





**COORDINATE SYSTEM NOTES:**

- HORIZONTAL DATUM: MONTANA STATE PLANE NAD83
- VERTICAL DATUM: NAVD88 AS ESTABLISHED BY NGS BENCHMARK PY0620.  
 NORTHING: 133106.81  
 EASTING: 1380717.80'  
 ELEVATION: 6677.12'
- COORDINATES ARE SHOWN IN UNITS OF INTERNATIONAL FEET UNLESS INDICATED OTHERWISE.
- ADDITIONAL CONTROL AVAILABLE UPON REQUEST TO THE ENGINEER.

**SURVEY NOTES:**

- UTILITIES SHOWN ARE BASED ON AVAILABLE RECORD DRAWINGS AND UTILITIES LOCATED BY ELECTRONIC METHOD IN THE FIELD. NO GUARANTEE IS GIVEN OR IMPLIED AS TO THE ACCURACY OF LOCATIONS PROVIDED OR THAT ALL UTILITIES ARE SHOWN. ALL UTILITY LOCATIONS ARE SUBJECT TO THE ACCURACY OF THE LOCATION METHOD, AND SUBJECT TO RELOCATION PRIOR TO ANY CONSTRUCTION ACTIVITIES. NO EXCAVATION WAS PERFORMED TO VERIFY UTILITIES. CONTRACTOR RESPONSIBLE FOR VERIFICATION OF LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO CONSTRUCTION.
- NO BOUNDARY SURVEY WAS CONDUCTED AS PART OF THIS PROJECT. ALL BOUNDARY LINES SHOWN WERE APPROXIMATED FROM RECORDS AND/OR MONTANA STATE LIBRARY CADASTRAL FRAMEWORK. BOUNDARY LINES ON THIS MAP DO NOT REPRESENT A LEGAL SURVEY AND SHOULD BE CONSIDERED APPROXIMATE. THESE BOUNDARY LINES ARE TO BE USED FOR GENERAL REFERENCE ONLY. NO LIABILITY IS ASSUMED BY WET FOR THE ACCURACY OF THESE BOUNDARY LINES.

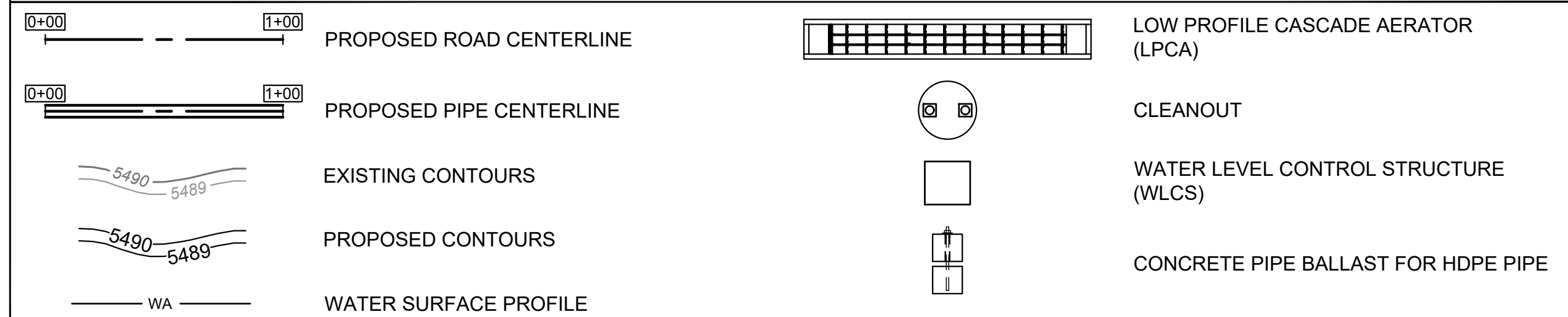
**GENERAL NOTES:**

- SCALES AND ORIENTATIONS TO NORTH VARY FROM SHEET TO SHEET. REFER TO THE NORTH ARROW AND SCALE BAR FOR SHEET-SPECIFIC SCALES AND NORTH ORIENTATIONS.
- THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL UTILITY LOCATES, BOTH PUBLIC AND PRIVATE, AT LEAST TWO WORKING DAYS PRIOR TO CONSTRUCTION.
- THE CONTRACTOR WILL NOTIFY THE ENGINEER OF ANY CONFLICTS BETWEEN THE PROJECT DRAWINGS AND THE ACTUAL SITE CONDITIONS PRIOR TO COMMENCING THE WORK IN QUESTION.
- THE CONTRACTOR WILL PERFORM ALL WORK NECESSARY TO COMPLETE THE PROJECT IN A SATISFACTORY MANNER PROVIDING ALL MATERIALS, LABOR, EQUIPMENT, AND INCIDENTALS NECESSARY TO COMPLETE THE WORK.
- THE CONTRACTOR WILL PRESERVE ALL PROJECT BENCHMARKS AND CONSTRUCTION STAKES TO THE MAXIMUM EXTENT PRACTICABLE. ANY PROJECT BENCHMARKS OR STAKES REQUIRING REPLACEMENT BY THE ENGINEER WILL BE AT THE CONTRACTOR'S EXPENSE.
- THE CONTRACTOR WILL PROVIDE INGRESS AND EGRESS FOR ALL PROPERTY LOCATED WITHIN THE PROJECT SITE.
- THE CONTRACTOR WILL PROVIDE ALL SIGNS, BARRIERS, AND TRAFFIC CONTROL AS NECESSARY THROUGHOUT THE CONSTRUCTION PERIOD.
- THE EXISTING UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE LOCATIONS BASED ON MAPPING INFORMATION AND/OR AS-BUILT PLANS MADE AVAILABLE TO THE ENGINEER. NO GUARANTEE IS MADE AS TO THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN.
- THE CONTRACTOR WILL CONTACT THE ENGINEER SHOULD IT APPEAR THAT THE WORK TO BE DONE IS NOT SUFFICIENTLY DETAILED BY THESE PLANS AND SPECIFICATIONS.
- THE CONTRACTOR WILL SUBMIT TO THE ENGINEER FOR REVIEW AND APPROVAL ALL SUBMITTALS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE PREPARATION, SUBMITTAL, AND ADHERENCE-TO ANY STORM WATER POLLUTION PREVENTION PLANS (SWPPP).

**CONSTRUCTION NOTES:**

- THE PROJECT IS LOCATED WITHIN A U.S. FISH AND WILDLIFE SERVICE NATIONAL WILDLIFE REFUGE. CONTRACTOR MUST COMPLY STRICTLY WITH ALL SITE REQUIREMENTS AND PERMIT CONDITIONS.
- ALL GROUNDWATER AND/OR SURFACE WATER ELEVATIONS INDICATED ARE APPROXIMATE. THE CONTRACTOR IS RESPONSIBLE FOR MANAGING ANY SURFACE OR GROUND WATER CONDITIONS WITHIN THE PROJECT SITE, THIS INCLUDES BUT IS NOT LIMITED TO: GROUNDWATER ENCOUNTERED IN EXCAVATIONS, PIPELINES INSTALLED IN WATER BODIES, AND STORMWATER MANAGEMENT WITHIN THE PROJECT AREA. MANAGEMENT OF SURFACE WATER AND GROUND WATER IS INCIDENTAL TO THE PROJECT, AND NO SEPARATE PAYMENT WILL BE MADE FOR MATERIALS, LABOR, AND INCIDENTALS NEEDED TO MEET THIS REQUIREMENT.**
- CONTRACTOR MUST COMPLY WITH THE INSTALLATION PROCEDURES DETAILED IN CHAPTER 10- MARINE INSTALLATIONS OF THE "HANDBOOK OF POLYETHYLENE PIPE" - SECOND EDITION (PLASTIC PIPE INSTITUTE).
- IN-SITU SOILS ARE SLIGHTLY TO MODERATELY CORROSIVE TO CONCRETE. ALL CONCRETE SHALL CONTAIN SUFFICIENT CLASS V FLY-ASH FOR SULFATE-RESISTANT CONCRETE.
- SOILS IN RIPARIAN AREAS ARE SOFT AND ARE COMPRISED OF LOOSE ORGANICS. CONTRACTOR IS RESPONSIBLE FOR PROVIDING ADEQUATE ACCESS EQUIPMENT SUCH AS AIRBOAT OR OTHER SUITABLE AMPHIBIOUS EQUIPMENT.
- EXCAVATOR OR AMPHIBIOUS DREDGER MUST BE USED WHEN TRENCHING IN RIPARIAN AREAS. EXCAVATORS MUST BE OUTFITTED WITH SWAMP-BUGGY OR APPROVED EQUAL UNDERCARRIAGES TO PROVIDE AN AMPHIBIOUS PLATFORM FOR TRENCHING IN RIPARIAN AREAS.
- IT IS RECOMMENDED THAT THE CONTRACTOR USE DREDGE ATTACHMENT FOR TRENCHING IN RIPARIAN AREAS. EDDYPUMP CORPORATION EXCAVATOR DREDGE PUMP OR EQUAL.
- MACHINE CONTROLS WILL BE REQUIRED FOR TRENCHING IN RIPARIAN AREAS. COORDINATE WITH ENGINEER TO ENSURE MACHINE CONTROLS ARE CALIBRATED TO PROJECT CONTROL SYSTEM (SEE SURVEY NOTES).
- PROVIDE SUITABLE COMPACTION EQUIPMENT FOR BACKFILLING OF TRENCHES IN NON-RIPARIAN AREAS. WHERE IN-SITU SOILS ARE USED FOR PIPE BEDDING, ENSURE MATERIALS MEET PROJECT SPECIFICATIONS.
- WHEN BACKFILLING STRUCTURES, COMPACT BACKFILL TO 95% OF MAX. DRY DENSITY (ASTM D698).
- CONTRACTOR TO PROVIDE ADEQUATE SHORING PLAN FOR EXCAVATIONS EXCEEDING 8 FT DEEP. SUBMIT ALL EXCAVATION AND SHORING PLANS TO THE ENGINEER FOR APPROVAL.
- ALL HDPE PIPE MATERIAL, FITTINGS, AND JOINTS SHALL BE PE4710 RESIN.
- CONTRACTOR TO COORDINATE WITH PIPE MANUFACTURER FOR JOINING OF PIPE/FITTINGS WHEN PIPE AND FITTINGS OF NON-EQUAL PIPE DR.
- USE STAINLESS STEEL MATERIALS FOR ANY NON-EPOXY-COATED METAL COMING INTO CONTACT WITH WATER OR SOILS.
- RESTORE ALL DISTURBED SITES, INCLUDING STAGING AREAS, TO PRE-CONSTRUCTION CONDITIONS. ALL RESTORED AREAS MUST BE RESTORED TO AND ELEVATION OF ± 0.5 FT OF EXISTING.
- COORDINATE WITH OWNER ON SEED MIX SPECIFICATIONS FOR RE-VEGETATION OF DISTURBED AREAS IF A SEED MIX IS NOT SPECIFIED.

**LEGEND**



**MATERIAL QUANTITY ESTIMATES**

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	COMMENTS
1	TEMPORARY ACCESS ROAD/STREAM CROSSING	870	L.F.	
	NILEX MUD MATS	19,200	S.F.	
	BASELOK GEOCELL	2,250	S.F.	
	BASELOK FABRI-GRID	2,250	S.F.	
	2" MINUS AGGREGATE	90	C.Y.	
2	CLEARING AND GRUBBING	4.0	ACRE	
3	AERATION STRUCTURE/POND INTAKE	1	L.S.	
	JMS ECO-AIR LOW PROFILE CASCADE AERATOR	1	EA.	
	REINFORCED CONCRETE	15	C.Y.	
	MANHOLE STEPS	17	EA.	
	PIPE BOOTS	2	EA.	
	ALUMINUM GRATING	112	S.F.	
	14" (IPS) DR-32.5 HDPE PIPE	120	L.F.	
	AGRIDRAIN INLINE WATER LEVEL CONTROL STRUCTURE	1	EA.	PROVIDE STOPLOGS WITH 3 FEET OF TOTAL ADJUSTMENT HEIGHT
4	PIPELINE INSTALLATION - UPLAND CONVENTIONAL TRENCHING	3,210	L.F.	
	14" (IPS) DR-32.5 HDPE PIPE	3,140	L.F.	
	CLEANOUT ASSEMBLIES	5	EA.	
5	PIPELINE INSTALLATION - RIPARIAN AND LAKE BED	L.F.	L.F.	
	14" (IPS) DR-32.5 HDPE PIPE	2,250	L.F.	
	CONCRETE PIPE ANCHORS	113	EA.	
	HYDRAULIC DREDGING	1,560	L.F.	
6	RECLAMATION/RE-VEGETATION	4.0	ACRE	

**NOTE:**  
 MATERIAL ESTIMATES ARE LISTED TO AID THE CONTRACTOR DURING PROJECT BIDDING. THE LIST IS NOT INCLUSIVE OF ALL MATERIALS OR INCIDENTALS REQUIRED FOR THE PROJECT SCOPE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL PROJECT TAKEOFFS.

M:\MTFWPM04\CAD\CIVIL\SC-TB01-MTFWPM04.dwg PLOT DATE 2023-04-14 10:45 USER: bsdtdway

No.	Description	Date	Drawn By

**ISSUED FOR BID**

Water & Environmental  
 TECHNOLOGIES  
 118 East 7th Street  
 Aberdeen, SD 57401  
 (605) 983-7476  
 waterenvtech.com

**NOTES AND LEGEND**

PROJECT NAME: URR-L WINTER HABITAT PIPELINE  
 LOCATION: RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
 FILE NO.: SC-TB01-MTFWPM04.dwg

JOB NO:	MTFWPM04
DATE:	6/14/23
DRAFTER:	
CHECKED BY:	
SHEET	T2

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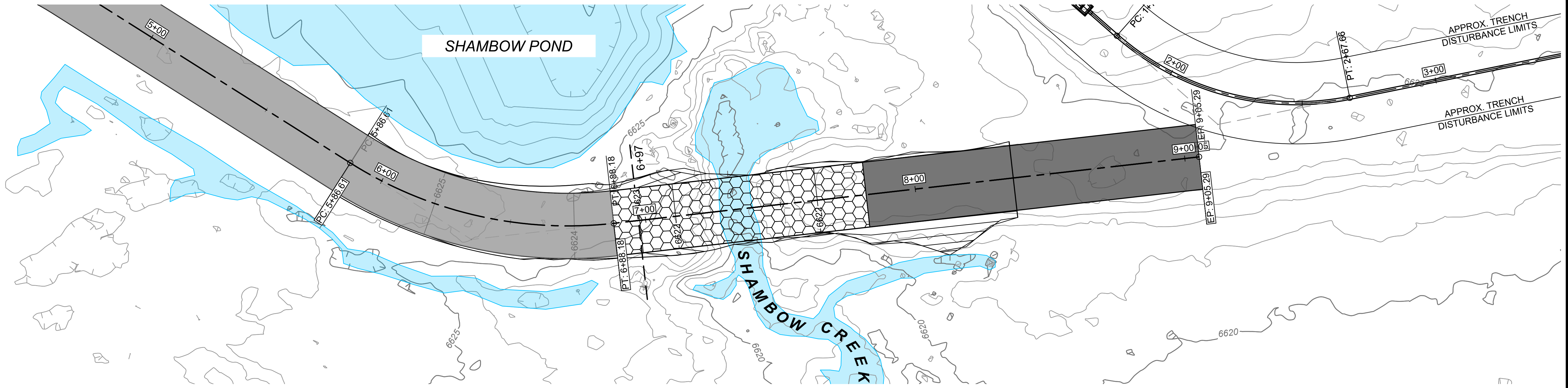








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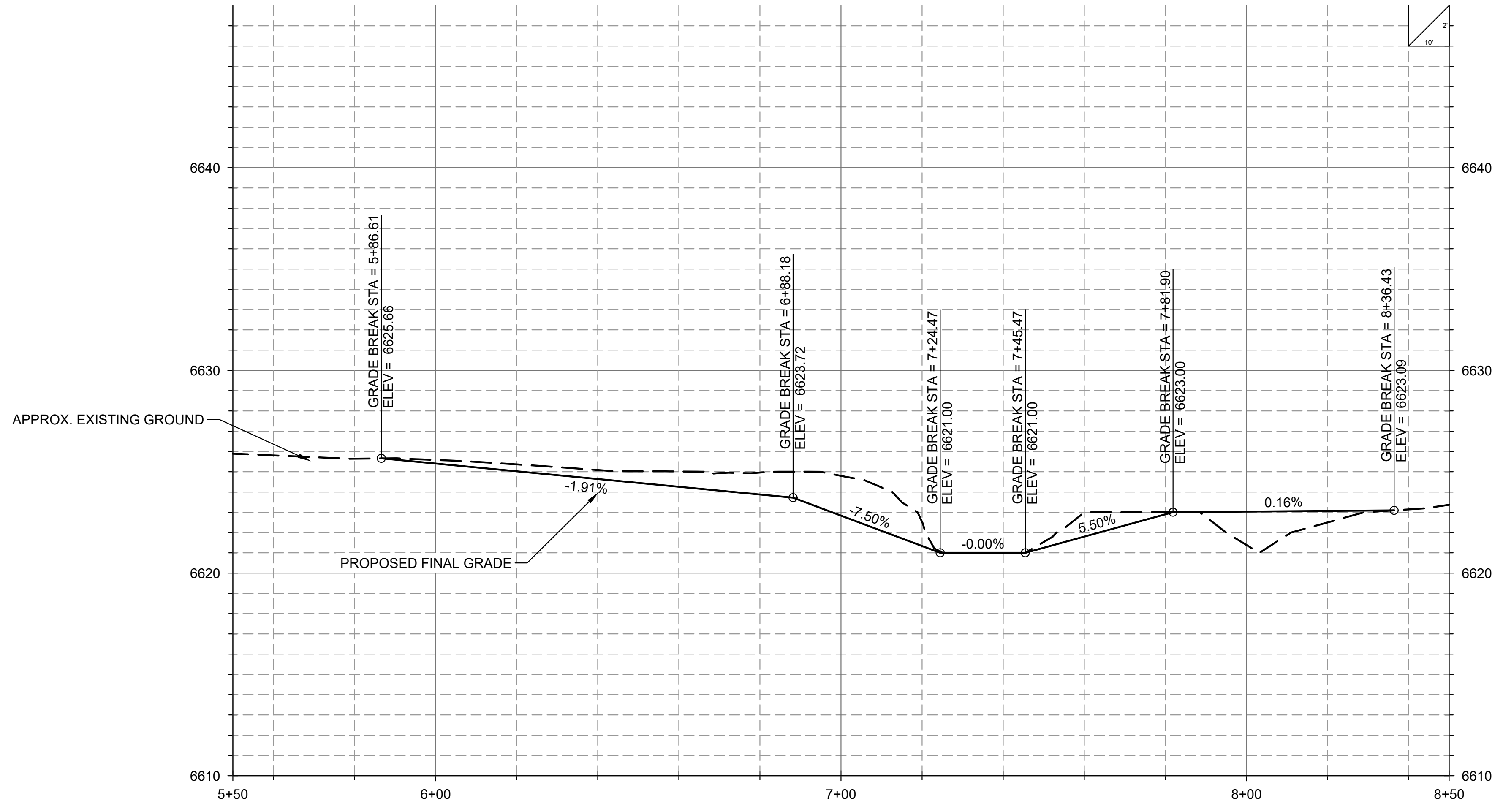
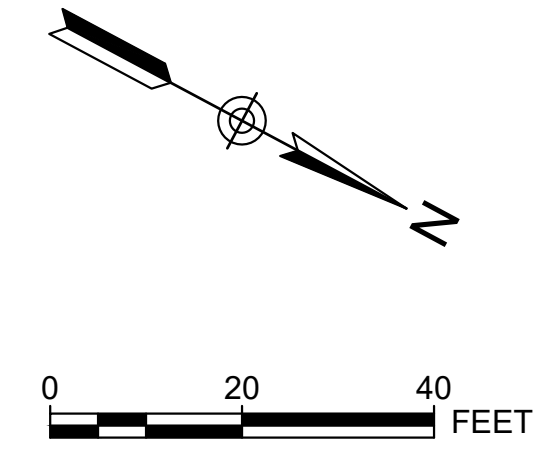


