



Lift Station Consolidation:

E-54 Sewer Improvement in San Antonio

Marshall Preas, P.E.
Underground Infrastructure Conference
March 20, 2024

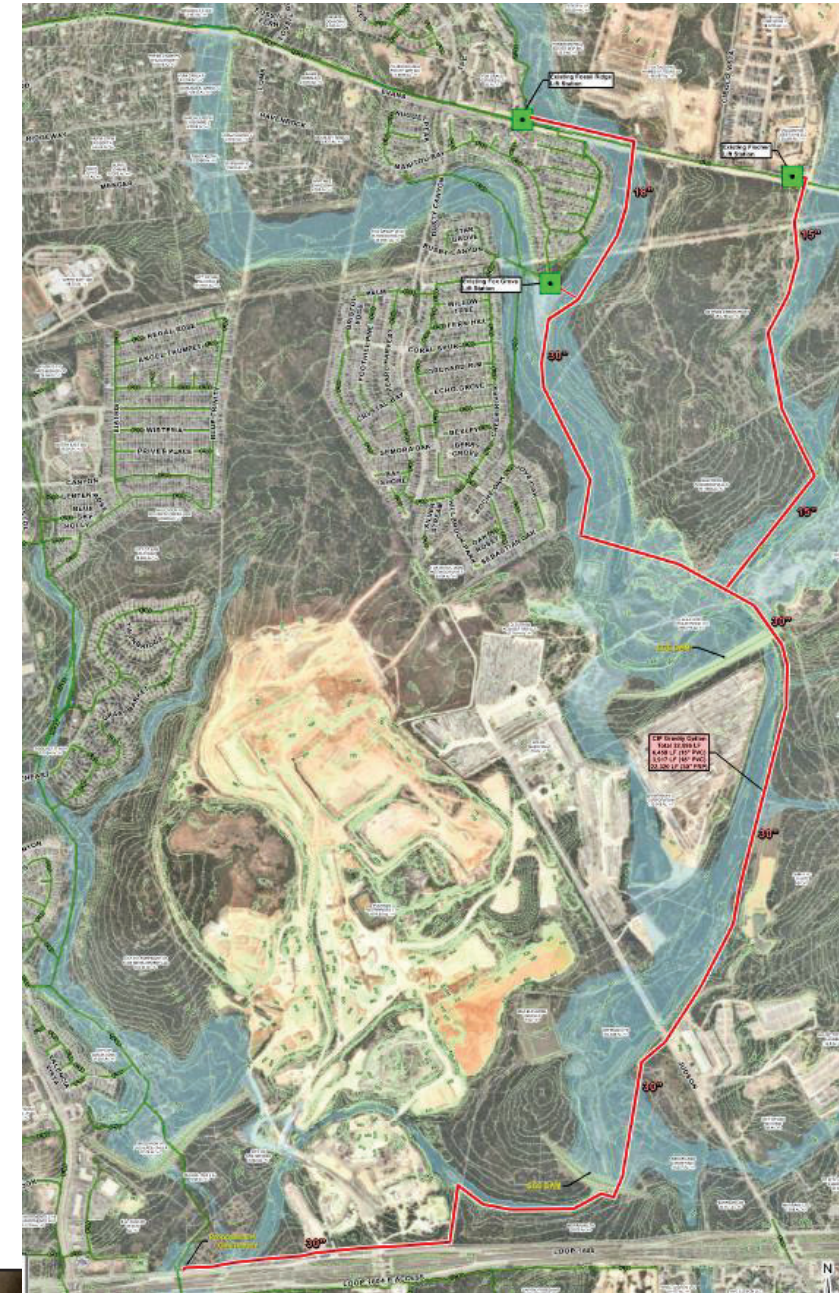
Water Resources | Transportation | Land Development | Surveying | Environmental



Background: SAWS CIP

Original CIP

- Decommissioned 3 SAWS lift stations
- 32,700 LF 15" to 30"



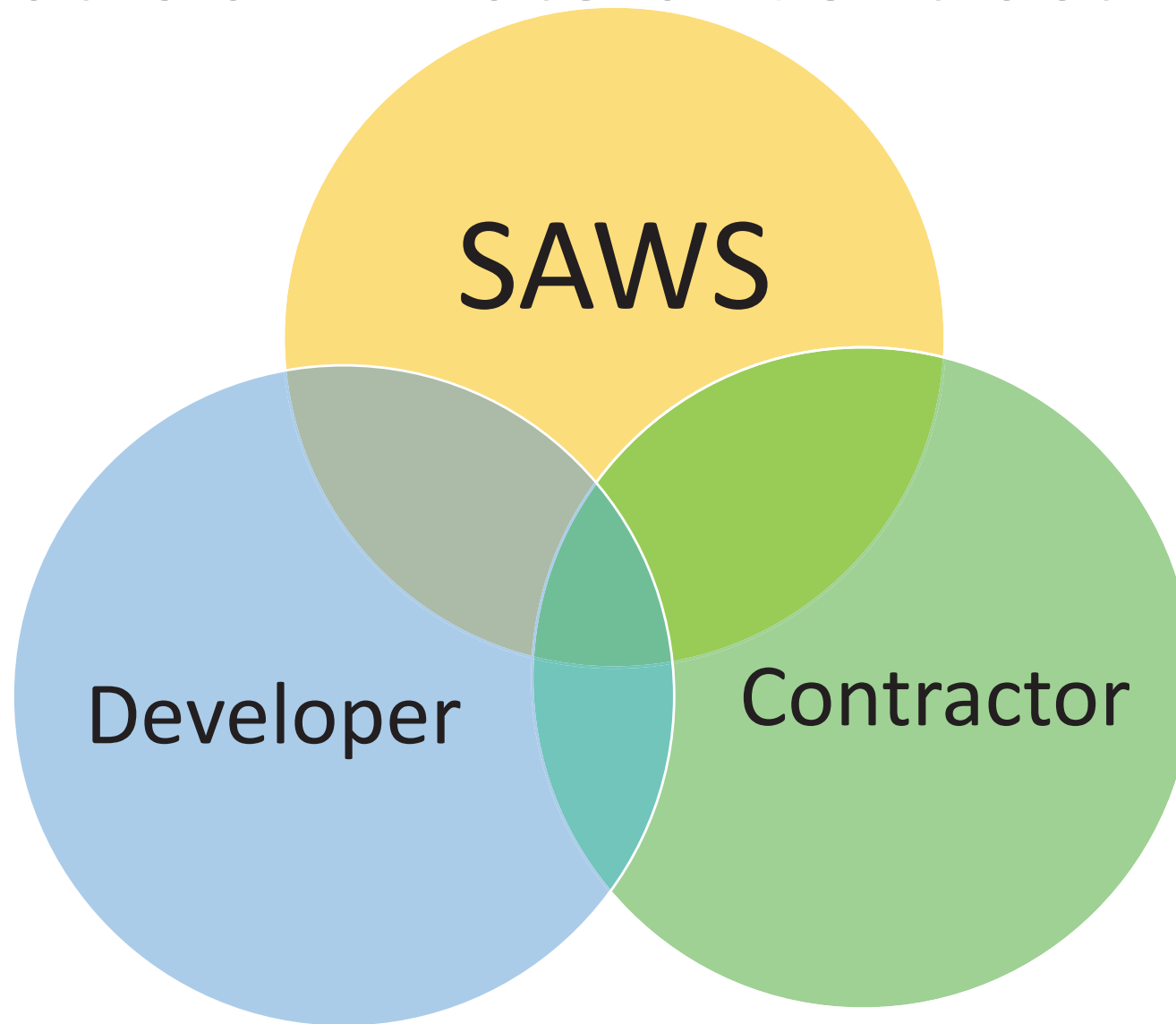
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Why and What is a Tri-Lateral Contract



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E-54 Design

(30%, 60%, 90%, 100%, Bid)



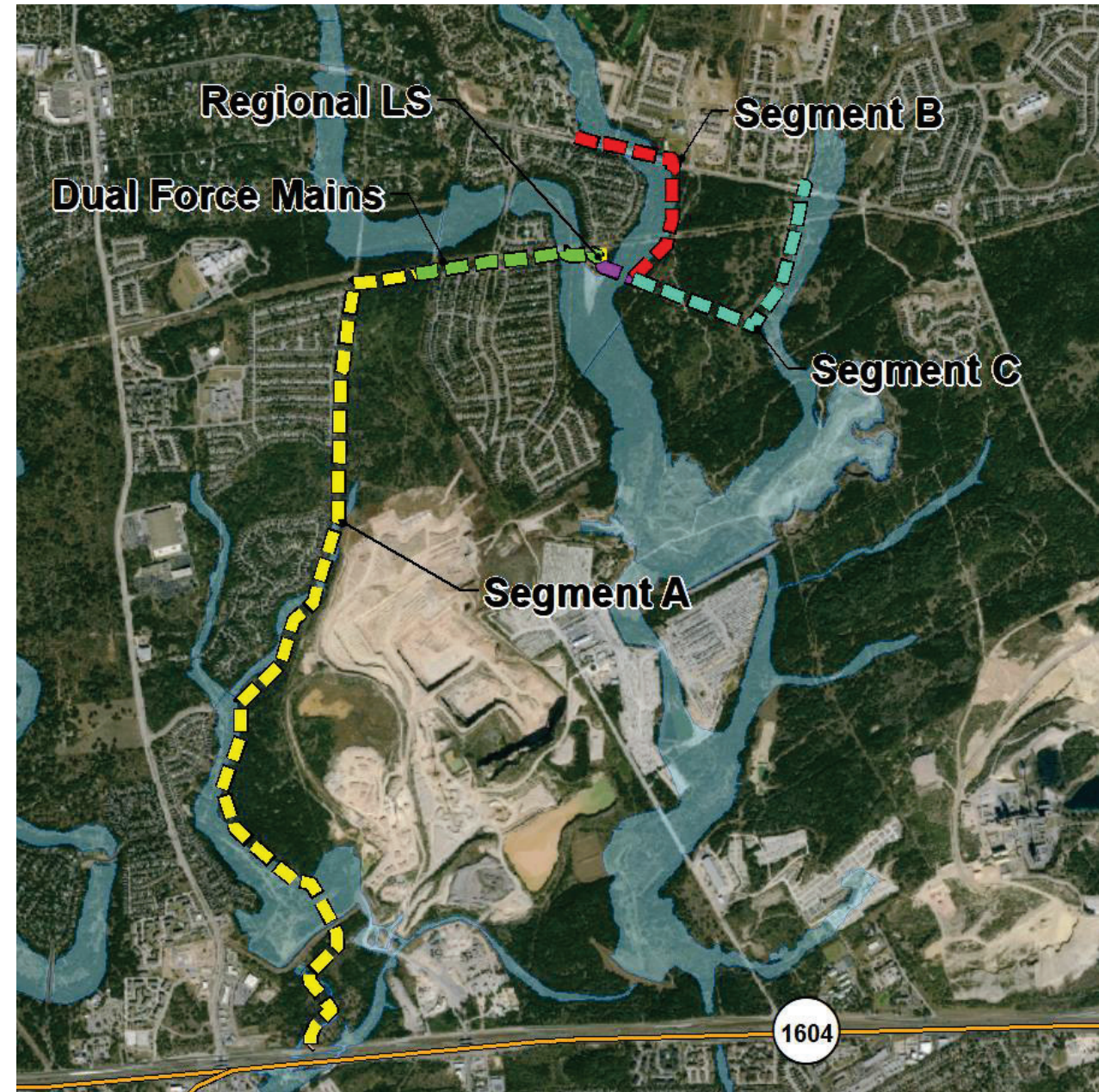
E-54: 30% Submittal

30% PER

- Regional LS
- Sized lift station for 6 MGD;
Ultimate capacity = 14 MGD
- Option to decommission 4th LS
- Alignment P&P sheets

