CONSTRUCTION PLANS FOR

IDALS NO. STO842436B

NUTRIENT REDUCTION WETLAND

STORY COUNTY, IOWA

SEPTEMBER 2026

GOVERNING SPECIFICATIONS

THE SPECIFICATIONS AS PREPARED BY 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" AND ALL CURRENT GENERAL SUPPLEMENTAL SPECIFICATIONS AND MATERIALS INSTRUCTIONAL MEMORANDUM SHALL GOVERN AS REFERENCED.

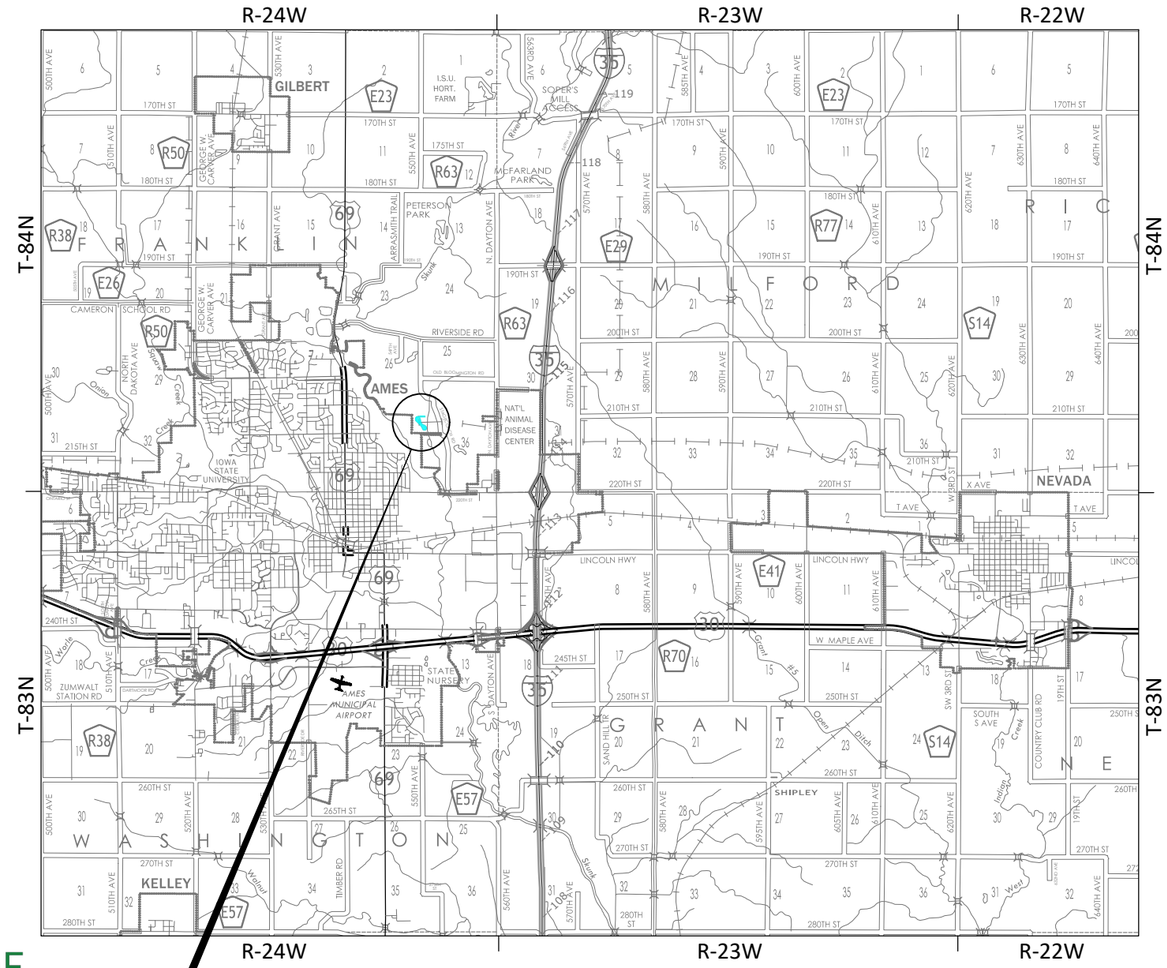
ALL APPLICABLE FEDERAL, STATE, AND LOCAL LAWS AND ORDINANCES WILL BE COMPLIED WITH IN THE CONSTRUCTION OF THIS PROJECT.

IOWA ONE CALL
1-800-292-8989 | 811
www.iowaonecall.com

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." THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING IOWA ONE CALL BY PHONE AT 811, OR ON THE WEB AT HTTP://WWW.IOWAONECALL.COM/. THIS IS REQUIRED BY LAW.
TICKET# _____.
TICKET NUMBER MUST BE PROVIDED TO THE ENGINEER AND IDALS PRIOR TO COMMENCEMENT OF WORK.
NRCS, IDALS, and the engineer make no representation as to the existence or nonexistence of any utility, public and/or private, buried or overhead, except as shown on the drawings. Where utilities are shown on the drawings, the location, depth and/or height are approximate. The exact location, depth and/or height must be determined by the utility company and/or the land owner prior to any construction within the project vicinity.



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SCALE FEET



SHEET INDEX

SHEET NO.	SHEET TITLE
A.01	TITLE SHEET
A.02	PLAN OVERVIEW
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A.04	EXISTING CONDITIONS & REMOVALS
B.01	INLET STRUCTURE DETAIL
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B.05	RCP INSTALLATION DETAIL
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C.01	ESTIMATED QUANTITIES
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K.01	SEEDING OVERVIEW
M.01	PLAN & PROFILE - PUMP INLET PIPE & OUTLET PIPE
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M.03	PLAN & PROFILE - TILE RE-LAY
M.04	PLAN & PROFILE - RING TILE

CONSERVATION PRACTICE STANDARDS USED:
656 - CONSTRUCTED WETLAND

NRCS JOB CLASS: IV
300 AC < WATERSHED AREA < 1000 AC

TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, JUDGEMENT, AND BELIEF, THESE PLANS MEET APPLICABLE NRCS STANDARDS AND APPLICABLE LAWS AND REGULATIONS.

NOTES
1. IF A CULTURAL RESOURCE IS IDENTIFIED DURING CONSTRUCTION, STOP WORK IMMEDIATELY AND NOTIFY THE LOCAL NATURAL RESOURCES CONSERVATION SERVICE OFFICE.
2. THERE IS NO GUARANTEE THAT THE WETLAND WILL FILL OR REMAIN FILLED WITH WATER.

IOWA DEPARTMENT OF AGRICULTURE & LAND STEWARDSHIP

PROJECT DATUM: STATE PLANE
HORIZONTAL: IOWA NORTH
VERTICAL: NAVD 1988

LICENSED PROFESSIONAL ENGINEER
BRANDON C. SHORT
29449
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.

BRANDON C. SHORT, PE

LICENSE NUMBER: 29449 DATE: 9/16/2026

MY LICENSE RENEWAL DATE IS 12/31/2026

PAGES OR SHEETS COVERED BY THIS SEAL:
ALL SHEETS

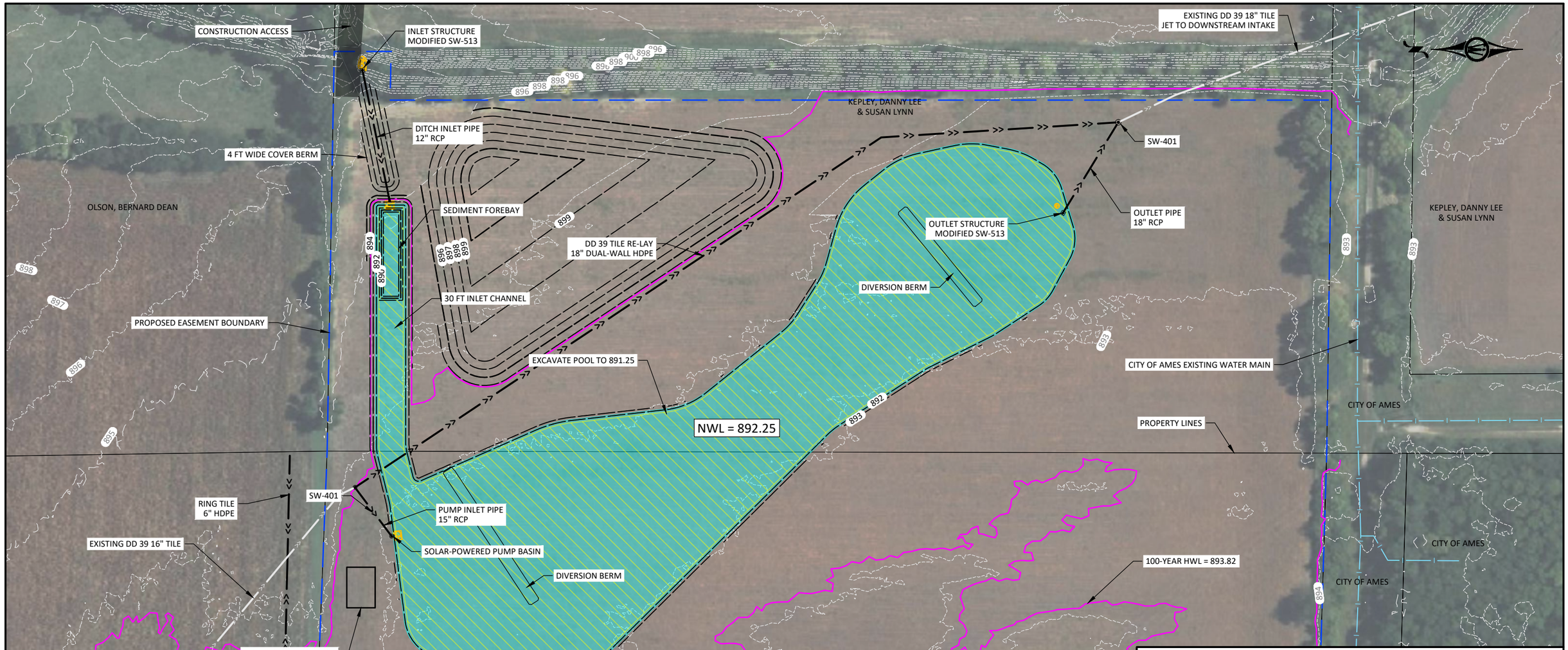
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DESIGNED	REV	DESCRIPTION	DATE
BCS	1.1	IDALS REVISIONS	02-09-2026
DRAWN NVD	1.2	PERMIT PLANS	05-20-2026
CHECKED JPR	1.3	PERMIT PLANS REV. 2	09-15-2026
CLIENT PROJ. NO. 25X.138711.000			

