Construction Methods Driving Utility Design

Along TxDOT's IH35 CapEx Central (LBL Section)

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PAPE-DAWSON ENGINEERS

Agenda

- Introduction
- Project Background & Challenges
- Design Change
- Construction Methods Considerations
- Lessons Learned
- Q&A

Why I-35 Cap-Ex Program?

1957

2011

- **Mobility:** Built in 1950s, now over 200,000 vehicle trips per day
- **Safety:** More than 40 pedestrians and bicyclists were killed crossing I-35 from 2016 to 2021
- **East-West Access:** physical barrier between East and Central/West Austin for communities of color

What is I-35 Cap-Ex Program?

- **North:** SH 45 North to US 290 East
- **Central:** US 290 East to SH 71/Ben White Boulevard (8 Miles)
- **South:** SH 71/Ben White Boulevard to SH 45 Southeast

Graphic by TxDOT

What is I-35 Cap-Ex Program?

Rendering by TxDOT

LBL Project Schedule

Graphic by TxDOT

Project Background & Challenges

Conflicts Identified

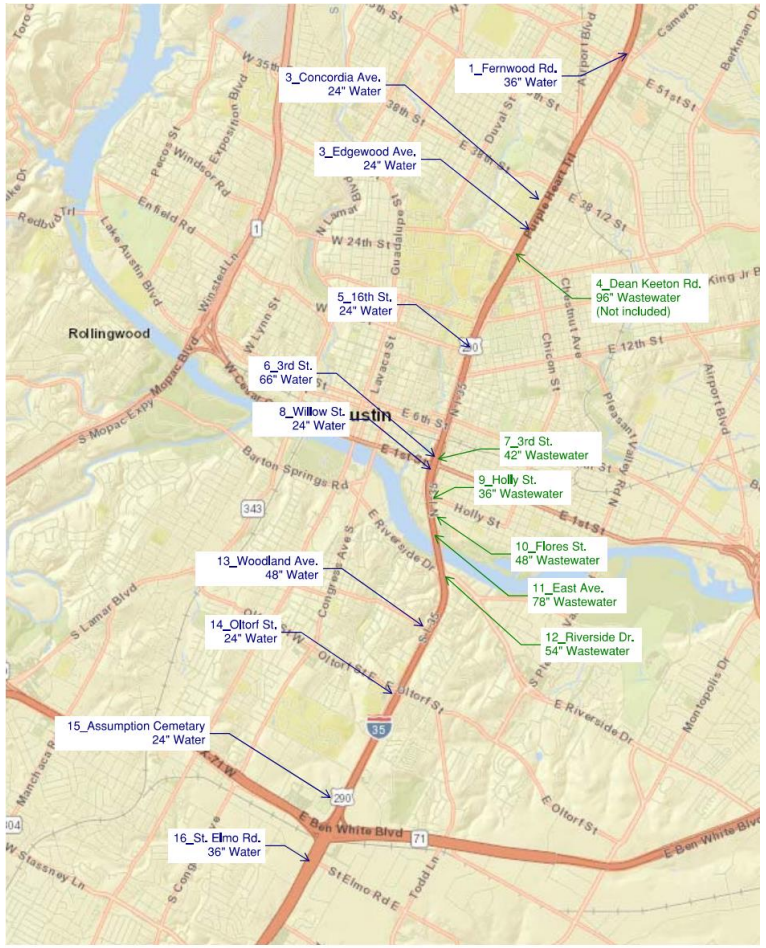
- TxDOT vs Austin Water

Overall Project Goal

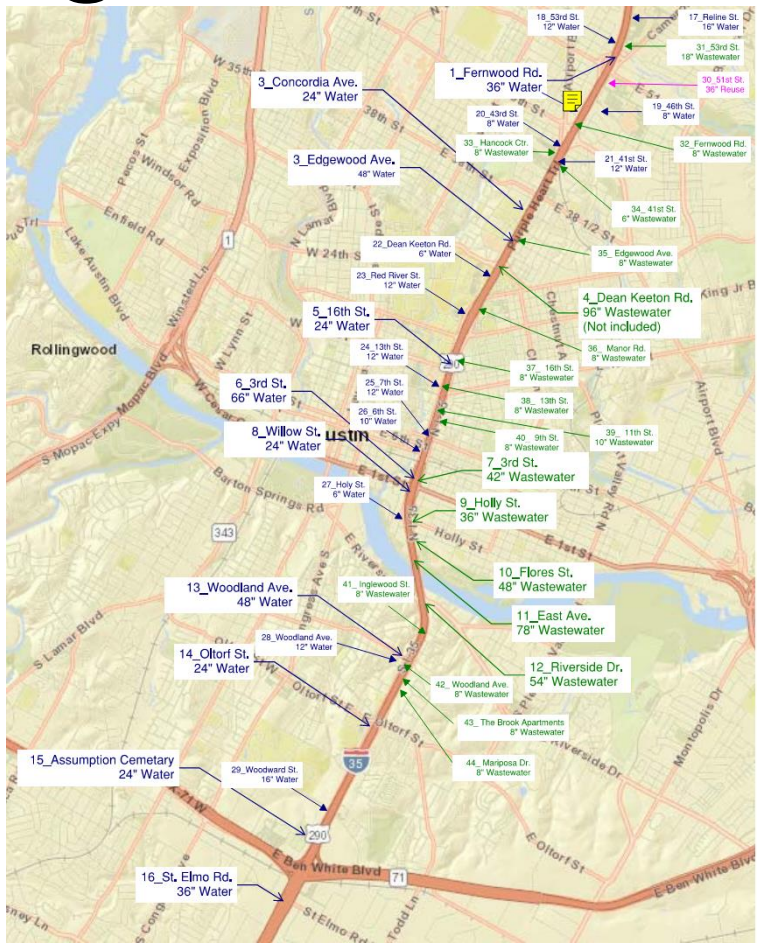
- Water
- Wastewater

Challenge

- Project delivery method
- Schedule



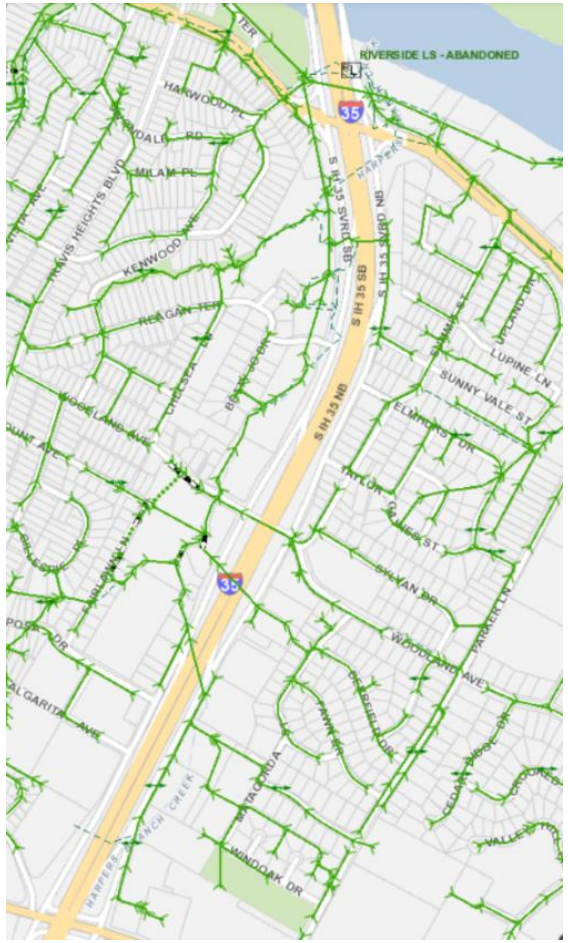
TxDOT Defined Conflicts



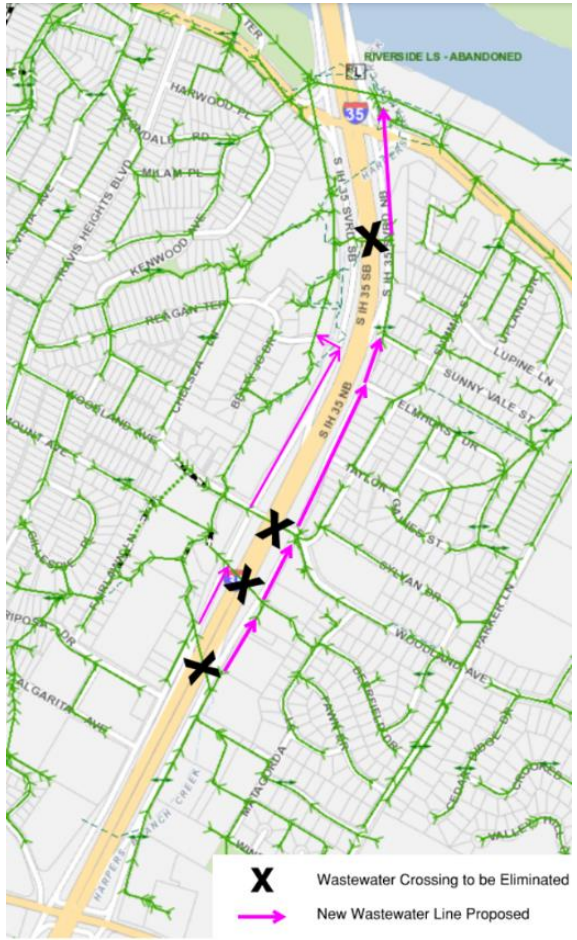
AW Defined Conflicts

Wastewater Preliminary Design

- Addressed direct conflicts
- Interceptor along both East & West side
- Right-sizing for existing and future



Existing WW System



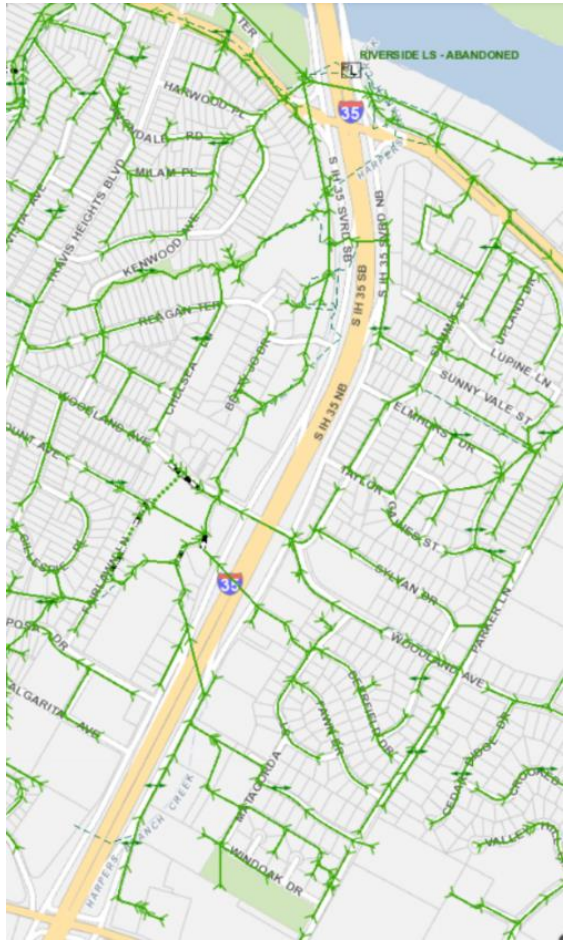
Proposed WW System (30%)

Wastewater Preliminary Design

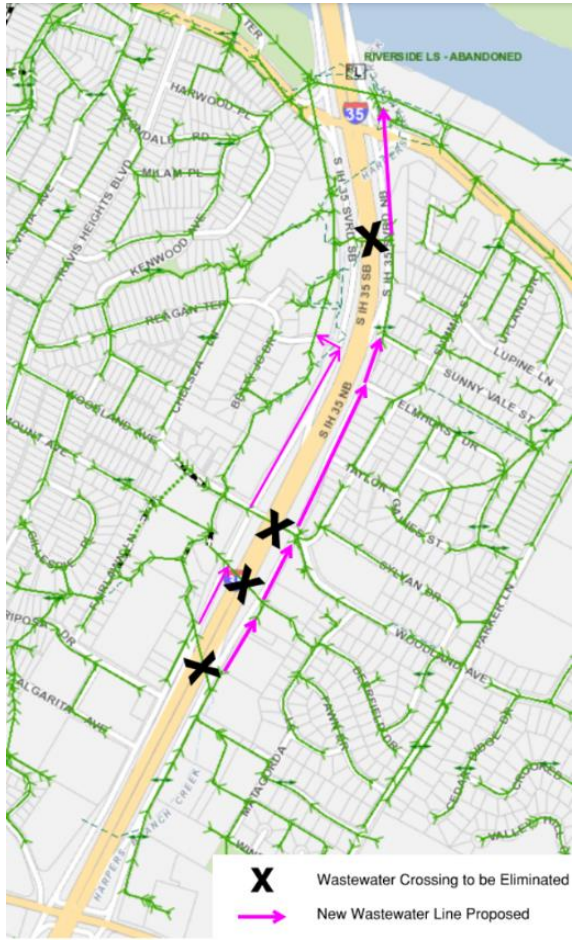
At 60% Submittal

- Size, depth & length
- OPCC

Size (inch)	Depth (ft)	Length (ft)
8	10-20	3036
12	10-20	1198
18	10-20	20
18	20-30	1316
24	10-20	1217
24	20-30	390
24	30-40	1940
24	40+	807
48	10-20	351