SAWS reviewed

Broke out design (LS & Pipe Line)



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Easements

- ROE for 23 properties
- Easement acquisition for 17 properties
 - COSA, Quarry, HOA, two (2) Developments
- Necessity Order
- Public outreach



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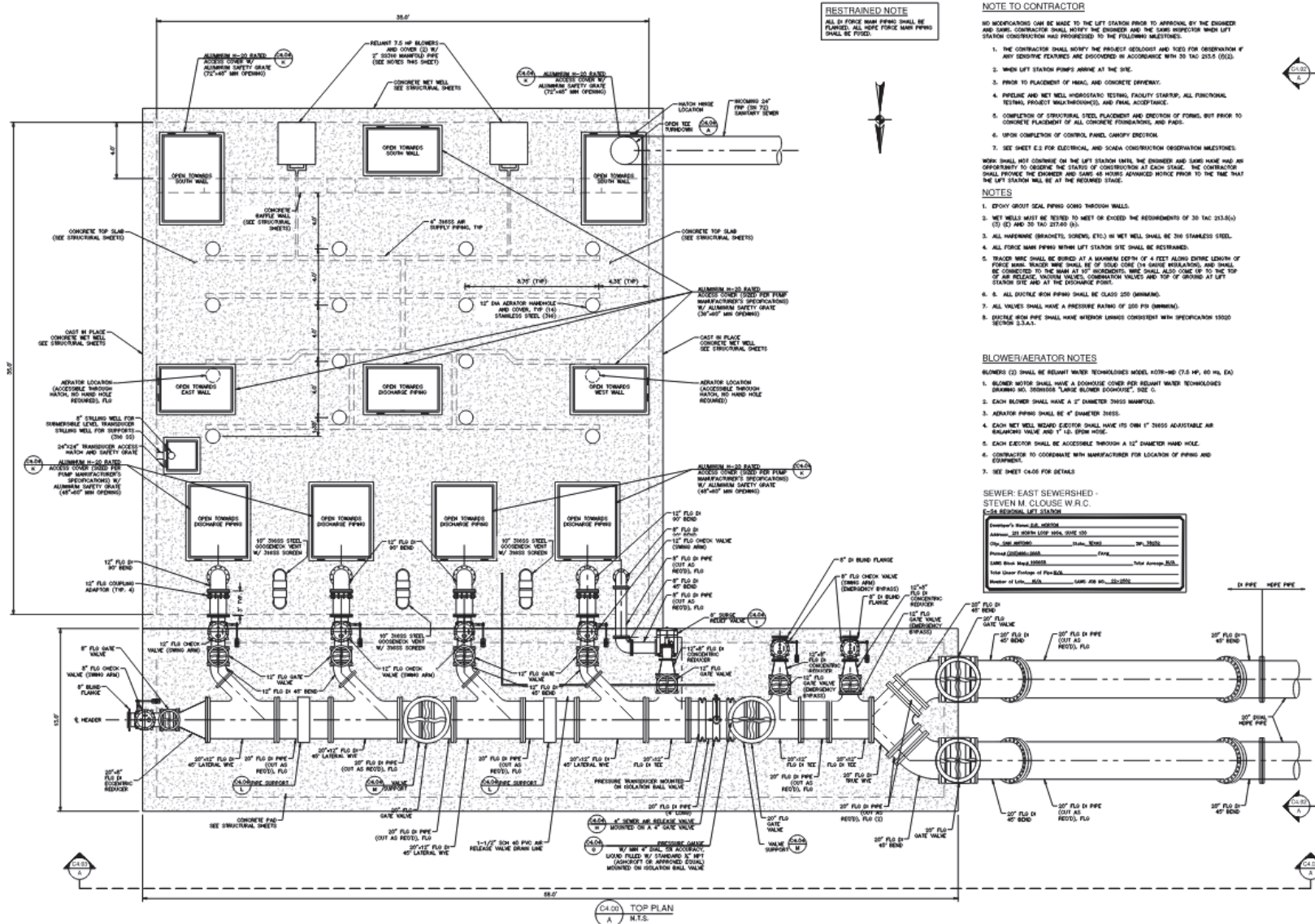
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Regional LS (Design)

- 6 MGD quadplex lift station
- Cast-in-place wet-well (14 MGD)
- SCADA system
- Aeration system



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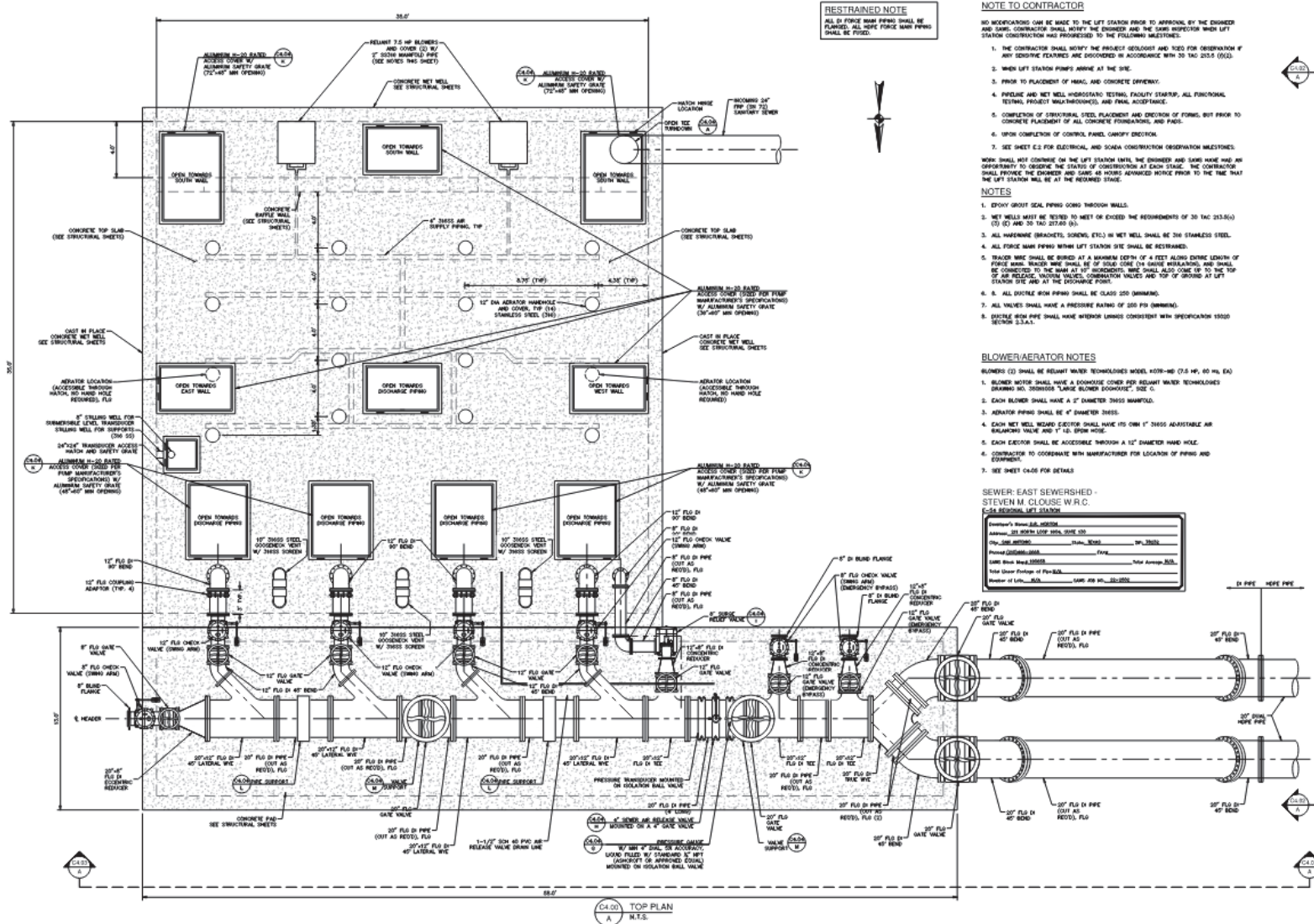
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Regional LS (Design)

- Electrical building with HVAC
- 20" header that connects to dual 20" HDPE force mains
- Abandonment of off-site lift stations

