

Appendix K: Final Pre-Construction Plan and Profile Drawings of the Water Pipeline and Wells

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CONSTRUCTION PLANS FOR

BASIN ELECTRIC WELL FIELD AND RAW WATER PIPELINE

DEER CREEK STATION

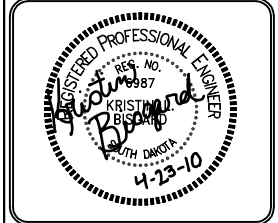
WHITE, SOUTH DAKOTA

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CONSULTANTS:



PROJECT TITLE:
BASIN ELECTRIC WELL FIELD AND RAW WATER PIPELINE

PROJECT LOCATION:
WHITE
SOUTH DAKOTA

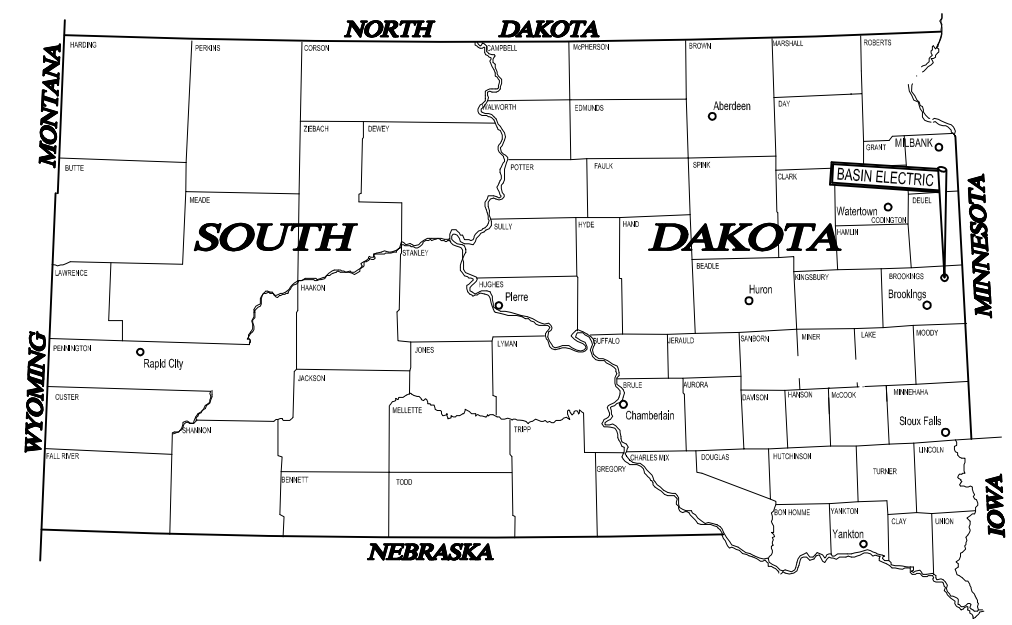
REV.	DATE	DESCRIPTION

DRAWN BY: JLU
DESIGNED BY: KLB
CHECKED BY: SDR
JOB NO: 20953-00-00
DATE: APRIL 2010

0 1/2" 1"
SCALE REDUCTION BAR

SHEET TITLE:
TITLE AND INDEX OF SHEETS

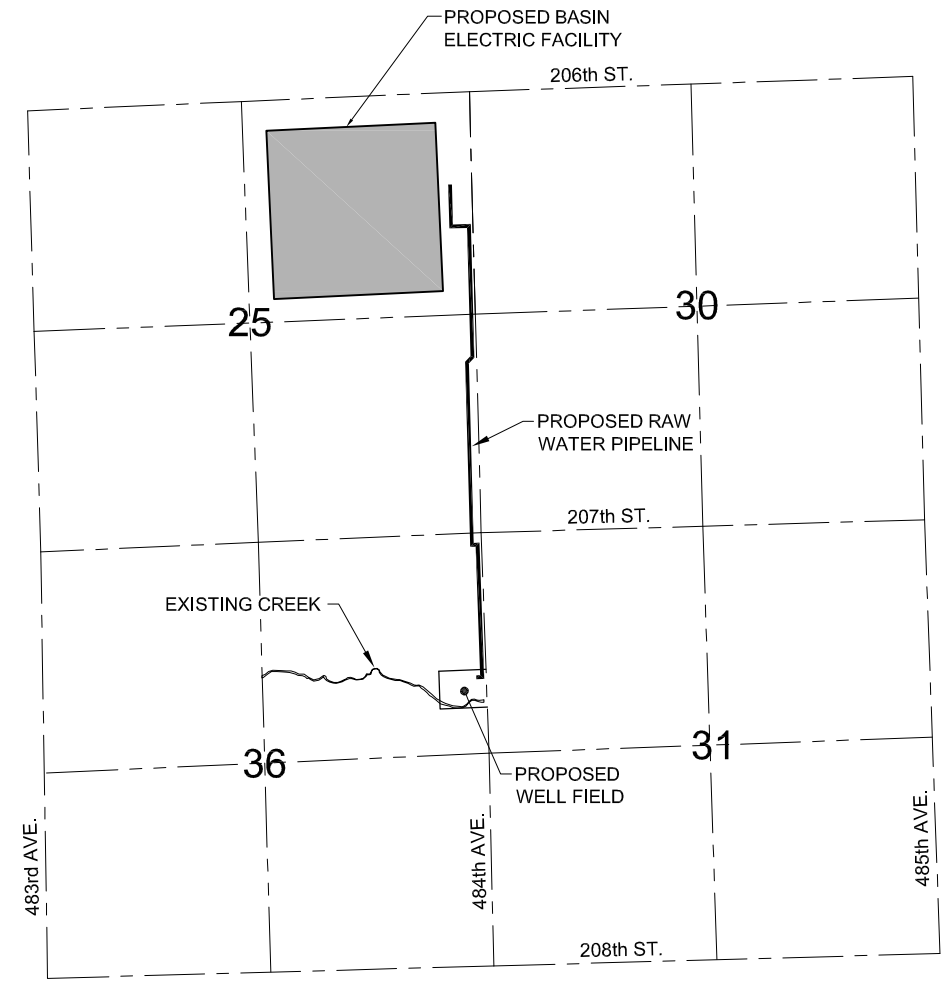
SHEET NO.:
1



North
PROJECT VICINITY MAP

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North
LOCATION MAP

APRIL 2010

GENERAL CONSTRUCTION NOTES:

- LOCATION OF EXISTING UTILITIES SHOWN ON THESE PLANS WAS TAKEN FROM THE BEST AVAILABLE RECORDS AND DOES NOT INCLUDE ALL UNDERGROUND UTILITIES SUCH AS ELECTRICAL, GAS, FUEL, UNDERGROUND CABLE TV. PRIOR TO EXCAVATION THE CONTRACTOR SHALL FIELD VERIFY EXACT LOCATION OF ALL UTILITIES WHETHER OR NOT SHOWN ON THESE PLANS. CONTRACTOR SHALL PROTECT ALL UTILITIES DURING CONSTRUCTION. ANY DISTURBANCE OR REPLACEMENT OF EXISTING UTILITIES SHALL BE INCIDENTAL TO THE PROJECT. ANY LOSS OF TIME DUE TO LOCATING, RELOCATING, OR ADJUSTING UTILITIES SHALL BE INCIDENTAL TO THE PROJECT.
- IT IS UNDERSTOOD AND AGREED THAT THE CONTRACTOR HAS CONSIDERED IN THE BID THE PERMANENT AND TEMPORARY UTILITY APPURTENANCES IN THEIR PRESENT OR RELOCATED POSITIONS AS SHOWN ON THE PLANS. ADDITIONAL COMPENSATION WILL NOT BE ALLOWED FOR DELAYS, INCONVENIENCES, OR DAMAGES SUSTAINED DUE TO INTERFERENCE FROM THE UTILITY APPURTENANCES OR THE OPERATION OF MOVING THEM.
- BARRICADE AND WARNING SIGNS SHALL BE PROVIDED, ERECTED, AND MAINTAINED IN ACCORDANCE WITH SECTION 010000 OF THE SPECIFICATIONS AND AS SHOWN ON THE DRAWINGS. SIGNS AND BARRICADES THAT ARE PERIODICALLY REQUIRED TO BE MOVED DUE TO CONSTRUCTION OPERATIONS SHALL BE PLACED AT LOCATIONS WHERE THEY GIVE SUFFICIENT WARNING TO MOTORISTS AND PEDESTRIANS OF THE CONDITIONS AHEAD AND SHALL BE RELOCATED AS NEEDED TO KEEP SIGNING CURRENT AT REQUIRED LOCATIONS.

ALL TRAFFIC CONTROL DEVICES AND METHODS SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).

THE CONTRACTOR SHALL PROTECT AND RESTRICT ALL PEDESTRIANS FROM WORK AREAS.

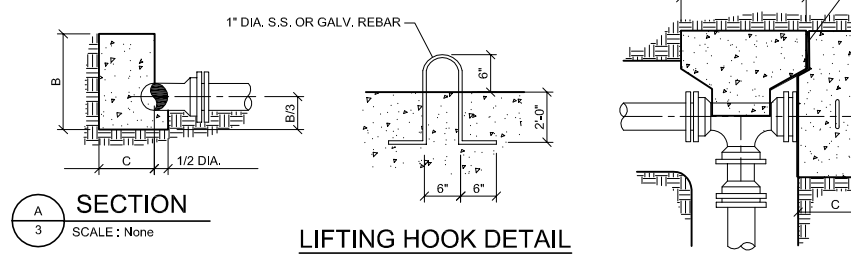
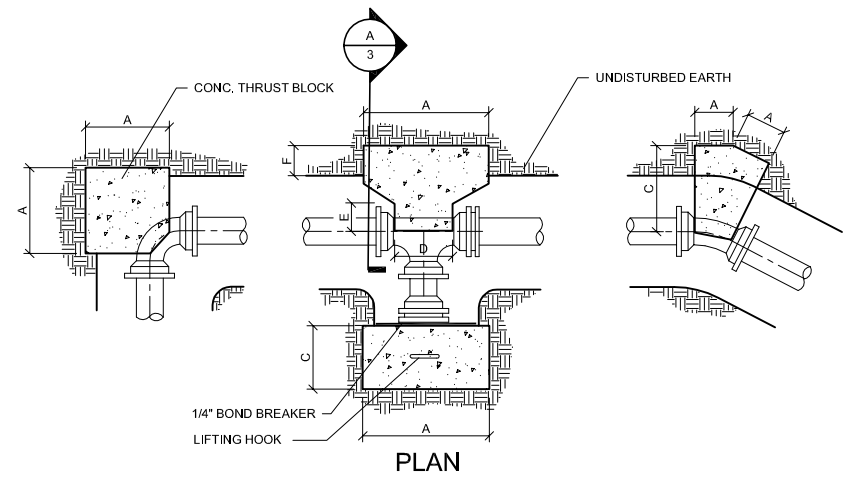
OPEN EXCAVATIONS SHALL BE COVERED OR BARRICADED.

WHEN PROVIDED, TRUCK CROSSING SIGNS WILL BE USED AT LOCATIONS AS SHOWN ON THE DRAWINGS AND/OR AS DETERMINED IN THE FIELD.
- ALL EXISTING TREES, SHRUBBERY, ETC. SHALL REMAIN UNDISTURBED, UNLESS REMOVAL HAS BEEN AUTHORIZED BY THE ENGINEER. ALL CLEARING, GRUBBING, AND DISPOSAL AS AUTHORIZED BY THE ENGINEER SHALL BE CONFINED TO THE EASEMENT AREAS AND SHALL BE LIMITED TO GREATEST EXTENT POSSIBLE. ALL DEBRIS SHALL BE DISPOSED OF BY THE CONTRACTOR AT A SITE PROVIDED BY THE CONTRACTOR.
- CONTRACTOR SHALL MAINTAIN CONSTRUCTION WORK WITHIN THE EASEMENT LIMITS AS SHOWN ON THE DRAWINGS OR DESIGNATED BY THE ENGINEER IN THE FIELD. ANY DAMAGE OUTSIDE THE CONSTRUCTION LIMITS WILL BE THE CONTRACTOR'S RESPONSIBILITY.

WHERE THE WORK IS ON PRIVATE PROPERTY, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CONTACT THE PROPERTY OWNERS WELL IN ADVANCE OF BEGINNING CONSTRUCTION. THE CONTRACTOR SHALL MAKE ARRANGEMENTS WITH THE PROPERTY OWNER REGARDING SCHEDULING AND ACCESS TO THE PROPERTY. THE CONTRACTOR SHALL ALSO DISCUSS AND OBTAIN PERMISSION FOR USE OF ANY ADDITIONAL PROPERTY OUTSIDE OF THE CONSTRUCTION AREA WHICH THE CONTRACTOR DEEMS NECESSARY FOR LOCATION OF PIPE STORAGE, EXCAVATED MATERIAL, AND OTHER MATERIALS OR EQUIPMENT. AN AGREEMENT, SIGNED BY THE PROPERTY OWNER, FOR THE USE OF THE PROPERTY SHALL BE PROVIDED TO BASIN ELECTRIC AND THE ENGINEER PRIOR TO OCCUPYING PROPERTY OUTSIDE OF THE CONSTRUCTION AREA.

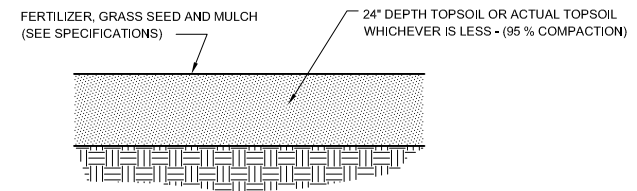
FOLLOWING INSTALLATION OF UTILITIES, ALL DISTURBED AREAS SHALL BE PROPERLY RESTORED TO ITS ORIGINAL CONDITION, AS MUCH AS IS PRACTICAL, AS HEREIN AFTER SPECIFIED AND AS REQUIRED BY THE PROPERTY OWNER. ALL SUCH WORK MUST BE ACCEPTED AND APPROVED BY THE ENGINEER AND PROPERTY OWNERS.
- THE CONTRACTOR SHALL REMOVE, SALVAGE, AND REINSTALL MAILBOXES, ROAD SIGNS, CULVERTS, ETC. THE COST OF THIS WORK SHALL BE CONSIDERED INCIDENTAL.
- ALL DEMOLITION AND REMOVAL OF MATERIAL WITHIN THE CONSTRUCTION LIMITS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE DISPOSED OF AT A SITE PROVIDED BY THE CONTRACTOR.
- ALL DUCTILE IRON VALVES, VALVE BOXES AND FITTINGS SHALL BE WRAPPED WITH 8 MIL. POLY TUBES OR WRAPPING. ALL BOLTS SHALL BE COR-BLUE.
- WATERMAIN SHALL BE INSTALLED WITH A MINIMUM COVER OF 6.0 FEET.
- AT INTERVALS OF NO MORE THAN 1000 FEET IN AREAS THAT ARE NOT NATIVE CLAY SOIL, THE CONTRACTOR SHALL PROVIDE CLAY FILL DAMS FOR THE FULL DEPTH OF THE TRENCH TO PREVENT THE CONVEYANCE OF WATER THROUGH THE BEDDING MATERIAL. IF THE NORMAL BACKFILL MATERIAL IS NOT SUITABLE FOR CONSTRUCTION OF THESE CLAY DAMS, THE CONTRACTOR WILL BE REQUIRED TO OBTAIN MATERIAL FROM OTHER OUTSIDE SOURCES FOR THIS PURPOSE. CLAY DAMS SHOULD NOT BE CONSTRUCTED AT OR NEAR THE BELL OF THE PIPE BUT SHOULD BE CONSTRUCTED NEAR THE CENTER OF A FULL LENGTH OF PIPE. CLAY DAMS WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED TO BE INCLUDED IN THE COST OF PIPE.
- DISPOSING OF HEAVILY CHLORINATED UTILITIES: THE ENVIRONMENT TO WHICH THE CHLORINATED WATER FROM DISINFECTION IS TO BE DISCHARGED (INCLUDING POINT OF STORM SEWER DISCHARGE) SHALL BE INSPECTED. IF THERE IS ANY QUESTION THAT THE CHLORINATED DISCHARGE WILL CAUSE DAMAGE TO THE ENVIRONMENT, INCLUDING CREEKS, STREAMS, PONDS OR LAKES THAT SUPPORT AQUATIC LIFE, THEN A REDUCING AGENT SHALL BE APPLIED TO THE WATER TO BE WASTED TO NEUTRALIZE THOROUGHLY THE CHLORINE RESIDUAL REMAINING IN THE WATER. CONTACT THE SURFACE WATER QUALITY PROGRAM AT (605) 773-3351 FOR MORE INFORMATION.
- IT IS ANTICIPATED THAT EXCAVATION IN AREAS ADJACENT TO AND/OR PARALLEL TO OTHER UNDERGROUND UTILITIES WILL NECESSITATE THE USE OF A TRENCH BOX OR SHORING IN ORDER TO PROTECT SAID UTILITIES.
- PRIOR TO PERFORMING EXCAVATION AND EMBANKMENT OPERATIONS WITHIN THE PROJECT LIMITS, THE CONTRACTOR SHALL SALVAGE ALL AVAILABLE TOPSOIL AND STOCKPILE IN A LOCATION OF THE CONTRACTOR'S CHOICE ON THE PROJECT SITE. UPON COMPLETION OF ALL GRADING OPERATIONS THE CONTRACTOR SHALL DEPOSIT AND SPREAD THE TOPSOIL TO MATCH THE EXISTING TOPSOIL DEPTH UP TO 2 FEET MAX FOR THE FULL WIDTH OF THE PIPE TRENCH.
- CONTRACTOR SHALL BE CAREFUL NOT TO DAMAGE WATER VALVE BOXES. DAMAGE TO VALVE BOXES, INCLUDING MISALIGNMENT OF BOXES DUE TO CARELESSNESS OF THE CONTRACTOR SHALL BE REPAIRED BY THE CONTRACTOR AT NO COST TO THE OWNER. ALL CASTINGS SHALL BE SALVAGED AND REMAIN PROPERTY OF THE OWNER. ALL EXCESS MATERIAL THAT IS NOT USED IN CONSTRUCTION SHALL BE REMOVED AND DISPOSED OF BY THE CONTRACTOR. ALL HAUL IS CONSIDERED INCIDENTAL.
- THE CONTRACTOR SHALL PROVIDE REASONABLE ACCESS FOR LOCAL RESIDENTS THROUGHOUT CONSTRUCTION, IF THESE AREAS NEED TO BE CLOSED FOR BRIEF PERIODS OF TIME THE CONTRACTOR SHALL COORDINATE THAT CLOSURE TO ENSURE MINIMAL INCONVENIENCE.
- CONSTRUCTION WILL REQUIRE A CAREFULLY PLANNED SEQUENCE OF CONSTRUCTION IN ORDER TO MINIMIZE INTERRUPTIONS TO THE PROPERTY OWNERS AND TO HANDLE THE STORM RUNOFF. DURING PORTIONS OF THE WORK, IT IS EXPECTED THAT THE DRIVEWAYS WILL BE ENTIRELY CLOSED TO TRAFFIC AND TEMPORARY ACCESS MAY HAVE TO BE PROVIDED ELSEWHERE.
- THE CONTRACTOR'S CLEANUP AND SURFACE RESTORATION ACTIVITIES SHALL FOLLOW IMMEDIATELY BEHIND UTILITY INSTALLATION. THE CONTRACTOR SHALL BACKFILL AND COMPACT THE TRENCH PROPERLY, CLEAN UP THE AREA, AND DISPOSE OF ALL ROCKS, RUBBLE, EXCESS DIRT, ETC. TO THE SATISFACTION OF THE OWNER / ENGINEER. UPON COMPLETION OF THE PIPE INSTALLATION, ALL DISTURBED ITEMS SUCH AS CULVERTS, UTILITIES, PIPELINES, TOPSOIL, FENCES, ROADWAYS, FIELD APPROACHES, PARKING LOTS, STREAM BEDS, ETC. SHALL BE RESTORED TO THEIR ORIGINAL CONDITION.
- TRENCH SURFACE RESTORATION:
(a) GRASS AREAS OR FARMED AREAS SHALL HAVE TOPSOIL STRIPPED AND STOCKPILED IN ACCORDANCE WITH THE SPECIFICATIONS AND PLAN DETAILS. REPLACE TOPSOIL AFTER BACKFILL IS COMPLETED. SEED IN ACCORDANCE WITH THE SPECIFICATIONS.
(b) ALL AREAS DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO SAME ELEVATIONS AS PRIOR TO CONSTRUCTION.
(c) GRAVEL SURFACED AREAS SHALL BE RESURFACED WITH A 6 INCH DEPTH OF GRAVEL IN ACCORDANCE WITH THE SPECIFICATIONS AND PLAN DETAILS.
- SEDIMENT EROSION CONTROL SHALL BE IN STRICT ACCORDANCE WITH SD DENR RULES AND REGULATIONS REFERENCED IN SECTION 011050 OF THE PROJECT SPECIFICATIONS.
- BIDDERS ARE EXPECTED TO EXAMINE THE SITE AND ARRIVE AT THEIR OWN CONCLUSIONS REGARDING THE CHARACTER AND LOCATIONS OF MATERIALS TO BE ENCOUNTERED. ALL CONTRACTORS DESIRING TO TAKE SOIL BORINGS ON THIS PROJECT MUST OBTAIN PERMISSION FROM THE OWNER AND THE PROPERTY OWNERS IN THE EVENT THE PROPOSED INVESTIGATION IS ON PRIVATE PROPERTY.

IF GROUNDWATER IS ENCOUNTERED AND DEWATERING IS NECESSARY, ALL COSTS ASSOCIATED WITH THE LABOR, EQUIPMENT, AND MATERIALS FOR DEWATERING THE PROJECT SHALL BE ABSORBED IN THE UNIT PRICE BID FOR PIPE INSTALLATION. ALL PIPE SHALL BE LAID IN A DRY LOCATION. THE CONTRACTOR SHALL DISCHARGE AND DISPOSE OF THE WATER IN AN APPROVED MANNER.

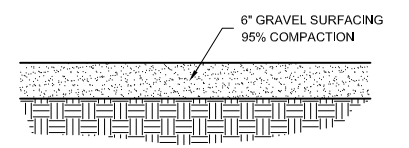


PIPE DIA.	BLOCKING DIMENSIONS																				
	TEES						PLUGS			90° BENDS			45° BENDS			22 1/2° BENDS			11 1/4° BENDS		
	A	B	C	D	E	F	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
6"	24	30	16	16	6	6	24	30	12	24	18	16	10	24	12	7	18	12	-	-	-
10"	40	42	23	22	8	6	40	42	24	35	34	24	18	38	27	12	30	27	-	-	-
14"	50	50	29	28	11	6	50	50	24	45	40	32	22	45	36	14	38	32	-	-	-
16"	54	54	32	30	12	6	54	54	24	50	42	36	24	48	40	15	42	34	-	-	-

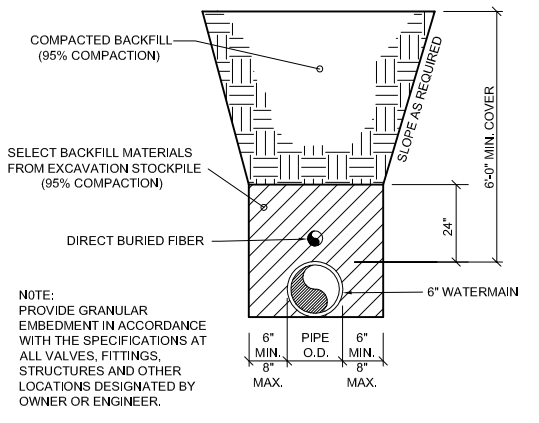
- THRUST BLOCKING NOTES :**
- CAST-IN-PLACE CONCRETE BLOCKS SHALL BE INSTALLED ON ALL BURIED FITTINGS. ALL THRUST BLOCKS SHALL BE CAST-IN-PLACE. PRECAST BLOCKS ARE NOT ACCEPTABLE.
 - PLACE DOUBLE LAYER OF PAPER BETWEEN CONCRETE BLOCKING AND PLUG.
 - MINIMUM THICKNESS OF CONCRETE BETWEEN FITTING AND UNDISTURBED SOIL SHALL BE 8".
 - ALL VALVES AND FITTINGS SHALL BE POLY WRAPPED.
 - COMPRESSIVE STRENGTH FOR THRUST BLOCKS SHALL NOT BE LESS THAN 3000 PSI.
 - BLOCKING DESIGN FOR 150 PSI AND 1500 PSI SOIL BEARING. BLOCKING FOR REDUCED BRANCH TEE SHALL BE AS LISTED UNDER TEES AND BRANCH DIAMETER. MAINTAIN MINIMUM "F" DIMENSION. ALL DIMENSIONS ARE IN INCHES.



