Contracted Scope

Project Description/Type of Construction

The project scope included the complete demolition and removal of the top four floors of the Old Main Patient Tower, built in the 1950s, plus the mechanical penthouse—while leaving the bottom two stories intact. The four stories that were demolished consisted of a concrete structure, interior clay tile and plaster walls, and brick facade. The structure was removed by using a combination of concrete crushing and jackhammering Brokk® machines, and sawcutting large concrete beams and columns. Because of the close proximity to surrounding buildings, a tower crane was used to fly large pieces of concrete to a nearby demolition staging area where they were then removed from site.

A temporary roof was built on top of the second floor in order to keep the bottom two floors intact and dry throughout demolition, and temporary protection was installed. Once demolition was complete, the temporary protection was removed and the final layer of roofing was installed.

Also included in the scope was the renovation of the cafeteria and lab spaces on the first and second floors. In the center of the campus and surrounded by other structures, a new two-story, 4,000-square-foot atrium was constructed and serves as a corridor/common space inside the main entrance, leading to the Behavioral Health area of the hospital.

The Rodgers team completed the demolition while working within tight site constraints. Surrounded by campus buildings, careful planning and site logistics were executed to ensure the hospital's surrounding buildings remained operational throughout the project.

Size of Project

Demolition of approximately 60,000 square feet encompassed four floors of the existing building plus the mechanical penthouse. Renovations of 63,000 square feet were completed in the first and second floors, along with construction of a two-story, 4,000-square-foot atrium.

Length of Project

The project started on January 10, 2014, and achieved substantial completion on June 12, 2015. The total project duration was 17 months.

Self-Performed Labor

As Construction Manager-at-Risk, Rodgers self-performed less than 1% of labor on the project—mainly infection control procedures separating the project from adjacent services.

ABC Members and Merit Opportunities

Rodgers worked with 11 specialty contractors, suppliers and subcontractors for the Self Regional Healthcare project who are members of ABC.

Aerial view shows Self Regional Healthcare after completion of the demolition and renovations.

Project Narrative

Why is this project special?

Self Regional Healthcare (SRH), in Greenwood South Carolina, is a 358-bed, non-profit healthcare system that serves a seven-county area and sees hundreds of visitors and patients each day. They needed to reduce their aging facility, which dated back to the 1950s. The cost to maintain and operate the older facility, many areas of which needed updates to meet current building codes, would easily justify the cost of demolition and renovation. SRH wanted to enhance patient and community access and update the facility's appearance. A new laboratory and cafeteria were also needed to meet the hospital's growing demands.

Early planning

SRH embarked on early planning in 2007 with the primary goal to demolish a major portion of the building that was called "Old Main," the six-story patient tower at the heart of the campus. In order to accomplish that end, multiple departments housed within the facility had to be relocated. Rodgers worked with the hospital on a number of relocation and renovation projects as part of a master plan that prepared the way for the Old Main demolition. Because of the early relationship and project planning, Rodgers was included in the selection process for the design team for the Old Main demolition and renovations. LS3P Architects was chosen as the lead designer, with DWG as consulting engineers and ADC as structural engineers.

In 2011, SRH's director of facilities, representatives from Rodgers and the design team visited Massachusetts General Hospital in Boston, where a similar scope of construction had taken place. They met with administrators and key personnel to review their plans and procedures, looking for lessons learned that would help SRH's project to be successful. Some of the areas that were impacted and improved by the collaboration included the implementation of noise and vibration monitors, with a baseline measure taken prior to start of construction, and then measurements throughout demolition and the rest of the project.

The team anticipated many of the design and construction challenges of a multi-phased project including cost controls, restrictive floor heights, infection control, and unforeseen conditions. Site access, utility rerouting, project phases, and demolition sequencing all had to be considered. Communication methods would be critical for collaboration within the design and construction team and for keeping the fully operational hospital's patients, visitors and staff aware of progress.

