TECHNICAL MEMORANDUM

Water Capital Improvements Plan Update and Conceptual Cost Opinions

Miscellaneous Water Modeling

City of San Marcos

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Attachment A CIP List: Conceptual Cost Opinions

Attachment B CIP List: Large Format Map

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1 INTRODUCTION

The City of San Marcos (City) completed a Master Plan for its water distribution system in 2016 and an update to that Master Plan in 2020. The purpose of the Master Plan is to guide the growth and development of the distribution system and to prepare a Capital Improvements Plan (CIP) list that would provide the City with a financial strategy for infrastructure improvements.

Since the time of publication of the 2020 Water Master Plan Update, the system has seen several changes, including new development and new pipeline projects, and construction costs in the industry have increased. In addition, the planning horizon for the 2025 projects is closing in and prioritization and details are needed in order to adequately plan for the design and implementation of the 2025 projects.

For these reasons, the City retained Plummer Associates, Inc. (Plummer) to complete an update to the 2020 CIP list for the projects required in the planning horizon and the conceptual cost of each of the remaining projects.

Table 1 presents the CIP cost opinions from the 2020 Water Master Plan Update and Table 2 summarizes the updated conceptual cost opinions for the 2022 construction climate.

Table 1: CIP Cost Opinions (2020)

Infrastructure Type	2025	2030	2035
Pumps / Wells	$ 7,200,000	-	$ 1,234,000
Pipes	$ 14,609,000	$ 12,112,000	$ 5,318,000
Tanks	$ 7,326,000	$ 4,493,000	-
Total	**$ 29,135,000**	**$ 16,605,000**	**$ 6,552,000**

Table 2: Updated CIP Cost Opinions (2022)

Infrastructure Type	2025	2030	2035
Pumps / Wells	$ 1,430,000	-	$ 1,450,000
Pipes	$ 23,220,000	$ 17,750,000	$ 6,390,000
Tanks	$ 5,350,000	$ 200,000	-
Total	**$ 30,000,000**	**$ 17,950,000**	**$ 7,840,000**

2 CIP LIST – 2022 UPDATE

In general, the criteria used to identify the capital improvements needed to serve the projected demand in each target year were as follows:

- State regulatory criteria met for storage and pumping capacity.
- Meeting a target pressure of 35 psi during maximum day demand conditions at all service connections in the distribution system.
- Minimum allowable pressure of 20 psi under fire flow conditions.
- Head loss of less than 7 ft per 1,000 ft. in all pipes.
- Pipe velocities below 7 ft/s during maximum day demand conditions.
- Adequate fire flow availability (including 1,000 gpm for new connections, 500 gpm for existing connections) under maximum day demand conditions; and
- Reducing water age where feasible through looped connections to improve water quality and provide redundant water delivery pathways.

One other goal of the proposed CIP list is to consolidate the 11 existing pressure planes into 3 pressures planes for the entire City distribution system. Fewer pressure planes will provide greater resiliency for previously isolated areas of the system and improve operational controls and simplicity of the controls.

2.1 CIP LIST TRACKED CHANGES

Several model changes have been made to the 2020 model based on new City GIS pipeline data and discussions with the City. The changes are discussed below.

1. CIP #3: Hunter Rd. Parallel – Removed.
    a. Since CIP #4 Southwest 810′ Plane Loop will tie in the 810′ pressure plane and Hunter Rd. to remain on the 936′ pressure plane.
2. CIP #3: Willow Creek Connections to McCarty Pressure Plane – New project.
    a. Two connections between the Willow Creek service area and McCarty pressure plane for redundant water sources for Willow Creek customers (well water from McCarty or surface water through Purgatory PRV).
3. CIP #9: Leah Ave. Extension – Reduced scope due to recent projects and proposed PGM of Texas Roadway Extension.
    a. See new CIP #31 for PGM of Texas Roadway Extension scope.
4. CIP #15: Add SWTP Pump – Removed.
    a. This project is fully funded and in the construction phase.

5. CIP #16: 12" Connection for CRWA – Updated alignment based on conceptual design documents from Freese and Nichols.
    a. Note that CRWA recently requested a potential oversize of this line. If the pipe diameter is increased, the City shall coordinate the decision with Plummer to have the model updated.
6. CIP #22: Kissing Tree - Kingswood Line – Update alignment to connect at Lazy Lane and upsize water line in Lazy Ln. to be 12".
7. CIP #26: Ranch Road 12 Parallel (Comanche Discharge Parallel) – Confirmed that the model was using a 12" diameter (previously identified as 16" diameter project) for the Ranch Road 12 improvements between Holland St. and Craddock Ave.
8. CIP #31: PGM of Texas Extension – Previous version of CIP list had project #31 to be an upgrade of the 12" in Clovis Barker to a 16". New project will leave Clovis Barker as 12" and install new 16" along transportation master plan route as discussed.
9. CIP #34: Northside Connection – Reduced scope to remove second railroad crossing and second IH-35 crossing. The new project will rely upon the completion of the 12" network within the Whisper PID development and then connect to the furthest east end of the Whisper PID network with a new 12". As the 12" travels east, it could follow along the un-developed Whisper parcels though the Maxwell CCN and then follow the extension of William Petus to the west to meet Harris Hill.
10. CIP #35: Post Rd. Connection – Removed from CIP list since model indicates that water can move from the Blanco Vista EST to the southwest through the existing Post Rd. 16" and to the southeast through existing 12" / 16" lines and the new 12" to the east of Whisper PID (CIP #34).
11. CIP #36: Potential 810 Elevated Storage Tank – Removed.
    a. Since additional elevated storage is not required for TCEQ compliance or for operational improvements, this project was re-named to cover the bolted tank rehabilitation project requested by Ron Riggins and Bruce Noel. Intended to cover inspection and rehabilitation of the panels at the RR 12 GST and Comanche Standpipe. Not intended for potential foundation work at Comanche.
    b. The new project name is "Bolted Steel Tank Rehabilitation"
12. CIP #39: Centerpoint Extension – Update scope to be all 12" diameter. The previous project used 16" and 12" to connect from Old Bastrop Hwy. to the recently installed Primrose line.
13. CIP #40: Francis Harris Extension – Scope has been modified to consider the Trace developer's plans along the southeast commercial parcels. Since an 8" tee has already been installed at Snowbell and Old Bastrop Hwy, this extension of the Old Bastrop Hwy. waterline will be all 8" from Poser Rd. to the south bound Francis Harris extension. Additionally, a 12" will be installed by the Trave developer along the central corridor, Esplanade Parkway. New CIP #37.1 and #37.2.

