

CONSTRUCTION DRAWINGS FOR FOR BIDDING PURPOSES ONLY OGLALA SIOUX TRIBE HWY 73 NORTH WATERLINE RELOCATIONS

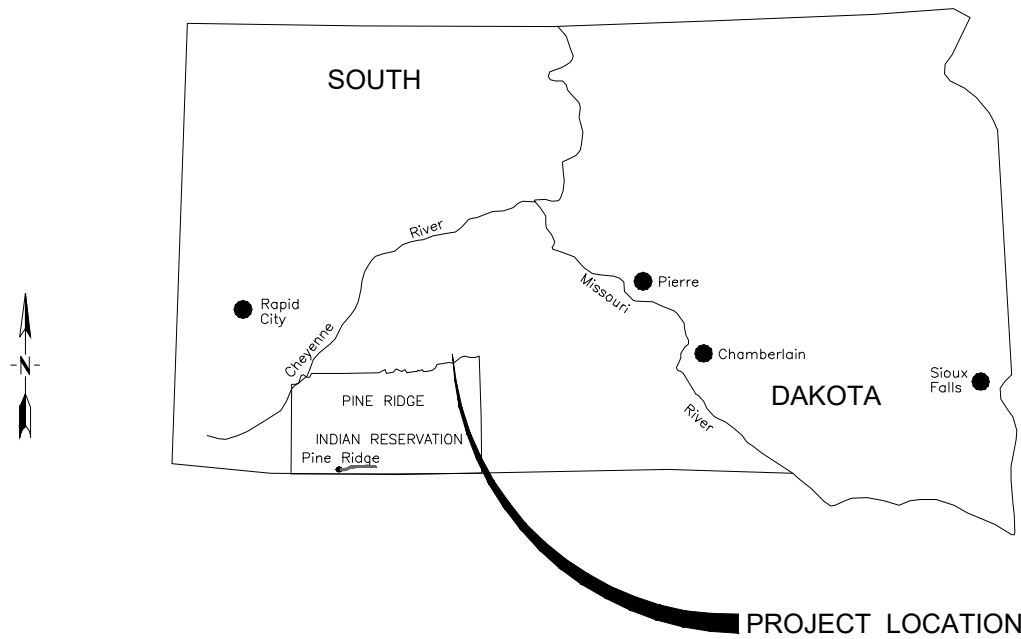
JACKSON COUNTY, SOUTH DAKOTA
 JUNE 2024

PCN 05HV
 MM P/N 2246.029.17

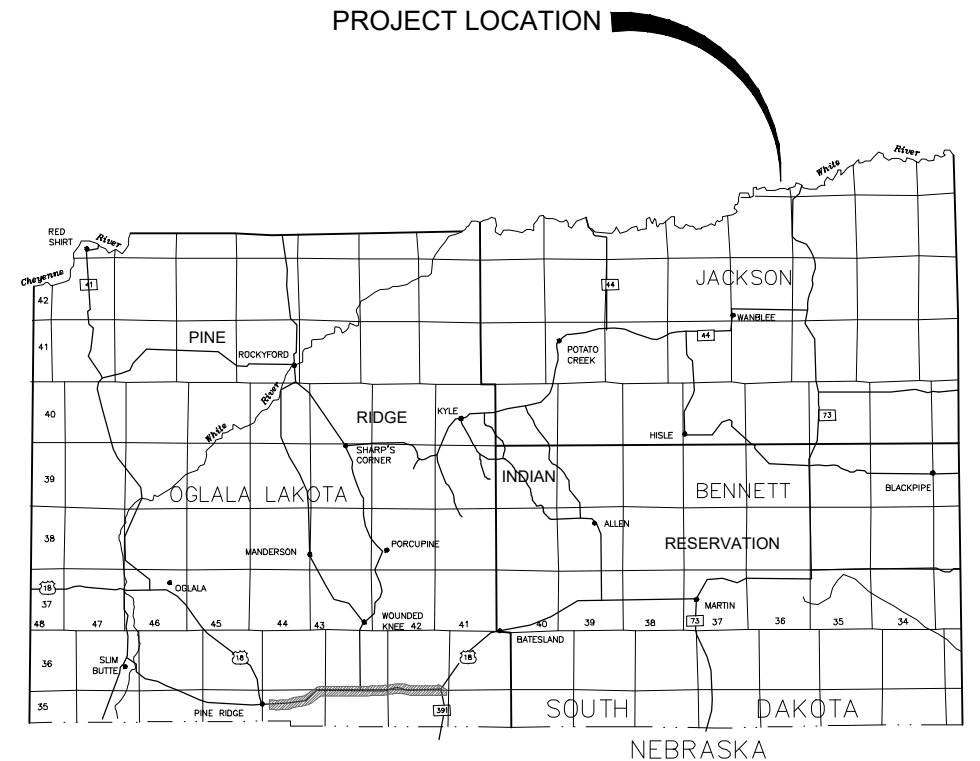
PREPARED BY:



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LOCATION MAP
 NOT TO SCALE



VICINITY MAP
 NOT TO SCALE

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06-07-2024

APPROVED BY: Michael R. Kynett
 MICHAEL KYNETT, P.E.
 PROJECT ENGINEER

APPROVED BY: _____
 CHUCK JACOBS
 DIRECTOR OF WATER MAINTENANCE
 AND CONSERVATION

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QUALITY ASSURANCE	
CRAIG NOWAK PROJECT MANAGER	Q.A. APPROVAL DATE 2246.029.17.088
JEFF WIEGAND OFFICE QUALITY ASSURANCE COORDINATOR	Q.A. PROJECT NUMBER
CRAIG NOWAK PEER REVIEWER	

SET NO. _____
 MORRISON-MAIERLE PROJECT NO. 2246.029.17

Q:\24\BIM\HIGHWAY 73 NORTH PIPELINE RELOCATIONS\ACAD\SHHEE\TS\029_CS.DWG PLOTTED BY LANE URICK ON JUN 24 2024

FOR BIDDING PURPOSES ONLY

GENERAL NOTES

WATER PIPELINE REPLACEMENT QUANTITIES

ITEM NO.	DESCRIPTION OF ITEM	ESTIMATED QTY	UNIT
451E0616 ¹	16" PVC WATER MAIN	14210	FT
451E0620	20" PVC WATER MAIN	520	FT
451E3903	3" AIR RELEASE VALVE ASSEMBLY	20	EACH
451E3904	4" AIR RELEASE VALVE ASSEMBLY	1	EACH
451E4585	FIRE HYDRANT WITH AUXILIARY VALVE AND BOX	22	EACH
451E4918	IMPORTED TRENCH BACKFILL	20	CY
451E5100	BORE AND JACK 1.5" PIPE	550	FT
451E5116	BORE AND JACK 16" PIPE	385	FT
451E5120	BORE AND JACK 20" PIPE	140	FT
451E6100	RECONNECT WATER SERVICE	4	EACH
451E6105	CONNECT TO EXISTING WATER MAIN	18	EACH

¹ INCLUDES 12330 FT OF CL165 PIPE AND 1880 FT OF CL235 PIPE

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS. WATER MAIN WORK SHALL BE PAID PER SECTION 01150 MEASUREMENT AND PAYMENT OF THE WATER MAIN RELOCATION SPECIFICATIONS.
2. EXISTING UTILITIES ARE SHOWN BASED ON INFORMATION AVAILABLE TO THE ENGINEER AND MAY NOT BE COMPLETE OR MAY VARY IN LOCATION. CONTRACTOR IS RESPONSIBLE FOR CONTACTING UTILITIES FOR LOCATION BEFORE EXCAVATION (WITHIN REQUIRED TIME FRAME), AND IS RESPONSIBLE FOR PROTECTION OF ALL UTILITIES WHETHER OR NOT THE UTILITIES ARE SHOWN ON THE PLANS.
3. CONTRACTOR IS RESPONSIBLE FOR PROTECTION OF ALL STRUCTURES ENCOUNTERED ALONG THE PIPELINE ROUTE AND OTHER CONSTRUCTION AREAS. ALL DAMAGED FENCES ARE TO BE REPAIRED TO EXISTING CONDITION OR BETTER. WHERE BILLBOARDS MUST BE DISTURBED, CONTRACTOR SHALL TAKE CARE TO NOT DAMAGE THE STRUCTURE AND WILL COMPENSATE OWNER FOR ANY DAMAGE TO SIGN. IT IS HIGHLY RECOMMENDED THAT THE CONTRACTOR CARRY OUT A STRUCTURAL SURVEY TO IDENTIFY CONDITIONS OF ANY STRUCTURES THAT MIGHT HAVE ANY POTENTIAL OF DISTURBANCE BY THE PROJECT. SAID STRUCTURAL SURVEY WOULD CONSIST OF PHOTOGRAPHS OR VIDEO TAPING BOTH BEFORE AND AFTER CONSTRUCTION.
4. THE CONTRACTOR SHALL CALL FOR THE EXISTING UTILITY LOCATION STAKES 48 HOURS PRIOR TO DIGGING. CALL LOCATING SERVICE AND ALL APPLICABLE UTILITY COMPANIES AS NECESSARY.
5. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH HIS PROPOSED PIPE SYSTEM LAYOUT FOR REVIEW PRIOR TO ORDERING ANY PIPE MATERIALS. LAYOUT SHALL INCLUDE DEPTH OF BURY, PRESSURE CLASS FOR DUCTILE IRON PIPE, WALL THICKNESS AND MATERIAL GRADE FOR STEEL AND DIMENSION RATIO (DR) FOR PVC AS APPROPRIATE.
6. ALL DEBRIS RESULTING FROM CONSTRUCTION OPERATING SHALL BE HAULED OFF-SITE AND DISPOSED OF PROPERLY AT THE CONTRACTOR'S EXPENSE.
7. ALL AREAS DISTURBED BY GRADING ACTIVITIES, INCLUDING STAGING/STORAGE AND HAUL ROUTES, SHALL BE EITHER PAVED OR SEEDED AND RETURNED TO THEIR ORIGINAL CONDITION.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR LAYING OUT ALIGNMENTS, LOCATIONS, AND GRADES OF THE NEW WATER LINES AND APPURTANCES.
9. PRESERVE AND PROTECT SURVEY MONUMENTS AND MARKERS THROUGHOUT CONSTRUCTION. IF DAMAGE OCCURS OR REMOVAL BECOMES NECESSARY, IMMEDIATELY NOTIFY ENGINEER AND RESTORE MONUMENT OR MAKERS TO ORIGINAL CONDITION. RESTORATION TO BE AT THE CONTRACTOR'S SOLE EXPENSE. PRESERVE PRIVATE AND PUBLIC MONUMENTS THAT ARE FOUND. IF MONUMENT MUST BE REMOVED, REPLACE AT ORIGINAL LOCATIONS USING REGISTERED LAND SURVEYOR. NOTIFY ENGINEER WHEN MONUMENTS ARE ENCOUNTERED. IF GOVERNMENT MONUMENTS ARE ENCOUNTERED, REFERENCE THE MONUMENT FOR LATER REPLACEMENT AND PROVIDE 10-DAY ADVANCE NOTIFICATION TO ENGINEER WHO WILL NOTIFY THE PROPER AUTHORITY.
10. CONTRACTOR SHALL MAKE EVERY ATTEMPT TO AVOID DISTURBANCE OF NATURAL VEGETATION TO SUCH EXTENT THAT IS REASONABLE. ALL DISTURBED AREAS SHALL BE RESEEDDED OR RESODDED IN ACCORDANCE WITH CONTRACT SPECIFICATIONS.
11. CONTRACTOR SHALL PROVIDE SEPARATE SPOIL PILES FOR THE FIRST 6 INCHES OF SOIL REMOVED (REFERRED TO AS TOPSOIL), AND REMAINING SOIL. IN AREAS WHERE SHALE IS EXCAVATED, CONTRACTOR SHALL AVOID PLACEMENT OF BROKEN SHALE WITHIN 2 FEET OF PIPE. TOP SOIL (TOP 6 INCHES EXCAVATED) SHALL BE USED FOR THE TOP 6 INCHES OF BACKFILL. ALL EXCESS BACKFILL SHALL BECOME PROPERTY OF THE CONTRACTOR FOR DISPOSAL AT HIS EXPENSE.
12. WATER FOR TESTING THIS PROJECT MAY BE OBTAINED FROM THE OGLALA SIOUX RURAL WATER SUPPLY SYSTEM (OSRWSS). CONTACT OSRWSS STAFF FOR AN APPROVED LOCATION TO OBTAIN CONSTRUCTION WATER. DISPOSAL OF TEST WATER SHALL BE CARRIED OUT IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS. ALL PERMITS MUST BE APPLIED FOR AND PURCHASED BY THE CONTRACTOR UNLESS SPECIFICALLY CALLED OUT A THE RESPONSIBILITY OF OWNER ON THE PLANS OR IN THE CONTRACT DOCUMENTS.
13. ALL REPLACEMENT PIPING ON MAINS TO BE THE SPECIFIED MATERIAL AND PRESSURE CLASS AS DESIGNATED ON THE PLAN SHEETS.
14. PROVIDE THRUST BLOCKING AT ALL BENDS, TEES, REDUCERS AND OTHER SIMILAR LOCATIONS. THE BLOCKING SHALL BE SO PLACED, UNLESS SPECIFICALLY SHOWN OTHERWISE, SO THAT PIPE AND FITTING JOINTS WILL BE ACCESSIBLE FOR REPAIRS. THRUST BLOCKS SHALL BE SIZED FOR HYDROSTATIC TEST PRESSURE. SEE DRAWING G-2 FOR DETAILS. THRUST BLOCKING SHALL BE INCIDENTAL TO WATER MAIN INSTALLATION AND SHALL BE PAID FOR AS PART OF THE WATER MAIN BID ITEMS.
15. ALL CAST IRON DUCTILE PIPE FITTINGS, VALVES, VALVE BOXES AND OTHER MISCELLANEOUS METAL ITEMS SHALL BE WRAPPED IN POLYETHYLENE IN ACCORDANCE WITH AWWA C105 "POLYETHYLENE ENCASEMENT FOR GRAY AND DUCTILE CAST-IRON PIPING FOR WATER AND OTHER LIQUIDS".
16. CONNECT DISSIMILAR PIPE MATERIALS BY MEANS OF A FLEXIBLE COUPLING. INSTALL FITTINGS IN STRICT CONFORMANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. PROVIDE SHOP DRAWING OF SELECTED FITTING FOR APPROVAL PRIOR TO USE.
17. ALL PIPE TO BE INSTALLED IN APPROXIMATE LOCATIONS SHOWN ON THESE PLANS UNLESS SPECIFIC OFFSETS ARE PROVIDED.
18. ALL EXISTING WATER LINES, FITTINGS, AND STRUCTURES TYPE, SIZE AND LOCATIONS ARE APPROXIMATE BASED ON WATER DISTRIBUTION SYSTEM BASE MAPS AND FIELD OBSERVATION. CONTRACTOR TO FIELD VERIFY ALL NEW CONNECTION POINTS.
19. ALL PIPE TO BE INSTALLED WITH A MINIMUM OF 6 FOOT DEPTH OF COVER PER STANDARD DETAIL (02221)
20. ALL GATE VALVES WITH BOXES TO BE INSTALLED PER STANDARD DETAIL (15955)
21. THE CONTRACTOR SHALL FURNISH AND MAINTAIN ALL NECESSARY TRAFFIC CONTROL IN ACCORDANCE WITH THE ROADWAY WORK SPECIFICATIONS.
22. ALL EXISTING UTILITIES AND SERVICE LINES SHALL BE KEPT IN SERVICE AT ALL TIMES DURING CONSTRUCTION OF THIS PROJECT, UNLESS OTHERWISE AUTHORIZED BY OWNER. CONTRACTOR TO PROVIDE TEMPORARY WATER AS NECESSARY.
23. REMOVE AND REPLACE EXISTING WATER LINE MARKER POSTS DISTURBED DURING CONSTRUCTION.
24. REPAIR AND RECONNECT EXISTING TRACER WIRES CUT OR DAMAGED DURING CONSTRUCTION USING METHODS CALLED OUT IN THE SPECIFICATIONS. INSTALL NEW TRACER WIRE ALONG ALL NEW PIPE INSTALLED AND CONNECT TO THE EXISTING TRACER WIRE AT THE WATER MAIN TIE-IN POINTS USING METHODS CALLED OUT IN THE SPECIFICATIONS.
25. THE CONTRACTOR SHALL ADJUST TO GRADE ALL WATER AND GAS VALVE BOXES, AND MANHOLES THAT FALL WITHIN THE LIMITS OF THIS CONTRACT. THE CONTRACTOR SHALL KEEP ALL SAID WATER, GAS, AND EXISTING SEWERS AND THEIR APPURTENANCES FREE OF DEBRIS AND OPERABLE AT ALL TIMES DURING CONSTRUCTION.
26. THE CONTRACTOR SHALL PAY ALL PERMIT AND OTHER ASSOCIATED FEES REQUIRED BY LOCAL, STATE AND FEDERAL AGENCIES.
27. CONTRACTOR SHALL REMOVE ALL ABANDONED WATER LINES AND APPURTANCES AFTER NEW WATER MAINS AND APPURTANCES ARE PLACED INTO SERVICE.
28. CONTRACTOR TO MEET ALL STORM WATER DISCHARGE PERMIT REQUIREMENTS PER SECTION 02221 OF THE SPECIFICATIONS.

G:\24\B\W\HIGHWAY 73 NORTH PIPELINE RELOCATIONS\ACAD\SHSHEET\029_G-1.DWG

<p style="font-size: small;">VERIFY SCALE!</p> <p style="font-size: x-small;">THESE PRINTS MAY BE REDUCED. LINE BELOW MEASURES ONE INCH ON ORIGINAL DRAWING.</p> <p style="text-align: center;">—————</p> <p style="font-size: x-small;">MODIFY SCALE ACCORDINGLY!</p>	<p style="font-size: x-small;">REVISIONS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="font-size: x-small;">NO.</th> <th style="font-size: x-small;">DESCRIPTION</th> <th style="font-size: x-small;">BY</th> <th style="font-size: x-small;">DATE</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>REV 6/21/2024</td> <td style="text-align: center;">MRK</td> <td style="text-align: center;">6/21/2024</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	NO.	DESCRIPTION	BY	DATE	1	REV 6/21/2024	MRK	6/21/2024												
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DRAWN BY: KRL

DSGN. BY: MRK

APPR. BY: CLN

DATE: 06/07/2024

Q.C. REVIEW BY: _____

DATE: _____

OGLALA SIOUX TRIBE HWY 73 NORTH
WATERLINE RELOCATIONS

JACKSON COUNTY

SOUTH DAKOTA

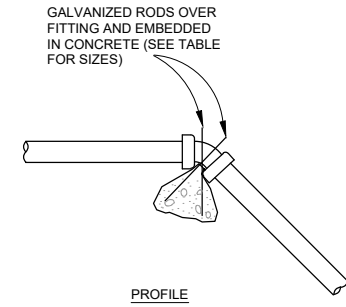
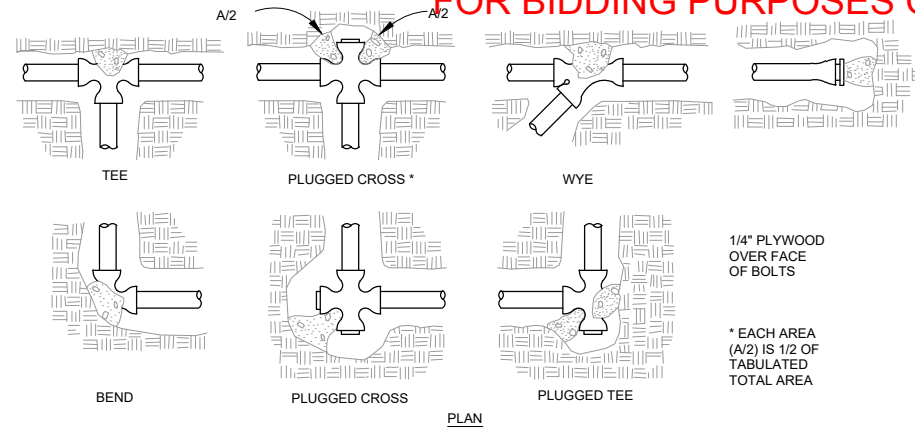
ESTIMATE OF QUANTITIES AND GENERAL NOTES

PROJECT NUMBER 2246.029.17
SHEET NUMBER 1
DRAWING NUMBER G-1

FOR BIDDING PURPOSES ONLY

HORIZONTAL BENDS - BEARING AREA OF THRUST BLOCKS IN SQ. FT. (150 PSI LINE PRESSURE, 2000LB/SF SOIL BEARING PRESSURE)								
FITTING SIZE	TEE, WYE, PLUG, OR CAP	90° BEND PLUGGED CROSS	TEE PLUGGED RUN		BEND ANGLE			
			A1	A2	45°	22 1/2°	11 1/4°	
2	0.75	1.13	1.13	0.75	-	-	-	-
3	1.13	1.50	1.50	1.13	1.13	0.75	-	-
4	1.50	2.10	2.85	2.10	1.50	1.13	-	-
6	3.15	4.50	6.45	4.50	2.40	1.50	1.13	-
8	5.70	7.95	11.4	8.10	4.35	2.25	1.50	-
10	8.85	12.6	17.7	12.6	6.90	3.60	1.80	-
12	12.8	18.0	25.5	18.0	9.90	5.10	2.55	-
14	17.3	24.5	34.5	24.5	13.4	6.90	3.45	-
16	22.5	32.0	45.0	32.0	17.4	9.00	4.50	-
18	28.5	40.5	57.0	40.5	21.9	11.4	5.70	-
20	35.3	50.0	70.5	50.0	27.2	14.1	7.05	-
24	51.0	72.0	102	72.0	39.3	20.4	10.2	-

VOLUME OF THRUST BLOCK IN CUBIC YARDS 150 PSI - (VERTICAL BENDS)			
FITTING SIZE	BEND ANGLE		
	11 1/4°	22 1/2°	45°
2	0.02	0.05	0.14
3	0.04	0.11	0.31
4	0.08	0.22	0.54
6	0.22	0.52	1.21
8	0.42	0.96	2.15
10	0.68	1.53	3.35
12	1.01	2.23	4.82
14	1.41	3.07	6.55
16	1.87	4.04	8.56
18	2.39	5.14	10.8
20	2.97	6.36	13.4
24	4.33	9.21	19.2



* EACH AREA (A/2) IS 1/2 OF TABULATED TOTAL AREA

FITTING SIZE	ROD SIZE	EMBEDMENT
12" AND LESS	#6	30"
14" - 16"	#8	36"

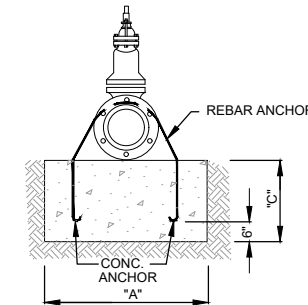
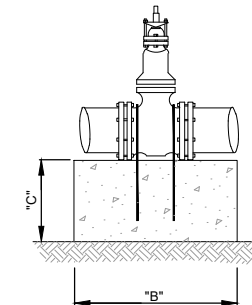
THRUST BLOCKING IS NOT REQUIRED FOR HORIZONTAL BENDS WHERE LENGTHS OF RESTRAINED JOINT PIPE ARE SPECIFIED ENTERING AND EXITING A RESTRAINED JOINT FITTING. PROVIDE THRUST BLOCKING FOR VERTICAL BENDS IN ADDITION TO PROVIDING SPECIFIED LENGTHS OF RESTRAINED JOINT.

