

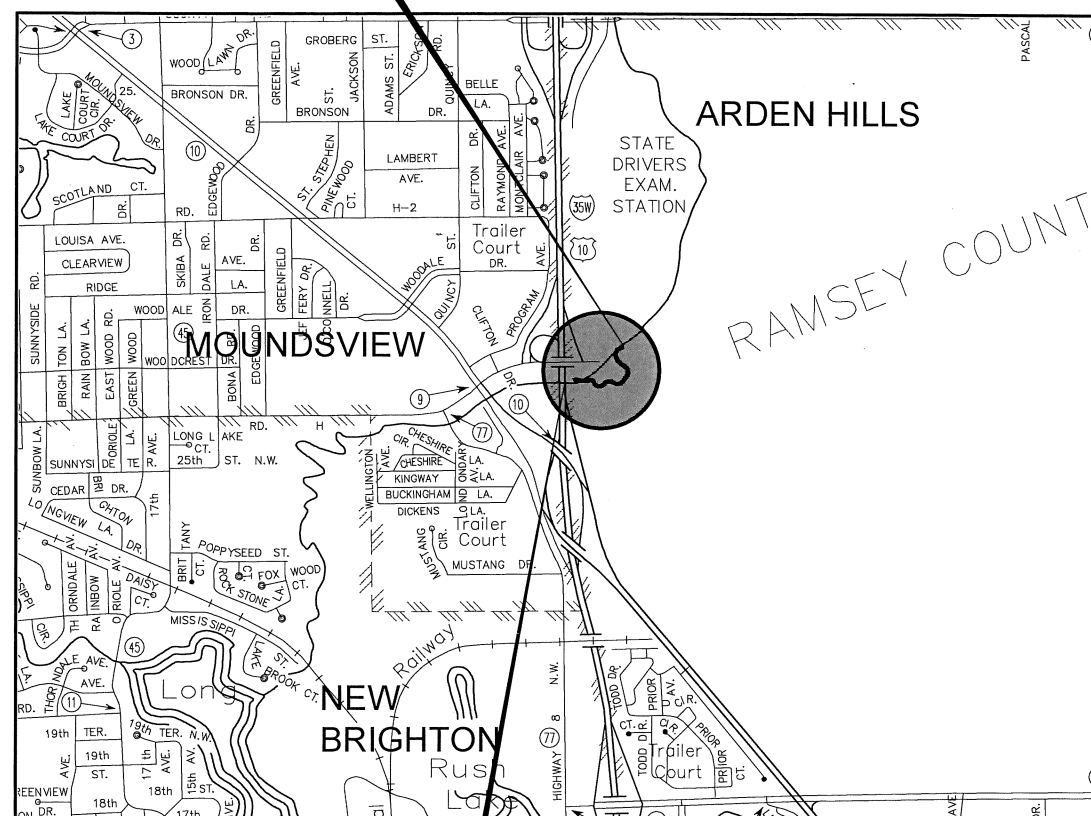
# MINNESOTA DEPARTMENT OF TRANSPORTATION RAMSEY COUNTY TCAAP BID PACKAGE #1 RICE CREEK REMEANDER CONSTRUCTION

CONSTRUCTION PLAN FOR BOX CULVERT, RETAINING WALL, UTILITY CASINGS, GRADING AND EROSION CONTROL IMPROVEMENTS

LOCATED ON: RICE CREEK FROM COUNTY ROAD H TO NB I-35W (GEOGRAPHIC DESCRIPTION)

RICE CREEK  
STATE AID PROJ. NO. 062-593-004  
GROSS-LENGTH 1247 FEET 0.24 MILES (RICE CREEK)

RICE CREEK REMEANDER  
BEGIN S.A.P. 062-593-004  
STA. 1+00



RICE CREEK REMEANDER  
END S.A.P. 062-593-004  
STA. 13+47.29

DESIGN DESIGNATION: RICE CREEK REMEANDER - S.A.P. 062-593-004  
STA. 1+00 TO 13+47.29

Functional Classification: N.A.  
No. of Traffic Lanes = N.A. No. of Parking Lanes = N.A.  
ADT (Current Year) 2016 = N.A. Design Speed N.A. mph  
ADT (Future Year) 2036 = N.A. Based on N.A. Sight Distance  
DHV (Design Hr. Vol.) = N.A. Height of eye N.A. Height of Object N.A.  
D (Directional Distr.) = XX % Design Speed not achieved at: N.A.  
T (Heavy Commercial) = XX % STA. N.A. TO STA. N.A. MPH N.A.  
R-Value XX 20 YR BESALS X Design Load X ton  
K-Value XXX 20 YR CESALS X

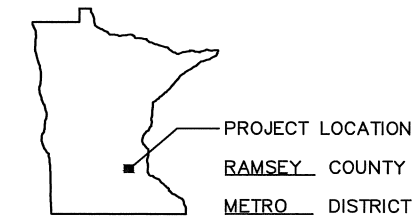
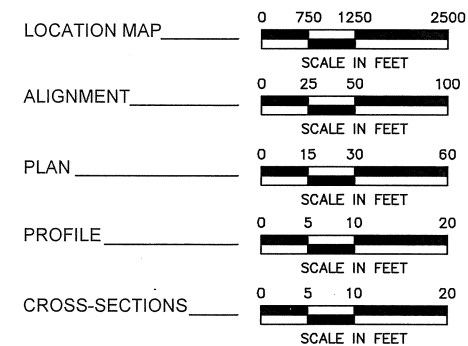
- LEGEND**
- o EXISTING GATE VALVE
  - o EXISTING HYDRANT
  - o EXISTING CURB BOX
  - o EXISTING WATERMAIN MANHOLE
  - o EXISTING SANITARY MANHOLE
  - o EXISTING STORM MANHOLE
  - o EXISTING CATCH BASIN
  - o EXISTING GAS VALVE
  - o EXISTING CABLE TV BOX
  - o EXISTING TELEPHONE BOX
  - o EXISTING POWER POLE
  - o EXISTING ELECTRICAL MANHOLE
  - o EXISTING ELECTRICAL TRANSFORMER
  - o EXISTING LIGHT POLE
  - o EXISTING WATERMAIN
  - o EXISTING SANITARY SEWER
  - o EXISTING STORM SEWER
  - o EXISTING GAS MAIN
  - o EXISTING CABLE TV
  - o EXISTING UNDERGROUND TELEPHONE LINE
  - o EXISTING UNDERGROUND POWER
  - o EXISTING OVERHEAD POWER
  - o EXISTING CURB AND GUTTER
  - o EXISTING FENCE
  - o EXISTING RIGHT-OF-WAY
  - o EXISTING EASEMENT
  - o EXISTING MAILBOX
  - o EXISTING SOIL BORING
  - o EXISTING STREET SIGN
  - o EXISTING TREE
  - o EXISTING TREE LINE
  - o EXISTING CONTOUR
  - o EXISTING CONTOUR
  - o PROPOSED GATE VALVE
  - o PROPOSED HYDRANT
  - o PROPOSED MANHOLE (STORM/SANITARY)
  - o PROPOSED CATCH BASIN
  - o PROPOSED WATERMAIN
  - o PROPOSED SANITARY SEWER
  - o PROPOSED STORM SEWER
  - o PROPOSED CURB AND GUTTER

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

THE EXACT LOCATION OF UNDERGROUND UTILITIES SHOWN IN THIS PLAN SET ARE UNKNOWN. THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE PRIOR TO STARTING ANY EXCAVATION.

GOPHER STATE ONE CALL SYSTEM.....1-800-252-1166

**PLAN SET SCALES**



MINN. PROJ. NO. \_\_\_\_\_

**GOVERNING SPECIFICATIONS**

THE 2014 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION" AND THE 2014 EDITION OF THE "MATERIAL LAB SUPPLEMENTAL SPECIFICATIONS FOR CONSTRUCTION" SHALL GOVERN. ALL TRAFFIC CONTROL SIGNING AND DEVICES SHALL CONFORM TO THE MMUTCD, INCLUDING THE FIELD MANUAL FOR TEMPORARY TRAFFIC CONTROL ZONE LAYOUTS.

**SHEET INDEX**

SHEET NO.	DESCRIPTION
1	COVER SHEET
2-3	STATEMENT OF ESTIMATED QUANTITIES
4	CONSTRUCTION NOTES
5-8	CONSTRUCTION DETAILS
9	CONSTRUCTION SEQUENCING
10	TYPICAL SECTIONS
11	ALIGNMENT PLAN AND TABULATION
12	INPLACE CONDITION PLAN
13	STORM WATER POLLUTION PREVENTION PLAN
14	INTERIM EROSION CONTROL AND REVEGETATIVE PLAN
15	FINAL EROSION CONTROL AND REVEGETATIVE PLAN
16	REMOVAL PLAN
17-18	UTILITY CASING PLAN AND PROFILES
19	UTILITY CASING AND ALIGNMENT TABULATION
20-21	GRADING PLANS
22-23	STABILIZATION PLANS
24-30	CROSS SECTIONS

**CULVERT NO. 91071 EXTENSION**

SHEET NO.	DESCRIPTION
31-38	CULVERT EXTENSION PLANS

**I-35W RAMP CULVERT**

SHEET NO.	DESCRIPTION
39-51	CULVERT PLANS
52-63	RETAINING WALL PLANS

THIS PLAN SET CONTAINS 63 SHEETS

## Kimley»Horn

2550 UNIVERSITY AVENUE WEST, SUITE 238N, ST. PAUL, MN 55114  
PHONE: 651-645-4197  
WWW.KIMLEY-HORN.COM

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.

DATE 07/24/15 LIC. NO. 21433

ENGINEER Thomas J. Lincoln  
THOMAS J. LINCOLN

APPROVED [Signature] 8/24 2015  
RAMSEY COUNTY ENGINEER

RECOMMENDED FOR APPROVAL [Signature] 8/24 2015  
STATE BRIDGE ENGINEER

[Signature] 9/14/ 2015  
DISTRICT STATE AID ENGINEER: REVIEWED FOR COMPLIANCE WITH STATE AID RULES/POLICY

[Signature] 9/14/ 2015  
APPROVED FOR STATE AID FUNDING: STATE AID ENGINEER

I HEREBY CERTIFY THAT THE FINAL FIELD REVISIONS, IF ANY, OF THIS PLAN WERE MADE BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

ENGINEER \_\_\_\_\_  
DATE \_\_\_\_\_ REG. NO. \_\_\_\_\_

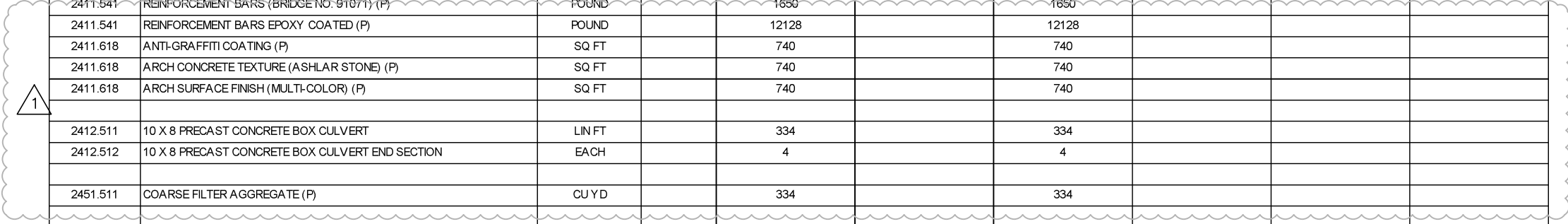
PLAN REVISIONS		
DATE	SHEET NO.	APPROVED BY

STATE PROJ. NO. \_\_\_\_\_  
STATE AID PROJ. NO. 062-593-004

SHEET NO. 1 OF 63 SHEETS

K:\TWC\_Civil\County\RAMSEY\TCAAP\_Spine\_Rd\_BP2\CAD\Plan\_Sheets\Construction\_Plans\BP1\TCAAP\_SPINERD\_BP1\_SEQ.dwg SEQ 1 September 30, 2015 - 9:42am  
 K:\TWC\_Civil\County\RAMSEY\TCAAP\_Spine\_Rd\_BP2\CAD\Plan\_Sheets\Construction\_Plans\BP1\TCAAP\_SPINERD\_BP1\_SEQ.dwg September 30, 2015 - 9:42am

STATEMENT OF ESTIMATED QUANTITIES									
Mn/DOT NO.	ITEM DESCRIPTION	UNIT	NOTES	TOTAL QUANTITY		S.A.P. 062-593-004		NON-PARTICIPATING	
				ESTIMATED QUANTITY	FINAL QUANTITY	PARTICIPATING		RAMSEY COUNTY	
						ESTIMATED QUANTITY	FINAL QUANTITY	ESTIMATED QUANTITY	FINAL QUANTITY
2011.601	CONSTRUCTION SURVEYING	LUMP SUM		1		0.94		0.06	
2021.501	MOBILIZATION	LUMP SUM		1		0.94		0.06	
2101.502	CLEARING	TREE		20		20			
2101.502	CLEARING (FOOTER LOG HARVESTING)	TREE		15		15			
2101.507	GRUBBING (ROOT WAD HARVESTING)	TREE		26		26			
2104.501	REMOVE SEWER PIPE (SANTARY)	LIN FT		365		365			
2104.501	REMOVE PIPE CULVERTS	LIN FT		80		80			
2104.501	REMOVE OVERHEAD CABLE	LIN FT		130		130			
2104.505	REMOVE BITUMINOUS PAVEMENT	SQ YD		2150		2150			
2104.509	REMOVE CULVERT HEADWALL	EACH		1		1			
2104.509	REMOVE MANHOLES	EACH		4		4			
2104.509	REMOVE UTILITY POLE	EACH		1		1			
2104.521	SALVAGE CHAIN LINK FENCE	LIN FT		880		880			
2104.525	ABANDON MONITORING WELL	EACH		2		2			
2104.602	CUTOFF ABANDONED MONITORING WELL	EACH		3		3			
2104.602	ABANDON PIPE SEWER	EACH		3		3			
2105.501	COMMON EXCAVATION (P)	CU YD		43210		43210			
2105.601	DEWATERING	LUMP SUM		1		1			
2105.607	CLAY FILL (P)	CU YD		60		60			
2401.601	STRUCTURE EXCAVATION (62X04 BOX CULVERT)	LUMP SUM		1		1			
2401.601	STRUCTURE EXCAVATION (BRIDGE NO. 91071)	LUMP SUM		1		1			
2411.501	STRUCTURAL CONCRETE (1A43) (P)	CU YD		43		43			
2411.501	STRUCTURAL CONCRETE (3Y43) (P)	CU YD		106		106			
2411.501	STRUCTURAL CONCRETE (3Y46) (P)	CU YD		8		8			
2411.541	REINFORCEMENT BARS (62X04 BOX CULVERT) (P)	POUND		4146		4146			
2411.541	REINFORCEMENT BARS (BRIDGE NO. 91071) (P)	POUND		1650		1650			
2411.541	REINFORCEMENT BARS EPOXY COATED (P)	POUND		12128		12128			
2411.618	ANTI-GRAFFITI COATING (P)	SQ FT		740		740			
2411.618	ARCH CONCRETE TEXTURE (ASHLAR STONE) (P)	SQ FT		740		740			
2411.618	ARCH SURFACE FINISH (MULTI-COLOR) (P)	SQ FT		740		740			
2412.511	10 X 8 PRECAST CONCRETE BOX CULVERT	LIN FT		334		334			
2412.512	10 X 8 PRECAST CONCRETE BOX CULVERT END SECTION	EACH		4		4			
2451.511	COARSE FILTER AGGREGATE (P)	CU YD		334		334			
2452.601	STEEL SHEET PILING (TEMPORARY)	LUMP SUM		1		1			
2502.502	DRAINAGE SYSTEM (B910) MODIFIED	LUMP SUM		1		1			
2503.602	CONSTRUCT BULKHEAD	EACH		2		2			
2503.603	30" HDPE PIPE SEWER	LIN FT		63		63			
2503.603	24" STEEL CASING PIPE	LIN FT		320				320	
2503.603	36" STEEL CASING PIPE	LIN FT		135				135	



No.	Date	Revisions
1	9/30/15	ADDENDUM NO. 1

App.	DRAWING NAME
	TCAAP_SPINERD_BP1_SEQ.dwg
	DESIGNED BY: R/JG
	DRAWN BY: R/JG
	CHECKED BY: W/CK
	DATE: 07/24/15
	PROJECT NO. 16055300X

**Kimley»Horn**  
 2550 UNIVERSITY AVENUE WEST, SUITE 238N, ST. PAUL, MN 55114  
 PHONE: 651-645-4197  
 WWW.KIMLEY-HORN.COM

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.  
  
 THOMAS J. LINDOLN  
 DATE: 07/24/15 MN LIC. NO. 21433

**RAMSEY COUNTY**  
 TCAAP  
 BID PACKAGE #1  
 RICE CREEK REMEANDER CONSTRUCTION  
 STATEMENT OF ESTIMATED QUANTITIES

CITY PROJECT	
COUNTY PROJECT	
S.A.P.	062-593-004
S.A.P.	

SHEET NO.  
 2  
 63

K:\TWC\_Civil\County\RAMSEY\TCAAP\CAD\Plan\_Sheets\Construction\_Plans\BP1\TCAAP\_SPINERD\_BP1\_SEQ.dwg SEQ\_2 September 29, 2015 - 1:23pm  
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STATEMENT OF ESTIMATED QUANTITIES									
Mn/DOT NO.	ITEM DESCRIPTION	UNIT	NOTES	TOTAL QUANTITY		S.A.P. 062-593-004		NON-PARTICIPATING	
				ESTIMATED QUANTITY	FINAL QUANTITY	PARTICIPATING		RAMSEY COUNTY	
						ESTIMATED QUANTITY	FINAL QUANTITY	ESTIMATED QUANTITY	FINAL QUANTITY
2504.602	INSTALL MONITORING WELL	EACH		2		2			
2511.501	RANDOM RIPRAP, CLASS II (P)	CU YD		23		23			
2511.501	RANDOM RIPRAP, CLASS III (P)	CU YD		393		393			
2511.501	RANDOM RIPRAP, CLASS IV (P)	CU YD		494		494			
2511.513	GRANULAR FILTER MATERIAL	TON		50		50			
2511.515	GEOTEXTILE FILTER, TYPE 5 (P)	SQ YD		2593		2593			
2511.602	24" TO 36" FIELDSTONE BOULDERS (BOULDER TOE & ESCAPE LOG)	TON		120		120			
2545.523	4" NON-METALLIC CONDUIT	LIN FT		160				160	
2557.501	INSTALL CHAIN LINK FENCE	LIN FT		880		880			
2557.501	WIRE FENCE DESIGN 48-9322	LIN FT		300		300			
2563.601	TRAFFIC CONTROL - TRAIL CLOSURE	LUMP SUM		1		1			
2572.602	NON-GAME ANIMAL HABITAT - TURTLE HIBERNACULUM	EACH		2				2	
2572.602	NON-GAME ANIMAL HABITAT - SNAKE HIBERNACULUM	EACH		2				2	
2572.602	NON-GAME ANIMAL HABITAT - FOX DEN	EACH		1				1	
2572.602	NON-GAME ANIMAL HABITAT - STANDING DEAD TREE	EACH		4				4	
2573.502	SILT FENCE, TYPE MS MACHINED SLICED	LIN FT		3150		3150			
2573.505	FLOATING SILT CURTAIN, TYPE MOVING WATER	LIN FT		225		225			
2573.533	SEDIMENT CONTROL LOG TYPE STRAW	LIN FT		3600		3600			
2573.535	STABILIZED CONSTRUCTION EXIT	LUMP SUM		1		1			
2573.550	EROSION CONTROL SUPERVISOR	LUMP SUM		1		1			
2573.602	TEMPORARY HEAD WALL	EACH		1		1			
2573.602	ROOT WADS (LOG TOE & ESCAPE LOG)	EACH		26		26			
2573.602	FOOTER LOGS (LOG TOE INSTALLATION)	EACH		15		15			
2573.602	NURSERY LOGS	EACH		13		13			
2574.525	SELECT TOPSOIL BORROW	CU YD		2330		2330			
2575.501	SEEDING	ACRE		5		5			
2575.502	SEED, MIXTURE 22-111	POUND		40		40			
2575.502	SEED, MIXTURE 34-261	POUND		10		10			
2575.502	SEED, MIXTURE 34-262	POUND		75		75			
2575.523	EROSION CONTROL BLANKET, CATEGORY 3	SQ YD		3100		3100			
2575.523	ROLANKA BIOD-MAT 40 OR APPROVED EQUAL	SQ YD		3180		3180			
2575.562	HYDRAULIC MATRIX, TYPE BONDED FIBER MATRIX (BFM)	POUND		14600		14600			
2575.562	HYDRAULIC MATRIX, TYPE HYDRAULIC MULCH	POUND		950		950			

No.	Date	Revisions	App.
1	9/30/15	ADDENDUM NO. 1	

DRAWING NAME TCAAP_SPINERD_BP1_SEQ.dwg
DESIGNED BY: R/JG
DRAWN BY: R/JG
CHECKED BY: WCK
DATE: 07/24/15
PROJECT NO. 16055300X

**Kimley»Horn**

2550 UNIVERSITY AVENUE WEST, SUITE 238N, ST. PAUL, MN 55114  
 PHONE: 651-645-4197  
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*Thomas J. Lincoln*  
 THOMAS J. LINCOLN  
 DATE: 07/24/15 MN LIC. NO. 21433

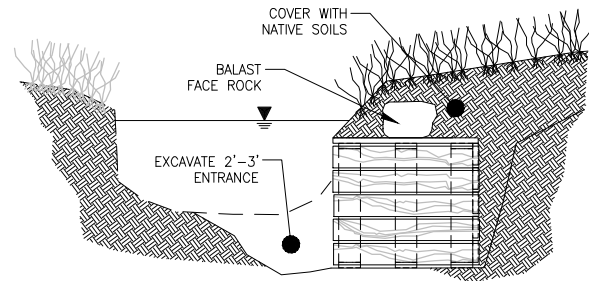
**RAMSEY COUNTY**

TCAAP  
 BID PACKAGE #1  
 RICE CREEK REMEANDER CONSTRUCTION  
 STATEMENT OF ESTIMATED QUANTITIES

CITY PROJECT	
COUNTY PROJECT	
S.A.P.	062-593-004
S.A.P.	

SHEET NO.  
 3  
 63

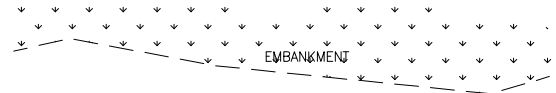




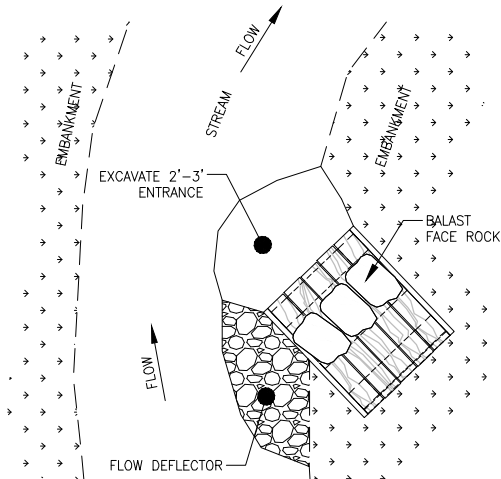
STREAM INSTALLATION - SECTION VIEW

- NOTES:
1. STRUCTURE IS BUILT USING OAK, WITH 2" BY 8" OR 12" WIDE DECKING.
  2. POST FRAME MAY BE 8"x8" OR 6"x6".
  3. STRUCTURE IS TO BE NAILED TOGETHER USING 200 RING SHANK NAILS.
  4. TO BE 3'-4' DEEP AND SET INTO THE BANK 4 TO 6'.
  5. THE BOTTOM OF THE STRUCTURE SHOULD BE SET ABOUT 2 TO 3 FEET BELOW THE CURRENT STREAM BED TO ASSIST IN FINE SEDIMENT ACCUMULATION, MAKING THE HABITAT SUITABLE FOR BURROWING.

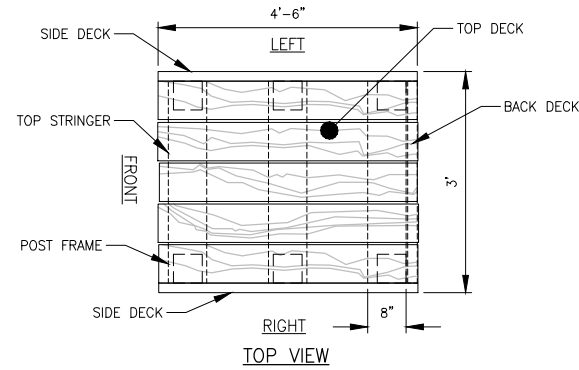
- MATERIAL LIST:
1. FIFTEEN (≈15) - 2"x8"x4.5' (5-TOP DECK, 10-SIDE DECK)
  2. ELEVEN (≈11) - 2"x8"x3' (6-STRINGERS, 5-BACK DECK)
  3. SIX (6) - 6"x6"x3' (POST FRAME)
  4. 268 - 3.5" RING SHANK NAILS (4 PER CONNECTION)



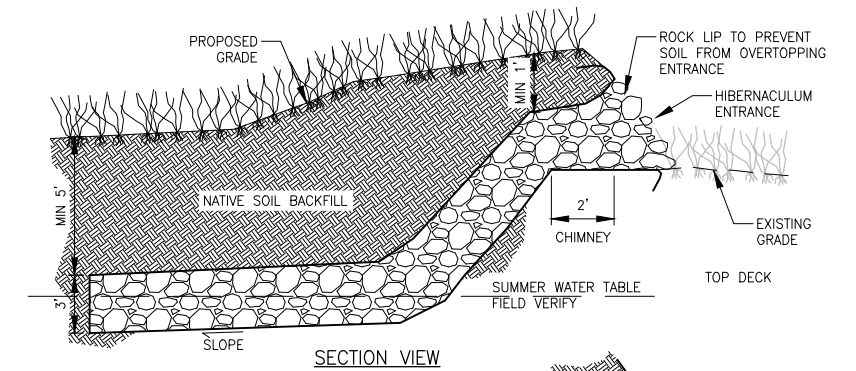
PLAN VIEW



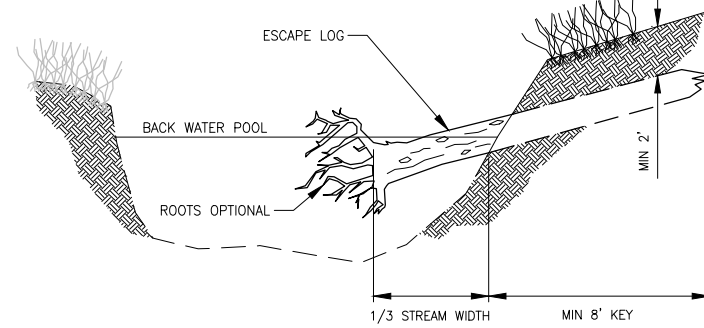
STREAM INSTALLATION - PLAN VIEW



TOP VIEW



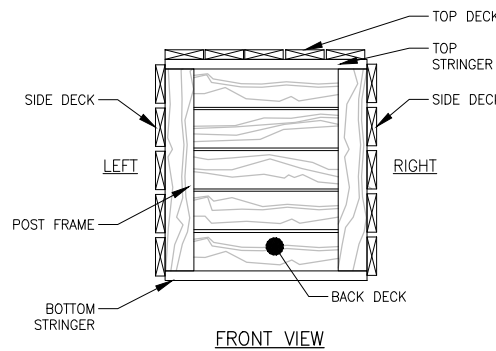
SECTION VIEW



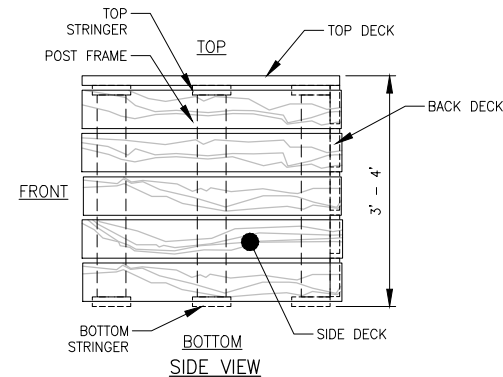
SECTION VIEW

- NOTE:
1. ROOT WADS CAN DOUBLE AS ESCAPE LOGS
  2. EROSION OF OPPOSITE BANK WILL NOT BE ALLOWED
  3. ROOT WAD TO BE PLACED AS DIRECTED SO THAT ROOT END IS SUBMERGED BELOW THE NORMAL WATER LEVEL

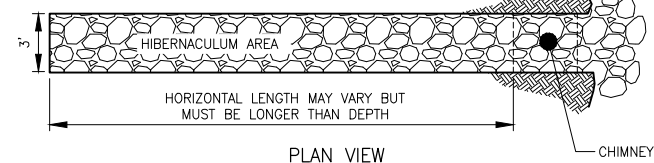
ESCAPE LOG (AMPHIBIOUS HABITAT STRUCTURE) - DETAIL 1  
NOT TO SCALE



FRONT VIEW



SIDE VIEW



PLAN VIEW

- NOTES:
1. HIBERNACULUM SHOULD BE PLACED OUT OF THE PRIMARY FLOODPLAIN WITH SOUTHERN OR WESTERN EXPOSURE.
  2. A MINIMUM OF FIVE FEET OF NATIVE SOIL FILL SHALL COVER THE ROCK. THIS ACTS AS A BUFFER TO MAINTAIN A TEMPERATURE OF AT LEAST 51 DEGREES FAHRENHEIT IN THE HIBERNACULUM AREA.
  3. A SOIL BERM MAY BE REQUIRED TO ISOLATE THE HIBERNACULUM FROM THE RIVER BANK, TO BE FLAGGED BY ENGINEER IN THE FIELD.
  4. RIPRAP TO BE 6"-10" ROCK ONLY
  5. SLOPE TO DRAIN TO THE BACK OF THE HIBERNACULUM AREA
  6. PLACE BOTTOM OF HIBERNACULUM AREA 1'-2' INTO SUMMER WATER TABLE
- SNAKE HIBERNACULUM (WINTER HABITAT) - DETAIL 3  
NOT TO SCALE

TURTLE HIBERNACULUM (UNDER BANK) - DETAIL 2  
NOT TO SCALE

M:\1382\01\CAD\CIV\05-08 - CNSTRCTN DTLS.dwg August 20, 2015 - 7:59am

No.	Date	Revisions	App.

DRAWING NAME 05-08 - CNSTRCTN DTLS.dwg	
DESIGNED BY:	EAM
DRAWN BY:	LNJ
CHECKED BY:	MJS
DATE:	07/14/2015
PROJECT NO.	160553004

Responsive partner. Exceptional outcomes.

1800 PIONEER CREEK CENTER  
MAPLE PLAIN, MN 55359

PHONE: 763-479-4200  
FAX: 763-479-4242

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.

*Ed Matthesen*  
ED MATTHIESEN  
DATE: 7/24/15 MN LIC. NO. 16800

TCAAP  
BID PACKAGE #1  
RICE CREEK REMEANDER CONSTRUCTION  
CONSTRUCTION DETAILS

CITY PROJECT	SHEET NO.
COUNTY PROJECT	5
S.A.P. 062-593-004	
S.A.P.	

63

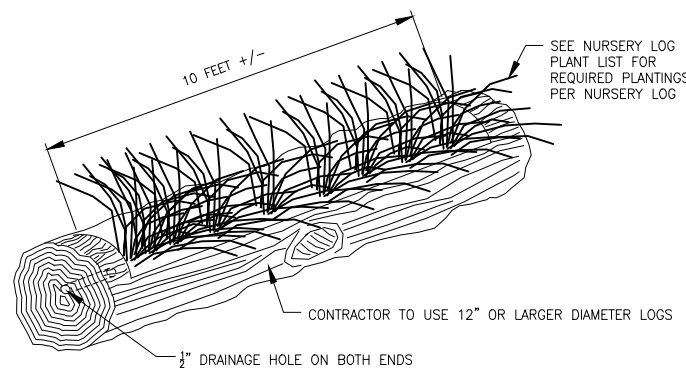
5% BIOCHAR BY VOLUME,  
MOTHER EARTH PREMIUM  
BIOCHAR OR EQUAL

NOTE: TREES USED FOR NURSERY LOGS SHALL BE LIMITED  
TO STRAIGHT SECTIONS.

QTY*	COMMON NAME	SCIENTIFIC NAME	CONTAINER SIZE
2	PENNSYLVANIA SEDGE	CAREX PENNSYLVANICA	PLUG
2	WOODLAND SEDGE	CAREX BLANDA	PLUG
2	GRACEFUL SEDGE	CAREX GRACILLIMA	PLUG
2	SPRENGEL'S SEDGE	CAREX SPRENGELII	PLUG
2	BOTTLEBRUSH GRASS	ELYMUS HYSTRIX	PLUG

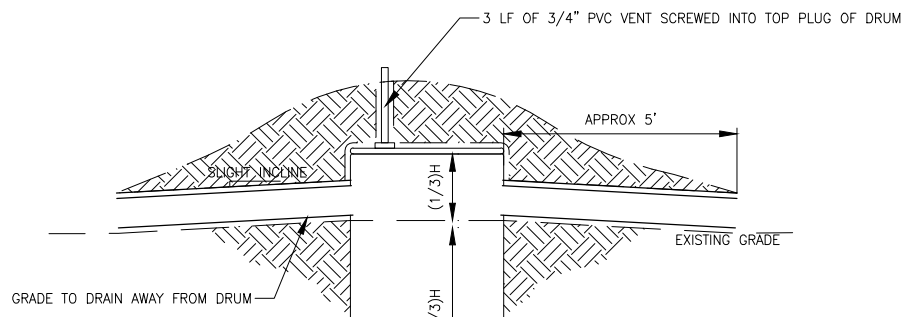
\*NOTE: QUANTITIES PER EACH NURSERY LOG

1/2" DRAINAGE HOLE ON BOTH ENDS

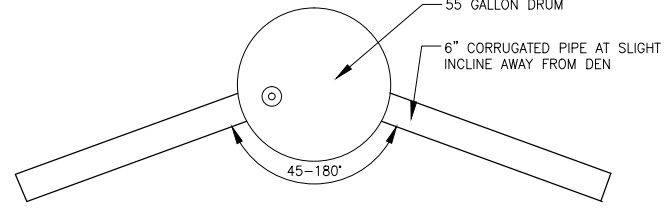


NURSERY LOG - DETAIL  
NOT TO SCALE

1  
6



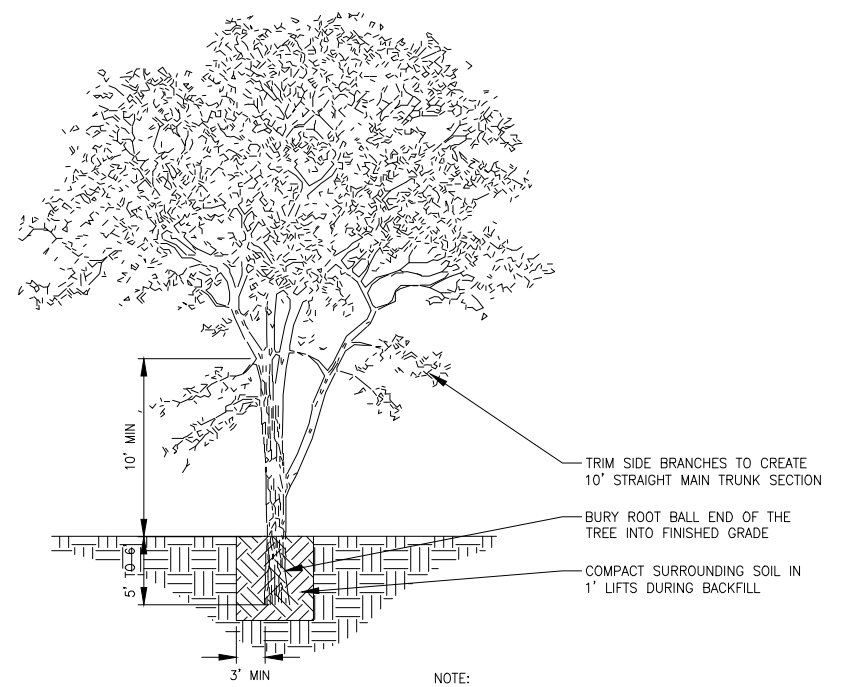
SECTION VIEW



PLAN VIEW

FOX DEN - DETAIL  
NOT TO SCALE

2  
6

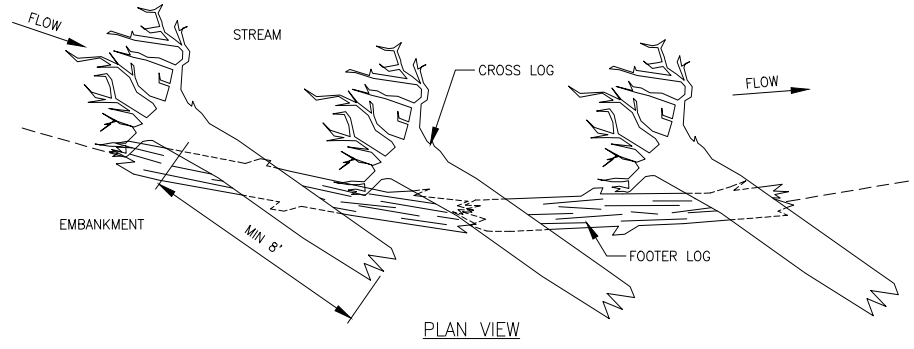


NOTE:

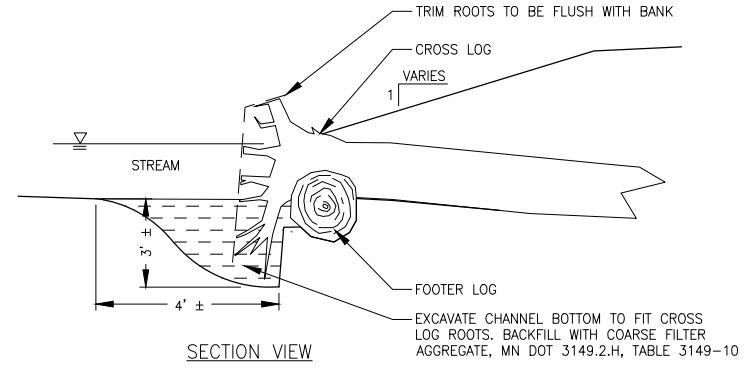
- 18" - 24" DBH LIVING TREE HARVESTED FROM DESIGNATED HARVEST AREA AND KEPT INTACT. ROOT BALL MAY BE REMOVED.
- ELM, ASH ARE NOT ALLOWABLE SPECIES
- TREE SHOWING DISEASE OR SIGNS OF STRESS AT HARVEST ARE NOT ALLOWED.

STANDING DEAD TREE - DETAIL  
NOT TO SCALE

3  
6



PLAN VIEW

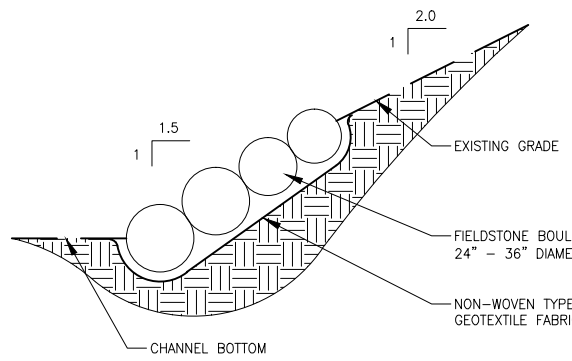


SECTION VIEW

NOTE:  
1. A MINIMUM OF TWO CROSS LOGS PER FOOTER LOG IS REQUIRED TO ANCHOR FOOTER LOG.

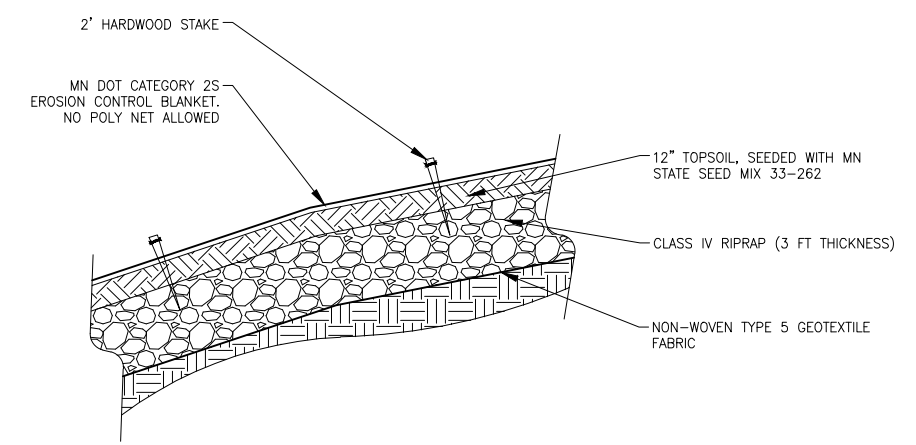
LOG TOE - DETAIL  
NOT TO SCALE

4  
6



STACKED BOULDER TOE - DETAIL  
NOT TO SCALE

5  
6



VEGETATED RIPRAP - DETAIL  
NOT TO SCALE

6  
6

M:\1382\01\CAD\CIV\05-08 - CNSTRCTN DTLS.dwg August 20, 2015 - 7:59am

No.	Date	Revisions	App.

DRAWING NAME 05-08 - CNSTRCTN DTLS.dwg	
DESIGNED BY:	EAM
DRAWN BY:	LNJ
CHECKED BY:	MJS
DATE:	07/14/2015
PROJECT NO.	160553004

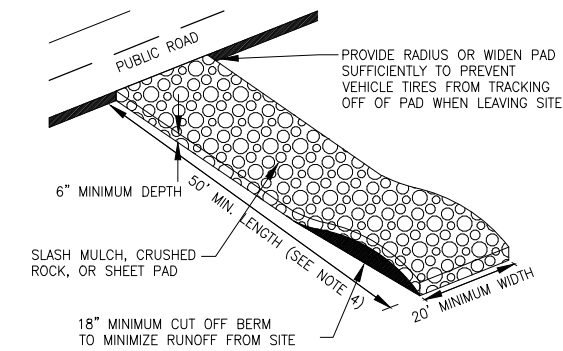
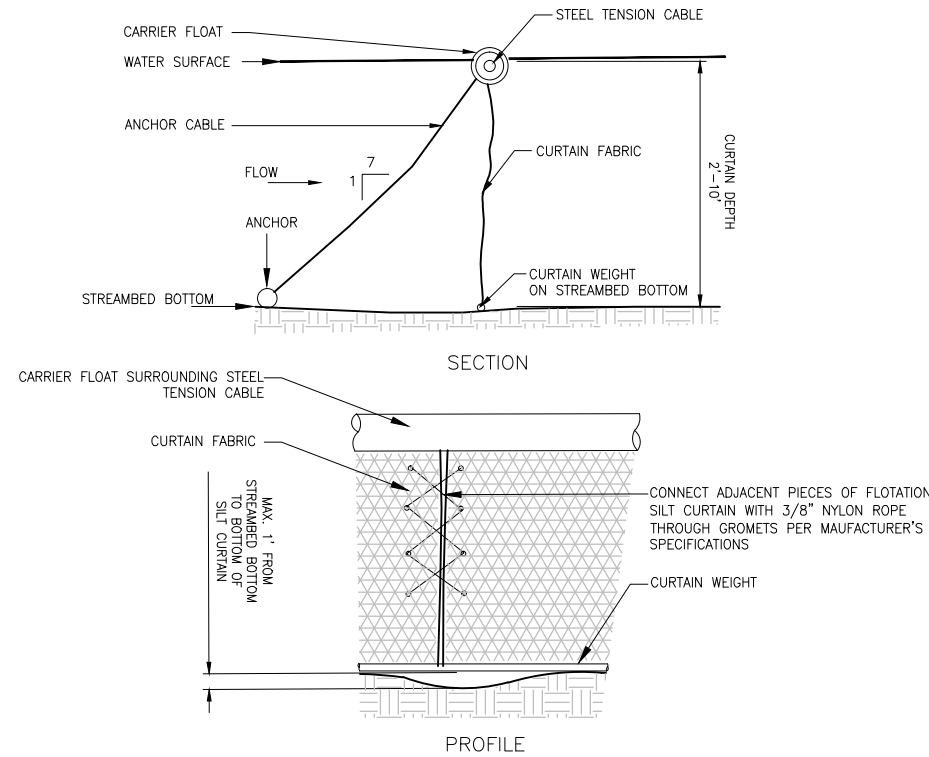
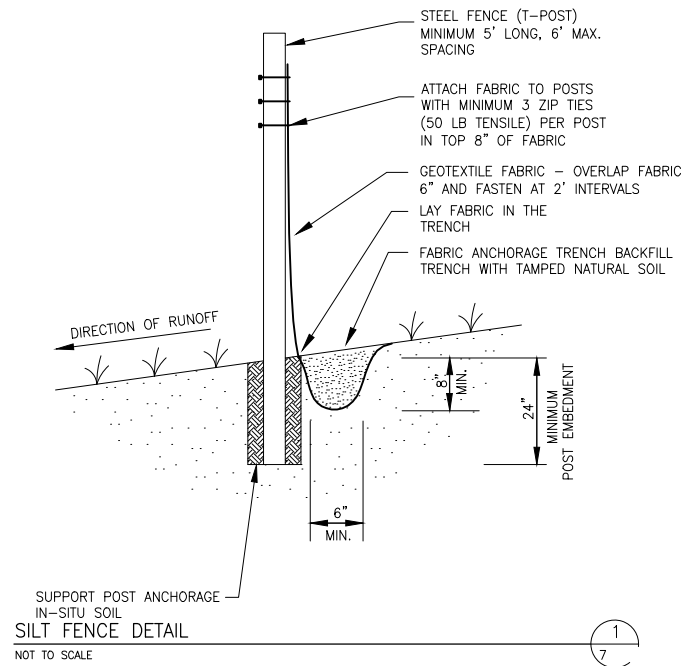
**WENCK ASSOCIATES**  
Responsive partner. Exceptional outcomes.  
1800 PIONEER CREEK CENTER  
MAPLE PLAIN, MN 55359  
PHONE: 763-479-4200  
FAX: 763-479-4242

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.  
*Ed Matthesen*  
ED MATTHIESEN  
DATE: 7/24/15 MN LIC. NO. 16800

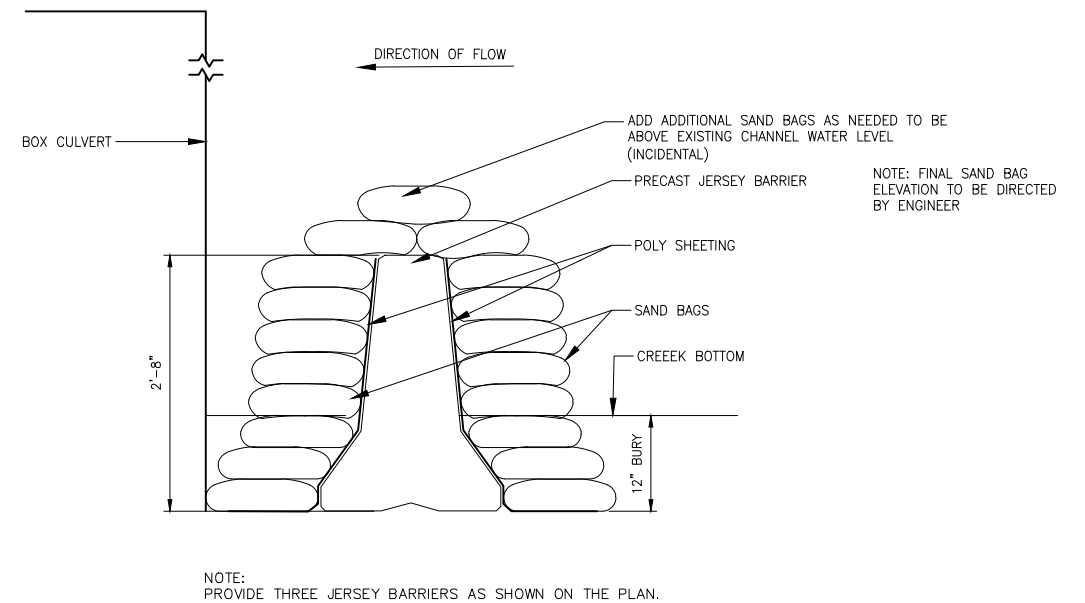
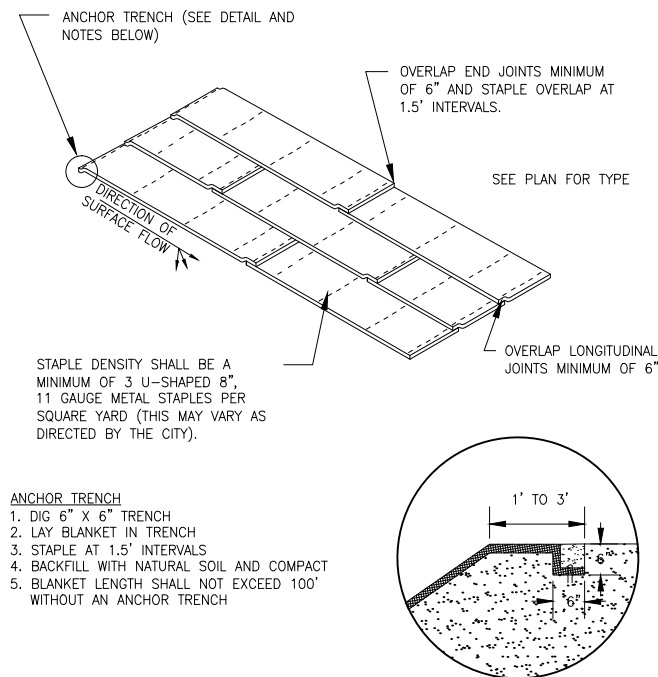
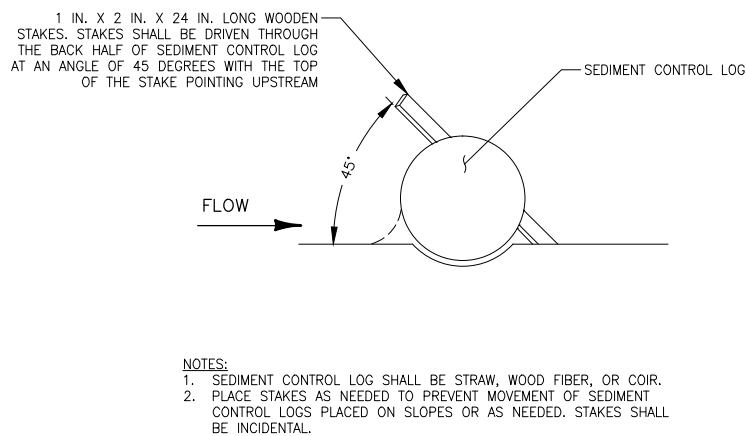
**RAMSEY COUNTY**  
TCAAP  
BID PACKAGE #1  
RICE CREEK REMEANDER CONSTRUCTION  
CONSTRUCTION DETAILS

CITY PROJECT	SHEET NO. 6
COUNTY PROJECT	
S.A.P. 062-593-004	
S.A.P.	

63



- NOTES:
- SEE MNDOT SPECIFICATIONS 2573 AND 3882.
  - FILTER FABRIC SHALL BE PLACED UNDER ROCK OR SLASH MULCH TO STOP MUD MIGRATION.
  - ENTRANCE MUST BE MAINTAINED TO PREVENT SEDIMENTATION ON PUBLIC ROADWAYS. FUGITIVE ROCKS OR SLASH MULCH WILL BE REMOVED FROM ADJACENT ROADWAYS DAILY OR MORE FREQUENTLY AS NECESSARY.
  - 50 FT MINIMUM LENGTH OR LENGTH SUFFICIENT TO ALLOW A MINIMUM OF 5 TIRE ROTATIONS ON PROVIDED PAD. MINIMUM LENGTH SHALL BE CALCULATED USING LARGEST TIRE WHICH WILL BE USED IN TYPICAL OPERATIONS.
  - IF RUNOFF FROM CONSTRUCTION ENTRANCE WILL DRAIN OFF SITE, PROVIDE SEDIMENT TRAP WITH STABILIZED OVERFLOW.



SEDIMENT CONTROL LOG DETAIL 1/7

EROSION CONTROL BLANKET DETAIL 5/7

TEMPORARY HEAD WALL 6/7

M:\1382\01\CAD\CIV\05-08 - CNSTRCTN DTLS.dwg August 20, 2015 - 8:00am

No.	Date	Revisions	App.	DRAWING NAME
				05-08 - CNSTRCTN DTLS.dwg
				DESIGNED BY: EAM
				DRAWN BY: LNJ
				CHECKED BY: MJS
				DATE: 07/14/2015
				PROJECT NO. 160553004

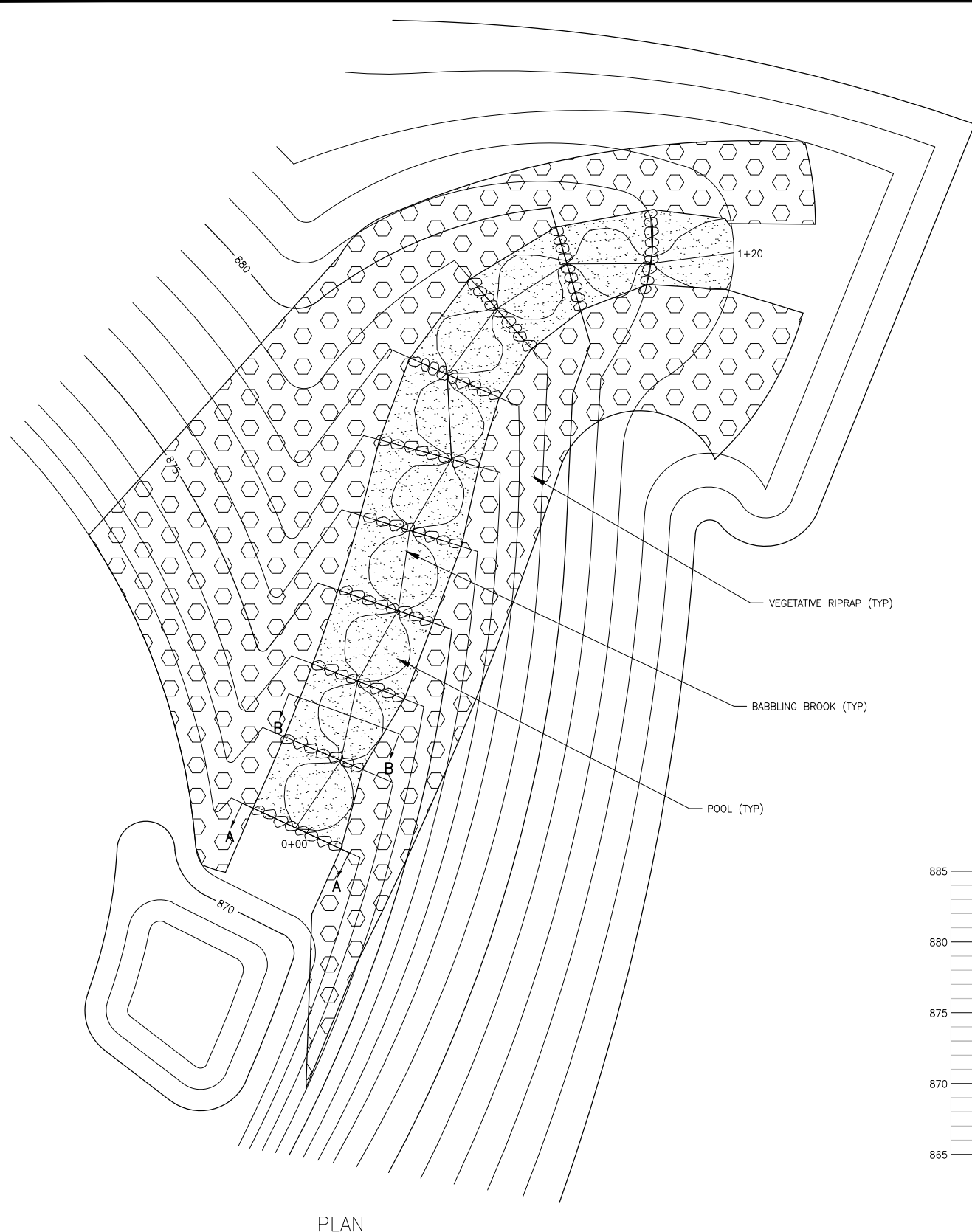
**WENCK ASSOCIATES**  
 Responsive partner. Exceptional outcomes.  
 1800 PIONEER CREEK CENTER MAPLE PLAIN, MN 55359  
 PHONE: 763-479-4200 FAX: 763-479-4242

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 ED MATTHIESEN  
 DATE: 7/24/15 MN LIC. NO. 16800

**RAMSEY COUNTY**  
 TCAAP  
 BID PACKAGE #1  
 RICE CREEK REMEANDER CONSTRUCTION  
 CONSTRUCTION DETAILS

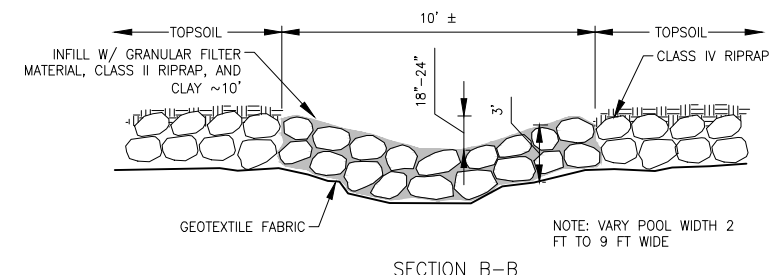
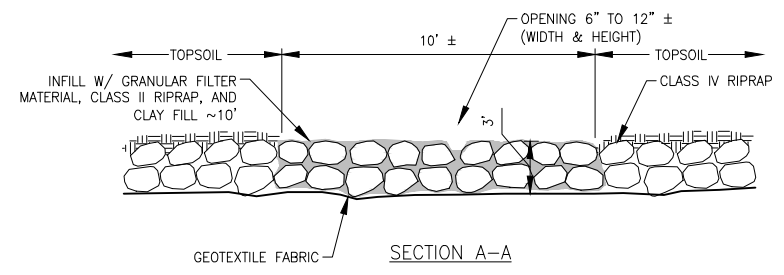
CITY PROJECT	SHEET NO.
COUNTY PROJECT	7
S.A.P. 062-593-004	
S.A.P.	

M:\1382\01\CAD\CIV\05-08 - CNSTRCTN DTLS.dwg August 20, 2015 - 8:00am



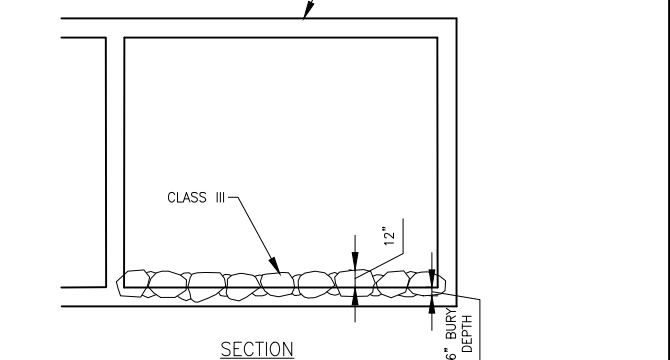
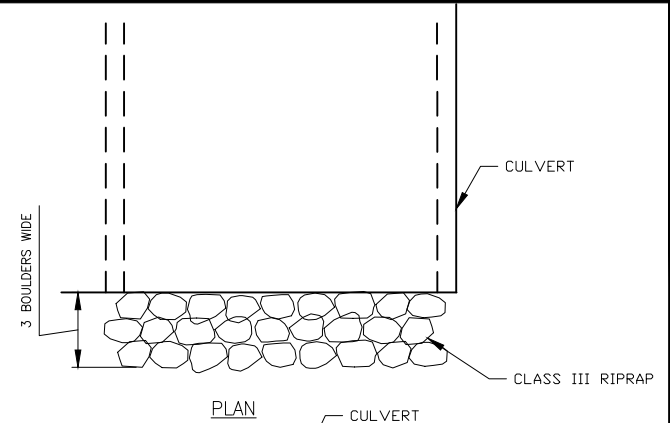
PLAN

BABBLING BROOK PLAN  
NOT TO SCALE



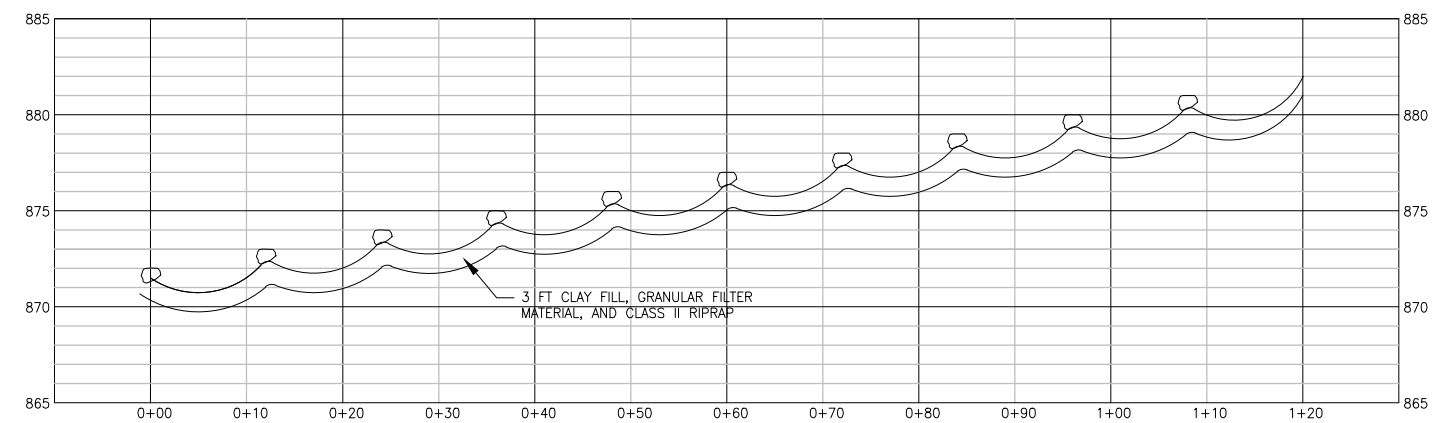
- CONSTRUCTION NOTES:
1. CONSTRUCT BABBLING BROOK IN TWO LIFTS:
    - 1.1. PLACE GEOTEXTILE FABRIC ON PREPARED SUBGRADE
    - 1.2. PLACE 1/2 FINISHED THICKNESS OF CLASS IV RIPRAP
    - 1.3. PLACE CLASS II RIPRAP TO FILL MAJOR VOIDS
    - 1.4. PLACE GRANULAR FILTER MATERIAL & CLAY AND BUCKET TAMP TO COMPACT MATERIALS INTO VOIDS.
  - 1.5. PLACE REMAINING THICKNESS OF CLASS IV RIPRAP AND BUCKET TAMP TO INTERLOCK CLASS IV RIPRAP LIFTS.
  - 1.6. PLACE CLASS II RIPRAP TO FILL MAJOR VOIDS
  - 1.7. PLACE GRANULAR FILTER MATERIAL & CLAY AND BUCKET TAMP TO COMPACT MATERIALS INTO THE VOIDS.

BABBLING BROOK SECTIONS  
NOT TO SCALE



- CONSTRUCTION NOTES:
1. PLACE AND ARRANGE RIPRAP
  2. PUSH RIPRAP DOWN WITH EXCAVATOR TO THE BURY DEPTH. MAINTAIN A FLAT FINISHED ELEVATION.

LOW FLOW VANE DETAIL  
NOT TO SCALE



PROFILE

BABBLING BROOK PROFILE  
NOT TO SCALE

No.	Date	Revisions	App.

DRAWING NAME 05-08 - CNSTRCTN DTLS.dwg	
DESIGNED BY:	EAM
DRAWN BY:	LNJ
CHECKED BY:	MJS
DATE:	07/14/2015
PROJECT NO.	160553004

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1800 PIONEER CREEK CENTER  
MAPLE PLAIN, MN 55359

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*Ed Matthesen*  
ED MATTHIESEN  
DATE: 7/24/15 MN LIC. NO. 16800

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RICE CREEK REMEANDER CONSTRUCTION  
CONSTRUCTION DETAILS

CITY PROJECT	SHEET NO. 8
COUNTY PROJECT	
S.A.P. 062-593-004	
S.A.P.	

63



**CONSTRUCTION SEQUENCING:**

1. FALL 2015
  - 1.1. ESTABLISH SITE EROSION CONTROL MEASURES PRIOR TO LAND DISTURBANCE.
  - 1.2. SALVAGE CHAIN LINK, PERIMETER FENCE AND REINSTALL AS SHOWN. USE SALVAGED FENCE UNTIL OUT, REMAINING CHAIN LINK FENCE TO BE NEW AS REQUIRED TO MAINTAIN PERIMETER CONTROL OF THE PROPERTY.
  - 1.3. COMPLETE CLEARING AND GRUBBING AS SHOWN ON THE PLANS, HARVEST ROOT WAD, FOOTER LOG AND DEAD TREE MATERIALS FROM TREES MARKED FOR REMOVAL OR OTHER TREES ONSITE AS DIRECTED.
  - 1.4. COMPLETE REMOVALS AS SHOWN ON THE PLANS.
  - 1.5. STRIP TOPSOIL FROM THE PROJECT AREA AND STOCKPILE FOR REUSE. STOCKPILE LOCATION TO BE DETERMINED.
  - 1.6. COMPLETE EXCAVATION OF REMEANDER AS SHOWN ON THE PLANS. EXCAVATION SPOIL TO BE STOCKPILED FOR REUSE. STOCKPILE LOCATION TO BE DETERMINED.
  - 1.7. INSTALL BRIDGE NO. 91071 EXTENSION AS SHOWN ON THE PLANS.
  - 1.8. INSTALL 1-35W RAMP CULVERT AS SHOWN ON THE PLANS, INCLUDING TEMPORARY WEIR ON UPSTREAM END OF THE CULVERTS AS SHOWN ON THE PLANS. CONSTRUCTION SHALL BE COMPLETED TO PREVENT RICE CREEK FROM BACKWATERING INTO THE NEW REMEANDER.
  - 1.9. INSTALL REMEANDER STABILIZATION PRACTICES.
  - 1.10. SPREAD TOPSOIL FROM STOCKPILE OVER THE PROJECT AREA AS SHOWN ON THE PLANS, IMPORTING ADDITIONAL TOPSOIL AS REQUIRED. TOPSOIL SHALL BE A MINIMUM OF 4" THICK.
  - 1.11. REVEGETATE PROJECT AND DISTURBED AREAS AND STABILIZE WITH EROSION CONTROL MEASURES AS SHOWN ON THE PLANS. LIVE SEED INSTALLATION SHALL OCCUR OCTOBER 15 TO FIRST FROST AND SHOULD BE COMPLETE AS DETAILED IN THE SWPPP.
2. SPRING 2016
  - 2.1. MAINTAIN INSTALLED VEGETATION, RESEEDING ALL AREAS THAT DO NOT SHOW GERMINATION BY MAY 31, 2016.
  - 2.2. SALVAGE CHAIN LINK, PERIMETER FENCE AND REINSTALL AS SHOWN. USE SALVAGED FENCE UNTIL OUT, REMAINING CHAIN LINK FENCE TO BE NEW AS REQUIRED TO MAINTAIN PERIMETER CONTROL OF THE PROPERTY.
  - 2.3. DIVERT RICE CREEK INTO THE NEW REMEANDER - JUNE 16, 2016 THROUGH JULY 15, 2016
    - 2.3.1. MAINTAIN TEMPORARY WEIR UPSTREAM OF 1-35W CULVERT EXTENSION UNTIL THE END OF DIVERSION TO CAPTURE ANY SEDIMENT FLUSH FROM THE DIVERSION.
    - 2.3.2. COMPLETE THE DIVERSION PROCESS AS QUICKLY AS POSSIBLE BY STAGING EQUIPMENT AND MATERIALS AS REQUIRED TO MINIMIZE TIME AND EXPOSURE OF DISTURBED SOILS TO FLOWING WATER.
    - 2.3.3. EXCAVATE THE BERM AT UPSTREAM END OF THE REMEANDER SEPARATING THE REMEANDER FROM RICE CREEK. SPOILS FROM THE EXCAVATION TO BE PLACED IN RICE CREEK AS SHOWN ON THE FINAL GRADING PLAN.
    - 2.3.4. BACKFILL ADDITIONAL COMMON BORROW IN RICE CREEK AS SHOWN ON THE FINAL GRADING PLAN TO COMPLETE THE DIVERSION AND PLUG FLOW INTO THE ABANDONED RICE CREEK CHANNEL.
    - 2.3.5. INSTALL STABILIZATION PRACTICES AS SHOWN ON FINAL STABILIZATION PLAN.
  - 2.4. MODIFY TEMPORARY WEIR UPSTREAM OF 1-35W CULVERT EXTENSION
    - 2.4.1. MODIFICATION OF THE TEMPORARY HEADWALL (CONSTRUCTED OF JERSEY BARRIERS AND SAND BAGS - SEE DETAIL 6 ON SHEET 7) SHALL BE COMPLETED DURING A DRY, NON-PRECIPIATION PERIOD.
    - 2.4.2. REMOVE THE CENTER JERSEY BARRIER FROM THE TEMPORARY HEADWALL UPSTREAM OF THE 1-35W RAMP CULVERT. ALLOW FLOW AND WEIGHT OF THE WATER TO COLLAPSE THE SANDBAGS IN THE VOID CREATED BY THE REMOVED JERSEY BARRIER. THE INTENT IS TO CREATE A LOWER ELEVATION IN THE TEMPORARY HEADWALL TO CONTROL FLOW. ONE OR MORE ADDITIONAL JERSEY BARRIERS MAY NEED TO BE REMOVED TO BALANCE FLOW AND WILL BE DIRECTED BY THE ENGINEER IN THE FIELD.
    - 2.4.3. AFTER 24 TO 48 HOURS, REMOVE SEDIMENT ACCUMULATION UPSTREAM OF THE TEMPORARY WEIR AND PLACE IN STOCKPILE LOCATION.
    - 2.4.4. REMOVE ALL REMAINING TEMPORARY WEIR COMPONENTS.
    - 2.4.5. STABILIZE ALL DISTURBED AREAS TO MATCH STABILIZATION PLANS.

M:\1382\01\CAD\CIV\09 - CNSTRCTN SQNCNG.dwg August 20, 2015 - 8:02am

No.	Date	Revisions	App.

<b>DRAWING NAME</b>	09 - CNSTRCTN SQNCNG.dwg
<b>DESIGNED BY:</b>	EAM
<b>DRAWN BY:</b>	LNJ
<b>CHECKED BY:</b>	MJS
<b>DATE:</b>	07/14/2015
<b>PROJECT NO.</b>	160553004



**WENCK ASSOCIATES**

Responsive partner. Exceptional outcomes.


