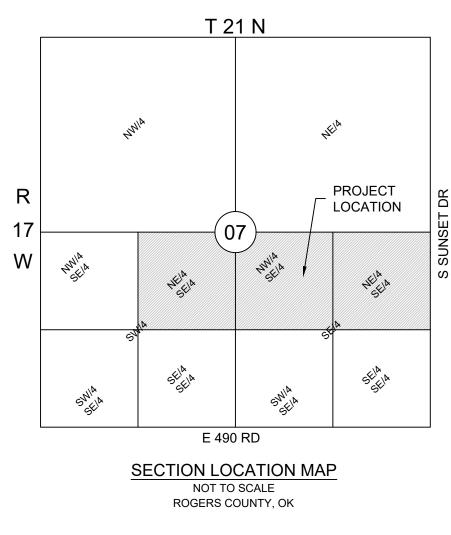


FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

_					
LEGEND					
	FOUND MONUMENT	XX	FENCE EDGE OF PAVEMENT		
	FIRE HYDRANT	ROW ROW ROW	RIGHT OF WAY		
₩.	FROST FREE YARD HYDRANT		ROAD CENTERLINE CURB AND GUTTER EXISTING EASEMENT LINE		
\mathbf{H}	WATER VALVE		PROPOSED EASEMENT LINE	SEV	VER CONSTRUCTION NOTES:
Ø	POWER POLE	ISS	EXISTING STORM SEWER EXISTING SANITARY SEWER	1. 2.	THE CONTRACTOR SHALL SET ALL LI
C	GUY WIRE	W SS	EXISTING WATER LINE PROPOSED SANITARY SEWER	3. 4.	THE CONTRACTOR SHALL NOTIFY AL THE CONTRACTOR, AT THIS OWN EX
S	EXISTING SANITARY SEWER MANHOLE	UGE	PROPOSED SANITARY SERVICE LINE PROPOSED UNDERGROUND ELECTRIC	-т.	THE PROPOSED IMPROVEMENTS
الله الله	STREET LIGHT		PROPOSED ASPHALT PAVEMENT PROPOSED CONCRETE SIDEWALK (HOME BUILDER)	5. 6.	ALL TRENCHES UNDER DRIVES AND ASPHALT AND CONCRETE STREETS A
4	ELECTRIC HOOKUP PANEL		PROPOSED SANITARY SEWER MANHOLE	7. 8.	ALL SEWER LINES SHALL BE AIR TEST ALL SANITARY SEWER PIPE SHALL BE
\diamond		0	PROPOSED SANITARY CLEANOUT	9.	THE CONTRACTOR IS RESPONSIBLE I
	EXISTING SANITARY HOOKUP	U/E	UTILITY EASEMENT		REVIEW AND APPROVAL PRIOR TO E
	PROPOSED SANITARY HOOKUP	D/E	DRAINAGE EASEMENT	10.	THE CONTRACTOR IS RESPONSIBLE I STATE PLANE COORDINATES AT HIS
	BENCHMARK	BSB	BUILDING SETBACK LINE	11.	SANITARY LINES SHOWN IN THIS CO
		POB	POINT OF BEGINNING		



SHEET LIST

C000 COVER SHEET C001 SPECIFICATIONS C100 OVERALL SITE PLAN - WEST C101 OVERALL SITE PLAN - EAST SEWER PROFILE C201 SEWER PROFILE C201 SEWER PROFILE C500 LIFT STATION PLAN AND DETAIL C501 STANDARD SEWER DETAILS

ITEM	DESCRIPTION	UNIT	QUANTITY
1	4" SDR-26 PVC Sewer Main	LF	1,570
2	6" SDR-26 PVC Sewer Main	LF	1,994
3	8" SDR-26 PVC Sewer Main	LF	2,616
4	4" Sch 40 Santiary Service Line	LF	9,569
5	3" Sch 80 Force Main	LF	101
6	Two-Way Sanitary Clean Out	EA	4
7	Sanitary Manhole, 4' Diameter	EA	18
8	Sanitary Service Wye, 4"x4", Installed	EA	55
-			

8	Sanitary Service Wye, 4"x4", Installed	EA EA	55
9	Sanitary Service Wye, 8"x4", Installed	EA	90
10	Sanitary Service Wye, 8"x4", Installed	EA	49
11	Sanitary RV Hookup	EA	194
12	Sanitary RV Dump Station	EA	1
13	Concrete Roadway T-Patch	SY	22
14	Aggreate Stone Drive Surface, 6" Depth	SY	1,065
15	Lift Station Package	EA	1

	BENCHMARK TABI	LE		
Point #	Raw Description	Elevation	Northing	Easting
1	CP PRIMARY OPUS BM1	640.420	487070.7200	2696437.9800
2	CP BM2 NEC CONC SAFE ROOM PAD MAG SPIKE	644.368	487326.6740	2696486.1080
4	CP BM4 SET MAG NWC PAD	651.019	487595.5070	2696249.1230
3	CP BM3 MAG SPIKE SEC ASPHALT PARKING	643.549	487091.0880	2695785.8590

LINE AND GRADE STAKES

O BE LOCATED AS DIRECTED BY THE ENGINEER

ALL UTILITY COMPANIES FOR LOCATION OF ALL UTILITY SERVICES BEFORE BEGINNING EXCAVATION. EXPENSE, SHALL REMOVE AND RESET ALL FENCES, POSTS, CULVERTS, STREET MARKERS, MAILBOXES, AND THE LIKE WITHIN THE LIMITS OF

