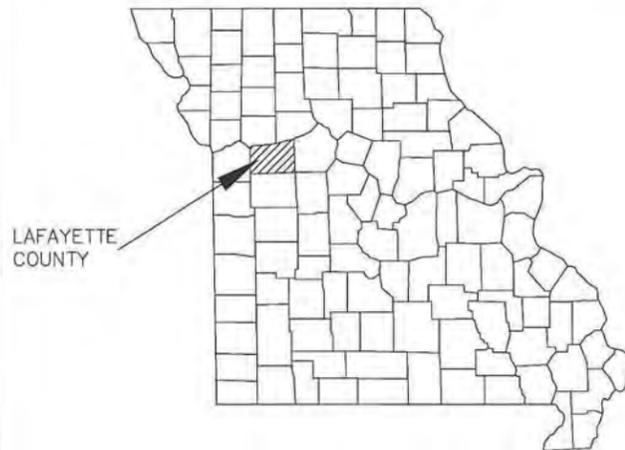




MISSOURI DEPARTMENT OF TRANSPORTATION I-70 REST AREA SEWER IMPROVEMENTS CONCORDIA, MISSOURI

T49N, R24W, SECTION 32

PROJECT LOCATION



PROJECT VICINITY MAP
(NO SCALE)



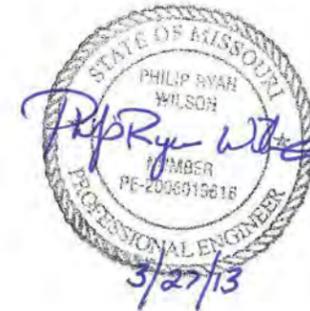
PROJECT VICINITY MAP
(NO SCALE)



UTILITY LOCATIONS ON THESE PLANS HAVE NOT BEEN FIELD VERIFIED.
IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONTACT DIG-RITE
BEFORE PROCEEDING WITH CONSTRUCTION.

BENCHMARK

TBM:
SET CHISELED "D" ON CONCRETE CURB A WEST SIDE OF REST AREA, 75' ±
WEST OF PICNIC TABLE AT SOUTHWEST CORNER OF REST AREA AT JOINT IN
CURB WHERE YELLOW PAINT STARTS ON CURB FOR EXIST RAMP.
ELEV = 752.67



GENERAL NOTES

1. The engineering information shown on these plans is from studies made in the field and represents the best information available to SHAFER, KLINE AND WARREN, INC.
2. All grassed area disturbed by the contractor shall be fertilized, seeded, and mulched unless otherwise noted on the plans.
3. All utilities and their connections shall be moved or adjusted by the Contractor to fit the new construction unless otherwise noted on the plans.
4. Contractor shall contact utility companies at least three working days, but no more than ten working days, prior to digging by calling DIGRITE at 1-800-344-7483
5. It is the Contractor's responsibility to coordinate the adjustment of the various utilities by the respective companies.
6. There shall be a minimum distance of 18" vertical clearance between the force main and water lines. See specifications.
7. All roads, driveways, culverts, fencing, landscape, structures & other improvements damaged during construction shall be repaired or replaced to equal or better condition.
8. Contractor to only remove trees & shrubs as needed for actual construction of utilities. Preserve existing vegetation to the maximum extent practical. Protect all trees not designated for removal. Do not drive or store equipment under dripline.
9. All signs damaged or removed during construction shall be replaced.
10. The locations of utility mains, structures & service connections plotted on these drawings are approximate only and were obtained from records made available to Shafer, Kline & Warren Inc. (SKW). There may be other existing utility mains, structures & service connections not known to SKW and not shown on the drawings. The verification of the existence and the determination of the exact location of utility mains, structures & service connections shall be the responsibility of the construction contractor(s).
11. Site clean up on a daily basis.
12. All open excavations shall be protected.
13. Replace any property monuments removed or destroyed by construction. All monuments shall be set by a surveyor licensed in the State of Missouri.
14. Contractor is to coordinate electrical power installation with electrical utility.

LEGEND

<ul style="list-style-type: none"> ● IB_E ● IBPC_E ● FPST ▶ FO ⊕ FH ▶ G ● GTPST ⊕ GA ⊕ H&V ⊕ LP ▶ MS ⊕ PP ⊕ RW ● SSMH ● STMH ⊕ □ TEP ● TBM ⊕ 	<ul style="list-style-type: none"> = EXIST IRON BAR = EXIST. IRON BAR W/ PLASTI = FENCE POST = FIBER OPTIC MARKER = FIRE HYDRANT = GAS MARKER = GATE POST = GUY ANCHOR = CONTROL POINT = LIGHT POLE = METAL SIGN = POWER POLE = R/W MARKER = SANITARY SEWER MANHOLE = STORM MANHOLE = STUMP = TELEPHONE PEDESTAL = TEMP BENCHMARK = TREE 	<ul style="list-style-type: none"> EXIST SEWER LINE EXIST MAJOR CONTOUR EXIST MINOR CONTOUR EXIST FLOW LINE TREE LINE EXIST BUILDING EXIST EASEMENT EXIST EDGE OF ASPHALT EXIST EDGE OF GRAVEL EXIST GRAVEL SHOULDER EXIST CHAINLINK FENCE EXIST OVERHEAD POWER EXIST STORM PIPE EXIST PROPERTY LINE EXIST SEWER PIPE EXIST GAS LINE EXIST POWER EXIST TELEPHONE LINE EXIST WATER LINE EXIST EDGE OF WATER PROPOSED SEWER LINE PERMANENT EASEMENT TEMPORARY EASEMENT
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DESCRIPTION

- COVER SHEET
- FORCEMAIN PLAN & PROFILE
- GRAVITY SEWER PLAN & PROFILE
- PUMP STATION DETAILS
- DETAILS
- ELECTRICAL IMPROVEMENTS

