

LEGEND	
	PROPOSED 12" SANITARY FORCE MAIN
	PROPOSED 6" SANITARY FORCE MAIN
	PROPOSED 12" WATER LINE
	PROPOSED RIGHT OF WAY
	PROPOSED DITCH
	EXISTING SANITARY FORCE MAIN
	EXISTING WATER LINE
	EXISTING DITCH
	EXISTING STORM SEWER
	EXISTING TELECOM
	EXISTING OVERHEAD ELECTRIC
	PROPOSED EDGE OF PAVEMENT
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE



Know what's below.  
Call before you dig.



OVERALL SHEET  
UTILITY SHEETS

DESIGN AGENCY

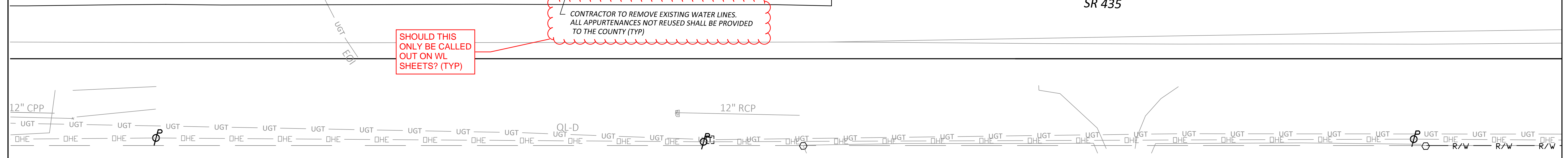
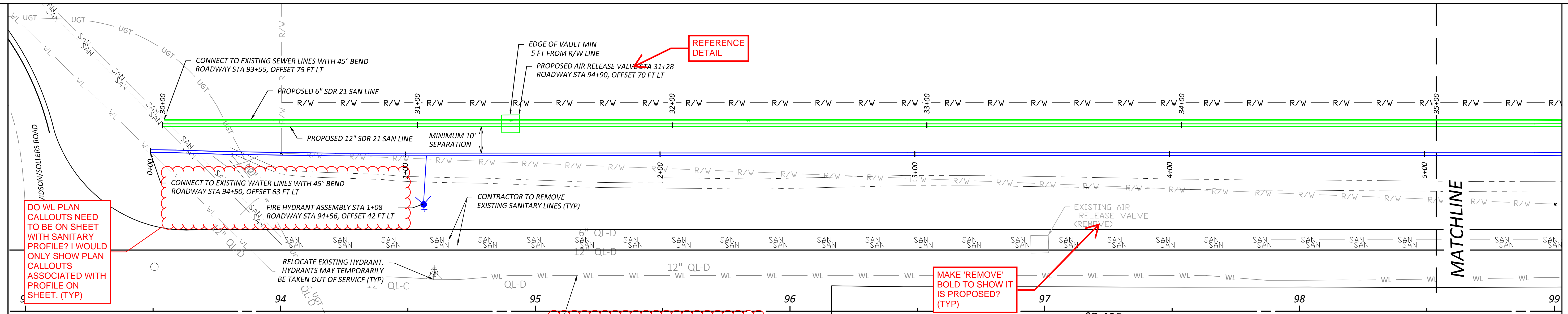
**Palmer**  
ENGINEERING  
8350 EAST KEMPER ROAD  
SUITE B  
CINCINNATI, OH 45249  
(513) 469-1600

DESIGNER  
**EMR**

REVIEWER  
SIB 01/19/24

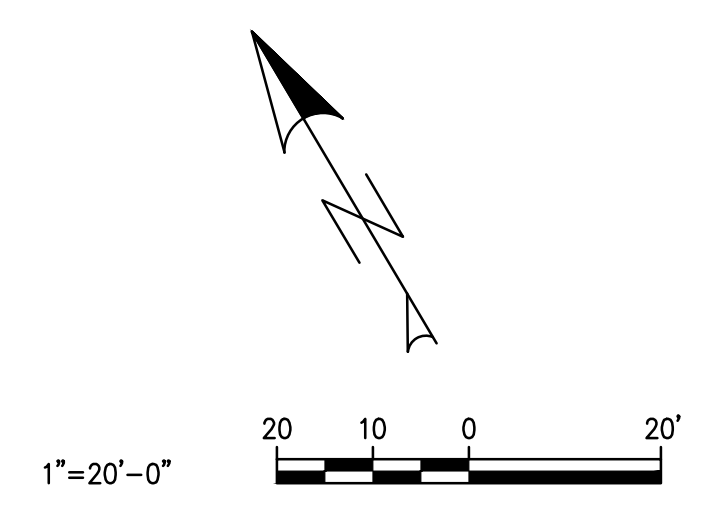
PROJECT ID  
**117955**

SHEET	TOTAL
02	15



**LEGEND**

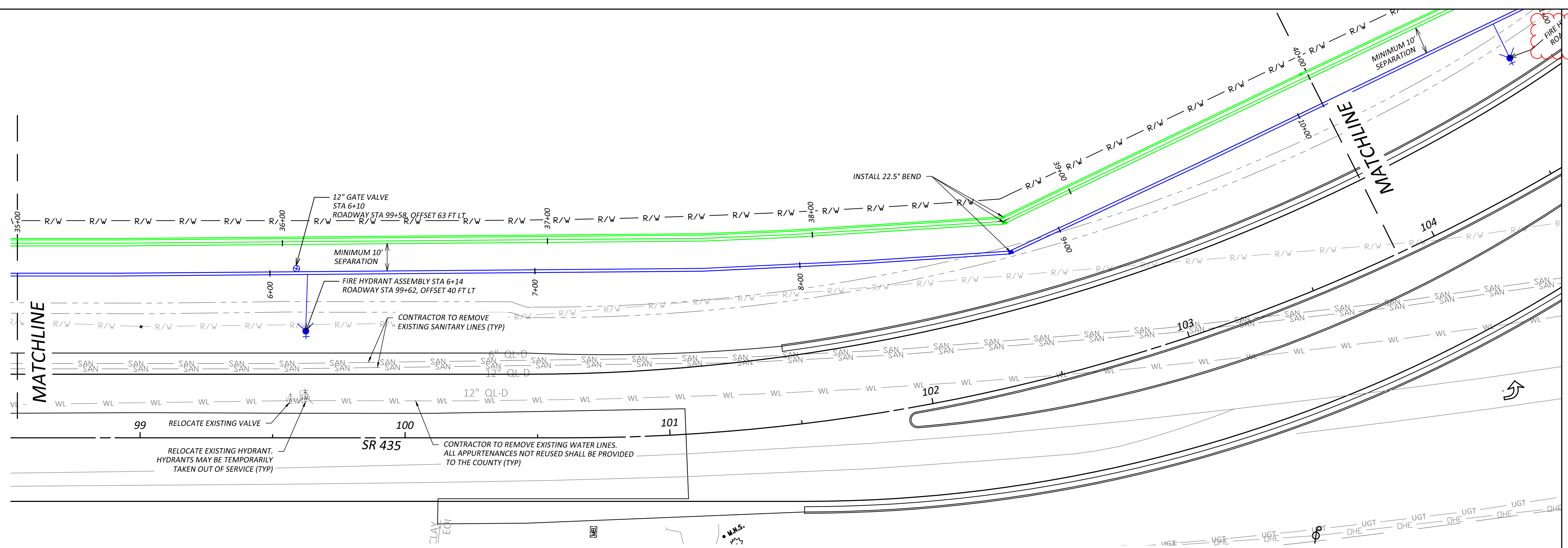
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	PROPOSED EDGE OF PAVEMENT
	EXISTING RIGHT OF WAY
	PROPOSED FIRE HYDRANT
	PROPOSED WATER VALVE



Know what's below.  
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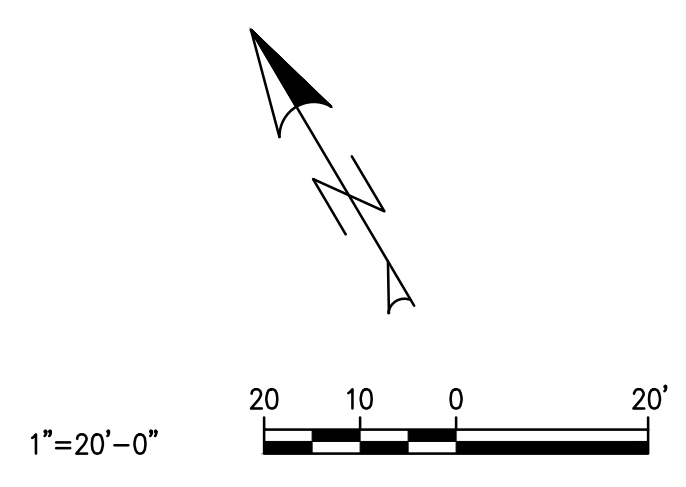
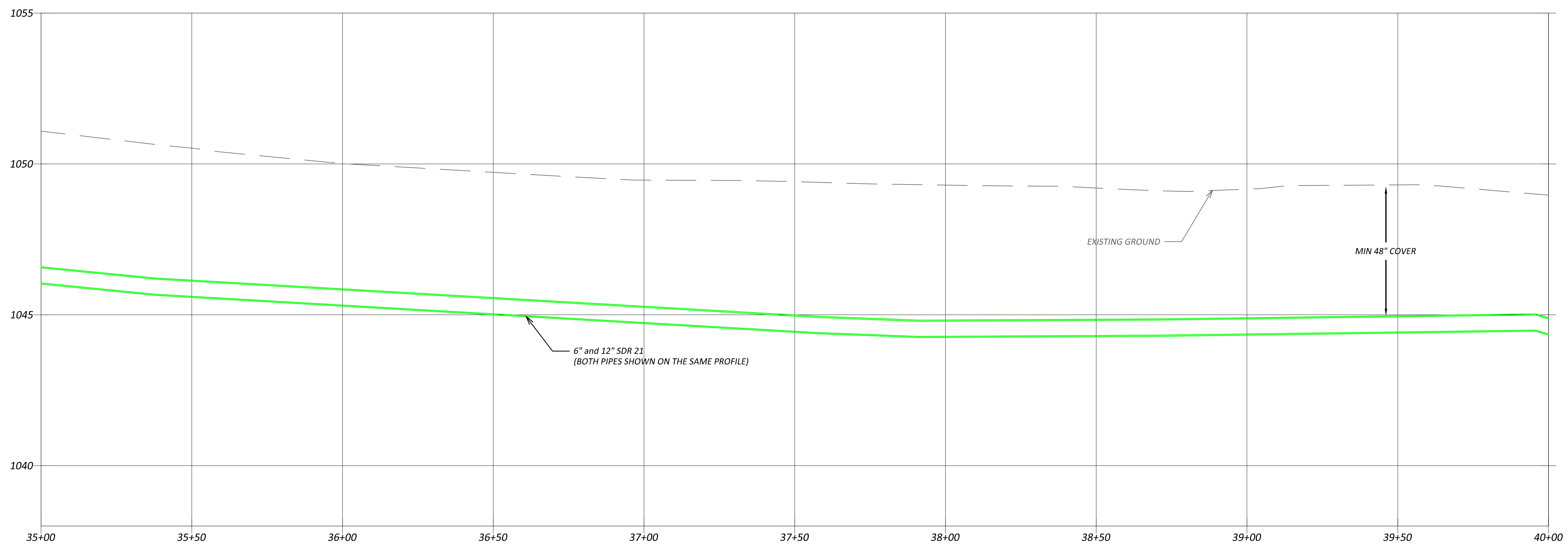
SANITARY FORCEMAIN  
SCALE: 1" = 20' HORZ.  
1" = 2' VERT.

DESIGN AGENCY	Palmer ENGINEERING
DESIGNER	EMR
REVIEWER	SIB
PROJECT ID	01/19/24
SHEET	03
TOTAL	15



**LEGEND**

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- EXISTING DITCH
- ST EXISTING STORM SEWER
- > EXISTING TELECOM
- OHT EXISTING OVERHEAD ELECTRIC
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- PROPOSED EDGE OF PAVEMENT
- R/W EXISTING RIGHT OF WAY
- PROPOSED FIRE HYDRANT
- ⊗ PROPOSED WATER VALVE



Know what's below.  
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SANITARY FORCE MAIN  
SCALE: 1" = 20' HORIZ.  
1" = 2' VERT.

**SANITARY SEWER PLAN AND PROFILE  
UTILITY SHEETS**

DESIGN AGENCY



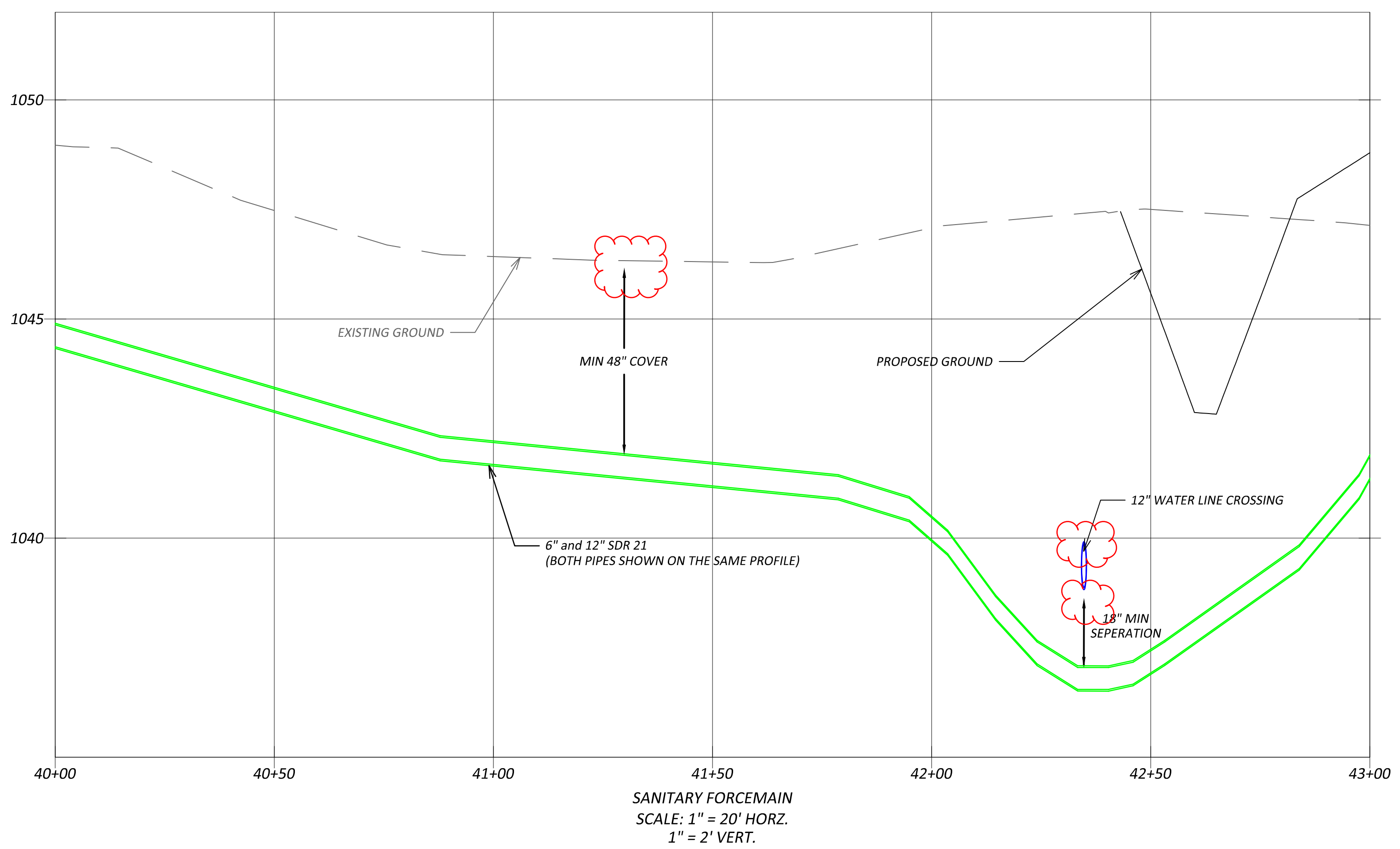
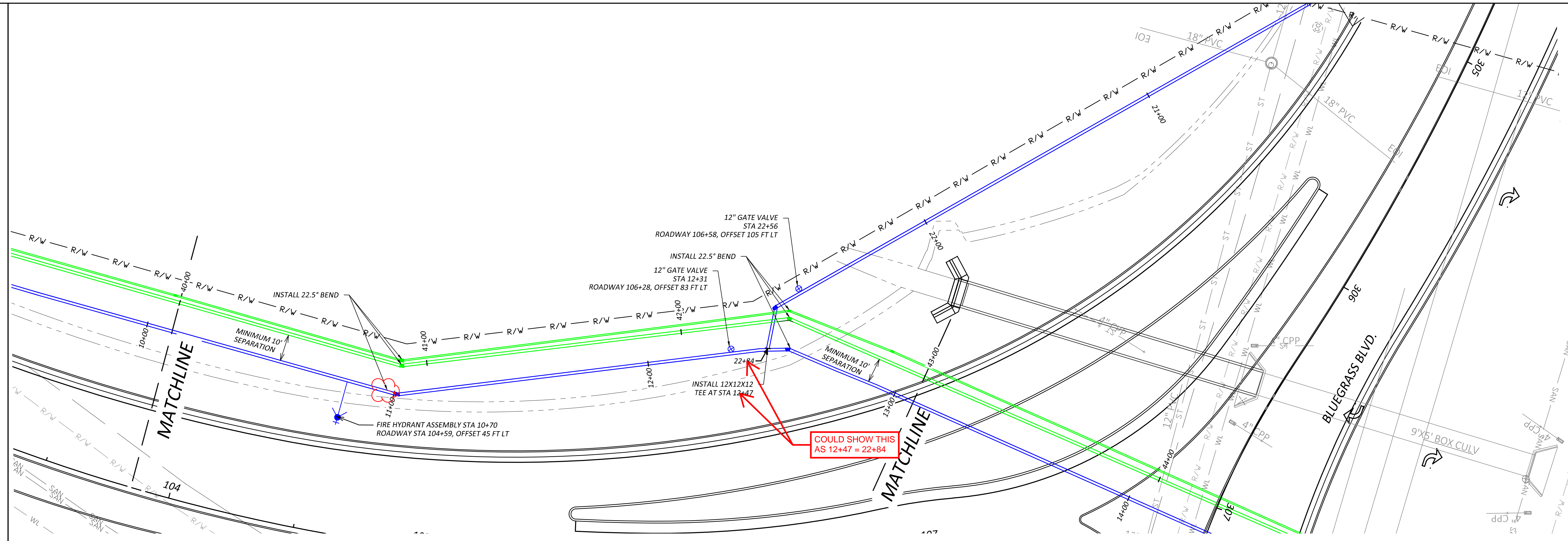
DESIGNER  
**EMR**

