

Ken Neyer Plumbing, Inc.

Specialty Contractor's Technology Shift Redefines the 'Impossible' on Mixed-Use Project

Cincinnati's new Liberty Center mega mixed-use development is a seminal step for the entire community of Liberty Township and Ohio's Cincinnati-Dayton metroplex—and a pivotal project for at least one specialty contractor charged with turning vision into reality.

Co-developed by Steiner + Associates and Bucksbaum Retail Properties, the approximately 1.2-million-sq-ft Liberty Center is designed to be a place for people to live, work and play. With shopping, dining, residential and office options, the first phase of the project includes 75,000 sq ft of Class A office space, 98,000 sq ft of restaurant and dining choices, 250,000 sq ft of upscale residential space, a 67,000-sq-ft cinema and even a 125-key hotel with tree-lined walkways and open areas, all constructed in the space of about two years.

For Ohio-based Ken Neyer Plumbing, one of the top specialty contractors in the region, designing, fabricating and installing the necessary plumbing systems for the Liberty Center's primary structures is a complex challenge that has

required speed, accuracy and an unexpected technology shift.

Inside Liberty Center

At first glance, the individual structures that make up the Liberty Center complex are seemingly ordinary. However, two of the mixed-use buildings include a ground level and first floor elevated post-tensioned slab with post-tensioned cables, thus there can be no core drilling or slab cutting once the deck is poured.

The first, Liberty Center Building "C", is a five-story, 101,000-sq-ft, mixed-use facility that includes covered parking and multiple retail spaces. The first floor structure consists of a 32,000-sq-ft post-tensioned concrete deck.

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**Jim Mercer, Ken Neyer Plumbing, Inc.
Commercial Project Manager**

Similarly, Liberty Center Building “H” is a five-story 164,000-sq-ft mixed-use structure. Like Building C, the first floor structure will be a concrete post-tensioned deck to provide covered parking and retail space. Building H’s post-tensioning deck is over 51,000 sq ft in area, with dimensions of 365 ft in length by 142 ft wide. To further complicate the layout, the floor takes a 22-degree turn about halfway along the length.

Because of the post-tensioning, Ken Neyer Plumbing field crews knew that laying out sleeves, hangers and pipes was going to be a challenge. Building C had over 400 sleeves on its first floor deck while Building H had over 500 sleeves that had to be located in the slab prior to the concrete pour.

Jim Mercer, commercial project manager for Ken Neyer Plumbing, explains, “We knew we couldn’t layout the sleeves and hangers using the conventional methods of pulling tapes because locating walls at that angle would have been impossible. If we couldn’t find a way to do it ourselves, we would have to hire a surveyor or civil engineer to mark out the walls and penetrations. We also had a very aggressive pour schedule. Building H had five pours—one per week—for the post-tensioned slab while Building C had four pours per week for its post-tensioned slab. So getting a surveyor to do it would have been very difficult with scheduling.”

Robotic Total Station Technology

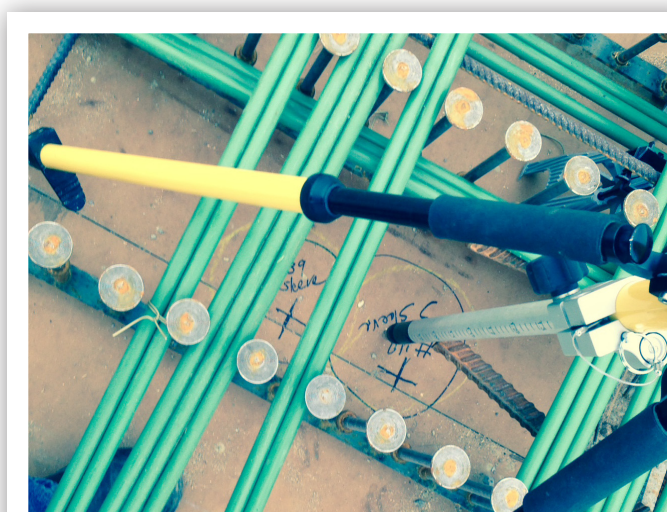
Fortunately, just prior to the Liberty Center project start, Mercer had attended a Construction Contractors Association conference where he had the opportunity to hear about advances in prefabrication tools linked to robotic total



station technology.

