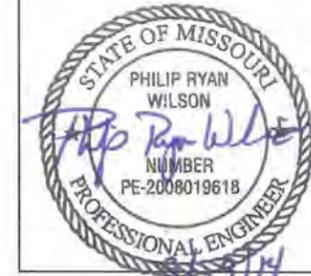




MISSOURI DEPARTMENT OF TRANSPORTATION SEWER IMPROVEMENTS RICHMOND, MISSOURI

T52N, R27W, SECTIONS 33, 34



THE CONTRACTOR SHALL ADHERE TO THE PROVISIONS OF THE SENATE BILL NUMBER 583, 78TH GENERAL ASSEMBLY OF THE STATE OF MISSOURI. THE BILL REQUIRES THAT ANY PERSON OR FIRM DOING EXCAVATION ON PUBLIC RIGHT-OF-WAY DO SO ONLY AFTER GIVING NOTICE TO, AND OBTAINING INFORMATION FROM, UTILITY COMPANIES. STATE LAW REQUIRES 48 HOURS ADVANCE NOTICE.

BENCHMARKS

- TBM1:
NORTHWEST CORNER OF CONCRETE PAD
AT TRUCK WASH.
ELEV = 754.56
- TBM2:
TOP OF SOUTHWEST BOLT OF SOUTH LEG
OF METAL SIGN (LODGING NEXT RIGHT),
ELEV = 750.28

TELEPHONE / TV
MEDIACOM
1-866-590-2225

AT&T
1-877-762-0503

WATER
CITY OF RICHMOND
1-816-776-5304

ELECTRICITY
KANSAS CITY POWER & LIGHT
1-888-544-4852

SEWER
CITY OF RICHMOND
1-816-776-5304

INDEX

DESCRIPTION

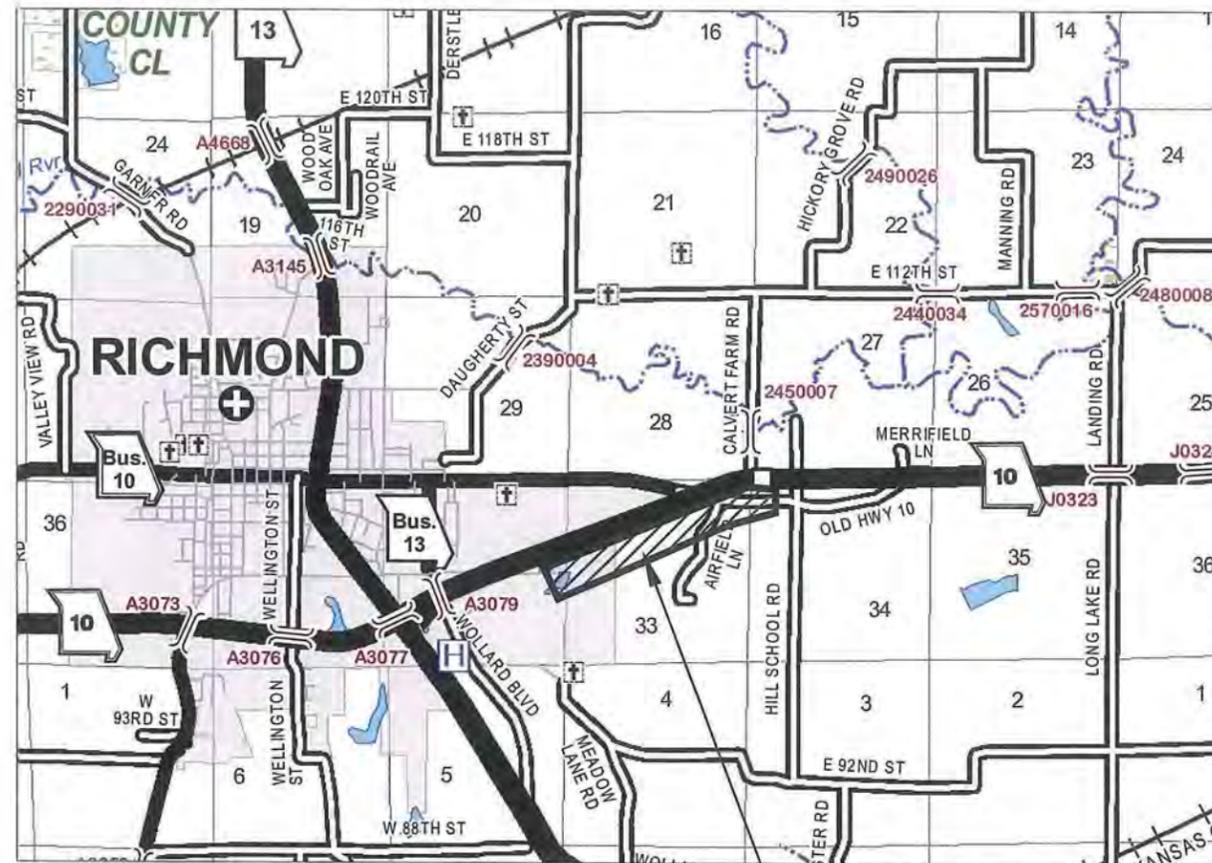
- COVER SHEET
- GENERAL LAYOUT
- FORCEMAIN PLAN & PROFILE
- SITE PLAN
- PUMP STATION DETAILS
- DETAILS
- ELECTRICAL

SHEET NO

- G1
- G2
- C1-C3
- C4
- C5
- C6-C7
- E-1-E-3



PROJECT VICINITY MAP
(NO SCALE)



PROJECT LOCATION

PROJECT VICINITY MAP

GENERAL NOTES

1. The completed pump station and forcemain shall be owned and maintained by the Missouri Department of Transportation.
2. 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.
3. All grassed area disturbed by the contractor shall be fertilized, seeded, and mulched unless otherwise noted on the plans.
4. All utilities and their connections shall be moved or adjusted by the Contractor to fit the new construction unless otherwise noted on the plans.
5. 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
6. It is the Contractor's responsibility to coordinate the adjustment of the various utilities by the respective companies.
7. There shall be a minimum distance of 18" vertical clearance between the forcemain and water lines. See specifications.
8. All roads, driveways, culverts, fencing, landscape, structures & other improvements damaged during construction shall be repaired or replaced to equal or better condition.
9. 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.
10. All signs damaged or removed during construction shall be replaced.
11. 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).
12. Site clean up on a daily basis.
13. All open excavations shall be protected.
14. Replace any property monuments removed or destroyed by construction. All monuments shall be set by a surveyor licensed in the State of Missouri.
15. Contractor is to coordinate electrical power installation with electrical utility.
16. Contractor to ensure erosion is kept to a minimum at all disturbed areas.

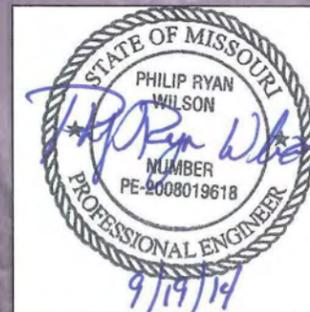
LEGEND

● IB_E	= EXIST IRON BAR	---	EXIST SEWER LINE
● IBPC_E	= EXIST. IRON BAR W/ PLASTI	---	EXIST MAJOR CONTOUR
● FPST	= FENCE POST	---	EXIST MINOR CONTOUR
▽ FD	= FIBER OPTIC MARKER	---	EXIST FLOW LINE
▽ FH	= FIRE HYDRANT	---	TREE LINE
▽ G	= GAS MARKER	---	EXIST BUILDING
● GTPST	= GATE POST	---	EXIST EASEMENT
⊕ GA	= GUY ANCHOR	---	EXIST EDGE OF ASPHALT
⊕ H&V	= CONTROL POINT	---	EXIST EDGE OF GRAVEL
⊕ LP	= LIGHT POLE	---	EXIST GRAVEL SHOULDER
▽ MS	= METAL SIGN	---	EXIST CHAINLINK FENCE
⊕ PP	= POWER POLE	---	EXIST OVERHEAD POWER
⊕ RW	= R/W MARKER	---	EXIST STORM PIPE
● SSMH	= SANITARY SEWER MANHOLE	---	EXIST PROPERTY LINE
● STMH	= STORM MANHOLE	---	EXIST SEWER PIPE
---	= STUMP	---	EXIST GAS LINE
□ TEP	= TELEPHONE PEDESTAL	---	EXIST POWER
● TEM	= TEMP BENCHMARK	---	EXIST TELEPHONE LINE
---	= TREE	---	EXIST WATER LINE
		---	EXIST EDGE OF WATER
		---	PROPOSED SEWER LINE
		---	PERMANENT EASEMENT
		---	TEMPORARY EASEMENT