1800 PIONEER CREEK CENTER      PHONE: 763-479-4200  
 MAPLE PLAIN, MN 55359      FAX: 763-479-4242

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*Ed Matthesen*

ED MATTHIESEN

DATE: 7/24/15 MN LIC. NO. 16800



**RAMSEY COUNTY**

TCAAP  
 BID PACKAGE #1  
 RICE CREEK REMEANDER CONSTRUCTION  
 CONSTRUCTION SEQUENCING

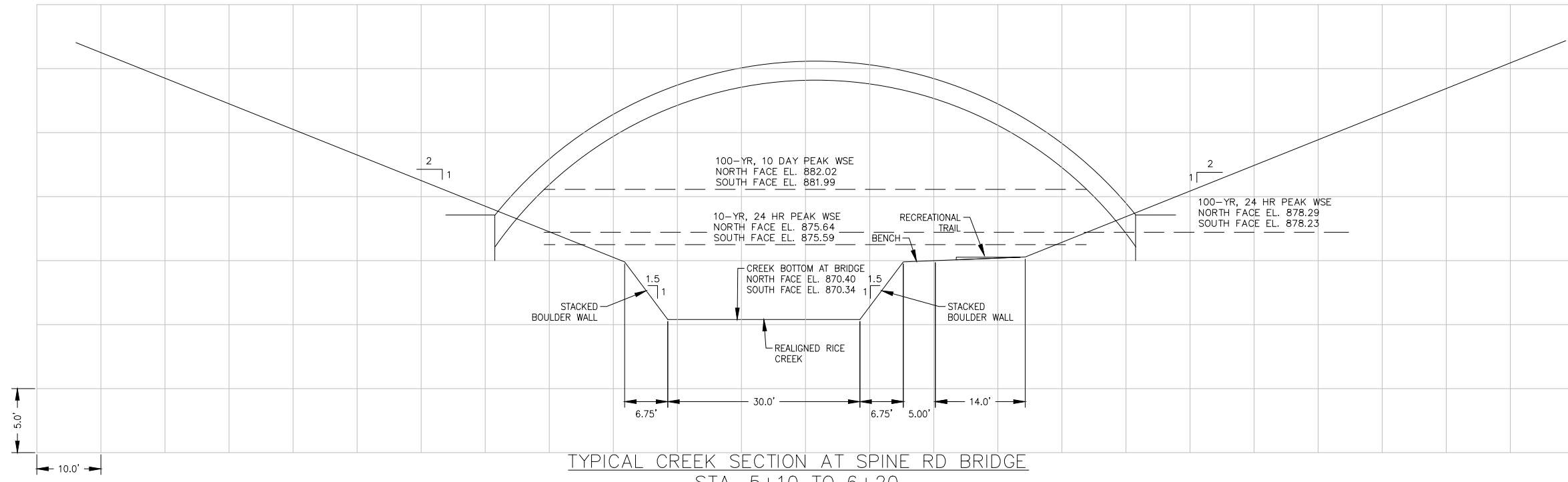
CITY PROJECT	
COUNTY PROJECT	
S.A.P.	062-593-004
S.A.P.	

SHEET NO.

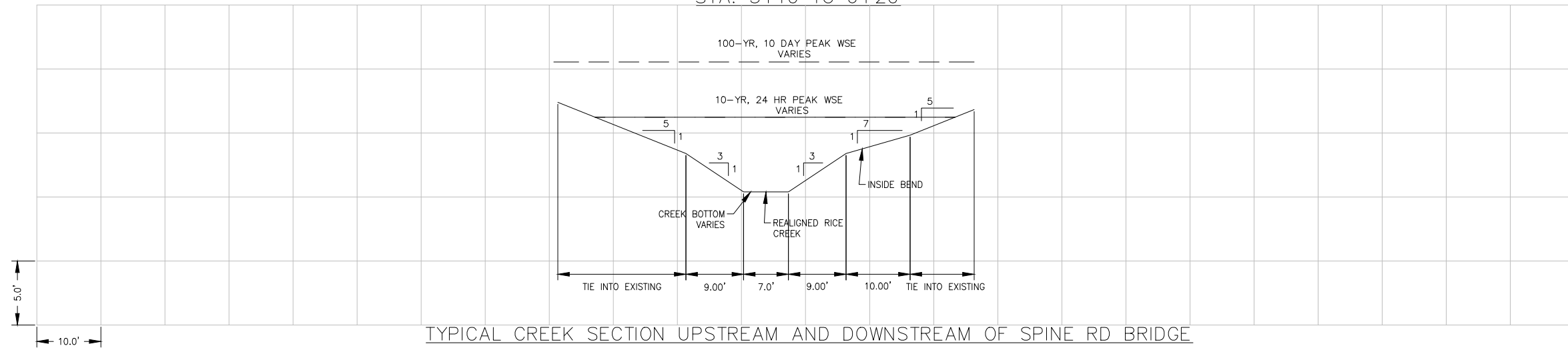
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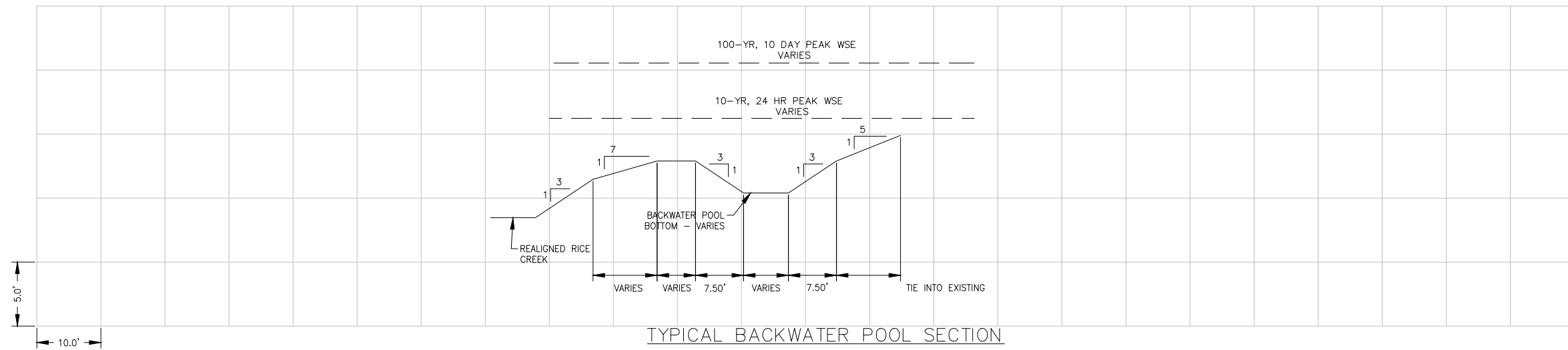
63



TYPICAL CREEK SECTION AT SPINE RD BRIDGE  
STA. 5+10 TO 6+20



TYPICAL CREEK SECTION UPSTREAM AND DOWNSTREAM OF SPINE RD BRIDGE



TYPICAL BACKWATER POOL SECTION

M:\1382\01\CAD\CIV\10 - TYP CRK RMNDR SECTS.dwg August 20, 2015 - 8:16am

No.	Date	Revisions	App.

DRAWING NAME	
10 - TYP CRK RMNDR SECTS.dwg	
DESIGNED BY:	EAM
DRAWN BY:	LNJ
CHECKED BY:	MJS
DATE:	07/14/2015
PROJECT NO.	160553004



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MAPLE PLAIN, MN 55359

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*Ed Matthesen*

ED MATTHESEN  
DATE: 7/24/15 MN LIC. NO. 16800



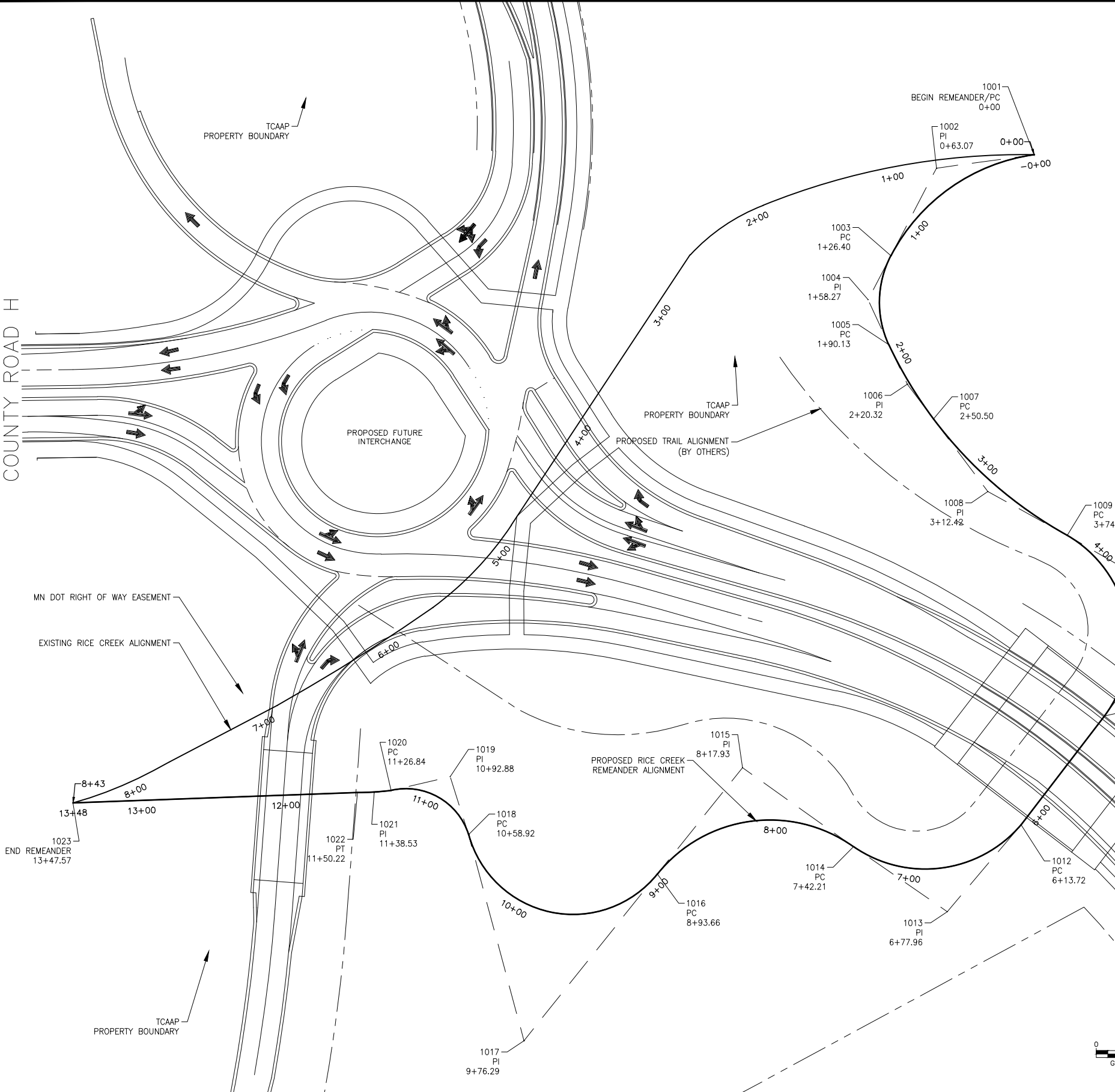
**RAMSEY COUNTY**

TCAAP  
BID PACKAGE #1  
RICE CREEK REMEANDER CONSTRUCTION  
TYPICAL SECTIONS

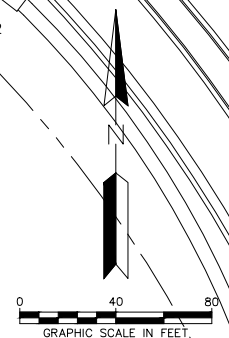
CITY PROJECT	
COUNTY PROJECT	
S.A.P.	062-593-004
S.A.P.	

SHEET NO.  
10  
63

COUNTY ROAD H



POINT NO.	POINT	STATION	CURVE DATA					COORDINATES		AZIMUTH
			DELTA	DEGREE	RADIUS	TANGENT	LENGTH	X	Y	
1001	BEGIN REMEANDER/PC	0+00.00						551226.432	211187.776	262° 13' 8"
1002	PI	0+63.07	54.6967	43.2733	132.405	68.480	126.40	551158.589	211178.457	PI
1003	PC	1+26.40						551126.987	211117.704	207° 28' 55"
1004	PI	1+58.27	52.1639	81.8511	70.000	34.265	63.73	551111.175	211087.305	PI
1005	PC	1+90.13						551125.483	211056.170	155° 19' 5"
1006	PI	2+20.32	11.7740	19.5020	293.794	30.293	60.37	551138.354	211028.747	PI
1007	PC	2+50.50						551156.549	211004.527	143° 5' 2"
1008	PI	3+12.42	24.1518	19.5020	293.794	62.855	123.84	551194.303	210954.274	PI
1009	PC	3+74.34						551249.313	210923.867	118° 55' 55"
1010	PI	4+46.46	96.6009	66.9680	85.557	96.029	144.25	551332.481	210875.860	PI
1011	PT	5+18.59					95.13	551275.232	210798.762	216° 35' 43"
1012	PC	6+13.72						551217.307	210723.301	220° 20' 53"
1013	PI	6+77.96	84.3250	65.6284	87.303	79.058	128.49	551166.123	210663.049	PI
1014	PC	7+42.21						551101.105	210708.025	304° 40' 23"
1015	PI	8+17.93	86.7849	57.3036	99.986	94.527	151.45	551024.124	210762.882	PI
1016	PC	8+93.66						550965.035	210689.098	218° 41' 20"
1017	PI	9+76.29	126.2499	76.3944	75.000	147.993	165.26	550872.511	210573.594	PI
1018	PC	10+58.92						550834.074	210716.508	342° 23' 15"
1019	PI	10+92.88	85.5631	125.9800	45.480	42.088	67.92	550821.339	210756.623	
1020	PC	11+26.84						550780.339	210756.623	256° 49' 28"
1021	PI	11+38.53	6.9659	29.7917	192.321	11.705	23.38	550768.741	210745.623	
1022	PT	11+50.22					197.35	550757.036	210745.595	267° 55' 33"
1023	END REMEANDER/PT	13+47.57						550559.811	210738.452	



M:\1382\01\CAD\CIV\11 - ALIGNMENT.dwg August 20, 2015 - 11:04am

No.	Date	Revisions	App.

DRAWING NAME 11 - ALIGNMENT.dwg	
DESIGNED BY:	EAM
DRAWN BY:	LNJ
CHECKED BY:	MJS
DATE:	07/14/2015
PROJECT NO.	160553004

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1800 PIONEER CREEK CENTER  
MAPLE PLAIN, MN 55359

PHONE: 763-479-4200  
FAX: 763-479-4242

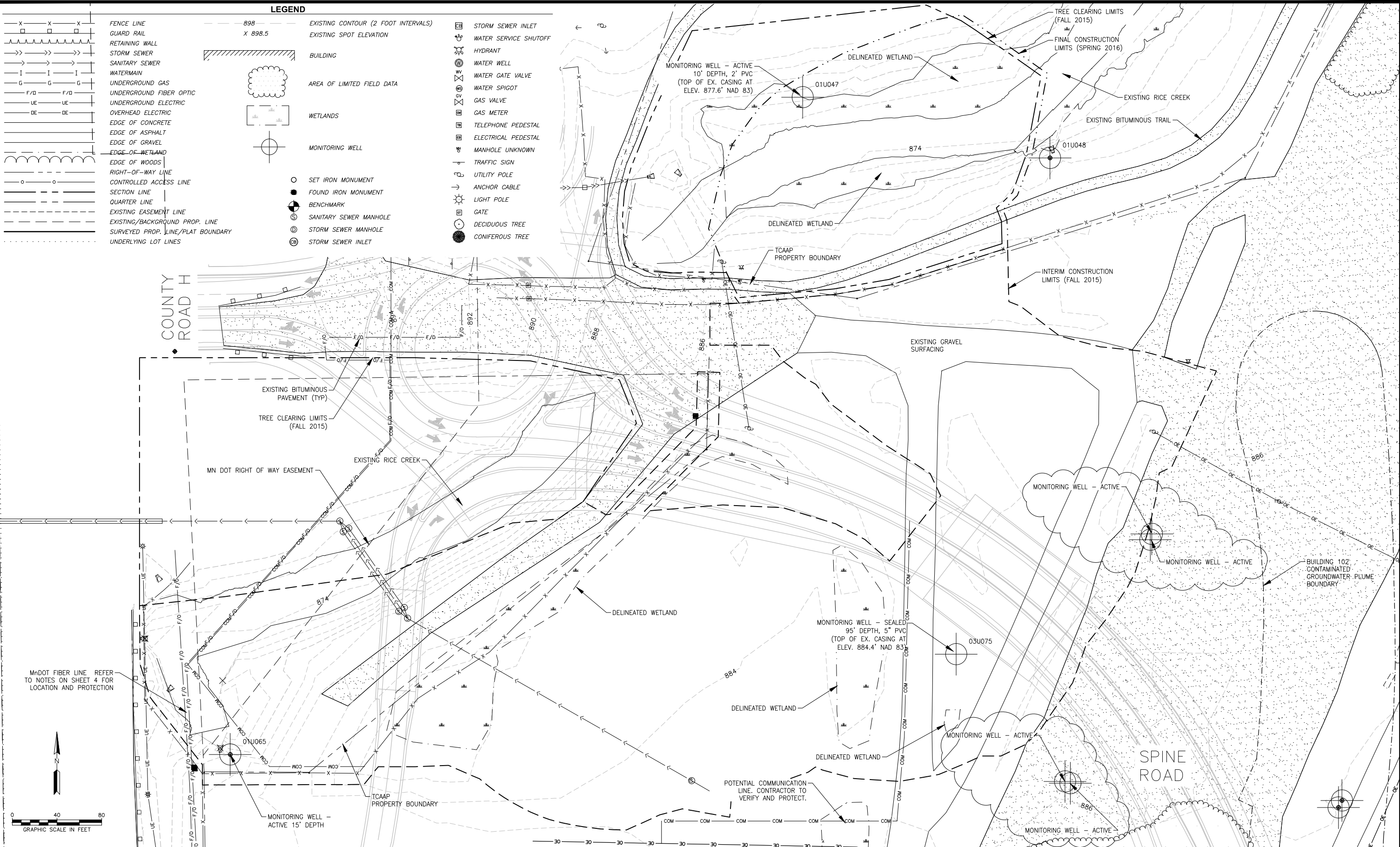
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*Ed Matthesen*  
ED MATTHIESEN  
DATE: 7/24/15 MN LIC. NO. 16800

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BID PACKAGE #1  
RICE CREEK REMEANDER CONSTRUCTION  
ALIGNMENT PLAN AND TABULATION

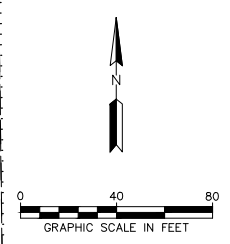
CITY PROJECT	SHEET NO. 11
COUNTY PROJECT	
S.A.P. 062-593-004	
S.A.P.	

63



M:\1382\01\CAD\CIV\12 - INPLACE CNDTN PLAN.dwg September 29, 2015 - 1:59pm

MNDOT FIBER LINE REFER TO NOTES ON SHEET 4 FOR LOCATION AND PROTECTION



No.	Date	Revisions	App.
1	9/30/15	ADDENDUM NO. 1	

<b>DRAWING NAME</b> 12 - INPLACE CNDTN PLAN.dwg	
DESIGNED BY:	EAM
DRAWN BY:	LNJ
CHECKED BY:	MJS
DATE:	07/14/2015
PROJECT NO.	160553004

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ED MATTHIESEN  
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**RAMSEY COUNTY**  
TCAAP  
BID PACKAGE #1  
RICE CREEK REMEANDER CONSTRUCTION  
INPLACE CONDITION PLAN

CITY PROJECT	SHEET NO.
COUNTY PROJECT	12
S.A.P. 062-593-004	63
S.A.P.	

Construction Dates: September 2015 - July 2016

**Party Responsible for Long Term Operation and Maintenance of the Site - OWNER**

Ramsey County  
1425 Paul Kirkwood Drive  
Arden Hills, MN 55112

Beth Engum, Project Engineer  
(651) 266-7115  
Beth.Engum@co.ramsey.mn.us

**Party Responsible for Implementation of the SWPPP - CONTRACTOR (TBD)**

**Surface Area Tabulation**

Total Site Area	7.2 acres
Existing Impervious Area	0.0 acres
Proposed Impervious Area	0.0 acres
Net Impervious Area Increase	0.0 acres



RAMSEY COUNTY  
SSURGO Soils

MAY 2015  
Figure 1

**CERTIFICATION**

In accordance with Part III.A.2 of the General Permit Authorization to Discharge Stormwater Associated with Construction Activity under the NPDES, the preparer of this document was trained under the University of Minnesota Erosion and Sediment Control Certification Program. Mr. Louis Sigtermans' certification in Design of SWPPP is valid through May 31, 2017.

UNIVERSITY OF MINNESOTA  
**Louis H Sigtermans**  
Saint Paul, MN

Design of Construction SWPPP (May 31, 2017)

**EROSION AND SEDIMENT CONTROL PRACTICES**

All exposed soil areas must have temporary erosion protection (erosion control blanket, hydromulch, seed) as soon as possible or within 7 days after the construction activity in that portion of the site has temporarily or permanently ceased.

CONTRACTOR shall implement appropriate construction phasing, vegetative buffer strips, horizontal slope grading, and other construction practices that minimize erosion when practical.

The normal wetted perimeter of any temporary or permanent drainage ditch that drains water from a construction site, or diverts water around a site, must be stabilized within 200 lineal feet from the property edge, or from the point of discharge to any surface water. Stabilization must be completed within 24 hours of connecting to a surface water. Pipe outlets must be provided with temporary or permanent energy dissipation within 24 hours of connection to a surface water.

The following measures will be taken as sediment control practices in order to minimize sediments from entering surface waters:

1. Installation of perimeter silt fence/bioroll as shown on sheet 7 prior to site disturbance. Perimeter sediment control structures shall be located as shown on sheets 14 and 15.
2. Rows of straw wattle or bioroll placed parallel to the contour lines every 25 feet for slope stabilization control.
3. Construction phasing as shown in interim stabilization plan on sheet 9 and as described below:
  - a. Installation of temporary head wall up to normal water level at box culvert.
  - b. Stabilization of interim grading and establishment of vegetative cover within the meander channel in Winter/Spring 2016.
  - c. Removal of downstream meander berm to allow creek flow to enter meander channel.
  - d. Allow 24 hours for sediment to settle and remove sediment trapped at the temporary head wall.
  - e. Removal of temporary head wall to complete reroute.
4. Street sweeping of tracked sediment when necessary.

**Temporary Sediment Basin**

Stormwater runoff on site will flow into the meander channel. During the interim grading phase the meander channel, head wall, and meander berm will form a basin with a live storage volume greater than the required minimum of 3,600 cubic feet per acre drained.

**Final Stabilization**

All areas disturbed by construction will receive seed according to the plans and specifications and within the specified vegetative time schedule. The following additional stabilization measures shall be taken:

1. Erosion control blanket installed 1 roll width above normal water level along entire length of the creek on both sides.
2. Remainder to be hydromulched with bonded fiber matrix.

Final stabilization will occur when the site has a uniform vegetative cover with a density of 70% over the entire disturbed area. All temporary synthetic erosion prevention and sediment control BMPs (such as silt fence) must be removed as part of the site final stabilization. All sediment must be cleaned out of conveyances and temporary sedimentation basins if applicable.

Notice of Termination (NOT) must be submitted within 30 days of final stabilization. Before Termination, revegetation establishment and coverage must meet the permit requirements.

**Dewatering**

Turbid or sediment-laden water must be discharged to an onsite sedimentation basin, or treated with the appropriate BMPs, such that discharge does not adversely affect the receiving water. Ensure that discharge points are adequately protected from erosion and scour. CONTRACTOR responsible to develop and submit dewatering plan to engineer, secure any required permits, and comply with permits.

**Pollution Prevention Measures**

**Solid Waste**

Solid waste, including but not limited to, collected asphalt and concrete millings, floating debris, paper, plastic, fabric, construction and demolition debris and other waste must be disposed of properly and must comply with MPCA disposal requirements.

**Hazardous Materials**

Hazardous materials, including but not limited to oil, gasoline, paint and any hazardous substance must be properly stored including secondary containments, to prevent spills, leaks or other discharge. Restricted access to storage areas must be provided to prevent vandalism. Storage and disposal of hazardous waste must be in compliance with MPCA regulations.

**Washing of Construction Vehicles**

External washing of trucks and other construction vehicles must be limited to a defined area of the site. Runoff must be contained and waste properly disposed of. No engine degreasing is allowed on site.

**Concrete Washout Area**

The contractor shall use means to washout concrete offsite.

**Amendments**

Amend the SWPPP as necessary to address any changes in design, construction, operation, maintenance, weather or seasonal conditions that have a significant effect on discharge of pollutants to surface or underground waters; or to address concerns identified during inspections or investigations by OWNER, USEPA or MPCA.

**Record Retention**

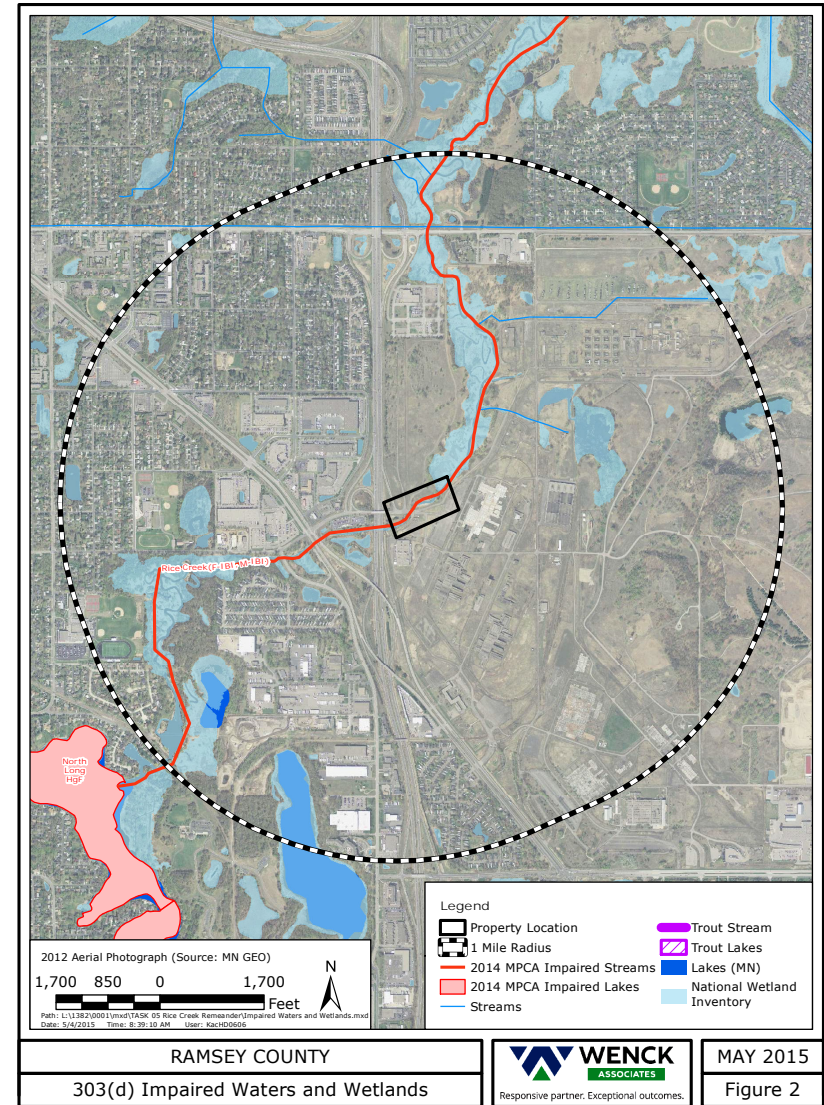
The SWPPP, all changes to it, and inspection and maintenance records must be kept on-site during construction. The OWNER must retain a copy of the SWPPP along with the following records for three (3) years after submittal of the Notice of Termination.

1. Any other permits required for the project;
2. Records of all inspection and maintenance conducted during construction;
3. All permanent operations and maintenance agreements that have been implemented, including all right of way, contract, covenants and other binding requirements regarding perpetual maintenance; and
4. All required calculations for design of the temporary and permanent stormwater management systems.

**Inspections**

The inspection log will be completed by the CONTRACTOR for the construction site. Inspections at the site will be completed as follows: Once every seven (7) days during active construction and, Within 24 hours after a rainfall event greater than 0.5 inches in 24 hours.

The individual performing inspections must be trained as required by part IV.E of the Permit. CONTRACTOR to provide OWNER with proof of training. Inspections must include stabilized areas, erosion prevention and sediment control BMPs, and infiltration areas. Corrective actions must be identified and date of correction must be noted as identified in Section IV.E. of the Permit.



RAMSEY COUNTY  
303(d) Impaired Waters and Wetlands

MAY 2015  
Figure 2

**IMPAIRED WATERS, SPECIAL WATERS, AND WETLANDS**

This Project is not located within 1 mile of a special water.

This Project is located within 1 mile of an impaired waters (Figure 2 this sheet):

- Rice Creek impaired for F-IBI, M-IBI.  
Because of the proximity of the project to an impaired water during construction:
1. All exposed soil areas must be stabilized as soon as possible to limit soil erosion but in no case later than 7 days after the construction activity in that portion of the site has temporarily or permanently ceased.
  2. Temporary sediment basins are required to handle runoff for common drainage locations that serve an area with 5 or more acres disturbed at one time.

This Project will result in temporary impacts to wetlands when diverting the creek into the new channel. Adverse impacts will be mitigated onsite and a wetland permit has been obtained.

**EROSION CONTROL ESTIMATED QUANTITIES**

Material	Quantity
MnDOT Seed Mix 34-261	31.5 lb/acre x 0.25 acres = 7.9 LBS
MnDOT Seed Mix 34-262	14.5 lb/acre x 5 acres = 73 LBS
Erosion Control Blanket	3,100 SY
Bonded Fiber Matrix	3,000 lb/acre x 4.5 acres = 13,500 LBS
Hydraulic Mulch	750 lbs/acre x 1.3 acres = 950 LBS
Floating Silt Curtain	225 LF
Sediment Control Log, Type Straw	3,600 LF
Silt Fence	3,150 LF

No.	Date	Revisions	App.
1	9/30/15	ADDENDUM NO. 1	

DRAWING NAME	
13 - SWPPP.dwg	
DESIGNED BY:	EAM
DRAWN BY:	LNJ
CHECKED BY:	MJS
DATE:	07/14/2015
PROJECT NO.	160553004

Responsive partner. Exceptional outcomes.

1800 PIONEER CREEK CENTER  
MAPLE PLAIN, MN 55359

PHONE: 763-479-4200  
FAX: 763-479-4242

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.

ED MATTHESEN  
DATE: 7/24/15 MN LIC. NO. 16800

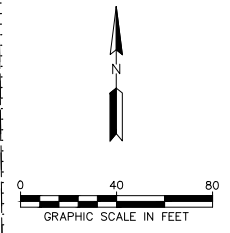
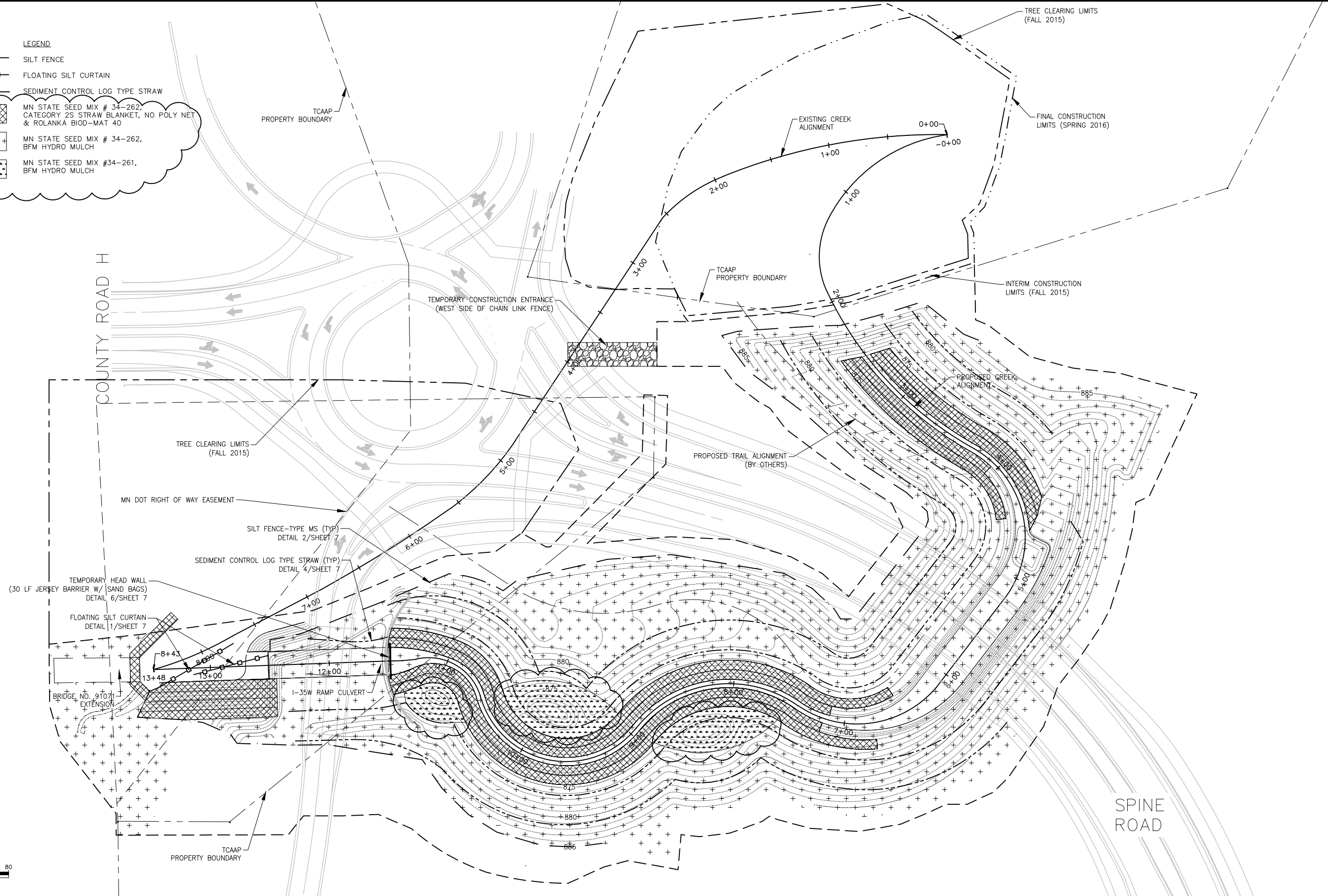
TCAAP  
BID PACKAGE #1  
RICE CREEK REMEANDER CONSTRUCTION  
STORMWATER POLLUTION PREVENTION PLAN

CITY PROJECT		SHEET NO.
COUNTY PROJECT		
S.A.P.	062-593-004	63
S.A.P.		

M:\1382\01\CAD\CIV\13 - SWPPP.dwg September 29, 2015 - 2:00pm

**LEGEND**

- SILT FENCE
- FLOATING SILT CURTAIN
- SEDIMENT CONTROL LOG TYPE STRAW
- MN STATE SEED MIX # 34-262, CATEGORY 25 STRAW BLANKET, NO POLY NET & ROLANKA BIOD-MAT 40
- MN STATE SEED MIX # 34-262, BFM HYDRO MULCH
- MN STATE SEED MIX #34-261, BFM HYDRO MULCH



M:\1382\01\CAD\CIV\14 - INTRM ERSN CNTRL AND REVEG PLAN.dwg September 29, 2015 - 2:01pm

No.	Date	Revisions
1	9/30/15	ADDENDUM NO. 1

App. 14	<b>DRAWING NAME</b> INTRM ERSN CNTRL AND REVEG PLAN.dwg
	DESIGNED BY: EAM
	DRAWN BY: LNJ
	CHECKED BY: MJS
	DATE: 07/14/2015
	PROJECT NO. 160553004

**WENCK ASSOCIATES**

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MAPLE PLAIN, MN 55359

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*Ed Matthesen*

ED MATTHIESEN  
DATE: 7/24/15 MN LIC. NO. 16800

**RAMSEY COUNTY**

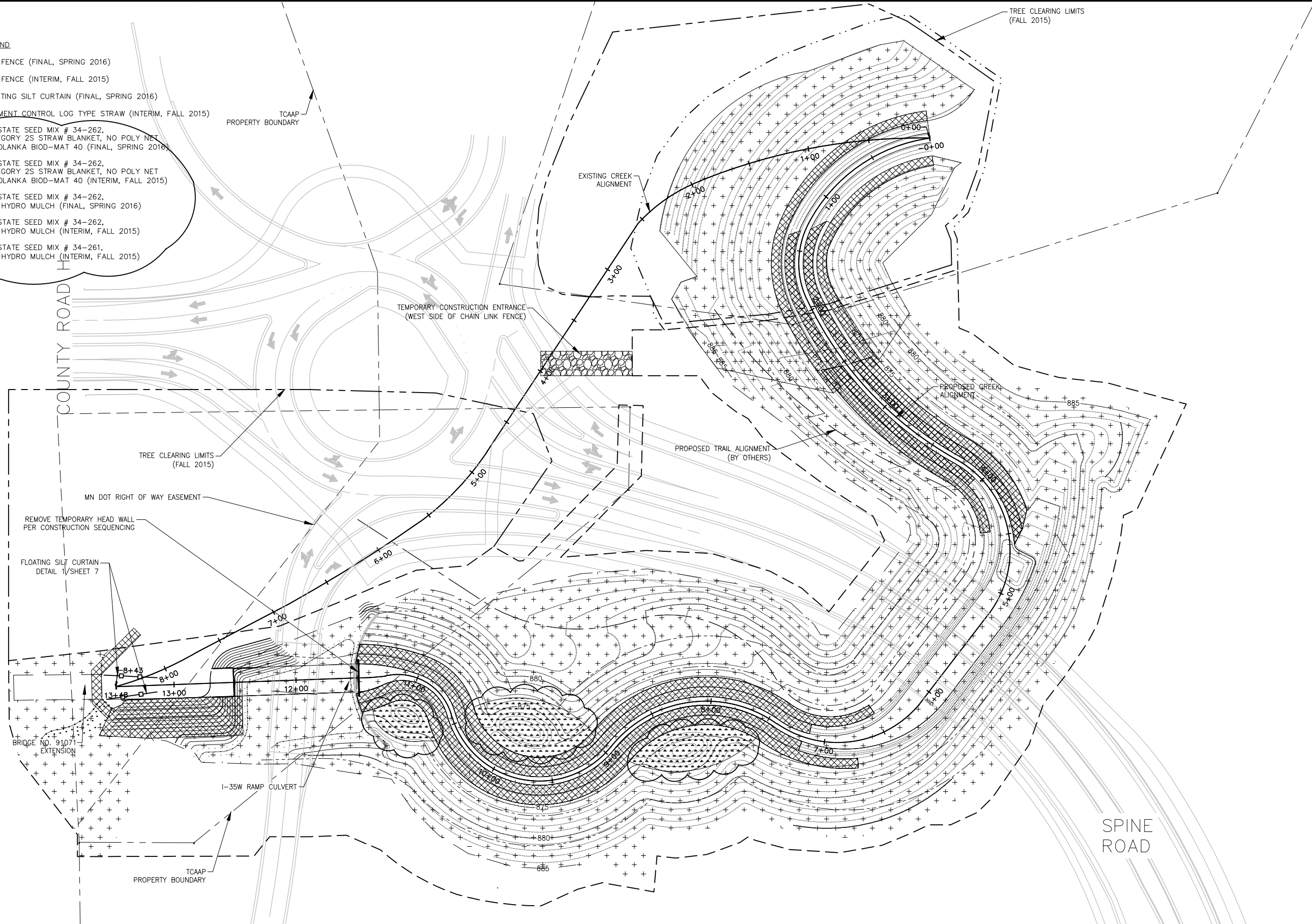
TCAAP  
BID PACKAGE #1  
RICE CREEK REMEANDER CONSTRUCTION  
INTERIM EROSION CONTROL  
& REVEGETATION PLAN

CITY PROJECT	
COUNTY PROJECT	
S.A.P.	062-593-004
S.A.P.	

SHEET NO.  
14  
63

M:\1382\01\CAD\CIV\15 - FINAL ERSN CNTRL AND REVEG PLAN.dwg September 29, 2015 - 2:03pm

- LEGEND**
- SILT FENCE (FINAL, SPRING 2016)
  - - - SILT FENCE (INTERIM, FALL 2015)
  - FLOATING SILT CURTAIN (FINAL, SPRING 2016)
  - SEDIMENT CONTROL LOG TYPE STRAW (INTERIM, FALL 2015)
  - ▨ MN STATE SEED MIX # 34-262, CATEGORY 2S STRAW BLANKET, NO POLY NET & ROLANKA BIOD-MAT 40 (FINAL, SPRING 2016)
  - ▩ MN STATE SEED MIX # 34-262, CATEGORY 2S STRAW BLANKET, NO POLY NET & ROLANKA BIOD-MAT 40 (INTERIM, FALL 2015)
  - ++ MN STATE SEED MIX # 34-262, BFM HYDRO MULCH (FINAL, SPRING 2016)
  - ++ MN STATE SEED MIX # 34-262, BFM HYDRO MULCH (INTERIM, FALL 2015)
  - MN STATE SEED MIX # 34-261, BFM HYDRO MULCH (INTERIM, FALL 2015)



No.	Date	Revisions
1	9/30/15	ADDENDUM NO. 1

App. 15	<b>DRAWING NAME</b> FINAL ERSN CNTRL AND REVEG PLAN.dwg
	DESIGNED BY: EAM
	DRAWN BY: LNJ
	CHECKED BY: MJS
	DATE: 07/14/2015
	PROJECT NO. 160553004

**WENCK ASSOCIATES**  
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MAPLE PLAIN, MN 55359  
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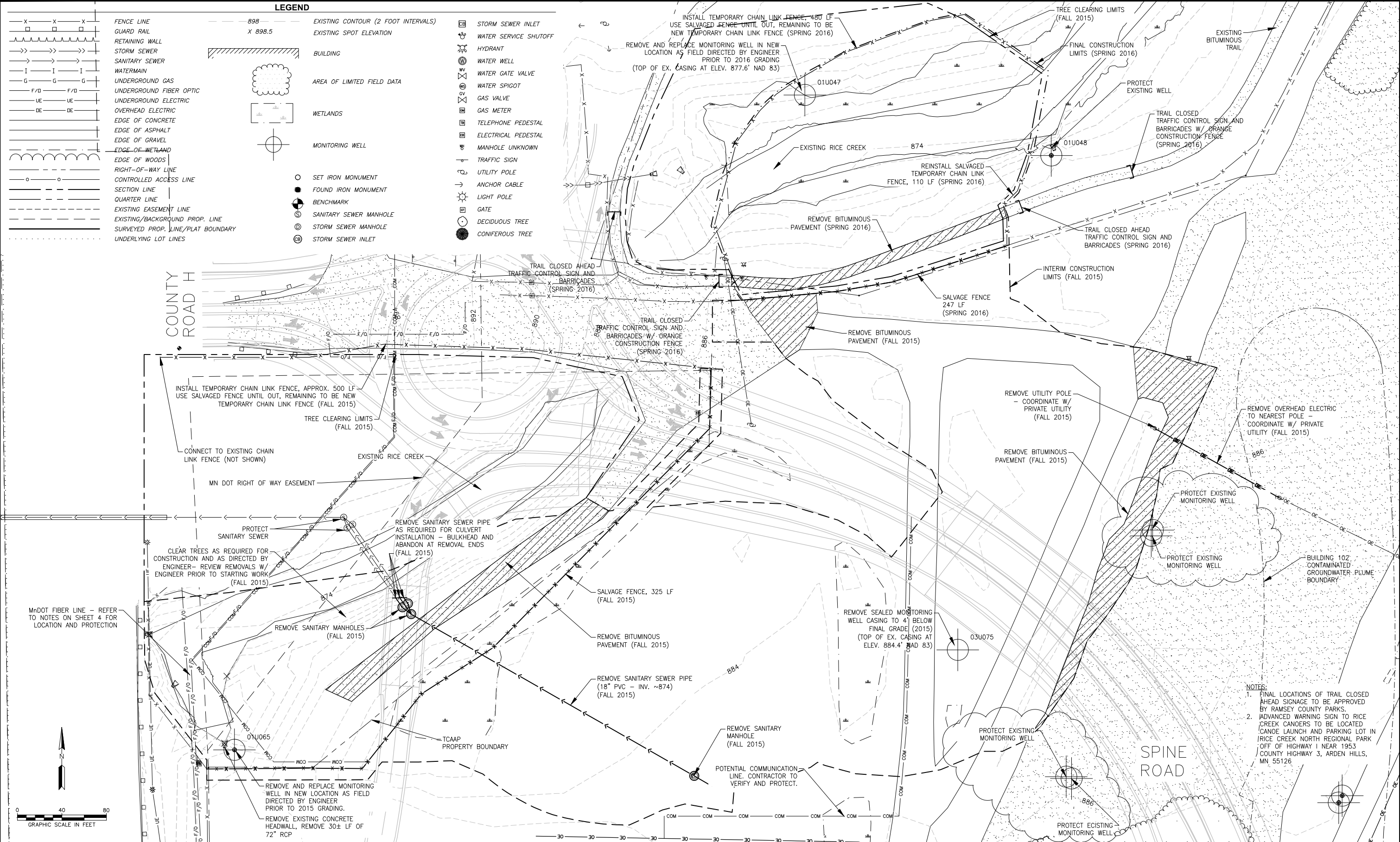
*Ed Matthesen*  
ED MATTHIESEN  
DATE: 7/24/15 MN LIC. NO. 16800

**RAMSEY COUNTY**

TCAAP  
BID PACKAGE #1  
RICE CREEK REMEANDER CONSTRUCTION  
FINAL EROSION CONTROL  
& REVEGETATION PLAN

CITY PROJECT	
COUNTY PROJECT	
S.A.P.	062-593-004
S.A.P.	

SHEET NO.  
15  
63



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No.	Date	Revisions
1	9/30/15	ADDENDUM NO. 1

App.	DRAWING NAME
	16 - REMOVAL PLAN.dwg
	DESIGNED BY: EAM
	DRAWN BY: LNJ
	CHECKED BY: MJS
	DATE: 07/14/2015
	PROJECT NO. 160553004

**WENCK ASSOCIATES**

Responsive partner. Exceptional outcomes.

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MAPLE PLAIN, MN 55359

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FAX: 763-479-4242

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*Ed Matthesen*  
ED MATTHESEN  
DATE: 7/24/15 MN LIC. NO. 16800

**RAMSEY COUNTY**

TCAAP  
BID PACKAGE #1  
RICE CREEK REMEANDER CONSTRUCTION  
REMOVAL PLAN

CITY PROJECT	
COUNTY PROJECT	
S.A.P.	062-593-004
S.A.P.	

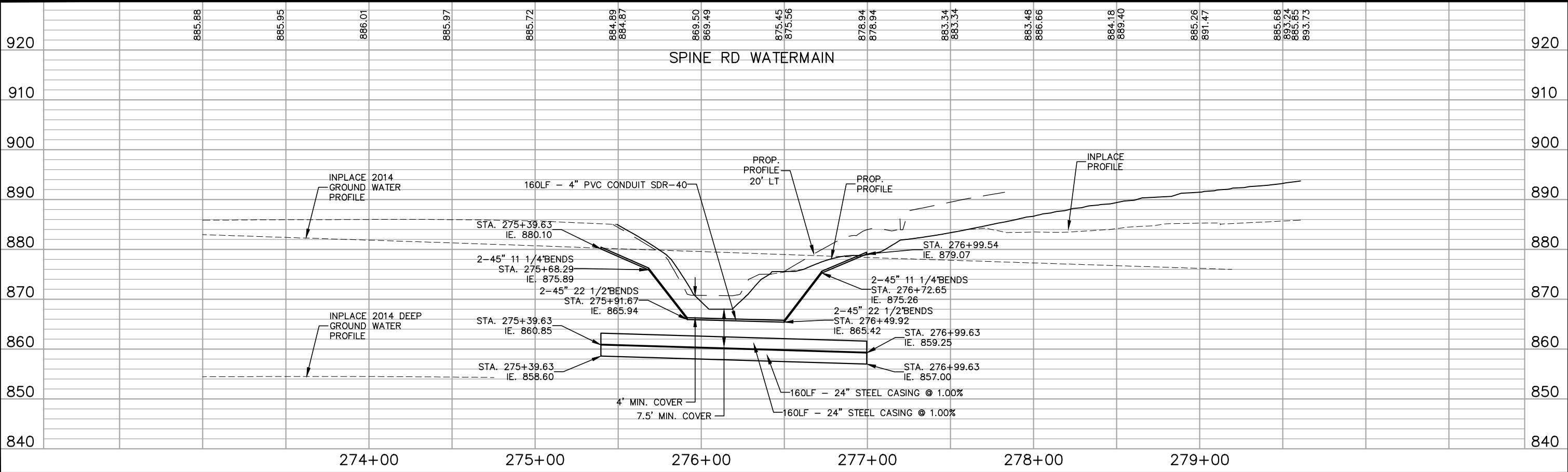
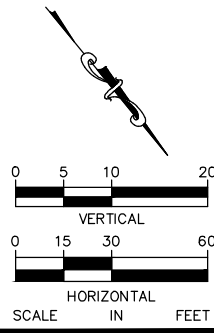
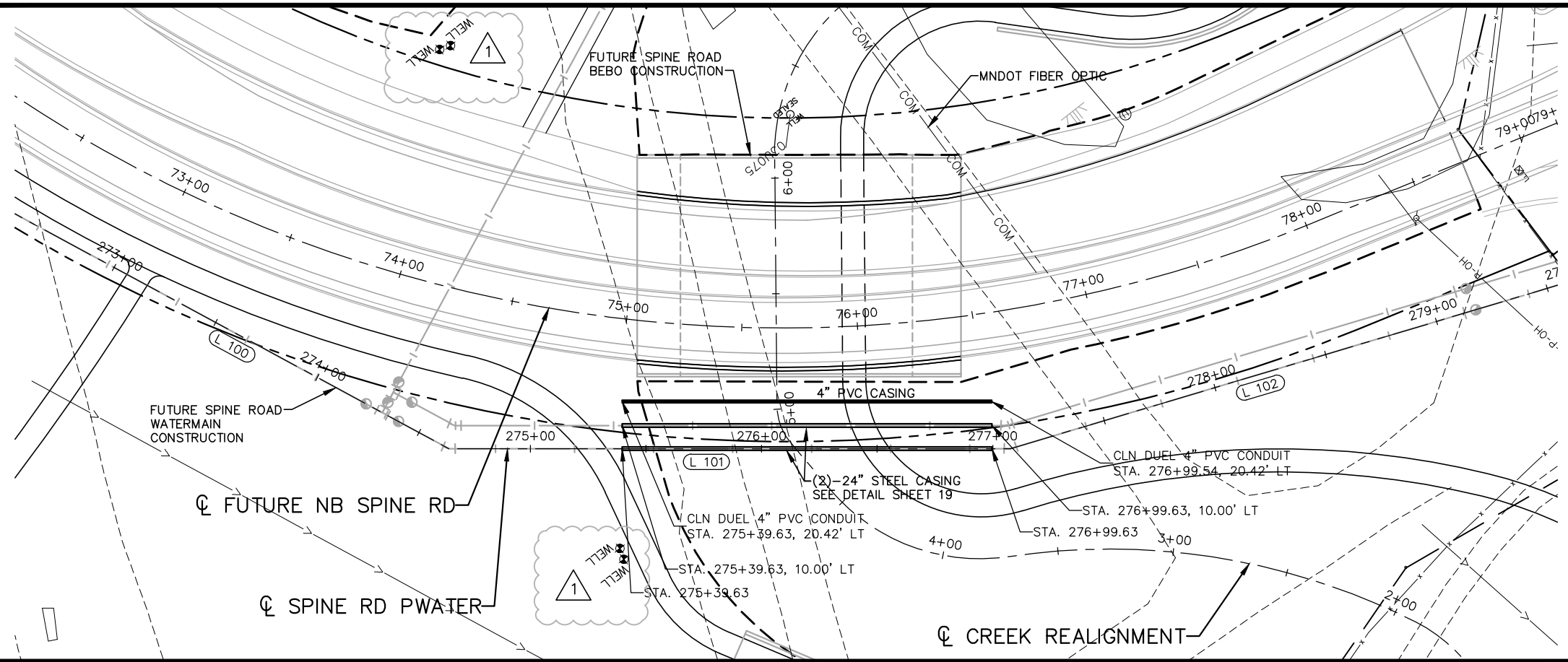
SHEET NO.	16
	63

**NOTES:**

- FINAL LOCATIONS OF TRAIL CLOSED AHEAD SIGNAGE TO BE APPROVED BY RAMSEY COUNTY PARKS.
- ADVANCED WARNING SIGN TO RICE CREEK CANOE LAUNCH AND PARKING LOT IN RICE CREEK NORTH REGIONAL PARK OFF OF HIGHWAY 1 NEAR 1953 COUNTY HIGHWAY 3, ARDEN HILLS, MN 55126



K:\TWC\_Civil\County\RAMSEY\TCAAAP\_Spine Rd BP2\CAD\Plan Sheets\Construction Plans\BP1\TCAAAP\_SPINERD\_BP1\_UTIL.dwg Layout01 September 29, 2015 - 1:24pm



No.	Date	Revisions	App.
1	9/30/15	ADDENDUM NO. 1	

**Kimley»Horn**  
 2550 UNIVERSITY AVENUE WEST, SUITE 238N, ST. PAUL, MN 55114  
 PHONE: 651-645-4197  
 WWW.KIMLEY-HORN.COM

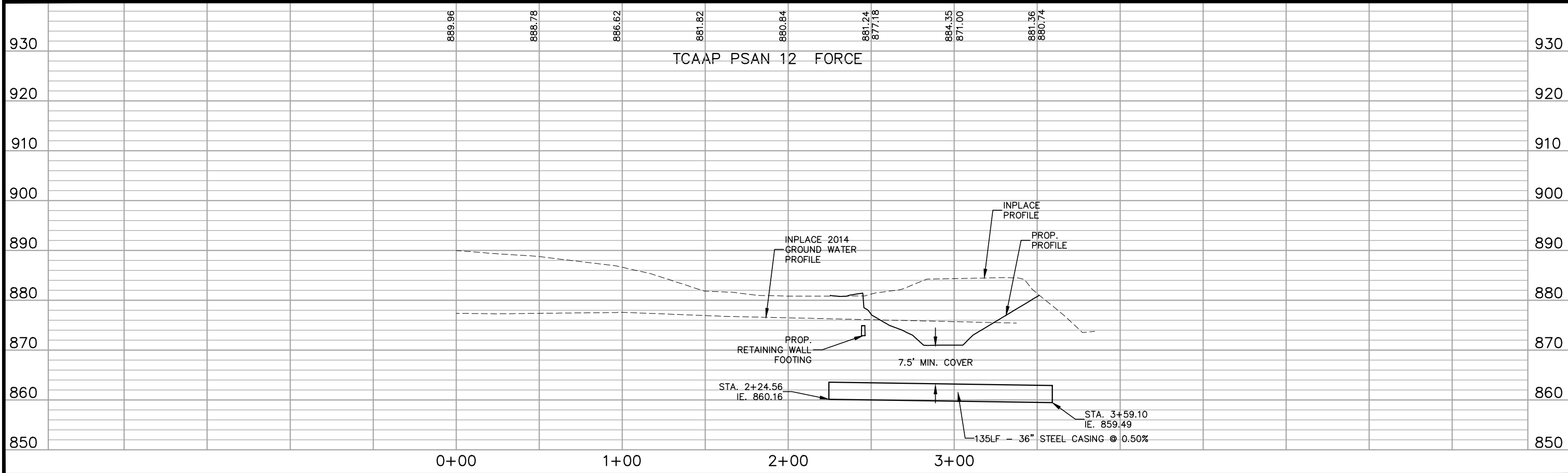
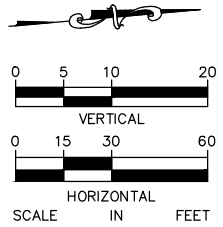
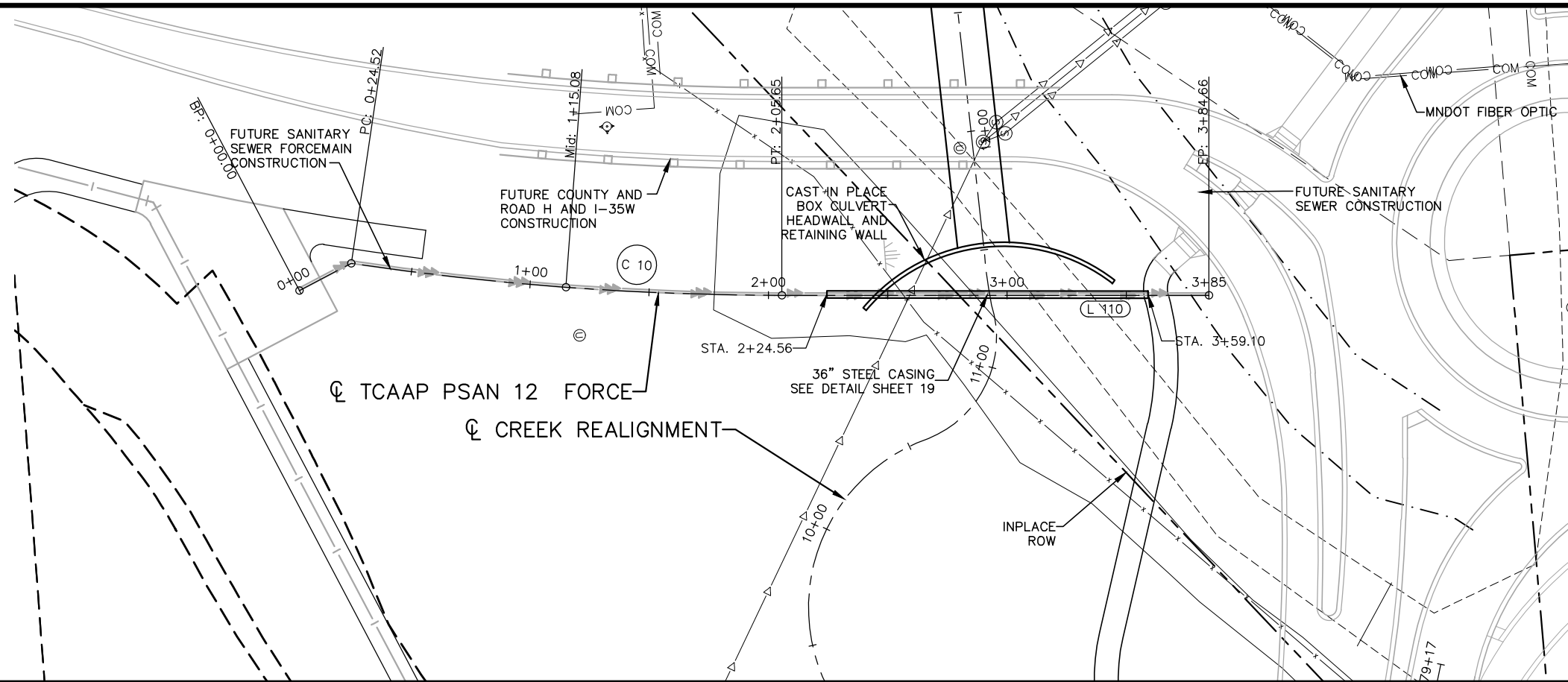
I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

*Thomas J. Lincoln*  
 THOMAS J. LINCOLN  
 DATE: 07/24/15 MN LIC. NO. 21433

**RAMSEY COUNTY**  
 TCAAAP  
 BID PACKAGE #1  
 RICE CREEK REMEANDER CONSTRUCTION  
 12" WATERMAIN  
 UTILITY CASING PLAN AND PROFILE  
 STA. 72+00 TO STA. 77+27

CITY PROJECT	SHEET NO.
COUNTY PROJECT	17
S.A.P. 062-593-004	
S.A.P.	63

K:\TWC\_Civil\County\RAMSEY\TCAAP\_Spine Rd BP2\CAD\Plan Sheets\Construction Plans\BP1\TCAAP\_SPINERD BP1\_UTIL.dwg Layout02 August 20, 2015 - 11:24am



No.	Date	Revisions	App.

DRAWING NAME	TCAAP_SPINERD BP1_UTIL.dwg
DESIGNED BY:	RJG
DRAWN BY:	XXX
CHECKED BY:	#####
DATE:	07/24/15
PROJECT NO.	16055300X

**Kimley»Horn**

2550 UNIVERSITY AVENUE WEST, SUITE 238N, ST. PAUL, MN 55114  
 PHONE: 651-645-4197  
 WWW.KIMLEY-HORN.COM

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*Thomas J. Lincoln*  
 THOMAS J. LINCOLN  
 DATE: 07/24/15 MN LIC. NO. 21433

**RAMSEY COUNTY**

TCAAP  
 BID PACKAGE #1  
 RICE CREEK REMEANDER CONSTRUCTION  
 SANITARY SEWER FORCEMAIN  
 UTILITY CASING PLAN AND PROFILE  
 STA. 0+00 TO STA. 3+63

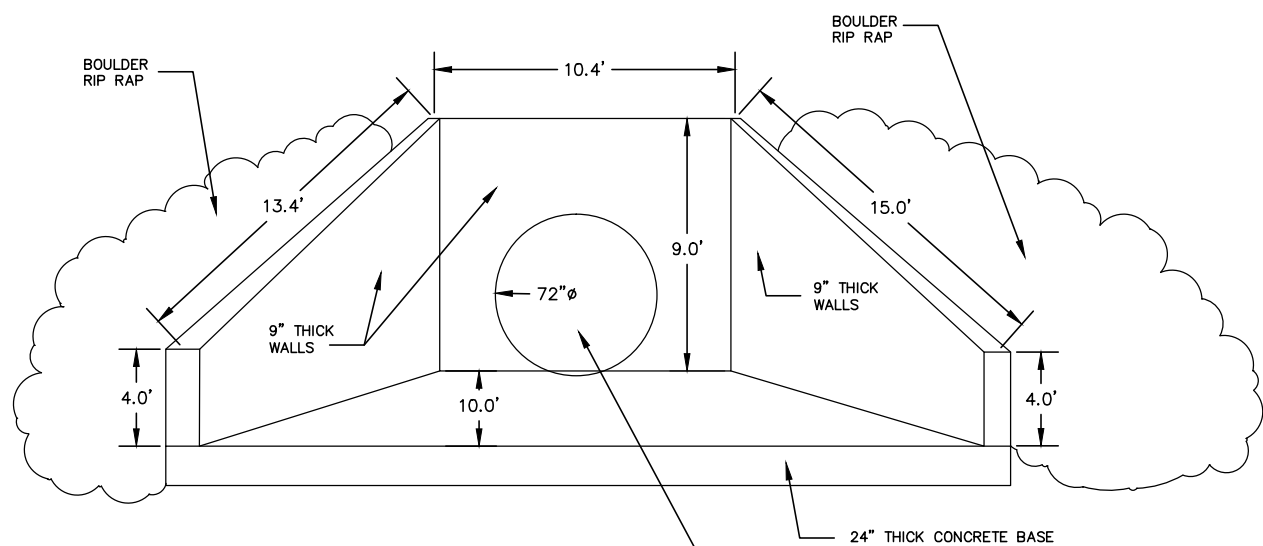
CITY PROJECT		SHEET NO.	18
COUNTY PROJECT			
S.A.P.	062-593-004		
S.A.P.			63

ALIGNMENT DATA  
SPINE RD WATERMAIN

SEGMENT NUMBER	BEGINNING STATION	ENDING STATION	PI STATION	NOTES	DELTA	DEGREE	RADIUS (FT)	TANGENT (FT)	LENGTH (FT)	BEGINNING COORDINATES NORTHING	BEGINNING COORDINATES EASTING	ENDING COORDINATES NORTHING	ENDING COORDINATES EASTING	AZIMUTH
L 100	272+31.87	274+64.76							232.89	210525.77	551501.68	210739.29	551408.68	336°27'43"
L 101	274+64.76	277+07.64							242.88	210739.29	551408.68	210888.97	551217.41	308°02'47"
L 102	277+07.64	279+60.67							253.03	210888.97	551217.41	210981.35	550981.84	291°24'47"

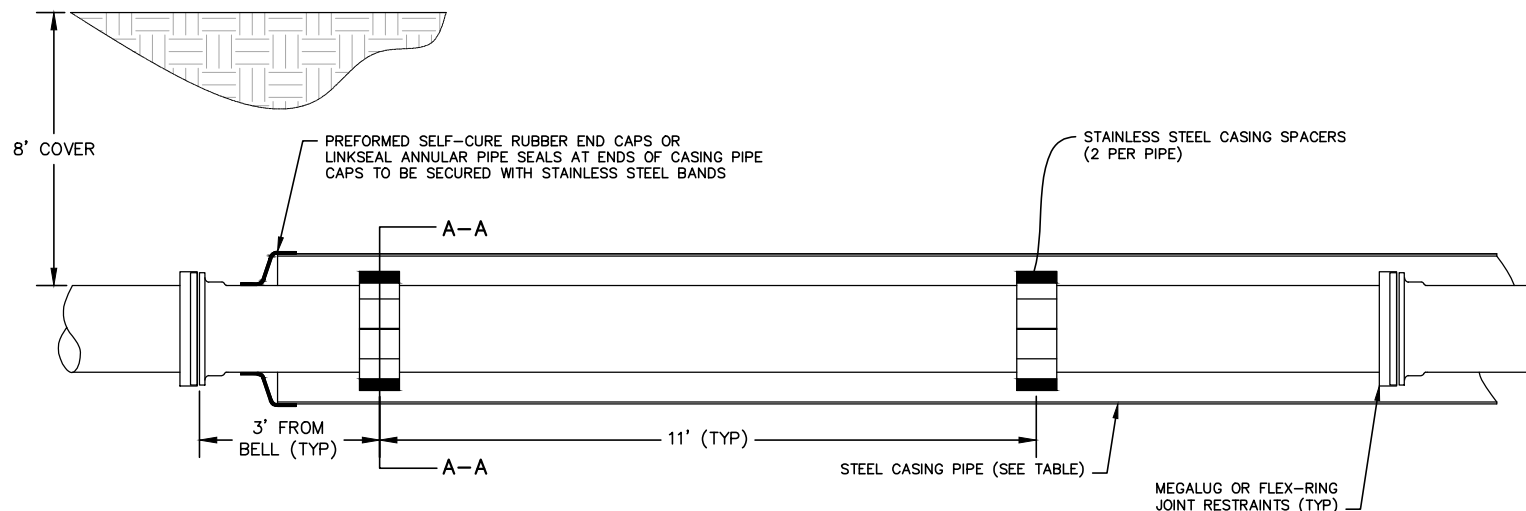
ALIGNMENT DATA  
TCAAP PSAN 12 FORCE

SEGMENT NUMBER	BEGINNING STATION	ENDING STATION	PI STATION	NOTES	DELTA	DEGREE	RADIUS (FT)	TANGENT (FT)	LENGTH (FT)	BEGINNING COORDINATES NORTHING	BEGINNING COORDINATES EASTING	ENDING COORDINATES NORTHING	ENDING COORDINATES EASTING	AZIMUTH
C 10	0+24.52	2+05.65	1+15.25		8°29'35"	4°41'19.28"	1222.00	90.74	181.14	210480.65	550743.09	210659.66	550769.72	12°42'39" 4°13'04"
L 110	2+05.65	3+84.66							179.00	210659.66	550769.72	210838.17	550782.89	4°13'09"



- NOTES:  
1. ASSUME REINFORCEMENT IN STRUCTURE.
1. APPROX. 30 L.F. - 72" RCP PIPE IN PLACE.  
2. UPSTREAM END BULKHEAD WITH SEWER BLOCK.

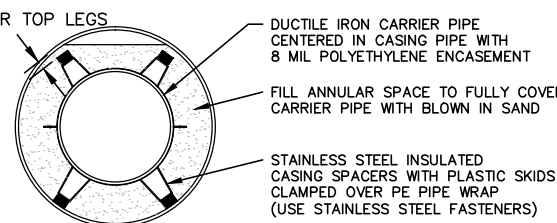
72" OUTLET STRUCTURE DEMOLITION



UTILITY CROSSING PROFILE

SIZE OF CARRIER	MJ BELL O.D.	MIN. CASING SIZE	MIN. CASING WALL THICKNESS
6	11.12	18	0.250
8	13.37	20	0.281
12	17.88	24	0.312
16	22.50	30	0.406
20	27.00	36	0.469
24	31.50	42	0.500

- NOTES:  
1. CASING PIPE SHALL BE ASTM 252 WELDED STEEL (MIN. 35,000 PSI YIELD STRENGTH) COATED WITH BITUMINOUS ASPHALT COATING ACCORDING TO AWWA C104.  
2. CASING SPACER SHALL BE STAINLESS STEEL EQUAL TO CASCADE WATERWORKS, ADVANCED PRODUCTS OR APPROVED EQUAL.  
3. SPACERS SHALL BE DESIGNED FOR ALL POTENTIAL STATIC AND DYNAMIC LOADS ASSOCIATED WITH THE INSTALLATION, CARRIER PIPE OPERATION AND REMOVAL.  
4. JACKED CASINGS SHALL NOT EXCEED 175 FEET IN LENGTH WITHOUT CITY APPROVAL.  
5. REFER TO PLANS FOR LENGTH OF CASING PIPE, BUT SHOULD EXTEND AT LEAST 15 FT. BEYOND THE CENTERLINE OF RAILROAD TRACKS AND AT LEAST 8 FT. BEYOND THE BACK OF ANY STREET CURB.  
6. ADDITIONAL CONDITIONS FOR UTILITY CROSSINGS MAY BE REQUIRED BY THE OWNER OF THE FACILITY BEING CROSSED.  
7. JOINT RESTRAINT MUST EXTEND AT LEAST 10 FEET BEYOND THE END OF THE CASING PIPE.



SECTION A-A

STANDARD CASING PIPE

No.	Date	Revisions	App.

DRAWING NAME	TCAAP_SPINERD_BP1_UTIL.dwg
DESIGNED BY:	RJG
DRAWN BY:	XXX
CHECKED BY:	#####
DATE:	07/24/15
PROJECT NO.	16055300X

**Kimley»Horn**

2550 UNIVERSITY AVENUE WEST, SUITE 238N, ST. PAUL, MN 55114  
PHONE: 651-645-4197  
WWW.KIMLEY-HORN.COM

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*Thomas J. Lincoln*  
THOMAS J. LINCOLN  
DATE: 07/24/15 MN LIC. NO. 21433

**RAMSEY COUNTY**

TCAAP  
BID PACKAGE #1  
RICE CREEK REMEANDER CONSTRUCTION

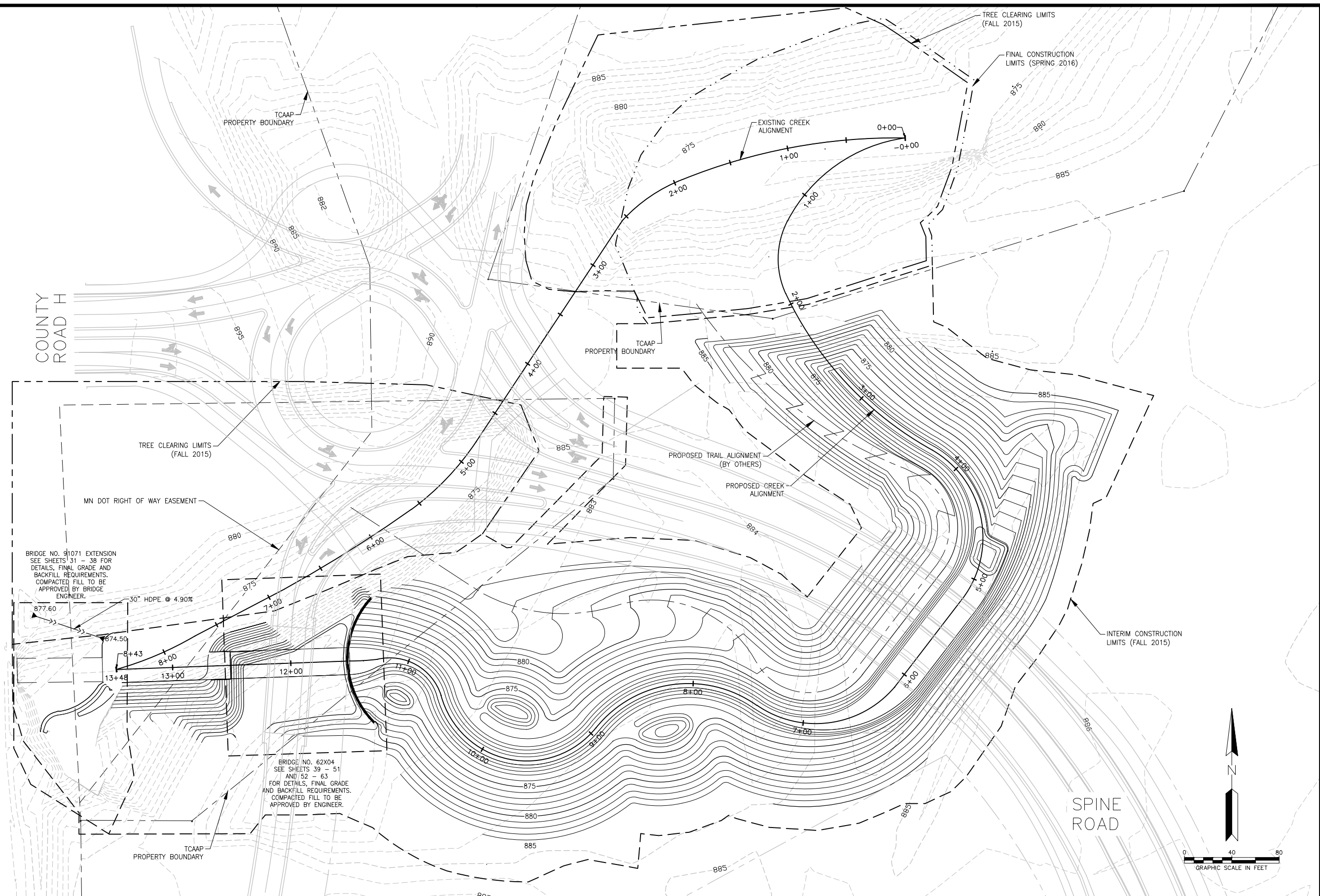
UTILITY CASING AND  
ALIGNMENT TABULATION

CITY PROJECT	
COUNTY PROJECT	
S.A.P.	062-593-004
S.A.P.	