REVIEWER  
**SIB 01/19/24**

PROJECT ID  
**117955**

SHEET	TOTAL
04	15

FAY-435-1.52

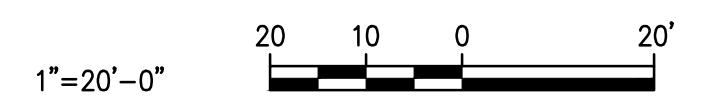


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**SANITARY SEWER PLAN AND PROFILE  
UTILITY SHEETS**

DESIGN AGENCY

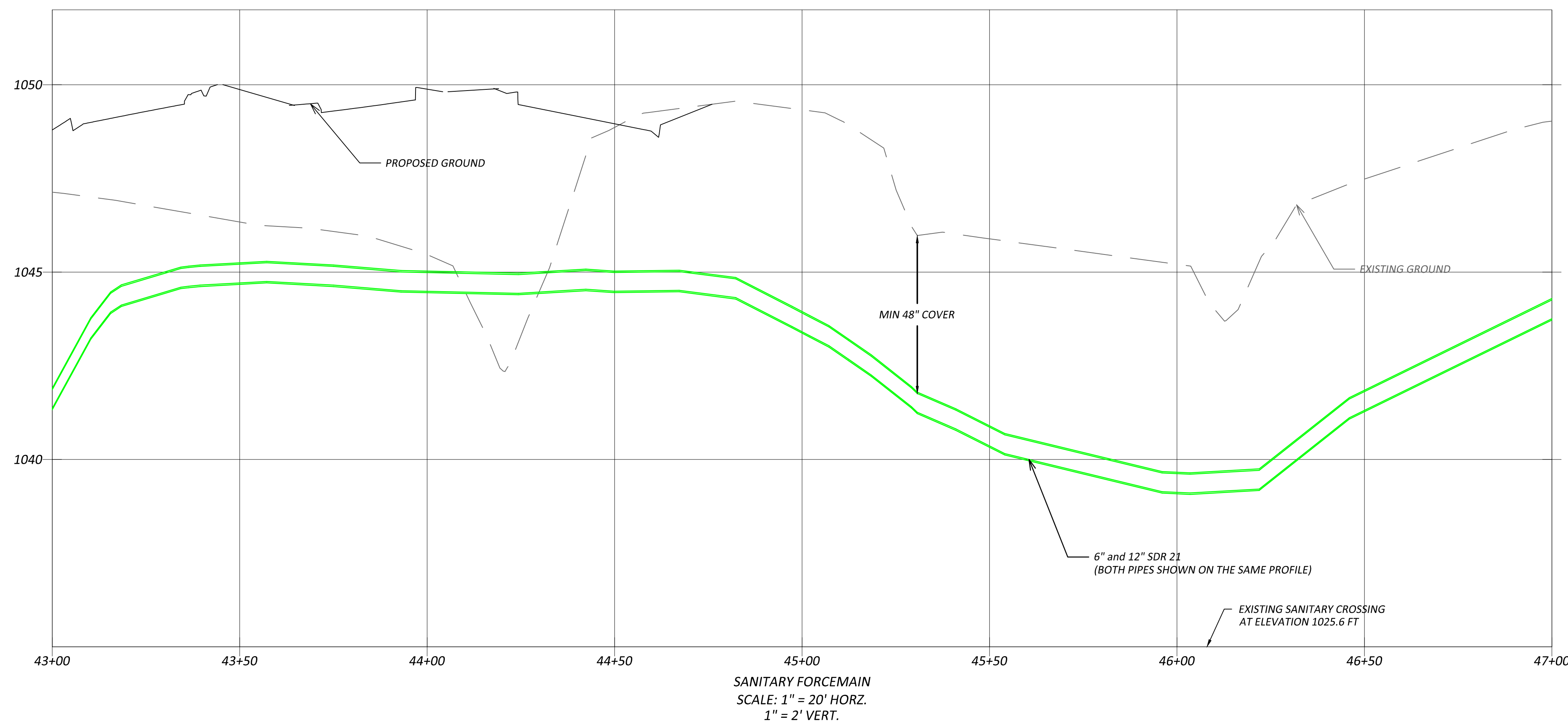
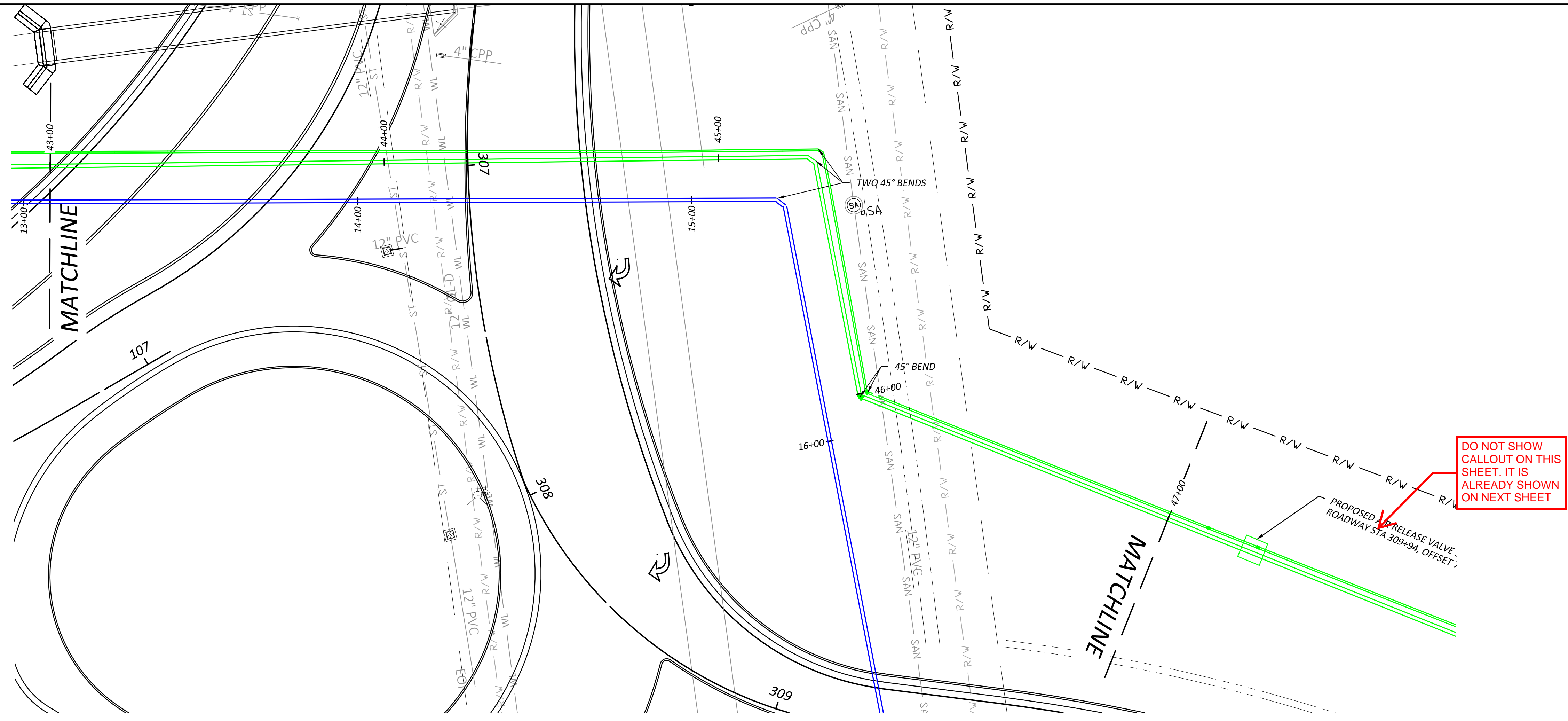


DESIGNER  
**EMR**

REVIEWER  
**SIB**

PROJECT ID  
**01/19/24**

SHEET TOTAL  
**05 15**

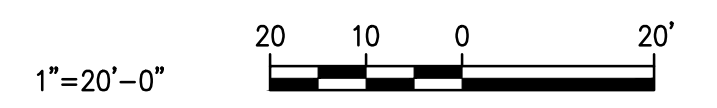


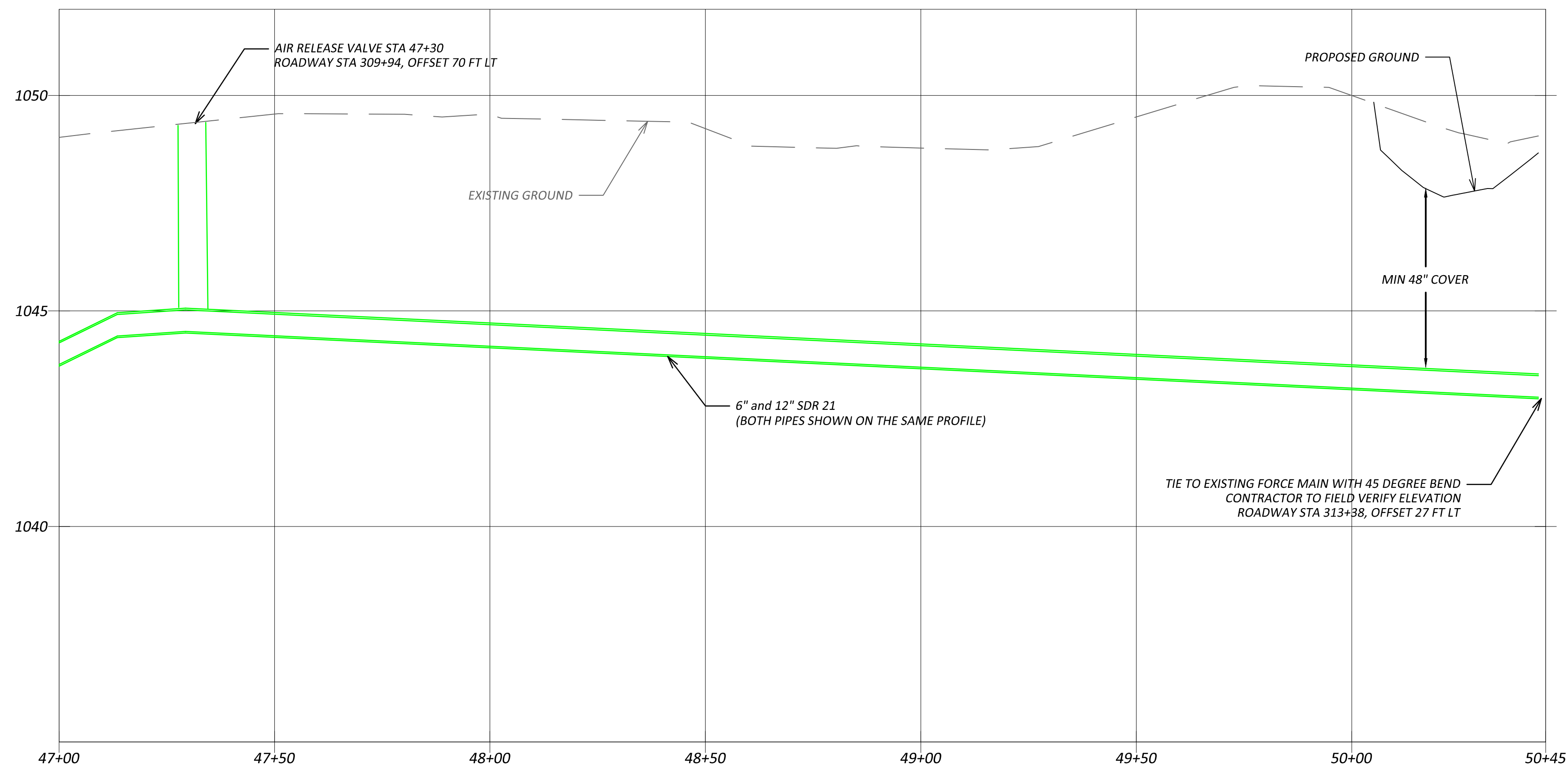
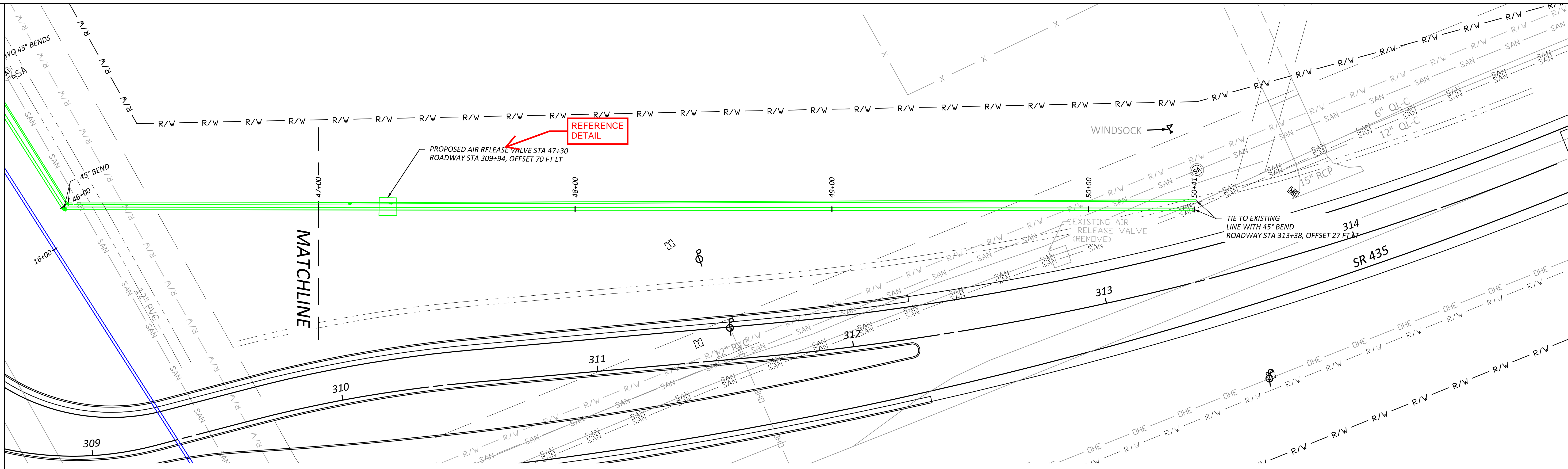
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SANITARY FORCE MAIN  
SCALE: 1" = 20' HORZ.  
1" = 2' VERT.

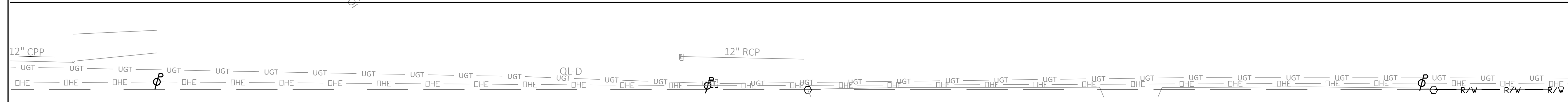
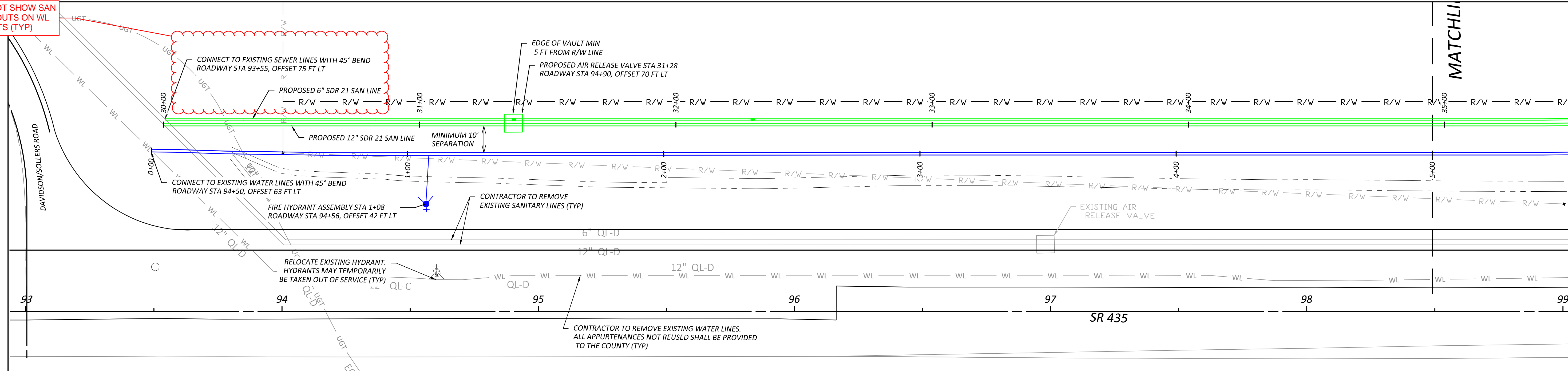
Know what's below.  
Call before you dig.

1"=20'-0"

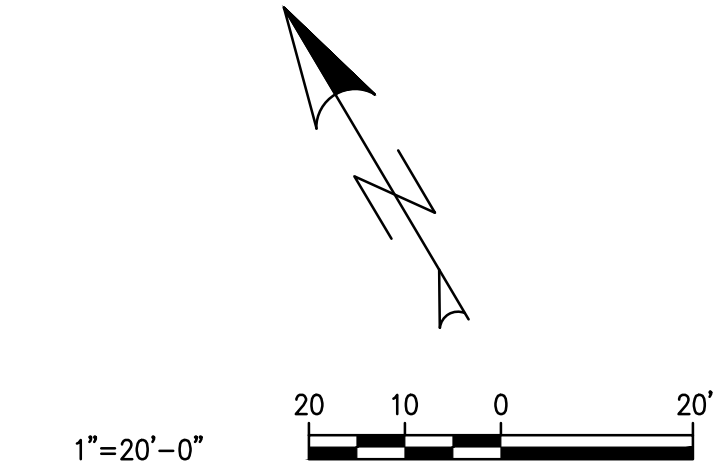
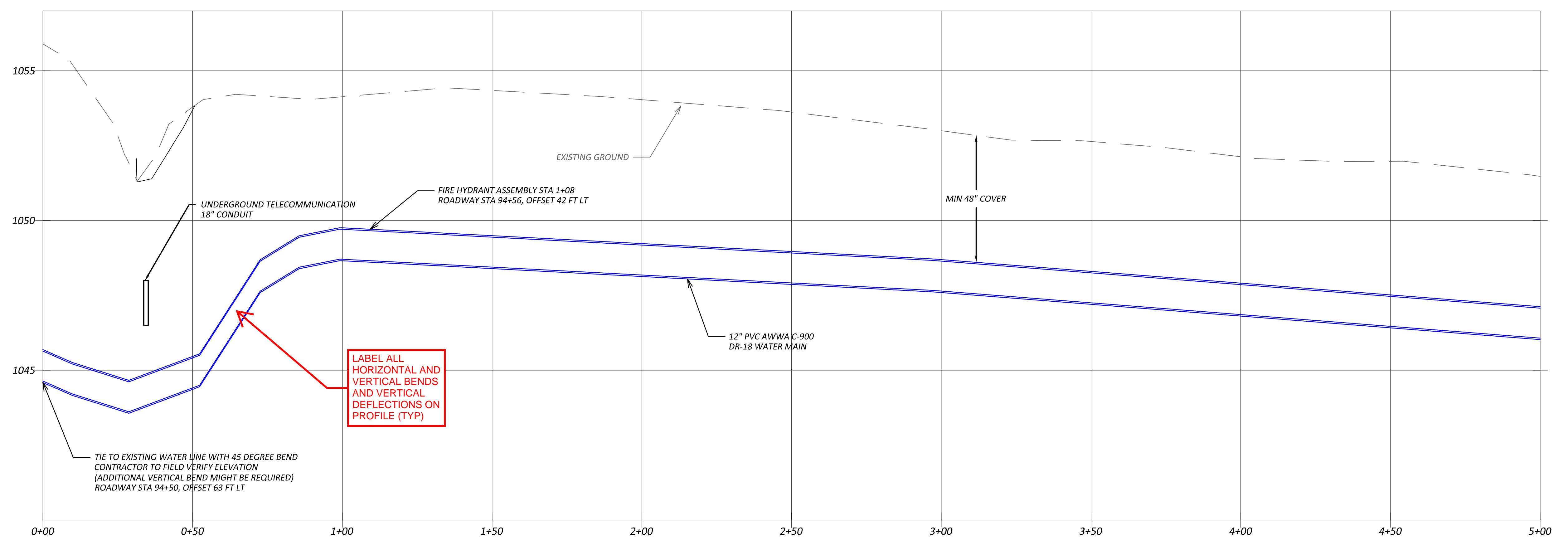
SANITARY SEWER PLAN AND PROFILE  
UTILITY SHEETS

DESIGN AGENCY	<b>Palmer</b> ENGINEERING
DESIGNER	EMR
REVIEWER	SIB
PROJECT ID	01/19/24
SHEET	117955
TOTAL	07
	15

DO NOT SHOW SAN CALLOUTS ON WL SHEETS (TYP)



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WATERLINE A  
SCALE: 1" = 20' HORZ.  
1" = 2' VERT.

