UNLOCKING
Keystone Road

Widened facility helps relieve congestion, improve safety in busy area of western Florida

By Eric Widholm

For years Keystone Road in northern Pinellas County, Florida, was a two-lane road bursting at its seams with a throng of bumper-to-bumper traffic. The web of aging utilities underground and overhead was equally problematic, raising the question of how to safely and efficiently reroute and upgrade the infrastructure without disrupting service and further clogging traffic on the vital roadway.

Complicating matters was the rolling terrain of the corridor – uncommon in this part of the state – as well as nearby lakes, wetlands, a broad mix of residential properties, and businesses. Keystone Road is a major Hurricane Evacuation Route, meaning it must remain open. Any detour on this main point of entry to the City of Tarpon Springs would have forced traffic miles to the north or south, causing huge problems for commuter traffic that has increased substantially because of the area's growth.

Today, the expansion of the 3-mile section of Keystone Road to four lanes between US 19 and East Lake Road is providing motorists a safer, smoother, and less-congested ride. Bicyclists and pedestrians enjoy the new multimodal trail that runs parallel to the roadway and links to the nationally recognized Fred E. Marquis Pinellas Trail. The City of Tarpon Springs has upgraded utilities to keep the City functioning well for years. The roadway facility was designed for future expansion to six lanes. And the $30 million, three-year project was completed more than $1 million under budget and 140 days ahead of schedule.

"Everybody loves the corridor. It's so scenic now," said Joseph DeMoss, engineering support services supervisor for Pinellas County who oversaw the project. "It's clean, it's open, and traffic flows very well."

Gary Schurman, engineering projects supervisor for the City of Tarpon Springs, echoed those sentiments.

"It's a massive improvement for the City," he said.

The overall Keystone Road project was more than a decade in the making for Pinellas County. The City also had been planning to upgrade its major utilities crossing under the road on county land for years. Ayres Associates provided roadway, structural, and drainage design; a maintenance of traffic plan; public involvement; utility coordination and relocation; permitting assistance; wetland mitigation; and photogrammetry for the County. Ayres provided design services for the utility relocation and upgrades for Tarpon Springs under a separate contract. David Nelson Construction of Palm Harbor, Florida, was the general contractor.

"I think it went as smooth as could be," said Brian Symanski, project manager for David Nelson Construction. He noted that during three years of construction they received few complaints, there were no major accidents, major construction issues were solved efficiently, and the overall team worked well together.

New link completes long-awaited section of trail

Expanding and improving multimodal transportation has become a major focus in Florida, and the new link to the Fred. E. Marquis Pinellas Trail that was part of the Keystone Road expansion is a huge step toward that end in the western part of the state.

"We get a huge amount of people who use the trail for multimodal transportation," said Joseph DeMoss, engineering support services supervisor for Pinellas County. "We're trying to loop the entire county with that trail."

The more than 42 miles of the Pinellas Trail extends from St. Petersburg in the south to Tarpon Springs in the north, connecting county parks, coastal areas, and many cities.

"The Pinellas Trail is very heavily used," DeMoss said. "It's nationally recognized. People from all over come just to ride on the trail. It's an economic generator, and this northern piece was a long time coming."

The 15-foot asphalt path runs approximately 2 miles on the project's north side. The trail was on the County's to-do list for a long time, DeMoss said. The new section linked what was a 2.7-mile separation between a section of trail east of US 19 and a 4-mile segment near Keystone Road along East Lake Road to near John Chestnut Park.

The Florida Department of Transportation has long-term plans to connect the Pinellas Trail into what is being called the Coast to Coast Connector. Once it's completed, the project would eventually be an estimated 275 miles of continuous trails stretching from St. Petersburg on the western coast to Canaveral National Seashore near Titusville on the eastern shore.

– Eric Widholm

Some utilities under Keystone Road were more than 50 years old. During construction the contractor discovered that older utilities crossed or were not accurately marked in previous plans. With the mass of stormwater improvements and retaining walls required for the project, finding new routes for the utilities also was a challenge. The project included eight stormwater retention ponds, 31 retaining walls, and more than 6 miles of drainage pipes up to 72 inches in size to control stormwater runoff, as well as sanitary sewer, overhead distribution and transmission lines, underground gas mains, and underground fiber optic cables.

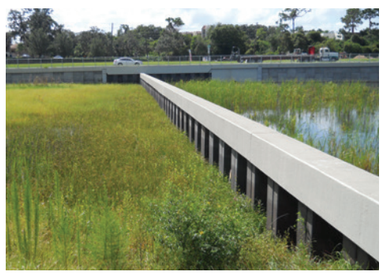
"It was just like a spaghetti of lines under this road – spaghetti lines of 30-inch and 48-inch pipes," said Dori Sabeh, Ayres Associates' lead designer for that portion of the project.

