

CITY OF DULUTH

DEPARTMENT OF PUBLIC WORKS AND UTILITIES - ENGINEERING DIVISION

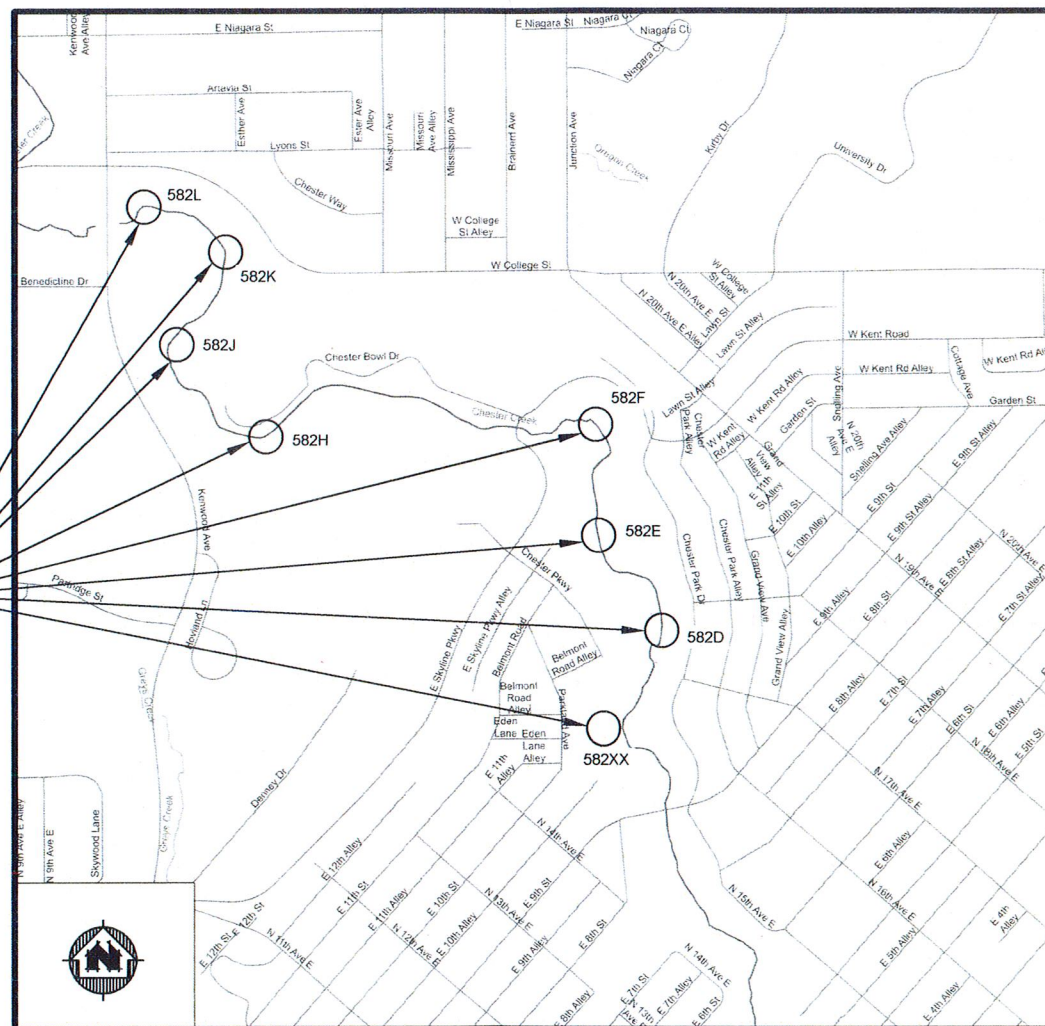
CONSTRUCTION PLANS FOR:

CHESTER CREEK (REACH #582 E, D, K, F, L, H, J & XX) BANK STABILIZATION (2016)
CITY PROJECT NO. 1280, 1281, 1283, 1349, 1350, 1352, 1353

LEGEND

	EXISTING WATER MAIN
	EXISTING GATE VALVE & HYDRANT
	WATER SERVICE & CURB STOP
	PROPOSED WATERMAIN, VALVE, & HYDRANT
	PROPOSED WATER SERVICE & CURB STOP
	EXISTING SANITARY SEWER & MANHOLE
	EXISTING FORCEMAIN
	EXISTING STORM SEWER & INLET
	PROPOSED STORM SEWER & INLET
	PROPOSED MANHOLE & SEWER MAIN
	BURIED ELECTRIC
	BURIED GAS & VALVE
	BURIED CABLE TELEVISION
	BURIED TELEPHONE
	BURIED FIBER OPTICS
	RAILROAD TRACKS
	EXISTING CURB & GUTTER
	PROPOSED CURB & GUTTER
	EXISTING SIDEWALK
	PROPOSED SIDEWALK
	EXISTING CULVERT PIPE
	PROPOSED CULVERT PIPE
	FENCE LINE
	DRAINAGE ARROW
	SILT FENCE
	RIGHT-OF-WAY
	BASELINE
	PROPERTY LINE
	TREE LINE
	IRON PIPE
	IRON ROD
	CONTROL POINT
	UTILITY POLE & GUY
	SOIL BORING
	LIGHT POLE
	PEDESTAL
	STREET SIGN
	MAILBOX
	FLAGPOLE
	EROSION BALES
	TREE - DECIDUOUS
	TREE - CONIFEROUS
	TREE TO BE REMOVED

PROJECT LOCATIONS



SITE LOCATION MAP
NOT TO SCALE

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

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/specindex.html>

THE 2016 EDITION OF THE CITY OF DULUTH PUBLIC WORKS AND UTILITIES
DEPARTMENT CONSTRUCTION STANDARDS 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

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C-16	CROSS SECTION - REACH 582F
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C-20	DETAILS

THIS PLAN SET CONTAINS 36 SHEETS

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: JESSICA C.L. OLSON 02/22/16 43102
DATE LIC NO.

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 02/22/16 50396
DATE LIC NO.

CITY APPROVAL

APPROVED CHIEF ENGINEER OF TRANSPORTATION 2/25/16
DATE

APPROVED CHIEF ENGINEER OF UTILITIES 2-25-16
DATE

APPROVED CITY ENGINEER 2-25-16
DATE



PROJECT NO. 00616087	SCALE: AS SHOWN	NO. 1	DATE 02/22/2016	REVISION	BY
F.B. :	DRAWN BY: KNN	1	06/15/15	MNDNR PERMITTING COMMENTS	KNN
	CHECKED BY: EJT		09/21/15	MNDNR PERMITTING COMMENTS	JJJ
			10/07/15	MNDNR PERMITTING COMMENTS	JJJ

PLOT DATE: 2/22/16, P:\610s\616\00616087\CADD\IC3D\616087 Chester Creek Design REVISED 100715.dwg



TRANSPORTATION • MUNICIPAL
DEVELOPMENT • ENVIRONMENTAL
332 W. Superior Street Duluth, MN 55802
218-722-3915 1-800-777-7380 Fax 218-722-4548
Web Address: www.msa-ps.com
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TITLE SHEET

CHESTER CREEK
BANK STABILIZATION

FILE NO.
00616087
SHEET
G 1

Table 1 - QUANTITIES						CP No. 1281	CP No. 1280	CP No. 1283	CP No. 1349	CP No. 1350	CP No. 1352	CP No. 1353	CP No. 1353
ITEM		ITEM	EST. TOTAL		UNIT	Site 582D	Site 582E	Site 582K	Site 582F	Site 582L	Site 582H	Site 582J	Site 582XX
NO.	SPEC.	DESCRIPTION	QUANTITY	UNITS	PRICE	Est. Quantity	Est. Quantity	Est. Quantity	Est. Quantity	Est. Quantity	Est. Quantity	Est. Quantity	Est. Quantity
1	A	Project Mobilization/Demobilization	1.00	LS	\$ -	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125
2	B	Control of Water	1.00	LS	\$ -	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125
3	C	Rock Construction Entrance	5	EA	\$ -		1	1	1	1			1
4	D	Maintenance and Restoration of Access Paths	1.00	LS	\$ -	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125
5	E	Clearing and Grubbing	1.00	LS	\$ -	0.125	0.125	0.125	0.125	0.125	0.125	0.125	0.125
6	F	Selected Debris Removal and Off-Site Disposal (P)	80	CY	\$ -		80						
7	G	Sediment Removal and On-Site Disposal (P)	740	CY	\$ -		80	200	270	95		75	20
8	H	Sediment Removal and Off-Site Disposal (P)	585	CY	\$ -		310		155	30		70	20
9	I	Boulder Vane (Cross and J-Hook)	270	EA	\$ -			270					
10	J	Toewood - Type A	130	LF	\$ -			130					
11	K	Vegetated Reinforced Soil Slope (VRSS) - Type A	1,265	SFF	\$ -		405	860					
12	K	Vegetated Reinforced Soil Slope (VRSS) - Type B	2,020	SFF	\$ -				1,330	690			
13	L	Live Stake	3,533	EA	\$ -	50	280	600	903	536	638	526	
14	M	French Drain	60	LF	\$ -	20	40						
15	N	Corrugated Polyethylene Drain Tile, 6-inch with Sock	130	LF	\$ -	70	60						
16	O	Site Grading (P)	260	CY	\$ -	10	250						
17	P	Common Fill (P)	80	CY	\$ -			80					
18	Q	Import Topsoil	298	TON	\$ -	4	40	50	84	40	32	32	16
19	R	Rip-Rap, Class I	4	TON	\$ -	4							
20	R	Rip-Rap, Class III	145	TON	\$ -							95	50
21	R	Rip-Rap, Class IV	560	TON	\$ -		560						
22	R	Rip-Rap, Class V	178	TON	\$ -				43	135			
23	S	Rock Filter Dike	25	TON	\$ -			25					
24	T	Concrete Dissipator Structure	1	EA	\$ -							1	
25	U	Silt Fence	1,860	LF	\$ -		260	1,600					
26	V	Silt Fence Baffle System	80	LF	\$ -		80						
27	W	Filter Log	428	LF	\$ -			250	102	76			
28	X	Erosion Control Blanket, Category 3N-2S	2,670	SY	\$ -	150	2,230		202	88			
29	X	Erosion Control Blanket, Category 4N-2S	725	SY	\$ -				215	115	160	158	77
30	Y	Natural Fiber Matting	350	SY	\$ -			350					
31	Z	Straw Mulch	5,776	SY	\$ -		720	1,600	667	867	822	1100	
32	AA	Seeding, Native Mix	4,591	SY	\$ -	150	3,100	350	416	200	140	158	77
33	BB	Seeding, Turf	5,056	SY	\$ -			1,600	667	867	822	1100	
34	CC	Trees	20	EA	\$ -		10	10					
35	DD	Shrubs, #2 Container	675	EA	\$ -		530	100	14	31			
36	EE	Plugs	100	EA	\$ -		100						
37	FF	Root Rap	45	SY	\$ -				14	31			
38	GG	Foot Path Construction & Restoration	172	LF	\$ -				125	35			12
39	HH	Deadfall and Debris Removal and Off-Site Disposal	225	SY	\$ -							225	
40	II	Biolog	760	LF	\$ -	55	705						
41	JJ	24-Inch HDPE Culvert with Apron Endwall	16	LF	\$ -							16	

NOTE: (P)= PAYMENT WILL BE BASED ON PLAN QUANTITY.

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 EROSION CONTROL.
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 BREAK OR NO CLOSER THAN 2-FEET TO THE GROUND. DEADFALL IS TO BE CONSIDERED ONLY FLOATABLE DEBRIS. DEADFALL IS TO REMOVED FROM PROJECT LIMITS.
3. COMMON EXCAVATION SHALL INCLUDE TOPSOIL STRIPPING AND STOCKPILING, AND SUBSOIL EXCAVATION AND STOCKPILING. IT IS ANTICIPATED THAT THE EXCAVATED SUBSOIL WILL BE SUITABLE FOR REUSE AS BACKFILL FOR V.R.S.S. AND IN OTHER AREAS AS NECESSARY. IT IS ANTICIPATED THAT IMPORTING TOPSOIL OR GENERAL FILL WILL NOT BE NECESSARY.
4. 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 AQUATIC PLANTS, ANIMALS, AND MUD FROM ALL ITEMS. EQUIPMENT AND GEAR SHALL BE DEFINED AS ALL BOATS, MOTORS, TRACKED VEHICLES, AND HEAVY EQUIPMENT, BARGES, HOSES, PUMPS, SHEET PILING, SILT CURTAINS OR TURBIDITY BARRIERS, WADERS, AND ALL OTHER EQUIPMENT WHICH MAY COME INTO 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.