14. CIP #42: McCarty Connection – Removed project from CIP since Crystal Clear 8" in McCarty is now in San Marcos ownership.
15. Maintenance Project #11 – Maintenance and repair data for WL21790 (24" PVC installed in 2002) has had one break in the past and is ranked as "moderate risk" based on the consequence and likelihood of failure evaluation conducted by Kirk Abbott. Maintenance Project #11 is a monitoring request because of the extremely high consequence of failure of this pipeline segment, but no CIP dollars are required to be allocated to this maintenance project. This maintenance project has been removed.

2.2 IMMEDIATE GOALS FOR 2025

1. CIP #1: Comanche Pump Improvements
    a. Design in Process – 90%
2. CIP #3: Willow Creek Connections
    a. Work to be completed by City staff
3. CIP #13: Airport Extension
    a. Construction complete
4. CIP #16: Highway 80 Extension 1
    a. Design in Process – 90%
5. CIP #26: RR 12 Pipeline Parallel
    a. Design in Process – 100%
6. CIP #26: Sessom Drive Improvements
    a. Design in Process – 100%

3 CONCEPTUAL COST OPINIONS

A summary of the updated conceptual cost opinions of the CIP projects is presented below, in Table 3. Detailed cost estimates for each project are included in Attachment A.

Table 3: CIP Conceptual Costs Summary

2022 CIP Number	Year	Project Name	Opinion of Probable Cost
1	2025	Replace Comanche Pumps	$ 2,470,000
1 - P			
2	2025	Replace Soyars Pumps	$ 1,430,000
3	2025	Willow Creek Connections to McCarty Pressure Plane	$ 120,000
4	2025	Southwest 810' Plane Loop	$ 1,450,000
5	2025	Stagecoach Trail Extension	$ 940,000
6	2025	Rattler Road Loop	$ 730,000
7	2025	South Hunter Rd Loop	$ 1,010,000
8	2025	Patricia and Sunset Acres	$ 1,090,000
9	2025	Leah Ave Extension	$ 690,000
10	2025	Upgrade IH-35 Crossings	$ 1,360,000
11	2025	Railroad Crossing and Upgrades near the Conn's shopping center.	$ 1,010,000
12	2025	Big Hat Feed	$ 1,060,000
13	2025	Airport Extension	$ 1,860,000
14	2025	Blanco Vista EST	$ 480,000
14 - T	2025		$ 5,350,000
16	2025	CRWA Interconnect	$ 1,630,000
17 - T	2025	Kissing Tree Tank	*developer cost*
18 - P	2025	Kissing Tree PS	*developer cost*
18			*developer cost*
20	2025	Kissing Tree Loop - Phase 2a	*developer cost*
22	2025	Kissing Tree - Kingswood Line	$ 1,640,000
23	2025	Kissing Tree - Deerwood Line	$ 1,120,000
24	2025	Kissing Tree - McCarty Line	*developer cost*
25	2025	Airport Loop	$ 2,670,000
26	2025	Parallel Comanche Outlet Main	$ 1,890,000

2022 CIP Number	Year	Project Name	Opinion of Probable Cost
27	2030	Kissing Tree - La Cima Loop - Connect to Estates of San Marcos	$ 220,000
28	2030	Kissing Tree - La Cima Loop - Primary	$ 5,360,000
29	2030	McCarty Tank Fill/Drain Line	$ 2,280,000
30	2030	US 80 Loop	$ 2,670,000
31	2030	PGM of Texas Extension	$ 3,060,000
32	2030	Trace Dev. Connection	$ 890,000
33	2030	Old Bastrop Extension 1	$ 310,000
34	2030	North Side Connection for ARWA BV EST Water	$ 1,310,000
36 - T	2030	Bolted Steel Tank Rehabilitation	$ 2,160,000
37.1	2030	Trace Dev. and Old Bastrop Extension to Francis Harris (8")	$ 200,000
37.1	2030	Trace Dev. and Old Bastrop Extension to Francis Harris (12")	$ 500,000
37.2	2030	Francis Harris Extension	$ 250,000
38 - W	2035	Add Well Capacity	$ 1,450,000
39	2035	Old Bastrop Extension 2	$ 1,660,000
40	2035	Centerpoint South Extension	$ 1,020,000
41	2035	South LBJ Upgrade	$ 400,000
42	2035	Old Bastrop Extension 3	$ 950,000
43	2035	Tanger Loop	$ 510,000
44	2035	IH 35 Frontage Upgrades	$ 1,850,000

P – Pump Station Project
T – Tank Project
W – Well Water Project

In developing the above CIP cost opinions, the Texas Water Development Board's (TWDB) Unified Costing Model (UCM) was used as a guide for pipelines and pump stations (UCM Update February 2019). New pump stations were estimated using UCM values as a function of required horsepower (HP). All costs based on the UCM values were then updated from the last UCM publication in February 2019 to August 2022 dollars using Engineering News Record (ENR) construction cost index (CCI) values. The ENR value from February 2019 was 11213 and the ENR value from August 2022 was 13171, resulting in an increase factor of 1.17.

For pipelines, cost opinions per linear foot were determined by assuming substrate type in the area (rock or soil) as well as the development density along the developed route (urban or rural), and then looking up the value for the proposed diameter in the appropriate table in the UCM. The UCM cost was then brought to present value using the ENR CCI.

For new pump stations, required HP was determined and recent bid tabs were used to develop cost opinions for stations with HP values from 80 to 200. Stations with HP values outside this range were interpolated from the UCM table for new pump stations which use $150 / HP to estimate pump station costs. Costs were then brought to present value using the ENR CCI.

For tanks, recent bid tabulations, detailed cost opinions, and UCM values were compared to estimated costs for new tanks. Costs were then brought to present value using the ENR CCI.