WATER LINE PLAN AND PROFILE  
UTILITY SHEETS

FAY-435-1.52

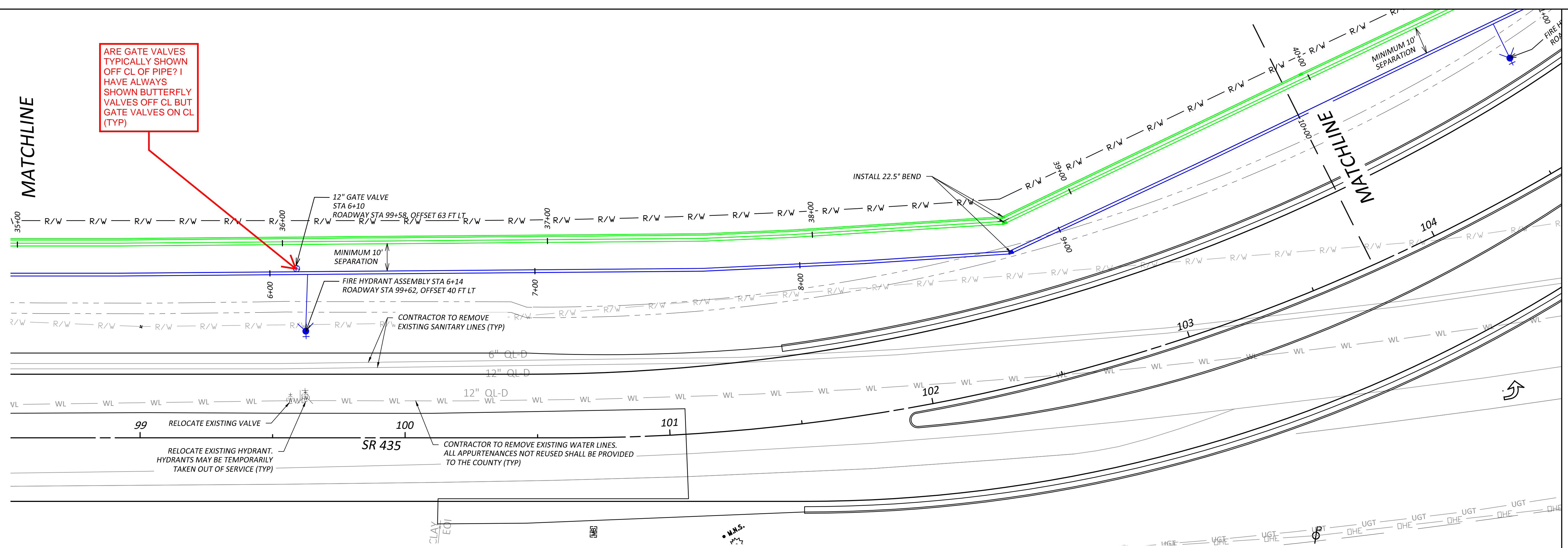
DESIGN AGENCY	
ENGINEERING 8350 EAST KEMPER ROAD SUITE B CINCINNATI, OH 45249 (513) 469-1600	
DESIGNER	
EMR	
REVIEWER	
SIB 01/19/24	
PROJECT ID	
117955	
SHEET	TOTAL
08	15



ARE GATE VALVES  
TYPICALLY SHOWN  
OFF CL OF PIPE? I  
HAVE ALWAYS  
SHOWN BUTTERFLY  
VALVES OFF CL BUT  
GATE VALVES ON CL  
(TYP)

MATCHLINE

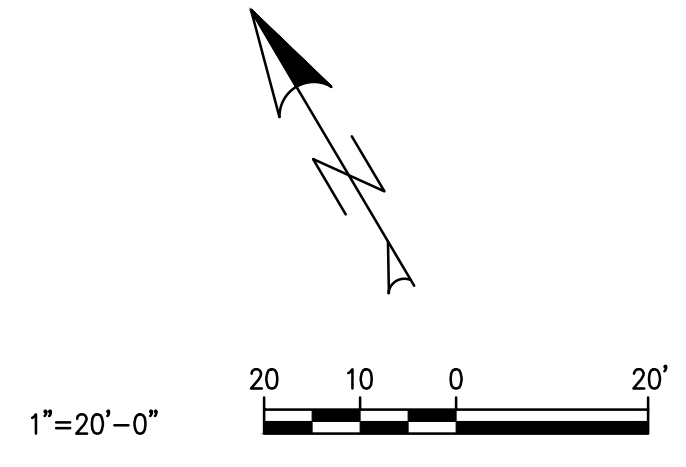
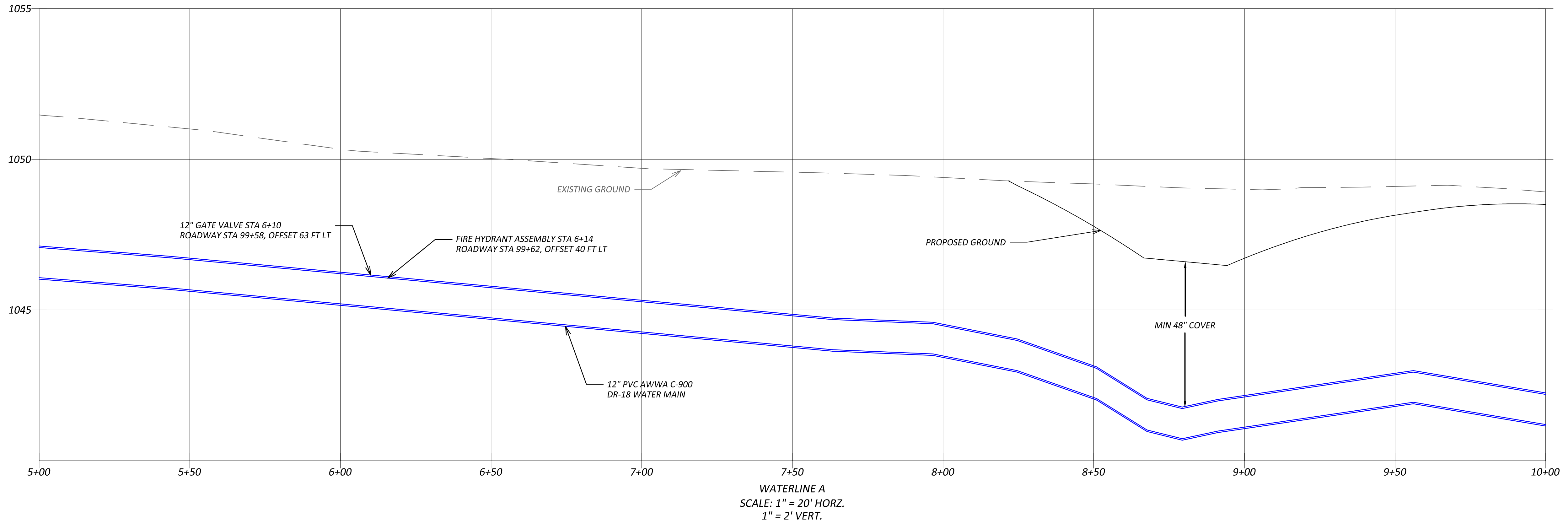
MATCHLINE



WATER LINE PLAN AND PROFILE  
UTILITY SHEETS

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FAY-435-1.52

DESIGN AGENCY

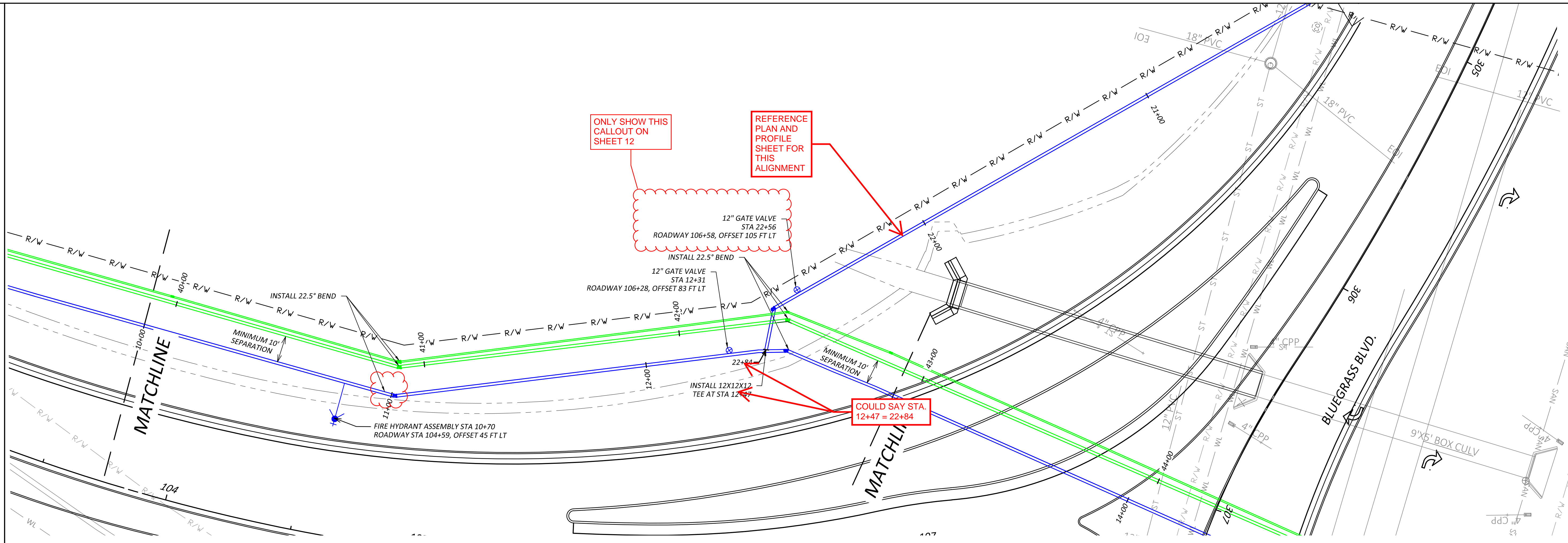
**Palmer**  
ENGINEERING  
8350 EAST KEMPER ROAD  
SUITE B  
CINCINNATI, OH 45249  
(513) 469-1600

DESIGNER  
EMR

REVIEWER  
SIB 01/19/24

PROJECT ID  
117955

SHEET TOTAL  
09 15



ONLY SHOW THIS  
CALLOUT ON  
SHEET 12

REFERENCE  
PLAN AND  
PROFILE  
SHEET FOR  
THIS  
ALIGNMENT

12" GATE VALVE  
STA 22+56  
ROADWAY 106+58, OFFSET 105 FT LT

INSTALL 22.5" BEND  
12" GATE VALVE  
STA 12+31  
ROADWAY 106+28, OFFSET 83 FT LT

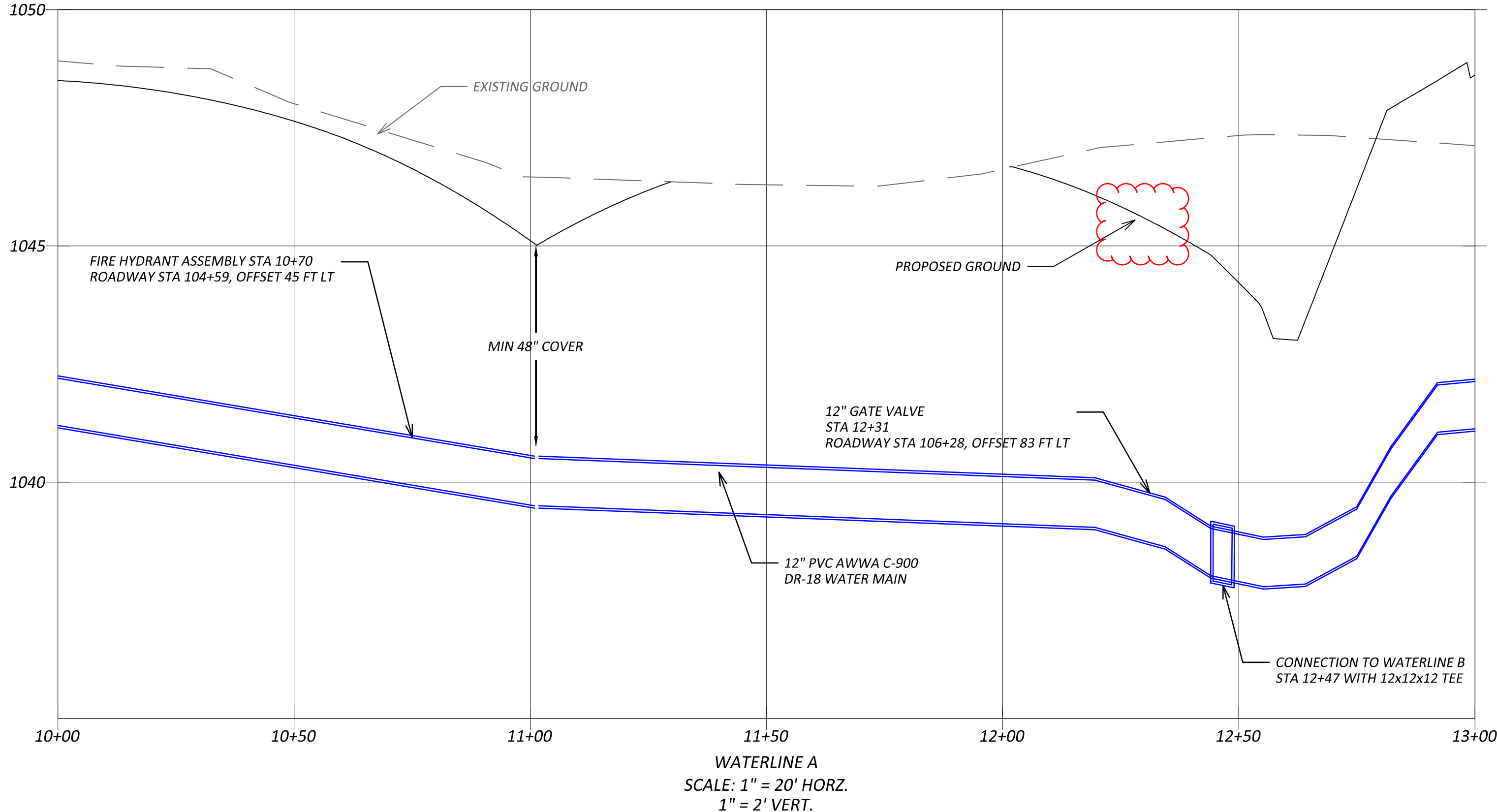
COULD SAY STA.  
12+47 = 22+84

FIRE HYDRANT ASSEMBLY STA 10+70  
ROADWAY STA 104+59, OFFSET 45 FT LT

INSTALL 12X12X12  
TEE AT STA 12+47

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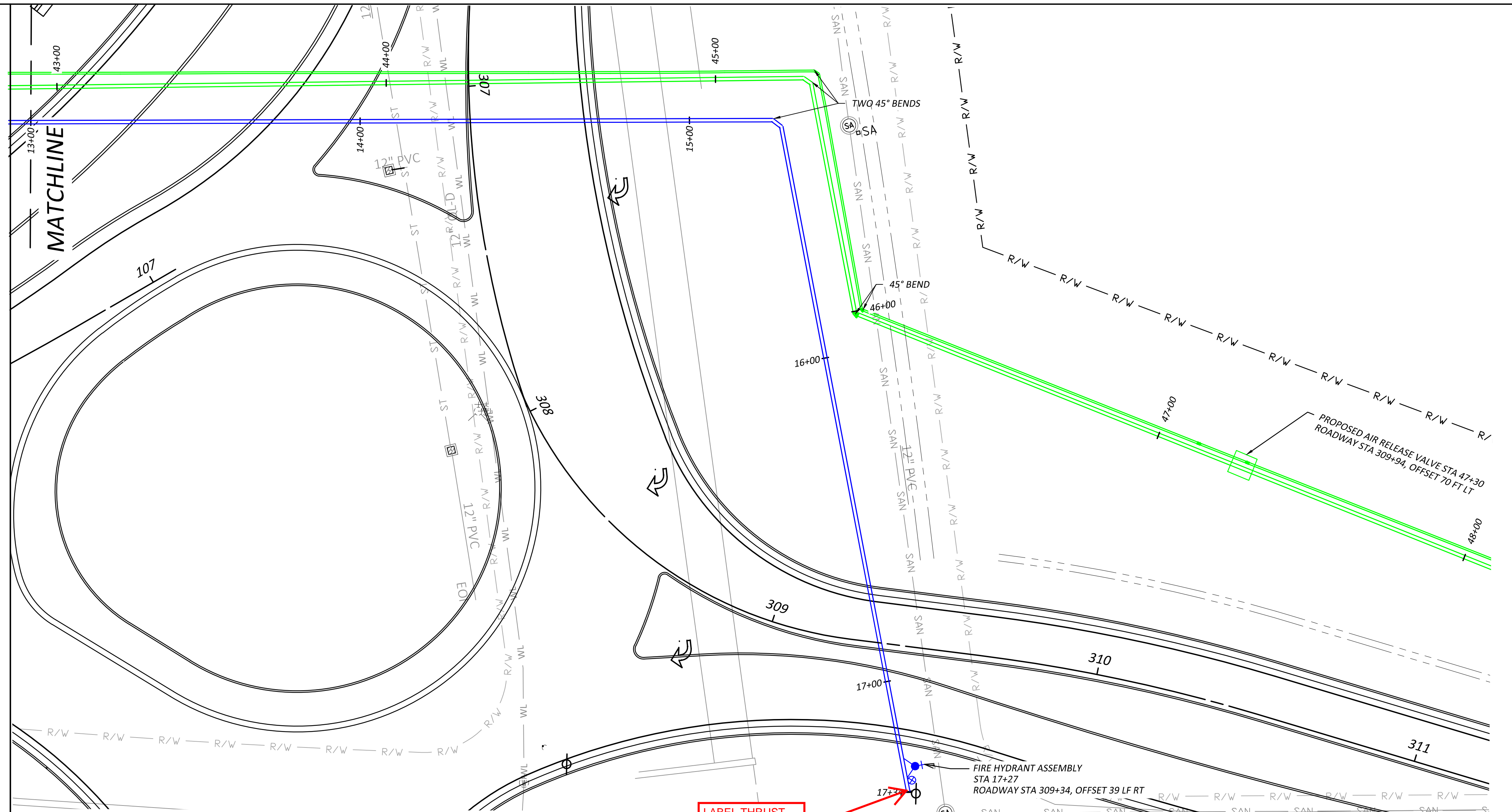


DESIGNER  
EMR

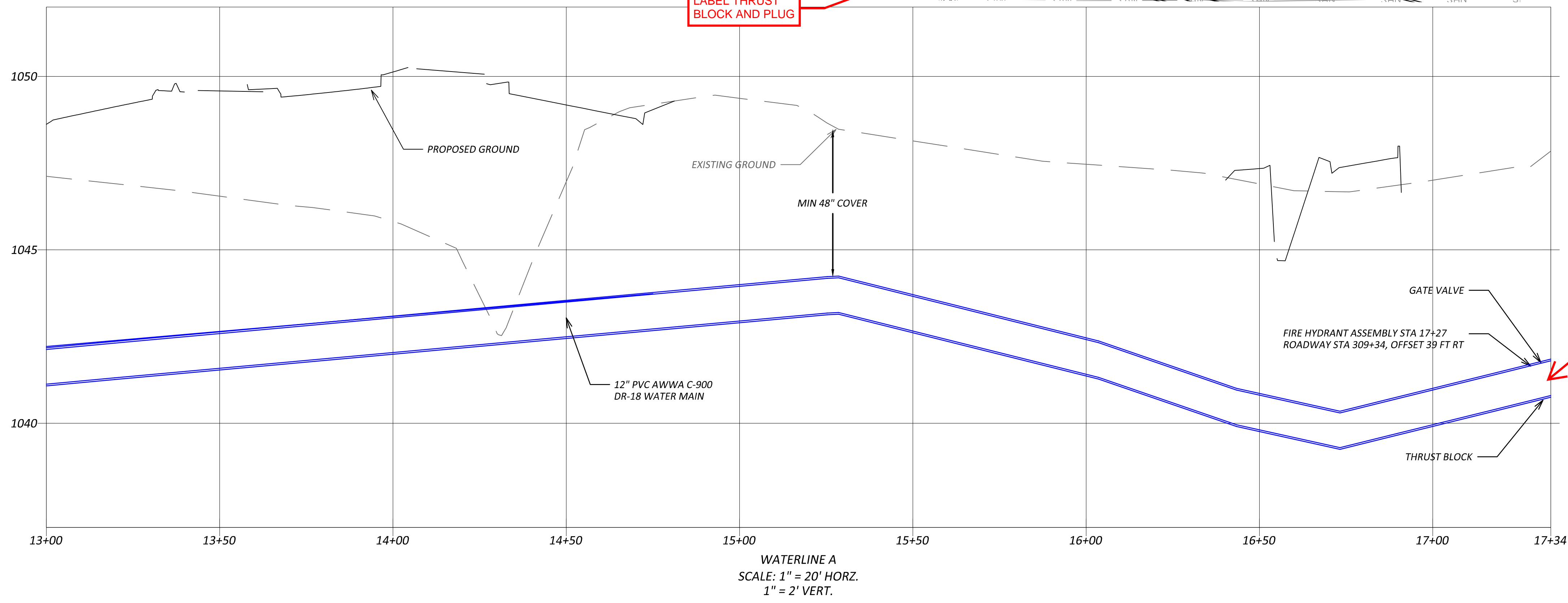
REVIEWER  
SIB 01/19/24

PROJECT ID  
117955

SHEET TOTAL  
10 15

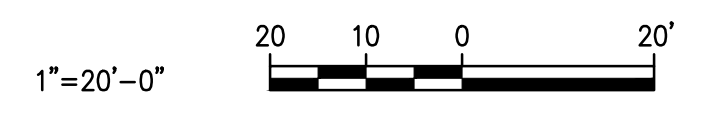
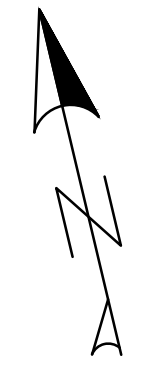