Soon after, the firm evaluated several of the industry’s top robotic total station solutions and selected the Trimble Field Link for MEP layout solution which includes Trimble Field Link software with a ruggedized Trimble Field Tablet connected to a Trimble Robotic Total Station. The Trimble Field Link software enables the 3D model with hanger points to be viewed in the field with the tablet controller for easy field location and staking.

Mercer says, “We especially liked that the solution provided more options, flexibility and long-term applications including the integrated camera and the measurement range that the total station is able to shoot.”



The Trimble Field Link system is very precise and works exactly as we expected. The Trimble Robotic Total Station is now an integral part of our field layout workflow on this job and all others down the road.

**Jim Mercer, Ken Neyer, Plumbing Inc.
Commercial Project Manager**

System accuracy was also very important, particularly on the Liberty Center project. Each of the buildings incorporates a framed wall on a post-tensioned slab, which will have 3 5/8-inch-diameter pipes positioned inside. Mercer needed to stake several hundred points to within 1/16-inch in order to fit inside the wall framing.

"A missed penetration would be costly," he adds. "With Trimble Field Link for MEP, we could do it on our own and as needed per the concrete pour schedule."

Point, Shoot and Walk

Ken Neyer Plumbing bought the MEP layout solution in the early phases of the Liberty Center project's underground work on Building C.

Mercer recalls, "There was little time to learn. We had training from Trimble, and then I started practicing with it and helping train six of our crew. I used it to shoot underground points for plumbing and to layout trenches just for practice. Then we had to use it on the elevated slab on top of a wood deck that was 20-ft in the air."

Prior to going in the field, the engineers located and numbered sleeves and hangers in a 2D CAD file. The model and points were then uploaded to the Trimble Field Tablet, which controls the Trimble Robotic Total Station.

"After that, it's pretty easy," says Mercer. "Prior to every pour, we tie the robotic total station to the established project control points. We create a point list and start walking around. The instrument tells us where to go next, while another person follows along behind screwing sleeves in the right location."

The floor penetration drawings included dimensions from the center line of the column grid. On occasion, the column locations weren't where the field team expected as referenced by the architectural drawings, and once again, the robotic total station provided support. In one case, a column was out by 1.25 inches because it had been moved during construction. Mercer and his team were able to verify the location with the architect and contractor, correct the drawings and keep moving.

Increasing Value & Efficiency

Throughout the layout of Building C, Mercer and his team continued to perfect the process and gain efficiency. They also developed new ways to mount the robotic total station on the continuously moving post-tensioned wood deck. They initially mounted the total station tripod to a concrete column in order to keep it level and wire-tied the tripod to the rebar that comes out of the top of the concrete column. It was taking 30 minutes to set up the total station each time the operator moved to a new location.

Not long after, the team came up with a new way to set up on the project site. They flipped a Blue Banger Hanger® upside down and stuck it in the concrete, then used a 3/4" All Thread rod to bolt a tripod stand with a centered hole in and tightened it down with a nut and washer, which allowed for much quicker setup with greater stability.

Ken Neyer Plumbing has now hired a new CAD prefab manager to further streamline the office-to-field connections to support work on Building B, which is currently under construction. They've already prefabricated underground pipes and components and will soon begin to place layout points on the prefab drawing, allowing them to layout the underground ditch lines so crews know where to dig trenches.

The team has also gained efficiencies in transferring field data back to the models. After the hangers and sleeves are located on the elevated post-tensioned slabs, the operator exports a .DWG file with the staked location of a point to the model. During layout, the Trimble Field Link software automatically indicates a green or red flag in the layout program at each of the layout points. If any points are out by 1/16-inch or more, a red flag will show up, indicating a point is out of tolerance with the design location and will require a change to the layout.

Mercer concludes, "Thus far, we haven't had to do that. The Trimble Field Link system is very precise and works exactly as we expected. The Trimble Robotic Total Station is now an integral part of our field layout workflow on this job and all others down the road."