GRASS SURFACE RESTORATION
(PUBLIC R.O.W. AND PRIVATE EASEMENT AREAS AND CRP/PASTURE AREAS)
SCALE: NONE

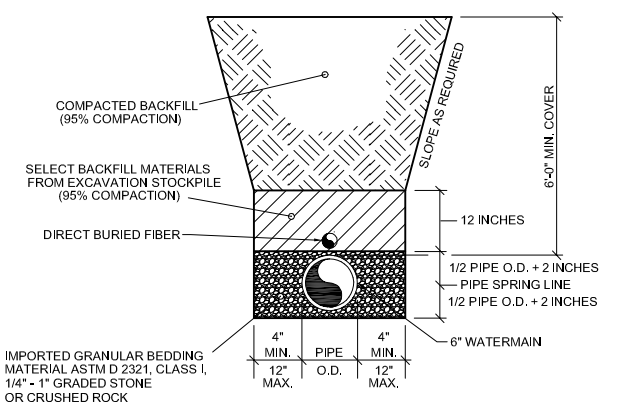


GRAVEL SURFACING RESTORATION
SCALE: NONE



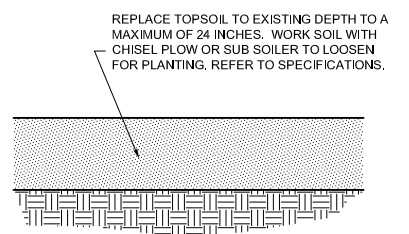
TYPICAL WATERMAIN BEDDING DETAIL
SCALE: NONE

- NOTE:**
- CONTRACTOR SHALL STRIP AND STOCKPILE TOPSOIL FROM TRENCH. CONTRACTOR TO STRIP AND STOCKPILE SUFFICIENT QUANTITIES OF TOPSOIL TO REPLACE TOPSOIL DEPTH AS SPECIFIED IN GRASS SURFACE AND CROP LAND SURFACE RESTORATION DETAILS.



ALTERNATE WATERMAIN BEDDING DETAIL
SCALE: NONE

- NOTE:**
- GRANULAR BEDDING SHALL BE INSTALLED IN AREAS WHERE ROCK OR UNSATISFACTORY SOILS ARE ENCOUNTERED. GRANULAR BEDDING SHALL BE GRADED AGGREGATE PRODUCT OF WHICH 100 PERCENT PASSES THE 1" SIEVE AND NOT MORE THAN 10 PERCENT WILL PASS THE NO. 200 SIEVE. INSTALLATION OF BEDDING MATERIAL SHALL ONLY BE WHEN AUTHORIZED BY OWNER AND ENGINEER.



CROP LAND SURFACE RESTORATION
SCALE: NONE

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GENERAL NOTES AND DETAILS

SHEET NO.:
2

CONSULTANTS:



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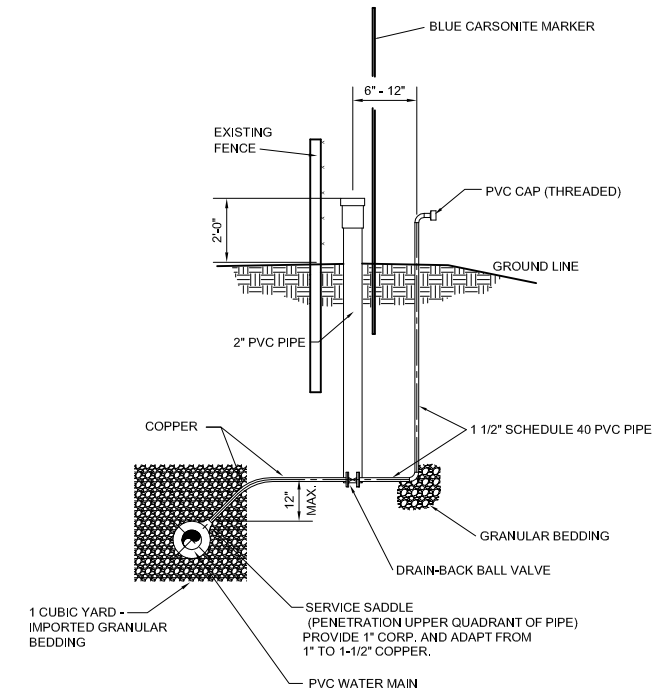
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SCALE REDUCTION BAR

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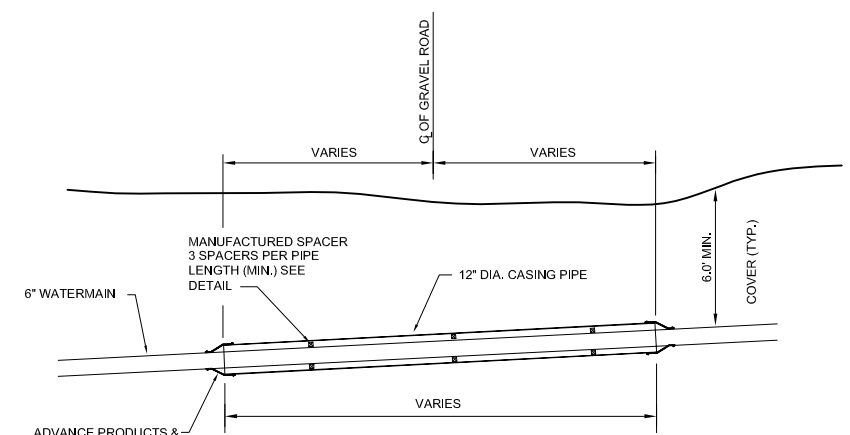
**GENERAL
DETAILS**

SHEET NO. :
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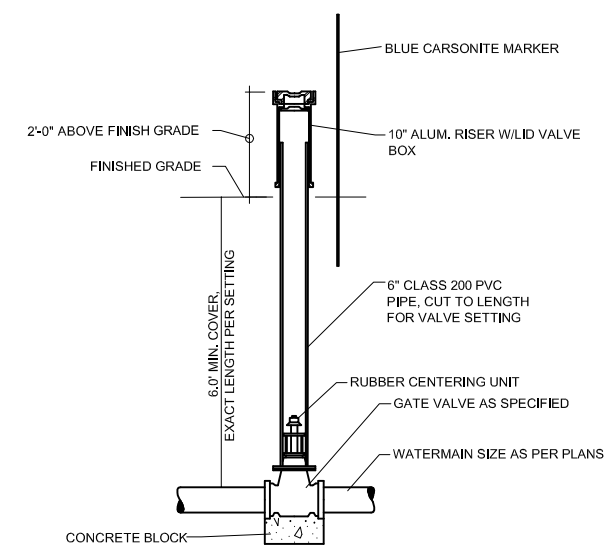


AIR RELEASE DETAIL
SCALE: NONE

1. VALVE, VALVE BOX AND BLOWOFF SHALL BE LOCATED WITH PRIVATE EASEMENT OR R.O.W. LOCATION SHALL BE COORDINATED WITH OWNER OR ENGINEER PRIOR TO INSTALLATION.

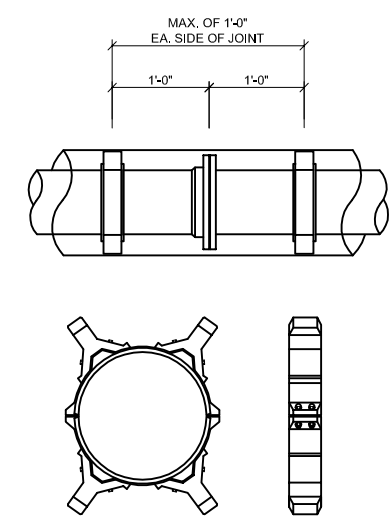


**STEEL ENCASEMENT DETAIL
GRAVEL ROAD CROSSINGS**
SCALE: NONE

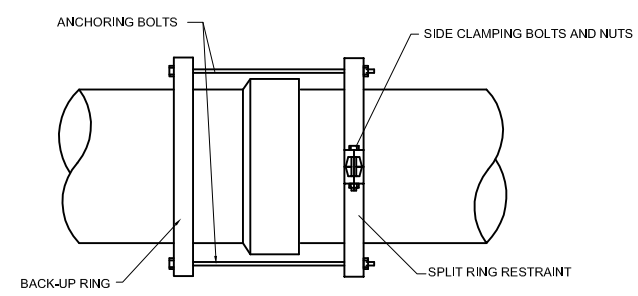


VALVE BOX DETAIL
SCALE: NONE

NOTE: ALL VALVES AND FITTINGS SHALL BE POLY WRAPPED.



ENCASEMENT PIPE SPACERS
Scale: NONE



RESTRAINT DETAIL
SCALE: NONE

CONSULTANTS:



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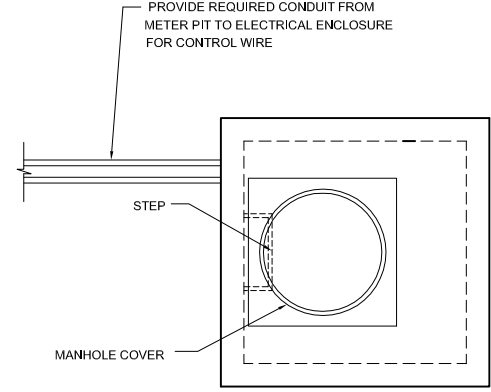
SHEET TITLE:

**GENERAL
DETAILS**

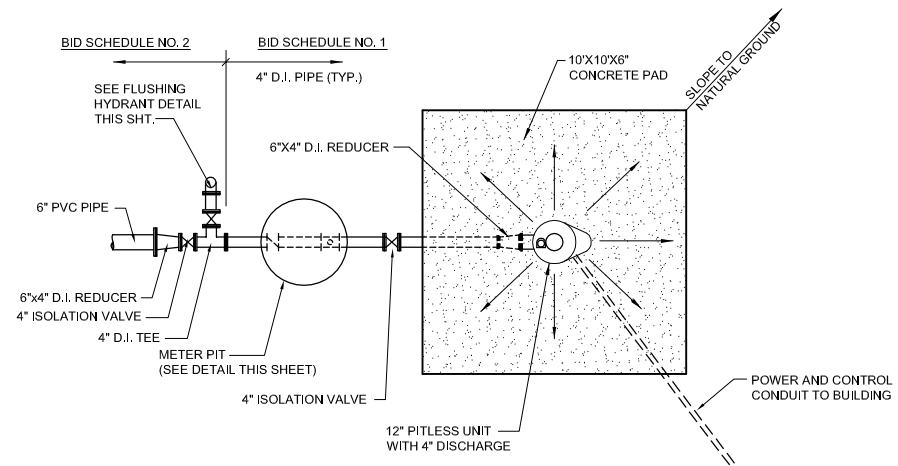
SHEET NO.:
4

BID SCHEDULE NO. 1
CONTRACTOR TO FURNISH AND INSTALL RAW WATER PIPELINE TO WITHIN 5 FEET OF METER PIT. MAKE CONNECTION TO METER PIT DISCHARGE PIPING. BID SCHEDULE NO. 1 BID ITEMS FOR SEEDING AND GRAVEL SURFACING SHALL INCLUDE SEEDING AND GRAVEL AROUND WELL AND BUILDING SITE.

BID SCHEDULE NO. 2
CONTRACTOR TO FURNISH AND INSTALL PITLESS ADAPTER UNITS, WELL PUMPS, COLUMN PIPE, METER, METER PIT, PIPING AND FITTINGS FROM WELLS TO A POINT 5 FEET OUTSIDE OF METER PIT, AND ELECTRICAL ENCLOSURE BUILDING INCLUDING ELECTRICAL SERVICE AND TELEMETRY & CONTROLS



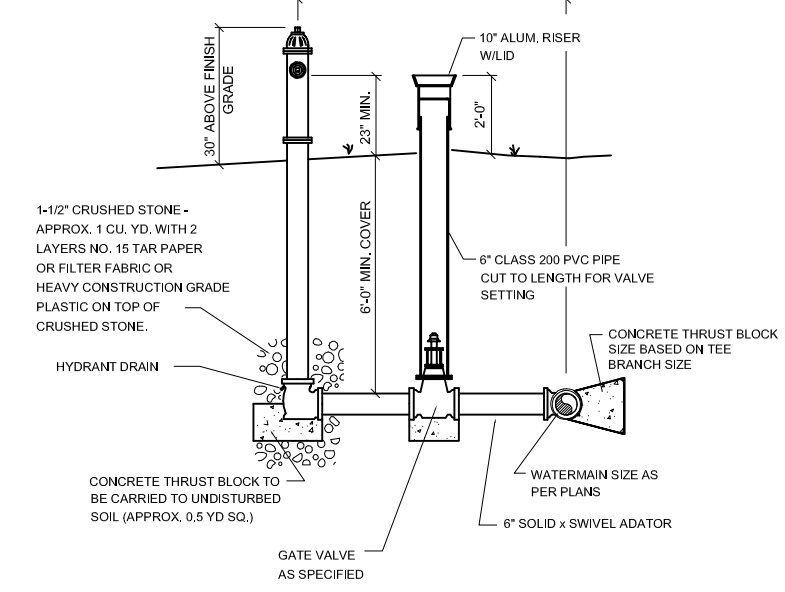
TOP VIEW
Scale: NONE



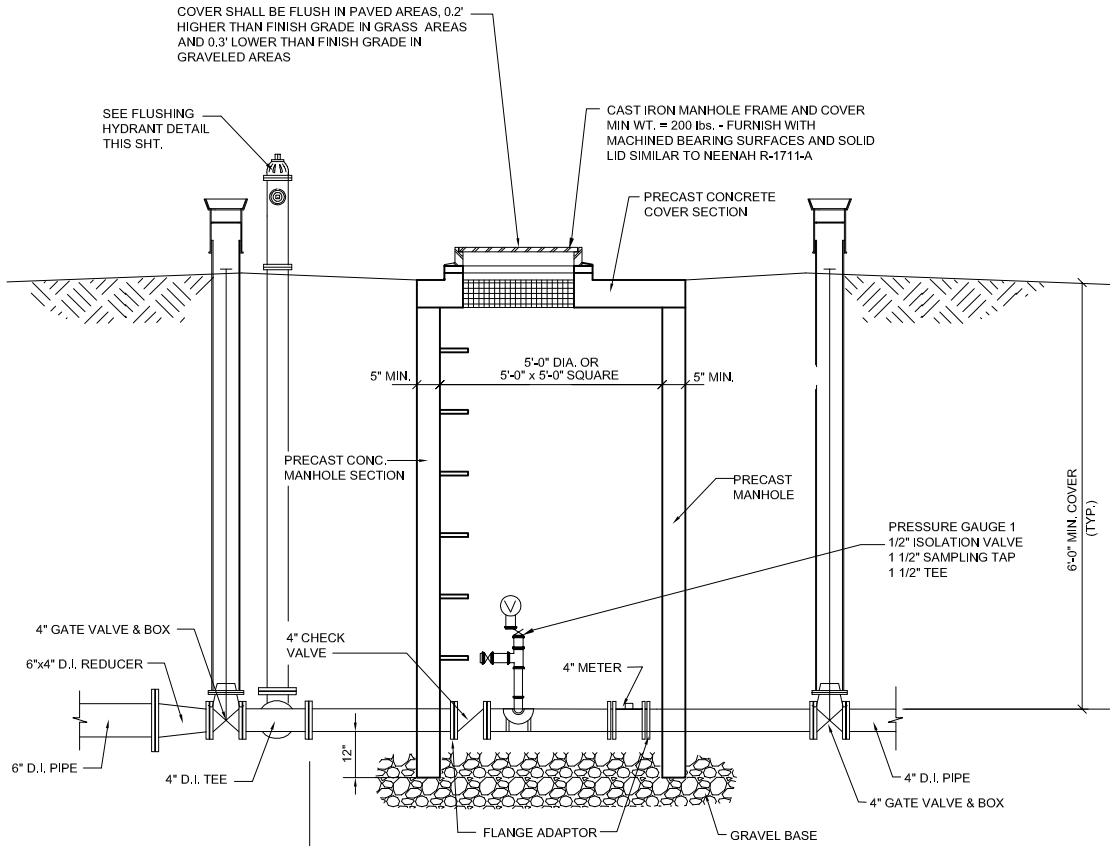
PLAN DETAIL
SCALE: NONE

NOTE:
FLUSHING HYDRANT AND PIG LAUNCH ABILITIES SHALL BE PROVIDED ON WELL NO. 2 CONNECTION. AS PART OF BID SCHEDULE NO. 2.
WELL NO. 1 TO INCLUDE BOTH ISOLATION VALVES AND REDUCER AS PART OF BID SCHEDULE NO. 1.

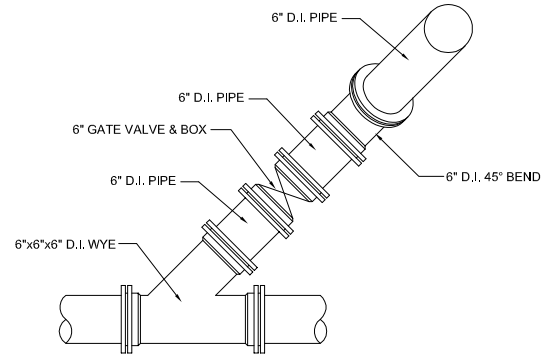
NOTE: FIRE HYDRANT TO HAVE A 2 - 1 1/2" NOZZLE



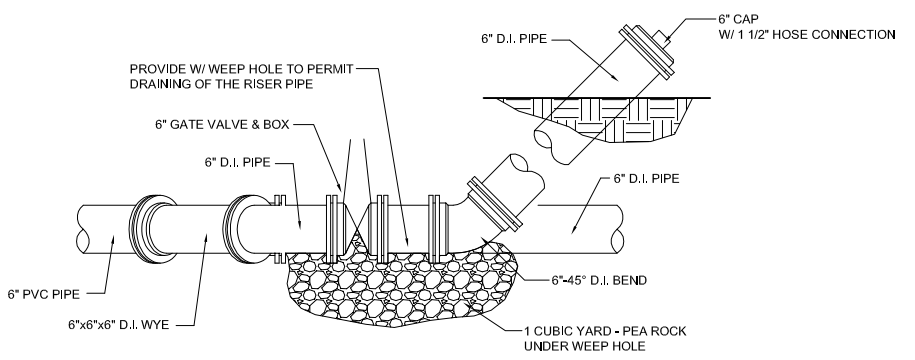
FLUSHING HYDRANT SETTING DETAIL
SCALE: NONE



METER PIT DETAIL
SCALE: NONE



PLAN VIEW



SECTION VIEW

6" PIG LAUNCH / RETRIEVAL DETAIL
SCALE: NONE



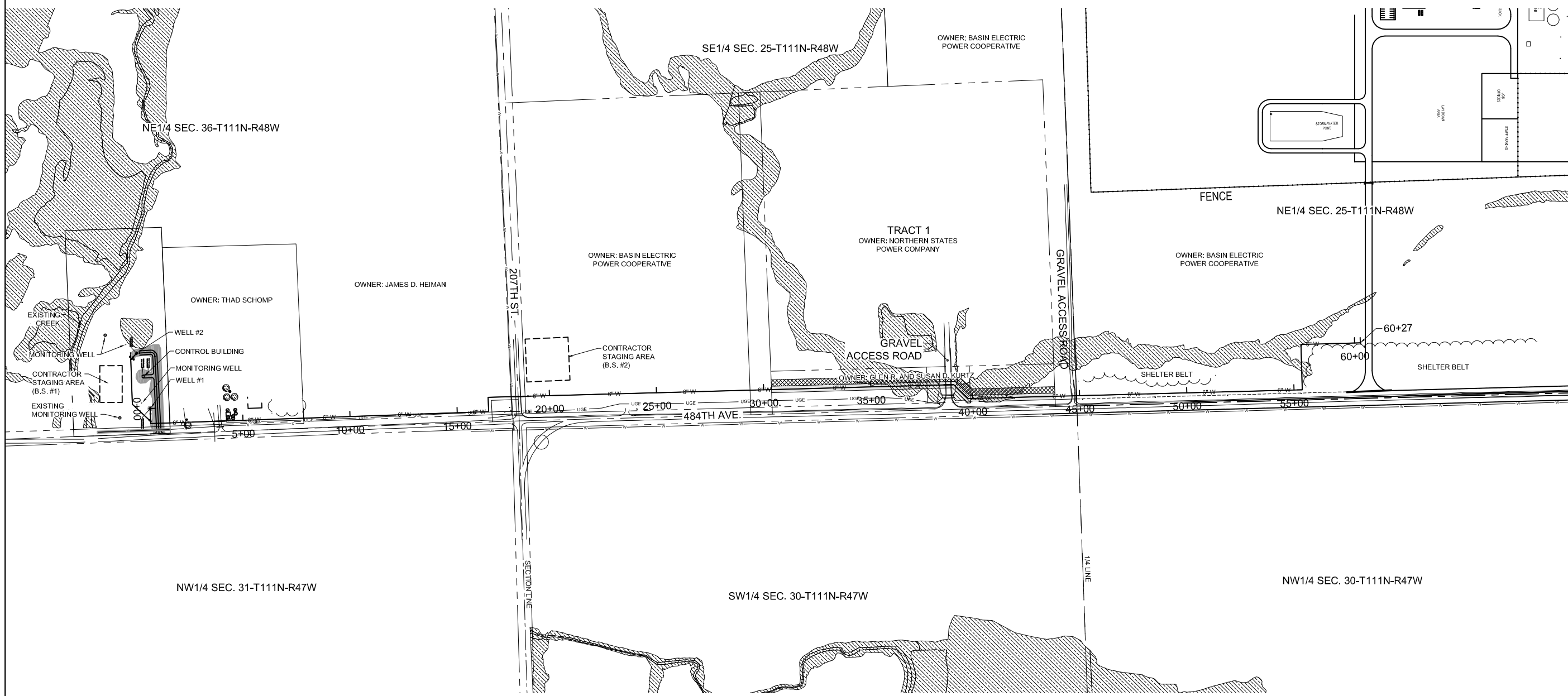
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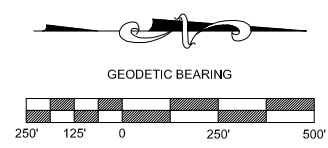


GENERAL WATERMAIN NOTES:

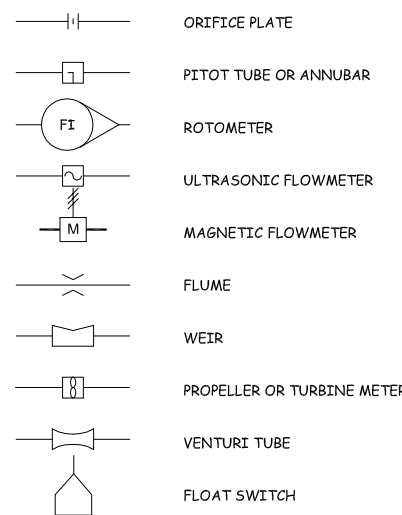
- CONTRACTOR SHALL INSTALL WATERLINE APPROXIMATELY IN CENTER OF EASEMENT WHEN POSSIBLE. IF EXISTING UTILITIES, TREES, BUILDINGS OR OTHER OBSTRUCTION ARE PRESENT, THEN THE WATERLINE SHALL BE ADJUSTED TOWARD THE HIGHWAY R.O.W. LINE TO AVOID EXISTING OBSTRUCTIONS.
- CONTRACTOR WILL BE RESPONSIBLE TO HAVE ALL UTILITIES LOCATED PRIOR TO EXCAVATION.
- WATERLINE SHALL BE LAID WITH A MINIMUM COVER OF SIX FOOT ZERO INCHES (6'-0").
- AIR RELEASE VALVES SHALL BE INSTALLED AT THE HIGH POINTS IN THE LINE FINAL LOCATIONS SHALL BE DETERMINED IN THE FIELD.
- CONTRACTOR SHALL INSTALL A NEW FENCE AND GATE FROM EXISTING FENCE IN NORTHEAST CORNER OF PROPERTY TO DEER CREEK.

