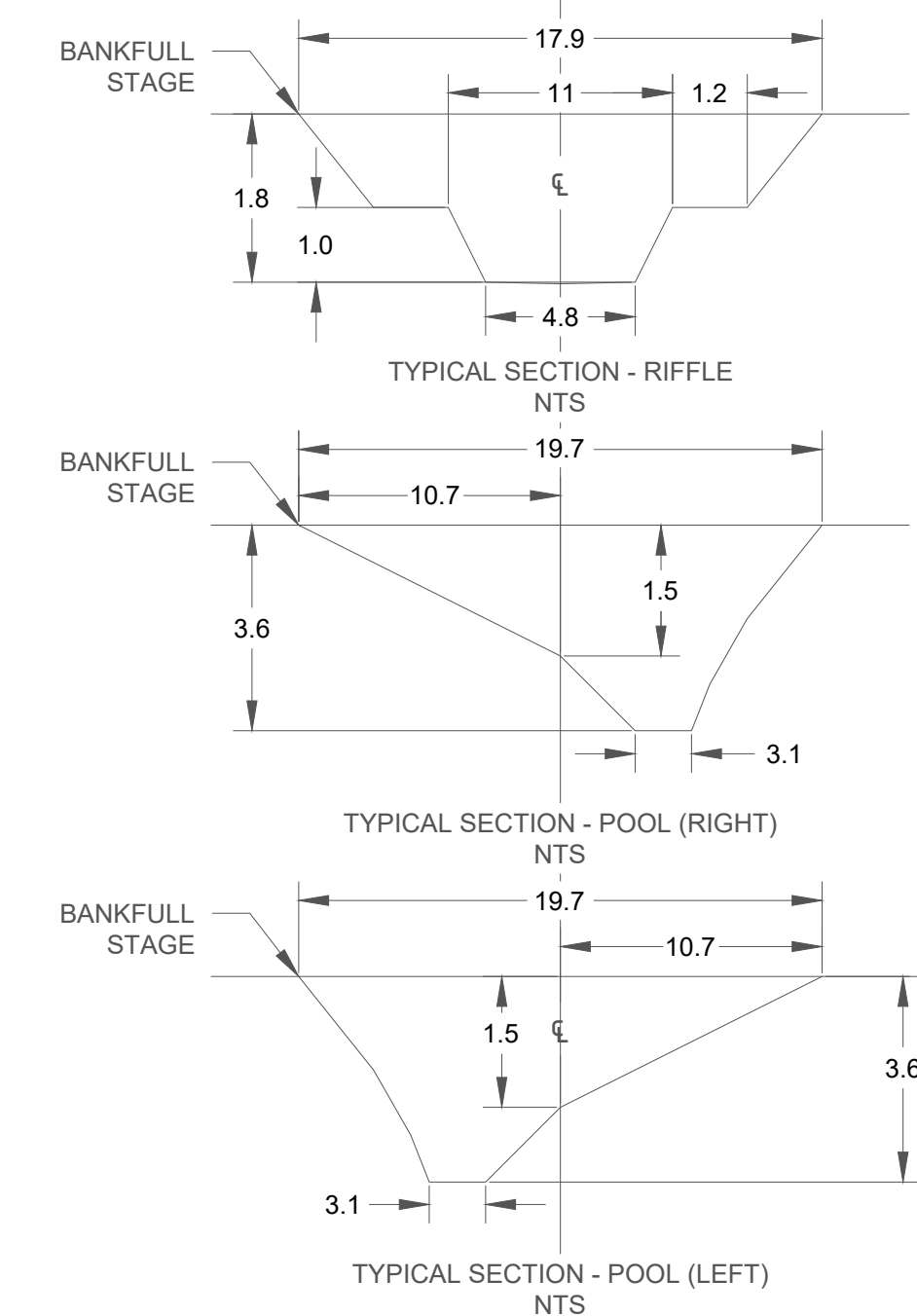
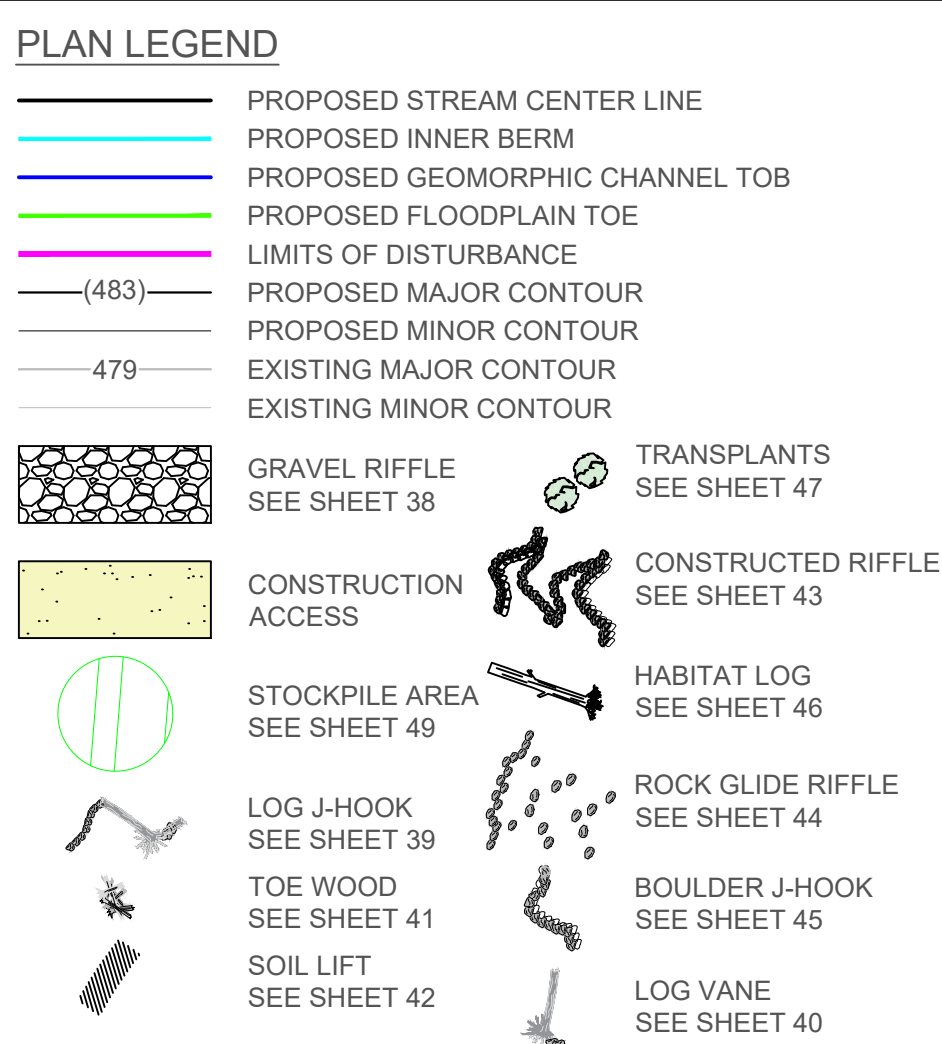
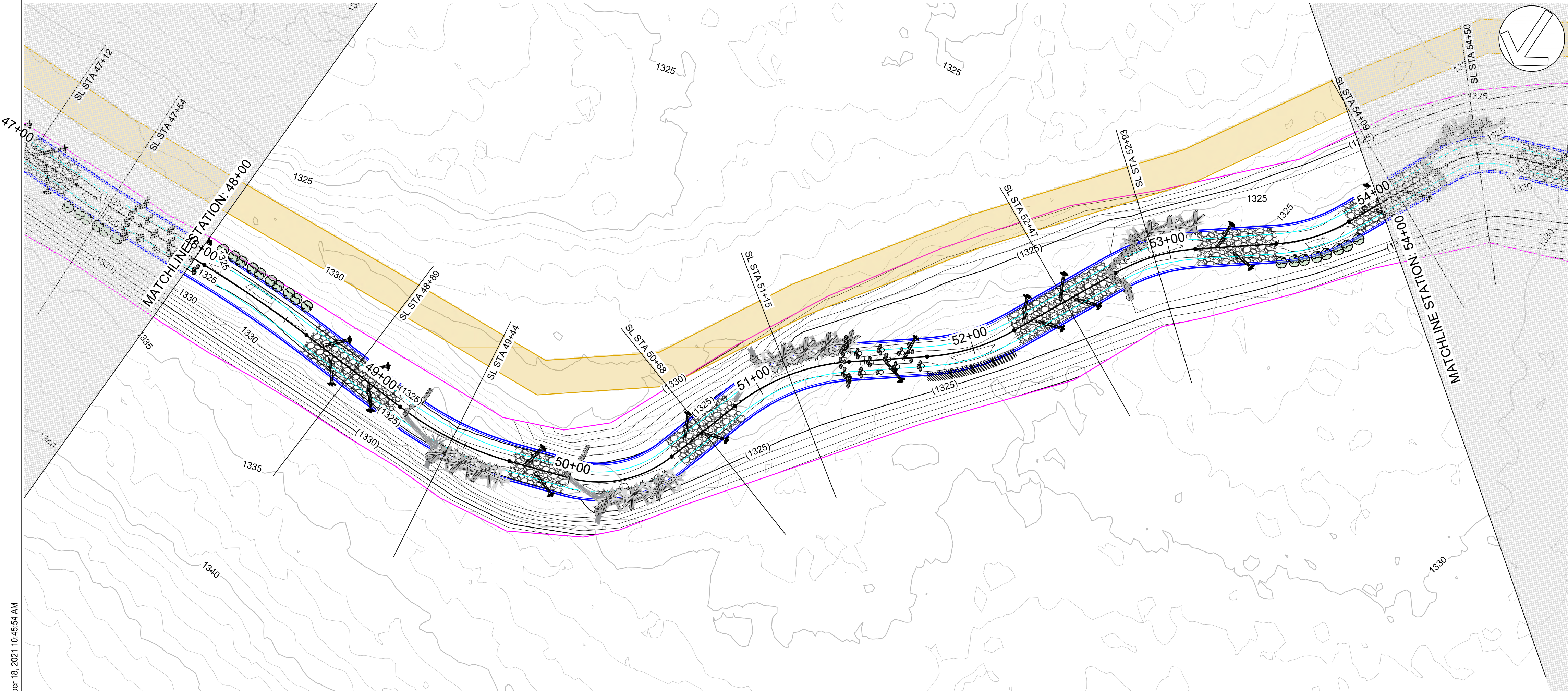
BID SET NOT FOR CONSTRUCTION

DATE: 10/15/2021
SCALE (34"x22"): 1" = 30'
SCALE (17"x11"): 1" = 60'

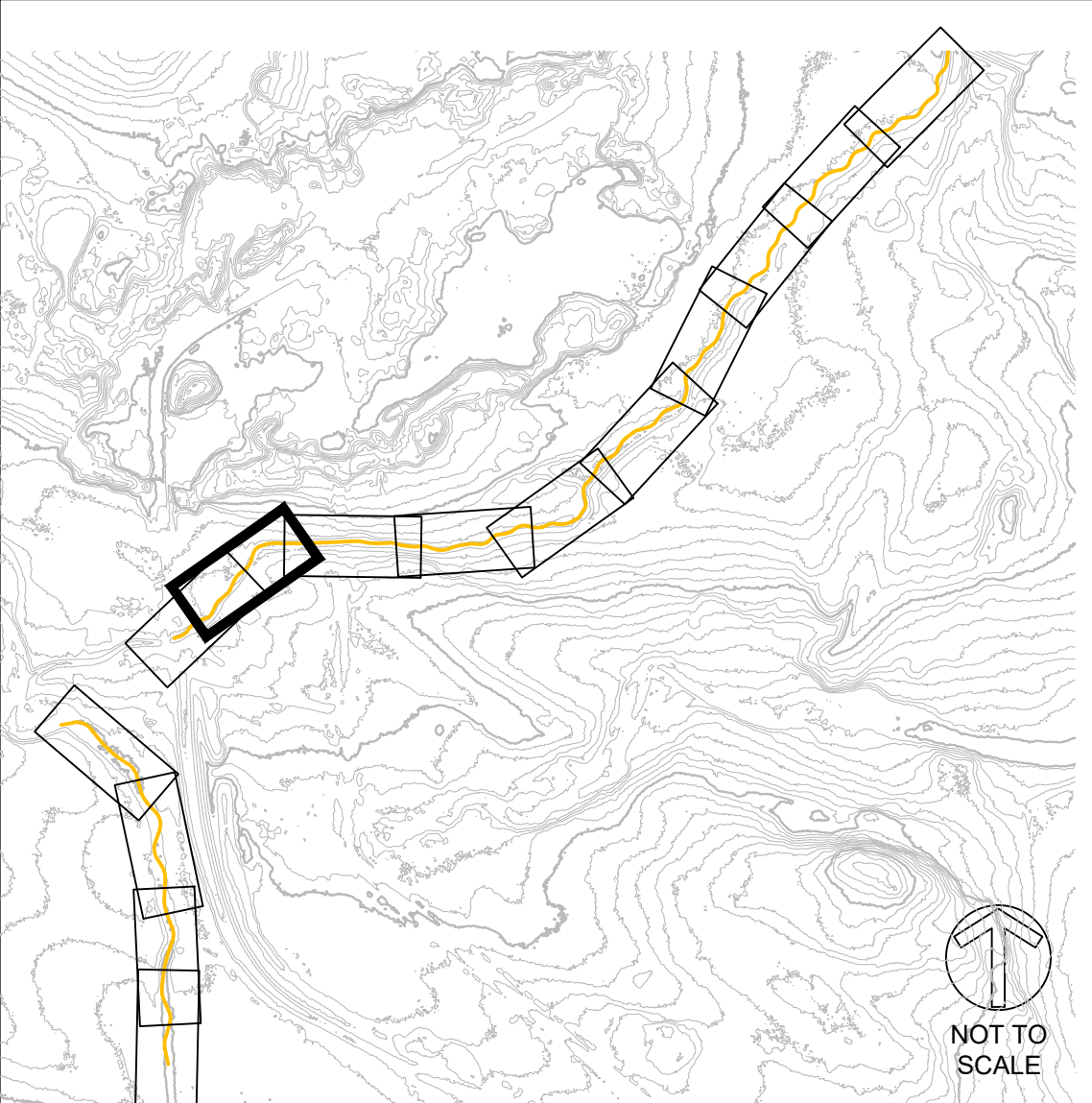
0 30 60
SCALE IN FEET

SHEET NUMBER
23 OF 50

C:\USERS\OWNER\NORTHSHOREMINING\CD\SHEETS\LITTLE39_PP.DWG | REIDE | SAVER | Friday, October 15, 2021 3:05:03 PM | ACAD.CTB | | PLOTTED: Monday, October 18, 2021 10:45:54 AM



SCALE: HOR 1"=30'; VERT 1"= 3'



APPROVED BY: KA	REV	CHECKED BY: MAG		DRAWN BY: GET	
		DESCRIPTION		APPRV	
	1	DRAFT 30% DESIGN		KA	KA
	2	DRAFT 60%		KA	KA
	3	DRAFT 90%		KA	KA
	4	BID SET		KA	KA
	XX			XX	XX
	XX			XX	XX
	XX			XX	XX
	XX			XX	XX

BIG AND LITTLE 39
STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION
LITTLE 39
PLAN AND PROFILE - (9)
STA 48+00 TO 54+00

CLIFFS

NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614

BEAVER RIVER CONSULTING

BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

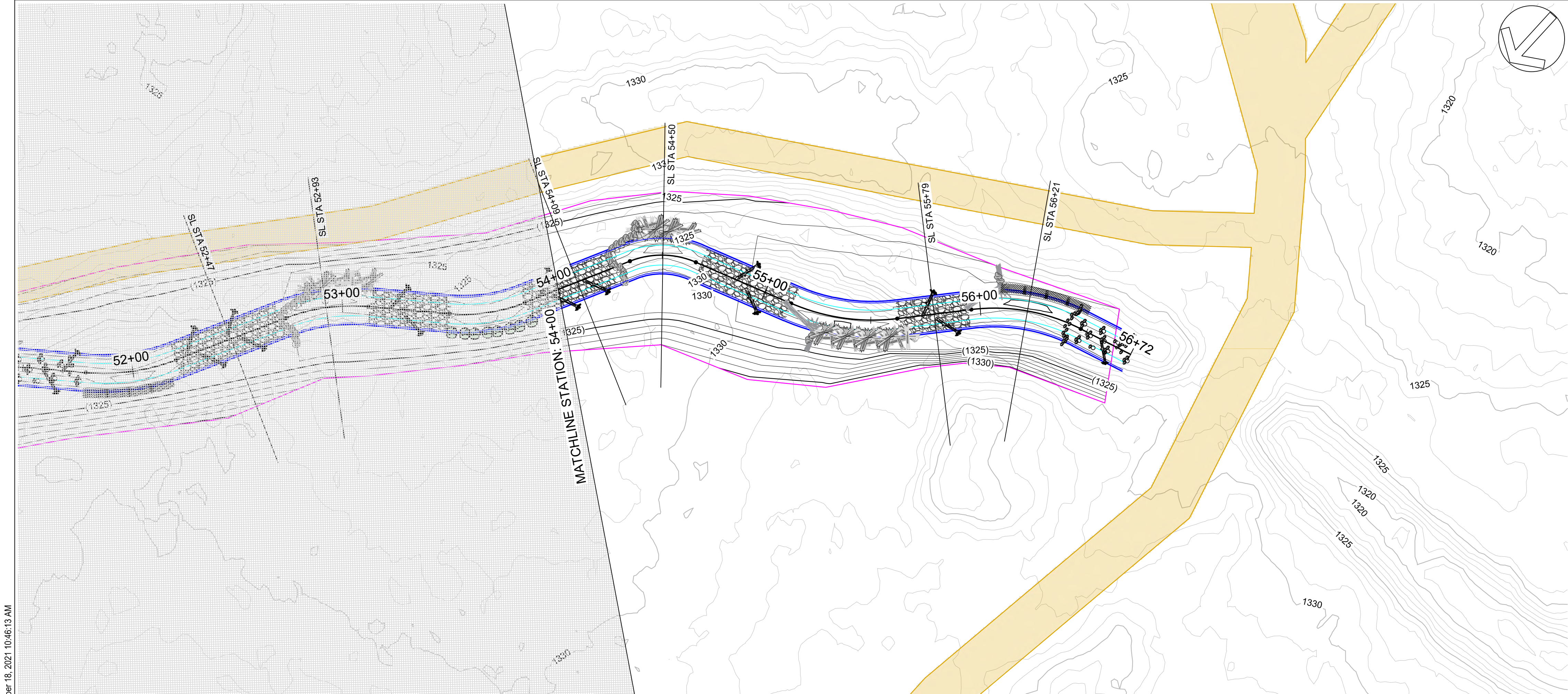
BID SET
NOT FOR
CONSTRUCTION

DATE: 10/15/2021
SCALE (34"x22"): 1" = 30'
SCALE (17"x11"): 1" = 60'

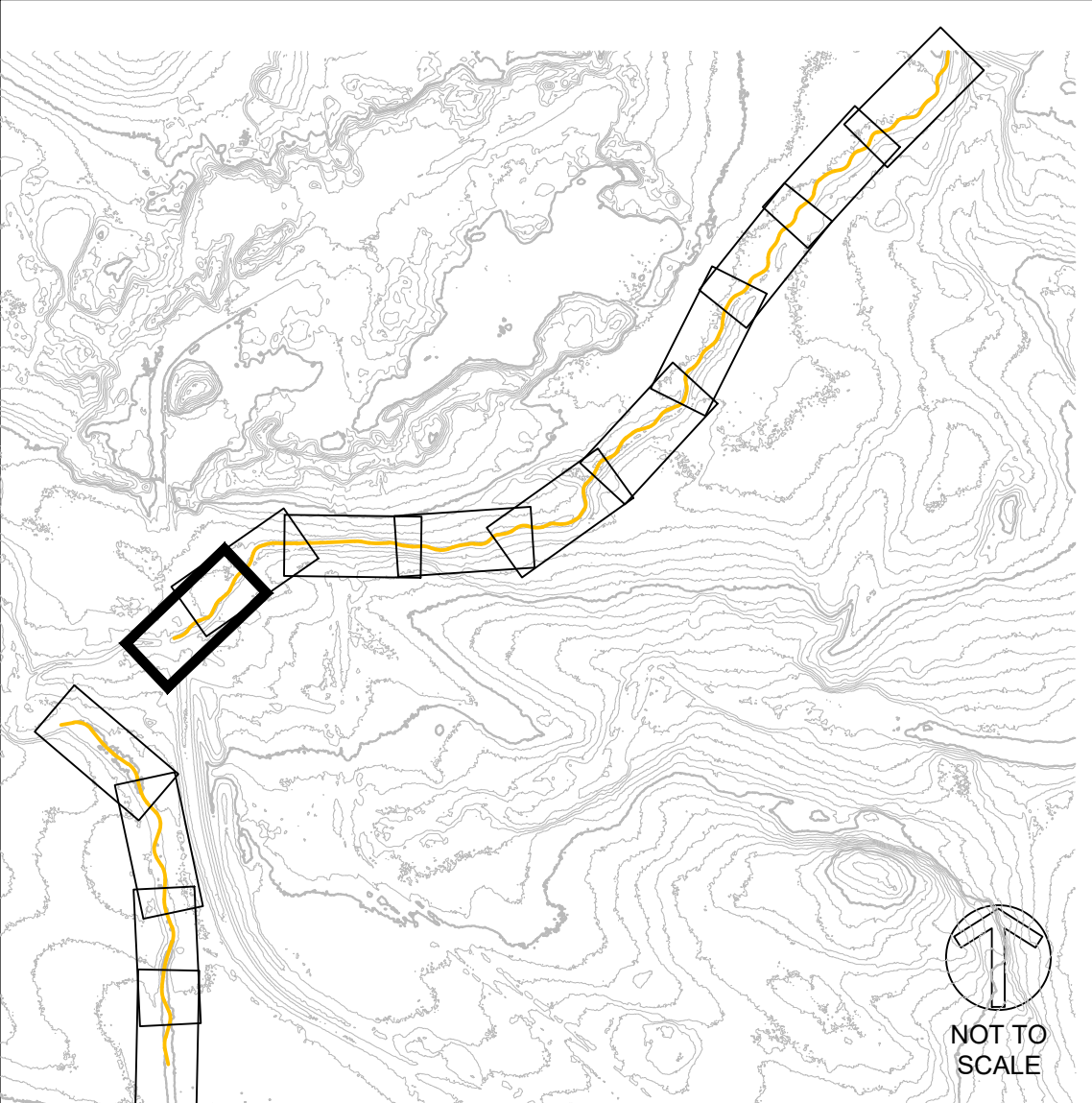
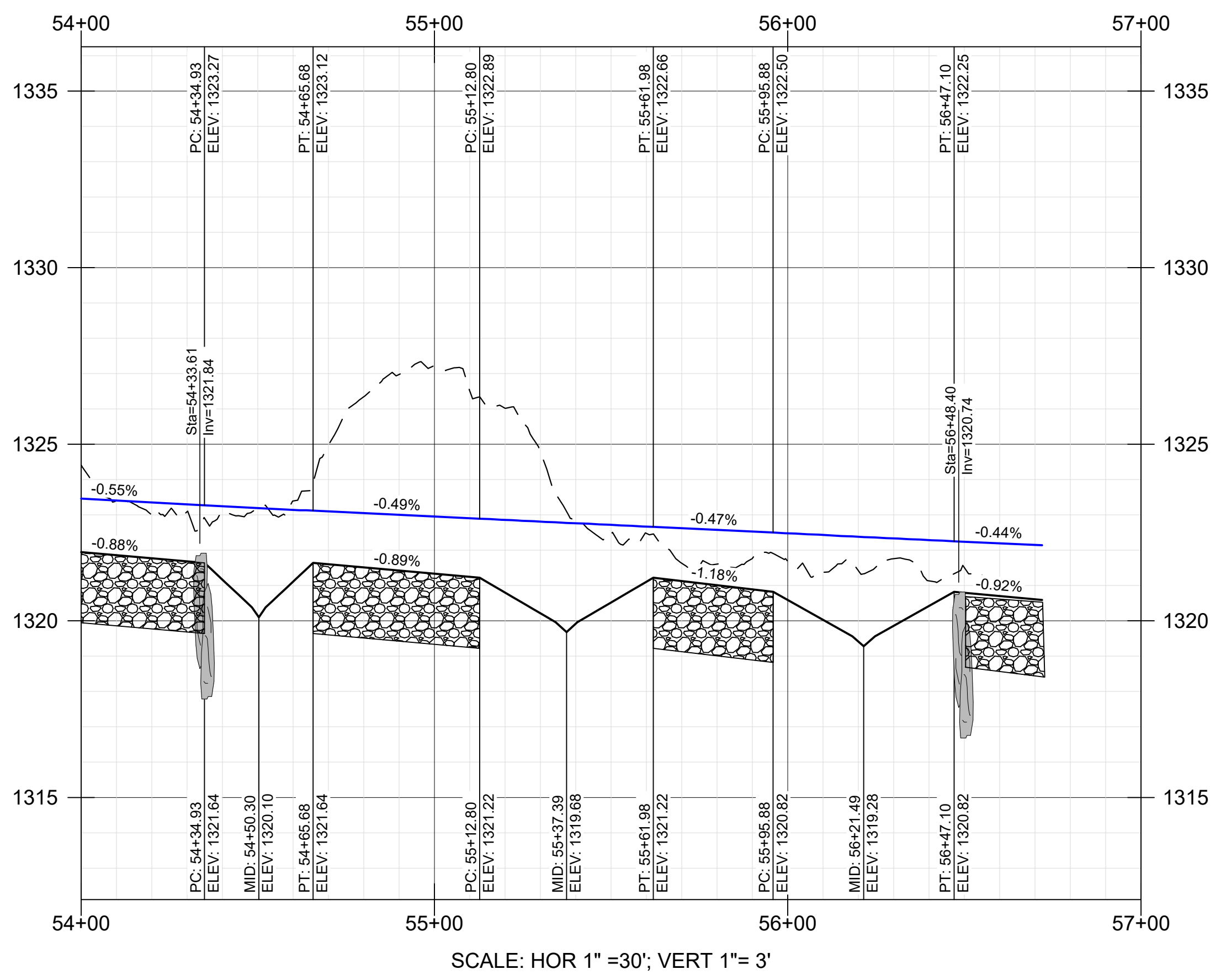
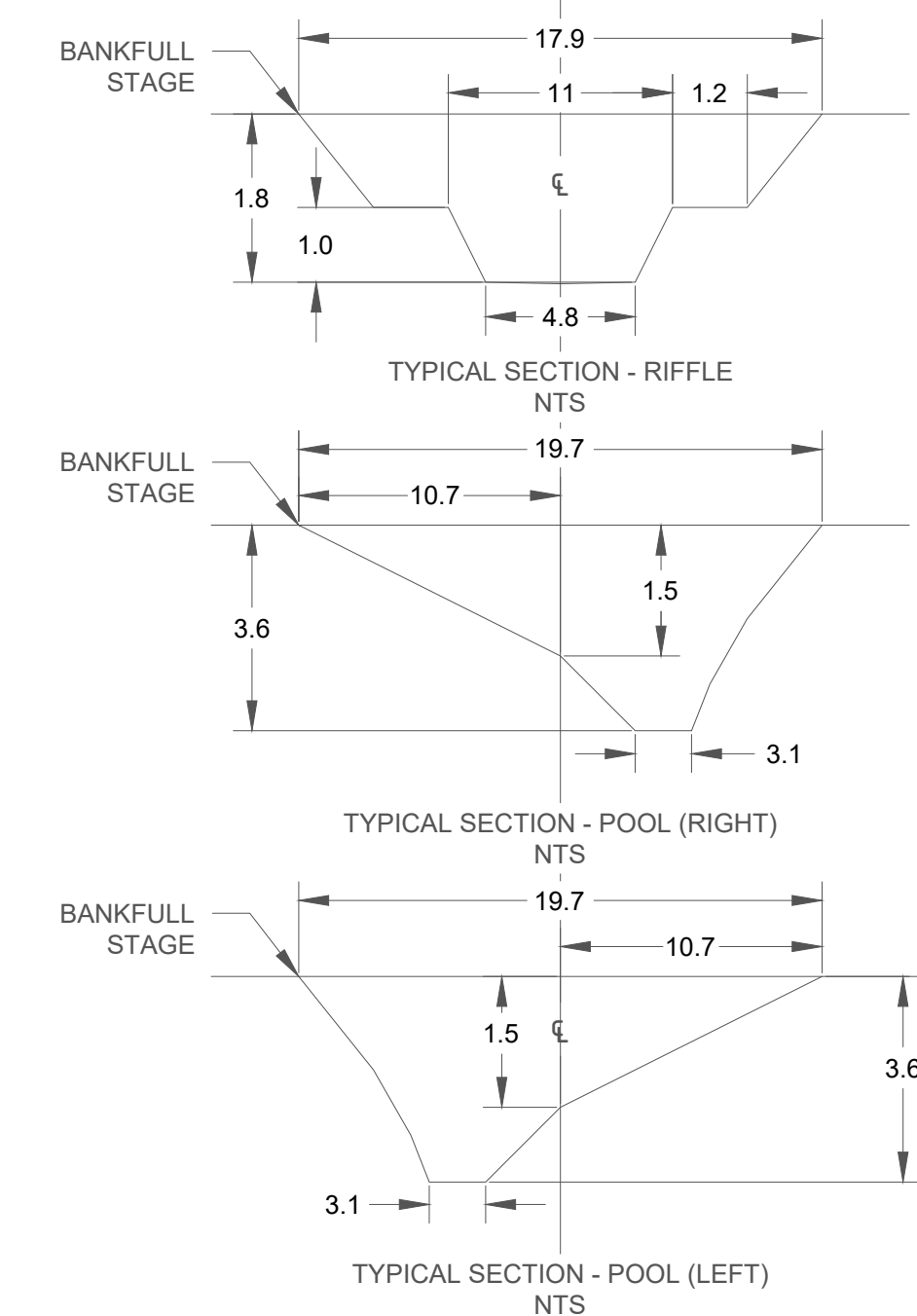
0 30 60
SCALE IN FEET

SHEET NUMBER
24 OF 50

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- PLAN LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED INNER BERM
 - PROPOSED GEOMORPHIC CHANNEL TOB
 - PROPOSED FLOODPLAIN TOE
 - LIMITS OF DISTURBANCE
 - PROPOSED MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR
 - GRAVEL RIFFLE (SEE SHEET 38)
 - CONSTRUCTION ACCESS
 - STOCKPILE AREA (SEE SHEET 49)
 - LOG J-HOOK (SEE SHEET 39)
 - TOE WOOD (SEE SHEET 41)
 - SOIL LIFT (SEE SHEET 42)
 - TRANSPLANTS (SEE SHEET 47)
 - CONSTRUCTED RIFFLE (SEE SHEET 43)
 - HABITAT LOG (SEE SHEET 46)
 - ROCK GLIDE RIFFLE (SEE SHEET 44)
 - BOULDER J-HOOK (SEE SHEET 45)
 - LOG VANE (SEE SHEET 40)
- PROFILE LEGEND**
- PROPOSED STREAM CENTER LINE
 - PROPOSED BANKFULL TOB
 - EXISTING GROUND
 - STRUCTURE BOULDER
 - AUGMENTED RIFFLE
 - HEADER AND FOOTER BOULDER



APPROVED BY: KA	REV	DESCRIPTION	CHECKED BY: MAG		DRAWN BY: GET	
			APPRV	KA	KA	KA
1	2	DRAFT 30% DESIGN	KA	KA	KA	KA
			KA	KA	KA	KA
			KA	KA	KA	KA
			KA	KA	KA	KA
3	DRAFT 60%	DRAFT 90%	KA	KA	KA	KA
			KA	KA	KA	KA
			KA	KA	KA	KA
			KA	KA	KA	KA
4	BID SET	BID SET	KA	KA	KA	KA
			KA	KA	KA	KA
			KA	KA	KA	KA
			KA	KA	KA	KA
XX	XX	XX	XX	XX	XX	XX
			XX	XX	XX	XX
			XX	XX	XX	XX
			XX	XX	XX	XX

**STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN**

**BID SET - NOT FOR CONSTRUCTION
LITTLE 39
PLAN AND PROFILE - (10)
STA 54+00 TO 56+59**

CLIFFS

NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614

BEAVER RIVER CONSULTING

BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

**BID SET
NOT FOR
CONSTRUCTION**

DATE: 10/15/2021
SCALE (34"x22"): 1" = 30'
SCALE (17"x11"): 1" = 60'

0 30 60
SCALE IN FEET

**SHEET NUMBER
25 OF 50**

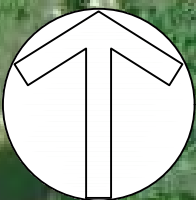
C:\USERS\OWNER\DRP\BOX\NORTHSHOREMINING\CD\SHEETS\LITTLE39_PP.DWG | REIDE | SAVED | Friday, October 15, 2021 3:05:03 PM | ACAD.CTB | | PLOTTED: Monday, October 18, 2021 10:47:48 AM

