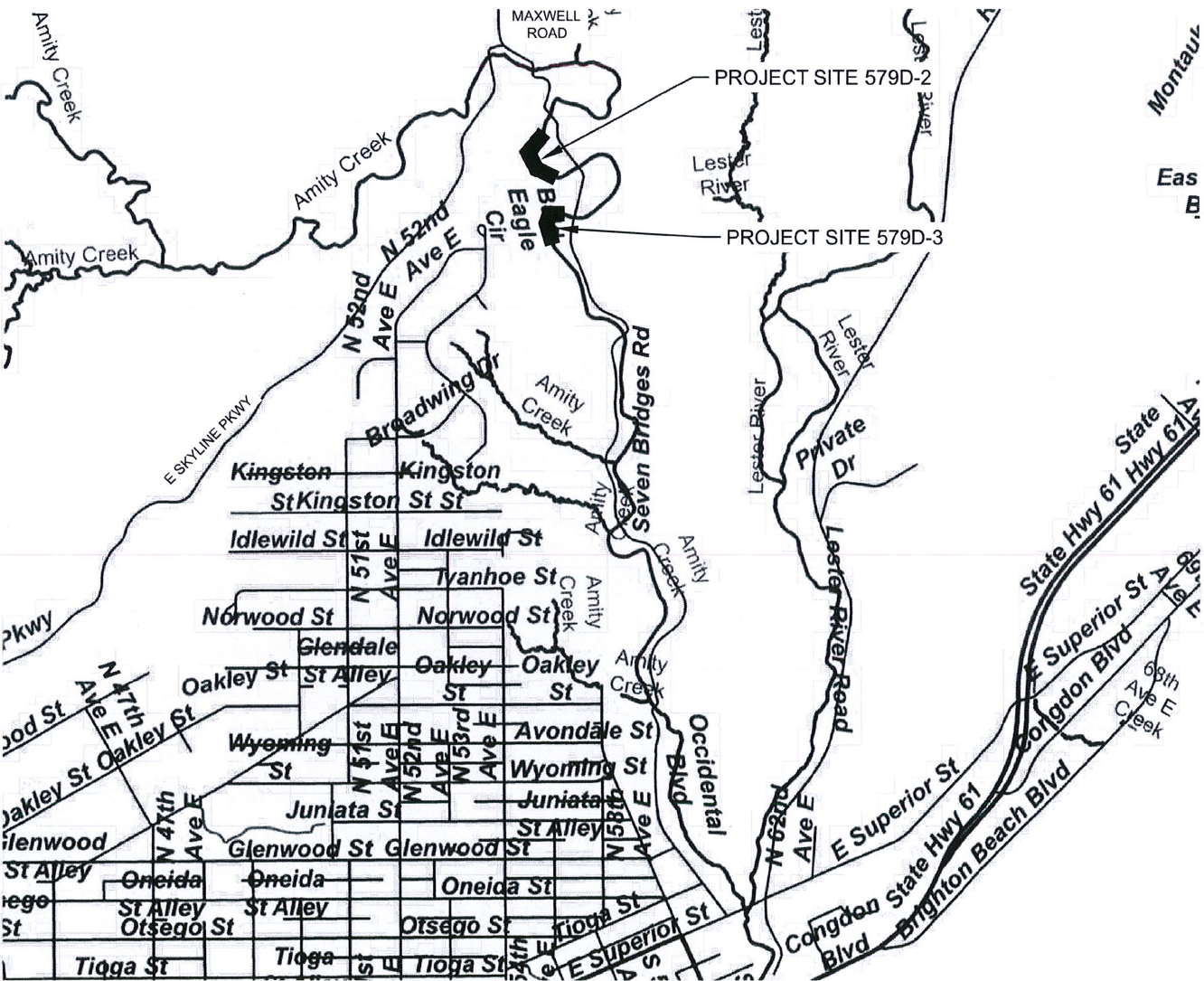


CITY OF DULUTH

DEPARTMENT OF PUBLIC WORKS AND UTILITIES - ENGINEERING DIVISION

CONSTRUCTION PLANS FOR: AMITY CREEK BANK STABILIZATION (2017) REACH #579 D-2, D-3

CITY PROJECT NO. 1355



SITE LOCATION MAP
NO SCALE

WARNING
LOCATION OF UNDERGROUND UTILITIES
TO BE VERIFIED BY CONTRACTOR
GOPHER STATE ONE CALL
1-800-252-1166
REQUIRED BY LAW

THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D. THIS QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF C/ASCE 38-2, ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA."



GOVERNING SPECIFICATIONS

THE 2016 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION
"STANDARD SPECIFICATIONS FOR CONSTRUCTION" SHALL GOVERN.
AVAILABLE AT: <http://www.dot.state.mn.us/pre-letting/spec/index.html>

THE 2017 EDITION OF THE CITY OF DULUTH PUBLIC WORKS AND UTILITIES DEPARTMENT
STANDARD SPECIFICATIONS AND SUPPLEMENTS OR ADDENDUMS SHALL APPLY.
AVAILABLE AT:
<http://www.duluthmn.gov/engineering/standard-construction-specifications/>

THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D. THIS
QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF C/ASCE 38-2,
ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING
SUBSURFACE UTILITY DATA."

WARNING:
LOCATION OF UNDERGROUND UTILITIES TO BE VERIFIED BY CONTRACTOR. CALL BEFORE
DIGGING. GOPHER STATE ONE CALL 1-800-252-1166 AS REQUIRED BY LAW.

SHEET INDEX

SHEET NO.	DESCRIPTION
G-1	TITLE SHEET
C-1	QUANTITIES AND SCHEDULES
C-2	OVERVIEW
C-3	TRAFFIC CONTROL PLAN
C-4	ACCESS PLAN
C-5	EROSION CONTROL DETAILS
C-6	CHANNEL DETAILS
C-7	TOEWOD DETAILS
C-8	COIR BENCH DETAILS
C-9	TYPICAL SECTIONS
C-10	RIFFLE STRUCTURE DETAIL
C-11	PLANTING PLAN
C-12-13	PLAN & PROFILE - REACH 579D-2
C-14-15	PLAN & PROFILE - REACH 579D-3
CS-1-11	CROSS SECTIONS - REACH 579D-2
CS-12-19	CROSS SECTIONS - REACH 579D-3

THIS PLAN SET CONTAINS 35 SHEETS.

PROJECT COORDINATE SYSTEM IS NAD 1983
HARN ADJ. MN ST. LOUIS CS96 (US FEET)

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

PROJECT ENGINEER: JOSEPH J. JUREWICZ MAR. 13, 2017 50396
DATE LIC. NO.

CITY APPROVAL

APPROVED: *[Signature]* 3/30/17
CHIEF ENGINEER OF TRANSPORTATION DATE
APPROVED: *[Signature]* 5/9/17
CHIEF ENGINEER OF UTILITIES DATE
APPROVED: *[Signature]* 5/9/17
CITY ENGINEER DATE

PROJECT NO.	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
00616087	DRAWN BY: JAS				
PROJECT DATE:	CHECKED BY: JJJ				
F.B.:					

PLOT DATE: 3/28/17, P:\610\616\00616087\CADD\Construction Documents\00616087_Amity_Title Sheet.dwg



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AMITY CREEK BANK STABILIZATION 2017
CITY OF DULUTH, MINNESOTA
CITY OF DULUTH PROJECT NO. 1355

TITLE SHEET

FILE NO
00616087
SHEET
G-1

ESTIMATED QUANTITIES - TABLE 1						
ITEM NO.	SPEC.	ITEM DESCRIPTION	UNITS	TOTAL ESTIMATED QUANTITY	QUANTITY SITE 579D-2	QUANTITY SITE 579D-3
1	A	Project Mobilization/Demobilization	LS	1	0.5	0.5
2	B	Control of Water	LS	1	0.5	0.5
3	C	Construction Entrance	EA	2	1	1
4	D	Maintenance and Restoration of Access Paths	LS	1	0.5	0.5
5	E	Clearing and Grubbing	LS	1	0.5	0.5
6	F	Toewood	LF	210	110	100
7	G	Coir Bench	SY	1320	920	400
8	H	Live Stake	EA	185	105	80
9	I	Filter Log	LF	900	500	400
10	J	Erosion Control Blanket, Category 3N-2S	SY	2350	1750	600
11	K	Seeding	SY	2910	2050	860
12	L	Shrubs	EA	74	43	31
13	M	Deadfall and Debris Removal and Off-Site Disposal	LS	1	0.5	0.5
14	N	Boulder Cross Vane	EA	8	5	3
15	O	Riffle	EA	10	6	4
16	P	Vegetated Keyway	EA	6	4	2
17	Q	Site Grading	LS	1	0.5	0.5
18	R	Silt Fence	LF	200	100	100
19	S	Traffic Control	LS	1	0.5	0.5

GENERAL CONSTRUCTION NOTES:

1. ALL EXCAVATION WITHIN OR ADJACENT TO THE STREAM BED SHALL BE UNDERTAKEN IN DRY CONDITIONS. THE CONTRACTOR SHALL INSTALL SANDBAGS, COFFERDAMS, AND BYPASS PIPING AS NECESSARY TO SAFELY ROUTE THE STREAM FLOW AROUND THE EXCAVATION AREA UNTIL CONSTRUCTION IS COMPLETE. THIS WORK ITEM SHALL BE PAID FOR AS A PART OF THE LUMP SUM BID ITEM FOR CONTROL OF WATER.
2. DEBRIS AND DEADFALL REMOVAL SHALL NOT BE INTERPRETED TO MEAN GRUBBING, BUT MAY INCLUDE REMOVAL OF LIVE TIMBER BY CUTTING AND LEAVING STUMP INTACT. LIVE TIMBER CAN BE CUT AT A BREAK OR NO CLOSER THAN 2-FEET TO THE GROUND. DEADFALL IS TO BE CONSIDERED ONLY FLOATABLE DEBRIS. DEADFALL OR CUT TIMBER IN GOOD CONDITION MAY BE UTILIZED ONSITE FOR TOEWOOD OR COIR BENCH STABILIZATION AS APPROVED BY THE ENGINEER.
3. SITE GRADING SHALL INCLUDE TOPSOIL STRIPPING AND STOCKPILING, AND SUBSOIL EXCAVATION AND STOCKPILING. IT IS ANTICIPATED THAT THE EXCAVATED SUBSOIL WILL BE SUITABLE TO REUSE AS BACKFILL FOR TOEWOOD, COIR BENCH AND IN OTHER AREAS AS NECESSARY.
4. OTHER ITEMS WHERE A METHOD OF PAYMENT IS NOT NOTED SHALL BE INCIDENTAL TO CONSTRUCTION.

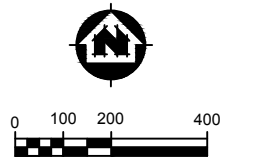
INVASIVE SPECIES CONTROL MEASURES:

PRIOR TO ENTERING THE PROJECT SITE, THE CONTRACTOR SHALL INSPECT ALL EQUIPMENT AND GEAR AND REMOVE ALL AQUATIC PLANTS, ANIMALS, AND MUD FROM ALL ITEMS. EQUIPMENT AND GEAR SHALL BE DEFINED AS ALL BOATS, MOTORS, TRACKED VEHICLES, HEAVY EQUIPMENT, BARGES, HOSES, PUMPS, SHEET PILING, SILT CURTAINS, OR TURBIDITY BARRIERS, WADERS AND ALL OTHER EQUIPMENT WHICH MAY COME IN CONTACT WITH SURFACE WATERS DURING CONSTRUCTION. THE CONTRACTOR SHALL SCRUB ALL EQUIPMENT AND GEAR WITH A STIFF-BRISTLED BRUSH WHEN FEASIBLE. THE CONTRACTOR SHALL MAINTAIN A MANIFEST DOCUMENTING THE ITEM, DATE, LOCATION AND DISINFECTION METHOD USED TO PERFORM DISINFECTION.

ESTIMATED EARTHWORK QUANTITIES - TABLE 2				
ITEM DESCRIPTION	UNITS	TOTAL ESTIMATED QUANTITY	QUANTITY SITE 579D-2	QUANTITY SITE 579D-3
Excavation	CY	1972	1253	719
Fill	CY	1856	1436	420

EARTHWORK NOTES:

1. QUANTITIES ARE NOT ADJUSTED FOR EXPANSION OR SHRINKAGE OF MATERIAL DURING EXCAVATION OR FILLING.
2. QUANTITIES INCLUDE ESTIMATED AMOUNTS OF EXCAVATION NEEDED FOR INSTALLATION OF TOEWOOD.



PROJECT COORDINATE SYSTEM IS NAD 1983
HARN ADJ. MN ST. LOUIS CS96 (US FEET)

PROJECT NO.:	00616087	SCALE:	AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE:		DRAWN BY:	JAS				
F.B.:		CHECKED BY:	JJJ				

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MAR. 13, 2017
Date

50396
License No.

JOSEPH J. JURKOWICZ

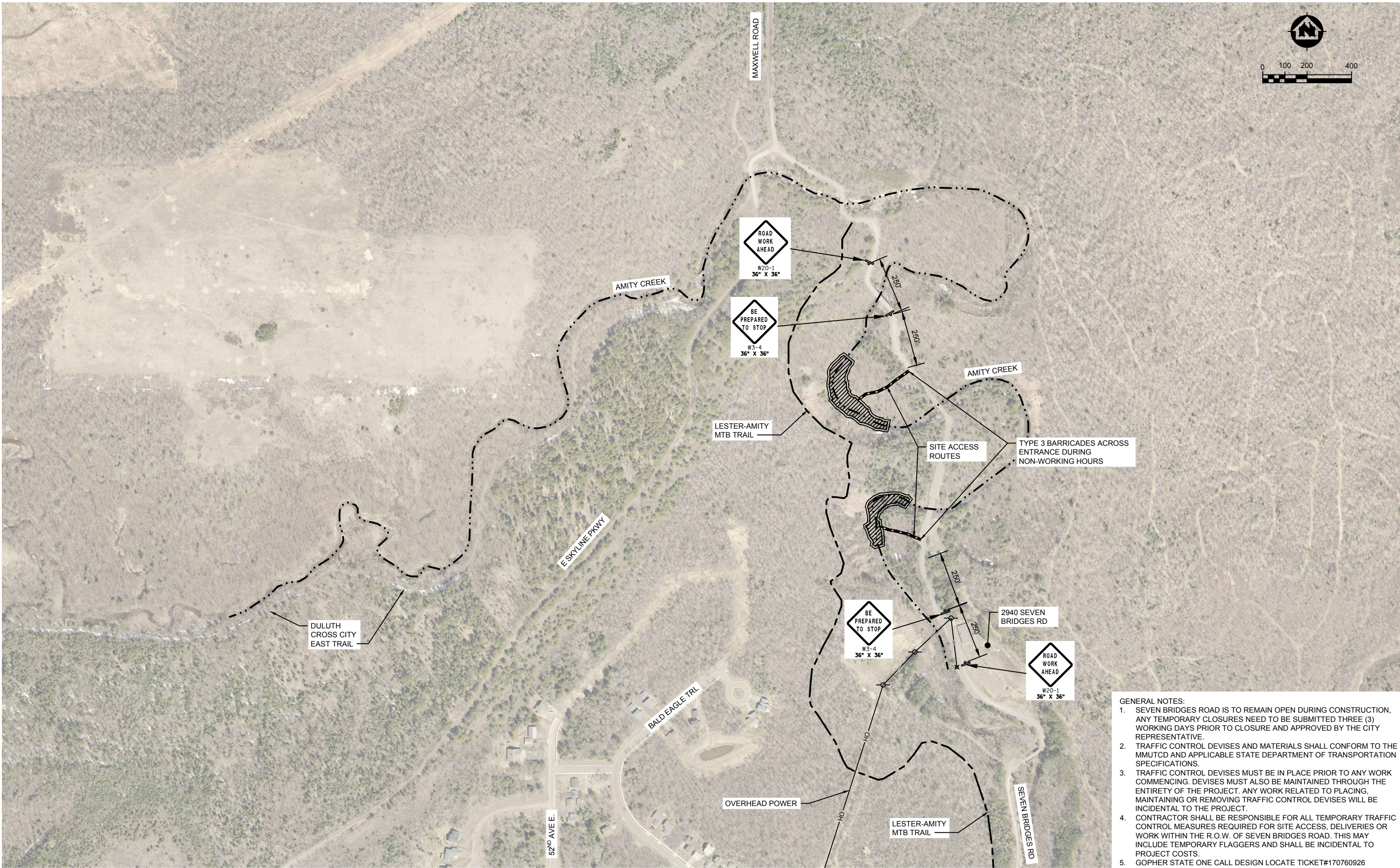


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AMITY CREEK BANK STABILIZATION 2017
CITY OF DULUTH, MINNESOTA
CITY OF DULUTH PROJECT NO. 1355

OVERVIEW

FILE NO.
00616087
SHEET
C-2



- GENERAL NOTES:
1. SEVEN BRIDGES ROAD IS TO REMAIN OPEN DURING CONSTRUCTION, ANY TEMPORARY CLOSURES NEED TO BE SUBMITTED THREE (3) WORKING DAYS PRIOR TO CLOSURE AND APPROVED BY THE CITY REPRESENTATIVE.
 2. TRAFFIC CONTROL DEVICES AND MATERIALS SHALL CONFORM TO THE MMUTCD AND APPLICABLE STATE DEPARTMENT OF TRANSPORTATION SPECIFICATIONS.
 3. TRAFFIC CONTROL DEVICES MUST BE IN PLACE PRIOR TO ANY WORK COMMENCING. DEVICES MUST ALSO BE MAINTAINED THROUGH THE ENTIRETY OF THE PROJECT. ANY WORK RELATED TO PLACING, MAINTAINING OR REMOVING TRAFFIC CONTROL DEVICES WILL BE INCIDENTAL TO THE PROJECT.
 4. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY TRAFFIC CONTROL MEASURES REQUIRED FOR SITE ACCESS, DELIVERIES OR WORK WITHIN THE R.O.W. OF SEVEN BRIDGES ROAD. THIS MAY INCLUDE TEMPORARY FLAGGERS AND SHALL BE INCIDENTAL TO PROJECT COSTS.
 5. GOPHER STATE ONE CALL DESIGN LOCATE TICKET#170760926

PROJECT NO.:	00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
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F.B.:		CHECKED BY: JJJ				

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MAR. 13, 2017
Date

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AMITY CREEK BANK STABILIZATION 2017
CITY OF DULUTH, MINNESOTA
CITY OF DULUTH PROJECT NO. 1355

TRAFFIC
CONTROL PLAN

FILE NO.
00616087
SHEET
C-3



- GENERAL NOTES:
1. TREE SALVAGE AREAS ARE LOCATIONS WHERE THE ENGINEER HAS DETERMINED THAT THERE ARE PREVIOUSLY FALLEN TREES SUITABLE TO BE USED FOR STREAM BANK RESTORATIONS. ANY WORK RELATED TO COLLECTING TREES FROM SALVAGE AREAS WILL BE INCIDENTAL TO THE STREAM RESTORATION ACTIVITY OCCURRING. DISTURBED AREAS MUST BE MULCHED AND SEEDED.
 2. CONTRACTOR SHALL SALVAGE SELECT TREES WHILE CREATING SITE ACCESS ROUTES TO BE USED FOR STREAM BANK RESTORATION ACTIVITIES. ON SITE REPRESENTATIVE WILL DETERMINE WHICH TREES WILL BE SALVAGED.
 3. CONTRACTOR SHALL LIMIT TRACKING OF MATERIAL ONTO THE PAVED ROADWAY BY INSTALLING ROCK CONSTRUCTION ENTRANCES AT ACCESS POINTS. ANY TRACKED MATERIAL ON THE ROAD WILL BE REQUIRED TO BE CLEANED BEFORE THE END OF WORK EACH DAY. CLEANING OF ROADWAYS WILL BE INCIDENTAL TO THE INSTALLATION AND REMOVAL OF ROCK CONSTRUCTION ENTRANCES.
 4. SITE ACCESS ROUTES SHALL BE COORDINATED WITH THE ON SITE REPRESENTATIVE PRIOR TO CLEARING SITE ACCESS.
 5. CONTRACTOR SHALL RESTORE SITE ACCESS ROUTES AS SPECIFIED AT CONSTRUCTION COMPLETION.
 6. IF THE CONTRACTOR DETERMINES A STAGING AREA IS NECESSARY, CONTRACTOR SHALL DISCUSS THIS NEED AT THE PRECONSTRUCTION MEETING, AND COORDINATE AVAILABLE LOCATION WITH CITY AND ENGINEER.
 7. SEVEN BRIDGES ROAD SHALL REMAIN OPEN DURING CONSTRUCTION. CONTRACTOR SHALL DISCUSS ANY TEMPORARY CLOSURES WITH ENGINEER AND CITY REPRESENTATIVE A MINIMUM OF THREE (3) WORKING DAYS PRIOR TO TEMPORARY ROAD CLOSURE.
 8. CONTRACTOR WILL BE REQUIRED TO BRING IN MATERIAL TO CREATE ACCESS TO EACH SITE OFF OF SEVEN BRIDGES ROAD DUE TO THE STEEP SLOPE ALONG THE SHOULDER OF THE ROAD. SLOPE IS APPROXIMATELY 7-FT HIGH AT APPROXIMATELY A 1:1 (H:V) SLOPE. ANY FILL REQUIRED FOR ACCESS WILL BE INCLUSIVE TO THE CONSTRUCTION ENTRANCE BID ITEM.
 9. CONTRACTOR WILL BE REQUIRED TO PROTECT BITUMINOUS PAVEMENT OF SEVEN BRIDGES ROAD. ANY PAVEMENT DAMAGE WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPAIR, NO ADDITIONAL PAYMENT WILL BE PROVIDED.

