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## Challenges ahead

It wasn't going to be easy.

Take the crawl space under three quarters of the building where plumbing, mechanical and electrical work was needed. This meant temporary shoring during demolition, as well as special venting and evacuation training for horizontal spaces. While contractors were required to train their own people, Tallon used the morning meeting to make sure everyone knew the same procedures.



There was the challenge of holding up the second and third floors as 5000 square feet of concrete was removed to cut out the atrium. Structural steel support beams had to be fabricated and placed before the concrete could be cut and removed.



Another issue involved fall protection around the atrium space during and after demolition. While the demo crew needed weighted rails and the carpenters, who would work after demolition, needed rails bolted to the floor, the two groups were able to work together to identify and buy one system that could be adjusted, a financial savings Tallon attributed to the working relationships that had been forged.

Then there was access. The library fronted on the quad and was surrounded by other buildings with the only regular vehicle access through an underpass into a tiny parking lot at the back. There also was no available elevator. Yet the concrete and interior material had to be removed. That meant tight coordination with Harper for front door fire lane access before 8 AM as well as construction of a loading platform and chute in the back.

To manage the resulting complexity, Tallon created a weekly schedule, then projected it each day for discussion and coordination.

*"This worked much better than having me just dictating what everyone should do."*

SENIOR SUPERINTENDENT DAVE TALLON

#### PLANS AT EVERYONE'S FINGERTIPS

Morning meetings were not the only paradigm-bending tactic on the \$20 million, 14-month project. Early on, a set of drawings 10 inches high convinced Lumpp, who'd been looking into paperless management, that this was a job that would benefit.

"So Dave and I started brainstorming how to do this," he remembers. "Basically, we got rid of all the paper. We built three computer stations with large monitors throughout the site, installed two wireless routers, and gave everyone a temporary password so they could also see documents on their tablets. We used *Bluebeam PDF reader* so drawing changes were available in real time to all personnel as well as specifications, submittals, RFI's, safety plans, quality reports and more."

*"The first time we floated this idea, people pushed back," Tallon remembers, but those same people quickly came on board. "The carpenter foreman came to me and said he didn't even know how to turn on the computer. So I showed him. He compared his paper drawings and it was a revelation because his were out of date. Two or three weeks in, he's the first one in line every morning. What he likes most is that he can zoom in and verify a measurement far more precisely than the paper drawings allowed. This avoids lot of mistakes."*

The availability of the monitors and the morning meetings also gave trades people unprecedented access to the 3D models – architectural, structural, mechanicals and more -- of the project. This let different trades people see, for example, where ductwork would need to move so the fire protection system could stay level. Workers could also see in advance where furniture would be placed and design elements utilized so that problems down the road could be avoided. Lumpp was surprised that the field foremen used the models as much as they did.

*"I thought it was more of an office thing," he said adding "They used the model to identify and coordinate potential conflicts—they were able to look further down in the system and see where, if they made a change, it would affect others. It took them a couple of weeks to learn the system, but those that used it were definitely more productive."*

## LEAN PROMOTES EFFICIENCY

The morning meetings, and paperless sharing of plans and 3D models, is in keeping with principles of Lean—a method of work that originated in factories and has seen a growing presence in construction. Lean practices, which are built around respect for people and the idea of maximizing value while eliminating waste, facilitate communication at the most efficient level—worker to worker, rather than having messages go up and down a chain of command. According to research sponsored by the [Lean Construction Institute](#) projects with high Lean intensity are three times more likely to complete ahead of schedule and two times more likely to complete under budget.

Under Lean practices “nothing hits the floor”

Lumpp knew it could be a challenging process to implement in the field.

*“It has to do with breaking habits and forming new ones which is never easy” he notes, adding that “Another habit we’re forming on this project is the sustainability program that ‘Nothing Hits the Floor’. Anything not being used needs to be stored on a pallet. We hung electrical cords from the ceiling to keep the floors clear.”*

## A winning team

The overall product of these new approaches is a resoundingly successful project based on great working relationships.

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For Steingraeber, working with Pepper was a new experience. *"This is the first time we've seen the construction manager from the beginning,"* he noted. *"It's not like you're the construction manager and we're the architects. We were in every single meeting together and were a team."* Steingraeber also contrasts the Harper project with others he's worked on where post mortems surfaced a variety of issues that just didn't exist here. *"What I'm most excited about is hearing from the staff and the owner that what we've created is what they asked for,"* he adds.

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Steve Petersen, Harper campus architect, agreed, noting that *"What I'm most proud of is that the contractor, the owner and the architect worked so well together for the needs of the college. There was almost no conflict."* Petersen also appreciated how Legat and Pepper worked collectively to create cost effective ways to bring in the light. *"Everyone focused on the main environment, which is the best environment for the student."* He added that, *"It was refreshing to have a contractor who listened so well and the project was a success because of that."*

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For Tallon, the real reward came from watching the team develop and grow, including every tradesperson that worked on the job. *"We just didn't have arguments,"* he notes, and that is very unusual for construction.

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## Credits

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