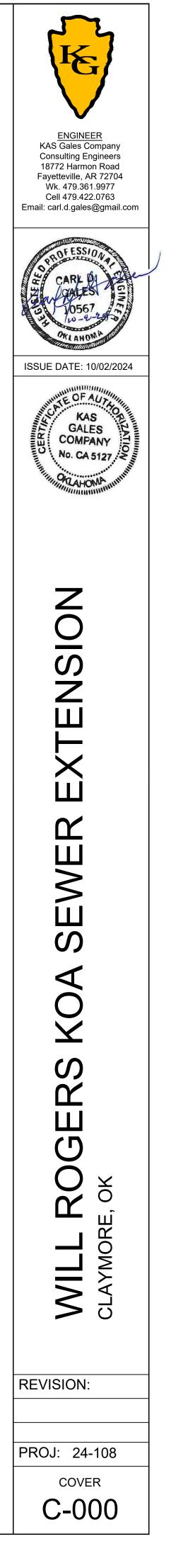
ID STREETS MUST BE BACKFILLED WITH BASEROCK AND COMP[ACTED TO 95% PD. S AND CURB AND GUTTER SHALL BE RESTORED TO MATCH ORGINAL CONDITIONS PRIOR TO CONSTRUCTION.

ESTED AND ALL MANHOLES SHALL BE VACUUM TESTED.

BE SDR26 UNLESS OTHERWISE NOTED. LE FOR PROVIDING THE ENGINEER WITH ALL SUBMITTALS FOR PIPING, RING AND COVER, MANHOLES AND EXTERNAL SEALANTS FOR THE D BEGINNING CONSTRUCTION.

LE FOR PROVIDING THE ENGINEER WITH CONSTRUCTION RECORD/AS BUILT DRAWINGS WITH VERIFIED USGS ELEVATIONS AND OKLAHOMA IS EXPENSE.

COLOR ARE TO BE DESIGNATED AS SERVICE LINE AND ARE TO BE CONSTRUCTED UNDER OKLAHOMA PLUMBING CODE.



PART 1 - GENERAL 1.1 RELATED DOCUMENTS A. Lift Station Specifications 1.2 SUMMARY A. Section Includes: 1. PVC pipe and fittings. 2. Nonpressure-type transition couplings. 3. Pressure-type pipe couplings. 4. Expansion joints and deflection fittings. 5. Backwater valves. 6. Cleanouts. 7. Encasement for piping. 8. Manholes 9. Concrete. 1.3 DEFINITIONS A. The following are industry abbreviations for materials: EPDM: Ethylene-propylene-diene-monomer rubber. PVC: Polyvinyl chloride plastic. TPE: Thermoplastic elastomer. 1.4 ACTION SUBMITTALS A. Product Data: For the following: 1. Pipe and fittings. 2. Non-pressure and pressure couplings 3. Expansion joints and deflection fittings. 4. Backwater valves. 5. Cleanouts. B. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers. 1.5 INFORMATIONAL SUBMITTALS A. Coordination Drawings: 1. Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from sewer system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures. B. Product Certificates: For each type of pipe and fitting. C. Field quality-control reports. 1.6 DELIVERY, STORAGE, AND HANDLING A. Do not store plastic pipe, and fittings in direct sunlight. B. Protect pipe, pipe fittings, and seals from dirt and damage. C. Handle manholes according to manufacturer's written rigging instructions. 1.7 FIELD CONDITIONS A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated: 1. Notify Owner no fewer than two days in advance of proposed interruption of service. 2. Do not proceed with interruption of service without Owner's written permission. PART 2 - PRODUCTS 2.1 PVC PIPE AND FITTINGS A. PVC, Schedule 40 and 80 Pipe: ASTM D 1785. 1. PVC, Schedule 40 and 80 Socket Fittings: ASTM D 2466. B. PVC Type PSM Sewer Piping: 1. Pipe: ASTM D 3034, [SDR 35] [SDR 26], PVC Type PSM sewer pipe with bell-and- spigot ends for gasketed joints, for diameters of 8 inches to 15 inches 2. Fittings: ASTM D 3034, PVC with bell ends. 3. Gaskets: ASTM F 477, elastomeric seals. 2.2 NONPRESSURE-TYPE TRANSITION COUPLINGS A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling; for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and include corrosion-resistant-metal tension band and tightening mechanism on each end B. Sleeve Materials: 1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC. 2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined. C. Nonpressure-Type, Rigid Couplings: 1. Description: ASTM C 1461, sleeve-type, reducing- or transition-type mechanical coupling; molded from ASTM C 1440, TPE material; with corrosion-resistant-metal tension band and tightening mechanism on each end. 2.3 PRESSURE-TYPE PIPE COUPLINGS A. Tubular-Sleeve Couplings: AWWA C219, with center sleeve, gaskets, end rings, and bolt fasteners. B. Metal, bolted, sleeve-type, reducing or transition coupling; for joining underground pressure piping. Include 200-psig minimum pressure rating and ends of same sizes as piping to be joined. C. Center-Sleeve Material: Manufacturer's standard. D. Gasket Material: Natural or synthetic rubber. E. Metal Component Finish: Corrosion-resistant coating or material. 2.4 EXPANSION JOINTS AND DEFLECTION FITTINGS A. Ductile-Iron Expansion Joints: 1. Description: Three-piece assembly of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110/A21.10 or AWWA C153/A21.53. Include rating for 250-psig minimum working pressure and for expansion indicated. B. Ductile-Iron Deflection Fittings: 1. Description: Compound coupling fitting with ball joint, flexing section, gaskets, and restrained-joint ends complying with AWWA C110/A21.10 or AWWA C153/A21.53. 2. Include rating for 250-psig minimum working pressure and for up to 15 degrees of deflection.

- 3. Combination horizontal and manual gate-valve type; with swing check valve, integral gate valve, and hub-and-spigot ends.