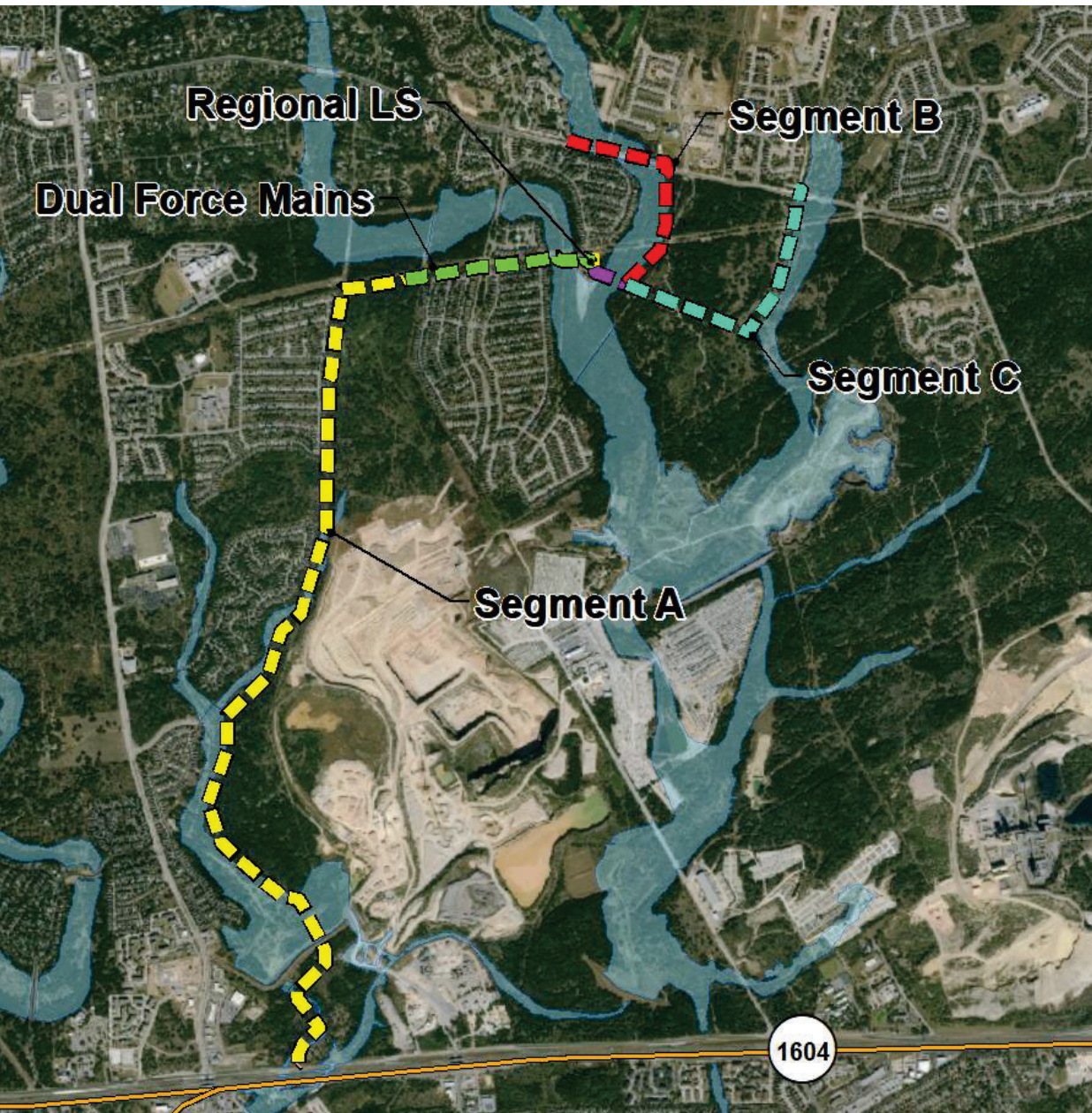


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Sanitary Sewer Main & Dual Force Mains

Sewer Main Contract

- Segments A, B & C
- Dual 20" HDPE force mains

Construction Phase

- NTP: 09/27/2022
- Completion: 04/08/2024



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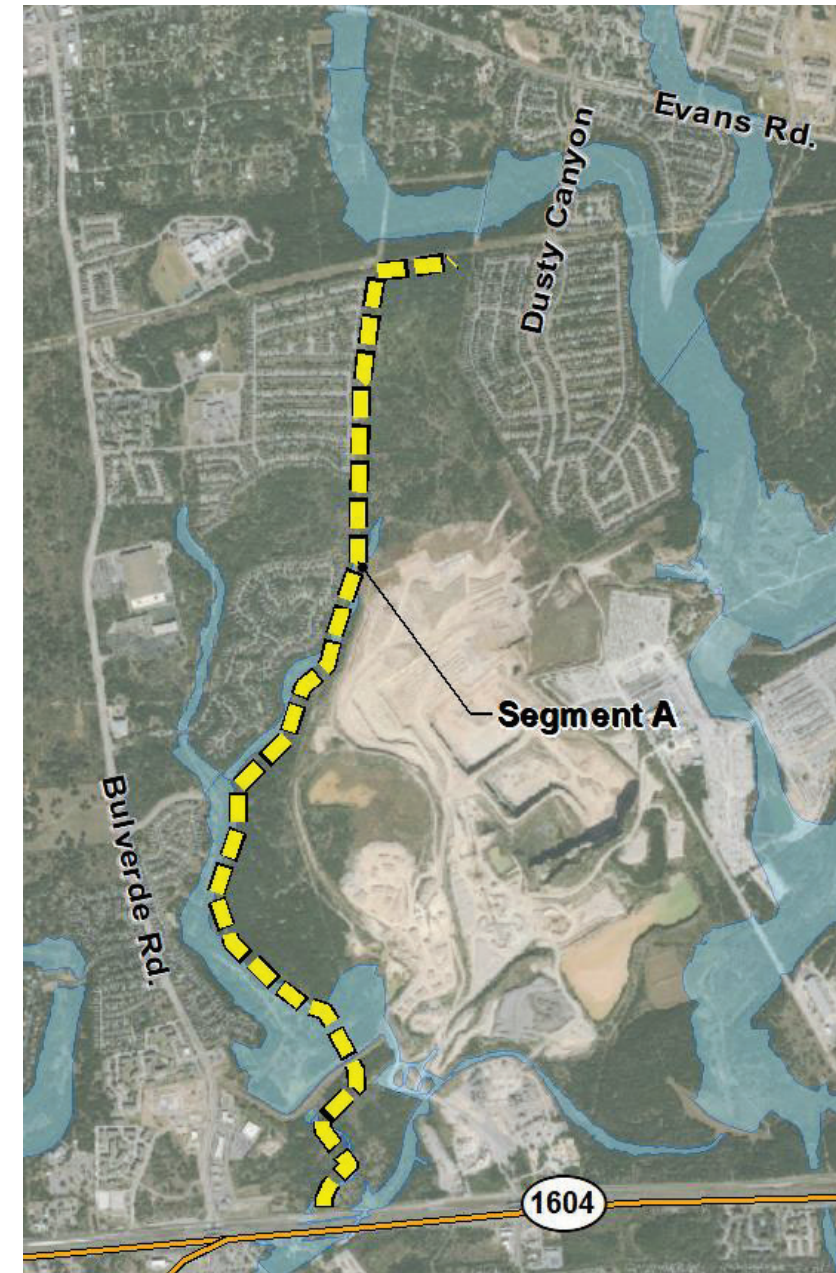
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Segment A

30" FRP

- 15,880 LF Open-Cut
- 230 LF – Reach 2 tunnel
- 121 LF of trenchless installation
- Average depth 15' (max 25')



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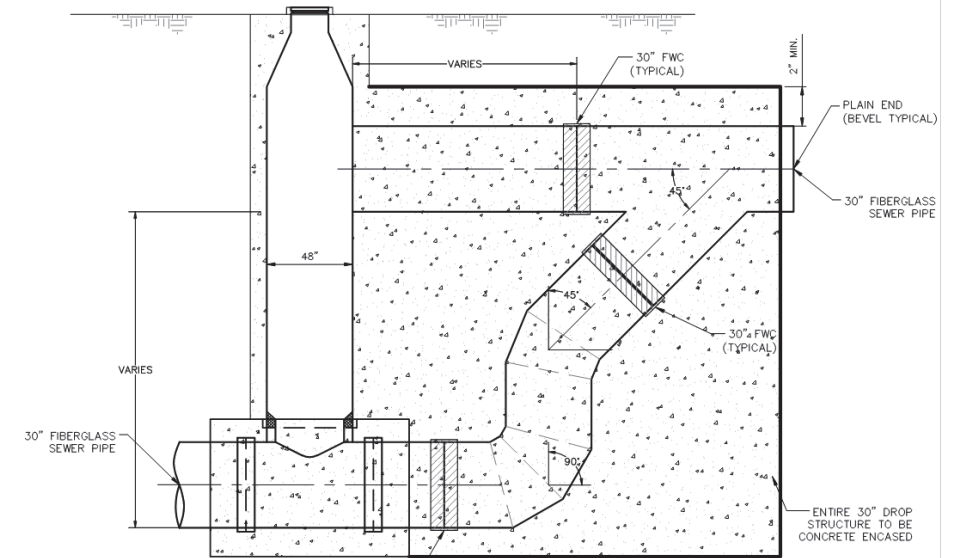
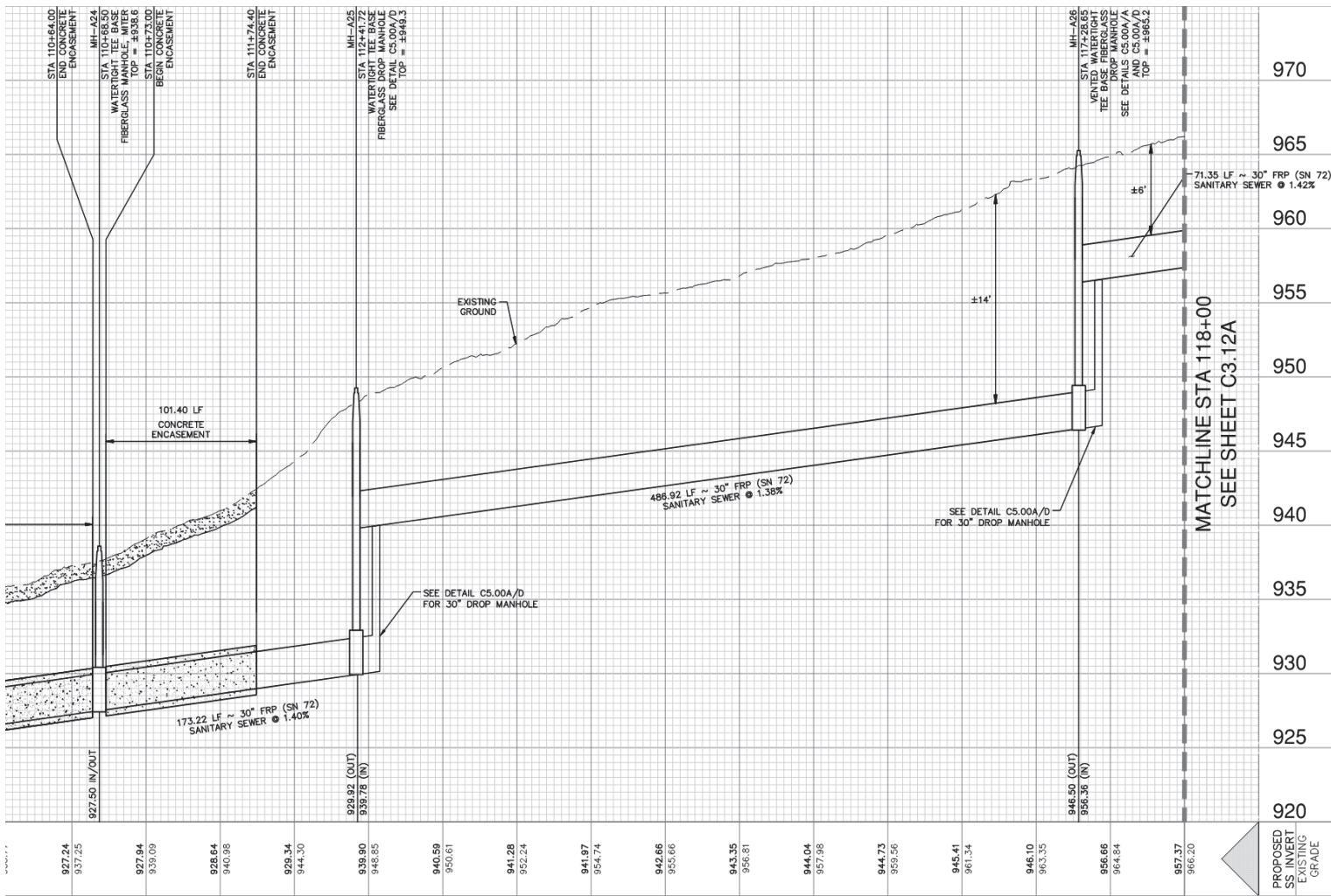
- Required SARA JUA, special condition for additional insured
- Covered under GBR
- 72" diameter primary liner
- 30" carrier pipe
- Annular grouting