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F.B.:		CHECKED BY: JJJ				

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CITY OF DULUTH, MINNESOTA
CITY OF DULUTH PROJECT NO. 1355

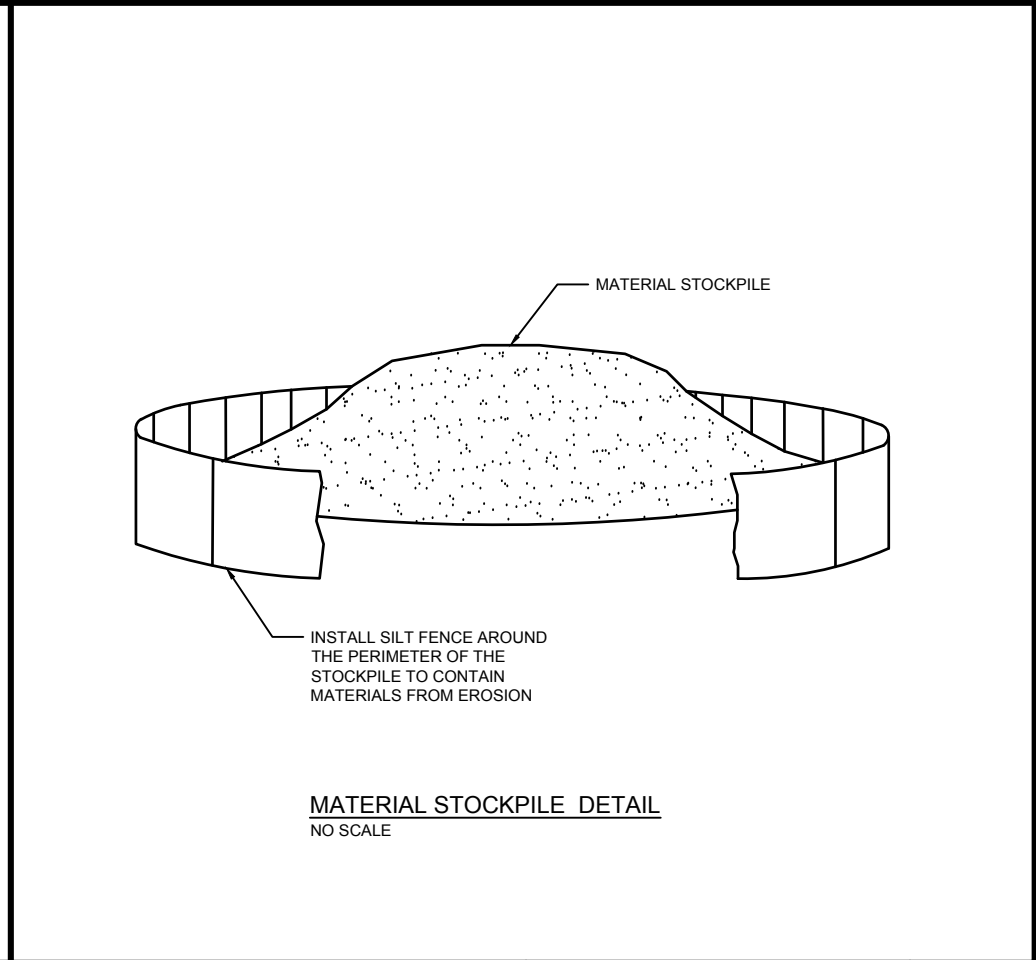
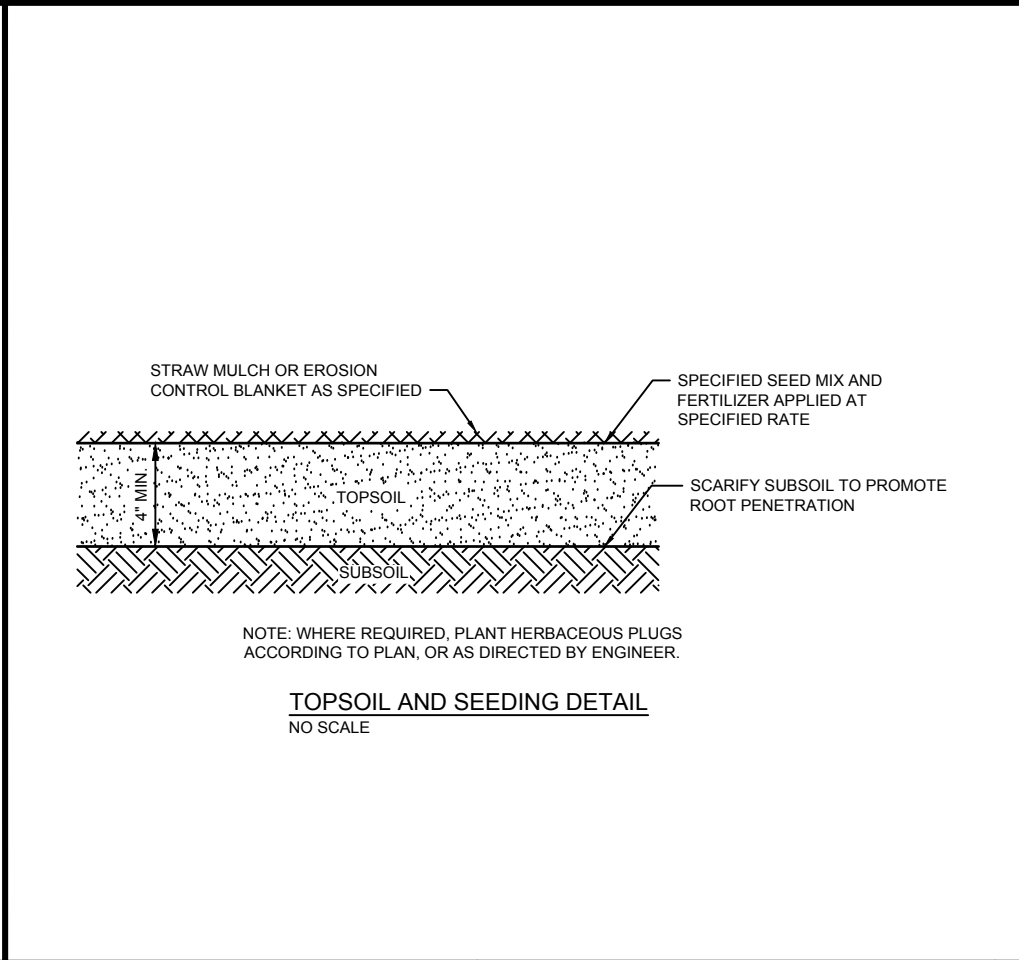
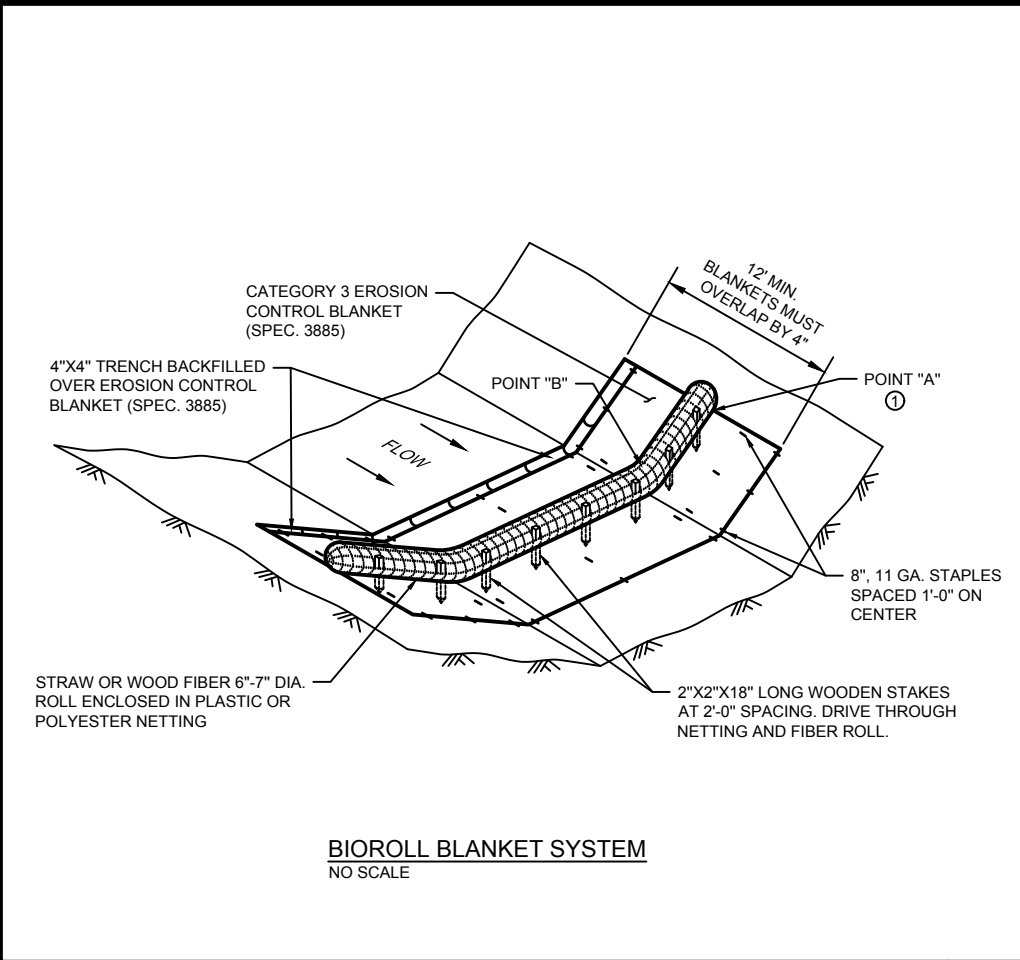
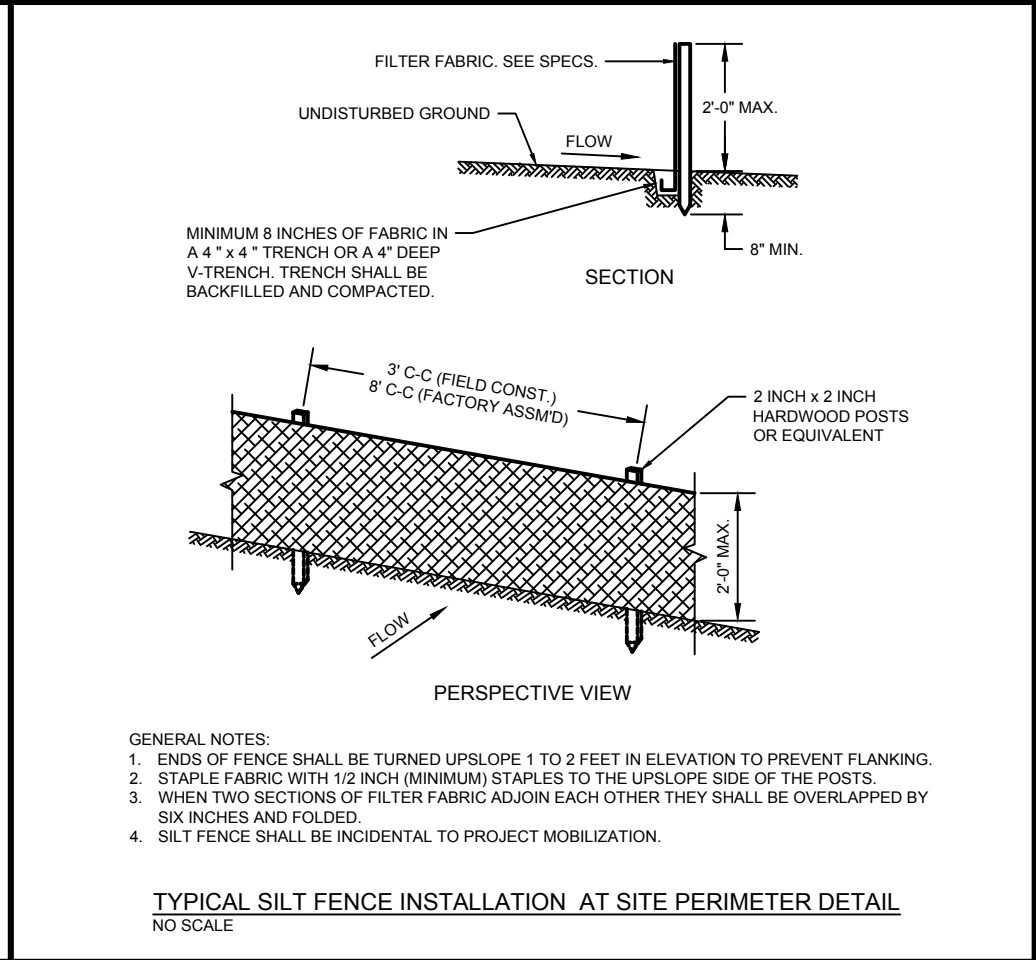
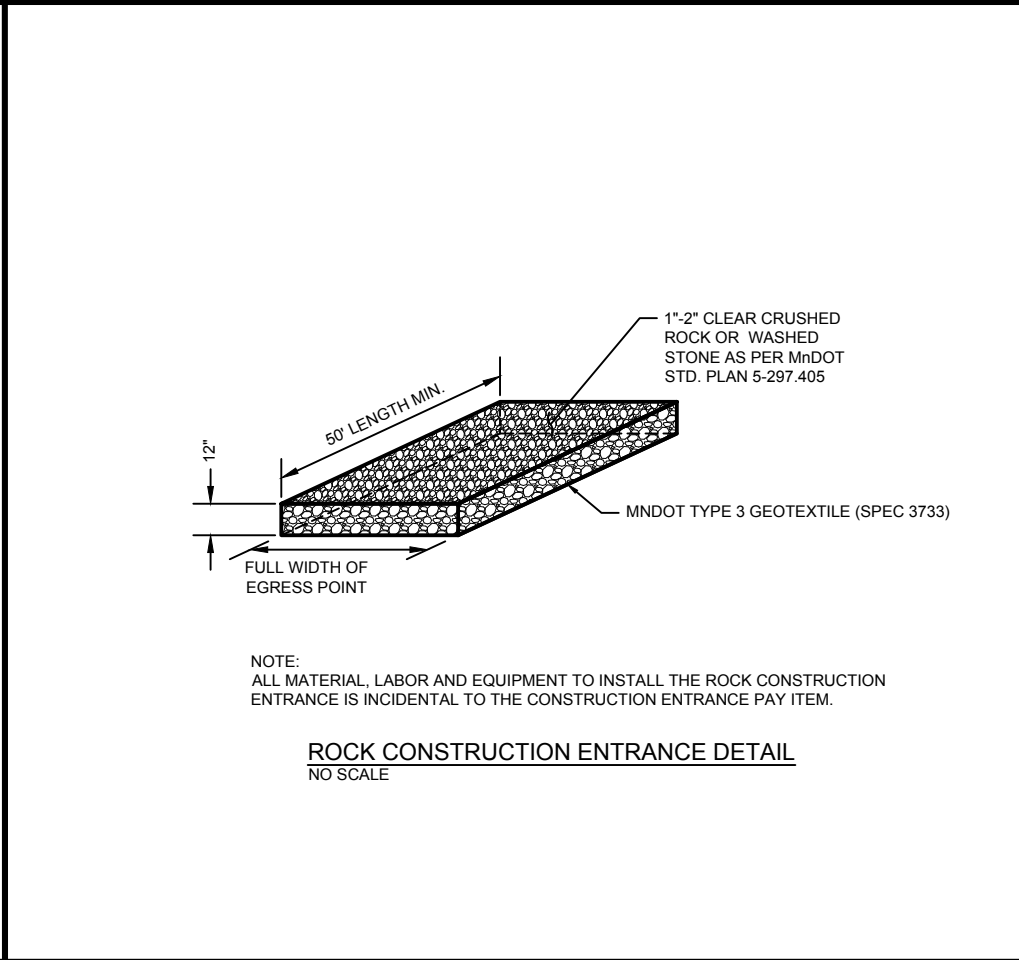
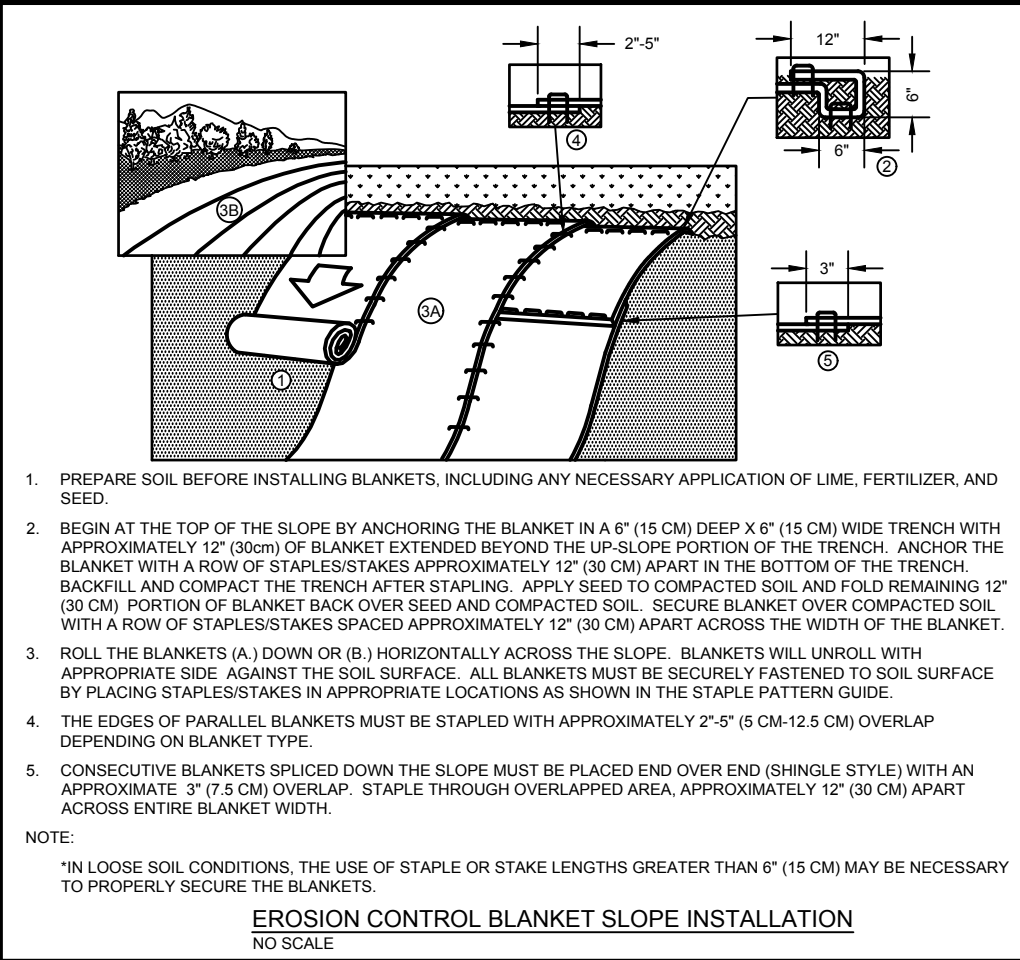
ACCESS PLAN

FILE NO.

00616087

SHEET

C-4



PROJECT NO.: 00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
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AMITY CREEK BANK STABILIZATION 2017 CITY OF DULUTH, MINNESOTA CITY OF DULUTH PROJECT NO. 1355	EROSION CONTROL DETAILS	FILE NO. 00616087 SHEET C-5
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NOTES:

1. COARSE BACKFILL (MNDOT COARSE FILTER AGGREGATE) SHALL BE PLACED TO A THICKNESS EQUAL TO THE DEPTH OF THE HEADER AND FOOTER BOULDERS AND SHALL EXTEND OUT FROM THE VANE ARMS TO THE STREAM BANK.
2. THE VANE ARMS OF THE BOULDER CROSS VANE SHALL BE CONSTRUCTED FIRST, FOLLOWED BY THE CENTRAL VANE.
3. BOULDER CROSS VANES SHALL BE BUILT TYPICALLY AS FOLLOWS:

A. OVER EXCAVATE STREAM BED TO A DEPTH EQUAL TO THE TOTAL THICKNESS OF THE HEADER AND FOOTER BOULDERS.

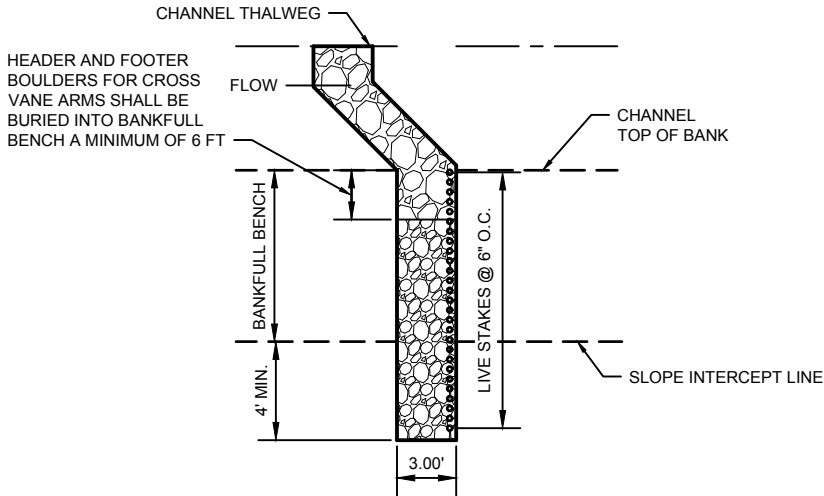
B. PLACE FOOTER BOULDERS OF THE VANE ARM. THERE SHALL BE NO GAPS BETWEEN BOULDERS.

C. PLACE COARSE BACKFILL BEHIND THE FOOTER BOULDERS.

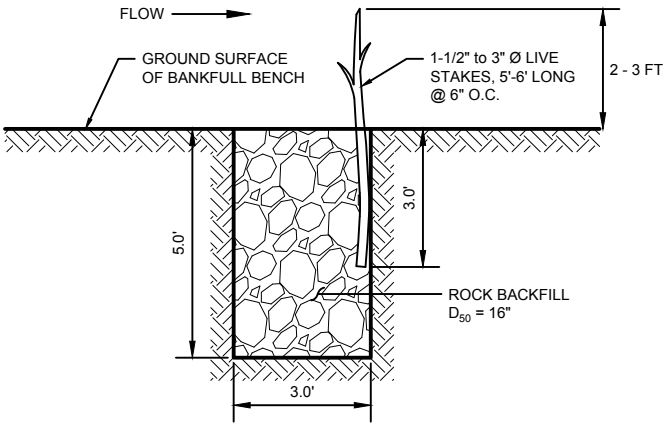
D. INSTALL HEADER BOULDERS ON THE VANE ARM ON TOP OF AND SET SLIGHTLY BACK FROM THE FOOTER BOULDERS (SUCH THAT PART OF THE HEADER BOULDER IS RESTING ON THE COARSE BACKFILL). HEADER BOULDERS SHALL SPAN THE SEAMS OF THE FOOTER BOULDERS. THERE SHALL BE NO GAPS BETWEEN BOULDERS.

E. PLACE COARSE BACKFILL BEHIND HEADER BOULDERS ENSURING THAT ANY VOIDS BETWEEN THE BOULDERS ARE FILLED.

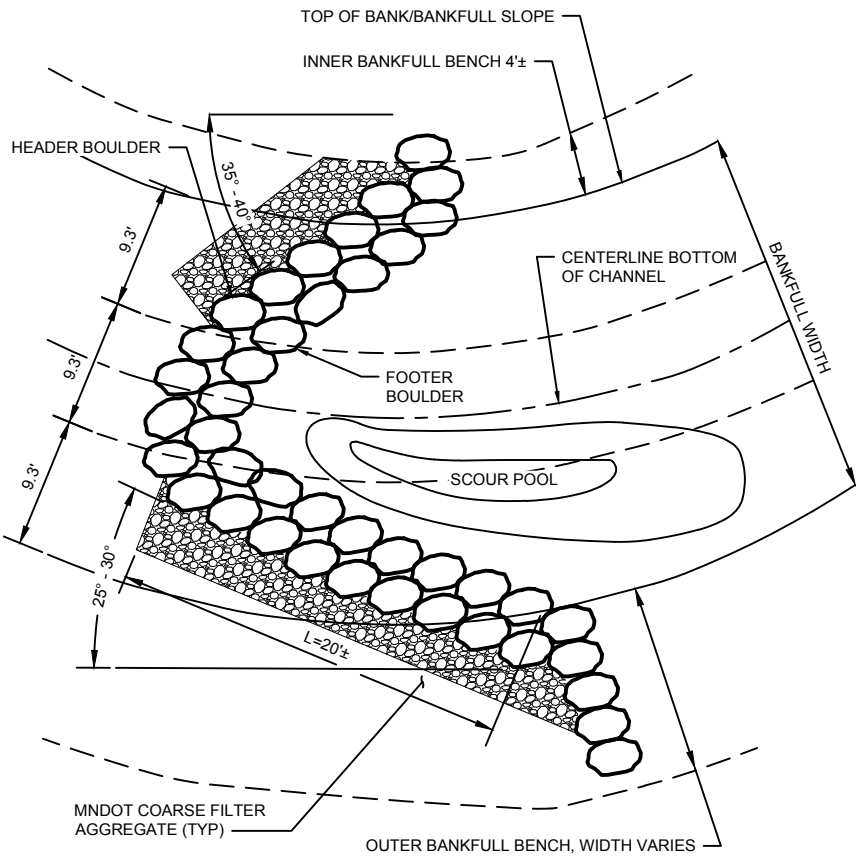
F. PLACE EACH BOULDER TO FORM THE HOOK BY INSTALLING A FOOTER BOULDER, THEN A HEADER BOULDER. GAPS AS WIDE AS 1/4 TO 1/3 THE BOULDER DIAMETER SHALL BE LEFT BETWEEN THE CENTRAL VANE BOULDERS.



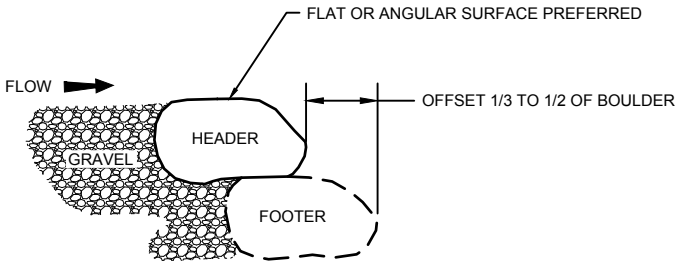
TYPICAL VEGETATED KEYWAY PLAN
NO SCALE



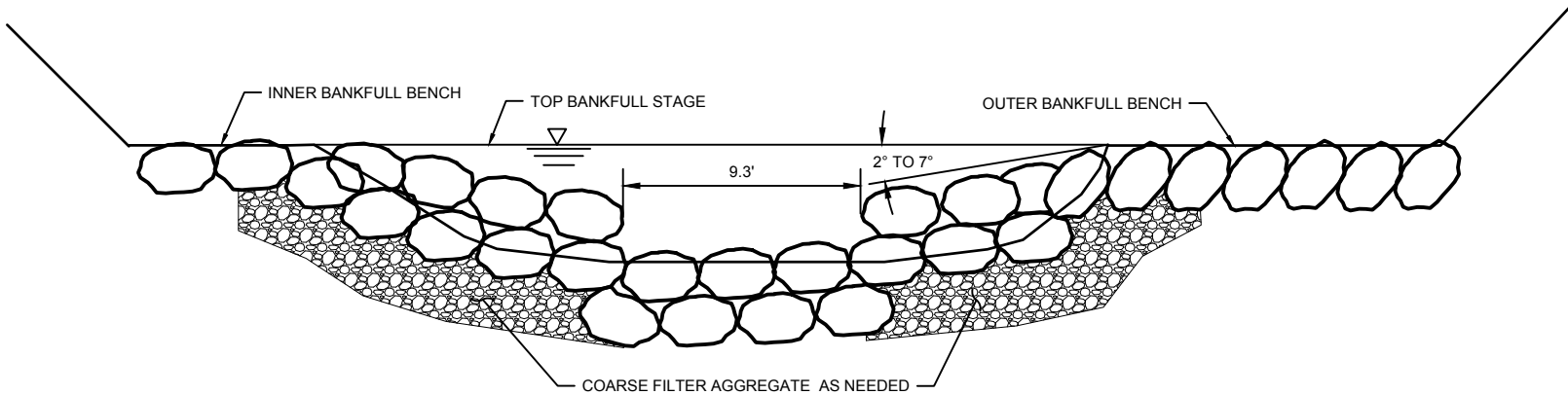
TYPICAL VEGETATED KEYWAY SECTION
NO SCALE



DETAIL OF BOULDER CROSS VANE
PLAN VIEW



HEADER AND FOOTER BOULDER PLACEMENT DETAIL



DETAIL OF BOULDER CROSS VANE
CROSS SECTION

PROJECT NO.:	00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
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MAR. 13, 2017

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AMITY CREEK BANK STABILIZATION 2017

CITY OF DULUTH, MINNESOTA

CITY OF DULUTH PROJECT NO. 1355

CHANNEL
DETAILS

FILE NO.

