

25,000 Feet of Microtunneling Chelford City Diversion Program

- Houston, Texas | 2019–2025
- The Pate Garver Team



January 27 – 28, 2026

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Chelford City Diversion Program – System Overview

- Four phased microtunneling projects
- Approximately 25,000 LF of microtunneling
- Elimination of three lift stations
- Elimination of Chelford City WWTP

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Program Timeline – 2019 to 2025

- Package 1A – Proof of concept (2020)
- Package 1 – WWTP abandonment (2021)
- Package 2 – Dual-diameter tunneling (2023–2025)
- Package 3 – Final gravity link (2023–2025)

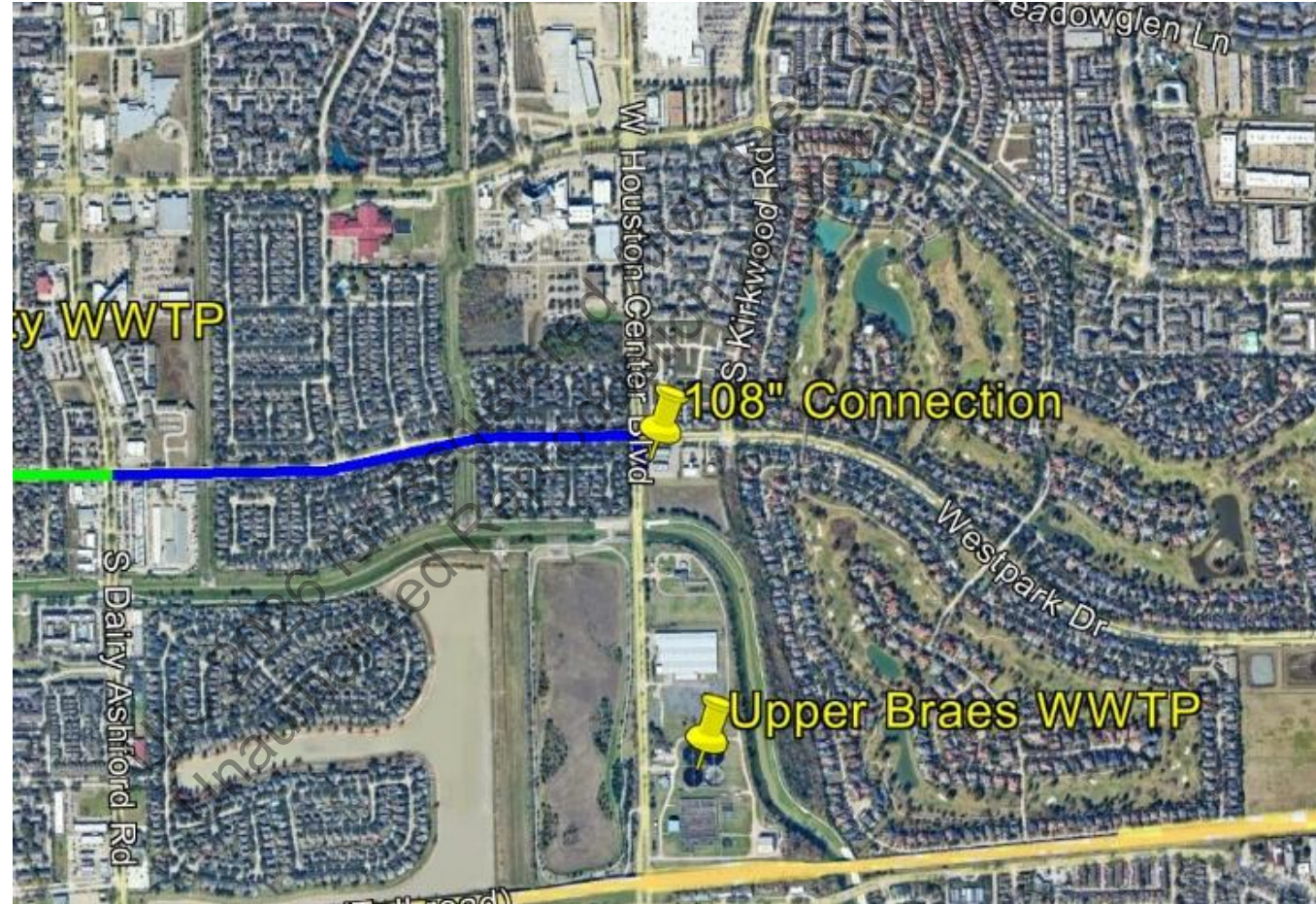
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Chelford Package 1A – Establishing the Baseline



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Chelford Package 1A – Establishing the Baseline