- A. Cast-Iron Cleanouts
- 1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover.
- 3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.
- B. PVC Cleanouts:
- 1. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.
- 2.7 ENCASEMENT FOR PIPING
- A. Standard: ASTM A 674 or AWWA C105/A21.5.
- B. Material: Linear low-density polyethylene film of 0.008-inch minimum thickness. C. Form: tube.
- D. Color: Black
- 2.8 MANHOLES
- A. Standard Precast Concrete Manholes
- 1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
- 2. Diameter: 48 inches minimum unless otherwise indicated.
- 3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation. 4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section; with
- separate base slab or base section with integral floor.
- 5. Riser Sections: 4-inch minimum thickness, of length to provide depth indicated.
- 6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated; with top of cone of size that matches grade rings.
- 7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.

- 8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
- 9. Steps: ASTM A 615, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP; wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.
- 10. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope. B. Designed Precast Concrete Manholes:
- 1. Description: ASTM C 913; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44 in AASHTO HL), heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for sealant joints.
- 2. Ballast: Increase thickness of one or more precast concrete sections or add concrete to manhole as required to prevent flotation.
- 3. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
- 4. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection. 5. Steps: ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP; wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.
- 6. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope. C. Manhole Frames and Covers:
- 1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser, with 4-inch-minimum-width flange and 26-inch-diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "SANITARY SEWER." 2. Material: ASTM A 48/A 48M, Class 35 gray iron unless otherwise indicated.
- D. Manhole-Cover Inserts: inflow. Include handle for removal and gasket for gastight sealing.
- 2. Type: Solid
- 2.9 CONCRETE
- A. General: Cast-in-place concrete complying with ACI 318, ACI 350, and the following: 1. Cement: ASTM C 150, Type II.
- 2. Fine Aggregate: ASTM C 33, sand.
- 3. Coarse Aggregate: ASTM C 33, crushed gravel.
- 4. Water: Potable. B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.
- 1. Reinforcing Bars: ASTM A 615, Grade 60 deformed steel. C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45
- maximum water/cementitious materials ratio. Include channels and benches in manholes. 1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe
- diameter. Form curved channels with smooth, uniform radius and slope. a. Invert Slope: 2 percent through manhole.
- 2. Benches: Concrete, sloped to drain into channel.
- a. Slope: 8 percent.
- 1. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed steel.
- PART 3 EXECUTION 3.1 EARTHWORK
- A. Excavating, trenching, and backfilling are specified in Standard Details
- 3.2 PIPING INSTALLATION
- A. General Locations and Arrangements: Drawing plans and details to indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions. B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of
- lubricants, cements, and other installation requirements.
- existing sewer is indicated.
- size of piping in direction of flow is prohibited.
- or combination of any. F. Install gravity-flow, nonpressure, drainage piping according to the following:
- 1. Install piping pitched down in direction of flow, at minimum slope of 1 percent unless otherwise indicated.
- 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors. 3. Install piping with 30-inch minimum cover. 4. Install piping below frost line. 5. Install ductile-iron, gravity sewer piping according to ASTM A 746.

- 6. Install PVC profile sewer piping according to ASTM D 2321 and ASTM F 1668. 7. Install PVC Type PSM sewer piping according to ASTM D 2321 and ASTM F 1668.
- G. Install force-main, pressure piping according to the following:
- 1. Install piping with restrained joints at tee fittings and at horizontal and vertical changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors. 2. Install piping with 36-inch minimum cover.
- 3. Install piping below frost line.
- 4. Install ductile-iron pressure piping according to AWWA C600 or AWWA M41