***SEE SWPP DETAILS SHEETS 48 AND 49 .
SEE SWPP NOTES SHEET 50***

- SPECIFIC SWPPP NOTES:
- CONSTRUCT STREAM IN PHASES NOT EXCEEDING 500 FEET IN LENGTH
 - BYPASS PUMP LOW FLOW WATER IN UP TO 500 FOOT SEGMENTS, IT IS ANTICIPATED THAT THE LOW FLOW WILL NOT EXCEED 1 CUBIC FEET PER SECOND, (448 GALLONS PER MINUTE)
 - PROCEED UP OR DOWNSTREAM
 - PHASING SHALL CONSIST OF STREAM DIVERSION, EARTHWORK, AND SEEDING AND BLANKETING WITHIN 2 DAYS FOLLOWING COMPLETION OF WORK ON EACH PHASE
 - FOLLOW FINAL STABILIZATION SHALL BE COMPLETED AS NOTED IN VEGETATION RESTORATION SHEETS
 - DISPOSE OF EXCESS SOIL MATERIAL IN PERMITTED DISPOSAL SITE INSIDE OF TAILINGS BASIN
 - SWPPP APPLIES TO LAND AREA ABOVE BANKFULL OR TOP OF BANK, BELOW THAT LINE MN DNR WATERS PERMIT APPLIES
 - IT IS NOT ANTICIPATED THAT A ROCK CONSTRUCTION ENTRANCE WILL BE NEEDED DUE TO CONSTRUCTION ACTIVITIES REMAINING ON SITE, BUT IF TRACKING IS NOTED ON THE PAVED SURFACE OF THE HIGHWAY A ROCK OR OTHER TYPE OF CONSTRUCTION ENTRANCE SHALL BE EMPLOYED
 - UTILIZE SEDIMENT CONTROL LOGS FOR ALL SOIL STOCKPILES

BMP'S USED

1. PHASING
2. DIVERSION
3. SEDIMENT CONTROL LOGS FOR CONTAINING SOIL STOCKPILES
4. TEMPORARY MULCH AND SEED FOR STOCKPILES AND OTHER DISTURBED AREAS THAT ARE NOT BEING WORKED FOR 7 DAYS



56+72

ACCESS TRAIL

50+00

45+00

40+00

35+00

ACCESS TRAIL

30+00

25+00

20+00

15+00

10+00

ACCESS TRAIL

5+00

0+00

BIG AND LITTLE 39
STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION
LITTLE 39

OVERVIEW - SWPPP



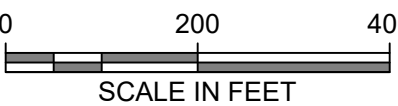
NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614



BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

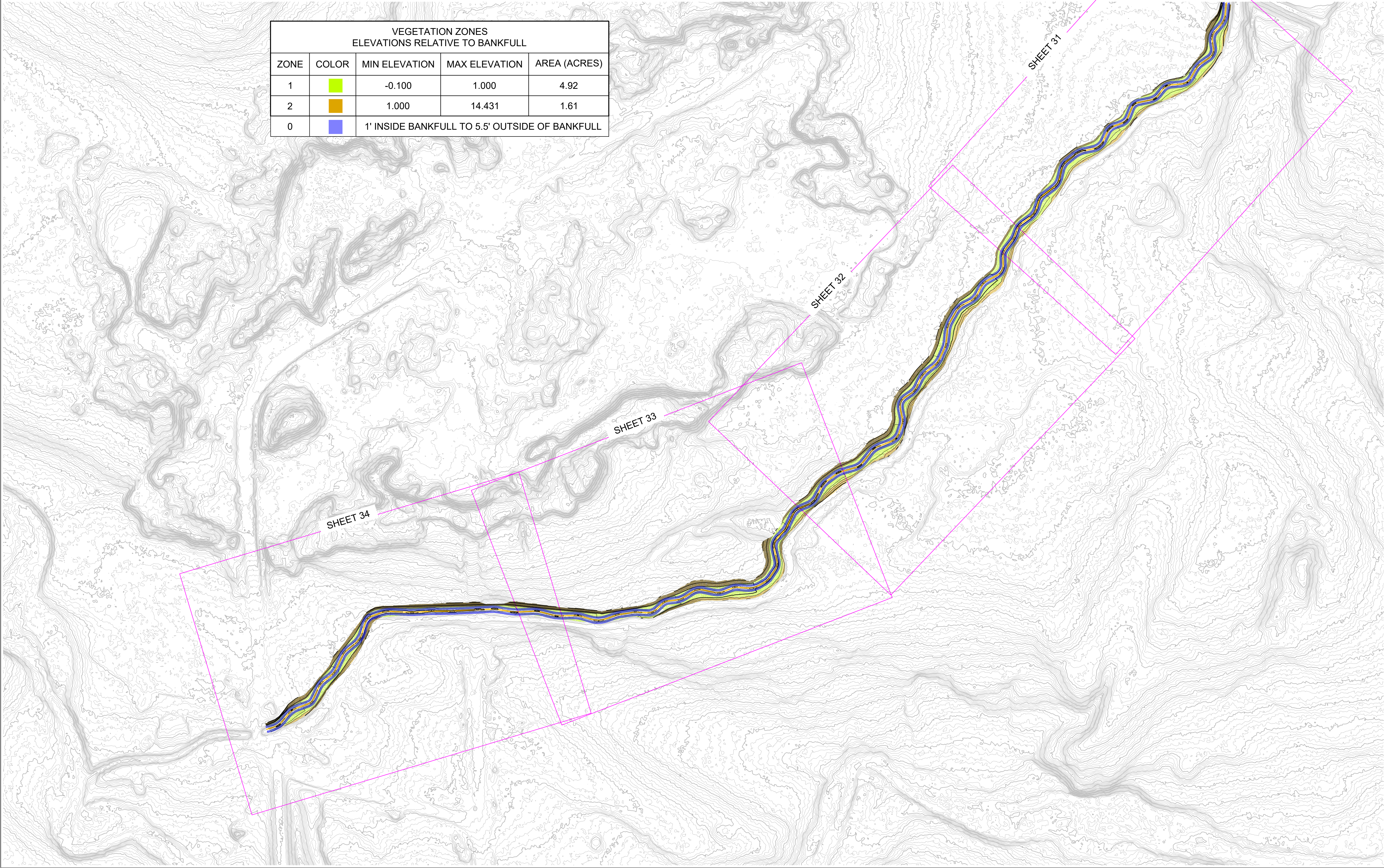
BID SET
NOT FOR
CONSTRUCTION

DATE: 10/15/2021
SCALE (34"X22"): 1" = 200'
SCALE (17"X11"): 1" = 400'

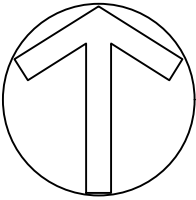


SHEET NUMBER
29 OF 50

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VEGETATION ZONES ELEVATIONS RELATIVE TO BANKFULL				
ZONE	COLOR	MIN ELEVATION	MAX ELEVATION	AREA (ACRES)
1	<div></div>	-0.100	1.000	4.92
2	<div></div>	1.000	14.431	1.61
0	<div></div>	1' INSIDE BANKFULL TO 5.5' OUTSIDE OF BANKFULL		



APPROVED BY: KA

REV

CHECKED BY: MUG

DESCRIPTION

DRAWN BY: GET

APPRV

BIG AND LITTLE 39
STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION
LITTLE 39

OVERVIEW - VEGETATION



NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614



BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

BID SET
NOT FOR
CONSTRUCTION

DATE: 10/15/2021
SCALE (34"x22"): 1" = 200'
SCALE (17"x11"): 1" = 400'

0200400

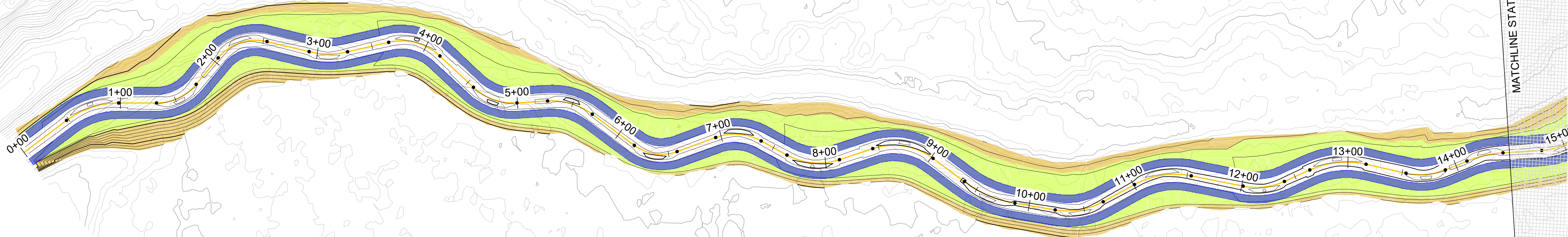
SCALE IN FEET

SHEET NUMBER

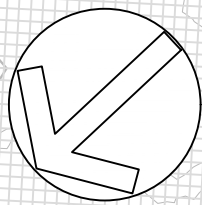
30 OF 50

DRAFT 30% DESIGN	KA	
DRAFT 60%	KA	
DRAFT 90%	KA	
BID SET	KA	
XX	XX	
XX	XX	
XX	XX	
XX	XX	

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VEGETATION ZONES ELEVATIONS RELATIVE TO BANKFULL				
ZONE	COLOR	MIN ELEVATION	MAX ELEVATION	AREA (ACRES)
1	■	-0.100	1.000	4.92
2	■	1.000	14.431	1.61
0	■	1' INSIDE BANKFULL TO 5.5' OUTSIDE OF BANKFULL		



MATCHLINE STATION: 14+50



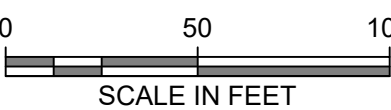
NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614



BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

BID SET
NOT FOR
CONSTRUCTION

DATE: 10/15/2021
SCALE (34"x22"): 1" = 50'
SCALE (17"x11"): 1" = 100'



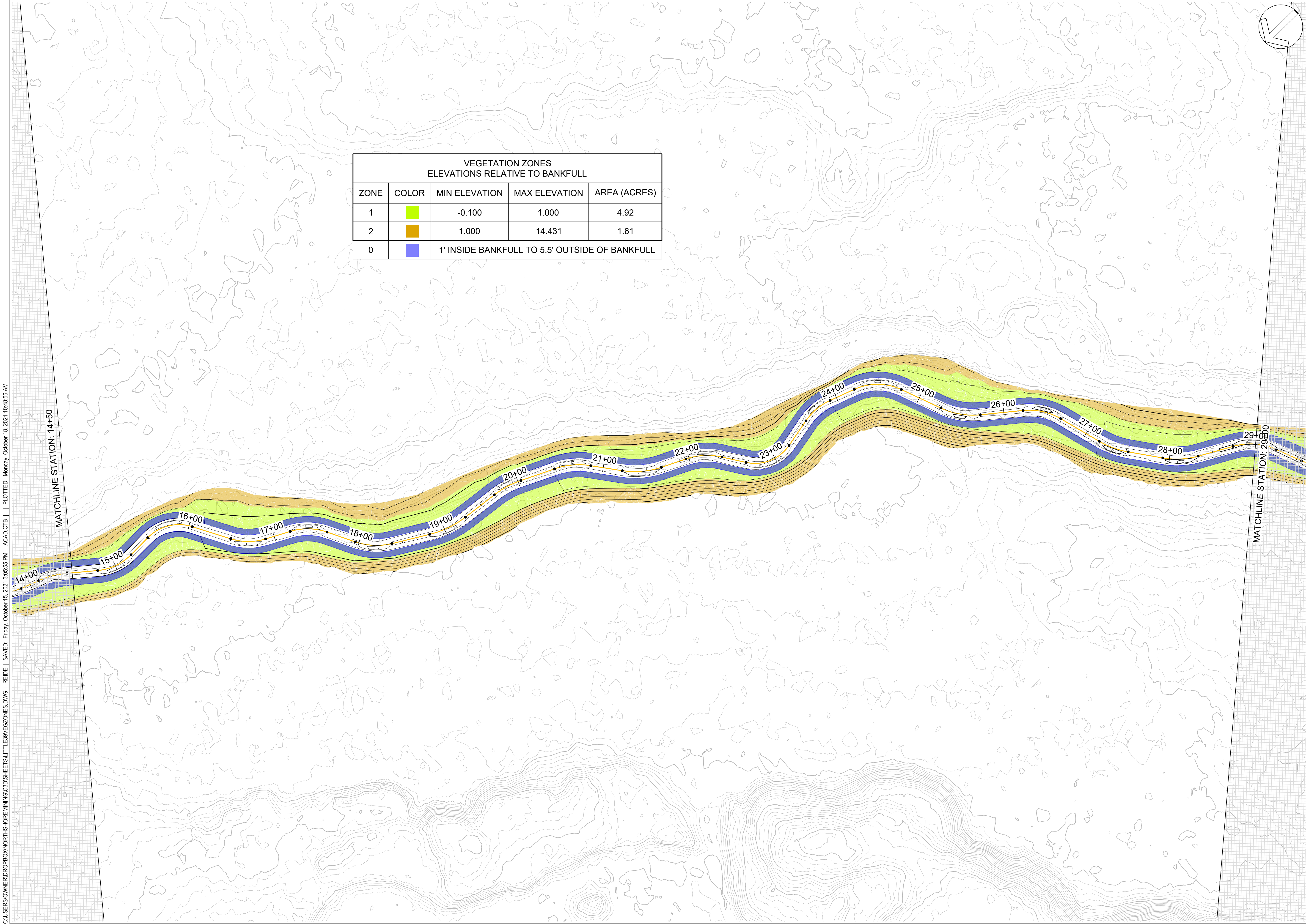
SHEET NUMBER
31 OF 50

BIG AND LITTLE 39
STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN

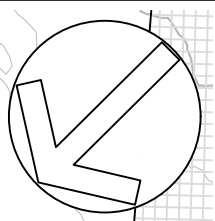
BID SET - NOT FOR CONSTRUCTION
LITTLE 39
VEGETATION - (1)
STA 0+00 TO 14+50

APPROVED BY: KA	CHECKED BY: MJG	DESCRIPTION	APPRV DRAWN BY: GET
1		DRAFT 30% DESIGN	KA
2		DRAFT 60%	KA
3		DRAFT 90%	KA
4		BID SET	KA
XX		XX	XX
XX		XX	XX
XX		XX	XX
XX		XX	XX

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VEGETATION ZONES ELEVATIONS RELATIVE TO BANKFULL				
ZONE	COLOR	MIN ELEVATION	MAX ELEVATION	AREA (ACRES)
1	Green	-0.100	1.000	4.92
2	Orange	1.000	14.431	1.61
0	Blue	1' INSIDE BANKFULL TO 5.5' OUTSIDE OF BANKFULL		



STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION
LITTLE 39
VEGETATION - (2)
STA 14+50 TO 29+00



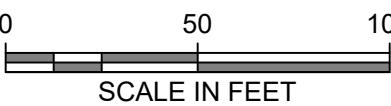
NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614



BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

BID SET
NOT FOR
CONSTRUCTION

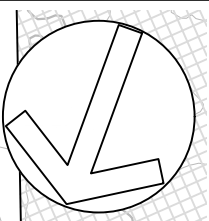
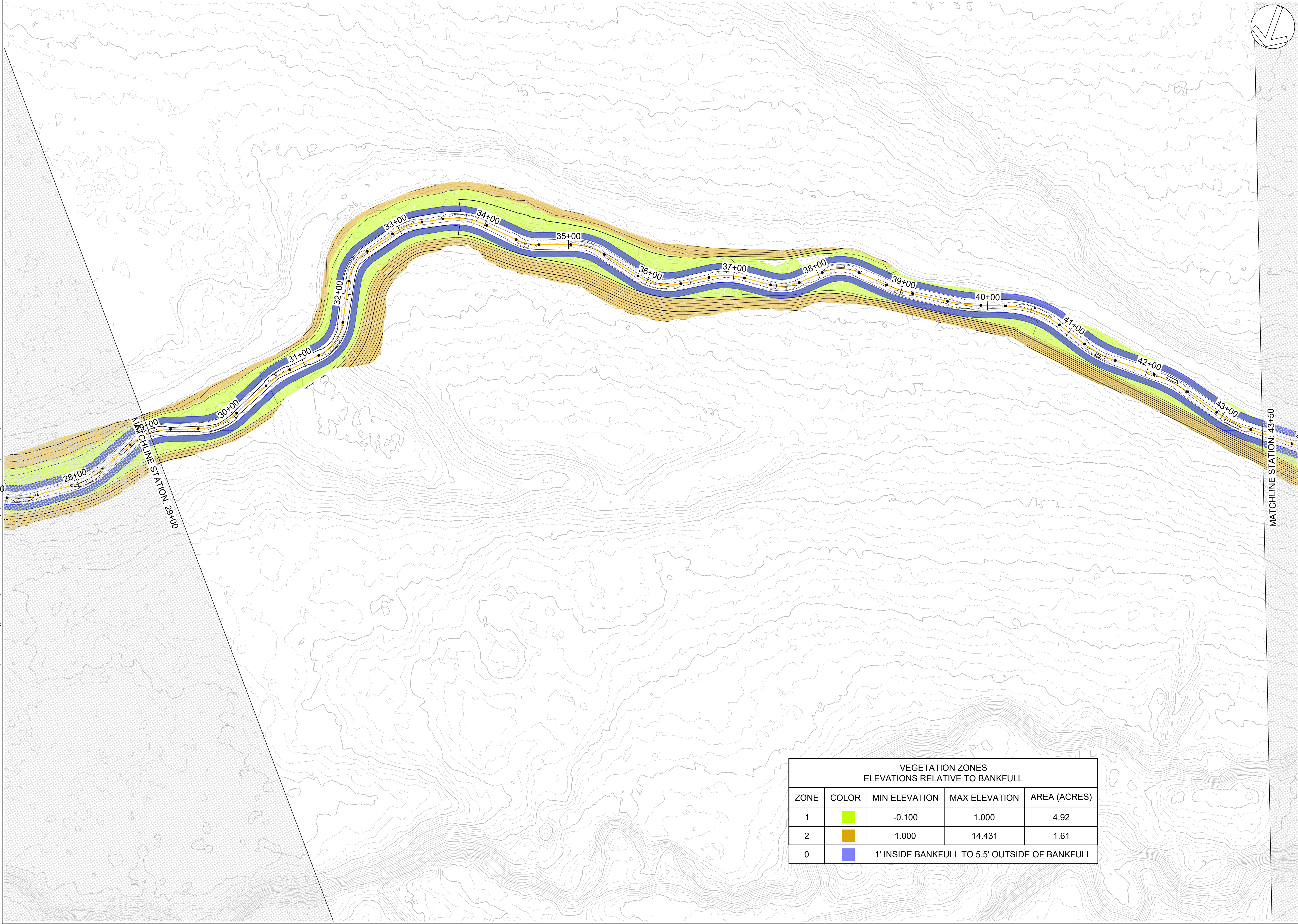
DATE: 10/15/2021
SCALE (34"x22"): 1" = 50'
SCALE (17"x11"): 1" = 100'



SHEET NUMBER
32 OF 50

APPROVED BY: KA	CHECKED BY: MJG	DRAWN BY: GET
REV	DESCRIPTION	APPRV
1	DRAFT 30% DESIGN	KA
2	DRAFT 60%	KA
3	DRAFT 90%	KA
4	BID SET	KA
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX

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VEGETATION ZONES ELEVATIONS RELATIVE TO BANKFULL				
ZONE	COLOR	MIN ELEVATION	MAX ELEVATION	AREA (ACRES)
1	■	-0.100	1.000	4.92
2	■	1.000	14.431	1.61
0	■	1' INSIDE BANKFULL TO 5.5' OUTSIDE OF BANKFULL		

APPROVED BY: KA

CHECKED BY: MUG

DRAWN BY: GET

REV


DESCRIPTION

APPRV


1	DRAFT 30% DESIGN	KA
2	DRAFT 60%	KA
3	DRAFT 90%	KA
4	BID SET	KA
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX

BIG AND LITTLE 39
STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION
LITTLE 39
VEGETAION - (3)
STA 29+00 TO 43+50



NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614



BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

BID SET
NOT FOR
CONSTRUCTION

DATE: 10/15/2021

SCALE (34"x22"): 1" = 50'

SCALE (17"x11"): 1" = 100'

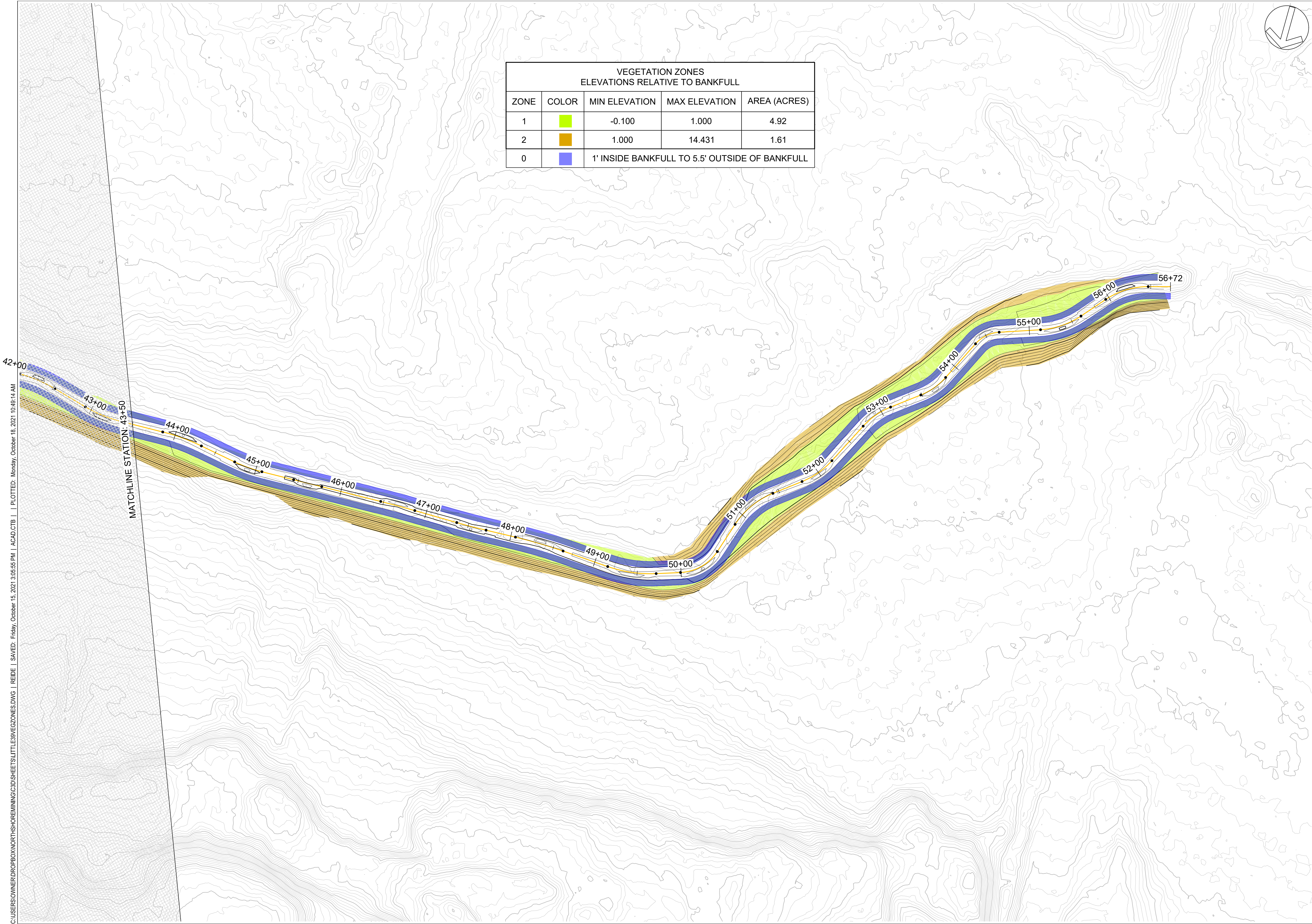
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SCALE IN FEET

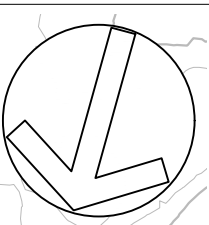
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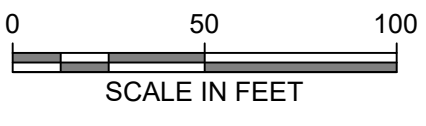
33 OF 50

C:\USERS\OWNER\PROPOX\NORTHSHOREMINING\CD\SHEETS\LITTLE39\VEGETATION\VEGETATION.DWG | REIDE | SAVER: Friday, October 15, 2021 3:05:55 PM | ACAD.CTB | PLOTTED: Monday, October 18, 2021 10:49:14 AM



VEGETATION ZONES ELEVATIONS RELATIVE TO BANKFULL				
ZONE	COLOR	MIN ELEVATION	MAX ELEVATION	AREA (ACRES)
1	Green	-0.100	1.000	4.92
2	Orange	1.000	14.431	1.61
0	Blue	1' INSIDE BANKFULL TO 5.5' OUTSIDE OF BANKFULL		




BIG AND LITTLE 39 STREAM RESTORATION NEAR SILVER BAY LAKE COUNTY, MN	APPROVED BY: KA	REV	CHECKED BY: MUG		DRAWN BY: GET					
			DESCRIPTION							
			1	DRAFT 30% DESIGN						
			2	DRAFT 60%						
			3	DRAFT 90%						
BID SET - NOT FOR CONSTRUCTION LITTLE 39 VEGETATION - (4) STA 43+50 TO 56+72		4	BID SET							
		XX	XX							
		XX	XX							
		XX	XX							
		XX	XX							
 NORTHSHORE MINING CO 10 OUTER DR SILVER BAY, MN 55614										
 BEAVER RIVER CONSULTING, LLC. 5752 EAGLE VIEW DRIVE DULUTH, MN 55803										
BID SET NOT FOR CONSTRUCTION										
DATE: 10/15/2021 SCALE (34"x22"): 1" = 50' SCALE (17"x11"): 1" = 100'										
 SCALE IN FEET										
SHEET NUMBER 34 OF 50										

APPROVED BY: KA	CHECKED BY: MJG	DRAWN BY: GET
REV	DESCRIPTION	APPRV
1	DRAFT 30% DESIGN	KA
2	DRAFT 60%	KA
3	DRAFT 90%	KA
4	BID SET	KA
XX	XX	XX
XX	XX	XX
XX	XX	XX
XX	XX	XX

**STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN**


**BID SET - NOT FOR CONSTRUCTION
LITTLE 39**

OVERLAY - NATIONAL WETLAND INVENTORY



CLIFFS

NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614



BEAVER RIVER CONSULTING


BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

**BID SET
NOT FOR
CONSTRUCTION**

DATE: 10/15/2021

SCALE (34"x22"): 1" = 150'

SCALE (17"x11"): 1" = 300'

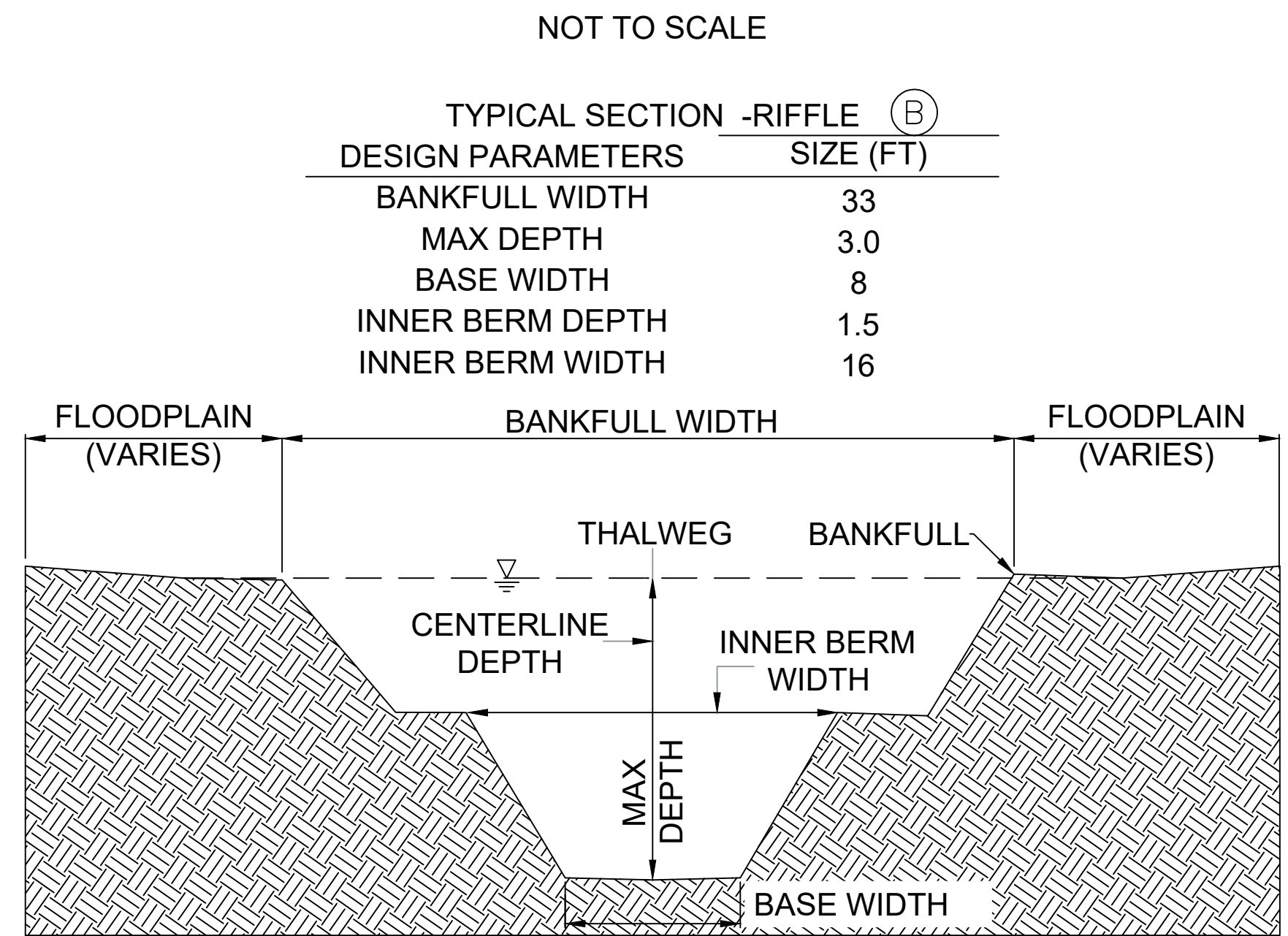
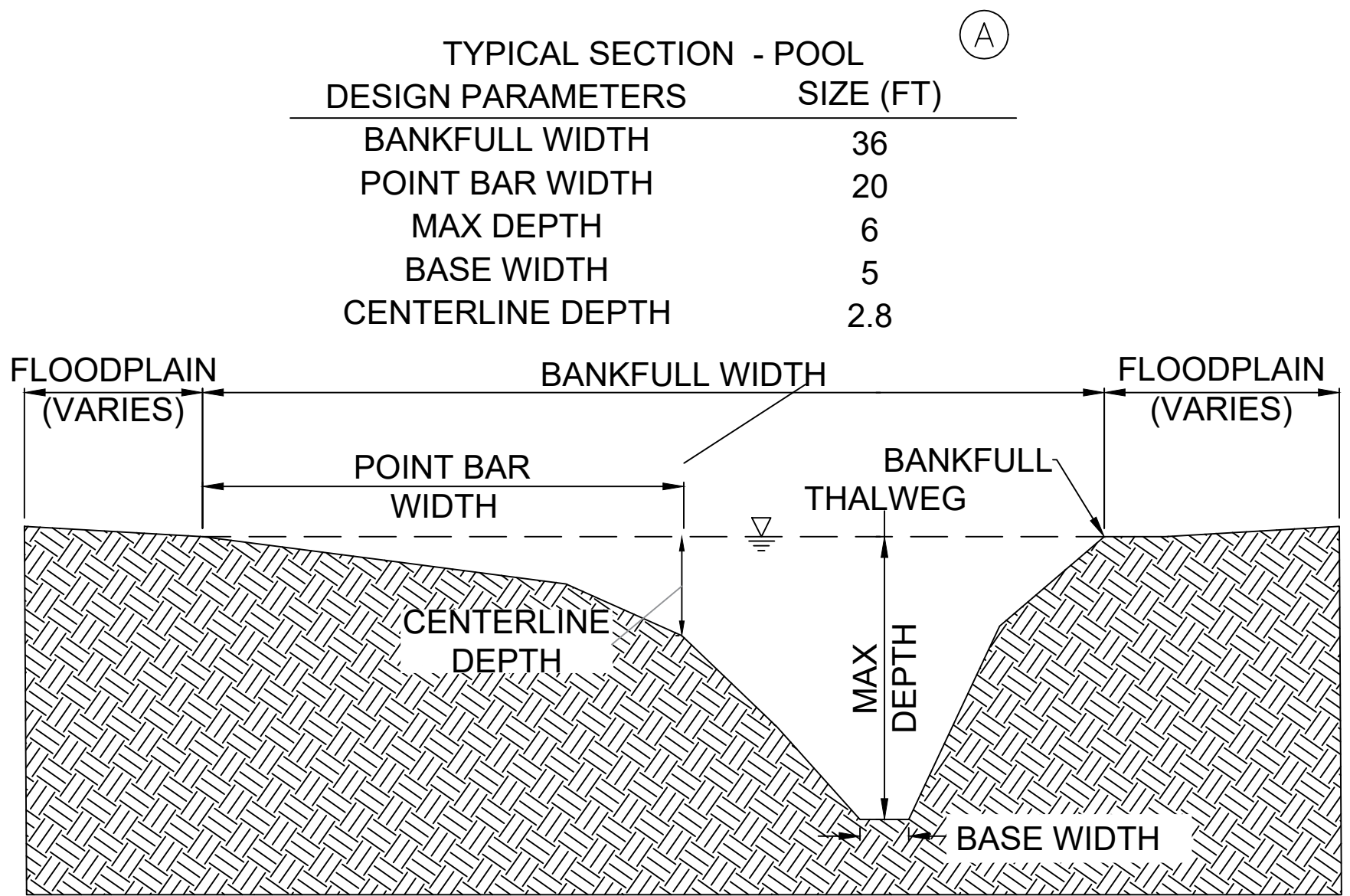


