Collection Systems 2018

Unexpected History Lesson and Contractual Deal Making: Lessons Learned from a Large-Diameter Force Main Replacement Project in Downtown Norfolk; Home to Historical Landmarks, High-Rise Buildings, Critical Stakeholders and Innovative Contractors

Presented During:

Lessons Learned (index.cfm?do=ev.viewEv&ev=1008)
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Abstract No:

248

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Abstract:

Introduction:
In what may have been one of the most highly watched, publically-visible, large-diameter pipeline projects in Downtown Norfolk's recent history, the Hampton Roads Sanitation District (HRSD) South Trunk Sewer Section G Force Main Replacement Project (Section G) was anything but normal. In a crowded, urban setting, constructing 30-inch force main is difficult and high risk. Section G coupled challenging open-cut work with a 50-inch microtunnelling

effort under a major thoroughfare and a 1,000-linear-foot (LF) horizontal directional drill (HDD) alongside the oldest structure in Norfolk.

Although extremely challenging, this project exceeded many technical and financial expectations. After brief background and design- and construction-phase highlights, this presentation will summarize several project accomplishments, including a "lessons-learned" synopsis that will benefit owners, engineers and contractors alike.

Design:
The scope of Section G included replacement of three 1940's-era, 30-inch to 36-inch force main segments totaling 6,000 LF in Downtown Norfolk, Virginia. Downtown Norfolk has evolved over three centuries. Before the late 1800s, the Elizabeth River occupied much of Downtown Norfolk. To expand the land mass, landfill waste and other artificial material and natural fill were placed along the existing river banks. Additionally, this corridor is filled with active and abandoned utilities and structures such as trolley tracks and sea walls that are reminiscent of former industries and shorelines. This melting pot of natural and artificial geology created substantial challenges for a design that was further complicated by the dense, aboveground urban environment, as well.

In addition to the geological, historical and urban challenges described, stakeholder involvement was a substantial endeavor during the design process. City of Norfolk agencies, hotel owners, a high-end shopping mall and several other downtown businesses and industries offered suggestions and considerations during the alignment analysis, as well as concerns and comments as the final alignment was presented. This presentation will detail how selected alignments, meeting the financial and technical expectations of HRSD, were strategically presented and sold to downtown stakeholders.

Construction:
Construction began in January 2016 and beat the operationally-ready date by five months, with the overall project ending in August 2017. Although many factors contributed to the highly productive construction execution, it was the team's frequent and informative interaction that was most important in the project maintaining it's exhaustive pace throughout. Several unexpected obstructions and conflicts were avoided using innovative solutions developed from team collaboration.

A significant highlight of the construction was the proposal from the contractor to circumvent an especially challenging section of the proposed open-cut alignment by installing pipe using HDD technology at no additional costs. The original alignment included a deviation down a small side street adjacent to Norfolk's busiest shopping mall to avoid restricted intersections along a major downtown thoroughfare. The contractor-proposed 1,000-LF HDD would bypass approximately 1,400 LF of complex open-cut installation. After several iterations of change-order negotiation, the team agreed to $1.4 million in HDD costs in exchange for removing $1.4 million of bid-item costs (corresponding to bypassed work), resulting in a net-zero cost change to the project. Also extremely rare, the proposed HDD path was alongside the oldest structure in Norfolk: a colonial-era, historical church constructed in the 1730's. The presentation will feature the deal-making negotiations, technical efforts including innovative design aspects and highlights on the nighttime pipe-pull.

Project Results:
There was considerable concern for maintaining progress during construction and limiting potential delays. Prior experience has shown that utility construction in Downtown Norfolk typically encounters unexpected conflicts and challenges. These complications often slow progress, increase costs and burden downtown businesses, traffic flows and local events. Furthermore, large-diameter pipeline construction, while less frequent, encounters these issues to greater extent due to the compounding size of the work. The plans and specifications were specifically designed to account for many of the unexpected issues by including contingency line-items and allowances for contractor flexibility.

In the end, the construction went remarkably well, surprising many local residents and stakeholders. Major milestones were met well before deadlines, budgets were maintained and overall stakeholder perception was decidedly positive. Major successes of the project included:
• 12 tie-ins to existing force main were completed successfully without line-stops or bypasses.
• The HDD was completed without any significant issues. No settlement in or around historical church was observed.
• The HDD was executed at zero-cost to overall project budget.
• The HDD pipe-pull was performed at night with little to no impact on traffic or downtown businesses.
• Fusible PVC was used by HRSD for the first time for HDD pipeline material.
• Substantial completion was met five months ahead of schedule, a 25-percent reduction in major construction time.
• Construction finished approximately $1M (10 percent) below contract value.
• Construction inspection services contract finished approximately $60k (13 percent) below budget.
• HRSD's contingency funds for construction went largely untouched.