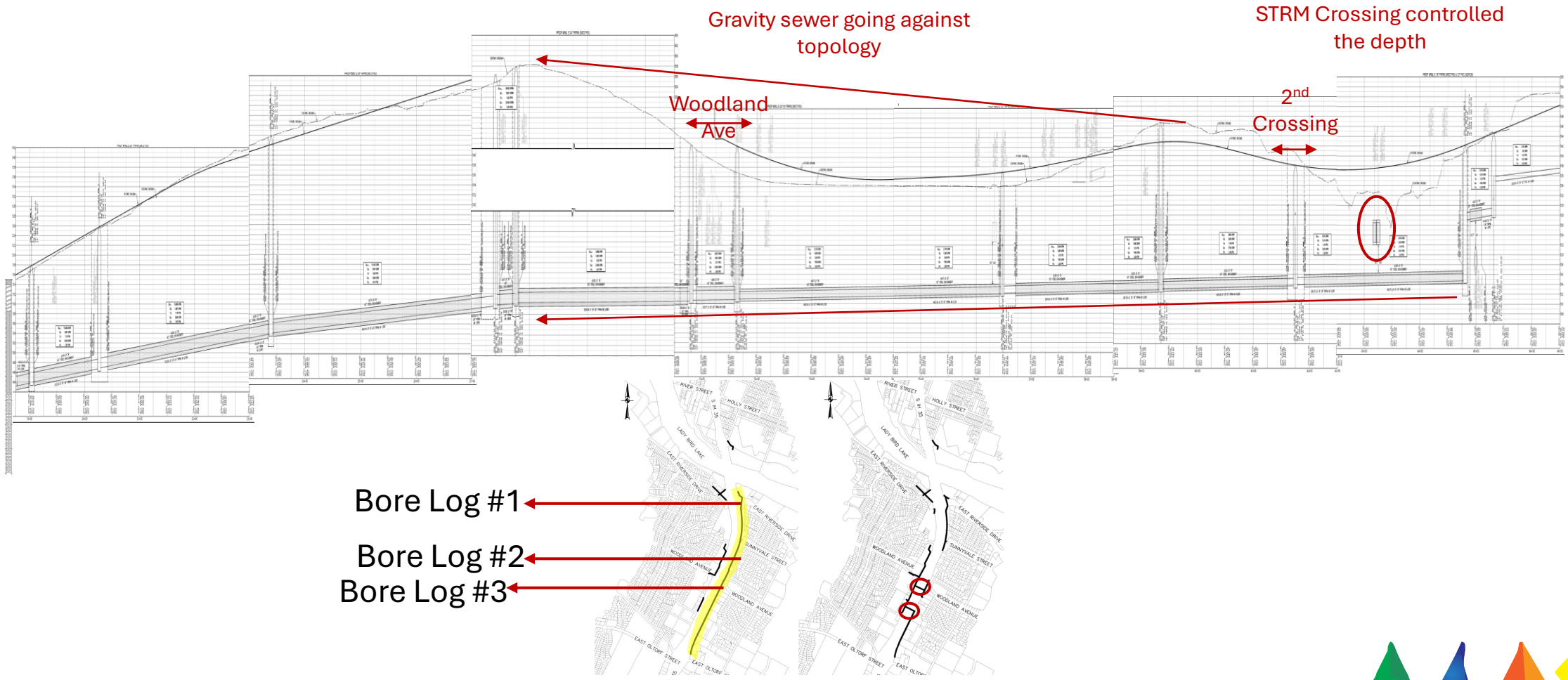


Existing WW System



Proposed WW System (30%)

60% Design Change



60% Design Change

Bore Log #1

1 of 2

WinCore Version 3.3

County	Travis	Structure	Utility	District	Austin
Highway	IH 35	Station	3352+88.81	Date	10/13/2023
CSJ	0015-13-428	Offset	198.46'LT	Grnd. Elev.	475.06 ft
				GW Elev.	N/A

Elev. (ft)	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
		SAND, clayey, with gravel, compact, dark brown to light brown (FILL) (SC)			4				SPT(mod):12-8-9
					8	56	37		#200(%)-41; SPT(mod):1-1-3
	23 (6) 31 (6)				6				SPT(mod):3-12-23
5									
467.1		GRAVEL, clayey, with sand, loose, light brown to pale brown			14	55	35		#200(%)-45; SPT(mod):9-11-14
					6				SPT(mod):12-50/4in
	4 (6) 15 (6)								
10									
462.1		SAND, clayey, with gravel, slightly compact to compact, light brown to pale brown, with limestone fragments (SC)			6				#200(%)-29; SPT(mod):23-49-29
15	8 (6) 50 (2)								
					11	44	26		#200(%)-39; SPT(mod):8-10-10
20	13 (6) 13 (6)								
					10				SPT(mod):7-9-10
25	15 (6) 15 (6)								
					9				SPT(mod):50/3in
445.1 30	50 (4.5) 50 (0.5)	LIMESTONE, soft to very hard, gray to light gray, with frequent clayey seams/layers							
					12				SPT(mod):50/4in
35	50 (2.5) 50 (0.5)								
					7				SPT(mod):50/5in
40	50 (4.5) 50 (1)								

Bore Log #2

1 of 2

WinCore Version 3.3

County	Travis	Structure	Utility	District	Austin
Highway	IH 35	Station	3367+04.29	Date	10/12/2023
CSJ	0015-13-428	Offset	148.66'LT	Grnd. Elev.	532.88 ft
				GW Elev.	N/A

Elev. (ft)	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
531.3		PAVEMENT, ~8" Asphalt, 11" Aggregate Base			6				SPT(mod):25-4-8
		SAND, clayey, loose to slightly compact, light brown (SC)			18	44	23		#200(%)-40; SPT(mod):5-11-8
528.9					27				
	27 (6) 44 (6)	SAND, clayey, with gravel, compact, light brown to reddish brown, with ferrous stains (SC)							
5					15	43	21		#200(%)-40; SPT(mod):12-28-25
524.9		LIMESTONE, very hard, light brown to pale brown, slightly to moderately fractured, with ferrous stained inclusions							REC:100%; RQD:61%
10	50 (0.25) 50 (0)		0	7952	5			150	REC:90%; RQD:50%
15	50 (0.5) 50 (0)								REC:97%; RQD:88%
20	50 (0.25) 50 (0)		0	5357	20			148	-pale brown to light gray below ~21ft REC:97%; RQD:92%
25	50 (0.25) 50 (0)								-clayey seam at ~26½ft REC:95%; RQD:87%
502.9 30	50 (0.5) 50 (0.5)	LIMESTONE, very hard, gray to light gray, slightly fractured	0	611	22			144	REC:80%; RQD:77%
35	50 (0.5) 50 (0)		0	781	20			148	REC:92%; RQD:78% -marly seams from ~37 to 38ft
40	50 (0.25) 50 (0)								

