CONSTRUCTION PLANS FOR

IDALS PROJECT NO. KOS952810CTZC

BERM CONSTRUCTION, WATER CONTROL STRUCTURES, DRAINAGE TILE,
EROSION AND SEDIMENT CONTROL

KOSSUTH COUNTY, IOWA

2023

PLAN REVISIONS		
REV	ISSUED FOR	DATE
-	-	-

GOVERNING SPECIFICATIONS

THE SPECIFICATIONS AS PREPARED BY THE IOWA DEPARTMENT OF AGRICULTURE AND LAND STEWARDSHIP AND BOLTON & MENK, INC. SHALL BE CONSIDERED AS PART OF THIS DOCUMENT. NATURAL RESOURCES CONSERVATION SERVICE CONSTRUCTION SPECIFICATIONS SHALL APPLY.

THE CURRENT EDITION OF THE "IOWA STATEWIDE URBAN STANDARD SPECIFICATIONS FOR PUBLIC IMPROVEMENTS" SHALL GOVERN.

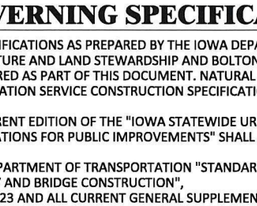
IOWA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION",
SERIES 2023 AND ALL CURRENT GENERAL SUPPLEMENTAL SPECIFICATIONS AND MATERIALS INSTRUCTIONAL MEMORANDUM SHALL GOVERN AS REFERENCED.

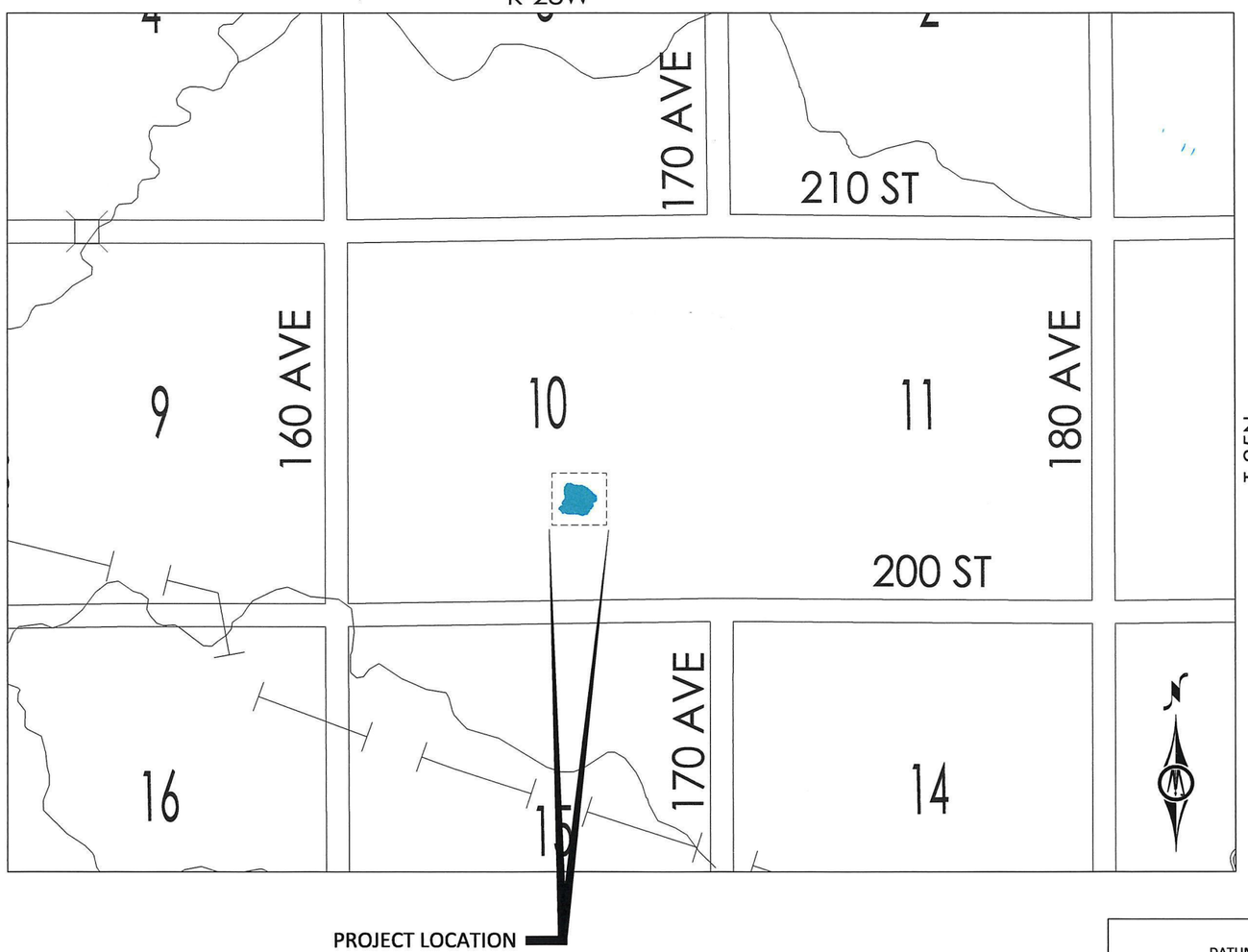
ALL APPLICABLE FEDERAL, STATE, AND LOCAL LAWS AND ORDINANCES WILL BE COMPLIED WITH IN THE CONSTRUCTION OF THIS PROJECT.

IOWA ONE CALL
1-800-292-8989 | 811
www.iowaonecall.com
Know what's below. Call before you dig.

NOTE: THE CONTRACTOR SHALL FIELD VERIFY EXACT LOCATIONS PRIOR TO COMMENCING CONSTRUCTION AS REQUIRED BY STATE LAW. NOTIFY IOWA ONE CALL, 811 OR 1-800-292-8989.

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."





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THESE PLANS PREPARED IN ACCORDANCE WITH NRCS ENGINEERING JOB CLASS V. STANDARDS FORR TASKS ARE AS FOLLOWS:
659 - SITE DESIGN
410 - OUTLET CAPACITY
378 - POOL DESIGN
TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, JUDGEMENT, AND BELIEVE, THESE PLANS MEET APPLICABLE NRCS STANDARDS.

LICENSED PROFESSIONAL ENGINEER
JONATHAN P. ROSENGREN
21661
IOWA

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

JONATHAN P. ROSENGREN, P.E.

LICENSE NUMBER: 21661 DATE: Jan 22, 2024

MY LICENSE RENEWAL DATE IS 12/31/2024

PAGES OR SHEETS COVERED BY THIS SEAL:

ALL PLAN SHEETS

DATUM EQUATION:
REDRAWN 1982 PLANS + 1198.5 = 2023 DATUM

PROJECT DATUM: IARCS1
HORIZONTAL: NAD83
VERTICAL: NAVD88

RECORD DRAWING INFORMATION
OBSERVER:
CONTRACTOR:
DATE:

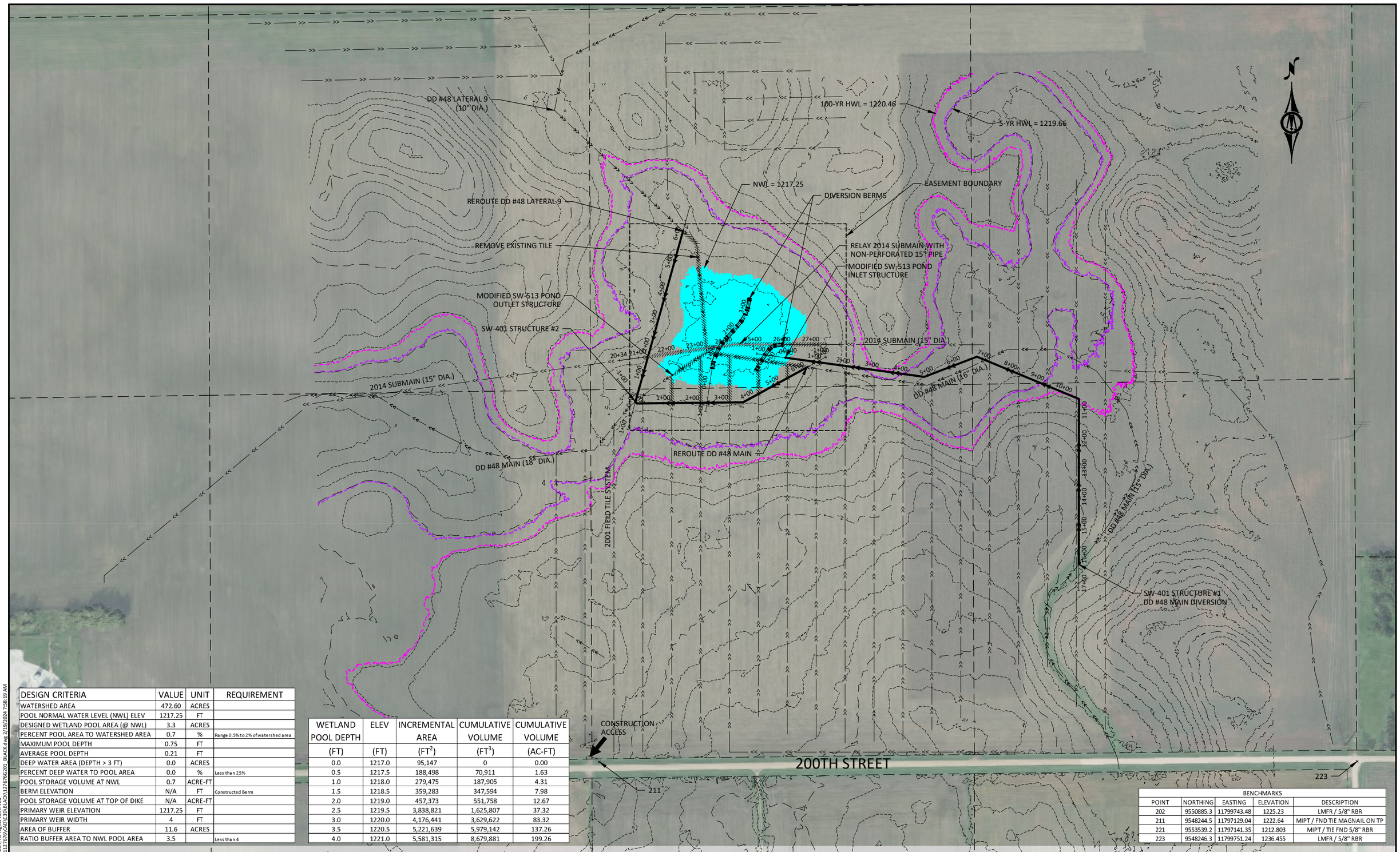
HORZ. 0 1000 2000
SCALE FEET

BOLTON & MENK
1519 BALTIMORE DRIVE
AMES, IOWA 50010
Phone: (515) 233-6100
Email: Ames@bolton-menk.com
www.bolton-menk.com

DESIGNED	REV	DESCRIPTION	DATE
SPM			
DRAWN TJB			
CHECKED JPR			
CLIENT PROJ. NO. 0P1.127676			

KOSSUTH COUNTY, IOWA
BLACK - KOS952810CTZC
TITLE SHEET

SHEET A.01



DESIGN CRITERIA	VALUE	UNIT	REQUIREMENT
WATERSHED AREA	472.60	ACRES	
POOL NORMAL WATER LEVEL (NWL) ELEV	1217.25	FT	
DESIGNED WETLAND POOL AREA (@ NWL)	3.3	ACRES	
PERCENT POOL AREA TO WATERSHED AREA	0.7	%	Range 0.5% to 2% of watershed area
MAXIMUM POOL DEPTH	0.75	FT	
AVERAGE POOL DEPTH	0.21	FT	
DEEP WATER AREA (DEPTH > 3 FT)	0.0	ACRES	
PERCENT DEEP WATER TO POOL AREA	0.0	%	Less than 25%
POOL STORAGE VOLUME AT NWL	0.7	ACRE-FT	
BERM ELEVATION	N/A	FT	Constructed Berm
POOL STORAGE VOLUME AT TOP OF DIKE	N/A	ACRE-FT	
PRIMARY WEIR ELEVATION	1217.25	FT	
PRIMARY WEIR WIDTH	4	FT	
AREA OF BUFFER	11.6	ACRES	
RATIO BUFFER AREA TO NWL POOL AREA	3.5		Less than 4