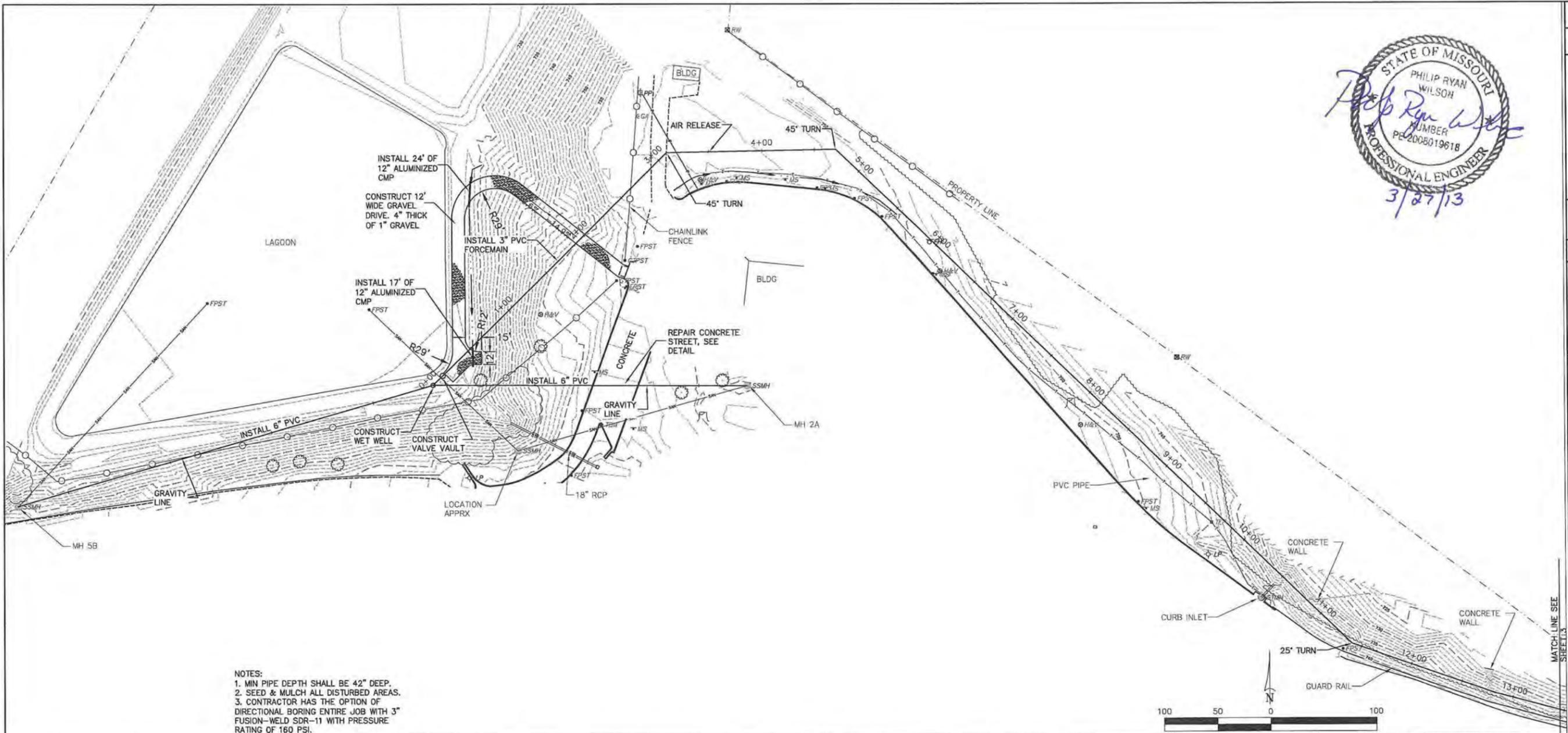
SHEET NO

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- 2-4
- 5
- 6
- 7
- E1

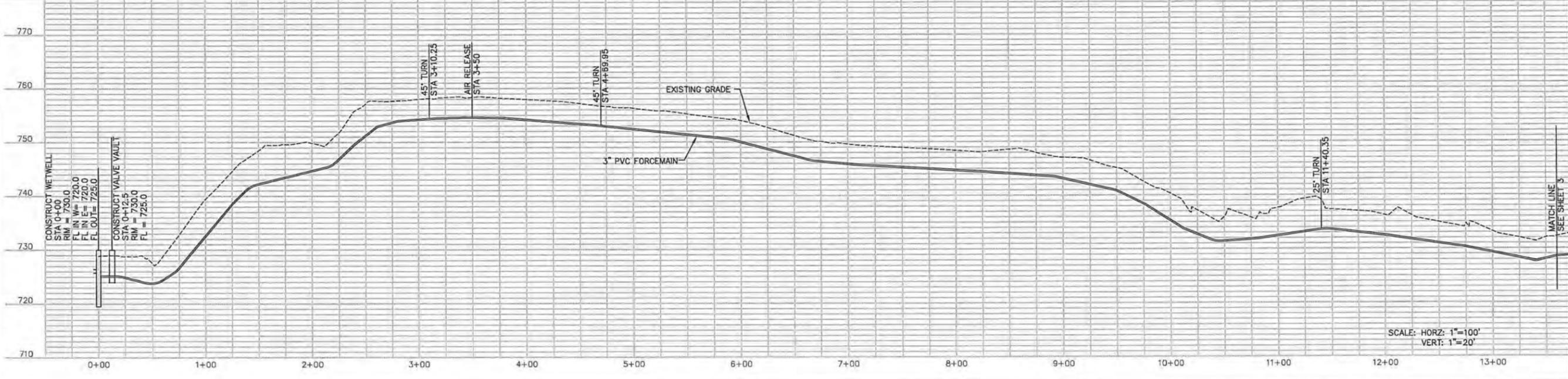
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 BY: JREIGELBERGER DATE: 3/21/2013
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 XREF DWG4: NONE

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SHAFER, KLINE & WARREN, INC. 107 Butler Street, Macon, MO 63552-1628 660/385-6441 FAX: 660/385-6614 OFFICE LOCATIONS: Chillicothe, MO Columbia, MO Houston, TX Iola, KS Kansas City, MO Lenexa, KS Macon, MO North Kansas City, MO Tulsa, OK																			
REST AREA SEWER IMPROVEMENTS CONCORDIA, MO																			
120340 SHEET NO. 1 OF 8																			

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 LAYOUT: SITE-2 BY: JREIDELBERGER DATE: 3/27/2013
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 XREF DWG3: NONE XREF DWG4: NONE



NOTES:
 1. MIN PIPE DEPTH SHALL BE 42" DEEP.
 2. SEED & MULCH ALL DISTURBED AREAS.
 3. CONTRACTOR HAS THE OPTION OF DIRECTIONAL BORING ENTIRE JOB WITH 3" FUSION-WELD SDR-11 WITH PRESSURE RATING OF 160 PSI.



SCALE: HORZ: 1"=100'
 VERT: 1"=20'



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4	DRAWN BY: JWR		1			
3	CHECKED BY: PW		2			
2	ISSUE DATE:		3			
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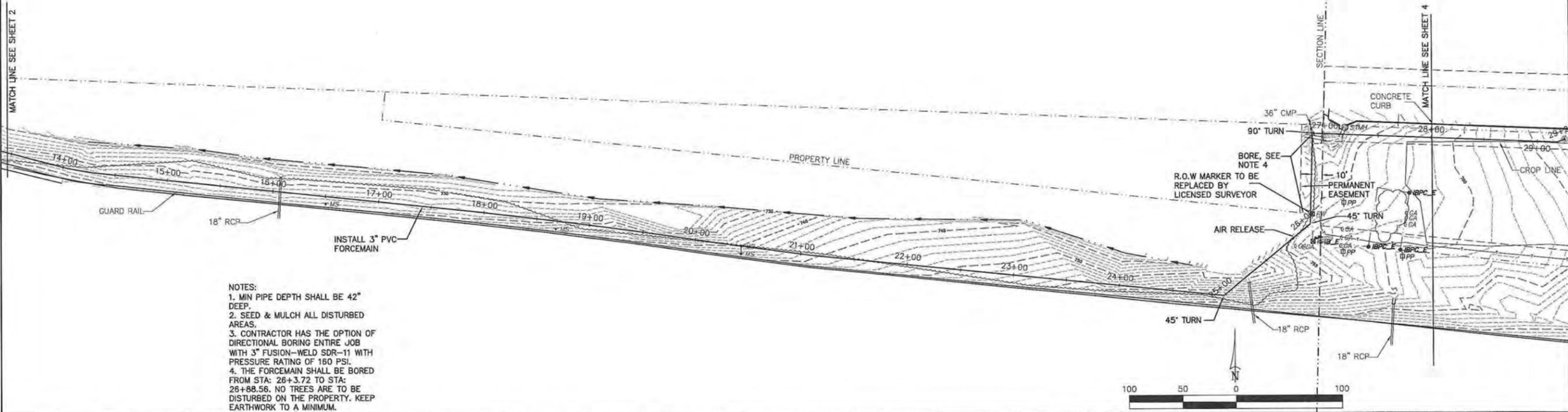
CIVIL ENGINEERS ELECTRICAL ENGINEERS MECHANICAL ENGINEERS STRUCTURAL ENGINEERS LANDSCAPE ARCHITECTS LAND SURVEYORS LAND PLANNERS

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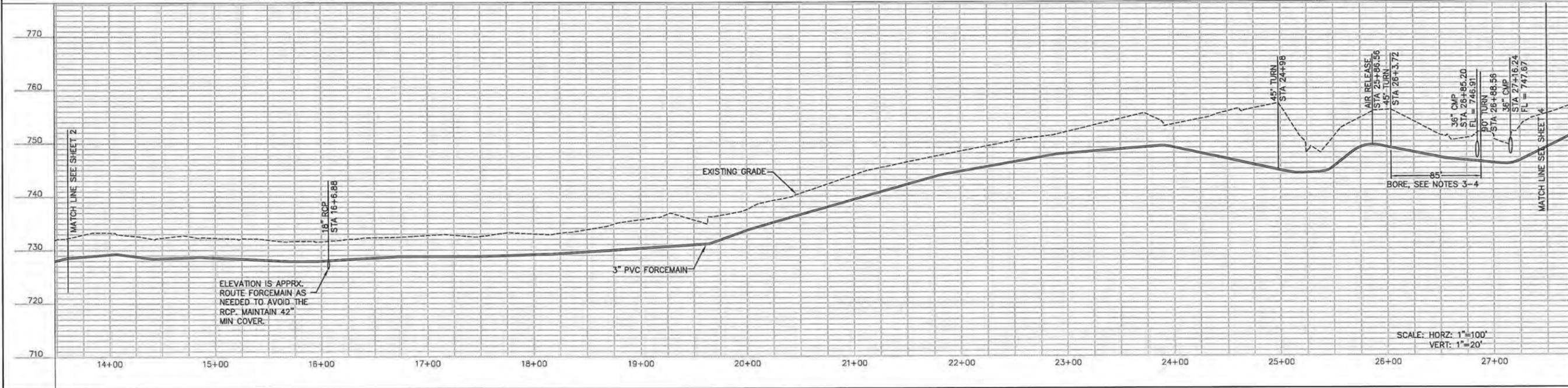
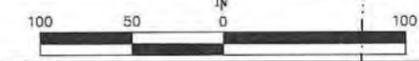
FORCEMAIN PLAN & PROFILE

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- NOTES:
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 2. SEED & MULCH ALL DISTURBED AREAS.
 3. CONTRACTOR HAS THE OPTION OF DIRECTIONAL BORING ENTIRE JOB WITH 3" FUSION-WELD SDR-11 WITH PRESSURE RATING OF 160 PSI.
 4. THE FORCEMAIN SHALL BE BORED FROM STA: 26+3.72 TO STA: 26+88.56. NO TREES ARE TO BE DISTURBED ON THE PROPERTY. KEEP EARTHWORK TO A MINIMUM.



ELEVATION IS APPRX. ROUTE FORCEMAIN AS NEEDED TO AVOID THE RCP. MAINTAIN 42" MIN COVER.



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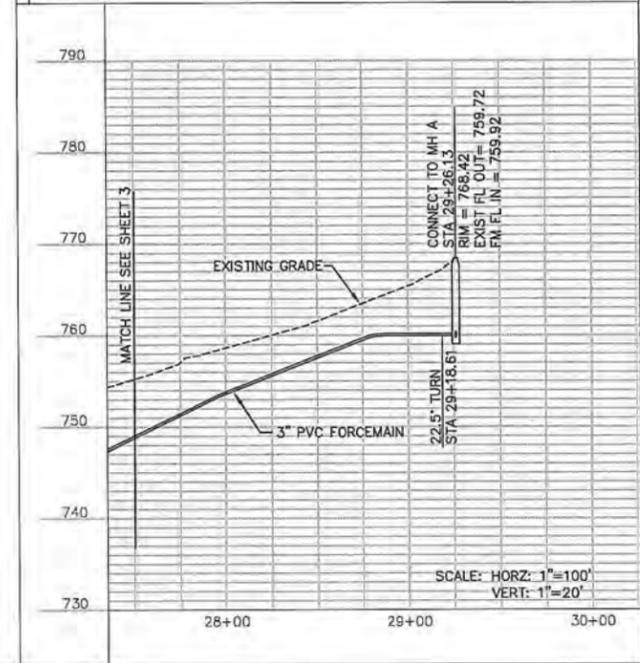
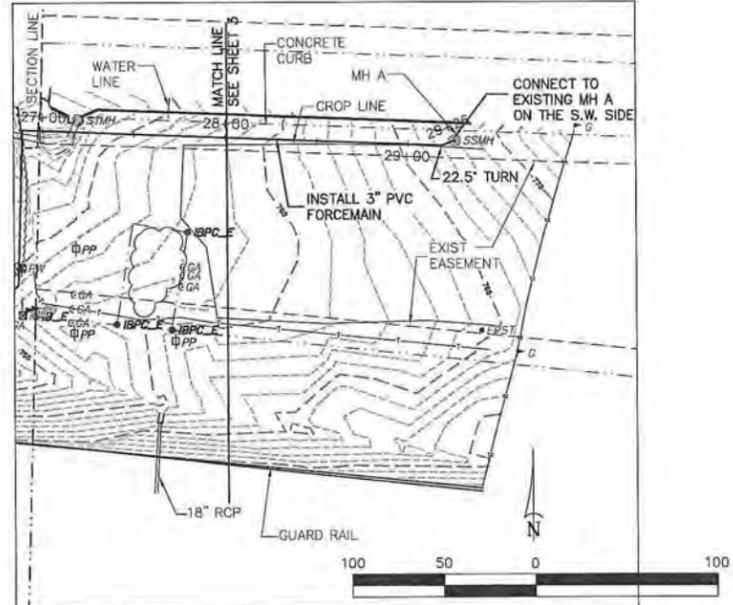
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FORCEMAIN PLAN & PROFILE