TEMPORARY ACCESS ROAD  
STA: 0+00 TO 6+51.8  
INSTALL MUD MATS OR APPROVED EQUAL  
SEE SHEET D10

BEGIN PERMANENT CROSSING  
STA: 6+51.7 - 0  
N: 133796.80  
E: 1363461.64

SHAMBOW CREEK PERMANENT CROSSING  
STA: 6+51.8 TO 7+45.5  
N: 133796.80  
E: 1363461.64

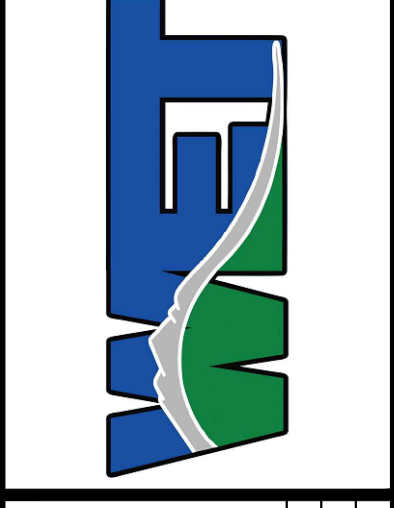
TEMPORARY ACCESS ROAD  
STA: 7+45.5 TO 8+69  
INSTALL MUD MATS OR APPROVED EQUAL  
SEE SHEET D10



No.	Description	Date	Drawn By

**ISSUED FOR BID**

Water & Environmental  
TECHNOLOGIES  
480 East Park Street  
P.O. Box 11  
Glen Ridge, NJ 07033  
908.782.8220  
waterenvtech.com



**ACCESS ROAD SHAMBOW CREEK  
CROSSING**

PROJECT NAME: URRL WINTER HABITAT PIPELINE  
LOCATION: RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
FILE NO: SC-GP01-MTFWPM04.dwg

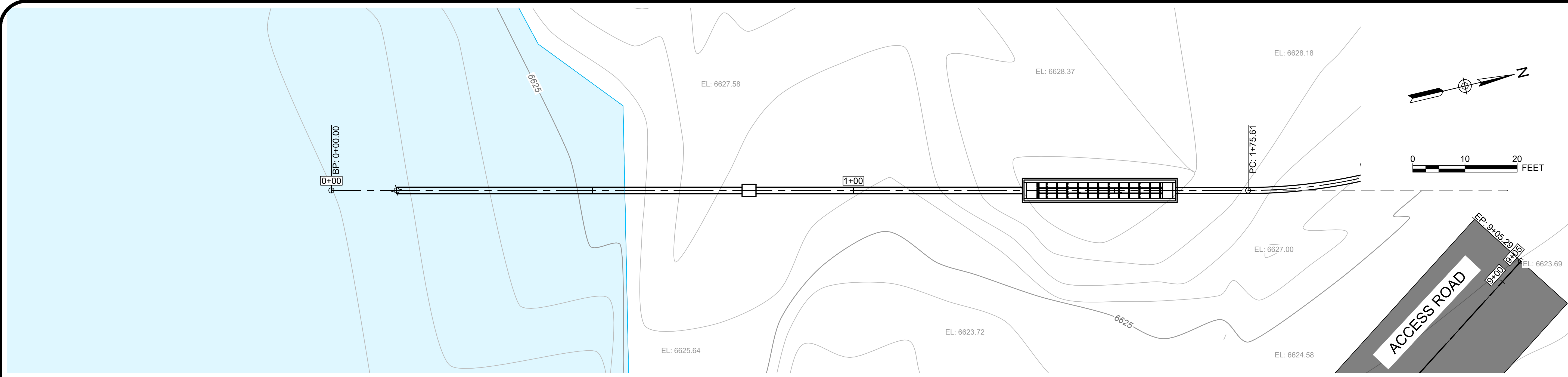
JOB NO: MTFWPM04  
DATE: 6/14/23  
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**C3**

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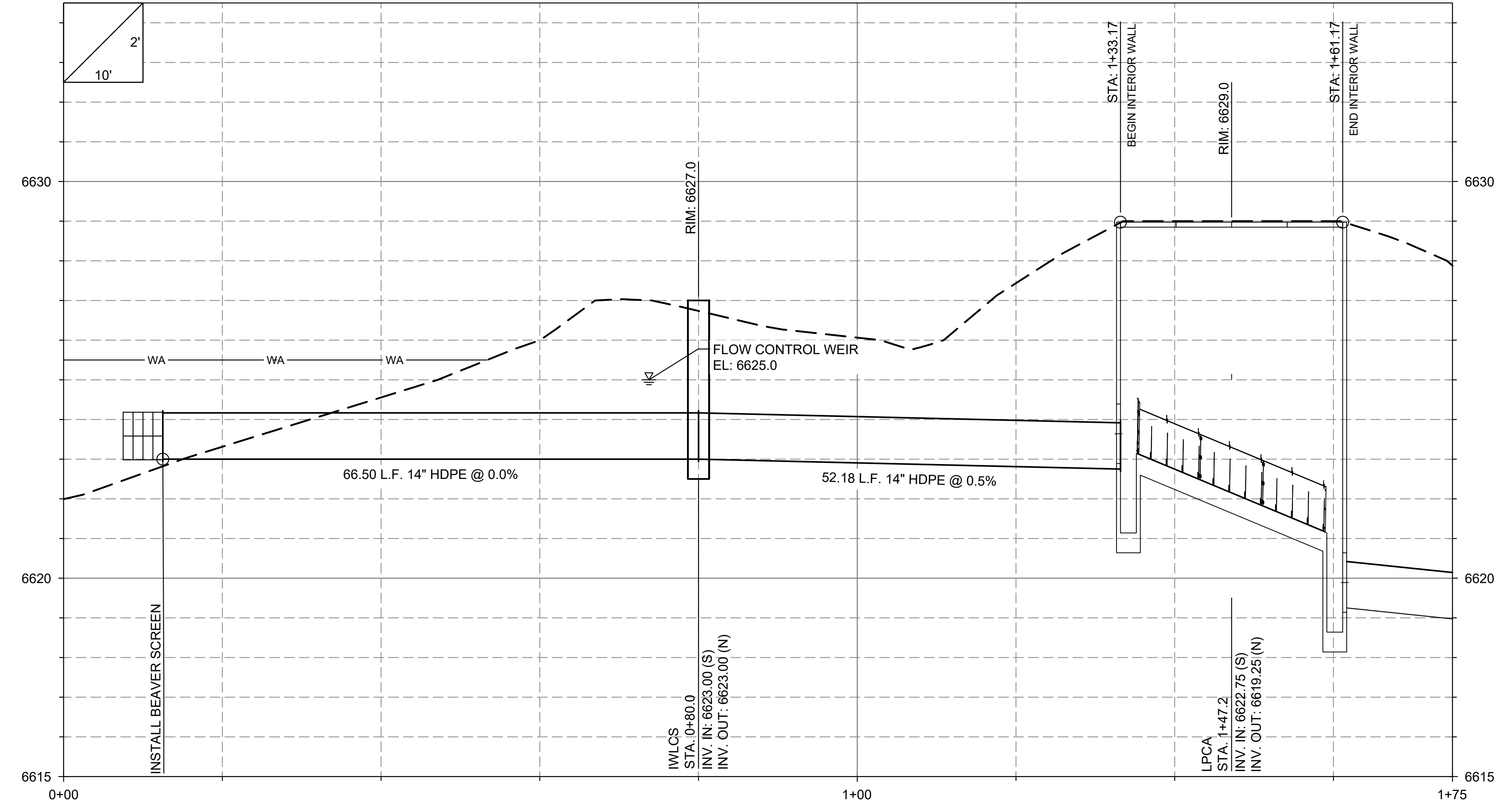
STA. 0+12.5  
BEGIN INTAKE PIPE  
INSTALL BEAVER SCREEN  
N: 133801.18  
E: 1383259.14  
SEE SHEET D3

STA. 0+12.5 TO 0+73.75  
INSTALL 61.0 L.F. OF 14" (IPS) DR-32.5 HDPE PIPE

STA. 0+73.75  
INSTALL WATER LEVEL CONTROL STRUCTURE  
N: 133860.81  
E: 1383273.14  
SEE SHEET D4

STA. 0+67.0 TO 1+31.1  
INSTALL 64.0 L.F. OF 14" (IPS) DR-32.5 HDPE PIPE

STA. 1+47.17  
INSTALL LOW PROFILE CASCADE AERATOR (LPCA)  
N: 133932.28  
E: 1383289.91  
SEE SHEETS D1 AND D2



INSTALL BEAVER SCREEN

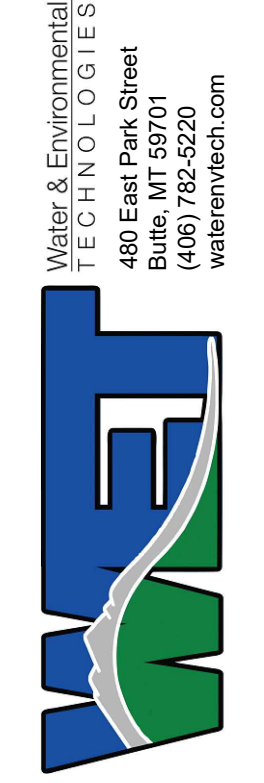
IWLCS  
STA. 0+80.0  
INV. IN: 6623.00 (S)  
INV. OUT: 6623.00 (N)

LPCA  
STA. 1+47.2  
INV. IN: 6623.75 (S)  
INV. OUT: 6619.25 (N)

No.	Description	Date	Drawn By

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Water & Environmental  
TECHNOLOGIES  
480 East Park Street  
Burlington, VT 05401  
(802) 782-8220  
waterenvtech.com

**SHAMBOW INTAKE SYSTEM  
PLAN AND PROFILE**

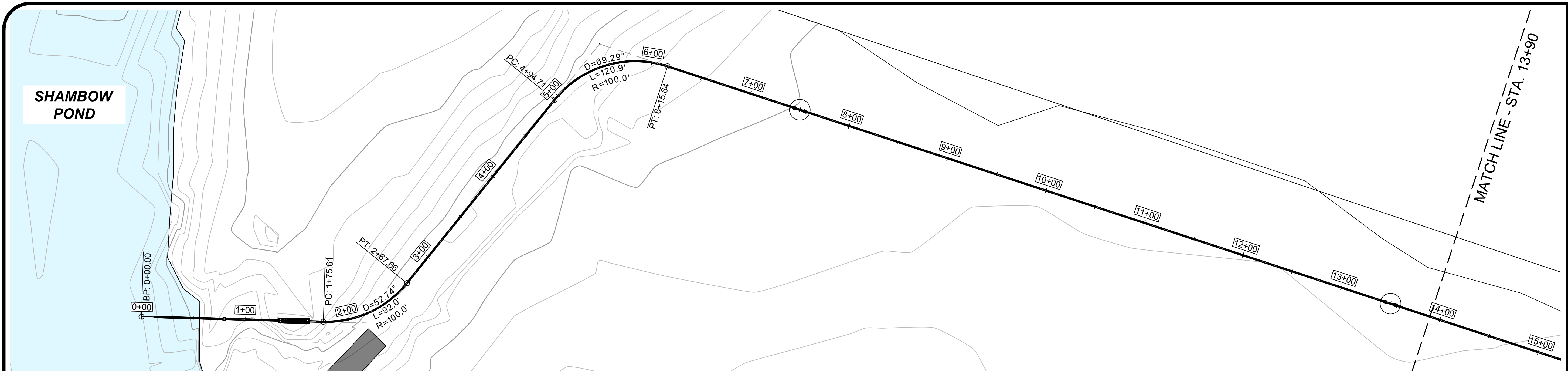
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LOCATION: RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
FILE NO: SC-STW01-MTFWPM04.dwg

JOB NO: MTFWPM04  
DATE: 6/14/23  
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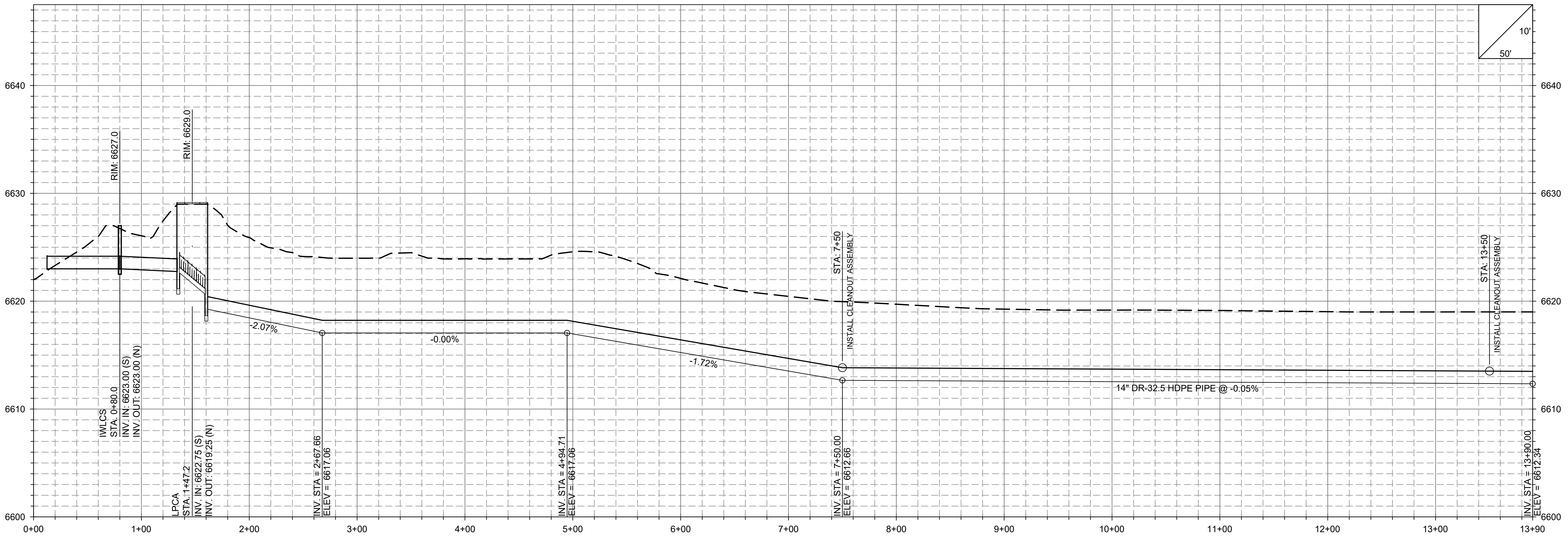
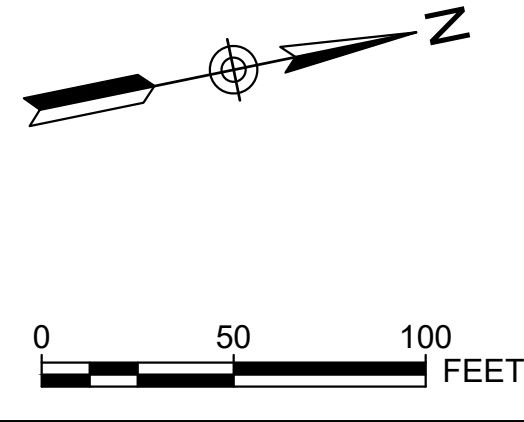
STA. 0+12.5 TO 1+47.2  
 INSTALL INTAKE AND WATER LEVEL  
 CONTROL SYSTEM  
 SEE SHEET C4 AND SHEET D3

STA. 1+47.2  
 INSTALL LOW PROFILE  
 CASCADE AERATOR  
 SEE SHEETS D1 AND D2  
 N: 133932.28  
 E: 1383289.91

STA. 7+50.0  
 INSTALL CLEANOUT ASSEMBLY  
 SEE SHEET D8  
 N: 134451.52  
 E: 1383188.68

STA. 1+61.2 TO 13+90  
 INSTALL 1,228.8 L.F. OF 14" (IPS) DR-32.5 HDPE PIPE  
 INSTALL 2 EA. CLEANOUT ASSEMBLIES

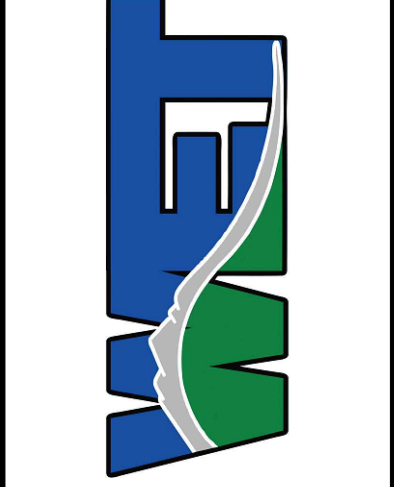
STA. 13+50.0  
 INSTALL CLEANOUT ASSEMBLY  
 SEE SHEET D8  
 N: 134972.39  
 E: 1383486.48



No.	Description	Date	Drawn By

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Water & Environmental  
 TECHNOLOGIES  
 480 East Park Street  
 Raleigh, NC 27601  
 (408) 782-5220  
 waterenvtech.com



**SHAMBOW POND  
 URRL PIPELINE  
 PLAN AND PROFILE**

PROJECT NAME: URRL WINTER HABITAT PIPELINE  
 LOCATION: RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
 FILE NO.: SC-STM01-MTF\PM04.dwg

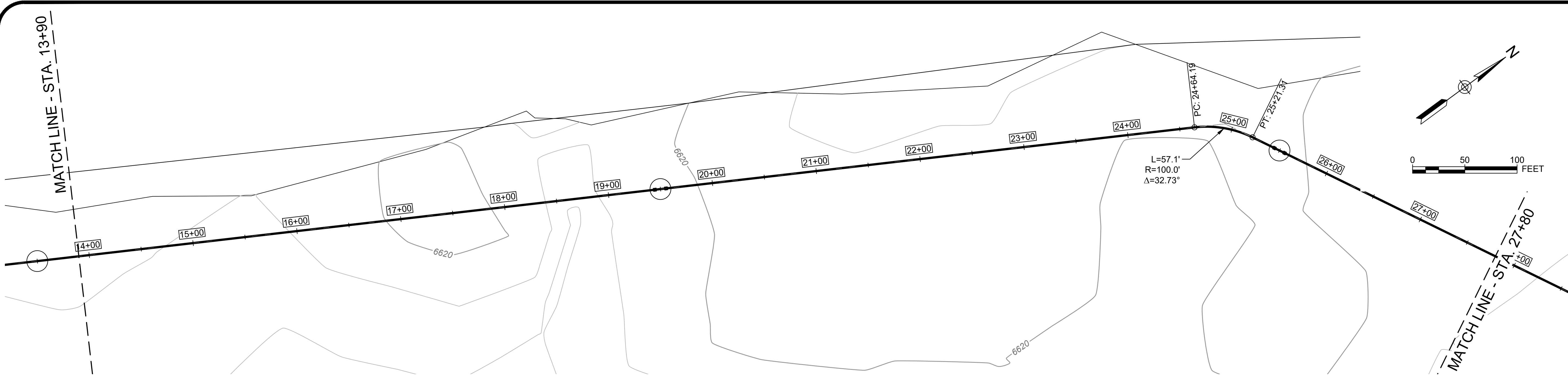
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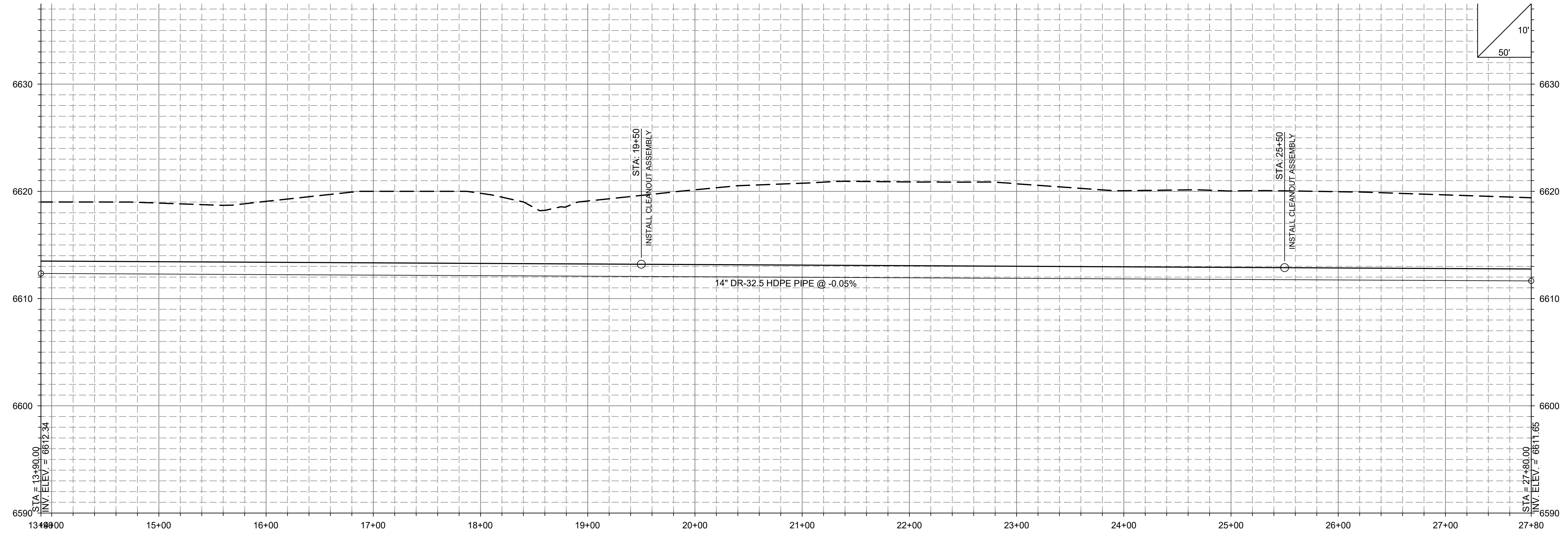
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STA. 13+90 TO 27+80  
 INSTALL 1,390.0 L.F. OF 14" (IPS) DR-32.5 HDPE PIPE  
 INSTALL 2 EA. CLEANOUT ASSEMBLIES

