



Keeping the Pressure Up: Managing Supply Chain and Market Conditions to Mitigate Construction Issues

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Underground Infrastructure Conference

Construction. Rehabilitation. Asset Management.

March 19-21, 2024 | Oklahoma City, OK



Project Background

1

**Modified
Design Approach**

2

Construction Results

3



Project Background

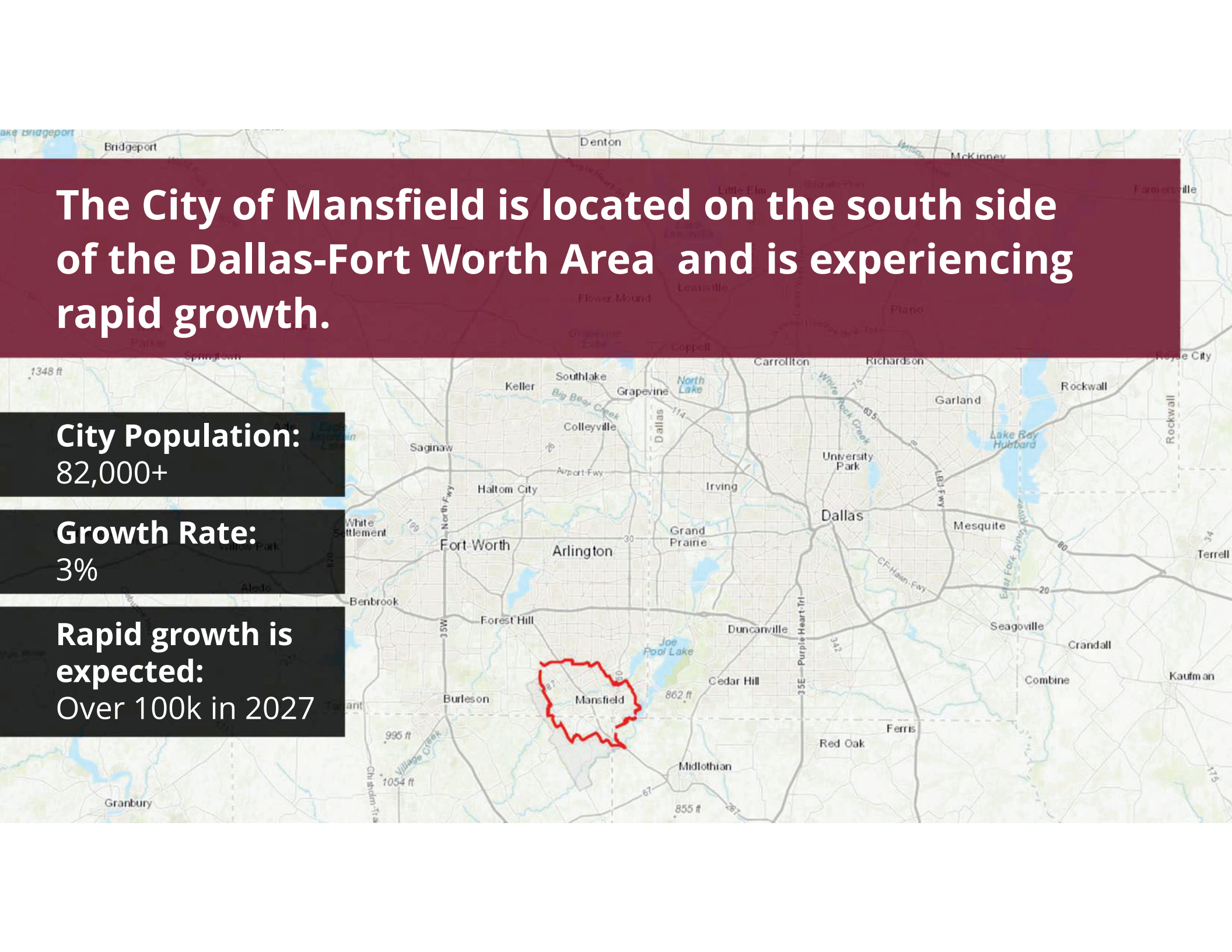
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A map of the Dallas-Fort Worth metropolitan area. The city of Mansfield is highlighted with a red outline in the south-central part of the map, near the border with Tarrant County. Major highways like I-35, I-75, and I-67 are visible. Other cities shown include Dallas, Fort Worth, Arlington, Irving, and Cedar Hill. A dark red banner is overlaid on the top left of the map.