Land costs associated with easements were estimated using recent Texas A&M Real Estate Research Center land prices for the Blacklands – South Region. When looking at the data for the years 2010-2021, the average cost per acre was $933. When zooming in on the last 5 years, the average cost per acre increased to $1,134.

The remaining cost assumptions are summarized below in Table 4.

Table 4: CIP Conceptual Cost Assumptions

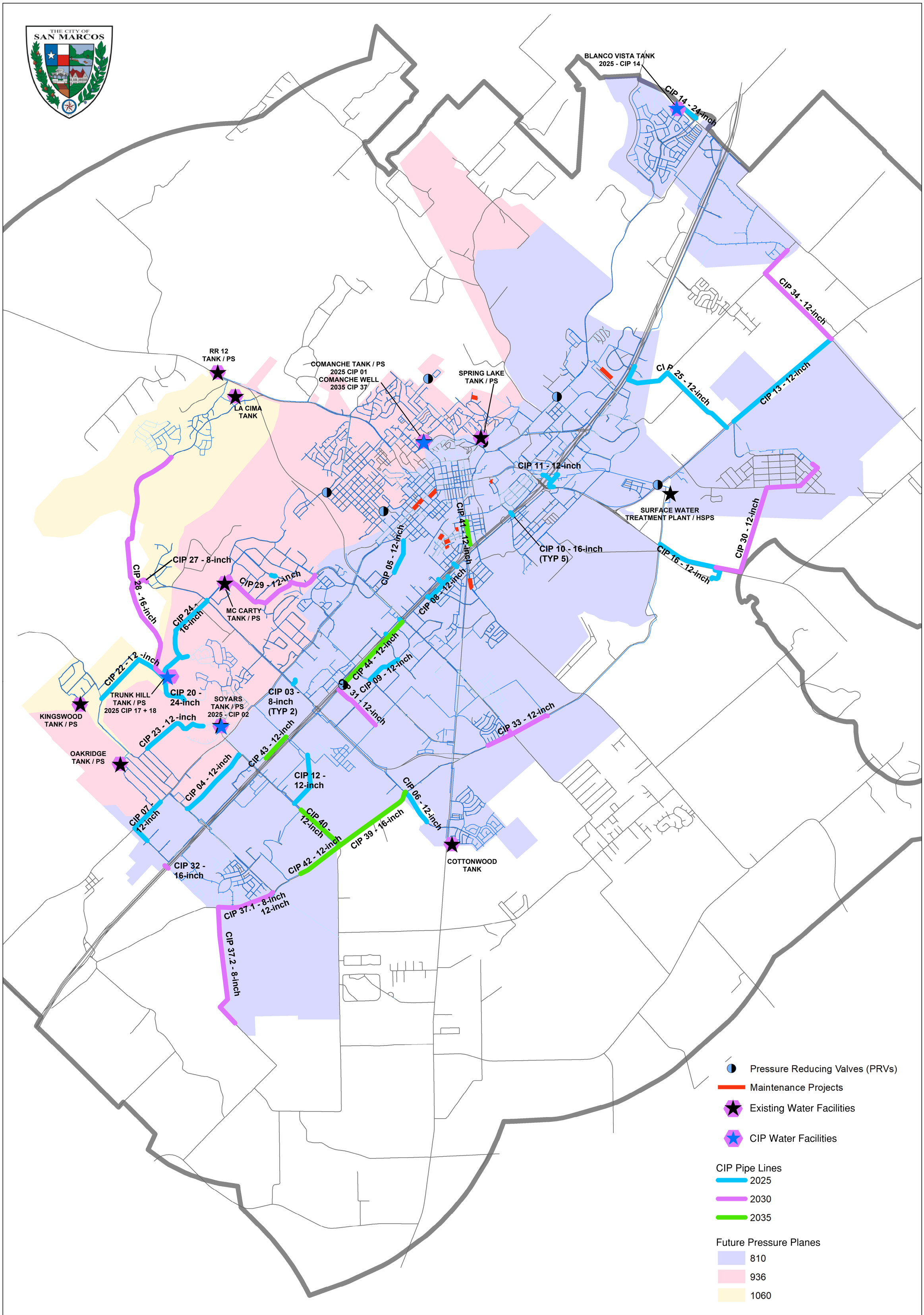
Project Cost Assumption	Value	Units
Interest During Construction	3.0%	
Rate of Return on Investments	0.5%	
Construction Period	1.0	years
Engineering, Legal, & Contingencies (Pipes)	30%	
Engineering, Legal, & Contingencies (All Other Facilities)	35%	
Debt Service Period	20	years
Annual Interest Rate	3.5%	
Operations & Maintenance (Pipelines)	1.0%	% of Capital Costs
Operations & Maintenance (Pump Stations)	2.5%	% of Capital Costs
Power Costs	$0.08	/ kilowatt-hour

Table and assumptions derived from the TWDB UCM February 2019 Cost Model.

The conceptual cost opinions were developed using August 2022 unit costs and cost approximations. If, in the future, the conceptual costs need to be updated, the ENR CCI multiplier can be applied to the cost opinion to approximate the change in material and labor prices over the period since August 2022.