THRUST BLOCK DETAILS

SCALE: N.T.S.

THRUST BLOCK NOTES

- KEEP CONCRETE CLEAR OF JOINT AND JOINT ACCESSORIES.
- CONCRETE THRUST BLOCKING SHALL BE POURED AGAINST UNDISTURBED EARTH.
- REQUIRED VOLUMES OR BEARING AREAS AT FITTINGS SHALL BE AS INDICATED BELOW, ADJUSTED, IF NECESSARY, TO CONFORM TO THE TEST PRESSURE(S) AND ALLOWABLE SOIL BEARING STRESS(ES) STATED IN THE SPECIFICATIONS.
- THRUST BLOCK VOLUMES FOR VERTICAL BENDS HAVING UPWARD RESULTANT THRUSTS ARE BASED ON TEST PRESSURE OF 150 PSIG AND THE WEIGHT OF CONCRETE = 4050 LBS/CU YD. TO COMPUTE VOLUMES FOR DIFFERENT TEST PRESSURES, USE THE FOLLOWING EQUATION: VOLUME = (TEST PRESS./150) x (TABLE VALUE).
- BEARING AREAS FOR HORIZONTAL BEND THRUST BLOCKS ARE BASED ON TEST PRESSURE OF 150 PSIG AND AN ALLOWABLE SOIL BEARING STRESS OF 2000 LBS/SQ. FT. TO COMPUTE BEARING AREAS FOR DIFFERENT TEST PRESSURES AND SOIL BEARING STRESSES, MULTIPLY TABLE VALUES BY THE FACTOR $(13.33)(P^1/S_b^1)$, WHERE: P¹ = ACTUAL TEST PRESSURE, PSIG
 $S_b = \frac{1}{2}$ ACTUAL SOIL BEARING PRESSURE, PSF.
- THRUST BLOCKS FOR VERTICAL BENDS HAVING DOWNWARD RESULTANT THRUSTS SHALL BE THE SAME AS FOR HORIZONTAL BENDS.
- BEARING AREAS, VOLUMES, AND SPECIAL BLOCKING DETAILS SHOWN ON PLANS TAKE PRECEDENCE OVER THIS STANDARD.
- BEARING AREA OF THRUST BLOCK SHALL NOT BE LESS THAN 1.0 SQ FT.
- VERTICAL BENDS THAT REQUIRE A THRUST BLOCK VOLUME EXCEEDING 5 CUBIC YARDS REQUIRE SPECIAL BLOCKING DETAILS.
- TEST PRESSURES ARE SHOWN IN THE PIPING SCHEDULE.
- ALLOWABLE SOIL BEARING STRESS IN ACCORDANCE WITH SPECIFICATION SECTION 15060.



NOTE: COAT RODS WITH "KOPPERS" BITUMASTIC NO. 50 COATING OR EQUAL.

THRUST BLOCK DIMENSIONS

ANCHOR ROD SIZE	VALVE SIZE	150 PSI			200 PSI			250 PSI			300 PSI		
		"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"	"A"	"B"	"C"
3/4"	4" 6" 8"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-7"
3/4"	10"	2'-6"	2'-6"	2'-0"	2'-9"	2'-6"	2'-6"	3'-0"	3'-0"	3'-0"	3'-7"	3'-0"	3'-0"
3/4"	12"	3'-0"	3'-0"	2'-8"	3'-5"	3'-0"	3'-0"	4'-3"	3'-0"	3'-0"	5'-1"	3'-0"	3'-0"
1"	14"	3'-5"	3'-0"	3'-0"	4'-6"	3'-0"	3'-0"	4'-0"	4'-0"	4'-0"	4'-9"	4'-0"	4'-0"
1 1/8"	16"	4'-4"	3'-0"	3'-0"	4'-1"	4'-0"	4'-0"	5'-1"	4'-0"	4'-0"	6'-1"	4'-0"	4'-0"
1 1/4"	18"	5'-5"	3'-0"	3'-0"	5'-1"	4'-0"	4'-0"	6'-4"	4'-0"	4'-0"	5'-9"	5'-0"	5'-0"
1 3/8"	24"	6'-5"	4'-0"	4'-0"	6'-6"	5'-0"	5'-0"	6'-5"	6'-0"	6'-0"	7'-8"	6'-0"	6'-0"

NOTE: PRESSURES SHOWN ABOVE ARE MAXIMUM WORKING PRESSURE IN SYSTEM.

THRUST BLOCKING AND ANCHORS ARE REQUIRED ON VALVES ONLY WHEN SPECIFIED ON THE PLANS OR IN THE SPECIAL PROVISIONS.

VALVE THRUST BLOCK DETAILS

SCALE: N.T.S.

THRUST BLOCK NOTES AND DETAILS

HORIZONTAL BENDS - BEARING AREA OF THRUST BLOCKS IN SQ. FT. (200 PSI LINE PRESSURE, 2000LB/SF SOIL BEARING PRESSURE)								
FITTING SIZE	TEE, WYE, PLUG, OR CAP	90° BEND PLUGGED CROSS	TEE PLUGGED RUN		BEND ANGLE			
			A1	A2	45°	22 1/2°	11 1/4°	
2	1.00	1.50	1.50	1.00	-	-	-	-
3	1.50	2.00	2.00	1.50	1.50	1.00	-	-
4	2.00	2.80	3.80	2.80	2.00	1.50	-	-
6	4.20	6.00	8.60	6.00	3.20	2.00	1.50	-
8	7.60	10.6	15.2	10.8	5.80	3.00	2.00	-
10	11.8	16.8	23.6	16.8	9.20	4.80	2.40	-
12	17.0	24.0	34.0	24.0	13.2	6.80	3.40	-
14	23.0	32.6	46.0	32.6	17.8	9.20	4.60	-
16	30.0	42.6	60.0	42.6	23.2	12.0	6.00	-
18	38.0	54.0	76.0	54.0	29.2	15.2	7.60	-
20	47.0	66.6	94.0	66.6	36.2	18.8	9.40	-
24	68.0	96.0	136	96.0	52.4	27.2	13.6	-

VOLUME OF THRUST BLOCK IN CUBIC YARDS 200 PSI - (VERTICAL BENDS)			
FITTING SIZE	BEND ANGLE		
	11 1/4°	22 1/2°	45°
2	0.03	0.07	0.16
3	0.06	0.17	0.36
4	0.13	0.31	0.66
6	0.32	0.72	1.51
8	0.60	1.32	2.72
10	0.97	2.10	4.28
12	1.42	3.05	6.19
14	1.97	4.18	8.46
16	2.60	5.49	11.1
18	3.32	6.98	14.1
20	4.11	8.63	17.4
24	5.97	12.5	25.1

HORIZONTAL BENDS - BEARING AREA OF THRUST BLOCKS IN SQ. FT. (250 PSI LINE PRESSURE, 2000LB/SF SOIL BEARING PRESSURE)								
FITTING SIZE	TEE, WYE, PLUG, OR CAP	90° BEND PLUGGED CROSS	TEE PLUGGED RUN		BEND ANGLE			
			A1	A2	45°	22 1/2°	11 1/4°	
2	1.33	2.00	2.00	1.33	-	-	-	-
3	2.00	2.67	2.67	2.00	2.00	1.33	-	-
4	2.67	3.73	5.06	3.73	2.67	2.00	-	-
6	5.60	8.00	11.5	8.00	4.26	2.67	2.00	-
8	10.1	14.1	20.3	14.4	7.73	4.00	2.67	-
10	15.7	22.4	31.5	22.4	12.3	6.40	3.20	-
12	22.7	32.0	45.3	32.0	17.6	9.06	4.53	-
14	30.7	43.4	61.3	43.4	23.7	12.3	6.13	-
16	40.0	56.8	80.0	56.8	30.9	16.0	8.00	-
18	50.6	72.0	101	72.0	38.9	20.3	10.1	-
20	62.6	88.8	125	88.8	48.2	25.1	12.5	-
24	90.6	128	181	128	69.8	36.3	18.1	-

VOLUME OF THRUST BLOCK IN CUBIC YARDS 250 PSI - (VERTICAL BENDS)			
FITTING SIZE	BEND ANGLE		
	11 1/4°	22 1/2°	45°
2	0.04	0.10	0.21
3	0.09	0.22	0.46
4	0.17	0.40	0.83
6	0.42	0.93	1.91
8	0.78	1.69	3.43
10	1.25	2.66	5.39
12	1.83	3.86	7.79
14	2.53	5.29	10.6
16	3.33	6.94	13.9
18	4.24	8.81	17.7
20	5.25	10.9	21.8
24	7.62	15.8	31.5

HORIZONTAL BENDS - BEARING AREA OF THRUST BLOCKS IN SQ. FT. (300 PSI LINE PRESSURE, 2000LB/SF SOIL BEARING PRESSURE)								
FITTING SIZE	TEE, WYE, PLUG, OR CAP	90° BEND PLUGGED CROSS	TEE PLUGGED RUN		BEND ANGLE			
			A1	A2	45°	22 1/2°	11 1/4°	
2	1.78	2.66	2.66	1.78	1.00	1.00	-	-
3	2.66	3.55	3.55	2.66	2.66	1.78	-	-
4	3.55	4.97	6.75	4.97	3.55	2.66	-	-
6	7.46	10.7	15.3	10.7	5.68	3.55	2.66	-
8	13.5	18.8	27.0	19.2	10.3	5.33	3.55	-
10	21.0	29.8	42.0	29.8	16.3	8.53	4.26	-
12	30.2	42.6	60.4	42.6	23.5	12.1	6.04	-
14	40.9	57.9	81.7	57.9	31.6	16.3	8.17	-
16	53.3	75.7	107	75.7	41.2	21.3	10.7	-
18	67.5	95.9	135	95.9	51.9	27.0	13.5	-
20	83.5	118	167	118	64.3	33.4	16.7	-
24	121	171	242	171	93.1	48.3	24.2	-

VOLUME OF THRUST BLOCK IN CUBIC YARDS 300 PSI - (VERTICAL BENDS)			
FITTING SIZE	BEND ANGLE		
	11 1/4°	22 1/2°	45°
2	0.05	0.12	0.25
3	0.12	0.27	0.56
4	0.22	0.49	1.01
6	0.52	1.13	2.31
8	0.96	2.05	4.14
10	1.54	3.23	6.50
12	2.24	4.68	9.40
14	3.08	6.41	12.8
16	4.06	8.40	16.8
18	5.16	10.7	21.3
20	6.39	13.2	26.3
24	9.26	19.0	37.9

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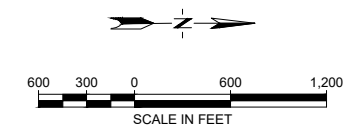
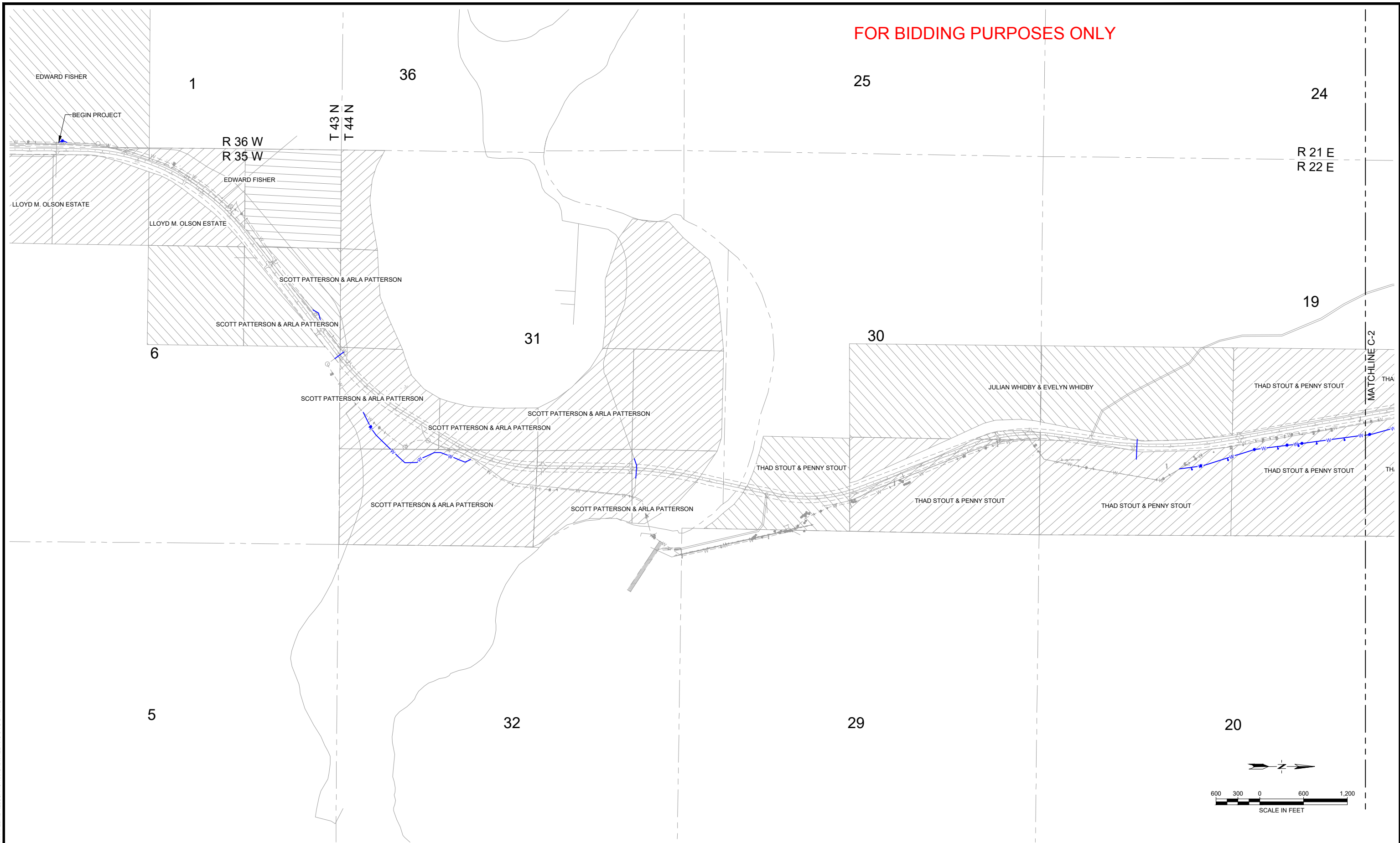
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DATE: 11/06/2023
Q.C. REVIEW BY: _____
DATE: _____

OGALA SIOUX TRIBE HWY 73 NORTH WATERLINE RELOCATIONS
JACKSON COUNTY SOUTH DAKOTA
THRUST BLOCK DETAILS

PROJECT NUMBER 2246.029.17
SHEET NUMBER 2
DRAWING NUMBER G-2

FOR BIDDING PURPOSES ONLY



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 EXPIRES 05/18/2024
 MICHAEL R. KYNETT

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 DSGN. BY: MLK
 APPR. BY: CLN
 DATE: 11/06/2023

Q.C. REVIEW
 BY: _____
 DATE: _____

OGALA SIOUX TRIBE HWY 73 NORTH
 WATERLINE RELOCATIONS
 JACKSON COUNTY
 SOUTH DAKOTA

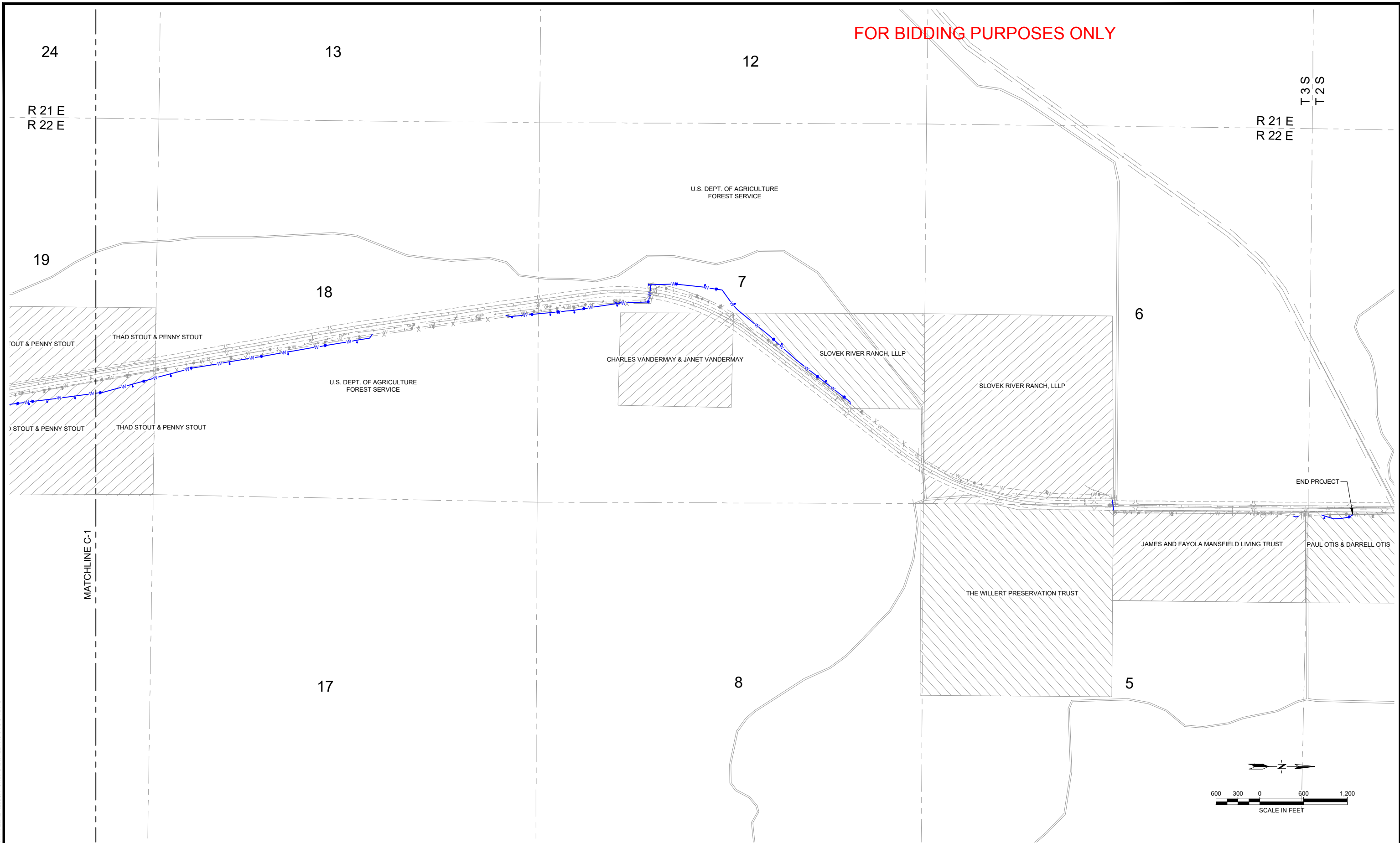
LAND OWNERSHIP MAP

PROJECT NUMBER
 2246.029.17

SHEET NUMBER
 3

DRAWING NUMBER
G-3

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Q:\248\B\HWY 73 NORTH PIPELINE RELOCATIONS\ACAD\SHR\TSG-3 TO G-4.DWG
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MICHAEL R. KYNETT

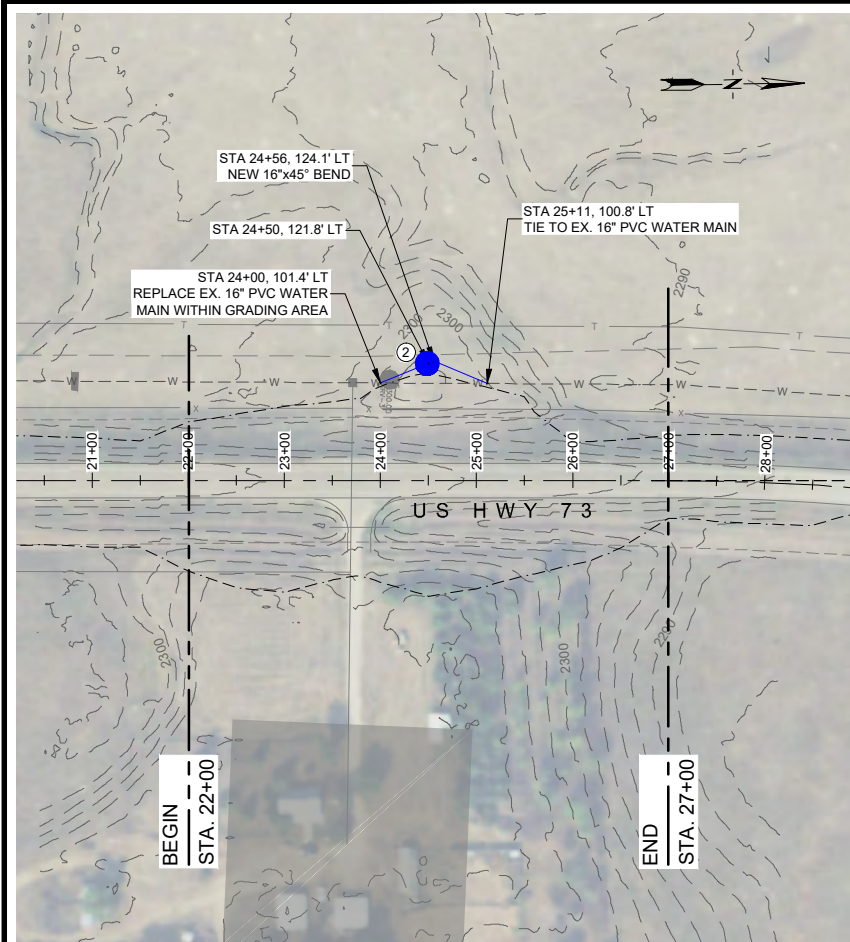
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OGALA SIOUX TRIBE HWY 73 NORTH
WATERLINE RELOCATIONS
JACKSON COUNTY SOUTH DAKOTA