WETLAND POOL DEPTH	ELEV	INCREMENTAL AREA	CUMULATIVE VOLUME	CUMULATIVE VOLUME
(FT)	(FT)	(FT^2)	(FT^3)	(AC-FT)
0.0	1217.0	95,147	0	0.00
0.5	1217.5	188,498	70,911	1.63
1.0	1218.0	279,475	187,905	4.31
1.5	1218.5	359,283	347,594	7.98
2.0	1219.0	457,373	551,758	12.67
2.5	1219.5	3,838,821	1,625,807	37.32
3.0	1220.0	4,176,441	3,629,622	83.32
3.5	1220.5	5,221,639	5,979,142	137.26
4.0	1221.0	5,581,315	8,679,881	199.26

BENCHMARKS				
POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
202	9550885.3	11799743.48	1225.23	LMFR / 5/8" RBR
211	9548244.5	11797129.04	1222.64	MIPT / FND TIE MAGNAIL ON TP
221	9553539.2	11797141.35	1212.803	MIPT / TIE FND 5/8" RBR
223	9548246.3	11799751.24	1236.455	LMFR / 5/8" RBR

HORZ. SCALE 0 150 300 FEET

BOLTON & MENK
1519 BALTIMORE DRIVE
AMES, IOWA 50010
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CLIENT PROJ. NO. OP1.127676			

KOSSUTH COUNTY, IOWA
NUTRIENT REDUCTION WETLAND PROJECT - TZ0323
OVERVIEW

SHEET A.02

BENCHMARKS				
POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
202	9550885.3	11799743.48	1225.23	LMFR / 5/8" RBR
211	9548244.5	11797129.04	1222.64	MIPT / FND TIE MAGNAIL ON TP
221	9553539.2	11797141.35	1212.803	MIPT / TIE FND 5/8" RBR
223	9548246.3	11799751.24	1236.455	LMFR / 5/8" RBR

HORZ. SCALE 0 300 600 FEET

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KOSSUTH COUNTY, IOWA

NUTRIENT REDUCTION WETLAND PROJECT - TZ0323

EXISTING SITE

SHEET ----

PIPE HAUNCH FILL AND COMPACTION METHOD
PLAN REQUIREMENTS COMPLIANCE VERIFICATION

THE CONTRACTOR IS SOLEY RESPONSIBLE FOR THE INSTALLATION OF ALL PIPE ACCORDING TO PLAN REQUIREMENTS. THE CONTRACTOR'S PARTICIPATION IN AND COMPLIANCE WITH THE FOLLOWING PROCEDURE IS REQUIRED AND WILL ALLOW FOR FEWER SOIL DENSITY TESTS TO ENSURE PROPER PIPE INSTALLATION.

STEP 1
BEFORE COMMENCING PIPE INSTALLATION, STANDARD SOIL PROCTOR DENSITY TEST RESULTS OF REPRESENTATIVE SAMPLE(S) OF PIPE HAUNCH FILL SHALL BE PROVIDED BY AN INDEPENDENT QUALIFIED SOILS TESTING LAB. THE SELECTION OF THE SAMPLE(S) WILL BE MADE BY THE ENGINEER AND CONTRACTOR (WHEN SPECIFIED).

STEP 2
CONTRACTOR MAY BEGIN EXCAVATING THE MODIFIED TYPE 4 TRENCH
WITH THE REQUIRED SHAPED BOTTOM GROOVE AND PLACE SEVERAL PIPE SECTIONS ONLY WHEN BOTH ENGINEER AND TESTING LAB TECHNICIAN ARE PRESENT

CONTRACTOR SHALL DEMONSTRATE THE INTENDED METHODS FOR COMPACTING THE FILL FOR THE PIPE HAUNCH AREAS. SOIL DENSITY TESTS SHALL BE TAKEN AT LOCATIONS DESIGNATED BY THE ENGINEER TO CONFIRM THAT THE INTEDNED METHODS FOR FILL AND COMPACTION OF THE PIPE HAUNCH AREAS SATIFIES THE PLAN REQUIREMENTS. CONTRACTOR SHALL MODIFIY THE INSTALLATION METHODS AND REPEAT STEP 2 UNTIL ACCEPTABLE TESTS RESULTS ARE ACHIEVED.

STEP 3
CONTRACTOR MAY INSTALL THE NEXT SEVERAL HUNDRED FEET OF PIPE. ENGINEER SHALL DESIGNATE SEVERAL LOCATIONS (APPROXIMATELY 10% OF THE INSTALLED LENGTH) WHERE CONTRACTOR SHALL LEAVE THE PIPE UNBLINDED FOR FURTHER DENSITY TESTS OF THE HAUNCH FILL AREA. ALL DENSITY TESTS MUST MEET PLAN REQUIREMENTS BEFORE WORK MAY PROCEED FURTHER.

IF DENSITY TESTING DATA CONFIRMS TO THE SATISFACTION OF THE ENGINEER THAT THE CONTRACTOR'S INSTALLATION METHOD WILL PRODUCE CONSISTENT COMPLIANCE WITH PLAN REQUIREMENTS, CONTRACTOR MAY CONTINUE INSTALLATION OF THE PIPE WITH NO ADDITIONAL TESTING REQUIRED. IF NOT, STEPS 2 AND 3 SHALL BE REPEATED UNTIL A RELIABLE, SUCCESSFUL METHOD OF PIPE INSTALLATION THAT PRODUCES SATISFACTORY RESULTS IS ESTABLISHED.

CONTRACTOR IS REQUIRED TO PROPERLY AND ADEQUATELY INSTRUCT SUBCONTRACTORS AND/OR SUBSEQUENT PIPE INSTALLATION WORKERS ON THE PROPER INSTALLATION METHOD.

STEP 4A
SOIL OR TRENCH CONDITION CHANGES

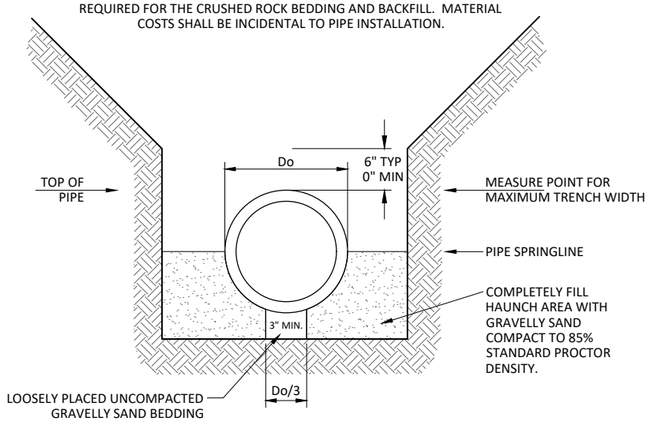
TO VERIFY CONTRACTOR'S COMPLIANCE WITH PLAN REQUIREMENTS UNDER THE CHANGED CONDITIONS, ENGINEER MAY STOP WORK AND REQUIRE ADDITIONAL SOIL PROCTOR TESTS AND/OR SOIL DENSITY TESTS SIMILAR TO STEPS 1 THROUGH 3. THE WORK AND COSTS OF THE FIRST TWO REVERIFICATIONS IS SUBSIDIARY TO THE PIPE INSTALLATION. SUBSEQUENT VERIFICATIONS WILL BE CONSIDERED EXTRA WORK.

STEP 4B
CONTRACTOR FAILS TO CONSISTENTLY PERFORM INSTALLATION METHOD OR INSTRUCT OTHER INSTALLERS

IF CONTRACTOR FAILS TO CONSISTENTLY PERFORM OR ADEQUATELY INSTRUCT SUBCONTRACTORS AND/OR SUBSEQUENT PIPE INSTALLATION WORKERS ON THE APPROVED INSTALLATION METHOD, ENGINEER MAY STOP WORK AND REQUIRE ADDITIONAL SOIL PROCTOR TESTS AND/OR SOIL DENSITY TESTS SIMILAR TO STEPS 1 THROUGH 3 TO VERIFY CONTRACTOR'S COMPLIANCE WITH PLAN REQUIREMENTS. THE WORK AND COSTS OF ALL VERIFICATIONS UNDER SUCH CONDITIONS IS SUBSIDIARY TO THE PIPE INSTALLATION.

EXCEPTION
IF CONTRACTOR ELECTS TO SHAPE THE TRENCH BOTTOM SUCH THAT A MINIMUM OF 45% OF THE OUTER CIRCUMFERENCE OF THE PIPE IS FIRMLY BEDDED IN AND CONSISTENTLY SUPPORTED BY UNDISTURBED SOIL, PIPE HAUNCH FILL COMPACTION TESTING WILL NOT BE REQUIRED. THE CONTRACTOR IS REQUIRED TO COMPLY WITH A PROPER INSTALLATION METHOD AND TO FULLY COMPLY WITH THE REQUIREMENTS OF THE VERIFICATION OUTLINED ABOVE FOR ALL SITUATIONS WHERE THIS EXCEPTION IS NOT MET.

CRUSHED ROCK MEETING THE GRADATION OF SUDAS CLASS I BEDDING MATERAL, SPECIFICATION SECTION 3010.2.02.A, MAY BE SUBSTITUTED FOR THE SAND OR CLAY HAUNCH BACKFILL MATERIAL. NO COMPACTION WILL BE REQUIRED FOR THE CRUSHED ROCK BEDDING AND BACKFILL. MATERIAL COSTS SHALL BE INCIDENTAL TO PIPE INSTALLATION.

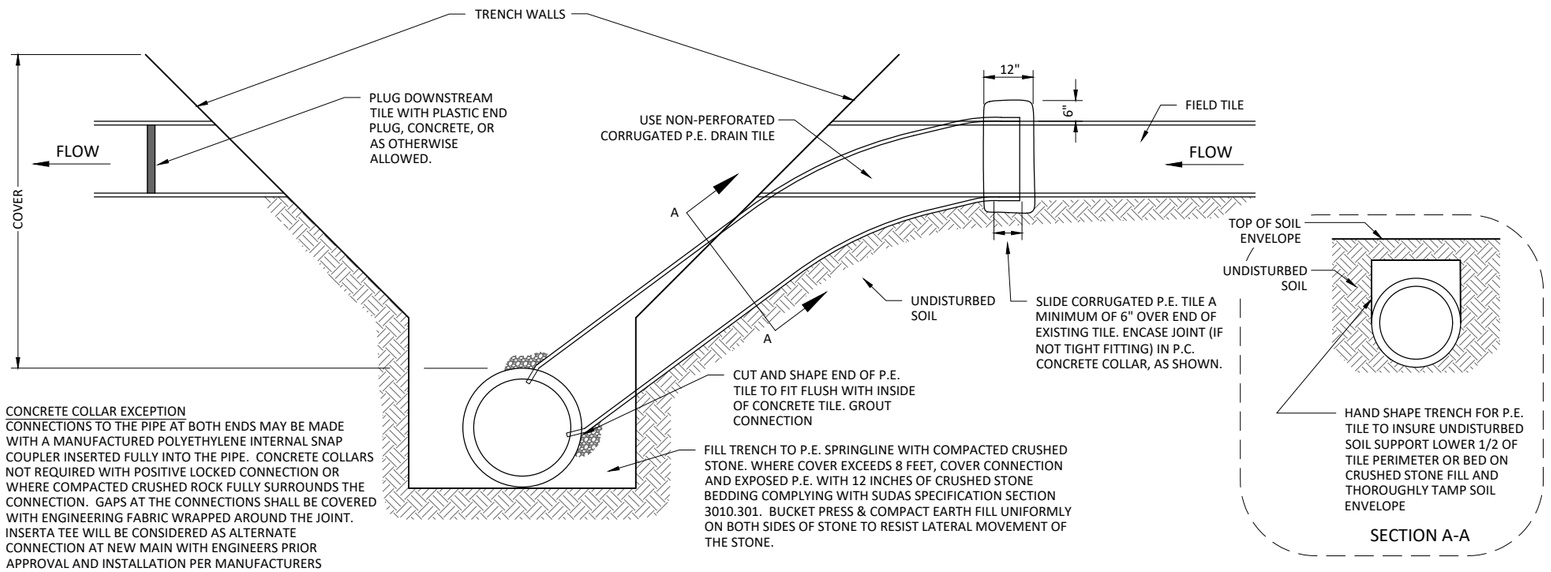


GRAVELLY SAND BEDDING SHALL BE CONSISTENT WITH THE GRADATION AND OTHER CHARACTERISTICS OF STANDARD AASHTO A1 OR A3 SOIL. A REPRESENTATIVE SAMPLE OF THE MATERIAL AND A GRADATION REPORT OR SUPPLIER'S CERTIFICATION OF COMPLIANCE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO DELIVERY TO SITE. SEE SOIL DATA IN APPENDIX OF SPECIFICATIONS BOOKLET.

