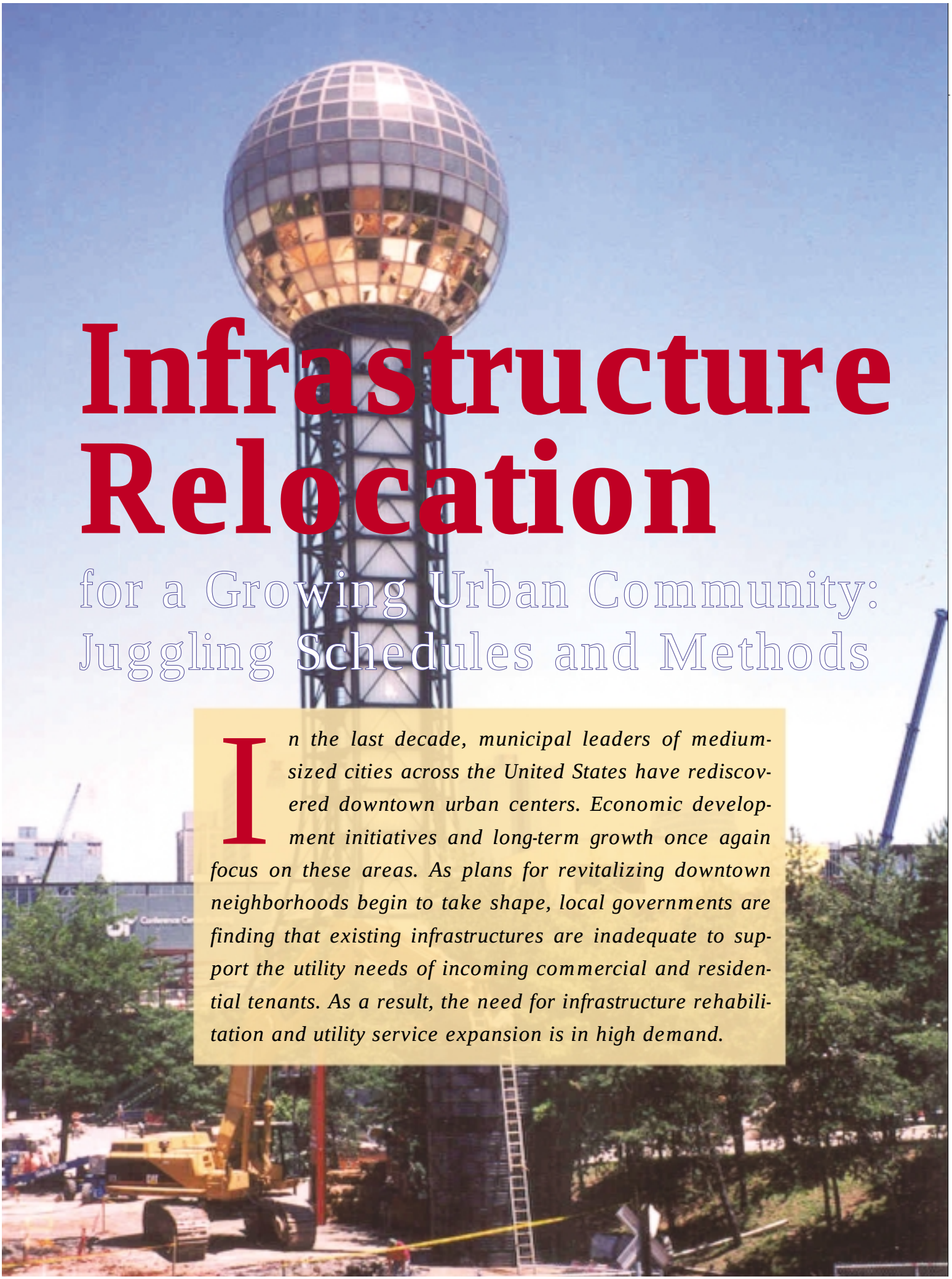

Infrastructure Relocation

for a Growing Urban Community: Juggling Schedules and Methods

In the last decade, municipal leaders of medium-sized cities across the United States have rediscovered downtown urban centers. Economic development initiatives and long-term growth once again focus on these areas. As plans for revitalizing downtown neighborhoods begin to take shape, local governments are finding that existing infrastructures are inadequate to support the utility needs of incoming commercial and residential tenants. As a result, the need for infrastructure rehabilitation and utility service expansion is in high demand.