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BY: JCARTER
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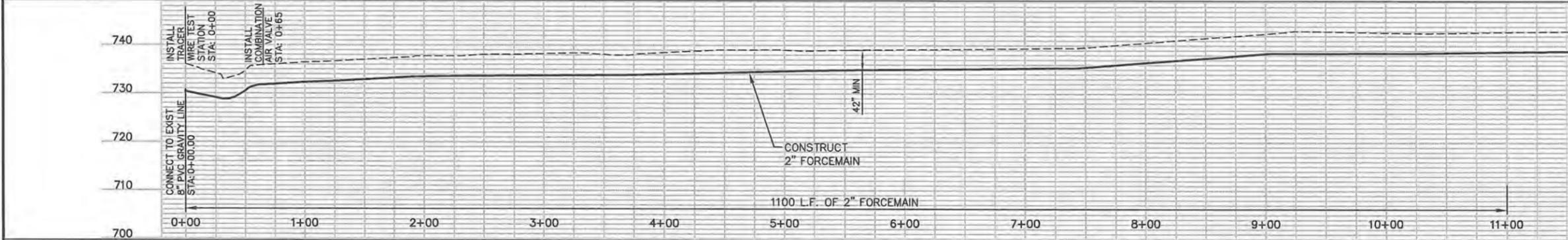
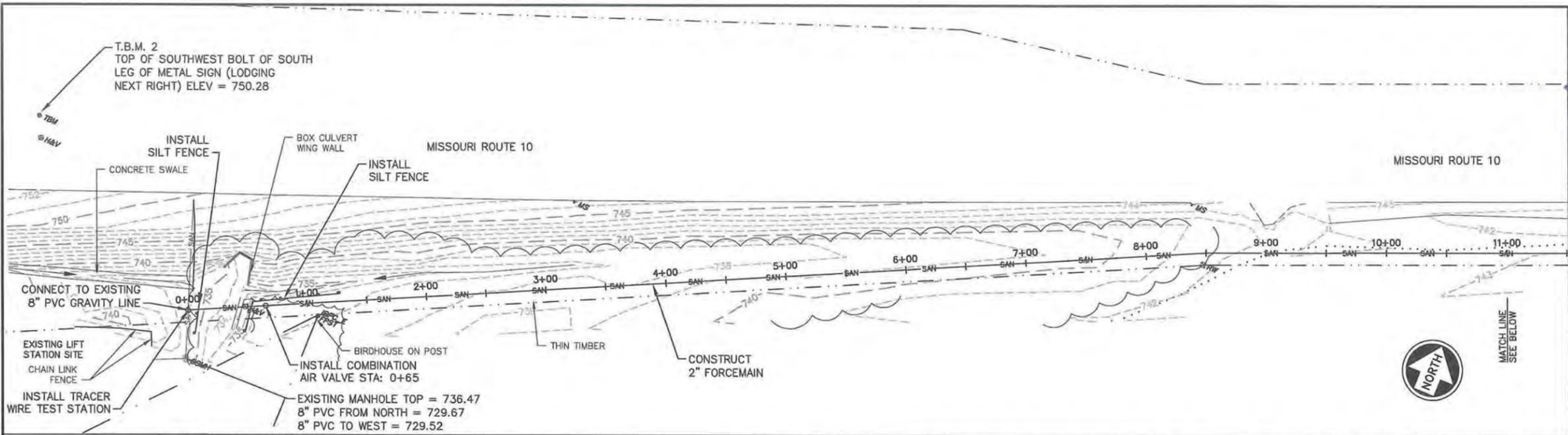
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<p>SHAFER, KLINE & WARREN, INC. 107 Butler Street, Macon, MO 63552-1628 660/385-6441 FAX: 660/385-6614</p> <p>OFFICE LOCATIONS: Columbia, MO Lima, MO Macon, MO</p> <p>SKW CIVIL ENGINEERS ELECTRICAL ENGINEERS STRUCTURAL ENGINEERS LANDSCAPE ARCHITECTS LAND SURVEYORS LAND PLANNERS</p>									
MODOT SEWER IMPROVEMENTS RICHMOND, MO					COVER				
140311-010 SHEET NO. G1									

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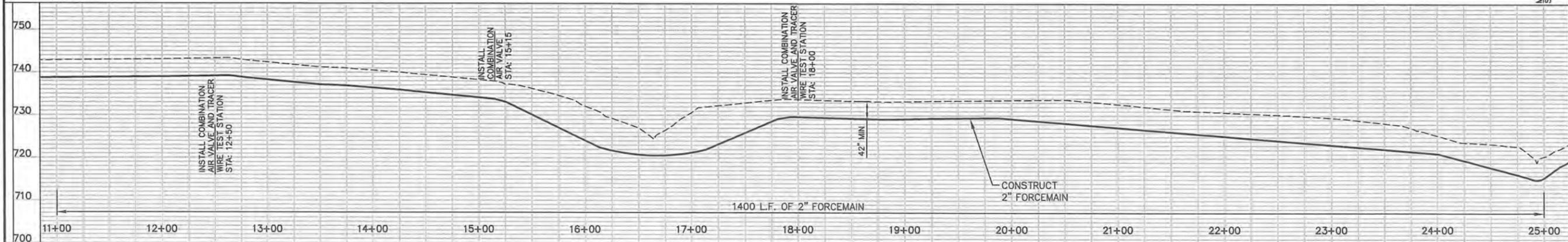
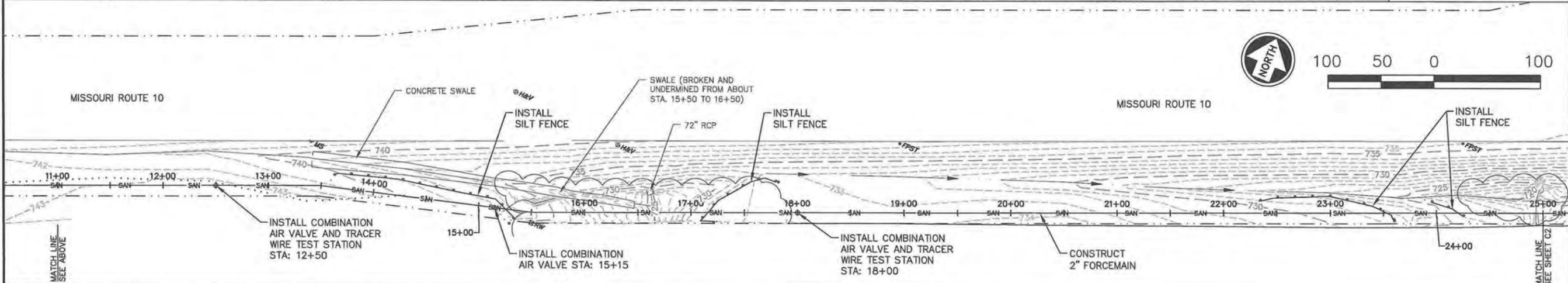


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Designed By: PRW	Drawn By: JDC	Checked By: PRW	Issue Date:
5	4	3	2
1	NO. DATE	REVISIONS	BY APPD
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 XREF DWG3: NONE XREF DWG4: NONE



- NOTE:
1. SEED & MULCH DISTURBED AREAS.
 2. REPLACE ANY DAMAGED CULVERTS.
 3. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DEVELOP A SWPPP AND OBTAIN A LAND DISTURBANCE PERMIT FROM THE MISSOURI DEPARTMENT OF NATURAL RESOURCES.
 4. THE FORCEMAIN SHALL BE INSTALLED BY BORING WHERE INDICATED. THE REMAINDER MAY BE INSTALLED BY OPEN CUT, OR BY DIRECTIONAL BORE.
 5. SEE SPECIFICATION SECTION 02530 FOR FORCEMAIN MATERIAL REQUIREMENTS.
 6. THE CONTRACTOR SHALL CONTACT PROPERTY OWNER AT LEAST 24 HOURS PRIOR TO CONSTRUCTION ACTIVITIES COMMENCING ON ANY EASEMENT OR RIGHT-OF-WAY CONTAINED WITHIN OR ADJACENT TO THAT PROPERTY TO INFORM THE PROPERTY OWNER OF THE CONSTRUCTION.



NO.	DATE	REVISIONS	BY
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3			
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 Drawn By: JDC
 Checked By: PRW
 Issue Date:

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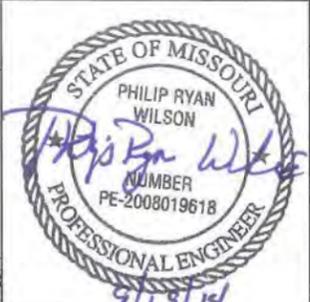
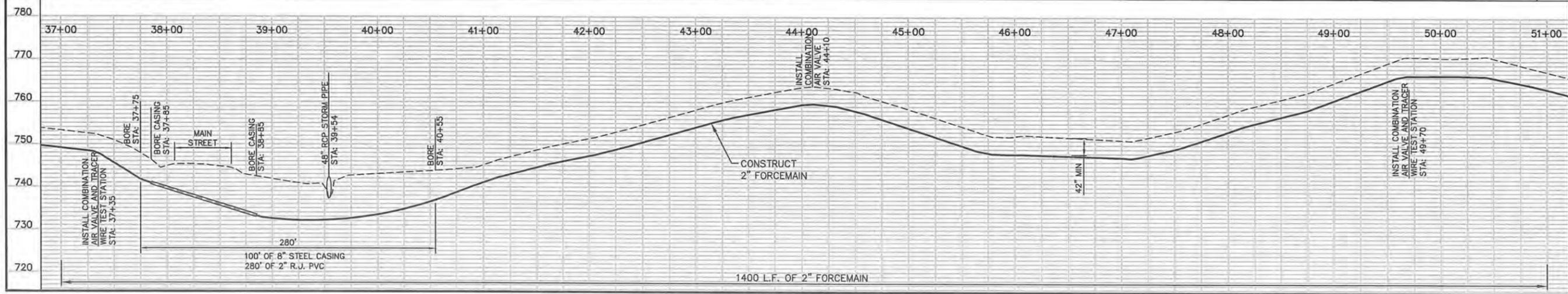
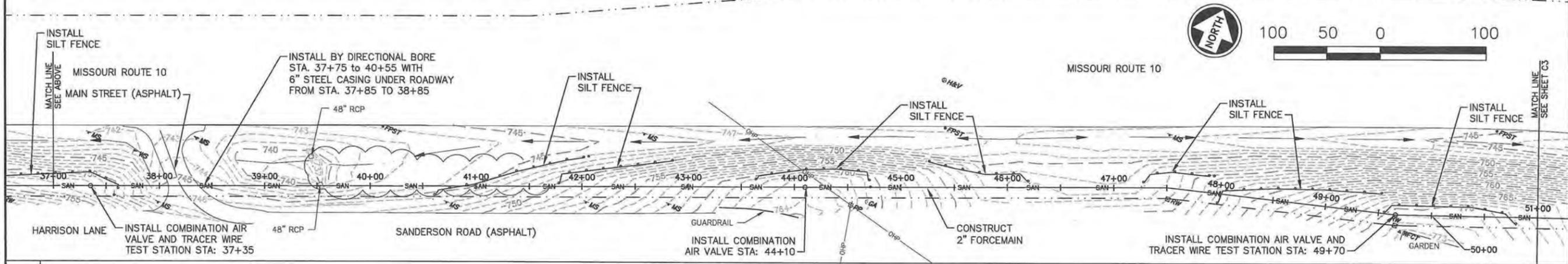
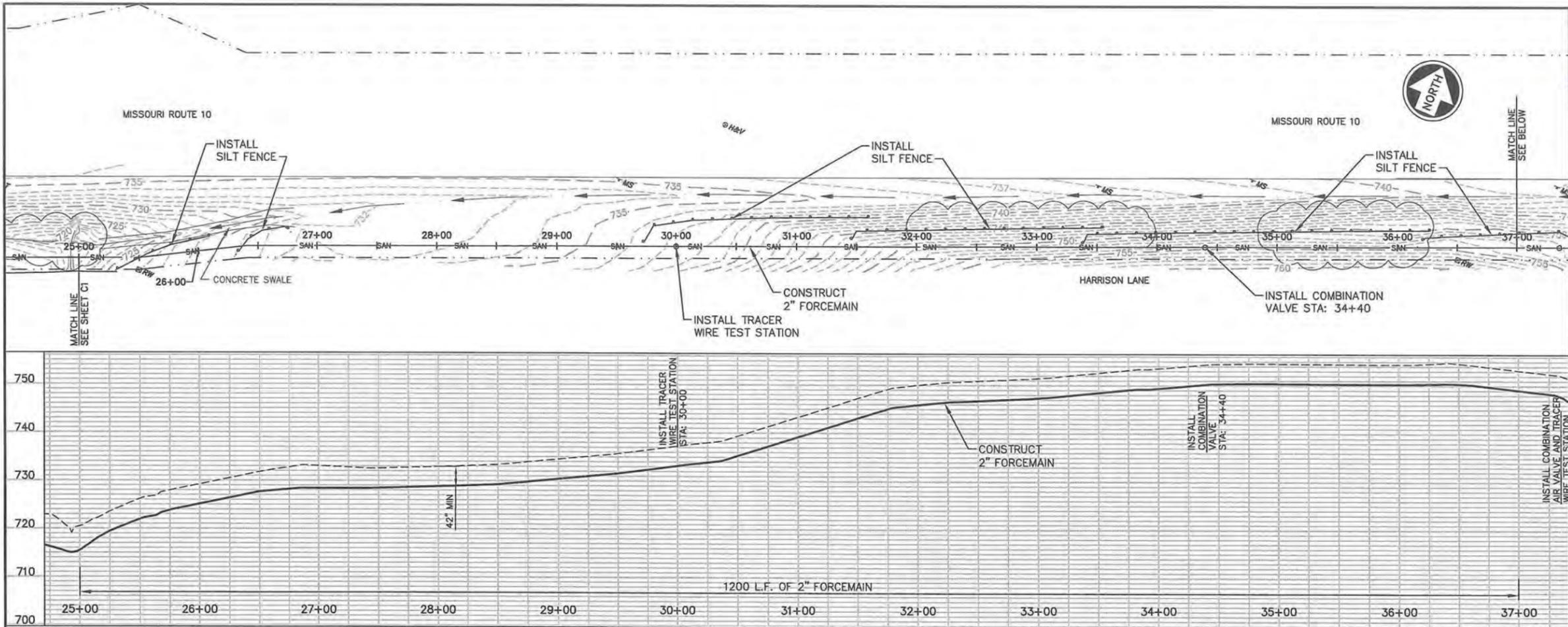
INC. ENGINEERS ELECTRICAL ENGINEERS MECHANICAL ENGINEERS LANDSCAPE ARCHITECTS LAND SURVEYORS LAND PLANNERS

