

Contracted Scope

Project Description/Type of Construction

UNC Greensboro (UNCG) selected Rodgers Builders, Inc. and DPR Construction, in joint venture as Rodgers DPR, as construction manager for the Dining Hall Renovations and Addition project. The project scope included a comprehensive renovation and modernization of UNCG's 119,000-square-foot dining hall facility. The original five dining halls and kitchen dated back to 1904-1986. The existing buildings were arranged around a pentagon-shaped central space. A new domed roof structure was erected using glued laminated wood beams, which were lighter weight than steel allowing for greater crane reach over the existing structure. The 106-foot clear span dome structure contains ribbed fiberglass skylights and tongue and groove wood panels.

This project required replacing all MEP and HVAC systems as well as extensive exterior skin and structural repairs.

Dining services remained operational throughout the construction, allowing the University and its students continued access to the dining halls.

A retail restaurant, cafeteria and other retail dining venues are included inside the new dining hall, as well as offices for administration and dining services. The warmth of the wood timbers and skylights in the central area created an inviting and light-filled space, transforming the existing facility into a modern dining hall and gathering space to enhance the student experience at UNC Greensboro.

Size of Project

119,000 square feet, including an addition of 33,000 square feet.

Length of Project

Renovations were constructed in five phases. Construction started June 20, 2012 and achieved substantial completion on July 17, 2015.

Self-Performed Labor

As Construction Manager-at-Risk, Rodgers DPR self-performed less than 1% of labor on the project.

ABC Members and Merit Opportunities

Rodgers DPR worked with 10 specialty contractors, suppliers and subcontractors for the UNC Greensboro Dining Hall Renovations and Addition project who are members of ABC.

- Architect's rendering showing the renovated dining hall and addition at UNC Greensboro.



Project Narrative

Why is this project special?

The University of North Carolina at Greensboro's dining facilities dated back to the early 1900s, with additions and renovations dating to 1986. With student population at nearly 18,000, UNCG knew it was time to upgrade these services in order to continue to attract students with a higher quality dining experience that included branded venues such as Mongolian Grill, Taco Bell and Pizza Hut.

Along with the University's facility management, the project team included Rodgers Builders, Inc. and DPR Construction, in joint venture as Rodgers DPR in association with minority contractor Walter B. Davis Company. Gantt Huberman Architects, a division of Bergmann Associates, served as the lead project designer. Engineers included Bulla Smith Design Engineering as the structural and civil engineer, McCracken and Lopez as the plumbing, mechanical, electrical and fire protection engineer, and Porter Khouw was the foodservice consultant.

- *"This is the most complicated project I have been involved with in the last 25 years that I have been at the University."*
- Fred Patrick, AIA, PE, LEED AP
Director of Facilities Design and Construction
University of North Carolina at Greensboro

The project involved unifying the five existing dining halls around a central atrium space. The design featured an arched dome with glued laminated (glulam) wood beams and skylights overtop the pentagon-shaped central commons, creating a warm, open gathering space for students as well as ample dining for the growing student body. A new glass facade would provide views into the Quad and a landscaped area with outdoor dining and a fountain.

Phasing the project for continued dining service

Renovations were completed in five phases over 30 months. It was important that food services remain operational throughout the project, except for limited down time between semesters.

The first phase of work included the early site package for relocating utilities, as well as moving the dining hall's main entrance. Temporary lines were run for chilled water, steam and potable water. A new electrical room was built to provide power to Phase One of construction, and the addition of 33,000 square feet for new dining areas was constructed before renovations could begin on the existing five wings. The number of seats available for dining needed to remain constant while each subsequent area was taken out of service for the renovations included in the remaining phases.

Subsequent phases involved renovations to the existing wings for branded restaurants, convenience store, post office, dining areas, kitchen and administrative offices.

Value analysis and alternates

North Carolina's state construction projects have stringent budget requirements, so preconstruction efforts were essential to ensure construction dollars were spent to the best advantage. In a complex project such as the dining hall renovations, with multiple building and additions throughout various decades, unexpected and unknown conditions were anticipated.

During the due diligence research period, Rodgers DPR discovered several structural and nonstructural deficiencies ranging from a slab-on-grade where the soils had washed out from underneath, to structural framing members with

major cracks and/or failures, to the discovery of asbestos and lead paint. Each unexpected issue eroded the budget available for the project.

To minimize potential impact to design and architectural enhancements, Rodgers DPR proposed numerous value-add alternatives such as installing the drainage systems earlier during construction and applying waterproofing to the walls in the area below the roof that needed to be replaced. This single item allowed the team to avoid the need for a temporary roof during demolition, saving the project nearly \$200,000.