- Pate Garver team as prime contractor and microtunnel installer
 - ≈4,700 LF of 60-inch FRP gravity sewer
 - Depths approaching 55 feet
 - Curved microtunnel drives to eliminate manholes
 - Completed ~7 months ahead of schedule



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Chelford Package 1 – Wastewater Treatment Plant Abandonment



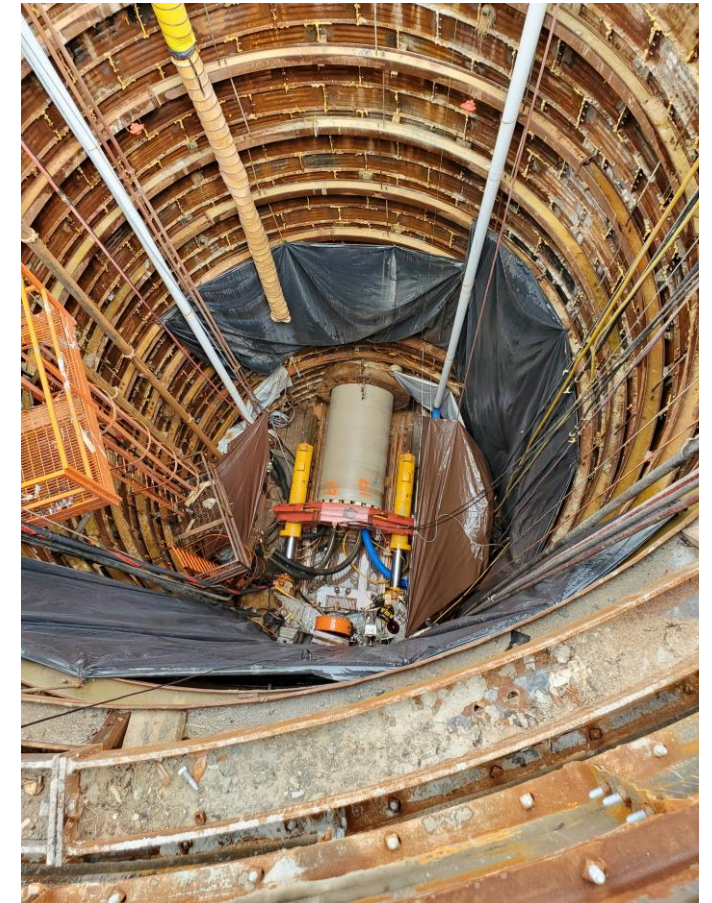
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Chelford Package 1 – Wastewater Treatment Plant Abandonment

- Pate Garver team as microtunneling subcontractor
 - 4,090 LF of 60-inch FRP microtunnel installed
 - 48-inch diversion tunnel installed by prime contractor
 - Chelford City WWTP permanently abandoned by GC



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Chelford Package 2 – Expanded Scope and Complexity



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Chelford Package 2 – Expanded Scope and Complexity

- Pate Garver team as prime contractor and microtunnel installer
- 36-inch FRP and 18-inch Extra-Strength clay pipe microtunneling
 - ≈9,600 LF of total microtunneling
 - Urban alignment along Richmond Avenue
 - Elimination of two lift stations