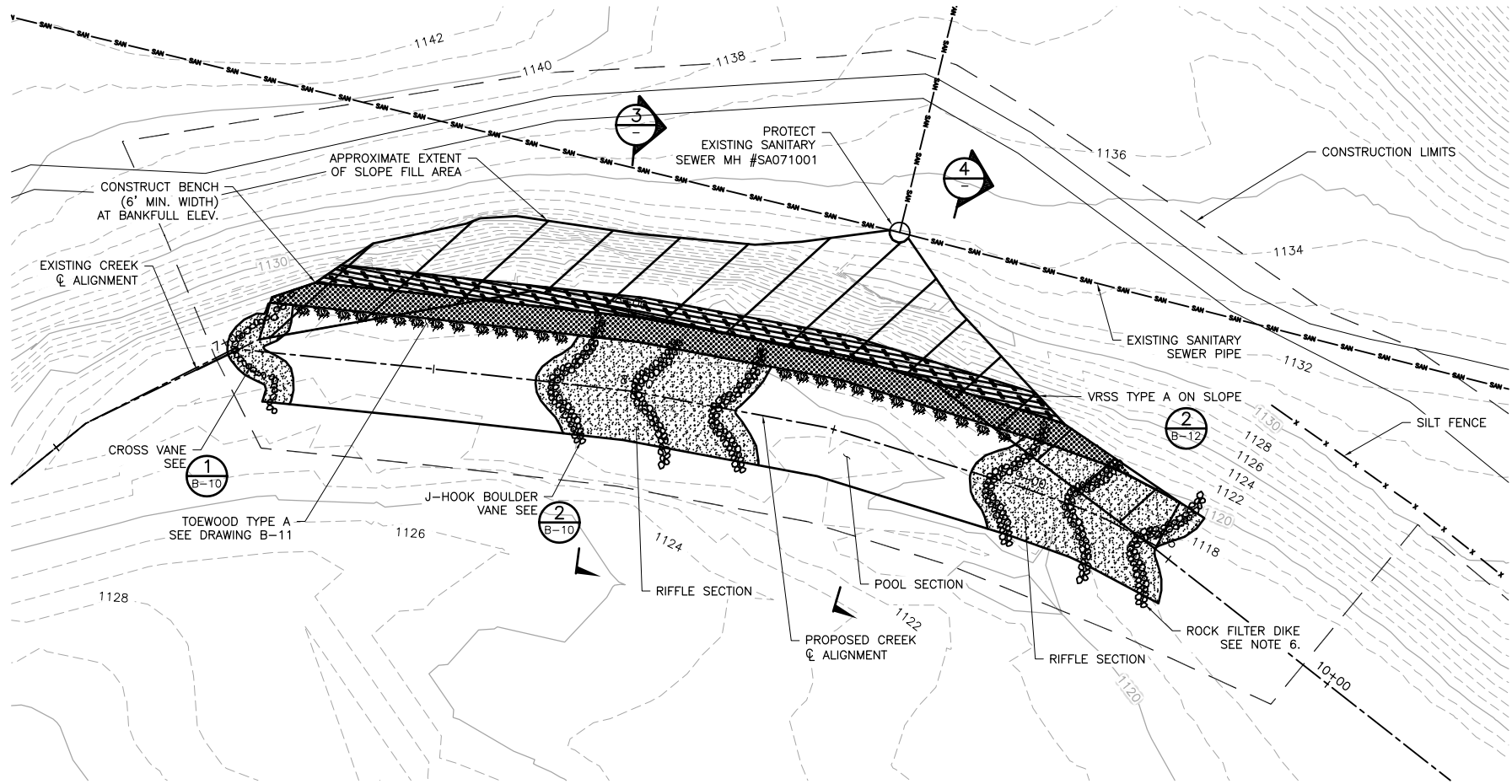
Planting Schedule - Table 2				REACHES 582L, J, H, F, AND XX ONLY
	Common Name	Species Name	Size	Quantity
Shrubs	Pagoda Dogwood	Cornus Alternifolia	#2 Container	6
	Red-Osier Dogwood	Corun Sericea	#2 Container	10
	Bush Honeysuckle	Diervilla Lonicera	#2 Container	12
	Red-berried Elder	Sambucus Pubens	#2 Container	9
	Snowberry	Symphoricarpus Albus	#2 Container	8
Live Stakes	Bebb's Willow	Salix Bebbiana	Live Stakes shall be 4-6' in Length & 1/2-2" in Diameter	651
	Balsam Willow	Salix Pyrifolia		651
	Red-Osier Dogwood	Corun Sericea		650
	Black Willow	Saliz Nigra		651
Cover Crop				Rate
	Oats	Avena Sativa	-	100 lbs/ac
	Winter Wheat	Triticum Aestivum	-	100 lbs/ac

Table 3 - Summary of Work				REACHES 582L, J, H, F, AND XX ONLY
Project Site	Proposed Work	Disturbance Area (SY)	Work in Channel	
#582 L	Rip Rap Bank Stabilization	250	No	
#582 J	Scour Protection at Culvert Outfall	190	No	
#582 H	Vegetated Slope Stabilization	135	No	
#582 F	Rip Rap Bank Stabilization	530	No	
#582 XX	Install Culvert at Foot Path	110	No	

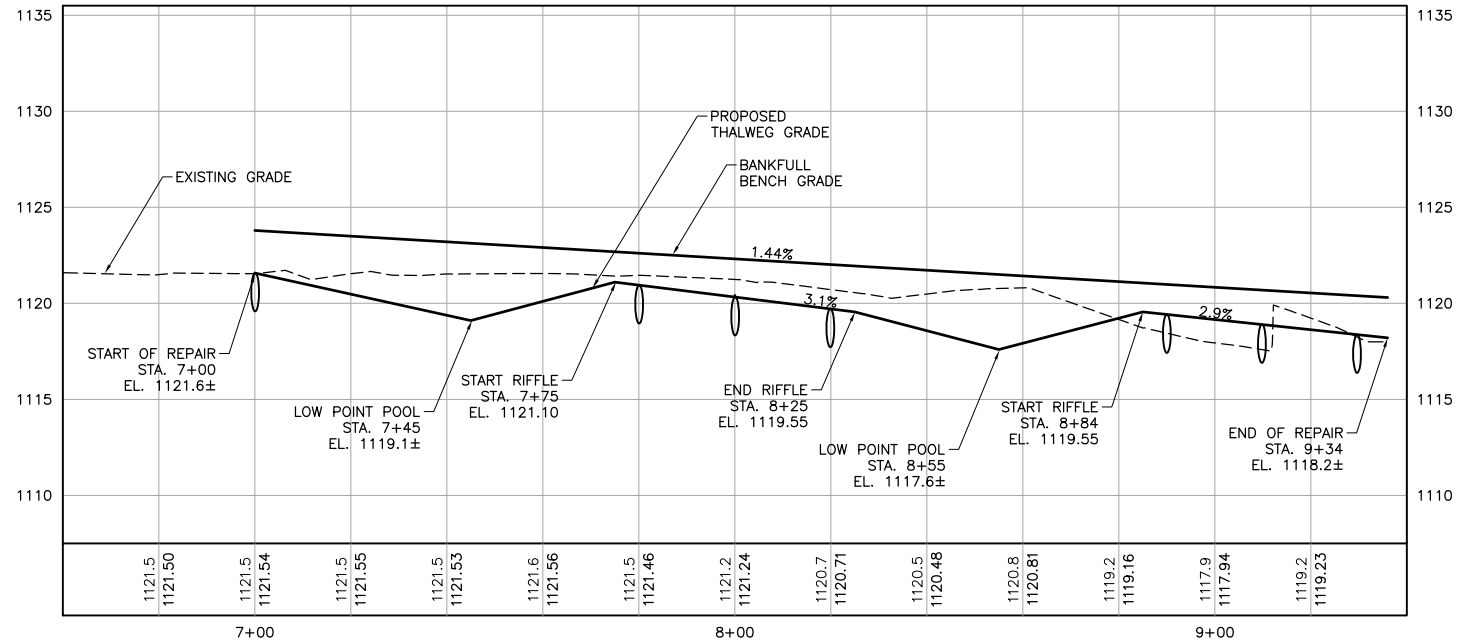
PROJECT NO.: 00616087	SCALE:AS SHOWN	NO.	DATE	REVISION	BY	I HEREBY CERTIFY THAT THIS PLAN, REPORT, OR SPECIFICATION WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA. 02/19/2016 Date 50396 License No.
PROJECT DATE: 02/22/2016	DRAWN BY: KNN	1	06/15/15	MINDNR PERMITTING COMMENTS	KNN	
F.B.:	CHECKED BY: EJT	-	-		-	
PLOT DATE: 3/4/16, C:\P\610s\616\00616087\CADD\IC3D\616087_Chester Creek Design REVISED 100715.dwg						
						JOSEPH JUREWICZ
						MSA TRANSPORTATION • MUNICIPAL DEVELOPMENT • ENVIRONMENTAL 332 W. Superior Street, Duluth, MN 55802 218-722-3915, 1-800-777-7380 Fax: 218-722-4548 Web Address: www.msa-ps.com © MSA Professional Services, Inc.
						QUANTITIES AND SCHEDULES
						CHESTER CREEK BANK STABILIZATION CP NO. 1349, 1350, 1352, 1353
						FILE NO. 00616087 SHEET G 2

CADD USER: Condi Nyland FILE: M:\DESIGN\23691453\00\582K_582K_COMBINED\23691453_B-01 THRU B-03.DWG PLOT SCALE: 1:2 PLOT DATE: 2/19/2016 10:51 AM

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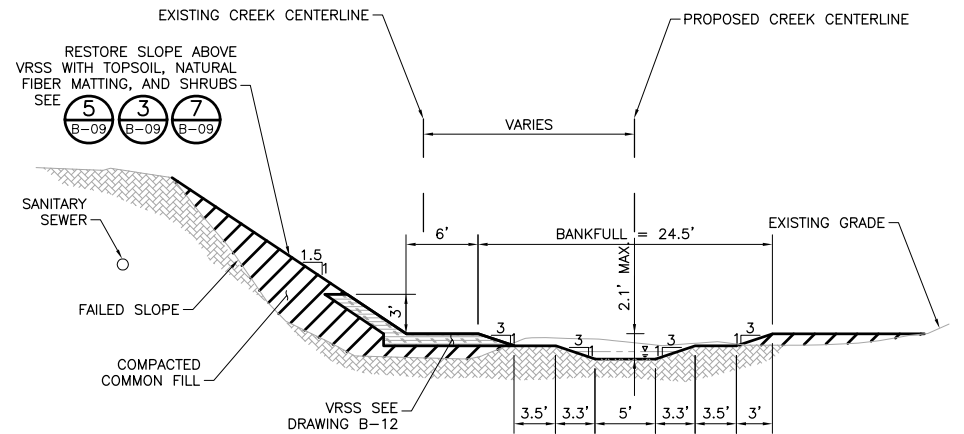


1 OVERVIEW: CHESTER CREEK BANK STABILIZATION REACH 582K

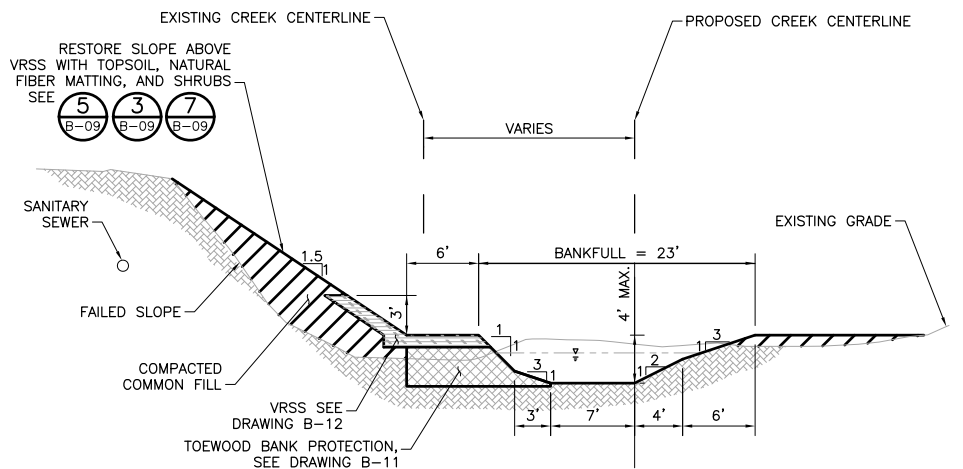


2 PROFILE: PROPOSED CHESTER CREEK ALIGNMENT - REACH 582K

- LEGEND:
- EXISTING SLOPE FAILURE AREA
 - SANITARY SEWER
 - EXISTING TRAIL/ROAD
 - CONSTRUCTION LIMITS
 - SILT FENCE
 - MAJOR CONTOUR
 - MINOR CONTOUR
 - MAJOR CONTOUR LABEL