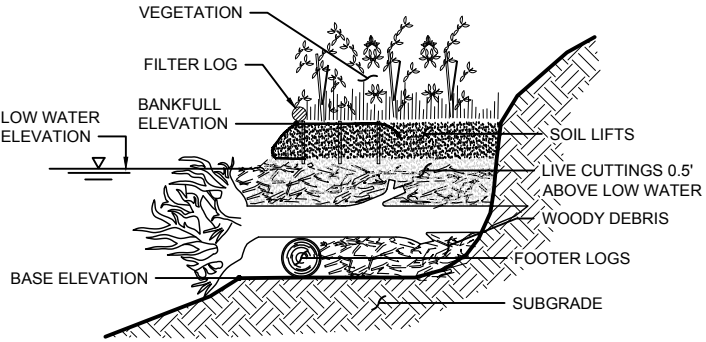
00616087

SHEET

C-6

1. INSTALLATION SUMMARY

TOEWOOD BENCH CONSTRUCTION WILL BE DONE IN DRY WEATHER CONDITIONS AFTER STREAM HAS BEEN DIVERTED AND SITE DEWATERED. ENGINEER REPRESENTATIVE MUST BE PRESENT FOR INSTALLATION OF TOEWOOD BENCH.

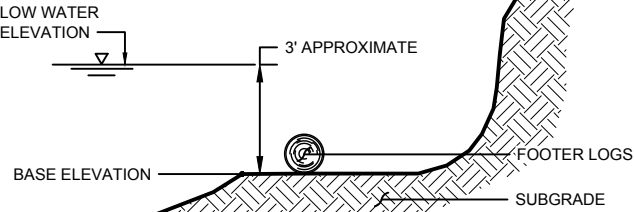


STATION - STATION (OUTSIDE BANK)
16+71 - 16+84
15+73 - 16+19
14+98 - 15+10
14+21 - 14+32
13+46 - 13+58
3+28 - 3+41
2+30 - 2+76
1+53 - 1+66

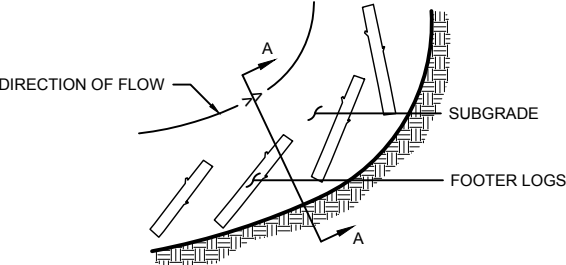
SEE CROSS-SECTION SHEETS CS-1
THRU CS-19 FOR ELEVATIONS.

2. SUBGRADE AND FOOTER LOGS

- SPECIFICATION:
- 10" MINIMUM DIAMETER.
 - LIMBS REMOVED.
 - 10' MINIMUM LENGTH.
- PLACEMENT:
- EXCAVATE TO BASE ELEVATION.
 - CONTRACTOR SHALL MAKE EFFORT TO SEPARATE GRANULAR AND FINE FILL NATIVE MATERIAL FOR USE IN STEPS 4 & 6.
 - SPACE FOOTER LOGS ENDS 8' APART, PERPENDICULAR TO STREAM.
 - KEY FOOTER LOGS 8' INTO BANK, 2' PROTRUDING INTO STREAM.



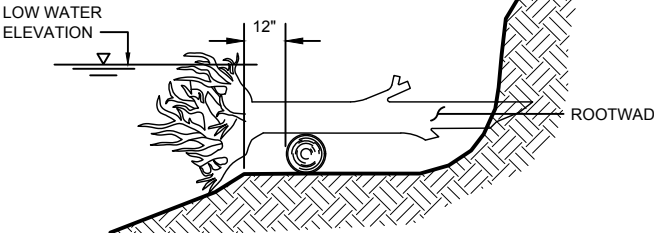
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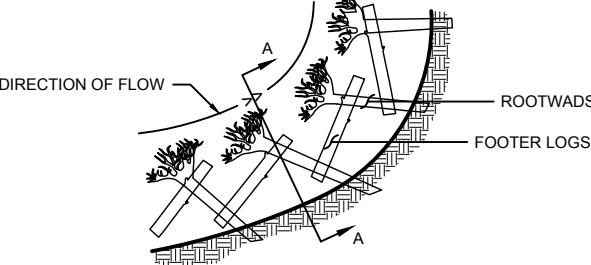
PLAN
NO SCALE

3. ROOTWAD PLACEMENT

- SPECIFICATION:
- 10" MINIMUM DIAMETER.
 - LENGTH INDICATED IN DESIGN CROSS SECTION OR 10' MINIMUM.
 - LIMBS SHALL BE REMOVED.
 - ROOTWADS SHALL BE LEFT INTACT.
- PLACEMENT:
- PLACE ROOTWADS ON TOP OF FOOTER LOGS AS SHOWN, OVERHANG ROOTWAD LOGS 1'-2'.
 - ANGLE ROOTWADS UPSTREAM AS DIRECTED IN FIELD.
 - PLACE ONE ROOTWAD PER FOOTER LOG.



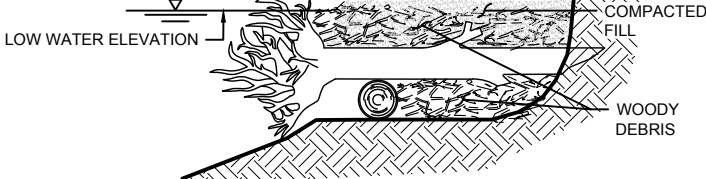
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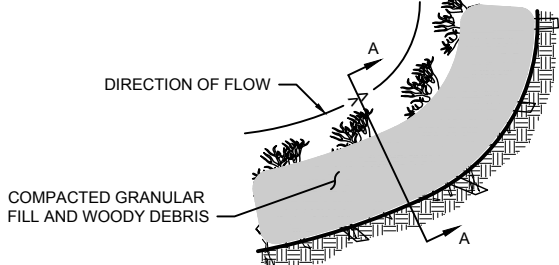
PLAN
NO SCALE

4. WOODY DEBRIS PLACEMENT

- SPECIFICATION:
- WOODY MATERIAL COMPOSED OF 75% SMALL LIMBS AND BRANCHES, 25% MEDIUM SIZED MATERIAL (3"-6" LIMBS), AND LOGS UP TO 10" DIAMETER (ONE PER FIVE FEET).
 - ALL MATERIAL SHALL BE FRESHLY CUT (NO ROTTEN LOGS OR LIMBS).
- PLACEMENT:
- FILL BETWEEN FOOTER LOGS AND ROOTWADS WITH WOODY MATERIAL.
 - PLACE WOODY MATERIAL TO 0.5' ABOVE LOW WATER ELEVATION.
 - LAYER GRANULAR FILL ON TOP OF WOODY DEBRIS.
 - COMPACT SO THE SETTLING OF FILL IS MINIMIZED, BUT DEBRIS IS NOT DISPLACED.
 - COMPACTED FILL SHALL BE PLACED SUCH THAT THE TOP IS 0.8' ABOVE LOW WATER ELEVATION.



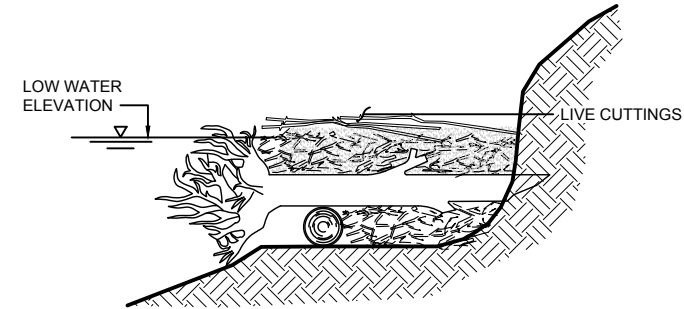
SECTION A-A
NO SCALE



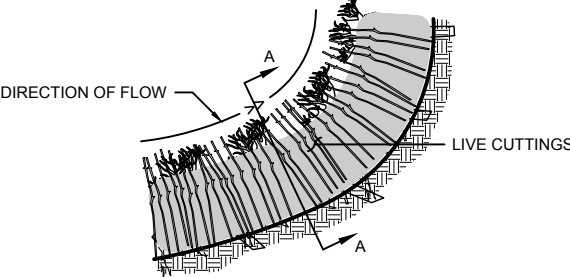
PLAN
NO SCALE

5. LIVE CUTTINGS

- PLACEMENT:
- LAY CUTTINGS WITH A DENSITY OF 10 CUTTINGS PER LINEAL FOOT.
 - TOPS OF CUTTINGS SHALL POINT TOWARD CHANNEL.
 - TRIM EXPOSED ENDS OF CUTTINGS, LEAVE NO MORE THAN 6" EXPOSED.
 - DEPOSIT NATIVE FILL OVER CUTTINGS AND WATER LIBERALLY.
 - COMPRESS FILL TO 2"-4".



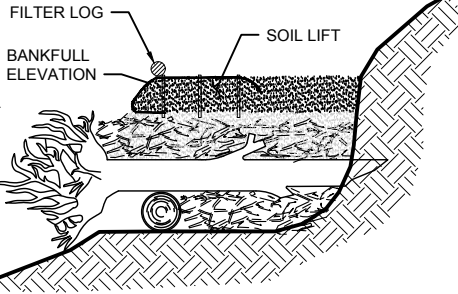
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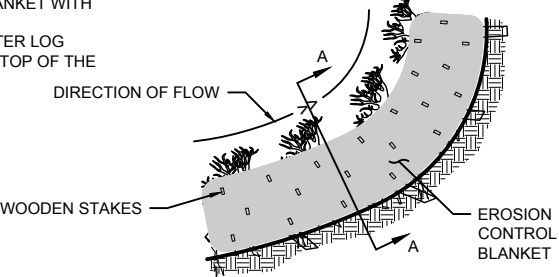
PLAN
NO SCALE

6. SOIL LIFT

- SPECIFICATION:
- BLANKET SHALL BE MINIMUM 12' WIDE ROLANKA BIOD-MAT, GEOCOIR 700, OR EQUAL LINED WITH MNDOT CAT. II EROSION CONTROL BLANKET WITH NATURAL NETTING.
 - 18" WOODEN STAKES (2x4 CUT AT ANGLE) PLACED AT MANUFACTURERS RECOMMENDED SPACING (3' MIN. TYP.) ALONG BLANKET.
- PLACEMENT:
- BEFORE APPLYING BLANKET, PLANT SEED ACCORDING TO PLANTING PLAN.
 - LAY MINIMUM 3' OF BLANKET (COCONUT BLANKET AND LINER) ALONG EDGE OF BENCH.
 - PLACE FILL ON TOP OF BLANKET, SLOPE THE FACE OF THE SOIL LIFT AT 2H:1V.
 - BUCKET COMPACT UNTIL BANKFULL ELEVATION PLUS 0.5' IS MET.
 - TRENCH COCONUT BLANKET INTO GROUND ONE FOOT.
 - CONTINUE TO FILL BENCH TO EXISTING BANK AND BLANKET WITH MNDOT CAT. 3 EROSION CONTROL BLANKET WITH NATURAL NETTING.
 - SECURE BLANKET WITH STAKES.
 - INSTALL FILTER LOG ALONG THE TOP OF THE SOIL LIFT.



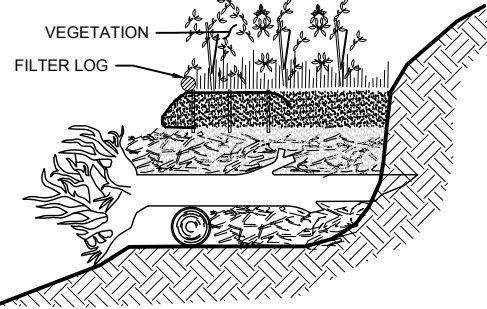
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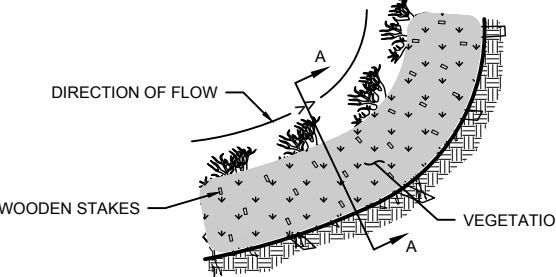
PLAN
NO SCALE

7. VEGETATION

- SPECIFICATION:
- SEE PLANTING PLAN FOR SPECIFICATIONS.
- PLACEMENT:
- PLANT SEED ON FACE OF LIFT BEFORE APPLYING EROSION CONTROL BLANKET.
 - FILTER LOG TO BE REMOVED ONCE VEGETATION BEGINS TO GROW, COVERING APPROXIMATELY 50% OF SOIL LIFT



SECTION A-A
NO SCALE

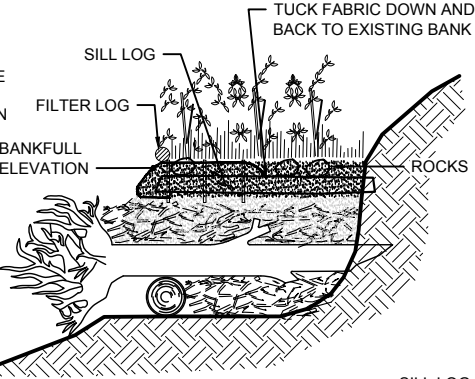


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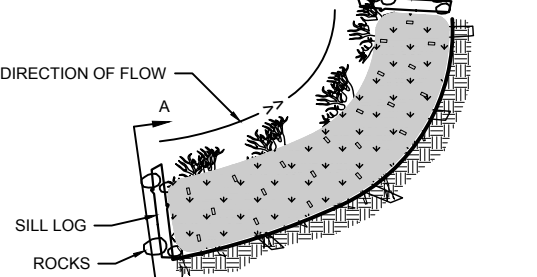
8. SILL LOGS & TERMINATION

- SPECIFICATION:
- 10" MINIMUM DIAMETER.
 - LIMBS REMOVED.
 - LENGTH SHALL BE DETERMINED BY WIDTH OF TOEWOOD BENCH.

- PLACEMENT:
- PLACE ONE SILL LOG AT THE START AND END OF THE TOEWOOD BENCH, PERPENDICULAR TO THE DIRECTION OF FLOW.
 - PLACE LARGE ROCKS ON TOP OF SILL LOG.
 - TOP OF ROCKS SHALL MEET BANKFULL ELEVATION.
 - TRENCH COIR BLANKET ONE FOOT UP AND DOWNSTREAM ENDS OF TOEWOOD BENCH.
 - TRANSITION BANKFULL BENCH TO EXISTING GRADE AS DIRECTED IN FIELD.



SECTION A-A
NO SCALE



PLAN
NO SCALE

PROJECT NO.:	00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE:		DRAWN BY: JAS				
F.B.:		CHECKED BY: JJJ				

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MAR. 13, 2017
Date
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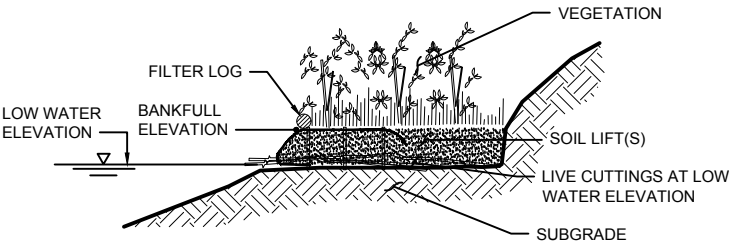
AMITY CREEK BANK STABILIZATION 2017
CITY OF DULUTH, MINNESOTA
CITY OF DULUTH PROJECT NO. 1355

TOEWOOD DETAILS

FILE NO.
00616087
SHEET
C-7

1. INSTALLATION SUMMARY

COIR BENCH CONSTRUCTION WILL BE DONE IN DRY WEATHER CONDITIONS AFTER STREAM HAS BEEN DIVERTED AND SITE DEWATERED. ENGINEER REPRESENTATIVE MUST BE PRESENT FOR INSTALLATION OF COIR BENCH.



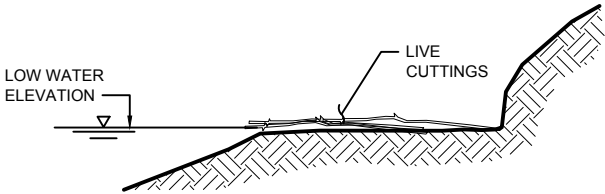
STATION - STATION (OUTSIDE BANK)
16+85 - 17+46
16+20 - 16+71
15+11 - 15+73
14+33 - 14+98
13+60 - 14+21
13+35 - 13+46
3+58 - 4+03
2+77 - 3+28
1+67 - 2+30
0+80 - 1+53

SEE CROSS-SECTION SHEETS CS-1 THRU CS-19 FOR ELEVATIONS.

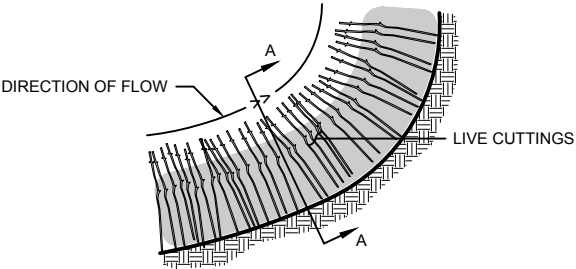
NOT USED

2. LIVE CUTTINGS

- PLACEMENT:
- LAY CUTTINGS WITH A DENSITY OF 10 CUTTINGS PER LINEAL FOOT.
 - TOPS OF CUTTINGS SHALL POINT TOWARD CHANNEL.
 - TRIM EXPOSED ENDS OF CUTTINGS, LEAVE NO MORE THAN 6" EXPOSED.
 - DEPOSIT NATIVE FILL OVER CUTTINGS AND WATER LIBERALLY.
 - COMPRESS FILL TO 2"-4".



SECTION A-A
NO SCALE



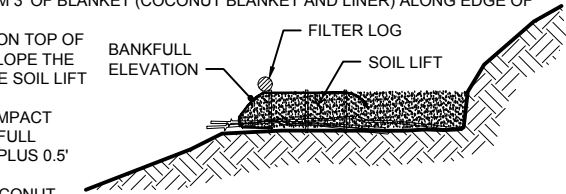
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NOT USED

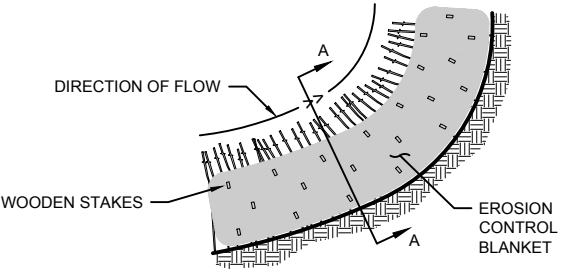
3. SOIL LIFT

- SPECIFICATION:
- BLANKET SHALL BE MINIMUM 12' WIDE ROLANKA BIOD-MAT, GEOCOIR 700, OR EQUAL LINED WITH MNDOT CAT. II EROSION CONTROL BLANKET WITH NATURAL NETTING.
 - 18" WOODEN STAKES (2x4 CUT AT ANGLE) PLACED AT MANUFACTURERS RECOMMENDED SPACING (3' MIN. TYP.) ALONG BLANKET.

- PLACEMENT:
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 - BUCKET COMPACT UNTIL BANKFULL ELEVATION PLUS 0.5' IS MET.
 - TRENCH COCONUT BLANKET INTO GROUND ONE FOOT.
 - CONTINUE TO FILL BENCH TO EXISTING BANK AND BLANKET WITH MNDOT CAT. 3 EROSION CONTROL BLANKET WITH NATURAL NETTING.
 - SECURE BLANKET WITH STAKES.
 - INSTALL FILTER LOG ALONG THE TOP OF THE SOIL LIFT.



SECTION A-A
NO SCALE

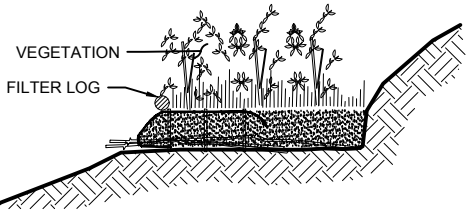


PLAN
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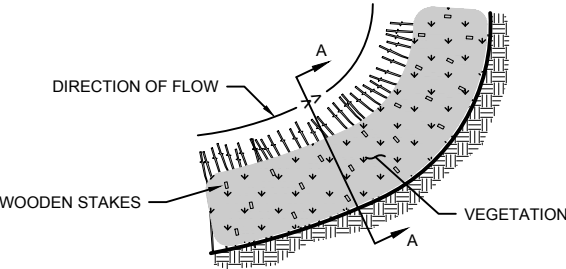
NOT USED

4. VEGETATION

- SPECIFICATION:
- SEE PLANTING PLAN FOR SPECIFICATIONS.
- PLACEMENT:
- PLANT SEED ON FACE OF LIFT BEFORE APPLYING EROSION CONTROL BLANKET.
 - FILTER LOG TO BE REMOVED ONCE VEGETATION BEGINS TO GROW, COVERING APPROXIMATELY 50% OF SOIL LIFT.



SECTION A-A
NO SCALE



PLAN
NO SCALE

NOT USED

PROJECT NO.:	00616087	SCALE:	AS SHOWN	NO.		DATE		REVISION		BY	
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F.B.:		CHECKED BY:	JJJ								

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MAR. 13, 2017

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JOSEPH J. JEFFREY

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CITY OF DULUTH, MINNESOTA
CITY OF DULUTH PROJECT NO. 1355

COIR BENCH DETAILS

FILE NO.
00616087
SHEET
C-8



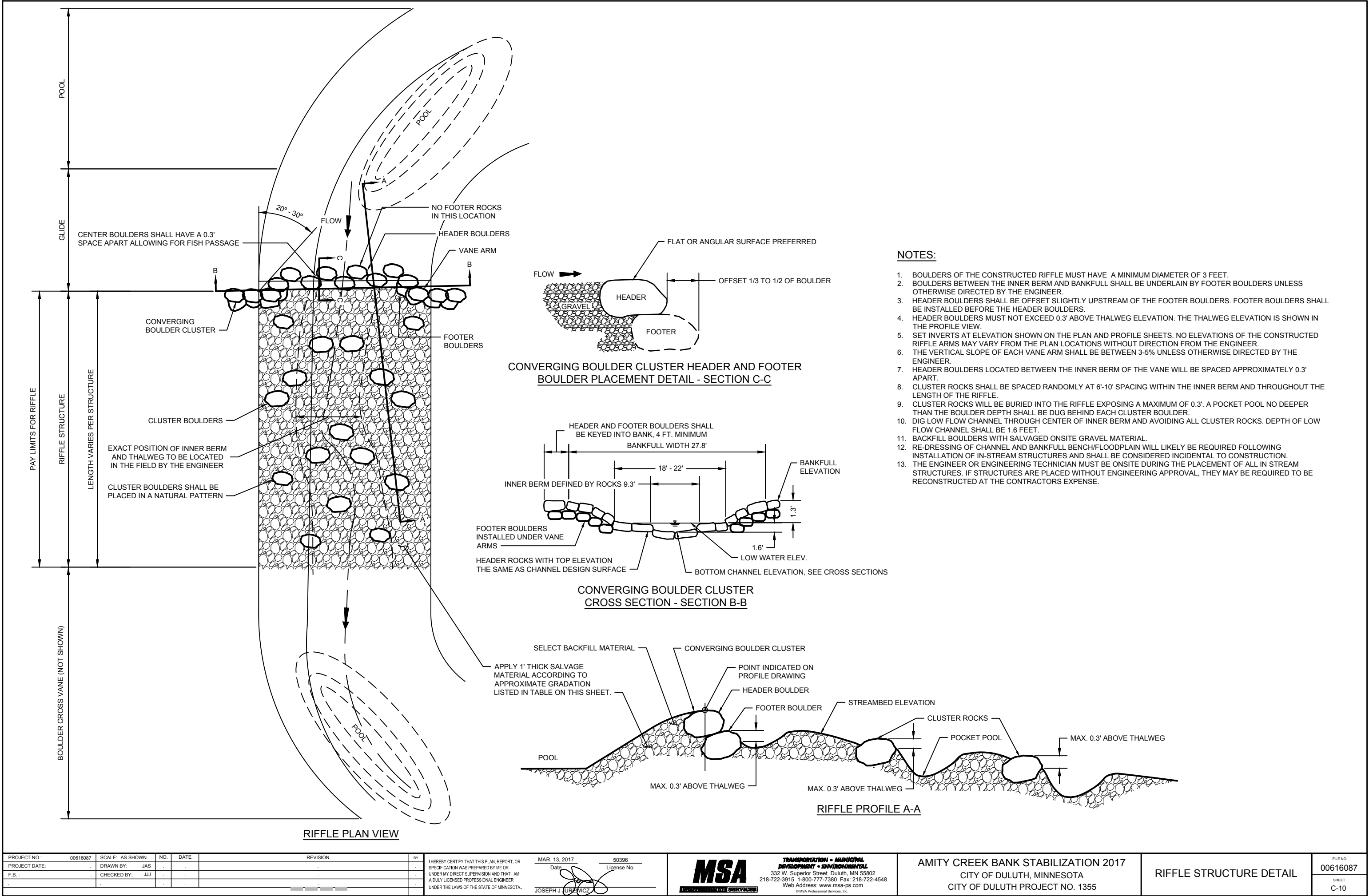
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CITY OF DULUTH, MINNESOTA
CITY OF DULUTH PROJECT NO. 1355

TYPICAL SECTIONS

FILE NO.
00616087
SHEET
C-9



PROJECT NO.:	00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
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CITY OF DULUTH, MINNESOTA
CITY OF DULUTH PROJECT NO. 1355

FILE NO. 00616087
SHEET C-10

PLANTING PLAN FOR AMITY CREEK BANK STABILIZATION 2017

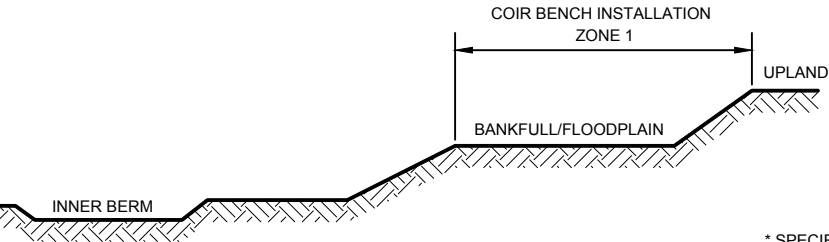
MNDOT APPLICABLE RESTORATION SPECIFICATIONS

THE FOLLOWING MNDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION, CURRENT EDITION, GOVERN THIS PROJECT'S RESTORATION PLAN.