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Segment A – 30” Drop MH



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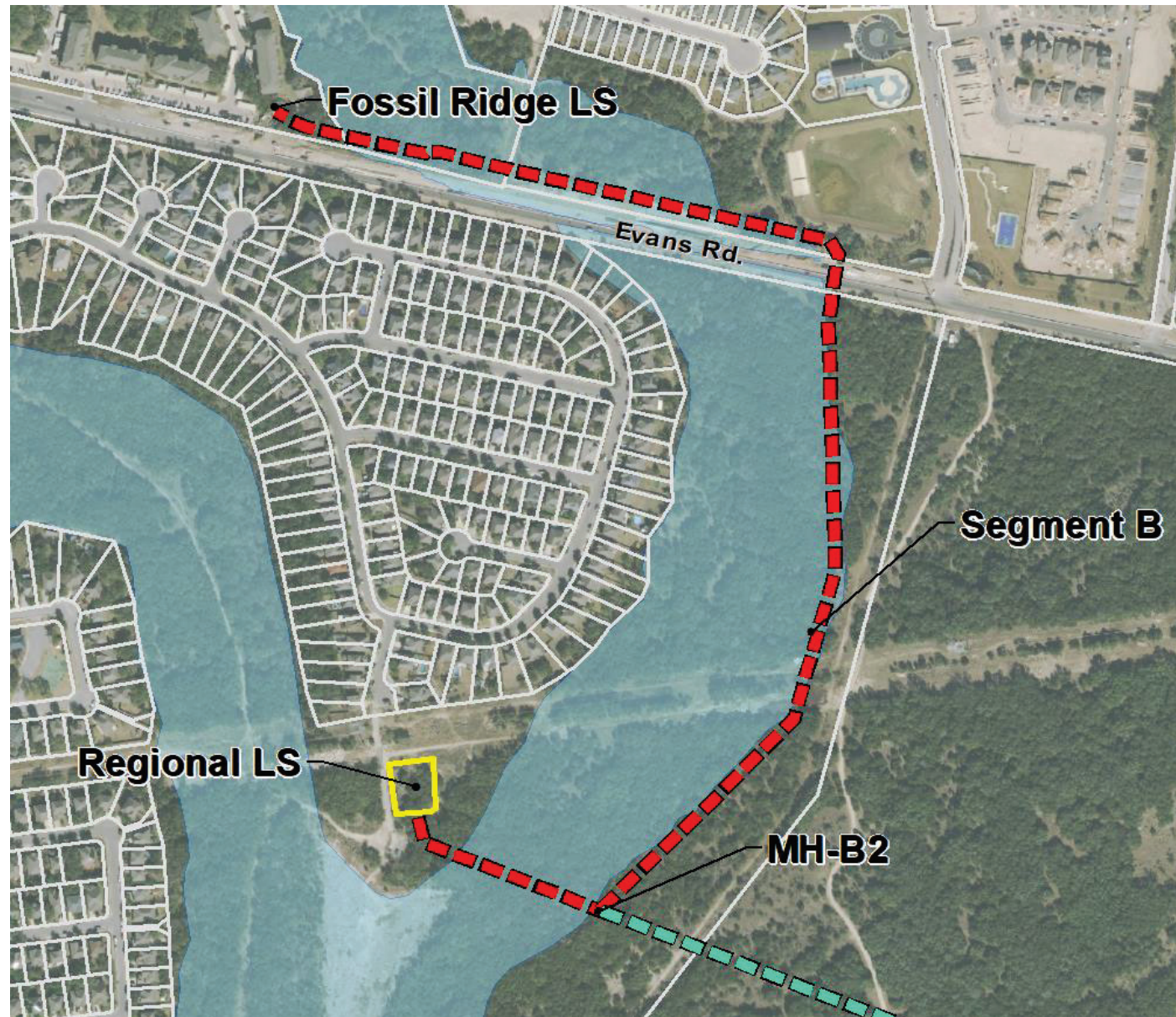
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Segment B: Fossil Ridge Gravity Main

- 21" & 24" PVC sanitary sewer main
- 4,393 LF open-cut
- 222 LF trenchless installation



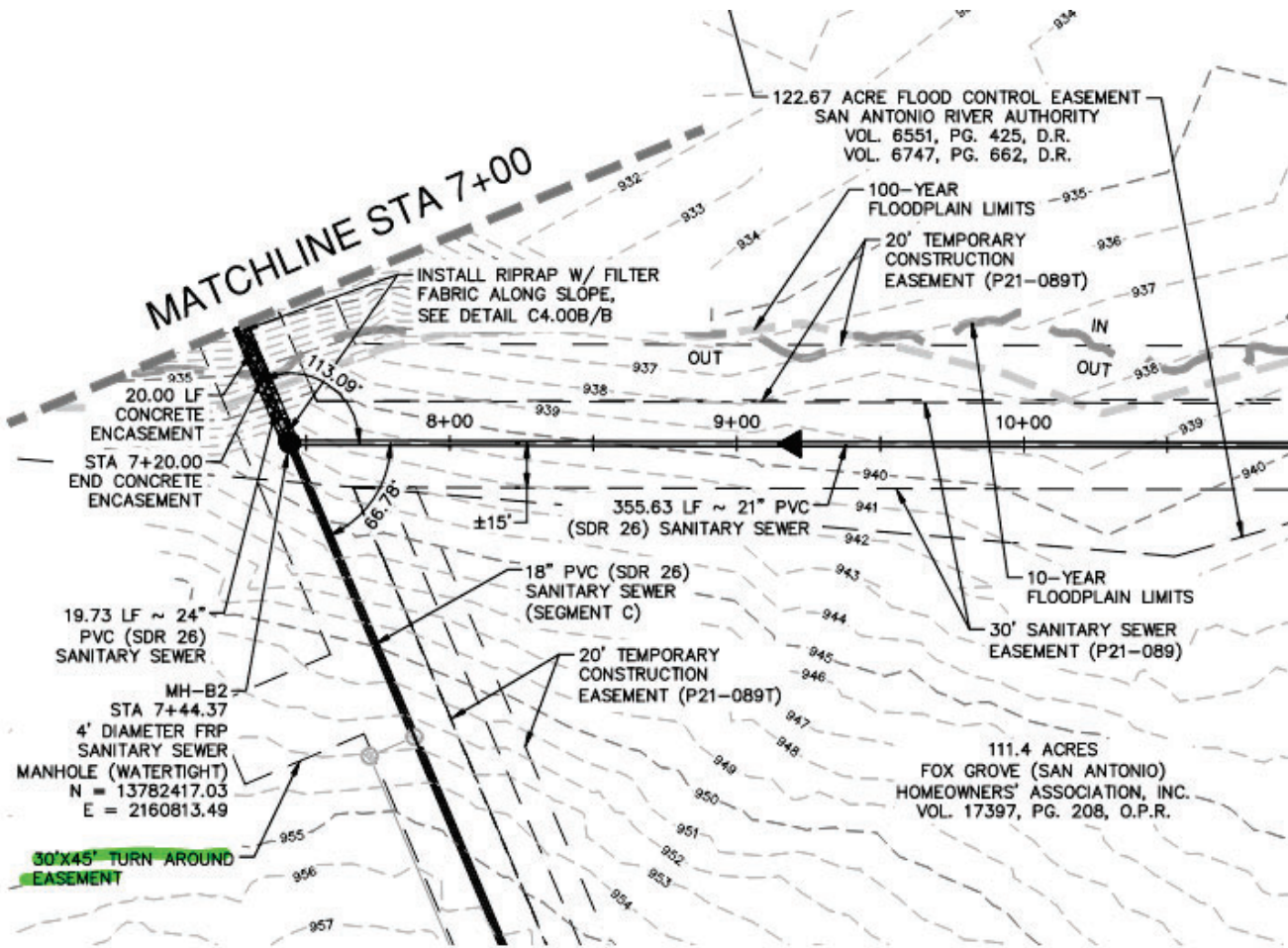
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Segment B – Concerns Project Access



