On The Fast Track

*Stevens Construction uses 150-foot tower crane to complete 12-story building in less than 10 months.*

By Barry Gantenbein, editor, Western Builder

With classes starting this month, several hundred University of Wisconsin-Madison students are moving into the 12-story, 127-unit apartment building at the corner of University Drive and Bassett Street in Madison, Wis. Last year at this time, the intersection was home to a couple of funky old houses.

The use of a more than 150-foot tall Potain HO-25 tower crane was essential to Stevens Construction Corp.'s fast track construction of the building.

The tower crane rented from Reynolds Crane in Madison lifted precast concrete, structural steel and other materials at the site from November of last year through May of this year.

A material lift on the side of the building assisted the tower crane, which had a 158-foot hook height, 150-foot radius, and a lifting capacity of 12,800 pounds at 150 feet.

With busy University Drive less than 15 feet from the east side of the building, and the building a tight fit on all sides of the site, crawler cranes weren’t an option for lifting materials and equipment at the site.

“The problem with that site was that there wasn’t a lot of room outside the footprint of the building. So, there wasn’t a place to have a crawler crane sitting on the outside,” said Geoffrey Vine, project manager for Stevens Construction Corp.

Stevens Construction, which has offices in Milwaukee and Madison, was the general contractor for the job.
beneath the courtyard. The footing for the tower crane was built in the crotch of the building.

"It was inside the footprint of the building. It left any limited space we had around the building for lay down, and not a piece of equipment sitting in that area," said Vine.

Typically, tower cranes are set inside a stair shaft, but on this job the stairwells weren't large enough for a tower crane because of the tight lay out of the building.

"Plus, it allowed us to construct the whole roof structure and the roof on before we needed to take the tower crane down. Because of the lay out, with the tower crane sitting in the crotch, we were able to reach anything we needed to reach on the other side of the building," Vine said.

**Solid footing**

A Stevens Construction crew poured a 21-foot square, six-foot deep, concrete footing strengthened with rebar mats to support the Potain HO-25 tower crane.

Before pouring the footing, Stevens Construction had to de-water below the base of the footing for the tower crane.

"The crane footing is actually the deepest footing in the building," said Vine.

The footing for the tower crane was poured below the slab-on-grade elevation for the basement slab, and remained in place after the tower crane was dismantled and removed.

"After the crane was removed, we went down inside the parking garage and poured the slab-on-grade area. Afterwards, you would have never known there was a crane inside the building for six months," Vine said.

By the time the tower crane footing was poured, about one-third of the foundation walls for the two-story underground parking structure had been poured but no precast concrete had been placed.

"That was the big push to get the tower crane up - to use it for the precast installation. That helped it start paying for itself," Vine said. "We set columns, then beams, then set precast. That was probably the biggest work the tower crane did, some of the columns were close to 12,000 pounds."

The tower crane was sized to have just enough lifting capacity to handle columns at the farthest points.

"Between that and the hook height we had to have because of the height of the steel structure, that's how we determined the size of the tower crane we needed to have for the project," Vine said.

When the tower crane was erected, it was used for forming and getting material into the hole for foundations, as well as erecting precast concrete.

Mid-States Concrete Products Co., Beloit, Wis., was the precast concrete manufacturer.

"As soon as the tower crane got on site, it was used every day pretty much constantly until the middle of April, although it stayed on site through May," said Vine.

Much of the lifting took place in winter and early spring, which presented some challenges. For instance, an ice storm shut down the tower crane for a day, as did a snowstorm that blocked the crane operator's view of the site.
Reynolds Crane supplied the operator for the tower crane. Stevens Construction personnel used radios to help the operator, who worked more than 150-feet above the site in a crane cab that could be swayed by wind as much as 8-feet.

"There were probably four people in the hole that had radios. There was direction given to the operator over the radio constantly," Vine said.

**Team effort**

Although the tower crane did much of the lifting at the job, other cranes were brought in periodically.

"Before we even started foundations, we had to put in soil retention and we used a sheet shoring system. Edward Kraemer and Sons did the retention system and they had a crane on site. For two months, we had both cranes working together every day," said Vine.

A large part of the tower crane's work was erecting the structural steel frame of the building. H & B Steel, Inc., with offices in Middleton, Wis. and North Freedom, Wis., was the subcontractor who did the steel erection for the construction of the Embassy.

Because there was almost no lay down area, structural steel had to come on the truck in the order it was going to be picked and put up on the decks.

"Nothing touched the ground. It came off the truck and then was set on the floor of the building where it was going to be erected. If any beams came out of order for a particular floor, there wasn't any place to put them except for the floor on which they were going to be erected."

Skyline Steel, Inc., Arlington, Wis., was the fabricator of the structural steel and was responsible for loading the steel onto trucks in the sequence needed by the erector.

"They staged everything in their yard in Arlington, and sent it down one truck at a time. The job they did was unbelievable. Everything that came was phased and set, and didn't have to be moved until it was time to be erected into place," Vine said.

Stevens Construction was able to close one lane of Bassett Street for unloading materials.

"It was basically a drive-through lane in and out for trucks. Anything that came off trucks, had to immediately go into the building because there wasn't a staging area," said Vine. "When it came off the truck, it had to go into place."

Steel erection for the 12-story building was completed in approximately nine weeks.

"That was the major push, to get the structure up so we could get in underneath and start finishing," Vine said. "As soon as the steel erector could get on the second floor and could get the floor deck down and was erecting above us, the mechanical people and the framing people kept moving in down below and working up."
Moving up

About the time H&B Steel was on the third floor deck, the material lift was built on the outside of the building so that other subcontractors could move materials into the building and follow the steel erector up as the building was constructed.

The material lift was built so that materials could be brought into the building through the parking garage or through temporary doors set up on each floor of the building.

"Basically, anything that we could get in pieces and parts, we would take up in the material lift. Dry wall, steel studs, and any kind of material were stocked through the material lift. The tower crane was being used for steel erection, which was the most important thing and always took precedent," said Vine.

After putting a temporary roof on the sixth floor ceiling/seventh floor deck, crews started dry walling on the building’s first floor even before final steel was erected on the upper floors.

“We had a nine and one-half month construction schedule for the 127-unit, 12-story building, so there were a lot of things happening at once,” Vine said.

Stevens got the contract for the construction of the building in October of 2000, and had a completion deadline of Aug. 15.

“The most impressive thing about the project is the schedule. I don’t think there’s another contractor in town that could have done it. It took a lot of commitment from all the subcontractors and suppliers to make it happen,” said Vine. “Our jobsite superintendent Dan Kast coordinated everything perfectly.”

The project was a design-build job.

“There was a limited amount of drawings because of the limited time. Basically, we had some general drawings, and there was a lot of design done by the suppliers or subcontractors,” said Vine. “For instance, the precast manufacturer took the constraints and designed the precast system for the two levels of underground parking. The steel manufacturer, with the engineer’s help, designed the structural steel frame.”

Stevens Construction is a general contractor that does a lot of large commercial projects, but the company is not a design-build firm.

“Because we’re a true general contractor and not a design-build contractor with a design staff, we partner with a whole array of architects. That way we’re able to partner with an architect who has experience specific to the project,” said Vine. “It takes an architect who builds banks, for instance, to build banks well.”

The architect for the Embassy was John Sutton, who specializes in buildings constructed in Downtown Madison.

Stevens Construction isn’t done working downtown. The company is currently building a similar project two blocks from the Embassy, and plans to use the tower crane for that job as well.

However, that building will have a concrete, post-tensioned slab frame as opposed to the structural steel, poured-deck slab construction used at the Embassy.