The City of Mansfield is located on the south side of the Dallas-Fort Worth Area and is experiencing rapid growth.

City Population:
82,000+

Growth Rate:
3%

Rapid growth is expected:
Over 100k in 2027

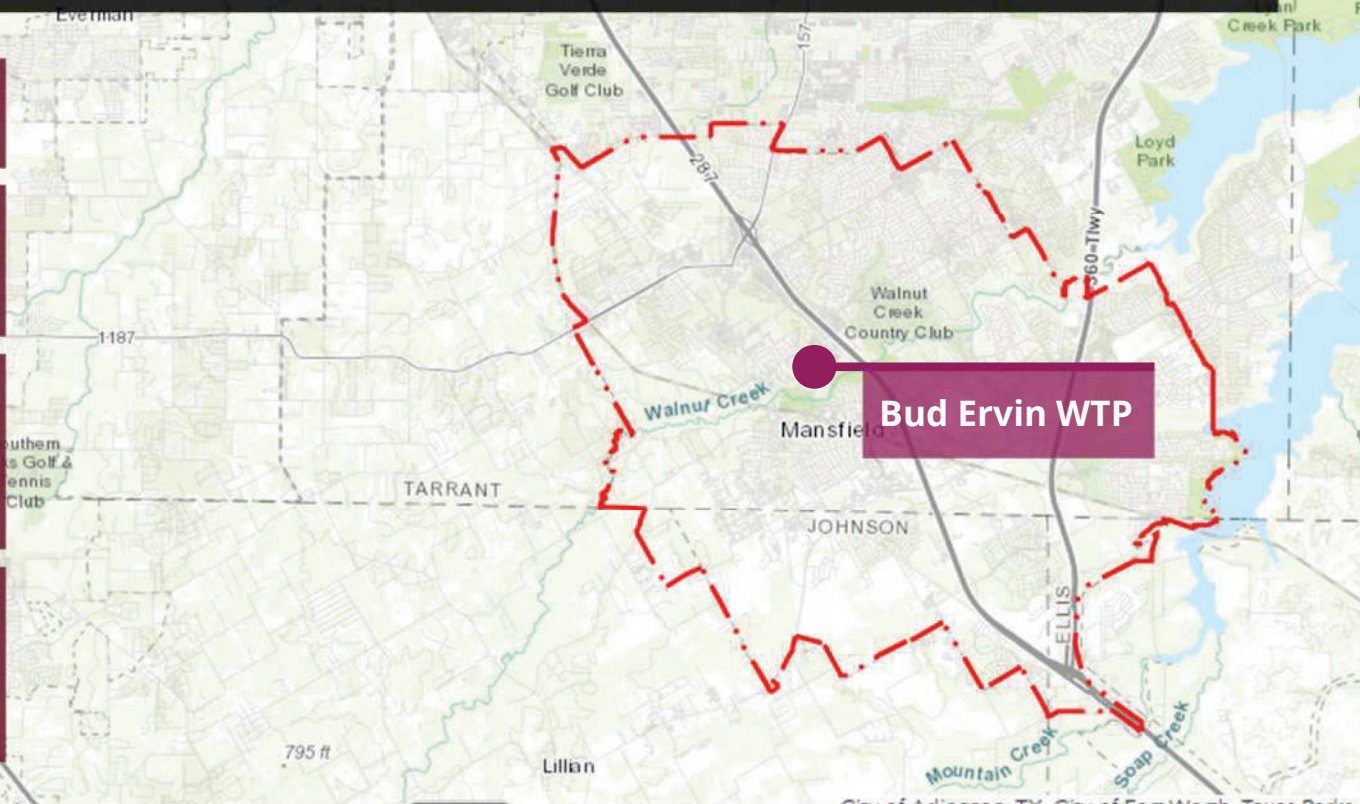
The City provides water and sewer service to not only our citizens **but also provides water to wholesale customers in the surrounding area.**