STA. 19+50.0  
 INSTALL CLEANOUT ASSEMBLY  
 SEE SHEET D8  
 N: 135493.27  
 E: 1383784.29

STA. 25+50.0  
 INSTALL CLEANOUT ASSEMBLY  
 SEE SHEET D8  
 N: 135991.96  
 E: 13864105.56



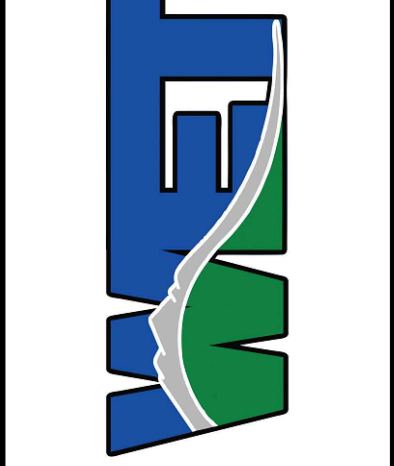
STA. 13+90.00  
 INV. ELEV. = 6612.34

STA. 27+80.00  
 INV. ELEV. = 6611.65

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 (408) 782-5220  
 waterenvtech.com



**SHAMBOW POND  
 URRL PIPELINE PLAN  
 AND PROFILE**

PROJECT NAME: URRL WINTER HABITAT PIPELINE  
 LOCATION: RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
 FILE NO.: SC-STM01-MTF\PM04.dwg

JOB NO: MTFWPM04  
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MATCH LINE - STA. 27+80

28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00 38+00 39+00 40+00 41+00 42+00

LAYDOWN AREA

UPPER RED ROCK LAKE (URRL)

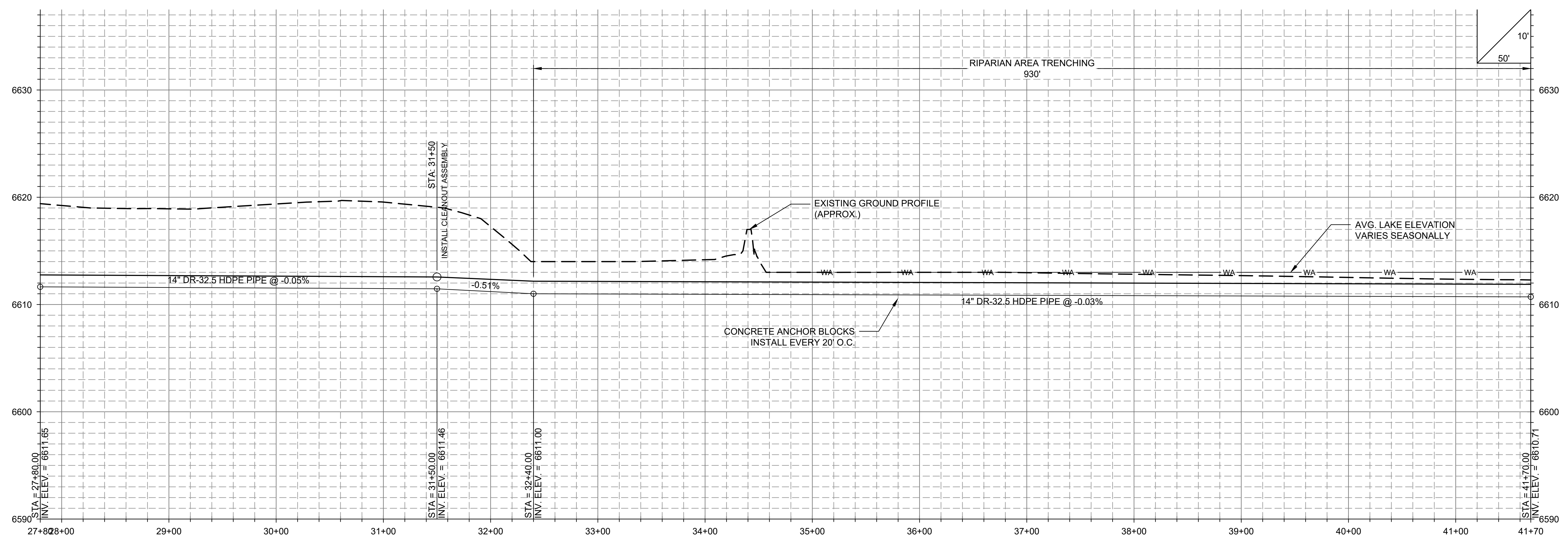
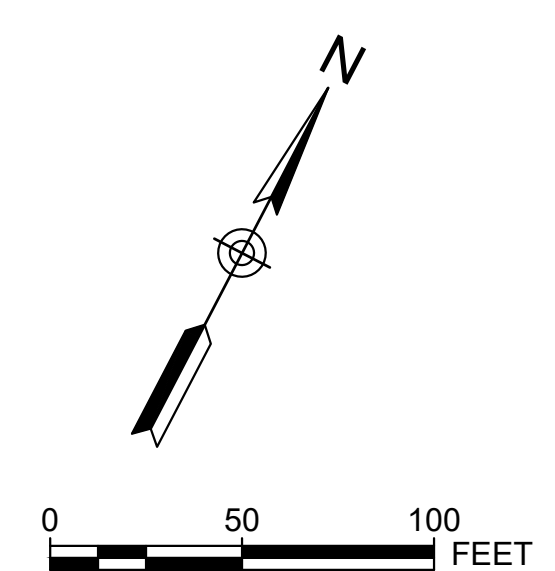
- NOTE:
- EQUIPMENT OUTFITTED WITH AMPHIBIOUS TRACKS (SWAMP BUGGY CONFIGURATION) REQUIRED FOR RIPARIAN AREAS.
  - GPS MACHINE-CONTROL EQUIPMENT PREFERRED.
  - SEE SHEETS D8, D9, AND D10 FOR PIPE BALLAST, OUTLET DIFFUSER, AND PIPELINE MOORING REQUIREMENTS.

MATCH LINE - STA. 41+70

STA. 27+80 TO 32+40  
 INSTALL 460.0 L.F. OF 14" (IPS) DR-32.5 HDPE  
 INSTALL 1 EA. CLEANOUT ASSEMBLIES

STA. 31+50.0  
 INSTALL CLEANOUT ASSEMBLY  
 SEE SHEET D8  
 N: 138269.16  
 E: 1384637.69

STA. 32+40 TO 41+70  
 INSTALL 930.0 L.F. OF 14" (IPS) DR-32.5 HDPE PIPE W/ PIPE ANCHORS  
 SEE DETAIL 2 SHEET D8 FOR TRENCHING REQUIREMENTS  
 SEE SHEETS D9-D11 FOR ADDITIONAL DETAILS



No.	Description	Date	Drawn By

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SHAMBOW POND  
 URRL PIPELINE PLAN  
 AND PROFILE

PROJECT NAME: URRL WINTER HABITAT PIPELINE  
 LOCATION: RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
 FILE NO.: SC-STM01-MTFWPM04.dwg

JOB NO: MTFWPM04  
 DATE: 6/14/23  
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SHEET C7

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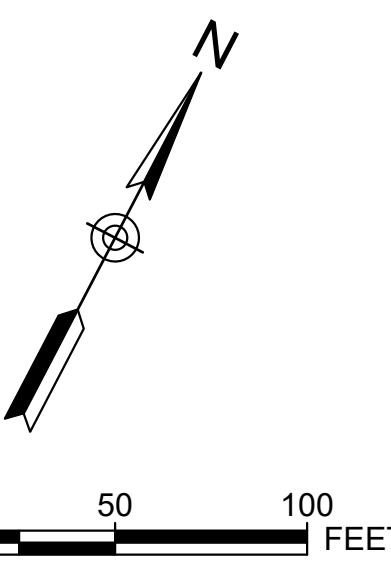


MATCH LINE - STA. 41+70

42+00 43+00 44+00 45+00 46+00 47+00 48+00 49+00 50+00 51+00 52+00 53+00 54+00 55+00 55+50

MATCH LINE - STA. 55+60

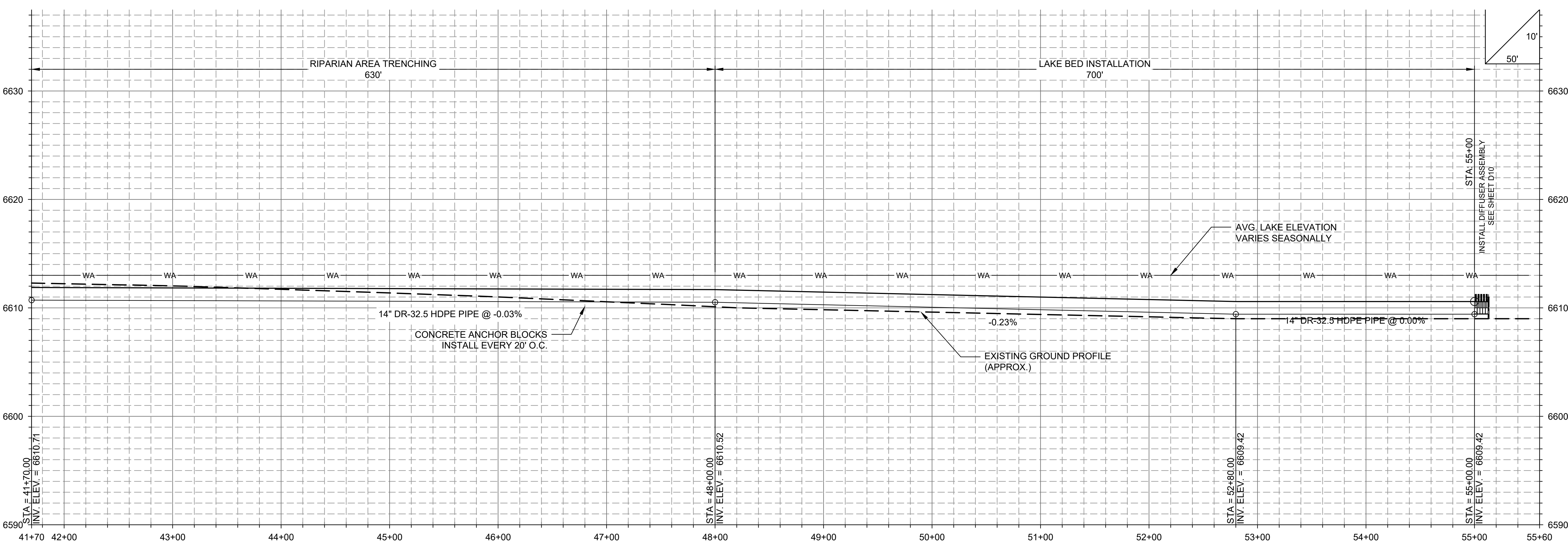
- NOTES:
- EQUIPMENT OUTFITTED WITH AMPHIBIOUS TRACKS (SWAMP BUGGY CONFIGURATION) REQUIRED FOR RIPARIAN AREAS.
  - GPS MACHINE-CONTROL EQUIPMENT PREFERRED.
  - SEE SHEETS D8, D9, AND D10 FOR PIPE BALLAST, OUTLET DIFFUSER, AND PIPELINE MOORING REQUIREMENTS.



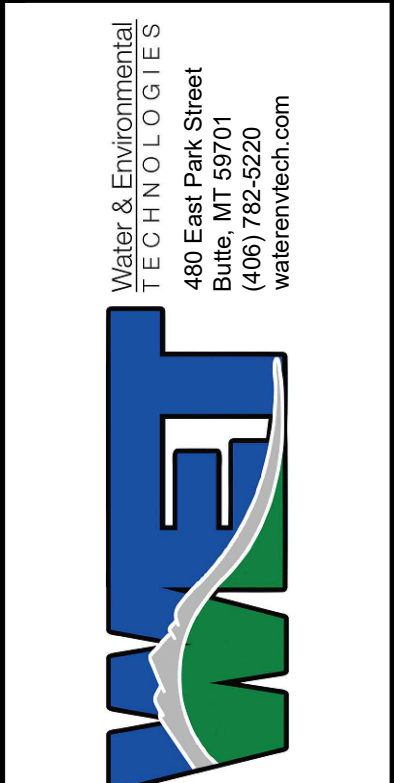
STA. 41+70 TO 48+00  
 INSTALL 630.0 L.F. OF 14" (IPS) DR-32.5 HDPE PIPE  
 SEE DETAIL 2 SHEET D8 FOR TRENCHING REQUIREMENTS  
 SEE SHEETS D9-D11 FOR ADDITIONAL DETAILS

STA. 48+00 TO 55+00  
 INSTALL 700.0 L.F. OF 14" (IPS) DR-32.5 HDPE PIPE  
 INSTALL PIPE DIRECTLY ON LAKE BED  
 SEE SHEETS D9-D11 FOR ADDITIONAL DETAILS

STA. 55+00.0  
 INSTALL DIFFUSER ASSEMBLY  
 SEE SHEET D10  
 N: 137354.83  
 E: 1386721.87



ISSUED FOR BID



SHAMBOW POND  
 URRL PIPELINE  
 PLAN AND PROFILE

PROJECT NAME: URRL WINTER HABITAT PIPELINE  
 LOCATION: RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
 FILE NO.: SC-STM01-MTFWPM04.dwg

JOB NO: MTFWPM04  
 DATE: 6/14/23  
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 CHECKED BY:

SHEET  
**C8**

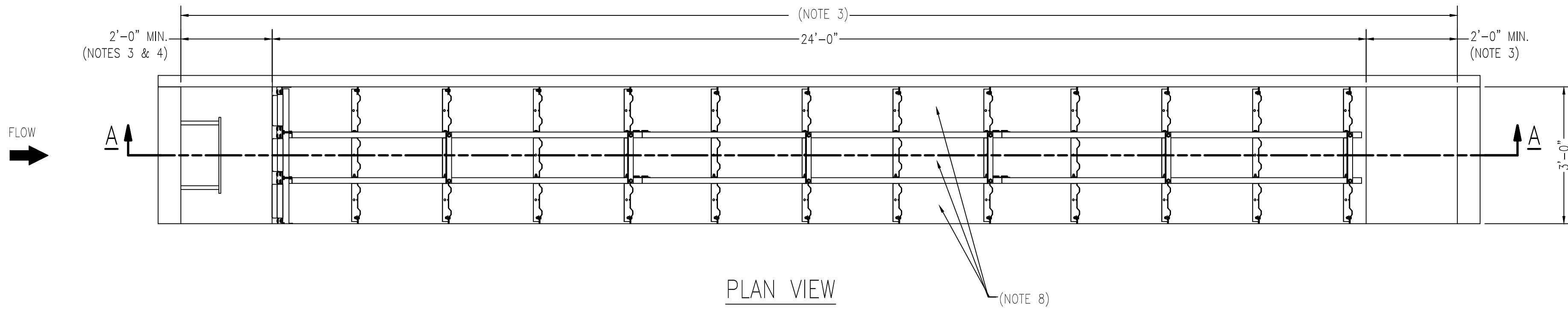
No.	Description	Date	Drawn By

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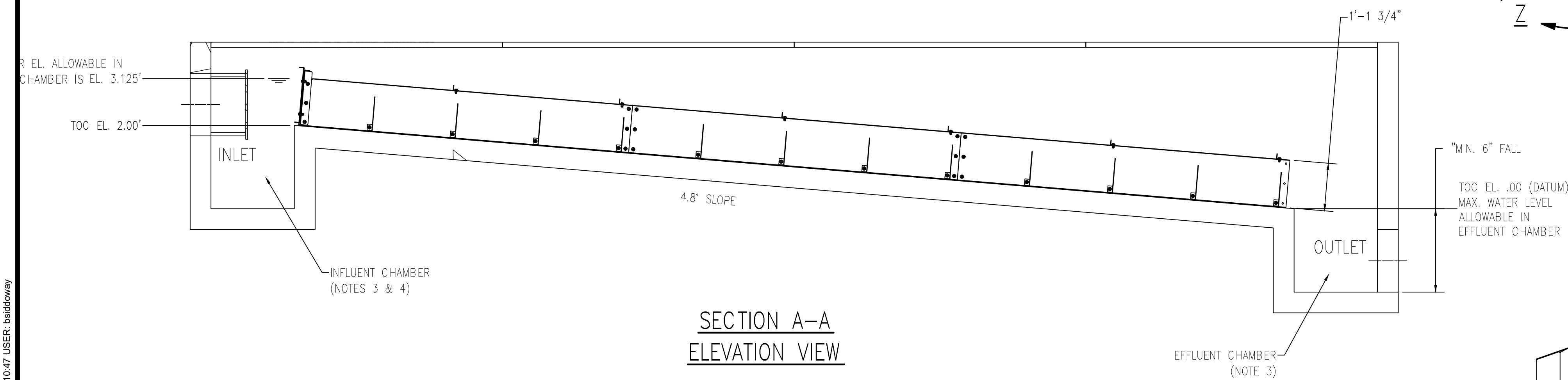
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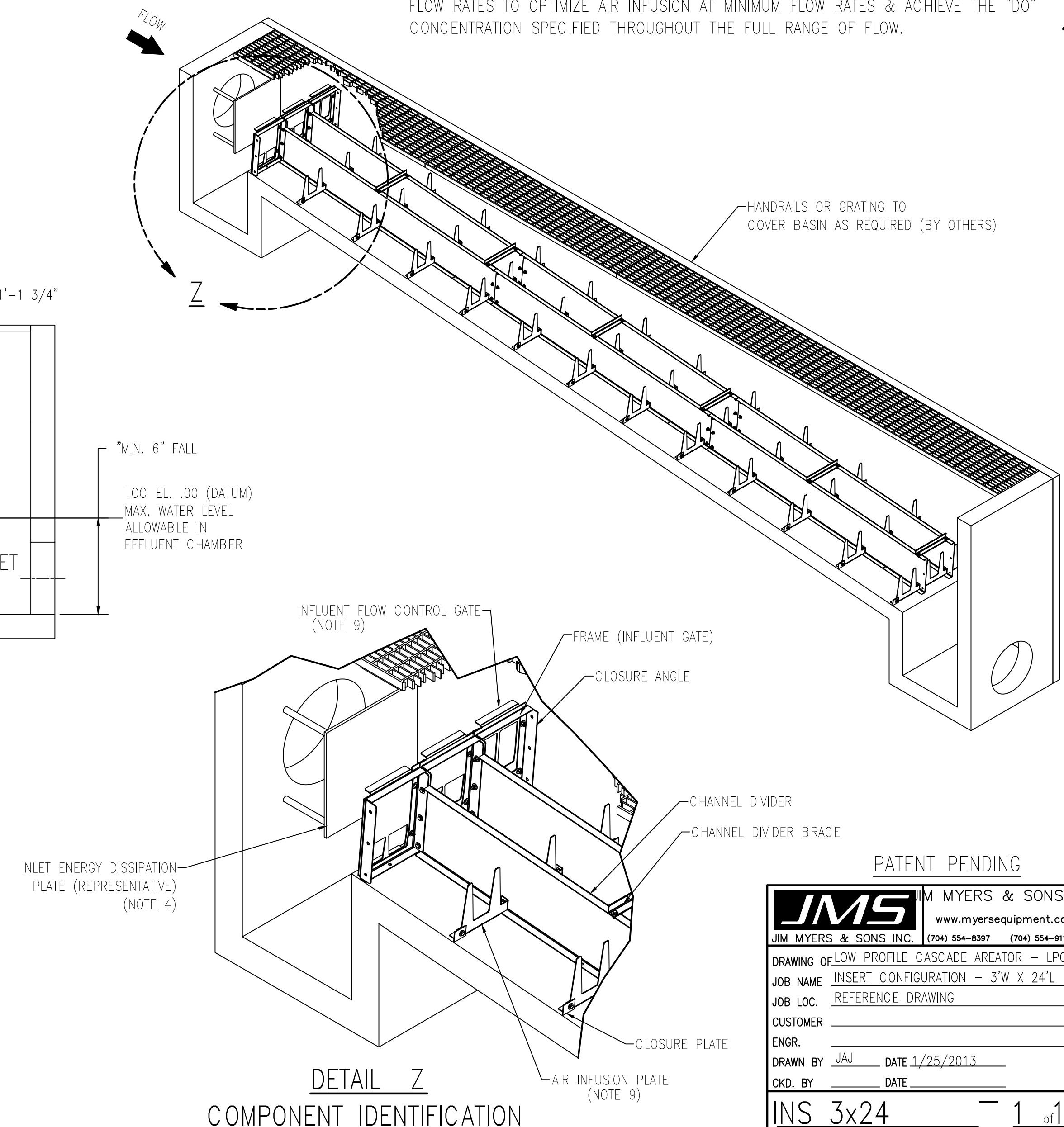
PLAN VIEW