TRENCH INSTALLATION TYPE 3

NOT TO SCALE

SOURCE: AMERICAN CONCRETE PIPE ASSOCIATION
CONCRETE PIPE DESIGN MANUAL

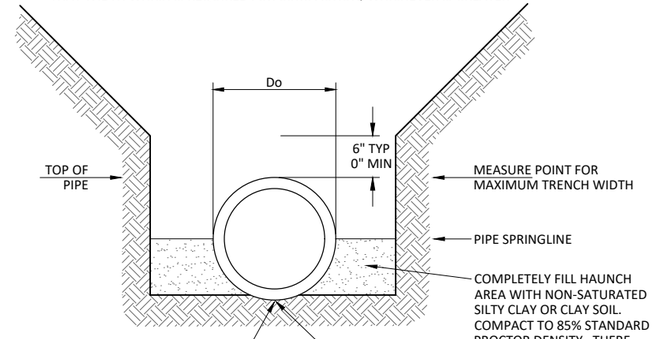


CONCRETE COLLAR EXCEPTION
CONNECTIONS TO THE PIPE AT BOTH ENDS MAY BE MADE WITH A MANUFACTURED POLYETHYLENE INTERNAL SNAP COUPLER INSERTED FULLY INTO THE PIPE. CONCRETE COLLARS NOT REQUIRED WITH POSITIVE LOCKED CONNECTION OR WHERE COMPACTED CRUSHED ROCK FULLY SURROUNDS THE CONNECTION. GAPS AT THE CONNECTIONS SHALL BE COVERED WITH ENGINEERING FABRIC WRAPPED AROUND THE JOINT. INSERTA TEE WILL BE CONSIDERED AS ALTERNATE CONNECTION AT NEW MAIN WITH ENGINEERS PRIOR APPROVAL AND INSTALLATION PER MANUFACTURERS RECOMMENDATION.

TYPICAL FIELD TILE CONNECTION

FOR FIELD TILE UP TO 10" DIAMETER

MINIMUM TRENCH WIDTH SHALL BE OUTSIDE DIAMETER OF PIPE PLUS 12" OR THAT WIDTH WHICH IS REQUIRED FOR COMPACTION, WHICHEVER IS GREATER



WHERE TRENCH BOTTOM IN FIRM UNDISTURBED SOIL, SHAPE TRENCH BASE GROOVE TO MATCH MINIMUM 1/6 OF THE OUTER CIRCUMFERENCE OF THE PIPE. WHERE THE SHAPED GROOVE CANNOT BE CONSTRUCTED INTO UNDISTURBED GROUND OR WHERE EXCESS CUT OCCURS OVER EXCAVATE AND PLACE MINIMUM 3-INCH THICK COMPACTED GRAVELLY SAND BEDDING TO RESTORE GRADE SUCH THAT 1/6 OR MORE OF THE OUTER CIRCUMFERENCE OF THE PIPE IS BEDDED. THIS MATERIAL AND WORK IS SUBSIDIARY TO THE INSTALLATION OF THE PIPE. CONTRACTOR MAY SUBSTITUTE PIPE BEDDING ROCK AS THE BEDDING MATERIAL. IT ALSO IS SUBSIDIARY.

WHERE FIRM BASE IS NOT ENCOUNTERED. OVER EXCAVATE AS DIRECTED BY ENGINEER. PLACE CRADLING ROCK AND BED PIPE IN IT SUCH THAT 1/6 OR MORE OF THE OUTER CIRCUMFERENCE OF THE PIPE IS SUPPORTED. THIS ROCK IS PAID FOR UNDER A SEPARATE BID ITEM.

MODIFIED TRENCH INSTALLATION TYPE 4

NOT TO SCALE

SOURCE: AMERICAN CONCRETE PIPE ASSOCIATION
CONCRETE PIPE DESIGN MANUAL

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KOSSUTH COUNTY, IOWA
NUTRIENT REDUCTION WETLAND PROJECT - TZ0323
RCP INSTALLATION

SHEET
B.01

CORRUGATED POLYETHYLENE DRAINAGE TUBING MATERIAL & INSTALLATION NOTES

1. ALL CPDT AND CONNECTORS FURNISHED SHALL BE IN COMPLIANCE WITH MATERIAL STANDARDS ASTM F405 AND F667, AS APPLICABLE, AND SHALL BE CLASSIFIED AS HEAVY-DUTY UNDER THOSE STANDARDS.
2. EXCEPT MODIFIED HEREIN OR OTHERWISE APPROVED BY ENGINEER, ALL CPDT SHALL BE INSTALLED IN COMPLIANCE WITH THE ASTM 449 STANDARD PRACTICE.
3. FOR PIPES 6" DIAMETER AND SMALLER A 90° V GROOVE BOTTOM MAY BE USED, FOR ALL LARGER PIPE A TRAPEZOIDAL BOTTOM OR A CIRCULAR BOTTOM CONFORMING TO THE OUTSIDE DIAMETER OF THE PIPE SHALL BE USED. PRIOR TO THE INSTALLATION OF CPDT, CONTRACTOR MUST PROVE TO ENGINEER THAT THE INSTALLATION REQUIREMENTS, INCLUDING THE SHAPE OF THE TRENCH BOTTOM, WILL BE ACCOMPLISHED.
4. WHERE TRENCH BOTTOM IS IN FIRM UNDISTURBED SOIL, SHAPE TRENCH BASE GROOVE. WHERE EXCESS CUT OCCURS, OVEREXCAVATE AND PLACE MINIMUM THREE (3) INCH THICK, GRAVELLY SAND BEDDING TO RESTORE GRADE. THIS BEDDING SHALL MEET THAT REQUIRED FOR TRENCH INSTALLATION TYPE 3 ON PLAN SHEET C.02. IF DUE TO CONTRACTOR ERROR THIS MATERIAL AND WORK IS SUBSIDIARY TO THE INSTALLATION OF THE PIPE. CONTRACTOR MAY SUBSTITUTE PIPE BEDDING ROCK AS THE BEDDING MATERIAL.
5. NATIVE SOILS MAY BE USED AS BACKFILL MATERIAL UNLESS UNSTABLE TRENCH CONDITIONS PREVENT THE TRENCH BOTTOM HOLDING THE SHAPED GROOVE. IF TRENCH BOTTOM WILL NOT HOLD GROOVE SHAPE CONTRACTOR SHALL NOTIFY ENGINEER IMMEDIATELY. A FLAT BOTTOM TRENCH INSTALLATION WILL THEN BE ASSUMED. THE REQUIRED BEDDING MATERIAL WILL BE PAID UNDER THE TILE TRENCH STABILIZATION AND CRADLING ROCK BID ITEM.
6. MINIMUM TRENCH WIDTH IS PIPE OUTSIDE DIAMETER PLUS FOUR (4) INCHES FOR PLOWED INSTALLATION AND PIPE OUTSIDE DIAMETER PLUS TWELVE (12) INCHES FOR OPEN TRENCH INSTALLATION.
7. ALL LATERAL CONNECTIONS, ELBOWS, TEES, ALIGNMENT CURVES, START HOLES AND ALL PORTIONS OF THE TRENCH NOT MEETING THE GROOVED TRENCH INSTALLATION REQUIREMENTS SHALL BE FILLED TO A MINIMUM OF SIX (6) INCH COVER OVER THE PIPE WITH GRADED CRUSHED STONE OR GRAVEL AS SHOWN ON TABLE 2 OF THIS SHEET. UNLESS DUE TO CONTRACTOR ERROR THIS BEDDING MATERIAL WILL BE PAID UNDER THE TILE TRENCH STABILIZATION AND CRADLING ROCK BID ITEM.
8. MANUFACTURER'S ENDCAPS SHALL BE INSTALLED AT THE TERMINATION OF EACH LINE UNLESS A CONNECTION TO AN EXISTING DRAIN IS MADE.
9. WITH THE INSTALLATION OF THE FIRST REACH OF CPDT ON THE PROJECT, CONTRACTOR IS REQUIRED TO WORK WITH THE ENGINEER TO CHECK AND CONFIRM THAT THE PIPE STRETCH, IF ANY, DOES NOT EXCEED 5%.
10. ALIGNMENT TURNS MAYBE MADE USING EITHER A MANUFACTURED FITTING OR CURVING THE LINE WITH A 25' MINIMUM RADIUS.

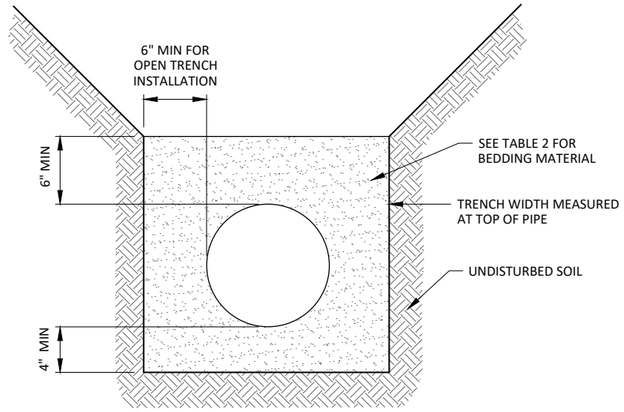
Table 1
Maximum Allowable Buried Depth to Flowline of CPDT

Nominal Pipe Diameter (IN)	Pipe Quality (ASTM)	Trench Width at Top of the Pipe (FT)			
		12"	18"	24"	30" or Greater
4	Standard	13	7	5.5	5
	Heavy-duty	Any	10	7	6
6	Standard	10	7	5.5	5
	Heavy-duty	Any	9.5	6.5	6
8	Standard	10	7	5.5	5
	Heavy-duty	Any	10	7	6
10	Heavy-duty	...	9	7	6
12	Heavy-duty	...	9	7	6
15	Heavy-duty	...	...	7	6

Table 2
Acceptable Bedding Material and Compaction Requirements

Description	Percentage Passing Sieve Sizes			Minimum Standard Density (%)	Maximum Compaction Layer Height (IN.)
	1"	3/4"	No. 4		
Crushed Stone Crushed Gravel*	100%	> 95%	< 5%	Dumped	18

* Class 1 Bedding Material Per SUDAS 3010.202A is an Allowable Substitute



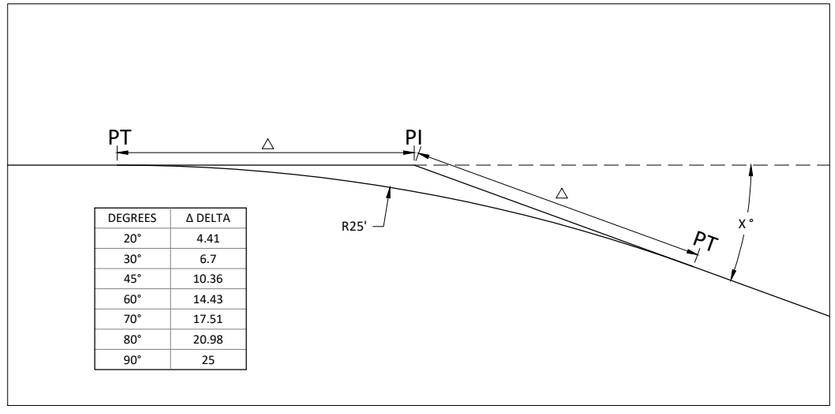
FILL TRENCH TO 6" ABOVE TOP OF PIPE WITH CRUSHED STONE OR GRAVEL MEETING THE REQUIREMENTS IN TABLE 2. BEDDING MATERIAL SHALL BE INCIDENTAL TO THE PIPE INSTALLATION.