2022 CIP Number		Year	Project Priority	Project Category	Project Name	Dia. (in)	Description	Length (ft)	Soil Type	Rural / Urban	Crossing Length (ft)	Crossing Unit Costs	$/LF (2022)	Line Placement	Project Cost	Land Acquisition	Surveying	Engineering	Environmental	Loan Interest	Opinion of Probable Cost
1		2025	**High**	**Capacity**	Replace Comanche Pumps	16	New Pumps at Comanche to fill RR 12 & 50 LF 16" yard piping	51	Soil					City Property	$ 2,400,000					$ 66,000	$ 2,470,000
1 - P		2025				Pumps															
2		2025	**High**	**Development**	Replace Soyars Pumps	Pumps	Replace Soyars pumps to fill the 936' Pressure Plane (2020) and Kissing Tree in 2025.														$ 1,430,000
3		2025	**High**	**Operational Benefit**	Willow Creek Connections to McCarty Pressure Plane	8	Two connections between the Willow Creek service area and McCarty pressure plane for redundant water sources (well water from McCarty or surface water through Purgatory PRV).	690	Soil	Rural			$ 116	Neighborhood	$ 80,040	$ 539	$ 1,000	$ 24,012	$ 3,267	$ 3,000	$ 120,000
4		2025	**Medium**	**Operational Benefit**	Southwest 810' Plane Loop	12	Connect Centerpoint to Transportation Way in the 810' plane.	5,320	Soil	Rural			$ 200	Easement / Industrial then Rural	$ 1,064,000	$ 4,155	$ 3,000	$ 319,200	$ 25,189	$ 30,000	$ 1,450,000
5		2025		**Operational Benefit**	Stagecoach Trail Extension	12	Extend line from end of Stagecoach to intersection of Belvin and Bishop (existing 12" tie in).	2,400	Soil	Rural	500	$ 422	$ 200	Easement / Rural (Stream Crossing)	$ 691,073	$ 1,874	$ 3,000	$ 207,322	$ 13,731	$ 20,000	$ 940,000
6		2025		**Operational Benefit**	Rattler Road Loop	12	Complete 12" loop around the high school on Rattler Rd.	2,430	Soil	Urban			$ 220	Easement / Rural & City Street (School)	$ 534,600	$ 1,898	$ 3,000	$ 160,380	$ 11,506	$ 15,000	$ 730,000
7		2025		**Development**	South Hunter Rd Loop	12	Connect existing 12" (on 810 plane) in Hunter Rd to 12" in Industrial Fork Rd.	3,840	Rock	Urban + Road Crossing	115	$ 422	$ 179	Easement / Rural & City Street	$ 735,907	$ 2,999	$ 3,000	$ 220,772	$ 18,182	$ 21,000	$ 1,010,000
8		2025		**Capacity**	Patricia and Sunset Acres	12	Upsize 2" line along Del Sol Dr and 8" line along Patricia Dr. to each be 12" diameter as a part of the Sunset Acres drainage project.	2,730	Soil	Urban			$ 200	City Roads	$ 546,000			$ 163,800	$ 12,926	$ 16,000	$ 1,090,000
9		2025		**Capacity**	Leah Ave Extension	12	Install 12" to connect Leah Ave between Cottonwood Pkwy and Clovis Barker	2,510	Soil	Urban			$ 200	Easement / Rural & City Street	$ 502,000	$ 1,960	$ 3,000	$ 150,600	$ 11,884	$ 14,000	$ 690,000
10		2025		**Operational Benefit**	Upgrade IH-35 Crossings	16	Upgrade 5 existing water line crossings (8" / 12") to be 16" Between McCarty & Aquarena Springs Rd. These IH-35 crossings are existing but need to be upgrades for 810' water.	1,490	Rock	Urban			$ 652	Road Crossing IH-35	$ 970,839		$ 10,000	$ 339,794	$ 7,055	$ 27,000	$ 1,360,000
11		2025		**Operational Benefit**	Railroad Crossing and Upgrades	12	Upgrade IH 35 crossing near the railroad crossing and upsize the 8"/10" lines to the east of IH 35 near the Conn's shopping center.	2,280	Rock	Urban	800	$ 422	$ 179	Easement & City Street	$ 745,499		$ 5,000	$ 223,650	$ 14,583	$ 21,000	$ 1,010,000
12		2025		**Development**	Big Hat Feed	12	Install 12" from McCarty behind the Premium outlets to the 24" to feed new industrial development and 18" line to serve Gas Lamp.	3,890	Soil	Rural			$ 200	Easement / Rural	$ 778,000	$ 3,038	$ 3,000	$ 233,400	$ 18,419	$ 22,000	$ 1,060,000
13		2025		**Development**	Airport Extension	12	Extend 12" northeast along HWY 21	9,010	Soil	Rural			$ 200	Easement	$ 1,802,000					$ 50,000	$ 1,860,000
14		2025	**High, Need to meet ARWA schedule for receiving flow**	**Development**	Blanco Vista EST	24	Build 1.0 MG elevated storage tank and 24" outlet line to Blanco Vista Blvd	1,570	Rock				$ 267	Development	$ 348,599	$ 1,226	$ 3,000	$ 104,580	$ 7,434	$ 10,000	$ 480,000
14 - T		2025				EST									$ 5,200,000					$ 143,000	$ 5,350,000
16		2025	**High, Need to meet CRWA schedule for receiving flow**	**Capacity**	12" Connection for CRWA Share	12	CRWA WTP HSPS 12" connection to proposed 12" line in Hwy 80.	5,900	Soil	Street Crossing	327	$ 422	$ 179	Easement / Rural	$ 1,194,458	$ 4,608	$ 3,000	$ 358,337	$ 27,936	$ 33,000	$ 1,630,000
17 - T	**(D)**	2025		**Development / Capacity**	Kissing Tree Tank	EST	New 0.50 MG Elevated Storage for 936' pressure plane														
18 - P	**(D)**	2025		**Development / Capacity**	Kissing Tree PS	Pumps	Pumps to fill La Cima Tank and deliver to 1063' pressure plane														
18	**(D)**	2025				16		1,110													
20	**(D)**	2025		**Development**	Kissing Tree Loop - Phase 2a	24	Central Loop in Development Phase I	2,400													
22		2025	**Medium, Depends on the completion of the Trunk Hill tank and PS.**	**Operational Benefit**	Kissing Tree - Kingswood Line	12	Connect Kissing Tree to Kingswood neighborhood by coming down Lazy Ln (include flow control valve). Note that if Kissing Tree develops the area around the proposed route, then Kissing Tree can oversize to 12" in their project.	6,020	Rock	Rural			$ 200	Development	$ 1,204,000	$ 4,702	$ 3,000	$ 361,200	$ 28,504	$ 34,000	$ 1,640,000
23		2025	**Low**	**Operational Benefit**	Kissing Tree - Deerwood Line	12	Connect Kissing Tree Loop to Trails End	4,120	Rock	Rural			$ 200	Development	$ 824,000	$ 3,218	$ 3,000	$ 247,200	$ 19,508	$ 23,000	$ 1,120,000
24	**(D)**	2025		**Development**	Kissing Tree - McCarty Line	16	Connect Kissing Tree Loop to 16" KT line from McCarty Ln.	5,010													
25		2025	**Low**	**Operational Benefit**	Airport Loop	12	Connect IH 35 to HWY 21 along Harris Hill Rd, creating a loop for the northeast service area.	9,800	Soil	River Crossing + Rural	500	$ 422	$ 179	Easement (Mainly Ru	$ 1,965,273	$ 7,654	$ 3,000	$ 589,582	$ 46,402	$ 55,000	$ 2,670,000
26		2025	**High**	**Capacity**	Old Ranch Road 12 Parallel Comanche Outlet Main	12	Parallel of existing 16" Comanche PS discharge line between Holland and Craddock.	6,990	Rock	Urban			$ 200	Easement	$ 1,398,000			$ 419,400	$ 33,097	$ 39,000	$ 1,890,000