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- NOTES:
 1. MIN PIPE DEPTH SHALL BE 42" DEEP.
 2. SEED & MULCH ALL DISTURBED AREAS.
 3. CONTRACTOR HAS THE OPTION OF DIRECTIONAL BORING ENTIRE JOB WITH 3" FUSION-WELD SDR-11 WITH PRESSURE RATING OF 160 PSI.
 4. CONNECTION TO MANHOLE A SHALL BE CORE DRILLED.



NO.	DATE	REVISIONS	BY
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 Checked By: PW
 Issue Date:

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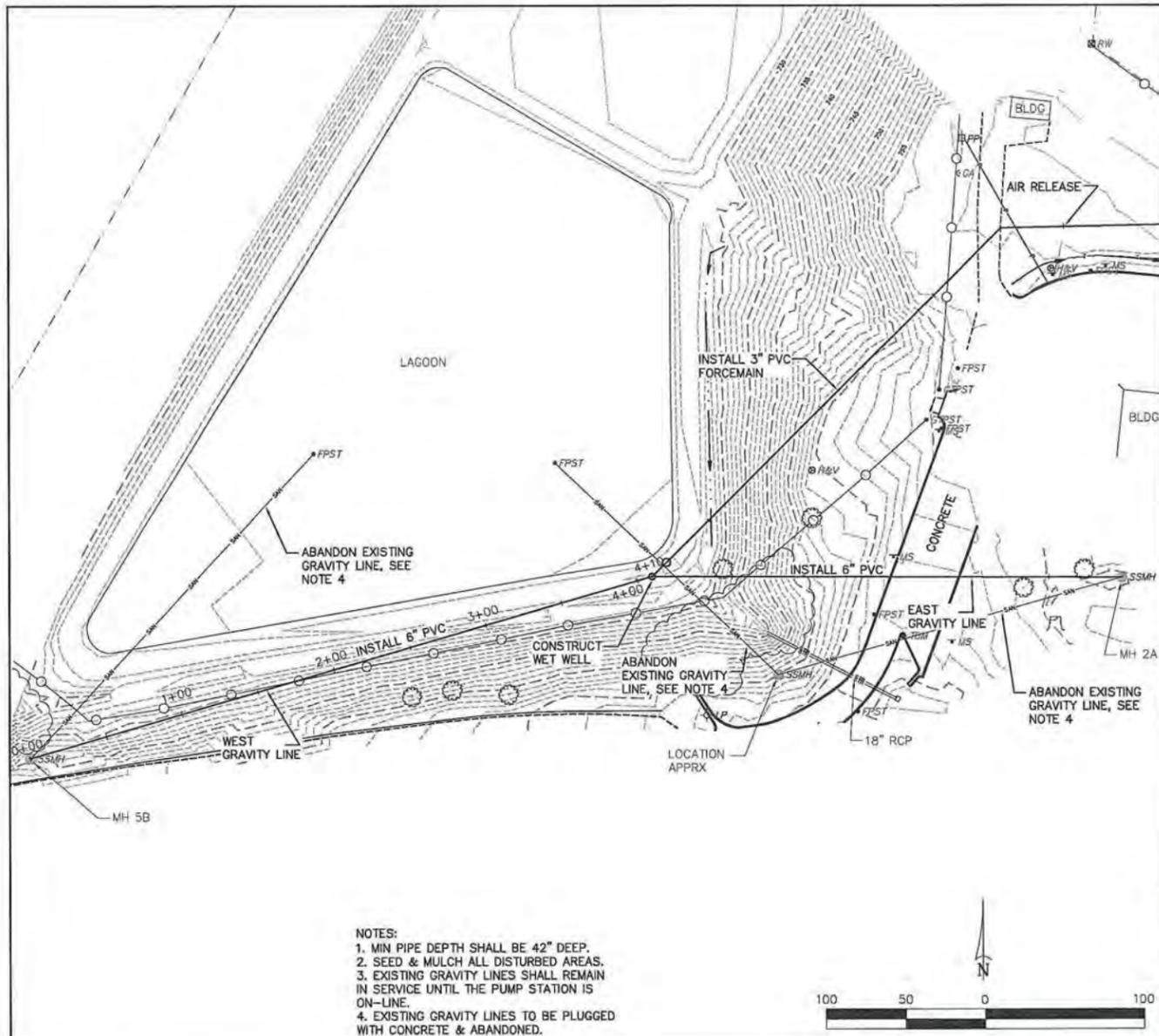
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 FORCEMAIN PLAN & PROFILE