FLAT BOTTOM TRENCH INSTALLATION

NOT TO SCALE

SOURCE: ASTM F449

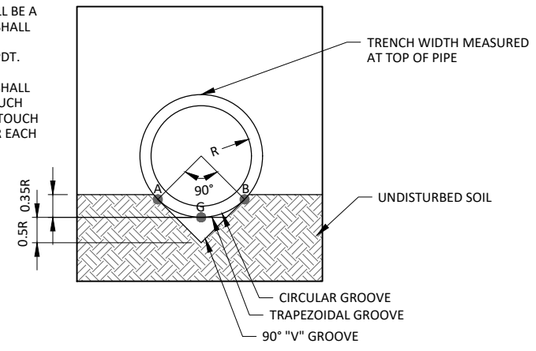
NOTE: THIS IS AN ALLOWED ALTERNATIVE INSTALLATION FOR CPDT



DEGREES	Δ DELTA
20°	4.41
30°	6.7
45°	10.36
60°	14.43
70°	17.51
80°	20.98
90°	25

THE CIRCULAR GROOVE SHALL BE A MINIMUM 0.35R DEEP AND SHALL MATCH THE OUTSIDE CURVE SHAPE OF THE DEFLECTED CPDT.

THE TRAPEZOIDAL GROOVE SHALL BE SHAPED AND ADJUSTED SUCH THAT POINTS A, B, & C WILL TOUCH THE UNDEFLECTED CPDT FOR EACH SIZE INSTALLED.



PREFFERED TRENCH INSTALLATION BOTTOM

TRAPEZOIDAL GROOVE, "V" GROOVE, & CIRCULAR GROOVE

NOT TO SCALE

SOURCE: ASTM F449

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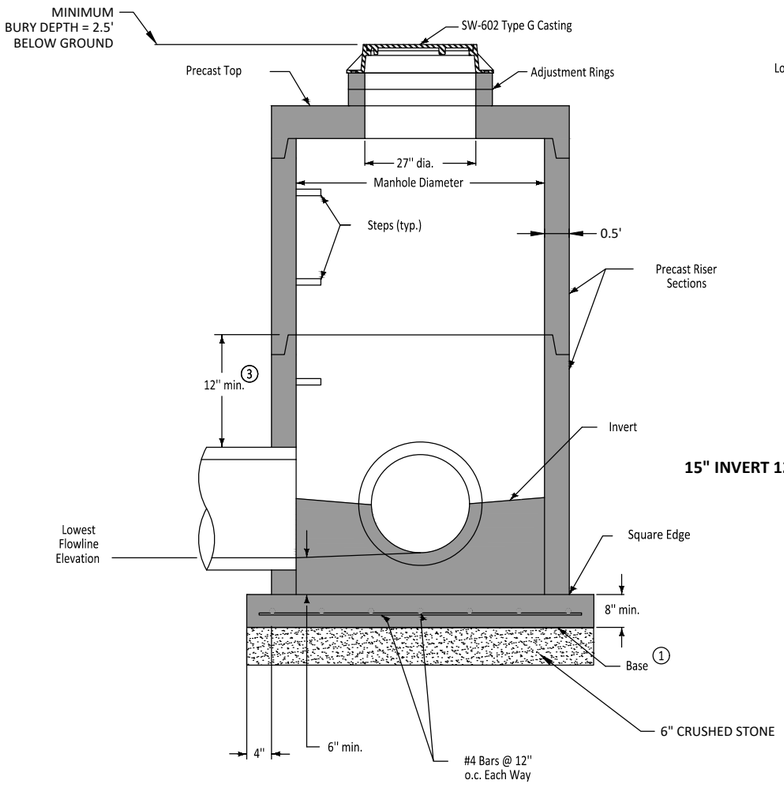
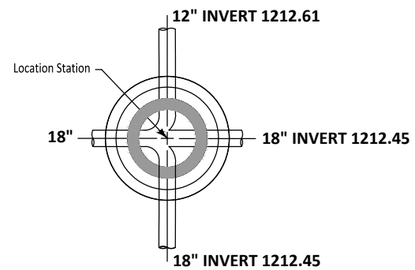
KOSSUTH COUNTY, IOWA
NUTRIENT REDUCTION WETLAND PROJECT - TZ0323
CPDT INSTALLATION

SHEET B.02

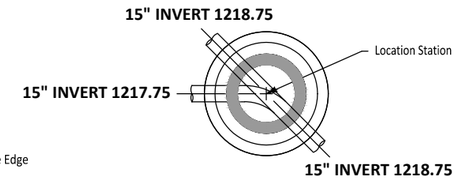
1. Cast-in-place base shown. If base is precast integral with bottom riser, the footprint of the base is not required to extend beyond the outer edge of the riser.
2. For additional configurations, maintain a minimum of 12 inches of concrete between vertical edges of pipe openings.
3. 12 inch minimum riser height above all pipe openings.



TYPICAL SECTION



PLAN (MANHOLE #2)



PLAN (MANHOLE #1)

Manhole Diameter (inches)	Maximum Pipe Diameter (inches) for 2 Pipes (2)	
	At 180 ° Separation	At 90 ° Separation
48	24	18
60	36	24
72	42	30
84	48	36
96	60	42

SW-401 DIMENSIONS		
STRUCTURE	DIAMETER	LOWEST FLOWLINE ELEV.
#1	48"	1217.75
#2	48"	1212.45

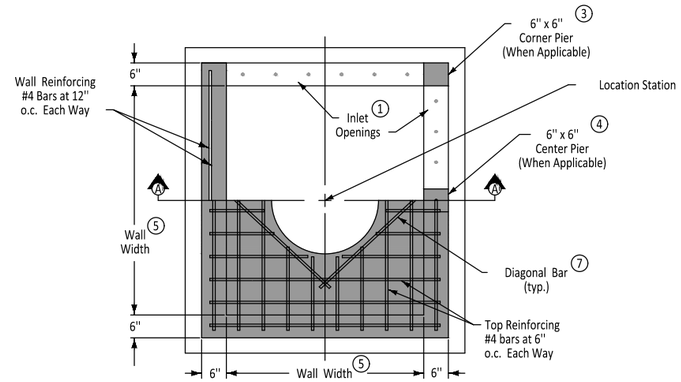
DETAIL - CONCRETE STRUCTURES
SW-401

SUDAS	Iowa Department of Transportation	REVISION
		NEW 04-21-09
FIGURE 6010.401	STANDARD ROAD PLAN	SW-401
		SHEET 1 of 1

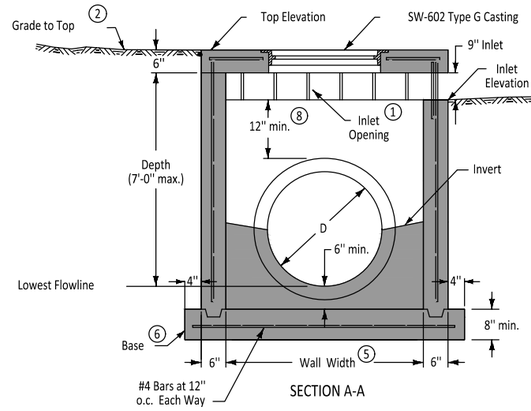
REVISIONS: New. Replaces SUDAS Type "M-A" Manhole. Will replace RA-50.

SUDAS DIRECTOR | DESIGN METHODS ENGINEER

CIRCULAR STORM SEWER MANHOLE



PLAN



SECTION A-A

Construction notes:
1. See Sheet B.04 for modifications to SW-513 Pond Inlet & Outlet Structures.

Structure may be built with openings on any or all sides. Provide openings and orientation as specified in the contract documents.

Adjacent walls may have different widths based upon pipe configuration, but structure must be rectangular.

1. Construct inlet openings with 15-inch #4 epoxy-coated bars at 8 inches on center. Embed bars a minimum of 3 inches into walls and top at all openings.
2. Grade to inlet elevation on open sides. Grade to top elevation on closed sides.
3. Corner pier required between openings of two adjacent walls. Extend wall reinforcing vertically through pier. Install one additional 15-inch #4 bar in pier.
4. Center pier required at center of any inlet opening with length of 5 feet or greater. Extend wall reinforcing vertically through pier. Install one additional 15-inch #4 bar in pier.
5. Wall widths vary with pipe diameter. Provide 6 inches of wall width (minimum) each side of pipe opening. Minimum wall width is 36 inches. Maximum wall width is 72 inches.
6. Cast-in-place base shown. If base is precast integral with walls, the footprint of base is not required to extend beyond the outer edge of the walls.
7. Install four #4 diagonal bars at all pipe openings.
8. 12" minimum wall height above all pipes.

DETAIL - SW-513 POND INLET & OUTLET STRUCTURES

SUDAS	Iowa Department of Transportation	NEW
FIGURE 6010.513	STANDARD ROAD PLAN	SW-513

REVISIONS: New. Replaces SUDAS Area Type "M-G" Intake.

SUDAS DIRECTOR | DESIGN METHODS ENGINEER

OPEN-SIDED AREA INTAKE

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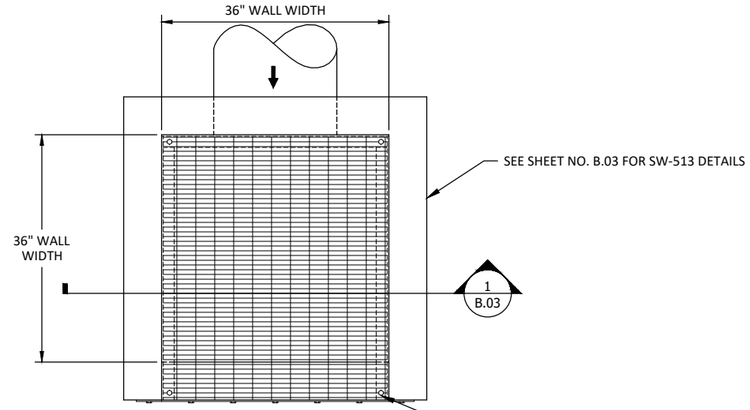
CHECKED JPR			
CLIENT PROJ. NO. OP1.127676			

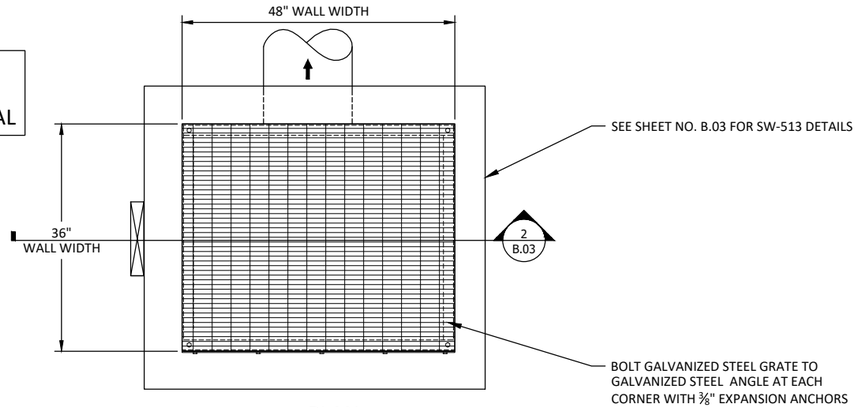
KOSSUTH COUNTY, IOWA
NUTRIENT REDUCTION WETLAND PROJECT - TZ0323
IOWA DOT STRUCTURE DETAILS