SCALE IN FEET

SHEET NUMBER

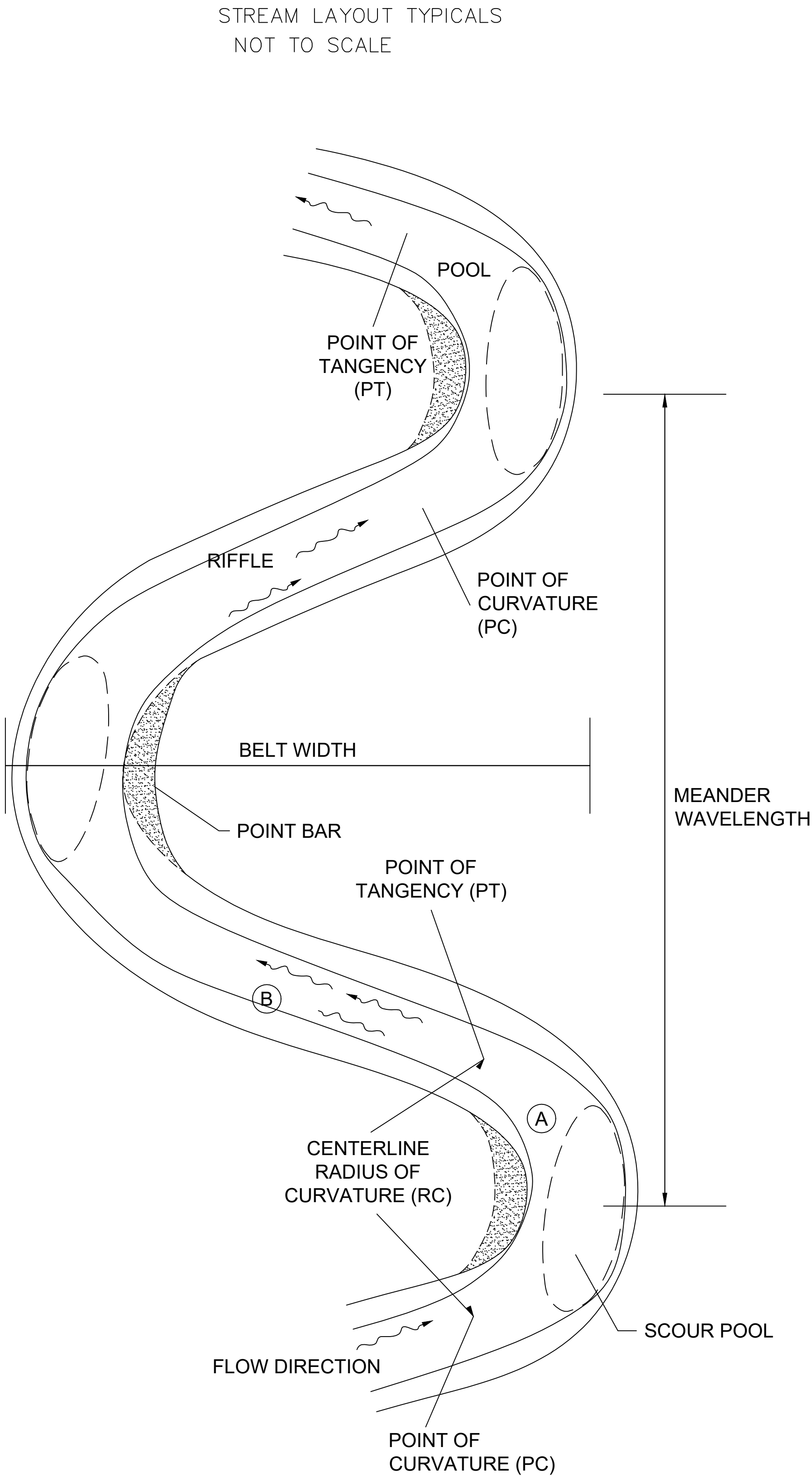
35 OF 50

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NOT TO SCALE


STREAM MORPHOLOGY
STREAM NAME: BIG 39




STREAM NAME	BIG 39		
STREAM TYPE	B4c		
DRAINAGE AREA, DA (SQ MI)	23		
DESIGN PARAMETERS	MINIMUM	MEDIAN	MAXIMUM
MEAN RIFFLE DEPTH, D _{BKF} (FT)		1.8	
RIFFLE WIDTH, W _{BKF} (FT)		33.0	
WIDTH-TO-DEPTH RATIO, [W _{BKF} /D _{BKF}]		18.0	
RIFFLE CROSS-SECTION AREA, A _{BKF} (SQ FT)		60.0	
MAX RIFFLE DEPTH, D _{MAX} (FT)		2.9	
POOL WIDTH, W _{BKFP} (FT)		36.0	
POOL CROSS-SECTION AREA, A _{BKFP} (SQ FT)		80.0	
MAX POOL DEPTH, D _{MAXP} (FT)		6.0	
RIFFLE LENGTH, L _{RIF} (FT)	1.4	3.0	4.3
POOL LENGTH, L _P (FT)	1.5	1.9	2.8
ENTRENCHMENT RATIO, ER [W _{FPA} /W _{BKF}]		2.2	
BELT WIDTH, W _{BLT} (FT)		80.0	
RADIUS OF CURVATURE, RC (FT)	3.0	4.4	9.0
POOL-TO-POOL SPACING, P-P (FT)	3.5		7.0
VALLEY SLOPE, VS (FT/FT)	0.0019		
WATER SURFACE SLOPE, WS (FT/FT)	0.0020		
SINUOSITY, K = SL/VL (FT/FT)	1.0300		

APPROVED BY: KA		CHECKED BY: MUG	DRAWN BY: GET
REV	DESCRIPTION		APPRV
1	DRAFT 30% DESIGN		KA
2	DRAFT 60%		KA
3	DRAFT 90%		KA
4	BID SET		KA
XX	XX		XX
XX	XX		XX
XX	XX		XX
XX	XX		XX
BIG AND LITTLE 39 STREAM RESTORATION NEAR SILVER BAY LAKE COUNTY, MN			
BID SET - NOT FOR CONSTRUCTION BIG 39			

DETAIL - TYPICAL SECTIONS			



NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614



BEAVER
RIVER
CONSULTING

BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

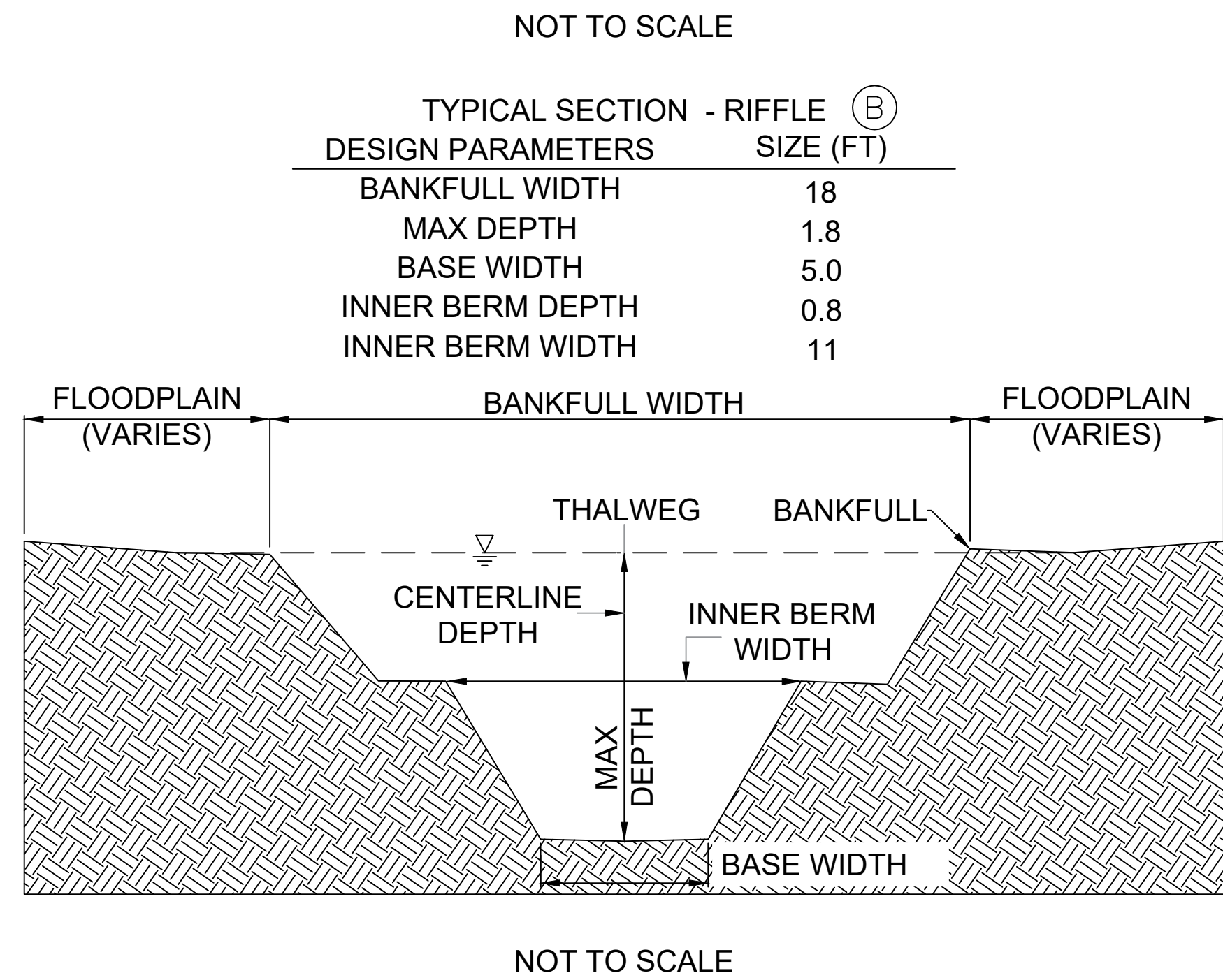
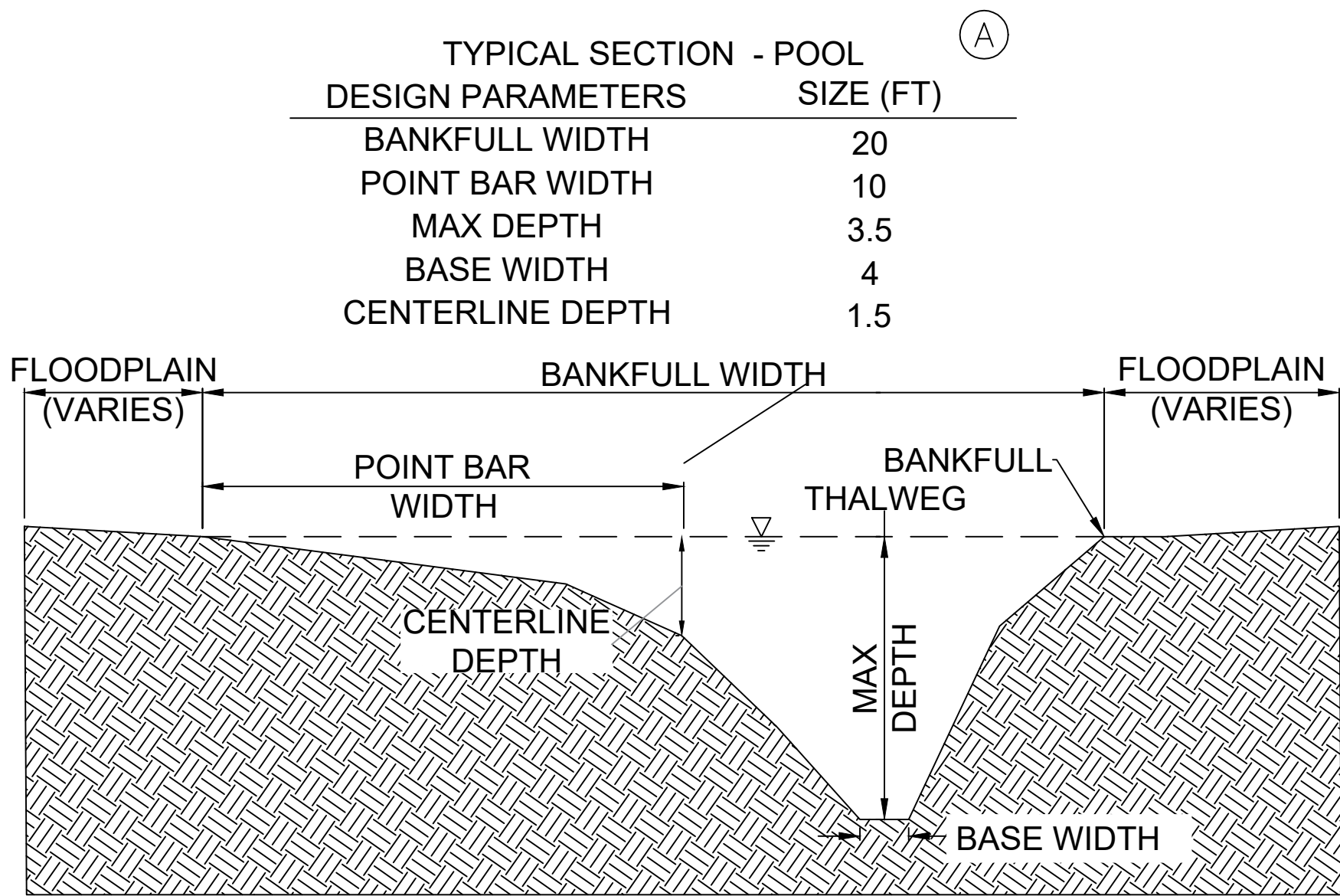
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DATE: 10/15/2021

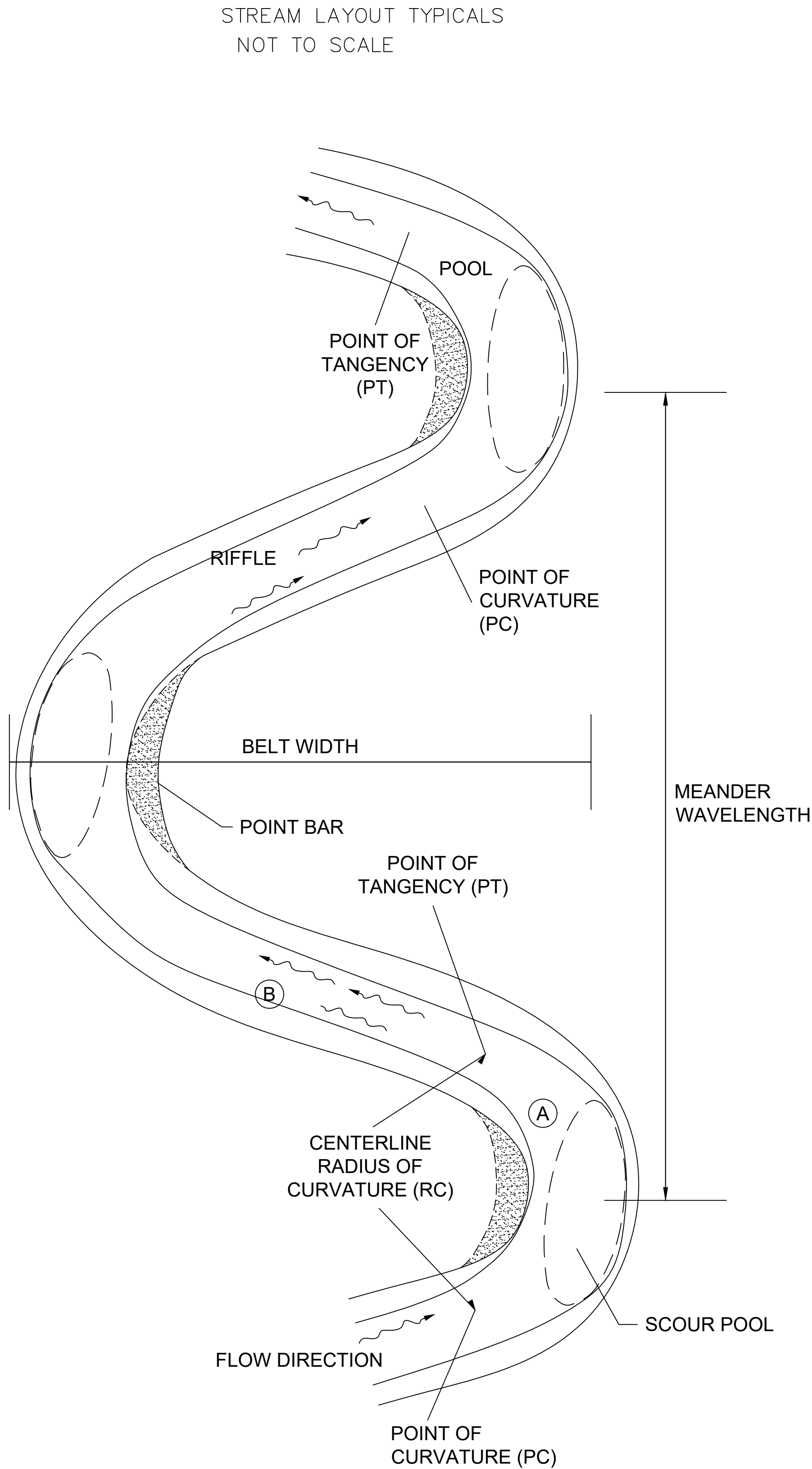
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SHEET NUMBER
36 OF 50

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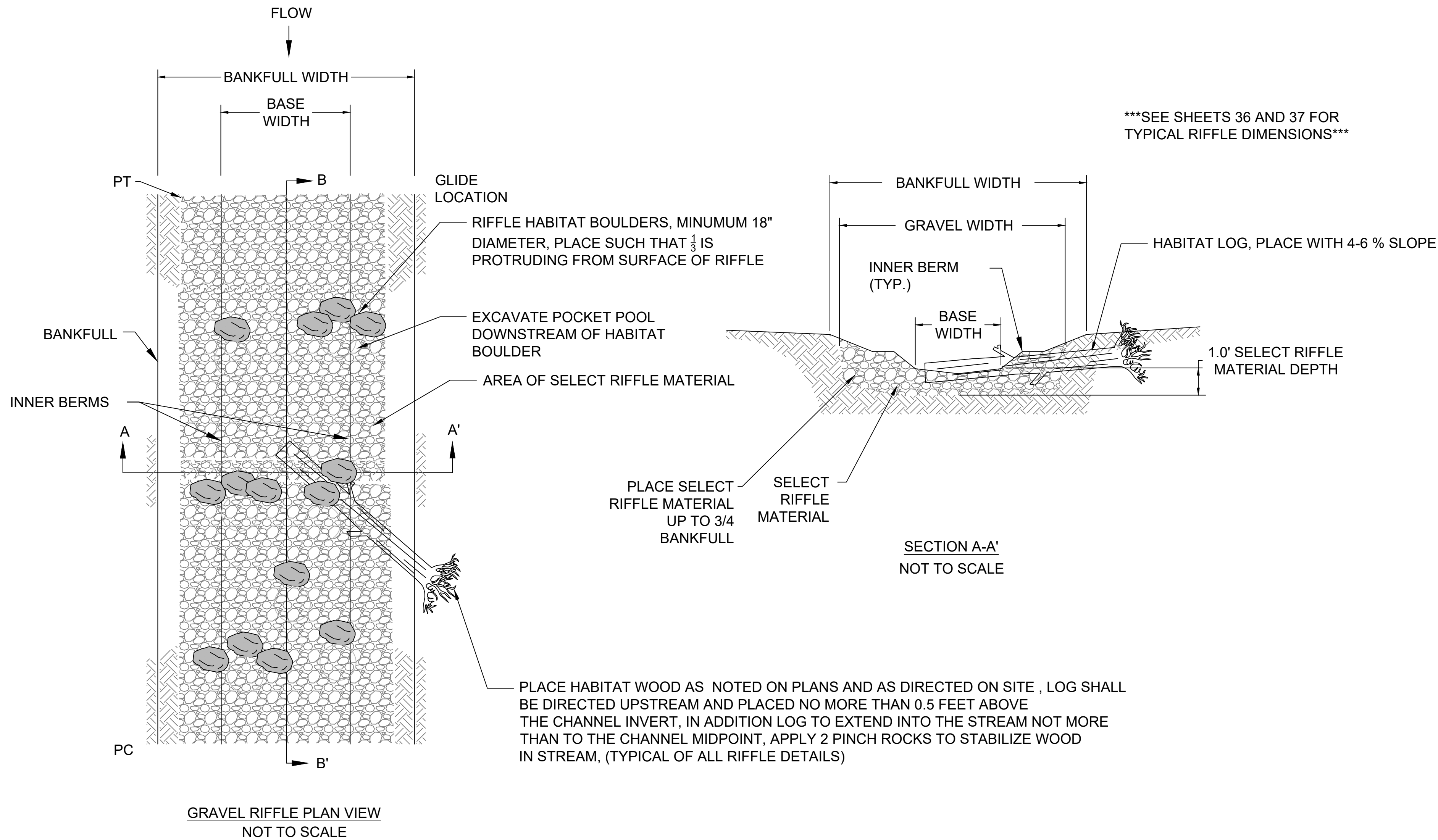
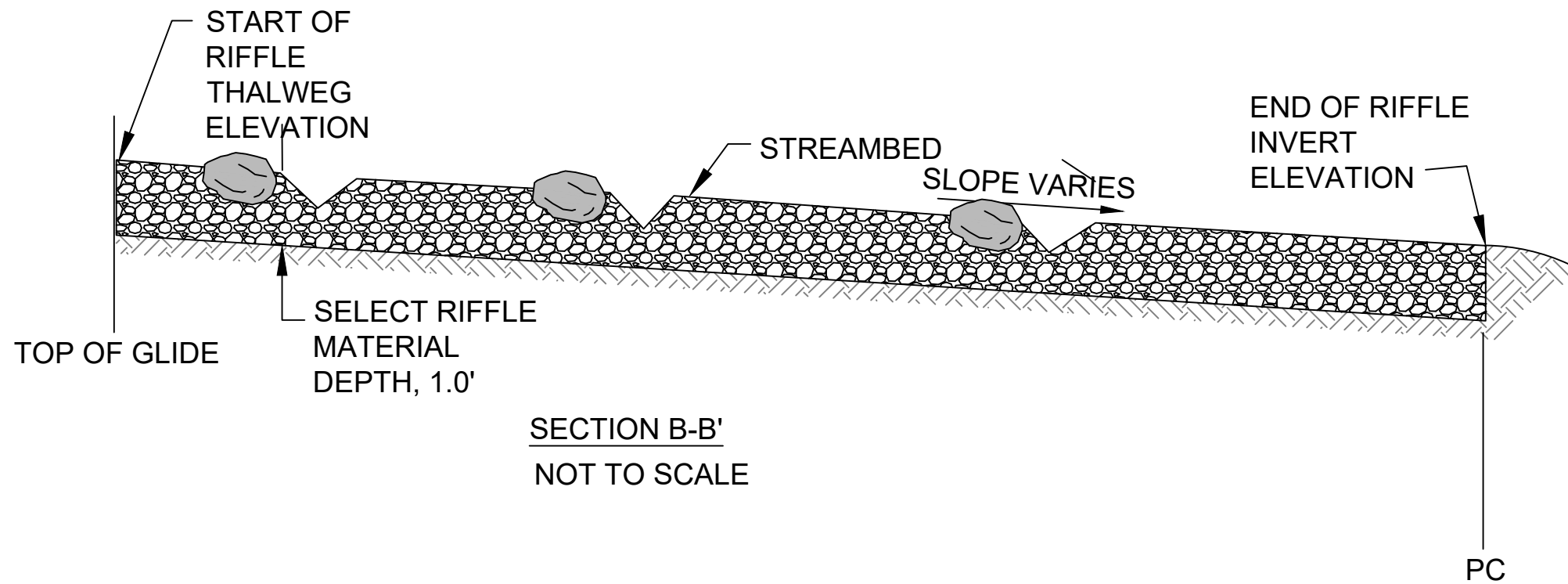
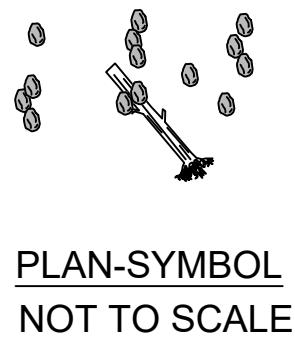
STREAM MORPHOLOGY
STREAM NAME: LITTLE 39



STREAM NAME	LITTLE 39		
STREAM TYPE	B4c		
DRAINAGE AREA, DA (SQ MI)	2		
DESIGN PARAMETERS	MINIMUM	MEDIAN	MAXIMUM
MEAN RIFFLE DEPTH, D_{BKF} (FT)		1.1	
RIFFLE WIDTH, W_{BKF} (FT)		18	
WIDTH-TO-DEPTH RATIO, $[W_{BKF}/D_{BKF}]$		16	
RIFFLE CROSS-SECTION AREA, A_{BKF} (SQ FT)		20	
MAX RIFFLE DEPTH, D_{MAX} (FT)		1.8	
POOL WIDTH, W_{BKFP} (FT)		20	
POOL CROSS-SECTION AREA, A_{BKFP} (SQ FT)		27	
MAX POOL DEPTH, D_{MAXP} (FT)		3.6	
RIFFLE LENGTH, L_{RIF} (FT)	1.7	3	4.7
POOL LENGTH, L_p (FT)	1.3	2.4	3.4
ENTRENCHMENT RATIO, $ER [W_{FPA}/W_{BKF}]$		2	
BELT WIDTH, W_{BLT} (FT)		45	
RADIUS OF CURVATURE, RC (FT)			
POOL-TO-POOL SPACING, P-P (FT)	3.5	5.5	7.7
VALLEY SLOPE, VS (FT/FT)	0.12-093		
WATER SURFACE SLOPE, WS (FT/FT)	varies		
SINUOSITY, $K = SL/VL$ (FT/FT)	1.02		

BIG AND LITTLE 39 STREAM RESTORATION NEAR SILVER BAY LAKE COUNTY, MN	APPROVED BY: KA	CHECKED BY: MJG	DRAWN BY: GET	APPRV
	REV	DESCRIPTION		KA
	1	DRAFT 30% DESIGN		KA
	2	DRAFT 60%		KA
	3	DRAFT 90%		KA
BID SET - NOT FOR CONSTRUCTION LITTLE 39 ----- DETAIL - TYPICAL SECTIONS	4	BID SET		KA
	XX	XX		XX
	XX	XX		XX
	XX	XX		XX
	XX	XX		XX
CLIFFS NORTHSHORE MINING CO 10 OUTER DR SILVER BAY, MN 55614 ----- BEAVER RIVER CONSULTING BEAVER RIVER CONSULTING, LLC. 5752 EAGLE VIEW DRIVE DULUTH, MN 55803 ----- BID SET NOT FOR CONSTRUCTION	DATE: 10/15/2021			
	NOT TO SCALE			
SHEET NUMBER 37 OF 50				

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NOTES:

1. THE GRAVEL AND COBBLE SUBSTRATE USED FOR THIS FEATURE SHOULD BE PREFERENTIALLY HARVESTED FROM THE ARMOR LAYER OF THE EXISTING CHANNEL AND AMENDED OR SORTED AS NOTED BY THE REGION OF THE RIFFLE/GLIDE.
2. SORTING AND SIEVING OF THE HARVESTED RIFFLE SUBSTRATE IS INCIDENTAL TO THE CONSTRUCTION OF THIS STRUCTURE
3. SELECT RIFFLE MATERIAL SHALL HAVE A GRADATION OF 25 % BY VOLUME OF CLASS III RIP RAP, 25 PERCENT BY VOLUME CLASS II RIP RAP, AND 50 PERCENT BY VOLUME HARVESTED IN PLACE STREAM BED MATERIAL.
4. SELECT RIFFLE MATERIAL WILL BE PLACED AT A MINIMUM THICKNESS OF 1.5'.
5. THE SELECT RIFFLE MATERIAL WILL BE PLACED SUCH THAT, IN CROSS-SECTION, ITS LOWEST ELEVATION OCCURS IN THE CENTER OF THE CHANNEL AS PER THE DETAIL.
6. HABITAT BOULDERS SHALL BE PLACED IN THE RIFFLE SUCH THAT NOT MORE THAN 1/3- 1/2 THE DIAMETER OF THE BOULDER PROTRUDES ABOVE THE STREAM BED. AS SHOWN SOME OF THE BOULDERS SHALL BE PLACED IN GROUPINGS OF 3 IN ORDER TO CREATE DOWNSTREAM SCOUR, THE BOULDERS SHALL BE 18-36" IN DIAMETER.
7. SELECT RIFFLE MATERIAL SHALL BE COMPACTED USING TRACK EQUIPMENT SUCH THAT FUTURE SETTLEMENT OF THE MATERIAL IS KEPT TO A MINIMUM.
8. RE-DRESSING OF CHANNEL AND BANKFULL BENCH/FLOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF IN-STREAM STRUCTURES AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.