SECTION A-A  
ELEVATION VIEW

REFERENCE DRAWING

- NOTES:
1. MATERIALS OF CONSTRUCTION TO BE T-304 STAINLESS STEEL.
  2. CONCRETE BASIN IS BY OTHERS.
  3. INLETS, OUTLETS, INFLUENT, AND EFFLUENT CHAMBERS TO BE SIZED (BY OTHERS) TO NOT EXCEED INDICATED MAX WATER ELEVATIONS.
  4. INFLUENT CHAMBERS MAY NEED TO INCLUDE ENERGY DISSIPATION DEVICE TO REDUCE WATER VELOCITY IMPACT ON INFLUENT DISTRIBUTION AND TO EVENLY DISTRIBUTE FLOW TO INFLUENT FLOW CONTROL GATES.
  5. SLOPE OF CONCRETE FLOOR AND LEVEL OF CONCRETE FLOOR ACROSS WIDTH OF BASIN IS CRITICAL TO PROPER SYSTEM PERFORMANCE.
  6. CONCRETE SURFACE TO BE FLAT AND SMOOTH (1/4" IN 10' IN ALL DIRECTIONS), AND IS CRITICAL FOR PROPER SEALING.
  7. PLACE SEAL MATERIAL BETWEEN MATING STEEL AND CONCRETE SURFACES BEFORE ANCHORING.
  8. BY MFR: INDIVIDUAL CHANNEL WIDTHS WILL CHANGE FOR JOB SPECIFIC APPLICATION FLOW RATES AND WILL BE DETERMINED AT TIME OF SUBMITTAL.
  9. BY MFR: THE PATENT PENDING LPCA INFLUENT FLOW CONTROL GATE & AIR INFUSION PLATES WILL BE TRAPEZOIDAL SHAPED. THEY ARE DESIGNED FOR JOB SPECIFIC APPLICATION FLOW RATES TO OPTIMIZE AIR INFUSION AT MINIMUM FLOW RATES & ACHIEVE THE "DO" CONCENTRATION SPECIFIED THROUGHOUT THE FULL RANGE OF FLOW.



DETAIL Z  
COMPONENT IDENTIFICATION

PATENT PENDING

**JMS** JIM MYERS & SONS  
www.myersequipment.com

JIM MYERS & SONS INC. (704) 554-8397 (704) 554-9113

DRAWING OF LOW PROFILE CASCADE AREATOR - LPCA

JOB NAME: INSERT CONFIGURATION - 3'W X 24'L

JOB LOC: REFERENCE DRAWING

CUSTOMER: \_\_\_\_\_

ENGR: \_\_\_\_\_

DRAWN BY: JAJ DATE: 1/25/2013

CHKD. BY: \_\_\_\_\_ DATE: \_\_\_\_\_

INS 3x24 1 of 1

CONTR. NO. SHEET

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**LOW PROFILE CASCADE AREATOR (LPCA) TYPICAL DETAILS**

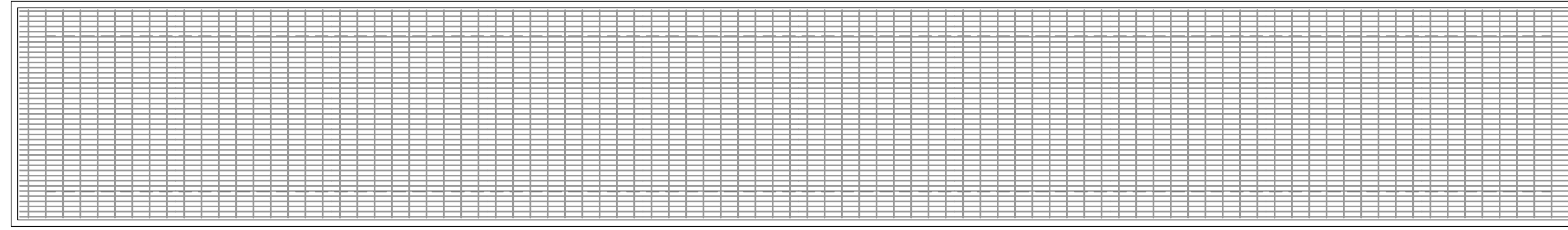
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LOCATION: RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
FILE NO: SC-DT01-MTFWPM04.dwg

JOB NO: MTFWPM04  
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1 GRATING PLAN  
Scale: NTS

**NOTE:**  
CONTRACTOR IS RESPONSIBLE FOR SURFACE AND GROUNDWATER MANAGEMENT, WHERE ENCOUNTERED.

- SHEET NOTES:**
1. GENERAL:
    - 1.1. GROUNDWATER MAY BE PRESENT IN TRENCH EXCAVATIONS. CONTRACTOR SHALL FURNISH, OPERATE, AND MAINTAIN SUFFICIENT DEWATERING SYSTEMS DURING CONSTRUCTION.
  2. CONCRETE:
    - 2.1. FURNISH M-4500 ( $f_c = 4,500$  PSI @ 28-DAYS) CONCRETE WITH ASTM C150 CLASS V PORTLAND CEMENT.
  3. REINFORCEMENT:
    - 3.1. FURNISH AND INSTALL GRADE 60, DEFORMED STEEL BARS MEETING ASTM A615 OR ASTM A705. USE ONLY EPOXY-COATED BARS.
    - 3.2. WALLS
      - 3.2.1. MIN. COVER = 2.5 INCHES
      - 3.2.2. FURNISH AND INSTALL MIN. NO. 4 REBAR SPACED VERTICALLY 36" O.C.
      - 3.2.3. FURNISH AND INSTALL MIN. NO. 4 REBAR SPACED HORIZONTALLY 24" O.C.
    - 3.3. SLAB
      - 3.3.1. MIN. COVER = 2.0 INCHES
      - 3.3.2. FURNISH AND INSTALL MIN. NO. 3 REBAR SPACED 24" O.C.
  4. PIPE CONNECTIONS
    - 4.1. FURNISH AND INSTALL PIPE BOOTS, TWO (2) PLACES. USE Z-LOK C107-12 OR APPROVED EQUAL. CAST-IN-PLACE BOOT CONNECTIONS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
  5. STEPS
    - 5.1. FURNISH AND INSTALL COPOLYMER POLYPROPYLENE COATED GRADE 60 STEEL REINFORCEMENT MANHOLE STEPS. SPACING IS 12" O.C.
  6. GRATING
    - 6.1. FURNISH AND INSTALL 36" X 48" ALUMINUM GRATING PANELS. PANELS ARE NOT REQUIRED TO BE TRAFFIC RATED.

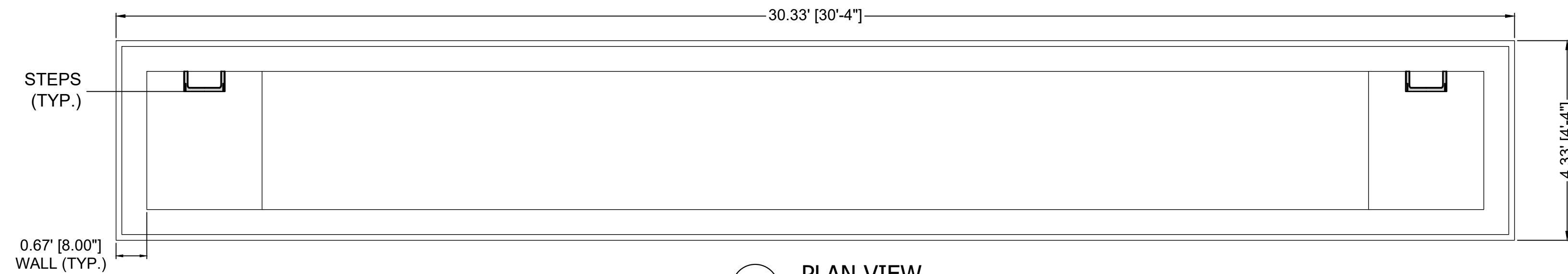
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water@wetch.com

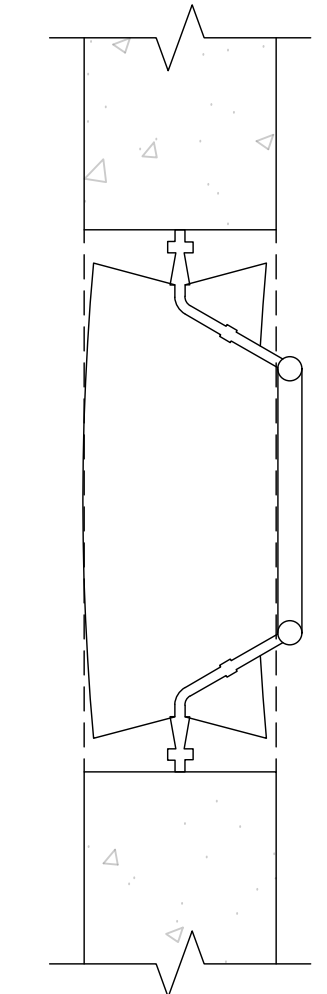
**LPCA ELEVATION DETAIL AND NOTES**

PROJECT NAME: URRL WINTER HABITAT PIPELINE  
LOCATION: RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
FILE NO: SC-DT01-MTFWPM04.dwg

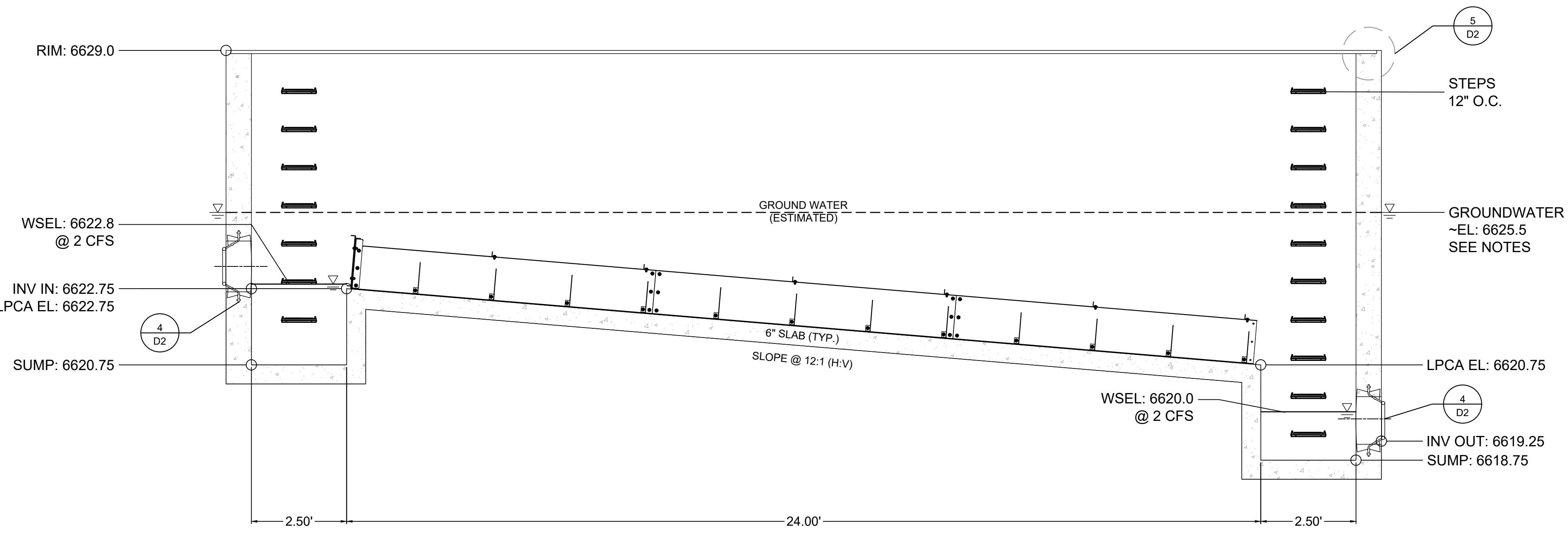
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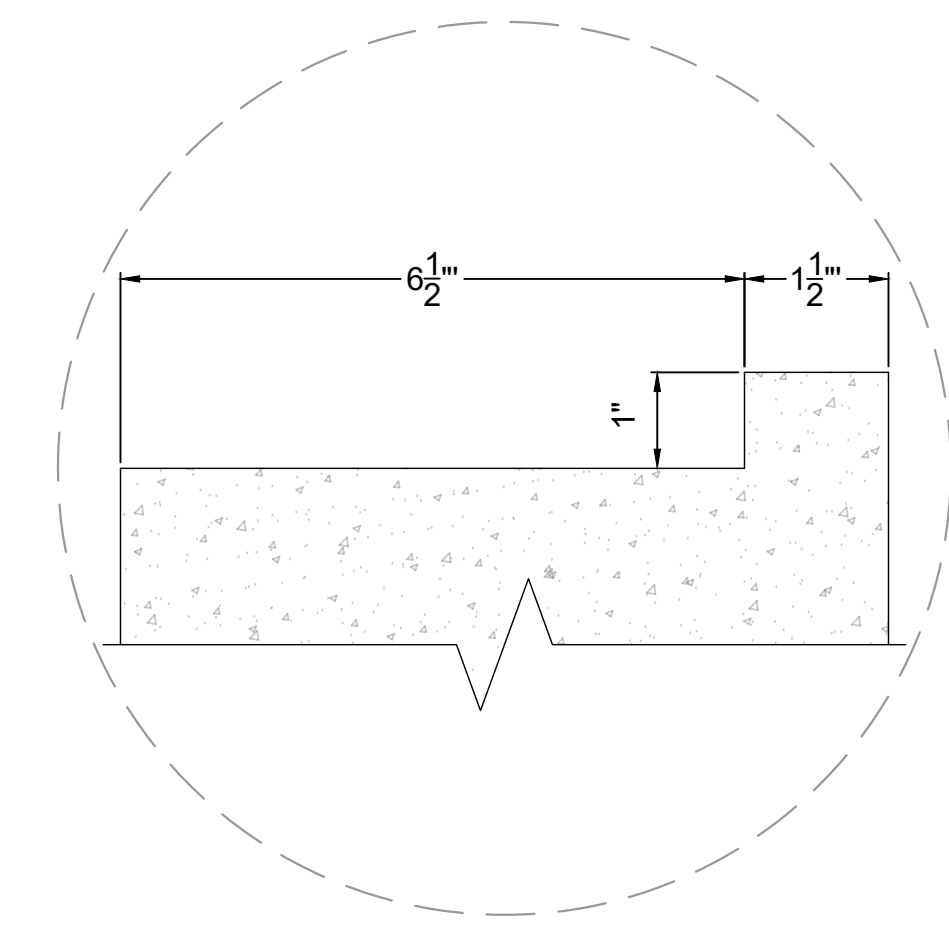
2 PLAN VIEW  
Scale: NTS