Bore Log #3

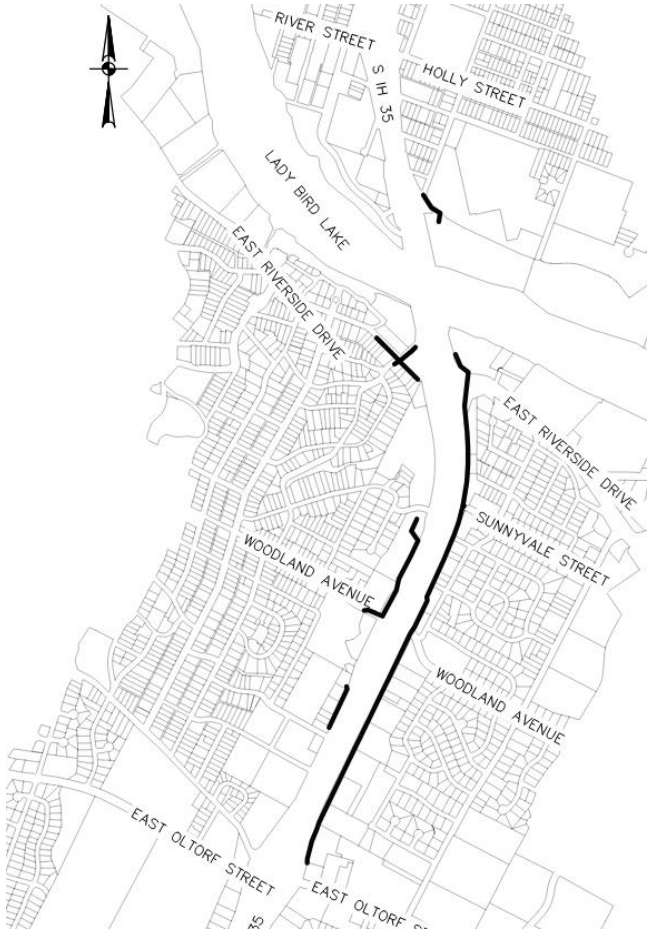
1 of 2

WinCore Version 3.3

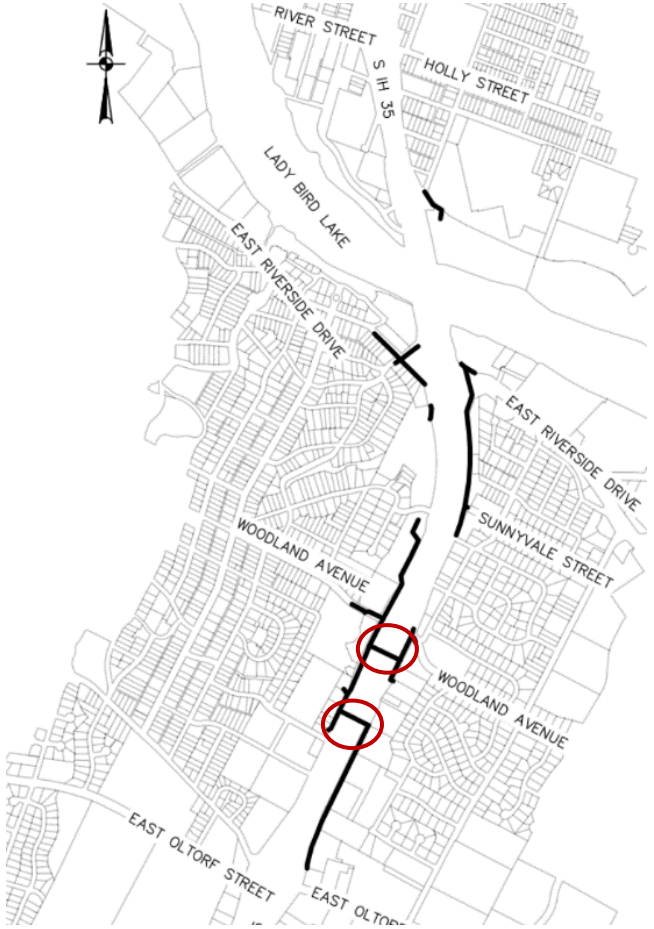
County	Travis	Hole	AWU-25	District	Austin
Highway	IH 35	Structure	Utility	Date	10/20/2023
CSJ	0015-13-428	Station	3376+21.46	Grnd. Elev.	535.67 ft
		Offset	99.54'LT	GW Elev.	484.67 ft

Elev. (ft)	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
		CLAY, lean, sandy, soft, brown (SC)			22				SPT(mod):7-8-9
533.7		CLAY, fat, with sand, very stiff, olive brown			29				SPT(mod):9-11-17
					64	33			SPT(mod):6-12-11
5	24 (6) 31 (6)								
529.7		SILT, elastic, with sand, very stiff to hard, olive-brown			28				SPT(mod):12-14-16
					31	71	36		#200(%)-72; SPT(mod):9-15-20
10	19 (6) 24 (6)								
15	40 (6) 48 (6)				28				#200(%)-77; SPT(mod):8-16-25
20	30 (6) 34 (6)								
512.7		TUFF, soft to hard, olive			25	66	28		#200(%)-73; SPT(mod):10-20-28
25	38 (6) 48 (6)				21				SPT(mod):15-25-32
30	50 (3.75) 50 (2)				20	69	41		#200(%)-49; SPT(mod):22-50/6in
35	50 (3.25) 50 (1.25)				20				SPT(mod):16-37-50/5in
40	50 (3.25) 50 (2.25)				18				SPT(mod):15-50/6in