APPROVED BY: KA	REV	CHECKED BY: MJG	DESCRIPTION	DRAWN BY: GET	APPRV
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	2		DRAFT 60%		KA
	3		DRAFT 90%		KA
	4		BID SET		KA
	XX		XX		XX
	XX		XX		XX
	XX		XX		XX
	XX		XX		XX

BIG AND LITTLE 39


STREAM RESTORATION

NEAR SILVER BAY


LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION

DETAIL - GRAVEL RIFFLE



NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614



BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

BID SET
NOT FOR
CONSTRUCTION

DATE:

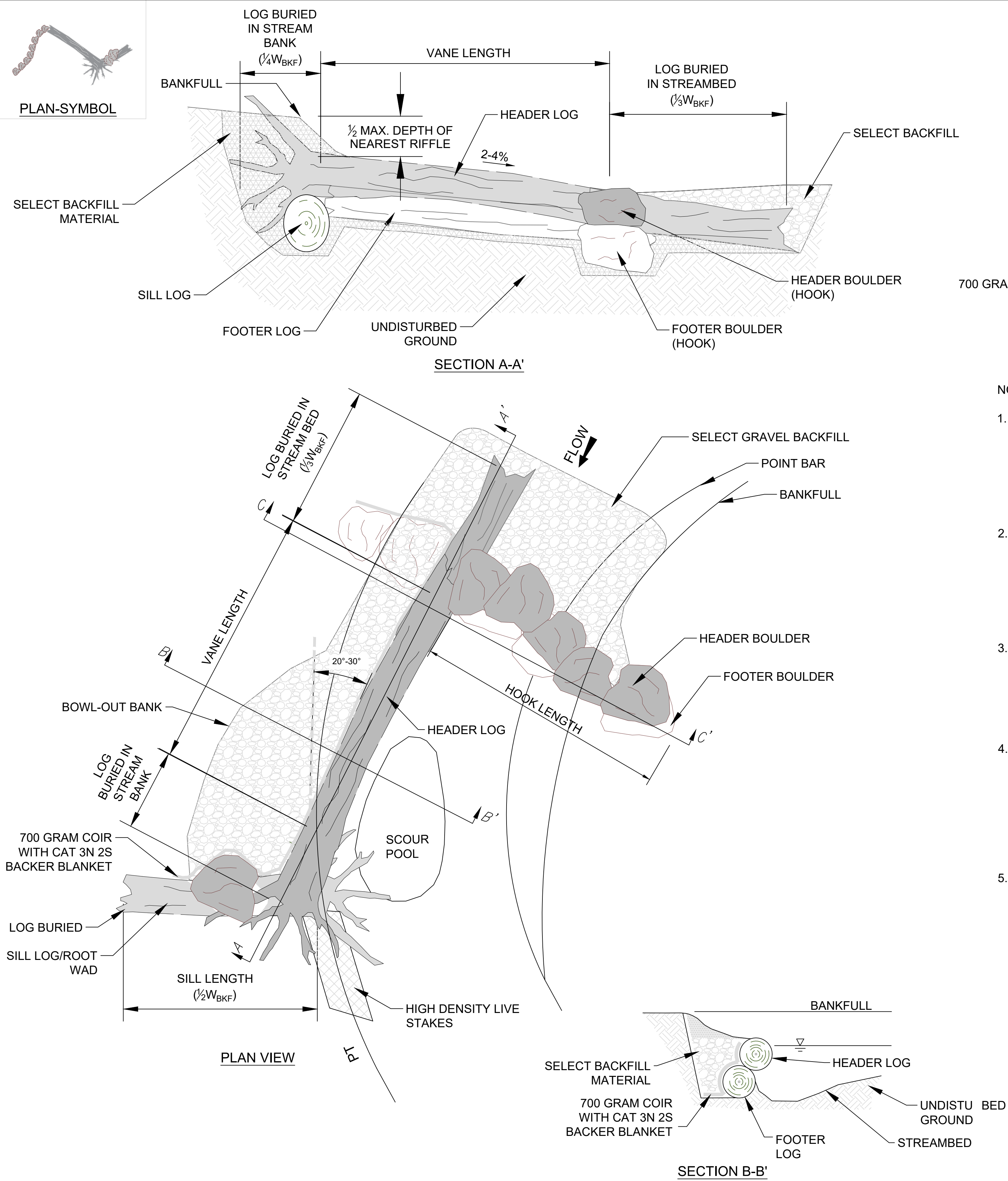
10/15/2021

NOT TO SCALE

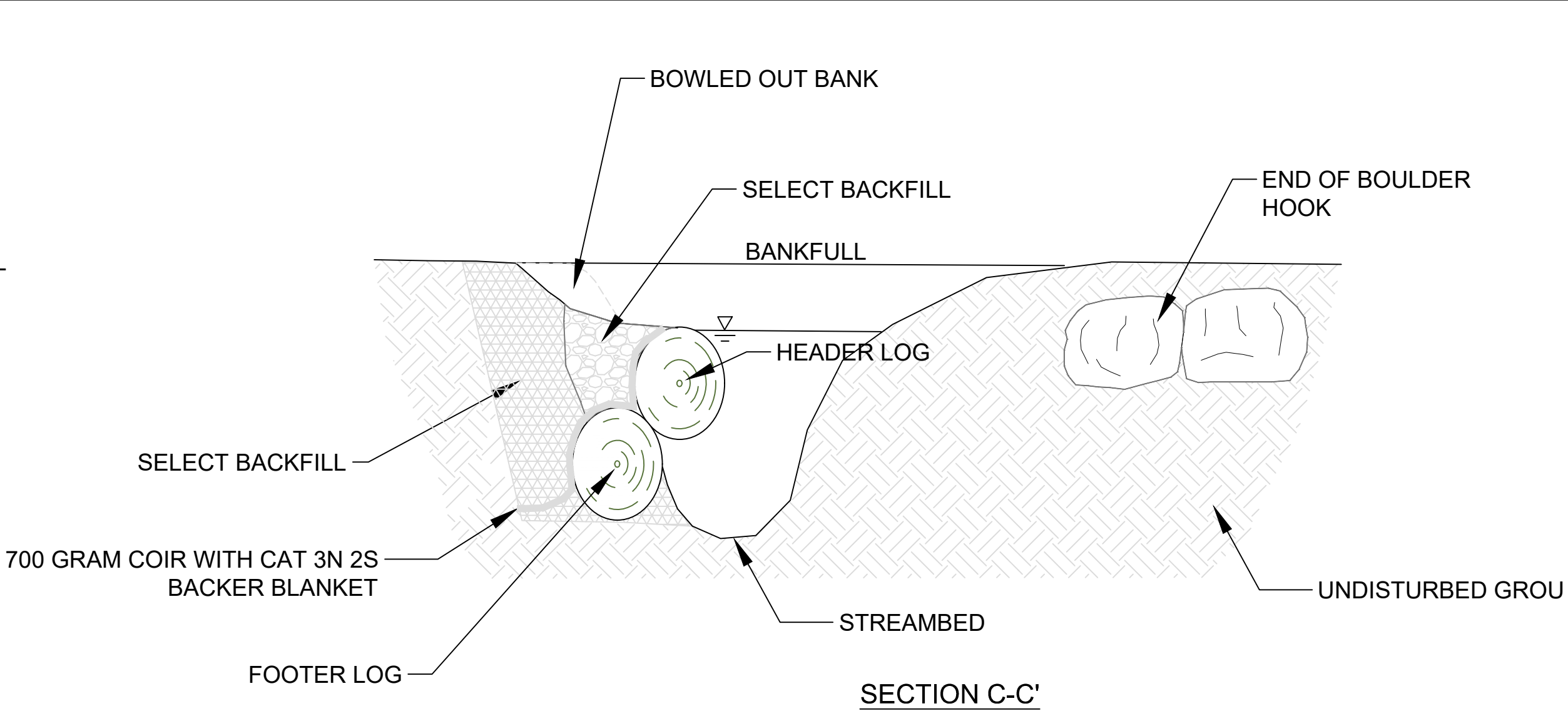
SHEET NUMBER

38 OF 50

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DETAIL - LOG J-HOOK
NOT TO SCALE



NOTES:

- THE LOG J-HOOK WITH ROOT WAD IS USED TO STABILIZE THE OUTSIDE BANK OF A STREAM CHANNEL IN A BEND BY PHYSICALLY PROTECTING THE BANK AND HELPING TURN THE WATER TOWARD THE CENTER OF THE CHANNEL. THE LOG J-HOOK CAN BE USED TO HELP STABILIZE AN EXISTING CHANNEL OR TO PROTECT THE BANK OF A NEWLY CONSTRUCTED CHANNEL.
- THE STRUCTURE IS COMPRISED OF BOTH LOGS AND BOULDERS. LOGS SHALL HAVE A MINIMUM DIAMETER OF 14". THE LENGTH OF THE LOGS WILL BE DETERMINED BY THE SIZE AND SHAPE OF THE CHANNEL. ALL LOGS SHALL BE RELATIVELY STRAIGHT AND LIMBS SHALL BE TRIMMED FLUSH. THE SIZE OF THE BOULDERS VARIES WITH THE SIZE OF THE CHANNEL.
- HEADER LOGS/BOULDERS SHALL BE UNDERLAIN BY FOOTER LOGS/BOULDERS UNLESS OTHERWISE DIRECTED BY THE ENGINEER. FOOTER LOGS PROVIDE SCOUR PROTECTION FOR HEADER LOGS. FOOTER BOULDERS PROVIDE SCOUR PROTECTION AND A FOUNDATION FOR THE HEADER BOULDERS.
- THE SILL LOG WITH ROOT WAD IS GENERALLY INSTALLED FIRST. THE CONTRACTOR SHALL DIG A TRENCH PERPENDICULAR TO THE BANKFULL FLOW DIRECTION AND INSTALL THE SILL LOG. IT MAY BE NECESSARY TO CUT THE SILL LOG ROOTWAD TO PREVENT THE ROOTWAD FROM PROTRUDING ABOVE THE BANKFULL ELEVATION. A BOULDER OR HEADER SILL LOG SHALL BE PLACED ON THE SILL LOG TO EFFECTIVELY EXTEND THE SILL FURTHER INTO THE BANK.
- THE HEADER LOG OF THE VANE ARM IS GENERALLY INSTALLED NEXT. THE CONTRACTOR SHALL DIG A TRENCH TO FACILITATE THE INSTALLATION OF THE VANE ARM. THE HEADER LOG SHALL TIE INTO THE STREAM BANK AT A MINIMUM ELEVATION OF 1/4 DMAX (MEASURED AT THE NEXT DOWNSTREAM RIFFLE) BELOW BANKFULL ELEVATION AND A MINIMUM ELEVATION OF 1/2 DMAX (MEASURED AT THE NEXT DOWNSTREAM RIFFLE) BELOW BANKFULL ELEVATION UNLESS10. OTHERWISE DIRECTED BY THE ENGINEER. THE HEADER LOG SHALL EXTEND FROM THE SILL LOG TO BEYOND THE HOOK PORTION OF THE STRUCTURE, GENERALLY AT A SLOPE OF 2 - 4%. THE VANE ARM FOOTER LOG SHALL BE CUT TO FIT BETWEEN SILL LOG AND THE BOULDER HOOK PORTION OF THE STRUCTURE. THE FOOTER LOG OF THE VANE ARM SHALL BE INSTALLED FROM UPSTREAM SIDE AND INSTALLED AGAINST THE LOWER HALF OF THE HEADER LOG RESULTING IN A STAGGER WITH THE HEADER LOG BEING SLIGHTLY MORE DOWNSTREAM THAN THE FOOTER LOG. ANY GAPS BETWEEN THE HEADER AND FOOTER LOGS WIDER THAN 1" SHALL BE CHINKED WITH BRANCHES AND/OR BRUSH FROM THE UPSTREAM SIDE. WHEN COMPLETE THE FOOTER LOG WILL NOT BE VISIBLE BUT THE HEADER LOG WILL BE VISIBLE DURING LOW FLOWS.
- THE HOOK PORTION OF THE STRUCTURE CONSISTS OF BOULDERS. THE CONTRACTOR SHALL EXCAVATE A TRENCH TO FACILITATE THE INSTALLATION OF A ROW OF FOOTER BOULDERS THAT EXTEND FROM THE END OF THE FOOTER LOG OF THE VANE ARM ACROSS THE CHANNEL TO BEYOND BANKFULL ON THE OTHER SIDE OF THE CHANNEL CREATING A BURIED SILL. THE CONTRACTOR SHALL INSTALL HEADER BOULDERS ON TOP OF THE FOOTER BOULDERS. ALL BOULDERS SHALL BE FIT TIGHTLY TOGETHER AND ANY GAPS WIDER THAN 1" SHALL BE CHINKED WITH GRAVEL AND COBBLE FROM THE UPSTREAM SIDE WITH ROCKS. WHEN COMPLETE THE FOOTER BOULDERS WILL NOT BE VISIBLE BUT THE HEADER BOULDERS WILL BE VISIBLE DURING LOW FLOWS.
- THE LOCATION AND ELEVATION OF THE SILL, VANE ARM AND THE BOULDER HOOK STRUCTURE MAY NOT VARY FROM THOSE SPECIFIED IN THE PLAN SHEETS UNLESS DIRECTED OTHERWISE BY THE ENGINEER. THE FOOTER DEPTH ON ALL STRUCTURES REQUIRING FOOTERS SHALL BE 6 TIMES GREATER THAN THE DROP BETWEEN THE STRUCTURE AND THE FOOTERED STRUCTURE DIRECTLY DOWNSTREAM.
- ON THE UPSTREAM SIDE OF THE LOGS AND BOULDERS 700 GRAM COIR WITH CAT 3N 2S BACKER BLANKET SHALL BE PLACED AS SHOWN IN THE DETAIL PLANVIEW DRAWING. THE BACKER BLANKET SHALL BE NAILED TO UPSTREAM SIDE OF THE HEADER LOGS USING 3" 10D GALVANIZED COMMON NAILS ON 12" SPACING. THE BACKER BLANKET SHALL BE CAREFULLY PLACED AGAINST THE UPSTREAM SIDE OF THE BOULDERS AND HELD IN PLACE BY BACKFILL MATERIAL.
- THE EXCAVATED AREAS UPSTREAM OF THE SILL, VANE ARM AND BOULDER HOOK SHOULD BE FILLED WITH SELECT BACKFILL MATERIAL AS SPECIFIED AND APPROVED BY THE ENGINEER. THE SELECT BACKFILL AND SOIL BACKFILL MATERIAL SHALL BE OVER COMPACTED USING EQUIPMENT SO THAT FUTURE SETTLEMENT IS KEPT TO A MINIMUM. THE STEAMBANK SHOULD BE BOWLED OUT BEHIND THE VANE ARM AT THE DOWNSTREAM END OF THE VANE ARM.
- THE SURFACE OF THIS STRUCTURE SHALL BE FINISHED TO A SMOOTH AND COMPACT SURFACE IN ACCORDANCE WITH THE LINES, GRADES, AND CROSS-SECTIONS OR ELEVATIONS SHOWN ON THE DRAWINGS. THE DEGREE OF FINISH FOR ELEVATIONS SHALL BE WITHIN 0.1' OF THE GRADES AND ELEVATIONS INDICATED. DRESSING OF THE CHANNEL, BANKFULL BENCH AND FLOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF THIS STRUCTURE AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.

APPROVED BY: KA		CHECKED BY: MJG	DRAWN BY: GET	APPRV	REV	DESCRIPTION
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BID SET - NOT FOR CONSTRUCTION

DETAIL - LOG J-HOOK



NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614



BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

BID SET
NOT FOR
CONSTRUCTION

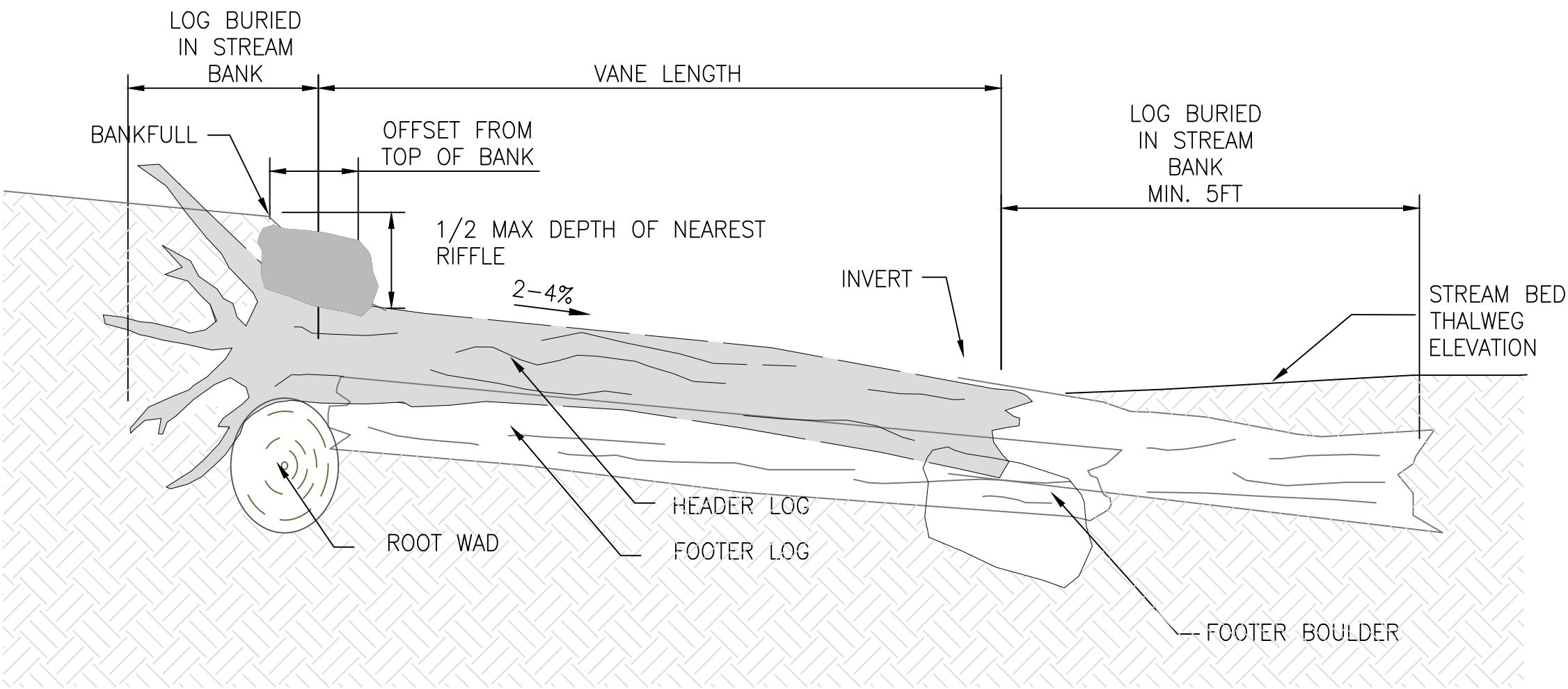
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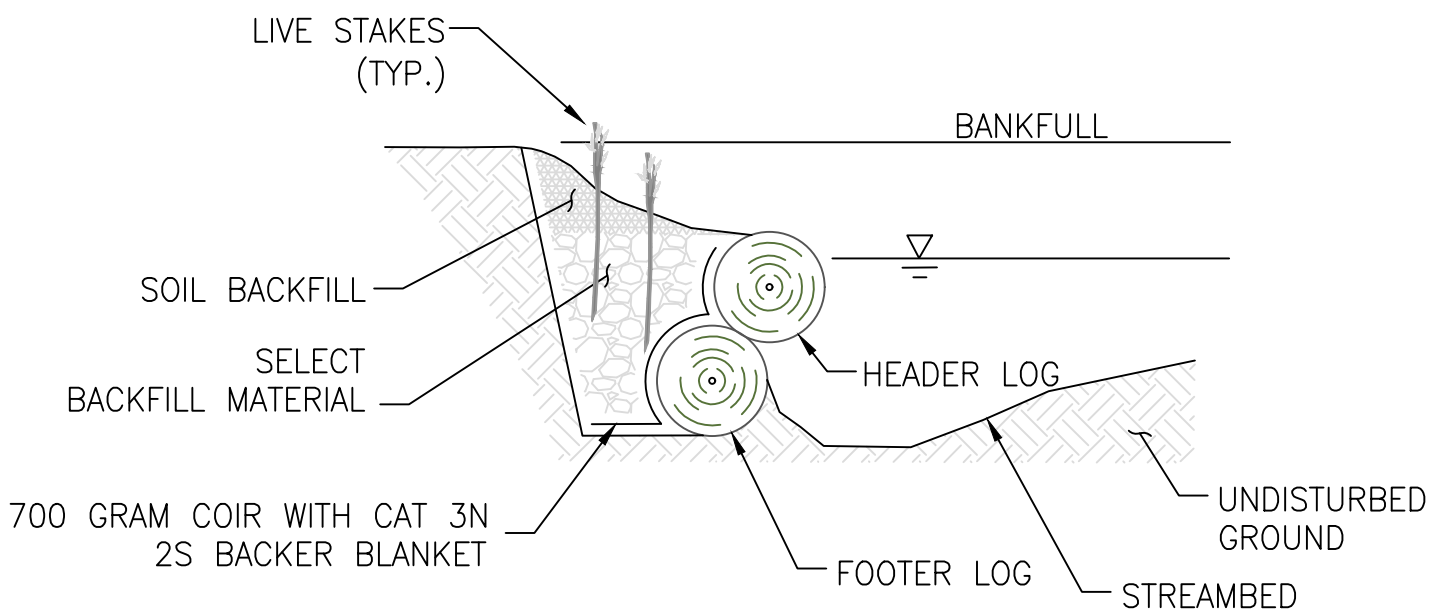
SHEET NUMBER
39 OF 50



PLAN-SYMBOL



SECTION A-A'



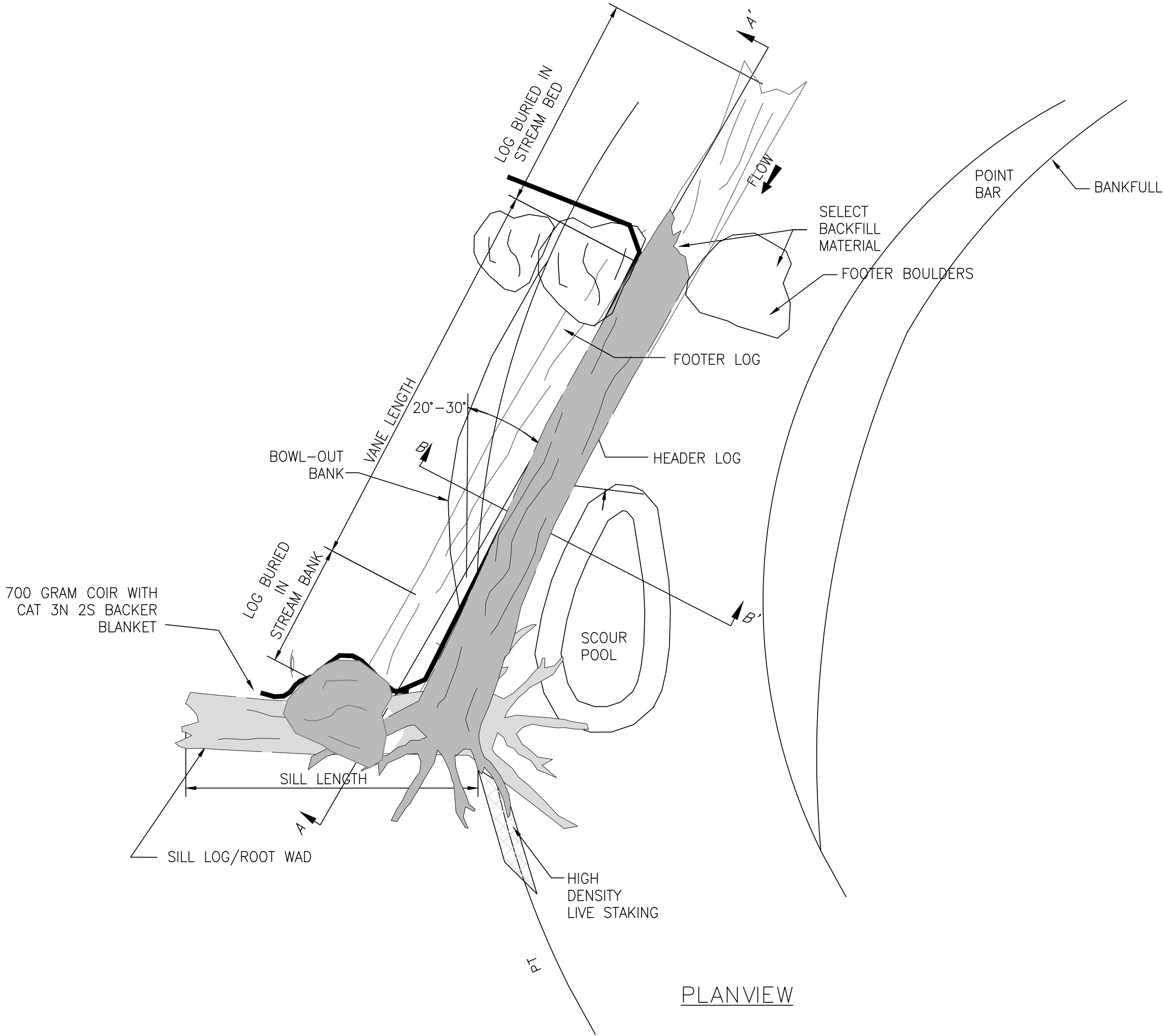
SECTION
B-B'

NOTE:

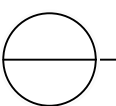
THE DEPARTURE ANGLE SHOWN ABOVE IS DEPICTED IN SUCH A WAY TO EMPHASIZE DETAIL. ACTUAL DEPARTURE ANGLE AND STRUCTURE LOCATION SHALL BE AS SHOWN ON THE PLAN AND PROFILE SHEETS AND WILL BE PROVIDED TO THE CONTRACTOR AS A 2004 FORMAT DWG FILE AND LN3 FILE.

NOTES:



1. LOGS SHALL HAVE MINIMUM DIAMETER OF 14" AND MINIMUM LENGTH OF 25 FEET.
2. ALL LOGS SHALL BE RELATIVELY STRAIGHT AND LIMBS SHALL BE TRIMMED FLUSH.
3. FOOTER LOGS/BOULDERS ARE LOGS/BOULDERS PLACED TO PROVIDE A FOUNDATION AND SCOUR PROTECTION FOR THE HEADER LOGS/BOULDERS.
4. HEADER LOGS/BOULDERS SHALL BE UNDERLAIN BY FOOTER LOGS/BOULDERS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
5. HEADER LOGS ARE THE TOP MOST LOGS USED IN EACH LOG STRUCTURE. ALL HEADER LOGS CAN BE SEEN PROTRUDING FROM THE WATER SURFACE DURING EXTREMELY LOW FLOWS.
6. HEADER LOGS SHALL BE OFFSET SLIGHTLY DOWNSTREAM OF THE FOOTING LOGS WHERE SCOUR POOLS ARE ANTICIPATED TO FORM AS SHOWN IN THE DETAIL.
7. SILL LOGS SHALL BE PLACED PERPENDICULAR TO THE BANKFULL FLOW DIRECTION.
8. THE FOOTER LOGS SHALL EXTEND FROM THE SILL LOG TO THE END OF THE HEADER LOG TOWARD THE BANK.
9. HOOK BOULDERS SHALL EXTEND FROM THE HEADER LOG TO BEYOND BANKFULL WIDTH.
10. SET INVERTS AT ELEVATION SHOWN ON THE PLAN AND PROFILE SHEETS. INVERTS AND ELEVATIONS WILL BE PROVIDED TO THE CONTRACTOR AS A 2004 FORMAT DWG FILE AND LN3 FILE. NO ELEVATIONS OF THE LOG DROPS STRUCTURE MAY VARY FROM THE PLAN LOCATIONS WITHOUT DIRECTIONS FROM ENGINEER.
11. HEADER LOG SHALL TIE INTO THE STREAM BANK AT A MAXIMUM ELEVATION OF 1/4 DMAX (MEASURED AT THE NEXT DOWNSTREAM RIFFLE) BELOW BANKFULL ELEVATION AND A MINIMUM ELEVATION OF 1/2 DMAX (MEASURED AT THE NEXT DOWNSTREAM RIFFLE) BELOW BANKFULL ELEVATION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
12. CUTTING OF THE SILL LOG ROOTWAD MAY BE REQUIRED TO PREVENT THE ROOTWAD FROM PROTRUDING ABOVE THE BANKFULL ELEVATION.
13. SHALL BE CHINKED WITH LIMBS AND/OR BRUSH ON THE UPSTREAM SIDE PRIOR TO PLACEMENT OF THE 700 GRAM COIR WITH CAT 3N 2S BACKER BLANKET.
14. ALL GAPS/VOIDS LARGER THAN 1 INCH BETWEEN THE HEADER AND FOOTING BOULDERS SHALL BE CHINKED WITH GRAVEL AND COBBLES.
15. ON THE STREAMBANK SIDE OF THE LOG AND/OR BOULDERS BACKER BLANKET SHALL BE PLACED AS SHOWN FOR THE ENTIRE LENGTH OF THE LOG.
16. SELECT BACKFILL AND SOIL BACKFILL MATERIAL SHALL BE COMPACTED SUCH THAT FUTURE SETTLEMENT OF THE MATERIAL IS KEPT TO A MINIMUM.
17. NAIL BACKER BLANKET TO EDGE OF HEADER LOG AND BACKFILL AS SHOWN IN THE PLANVIEW DETAIL.
18. THE SURFACE OF THIS STRUCTURE SHALL BE FINISHED TO A SMOOTH AND COMPACT SURFACE IN ACCORDANCE WITH THE LINES, GRADES, AND CROSS-SECTIONS OR ELEVATIONS SHOWN ON THE DRAWINGS. THE DEGREE OF FINISH FOR INVERT ELEVATIONS SHALL BE WITHIN 0.1 FT OF THE GRADES AND ELEVATIONS INDICATED.
19. RE-DRESSING OF CHANNEL AND BANKFULL BENCH/FLOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF IN-STREAM STRUCTURES AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.
20. SEE THE PLANTING DETAIL FOR HIGH DENSITY LIVE STAKING.
21. NO LIVE STAKES SHALL BE INSTALLED ON THE UPSTREAM SIDE OF THE LOG VANE AT OR BELOW THE TIE-IN ELEVATION OF THE HEADER LOG WITH THE STREAM BANK UNLESS OTHERWISE DIRECTED BY THE ENGINEER.



PLAN VIEW



DETAIL — LOG VANE
NOT TO SCALE

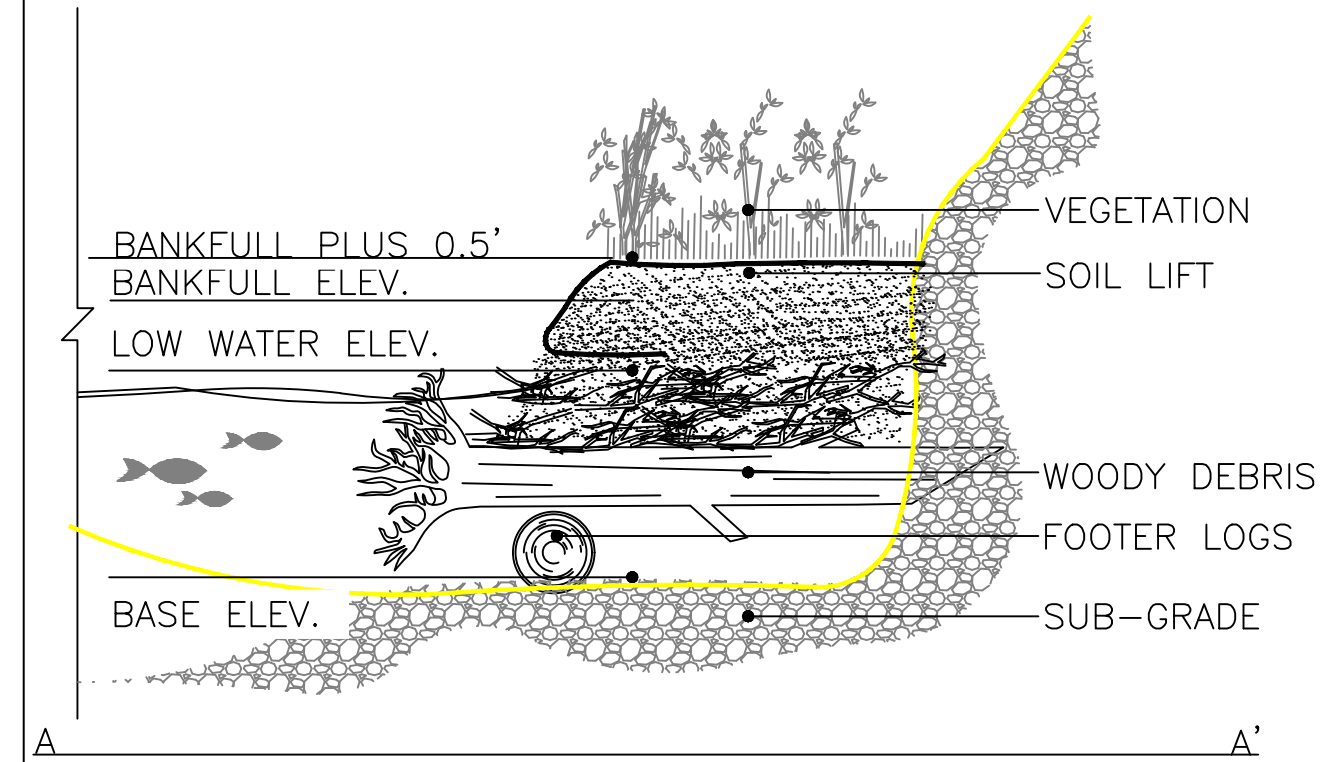
<p>BIG AND LITTLE 39 STREAM RESTORATION NEAR SILVER BAY LAKE COUNTY, MN</p>	APPROVED BY: KA	CHECKED BY: NJG	DRAWN BY: GET
	REV	DESCRIPTION	APPROV
	1	DRAFT 30% DESIGN	KA
	2	DRAFT 60%	KA
	3	DRAFT 90%	KA
	4	BID SET	KA
	XX	XX	XX
	XX	XX	XX
	XX	XX	XX
	XX	XX	XX
<p>BID SET - NOT FOR CONSTRUCTION</p> <p>-----</p> <p>-----</p> <p>DETAIL - LOG VANE</p>			
<div>  <p>CLIFFS</p> <p>NORTHSHORE MINING CO 10 OUTER DR SILVER BAY, MN 55614</p> <p>----</p> <div>  <p>BEAVER RIVER CONSULTING</p> </div> <p>BEAVER RIVER CONSULTING, LLC. 5752 EAGLE VIEW DRIVE DULUTH, MN 55803</p> <p>----</p> </div>			
<p>BID SET NOT FOR CONSTRUCTION</p>			
<p>DATE: 10/15/2021</p>			
<p>NOT TO SCALE</p>			
<p>SHEET NUMBER 40 OF 50</p>			

1. INSTALLATION SUMMARY

TOEWOOD BENCH CONSTRUCTION WILL BE DONE IN DRY WEATHER
CONDITIONS AFTER STREAM HAS BEEN DIVERTED AND SITE DEWATERED.

ENGINEER OR SWCD REPRESENTATIVE MUST BE PRESENT FOR INSTALLATION OF TOEWOOD BENCH.

THE DRAWINGS ON THIS PAGE ARE NOT TO SCALE.