4 PIPE BOOT DETAIL  
Scale: NTS



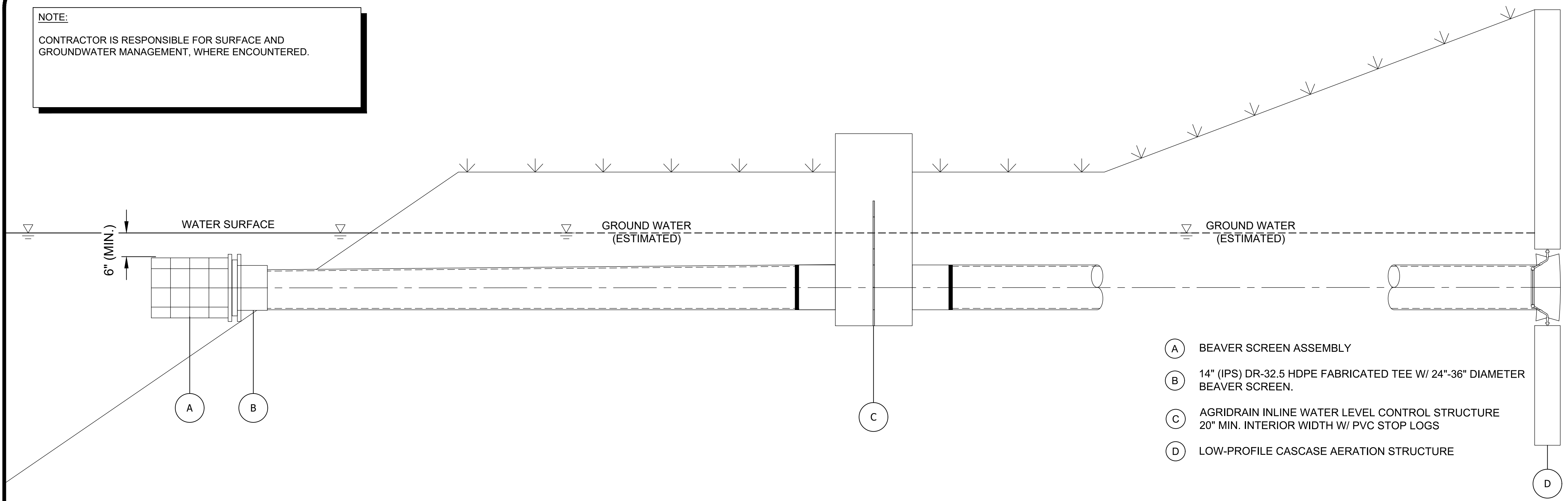
3 ELEVATION VIEW  
Scale: NTS



5 WALL DETAIL  
Scale: NTS

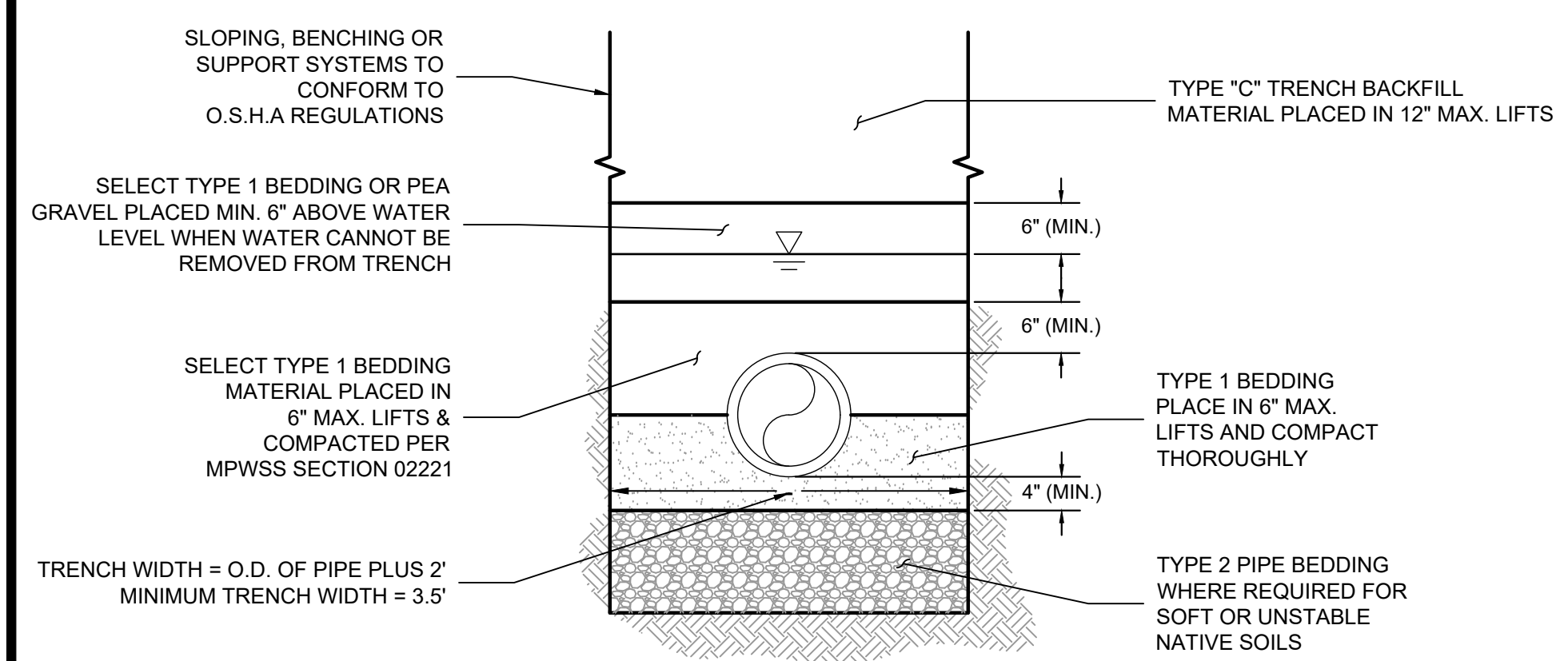


**NOTE:**  
 CONTRACTOR IS RESPONSIBLE FOR SURFACE AND GROUNDWATER MANAGEMENT, WHERE ENCOUNTERED.

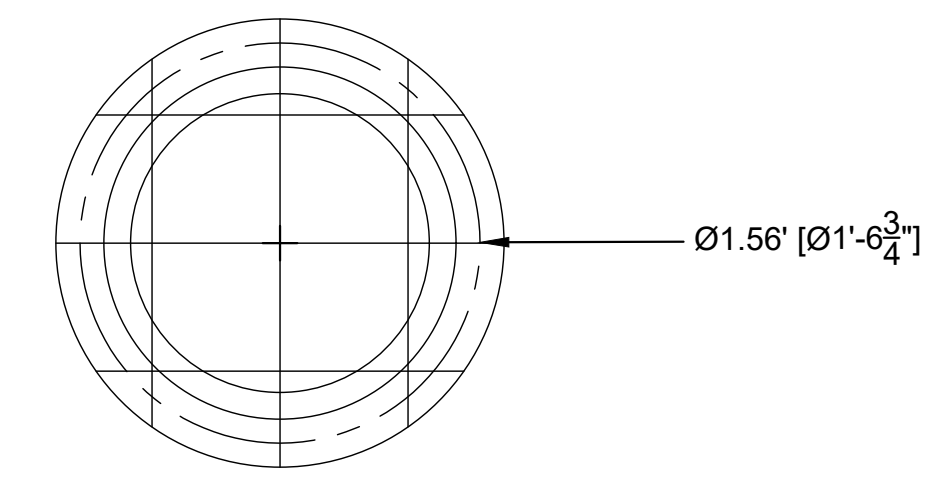


- (A) BEAVER SCREEN ASSEMBLY
- (B) 14" (IPS) DR-32.5 HDPE FABRICATED TEE W/ 24"-36" DIAMETER BEAVER SCREEN.
- (C) AGRIDRAIN INLINE WATER LEVEL CONTROL STRUCTURE 20" MIN. INTERIOR WIDTH W/ PVC STOP LOGS
- (D) LOW-PROFILE CASCASE AERATION STRUCTURE

**1 SHAMBOW POND INTAKE DETAIL: PROFILE VIEW**  
 Scale: NTS

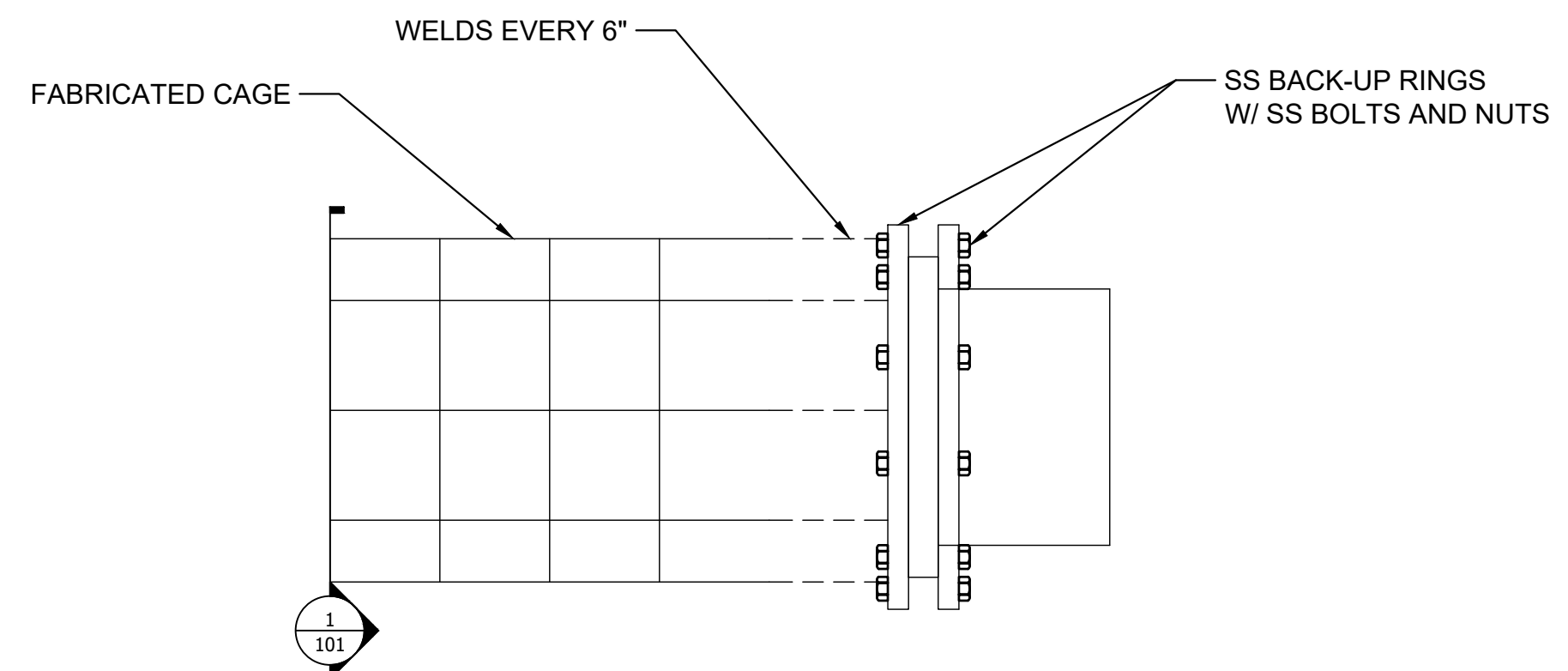


**2 TRENCH DETAIL**  
 Scale: NTS



**3 BEAVER SCREEN: SECTION VIEW**  
 Scale: NTS

- NOTES:**
- INSTALL BEAVER SCREEN CAGE. CAGE TO BE FABRICATED FROM 4"x4" OR 6"x6" STAINLESS STEEL WELDED WIRE FABRIC OR APPROVED EQUAL.
  - WELD FABRICATED CAGE TO STAINLESS STEEL BACK-UP RING FLANGES.



**4 BEAVER SCREEN: PROFILE VIEW**  
 Scale: NTS

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**POND INTAKE DETAILS**

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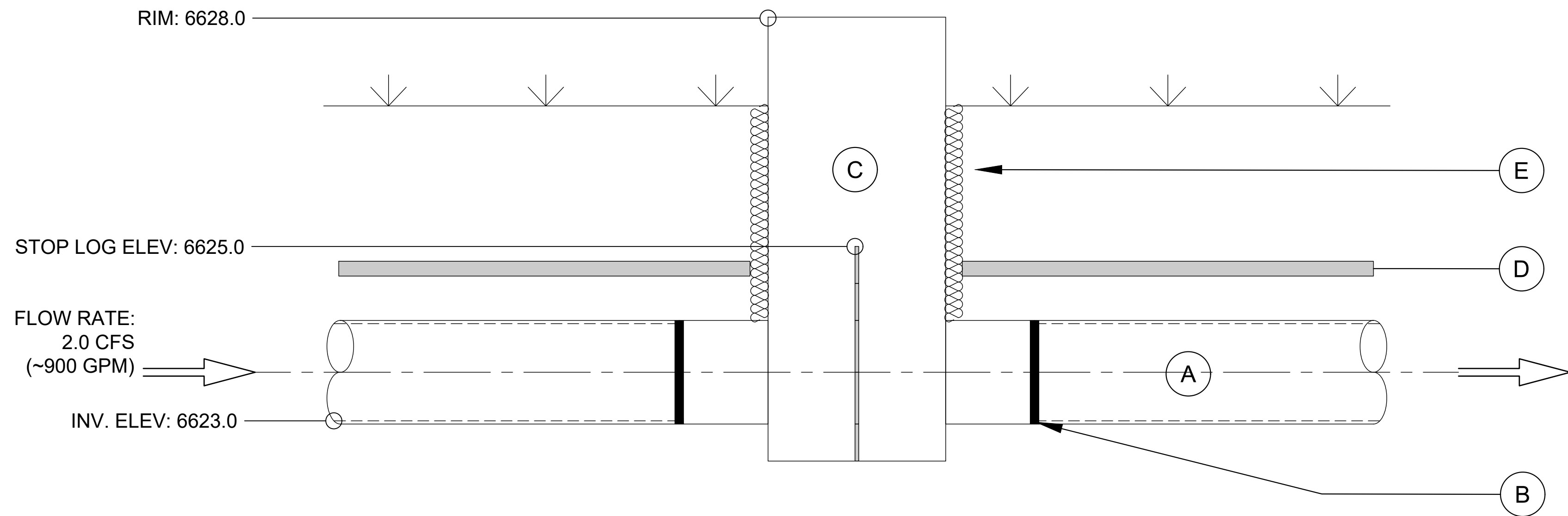
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NOTE:  
CONTRACTOR IS RESPONSIBLE FOR SURFACE AND GROUNDWATER MANAGEMENT, WHERE ENCOUNTERED.



- (A) 14" (IPS) DR-32.5 HDPE PIPE. 14" O.D. 13.08" I.D.
- (B) FLEXIBLE COUPLER FOR 13.08" I.D. HDPE PIPE CONNECTION.  
NOTE: MANUFACTURER TO SPECIFY MODEL SIZE.
- (C) AGRIDRAIN INLINE WATER LEVEL CONTROL STRUCTURE  
20" MIN. INTERIOR WIDTH W/ PVC STOP LOGS
- (D) 2" RIGID FOAM INSULATION BOARD WHERE BURY DEPTHS ARE LESS THAN 50".  
SUITABLE FOR DIRECT-BURY APPLICATIONS. NOT NEEDED WHERE  
GROUNDWATER IS ENCOUNTERED
- (E) INSTALL SPRAY FOAM INSULATION BELOW GRADE. SPRAY FOAM TO BE  
SUITABLE FOR DIRECT-BURY APPLICATIONS.  
R-33 OR BETTER RATING.

1 WATER LEVEL CONTROL STRUCTURE: PROFILE VIEW  
Scale: NTS

Manufactured by:

PO Box 458 · 1462 340<sup>th</sup> Street · Adair, Iowa 50002  
Phone: 1-800-232-4742 · Fax: 1-800-282-3353  
www.agridrain.com · email: info@agridrain.com

### Inline Water Level Control Structure™

- Available in manual or automated.
- Constructed of rugged 1/2" PVC with lockable plastic lid.
- Stainless steel screws and custom anodized aluminum corner extrusions used for strength and durability.\*
- Flexible couplers allow PVC, plastic pipe, or other materials to be easily attached. (Please specify type of pipe when ordering.)
- Rugged injection molded stoplogs in 5" and 7" heights for adjustability (included in structures with 4" through 12" pipe sizes).
- PVC stoplogs with metal hooks in 5" and 7" heights for adjustability (included in structures with 15" through 24" pipe sizes).
- Stoplog maintenance recommended: Remove stoplogs and grease seal with Ultra Lube (included). Ensure there is no debris in the tracks or along the bottom of the structure. Replace stoplogs after greasing, ensuring bottom stoplog is installed first.
- To minimize seepage, align stoplogs firmly against one side of the stoplog track.
- Stoplogs must remain in track during structure installation.
- Structures are intended for gravity flow; some seepage may occur.
- 5-year warranty on all standard structures.

\*For water that is caustic, acid, corrosive, salt, or pH below 5 pH or above 9 pH, please notify us of your requirements to ensure structures are built with compatible hardware. For these applications, Agri Drain recommends stainless steel.

Pipe Size	Available Heights	Width	Depth
4"	2' - 12'	8"	10"
6"	2' - 12'	8"	10"
8"	2' - 12'	11 5/8"	12"
10"	2' - 12'	14"	16"
12"	2' - 12'	16"	20"
15"	2' - 12'	20"	24"
18"	2' - 12'	24"	28"
24"	3' - 10'	31"	39"

**Stoplog Retainer**  
Hold extra stoplogs up & out of the way!

- Stainless steel retainer hooks to lowest stoplog that you want to hold up within your Inline Water Level Control Structure™.

2 WATER LEVEL CONTROL STRUCTURE SPECIFICATION  
Scale: NTS

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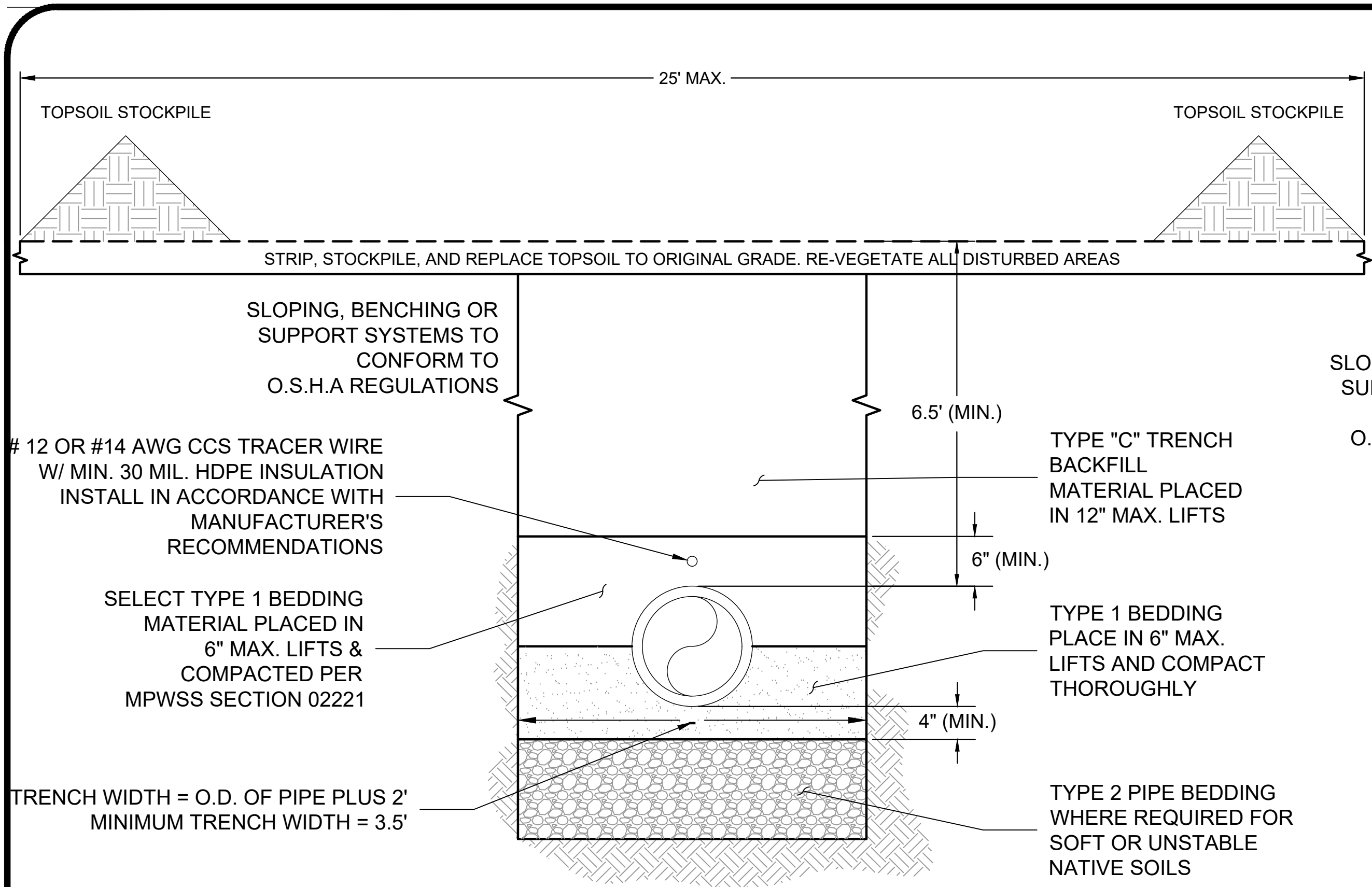
WATER LEVEL CONTROL STRUCTURE

PROJECT NAME: URRIL WINTER HABITAT PIPELINE  
LOCATION: RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
FILE NO.: SC-DT01-MTFWPM04.dwg