IOWA DEPARTMENT OF AGRICULTURE AND LAND STEWARDSHIP
IDALS PROJECT NO. STO842436B
TITLE SHEET

SHEET A.01



LEGEND

- NORMAL POOL (892.25)
- 100-YEAR HWL (893.82)
- PROPOSED EASEMENT BOUNDARY
- RIP-RAP
- EXCAVATE TO 891.25

HORZ. SCALE 0 60 120 FEET

WETLAND POOL DEPTH (FT)	ELEV (FT)	INCREMENTAL AREA (FT^2)	CUMULATIVE VOLUME (FT^3)	CUMULATIVE VOLUME (AC-FT)
0.0	891.25	203,400		
0.8	892.00	212,400	155,925	3.58
1.0	892.25	215,500	209,413	4.81
1.8	893.00	391,026	436,860	10.03
1.8	893.07	434,251	465,744	10.69
2.0	893.25	577,078	556,764	12.78
2.3	893.50	758,252	723,680	16.61

DESIGN CRITERIA	VALUE	UNIT	REQUIREMENT
PUMPED WATERSHED AREA	354.1	ACRES	
PUMP PEAK FLOW	0.98	CFS	
PUMP PERCENT CAPTURE	48.7	%	
EFFECTIVE TREATED PUMPED WATERSHED	172.0	ACRES	
DITCH WATERSHED AREA	661.5	ACRES	
DITCH PERCENT CAPTURE	92.7	%	
EFFECTIVE TREATED DITCH WATERSHED	613.0	ACRES	
TOTAL EFFECTIVE TREATED WATERSHED AREA	785.0	ACRES	
SURFACE WATERSHED AREA	382.6	ACRES	
POOL NORMAL WATER LEVEL (NWL) ELEV	892.25	FT	
DESIGNED WETLAND POOL AREA (@ NWL)	4.9	ACRES	
PERCENT POOL AREA TO WATERSHED AREA	0.6	%	Range 0.5% to 2% of watershed area
MAXIMUM POOL DEPTH	1.75	FT	
AVERAGE POOL DEPTH	1.0	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	4.8	ACRE-FT	
OVERFLOW ELEVATION	893.07	FT	Natural Overflow
POOL STORAGE VOLUME AT OVERFLOW	10.7	ACRE-FT	
PRIMARY WEIR ELEVATION	892.25	FT	Conveys Tile Flow Only
PRIMARY WEIR WIDTH	16	FT	Modified SUDAS SW-513 Outlet Structure
TOTAL EASEMENT AREA	31.8	ACRES	
AREA OF BUFFER	26.9	ACRES	
RATIO BUFFER AREA TO NWL POOL AREA	5.4		
25-YEAR STORM HWL IN POOL	893.69	FT	
25-YEAR PEAK INFLOW	359	CFS	
25-YEAR PEAK OUTFLOW	338	CFS	
100-YEAR STORM HWL IN POOL	893.82	FT	
100-YEAR PEAK INFLOW	515	CFS	
100-YEAR PEAK OUTFLOW	496	CFS	

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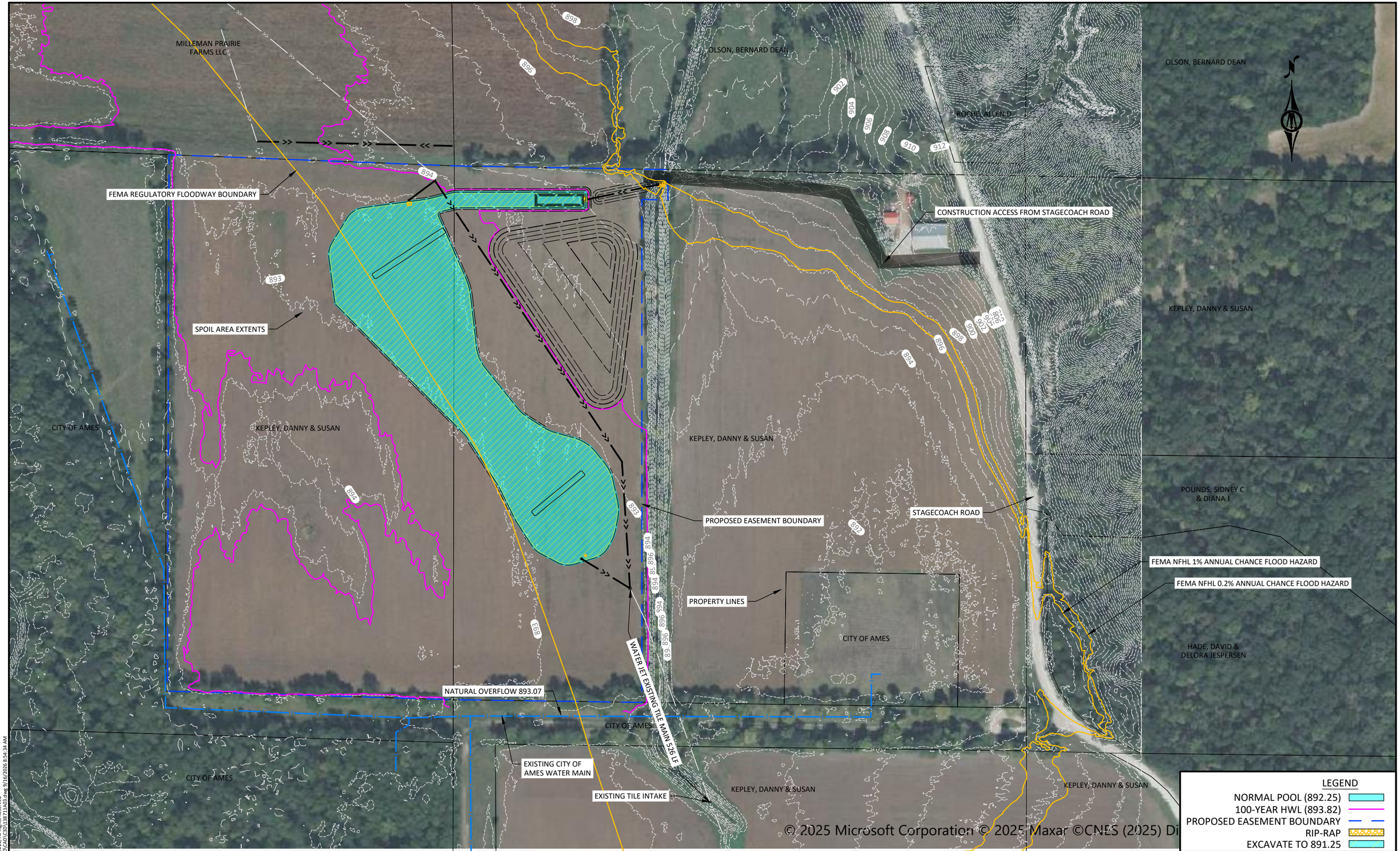
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1.2	PERMIT PLANS	05-20-2026
1.3	PERMIT PLANS REV. 2	09-15-2026

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IDALS PROJECT NO. STO842436B
PLAN OVERVIEW

SHEET A.02



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IDALS PROJECT NO. STO842436B
SITE OVERVIEW

SHEET A.03

COMPLETELY REMOVE EXISTING TILE FOR 50 FT

EXISTING DD 39 18" TILE

REMOVE EXISTING TILE
MIN. 5 FT REMOVED EVERY 50 FT
MAY CRUSH IN PLACE IF CLAY

PRESERVE EXISTING CITY
OF AMES WATER MAIN

COMPLETELY REMOVE EXISTING TILE FOR 50 FT

EXISTING DD 39 16" TILE

PRESERVE EXISTING UTILITY POLE

OLSON, BERNARD DEAN

KEPLEY, DANNY & SUSAN

KEPLEY, DANNY & SUSAN

KEPLEY, DANNY & SUSAN

MILLEMAN PRAIRIE
FARMS LLC

CITY OF AMES

CITY OF AMES

CITY OF AMES

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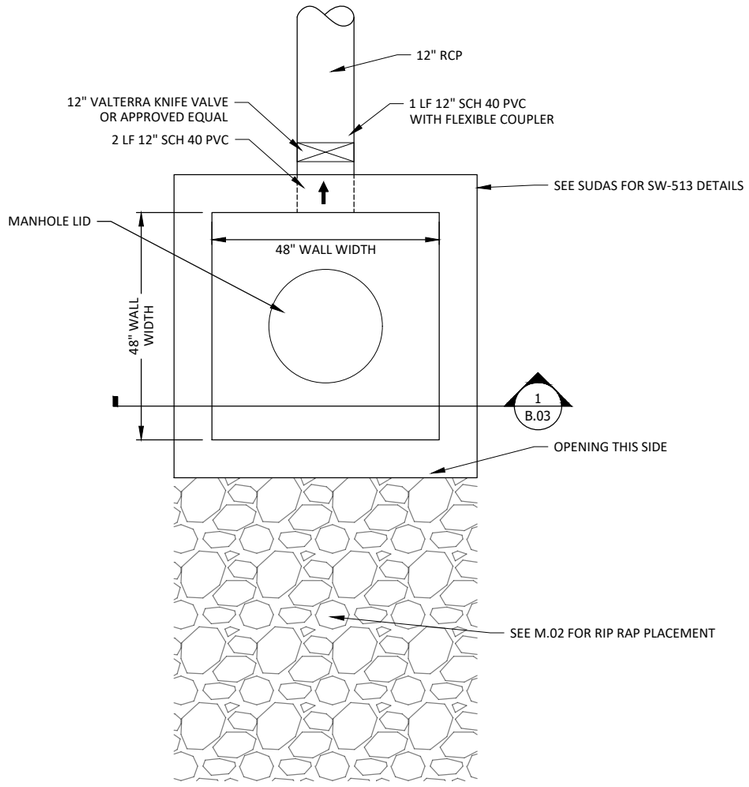
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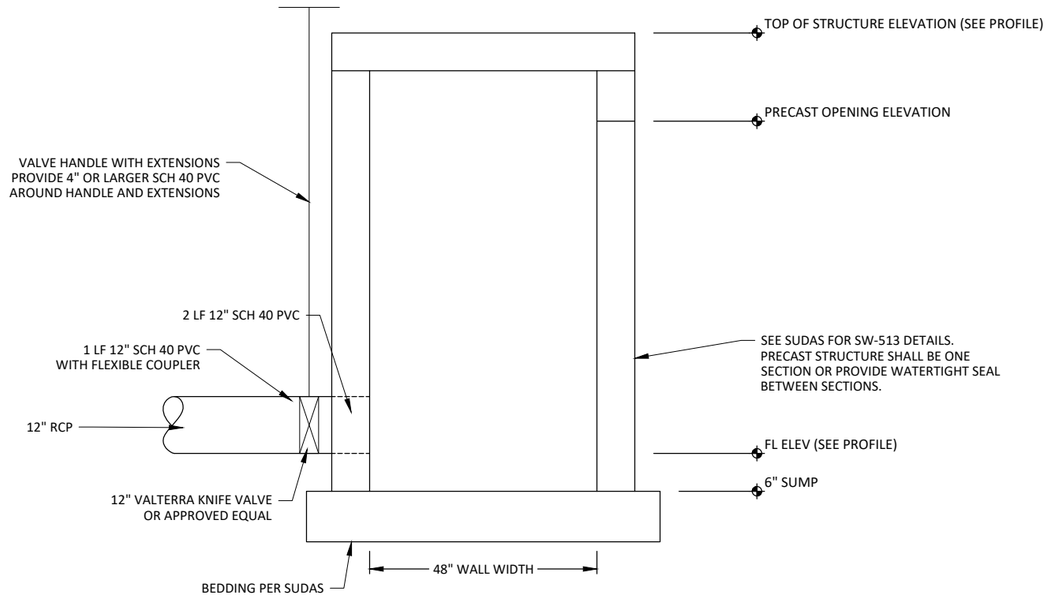
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IDALS PROJECT NO. STO842436B
EXISTING CONDITIONS & REMOVALS