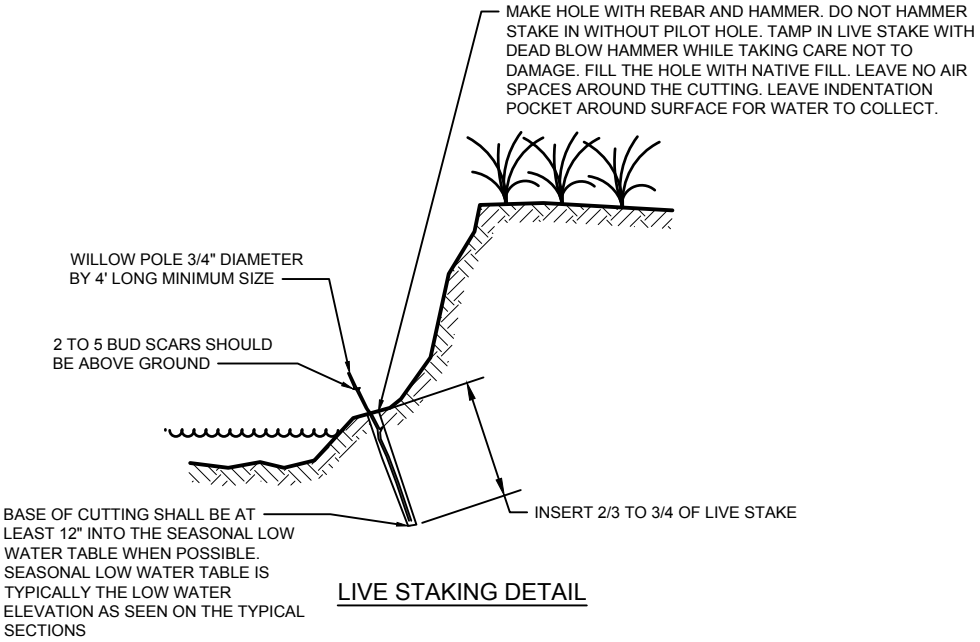
DIVISION I
ENTIRE DIVISION

DIVISION II, CONSTRUCTION DETAILS
SECTION 2571 PLANT INSTALLATION
SECTION 2573 STORM WATER MANAGEMENT
SECTION 2575 CONTROLLING EROSION AND ESTABLISHING VEGETATION
SECTION 2577 SOIL BIOENGINEERED SYSTEMS

DIVISION III, MATERIALS
SECTION 3861 PLANT STOCK
SECTION 3876 SEED (MNDOT SEED MANUAL)
SECTION 3882 MULCH
SECTION 3885 EROSION CONTROL BLANKET



ZONE PLANTING DETAIL



LIVE STAKING DETAIL

* SPECIES THAT REQUIRE 5' HIGH x 5" DIAMETER VENTED TREE TUBE WITH 1"x1"x5' OAK STAKES.
** SPECIES THAT REQUIRE 8' HIGH x 2.5" DIAMETER FENCING WITH 1 T-POST & THREE 1' LONG METAL LAWN STAKES OR 2 T-POSTS.

ZONE ONE - FLOODPLAIN

PLANTING AREA

11' WIDE BANKFULL BENCH AREA SEE ZONE PLANTING DETAIL ON THIS SHEET FOR PLANT AND SEED ZONE AREAS AND GENERAL AREA HATCHING ON PLANS.

LIVE STAKES

PLANT ONE LIVE STAKE OR WILLOW PLUG FOR EVERY 5 FEET ALONG STREAM EDGE:
SHRUB WILLOW - 50%
BLACK WILLOW (SALIX NIGRA) - 50%

CANOPY

THE FOLLOWING CANOPY PLANTS NEED TO BE 28 CU.IN. PLANT BAND WITH A MINIMUM PLANT HEIGHT OF 1 FOOT. PLANT THE FOLLOWING EVERY 8 FOOT SPACING (WEIGHTED ALONG STREAM EDGE):

**WHITE CEDAR (THUJA OCCIDENTALIS) - 25%
*YELLOW BIRCH (BETULA ALLEGHANIENSIS) - 25%
WHITE SPRUCE (PICEA MARIANA) - 50%

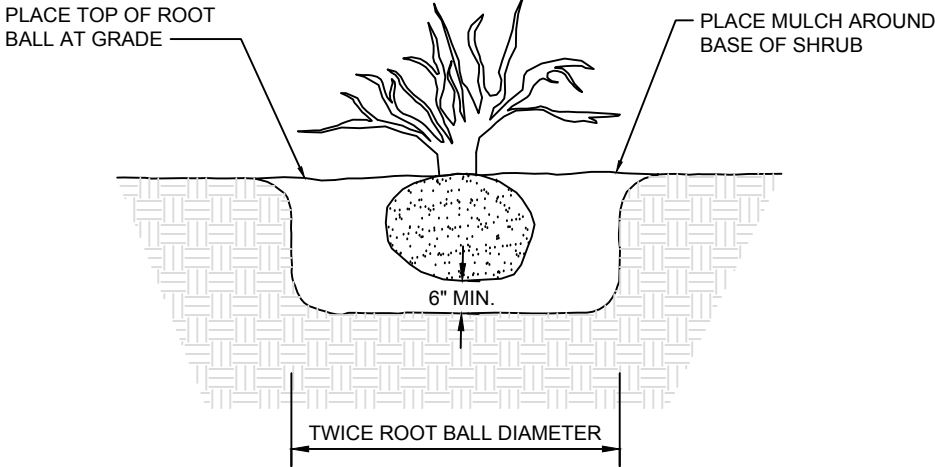
SUB-CANOPY~ THE FOLLOWING SUB-CANOPY PLANTS NEED TO BE 18" HEIGHT (MINIMUM). CAN BE PLUGS OR BARE ROOT STOCK (MUST BE PLANTED IN SPRING). PLANT THE EVERY 64 SQUARE FEET

PLANTING NOTES

SEEDING SHALL TAKE PLACE ON AUTHORIZED SEED MIX PLANTING DATES, AS PER SEED NOTES. CONTAINERIZED STOCK PLANTS CAN BE PLANTED ANY TIME BEFORE THE GROWING SEASON, AND BARE ROOT IS ALLOWED IN SPRING BEFORE JUNE 1ST.

SEED NOTES

- ALL SEED SHALL BE PLACED PRIOR TO HYDRO MULCHING.
- A HARROWING OR RAKING SHALL FOLLOW ALL GRASS SEED INSTALLATION.
- A COVER CROP OF OATS OR WINTER WHEAT SHALL BE SOWN ALONG WITH NATIVE GRASSES AT A RATE OF 25 LBS./ACRE. OATS SHALL BE USED FOR A SPRING OR SUMMER SEEDING, AND WINTER WHEAT SHALL BE USED FOR A FALL SEEDING.



NOTES:

- SCARIFY BOTTOM AND SIDES OF PLANTING PIT PRIOR TO PLANTING.
- LOOSEN ROOT BALL BEFORE PLANTING.
- BACKFILL WITH PLANTING SOIL AND TAMP TO PREVENT SETTLEMENT.
- SHRUBS ARE FOR ACCESS PATH RESTORATION. PLANTINGS SHALL BE SPACED 1 FOR EVERY 64 SF.

SHRUB PLANTING DETAIL

NOT TO SCALE

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F.B.:		CHECKED BY: JJJ	-	-	-	-
			-	-	-	-

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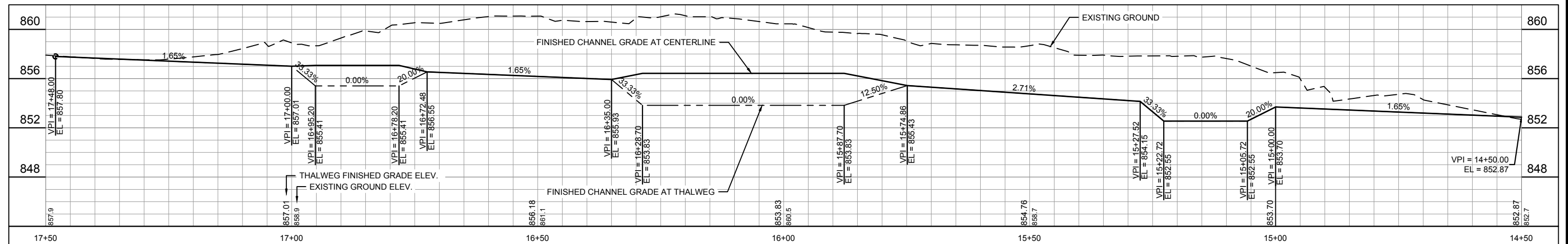
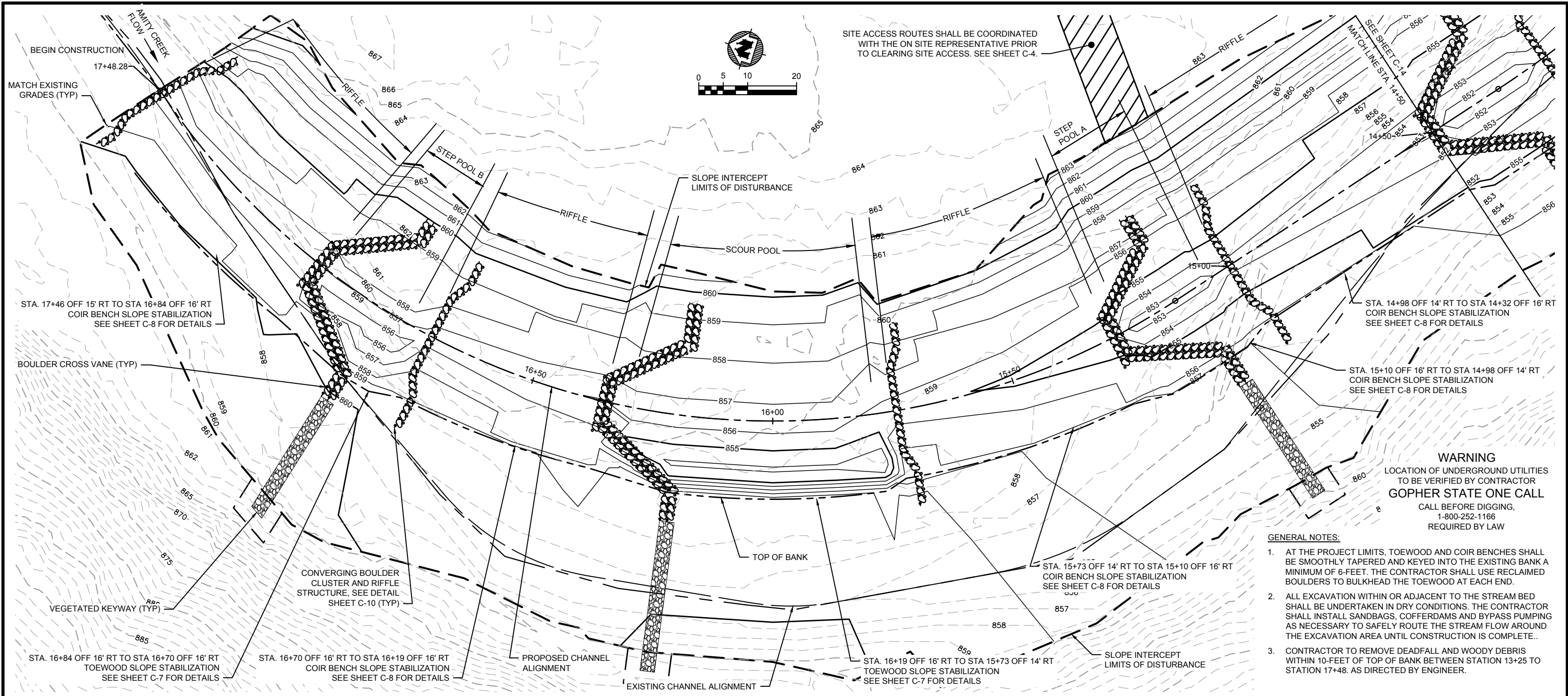


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CITY OF DULUTH PROJECT NO. 1355

PLANTING PLAN

FILE NO.
00616087
SHEET
C-11



PROFILE ON PROPOSED CHANNEL ALIGNMENT

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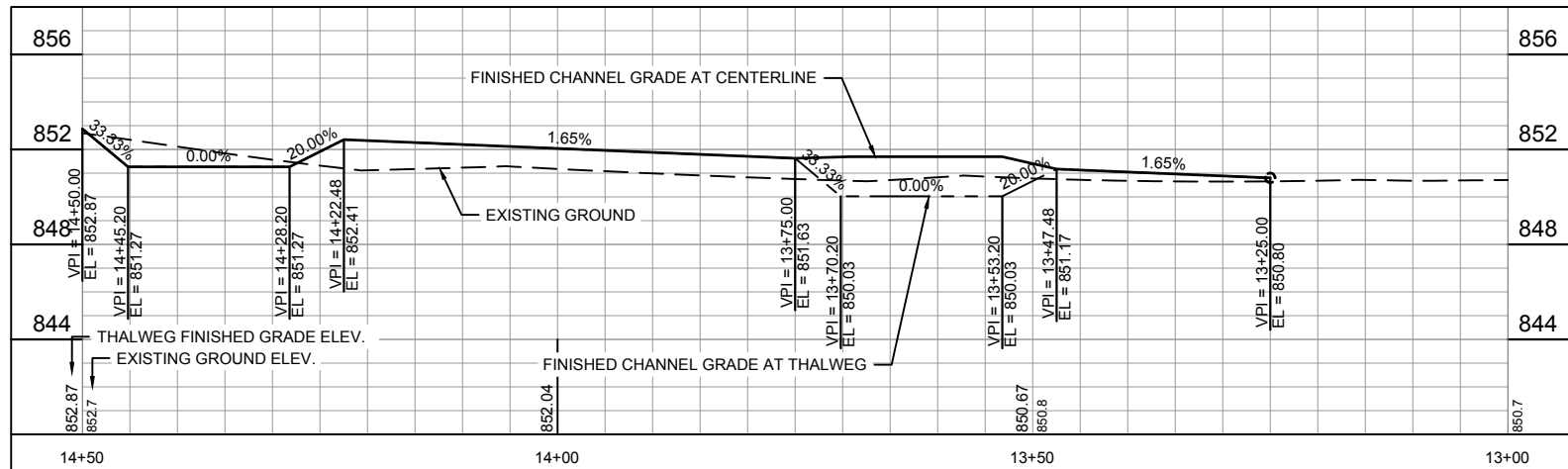
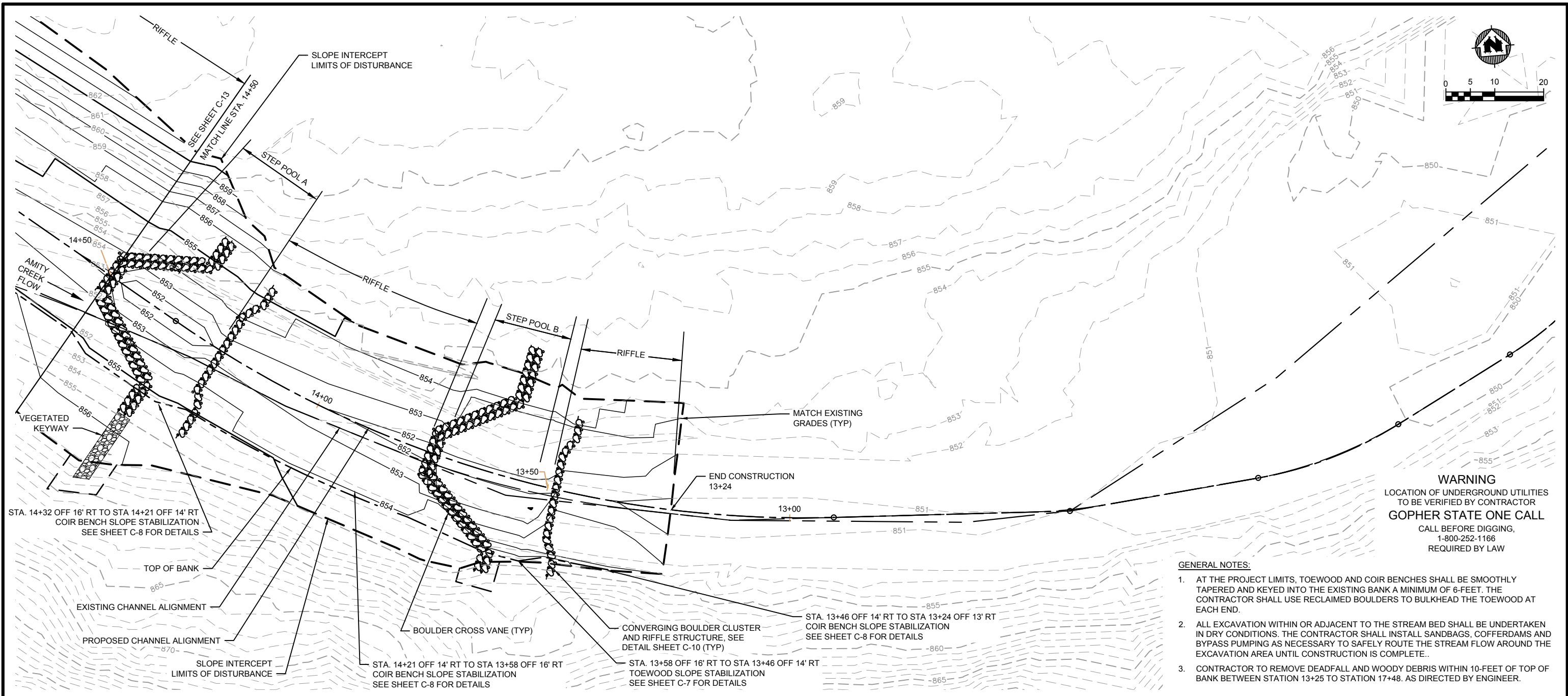
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PLAN & PROFILE -
REACH 579D-2

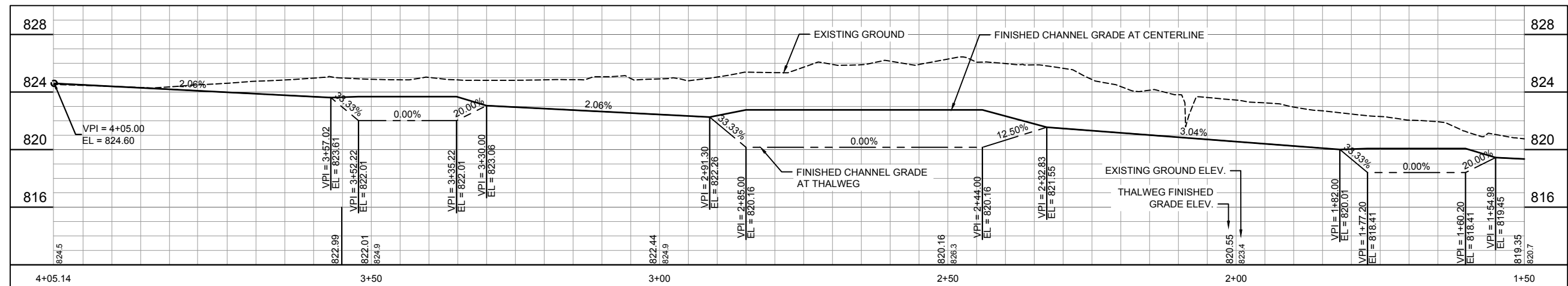
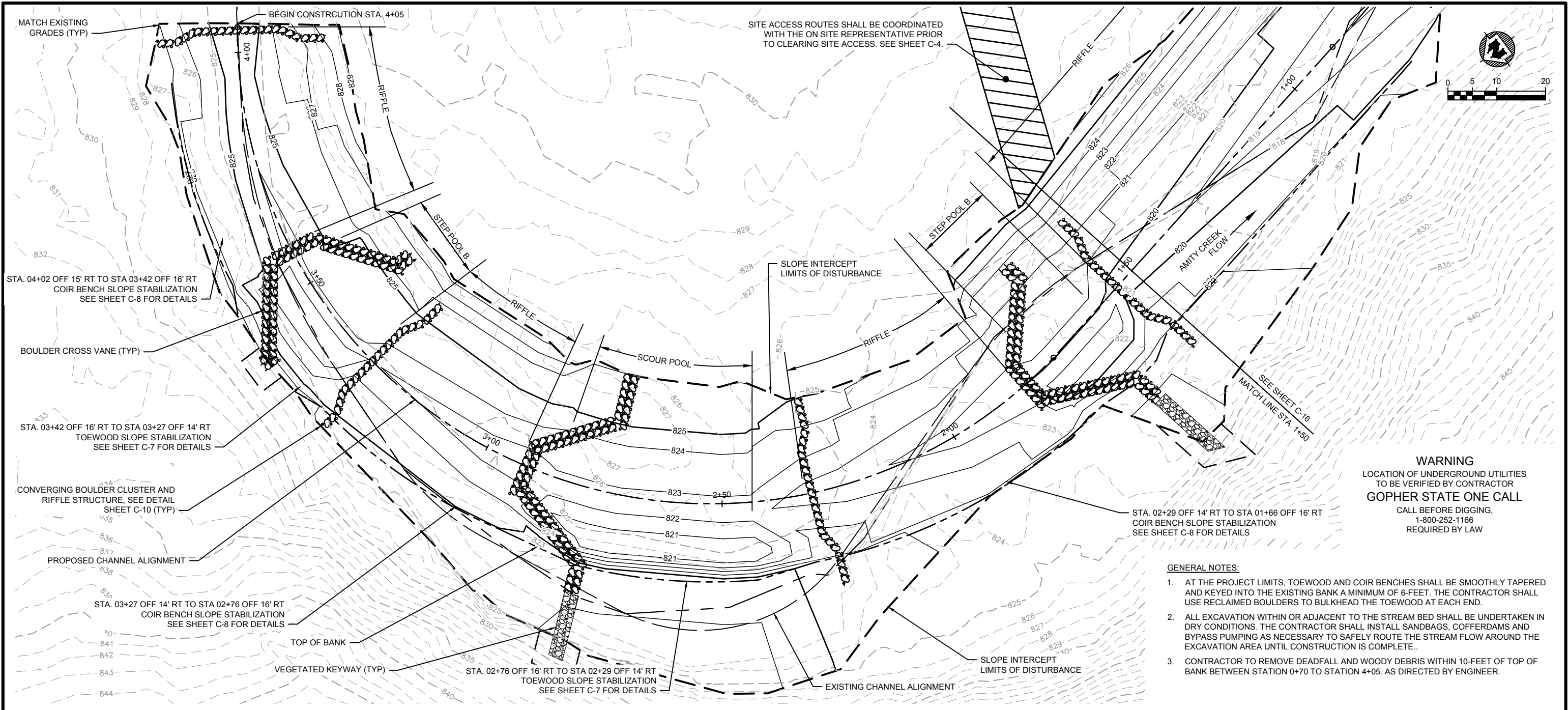
FILE NO.
00616087