As a result of the project's success, the project team has received many accolades from downtown stakeholders, a letter of recommendation from the City of Norfolk Public Works Department, and was awarded the distinguished 2016 Engineer's Club of Hampton Roads Engineering Achievement Award.

This paper will present the numerous challenges that many utilities face when installing large pipe in an urban and/or historical area using various installation methods as well as strategies to address corresponding design and construction issues. Learn about the proactive, frequent measures taken to engage skeptical stakeholders and bridge support for the project's mission. Documented experiences and photos of the project alongside historical monuments, Norfolk's Financial District, centuries-old seawalls, and other fascinating features, will provide backdrop to a unusually complex pipeline installation and enhance this presentation for any utility planning publically-sensitive, buried-infrastructure improvement projects.

Topic:

3. Design and Construction– Delivering Capital Projects

Keywords:

Collection Systems
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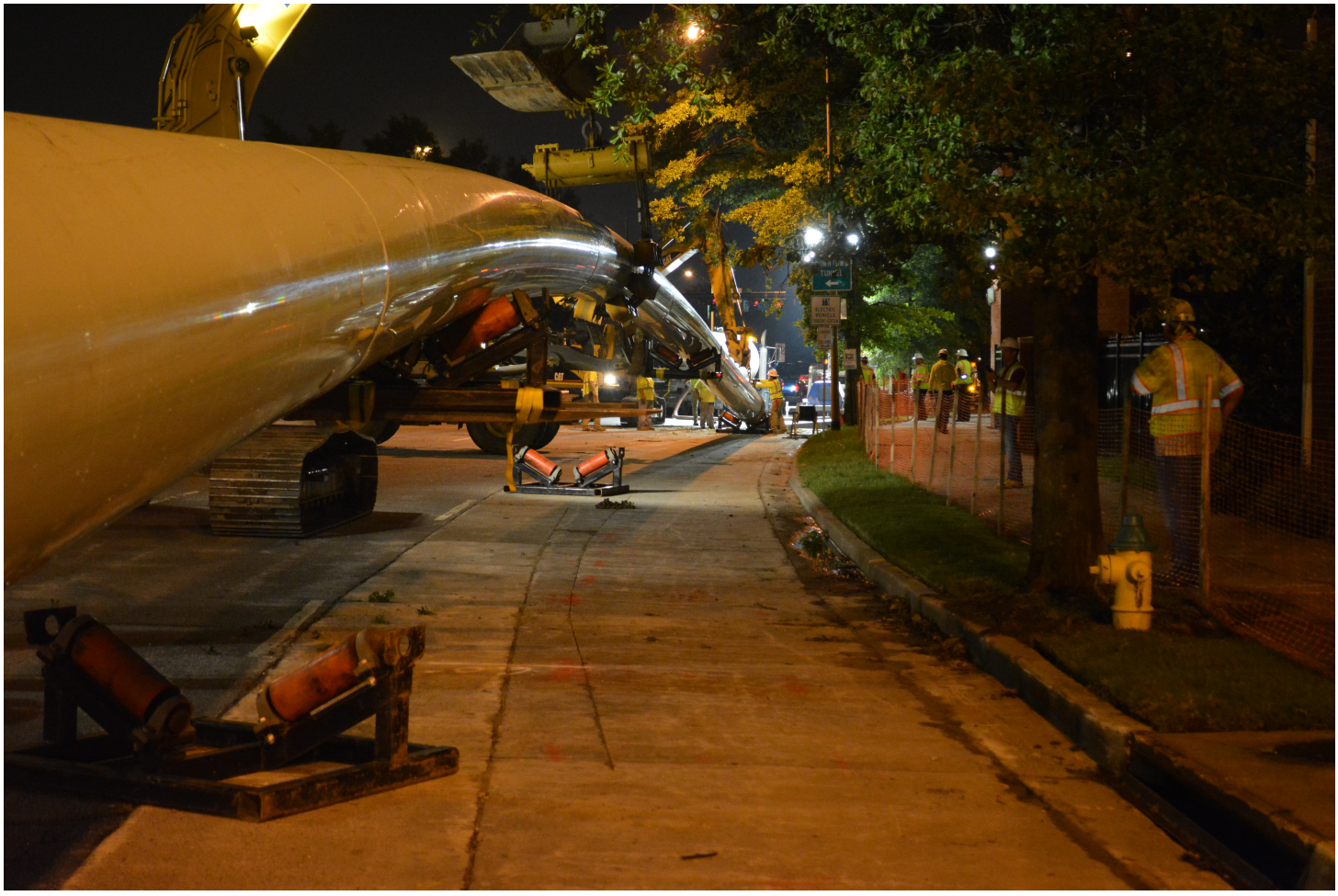
Force Mains