2022 CIP Number		Year	Project Priority	Project Category	Project Name	Dia. (in)	Description	Length (ft)	Soil Type	Rural / Urban	Crossing Length (ft)	Crossing Unit Costs	$/LF (2022)	Line Placement	Project Cost	Land Acquisition	Surveying	Engineering	Environmental	Loan Interest	Opinion of Probable Cost
27		2030		**Operational Benefit**	Kissing Tree - La Cima Loop - Connect to Estates of San Marcos	8	Connect the Estates of San Marcos to the 1063' pressure plane with an 8" tee and 8" pipe from the new 16" Kissing Tree-La Cima connection (See CIP 28).	1,310	Rock	Rural			$ 116	Development	$ 151,960	$ 1,023	$ 3,000	$ 45,588	$ 6,203	$ 5,000	$ 220,000
28		2030		**Operational Benefit / Capacity**	Kissing Tree - La Cima Loop - Primary	16	16" cross country pipeline from the new Kissing Tree Truck Hill Elevated Storage Tank to La Cima neighborhood. Also connect this loop to existing neighborhood (Estates of San Marcos) with an 8" new line along W. McCarty Ln. New 8" needs PRV to reduce pressure to 95 psi. (See CIP 27)	17,970	Rock	Rural			$ 220	Development / Rural	$ 3,953,400	$ 14,034	$ 7,500	$ 1,186,020	$ 85,085	$ 109,000	$ 5,360,000
29		2030		**Operational Benefit**	McCarty Tank Fill/Drain Line	12	Connect McCarty Standpipe to 810 plane via Stagecoach. McCarty should now be operated at 810' (max elev is 857') and serve as elevated storage for the 810' plane.	8,380	Rock	Urban			$ 200	Easement / Urban	$ 1,676,000	$ 6,545	$ 3,000	$ 502,800	$ 39,678	$ 47,000	$ 2,280,000
30		2030		**Operational Benefit**	US 80 Loop	12	Extend 12" line from existing 30" along SH 80 to edge of CCN, then north along property boundaries to connect to dead end at airport.	12,550	Soil	Rural			$ 179	Easement (Mainly Ru	$ 2,246,450	$ 9,801	$ 3,000	$ 673,935	$ 59,422	$ 62,000	$ 3,060,000
31		2030		**Operational Benefit**	PGM of Texas Extension	12	Install new 12" line along the proposed roadway alignment which connects to the PGM of Texas access drive. Tie into 16" along IH 35, 12" in Leah Ave, and 24" behind Amazon.	3,610	Soil	Urban			$ 179	Easement	$ 646,190		$ 5,000	$ 193,857	$ 17,093	$ 18,000	$ 890,000
32		2030		**Development**	Trace Dev. Connection	12	Connect development on the south end to 16" along IH 35	320	Rock	I-35 Crossing		$ 704		Bore Below IH-35	$ 221,204		$ 5,000	$ 66,361	$ 1,515	$ 7,000	$ 310,000
33		2030		**Operational Benefit**	Old Bastrop Extension 1	12	Connect the 16" along Old Bastrop Rd to the East to the 18" line north of Cottonwood and complete 12" line on Redwood south to connect at Old Bastrop.	5,100	Soil	Redwood Drive Crossing		$ 422	$ 179	Easement / Rural & Urban	$ 961,447	$ 3,983	$ 3,000	$ 288,434	$ 24,148	$ 27,000	$ 1,310,000
34		2030		**Capacity / Development**	North Side Connection for ARWA BV EST Water	12	Connect to 12" lines in Whisper and continue 12" to the east toward Hwy 21. Connect to 12" in Hwy 21 at the intersection with William Petus.	8,850	Soil	Rural			$ 179	Easement (Mainly Ru	$ 1,584,150	$ 6,912	$ 3,000	$ 475,245	$ 41,903	$ 44,000	$ 2,160,000
36 - T		2030		**Operational Benefit / Capacity**	Bolted Steel Tank Rehabilitation	Tank	Bolted steel tank rehabilitation project as requested by Ron Riggins and Bruce Noel. Intended to cover inspection and rehabilitation of the tank panels at the RR 12 GST and Comanche Standpipe.														$ 200,000
37.1	**(D)**	2030		**Development**	Trace Dev. and Old Bastrop Extension to Francis Harris	8	This project includes the proposed 8" line to be installed by Trace Development on the south portion of their property, along their commercial frontage. The align will be from Posey Rd. to Francis Harris.	3,070	Soil	Rural			$ 116	City Roads	$ 356,120	$ 2,398	$ 1,000	$ 106,836	$ 14,536	$ 10,000	$ 500,000
37.1	**(D)**	2030		**Development**	Trace Dev. and Old Bastrop Extension to Francis Harris	12	This project includes the proposed 12" line to be installed by Trace Development on the south portion of their property, along their commercial frontage. The align will be from Posey Rd. to Francis Harris.	1,010	Soil	Rural			$ 179	City Roads	$ 180,790	$ 789	$ 1,000	$ 54,237	$ 4,782	$ 5,000	$ 250,000
37.2		2030		**Industrial**	Francis Harris Extension	8	Extend a new 8" line to the Francis Harris to power plant from Trace 12" line in Old Bastrop.	8,830	Soil	Rural			$ 116	City Roads	$ 1,024,280		$ 1,000	$ 307,284	$ 41,809	$ 29,000	$ 1,410,000
38 - W		2035		**Operational Benefit**	Add Well Capacity	Well	Add groundwater well at Comanche.										$ 3,000				$ 1,450,000
39		2035		**Development / Capacity**	Old Bastrop Extension 2	16	Rattler to Centerpoint Extension along Old Bastrop Highway	6,090	Soil	Rural			$ 200	Easement	$ 1,218,000	$ 4,756	$ 3,000	$ 365,400	$ 28,835	$ 34,000	$ 1,660,000
40		2035		**Operational Benefit**	Centerpoint South Extension	12	Install 12" perpendicular to Old Bastrop to 12" Existing Line and connect to end point of 12" in Centerpoint Rd. near the Master's School.	3,720	Soil	Rural			$ 200	Easement	$ 744,000	$ 2,905	$ 3,000	$ 223,200	$ 17,614	$ 21,000	$ 1,020,000
41		2035		**Operational Benefit**	South LBJ Upgrade	12	Upgrade small diameter line in S. LBJ from E. Grove St. to IH-35 Crossing	1,630	Rock	Urban			$ 179	City Roads	$ 291,770		$ 1,000	$ 87,531	$ 7,718	$ 9,000	$ 400,000
42		2035		**Development / Capacity**	Old Bastrop Extension 3	12	Centerpoint to Horace Howard Extension along Old Bastrop Highway, Include connection to existing line on Horace Howard Dr.	3,460	Soil	Rural			$ 200	Easement	$ 692,000	$ 2,702	$ 3,000	$ 207,600	$ 16,383	$ 20,000	$ 950,000
43		2035		**Operational Benefit**	Tanger Loop	12	Connect existing 24" to end of proposed 12" developer line along IH-35 north of Centerpoint (Behind Bill Miller's)	2,060	Soil	Rural			$ 179	Easement	$ 368,740	$ 1,609	$ 3,000	$ 110,622	$ 9,754	$ 11,000	$ 510,000
44		2035		**Operational Benefit**	IH 35 Frontage Upgrades	12	Upgrade IH 35 lines along northbound side to 12" pipes from tan warehouse building north of McCarty to the northeast until Wonder World Dr.	6,180	Soil	Urban			$ 220	Easement	$ 1,359,600		$ 7,500	$ 407,880	$ 29,261	$ 38,000	$ 1,850,000