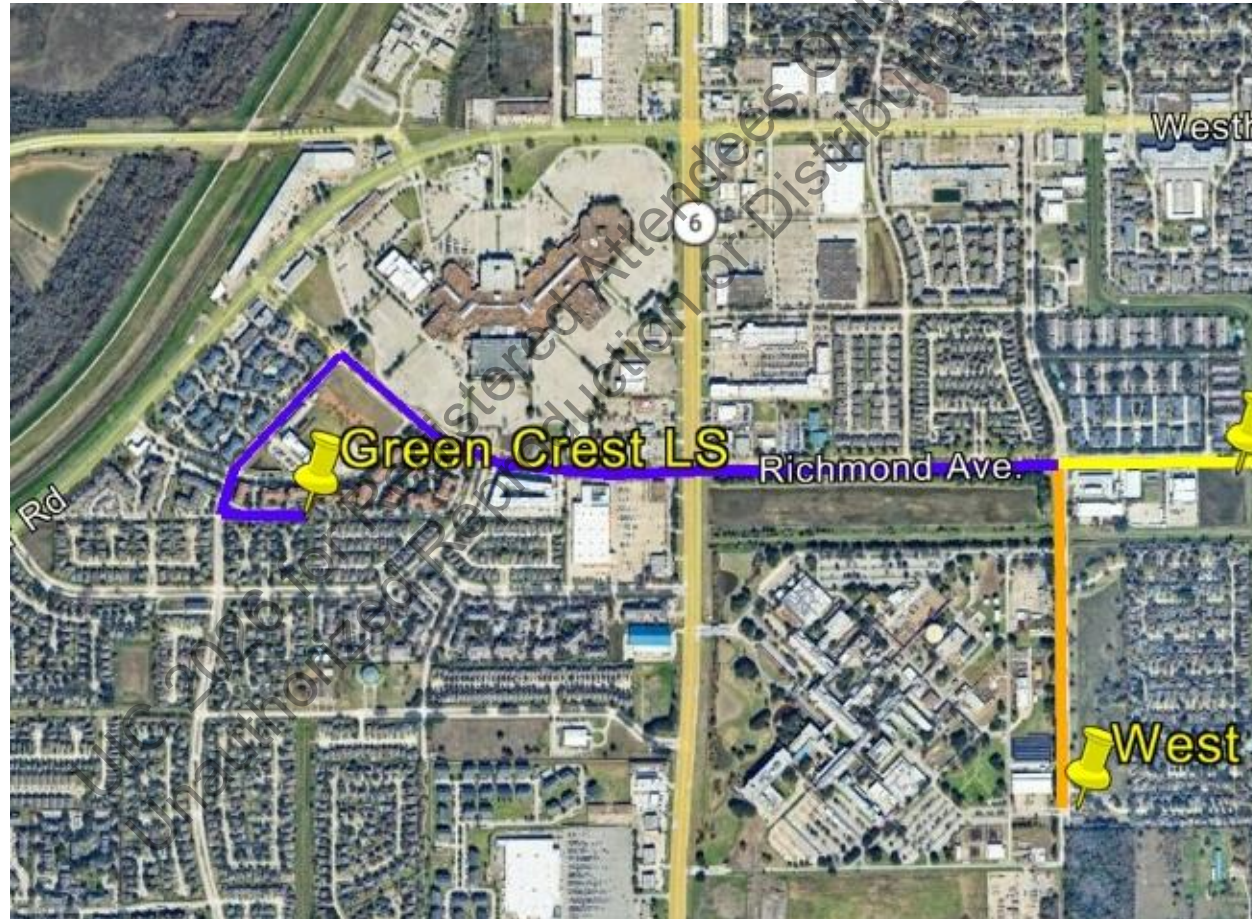
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Chelford Package 3 – Final Gravity Link



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Chelford Package 3 – Final Gravity Link

- Pate Garver team as prime contractor and microtunnel installer
 - Over 6,300 LF of 24-inch FRP microtunnel
 - Highest shaft density of the program
 - Final system connectivity achieved



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Chelford Package 3 – Steel Casing Strategy

- ≈800 LF of 36-inch Permalok steel casing
 - 24-inch FRP carrier pipe
 - Selective application to meet stakeholder requirements

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Key Challenges – Chelford City Diversion Program

- Dense urban corridors with limited shaft footprints and complex traffic control
- High groundwater and variable Houston soils requiring tight pressure control
- Long gravity tunnels with flat slopes and limited tolerance for alignment error
- Maintaining tunneling continuity across phased projects and contract changes

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Key Challenges – Chelford City Diversion Program

- Package 1A:
 - Proposing and approval for long, curved microtunnel drives
 - Recovery from broken FRP pipe

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Key Challenges – Chelford City Diversion Program

- Package 1A:
 - Proposing and approval for long, curved microtunnel drives
 - Recovery from broken FRP pipe
- Package 1:
 - Proposing and approval for long 60-inch microtunnel drives

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Key Challenges – Chelford City Diversion Program

- Package 1A:
 - Proposing and approval for long, curved microtunnel drives
 - Recovery from broken FRP pipe
- Package 1:
 - Proposing and approval for long 60-inch microtunnel drives
- Package 2:
 - Tunnel misalignment on flat grades

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Key Challenges – Chelford City Diversion Program

- Package 1A:
 - Proposing and approval for long, curved microtunnel drives
 - Recovery from broken FRP pipe
- Package 1:
 - Proposing and approval for long 60-inch microtunnel drives
- Package 2:
 - Tunnel misalignment on flat grades
- Packages 2 & 3
 - Takeover Contract assignment and startup

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Chelford City Diversion Program Outcomes

- Three lift stations eliminated
- One WWTP abandoned
- Reduced O&M and lifecycle costs
- Improved system resilience
- Completed pipe installations and connections within EPA Consent Decree deadlines

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Chelford Program – Project Comparison

- Four projects delivered over six years
 - Pipe sizes ranged from 18-inch to 60-inch
 - Varied contractor roles
 - Single gravity system outcome

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Lessons Learned

- Phased delivery reduces risk
- Design flexibility improves constructability
- Continuity of tunneling crews is critical
- Microtunneling enables system-level change



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Conclusion / Q&A

- Chelford demonstrates phased microtunneling success
 - Gravity systems outperform pumped infrastructure
- Questions?



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