

EXECUTIVE SUMMARY

Depth Study: Steel Re-design

The Army National Guard Readiness Center addition is an 8-story joint headquarters building located in Arlington, Virginia. It consists of 3 underground levels, 5 above grade levels, and a mechanical penthouse. The building is constructed of cast-in-place concrete with reinforced shear walls. The building includes large data areas, a library fitness center, open office space and office suites, and sensitive areas protected by SCIFS. A large plaza at the 1T level doubles as a green roof. It is anticipated to achieve a LEED silver rating.

Due to the national significance of the building, the structural design of the Army National Guard Readiness Center Addition was guided by progressive collapse and blast requirements. For the purpose of this thesis, the problem of progressive collapse shall be reevaluated for an alternate steel framing system. With the added risk of terrorist attacks and other threats on the building's structure, blast and explosion loading will also be considered for the new steel structure. Through research and analysis of various load cases and various collapse scenarios, the structure will be designed to protect the occupants from potential disasters.

Breadth 1: Architectural

The change in structural systems from concrete to steel will inevitably have an effect on the floor layouts. After the steel structure is redesigned and it becomes clear where it will impact the floor plans, spatial relation exercises such as bubble diagrams will be used to reconfigure the plans and create a working typical floor plan that fits with the proposed structure. Final drawings will be created using AutoCAD and will be included in the final report. Along with the floor plans, the building's façade will also be affected by the change in structural layout. Sketches will be used to determine a viable solution to the façade.

Breadth 2: Construction Management

Curing time and formwork construction can be eliminated from the construction schedule when changing the structural system from concrete to steel. Procurement time however, may increase the construction time and must be considered as well. To account for this and other impacts the redesign will have on the project schedule and cost, an in-depth analysis will be completed to determine if the proposed steel system is an economical alternative to the existing concrete structure. To ensure that this analysis is as accurate and true to life as possible, general contractors, sub-contractors and vendors from the Arlington areal will be consulted.