

Thesis Proposal

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Construction Management Option
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Constitution Center

400 7th Street SE, Washington, DC 20024

NATALIE L. BRYNER

CONSTRUCTION MANAGEMENT OPTION

CONSTITUTION CENTER

400 7TH STREET SE, WASHINGTON, DC 20024



BUILDING STATISTICS

- Size: 1,500,000-SF base building and 600,000-SF parking garage
- Number of Stories: Three-level underground parking garage, 10 stories + Pent House
- Occupancy Type: Class A Office Space
- Cost: \$246 Million GMP
- Construction Dates: July 2007 - November 2009
- Delivery Method: Design-Bid-Build
- LEED Gold Project



MECHANICAL & ELECTRICAL

- Centralized Plant in the Penthouse Housing:
 - Two 800 h.p. Boilers
 - One 350 h.p. Boiler
 - Three 1200 ton Trane Chillers
 - Eight 30,000 CFM Trane Air Handlers
 - Eight 30,000 CFM Semco Energy Recovery Units
 - Four 1200 ton Cooling Towers utilizing 6,700 Active Chilled Beams
- Power distribution system of 13.8 kVA feed from four primary switchgear connected to Pepco feeders
- 10 secondary 4000A transformers within the garage and Pent House levels
- Two 1000 kilowatt generators are roof mounted to provide power back-up to the critical building systems during a power outage
- Two dedicated chiller/purifier drinking water systems that continuously circulate water throughout the building
- Custom made Chilled-Beam System from Germany

PROJECT TEAM

- Owner/Developer: David Nassif Associates
- General Contractor: James G. Davis Construction Corporation
- Owners Representative: Kramer Consulting
- Architect: SmithGroup, Inc.
- MEP Engineer: SmithGroup, Inc.
- Civil Engineer: Wiles Mensch Corporation
- Structural Engineer: SK&A

STRUCTURAL

- Precast panels found at all four corners of the building, which frame the spandrel glass
- Blast resistant curtainwall throughout at Streetscape and Courtyard, with floor two being the most resistant including an air barrier system
- Metal panel on the Pent House level to conceal the MEP equipment
- Blast protection in garage tenant space, entrance ramp, internal ramps, electrical rooms, telecom rooms, elevator shafts, egress stairs, and exposed columns
- Two-way waffle slab on all floors except the Pent House

ARCHITECTURE

- Renovation of an existing building, originally constructed in 1976 and occupied by the Department of Transportation (DOT)
- 4 separate, but integrated quadrants that have their own elevator, stairs ways, bathrooms, electrical closets, communication closets
- One acre of courtyard that is a private, secure green space with fountain, seating areas, sculpture, and 32 Honey Locust Trees that are 11'-15' tall
- White Marble and Jerusalem Limestone are located around the first level of the building, creating a boarder for the spandrel glass located at the storefront entrances
- Built-up roofing system and metal panels used to conceal the MEP equipment on the Pent House level



RENDERINGS PROVIDED BY SMITHGROUP, INC. AND STUDIO CHRISTEN

EXECUTIVE SUMMARY

The following proposal contains information about the research that will be conducted during the spring semester. This research will be based off of four analyses that pertain to the construction of Constitution Center. There are four analyses that will be outline include the chilled beam systems, curtain wall installation, structural integrity of the parking garage, and pedestrian safety.

Analysis 1:

The first analysis deals with the chilled beam system being installed. This is the largest system being installed in the United States and provides an area to gain knowledge to a system that may become widely used in future buildings. This analysis also provides an area for a critical industry research and a mechanical breadth. Both of these topics will deal with the commissioning requirements for Constitution Center.

Analysis 2:

The second analysis incorporates the MAE Graduate-Level component of *CE 533 - Construction Productivity Analysis and Performance Evaluation*. The research would focus around the curtain wall installation procedures and how they impact both the schedule and the site logistics.

Analysis 3:

The third analysis incorporates a structural breadth for a redesign of the parking garage waffle slab. During the renovation process, quadrants of the parking garage were completely shut down in order for the floors to be updated. The redesign will focus on a two-way reinforced concrete system and a flat plate, drop panel with column capitols.

Analysis 4:

The final analysis will study the safety requirements for the pedestrians about Constitution Center. Since the L'Enfant Metro Station Entrance was within the construction site, it was a problematic feature to keep the pedestrians safe, but not limiting the use of the metro or the work taking place on the construction site. This research will also be studying a critical industry issue and will allow for the expansion of knowledge in a field that is very important on every construction site.

APPENDIX A:

Mechanical Breadth

While analyzing the chilled beam system, the chance to evaluate the commissioning requirements for the mechanical systems will provide an opportunity for a mechanical breadth as well as a critical industry issue. With a project the size of Constitution Center, the commissioning requirements are very detailed. After evaluating the requirements, if necessary an updated or new system of tracking the commissioning will be proposed.

Structural Breadth

Analysis of the structural system will be conducted in order to determine the renovation requirements of the waffle slab. If necessary, an updated or new system will be proposed. There are two options for a redesign: a two-way reinforced concrete system or a flat plate, drop panel with column capitals. Both of these redesigns will have to have a detailed analysis on loads, cost, and schedule and will provide a structural breadth to be applied to the construction management issue.