Receives water from TRWD

Began treating water at the City run plant built in 1973

Undergoing \$50 million plant expansion (45 MGD to 70 MGD)

Rated as Outstanding Drinking Water System (3 in Texas)






In 2022, we were providing water to our wholesale customer, Johnson County Special Utility District (JCSUD) through an 18-inch transmission main.

JCSUD serves an estimated 57,000 in population in a growing area

Pipeline was at maximum capacity

An aerial photograph of an industrial and residential area. A blue line representing a water transmission main runs through the landscape, starting from the top right and heading towards the bottom left. The map shows various roads, including Lone Star Rd, Highway 281, and several residential streets like Burney St and Birch St. A large industrial facility with multiple buildings is visible in the center. The text is overlaid on the map in white and purple boxes.

Due to the growth in the area the improvements identified in the master plan to provide additional water to JCSUD were required to be accelerated.

Existing 30-inch transmission main

Accelerated plan identified on June 2022

City committed to increasing water to JCSUD by August 1st, 2023

Garver was at the 30% Conceptual Design

Mansfield Meter Station JCSUD Connection



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RESEARCH WAS PERFORMED BY SPOONER & ASSOCIATES, INC.

3. UNDERGROUND UTILITIES SHOWN HEREON WERE TAKEN FROM RECORD INFORMATION. ACTUAL LOCATIONS

ATTENTION HAS BEEN MADE AS A PART OF THIS SURVEY TO CONFIRM, OBTAIN OR SHOW DATA CONCERNING THE DEPTH OR CORRECTION OF ANY UTILITY OR SUBSURFACE FACILITY. SURFACE AND SUBSURFACE FACILITIES NOT SHOWN OR CONSIDERED AS A PART OF THIS SURVEY AND NOT BALANCED OR ESTIMATED FROM THE TOP OF THE STRUCTURE BY FIELD CREW PERSONNEL.

ALL WORK SHOWN ON THIS SURVEY IS BASED ON THE DATA PROVIDED BY THE CLIENT. THE ENGINEER HAS NO RESPONSIBILITY FOR THE ACCURACY OF THE DATA PROVIDED BY THE CLIENT. THE ENGINEER HAS NO RESPONSIBILITY FOR THE ACCURACY OF THE DATA PROVIDED BY THE CLIENT. THE ENGINEER HAS NO RESPONSIBILITY FOR THE ACCURACY OF THE DATA PROVIDED BY THE CLIENT.

We developed a plan to address design challenges and maintain momentum during construction to meet a 12-month timeframe to bring the additional water online.