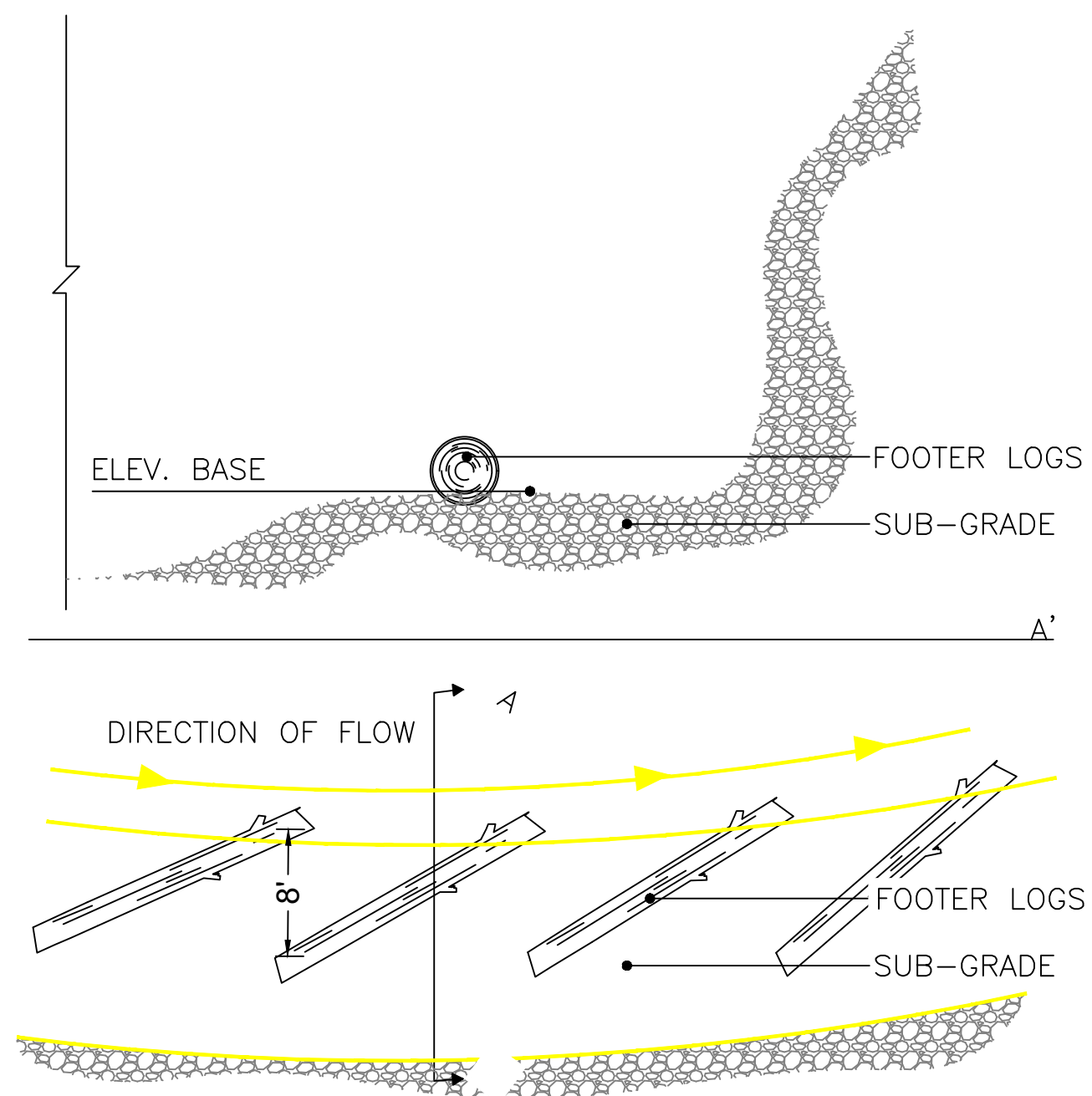
2. SUBGRADE AND FOOTER LOGS

SPECIFICATION:

- 10" MIN. DIAMETER
- LIMBS REMOVED
- 10' MIN. LENGTH

PLACEMENT:

- EXCAVATE TO BASE ELEVATION
- SPACE FOOTER LOGS ENDS X' APART, PERPENDICULAR TO STREAM



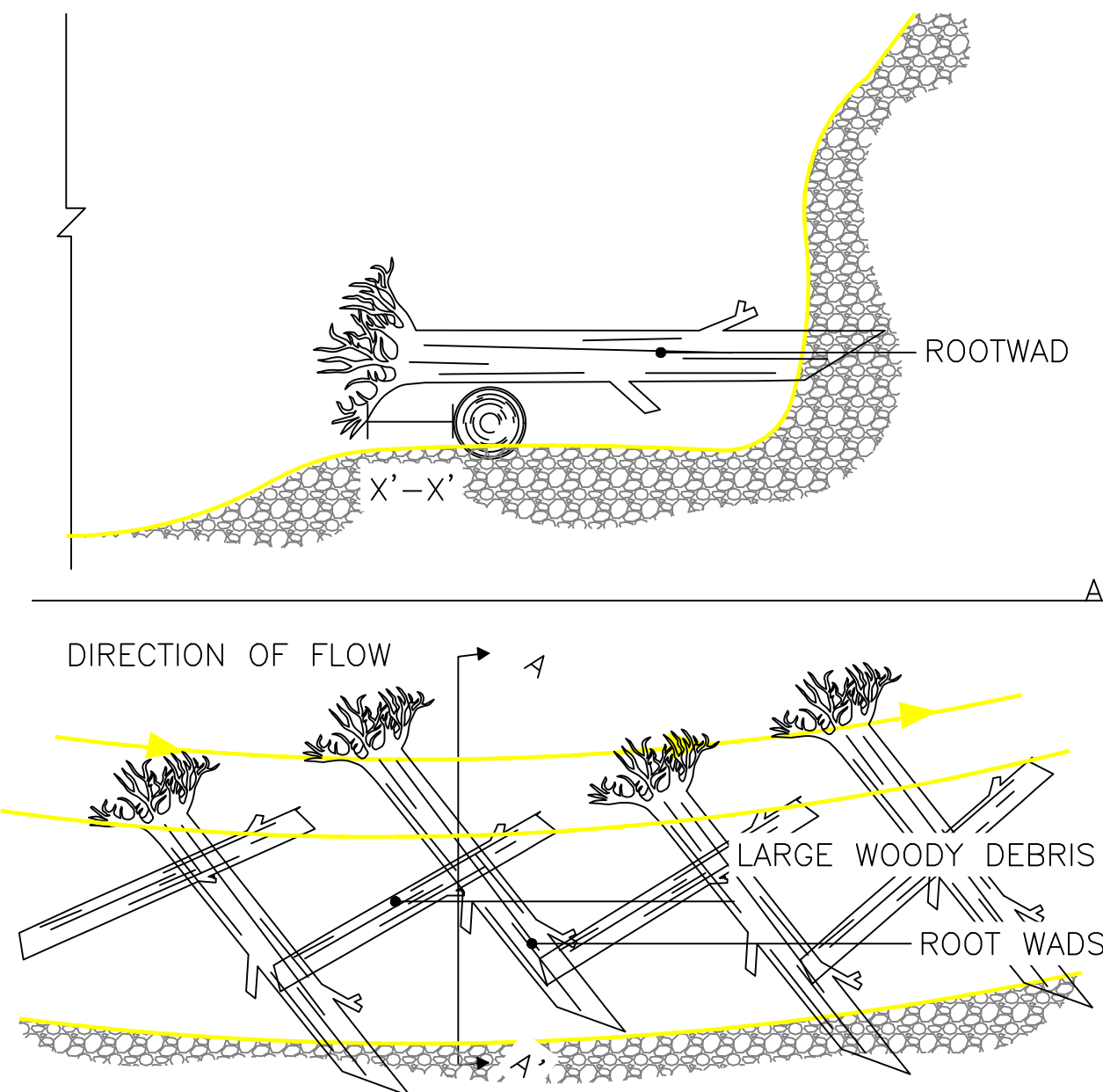
3. ROOTWAD PLACEMENT

ROOTWAD SPECIFICATION:

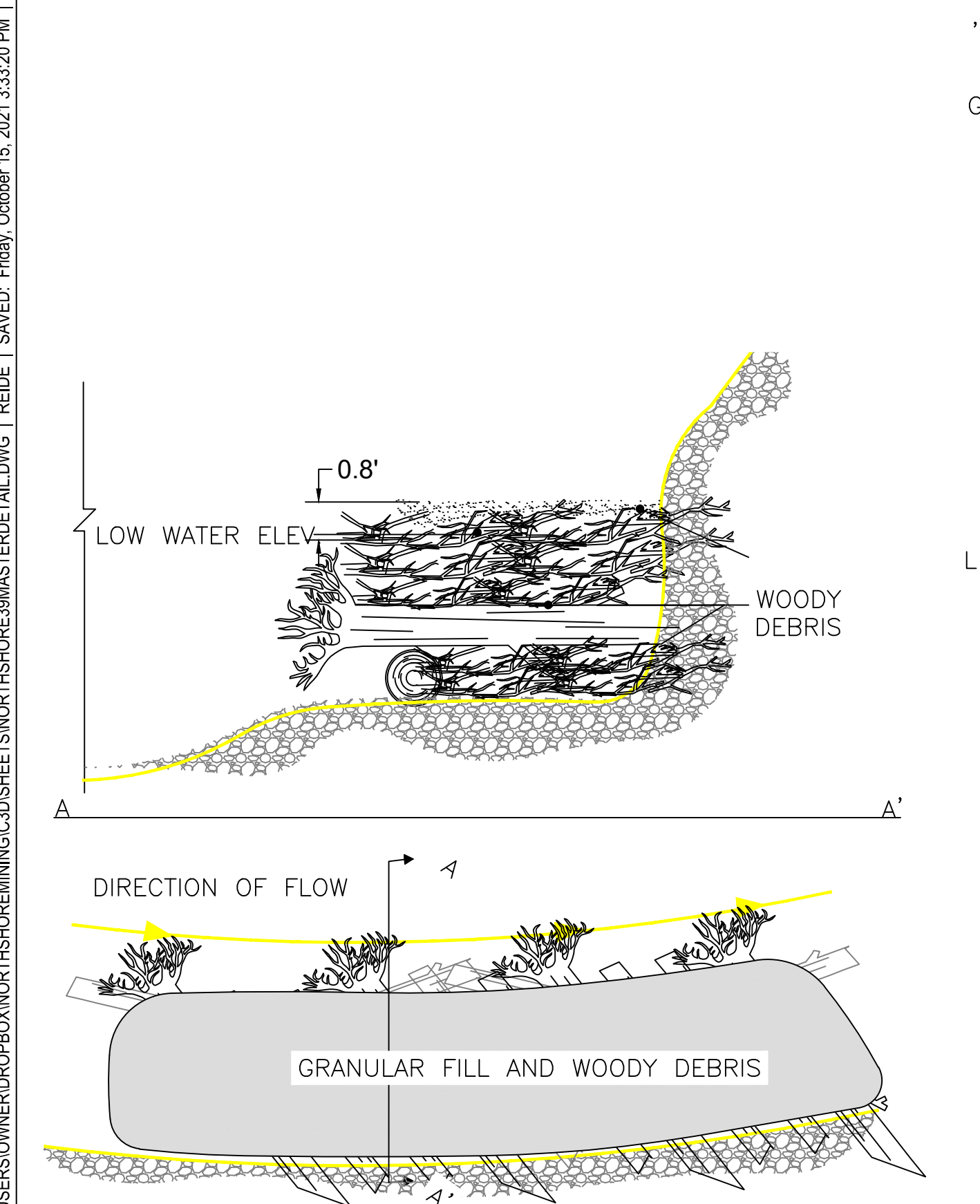
- 12" MIN DIAMETER, PROVIDED BY CLIFFS LOCATED IN STAGING AREA
- LOG LENGTH OF 10' MINIMUM
- LIMBS SHALL BE REMOVED
- ROOT WADS SHALL BE LEFT INTACT

PLACEMENT:

- PLACE ROOTWADS ON TOP OF FOOTER LOGS AS SHOWN, OVERHANG ROOT WAD LOGS 2'-5', VARY AS SHOWN SUCH THAT EVERY OTHER ROOT WAD IS PROTRUDING INTO STREAM 4-6 FEET FROM BANKFULL FEET
- ANGLE ROOTWADS UPSTREAM AS DIRECTED IN FIELD
- PLACE 1 ROOT WAD PER FOOTER LOG



4. WOODY DEBRIS PLACEMENT



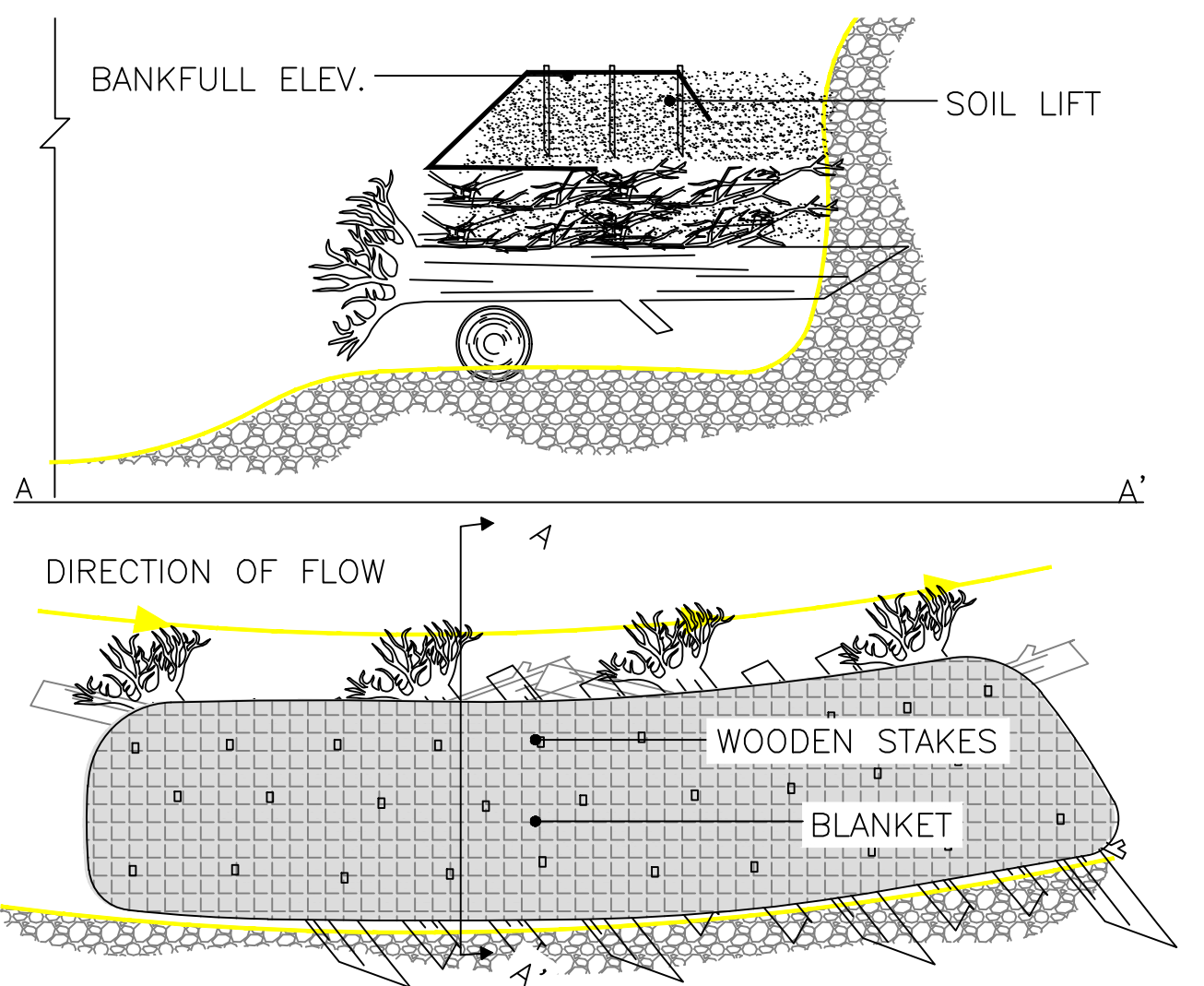
5. SOIL LIFT

MATERIAL SPECIFICATION:

- BLANKET SHALL BE: 9.8' WIDE ROLANKA BIOD-MAT 70, GEOCOIR 700, OR EQUAL BACKED WITH EROSION CONTROL BLANKET WITH NATURAL NETTING
- WOODEN STAKES: 18" WOODEN STAKES (2X4 CUT AT ANGLE OR EQUAL), PLACED AT MANUFACTURERS RECOMMENDED SPACING (3' MIN. TYP.) ALONG BLANKET.

PLACEMENT:

- LAY BLANKET ON TOP OF SOIL A MINIMUM OF 3 FEET BACK FROM FACE OF WOOD, ON TOP OF BENCH ENSURE THAT COIR BLANKET IS A MINIMUM OF 3 FEET BACK FROM TOP OF BENCH
- PLACE FILL ON TOP OF BLANKET SLOPE AT 2:1 (H:V).
- BEFORE WRAPPING UP BLANKET, SEED ALL AREAS ABOVE LOW FLOW ELEVATION WITH ZONE 1 SEED MIX.
- BUCKET COMPACT UNTIL BANKFULL PLUS 0.5' ELEVATION IS MET, GRADE TOP OF BENCH 2% TO EXISTING GROUND .
- TRENCH COCONUT BLANKET INTO GROUND 0.5' ALONG OUTSIDE OF BEND.




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2	DRAFT 60%	KA	
3	DRAFT 90%	KA	
4	BID SET	KA	
XX	XX	XX	
XX	XX	XX	
XX	XX	XX	
XX	XX	XX	

**BIG AND LITTLE 39
STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN**


BID SET - NOT FOR CONSTRUCTION

DETAIL - TOE WOOD



CLIFFS

NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614



**BEAVER
RIVER
CONSULTING**

BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

**BID SET
NOT FOR
CONSTRUCTION**

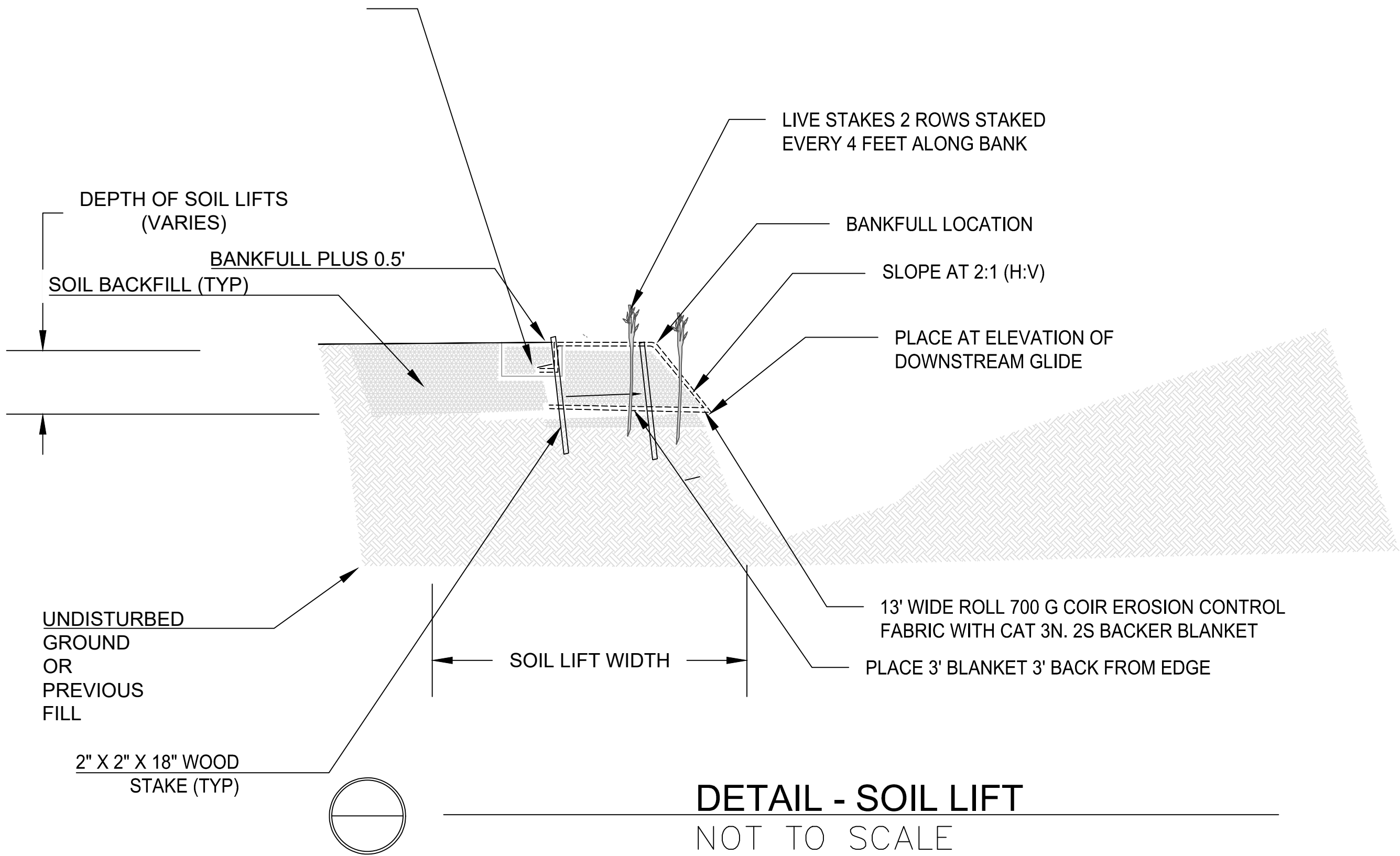
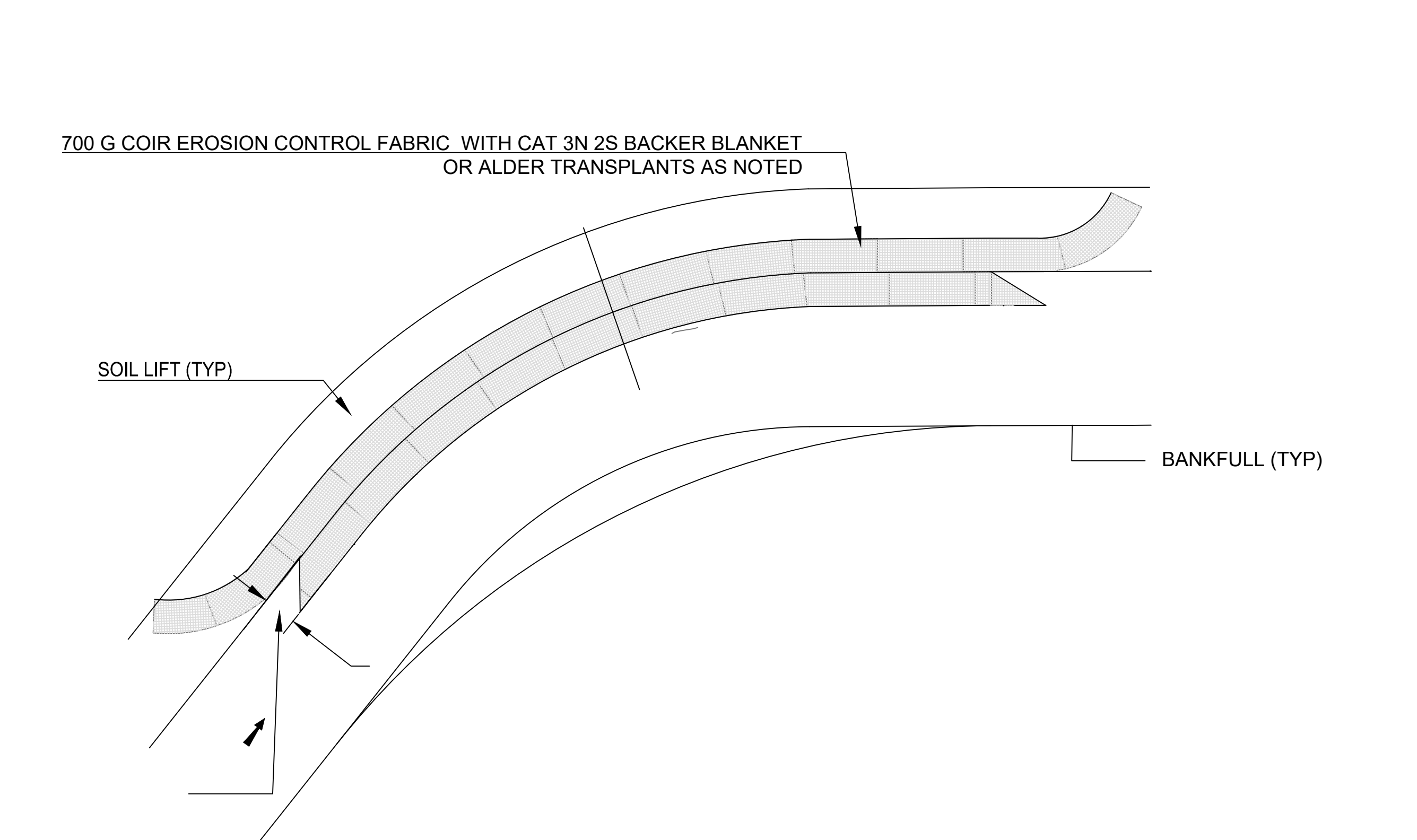
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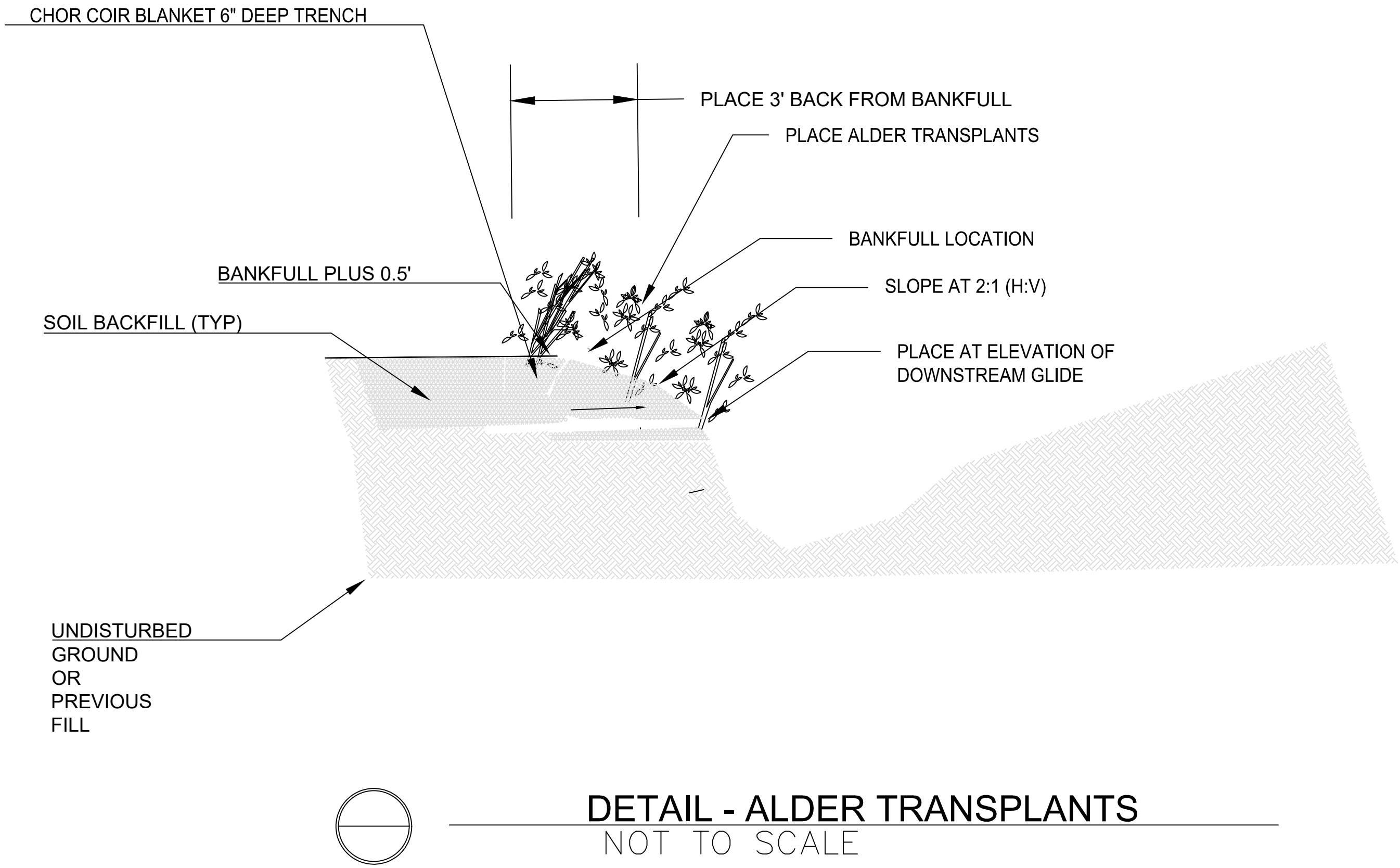
SHEET NUMBER

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C:\USERS\OWNER\PROJ\NORTHSHORE\MINING\CD\SHEETS\NORTHSHORE3\MASTER\DETAIL.DWG | REIDE | SAVED: Friday, October 15, 2021 3:32:20 PM | ACAD.CTB | PLOTTED: Monday, October 18, 2021 10:50:46 AM



DETAIL - SOIL LIFT
NOT TO SCALE



DETAIL - ALDER TRANSPLANTS
NOT TO SCALE

NOTES SOIL LIFTS:

1. THE SOIL BACKFILL USED FOR LIFTS AND TOPSOIL USED FOR LAYERING WITH THE LIVE BRANCHES SHALL BE FREE OF ANY LARGE ROOTS OR WOODY DEBRIS AND SHALL GENERALLY BE FREE FROM ANY GRAVEL OR COBBLE MATERIAL.
2. SOIL BACKFILL SHALL BE COMPACTED SUCH THAT FUTURE SETTLING WILL BE KEPT TO A MINIMUM; YET, NOT SUCH THAT THE UNDERLYING SOIL LIFT IS DISPLACED OR DAMAGED.
3. THE TOP OF THE BACKFILL FOR THE FIRST LIFT SHALL BE SLOPED AT APPROXIMATELY 2% AWAY FROM THE STREAM.
4. PLACE SOIL BACKFILL UP TO THE LIFT HEIGHT SPECIFIED OF NO GREATER THAN 1.0 FT BEING CAREFUL NOT TO PUSH/PULL OR TEAR THE FABRIC PREVIOUSLY PLACED.
5. THE EROSION CONTROL BLANKET SHALL BE PULLED AS TIGHT AS POSSIBLE WITHOUT TEARING OR EXCESSIVELY DISTORTING THE FABRIC. THE COIR BLANKET USED FOR THE SOIL LIFT SHALL BE 13' WIDE AND PLACED AS SHOWN IN THE DETAIL.
6. SECURE THE EROSION CONTROL AND NON-WOVEN MATTING IN PLACE BY STAKING THE END OF THE EROSION CONTROL FABRIC WITH WOODEN STAKES ON 1.5-FOOT CENTERS.
7. THE SURFACE OF THIS STRUCTURE SHALL BE FINISHED TO A SMOOTH AND COMPACT SURFACE IN ACCORDANCE WITH THE LINES, GRADES, AND CROSS-SECTIONS OR ELEVATIONS SHOWN ON THE DRAWINGS. THE DEGREE OF FINISH FOR ELEVATIONS SHALL BE WITHIN 0.1 FT OF THE GRADES AND ELEVATIONS INDICATED OR APPROVED BY THE ENGINEER.
8. RE-DRESSING OF CHANNEL AND BANKFULL BENCH/FLOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF IN-STREAM STRUCTURES AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.

NOTES ON ALDER TRANSPLANTS:

1. ALL ALDER SHALL BE OBTAINED FROM ON SITE SOURCES
2. CUT ALDER TO 2 FEET ABOVE ROOT BALL
3. EXCAVATE TRANSPLANTS FROM SOURCE AND STORE FOR NO MORE THAN 48 HOURS BEFORE PLACEMENT ON SITE
4. REMOVE A MINIMUM OF 1 FOOT OF ROOT MATERIAL BELOW THE SURFACE OF THE ALDER
5. PLACE ON THE BANK AS SHOWN CONTINUOUSLY ALONG THE BANKS AS NOTED IN THE PLAN SHEETS
6. PLACE ALDER TRANSPLANTS A MINIMUM OF 3 FEET BACK FROM THE STREAM BANKFULL EDGE

BIG AND LITTLE 39 STREAM RESTORATION NEAR SILVER BAY LAKE COUNTY, MN					APPROVED BY: KA	CHECKED BY: MUG	DRAWN BY: GET
BID SET - NOT FOR CONSTRUCTION ----- ----- DETAIL - SOIL LIFT AND ALDER TRANSPLANTS					REV	DESCRIPTION	APPRV
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					2	DRAFT 60%	KA
					3	DRAFT 90%	XX
					XX	XX	XX
					XX	XX	XX
BID SET - NOT FOR CONSTRUCTION					XX	XX	XX
					XX	XX	XX
					XX	XX	XX
DETAIL - SOIL LIFT AND ALDER TRANSPLANTS					XX	XX	XX
					XX	XX	XX
					XX	XX	XX



NORTHSHORE MINING CO

10 OUTER DR

SILVER BAY, MN 55614



BEAVER RIVER CONSULTING

BEAVER RIVER CONSULTING, LLC.