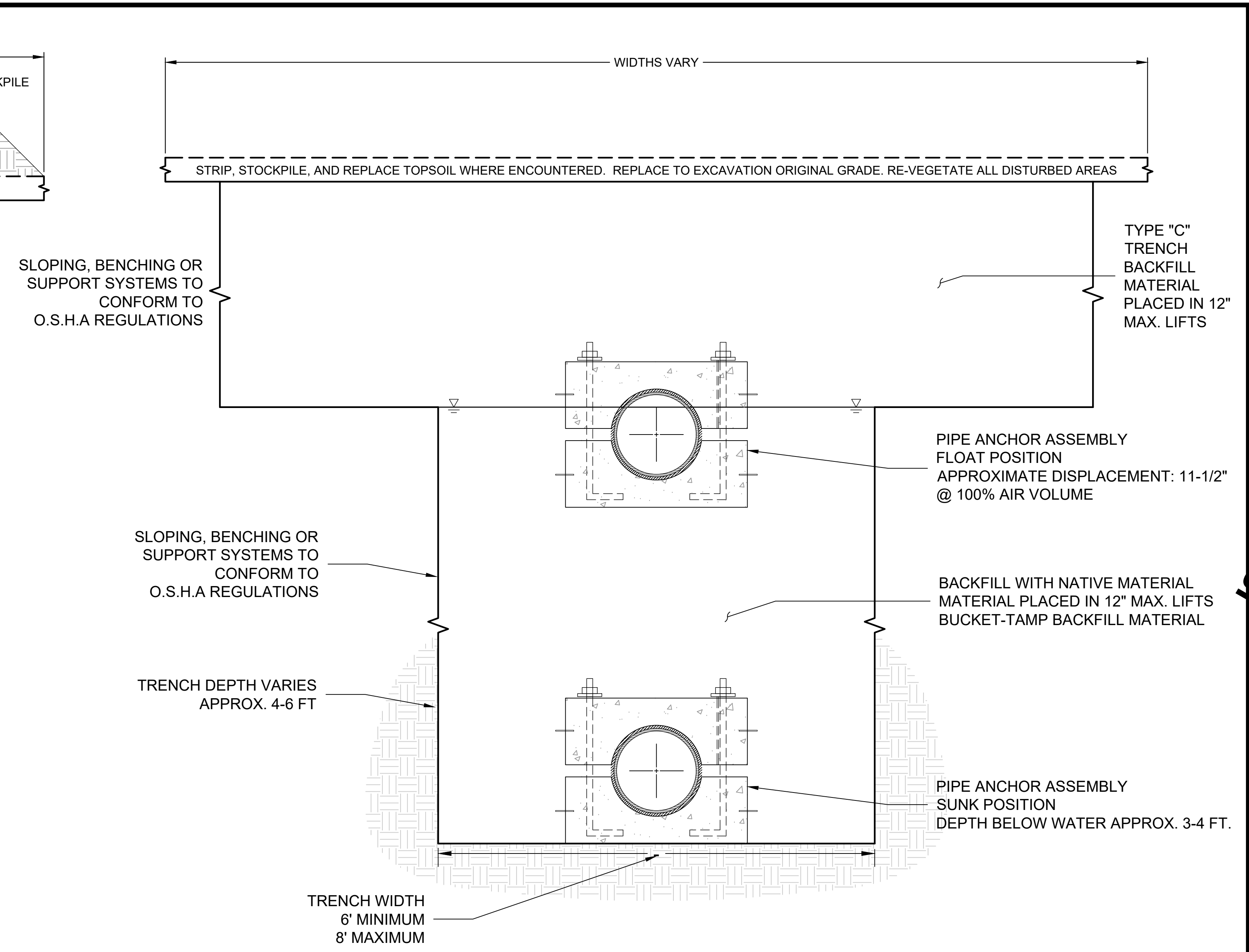
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**1 TRENCH DETAIL: CONVENTIONAL TRENCHING (UPLAND)**  
Scale: NTS



**2 TRENCH DETAIL: RIPARIAN AREAS**  
Scale: NTS

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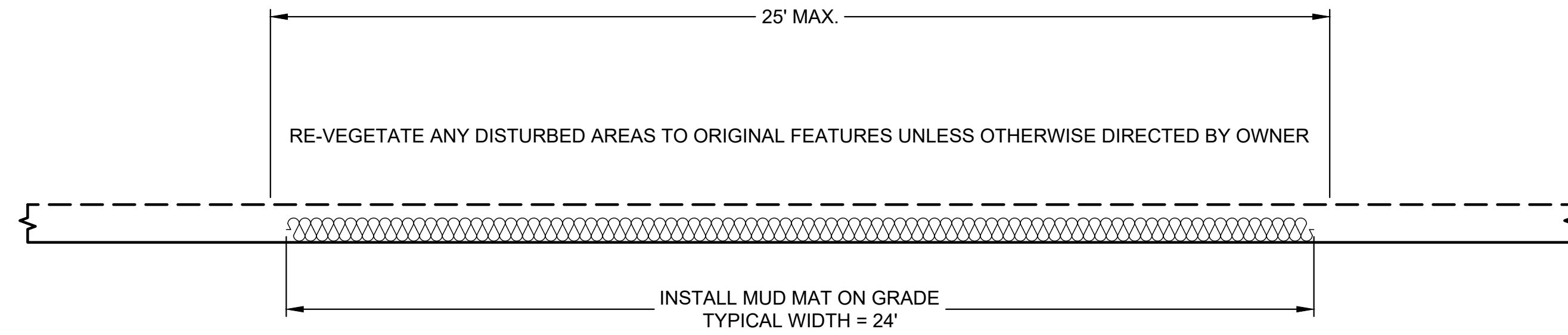
**TRENCH DETAILS**

PROJECT NAME: URRL WINTER HABITAT PIPELINE  
LOCATION: RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
FILE NO: SC-DT01-MTFWPM04.dwg

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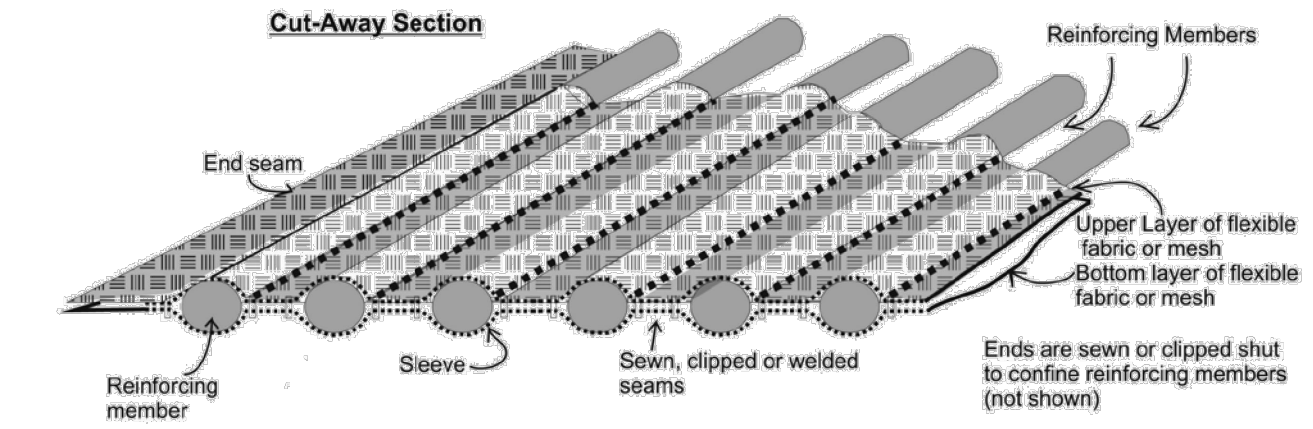


1 TEMPORARY ACCESS ROAD DETAIL: SECTION VIEW  
Scale: NTS

**GENERAL NOTES:**

1. INSTALL SUB GRADE PROTECTION MATS IN ACCORDANCE WITH MANUFACTURE'S RECOMMENDATIONS.
2. REMOVE MATS AT THE COMPLETION OF THE PROJECT. REPLACE TOPSOIL TO ORIGINAL GRADE AND RE-VEGETATE ALL DISTURBED AREAS.

**Mud Mats**



Property	Test	Unit	Value
<b>Mechanical</b>			
Grab Tensile Strength	ASTM-D4632	N (lbf)	3570 (802.6)
Apparent Breaking Elongation	ASTM-D4632	%	25 / 18
Puncture Resistance	ASTM-D4833	N (lbf)	1665 (374.3)
Mullen Burst	ASTM-D3786	kPa (psi)	3150 (456.88)
Trapezoidal Tearing Strength	ASTM-D4533	N (lbf)	2700 (607)
Apparent Opening Size	ASTM-D4751	mm (US Sieve)	0.212 (70)
Constant Head Permittivity	ASTM-D4491	l/min/m <sup>2</sup> (g/min/ft <sup>2</sup> )	821 (20.16)
Wide Width Tensile	ASTM-D4595	kg/cm (lbs/in)	122.5 (685.7)
<b>Packaging</b>			
Roll Weight	Measured	kg (lbs)	40 (90)
Roll Width	Measured	m (ft)	2.44 (8)
Roll Length	Measured	m (ft)	4.57 (15)

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Rev: 12/2017

2 ACCESS ROAD SUBGRADE PROTECTION SPECIFICATION

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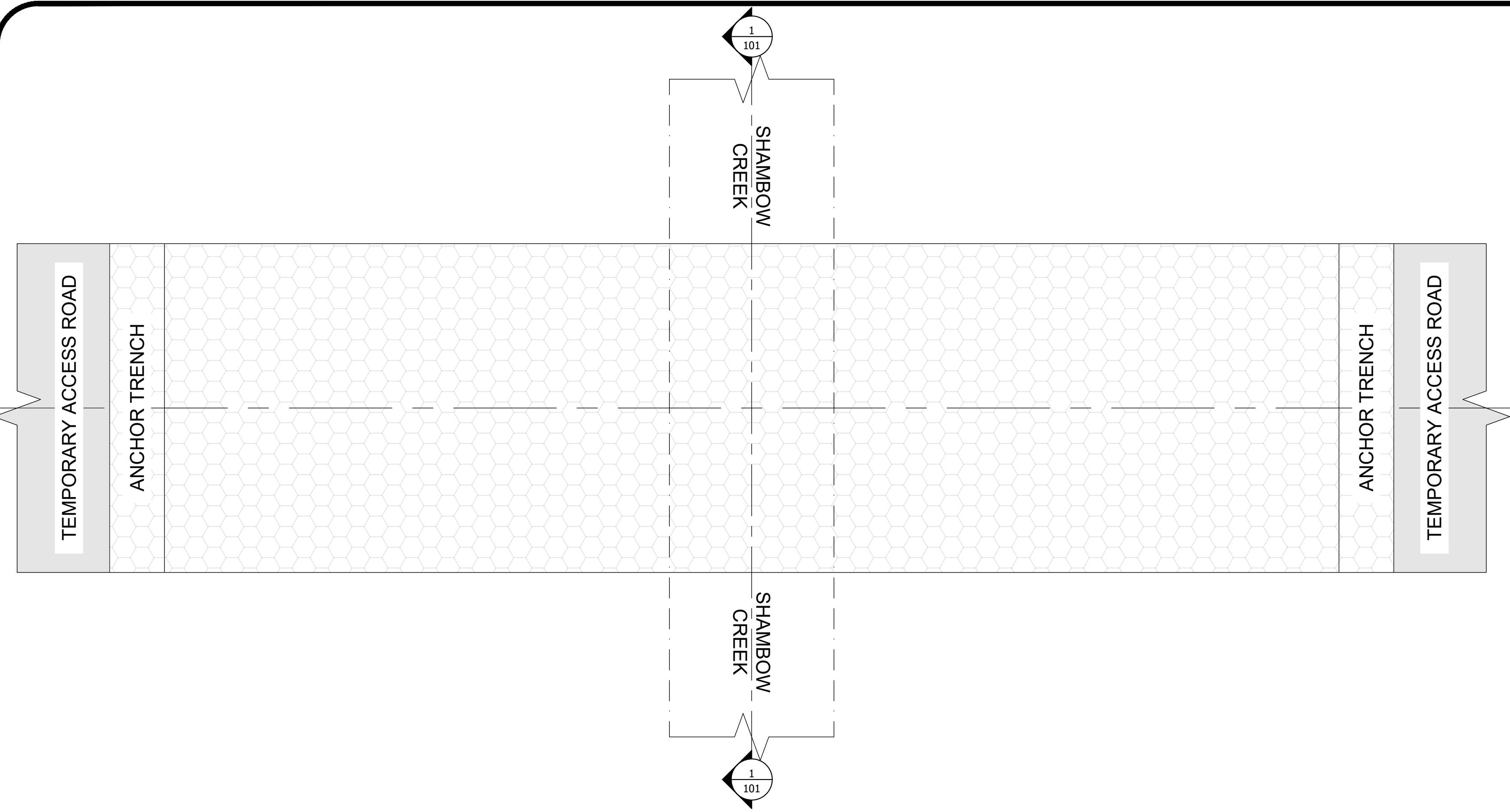
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LOCATION: RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
FILE NO: SC-DT01-MTFWPM04.dwg

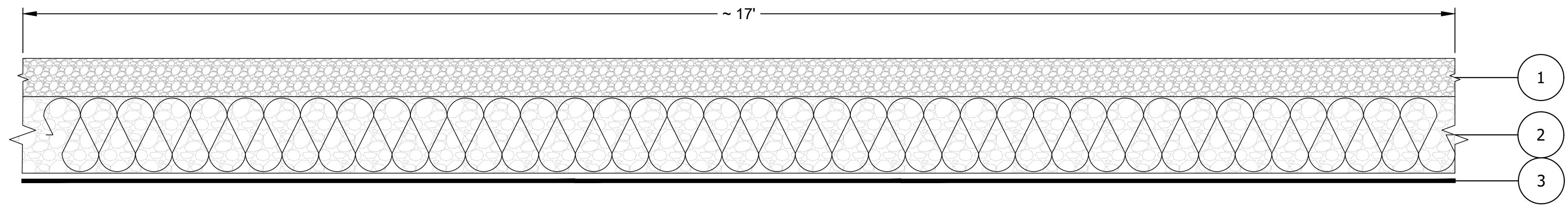
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**1** STREAM CROSSING DETAIL - PLAN VIEW  
Scale: NTS



1. INSTALL 2" THICK 2"-MINUS WASHED ANGULAR ROCK. MATCH FINISHED GROUND TO EXISTING SHAMBOW CREEK ELEVATION AT CROSSING.
2. INSTALL GC30 GEOCELL SUBGRADE STABILIZATION. 4" CELL DEPTH. FILL CELLS WITH 2"-MINUS WASHED ANGULAR ROCK.
3. INSTALL BASELOK FABRI-GRID® ON PREPARED SUBGRADE.

**2** STREAM CROSSING DETAIL: SECTION VIEW  
Scale: NTS

**GC20**  
8.5' x 10.2"  
(224 mm x 259 mm)

**GC30**  
11.3' x 12.6"  
(287 mm x 320 mm)

**GC40**  
18.7' x 20"  
(475 mm x 508 mm)

**SELECTION GUIDE**

Base Stabilization			
Application	Cell Aperture	Cell Depth	Other Materials
Light Applications Trails, Bike Lanes, ATV Trails & Foot/Horse Paths	GC20	3" (7.5 cm) or 4" (10 cm)	6 oz non woven fabric
Non-Industrial Passenger Vehicles & Light Industrial	GC20 or GC30	3" (7.5 cm) or 4" (10 cm)	6 oz non woven fabric
Industrial 18-Wheelers, Oil & Gas, Mining & Heavy Industrial	GC30	4" (10 cm), 6" (15 cm) or 8" (20 cm)	6 oz non woven fabric, FabGrid™
Heavy Applications, Fire Trucks & H-20 Loading	GC20 or GC30	6" (15 cm) or 8" (20 cm)	FabGrid,™ high strength woven fabric.
Subbase Stabilization	GC40	6" (15 cm) or 8" (20 cm)	Non woven fabric, geomembrane

Slopes		Channels		
Slope Steepness	Cell Aperture	Cell Depth	Flow Velocity	Infill Material
6:1, 5:1 or less	GC40	3" (7.5 cm) or 4" (10 cm)	Up to 10 ft/s (3 m/s)	Angular Rock
4:1	GC20 or GC30	3" (7.5 cm) or 4" (10 cm)	Up to 20 ft/s (6 m/s)	Vegetated Soil
3:1	GC30	4" (10 cm) or 6" (15 cm)	Over 20 ft/s (6 m/s)	Concrete
2:1	GC20 or GC30	6" (15 cm)		
1:1 or steeper	GC20 or GC30	6" (15 cm) or 8" (20 cm)		

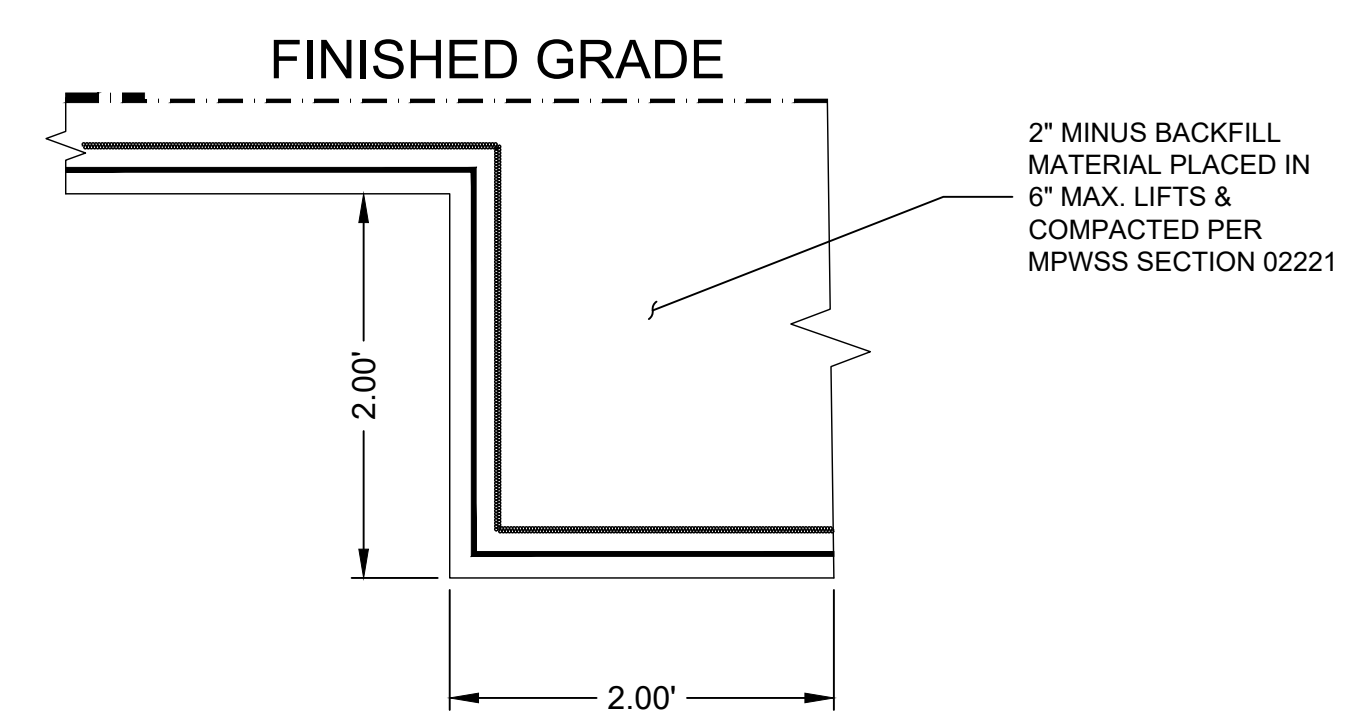
Retaining Walls <sup>1</sup> (GC30)	
Cell Embedment	Panel Expansion <sup>2,3</sup>
3 cells	17.85' (5.44 m) x 2.63' (0.80 m)
4 cells	17.85' (5.44 m) x 3.5' (1.07 m)
5 cells	17.85' (5.44 m) x 4.38' (1.33 m)
6 cells	17.85' (5.44 m) x 5.26' (1.6 m)

<sup>1</sup>Cell depth 6" (15 cm) or 8" (20 cm)  
<sup>2</sup>Custom front to back dimensions available upon request  
<sup>3</sup>Front Strip solid and black, green or tan in color

BASELOK® | GEOCELL | 15

**3** GEOCELL SPECIFICATION

**GENERAL NOTES:**  
1. INSTALL GEOCELL AND NON-WOVEN GEOTEXTILE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.



**4** ANCHOR TRENCH DETAIL  
Scale: NTS

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SHAMBOW CREEK CROSSING DETAILS

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LOCATION: RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
FILE NO.: SC-DT01-MTFWPM04.dwg