SHEET B.03

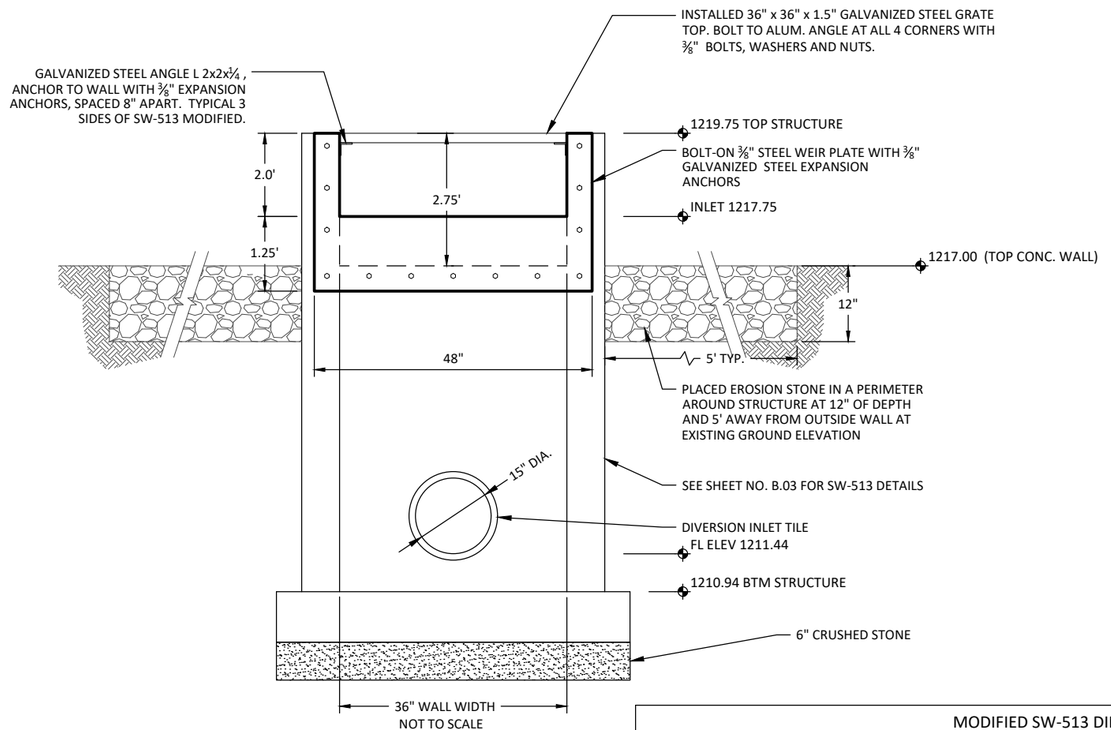


PLAN
MODIFIED SW-513
POND INLET STRUCTURE
NOT TO SCALE

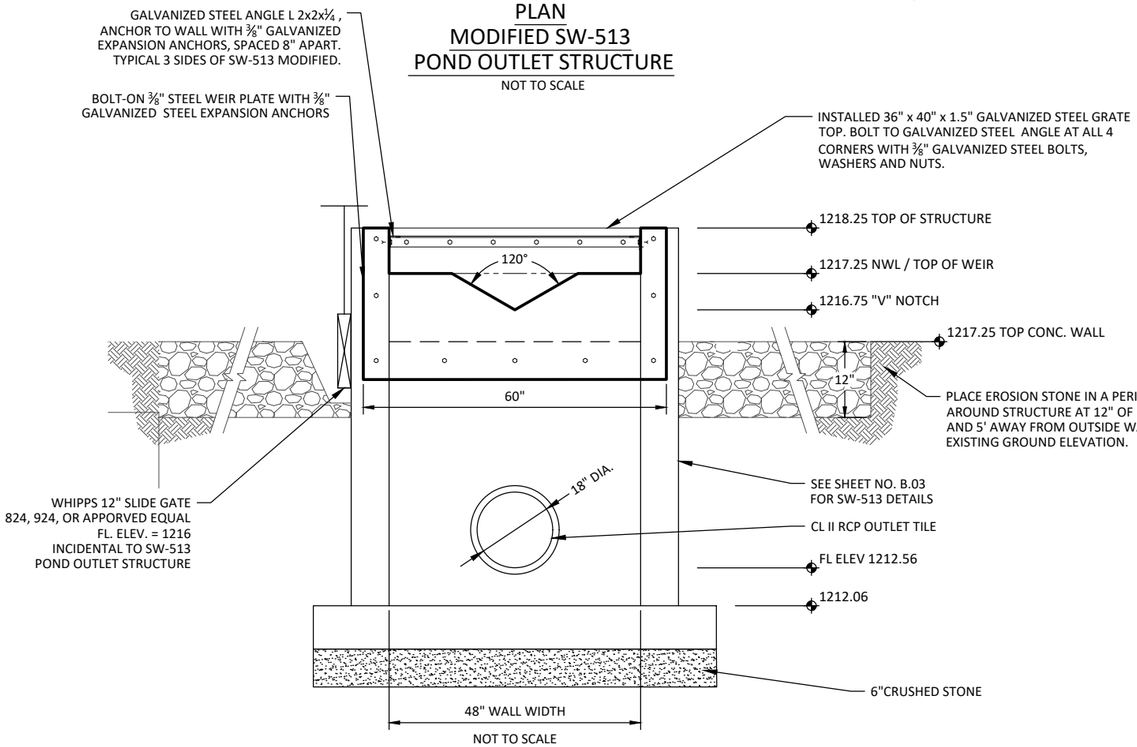
NOTE: BAR GRATE SHALL BE McNICHOLS HEAVY DUTY WELDED GHB-100, 19 W-4, OR APPROVED EQUAL



PLAN
MODIFIED SW-513
POND OUTLET STRUCTURE
NOT TO SCALE



SECTION 1
BID ITEM NO. 3 MODIFIED SW-513 POND INLET STRUCTURE



SECTION 2
BID ITEM NO 4. MODIFIED SW-513 POND OUTLET STRUCTURE

MODIFIED SW-513 DIMENSIONS					
	DIMENSIONS	RIM ELEV.	INLET ELEV.	SUMP ELEV.	PIPE FL ELEV.
INLET STRUCTURE	36" X 36"	1219.75	1217.75	1210.94	1211.44
OUTLET STRUCTURE	48" X 36"	1218.25	1216.75	1212.06	1212.56

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CLIENT PROJ. NO. 0P1.127676

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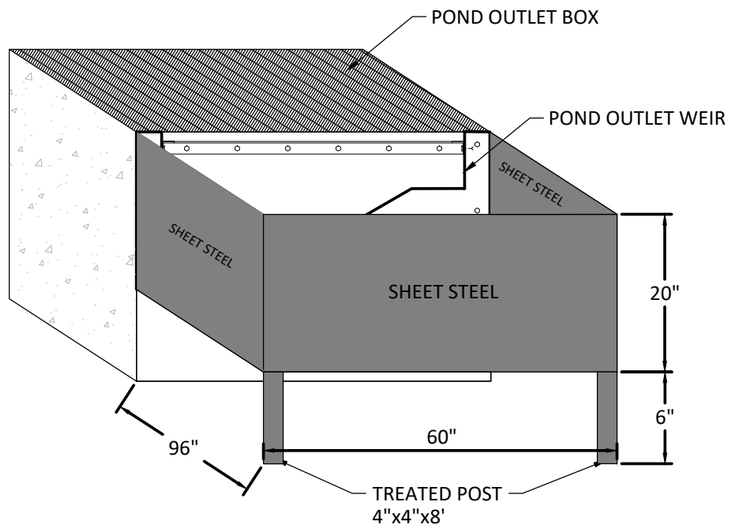
KOSSUTH COUNTY, IOWA
NUTRIENT REDUCTION WETLAND PROJECT - TZ0323
MODIFIED STRUCTURE DETAILS

SHEET
B.04

NOT TO SCALE



SUBSIDIARY TO "MODIFIED SW-513 POND OUTLET STRUCTURE" BID ITEM
ALL COSTS TO FURNISH AND INSTALL TRASH GUARD ARE INCIDENTAL TO THAT BID ITEM

2 - 4" x 4" x 8' TREATED POSTS
3 - SHEET STEEL SHEETS
1 - 60" x 20" 2 - 96" x 20"
ANGLE IRON--EITHER WELDED OR BOLTED--ON TOP AND BOTTOM OF EACH SHEET AS BRACE
BOLT TRASH GUARD ONTO BOX
DIRTWORK AS NECESSARY TO ALLOW FLOW OF WATER UNDER TRASH GUARD WITH 6" MINIMUM CLEARANCE

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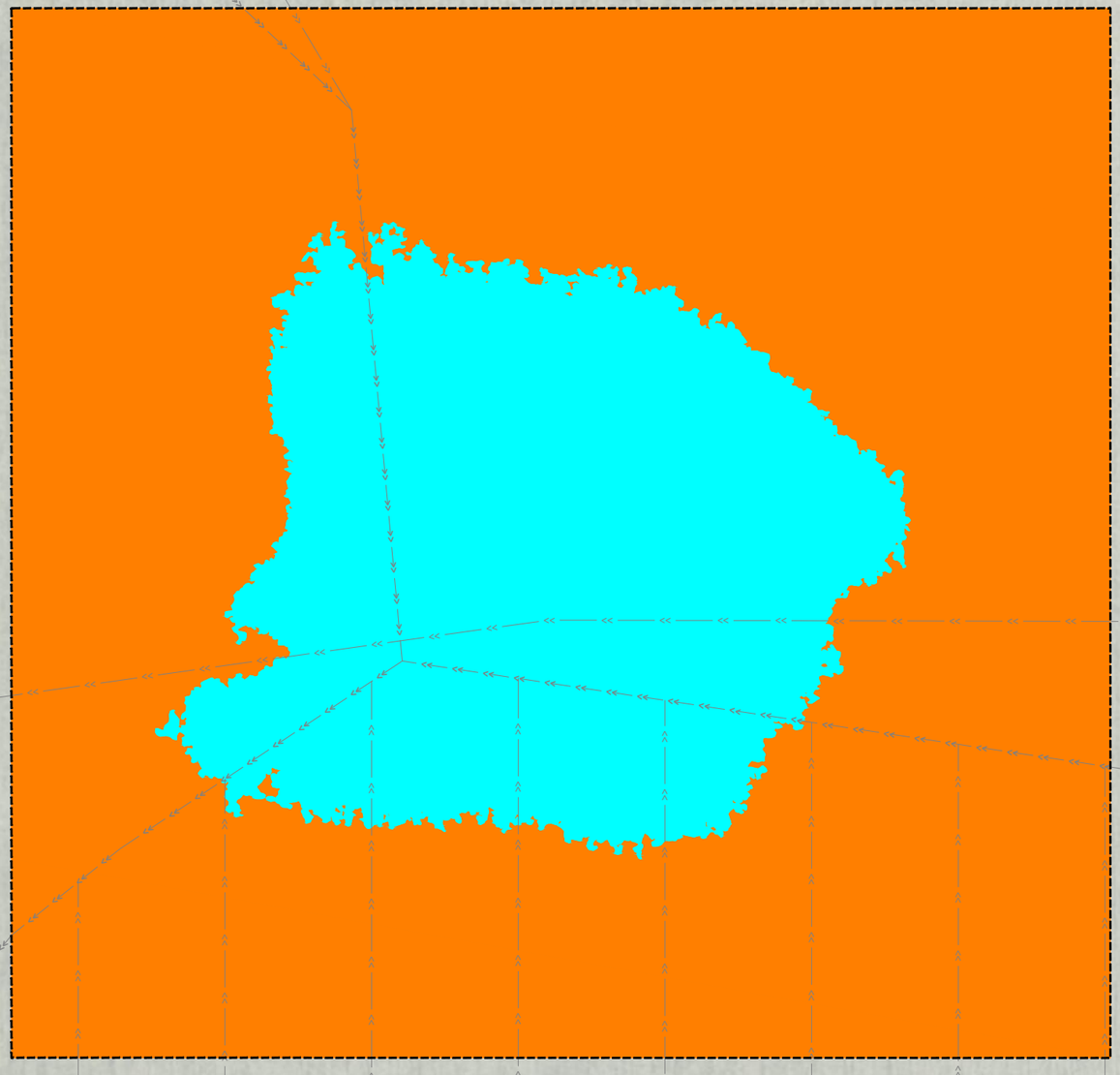
KOSSUTH COUNTY, IOWA
NUTRIENT REDUCTION WETLAND PROJECT - TZ0323
TRASH GUARD DETAIL