SHEET A.04



PLAN
MODIFIED SW-513
INLET STRUCTURE

NOT TO SCALE



SECTION
MODIFIED SW-513
INLET STRUCTURE
1

NOT TO SCALE

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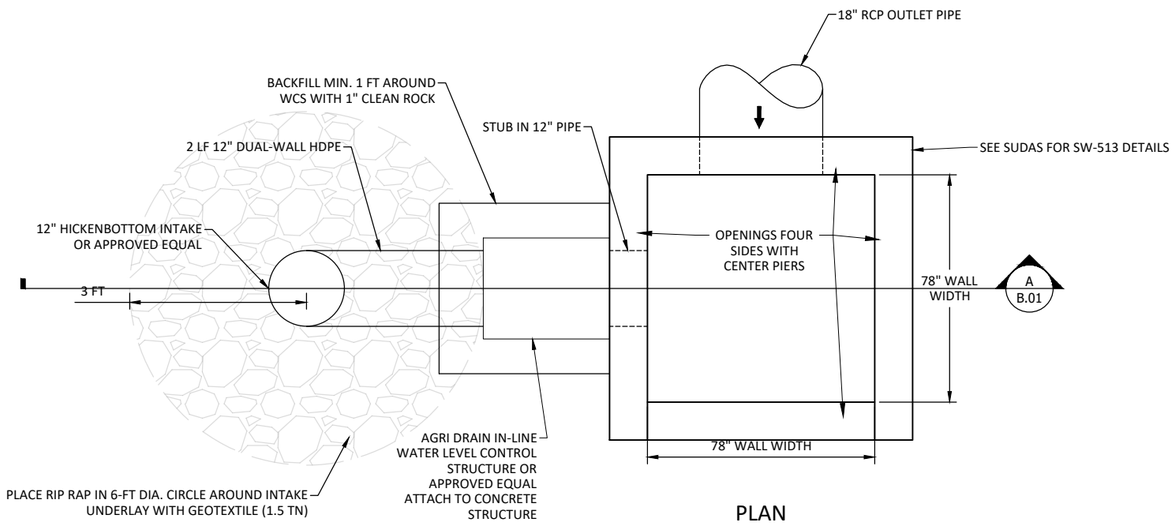
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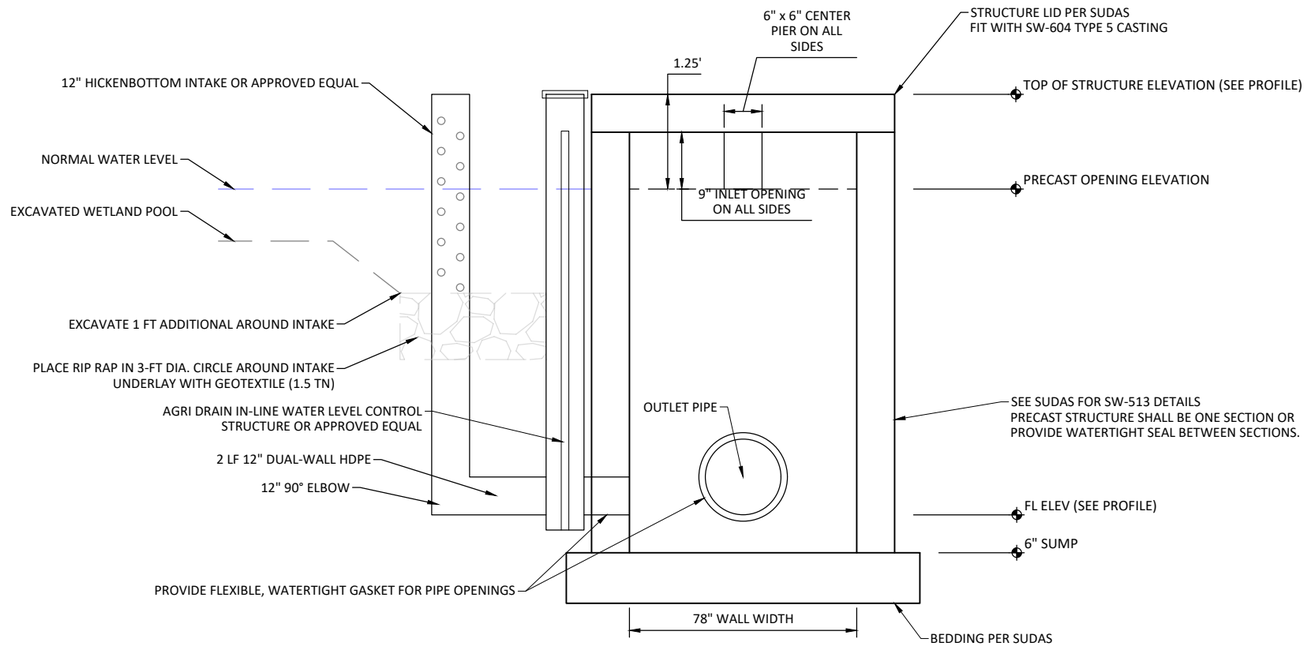
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IDALS PROJECT NO. STO842436B
INLET STRUCTURE DETAIL

SHEET
B.01



PLAN
MODIFIED SW-513
OUTLET STRUCTURE
NOT TO SCALE



SECTION
MODIFIED SW-513
OUTLET STRUCTURE
A
NOT TO SCALE

NOTES:
1. ALL FASTENERS SHALL BE GALVANIZED OR STAINLESS STEEL.
2. HICKENBOTTOM INTAKE, WATER LEVEL CONTROL STRUCTURE, DUAL-WALL HDPE, ELBOW, TRASH GUARD, CASTING, AND ALL HARDWARE AND APPURTENANCES SHOWN ON THIS PAGE OR REQUIRED FOR INSTALLATION ARE SUBSIDIARY TO THE OUTLET STRUCTURE.

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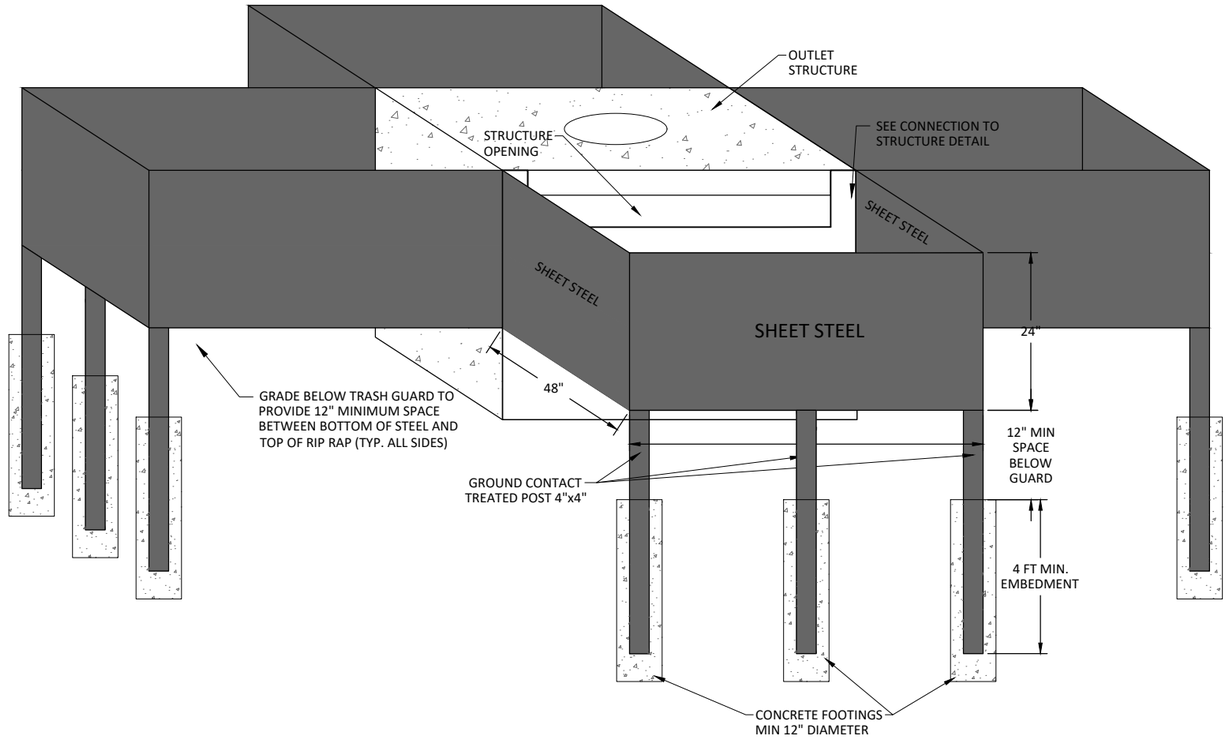
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OUTLET STRUCTURE DETAIL

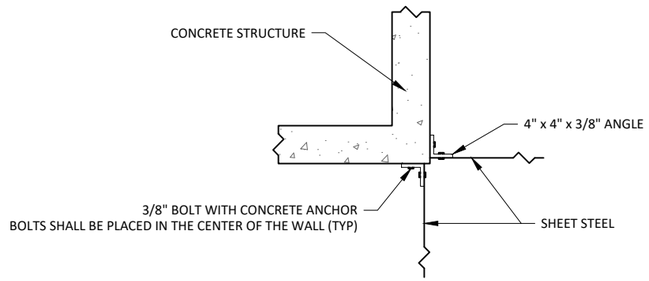
SHEET
B.02

TRASH GUARD FOR WETLAND OUTLET STRUCTURE

NOT TO SCALE



TRASH GUARD CONNECTION TO STRUCTURE



NOTE: TRASH GUARD AND APPURTENANCES ARE TYPICAL FOR ALL SIDES OF OUTLET STRUCTURE. QUANTITIES AND DIMENSIONS FOR STEEL SHEETS PER SIDE OF STRUCTURE ARE AS FOLLOWS:

1 - STEEL SHEET - 90" x 24" x 3/8"
2 - STEEL SHEETS - 48" x 24" x 3/8"

ANGLE IRON--EITHER WELDED OR BOLTED--ON TOP AND BOTTOM OF EACH SHEET AS BRACE.
BOLT TRASH GUARD ONTO ANGLE IRON ANCHORED TO OUTLET STRUCTURE.
PROVIDE THREE POSTS WITH CONCRETE FOOTINGS ON EACH SIDE
GRADE AS NECESSARY TO ALLOW FLOW OF WATER UNDER TRASH GUARD WITH 12" MINIMUM CLEARANCE.