MODOT SEWER IMPROVEMENTS
RICHMOND, MO

FORCEMAIN PLAN AND PROFILE

140311-010
 SHEET NO.
C1

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 XREF DWG2: 140311-010 Site Design.dwg
 XREF DWG3: NONE
 XREF DWG4: NONE
 DATE: 9/18/2014
 BY: JCARTER



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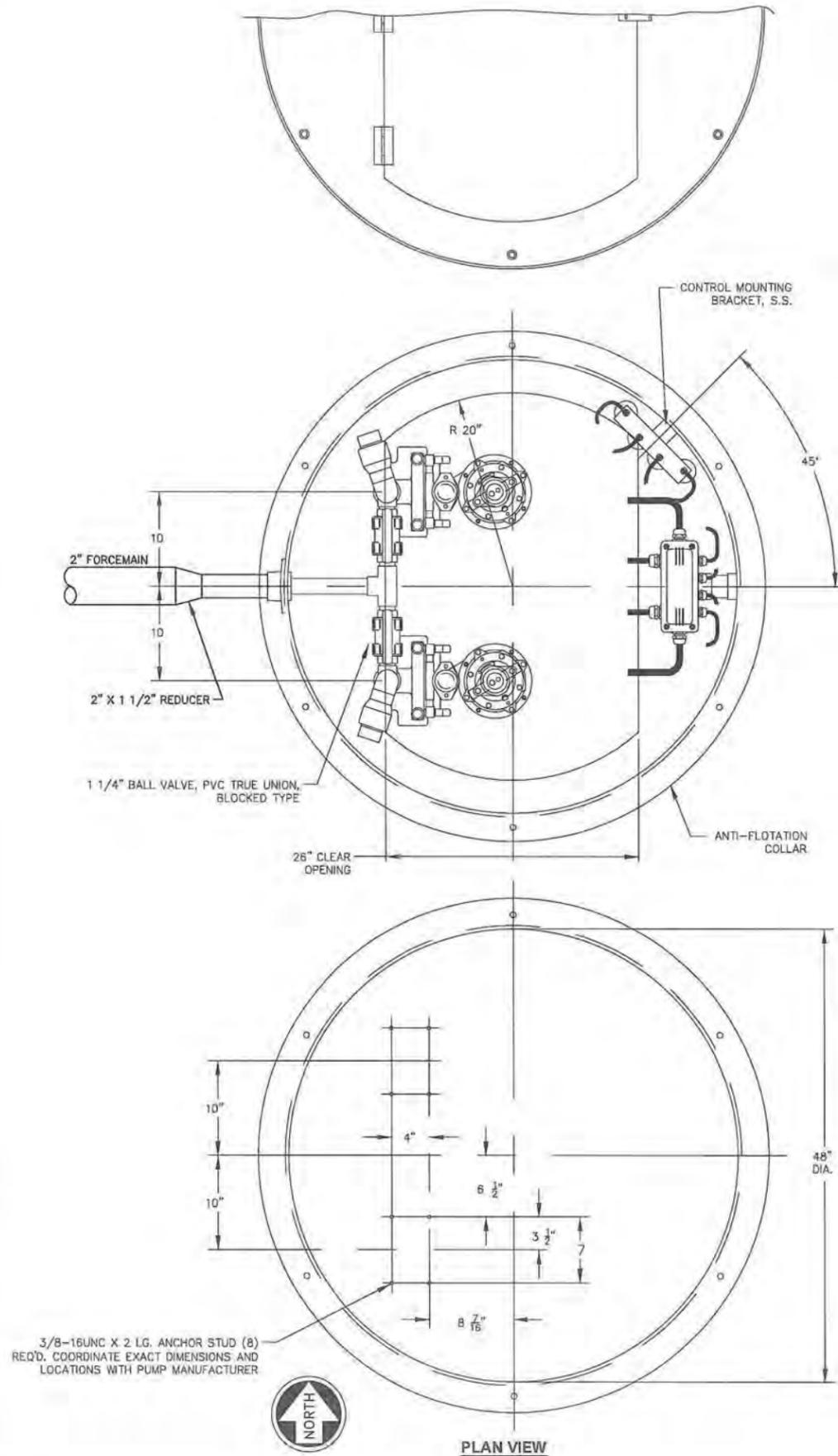
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3	CHECKED BY: PRW
2	ISSUE DATE:
1	NO. DATE REVISIONS
0	BY: APPD

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 Lenexa, KS
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MODOT SEWER IMPROVEMENTS
RICHMOND, MO
FORCEMAIN PLAN AND PROFILE
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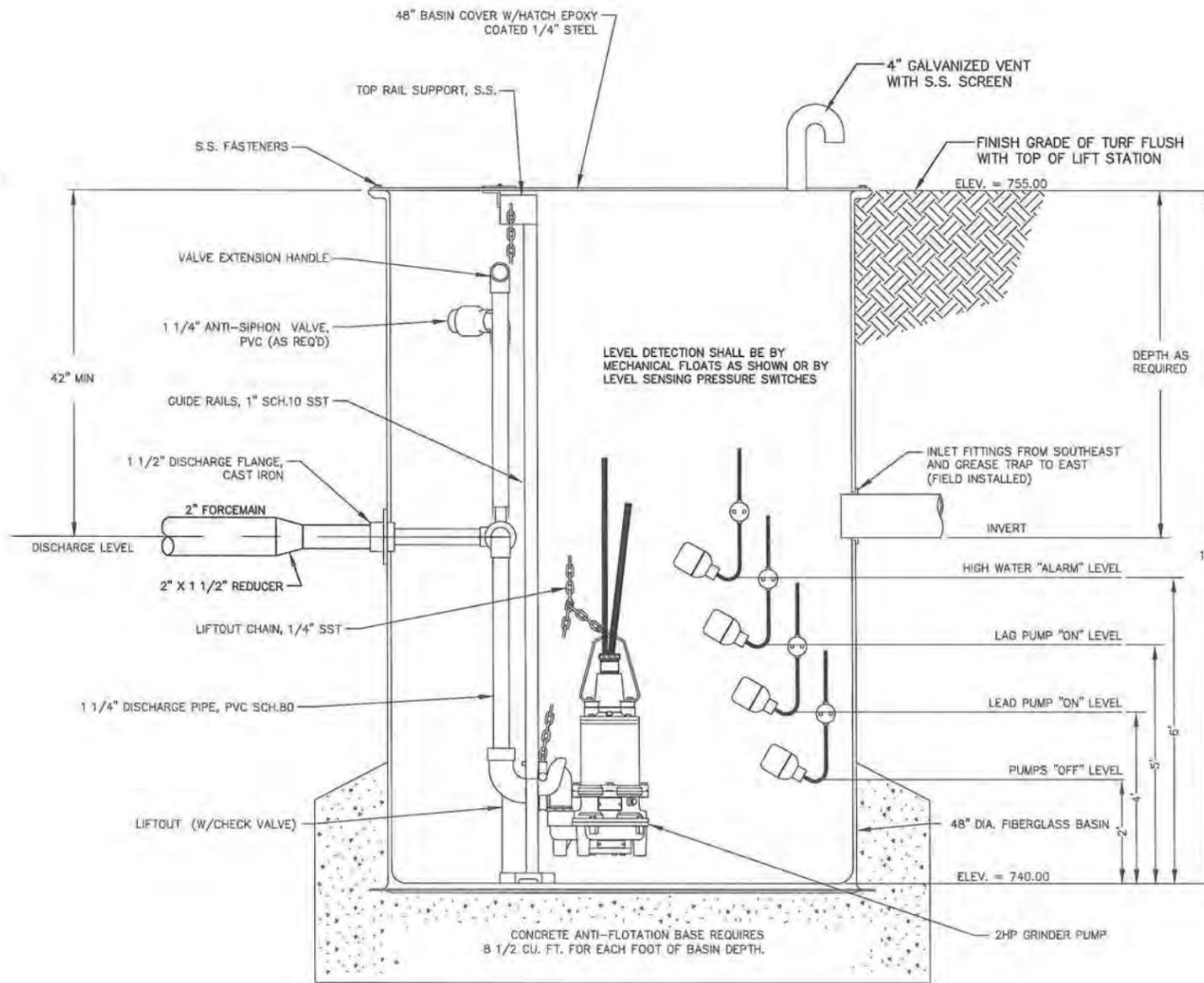
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 DATE: 10/31/2014