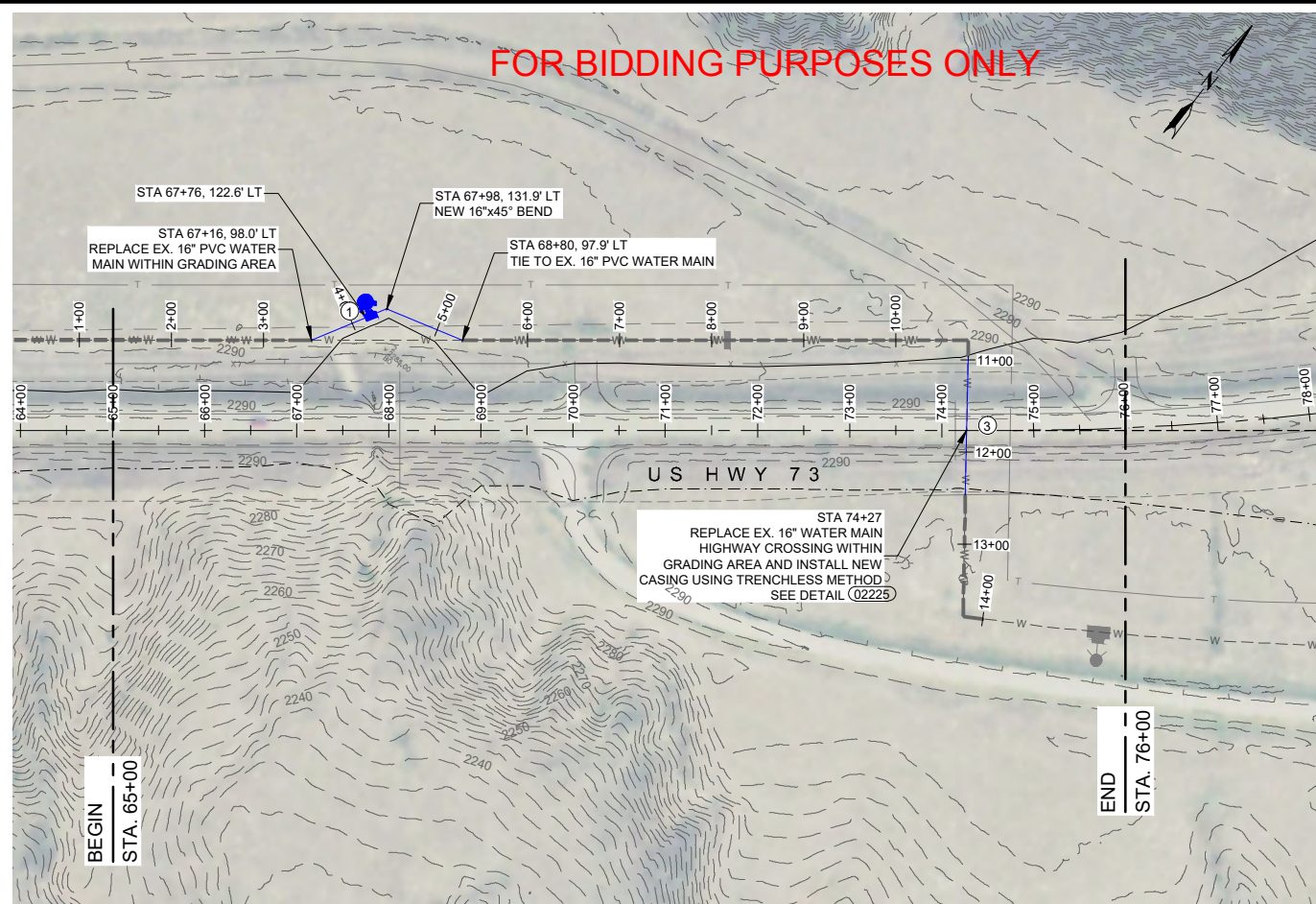
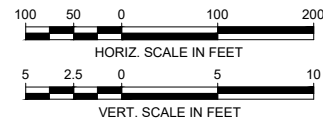
LAND OWNERSHIP MAP

PROJECT NUMBER 2246.029.17
SHEET NUMBER 4
DRAWING NUMBER G-4

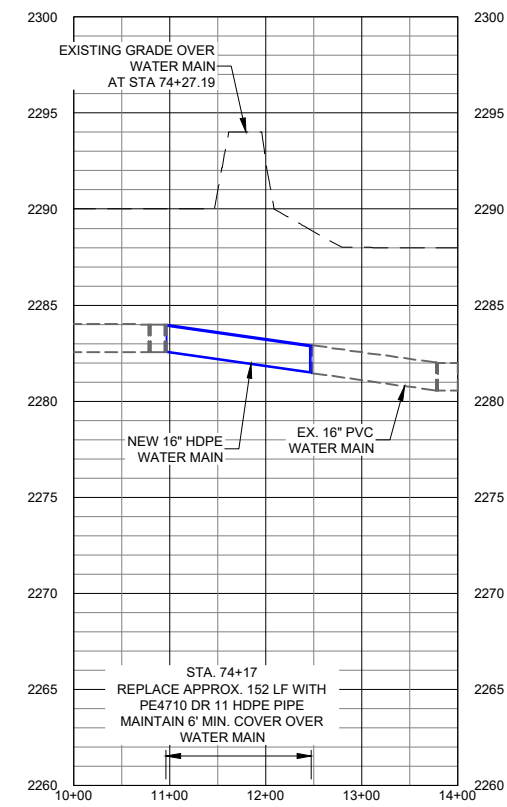
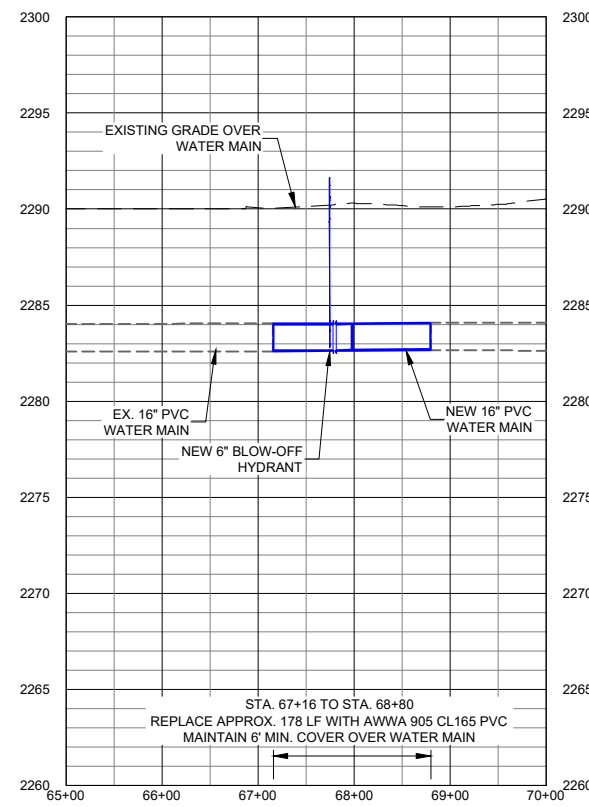
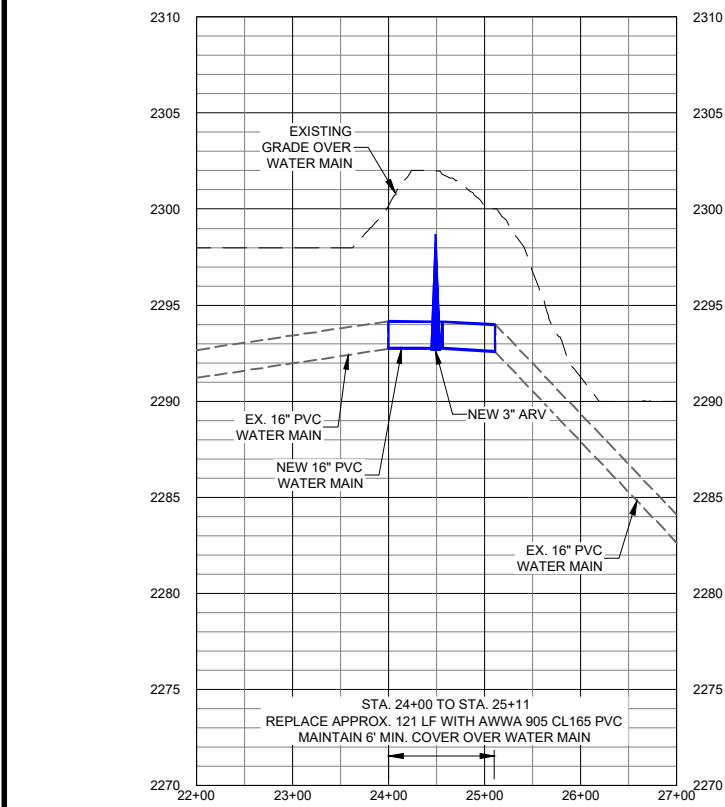


KEY NOTES

- ① REMOVE AND REPLACE EXISTING 6" BLOW-OFF HYDRANT TO NEW PIPE ALIGNMENT AND ELEVATION SEE DETAIL (15936)
- ② REMOVE AND REPLACE EXISTING ARV TO NEW PIPE ALIGNMENT AND ELEVATION SEE DETAIL (15260)
- ③ FURNISHING AND INSTALLING THE CASING AND CARRIER PIPE ARE INCLUDED UNDER BID ITEM 451E5116 BORE AND JACK 16" PIPE. SEE SECTION 01150 MEASUREMENT AND PAYMENT IN THE WATER MAIN RELOCATION SPECIFICATIONS FOR FULL DESCRIPTION.



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OGALA SIOUX TRIBE HWY 73 NORTH
WATERLINE RELOCATIONS
SOUTH DAKOTA

PLAN AND PROFILE
STA 22+00 TO STA 27+00
STA 65+00 TO STA 75+00

PROJECT NUMBER
2246.029.17

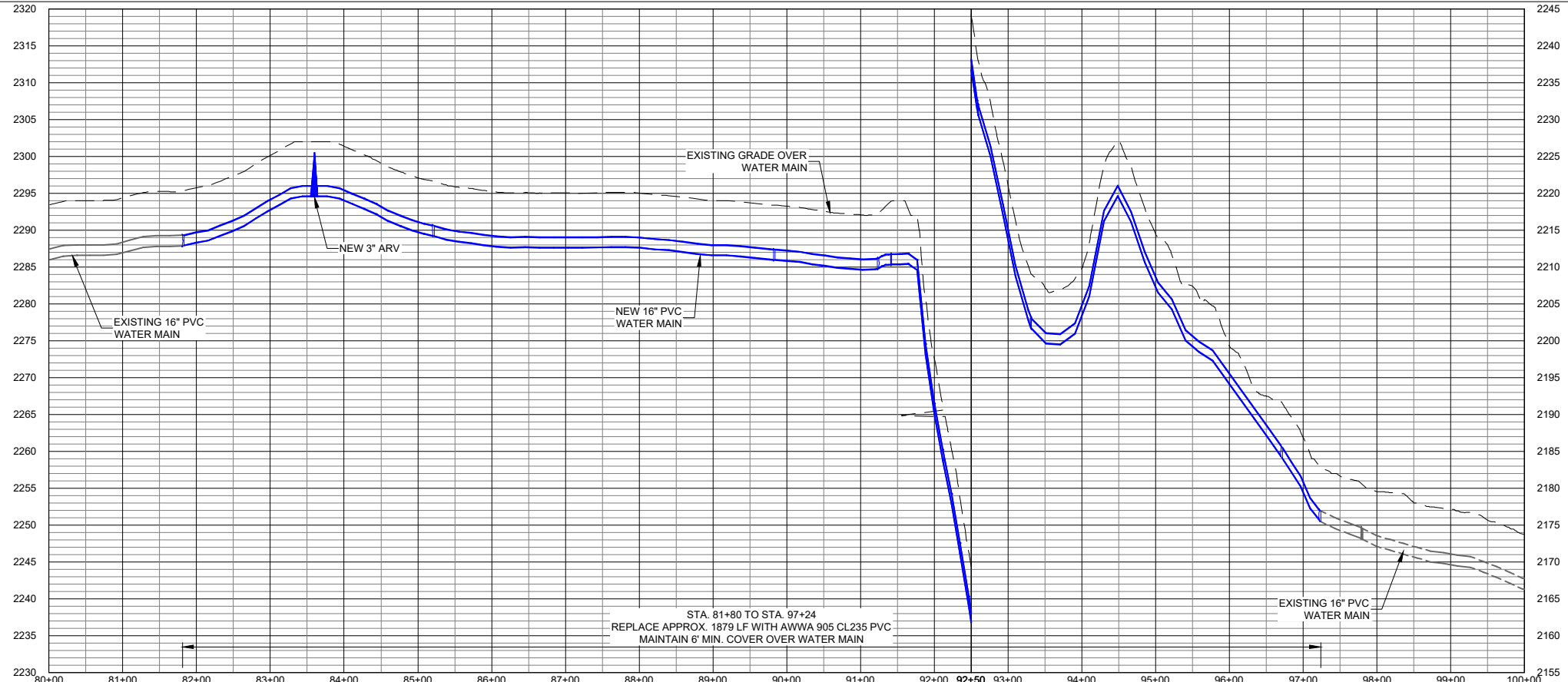
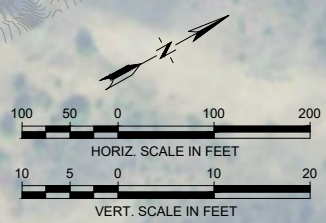
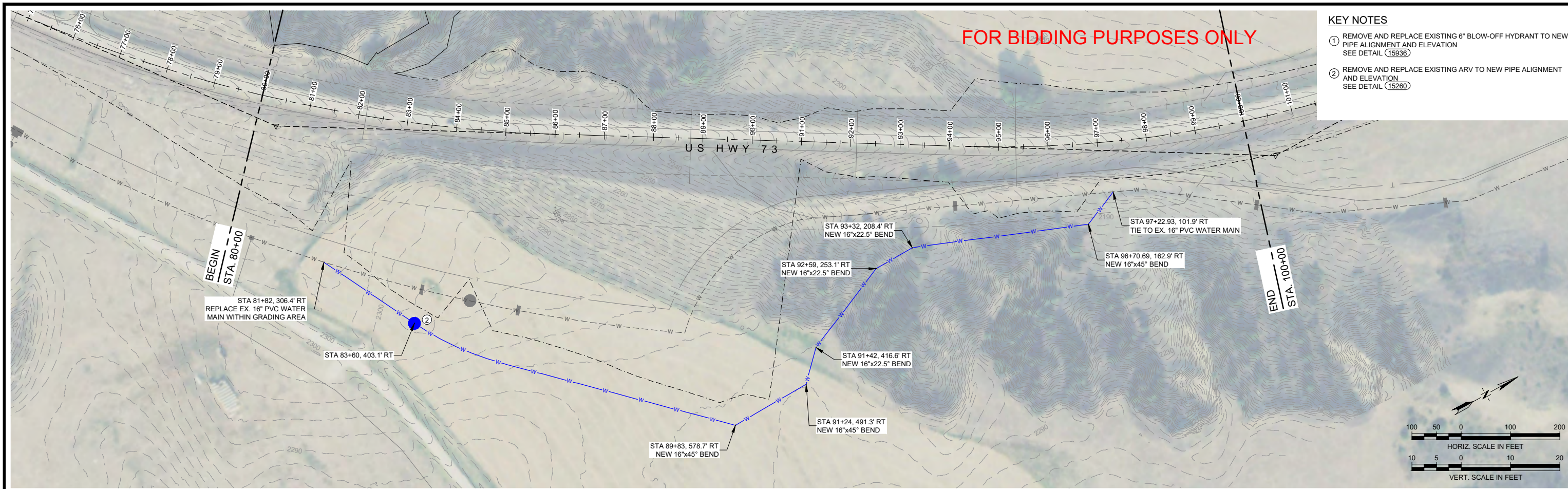
SHEET NUMBER
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DRAWING NUMBER
G-5

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KEY NOTES

- ① REMOVE AND REPLACE EXISTING 6" BLOW-OFF HYDRANT TO NEW PIPE ALIGNMENT AND ELEVATION SEE DETAIL (15936)
- ② REMOVE AND REPLACE EXISTING ARV TO NEW PIPE ALIGNMENT AND ELEVATION SEE DETAIL (15260)



Q:\24\BIM\CH-HIGHWAY 73 NORTH PIPELINE RELOCATIONS\ACAD\SHS\029_G-6.DWG

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STATE OF SOUTH DAKOTA
MICHAEL R. KYNETT
13037
05/18/2024

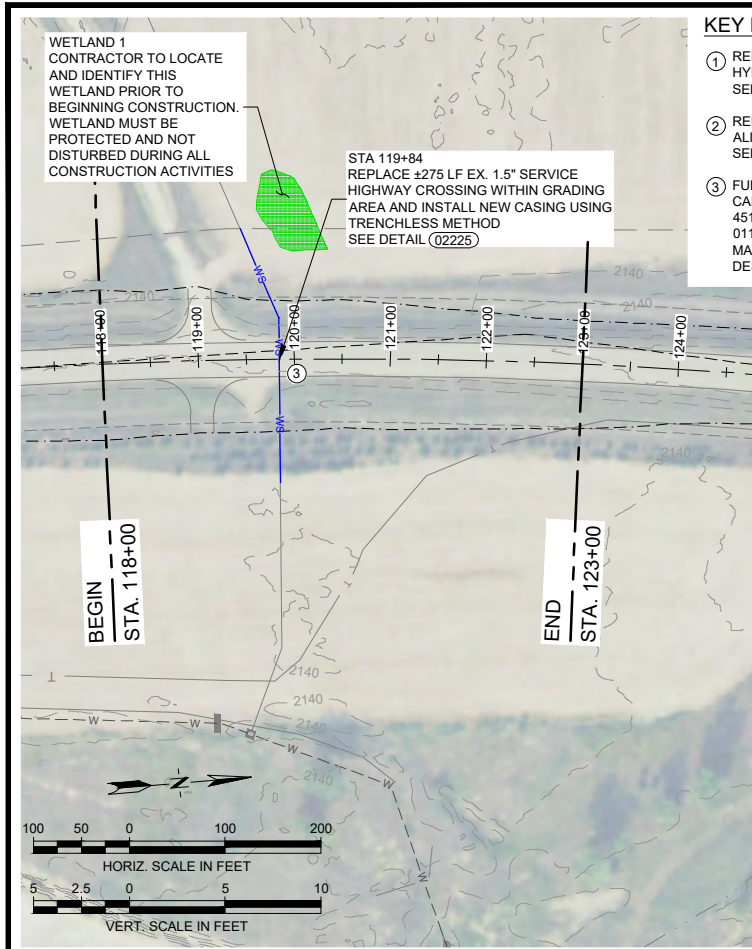
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SHEET NUMBER: 6
DRAWING NUMBER: G-6

JACKSON COUNTY
SOUTH DAKOTA

OGALA SIOUX TRIBE HWY 73 NORTH
WATERLINE RELOCATIONS

PLAN AND PROFILE
STA 80+00 TO STA 100+00

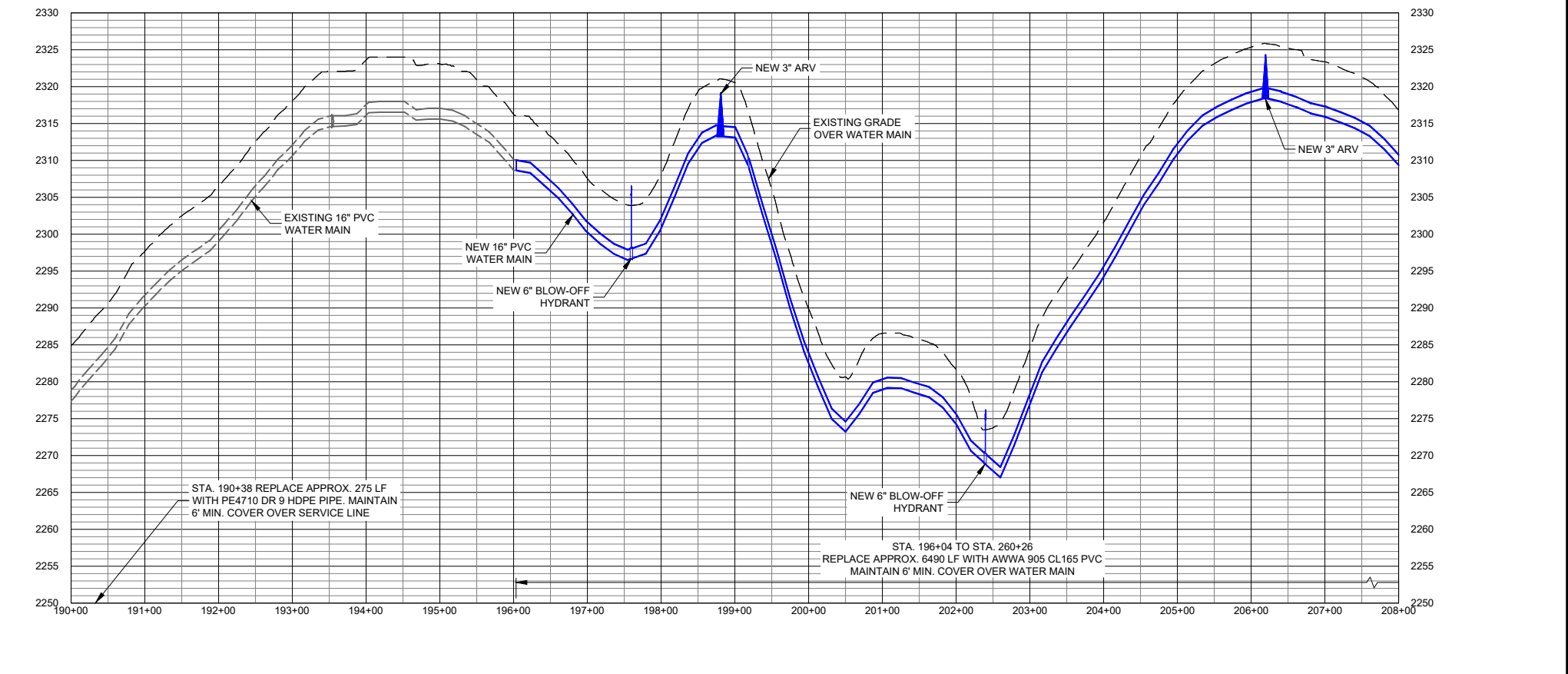
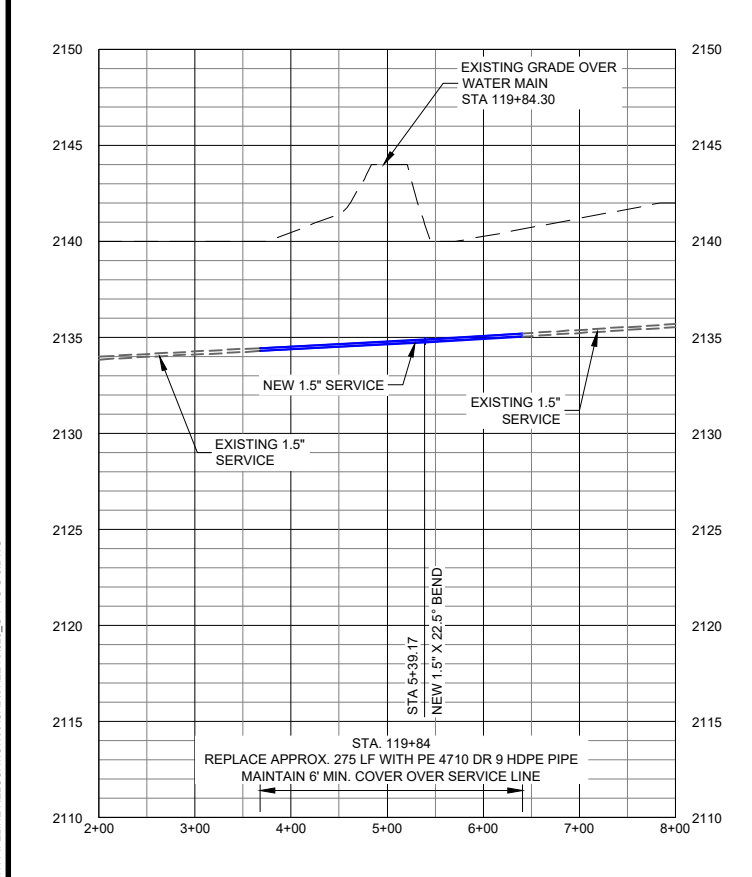
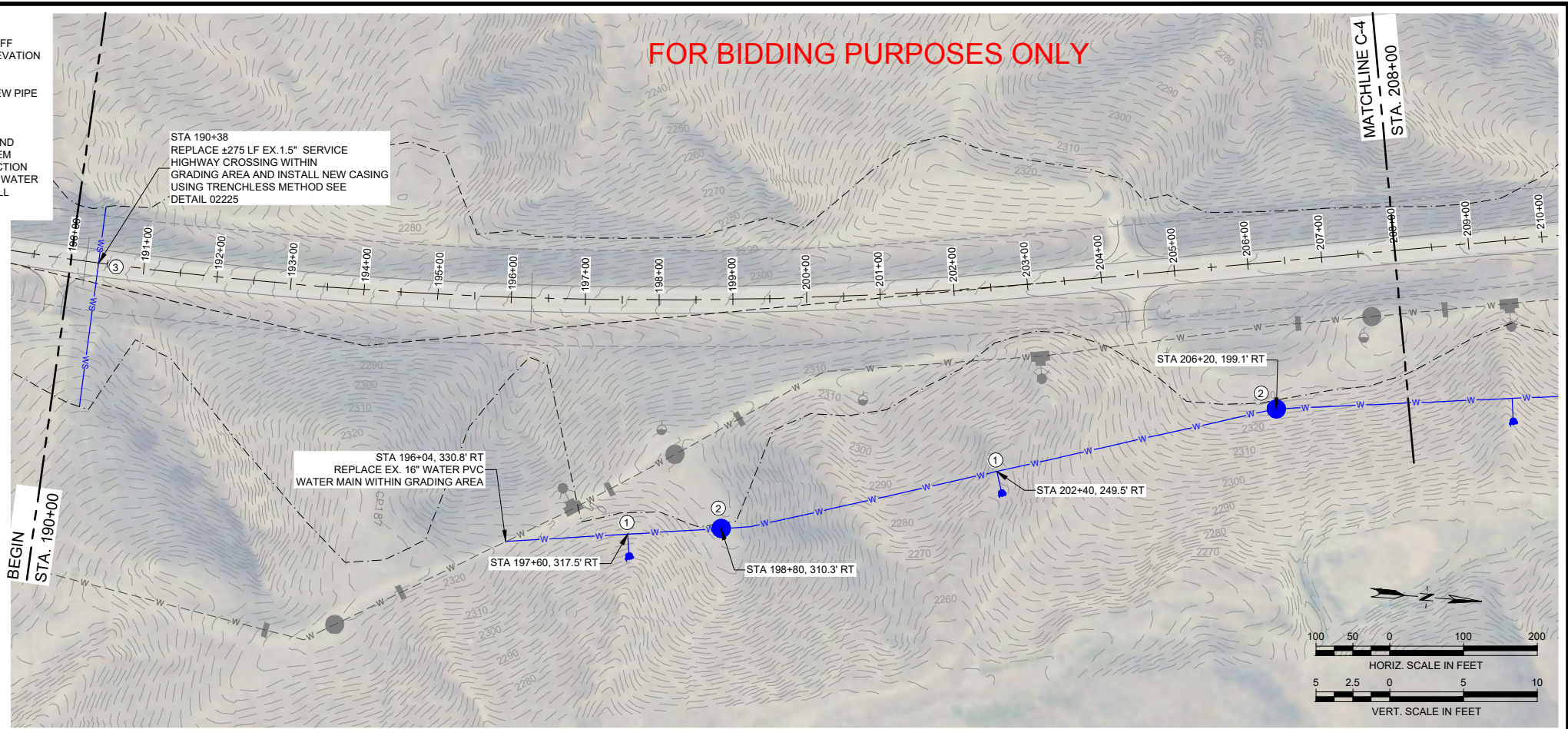
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SHEET NUMBER: 6
DRAWING NUMBER: G-6