ALL FASTENERS SHALL BE GALVANIZED OR STAINLESS STEEL

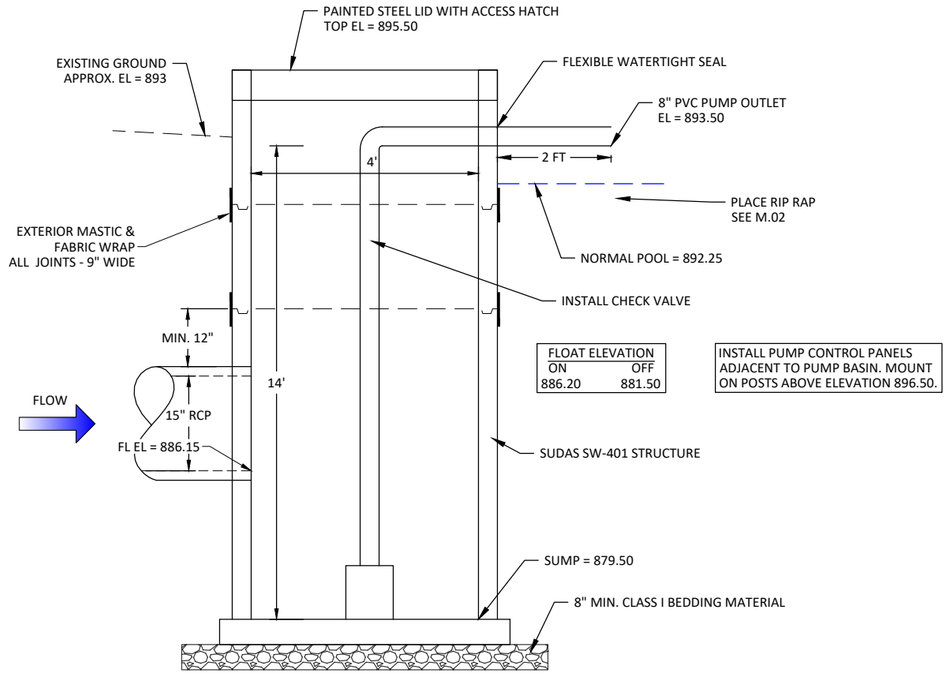
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TRASH GUARD DETAIL

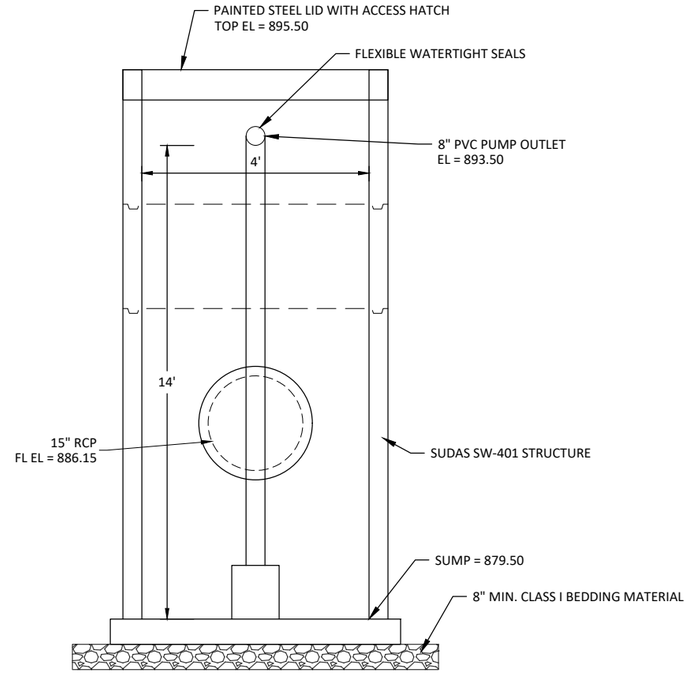
SHEET B.03



FLOAT ELEVATION	
ON	OFF
886.20	881.50

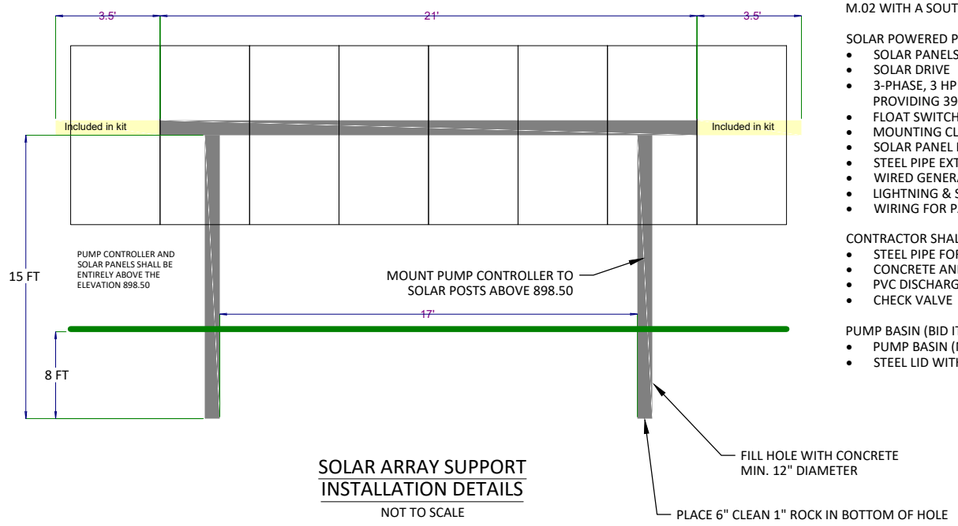
INSTALL PUMP CONTROL PANELS ADJACENT TO PUMP BASIN. MOUNT ON POSTS ABOVE ELEVATION 896.50.

SW-401 WEIR & PUMP BASIN ELEVATION
NOT TO SCALE



SW-401 WEIR & PUMP BASIN SECTION
NOT TO SCALE

SOLAR ARRAY SUPPORT INSTALLATION DETAILS



SOLAR ARRAY SUPPORT
INSTALLATION DETAILS
NOT TO SCALE

NOTE:SOLAR PANELS SHALL BE INSTALLED IN THE LOCATION SHOWN ON A.03 AND M.02 WITH A SOUTHWARD ORIENTATION.

SOLAR POWERED PUMP SYSTEM (BID ITEM 18) SHALL INCLUDE THE FOLLOWING:

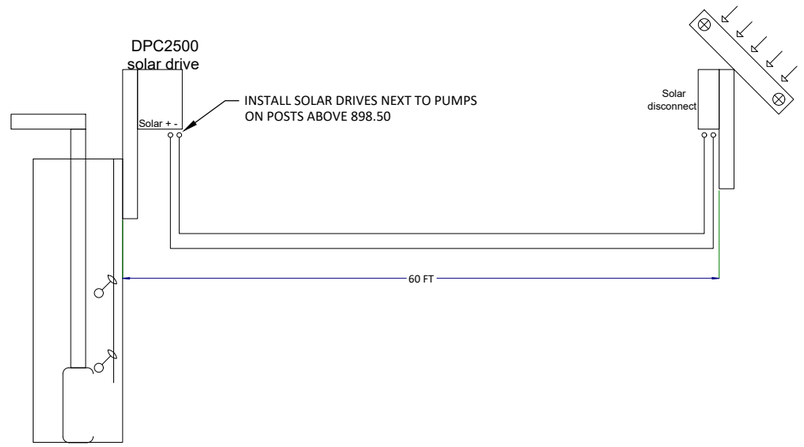
- SOLAR PANELS
- SOLAR DRIVE
- 3-PHASE, 3 HP AXIAL PUMP (CARRY CP-04 WITH 20° IMPELLER OR APPROVED EQUAL, PROVIDING 390 GPM AT 12.5 FT TDH)
- FLOAT SWITCH
- MOUNTING CLAMPS FOR CONTROLLER
- SOLAR PANEL MOUNTING KIT
- STEEL PIPE EXTENDERS
- WIRED GENERATOR PLUG
- LIGHTNING & SURGE PROTECTOR
- WIRING FOR PANELS, PUMP, AND CONTROLLER

CONTRACTOR SHALL PROVIDE THE FOLLOWING, SUBSIDIARY TO BID ITEM 20:

- STEEL PIPE FOR MOUNTING
- CONCRETE AND ROCK BEDDING FOR MOUNTING POLES
- PVC DISCHARGE PIPE
- CHECK VALVE

PUMP BASIN (BID ITEM 17) SHALL INCLUDE THE FOLLOWING:

- PUMP BASIN (MODIFIED SW-401, SEE DETAILS)
- STEEL LID WITH STAND



PUMP WIRING DIAGRAM
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IDALS PROJECT NO. STO842436B
PUMP BASIN & SOLAR ARRAY DETAILS