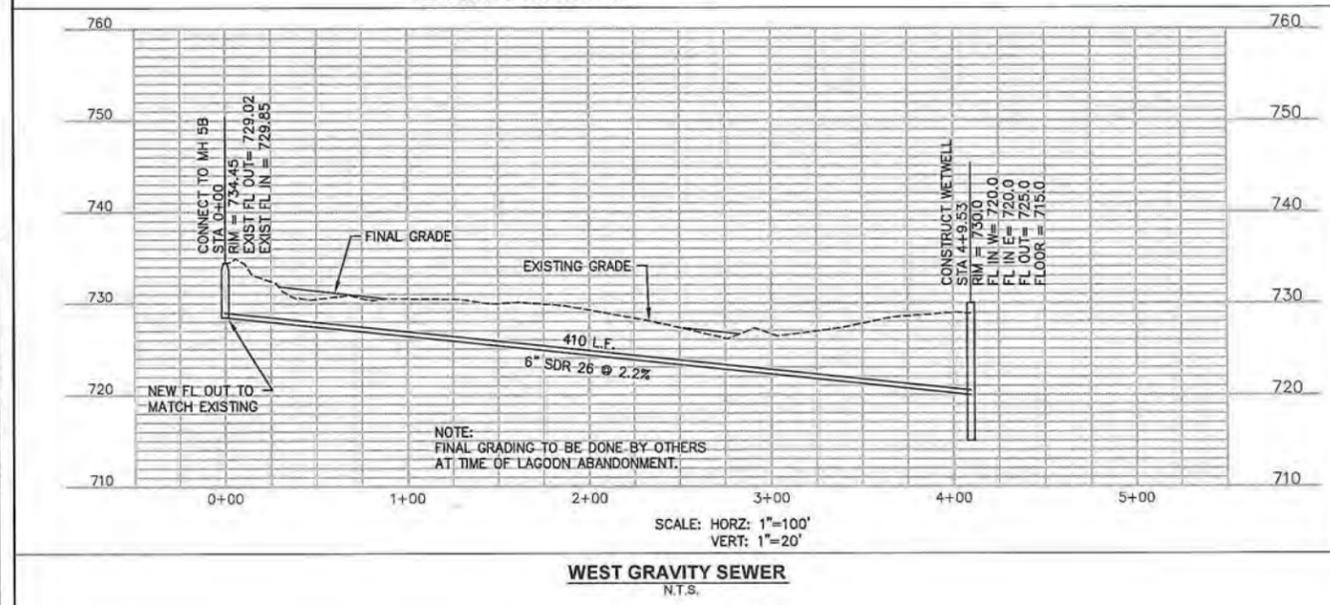
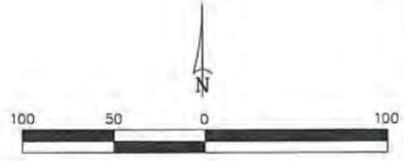
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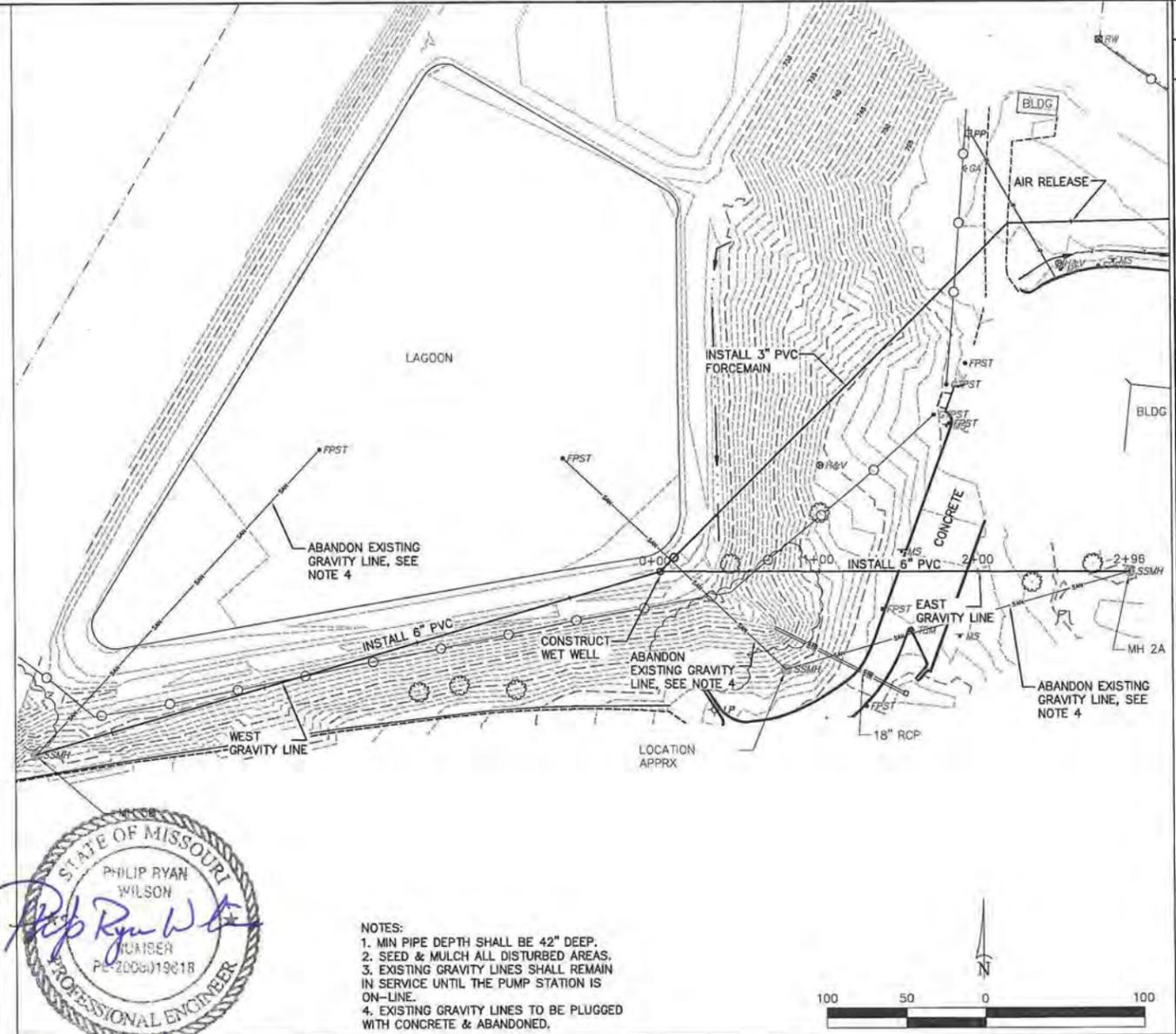
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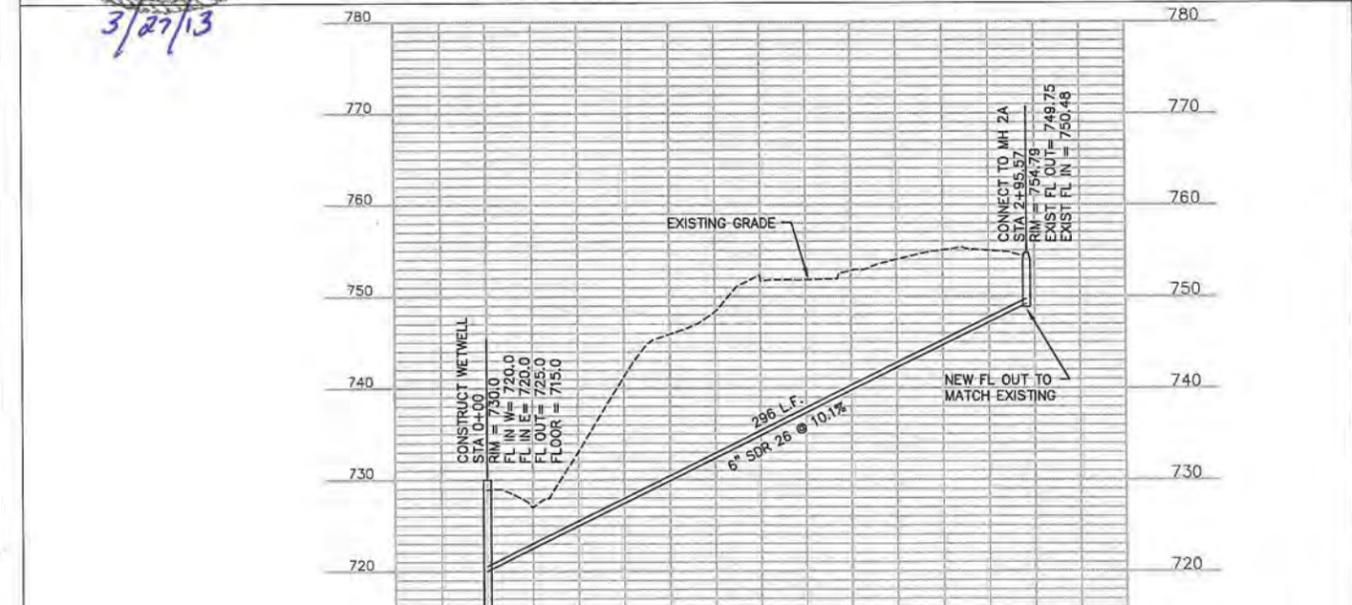
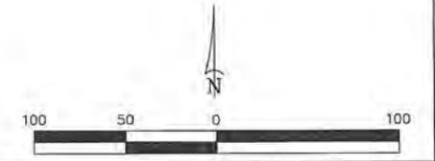
- NOTES:
 1. MIN PIPE DEPTH SHALL BE 42" DEEP.
 2. SEED & MULCH ALL DISTURBED AREAS.
 3. EXISTING GRAVITY LINES SHALL REMAIN IN SERVICE UNTIL THE PUMP STATION IS ON-LINE.
 4. EXISTING GRAVITY LINES TO BE PLUGGED WITH CONCRETE & ABANDONED.



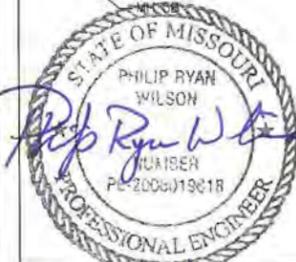
WEST GRAVITY SEWER
N.T.S.



- NOTES:
 1. MIN PIPE DEPTH SHALL BE 42" DEEP.
 2. SEED & MULCH ALL DISTURBED AREAS.
 3. EXISTING GRAVITY LINES SHALL REMAIN IN SERVICE UNTIL THE PUMP STATION IS ON-LINE.
 4. EXISTING GRAVITY LINES TO BE PLUGGED WITH CONCRETE & ABANDONED.



EAST GRAVITY SEWER
N.T.S.



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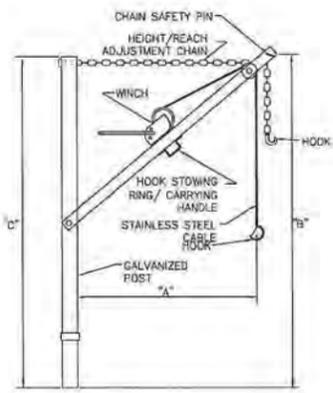
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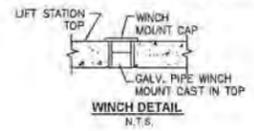
GRAVITY SEWER PLAN & PROFILE

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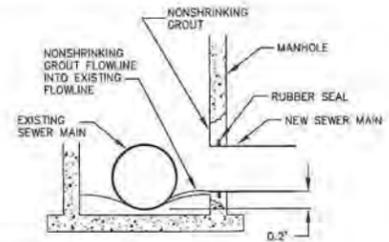
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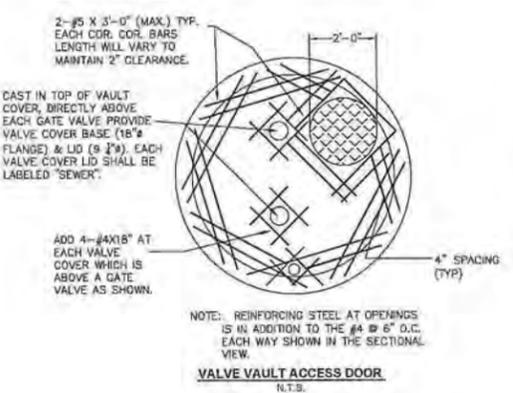
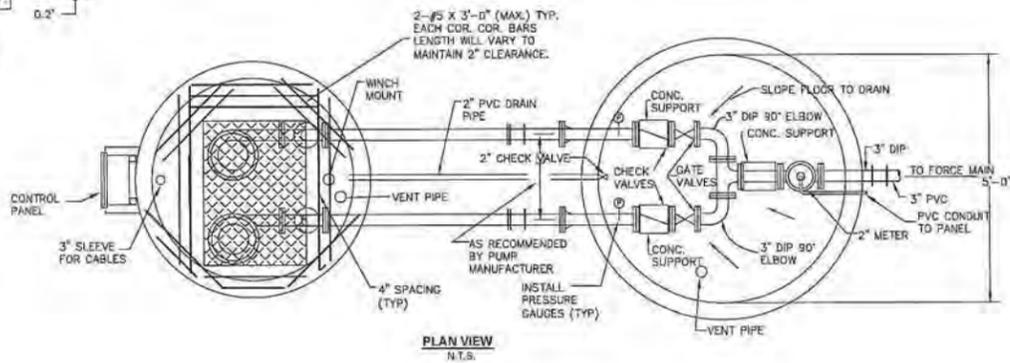
ITEM	LIFTING CAPACITY	"A" MIN	"A" MAX	"B" MIN	"B" MAX	"C" MIN	"C" MAX
LIFT STATION PUMP HOIST	1000 LB	14"	36"	36"	69"	72"	