- KEY NOTES**
- 1 REMOVE AND REPLACE EXISTING 6" BLOW-OFF HYDRANT TO NEW PIPE ALIGNMENT AND ELEVATION SEE DETAIL (15936)
 - 2 REMOVE AND REPLACE EXISTING ARV TO NEW PIPE ALIGNMENT AND ELEVATION SEE DETAIL (15260)
 - 3 FURNISHING AND INSTALLING THE CASING AND CARRIER PIPE ARE INCLUDED UNDER BID ITEM 451E5100 BORE AND JACK 1.5" PIPE. SEE SECTION 01150 MEASUREMENT AND PAYMENT IN THE WATER MAIN RELOCATION SPECIFICATIONS FOR FULL DESCRIPTION.

LEGEND

DELINEATED WETLAND



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13037
MICHAEL R. KYNETT

DATE: 11/06/2023

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DSGN. BY: _____
APPR. BY: _____
DATE: 11/06/2023

JACKSON COUNTY

OGLALA SIOUX TRIBE HWY 73 NORTH WATERLINE RELOCATIONS

SOUTH DAKOTA

PLAN AND PROFILE
STA 118+00 TO STA 123+00
STA 190+00 TO STA 208+00

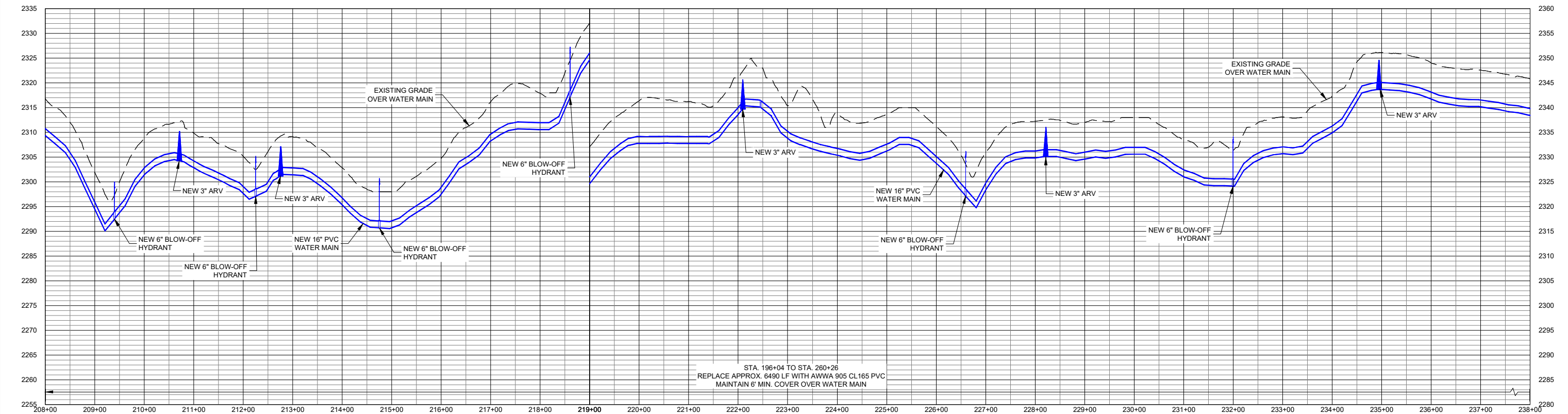
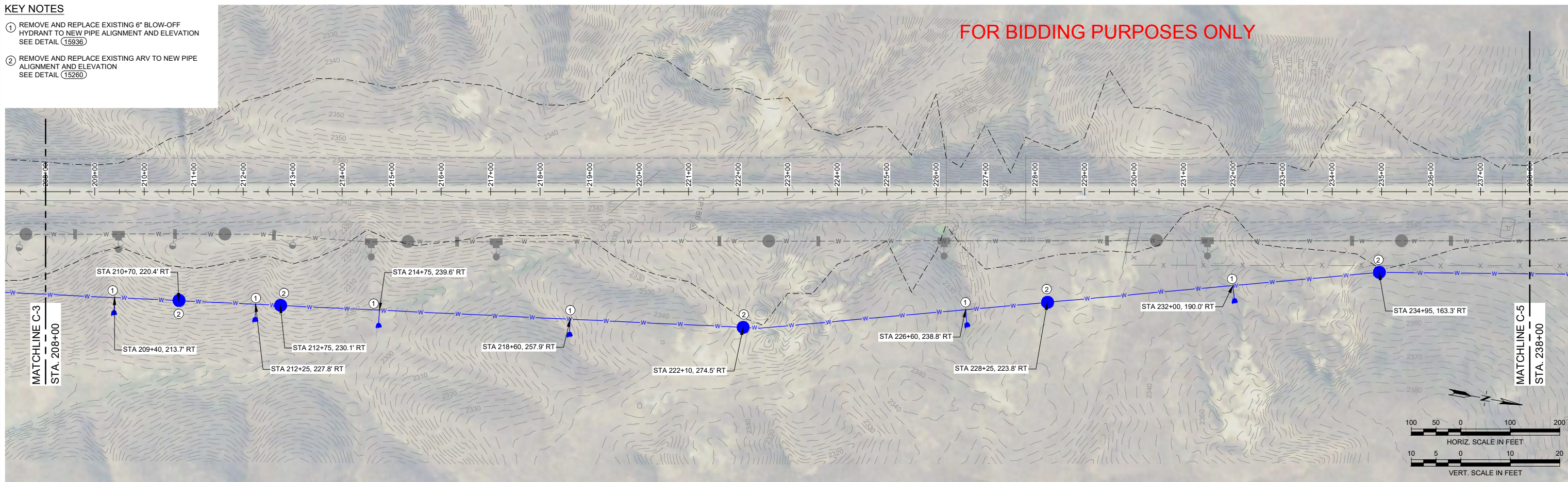
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SHEET NUMBER: 7
DRAWING NUMBER: **G-7**

Q:\24\BIM\CH-HIGHWAY 73 NORTH PIPELINE RELOCATIONS\CADD\SSHEETS\029_G-7 TO G-8.DWG
PLOTTED BY:LANE URICK ON Jun/24/2024

KEY NOTES

- ① REMOVE AND REPLACE EXISTING 6" BLOW-OFF HYDRANT TO NEW PIPE ALIGNMENT AND ELEVATION SEE DETAIL (15936)
- ② REMOVE AND REPLACE EXISTING ARV TO NEW PIPE ALIGNMENT AND ELEVATION SEE DETAIL (15260)

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WATERLINE RELOCATIONS
SOUTH DAKOTA

JACKSON COUNTY

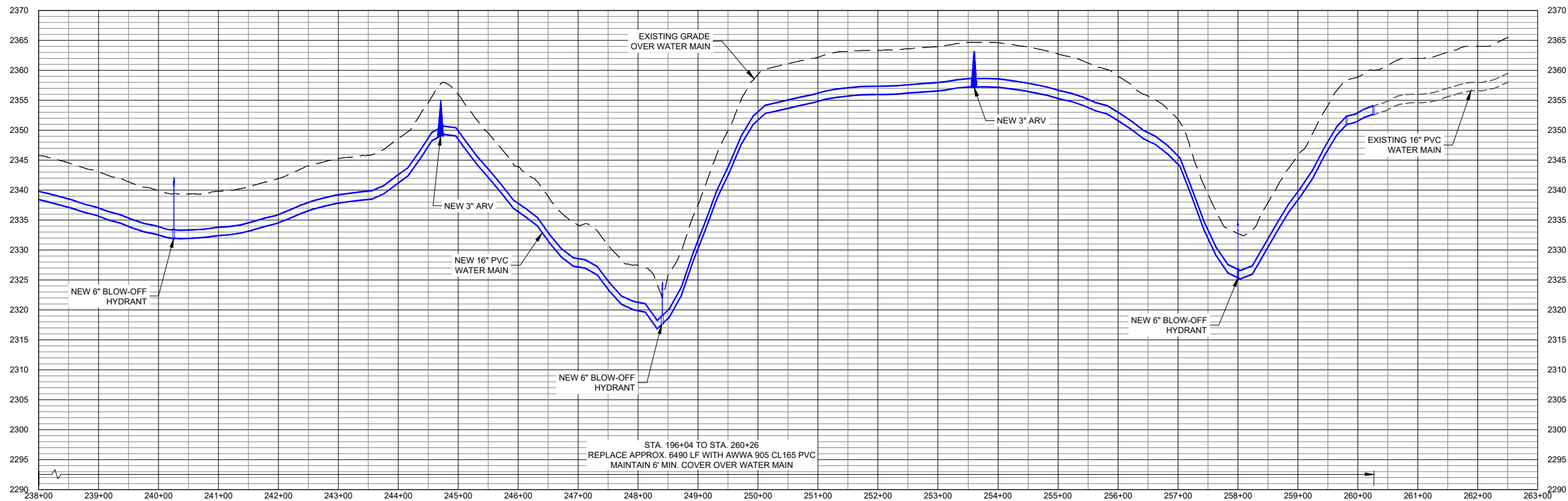
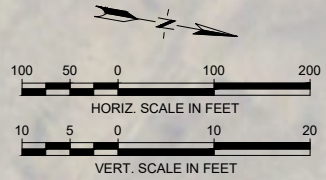
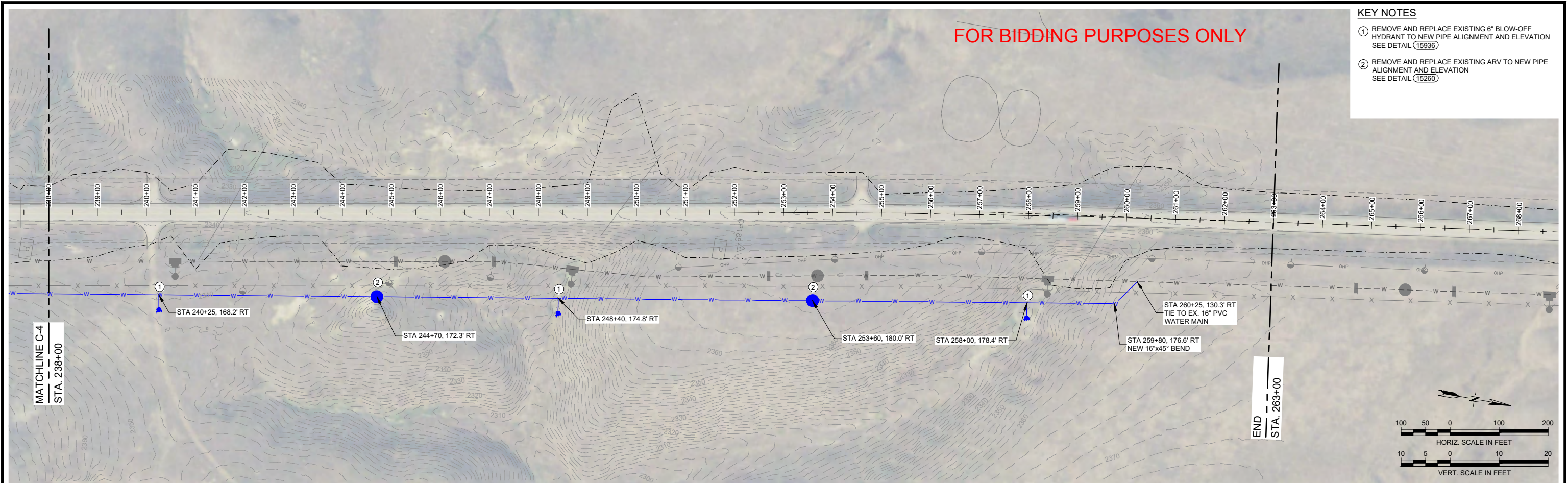
PLAN AND PROFILE
STA 208+00 TO STA 238+00

PROJECT NUMBER 2246.029.17
SHEET NUMBER 8
DRAWING NUMBER G-8

FOR BIDDING PURPOSES ONLY

KEY NOTES

- ① REMOVE AND REPLACE EXISTING 6" BLOW-OFF HYDRANT TO NEW PIPE ALIGNMENT AND ELEVATION SEE DETAIL (15936)
- ② REMOVE AND REPLACE EXISTING ARV TO NEW PIPE ALIGNMENT AND ELEVATION SEE DETAIL (15280)



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OGALA SIOUX TRIBE HWY 73 NORTH
WATERLINE RELOCATIONS
SOUTH DAKOTA

PLAN AND PROFILE
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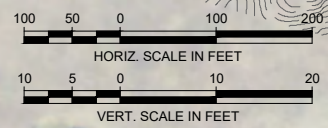
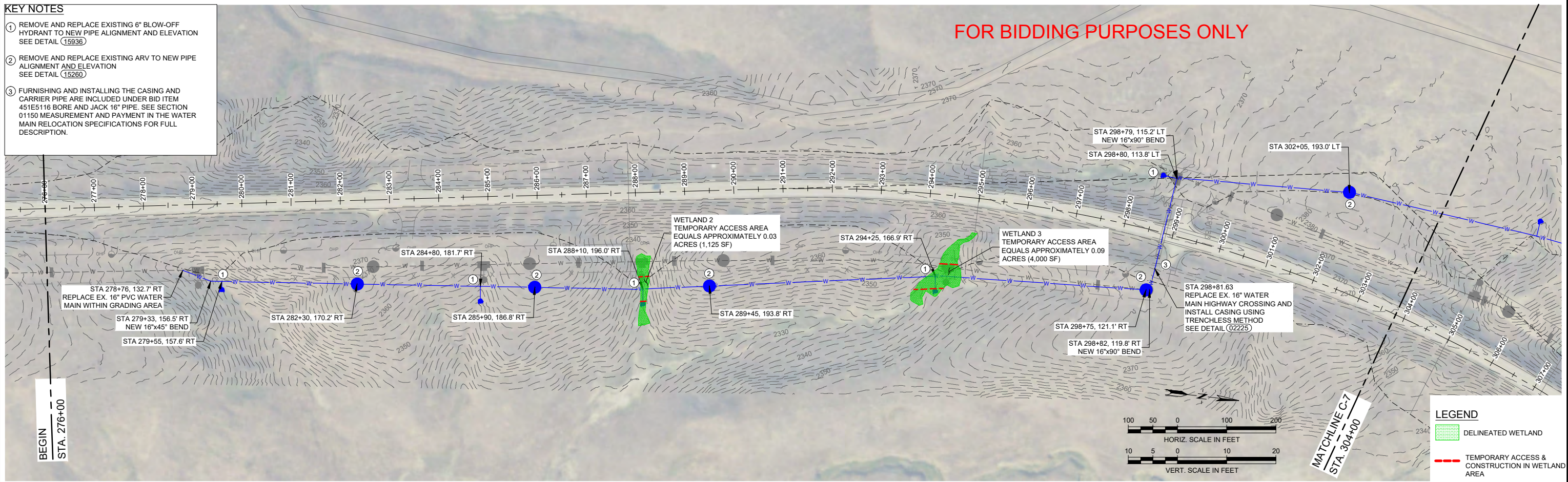
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SHEET NUMBER
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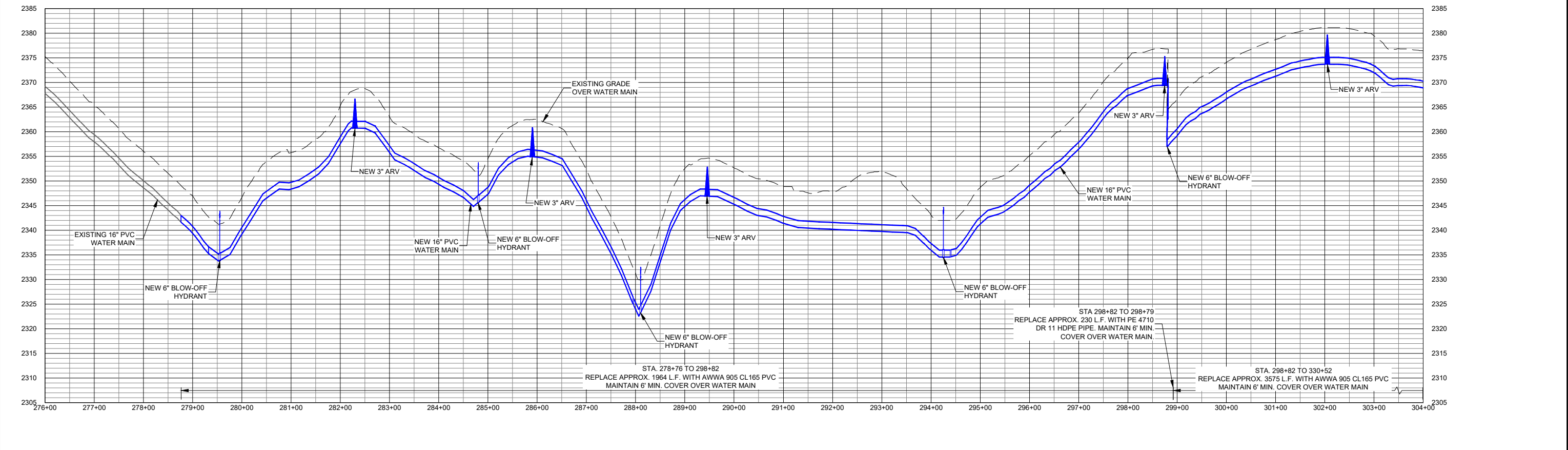
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G-9

- KEY NOTES**
- 1 REMOVE AND REPLACE EXISTING 6" BLOW-OFF HYDRANT TO NEW PIPE ALIGNMENT AND ELEVATION SEE DETAIL (15936)
 - 2 REMOVE AND REPLACE EXISTING ARV TO NEW PIPE ALIGNMENT AND ELEVATION SEE DETAIL (15260)
 - 3 FURNISHING AND INSTALLING THE CASING AND CARRIER PIPE ARE INCLUDED UNDER BID ITEM 451E5116 BORE AND JACK 16" PIPE. SEE SECTION 01150 MEASUREMENT AND PAYMENT IN THE WATER MAIN RELOCATION SPECIFICATIONS FOR FULL DESCRIPTION.