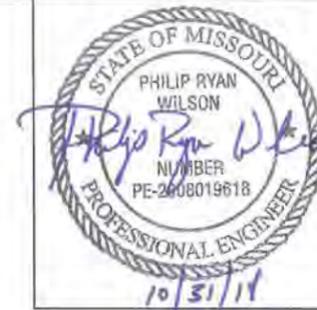
NOTES:
 1. 48" DUPLEX 2HP GRINDER PUMP PACKAGE W/ LIFTOUT AND REMOTE MOUNTED CONTROL PANEL

DESCRIPTION	SEWER PUMP STATION
NUMBER OF UNITS	2
RATED TOTAL HEAD (FT) MIN.	113
CAPACITY (PER PUMP) AT RATED TOTAL HEAD (GPM)	20
MINIMUM SHUTOFF HEAD (FT)	130
OPERATING HEAD RANGE (FT)	112-124
(FT) MOTOR POWER (VOLTS/PHASE/HZ)	230/1/60
MAXIMUM NAMEPLATE HORSEPOWER	2.5
IMPELLER TYPE MINIMUM	GRINDER
DISCHARGE SIZE (INCHES)	1 1/4"

NOTE: MAX (NOMINAL) PUMP OPERATING SPEED AT RATED HEAD SHALL BE 3450 R.P.M.



PACKAGE PUMP STATION PLAN
 SCALE: 3/4" = 1'



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Designed By: PRW
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 Checked By: PRW
 Issue Date:

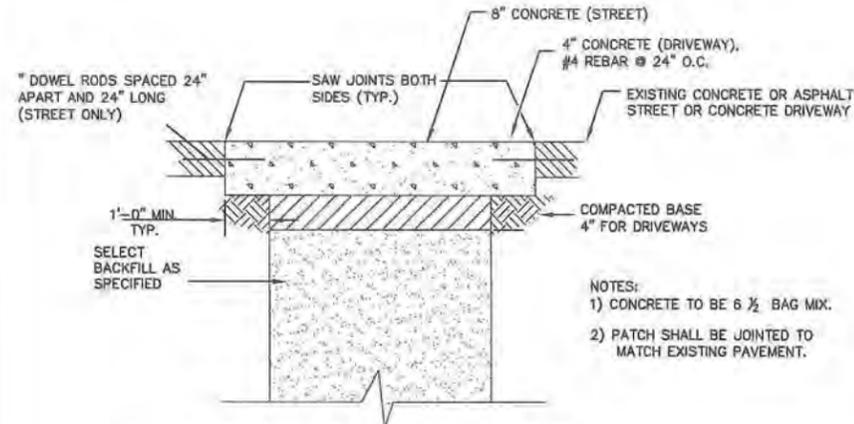
SHAFER, KLINE & WARREN, INC.
 107 Butler Street, Macon, MO 63552-1628
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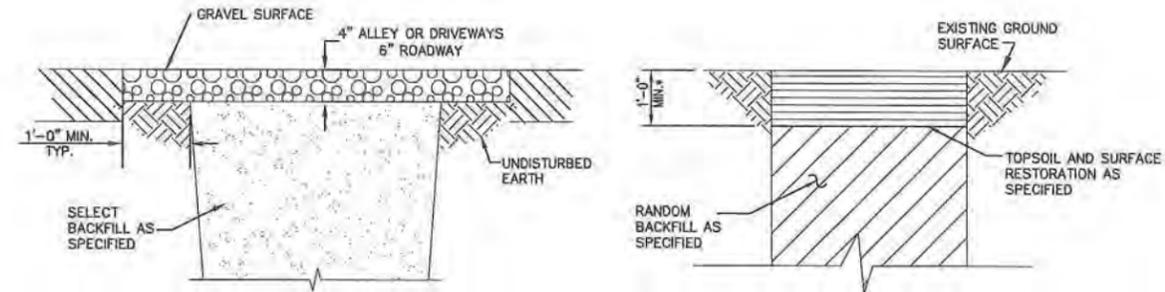
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MODOT SEWER IMPROVEMENTS
 RICHMOND, MO

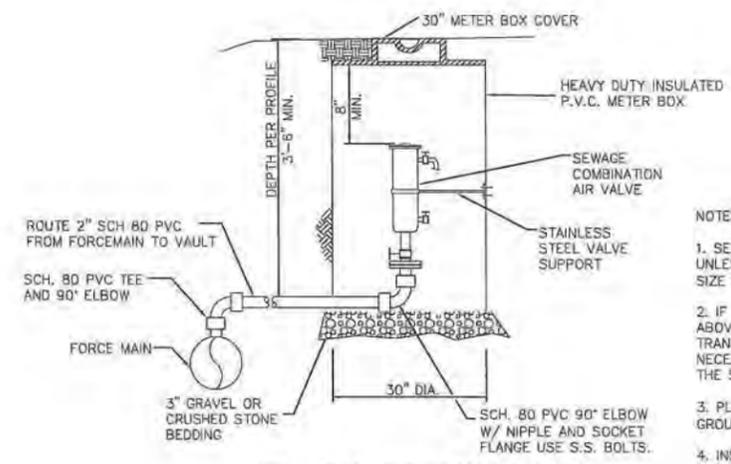
PUMP STATION DETAILS



CONCRETE DRIVING SURFACES AND ASPHALT STREETS



TYPICAL TRENCH BACKFILL & SURFACE RESTORATION DETAILS
SCALE: N.T.S.



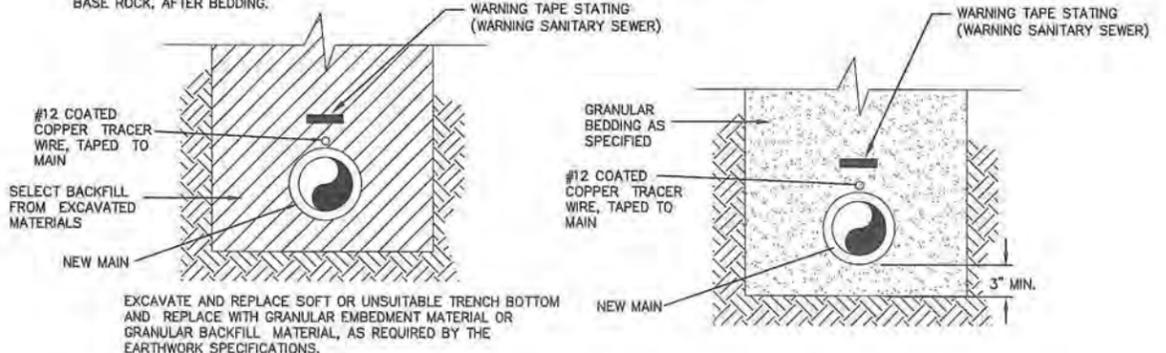
COMBINATION AIR VALVE & VAULT
SCALE: N.T.S.

- NOTES:
- SEWAGE AIR CONTROL VALVE INLETS SHALL BE 2" NPT. UNLESS OTHERWISE NOTED ON THE PLANS OR PROFILES, OUTLET SIZE SHALL BE 1" NPT AND AIR RELEASE ORIFICE SHALL BE 1/8".
 - 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.
 - PLACE 4"x4" POST BESIDE VALVE BOX. SHALL BE 4" IN GROUND & 4" ABOVE GROUND.
 - INSTALL TRACER WIRE TEST STATION BESIDE COMBINATION AIR RELEASE VAULT WHERE NOTED ON PLAN AND PROFILE.

PIPE SIZE (INCHES)	TRENCH WIDTH			
	MIN. TRENCH WIDTH IN EARTH (INCHES)	MAX. TRENCH WIDTH IN EARTH (INCHES)	MIN. TRENCH WIDTH IN ROCK (INCHES)	MAX. TRENCH WIDTH IN ROCK (INCHES)
< 4	20	25	20	20
4 - 6	22	30	24	24
8	22	30	24	24
10	24	32	24	24
12	30	35	26	26

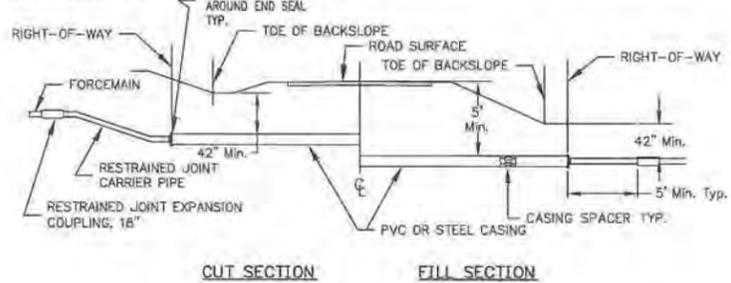
NOTE: WHEN ANY TRENCH IS AT EDGE OF PAVEMENT, BACKFILL TRENCH WITH COMPACTED ROLL STONE BASE ROCK, AFTER BEDDING.