LEGEND

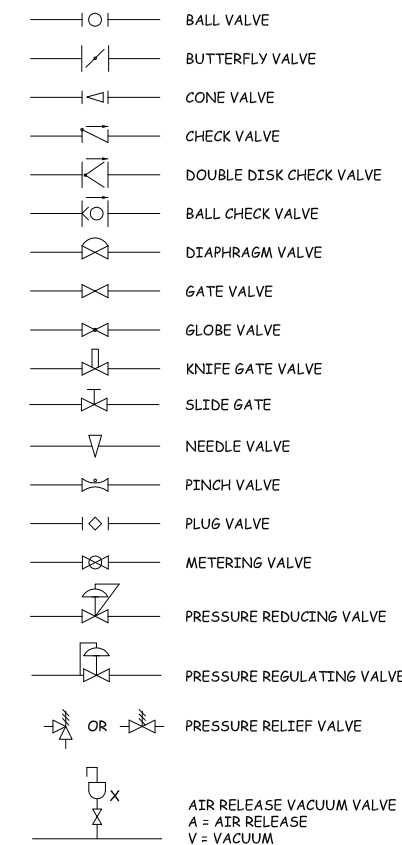
- W — EXISTING WATER LINE
- UGE — UNDERGROUND ELECTRIC LINE
- UGT — UNDERGROUND TELEPHONE LINE
- W — PROPOSED WATER LINE
- ☐ TRANSFORMER
- ⚡ POWER POLE
- ⊙ TELEPHONE PEDESTAL
- ⊙ DECIDUOUS TREE
- ▨ WETLANDS



PRIMARY ELEMENT SYMBOLOGY



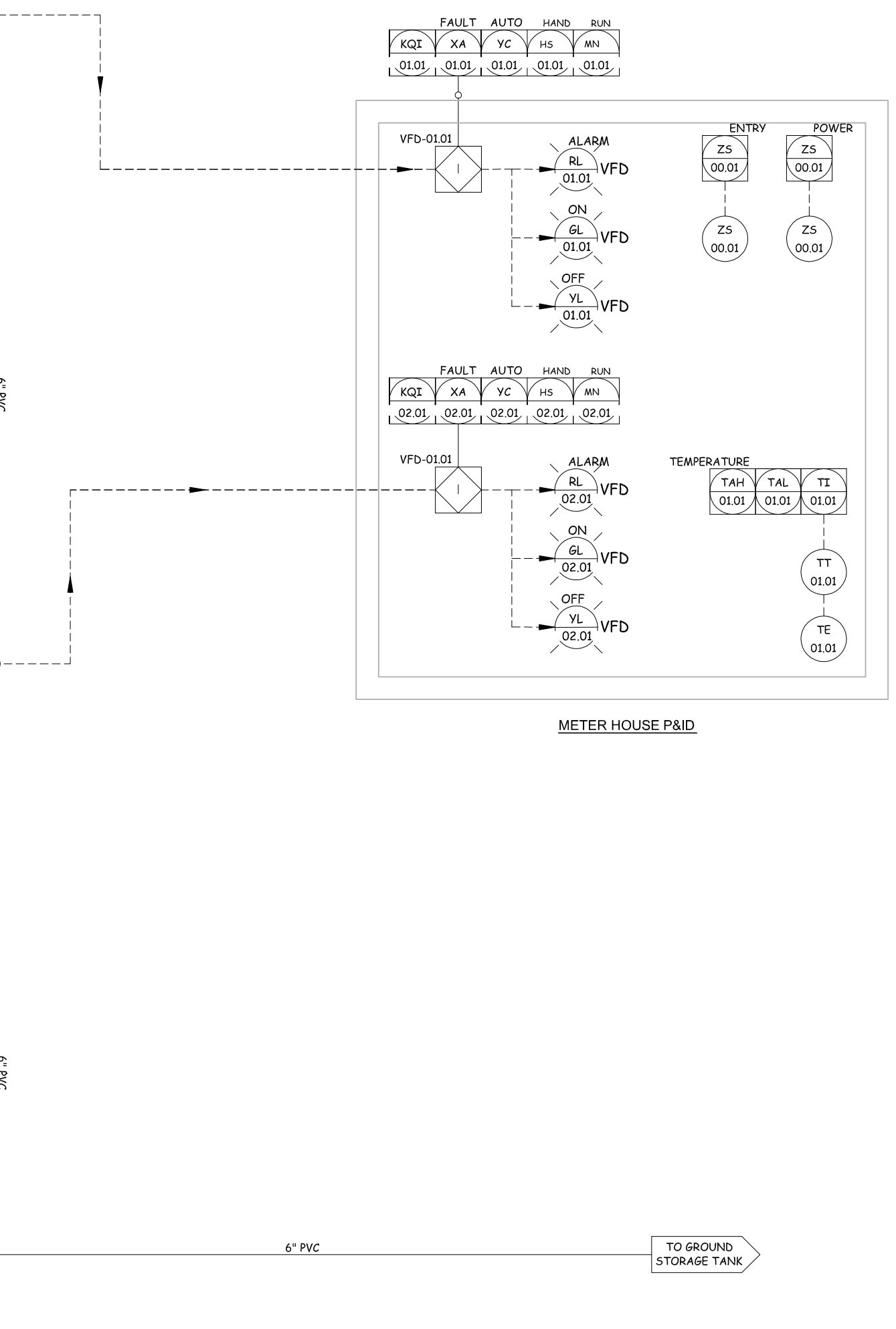
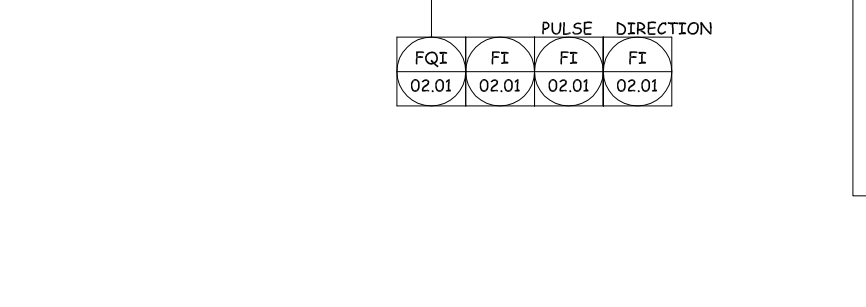
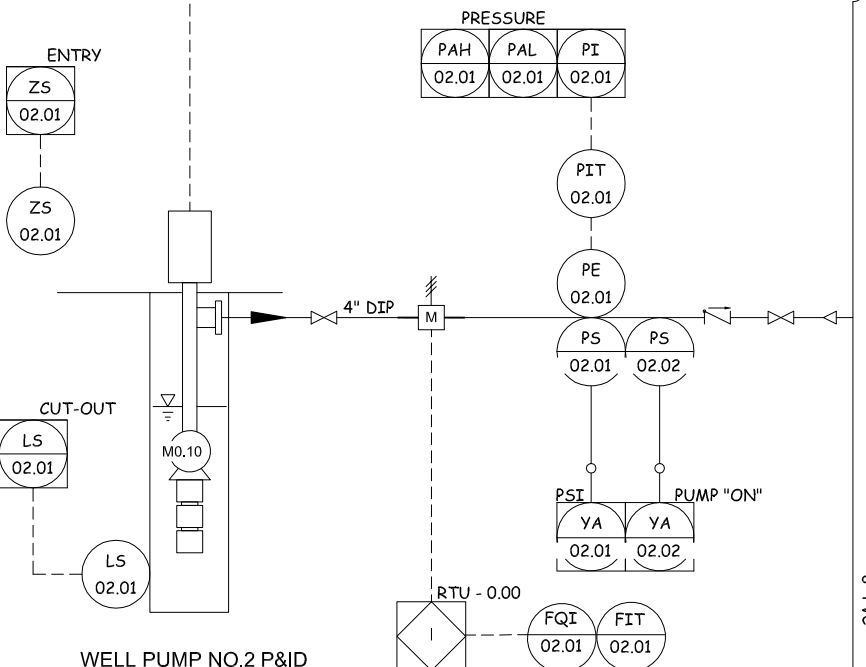
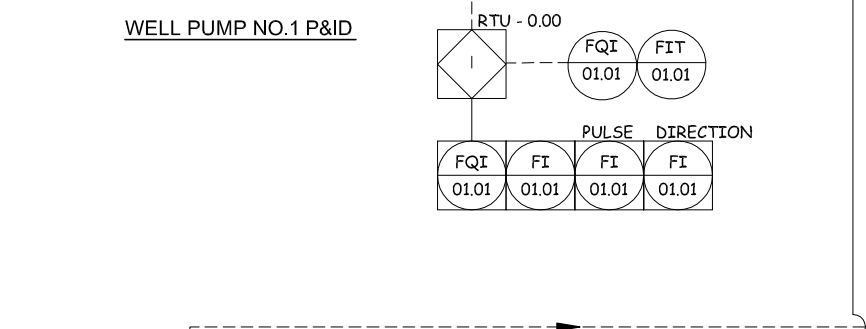
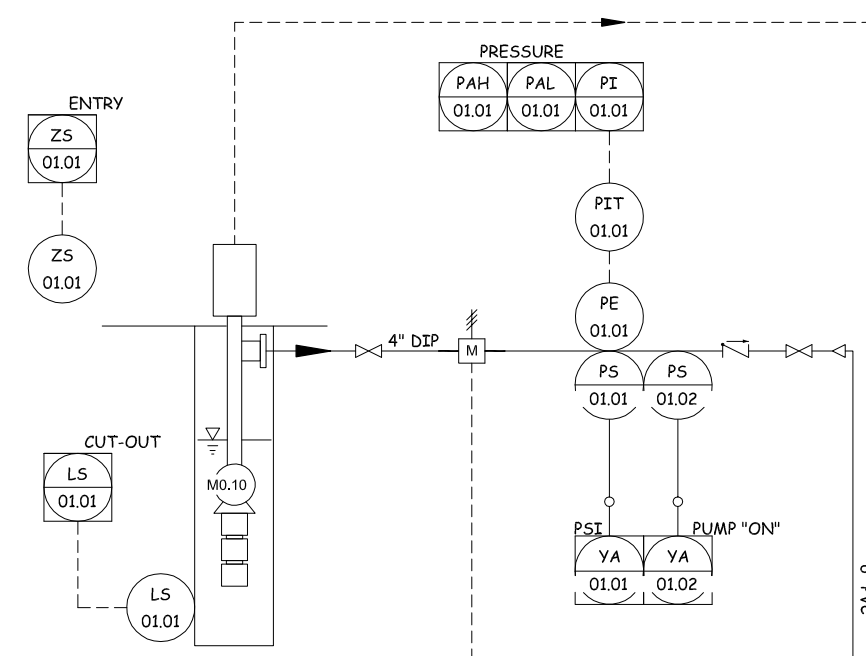
VALVES



CONTROL SWITCH NOTATION ABBREVIATIONS



- ACK ACKNOWLEDGE
- ESTOP EMERGENCY STOP
- FAIL FAILURE
- FOR FORWARD-OFF-REVERSE
- FR FORWARD-REVERSE
- FS FAST-SLOW
- HA HAND-AUTO
- HOA HAND-OFF-AUTO
- HOR HAND-OFF-REMOTE
- LL LEAD-LAG
- LLS LEAD-LAG-STANDBY
- LOR LOCAL-OFF-REMOTE
- LR LOCAL-REMOTE
- LS LEAD-STANDBY
- MA MANUAL-AUTO
- OAC OPEN-AUTO-CLOSE
- OC OPEN-CLOSE
- OSC OPEN-STOP-CLOSE
- RJ RUN-JOG
- RJR RUN-JOG-REVERSE
- SIL SILENCE
- SS START-STOP

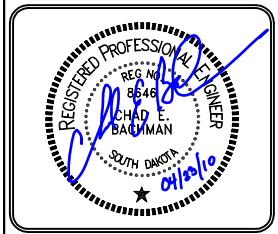


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409 22nd Ave. S. P.O. Box 298
Brookings, South Dakota 57006
605-692-6342
www.bannerassociates.com

Designing Projects. Building Trust.

CONSULTANTS:



PROJECT TITLE:
BASIN ELECTRIC WELL FIELD AND RAW WATER PIPELINE

PROJECT LOCATION:
WHITE SOUTH DAKOTA

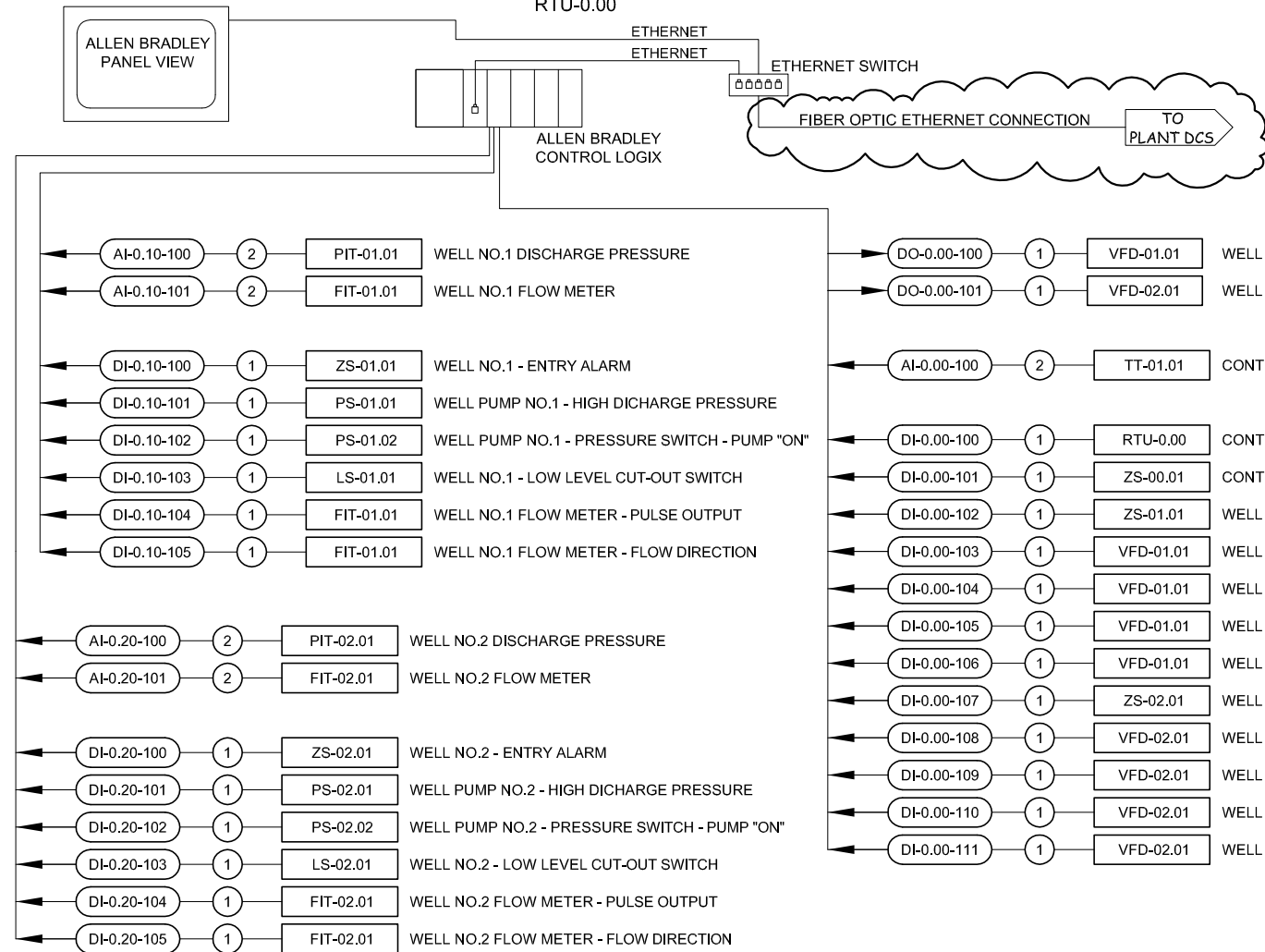
REV.	DATE	DESCRIPTION

DRAWN BY: JLU
DESIGNED BY: CEB
CHECKED BY: SDR
JOB NO: 20953-00-00
DATE: APRIL 2010

SHEET TITLE:
PROCESS P&ID SHEET

SHEET NO.:
6

PROPOSED WELL PUMP CONTROL BUILDING RTU
RTU-0.00



- FIBER OPTICS TO BE INSTALLED TO METER HOUSE BY CONTRACTOR FOR BID SCHEDULE NO. 2. CONTRACTOR FOR BID SCHEDULE NO. 1 SHALL BE RESPONSIBLE FOR BRINGING FIBER OPTICS INTO BUILDING AND COILING EXTRA FIBER OPTICS NEXT TO RTU-0.00.
- OWNER WILL BE RESPONSIBLE FOR PROVIDING AND INSTALLING EQUIPMENT NEEDED TO TERMINATE THE FIBER TO RTU-0.00 AND ESTABLISHING COMMUNICATIONS BETWEEN RTU0.00 AND THE DCS.

GENERAL NOTES:

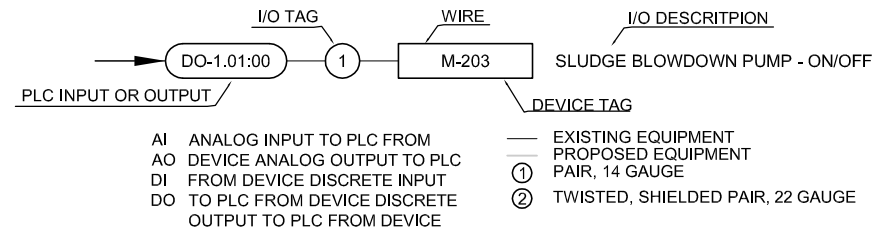
- COORDINATE FINAL LOCATION OF SENSORS WITH ENGINEER OR OWNER.
- INSTRUMENTATION WIRING CAN BE COMBINED IN THE SAME CONDUIT WITH OTHER SIMILAR INSTRUMENTATION WIRING TO MINIMIZE THE NUMBER OF CONDUIT CROSSING FROM ONE SIDE OF GATE HOUSE TO THE OTHER.
- DISCRETE AND ANALOG SIGNAL WIRES SHALL NOT BE INSTALLED IN THE SAME CONDUIT. ROUTE SEPARATE CONDUIT FOR DISCRETE AND ANALOG SIGNAL WIRES.
- INSTRUMENTATION CONDUIT TO RUN PERPENDICULAR TO WALLS AND FLOOR.
- ALL CONTROL SYSTEM CONDUIT AND WIRE SHALL COMPLY WITH THE REQUIREMENTS OF DIVISION 16 SPECIFICATIONS
- CONTRACTOR IS RESPONSIBLE FOR PROVIDING A FULLY FUNCTIONAL SYSTEM COMPLYING WITH THE PROJECT PLANS AND SPECS.

REFERENCE NOTES:

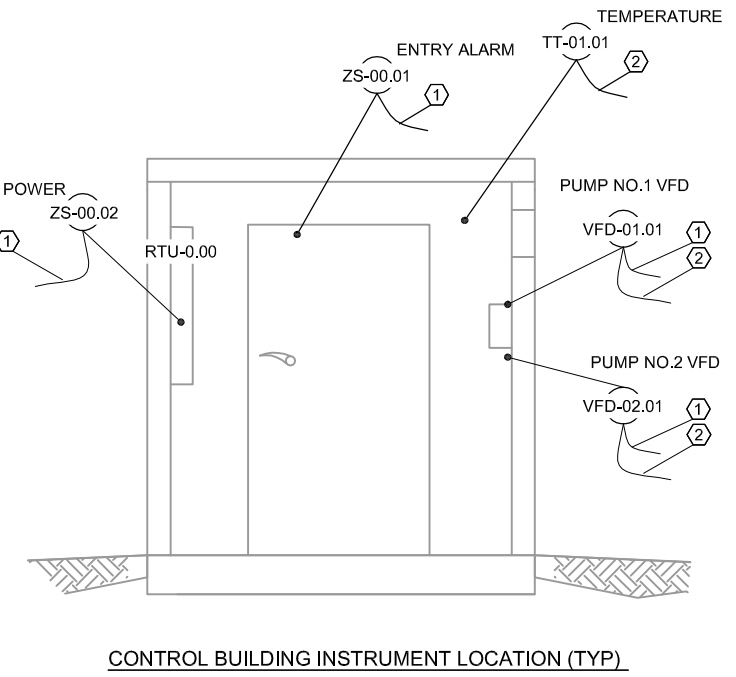
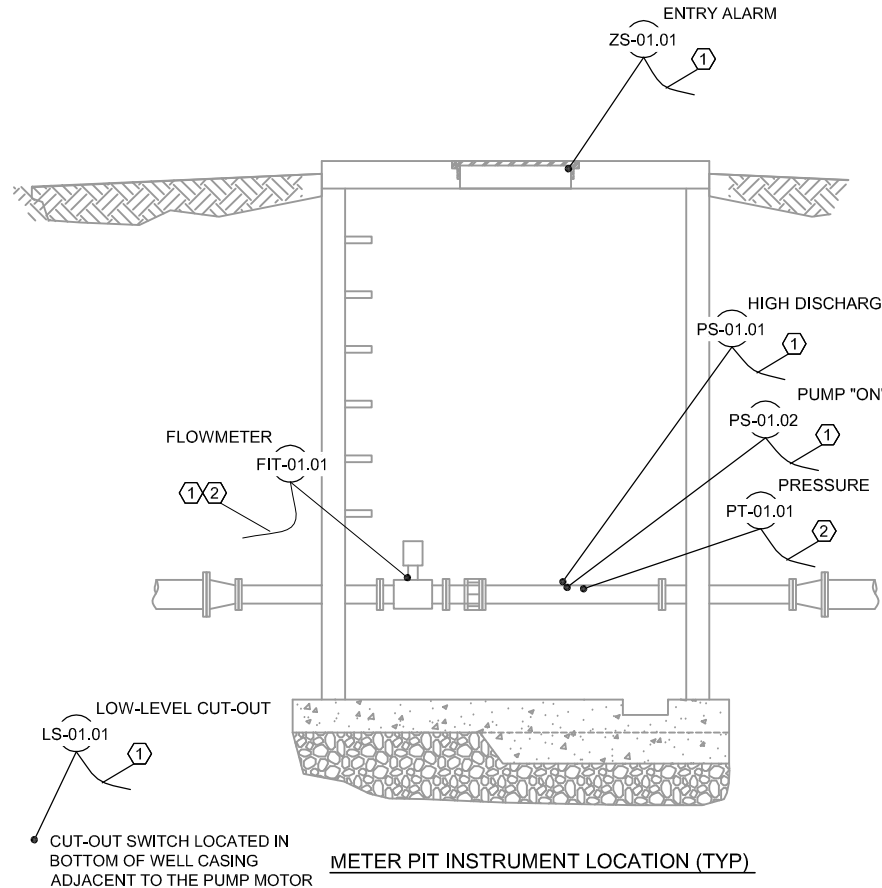
- ① 3/4" DIA. CONDUIT, TO PLC FOR DISCRETE SIGNAL (24VDC OR 120 VAC).
- ② 3/4" DIA. CONDUIT, TO PLC FOR ANALOG SIGNAL (4-20 mA OR 0-10V).
- ③ 3/4" DIA. CONDUIT, DEVICE TO PLC FOR COMMUNICATION VIA DEVICENET.
- ④ 3/4" DIA. CONDUIT, TO PLC FOR ETHERNET CONNECTION.