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- LEGEND**
- DELINEATED WETLAND
 - TEMPORARY ACCESS & CONSTRUCTION IN WETLAND AREA



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WATERLINE RELOCATIONS
SOUTH DAKOTA

PLAN AND PROFILE
STA 276+00 TO STA 304+00

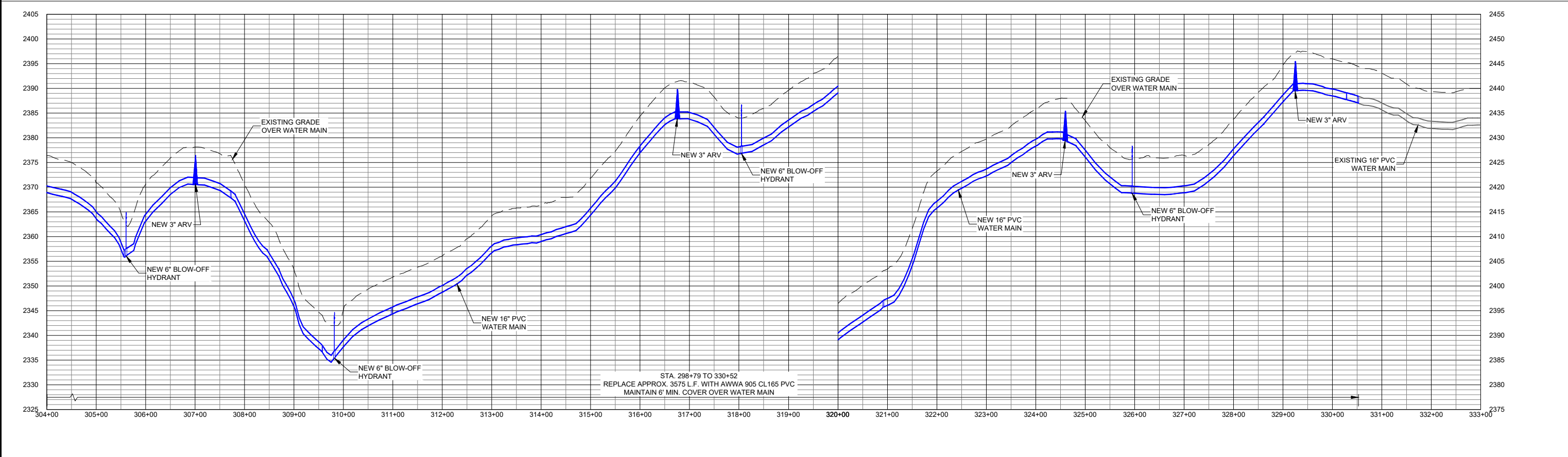
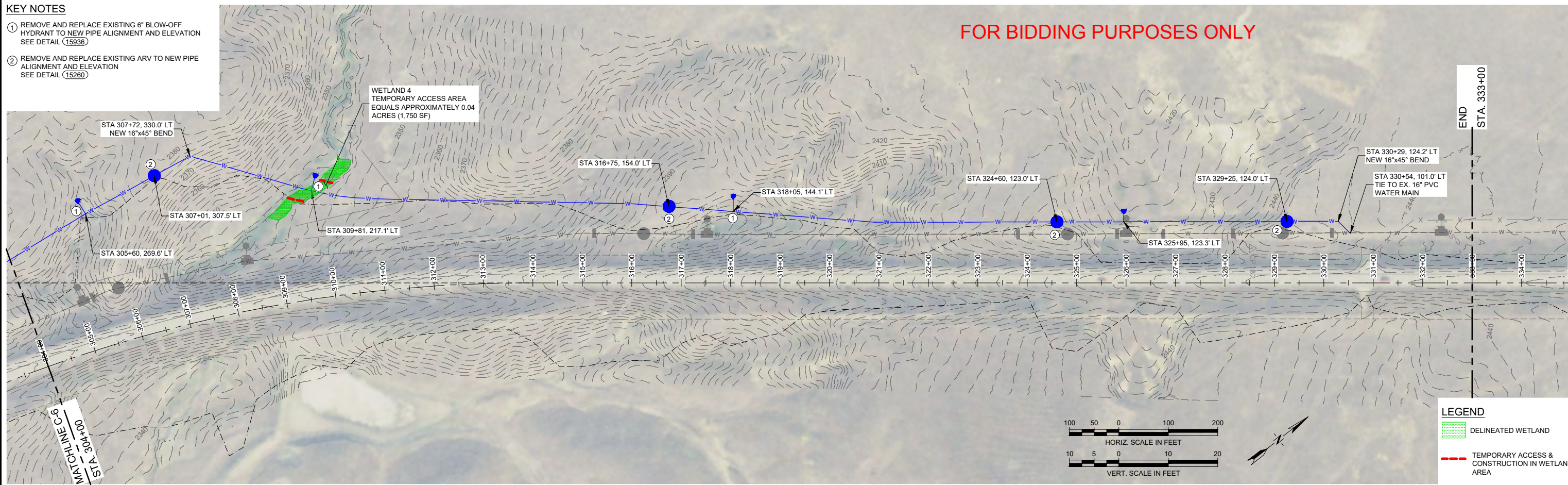
PROJECT NUMBER 2246.029.17
SHEET NUMBER 10
DRAWING NUMBER G-10

PLOTTED BY: LANE URICK ON Jun/24/2024

KEY NOTES

- ① REMOVE AND REPLACE EXISTING 6" BLOW-OFF HYDRANT TO NEW PIPE ALIGNMENT AND ELEVATION SEE DETAIL (15936)
- ② REMOVE AND REPLACE EXISTING ARV TO NEW PIPE ALIGNMENT AND ELEVATION SEE DETAIL (15260)

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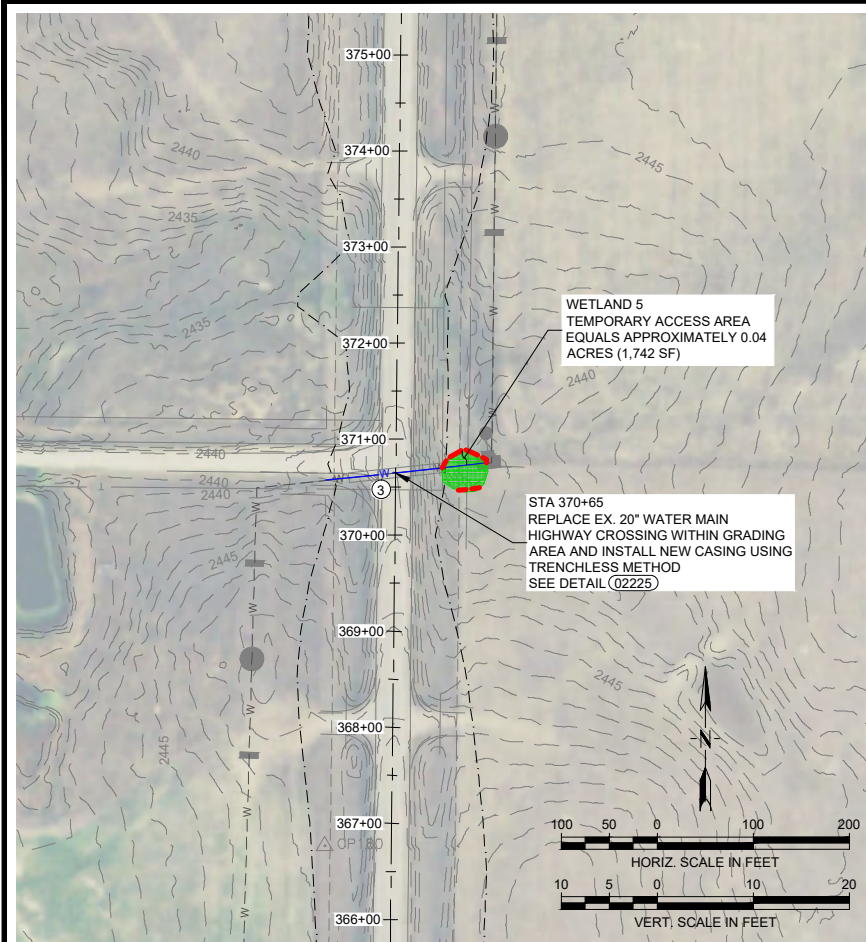
OGLA LA SIOUX TRIBE HWY 73 NORTH
WATERLINE RELOCATIONS
SOUTH DAKOTA

PLAN AND PROFILE
STA 304+00 TO STA 333+00

PROJECT NUMBER
2246.029.17

SHEET NUMBER
11

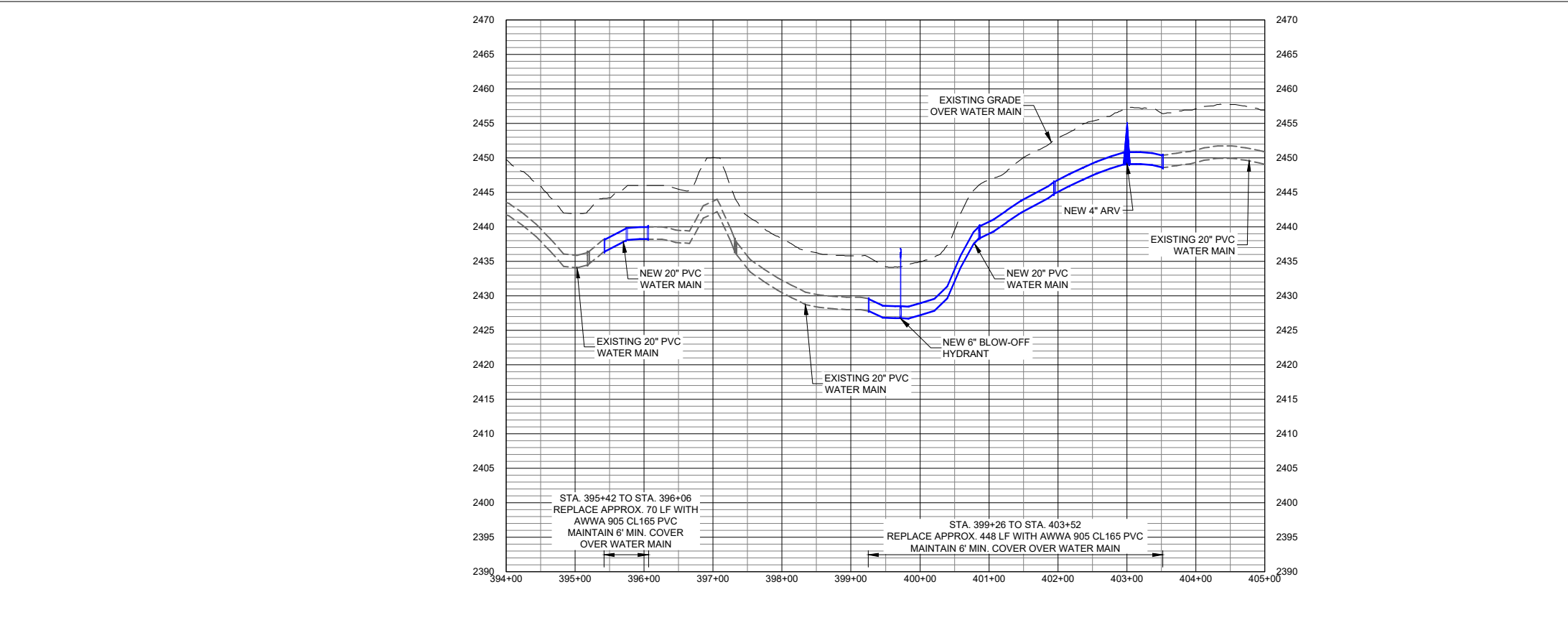
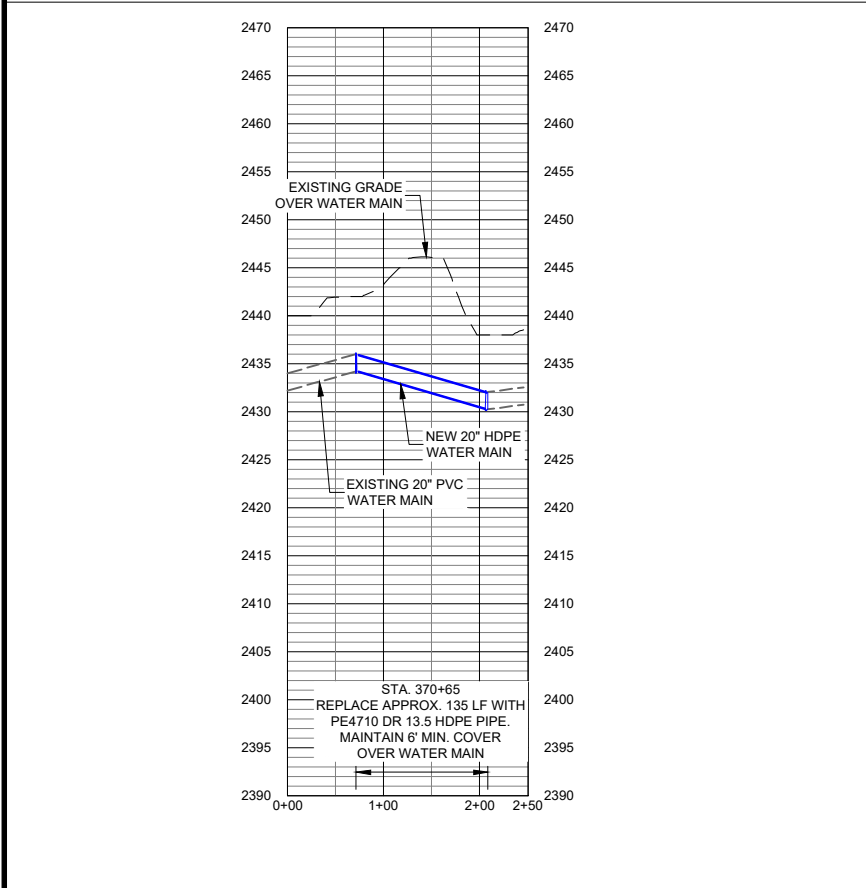
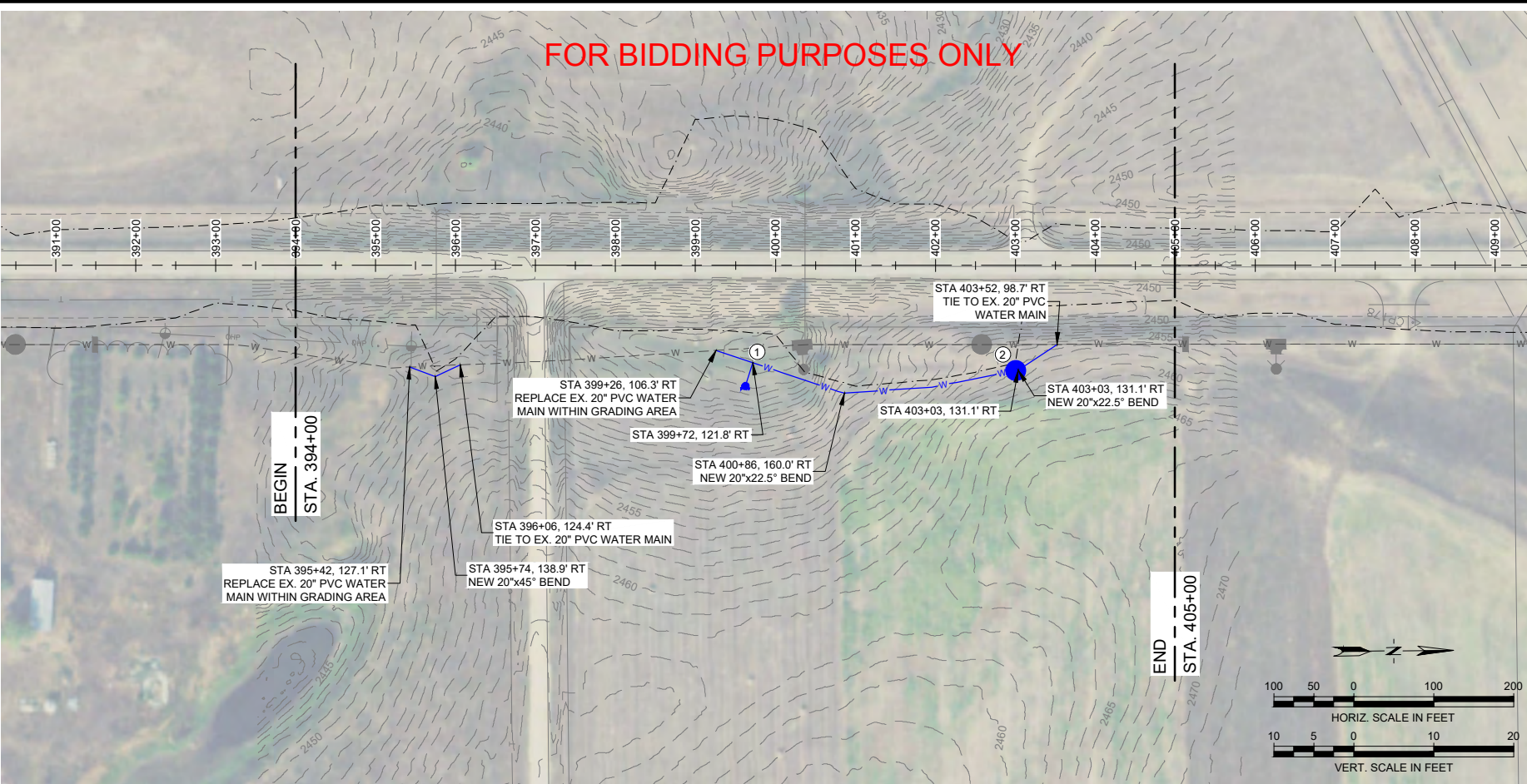
DRAWING NUMBER
G-11



- KEY NOTES**
- 1 REMOVE AND REPLACE EXISTING 6" BLOW-OFF HYDRANT TO NEW PIPE ALIGNMENT AND ELEVATION SEE DETAIL (15936)
 - 2 REMOVE AND REPLACE EXISTING ARV TO NEW PIPE ALIGNMENT AND ELEVATION SEE DETAIL (15260)
 - 3 FURNISHING AND INSTALLING THE CASING AND CARRIER PIPE ARE INCLUDED UNDER BID ITEM 451E5120 BORE AND JACK 20" PIPE. SEE SECTION 01150 MEASUREMENT AND PAYMENT TO THE WATER MAIN RELOCATION SPECIFICATIONS FOR FULL DESCRIPTION.

LEGEND

- DELINEATED WETLAND
- TEMPORARY ACCESS & CONSTRUCTION IN WETLAND AREA



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REGISTERED PROFESSIONAL ENGINEER
05/18/2024
13037
MICHAEL R. KYNETT

DRAWN BY: _____
DSGN. BY: _____
APPR. BY: _____
DATE: 11/06/2023

Q.C. REVIEW BY: _____
DATE: _____

OGDLA SIOUX TRIBE HWY 73 NORTH
WATERLINE RELOCATIONS
SOUTH DAKOTA

JACKSON COUNTY

PLAN AND PROFILE
STA 366+00 TO STA 375+00
STA 394+00 TO STA 405+00

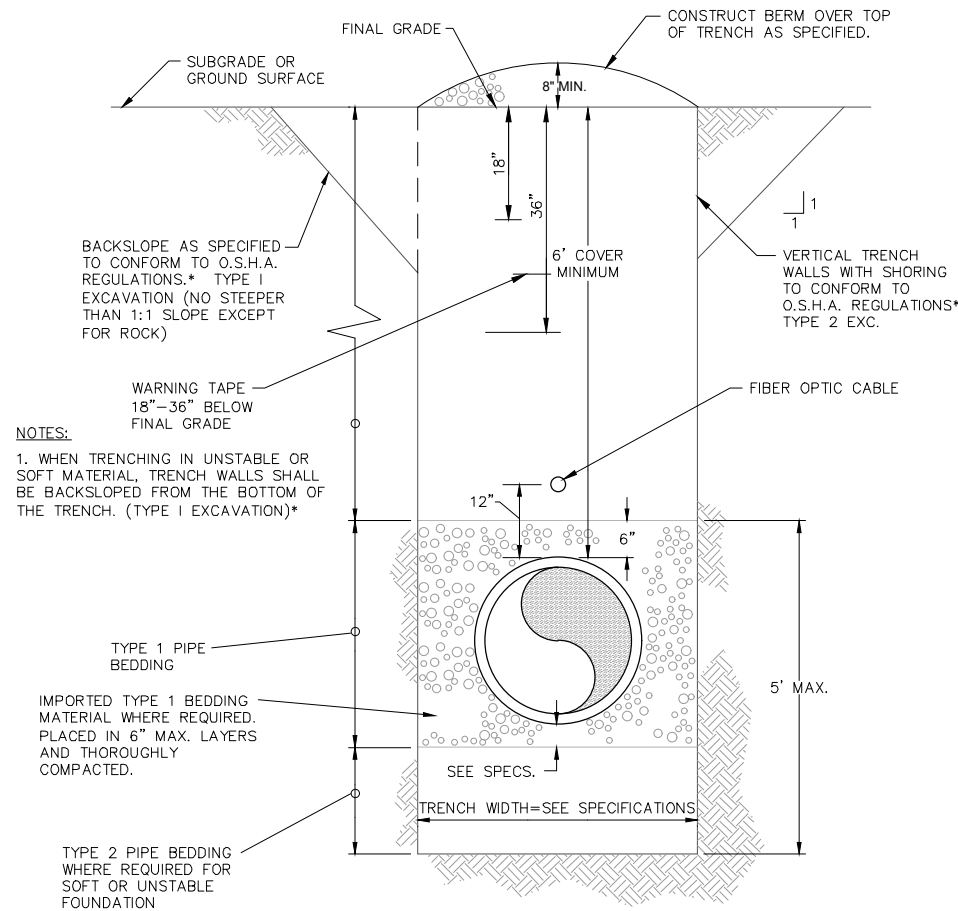
PROJECT NUMBER
2246.029.17

SHEET NUMBER
12

DRAWING NUMBER
G-12

Q:\2246\HWY73 NORTH PIPELINE RELOCATIONS\CADD\SH029_G-12.DWG
PLOTTED BY:LANE URICK ON Jun/24/2024

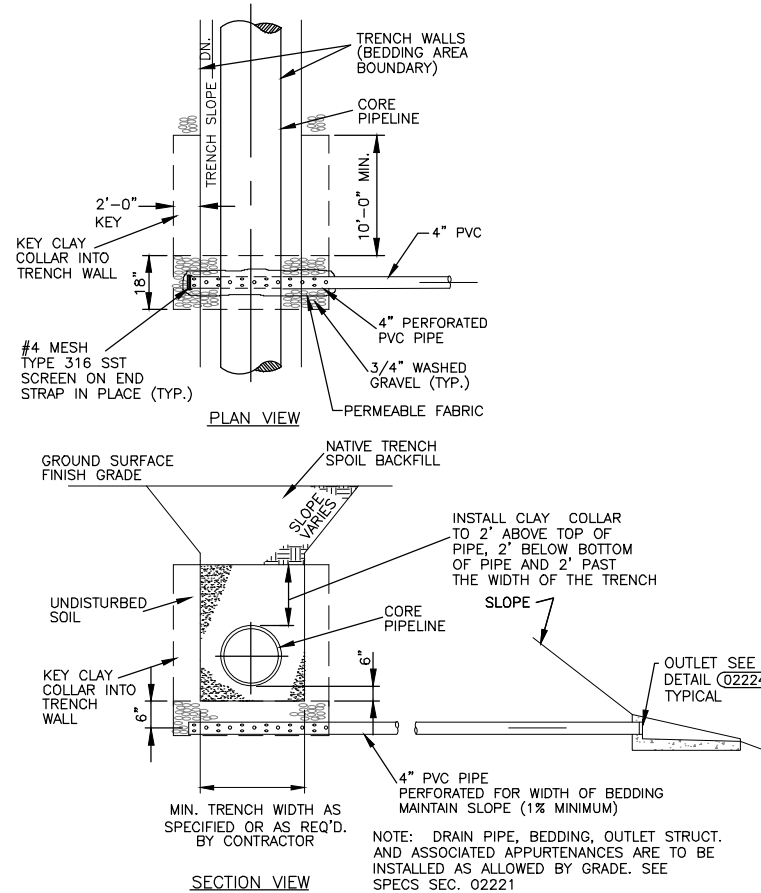
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TYPICAL PIPE TRENCH 02221

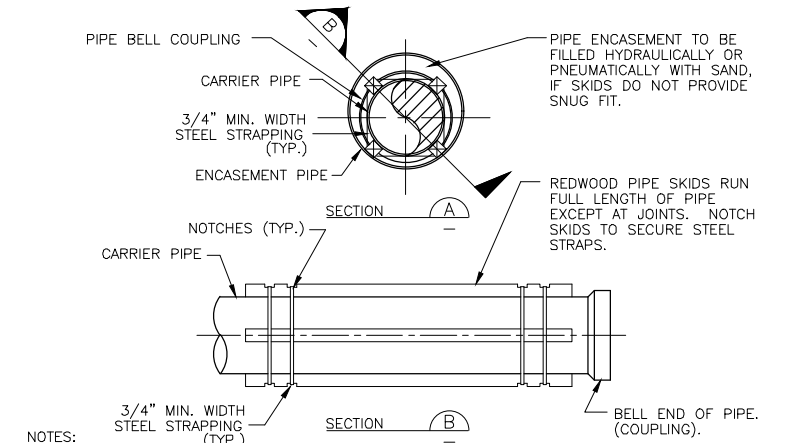
NOT TO SCALE

* SEE O.S.H.A. SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION, SECTION 1926.652.



