Rock Bore Using Segmented PVC Pipe

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Fort Worth Wholesale Shared 16” Main

Fort Worth Wholesale – Project Size

Material/Sizes	Proposed Installation Method	Linear Feet
16” C900/IB DR-14	Via Open-Cut	13,782 LF
16” C900/Certa-Lok RJ DR-14	Horizontal Directional Drilling	2,068 LF
16” C900/IB DR-14	Carrier Pipe with Steel Casing	1,997 LF

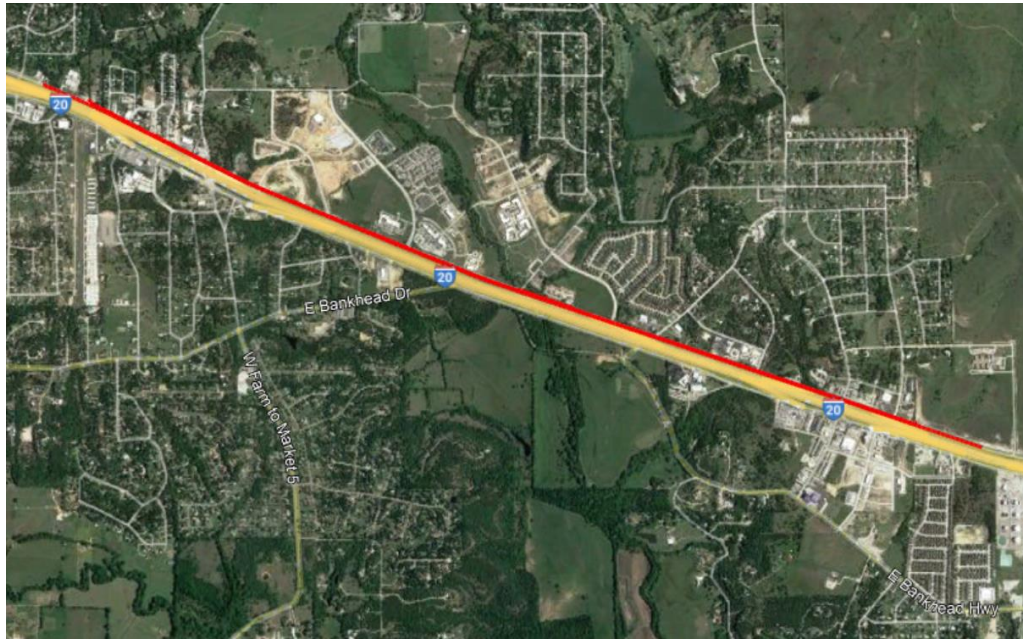
Project Scope

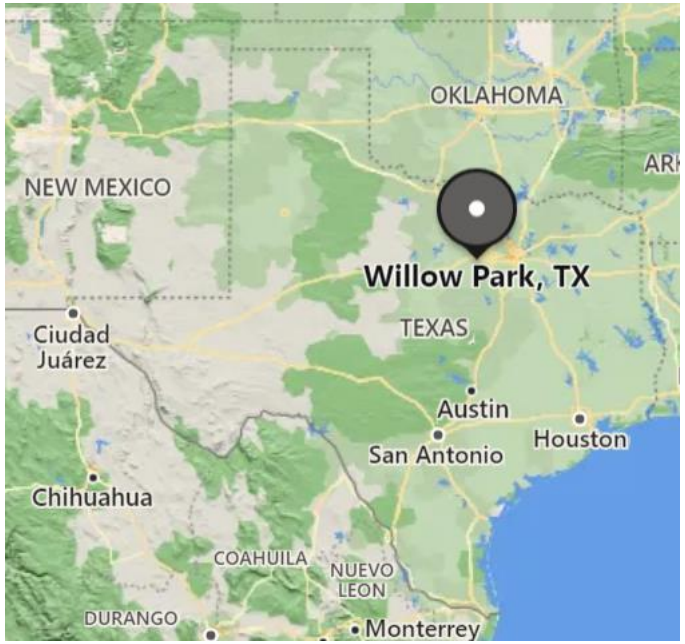
- Willow Park (owner) and Hudson Oaks (shared interest) entered into inter-local agreement for wholesale water from City of Fort Worth
- New 16” waterline to connect future delivery points
- Funded by Texas Water Development Board
- Rapid population growth causing trouble meeting demand
- Halff Associates tasked to find cost-effective way to supply new waterline through both open-cut and trenchless methods

Project Challenges

- Coordination between numerous parties TXDOT for large open-cut and trenchless portions within busy TXDOT Right-of-Way.
- Hard rock located in multiple trenchless segments
- Layout with constrained job site, high project visibility and lack of laydown room
- Varied soils over trenchless bores