SHEET NO.  
19  
63

K:\TWC\_Civil\County\RAMSEY\TCAAP\_Spine Rd BP2\CAD\Plan Sheets\Construction Plans\BP1\TCAAP\_SPINERD\_BP1\_UTIL.dwg August 20, 2015 11:25am

M:\1382\01\CAD\CIV\20 - INTRM RMNDR GRDNG.dwg August 20, 2015 - 11:43am



BRIDGE NO. 91071 EXTENSION  
SEE SHEETS 31 - 38 FOR  
DETAILS, FINAL GRADE AND  
BACKFILL REQUIREMENTS.  
COMPACTED FILL TO BE  
APPROVED BY BRIDGE  
ENGINEER.

30" HDPE @ 4.90%

BRIDGE NO. 62X04  
SEE SHEETS 39 - 51  
AND 52 - 63  
FOR DETAILS, FINAL GRADE  
AND BACKFILL REQUIREMENTS.  
COMPACTED FILL TO BE  
APPROVED BY ENGINEER.

No.	Date	Revisions	App.

DRAWING NAME 20 - INTRM RMNDR GRDNG.dwg	
DESIGNED BY:	EAM
DRAWN BY:	LNJ
CHECKED BY:	MJS
DATE:	07/14/2015
PROJECT NO.	160553004



**WENCK ASSOCIATES**

Responsive partner. Exceptional outcomes.


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MAPLE PLAIN, MN 55359

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*Ed Matthesen*

ED MATTHIESEN  
DATE: 7/24/15 MN LIC. NO. 16800

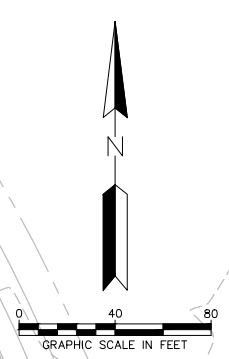
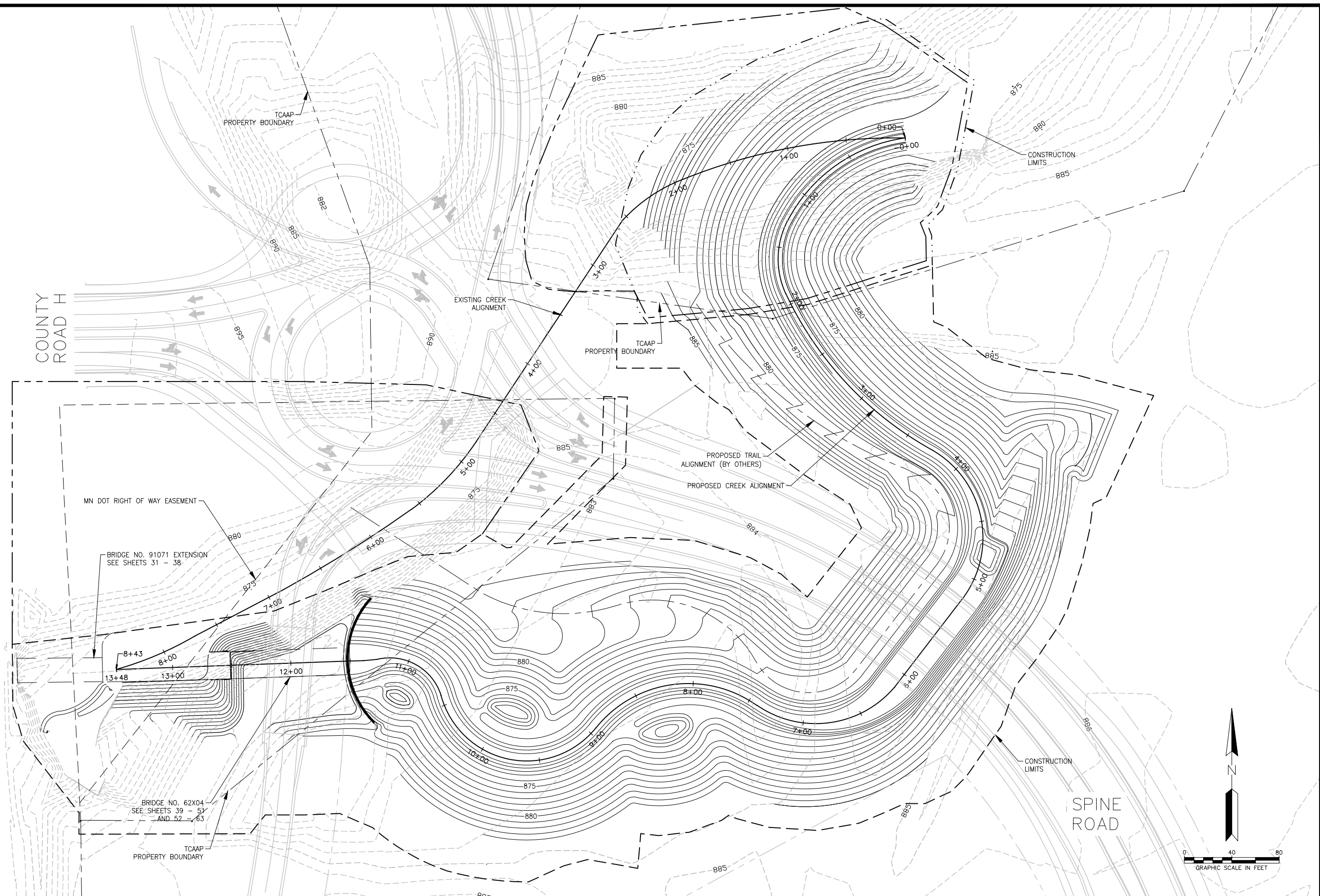


**RAMSEY COUNTY**

TCAAP  
BID PACKAGE #1  
RICE CREEK REMEANDER CONSTRUCTION  
INTERIM REMEANDER  
GRADING PLAN

CITY PROJECT	SHEET NO. 20
COUNTY PROJECT	
S.A.P. 062-593-004	63
S.A.P.	

M:\1382\01\CAD\CIV\21 - FINAL RMNDR GRDNG.dwg August 20, 2015 - 11:48am



No.	Date	Revisions	App.

<b>DRAWING NAME</b>	21 - FINAL RMNDR GRDNG.dwg
<b>DESIGNED BY:</b>	EAM
<b>DRAWN BY:</b>	LNJ
<b>CHECKED BY:</b>	MJS
<b>DATE:</b>	07/14/2015
<b>PROJECT NO.</b>	160553004




**Responsive partner. Exceptional outcomes.**

1800 PIONEER CREEK CENTER  
MAPLE PLAIN, MN 55359

PHONE: 763-479-4200  
FAX: 763-479-4242

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.

*Ed Matthesen*  
ED MATTHESEN  
DATE: 7/24/15 MN LIC. NO. 16800

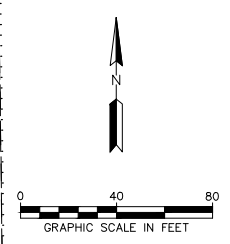
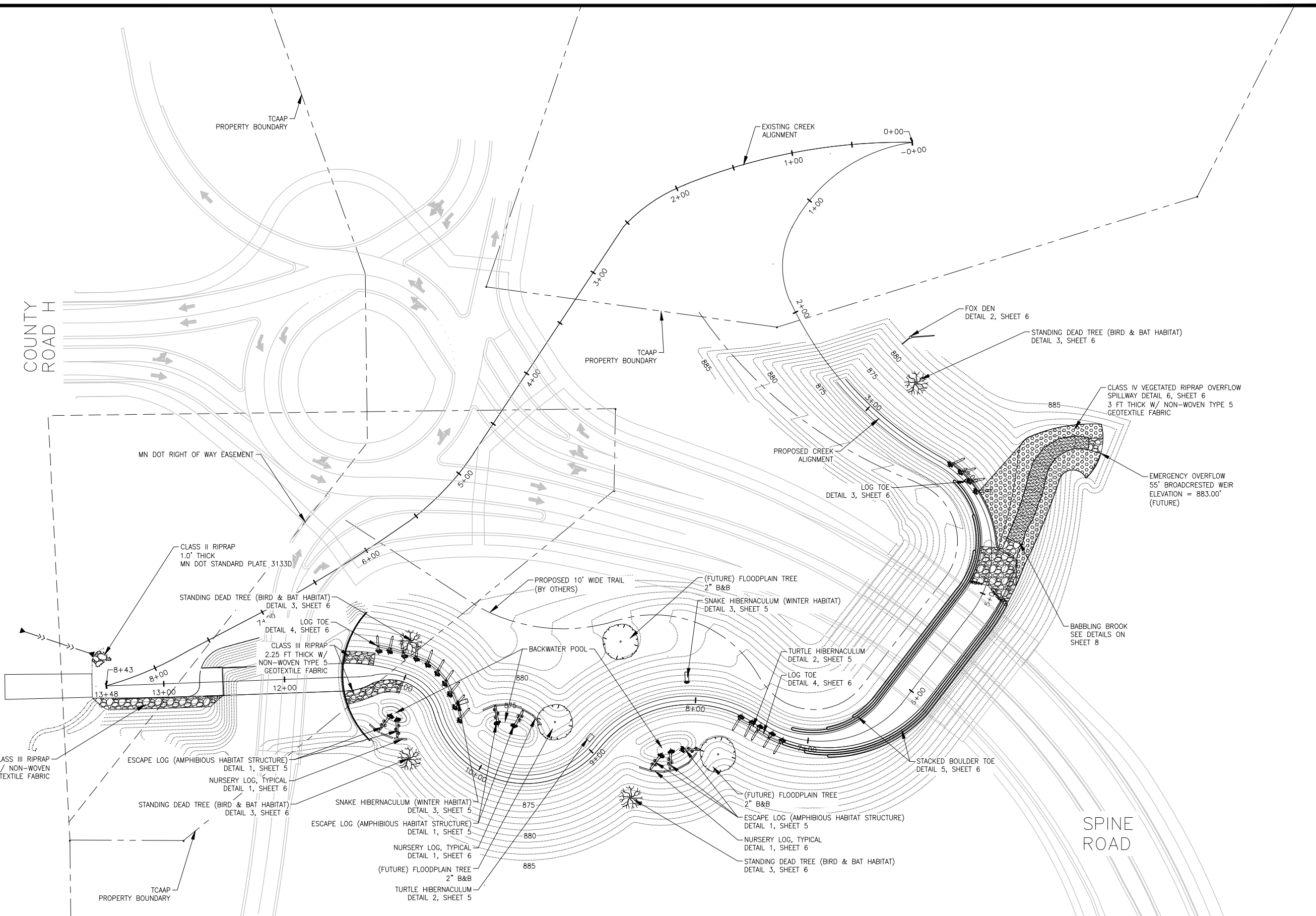


**TCAAP  
BID PACKAGE #1  
RICE CREEK REMEANDER CONSTRUCTION  
FINAL REMEANDER  
GRADING PLAN**

CITY PROJECT	
COUNTY PROJECT	
S.A.P.	062-593-004
S.A.P.	

SHEET NO.  
21  
63

M:\1382\01\CAD\CIV\22 - INTRM CRK RMDR STBZN PLAN.dwg August 20, 2015 - 11:51am



No.	Date	Revisions

App. 22	<b>DRAWING NAME</b> INTRM CRK RMDR STBZN PLAN.dwg
	DESIGNED BY: EAM
	DRAWN BY: LNJ
	CHECKED BY: MJS
	DATE: 07/14/2015
	PROJECT NO. 160553004

**WENCK ASSOCIATES**  
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MAPLE PLAIN, MN 55359  
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FAX: 763-479-4242

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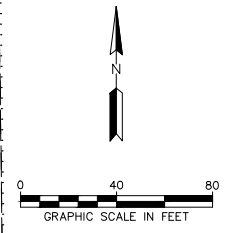
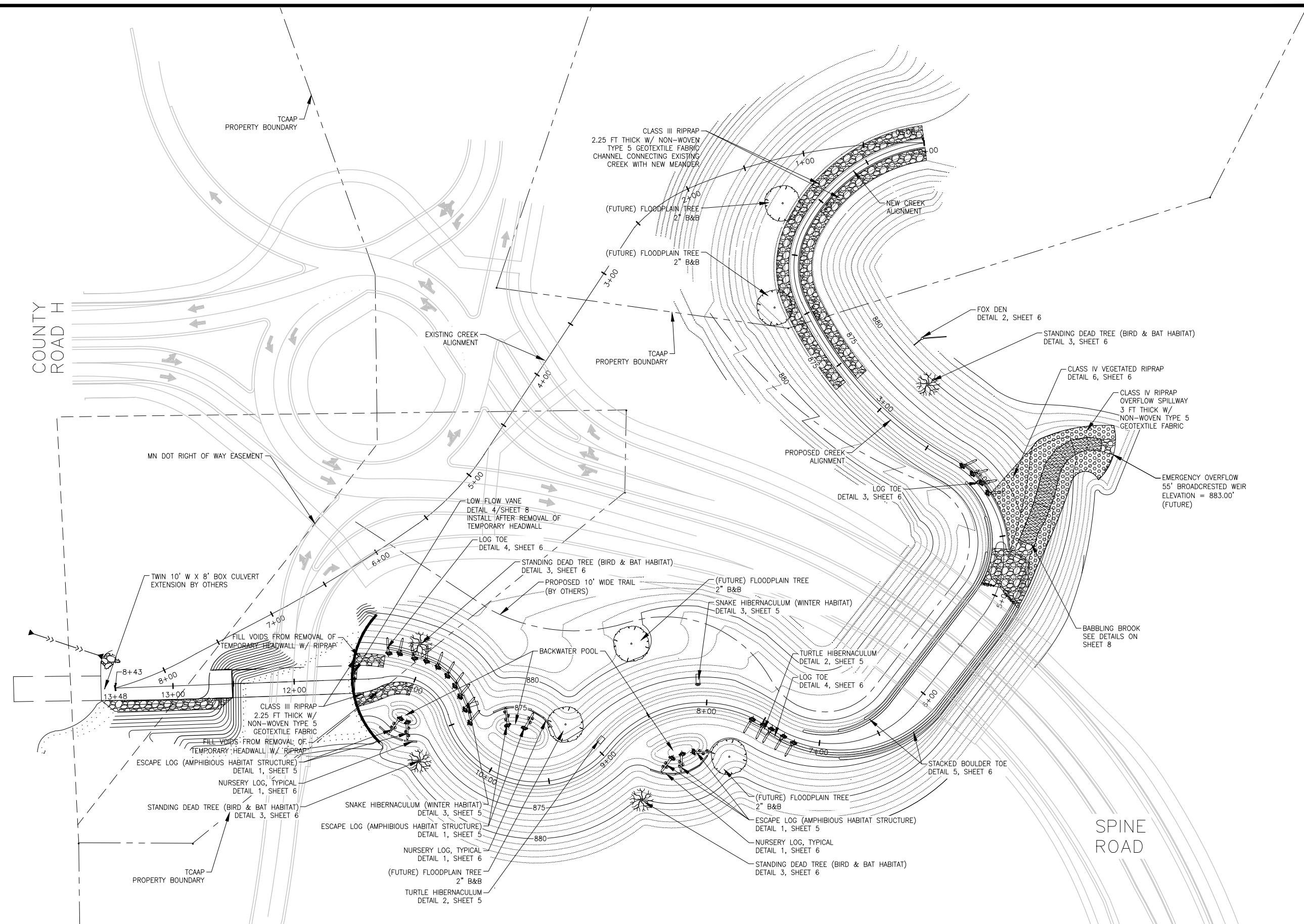
*Ed Matthesen*  
ED MATTHIESEN  
DATE: 7/24/15 MN LIC. NO. 16800

**RAMSEY COUNTY**  
TCAAP  
BID PACKAGE #1  
RICE CREEK REMEANDER CONSTRUCTION  
INTERIM STABILIZATION PLAN

CITY PROJECT	
COUNTY PROJECT	
S.A.P.	062-593-004
S.A.P.	

SHEET NO.	22
	63

M:\1382\01\CAD\CIV\23 - FNL CRK RMDR STBZN PLAN.dwg August 20, 2015 - 11:53am



No.	Date	Revisions

App.	DRAWING NAME
23	- FNL CRK RMDR STBZN PLAN.dwg
	DESIGNED BY: EAM
	DRAWN BY: LNJ
	CHECKED BY: MJS
	DATE: 07/14/2015
	PROJECT NO. 160553004

**WENCK ASSOCIATES**  
 Responsive partner. Exceptional outcomes.  
 1800 PIONEER CREEK CENTER  
 MAPLE PLAIN, MN 55359  
 PHONE: 763-479-4200  
 FAX: 763-479-4242

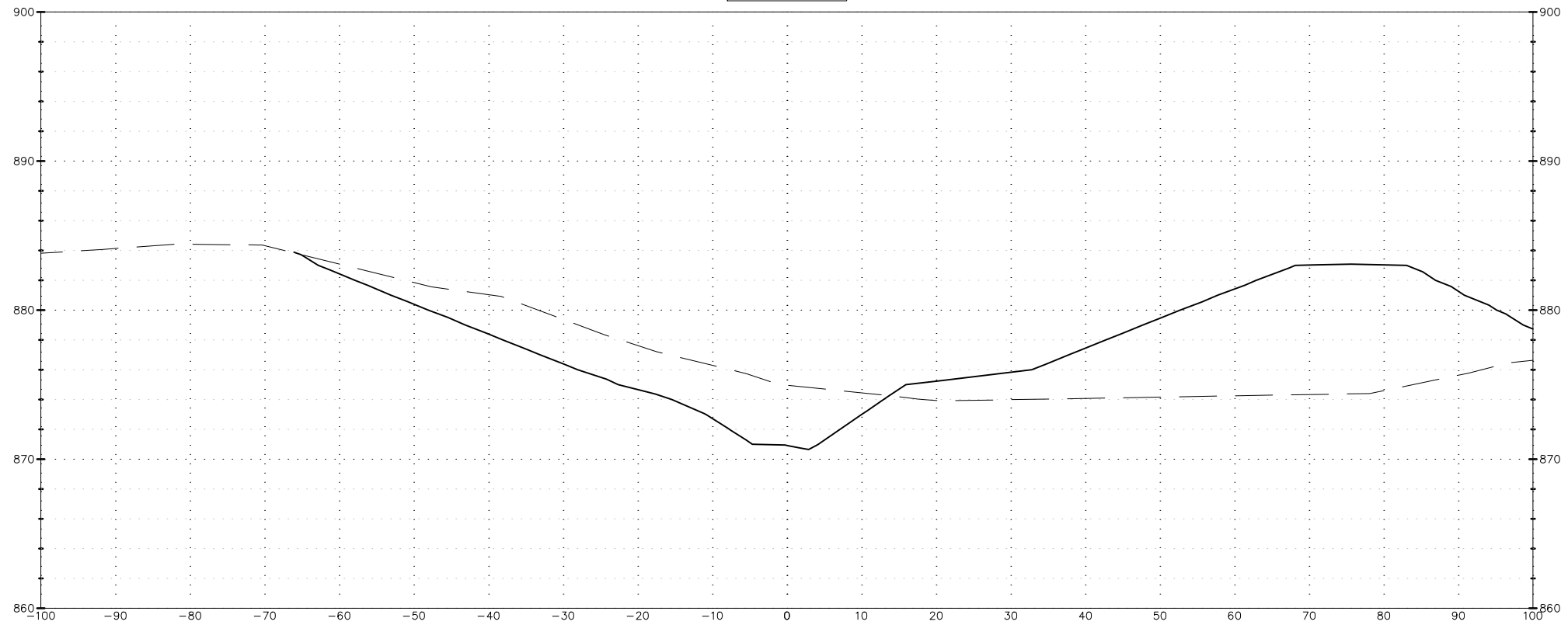
I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.  
 ED MATTHIESEN  
 DATE: 7/24/15 MN LIC. NO. 16800

**RAMSEY COUNTY**  
 TCAAP  
 BID PACKAGE #1  
 RICE CREEK REMEANDER CONSTRUCTION  
 FINAL STABILIZATION PLAN

CITY PROJECT	
COUNTY PROJECT	
S.A.P.	062-593-004
S.A.P.	

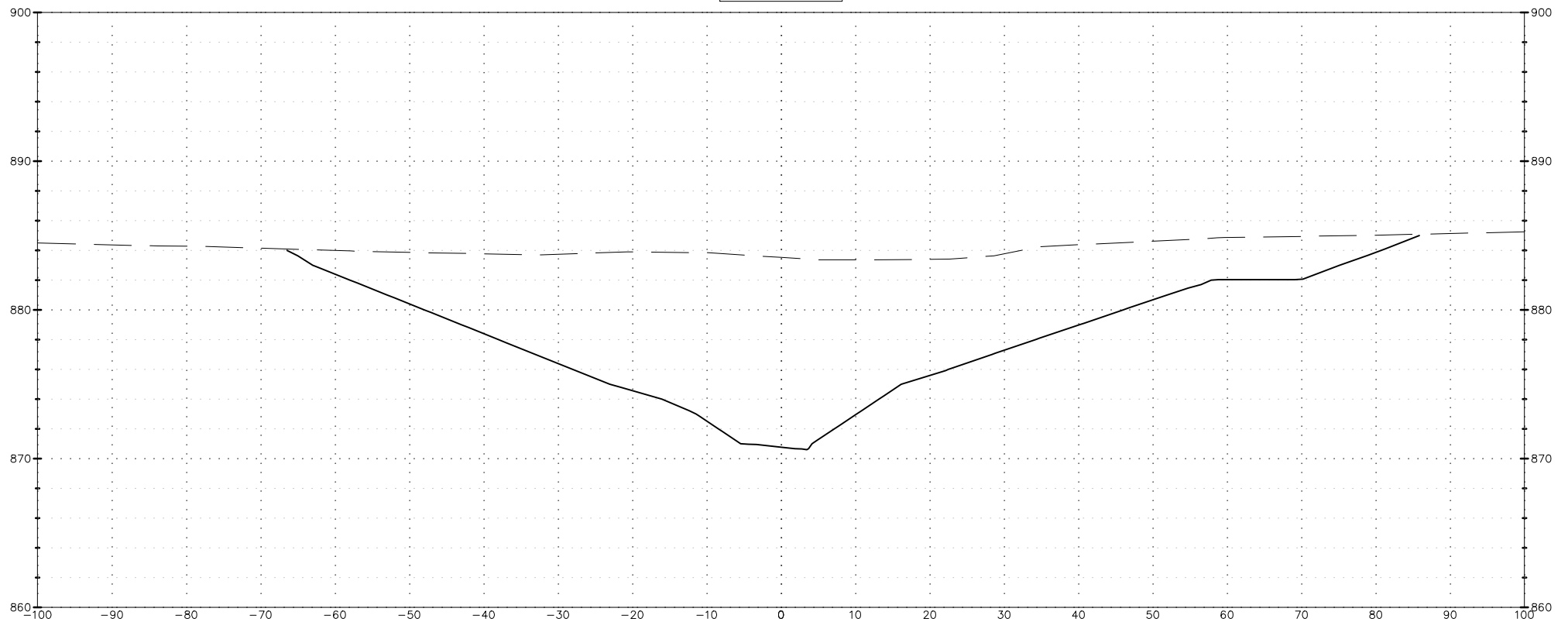
SHEET NO.  
 23  
 63

1+00.00



LEGEND  
 - - - - - EXISTING GROUND PROFILE  
 \_\_\_\_\_ PROPOSED GROUND PROFILE  
 - - - - - GROUNDWATER PROFILE (JUNE 2014)

2+00.00



M:\1382\01\CAD\CIV\24-30 - CROSS SECTIONS.dwg July 14, 2015 - 12:32pm

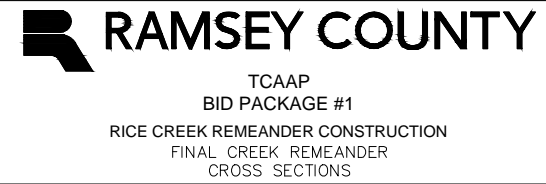
No.	Date	Revisions	App.

DRAWING NAME	24-30 - CROSS SECTIONS.dwg
DESIGNED BY:	EAM
DRAWN BY:	LNJ
CHECKED BY:	MJS
DATE:	07/14/2015
PROJECT NO.	160553004



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*Ed Mathiesen*  
 ED MATHIESEN  
 DATE: 7/14/15 MN LIC. NO. 16800

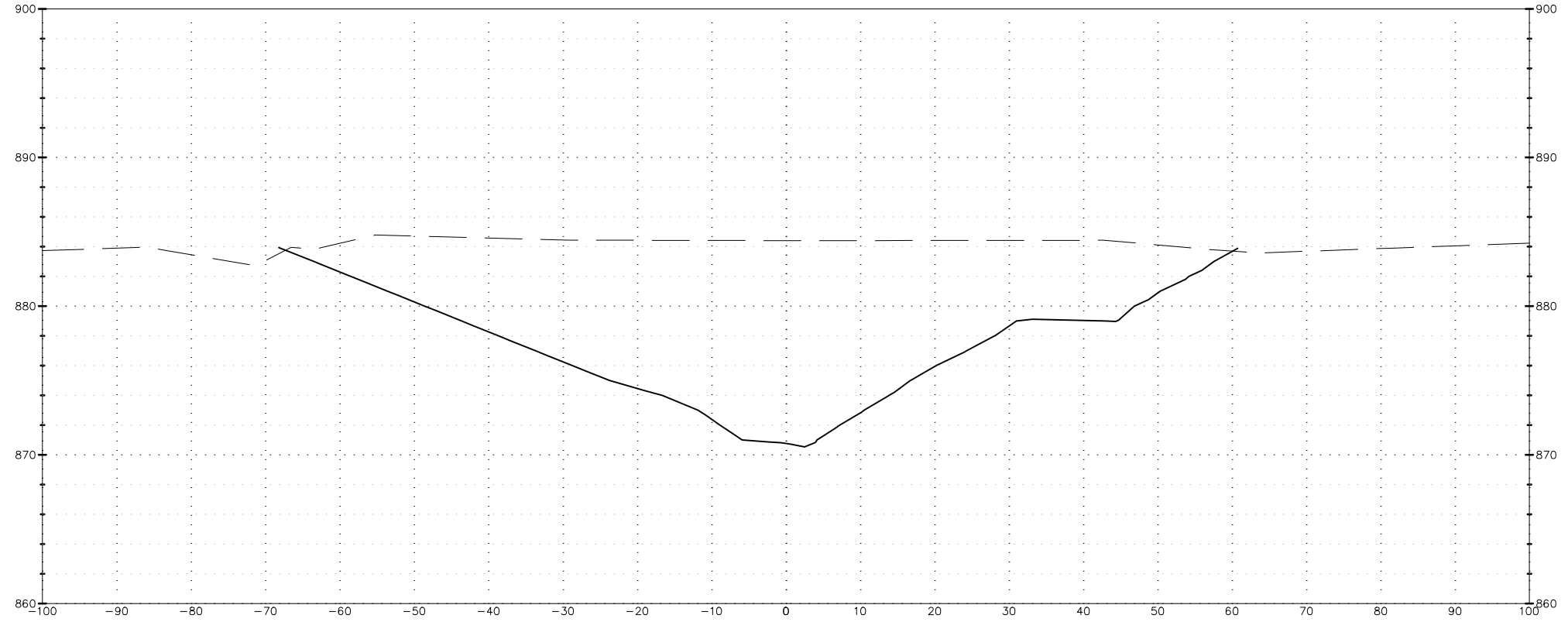


CITY PROJECT	
COUNTY PROJECT	
S.A.P.	062-593-004
S.A.P.	

SHEET NO.  
 24  
 30

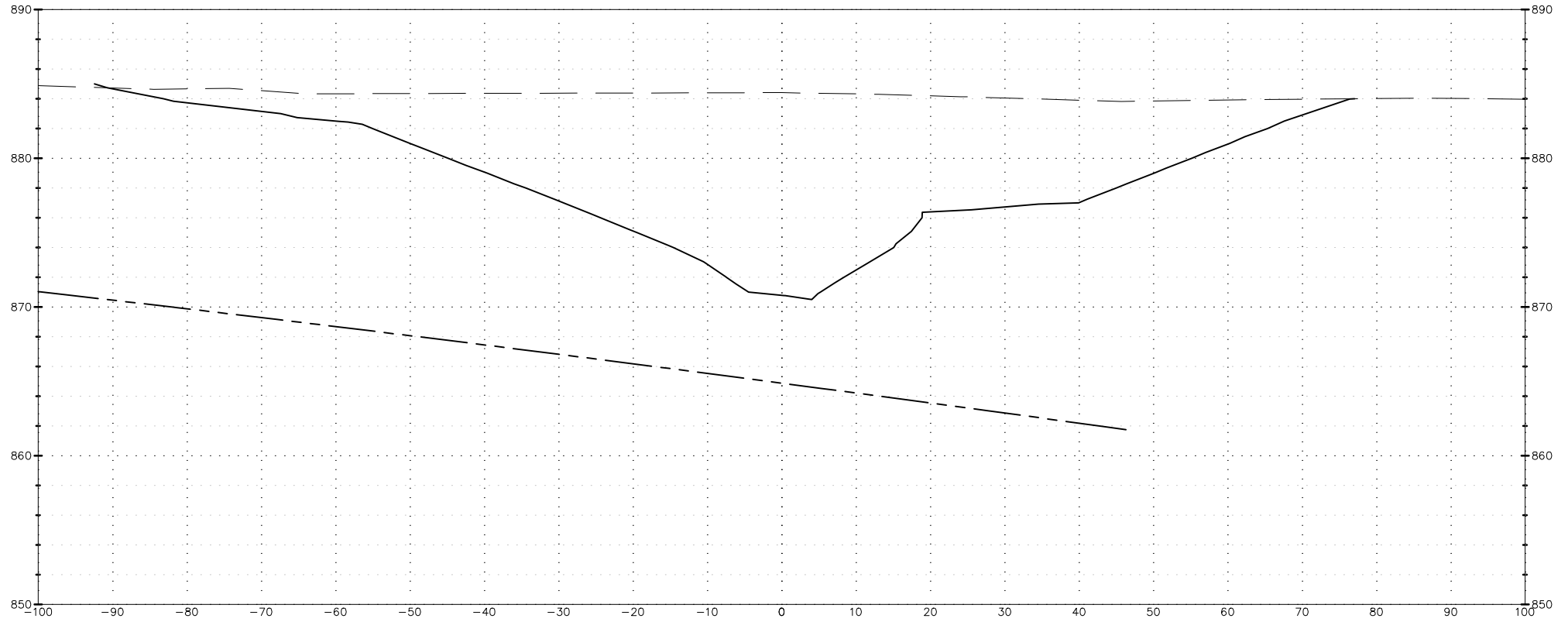


3+00.00



LEGEND  
 - - - - - EXISTING GROUND PROFILE  
 \_\_\_\_\_ PROPOSED GROUND PROFILE  
 . . . . . GROUNDWATER PROFILE (JUNE 2014)

4+00.00



M:\1382\01\CAD\CIV\24-30 - CROSS SECTIONS.dwg July 14, 2015 - 12:31pm

No.	Date	Revisions	App.


DRAWING NAME	24-30 - CROSS SECTIONS.dwg
DESIGNED BY:	EAM
DRAWN BY:	LNJ
CHECKED BY:	MJS
DATE:	07/14/2015
PROJECT NO.	160553004



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*Ed Mathiesen*  
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 DATE: 7/14/15 MN LIC. NO. 16800

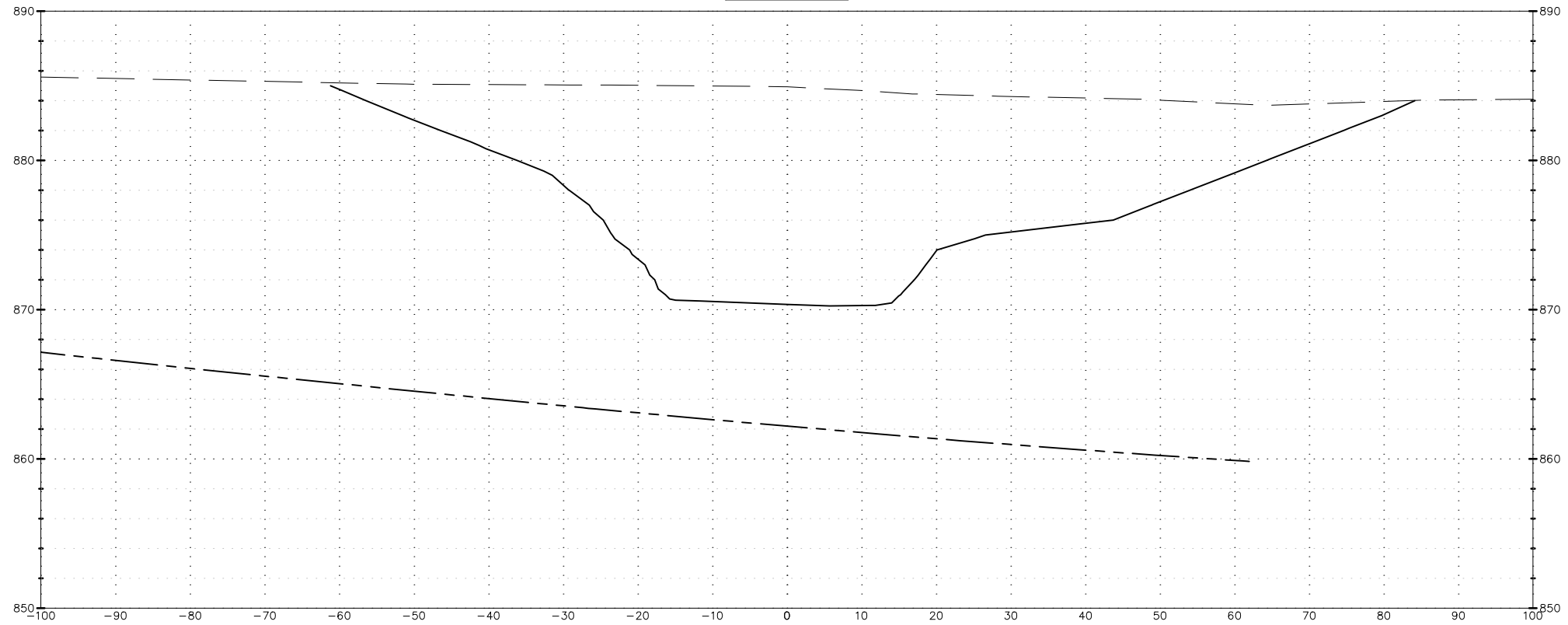


**RAMSEY COUNTY**  
 TCAAP  
 BID PACKAGE #1  
 RICE CREEK REMEANDER CONSTRUCTION  
 FINAL CREEK REMEANDER  
 CROSS SECTIONS

CITY PROJECT	
COUNTY PROJECT	
S.A.P.	062-593-004
S.A.P.	

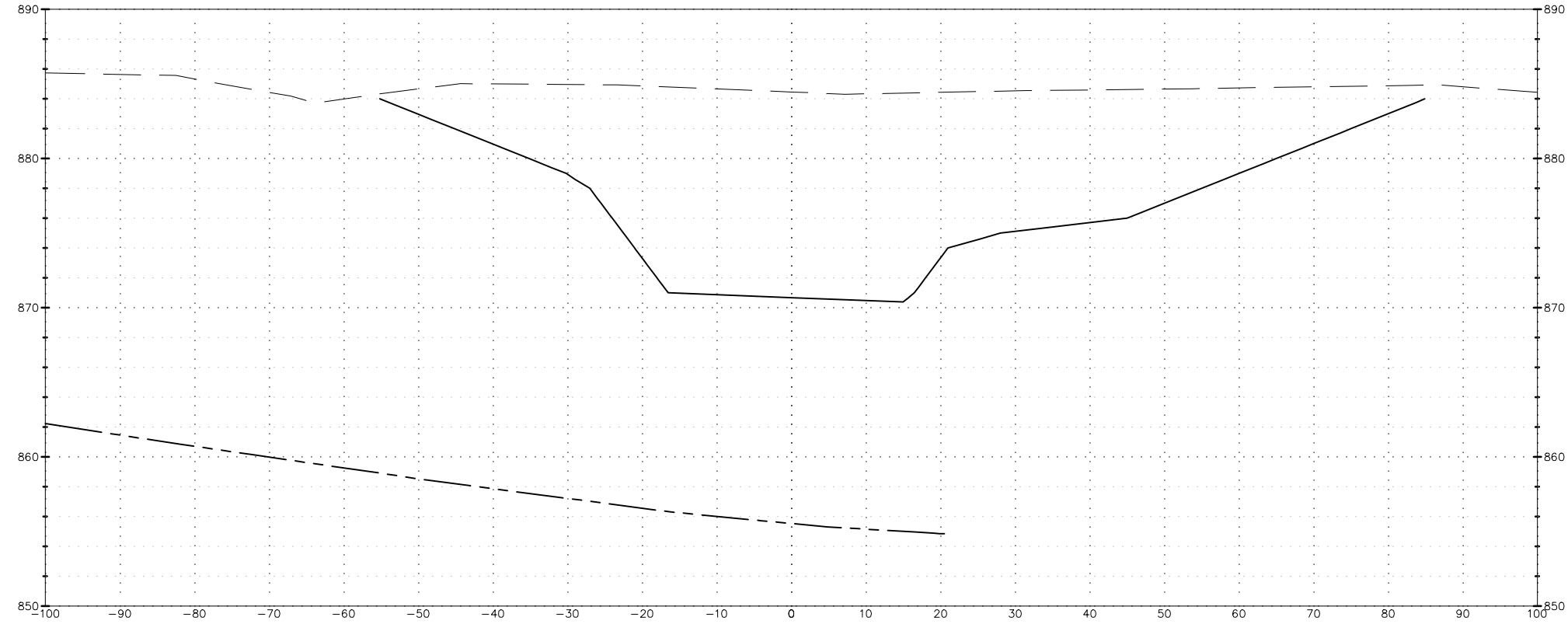
SHEET NO.  
 25  
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5+00.00



LEGEND  
 - - - - - EXISTING GROUND PROFILE  
 \_\_\_\_\_ PROPOSED GROUND PROFILE  
 - - - - - GROUNDWATER PROFILE (JUNE 2014)

6+00.00



M:\1382\01\CAD\CIV\24-30 - CROSS SECTIONS.dwg July 14, 2015 - 12:31pm

No.	Date	Revisions	App.


DRAWING NAME	24-30 - CROSS SECTIONS.dwg
DESIGNED BY:	EAM
DRAWN BY:	LNJ
CHECKED BY:	MJS
DATE:	07/14/2015
PROJECT NO.	160553004



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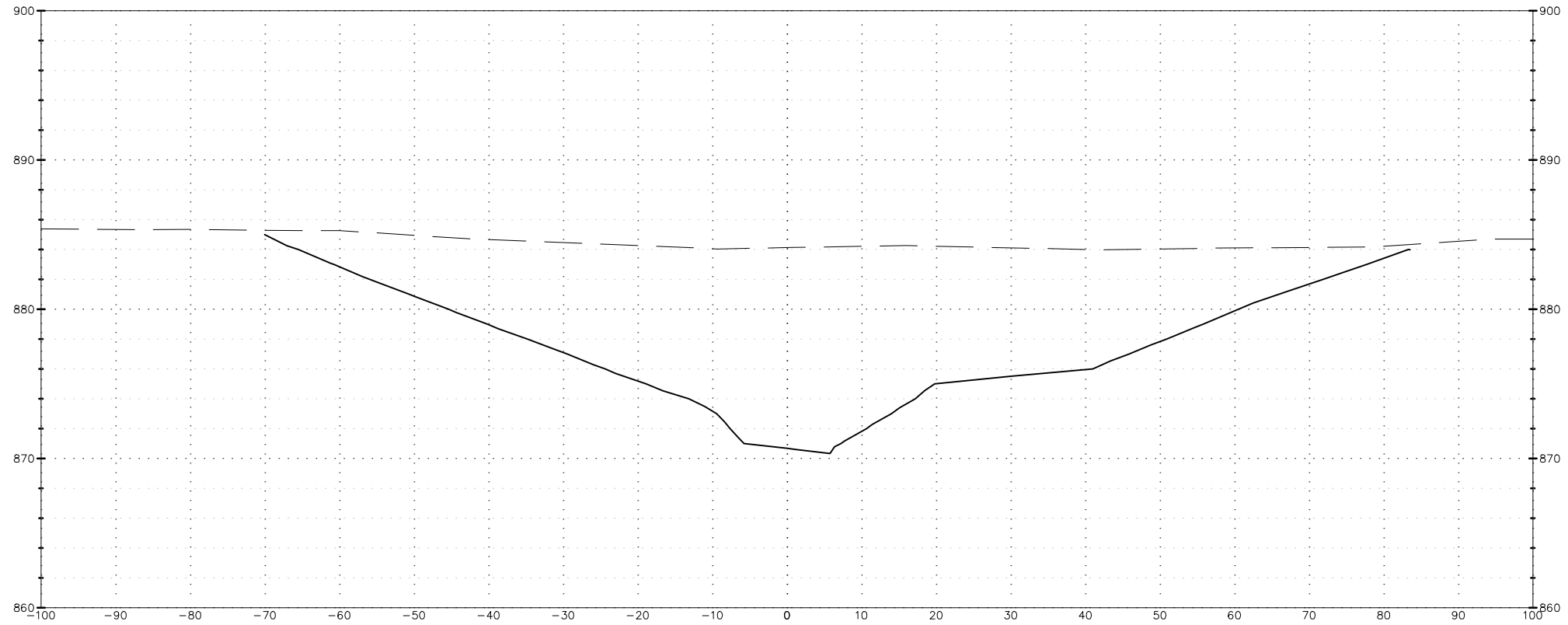


**RAMSEY COUNTY**  
 TCAAP  
 BID PACKAGE #1  
 RICE CREEK REMEANDER CONSTRUCTION  
 FINAL CREEK REMEANDER  
 CROSS SECTIONS

CITY PROJECT	
COUNTY PROJECT	
S.A.P.	062-593-004
S.A.P.	

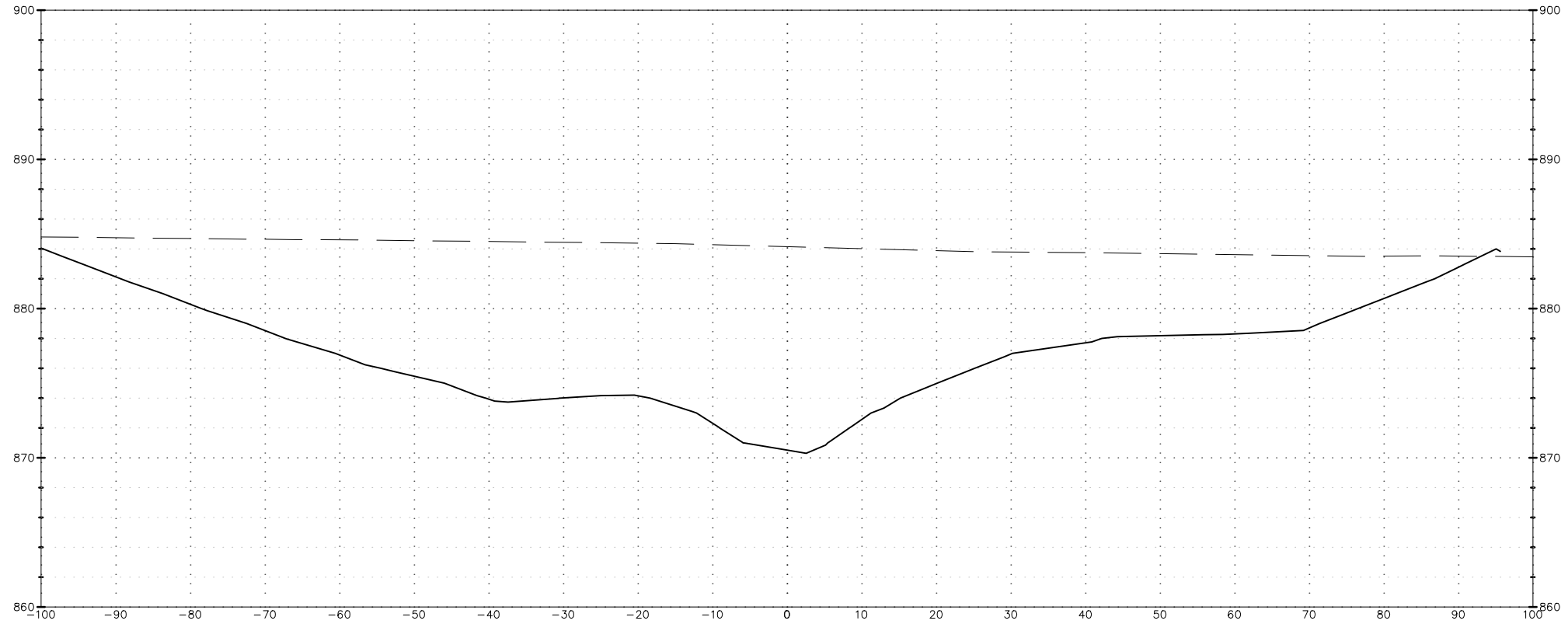
SHEET NO.  
 26  
 30

7+00.00



LEGEND  
 - - - - - EXISTING GROUND PROFILE  
 \_\_\_\_\_ PROPOSED GROUND PROFILE  
 . . . . . GROUNDWATER PROFILE (JUNE 2014)

8+00.00



M:\1382\01\CAD\CIV\24-30 - CROSS SECTIONS.dwg July 14, 2015 - 12:30pm

No.	Date	Revisions	App.


DRAWING NAME 24-30 - CROSS SECTIONS.dwg	
DESIGNED BY:	EAM
DRAWN BY:	LNJ
CHECKED BY:	MJS
DATE:	07/14/2015
PROJECT NO.	160553004



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*Ed Mathiesen*  
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 DATE: 7/14/15 MN LIC. NO. 16800

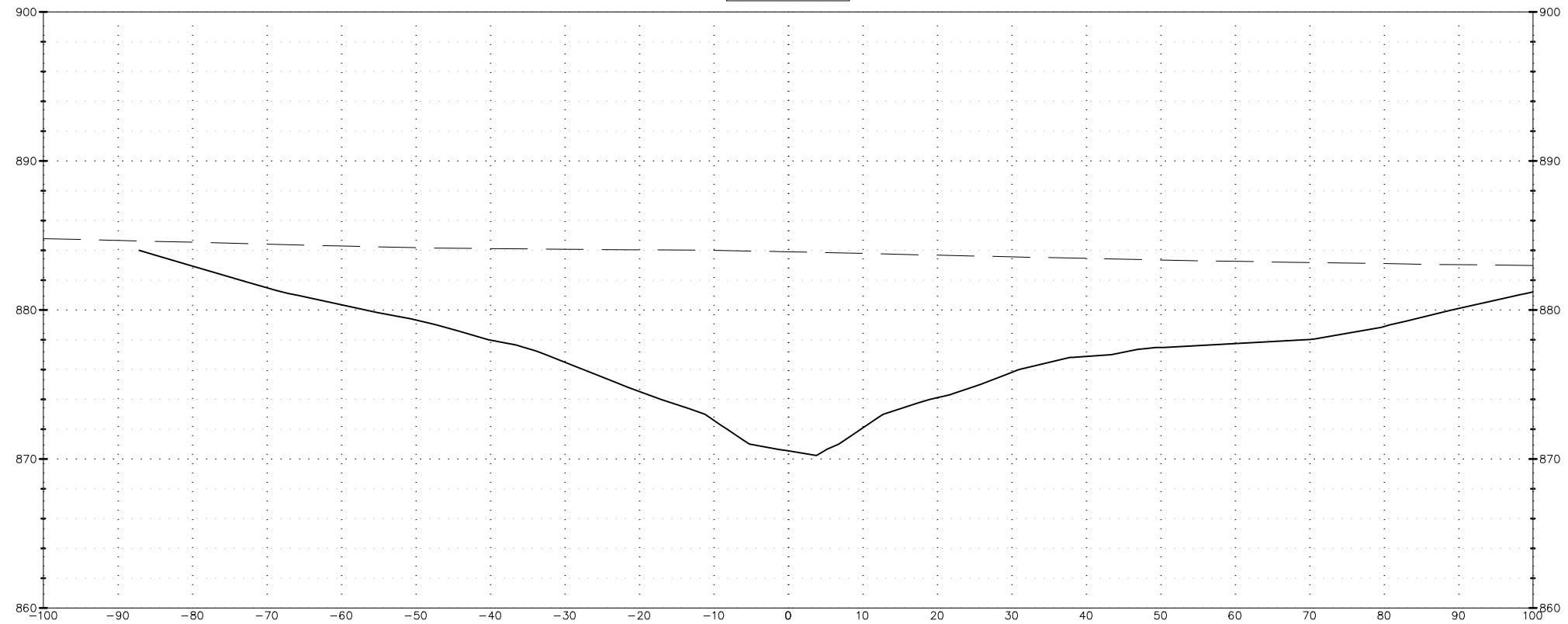


**RAMSEY COUNTY**  
 TCAAP  
 BID PACKAGE #1  
 RICE CREEK REMEANDER CONSTRUCTION  
 FINAL CREEK REMEANDER  
 CROSS SECTIONS

CITY PROJECT	SHEET NO. 27
COUNTY PROJECT	
S.A.P. 062-593-004	
S.A.P.	

30

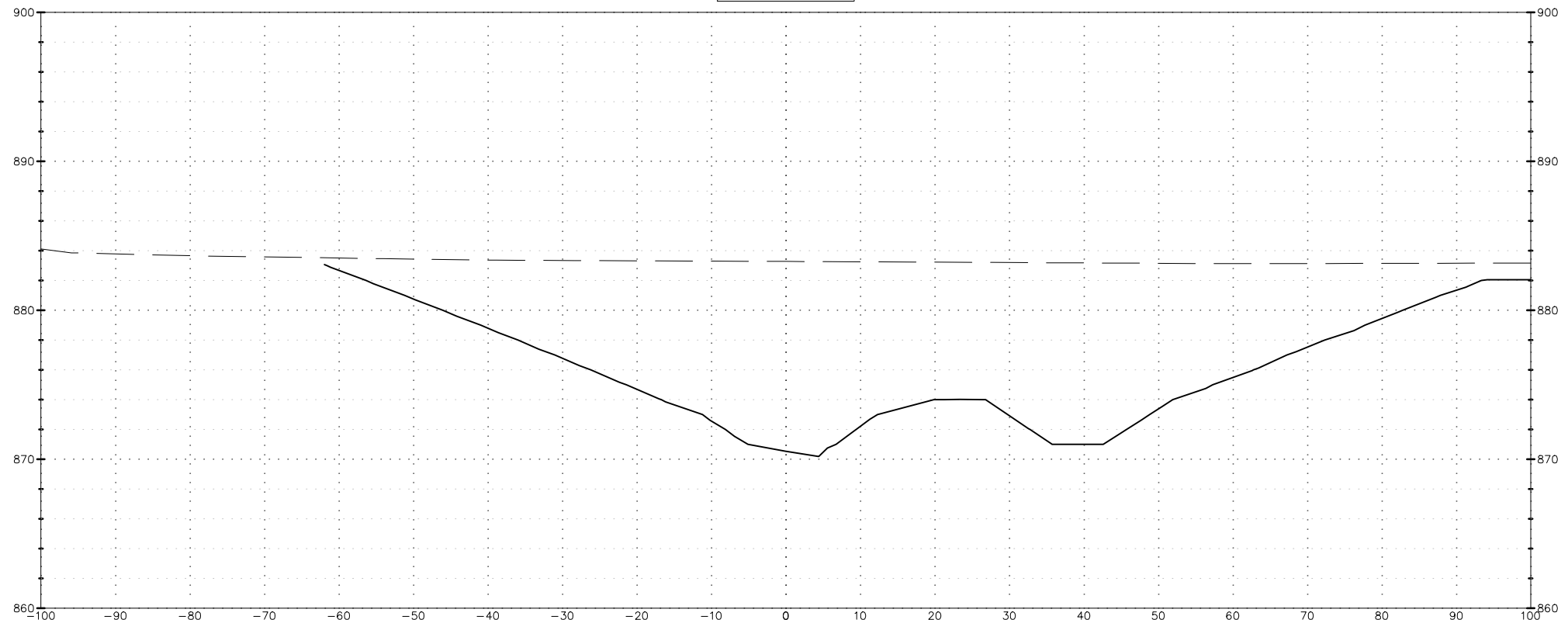
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LEGEND

- - - - - EXISTING GROUND PROFILE
- PROPOSED GROUND PROFILE
- ..... GROUNDWATER PROFILE (JUNE 2014)

10+00.00



M:\1382\01\CAD\CIV\24-30 - CROSS SECTIONS.dwg July 14, 2015 - 12:30pm

No.	Date	Revisions	App.

DRAWING NAME	
24-30 - CROSS SECTIONS.dwg	
DESIGNED BY:	EAM
DRAWN BY:	LNJ
CHECKED BY:	MJS
DATE:	07/14/2015
PROJECT NO.	160553004



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*Ed Matthesen*

ED MATTHIESEN

DATE: 7/14/15 MN LIC. NO. 16800



**RAMSEY COUNTY**

TCAAP  
 BID PACKAGE #1  
 RICE CREEK REMEANDER CONSTRUCTION  
 FINAL CREEK REMEANDER  
 CROSS SECTIONS

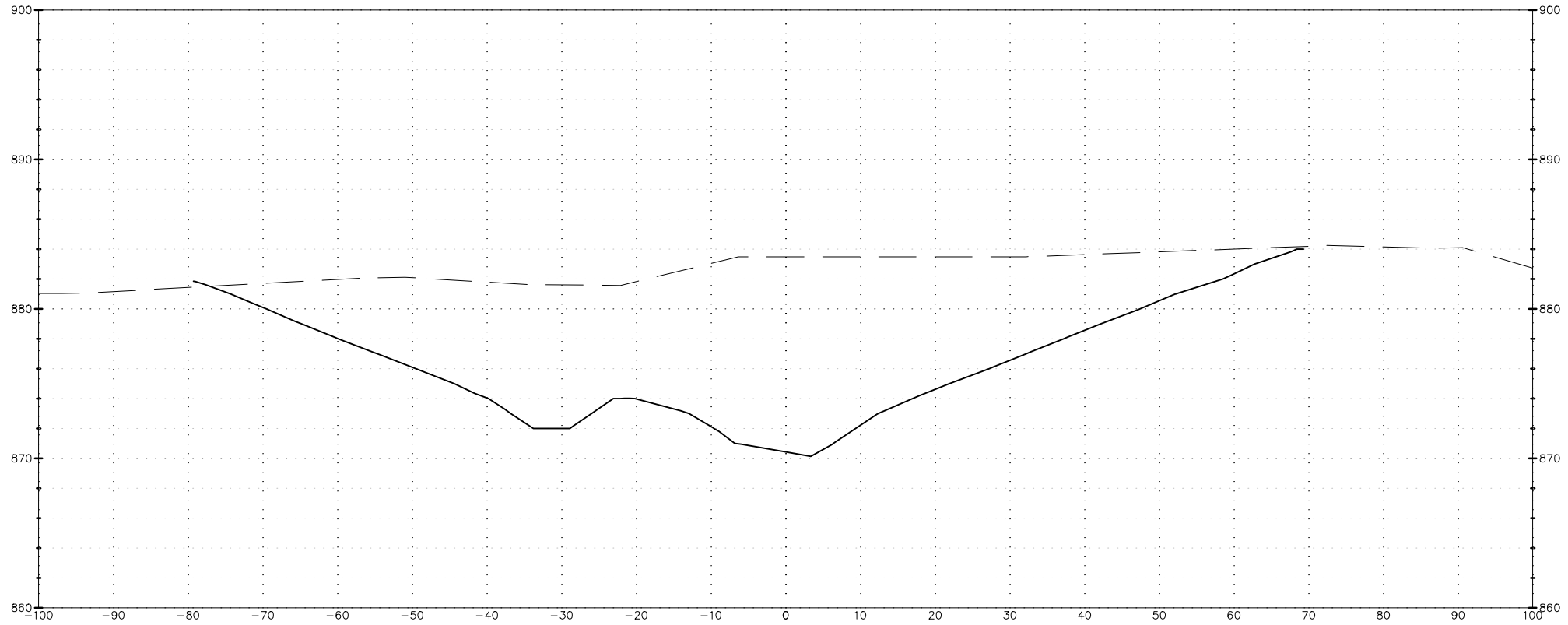
CITY PROJECT	
COUNTY PROJECT	
S.A.P.	062-593-004
S.A.P.	

SHEET NO.

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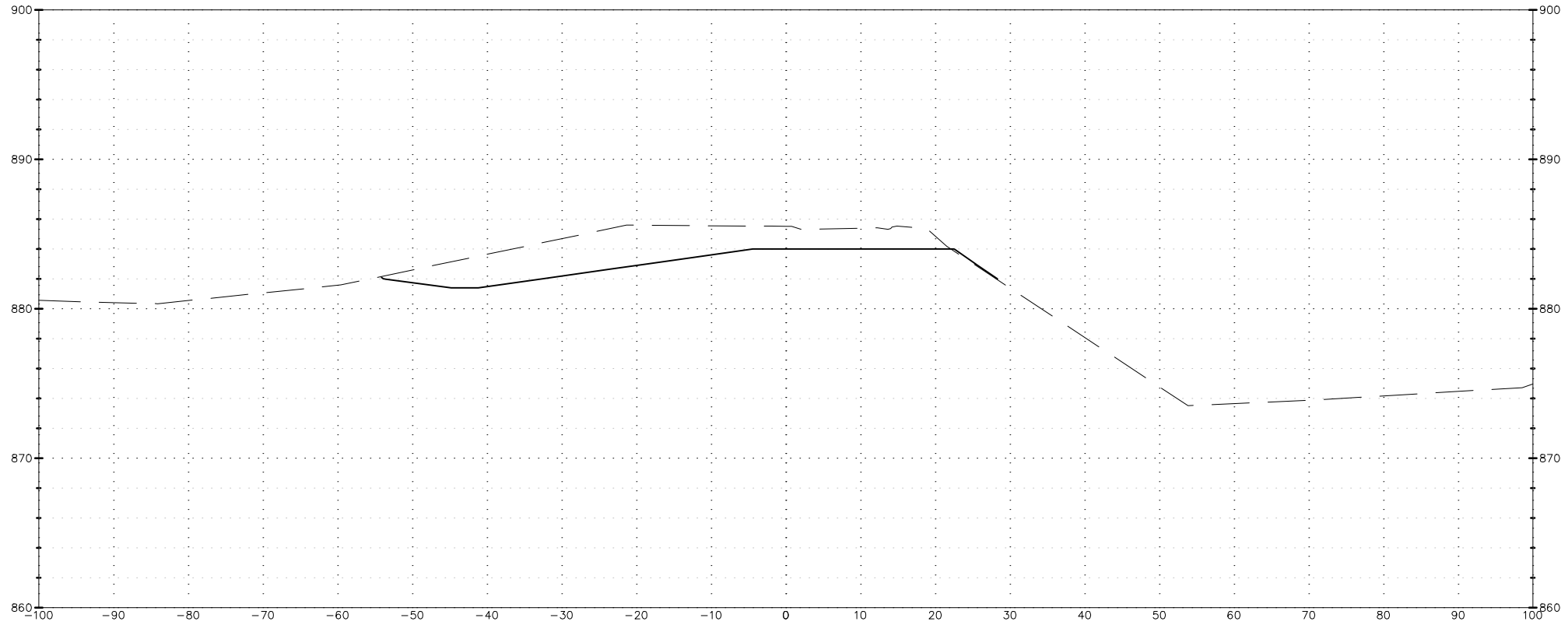
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11+00.00



LEGEND  
 - - - - - EXISTING GROUND PROFILE  
 \_\_\_\_\_ PROPOSED GROUND PROFILE  
 . . . . . GROUNDWATER PROFILE (JUNE 2014)

12+00.00



M:\1382\01\CAD\CIV\24-30 - CROSS SECTIONS.dwg July 14, 2015 - 12:29pm

No.	Date	Revisions	App.


DRAWING NAME	24-30 - CROSS SECTIONS.dwg
DESIGNED BY:	EAM
DRAWN BY:	LNJ
CHECKED BY:	MJS
DATE:	07/14/2015
PROJECT NO.	160553004



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*Ed Matthesen*  
 ED MATTHIESEN  
 DATE: 7/14/15 MN LIC. NO. 16800

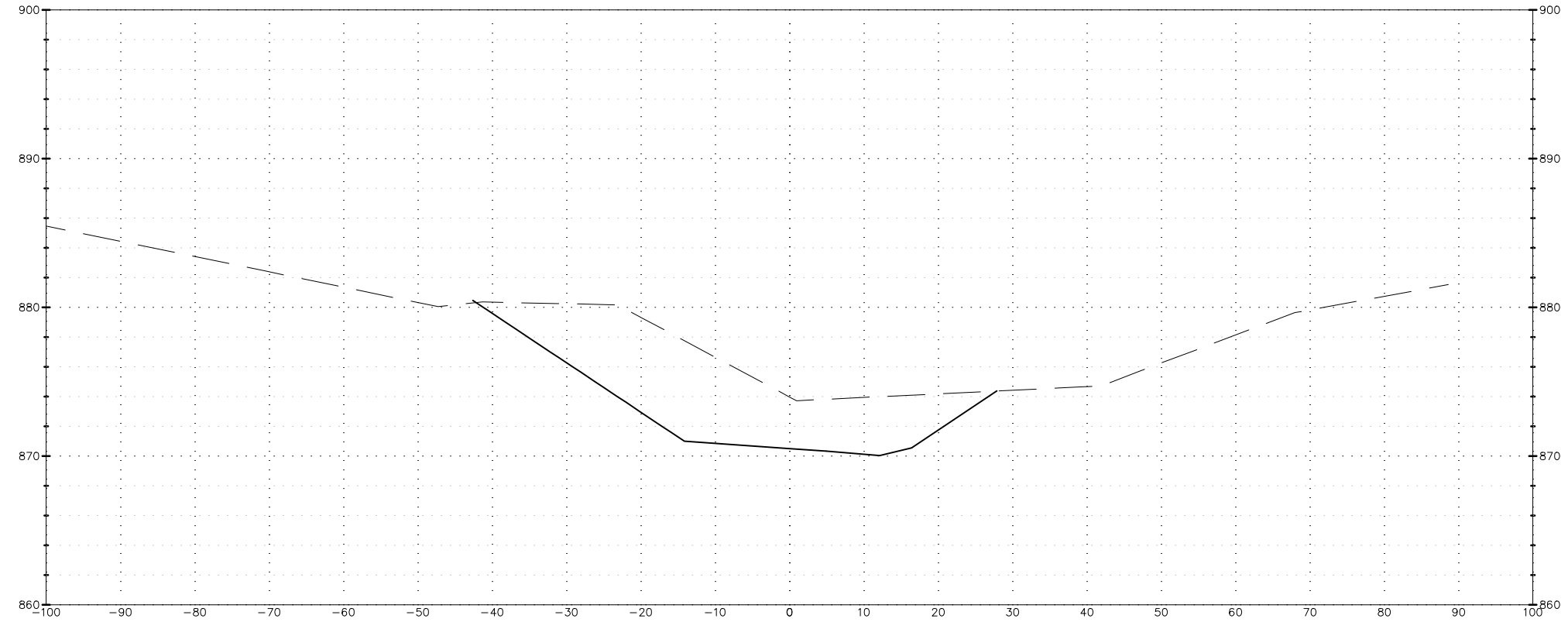


**RAMSEY COUNTY**  
 TCAAP  
 BID PACKAGE #1  
 RICE CREEK REMEANDER CONSTRUCTION  
 FINAL CREEK REMEANDER  
 CROSS SECTIONS

CITY PROJECT	
COUNTY PROJECT	
S.A.P.	062-593-004
S.A.P.	

SHEET NO.  
 29  
 30

13+00.00



LEGEND  
 - - - - - EXISTING GROUND PROFILE  
 \_\_\_\_\_ PROPOSED GROUND PROFILE  
 . . . . . GROUNDWATER PROFILE (JUNE 2014)

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No.	Date	Revisions	App.

DRAWING NAME 24-30 - CROSS SECTIONS.dwg	
DESIGNED BY:	EAM
DRAWN BY:	LNJ
CHECKED BY:	MJS
DATE:	07/14/2015
PROJECT NO.	160553004



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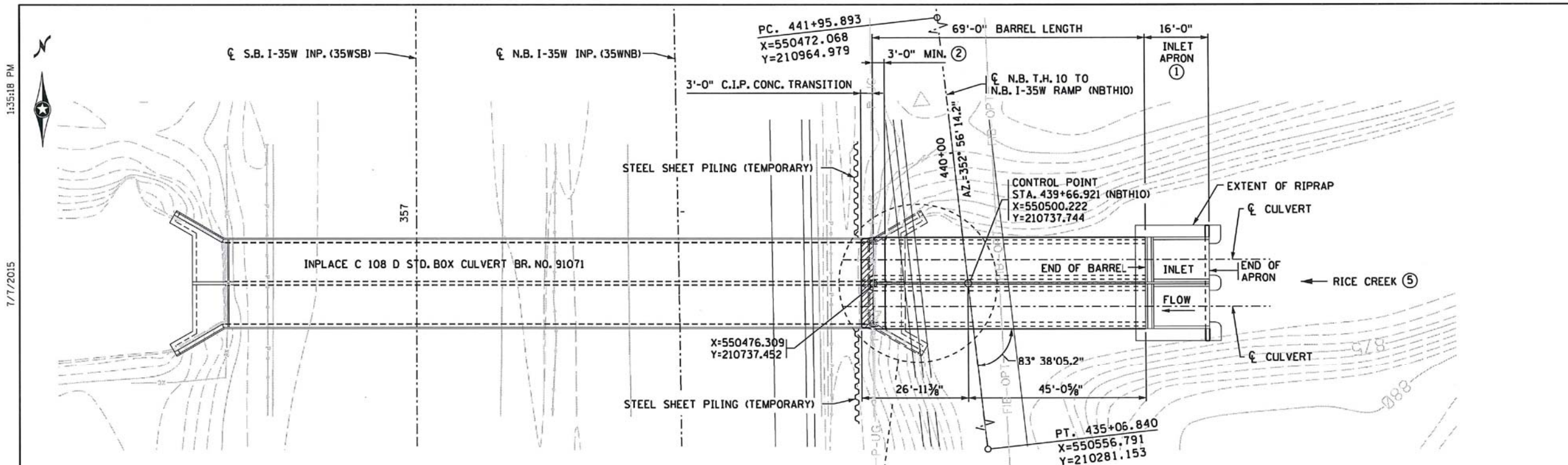
*Ed Matthesen*  
 ED MATTHIESEN  
 DATE: 7/14/15 MN LIC. NO. 16800



**RAMSEY COUNTY**  
 TCAAP  
 BID PACKAGE #1  
 RICE CREEK REMEANDER CONSTRUCTION  
 FINAL CREEK REMEANDER  
 CROSS SECTIONS

CITY PROJECT	
COUNTY PROJECT	
S.A.P.	062-593-004
S.A.P.	

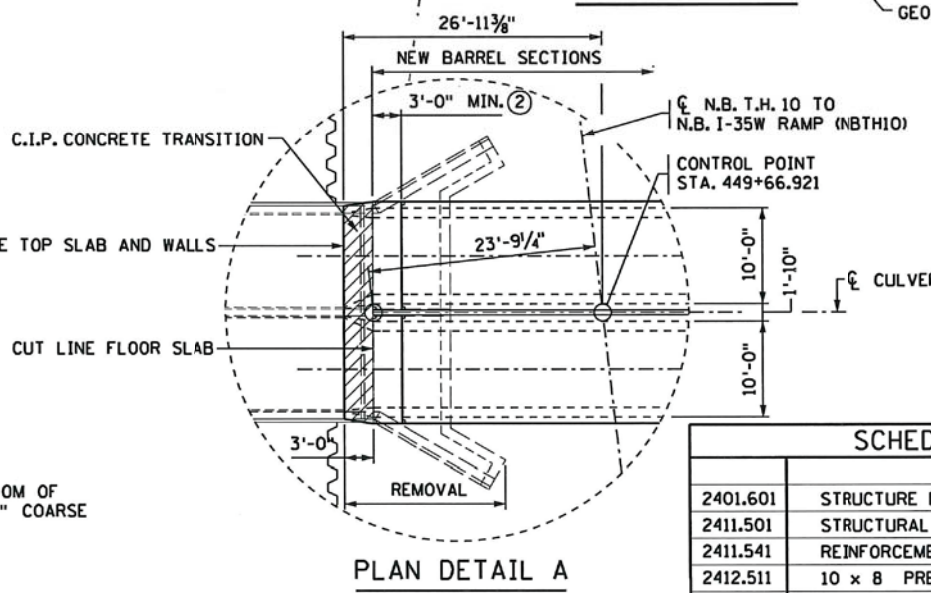
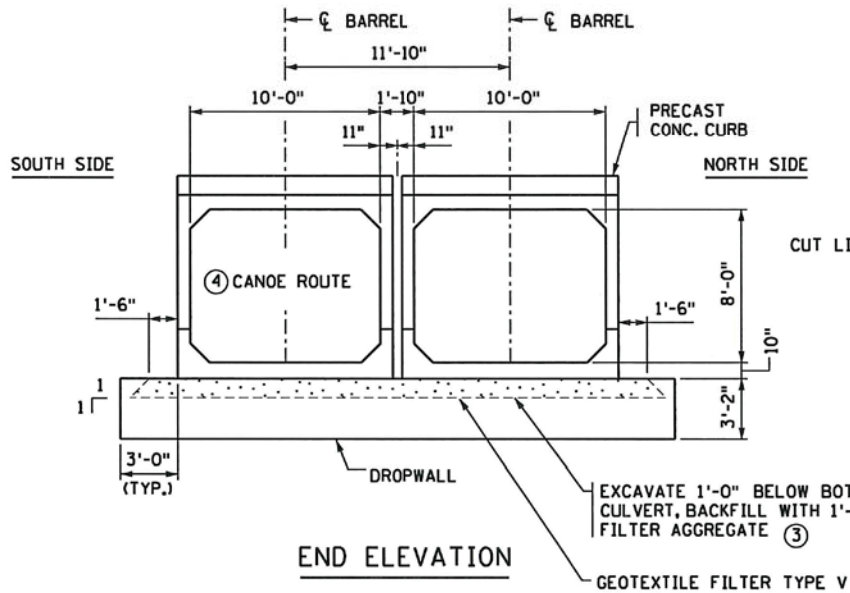
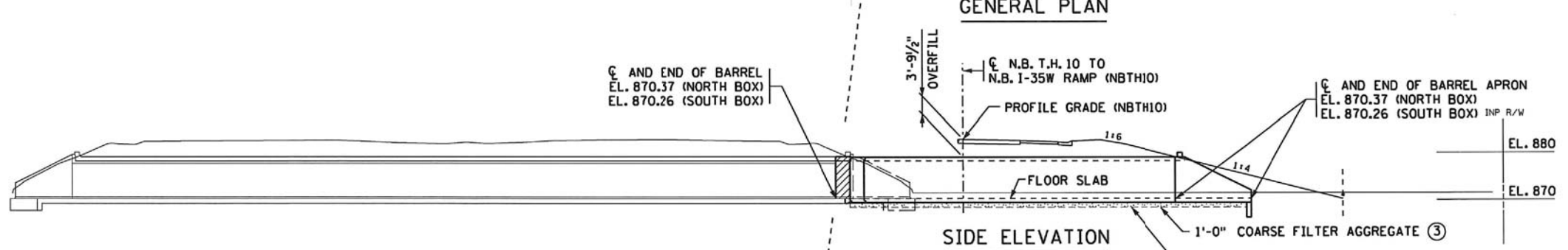
SHEET NO.  
 30  
 30



**DESIGN DATA**  
 2012 AASHTO LRFD BRIDGE DESIGN, SEVENTH EDITION AND MNDOT BRIDGE DESIGN MANUAL  
 LOAD AND RESISTANCE FACTOR DESIGN METHOD  
 HL93 LIVE LOAD  
 INSIDE HEIGHT = 8'-0"  
 INSIDE WIDTH = 10'-0"  
 BARREL LENGTH = 2 LINES OF 69'-0"  
 HEIGHT OF WINGWALL AT END = 1'-9"  
 DEPTH OF DROPWALL = 3'-2"  
 SKEW ANGLE = 0  
 MINIMUM DESIGN FILL DEPTH = 3'-0"  
 MAXIMUM DESIGN FILL DEPTH = 7'-0"  
 UNIT WEIGHT FILL = 130.0 LBS./CU.FT.  
 ANGLE INTERNAL FRICTION = 30°  
 MATERIAL DESIGN PROPERTIES:  
 PRECAST CONCRETE:  
 fy = 60 ksi REINFORCEMENT BARS  
 f'c = 5 KSI CONCRETE  
 fy = 65 ksi WELDED WIRE FABRIC REINFORCEMENT

**LIST OF SHEETS**

NO.	DESCRIPTION
C1	GENERAL PLAN AND ELEVATION
C2	PRECAST CONCRETE BARREL DETAILS
C3	PRECAST CONCRETE END SECTION TYPE I-SINGLE OR DOUBLE BARREL
C4-C5	PRECAST CONCRETE END SECTION TYPE III-SINGLE OR DOUBLE BARREL
C6	C.I.P. TRANSITION DETAILS
C7	ALTERNATE DROPWALLS FOR BOX CULVERT
C8	EMBANKMENT PROTECTION FOR BOX CULVERTS



- NOTES:**
- END SECTION TO BE TYPE I OR TYPE III.
  - NEW PRECAST STUB CULVERT SECTION.
  - COARSE FILTER AGGREGATE SHALL BE AN AGGREGATE WITH 100% PASSING THE 2" SIEVE, 0-10% PASSING THE #4 SIEVE, 0-3% PASSING THE #20 SIEVE. THE COARSE FILTER AGGREGATE SHALL CONSIST OF CRUSHED QUARRY ROCK.
  - DESIGNATED CANOE ROUTE. USE RECESSED TIES THIS CULVERT ONLY.
  - SEE CIVIL DRAWINGS FOR RE-MEANDERED CREEK ALIGNMENT AND PROFILE.
  - SEE CIVIL DRAWINGS FOR UTILITY WORK.