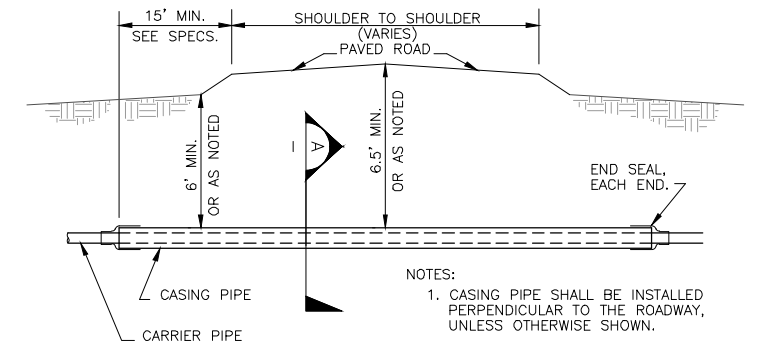
IMPERVIOUS SOIL (CLAY) TRENCH PLUGS WITH UNDERDRAIN 02223

NOT TO SCALE



NOTES:

1. THE PIPE SKIDS SHALL BE OF SUFFICIENT DEPTH TO PREVENT THE BELL END OF THE PIPE FROM COMING IN CONTACT WITH THE PIPE CASING. SKID DEPTH SHALL EXCEED THE OUTSIDE SURFACE OF THE OUTERMOST EDGE OF THE PIPE BELL BY A MINIMUM OF 1/4 INCH.
2. DO NOT USE CREOSOTE TREATED WOODEN PIPE SKIDS WITH PVC PIPE AS CREOSOTE WILL DAMAGE PVC MATERIAL.
3. SEE SPECIFICATIONS FOR CASING CHOCK ALTERNATIVE TO REDWOOD SKIDS.
4. SEE SPECS FOR ALTERNATIVE TRENCHLESS METHODS.



ROAD BORING AND JACKING - TYPICAL CROSS SECTION

ROAD CROSSING DETAIL 02225

NOT TO SCALE

- NOTES:
1. CASING PIPE SHALL BE INSTALLED PERPENDICULAR TO THE ROADWAY, UNLESS OTHERWISE SHOWN.

Q:\24\BIM\CH-HIGHWAY 73 NORTH PIPELINE RELOCATIONS\CAD\SHS\029_ DETAILS.DWG

REVISIONS			
NO.	DESCRIPTION	BY	DATE

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REG. NO. 05/18/2024 13037
MICHAEL R. KYNETT

DRAWN BY: KRL
DSGN BY: MRK
APPR BY: CLN
DATE: 11/06/2023

Q.C. REVIEW BY: _____
DATE: _____

OGALA SIOUX TRIBE HWY 73 NORTH WATERLINE RELOCATIONS
JACKSON COUNTY SOUTH DAKOTA

STANDARD DETAILS

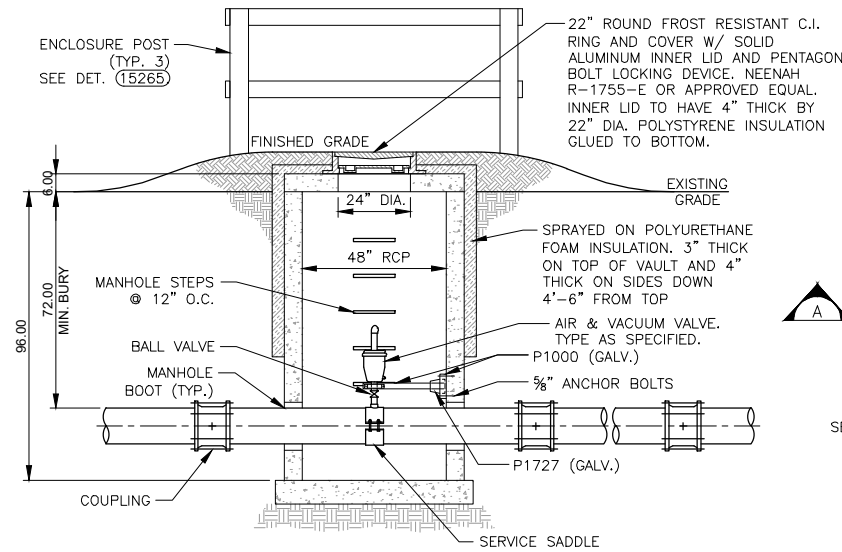
PROJECT NUMBER 2246.029.17
SHEET NUMBER 13
DRAWING NUMBER G-13

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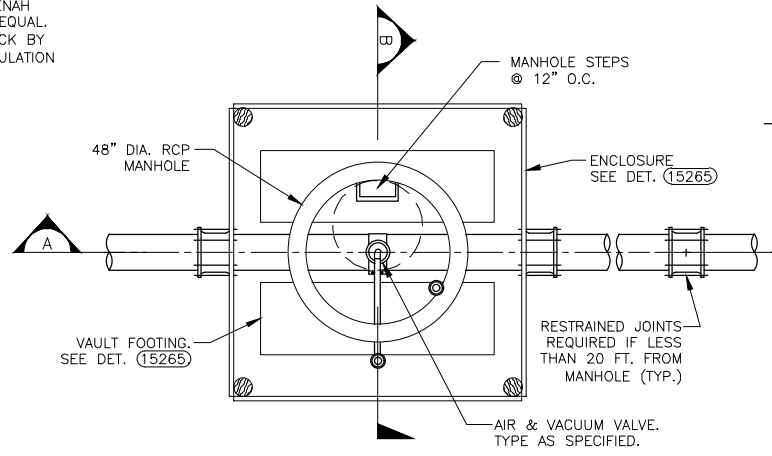
FOR BIDDING PURPOSES ONLY

NOTES:

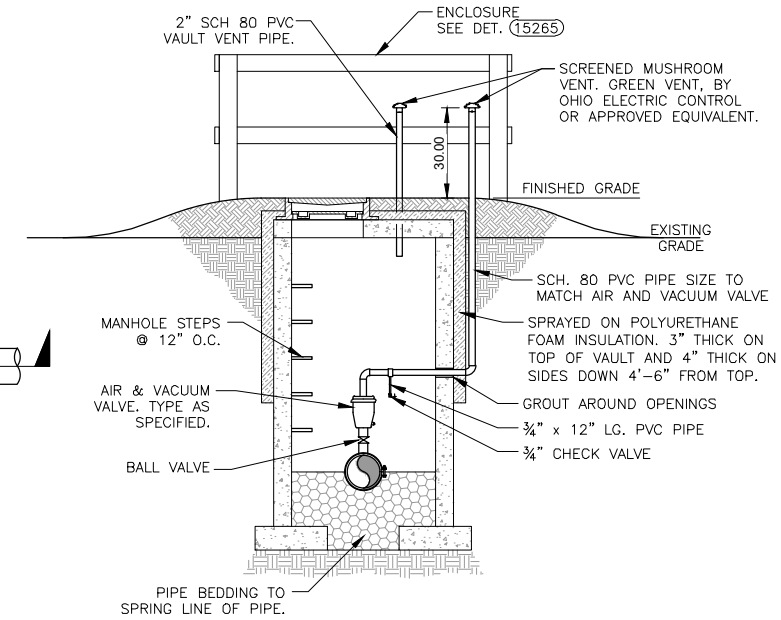
1. SWAY BRACE PRODUCT NUMBERS ARE UNISTRUT. USE UNISTRUT, KINLINE OR EQUAL. SECURE CARV TO SWAY BRACE W/ 2"x 12 GA. STRAP. USE STRUT MFR'S BOLTS AND NUTS. PAINT GALV. ITEMS BEFORE INSTALLATION.
2. SEE SPECIFICATIONS AND DRAWINGS FOR TYPE AND SIZE OF AIR RELEASE AND BALL VALVE.



SECTION A



PLAN

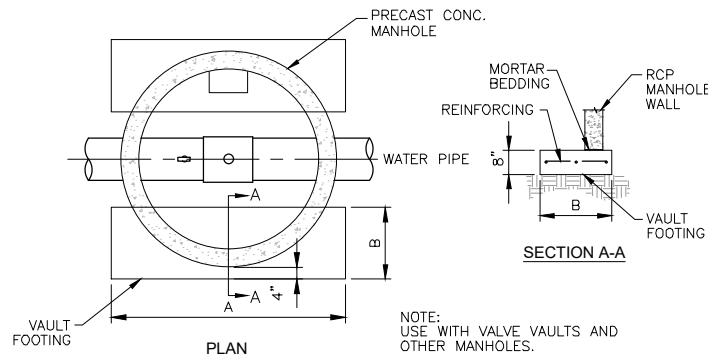


SECTION B

ARV VAULT DETAIL

SCALE: 3/8" = 1'-0"

15260

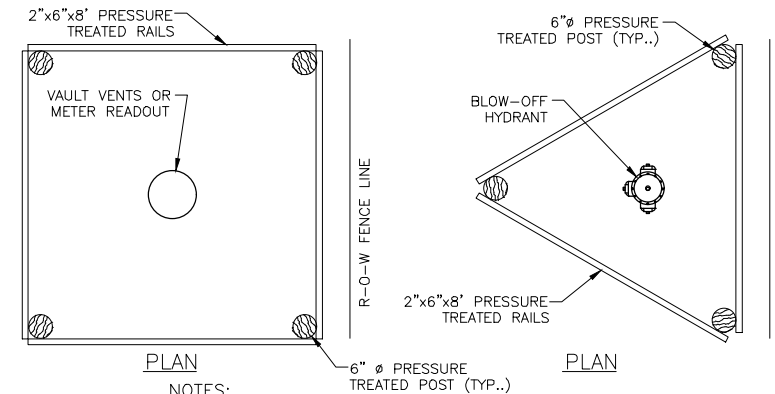


	A	B	REINFORCING
48" MANHOLE (58" O.D.)	6'-4"	2'-0"	W/3~#4 LONG, 4~#4 TRANS. (SHORT)
60" MANHOLE (72" O.D.)	6'-6"	2'-0"	W/3~#4 LONG, 4~#4 TRANS. (SHORT)
72" MANHOLE (86" O.D.)	7'-8"	2'-0"	W/3~#4 LONG, 4~#4 TRANS. (SHORT)
84" MANHOLE (100" O.D.)	8'-10"	3'-8"	W/4~#4 LONG, 6~#4 TRANS. (SHORT)
90" MANHOLE (107" O.D.)	9'-4"	3'-8"	W/4~#4 LONG, 6~#4 TRANS. (SHORT)
96" MANHOLE (114" O.D.)	10'-0"	3'-8"	W/4~#4 LONG, 6~#4 TRANS. (SHORT)

TYPICAL VAULT FOOTING

15264

NOT TO SCALE

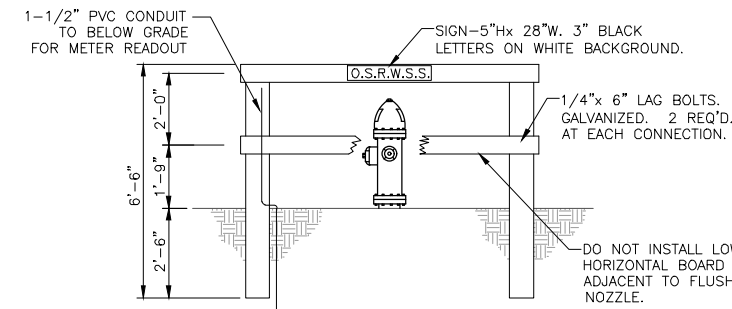


PLAN

PLAN

NOTES:

1. PROVIDE PROTECTIVE ENCLOSURE FOR VAULT VENTS, BLOW-OFF HYDRANTS AND METER READOUTS. CENTER FENCE AROUND ITEM BEING FENCED.
2. PROVIDE 3 POST ENCLOSURE AROUND BLOW-OFF HYDRANTS AND 4 POST ENCLOSURE AROUND VAULTS AND MANHOLES.



ELEVATION

ENCLOSURE DETAIL

15265

SCALE: 3/8" = 1'-0"

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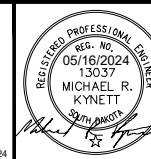
VERIFY SCALE!		REVISIONS			
NO.	DESCRIPTION	BY	DATE		

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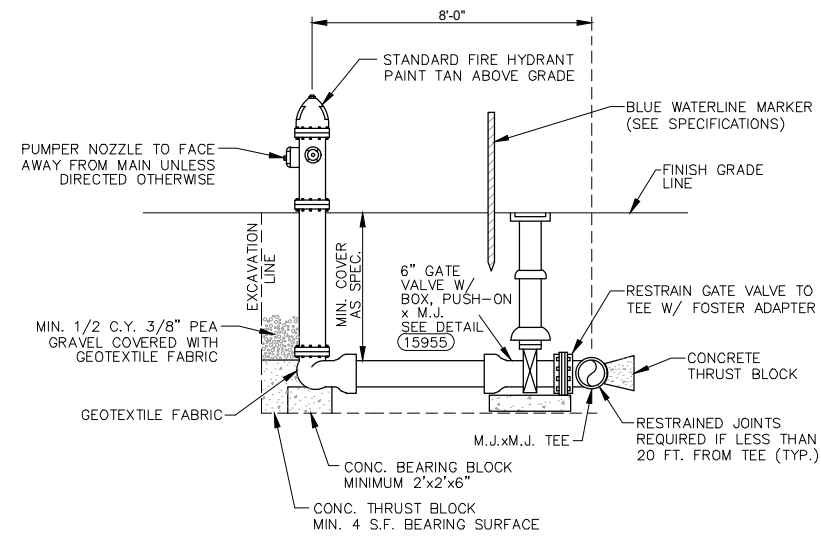
DRAWN BY: KRL
DSGN BY: MRK
APPR BY: CLN
DATE: 11/06/2023
Q.C. REVIEW BY: DATE:

OGLA LA SIOUX TRIBE HWY 73 NORTH WATERLINE RELOCATIONS SOUTH DAKOTA
STANDARD DETAILS
G-14

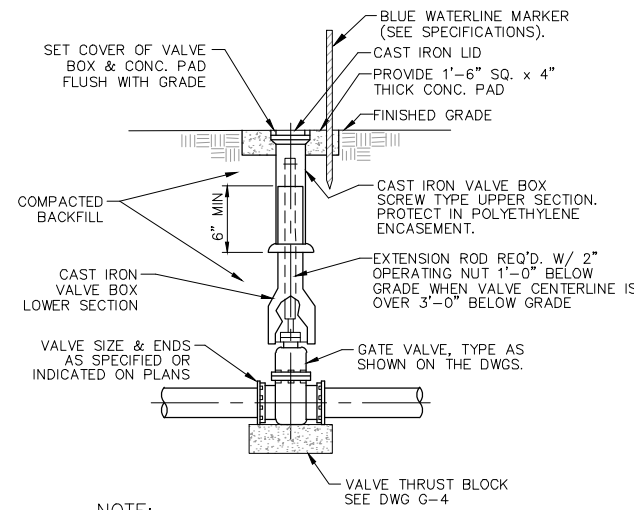
PROJECT NUMBER 2246.029.17
SHEET NUMBER 14
DRAWING NUMBER G-14

NOTES:

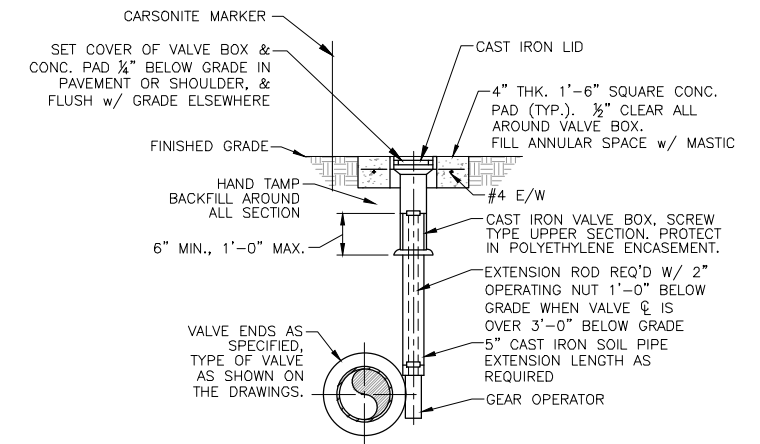
1. THRUST BLOCKING TO BE IN CONFORMANCE W/ DRAWING G-4.
2. FOR BOLTED FITTINGS, BLOCKING SHALL NOT OBSTRUCT BOLTS.
3. HYDRANT WEEP HOLES TO REMAIN UNOBSTRUCTED.
4. PROVIDE PROTECTIVE ENCLOSURE AROUND HYDRANTS PER DETAIL (15265)
5. COAT ALL FERROUS METAL PIPING, FITTINGS, VALVES, ETC. AS SPECIFIED.



BLOW-OFF HYDRANT DETAIL (15936)
NOT TO SCALE



BURIED GATE VALVE BOX (15955)
NOT TO SCALE



BURIED BUTTERFLY OR PLUG VALVE BOX SETTING (15956)
NOT TO SCALE

G:\24\BWM\CH-HIGHWAY 73 NORTH PIPELINE RELOCATIONS\ACAD\SHR\TS\029 DETAILS.DWG

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PLOTTED BY:LANE URICK ON Jun/24/2024

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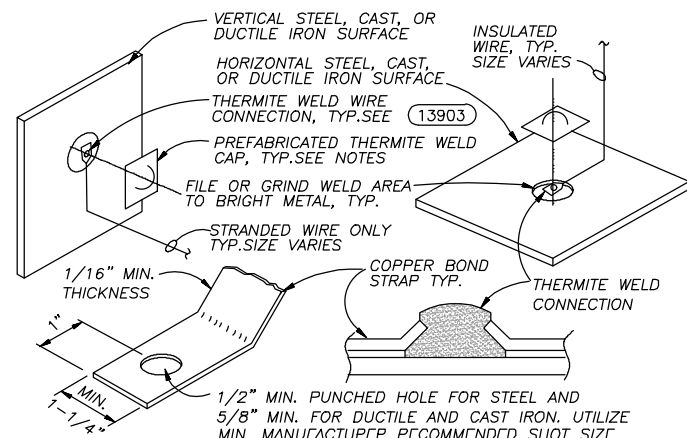
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05/18/2024
13037
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SOUTH DAKOTA

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DRAWN BY: KRL	DATE: 11/06/2023
DSGN. BY: MRK	Q.C. REVIEW BY: _____
APPR. BY: CLN	DATE: _____

OGLALA SIOUX TRIBE HWY 73 NORTH WATERLINE RELOCATIONS		PROJECT NUMBER 2246.029.17
JACKSON COUNTY	SOUTH DAKOTA	SHEET NUMBER 15
STANDARD DETAILS		DRAWING NUMBER G-15



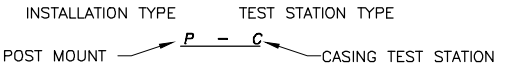
- NOTES:**
- COPPER SLEEVE REQUIRED FOR THERMITE WELDING OF No. 10 AWG AND SMALLER WIRE AND No. 4 AND No. 2 AWG JOINT BOND WIRES.
 - WELDER AND CARTRIDGE SIZE VARIES ACCORDING TO SURFACE SHAPE, MATERIAL, AND HORIZONTAL OR VERTICAL SURFACE. CONSULT WELDER MANUFACTURER FOR RECOMMENDED WELDER AND CARTRIDGE.
 - FOR MULTIPLE WIRE CONNECTIONS TO PIPE SEPARATE THERMITE WELD CONNECTIONS BY ONE PIPE DIAMETER MINIMUM. 2'-0" MAXIMUM.
 - WIRE CONNECTIONS TO FOREIGN PIPELINES SHALL BE MADE BY FOREIGN PIPELINE REPRESENTATIVE.
 - USE 15 GRAM MAXIMUM SIZE WELD CARTRIDGES FOR CONNECTIONS TO PETROLEUM AND NATURAL GAS PIPELINES OR STRUCTURES. THERMITE CONNECTIONS ONLY AS SPECIFIED & APPROVED BY OWNER. CROW'S FOOT LARGER WIRE CONNECTIONS IF SPECIFIED & APPROVED BY OWNER.
 - COAT COMPLETED THERMITE WELD CONNECTIONS W/ PREFABRICATED IP OR XP HANDYCAP, HEAT SHRINK SLEEVE, EPOXY, OR AS OWNER SPECIFIED.
 - COLOR CODE WIRES ACCORDING TO WIRE COLOR CODE SEE
 - ATTACH THERMITE WELD TO STUD OR WELD BASE PLATE IF PROVIDED.
 - INSTALL PIPE MARKING SIGNS NEXT TO TEST STATIONS AS SPECIFIED.

VERTICAL AND HORIZONTAL WIRE AND COPPER STRAP THERMITE CONNECTIONS (13901)
NTS

INSTALLATION TYPE	TEST STATION TYPE
P POST MOUNT	T - STANDARD, TWO WIRE
F FLUSH MOUNT	F - FOREIGN PIPE CROSSING
	C - CASING
	A - ANODE
	I - BURIED INSULATOR
	XB - CROSS BOND
	IRE - REFERENCE ELECTRODE/PLASTIC MONITORING PIPE
	IRC - REFERENCE COUPONS/PLASTIC MONITORING PIPE
	F - D - FOREIGN CROSSING WITH DRAIN ANODE
	F - A - FOREIGN CROSSING WITH GROUND ANODES
	T - C - TYPE T W/ 200' CURRENT SPAN
	GA-P - GALVANIC ANODE TO PIPELINE
	GA-F - GALVANIC ANODE TO FITTING
	- TEMP - TEMPORARY TEST STATION
	- TW - TRACER WIRE ACCESS BOXES

NOTE: INSTALL PIPE MARKING SIGNS NEXT TO TEST STATIONS AS SPECIFIED.

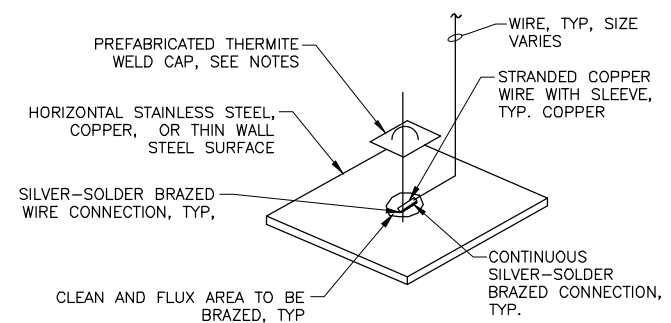
TEST STATION DETAILS 13920 AND 13930 SERIES
EXAMPLE TEST STATION



- NOTES:**
- TEST STATIONS SHALL BE INSTALLED AT THE APPROXIMATE LOCATIONS GIVEN IN THE SCHEDULE OR AS APPROVED BY THE ENGINEER IN THE FIELD. ACTUAL LOCATIONS AND TYPE MAY VARY DEPENDING UPON ACTUAL FIELD CONDITIONS ENCOUNTERED.
 - ADDITIONAL TEST STATIONS SHALL BE INSTALLED IF UNKNOWN FIELD CONDITIONS OR FOREIGN PIPE LOCATIONS ARE ENCOUNTERED DURING CONSTRUCTION. THESE ADDITIONAL TEST STATIONS SHALL BE LOCATED AND CONSTRUCTED AS APPROVED BY ENGINEER IN THE FIELD.
 - REFER TO "CP" SERIES DRAWINGS FOR TEST STATION DETAILS.
 - INSTALL CURRENT TEST SPAN TEST WIRES, REFERENCE ELECTRODES, COUPONS, ANODES, DRAIN ANODES, OR GROUND CELLS, ETC.; ONLY AT LOCATIONS NOTED ON TEST STATION SCHEDULE OR PLAN DRAWINGS.