Rock blasting and monitoring for cracks in adjacent brick buildings

Prior to beginning work on the dining hall, utilities needed to be rerouted. The existing southern and western portions of the dining hall were in a low-lying area with insufficient drainage at the loading dock. Underground 24” pipes were replaced with 60” pipes to ensure adequate drainage. A portion of the new piping would be under the southwest corner of the facade, so the work had to occur prior to laying that foundation.

Rock excavation of up to a 12-foot rock cut was anticipated, requiring blasting to remove the rock. Access to the blasting area was tightly controlled, and explosive shots were designed to fracture the rock with minimal impact to adjacent structures. Since the older dining facilities were brick, inspections were performed to evaluate the existing conditions and the team installed a crack monitoring system to document and evaluate existing cracks in the brick facade, as well as any new ones that might appear.

Air quality and access maintained for dining service

Rodgers DPR was committed to ensuring the safe and efficient continued operations of dining services for UNCG's students. Dust migration was minimized into occupied and food service areas through the use of containment walls along with air scrubbers to place the workspace under

negative pressure. Room pressure was routinely monitored using a differential pressure monitor throughout the project.

By the end of the second phase, three of the five dining wings were renovated. Four wings were in operation and serving 10,000 meals a day. These wings were connected by the old roof dome, which needed to be removed and the central area closed to students for Phase Three. Access to dining service was maintained via a temporary corridor around the perimeter connecting the four active wings.

Managing water intrusion

In the third phase of construction, the existing roof dome over the central area had to be removed and additional structure installed to support the new glulam beams for the new roof, which would be both lighter weight and add warmth to the new finished space.

To protect the open central area, the original plans called for a temporary tented roof over the unprotected area. The Rodgers DPR team devised an alternate solution, which provided both greater efficiency and cost savings. The temporary roof would have cost the team in terms of time and manpower, since it would need to be removed daily for crane access and construction activities and replaced when work was completed each day to protect against water intrusion. Instead, the walls of the five adjacent dining wings were weatherproofed up to about four feet above floor level and the new floor slab in the central pentagonal space was protected with a temporary waterproofing membrane, creating a water-tight “bathtub” effect in the central area and keeping the over-head span open for construction activity. Water was channeled out of the area into the new storm drain system using temporary floor drains.

A partial flat roof area remained in place around the perimeter of the central commons, providing an upper level for work to occur during the new roof installation. Once the new domed roof

was installed, the temporary waterproofing protections were removed and the partial roof and walls were demolished, further opening up the central space.

One of the advantages of this solution was in providing full access for the crane's reach over the central area without obstruction.

Even so, crane use was limited since safety precautions precluded flying over the occupied and in-service dining wings. All deliveries and crane work had to be carefully coordinated to keep subcontractors on schedule.

Special challenges working around and within a dated structure

Additional challenges of working on older facilities included dealing with hazardous materials. Since the five dining wings were originally built from the early 1900s to the 1980s, it was known there was lead paint and asbestos in every wing. Prior to beginning renovation work, the space was inspected by a licensed asbestos inspector. Removal was carefully scheduled and performed by an abatement contractor to remove the known asbestos during demolition. When additional asbestos was discovered, work was immediately halted, the owner was notified, and the area was made safe and abated by the contractor. In each instance, the consultant performed clearance assessments to ensure Rodgers DPR's employees and subcontractors were returning to a safe work environment.

Arched wood roof is lightweight solution

While this 119,000-square-foot project showcases the beauty of heavy timber on a grand scale, much of the advantage of using wood came from its light weight. The arched glulam roof structure was designed to resolve the complex geometrical challenges of the arrangement of five existing building wings around a pentagon-shaped central space. Prior to the renovation, this central space was filled with confusing walls and corridors that

segmented the building and blocked any visual connection between the wings. The decision was made to remove all of the existing walls from the central area, expose the masonry gable ends of the existing wings, and clear span the new roof 106 feet across the central commons.

The light weight of individual glulam arches allowed them to be erected over the building's interior, while the crane reach required for a heavier building material would not have been possible.

Construction progressed while activities in the central area continued operation. The wood roof structure, designed to float the 106-foot distance above the gambrel roofs of the existing wings, was more cost effective than a similar steel form.

Skylights between each pair of primary groin arches reinforce the geometry of the solution while bringing abundant natural light deep into the building's interior.

Ten new concrete columns founded on micropiles were "drilled" down through the existing building to support the new roof. The 10 primary glulam groin arches rise and converge on a steel compression ring above the center of the space and rest in steel saddles atop the new concrete columns. Steel tie rods connect to a steel tension ring suspended below the compression ring and anchor steel brackets across the low end of each pair of primary arches to resist their outward thrust.