- 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 11.25° 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
 - WARNING TAPE SHALL BE INSTALLED WITH ALL MAIN LINES

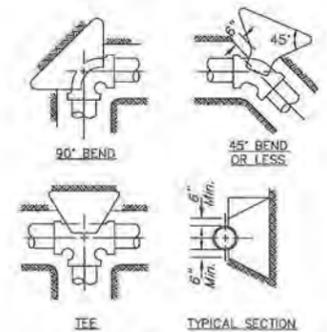


TYPICAL PIPE INSTALLATION/BEDDING DETAILS
SCALE: N.T.S.

- NOTES: COUNTY ROAD CROSSINGS
- CARRIER PIPE BETWEEN COUPLINGS TO BE RESTRAINED JOINT; PIPING TO MEET ASTM D 2241. CROSSINGS LESS THAN 80 L.F. MAY BE SLIP JOINT PVC
 - FOR ALL PIPELINES 2" OR GREATER, MINIMUM CASING LENGTH SHALL BE FROM RIGHT-OF-WAY TO RIGHT-OF-WAY
 - INSTALL HDPE CASING SPACERS AND END SEALS PER THE MANUFACTURERS RECOMMENDATIONS BASED ON CARRIER PIPE AND CASING SIZES. CASING SPACERS SHALL BE A MAX OF 9' APART WITH A MINIMUM OF 3 RUNNERS & HOLD THE CARRIER PIPE IN THE CENTER OF THE CASING. CASING ENDS SHALL BE SEALED WITH SYNTHETIC RUBBER WRAP-AROUND END SEALS W/ STAINLESS STEEL BANDS, CASCADE WATERWORKS MFG. "MODEL CCE", ADVANCE PRODUCTS & SYSTEMS, INC. "MODEL AW" OR ENGINEER APPROVED EQUAL.
 - GRAVELED COUNTY ROADS MAY BE OPEN CUT UNLESS OTHERWISE NOTED ON PLANS OR COUNTY PERMITS
 - COUNTY ROAD PERMITS AND REGULATIONS SHALL BE FOLLOWED AND WILL SUPERCEDE CONTRACT PLANS AND SPECIFICATIONS



COUNTY ROAD CROSSING DETAIL
SCALE: N.T.S.



THRUST BLOCK AREA TABLE

PIPE SIZE	24"	20"	18"	16"	14"	12"	10"	8"	6"	4" & UNDER
90° BEND	40	30	25	20	12	8	5	3	1	1
45° BEND	24	18	14	12	7	5	3	1.5	1	1
22 1/2° BEND	12	8	7	5.5	3.5	2.5	1.5	1	1	1
11 1/4° BEND	6	4	3.5	3	2	1.5	1	1	1	1
TEE	30	22	18	14	8	6	3.5	2	1	1

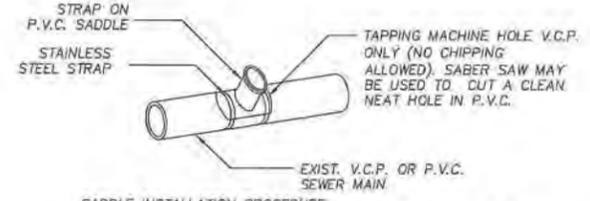
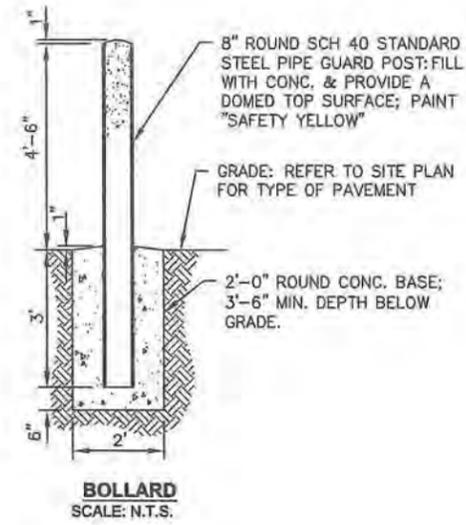
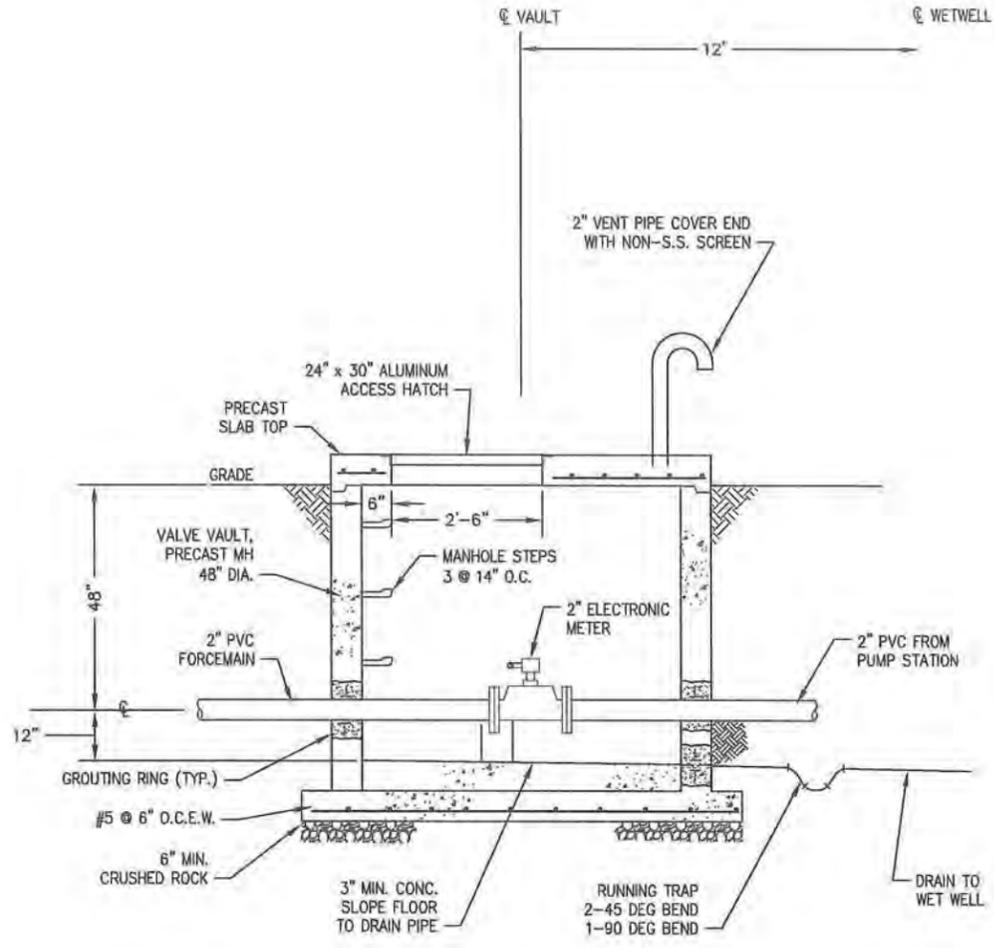
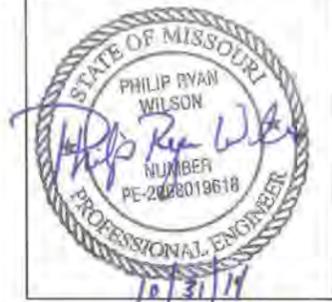
*TABLE GIVES REQUIRED AREA OF BEARING IN SQUARE FEET BETWEEN CONCRETE AND UNDISTURBED TRENCH WALL.

- NOTE:
- THRUST BLOCKS SHALL BE POURED CONCRETE.
 - THRUST BLOCKS SHALL BE PLACED AT EVERY FITTING.

TYPICAL CONCRETE THRUST BLOCKS
SCALE: N.T.S.

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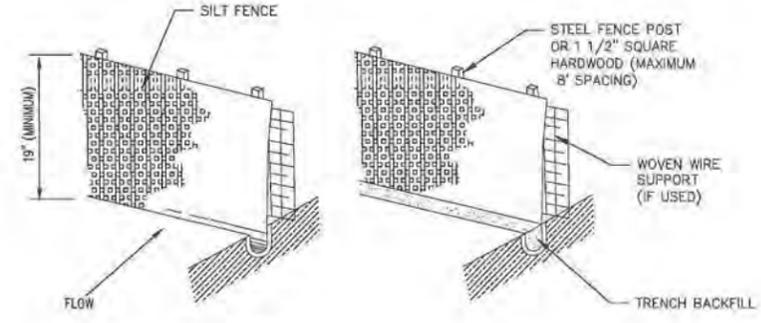
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<p>MODOT SEWER IMPROVEMENTS RICHMOND, MO</p>									
<p>140311-010 SHEET NO. C6</p>									



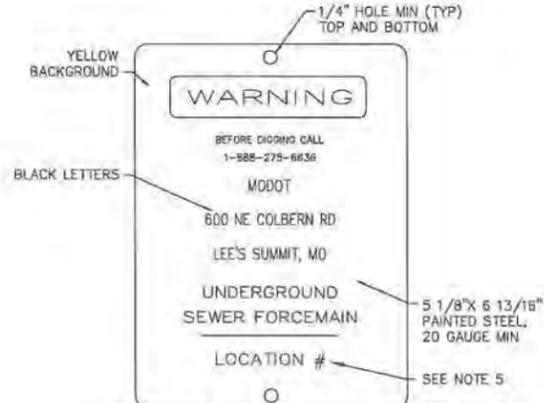
SADDLE INSTALLATION PROCEDURE:
 THE CONTRACTOR SHALL CUT A CLEAN, NEAT HOLE IN THE EXISTING SEWER MAIN ABOVE THE SPRING LINE AND INSTALL "STRAP ON PVC SADDLE" WITH STAINLESS STEEL STRAPS. THIS APPLIES TO P.V.C. OR V.C.P., WHICHEVER IS EXISTING.

NOTE:
 1. CONTRACTOR SHALL COORDINATE SERVICE CONNECTION WITH THE CITY OF RICHMOND AND ENSURE A CITY INSPECTOR IS PRESENT WHEN THE CONNECTION IS MADE.

