1. ABSTRACT

As ever greater numbers of tourists flock to the white sand beaches of the Florida Panhandle, local traffic congestion becomes an ever greater trouble. In 2015, the Florida Department of Transportation (FDOT) initiated a series of projects designed to widen portions of US Highway 98 (US98) between the cities of Destin and Miramar Beach from four lanes to six to begin compensating for the growing number of vehicles while also providing upgrades to stormwater collection and conveyance and safe spaces for bicyclists and pedestrians.

This expansion required the relocation of local utilities to allow for road construction and to ensure owners would retain necessary access to their pipelines. The utility owners in both Miramar Beach and Destin, South Walton Utility Co., Inc. (SWU) and Destin Water Users, Inc. (DWU), respectively, each bid a project to relocate their water and sewer utilities. Through a combination of horizontal directional drilling (HDD) and direct bury installation methods, approximately 12 miles of 6- to 20-inch piping was installed between the two projects. Out of this total, approximately two miles were installed using HDD methods.

This paper will review the benefits that HDD can provide to local utilities during periods of extensive work along active and busy roadways, specifically at roadway crossings; how drills can be manipulated to effectively work around existing space constraints; and how a mixture of multiple installation methodologies and pipe materials can be the most cost-effective options for owners.

2. INTRODUCTION

US Highway 98 (US98) is known as one of the most attractive scenic driving routes in the country. Passing through Florida’s Emerald Coast, it provides unparalleled views of the Gulf of Mexico while also allowing for the ever-increasing number of tourists to flow into the state. This provides smaller towns and cities in the panhandle the opportunity of a share in the economy driving tourism found so in these southern areas. At peak seasonal times, traffic from visitors to the state can cause significant difficulty in areas such as Destin, where the residential populations are higher and urban developments are more frequent.

The final section of US98 originally began as a section of Conners Highway, a road built by Buffalo, New York politician William J. Conners to ease access to his land located by Lake Okeechobee, which he purchased in 1917. At this time, the only way to access the Lake was by manmade canals once the paved road ended at Twenty Mile Bend. With the approval of the State Legislature, 19 miles of land parallel to the canal and 33 miles along the Lake was dredged and paved. Once the final segment was paved in 1925, the Highway reached from West Palm Beach to
Okeechobee. After Mr. Conners’ death in 1929, the State purchased the road and it remained part of US98 until 2000, when the Highway was rerouted to join State Road 80.

In 1933, the State officially commissioned US98 as a road between Pensacola and Apalachicola in the northern part of the state. In 1951, the highway began extending eastward to join with Conners Highway and in 1955, it began extending westward into Alabama. Today the full reach of US98 is as an east to west highway, from Palm Beach, Florida, to Bude, Mississippi.

As the state’s permanent residency continues to grow today, having become known as a popular retirement destination as well as attracting a growing crowd of younger individuals looking to start families, traffic has become one of the major points of infrastructure that needs improvement. Considering the economic dependence of the state on its tourism and relatively few major highways accessing the state from the west, it is imperative that the flow of traffic remain as smooth as possible. Additionally, US98 is what is known as an arterial road, meaning that there are considerable amounts of freight traffic making its way into the state in addition to its residential and tourism traffic, which creates a set of issues regarding weight bearings and compaction for utilities located below the road.

To ensure the most efficient movement of traffic, the Florida Department of Transportation (FDOT) began a road widening project between the cities of Destin and Miramar Beach to expand the highway from a majority of four lanes along the stretch to six, allowing for an extra lane of travel in both directions.

3. PROJECT DESIGN

The utility relocation portion of the FDOT project was completed through two separately bid projects, each controlled by the utility of the city in which the work was to take place. The Destin project, reaching from Airport Road to the Okaloosa / Walton County line, was spearheaded by Destin Water Users (DWU) who in turn brought Baskerville-Donavan of Pensacola, FL on as engineer. As the project would require 3.8 miles of road work and utility relocation, it was completed in three phases to cause the least impact on residents. As a portion of US98 was already built as a six-lane highway, the area between Matthew Blvd. and Legendary Dr. did not require any additional work. Phase 1 stretched from Airport Rd. to the edge of Henderson Beach state park and Phase 2 picked up immediately after that and ended at Matthew Blvd. Phase 3 did not begin until Legendary Dr. and finished at Emerald Bay Dr. (See Figure 1)

![Figure 1. Representation of Destin Water User’s three phase project. (Phase 1, blue; Phase 2, green; Phase 3, orange)](image)

As the work on Phase 1 was to take place within the FDOT’s existing right of way, it was given priority of completion at the start of construction over Phases 2 and 3. Overall, the project was to have a timeline beginning with construction in the Summer of 2017 and project completion in the Winter of 2021.