**SCHEDULE OF QUANTITIES FOR ENTIRE CULVERT**

ITEM	UNIT	QUANTITY
2401.601	STRUCTURE EXCAVATION	LUMP SUM 1
2411.501	STRUCTURAL CONCRETE (3Y46)	CU. YD. 8 (P)
2411.541	REINFORCEMENT BARS	POUND 1650 (P)
2412.511	10 x 8 PRECAST CONCRETE BOX CULVERT	LIN. FT. 138 (P)
2412.512	10 x 8 PRECAST CONCRETE BOX CULVERT END SECTION	EACH 2 (P)
2451.511	COARSE FILTER AGGREGATE (CV)	CU. YD. 85
2452.601	STEEL SHEET PILING (TEMPORARY)	LUMP SUM 1
2511.501	RANDOM RIPRAP CLASS III	CU. YD. 14 (P)
2511.515	GEOTEXTILE FILTER TYPE V	SQ. YD. 289 (P)

**CONSTRUCTION NOTES**  
 THE 2014 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION" AND THE 2014 EDITION OF THE "MATERIALS LAB SUPPLEMENTAL SPECIFICATIONS FOR CONSTRUCTION" SHALL GOVERN.  
 THE BAR SIZES SHOWN IN THIS PLAN ARE IN U.S. CUSTOMARY DESIGNATIONS.  
 ALL EXPOSED CONCRETE EDGES SHALL BE FORMED WITH A 1/2" OR 3/4" CHAMFER UNLESS OTHERWISE NOTED.  
 CONSTRUCTION TO BE IN ACCORDANCE WITH SPEC. 2411 AND 2412, EXCEPT AS NOTED.  
 FOR STRUCTURE EXCAVATION AND BACKFILL SEE SPEC. 2451.  
 SEE ROADWAY PLANS FOR CULVERT SUBCUT, BEDDING AND BACKFILL REQUIREMENTS.  
 THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D. THIS UTILITY QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CI/ASCE 38-02, ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA".

APPROVED .....  
 DATE .....  
 RAMSEY COUNTY ENGINEER

**BRIDGE NO. 91071**  
 DBL. 10' W x 8' H BOX CULVERT EXTENSION UNDER N.B. T.H. 10 TO N.B. I-35W RAMP 1.2 MILES NORTH OF THE JUNCTION OF I-694 IN ARDEN HILLS  
 IDENTIFICATION NO. 113  
**GENERAL PLAN AND ELEVATION**  
 SEC. 8/9 TWP. 30 N. R. 23 W.  
 CITY: ARDEN HILLS COUNTY: RAMSEY  
 APPROVED .....  
 DATE 7/7/15

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE:
				PROJECT NO. 129594

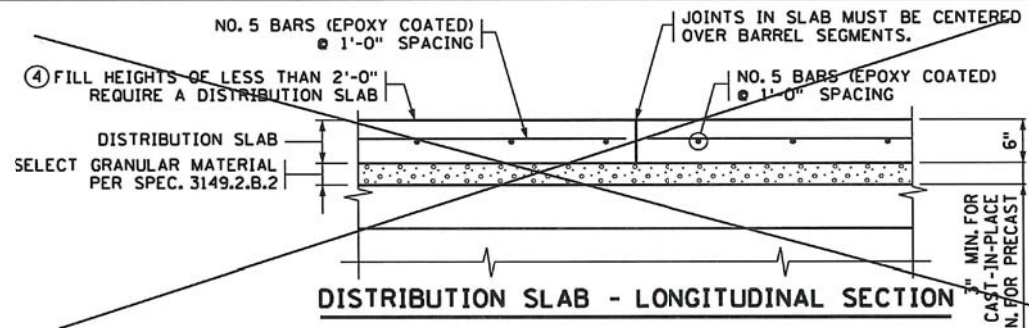
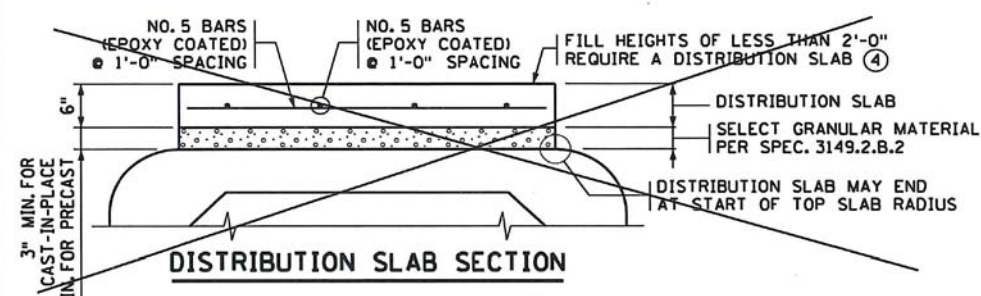


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 JEFFREY A. JOHNSON  
 DATE: 7-7-15 MN LIC. NO. 17280

**RAMSEY COUNTY**  
 TCAAP BP1  
 CULVERT 91071  
 GENERAL PLAN, LONGITUDINAL AND TRANSVERSE SECTION

COUNTY PROJECT	SHEET NO.
S.A.P. 062-593-004	31
S.P.	C1
S.P.	
S.P.	

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1:35:19 PM  
7/7/2015



**CONSTRUCTION NOTES**

CULVERTS TO BE CONSTRUCTED AS PER SPEC. 2412 EXCEPT AS NOTED.

REFER TO THE GENERAL PLAN AND ELEVATION SHEET FOR THE DISTANCE BETWEEN BARRELS OF ADJACENT BOXES AND TO STANDARD FIGURE 5-395.115 FOR MATERIAL REQUIREMENTS FOR FILL BETWEEN ADJACENT BOXES.

THE WELDED WIRE FABRIC, SHEAR REINFORCEMENT AND REINFORCEMENT BARS SHALL CONFORM TO APPLICABLE REQUIREMENTS OF AASHTO M259.

1/2" MIN. AND 2" MAX. CONCRETE COVER ON ALL REINFORCEMENT, INCLUDING SHEAR REINFORCEMENT, EXCEPT FOR TONGUE AND GROOVE DETAIL.

ANY OF THE FOLLOWING COMBINATIONS OF STEEL REINFORCEMENT MAY BE USED:  
 (a) 1 OR 2 LAYERS OF WELDED WIRE FABRIC OR  
 (b) 1 LAYER OF WELDED WIRE FABRIC AND 1 LAYER OF REINFORCEMENT BARS OR  
 (c) 1 LAYER OF REINFORCEMENT BARS.

THE REINFORCEMENT SHALL BE DEVELOPED IN ACCORDANCE WITH AASHTO "LRFD BRIDGE DESIGN SPECIFICATIONS". IF BAR REINFORCEMENT IS SUBSTITUTED FOR WELDED WIRE FABRIC, THE AREA OF REINFORCEMENT SHALL BE INCREASED BY 8%, AND CONTRACTOR SHALL SUBMIT DESIGN CALCULATIONS VERIFYING COMPLIANCE WITH AASHTO 5.7.3.4. "CONTROL OF CRACKING BY DISTRIBUTION OF REINFORCEMENT".

THE MAXIMUM SIZE OF REINFORCEMENT BARS SHALL BE NO. 6. THE MAXIMUM WELDED WIRE FABRIC SIZE SHALL BE A W23 PER LAYER (MAXIMUM OF 2 LAYERS).

THE SPACING CENTER TO CENTER OF THE TRANSVERSE WIRES SHALL NOT BE LESS THAN 2" NOR MORE THAN 4". THE SPACING CENTER TO CENTER OF THE LONGITUDINAL WIRES SHALL NOT BE MORE THAN 8".

WELDING WILL NOT BE ALLOWED ON REINFORCEMENT BARS OR WELDED WIRE FABRIC, EXCEPT THAT THE ORIGINAL WELDING REQUIRED TO MANUFACTURE WIRE FABRIC IS ACCEPTABLE.

WHEN REINFORCEMENT IS CUT, ADDITIONAL REINFORCEMENT SHALL BE ADDED ON BOTH SIDES OF THE CUT MEMBER TO REPLACE OR EXCEED THE CUT STEEL.

CONCRETE SHALL BE MIX NO. 3W36 WITH NO CALCIUM CHLORIDE ALLOWED.

SHOP DRAWING APPROVAL PER SPEC. 3238.2.A IS NOT REQUIRED UNLESS OPENINGS OR ATTACHMENTS ARE PLACED ON A BARREL SEGMENT.

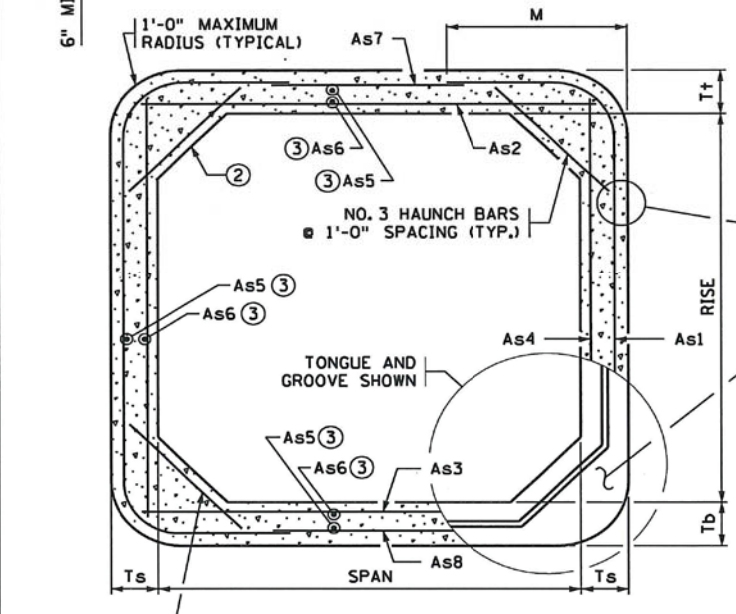
COMPACT THE FIRST 1.5' (LOOSE) OF FILL ABOVE THE BOX WITH LIGHT COMPACTION EQUIPMENT SUCH AS PLATE COMPACTORS OR WALK BEHIND ROLLERS.

TRANSVERSE REINFORCEMENT IS PARALLEL TO THE CULVERT SPAN. LONGITUDINAL REINFORCEMENT IS PERPENDICULAR TO THE CULVERT SPAN.

① CULVERT TIES ARE TO BE 1" DIAMETER RODS. SEE STANDARD PLATE NO. 3145 FOR CONNECTION DETAILS.

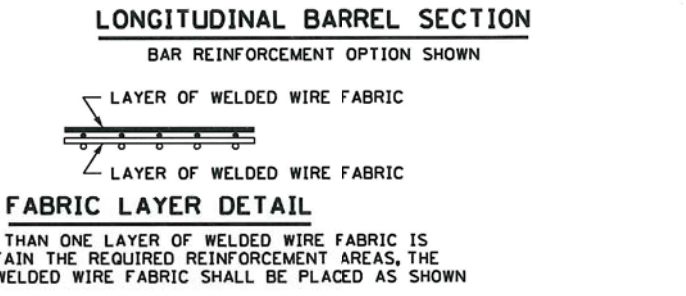
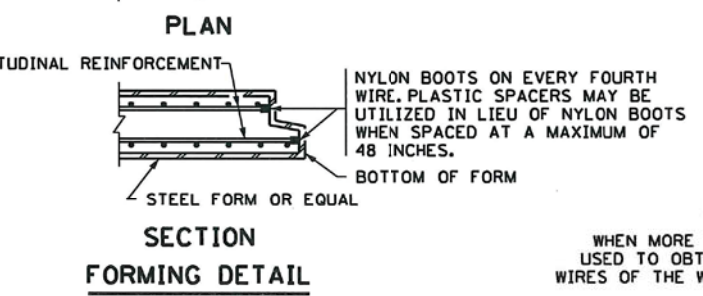
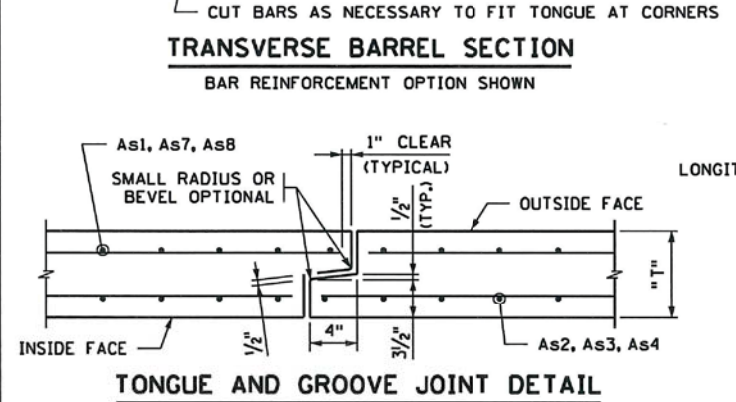
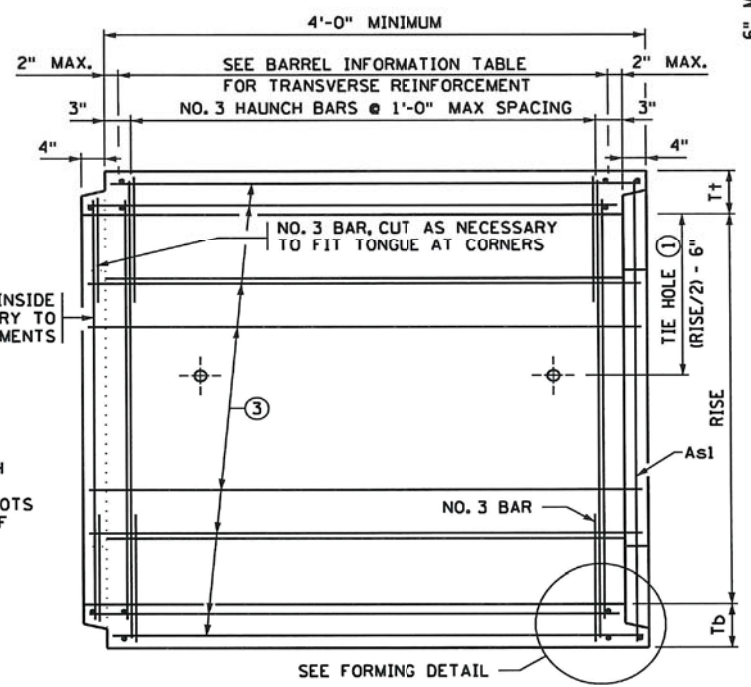
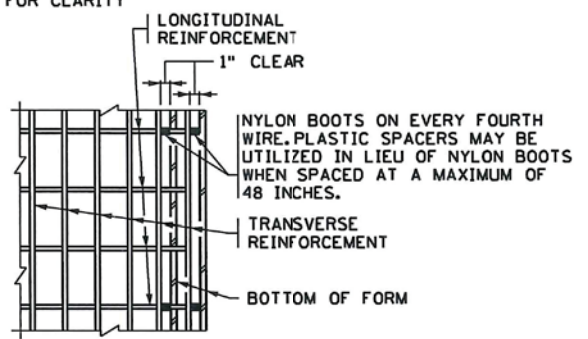
② HAUNCH SIZES ARE TO BE 12" VERTICAL, 12" HORIZONTAL ON ALL BOX SIZES.

③ LONGITUDINAL REINFORCEMENT DENOTED AS As5 AND As6 MUST BE PLACED IN ALL SLABS AND WALLS AND MUST BE 0.06 SQ. IN./FT. MIN.



HAUNCH BAR LENGTH:  
 31" FOR 8" WALL THICKNESS  
 34" FOR 9" WALL THICKNESS  
 34" FOR 10" WALL AND 10" SLAB  
 36" FOR 10" WALL AND 11" SLAB  
 38" FOR 10" WALL AND 12" SLAB  
 38" FOR 11" WALL THICKNESS

CUT OR BEND INSIDE REINFORCEMENT AS NECESSARY TO ACHIEVE COVER REQUIREMENTS



④ ROADWAY OR SHOULDER FILL HEIGHTS OF LESS THAN 2'-0" REQUIRE A DISTRIBUTION SLAB.

USE CONCRETE MIX 3Y43 FOR THE DISTRIBUTION SLAB.

CAST-IN-PLACE DISTRIBUTION SLABS SHALL BE 6" THICK. PROVIDE 3" MINIMUM SELECT GRANULAR MATERIAL PER SPEC. 3149.2.B.2 BETWEEN BARREL AND DISTRIBUTION SLAB.

PRECAST DISTRIBUTION SLABS SHALL BE 6" THICK AND MAY BE USED FOR FILL HEIGHTS OVER 1'-0". PROVIDE 6" MINIMUM SELECT GRANULAR MATERIAL PER SPEC. 3149.2.B.2 BETWEEN BARREL AND DISTRIBUTION SLAB.

THE WIDTH OF THE DISTRIBUTION SLAB SHALL EXTEND BETWEEN THE OUTSIDE EDGES OF THE SHOULDERS UNLESS DIRECTED BY THE ENGINEER.

PAYMENT FOR THE DISTRIBUTION SLAB AND SELECT GRANULAR MATERIAL BENEATH THE SLAB SHALL BE CONSIDERED INCIDENTAL.

IF DISTRIBUTION SLAB IS USED AS PAVEMENT SURFACE IT MUST BE REDESIGNED PER THE MNDOT PAVEMENT DESIGN MANUAL.

BARREL INFORMATION TABLE ***																									
LOCATION	SIZE	CLASS	f'c (P.S.I.)	FILL HEIGHT RANGE (FT.)	DISTRIBUTION SLAB REQUIRED *	RECESSED TIE RODS REQUIRED **	DIMENSIONS					WEIGHT (LBS./FT.)	WELDED WIRE FABRIC REINFORCEMENT												
							SPAN (FT.)	RISE (FT.)	T+ (IN.)	Td (IN.)	Ts (IN.)		As1		As2		As3		As4		As7		As8		
													AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)	M (FT.)	AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)	AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)	AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)	AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)	AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)
STA. 449+66	10'x8'	2	5000	3-7	NO	YES (SOUTH)	10	8	9	10	8	4600	0.39	14'-8"	2'-10"	0.62	10'-6"	0.66	10'-6"	0.20	8'-6"	0.24	8'-3"	0.24	8'-3"

\* ALL CLASS 1 CULVERTS WITH FILL HEIGHTS OF LESS THAN 2'-0" REQUIRE A DISTRIBUTION SLAB. IF A DISTRIBUTION SLAB IS NOT REQUIRED, INDICATE "NO" IN THIS BOX.

\*\* FOR PEDESTRIAN CULVERT APPLICATIONS HIDE-AWAY OR RECESSED TIE CONNECTIONS ARE REQUIRED. SEE STANDARD PLATE 3145. IF REQUIRED, INDICATE "YES" IN THIS BOX.

\*\*\* BOX CULVERTS WITH SPANS FROM 6 TO 14 FT. ARE DESIGNED FOR HL-93 LIVE LOADS (AASHTO LRFD 3.6.2.1) NOT INCLUDING THE DESIGN LANE LOAD. BOXES WITH SPANS OF 16 FT. ARE DESIGNED FOR HL-93 LIVE LOADS INCLUDING THE DESIGN LANE LOAD.

REVISION: 09-11-2014  
 APPROVED: MARCH 24, 2011  
 Nancy Subenberger  
 STATE BRIDGE ENGINEER

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE:
				PROJECT NO. 129594



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.

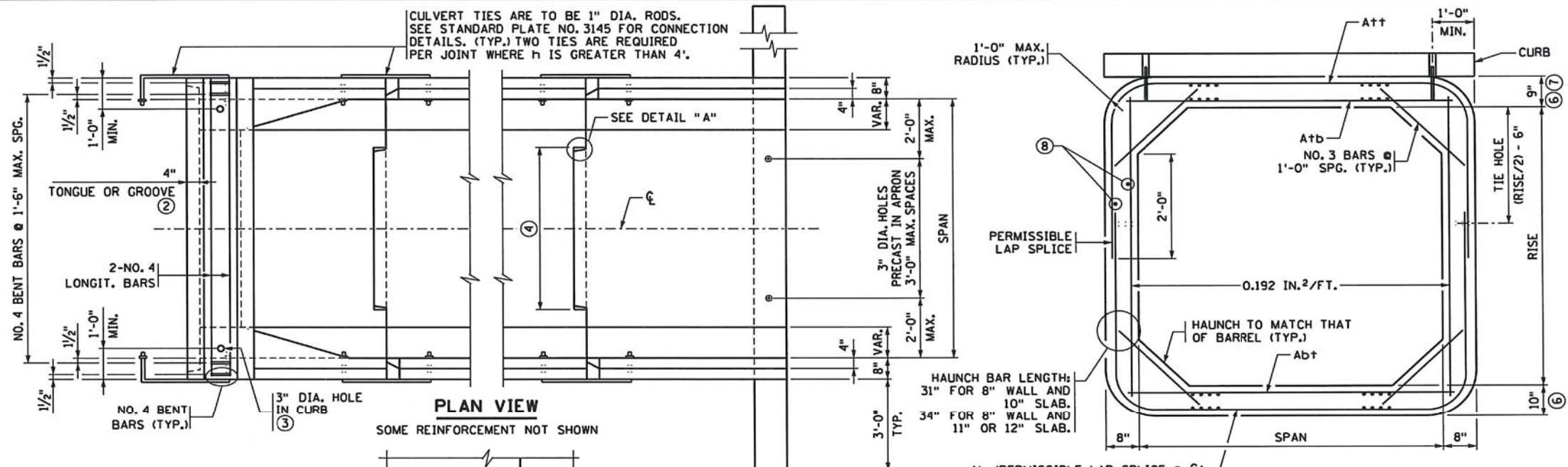
JEFFREY A. JOHNSON  
 DATE: 7-7-15 MN LIC. NO. 17280

**RAMSEY COUNTY**  
 TCAAP BP1  
 PRECAST CONCRETE  
 BARREL DETAILS

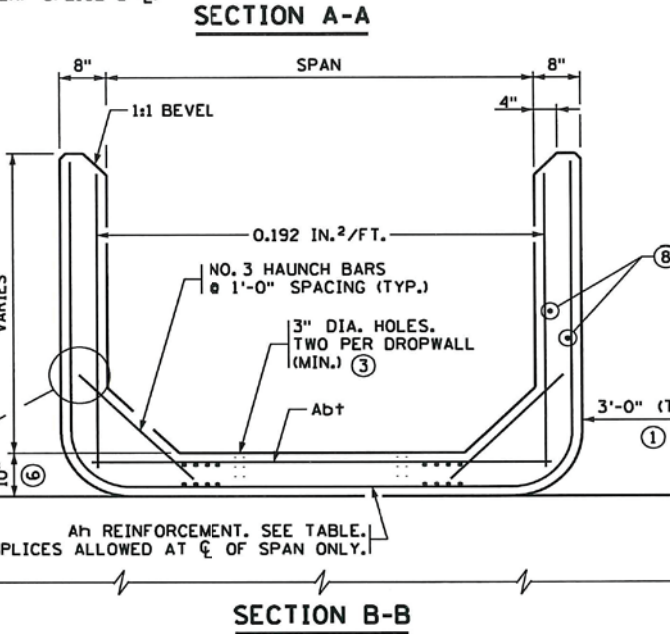
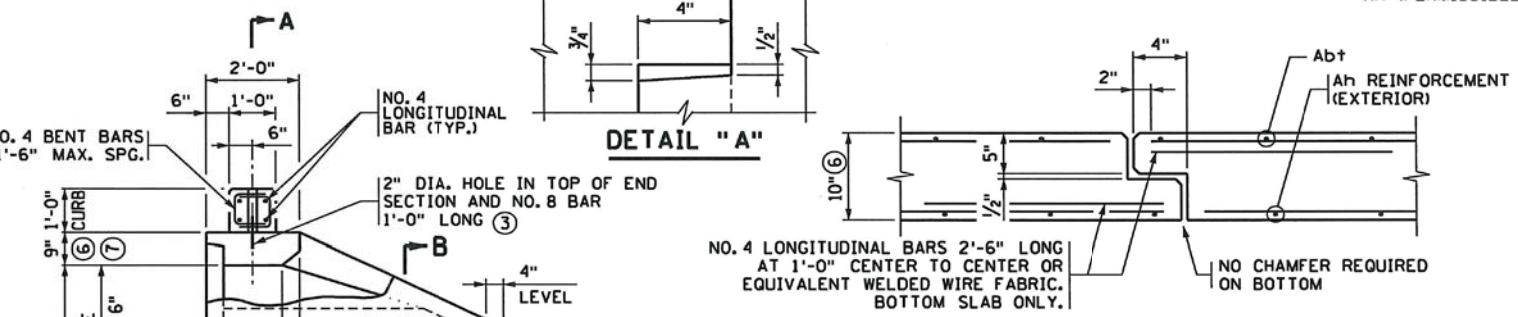
FIG. 5-395.101(A)		BRIDGE NO. 91071
COUNTY PROJECT		SHEET NO.
S.A.P. 062-593-004	32 C2	
S.P.		
S.P.		
S.P.		



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- ### CONSTRUCTION NOTES
- SEE STANDARD FIG. 5-395.101(A) AND FIG. 5-395.101(B) FOR ADDITIONAL DIMENSIONS AND CONSTRUCTION NOTES.
- ALL END SECTIONS REQUIRE CURB ON LINTEL BEAM.
- ON ALL END SECTIONS FOR WATERWAYS, USE DROPWALLS ON INLET AND OUTLET ENDS.
- SEE STANDARD FIG. 5-395.115 FOR EMBANKMENT PROTECTION.
- FINISH ALL EXPOSED EDGES OF CONCRETE WITH 1/2" OR 3/4" CHAMFER OR RADIUS UNLESS OTHERWISE NOTED.
- WITH DOUBLE BOXES LOCATE DROPWALL JOINTS BETWEEN END SECTIONS. SEE STANDARD FIG. 5-395.111 FOR ALTERNATE DROPWALLS. LIMITS OF EXCAVATION FOR DROPWALL TO BE APPROXIMATELY THE SAME AS DROPWALL DIMENSIONS. DROPWALL TO BE CONCRETE MIX NO. 1A43 OR MIX NO. 3Y43. FURNISHING AND INSTALLATION OF DROPWALL TO BE INCLUDED IN PRICE BID FOR END SECTIONS. DROPWALL NOT REQUIRED FOR NON-WATERWAY USE.
  - CHECK LOCATION TO DETERMINE WHETHER A TONGUE OR A GROOVE IS USED.
  - FILL HOLE WITH GROUT. GROUT SHALL CONSIST OF 1 PART CEMENT AND 2 PARTS SAND, USE TYPE 1A AIR ENTRAINED PORTLAND CEMENT. GROUT MIX SHALL HAVE A MAXIMUM SLUMP OF 4".
  - 3'-6" MIN. TONGUE AND 3'-7" MIN. GROOVE FOR CULVERTS WITH 6'-0" SPANS. 5'-0" MIN. TONGUE AND 5'-1" MIN. GROOVE FOR CULVERTS WITH SPANS GREATER THAN 6'-0". CENTER TONGUE AND GROOVE ON C/2 OF EACH APRON JOINT. TONGUE AND GROOVE JOINT ON ALL THREE SIDES OF APRON IS PERMISSIBLE.
  - AS AN ALTERNATE TO THE ONE LAYER WELDED WIRE FABRIC, PROVIDE TWO LAYERS OF REBAR OR WELDED WIRE FABRIC WITH THE STEEL AREA EQUAL TO HALF OF THE TEMPERATURE STEEL PER CODE REQUIREMENTS IN EACH FACE OF THE DROPWALL.
  - APRON TOP AND BOTTOM SLAB THICKNESS MAY BE 8" FOR CULVERTS WITH 6' SPANS ONLY. BOTTOM SLAB THICKNESS MAY BE INCREASED UP TO 2" MAX. PROVIDED CONCRETE COVER IS 1 1/2" MIN., 2" MAX.
  - 10" MINIMUM TOP SLAB FOR 14' AND 16' SPANS.
  - LONGITUDINAL REINFORCEMENT PERPENDICULAR TO THE CULVERT SPAN SHALL HAVE A MINIMUM OF 0.06 SQUARE INCHES PER PERIPHERAL FOOT ON ALL FACES OF THE BARREL.



A+t, A+b REINFORCEMENT		
SPAN (FT.)	A+t (IN <sup>2</sup> /FT.)	A+b (IN <sup>2</sup> /FT.)
6	0.27	0.44
8	0.47	0.60
10	0.62	0.74
12	0.88	1.06
14	1.20	1.58
16	1.52	2.09

A+b REINFORCEMENT	
SPAN (FT.)	A+b (IN <sup>2</sup> /FT.)
6-10	0.20
12	0.30
14	0.39
16	0.39

APRON DIMENSIONS & A <sub>h</sub> REINFORCEMENT											
RISE FT.	L	SECTION 1		SECTION 2		SECTION 3		SECTION 4		SECTION 5	
		X	A <sub>h</sub>	h <sub>2</sub>	Y	A <sub>h</sub>	h <sub>3</sub>	Z	A <sub>h</sub>	h <sub>4</sub>	h <sub>5</sub>
4	8	8' (4')	0.192	1'-9" (3'-9")	(4')	(0.192)	(1'-9")				
5	10	6'	0.192	3'-9"	4'	0.192	1'-9"				
6	12	6'	0.192	4'-9"	6'	0.192	1'-9"				
7	14	6'	0.192	5'-9"	8' (4')	0.192	1'-9" (3'-9")	(4')	(0.192)	(1'-9")	
8	16	6'	0.20	6'-9"	6'	0.192	3'-9"	4'	0.192	1'-9"	
9	18	6'	0.29	7'-9"	6'	0.20	4'-9"	6'	0.192	1'-9"	
10	20	6'	0.42	8'-9"	6'	0.29	5'-9"	8' (4')	0.192	1'-9" (3'-9")	(4')
11	22	6'	0.60	9'-9"	6'	0.42	6'-9"	6'	0.192	3'-9"	4'
12	24	6'	0.78	10'-9"	6'	0.60	7'-9"	6'	0.20	4'-9"	6'
13	26	6'	1.03	11'-9"	6'	0.78	8'-9"	6'	0.28	5'-9"	8' (4')
14	28	6'	1.38	12'-9"	6'	1.03	9'-9"	6'	0.40	6'-9"	6'

NOTE: A<sub>h</sub> IS AREA OF REINFORCEMENT PER FOOT OF LENGTH (IN<sup>2</sup>/FT.) VALUES IN ( ) MAY BE USED FOR END SECTIONS WITH SPANS OF 14' AND 16' ONLY.

REVISION: 11-06-2013

APPROVED: MARCH 24, 2011  
*Nancy Subenberger*  
 STATE BRIDGE ENGINEER

No.	Date	Revisions	App.	DRAWING NAME
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				DRAWN BY: MAW
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				PROJECT NO. 129594



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*Jeffrey A. Johnson*  
 JEFFREY A. JOHNSON  
 DATE: 7-7-15 MN LIC. NO. 17280

**RAMSEY COUNTY**  
 TCAAP BP1  
 PRECAST CONCRETE END SECTION  
 TYPE I - SINGLE OR DOUBLE BARREL

COUNTY PROJECT  
 S.A.P. 062-593-004  
 S.P.  
 S.P.  
 S.P.

BRIDGE NO. 91071  
 SHEET NO. 33 C3  
 63

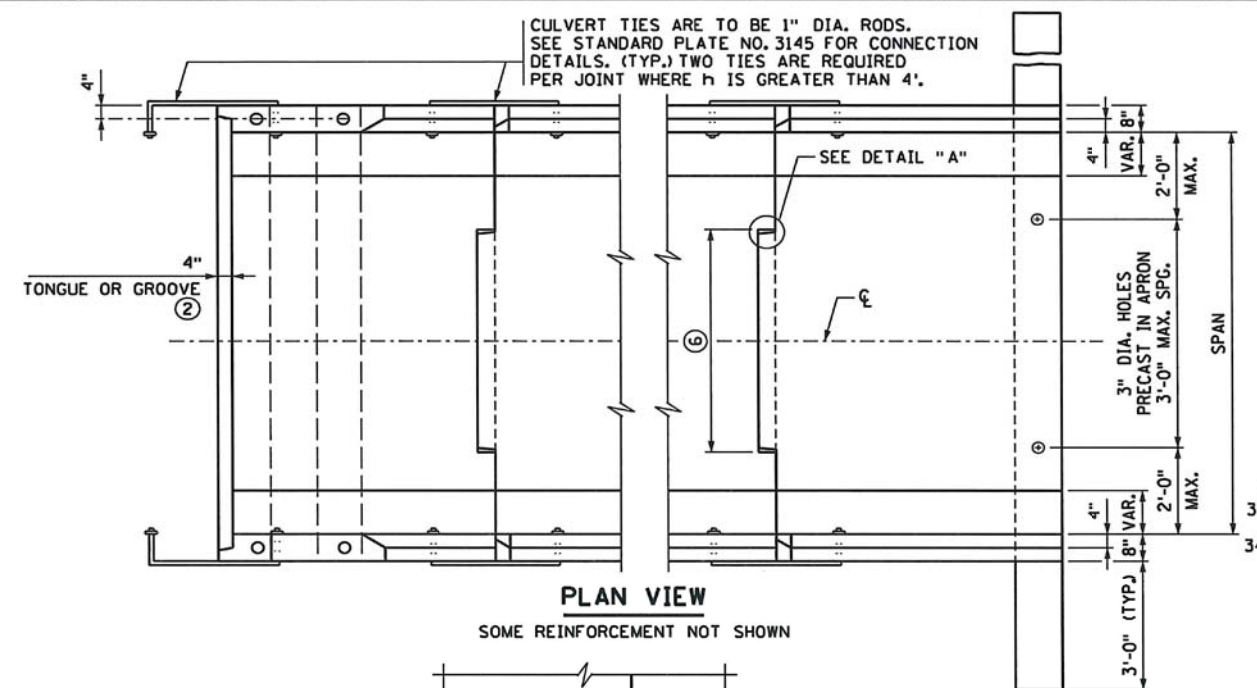
FIG. 5-395.102

TITLE: PRECAST CONCRETE END SECTION  
 TYPE I - SINGLE OR DOUBLE BARREL  
 FOR SKEWS UP TO 7/2'

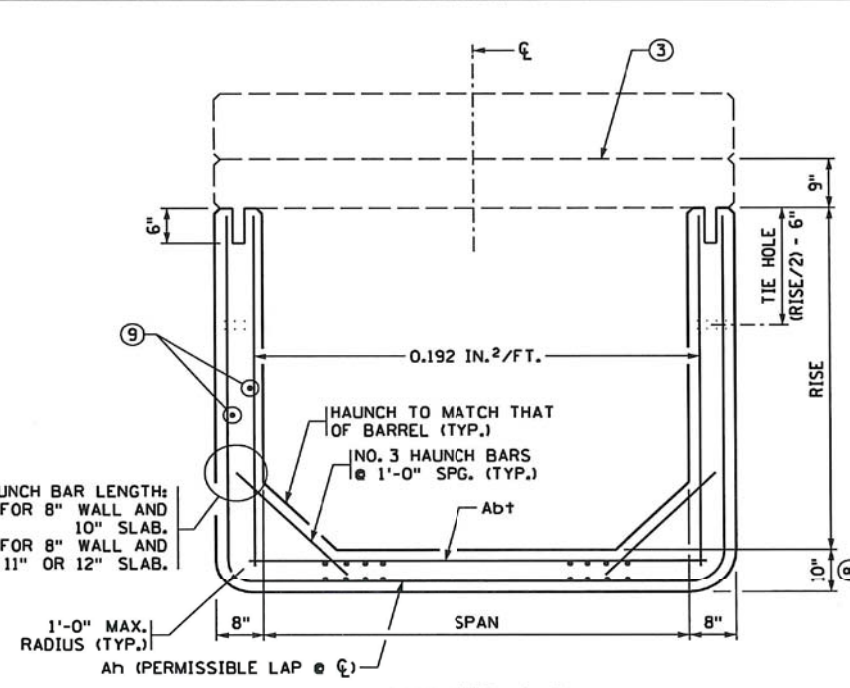
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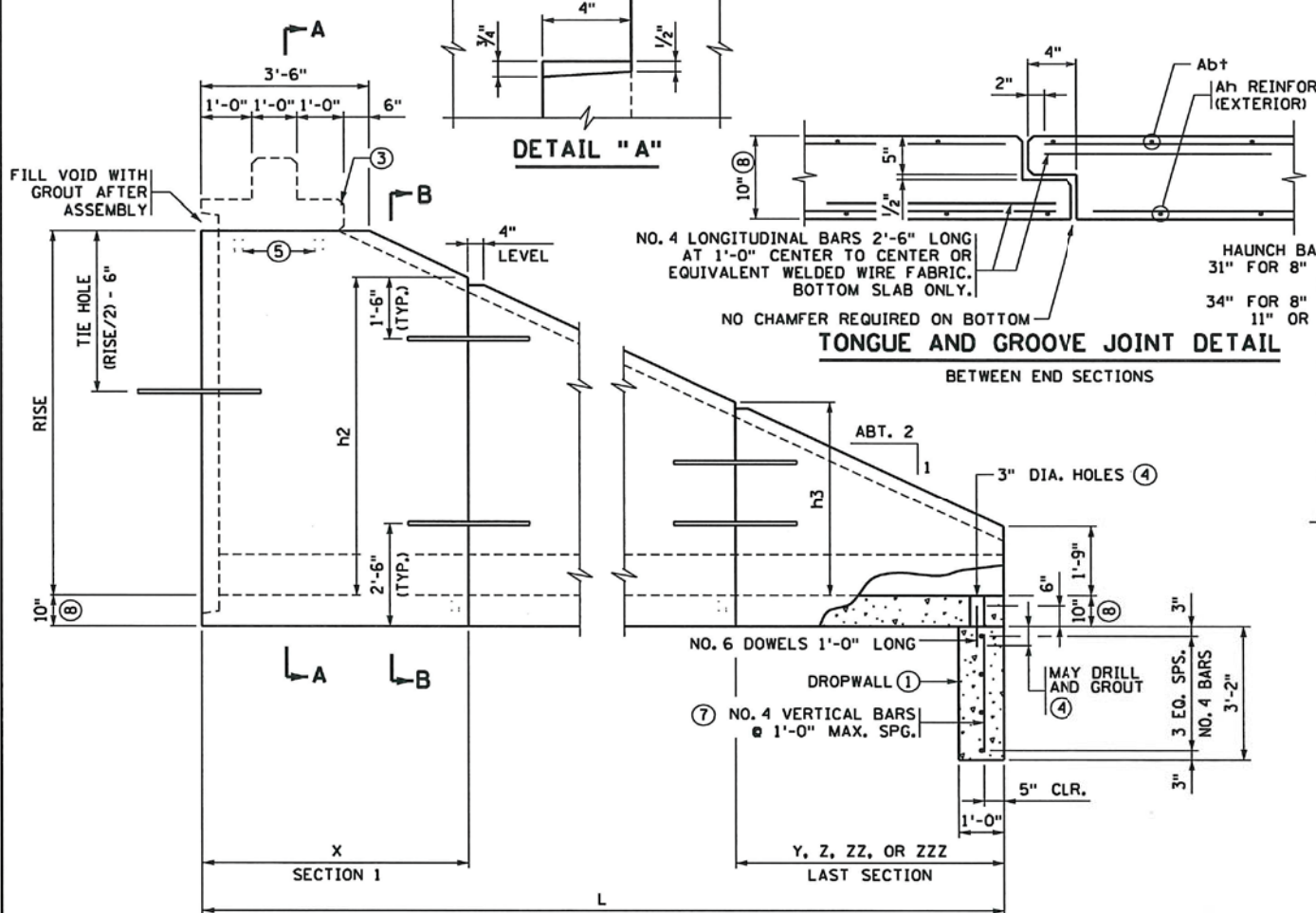
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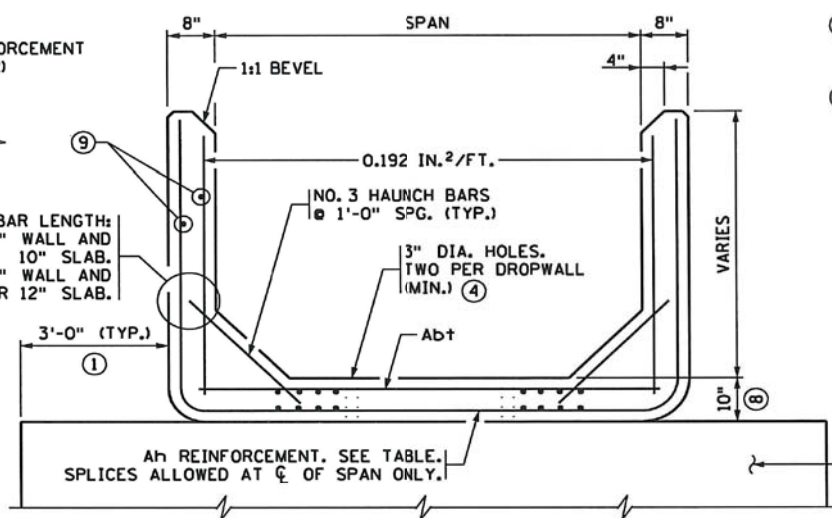
PLAN VIEW  
SOME REINFORCEMENT NOT SHOWN



SECTION A-A



TONGUE AND GROOVE JOINT DETAIL  
BETWEEN END SECTIONS



SECTION B-B

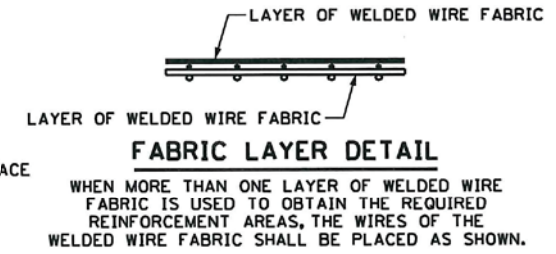
**Abt REINFORCEMENT**

SPAN (FT.)	Abt (IN <sup>2</sup> /FT.)
6-10	0.20
12	0.30
14	0.39
16	0.39

**APRON DIMENSIONS & Ah REINFORCEMENT**

RISE FT.	L FT.	SECTION 1		SECTION 2		SECTION 3		SECTION 4		SECTION 5		h6				
		X	Ah	Y	Ah	Z	Ah	ZZ	Ah	ZZZ	Ah					
4	8	8' (4')	0.192	1'-9" (3'-9")	(4')	(0.192)										
5	10	6'	0.192	3'-9"	4'	0.192	1'-9"									
6	12	6'	0.192	4'-9"	6'	0.192	1'-9"									
7	14	6'	0.192	5'-9"	8' (4')	0.192	1'-9" (3'-9")	(4')	(0.192)	(1'-9")						
8	16	6'	0.20	6'-9"	6'	0.192	3'-9"	4'	0.192	1'-9"						
9	18	6'	0.29	7'-9"	6'	0.20	4'-9"	6'	0.192	1'-9"						
10	20	6'	0.42	8'-9"	6'	0.29	5'-9"	8' (4')	0.192	1'-9" (3'-9")	(4')	(0.192)	(1'-9")			
11	22	6'	0.60	9'-9"	6'	0.42	6'-9"	6'	0.192	3'-9"	4'	0.192	1'-9"			
12	24	6'	0.78	10'-9"	6'	0.60	7'-9"	6'	0.20	4'-9"	6'	0.192	1'-9"			
13	26	6'	1.03	11'-9"	6'	0.78	8'-9"	6'	0.28	5'-9"	8' (4')	0.192	1'-9" (3'-9")	(4')	(0.192)	(1'-9")
14	28	6'	1.38	12'-9"	6'	1.03	9'-9"	6'	0.40	6'-9"	6'	0.192	3'-9"	4'	0.192	1'-9"

NOTE: Ah IS AREA OF REINFORCEMENT PER FOOT OF LENGTH (IN<sup>2</sup>/FT.) VALUES IN ( ) MAY BE USED FOR END SECTIONS WITH SPANS OF 14' AND 16' ONLY.



REVISION: 11-06-2013

APPROVED: MARCH 24, 2011

*Nancy Subenberger*  
STATE BRIDGE ENGINEER

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*Jeffrey A. Johnson*  
JEFFREY A. JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

**RAMSEY COUNTY**

TCAAP BP1

PRECAST CONCRETE END SECTION  
TYPE III - SINGLE OR DOUBLE BARREL

COUNTY PROJECT

S.A.P. 062-593-004

S.P.

S.P.

S.P.

FIG. 5-395.104(A)

BRIDGE NO. 91071

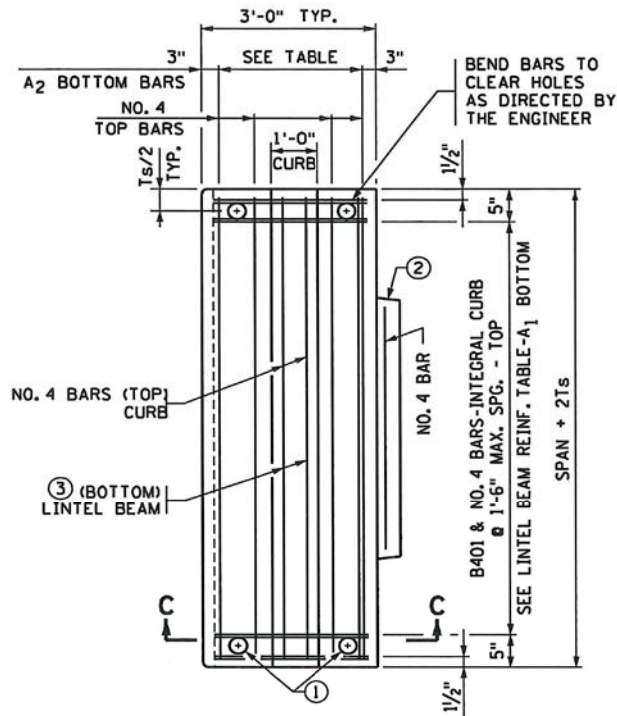
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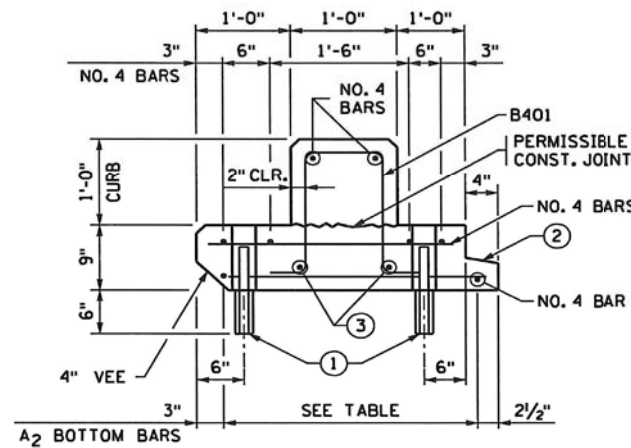
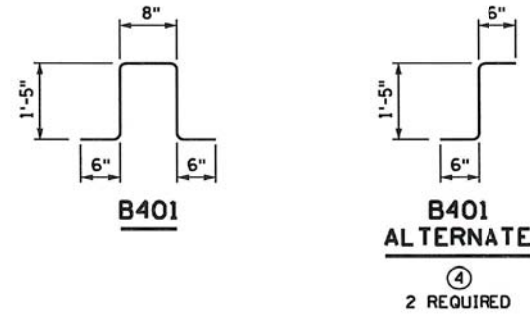
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PLAN VIEW OF SQUARE LINTEL BEAM

LINTEL BEAM BOTTOM REINFORCEMENT		
SPAN (FT.)	A <sub>1</sub>	A <sub>2</sub>
6	NO. 4 @ 1'-2"	NO. 4 @ 9/2"
8	NO. 4 @ 8"	NO. 5 @ 8"
10	NO. 5 @ 8"	NO. 6 @ 7 1/2"
12	NO. 5 @ 6"	NO. 6 @ 6"
14	NO. 6 @ 6"	NO. 7 @ 6"
16	NO. 6 @ 6"	NO. 7 @ 6"

NOTE: MAXIMUM BAR SPACING GIVEN,  
REDUCE AS NECESSARY



SECTION C-C  
INTEGRAL CURB WITH TONGUE.  
ADDITIONAL REINFORCEMENT IN TONGUE NOT SHOWN.

**CONSTRUCTION NOTES**

SEE STANDARD FIG. 5-395.101(A) AND FIG. 5-395.101(B) FOR ADDITIONAL DIMENSIONS AND CONSTRUCTION NOTES.

ALL END SECTIONS REQUIRE CURB ON LINTEL BEAM.

GROUT SHALL CONSIST OF 1 PART CEMENT AND 2 PARTS SAND. USE TYPE 1A AIR ENTRAINED PORTLAND CEMENT. GROUT MIX SHALL HAVE A MAXIMUM SLUMP OF 4".

- ① 3" DIA. HOLE THROUGH LINTEL BEAM AND 2" DIA. HOLE IN TOP OF WALL SECTION. PLACE NO. 8 DOWEL, 1'-0" LONG, IN HOLE AND FILL HOLE WITH GROUT.
- ② CHECK THE LOCATION TO DETERMINE WHETHER A TONGUE OR A GROOVE IS USED. TONGUE AND GROOVE TO TERMINATE AT HAUNCH.
- ③ FOR SPANS UNDER 10'-0" USE NO. 8 BARS. FOR SPANS OF 10'-0" TO 12'-0" USE NO. 9 BARS. FOR 14'-0" AND 16'-0" SPAN, USE NO. 10 BARS.
- ④ ALTERNATE BAR BEND MAY BE USED FOR B401.

REVISION: 11-06-2013  
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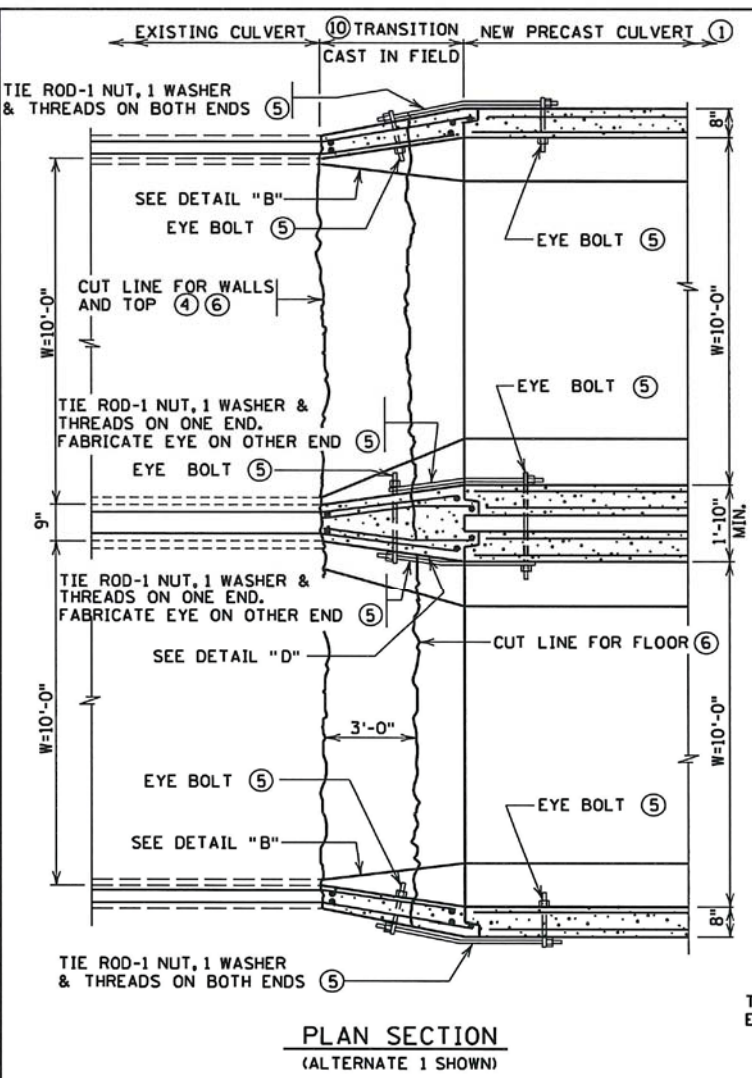
**RAMSEY COUNTY**  
TCAAP BP1  
PRECAST CONCRETE END SECTION  
TYPE III - SINGLE OR DOUBLE BARREL

COUNTY PROJECT	S. A. P. 062-593-004
S.P.	
S.P.	
S.P.	

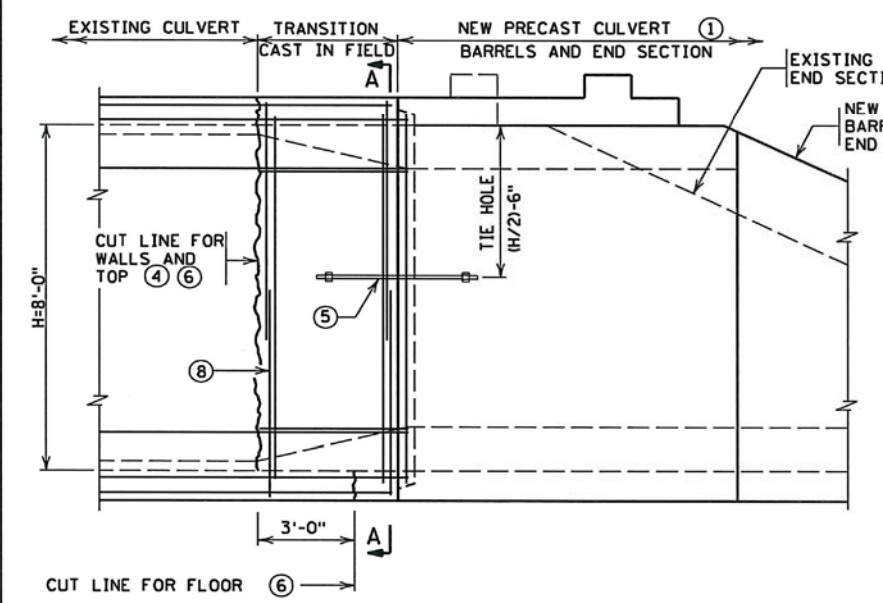
FIG. 5-395.104(B)  
BRIDGE NO. 91071

SHEET NO. 35  
C 5  
63

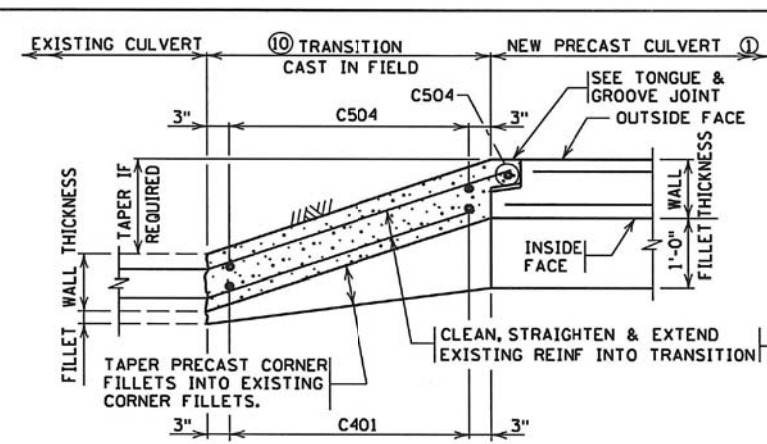
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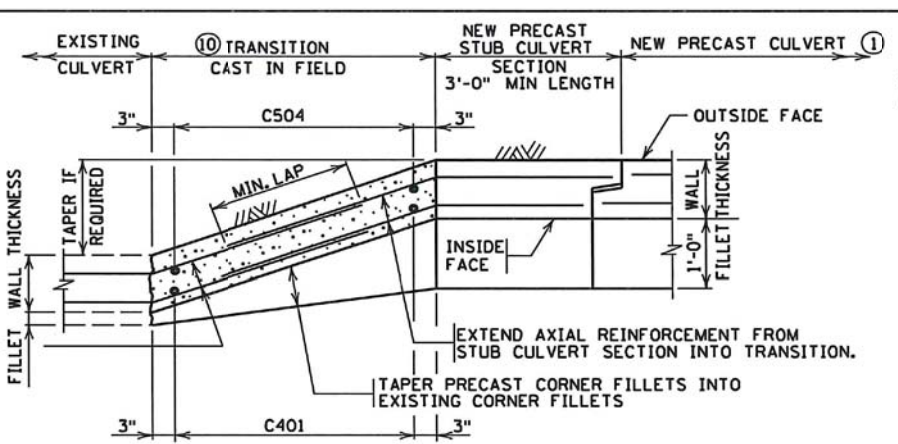
**PLAN SECTION**  
(ALTERNATE 1 SHOWN)



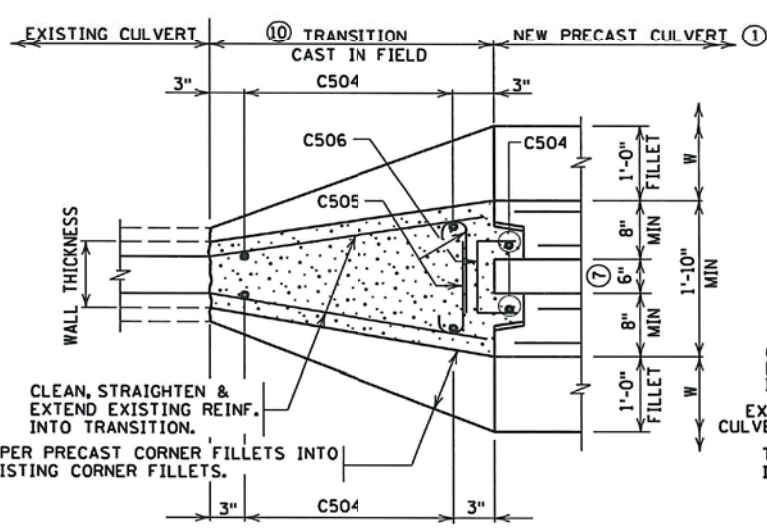
**SIDE ELEVATION**  
(ALTERNATE 1 SHOWN)



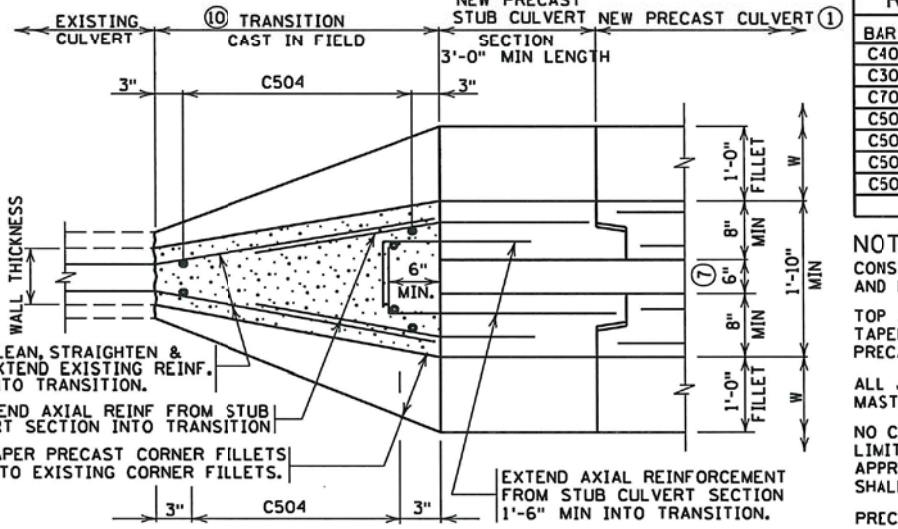
**DETAIL B 10**  
ALTERNATE 1  
(CULVERT TIE NOT SHOWN)



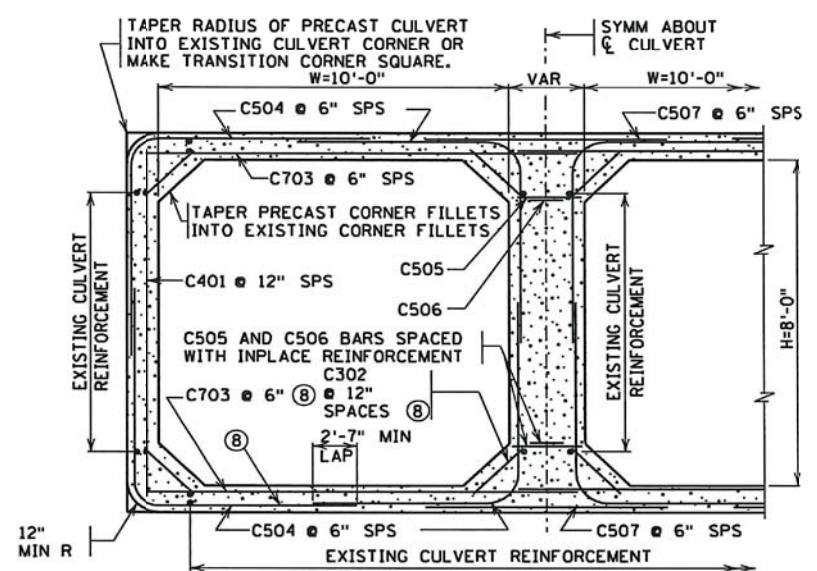
**DETAIL B 10**  
ALTERNATE 2  
(NO CULVERT TIE REQUIRED)



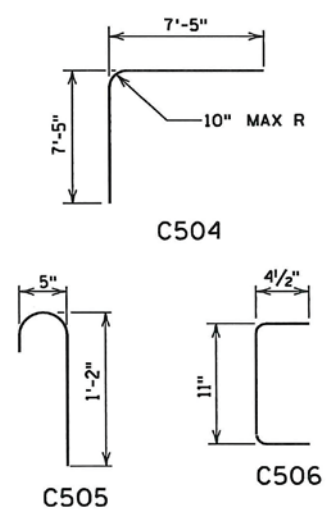
**DETAIL D 10**  
ALTERNATE 1  
(CULVERT TIE NOT SHOWN)



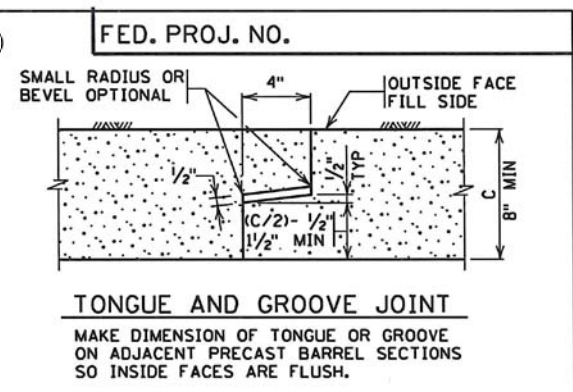
**DETAIL D 10**  
ALTERNATE 2  
(NO CULVERT TIE REQUIRED)



**SECTION A-A**  
(ALTERNATE 1 SHOWN)



**C.I.P. CONCRETE TRANSITION DETAILS**  
FROM EXISTING DOUBLE BARREL CAST-IN-PLACE BOX CULVERT TO PRECAST EXTENSION



**TONGUE AND GROOVE JOINT**  
MAKE DIMENSION OF TONGUE OR GROOVE ON ADJACENT PRECAST BARREL SECTIONS SO INSIDE FACES ARE FLUSH.

**TRANSITION QUANTITIES 2 9**

STRUCTURE CONC. (3Y46)	7 CY
REINFORCEMENT BARS	1650 POUND

**REINFORCEMENT FOR TRANSITION 9**

BAR	NO.	LENGTH	SHAPE	LOCATION
C401	8	8'-6"	STR	INSIDE VERTICAL
C302	32	1'-4"	STR	INSIDE CORNERS
C703	24	12'-9"	STR	INSIDE TOP AND BOTTOM
C504	56	14'-10"	BENT	OUTSIDE CORNERS
C505	16	1'-9"	BENT	INTERIOR WALL HORIZ.
C506	8	1'-8"	BENT	INTERIOR WALL HORIZ.
C507	12	4'-0"	STR	OUTSIDE TOP AND BOTTOM

- NOTES:**
- CONSTRUCTION SHALL START FROM THE EXISTING CULVERT AND PROCEED OUTWARD IN EACH DIRECTION.
  - TOP AND BOTTOM SLABS & SIDE WALLS MAY HAVE TO BE TAPERED IN THE TRANSITION AREA TO MATCH PRECAST CULVERT DIMENSIONS.
  - ALL JOINTS BETWEEN BARREL LENGTHS TO BE SEALED WITH MASTIC. SEE SPECIAL PROVISIONS.
  - NO CUTTING WILL BE PERMITTED UNTIL THE CUTTING LIMITS HAVE BEEN OUTLINED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. REMOVAL AND RECONSTRUCTION SHALL CONFORM TO SPEC. 2433, EXCEPT AS NOTED.
  - PRECAST CULVERTS TO BE CONSTRUCTED PER SPEC. 2411.
  - ANY ADDITIONAL REINFORCEMENT SHALL BE PER SPEC. 3301, GRADE 60 OR SPEC. 3303.
  - END SECTIONS TO BE EITHER TYPE I, II, OR III, DEPENDING ON CULVERT SKEW. SEE STANDARD PLAN SHEETS 5-395.110M
  - TO BE INCLUDED IN PRICE BID FOR OTHER ITEMS.
  - NOT USED.
  - REMOVE INPLACE CULVERT WINGS AS NECESSARY TO PROVIDE CLEARANCE FOR CONSTRUCTION OF SIDE WALL TRANSITION AS DIRECTED BY THE ENGINEER.
  - CULVERT TIES ARE TO BE 1" DIA RODS. SEE STANDARD PLATE NO M3145 FOR CONNECTION DETAILS. MODIFY AS REQUIRED AT TRANSITION. ALTERNATE CULVERT TIES MAY BE USED IF APPROVED BY THE ENGINEER. ALL HOLES IN THE BARRELS ARE TO BE APPROVED BY THE ENGINEER.
  - APPLY AN APPROVED EPOXY BONDING AGENT TO ALL SURFACES IN CONTACT WITH NEW CONCRETE.
  - FILL 6" VOID BETWEEN CULVERT WALLS WITH LEAN MIX BACKFILL (SPEC. 2520).
  - CUT BARS AS NECESSARY IN FIELD.
  - QUANTITIES ARE FOR ONE DBL BARREL TRANSITION USING ALTERNATE 1 DESIGN.
  - SEE "PLAN DETAIL A" SHEET 1 FOR ADDITIONAL INFORMATION.

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE:
				PROJECT NO. 129594



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JEFFREY A JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

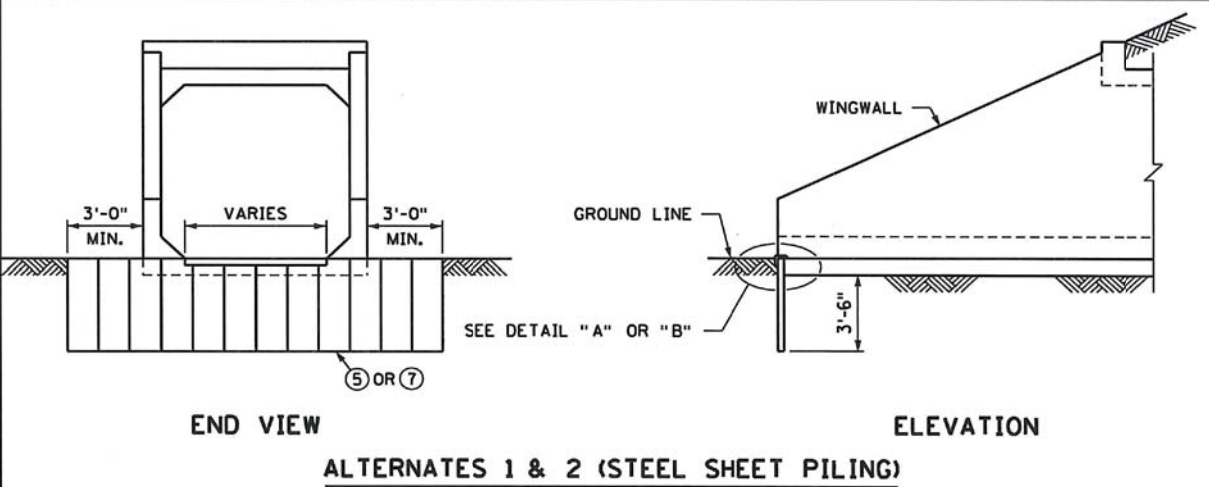
**RAMSEY COUNTY**  
TCAAP BP1  
C.I.P. CONCRETE TRANSITION DETAILS

COUNTY PROJECT	S.A.P. 062-593-004	SHEET NO. 36
S.P.		C6
S.P.		
S.P.		