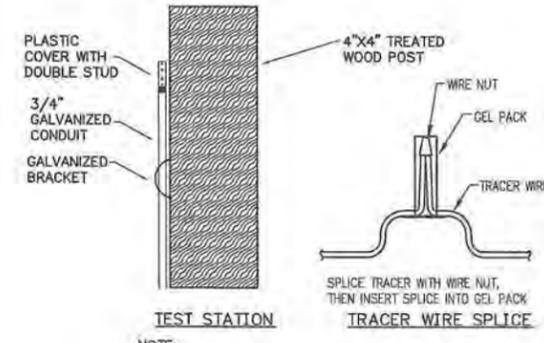
SADDLE DETAIL
 SCALE: N.T.S.



- CONSTRUCTION SPECIFICATIONS:**
1. POSTS WHICH SUPPORT THE SILT FENCE SHALL BE INSTALLED ON A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE AND SPACED AT A MAXIMUM 8' APART OR TO SILT FENCE MANUFACTURER SPECIFICATIONS, WHICHEVER IS STRICTER.
 2. SILT FENCE SHALL BE TRENCHED IN WITH A SPADE OR MECHANICAL TRENCHER SO THAT THE DOWNSLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW.
 3. THE TRENCH SHOULD BE A MINIMUM OF 6" DEEP 3-4" WIDE TO ALLOW FOR THE SILT FENCE TO BE LAID IN THE GROUND AND BACKFILLED.
 4. SILT FENCE SHOULD BE SECURELY FASTENED TO EACH SUPPORT POST OR TO WOVEN WIRE WHICH IS IN TURN ATTACHED TO THE FENCE POSTS.
 5. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
 6. SILT FENCE SHALL BE REMOVED WHEN IT HAS SERVED ITS USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
 7. SEDIMENT TRAPPED BY THIS PRACTICE SHALL BE UNIFORMLY DISTRIBUTED ON THE SOURCE AREA PRIOR TO TOPSOILING.
 8. SILT FENCE SHALL BE MIRAFI-100X FILTER FABRIC OR APPROVED EQUAL.



- NOTES:** NAME PLATES AND SEWER LINE MARKERS
- 1) NAME PLATES SHALL BE PLACED IN ALL FENCE CROSSINGS.
 - 2) NAME PLATES AND POSTS SHALL BE PLACED ON BOTH SIDES OF ALL ROAD CROSSINGS AND CREEK/STREAM CROSSINGS.
 - 3) NAME PLATES AND POSTS SHALL BE PLACED AT ALL FORCEMAIN APPURTENANCES: I.E. GATE VALVES, AIR RELEASE VALVES, TEST STATIONS...
 - 4) 48" MINIMUM CLEARANCE BETWEEN BOTTOM OF SIGN AND EXISTING GROUND LEVEL.
 - 5) COORDINATE WITH OWNER FOR LOCATION NUMBERS ON NAME PLATE.



- NOTE:**
1. TRACER WIRE TEST STATIONS SHALL BE PLACED NEAR FENCE OR POWER POLES, IF POSSIBLE. MAXIMUM SPACING OF TEST STATIONS SHALL BE 2640' FEET UNLESS NOTED OTHERWISE ON PLANS.

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 LAYOUT: C7
 XREF DWG1: NONE
 XREF DWG2: NONE
 XREF DWG3: NONE
 XREF DWG4: NONE
 BY: JCARTER
 DATE: 10/31/2014

Designed By: PRW	5	10-31-14	ADDED METER PIT	REVISIONS	BY: APPD
Drawn By: JJC	4				JJC
Checked By: PRW	3				
Issue Date:	2				
	1				

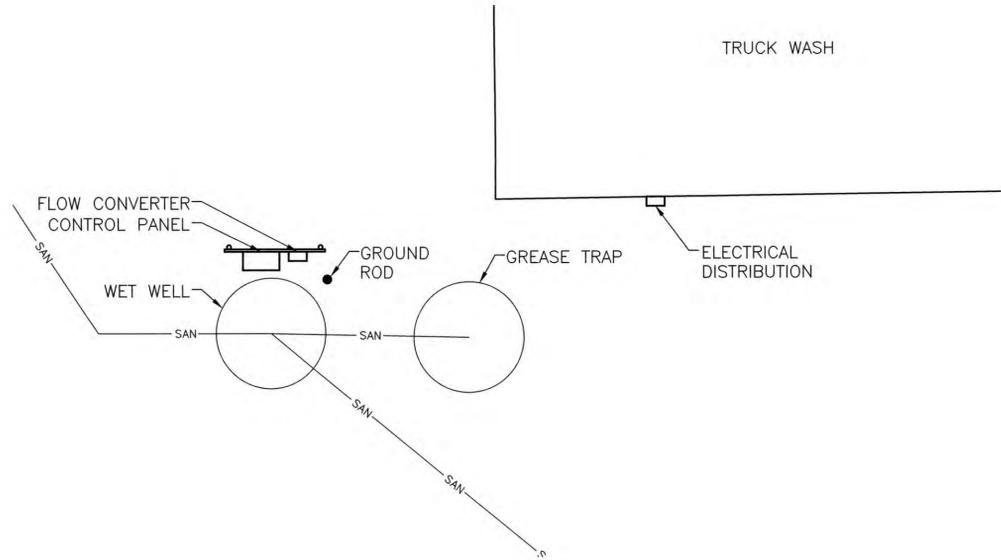
SHAFFER, KLINE & WARREN, INC.
 107 Butler Street, Macon, MO 63552-1628
 660/385-6441 FAX: 660/385-6614
 OFFICE LOCATIONS:
 North Kansas City, MO
 Houston, TX
 Columbia, MO
 Lenexa, KS
 Macon, MO
 TULSA, OK

MODOT SEWER IMPROVEMENTS RICHMOND, MO

DETAILS

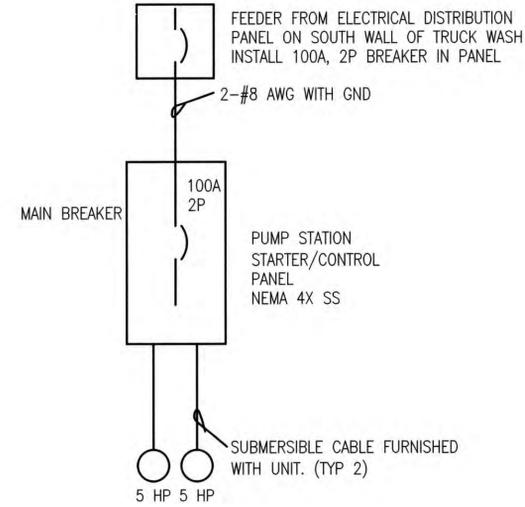
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 SHEET NO.
C7

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 XREF DWG3: NONE XREF DWG4: NONE



PUMP STATION SITE PLAN

SCALE: 1"=5'



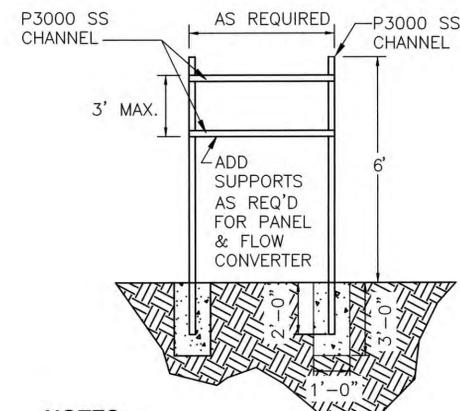
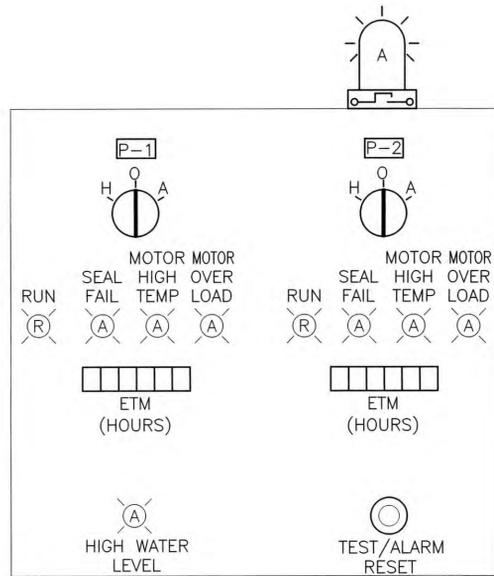
ONE-LINE

NOTE:

1. INSTALL 100A, 2P BREAKER IN PANEL AT SERVICE. ROUTE 2-#8 WITH GND, 1" CONDUIT TO PUMP CONTROL PANEL.

LEGEND

- WIRING WITHIN PANEL
- - - FIELD WIRING
- - - ENCLOSURE BOARDER
- PM PHASE MONITOR
- SPD SURGE PROTECTION DEVICE
- * INDICATED DEVICE MOUNTED ON HINGED DEADFRONT INTERIOR
- EXTERIOR LIGHT DELAY TO MAKE
- PILOT LIGHT ALARM BEACON DUSK TO DAWN LIGHT 20 WATT LED



NOTES:

1. STRUT PRODUCT NUMBERS SHOWN ARE BY UNISTRUT CORP.
2. HARDWARE SHALL BE STAINLESS STEEL
3. MIN. EMBEDMENT OF EXP. BOLTS SHALL BE 3 1/2"
4. FOR SMALL ENCLOSURES, LESS THAN 6"x8"—A SINGLE POST IS ADEQUATE, 42" HEIGHT.