SHEET
C-12



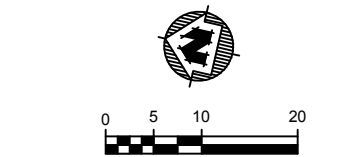
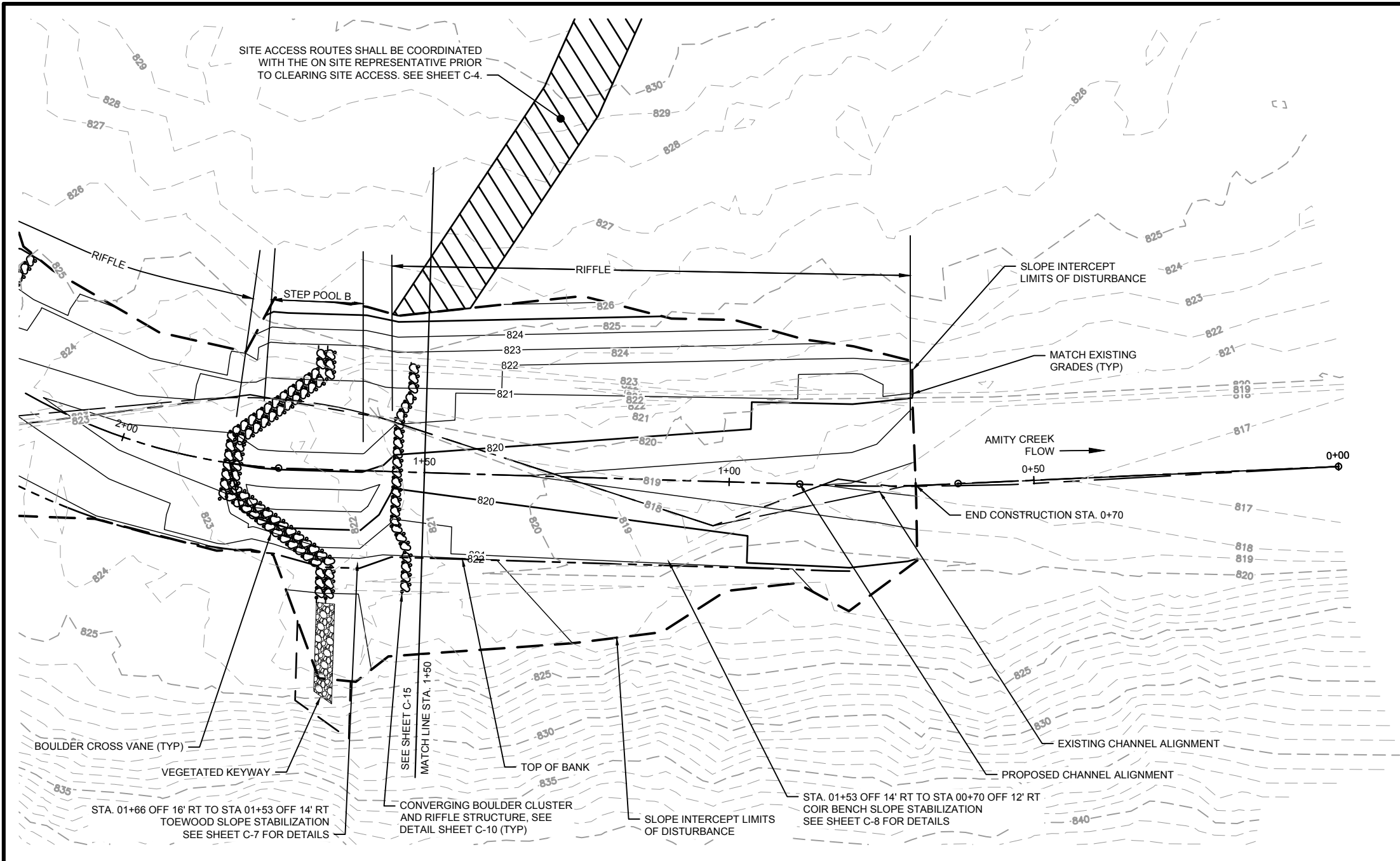
PROFILE ON PROPOSED CHANNEL ALIGNMENT

PROJECT NO.: 00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
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CITY OF DULUTH PROJECT NO. 1355				FILE NO.	
				00616087	
				SHEET	
				C-13	



PROFILE ON PROPOSED CHANNEL ALIGNMENT

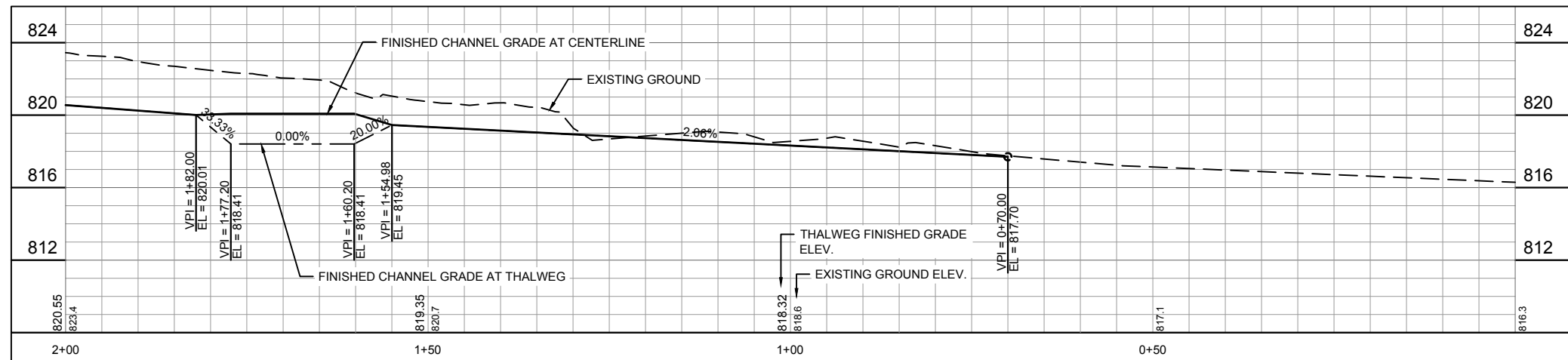
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PROJECT DATE:	DRAWN BY: JAS												
F.B.:	CHECKED BY: JJJ												



WARNING
LOCATION OF UNDERGROUND UTILITIES
TO BE VERIFIED BY CONTRACTOR
GOPHER STATE ONE CALL
CALL BEFORE DIGGING,
1-800-252-1166
REQUIRED BY LAW

GENERAL NOTES:

1. AT THE PROJECT LIMITS, TOEWOOD AND COIR BENCHES SHALL BE SMOOTHLY TAPERED AND KEYED INTO THE EXISTING BANK A MINIMUM OF 6-FEET. THE CONTRACTOR SHALL USE RECLAIMED BOULDERS TO BULKHEAD THE TOEWOOD AT EACH END.
2. ALL EXCAVATION WITHIN OR ADJACENT TO THE STREAM BED SHALL BE UNDERTAKEN IN DRY CONDITIONS. THE CONTRACTOR SHALL INSTALL SANDBAGS, COFFERDAMS AND BYPASS PUMPING AS NECESSARY TO SAFELY ROUTE THE STREAM FLOW AROUND THE EXCAVATION AREA UNTIL CONSTRUCTION IS COMPLETE..
3. CONTRACTOR TO REMOVE DEADFALL AND WOODY DEBRIS WITHIN 10-FEET OF TOP OF BANK BETWEEN STATION 0+70 TO STATION 4+05. AS DIRECTED BY ENGINEER.



PROFILE ON PROPOSED CHANNEL ALIGNMENT

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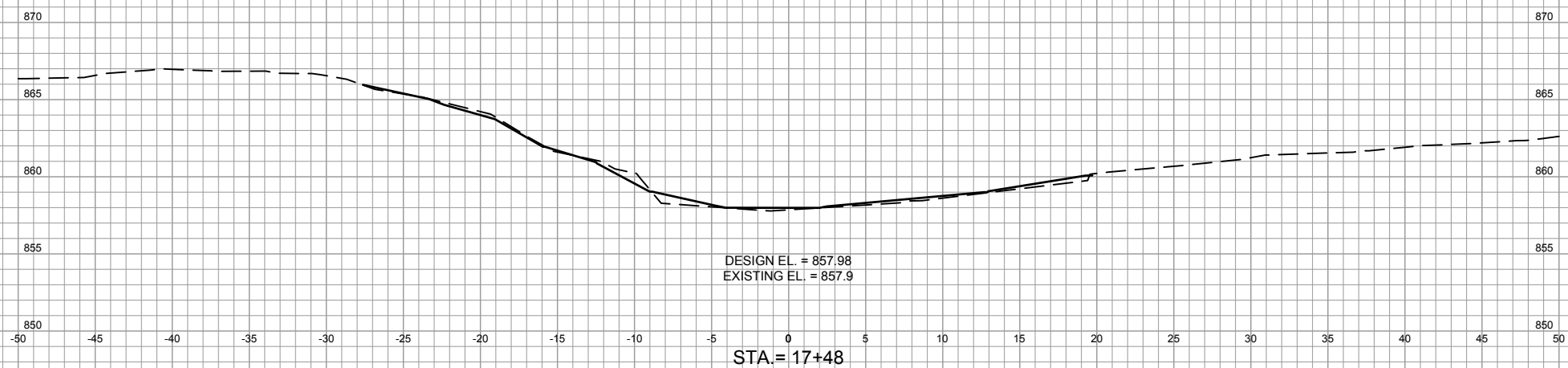
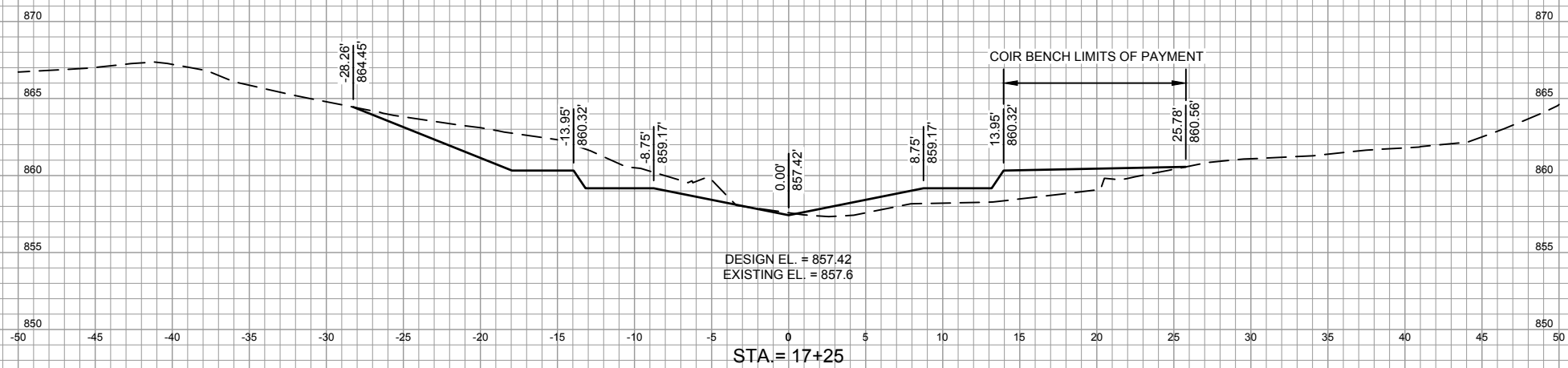
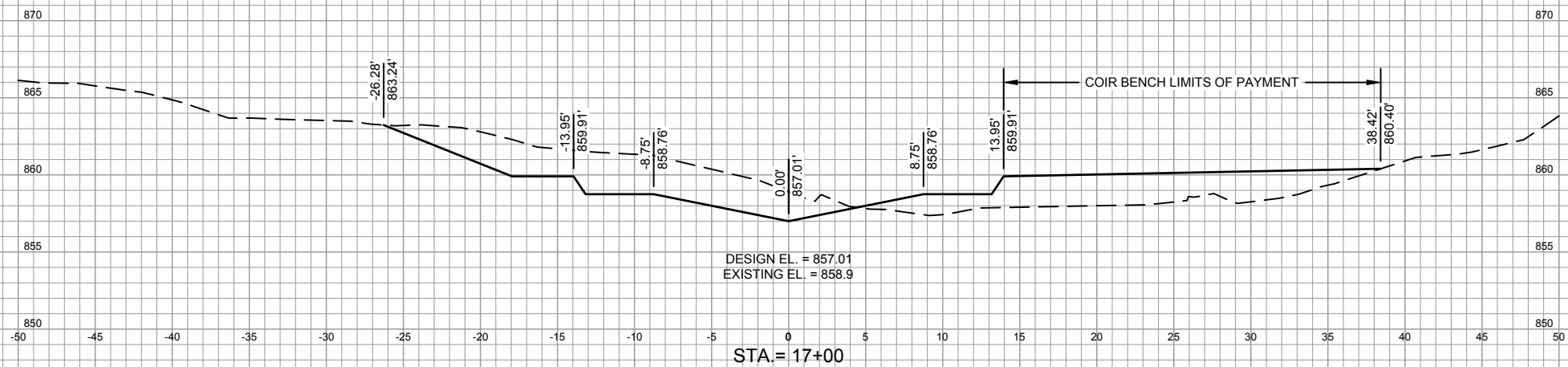
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AMITY CREEK BANK STABILIZATION 2017
CITY OF DULUTH, MINNESOTA
CITY OF DULUTH PROJECT NO. 1355

PLAN & PROFILE -
REACH 579D-3

FILE NO.
00616087
SHEET
C-15



SECTIONS REFERENCE PLAN SHEET C-13

PROJECT NO.:	00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE:	-	DRAWN BY: JAS	-	-	-	-
F.B.:	-	CHECKED BY: JJJ	-	-	-	-
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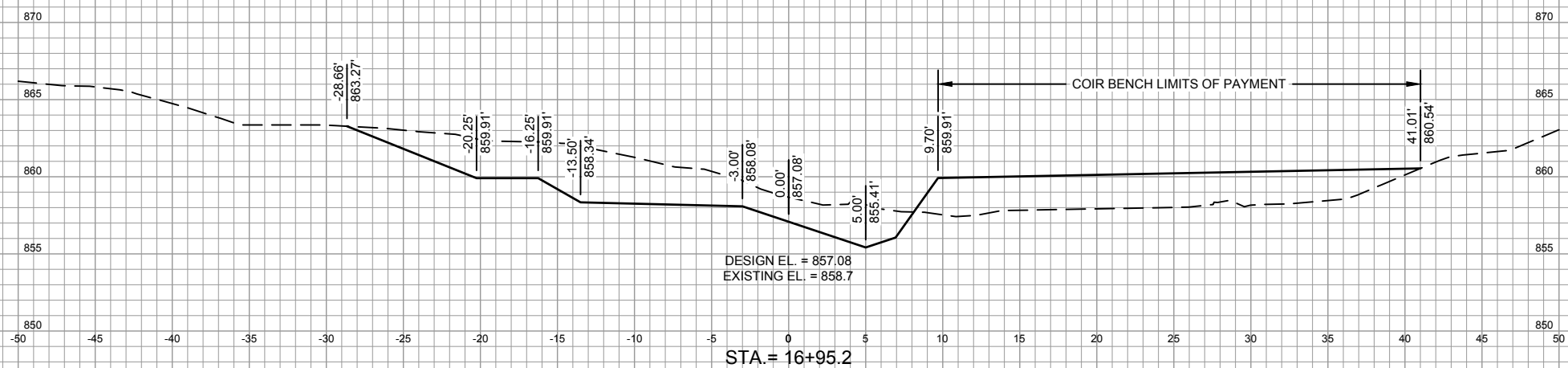
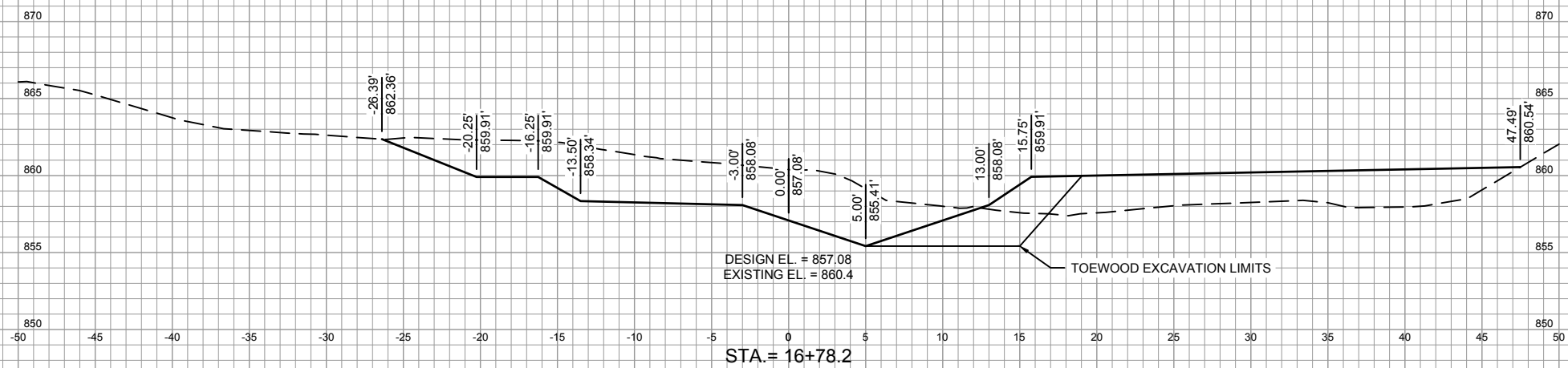
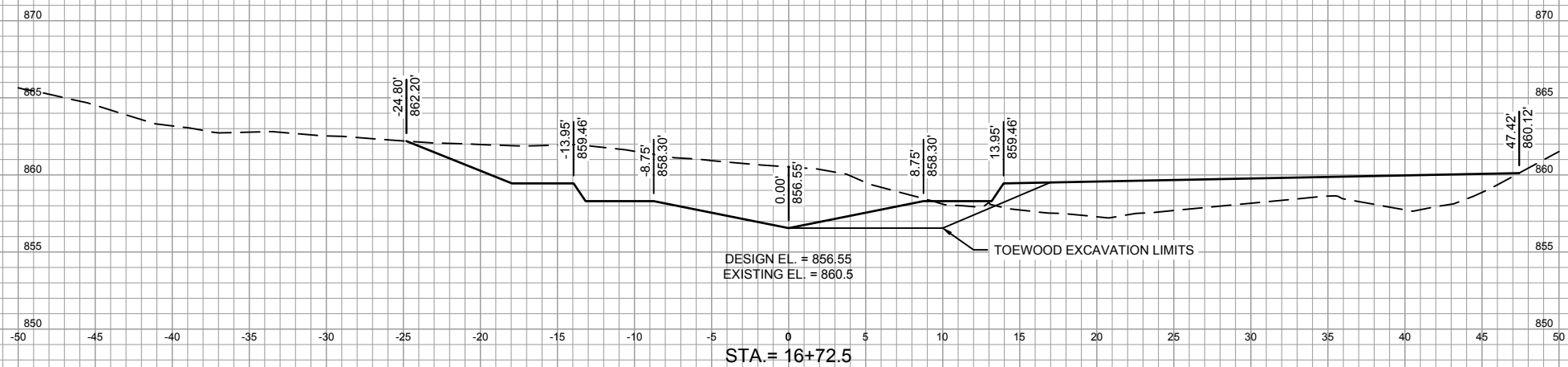
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REACH 579D-2

FILE NO.
00616087
SHEET
CS-1



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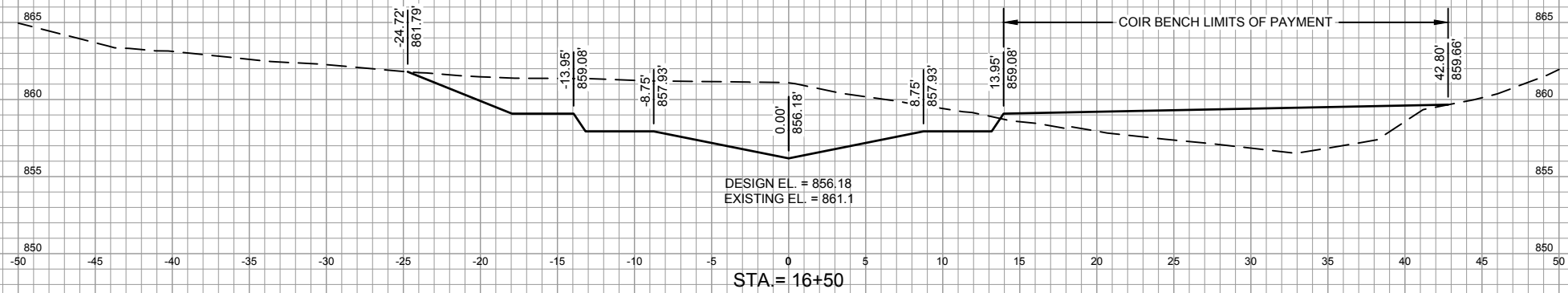
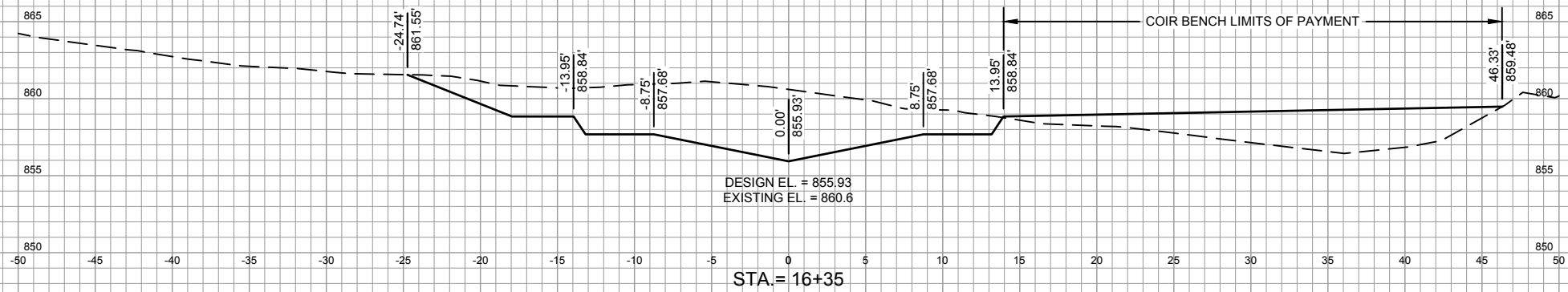
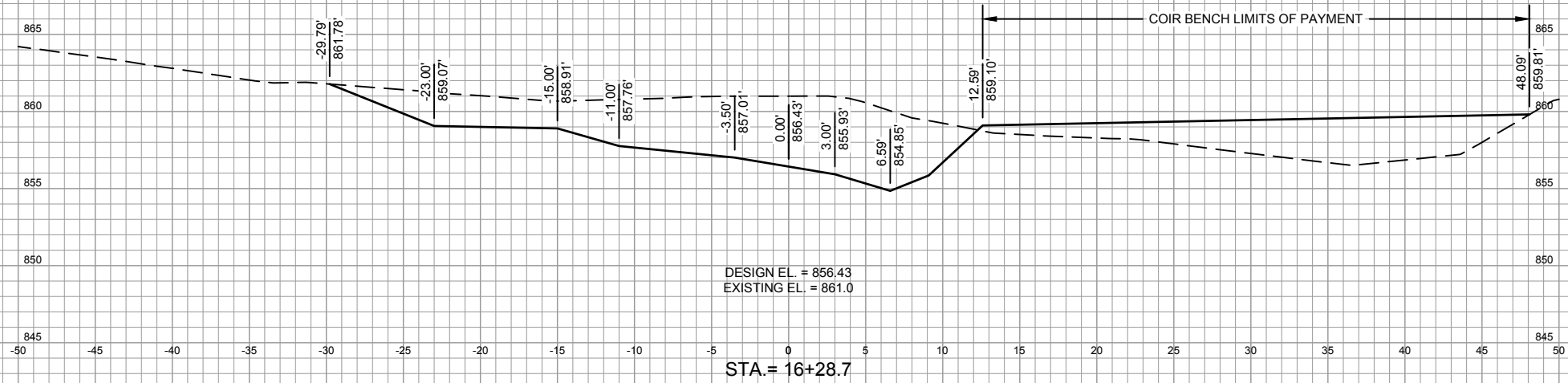


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FILE NO.
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SHEET
CS-2