Infrastructure rehabilitation in dense urban areas can be challenging. Owners and contractors are faced with numerous issues such as trying to minimize traffic congestion and maintain pedestrian safety throughout the project. In order to address these concerns, open communication among public utility companies, transportation departments, city officials, downtown residents and business owners, and construction crews is crucial.

In addition to communication, project managers must identify infrastructure expansion and rehabilitation methods that have a minimal impact on downtown communities. These methods also must allow the project to be completed in a timely and efficient manner. By ensuring clear communication and selecting an innovative and calculated construction approach, cities can quickly expand their infrastructure to make way for new growth and economic development.

The City of Knoxville, Tenn., now is successfully facing these issues as it works toward a crucial deadline in a major downtown revitalization project. The following account of Knoxville's experiences provides insight into the process, its challenges and the potential community impact.

Knoxville is the third largest city in Tennessee and is in the midst of revitalizing its downtown infrastructure. In June 1999, construction began on a 500,545-square-foot convention center that will be the cornerstone in the city's efforts to rejuvenate its downtown area. The Knoxville Convention Center is part of a $160 million renovation planned for the 1982 World's Fair Park site. The selected location for the convention center is along Henley Street between two main downtown arteries, Clinch Avenue and the heavily traveled Cumberland Avenue.

The Knoxville Convention Center is scheduled to open on July 31, 2002, with a Junior Olympics event. Approximately 15,000 young athletes, accompanied by their family members and coaches, will descend on World's Fair Park and the new convention center. The economic impact of this event alone is estimated at $50 million. The City of Knoxville has placed the construction of the convention center on a fast track to ensure it will be completed in time for the event.

Renovations at World's Fair Park in Knoxville, Tenn., required the rehabilitation of a large portion of the city's sewer lines to accommodate the new structures.

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W.L. Hailey and Company, headquartered in Nashville, Tenn., was contracted by Clark/Denark-Smith, a project management group, to relocate the existing sewer from beneath the convention center site for the Knoxville Utility Board and the Public Building Authority. This project included replacing approximately 2,000′ of sewer pipe with 2,088′of 48″ Hobas pipe to provide the necessary utility service for the convention center complex. The new line will enable the city to easily expand the system to accommodate further growth.

Project Scope and Challenges

"The City of Knoxville and the Knoxville Utility Board have invested a significant amount of time and money in the renovation of World's Fair Park," said Dan Herrell, Project Engineer at W.L. Hailey. "On-site, there is a great deal of energy and activity. Because the convention center is the focal point of this downtown revitalization project, much of the emphasis has been placed on getting the facility up and running, which means a tight, challenging schedule."

The tight schedule requires a number of construction contractors to be on-site at World's Fair Park simultaneously. As a result, precise scheduling is necessary to avoid crews working on top of one another.

"Weekly progress meetings provide us with an opportunity to discuss coordination issues," Herrell said. "When our work will overlap with other crews' activities or potentially interrupt traffic, we include the outside project managers and city officials in our planning. This ensures that there are no unnecessary construction delays. The majority of scheduling conflicts are resolved on-site."

Within the scope of the World's Fair Park project, W.L. Hailey is responsible for relocating sewer lines from beneath the proposed site of the convention center to an area outlined roughly by Cumberland Avenue, 11th Street, World's Park Drive and Henley Street. The construction site also includes railroad tracks that pass near the L&N Depot and Butcher Shop Restaurant along World's Park Drive.

Phase I

The first challenge of the project was installing sewer pipes beneath Cumberland Avenue. This is one of the heaviest traveled streets surrounding the University of Tennessee. Each year, beginning in late August, pedestrian traffic soars as college students walk to and from businesses along the street. In addition, when college football season begins in September, the vast majority of the 106,000 fans walk along Cumberland Avenue to and from Neyland Stadium, the largest on-campus stadium in the nation. In order to avoid unnecessary traffic congestion, W.L.