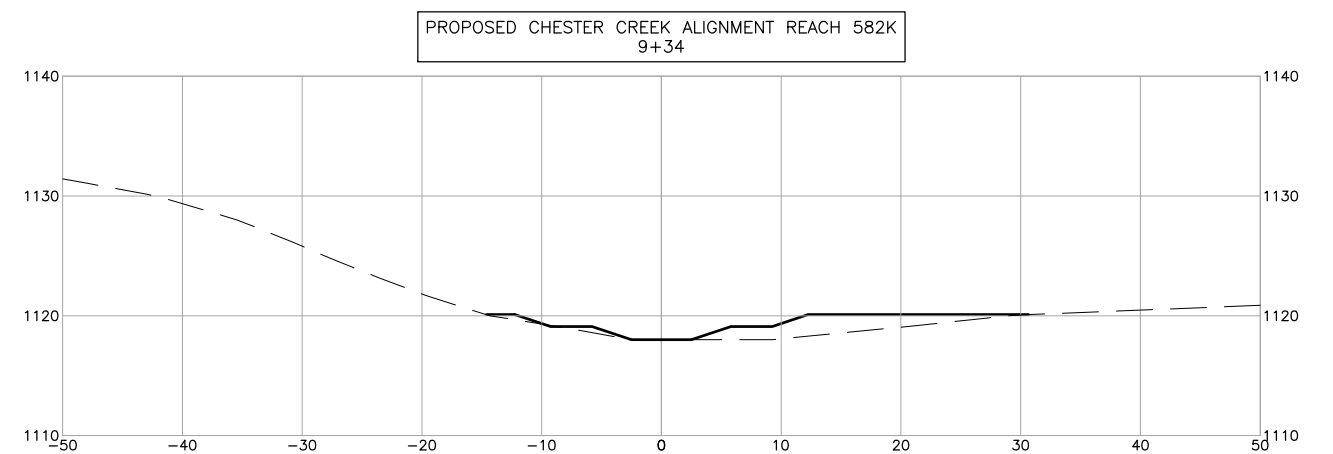
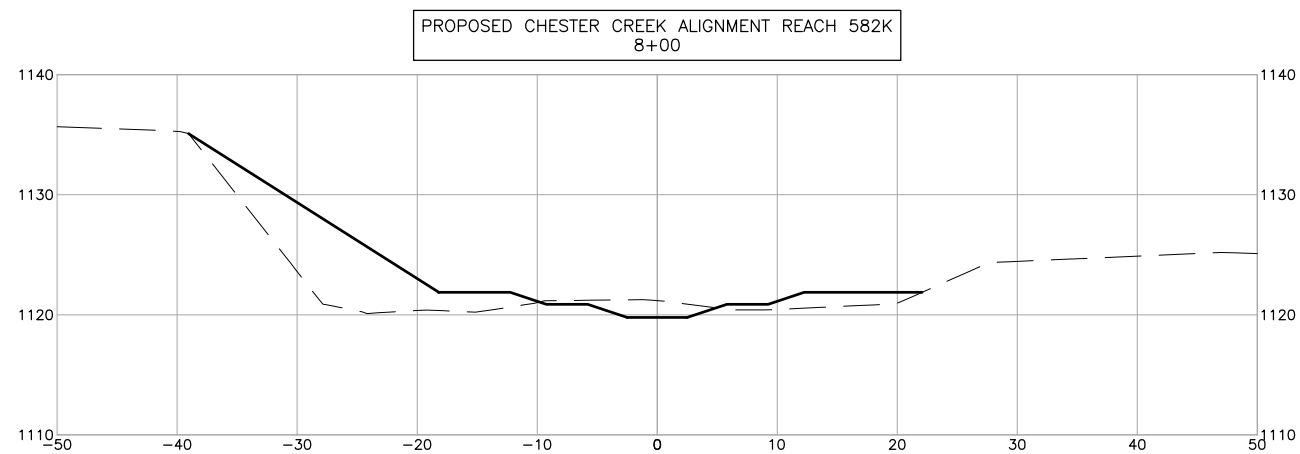
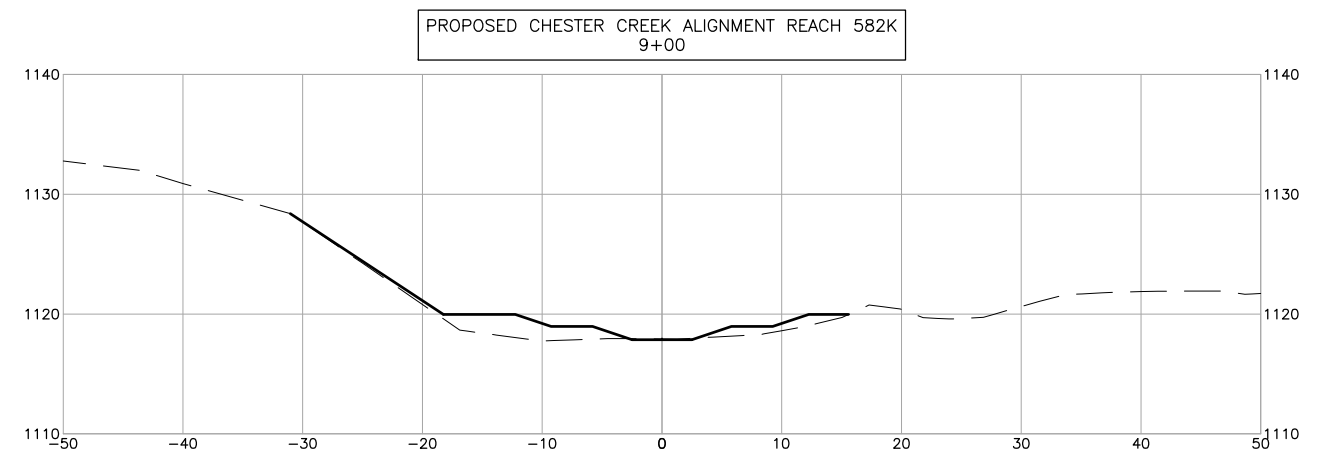
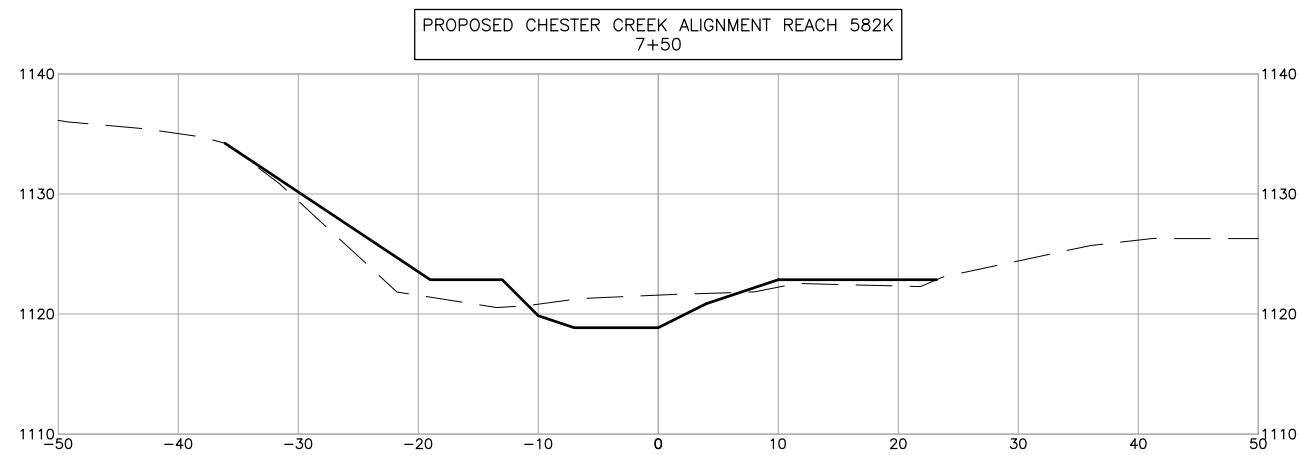
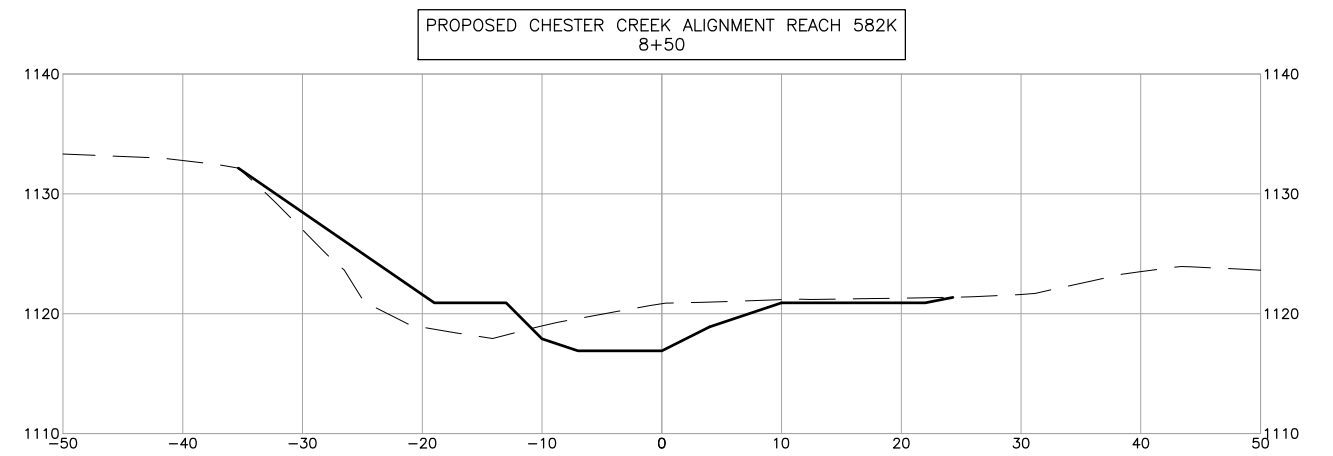
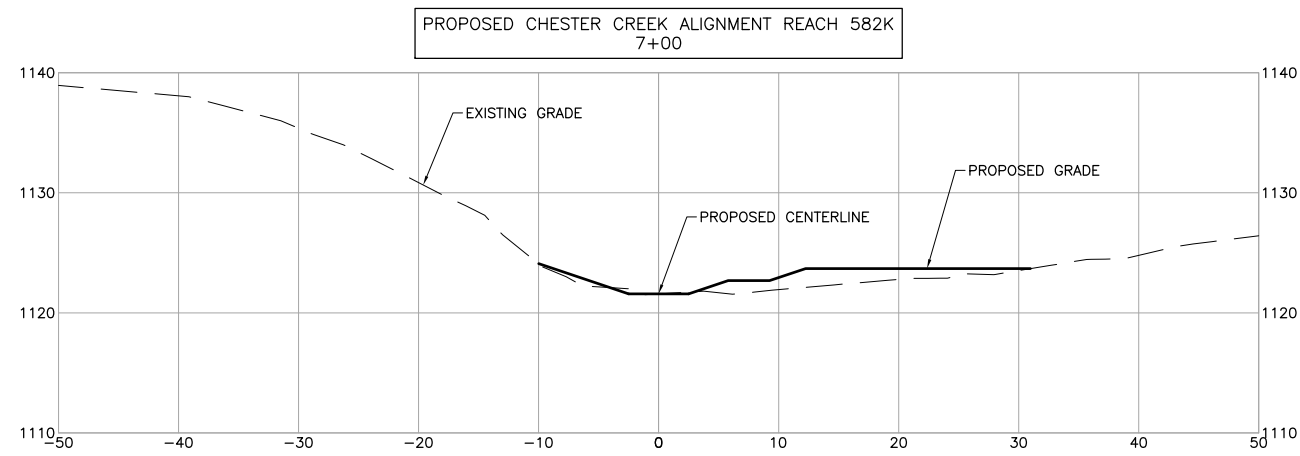
3 SECTION: TYPICAL SECTION - RIFFLE SECTION



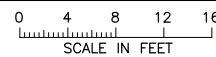
4 SECTION: TYPICAL SECTION - POOL SECTION

ISSUED FOR BID
2/16/2016

					I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.										CLIENT BID CONSTRUCTION PERMIT RECORD										<div>Project Office: BARR ENGINEERING CO. 325 SOUTH LAKE AVENUE SUITE 700 DULUTH, MN 55802 Corporate Headquarters: Minneapolis, Minnesota Ph: 1-800-786-5830 Fax: (218) 727-6450 www.barr.com</div>										Scale Date Drawn Checked Designed Approved				AS SHOWN 10/15/2014 MRH3 PJH2 MRH3 PJH2				CITY OF DULUTH DULUTH, MINNESOTA										CHESTER CREEK BANK STABILIZATION REACH 582K PLAN, PROFILE AND TYPICAL SECTION										BARR PROJECT No. 23/69-1453 CLIENT PROJECT No. 1280, 1281, 1283 DWG. No. B-02 REV. 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PROFILE: CHESTER CREEK BANK STABILIZATION REACH 582K



ISSUED FOR BID
2/16/2016

										I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.										CLIENT BID CONSTRUCTION PERMIT RECORD										2/18/16										 Project Office: BARR ENGINEERING CO. 325 SOUTH LAKE AVENUE SUITE 700 DULUTH, MN 55802 Corporate Headquarters: Minneapolis, Minnesota Ph: 1-800-786-5830 Fax: (218) 727-6450 www.barr.com										Scale AS SHOWN Date 10/15/2014 Drawn MRH3 Checked PJH2 Designed MRH3 Approved PJH2										CITY OF DULUTH DULUTH, MINNESOTA										CHESTER CREEK BANK STABILIZATION REACH 582K										BARR PROJECT No. 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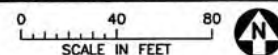


LEGEND:

- EXISTING SCARP
- AREA REQUIRING LIMITED REMOVAL OF SELECT DEAD TREES AND BRANCHES IN CHANNEL AND ALONG BANKS; ONLY REMOVE MARKED ITEMS
- EXISTING TRAIL
- CONSTRUCTION LIMITS
- STAGING AND LAYDOWN AREA, EXCESS SOIL STOCKPILE AREA
- SILT FENCE

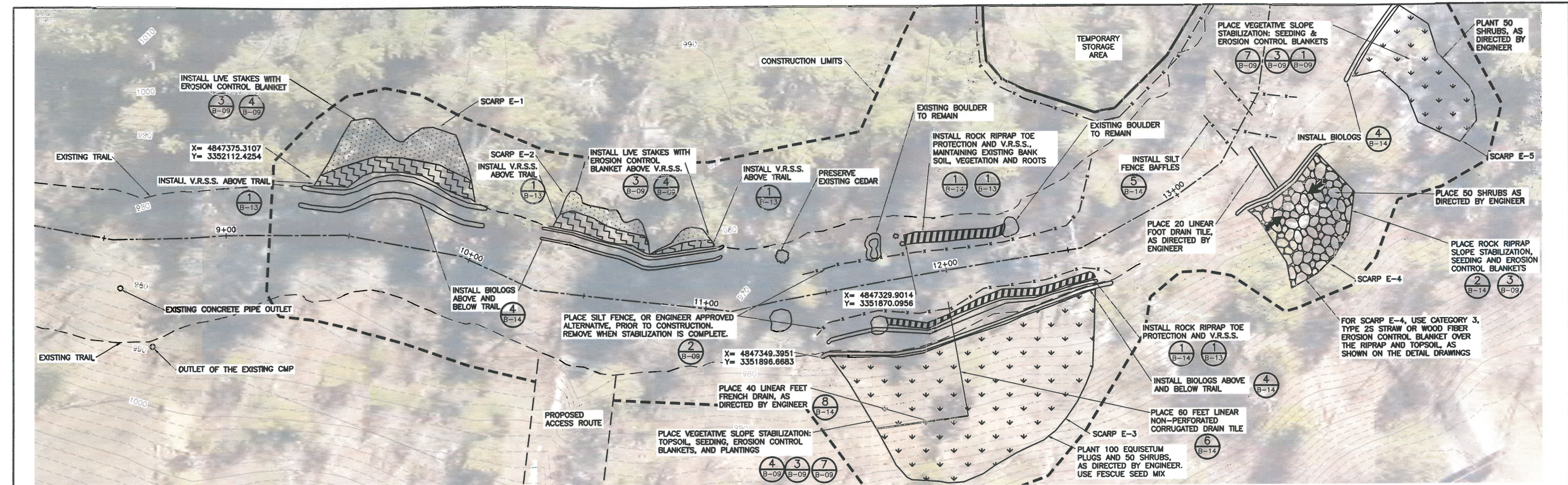
- NOTES
1. CONTROL PUBLIC ACCESS TO WORK AREAS AS NEEDED WITH CONSTRUCTION FENCING OR SILT FENCING.
 2. CONTOURS REPRESENT 2012 POST FLOOD ELEVATIONS.
 3. CONTRACTOR TO PROVIDE PROPOSED ACCESS ROAD AND RESTORATION DESIGN TO ENGINEER FOR APPROVAL 14 DAYS PRIOR TO CONSTRUCTION START DATE.
 4. ACCESS ROUTE AND OTHER AREAS DISTURBED DURING CONSTRUCTION SHALL BE RESTORED WITH TOPSOIL, SEED, EROSION CONTROL BLANKET, AND BIOLOGS AS SPECIFIED BY THE ENGINEER. SEED SHALL BE 36-311 WOODLAND EDGE ME (SECTION 32900 - 2.03). ACCESS ROUTE SHALL BE LOOSENEED PRIOR TO PLACEMENT OF TOPSOIL AND SEEDING.
 5. NO IN-STREAM WORK SHALL OCCUR BETWEEN OCTOBER 1ST AND JUNE 30TH.
 6. ACCESS ROUTE AND SCARPS E-1 THROUGH E-5 ARE STEEPER THAN 33%.
 7. PHASE WORK TO MINIMIZE SOIL EXPOSURE, BEGINNING WITH SCARP E-5 AND STABILIZING AS SOON AS WORK IS COMPLETED.
 8. NO ACTIVITY AFFECTING THE BED OF THE PROTECTED WATER MAY BE CONDUCTED BETWEEN APRIL 1 AND JUNE 30, TO MINIMIZE IMPACTS ON FISH SPAWNING AND MIGRATION. WORK EXCLUSION DATES IN THIS TRIBUTARY ALSO INCLUDE SEPTEMBER 15-JUNE 30 DUE TO DOCUMENTATION OF TEMPERATURES SUPPORTIVE TO FALL SPAWNING BROOK TROUT. WORK IN THIS TRIBUTARY SHOULD LIMIT AND REPLACE ANY BANK VEGETATION REMOVED AND LIMIT REMOVAL OF ANY IN STREAM DEADFALL (582J).