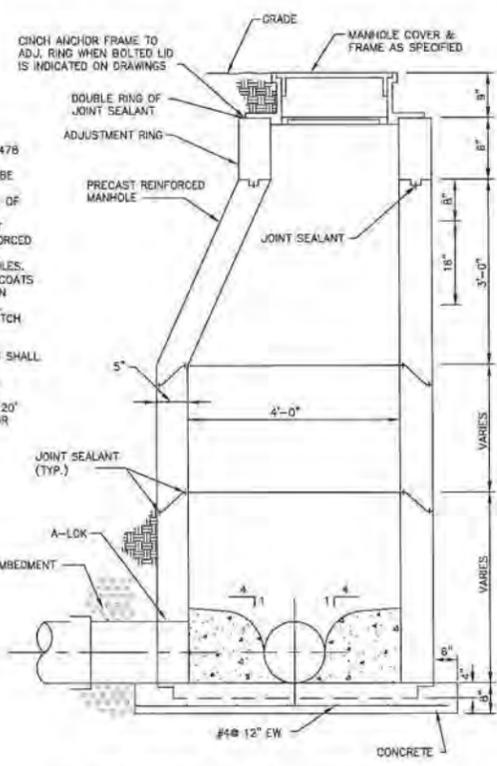
- TO INSTALL NEW SEWER MAIN INTO EXISTING MANHOLE:**
- BREAK OPENING INTO MANHOLE. DIVERT FLOW FROM UPSTREAM INVERT INTO DOWNSTREAM INVERT USING PUMPING IF NECESSARY.
 - INSTALL NEW SEWER MAIN WITH INVERT 0.2' ABOVE EXISTING FLOWLINE. COMPLETE WITH GASKETED SEAL FORMED INTO OPENING WITH NONSHRINKING GROUT.
 - CHIP AND GROUT A NEW FLOWLINE FROM THE NEW INVERT TO THE EXISTING FLOWLINE.
 - RETURN MANHOLE TO SERVICE.



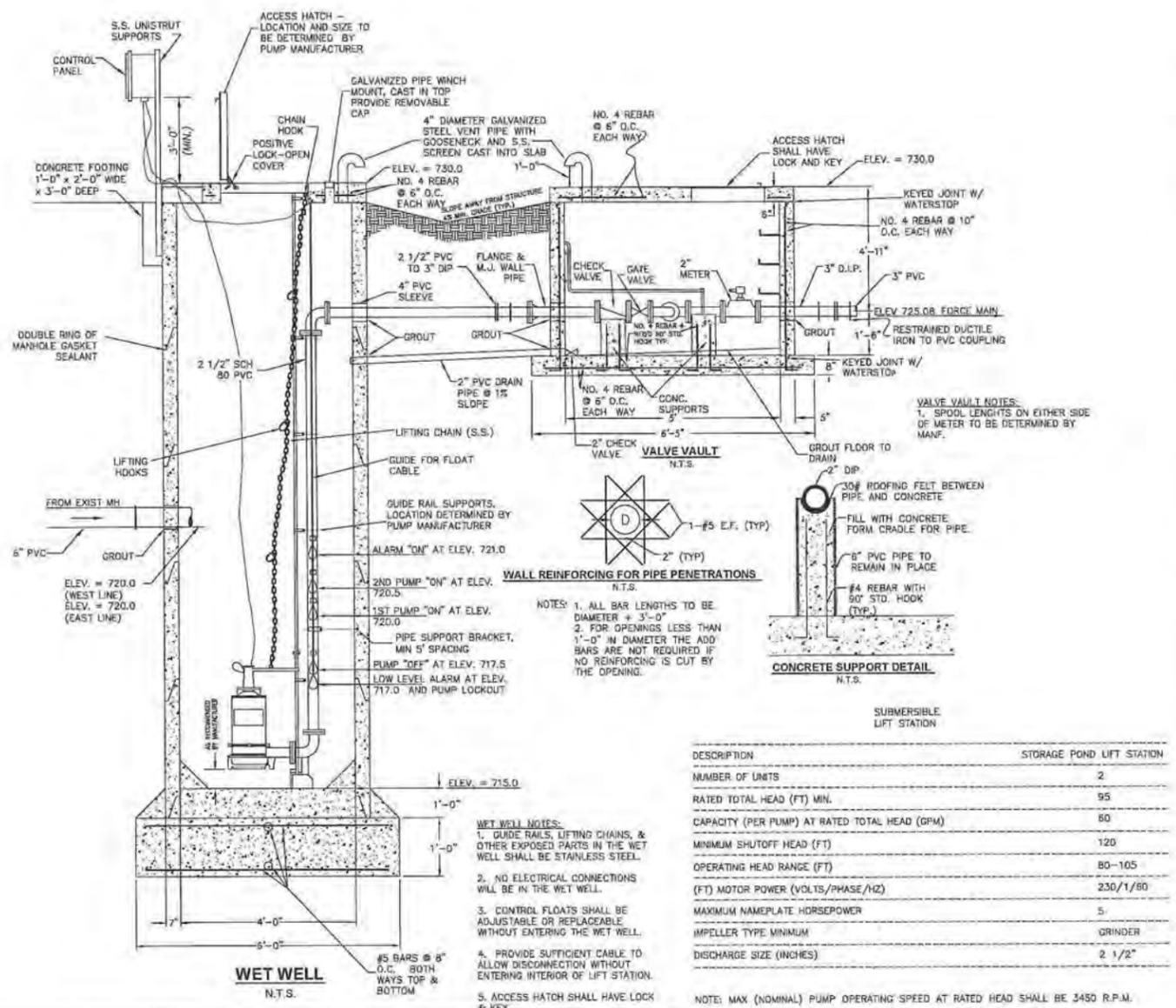
CONNECTION TO EXISTING MANHOLE DETAIL
N.T.S.



- NOTE:**
- PRECAST CONCRETE MANHOLES SHALL CONFORM TO ASTM C478 EXCEPT AS MODIFIED BY THE SPECIFICATIONS.
 - BASES NOT BUILT MONOLITHIC WITH BOTTOM SECTION SHALL BE POURED OF 3000 PSI CONCRETE.
 - MANHOLE MAY BE TRANSITIONED TO 4'-0" DIA., B' ABOVE F.L. OF OUTFALL FOR 5'-0" AND 5'-0" MANHOLES.
 - THE BOTTOM SECTION OF ALL PRECAST MANHOLES NOT BUILT MONOLITHIC WITH THE BASE SHALL BE SET INTO A STEEL REINFORCED POURED CONCRETE BASE A MINIMUM OF 4" (#4 @ 12" E.W.)
 - WATERPROOFING WILL BE REQUIRED ON THE OUTSIDE OF MANHOLES. THE BITUMEN SHALL CONSIST OF TWO (2) THIRTY-ONE (31) MILL COATS OF ASPHALT, COAL TAR PITCH, OR A COATING MEETING AMERICAN SOCIETY FOR TESTING MATERIALS (ASTM) D-41. ASPHALT SHALL CONFORM TO THE REQUIREMENTS OF ASTM D-449. COAL-TAR PITCH SHALL CONFORM TO THE REQUIREMENT OF ASTM C450.
 - THE COMPRESSIVE STRENGTH OF CONCRETE USED IN THE CONSTRUCTION OF PRECAST REINFORCED CONCRETE MANHOLES SHALL NOT BE LESS THAN 4000 PSI.
 - ONLY ECCENTRIC MANHOLE CONES WILL BE ALLOWED UNLESS OTHERWISE APPROVED BY THE CITY OR ENGINEER.
 - ADDITIONAL BASE THICKNESS FOR MANHOLES GREATER THAN 20" DEEP SHALL BE APPROVED BY THE ENGINEER WITH SUBMITTAL OR APPROPRIATE CALCULATIONS.



4'-0" I.D. STANDARD PRECAST MANHOLE
N.T.S.



DESCRIPTION	STORAGE POND LIFT STATION
NUMBER OF UNITS	2
RATED TOTAL HEAD (FT) MIN.	95
CAPACITY (PER PUMP) AT RATED TOTAL HEAD (GPM)	80
MINIMUM SHUTOFF HEAD (FT)	120
OPERATING HEAD RANGE (FT)	80-105
(FT) MOTOR POWER (VOLTS/PHASE/Hz)	230/1/60
MAXIMUM NAMEPLATE HORSEPOWER	5
IMPELLER TYPE MINIMUM	GRINDER
DISCHARGE SIZE (INCHES)	2 1/2"

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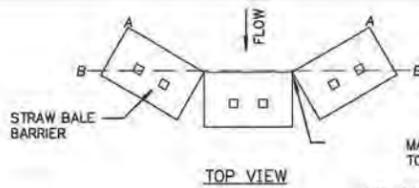
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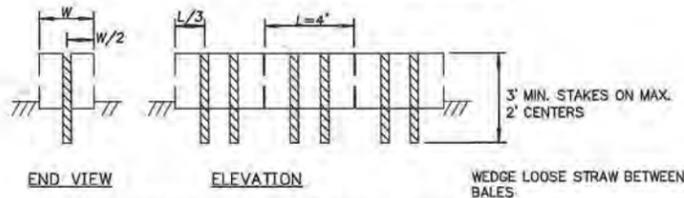
PUMP STATION DETAILS

120340
 SHEET NO.
 6 OF 8



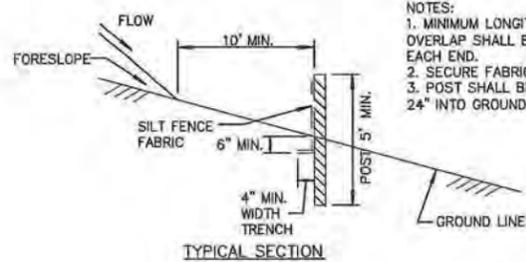
MASH STRAW BALES TOGETHER TO MINIMIZE OPEN SPACE

NOTE: POINTS "A" SHOULD BE HIGHER THAN POINTS "B" TO ENSURE FLOW THRU OR OVER BARRIER, NOT AROUND IT.