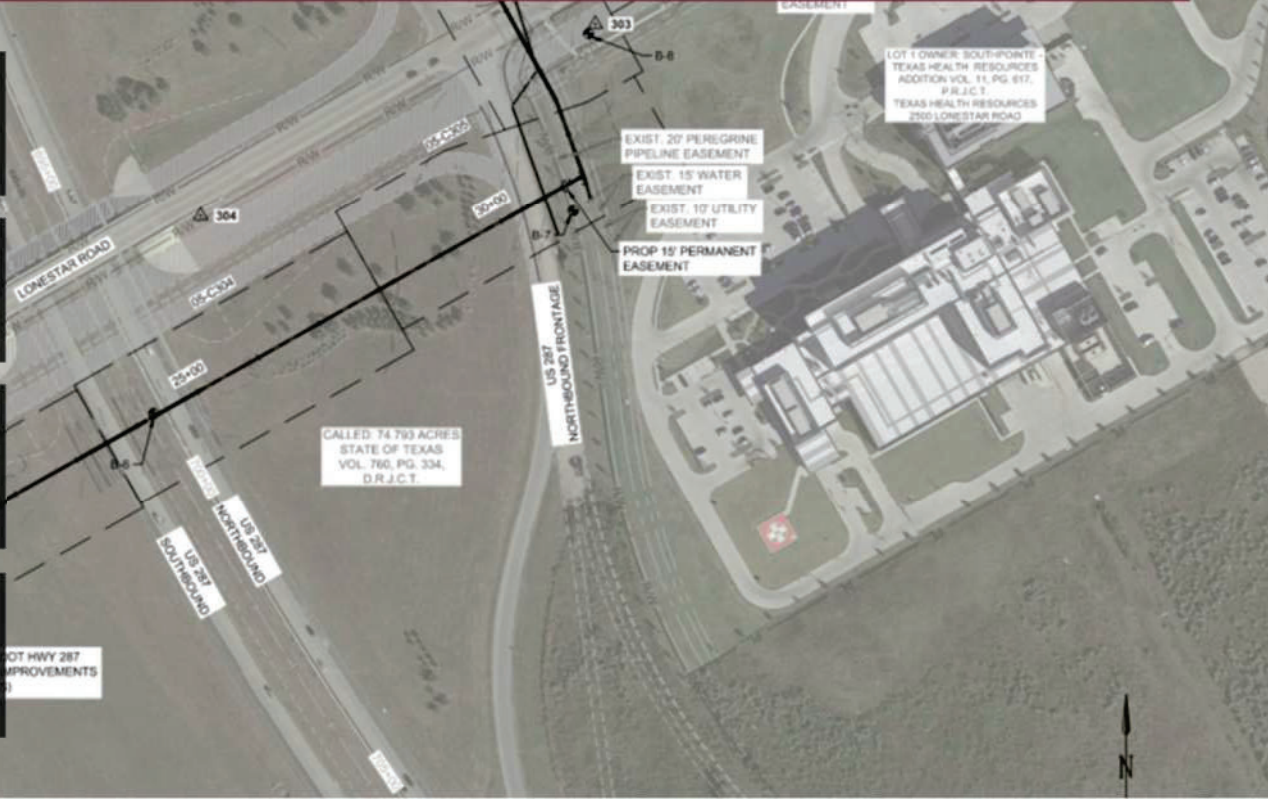
4,000 LF of 30-inch pipeline

Active Hwy 287 expansion project

Securing easements in developing properties

Minimize material lead times

CONTROL POINT TABLE				
POINT	DESCRIPTION	NORTHING	EASTING	ELEV.
301	EXIST. 30" WATER MAIN	1000.00	1000.00	100.00
302	EXIST. 30" WATER MAIN	1000.00	1000.00	100.00
303	EXIST. 30" WATER MAIN	1000.00	1000.00	100.00
304	EXIST. 30" WATER MAIN	1000.00	1000.00	100.00
305	EXIST. 30" WATER MAIN	1000.00	1000.00	100.00
306	EXIST. 30" WATER MAIN	1000.00	1000.00	100.00
307	EXIST. 30" WATER MAIN	1000.00	1000.00	100.00
308	EXIST. 30" WATER MAIN	1000.00	1000.00	100.00
309	EXIST. 30" WATER MAIN	1000.00	1000.00	100.00
310	EXIST. 30" WATER MAIN	1000.00	1000.00	100.00




We expedited our design by modifying our project approach to meet the required time window by collaborating closely with the City and other stakeholders.



30% to 90% Design

- Removed the 60% design milestone

Conducted additional workshops to obtain decisions and buyoff from all parties



In 2021 and 2022, ductile iron pipe was in high demand and lead times for materials was extensive.

City standard requires ductile iron pipe for large diameter transmission mains

4 – 5 months lead time for DI Pipe

Valves ranged from in stock to 9-month lead times

As part of our collaboration effort, we worked with the City to identify materials to minimize lead times and developed a Ductile Iron free solution.