LABEL THRUST BLOCK AND PLUG

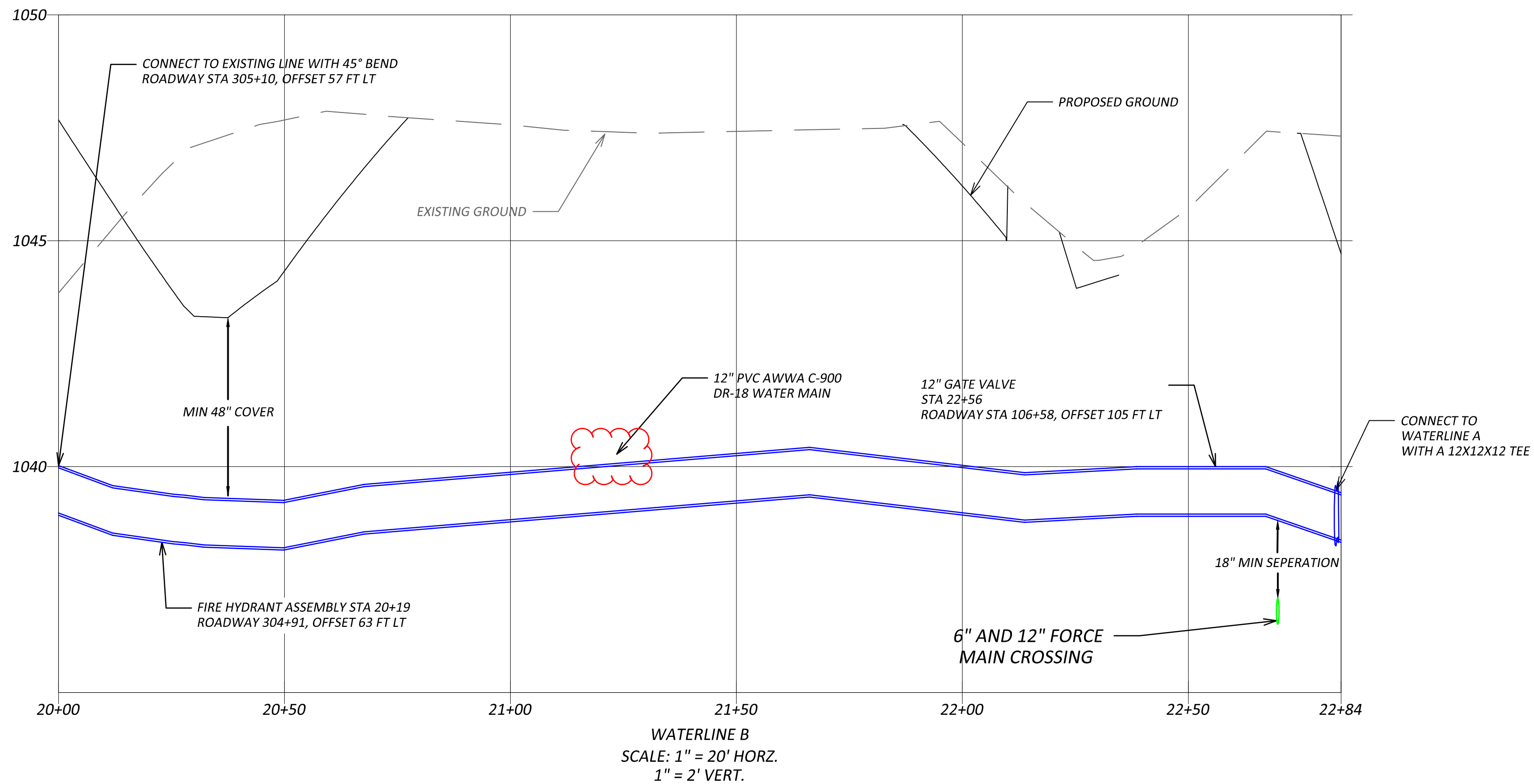
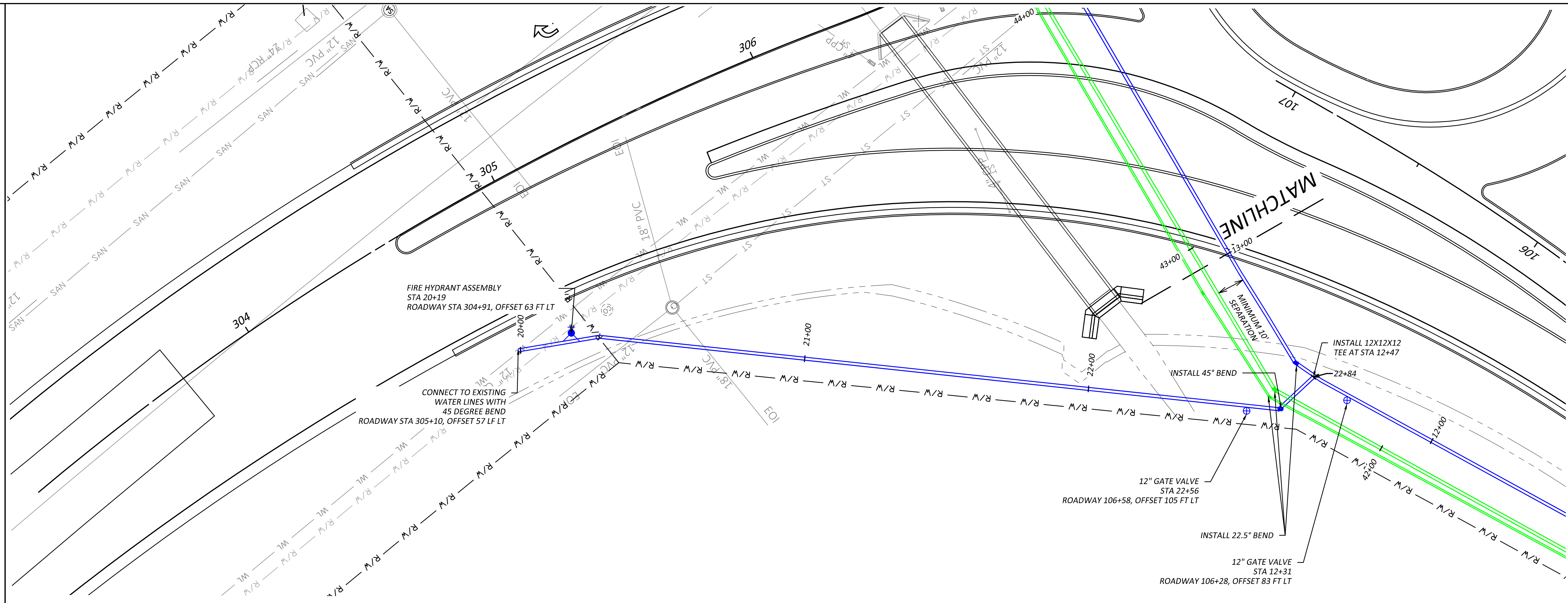


LABEL PLUG AS WELL AS THRUST BLOCK?

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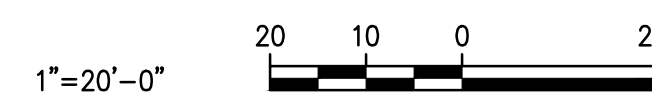


DESIGN AGENCY	
ENGINEERING 8350 EAST KEMPER ROAD SUITE B CINCINNATI, OH 45249 (513) 469-1600	
DESIGNER	EMR
REVIEWER	SIB
PROJECT ID	117955
SHEET	TOTAL
11	15



**LEGEND**

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DESIGN AGENCY	Palmer ENGINEERING
DESIGNER	EMR
REVIEWER	SIB
PROJECT ID	117955
SHEET	12
TOTAL	15

**ELEVATION DATUM:**

ALL ELEVATIONS ARE BASED ON NAVD 88 (ODOT VRS GEOID 12B)

**GENERAL NOTES AND DETAILS:**

ALL CONSTRUCTION METHODS, MATERIALS, AND SPECIFICATIONS SHALL COMPLY WITH THE FAYETTE COUNTY ENGINEERING STANDARDS AND SPECIFICATIONS OR OHIO DEPARTMENT OF TRANSPORTATION CONSTRUCTION STANDARDS AND SPECIFICATIONS, WHICHEVER IS MORE RESTRICTIVE AS DETERMINED BY THE COUNTY.

**MODIFICATIONS:**

ANY MODIFICATIONS TO THE SPECIFICATIONS OR CHANGES TO THE WORK AS SHOWN ON THE DRAWINGS MUST HAVE PROPER WRITTEN APPROVAL BY THE COUNTY.

**UTILITY OWNERSHIP:**

**TELEPHONE**  
AT&T OHIO  
111 N 4TH STREET, ROOM 802  
COLUMBUS, OHIO 43215  
ATTN: CHRIS MORRIS  
(614) 223-4176

**SPECTRUM**  
32 ENTERPRISE DRIVE  
CHILlicothe, OH 45601  
ATTN: JIM OREBAUGH  
(740) 253-2122

**GAS**  
DOMINION TRANSMISSION  
518 EAST PITTSBURGH STREET  
GREENSBURG, PA 15601  
ATTN: ANGEL MARRERO  
(724) 468-7723

**ELECTRIC**  
AES OHIO  
1900 DRYDEN ROAD  
DAYTON, OH 45439  
ATTN: BILL GOURLY  
(937) 331-4521

**SANITARY**  
FAYETTE COUNTY DEPARTMENT OF SANITARY SERVICES  
133 SOUTH MAIN STREET, SUITE L-22  
WASHINGTON COURT HOUSE, OH 431160  
ATTN: STEVE LUEBBE  
(740) 333-3538

**OHIO UTILITIES PROTECTION SERVICES**  
2 WORKING DAYS BEFORE YOUR DIG CALL TOLL FREE (1-800-362-2784)

**CLEAN WATER CONNECTIONS:**

ROOF DRAINS, FOUNDATION DRAINS, AND ALL OTHER CLEAN WATER CONNECTIONS TO THE SANITARY SYSTEM ARE PROHIBITED.

**SUBCONTRACTOR SUPERVISION:**

THE CONTRACTOR IS REQUIRED TO HAVE A PROJECT SUPERVISOR ON-SITE TO SUPERVISE THE SUBCONTRACTOR FOR QUALITY CONTROL PURPOSES AND TO PROVIDE ANY NECESSARY ASSISTANCE TO THE SUBCONTRACTOR TO ENSURE QUALITY WORK.

**CROSSINGS AND CONNECTIONS TO EXISTING PIPES AND UTILITIES:**

WHERE PLANS PROVIDE FOR A PROPOSED CONDUIT TO BE CONNECTED TO, OR CROSS OVER OR UNDER AND EXISTING SEWER OR UNDERGROUND UTILITY, THE CONTRACTOR SHALL LOCATE THE EXISTING PIPES OR UTILITIES BOTH AS TO LINE AND GRADE BEFORE STARTING TO LAY THE PROPOSED CONDUIT.

IF IT IS DETERMINED THAT THE ELEVATION OF THE EXISTING CONDUIT, OR EXISTING APPURTENANCE TO BE CONNECTED, DIFFERS FROM THE PLAN ELEVATION, OR RESULTS IN A CHANGE IN THE PLAN CONDUIT SLOPE, THE COUNTY SHALL BE NOTIFIED BEFORE STARTING CONSTRUCTION OF ANY PORTION OF THE PROPOSED CONDUIT WHICH WILL BE AFFECTED BY THE VARIANCE IN THE EXISTING ELEVATIONS.

IF IT IS DETERMINED THAT THE PROPOSED CONDUIT WILL INTERSECT ANY EXISTING SEWER OR UNDERGROUND UTILITY IF CONSTRUCTED AS SHOWN ON THE PLAN, THE COUNTY SHALL BE NOTIFIED BEFORE STARTING CONSTRUCTION OF ANY PORTION OF THE PROPOSED CONDUIT WHICH WOULD BE AFFECTED BY THE INTERFERENCE WITH AN EXISTING FACILITY.

**WATER MAIN SEPARATION**

WHENEVER A SANITARY SEWER AND A WATER MAIN MUST CROSS, THE SEWER SHALL BE LAID BELOW THE WATER MAIN AT SUCH AN ELEVATION THAT THE CROWN OF THE SEWER IS AT LEAST 18" BELOW THE BOTTOM OF THE WATER MAIN PIPE. IF IT IS ABSOLUTELY IMPOSSIBLE TO MAINTAIN THE 18" VERTICAL SEPARATION, THE SEWER SHALL BE EITHER CONSTRUCTED OF EITHER SLIP-ON OR MECHANICAL JOINT WATER MAIN MATERIAL AND BE PRESSURE TESTED TO 150 PSI TO ENSURE WATER-TIGHTNESS OR BE ENCASED IN A 1/2" THICK CONTINUOUS STEEL, DUCTILE IRON OR PRESSURE RATED, DR 18 OR LESS PVC PIPE FOR A DISTANCE OF 10 FEET ON EITHER SIDE OF THE CROSSING. THE SEWER SHALL BE THE LONGEST STANDARD LENGTH AVAILABLE AND BE CENTERED AT THE POINT OF CROSSING SO

THE JOINTS ARE AS FAR AS POSSIBLE FROM THE WATER MAIN.

WHENEVER A STORM SEWER AND A WATER MAIN MUST CROSS, THE PIPES SHALL BE LAID AT SUCH ELEVATIONS THAT THE CROWN OF ONE PIPE IS AT LEAST 18" BELOW THE BOTTOM OF THE OTHER.

WATER MAIN MUST BE INSTALLED WITH A MINIMUM OF 10' HORIZONTAL SEPARATION FROM ALL STORM AND SANITARY SEWERS, MEASURED FROM OUTSIDE OF PIPE TO OUTSIDE OF PIPE.

**NONRUBBER TIRE VEHICLES:**

NO NONRUBBER TIRE VEHICLES SHALL BE MOVED ON PUBLIC STREETS. EXCEPTIONS MAY BE GRANTED BY THE COUNTY WHERE SHORT DISTANCES AND SPECIAL CIRCUMSTANCES ARE INVOLVED. GRANTING OF EXCEPTIONS MUST BE IN WRITING AND ANY RESULTING DAMAGE MUST BE REPAIRED TO THE SATISFACTION OF THE COUNTY. THE CONTRACTOR SHALL USE EXTREME CARE WHEN OPERATING NONRUBBER TIRE VEHICLES ON STREETS OR DRIVEWAYS TO AVOID MARKING OR DAMAGING THE PAVEMENT. PROTECTION OF THE PAVEMENT FROM DAMAGE RESULTING FROM THE TRACK OF NONRUBBER TIRE VEHICLES UTILIZED IN TRENCH EXCACTION SHALL BE REQUIRED. A WOOD PLANK SYSTEM, USED TIRES, RUBBER MATS, OR OTHER MEANS AS APPROVED THE COUNTY'S REPRESENTATIVE SHALL BE USED TO PROTECT THE PAVEMENT.

**WORK LIMITS:**

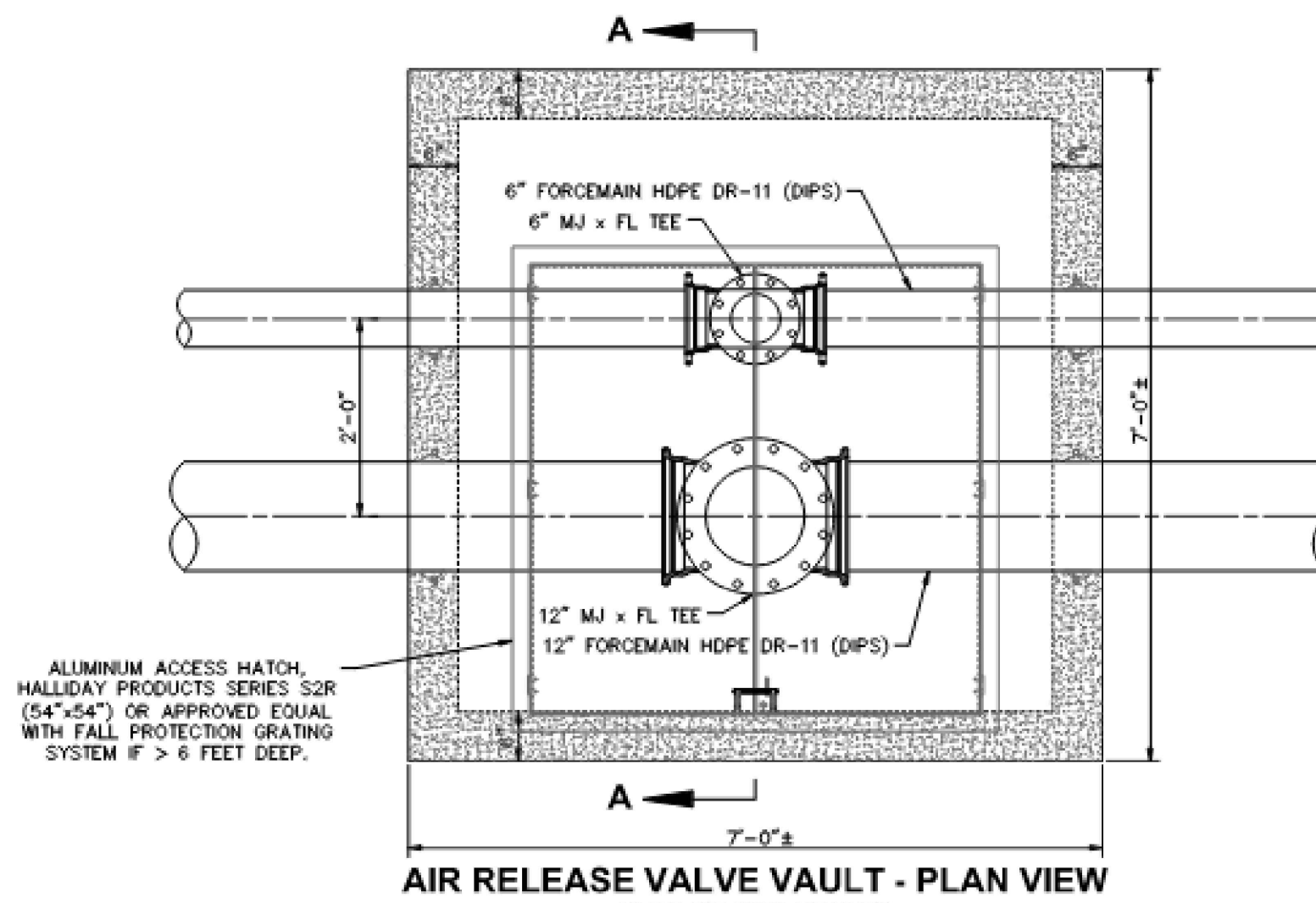
ALL WORK SHALL BE WITHIN EXISTING OR PROPOSED RIGHT-OF-WAY AND/OR CONSTRUCTION LIMITS UNLESS OTHERWISE INSTRUCTED BY THE COUNTY. THE WORK LIMITS SHOWN ON THESE PLANS ARE FOR PHYSICAL CONSTRUCTION ONLY. THE INSTALLATION AND OPERATION OF ALL TEMPORARY TRAFFIC CONTROL AND TEMPORARY TRAFFIC DEVICES REQUIRED BY THESE PLANS SHALL BE PROVIDED BY THE CONTRACTOR WHETHER INSIDE OF OUTSIDE THESE WORK LIMITS.

**SANITARY SEWER NOTES:**

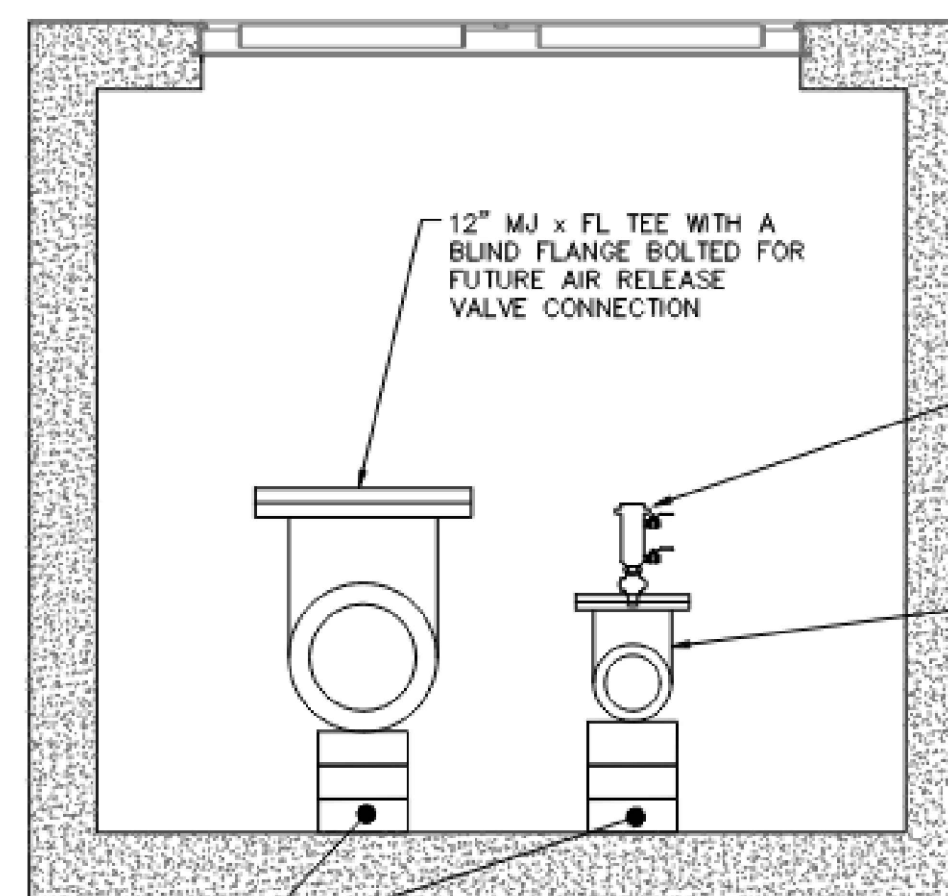
- A. **SANITARY SEWERS SHALL CONFORM TO THE OEPA "TEN STATES STANDARDS" LATEST EDITION.**
- B. POLYVINYL CHLORIDE PIPE (PVC) PIPE AND THE FITTINGS SHALL CONFORM TO ASTM D3034. PIPE JOINTS AND GASKETS SHALL CONFORM TO ASTM 3212 AND F477 RESPECTIVELY. A MANUFACTURER'S CERTIFICATION THAT THE PRODUCT WAS MANUFACTURED, TESTED, AND SUPPLIED IN ACCORDANCE WITH THIS SPECIFICATION SHALL BE FURNISHED UPON REQUEST TO THE PROJECT ENGINEER. PIPE INSTALLATION SHALL BE IN ACCORDANCE WITH THE RECOMMENDATION FROM THE MANUFACTURER. THE SEWER PIPE INSTALLED UNDER PAVED AREAS SHALL BE BACKFILLED WITH ODOT 703.11, TYPE 3, (#57 OR #67) AGGREGATE.
- C. SANITARY LATERAL CONNECTIONS DASH ALL "WYE" BRANCHES SHALL BE OF THE SAME MATERIAL AS THE MAIN SEWER. THEY SHALL BE A MINIMUM OF 6" IN DIAMETER, PLUGGED, AND MARKED ACCORDING TO THE APPROPRIATE STANDARD DRAWING.
- D. CLEAN WATER CONNECTIONS- ROOF DRAINS, FOUNDATION, DRAINS, AND OTHER CLEAN WATER CONNECTIONS TO THE SANITARY SEWER SYSTEM ARE PROHIBITED.
- E. ALL FORCEMAIN SHALL BE CONSTRUCTED OF SDR-21, IN ACCORDANCE WITH ASTM D1784.
- F. A MINIMUM OF 10' HORIZONTAL SEPARATION OF WATER AND SEWER LINES SHALL BE MAINTAINED AT ALL TIMES.
- G. WEEKEND SHUTDOWNS MAY BE REQUIRED FOR CONNECTION TO EXISTING FORCEMANS. COORDINATE WITH FAYETTE COUNTY TO SCHEDULE TIE INS.
- H. EXISTING SEWER LINE TAKEN OUT OF SERVICE SHALL BE REMOVED.
- I. A MINIMUM OF 48" OF COVER SHALL BE PROVIDED IN ALL AREAS.