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ATTACHMENT B
CIP MAP - 2022 UPDATE

Plummer Associates, Inc
6300 La Calma Dr. Suite 400
Austin, Texas 78752
Date: 12/9/2022

Document Path: M:\Projects\0600\018-01\20220331 FA 1 - CIP Update - Hannah\CIP Figure.mxd

TECHNICAL MEMORANDUM

Water Distribution System Model Update to 2022 Conditions

Miscellaneous Water Modeling

City of San Marcos

PREPARED FOR	Shaun Condor, PE City of San Marcos
PREPARED BY	Hannah Leppla, PE (TX No. 130165) Plummer Associates, Inc.
cc	Stephen J. Coonan, PE, Principal
DATE	December 9, 2022
VERSION	1
PROJECT NO.	0600-018-03 Fund Allocation #1
FILE DIRECTORY	m:\projects\0600\018-01\20220331 fa 1 - cip update - hannah\task 1 - model update to 2022\20220622 model update - fa 1 - task 1.docx

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Texas Registered Engineering Firm F-13

1 INTRODUCTION

The purpose of this memo is to present and discuss the updates to the calibrated InfoWater model to bring the distribution system up to date with the existing 2022 conditions. The previous Water Master Plan model was representative of the 2019 meter demands and pipeline network. In the past 3 years, there has been an increase in the water demand on the City's system and new pipe networks have been installed.

New data includes:

- 2022 GIS Data for Pipelines
- 2022 GIS Data for Customer Meter Locations
- 2021 Monthly Meter Consumption Data

Table 1 summarizes the changes to the model system and Figure 1 shows a chart demonstrating the changes.

Table 1: Model Component Comparison

System Component	2019 Model	2022 Model
8" and Smaller Dia. (miles) [1]	171.7	198.2
10" - 12" Dia. (miles) [1]	69.3	75.4
16" - 24" Dia. (miles) [1]	42.4	43.1
Greater than 24" Dia. (miles) [1]	4.5	4.5
Customer Meters – Excel (units) [2]	12,617	14,700
Customer Meters – GIS (units)	12,792	14,752
Annual Average Demand (gpm) [3]	5,808	5,964
Annual Average Demand (MGD)	8.4	8.6

[1] LIFECYCLE = ACTIVE; WATERTYPE = POTABLEWATER; OWNERSHIP = COSM
[2] Based on unique account numbers.
[3] Annual average demand for the 2022 model build is based on 2021 meter data.