SHEET
B.04

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

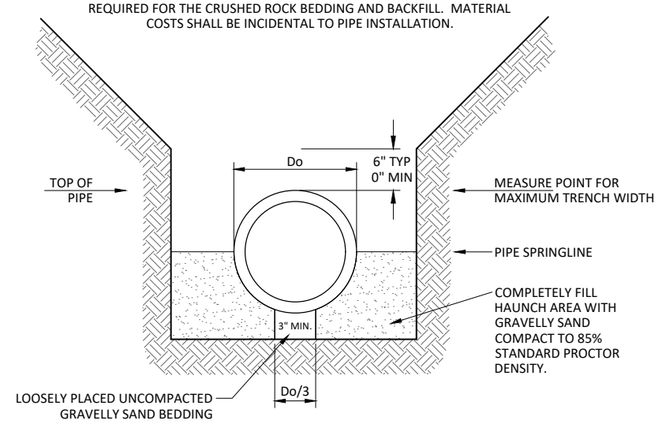
TO VERIFY CONTRACTOR'S COMPLIANCE WITH PLAN REQUIREMENTS UNDER THE CHANGED CONDITIONS, ENGINEER MAY STOP WORK AND REQUIRE ADDITIONAL SOIL PROCTOR TESTS AND/OR SOIL DENSITY TESTS SIMILAR TO STEPS 1 THROUGH 3. THE WORK AND COSTS OF THE FIRST TWO REVERIFICATIONS IS SUBSIDIARY TO THE PIPE INSTALLATION. SUBSEQUENT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

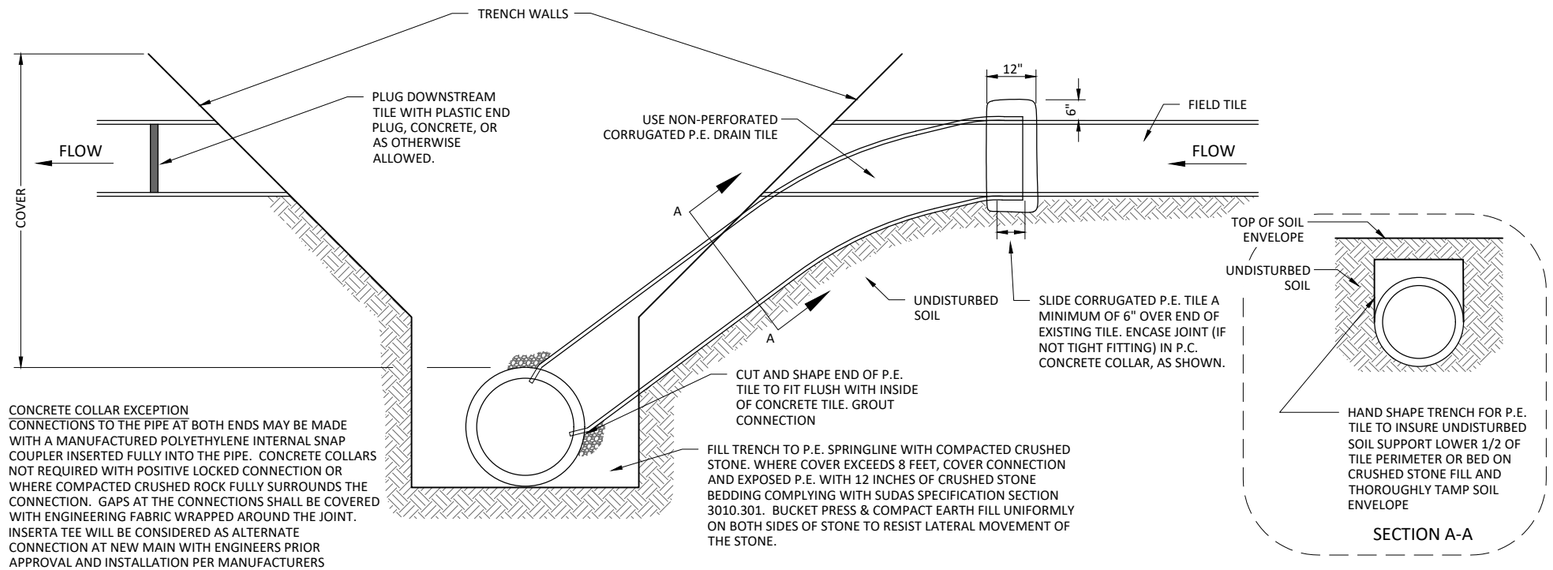
CRUSHED ROCK MEETING THE GRADATION OF SUDAS CLASS I BEDDING MATERAL, SPECIFICATION SECTION 3010.2.02.A, MAY BE SUBSTITUTED FOR THE SAND OR CLAY HAUNCH BACKFILL MATERIAL. NO COMPACTION WILL BE REQUIRED FOR THE CRUSHED ROCK BEDDING AND BACKFILL. MATERIAL COSTS SHALL BE INCIDENTAL TO PIPE INSTALLATION.



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

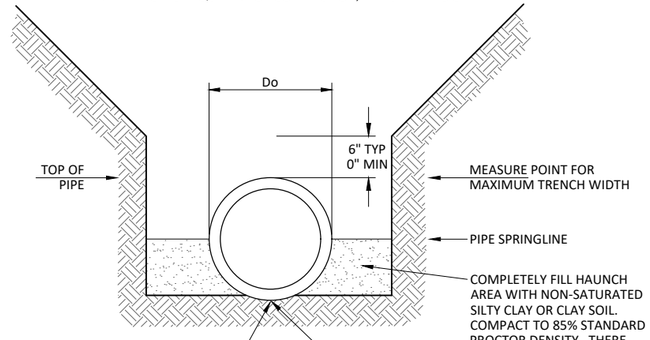


CONCRETE COLLAR EXCEPTION
CONNECTIONS TO THE PIPE AT BOTH ENDS MAY BE MADE WITH A MANUFACTURED POLYETHYLENE INTERNAL SNAP COUPLER INSERTED FULLY INTO THE PIPE. CONCRETE COLLARS NOT REQUIRED WITH POSITIVE LOCKED CONNECTION OR WHERE COMPACTED CRUSHED ROCK FULLY SURROUNDS THE CONNECTION. GAPS AT THE CONNECTIONS 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



MODIFIED TRENCH INSTALLATION TYPE 4

NOT TO SCALE
SOURCE: AMERICAN CONCRETE PIPE ASSOCIATION
CONCRETE PIPE DESIGN MANUAL

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REV	DESCRIPTION	DATE
1.1	IDALS REVISIONS	02-09-2026
1.2	PERMIT PLANS	05-20-2026
1.3	PERMIT PLANS REV. 2	09-15-2026

IOWA DEPARTMENT OF AGRICULTURE AND LAND STEWARDSHIP
IDALS PROJECT NO. STO842436B
RCP INSTALLATION DETAIL

SHEET
B.05

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 B.02. THIS MATERIAL AND WORK SHALL BE INCIDENTAL 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 SHALL BE INCIDENTAL TO THE INSTALLATION OF THE PIPE.
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. BEDDING MATERIAL SHALL BE INCIDENTAL TO THE INSTALLATION OF THE PIPE.
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.

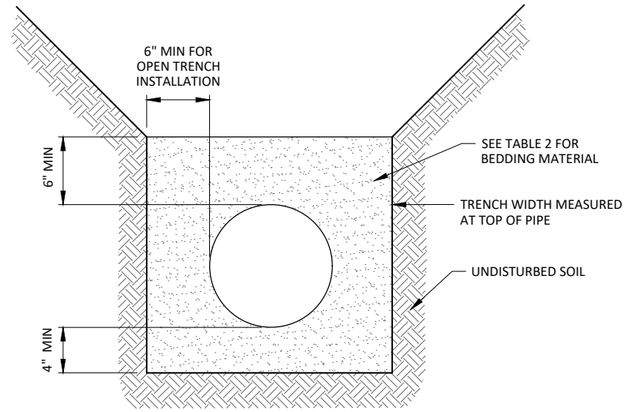
Table 1
Maximum Allowable Buried Depth to Flowline of CPDT

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.

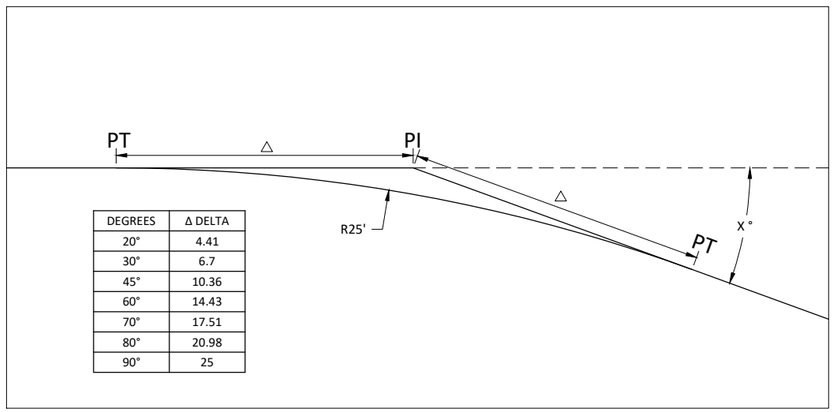
FLAT BOTTOM TRENCH INSTALLATION

NOT TO SCALE

SOURCE: ASTM F449

NOTE: THIS IS AN ALLOWED ALTERNATIVE INSTALLATION FOR CPDT

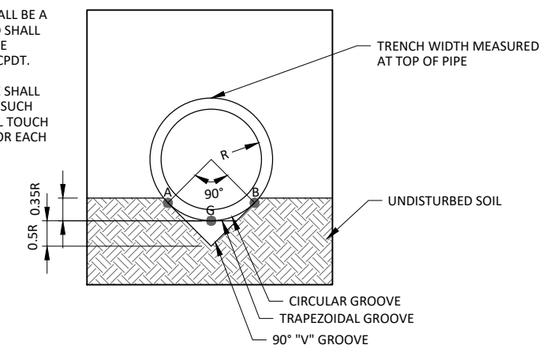
DISTRICT TILE MAIN SHALL BE INSTALLED WITH A FLAT BOTTOM TRENCH AND BEDDED AS SHOWN.