Pipe Materials for 30-inch Potable Water Line						
Category	Ductile Iron (ANSI/AWWA C151/A21.51)	Polyvinyl Chloride (PVC) (AWWA C900)	Fusible PVC (AWWA C900)	Steel (AWWA C200)	HDPE (ANSI/AWWA C906) - PE4710	Bar-Wrapped Concrete Cylinder Pipe (AWWA C303)
Recommend Pipe Restraint Method	Integrated Restrained Fittings (Flanged Connections/External Restraints	External thrust restraint	Fused	Welded	Fused/External Restraints	Steel Snap Ring Joints
Internal Corrosion Protection Requirements	Cemapure PL 90 Coating/Cement Mortar Lining	Not Required	Not Required	Cemapure PL 90 Coating/Cement Mortar Lining	Not Required	Zinc Metalized Joints/Cement Mortar Lining
External Corrosion Protection Requirements	Cathodic protection - Asphaltic Coating/Impressed Current w/Sacrificial Anodes	Not Required	Not Required	Cathodic protection - Epoxy Coating	Not Required	Mortar Coated Joints Grout Diaper
Pipe Material Design/Properties	Flexible	Flexible	Flexible	Flexible	Flexible	Rigid
Product Lead Time	16-20 weeks	6-8 weeks ~8-months on fittings/restraints	26+ weeks ~8-months on fittings/restraints	10-12 weeks	8-10 weeks ~8-months on fittings/restraints	8-10 weeks
Relative Costs/Cost Projection	\$240/LF	\$285/LF	\$425/LF	\$178/LF	\$265/LF	\$160/LF
Pressures Class (psi)	150 up to 350	165 - 305	200 maximum	150 - 300	160 - 250	150 up to 400
Ease of Maintenance/Repairs	City can self perform	City can self perform	City can self perform	City/Licensed Welder - depends on situation	City/Specialty Contractor for repair	Specialty Contractor required for repairs
Manufacture/Location	US Pipe/Locations throughout the US	Diamond Plastics/Locations throughout the US	Locations throughout US	Northwest Pipe/Locations throughout the US	ISCO/Locations throughout the US	Thompson Pipe Group/North TX
Other Factors	N/A	Need to protect pipe at jobsite	Sole source approach/requires fittings at bends	N/A	Requires fittings/restraints, ID is smaller compared to other materials could require pipe size increase to 36-inch (160 psi max)	Higher install price

Prior to bidding the project the City updated their standard details to closely reflect their current needs.

KEY FACTORS

Up to date standard details/products

Flexibility to select alternative materials

Vetting of new manufacturers (valves)

[illegible]

We developed a construction package utilizing incentives to keep the Contractor motivated throughout the duration of the work.

3.3 **Early Completion Incentive.** OWNER and CONTRACTOR agree that financial incentives for early completion shall be compensated as per the schedule below.

<u>Incentive Milestone</u>	<u>Paid by OWNER to CONTRACTOR</u>
Maximum Incentive	Partial use prior to May 1, 2023 to August 1, 2023 - \$1,750 per day
Moderate Incentive	Partial use prior to June 1, 2023 to August 1, 2023 - \$1,500 per day
Minimum Incentive	Partial use prior to July 1, 2023 to August 1, 2023 - \$1,000 per day

Maximum Incentive shall be 5% of Contract price.

We updated the Contract language to clarify the understanding and intent specifically for the project.

Substantial Completion

Contract Completion/LDs

15.03 SUBSTANTIAL COMPLETION

Add Sentence to 15.03.A of the General Conditions:

“Substantial Completion is further defined by all bid items complete in place.”

Final Completion

Contract Completion/LDs

15.04 PARTIAL USE OR OCCUPANCY

Add Paragraph 15.04.A.5 of the General Conditions:

“5. Partial use for this project is defined as the 30-inch Transmission Main and all connecting sections are installed, backfilled, and all testing associated with the pipeline work has been completed and accepted and the Owner is able to supply water to the Johnson County Special Utility District (JCSUD).”