		S	STRUCTURE T	ABLE (GRAVIT	Y SYSTEM)					:	STRUCTURE ⁻	TABLE (LIFT S	TATION SYSTE	EM)	
STRUCTURE NAME:	SEWER ALINGMENT:	SEWER STA:	MH SIZE AND RIM ELEV	PIPES IN:	PIPES OUT	NORTHING:	EASTING:	STRUCTURE NAME:	SEWER ALINGMENT:	SEWER STA:	MH SIZE AND RIM ELEV	PIPES IN:	PIPES OUT	NORTHING:	EASTING:
CLEAN OUT 1	SANITARY LINE 3	3+23.04	DIA.: 48" 653.28	NE 6" SDR 26 PVC	S 6" SDR 26 PVC	487684.1114	2695816.1698	CLEAN OUT 5	SANITARY LINE 5	9+89.04	DIA.: 48" 646.91	NW 6" SDR 26 PVC	S 6" SDR 26 PVC	487666.1564	2696763.4240
CLEAN OUT 2	SANITARY LINE 3	3+51.67	DIA.: 48" 653.66	E 6" SDR 26 PVC	SW 6" SDR 26 PVC	487704.7200	2695836.1698	CLEAN OUT 6	SANITARY LINE 5	10+64.42	DIA.: 48" 647.88	W 6" SDR 26 PVC	SE 6" SDR 26 PVC	487717.9845	2696708.6858
MH-108	SANITARY LINE 1	0+00.16	DIA.: 48" 639.76	E 8" PVC SDR 26 PVC		487104.3226	2694250.9063	MH 5A	SANITARY LINE 5	1+03.23	DIA.: 48" 642.00	E 8" PVC SDR 26 PVC	SW 8" SDR 26 PVC	487155.3124	2696391.2446
MH 1A	SANITARY LINE 1	3+91.10	DIA.: 48" 637.28	E 8" PVC SDR 26 PVC	W 8" SDR 26 PVC	487044.5275	2694637.2506	MH 5B	SANITARY LINE 5	4+89.92	DIA.: 48" 640.68	N 6" SDR 26 PVC	W 8" SDR 26 PVC	487167.2388	2696777.7122
MH 1B	SANITARY LINE 1	7+83.14	DIA.: 48" 640.18	E 8" PVC SDR 26 PVC	W 8" SDR 26 PVC	487056.2460	2695029.1092	MH 5C	SANITARY LINE 5	7+11.80	DIA.: 48" 642.66	N 6" SDR 26 PVC W 4" SDR 26 PVC	S 6" SDR 26 PVC	487389.0339	2696771.5843
MH 1C	SANITARY LINE 1	11+77.14	DIA.: 48" 641.33	E 8" PVC SDR 26 PVC	W 8" SDR 26 PVC	487067.9948	2695422.9340	MH 5D	SANITARY LINE 5	8+27.93	DIA.: 48" 644.10	N 6" SDR 26 PVC W 4" SDR 26 PVC	S 6" SDR 26 PVC	487505.1251	2696768.3769
MH 1D	SANITARY LINE 1	15+70.55	DIA.: 48" 642.63	N 8" PVC SDR 26 PVC	W 8" SDR 26 PVC	487079.7842	2695816.1698	MH 5E	SANITARY LINE 5	15+07.58	DIA.: 48" 651.74		E 6" SDR 26 PVC	487704.4709	2696265.5940
MH 1E	SANITARY LINE 1	16+26.16	DIA.: 48" 643.85	N 6" SDR 26 PVC E 8" PVC SDR 26 PVC	S 8" SDR 26 PVC	487135.3881	2695816.2848	MH 6A	SANITARY LINE 6	3+70.97	DIA.: 48" 643.81		E 4" SDR 26 PVC	487377.9733	2696401.0541
MH 1F	SANITARY LINE 1	18+51.84	DIA.: 48" 647.21	E 4" SDR 26 PVC N 6" SDR 26 PVC	S 6" SDR 26 PVC	487361.0697	2695816.1698	MH 7A	SANITARY LINE 7	3+88.23	DIA.: 48" 645.82		E 4" SDR 26 PVC	487493.4909	2696380.3197
MH 1G	SANITARY LINE 1	23+30.87	DIA.: 48" 646.42		W 4" SDR 26 PVC	487375.4251	2696294.9912	WET WELL	SANITARY LINE 5	0+00.15	DIA.: 48" 640.01	NE 8" PVC SDR 26 PVC		487068.2480	2696336.0583
MH 2A	SANITARY LINE 2	5+00.26	DIA.: 48" 642.55		W 8" SDR 26 PVC	487149.7709	2696316.3405		·						
MH 3A	SANITARY LINE 3	1+47.52	DIA.: 48" 649.67	N 6" SDR 26 PVC E 4" SDR 26 PVC	S 6" SDR 26 PVC	487508.5906	2695816.1698								
MH 3B	SANITARY LINE 3	6+82.27	DIA.: 48" 653.14		W 6" SDR 26 PVC	487714.6272	2696166.6210								
MH 4A	SANITARY LINE 4	3+69.85	DIA.: 48" 648.40		W 4" SDR 26 PVC	487519.6860	2696185.8564								

- 2.5 BACKWATER VALVES
- A. Cast-Iron Backwater Valves:
- 1. Description: ASME A112.14.1, gray-iron body and bolted cover, with bronze seat.
- 2. Horizontal type; with swing check valve and hub-and-spigot ends.
- 4. Terminal type; with bronze seat, swing check valve, and hub inlet.
- 2.6 CLEANOUTS
 - Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
- 2. Top-Loading Classification(s): as indicated on plans and according to section 3.7 below

- 1. Description; Manufactured, plastic form, of size to fit between manhole frame and cover and designed to prevent stormwater

- D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.
- piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe- jacking process of microtunneling, boring

- 5. Install ductile-iron special fittings according to AWWA C600.
- 6. Install PVC pressure piping according to AWWA M23 or to ASTM D 2774 and ASTM F 1668.
- 7. Install PVC water-service piping according to ASTM D 2774 and ASTM F 1668. H. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105/A21.5:
- 1. Ductile-iron pipe and fittings.
- 2. Expansion joints and deflection fittings.
- I. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.
- 3.3 PIPE JOINT CONSTRUCTION
- A. Join gravity-flow, nonpressure, drainage piping according to the following: 1. Join ductile-iron, gravity sewer piping according to AWWA C600 for push-on joints.
- 2. Join PVC profile sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
- 3. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
- 4. Join PVC gravity sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
- 5. Join dissimilar pipe materials with nonpressure-type, rigid couplings.
- B. Join force-main, pressure piping according to the following:
- 1. Join ductile-iron pressure piping according to AWWA C600 or AWWA M41 for push-on joints.
- 2. Join ductile-iron special fittings according to AWWA C600 or AWWA M41 for push-on joints.
- 3. Join PVC pressure piping according to AWWA M23 for gasketed joints.
- 4. Join dissimilar pipe materials with pressure-type couplings.
- C. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- 1. Use pressure pipe couplings for force-main joints. 3.4 MANHOLE INSTALLATION
- A. General: Install manholes complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Install FRP manholes according to manufacturer's written instructions.
- D. Form continuous concrete channels and benches between inlets and outlet. E. Set tops of frames and covers flush with finished surface of manholes that occur in pavements.
- F. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.
- G. Install manhole-cover inserts in frame and immediately below cover.
- 3.5 CONCRETE PLACEMENT
- A. Place cast-in-place concrete according to ACI 318.
- 3.6 BACKWATER VALVE INSTALLATION
- A. Install horizontal-type backwater valves in piping manholes or pits.
- B. Install combination horizontal and manual gate-type valves in piping and in manholes.
- C. Install terminal-type backwater valves on end of piping and in manholes. Secure units to sidewalls.
- 3.7 CLEANOUT INSTALLATION
- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
- 1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
- 2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
- 3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
- 4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads .
- B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 12 by 12 by 6 inches deep. Set with tops 1 inch above
- surrounding grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.
- 3.8 CONNECTIONS
- A. Make connections to existing piping and underground manholes.
- 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
- 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi. ections from side into existing piping, NPS 21 or larger, or to underground manholes by cutting opening into Make branch
- existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of, and be flush with, inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
- a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
- 4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris
- or other extraneous material that may accumulate.
- 3.9 CLOSING ABANDONED SANITARY SEWER SYSTEMS
- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
- 1. Close open ends of piping with at least 8-inch- thick, bulkheads made from flowable fill.
- - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