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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1.2	PERMIT PLANS	05-20-2026
1.3	PERMIT PLANS REV. 2	09-15-2026

IOWA DEPARTMENT OF AGRICULTURE AND LAND STEWARDSHIP
IDALS PROJECT NO. STO842436B
CPDT INSTALLATION DETAIL

SHEET B.06

Bid Item	Description	Specifications		Plan No.	Estimated Quantities	
		No.	Page		Quantity	Unit
1	Site Stripping & Preparation	IA CS-001	3	A.02	1	LS
2	Crop Damage	IA CS-001	3	-	0	AC
3	Buffer Seeding	IA CS-006	7	K.01	26.6	AC
4	Structure Seeding	IA CS-006	7	K.01	0.4	AC
5	Mobilization and Demobilization	IA CS-008	11	-	1	LS
6	Drain Tile Investigation and Removal	IA CS-009	14	A.04	4	HR
7	Excavation (General)	IA CS-021	20	D.01	13571	CY
8	Earthfill (General)	IA CS-023	22	D.01, M.03	334	CY
9	Topsoil Stripping, Stockpiling, & Placement	IA CS-026	26	D.01	344	CY
10	12" Dia. Reinforced Concrete Pipe	IA CS-031	28	B.04, M.03	168	LF
11	15" Dia. Reinforced Concrete Pipe	IA CS-031	28	B.04, M.02	35	LF
12	18" Dia. Reinforced Concrete Pipe	IA CS-031	28	B.04, M.03	151	LF
13	12" Reinforced Concrete Apron, Footing, Bar Guard	IA CS-031	28	M.03	1	EA
14	Modified SW-513 Inlet Structure (48" x 48")	IA CS-031	28	B.02, M.03	1	EA
15	Modified SW-513 Outlet Structure (48" x 48")	IA CS-031	28	B.01, M.03	1	EA
16	SW-401 Concrete Manhole Structure	IA CS-031	28	M.01-M.02	2	EA
17	SW-401 Pump Basin	IA CS-031	28	B.03, M.02	1	EA
18	Solar Pump System	IA CS-031	28	B.03, M.03	1	EA
19	6" Dia. Corrugated HDPE Pipe (Dual-Wall, Non-Perforated)	IA CS-046	36	B.05, M.02	662	LF
20	18" Dia. Corrugated HDPE Pipe (Dual-Wall, Non-Perforated)	IA CS-046	36	B.05, M.01	1150	LF
21	Rip Rap (Class E)	IA CS-061	40	M.02-M.03	28.4	TN
22	Clean Existing Tile Main (526 LF)	IA CS-046			1	LS

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IOWA DEPARTMENT OF AGRICULTURE AND LAND STEWARDSHIP
IDALS PROJECT NO. STO842436B
ESTIMATED QUANTITIES

SHEET C.01

4 FT WIDE COVER BERM
TOP ELEV. 898.50
GRADE AT 6:1 SLOPE

SPOIL PILE

SEDIMENT FOREBAY
ELEV. 888.25
GRADE AT 2.5:1 SLOPE

30 FT WIDE INLET CHANNEL
ELEV. 891.25
GRADE AT 4:1 SLOPE

EXCAVATE POOL TO 891.25
GRADE AT 4:1 SLOPE

DIVERSION BERM
10 FT TOP, 4:1 SIDES
TOP ELEV = 891.75

EXCAVATE POOL TO 891.25

DIVERSION BERM
10 FT TOP, 4:1 SIDES
TOP ELEV = 891.75

EXCAVATE POOL TO 891.25
GRADE AT 4:1 SLOPE

EXCAVATE POOL TO 891.25
GRADE AT 4:1 SLOPE

SPOIL AREA EXTENTS

PROTECT EXISTING CITY
OF AMES WATER MAIN

100-YEAR HWL = 893.50

PRESERVE EXISTING
UTILITY POLE

EARTHWORK QUANTITIES	
EXCAVATION (POOL, INLET CHANNEL, SEDIMENT FOREBAY):	13,570 CY
EARTHFILL (COVER BERM, DIVERSION BERMS):	334 CY
SPOIL (6" SPREAD OVER AREAS SHOWN):	13,236 CY

LEGEND
- NORMAL POOL (892.50)
- 100-YEAR HWL (893.82)
- PROPOSED EASEMENT BOUNDARY
- RIP-RAP
- EXCAVATE TO 891.50
- MINIMUM 6" TOPSOIL LAYER

HORZ. SCALE 0 50 100 FEET

1" = 200'

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IDALS PROJECT NO. STO842436B
GRADING OVERVIEW

SHEET D.01

SEED COVER BERM STRUCTURE SEEDING

SEED BUFFER AREA TO EASEMENT BOUNDARY BUFFER SEEDING

SPOIL AREA EXTENTS

SEED DISTURBED AREAS TO 1 FT BELOW NORMAL POOL STRUCTURE SEEDING

SEED DISTURBED AREAS TO 1 FT BELOW NORMAL POOL BUFFER SEEDING

SPOIL AREA EXTENTS

DO NOT SEED POOL

SEED BUFFER AREA TO EASEMENT BOUNDARY BUFFER SEEDING

SEEDING AREAS	
BUFFER SEEDING	26.6 AC
STRUCTURE SEEDING	0.4 AC

SEED FINAL SPOIL AREA BUFFER SEEDING

SEED BUFFER AREA TO EASEMENT BOUNDARY BUFFER SEEDING

SEED DISTURBED AREAS TO 1 FT BELOW NORMAL POOL BUFFER SEEDING

LEGEND

- NORMAL POOL (892.25)
- 100-YEAR HWL (893.82)
- PROPOSED EASEMENT BOUNDARY
- RIP-RAP
- EXCAVATE TO 891.25
- STRUCTURE SEEDING
- BUFFER SEEDING

HORZ. SCALE 0 50 100 FEET

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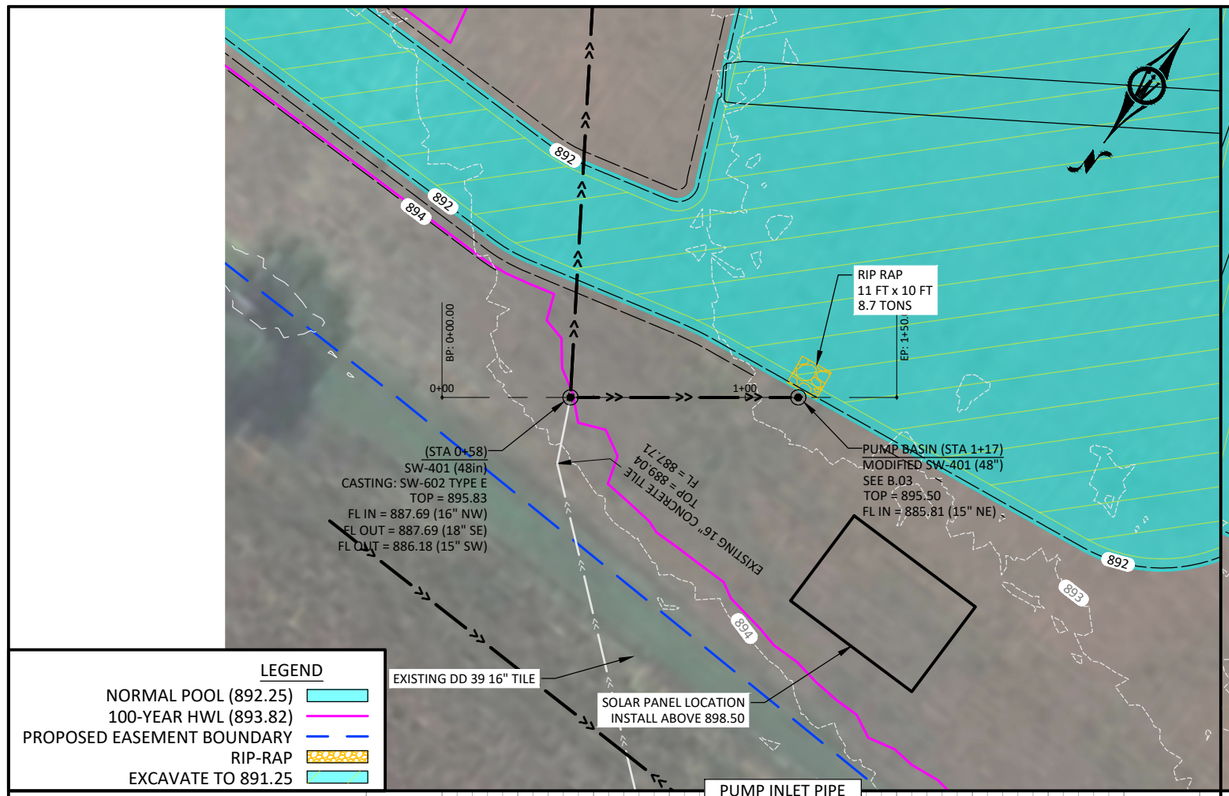
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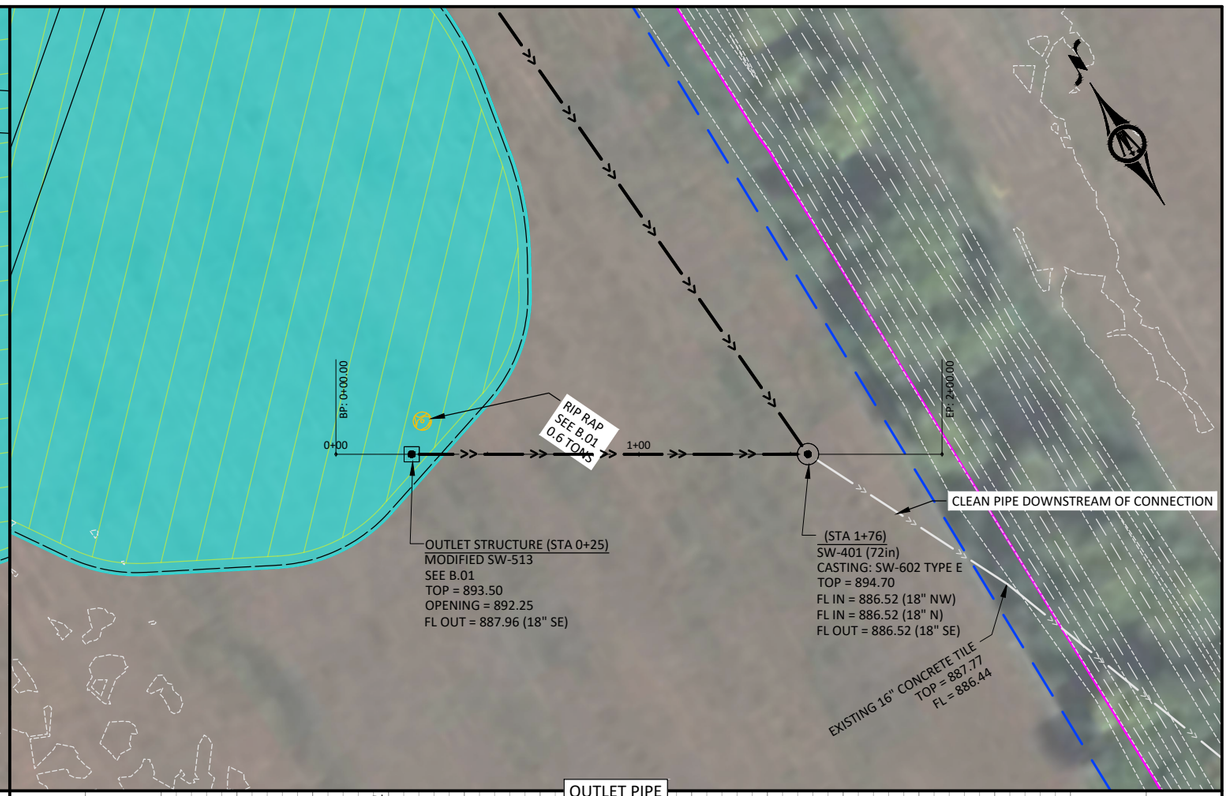
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SEEDING OVERVIEW