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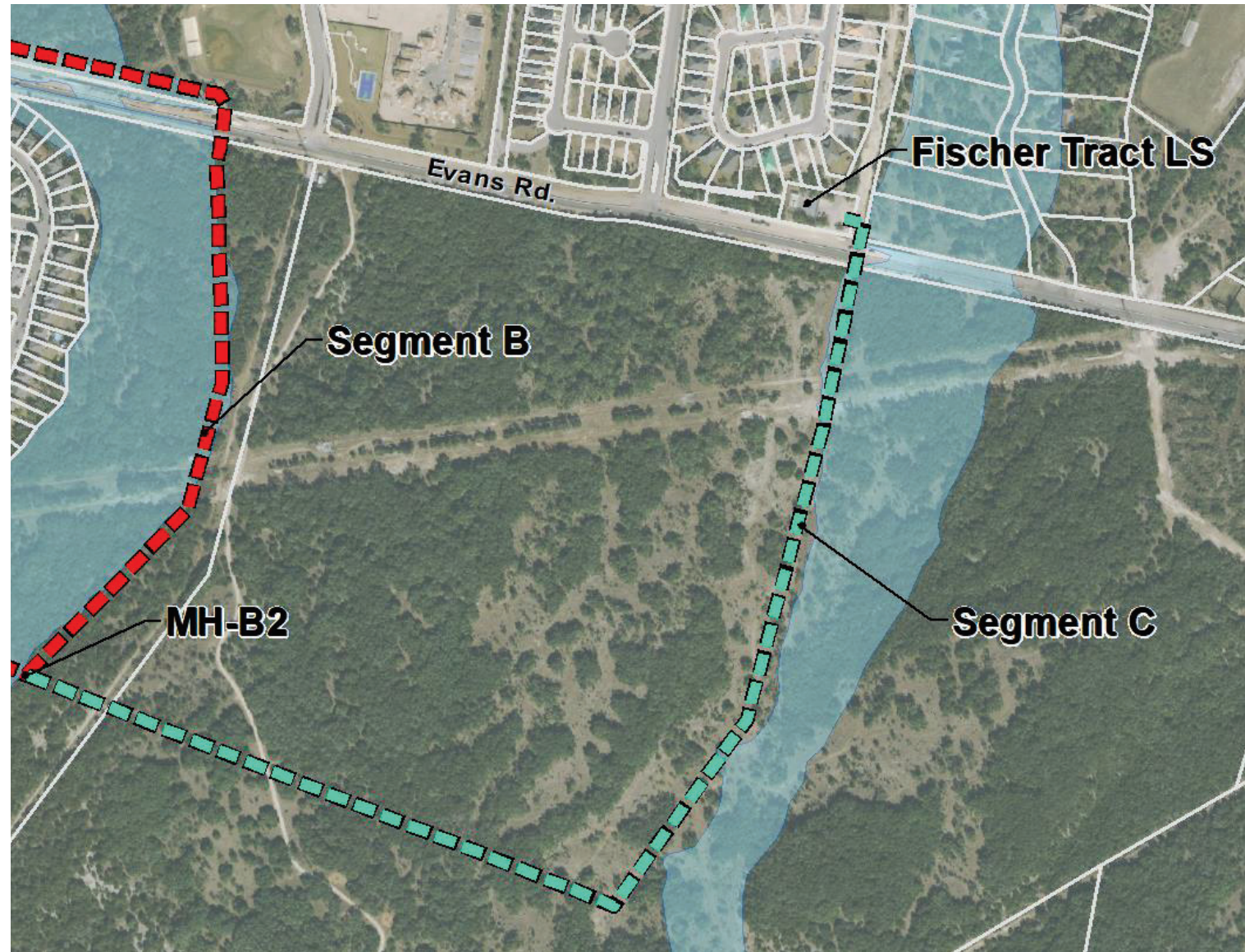
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Segment C: Fischer Tract Gravity Main

18" PVC Sanitary Sewer Main

- 1,854 LF open-cut
- 1,960 LF tunnel: Reach 1
- 205 LF trenchless installation



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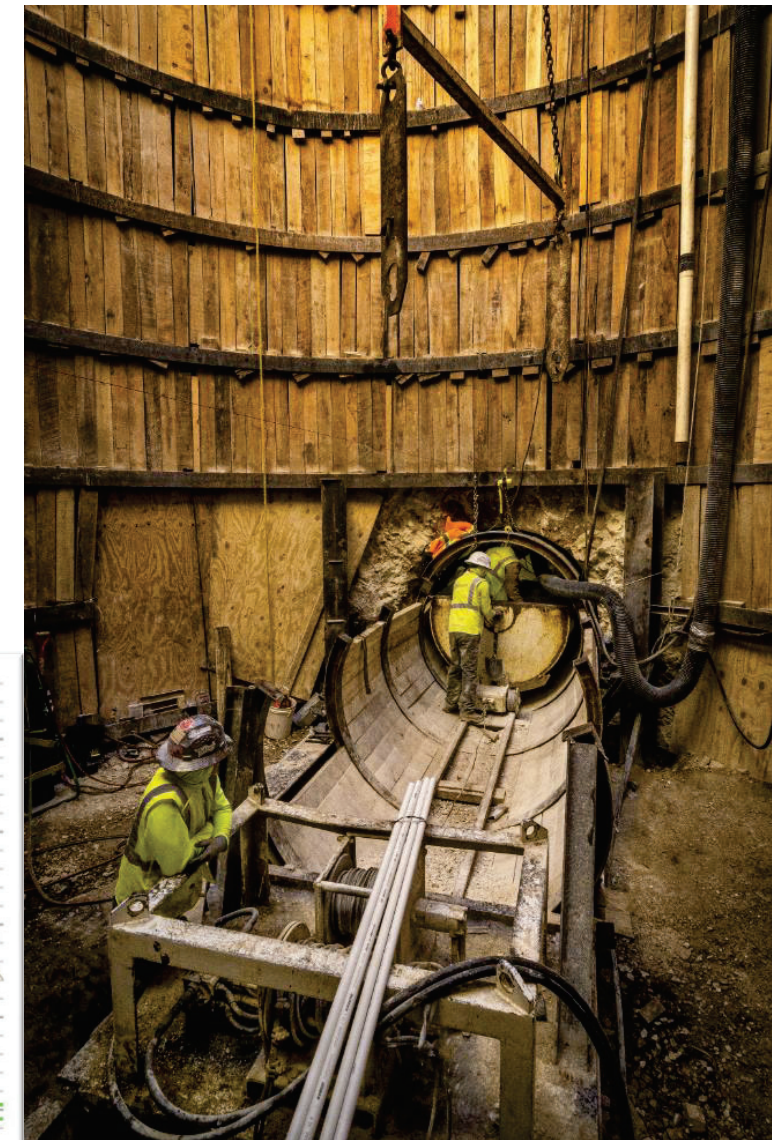
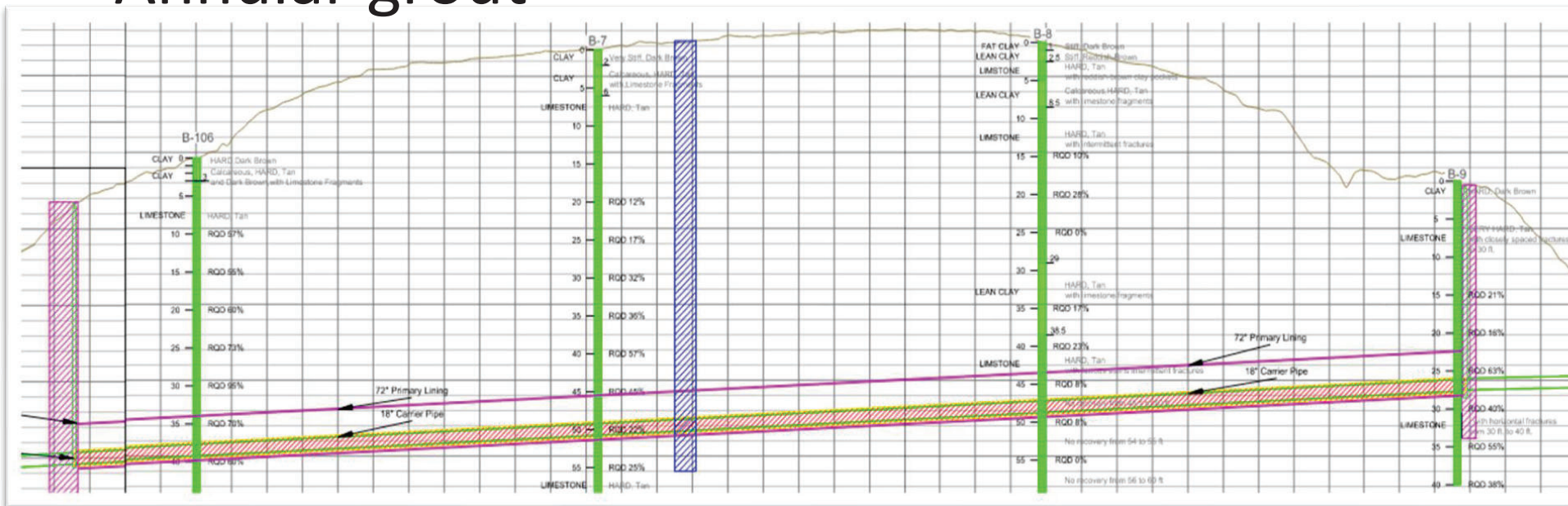
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Segment C: Reach 1 Tunnel

1,964 LF tunnel/bore

- 72" diameter primary liner; 18" carrier pipe
- Intermediate shaft/Variance
- Annular grout