5752 EAGLE VIEW DRIVE

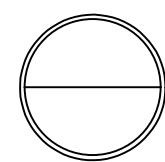
DULUTH, MN 55803

BID SET
NOT FOR
CONSTRUCTION

DATE: 4/19/2021

NOT TO SCALE

SHEET NUMBER
42 OF 50



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|-----|------------------|-----------------|-----------------|---------------|
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| 2 | DRAFT 60% | | | KA |
| 3 | DRAFT 90% | | | KA |
| 4 | BID SET | | | KA |
| XX | XX | | | XX |
| XX | XX | | | XX |
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| XX | XX | | | XX |
- # BIG AND LITTLE 39

STREAM RESTORATION

NEAR SILVER BAY


LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION

DETAIL - BOULDER CONSTRUCTED RIFFLE
- 

CLIFFS

NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614

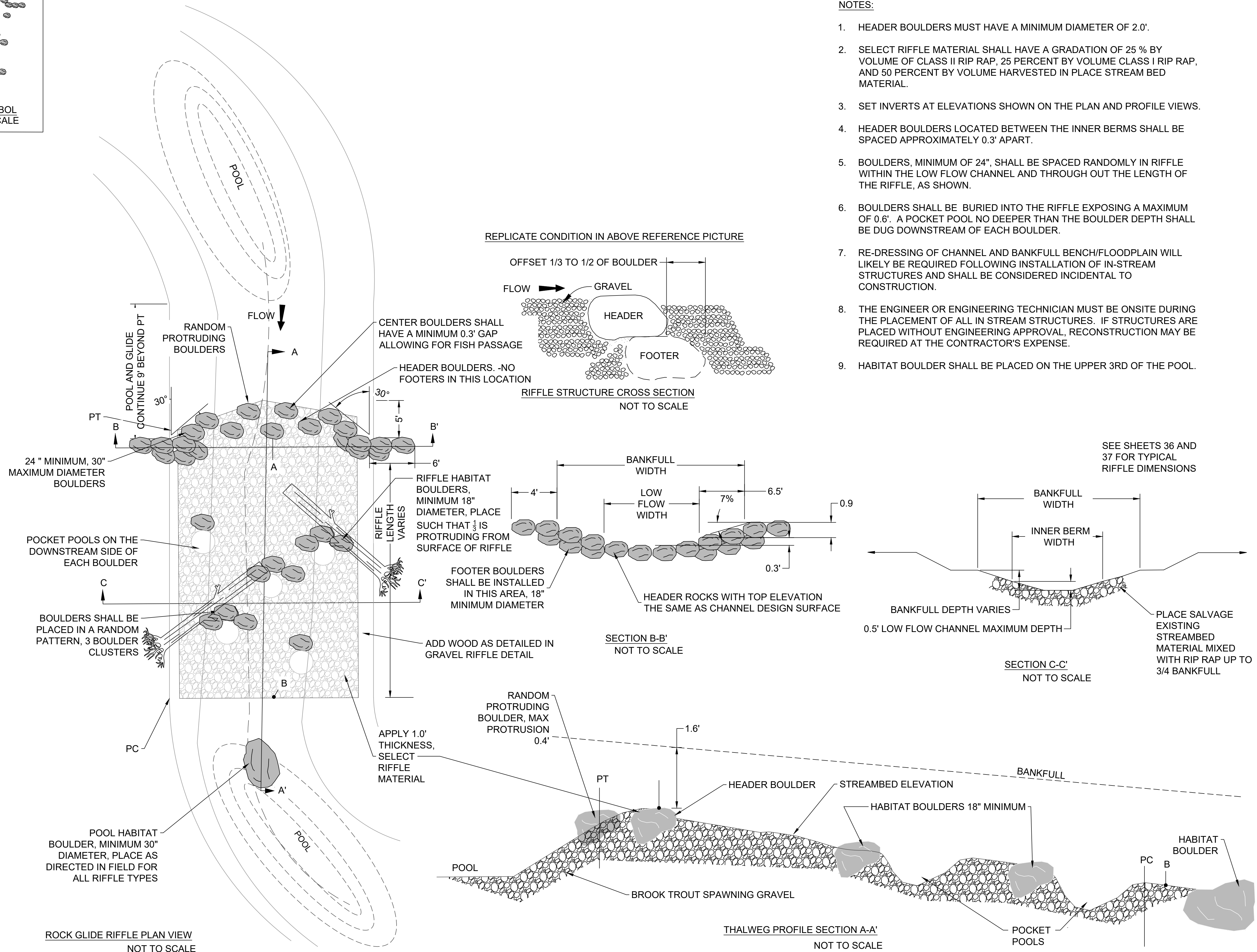


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BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

- # BID SET NOT FOR CONSTRUCTION
- DATE: 10/15/2021
- NOT TO SCALE
- SHEET NUMBER

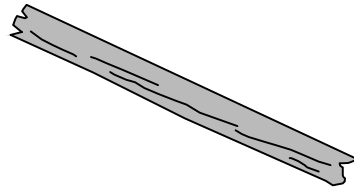
43 OF 50



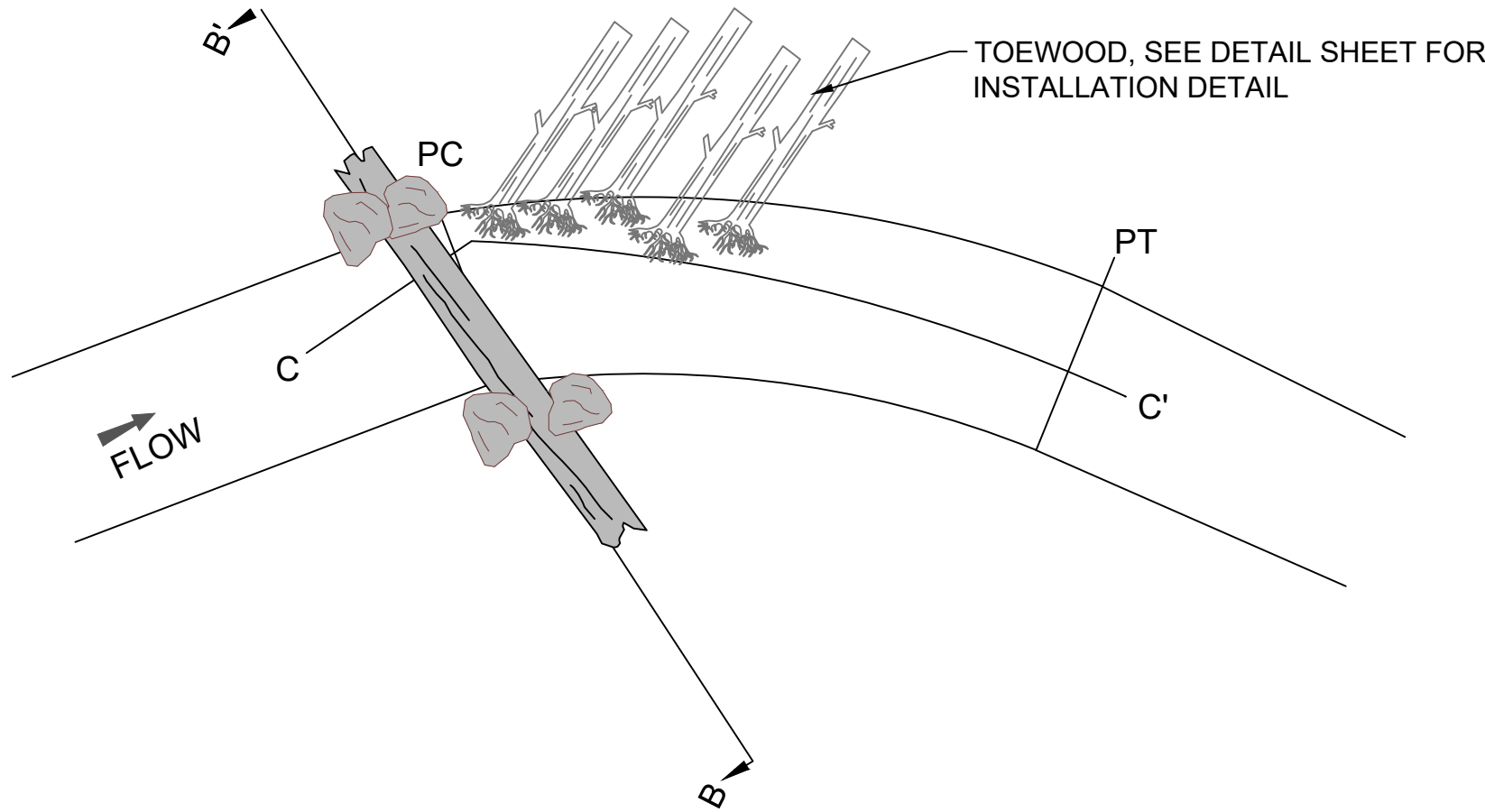
- NOTES:**
1. HEADER BOULDERS MUST HAVE A MINIMUM DIAMETER OF 2.0'.
 2. SELECT RIFFLE MATERIAL SHALL HAVE A GRADATION OF 25 % BY VOLUME OF CLASS II RIP RAP, 25 PERCENT BY VOLUME CLASS I RIP RAP, AND 50 PERCENT BY VOLUME HARVESTED IN PLACE STREAM BED MATERIAL.
 3. SET INVERTS AT ELEVATIONS SHOWN ON THE PLAN AND PROFILE VIEWS.
 4. HEADER BOULDERS LOCATED BETWEEN THE INNER BERMS SHALL BE SPACED APPROXIMATELY 0.3' APART.
 5. BOULDERS, MINIMUM OF 24", SHALL BE SPACED RANDOMLY IN RIFFLE WITHIN THE LOW FLOW CHANNEL AND THROUGH OUT THE LENGTH OF THE RIFFLE, AS SHOWN.
 6. BOULDERS SHALL BE BURIED INTO THE RIFFLE EXPOSING A MAXIMUM OF 0.6'. A POCKET POOL NO DEEPER THAN THE BOULDER DEPTH SHALL BE DUG DOWNSTREAM OF EACH BOULDER.
 7. RE-DRESSING OF CHANNEL AND BANKFULL BENCH/FLOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF IN-STREAM STRUCTURES AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.
 8. THE ENGINEER OR ENGINEERING TECHNICIAN MUST BE ONSITE DURING THE PLACEMENT OF ALL IN STREAM STRUCTURES. IF STRUCTURES ARE PLACED WITHOUT ENGINEERING APPROVAL, RECONSTRUCTION MAY BE REQUIRED AT THE CONTRACTOR'S EXPENSE.
 9. HABITAT BOULDER SHALL BE PLACED ON THE UPPER 3RD OF THE POOL.

<p>BIG AND LITTLE 39 STREAM RESTORATION NEAR SILVER BAY LAKE COUNTY, MN</p>	REV/	CHECKED BY: KA	DRAWN BY: GET
	1	DESCRIPTION	APPROV
	2	DRAFT 30% DESIGN	KA
	3	DRAFT 60%	KA
	4	DRAFT 90%	KA
<p>BID SET - NOT FOR CONSTRUCTION</p> <p>-----</p>	XX	XX	XX
	XX	XX	XX
	XX	XX	XX
	XX	XX	XX
<p>DETAIL - ROCK GLIDE RIFFLE</p> <p>-----</p>	XX	XX	XX
	XX	XX	XX
	XX	XX	XX
	XX	XX	XX

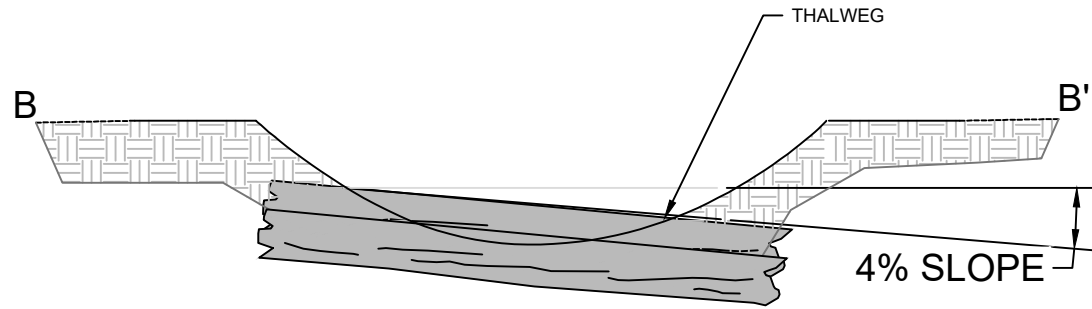
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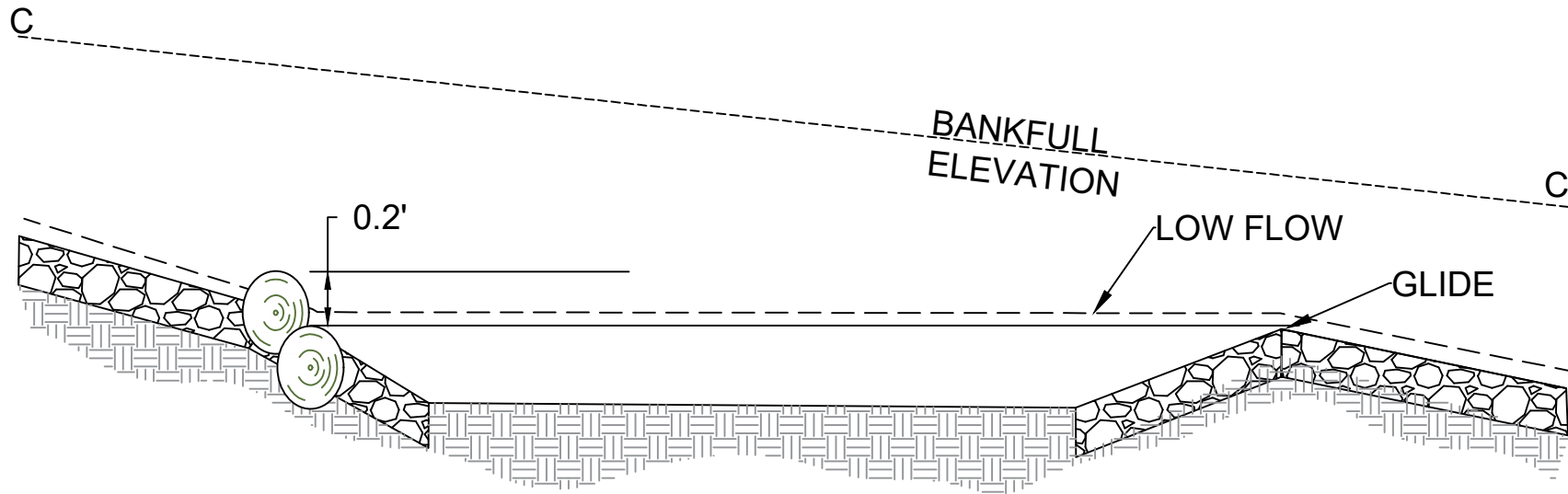
PLAN-SYMBOL



RUN LOG PLAN VIEW
NOT TO SCALE



RUN LOG CROSS SECTION B-B'
NOT TO SCALE

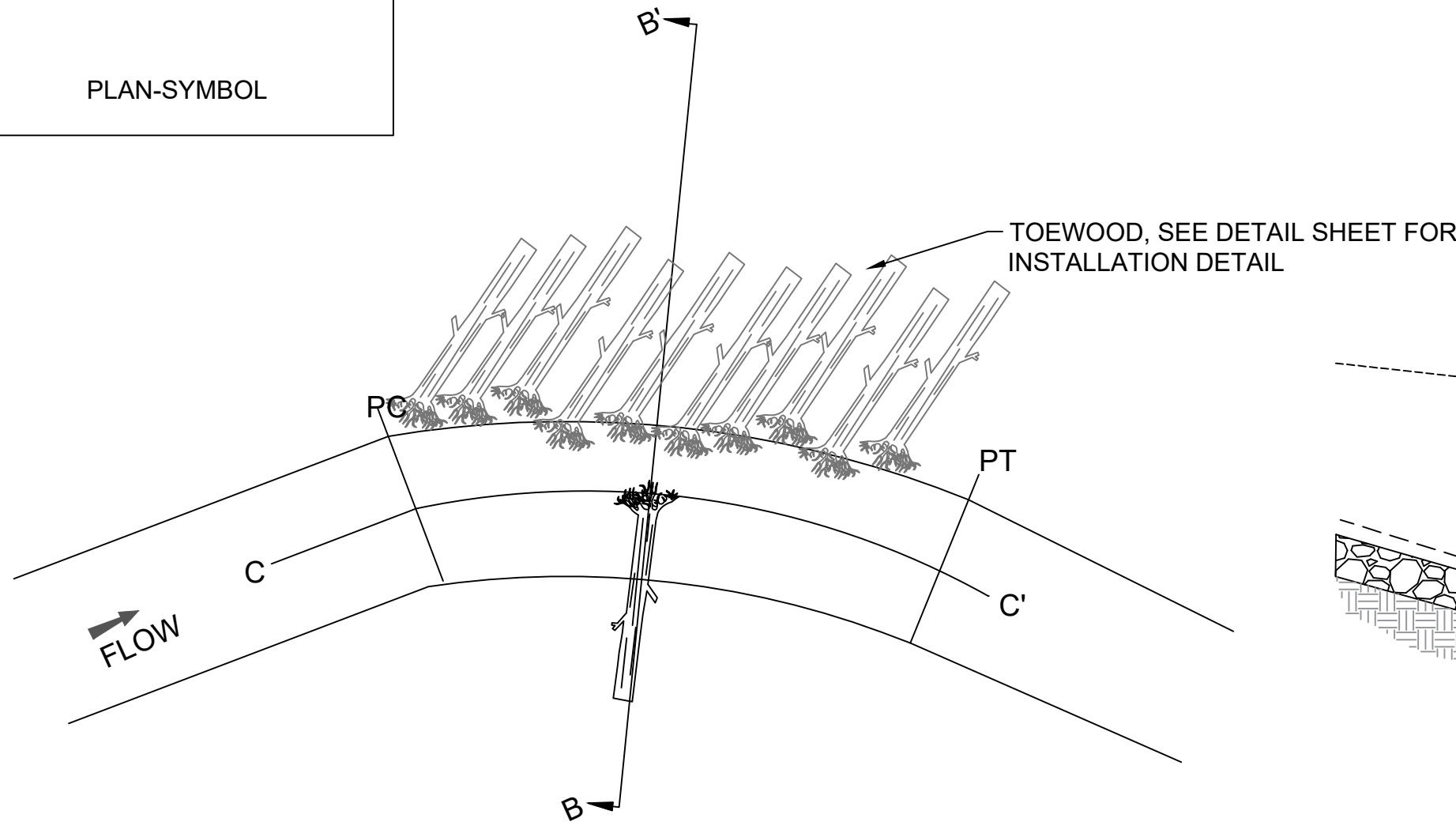


RUN LOG PROFILE C-C'
NOT TO SCALE

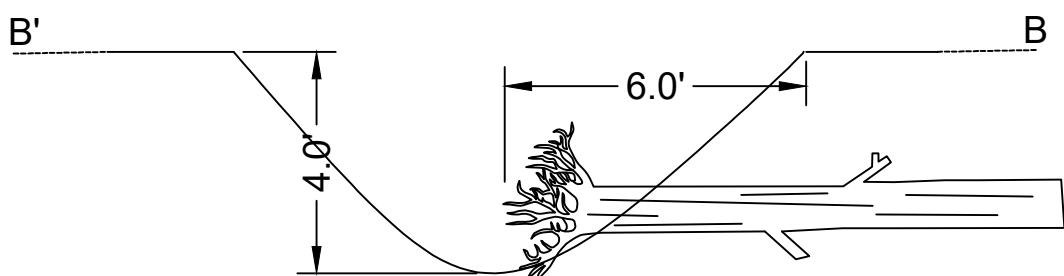
RUN LOG DETAIL



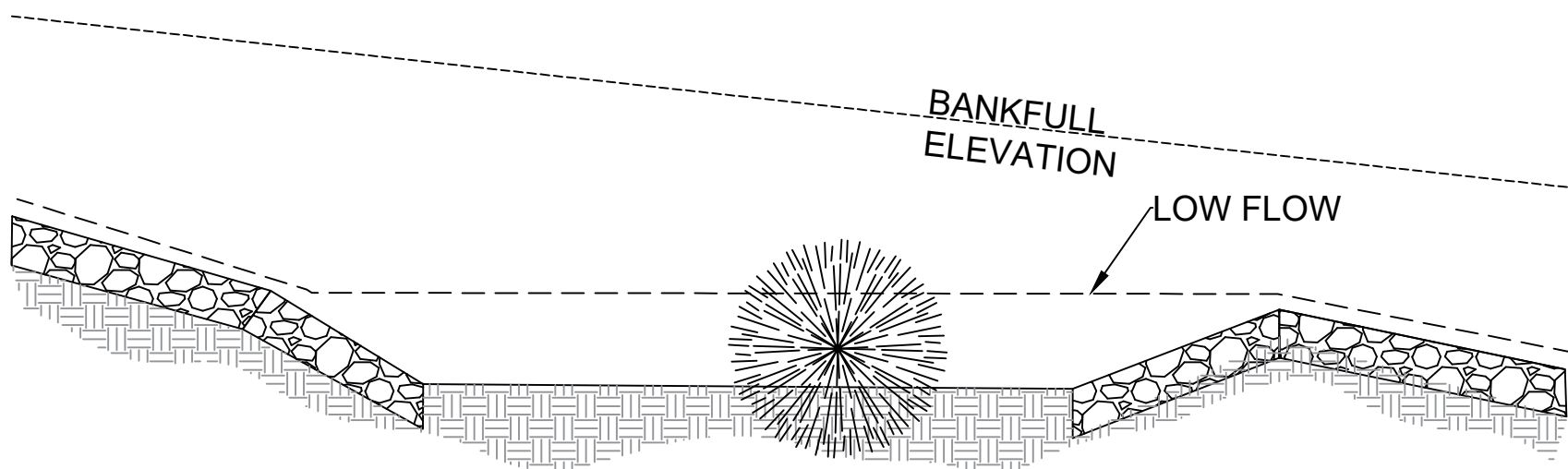
PLAN-SYMBOL



POINT BAR LOG PLAN VIEW
NOT TO SCALE

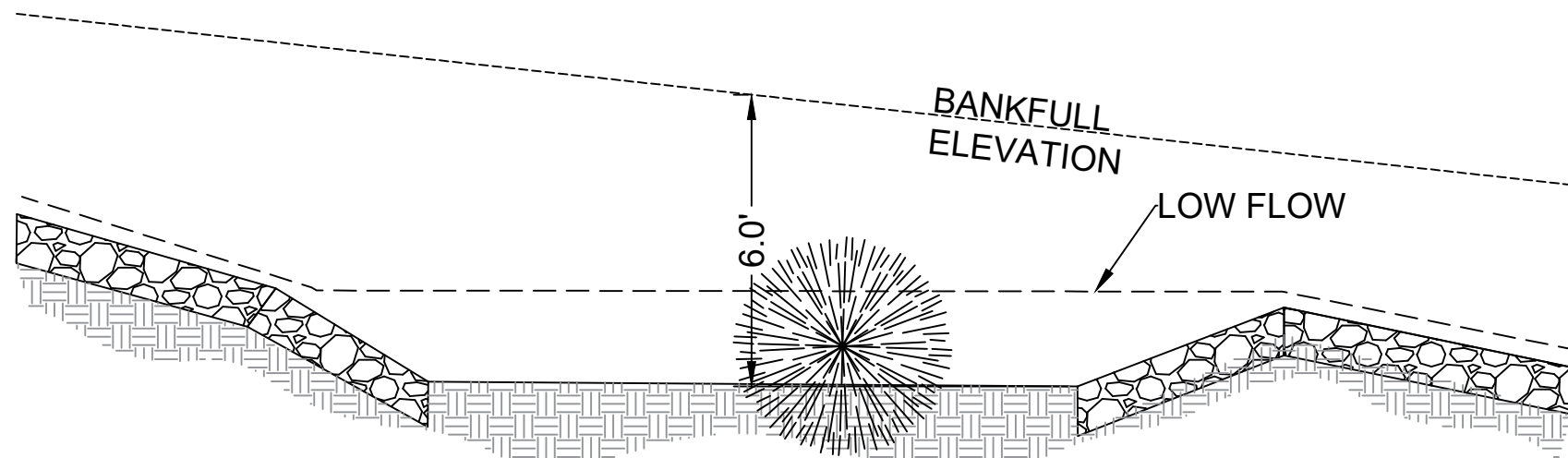


POINT BAR LOG CROSS SECTION B-B'
NOT TO SCALE



POINT BAR LOGS PROFILE C-C'
NOT TO SCALE

POINT BAR LOG DETAIL



HABITAT LOGS PROFILE C-C'
NOT TO SCALE

APPROVED BY: KA	CHECKED BY: MUG	DRAWN BY: GET	APPRV	
			REV	DESCRIPTION
	1	KA	KA	DRAFT 30% DESIGN
	2	KA	KA	DRAFT 60%
	3	KA	KA	DRAFT 90%
	4	KA	KA	BID SET
	XX		XX	
	XX		XX	
	XX		XX	
	XX		XX	

BIG AND LITTLE 39 STREAM RESTORATION NEAR SILVER BAY LAKE COUNTY, MN	
BID SET - NOT FOR CONSTRUCTION	
----- DETAIL - HABITAT LOG	



NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614



BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

BID SET NOT FOR CONSTRUCTION	
------------------------------------	--

DATE:	10/15/2021
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NOT TO SCALE	
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SHEET NUMBER	
46	OF 50

SEED MIX ZONE 0 AND 1

GRASS SEED 15 LBS./ACRE

Big bluestem (<i>Andropogon gerardii</i>)	20%
Fringed brome (<i>Bromus ciliatus</i>)	8%
Blue-joint grass (<i>Calamagrostis canadensis</i>)	2%
Caterpillar Sedge (<i>Carex crinita</i>)	5%
Poverty oats (<i>Danthonia spicata</i>)	10%
Slender Wheatgrass (<i>Elymus trachycalum</i>)	12%
Virginia wild rye (<i>Elymus virginicus</i>)	13%
American manna (<i>Glyceria grandis</i>)	10%
Fowl bluegrass (<i>Poa palustris</i>)	5%
Cord grass (<i>Spartina pectinata</i>)	15%

Wildflower Seed 32oz. /acre

Yarrow (<i>Achillea millefolium</i>)	2%
Fragrant giant hyssop (<i>Agastache foeniculum</i>)	10%
Swamp milkweed (<i>Asclepias incarnata</i>)	10%
Common milkweed (<i>Asclepias syriaca</i>)	10%
Fireweed (<i>Epilobium angustifolium</i>)	2%
Boneset (<i>Eupatorium perfoliatum</i>)	8%
Joe-Pye weed (<i>Eutrochium maculatum</i>)	5%
Common ox-eye (<i>Heliopsis helianthoides</i>)	5%
Wild bergamot (<i>Monarda fistulosa</i>)	10%
Black-eyed Susan (<i>Rudbeckia hirta</i>)	5%
Stiff goldenrod (<i>Solidago rigida</i>)	7%
Blue vervain (<i>Verbena hastata</i>)	20%
Golden alexanders (<i>Zizia aurea</i>)	6%

ZONE 0

PLANTING AREA-

6.5' WIDE NEAR CREEK AREA MINUS TOE WOOD
CANOPY-

THE FOLLOWING CANOPY PLANTS SHALL BE 1.5' HEIGHT CONTAINERIZED STOCK. PLANT AT 8 FOOT SPACING ABOVE BANKFULL ELEVATION:

- WHITE SPRUCE (PICEA GLAUCA)-90%
- *WHITE CEDAR (*THUJA OCCIDENTALIS*)-10%

SUB-CANOPY-

THE FOLLOWING SUB-CANOPY PLANTS SHALL BE 1.5' HEIGHT CONTAINERIZED STOCK. PLANT THE FOLLOWING EVERY 10 FOOT SPACING, AT OR ABOVE BANKFULL ELEVATION.

- SPECKLED ALDER (ALNUS INCANA)-50%
- RED-OSIER DOGWOOD (CORNUS SERICEA)-50%

TRANSPLANTS:

TRANSPLANT WILLOW AND DOGWOOD SHRUBS FROM THE EXCAVATED AREA AS NOTED ON PLAN SHEETS

SEED AND COIR AND BACKER BLANKET

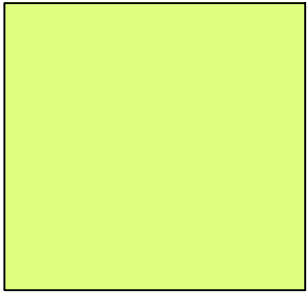
- BLANKET MAIN CHANNEL WITH 6.5' WIDE 700 GRAM COIR BLANKET AND BACKED WITH MN DOT CATEGORY 3N, 2S, EROSION CONTROL BLANKET. INSTALL 2' LONG, 2"X2" WOOD STAKES WITH A ROOFING NAIL AT THE TOP TO SECURE THE BLANKET, INSTALL STAKES EVERY 5' ALONG BLANKET EDGES AND EVERY 5' DOWN THE CENTERLINE OF THE BLANKET. SEED WITH MIX NOTED ON THIS DETAIL SHEET WITH 25 LBS/ACRE OF COVER CROP AS APPROVED BY ENGINEER.

ZONE 2 AND 3 SEED MIX, PLUS ACCESS TRAILS

Grasses 15 lbs/ac
Forbs 32 oz/ac

Grasses	Mix %
Big bluestem (<i>Andropogon gerardii</i>)	10%
Fringed brome (<i>Bromus ciliatus</i>)	8%
Poverty oats (<i>Danthonia spicata</i>)	30%
Canada wild rye (<i>Elymus canadensis</i>)	18%
Slender Wheatgrass (<i>Elymus trachycalum</i>)	24%
Little Bluestem (<i>Schizachrium scoparium</i>)	10%

Forbs	Mix %
Yarrow (<i>Achillea millefolium</i>)	1%
Fragrant giant hyssop (<i>Agastache foeniculum</i>)	12%
Canada anemone (<i>Anemone canadensis</i>)	2%
Common milkweed (<i>Asclepias syriaca</i>)	10%
Fireweed (<i>Epilobium angustifolium</i>)	3%
Large-leaved aster (<i>Eurybia macrophylla</i>)	1%
Grass-leaved goldenrod (<i>Euthamia graminifolia</i>)	2%
Stiff sunflower (<i>Helianthus pauciflorus</i>)	5%
Common ox-eye (<i>Heliopsis helianthoides</i>)	12%
Wild bergamot (<i>Monarda fistulosa</i>)	5%
Meadow rose (<i>Rosa blanda</i>)	3%
Black-eyed Susan (<i>Rudbeckia hirta</i>)	8%
Gray goldenrod (<i>Solidago nemoralis</i>)	4%
Upland goldenrod (<i>Solidago ptarmicoides</i>)	5%
Stiff goldenrod (<i>Solidago rigida</i>)	5%
Lindleys aster (<i>Symphotrichum ciliolatum</i>)	9%
Blue vervain (<i>Verbena hastata</i>)	5%
Golden alexanders (<i>Zizia aurea</i>)	8%



ZONE 1

SEEDING AND PLANTING AREA-

FLOODPLAIN AREA NOTED ON PLAN SHEET

CANOPY

THE FOLLOWING CANOPY PLANTS SHALL BE 1.5' HEIGHT CONTAINERIZED STOCK. PLANT AT 8 FOOT SPACING:

- WHITE SPRUCE (PICEA GLAUCA) -50%
- YELLOW BIRCH (BETULA ALLEGHANIENSIS)-10%
- *WHITE PINE (PINUS STROBUS) -40%

SUB-CANOPY

THE FOLLOWING SUB-CANOPY PLANTS SHALL BE 1.5' HEIGHT CONTAINERIZED STOCK. PLANT THE FOLLOWING AT 10 FOOT SPACING,

- CHOKE CHERRY (PRUNIS VIRGINIANA)-20%
- NANNYBERRY (VIBURNUM LENTAGO)-20%
- JUNEBSERRIES (AMELANCHIER SPP.)-30%
- BUSH HONEYSUCKLE (DIERVILLA LONICERA)-30%

SEED AND APPLY EROSION CONTROL BLANKET

- APPLY TYPE CAT 3N2S EROSION CONTROL BLANKET, APPLY STAPLES AND BLANKET AS PER DETAIL ON SHEET??
- SEED WITH MIX NOTED ON THIS DETAIL SHEET WITH 25 LBS/ACRE OF COVER CROP.
- SCARIFY SOIL PRIOR TO SEEDING

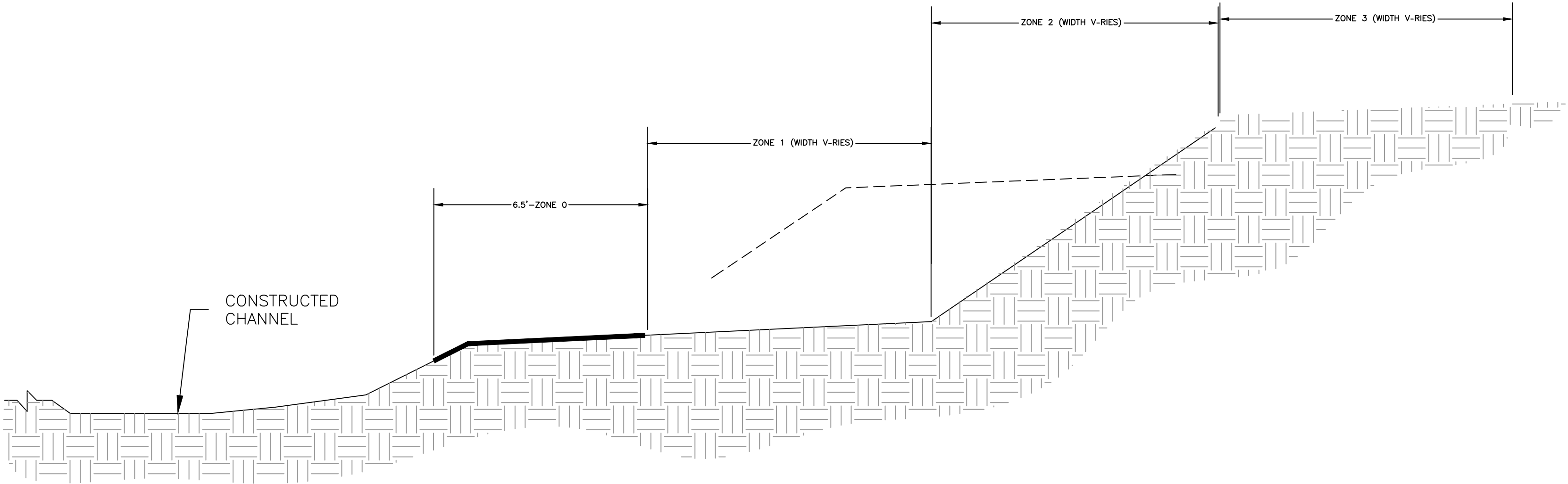
TREE PROTECTION:

* SPECIES THAT REQUIRE 6' HIGH X 3.0' DIAMETER FENCING WITH 2 T-POSTS PLACED ON THE UPSTREAM SIDE OF THE TREE CAGE

ACCESS ROADS AND TRAILS
THIS AREA APPLIES TO GRASSED TRAILS NEAR STREAMS NOT EXISTING GRAVEL ROADS

SEED, MULCH, SOIL

- APPLY WEED FREE STRAW MULCH
- SEEDAT 60LBS PER ACRE WITH MIX NOTED ON THIS DETAIL SHEET WITH 25 LBS/ACRE OF COVER CROP AS APPROVED BY ENGINEER.
- SCARIFY SOIL PRIOR TO SEEDING



ZONE PLANTING
TYPICAL CROSS SECTION DETAIL



ZONE 2

SEEDING AND PLANTING AREA-

SLOPE AREA FROM NEW FLOODPLAIN TO EXISTING GROUND

CANOPY

THE FOLLOWING CANOPY PLANTS SHALL BE 1.5' HEIGHT CONTAINERIZED STOCK. PLANT AT 8 FOOT SPACING:

- WHITE SPRUCE (PICEA GLAUCA) -30%
- RED PINE (*PINUS RESINOSA*)-40%
- JACK PINE (*PINUS BANKSIANA*)- 20%
- *WHITE PINE (PINUS STROBUS) -10%

SUB-CANOPY

THE FOLLOWING SUB-CANOPY PLANTS SHALL BE 1.5' HEIGHT CONTAINERIZED STOCK. PLANT THE FOLLOWING AT 10 FOOT SPACING,

- CHOKE CHERRY (PRUNIS VIRGINIANA)-20%
- NANNYBERRY (VIBURNUM LENTAGO)-20%
- JUNEBSERRIES (AMELANCHIER SPP.)-20%
- BUSH HONEYSUCKLE (DIERVILLA LONICERA)-20%

SEED AND BLANKET

- APPLY CATEGORY 3N, 2S EROSION CONTROL BLANKET
- SEED AT 60LBS PER ACRE WITH MIX NOTED ON THIS DETAIL SHEET WITH 25 LBS/ACRE OF COVER CROP AS APPROVED BY ENGINEER.
- SCARIFY SOIL PRIOR TO SEEDING

ZONE 3

SEEDING AND PLANTING AREA-

HIGH GROUND AREAS WHERE REED CANARY GRASS IS PRESENT ON BIG 39 PROJECT

TREES AND SHRUBS

- TREE AND SHRUB SPECIES AND DENSITY SHALL BE THE SAME AS ZONE 3.