INSTRUMENTATION LEGEND

FCV	FLOW CONTROL VALVE	TT	TEMPERATURE TRANSMITTER
AE	ANALYSIS SENSOR	RTU	REMOTE TERMINAL UNIT
M	MOTOR	FS	FLOW SWITCH
LS	LEVEL TRANSMITTER	PS	PRESSURE SWITCH
FT	FLOW TRANSMITTER	LT	LEVEL TRANSMITTER
PD	PANEL DISPLAY	SV	SOLENOID VALVE
PI	PULSED INPUT	BV	BUTTERFLY VALVE
PV	PNEUMATIC VALVE	CV	CONTROL VALVE
		PS	PRESSURE SENSOR



I/O DESCRIPT.	REQUIRED	PROVIDED	SPARE
DISCRETE IN	24	48	24
DISCRETE OUT	2	16	14
ANALOG IN	5	8	3
ANALOG OUT	0	0	0

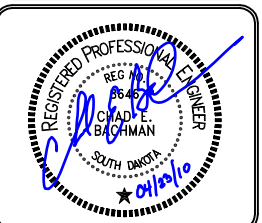


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CONSULTANTS:



PROJECT TITLE:
**BASIN
ELECTRIC
WELL FIELD AND
RAW WATER
PIPELINE**

PROJECT LOCATION:
WHITE
SOUTH DAKOTA

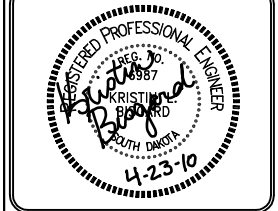
REV.	DATE	DESCRIPTION

DRAWN BY: JLU
DESIGNED BY: CEB
CHECKED BY: SDR
JOB NO: 20953-00-00
DATE: APRIL 2010

SHEET TITLE:
**PLC I/O
LAYOUT &
DEVICE
LOCATION**

SHEET NO.:
7

CONSULTANTS:



PROJECT TITLE:

**BASIN
ELECTRIC
WELL FIELD AND
RAW WATER
PIPELINE**

PROJECT LOCATION:
WHITE
SOUTH DAKOTA

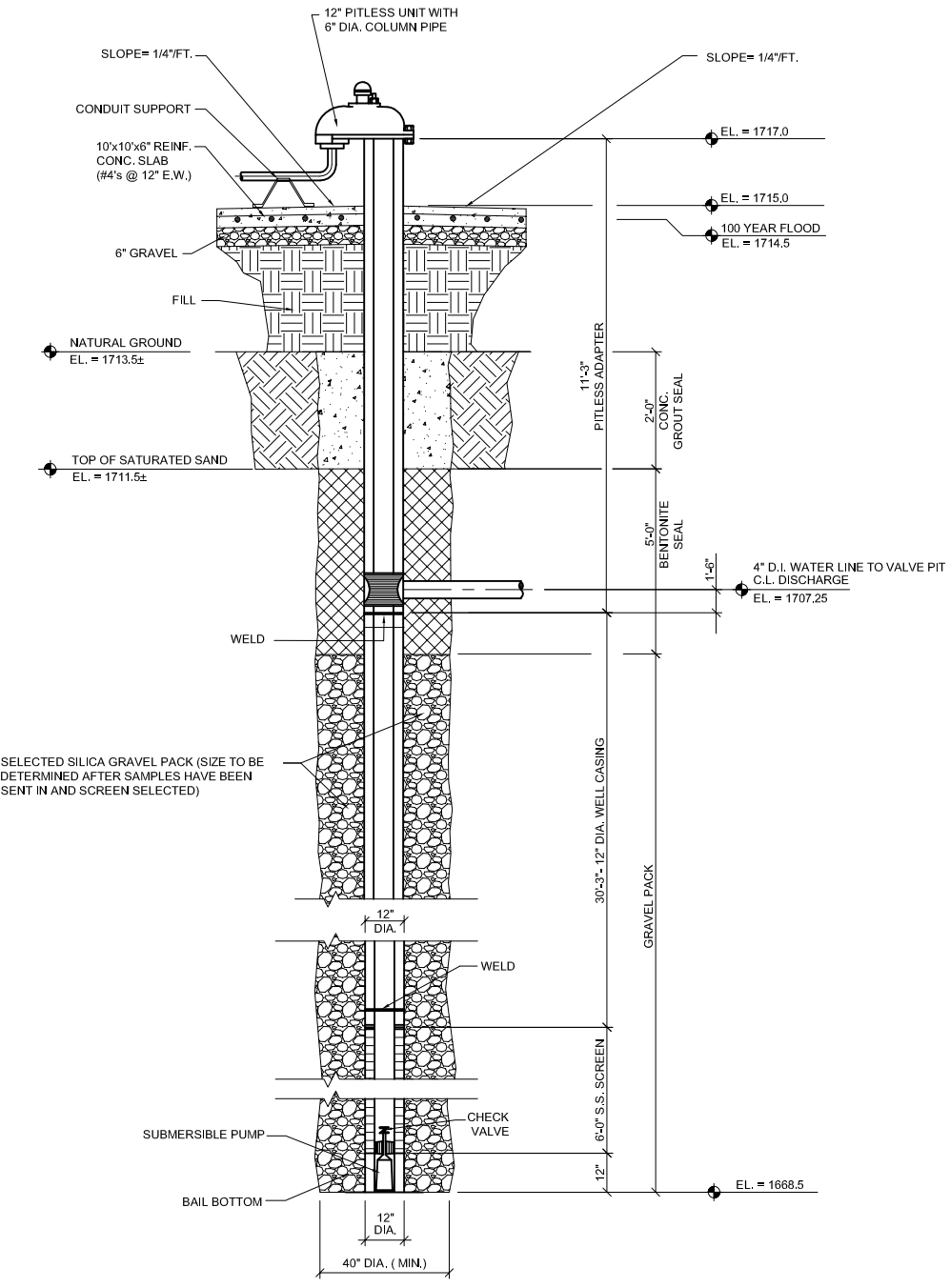
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DRAWN BY: JLU
DESIGNED BY: KLB
CHECKED BY: SDR
JOB NO: 20953-00-00
DATE: APRIL 2010

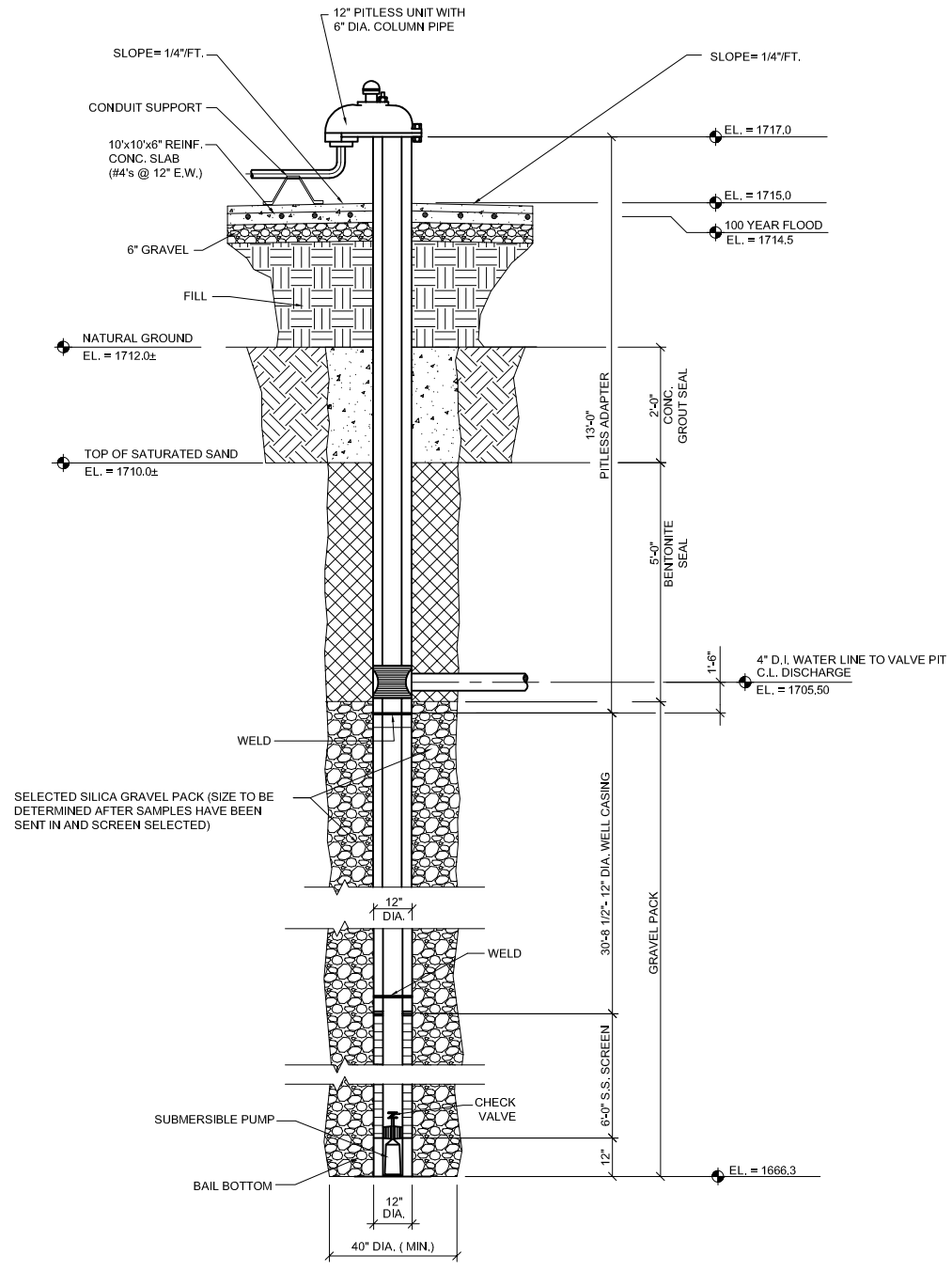
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**WELLS 1 & 2
CROSS
SECTIONS**

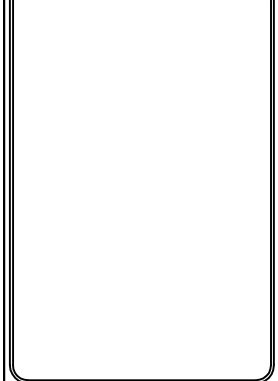
SHEET NO.:
8



WELL CROSS SECTION - WELL NO. 1
SCALE: NONE



WELL CROSS SECTION - WELL NO. 2
SCALE: NONE



**BASIN
ELECTRIC
WELL FIELD AND
RAW WATER
PIPELINE**

PROJECT LOCATION:
WHITE
SOUTH DAKOTA

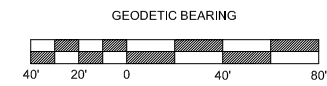
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DRAWN BY: JLU
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JOB NO: 20953-00-00
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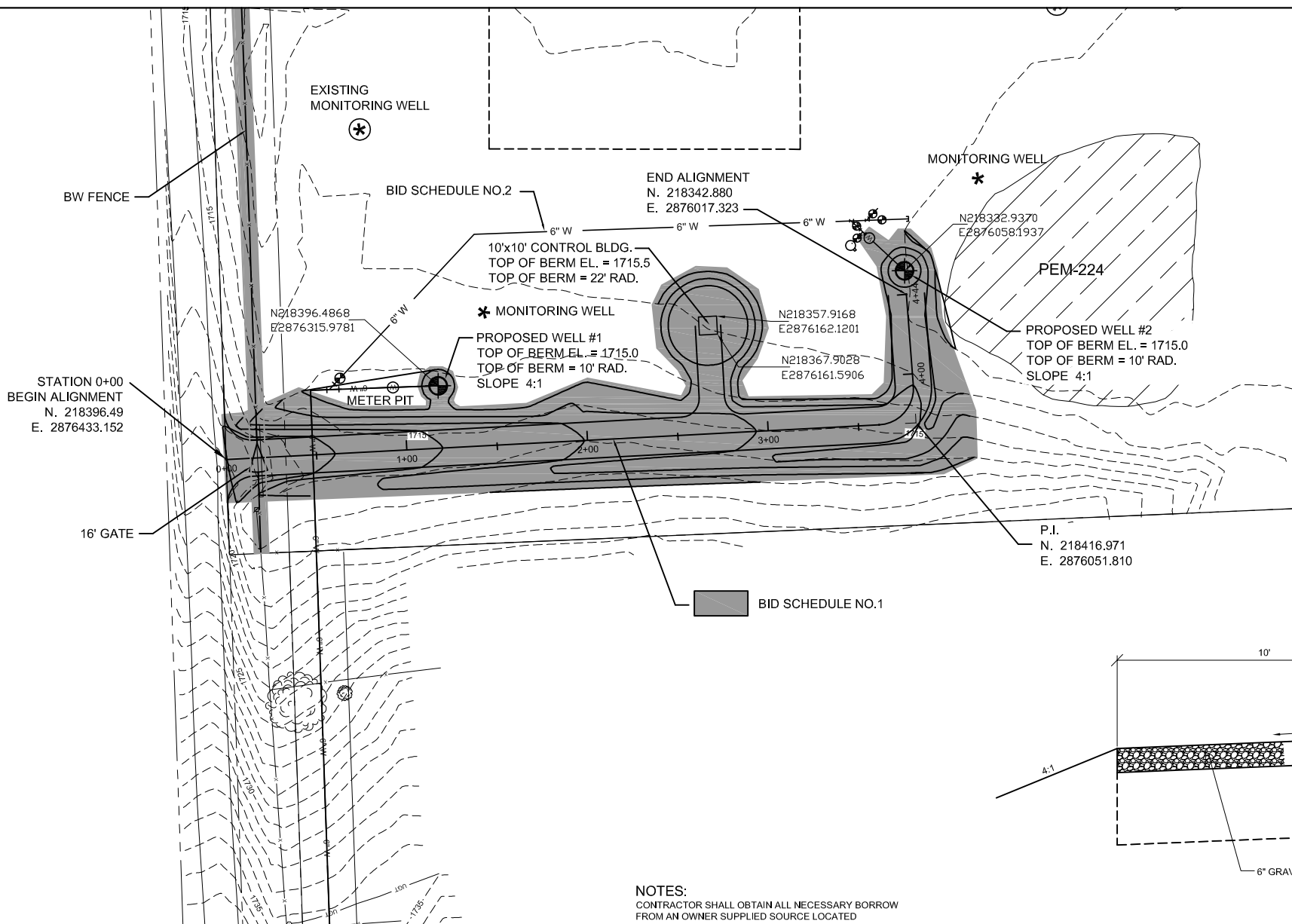
**WELL
ACCESS ROAD
STA. 0+00 TO 4+85**

BID SCHEDULE NO.1
INCLUDES WELLS, MONITORING WELLS, SITE GRADING,
SURFACE RESTORATION, WELL PIPING TO AND THROUGH
METER PIT, FENCE, GATE, AND CONTROL BUILDING.

BID SCHEDULE NO.2
INCLUDES PIPING FROM METER PITS TO
DEER CREEK STATION.

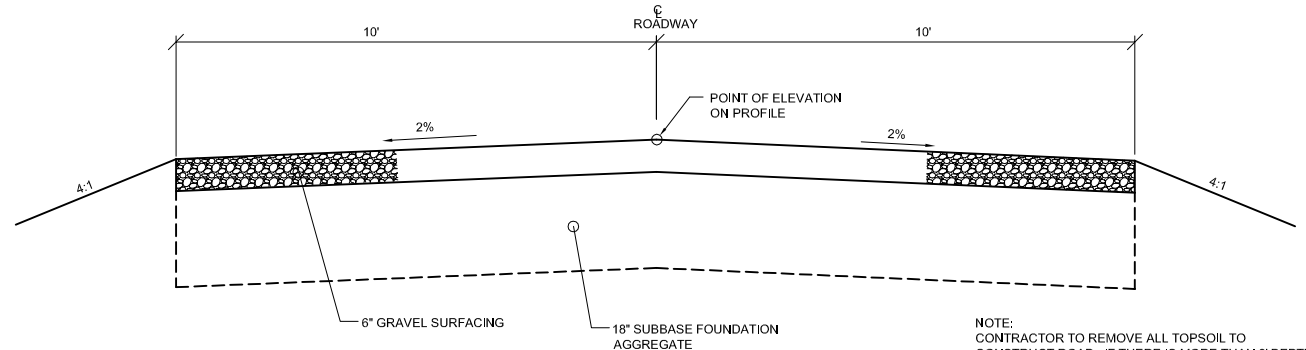


ALL DIMENSIONS SHOWN ARE IN
TERMS OF U.S. SURVEY FEET



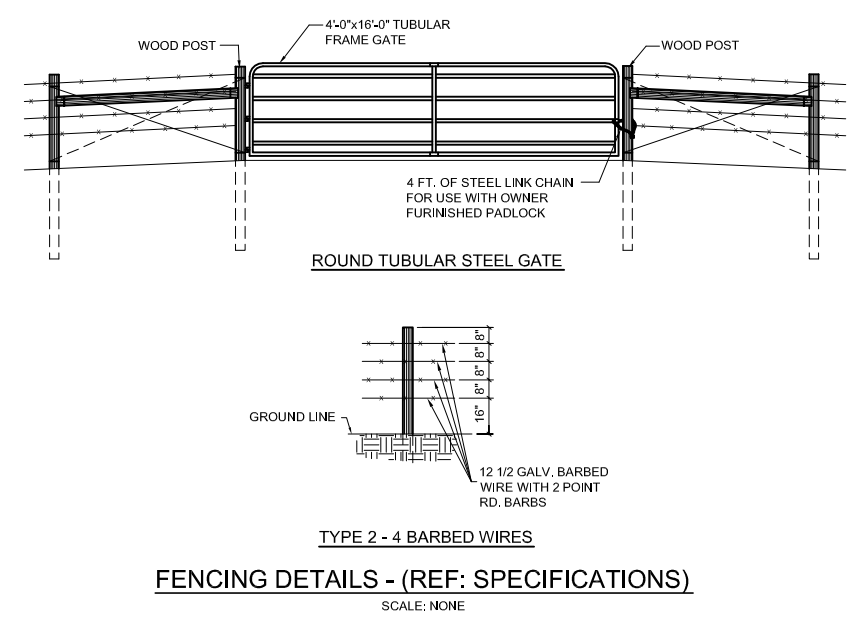
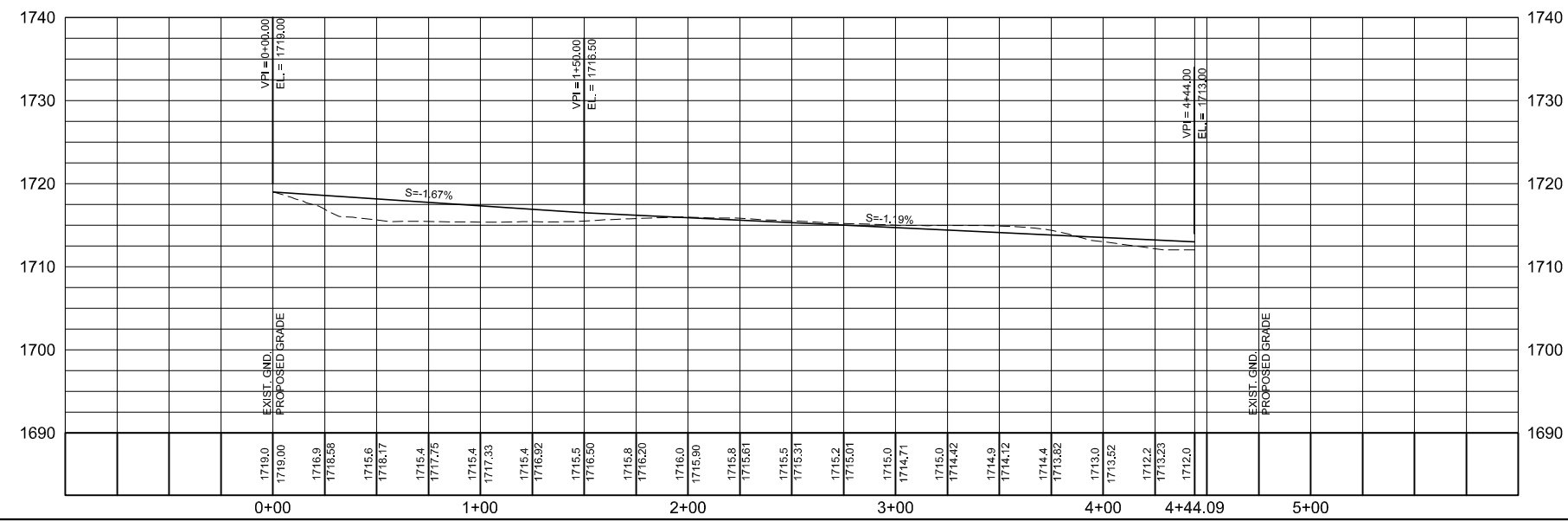
NOTES:
CONTRACTOR SHALL OBTAIN ALL NECESSARY BORROW
FROM AN OWNER SUPPLIED SOURCE LOCATED
APPROXIMATELY 1.5 MILES FROM WELL FIELD.
CONTRACTOR IS RESPONSIBLE FOR HAULING MATERIAL
FROM OWNER'S BORROW SITE TO THE WELL FIELD
CONSTRUCTION SITE.

CONTRACTOR SHALL INSTALL A NEW FENCE, INCLUDING
16' GATE, FROM EXISTING FENCE IN NORTHEAST CORNER
OF PROPERTY TO DEER CREEK.

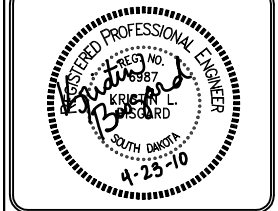


GRAVEL ROAD TYPICAL SECTION
SCALE: NONE

NOTE:
CONTRACTOR TO REMOVE ALL TOPSOIL TO
CONSTRUCT ROAD. IF THERE IS MORE THAN 2' DEPTH
OF EXISTING TOPSOIL TO BE REMOVED CONTRACTOR
WILL CONTACT ENGINEER.



CONSULTANTS:



PROJECT TITLE:

**BASIN
ELECTRIC
WELL FIELD AND
RAW WATER
PIPELINE**

PROJECT LOCATION:
WHITE
SOUTH DAKOTA

REV.	DATE	DESCRIPTION

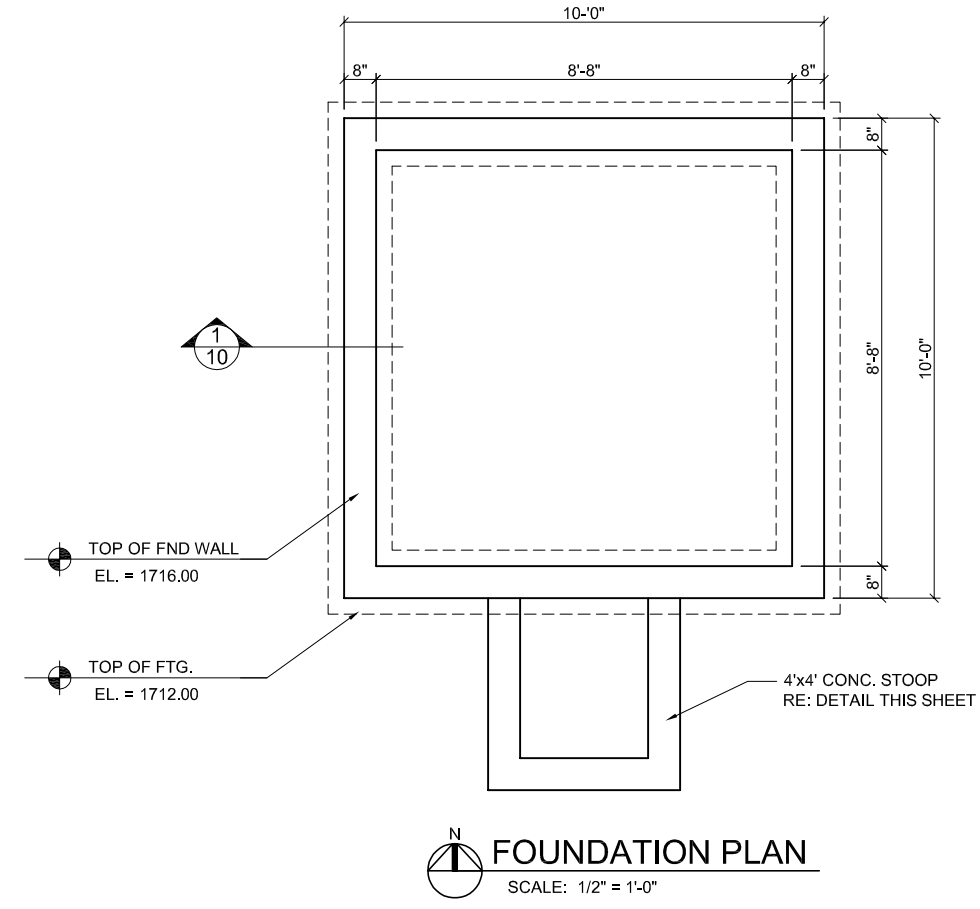
DRAWN BY: CMC
DESIGNED BY: KLB
CHECKED BY: SDR
JOB NO: 20953-00-00
DATE: APRIL 2010