- *"Most notable regarding this project is the Old Main footprint was located in the heart of the existing facility. This had to be removed piece by piece, and without disruption to critical way finding and patient care which surrounded the demolition zone in all directions. Completed in June 2015, the project was on time, on budget, and a huge success."*
  - Lee Lowe, Director of Facility Services, Self Regional Healthcare

Major demolition in the heart of an occupied hospital campus

Demolition involved removing four stories of the existing brick-clad, concrete structure surrounded by north, south, east and west wings. A large rooftop mechanical penthouse was also removed. A central portion of the structure was removed down to the foundation, creating two separate structures. A new steel-framed structure was built inside the complex separated by expansion joints, using the existing foundations for support and surrounded by the adjacent existing buildings. This two-story addition would serve as a new open atrium and main entrance corridor.

Demolition of four stories of the Old Main would occur within the heart of the existing, fully operational hospital campus, leaving the two

lower stories of Old Main intact. The demolition was scheduled to occur over eight months.

Due to site contraints, the existing brick, concrete and steel structure was to be removed using sawing and hammering, and robotic Brokk® hydraulic concrete crushers to munch the concrete structure. Debris would be removed using a tower crane and skip pans. It was essential to have effective scaffolding in place. The scaffold system would serve two functions: provide a work platform and handrail system for the safety and protection of the workers during demolition, as well as provide green screening around the outside of the scaffold to protect surrounding rooftops and adjacent areas from debris and damage.

Rodgers produced a 3D logistics plan that included a virtual model of the scaffolding. The model allowed the construction team to show SRH how the campus would be impacted by the crane swing. The structural engineer was able to review the model to evaluate proper support of the weight of equipment and workers that would be added to the upper slabs during demolition, and showed where additional shoring would be needed for support.

The model also was used to create a time lapse animation of the demolition sequence for review by the project team.

Removal of demolished materials

Safe removal of the demolished materials from the center of the campus was also a challenge. During demolition, two shifts were scheduled so that the daytime shift could continue with demo and the night shift could offload the materials that were removed during both shifts. Loaded skip pans were double rigged for safety and then flown off the building by the tower crane and put in dumpsters on site to be hauled off the next day.

A total of 16,000 tons of materials were removed and 500,000 pounds of metal recycled, as well as brick and concrete being recycled or reused.

Concurrent with demolition, renovations were taking place on the first and second floors for the laboratory and cafeteria, which were temporarily relocated. The hospital's front entrance was closed during construction and access was rerouted through other entrances into the building.

Innovative solutions

Innovative construction methods were used to protect the existing first and second floors and adjacent areas during demolition of the upper floors. Potential water intrusion during demolition was a particular concern, since the facility needed to continue daily 24/7 operations throughout construction.

The construction team devised an innovative solution to mitigate and manage water entering the building. New walls were built and weatherproofed inside the perimeter of the first and second floors, which would later become exterior walls when the old exterior walls were demolished. The interior of the third floor was gutted so a new roof could be built inside the building above the second floor to allow demolition to occur above.

A water barrier was put in place to manage rainfall, diverting water through new roof drains. A temporary roof drain system took water from the new roof through a system of pipes and a filter bag and dispersed it on site.

Any water that was captured inside the weather walls in the new open central area was moved through a sump with two electric pumps into the existing roof drain leader system.

- *"Rodgers accepted the challenge with this ambitious project and was a fantastic partner in the process. Their construction team, from the senior project manager, onsite management team members, field superintendent and additional workers, all understood the mission to deliver the project in an effective manner with safety in mind and with minimal changes to the established project costs and design. A job well done!"*
  - Rebecca M. Smith, AIA, LEED AP, Project Architect, LS3P

Special challenges working around and within an aging, dated structure

Challenges of the aging facility included sorting out existing plumbing, mechanical and electrical systems. During the early phase of demolition, some utilities to the upper mechanical penthouses needed to remain operational, including the elevators. Rodgers staff met with SRH's engineering department to investigate existing conditions. Some utilities in the older structure had been "borrowing" power from newer additions to serve their needs. Every line in every system, totaling in the thousands – serving sewer, domestic water, telecommunications, etc. – was vetted and investigated back to its source, then rerouted.

As part of the make-safe process for utility shutdowns, the construction team met weekly to schedule shutdowns in coordination with the owner, then cap and make safe.

- *"To complete the project successfully, it was incumbent on the construction team to unravel and coordinate a large and complex web of new and existing structural requirements and conditions, mechanical equipment, duct, conduit, and plumbing routing, and final construction requirements, and to be able to communicate with the design team effectively and quickly as new conditions were uncovered."*

  - Richard G. Hamlin, P.E., Project Manager, ADC Engineering, Inc.

