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Spring Thesis Project Breadth Proposal

Submitted: 12.13.2002

ANALYSIS I – Alternate Curtain Wall System

Existing System

A metal-and-glass curtain wall system covers six stories of the south façade of the Elliott School of International Affairs. Installation of the stick system progressed slowly, resulting in numerous delays to interior work and, ultimately, the overall project schedule.

On the six floors of the Elliott School with the metal-and-glass curtain wall, all rooms along the south façade of the building were left with bare metal studs, while drywall was hung, finished, and painted in the spaces within the building. The inability to completely close the building from weather elements led to an inefficient progression of work as numerous trades would complete work in the majority of the sixth floors, move men, equipment and materials to the next floor, only to have to later return to finish the rooms originally exposed by the lack of a curtain wall.

Metal-And-Glass Curtain Wall

Alternative and Analysis

A prefabricated metal-and-glass curtain wall system will be analyzed for application on the Elliott School project. The analysis of the unitized curtain wall system will attempt to decrease the duration of installation, allowing for the shortening the overall construction schedule, while maintaining the complete intent of the architectural design.

The unitized system will be comprised of the same components as the stick system, but the will allow the majority of the components to be assembled in a manufacturing plant under controlled working conditions. The unitized system will promote quality assembly and allow for the added fabrication lead time and rapid enclosure of the building. The unitized system will require three joints along each mullion and rail, while the stick system had just two. The added construction joint along each mullion and rail will require additional effort in the related engineering and shop drawing processes, as well as qualified installation.

The analysis will weigh the likely added engineering and factory costs to the impact on construction schedule. A schematic redesign of the existing system will be created and then its design and installation costs will be estimated. The redesign and cost estimation will be done using information from construction and engineering texts as well as feedback and data from the project's curtain wall contractor, Ridgeview Glass.

Core Thesis Investigation Areas Addressed

- Value Engineering Analysis
- Constructability Review
- Schedule Reduction/Acceleration
- Systems Engineering/Integration

ANALYSIS II – Alternate Tiered Seating System

Existing System

Ten of the academic classrooms of the Elliott School contain tiered seating. The layout, quantity of tiers, and general size of the seating arrangements vary depending on the specific classroom. The tiered seating was constructed of cast-in-place concrete slabs on metal decking, which was supported by concrete block. The

radius and edge detail of the slab was formed by site welded steel nosings. The intensive steel work required to create the unique edge detail resulted in delays to the construction schedule.

The tiered seating levels were constructed of cast-in-place concrete to allow construction lifts the necessary room to maneuver for the installation of electrical, lighting, mechanical, plumbing, and ceiling components. Although intended to provide a minimized construction schedule, by easing the installation of overhead materials, the time added to the project through the delays in forming the steel edge detail were significant.

Alternative and Analysis

An investigation into prefabricated tier components will be performed. Form systems are also currently available from numerous manufacturers, including Stadium Savers Ltd. and Enterprise Facilities, for utilization in sports venues and theatres.

Also, the Elliott School project's concrete contractor, Miller & Long, regularly precasts stair components on job sites for later installation. Sections of stairs are precast within the building or onsite with the remaining concrete from pours made throughout the site. Once the stairs have been fully poured and allowed to cure, they are lifted from the ground and set in place. A similar process for casting components for the tiered seating system will be investigated.

The utilization of prefabricated seating components will be analyzed on the basis of constructability, cost, and impact on schedule. A schematic design will be created for both an offsite prefabricated system as well as an onsite precast concrete system. Manufacturer estimates as well as data from RS Means and ICE estimating software will be used to create cost and schedule estimates. The cost and schedule estimates will be compared to the actual budget and schedule of the Elliott School

and a determination will be made concerning the effectiveness of the alternate systems in reducing schedule while not dramatically increasing project cost.

Core Thesis Investigation Areas Addressed

- Value Engineering Analysis
- Constructability Review
- Schedule Reduction/Acceleration
- Systems Engineering/Integration