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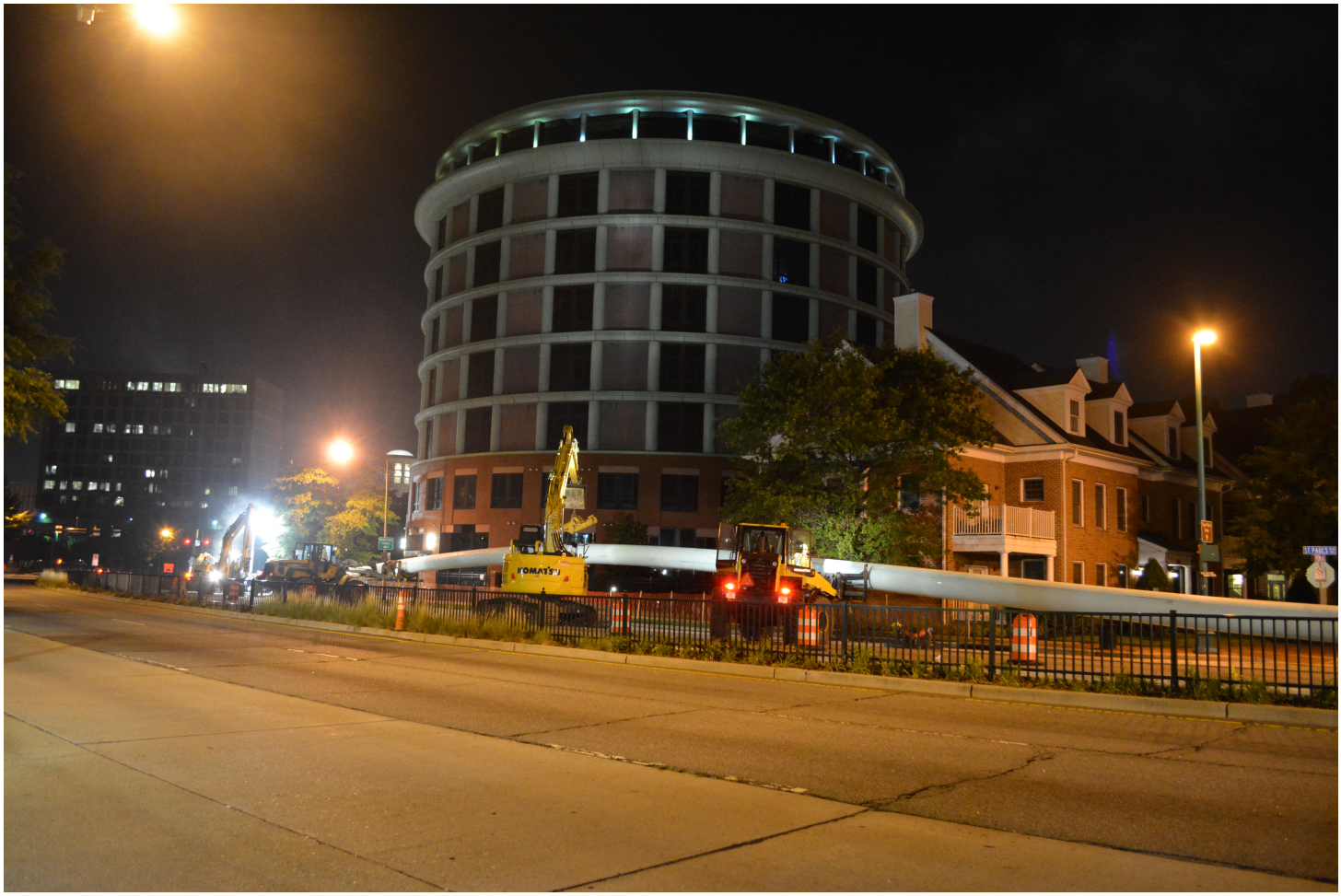
·Photo showing the 30-inch FPVC pipe curvature during the HDD night work