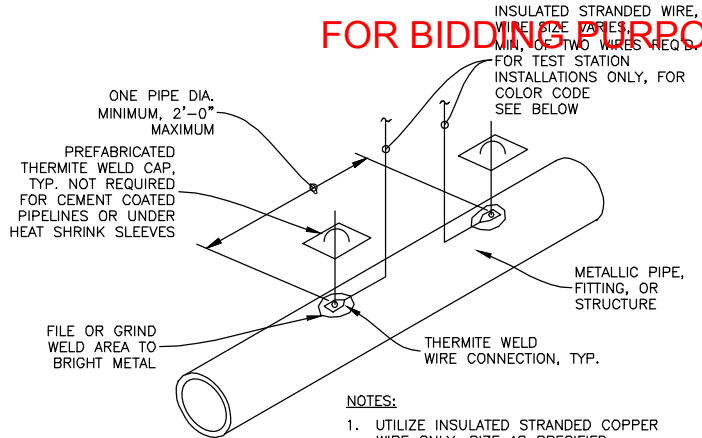
STANDARD TEST STATION LEGEND (13904)
NTS

NO.	DESCRIPTION	BY	DATE



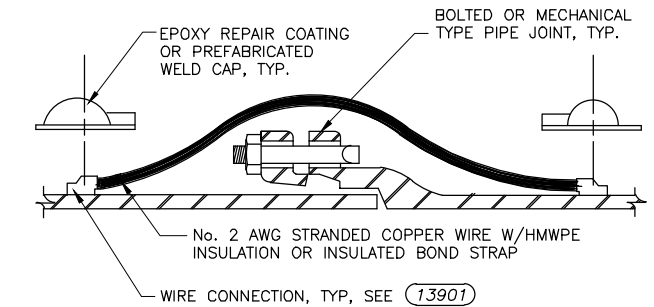
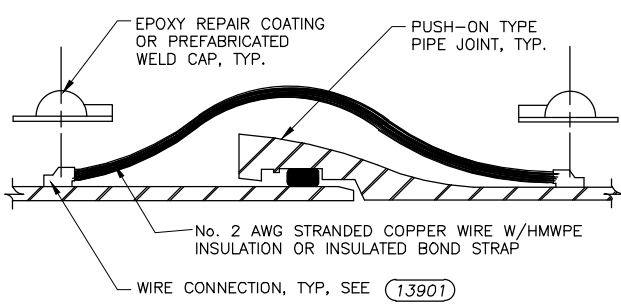
- NOTES:**
- BRAZE (SILVER-SOLDER) COPPER WIRE ELECTRICAL CONNECTION TO COPPER, STAINLESS STEEL, AND THIN WALL STEEL (0.035" OR LESS) PIPING OR TUBING.
 - SELECT A LOCATION TO BRAZE ON FITTING EDGE OR LIP, SO AS TO NOT DAMAGE INTERNAL COATINGS, RUBBER LINING, OR GASKETS.
 - CLEAN AND PREPARE SURFACE FOR BRAZING. FLUX SURFACE WITH A SUITABLE TYPE FLUX FOR MATERIAL TYPES BEING SOLDERED IN ACCORDANCE WITH THE SILVER SOLDER MANUFACTURER'S INSTRUCTIONS.
 - BRAZE THE SLEEVED COPPER WIRE WITH A SUITABLE TYPE SILVER BRAZING ALLOY FOR THE MATERIALS BEING CONNECTED IN ACCORDANCE WITH BRAZE MATERIAL MANUFACTURER'S DIRECTIONS.
 - SILVER-SOLDER WIRE TO PROPERLY PREPARED AND FLUXED AREA IN A MANNER SO AS TO NOT LEAVE CRACKS OR CREVICES IN THE COMPLETED BRAZED CONNECTION. VISUALLY INSPECT AND TAP WITH HAMMER TO TEST ADHESION.
 - ALLOW TO COOL AND REMOVE REMAINING FLUX WITH (STAINLESS STEEL) WIRE BRUSH AND SOLVENT CLEAN (SSPC SP-1).
 - ONLY COAT CONNECTIONS TO COPPER AND THIN WALL STEEL PIPING OR TUBING IN SPECIFIED THERMITE WELD COATING METHOD. STAINLESS STEEL CONNECTIONS DO NOT NEED TO BE COATED.
 - UTILIZE INSULATED STRANDED COPPER WIRE ONLY, SIZE AS SPECIFIED.

BRAZED WIRE CONNECTIONS (13901B)
NTS



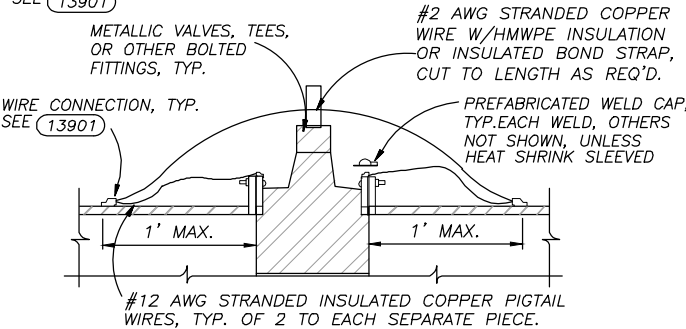
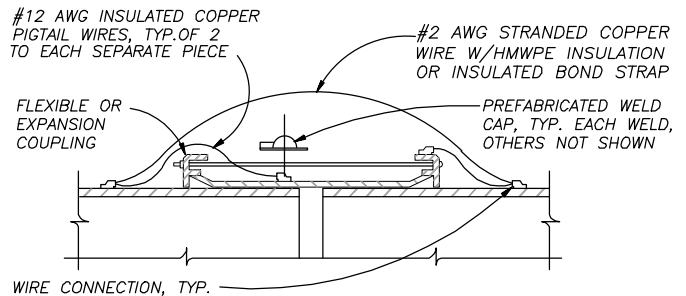
- NOTES:**
- UTILIZE INSULATED STRANDED COPPER WIRE ONLY, SIZE AS SPECIFIED.
 - UTILIZE ONE STRIP OF PURPLE TAPE TO IDENTIFY NORTH OR WEST STRUCTURES AND ONE STRIP OF GRAY TAPE TO IDENTIFY SOUTH OR EAST STRUCTURES, AS REQ'D.
- WIRE COLOR CODE:**
- PIPELINE TEST WIRES:
WATER - BLUE
WASTEWATER - GREEN OR PURPLE IF REUSE
FOREIGN PIPELINES - WHITE OR AS REQUESTED BY FOREIGN PIPELINE COMPANY
CURRENT TEST SPAN - UPSTREAM SIDE MARK W/ RED TAPE
UNPROTECTED PIPELINE - BLACK
 - CASINGS - ORANGE
 - ANODE LEADS - BLACK - (UPSTREAM W/ RED TAPE)
RIBBON ANODES - BLACK - IDENTIFY LOCATION & DIRECTION W/ TAGS
 - REFERENCE ELECTRODE WIRES - YELLOW
 - COUPON WIRES - GREEN - DUAL LEADS TO EACH COUPON
PROTECTED COUPON - GREEN (W/ 1 STRIP OF WHITE TAPE)
UNPROTECTED COUPON - GREEN (W/ 1 STRIP OF BLACK TAPE)
 - TRACER WIRES NON-METALLIC PIPE - GREEN W/ 2 STRIPS OF BLACK TAPE

PIPELINE WIRE CONNECTION (13902)
NTS



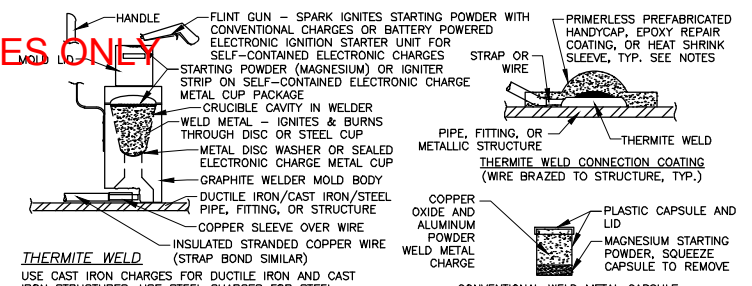
- NOTES:**
- NUMBER OF JOINT BONDS AT EACH JOINT AS SPECIFIED
 - PUSH-ON AND MECHANICAL TYPE JOINTS SHOWN, TYP. OF ALL JOINT TYPES.
 - JOINT BONDING NOT REQUIRED ON CAST IRON SOIL PIPE
 - ATTACH THERMITE WELD TO STUD OR WELD BASE PLATE IF PROVIDED.

INSULATED WIRE JOINT BOND (13905)
NTS



- NOTES:**
- NUMBER OF JOINT BONDS AT EACH JOINT AS SPECIFIED.
 - INSTALL AT FLEXIBLE COUPLINGS AND BOLTED CONNECTIONS WITH PIG TAIL WIRES TO COUPLING OR FITTING BODY IF HEAT SHRINK SLEEVE AND STRAP TYPE JOINT BONDS NOT ALREADY UTILIZED.
 - POSITION & PROVIDE LENGTH AS REQUIRED FOR MIN. TOTAL 2" SLACK.
 - ATTACH THERMITE WELD TO STUD OR WELD BASE PLATE IF PROVIDED.
 - PROVIDE ADDITIONAL PIGTAIL WIRES TO MULTIPLE SEGMENTED FITTINGS, TYP. OF 2 TO EACH SEPARATE PIECE, LENGTH AS REQ'D.

COUPLING OR FITTING JOINT BOND (13906)
NTS



- THERMITE WELD**
USE CAST IRON CHARGES FOR DUCTILE IRON AND CAST IRON STRUCTURES. USE STEEL CHARGES FOR STEEL STRUCTURES.
(SIMILAR SIZE AND TYPE OF CONVENTIONAL OR ELECTRONIC IGNITION TYPE CHARGES ACCEPTABLE)
COMPLETE WELDS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS
- STEP 1**
FILE STRUCTURE CONNECTION AREA (2"x2") TO BARE BRIGHT SHINY METAL & CLEAN. ALL WIRE WELDS SHALL BE A MINIMUM OF ONE PIPE DIAMETER APART UP TO A MAXIMUM OF 2 FEET SEPARATION DISTANCE.
- STEP 2**
STRIP INSULATION FROM WIRE. ATTACH COPPER SLEEVE (REQUIRED ON No. 10 AWG WIRE & SMALLER & No. 2 & No. 4 AWG JOINT BOND WIRES AS SPECIFIED)
- STEP 3**
ATTACH COPPER SLEEVE TO WIRE WITH CORRECT HAMMER DIE OR CRIMP TOOL. FACTORY SLEEVES SHALL BE ANGLED AND FIELD MADE BONDS SHALL HAVE WIRE EXTEND 1/4" PAST SLEEVE SO WIRE IS EXPOSED TO THERMITE WELD.
- STEP 4**
PLACE WASHER IN BOTTOM OF MOLD AND FILL CRUCIBLE W/ POWDER OR INSERT PREFABRICATED ELECTRONIC CANISTER CHARGE, CLOSE LID, HOLD FIRMLY W/ OPENING AWAY FROM OPERATOR, & IGNITE W/ FLINT GUN OR ELECTRONIC IGNITION STARTER.
- STEP 5**
REMOVE SLAG FROM CONNECTION, VISUALLY INSPECT & TAP WELD TO TEST FOR SOUNDNESS & ADHESION W/ HAMMER. MEASURE JOINT BOND RESISTANCE AS SPECIFIED. REPLACE ALL POORLY FORMED, UNSIGHTLY, POROUS, HIGH RESISTANT, OR DEFECTIVE WELDS. INSTALL ADDITIONAL BOND WIRE OR STRAP IF REQUIRED.
- STEP 6**
CLEAN AND COAT CONNECTION AND EXPOSED STRUCTURE SURFACE WITH HEAT SHRINK SLEEVE, PRIMERLESS HANDYCAP, OR EPOXY REPAIR COATING MATERIALS PER BELOW, APPLY IN ACCORDANCE WITH COATING MANUFACTURER'S RECOMMENDATIONS.
- 6-A. IF CROWFOOT CONNECTION LOCATED AT PIPE JOINT TO BE COATED WITH HEAT SHRINK SLEEVE, APPLY MASTIC FILLER & HEAT SHRINK SLEEVE OVER CONNECTION. NO WELD CAP REQUIRED. IF NOT HEAT SHRINKED, THEN EITHER:
6-B. UTILIZE REGULAR SIZE PRIMERLESS THERMITE WELD CAP FOR No. 8 AWG AND SMALLER WIRE.
6-C. UTILIZE PRIMERLESS HANDYCAP XL-IP (EXTRA LARGE) OR EQUAL FOR No. 6 AND LARGER WIRE AND PIN WELD TYPE CONNECTIONS.
6-D. OR UTILIZE 100 PERCENT MOISTURE TOLERANT EPOXY REPAIR COATING (PROTAL 7125 OR APPROVED EQUAL) FOR HARD TO COAT CONNECTIONS AND SPOT EXTERNAL COATING REPAIRS.
6-E. REPAIR PIPE OR STRUCTURE COATING DAMAGE WITH SPECIFIED AND APPROVED COATING REPAIR MATERIALS FOR ORIGINAL COATING TYPE.
- GENERAL EXOTHERMIC WELD & COATING PROCEDURES**
THERMITE WELD AND WIRE CONNECTION (13903)
NTS

Q:\24816\HIGHWAY 73 NORTH PIPELINE RELOCATIONS\CAD\SHS\13902.DWG

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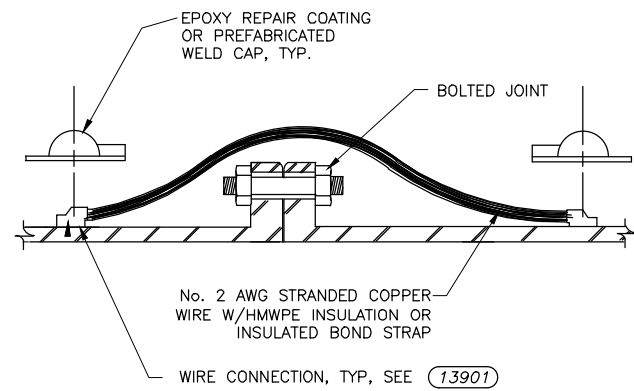
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OGLA SIOUX TRIBE HWY 73 NORTH WATERLINE RELOCATIONS SOUTH DAKOTA

JACKSON COUNTY

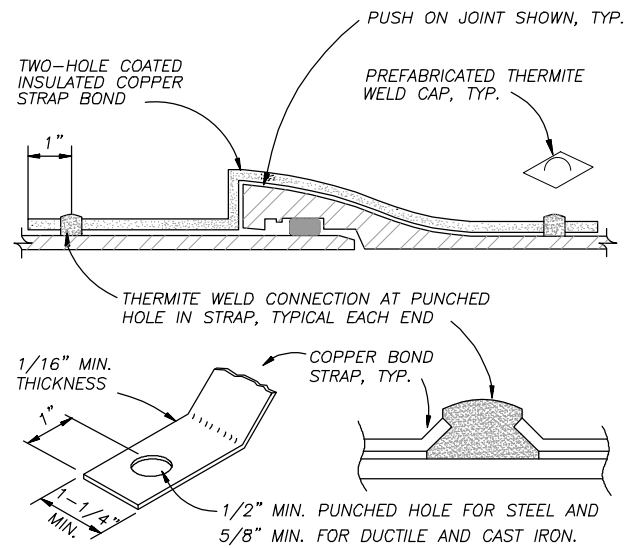
STANDARD DETAILS

PROJECT NUMBER: 2246.029.17
SHEET NUMBER: 16
DRAWING NUMBER: G-16



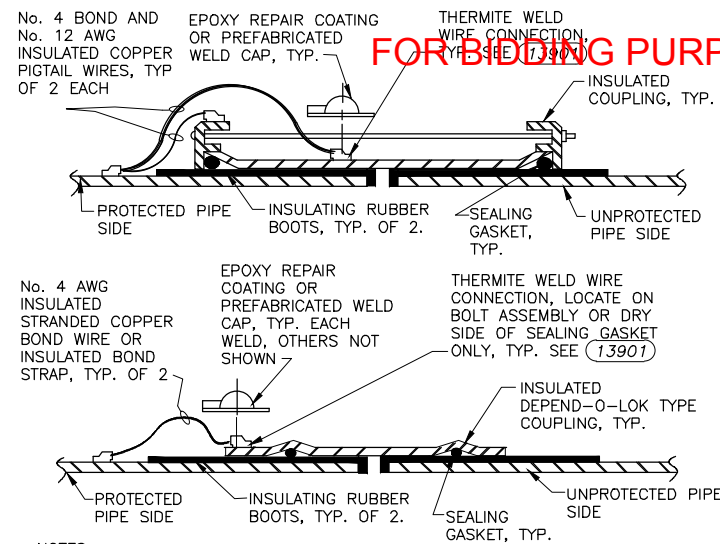
- NOTES:
1. NUMBER OF JOINT BONDS AT EACH JOINT AS SPECIFIED
 2. BOLTED JOINT CONNECTION SHOWN, TYPICAL OF ALL JOINT TYPES.
 3. INSTALL AT BOLTED TYPE CONNECTIONS IF HEAT SHRINK SLEEVE AND STRAP JOINT BONDS NOT ALREADY UTILIZED
 4. ATTACH THERMITE WELD TO STUD OR WELD BASE PLATE IF PROVIDED.

BOLTED CONNECTION JOINT BOND (13907)
NTS



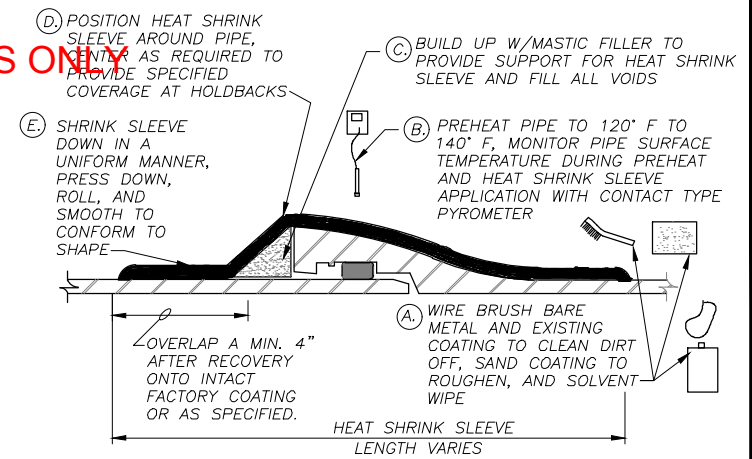
- NOTES:
1. NUMBER OF STRAP BONDS AT EACH JOINT AS SPECIFIED.
 2. CADWELD AND FORM COPPER STRAP TO MATCH JOINT PROFILE.
 3. PROVIDE COATED INSULATED BOND STRAP PER SPECIFICATIONS.
 4. TWO-HOLE INSULATED BOND STRAP CAN BE USED IN PLACE OF WIRE TYPE JOINT BOND, WHERE BARE PIPE OR HEAT SHRINK SLEEVE IS NOT REQUIRED FOR JOINT COATING. PRIME AND COAT THERMITE CONNECTION WITH PREFABRICATED THERMITE WELD CAP. COAT BARE COPPER AREAS W/ REPAIR COATINGS PER COATING MANUFACTURER AND SPECIFICATIONS.
 5. ATTACH THERMITE WELD TO STUD OR WELD BASE PLATE IF PROVIDED.

COATED COPPER STRAP JOINT BONDS (13909)
NTS



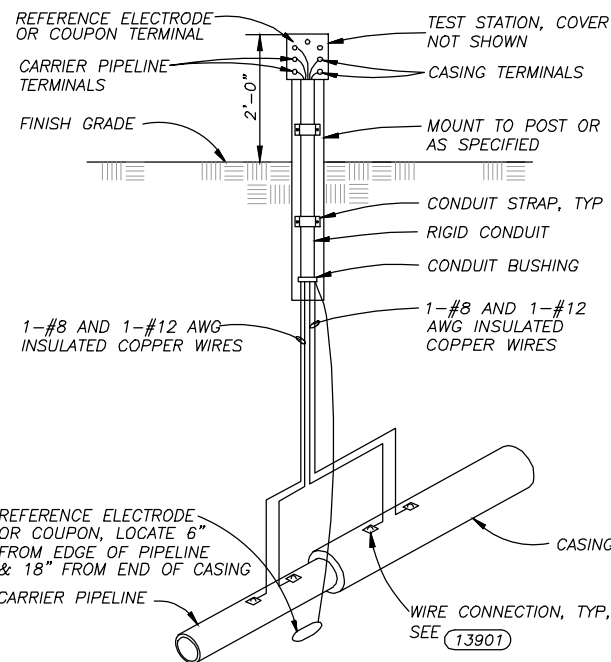
- NOTES:
1. BOND TO PROTECTED PIPE SIDE ONLY, DO NOT BOND ACROSS JOINT.
 2. INSULATE RESTRAINING RODS IF ABOVEGRADE TYPE WITH INSULATING SLEEVES AND WASHERS ON BOTH ENDS. IF BURIED, INSTALL INSULATING SLEEVES & WASHERS ON UNPROTECTED END ONLY, SEE (13910R)
 3. INSULATED RESTRAINED COUPLINGS ONLY ALLOWED FOR BURIED JOINTS UP TO 46" PIPE DIAMETER, FOR LARGER SIZE RESTRAINED INSULATORS UTILIZE MONOLITHIC TYPE INSULATORS PER SPECIFICATIONS.
 4. COAT THERMITE WELD CONNECTION WITH EPOXY REPAIR COATING OR PREFABRICATED WELD CAP IF NOT HEAT SHRINK SLEEVED.
 5. TEST FOR ELECTRICAL ISOLATION. TEST BURIED INSULATORS BOTH PRIOR TO AND AFTER BURIAL.

INSULATING FLEXIBLE TYPE COUPLINGS (13910)
NTS



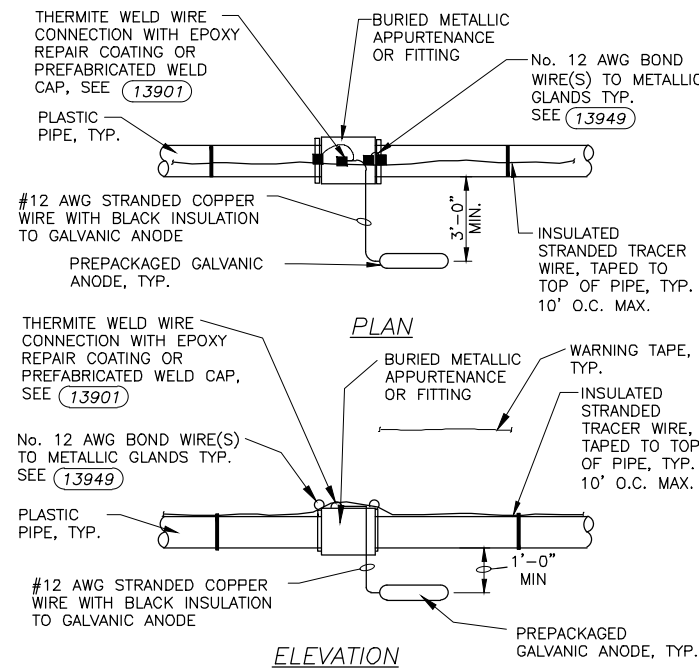
- NOTES:
1. PUSH-ON JOINT SHOWN, TYPICAL OF ALL JOINT TYPES OR REPAIRS.
 2. MASTIC AND SLEEVE SHALL BE AS RECOMMENDED BY HEAT SHRINK SLEEVE MANUFACTURER FOR EACH PIPE AND JOINT TYPE.
 3. CLEAN, PREHEAT, APPLY MASTIC FILLER AND HEAT SHRINK SLEEVE PER HEAT SHRINK MANUFACTURER'S DIRECTIONS WHILE MONITORING PREHEAT AND APPLICATION TEMPERATURES.
 4. ALLOW COMPLETED SLEEVE TO COOL BEFORE BACKFILLING.
 5. HEAT SHRINK SLEEVE JOINT COATING AND MASTIC FILLER SHALL COMPLETELY COVER PIPE HOLD BACK, JOINT, AND BOND STRAP. MASTIC FILLER SHALL PROVIDE SMOOTH TRANSITION AT ALL EDGES AND STEP-DOWNS AND FILL ALL VOIDS. PROVIDE AND INSTALL FILLER MATERIALS ACCORDING TO HEAT SHRINK MANUFACTURER.
 6. JOINT BOND WIRES/STRAPS, ANODE & TEST LEADS (NOT SHOWN) SHALL BE COMPLETELY ENCASED UNDER THE HEAT SHRINK SLEEVE COATING.