SHEET K.01

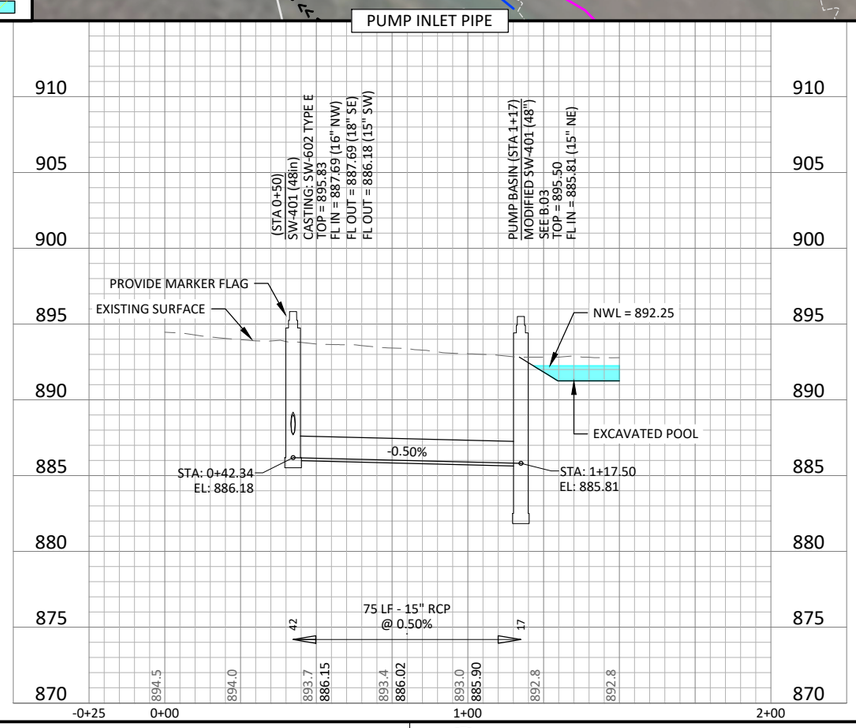
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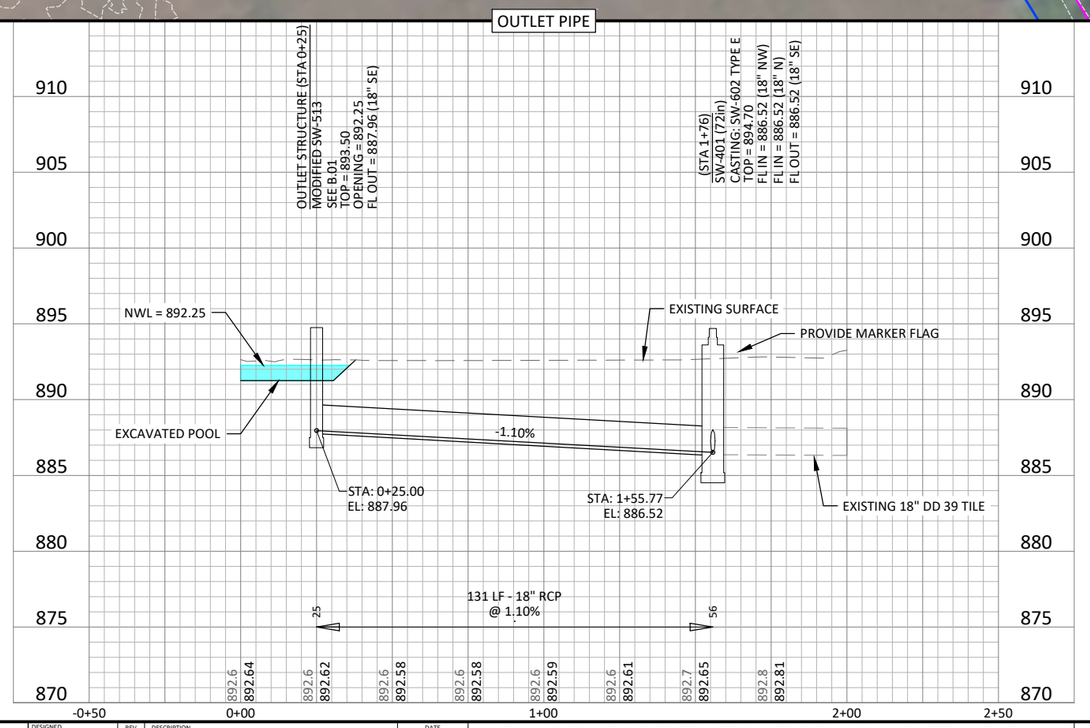




LEGEND

- NORMAL POOL (892.25)
- 100-YEAR HWL (893.82)
- PROPOSED EASEMENT BOUNDARY
- RIP-RAP
- EXCAVATE TO 891.25





HORZ. 0 25 50 SCALE FEET

VERT. 0 5 10 SCALE FEET

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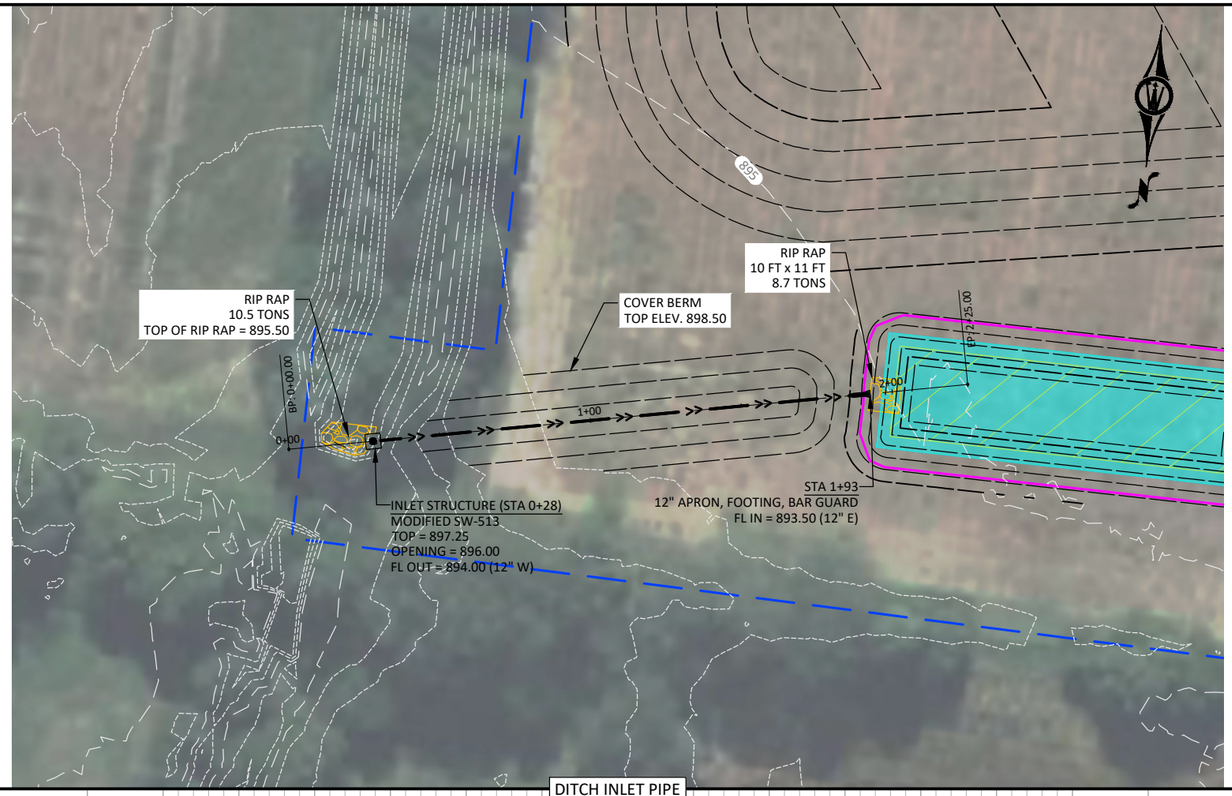
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IDALS PROJECT NO. STO842436B