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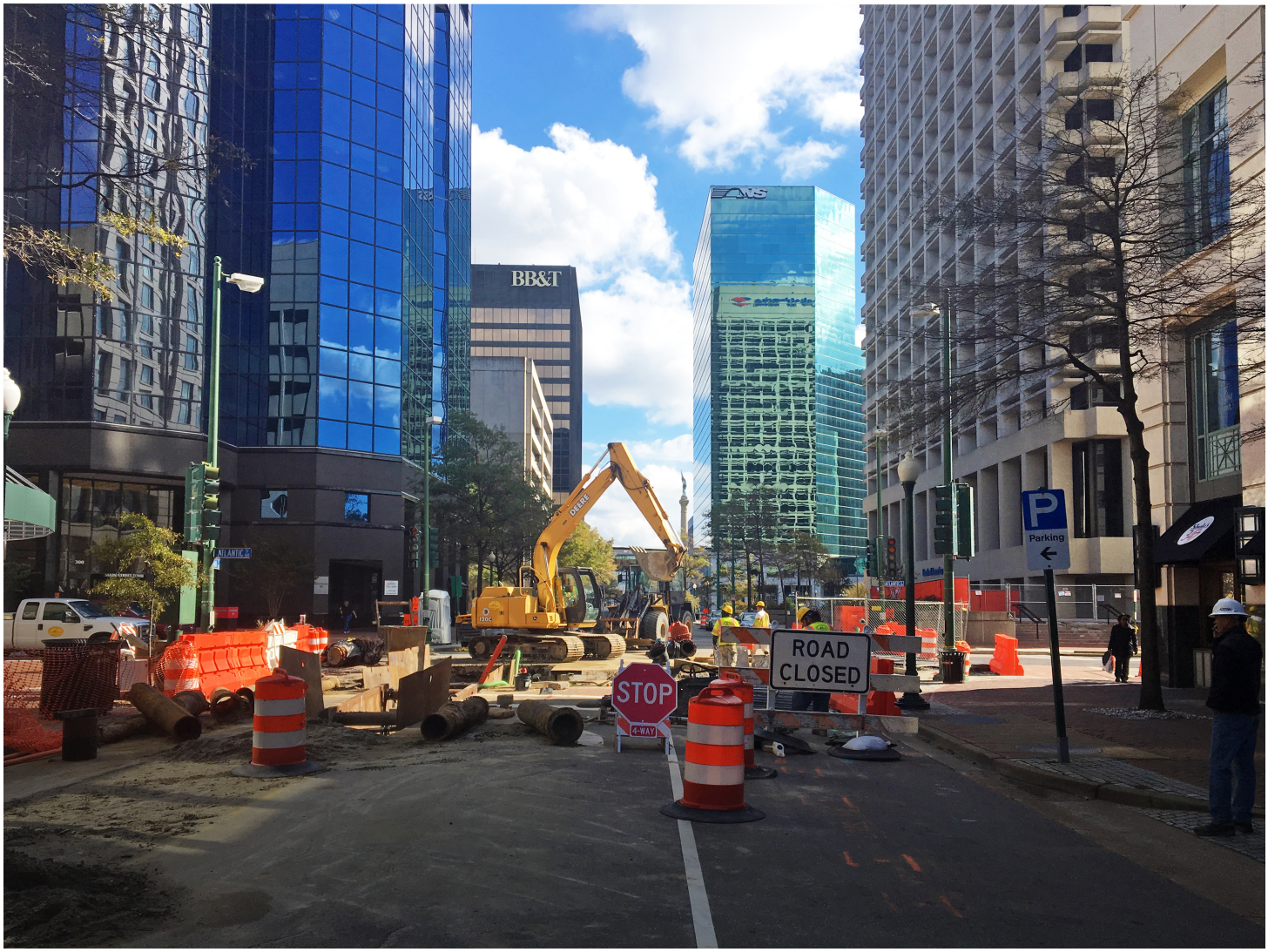
·HDD pipe string-out along Saint Paul's Boulevard in Downtown Norfolk



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·Complex open-cut construction in Norfolk's Financial District adjacent to critical stakeholders

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Yes

If yes, Where

2017 American Water Works Association Water Joint Annual Conference, Hampton, VA