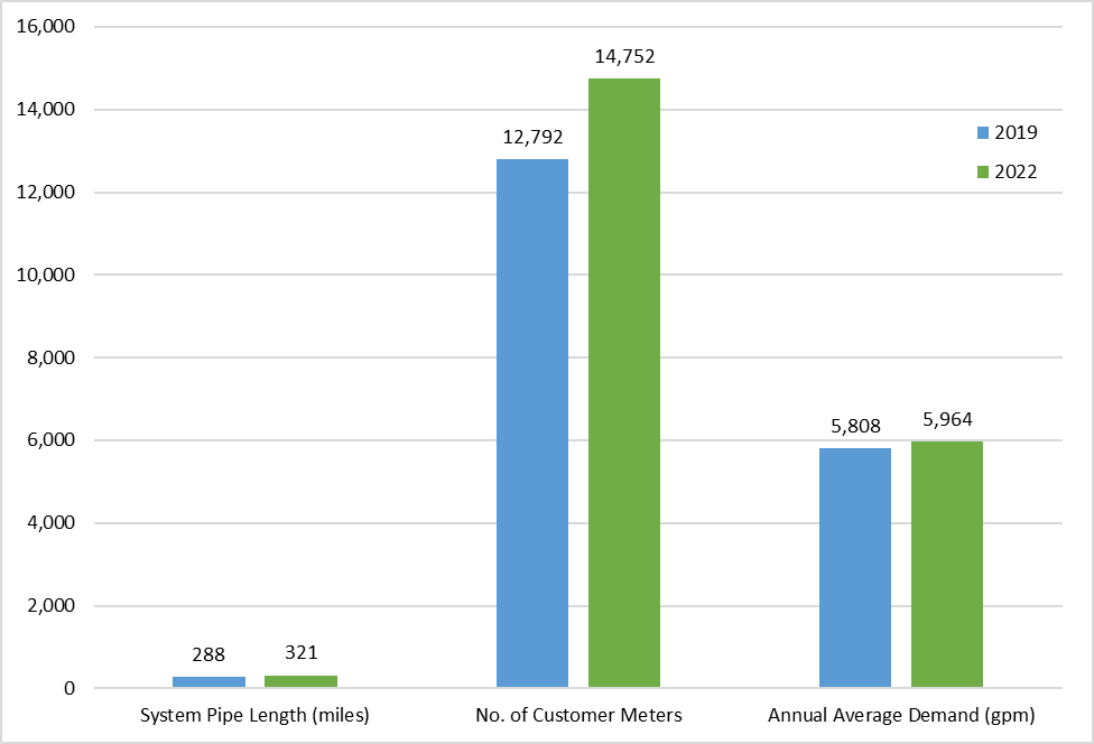

Figure 1: Comparison of Water Model Updates

2 PIPE NETWORK UPDATES

The pipe network has expanded mainly in the area where new residential developments are being constructed. Figure 2 shows five (5) areas highlighted in blue where the model pipe network was expanded.

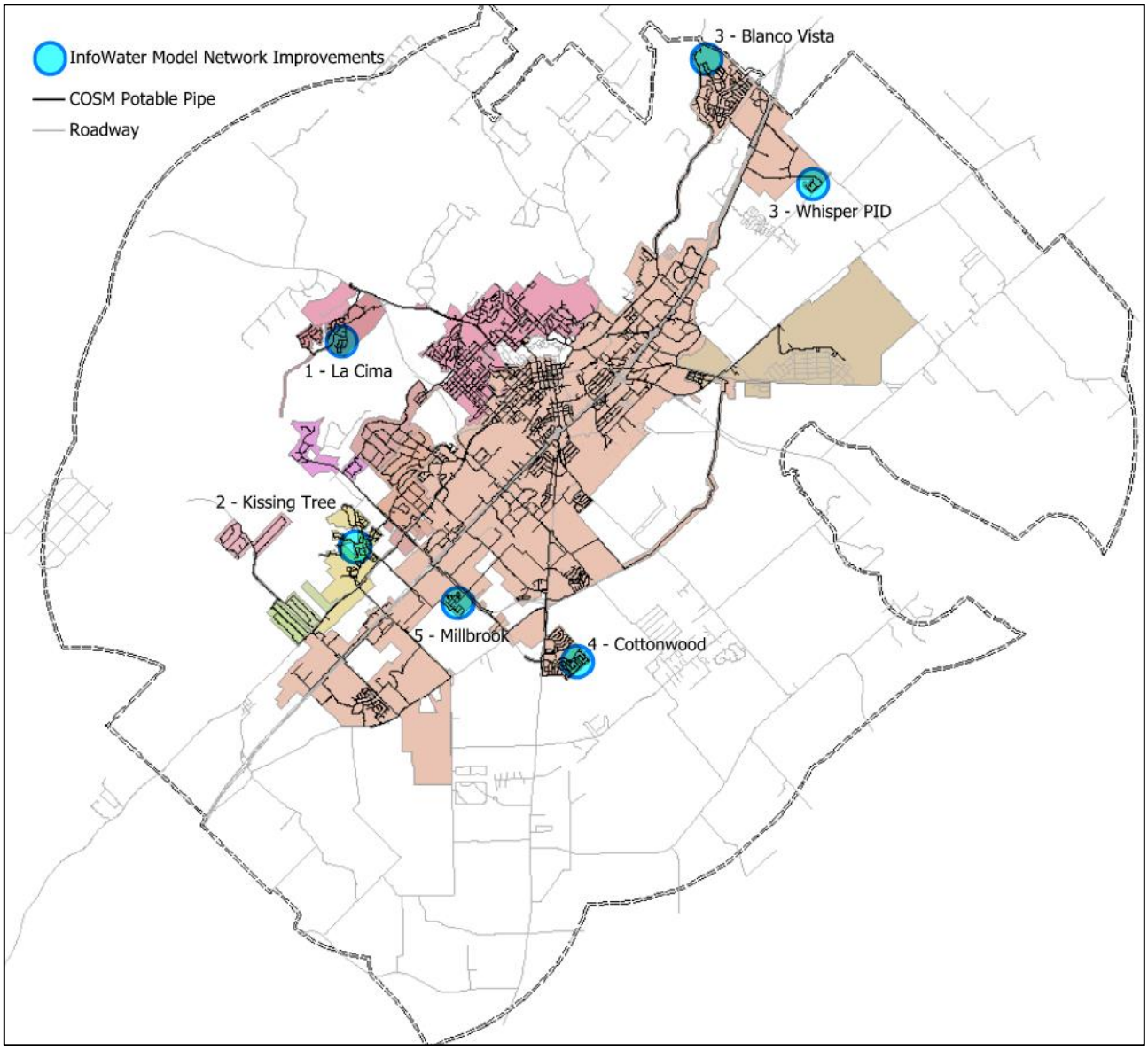

Figure 2: Water Distribution System as of October 2022 with Network Improvements

3 SERVICE AREA DEMAND UPDATES

The following section describes the updates to the water model based on the new meter data received. The annual average potable water demand calculated from the 2021 meter data was 5,964 gpm (8.6 MGD). The demand has increased 2.7% from 2019 to 2021, primarily from an increase in number of customers served.

Table 2: Population and Demand Updates

	Service Area Population Estimate	Projected GPCD [1]	Average Day Demand Estimate (gpm / MGD)
2019 [2]	65,234	128	5,808 / 8.4
2021 [3]	**70,337**	**122**	**5,964 / 8.6**
2022 [4]	86,717	-	-
2025	89,372	116	7,199 / 10.4
2030	102,695	114	8,130 / 11.7
2035	133,701	112	10,399 / 15.0

[1] GPCD projections have recently been updated by the City's Water Conservation and Drought Response Plan (April 2019). The projections presented in the plan predict a demand of 112 gpcd in 2025, 110 gpcd in 2030, and 109 gpcd in 2035. For the purposes for the planning document, the higher demands shown in the table were used when predicting future water supply and infrastructure needs.
[2] From the 2020 WMP Document. Represents 2019 meter data evaluation.
[3] Population back-calculated from 2021 meter data and average projected GPCD.
[4] Region L population projections for 2022.