1 PLAN: CHESTER CREEK BANK STABILIZATION REACH 582e



EPF M:\Design\23691453\00\23691453_C-01-Chester Creek_Plan582e_L1_6430.dwg Plot at 1 06/04/2014 19:14:12

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.				CLIENT BID 2/16/16				Project Office: BARR ENGINEERING CO. 325 SOUTH LAKE AVENUE SUITE 700 DULUTH, MN. 55802 Ph: 1-800-786-5830 Fax: (218) 727-6450 www.barr.com				Scale AS SHOWN Date 3/28/2013				CITY OF DULUTH				CHESTER CREEK BANK STABILIZATION REACH 582e				BARR PROJECT No. 23/69-1453			
SIGNATURE JESSICA C. L. OLSON				CONSTRUCTION PERMIT RECORD				Drawn EPF				DULUTH, MINNESOTA				PLAN VIEW - EXISTING AND REMOVAL				CLIENT PROJECT No. 1280, 1281, 1283				DWG. No. B-05			
PRINTED NAME JESSICA C. L. OLSON				RELEASED TO/FOR				Checked MRH3																REV. No. A			
DATE 2/16/16 LIC. NO. 43102				A B C 0 1 2 3				Designed JCO																			
NO. BY CHK APP DATE REVISION DESCRIPTION				DATE RELEASED				Approved JCO																			

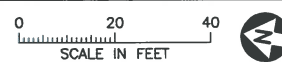


NOTES:

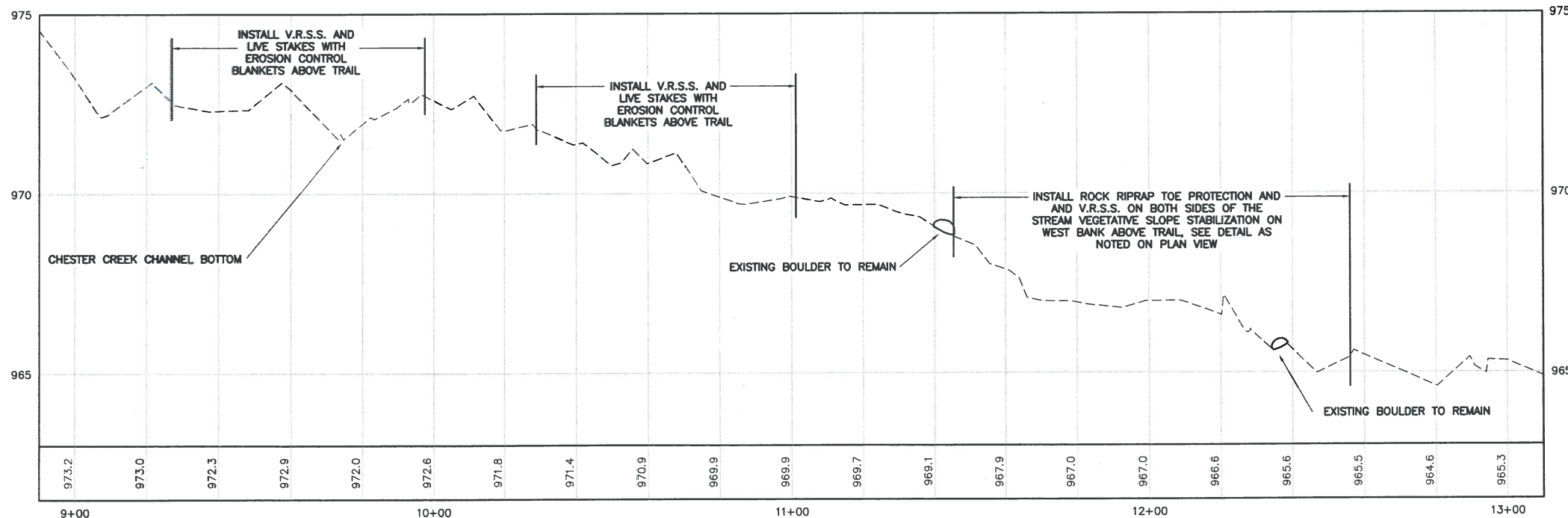
1. TEMPORARY STORAGE AREA TO BE GRADED, SEEDED AND MULCHED FOLLOWING CONSTRUCTION COMPLETION.
2. CHESTER CREEK IS NOT INCLUDED ON THE 2013 MPCA LIST OF MINNESOTA IMPAIRED WATERS. CHESTER CREEK IS A DESIGNATED TROUT STREAM.
3. AREAS OF DISTURBANCE SHALL BE LIMITED TO CONSTRUCTION LIMITS AS SHOWN ON PLANS.
4. SEED DISTURBED AREAS WITH 38-311 WOODLAND EDGE SE, EXCEPT WHERE OTHERWISE NOTED.
5. PHASE WORK TO MINIMIZE SOIL EXPOSURE, BEGINNING WITH SCARP E-5 WORKING UPSTREAM, AND STABILIZING AS SOON AS WORK IS COMPLETED.
6. NO IN-STREAM WORK SHALL OCCUR BETWEEN OCTOBER 1ST AND JUNE 30TH.
7. CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP).
8. EROSION PREVENTION AND SEDIMENT CONTROL SHALL BE IN ACCORDANCE WITH THE SWPPP.
9. INSTALL SILT FENCE Baffles PRIOR TO COMMENCING WORK IN WATER.
10. DURING THE MNDNR WORK IN WATER RESTRICTION FISH SPAWNING TIME FRAME BETWEEN OCTOBER 1ST AND JUNE 30TH, COMPLETE STABILIZATION WITHIN 24 HOURS FOR EXPOSED SOIL AREAS WITHIN 200 FEET OF THE WATER'S EDGE.
11. NO ACTIVITY AFFECTING THE BED OF THE PROTECTED WATER MAY BE CONDUCTED BETWEEN APRIL 1 AND JUNE 30, TO MINIMIZE IMPACTS ON FISH SPAWNING AND MIGRATION. WORK EXCLUSION DATES IN THIS TRIBUTARY ALSO INCLUDE SEPTEMBER 15-JUNE 30 DUE TO DOCUMENTATION OF TEMPERATURES SUPPORTIVE TO FALL SPAWNING BROOK TROUT. WORK IN THIS TRIBUTARY SHOULD LIMIT AND REPLACE ANY BANK VEGETATION REMOVED AND LIMIT REMOVAL OF ANY IN STREAM DEADFALL. (582J)

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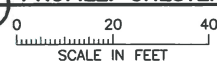
1 PLAN: CHESTER CREEK BANK STABILIZATION REACH 582e



LEGEND:	
	CONSTRUCTION LIMITS
	EXISTING TRAIL
	STREAM CENTERLINE
	SILT FENCE
	ROCK RIPRAP
	V.R.S.S., TYPE A
	ROCK RIPRAP TOE PROTECTION AND V.R.S.S.
	LIVE STAKES AND EROSION CONTROL BLANKET
	VEGETATIVE SLOPE STABILIZATION (TOPSOIL, SEED, ECB, PLANTINGS)

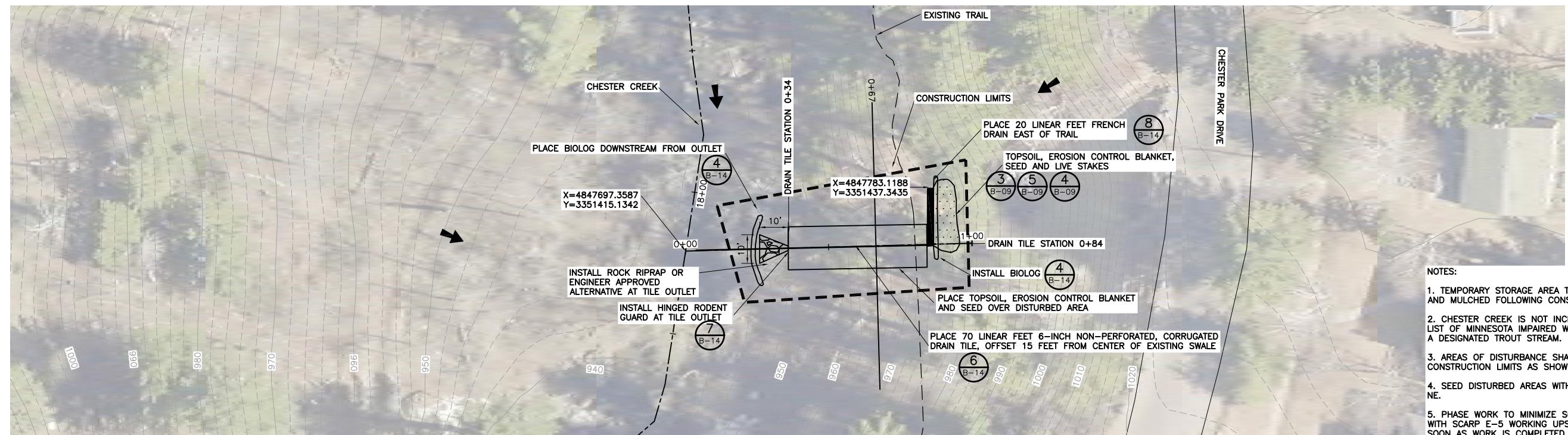


2 PROFILE: CHESTER CREEK BANK STABILIZATION REACH 582e

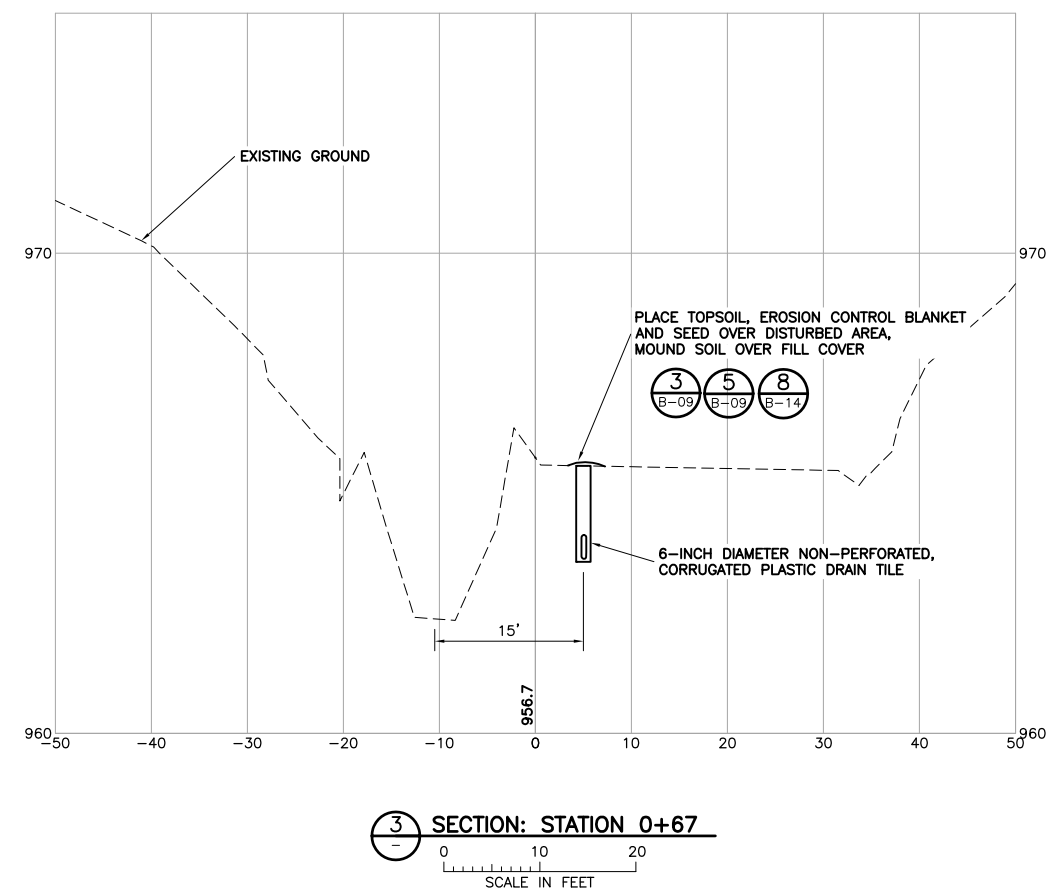
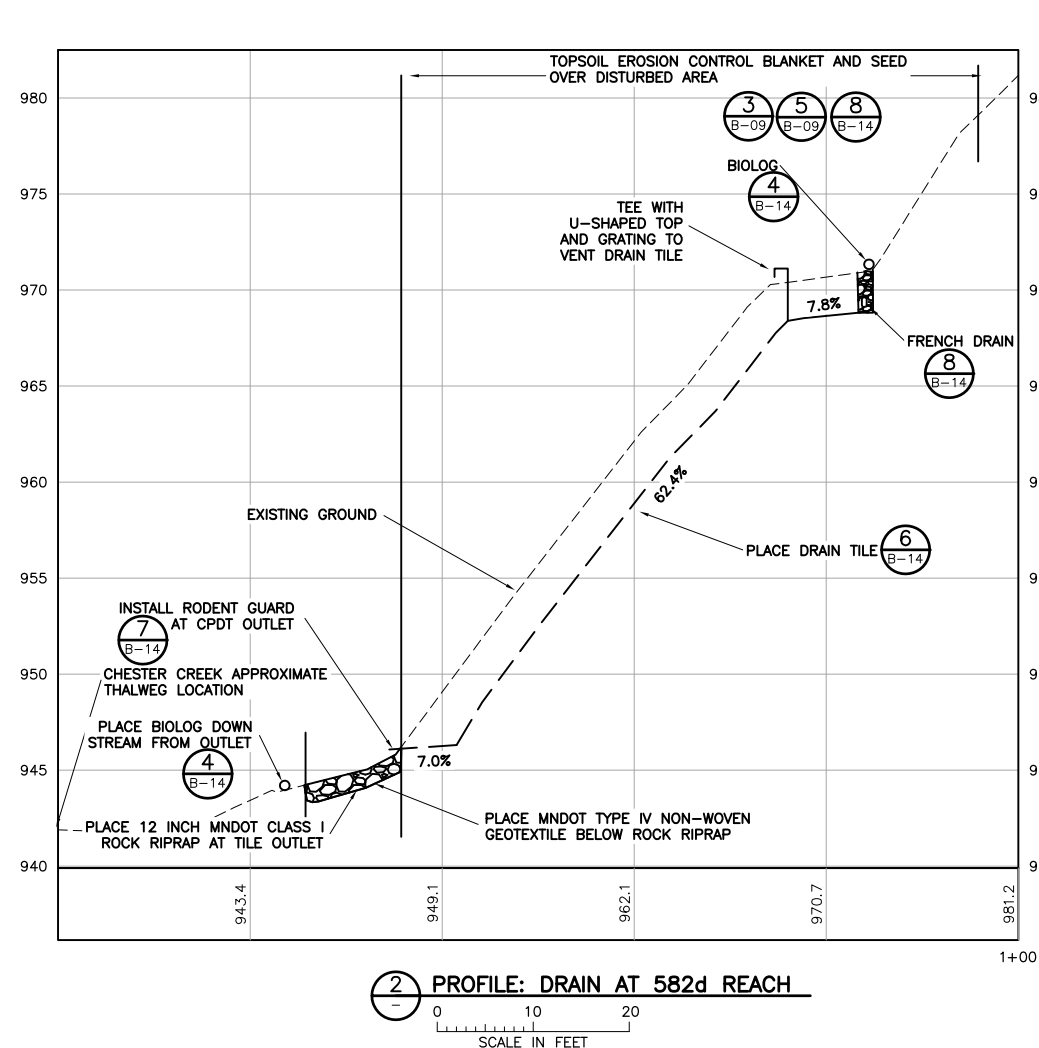