SHEET
B.05

ALL 9.1 ACRES IN ORANGE ARE TO BE SEEDED
SEED BED PREPARATION AND SEED MIX WILL FOLLOW IA-CS-6 SPECIFICATIONS



HORZ. 0 50 100
SCALE FEET

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KOSSUTH COUNTY, IOWA
NUTRIENT REDUCTION WETLAND PROJECT - TZ0323
SEEDING MAP

SHEET
B.06

CREP: WQI: x

BID ITEM	SUB-ITEM	DESCRIPTION	SPECIFICATIONS	PAGE	PLAN SHEETS	ESTIMATED QUANTITIES	UNITS
1	-	SITE STRIPPING & PREPARATION	IA CS-001	1 - 2	A.02, D.01, M.01, M.02	1	LS
2	-	DRAIN TILE INVESTIGATION AND REMOVAL	IA CS-009	12 - 15	A.02, M.02	25	HR
3	-	MODIFIED SW-513 POND INLET STRUCTURE (36" X 36")	IA CS-031 6010-1.08-B	22 - 28	A.02, B.03, B.04, M.01	1	EA
4	-	MODIFIED SW-513 POND OUTLET STRUCTURE (48" X 36")	IA CS-031 6010-1.08-B	22 - 28	A.02, B.03, B.04, M.01, M.02	1	EA
5	-	SW-401 CONCRETE STRUCTURE	IA CS-031 6010-1.08-A	22 - 28	A.02, B.02, M.02	2	EA
6	-	EROSION STONE	IA CS-061	30 - 34	B.04	22.5	TN
7	-	EARTHFILL (GENERAL)	IA CS-023	16 - 19	A.02, D.01	40	CY
8	-	15" DIA. SINGLE-WALL HDPE (NON-PERFORATED)	IA CS-046	29 - 32	A.02, B.02, M.01	1635	LF
9	-	12" DIA. SINGLE-WALL HDPE (NON-PERFORATED)	IA CS-046	29 - 32	A.02, B.02, M.02	613	LF
10	-	REINFORCED CONCRETE PIPE (RCP), 18" DIA.	IA CS-031 4020-1.08-A	22 - 28	A.02, B.01, M.02	628	LF
11	-	RELAY EXISTING 15" DIA. DUAL-WALL 2014 SUBMAIN AS NON-PERFORATED	IA CS-046	29 - 32	A.02, B.02, M.01	600	LF
12	-	DRAINFILL	IA CS-024	20 - 21	B.01, B.02, M.01	450	TN
13	-	SILT FENCE INSTALLATION AND REMOVAL	IA CS-005	3 - 5		100	LF
14	-	BUFFER SEEDING	IA CS-006	6 - 8	B.06	9.1	AC
15	-	CROP DAMAGE	IA CS-001	1 - 2		3.5	AC
16	-	TILE CONNECTIONS 12" DIA. OR LARGER	IA CS-046	29 - 32	A.02, B.01, M.01, M.02	4	EA
17	-	TILE CONNECTIONS 10" DIA. OR SMALLER	IA CS-046	29 - 32	B.01, M.01, M.02	9	EA
18	-	MOBILIZATION AND DEMOBILIZATION	IA CS-008	9 - 14		1	LS

ESTIMATE REFERENCE INFORMATION	
ITEM NO.	DESCRIPTION
1	SITE STRIPPING & PREPARATION
2	DRAIN TILE INVESTIGATION AND REMOVAL
	MATERIAL COSTS FOR ITEMS NEEDED TO MAKE REPAIRS WILL BE NEGOTIATED AS EXTRA WORK.
3	MODIFIED SW-513 POND INLET STRUCTURE (36" X 36")
	SEE SHEETS B.03 & B.04 FOR DETAILS OF SW-513 MODIFICATIONS.
4	MODIFIED SW-513 POND OUTLET STRUCTURE (48" X 36")
	SEE SHEETS B.03 & B.04 FOR DETAILS OF SW-513 MODIFICATIONS.
5	SW-401 CONCRETE STRUCTURE
	SEE SHEET B.03 FOR DETAILS.
6	EROSION STONE
	THIS ITEM IS TO FURNISH AND PLACE EROSION STONE AROUND MODIFIED SW-513 STRUCTURES SHOWN ON SHEET B.04.
7	EARTHFILL (GENERAL)
	MATERIAL IS TO BE BORROWED FROM ON-SITE TAKING EXTRA CARE TO AVOID CREATING CONTIGUOUS EXCAVATION CHANNELS THAT WILL DIRECT THE WETLAND FLOW WHERE IT IS NOT DESIRED. SEE SHEET D.01.
8	15" DIA. SINGLE-WALL HDPE (NON-PERFORATED)
	SEE SHEET B.02 FOR INSTALLATION DETAILS AND SHEET B.01 FOR FIELD TILE CONNECTION DETAILS. USE SUDAS CLASS F-3 BEDDING WHERE SPECIFIED ON THE PLANS.
9	12" DIA. SINGLE-WALL HDPE (NON-PERFORATED)
	SEE SHEET B.02 FOR INSTALLATION DETAILS AND SHEET B.01 FOR FIELD TILE CONNECTION DETAILS.
10	REINFORCED CONCRETE PIPE (RCP), 18" DIA.
	SEE SHEET B.01 FOR INSTALLATION AND FIELD TILE CONNECTION DETAILS.
11	RELAY EXISTING 15" DIA. DUAL-WALL 2014 SUBMAIN AS NON-PERFORATED
	REMOVE AND REPLACE THE EXISTING 15" DIA. DUAL-WALL SUBMAIN WITH NON-PERFORATED TILE FOR 600LF THROUGH THE WETLAND POOL.
12	DRAINFILL
	THIS ITEM IS PAYMENT FOR CLASS F-3 BEDDING MATERIAL ONLY.
13	SILT FENCE INSTALLATION AND REMOVAL
	TO BE PLACED IF NEEDED.
14	BUFFER SEEDING
	SEE SHEET B.06 FOR DETAILS
15	CROP DAMAGE
16	TILE CONNECTIONS 12" DIA. OR LARGER
	INCLUDES CONNECTIONS FOR THE DIVERSION AND REROUTE TILES.
17	TILE CONNECTIONS 10" DIA. OR SMALLER
	SEE SHEET B.01 FOR DETAILS
18	MOBILIZATION AND DEMOBILIZATION
	SHALL INCLUDE DEEP TILLAGE OF ANY COMPACTED PATHWAYS ONCE CONSTRUCTION IS COMPLETE AND IS CONSIDERED INCIDENTAL TO THIS ITEM.

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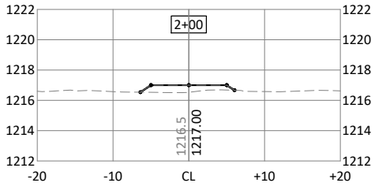
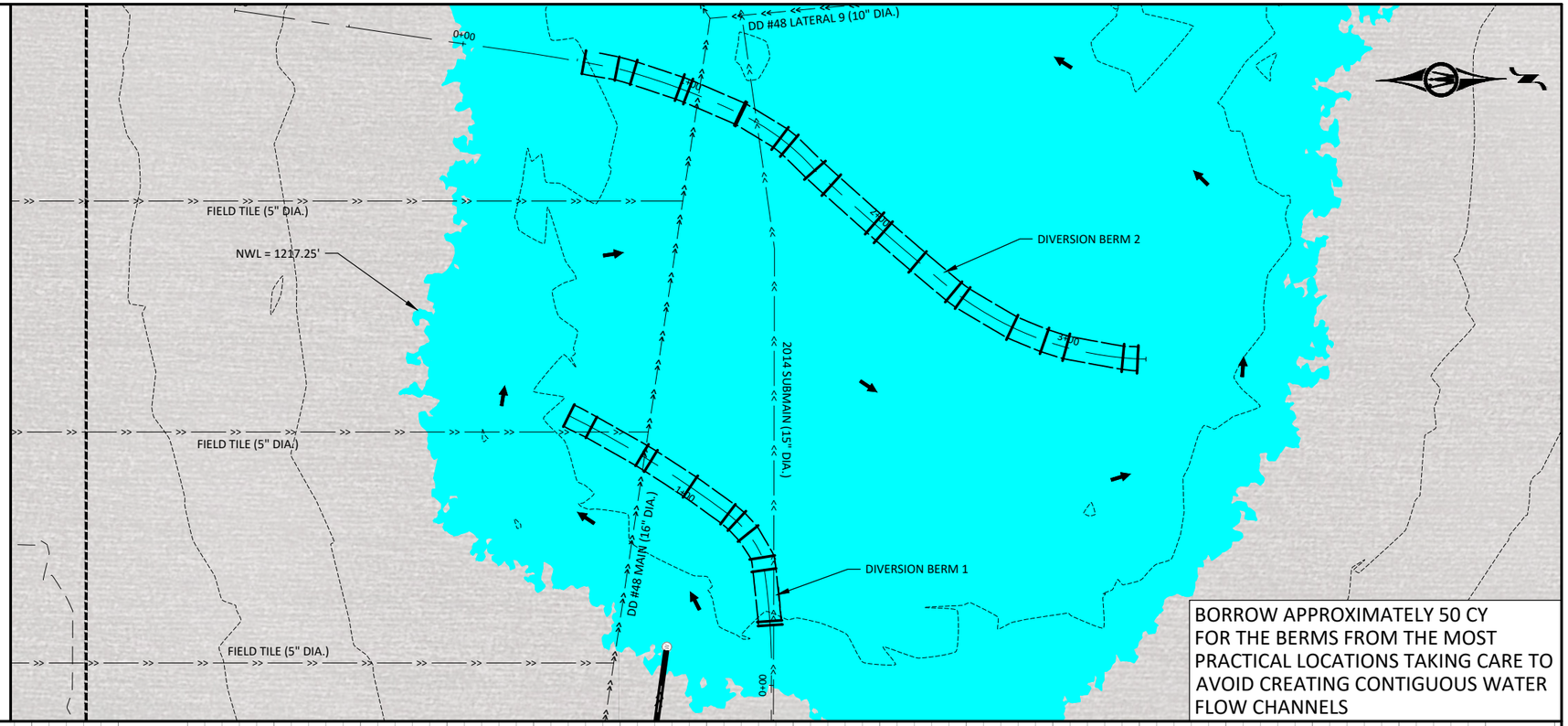
KOSSUTH COUNTY, IOWA
NUTRIENT REDUCTION WETLAND PROJECT - TZ0323
ESTIMATED QUANTITIES & REFERENCE NOTES