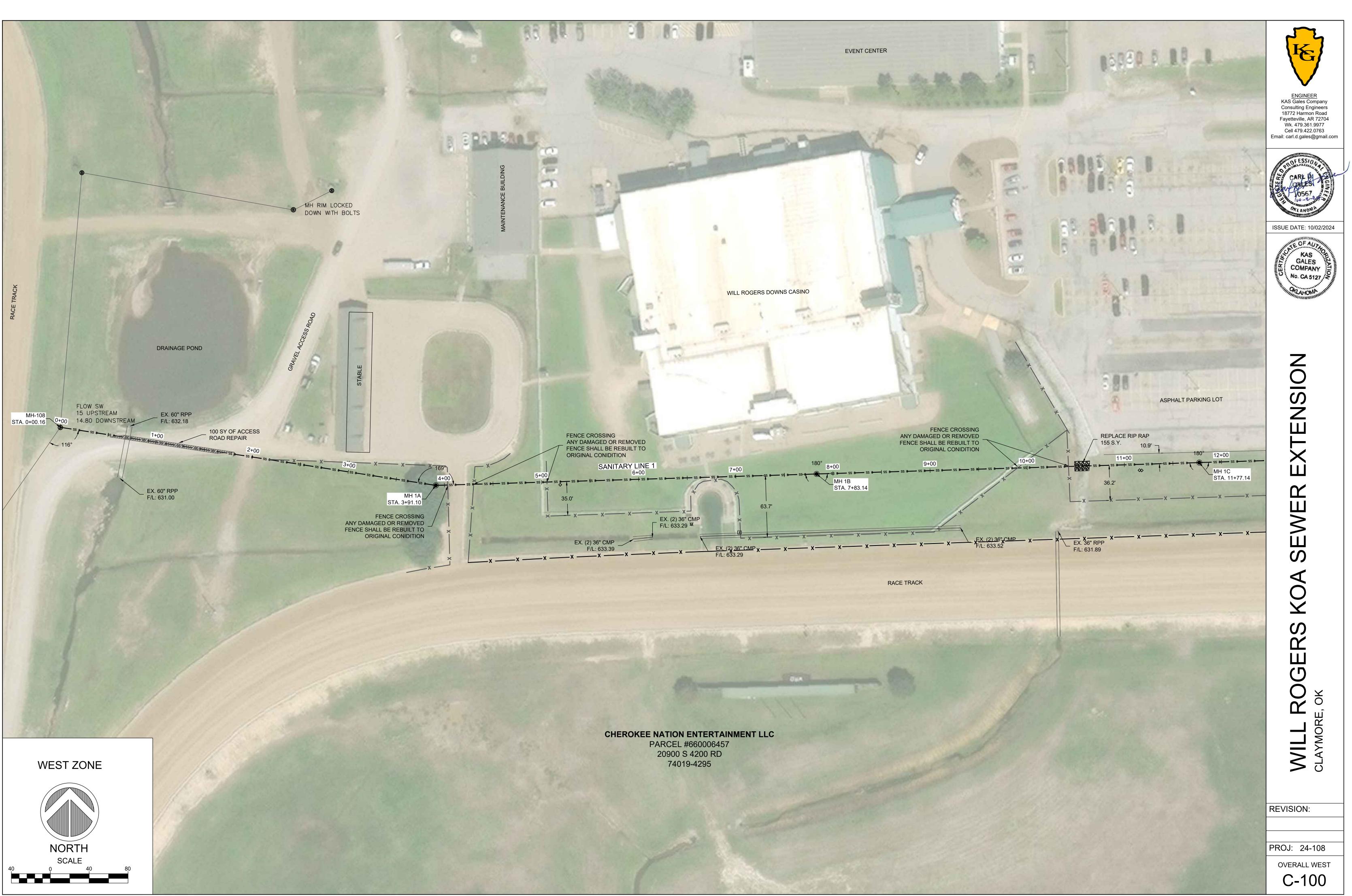
- 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes: Excavate around manhole as required and use either procedure below:
- 1. Remove manhole and close open ends of remaining piping. 2. Remove top of manhole down to at least 36 inches below final grade. Close open ends of piping. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
- C. Backfill to grade according to Construction Details.
- 3.10 FIELD QUALITY CONTROL
- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
- 1. Submit separate report for each system inspection. 2. Defects requiring correction include the following:
- a. Alignment: Less than full diameter of inside of pipe is visible between structures.
- b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
- c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
- d. Infiltration: Water leakage into piping.
- e. Exfiltration: Water leakage from or around piping. 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
- 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
- 1. Do not enclose, cover, or put into service before inspection and approval.
- 2. Test completed piping systems according to requirements of authorities having jurisdiction. 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
- 4. Submit separate report for each test.
- 5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following: a. Fill sewer piping with water. Test with pressure of at least 10-foot head of water, and maintain such pressure without leakage for at least 15 minutes.
- b. Allowable leakage is maximum of 50 gal./inch of nominal pipe size per mile of pipe, during 24-hour period.
- c. Close openings in system and fill with water.
- d. Purge air and refill with water.
- e. Disconnect water supply. f. Test and inspect joints for leaks.
- 6. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following: a. Test plastic gravity sewer piping according to ASTM F 1417. 7. Force Main: Perform hydrostatic test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than 1-1/2
- times the maximum system operating pressure, but not less than 150 psig. a. Ductile-Iron Piping: Test according to AWWA C600
- b. PVC Piping: Test according to AWWA M23
- 8. Manholes: Perform hydraulic test according to ASTM C 969.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.
- 3.11 CLEANING
- A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