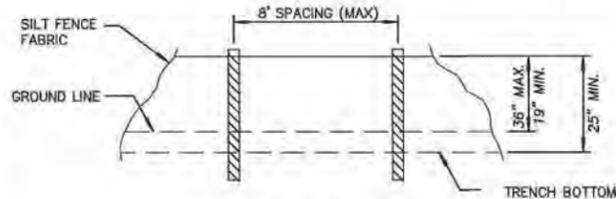


TEMPORARY STRAW BALE DITCH CHECK

N.T.S.

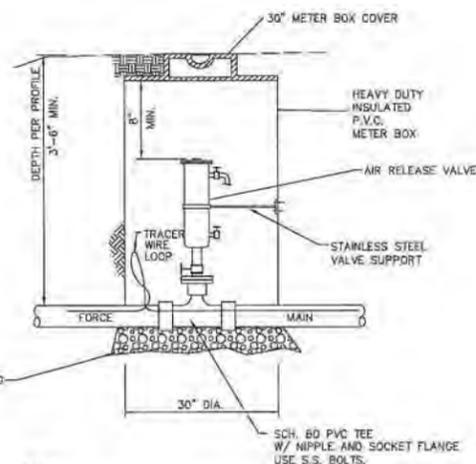


NOTES:
1. MINIMUM LONGITUDINAL SPLICE OVERLAP SHALL BE 2' WITH A POST AT EACH END.
2. SECURE FABRIC TO METAL POST.
3. POST SHALL BE DRIVEN A MINIMUM 24" INTO GROUND.



SILT FENCE DETAIL

N.T.S.

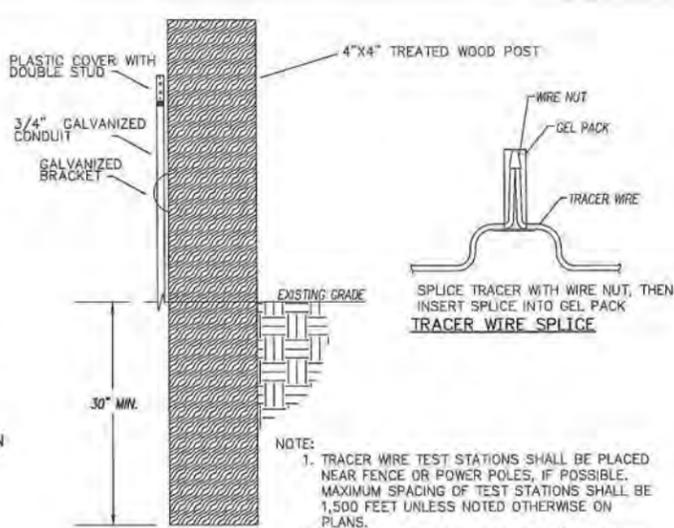


NOTES

- SEWAGE AIR CONTROL VALVE INLETS SHALL BE 2" NPT. UNLESS OTHERWISE NOTED ON THE PLANS OR PROFILES, OUTLET SIZE SHALL BE 1/2" NPT AND AIR RELEASE ORIFICE SHALL BE 3/16".
- IF HEIGHT OF VAULT CAUSES FRAME AND COVER TO BE ABOVE GRADE, PERFORM GRADING TO PROVIDE A SMOOTH TRANSITION. DO NOT LOCATE VAULT TO OBSTRUCT DITCH. IF NECESSARY, OFFSET ALIGNMENT AT VAULT TO AVOID PLACING THE STRUCTURE IN DITCH FLOWLINE, OR ROADWAY.
- ALL VALVE VAULTS SHALL HAVE A MARKER POST. MARKER POSTS SHALL BE REBOUNDABLE UTILITY MARKERS (GREEN COLOR) WITH DECAL INDICATING SEWER FORCEMAIN.

AIR RELEASE VALVE & VAULT

N.T.S.

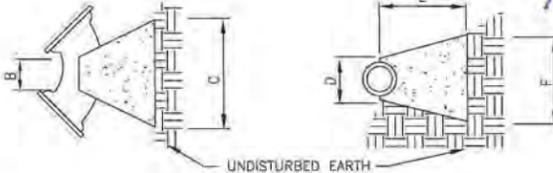


TEST STATION

- NOTE:
- TRACER WIRE TEST STATIONS SHALL BE PLACED NEAR FENCE OR POWER POLES, IF POSSIBLE. MAXIMUM SPACING OF TEST STATIONS SHALL BE 1,500 FEET UNLESS NOTED OTHERWISE ON PLANS.
 - POST TO BE SET A MINIMUM OF 30" DEEP AND TAMPED.
 - TEST STATIONS TO BE PLACED ALONG THE BRUSH LINE OR NEXT TO AN EXISTING OBJECT.

TRACER WIRE DETAIL

N.T.S.



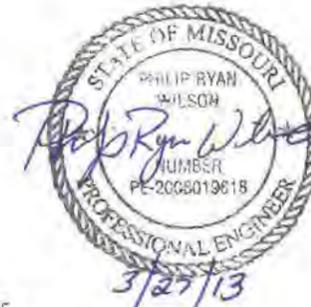
TYPICAL CONCRETE THRUST BLOCKS

N.T.S.

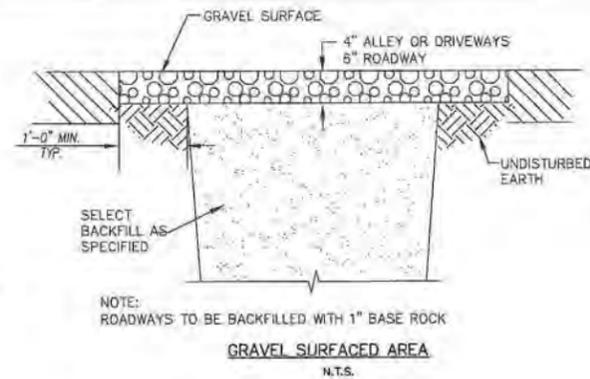
THRUST BLOCKS SHALL BE POURED CONCRETE.

BENDS	B	C	D	E	F
2"-3" 11 1/4 DEG	8"	15"	10"	24"	12"
2"-3" 22 1/2 DEG	8"	19"	10"	24"	13"
4" 11 1/4 DEG	8"	15"	12"	24"	13"
4" 22 1/2 DEG	8"	19"	12"	24"	13"
6" 11 1/4 DEG	8"	15"	12"	24"	12"
6" 22 1/2 DEG	8"	19"	12"	24"	13"

BENDS	B	C	D	E	F
2"-3" 45 DEG.	8"	30"	10"	24"	14"
2"-3" 90 DEG.	8"	30"	10"	24"	27"
4" 90 DEG.	8"	30"	12"	24"	27"
4" 90 DEG.	8"	30"	12"	24"	27"
6" 45 DEG.	8"	30"	12"	24"	14"
6" 90 DEG.	8"	30"	12"	24"	27"

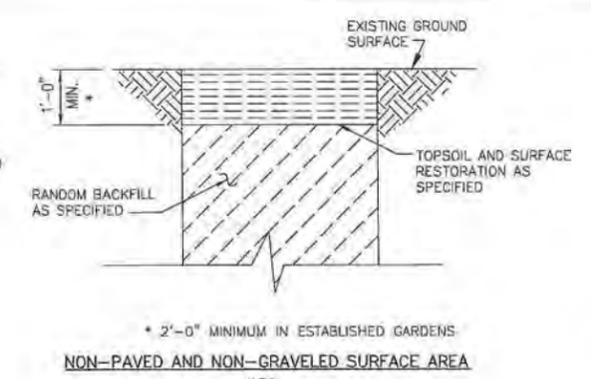


3/27/13



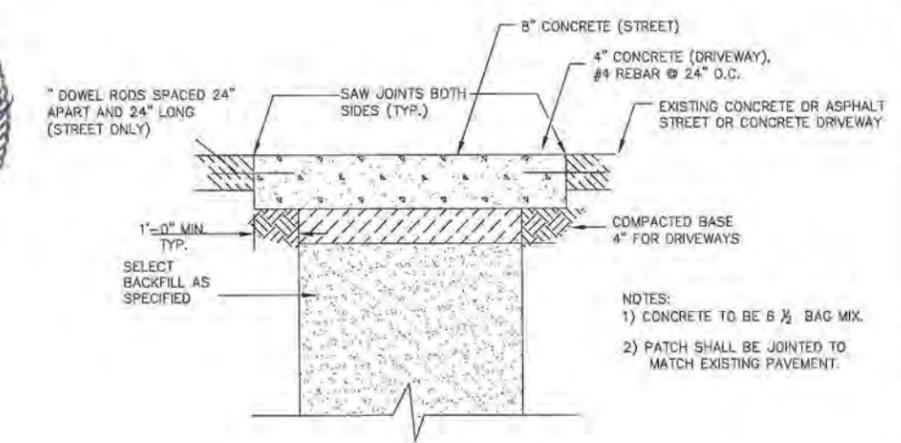
GRAVEL SURFACED AREA

N.T.S.



NON-PAVED AND NON-GRAVELED SURFACE AREA

N.T.S.



CONCRETE DRIVING SURFACES AND ASPHALT STREETS

N.T.S.

TYPICAL TRENCH BACKFILL & SURFACE RESTORATION DETAILS

N.T.S.