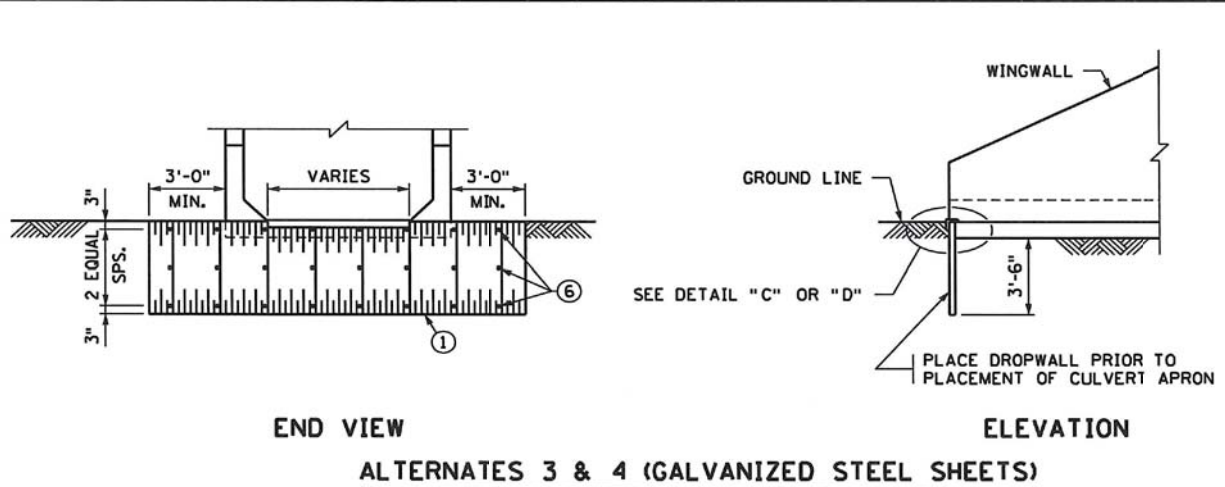
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7/7/2015

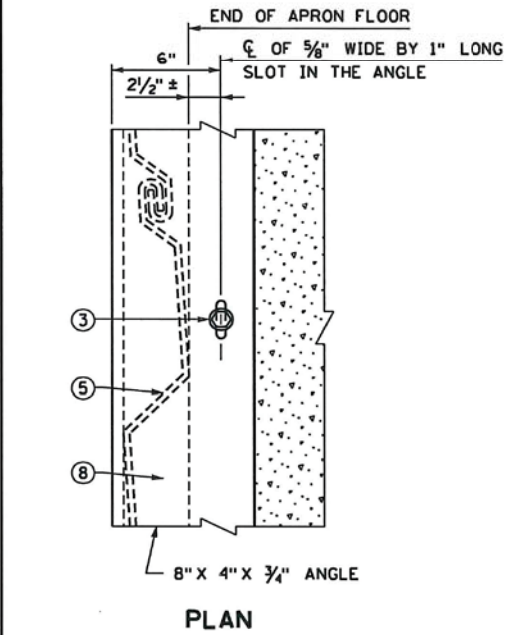
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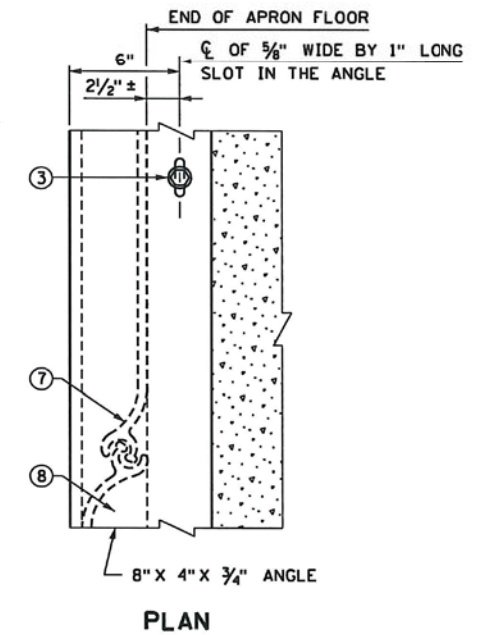
**END VIEW** **ELEVATION**  
**ALTERNATES 1 & 2 (STEEL SHEET PILING)**



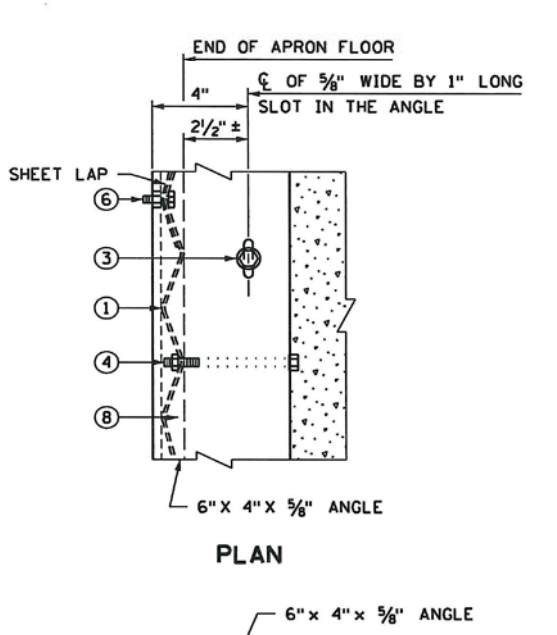
**END VIEW** **ELEVATION**  
**ALTERNATES 3 & 4 (GALVANIZED STEEL SHEETS)**



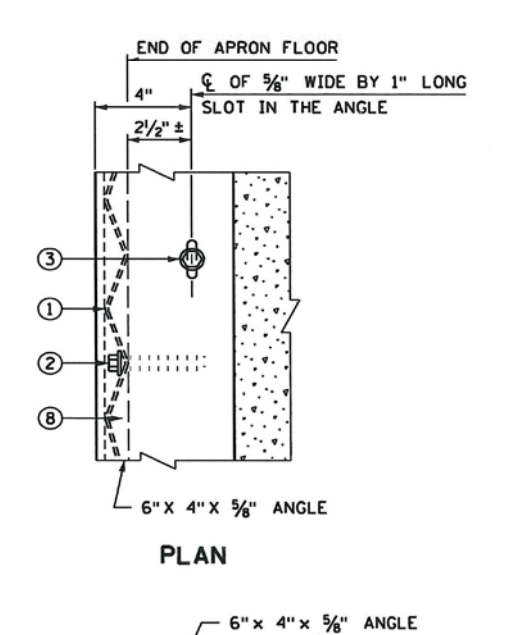
**PLAN**



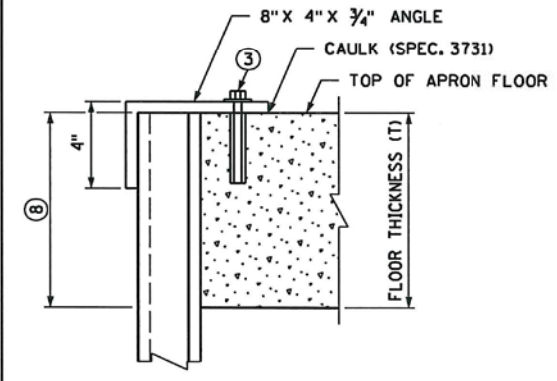
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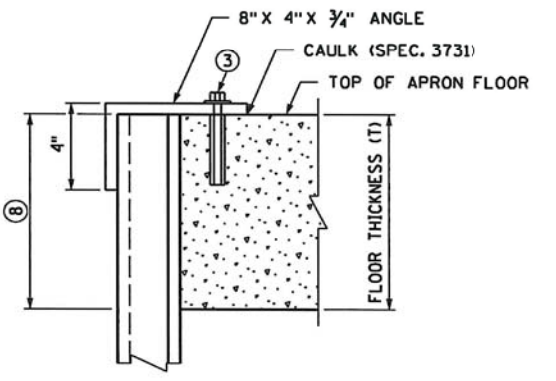
**PLAN**



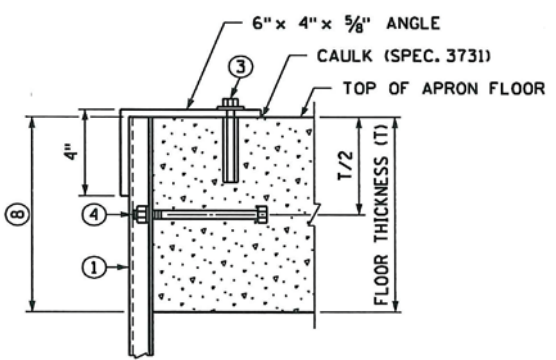
**PLAN**



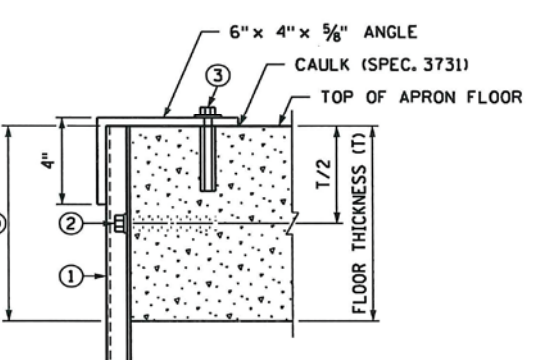
**ELEVATION**  
**DETAIL "A" - ALTERNATE 1**  
STEEL SHEET PILING SHOWN



**ELEVATION**  
**DETAIL "B" - ALTERNATE 2**  
STEEL SHEET PILING SHOWN



**ELEVATION**  
**DETAIL "C" - ALTERNATE 3**  
ON NEW CONSTRUCTION ONLY



**ELEVATION**  
**DETAIL "D" - ALTERNATE 4**  
ON NEW OR OLD CONSTRUCTION

**CONSTRUCTION NOTES**

- GALVANIZE ALL FASTENERS AS PER SPEC. 3392.
- BEFORE CULVERT PLANS ARE PREPARED, SAMPLES SHALL BE TAKEN FROM THE DRAINAGE AREA FOR PH DETERMINATION. THE SOIL AND WATER SHOULD HAVE A PH OF 6.5 OR MORE IF SHEET STEEL IS USED.
- ① 2 1/2" x 1/2" OR 2 3/8" x 1/2" CORRUGATED (12 GAGE) OR HEAVIER GALVANIZED STEEL SHEETS.
- ② FASTEN THE STEEL SHEETS TO THE FRONT EDGE OF THE APRON WITH 3/8" DIAMETER BY 4" LONG BOLTS AND APPROVED ANCHORAGES (10" ± CENTER TO CENTER, TO THE NEAREST VALLEY).
- ③ FASTEN THE 8" x 4" x 3/4" OR 6" x 4" x 5/8" ANGLE WITH 3/8" DIAMETER 4" LONG BOLTS, 1" O.D. WASHER AND AN APPROVED ANCHORAGE (2'-0" SPACING).
- ④ FASTEN THE STEEL SHEETS TO THE FRONT EDGE OF THE APRON WITH 3/8" DIAMETER 5" LONG BOLTS, NUT AND LOCK WASHER (10" ± CENTER TO CENTER, TO THE NEAREST VALLEY).
- ⑤ (12 GAGE) GALVANIZED CORRUGATED STEEL SHEET PILING, INTERLOCKING TYPE A.
- ⑥ 3/8" DIA. x 1" LONG BOLT WITH NUT, TO LAP STEEL SHEETS.
- ⑦ STEEL SHEET PILING, SECTION NO. MP-112 OR EQUAL.
- ⑧ FILL THE VOIDS AS SHOWN, WITH CONCRETE OR CONCRETE GROUT, AS APPROVED BY THE ENGINEER.

REVISION: 11-06-2013  
APPROVED: MARCH 24, 2011  
*Nancy Subenberger*  
STATE BRIDGE ENGINEER

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE:
				PROJECT NO. 129594



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*Jeffrey A. Johnson*  
JEFFREY A. JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

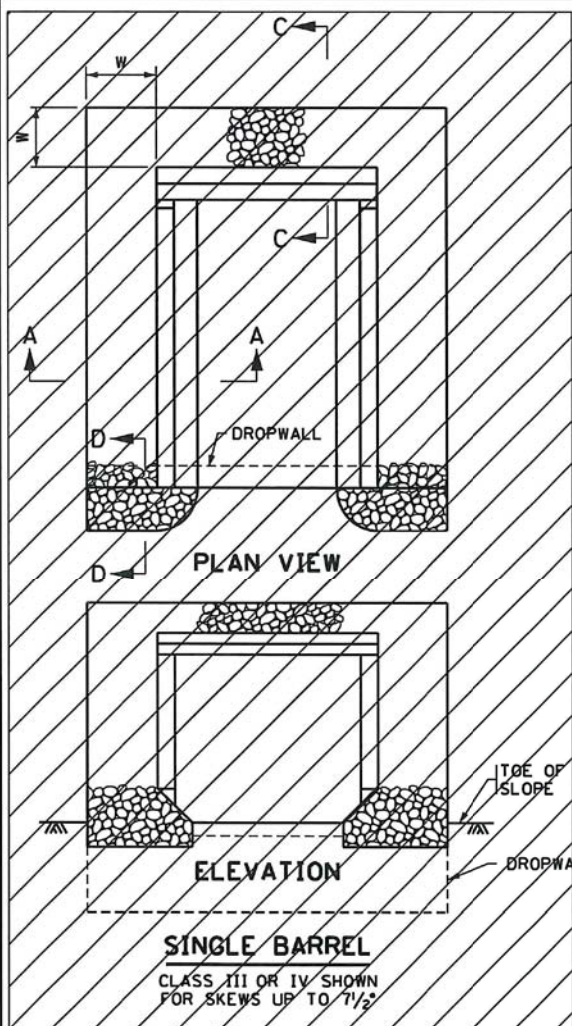
**RAMSEY COUNTY**  
TCAAP BP1  
ALTERNATE DROPWALLS FOR BOX CULVERTS

<b>FIG. 5-395.111</b>		<b>BRIDGE NO.</b> 91071
<b>ALTERNATE DROPWALLS FOR BOX CULVERTS</b>		
COUNTY PROJECT S.A.P. 062-593-004		<b>SHEET NO.</b> 37 C7
S.P.		
S.P.		
S.P.		
<b>63</b>		

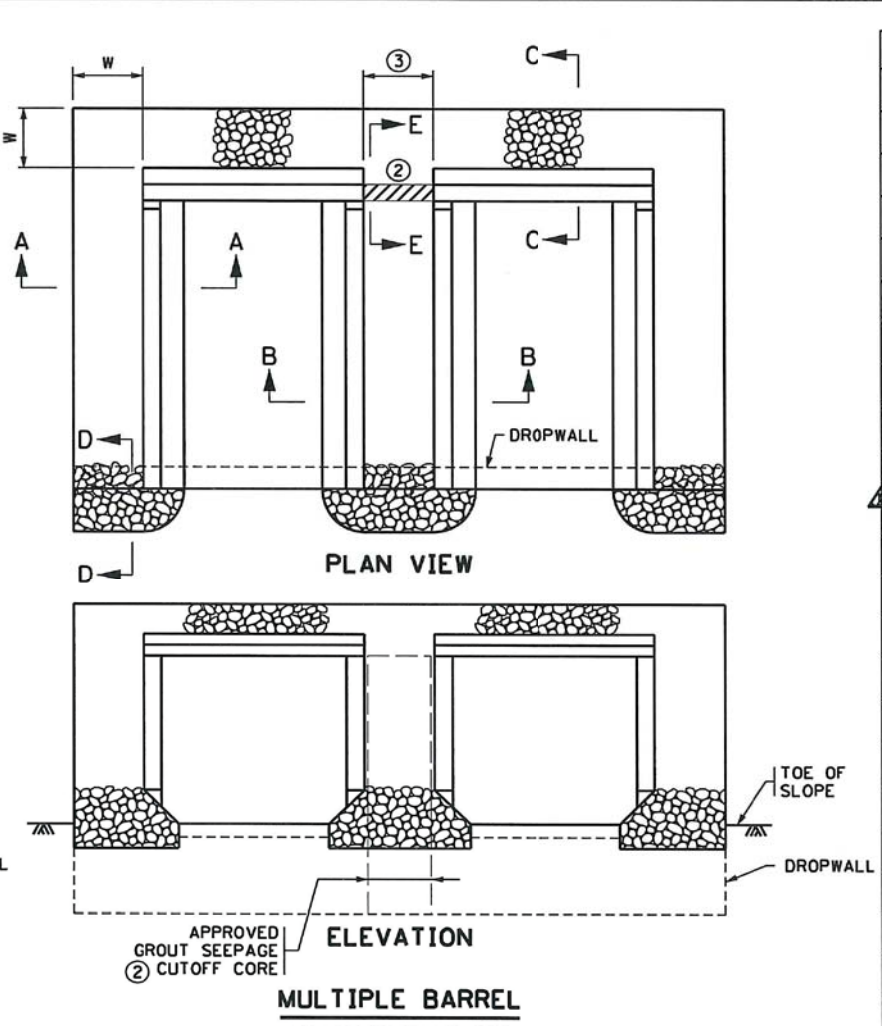
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7/7/2015

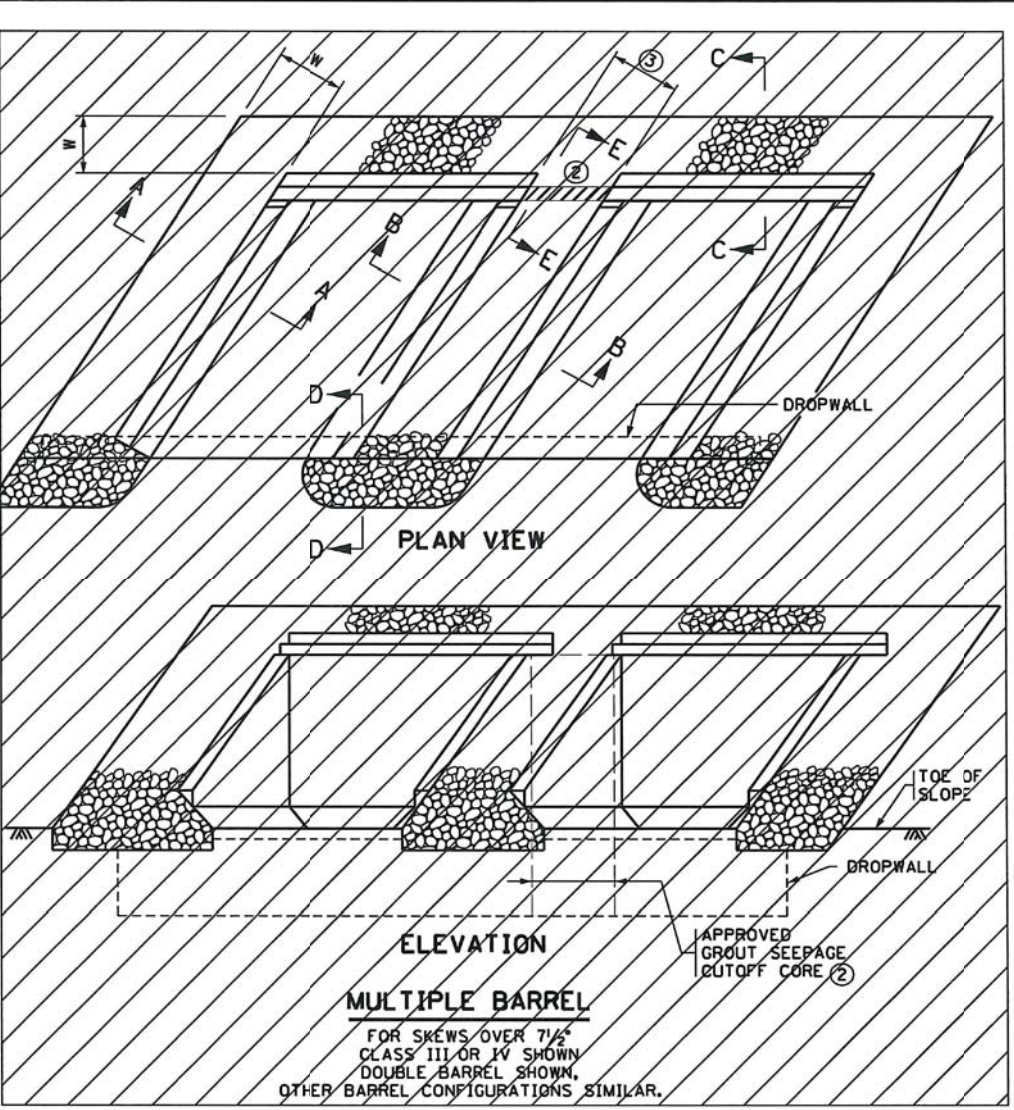
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**SINGLE BARREL**  
CLASS III OR IV SHOWN  
FOR SKEWS UP TO 7 1/2°



**MULTIPLE BARREL**  
FOR SKEWS UP TO 7 1/2°  
CLASS III OR IV SHOWN  
DOUBLE BARREL SHOWN

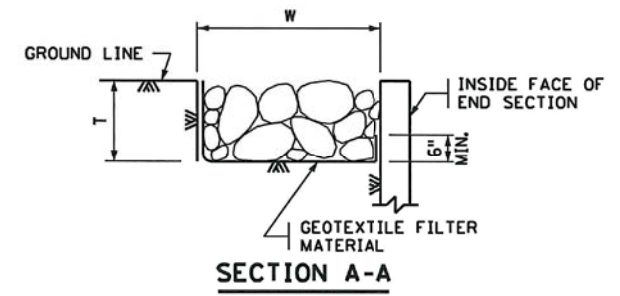


**MULTIPLE BARREL**  
FOR SKEWS OVER 7 1/2°  
CLASS III OR IV SHOWN  
DOUBLE BARREL SHOWN  
OTHER BARREL CONFIGURATIONS SIMILAR.

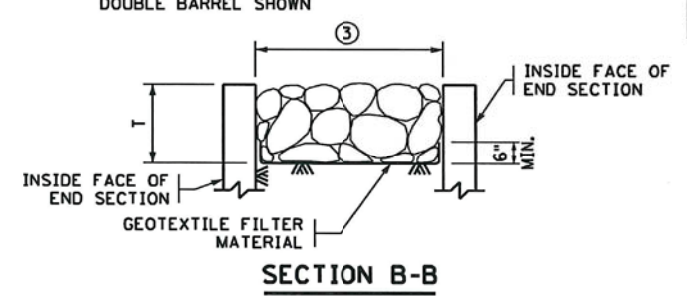
- CONSTRUCTION NOTES**
- THIS PLAN SHEET IS FOR CULVERT EMBANKMENT PROTECTION ONLY. REFER TO THE GRADING PLANS FOR ADDITIONAL RIPRAP OR OTHER SCOUR PROTECTION MEASURES.
- RIPRAP SHALL COMPLY WITH SPECS. 2511 AND 3601.
- FOR TYPE OF GEOTEXTILE FILTER MATERIAL REQUIRED, SEE SPEC. 3733. GEOTEXTILE STRIPS SHOULD BE CONTINUOUS WITHOUT OVERLAPS, EXCEPT FOR THE TOP STRIP, WHICH SHOULD SHINGLE VERTICAL STRIPS. THE TOP EDGE SHOULD BE BURIED TO PREVENT UNDERMINING.
  - IF THE DISTANCE BETWEEN DOUBLE BARRELS IS LESS THAN 2'-0" USE EITHER PEA ROCK OR LEAN MIX BACKFILL (SPEC. 2520) BETWEEN THE CULVERTS AS APPROVED BY THE ENGINEER. IF PEA ROCK IS USED PROVIDE APPROVED GROUT SEEPAGE CUTOFF CORE, MINIMUM 12" THICK BETWEEN THE CULVERT'S TWO ENDS AND PROVIDE CLASS I GROUTED RIPRAP IN LIEU OF CLASS III RIPRAP.
  - REFER TO THE GENERAL PLAN AND ELEVATION SHEET FOR THE DISTANCE BETWEEN BARRELS OF ADJACENT BOXES.

**RIPRAP CLASS**

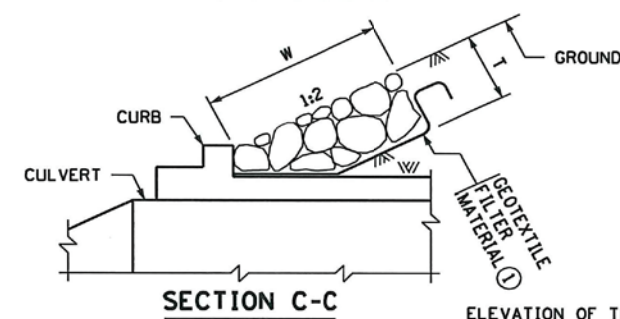
RIPRAP CLASS	RIPRAP CLASS	T	W
<input checked="" type="checkbox"/>	III	1'-6"	3'-0"
<input type="checkbox"/>	IV	2'-0"	4'-0"



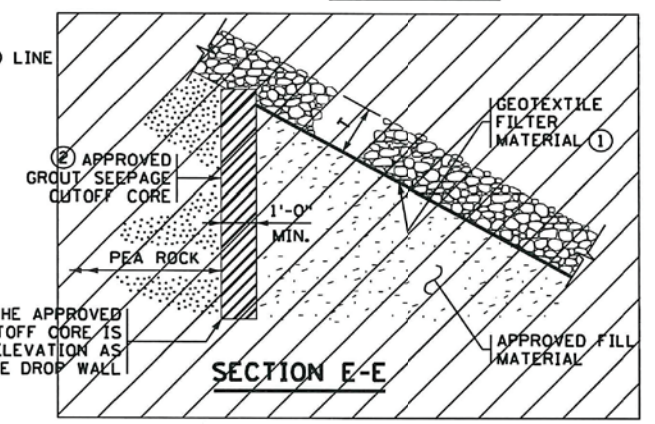
**SECTION A-A**



**SECTION B-B**

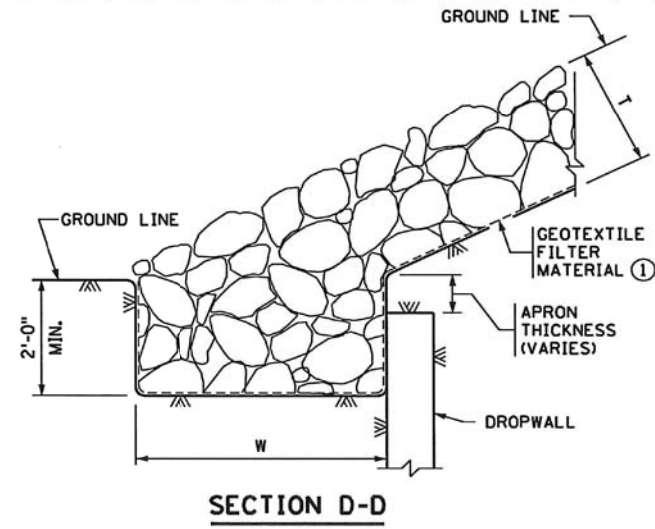


**SECTION C-C**



**SECTION E-E**

ELEVATION OF THE APPROVED GROUT SEEPAGE CUTOFF CORE IS TO BE THE SAME ELEVATION AS THE BOTTOM OF THE DROP WALL



**SECTION D-D**

REVISION:  
APPROVED: SEPTEMBER 11, 2014  
*Nancy Subenberger*  
STATE BRIDGE ENGINEER

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE:
				PROJECT NO. 129594



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*Jeffrey A. Johnson*  
JEFFREY A. JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

**RAMSEY COUNTY**  
TCAAP BP1  
EMBANKMENT PROTECTION FOR BOX CULVERTS

COUNTY PROJECT  
S.A.P. 062-593-004  
S.P.  
S.P.  
S.P.

BRIDGE NO. 91071  
SHEET NO. 38 C8  
63

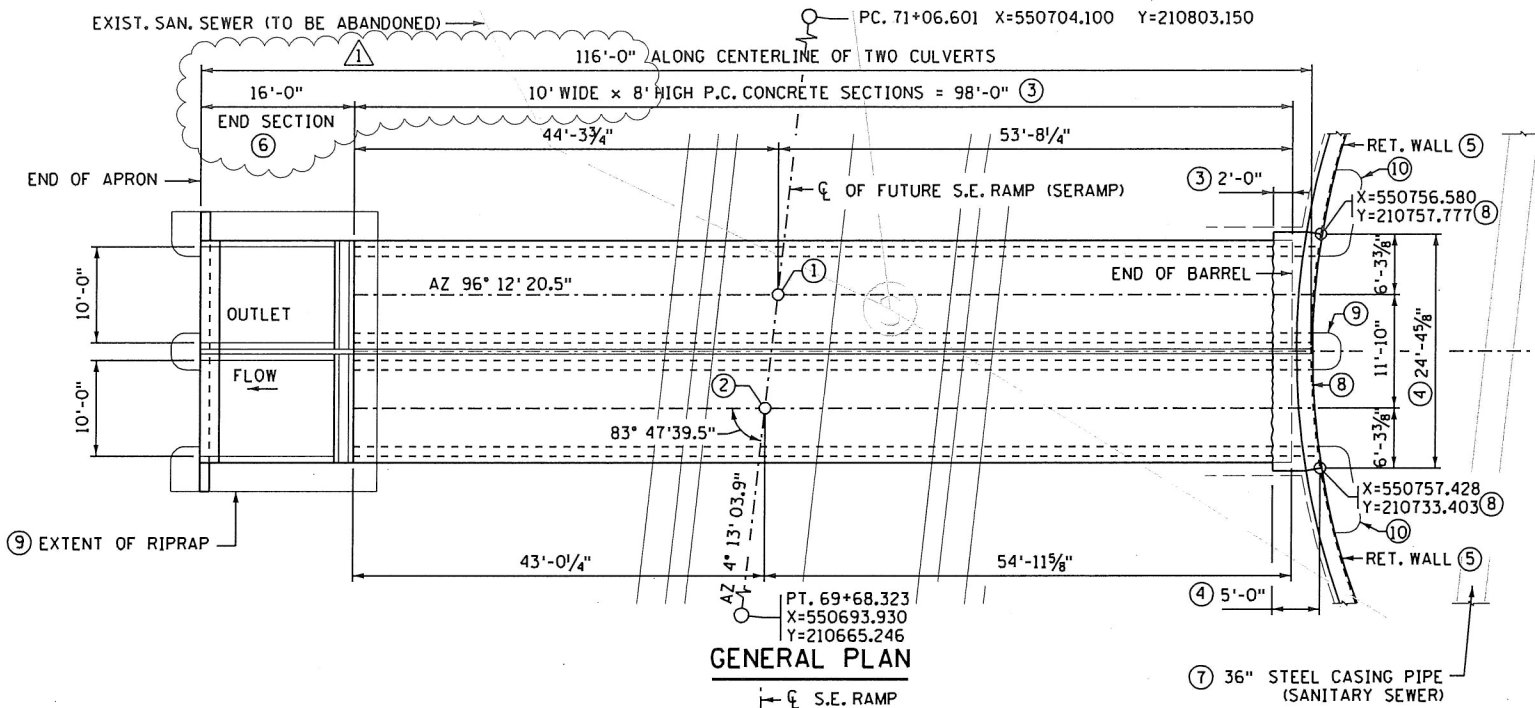
**FIG. 5-395.115**

**EMBANKMENT PROTECTION FOR BOX CULVERTS**

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9/29/2015

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GENERAL PLAN

- ① CONTROL POINT  
CL S.E. RAMP (SERAMP) STA. 70+52.842  
X=550700.146 Y=210749.536
- ② CL S.E. RAMP (SERAMP) STA. 70+40.939  
X=550699.271 Y=210737.665
- ③ CONTRACTOR MAY PROVIDE LONGER BOX SECTION LENGTHS, BUT NEEDS TO MAINTAIN OVERALL LENGTH. THE BOX SECTION ON EAST END IS MODIFIED TO INCORPORATE THE CAST-IN-PLACE CONCRETE END TRANSITION.
- ④ CAST-IN-PLACE CONCRETE END TRANSITIONS.
- ⑤ SEE RETAINING WALL PLANS.
- ⑥ END SECTION TYPE I OR TYPE III.
- ⑦ SEE CIVIL DRAWINGS FOR UTILITY WORK. FUTURE ACCESS TO THESE UTILITIES IS PROHIBITED.
- ⑧ FRONT FACE WALL REFERENCE LINE RADIUS = 74.91'
- ⑨ RIPRAP PER STD. 5-395.115
- ⑩ RIPRAP, 3' x 9' AREA. SEE STD. 5-395.115
- ⑪ DESIGNATED CANOE ROUTE. USE RECESSED TIES THIS CULVERT ONLY.
- ⑫ SEE CIVIL DRAWINGS FOR RE-MEANDERED CREEK ALIGNMENT AND PROFILE.

**DESIGN DATA**

2012 AASHTO LRFD BRIDGE DESIGN, SEVENTH EDITION AND MNDOT BRIDGE DESIGN MANUAL

LOAD AND RESISTANCE FACTOR DESIGN METHOD

HL93 LIVE LOAD

INSIDE HEIGHT = 8'-0"

INSIDE WIDTH = 10'-0"

BARREL LENGTH = 2 LINES OF 98'-0"

HEIGHT OF WINGWALL AT WEST END = 1'-9"

DEPTH OF DROPWALL AT WEST END = 3'-2"

SKREW ANGLE = 83° 47' 39.5"

MINIMUM DESIGN FILL DEPTH = 15'-0"

MAXIMUM DESIGN FILL DEPTH = 25'-0"

UNIT WEIGHT FILL = 130.0 LBS./CU.FT.

ANGLE INTERNAL FRICTION = 30°

MATERIAL DESIGN PROPERTIES:

PRECAST CONCRETE:

f<sub>y</sub> = 60 KSI REINFORCEMENT BARS

f'<sub>c</sub> = 5 KSI CONCRETE

f<sub>y</sub> = 65 KSI WELDED WIRE FABRIC REINFORCEMENT

**LIST OF SHEETS**

NO.	DESCRIPTION
D1	GENERAL PLAN, LONGITUDINAL AND TRANSVERSE SECTIONS
D2	BRIDGE QUANTITIES
D3-D5	CAST-IN-PLACE CONCRETE END TRANSITION DETAILS
D6	CULVERT DETAILS, BILL OF REINFORCEMENT AND QUANTITIES
D7-D12	BARREL DETAILS
D13	BRIDGE SURVEY SHEET
RW1	RETAINING WALL GENERAL NOTES AND SUMMARY OF QUANTITIES
RW2-RW12	RETAINING WALL DETAILS

**CONSTRUCTION NOTES**

THE 2014 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION" AND THE 2014 EDITION OF THE "MATERIALS LAB SUPPLEMENTAL SPECIFICATIONS FOR CONSTRUCTION" SHALL GOVERN.

THE BAR SIZES SHOWN IN THIS PLAN ARE IN U.S. CUSTOMARY DESIGNATIONS.

BAR MARKED WITH THE SUFFIX "E" SHALL BE EPOXY COATED IN ACCORDANCE WITH SPEC. 3301.

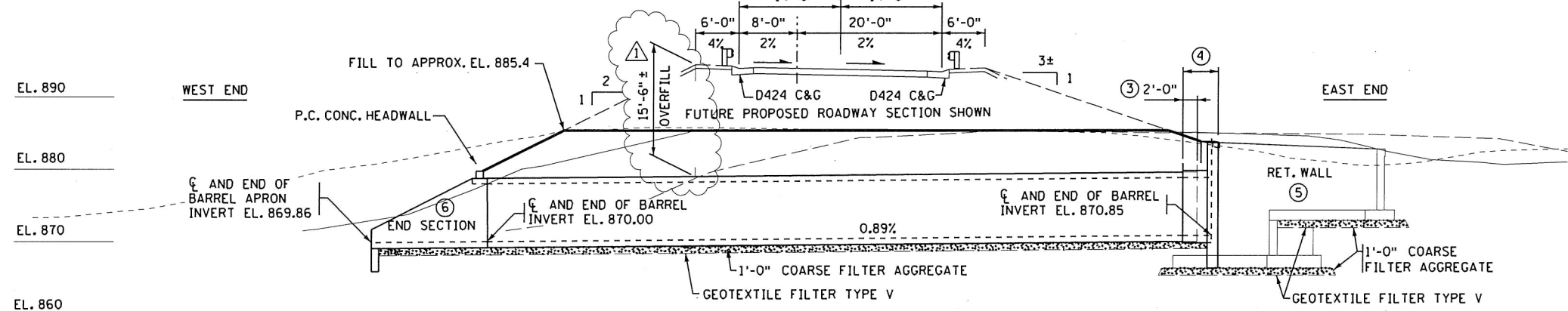
DRAWINGS ARE NOT TO BE SCALED.

JOINTS BETWEEN SECTIONS TO BE WRAPPED IN ACCORDANCE WITH SPEC 2412.

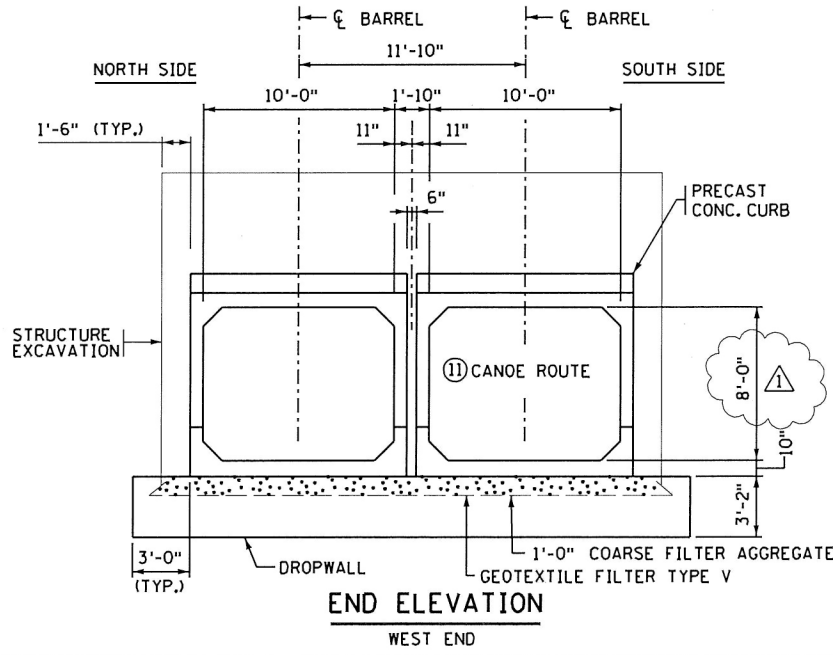
ALL EXPOSED CONCRETE EDGES SHALL BE FORMED WITH A 1/2" OR 3/4" CHAMFER UNLESS OTHERWISE NOTED.

CONSTRUCTION TO BE IN ACCORDANCE WITH SPEC. 2411 AND 2412, EXCEPT AS NOTED.

FOR STRUCTURE EXCAVATION AND BACKFILL SEE SPEC. 2451.



SIDE ELEVATION



END ELEVATION

**EXISTING GROUND PROFILE**

25' NORTH -----

CL CULVERTS -----

25' SOUTH -----

THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D. THIS UTILITY QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF C1/ASCE 38-02, ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA". SEE BORING SHEETS FOR INPLACE UTILITIES.

APPROVED: \_\_\_\_\_ RAMSEY COUNTY ENGINEER

DATE: \_\_\_\_\_

**BRIDGE NO. 62X04**

DBL. 10' WIDE x 8' HIGH BOX CULVERT RAMP FROM I-35W N.B. TO COUNTY RD. H OVER RICE CREEK 1.2 MILES NORTH OF THE JUNCTION OF I-694 IN ARDEN HILLS IDENTIFICATION NO. 113

**GENERAL PLAN AND ELEVATION**

SEC. 9 TWP. 030 N. R. 23 W.

CITY OF ARDEN HILLS RAMSEY CO.

APPROVED: \_\_\_\_\_ STATE BRIDGE ENGINEER

DATE: \_\_\_\_\_

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE:
▲	9-30-15	ADDENDUM NO. 1		PROJECT NO. 129594



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JEFFREY A JOHNSON

DATE: 7-7-15 MN LIC. NO. 17280

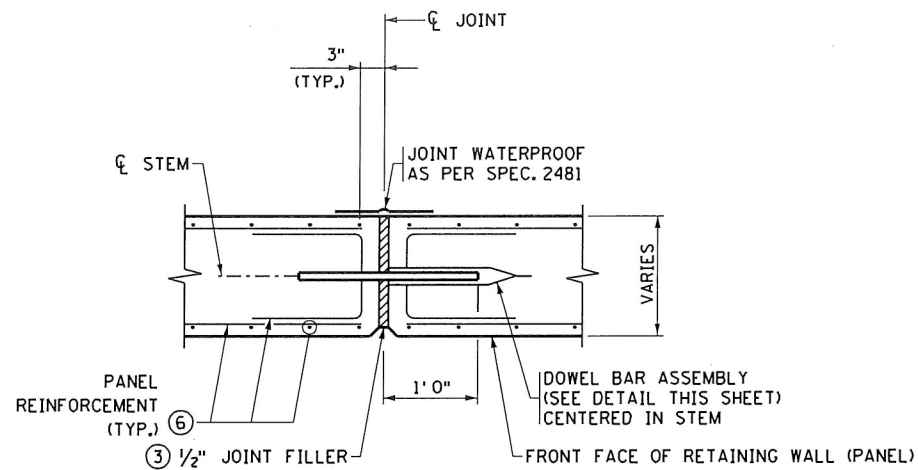
**RAMSEY COUNTY**

TCAAP BP1

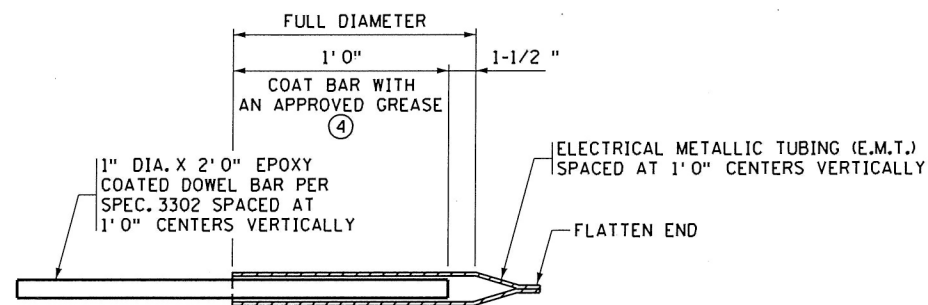
CULVERT

GENERAL PLAN, LONGITUDINAL AND TRANSVERSE SECTION

COUNTY PROJECT	SHEET NO.
S.A.P. 062-593-004	39
S.P.	D1
S.P.	63
S.P.	



**CORK AND DOWELED JOINT DETAIL**  
(TYPICAL SECTION THROUGH JOINT)



**DOWEL BAR ASSEMBLY**

**NOTES:**

THE MATERIALS AND PLACEMENT OF THE CORK AND DOWEL JOINT/ CONSTRUCTION JOINT (DOWEL BAR ASSEMBLIES, NO. 16 REINFORCING BARS, JOINT FILLER, AND JOINT WATERPROOFING) ARE INCIDENTAL FOR WHICH NO DIRECT PAYMENT WILL BE MADE.

THE CONTRACTOR SHALL ASSIGN TO THE REINFORCING BAR SUPPLIER THE RESPONSIBILITY OF SUPPLYING THE NECESSARY MATERIALS ASSOCIATED WITH THE DETAILS SHOWN ON THIS SHEET.

- ③ JOINT FILLER SHALL BE CORK (SPEC. 2401.3E3).
- ④ GREASE SHALL BE AN APPROVED HIGH PRESSURE TYPE THAT IS EFFECTIVE OVER THE FULL RANGE OF EXPECTED TEMPERATURES AND RESISTANT TO CHEMICAL ACTION.
- ⑤ DOWEL BAR ASSEMBLY MUST BE INSTALLED PERPENDICULAR TO JOINT AND PARALLEL TO THE WALL FACE, AND TO EACH OTHER.
- ⑥ SEE REINFORCING DETAILS.

**62X04 QUANTITIES FOR BOX CULVERT AND RETAINING WALLS**

SPEC NO	ITEM	UNIT	BOX CULVERT	RETAINING WALLS	TOTAL
2401.601	STRUCTURE EXCAVATION	LUMP SUM	1		1
2411.501	STRUCTURAL CONCRETE (1A43)	CU YD		43	43 (P)
2411.501	STRUCTURAL CONCRETE (3Y43)	CU YD	25	81	106 (P)
2411.541	REINFORCEMENT BARS	POUND		4146	4146 (P)
2411.541	REINFORCEMENT BARS EPOXY COATED	POUND	① 4790	7338	① 12128 (P)
2411.618	ANTI-GRAFFITI COATING	SQ. FT.	① 91	649	① 740 (P)
2411.618	ARCH CONCRETE TEXTURE (ASHLAR STONE)	SQ. FT.	① 91	649	① 740 (P)
2411.618	ARCH SURFACE FINISH (MULTI-COLOR)	SQ. FT.	① 91	649	① 740 (P)
2412.511	10 x 8 PRECAST CONCRETE BOX CULVERT	LIN. FT.	196		196 (P)
2412.512	10 x 8 PRECAST CONCRETE BOX CULVERT END SECTION	EACH	2		2 (P)
2451.511	COARSE FILTER AGGREGATE (CV)	CU. YD.	① 115	59	① 174 (P)
2502.502	DRAINAGE SYSTEM TYPE (WALL)	LUMP SUM	1		1
2511.501	RANDOM RIPRAP CLASS III	CU YD	① 15		① 15 (P)
2511.515	GEOTEXTILE FILTER TYPE V	SQ YD	490	213	703 (P)

- ①
- ②
- ③

- ① FORM LINER.
- ② PAYMENT FOR ALL PRECAST COMPONENTS INCLUDING DESIGN, SUBMITTALS, ALL CONNECTIONS, WATERPROOFING, FABRICATION, HAULING AND COMPLETE INSTALLATION SHALL BE INCLUDED IN THE PRICE BID FOR "10x8 PRECAST CONCRETE BOX CULVERT".
- ③ COARSE FILTER AGGREGATE SHALL BE AN AGGREGATE WITH 100% PASSING THE 2" SIEVE, 0-10% PASSING THE #4 SIEVE, 0-3% PASSING THE #200 SIEVE. THE COARSE FILTER AGGREGATE SHALL CONSIST OF CRUSHED QUARRY ROCK.

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				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE:
①	9-30-15	ADDENDUM NO. 1		PROJECT NO. 129594



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*Jeffrey A. Johnson*  
JEFFREY A. JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

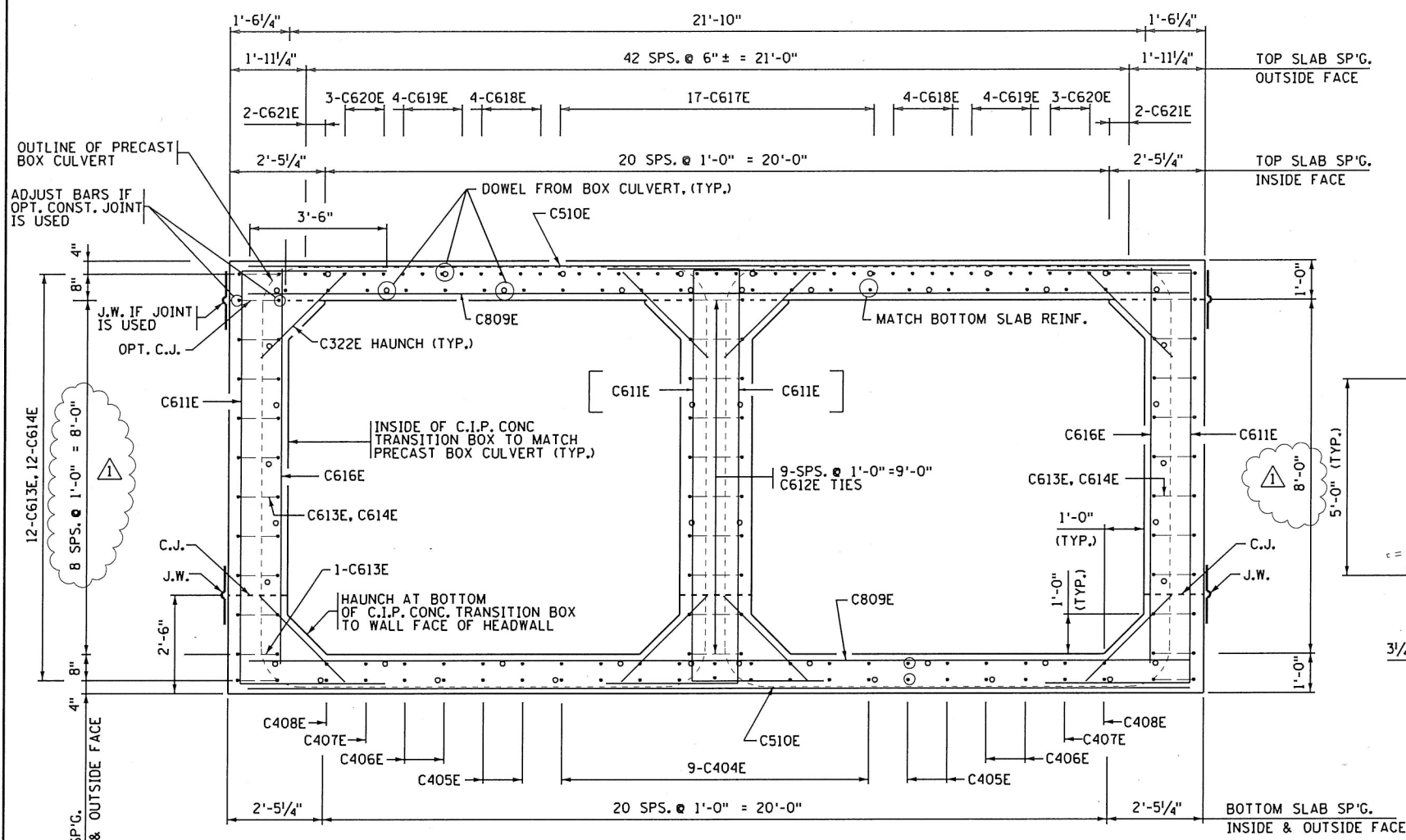
**RAMSEY COUNTY**  
TCAAP BP1  
BRIDGE QUANTITIES

COUNTY PROJECT	SHEET NO.
S.A.P. 062-593-004	40
S.P.	D2
S.P.	
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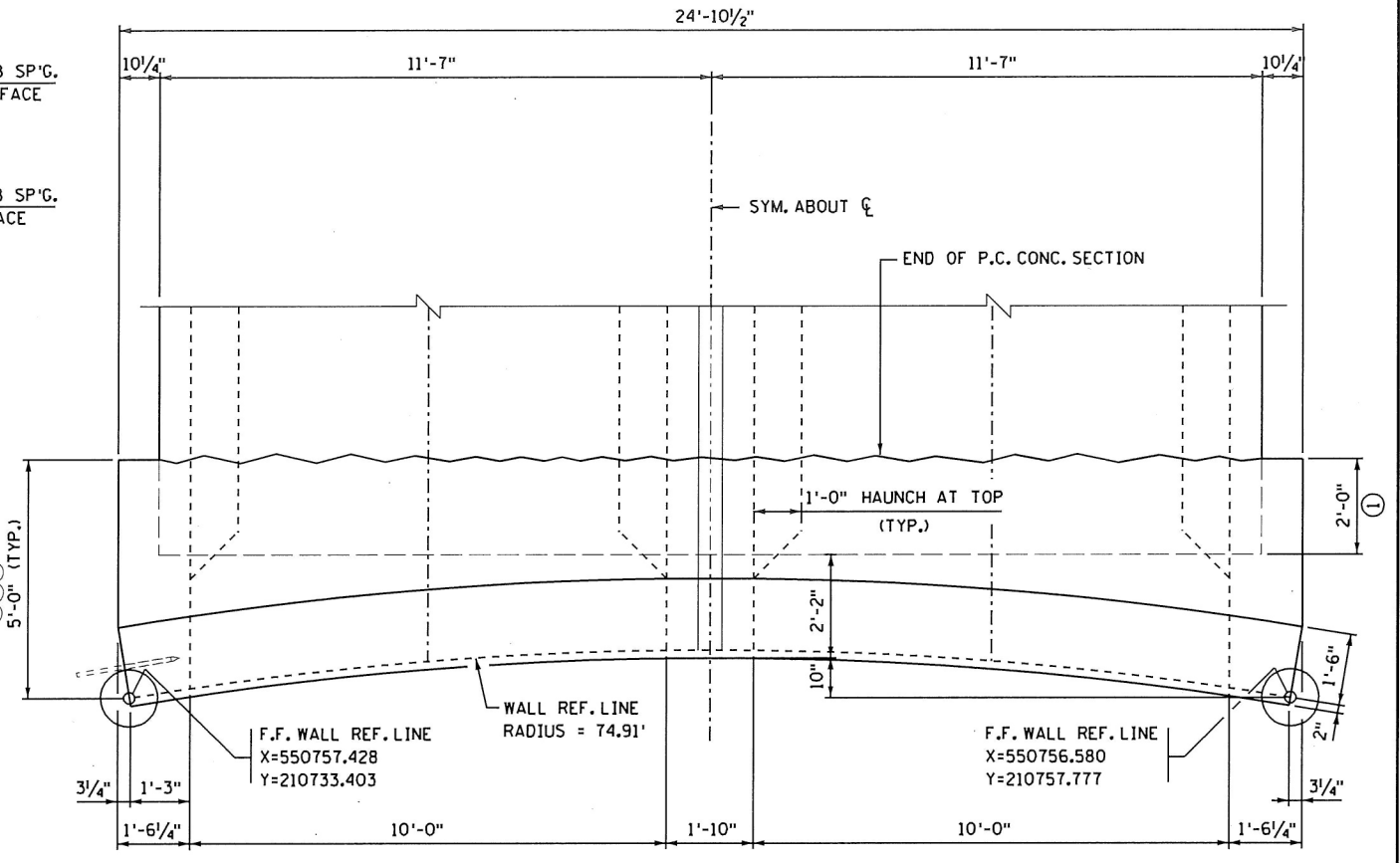
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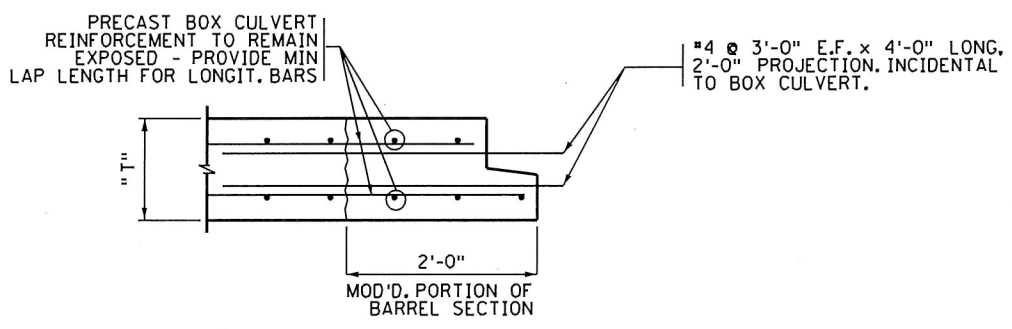
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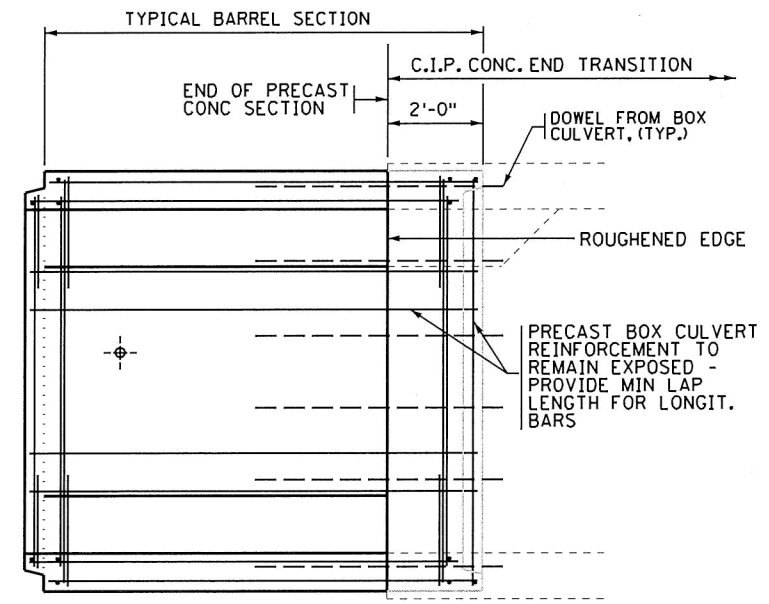
**TYPICAL BOX SECTION A-A**



**C.I.P. CONCRETE END TRANSITION PLAN**



**TONGUE AND GROOVE JOINT DETAIL AT PRECAST BARREL SECTION**  
EAST BARREL END



**MODIFIED LONGITUDINAL BARREL SECTIONS**  
BAR REINFORCEMENT OPTION SHOWN

- NOTES:**
- C.J. = CONSTRUCTION JOINT
  - OPT. C.J. = OPTIONAL CONSTRUCTION JOINT
  - J.W. = JOINT WATERPROOFING
  - ① MODIFIED PORTION OF BOX SECTION.

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①	9-30-15	ADDENDUM NO. 1		PROJECT NO. 129594



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JEFFREY A JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

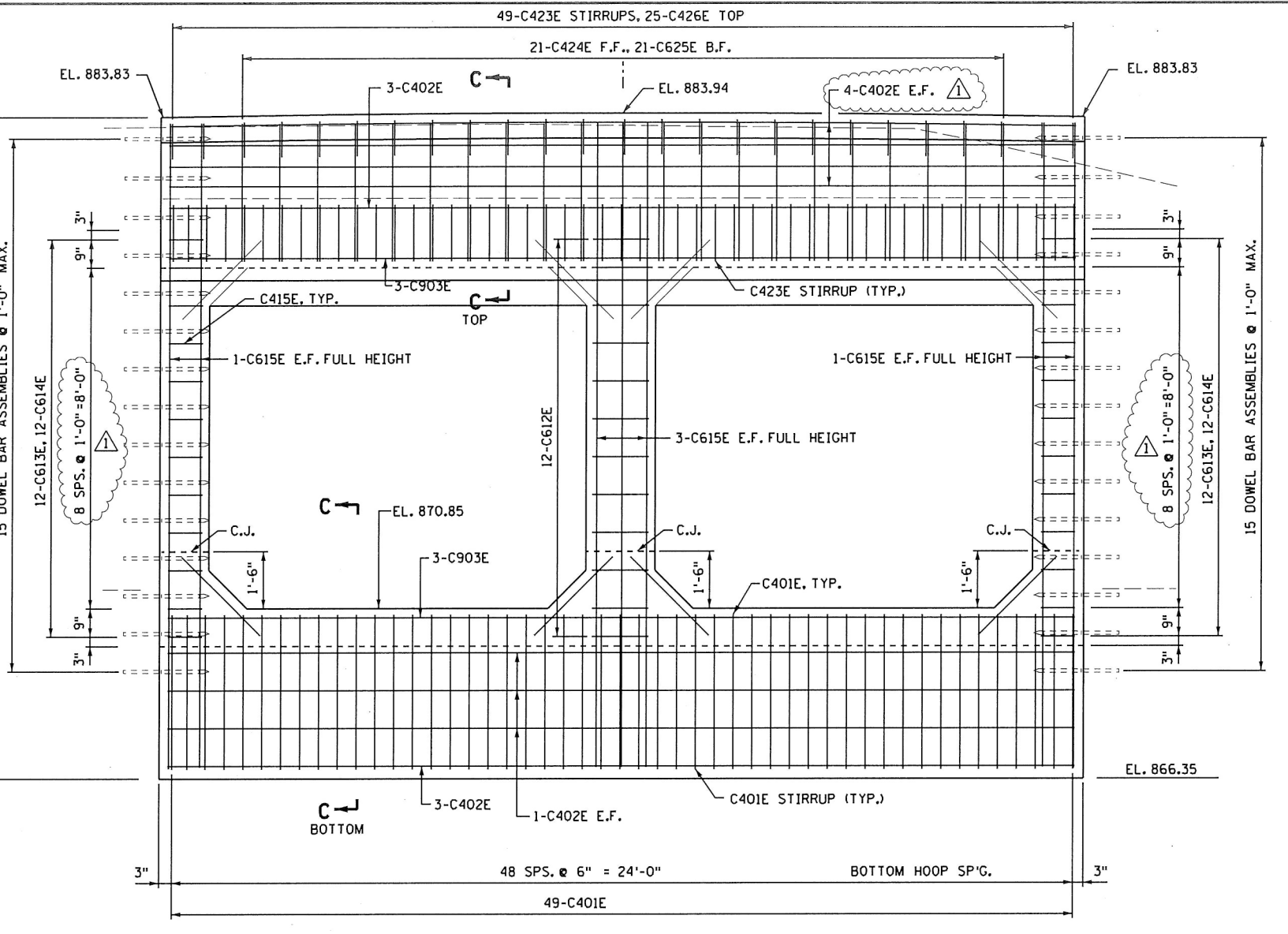
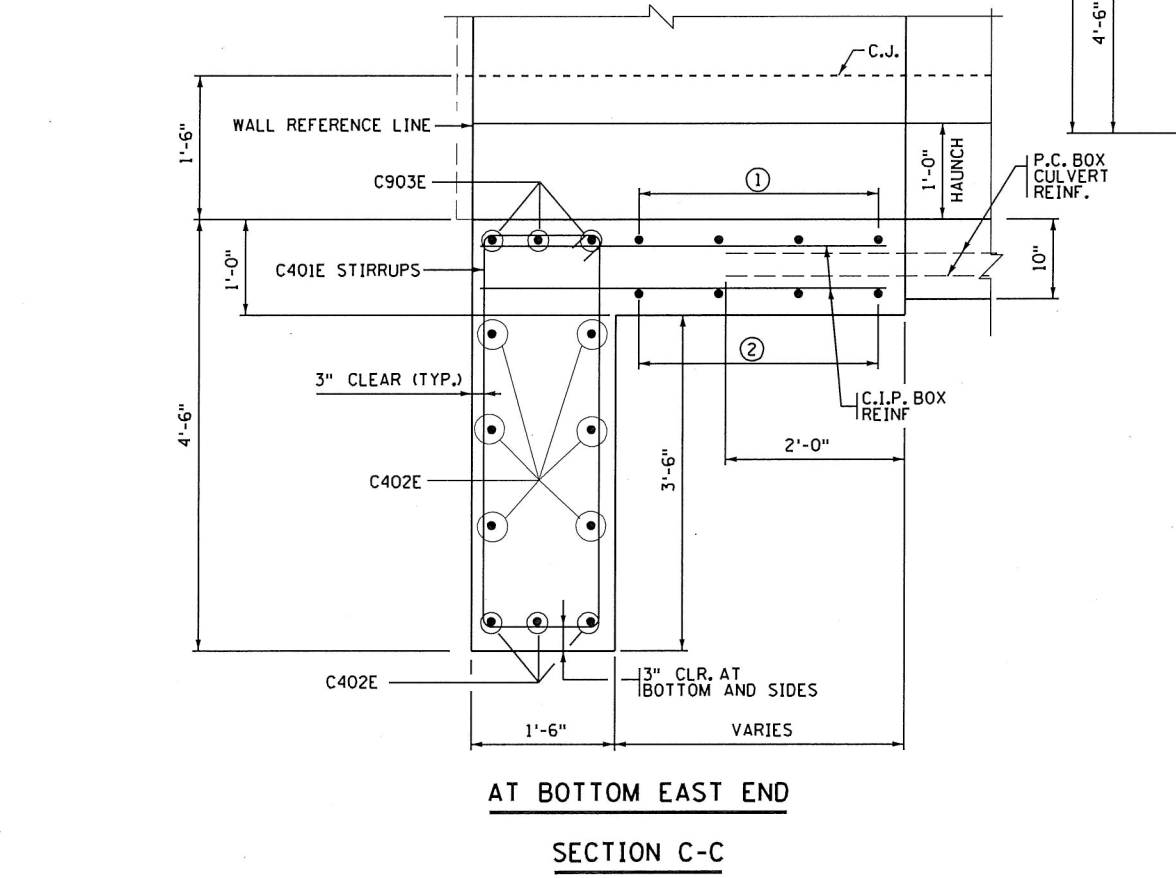
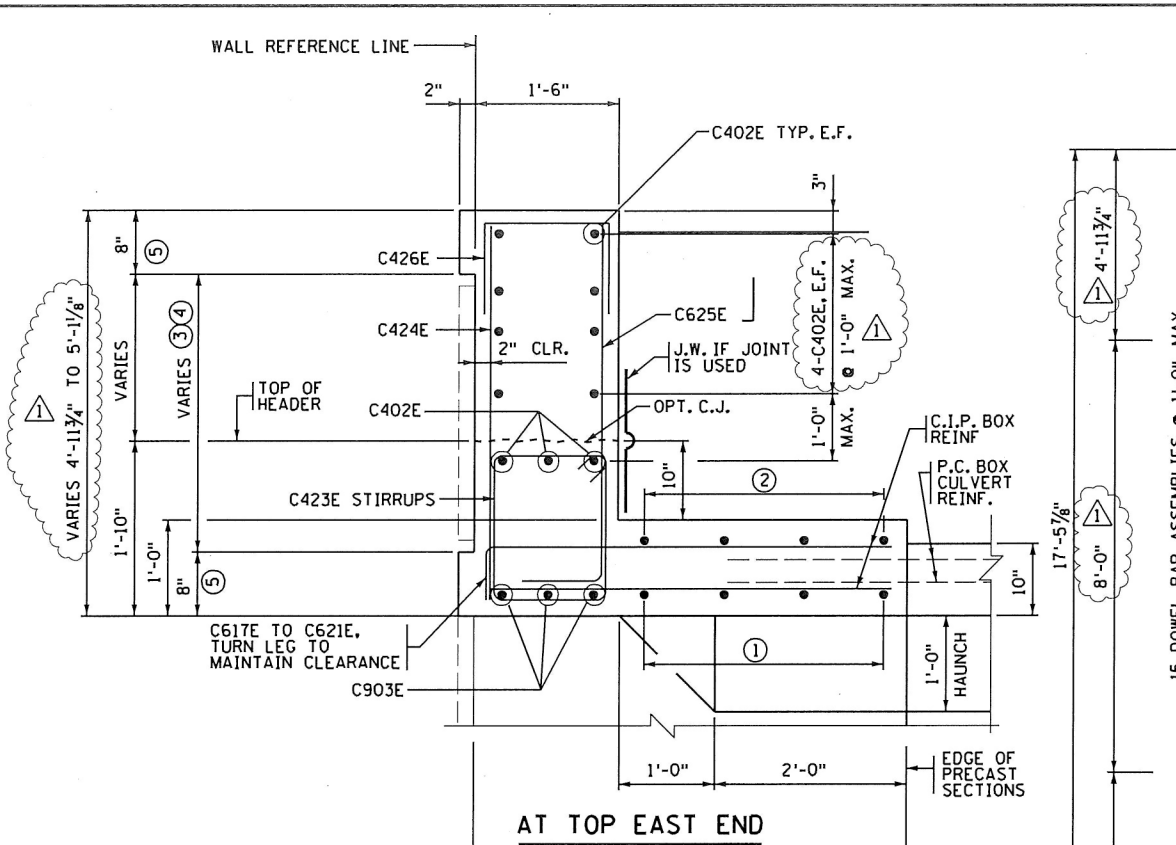
**RAMSEY COUNTY**  
TCAAP BP1  
CULVERT  
CAST-IN-PLACE CONCRETE TRANSITION DETAILS

COUNTY PROJECT	SHEET NO.
S.A.P. 062-593-004	41
S.P.	D3
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S.P.	
S.P.	63

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NOTES:

- ① 4-C809E @ 10" SPS. = 2'-6"
- ② 4-C510E @ 10" SPS. = 2'-6"
- ③ ARCHITECTURAL CONCRETE TEXTURE (ASHLAR STONE)
- ④ ARCHITECTURAL CONCRETE SURFACE FINISH (MULTI-COLOR)
- ⑤ SMOOTH FINISH

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				DATE:
				PROJECT NO. 129594
①	9-30-15	ADDENDUM NO. 1		



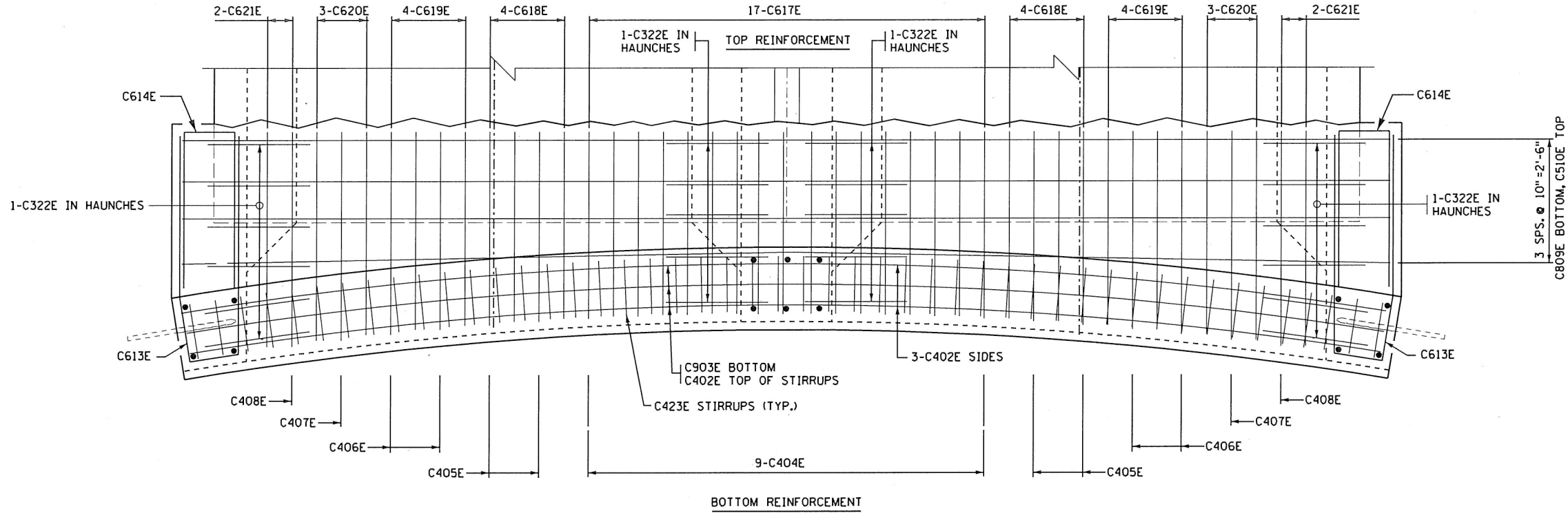
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JEFFREY A JOHNSON  
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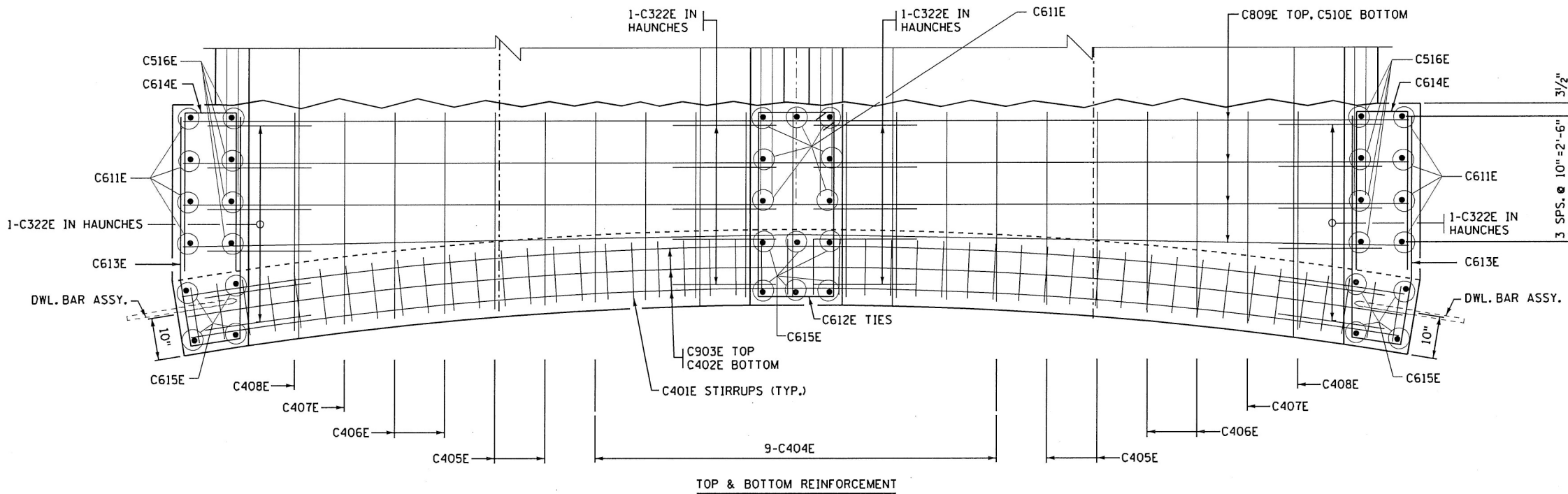
**RAMSEY COUNTY**  
TCAA BP1  
CULVERT  
CAST-IN-PLACE CONCRETE TRANSITION DETAILS

COUNTY PROJECT	
S.A.P.	062-593-004
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TOP SLAB PLAN



BOTTOM SLAB PLAN

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				DRAWN BY: MAW
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*Jeffrey A. Johnson*  
JEFFREY A. JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

**RAMSEY COUNTY**  
TCAAP BP1  
CULVERT  
CAST-IN-PLACE CONCRETE TRANSITION DETAILS

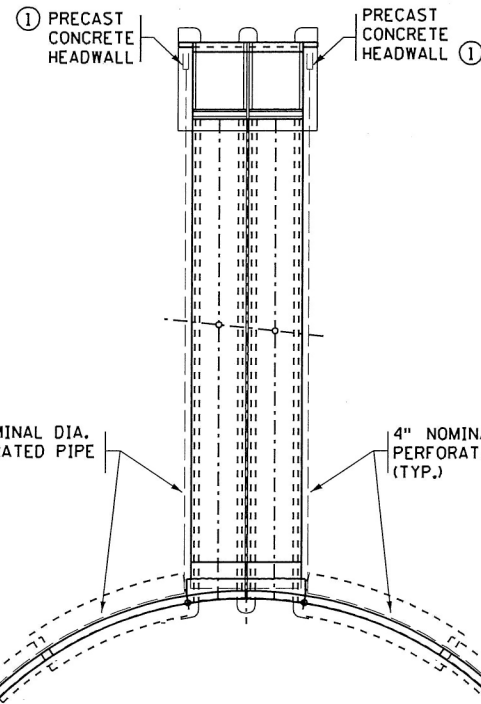
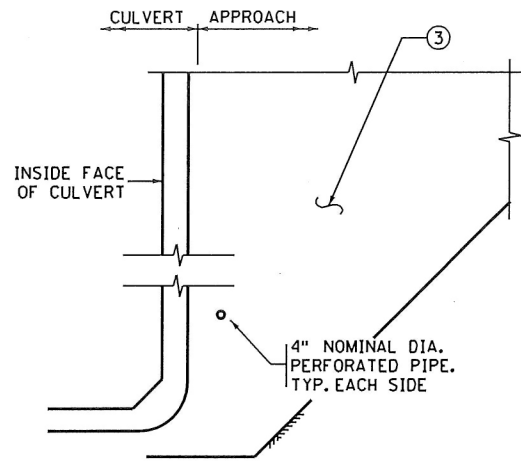
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**NOTES:**

ALL PIPE SHALL COMPLY WITH Mn/DOT SPEC. 3245.