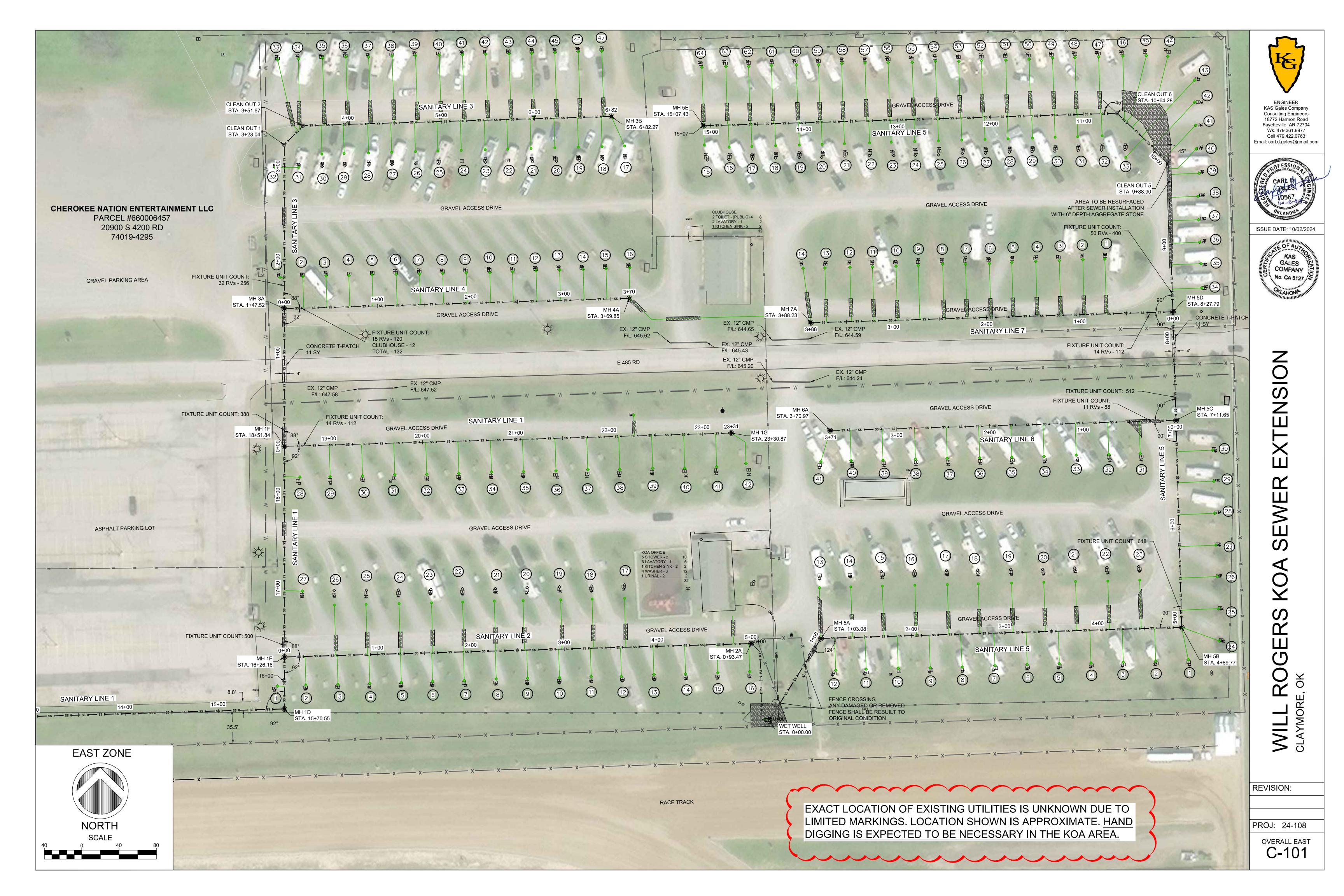
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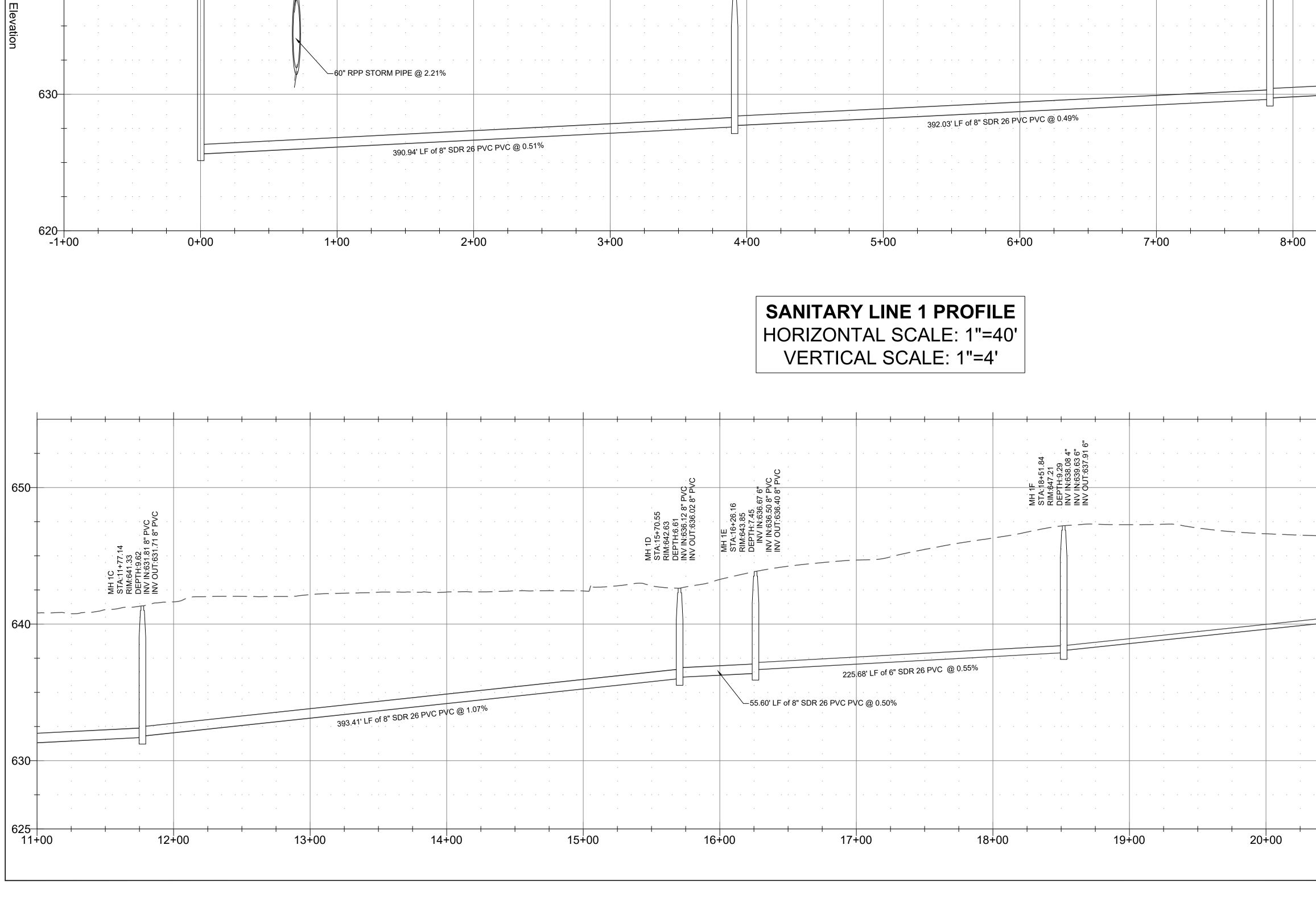
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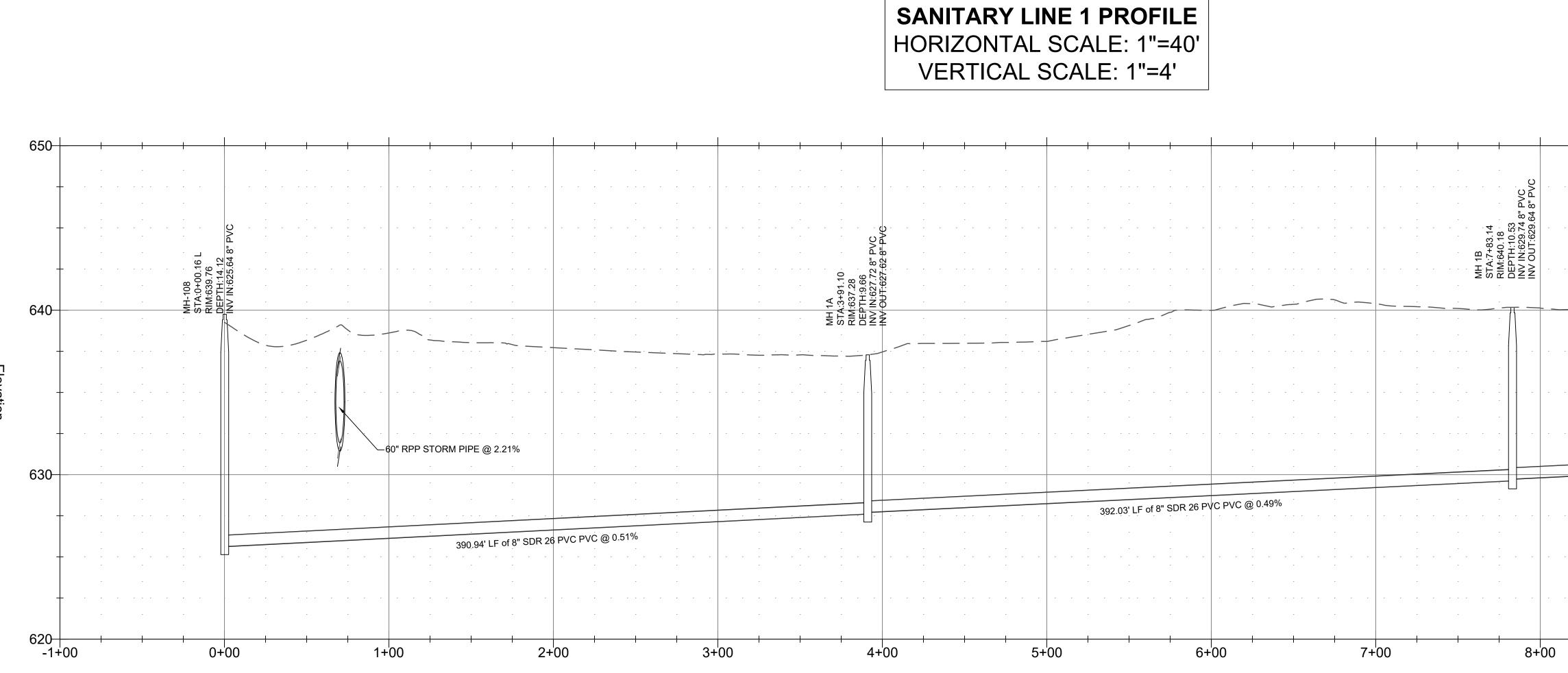