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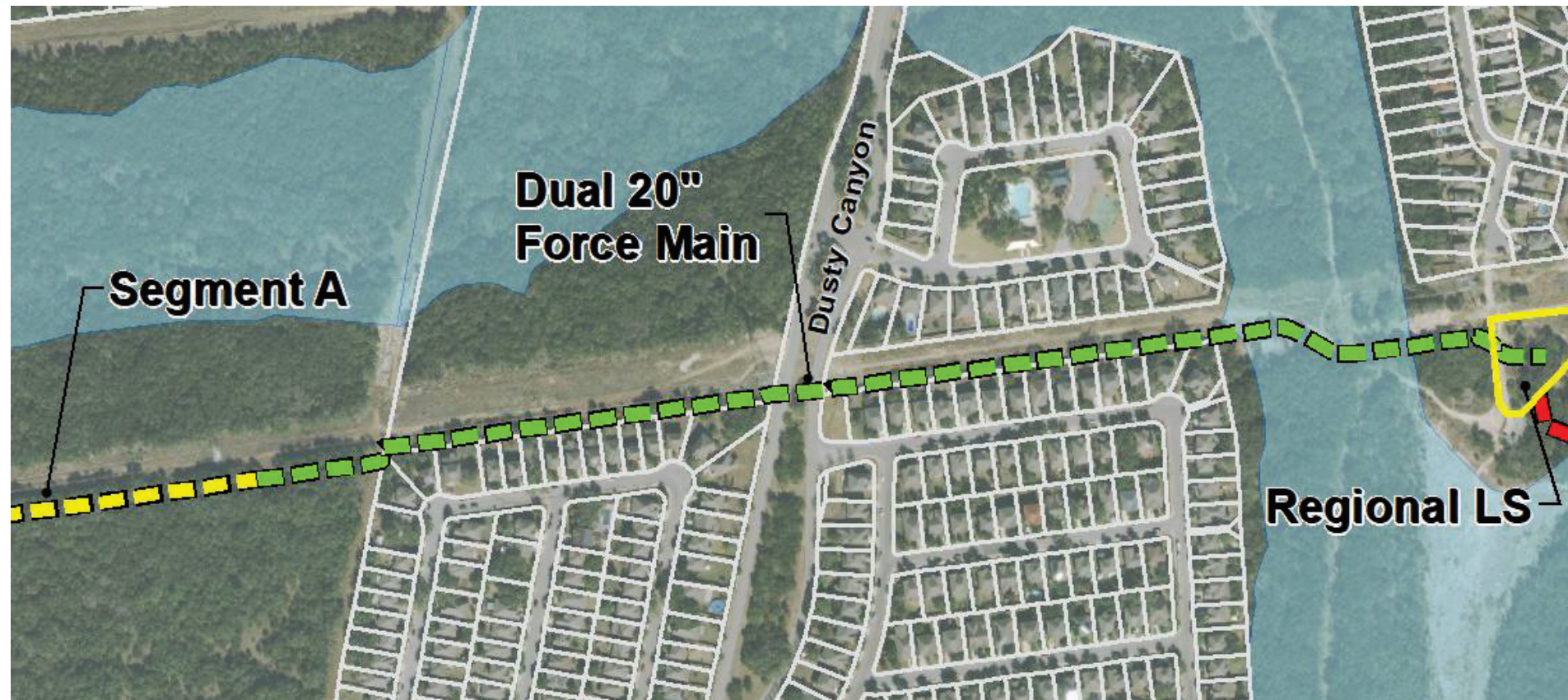
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E-54 Lift Station Force Main

Dual 20" HDPE Force Main



- 5,320 LF open-cut
- 1,110 LF trenchless



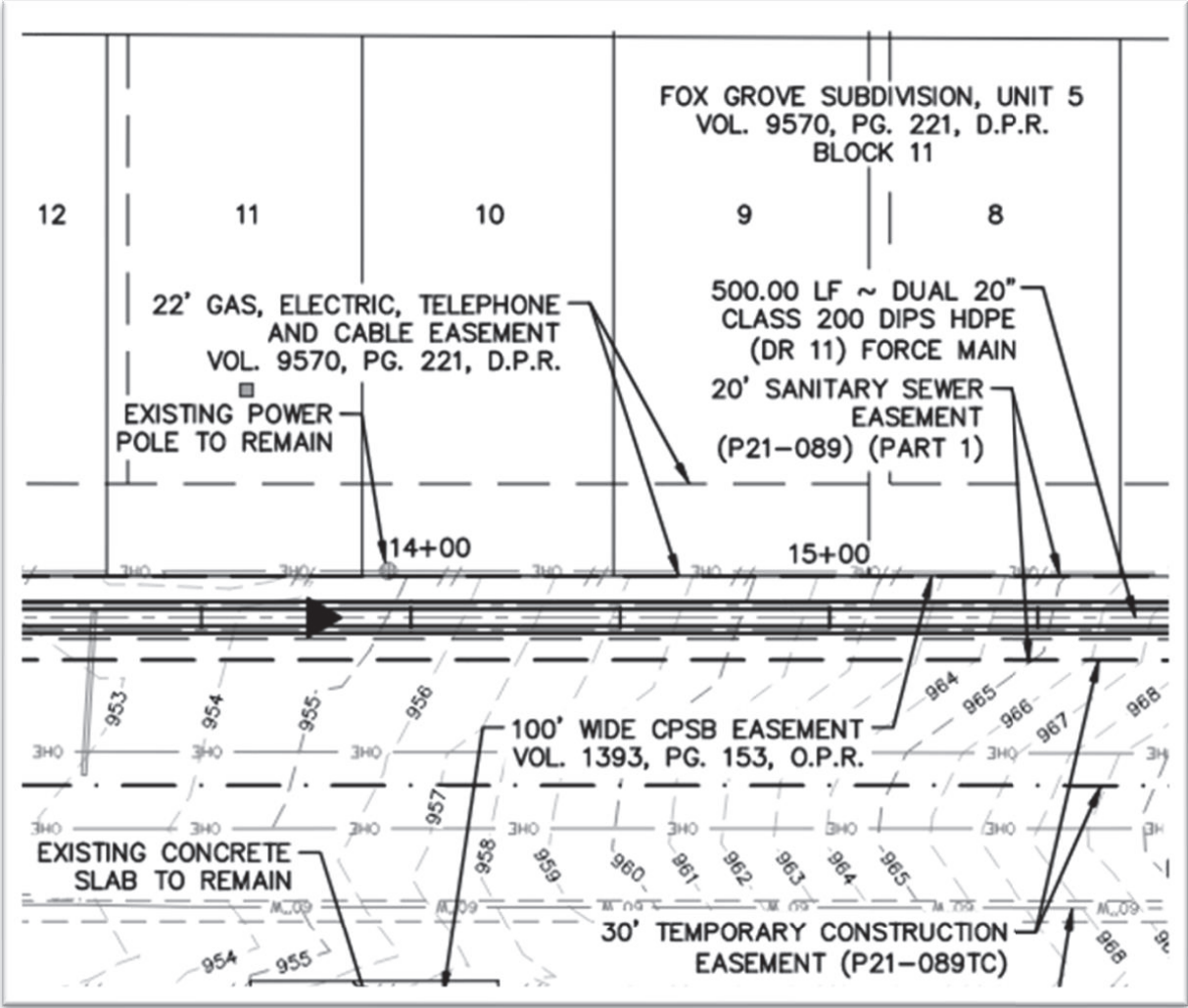
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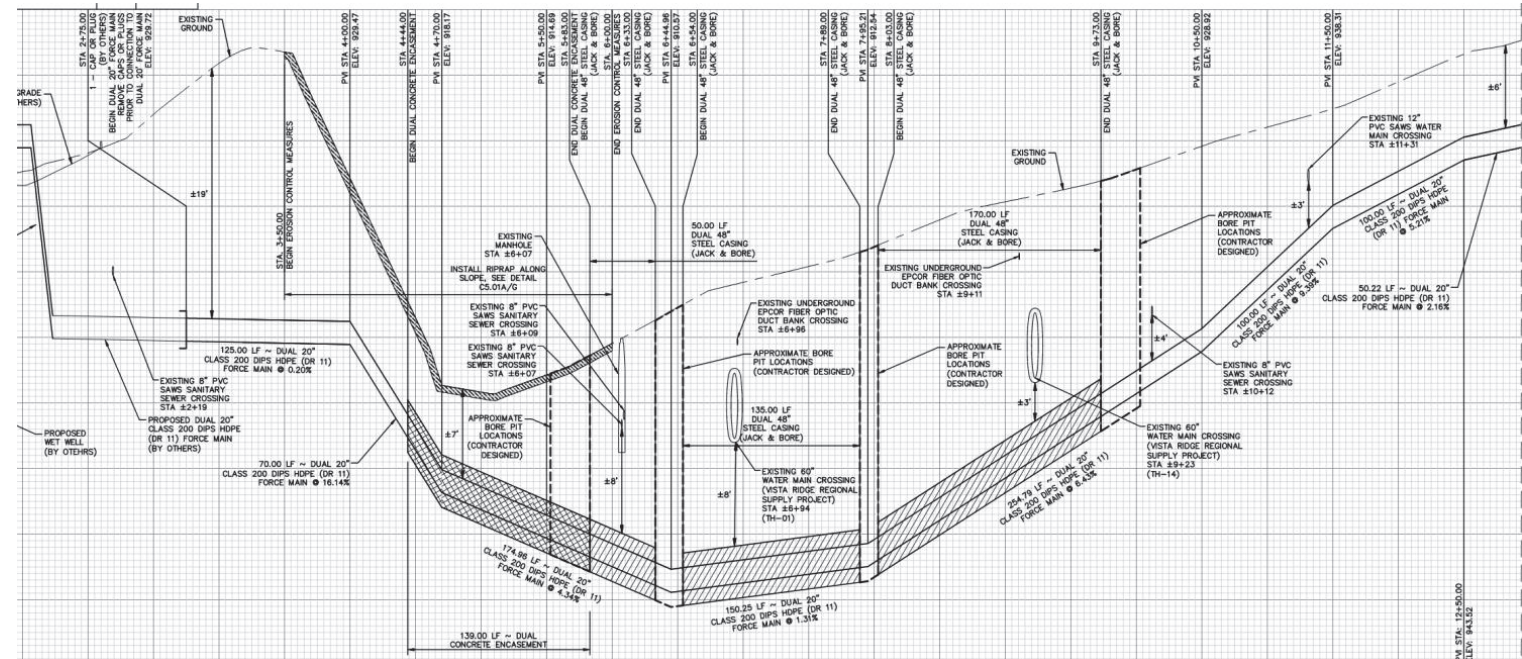
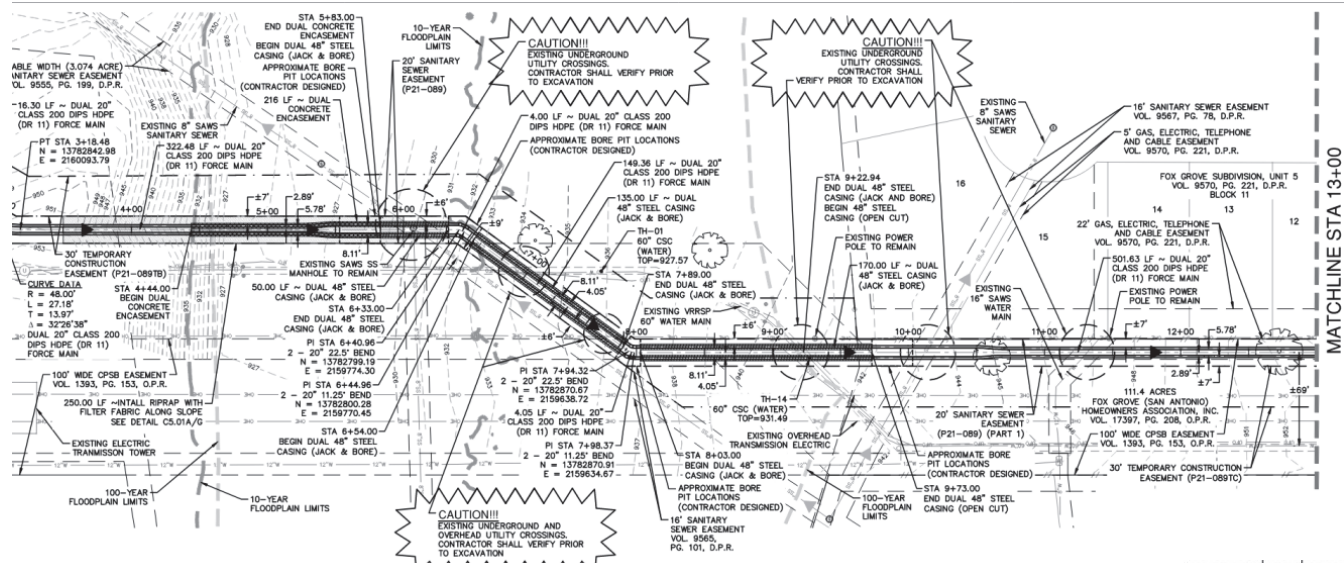