ISSUED FOR BID
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NO. BY CHK APP DATE REVISION DESCRIPTION				SIGNATURE PRINTED NAME JESSICA C. L. OLSON DATE 2/16/16 LIC. NO. 43102				RELEASED TO/FOR DATE RELEASED																			



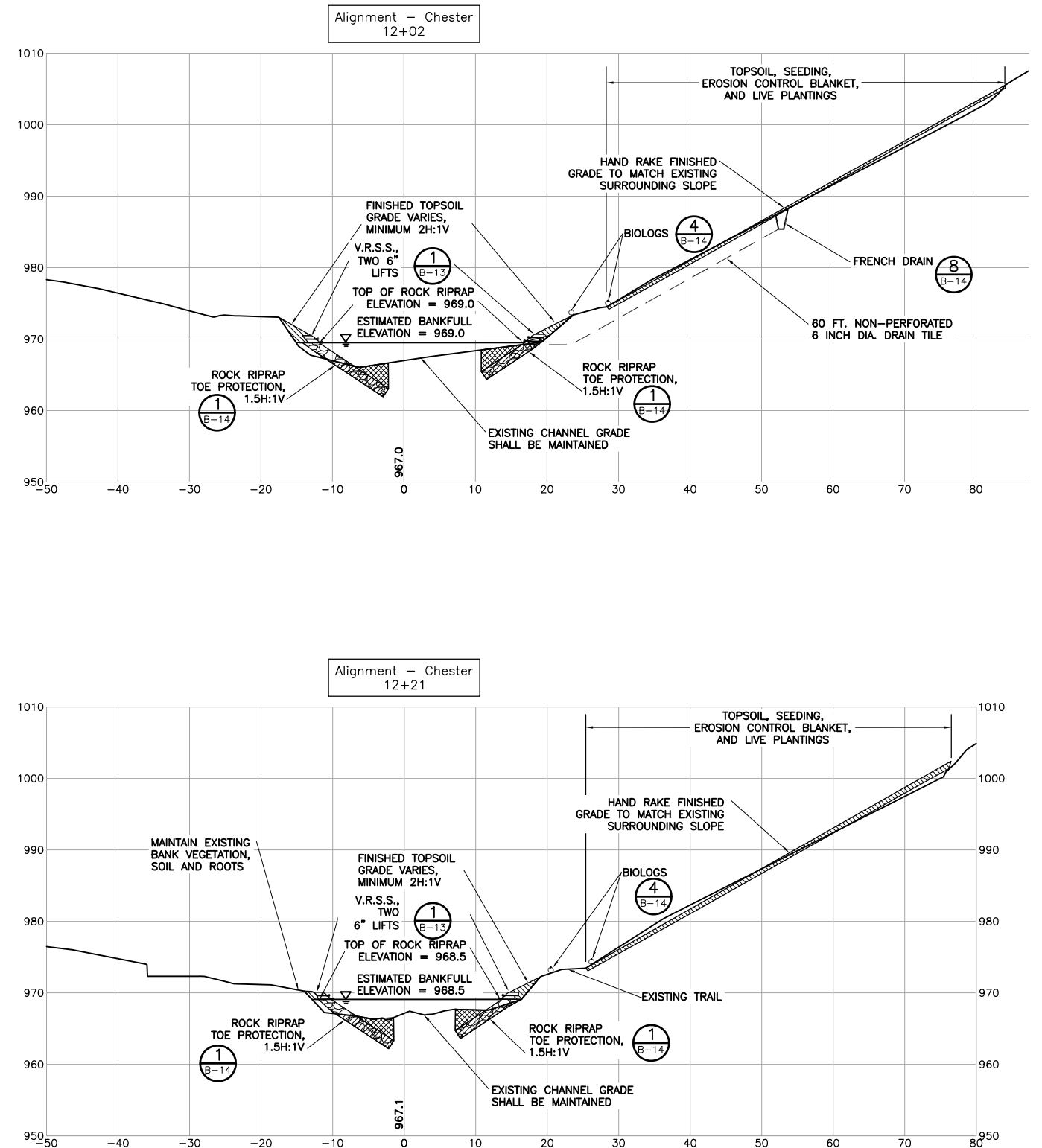
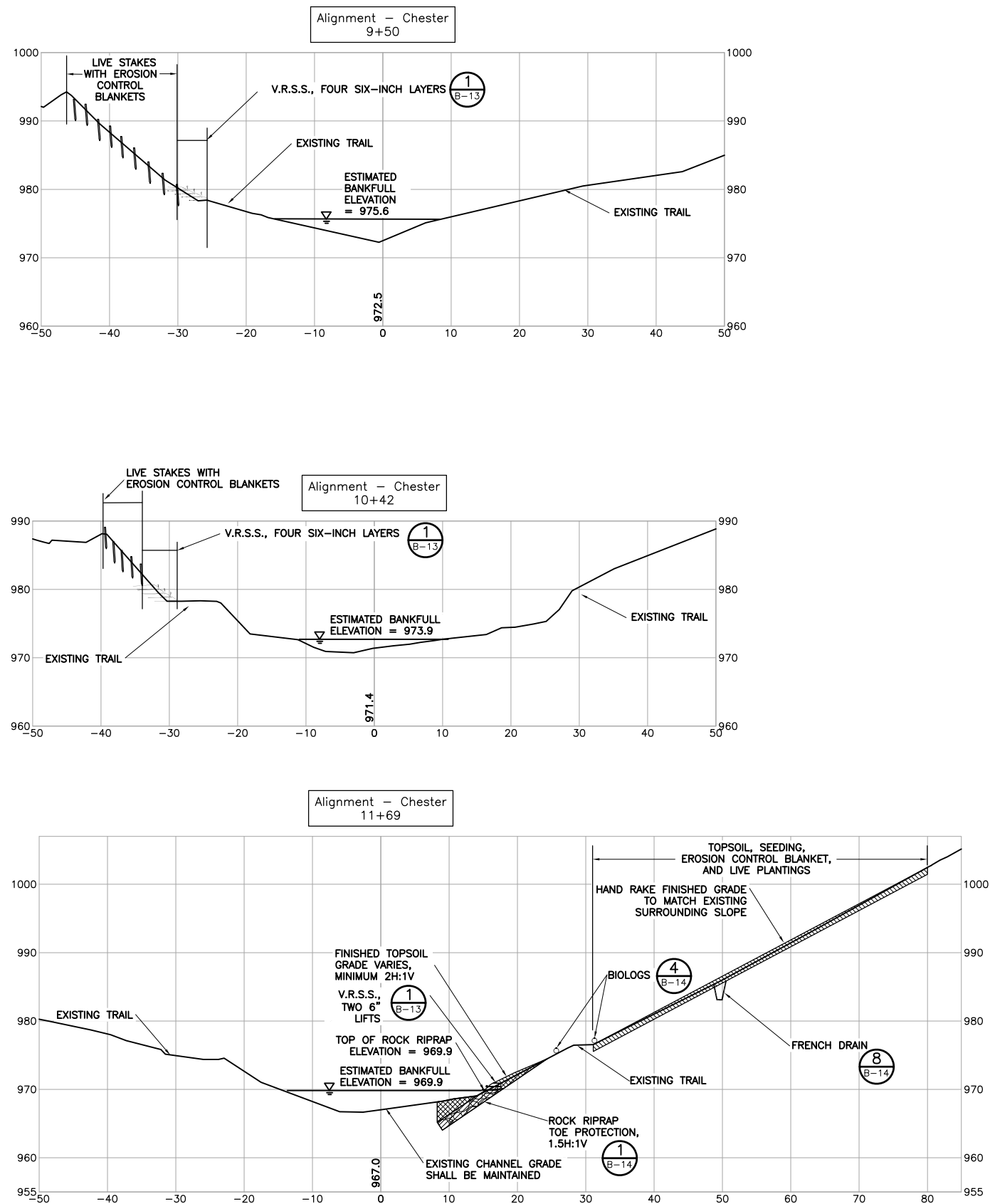
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4. SEED DISTURBED AREAS WITH 36-311 WOODLAND EGGE NE.
5. PHASE WORK TO MINIMIZE SOIL EXPOSURE, BEGINNING WITH SCARP E-5 WORKING UPSTREAM, AND STABILIZING AS SOON AS WORK IS COMPLETED.
6. NO IN-STREAM WORK SHALL OCCUR BETWEEN OCTOBER 1ST AND JUNE 30TH.
7. SITE SHALL BE ACCESSED VIA FOOT PATH FROM CHESTER PARK DRIVE.
8. CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP).
9. EROSION PREVENTION AND SEDIMENT CONTROL SHALL BE IN ACCORDANCE WITH THE SWPPP.
10. DURING THE MNDNR WORK IN WATER RESTRICTION FISH SPAWNING TIME FRAME BETWEEN OCTOBER 1ST AND JUNE 30TH, COMPLETE STABILIZATION WITHIN 24 HOURS FOR EXPOSED SOIL AREAS WITHIN 200 FEET OF THE WATER'S EDGE.
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1 SECTION: CHESTER CREEK REACH 582e

0 10 20

SCALE IN FEET

ISSUED FOR BID
2/16/2016

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
A	EPF	MRH3	JCO	2/16/16	ISSUED FOR BID

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

SIGNATURE: *J. Olson*

PRINTED NAME: JESSICA C. L. OLSON

DATE: 2/16/16 LIC. NO. 43102

CLIENT	BID	CONSTRUCTION	PERMIT	RECORD	RELEASED TO/FOR	DATE RELEASED
BARR ENGINEERING CO.	2/16/16					

BARR

Project Office:
BARR ENGINEERING CO.
325 SOUTH LAKE AVENUE
SUITE 700
DULUTH, MN. 55802

Corporate Headquarters:
Minneapolis, Minnesota
Ph: 1-800-786-5830
Fax: (218) 727-6450
www.barr.com