Careful detailing of the wood connections was employed throughout the design to enhance aesthetic effect and structural performance.

BIM was used in the design drawings and the fabrication drawings to verify conditions and clearances and to visualize the complex component intersections. The detailed fabrication drawings, in combination with exacting fabrication and careful control of the support structure geometry, allowed the roof structure to be accurately erected with no field modifications.

The warmth and beauty of the wood created an inviting and light-filled space, transforming the existing facility while defining the warm aesthetics of the newly-renovated dining hall.

Innovation and Technology

Point Cloud 3D scanning

The dining hall renovations posed numerous challenges that required innovative approaches. Using technology that was still relatively new at that time, Rodgers' Virtual Design and Construction (VDC) team used state-of-the-art Point Cloud 3D laser scanning technology to accurately model and measure the angles of the existing structure to ensure the correct fabrication and fit of the new glulam beams for the domed roof—which were installed with no field modifications required, eliminating potential cost and schedule delays.

360 Glue enhances trade coordination and communications

The project team 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.

Although contract documents and design drawings were complete prior to the start of construction, once demolition began it was discovered that many conditions were unknown or not previously documented. Field modifications were necessary, and Rodgers DPR's superintendent used an iPad in the field to access drawings and the BIM to coordinate solutions as needed with the architect and other team members.

- *"The integration of PME/FP systems into your 3-D BIM model was essential in coordinating the building systems, avoiding costly conflicts in the field. This saved numerous hours and dollars, and served as a training tool for the Owner's operations team throughout construction."*
-Cheryl Walker, FAIA, Principal
Gantt Huberman Architects

Rodgers DPR's VDC team provided training in 360 Glue for the designers, owner and subcontractors. The team ran monthly coordination meetings with the design team including the kitchen designers, and bi-weekly coordination meetings with the trade contractors.

Awards and recognition

The project was recently ranked among the top construction projects completed in the Triad area by the *Triad Business Journal* on August 28, 2015. It received a regional "Wood Design Award" from the Wood Products Council, and a "Certificate of Merit" from the State Construction Office, presented to the design and construction team. *Business NC* magazine will include the renovations at UNCG's Dining Hall among its "Building North Carolina" featured projects in November 2015. On November 19, ABC of the Carolinas awarded an Eagle for Excellence in Construction.

In April 2014, UNCG presented Rodgers' Virtual Design & Construction Manager, Daryl Key, with their "Craftsmanship Quality Award" for her "outstanding work associated with BIM modeling for the project."

The UNCG dining hall project is registered for LEED® Silver certification.

Success defined by client satisfaction

- *"I am proud to be a part of the project. It has been a once-in-a-lifetime experience. Teamwork and dedication from all parties has been something you don't experience every day. It is something special. I can't put it into words. You have to feel it."*
- Fred Patrick, AIA, PE, LEED AP
Director of Facilities Design and Construction, UNCG

Construction was complete and all dining services restored in July 2015.

Quality of Finished Project

The Dining Hall Renovation at UNC Greensboro includes the complete renovation and addition to the main campus dining facility. The existing building, which is centrally located, includes a 3-story addition that faces the campus fountain plaza and creates a stronger entry. The new entrance facade is primarily glass, allowing visual connectivity from both the exterior and interior. Balcony seating at the second floor adds to the dining experience. The interior renovation consists of creating diverse and dispersed serveries for themed food venues, a food theater,



and complete revisions to all administrative and back-of-house functions, as well as new fire protection, plumbing, mechanical, and electrical systems.

Phase 1 consisted of constructing the 37,330 sq. ft. addition which unifies the 1922 and 1939 wings and 1986 addition into a lively transparent façade with balcony seating and creates a new entrance connected to the central campus fountain plaza.

Phase 2 completely renovated the 1927 and 1939 wings to provide seating, a food theatre, relocation of the main dish room, and complete upgrades to HVAC and electrical systems. Existing steel joists, wood decking and brick walls will be exposed, creating soaring 30-foot high ceilings. These renovations will also be mirrored in Phase 4 of construction to the 1922 and 1925 wings along with improved and updated loading and delivery answers.

The real “magic” happened in Phase 3. With all circulation moved outside of the building’s center, the center was deconstructed, the historic cupola removed, and the serveries dispersed to reflect emerging dining trends. The existing roof was replaced with a complex pentagonal dome consisting of an exposed glulam and wood structure. Daylighting is introduced into the core of the building by skylit ribs integrated into the domed structure.



- After the old roof dome was removed, supports were installed for the new glulam wood beams. The beams and new domed roof were installed over the existing exterior walls and partial perimeter roof which provided a work surface. The walls and partial roof were later removed to further open up the atrium space under the wood dome and skylights.