PANEL MOUNTING DETAIL

NOT TO SCALE

5					
4					
3					
2					
1					
	NO.	DATE	REVISIONS	BY	APP'D

Designed By: PRW
 Drawn By: JDC
 Checked By: PRW
 Issue Date:



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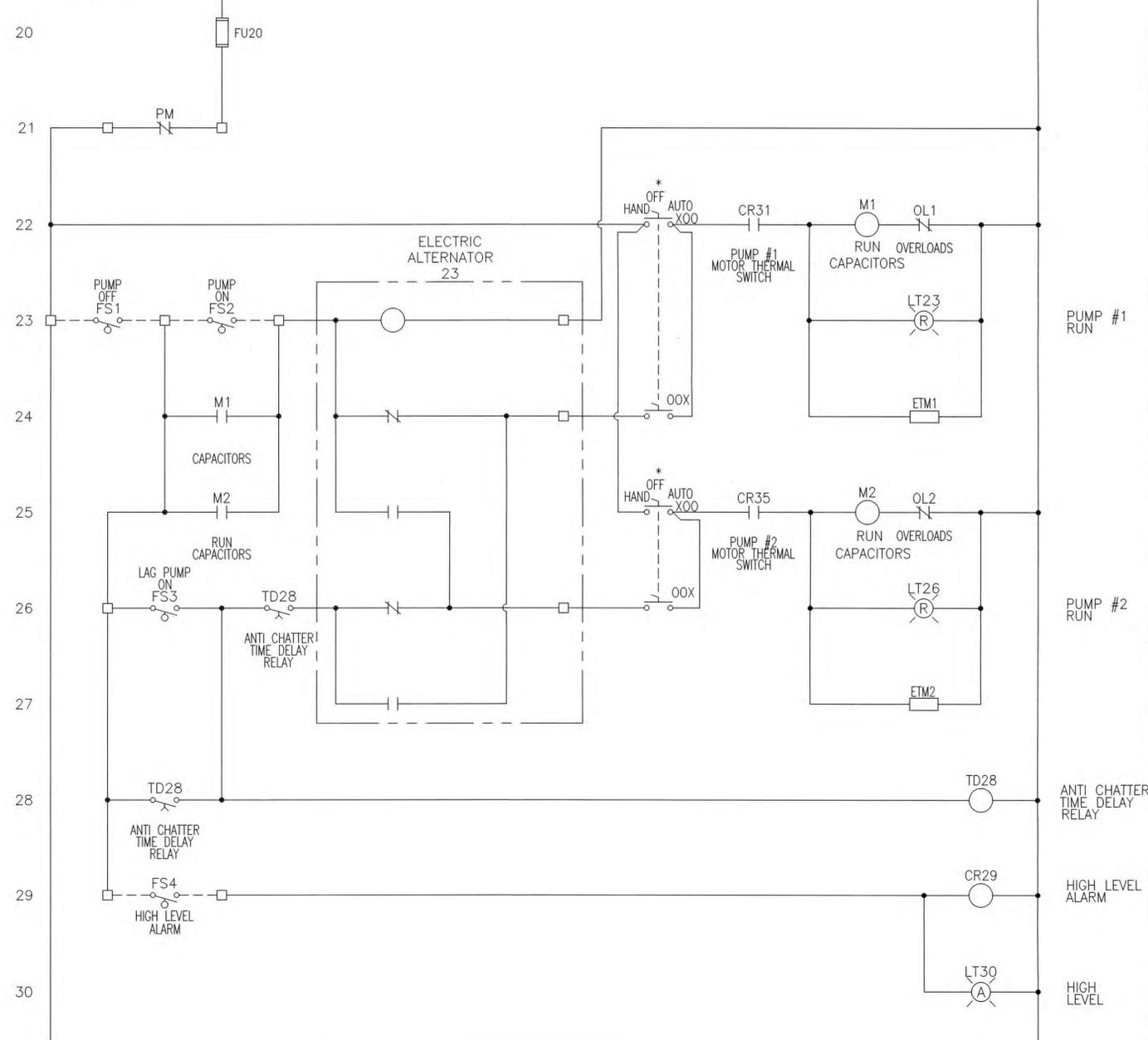
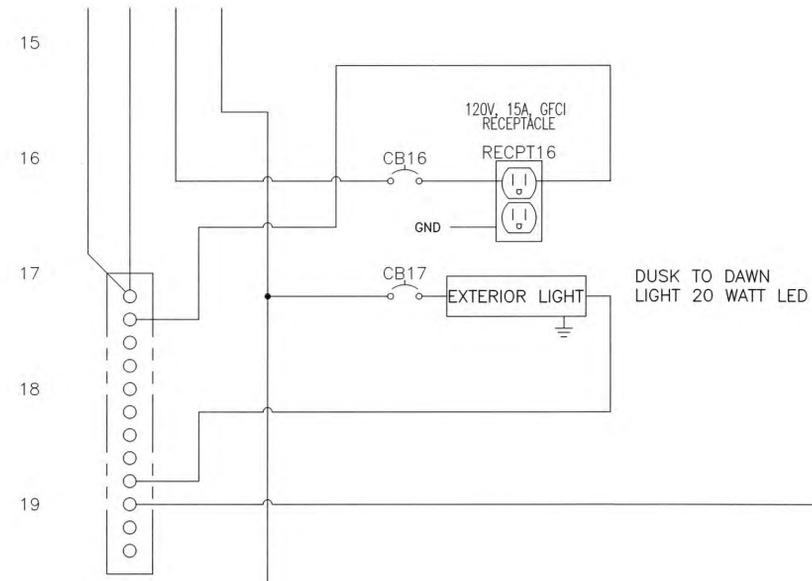
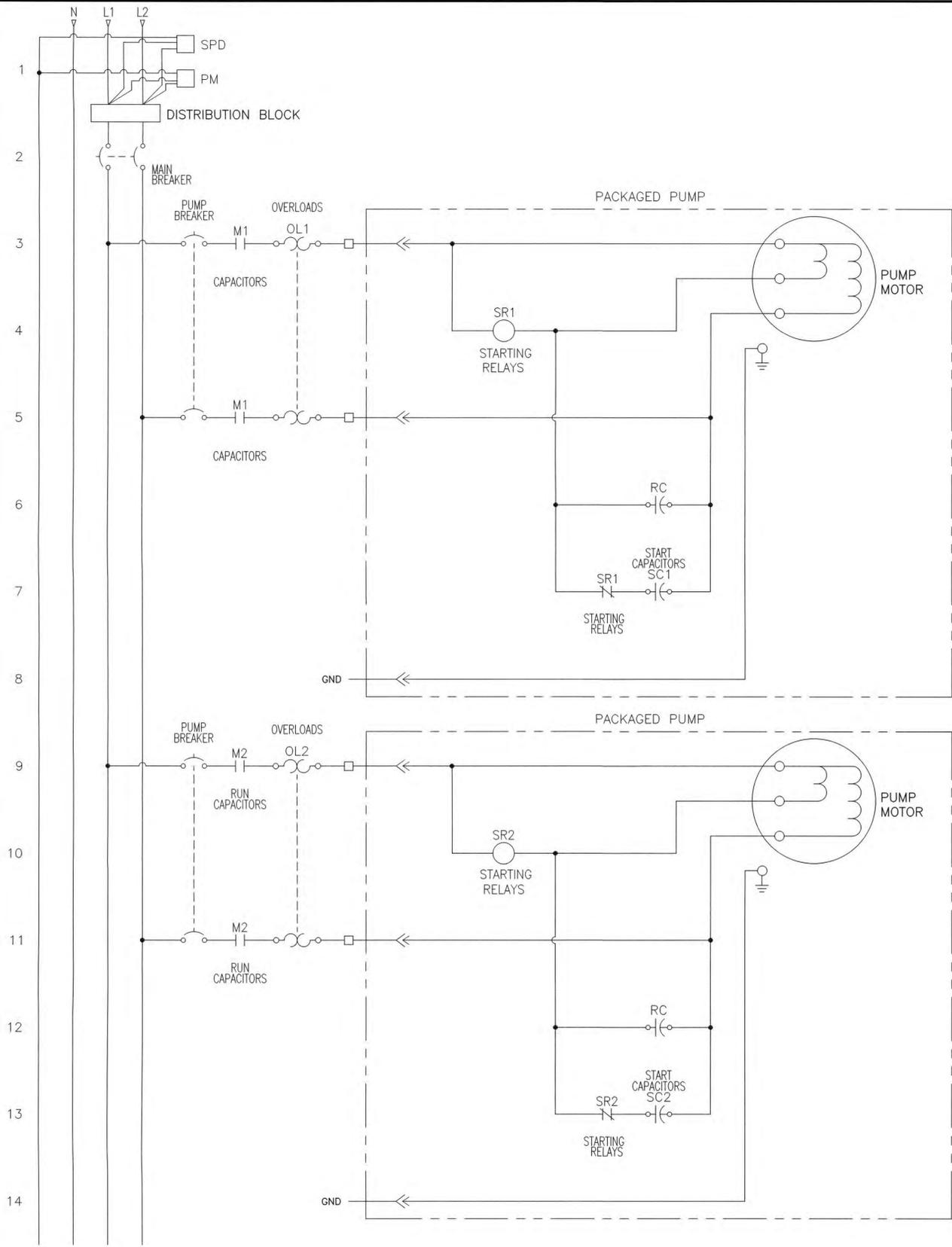
REGISTERED PROFESSIONAL ENGINEER
 MISSOURI
 9/19/14

**MODOT SEWER IMPROVEMENTS
 RICHMOND, MO**

SITE PLAN / ONE-LINE / DETAILS

140311-010
 SHEET NO.
 E-1

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 LAYOUT: LAYOUT1 BY: CPORTER DATE: 9/19/2014
 XREF DWG1: NONE XREF DWG2: NONE
 XREF DWG3: NONE XREF DWG4: NONE



5	DESIGNED BY: PRW	REVISIONS	BY: APPD
4	DRAWN BY: JDC	1	SHAFFER, KLINE & WARREN INC.
3	CHECKED BY: PRW	2	MISSOURI CERTIFICATE OF AUTHORITY: F00139850
2	ISSUE DATE:	3	
1		4	
		5	