SCALE REDUCTION BAR

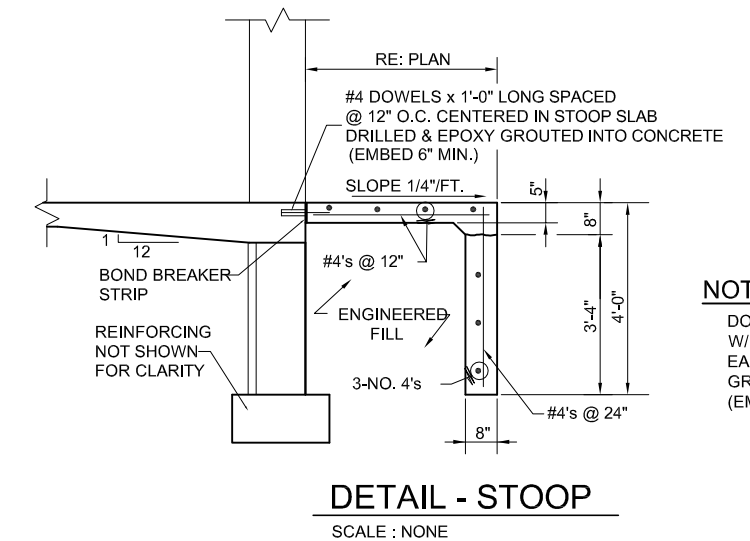
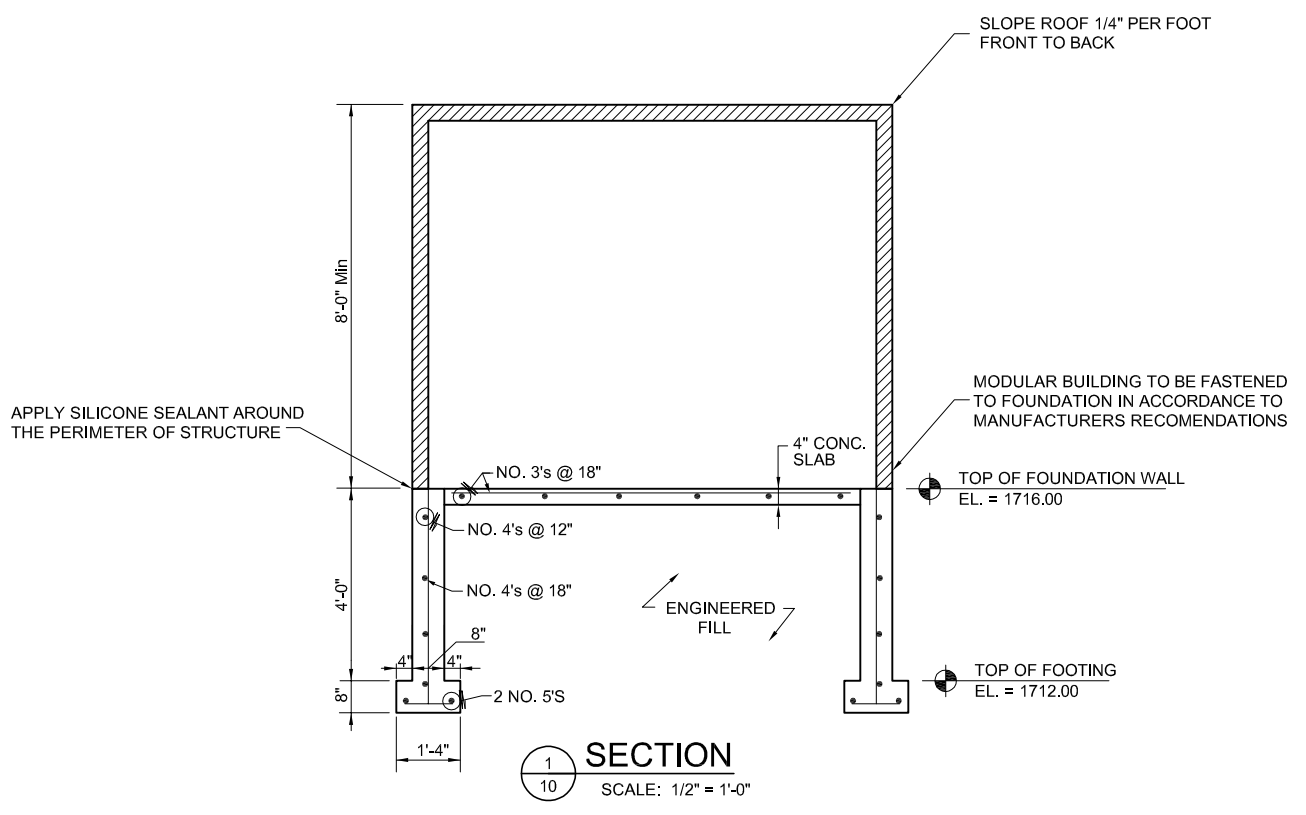
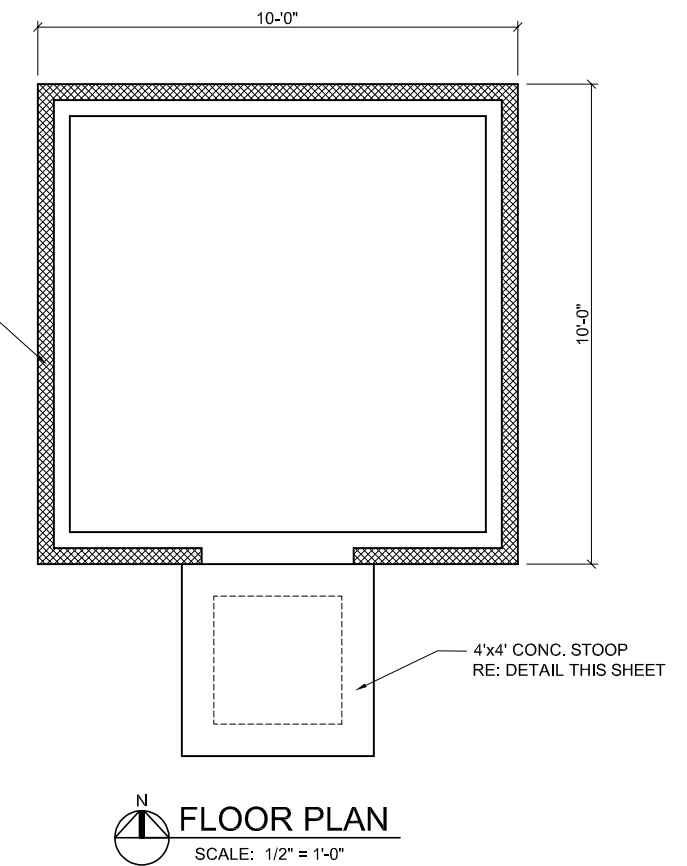
SHEET TITLE:

**ELECTRICAL
ENCLOSURE
PLAN & SECTIONS**

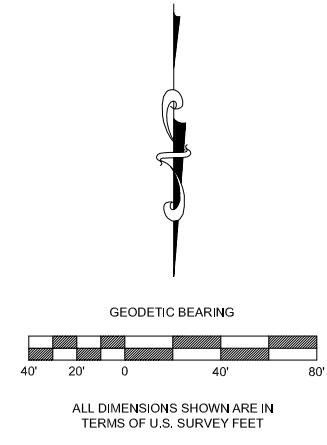
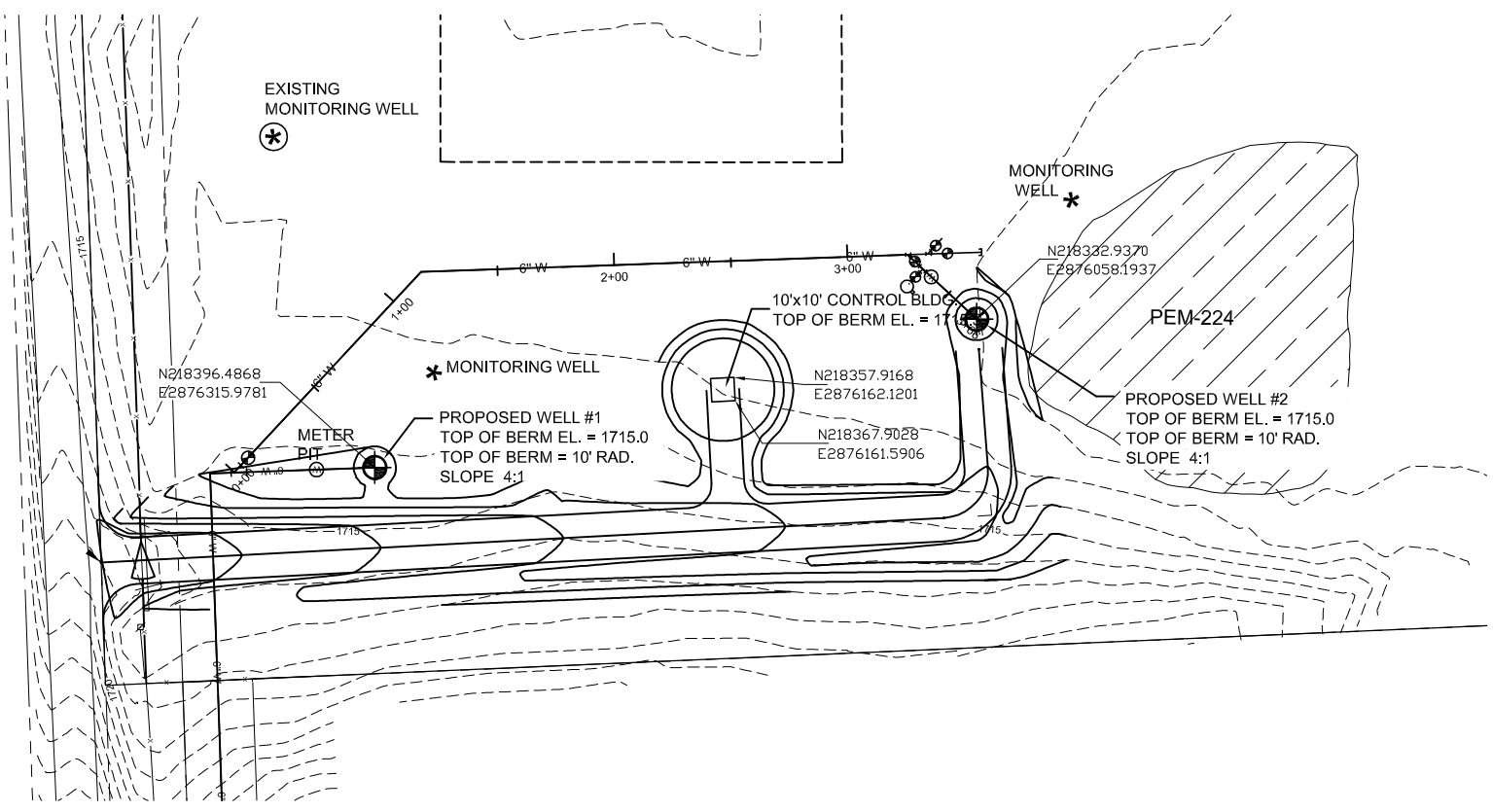
SHEET NO.:
10



MODULAR BUILDING TO BE FASTENED TO FOUNDATION IN ACCORDANCE TO MANUFACTURERS RECOMENDATIONS



NOTE:
DOWEL STOOP WALLS TO FOUNDATION W/ 3-#4 DOWELS x 1'-0" LONG. EACH WALL. DRILLED & EPOXY GROUTED INTO FOUNDATION WALL (EMBED 6")



GENERAL WATERMAIN NOTES:

- CONTRACTOR SHALL INSTALL WATERLINE APPROXIMATELY IN CENTER OF EASEMENT WHEN POSSIBLE. IF EXISTING UTILITIES, TREES, BUILDINGS OR OTHER OBSTRUCTION ARE PRESENT, THEN THE WATERLINE SHALL BE ADJUSTED TOWARD THE HIGHWAY R.O.W. LINE TO AVOID EXISTING OBSTRUCTIONS.
- CONTRACTOR WILL BE RESPONSIBLE TO HAVE ALL UTILITIES LOCATED PRIOR TO EXCAVATION.
- WATERLINE SHALL BE LAID WITH A MINIMUM COVER OF SIX FOOT ZERO INCHES (6'-0").
- AIR RELEASE VALVES SHALL BE INSTALLED AT THE HIGH POINTS IN THE LINE FINAL LOCATIONS SHALL BE DETERMINED IN THE FIELD.
- PIPING MATERIAL USED FOR ALL ROAD/DRIVEWAY BORINGS SHALL BE FUSIBLE C-900 PVC PIPE OR CERTA-LOK.
- CONTRACTOR FOR BID SCHEDULE #2 SHALL BE RESPONSIBLE FOR FOR INSTALLATION OF DIRECT BURIED FIBER (PROVIDED BY OWNER). CONTRACTOR FOR BID SCHEDULE #1 SHALL TERMINATE DIRECT BURIED FIBER INSIDE THE CONTROL BUILDING. CONTRACTOR FOR BID SCHEDULE #2 SHALL COORDINATE WITH CONTRACTOR FOR BID SCHEDULE #1.
- CONTRACTOR SHALL COORDINATE WITH OWNER (SITE INSPECTOR), ENGINEER AND PROPERTY OWNER BEFORE CONSTRUCTION ACTIVITIES BEGIN. ANY TREE REMOVAL OR RELOCATION SHALL BE COORDINATED BETWEEN ALL PARTIES.

UTILITIES:
STA. 0+00 - CL
CONNECT TO WYE / GATE VALVE
INSTALLED ON MAIN WATER LINE
FROM WELL #1

UTILITIES:
STA. 0+00 TO 3+26 - CL
FURNISH & INSTALL:
326 L.F. - 6" DIA. PVC WATER MAIN

UTILITIES:
STA. 1+09 - CL
FURNISH & INSTALL:
1 - 6" D.I. M.J. 45 DEG. BEND
W/J JOINT RESTRAINTS
CONCRETE THRUST BLOCK

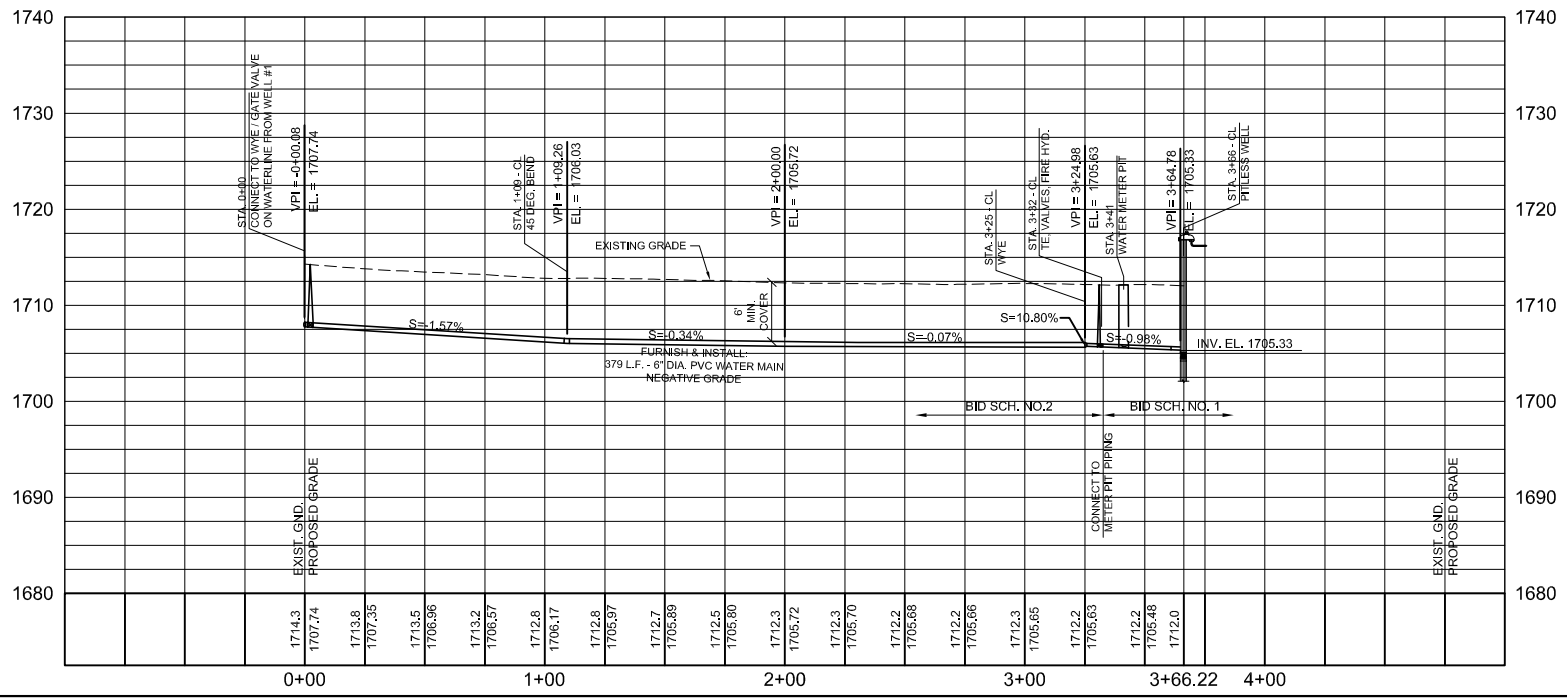
UTILITIES:
STA. 3+26± TO 3+40± - CL
CONNECT TO METER PIT
FURNISH AND INSTALL:
14 L.F. - 4" DIA. PVC WATER MAIN
1 - 6"x6"x4" D.I. M.J. WYE W/J JOINT RESTRAINTS
1 - 4" D.I. M.J. TEE W/ JOINT RESTRAINTS
2 - 4" D.I. M.J. GATE VALVE AND BOX W/ JOINT RESTRAINTS
1 - 4" FLUSHING HYDRANT (REF. HYDRANT DETAIL SHT. 4)
CONCRETE THRUST BLOCKS

UTILITIES
BID SCHEDULE NO. 1:
STA. 3+40 - CL
FURNISH & INSTALL:
1 - WATER METER PIT
REF. - PLAN AND DETAIL SHT. 4

UTILITIES
BID SCHEDULE NO. 1:
STA. 3+40 TO 3+66 - CL
FURNISH & INSTALL:
24 L.F. - 4" D.I. M.J. WATERMAIN PIPE
1 - 4" D.I. M.J. GATE VALVE AND BOX W/ JOINT RESTRAINTS
CONNECT TO METER PIT / WELL NO. 2

UTILITIES
BID SCHEDULE NO. 1:
STA. 3+66 - CL
PROPOSED WELL NO. 2
REF. - PLAN SHT. 4

UTILITIES:
STA. 3+26± TO 3+66± - (CL TANG.)
FURNISH AND INSTALL:
40 L.F. - 6" DIA. PVC WATER MAIN
1 - 6"x6"x6" D.I. M.J. WYE W/J JOINT RESTRAINTS
2 - 6" D.I. M.J. GATE VALVES AND BOX W/ JOINT RESTRAINTS
(REF. PIG LAUNCH DETAIL SHT. 4)
1 - D.I. M.J. CAP W/J JOINT RESTRAINTS
CONCRETE THRUST BLOCKS



CONSULTANTS:



PROJECT TITLE:
**BASIN
ELECTRIC
WELL FIELD AND
RAW WATER
PIPELINE**

PROJECT LOCATION:
WHITE
SOUTH DAKOTA

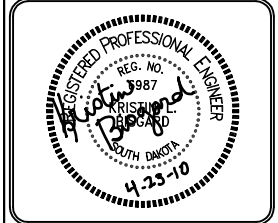
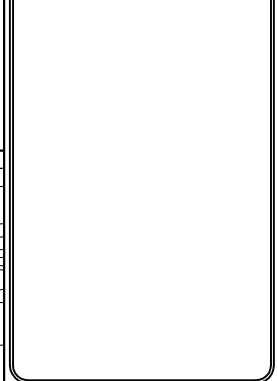
REV.	DATE	DESCRIPTION

DRAWN BY: CMC
DESIGNED BY: KLB
CHECKED BY: SDR
JOB NO: 20953-00-00
DATE: APRIL 2010

SCALE REDUCTION BAR

SHEET TITLE:
**WELL 2
PLAN AND
PROFILE
STA. 00+00 TO 3+84**

SHEET NO.:
11

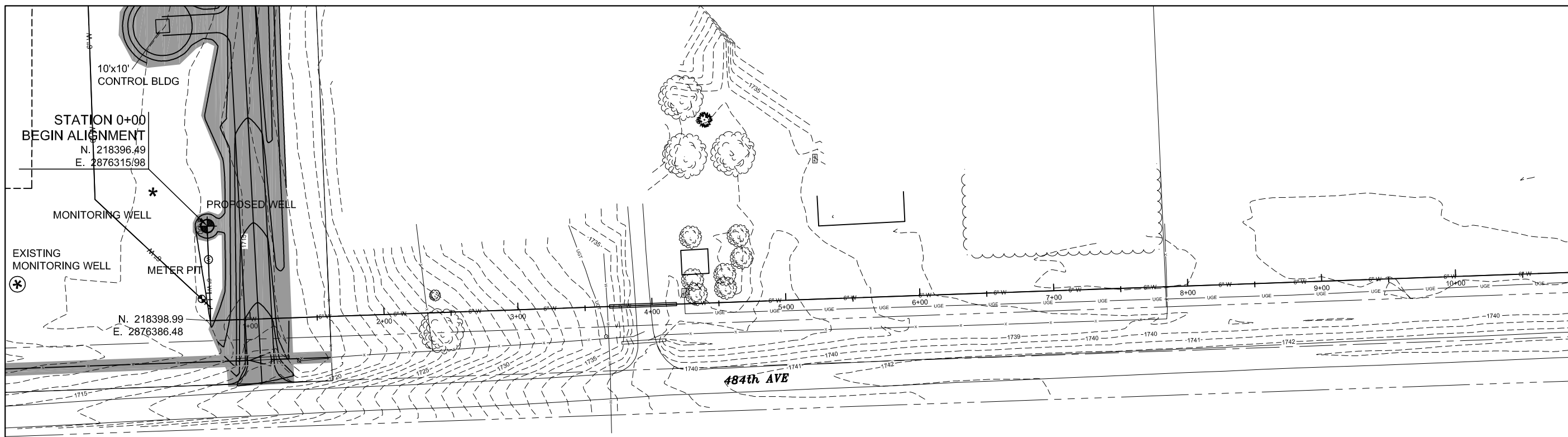


**BASIN
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RAW WATER
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DRAWN BY: JLU
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JOB NO: 20953-00-00
DATE: APRIL 2010

**PLAN AND
PROFILE
STA. 0+00
TO 10+00**



GENERAL WATERMAIN NOTES:

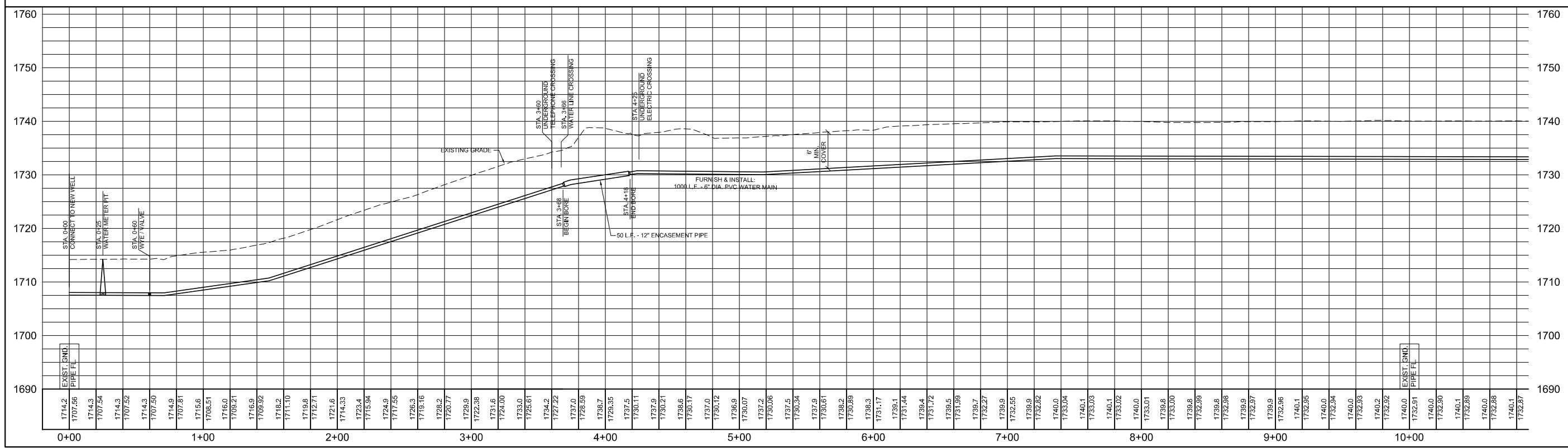
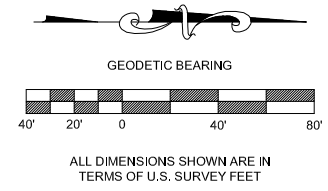
- CONTRACTOR SHALL INSTALL WATERLINE APPROXIMATELY IN CENTER OF EASEMENT WHEN POSSIBLE. IF EXISTING UTILITIES, TREES, BUILDINGS OR OTHER OBSTRUCTION ARE PRESENT, THEN THE WATERLINE SHALL BE ADJUSTED TOWARD THE HIGHWAY R.O.W. LINE TO AVOID EXISTING OBSTRUCTIONS.
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- CONTRACTOR SHALL COORDINATE WITH OWNER (SITE INSPECTOR), ENGINEER AND PROPERTY OWNER BEFORE CONSTRUCTION ACTIVITIES BEGIN. ANY TREE REMOVAL OR RELOCATION SHALL BE COORDINATED BETWEEN ALL PARTIES.