SECTIONS REFERENCE PLAN SHEET C-13

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PROJECT DATE:	-	DRAWN BY:	JAS	-	-	-	-
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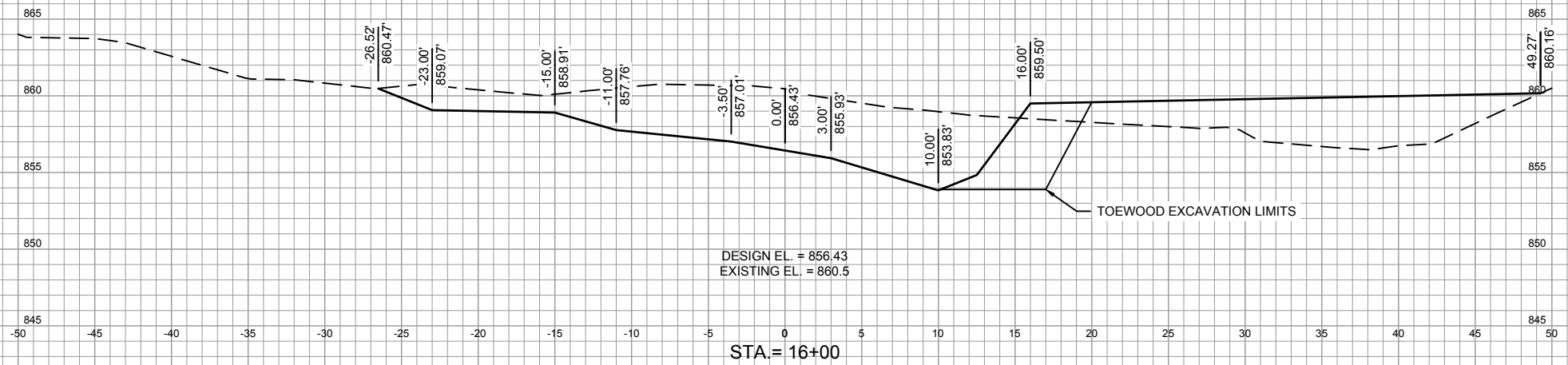
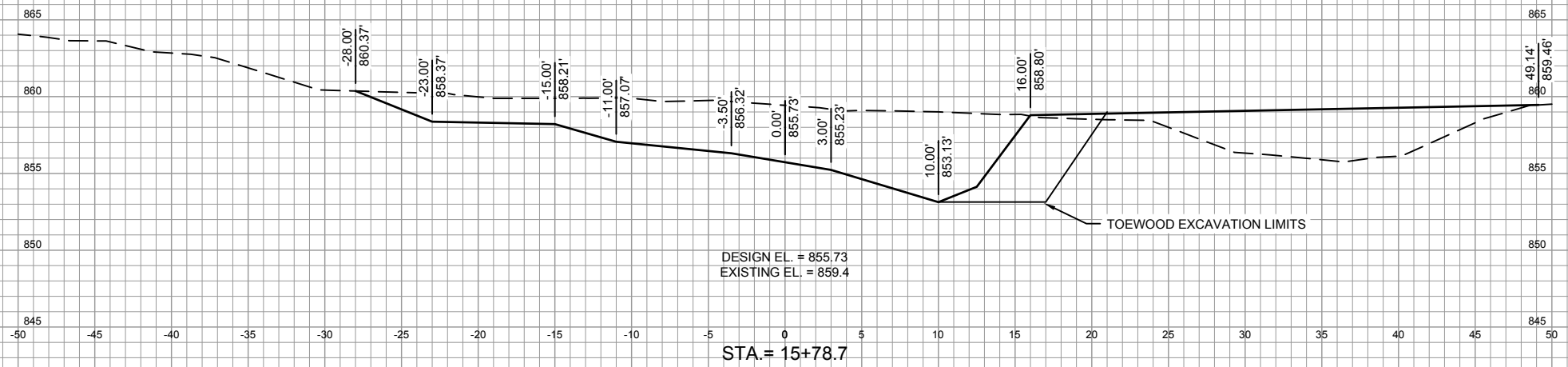
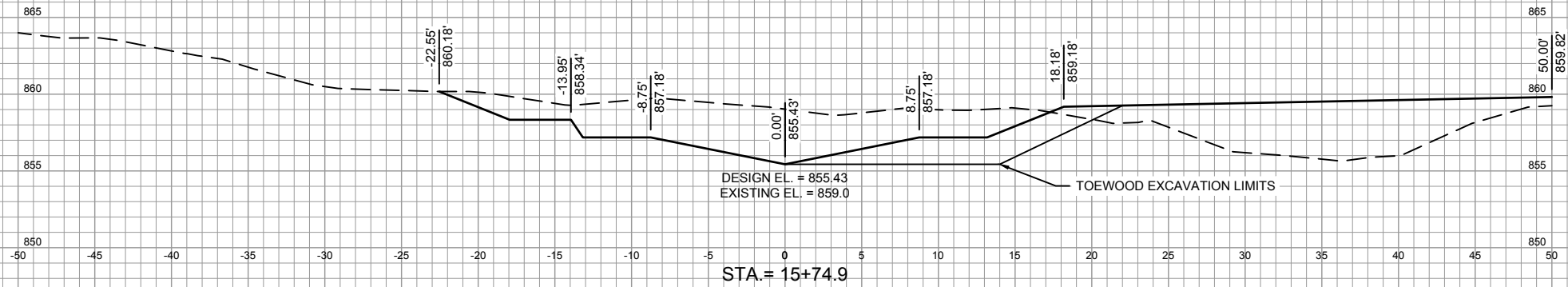


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SHEET
CS-3



SECTIONS REFERENCE PLAN SHEET C-13

PROJECT NO.:	00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE:		DRAWN BY: JAS	-	-	-	-
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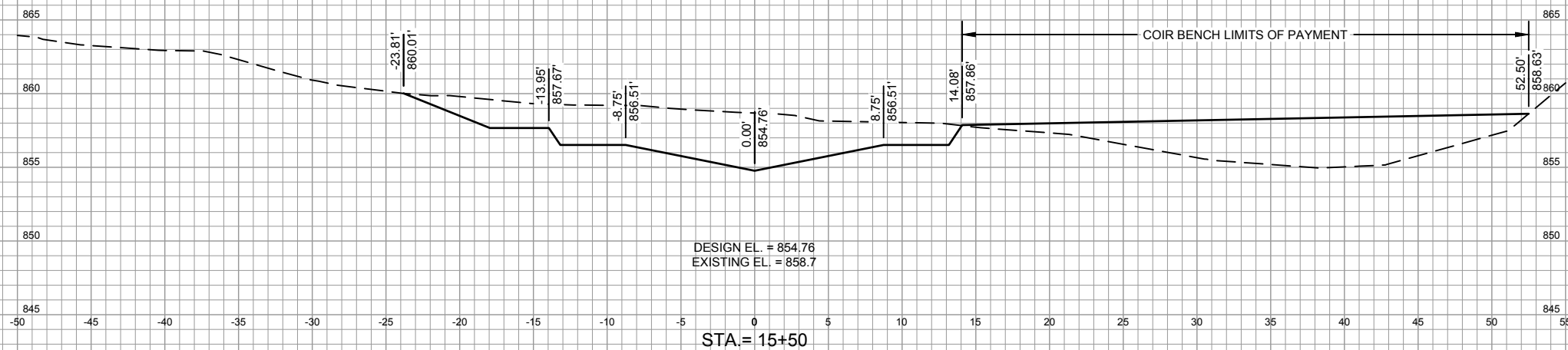
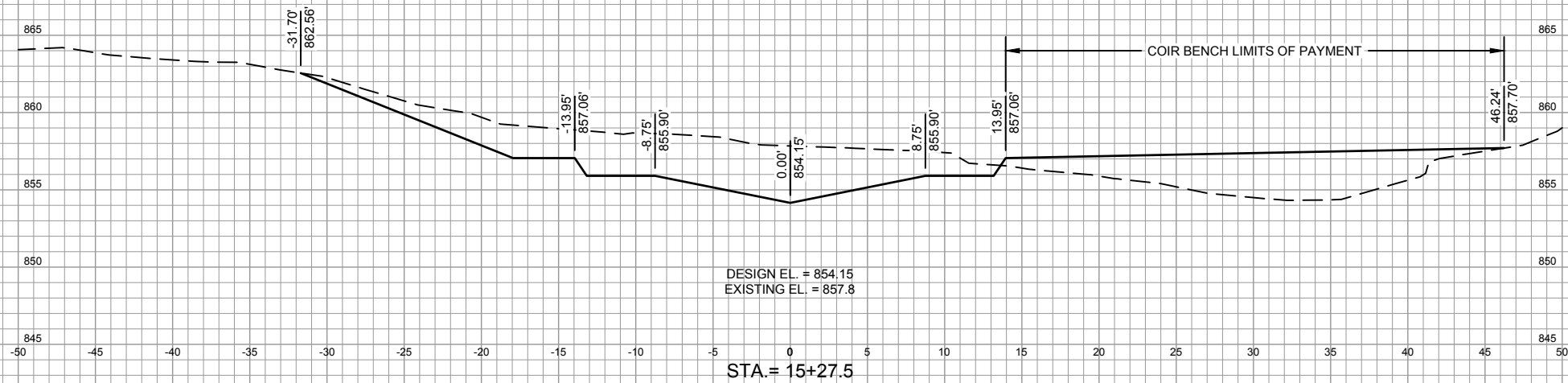
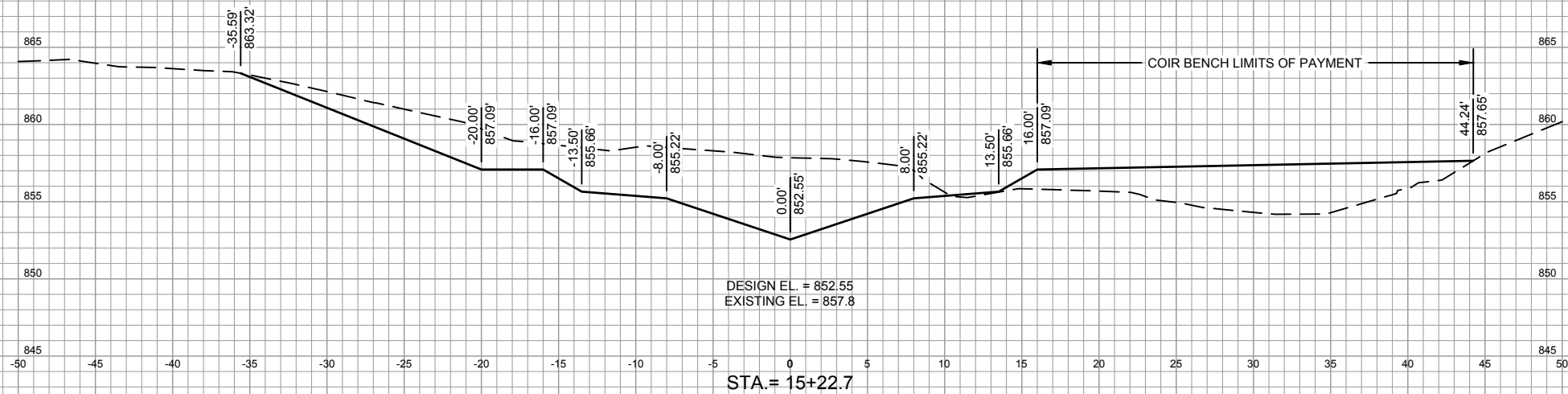


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SECTIONS REFERENCE PLAN SHEET C-13

PROJECT NO.:	00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE:	-	DRAWN BY: JAS	-	-	-	-
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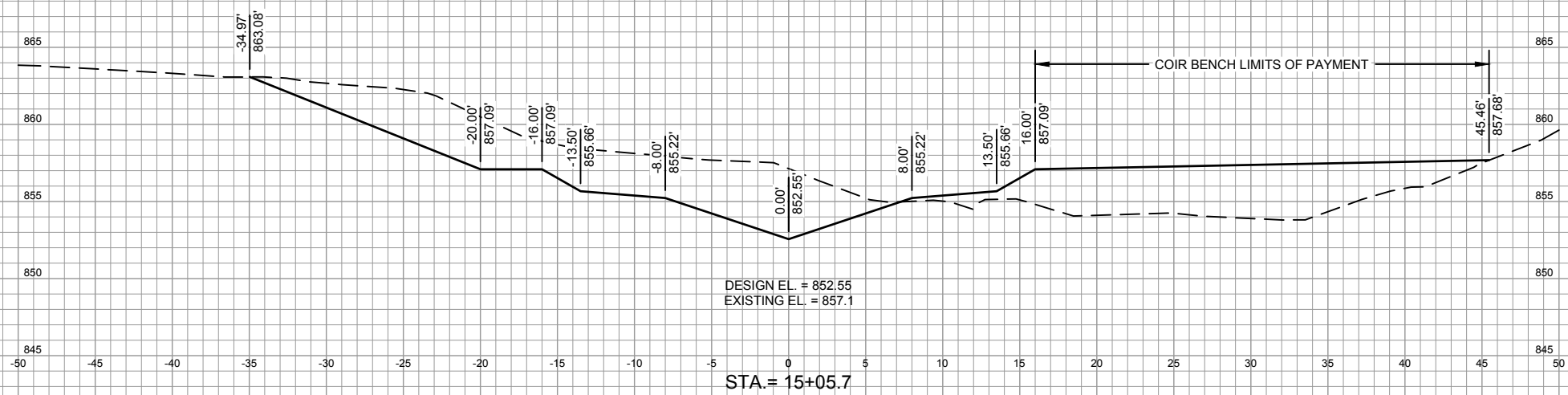
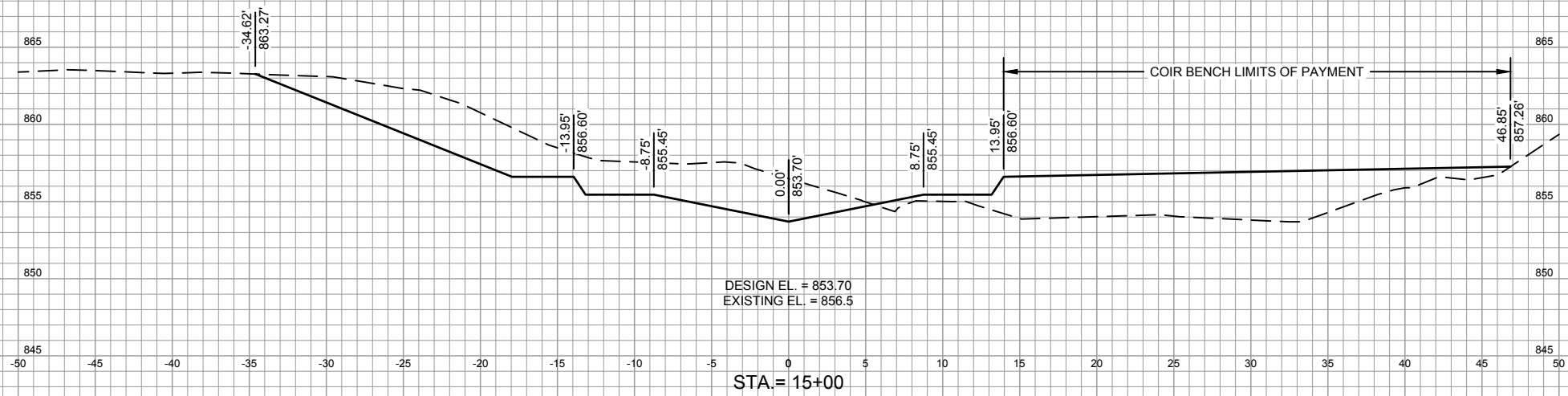
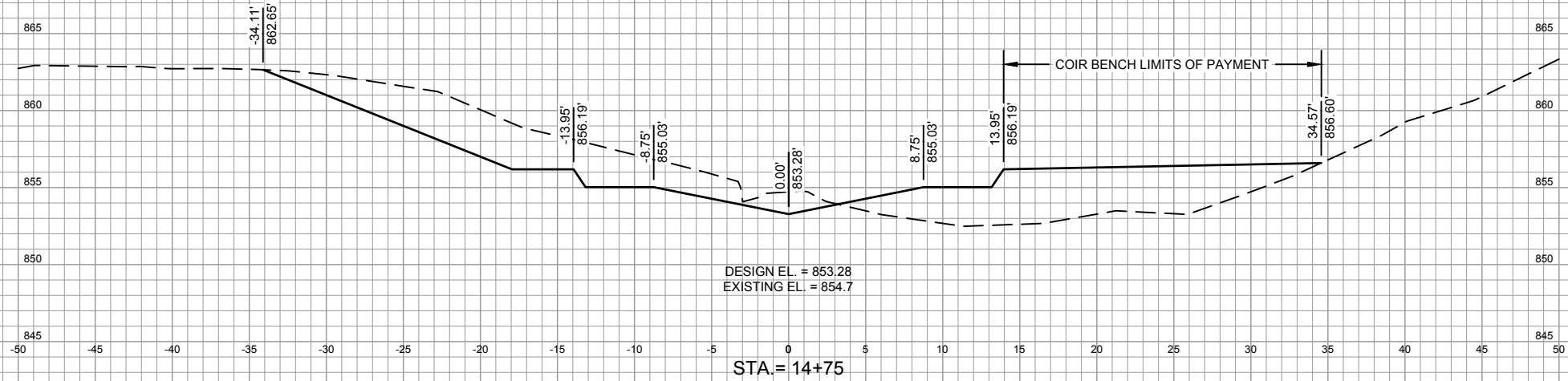


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FILE NO.
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SHEET
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SECTIONS REFERENCE PLAN SHEET C-13

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PROJECT DATE:	-	DRAWN BY: JAS	-	-	-	-
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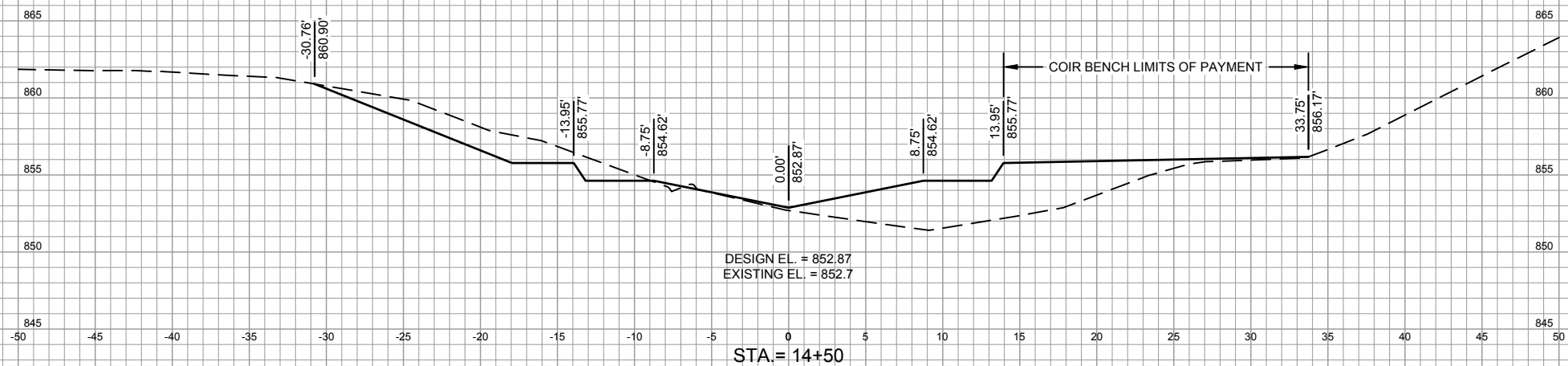
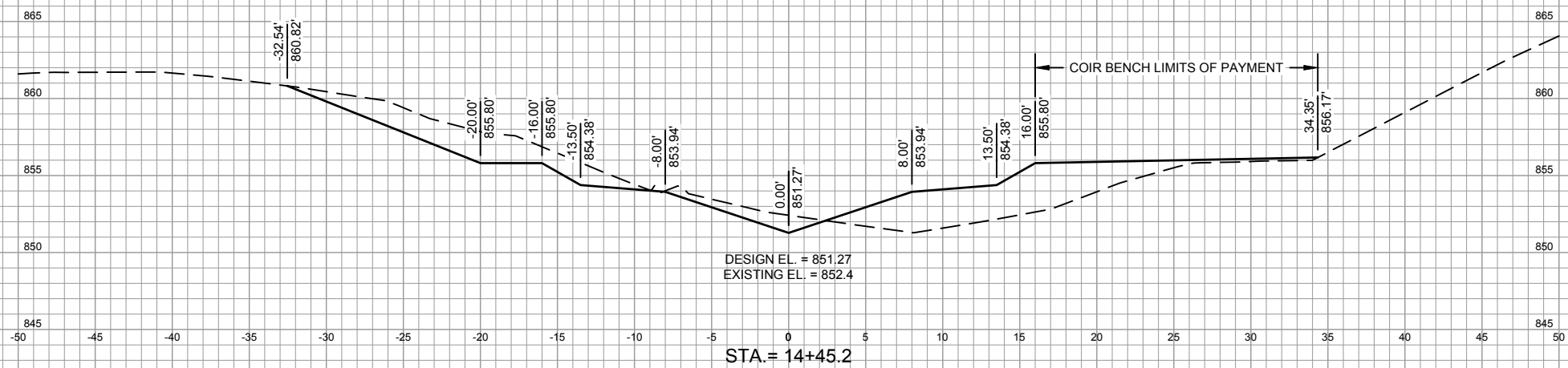
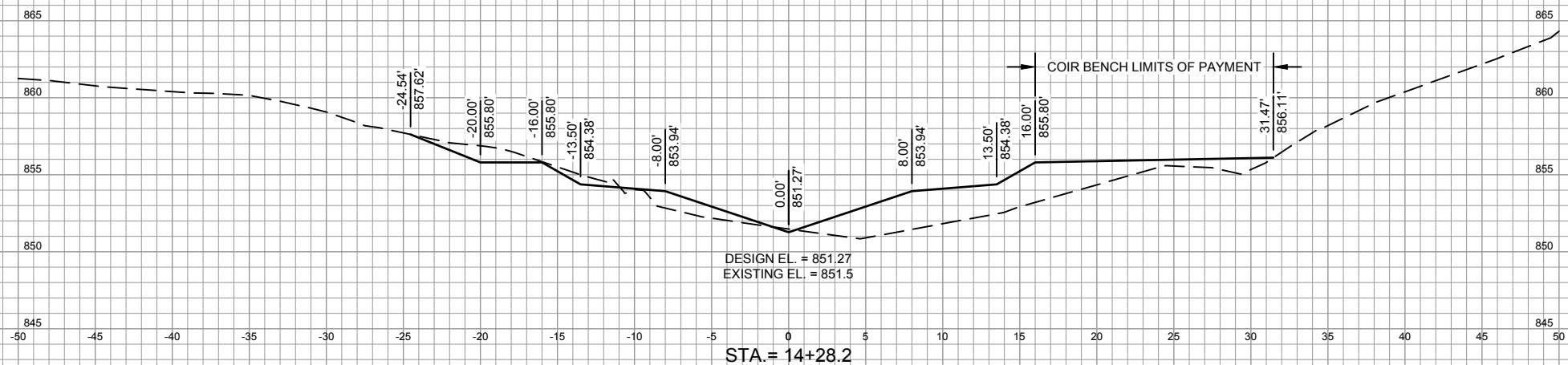
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FILE NO.
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SHEET
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SECTIONS REFERENCE PLAN SHEET C-14