**HYDROSTATIC TESTING OF FORCEMAIN:**

- A. AFTER THE PIPE HAS BEEN LAID AND BACKFILLED, ALL NEWLY LAID PIPE OR VALVED SECTION SHALL BE SUBJECTED TO A HYDROSTATIC PRESSURE AND LEAKAGE TEST. ALL SDR-21 FORCEMANS MUST BE HYDROSTATICALLY TESTED FOLLOWING ASTM F - 2164, "STANDARD PRACTICE FOR FIELD LEAD TESTING OF POLYETHYLENE (PE) PRESSURE PIPING SYSTEM USING HYDROSTATIC PRESSURE." THE TEST MUST BE PERFORMED BY THE CONTRACTOR IN THE PRESENCE OF A REPRESENTATIVE OF THE SHELBY COUNTY SEWER DISTRICT. THE LEAKAGE TEST PRESSURE SHALL BE 1.5 TIMES THE OPERATING PRESSURE OR 150 PSI, WHICHEVER IS GREATER. THE DURATION OF THE LEAKAGE TEST PHASE SHOULD NOT BE LESS THAN 1 HOUR. HYDROSTATIC PRESSURE SHALL BE APPLIED BY MEANS OF A PUMP, TAKING WATER FROM AN AUXILIARY SUPPLY. ALL PIPING MUST BE PROPERLY FILLED AND FLUSHED TO DISPEL ALL AIR BEFORE THE TEST IS MADE USING POTABLE WATER.
- B. LEAKAGE IS DEFINED AS THE QUANTITY OF WATER TO BE SUPPLIED INTO THE NEWLY LAID PIPE, OR ANY VALVE SECTION THEREOF, NECESSARY TO MAINTAIN THE SPECIFIED LEAKAGE TEST PRESSURE AFTER THE PIPE HAS BEEN FILLED WITH WATER AND THE AIR EXPELLED.
- C. DURING THE HYDROSTATIC TEST, A THOROUGH EXAMINATION OF ALL PIPING, FITTINGS, VALVES, HYDRANTS, ETC. SHALL BE PERFORMED. LEAKING JOINTS SHALL BE TIGHTENED AND CRACKED OR OTHERWISE DEFECTIVE MATERIAL SHALL BE REMOVED AND REPLACED AND THE TEST SHOULD BE REPEATED UNTIL SATISFACTORY RESULTS ARE OBTAINED.
- D. THERE IS NO LEAKAGE ALLOWANCE FOR A SECTION OF HEAT - FUSION JOINT POLYETHYLENE PIPING, BECAUSE PROPERLY MADE HEAT FUSION JOINTS DO NOT LEAK.
- E. IF NO VISUAL LEAKAGES OBSERVED, AND THE PRESSURE DURING THE TESTING PHASE HOLD STEADY (WITHIN 5% OF THE TEST PHASE PRESSURE) FOR THE 1 HOUR TEST PHASE PERIOD, A PASSING TEST IS INDICATED.



**AIR RELEASE VALVE VAULT - PLAN VIEW**  
AT THE FOLLOWING LOCATIONS:  
STA 31+28  
STA 47+30

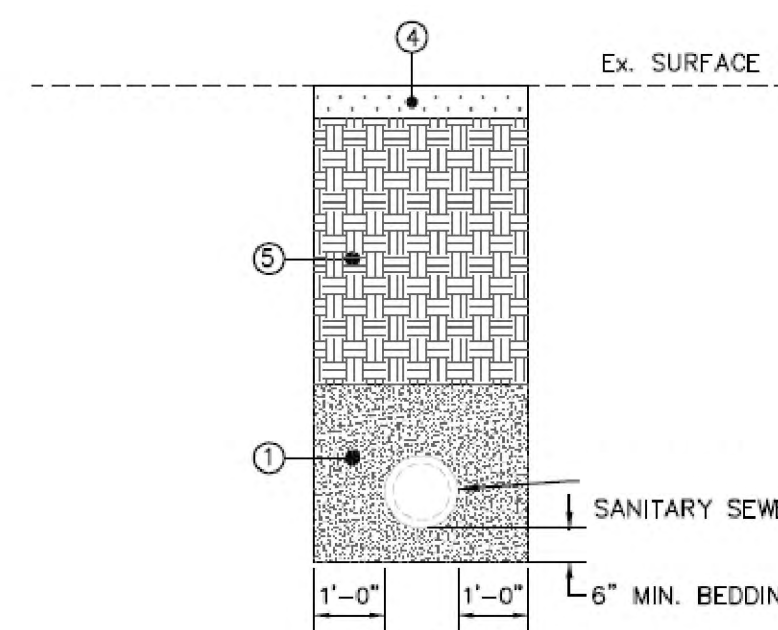


**SECTION "A-A"**

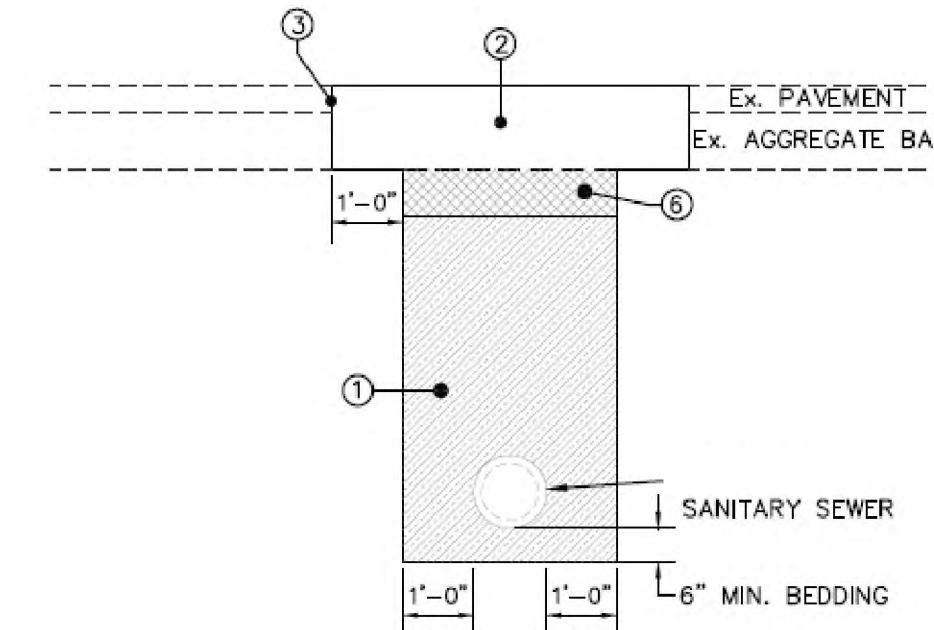


**FORCEMAIN UTILITY MARKER**

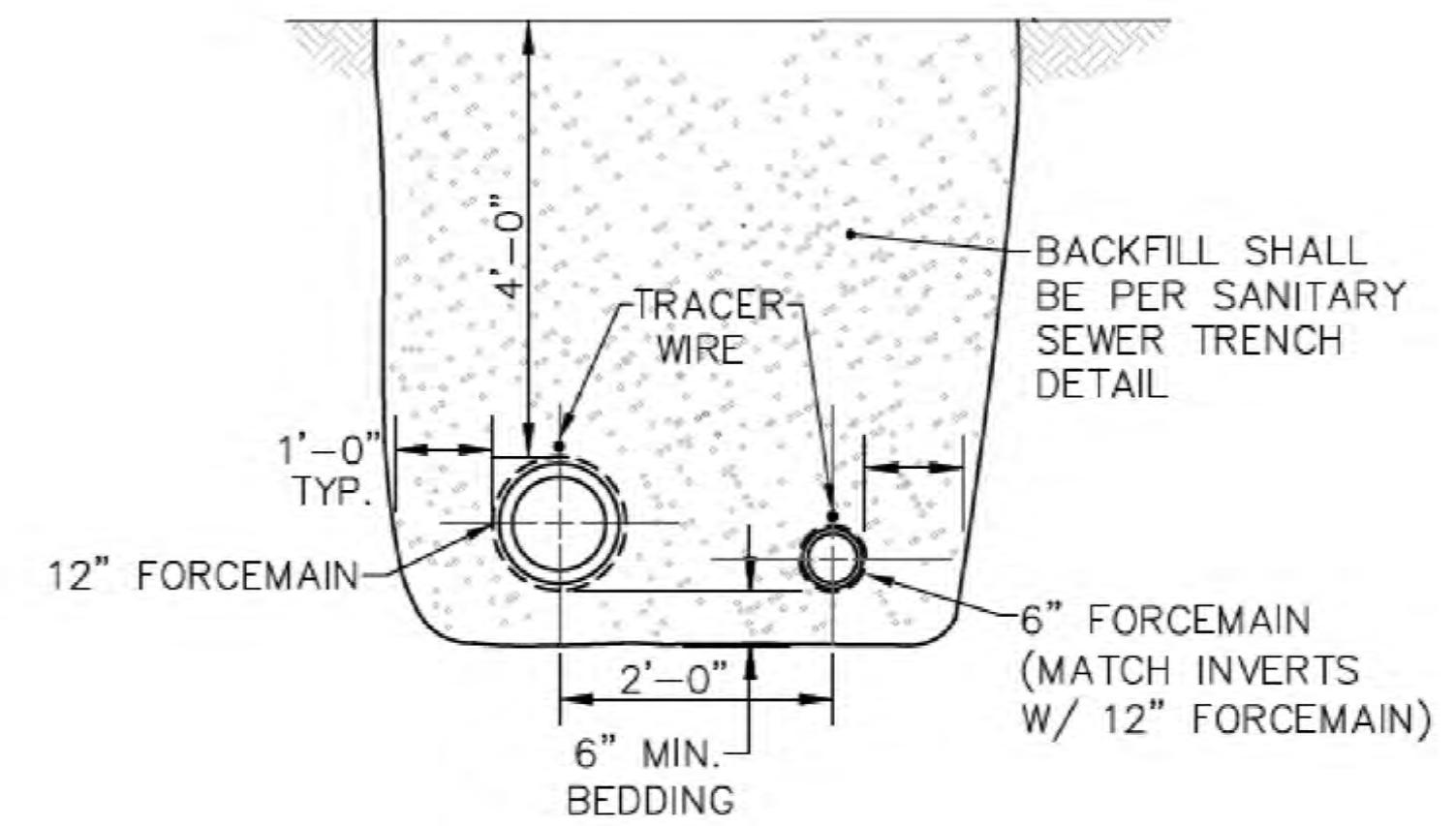
PROVIDE MARKERS INDICATING THE FORCEMAIN LOCATION AT APPROXIMATELY EVERY 500 FT. OR AT ANY SIGNIFICANT BENDS (WWW.RHINOMARKS.COM)



**TRENCH DETAIL (UNPAVED AREAS)**



**TRENCH DETAIL (PAVED AREAS)**



**FORCEMAIN TRENCH DETAIL**

**NOTES**

**INSTALLATION:**

DIRECTIONAL DRILL CONSTRUCTION: TRACER WIRE SHALL BE COPPERHEAD SOLOSHOT EHS REINFORCED TRACER WIRE MANUFACTURED BY COPPERHEAD INDUSTRIES, LLC. OR APPROVED EQUIVALENT.

OPEN CUT CONSTRUCTION: TRACER WIRE SHALL BE COPPERHEAD HS REINFORCED TRACER WIRE MANUFACTURED BY COPPERHEAD INDUSTRIES, LLC OR APPROVED EQUIVALENT.

TRACER WIRE MUST BE RUN ON TOP OF THE FORCEMAIN CONTINUOUSLY FOR THE FULL LENGTH OF THE PIPE. TRACER WIRE SHALL BE TAPED TO THE PIPE USING 1-1/2" POLYETHYLENE TAPE WRAPPED TWICE AROUND THE PIPE. TRACER WIRE WILL COME TO THE SURFACE AT THE VALVE VAULT AND ANY AIR RELEASE VALVE STRUCTURE.

TRACER WIRE THAT MUST BE SPLICED SHALL USE SNAKEBITE TRACER WIRE CONNECTORS MANUFACTURED BY COPPERHEAD INDUSTRIES, LLC OR APPROVED EQUIVALENT.

ALL MATERIAL, LABOR, EQUIPMENT NEEDED FOR THE INSTALLATION OF THE TRACER WIRE SHALL BE INCIDENTAL TO THE FORCEMAIN INSTALLATION.



GREEN REINFORCED TRACER WIRE INCIDENTAL TO FORCEMAIN INSTALLATION.

PROP. HDPE DR-11 SANITARY SEWER FORCEMAIN

**SANITARY SEWER FORCEMAIN TRACER WIRE DETAILS**

- ① STRUCTURAL BEDDING/BACKFILL SHALL BE ODOT 703.11 TYPE 3, (#57 OR #67) OR AS APPROVED BY THE ENGINEER, COMPACTED IN 8" LAYERS, COST TO BE INCLUDED IN COST OF SEWER PIPE.
- ② 4" MIN. ODOT ITEM 441, ASPHALT CONCRETE (MIN. 2 LIFTS)
- ③ SAWCUT, 2" MINIMUM DEPTH
- ④ 2" MINIMUM TOPSOIL PER ODOT ITEM 653 AND SEEDING AND MULCHING PER ODOT ITEM 659
- ⑤ BACKFILL, PER ODOT ITEM 203
- ⑥ ODOT ITEM 304 AGGREGATE BASE (MIN. 6")

SANITARY DETAILS AND NOTES SHEET  
UTILITY SHEETS

DESIGN AGENCY

**Palmer**  
ENGINEERING  
8350 EAST KEMPER ROAD  
SUITE B  
CINCINNATI, OH 45249  
(513) 469-1600

DESIGNER

**EMR**

REVIEWER

**SIB 01/19/24**

PROJECT ID

**117955**

SHEET TOTAL

**13 15**

FAY-435-1.52

**LATEST**

**WATER MAIN HYDROSTATIC TESTING NOTES:**

- A. AFTER THE PIPE HAS BEEN LAID AND BACKFILLED, ALL NEWLY LAID PIPE OR VALVED SECTION SHALL BE SUBJECTED TO HYDROSTATIC PRESSURE AND LEAKAGE TEST. ALL WATER MAINS MUST BE HYDROSTATICALLY TESTED IN ACCORDANCE WITH AWWA C-605. THE TESTS MUST BE PERFORMED IN THE PRESENCE OF A REPRESENTATIVE OF FAYETTE COUNTY.
 

THE MINIMUM LEAKAGE TEST PRESSURE FOR ALL WATER MAIN SHALL BE 150 PSI, OR 1.5 TIMES THE ANTICIPATED AVERAGE STATIC PRESSURE, WHICHEVER IS GREATER. THE MINIMUM TEST PRESSURE SHALL BE HELD FOR A MINIMUM OF TWO (2) HOURS FOR ALL WATER MAIN. HYDROSTATIC PRESSURE SHALL BE APPLIED BY MEANS OF A PUMP TAKING WATER FROM AN AUXILIARY SUPPLY. ALL PIPING MUST BE PROPERLY FILLED AND FLUSHED TO DISPEL ALL AIR BEFORE THE TEST IS MADE USING POTABLE WATER.
- B. HYDROSTATIC TESTING MUST BE PERFORMED ON ALL NEW WATER MAIN, WITH THE EXCEPTION OF CONNECTION POINTS, AS APPROVED BY FAYETTE COUNTY.
- C. LEAKAGE IS DEFINED AS THE QUANTITY OF WATER TO BE SUPPLIED INTO THE NEWLY LAID PIPE, OR ANY VALVED SECTION THEREOF, NECESSARY TO MAINTAIN THE SPECIFIED LEAKAGE TEST PRESSURE AFTER THE PIPE HAS BEEN FILLED WITH WATER AND THE AIR EXPELLED.
- D. NO PIPE INSTALLATION WILL BE ACCEPTED IF THE LEAKAGE EXCEEDS THE LEAKAGE DETERMINED BY THE FORMULA BELOW:

$$Q = \frac{L \cdot D \cdot \sqrt{P}}{148,000}$$

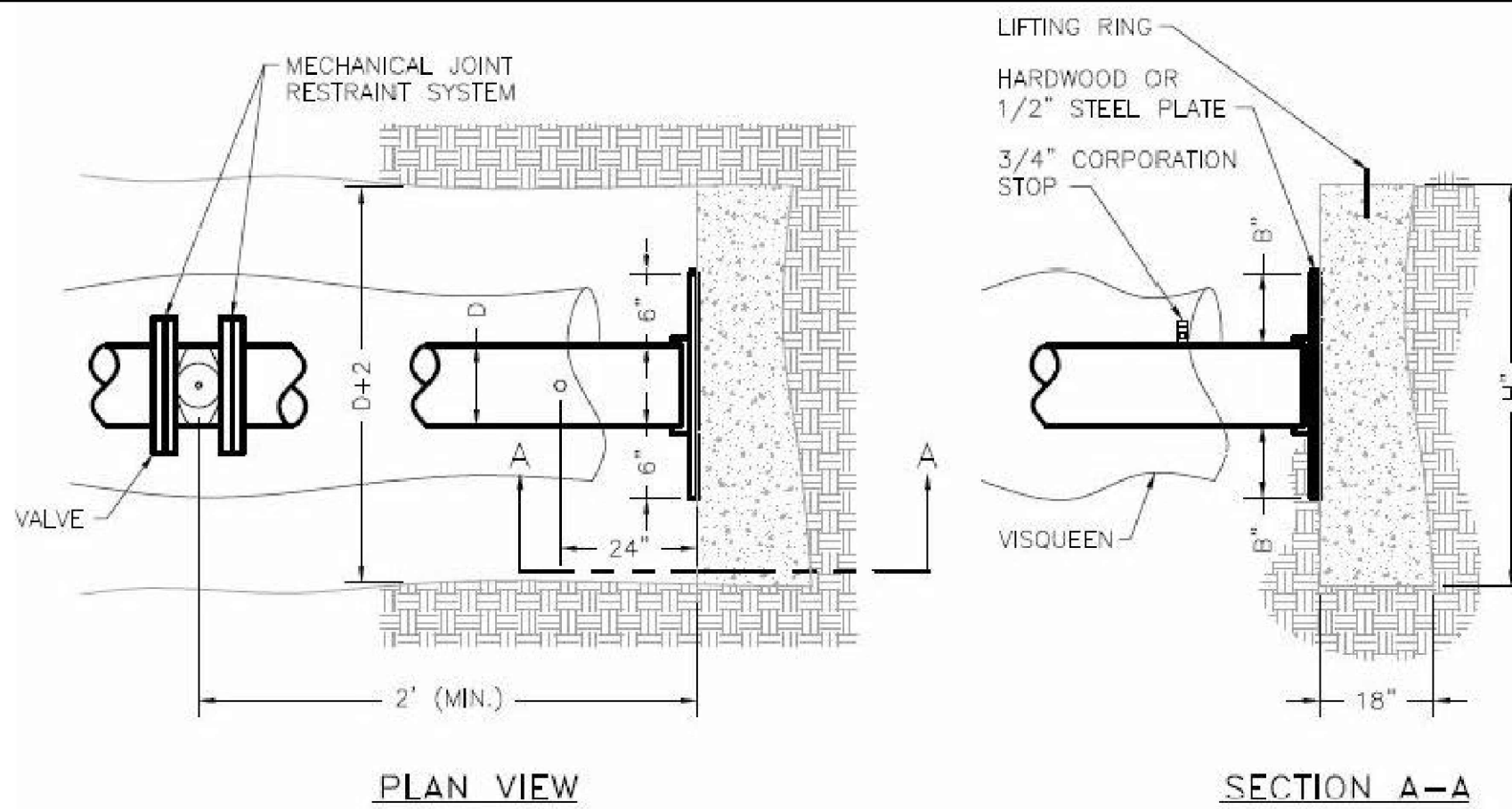
WHERE: L = LENGTH OF PIPE TESTED, IN FT.  
 D = PIPE DIAMETER, IN INCHES  
 P = AVERAGE TEST PRESSURE  
 Q = ALLOWABLE LEAKAGE PER HOUR

DURING THE HYDROSTATIC TEST, A THOROUGH EXAMINATION OF ALL PIPING, FITTINGS, VALVES, HYDRANTS, ETC. SHALL BE PERFORMED. LEAKING JOINTS SHALL BE TIGHTENED AND CRACKED OR OTHERWISE DEFECTIVE MATERIAL SHALL BE REMOVED AND REPLACED AND THE TEST SHALL BE REPEATED UNTIL SATISFACTORY RESULTS ARE OBTAINED.