The project consisted of a combination of water, pressure wastewater, reclaimed water, and sewer mains to be installed through a combination of horizontal directional drilling (HDD) and open cut methodologies. The largest obstacle Baskerville-Donovan faced was the sheer number of utilities occupying the same space. Due to the very tight spacing of the existing communication, water, sewer, storm water, gas, and power utilities that had to be navigated around, and the fact that the work to be completed by FDOT was following immediately behind the DWU project, the majority of the piping was installed via open trenching. Extensive coordination was required amongst all involved parties to ensure that no damage occurred to any existing lines or conduits while also ensuring that the new pipe was installed safely and without the threat of cross contamination.

HDD was utilized for portions of the project that were outside of the FDOT right of way (ROW) and for road crossings as it allowed DWU to minimize the impact on traffic, local business, and residents. Using HDD for road crossings meant that far less extensive traffic control was needed during installations and less pavement repair was
required, as only two trenched locations were required on opposite sides of the road for each drill. Crossings were completed in a perpendicular alignment to the road so as to minimize the interaction with the other utilities.

For the existing utilities that were being relocated, the majority of the pipelines were to be plugged and left in place once the new lines had been placed into service. It was planned that the FDOT contractor completing the road work would remove the plugged lines as they progressed if necessary. Only one small water line that had already been removed from service was to be grouted in place.

In total, the project – including the FDOT road widening – was expected to cost approximately $33.3 million.

The end point of the project was determined by the county line between Okaloosa and Walton counties. Once installed, the Destin portion of the project would be tied into the Miramar Beach portion using standard ductile iron joints to maintain a constant piping system.

The utility for Miramar Beach, South Walton Utility Co., Inc. (SWU), elected to use Poly, Inc. of Dothan, AL as engineer to assist in designing the project. In its entirety, the project began just before Emerald Bay Dr. and ran continuously until Tang-O-Mar Dr. (see Figure 2). It was completed in two phases, as the installation had to begin further into Okaloosa County in order to allow the space for tying into the Destin portion. It covered 3.4 miles of highway.

For this project, Poly, Inc. also proceeded with all mixture of HDD and open cut-based design and installation. The split methodology was used because there were existing conditions that precluded the use of open trenching in the certain areas. Additionally, the ground conditions within the project scope were ideal for the trenchless technology – a dense sand composition, which would hold its shape, and a high-water table.

Post installation, once all testing on the new line had been completed, the existing water, force, reclaim, and sewer mains were to be grout filled and abandoned in place. This was to reduce the amount of road interference that was to occur during construction as well as ensuring the empty pipes would not cause any problems in the future.

The project, including the FDOT portions, was expected to cost $42 million.

In both projects, fusible polyvinylchloride pipe (FPVCP) was used for the HDD installed portions. This was in part due to its pressure class to external diameter ratio. Since the molecular structure of the FPVCP allows it to maintain a higher pressure class while limiting wall thickness, smaller bore holes were needed at the time of installation which meant savings on drilling.

Additionally, the gasketless restrained nature of the pipe meant that it could be installed in close proximity to the other utilities without the threat of contamination from the sewer and storm sewer lines. Since FPVCP does not require mechanical fittings at each joint of the pipe, the Florida Department of Environmental Protection (FDEP) allowed the waiver of the normal separation of force mains and water mains. FDOT also allows for FPVCP to be utilized uncased under most highways and interstates at a depth below pavement of 10 times the reamer size. The stiffness of FPVCP (<DR 25) are greater than typical steel casings specified by DOT’s around the country, providing the ability to handle the live loads.
In the DWU project, FPVCP was also used in large portions of the open trenching. Since the relocated lines had to be installed so close to one another, the FPVCP allowed for minimal separation. It was also allowed for quicker installation, as longer lengths of pipe could be staged and installed at one time in longer trenched excavations.

The work completed on the relocated utilities also extensively improved the storm water collection and conveyance abilities along US98, an important factor with the increasingly volatile weather and proximity to the Gulf of Mexico.

All applicable permitting was acquired through FDOT, FDEP, and both cities and counties.

The City of Destin and Baskerville-Donovan, Inc. accepted bids for the U.S. 98/S.R. 30 Utilities Relocation Program project on January 13, 2016. Out of a total of three bids, J & P Construction Co., Inc. (J&P Construction) was chosen as the prime contractor. In addition to providing the lowest bid, J&P Construction also maintained a long working relationship with both DWU and Baskerville-Donovan. This meant that they had an extensive knowledge of the existing utility locations, as well as established relationships with many of the owners of those utilities.