Scale	AS SHOWN
Date	3/28/2014
Drawn	EPF
Checked	MRH3
Designed	JCO
Approved	JCO

CITY OF DULUTH

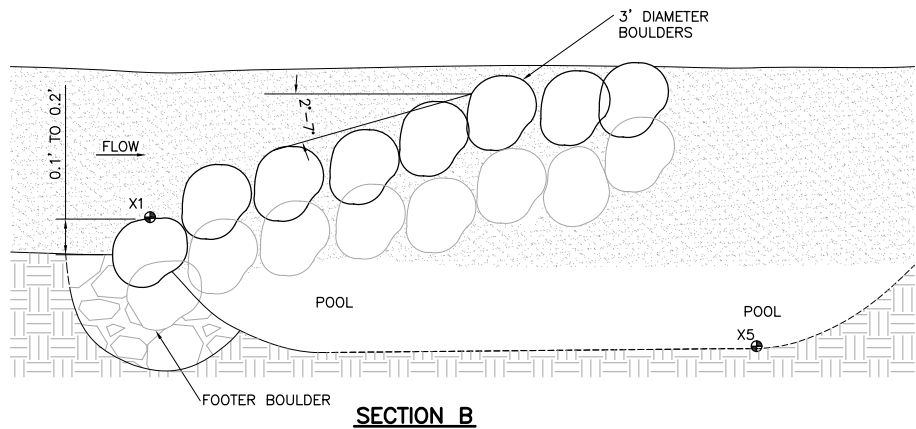
DULUTH, MINNESOTA

CHESTER CREEK BANK STABILIZATION
REACH 582e

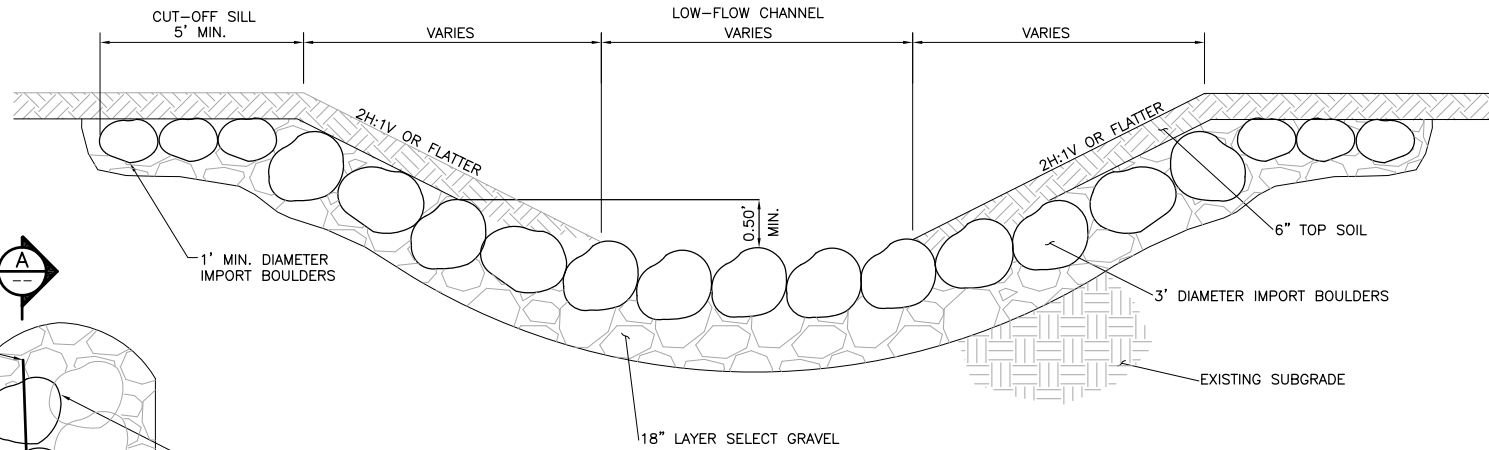
SECTIONS

BARR PROJECT No.	23/69-1453
CLIENT PROJECT No.	1280, 1281, 1283
DWG. No.	B-08
REV. No.	A

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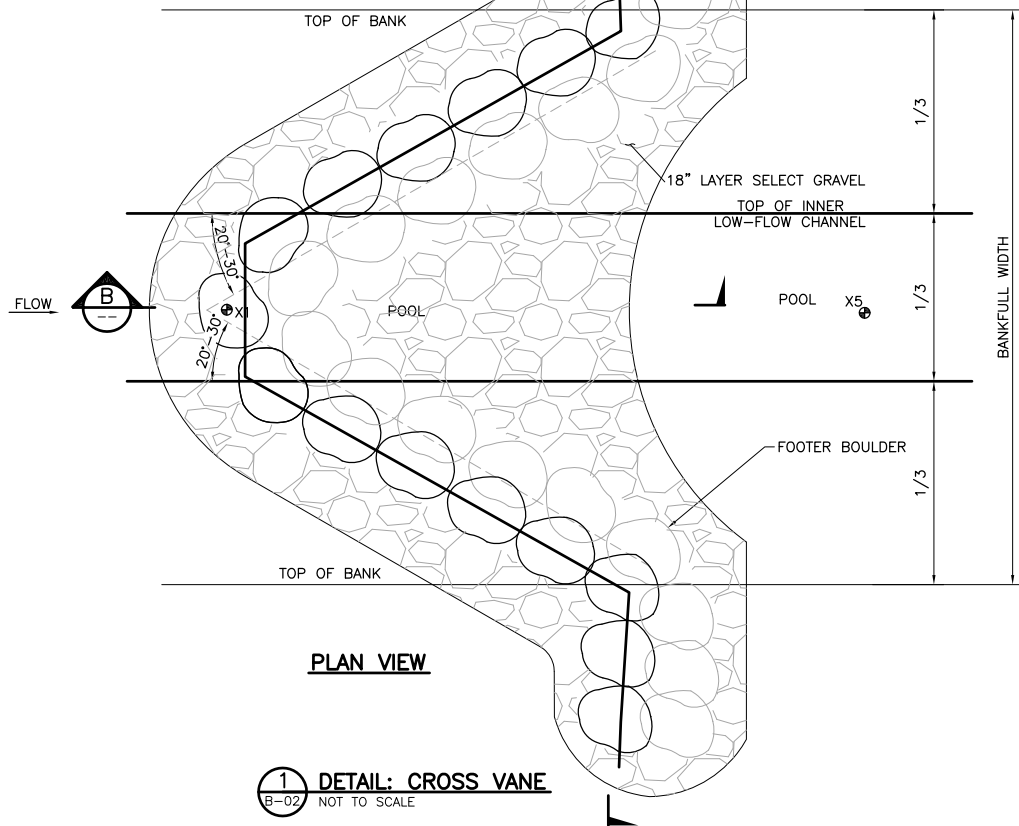


SECTION B



SECTION A

BASIS OF MEASUREMENT:
NOTE: BOULDER VANE WILL BE
MEASURED ON THE BASIS OF UNIT
LENGTH IN LINEAR FEET (L.F.) AS
MEASURED IN THE FIELD BY
ACTUAL HORIZONTAL SURVEY OR
OTHER MEASUREMENT BY ENGINEER
AND ROUNDED OFF TO THE
NEAREST WHOLE FOOT.
MEASUREMENT SHALL BE ALONG
THE CENTERLINE OF THE
UPPERMOST COURSE OF
BOULDERS, END TO END.

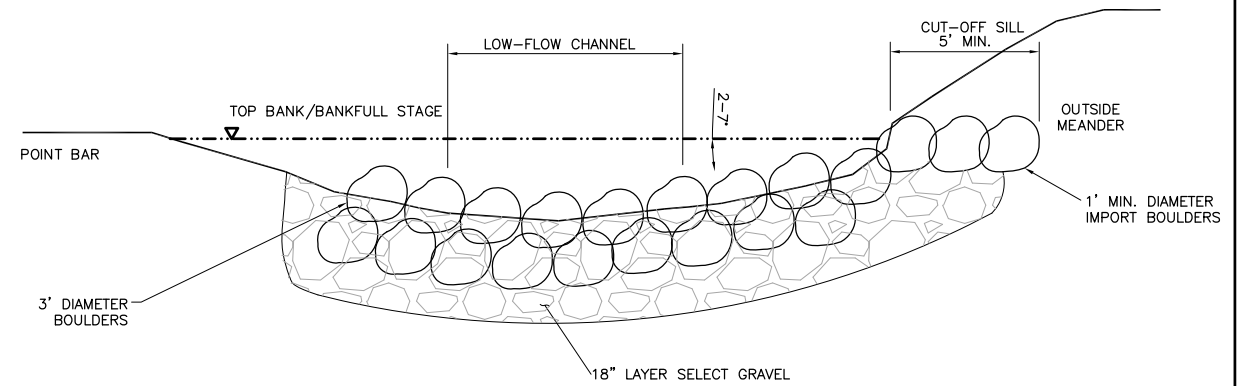


PLAN VIEW

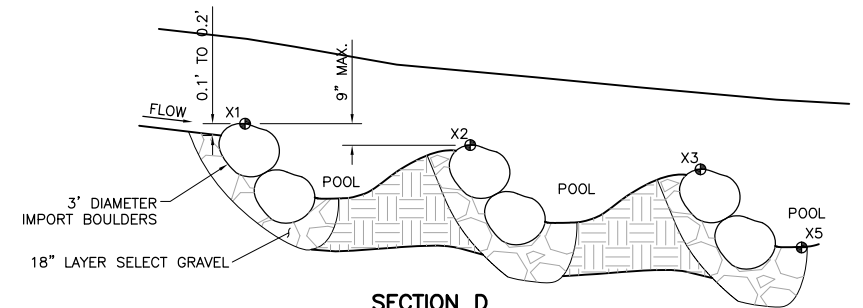
1 DETAIL: CROSS VANE
B-02 NOT TO SCALE

NOTES (APPLIES TO BOTH DETAILS):

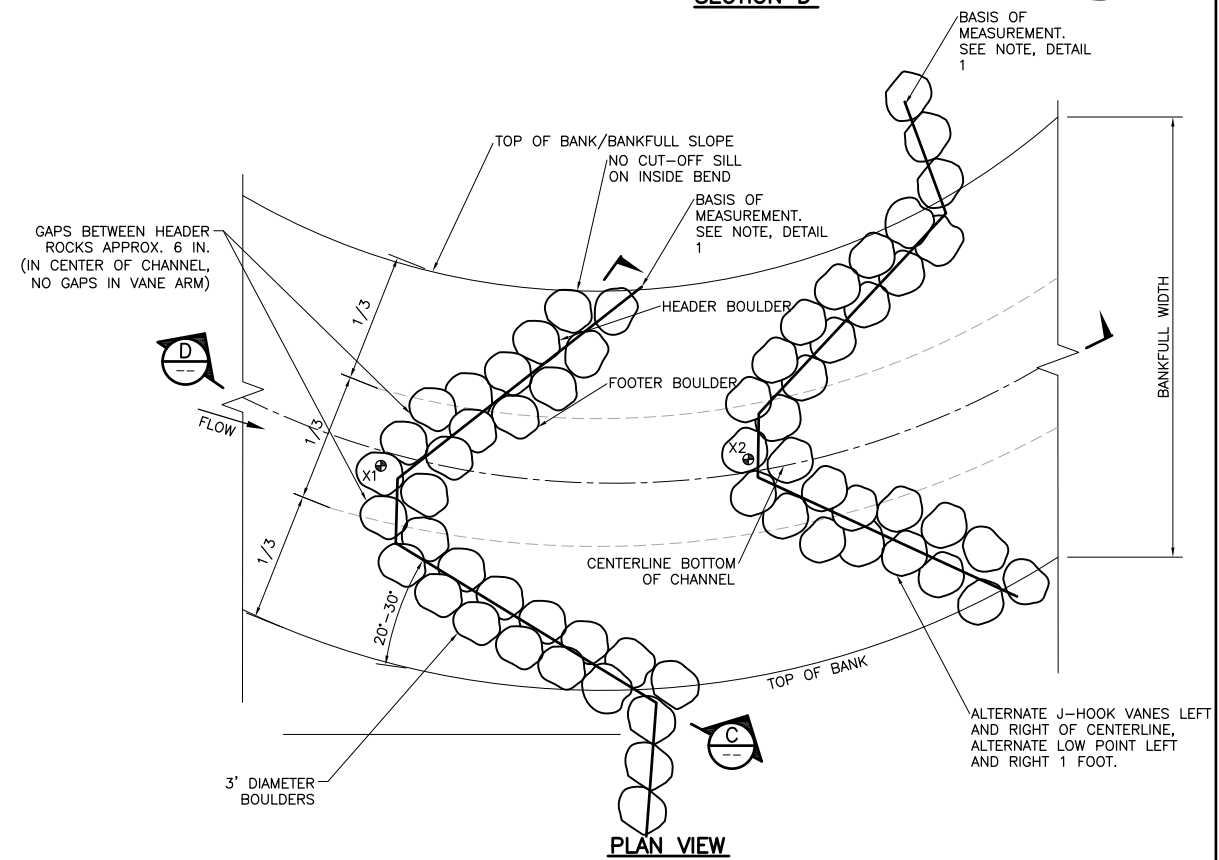
1. SELECT GRAVEL MATERIAL SHALL BE PLACED TO A THICKNESS EQUAL TO THE DEPTH OF THE HEADER AND FOOTER BOULDERS AND SHALL EXTEND 18" UPSTREAM OF THE BOULDERS. SELECT GRAVEL MATERIAL SHALL BE HARVESTED FROM THE EXISTING STREAM BED AS DIRECTED AND SHALL HAVE A DSO OF NOT LESS THAN 3-IN. AND A D100 OF 12-IN.
2. THE VANE ARMS SHALL BE CONSTRUCTED FIRST, FOLLOWED BY THE HOOK.
3. CROSS VANES AND J-HOOK BOULDER 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 PLUS RIPRAP AND FILTER.
 - B. PLACE FOOTER BOULDERS OF THE VANE ARM. THERE SHALL BE NO GAPS BETWEEN FOOTER BOULDERS.
 - C. PLACE SELECT GRAVEL BACKFILL BEHIND THE FOOTER BOULDERS.
 - D. INSTALL HEADER BOULDERS ON THE VANE ARM ON TOP OF AND SET SLIGHTLY UPSTREAM 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 SELECT GRAVEL 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 HOOK BOULDERS.
 - G. MANUALLY PLACE SELECT GRAVEL ON UPSTREAM FACE OF VANE TO FILL GAPS BETWEEN STONES.
 - H. RAMP UP SELECT GRAVEL MATERIAL ON UPSTREAM FACE OF VANE TO 0.1' TO 0.2' BELOW TOP OF BOULDERS ACROSS ENTIRE CHANNEL WIDTH.
4. SEE TYPICAL SECTION (B TYPE RIFFLE) FOR BANKFULL AND LOW-FLOW CHANNEL DIMENSIONS.



SECTION C



SECTION D



PLAN VIEW

2 DETAIL: J-HOOK BOULDER VANE
B-02 NOT TO SCALE

ISSUED FOR BID
2/16/2016

NO.	BY	CHK	APP	DATE	REVISION DESCRIPTION
A	MRH3	PJH2	PJH2	2/16/16	ISSUED FOR BID

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.					SIGNATURE <i>Peter J. Hink</i>
PRINTED NAME PETER J. HINCK					DATE 2/16/16 LIC. NO. 49583

CLIENT	BID	CONSTRUCTION PERMIT	RECORD	RELEASED TO/FOR	DATE RELEASED
BARR ENGINEERING CO.	2/16/16				

A	B	C	O	1	2	3
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Project Office: BARR ENGINEERING CO. 325 SOUTH LAKE AVENUE SUITE 700 DULUTH, MN 55802	
Corporate Headquarters: Minneapolis, Minnesota Ph: 1-800-632-2277	Ph: 1-800-786-5830 Fax: (218) 727-6450 www.barr.com

Scale	AS SHOWN
Date	10/15/2014
Drawn	MRH3
Checked	PJH2
Designed	MRH3
Approved	PJH2

CITY OF DULUTH

DULUTH, MINNESOTA

CHESTER CREEK BANK STABILIZATION
REACH 582K

CROSS AND J-HOOK BOULDER
VANE DETAILS

BARR PROJECT No. 23/69-1453	
CLIENT PROJECT No. 1280, 1281, 1283	
DWG. No. B-10	REV. No. A

A cross-sectional diagram of a riverbank. On the left, a vertical line represents the water surface. Three horizontal lines indicate different elevations: 'BANKFULL ELEV.' at the top, 'LOW WATER ELEV.' in the middle, and 'BASE ELEV.' at the bottom. The riverbank is shown with various layers and features. At the top, there is 'VEGETATION' (represented by trees and bushes). Below the vegetation is a layer of 'SOIL LIFTS'. Underneath the soil lifts is a layer of 'LIVE CUTTINGS' (represented by horizontal lines). Below the live cuttings is a layer of 'WOODY DEBRIS' (represented by irregular shapes). Below the woody debris is a layer of 'TOEWOOD' (represented by horizontal lines). Below the toewood is a layer of 'FOOTER LOGS' (represented by horizontal lines). At the bottom of the bank is the 'SUB-GRADE' (represented by a wavy line). The diagram also shows 'FISH' swimming in the water and a 'WHEEL' (represented by a circle with a cross) at the base of the bank.