Partial Use

Incentive

We also included language and secured TCE's to encourage the Contractor to order and acquire longer lead time materials.



2.03 BEFORE STARTING CONSTRUCTION

Add the following language to Paragraph 2.05.A.3 of the General Conditions:

"a. Partial payments for verified materials on hand will be allowed for only water pipe, casing pipe and valve bid items. Contractor is allowed to separate product costs and installation costs for these bid items as follows:

Material staging within temporary construction easement



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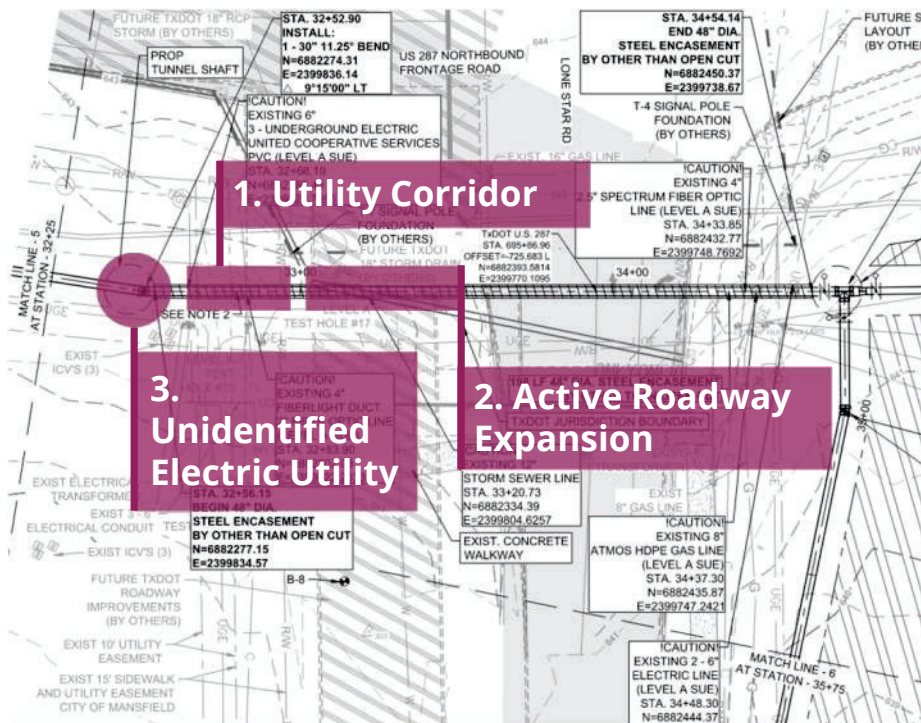
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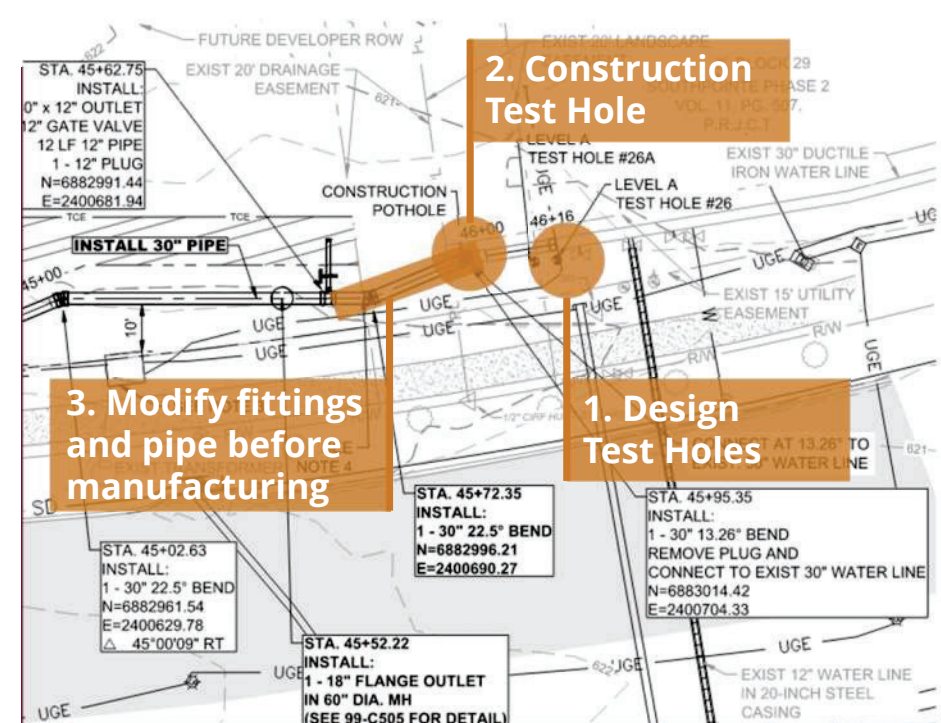
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12 16 - 30-inch Butterfly Valves