60% Design Change



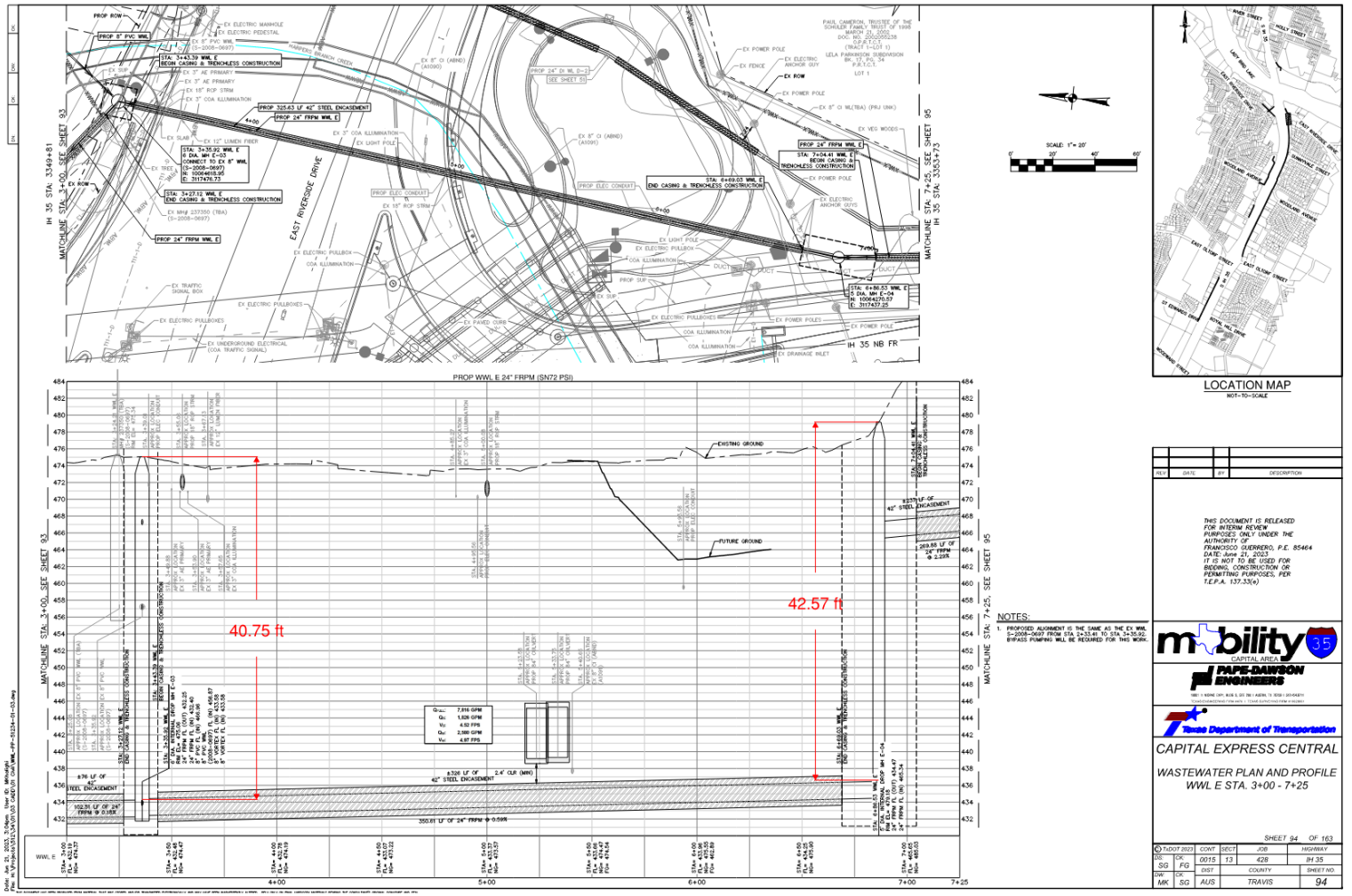
60% Design WW System



100% Design WW System

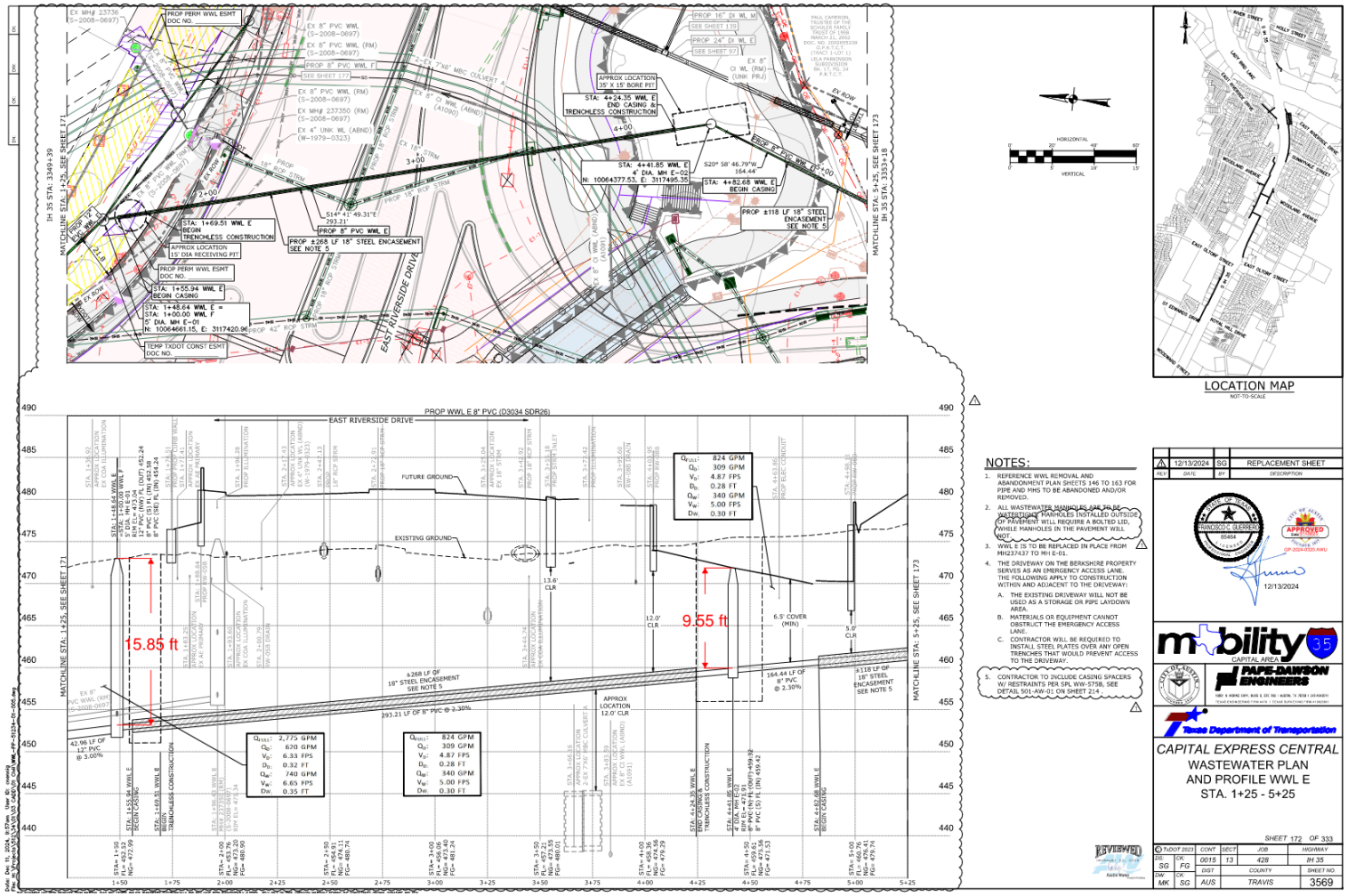
60% Design Change – Example 1