PROJECT NO.:	00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE:	-	DRAWN BY: JAS	-	-	-	-
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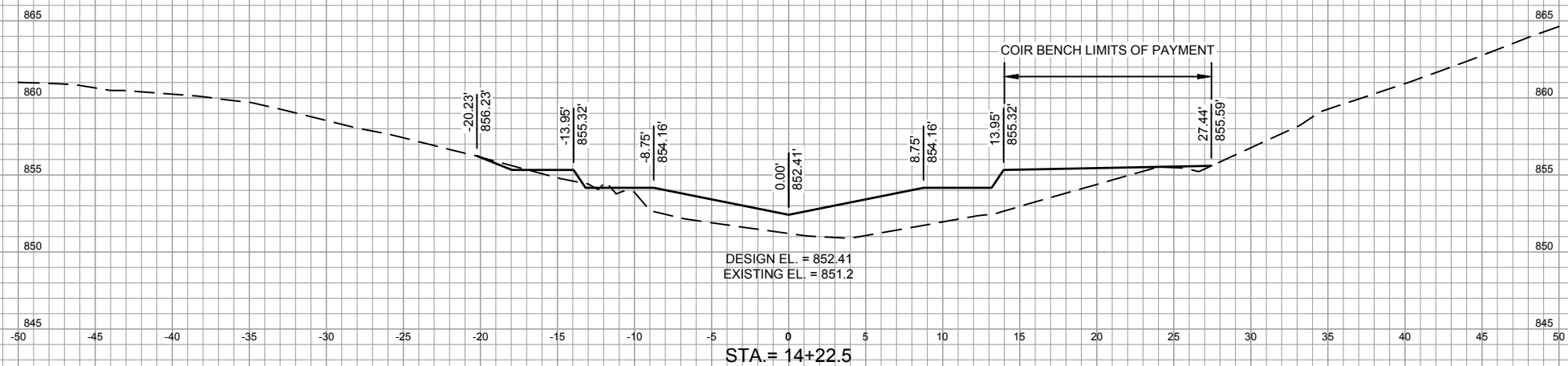
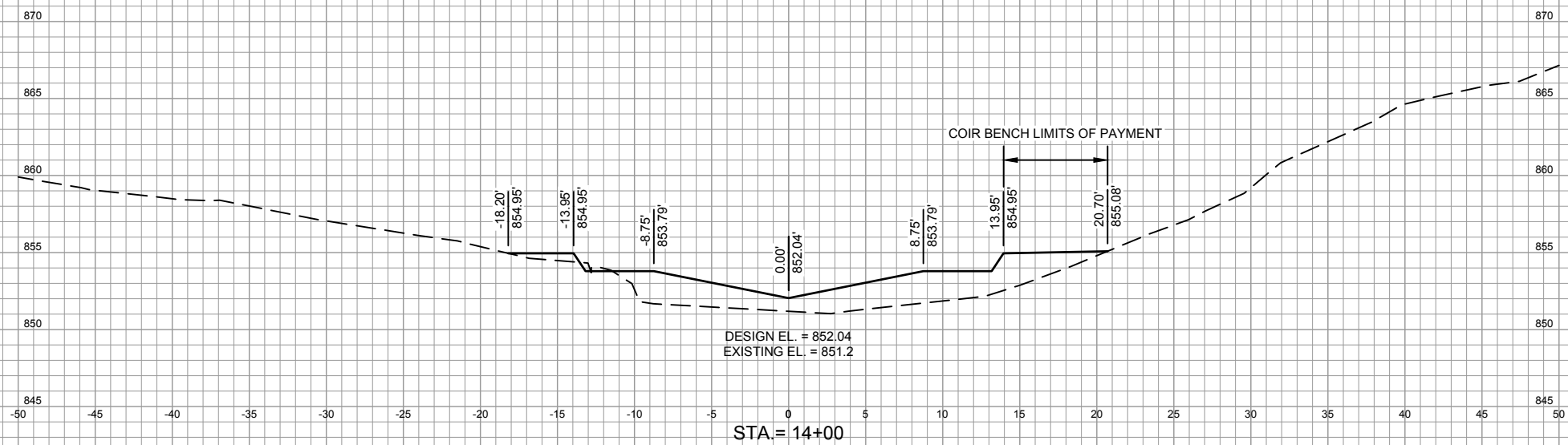


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FILE NO.
00616087
SHEET
CS-7



SECTIONS REFERENCE PLAN SHEET C-14

PROJECT NO.:	00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE:	-	DRAWN BY: JAS	-	-	-	-
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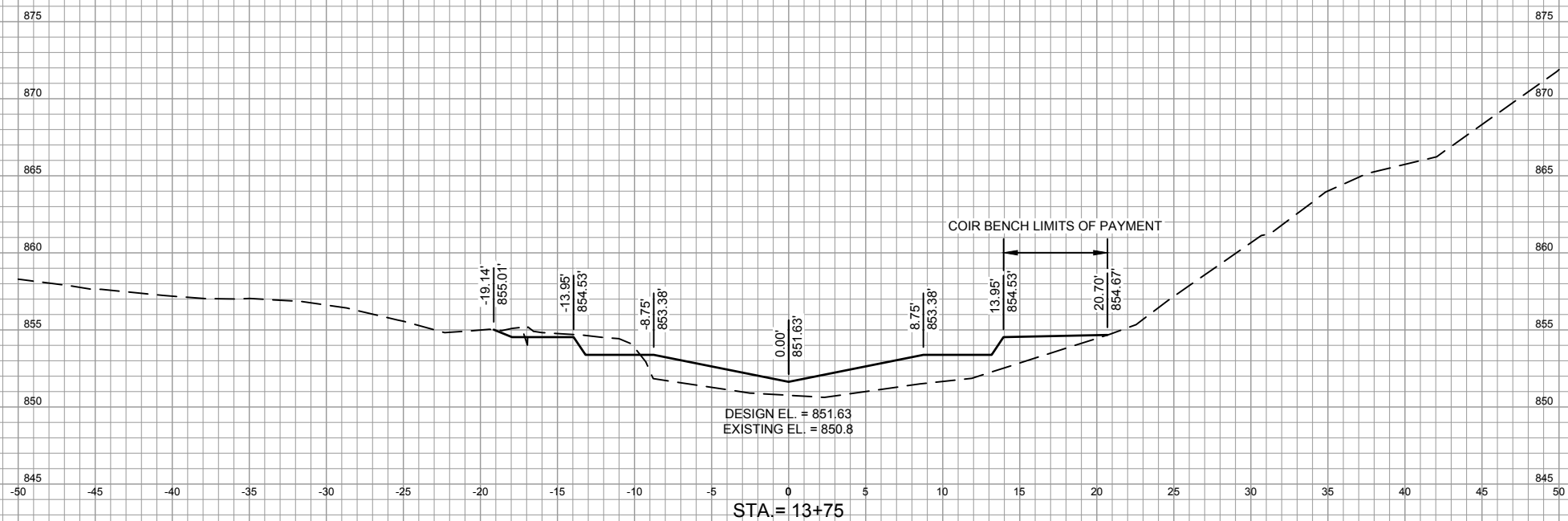
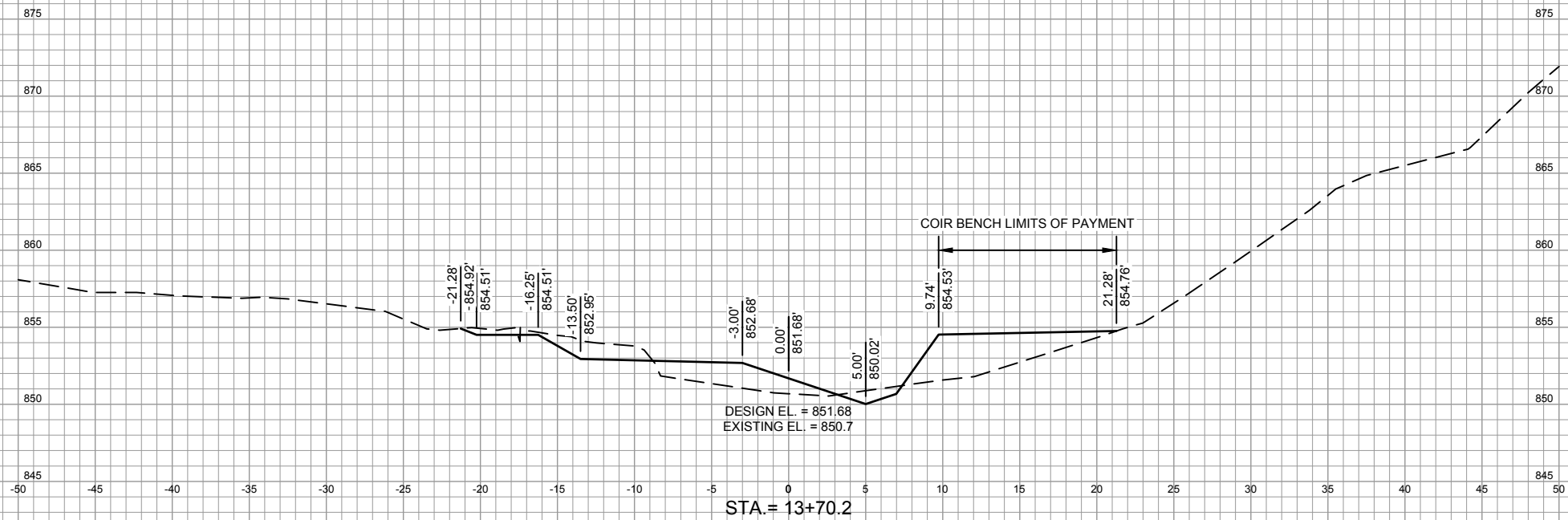


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FILE NO.
00616087
SHEET
CS-8



SECTIONS REFERENCE PLAN SHEET C-14

PROJECT NO.:	00616087	SCALE:	AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE:	-	DRAWN BY:	JAS	-	-	-	-
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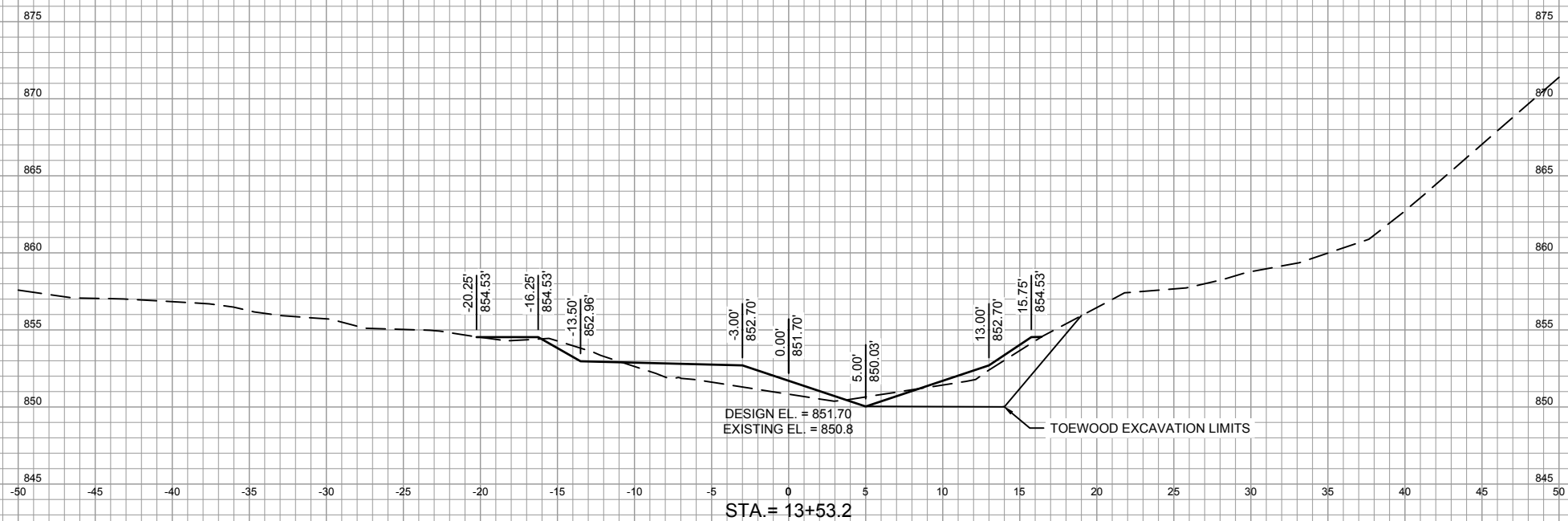
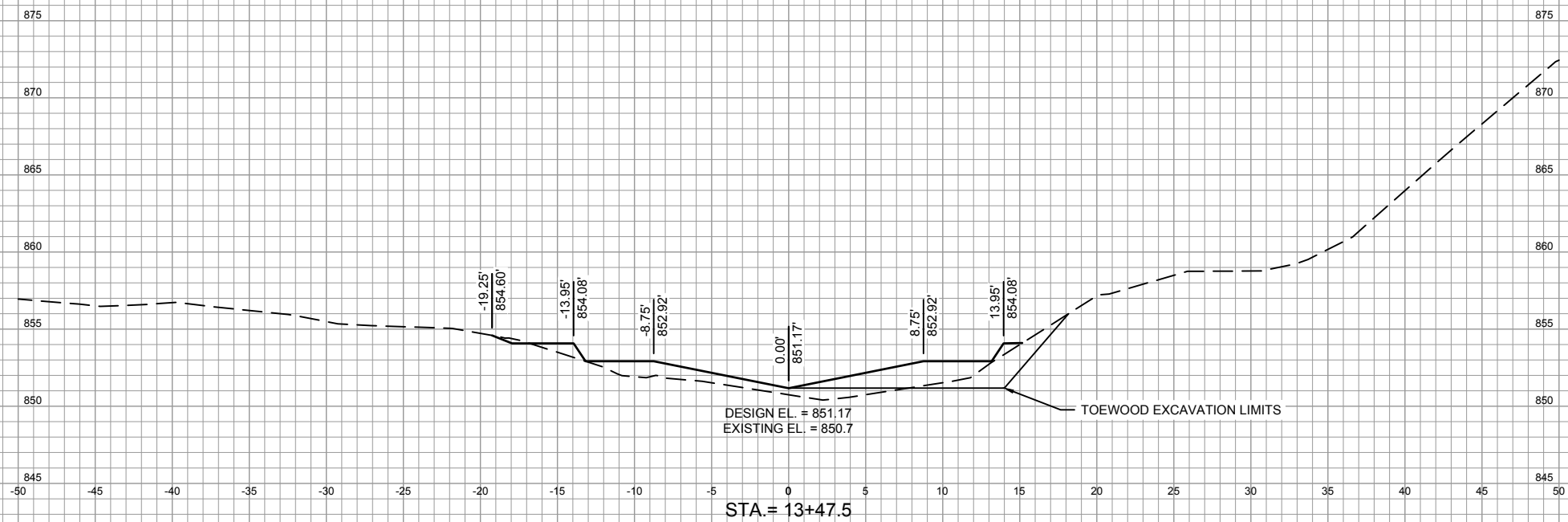


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FILE NO.
00616087
SHEET
CS-9



SECTIONS REFERENCE PLAN SHEET C-14

PROJECT NO.:	00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE:	-	DRAWN BY: JAS	-	-	-	-
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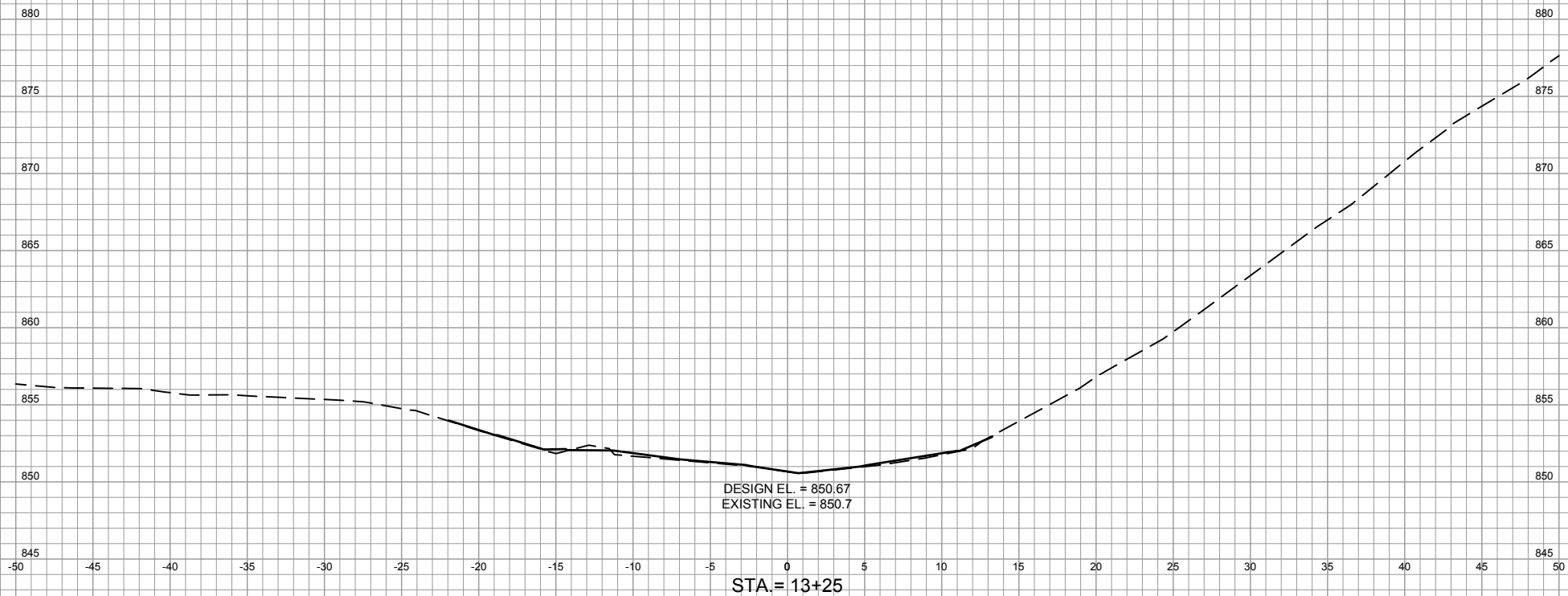


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SHEET
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SECTIONS REFERENCE PLAN SHEET C-14

PROJECT NO.:	00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE:	-	DRAWN BY: JAS	-	-	-	-
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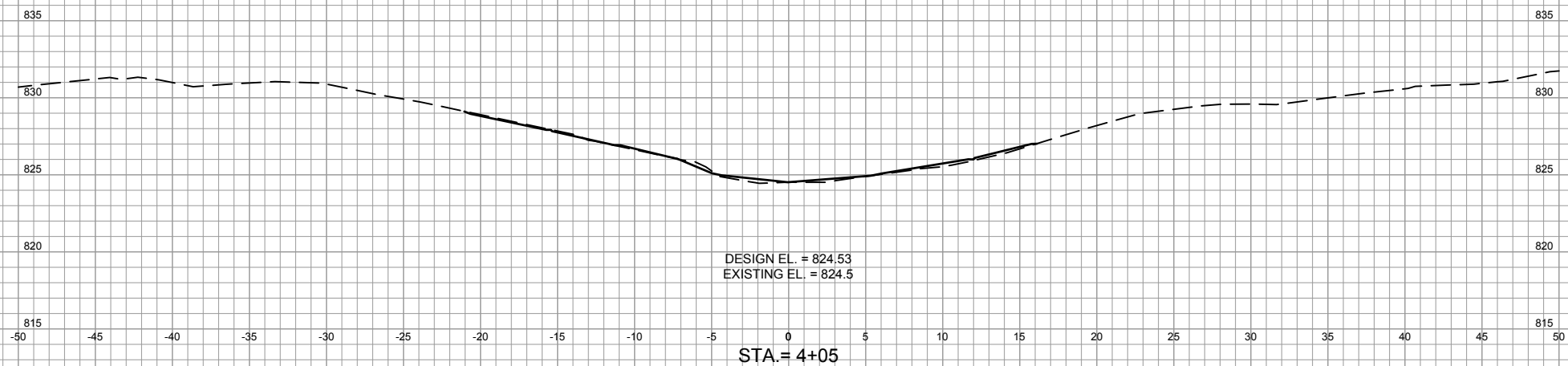
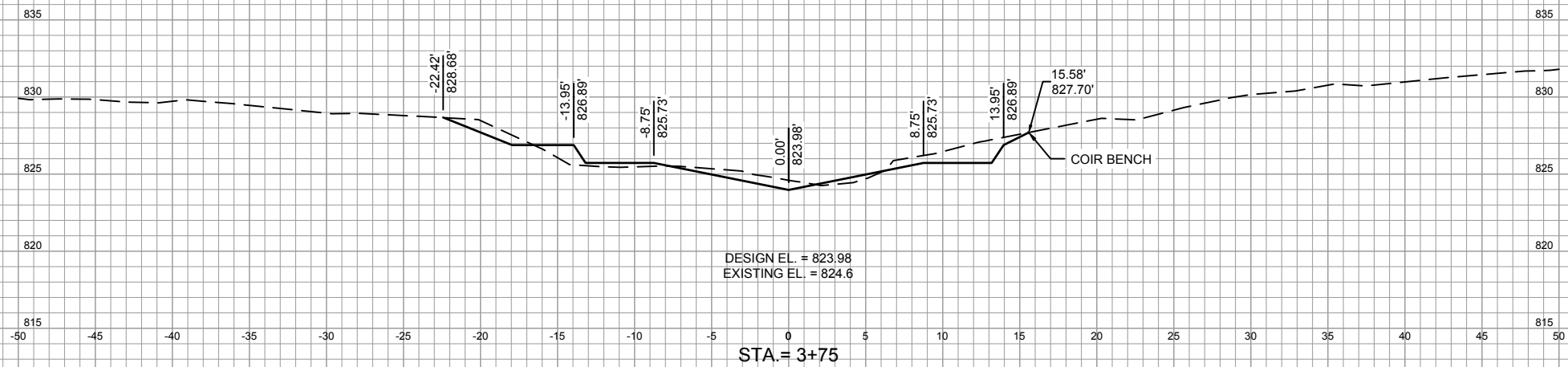


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FILE NO.
00616087
SHEET
CS-11



SECTIONS REFERENCE PLAN SHEET C-15

PROJECT NO.:	00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE:	-	DRAWN BY: JAS	-	-	-	-
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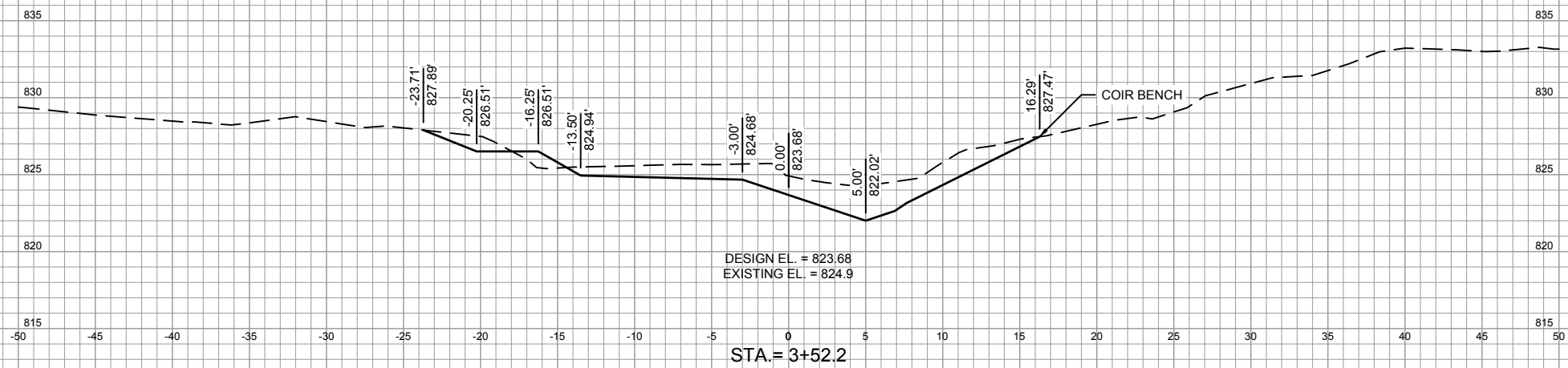


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FILE NO.
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SHEET
CS-12



SECTIONS REFERENCE PLAN SHEET C-15

PROJECT NO.:	00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
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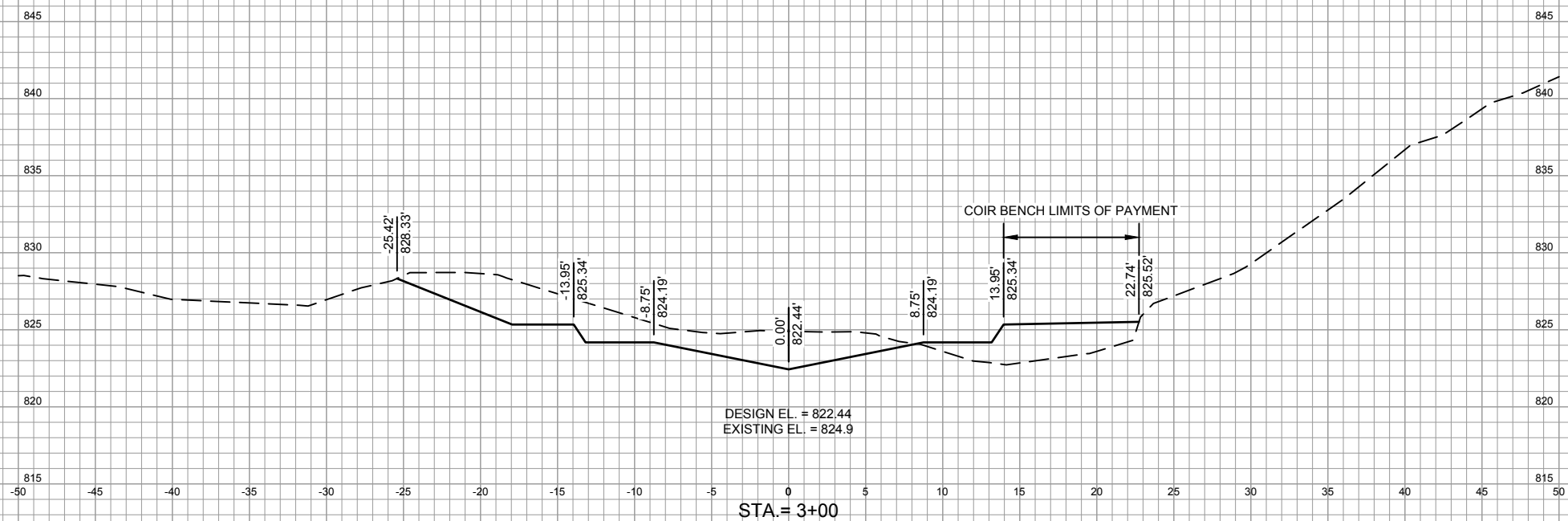
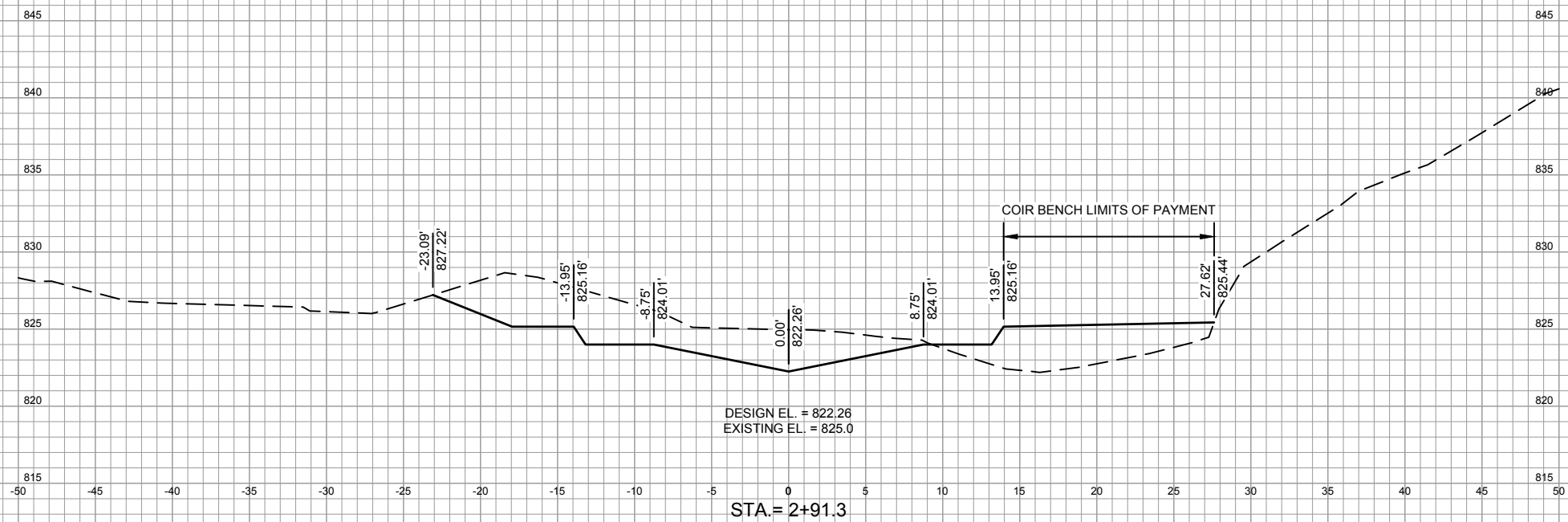