Project Location





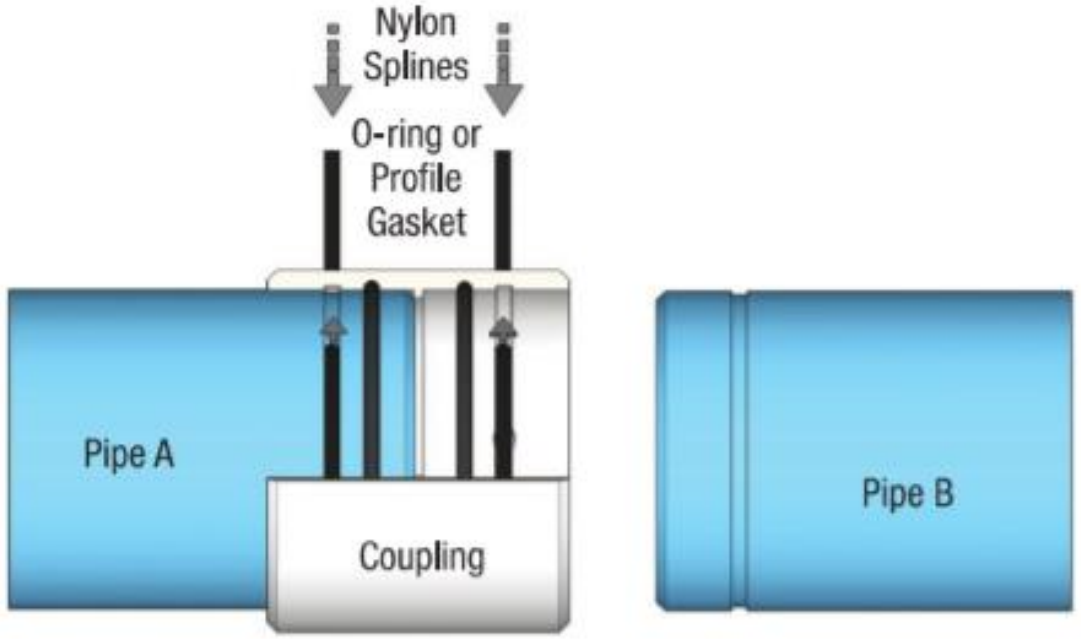
Willow Park & Hudson Oaks, TX

- Population – 5,400 (Willow Park) & 1,600 (Hudson Oaks)
- Smaller cities outside DFW metroplex
- Experiencing rapid growth
- Raw water received from Fort Worth
- Entered into joint agreement to develop 16” waterline

Installation Methods Selection

- Majority is open-cut
- Large portions located in front of businesses
- Casing with carrier pipe was opted to reduce disruption in front of high-traffic areas
- HDD/Trenchless method chosen for Clear Fork Trinity River and other tributaries, due to difficulties of open-cut for these crossings.

Approved Pipe Materials



Benefits of Segmented PVC Pipe

- Designed for constrained job sites
- Can be cartridge style loaded
- Doesn’t require fusion
- Speeds up construction
- Same resin as standard PVC
- Doesn’t require additional adapters

Bid Results

- Engineer's estimate: $3.95 million
- Wildstone Construction, LLC was low-bidder, at $3.60 million

Contractor Selection

- Wildstone Construction selected as low-bidder and General Contractor
- Selected CJB Construction for HDD portions