- 60% Design WW System at Riverside Rd Crossing

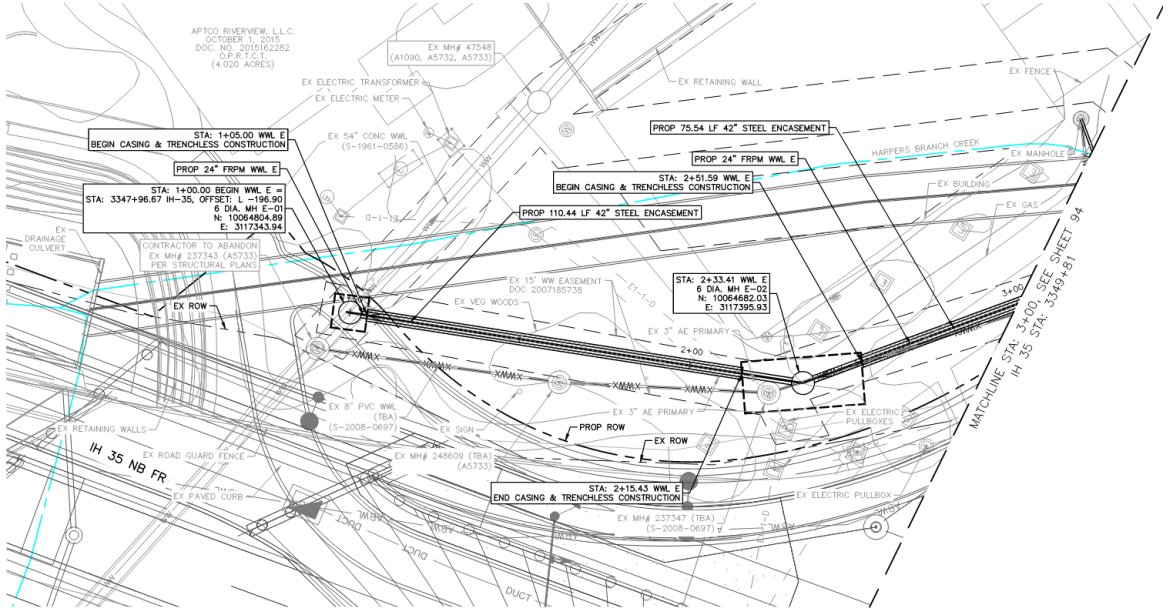


60% Design Change – Example 1

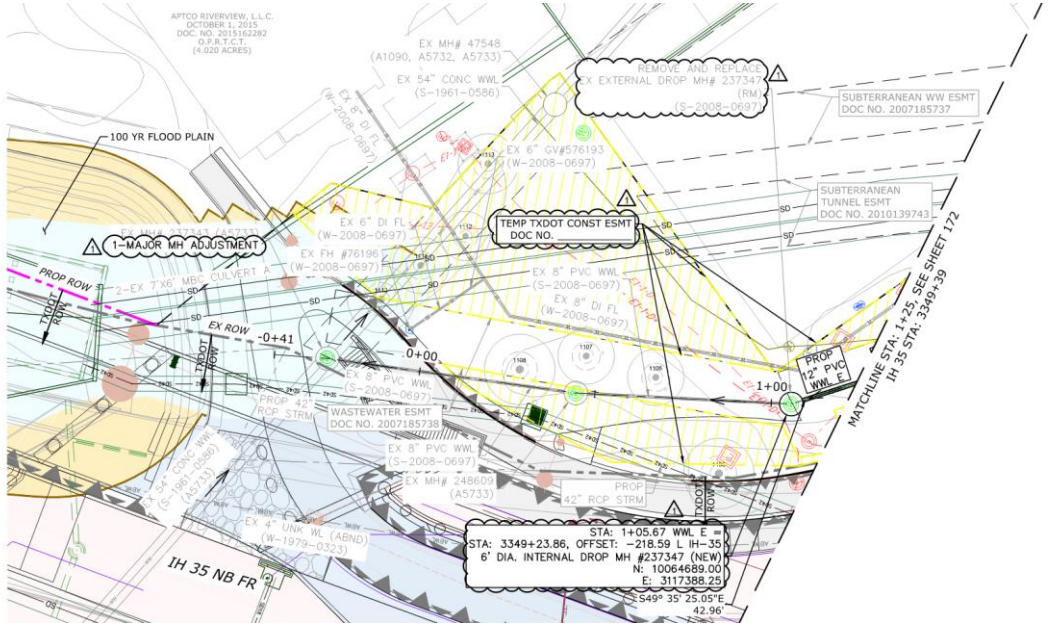
- 100% Design WW System at Riverside Rd Crossing