Close coordination and communication was key to resolve challenges in the field.



Unknown Christmas Electric Utility

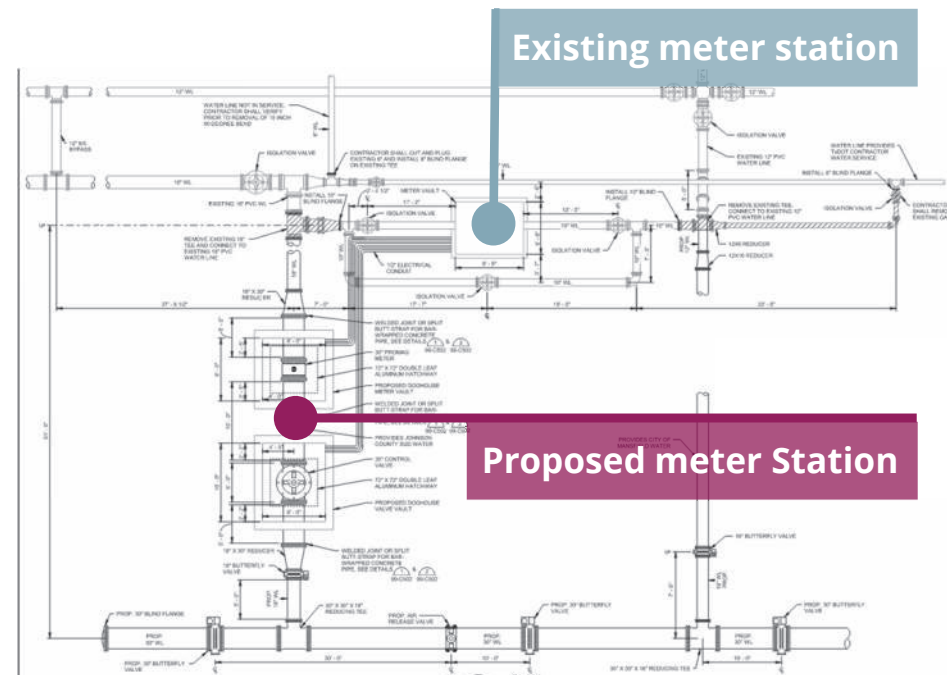


Existing Pipeline Connection

During Construction it was determined that a temporary meter station was needed to be added to the Contractors scope of work.



City Relationships to secure flow control valve/meter were critical



Worked with the Contractor on plan modification

Temporary approach to the meter vaults

The Project had a couple of obstacles but ultimately met the City's objective and was put in service on July 12, 2023.



Owner Directed Change to add a meter station
(meter and actuated valve in vaults)
30 additional days



Bid Open Date Sept 22, 2022
Partial Use Date July 12, 2023

Takeaways

1

A flexible design approach was key to keeping up with the changing market conditions.

2

An incentive-based contract provided value to keep the Contractor motivated.

3

Relationships were key between the City, Engineer, Contractor, and Material Vendors.



Q&A

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