WRAP PERFORATED PIPE WITH GEOTEXTILE AS PER Mn/DOT SPEC. 3733, TYPE 1. ATTACH TO PIPE AS PER Mn/DOT SPEC. 2502.

① PRECAST CONCRETE HEADWALL WITH RODENT SCREEN. SEE STANDARD PLATE 3131 FOR DETAILS.

② 1/8" PER FT. MINIMUM SLOPE.

③ BACKFILL MATERIAL. (UNDER GRADING PORTION OF CONTRACT)

SEE RETAINING WALL DETAILS FOR ADDITIONAL DETAILS.

**DRAINAGE SYSTEM TYPE WALL**

BAR MARK	NO. OF BARS	LENGTH	SHAPE	LOCATION
<b>END TRANSITION EPOXY COATED BARS</b>				
C401E	49	11'-6"	BENT	VERT. STIRRUPS CUT-OFF WALL
C402E	20	24'-2"	STR	HORIZ CUT-OFF WALL
C903E	6	24'-2"	STR	HORIZ CUT-OFF WALL
C404E	18	3'-8"	STR	LONGIT. BOTTOM SLAB
C405E	8	3'-10"	STR	LONGIT. BOTTOM SLAB
C406E	8	4'-0"	STR	LONGIT. BOTTOM SLAB
C407E	4	4'-2"	STR	LONGIT. BOTTOM SLAB
C408E	4	4'-4"	STR	LONGIT. BOTTOM SLAB
C809E	8	24'-4"	STR	TRANSVERSE SLAB
C510E	8	24'-4"	STR	TRANSVERSE SLAB
C611E	23	17'-4"	BENT	VERT. FACE
C612E	12	11'-6"	BENT	HORIZ. TIES
C613E	24	10'-0"	BENT	HORIZ. TIES
C614E	24	7'-2"	BENT	HORIZ. TIES
C615E	14	17'-0"	STR	VERT
C616E	8	9'-8"	STR	VERT
C617E	17	4'-8"	BENT	LONGIT.. TOP TOP SLAB
C618E	8	4'-10"	BENT	LONGIT.. TOP TOP SLAB
C619E	8	5'-0"	BENT	LONGIT.. TOP TOP SLAB
C620E	6	5'-2"	BENT	LONGIT.. TOP TOP SLAB
C621E	4	5'-4"	BENT	LONGIT.. TOP TOP SLAB
C322E	48	3'-1"	STR	DIAGONAL HAUNCH
C423E	49	6'-1"	BENT	VERT. STIRRUPS HEADER
C424E	21	4'-8"	STR	VERT. HEADER WALL F.F.
C625E	21	5'-8"	BENT	VERT. HEADER WALL B.F.
C426E	25	3'-2"	BENT	HEADER TOP

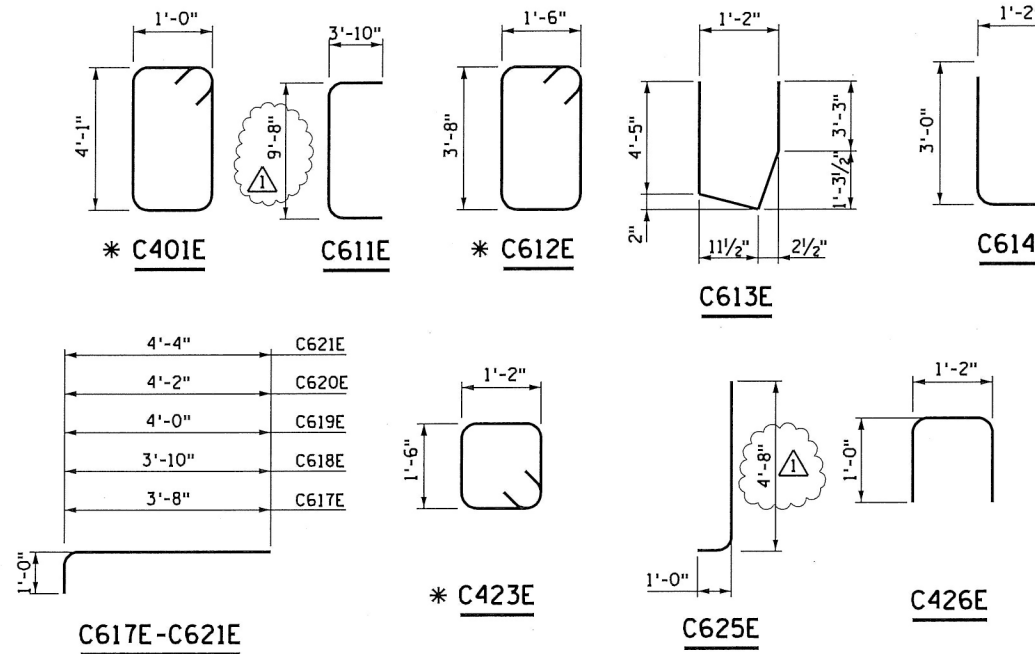
**QUANTITIES FOR CULVERT & C.I.P. CONC. END TRANSITIONS**

ITEM	UNIT	QUANTITY
STRUCTURE CONCRETE (3Y43)	CU YD	25
REINFORCEMENT BARS EPOXY COATED	POUND	4790
STRUCTURE EXCAVATION	LUMP SUM	1
10 x 8 PRECAST CONCRETE BOX CULVERT	LIN FT	196
10 x 8 PRECAST CONCRETE BOX CULVERT END SECTION	EACH	1
DOWEL BAR ASSEMBLY		

① CONTRACTOR MAY PROVIDE LONGER BOX SECTION LENGTHS, BUT NEEDS TO MAINTAIN OVERALL LENGTH. THE BOX SECTIONS ON EAST END ARE MODIFIED TO INCORPORATE THE CAST-IN-PLACE CONCRETE END TRANSITION. PAYMENT FOR ALL PRECAST COMPONENTS INCLUDING DESIGN, SUBMITTALS, ALL CONNECTIONS, WATERPROOFING, FABRICATION, HAULING AND COMPLETE INSTALLATION SHALL BE INCLUDED IN THE PRICE BID FOR "10x8 PRECAST CONCRETE BOX CULVERT".

② SEE DETAILS ON SHEET C2. (INCIDENTAL)

③ INCLUDES CULVERT END SECTION TRANSITION AND HEADWALL REINFORCEMENT.



**BAR BENDING DIAGRAMS**

• BAR TYPE USES STANDARD STIRRUP AND TIE HOOKS.

NOTE  
BENT BAR DIMENSIONS GIVEN ARE OUT-TO-OUT. ACTUAL BAR LENGTHS SHALL BE DETERMINED BASED ON DIMENSIONS SHOWN IN THE BAR BENDING DIAGRAMS. TOTAL BAR LENGTHS SHOWN ARE FOR USE IN COMPUTING REINFORCEMENT BAR WEIGHTS FOR PAYMENT ONLY.

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JEFFREY A JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280



TCAAP BP1  
CULVERT  
BILL OF REINFORCEMENT  
AND QUANTITIES

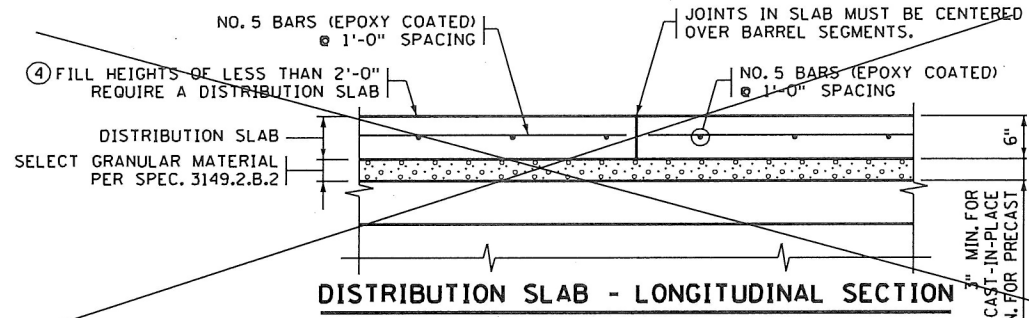
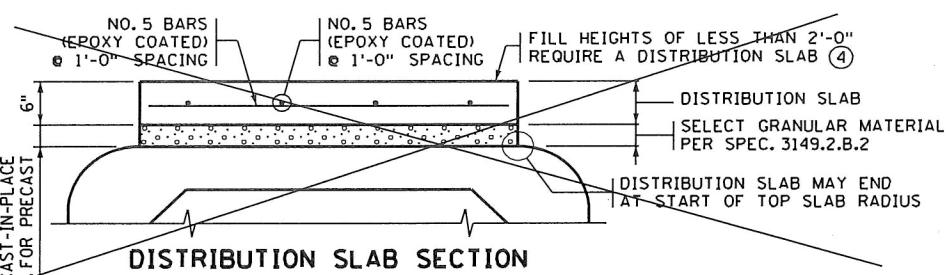
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**CONSTRUCTION NOTES**

CULVERTS TO BE CONSTRUCTED AS PER SPEC. 2412 EXCEPT AS NOTED.

REFER TO THE GENERAL PLAN AND ELEVATION SHEET FOR THE DISTANCE BETWEEN BARRELS OF ADJACENT BOXES AND TO STANDARD FIGURE 5-395.115 FOR MATERIAL REQUIREMENTS FOR FILL BETWEEN ADJACENT BOXES.

THE WELDED WIRE FABRIC, SHEAR REINFORCEMENT AND REINFORCEMENT BARS SHALL CONFORM TO APPLICABLE REQUIREMENTS OF AASHTO M259.

1/2" MIN. AND 2" MAX. CONCRETE COVER ON ALL REINFORCEMENT, INCLUDING SHEAR REINFORCEMENT, EXCEPT FOR TONGUE AND GROOVE DETAIL.

ANY OF THE FOLLOWING COMBINATIONS OF STEEL REINFORCEMENT MAY BE USED:  
 (a) 1 OR 2 LAYERS OF WELDED WIRE FABRIC OR  
 (b) 1 LAYER OF WELDED WIRE FABRIC AND 1 LAYER OF REINFORCEMENT BARS OR  
 (c) 1 LAYER OF REINFORCEMENT BARS.

THE REINFORCEMENT SHALL BE DEVELOPED IN ACCORDANCE WITH AASHTO "LRFD BRIDGE DESIGN SPECIFICATIONS". IF BAR REINFORCEMENT IS SUBSTITUTED FOR WELDED WIRE FABRIC, THE AREA OF REINFORCEMENT SHALL BE INCREASED BY 8%, AND CONTRACTOR SHALL SUBMIT DESIGN CALCULATIONS VERIFYING COMPLIANCE WITH AASHTO 5.7.3.4. "CONTROL OF CRACKING BY DISTRIBUTION OF REINFORCEMENT".

THE MAXIMUM SIZE OF REINFORCEMENT BARS SHALL BE NO. 6. THE MAXIMUM WELDED WIRE FABRIC SIZE SHALL BE A W23 PER LAYER (MAXIMUM OF 2 LAYERS).

THE SPACING CENTER TO CENTER OF THE TRANSVERSE WIRES SHALL NOT BE LESS THAN 2" NOR MORE THAN 4". THE SPACING CENTER TO CENTER OF THE LONGITUDINAL WIRES SHALL NOT BE MORE THAN 8".

WELDING WILL NOT BE ALLOWED ON REINFORCEMENT BARS OR WELDED WIRE FABRIC, EXCEPT THAT THE ORIGINAL WELDING REQUIRED TO MANUFACTURE WIRE FABRIC IS ACCEPTABLE.

WHEN REINFORCEMENT IS CUT, ADDITIONAL REINFORCEMENT SHALL BE ADDED ON BOTH SIDES OF THE CUT MEMBER TO REPLACE OR EXCEED THE CUT STEEL.

CONCRETE SHALL BE MIX NO. 3W36 WITH NO CALCIUM CHLORIDE ALLOWED.

SHOP DRAWING APPROVAL PER SPEC. 3238.2.A IS NOT REQUIRED UNLESS OPENINGS OR ATTACHMENTS ARE PLACED ON A BARREL SEGMENT.

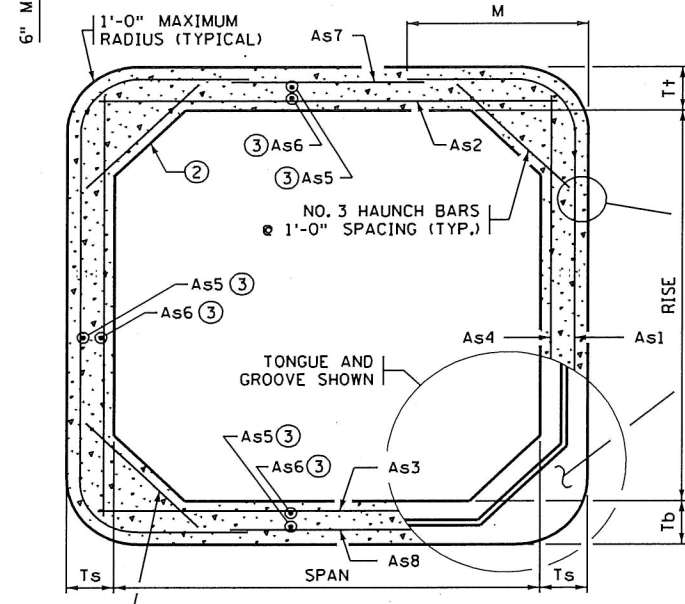
COMPACT THE FIRST 1.5' (LOOSE) OF FILL ABOVE THE BOX WITH LIGHT COMPACTION EQUIPMENT SUCH AS PLATE COMPACTORS OR WALK BEHIND ROLLERS.

TRANSVERSE REINFORCEMENT IS PARALLEL TO THE CULVERT SPAN. LONGITUDINAL REINFORCEMENT IS PERPENDICULAR TO THE CULVERT SPAN.

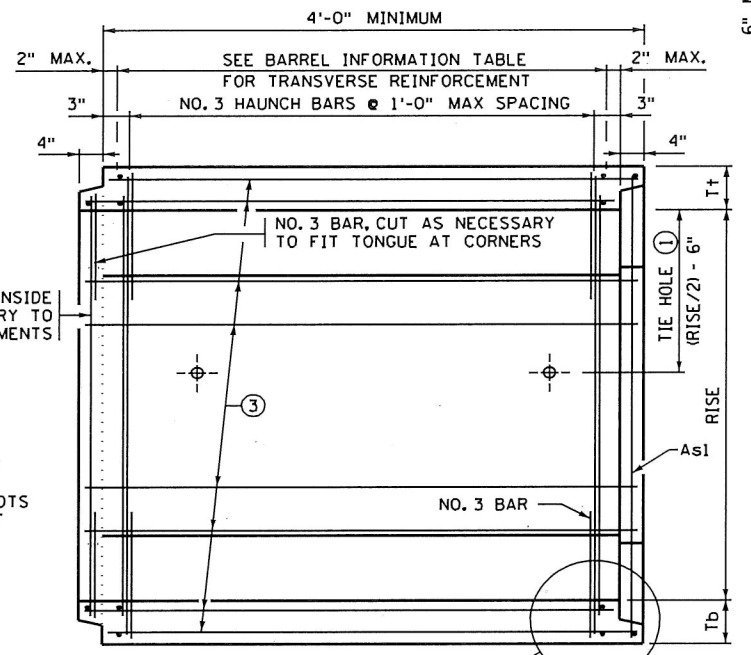
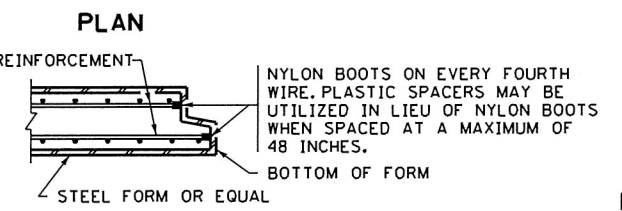
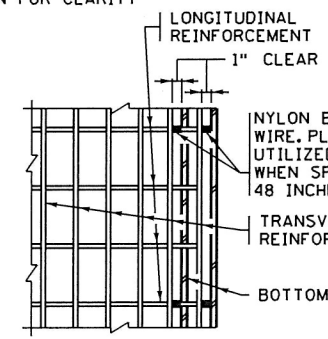
① CULVERT TIES ARE TO BE 1" DIAMETER RODS. SEE STANDARD PLATE NO. 3145 FOR CONNECTION DETAILS.

② HAUNCH SIZES ARE TO BE 12" VERTICAL, 12" HORIZONTAL ON ALL BOX SIZES.

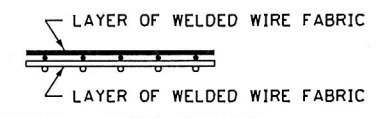
③ LONGITUDINAL REINFORCEMENT DENOTED AS As5 AND As6 MUST BE PLACED IN ALL SLABS AND WALLS AND MUST BE 0.06 SQ. IN./FT. MIN.



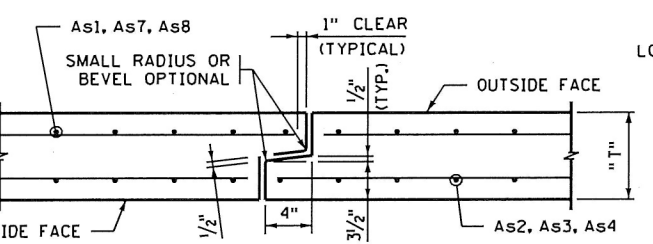
HAUNCH BAR LENGTH:  
 31" FOR 8" WALL THICKNESS  
 34" FOR 9" WALL THICKNESS  
 34" FOR 10" WALL AND 10" SLAB  
 36" FOR 10" WALL AND 11" SLAB  
 38" FOR 10" WALL AND 12" SLAB  
 38" FOR 11" WALL THICKNESS



**LONGITUDINAL BARREL SECTION**  
BAR REINFORCEMENT OPTION SHOWN



WHEN MORE THAN ONE LAYER OF WELDED WIRE FABRIC IS USED TO OBTAIN THE REQUIRED REINFORCEMENT AREAS, THE WIRES OF THE WELDED WIRE FABRIC SHALL BE PLACED AS SHOWN



**TONGUE AND GROOVE JOINT DETAIL**

④ ROADWAY OR SHOULDER FILL HEIGHTS OF LESS THAN 2'-0" REQUIRE A DISTRIBUTION SLAB.

USE CONCRETE MIX 3Y43 FOR THE DISTRIBUTION SLAB.

CAST-IN-PLACE DISTRIBUTION SLABS SHALL BE 6" THICK. PROVIDE 3" MINIMUM SELECT GRANULAR MATERIAL PER SPEC. 3149.2.B.2 BETWEEN BARREL AND DISTRIBUTION SLAB.

PRECAST DISTRIBUTION SLABS SHALL BE 6" THICK AND MAY BE USED FOR FILL HEIGHTS OVER 1'-0". PROVIDE 6" MINIMUM SELECT GRANULAR MATERIAL PER SPEC. 3149.2.B.2 BETWEEN BARREL AND DISTRIBUTION SLAB.

THE WIDTH OF THE DISTRIBUTION SLAB SHALL EXTEND BETWEEN THE OUTSIDE EDGES OF THE SHOULDERS UNLESS DIRECTED BY THE ENGINEER.

PAYMENT FOR THE DISTRIBUTION SLAB AND SELECT GRANULAR MATERIAL BENEATH THE SLAB SHALL BE CONSIDERED INCIDENTAL.

IF DISTRIBUTION SLAB IS USED AS PAVEMENT SURFACE IT MUST BE REDESIGNED PER THE MnDOT PAVEMENT DESIGN MANUAL.

**BARREL INFORMATION TABLE \*\*\***

LOCATION	SIZE	CLASS	f'c (P.S.I.)	FILL HEIGHT RANGE (FT.)	DISTRIBUTION SLAB REQUIRED *	RECESSED TIE RODS REQUIRED **	DIMENSIONS					WEIGHT (LBS./FT.)	WELDED WIRE FABRIC REINFORCEMENT												
							SPAN (FT.)	RISE (FT.)	T+ (IN.)	Tb (IN.)	Ts (IN.)		As1		As2		As3		As4		As7		As8		
													AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)	AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)	AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)	AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)	AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)	AREA (IN. <sup>2</sup> /FT.)	LENGTH (FT.)	
① STA. 70+38	10'x8'	4	6000	15-25	NO	YES (SOUTH)	10	8	10	10	8	4750	0.85	14'-9"	2'-10"	1.52	10'-6"	1.57	10'-6"	0.20	8'-6"	0.24	8'-5"	0.24	8'-5"

\* ALL CLASS 1 CULVERTS WITH FILL HEIGHTS OF LESS THAN 2'-0" REQUIRE A DISTRIBUTION SLAB. IF A DISTRIBUTION SLAB IS NOT REQUIRED, INDICATE "NO" IN THIS BOX.

\*\* FOR PEDESTRIAN CULVERT APPLICATIONS HIDE-AWAY OR RECESSED TIE CONNECTIONS ARE REQUIRED. SEE STANDARD PLATE 3145. IF REQUIRED, INDICATE "YES" IN THIS BOX.

\*\*\* BOX CULVERTS WITH SPANS FROM 6 TO 14 FT. ARE DESIGNED FOR HL-93 LIVE LOADS (AASHTO LRFD 3.6.2.1) NOT INCLUDING THE DESIGN LANE LOAD. BOXES WITH SPANS OF 16 FT. ARE DESIGNED FOR HL-93 LIVE LOADS INCLUDING THE DESIGN LANE LOAD.

REVISION: 09-11-2014  
 APPROVED: MARCH 24, 2011  
 Nancy Rubenberger  
 STATE BRIDGE ENGINEER

No.	Date	Revisions	App.	DRAWING NAME
①	9-30-15	ADDENDUM NO. 1		PROJECT NO. 129594



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JEFFREY A. JOHNSON  
 DATE: 7-7-15 MN LIC. NO. 17280

**RAMSEY COUNTY**  
 TCAAP BP1  
 PRECAST CONCRETE  
 BARREL DETAILS

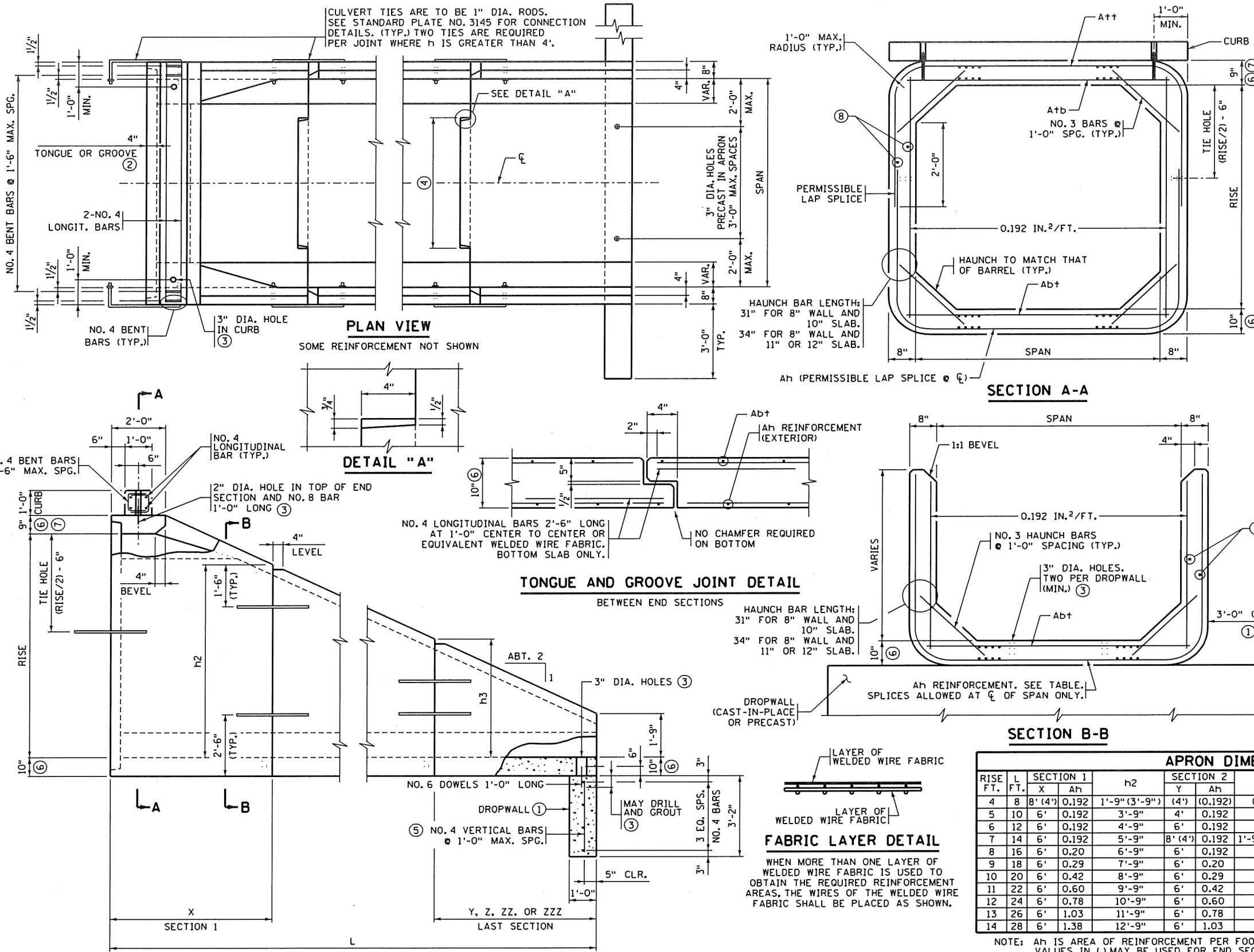
COUNTY PROJECT	S.A.P. 062-593-004	SHEET NO.	45
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**FIG. 5-395.101(A)**

**PRECAST CONCRETE BARREL DETAILS**

**BRIDGE NO. 62X04**

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- CONSTRUCTION NOTES**  
 SEE STANDARD FIG. 5-395.101(A) AND FIG. 5-395.101(B) FOR ADDITIONAL DIMENSIONS AND CONSTRUCTION NOTES.  
 ALL END SECTIONS REQUIRE CURB ON LINTEL BEAM.  
 ON ALL END SECTIONS FOR WATERWAYS, USE DROPWALLS ON INLET AND OUTLET ENDS.  
 SEE STANDARD FIG. 5-395.115 FOR EMBANKMENT PROTECTION.  
 FINISH ALL EXPOSED EDGES OF CONCRETE WITH 1/2" OR 3/4" CHAMFER OR RADIUS UNLESS OTHERWISE NOTED.
- WITH DOUBLE BOXES LOCATE DROPWALL JOINTS BETWEEN END SECTIONS. SEE STANDARD FIG. 5-395.111 FOR ALTERNATE DROPWALLS. LIMITS OF EXCAVATION FOR DROPWALL TO BE APPROXIMATELY THE SAME AS DROPWALL DIMENSIONS. DROPWALL TO BE CONCRETE MIX NO. 1A43 OR MIX NO. 3Y43. FURNISHING AND INSTALLATION OF DROPWALL TO BE INCLUDED IN PRICE BID FOR END SECTIONS. DROPWALL NOT REQUIRED FOR NON-WATERWAY USE.
  - CHECK LOCATION TO DETERMINE WHETHER A TONGUE OR A GROOVE IS USED.
  - FILL HOLE WITH GROUT. GROUT SHALL CONSIST OF 1 PART CEMENT AND 2 PARTS SAND. USE TYPE 1A AIR ENTRAINED PORTLAND CEMENT. GROUT MIX SHALL HAVE A MAXIMUM SLUMP OF 4".
  - 3'-6" MIN. TONGUE AND 3'-7" MIN. GROOVE FOR CULVERTS WITH 6'-0" SPANS, 5'-0" MIN. TONGUE AND 5'-1" MIN. GROOVE FOR CULVERTS WITH SPANS GREATER THAN 6'-0". CENTER TONGUE AND GROOVE ON  $\frac{1}{2}$  OF EACH APRON JOINT. TONGUE AND GROOVE JOINT ON ALL THREE SIDES OF APRON IS PERMISSIBLE.
  - AS AN ALTERNATE TO THE ONE LAYER WELDED WIRE FABRIC, PROVIDE TWO LAYERS OF REBAR OR WELDED WIRE FABRIC WITH THE STEEL AREA EQUAL TO HALF OF THE TEMPERATURE STEEL PER CODE REQUIREMENTS IN EACH FACE OF THE DROPWALL.
  - APRON TOP AND BOTTOM SLAB THICKNESS MAY BE 8" FOR CULVERTS WITH 6" SPANS ONLY. BOTTOM SLAB THICKNESS MAY BE INCREASED UP TO 2" MAX. PROVIDED CONCRETE COVER IS 1 1/2" MIN., 2" MAX.
  - 10" MINIMUM TOP SLAB FOR 14' AND 16' SPANS.
  - LONGITUDINAL REINFORCEMENT PERPENDICULAR TO THE CULVERT SPAN SHALL HAVE A MINIMUM OF 0.06 SQUARE INCHES PER PERIPHERAL FOOT ON ALL FACES OF THE BARREL.

**Att, Atd REINFORCEMENT**

SPAN (FT.)	Att (IN <sup>2</sup> /FT.)	Atd (IN <sup>2</sup> /FT.)
6	0.27	0.44
8	0.47	0.60
10	0.62	0.74
12	0.88	1.06
14	1.20	1.58
16	1.52	2.09

**Abt REINFORCEMENT**

SPAN (FT.)	Abt (IN <sup>2</sup> /FT.)
6-10	0.20
12	0.30
14	0.39
16	0.39

**APRON DIMENSIONS & Ah REINFORCEMENT**

RISE FT.	L FT.	SECTION 1 X Ah	h2		SECTION 2 Y Ah		h3		SECTION 3 Z Ah		SECTION 4 ZZ Ah		SECTION 5 ZZZ Ah		h6	
			h2	h3	Y	Ah	h3	Z	Ah	ZZ	Ah	h5	ZZZ	Ah		
4	8	8' (4')	0.192	1'-9" (3'-9")	(4')	(0.192)	(1'-9")									
5	10	6'	0.192	3'-9"	4'	0.192	1'-9"									
6	12	6'	0.192	4'-9"	6'	0.192	1'-9"									
7	14	6'	0.192	5'-9"	8' (4')	0.192	1'-9" (3'-9")	(4')	(0.192)	(1'-9")						
8	16	6'	0.20	6'-9"	6'	0.192	3'-9"	4'	0.192	1'-9"						
9	18	6'	0.29	7'-9"	6'	0.20	4'-9"	6'	0.192	1'-9"						
10	20	6'	0.42	8'-9"	6'	0.29	5'-9"	8' (4')	0.192	1'-9" (3'-9")	(4')	(0.192)	(1'-9")			
11	22	6'	0.60	9'-9"	6'	0.42	6'-9"	6'	0.192	3'-9"	4'	0.192	1'-9"			
12	24	6'	0.78	10'-9"	6'	0.60	7'-9"	6'	0.20	4'-9"	6'	0.192	1'-9"			
13	26	6'	1.03	11'-9"	6'	0.78	8'-9"	6'	0.28	5'-9"	8' (4')	0.192	1'-9" (3'-9")	(4')	(0.192)	(1'-9")
14	28	6'	1.38	12'-9"	6'	1.03	9'-9"	6'	0.40	6'-9"	6'	0.192	3'-9"	4'	0.192	1'-9"

NOTE: Ah IS AREA OF REINFORCEMENT PER FOOT OF LENGTH (IN<sup>2</sup>/FT.) VALUES IN ( ) MAY BE USED FOR END SECTIONS WITH SPANS OF 14' AND 16' ONLY.

FIG. 5-395.102

TITLE: PRECAST CONCRETE END SECTION  
 TYPE I - SINGLE OR DOUBLE BARREL  
 FOR SKEWS UP TO 7/2"  
 BRIDGE NO. 62X04

No.	Date	Revisions	App.	DRAWING NAME
9-30-15		ADDENDUM NO. 1		PROJECT NO. 129594



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.  
 JEFFREY A JOHNSON  
 DATE: 7-7-15 MN LIC. NO. 17280

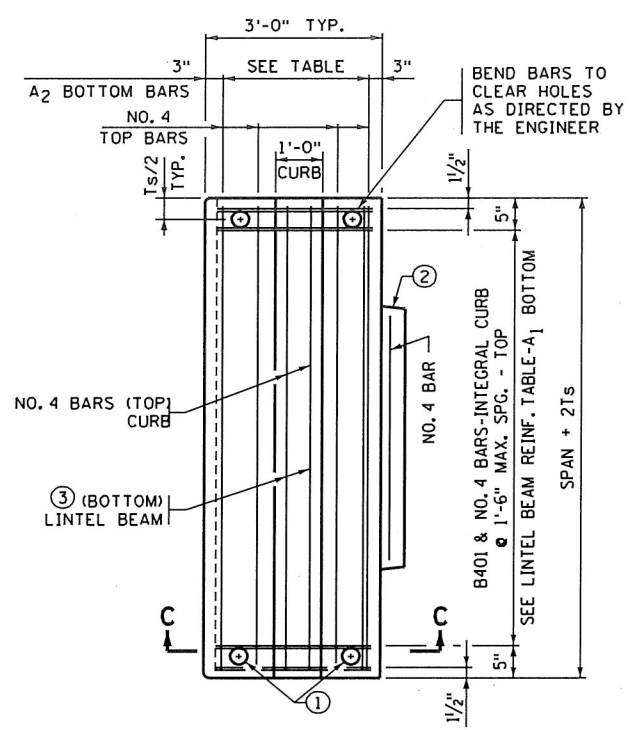


TCAAP BP1  
 PRECAST CONCRETE END SECTION  
 TYPE I - SINGLE OR DOUBLE BARREL

COUNTY PROJECT	SHEET NO.
S.A.P. 062-593-004	46
S.P.	D8
S.P.	63
S.P.	



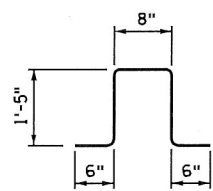
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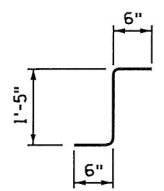
**PLAN VIEW OF SQUARE LINTEL BEAM**

LINTEL BEAM BOTTOM REINFORCEMENT		
SPAN (FT.)	A <sub>1</sub>	A <sub>2</sub>
6	NO. 4 @ 1'-2"	NO. 4 @ 9/2"
8	NO. 4 @ 8"	NO. 5 @ 8"
10	NO. 5 @ 8"	NO. 6 @ 7 1/2"
12	NO. 5 @ 6"	NO. 6 @ 6"
14	NO. 6 @ 6"	NO. 7 @ 6"
16	NO. 6 @ 6"	NO. 7 @ 6"

NOTE: MAXIMUM BAR SPACING GIVEN, REDUCE AS NECESSARY

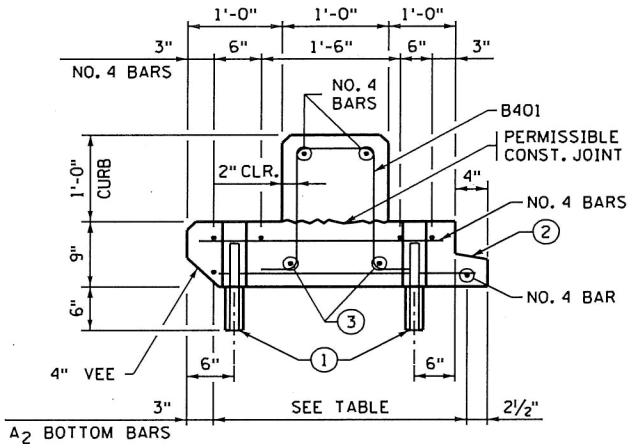


**B401**



**B401 ALTERNATE**

④  
2 REQUIRED



**SECTION C-C**

INTEGRAL CURB WITH TONGUE.  
ADDITIONAL REINFORCEMENT IN TONGUE NOT SHOWN.

**CONSTRUCTION NOTES**

SEE STANDARD FIG. 5-395.101(A) AND FIG. 5-395.101(B) FOR ADDITIONAL DIMENSIONS AND CONSTRUCTION NOTES.

ALL END SECTIONS REQUIRE CURB ON LINTEL BEAM.

GROUT SHALL CONSIST OF 1 PART CEMENT AND 2 PARTS SAND. USE TYPE 1A AIR ENTRAINED PORTLAND CEMENT. GROUT MIX SHALL HAVE A MAXIMUM SLUMP OF 4".

- ① 3" DIA. HOLE THROUGH LINTEL BEAM AND 2" DIA. HOLE IN TOP OF WALL SECTION. PLACE NO. 8 DOWEL, 1'-0" LONG, IN HOLE AND FILL HOLE WITH GROUT.
- ② CHECK THE LOCATION TO DETERMINE WHETHER A TONGUE OR A GROOVE IS USED. TONGUE AND GROOVE TO TERMINATE AT HAUNCH.
- ③ FOR SPANS UNDER 10'-0" USE NO. 8 BARS. FOR SPANS OF 10'-0" TO 12'-0" USE NO. 9 BARS. FOR 14'-0" AND 16'-0" SPAN, USE NO. 10 BARS.
- ④ ALTERNATE BAR BEND MAY BE USED FOR B401.

**FIG. 5-395.104(B)**

REVISION: 11-06-2013  
 APPROVED: MARCH 24, 2011  
*Nancy Subenberger*  
 STATE BRIDGE ENGINEER

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE:
△	9-30-15	ADDENDUM NO. 1		PROJECT NO. 129594



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*Jeffrey A. Johnson*  
 JEFFREY A. JOHNSON  
 DATE: 7-7-15 MN LIC. NO. 17280

**RAMSEY COUNTY**  
 TCAA BP1  
 PRECAST CONCRETE END SECTION  
 TYPE III - SINGLE OR DOUBLE BARREL

COUNTY PROJECT	
S.A.P.	062-593-004
S.P.	
S.P.	
S.P.	

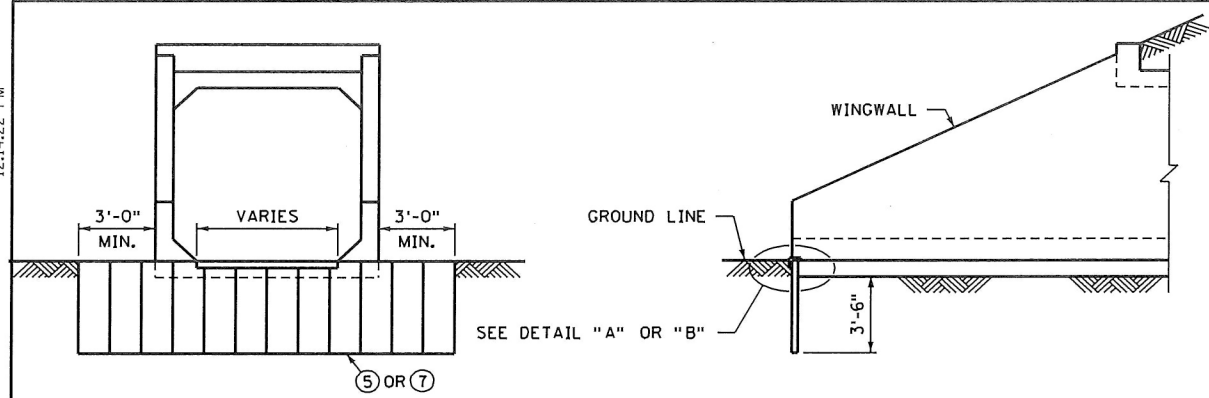
BRIDGE NO. 62X04
SHEET NO. 48 D10
63



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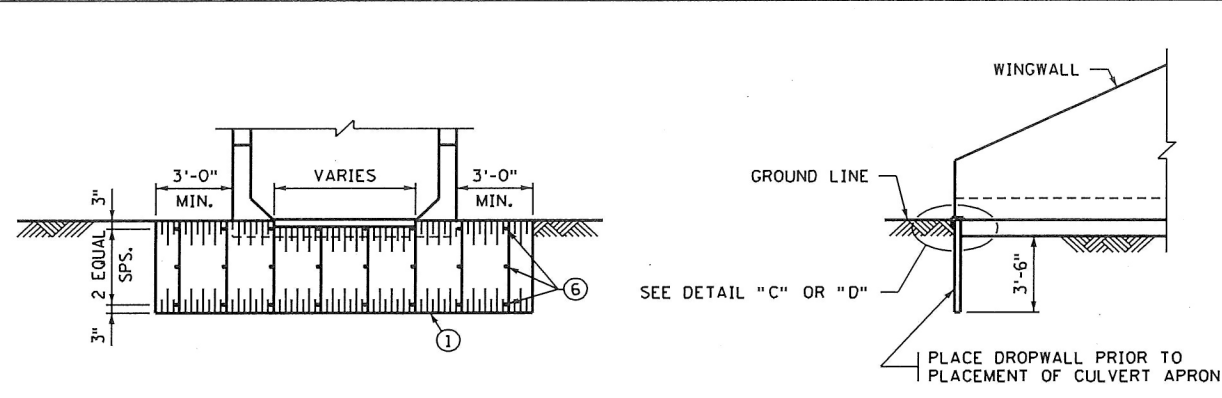
9/29/2015

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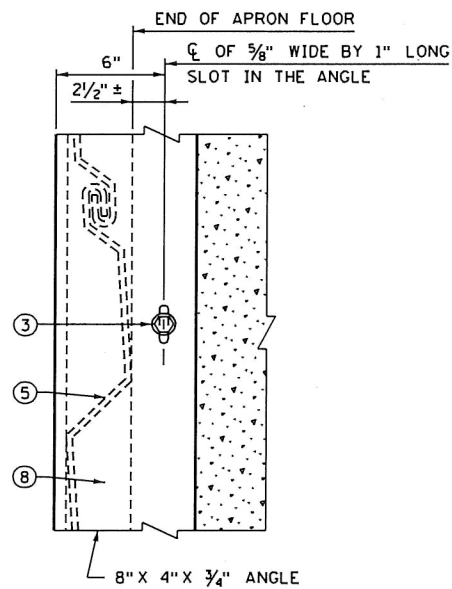
END VIEW ELEVATION

ALTERNATES 1 & 2 (STEEL SHEET PILING)

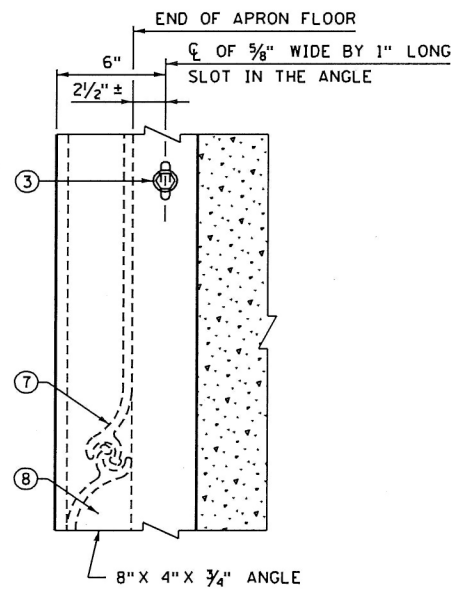


END VIEW ELEVATION

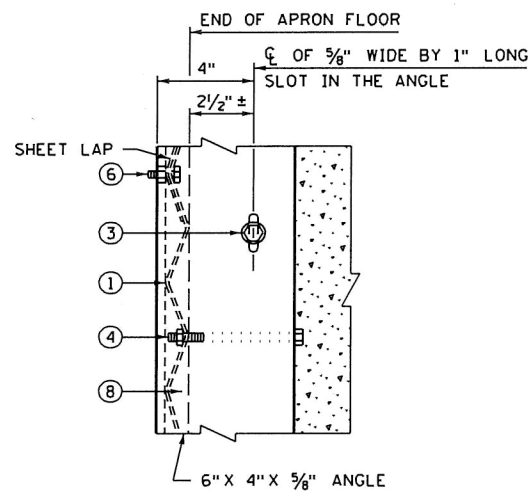
ALTERNATES 3 & 4 (GALVANIZED STEEL SHEETS)



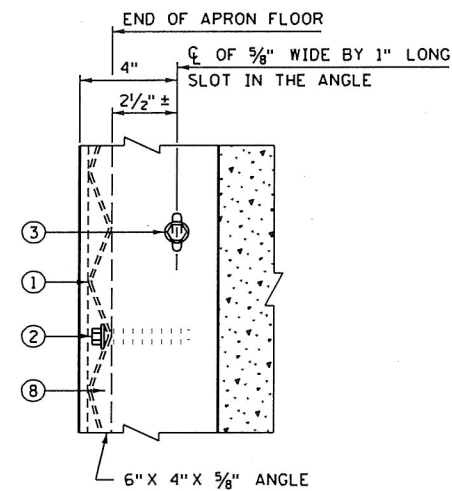
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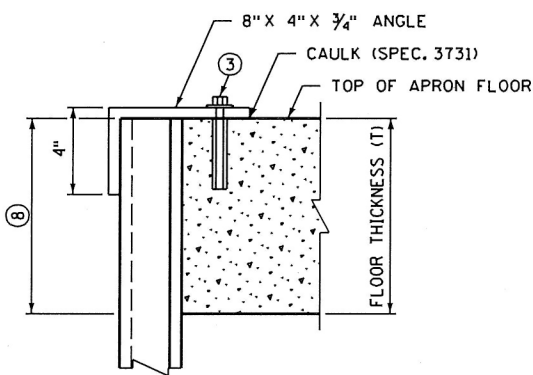
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PLAN

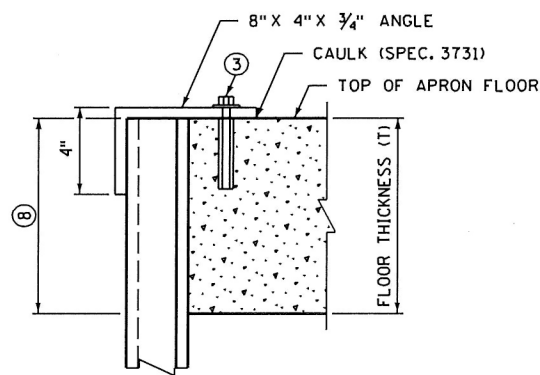


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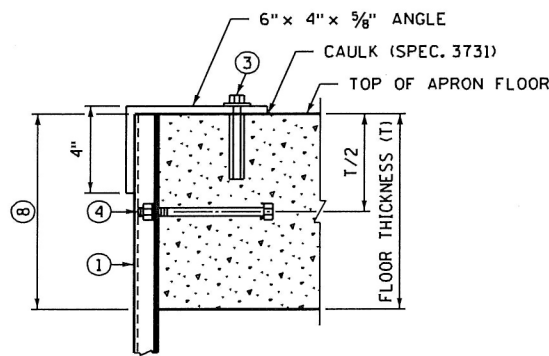
ELEVATION

DETAIL "A" - ALTERNATE 1  
STEEL SHEET PILING SHOWN



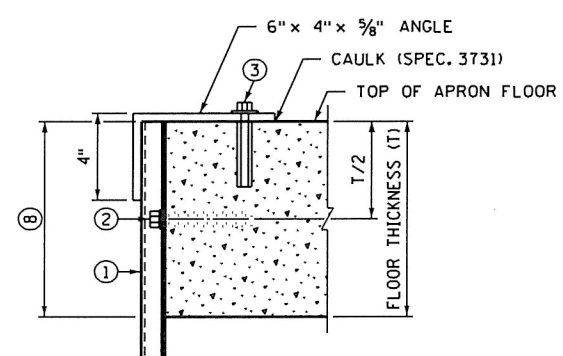
ELEVATION

DETAIL "B" - ALTERNATE 2  
STEEL SHEET PILING SHOWN



ELEVATION

DETAIL "C" - ALTERNATE 3  
ON NEW CONSTRUCTION ONLY



ELEVATION

DETAIL "D" - ALTERNATE 4  
ON NEW OR OLD CONSTRUCTION

CONSTRUCTION NOTES

- GALVANIZE ALL FASTENERS AS PER SPEC. 3392.
- BEFORE CULVERT PLANS ARE PREPARED, SAMPLES SHALL BE TAKEN FROM THE DRAINAGE AREA FOR PH DETERMINATION. THE SOIL AND WATER SHOULD HAVE A PH OF 6.5 OR MORE IF SHEET STEEL IS USED.
- ① 2 1/2" x 1/2" OR 2 3/8" x 1/2" CORRUGATED (12 GAGE) OR HEAVIER GALVANIZED STEEL SHEETS.
- ② FASTEN THE STEEL SHEETS TO THE FRONT EDGE OF THE APRON WITH 3/8" DIAMETER BY 4" LONG BOLTS AND APPROVED ANCHORAGES (10" ± CENTER TO CENTER, TO THE NEAREST VALLEY).
- ③ FASTEN THE 8" x 4" x 3/4" OR 6" x 4" x 5/8" ANGLE WITH 3/8" DIAMETER 4" LONG BOLTS, 1" O.D. WASHER AND AN APPROVED ANCHORAGE (2'-0" SPACING).
- ④ FASTEN THE STEEL SHEETS TO THE FRONT EDGE OF THE APRON WITH 3/8" DIAMETER 5" LONG BOLTS, NUT AND LOCK WASHER (10" ± CENTER TO CENTER, TO THE NEAREST VALLEY).
- ⑤ (12 GAGE) GALVANIZED CORRUGATED STEEL SHEET PILING, INTERLOCKING TYPE A.
- ⑥ 3/8" DIA. x 1" LONG BOLT WITH NUT, TO LAP STEEL SHEETS.
- ⑦ STEEL SHEET PILING, SECTION NO. MP-112 OR EQUAL.
- ⑧ FILL THE VOIDS AS SHOWN, WITH CONCRETE OR CONCRETE GROUT, AS APPROVED BY THE ENGINEER.

REVISION: 11-06-2013

APPROVED: MARCH 24, 2011

*Nancy Subenberger*  
STATE BRIDGE ENGINEER

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE:
9-30-15		ADDENDUM NO. 1		PROJECT NO. 129594



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*Jeffrey A. Johnson*  
JEFFREY A. JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

**RAMSEY COUNTY**  
TCAAP BP1  
ALTERNATE DROPWALLS  
FOR BOX CULVERTS

COUNTY PROJECT	S.A.P. 062-593-004
S.P.	
S.P.	
S.P.	

BRIDGE NO. 62X04

SHEET NO. 49 D11

63

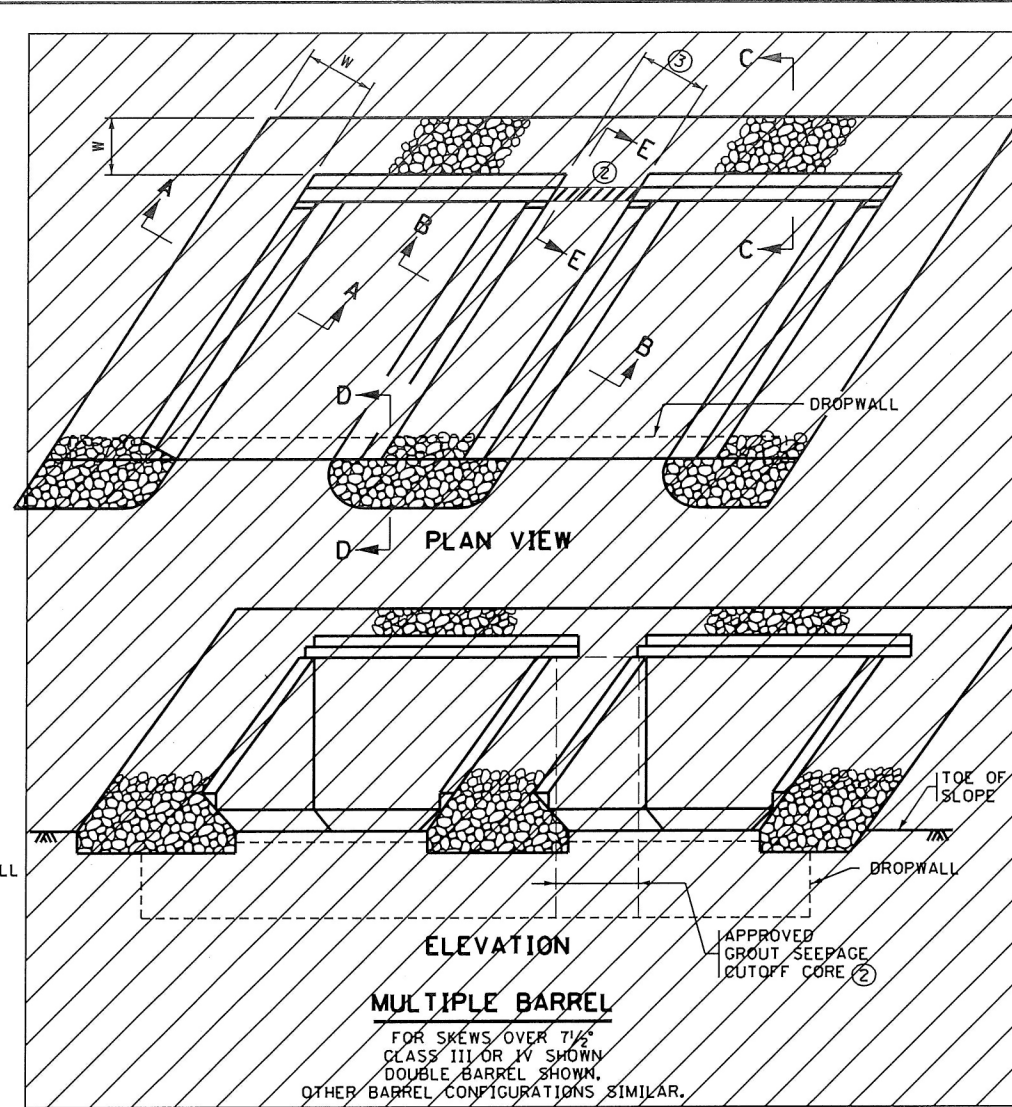
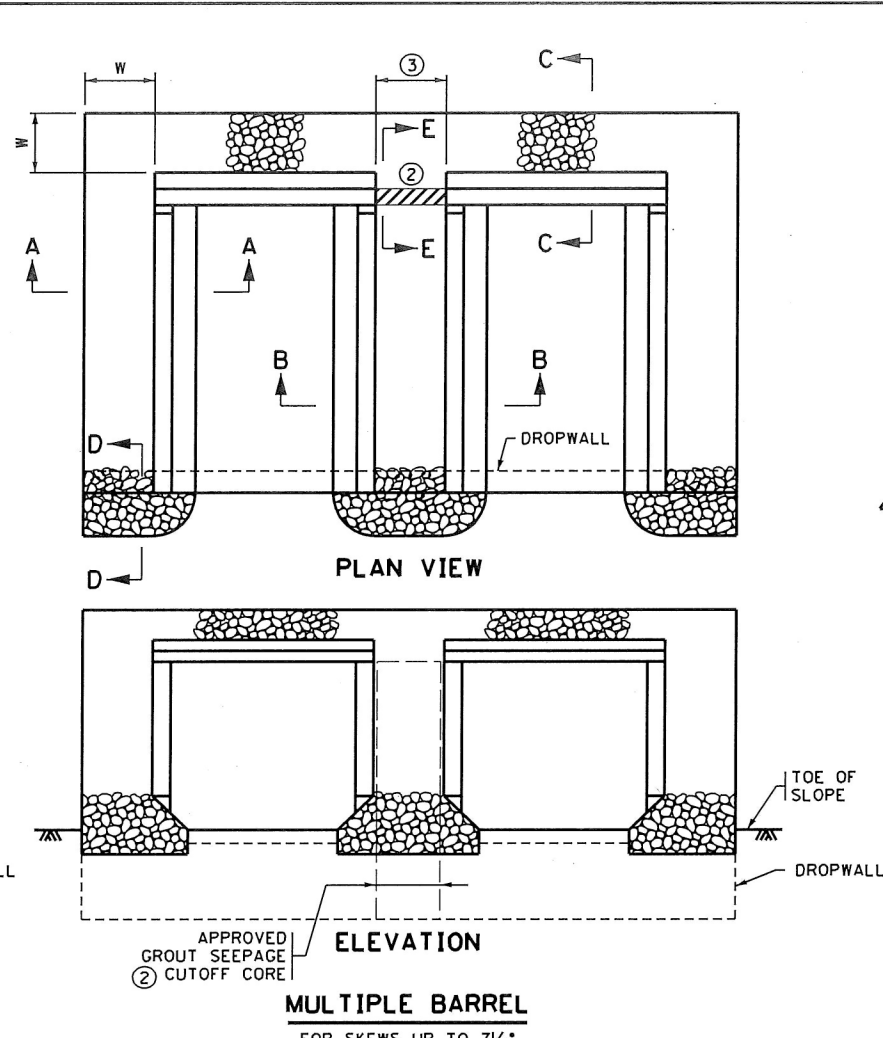
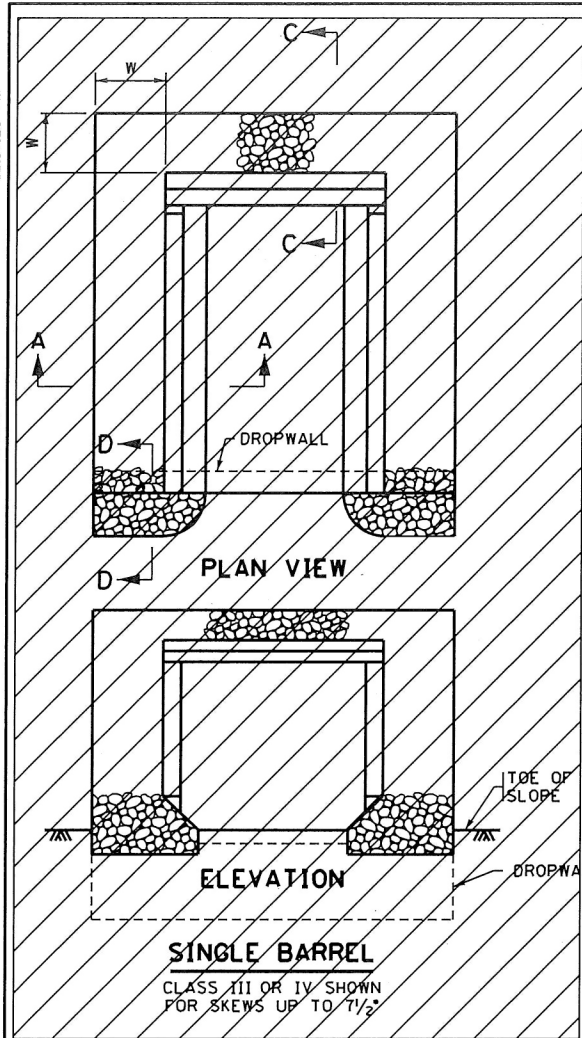
FIG. 5-395.111

ALTERNATE DROPWALLS FOR BOX CULVERTS

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9/29/2015

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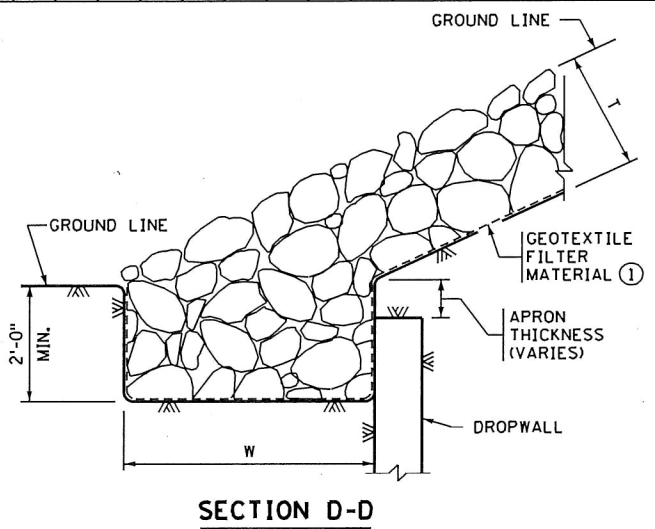
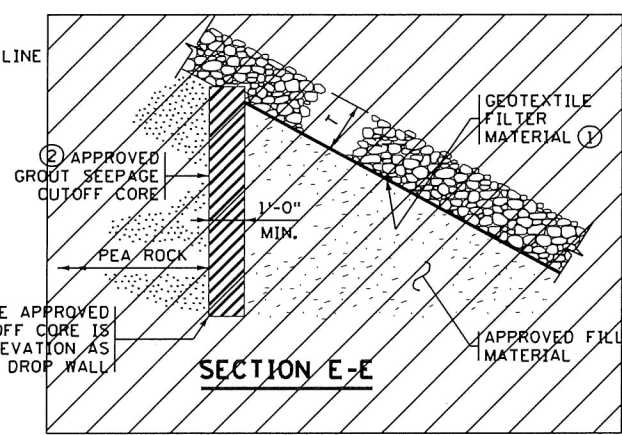
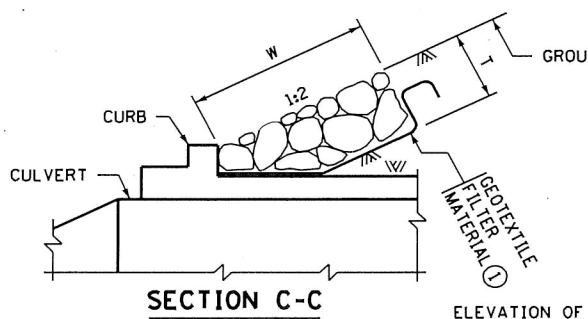
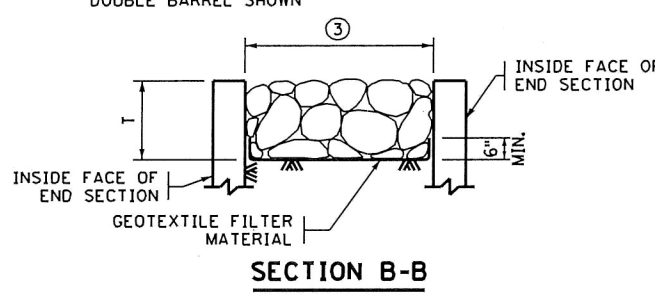
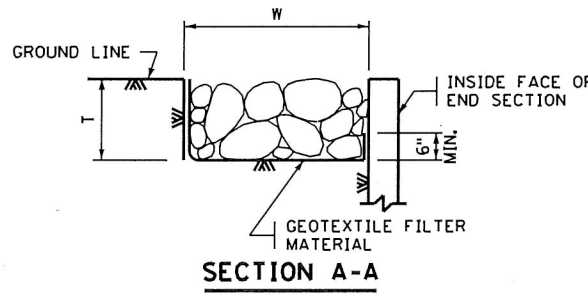


**CONSTRUCTION NOTES**

- THIS PLAN SHEET IS FOR CULVERT EMBANKMENT PROTECTION ONLY. REFER TO THE GRADING PLANS FOR ADDITIONAL RIPRAP OR OTHER SCOUR PROTECTION MEASURES.
- RIPRAP SHALL COMPLY WITH SPECS. 2511 AND 3601.
- FOR TYPE OF GEOTEXTILE FILTER MATERIAL REQUIRED, SEE SPEC. 3733. GEOTEXTILE STRIPS SHOULD BE CONTINUOUS WITHOUT OVERLAPS, EXCEPT FOR THE TOP STRIP, WHICH SHOULD SHINGLE VERTICAL STRIPS. THE TOP EDGE SHOULD BE BURIED TO PREVENT UNDERMINING.
  - IF THE DISTANCE BETWEEN DOUBLE BARRELS IS LESS THAN 2'-0" USE EITHER PEA ROCK OR LEAN MIX BACKFILL (SPEC. 2520) BETWEEN THE CULVERTS AS APPROVED BY THE ENGINEER. IF PEA ROCK IS USED PROVIDE APPROVED GROUT SEEPAGE CUTOFF CORE, MINIMUM 12" THICK BETWEEN THE CULVERTS TWO ENDS AND PROVIDE CLASS I GROUTED RIPRAP IN LIEU OF CLASS III RIPRAP.
  - REFER TO THE GENERAL PLAN AND ELEVATION SHEET FOR THE DISTANCE BETWEEN BARRELS OF ADJACENT BOXES.

**RIPRAP CLASS**

RIPRAP CLASS	RIPRAP CLASS	T	W
<input checked="" type="checkbox"/>	III	1'-6"	3'-0"
<input type="checkbox"/>	IV	2'-0"	4'-0"



ELEVATION OF THE APPROVED GROUT SEEPAGE CUTOFF CORE IS TO BE THE SAME ELEVATION AS THE BOTTOM OF THE DROP WALL

**FIG. 5-395.115**

REVISION:  
APPROVED: SEPTEMBER 11, 2014  
*Nancy Subenberger*  
STATE BRIDGE ENGINEER

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE:
				PROJECT NO. 129594
▲	9-30-15	ADDENDUM NO. 1		



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*Jeffrey A. Johnson*  
JEFFREY A. JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

<b>EMBankment PROTECTION FOR BOX CULVERTS</b>		<b>BRIDGE NO. 62X04</b>	
<b>RAMSEY COUNTY</b>		COUNTY PROJECT	
TCAAP BP1		S.A.P. 062-593-004	
EMBankment PROTECTION FOR BOX CULVERTS		S.P.	
		S.P.	
		S.P.	
		S.P.	
		SHEET NO. 50 D12	
		63	

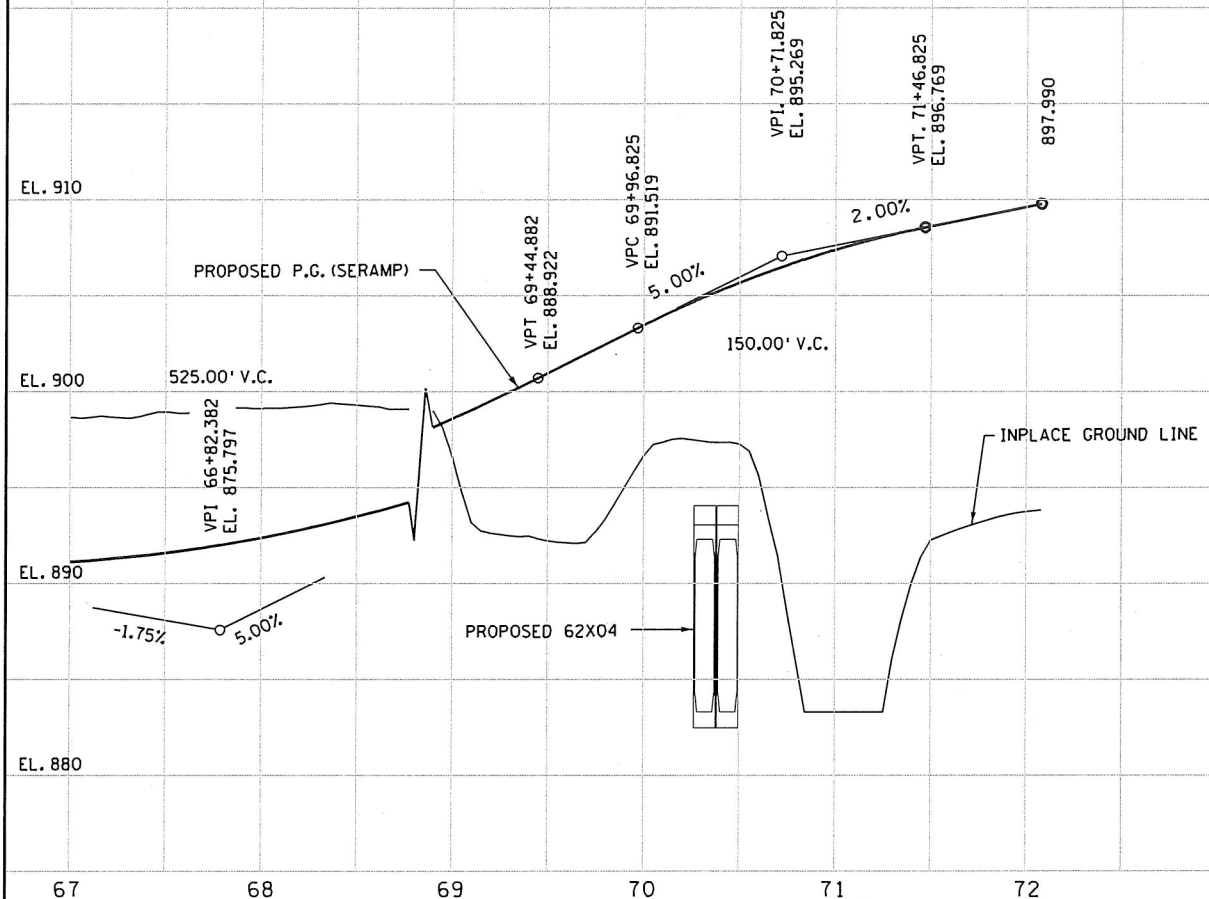
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9/29/2015

### CONTRACTED PROFILE

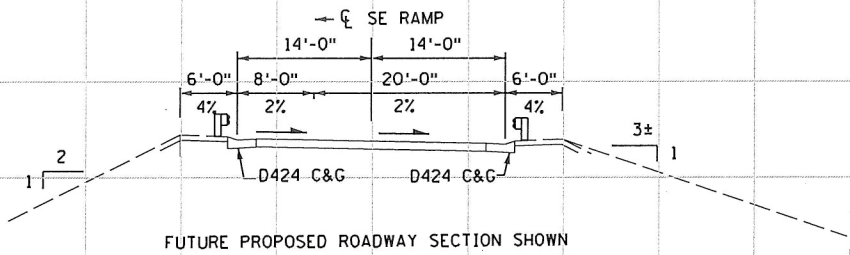
SCALE : 0 50' 0 5'  
HORIZONTAL VERTICAL

### FUTURE S.E. RAMP PROFILE (SERAMP)



### TYPICAL SECTIONS & PERTINENT DATA

SCALES AS SHOWN



### LOCATION ENGINEER'S OBSERVATIONS AT BRIDGE SITE

- SPECIAL FEATURES: WATERFALLS, DAMS, FLOODS, ICE, DEBRIS, SLIDING BANKS, RECREATIONAL BOATING.
- OTHER BRIDGES OR CULVERTS OVER THE SAME STREAM (PARTICULARLY STRUCTURES WHICH CARRY HIGH WATER WITHOUT OVERFLOW OF ROADWAY): GIVEN LOCATION, TYPE, LENGTH, HEIGHT ABOVE HIGH WATER, CROSS-SECTIONAL AREA ETC.
- APPARENT HIGHWATER ELEVATION OBTAINED FROM:
- OTHER DATA: APPROX. VELOCITY OF WATER AT TIME OF SURVEY.