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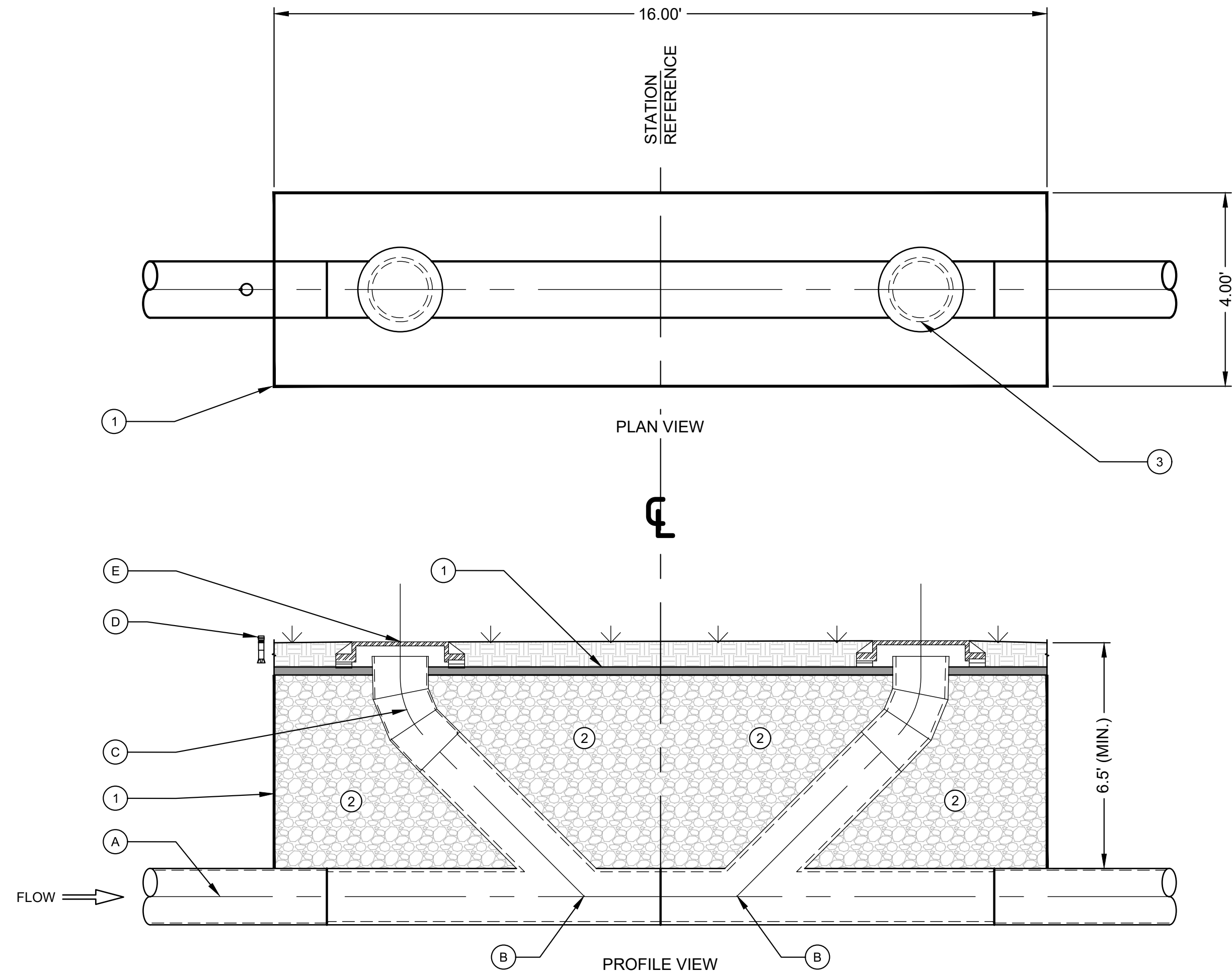
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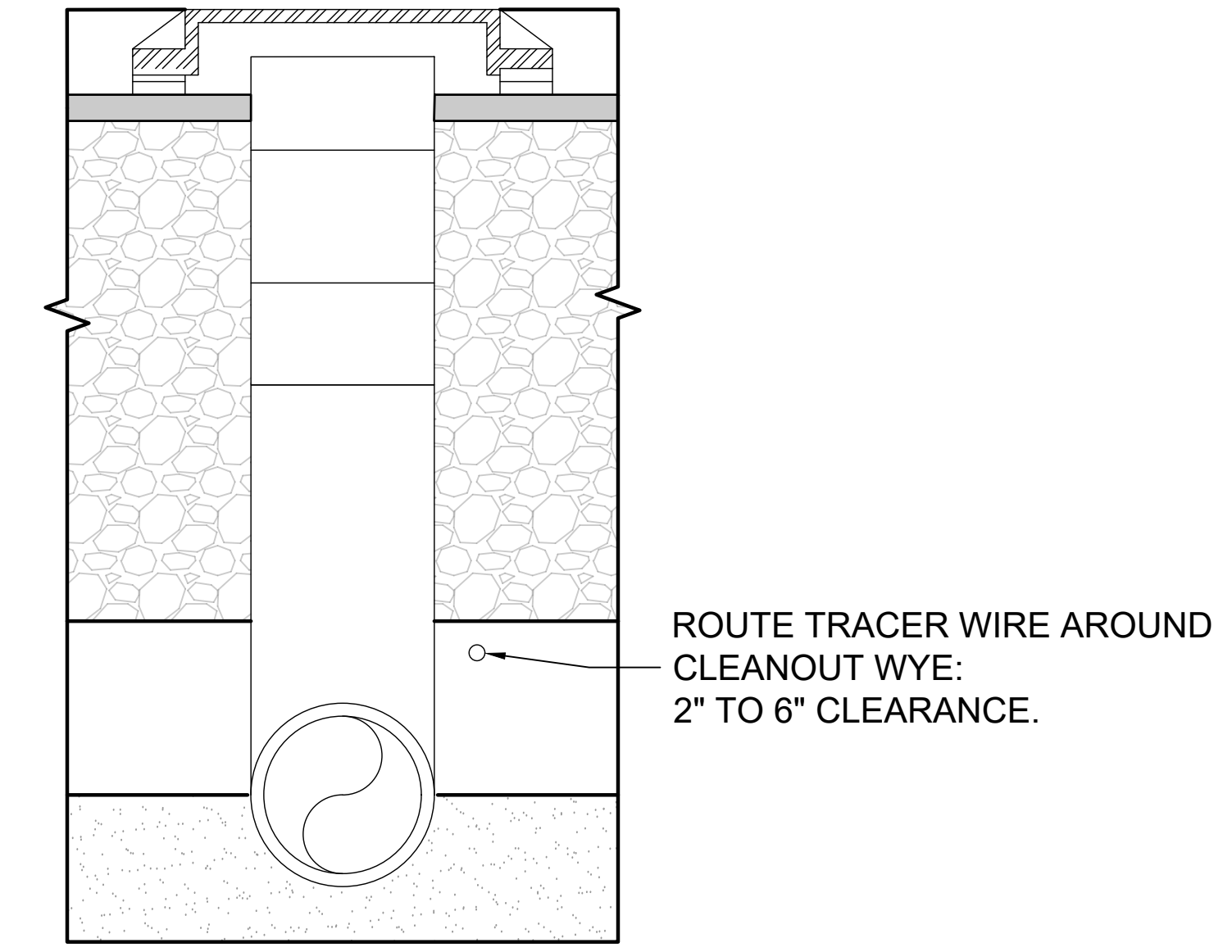
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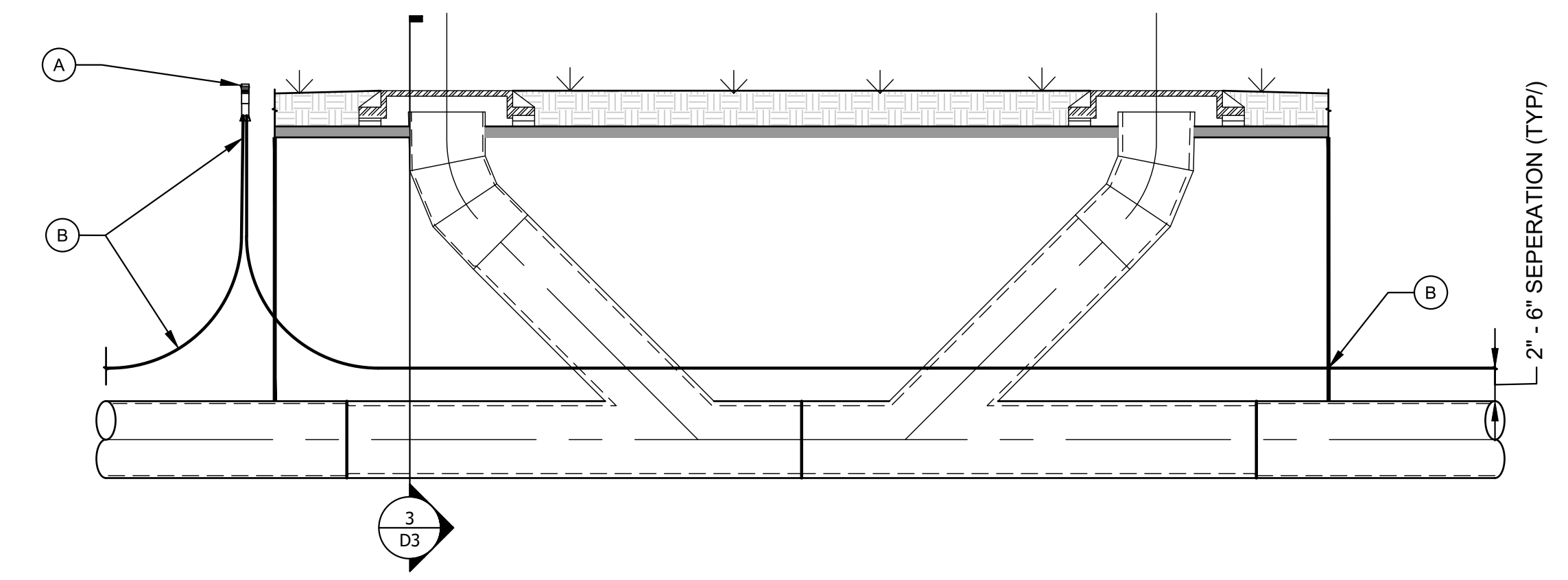


- (A) 14" (IPS) DR-32.5 HDPE PIPE
- (B) 14" (IPS) DR-17 HDPE 45° LATERAL WYE - FABRICATED  
NOTE: MANUFACTURER TO BEVEL (2) PIPE ENDS TO DR-32.5
- (C) 14" (IPS) DR-32.5 HDPE 45° FABRICATED ELBOW: THREE-SEGMENT MITERED BEND
- (D) COPPERHEAD SNAKEPIT® TRACER WIRE ACCESS BOX OR COBRA T2 ABOVE-GRADE TEST STATION. APWA COLOR CODE: BLUE.
- (E) 24" Ø CAST IRON MANHOLE LID AND FRAME WITH GRADE RINGS. MATCH RIM ELEVATIONS TO EXISTING GRADE.
- (1) 2" RIGID FOAM INSULATION BOARD. SUITABLE FOR DIRECT-BURY APPLICATIONS.
- (2) PEA GRAVEL OR C-33 SAND INFILL. LESS THAN 5% PASSING NO. 200 SIEVE.
- (3) FIELD-CORE TWO (2) HOLES IN TOP OF RIGID FOAM INSULATION BOARD AT PIPE OD + 1" DIAMETER.

**1 CLEANOUT DETAIL**  
Scale: NTS



**2 CLEANOUT TRACER WIRE DETAIL - PROFILE VIEW**  
Scale: NTS



- (A) COPPERHEAD SNAKEPIT® TRACER WIRE ACCESS BOX OR COBRA T2 ABOVE-GRADE TEST STATION. APWA COLOR CODE: BLUE. ADJUST 2-6" ABOVE FINISHED GRADE
- (B) ROUTE TRACER WIRE THROUGH RIGID BOARD INSULATION.

**3 CLEANOUT TRACER WIRE DETAIL - SECTION VIEW**  
Scale: NTS

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**CLEANOUT AND TRACER WIRE DETAILS**

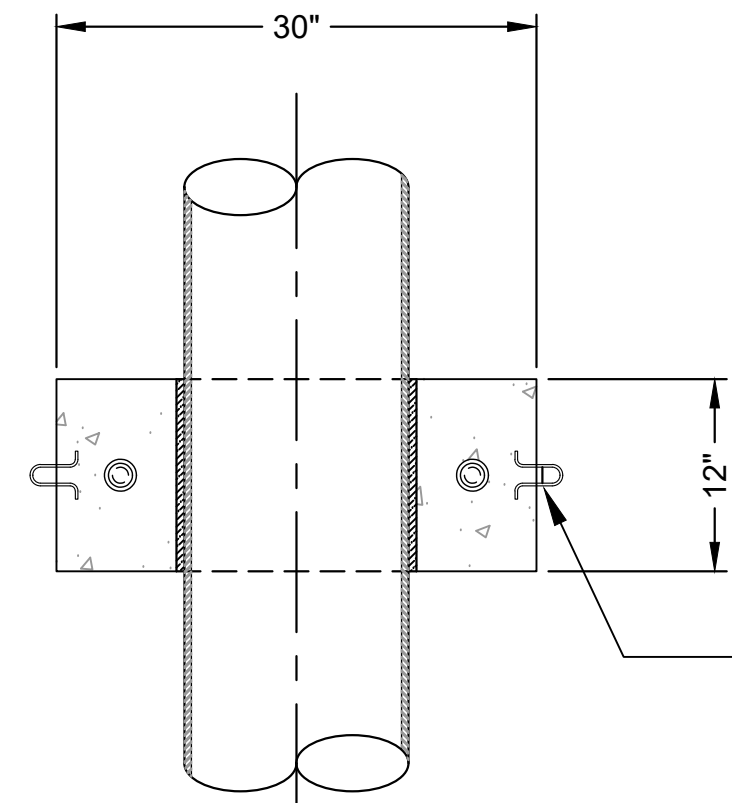
PROJECT NAME: URRIL WINTER HABITAT PIPELINE  
LOCATION: RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
FILE NO.: SC-DT01-MTFWPM04.dwg

JOB NO: MTFWPM04  
DATE: 6/14/23  
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SHEET  
**D8**

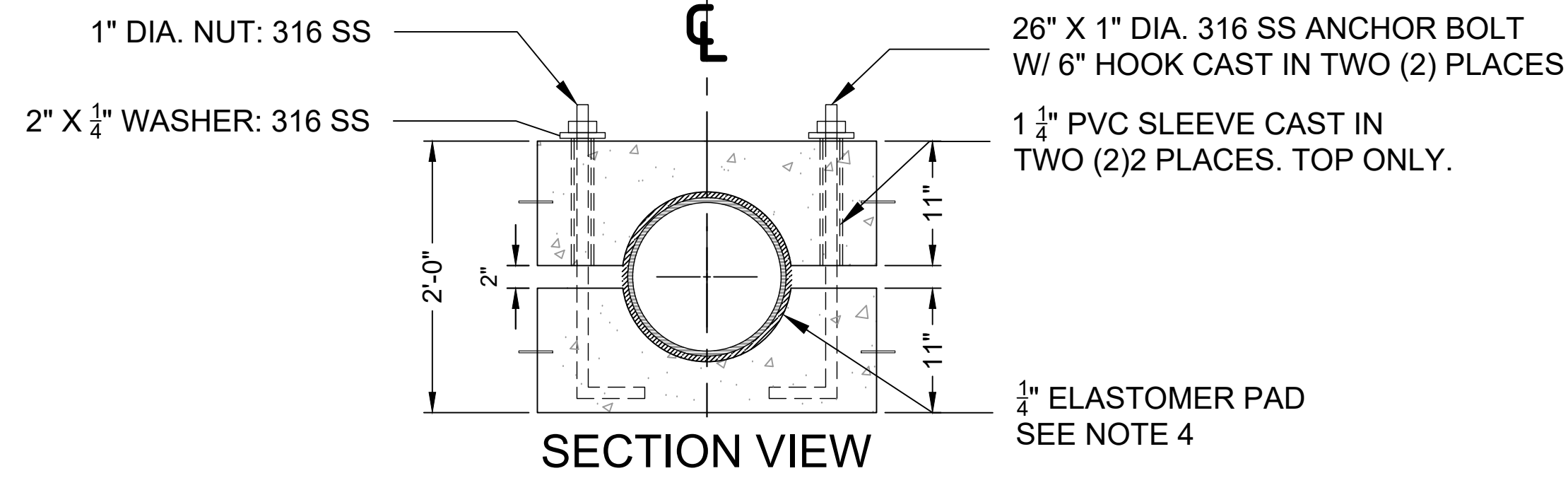
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LIFT HOOKS CAST IN TWO (2) PLACES  
TWO(2) PER BLOCK

PLAN VIEW



26" X 1" DIA. 316 SS ANCHOR BOLT  
W/ 6" HOOK CAST IN TWO (2) PLACES

1 1/4" PVC SLEEVE CAST IN  
TWO (2) PLACES. TOP ONLY.

1/4" ELASTOMER PAD  
SEE NOTE 4

1" DIA. NUT: 316 SS

2" X 1/4" WASHER: 316 SS

SECTION VIEW

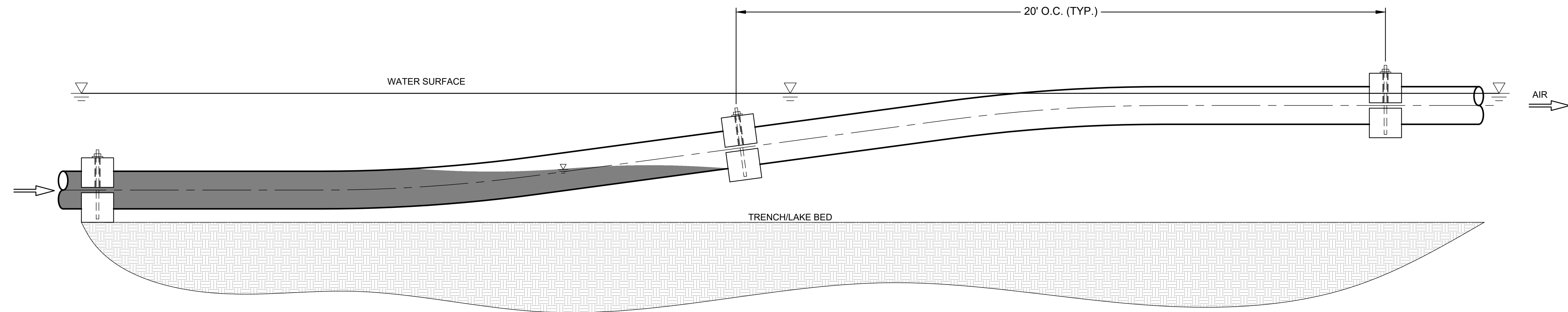
**1 CONCRETE PIPE ANCHOR DETAIL**  
Scale: NTS

**GENERAL NOTES:**

1. CONCRETE: FC = 5,000 PSI @ 28 DAYS MINIMUM. TYPE III PORTLAND CEMENT, 5% TO 8% ENTRAINED AIR. WATER /CEMENT RATIO NOT TO EXCEED 0.44
2. STEEL REINFORCEMENT CONFORMS TO LATEST ASTM SPECIFICATION: ASTM A-615 GRADE 60 BLACK DEFORMED BARS 3" MINIMUM COVER. MANUFACTURER TO SUBMIT ALL SHOP DRAWINGS INCLUDING REBAR REINFORCEMENT DETAILS TO ENGINEER FOR APPROVAL.
3. ANCHOR BOLTS, NUTS, & WASHERS ARE 316 STAINLESS STEEL
4. SUPPLY WITH 2 PIECES COMMERCIAL GRADE NEOPRENE RUBBER (PER SIDE) 1,000 PSI TENSILE STRENGTH, BLACK, SHORE A50 DUROMETER HARDNESS
5. MAXIMUM PIPE OD FOR THIS ANCHOR IS 14"
6. WEIGHT ESTIMATE IS BASED ON HOLE SIZED SPECIFIED.
7. TO BE FIELD-ASSEMBLED BY CONTRACTOR

**ESTIMATED WEIGHTS**

TOP: 267 LBS  
BOTTOM: 267 LBS



PIPE  
SUBMERSION  
FLOW RATE:  
**80 GPM MIN.**  
**100 GPM MAX.**

20' O.C. (TYP.)