The diagram shows a cross-section of a foundation. A horizontal line represents the 'BASE ELEV.' (Base Elevation). Below this line is the 'SUB-GRADE' (Sub-Grade), which is indicated by a dashed line. The area between the base elevation and the sub-grade is filled with a pattern of small circles, representing the 'FOOTER LOGS' (Footer Logs). A vertical line on the left side of the diagram is labeled 'X5'.

A cross-sectional diagram of a stream bed. A large, horizontal, cylindrical object labeled 'ROOT WAD' is embedded in the bed. The wad has a textured, fibrous appearance. A line points from the label 'ROOT WAD' to the object. To the left of the wad, there is a small, circular, textured object labeled '2-'. The stream bed is depicted with a wavy line representing the water surface and a stippled area representing the substrate. A vertical line on the left indicates the stream bank.

A cross-sectional diagram of a soil profile. The profile is divided into several horizontal layers. The top layer is labeled 'SOIL LIFTS'. Below it, a specific layer is labeled 'X1, X3'. The diagram shows various soil textures, including a layer with many small circles (likely representing gravel or coarse sand) and a layer with horizontal lines (likely representing silt or clay). A vertical line on the right side of the profile indicates the boundary of the soil lift X1, X3.

BANKFULL ELEV.

ROCKS

SILL LOG

TUCK FABRIC DOWN AND BACK TO EXISTING BANK

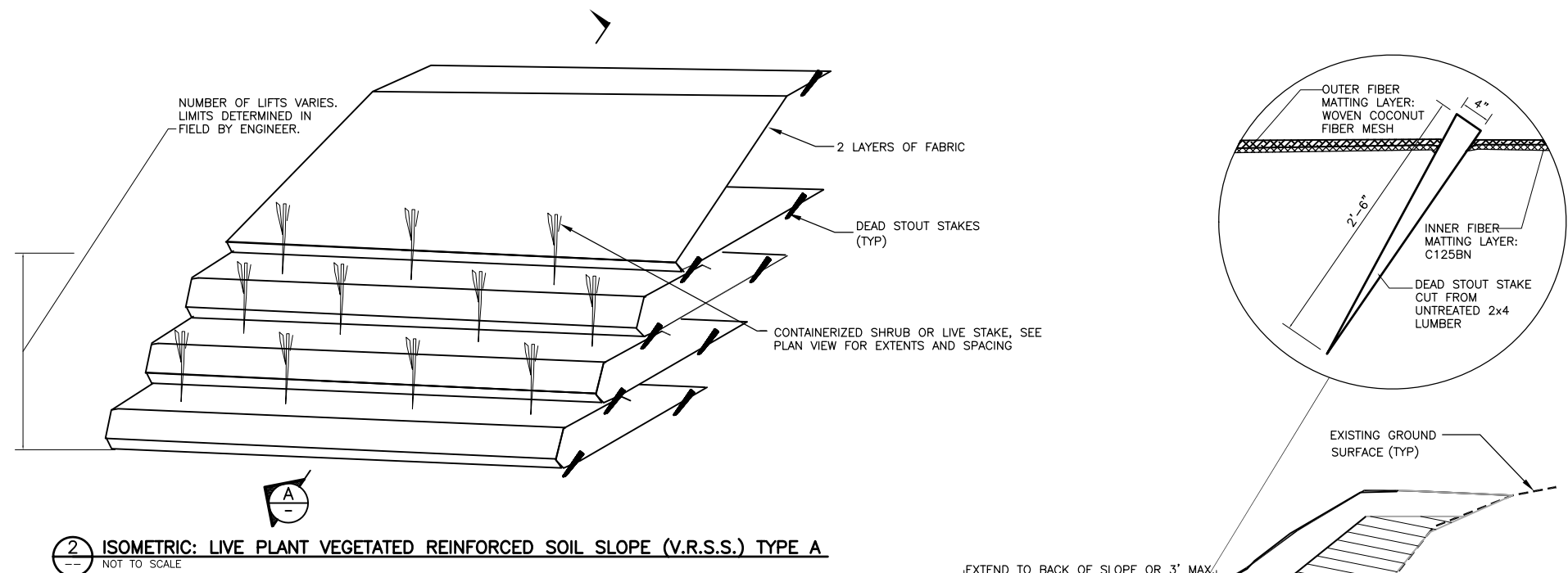
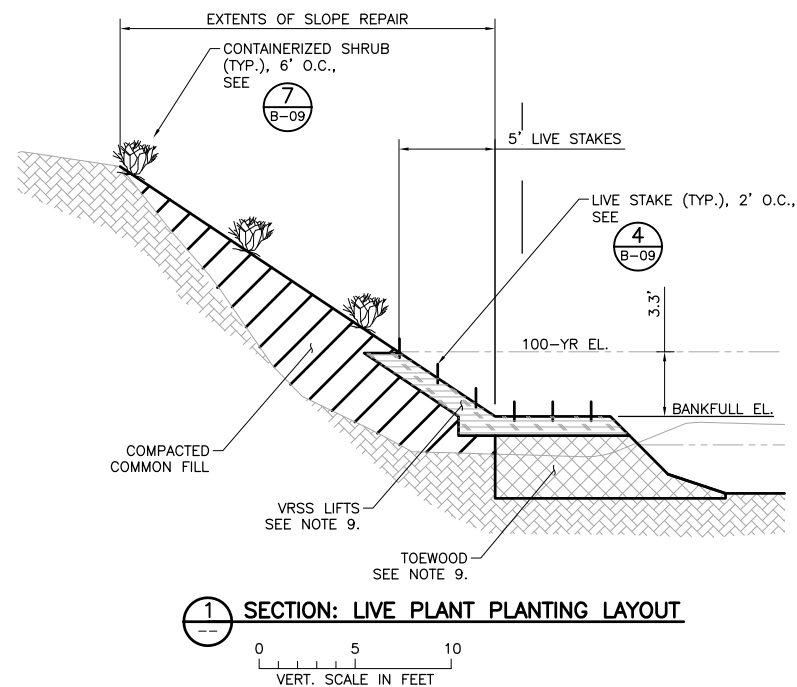
A A'

BARR PROJECT No. 23/69-1453	
CLIENT PROJECT No. 1280, 1281, 1283	
DWG. No. B-11	REV. No. A

ISSUED FOR BID
2/16/2016

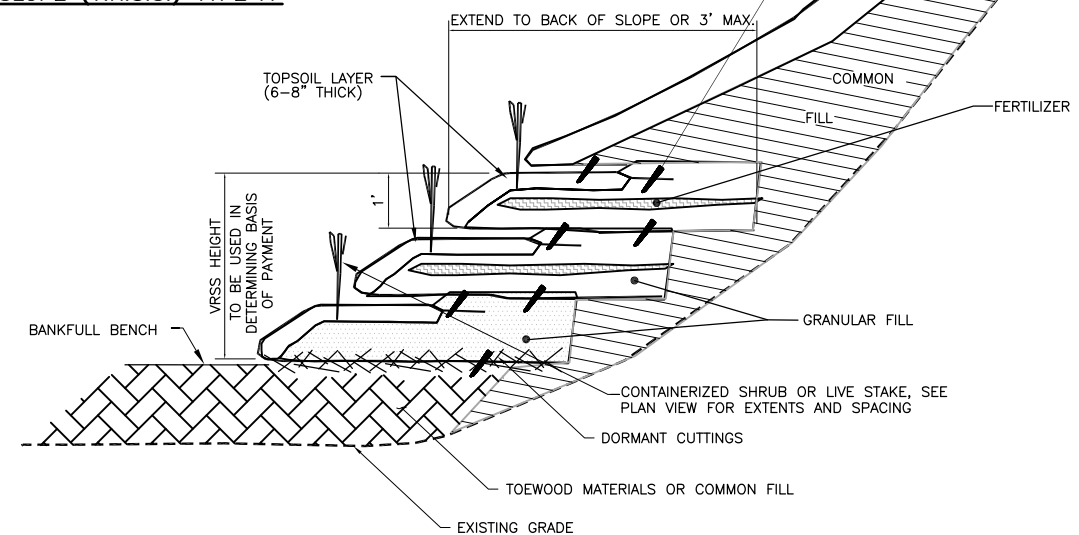
TABLE 1: IN-STREAM STRUCTURE CONTROL POINTS

STRUCTURE	FIRST CONTROL POINT X1		SECOND CONTROL POINT X2		THIRD CONTROL POINT X3		FOURTH CONTROL POINT X4		BEDDING MATERIAL		FILTER MATERIAL THICKNESS (IN)	POOL BOTTOM CONTROL POINT X5		Notes
	STATION (FT)	ELEVATION (FT)	STATION (FT)	ELEVATION (FT)	STATION (FT)	ELEVATION (FT)	STATION (FT)	ELEVATION (FT)	TYPE	THICKNESS (IN)		STATION (FT)	ELEVATION (FT)	
CROSS VANES - SEE DETAIL 1 ON D-04														
1	7+10	1121.7	—	—	—	—	—	—	CLASS II	18	6	7+46	1119.10	3' DIAMETER BOULDERS
J-HOOK VANE GROUPS - SEE DETAIL 2 ON D-04														
1	7+80	1121.20	8+00	1120.65	8+20	1120.10	—	—	CLASS II	18	6	8+55	1117.55	3' DIAMETER BOULDERS
2	8+90	1119.65	9+10	1119.10	9+30	1118.60	—	—	CLASS II	18	6	9+35	1118.10	3' DIAMETER BOULDERS
TOE WOOD - SEE D-02														
1	7+16	1123.47	7+16	1121.20	7+75	1122.61	7+75	1121.20	—	—	—	7+46	1119.10	
2	8+25	1121.88	8+25	1119.65	8+85	1121.01	8+85	1119.65	—	—	—	8+55	1117.55	



GENERAL NOTES ON V.R.S.S.

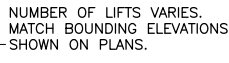
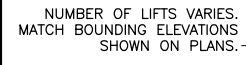
1. THE ENGINEER MUST BE NOTIFIED AT LEAST 3 DAYS PRIOR TO V.R.S.S. INSTALLATION AND MUST BE ON SITE DURING INSTALLATION.
2. SOAK DORMANT CUTTINGS FOR A MINIMUM OF 24 HOURS IN FLOWING WATER BEFORE PLANTING. SOAKING FOR 5-7 DAYS IS CONSIDERED IDEAL. THE DORMANT CUTTINGS SHOULD ONLY BE INSTALLED DURING THE DORMANT SEASON, AFTER LEAF DROP IN THE FALL AND BEFORE BUD BREAK IN THE SPRING. DORMANT CUTTINGS STORED IN COLD STORAGE WITH NO VISIBLE SIGN OF BUD BREAK MAY BE USED INTO LATE SPRING.
3. DORMANT CUTTINGS ARE TO BE PLACED ON TOP OF THE BANKFULL BENCH AT 3 BRANCHES PER LINEAR FOOT; THE BASAL END OF THE CUTTINGS SHOULD EXTEND AT LEAST 2 FOOT PAST THE BACK OF THE GRADED BENCH. NO MORE THAN 6 INCHES OF THE BUDDING END OF THE LIVE BRANCH SHOULD EXTEND PAST THE FRONT OF THE GRADED BENCH. COVER THE DORMANT CUTTINGS WITH TOPSOIL TO CREATE AN EVEN SURFACE FOR THE CONSTRUCTION OF THE FIRST SOIL LIFT.
4. LAY NATURAL FIBER MATTING ON BOTTOM OF THE BENCH, OVERLAPPING ADJACENT MATTING BY 1 FOOT. THE OUTER EXPOSED FIBER MATTING LAYER OF EACH SOIL LIFT SHALL BE GEOCOIR/DEKOWE 900 WOVEN COCONUT FIBER MESH, BIOD-MATTM 90, OR AN ENGINEER APPROVED EQUIVALENT.
5. THE INNER LAYER OF EACH SOIL LIFT SHALL BE BIONET C125BN OR AN ENGINEER APPROVED EQUIVALENT. LAY THE INNER LAYER OF BIONET ON TOP OF NATURAL FIBER MATTING OF EACH SOIL LIFT. FABRIC SHOULD BE INSTALLED SMOOTH WITH NO UNNECESSARY FOLDS OR WRINKLES. STAKE THE SHOREWARD END OF THE FIBER MATTING IN PLACE WITH WOODEN STAKES SPACED EVERY THREE FEET AS SHOWN ON THE DRAWINGS.
6. THE FIRST 6 TO 8 INCHES OF THE BOTTOM SOIL LIFT SHALL BE FILLED WITH MATERIAL EXCAVATED FROM THE STREAM BED. THE TOP 6 TO 8 INCHES ON THE FRONT OF THE SURFACE LAYER SHOULD BE COMPRISED OF TOPSOIL MIX AS SHOWN ON THE DRAWINGS.
7. THE TOPSOIL LAYER SHALL BE SEEDED WITH THE VRSS SEED MIX AT 0.7 POUNDS PER 1,000 SQUARE FEET OF LIFT SURFACE AREA AS SHOWN ON THE DRAWINGS.
8. FOLD THE FIBER MATTING OVER THE FILL MATERIAL AND STAKE IN PLACE SO THE FABRIC IS TAUT AND SMOOTH WITH NO UNNECESSARY FOLDS OR WRINKLES. BACKFILL BEHIND THE BOTTOM SOIL LIFT WITH GRANULAR FILTER MATERIAL TO MEET THE EXISTING SLOPE AS SHOWN ON THE DRAWINGS.