Dual 20" FM – Concerns Corridor



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Dual 20" FM: Corridor



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Permitting

- City of San Antonio
 - Floodplain, Tree Removal Permit, ROW
- Bexar County
 - Floodplain, Water Quality, ROW, Blasting
- SARA & COSA JUA
- Texas Commission of Environmental Quality
 - SCS (SCS Modification), WPAP, AST, Rule Variance
- USACOE PCN

TREE CANOPY MITIGATION CALCULATIONS	TOTAL MITIGATION
<u>OUTSIDE FLOODPLAIN</u> A. EXISTING CANOPY AREA PRESERVED: <u>40,952 SF</u> B. EXISTING CANOPY AREA REQUIRED TO BE PRESERVED: $25\% \times 388,302 \text{ SF} = 97,076 \text{ SF}$ ** TREE CANOPY AREA BEING PRESERVED DOES NOT EXCEED THE REQUIRED CANOPY AREA; THEREFORE, MITIGATION IS REQUIRED.	OUTSIDE FLOODPLAIN CANOPY MITIGATION INCHES = 1,071 INCHES FLOODPLAIN CANOPY MITIGATION INCHES = 1,441 INCHES BUFFER CANOPY MITIGATION INCHES = 401 INCHES COSA TREE PRESERVE PROPERTY MITIGATION INCHES = 251 INCHES HERITAGE TREE (INSIDE FLOODPLAIN) MITIGATION INCHES* = 399 INCHES *NO MITIGATION REQUIRED FOR HERITAGE TREES OUTSIDE OF FLOODPLAIN (CIP PROJECT)
<u>INSIDE FLOODPLAIN</u> A. EXISTING CANOPY AREA PRESERVED: <u>12,895 SF</u> B. EXISTING CANOPY AREA REQUIRED TO BE PRESERVED: $80\% \times 110,518 \text{ SF} = 88,414 \text{ SF}$ ** TREE CANOPY AREA BEING PRESERVED DOES NOT EXCEED THE REQUIRED CANOPY AREA; THEREFORE, MITIGATION IS REQUIRED.	MITIGATION FEE @ \$200.00/INCH OUTSIDE FLOODPLAIN CANOPY FEE = 1,071 INCHES X \$200 = \$214,200 FLOODPLAIN CANOPY FEE = 1,441 INCHES X \$200 = \$288,200 BUFFER CANOPY FEE = 401 INCHES X \$200 = \$80,200 COSA TREE PRESERVE PROPERTY CANOPY FEE = 251 INCHES X \$200 = \$50,200 HERITAGE TREE FEE = 399 INCHES X \$200 = \$79,800 TOTAL MITIGATION FEE = \$712,600
<u>INSIDE 30' WIDE BUFFER</u> A. EXISTING CANOPY AREA PRESERVED: <u>2,260 SF</u> B. EXISTING CANOPY AREA REQUIRED TO BE PRESERVED: $80\% \times 28,526 \text{ SF} = 22,821 \text{ SF}$ ** TREE CANOPY AREA BEING PRESERVED DOES NOT EXCEED THE REQUIRED CANOPY AREA; THEREFORE, MITIGATION IS REQUIRED.	
<u>ON COSA TREE PRESERVE PROPERTY</u> A. EXISTING CANOPY AREA PRESERVED: <u>1,702 SF</u> B. EXISTING CANOPY AREA REQUIRED TO BE PRESERVED: $100\% \times 14,376 \text{ SF} = 14,376 \text{ SF}$ ** TREE CANOPY AREA BEING PRESERVED DOES NOT EXCEED THE REQUIRED CANOPY AREA; THEREFORE, MITIGATION IS REQUIRED.	
MITIGATION REQUIREMENTS	
<u>OUTSIDE FLOODPLAIN</u> NUMBER OF TREES REQUIRED TO BE PLANTED = $56,124 \text{ SF} \div (875 \text{ SF/TREE}) = 64 \text{ TREES}$ INCHES OF CANOPY REQUIRED TO BE MITIGATED = 64 TREES X 16.7 INCHES = 1,071 INCHES	
<u>INSIDE FLOODPLAIN</u> NUMBER OF TREES REQUIRED TO BE PLANTED = $75,519 \text{ SF} \div (875 \text{ SF/TREE}) = 86 \text{ TREES}$ INCHES OF CANOPY REQUIRED TO BE MITIGATED = 86 TREES X 16.7 INCHES = 1,441 INCHES	
<u>INSIDE 30' WIDE BUFFER</u> NUMBER OF TREES REQUIRED TO BE PLANTED = $20,561 \text{ SF} \div (875 \text{ SF/TREE}) = 24 \text{ TREES}$ INCHES OF CANOPY REQUIRED TO BE MITIGATED = 24 TREES X 16.7 INCHES = 401 INCHES	
<u>ON COSA TREE PRESERVE PROPERTY</u> NUMBER OF TREES REQUIRED TO BE PLANTED = $12,674 \text{ SF} \div (875 \text{ SF/TREE}) = 15 \text{ TREES}$ INCHES OF CANOPY REQUIRED TO BE MITIGATED = 15 TREES X 16.7 INCHES = 251 INCHES	
<u>HERITAGE TREE</u> TOTAL HERITAGE INCHES INSIDE FLOODPLAIN = 133 INCHES REQUIRED HERITAGE PRESERVATION = 133 INCHES X 100% = 133 INCHES HERITAGE INCHES TO BE MITIGATED AT 3:1 = 133 INCHES X 3 = 399 INCHES	



Bidding

RFCSP

- Regional Lift Station: 4 bidders
 - Pipeline: 3 bidders
- ### Special conditions
- Additional insured
 - Temporary easement
 - Coordination

al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	2" Water Service (incl. Meter, Backflow Preventor, Spigot, etc)	LS	\$15,000.00	1	\$15,000.00	\$14,953.00	1	\$14,953.00	\$59,529.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Site Security and Lighting - (Incl. Security Fence, Gates, etc.)	LS	\$150,000.00	1	\$150,000.00	\$89,978.00	1	\$89,978.00	\$218,833.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Lift Station & Force Main Commissioning, Testing, and Startup	LS	\$10,000.00	1	\$10,000.00	\$36,383.00	1	\$36,383.00	\$9,685.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	24-inch PVC (SDR 26) Sanitary Sewer Gravity Main (all depths)	LF	\$1,192.00	91	\$108,472.00	\$1,054.00	91	\$98,914.00	\$816.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	24-inch FRP (SN 72) Sanitary Sewer Gravity Main (all depths)	LF	\$1,302.00	36	\$46,872.00	\$1,038.00	36	\$37,368.00	\$1,307.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	4-ft FRP Manhole	EA	\$45,609.00	1	\$45,609.00	\$48,462.00	1	\$48,462.00	\$42,438.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	4-ft FRP Manhole, Mitered	EA	\$47,150.00	1	\$47,150.00	\$48,717.00	1	\$48,717.00	\$45,941.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Trench Protection	LF	\$73.00	127	\$9,271.00	\$6.00	127	\$762.00	\$156.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Revegetation	SY	\$29.00	267	\$7,743.00	\$6.00	267	\$1,602.00	\$32.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	8-inch PVC (SDR 26) Sanitary Sewer Gravity Main (all depths)	LF	\$922.00	136	\$125,332.00	\$330.00	136	\$44,880.00	\$530.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	12-inch PVC (SDR 26) Sanitary Sewer Gravity Main (all depths)	LF	\$955.00	67	\$63,585.00	\$287.00	67	\$19,229.00	\$645.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	4-ft Doghouse Manhole (0-6')	EA	\$22,900.00	2	\$45,800.00	\$14,250.00	2	\$28,500.00	\$24,063.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	4-ft Extra Depth Doghouse Manhole (>6')	VF	\$1,120.00	31	\$34,720.00	\$1,066.00	31	\$33,046.00	\$4,893.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Trench Protection	LF	\$73.00	203	\$14,819.00	\$6.00	203	\$1,218.00	\$156.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Revegetation	SY	\$29.00	160	\$4,640.00	\$6.00	160	\$960.00	\$38.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	4-ft Doghouse Manhole (0-6')	EA	\$27,244.00	1	\$27,244.00	\$20,670.00	1	\$20,670.00	\$16,550.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	4-ft Extra Depth Doghouse Manhole (>6')	VF	\$882.00	10	\$8,820.00	\$1,366.00	10	\$13,660.00	\$3,800.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	21-inch PVC (SDR 26) Sanitary Sewer Gravity Main (all depths)	LF	\$1,206.00	44	\$53,064.00	\$745.00	44	\$32,780.00	\$22,125.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Trench Protection	LF	\$145.00	44	\$6,380.00	\$6.00	44	\$264.00	\$156.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	18-inch PVC (SDR 26) Sanitary Sewer Gravity Main (all depths)	LF	\$1,037.00	26	\$26,962.00	\$803.00	26	\$20,878.00	\$1,438.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Trench Protection	LF	\$145.00	26	\$3,770.00	\$11.00	26	\$286.00	\$157.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Manhole Rehabilitation	VF	\$947.00	16	\$15,152.00	\$1,004.00	16	\$16,064.00	\$1,121.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	20-inch HDPE FM (DIPS, DR 11, Class 200) Open Cut	LF	\$506.00	204	\$103,224.00	\$425.00	204	\$86,700.00	\$984.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Trench Protection	LF	\$73.00	204	\$14,892.00	\$6.00	204	\$1,224.00	\$153.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Revegetation	SY	\$36.00	333	\$11,988.00	\$6.00	333	\$1,998.00	\$37.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Existing LS#235 (Fossil Ridge) LS Demolition and Decommissioning	LS	\$137,240.00	1	\$137,240.00	\$262,970.00	1	\$262,970.00	\$179,401.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Existing LS#297 (Fischer) LS Demolition and Decommissioning	LS	\$140,608.00	1	\$140,608.00	\$166,293.00	1	\$166,293.00	\$253,601.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Existing LS#236 (Fox Grove) LS Demolition and Decommissioning	LS	\$127,133.00	1	\$127,133.00	\$116,825.00	1	\$116,825.00	\$172,787.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Bypass Pumping-Small Diameter (Temporary San Sewer for Offsite Residential Development	WK	\$4,150.00	30	\$124,500.00	\$29,243.00	30	\$87,290.00	\$8,794.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Small Diameter Bypass Pumping	LS	\$130,000.00	1	\$130,000.00	\$106,238.00	1	\$106,238.00	\$141,470.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Karst Feature Management Allowance	ALW	\$150,000.00	1	\$150,000.00	\$166,950.00	1	\$166,950.00	\$150,000.00