60% Design Change – Example 2



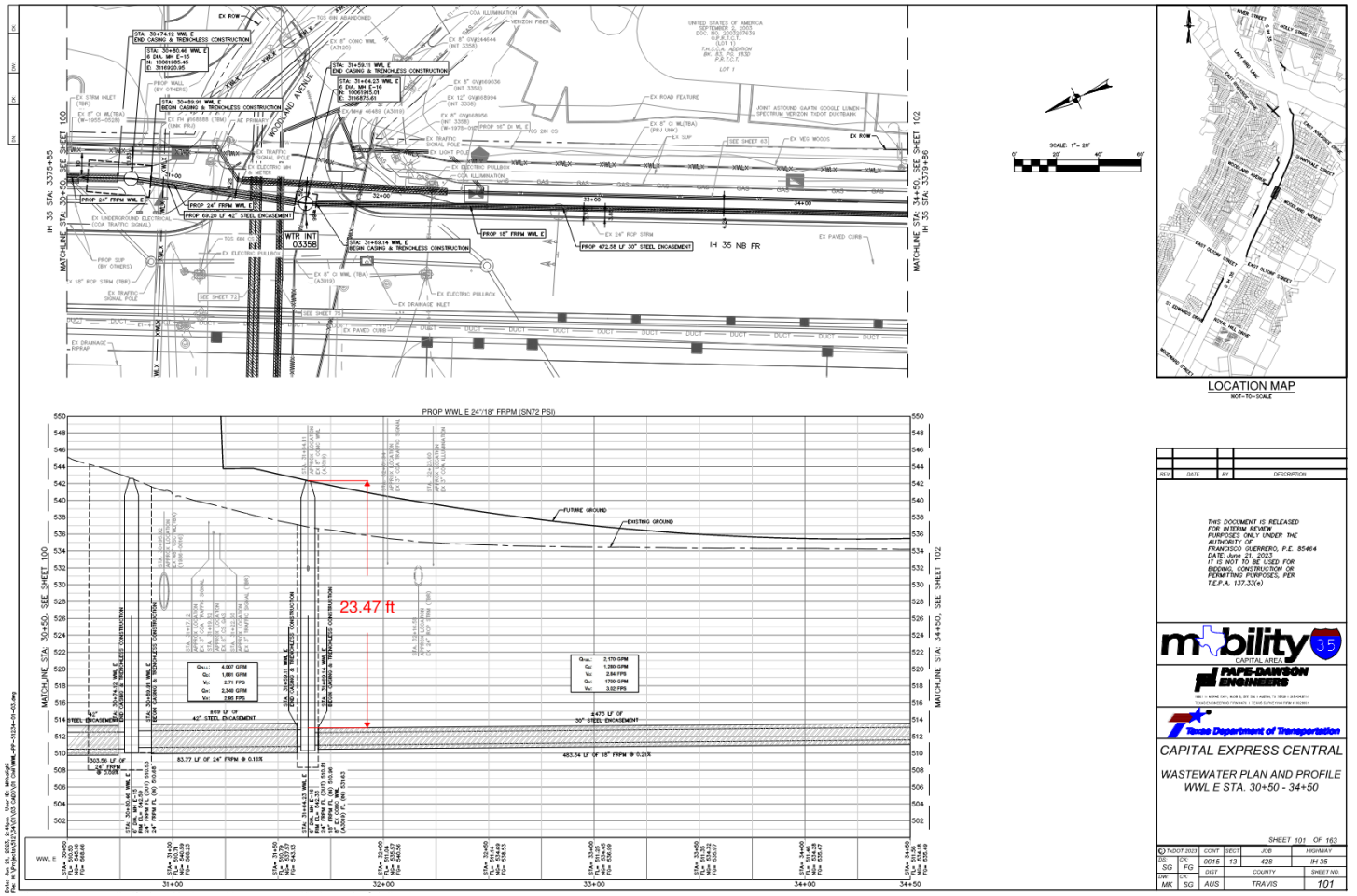
60% Design WW System at Berkshire Property