### HYDRAULIC ENGINEERS RECOMMENDATION DATE: 9-28-2015

STREAM OR DITCH DESIGNATION: RICE CREEK  
 DRAINAGE AREA: 153.1 SQ. MI.  
 MAX. FLOOD ON RECORD: XX.X C.F.S. UNKNOWN  
 MAXIMUM OBSERVED HIGHWATER ELEVATION: UNKNOWN FT.  
 DESIGN FLOOD (100 YR. FREQ.) (10 DAY SNOW MELT): 1309.24 C.F.S.  
 HEADWATER ELEVATION: 882.27 FT.  
 DESIGN MEAN VELOCITY THROUGH STRUCTURE: 8.2 F.P.S.  
 TOTAL STAGE INCREASE: 0.0 FT.  
 LOW MEMBER AT OR ABOVE ELEVATION: 878.85 FT.  
 WATERWAY AREA REQUIRED BELOW ELEV. 877.73 = NA S.F. AT RIGHT ANGLES TO CHANNEL  
 BASIC FLOOD (100 YR. FREQ.) (24 HR. RAINFALL) 842.76 C.F.S.  
 HEADWATER ELEVATION: 877.94 FT.  
 TOTAL STAGE INCREASE: 0.0 FT.  
 MEAN VELOCITY THROUGH STRUCTURE: 6.5 F.P.S.  
 FLOWLINE ELEVATION: 870.85' SKEW ANGLE: 6°  
 ESTIMATED PRELIMINARY TOTAL SCOUR AT PIER EL. N/A (500 OR OT YR. FREQ.)

### SCOUR CONFIRMATION RECOMMENDATION DATE: XX-XX-XX

TOTAL SCOUR AT PIER EL. N/A (500 OR OT YR. FREQ.)  
 SCOUR CODE: L

BRIDGE SURVEY SHEETS MADE FROM :  
 RAMSEY COUNTY SURVEY DATA

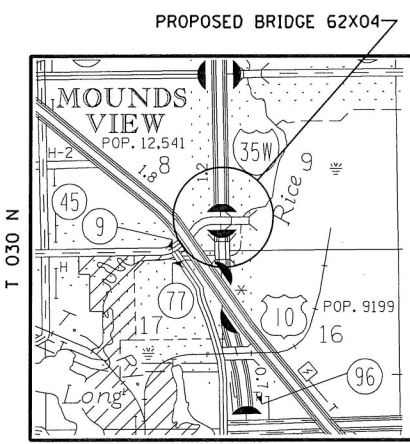
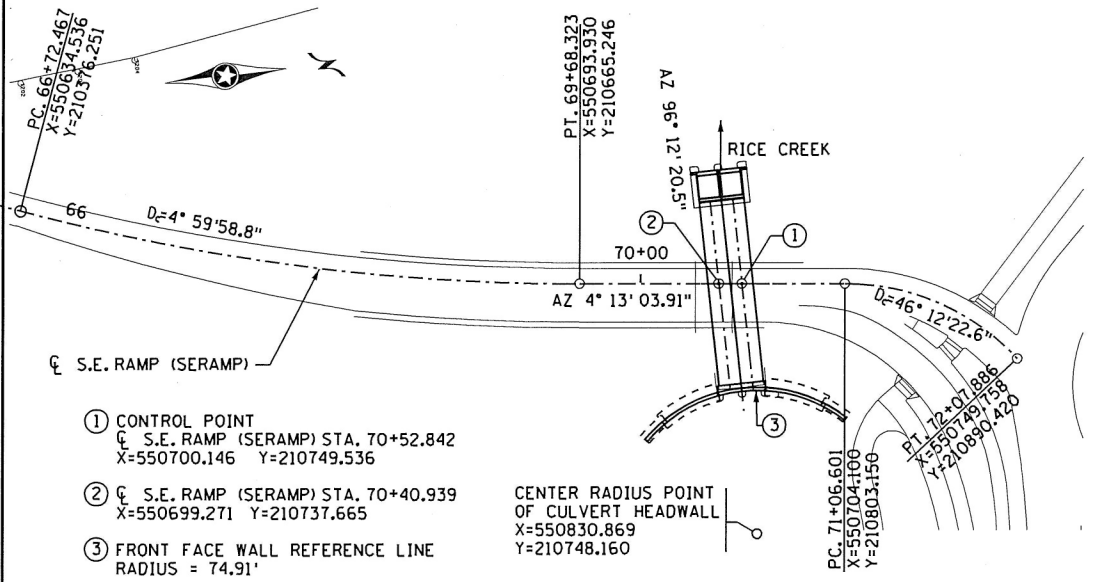
BENCH MARK ELEVATION 905.070 (N.A.V.D. 88 ADJ.)  
 GISD STATION 24710 6204 D  
 IRON ROD (DEPTH 8 FT.)  
 IN MOUNDS VIEW, 0.8 MILE NORTHWEST ALONG TRUNK HIGHWAY 10 FROM THE JUNCTION OF EASTBOUND TRUNK HIGHWAY 10 BRIDGE NUMBER 9586 OVER I-35W. AT TRUNK HIGHWAY 10 MILEPOINT 237.6, 55.0 FEET SOUTHWEST OF EASTBOUND TRUNK HIGHWAY 10, 66.0 FEET SOUTHWEST OF DRIVEWAY OF HOUSE AT 2280 TRUNK HIGHWAY 10, 55.0 FEET NORTHWEST OF DRIVEWAY, 14.0 FEET NORTHEAST POWER POLE, 8.0 FEET NORTH OF TELEPHONE MANHOLE, 3.0 FEET NORTHEAST OF WITNESS POST.  
 2nd BENCH MARK ELEVATION 880.051 (N.A.V.D. 88 ADJ.)  
 GISD STATION 24955 6284 N 1  
 IN ARDEN HILLS, IN NORTHWEST CORNER OF I-35W BOX CULVERT OVER RICE CREEK, 1.0 MILE NORTH ON I-35W FROM THE JUNCTION OF I-35W AND TRUNK HIGHWAY 96, 50 FEET WEST OF I-35W, 1 FOOT WEST OF WITNESS POST.

### PLAT

SCALE: 0 50'

THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D. THIS UTILITY QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF C1/ASCE 38-02, ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA".

WARNING:  
 DIAL GOPHER STATE ONE CALL AT 1-800-252-1166 48 HOURS IN ADVANCE OF CONSTRUCTION OPERATIONS TO OBTAIN COMPLETE UTILITY PROPERTY OWNERSHIP & LOCATION INFORMATION.



INDEX MAP  
 (FOUR SECTIONS)

MINNESOTA  
 DEPARTMENT OF TRANSPORTATION

### BRIDGE SURVEY

RAMP FROM I-35W N.B. TO  
 COUNTY RD. H OVER RICE CREEK  
 1.2 MILES NORTH OF THE JUNCTION OF  
 I-694 IN ARDEN HILLS

SEC 8/9 T 030 N R 23 W

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE:
				PROJECT NO. 129594
▲	9-30-15	ADDENDUM NO. 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.

JEFFREY A JOHNSON  
 DATE: 7-7-15 MN LIC. NO. 17280



TCAAP BP1  
 BRIDGE SURVEY

COUNTY PROJECT	SHEET NO.
S.A.P. 062-593-004	51
S.P.	D13
S.P.	
S.P.	

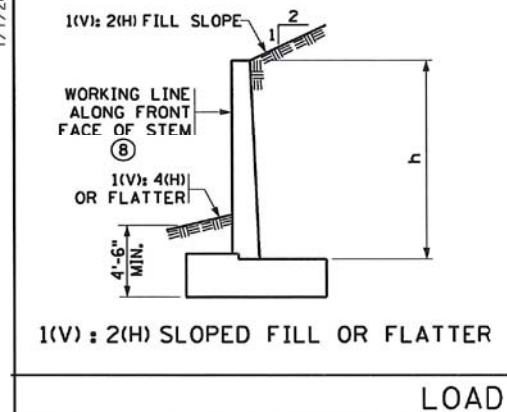
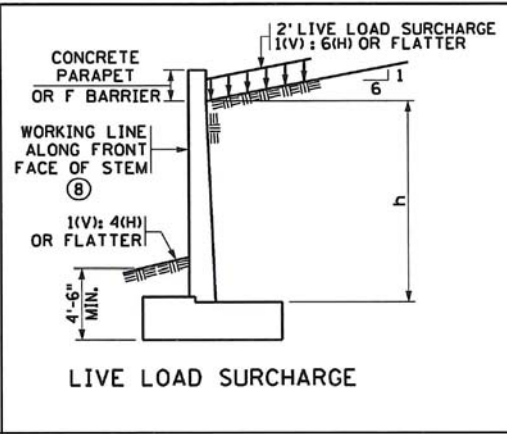
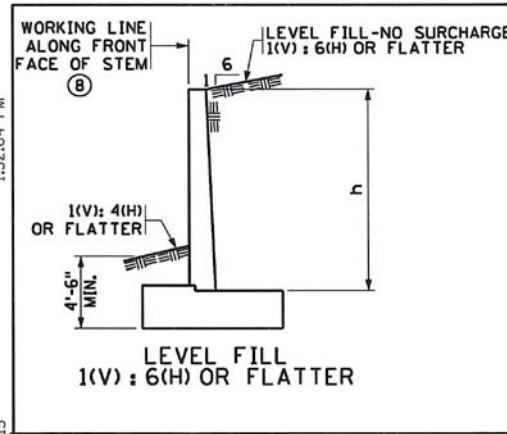
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7/7/2015

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h = STEM HEIGHT, DEFINED AS DISTANCE BETWEEN TOP OF FOOTING TO TOP OF WALL, NOT INCLUDING PARAPET OR BARRIER.

LOAD CASES

**DESIGN CRITERIA**

THESE LRFD CIP RETAINING WALL STANDARDS HAVE BEEN DEVELOPED BASED ON THE FIFTH EDITION WITH 2010 INTERIMS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, AND MNDOT DESIGN POLICIES AS STATED IN THE MNDOT LRFD BRIDGE DESIGN MANUAL.

$f'_c = 4 \text{ ksi}$   
 $f_y = 60 \text{ ksi}$   
 $n = 8$

REFER TO STANDARD FIGURE 5-297.639 FOR ADDITIONAL DESIGN CRITERIA.

**BAR LAP**

BAR SIZE	PLAIN	EPOXY
5	2'-5"	2'-1"
6	2'-11"	3'-1"
7	3'-7"	3'-10"
8	4'-9"	5'-1"
9	6'-0"	6'-5"
10	7'-7"	8'-2"
11	9'-4"	10'-0"

**SUMMARY OF QUANTITIES FOR RETAINING WALLS**

PANEL	STRUCTURAL CONCRETE		REINFORCEMENT BARS		STRUCTURE EXCAVATION		STRUCTURAL BACKFILL (CV) ①	AGGREGATE BACKFILL (CV) ②	ANTI GRAFFITI COATING	ARCH. CONC. TEXTURE (FRACTURED FIN)	ARCH. SURFACE FINISH (SINGLE COLOR)	GEOTEXTILE FILTER TYPE V
	FOOTING	STEM	PLAIN ⑦	EPOXY ⑤	CLASS..	CLASS..						
	CU YD	CU YD	POUND	POUND	CU YD	CU YD	CU YD	CU YD	SQ FT	SQ FT	SQ FT	SQ YD
A1	4.6	7.9	417.0	746.0				5.5	46	46	46	29
A2	16.7	32.6	1656.0	2923.0				24	279	279	279	77.5
A3	16.7	32.6	1656.0	2923.0				24	279	279	279	77.5
A4	4.6	7.9	417.0	746.0				5.5	46	46	46	29
TOTAL	43	81	4146	7338				59	649	649	649	213

**GENERAL NOTES:**

**UTILITIES:**  
EXISTING AND PROPOSED UTILITIES ARE SHOWN IN THE GRADING PLANS. PRIOR TO EXCAVATION VERIFY THE LOCATION OF EXISTING FACILITIES AND EXERCISE CARE IN ADJACENT CONSTRUCTION.

**EXCAVATION AND EARTHWORK:**  
ALL EXCAVATION AND EMBANKMENT WORK SHALL CONFORM TO SPEC. 2451.

**CONCRETE:**  
ALL CONCRETE SHALL CONFORM TO SPEC. 2461.

TRANSVERSE CONSTRUCTION JOINTS IN FOOTING ARE PERMISSIBLE. KEYWAYS AND CONTINUOUS REINFORCEMENT ARE REQUIRED THROUGH THESE JOINTS.

THE THICKNESS OF THE ARCHITECTURAL CONCRETE TEXTURE VARIES WITH THE TEXTURE RELIEF PATTERN. THE STRUCTURAL CONCRETE 3Y43 QUANTITIES DO NOT INCLUDE THE MATERIAL WITHIN THE ARCHITECTURAL CONCRETE TEXTURE. CONCRETE NEEDED FOR THE TEXTURING IS INCIDENTAL.

**POURING SEQUENCE:**  
THE POURING SEQUENCE SHALL BE AT THE CONTRACTOR'S OPTION. SUBMIT SEQUENCE (WITHIN 7 CALENDAR DAYS) TO THE ENGINEER FOR APPROVAL PRIOR TO BEGINNING THE FIRST POUR.

**CONSTRUCTION:**  
CONSTRUCT IN ACCORDANCE WITH SPEC. 2411, EXCEPT AS NOTED.

REFER TO STANDARD PLAN 5-297.624 (2 OF 6) FOR WALL CORNER DETAILS AND STEPPED FOOTING DETAILS.

REFER TO STANDARD PLAN 5-297.625 FOR WALL SHEAR LUG DETAILS.

APPLY MEMBRANE WATERPROOFING SYSTEM PER SPEC. 2481 TO BACK SIDE OF WALL TO COVER ALL THRU-BOLT FORM HOLES.

**REINFORCING STEEL:**  
USE REINFORCEMENT BARS CONFORMING TO SPEC. 3301, GRADE 60.

BARS MARKED WITH THE SUFFIX "E" TO BE EPOXY COATED. ALL BARS WHICH EXTEND OUT OF THE FOOTING AND ALL BARS WHICH ARE ABOVE THE FOOTING TO BE EPOXY COATED.

ALL BENT BAR DIMENSIONS ARE GIVEN OUT-TO-OUT.

MAINTAIN CLEAR DISTANCE BETWEEN REINFORCEMENT BARS AND FACE OF CONCRETE OF 3 INCHES IN FOOTINGS, 5 INCHES IN BOTTOM OF SPREAD FOOTINGS, AND 2 INCHES ELSEWHERE UNLESS OTHERWISE NOTED. REFER TO STANDARD PLAN 5-297.624 (1 OF 6) DETAIL "C" FOR COVER REQUIREMENTS ON WALLS WITH ARCHITECTURAL CONCRETE TEXTURE OR RUSTICATION.

THE CONTRACTOR HAS THE OPTION OF SUBSTITUTING 60'-0" LONG BARS FOR THE LONGITUDINAL FOOTING STEEL SHOWN. CHANGES IN THE BILL OF REINFORCEMENT ARE THE RESPONSIBILITY OF THE CONTRACTOR. PAYMENT WILL BE BASED ON QUANTITIES SHOWN.

THE CONSTRUCTION JOINT FOR CONCRETE PARAPET OR BARRIER MAY BE LOCATED AT TOP OR BOTTOM OF COPING, AT THE CONTRACTOR'S OPTION. PAYMENT WILL BE BASED ON QUANTITIES SHOWN, WHICH IS BASED ON CONSTRUCTION JOINT ABOVE COPING.

FOR VARIABLE STEM HEIGHTS, VARY THE LAP LENGTH OF THE VERTICAL REINFORCEMENT. MINIMUM LAP LENGTHS ARE GIVEN IN THE TABLE ON THIS SHEET. SMALLER BAR GOVERNS LAP LENGTH.

**DOWEL BAR ASSEMBLIES:**  
DOWELED JOINTS/CONSTRUCTION JOINTS ARE SHOWN ON STANDARD PLAN 5-297.624 (3 OF 6). THESE JOINTS ARE INCIDENTAL.

AT THE CONTRACTOR'S OPTION, CONSTRUCTION JOINTS MAY BE SUBSTITUTED IN LIEU OF CORK AND DOWEL JOINTS. REINFORCEMENT QUANTITIES WERE COMPUTED ASSUMING A CORK AND DOWEL JOINT BETWEEN EVERY PANEL. CHANGES IN THE BILL OF REINFORCEMENT ARE THE RESPONSIBILITY OF THE CONTRACTOR, AND NO ADDITIONAL PAYMENT WILL BE MADE. AT A MINIMUM, PLACE CORK AND DOWEL JOINTS EVERY 9'-6". PLACE A CORK AND DOWEL JOINT AT ALL VERTICAL FOOTING STEPS.

**GEOMETRICS AND GRADES:**  
DATA FOR BASELINE GEOMETRY IS TABULATED FOR WALL ALIGNMENT, SEE LAYOUT SHEETS. WALL ALIGNMENT REFERENCE IS ALONG FRONT FACE OF WALL. ⑧

ON UP TO 10% SLOPES, THE CONTRACTOR HAS THE OPTION OF POURING FOOTINGS SLOPED OR STEPPED. ADDITIONAL CONCRETE VOLUMES AND CHANGES TO THE BILL OF REINFORCEMENT WHICH MAY RESULT FROM CONTRACTOR REQUESTED OPTIONS ARE THE RESPONSIBILITY OF THE CONTRACTOR. NO ADDITIONAL PAYMENT WILL BE MADE.

QUANTITIES ARE BASED ON ASSUMED TOP OF ROCK ELEVATION. ACTUAL TOP OF ROCK TO BE DETERMINED BY ENGINEER. SEE SHEET 5-297.624 (4 OF 6) FOR PAY LIMITS.

**PILE LOADS:**  
THE PILE LOADS SHOWN IN THE PLANS AND THE CORRESPONDING NOMINAL PILE BEARING RESISTANCES (R<sub>n</sub>) WERE COMPUTED USING LRFD METHODOLOGY.

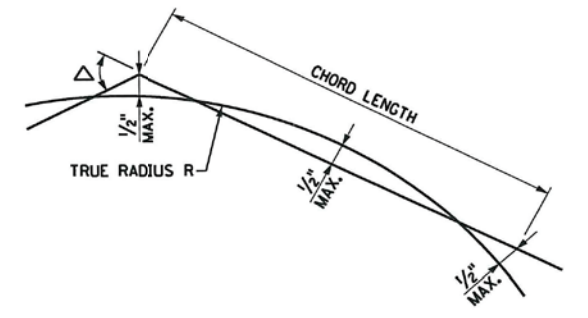
- NOTES:**
- ① STRUCTURAL BACKFILL SPEC. 3149.2D2. SEE EARTHWORK SUMMARY AND TABULATIONS.
  - ② COMPACT TO 100% DENSITY IN ACCORDANCE WITH SPEC. 2105.3F1 UNLESS RECOMMENDED OTHERWISE BY THE SOILS ENGINEER.
  - ③ LIMITING CRITERIA.
  - ④ CURVED FORMS MAY BE USED FOR ANY WALL WITH A RADIUS, BUT MUST BE USED ON WALLS WITH RADIUS LESS THAN 23 FEET.
  - ⑤ DOES NOT INCLUDE DOWELED JOINT/CONSTRUCTION JOINT QUANTITIES, WHICH ARE INCIDENTAL. DOWELED JOINT/CONSTRUCTION JOINT DETAILS ARE SHOWN ON STANDARD PLAN 5-297.624 (3 OF 6).
  - ⑥ QUANTITIES FOR THE FOUNDATION WITH AGGREGATE BACKFILL OPTION ONLY.
  - ⑦ DOES NOT INCLUDE ADDITIONAL REINFORCING BARS AND STRUCTURAL CONCRETE (1A43) REQUIRED FOR STEPPED FOOTINGS, WHICH IS INCIDENTAL.
  - ⑧ FOR RETAINING WALLS THAT ABUT A BRIDGE OR BRIDGE WING WALL, NOTE THAT THE DESIGNATION OF "FRONT FACE" MAY VARY FROM THE BRIDGE PLANS TO THE RETAINING WALL PLANS.
  - ⑨ QUANTITY IN EARTHWORK QUANTITIES. SEE EARTHWORK SUMMARY AND TABULATIONS.

**CURVED RETAINING WALLS ALLOWABLE CHORD LENGTH ④**

MAXIMUM DEGREE OF CURVE	RADIUS	ALLOWABLE CHORD LENGTH	DEVIATION FROM TRUE RADIUS	MAXIMUM DEFLECTION ANGLE Δ
4°-00'	1432'	30'-6"	± 1/2" (3)	1°-15'
8°-00'	716'	21'-10"	± 1/2" (3)	1°-45'
16°-30'	347'	15'-3"	± 1/2" (3)	2°-30'
23°-00'	249'	12'-11"	± 1/2" (3)	2°-57'
65°-30'	87'	7'-7 1/2"	± 1/2"	5°-00' (3)
114°-30'	50'	4'-4 1/6"	± 1/4"	5°-00' (3)
250°-00'	23'	2'-0"	± 1/8"	5°-00' (3)

**SHEET INDEX**

NO.	TITLE
	GENERAL NOTES & SUMMARY OF QUANTITIES
	GENERAL LAYOUT
	GENERAL PLAN & ELEVATION
	WALL REINFORCEMENT
	PANEL TABULATIONS
	MISCELLANEOUS DETAILS



REVISIONS:

APPROVED: AUGUST 27, 2014  
*Nancy Dautenberger*  
STATE BRIDGE ENGINEER

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE:
				PROJECT NO. 129594



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.

*Jeffrey A. Johnson*  
JEFFREY A. JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

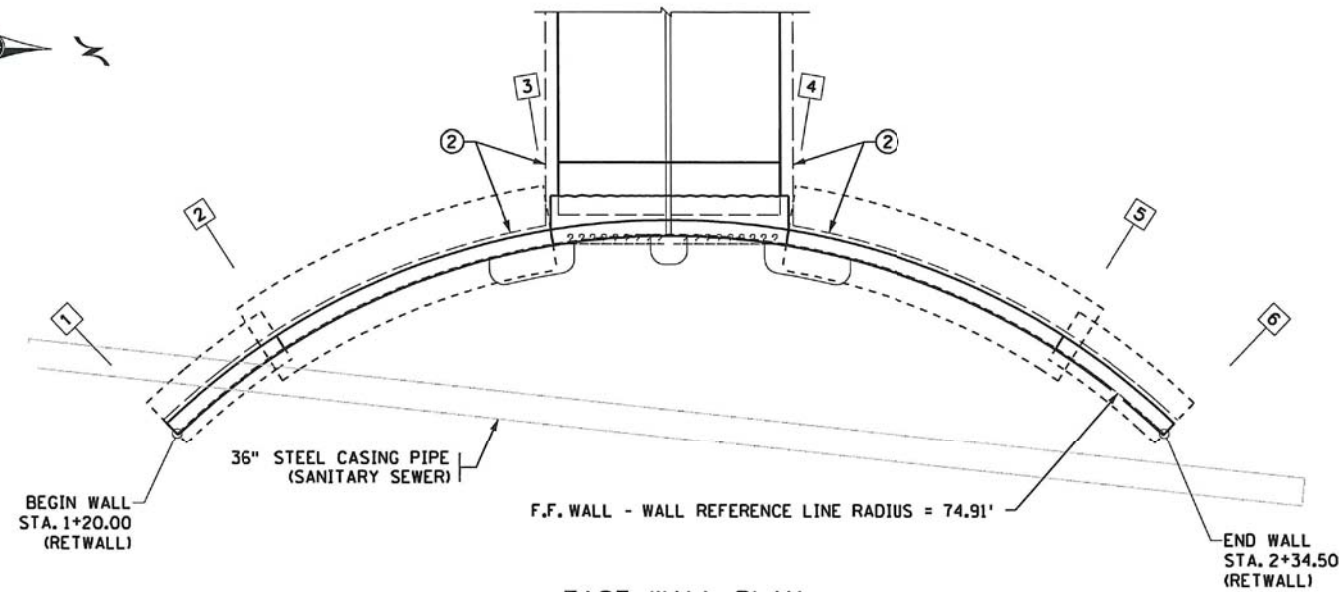
**RAMSEY COUNTY**  
TCAAP BP1  
RETAINING WALL GENERAL NOTES AND SUMMARY OF QUANTITIES

COUNTY PROJECT	SHEET NO.
S.A.P. 062-593-004	52 RW1
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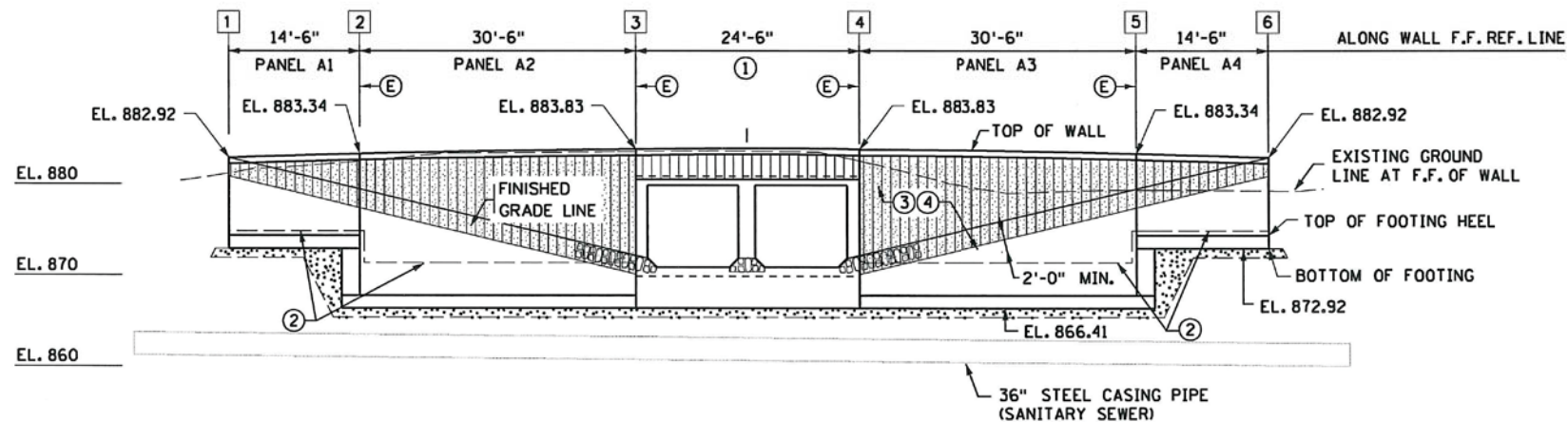
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**EAST WALL PLAN**

WALL IS STANDARD CANTILEVERED 1 TO 2 SLOPE BACKFILL, TYPE II DRAINAGE

CENTER RADIUS POINT OF CULVERT HEADWALL  
X=550830.869  
Y=210748.160



**EAST WALL ELEVATION**

JOINT NO	WALL DIMENSION (IN STATIONS)	X	Y	GROUND ELEVATION	TOP OF WALL	WALL HEIGHT (FT)	TOP OF FOOTING HEEL	BOTTOM OF FOOTING	PANEL LENGTH	PANEL NAME
<b>RETAINING WALLS</b>										
1	1 + 20.00	550778.627	210694.474	882.92	882.92					
2	1 + 34.50	550769.276	210705.526	879.45	883.34	9.00	874.34	872.92	14.5	A1
3	1 + 65.00	550757.428	210733.403	871.85	883.83	16.00	867.83	866.41	30.5	A2
4	1 + 89.50	550756.580	210757.777	871.85	883.83		867.83	866.41	24.5	
5	2 + 20.00	550766.462	210786.410	879.45	883.34	16.00	867.83	866.41	30.5	A3
6	2 + 34.50	550775.023	210798.085	882.92	882.92	9.00	874.34	872.92	14.5	A4

**NOTES**

- (E) DENOTES WALL EXPANSION JOINT LOCATIONS (CORK AND DOWEL JOINTS).
- (1) CAST-IN-PLACE CONCRETE END TRANSITION AND HEADWALL.
- (2) 4" DIA PERF DRAINAGE SYSTEM TYPE II. SEE RETAINING WALL DETAILS, B910.
- (3) ARCH CONC TEXTURE (FRACTURED FIN). TYP. ALL PANELS.
- (4) ARCH SURFACE FINISH (SINGLE COLOR). TYP. ALL PANELS.

No.	Date	Revisions	App.	DRAWING NAME
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*Jeffrey A. Johnson*  
JEFFREY A JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280



CAST-IN-PLACE CONCRETE RETAINING WALL DETAILS

COUNTY PROJECT	
S. A. P.	062-593-004
S.P.	
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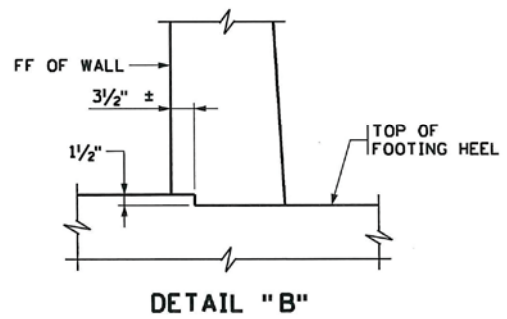
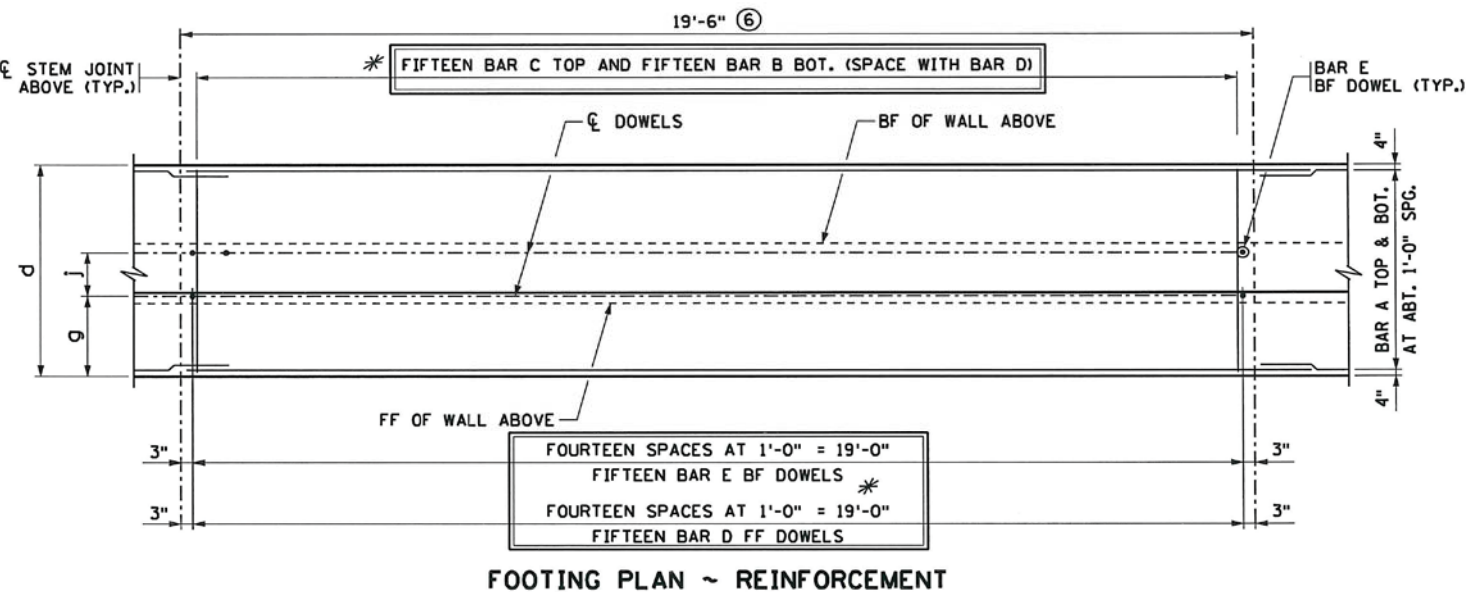
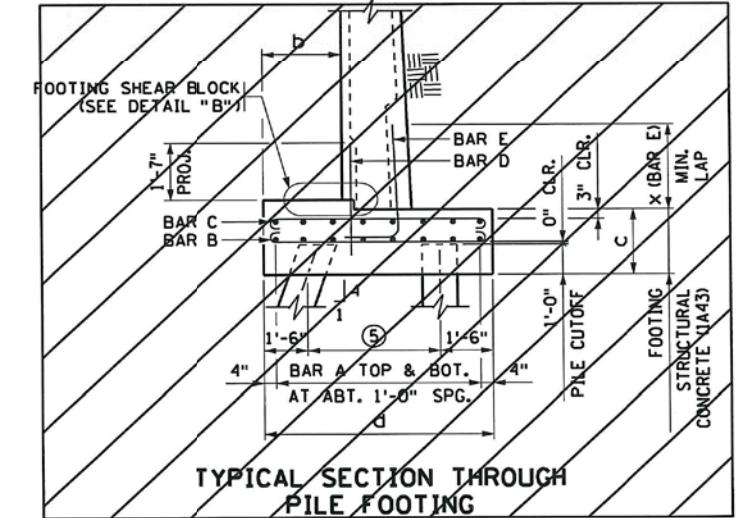
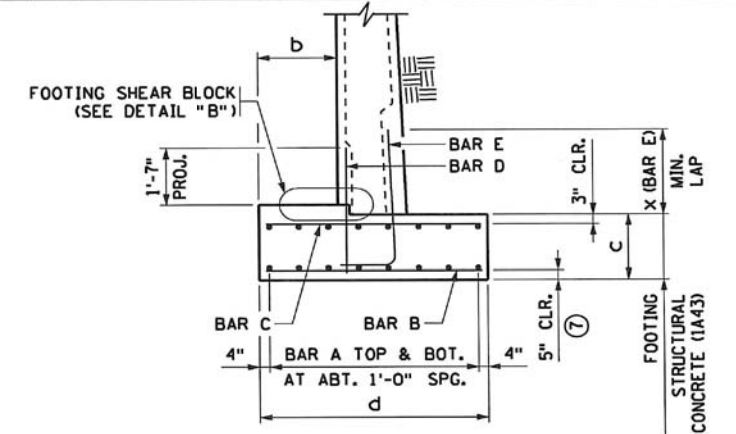
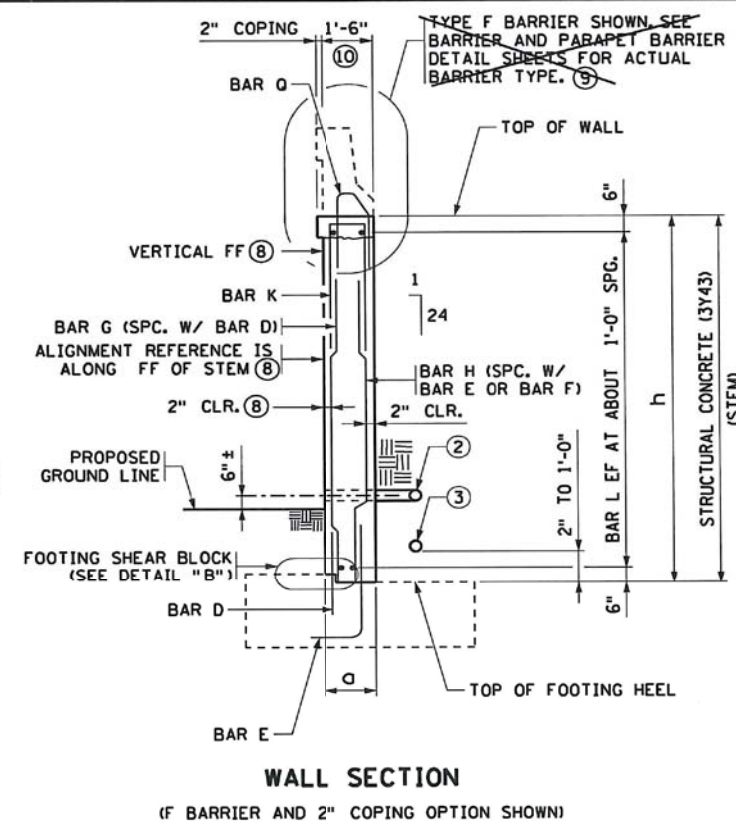
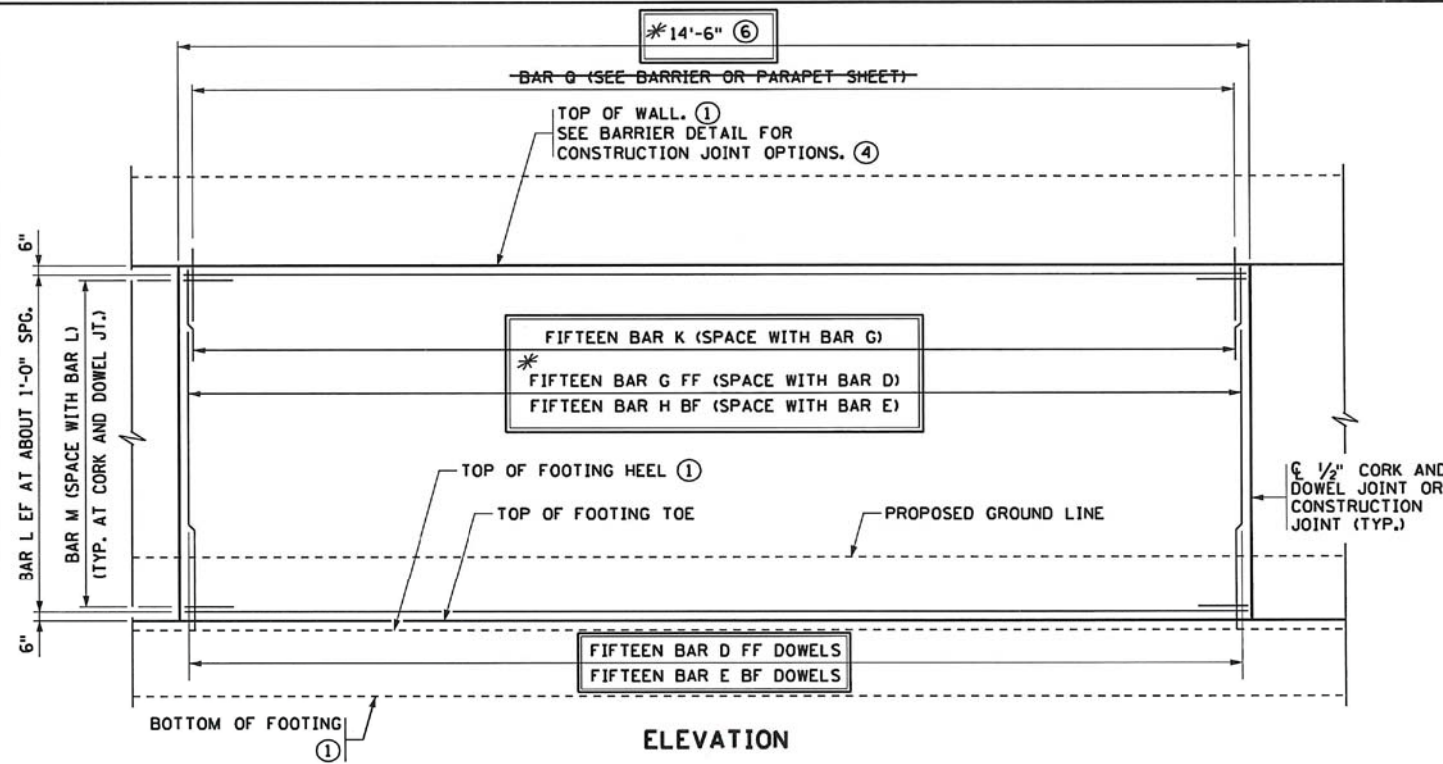
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- NOTES:**
- REFER TO RETAINING WALL PANEL TABULATIONS FOR DIMENSIONS "a" THROUGH "x".
- STEM REINFORCEMENT IS TO BE SYMMETRICALLY/EQUALLY SPACED BETWEEN STEM JOINTS.
- FOOTING REINFORCEMENT SYMMETRICAL ABOUT STEM JOINT ABOVE UNLESS OTHERWISE NOTED. SEE RETAINING WALL TABLES FOR PILE SPACING AND LAYOUT.
- BF DENOTES BACK FACE.  
FF DENOTES FRONT FACE.  
EF DENOTES EACH FACE.
- (1) STRAIGHT LINE BETWEEN ELEVATIONS SHOWN ON WALL ELEVATION (EXCEPT FOR STEPPED CONDITIONS). IF A BARRIER IS NOT USED, TOPS OF RETAINING WALL COULD BE USED.
  - (2) TYPE I DRAINAGE. SEE SECTION A-A ON STANDARD PLAN 5-297.624 (5 OF 6).
  - (3) TYPE II DRAINAGE. SEE SECTION B-B ON STANDARD PLAN 5-297.624 (5 OF 6).
  - (4) SEE STANDARD PLAN 5-297.624 (1 OF 6).
  - (5) SEE GENERAL PLAN FOR PILE SPACING.
  - (6) AT THE CONTRACTOR'S OPTION, PANEL LENGTH MAY VARY UP TO ± 1'-0". BAR CUTTING LISTS SHALL BE REVISED ACCORDINGLY BY THE CONTRACTOR.
  - (7) 5" BOTTOM OF FOOTING CLEARANCE FOR ALL BARS EXCEPT BAR D. BAR D BOTTOM OF FOOTING CLEARANCE VARIES.
  - (8) REFER TO DETAIL "C" AND NOTES ON STANDARD PLAN 5-297.624 (1 OF 6).
  - (9) REBAR AND CONCRETE ARE INCLUDED IN THE PAY ITEM BY LINEAR FEET FOR THE BARRIER OR PARAPET.
  - (10) WALL THICKNESS AT TOP OF STEM, NOT INCLUDING COPING.
- \* DENOTES MODIFICATIONS FROM STANDARD PLAN

PANEL LENGTH FROM 30'-6" TO 14'-6".  
CHANGED BAR SPACES FROM THIRTY TO FOURTEEN.  
CHANGED NUMBER OF BARS FROM THIRTY-ONE TO FIFTEEN.

REVISIONS:

APPROVED: AUGUST 27, 2014  
*Nancy Auerberger*  
STATE BRIDGE ENGINEER

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
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*Jeffrey A. Johnson*  
JEFFREY A. JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

REVISOR: *Christopher*  
APPROVED: 8-27-2014  
STATE DESIGN ENGINEER

**RAMSEY COUNTY**  
TCAAP BP1  
RETAINING WALL REINFORCEMENT DETAILS (SHORT WALLS)

REINFORCING WALL REINFORCEMENT DETAILS (SHORT WALLS)

COUNTY PROJECT: S.A.P. 062-593-004

S.P.

S.P.

S.P.

SHEET NO. 54 RW3

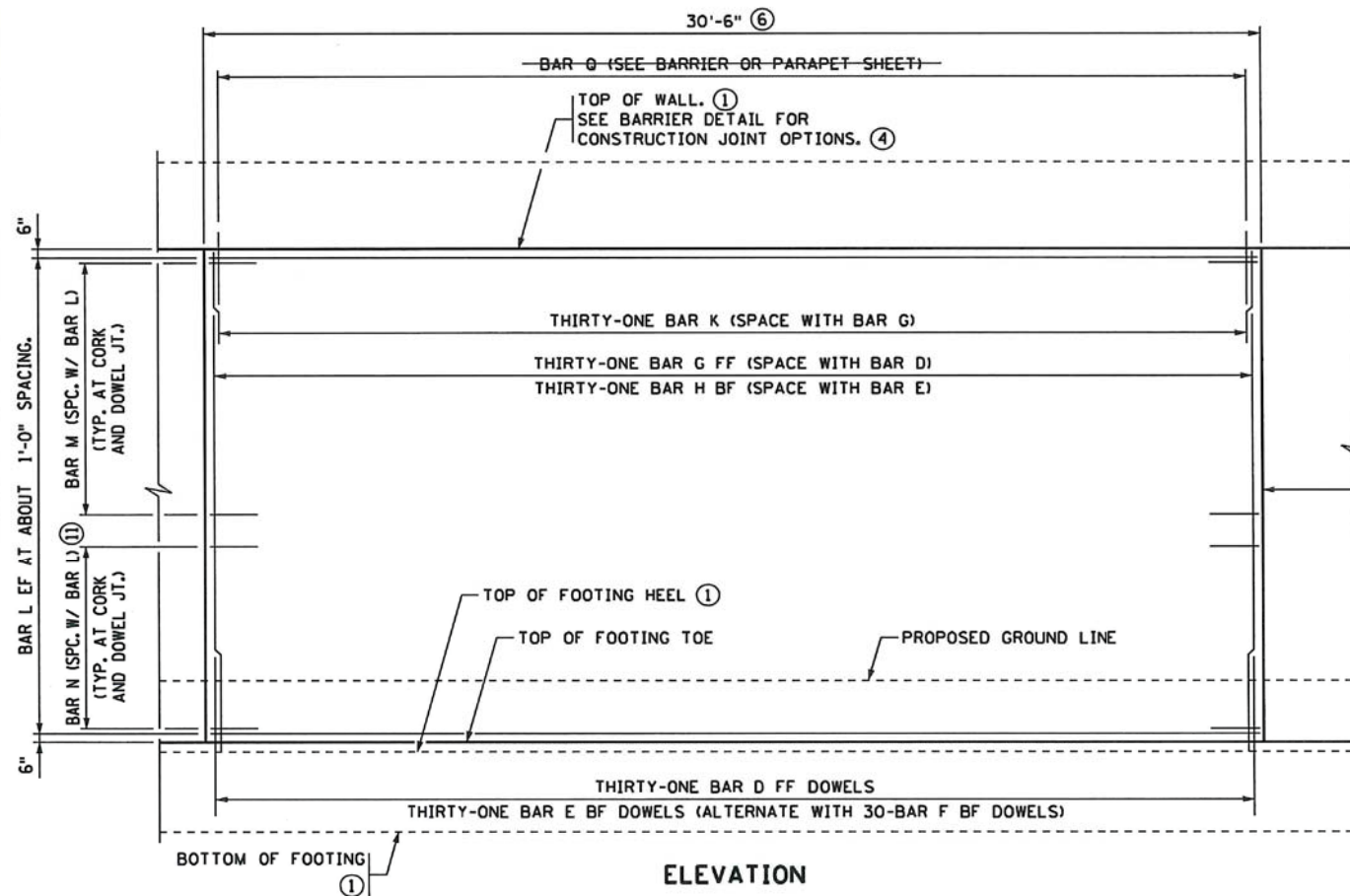
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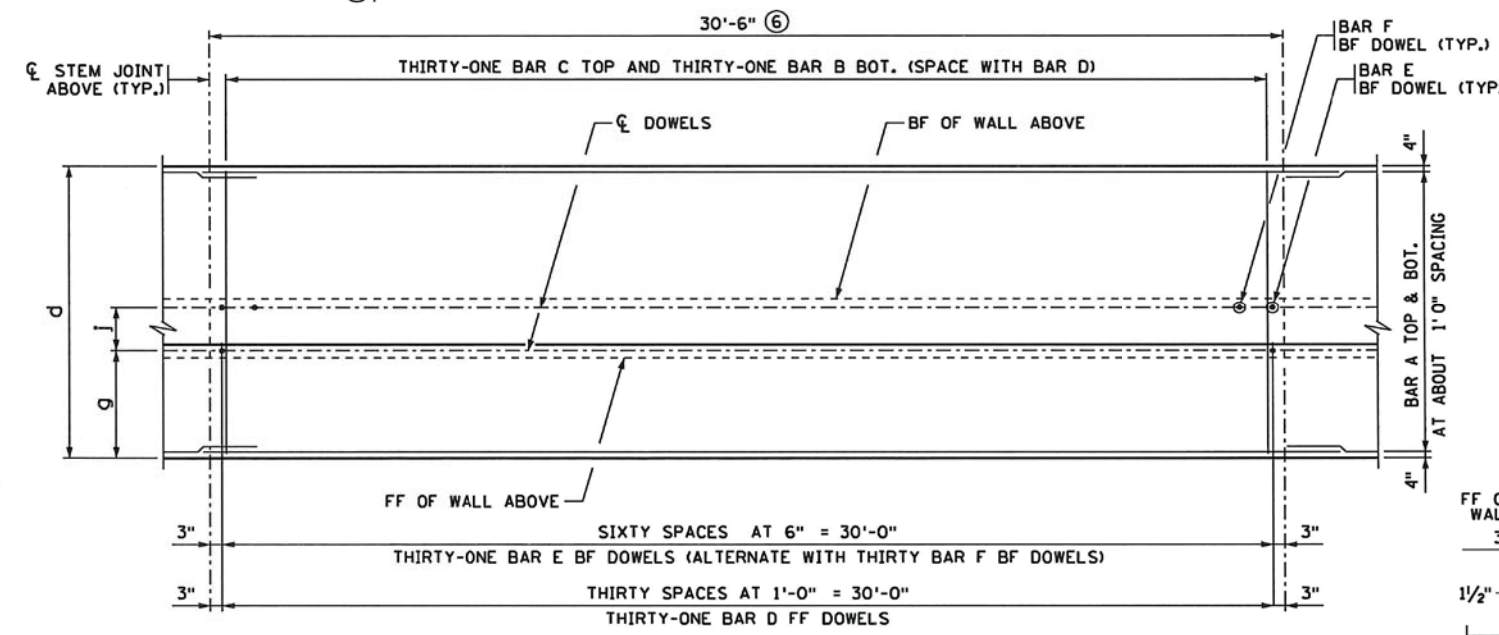
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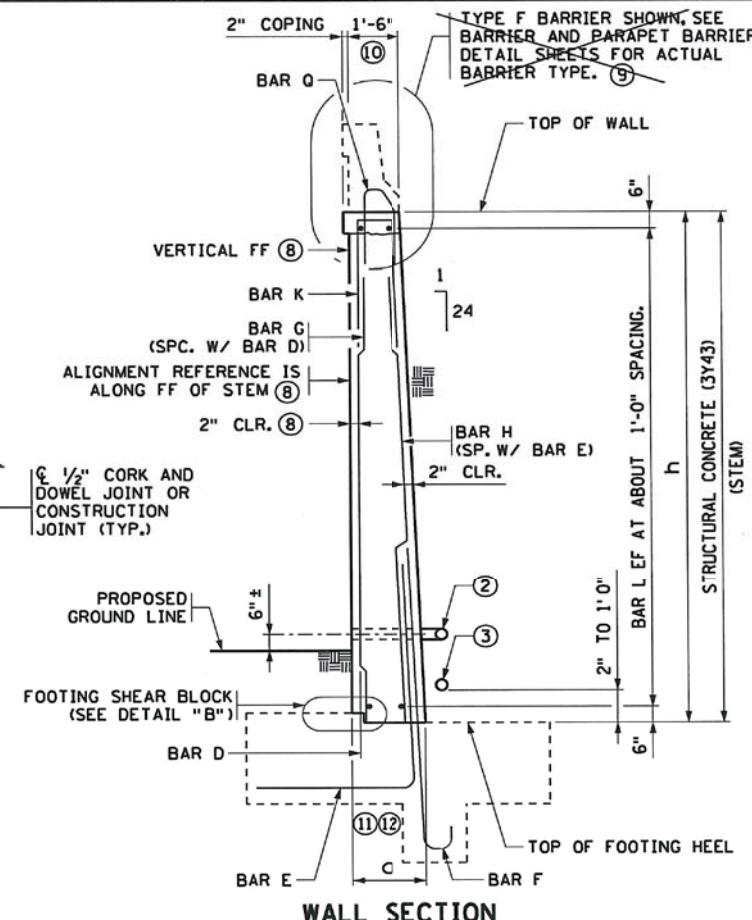
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ELEVATION

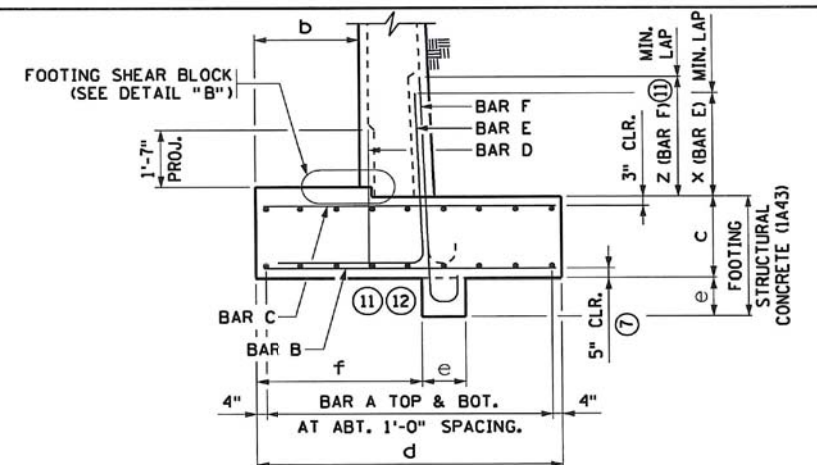


FOOTING PLAN ~ REINFORCEMENT

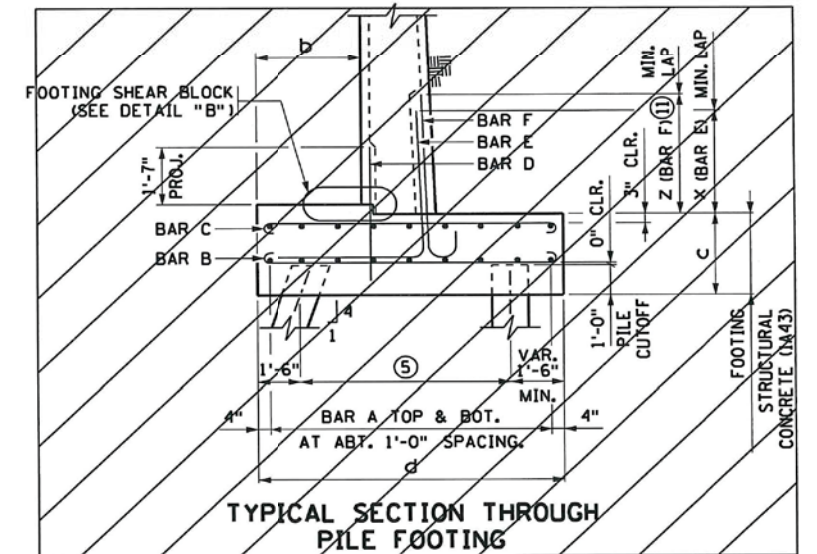


WALL SECTION

(F BARRIER AND 2" COPING OPTION SHOWN)



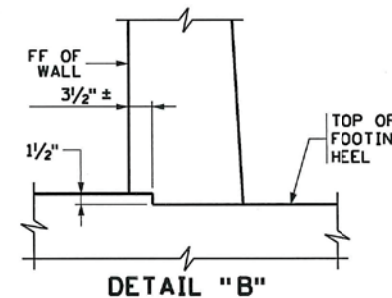
TYPICAL SECTION THROUGH SPREAD FOOTING



TYPICAL SECTION THROUGH PILE FOOTING

NOTES:

- REFER TO RETAINING WALL PANEL TABULATIONS FOR DIMENSIONS "a" THROUGH "x".
- STEM REINFORCEMENT IS TO BE SYMMETRICALLY/EQUALLY SPACED BETWEEN STEM JOINTS.
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- ① STRAIGHT LINE BETWEEN ELEVATIONS SHOWN ON WALL ELEVATION (EXCEPT FOR STEPPED CONDITIONS). IF A BARRIER IS NOT USED, TOPS OF RETAINING WALL COULD BE USED.
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- ③ TYPE II DRAINAGE. SEE SECTION B-B ON STANDARD PLAN 5-297.624 (5 OF 6).
- ④ SEE STANDARD PLAN 5-297.624 (1 OF 6).
- ⑤ SEE GENERAL PLAN FOR PILE SPACING.
- ⑥ AT THE CONTRACTOR'S OPTION, PANEL LENGTH MAY VARY UP TO ± 1'-0". BAR CUTTING LISTS SHALL BE REVISED ACCORDINGLY BY THE CONTRACTOR.
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- ⑨ REBAR AND CONCRETE ARE INCLUDED IN THE PAY ITEM BY LINEAR FEET FOR THE BARRIER OR PARAPET.
- ⑩ WALL THICKNESS AT TOP OF STEM, NOT INCLUDING COPING.
- ⑪ THIS FEATURE MAY NOT BE PRESENT ON ALL MEDIUM HEIGHT WALLS.
- ⑫ CONTRACTOR MAY CONSTRUCT KEYWAY WITHOUT FORMS, AS APPROVED BY THE ENGINEER.



DETAIL "B"

REVISION:

APPROVED: AUGUST 27, 2014

*Nancy A. Rubenberger*  
STATE BRIDGE ENGINEER

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
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*Jeffrey A. Johnson*  
JEFFREY A. JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

REVISOR: MODIFIED

APPROVED: 8-27-2014

*Christopher Ky*  
STATE DESIGN ENGINEER

RETAINING WALL REINFORCEMENT DETAILS (MEDIUM WALLS)

STANDARD PLAN 5-297.622 1 OF 1

RAMSEY COUNTY

TCAAP BP1

RETAINING WALL REINFORCEMENT DETAILS (MEDIUM WALLS)

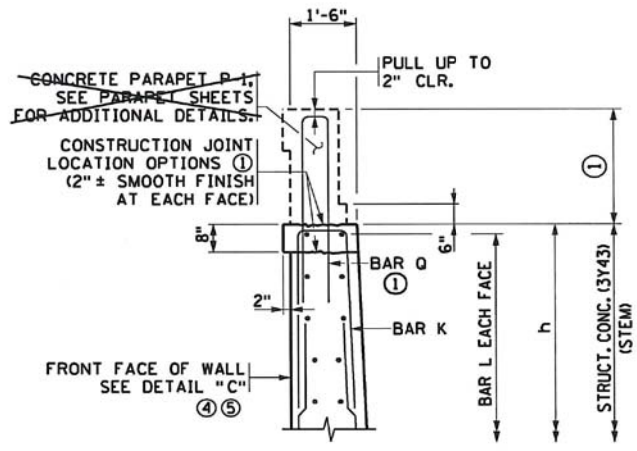
COUNTY PROJECT	S. A. P. 062-593-004	SHEET NO.	55 RW4
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63

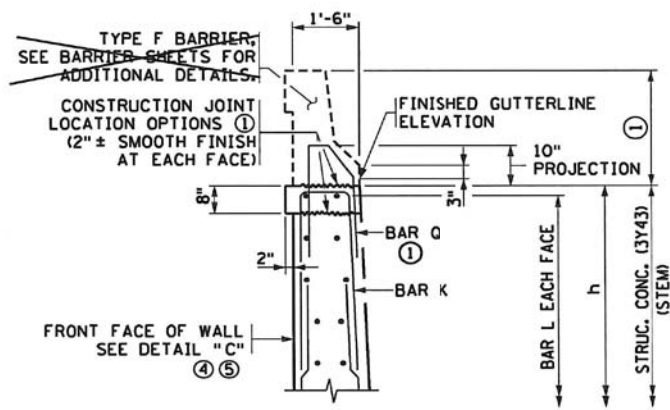
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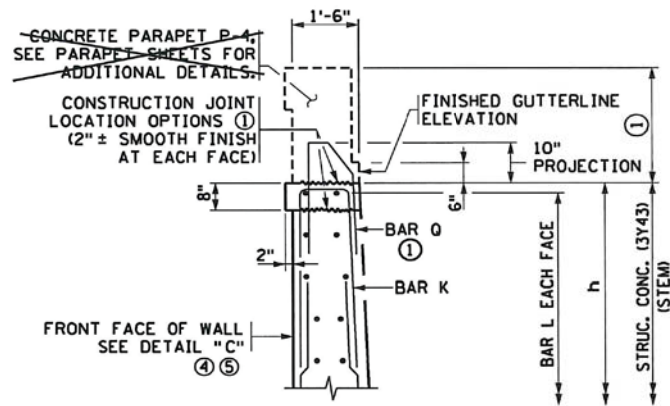
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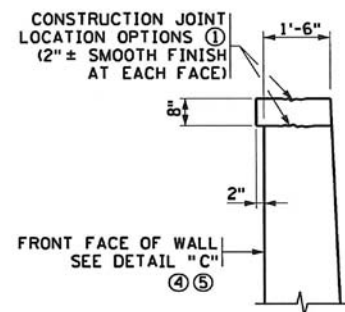
CONCRETE PARAPET P-1 DETAIL  
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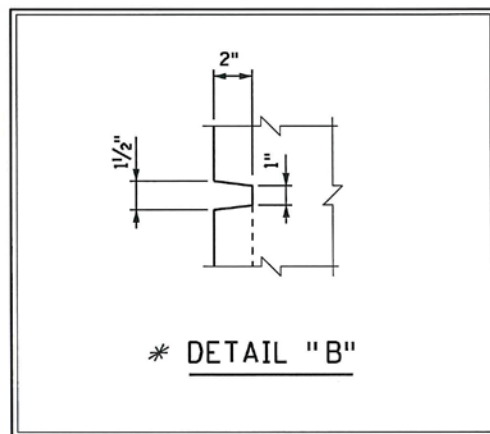
TYPE F BARRIER DETAIL  
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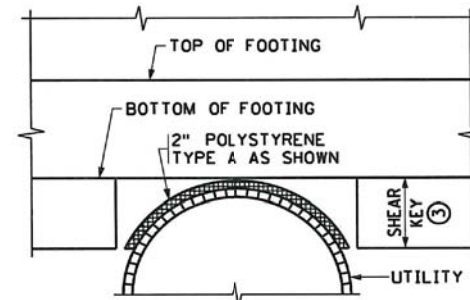
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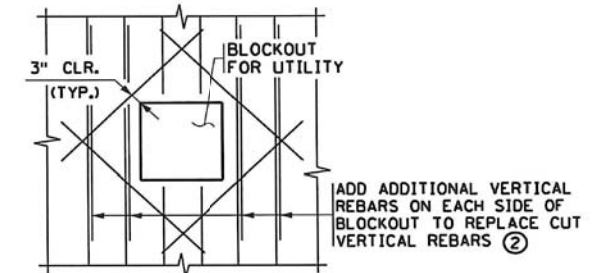
COPING DETAIL



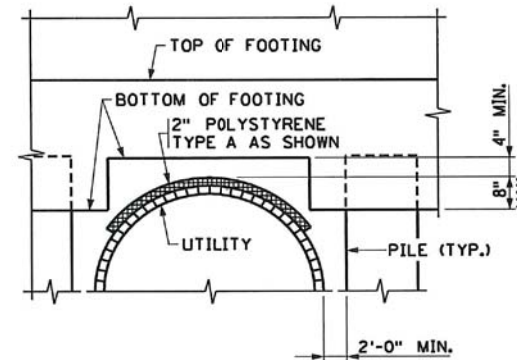
\* DETAIL "B"



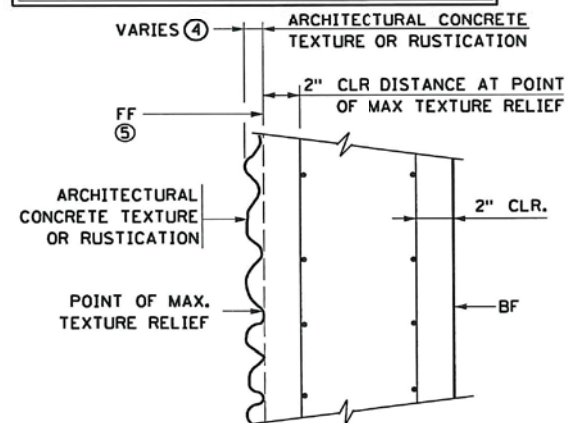
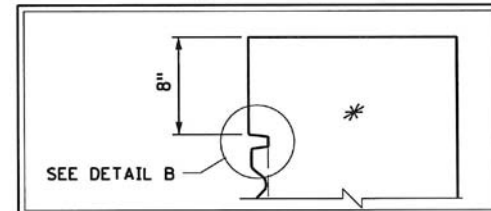
PIPE UNDER SPREAD FOOTING (THROUGH SHEAR KEY)



UTILITY BLOCKOUT DETAIL



PIPE THROUGH PILE FOOTING



DETAIL "C"

**NOTES:**

ARCHITECTURAL TREATMENT OPTION ON FRONT FACE OF RETAINING WALL, INCLUDING COPING OR HORIZONTAL REVEL OPTION TO BE DETERMINED BY MnDOT.

- ① REFER TO PARAPET OR BARRIER SHEETS FOR ADDITIONAL INFORMATION INCLUDING Q BAR PLACEMENT DETAILS, AND PAYMENT.
- ② FIELD CUT/ADJUST VERTICAL AND HORIZONTAL REINFORCEMENT AS NECESSARY TO CLEAR BLOCKOUT. PLACE REINFORCEMENT AS SHOWN.
- ③ MODIFY AS NEEDED FOR INTERRUPTION.
- ④ THE THICKNESS OF THE ARCHITECTURAL CONCRETE TEXTURE VARIES WITH THE TEXTURE RELIEF. THE STRUCTURAL CONCRETE 3Y43 QUANTITIES DO NOT INCLUDE THE MATERIAL WITHIN THE ARCHITECTURAL CONCRETE TEXTURE. MATERIAL NEEDED FOR THE TEXTURING SHALL BE INCIDENTAL. SEE SPECIAL PROVISIONS 2411. TEXTURE RELIEF TO ADHERE TO FHWA CRASH BARRIER GUIDANCE WHENEVER THE WALL FACE IS INSIDE OR NEAR THE CLEAR ZONE.
- ⑤ FOR RETAINING WALLS THAT ABUT A BRIDGE OR BRIDGE WING WALL, NOTE THAT THE DESIGNATION OF "FRONT FACE" MAY VARY FROM THE BRIDGE PLANS TO THE RETAINING WALL PLANS.

\* DENOTES MODIFICATIONS FROM STANDARD PLAN

REVISIONS:

APPROVED: AUGUST 27, 2014

*Nancy Dubenberger*  
STATE BRIDGE ENGINEER

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE: .
				PROJECT NO. 129594



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.

*Jeffrey A. Johnson*  
JEFFREY A. JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

MODIFIED

STANDARD SHEET NO. 5-297-624 (1 OF 6)

STANDARD APPROVED: AUGUST 27, 2014

TITLE: RETAINING WALL MISCELLANEOUS DETAILS

**RAMSEY COUNTY**  
TCAAP BP1  
RETAINING WALL MISCELLANEOUS DETAILS

COUNTY PROJECT		SHEET NO.
S.A.P.	062-593-004	
S.P.		
S.P.		
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### BILL OF REINFORCEMENT FOR STEPPED FOOTING DETAILS ①②

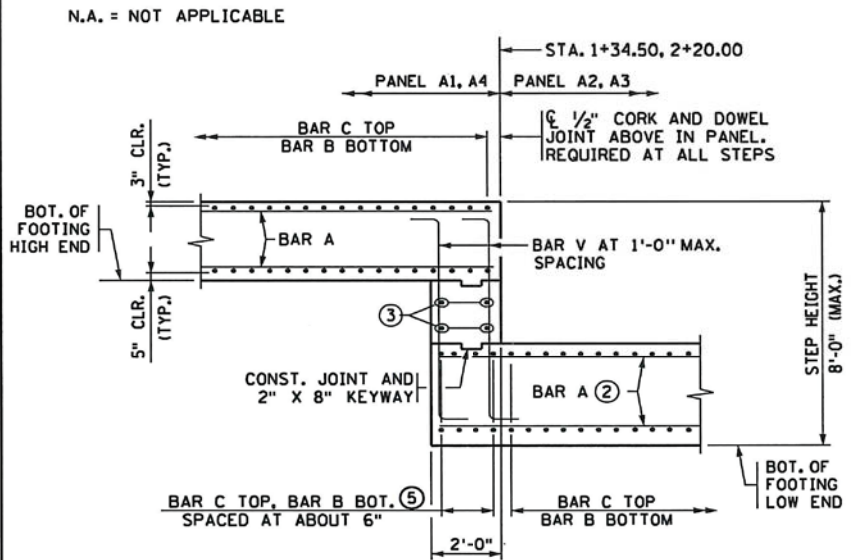
STATION	STEP TYPE (VAR. OF MIN.)	JOINT	BOT. OF FOOTING EL. LOW END	BOT. OF FOOTING EL. HIGH END	BAR (B, C, V)	MARK	NO.	LENGTH	A- DIMENSION
1+34.50	TYPE 1	2	866.41	872.92	B (8)		4		N.A.
					C (8)			N.A.	
					V (7)				
2+20.00	TYPE 1	5	866.41	872.92	B (8)		4		N.A.
					C (8)			N.A.	
					V (7)				
					B (8)			N.A.	
					C (8)		4		N.A.
					V (7)				
					B (8)				N.A.
					C (8)		4		N.A.
					V (7)				
					B (8)				N.A.
					C (8)		4		N.A.
					V (7)				
					B (8)				N.A.
					C (8)		4		N.A.
					V (7)				
					B (8)				N.A.
					C (8)		4		N.A.
					V (7)				
					B (8)				N.A.
					C (8)		4		N.A.
					V (7)				
					B (8)				N.A.
					C (8)		4		N.A.
					V (7)				
					B (8)				N.A.
					C (8)		4		N.A.
					V (7)				
					B (8)				N.A.
					C (8)		4		N.A.
					V (7)				

N.A. = NOT APPLICABLE

### BILL OF REINFORCEMENT FOR CORNER DETAILS ①

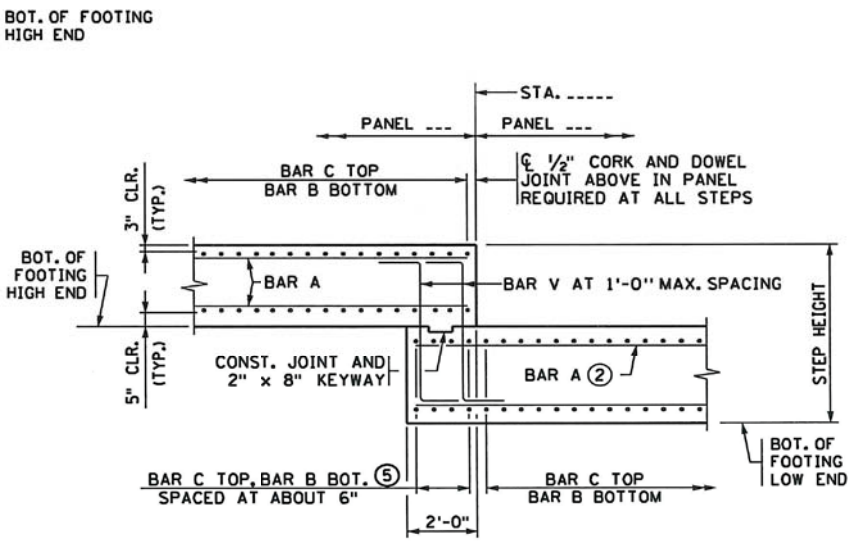
STATION	JOINT	INSIDE OR OUTSIDE CORNER	BAR	MARK	NO.	LENGTH	SHAPE	A- DIMENSION
			U	C4 E		8'-8"		N.A.
			W	C4 E		6'-4"		N.A.
			Y	C4 E		4'-11"		2'-11"
			Y	C4 E		5'-9"		3'-9"
			Y	C4 E		7'-5"		5'-5"
			U	C4 E		8'-8"		N.A.
			W	C4 E		6'-4"		N.A.
			Y	C4 E		4'-11"		2'-11"
			Y	C4 E		5'-9"		3'-9"
			Y	C4 E		7'-8"		5'-5"
			U	C4 E		8'-8"		N.A.
			W	C4 E		6'-4"		N.A.
			Y	C4 E		4'-11"		2'-11"
			Y	C4 E		5'-9"		3'-9"
			Y	C4 E		7'-5"		5'-5"
			U	C4 E		8'-8"		N.A.
			W	C4 E		6'-4"		N.A.
			Y	C4 E		4'-11"		2'-11"
			Y	C4 E		5'-9"		3'-9"
			Y	C4 E		7'-8"		5'-5"

N.A. = NOT APPLICABLE



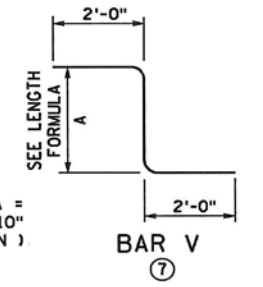
STEPPED FOOTING DETAIL - LONGIT. SECTION ①②

(SPREAD FOOTING SHOWN)

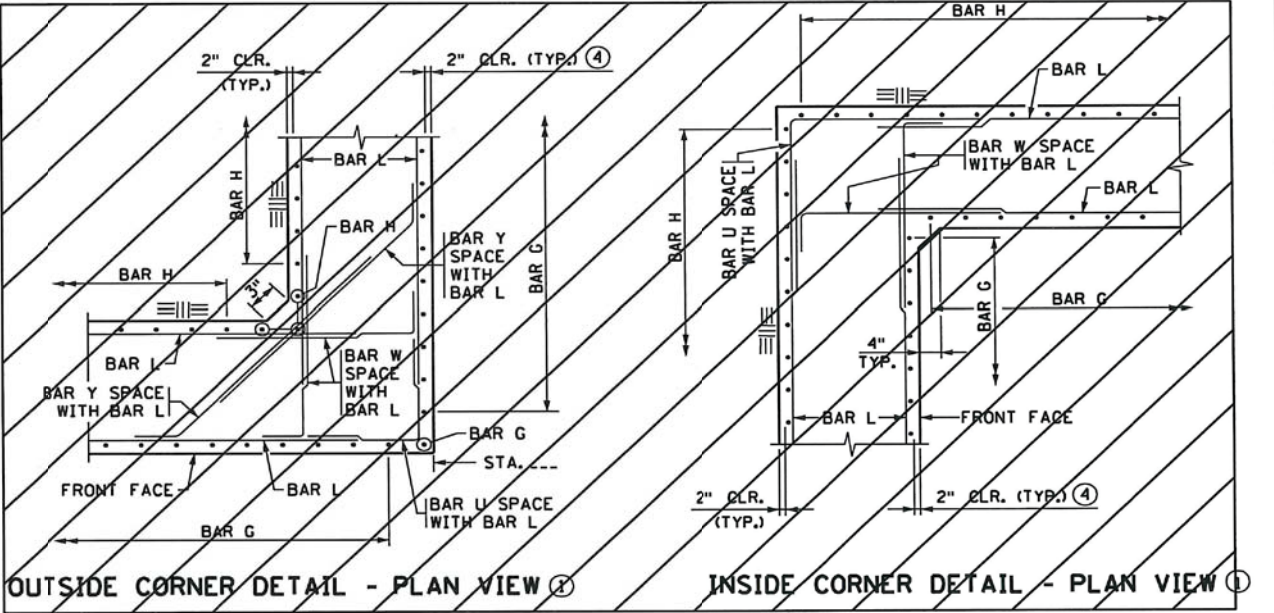
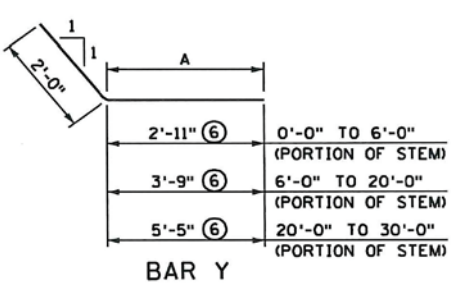
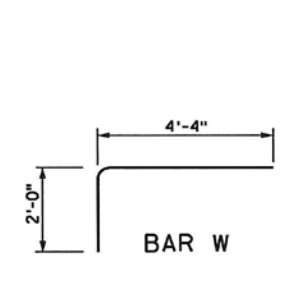


STEPPED FOOTING DETAIL - LONGIT. SECTION ①②

TYPE 2 - MINIMUM STEP HEIGHT (SPREAD FOOTING SHOWN)



BAR V LENGTH FORMULA = STEP HEIGHT MINUS 10" (A-DIMENSION)

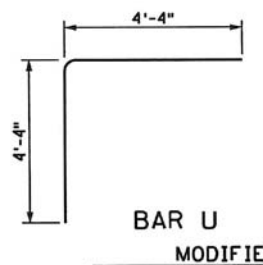


OUTSIDE CORNER DETAIL - PLAN VIEW ①

INSIDE CORNER DETAIL - PLAN VIEW ①

#### NOTES:

- ADDITIONAL REINFORCING BARS, STRUCTURAL CONCRETE, AND OTHER COMPONENTS REQUIRED TO CONSTRUCT CORNERS AND STEPPED FOOTINGS ARE INCIDENTAL.
- CONTRACTOR IS REQUIRED TO COMPLETE THE BILL OF REINFORCEMENT TABLE AND SUBMIT TO PROJECT ENGINEER AT LEAST 3 WEEKS PRIOR TO REBAR FABRICATION.
- FOR THE LOWER OF THE TWO FOOTINGS AT A STEP, THE CONTRACTOR IS RESPONSIBLE FOR MODIFYING THE LENGTH OF BAR A TO EXTEND BENEATH THE STEP OR USE SPLICED BARS.
- 6 INCH MAX. SPACING. BARS TO BE SAME TYPE AS BAR B OF THE LOWER FOOTING.
- REFER TO DETAIL "C" AND NOTES ON STANDARD PLAN 5-297.624 (1 OF 6).
- REFER TO TABLE LABELED "BILL OF REINFORCEMENT FOR STEPPED FOOTING DETAILS" FOR ADDITIONAL B AND C BARS IN LOWER FOOTING.
- USE THE BAR Y LEG DIMENSION FOR THE PORTION OF STEM LOCATION INDICATED IN THE BAR BEND IN DETAIL. (0'-0" REPRESENTS TOP OF THE STEM).
- BAR V SIZE TO MATCH BAR B. SEE PANEL TABULATIONS FOR SIZE.
- SEE PANEL TABULATIONS FOR BAR SIZE AND LENGTH.