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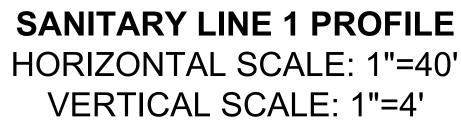
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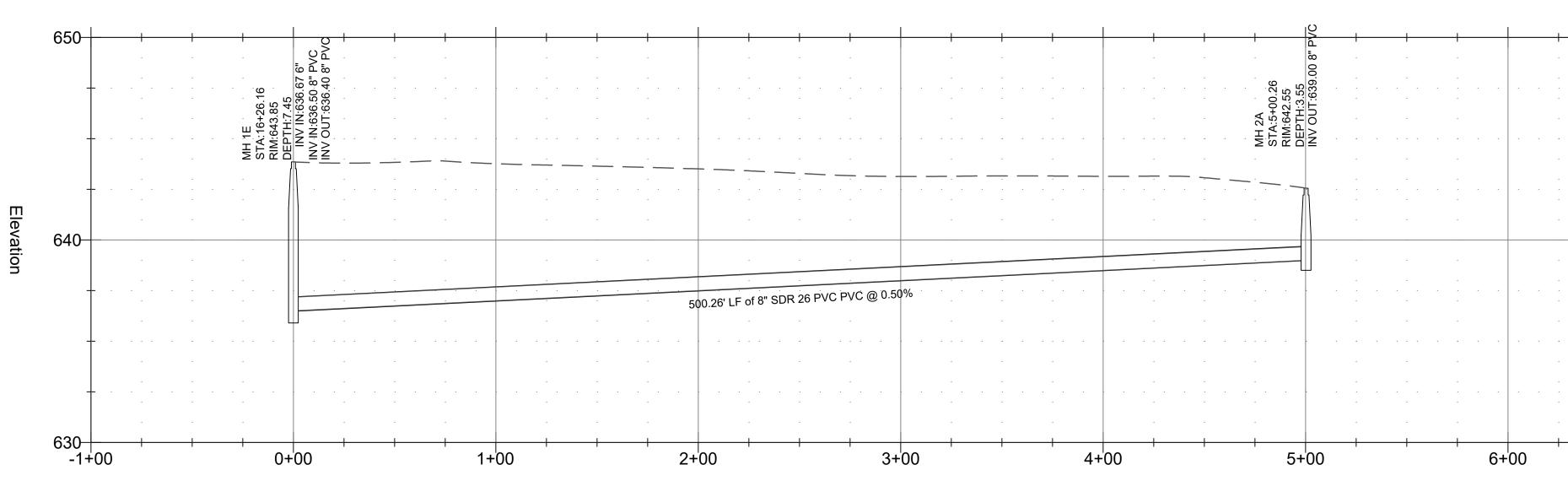