BELOW IS A TABLE WHICH REPRESENTS THE ALLOWABLE LEAKAGE IN GALLONS PER HOUR.

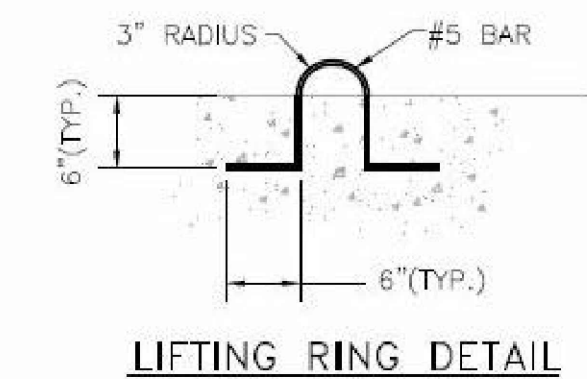
**ALLOWABLE LEAKAGE PER 1000FT. OF PIPELINE (GALLONS PER HOUR)**

AVG. TEST PRESSURE (PSI) BAR	NOMINAL PIPE DIAMETER - INCHES							
	3	4	6	8	10	12	14	16
450(31)	0.43	0.57	0.86	1.15	1.43	1.72	2.01	2.29
400(28)	0.41	0.54	0.81	1.08	1.35	1.62	1.89	2.16
350(24)	0.38	0.51	0.76	1.01	1.26	1.52	1.77	2.02
300(21)	0.35	0.47	0.70	0.94	1.17	1.40	1.64	1.87
275(19)	0.34	0.45	0.67	0.90	1.12	1.34	1.57	1.79
250(17)	0.32	0.43	0.64	0.85	1.07	1.28	1.50	1.71
225(16)	0.30	0.41	0.61	0.81	1.01	1.22	1.42	1.62
200(14)	0.29	0.38	0.57	0.76	0.96	1.15	1.34	1.53
175(12)	0.27	0.36	0.54	0.72	0.89	1.07	1.25	1.43
150(10)	0.25	0.33	0.50	0.66	0.83	0.99	1.16	1.32



**NOTES:**

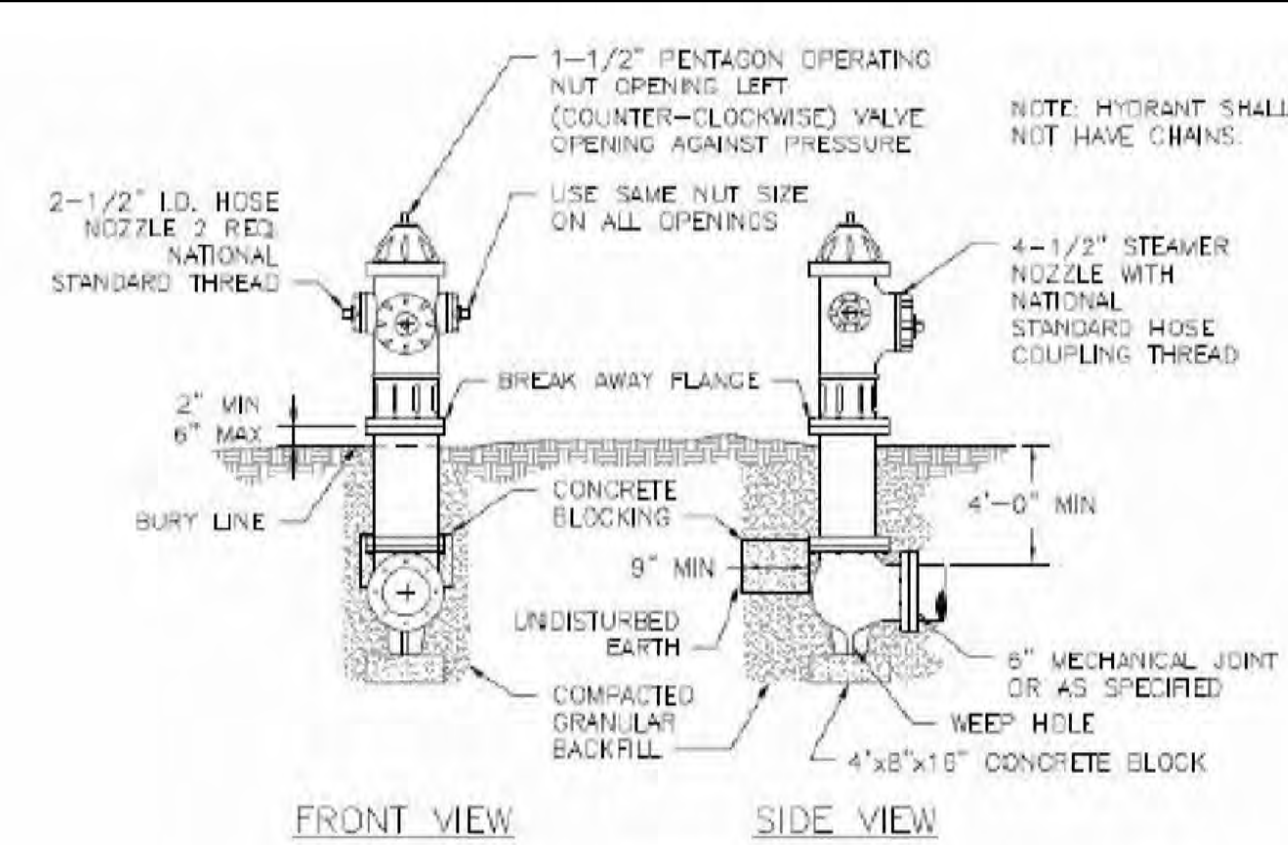
1. CONCRETE FOR BACKING SHALL BE ODOT CLASS "QC1".
2. BACKING SHALL BE DESIGNED FOR 3000 PSF SOIL BEARING.
3. CONCRETE SHALL BE PLACED AGAINST UNDISTURBED EARTH.
4. PROVIDE CLEARANCE FOR REMOVAL OF BOLTS.
5. VISQUEEN SHALL BE PLACED IN A MANNER SUCH THAT CONCRETE BLOCKING DOES NOT HAVE DIRECT CONTACT WITH TEE AND/OR FITTINGS.
6. END OF PIPE SHALL BE CAPPED OR PLUGGED.
7. STEEL PLATE SHALL BE GREASED WHERE IN CONTACT WITH CONCRETE BACKING.
8. PLUG POLES SHALL BE INSTALLED AT ALL END-OF-LINE STUBS AT THE THRUST BLOCK.



SIZE OF PIPE	H	B	L (PVC)	L (DIP)	V
6"	8	1	20	18	2.52
8"	12	1	20	18	4.00
12"	23	3	20	18	8.64
16"	37	3	20	18	15.39

V = VOLUME OF CONCRETE IN CUBIC FEET.

**THRUST BLOCK**  
NOT TO SCALE

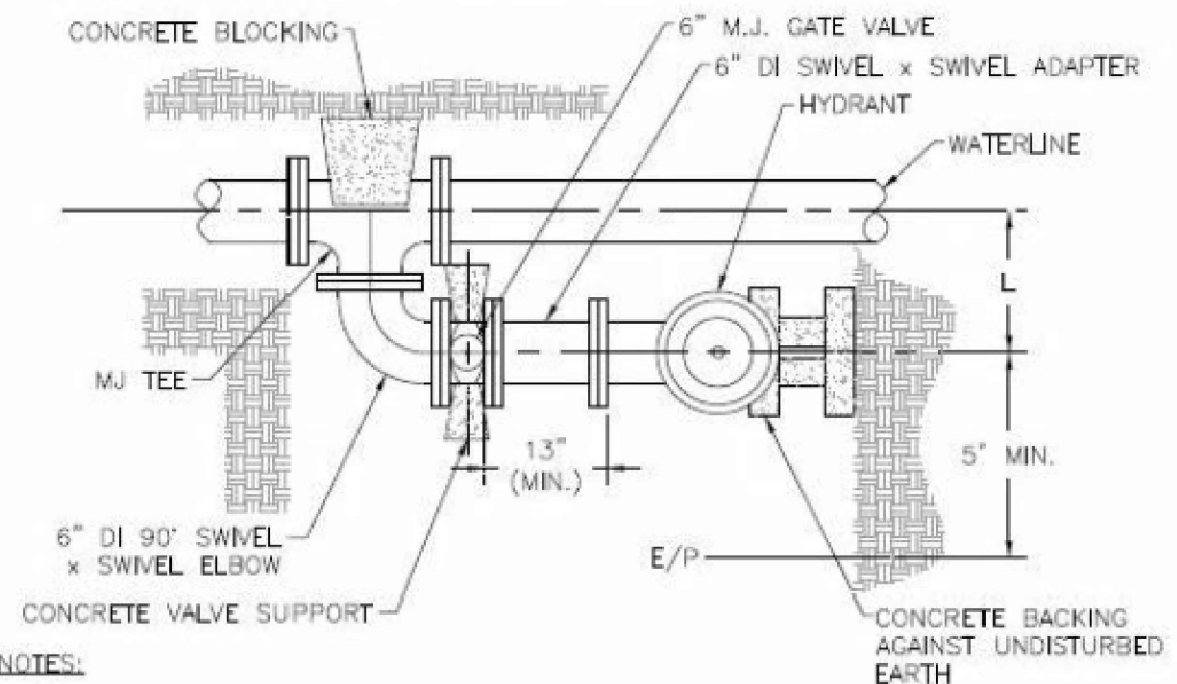


**NOTES:**

1. BACKFILL SHALL BE GRANULAR MATERIAL CONFORMING TO ODOT #57 STONE, ITEM 703.11 TYPE 2, GRADE A, OR APPROVED, SUITABLE EXCAVATED MATERIAL POWER TAMPED IN LAYERS NOT EXCEEDING 4" IN THICKNESS. LOOSE MEASUREMENT BACKFILL SHALL EXTEND FROM THE BOTTOM OF THE PIT OR TRENCH TO 6" BELOW THE EXISTING OR PROPOSED SURFACE. COST OF FURNISHING AND PLACING BACKFILL SHALL BE INCLUDED IN THE PRICE BID FOR EACH HYDRANT.
2. ALL HYDRANTS SHALL BE INSTALLED WITH HARDWOOD OR CONCRETE BLOCKING AGAINST UNDISTURBED EARTH.
3. DRAIN ROCK AROUND AND ABOVE HYDRANT SHALL BE 2" OR LARGER, CLOTH FILTER MATERIAL SHALL BE PLACED BETWEEN DRAIN AND RILL.

**TYPICAL 6" HYDRANT SETTING-TYPE "A"**  
NOT TO SCALE

MAIN LINE	MINIMUM L	
	TYPE B	TYPE B MODIFIED
6"	24"	19"
8"	25"	20"
10"	26"	21"
12"	28"	23"
16"	31"	26"



**NOTES:**

1. TYPE B: LONG SIDE OF BEND TO TEE.  
TYPE B MODIFIED: SHORT SIDE OF BEND TO TEE.
2. HYDRANTS SHALL HAVE A MAXIMUM BURY OF 7"-9". MODIFICATION OF THE HYDRANT LEAD TO MEET THIS REQUIREMENT SHALL BE IN THE SECTION FROM THE VALVE TO THE HYDRANT.
3. BACKFILL SHALL BE GRANULAR MATERIAL CONFORMING TO ODOT #57 STONE, ITEM 703.11 TYPE 2, GRADE A, OR APPROVED, SUITABLE EXCAVATED MATERIAL POWER TAMPED IN LAYERS NOT EXCEEDING 4" IN THICKNESS. LOOSE MEASUREMENT BACKFILL SHALL EXTEND FROM THE BOTTOM OF THE PIT OR TRENCH TO 6" BELOW THE EXISTING OR PROPOSED SURFACE. COST OF FURNISHING AND PLACING BACKFILL SHALL BE INCLUDED IN THE PRICE BID FOR EACH HYDRANT.
4. ALL HYDRANTS SHALL BE INSTALLED WITH HARDWOOD OR CONCRETE BLOCKING AGAINST UNDISTURBED EARTH.
5. DRAIN ROCK AROUND AND ABOVE HYDRANT SHALL BE 2" OR LARGER, CLOTH FILTER MATERIAL SHALL BE PLACED BETWEEN DRAIN AND RILL.
6. TYPE B OR TYPE B MODIFIED SETTING SHALL ONLY BE UTILIZED WHEN TYPICAL 6" HYDRANT SETTING IS NOT APPLICABLE.
7. REFER TO TYPICAL 6" HYDRANT SETTING TYPE A DETAIL FOR ELEVATION AT HYDRANT.

**TYPICAL 6" HYDRANT SETTING-TYPE "B"**  
NOT TO SCALE

**WATER MAIN DISINFECTION NOTES:**

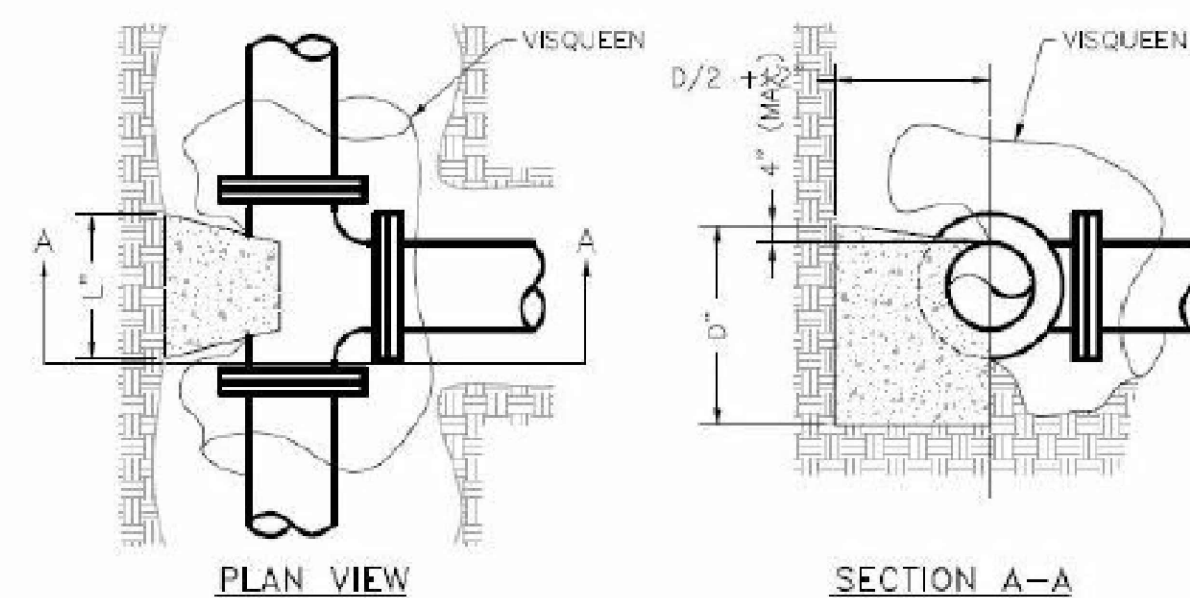
- A. DISINFECTION OR STERILIZATION OF NEW MAINS AND SERVICES, AS REQUIRED BY THE OEPA, SHALL BE COORDINATED THROUGH THE COUNTY SANITARY ENGINEER'S REPRESENTATIVE. THE VILLAGE'S REPRESENTATIVE RESERVES THE RIGHT TO REQUIRE STRICTER CHLORINE RESIDUAL REQUIREMENTS ON A CASE-BY-CASE BASIS.
- B. MAINTAIN PIPES FREE OF DIRT AND FOREIGN MATTER DURING CONSTRUCTION BY DEWATERING TRENCH AND SEALING OPEN PIPE BARRELS. SWAB EACH LENGTH OF PIPE AS IT IS INSTALLED.
- C. DISINFECTION TESTING SHALL BE PERFORMED PRIOR TO HYDROSTATIC TESTING. DISINFECTION SHALL BE COMPLETED IN ACCORDANCE WITH AWWA C-651. SAMPLE WATER AT EACH HYDRANT OR IF NO HYDRANT IS AVAILABLE, A SAMPLE TAP SHALL BE INSTALLED BY CONTRACTOR EVERY 1200 FT. ANALYZE SAMPLE USING ORTHOTOLIDINE REAGENT TO VERIFY FREE CHLORINE CONCENTRATION. MAINTAIN CONCENTRATION IN MAIN FOR 24 HOURS. SAMPLE HYDRANTS AT COMPLETION OF STERILIZATION VERIFYING MINIMUM CHLORINE RESIDUAL OF 20 MG PER LITER.
- D. CONTRACTOR SHALL ACCOMMODATE FLUSHING AND SAMPLE LOCATIONS WITH FAYETTE COUNTY.
- E. THE CONTRACTOR SHALL DISINFECT ALL WATER MAIN AND WATER SERVICE LINES IN ACCORDANCE WITH AWWA C-651, LATEST REVISION. THE DISINFECTION MAY BE PERFORMED BY USING EITHER THE CONTINUOUS FEED METHOD OR THE TABLET METHOD.
- F. THE PROCEDURES FOR DISINFECTION SHALL BE IN ACCORDANCE WITH AWWA C-651. THE VILLAGE SHALL APPROVE OF THE METHOD AND PROCEDURES USED.
- G. PERFORM BACTERIOLOGICAL TESTING, PER AWWA C-651, FOLLOWING HYDROSTATIC TESTING. SAMPLE THE MAIN FROM HYDRANTS OR TEST TAB IN THE PROPOSED LINE. PICKED UP ON PHONE THE SAMPLE IS TO BE DELIVERED TO A STATE CERTIFIED LABORATORY. DELIVER COPIES OF THE LABORATORY REPORT TO THE VILLAGE IN THE EVENT OF DETECTION OF COLIFORM ORGANISM, REPEAT, FLUSHINGS, STERILIZATION, AND SAMPLING OF MAINS UNTIL ACCEPTABLE TEST RESULTS ARE ACHIEVED ON TWO (2) CONSECUTIVE DAYS. THIS IS TO BE PERFORMED PRIOR TO TRANSFER OF SERVICES TO THE NEW MAIN.