UTILITIES:
STA. 0+25 - CL
FURNISH & INSTALL:
1 - WATER METER PIT

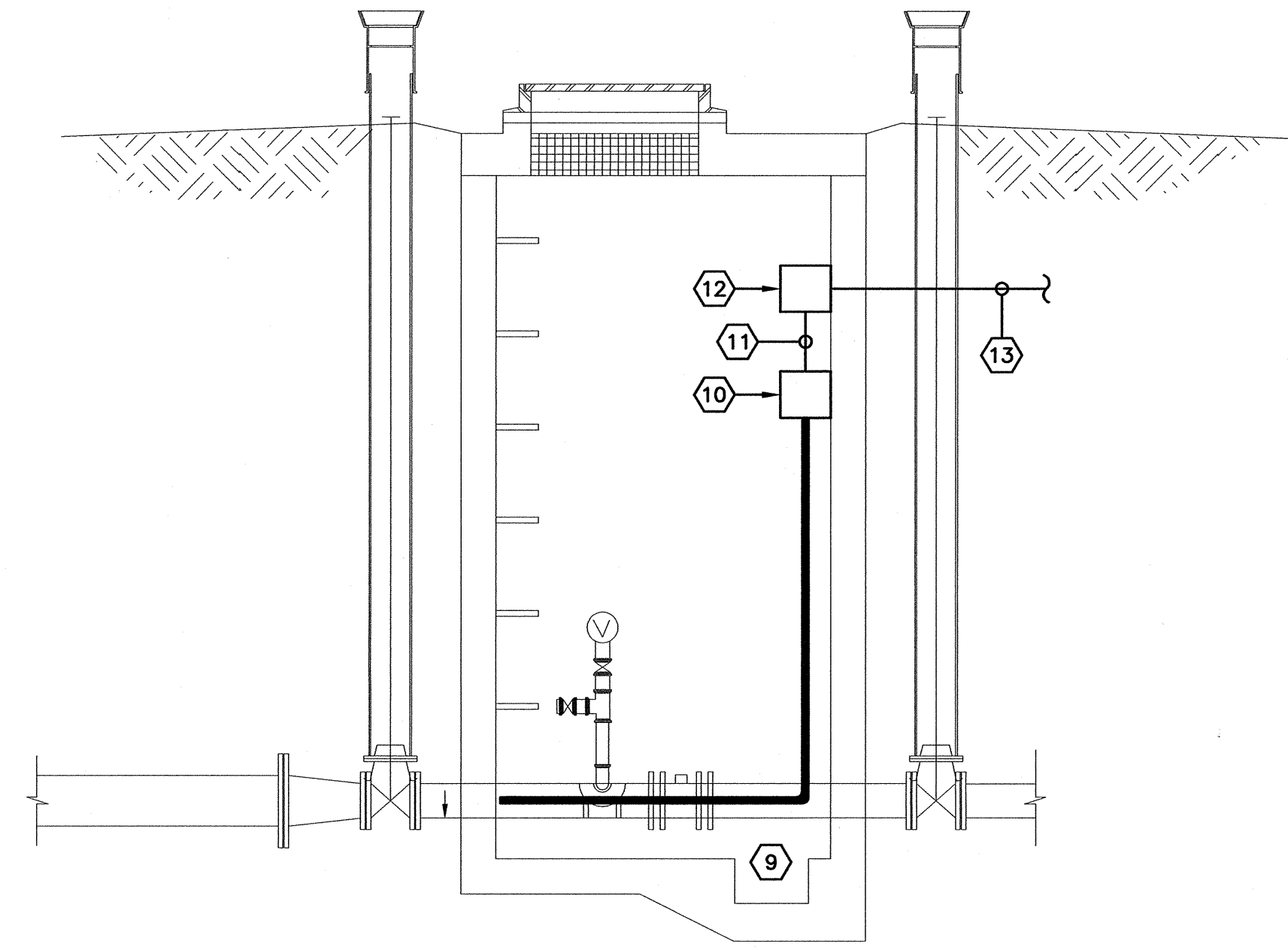
UTILITIES:
STA. 0+70.5 - CL
FURNISH & INSTALL:
1 - 6" D.I. M.J. 90° BEND W/JOINT RESTRAINTS
CONCRETE THRUST BLOCK

UTILITIES:
STA. 3+68 TO 4+18 - CL
FURNISH & INSTALL:
50 L.F. - 12" DIA. ENCASEMENT PIPE

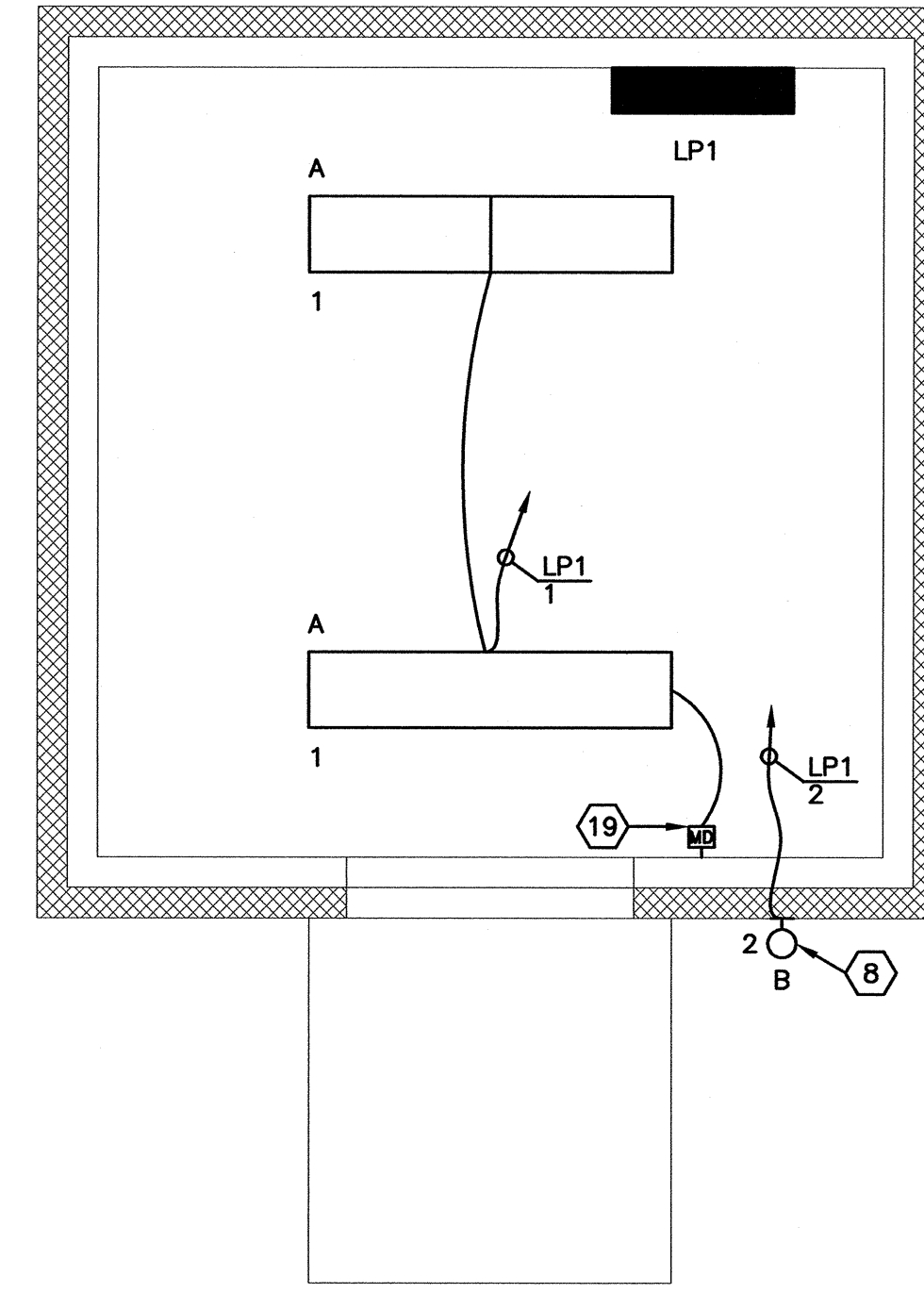
UTILITIES:
STA. 0+00 TO 10+00 - CL
INSTALL:
1000 L.F. - DIRECT BURIED FIBER
(TO BE FURNISHED BY OWNER)



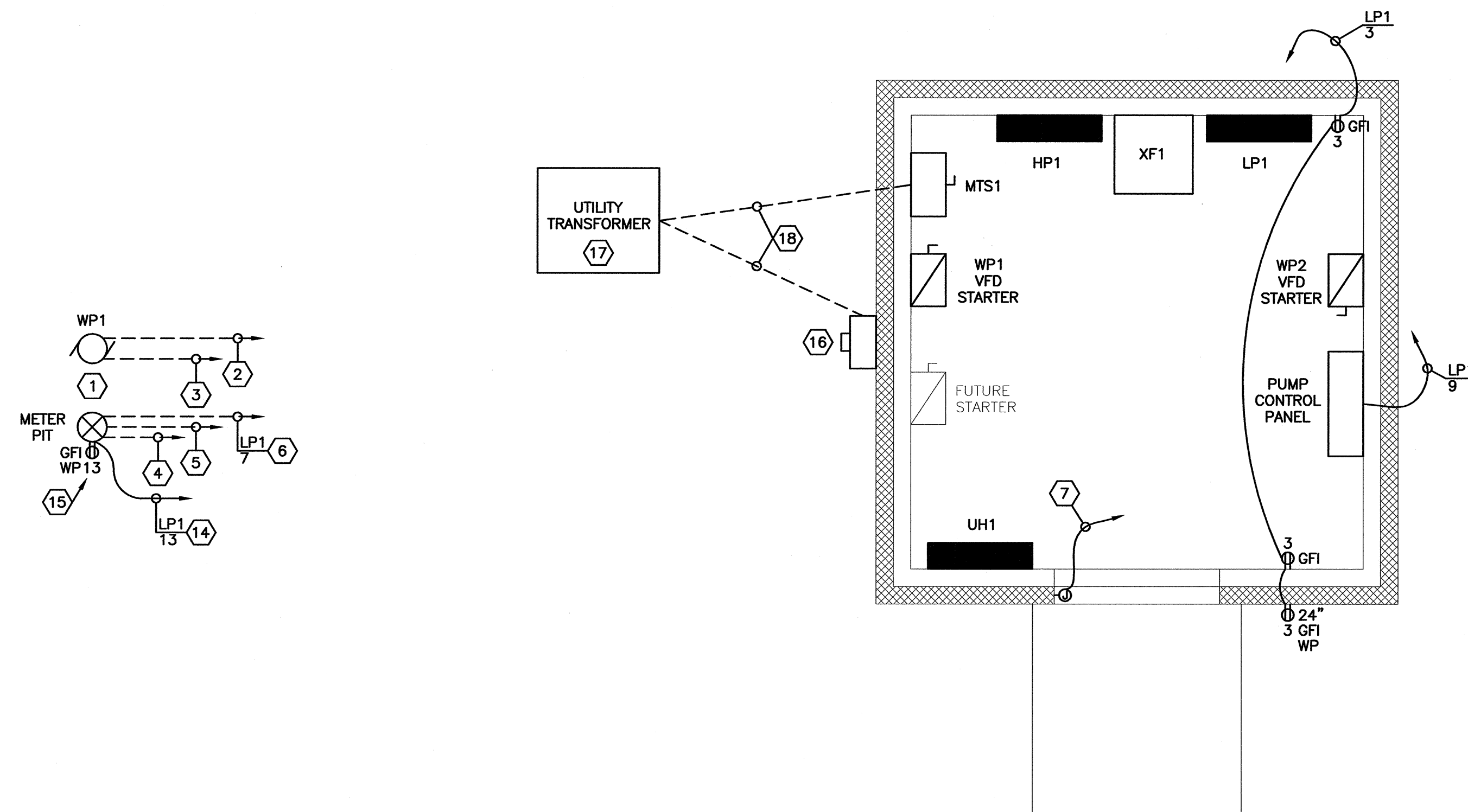
W:\Banner Associates, SD\Deer Creek Station Well Pumps\E1.0-electrical.dwg:4/23/2010 11:12 AM



3 METERING PIT - HEAT TRACE DETAIL
E1.0 SCALE: NO SCALE



1 CONTROL ROOM - LIGHTING PLAN
E1.0 SCALE: 1/2" = 1'-0"
1'-0" 0 2'-0"



2 CONTROL ROOM - POWER & AUXILIARY PLAN
E1.0 SCALE: 1/2" = 1'-0"
1'-0" 0 2'-0"

GENERAL NOTES

- A CONDUIT FOR INSTRUMENTATION AND CONTROL WIRING IS INDICATED ON POWER AND AUXILIARY DRAWING. REFER TO PROCESS P&ID DRAWING FOR ADDITIONAL INFORMATION ON TYPE AND SIZE OF DISCRETE AND ANALOG INSTRUMENTATION AND CONTROL WIRING.
- B ELECTRICAL CONTRACTOR SHALL UTILIZE RIGID NONMETALLIC CONDUIT (SCHEDULE 40 AND/OR 80 PVC) AS PART OF THE ELECTRICAL WIRING SYSTEM FOR ALL UNDERGROUND INSTALLATIONS.
- C ELECTRICAL CONTRACTOR SHALL UTILIZE RIGID STEEL CONDUIT AND LIQUID TIGHT FLEXIBLE METAL CONDUIT AS PART OF THE ELECTRICAL WIRING SYSTEM FOR ALL INDOOR AND OUTDOOR ABOVE GROUND INSTALLATIONS.

KEYED NOTES

- 1 APPROXIMATE LOCATION OF WELL AND ASSOCIATED METER PIT. SEE SITE PLAN FOR EXACT LOCATION AND DISTANCE FROM CONTROL BUILDING.
- 2 PROVIDE 3/4" CONDUIT FOR DISCRETE INSTRUMENTATION WIRING BETWEEN CUT-OUT SWITCH IN BOTTOM OF WELL CASING AND PUMP CONTROL PANEL IN CONTROL BUILDING.
- 3 SEE MOTOR SCHEDULE FOR CIRCUIT INFORMATION.
- 4 PROVIDE 1 1/2" CONDUIT FOR ANALOG INSTRUMENTATION WIRING BETWEEN ANALOG INSTRUMENTS IN METER PIT AND PUMP CONTROL PANEL IN CONTROL BUILDING. SEE PROCESS P&ID DRAWING FOR QUANTITY AND TYPE OF ANALOG INSTRUMENTS IN METER PIT.
- 5 PROVIDE 1 1/2" CONDUIT FOR DISCRETE INSTRUMENTATION WIRING BETWEEN DISCRETE INSTRUMENTS IN METER PIT AND PUMP CONTROL PANEL IN CONTROL BUILDING. SEE PROCESS P&ID DRAWING FOR QUANTITY AND TYPE OF DISCRETE INSTRUMENTS IN METER PIT.
- 6 PROVIDE (2) #10 CONDUCTORS AND #10 GROUND FOR HEAT TRACE CIRCUIT IN METER PIT. SEE DETAIL 3/E1.0 FOR ADDITIONAL INFORMATION.
- 7 PROVIDE 3/4" CONDUIT FOR DISCRETE INSTRUMENTATION WIRING BETWEEN DOOR ENTRY ALARM SWITCH AND PUMP CONTROL PANEL.
- 8 LIGHT FIXTURE SHALL BE MOUNTED AT 6'-0" ABOVE FINISHED GRADE TO CENTER OF UNIT.
- 9 PROVIDE 12'-0" OF THERMON HEAT TRACE CABLE (5-FLX-1-0J). CABLE SHALL BE RATED AT 120 VOLT, 5 WATT PER LINEAR FOOT.
- 10 PROVIDE THERMON TERMINATION KIT (PETK-1D) AND JUNCTION BOX (PCA-H) FOR TRANSITIONING FROM HEAT TRACE CABLE TO CONDUIT AND WIRE. TERMINATION JUNCTION BOX SHALL BE MOUNTED NEAR TOP OF METER PIT TO HELP ENSURE THAT IT IS NOT SUBMERSED IN WATER.
- 11 PROVIDE (2) #12 + #12 GROUND IN 1/2" RIGID METALLIC STEEL CONDUIT BETWEEN JUNCTION BOX AND THERMOSTAT.
- 12 PROVIDE THERMON FREEZE PROTECTION THERMOSTAT (B4X-15140).
- 13 SEE KEYED NOTE #6 FOR CONTINUATION OF CIRCUIT.
- 14 PROVIDE #10 AWG CONDUCTORS FOR ENTIRE CIRCUIT RUN.
- 15 DUPLEX RECEPTACLE SHALL BE MOUNTED 24" ABOVE FINISHED GRADE TO CENTER OF OPENING AT METER PIT LOCATION. PROVIDE MOUNTING PEDESTAL AS REQUIRED TO ENSURE A SECURE MOUNTING ENVIRONMENT.
- 16 COORDINATE EXACT MOUNTING LOCATION OF METER SOCKET WITH UTILITY.
- 17 COORDINATE EXACT LOCATION OF UTILITY TRANSFORMER WITH UTILITY.
- 18 SEE ONE-LINE RISER DIAGRAM.
- 19 PROVIDE WALL MOUNTED MOTION SENSOR FOR CONTROL OF TYPE 'A' LIGHT FIXTURES IN CONTROL BUILDING.

BANNER

Consulting Engineers & Architects

409 22nd Ave. S. P.O. Box 298
Brookings, South Dakota 57006
605-692-6342
www.bannerassociates.com

Designing Projects, Building Trust

CONSULTANTS:
PSE Power System
Engineering, Inc.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of South Dakota.

Josh L. Mulder
Josh L. Mulder Reg. No. 7634
Date 4-23-2010

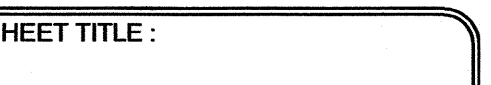


PROJECT TITLE:
**BASIN
ELECTRIC
WELL FIELD AND
RAW WATER
PIPELINE**

PROJECT LOCATION:
WHITE
SOUTH DAKOTA

REV.	DATE	DESCRIPTION
1	4-23-10	ISSUED FOR CONSTRUCTION

DRAWN BY: CDD
DESIGNED BY: JLM
CHECKED BY: JLM
JOB NO: SD0141006
DATE: 04-23-2010



SHEET TITLE:
**ELECTRICAL
LIGHTING,
POWER AND
AUXILIARY**

SHEET NO.:
E1.0

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of South Dakota.

Josh L. Mulder
Josh L. Mulder Reg. No. 7634
Date: 4-23-2010



PROJECT TITLE:
**BASIN
ELECTRIC
WELL FIELD AND
RAW WATER
PIPELINE**

PROJECT LOCATION:
WHITE
BROOKINGS

REV.	DATE	DESCRIPTION
1	4-23-10	ISSUED FOR CONSTRUCTION

DRAWN BY: CDD
DESIGNED BY: JLM
CHECKED BY: JLM
JOB NO: SD0141006
DATE: 04-23-2010

0 1/2" 1"
SCALE REDUCTION BAR

SHEET TITLE:
**ELECTRICAL
ONE-LINE RISER
AND
GROUNDING
DETAILS**

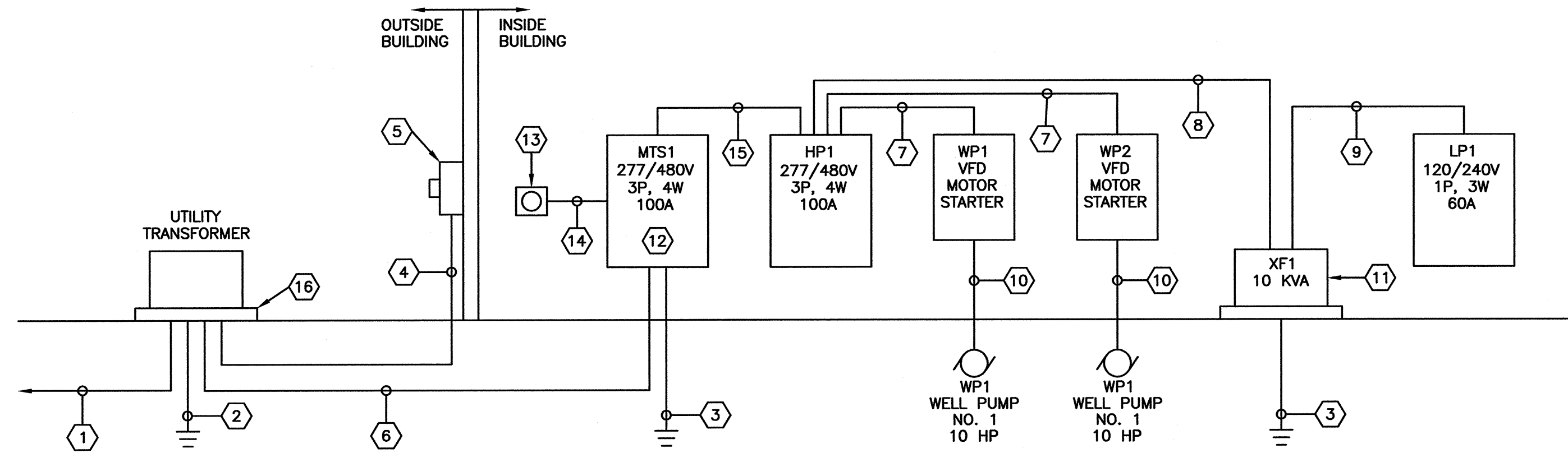
SHEET NO.:
E2.0

GENERAL NOTES

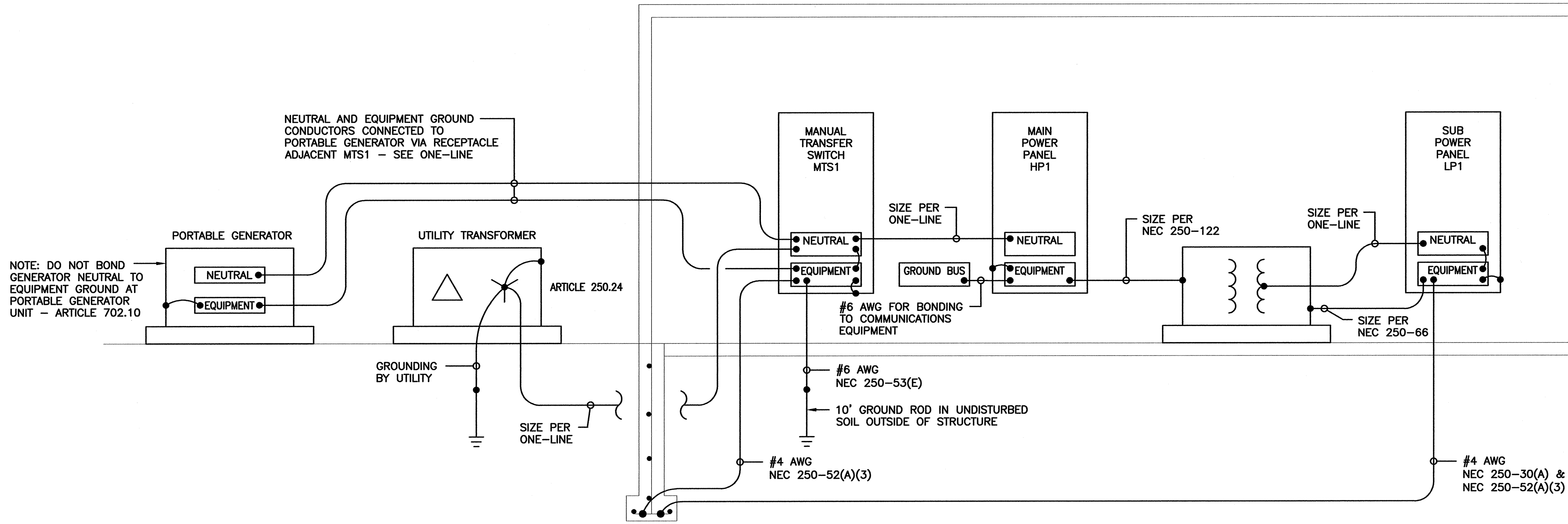
- A FAULT CURRENT INTERRUPTING CAPACITY RATINGS FOR PANELBOARDS ARE SHOWN ON ASSOCIATED PANELBOARD SCHEDULES.
- B ELECTRICAL CONTRACTOR SHALL UTILIZE RIGID NONMETALLIC CONDUIT (SCHEDULE 40 AND/OR 80 PVC) AS PART OF THE ELECTRICAL WIRING SYSTEM FOR ALL UNDERGROUND INSTALLATIONS.
- C ELECTRICAL CONTRACTOR SHALL UTILIZE RIGID STEEL CONDUIT AND LIQUID TIGHT FLEXIBLE METAL CONDUIT AS PART OF THE ELECTRICAL WIRING SYSTEM FOR ALL INDOOR AND OUTDOOR ABOVE GROUND INSTALLATIONS.