An open-cut method was utilized to install the 48″ sewer pipe during Phase II of the project.

Hailey chose to tunnel a portion of the project and designed a construction schedule that focused on utilizing days when pedestrian and vehicular traffic was lighter.

In May 2001, W.L. Hailey began excavating a 24′-diameter, 28′-deep shaft, starting from the southern end of the project along Cumberland Avenue. From within this shaft, a 10′ cast-in-place concrete junction box was constructed around the existing 42″ sewer line.

Lennut and Company, Inc., a subcontractor for W.L. Hailey, bored a 1,240 linear foot, 6′-wide tunnel, a portion of which spans beneath Cumberland Avenue. As work proceeded, liner plates were utilized to support the tunnel.

"In this area, the difficulty of the project was compounded by the existing infrastructure of commercial buildings," Herrell said. "Services had to be carefully identified prior to construction. W.L. Hailey utilized plans developed by the engineering firm Barge Waggoner Sumner & Cannon and contracted with Tennessee One Call to pinpoint the location of existing utilities."

Along Cumberland Avenue, exploratory excavation was required to identify the exact location of water lines. The remainder of the excavation process consisted of pot holing to locate the existing underground infrastructure.

In December 2001, the 48″ pipe was installed inside the first phase tunnel. As the final lining of the tunnel, the pipe will be grouted into place.

Phase II

During the second phase of the project, crews installed the section of the 48″ sewer pipe that runs parallel to the railroad tracks between Clinch Avenue and the L&N Depot Office and Butcher Shop Restaurant. For this portion of the installation, W.L. Hailey chose an open-cut construction method, utilizing a CAT 375 Excavator. After the pipe was installed and the trench backfilled, a cold mix asphalt was poured over the trench to provide a temporary surface as work on the remaining portion of the second phase proceeded. The temporary surface eased traffic congestion around the job site and enhanced safety for pedestrians traveling in and around the work area.

Another interesting challenge was the need to coordinate the construction schedule around pick-ups and deliveries at the Knoxville Museum of Art that is located adjacent to the project site. W.L. Hailey worked with museum officials to time construction around the museum's shipping and receiving schedules.

Phase III

W.L. Hailey currently is working on the final phase of the project, which began in October 2001. During this phase, Lennut and Company is utilizing a tunnel boring machine to bore a 6′-diameter tunnel, measuring 220′ long. The tunnel runs from the opposite end of the open-cut portion of the project, closest to World's Fair Park Drive and the Knoxville business district.

The starting point for the tunnel is located within a tight easement (35′), making it impossible to sink a shaft straight down to commence boring. A typical easement for a similar project would be at least 50′. Consequently, W.L. Hailey excavated a 15′-wide, 30′-deep trench inside the easement parameters and began the tunnel from the bottom of the trench.

At the end of the tunnel, W.L. Hailey will construct a 30′-diameter, 25′-deep shaft at the edge of the business district. From within this shaft, crews will construct a 10′ cast-in-place junction box to divert flow from the existing sewer line into the new line.

The Final Picture

W.L. Hailey is on target to complete the sewer line relocation for the Knoxville Convention Center by the May 2002 deadline. Once the project is finished and the 48″ sewer main is in place, W.L. Hailey will divert sewer flows into the new structure. The old line will be abandoned and filled with approximately 650 cubic yards of grout.

"As business districts and downtown areas are revitalized and infrastructure continues to age, reconfiguring and replacing sewer lines will become increasingly necessary," Herrell said. "The World's Fair sewer relocation project is a good model for owners considering sewer rehabilitation or relocation. Decision-makers who are faced with expanding or rehabilitating infrastructure within urban environments must identify construction methods that will allow the project to be completed on time while minimizing unnecessary interruptions to pedestrian and vehicular traffic. Tunneling is one of the methods that should be considered when beginning similar projects involving heavily traveled roadways."

W.L. Hailey is one of the largest environmental construction firms in the United States and is ranked in the top 20 for water and storm water management services. It has offices in Atlanta, Ga., Birmingham, Ala., and Nashville, Tenn.

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