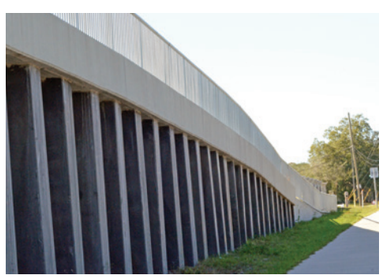
The City's main potable water supply – an old 20-inch cast iron pipe – was relocated outside the pavement area. The pipe provides water to more than half of the City's 24,000 people. The City's goal was no interruption of water service for residents and businesses during the project, Schurman said. Ayres Associates' custom-designed thrust blocks and anchors allowed for the process to be completed smoothly.

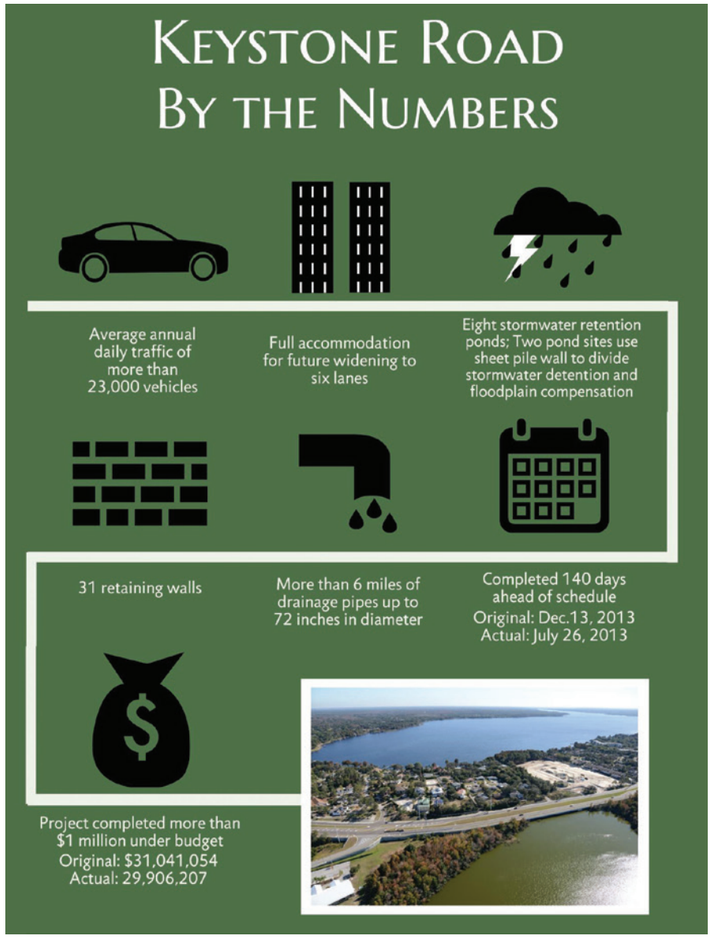
Schurman said he is amazed the utility portion of the project went as well as it did.

"In preparation for the project, we did a lot of study on the water line itself – testing valves, determining which ones worked, which ones didn't," he said. "We went through the whole exercise in case there was any kind of failure. Our staff was trained in what to do. Failure of a 20-inch water line would have been a big deal."

The corridor required miles of retaining walls that included cast-in-place, concrete sheet pile, steel sheet pile, and mechanically stabilized earth-type, said Hisham Sunna, who oversaw structural engineering for Ayres Associates. Groundwater elevations and lack of available right-of-way required various types of walls to be used depending on site conditions. Many walls were designed so the contractor could







select what materials worked best for that particular area and could be constructed at the least cost, Sunna said.