SHEET C.01

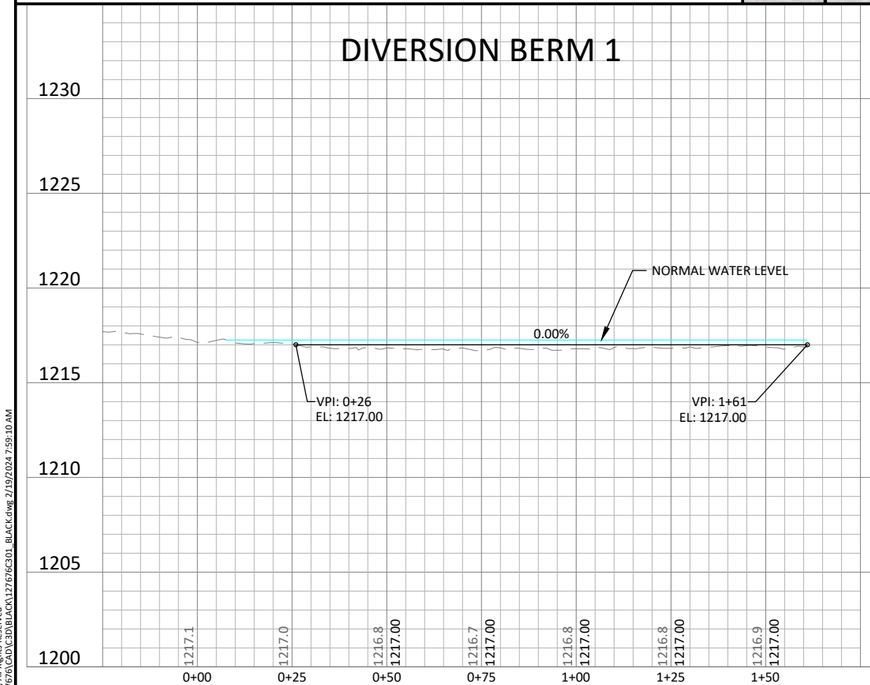


TYPICAL BERM CROSS-SECTION
10' WIDE TOP
3:1 SIDE SLOPES

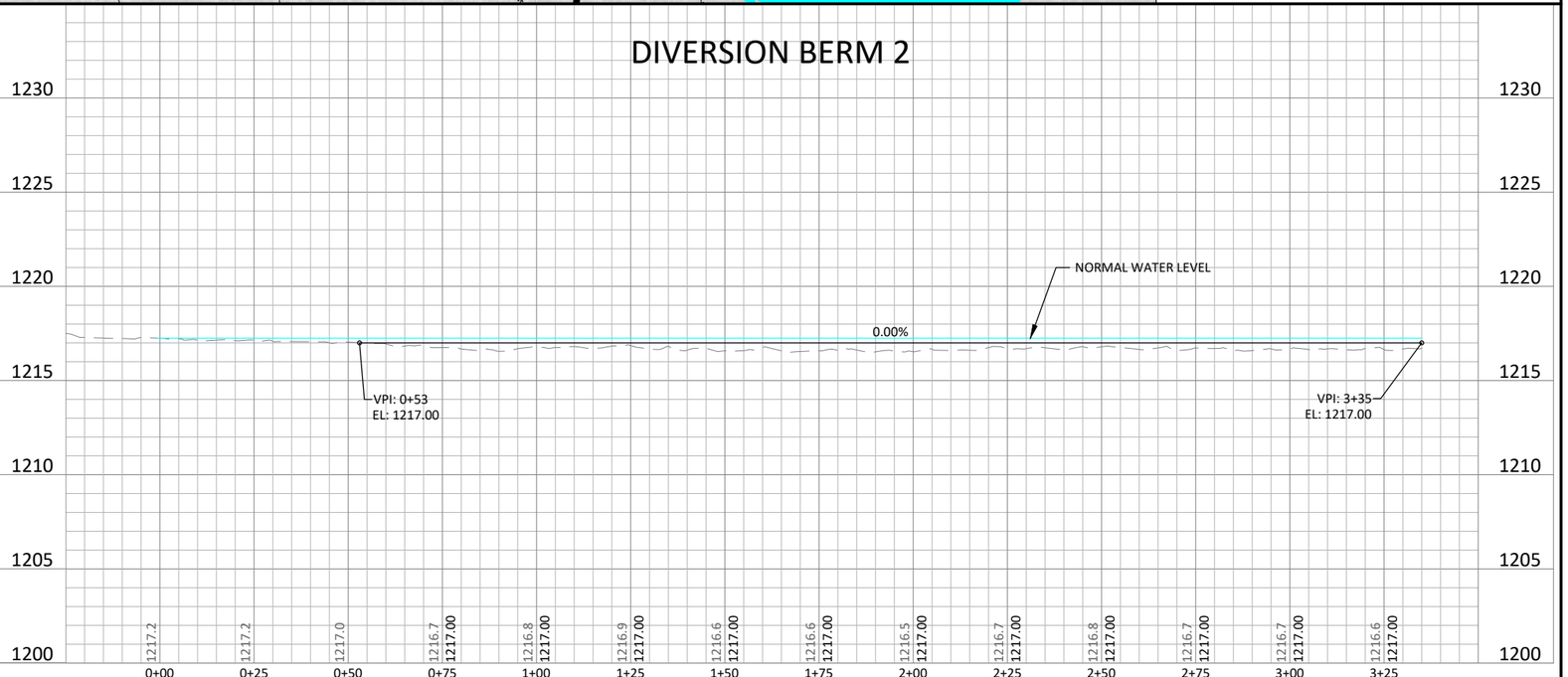


BORROW APPROXIMATELY 50 CY FOR THE BERMS FROM THE MOST PRACTICAL LOCATIONS TAKING CARE TO AVOID CREATING CONTIGUOUS WATER FLOW CHANNELS

DIVERSION BERM 1



DIVERSION BERM 2



HORZ. 0 25 50 SCALE FEET
VERT. 0 5 10 SCALE FEET

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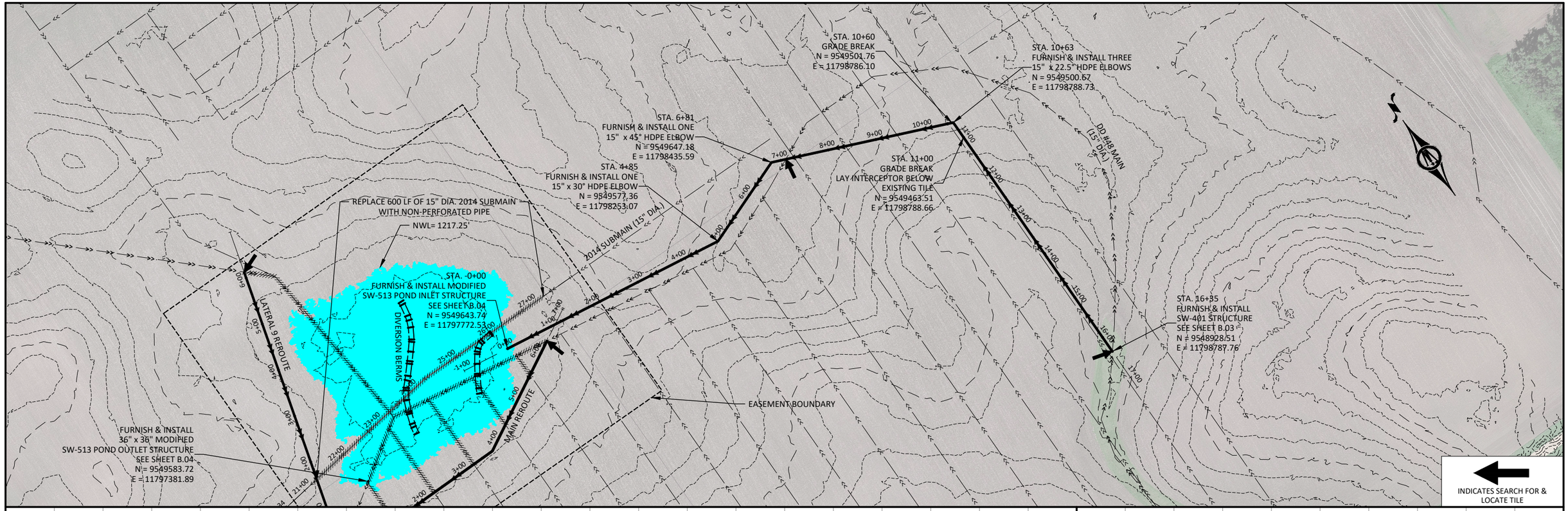
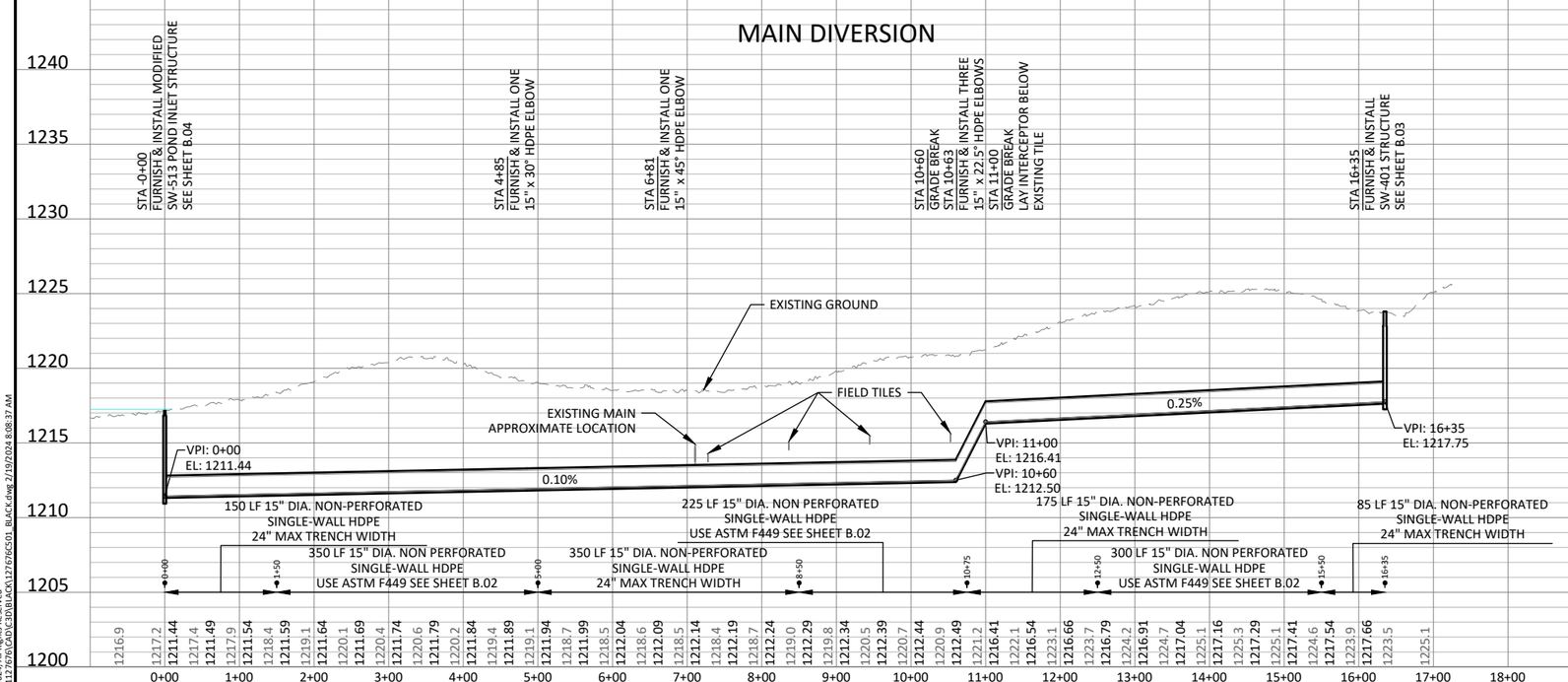
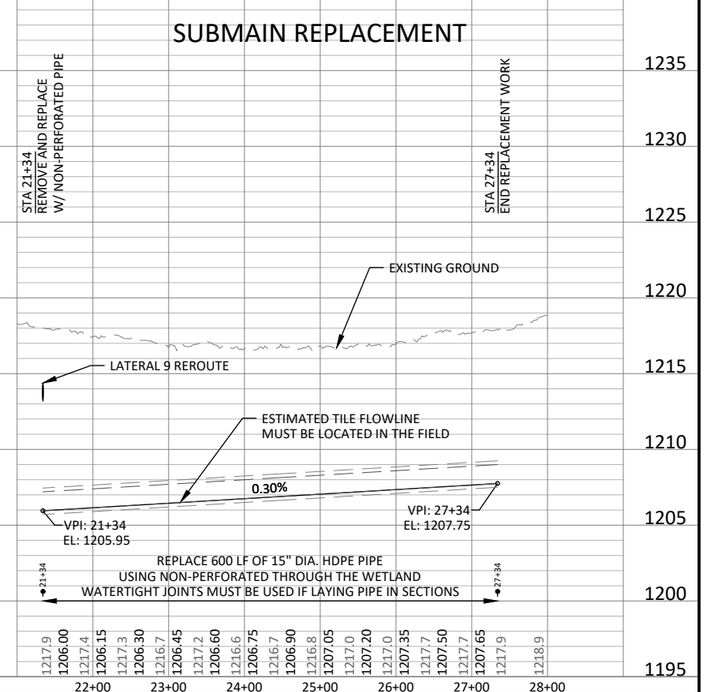
KOSSUTH COUNTY, IOWA
NUTRIENT REDUCTION WETLAND PROJECT - TZ0323
PLAN & PROFILE - DIVERSION BERMS