BAR U MODIFIED

REVISION:

APPROVED: AUGUST 27, 2014

*Nancy Daubnerberger*  
STATE BRIDGE ENGINEER

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE:
				PROJECT NO. 129594



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*Jeffrey A. Johnson*  
JEFFREY A. JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

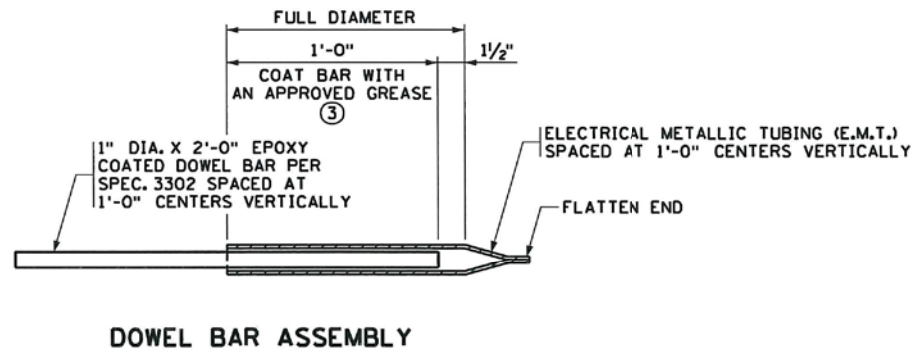
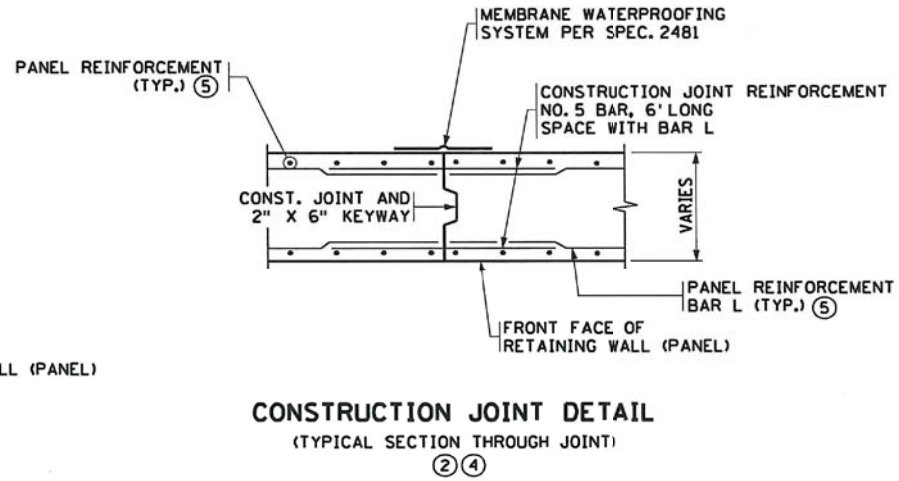
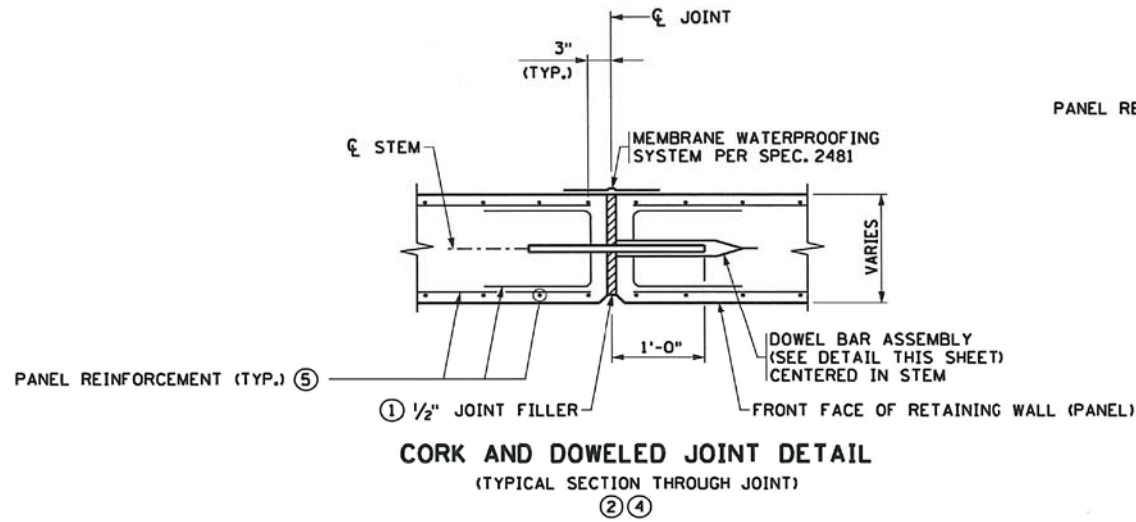
STANDARD SHEET NO. 5-297.624 (2 OF 6)

STANDARD APPROVED: AUGUST 27, 2014

TITLE: RETAINING WALL MISCELLANEOUS DETAILS

**RAMSEY COUNTY**  
TCAAP BP1  
RETAINING WALL MISCELLANEOUS DETAILS

COUNTY PROJECT	SHEET NO.
S.A.P. 062-593-004	57
S.P.	RW6
S.P.	
S.P.	



**NOTES:**

THE MATERIALS AND PLACEMENT OF THE CORK AND DOWEL JOINT/ CONSTRUCTION JOINT (DOWEL BAR ASSEMBLIES, NO. 5 REINFORCING BARS, JOINT FILLER, AND JOINT WATERPROOFING) ARE INCIDENTAL.

THE CONTRACTOR SHALL ASSIGN TO THE REINFORCING BAR SUPPLIER THE RESPONSIBILITY OF SUPPLYING THE NECESSARY MATERIALS ASSOCIATED WITH THE DETAILS SHOWN ON THIS SHEET.

- ① JOINT FILLER SHALL BE CORK SPEC. 2401.3E3.
- ② AT THE CONTRACTOR'S OPTION, CONSTRUCTION JOINTS MAY BE SUBSTITUTED IN LIEU OF CORK AND DOWEL JOINTS. REINFORCEMENT QUANTITIES WERE COMPUTED ASSUMING A CORK AND DOWEL JOINT BETWEEN EVERY PANEL. CHANGES IN THE BILL OF REINFORCEMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, AND NO ADDITIONAL PAYMENT WILL BE MADE. AT A MINIMUM, PLACE CORK AND DOWEL JOINTS EVERY 9'-6". A CORK AND DOWEL JOINT IS REQUIRED AT ALL VERTICAL FOOTING STEPS.
- ③ GREASE SHALL BE AN APPROVED HIGH PRESSURE TYPE THAT IS EFFECTIVE OVER THE FULL RANGE OF EXPECTED TEMPERATURES AND RESISTANT TO CHEMICAL ACTION.
- ④ DOWEL BAR ASSEMBLY MUST BE PLACED PERPENDICULAR TO JOINT AND PARALLEL TO THE WALL FACE, AND TO EACH OTHER.
- ⑤ SEE PANEL SHEETS FOR REINFORCING DETAILS.

REVISION:	
APPROVED: AUGUST 27, 2014	<i>Nancy Damberger</i> STATE BRIDGE ENGINEER

STANDARD SHEET NO. 5-297.624 (3 OF 6)	TITLE: RETAINING WALL MISCELLANEOUS DETAILS
STANDARD APPROVED: AUGUST 27, 2014	

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE:
				PROJECT NO. 129594

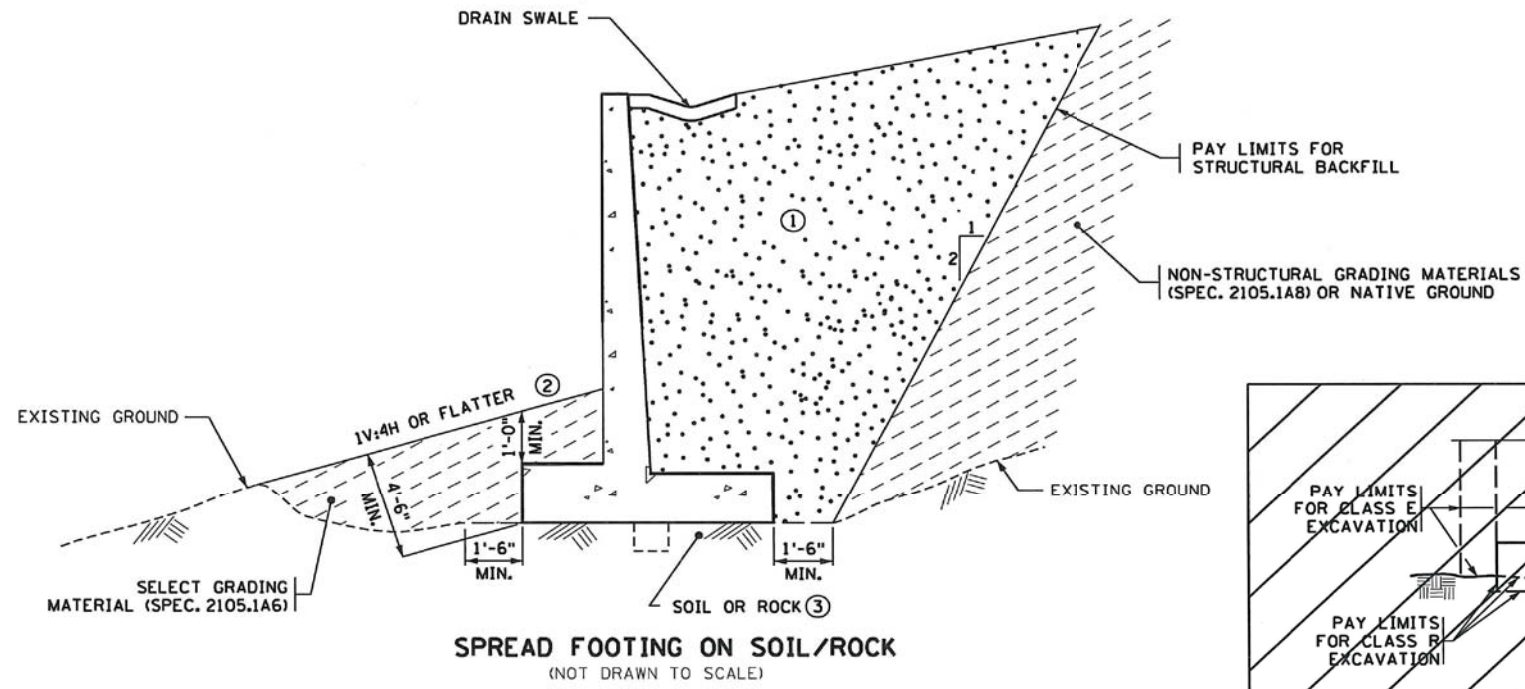


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*Jeffrey A. Johnson*  
JEFFREY A. JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

**RAMSEY COUNTY**  
TCAAP BP1  
RETAINING WALL MISCELLANEOUS DETAILS

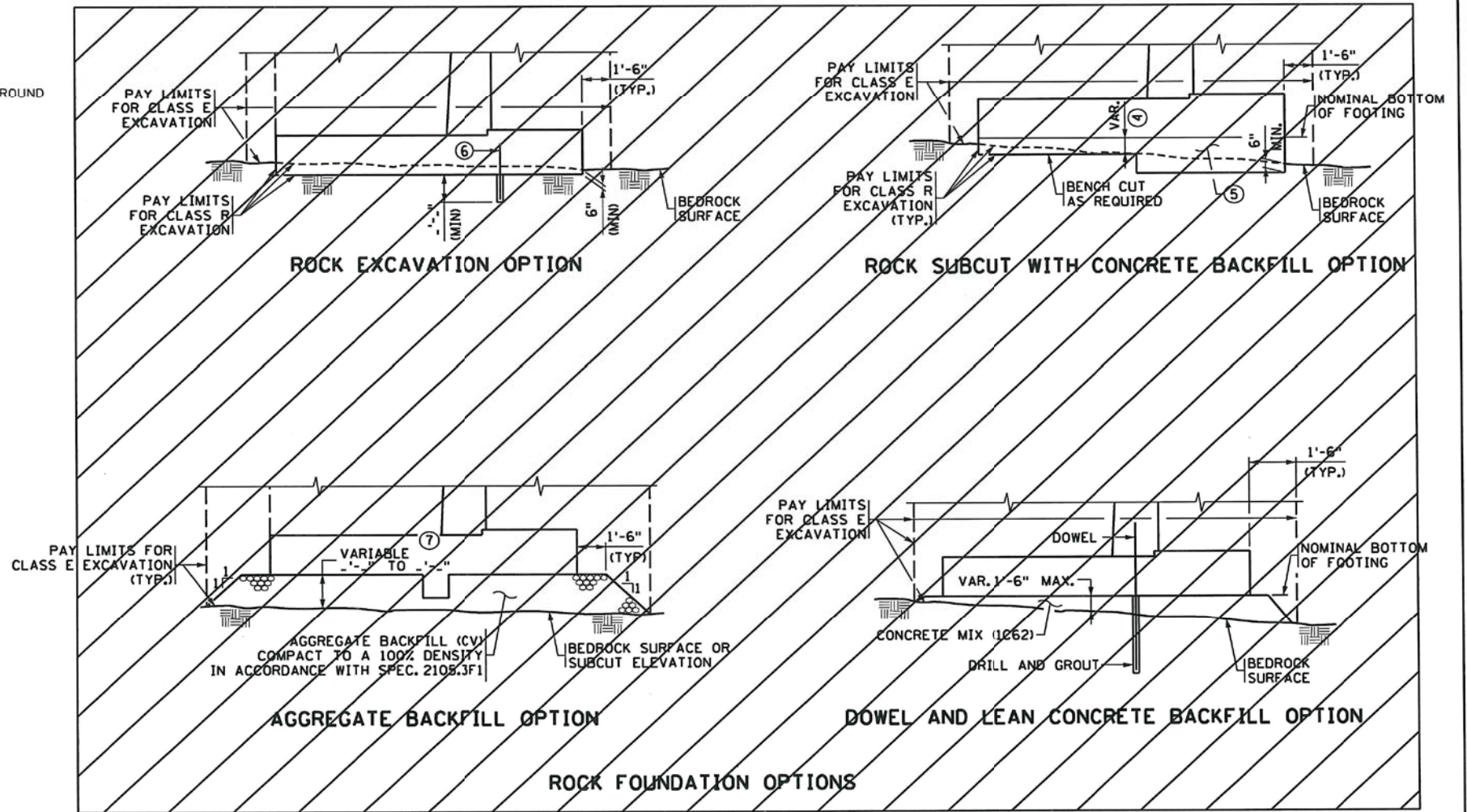
COUNTY PROJECT	SHEET NO.
S. A. P. 062-593-004	58
S.P.	RW7
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S.P.	63



**SPREAD FOOTING ON SOIL/ROCK**  
(NOT DRAWN TO SCALE)

SEE SHEET RW10 FOR SUBCUT AND COARSE FILTER AGGREGATE NOTES

- ① STRUCTURAL BACKFILL (SPEC. 3149.2D2) COMPACT BACKFILL TO SPECIFIED DENSITY METHOD SPEC. 2105.3F1
- ② PROVIDE SLOPE OF 1V:24H TO 1V:4H FOR PROPER DRAINAGE.
- ③ LEVEL FOUNDATION SURFACE AND CLEAR SURFACE OF LOOSE DEBRIS BEFORE PLACING FOUNDATION DIRECTLY ON SOIL OR ROCK.
- ④ SEE SPECIAL PROVISIONS FOR PAYMENT OF ADDITIONAL CONCRETE.
- ⑤ STRUCTURAL CONCRETE (1A43) OR LEAN CONCRETE BACKFILL (1C62), AS APPROVED BY ENGINEER.
- ⑥ DRILL HOLES FOR ANCHORS TO KEY FOOTING IN ROCK.
- ⑦ MINIMUM DEPTH 1 FT. 6 INCH OR SHEAR KEY DEPTH.



MODIFIED:  
NOTE ADDED REGARDING SUBCUT AND COARSE  
FILTER AGGREGATE

REVISION:

APPROVED: AUGUST 27, 2014

*Nancy Subenberger*  
STATE BRIDGE ENGINEER

No.	Date	Revisions	App.	DRAWING NAME
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*Jeffrey A. Johnson*  
JEFFREY A. JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

STANDARD SHEET NO. 5-297-624 (4 OF 6)	TITLE: RETAINING WALL MISCELLANEOUS DETAILS (GEOTECHNICAL DETAILS)
STANDARD APPROVED: AUGUST 27, 2014	

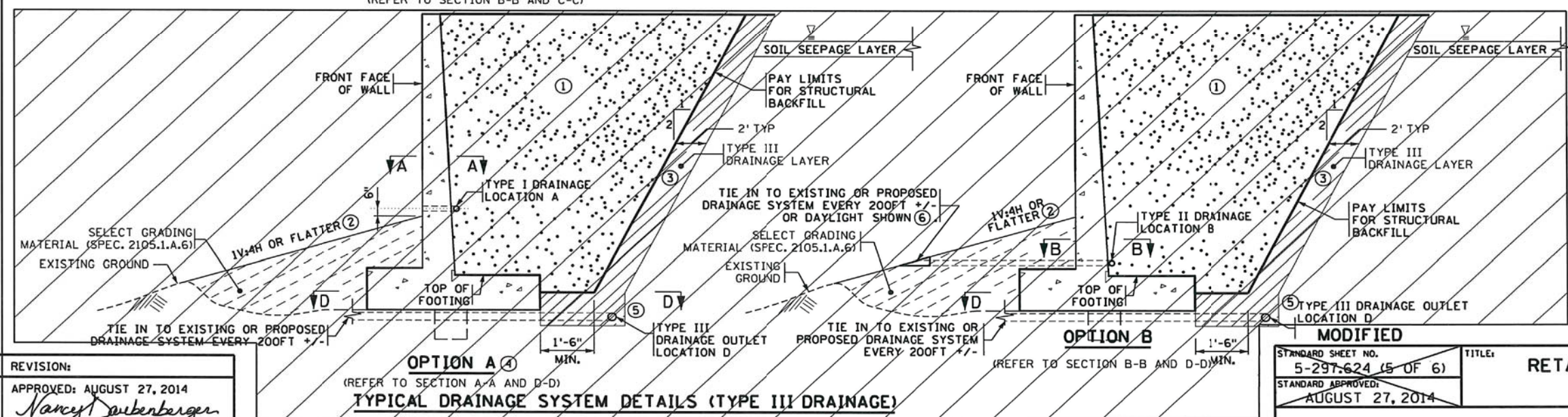
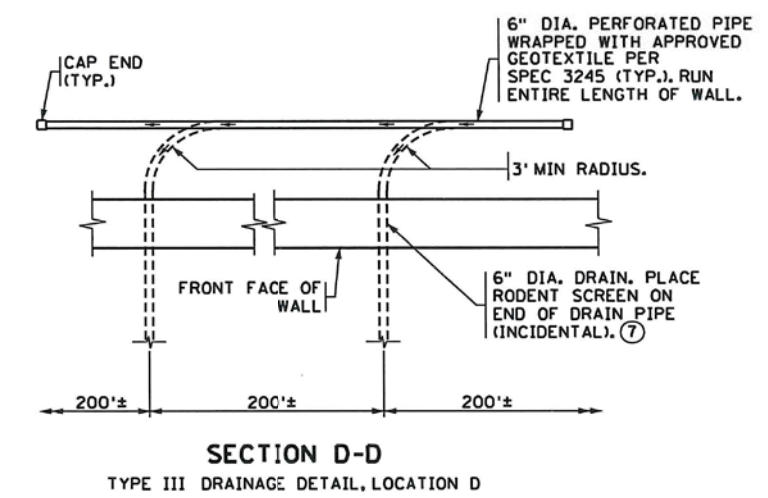
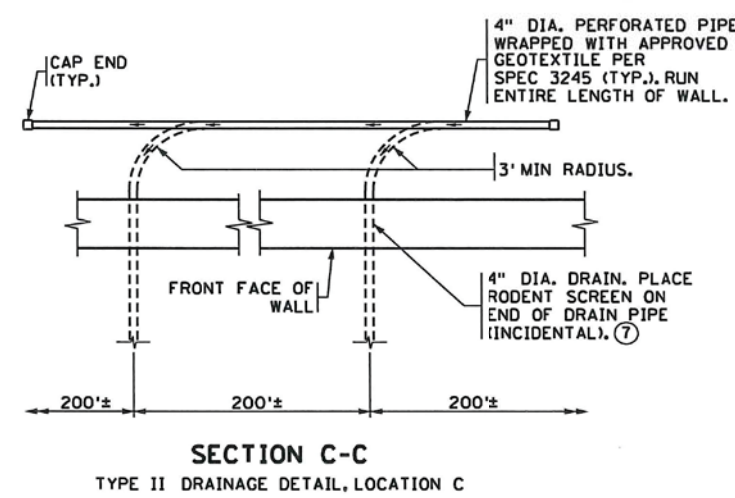
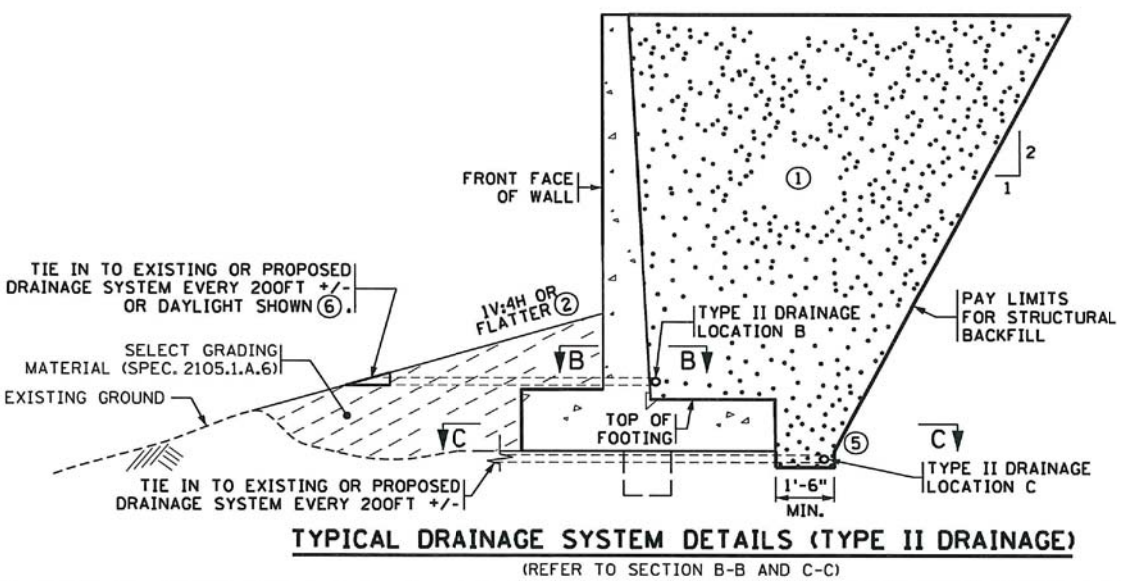
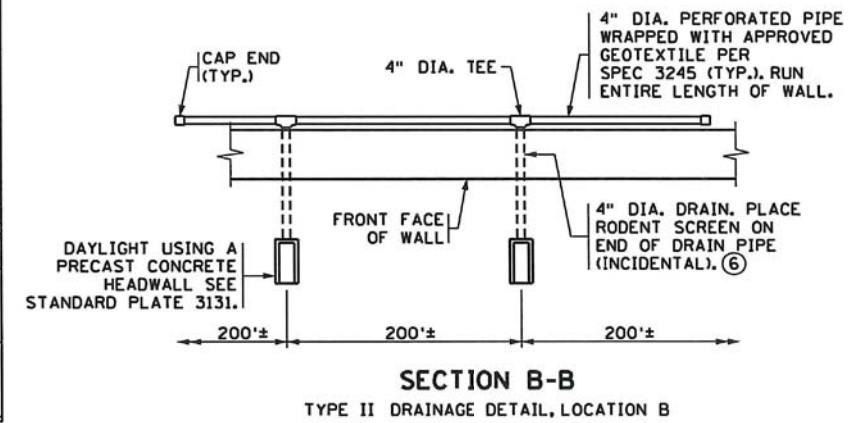
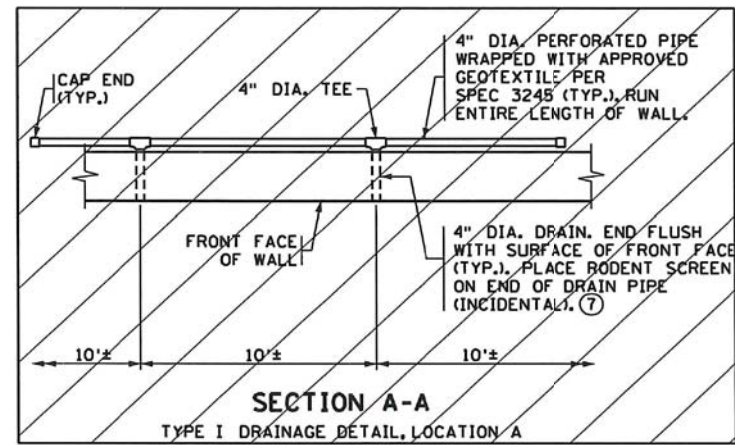
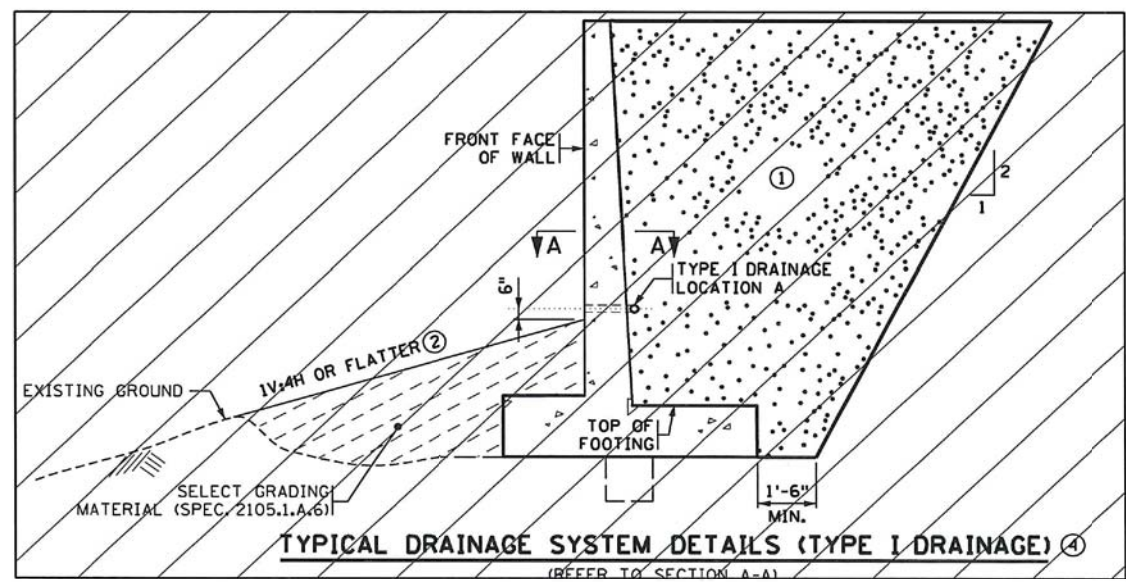
**RAMSEY COUNTY**  
TCAAP BP1  
RETAINING WALL MISCELLANEOUS DETAILS  
(GEOTECHNICAL DETAILS)

COUNTY PROJECT	SHEET NO.
S.A.P. 062-593-004	59
S.P.	RW8
S.P.	
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7/7/2015

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**NOTES:**

- BACKFILL MATERIAL SHALL COMPLETELY SURROUND PIPE AT ALL TIMES.
- SLOPE PIPE TO ENSURE PROPER DRAINAGE AT ALL TIMES.
- DRAINAGE SYSTEM PAID BY LUMP SUM PER SPEC. 2502.
- ① STRUCTURAL BACKFILL. SEE SHEET 5-297.620. COMPACT BACKFILL TO SPECIFIED DENSITY METHOD SPEC. 2105.3.F.1.
- ② PROVIDE SLOPE OF 1V:24H TO 1V:4H FOR PROPER DRAINAGE.
- ③ TYPE III DRAINAGE LAYER TO BE FINE FILTER AGGREGATE PER SPEC. 3149.2.J.2. FINE FILTER AGGREGATE MAY BE REPLACED WITH TYPE VI DRAINAGE GEOCOMPOSITE MATERIAL.
- ④ DRAINAGE SYSTEMS INSTALLED AT LOCATION A SHALL NOT BE USED WHEN A SIDEWALK, TRAIL, OR ROADWAY IS LOCATED ADJACENT TO THE FRONT FACE OF THE WALL TO PREVENT PONDING OR ICE ACCUMULATION.
- ⑤ EXTEND STRUCTURAL BACKFILL OR FINE FILTER AGGREGATE 8" BELOW BOTTOM OF FOOTING.
- ⑥ TYPE II LOCATION B DRAINAGE MAY DAYLIGHT DIRECTLY USING PRECAST CONCRETE HEADWALLS OR BE TIED INTO DRAINAGE SYSTEM.
- ⑦ THE RODENT SCREEN SHALL BE FABRICATED FROM CARBON STEEL FLATTENED EXPANDED METAL, STYLE 1/2" NO. 4F. IT SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION.

REVISIONS:  
APPROVED: AUGUST 27, 2014  
*Nancy A. Subenberger*  
STATE BRIDGE ENGINEER

STANDARD SHEET NO. 5-297.624 (5 OF 6)  
STANDARD APPROVED: AUGUST 27, 2014

TITLE: **RETAINING WALL MISCELLANEOUS DETAILS (GEOTECHNICAL DETAILS)**

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
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*Jeffrey A. Johnson*  
JEFFREY A. JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

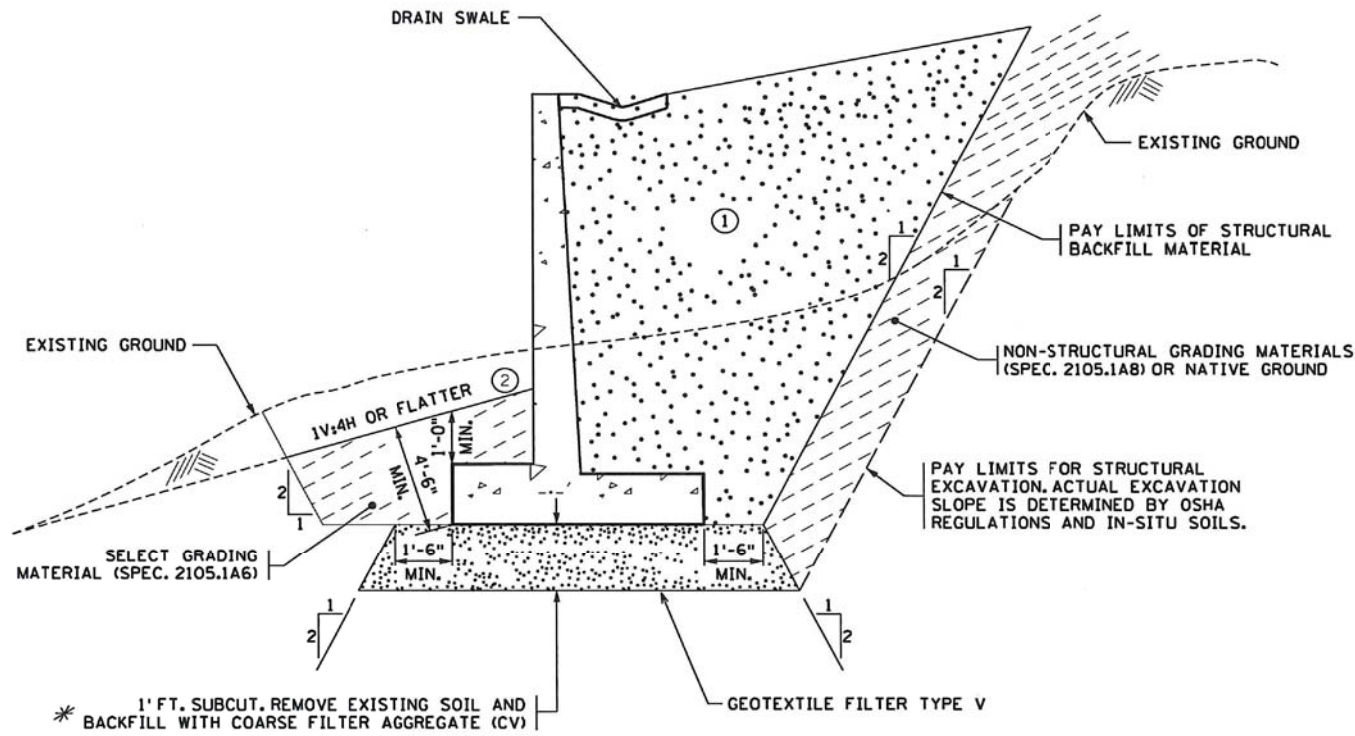
**RAMSEY COUNTY**  
TCAAP BP1  
RETAINING WALL MISCELLANEOUS DETAILS (GEOTECHNICAL DETAILS)

COUNTY PROJECT	SHEET NO.
S.A.P. 062-593-004	60
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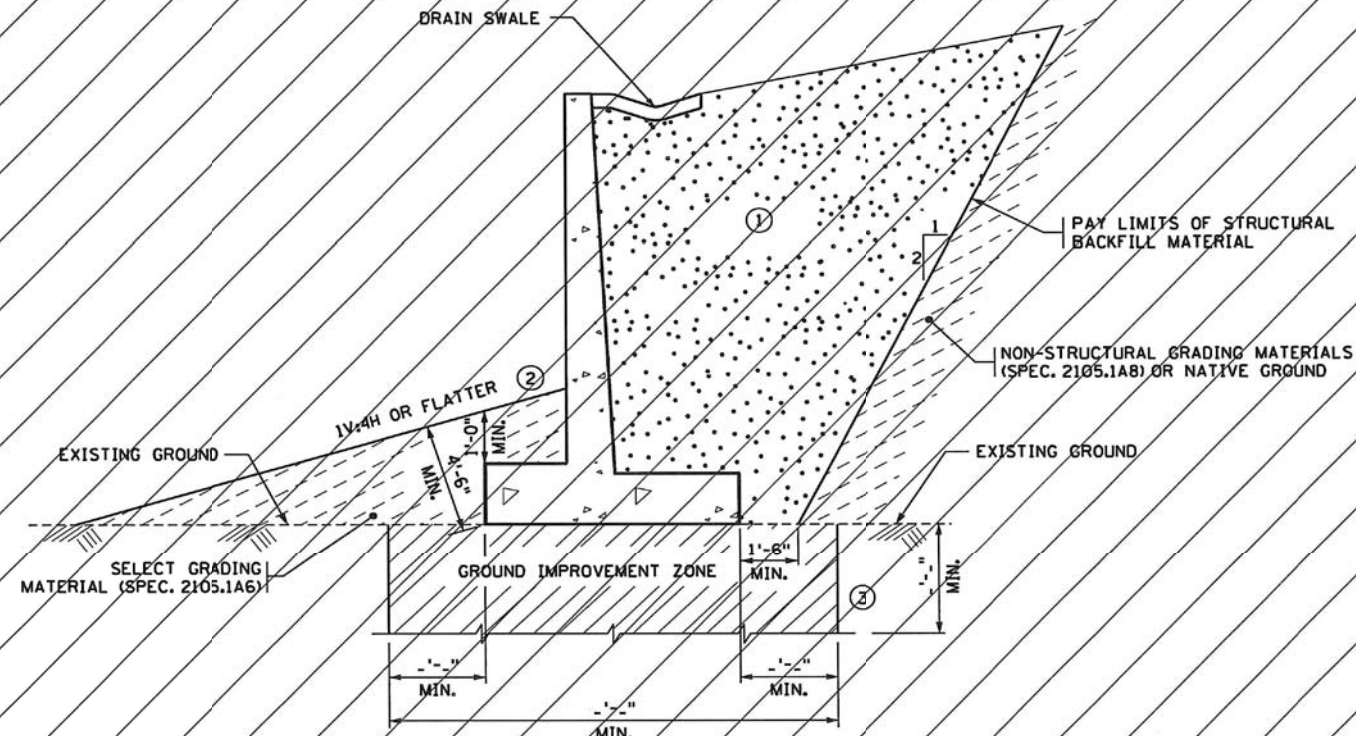
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7/7/2015

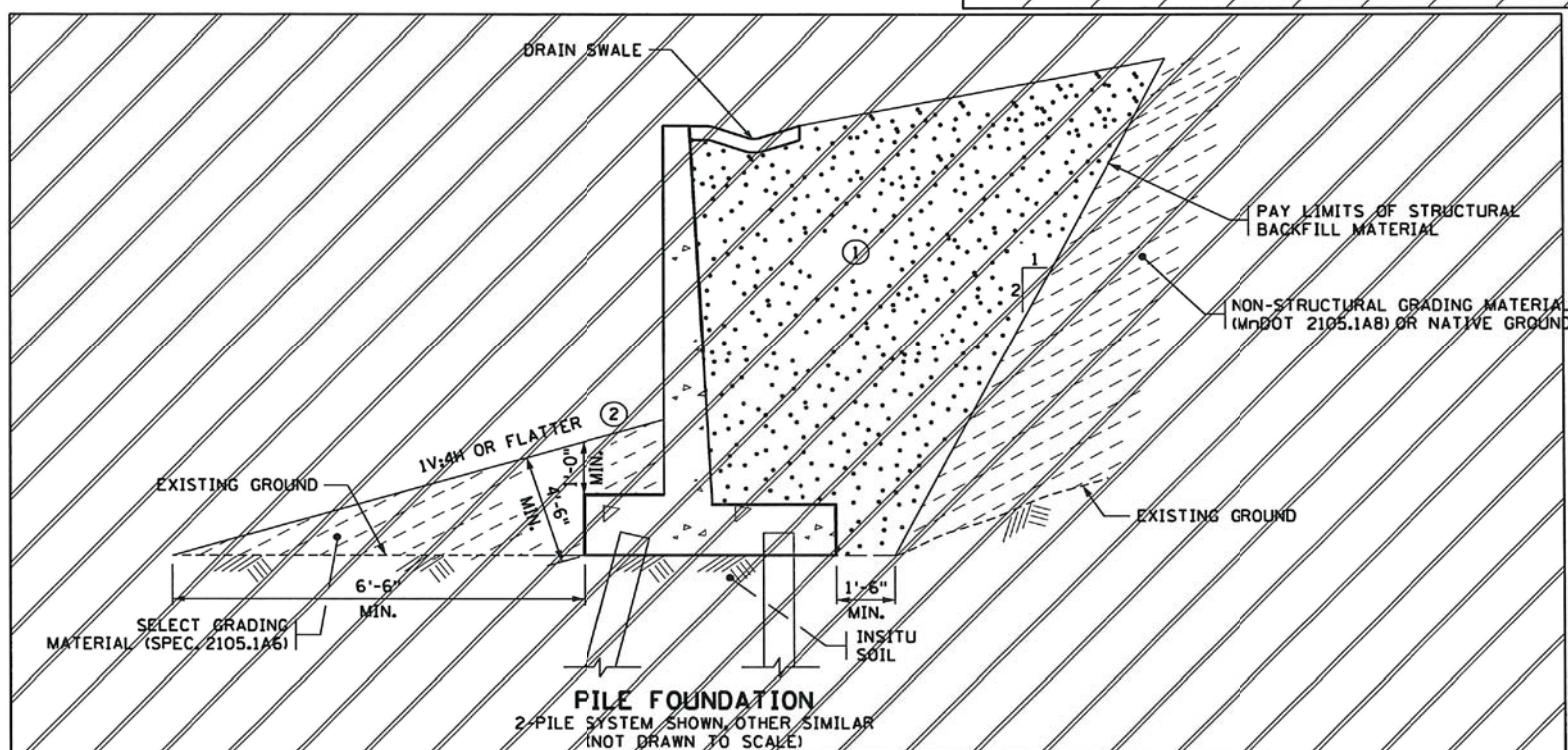
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**SPREAD FOOTING WITH SOIL SUBCUT**  
(NOT DRAWN TO SCALE)



**SPREAD FOOTING PLACED OVER GROUND IMPROVEMENT**  
(NOT DRAWN TO SCALE)



**PILE FOUNDATION**  
2-PILE SYSTEM SHOWN, OTHER SIMILAR  
(NOT DRAWN TO SCALE)

- ① BACKFILL WITH STRUCTURAL BACKFILL SPEC. 3149.2D2 COMPACT BACKFILL PER SPEC. 2105.3F3.
- ② PROVIDE SLOPE OF 1V:24H TO 1V:4H FOR PROPER DRAINAGE.
- ③ PROVIDE SUFFICIENT COVERAGE AREA AND TREATMENT VOLUME TO GIVE GENERALLY UNIFORM SUPPORT TO THE FOUNDATION. IMPROVED GROUND OR SURFACE PREPARATIONS PLACED TO IMPROVE GROUND SUPPORT ARE TO BE IN IMMEDIATE CONTACT WITH THE FOOTING AND FOUNDATION MATERIAL.

\* DENOTES MODIFICATIONS FROM STANDARD PLAN

REVISION:

APPROVED: AUGUST 27, 2014

*Nancy Dauenberger*  
STATE BRIDGE ENGINEER

MODIFIED:

IN SPREAD FOOTING WITH SOIL SUBCUT DETAIL: \*  
GRANULAR MATERIAL SPECIFICATION FOR NOTE REMOVED  
AND REPLACED WITH COARSE FILTER AGGREGATE (CV)

MODIFIED

STANDARD SHEET NO.  
5-297.624 (6 OF 6)

STANDARD APPROVED:  
AUGUST 27, 2014

TITLE: **RETAINING WALL MISCELLANEOUS DETAILS (GEOTECHNICAL DETAILS)**

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE:
				PROJECT NO. 129594



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.

*Jeffrey A. Johnson*  
JEFFREY A. JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

**RAMSEY COUNTY**

TCAAP BP1

RETAINING WALL MISCELLANEOUS DETAILS (GEOTECHNICAL DETAILS)

COUNTY PROJECT	S. A. P. 062-593-004	SHEET NO.
S.P.		61
S.P.		RW10
S.P.		63

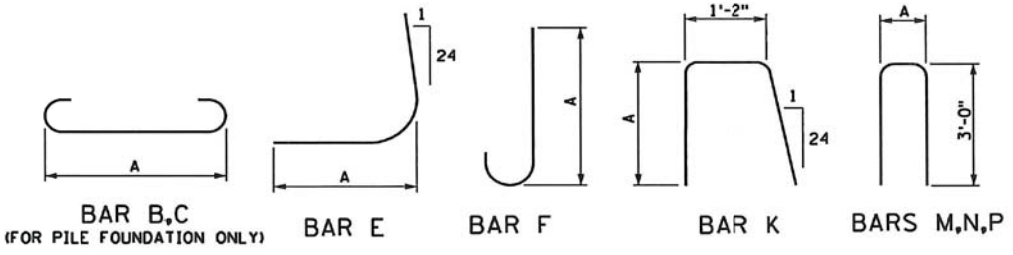
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7/7/2015 1:32:16 PM

BAR	MARK	NO.	LENGTH	A	LOCATION	WT.	DIMENSIONS & QUANTITIES	
h = 9' PANELS: A1 AT LOW END: 8'-5" AT HIGH END: 9'-0" L = 14'-6"							SPREAD FOOTING REINFORCEMENT	
A	F	501	14	16'-11"	STR.	LONG T & B	247	
B	F	502	15	5'-5"	STR.	TRANS BOT	85	
C	F	503	15	5'-5"	STR.	TRANS TOP	85	
DIMENSIONS							SPREAD FOOTING	
b	1'-5"		e	-				
c	1'-5"		f	-				
d	5'-11"		g	1'-7 1/4"				
STEM								
a	1'-10 1/2"		x	2'-1"				
j	1'-5 7/8"		z	-				
TOW THICKNESS							1'-6"	
RUSTICATION THICK FF								
FOOTING DOWELS & STEM REINFORCEMENT							QUANTITIES	
D	F	504E	15	3'-0"	STR.	DOWEL FF	47	STRUCTURE CONCRETE (1A43)
E	F	505E	15	4'-4"	0'-10"	DOWEL BF	68	(FOOTING)
F	F	506E	-	-	-	DOWEL BF	-	SPREAD 4.6 CY
G	S	401E	15	6'-2"	STR.	VERT FF	62	
H	S	502E	15	6'-2"	STR.	VERT BF	96	STRUCTURE CONCRETE (3Y43)
J	S	503E	-	0'-0"	STR.	VERT BF	-	(STEM)
K	S	504E	15	10'-8"	4'-9"	TIE	167	7.9 CY
L	S	405E	18	14'-0"	STR.	HORIZ EF	168	REINFORCEMENT (PLAIN)
M	S	506E	18	7'-4"	1'-4"	EXP JT TIE	138	SPREAD 417 LB
N	S	507E	-	7'-9"	1'-9"	EXP JT TIE	-	
P	S	508E	-	8'-2"	2'-2"	EXP JT TIE	-	REINFORCEMENT (EPOXY)
Q	S	509E	-	6'-11"	3'-1"	J-RAIL DOWEL	-	746 LB

BAR	MARK	NO.	LENGTH	A	LOCATION	WT.	DIMENSIONS & QUANTITIES	
h = 16' PANELS: A2 AT LOW END: 15'-6" AT HIGH END: 16'-0" L = 30'-6"							SPREAD FOOTING REINFORCEMENT	
A	F	501	20	32'-11"	STR.	LONG T & B	687	
B	F	502	31	8'-5"	STR.	TRANS BOT	272	
C	F	803	31	8'-5"	STR.	TRANS TOP	697	
DIMENSIONS							SPREAD FOOTING	
b	2'-9"		e	1'-4"				
c	1'-5"		f	4'-2 1/2"				
d	8'-11"		g	2'-11 1/4"				
STEM								
a	2'-2"		x	2'-1"				
j	1'-9 3/8"		z	5'-3"				
TOW THICKNESS							1'-6"	
RUSTICATION THICK FF								
FOOTING DOWELS & STEM REINFORCEMENT							QUANTITIES	
D	F	504E	31	3'-0"	STR.	DOWEL FF	97	STRUCTURE CONCRETE (1A43)
E	F	505E	31	10'-6"	4'-6"	DOWEL BF	339	(FOOTING)
F	F	706E	30	9'-0"	7'-7"	DOWEL BF	552	SPREAD 16.7 CY
G	S	401E	31	13'-2"	STR.	VERT FF	273	
H	S	502E	31	13'-2"	STR.	VERT BF	426	STRUCTURE CONCRETE (3Y43)
J	S	503E	-	-	STR.	VERT BF	-	(STEM)
K	S	504E	31	10'-8"	4'-9"	TIE	345	32.6 CY
L	S	405E	32	30'-0"	STR.	HORIZ EF	641	REINFORCEMENT (PLAIN)
M	S	506E	20	7'-4"	1'-4"	EXP JT TIE	153	SPREAD 1656 LB
N	S	507E	12	7'-9"	1'-9"	EXP JT TIE	97	
P	S	508E	-	8'-2"	2'-2"	EXP JT TIE	-	REINFORCEMENT (EPOXY)
Q	S	509E	-	6'-11"	3'-1"	J-RAIL DOWEL	-	2923 LB

BAR	MARK	NO.	LENGTH	A	LOCATION	WT.	DIMENSIONS & QUANTITIES	
h = 16' PANELS: A3 AT LOW END: 15'-6" AT HIGH END: 16'-0" L = 30'-6"							SPREAD FOOTING REINFORCEMENT	
A	F	501	20	32'-11"	STR.	LONG T & B	687	
B	F	502	31	8'-5"	STR.	TRANS BOT	272	
C	F	803	31	8'-5"	STR.	TRANS TOP	697	
DIMENSIONS							SPREAD FOOTING	
b	2'-9"		e	1'-4"				
c	1'-5"		f	4'-2 1/2"				
d	8'-11"		g	2'-11 1/4"				
STEM								
a	2'-2"		x	2'-1"				
j	1'-9 3/8"		z	5'-3"				
TOW THICKNESS							1'-6"	
RUSTICATION THICK FF								
FOOTING DOWELS & STEM REINFORCEMENT							QUANTITIES	
D	F	504E	31	3'-0"	STR.	DOWEL FF	97	STRUCTURE CONCRETE (1A43)
E	F	505E	31	10'-6"	4'-6"	DOWEL BF	339	(FOOTING)
F	F	706E	30	9'-0"	7'-7"	DOWEL BF	552	SPREAD 16.7 CY
G	S	401E	31	13'-2"	STR.	VERT FF	273	
H	S	502E	31	13'-2"	STR.	VERT BF	426	STRUCTURE CONCRETE (3Y43)
J	S	503E	-	-	STR.	VERT BF	-	(STEM)
K	S	504E	31	10'-8"	4'-9"	TIE	345	32.6 CY
L	S	405E	32	30'-0"	STR.	HORIZ EF	641	REINFORCEMENT (PLAIN)
M	S	506E	20	7'-4"	1'-4"	EXP JT TIE	153	SPREAD 1656 LB
N	S	507E	12	7'-9"	1'-9"	EXP JT TIE	97	
P	S	508E	-	8'-2"	2'-2"	EXP JT TIE	-	REINFORCEMENT (EPOXY)
Q	S	509E	-	6'-11"	3'-1"	J-RAIL DOWEL	-	2923 LB

BAR	MARK	NO.	LENGTH	A	LOCATION	WT.	DIMENSIONS & QUANTITIES	
h = 9' PANELS: A4 AT LOW END: 8'-5" AT HIGH END: 9'-0" L = 14'-6"							SPREAD FOOTING REINFORCEMENT	
A	F	501	14	16'-11"	STR.	LONG T & B	247	
B	F	502	15	5'-5"	STR.	TRANS BOT	85	
C	F	503	15	5'-5"	STR.	TRANS TOP	85	
DIMENSIONS							SPREAD FOOTING	
b	1'-5"		e	-				
c	1'-5"		f	-				
d	5'-11"		g	1'-7 1/4"				
STEM								
a	1'-10 1/2"		x	2'-1"				
j	1'-5 7/8"		z	-				
TOW THICKNESS							1'-6"	
RUSTICATION THICK FF								
FOOTING DOWELS & STEM REINFORCEMENT							QUANTITIES	
D	F	504E	15	3'-0"	STR.	DOWEL FF	47	STRUCTURE CONCRETE (1A43)
E	F	505E	15	4'-4"	0'-10"	DOWEL BF	68	(FOOTING)
F	F	506E	-	-	-	DOWEL BF	-	SPREAD 4.6 CY
G	S	401E	15	6'-2"	STR.	VERT FF	62	
H	S	502E	15	6'-2"	STR.	VERT BF	96	STRUCTURE CONCRETE (3Y43)
J	S	503E	-	0'-0"	STR.	VERT BF	-	(STEM)
K	S	504E	15	10'-8"	4'-9"	TIE	167	7.9 CY
L	S	405E	18	14'-0"	STR.	HORIZ EF	168	REINFORCEMENT (PLAIN)
M	S	506E	18	7'-4"	1'-4"	EXP JT TIE	138	SPREAD 417 LB
N	S	507E	-	7'-9"	1'-9"	EXP JT TIE	-	
P	S	508E	-	8'-2"	2'-2"	EXP JT TIE	-	REINFORCEMENT (EPOXY)
Q	S	509E	-	6'-11"	3'-1"	J-RAIL DOWEL	-	746 LB



\* BAR LISTS SHOW REINFORCEMENT FOR SPREAD FOOTINGS ONLY AND ARE FOR SPECIFIC INDIVIDUAL PANELS AS SHOWN. QUANTITIES REFLECT ACTUAL INDIVIDUAL PANEL DIMENSIONS.

**NOTES:**  
 L = DENOTES PANEL LENGTH.  
 FF = DENOTES FRONT FACE.  
 BF = DENOTES BACK FACE.  
 EF = DENOTES EACH FACE.  
 DWL = DENOTES DOWEL.  
 BARS MARKED WITH THE SUFFIX "E" ARE EPOXY COATED.  
 x = PROJECTION OF BAR E INTO STEM.  
 z = PROJECTION OF BAR F INTO STEM.

REVISION:  
 APPROVED: AUGUST 27, 2014  
 Nancy A. Sauter  
 STATE BRIDGE ENGINEER

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE:
				PROJECT NO. 129594



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.  
 JEFFREY A. JOHNSON  
 DATE: 7-7-15 MN LIC. NO. 17280

MINNESOTA DEPARTMENT OF TRANSPORTATION  
 STATE DESIGN ENGINEER  
 APPROVED: 8-27-2014

MODIFIED  
 RETAINING WALL PANEL TABULATIONS (1V:2H SLOPED FILL)  
 STANDARD PLAN 5-297.627 1 OF 3  
 COUNTY PROJECT S.A.P. 062-593-004  
 SHEET NO. 62 RW11  
 RAMSEY COUNTY TCAAP BP1  
 RETAINING WALL PANEL TABULATIONS (1V:2H SLOPED FILL)  
 63

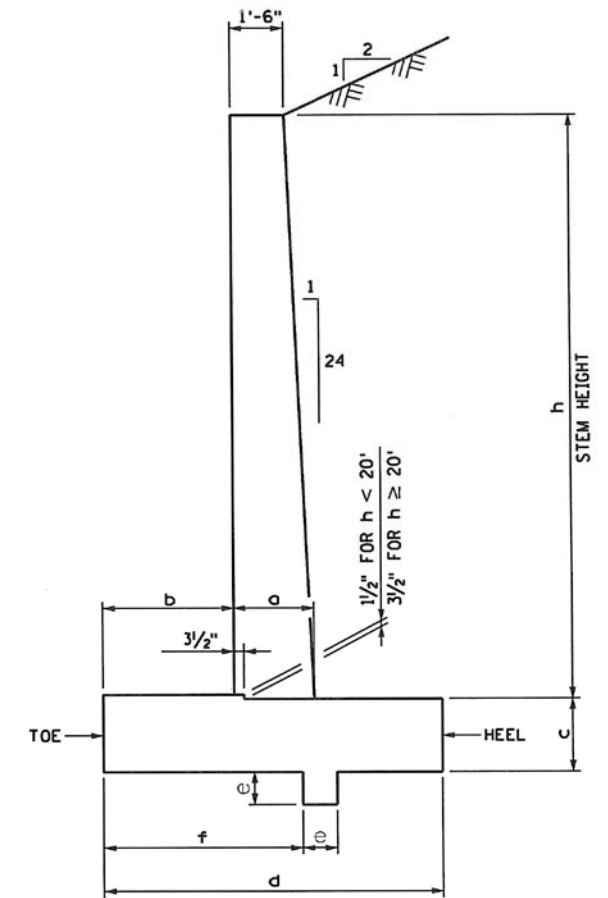
**SPREAD FOOTING DIMENSIONS AND SOIL STRESSES**  
1(V) : 2(H) SLOPED FILL

SHORT WALL (5'-9")  
MEDIUM WALL (10'-18")  
TALL WALL (19'-27")

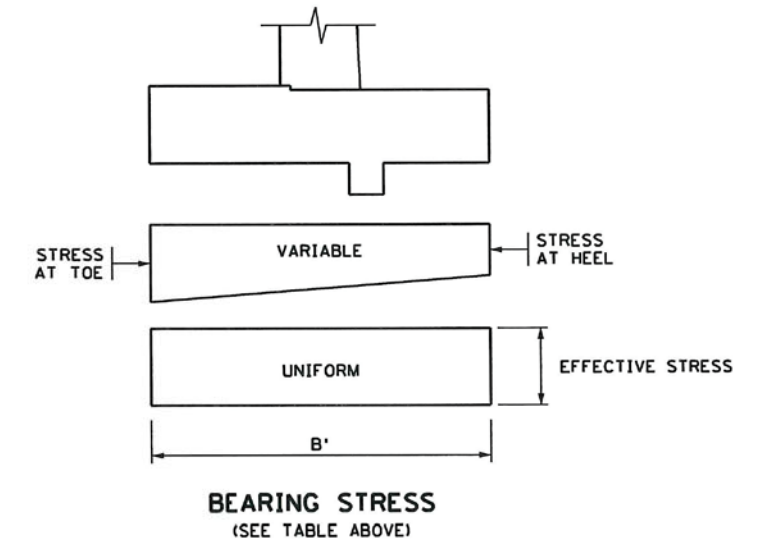
WALL GEOMETRICS AND DATA - SPREAD FOOTING							QUANTITIES PER FOOT - SPREAD FOOTING				EQUIVALENT UNIFORM BEARING STRESS						
STEM HEIGHT DIM. h	STEM WIDTH DIM. a	TOE WIDTH DIM. b	FOOTING THICKNESS DIM. c	FOOTING WIDTH DIM. d	SHEAR KEY SIZE DIM. e	SHEAR KEY LOCATION DIM. f	STRUCTURAL CONCRETE		REINFORCEMENT		WALL DETAILING SCHEME	SERVICE		STRENGTH I		EQUIVALENT VARIABLE (TRAPEZOIDAL) BEARING STRESS	
							1A43 FOOTING (CU. YD.)	3Y43 STEM (CU. YD.)	PLAIN (POUND)	EPOXY (POUND)		EFFECTIVE WIDTH B'	EFFECTIVE STRESS KSF	EFFECTIVE WIDTH B'	EFFECTIVE STRESS KSF	STRESS AT TOE KSF	STRESS AT HEEL KSF
5	1'-8 1/2"	9"	1'-5"	3'-3"	N.A.	N.A.	0.18	0.30	14.9	31.1	SHORT	2'-4 5/8"	1.33	1'-10 3/4"	1.85	2.46	0.10
6	1'-9"	11"	1'-5"	3'-8"	N.A.	N.A.	0.20	0.36	15.7	34.7	SHORT	2'-7 5/8"	1.53	2'-0 1/2"	2.14	2.86	0.03
7	1'-9 1/2"	1'-1"	1'-5"	4'-5"	N.A.	N.A.	0.24	0.43	19.6	39.0	SHORT	3'-3 1/2"	1.63	2'-7 1/2"	2.28	3.03	0.19
8	1'-10"	1'-3"	1'-5"	5'-2"	N.A.	N.A.	0.28	0.49	23.4	42.5	SHORT	3'-11 1/2"	1.75	3'-2 5/8"	2.43	3.21	0.34
9	1'-10 1/2"	1'-5"	1'-5"	5'-11"	N.A.	N.A.	0.32	0.56	27.2	46.1	SHORT	4'-7 3/4"	1.86	3'-9 7/8"	2.59	3.40	0.49
10	1'-11"	1'-7"	1'-5"	6'-8"	N.A.	N.A.	0.36	0.63	28.8	52.2	MEDIUM	5'-3 7/8"	1.99	4'-5 1/8"	2.76	3.59	0.64
11	1'-11 1/2"	1'-9"	1'-5"	7'-5"	N.A.	N.A.	0.40	0.70	35.9	61.5	MEDIUM	6'-0 1/8"	2.11	5'-0 1/2"	2.93	3.79	0.78
12	2'-0"	1'-11"	1'-5"	8'-2"	N.A.	N.A.	0.44	0.78	44.3	65.2	MEDIUM	6'-8 1/2"	2.24	5'-7 7/8"	3.11	4.00	0.92
13	2'-0 1/2"	2'-1"	1'-5"	8'-11"	N.A.	N.A.	0.48	0.85	54.3	69.5	MEDIUM	7'-4 7/8"	2.36	6'-3 1/4"	3.29	4.20	1.07
14	2'-1"	2'-3"	1'-5"	8'-11"	1'-4"	3'-7 1/2"	0.55	0.93	54.3	75.7	MEDIUM	7'-1 7/8"	2.61	5'-10 1/2"	3.65	4.76	0.86
15	2'-1 1/2"	2'-6"	1'-5"	8'-11"	1'-4"	3'-11"	0.55	1.01	54.3	85.7	MEDIUM	6'-10 5/8"	2.81	5'-5 1/4"	3.98	5.26	0.58
16	2'-2"	2'-9"	1'-5"	8'-11"	1'-4"	4'-2 1/2"	0.55	1.09	54.3	95.7	MEDIUM	6'-7 7/8"	3.05	4'-11 3/8"	4.36	5.81	0.24
17	2'-2 1/2"	3'-0"	1'-7"	9'-2"	1'-6"	4'-6"	0.64	1.17	61.6	108.0	MEDIUM	6'-6 3/4"	3.30	4'-8 7/8"	4.83	6.44	0.00
18	2'-3"	3'-6"	1'-7"	9'-6"	2'-0"	5'-0 1/2"	0.72	1.25	67.4	118.5	MEDIUM	6'-10 3/8"	3.35	4'-10 1/2"	4.98	6.65	0.00
19	2'-3 1/2"	3'-9"	1'-9"	10'-1"	2'-2"	5'-4"	0.85	1.33	68.0	136.3	TALL	7'-3 5/8"	3.51	5'-2 1/4"	5.24	6.99	0.00
20	2'-4"	4'-0"	1'-9"	10'-7"	2'-6"	5'-7 1/2"	0.96	1.42	75.0	151.7	TALL	7'-8 3/4"	3.63	5'-6"	5.42	7.23	0.00
21	2'-4 1/2"	4'-4"	1'-9"	11'-1"	2'-6"	6'-0"	1.00	1.50	79.7	160.8	TALL	8'-1 1/2"	3.71	5'-9"	5.57	7.43	0.00
22	2'-5"	4'-8"	1'-11"	11'-8"	2'-6"	6'-4 1/2"	1.11	1.59	82.7	180.0	TALL	8'-6 3/4"	3.84	6'-0 1/2"	5.78	7.71	0.00
23	2'-5 1/2"	5'-0"	2'-0"	12'-4"	2'-6"	6'-9"	1.20	1.68	99.1	210.3	TALL	9'-2"	3.91	6'-6 1/4"	5.85	7.80	0.00
24	2'-6"	5'-4"	2'-2"	12'-10"	2'-6"	7'-1 1/2"	1.32	1.77	111.0	233.9	TALL	9'-5 5/8"	4.06	6'-8"	6.14	8.19	0.00
25	2'-6 1/2"	5'-8"	2'-3"	13'-4"	2'-6"	7'-6"	1.41	1.87	114.3	266.3	TALL	9'-9 3/4"	4.17	6'-10 3/8"	6.37	8.50	0.00
26	2'-7"	6'-0"	2'-5"	13'-11"	2'-6"	7'-10 1/2"	1.55	1.96	120.3	302.3	TALL	10'-3"	4.30	7'-1 3/4"	6.59	8.79	0.00
27	2'-7 1/2"	6'-4"	2'-6"	14'-6"	2'-6"	8'-3"	1.65	2.06	109.9	371.1	TALL	10'-8 3/4"	4.39	7'-5 5/8"	6.74	8.98	0.00

N.A. = NOT APPLICABLE

NOTE:  
EPOXY REINFORCEMENT QUANTITY ASSUMES A CORK AND DOWEL JOINT IS USED ON BOTH PANEL ENDS.  
THE QUANTITY MUST BE ADJUSTED WHEN CONSTRUCTION JOINTS ARE USED.



TYPICAL SECTION



BEARING STRESS  
(SEE TABLE ABOVE)

STEM HEIGHT h	REINFORCEMENT - SPREAD FOOTING			
	STEM DOWEL SIZE AND SPACING	FOOTING		
		TOE (BOTTOM TRANSVERSE)	HEEL (TOP TRANSVERSE)	LONGITUDINAL (TOP AND BOT.)
BAR SIZE & SPA.	BAR SIZE & SPA.	BAR SIZE & SPA.	BAR SIZE & SPA.	
5	5 @ 12"	5 @ 12"	5 @ 12"	5 @ 12"
6	5 @ 12"	5 @ 12"	5 @ 12"	5 @ 12"
7	5 @ 12"	5 @ 12"	5 @ 12"	5 @ 12"
8	5 @ 12"	5 @ 12"	5 @ 12"	5 @ 12"
9	5 @ 12"	5 @ 12"	5 @ 12"	5 @ 12"
10	5 @ 12"	5 @ 12"	5 @ 12"	5 @ 12"
11	5 @ 12"	5 @ 12"	6 @ 12"	5 @ 12"
12	5 @ 12"	5 @ 12"	7 @ 12"	5 @ 12"
13	5 @ 12"	5 @ 12"	8 @ 12"	5 @ 12"
14	5 @ 12"	5 @ 12"	8 @ 12"	5 @ 12"
15	5 @ 12"	5 @ 12"	8 @ 12"	5 @ 12"
16	5 @ 12"	5 @ 12"	8 @ 12"	5 @ 12"
17	6 @ 12"	5 @ 12"	9 @ 12"	5 @ 12"
18	6 @ 12"	6 @ 12"	9 @ 12"	5 @ 12"
19	7 @ 12"	6 @ 12"	9 @ 12"	5 @ 12"
20	7 @ 12"	6 @ 12"	9 @ 12"	5 @ 12"
21	7 @ 12"	6 @ 12"	9 @ 12"	5 @ 12"
22	8 @ 12"	6 @ 12"	9 @ 12"	5 @ 12"
23	8 @ 12"	6 @ 12"	10 @ 12"	5 @ 12"
24	8 @ 12"	7 @ 12"	10 @ 12"	5 @ 12"
25	9 @ 12"	7 @ 12"	10 @ 12"	5 @ 12"
26	10 @ 12"	7 @ 12"	10 @ 12"	5 @ 12"
27	11 @ 12"	5 @ 12"	10 @ 12"	5 @ 12"

REVISION:  
APPROVED: AUGUST 27, 2014  
*Nancy Dubenberger*  
STATE BRIDGE ENGINEER

No.	Date	Revisions	App.	DRAWING NAME
				DESIGNED BY: MAW
				DRAWN BY: MAW
				CHECKED BY: MHD
				DATE:
				PROJECT NO. 129594



REVISOR:  
*Christopher*  
STATE DESIGN ENGINEER  
APPROVED: 8-27-2014

RETAINING WALL 1(V) : 2(H) SLOPED FILL  
SPREAD FOOTING GEOMETRY AND DATA

STANDARD PLAN 5-297.631 | 1 OF 2

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.  
*Jeffrey A. Johnson*  
JEFFREY A. JOHNSON  
DATE: 7-7-15 MN LIC. NO. 17280

RAMSEY COUNTY  
TCAAP BP1  
RETAINING WALL 1(V) : 2(H) SLOPED FILL  
SPREAD FOOTING GEOMETRY AND DATA

COUNTY PROJECT	SHEET NO.
S.A.P. 062-593-004	63
S.P.	RW12
S.P.	
S.P.	