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SHEET
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SECTIONS REFERENCE PLAN SHEET C-15

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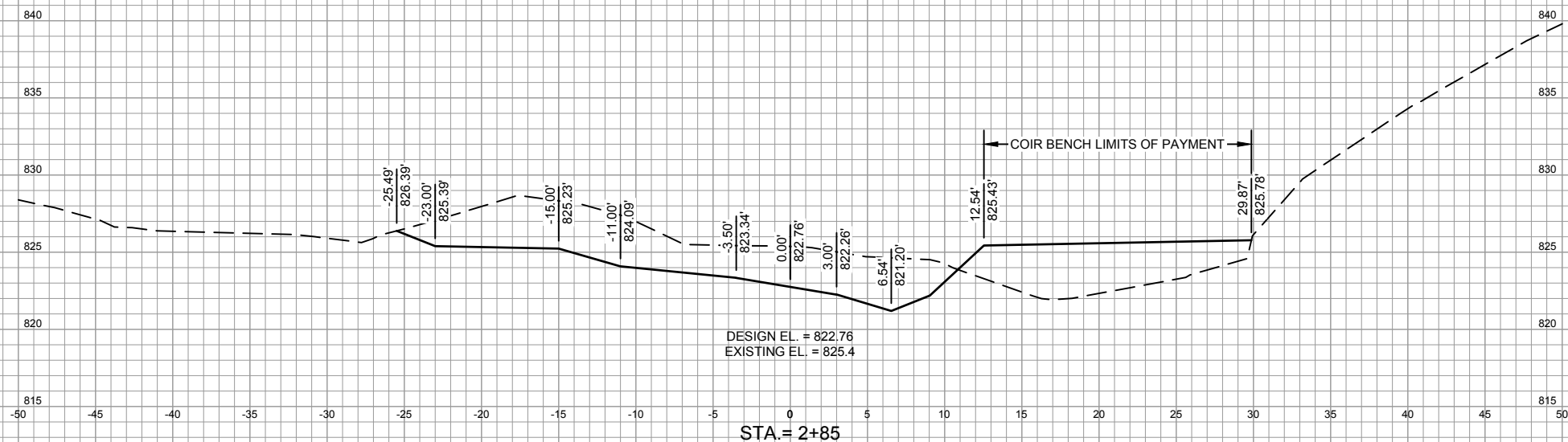
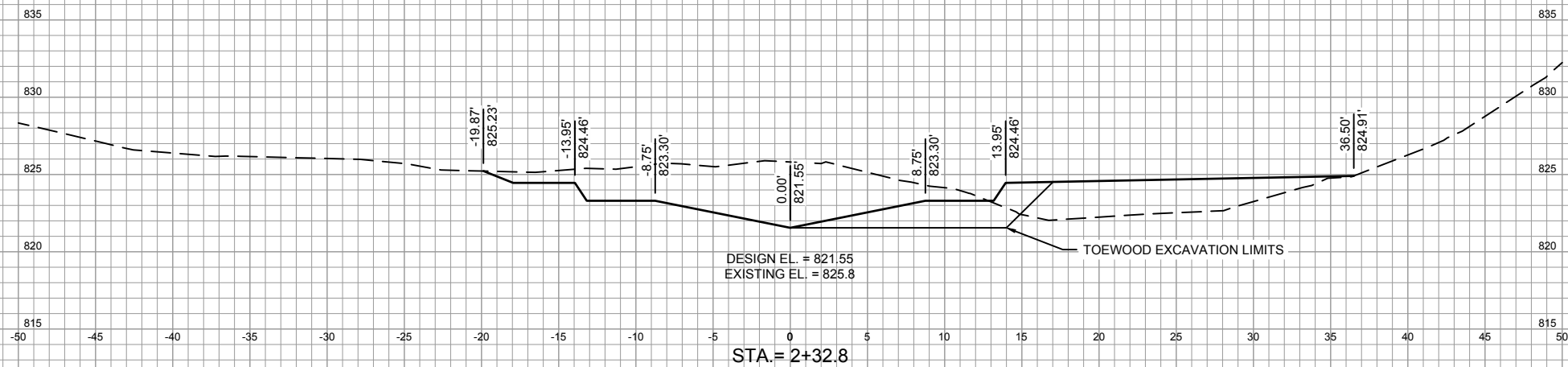


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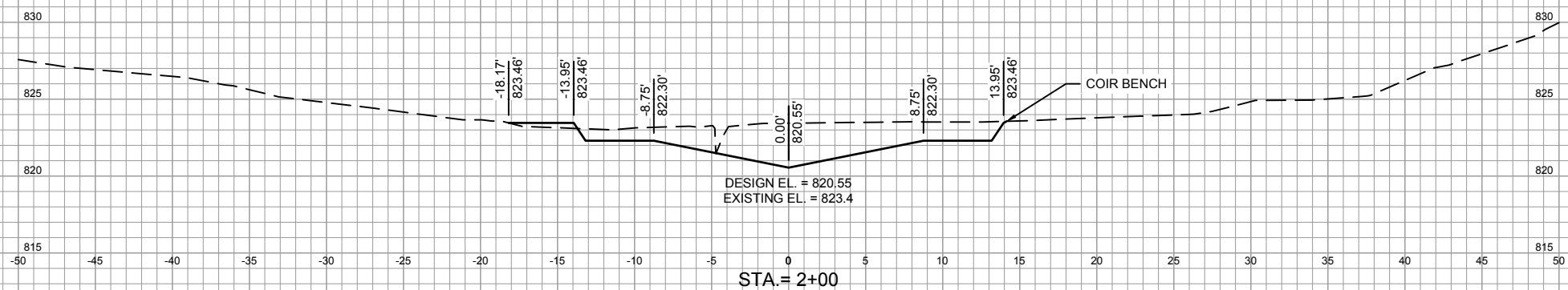
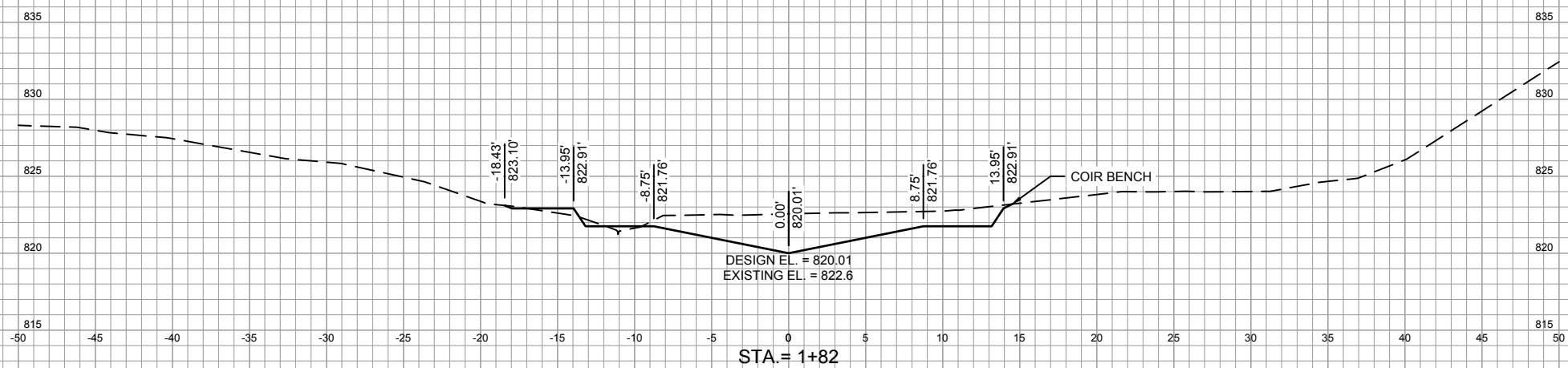
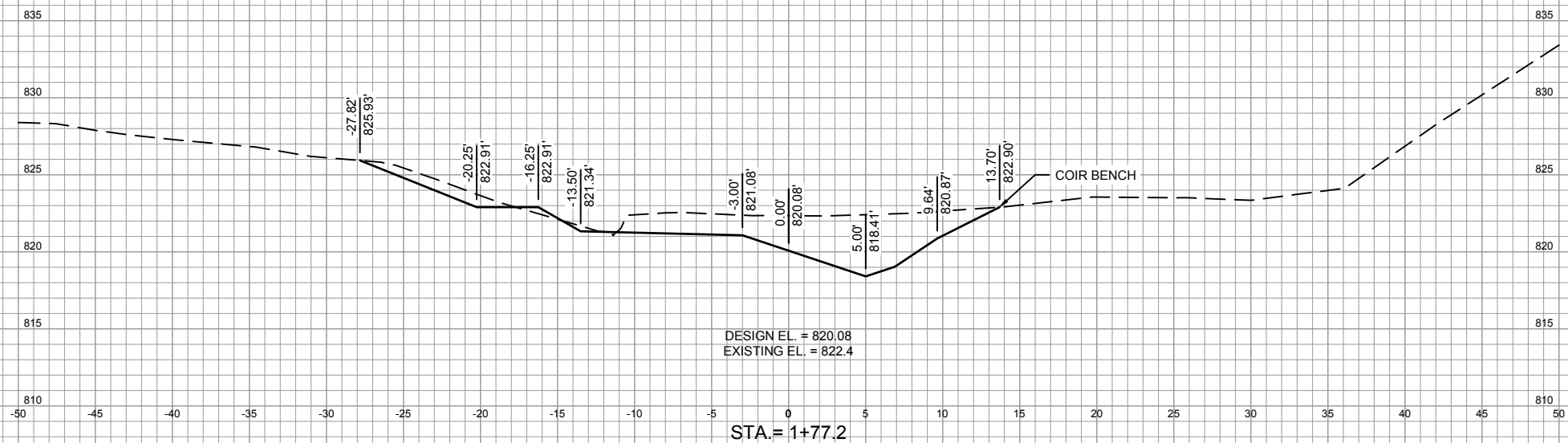


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AMITY CREEK BANK STABILIZATION 2017
CITY OF DULUTH, MINNESOTA
CITY OF DULUTH PROJECT NO. 1355

CROSS SECTIONS -
REACH 579D-3

FILE NO.
00616087
SHEET
CS-15



SECTIONS REFERENCE PLAN SHEET C-15

PROJECT NO.:	00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE:	-	DRAWN BY: JAS	-	-	-	-
F.B.:	-	CHECKED BY: JJJ	-	-	-	-
-	-	-	-	-	-	-

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MAR. 13, 2017
Date
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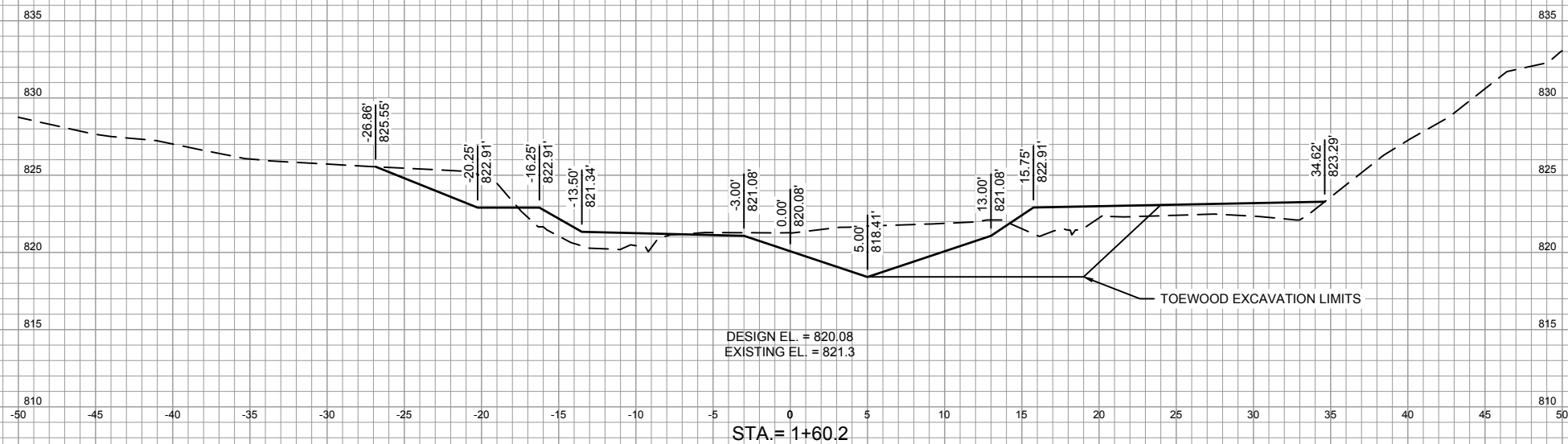
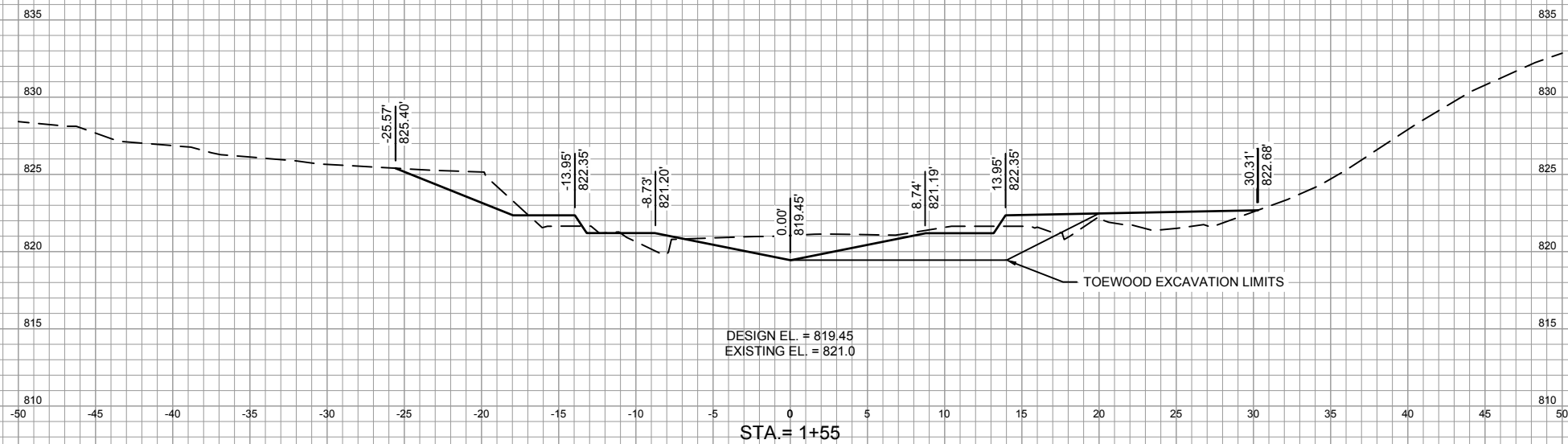


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CROSS SECTIONS -
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FILE NO.
00616087
SHEET
CS-16



SECTIONS REFERENCE PLAN SHEET C-15

PROJECT NO.:	00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE:		DRAWN BY: JAS	-	-	-	-
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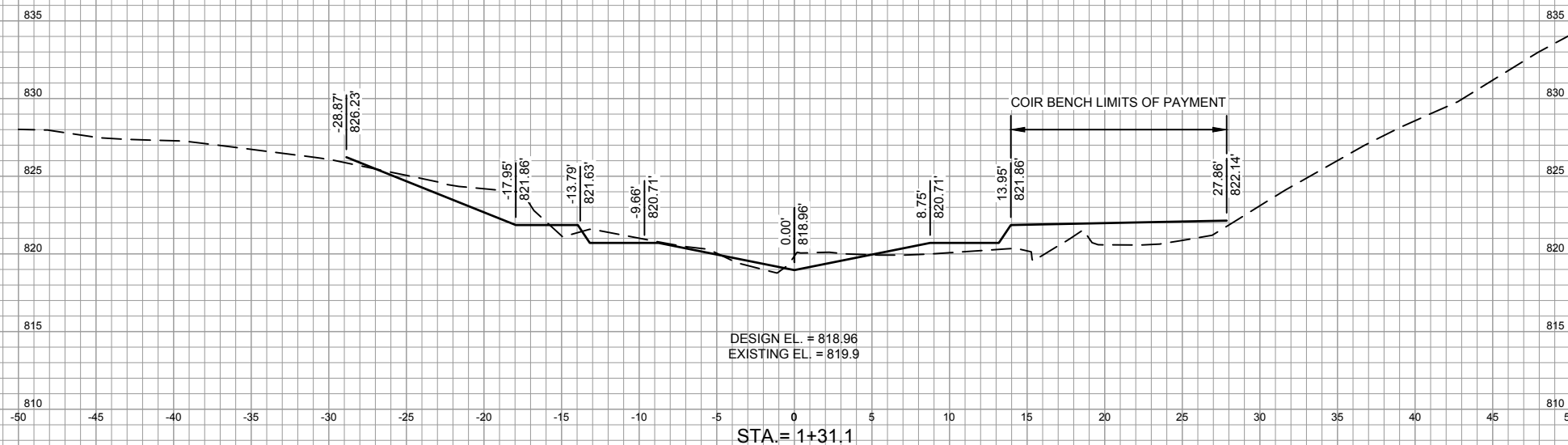
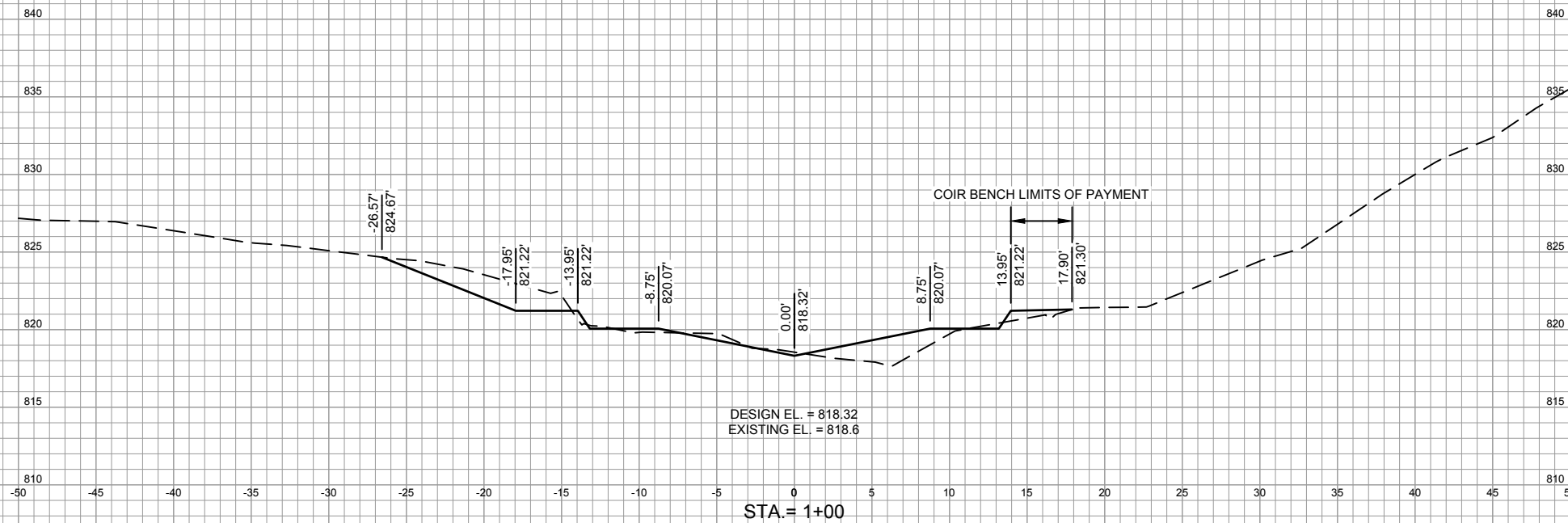


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FILE NO.
00616087
SHEET
CS-17



SECTIONS REFERENCE PLAN SHEET C-16

PROJECT NO.:	00616087	SCALE:	AS SHOWN	NO.		DATE		REVISION		BY	
PROJECT DATE:		DRAWN BY:	JAS								
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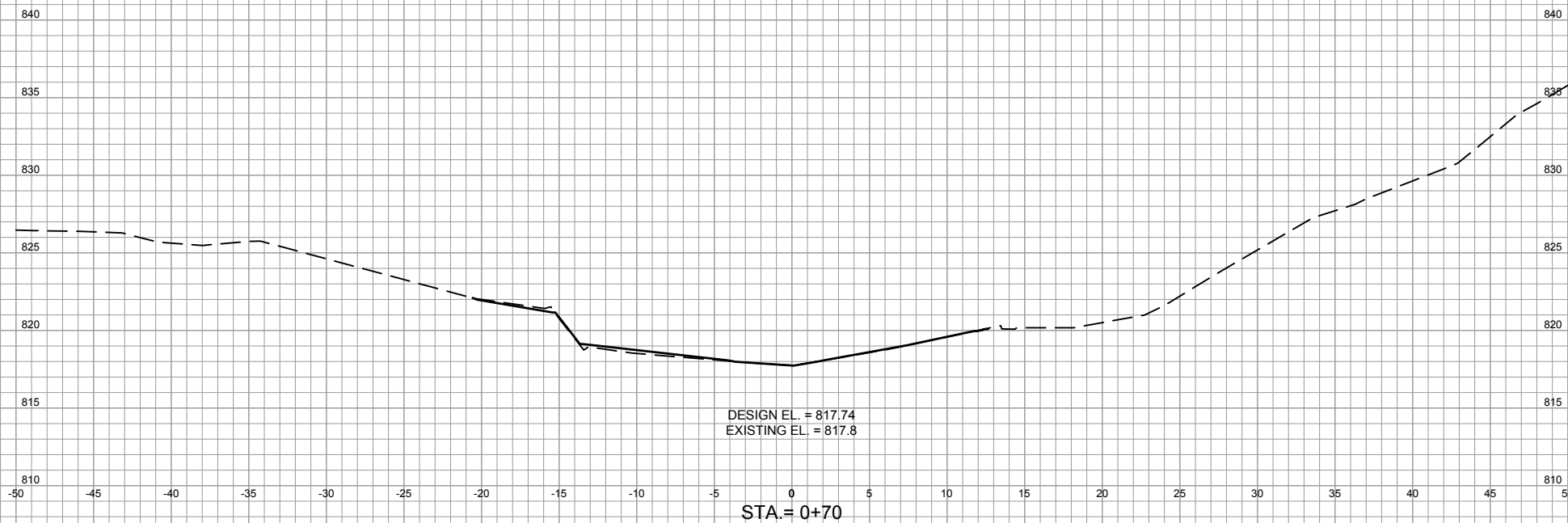


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FILE NO.
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SHEET
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SECTIONS REFERENCE PLAN SHEET C-16

PROJECT NO.:	00616087	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
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CS-19