**WATER MAIN NOTES:**

- A. WEEKEND SHUTDOWNS MAY BE REQUIRED FOR CONNECTION TO EXISTING FORCE MAINS
- B. HYDRANTS AND WATER VALVES MAY BE REUSED BY CONTRACTOR. ANY EXISTING APPURTENANCES NOT REINSTALLED SHALL BE PROVIDED TO FAYETTE COUNTY.
- C. EXISTING WATER LINE TAKEN OUT OF SERVICE SHALL BE REMOVED.
- D. A MINIMUM OF 48" OF COVER SHALL BE MAINTAINED IN ALL AREAS.
- E. WEEKEND SHUTDOWNS MAY BE REQUIRED FOR CONNECTION TO EXISTING FORCE MAINS. COORDINATE WITH FAYETTE COUNTY TO SCHEDULE TIE INS.
- F. COORDINATE WITH FAYETTE COUNTY FOR EXISTING VALVES TO CLOSE FOR CONNECTION TO EXISTING LINE. EXISTING VALVE AT APPROXIMATELY STA 92+12, 145 FT LT

R/W	BRANCH																								
	3"			4"			6"			8"			12"			16"			20"			24"			
	L	D	V	L	D	V	L	D	V	L	D	V	L	D	V	L	D	V	L	D	V	L	D	V	
3"	12	5	0.5																						
4"	10	6	0.5	11	8	0.8																			
6"	8	7	0.5	11	8	0.8	18	12	1.9																
8"	8	8	0.5	10	9	0.7	18	12	1.9	23	16	3.5													
12"	6	12	0.6	8	12	0.8	18	12	1.9	23	16	3.5	38	22	8.7										
16"	6	16	0.8	6	16	0.8	14	16	2.0	20	18	3.3	36	23	8.7	49	30	13.6							
20"	6	20	1.0	6	20	1.0	11	20	1.9	18	20	3.3	35	24	8.7	46	32	13.6	60	38	26.6				
24"	6	24	1.2	6	24	1.2	9	24	1.9	15	24	3.3	30	28	8.7	42	36	14.0	54	42	26.3	68	48	45.4	

V = VOLUME OF CONCRETE IN CUBIC FEET



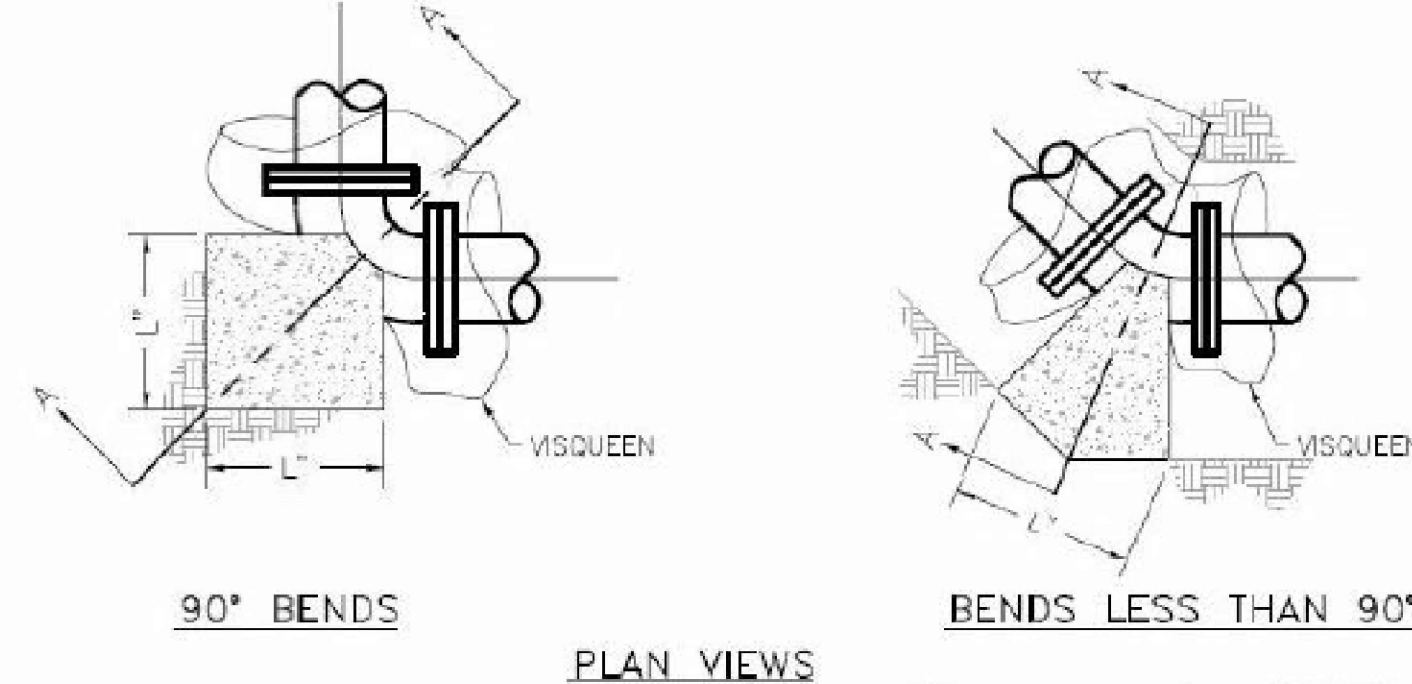
**NOTES:**

1. CONCRETE FOR BACKING SHALL BE ODOT CLASS "QC1".
2. BACKING SHALL BE DESIGNED FOR 3000 PSF SOIL BEARING.
3. REINFORCING STEEL SHALL BE USED AS DIRECTED BY THE CONTRACT ADMINISTRATOR.
4. CONCRETE SHALL BE PLACED AGAINST UNDISTURBED EARTH.
5. PROVIDE CLEARANCE FOR REMOVAL OF BOLTS.
6. VISQUEEN SHALL BE PLACED IN A MANNER SUCH THAT CONCRETE BLOCKING DOES NOT HAVE DIRECT CONTACT WITH TEE AND/OR FITTINGS.

**BACKING FOR TEES**  
NOT TO SCALE

R/W	DEGREE OF BEND											
	11 1/4"			22 1/2"			45"			90"		
	L	D	V	L	D	V	L	D	V	L	D	V
3"	4	3	0.1	6	4	0.2	10	4	0.3	10	4	0.3
4"	5	4	0.2	9	5	0.4	14	5	0.6	14	5	0.6
6"	8	6	0.5	12	7	0.7	20	8	1.4	18	9	1.7
8"	9	8	0.7	16	9	1.4	24	12	2.7	25	11	4.0
12"	14	12	1.8	24	14	3.6	36	18	6.8	32	18	10.7
16"	18	16	3.4	32	18	6.7	36	32	13.4	41	26	25.4
20"	25	20	6.4	30	30	11.5	49	38	20.8	50	32	46.5
24"	27	24	9.0	39	34	18.4	60	42	35.0	58	40	77.7

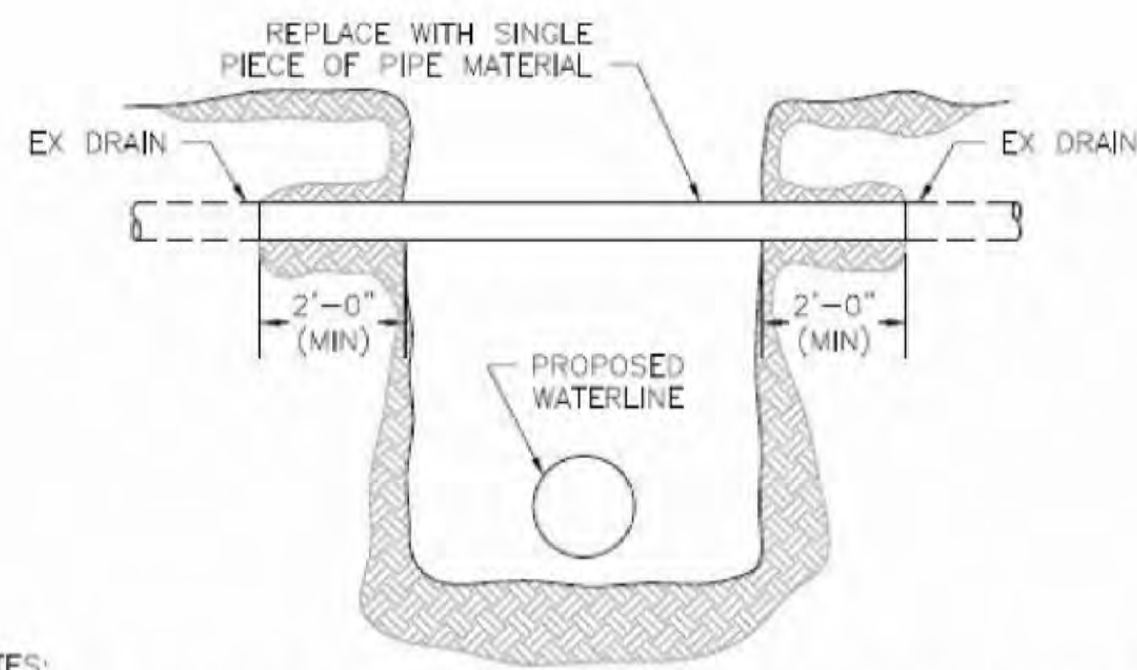
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**NOTES:**

1. CONCRETE FOR BACKING SHALL BE ODOT CLASS "QC1".
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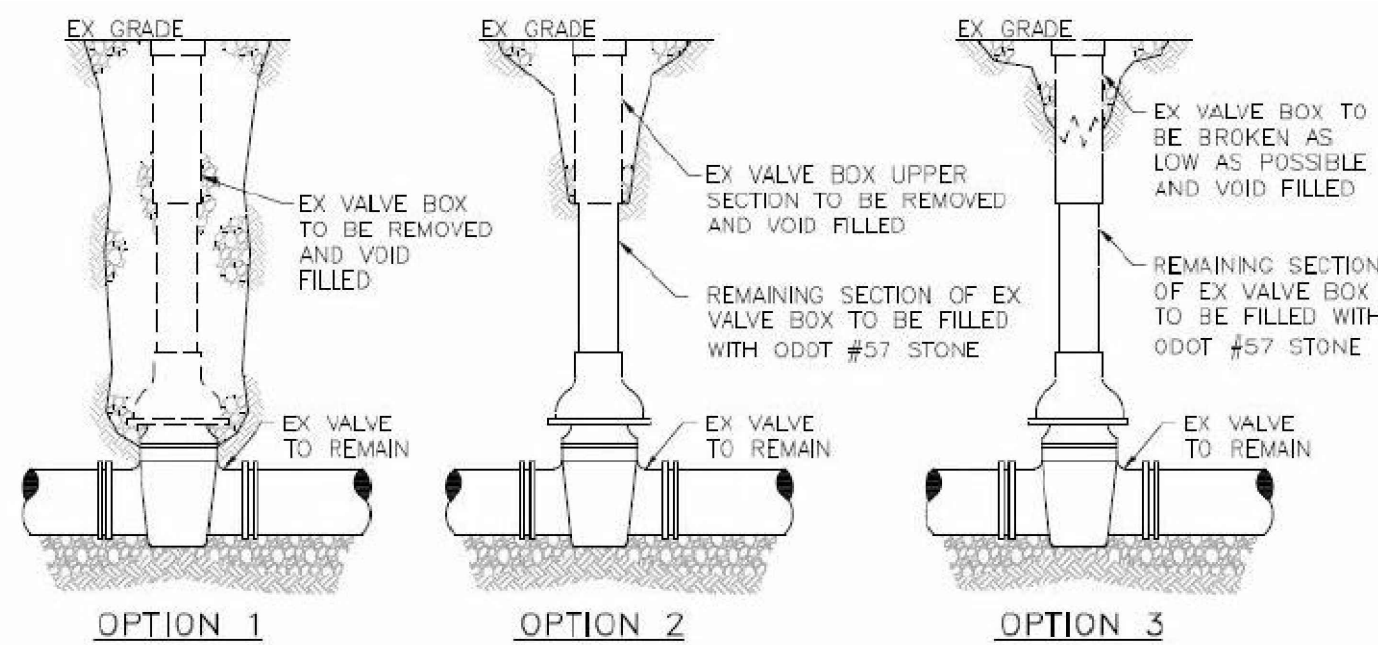
**BACKING FOR BENDS**  
NOT TO SCALE



**NOTES:**

- INSIDE DIAMETER OF REPLACEMENT PIPE SHALL BE EQUAL TO OR GREATER THAN INSIDE DIAMETER OF EXISTING PIPE.
- REPLACEMENT MATERIAL USED SHALL BE EQUAL TO OR BETTER THAN THE EXISTING MATERIAL AS DIRECTED BY THE ENGINEER OR HIS REPRESENTATIVE.
- PROVIDE RUBBER FLEXIBLE PIPE COUPLING WHERE EXISTING TILE OR UNDERDRAIN HAS WATERTIGHT JOINTS. PROVIDE 30# FELT OR CONCRETE MORTAR OVER THE UPPER HALF OF THE JOINT WHERE OPEN JOINTS ARE ENCOUNTERED.
- BACKFILL BETWEEN WATERLINE AND REPLACEMENT TILE OR UNDERDRAIN SHALL BE COMPACTED GRANULAR.
- MINIMUM ROAD AND CURB UNDERDRAIN REPLACEMENT MATERIAL SHALL BE:
  - PERFORATED CONCRETE: ODOT ITEM 706.06
  - CONCRETE DRAIN TILE: ODOT ITEM 706.07
  - VITRIFIED CLAY: ODOT ITEM 706.08
  - PERFORATED PVC: ODOT ITEM 707.41
  - POLYETHYLENE DRAINAGE TUBING (PERFORATED): ODOT ITEM 707.31
- MINIMUM DRAIN TILE REPLACEMENT MATERIAL SHALL BE:
  - PVC: ASTM-D 2241, SDR 26
  - DUCTILE IRON: AWWA C151, PC 350
  - STEEL PIPE: ASTM-A 139 GRADE B
  - CONCRETE: ODOT ITEM 706.02

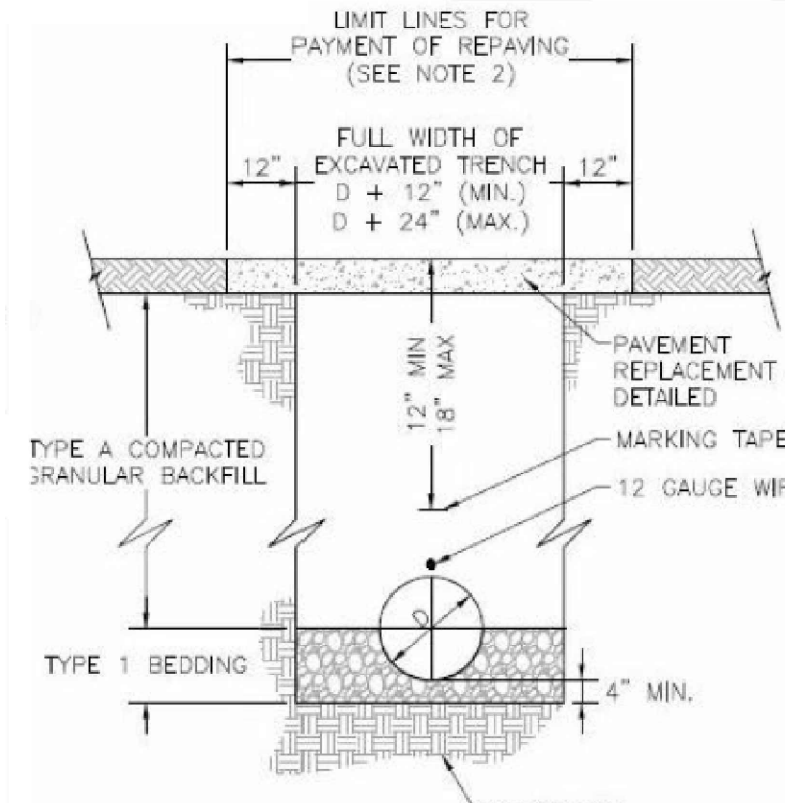
**DRAIN TILE AND UNDERDRAIN REPLACEMENT**  
NOT TO SCALE



**NOTES:**

- EXISTING VALVES TO BE ABANDONED IN PLACE AND SHALL BE LEFT IN THE "CLOSED" OR "OPEN" POSITION AS DESIGNATED BY THE OWNER OR AS OUTLINED IN THE DRAWINGS. PRIOR TO REMOVAL OF THE VALVE BOX THE VALVE SHALL BE ACTUATED TO A FULLY OPEN OR FULLY CLOSED POSITION AND THE POSITION VERIFIED BY THE OWNER OR THE OWNER'S REPRESENTATIVE BEFORE FURTHER ACTION IS TAKEN.
- FOLLOWING VERIFICATION OF VALVE POSITION THE VALVE BOX SHALL BE REMOVED UTILIZING ONE OF THE THREE OPTIONS SHOWN. OPTION 1 IS THE PREFERRED ALTERNATIVE FOR REMOVAL OF THE VALVE BOX. HOWEVER, WHERE THE VALVE IS LOCATED IN AN AREA OF PAVEMENT THAT IS NOT TO BE DISTURBED OR ACCESS FOR EXCAVATION OF THE VALVE BOX AREA IS LIMITED, OPTION 2 OR OPTION 3 MAY BE APPLIED AS AN ALTERNATE. CONTRACTOR SHALL COORDINATE WITH THE OWNER AND/OR THE OWNER'S REPRESENTATIVE ON THE OPTION TO BE UTILIZED PRIOR TO INITIATING THE WORK.
- ONCE THE VALVE BOX HAS BEEN REMOVED, THE REMAINING VOID IS TO BE FILLED WITH COMPACTED GRANULAR MATERIAL AND THE SURFACE RESTORED TO MATCH ADJACENT IN ACCORDANCE WITH DRAWINGS.
- WHERE EXISTING VALVE BOX IS LOCATED IN PAVEMENT THE PAVEMENT SURFACE REMOVED FOR ACCESS TO THE VALVE SHALL BE SAW CUT.

**ABANDONMENT OF EXISTING VALVE**  
NOT TO SCALE



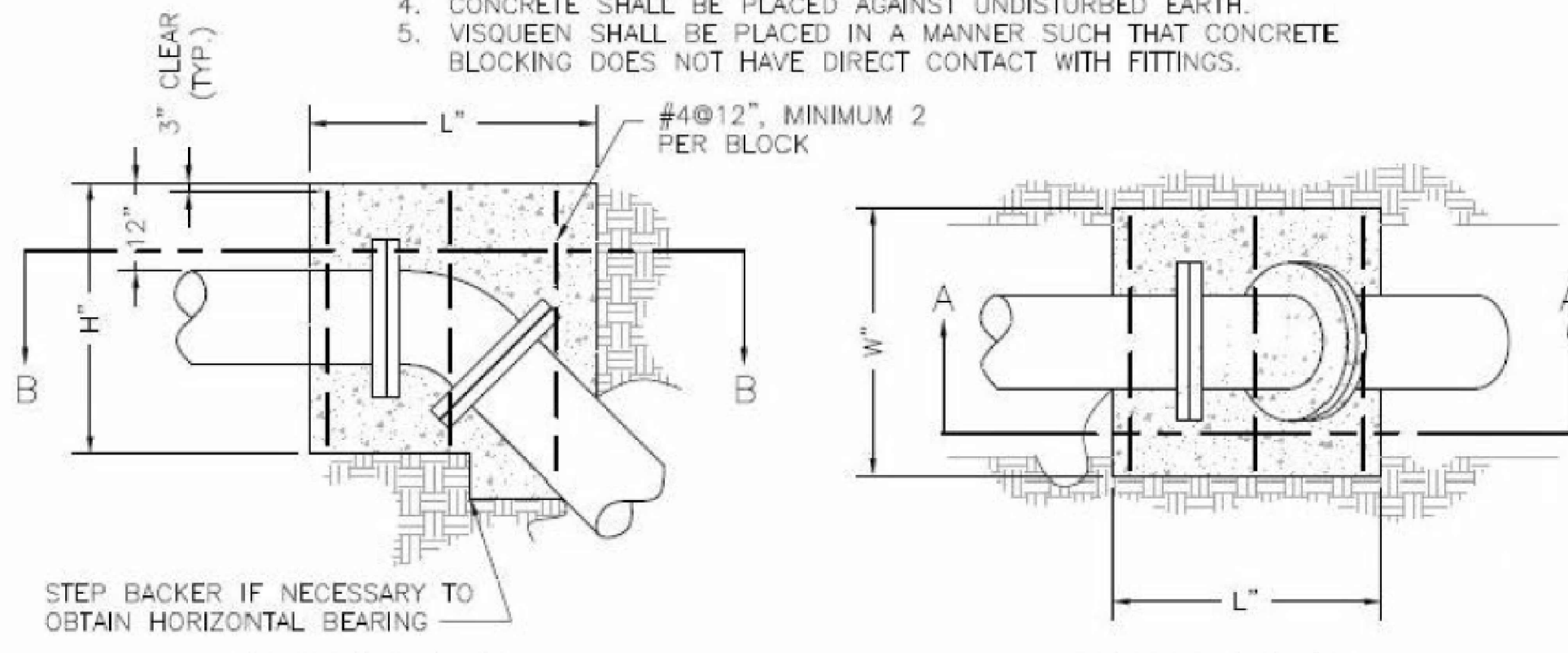
**TRENCH DETAIL FOR WATERLINE INSTALLED UNDER OR WITHIN 5' OF PAVED AREAS**  
NOT TO SCALE

PIPE SIZE	DEGREE OF BEND															
	11 1/4'				22 1/2'				45'				90'			
	L	W	H	V	L	W	H	V	L	W	H	V	L	W	H	V
3"	12	18	12	1.5	13	25	16	3.0	18	30	19	5.9	25	30	24	10.4
4"	12	24	16	2.6	16	30	18	5.0	22	36	24	11.0	27	48	25	18.7
6"	12	48	18	6.0	15	43	36	13.4	30	55	24	22.9	37	54	36	41.6
8"	12	63	24	10.5	18	57	34	20.2	36	57	33	39.2	47	60	46	75.0
12"	20	54	36	22.6	37	62	37	49.0	48	62	51	87.9	66	66	66	166.4
16"	31	65	38	44.3	60	65	39	88.1	65	65	65	159.2	72	96	72	288.0
20"	45	70	40	72.8	56	70	60	136.2	72	76	78	247.0	86	108	84	451.8
24"	41	72	54	92.3	67	74	69	198.0	88	84	84	359.1	96	120	96	640.0

V = VOLUME OF CONCRETE IN CUBIC FEET

**NOTES:**

- CONCRETE FOR BACKING SHALL BE ODOT CLASS "GC1".
- BACKING SHALL BE DESIGNED FOR 3000 PSF SOIL BEARING.
- REINFORCING STEEL SHALL BE USED AS SHOWN.
- CONCRETE SHALL BE PLACED AGAINST UNDISTURBED EARTH.
- VISQUEEN SHALL BE PLACED IN A MANNER SUCH THAT CONCRETE BLOCKING DOES NOT HAVE DIRECT CONTACT WITH FITTINGS.