SECTION: LIVE PLANT VEGETATED REINFORCED SOIL SLOPE (V.R.S.S.), TYPE A

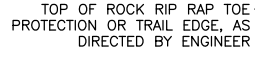
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2/16/2016

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										BID		2/16/16												Date		10/15/2014						23/69-1453	
										CONSTRUCTION														Drawn		MRH3						CLIENT PROJECT No.	
										PERMIT														Checked		PUH2						1280, 1281, 1283	
										RECORD														Designed		MRH3						DWG. No.	
SIGNATURE 										RELEASED				A		B		C		0		1		2		3						REV. No.	
PRINTED NAME PETER J. HINCK										TO/FOR																						A	
DATE 2/16/16 LIC. NO. 49583																																	
NO. BY CHK. APP. DATE REVISION DESCRIPTION																																	
A MRH3 PUH2 PUH2 2/16/16 ISSUED FOR BID																																	

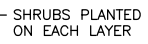


GENERAL

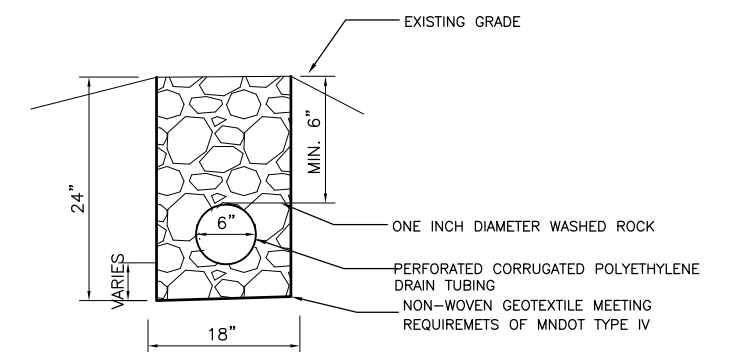
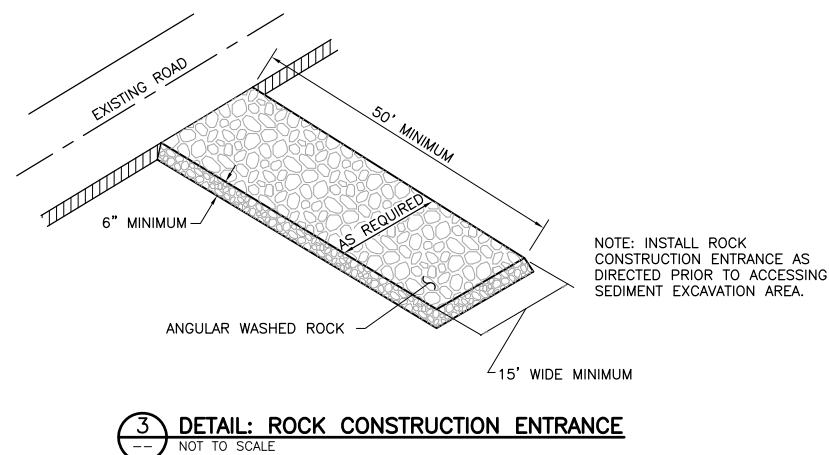
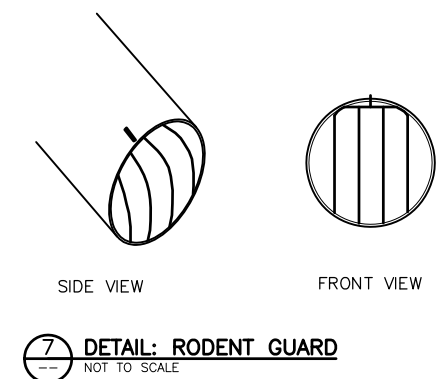
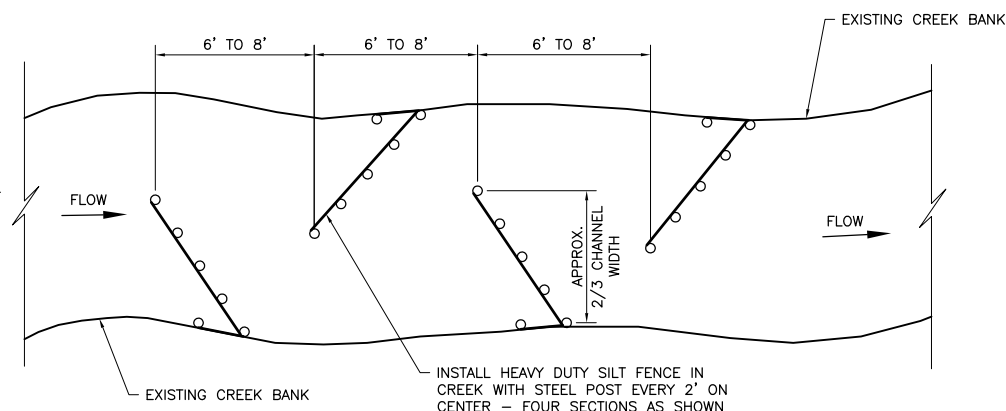
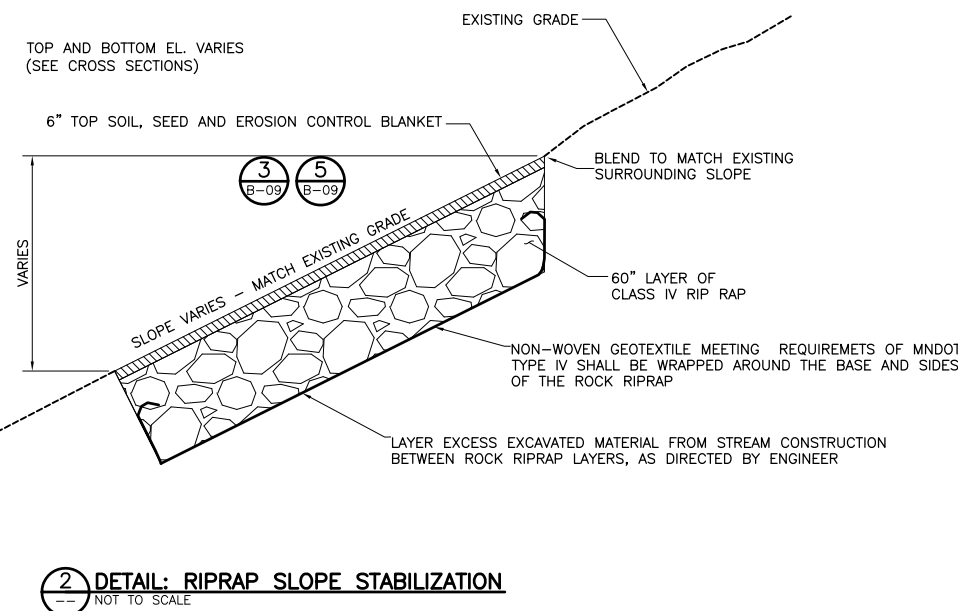
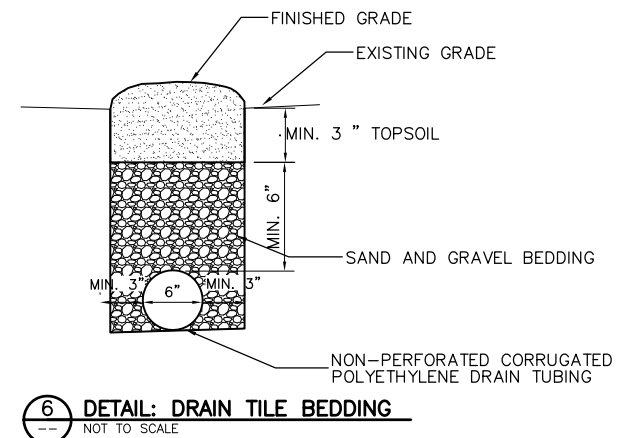
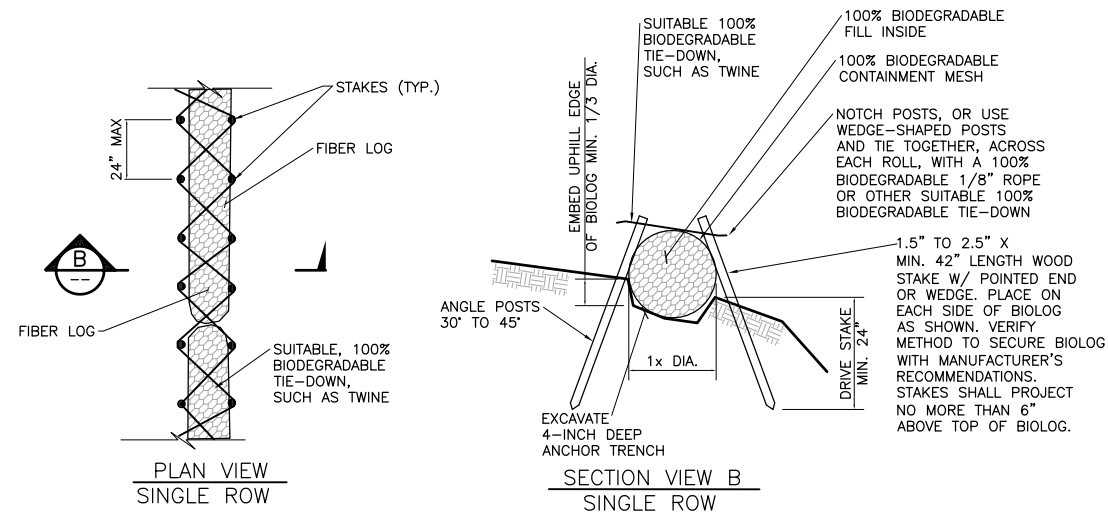
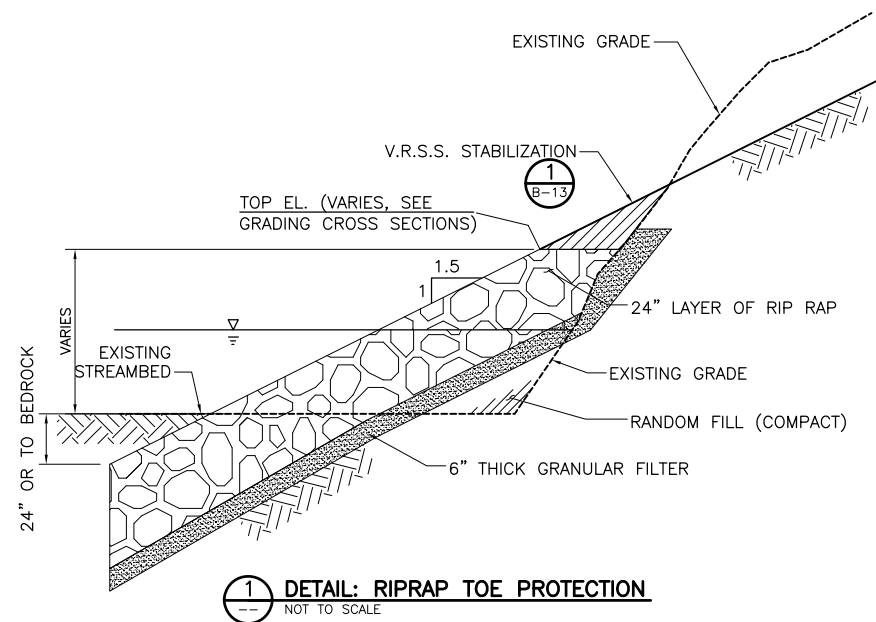
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7. THE TOPSOIL LAYER SHALL BE SEEDED WITH THE VRSS SEED MIX AT 0.7 POUNDS PER 1,000 SQUARE FEET OF LIFT SURFACE AREA AS SHOWN ON THE DRAWINGS.
8. FOLD THE FIBER MATTING OVER THE FILL MATERIAL AND STAKE IN PLACE SO THE FABRIC IS TAUT AND SMOOTH WITH NO UNNECESSARY FOLDS OR WRINKLES. BACKFILL BEHIND THE BOTTOM SOIL LIFT WITH GRANULAR FILTER MATERIAL TO MEET THE EXISTING SLOPE AS SHOWN ON THE DRAWINGS.



	Common Name	Species Name	Size	Quantity
TREES				
	Sugar Maple	<i>Acer saccharum</i>	1" caliper bare root	3
	Basswood	<i>Tilia americana</i>	1" caliper bare root	3
	White Pine	<i>Pinus strobus</i>	1" caliper bare root	4
		Total Trees		10
SHRUBS				
	Pagoda dogwood	<i>Cornus alternifolia</i>	#2 container	70
	Red-osier Dogwood	<i>Cornus sericea</i>	#2 container	120
	Bush Honeysuckle	<i>Diervilla lonicera</i>	#2 container	140
	Red-berried Elder	<i>Sambucus pubens</i>	#2 container	115
	Snowberry	<i>Symphoricarpus albus</i>	#2 container	85
		Total Shrubs		530
PLUGS				
	Horsetail	<i>Equisetum</i>	Plugs	100
		Total Plugs		100



										I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.										CLIENT BID 2/16/16 CONSTRUCTION PERMIT RECORD										 Project Office: BARR ENGINEERING CO. 325 SOUTH LAKE AVENUE SUITE 700 DULUTH, MN. 55802 Corporate Headquarters: Minneapolis, Minnesota Ph: 1-800-786-5830 Fax: (218) 727-6450 www.barr.com										Scale AS SHOWN Date 3/28/2014 Drawn EPF Checked MRH3 Designed JCO Approved JCO										CITY OF DULUTH DULUTH, MINNESOTA																				CHESTER CREEK BANK STABILIZATION REACHES 582e AND 582d VRSS, TYPE A DETAILS																				BARR PROJECT No. 23/69-1453 CLIENT PROJECT No. 1280, 1281, 1283 DWG. No. B-13 REV. No. A									
A EPF MRH3 JCO 2/16/16 ISSUED FOR BID										SIGNATURE  PRINTED NAME JESSICA C. L. OLSON DATE 2/16/16 LIC. NO. 43102										RELEASED TO/FOR A B C O 1 2 3 DATE RELEASED																																																																															
NO. BY CHK. APP. DATE REVISION DESCRIPTION																																																																																																			



GENERAL NOTE: TILE SHALL DRAIN FROM NORTH TO SOUTH,
AT A MINIMUM GRADE OF 6%.

ISSUED FOR BID
2/16/2016

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.										CLIENT BID CONSTRUCTION PERMIT RECORD		2/16/16				Project Office: BARR ENGINEERING CO. 325 SOUTH LAKE AVENUE SUITE 700 DULUTH, MN. 55802 Ph: 1-800-786-5830 Fax: (218) 727-6450 Ph: 1-800-632-2277 www.barr.com		Scale AS SHOWN Date 3/28/2014 Drawn EPF Checked MRH3 Designed JCO Approved JCO		CITY OF DULUTH DULUTH, MINNESOTA		CHESTER CREEK BANK STABILIZATION REACHES 582e, 582d, AND 582k		BARR PROJECT No. 23/69-1453	
SIGNATURE 										RELEASED TO/FOR		A B C 0 1 2 3		DATE RELEASED		DETAILS		CLIENT PROJECT No. 1280, 1281, 1283							
PRINTED NAME JESSICA C. L. OLSON DATE 2/16/16 LIC. No. 43102																		DWG. No. B-14		REV. No. A					
NO. BY CHK. APP. DATE REVISION DESCRIPTION																									