PLAN & PROFILE - PUMP INLET PIPE & OUTLET PIPE

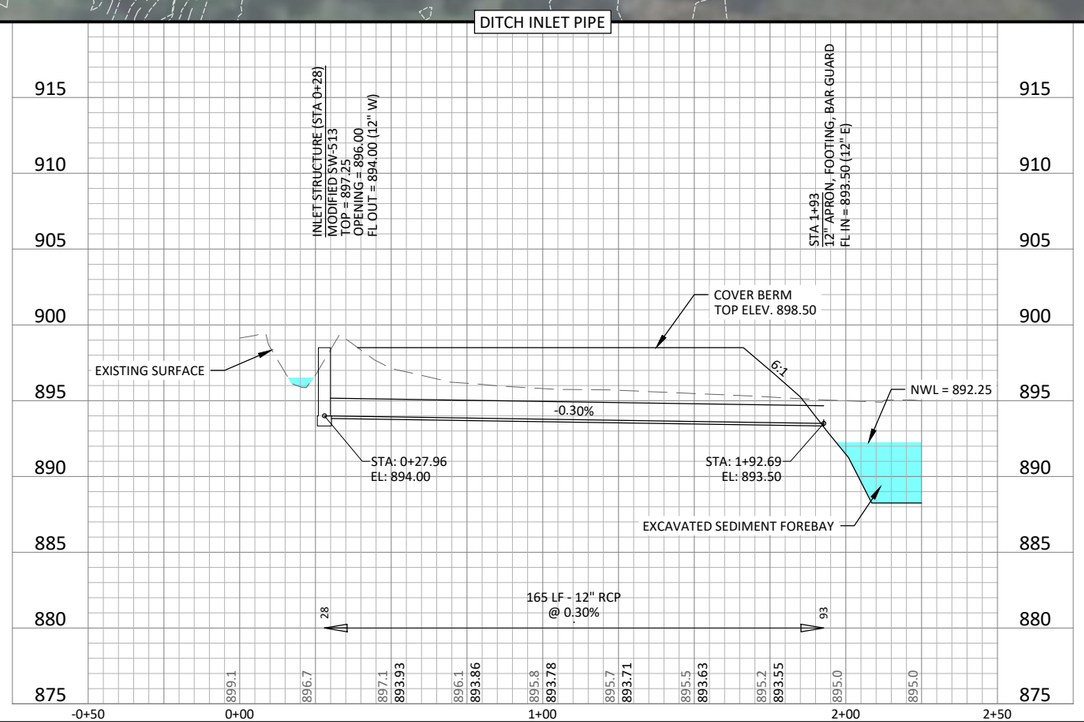
SHEET M.01



LEGEND

- NORMAL POOL (892.25)
- 100-YEAR HWL (893.82)
- PROPOSED EASEMENT BOUNDARY
- RIP-RAP
- EXCAVATE TO 891.25

DITCH INLET PIPE



HORZ. SCALE 0 25 50 FEET

VERT. SCALE 0 5 10 FEET

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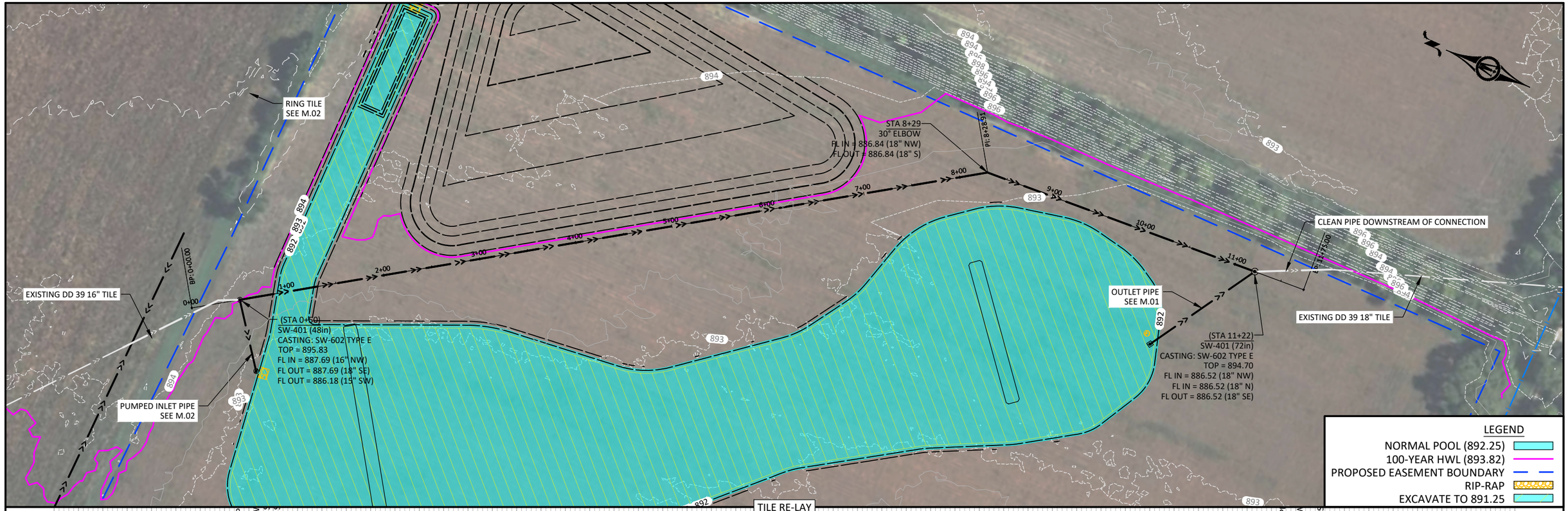
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IOWA DEPARTMENT OF AGRICULTURE AND LAND STEWARDSHIP
IDALS PROJECT NO. STO842436B
PLAN & PROFILE - DITCH INLET PIPE

SHEET M.02



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HORZ. 0 50 100 SCALE FEET
VERT. 0 5 10 SCALE FEET

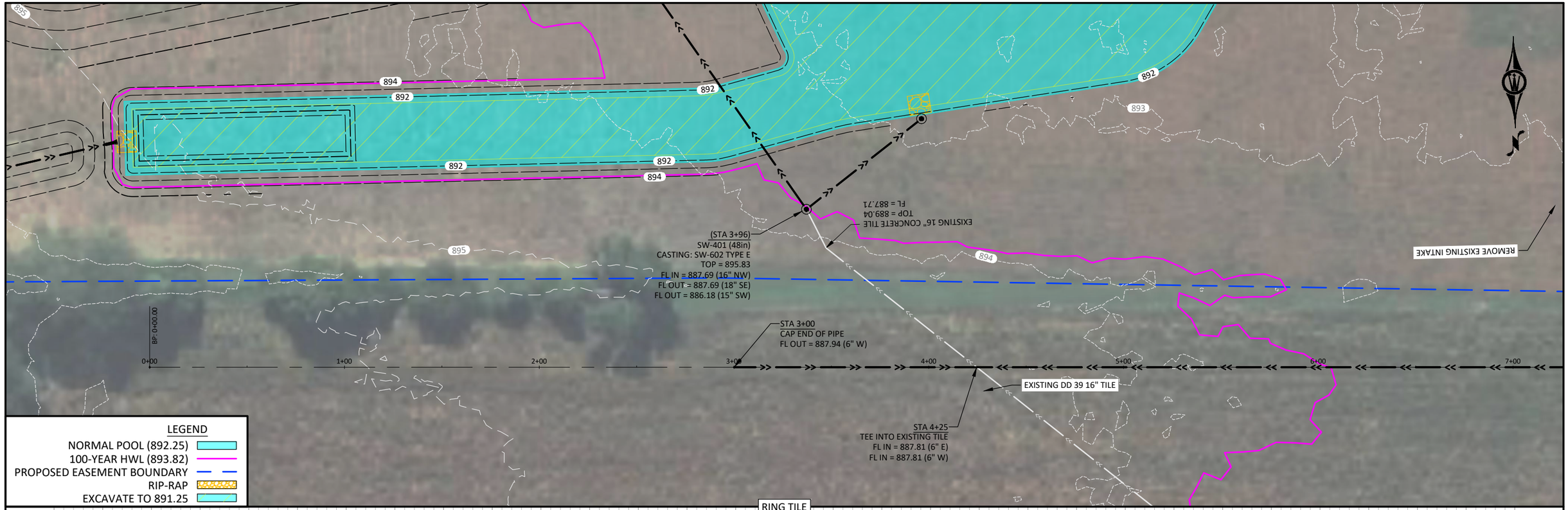
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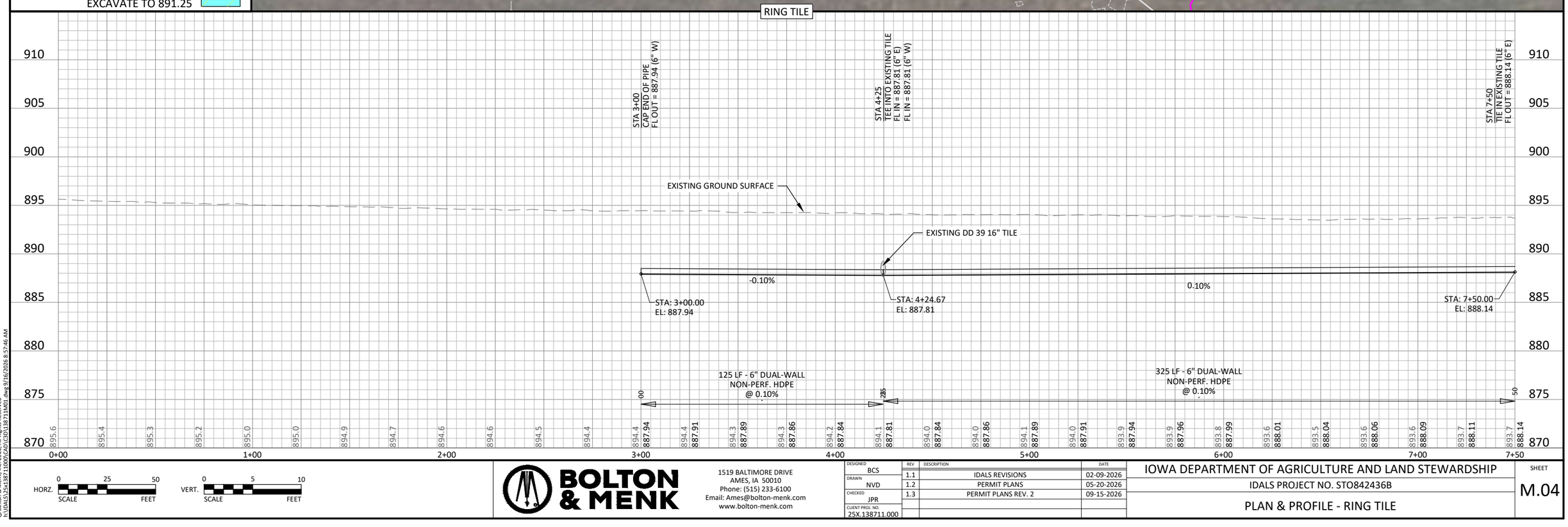
DESIGNED	BCS		
DRAWN	NVD		
CHECKED	JPR		
CLIENT PROJ. NO.	25X.138711.000		

REV	DESCRIPTION	DATE
1.1	IDALS REVISIONS	02-09-2026
1.2	PERMIT PLANS	05-20-2026
1.3	PERMIT PLANS REV. 2	09-15-2026

IOWA DEPARTMENT OF AGRICULTURE AND LAND STEWARDSHIP
IDALS PROJECT NO. STO842436B
PLAN & PROFILE - TILE RE-LAY

SHEET M.03





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

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DESIGNED	REV	DESCRIPTION	DATE
BCS	1.1	IDALS REVISIONS	02-09-2026
DRAWN NVD	1.2	PERMIT PLANS	05-20-2026
CHECKED JPR	1.3	PERMIT PLANS REV. 2	09-15-2026
CLIENT PROJ. NO. 25X.138711.000			

IOWA DEPARTMENT OF AGRICULTURE AND LAND STEWARDSHIP
IDALS PROJECT NO. STO842436B
PLAN & PROFILE - RING TILE

SHEET M.04