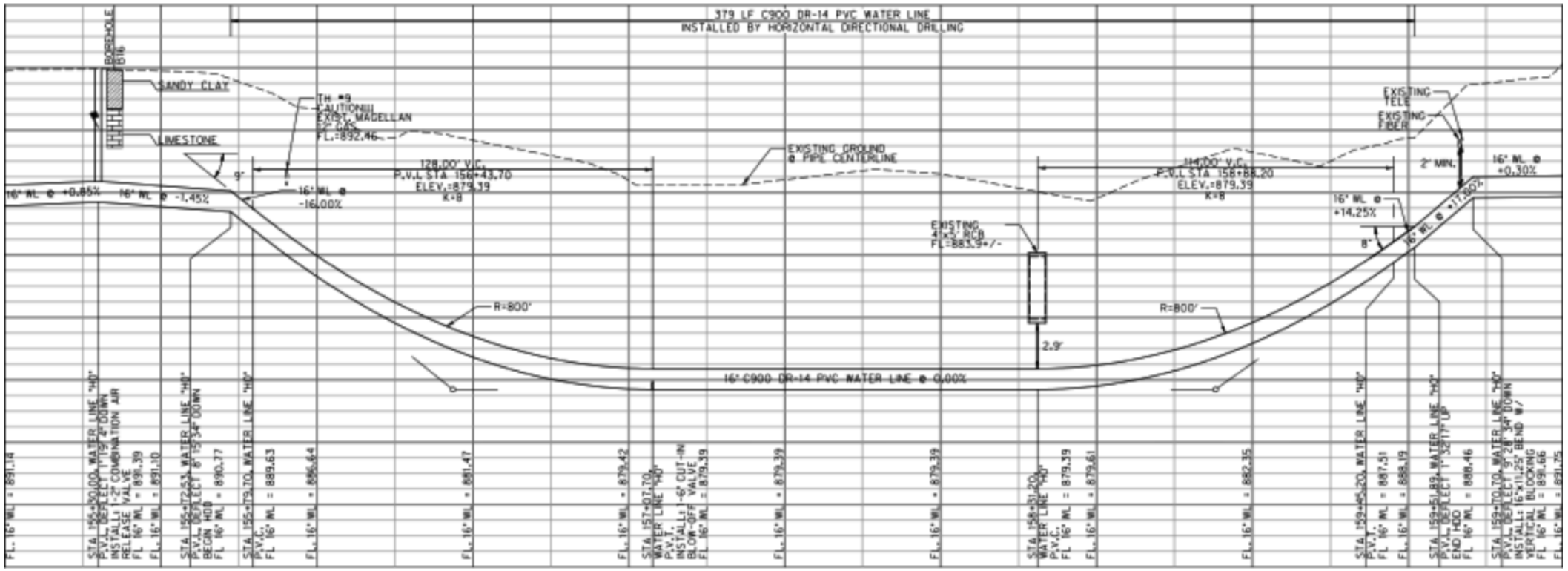
Description of Bores in Project

Bores	Length (LF)	Ground Conditions
1 – Clear Fork Trinity River	1,069	Sand, Cobble and Limestone
2	620	Limestone
3	379	Limestone

Site Conditions

- Busy highway (I-20)
- In front of business and subdivisions
- Very little room for layout
- Rock – Limestone
- Highly congested areas with heavy vehicle traffic
- No easements, working entirely in TxDOT Right-Of-Way with very busy franchise utility corridor

Example of Proposed Bores



Site Preparations

- Review the bore path
- Locate bore entrance/exit pits
- Review Geo-Tech Boreholes
- Select reamer to use with Trenchless pipe

Drilling Equipment

- Vermeer D100X140
- Recycling mud -unit
- Bentonite with Polymers
- Reamer

Reamer

Puller Head

Certa-Lok Assemble

Product Installation

Clean, lubricate & assemble joint

Insert spline

Pullback continues

Video of HDD Cartridge Style Loading

Difficulties Encountered

- Hard Rock – Limestone
- Creek Bore – Sand, Limestone, and Cobble
- Limitations of job site
- Field adjustments for cable/utilities
- Reamers
- Adjusting bore fluid due to varied soil conditions


KOMATSU


POLYGON PIN


WHATABURGER
24 HOURS
Exxon
TACO CASA


CASA
SONIC
DEERE

Lessons Learned – Job Site

- F1962 calculations (NAPCO Bore Path Analysis) matched the pull forces experienced in the field
- Limestone is easier to bore than cobble
- First bore was most challenging; combo of sand, cobble, then Limestone

Lessons Learned - Design

- Be flexible, in-field modifications required of trenchless bore path
- Cartridge style loading, advantageous due to varied bore length and congested job sites
- Segmented PVC pipe can handle rock bores with proper hole sizing and borehole fluid
- Pre-construction SUE design/locates for trenchless installations is worth the cost

Conclusion

- Segmented pipe was beneficial due to ability to reduce project layout
- Project was a huge success: overcame delays caused by weather and franchise utility coordination; project on-budget and received positive publicity in local newspaper.
- Bores were completed, including with field modifications
- Segmented PVC pipe will be considered in future trenchless projects, as needed

Contributors

- Project Manager – Halff Associates
  - Kevin Gronwaldt, PE – Design Engineer
- Municipalities –
  - Sterling Naron – Hudson Oak Town Administrator
  - Bryan Grimes – Willow Park Town Administrator
- General Contractor - WildStone Construction
- Horizontal Directional Drilling Subcontractor – CJB Construction
  - Thad Parker – Operations Manager
- NAPCO Pipe & Fitting
  - Mark Montgomery (North Texas Sales Rep)
  - Robert Eads (Regional Sales Manager)
  - Keith Moggach (Engineering Manager)

Questions?

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