From the existing model, a new scenario was created to simulate the 2022 existing condition and 2021 meter demand. Because the increase in demand was not focused in one area of the system and because the system network improvements from Figure 2 were distributed across the City's pressure planes, the 2019 demands at each modeled node were increased by 2.7% to represent the new 2021 demand.

4 PRESSURE PLANE UPDATES

The updated 2022 model also accurately reflects the City's current pressure planes by simulating closed valves and pressure reducing valves in different areas of the distribution system. Two (2) notable areas of change are the Hwy 21 pressure zone to the northeast and Deerwood to the southwest.

The service area to the northeast along Hwy 21, is located in the 810' pressure plane (main pressure zone) and should be served off of the 810' distribution system. There is a backup connection with a PRV from the high service transmission main to the 12" line along Hwy 21. Currently, the customers along Hwy 21 are served through the PRV, creating a separate pressure plane from the 810' pressure plane.

Previously, Deerwood was served through the Oakridge booster pump station and hydropneumatics tank. Because the goal is to serve Oakridge and Deerwood via the Soyars pressure plane, an interim step has been taken to isolate Deerwood from Oakridge and to serve Deerwood through the 12" line in Hunter Rd. This brings Deerwood onto the Soyars pressure plane.

There are still ten (10) pressure planes being operated in the City's system as of October 2022. The ultimate goal is to build out the potable water distribution system and operate three (3) pressure planes.

Figure 3 shows the current pressure planes and the locations of the PRVs. Table 3 shows the conversion of the existing pressure planes into the future, proposed pressure planes.

Table 3: Pressure Plane Consolidation

2022 Pressure Planes	Future Pressure Planes
810' Pressure Plane (Main Pressure Zone)	810' Pressure Plane
Hwy 21	
936' Pressure Plane (Comanche)	936' Pressure Plane
McCarty Well	
Willow Creek	
Soyars	
Oark Ridge	
1063' Pressure Plane (La Cima)	1063' Pressure Plane
Estates and San Marcos [1]	
Kingswood	

[1] Estates of San Marcos will be served by the 1063' Pressure Plane but will require a PRV.

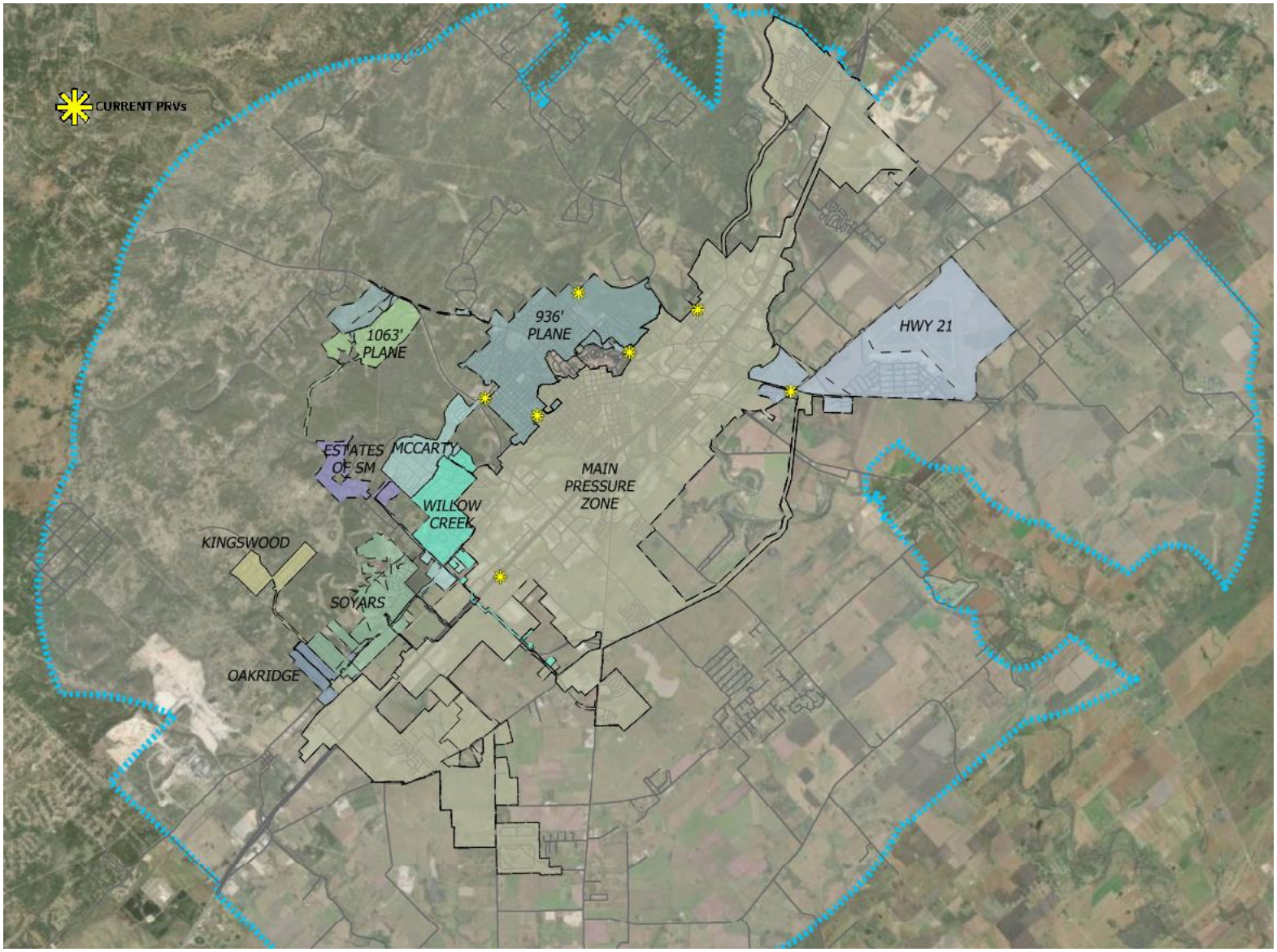

Figure 3: 2022 Current Pressure Planes