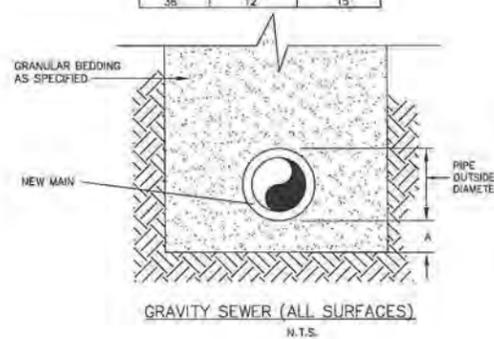
- NOTES:
1) CONCRETE TO BE 6 1/2" BAG MIX.
2) PATCH SHALL BE JOINTED TO MATCH EXISTING PAVEMENT.

NOTES: PIPE INSTALLATION/BEDDING (FORCEMAIN)

- PIPE SHALL BE BURIED TO A MINIMUM DEPTH OF 42" TO THE TOP OF THE MAIN LINE AND SERVICES.
- PVC PIPE SHALL BE SLIP JOINT SDR21 AND SHALL MEET REQUIREMENTS OF ASTM 2241. JOINTS SHALL BE 20" IN LENGTH UNLESS PREAPPROVED BY THE ENGINEER.
- ALL CHANGES IN THE MAIN LINE DIRECTION GREATER THAN 11.0" SHALL BE ACCOMPLISHED USING STANDARD FITTINGS.
- TRACER WIRE SHALL BE TYPE UF #12 SOLID CONDUCTOR.
- TRACER WIRE SHALL BE INSTALLED WITH ALL MAIN LINES AND SERVICE LINES.

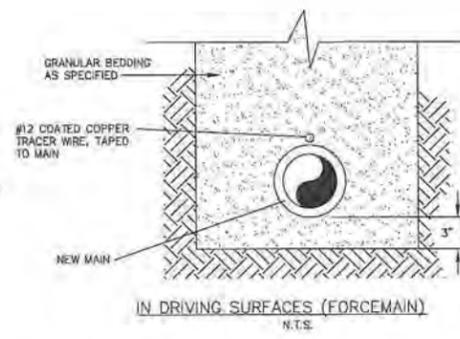
PIPE SIZE (INCHES)	TRENCH WIDTH		
	MIN. TRENCH WIDTH IN EARTH (INCHES)	MAX. TRENCH WIDTH IN EARTH (INCHES)	MIN. TRENCH WIDTH IN ROCK (INCHES)
< 4	20	26	20
4 - 6	24	30	24
8	26	32	24
10	30	34	24
12	32	36	26

NOTE: WHEN ANY TRENCH IS AT EDGE OF PAVEMENT, BACKFILL TRENCH WITH COMPACTED ROLL STONE BASE ROCK AFTER BEDDING.



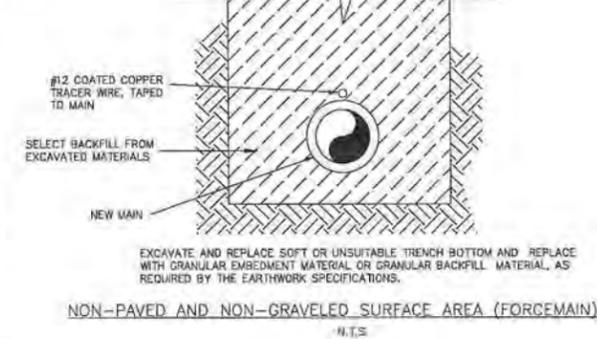
GRAVITY SEWER (ALL SURFACES)

N.T.S.



IN DRIVING SURFACES (FORCEMAIN)

N.T.S.



NON-PAVED AND NON-GRAVELED SURFACE AREA (FORCEMAIN)

N.T.S.

TYPICAL PIPE INSTALLATION/BEDDING DETAILS

N.T.S.

LA120340-010, CAD/CIVIL/201340 DETAILS.DWG
LAYOUT: SEWER
BY: JREIGELBERGER | DATE: 3/21/2013
XREF DWG1: NONE
XREF DWG2: NONE
XREF DWG3: NONE
XREF DWG4: NONE

SHAFER, KLINE & WARREN, INC.
107 Butler Street, Macon, MO 63552-1628
660/385-6441
FAX: 660/385-6614



OFFICE LOCATIONS:
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Houston, TX
Iola, KS
Kansas City, MO
Lenexa, KS
Macon, MO
North Kansas City, MO
Tulsa, OK

REST AREA SEWER IMPROVEMENTS
CONCORDIA, MO

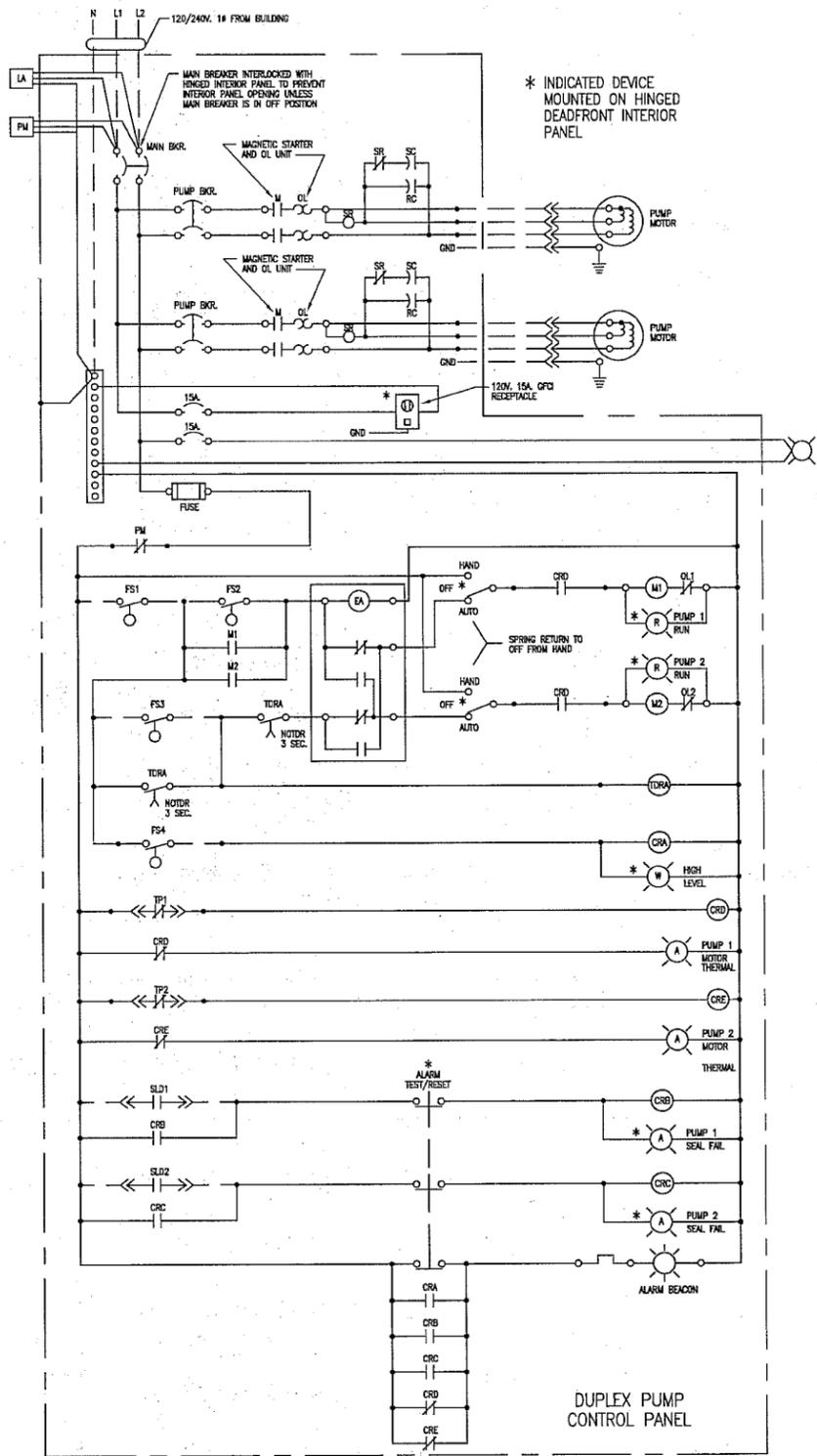
120340
SHEET NO.
7 OF 8

DESIGNED BY: PRW
DRAWN BY: JWR
CHECKED BY: PRW
ISSUE DATE:

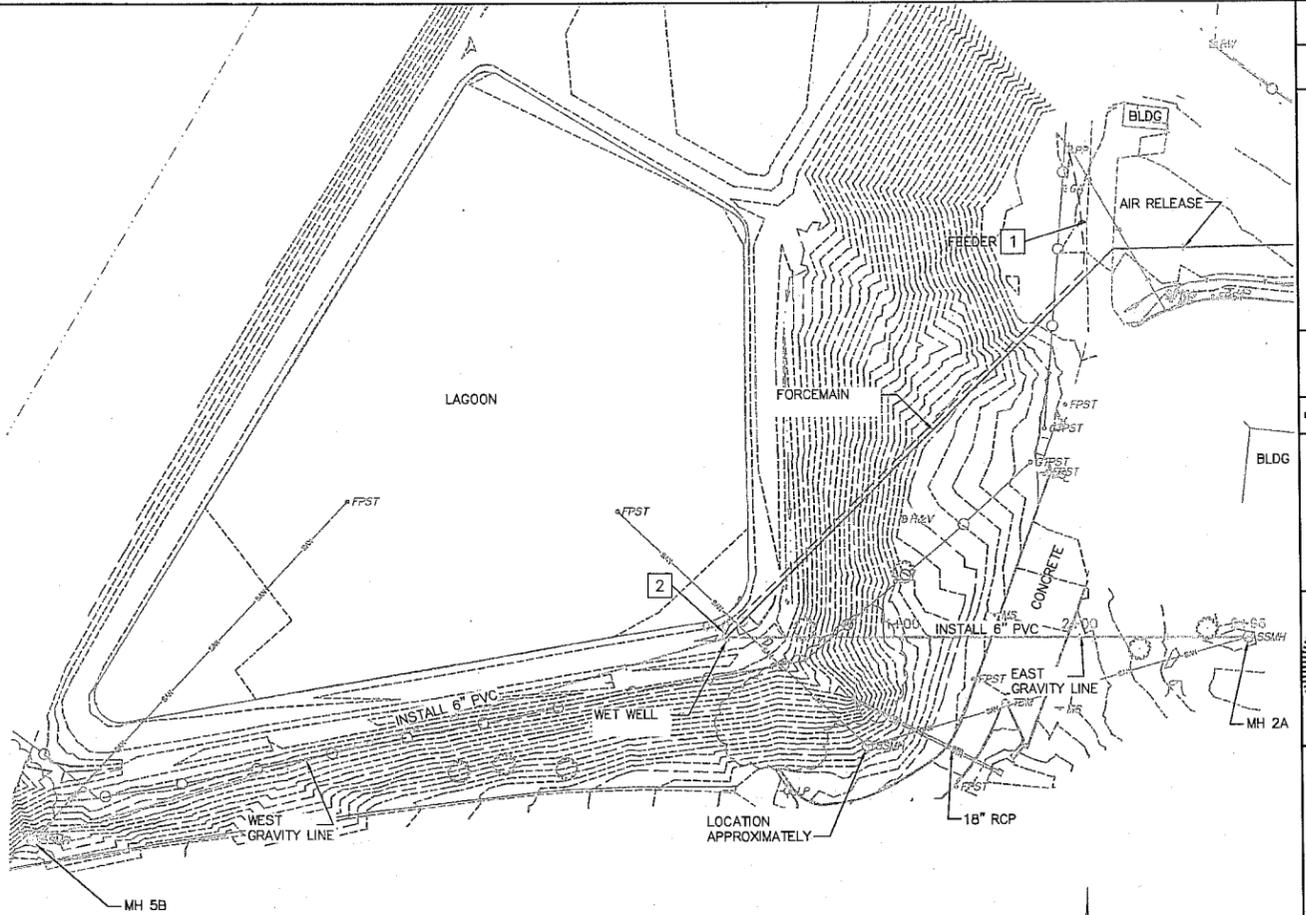
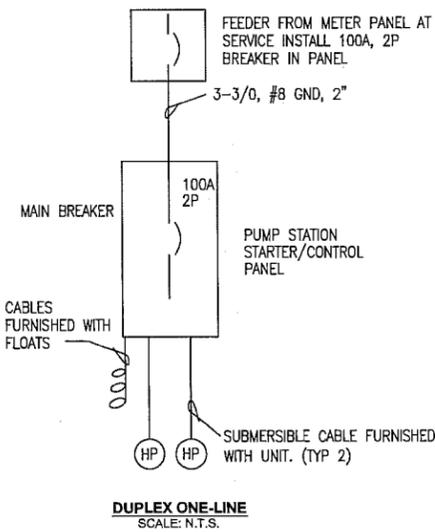
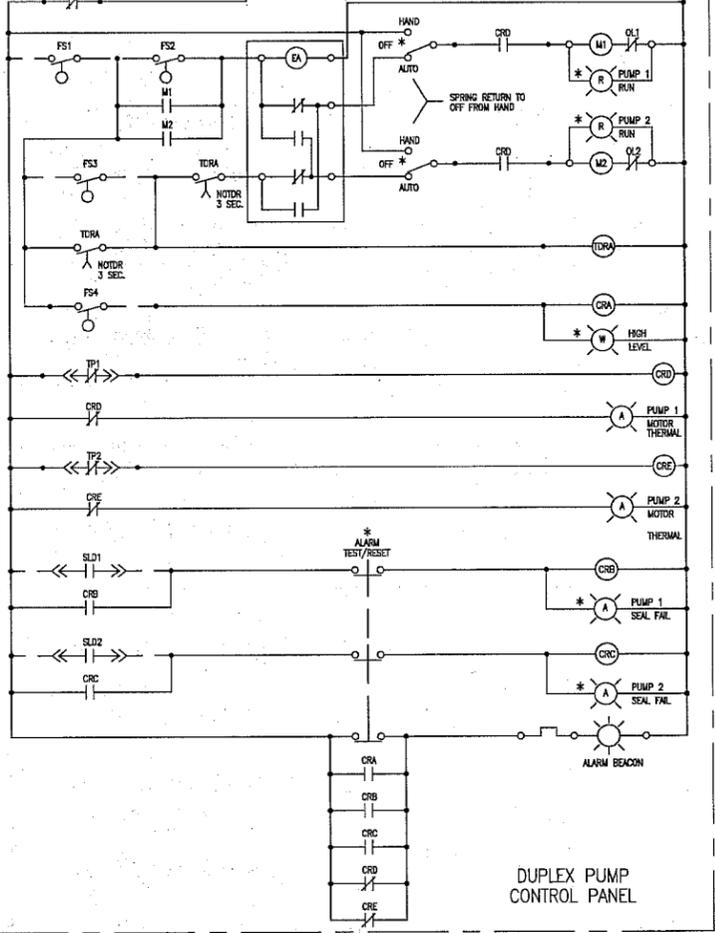
NO. DATE REVISIONS BY: APPD

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MISSOURI CERTIFICATE OF AUTHORITY: F0019850

LA 120340-010 CAD WEP 120340 E1 DWG
 LAYOUT: SITE-5 DATE: 3/27/2013
 XREF DWG1: NONE XREF DWG2: NONE
 XREF DWG3: NONE XREF DWG4: NONE

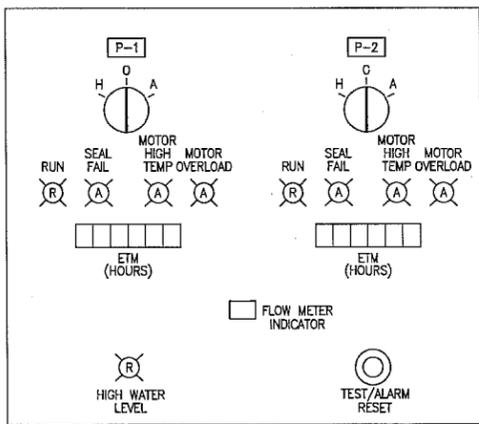


- LEGEND**
- SR1,SR2 - STARTING RELAYS
 - SC1,SC2 - START CAPACITORS
 - M1,M2 - RUN CAPACITORS
 - OL1,OL2 - OVERLOADS
 - TP1,TP2 - THERMAL PROTECTORS
 - SLD1,SLD2 - SEAL LEAK DETECTORS
 - GND - EQUIP. GROUND
 - EA - ELECTRIC ALTERNATOR
 - CRA - CONTROL RELAY A-HIGH LEVEL ALARM
 - CRB - CONTROL RELAY B-PUMP 1 SEAL ALARM
 - CRC - CONTROL RELAY B-PUMP 2 SEAL ALARM
 - CRD - CONTROL RELAY D-PUMP 1 MOTOR THERMAL SWITCH
 - CRE - CONTROL RELAY E-PUMP 2 MOTOR THERMAL SWITCH
 - FS1 - FLOAT SWITCH 1-PUMP OFF
 - FS2 - FLOAT SWITCH 2-PUMP ON
 - FS3 - FLOAT SWITCH 3-LAG PUMP ON
 - FS4 - FLOAT SWITCH 4-HIGH LEVEL ALARM
 - PM - PHASE MONITOR
 - WIRING WITHIN PANEL
 - FIELD WIRING
 - CONTROL PANEL TERMINALS
 - EQUIP. TERMINALS
 - LIGHTING ARRESTOR
 - * INDICATED DEVICE MOUNTED ON HINGED DEADFRONT INTERIOR DELAY TO MAKE
 - FLASHER
 - DUSK TO DAWN LIGHT 65 WATT FLUORESCENT

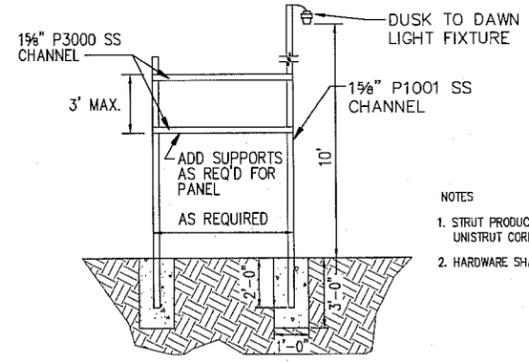


- NOTES:**
- INSTALL 100A; 2P BREAKER IN PANEL AT SERVICE. ROUTE 3-3/0, #8 GND, 2" CONDUIT TO PUMP CONTROL PANEL. FIBERGLASS PULL BOX 200' FROM PUMP STATION.
 - ROUTE 2c #18 SHIELDED TWISTED PAIR IN 3/4" C FROM STARTER/CONTROL PANEL TO FLOW METER.

EAST GRAVITY SEWER ELECTRICAL SITE PLAN



DUPLEX SUB PANEL LAYOUT
SCALE: N.T.S.



- NOTES**
- STRUT PRODUCT NUMBERS SHOWN ARE BY UNISTRUT CORP.
 - HARDWARE SHALL BE STAINLESS STEEL

PANEL MOUNTING DETAIL
SCALE: N.T.S.

DESIGNED BY: HAS		DRAWN BY: MLD		CHECKED BY: DND		ISSUE DATE: 3-27-13	
NO. 5		NO. 4		NO. 3		NO. 2	
NO. 1		NO. 1		NO. 1		NO. 1	
REVISIONS		BY		APPD		BY	
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REST AREA SEWER IMPROVEMENTS
 CONCORDIA, MO

ELECTRICAL IMPROVEMENTS

120340
 SHEET NO. **E1**