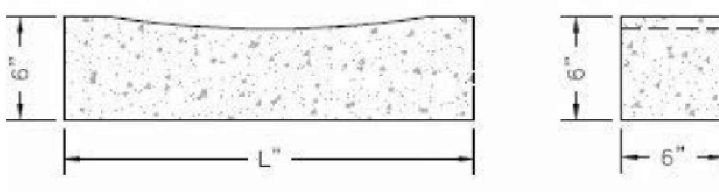


**BACKING FOR VERTICAL BENDS**  
NOT TO SCALE

	SIZE	L	V
GATE VALVES	3"	15	0.31
	4"	16	0.33
	6"	17	0.36
	8"	20	0.42
BUTTERFLY VALVES	12"	24	0.50
	14"	28	0.58
	16"	30	0.63
	20"	36	0.75
	24"	42	0.88
	30"	48	1.00

**NOTES:**

- CONCRETE FOR SUPPORTS SHALL BE ODOT CLASS "GC1".
- BACKING SHALL BE DESIGNED FOR 300 PSF SOIL BEARING.
- CONCRETE SHALL BE PLACED AGAINST UNDISTURBED EARTH.
- PROVIDE CLEARANCE FOR REMOVAL BOLTS.



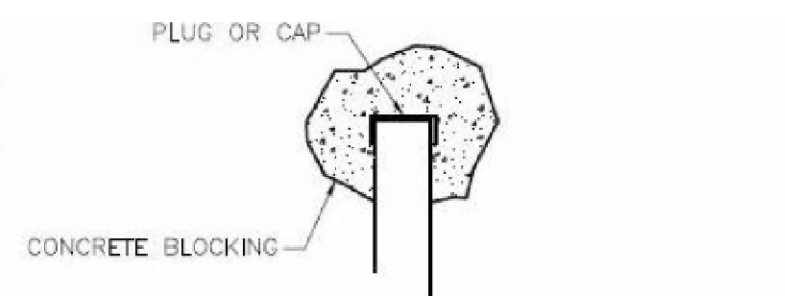
**CONCRETE VALVE SUPPORTS**  
NOT TO SCALE

**BACKFILL:**

- TYPE A SHALL BE COMPACTED GRANULAR MATERIAL AS SPECIFIED IN ODOT CMS ITEM 304.
- TYPE B SHALL BE NATURAL SOIL FREE FROM STONES LARGER THAN 2 INCHES ACROSS THEIR GREATEST DIMENSION, TOPSOIL, VEGETATION, DEBRIS, RUBBISH OR FROZEN MATERIAL.
- TYPE C SHALL BE LOW STRENGTH MORTAR BACKFILL, TYPE 1 AS SPECIFIED IN ODOT CMS ITEM 613.

**BEDDING:**

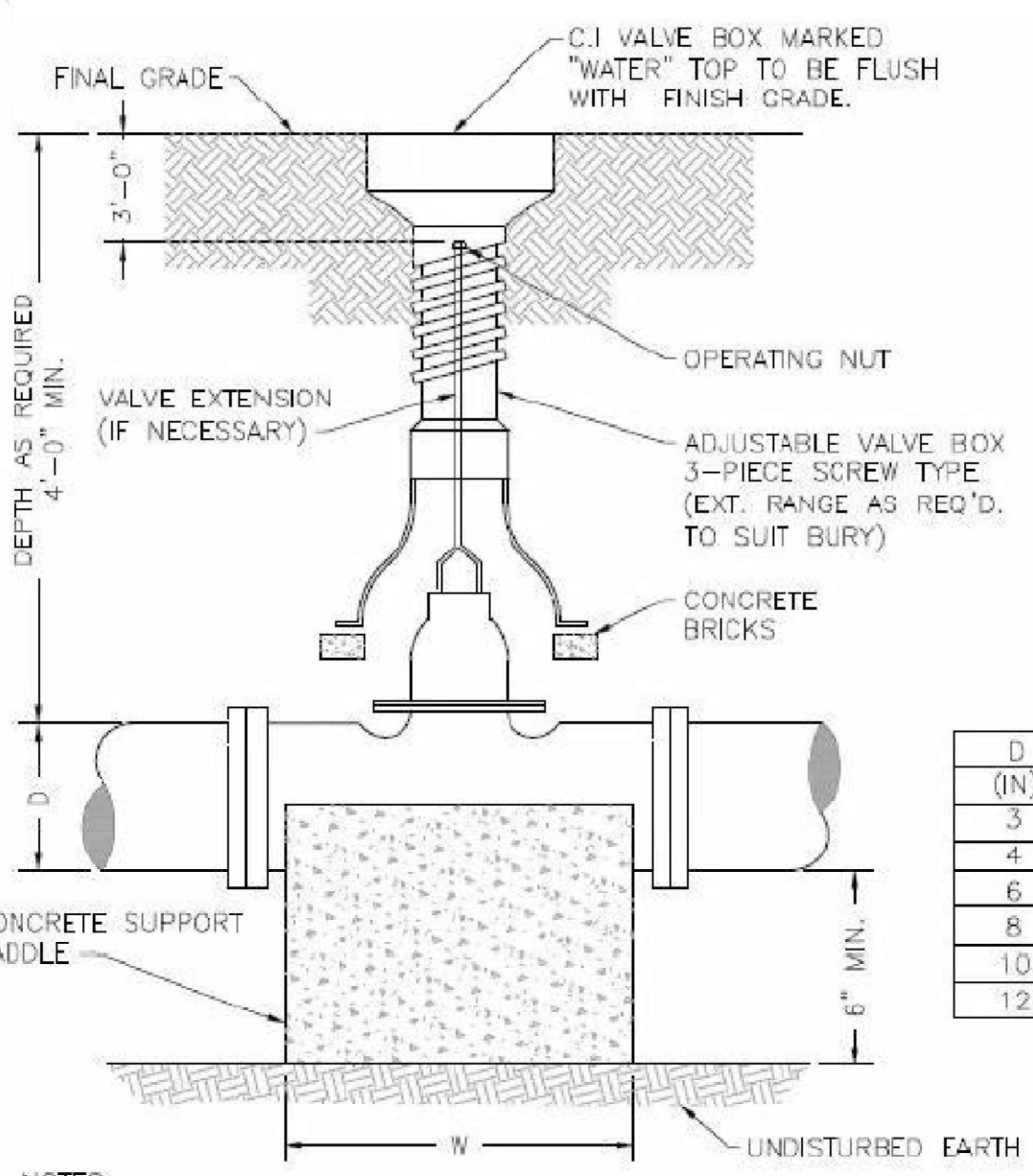
- TYPE 1—GRANULAR MATERIAL No. 57, 6, 67, 68 OR 7 PER ODOT CMS TABLE 703.01-1.
- TYPE 2—NATIVE SOIL FREE FROM STONES LARGER THAN 2 INCHES ACROSS THEIR GREATEST DIMENSIONS, TOP SOIL, VEGETATION, DEBRIS OR FROZEN MATERIAL.
- TYPE 3—CONCRETE BEDDING, CLASS GC1 CONCRETE PER ODOT CMS 499.



**CONCRETE BLOCKING FOR ABANDONED WATERLINES**  
NOT TO SCALE

**NOTE:**

- PAVED AREAS INCLUDE:
  - ANY ROAD (ASPHALT, CONCRETE, GRAVEL)
  - ANY DRIVEWAY
  - ANY PARKING LOT
  - ANY OTHER AREA SUBJECT TO TRAFFIC
- IN AREAS WHERE DISTANCE BETWEEN CENTERLINE OF PIPE AND FACE OF CURB/GUTTER EXCEEDS "D"+2", PAVEMENT RESTORATION QUANTITIES SHALL BE COORDINATED WITH THE ENGINEER TO ALLOW SURFACE REPAIR TO EXTEND TO THE FACE OF CURB/GUTTER.

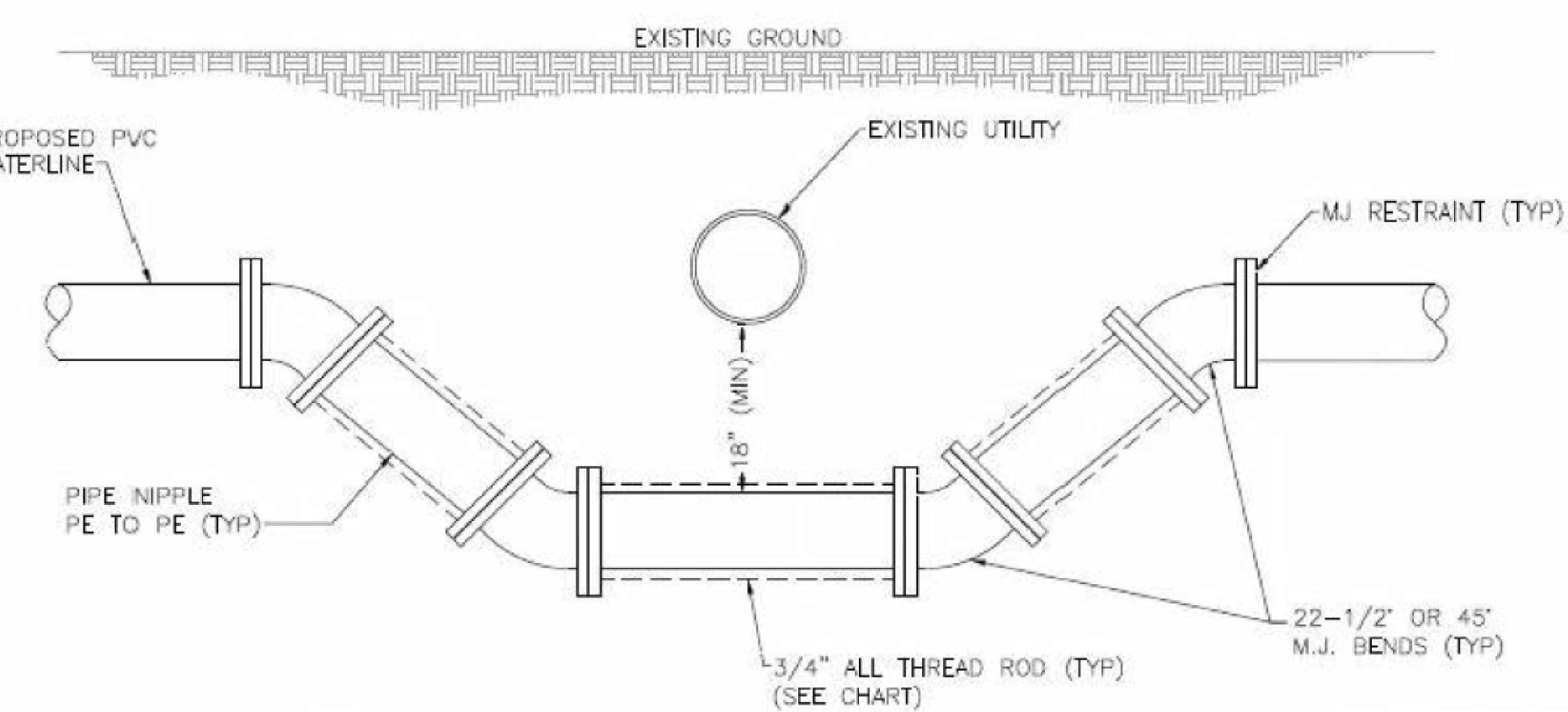


**NOTES:**

- VISQUEEN SHALL BE PLACED IN A MANNER SUCH THAT CONCRETE BLOCKING DOES NOT HAVE DIRECT CONTACT WITH VALVE.

**STANDARD VALVE BOX**  
NOT TO SCALE

D (IN)	W (IN)
3	4
4	5
6	5
8	6
10	6
12	7

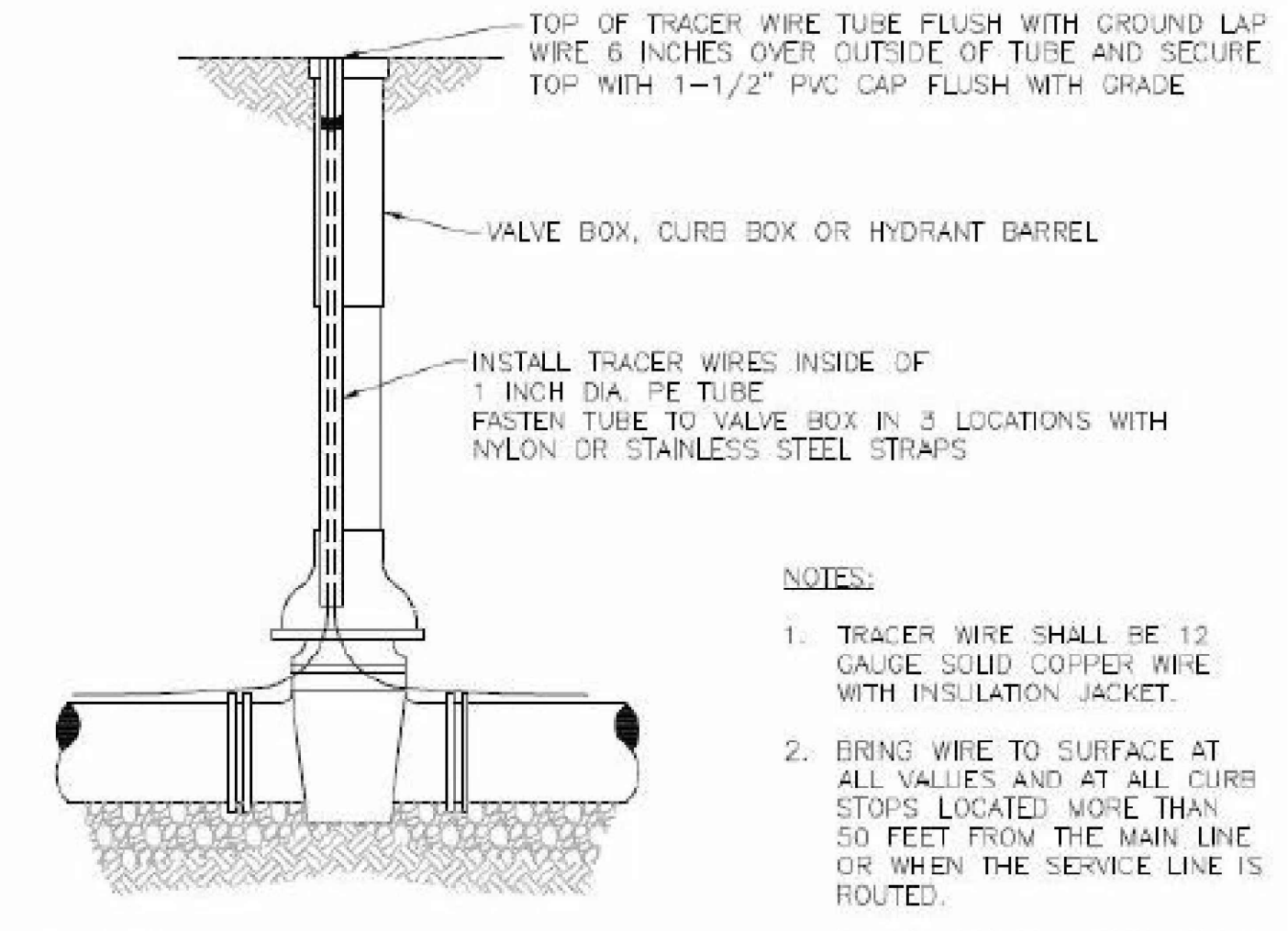


**NOTES:**

- WHERE EXISTING UTILITY GRADE CONFLICTS WITH GRADE OF PROPOSED WATERLINE, PROPOSED WATERLINE SHALL BE ADJUSTED IN GRADE TO PROVIDE A MINIMUM SEPARATION DISTANCE OF 18" BETWEEN UTILITIES.
- ALL JOINTS INVOLVED IN GRADE ADJUSTMENT SHALL INCORPORATE MECHANICAL JOINTS AND SHALL BE RESTRAINED.

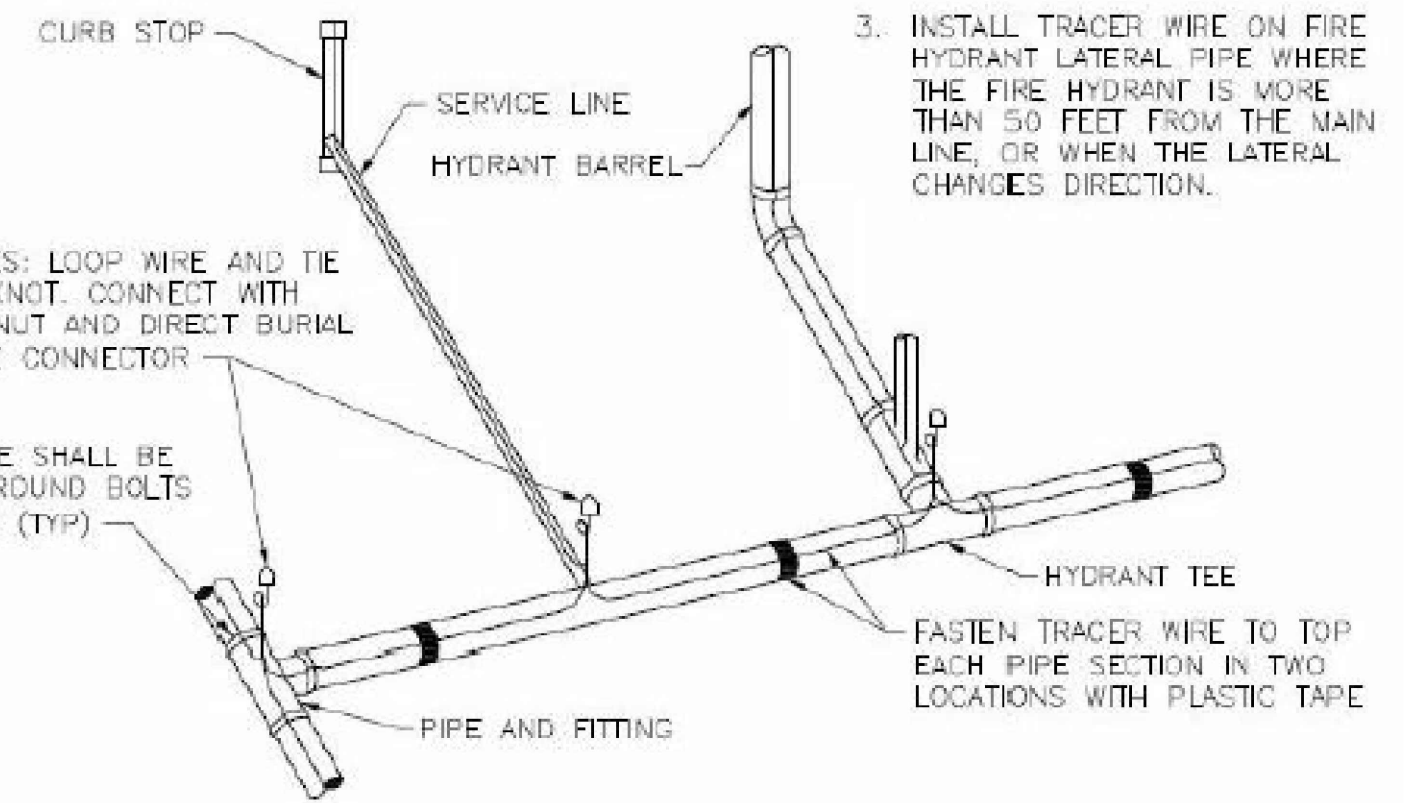
PIPE DIAMETER	NO OF RODS
4" & 6"	2
8"	3
10" & UP	4

**TYPICAL WATERLINE GRADE ADJUSTMENT**  
NOT TO SCALE



**NOTES:**

- TRACER WIRE SHALL BE 12 GAUGE SOLID COPPER WIRE WITH INSULATION JACKET.
- BRING WIRE TO SURFACE AT ALL VALVES AND AT ALL CURB STOPS LOCATED MORE THAN 50 FEET FROM THE MAIN LINE OR WHEN THE SERVICE LINE IS ROUTED.
- INSTALL TRACER WIRE ON FIRE HYDRANT LATERAL PIPE WHERE THE FIRE HYDRANT IS MORE THAN 50 FEET FROM THE MAIN LINE, OR WHEN THE LATERAL CHANGES DIRECTION.



**TRACER WIRE DETAIL**  
NOT TO SCALE