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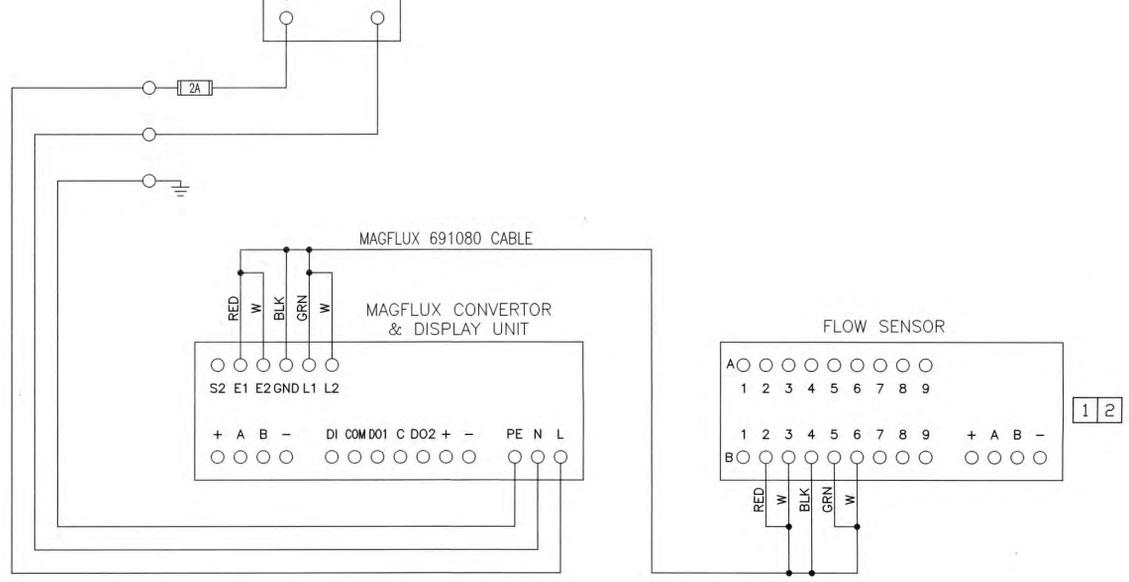
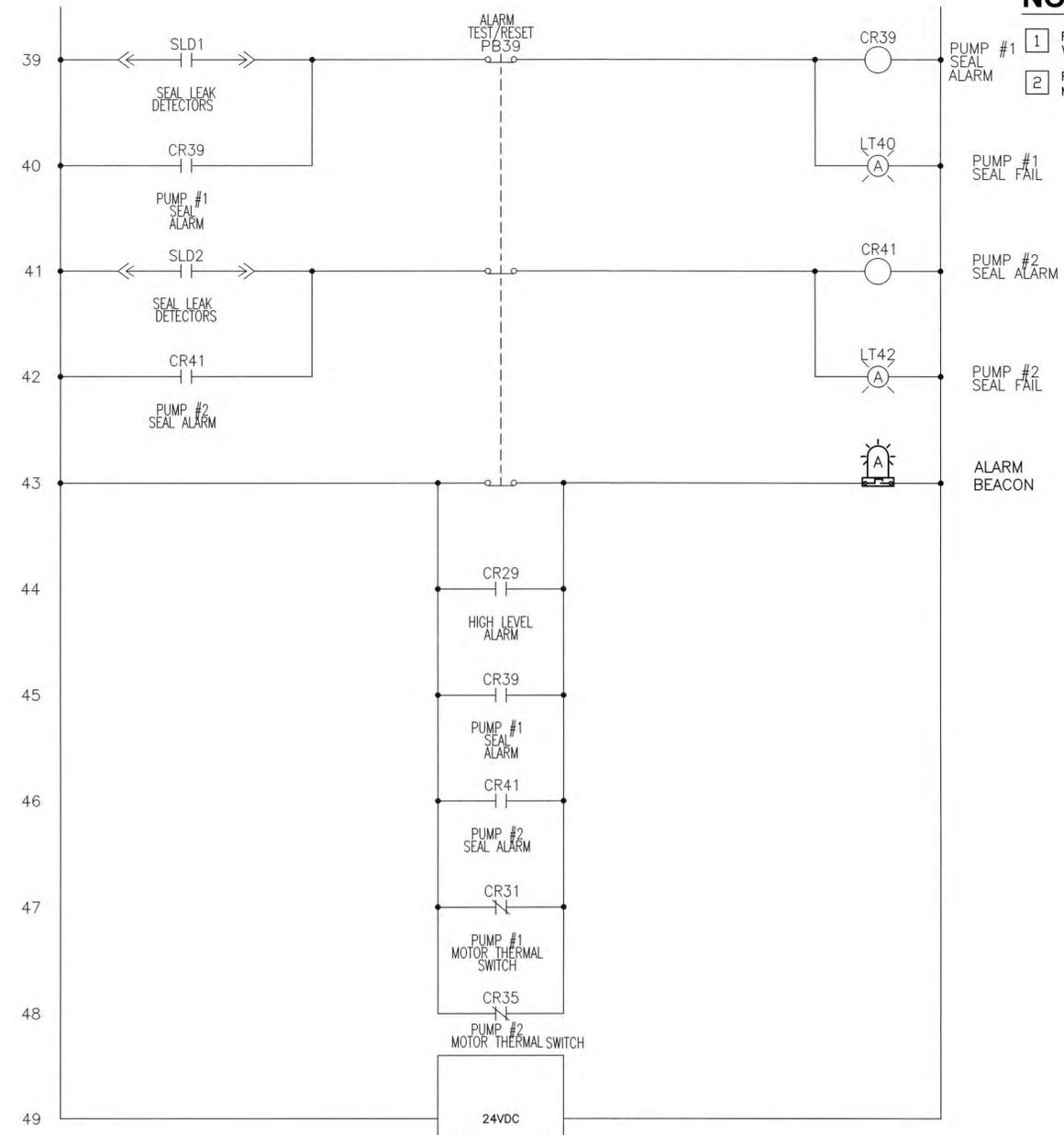
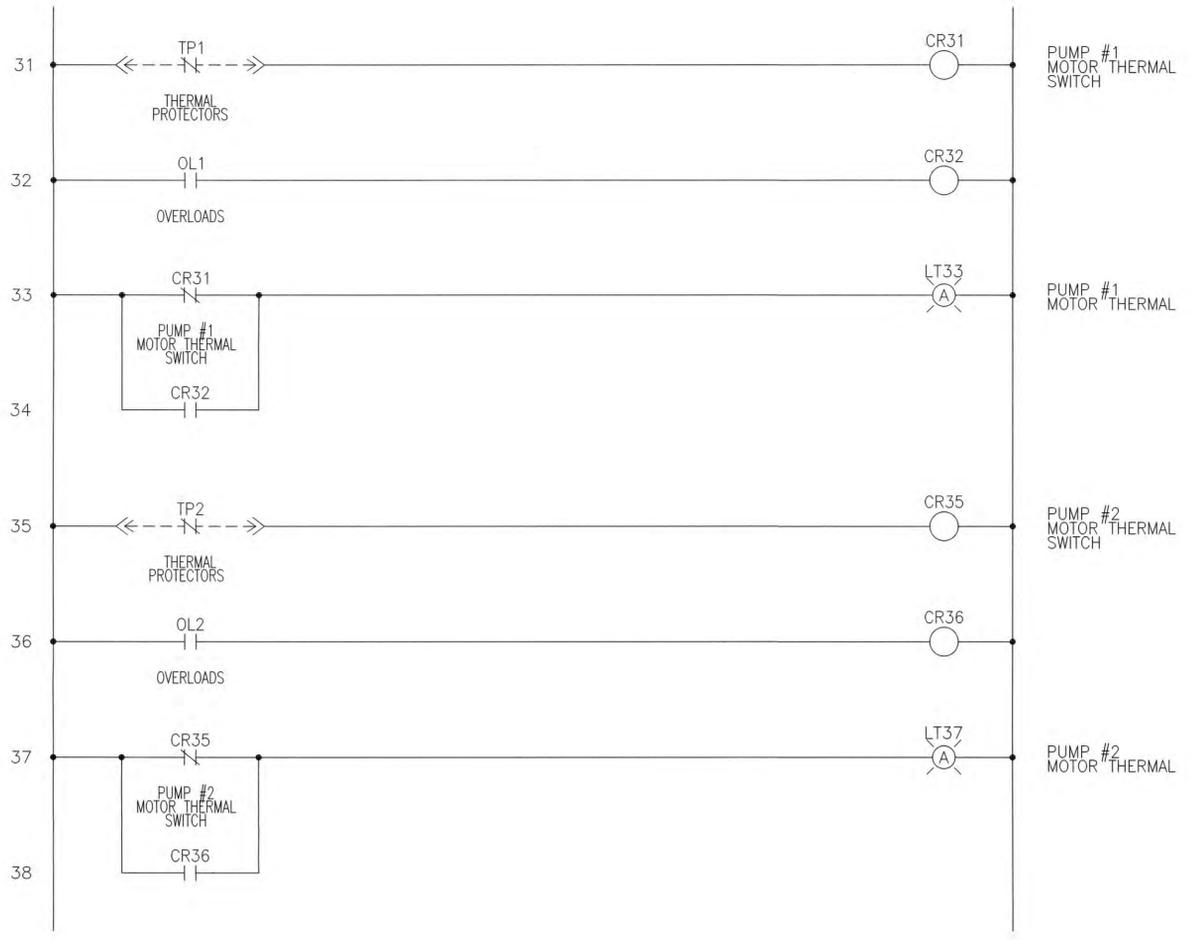
SKW
 CIVIL ENGINEERS ELECTRICAL ENGINEERS MECHANICAL ENGINEERS STRUCTURAL ENGINEERS LANDSCAPE ARCHITECTS LAND SURVEYORS LAND PLANNERS

**MODOT SEWER IMPROVEMENTS
 RICHMOND, MO**

SCHEMATIC

140311-010
 SHEET NO.
 E-2

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 LAYOUT: LAYOUT1 BY: CPORTER DATE: 9/19/2014
 XREF DWG1: NONE XREF DWG2: NONE
 XREF DWG3: NONE XREF DWG4: NONE



NOTES:
 1 ROUTE MAGFLUX #691080 CABLE INTO WET WELL AND DOWN TO FLOW SENSOR
 2 FLOW SENSOR TO BE POTTED WITH MAGFLUX POTTING KIT #579036

5	DESIGNED BY: PRW	DATE	BY: APPD
4	DRAWN BY: JDC	REVISIONS	
3	CHECKED BY: PRW	NO.	
2	ISSUE DATE:		
1			

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MODOT SEWER IMPROVEMENTS RICHMOND, MO

SCHEMATIC

140311-010
 SHEET NO.
 E-3