SHEET D.01







HORZ. SCALE 0 100 200 FEET
VERT. SCALE 0 5 10 FEET

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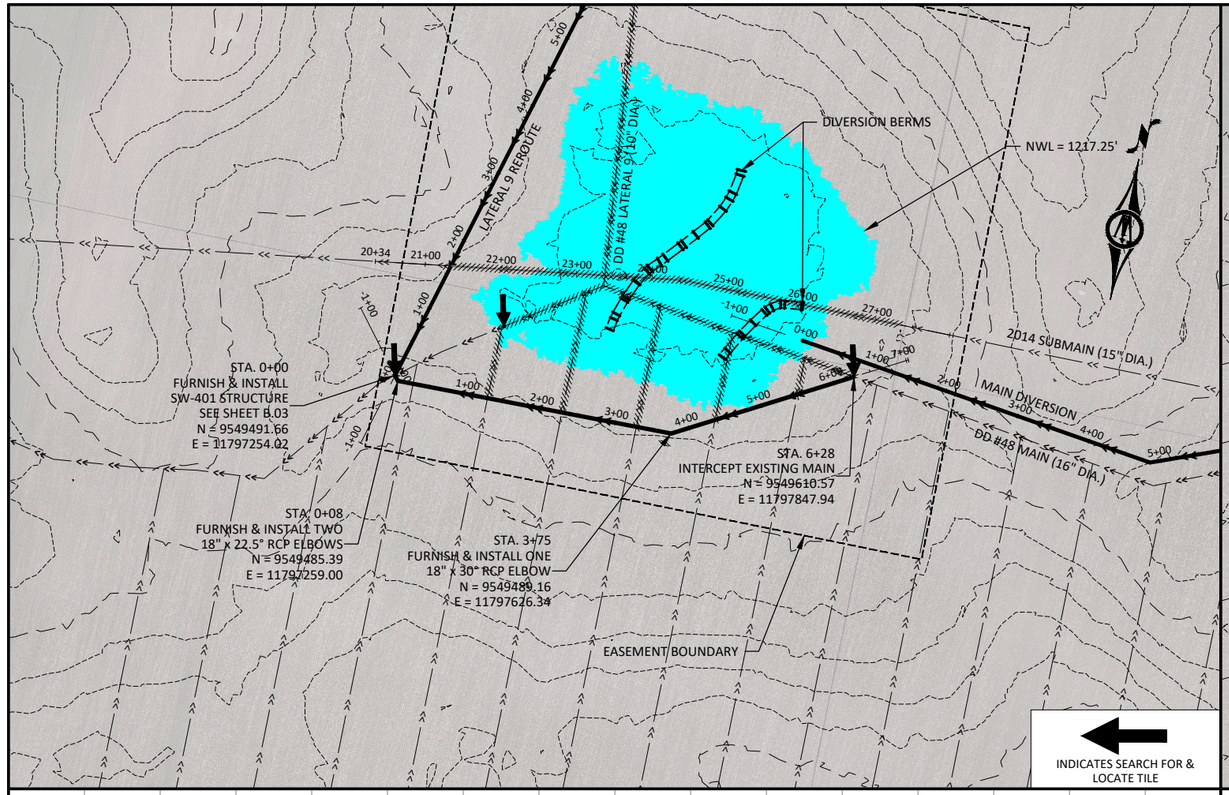
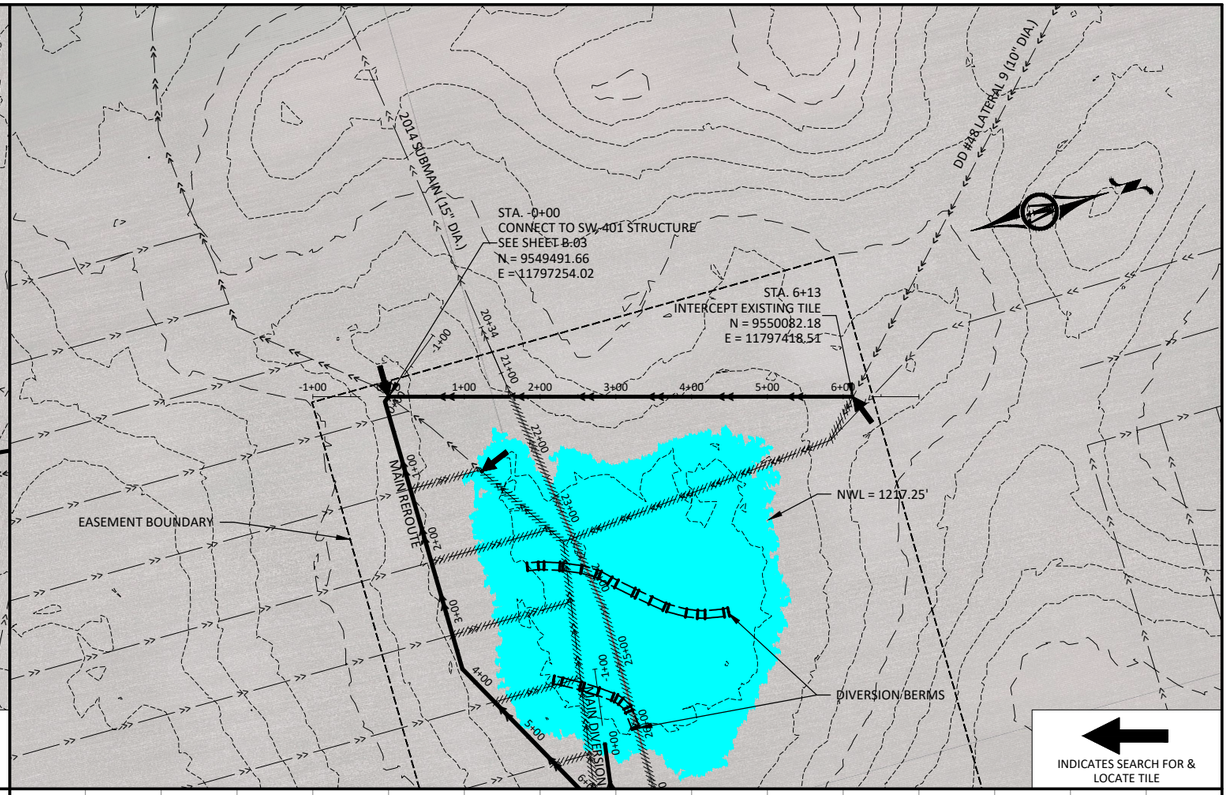
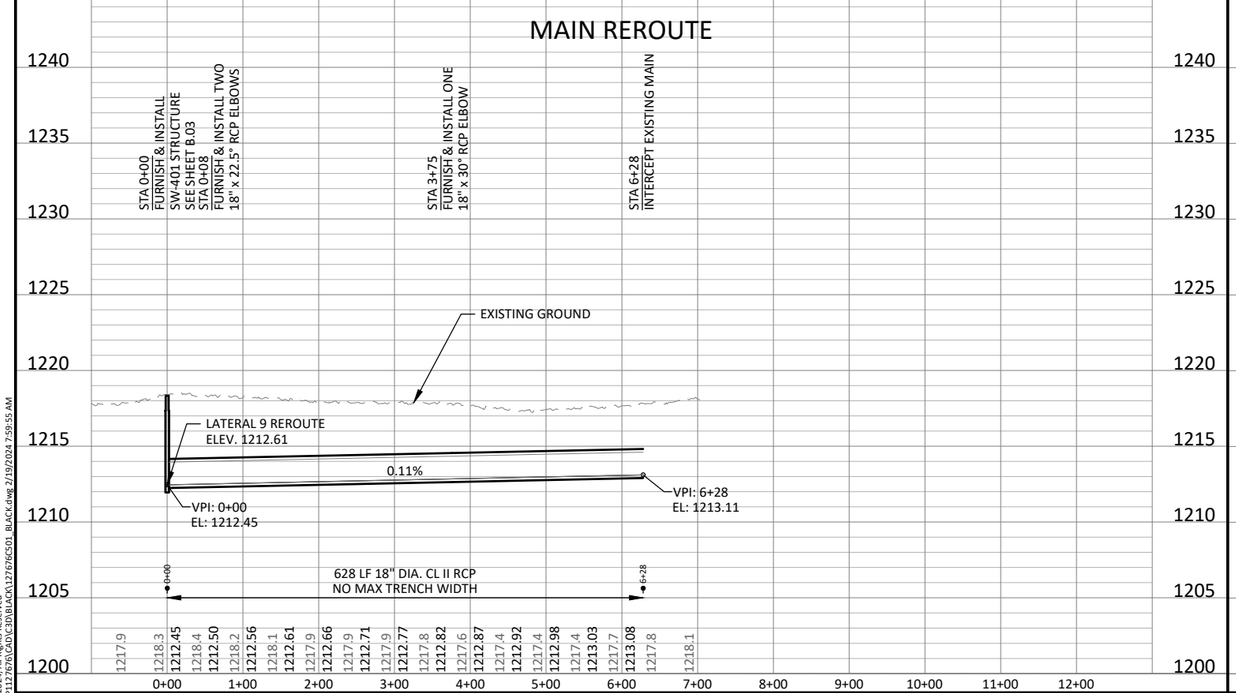
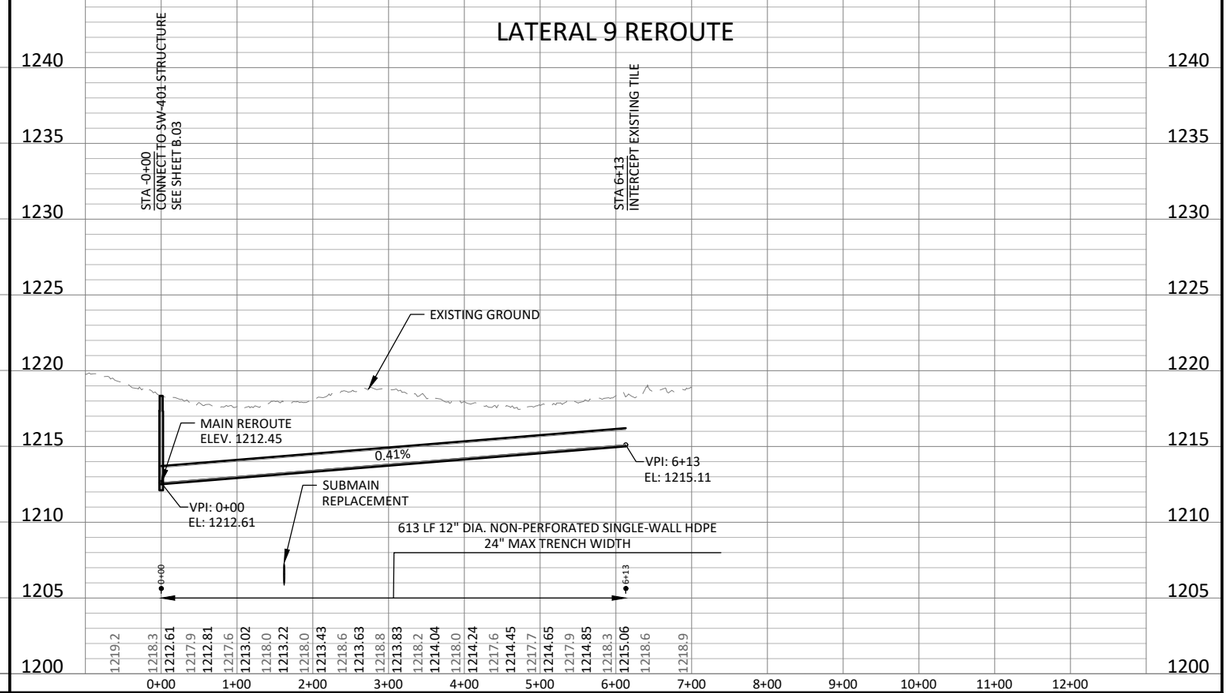
KOSSUTH COUNTY, IOWA
NUTRIENT REDUCTION WETLAND PROJECT - TZ0323
PLAN & PROFILE - MAIN DIVERSION & SUBMAIN REPLACEMENT

SHEET M.01









HORZ. SCALE 0 100 200 FEET

VERT. SCALE 0 5 10 FEET

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NUTRIENT REDUCTION WETLAND PROJECT - TZ0323

PLAN & PROFILE - MAIN & LATERAL 9 REROUTES

SHEET M.02