The City of Miramar Beach and Poly, Inc. accepted bids for the 6 Laning Utility Relocation Project Along US Highway 98 – 2015 project on November 4, 2015. After the close of bidding, H&T Contractors was chosen as the prime contractor.

4. CONSTRUCTION

Prior to construction, both contractors chose to subcontract the HDD portions of the projects to the driller Gator Boring & Trenching, Inc. (Gator Boring) of Pensacola, FL. Since both projects were occurring simultaneously, Gator Boring also brought in Walton Construction Services, Inc. to assist on parts of the DWU project to ensure that construction remained on schedule.

In both projects, Gator Boring utilized the same equipment for both the drilling and locating requirements. The HDD segments were primarily completed using a Universal UNI 60 x 70 rig. On a small number of the crossings, a Toro DD 40-45 was used (Figure 3). To ensure there were no incidents during the actual installations, a Falcon F5 system was used to monitor the activity occurring around the drills. Small diameter FPVCP fusion was completed using a McElroy Tracstar 500 machine by Gator Boring. Larger diameter fusion for pipe sizes above 12-inches was completed by Underground Solutions.

Figure 3. A Toro DD 40-45 drill rig on site.
Construction on the DWU project commenced on schedule. FDOT required all work to be completed during normal working hours on normal workdays, unless special permissions were sought for items such as HDD installations (see Figure 4), which could not be stopped until completed, and work that required traffic detouring, which was required to take place on the weekends. Since the rate of work on the FDOT expansion was anticipated to keep pace with the relocations, open trenching was allowed without a complete return of ground surfaces to normal. Continued, open communication was also particularly important while navigating the scheduling of work, as FDOT did not permit work on state roads to occur on most holidays or on other specific calendar events.

![Figure 4. A Universal UNI 60 x 70 drill rig set to complete a perpendicular road crossing beneath US98.](image)

For the most part, the work was located with FDOT’s ROW, which meant that easements and liens were not required for crossing driveways. Temporary easements were required for HDD sections, which required sedentary equipment and larger sections of pavement disruption. Permanent utility easements were acquired for tie-ins between HDD installed crossings and shallower open cut mains to ensure that future access would be possible should additional work be required.

During construction, the most constant difficulty faced was the tight space in which all the work had to occur between utilities. Constant communication was required between contractor and each individual utility to provide notice of dig times and testing to be conducted. One major obstacle arose when a utility installing a communications conduit cross bored a new water main that had been installed via HDD after the project had initially been completed. The damaged pipe was grout filled and abandoned by J&P and Gator Boring was called back to replace it.

The DWU project was considered completed on time and on budget even though on paper, it may have appeared otherwise. During the construction process, five Change Orders were made expanding the work that was to be completed as part of the contract. So while the bid contract was not completed on the anticipated schedule, the project itself was.

On the SWU project, H&T Contractors was selected for their low bid.

The SWU project faced many of the same obstacles the DWU project did; space remained very tight along the entire alignment and constant communication was required. FDOT scheduling requirements for the SWU project were different as well. Work was only permitted Monday thru Thursday but could occur beyond “normal” working hours.

During construction, it was determined that HDD provided key benefits for additional sections that had originally been designed as open cut. As such, a number of change orders were issued to alter the project. The goal for the completion of the relocation work was planned to occur prior to the commencement of the road widening work by FDOT. Due to a few hiccups during the construction process, this was unable to occur and the widening eventually caught up with the relocation.
In total, the pipe work on both projects took 18 months to complete. Once all the HDD work was completed, each line was pressure tested at 200 psi for 2 hours. At the successful completion of each of these tests, the lines were considered ready for integration into the various systems in which they would be involved.

5. CONCLUSION

In conclusion, the use of FPVCP as a primary installation material allowed both owners a greater peace of mind as the restrained system provided a cost effective and easily accessible new addition to their utility systems. The ability to fuse individual sticks of the material allowed the contractors to assemble portions of the installation in groups, cutting down on installation times. This also allowed the driller to maintain a continuous installation as each site was established, reducing down times and increasing efficacy.

The use of multiple installation types also provided the owners the ability to work around issues as they arose, saving them money and headaches in the long run. The use of FPVCP installed by HDD uncased under DOT highways proves to be a huge benefit all over the State of Florida and other parts of the county when compared to costly jack and bore crossings.

REFERENCES


Florida Department of Transportation – US 98 from Emerald Bay Drive to Tan-O-Mar Drive (https://nwflroads.com/projects/414132-4)

Florida Department of Transportation – US 98 from CR 30F (Airport Road) to Walton County (https://nwflroads.com/projects/414132-3)