Point Cloud 3D laser scanning and coordination for quality control

After the first and second floors were protected from the demolition above, Rodgers' Virtual Design and Construction (VDC) team produced a Point Cloud 3D laser scan of the existing spaces for the new laboratory and cafeteria to determine the location of existing utilities and structural elements and integrated this information into the already-coordinated virtual model. The existing building documentation was discovered to be incomplete or inaccurate in a number of areas.

Once these conditions were revealed by the laser scan, the design and engineering team was able to prepare correction documents for construction and the VDC and operations teams were able to complete the systems coordination.

Rodgers' VDC team held weekly coordination meetings with all the key subcontractors and the designers. Our team created the Building Information Model (BIM), issued coordination drawings and did a walkthrough with each subcontractor to ensure scope was understood.

Rodgers provided a virtual station – a unit complete with computer and the BIM – for all subcontractors to access on the project site. Many of the trades' staff used iPads to access the model in the field. Rodgers held small group sessions for coordination review at the virtual station. The project team also used 360 Glue, a cloud-based application by Autodesk that allows the architect, engineer, contractor and trades to access the BIM and collaborate to quickly resolve issues.

- *"Through a combination of modern technology, 3D scanners and BIM coordination drawings, and 'on-the-ground' expert field superintendents, predesign and construction conditions were documented and relied upon throughout the construction and design process. This facilitated a quicker, more accurate design and helped reduce unforeseen conditions and subsequent change orders."*

  - Brian Bates, P.E., Vice President, DWG Consulting Engineers

Budget and schedule

During preconstruction efforts, Rodgers provided SRH with a guaranteed maximum price (GMP). The final construction cost was maintained at exactly the GMP by carefully monitoring the GMP-identified contingencies to be sure these were not overrun.

Likewise, the project was able to maintain the originally contracted schedule, with owner-approved time extensions for abatement and capping existing utilities.

Phasing and sequence of work critical to continued hospital operations

In order to keep multiple departments and functions of the hospital operational, the work

had to be phased to allow ongoing activities to continue. Demolition and renovation activities were sequenced so that departments could be moved without impact. The project team held daily meetings with SRH facilities staff to coordinate logistics and address concerns.

An early phase of work was the relocation of one of the two primary electrical rooms for the hospital. It was located on the first floor of the Old Main, within the footprint where the new main corridor was planned. The electrical room was partially relocated prior to demolition so service could be provided for new areas that were under construction as part of the master plan. The remaining half of the electrical room was removed and relocated east of the main corridor during the demolition phase.

For safety reasons and insurance requirements, the first and second floors that remained in place were not accessible during the demolition phase. Once they became available for renovation work to begin for the laboratory and new cafeteria, the Rodgers VDC team produced a laser scan of each area.

The team discovered that as newer additions had been attached to the original 1950s facility there were some adaptations and modifications made that were not documented.

- *"The original construction had very little space above the ceiling, but required some structural retrofits for the support of new kitchen hoods, ceiling-mounted partitions, lab equipment and storage, new mechanical units and new mechanical chases, while the space was also densely populated with piping, conduit and ductwork, both new and existing. This density...together with portions of work that were required to be open prior to completion of construction, created sequencing challenges that had to be overcome throughout the project."*
  - Richard G. Hamlin, P.E., Project Manager, ADC Engineering, Inc.

As described earlier, the scans revealed significant inconsistencies with prior as-built documentation. For example, concrete joists were lower than shown and often in different locations. Since the project was fast-paced, there was not enough time to make corrections to the drawings prior to beginning work so the construction team's discoveries were communicated to the design team for solutions as the project progressed.

Sequencing work in the renovated areas was also complicated. Only about two-thirds of the scope of each area could be completed during demolition since there were new interior walls that would become exterior walls after completion of the demolition phase.

Construction of the new main entrance corridor could not begin until demolition was complete to ground level in the main corridor footprint. These areas were finalized and turned over to the owner approximately four months after the demolition phase.

Unique hospital construction challenges require collaboration from all team members

Healthcare construction requires the team to thoroughly understand DHEC codes and inspections, infection control measures, and active communication requirements of being a construction partner to hospital administration and staff throughout the project. Rodgers is especially proud to work with a group of select subcontractors and suppliers who are skilled in this unique construction delivery.