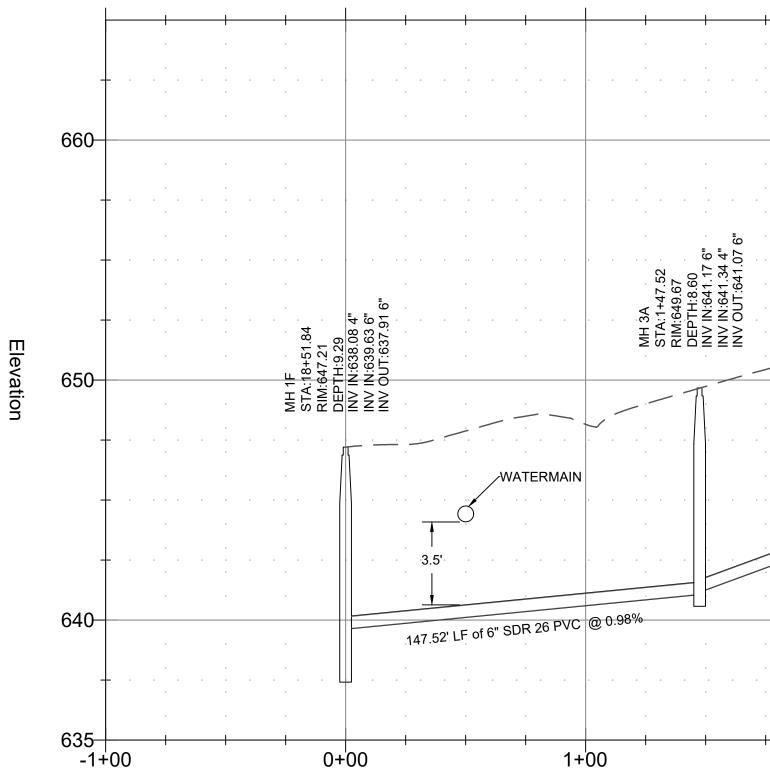






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SANITARY LINE 2 PROFILE HORIZONTAL SCALE: 1"=40' VERTICAL SCALE: 1"=4'

SANITARY LINE 3 PROFILE HORIZONTAL SCALE: 1"=40' VERTICAL SCALE: 1"=4'

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175.52' LF of 6" SDR	26 PVC @ 3.67%	28.72' LF of 6" SDR 26 PVC @ 0.55%	330.60' LF of 6" SDR 26 PVC (