Bidding

Special specifications

- Karts feature mitigation
- Blasting
- Tunnel & shaft
- Plug valves
- Special shoring

al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	2" Water Service (incl. Meter, Backflow Preventor, Spigot, etc)	LS	\$15,000.00	1	\$15,000.00	\$14,933.00	1	\$14,933.00	\$59,529.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Site Security and Lighting - (Incl. Security Fence, Gates, etc.)	LS	\$150,000.00	1	\$150,000.00	\$89,978.00	1	\$89,978.00	\$218,833.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Lift Station & Force Main Commissioning, Testing, and Startup	LS	\$10,000.00	1	\$10,000.00	\$36,383.00	1	\$36,383.00	\$9,685.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	24-inch PVC (SDR 26) Sanitary Sewer Gravity Main (all depths)	LF	\$1,192.00	91	\$108,472.00	\$1,054.00	91	\$98,914.00	\$816.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	24-inch FRP (SN 72) Sanitary Sewer Gravity Main (all depths)	LF	\$1,302.00	36	\$46,872.00	\$1,038.00	36	\$37,368.00	\$1,307.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	4-ft FRP Manhole	EA	\$45,609.00	1	\$45,609.00	\$48,462.00	1	\$48,462.00	\$42,438.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	4-ft FRP Manhole, Mitered	EA	\$47,150.00	1	\$47,150.00	\$48,717.00	1	\$48,717.00	\$45,941.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Trench Protection	LF	\$73.00	127	\$9,271.00	\$6.00	127	\$762.00	\$156.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Revegetation	SY	\$29.00	267	\$7,743.00	\$5.00	267	\$1,602.00	\$32.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	8-inch PVC (SDR 26) Sanitary Sewer Gravity Main (all depths)	LF	\$922.00	136	\$125,392.00	\$330.00	136	\$44,880.00	\$530.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	12-inch PVC (SDR 26) Sanitary Sewer Gravity Main (all depths)	LF	\$955.00	67	\$63,985.00	\$287.00	67	\$19,229.00	\$645.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	4-ft Doghouse Manhole (0-6')	EA	\$22,900.00	1	\$45,800.00	\$14,250.00	2	\$28,500.00	\$24,063.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	4-ft Extra Depth Doghouse Manhole (>6')	VF	\$1,120.00	31	\$34,720.00	\$1,066.00	31	\$33,046.00	\$4,893.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Trench Protection	LF	\$73.00	203	\$14,819.00	\$6.00	203	\$1,218.00	\$156.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Revegetation	SY	\$29.00	160	\$4,640.00	\$6.00	160	\$960.00	\$38.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	4-ft Doghouse Manhole (0-6')	EA	\$27,244.00	1	\$27,244.00	\$20,670.00	1	\$20,670.00	\$16,550.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	4-ft Extra Depth Doghouse Manhole (>6')	VF	\$882.00	10	\$8,820.00	\$1,366.00	10	\$13,660.00	\$3,800.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	21-inch PVC (SDR 26) Sanitary Sewer Gravity Main (all depths)	LF	\$1,206.00	44	\$53,064.00	\$745.00	44	\$32,780.00	\$22,125.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Trench Protection	LF	\$145.00	44	\$6,380.00	\$6.00	44	\$264.00	\$156.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	18-inch PVC (SDR 26) Sanitary Sewer Gravity Main (all depths)	LF	\$1,037.00	26	\$26,962.00	\$803.00	26	\$20,878.00	\$1,438.00
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al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Manhole Rehabilitation	VF	\$947.00	16	\$15,152.00	\$1,004.00	16	\$16,064.00	\$1,121.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	20-inch HDPE FM (DIPS, DR 11, Class 200) Open Cut	LF	\$506.00	204	\$103,224.00	\$425.00	204	\$86,700.00	\$984.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Trench Protection	LF	\$73.00	204	\$14,892.00	\$6.00	204	\$1,224.00	\$153.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Revegetation	SY	\$36.00	333	\$11,988.00	\$6.00	333	\$1,998.00	\$37.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Existing S#235 (Fossil Ridge) LS Demolition and Decommissioning	LS	\$137,240.00	1	\$137,240.00	\$262,970.00	1	\$262,970.00	\$179,401.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Existing LS#297 (Fischer) LS Demolition and Decommissioning	LS	\$140,608.00	1	\$140,608.00	\$166,293.00	1	\$166,293.00	\$253,601.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Existing LS#236 (Fox Grove) LS Demolition and Decommissioning	LS	\$127,133.00	1	\$127,133.00	\$116,825.00	1	\$116,825.00	\$172,787.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Bypass Pumping-Small Diameter (Temporary San Sewer for Offsite Residential Development	WK	\$4,150.00	30	\$124,500.00	\$29,243.00	30	\$877,290.00	\$8,794.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Small Diameter Bypass Pumping	LS	\$130,000.00	1	\$130,000.00	\$106,238.00	1	\$106,238.00	\$141,470.00
al Sanitary Sewer Bid Items	01.4600.00.0002 - Construction	Karst Feature Management Allowance	ALW	\$150,000.00	1	\$150,000.00	\$166,950.00	1	\$166,950.00	\$150,000.00



Underground Infrastructure Conference
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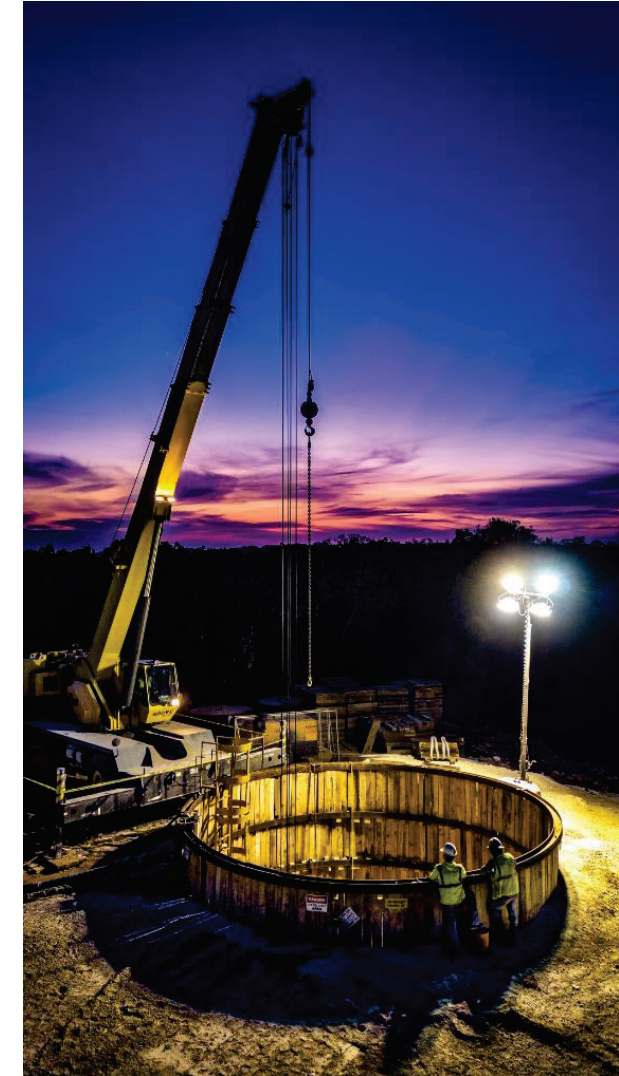
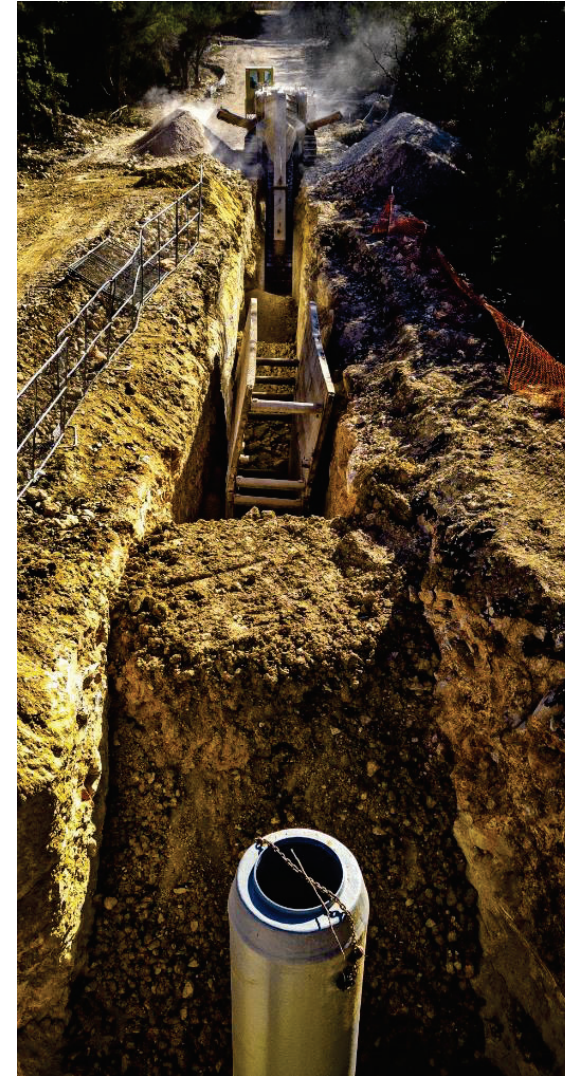
Construction Phase/Current Status

Pipeline

- 100% installed & tested

Regional lift station

- Excavation complete
- Wet well
- Estimated completion: Oct. 2025



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Questions?

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