HEAT SHRINK SLEEVE JOINT COATING OR PIPE COATING REPAIR (13917)
NTS



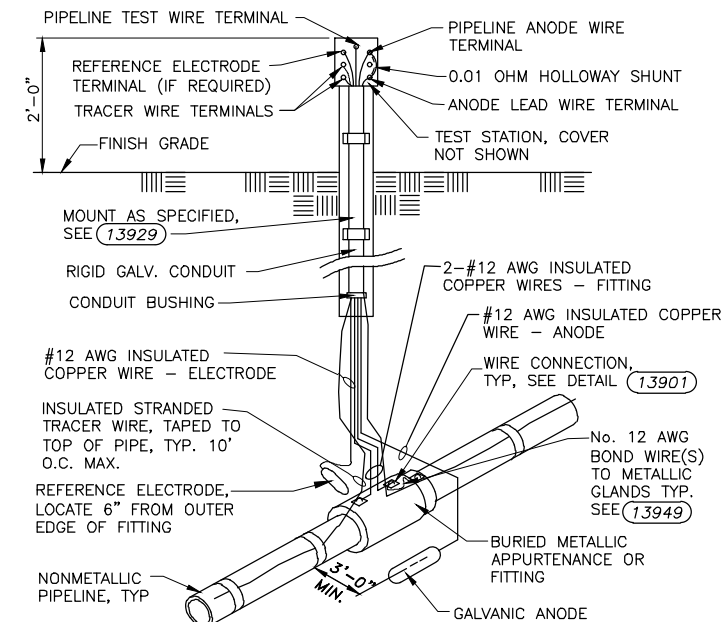
- NOTES:
1. INSTALL REFERENCE ELECTRODES OR COUPONS ONLY AT TEST STATIONS INDICATED ON TEST STATION LOCATIONS SCHEDULE.
 2. COLOR CODE WIRES ACCORDING TO WIRE COLOR CODE. (13902)

TYPE P-C POST MOUNTED TEST STATION (13924)
NTS



- NOTES:
1. MIN. TWO No. 12 AWG BOND WIRES EACH FOR 12" AND LARGER PIPE, ONE BOND WIRE FOR SMALLER PIPE.
 2. PROVIDE TYPE, NUMBER & SIZE OF ANODES AS SPECIFIED, MINIMUM SHALL BE ONE ANODE PER FITTING

GALVANIC ANODE INSTALLATION AT BURIED METALLIC FITTINGS (13940)
NTS



- NOTES:
1. INSTALL GALVANIC ANODE MINIMUM 1'-0" BELOW PIPE INVERT ELEVATION. CONNECT ANODE TO FITTING ONLY THROUGH TEST STATION.
 2. INSTALL REFERENCE ELECTRODES ONLY AT TEST STATIONS INDICATED ON TEST STATION LOCATION SCHEDULE.
 3. COLOR CODE WIRES ACCORDING TO WIRE COLOR CODE, SEE (13902)

POST MOUNTED TEST STATION WITH GALVANIC ANODE (13941)
NTS

Q:\24\BWM\CH\HIGHWAY 73 NORTH PIPELINE RELOCATIONS\CAD\SHS\TS029.DETAILS.DWG

VERIFY SCALE!		REVISIONS	
NO.	DESCRIPTION	BY	DATE

THESE PRINTS MAY BE REDUCED. LINE BELOW MEASURES ONE INCH ON ORIGINAL DRAWING.

MODIFY SCALE ACCORDINGLY!

PLOTTED BY:LANE URICK ON Jun/24/2024

Morrison Maierle
engineers • surveyors • planners • scientists

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REGISTERED PROFESSIONAL ENGINEER
No. 05/18/2024
13037
MICHAEL R. KYNETT

DATE: 11/06/2023

Q.C. REVIEW BY: _____ DATE: _____

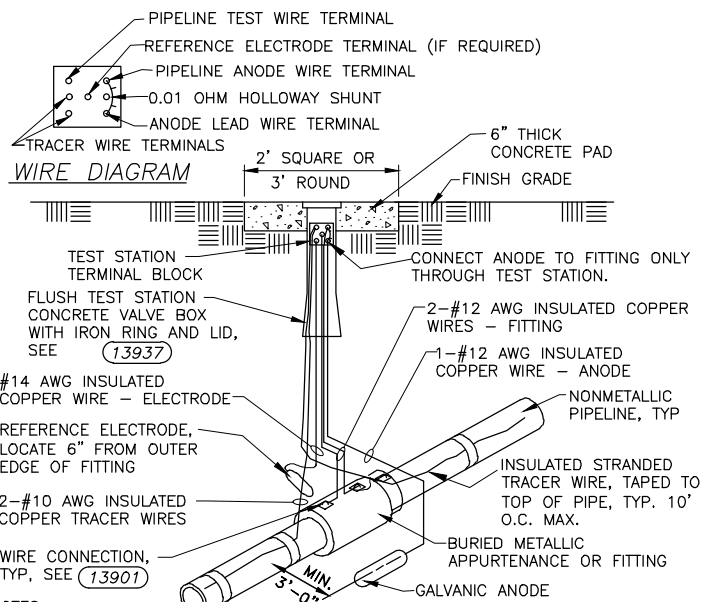
DRAWN BY: KRL
DSGN BY: MRK
APPR BY: CLN
DATE: 11/06/2023

OGALA SIOUX TRIBE HWY 73 NORTH WATERLINE RELOCATIONS SOUTH DAKOTA

JACKSON COUNTY

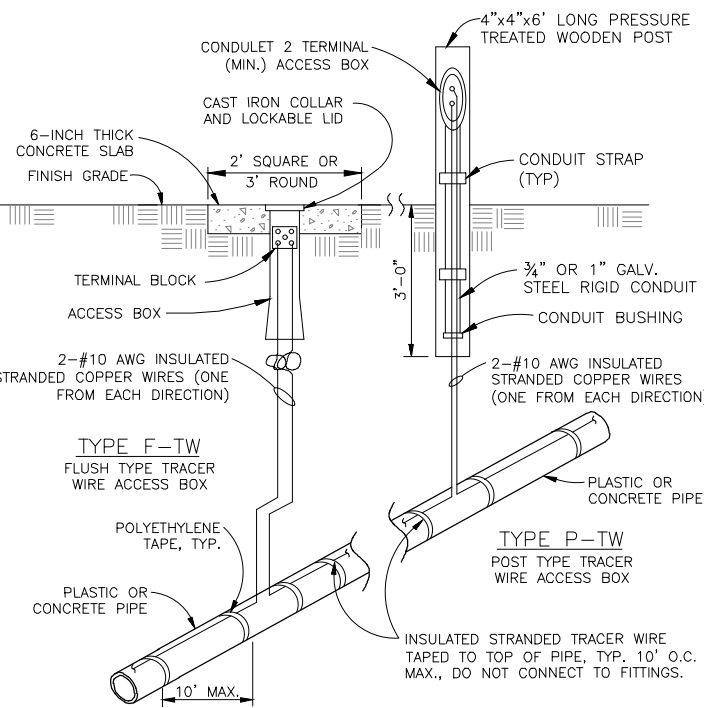
STANDARD DETAILS

PROJECT NUMBER 2246.029.17
SHEET NUMBER 17
DRAWING NUMBER G-17



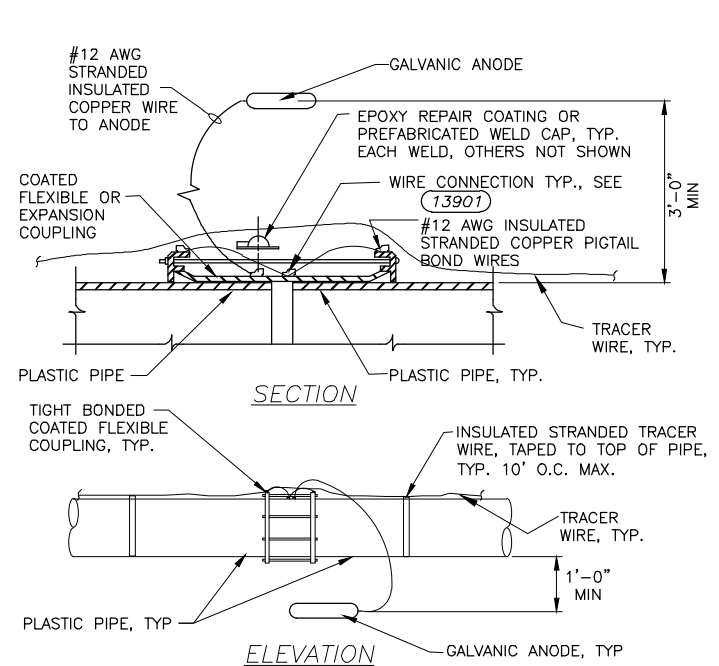
- NOTES:**
1. PROVIDE SUFFICIENT SLACK IN TEST WIRES TO ALLOW TERMINAL BLOCK TO EXTEND 18" OUT OF TEST STATION. COIL WIRES IN TEST STATION.
 2. INSTALL GALVANIC ANODE MINIMUM 1'-0" BELOW PIPE INVERT ELEVATION.
 3. INSTALL REFERENCE ELECTRODES ONLY AT TEST STATIONS INDICATED ON TEST STATION LOCATION SCHEDULE.
 4. COLOR CODE WIRES ACCORDING TO WIRE COLOR CODE, SEE (13902)

TYPE F-GA-F (GALVANIC ANODE TO FITTING)
FLUSH MOUNTED TEST STATION WITH GALVANIC ANODE (13942)
 NTS



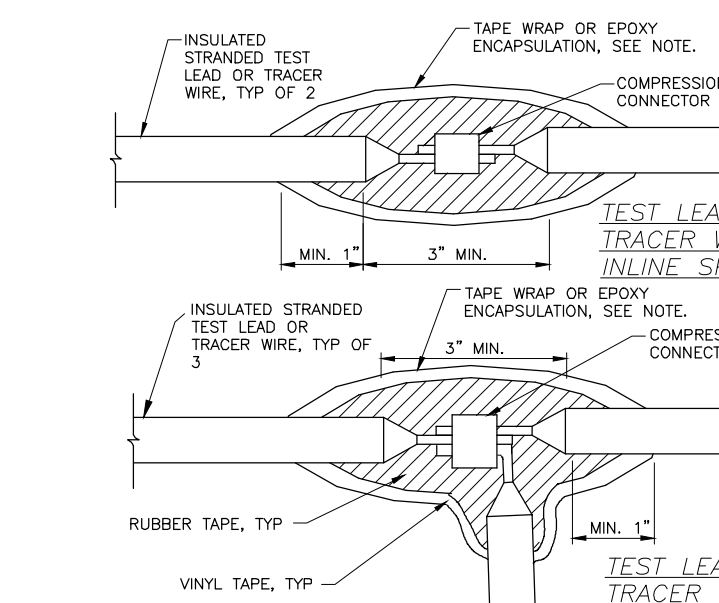
- NOTES:**
1. FLUSH & POST TYPE ACCESS BOXES SHOWN, USE POST IF POSSIBLE.
 2. INSTALL WHERE NO TEST STATIONS AVAILABLE FOR TERMINATION, SO AS TO ALLOW NO TRACER WIRE SPANS LONGER THAN 2,000 FEET.
 3. PROVIDE SUFFICIENT SLACK IN TRACE WIRES TO ALLOW TERMINAL BLOCK TO EXTEND 18" OUT OF FLUSH BOX. COIL WIRES IN ACCESS BOX.
 4. INSTALL PIPE MARKING SIGNS NEXT TO BOXES AS SPECIFIED.

TRACER WIRE ACCESS DETAIL (13947B)
 NOT TO SCALE



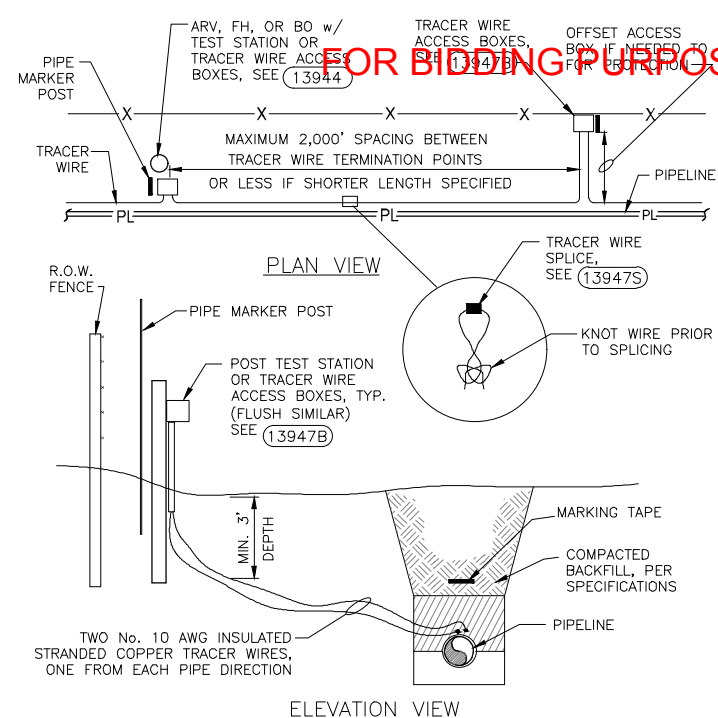
- NOTES:**
1. MIN. TWO EACH No. 12 AWG BONDS EACH FOR 12" AND LARGER PIPE, 1 BOND ALLOWED FOR SMALLER PIPE.
 2. PROVIDE TYPE, NUMBER & SIZE OF ANODES AS SPECIFIED, MINIMUM SHALL BE ONE ANODE PER FITTING

CORROSION PROTECTION FOR FLEXIBLE METALLIC COUPLINGS ON PLASTIC PIPE (13943)
 NTS



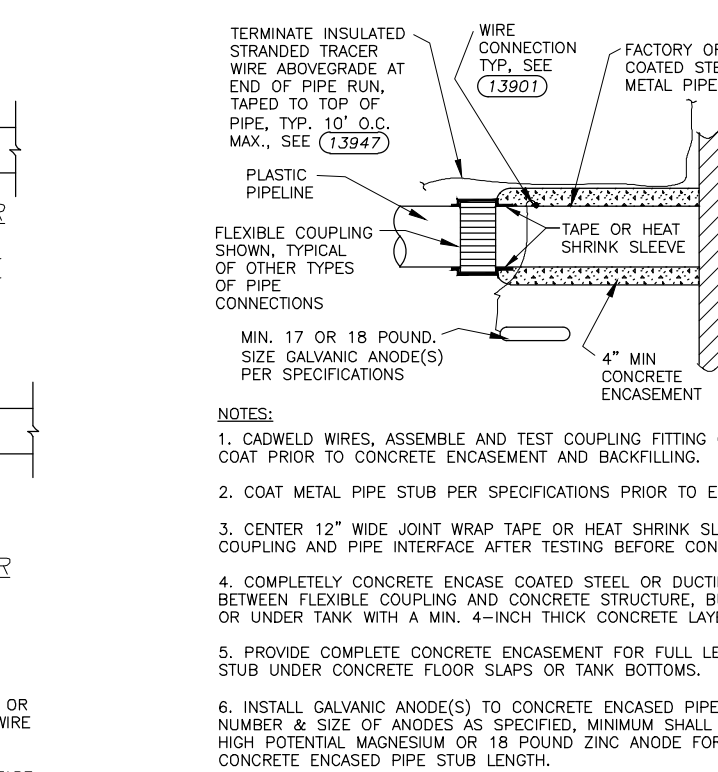
- NOTES:**
1. TRACER WIRE ONLY REQUIRED FOR NON-METALLIC TYPE PIPE INSTALLATIONS.
 2. MAKE WIRE SPLICE CONNECTION WITH COMPRESSION TYPE CONNECTOR IN ACCORDANCE WITH COMPRESSION CONNECTOR MANUFACTURER RECOMMENDATIONS OR SECURE WITH SPLIT BOLT AND SILVER SOLDER. DO NOT USE BUTT SPLICES OR WIRE NUTS. COMPLETE ALL SPLICES ONLY IN THE PRESENCE OF THE ENGINEER.
 3. WRAP ENTIRE CONNECTION WITH TWO (2) LAYERS OF HIGH VOLTAGE RUBBER TAPE AND THEN WRAP WITH TWO (2) LAYERS OF VINYL ELECTRICAL TAPE AND COAT WITH SEALER OR ENCAPSULATE IN EPOXY SPLICE KIT. EXTEND A MINIMUM OF 1-INCH ONTO INTACT WIRE INSULATION.

TEST LEAD AND TRACER WIRE SPLICES (13947S)
 NOT TO SCALE



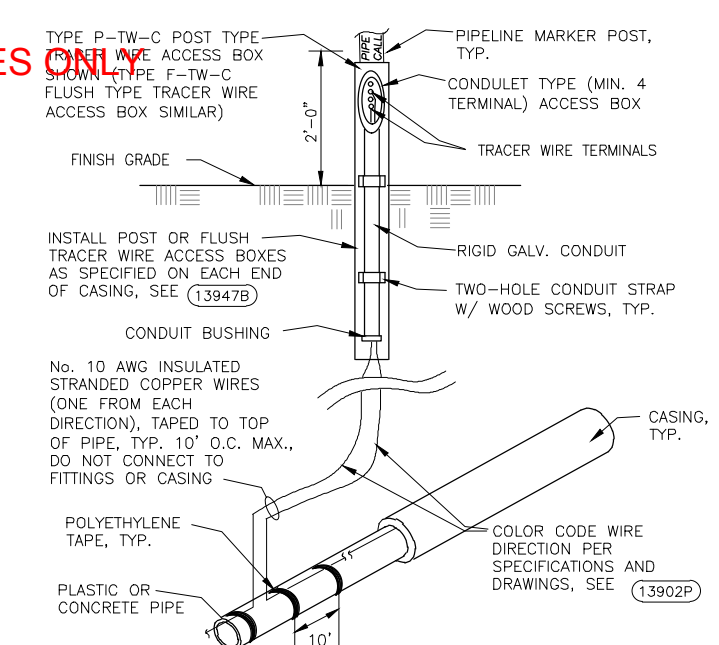
- NOTES:**
1. TERMINATE TRACER WIRE AT TEST STATIONS OR TRACER WIRE ACCESS BOXES LOCATED AT SPECIFIED DISTANCES, STRUCTURES AND END OF EACH PIPE RUN. TEST TRACER WIRE CONTINUITY.
 2. LOCATE TRACER WIRE ACCESS BOXES OR TEST STATIONS IN PROTECTED LOCATIONS. OFFSET TEST STATIONS OR TRACER WIRE ACCESS BOXES TO R.O.W. FENCELINE OR EDGE OF ROADWAY, IF NO PROTECTED LOCATION AVAILABLE OVER PIPELINE. CO-ORDINATE TEST STATION OR TRACER WIRE ACCESS BOX LOCATIONS WITH ENGINEER.

TRACER WIRE DETAIL (13947)
 NOT TO SCALE



- NOTES:**
1. CADWELD WIRES, ASSEMBLE AND TEST COUPLING FITTING CONNECTION AND COAT PRIOR TO CONCRETE ENCASEMENT AND BACKFILLING.
 2. COAT METAL PIPE STUB PER SPECIFICATIONS PRIOR TO ENCASEMENT.
 3. CENTER 12" WIDE JOINT WRAP TAPE OR HEAT SHRINK SLEEVE ON FLEXIBLE COUPLING AND PIPE INTERFACE AFTER TESTING BEFORE CONCRETE ENCASEMENT.
 4. COMPLETELY CONCRETE ENCASE COATED STEEL OR DUCTILE IRON PIPE STUB BETWEEN FLEXIBLE COUPLING AND CONCRETE STRUCTURE, BUILDING WALL, FLOOR OR UNDER TANK WITH A MIN. 4-INCH THICK CONCRETE LAYER.
 5. PROVIDE COMPLETE CONCRETE ENCASEMENT FOR FULL LENGTH OF METAL PIPE STUB UNDER CONCRETE FLOOR SLABS OR TANK BOTTOMS.
 6. INSTALL GALVANIC ANODE(S) TO CONCRETE ENCASED PIPE. PROVIDE TYPE, NUMBER & SIZE OF ANODES AS SPECIFIED, MINIMUM SHALL BE ONE 17 POUND HIGH POTENTIAL MAGNESIUM OR 18 POUND ZINC ANODE FOR EVERY 25 FEET OF CONCRETE ENCASED PIPE STUB LENGTH.

CONCRETE ENCASED METAL PIPE STUB BETWEEN PLASTIC PIPE FLEXIBLE COUPLING AND CONCRETE STRUCTURE CONNECTION (13948)
 NTS



- NOTES:**
1. INSTALL TRACER WIRE ACCESS BOX AT EACH END OF CASING, POST TYPE ACCESS BOX SHOWN (FLUSH SIMILAR), USE POST TYPE IF POSSIBLE. FOR FLUSH BOXES PROVIDE SUFFICIENT SLACK IN WIRES TO ALLOW TERMINAL BLOCK TO EXTEND MIN. 18" OUT OF BOX. COIL WIRES IN FLUSH TYPE ACCESS BOX.
 2. INSTALL NUMBER AND SIZE OF PREPACKAGED GALVANIC ANODES TO METALLIC CASINGS, ONLY IF INDICATED ON TEST STATION/TRACER WIRE ACCESS BOX LOCATION SCHEDULE OR DRAWINGS OR IF SPECIFIED, SEE (13947A)

TYPE P-TW-C AND F-TW-C (CASING) TRACER WIRE ACCESS BOXES AT CASINGS (13947C)
 NTS

Q:\24\BIM\HIGHWAY 73 NORTH PIPELINE RELOCATIONS\CADD\SHEET\029 DETAILS.DWG
 PLOTTED BY:LANE URICK ON Jun/24/2024

VERIFY SCALE!		REVISIONS	
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REGISTERED PROFESSIONAL ENGINEER
 REG. NO. 05/18/2024
 13037
 MICHAEL R. KYNETT

DRAWN BY: KRL
 DSGN BY: MRK
 APPR BY: CLN
 DATE: 11/06/2023
 Q.C. REVIEW BY: _____
 DATE: _____

OGLA SIOUX TRIBE HWY 73 NORTH WATERLINE RELOCATIONS SOUTH DAKOTA
 STANDARD DETAILS

PROJECT NUMBER 2246.029.17
 SHEET NUMBER 18
 DRAWING NUMBER G-18