100% Design WW System at Berkshire Property

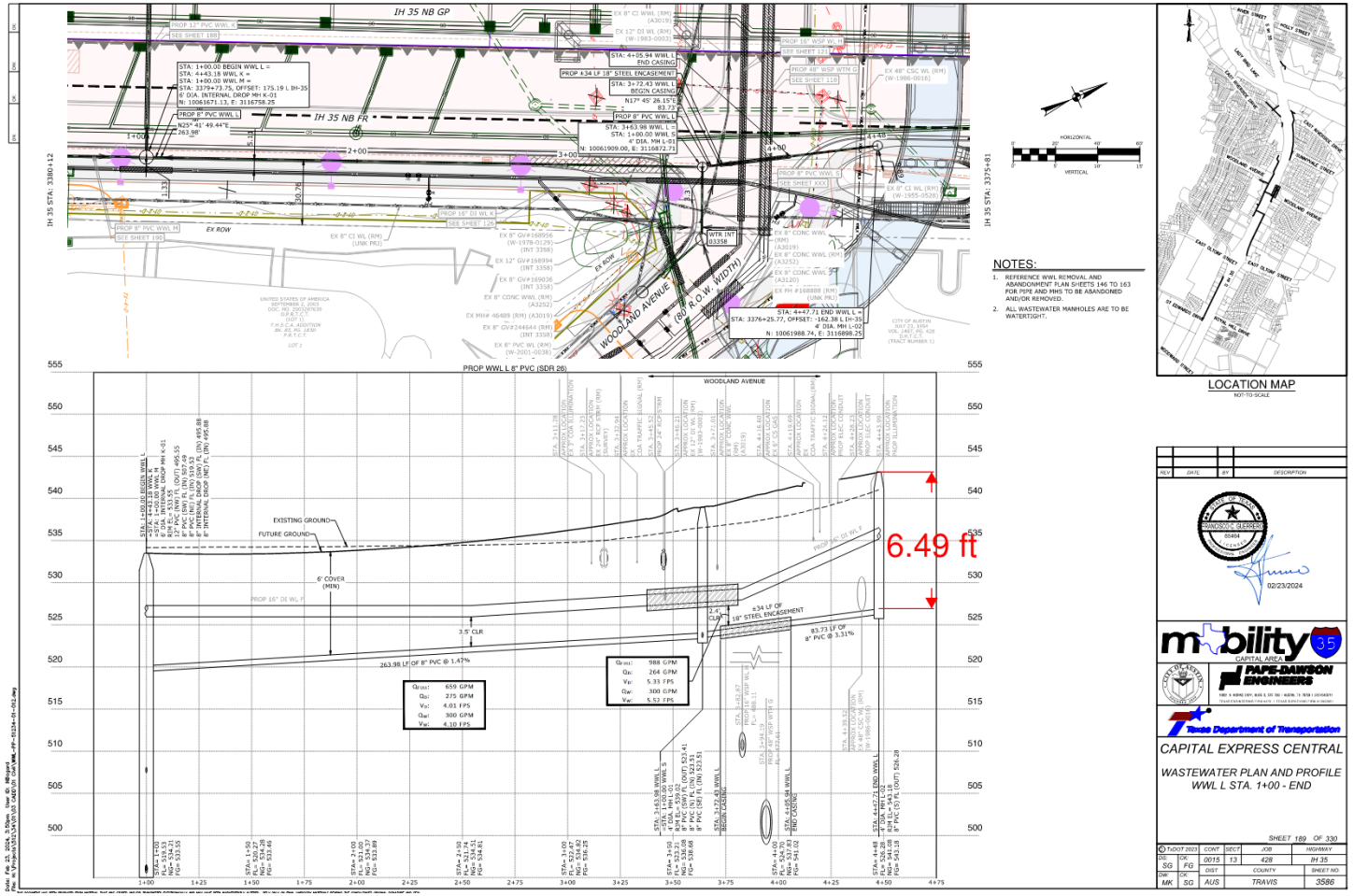
60% Design Change – Example 3

- 60% Design WW System at Woodland Crossing



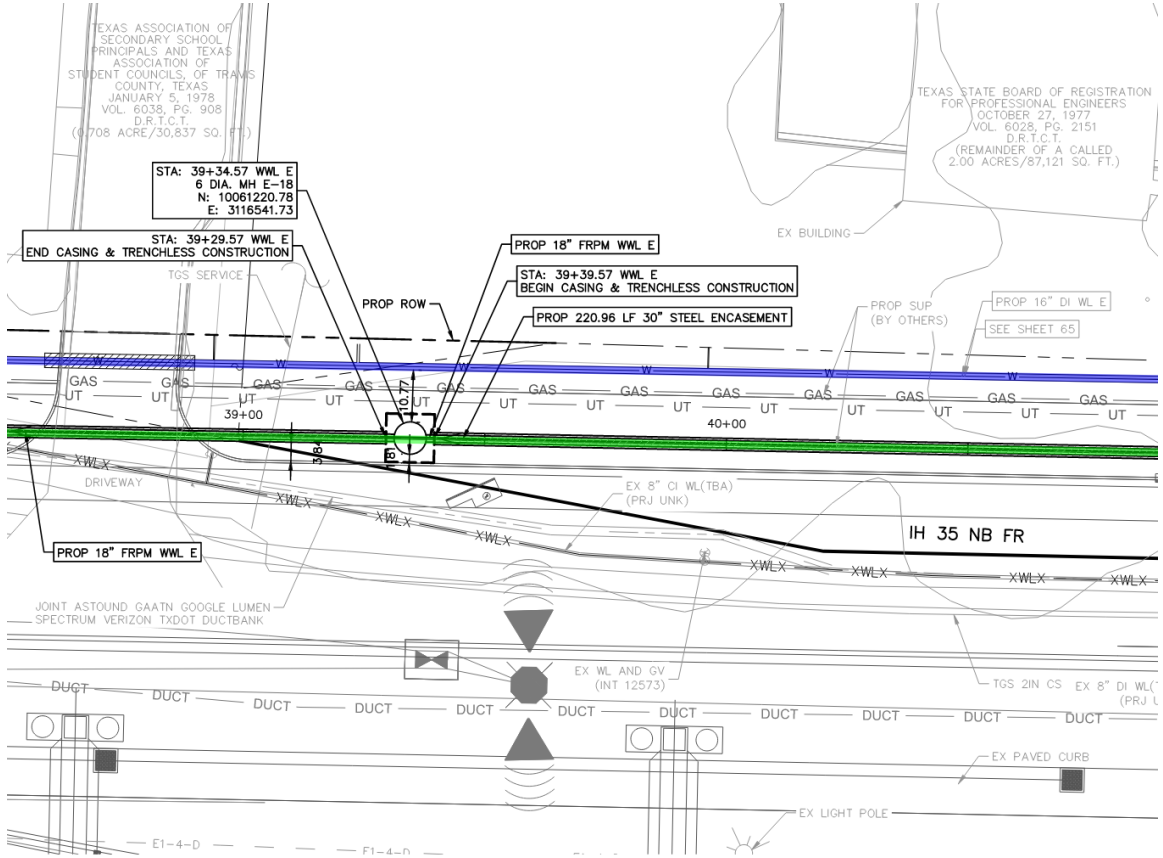
60% Design Change – Example 3

- 100% Design WW System at Woodland Crossing

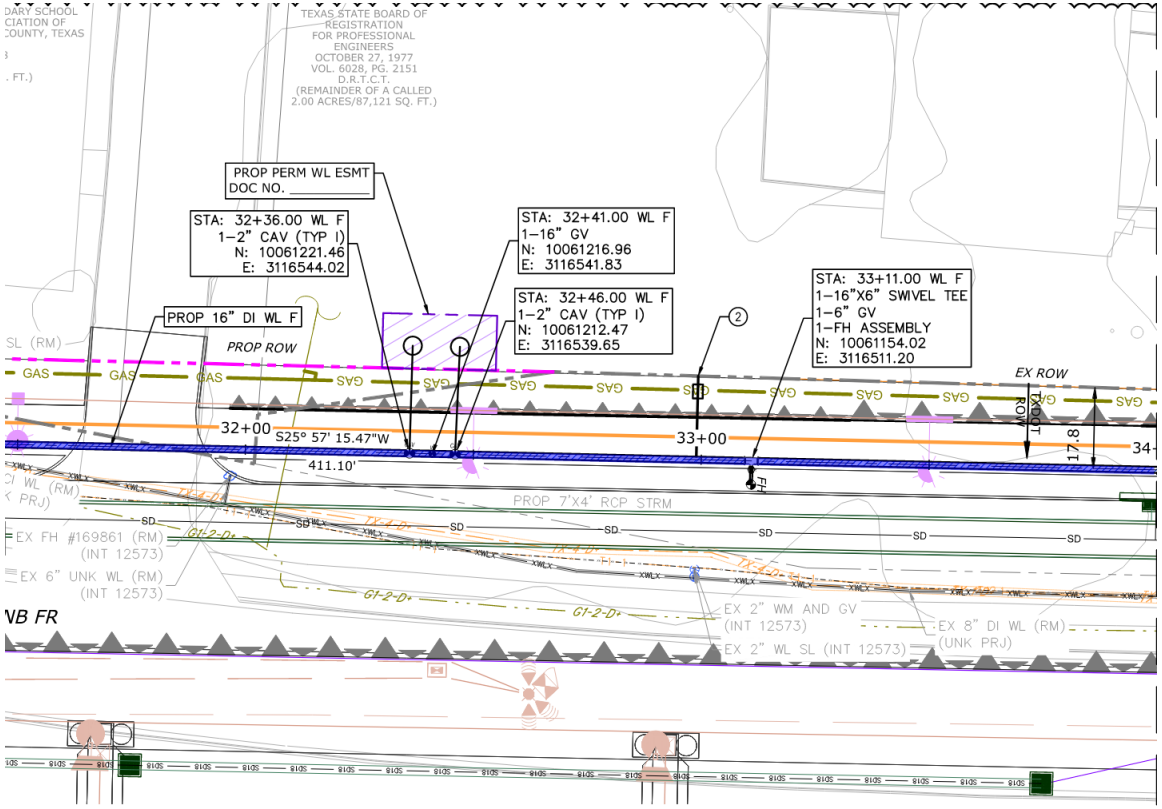


60% Design Change – Example 4

- 60% Design WW System South of Woodland Crossing



- 100% Design WW System South of Woodland Crossing



60% Design Change

Challenge

- Direction changed for crossings
- Schedule remains the same

Solution

- Added two crossings
- Redesigned within schedule

Result

- OPCC
- Constructability

Size (inch)	Depth (ft)	Length (ft)
8	<10	1259
8	10-20	4537
8	20-30	541
12	10-20	1549
12	30-40	149
15	10-20	1358
15	20-30	200
24	10-20	129
24	20-30	427
24	30-40	895
48	10-20	390

Project Bid

Lady Bird Lake Section

- $746M awarded to Balfour Beatty
- $48M for W&WW Utility Relocation
- Construction last from 2025 to 2033

Rendering by TxDOT
Rendering by TxDOT

Lessons Learned

- Consider space & schedule required for construction during design: open cut &tunnel
- Cost can be a big driver – even for TxDOT
- Coordination is KEY

Acknowledgement

Questions?

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