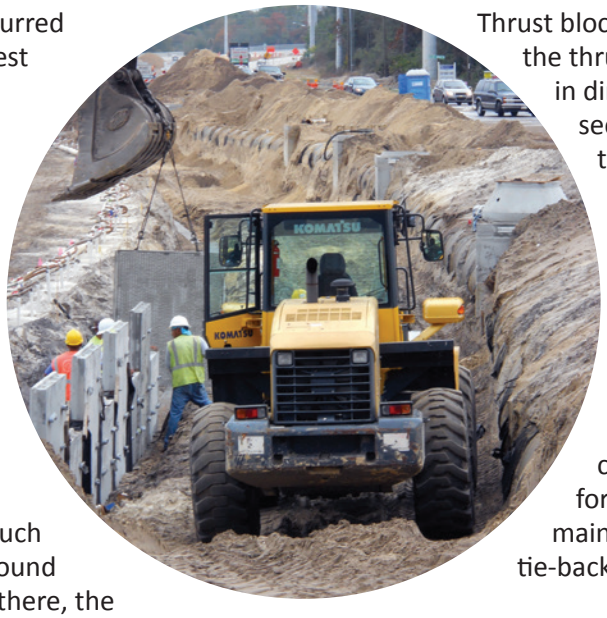
Of the eight stormwater retention ponds, two are dual-use ponds where available land for pond sites was limited, said Tim Foushee, who led Ayres Associates' stormwater design and permitting of the project. The sites use a watertight sheet pile wall to divide between stormwater detention and floodplain compensation without sacrificing precious volume. Ayres Associates also assisted navigating the project through a complex permitting environment, including a Sovereign Submerged Lands easement for a retaining wall along Salt Lake.

Flexible construction staging and traffic control plans accommodated numerous residents and businesses and the roadway's many users during construction, and public involvement was vital, DeMoss said. The County, City, Ayres Associates, and David Nelson Construction worked together to get advance notice to residents, commuters, and businesses about major construction activities. The County created several public service videos, maintained a telephone question-and-answer line and project website, gave quarterly updates, and hosted several public meetings.

"Ayres, overall as an organization, was very responsible during the entire project," DeMoss said. "The staff were very accommodating and honest. … It was a long, complex project with lots of changing conditions. There were a lot of things that made this project challenging, and in the end Ayres and David Nelson Construction came through and did a phenomenal job." ■

Utility improvements challenging part of project

People driving, bicycling, or walking along Keystone Road certainly notice the visual appeal of the new corridor – the pavement, improved views, and sidewalks and trail. But it's the work that occurred underground that caused the biggest obstacles and required the most decision-making during design and construction.



Relocating or upgrading the major utilities under or above a major thoroughfare reconstruction like Keystone Road always is a challenge, said Brian Symanski, project manager for David Nelson Construction, the project's general contractor.

"The County and City gave us as much data as they could," he said. "We found a lot of times that when we got in there, the lines where not where they were shown. They were deeper, shallower, or in a different horizontal alignment. That made things a lot more difficult, a lot trickier. You wonder how they laid it originally."

The contractor was flexible during construction, and working with Ayres Associates as the designer, the unforeseen circumstances were remedied quickly, said Joseph DeMoss, engineering support services supervisor for Pinellas County.

"Some of these utilities were constructed back in the 1950s," DeMoss said. "We had spotty information, as-built plans. We had a lot of problems with that. The SUE (subsurface utility engineering) is only as good as the spots you do the check on. And what ended up happening was that in between the points, the lines would move. You expected to go from point to point, and they didn't. They would shift alignments or kept crossing each other."

The more significant challenge was finding a suitable route to relocate and repair the City of Tarpon Springs' old 20-inch water line, one of the city's main sources of water, said Gary Schurman, engineering projects supervisor. The City's goal was no interruption of service, Schurman said, and Ayres Associates' custom-designed thrust blocks and anchors allowed this to happen.

Thrust blocks are anchors used to counter the thrust forces that occur at changes in direction, at changes in the cross-sectional area, or at the pipeline termination in a pressurized pipe, said Dori Sabeh, Ayres Associates' lead utility designer for the project. They increase the ability of fittings to resist movement by increasing the bearing area. The custom-designed thrust block secured the live tapping valves and line stops for the shallow connections. The design provided for a pipe layout to allow safe future maintenance around retaining walls and tie-back walls, Sabeh said.

"In addition to providing a layout to avoid the retaining walls/tie-backs and allow for future maintenance, a major design concern was how to restrain the proposed tapping sleeve and valve as well as the adjacent line stop at the shallow connection point with the 12-foot-spaced, lead joint, existing water main," Sabeh said.

"We considered this challenge as a perfect opportunity to practice what we excel at – providing innovative solutions. We custom-designed an encasement for the connection's adjacent lead joints, which served as a thrust block for the tapping sleeve and valve as well as a reverse dead man to the line stop."

In the end, Tarpon Springs residents and businesses saw at most a few minutes of lowered water pressure throughout the entire project, Schurman said, with most never even noticing a change.

"We wanted no interruption of service. It was something we asked for early on in the project. We didn't know how that would be possible," he said. "As we worked through it (with Ayres Associates), we were able to come up with a way to do it, to isolate the pipes, so there really was no impact."

– Eric Widholm