SEED, MULCH, SOIL

- APPLY WEED FREE STRAW MULCH
- REMOVE TOP 10" OF SOIL WITH REED CANARY GRASS PRESENT AND DISPOSE OF AT SITE APPROVED BY ENGINEER.
- SEEDAT 60LBS PER ACRE WITH MIX NOTED ON THIS DETAIL SHEET WITH 25 LBS/ACRE OF COVER CROP AS APPROVED BY ENGINEER.
- SCARIFY SOIL PRIOR TO SEEDING

APPROVED BY: KA		CHECKED BY: MUG	DRAWN BY: GET
REV	DESCRIPTION	APPRV	
1	DRAFT 30% DESIGN	KA	
2	DRAFT 60%	KA	
3	DRAFT 90%	KA	
4	BID SET	KA	
XX	XX	XX	
XX	XX	XX	
XX	XX	XX	
XX	XX	XX	


BIG AND LITTLE 39
STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION

DETAIL - PLANTING



NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614



BEAVER
RIVER
CONSULTING

BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

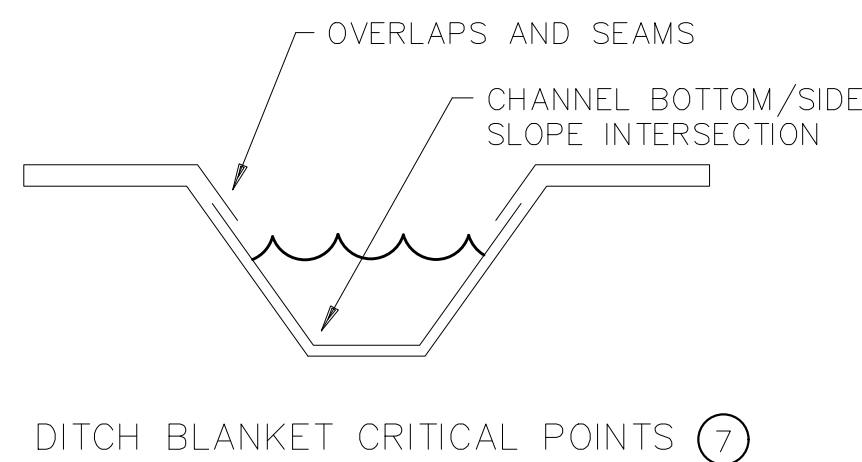
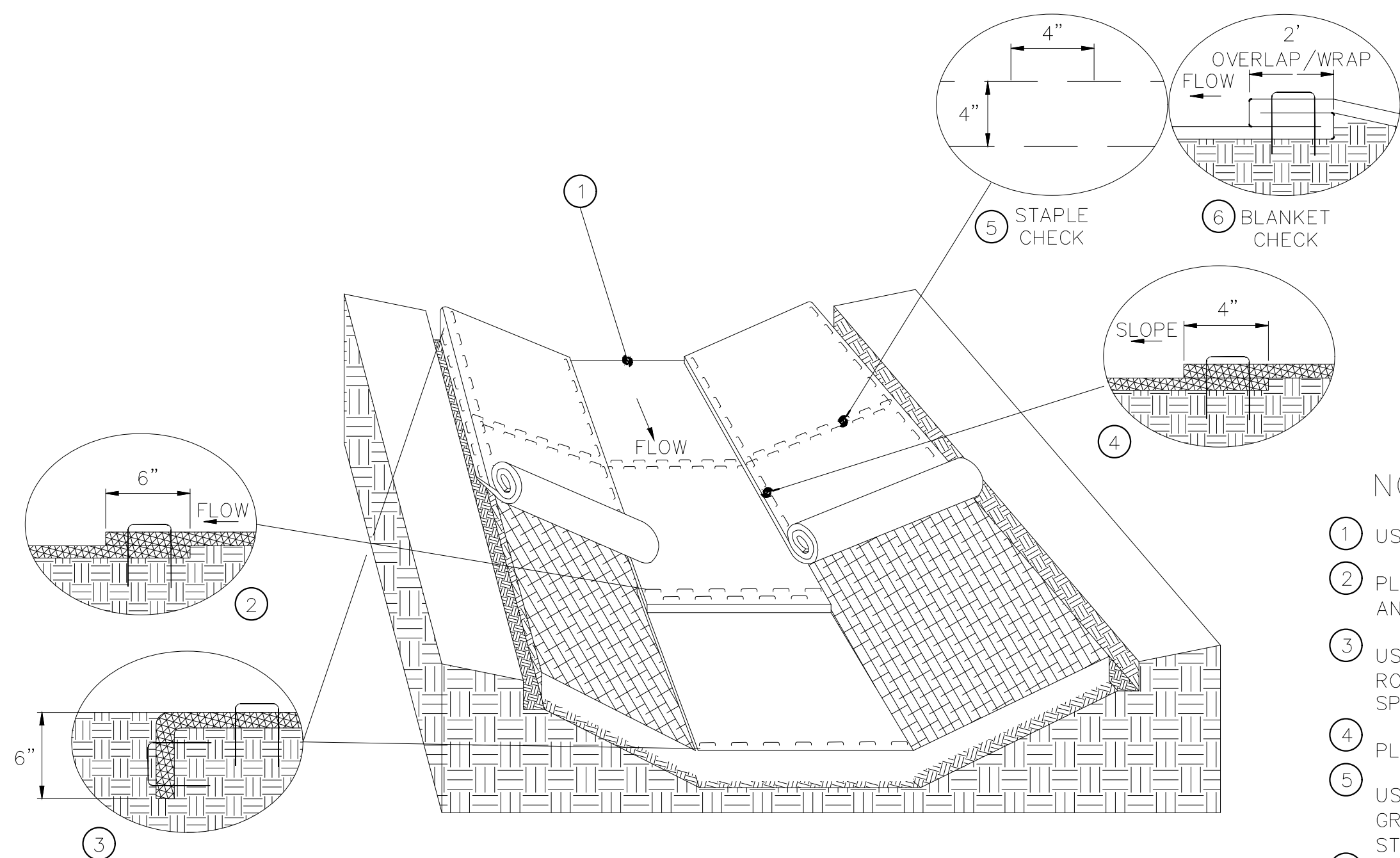
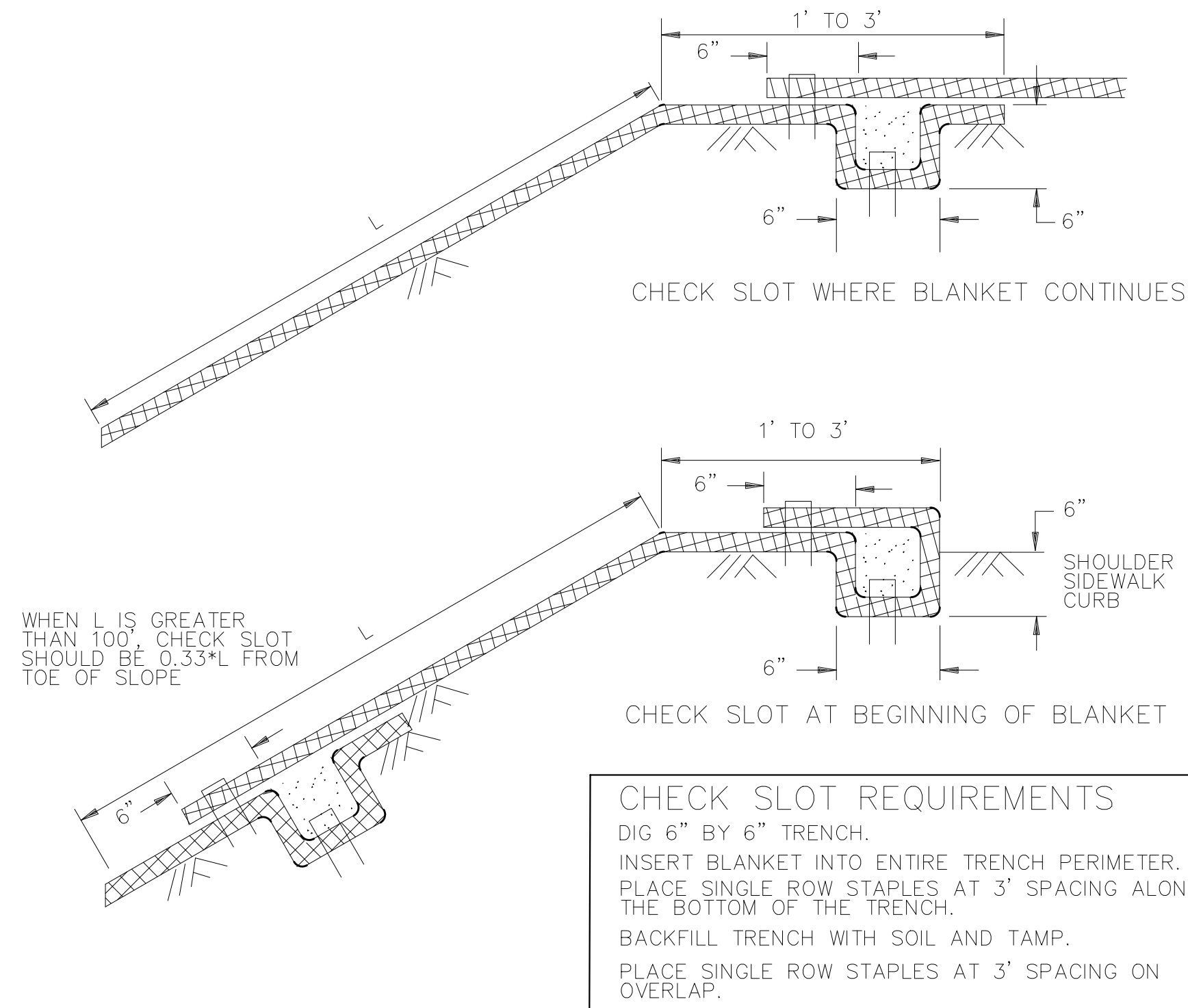
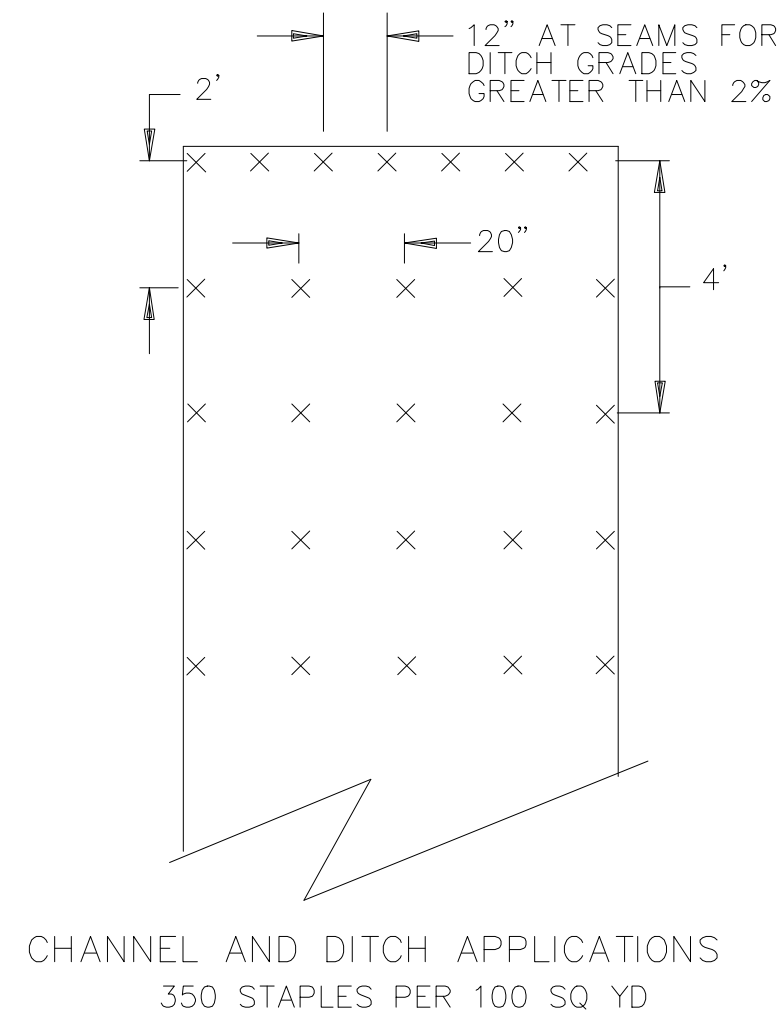
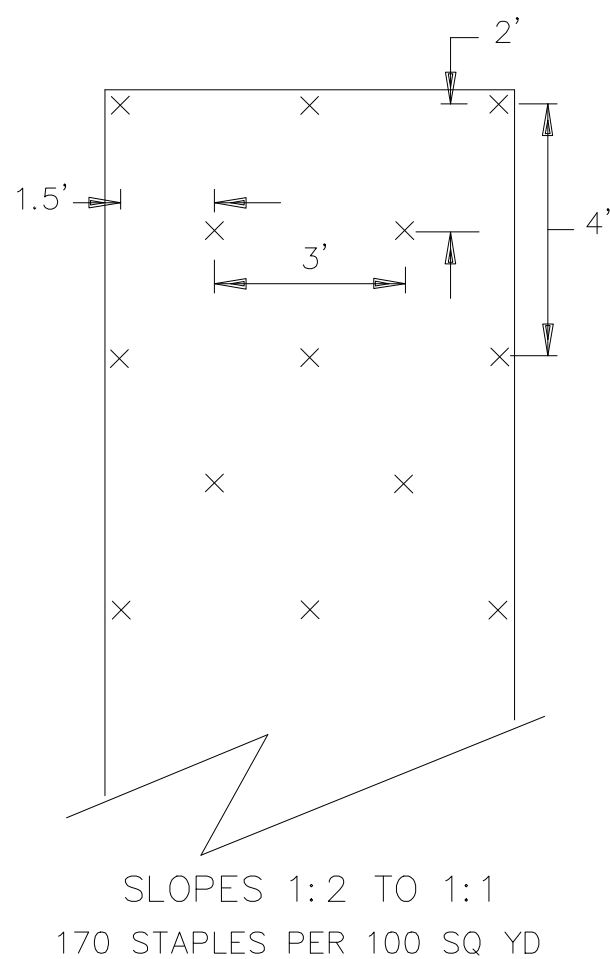
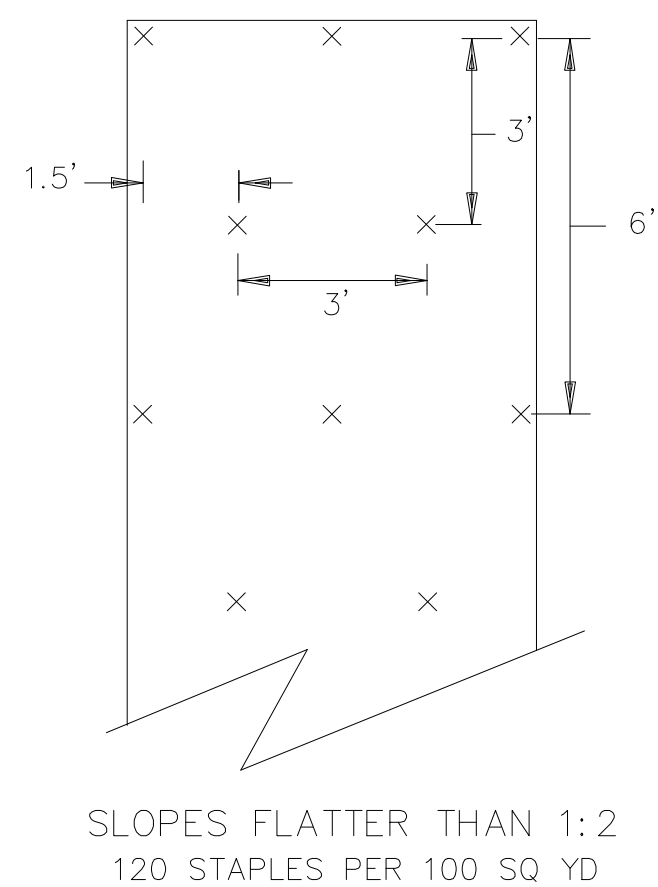
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CONSTRUCTION

DATE:10/15/2021

NOT TO SCALE

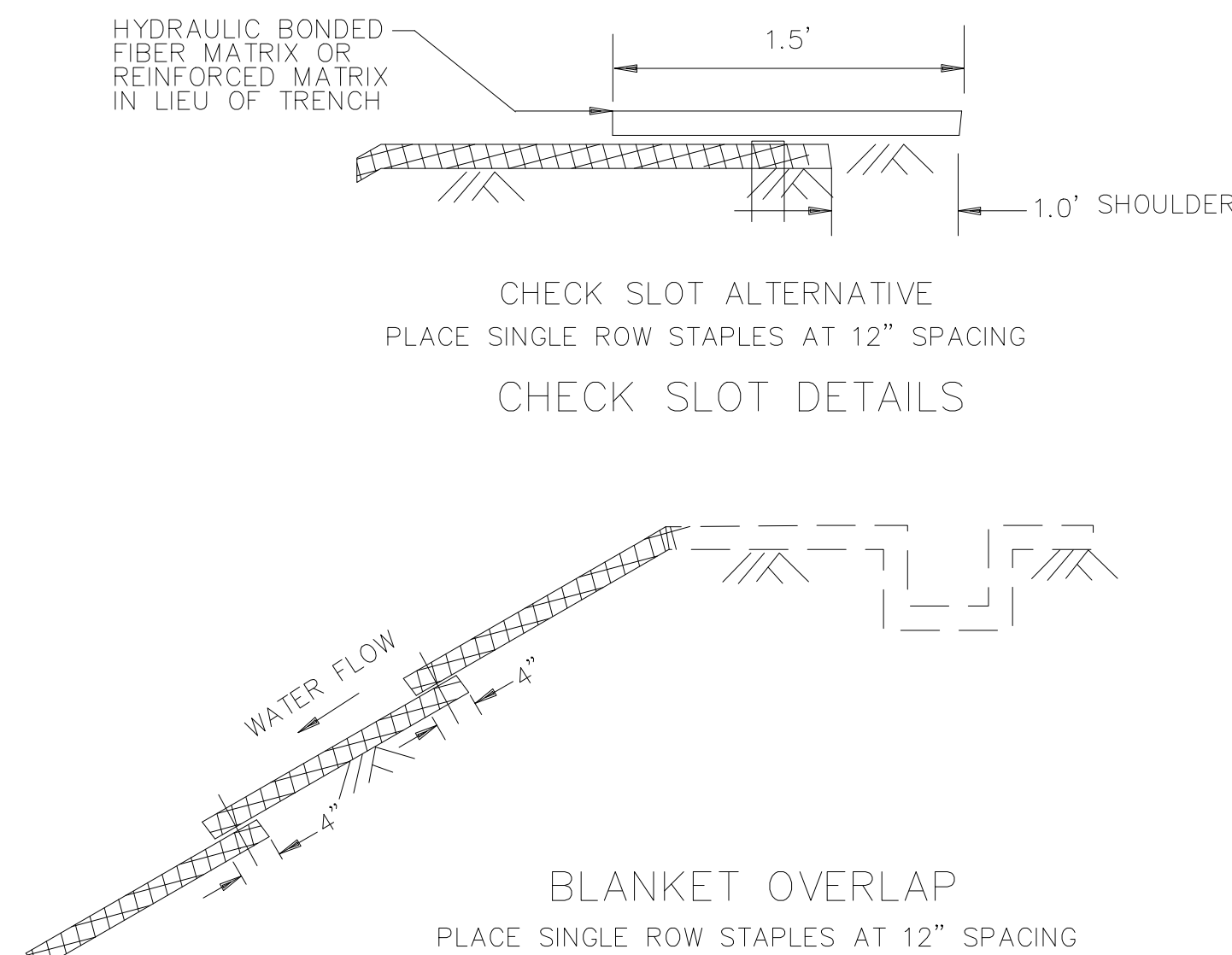
SHEET NUMBER

47 OF 50





- NOTES:

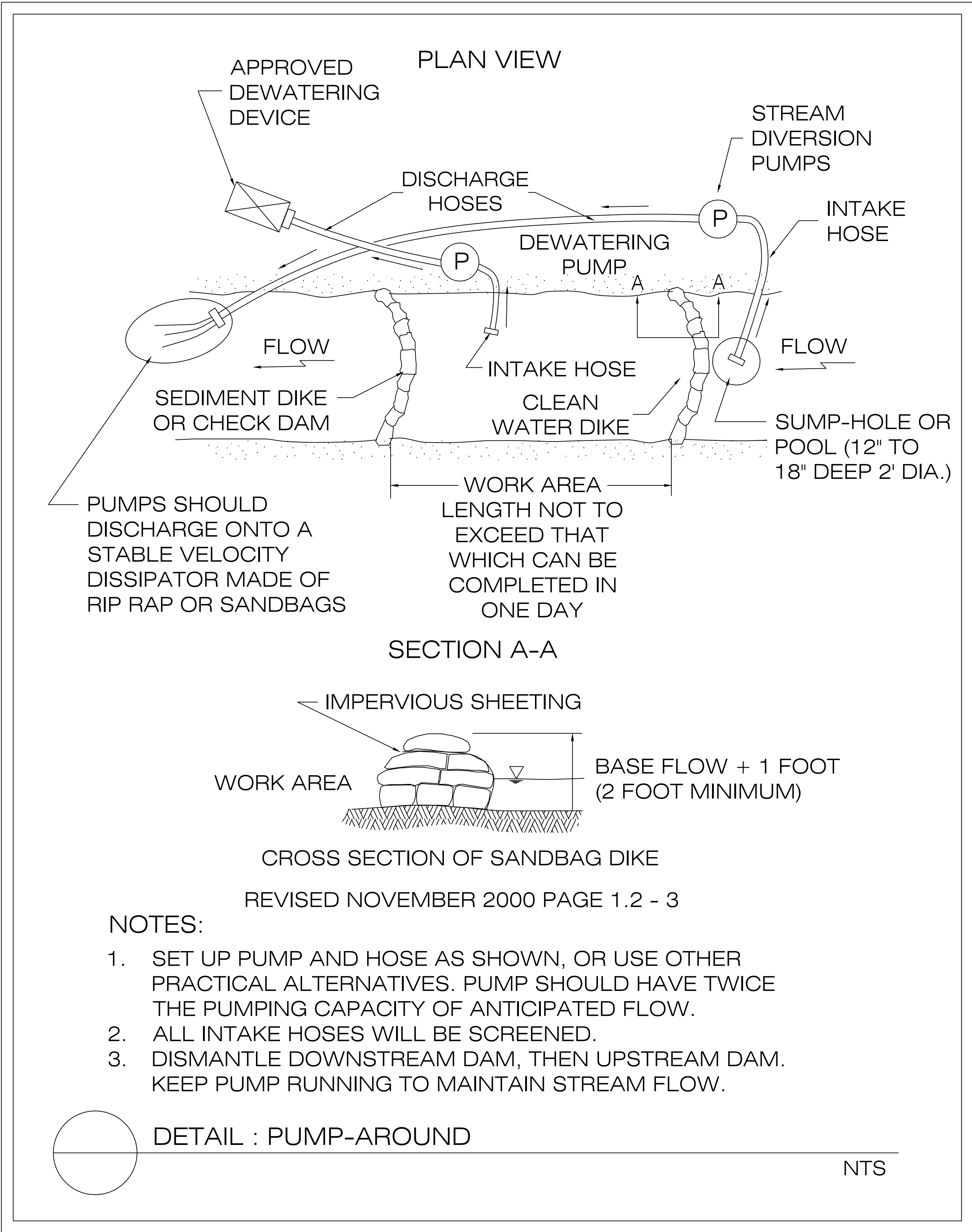
- ① USE CHECK SLOT DETAIL (NO ALTERNATES).
- ② PLACE DOUBLE ROW OF STAPLES STAGGERED 4" APART AND 4" ON CENTER.
- ③ USE 6" X 6" TRENCH TO PLACE BLANKET. PLACE SINGLE ROW OF STAPLES ON TOP AND TRENCH SIDES AT 12" SPACING. BACKFILL TRENCH WITH SOIL AND TAMP.
- ④ PLACE SINGLE ROW OF STAPLES AT 12" SPACING.
- ⑤ USE STAPLE CHECK FOR CHANNEL SLOPES LESS THAN 2.5% GRADE AT 100' INTERVALS. PLACE DOUBLE ROW OF STAPLES STAGGERED 4" APART AND AT 4" SPACING.
- ⑥ USE BLANKET CHECKS FOR THE FOLLOWING SLOPES:
2.5%–3% 100' INTERVALS
3%–5% 50' INTERVALS
5%–7% 25' INTERVALS
- ⑦ CRITICAL POINTS SHALL BE SECURED WITH PROPER STAPLE PATTERNS.



- ## GENERAL BLANKET INSTALLATION REQUIREMENTS
- REPP = ROLLED EROSION PREVENTION PRODUCT.
- PREPARE SOIL AS PER SPECIFICATION 2574.
- LAY PARALLEL OR PERPENDICULAR TO THE DIRECTION OF WATER FLOW.
- OVERLAP ADJACENT STRIP EDGES A MINIMUM OF 4".
- OVERLAP BLANKET 6" (MINIMUM) AT EACH END. OVERLAP BOTTOM END OF UPPER BLANKET OVER TOP END OF LOWER BLANKET. STAPLE ALONG OVERLAP EVERY 1.5'.
- THE UPPERMOST BLANKET OF ALL SLOPE APPLICATIONS MUST START IN A CHECK SLOT. IF SLOPE LENGTH (L) IS 100' OR GREATER, INSERT BLANKET INTO A CHECK SLOT $\frac{1}{3}$ FROM THE BOTTOM OF THE SLOPE.

<p>BIG AND LITTLE 39</p> <p>STREAM RESTORATION</p> <p>NEAR SILVER BAY</p> <p>LAKE COUNTY, MN</p>	REV	DESCRIPTION	CHECKED BY: MJG	DRAWN BY: GET
	1	DRAFT 30% DESIGN		KA
	2	DRAFT 60%		KA
	3	DRAFT 90%		KA
	4	BID SET		KA
	XX	XX		XX
	XX	XX		XX
	XX	XX		XX
	XX	XX		XX
	XX	XX		XX
<p>BID SET - NOT FOR CONSTRUCTION</p> <p>-----</p> <p>DETAIL - EROSION CONTROL BLANKET</p>				
<div>  <p>CLIFFS</p> <p>NORTHSHORE MINING CO 10 OUTER DR SILVER BAY, MN 55614</p> <p>----</p>  <p>BEAVER RIVER CONSULTING, LLC. 5752 EAGLE VIEW DRIVE DULUTH, MN 55803</p> <p>----</p> </div>				
<p>BID SET</p> <p>NOT FOR</p> <p>CONSTRUCTION</p>				
<p>DATE: 10/15/2021</p>				
<p>NOT TO SCALE</p>				
<p>SHEET NUMBER</p> <p>48 OF 50</p>				

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APPROVED BY: KA	CHECKED BY: MUG	DRAWN BY: GET	APPRV	
			REV	DESCRIPTION
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	2	KA	2	DRAFT 60%
	3	KA	3	DRAFT 90%
	4	KA	4	BID SET
	XX	XX	XX	XX
	XX	XX	XX	XX
	XX	XX	XX	XX
	XX	XX	XX	XX


STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION

DETAIL - SWPP



NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614



BEAVER RIVER CONSULTING
BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

BID SET
NOT FOR
CONSTRUCTION

DATE: 10/15/2021

NOT TO SCALE

SHEET NUMBER
49 OF 50

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BIG/LITTLE 39 CREEKS STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

SWPPP PREPARATION DATE: 10/14/2021

SWPPP CONTACT

KEITH ANDERSON, BEAVER RIVER CONSULTING

5752 EAGLE VIEW DRIVE

DULUTH,MN 55803

218-626-7450

NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM PERMIT NUMBER:

CHAIN OF RESPONSIBILITY:

BY SIGNING BELOW, ALL PARTIES AGREE TO FOLLOWING THE SWPPP SETFORTH.

OWNER:

PHONE#:

OPERATOR:

PHONE#:

SWPPP DESIGNER: KEITH ANDERSON, KEITH@BEAVERRIVERCONSULTING.COM

PHONE#: CELL 218-626-7450

SWPPP INSPECTOR/MANAGER:

PHONE#:

CONSTRUCTION SWPPP DESIGNATE:

PHONE#:

ESTIMATED PROJECT DATES:

PROJECT START DATE: / /

PROJECT END DATE: / /

WATER BODY: BIG AND LITTLE 39 CREEKS, LAKE COUNTY MN

DNR WORK RESTRICTIONS: JULY 1-SEPTEMBER 15TH WITHOUT AMENDMENT

MN DNR SPECIAL WATERS, ENSURE ANY EQUIPMENT WORKING IN THE WATER HAS BEEN WASHED AND IS FREE OF EXOTIC SPECIES

STORMWATER POLLUTION PREVENTION PLAN FOR THE BIG/LITTLE 39 STREAM RESTORATION PROJECTS

PROJECT INFORMATION:

THE PROJECT INVOLVES THE RESTORATION OF TWO REACHES OF STREAM IN THE BIG AND LITTLE 39 WATERSHED AREA. FLOODPLAIN EXCAVATION AND CHANNEL REALIGNMENT WILL BE PERFORMED TO ALLOW THE STREAMS TO BE IMPROVED TO A NATURAL CONDITION.