WATER SURFACE

TRENCH/LAKE BED

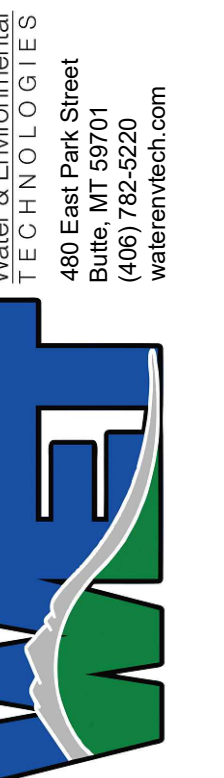
AIR

**2 PIPE SUBMERGENCE DETAIL**  
Scale: NTS

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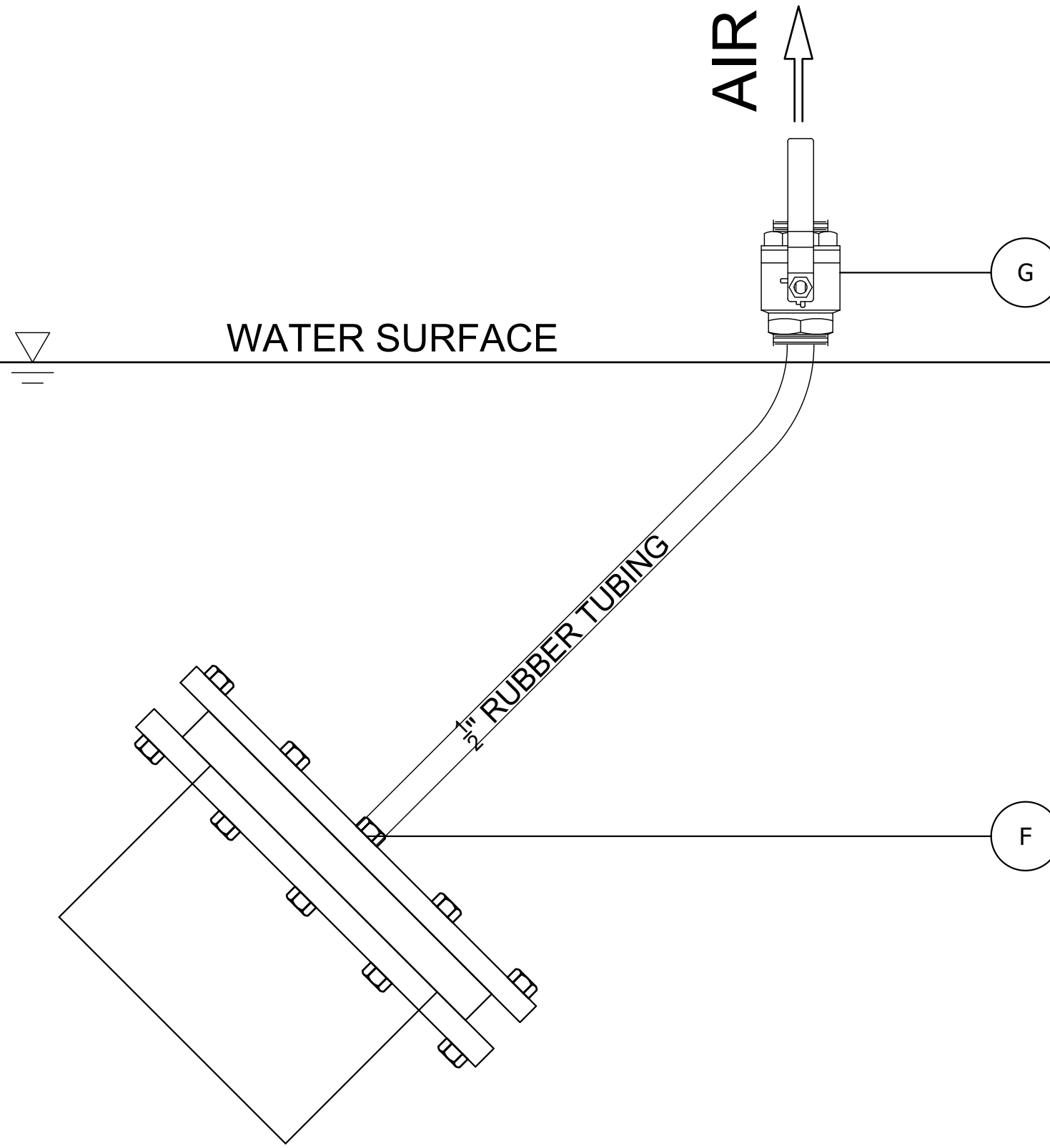
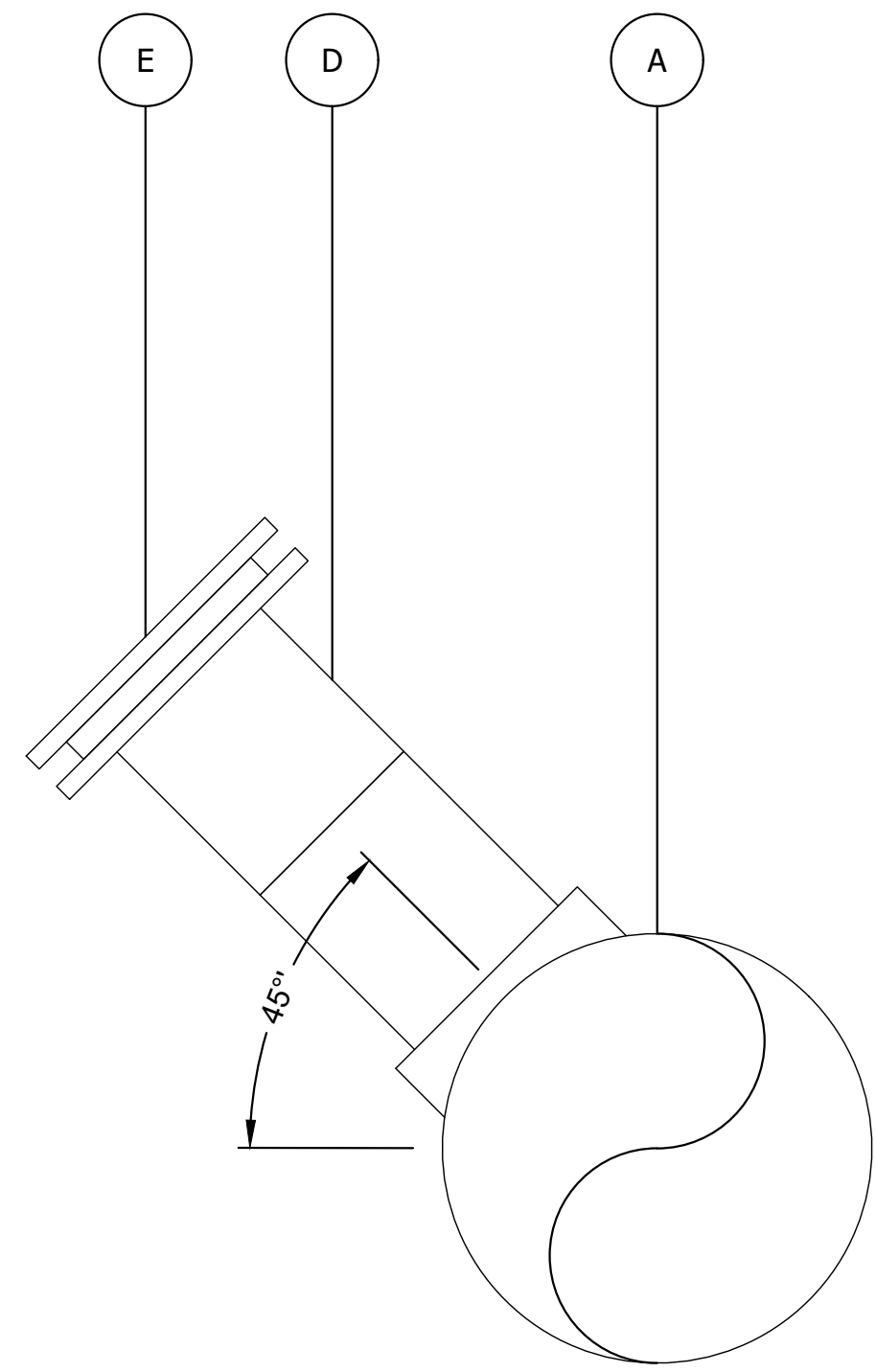
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**PIPE ANCHOR AND PIPELINE  
SUBMERGENCE DETAILS**

PROJECT NAME: URRL WINTER HABITAT PIPELINE  
LOCATION: RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
FILE NO: SC-DT01-MTFWPM04.dwg

JOB NO: MTFWPM04  
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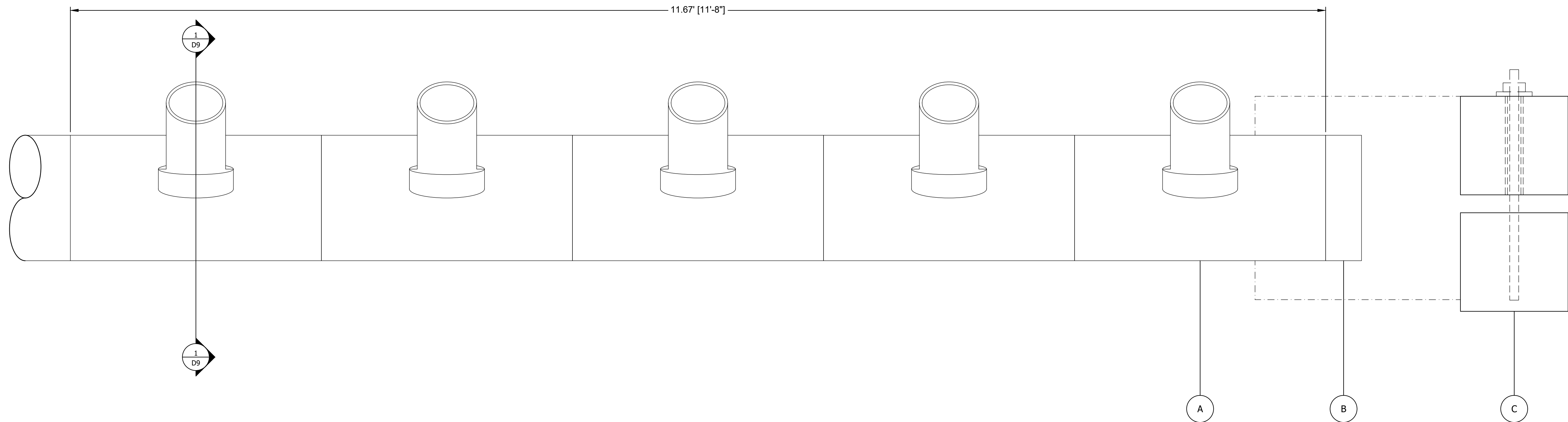
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**D9**



- (A) 14"x6" (IPS) DR-26 HDPE BRANCH SADDLE REDUCING TEE. FIVE (5) TOTAL.
- (B) 14" Ø (IPS) DR26 END CAP.
- (C) CONCRETE PIPE BALLAST BLOCK.
- (D) 6" Ø (IPS) DR26 HDPE FLANGE ADAPTER W/ SS BACKUP RING. FIVE (5) TOTAL.
- (E) 6" TEMPORARY BLIND FLANGE. FIVE (5) TOTAL.
- (F) WATER-TIGHT CONNECTION TO BLIND FLANGE.
- (G) TEMPORARY 1/2" BALL VALVE. FIVE (5) TOTAL.

NOTES:

1. ENSURE BALL VALVES ARE OPEN AND ABOVE WATER WHILE SUBMERGING THE PIPELINE.
2. REMOVE TEMPORARY BLIND FLANGES ONCE PIPELINE IS SUBMERGED.
3. INSTALL CONCRETE BALLAST BLOCK AT END OF DIFFUSER PORT ASSEMBLY. SHOWN SEPARATE FOR CLARITY.



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**DIFFUSER DETAILS**

PROJECT NAME: URRL WINTER HABITAT PIPELINE  
 LOCATION: RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
 FILE NO.: SC-DT01-MTFWPM04.dwg

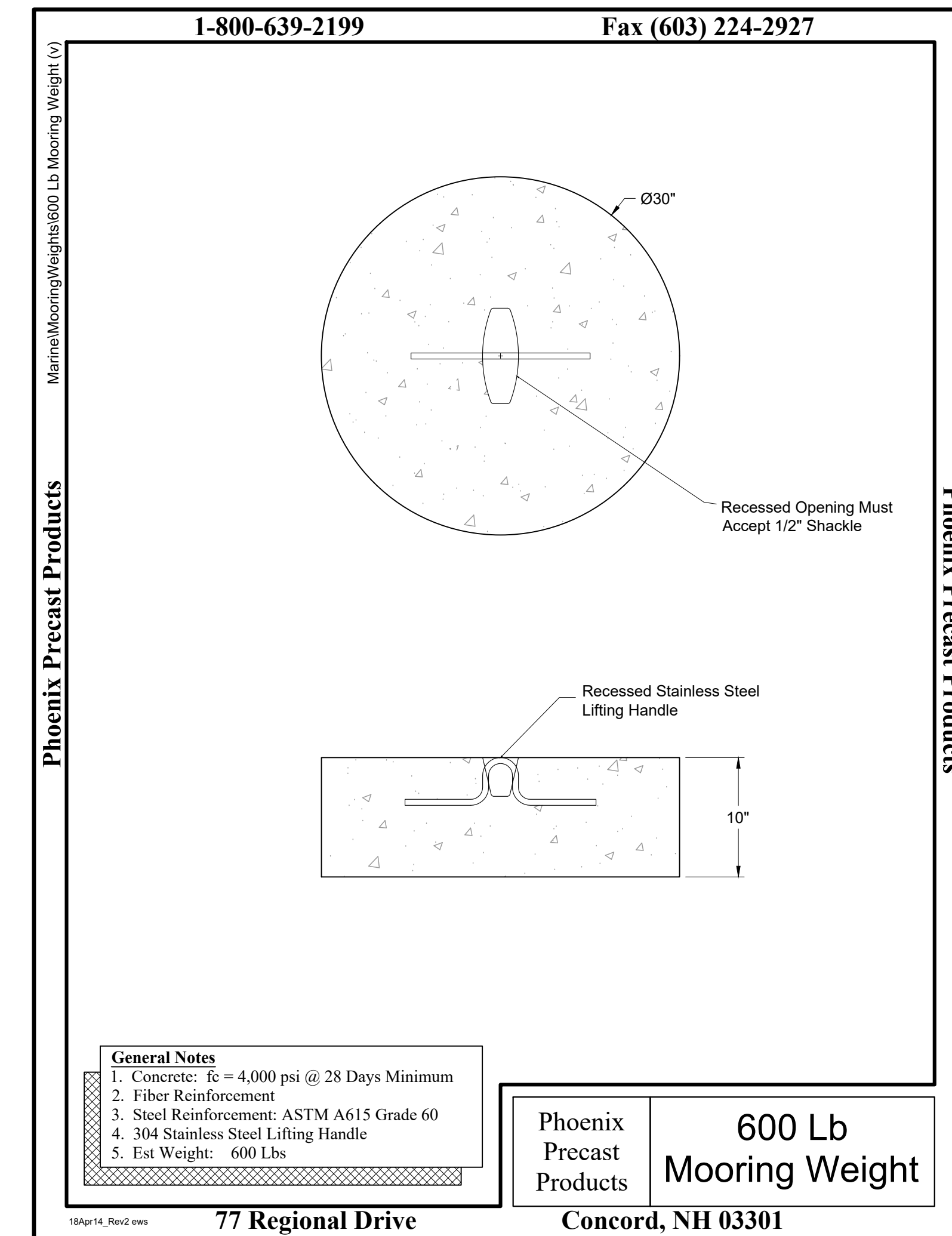
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**D10**

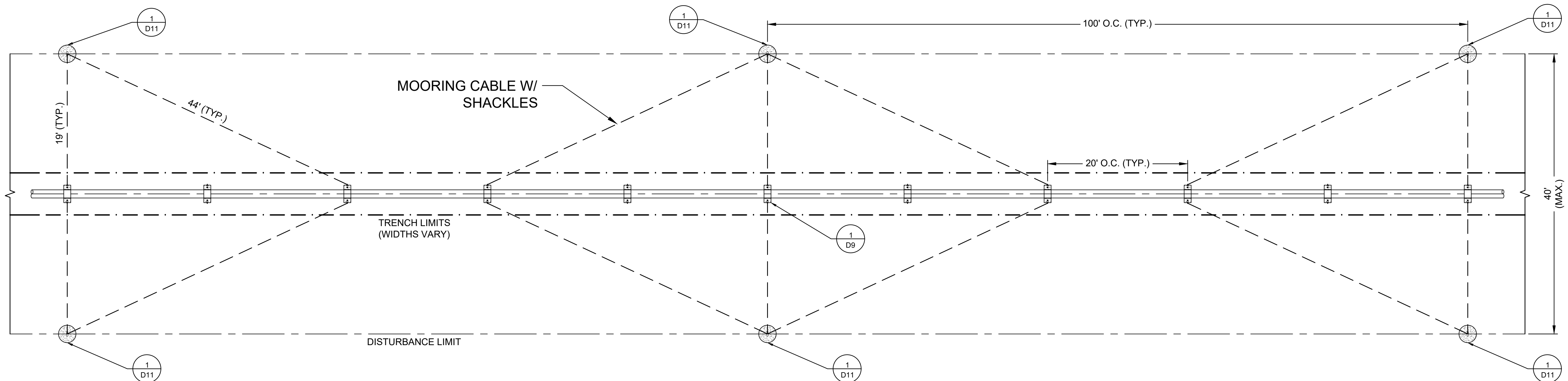


**SHEET NOTES:**

1. FURNISH AND INSTALL MOORING ANCHORS SPACED 100 FT. O.C. EACH SIDE OF THE PIPELINE CENTERLINE. MAXIMUM OFFSET FROM PIPELINE CENTERLINE TO CENTER OF MOORING ANCHORS IS 20 FT. OFFSET DISTANCES MAY VARY.
2. CAREFULLY OBSERVE WEATHER CONDITIONS. IF WIND SPEEDS ARE EXCESSIVE, HALT INSTALLATION OF THE PIPELINE AND SECURE MOORING CABLES UNTIL WEATHER CONDITIONS IMPROVE. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING SAFE WORKING CONDITIONS AND FOR MAINTAINING THE INTEGRITY OF THE PIPE DURING INSTALLATION. DAMAGE TO PIPE DURING INSTALLATION MUST BE REPAIRED AT NO ADDITIONAL COST TO THE OWNER.
3. FURNISH AND INSTALL MOORING CABLES WITH SHACKLES. CONNECT MOORING CABLES TO MOORING AND PIPELINE ANCHORS SO THAT PIPELINE IS SECURE DURING INCLEMENT WEATHER CONDITIONS OR DURING PAUSES IN INSTALLATION.
4. ENSURE MOORING IS DISCONNECTED WHEN SUBMERGING THE PIPELINE. MOORING SHOULD BE DISCONNECTED A MAXIMUM OF 100 FEET AHEAD OF SUBMERGING PIPE. PIPE SUBMERGENCE RATE = 5-8 MINUTES PER 100 FEET.
5. ACCESS TO RIPARIAN AREAS IS LIMITED. ENSURE PROPER EQUIPMENT FOR ACCESS IS AVAILABLE DURING THE PROJECT.



**1 TYPICAL MOORING ANCHOR**  
Scale: NTS



**1 MOORING ANCHOR PLAN: PLAN VIEW**  
Scale: NTS

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**PIPELINE MOORING PLAN**

PROJECT NAME: URRL WINTER HABITAT PIPELINE  
LOCATION: RED ROCK LAKES NATIONAL WILDLIFE REFUGE  
FILE NO.: SC-DT01-MTFWPM04.dwg

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