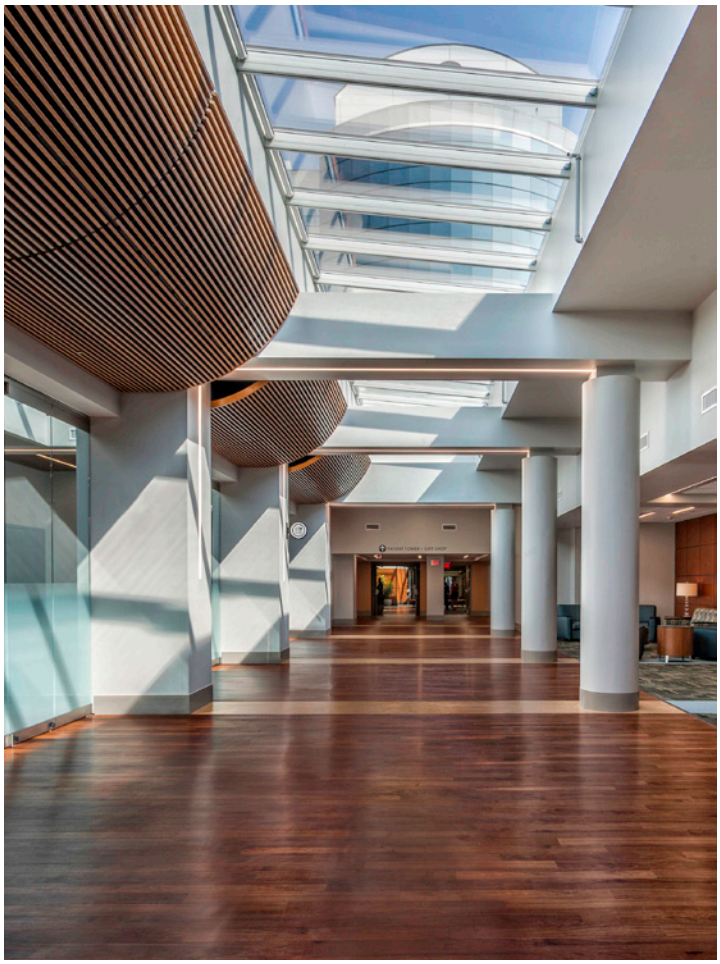
Noise and vibration monitors used throughout demolition and the renovations measured no activity exceeding acceptable levels and virtually no problems occurred, even though demolition of portions of the structure was occurring within a few feet of occupied areas, including less than a foot from the hospital's main switchboard.

Self Regional Hospital held a public celebration to reopen its front doors on June 25, 2015.

- *"Commitment by owner, design team, and contractor working together as a team, going above and beyond at all levels, was the foundation from which our success is attributed."*
  - Lee Lowe, Director of Facility Services, SRH

Quality of Finished Project

A series of complex renovations to Self Regional Healthcare's existing facilities made improvements to wayfinding, operational efficiency, and patient comfort in order to accommodate evolving healthcare needs. The welcoming new main corridor and light-filled cafeteria/servery anchor the project.



The 1950s-era structure had 10'-10" floor-to-floor heights which challenged the design team to use low profile lighting fixtures, exposed ductwork, fabric and wood panel ceilings, graphic wall coverings, and banquette seating to help transform the original first floor area into a warm and inviting dining space.

Relocating the old electrical room and revising the structure in this central area allowed raised ceiling heights, skylights, and new windows into second floor spaces above, bringing light deep into the hospital interior.

Moveable glass and resin panel systems help subdivide and open up the spaces for flexible use of the dining and main corridor according to the needs of the day.

The vibrant green and orange color palette along with the tree graphic help bring the outdoors into the interior dining space, which is now positioned in an easily accessible location along the main corridor.

The new servery area is an appealing yet functional space for its customers.

The project also included relocation of many clinical and support spaces, demolition of four under-utilized floors of the original hospital, and improved staff circulation by creating a new bridge connector at the second floor. These changes all contribute to better patient, family and staff experiences while significantly reducing operational costs.

Final aerial photographs show the new roof installed over the second floor.