PROJECT DESCRIPTION:

THIS PROJECT INVOLVES RESTORING HABITAT AND FLOODPLAINS TO PREVIOUSLY DITCHED CHANNELS USING FLUVIAL GEOMORPHOLOGY TECHNIQUES THAT WILL ADD FLOODPLAIN PROCESSES AND REESTABLISH RIFFLE AND POOL MORPHOLOGY THUS ENHANCING FISH HABITAT. THE RESTORATION WILL INCLUDE TOEWOOD BANK STABILIZATION AND COARSE RIFFLE STRUCTURES TO CONTROL THE DESIGN STREAM GRADE. EACH REACH WILL BE COMPLETED ON A PHASING SCHEDULE THAT WILL BE DEVELOPED AT THE PRE-CONSTRUCTION MEETING AND ALONG WITH CORRESPONDING SWPPP AMENDMENTS.

THE TOTAL DISTURBED ARE FOR THE PROJECT IS 12.5 ACRES.
THE TOTAL AREA OF IMPERVIOUS SURFACE PRE PROJECT 0 ACRES
THE TOTAL AREA OF IMPERVIOUS SURFACE POST PROJECT, 0 ACRES

SEE INDEX FOR PLANS, DETAILS, SPECIFICATIONS, PHASING PLAN

REGULATORY CONTEXT:

SPECIAL OR IMPAIRED WATERS: THIS PROJECT DOES DISCHARGE TO SPECIAL WATERS, BIG AND LITTLE 39 CREEK. IN ADDITION TO THE MAIN STEM OF THE BEAVER RIVER WHICH IS AN MPCA IMPAIRED WATER.

THIS PROJECTS STORM WATER DISCHARGE IS NOT ANTICIPATED TO IMPACT ANY OF THE FOLLOWING: OUTSTANDING RESOURCE VALUE WATERS, CALCAREOUS FENS, PROPERTIES LISTED BY THE NATIONAL REGISTER OF HISTORIC PLACES OR ARCHAEOLOGICAL SITES AND IS NOT SUBJECT TO ADDITIONAL REGULATIONS DUE TO ANY FORMAL ENVIRONMENTAL REVIEW, ENDANGERED OR THREATENED SPECIES, WETLANDS DELINEATED AND IMPACT IS COORDINATED WITH ARMY CORPS OF ENGINEERS ALONG WITH THE WETLAND CONSERVATION ACT PANEL.

DEPARTMENT OF NATURAL RESOURCES HAS AUTHORITY OF WORK BELOW ORDINARY HIGH WATER LEVEL. PUBLIC WATERS WORK PERMIT SHALL BE OBTAINED AND ADHERED TO.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP) IMPLEMENTATION RESPONSIBILITIES:

1. THE OWNER AND CONTRACTOR ARE IDENTIFIED BY THE BID DOCUMENTS.
2. CONTRACTOR SHALL VERIFY THAT ALL PERMITS HAVE BEEN OBTAINED.
3. CONTRACTOR SHALL PERFORM SITE INSPECTIONS, RECORD KEEPING AND RECORD RETENTION IN ACCORDANCE WITH ALL PERMITS.
4. CONTRACTOR SHALL INSTALL ALL SEDIMENT CONTROL BEST-MANAGEMENT-PRACTICES (BMP) AND CONSTRUCTION ENTRANCES PRIOR TO SITE GRADING, EXCAVATION, STOCKPILING OR DISTURBING EXISTING VEGETATIVE COVER.
5. CONTRACTOR SHALL PERFORM SITE GRADING, EXCAVATION, STOCKPILING WORK IN ACCORDANCE WITH SWPPP.
6. CONTRACTOR SHALL INSTALL, INSPECT, MONITOR AND MAINTAIN TEMPORARY AND PERMANENT EROSION CONTROL BMP AS SHOWN ON PLANS, CONTINUOUSLY DURING DURATION OF WORK.
7. CONTRACTOR SHALL INITIATE SOIL STABILIZATION IMMEDIATELY AND STABILIZE ALL EXPOSED SOILS WITHIN 7 DAYS AFTER CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED.
8. CONTRACTOR SHALL REPLACE OR REPAIR EROSION CONTROL AND SEDIMENT CONTROL BMPS IMMEDIATELY IF IT IS FOUND THAT THEY ARE NOT FUNCTIONING PROPERLY.
9. CONTRACTOR SHALL PERFORM SITE RESTORATION ACTIVITIES FOR PERMANENT VEGETATION ESTABLISHMENT.
10. CERTIFIED SWPPP INPECTOR/MANAGER IDENTIFIED AT THE PRECONSTRUCTION MEETING SHALL INSPECT THE ENTIRE PROJECT AT LEAST ONCE EVERY SEVEN (7) DAYS DURING ACTIVE CONSTRUCTION AND WITHIN 24 HOURS AFTER A RAINFALL EVENT GREATER THAN 0.5 INCHES IN 24 HOURS.
11. INSPECTIONS SHALL BE CONDUCTED WITH THE PROVIDED SWPPP INSPECTION WORKSHEET.
12. REDUNDANT BMP SHALL BE INSTALLED IF FREQUENT FAILURE OR EXCESSIVE MAINTENANCE IS NOTED AND SWPPP WILL BE AMENDED TO THAT EFFECT.
13. CONTRACTOR SHALL REMOVE SEDIMENT CONTROL DEVICES AT COMPLETION OF PROJECT AND SUBMIT A NOTICE OF TERMINATION TO MINNESOTA POLLUTION CONTROL AGENCY.
14. CONTRACTOR SHALL ENSURE THAT THE PUBLIC WATERS PERMIT STIPULATIONS ARE FOLLOWED.

RECORD RETENTION

1. SWPPP RECORDS SHOULD BE MAINTAINED BY OWNER FOR THREE YEARS AFTER FINAL STABILIZATION.
2. CHANGES MADE TO SWPPP PLAN IMPLEMENTATION SHALL BE RECORDED AS SWPPP AMENDMENTS WITH 24 HOURS.
3. SWPPP AMENDMENTS SHALL BE ACCOMPANIED BY NOTIFICATION OF CHANGES TO SWPPP INSPECTOR/MANAGER.
3. A COPY OF SWPPP PLAN SHALL BE MAINTAINED ON SITE OR IN CONSTRUCTION VEHICLE DURING ACTIVE CONSTRUCTION.
4. INSPECTIONS WILL BE RECORDED WITH 24 HOURS IN WRITING AND RETAINED WITH SWPPP RECORD IN A DESIGNATED LOCATION.

CONSTRUCTION ACTIVITY FIELD REQUIREMENTS:

A. ALL FIELD REQUIREMENTS SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE SWPPP.
1. THE CONTRACTOR MUST IMPLEMENT SWPPP AND PROVIDE BMPS IDENTIFIED IN THE SWPPP IN A APPROPRIATE AND FUNCTIONAL MANNER.
2. THE CONTRACTOR SHALL RESPOND TO CHANGING SITE CONDITIONS AND IMPLEMENT/SUPPLEMENT EROSION PREVENTION AND SEDIMENT CONTROL MEASURES UTILIZED TO PROVIDE ADEQUATE PROTECTION OF DISTURBED SOILS AND ADEQUATE PREVENTION OF SEDIMENT TRANSPORT OFF-SITE. AT A MINIMUM, THE FOLLOWING STORM WATER POLLUTION PREVENTION CONSTRUCTION FIELD REQUIREMENTS SHALL BE FURNISHED BY THE CONTRACTOR.

B. EROSION PREVENTION PRACTICES

1. THE CONTRACTOR SHALL ATTEMPT TO PHASE ALL WORK TO MINIMIZE EROSION AND MAINTAIN VEGETATION COVER TO THE EXTENT POSSIBLE.
2. ALL EXPOSED SOILS WITH PERIMETER CONTROL BMPS MUST BE STABILIZED NO LATER THAN 7 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED, INCLUDING STOCKPILES WITH SIGNIFICANT SILT, CLAY OR ORGANIC COMPONENTS.
3. TEMPORARY OR PERMANENT ENERGY DISSIPATION AT PIPE OUTLETS MUST BE PROVIDED WITHIN 24 HOURS OF CONNECTING TO A SURFACE WATER.
5. TOPSOIL WILL BE SALVAGED AND STOCKPILED FOR REAPPLICATION SO AS TO ENSURE MAXIMUM GROWTH POTENTIAL.

C. SEDIMENT CONTROL PRACTICES

CONTRACTOR SHALL BE RESPONSIBLE FOR THE FOLLOWING SEDIMENT CONTROL PRACTICES:
1. DUE TO THE LOCATION AND UNIQUE NATURE OF THE PROJECT WORKING IN THE STREAMS, DOWNGRAIDENT SEDIMENT CONTROL IS NOT FEASIBLE, ALL EFFORTS WILL BE MADE TO CONTROL SEDIMENT BY PHASING THE STREAM PROJECT AS NOTED IN THE PLANS AND STABILIZING AND DIVERTING THE WATER DURING CONSTRUCTION.
2. TIMING AND INSTALLATION OF SEDIMENT CONTROL DEVICES CAN BE ADJUSTED BY CONTRACTOR TO ACCOMMODATE SHORT-TERM ACTIVITIES SUCH AS CLEARING AND GRUBBING OR VEHICLE PASSAGE. ANY SHORT TERM ACTIVITY MUST BE COMPLETED AS QUICKLY AS POSSIBLE AND THE SEDIMENT CONTROL PRACTICES MUST BE INSTALLED IMMEDIATELY AFTER THE ACTIVITY IS COMPLETED AND IN ALL CASES PRIOR TO THE NEXT PRECIPITATION EVENT.
3. TEMPORARY SOIL STOCKPILES MUST HAVE SILT FENCE/TOP SOIL BERMS OR OTHER EFFECTIVE SEDIMENT CONTROL. SOIL STOCKPILES SHALL NOT BE PLACED WITH IN SURFACE WATERS OR STORMWATER CONVEYANCES. ALL STOCKPILES THAT WILL NOT BE DISTURBED FOR ONE MONTH OR LONGER SHALL BE PROTECTED FROM EROSION BY CONTRACTOR USING A COVER OF MULCH, EROSION CONTROL MATS OR PLASTIC SHEETING.
4. CONTRACTOR SHALL IMPLEMENT MEASURES TO CONTROL VEHICLE TRACKING OFFSITE IF NECESSARY.

D. DEWATERING AND BASIN DRAINING (IF APPLICABLE)

1. CONTRACTOR'S DEWATERING ACTIVITIES THAT HAVE SEDIMENT-LADEN DISCHARGE MUST DISCHARGE INTO A TEMPORARY OR PERMANENT SEDIMENTATION BASIN OR THROUGH SOME FORM OF BMP, SUCH AS A FILTER BAG, BY CONTRACTOR TO LIMIT SEDIMENT FROM LEAVING THE SITE TO ENSURE EFFLUENT WATER IS FREE OF SEDIMENT.

I. DEWATERING PLANS SHALL BE FURNISHED TO SWPPP PERSONNEL AT TIME OF CONSTRUCTION.
II. DEWATERING DISCHARGE POINTS MUST BE DISPERSED OVER PLYWOOD, NATURAL RIPRAP, SANDBAGS, PLASTIC SHEETING, OR OTHER ACCEPTED ENERGY DISSIPATING MEASURES IN A NON-EROSIVE MANNER.
III. DEWATERING BMPS SHALL BE INSPECTED BY THE CONTRACTOR PERIODICALLY DAILY AND IMMEDIATELY MAINTAINED OR REPAIRED IF SEDIMENT-LADEN WATER IS BEING DISCHARGED.

E. SWPPP PERSONNEL SHALL BE RESPONSIBLE FOR PERFORMING THE FOLLOWING INSPECTIONS AND MAINTENANCE:

1. ALL NONFUNCTIONAL BMPS SHALL BE REPAIRED, REPLACED WITHIN 24 HOURS AFTER DISCOVERY. CONTRACTOR SHALL PLACE ANY ADDITIONAL EROSION CONTROL MEASURES DEEMED NECESSARY BY THE ENGINEER WITH 24 HOURS OF NOTICE.
2. THE SWPPP INSPECTOR MUST ROUTINELY INSPECT THE SITE ONCE EVERY 7 DAYS DURING ACTIVE CONSTRUCTION AND WITH 24 HOURS AFTER A RAINFALL EVENT GREATER THAN 0.5 INCHES IN 24 HOURS.
3. ALL SILT MUST BE REMOVED FROM SILT FENCE BY CONTRACTOR WHEN IT REACHES A HEIGHT EQUAL TO ONE-THIRD OF THE HEIGHT OF THE SILT FENCE. CONTRACTOR SHALL REPAIR SILT FENCE THAT IS NONFUNCTIONAL WITH 24 HOURS OF DISCOVERY.
4. INSPECTIONS CAN BE SUSPENDED DUE TO FROZEN GROUND CONDITIONS UNTIL FIRST RUNOFF OCCURS OR CONSTRUCTION ACTIVITIES RESUME.

F. POLLUTION PREVENTION MEASURES

CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING THE FOLLOWING POLLUTION MANAGEMENT MEASURES ON THE SITE:
1. SOLID WASTE: COLLECTED SEDIMENT, ASPHALT, CONCRETE MILLINGS, FLOATING DEBRIS, PAPER, PLASTIC, FABRIC, CONSTRUCTION AND DEMOLITION DEBRIS AND OTHER WASTES MUST BE DISPOSED OF PROPERLY AND MUST COMPLY WITH MPCA DISPOSAL REQUIREMENTS.
2. HAZARDOUS MATERIAL: HAZARDOUS SUBSTANCES MUST BE STORED IN APPROPRIATE CONTAINERS AND STEPS IMPLEMENTED TO PREVENT SPILLS, LEAKS, AND VANDALISM.
3. ADEQUATE SUPPLIES TO CLEAN UP SPILLS MUST BE AVAILABLE ON SITE.
4. NO VEHICLE DEGREASING ON SITE.

G. DIVERSION

1. CONTRACTORS MUST PROVIDE DETAILS ON STREAM DIVERSION AT THE PRECONSTRUCTION MEETING. THIS INCLUDES BUT NOT LIMITED TO: PIPE SIZES, PUMP SIZES, DIVERSION CHANNEL SIZE, DIVERSION CHANNEL LOCATIONS, WITH ASSOCIATED DEWATERING PLANS IF APPLICABLE.
2. DIVERSION CAN BE ACHIEVED USING BERMS, ABANDONED CHANNELS, JERSEY BARRIERS, PIPES, SANDBAG DAMS, PLYWOOD DAMS, OR OTHER METHODS THAT ARE DEEMED APPROPRIATE FOR THE SITE.

FINAL STABILIZATION

1. ALL DISTURBED AREAS SHALL BE STABILIZED BY USING COIR MAT, EROSION CONTROL BLANKETS, MULCH, OR HYDROSEEDDED AS PER VEGETATIVE DETAILS SHEETS
2. ALL DISTURBED AREAS SHALL BE PERMANENTLY STABILIZED BY SEED, SHRUBS, AND TREES AS SPECIFIED IN PLANS.
3. TEMPORARY SEDIMENT EROSION CONTROL BMPS SHALL BE REMOVED AT PROJECT CLOSEOUT.

APPROVED BY: KA

REV

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2

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4

XX

XX

XX

XX

CHECKED BY: JMG

DESCRIPTION

DRAFT 30% DESIGN

DRAFT 60%

DRAFT 90%

BID SET

XX

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XX

XX

DRAWN BY: GET

APPRV

KA

KA

KA

KA

XX

XX

XX

XX

BIG AND LITTLE 39
STREAM RESTORATION
NEAR SILVER BAY
LAKE COUNTY, MN

BID SET - NOT FOR CONSTRUCTION

DETAIL - SWPP NOTES



NORTHSHORE MINING CO
10 OUTER DR
SILVER BAY, MN 55614



BEAVER
RIVER
CONSULTING

BEAVER RIVER CONSULTING, LLC.
5752 EAGLE VIEW DRIVE
DULUTH, MN 55803

BID SET
NOT FOR
CONSTRUCTION

DATE:

10/15/2021

NOT TO SCALE

SHEET NUMBER

50 OF 50

Appendix B, NHIS Review and Concurrence

Memorandum

To: MNDNR Environmental Policy & Review Unit
From: Tyler Conley, Mark Jacobson – Barr Engineering
Subject: Big and Little Thirtynine Creek Restoration Threatened and Endangered Species Review
Date: December 1, 2021
Project: 23381049
c: Nate Schroeder – Northshore Mining Company

Northshore Mining Company (Northshore) is in the process of permitting two stream mitigation projects related to the West Ridge Railroad and Tailings Basin Progression Project. The stream mitigation projects include the Big Thirtynine Creek and Little Thirtynine Creek Sites. The stream restoration locations are shown on **Figure 1**. This technical memorandum summarizes the results of the desktop review for the presence of endangered, threatened, and special concern (ETSC) species within the creek restoration extent **Figure 2**. The purpose of this memorandum is to identify the potential for ETSC species to be impacted by the proposed projects. On behalf of Northshore, Barr requests that the MDNR consider the documentation and conclusions of this review and provide a written determination addressing the sufficiency of this memo to fulfill the endangered and threatened species component of the Wetland Conservation Act (Minnesota Rule 8420.0515, subparts 1 and 2).

1.1 MNDNR NHIS Database Query

In November 2021, Barr queried the current NHIS database to identify any ETSC species that have been previously recorded within one mile of the stream restoration project extents. The database review indicated that no ETSC species have been previously identified within the restoration area. However, two state-listed special concern species have been identified within one mile of the project extents (**Table 1**).

Table 1 Rare Species Documented within One Mile of Big Thirtynine Creek and Little Thirtynine Creek Site According to MNDNR NHIS

Scientific Name	Common Name	Federal Status	State Status	Suitable Habitat Present?	Further Action Required?
<i>Cladium mariscoides</i>	Twig rush	None	Special Concern	Yes	No
<i>Eleocharis nitida</i>	Neat spikerush	None	Special Concern	Yes	No

1.1.1 Twig Rush (*Cladium mariscoides*)

Twig rush occurs mostly in fens, particularly prairie rich fens, northern rich fens, and calcareous fens (MDNR, 2021a). Twig rush is found in two locations within one mile of the project extents. Both

To: MNDNR EWR Environmental Policy & Review Unit
From: Tyler Conley, Mark Jacobson – Barr Engineering
Subject: Big and Little Thirtynine Creek Restoration Threatened and Endangered Species Review
Date: December 1, 2021
Page: 2

populations are found within former borrow sites where clay soils had been excavated for basin construction. One location has approximately 50 stems in a single patch covering about 12 square meters. The other nearby location has around 500 stems in a single patch covering about 15 square meters (Barr, 2016). No fen plant communities are located within the project extents. Suitable habitat for twig rush may be present within the creek restoration area. However, the species is listed as special concern and is not legally protected under state endangered species law. No further action is required.

1.1.2 Neat Spikerush (*Eleocharis nitida*)

Neat spikerush is a colonizer of small wet localized depressions, such as shallow ditches, pits, trails, and wheel ruts in sand, gravel, or clay (MDNR, 2021b). One population of neat spikerush has been found within one mile of the project extents. This population of neat spikerush is located in a ditch next to the railroad, including about 100 stems within a small, less than one square meter patch (Barr, 2016). Suitable habitat for neat spikerush may be present within the creek restoration area. However, the species is listed as special concern and is not legally protected under state endangered species law. No further action is required.

2.0 References

Barr Engineering. 2016. Endangered, Threatened, and Special Concern Plant Species Survey Report. October 2016.

Minnesota Department of Natural Resources. 2021a. Rare Species Guide: *Cladium mariscoides*. Accessed November 24, 2021, at:
<https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PMCYP04050>

Minnesota Department of Natural Resources. 2021b. Rare Species Guide: *Eleocharis nitida*. Accessed November 24, 2021, at *Eleocharis nitida*:
<https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PMCYP09180>

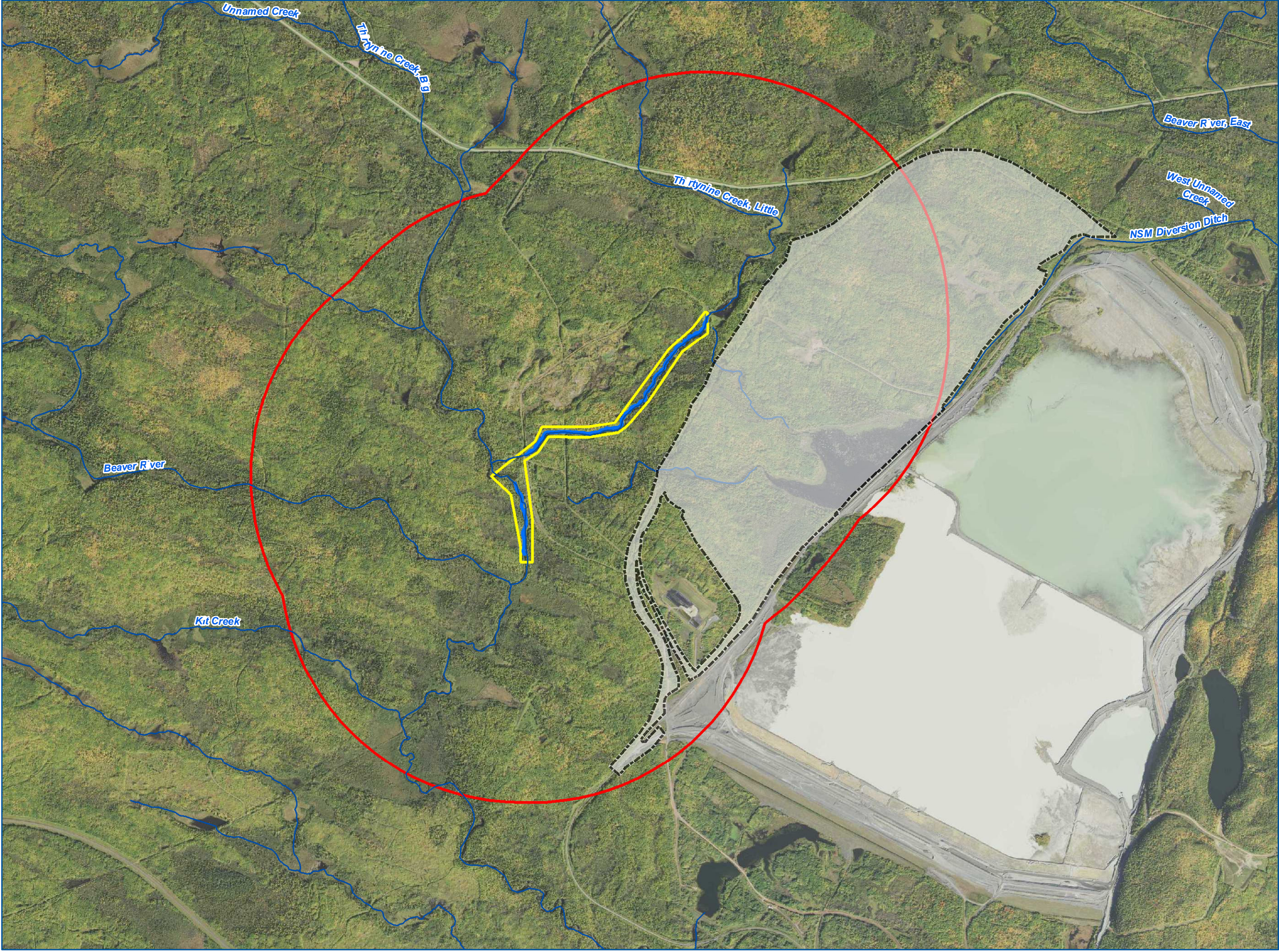
Figures

Figure 1 – Project Location Map

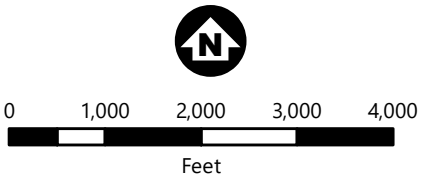
Figure 2 – Thirtynine Creek Restoration Area

Figures

Barr Footer: ArcGIS 10.8.1, 2021-11-23 11:38 File: I:\Client\NorthShoreMining\Work_Orders\DS14_2014_RR_Design\Maps\Other\Stream Mitigation\2021 Big Little 39 NHS Review\Figure 1 - Stream Restoration NHS Big Little 39.mxd User: maj



- Legend**
- Tailings Basin Project Area
 - Stream Restoration Sites
 - Streams
 - Review Area
 - Stream Restoration Project Extent



PROJECT LOCATION
BIG AND LITTLE 39 CREEKS
STREAM RESTORATION
Northshore Mining Co.
Lake County, Minnesota

FIGURE 1



From: [Bump, Samantha \(DNR\)](#)
To: Nathaniel.Schroeder@clevelandcliffs.com
Cc: Andrea.Hayden@clevelandcliffs.com; [Mielke, Sara \(DNR\)](#); [Bentley, Cliff \(DNR\)](#)
Subject: FW: NHIS Review: Big & Little 39 Restoration
Date: Wednesday, December 22, 2021 1:22:07 PM
Attachments: [Northshore Big_Little_39_Restoration_NHIS_Review.pdf](#)
[image004.png](#)
[image005.png](#)
[image006.png](#)
[image007.png](#)

Hi Nate,

I have reviewed the attached assessment of the potential for the above project to impact rare features. I concur with your assessment and have the additional comments:

- As noted in your review, twig rush (*Cladium mariscoides*) and neat spikerush (*Eleocharis nitida*), both state-listed species of special concern, have been documented in the area and suitable habitat may be present within the restoration area. As such, we recommend minimizing or avoiding impacts in suitable habitat whenever feasible. Also, we recommend inspecting and cleaning all equipment prior to bringing it to the site to prevent the introduction and spread of invasive species. Please reference the resources available for [native vegetation establishment and management](#) and [stream restoration](#).
- Canada Lynx (*Lynx canadensis*), federally listed as threatened and state-listed as special concern, has been documented in the vicinity of the proposed project. This species is found in large tracks of boreal and mixed conifer-hardwood forest where they are highly dependent on snowshoe hare for prey. Population densities in the U.S. are typically lower than that of Canada. To determine conservation measures required or recommended by the U.S. Fish and Wildlife Service (USFWS), review your project in [IPaC](#). For additional information on this species, review the [USFWS Canada Lynx Fact Sheet](#).

The reference number for this correspondence is ERDB #20220067. Thank you for notifying us of this project, and for the opportunity to provide comments.

Have a great day,

Samantha Bump

NHIS Review Specialist | Ecological & Water Resources

Minnesota Department of Natural Resources

Samantha.Bump@state.mn.us



From: Mielke, Sara (DNR) <sara.mielke@state.mn.us>
Sent: Thursday, December 2, 2021 1:55 PM
To: Bump, Samantha (DNR) <samantha.bump@state.mn.us>
Cc: Joyal, Lisa (DNR) <lisa.joyal@state.mn.us>; Fairman, Kate (DNR) <kate.fairman@state.mn.us>
Subject: FW: NHIS Review

From: Schroeder, Nathaniel A <Nathaniel.Schroeder@clevelandcliffs.com>
Sent: Thursday, December 2, 2021 7:23 AM
To: Mielke, Sara (DNR) <sara.mielke@state.mn.us>; Fairman, Kate (DNR) <kate.fairman@state.mn.us>
Cc: Hayden, Andrea J <Andrea.Hayden@clevelandcliffs.com>
Subject: NHIS Review

This message may be from an external email source.

Do not select links or open attachments unless verified. Report all suspicious emails to Minnesota IT Services Security Operations Center.

Good morning,

We had Barr complete the Threatened and Endangered Species review for us. I have attached this review. I looked to see who to send this to and it looks like "Regional Program staff" where the project is proposed would be the normal path forward. Since you are the reviewers, does NSM send directly to you for concurrence? I worried that if I send it directly to the Region 2 reviewer it may not be properly applied to the project.

I have attached the review, but if I should send it to someone else please let me know. I hope to have the EAW and spreadsheet responses complete today.

Please advise,



Nate Schroeder
Environmental Engineer
P 218.226.6083 M 218.226.8567
Nathaniel.Schroeder@clevelandcliffs.com

CLEVELAND-CLIFFS INC.
Northshore Mining Company
10 Outer Drive
Silver Bay, MN 55614
clevelandcliffs.com

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Appendix C, Climate Trend Analysis and Carbon Footprint Estimation Data Sources and Output

Summary of Estimated Mobile GHG Emissions

1 gram =	1.1023E-06	short ton
Life of Project =	50	years
Time of construction =	3	months

Source Type ID	Emission Source	Number of Units ¹⁰	Hours of Operation/year ⁷	Vehicle Type	Estimated Vehicle Year ⁸	Fuel Type	MPG	VMT/day	horsepower if applicable	hp-hr if applicable	Fuel Amount		CO ₂ Emission Factors ¹		CH ₄ Emission Factors		N ₂ O Emission Factors		CO ₂ (tons/year)	CH ₄ (tons/year)	N ₂ O (tons/year)	CO ₂ e (tons/year)
											Value ⁶	Unit	Value	Unit	Value	Unit	Value	Unit				
DE-3	Construction - gasoline mobile sources On-Road	4	100	Passenger Cars	2007	Gasoline	20	14	N/A	N/A	521	total gallons	8.78	kg CO ₂ /gallon	0.0072	g CH ₄ /mile ³	0.0052	g N ₂ O/mile ³	1.68	0.000000	0.000000	1.68
DE-3	Construction - diesel mobile sources - On-Road	2	100	Medium- and Heavy-Duty Trucks	2007-2018	Diesel	15	5	N/A	N/A	548	total gallons	10.21	kg CO ₂ /gallon	0.0095	g CH ₄ /mile ⁴	0.0431	g N ₂ O/mile ⁴	2.05	0.000000	0.000001	2.05
DE-3	Construction - diesel mobile sources - On-Road	2	100	Light Trucks	2007-2018	Diesel	14	5	N/A	N/A	511	total gallons	10.21	kg CO ₂ /gallon	0.029	g CH ₄ /mile ⁴	0.0214	g N ₂ O/mile ⁴	1.92	0.000000	0.000000	1.92
DE-3	Construction - diesel mobile sources - Nonroad	7	500	Construction Equipment ⁹	N/A	Diesel	N/A	N/A	100	350000	4,375	total gallons	10.21	kg CO ₂ /gallon	0.2	g CH ₄ /gallon ²	0.47	g N ₂ O/gallon ²	16.41	0.000019	0.000045	16.43
TOTAL																			16.41	0.000019	0.000045	22.08

Notes:
(2) Table 5, Mobile Combustion CH₄ and N₂O for Non-Road Vehicles. Emission Factors for Greenhouse Gas Inventories, EPA CCCL April, 2021. <https://www.epa.gov/climateleadership/ghg-emission-factors-hub>
(3) Table 3, Mobile Combustion CH₄ and N₂O for On-Road Gasoline Vehicles. Emission Factors for Greenhouse Gas Inventories, EPA CCCL April, 2021. <https://www.epa.gov/climateleadership/ghg-emission-factors-hub>
(4) Table 4, Mobile Combustion CH₄ and N₂O for On-Road Diesel and Alternative Fuel Vehicles. Emission Factors for Greenhouse Gas Inventories, EPA CCCL April, 2021. <https://www.epa.gov/climateleadership/ghg-emission-factors-hub>
(5) Includes equipment, such as excavators, haul trucks, skid steers
(6) for Nonroad sources, fuel amount is calculated based on fuel usage estimates per horsepower-hour (0.05 gallons for diesel, 0.12 gallons for gasoline) from Table A9-3E in SCAQMD CEQA Air Quality Handbook (<https://www.cvw.org/ArchiveCenter/ViewFile/Item/608>).
(7) Based on 10 hrs/day, 5 days/week for 16 weeks for construction
(8) Values based off of the most conservative year (2007) for the most recent year average for medium- and heavy-duty trucks and light trucks (2007-2018). <https://www.epa.gov/climateleadership/ghg-emission-factors-hub>
(9) Includes equipment, such as dumpers, and excavators, as well as fuel consumption from trucks that are used off-road in construction.
(10) Numbers are based on a hypothetical assessment and not from a specific source.

Summary of GHG Sources and Sinks From Land Use Changes

Source Type ID	Emission Source	Area (acres)	Net CO ₂ Flux for land use conversion (M metric tons CO ₂ e) ^{1,2}	2019 Total US Land Use Change from Wetland to "other" (thousands of hectares) ³	2019 Total US Land Use Change from Grassland (thousands of hectares) ³	CO ₂ e emission factor (metric tons CO ₂ e/acre/year)	CO ₂ e Emissions (tons/year)
DE-4	Land Use Change - Conversion from wetlands to open water "other" ²	0.1	1.5	121	--	5.02	0.55
DE-4	Land Use Change - Conversion from grassland to Forest Land ¹	1.4	-10.5	--	992	(4.28)	(6.61)
						Total	(6.06)

Notes:

(1) Table 6-24: Net CO₂ Flux from Forest C Pools in Land Converted to Forest Land by Land Use Change Category, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2019. <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2019>

(2) Table 6-66: Net CO₂ Flux from C Stock Changes in Vegetated Coastal Wetlands Converted to Unvegetated Open Water Coastal Wetlands, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2019. <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2019>

(3) Table 6-5: Land Use and Land-Use Change for the U.S. Managed Land Base for All 50 States, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 - 2019. <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2019>