KEYED NOTES

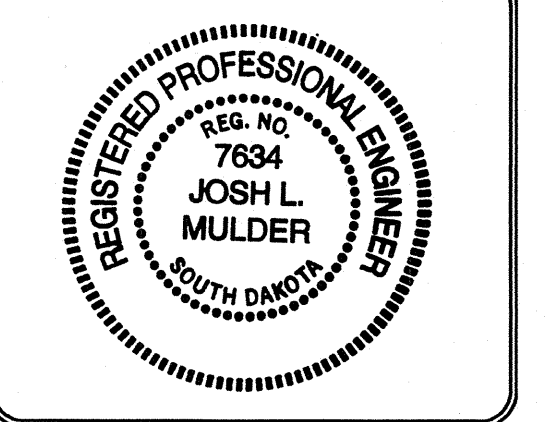
- 1 PRIMARY WIRING BY UTILITY.
- 2 UTILITY TRANSFORMER GROUNDING PROVIDED BY UTILITY COMPANY.
- 3 GROUND PER NEC - SEE ELECTRICAL SYSTEM GROUNDING DETAIL.
- 4 PROVIDE 1" RIGID STEEL CONDUIT FROM METER SOCKET TO SECONDARY SIDE OF TRANSFORMER FOR METER/CT WIRING. UNDERGROUND PORTION OF CIRCUIT SHALL BE A MINIMUM OF 42" BELOW FINISHED GRADE.
- 5 PROVIDE UTILITY APPROVED METER SOCKET. COORDINATE EXACT MOUNTING LOCATION OF METER SOCKET WITH UTILITY. METER BASE IS PROVIDED BY THE UTILITY.
- 6 PROVIDE (4) #1 CONDUCTORS IN 2" CONDUIT FROM UTILITY TRANSFORMER TO MTS1. UNDERGROUND PORTION OF CIRCUIT SHALL BE A MINIMUM OF 42" BELOW FINISHED GRADE AND BE SCHEDULE 40 PVC.
- 7 PROVIDE (3) #10 PHASE CONDUCTORS AND #10 GROUND CONDUCTOR IN 3/4" CONDUIT.
- 8 PROVIDE (2) #10 PHASE CONDUCTORS AND #10 GROUND CONDUCTOR IN 3/4" CONDUIT.
- 9 PROVIDE (2) #4 PHASE CONDUCTORS, #4 NEUTRAL CONDUCTOR AND #8 GROUND CONDUCTOR IN 1 1/4" CONDUIT.
- 10 PROVIDE (3) #10 PHASE CONDUCTORS AND #10 GROUND CONDUCTOR IN 3/4" CONDUIT.
- 11 PROVIDE 10 KVA TRANSFORMER WITH 480 VOLT, 1-PHASE PRIMARY AND 240/120 VOLT, 1-PHASE SECONDARY.
- 12 PROVIDE SERVICE ENTRANCE RATED 100A, 277/480V, 3-PHASE, 4-WIRE, 3-POLE, OPEN TRANSITION MANUAL TRANSFER SWITCH (MTS1). NORMAL SIDE OF MTS1 SHALL BE FED FROM UTILITY SOURCE AND EMERGENCY SIDE OF MTS1 SHALL BE FED FROM PORTABLE GENERATOR VIA CORD AND PLUG SET.
- 13 PROVIDE HUBBELL MODEL #HBL5100B7W 4-POLE, 5-WIRE INLET RECEPTACLE AND HUBBELL MODEL #HBL5100C7W CONNECTOR. INLET RECEPTACLE SHALL BE MOUNTED IN APPROPRIATE SIZED JUNCTION BOX ADJACENT MTS1. CONNECTOR SHALL BE TURNED OVER TO OWNER FOR TERMINATION TO CORD OF PORTABLE GENERATOR. GENERATOR SHALL BE WIRED AS A NON-SEPARATELY DERIVED SYSTEM SUCH THAT NEUTRAL CONDUCTOR IS NOT BONDED TO EQUIPMENT GROUNDING CONDUCTOR AT GENERATOR. NEUTRAL SHALL BE GROUNDED AND BONDED AT MAIN SERVICE ENTRANCE POINT.
- 14 PROVIDE (3) #1 PHASE CONDUCTORS, #1 NEUTRAL CONDUCTOR, AND #6 GROUND CONDUCTOR IN 2" CONDUIT FROM EMERGENCY SIDE OF MANUAL TRANSFER SWITCH TO "PORTABLE GENERATOR RECEPTACLE".
- 15 PROVIDE (3) #1 PHASE CONDUCTORS, #1 NEUTRAL CONDUCTOR, AND #6 GROUND CONDUCTOR IN 2" CONDUIT FROM LOAD SIDE OF MANUAL TRANSFER SWITCH TO HP1.
- 16 PROVIDE UTILITY APPROVED CONCRETE PAD FOR UTILITY TRANSFORMER. CONTACT SIOUX VALLEY ENERGY TO REQUEST DETAIL FOR CONCRETE PAD.



1 ELECTRICAL ONE-LINE RISER DIAGRAM
NO SCALE



2 ELECTRICAL SYSTEM GROUNDING DETAIL
NO SCALE



PROJECT TITLE:
**BASIN
ELECTRIC
WELL FIELD AND
RAW WATER
PIPELINE**

PROJECT LOCATION:
**WHITE
BROOKINGS**

REV.	DATE	DESCRIPTION
1	4-23-10	ISSUED FOR CONSTRUCTION

DRAWN BY: CDD
DESIGNED BY: JLM
CHECKED BY: JLM
JOB NO: SD0141006
DATE: 04-23-2010

0 1/2" 1"
SCALE REDUCTION BAR

SHEET TITLE:
**ELECTRICAL
SCHEDULES**

SHEET NO.:
E3.0

ELECTRICAL SYMBOL LEGEND

POWER		18" A.F.F. UNLESS NOTED OTHERWISE
⊕	DUPLEX RECEPTACLE	18" A.F.F. UNLESS NOTED OTHERWISE
⊕	DOUBLE DUPLEX RECEPTACLE	
⊕	MANUAL TRANSFER SWITCH	
⊕	MOTOR STARTER	
⊕	MOTOR - SEE MOTOR SCHEDULES	
⊕	JUNCTION BOX	48" A.F.F. UNLESS NOTED OTHERWISE
⊕	PANELBOARD	
LIGHTING (SEE LIGHT FIXTURE SCHEDULE)		
A	1'x4' FLUORESCENT FIXTURE	48" A.F.F. UNLESS NOTED OTHERWISE
12 b	-TYPICAL: TYPE A, CIRCUIT 12, SWITCH LEG a	
⊕	WALL MOUNTED FIXTURE	
⊕	MOTION SENSOR LIGHT SWITCH	
CONDUIT		
⊕	EXPOSED CONDUIT STRAIGHT WITH BUILDING LINES	NOTE: ALL MEASUREMENTS ARE TO CENTER UNLESS NOTED OTHERWISE
⊕	CONCEALED CONDUIT	
⊕	CIRCUIT HOME RUN	

ELECTRICAL ABBREVIATIONS

A	AMPERE	MAX	MAXIMUM
A.F.F.	ABOVE FINISHED FLOOR	MCB	MAIN CIRCUIT BREAKER
A.F.G.	ABOVE FINISHED GRADE	MIN	MINIMUM
AHU	AIR HANDLING UNIT	MISC.	MISCELLANEOUS
AL	ALUMINUM	MLO	MAIN LUGS ONLY
AMP	AMPERE	NC	NORMALLY CLOSED CONTACT
APPROX	APPROXIMATELY	NEC	NATIONAL ELECTRICAL CODE
AUTO	AUTOMATIC	NL	NIGHT LIGHT
		NO	NORMALLY OPEN CONTACT
C	CONDUIT	OH	OVERHEAD
CB	CIRCUIT BREAKER	PF	POWER FACTOR
CCTV	CLOSED CIRCUIT TELEVISION	PH	PHASE
CKT	CIRCUIT	PT	POTENTIAL TRANSFORMER
CR	CORROSION RESISTANT	PVC	POLYVINYL CHLORIDE
CT	CURRENT TRANSFORMER		
CU	COPPER		
DWG	DRAWING	RMC	RIGID METAL CONDUIT
EM	EMERGENCY	RTU	ROOF TOP UNIT
EMT	ELECTRICAL METALLIC TUBING		
F	FUSE	TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
GFI	GROUND FAULT INTERRUPTER	TYP	TYPICAL
HOA	HAND-OFF-AUTOMATIC SWITCH	UE	UNDERGROUND ELECTRICAL
HP	HORSEPOWER	V	VOLT
IMC	INTERMEDIATE METAL CONDUIT	VA	VOLT-AMPERES
J-BOX	JUNCTION BOX	W	WATT
KV	KILOVOLT	WP	WEATHERPROOF
kVA	KILOVOLT-AMPERE	XF	TRANSFORMER
kVAR	KILOVOLT-AMPERE REACTIVE		
KW	KILOWATT		
KWH	KILOWATT HOUR		

PANEL SCHEDULE													
PANEL: HP1		LOCATION: WELL CNTRL BUILDING				VOLTS: 480/277 WYE				AIC RATING: 14,000			
BUS SIZE (AMPS): 100		MCB (AMPS): 100		CONFIGURATION: 3-PHASE, 4-WIRE				MOUNTING: SURFACE					
1. PROVIDE POCKET SLIDE-IN TYPED CIRCUIT DIRECTORY				3. PROVIDE BOLT ON CIRCUIT BREAKERS									
2. PROVIDE COPPER PHASE AND GROUND BUSES				4. PROVIDE EQUIPMENT GROUND BUS									
ROOM	CIRCUIT DESCRIPTION	LOAD VA	CIRCUIT BREAKER	POLES	CIRCUIT #	P H	CIRCUIT #	POLES	CIRCUIT BREAKER	LOAD VA	CIRCUIT DESCRIPTION	ROOM	
OUTSIDE	WP1	3878	30	3	1	A	2	2	30	5000	LP1 VIA XF1	CONTROL BLDG	
-	-	3878	-	-	3	B	4	-	-	5000	-	-	
-	-	3878	-	-	5	C	6	1	20	-	SPARE	-	
OUTSIDE	WP2	3878	30	3	7	A	8	1	20	-	SPARE	-	
-	-	3878	-	-	9	B	10	1	20	-	SPARE	-	
-	-	3878	-	-	11	C	12	1	20	-	SPARE	-	
-	SPARE FOR FUTURE	3878	30	3	13	A	14	-	-	-	SPACE	-	
-	WELL PUMP	3878	-	-	15	B	16	-	-	-	SPACE	-	
-	-	3878	-	-	17	C	18	-	-	-	SPACE	-	
-	SPACE	3878	-	-	19	A	20	-	-	-	SPACE	-	

THIS PANELBOARD SHALL BE UL LISTED AS SUITABLE FOR USE AS SERVICE ENTRANCE RATED EQUIPMENT.

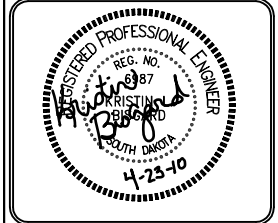
PANEL SCHEDULE													
PANEL: LP1		LOCATION: WELL CNTRL BUILDING				VOLTS: 240/120				AIC RATING: 10,000			
BUS SIZE (AMPS): 60		MCB (AMPS): 60		CONFIGURATION: 1-PHASE, 3-WIRE				MOUNTING: SURFACE					
1. PROVIDE POCKET SLIDE-IN TYPED CIRCUIT DIRECTORY				3. PROVIDE BOLT ON CIRCUIT BREAKERS									
2. PROVIDE COPPER PHASE AND GROUND BUSES				4. PROVIDE EQUIPMENT GROUND BUS									
ROOM	CIRCUIT DESCRIPTION	LOAD VA	CIRCUIT BREAKER	POLES	CIRCUIT #	LINE	CIRCUIT #	POLES	CIRCUIT BREAKER	LOAD VA	CIRCUIT DESCRIPTION	ROOM	
CONTROL BLDG	LIGHTING	400	20	1	1	1	2	1	20	100	SECURITY LIGHTING	OUTSIDE	
CONTROL BLDG	RECEPTACLES	600	20	1	3	2	4	2	30	2085	UH1	CONTROL BLDG	
METER PIT	HEAT TRACE	100	20	1	5	1	6	-	-	2085	-	-	
METER PIT	HEAT TRACE	100	20	1	7	2	8	-	-	-	SPACE	-	
CONTROL BLDG	CONTROL / TELEMTRY PANEL	500	20	1	9	1	10	-	-	-	SPACE	-	
METER PIT	METER PIT RECEPTACLE	200	20	1	11	2	12	-	-	-	SPACE	-	
METER PIT	METER PIT RECEPTACLE	200	20	1	13	1	14	-	-	-	SPACE	-	
	SPARE		20	1	15	2	16	-	-	-	SPACE	-	
	SPARE		25	1	17	1	18	-	-	-	SPACE	-	
	SPARE		20	1	19	2	20	-	-	-	SPACE	-	

MOTOR - EQUIPMENT - STARTER SCHEDULE													
MOTOR				STARTER						PANEL NAME		NOTE(S)	
NUMBER	LOCATION	DESCRIPTION	HP	VOLT	PH	FLA	TYPE	SIZE	MCP SIZE	CONTROLS	RUN INDICATION		CIRCUIT NUMBER(S)
WP1	OUTSIDE	WELL PUMP NO. 1	10	480	3	14	VFD	-	30-3	HOA	GREEN PILOT LIGHT	HP1	1,3,5
												3 #10 + #10 G - 3/4"C	1
WP2	OUTSIDE	WELL PUMP NO. 2	10	480	3	14	VFD	-	30-3	HOA	GREEN PILOT LIGHT	HP1	7,9,11
												3 #10 + #10 G - 3/4"C	1
UH1	RECEIVING	ELECTRIC UNIT HEATER	4 KW	240	1	17.35	-	-	-	-	-	LP1	4,6
	105											2 #10 + #10 G - 3/4"C	2

DEFINITIONS:
MCP - MOTOR CIRCUIT PROTECTOR
FVNR - FULL VOLTAGE NON-REVERSING
FVR - FULL VOLTAGE REVERSING
VFD - VARIABLE FREQUENCY DRIVE MOTOR STARTER
HOA - HAND OFF AUTO SELECTOR SWITCH

NOTES:
1. PROVIDE VARIABLE FREQUENCY DRIVE STARTER FOR WELL PUMP MOTOR. PROVIDE AUXILIARY RUN CONTACTS FOR RUN FEEDBACK TO PUMP CONTROL PANEL. ALSO INCLUDE HAND-OFF-AUTO SELECTOR SWITCH AUXILIARY CONTACTS FOR SWITCH STATUS OUTPUT TO PUMP CONTROL PANEL. SEE MOTOR STARTER SPECIFICATION FOR ADDITIONAL REQUIREMENTS.
2. PROVIDE QMARK MODEL #MWH5004, 4 KW, 240 VOLT ELECTRIC UNIT HEATER.

LIGHT FIXTURE SCHEDULE						
TYPE	MANUFACTURER	MODEL	VOLT	LAMP	BALLAST	DESCRIPTION
A	COLUMBIA	IC4-232-ST-EU-ICFC	120	2 - T8	ELECTRONIC 2L	4' FLUORESCENT STRIP LIGHT WITH SOLID TOP REFLECTOR AND WIRE GUARD FOR LAMP PROTECTION
	LITHONIA	WITH ICWG4		32 WATT		
B	HUBBELL	NRG-307B-PC	120	1 - HPS	HPF	SECURITY WALLPACK LIGHT FIXTURE WITH VANDAL RESISTANT LENS AND CAST ALUMINUM HOUSING - INTERNAL PHOTOCCELL
	LITHONIA			70 WATT		



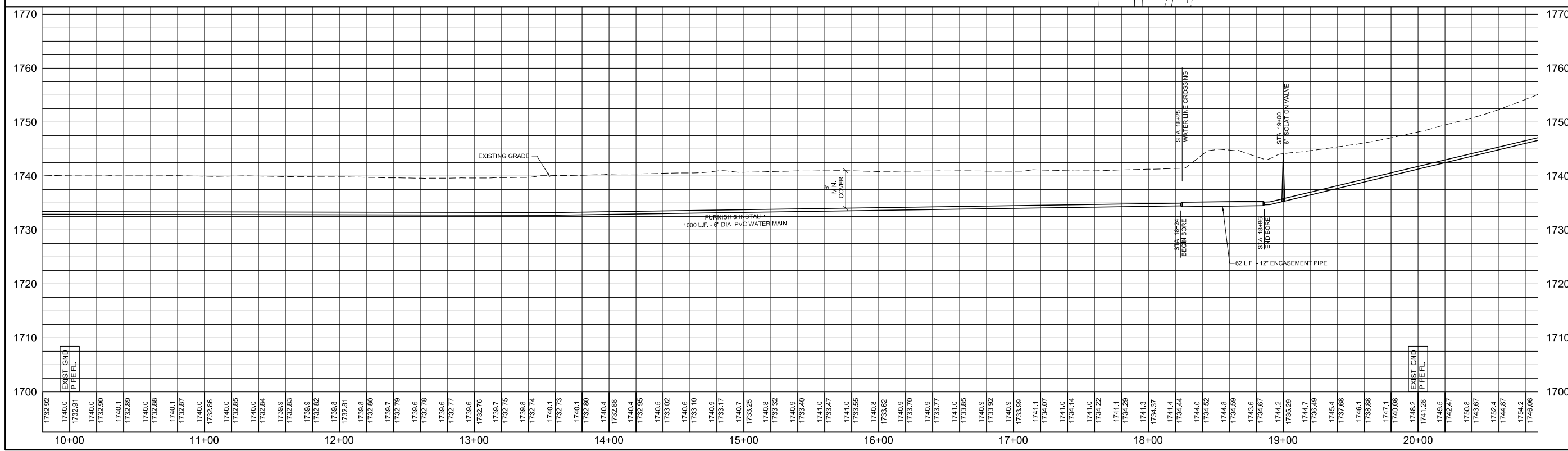
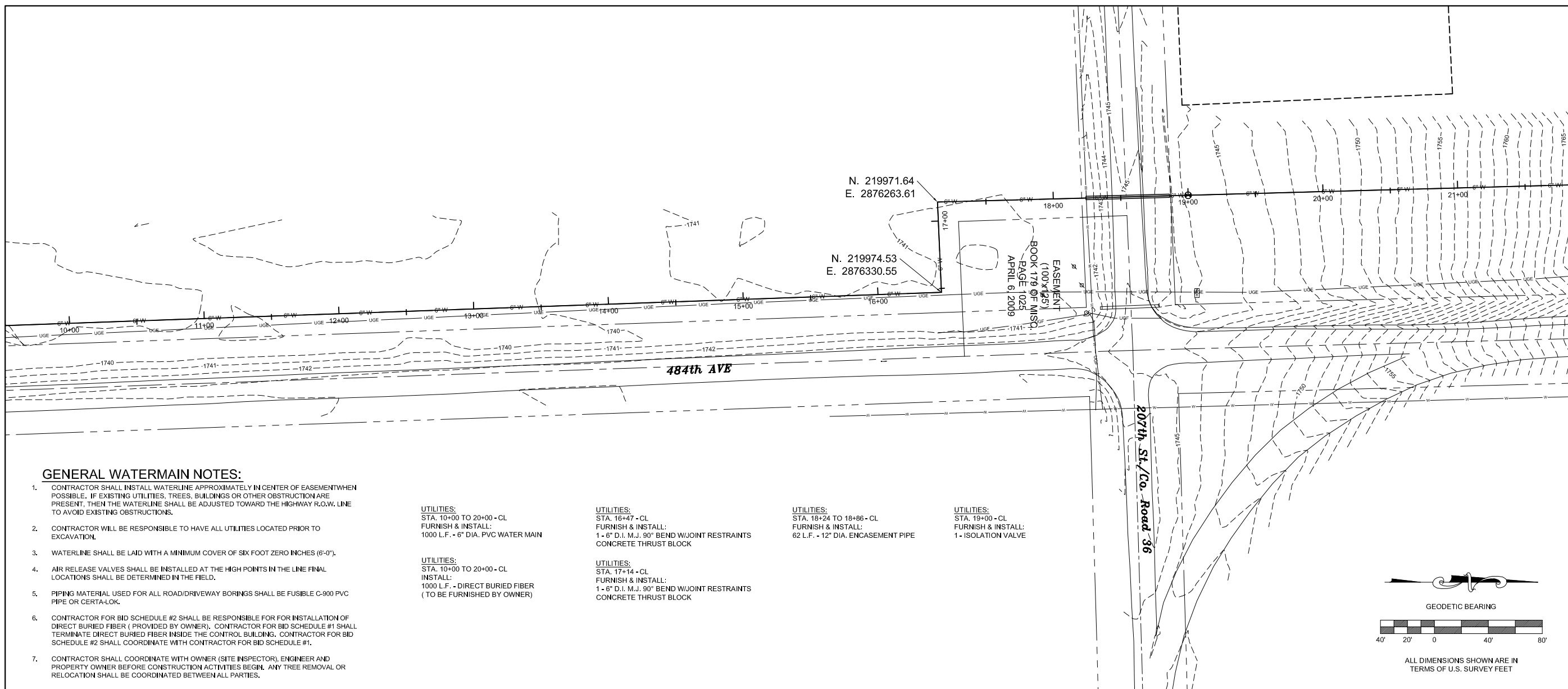
**BASIN
ELECTRIC
WELL FIELD AND
RAW WATER
PIPELINE**

REV.	DATE	DESCRIPTION

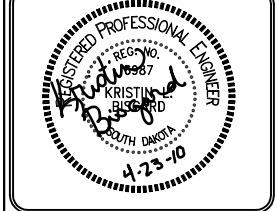
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DESIGNED BY: KLB
CHECKED BY: SDR
JOB NO: 20953-00-00
DATE: APRIL 2010



SHEET TITLE:
**PLAN AND
PROFILE
STA. 10+00
TO 20+00**



CONSULTANTS:



PROJECT TITLE:

**BASIN
ELECTRIC
WELL FIELD AND
RAW WATER
PIPELINE**

PROJECT LOCATION:
WHITE
SOUTH DAKOTA

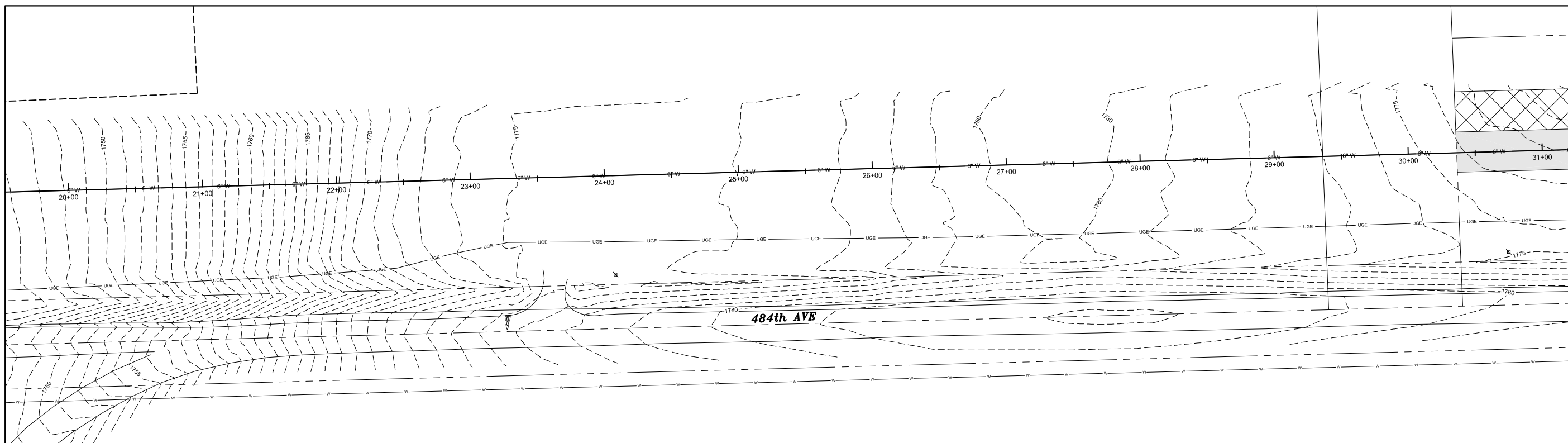
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SCALE REDUCTION BAR

