

Virginia Tech War Memorial Hall: Integrative Team Design

Abstract

War Memorial Hall, at Virginia Polytechnical Institute (Virginia Tech), in Blacksburg, Virginia, is made up of a 1924 headhouse and an addition that was completed in 1972, that for this project, will be a complete demolition and rebuild in its footprint. The 220,000 square-foot building houses the recreational sports department, offices and classrooms for the school of education, registrar, and will soon house a Wellness Hub which includes a Knowledge Commons, a relaxation zone, and a grab-and-go healthy snack bar among other spaces.

As a capstone exercise, three student teams were paired with professionals in allied fields to create a robust collaboration between industry mentors and engineering students to help identify problems early in design, brainstorm solutions, and to verify work and progress. Communication was carried out through scheduled class time through videoconference or in person, weekly discipline design meetings at the professional's offices, and less-formal emails for occasional guidance. Student design teams paired with teams of licensed professional engineers to create fully integrated designs of the renewed War Memorial Hall. Using lessons learned in five years of coursework and required internship experiences and guided by the diverse experience of the professional volunteer mentors.

Within student design teams were mechanical, electrical, and structural discipline sub-teams to address and exceed Virginia Tech's integrated design goals. These challenges include achieving 30% increased thermal performance, designing for a spatial daylight autonomy of at least 40%, providing natural ventilation strategies in all exterior classrooms and offices, creating a cohesive façade for the original 1924 structure and new addition, and finally, designing a Wellness Hub within the existing 1924 structure.

Each discipline was responsible for designing their respective building systems and coordinating with other disciplines to provide a cohesive final design. Some highlights detailed within include structural design for a gravity system mainly comprised of composite steel framing supported on shallow spread footings and incorporates braced frames to continue the usage of steel in the lateral system. Precast concrete bearing walls on continuous footings are designed to allow optimal space usage and around the natatorium to ensure structural integrity in its corrosive environment. The gymnasium and natatorium roof systems utilize long-span DLH joists to allow for openness. A rainwater reclamation system was designed for greywater harvesting to be utilized in hose bibs, urinals and toilets in the locker room, as well as irrigation for the drill field. Reuse of the original Hokie Stone saved resources while allowing for synthesis of design between the 1924 head house and the new build. That combined with large open spaces required had to be considered by the structural team for support, as well as the mechanical teams for building thermal performance.

Safety of the occupants and the campus community were of the highest priority in every aspect of design, therefore, discipline integration was present in every detail for fire protection, security, and emergency considerations. These systems are backed up by emergency power systems. Structural teams included a firewall between the 1924 headhouse and the new construction to prevent fire from spreading from one building to the other through the link. An active shooter detection system was designed with detection devices located at the main entrances, in corridors, and in large gathering spaces.

Through this professional-level design process, students were able to gain and further develop skills and learn the types of knowledge that must be learned through experience. While designing War Memorial Hall, working with peers and industry mentors motivated team members to develop the discipline needed and both the technical skills for design and essential skills in communication and collaboration needed to carry out a large-scope project impacting community experience.