**PLAN AND
PROFILE
STA. 20+00
TO 30+00**

SHEET NO.:
14



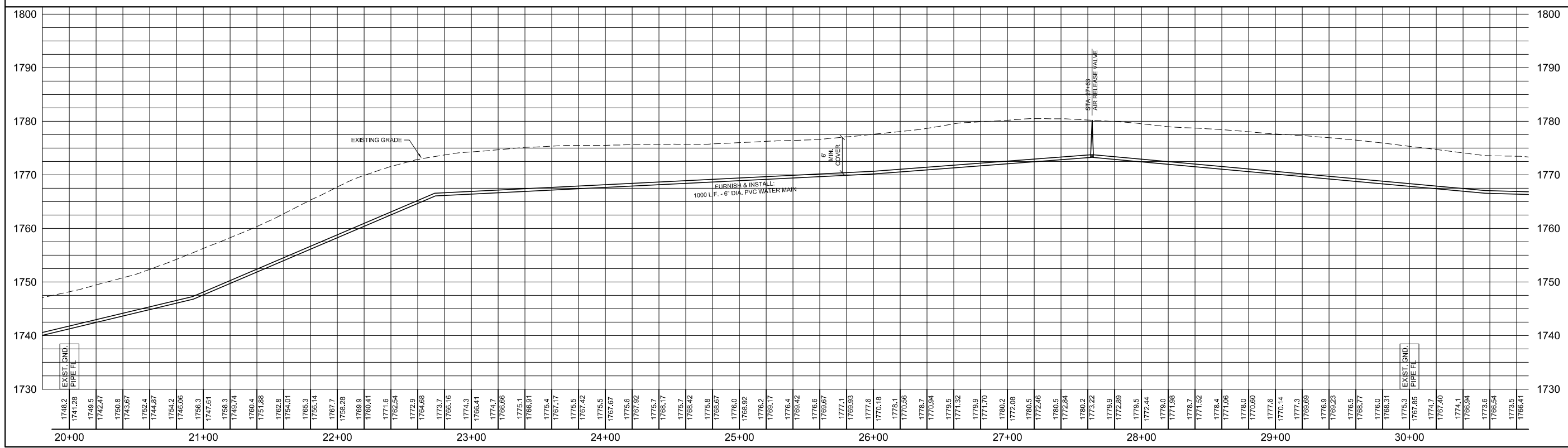
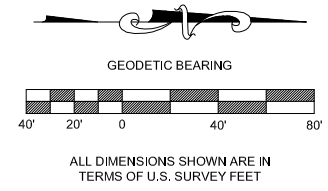
GENERAL WATERMAIN NOTES:

- CONTRACTOR SHALL INSTALL WATERLINE APPROXIMATELY IN CENTER OF EASEMENT WHEN POSSIBLE. IF EXISTING UTILITIES, TREES, BUILDINGS OR OTHER OBSTRUCTION ARE PRESENT, THEN THE WATERLINE SHALL BE ADJUSTED TOWARD THE HIGHWAY R.O.W. LINE TO AVOID EXISTING OBSTRUCTIONS.
- CONTRACTOR WILL BE RESPONSIBLE TO HAVE ALL UTILITIES LOCATED PRIOR TO EXCAVATION.
- WATERLINE SHALL BE LAID WITH A MINIMUM COVER OF SIX FOOT ZERO INCHES (6'-0").
- AIR RELEASE VALVES SHALL BE INSTALLED AT THE HIGH POINTS IN THE LINE. FINAL LOCATIONS SHALL BE DETERMINED IN THE FIELD.
- PIPING MATERIAL USED FOR ALL ROAD/DRIVEWAY BORINGS SHALL BE FUSIBLE C-900 PVC PIPE OR CERTA-LOK.
- CONTRACTOR FOR BID SCHEDULE #2 SHALL BE RESPONSIBLE FOR FOR INSTALLATION OF DIRECT BURIED FIBER (PROVIDED BY OWNER). CONTRACTOR FOR BID SCHEDULE #1 SHALL TERMINATE DIRECT BURIED FIBER INSIDE THE CONTROL BUILDING. CONTRACTOR FOR BID SCHEDULE #2 SHALL COORDINATE WITH CONTRACTOR FOR BID SCHEDULE #1.
- CONTRACTOR SHALL COORDINATE WITH OWNER (SITE INSPECTOR), ENGINEER AND PROPERTY OWNER BEFORE CONSTRUCTION ACTIVITIES BEGIN. ANY TREE REMOVAL OR RELOCATION SHALL BE COORDINATED BETWEEN ALL PARTIES.

UTILITIES:
STA. 20+00 TO 30+00 - CL
FURNISH & INSTALL:
1000 L.F. - 6" DIA. PVC WATER MAIN

UTILITIES:
STA. 27+63 - CL
FURNISH & INSTALL:
1 - 6" AIR RELEASE VALVE

UTILITIES:
STA. 20+00 TO 30+00 - CL
INSTALL:
1000 L.F. - DIRECT BURIED FIBER
(TO BE FURNISHED BY OWNER)



CONSULTANTS:



PROJECT TITLE:
**BASIN
 ELECTRIC
 WELL FIELD AND
 RAW WATER
 PIPELINE**

PROJECT LOCATION:
 WHITE
 SOUTH DAKOTA

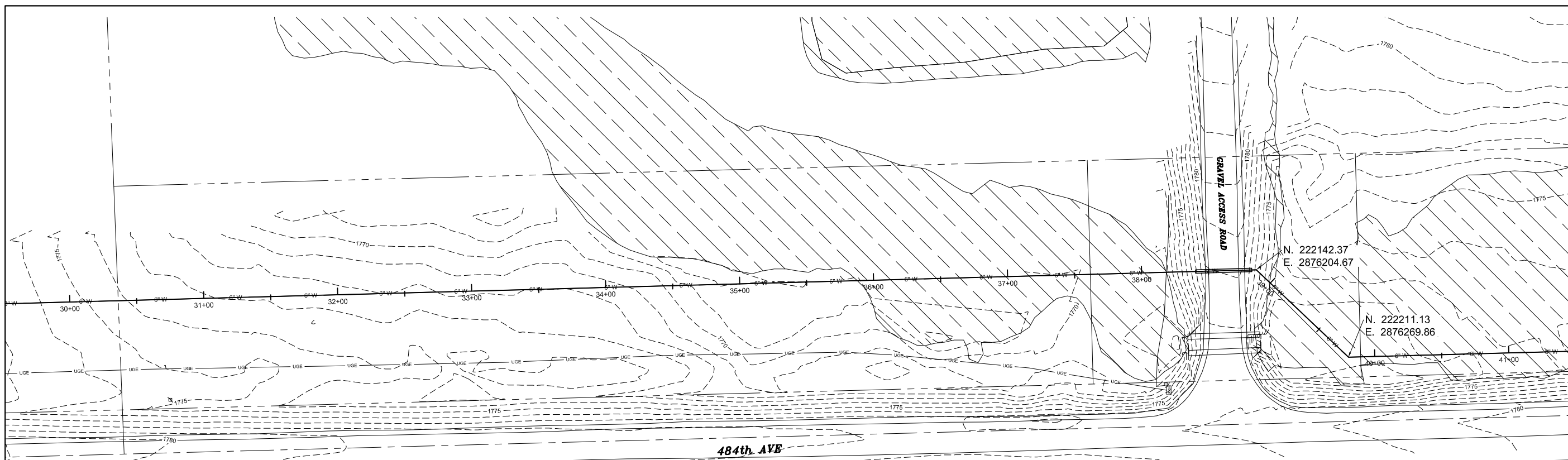
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0 1/2" 1"
 SCALE REDUCTION BAR

SHEET TITLE:
**PLAN AND
 PROFILE
 STA. 30+00
 TO 40+00**

SHEET NO.:
15



GENERAL WATERMAIN NOTES:

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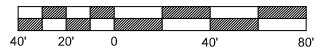
UTILITIES:
 STA. 30+00 TO 40+00 - CL
 FURNISH & INSTALL:
 1000 L.F. - 6" DIA. PVC WATER MAIN

UTILITIES:
 STA. 30+00 TO 40+00 - CL
 INSTALL:
 1000 L.F. - DIRECT BURIED FIBER
 (TO BE FURNISHED BY OWNER)

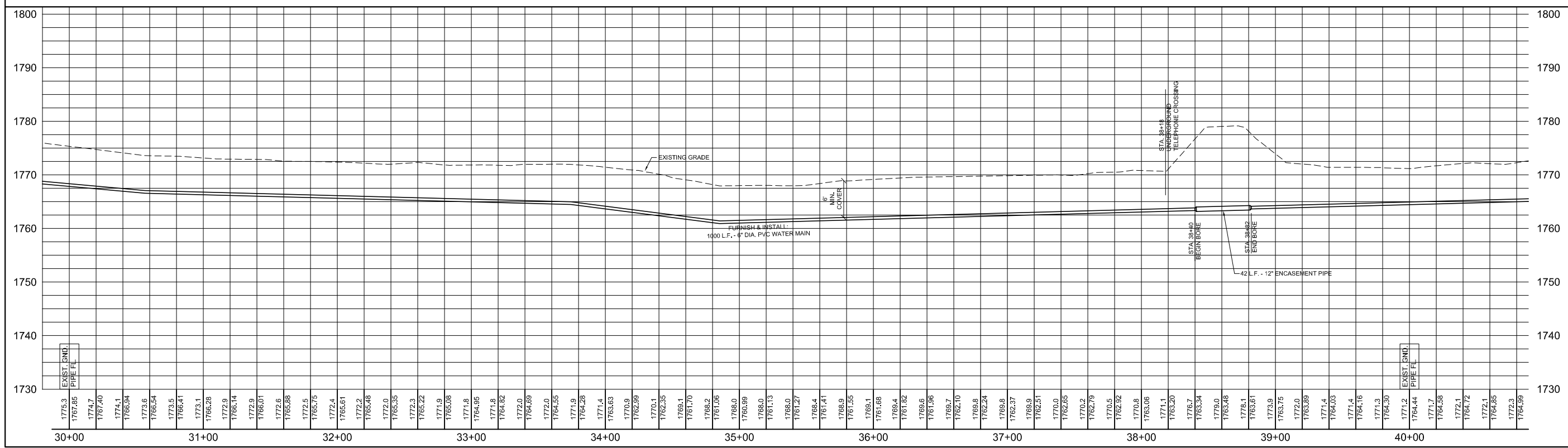
UTILITIES:
 STA. 38+40 TO 38+82 - CL
 FURNISH & INSTALL:
 42 L.F. - 12" DIA. ENCASEMENT PIPE

UTILITIES:
 STA. 38+85.6 - CL
 FURNISH & INSTALL:
 1 - 6" 45° D.I. M.J. BEND W/JOINT RESTRAINTS
 CONCRETE THRUST BLOCK

UTILITIES:
 STA. 39+80.4 - CL
 FURNISH & INSTALL:
 1 - 6" 45° D.I. M.J. BEND W/JOINT RESTRAINTS
 CONCRETE THRUST BLOCK



ALL DIMENSIONS SHOWN ARE IN
 TERMS OF U.S. SURVEY FEET



CONSULTANTS:



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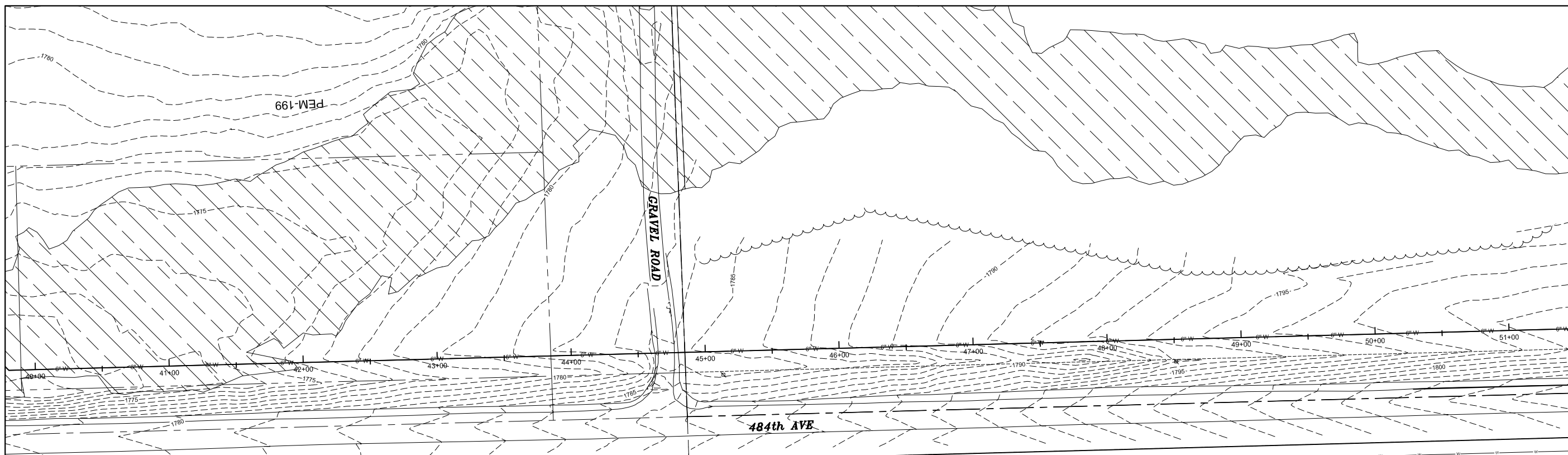
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SCALE REDUCTION BAR

**PLAN AND
PROFILE
STA. 40+00
TO 50+00**

SHEET NO.:
16

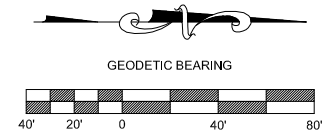


GENERAL WATERMAIN NOTES:

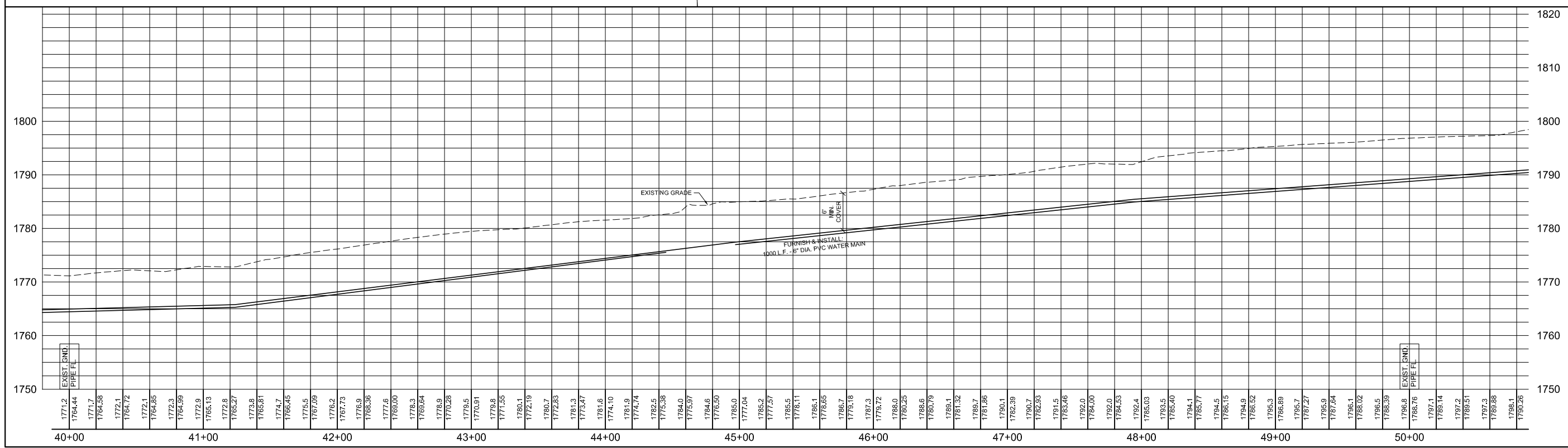
- CONTRACTOR SHALL INSTALL WATERLINE APPROXIMATELY IN CENTER OF EASEMENT WHEN POSSIBLE. IF EXISTING UTILITIES, TREES, BUILDINGS OR OTHER OBSTRUCTION ARE PRESENT, THEN THE WATERLINE SHALL BE ADJUSTED TOWARD THE HIGHWAY R.O.W. LINE TO AVOID EXISTING OBSTRUCTIONS.
- CONTRACTOR WILL BE RESPONSIBLE TO HAVE ALL UTILITIES LOCATED PRIOR TO EXCAVATION.
- WATERLINE SHALL BE LAID WITH A MINIMUM COVER OF SIX FOOT ZERO INCHES (6'-0").
- AIR RELEASE VALVES SHALL BE INSTALLED AT THE HIGH POINTS IN THE LINE FINAL LOCATIONS SHALL BE DETERMINED IN THE FIELD.
- PIPING MATERIAL USED FOR ALL ROAD/DRIVEWAY BORINGS SHALL BE FUSIBLE C-900 PVC PIPE OR CERTA-LOK.
- CONTRACTOR FOR BID SCHEDULE #2 SHALL BE RESPONSIBLE FOR FOR INSTALLATION OF DIRECT BURIED FIBER (PROVIDED BY OWNER). CONTRACTOR FOR BID SCHEDULE #1 SHALL TERMINATE DIRECT BURIED FIBER INSIDE THE CONTROL BUILDING. CONTRACTOR FOR BID SCHEDULE #2 SHALL COORDINATE WITH CONTRACTOR FOR BID SCHEDULE #1.
- CONTRACTOR SHALL COORDINATE WITH OWNER (SITE INSPECTOR), ENGINEER AND PROPERTY OWNER BEFORE CONSTRUCTION ACTIVITIES BEGIN. ANY TREE REMOVAL OR RELOCATION SHALL BE COORDINATED BETWEEN ALL PARTIES.

UTILITIES:
STA. 40+00 TO 50+00 - CL
FURNISH & INSTALL:
1000 L.F. - 6" DIA. PVC WATER MAIN

UTILITIES:
STA. 40+00 TO 50+00 - CL
INSTALL:
1000 L.F. - DIRECT BURIED FIBER
(TO BE FURNISHED BY OWNER)



ALL DIMENSIONS SHOWN ARE IN TERMS OF U.S. SURVEY FEET



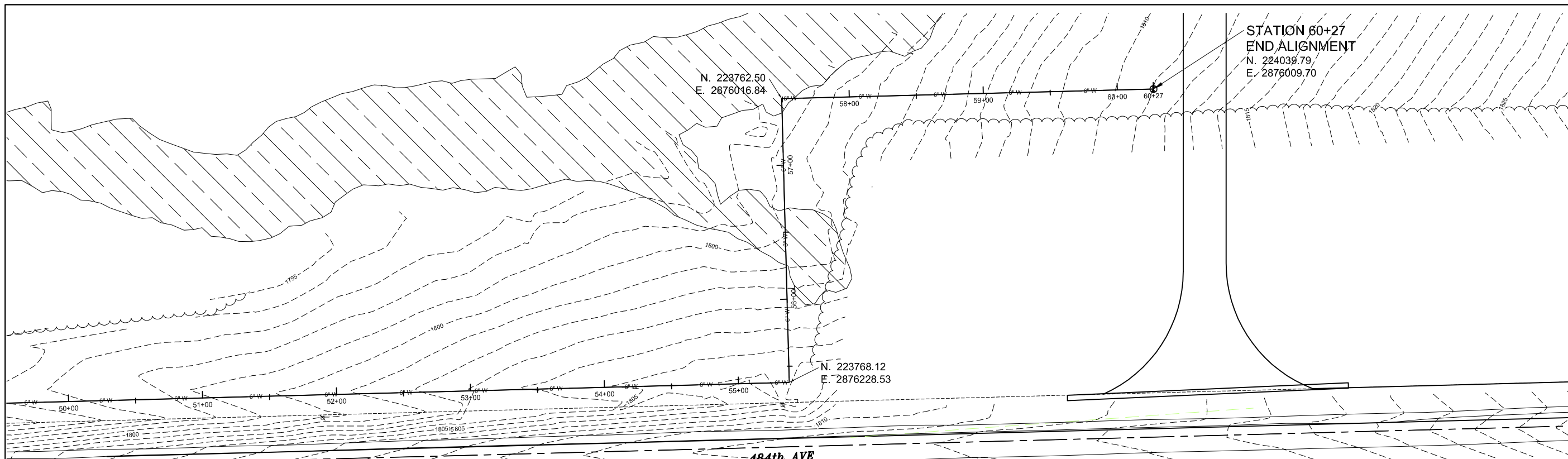
EXIST. GND. PIPE FL.

EXIST. GND. PIPE FL.

FURNISH & INSTALL:
1000 L.F. - 6" DIA. PVC WATER MAIN

6' MIN. COVER

EXISTING GRADE



GENERAL WATERMAIN NOTES:

- CONTRACTOR SHALL INSTALL WATERLINE APPROXIMATELY IN CENTER OF EASEMENT WHEN POSSIBLE. IF EXISTING UTILITIES, TREES, BUILDINGS OR OTHER OBSTRUCTIONS ARE PRESENT, THEN THE WATERLINE SHALL BE ADJUSTED TOWARD THE HIGHWAY R.O.W. LINE TO AVOID EXISTING OBSTRUCTIONS.
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UTILITIES:
STA. 50+00 TO 60+27 - CL
FURNISH & INSTALL:
1027 L.F. - 6" DIA. PVC WATER MAIN

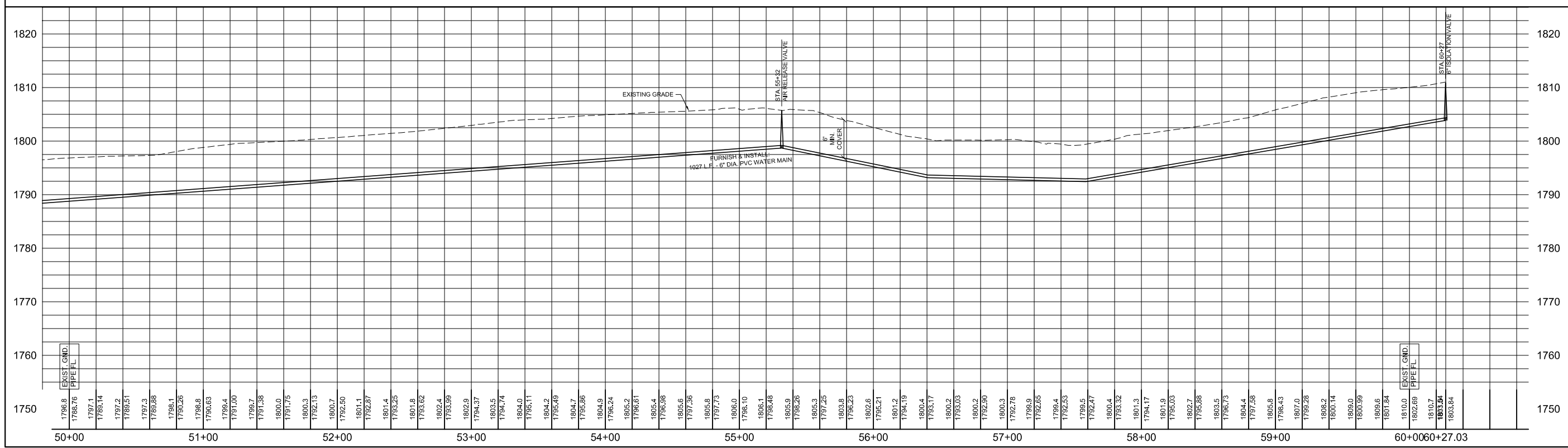
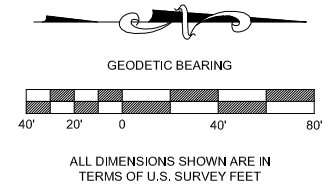
UTILITIES:
STA. 50+00 TO 60+27 - CL
INSTALL:
1027 L.F. - DIRECT BURIED FIBER
(TO BE FURNISHED BY OWNER)

UTILITIES:
STA. 55+32 - CL
FURNISH & INSTALL:
1 - 6" AIR RELEASE VALVE

UTILITIES:
STA. 55+38 - CL
FURNISH & INSTALL:
1 - 6" D.I. M.J. 90° BEND W/Joint RESTRAINTS
CONCRETE THRUST BLOCK

UTILITIES:
STA. 60+27 - CL
FURNISH & INSTALL:
1 - 6" ISOLATION VALVE

UTILITIES:
STA. 57+50 - CL
FURNISH & INSTALL:
1 - 6" D.I. M.J. 90° BEND W/Joint RESTRAINTS
CONCRETE THRUST BLOCK



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Consulting Engineers & Architects

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Brookings, South Dakota 57006
605-692-6342
www.bannerassociates.com

Designing Projects. Building Trust.

CONSULTANTS:



PROJECT TITLE:
**BASIN
ELECTRIC
WELL FIELD AND
RAW WATER
PIPELINE**

PROJECT LOCATION:
WHITE
SOUTH DAKOTA

REV.	DATE	DESCRIPTION

DRAWN BY: JLU
DESIGNED BY: KLB
CHECKED BY: SDR
JOB NO: 20953-00-00
DATE: APRIL 2010

SHEET TITLE:
**PLAN AND
PROFILE
STA. 50+00
TO 60+00**

SHEET NO.:
17