

Revised
Thesis
Proposal

1099 New York Avenue
Washington, D.C.



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Executive Summary

This proposal serves as an outline for the issues I plan research and the analyses I plan to conduct in the spring semester. The four topic areas that will be explored include sustainability, MEP coordination with Building Information Modeling (BIM), the constructability of the east façade, and the scheduling impact from changing the completion date of the Main Lobby.

Analysis I (Includes Mechanical and Structural Breadths)

With energy conservation on everyone's mind, building green has become a popular method in the industry as of late. As a competitive developer, Tishman Speyer is always looking to be at the forefront of the construction market with each of their high profile projects. I will investigate the current LEED status of the project and develop an outline that will include which aspects of the project can be altered to earn a LEED Silver Rating.

This analysis will feature both breadths for my research. Breadth work will be done in the Mechanical and Structural fields. A redesign of the mechanical system will be looked at as well as structural a close look at the implications for adding a green roof.

Analysis II

During core construction of the building it was discovered that although the MEP systems had been coordinated on the drawings, there was still difficulty with fitting all the components into the physical space. A redesign of the plenum space was required to ensure that each system fit. The same problem has been noticed in the lobby area as well. In an effort to remediate this issue, I will be looking at the different methods of MEP coordination that are currently employed by professionals and comparing them to methods that are utilizing BIM.

Analysis III

Below the east façade is a public alley that has to remain accessible for the duration of the entire project. This presents a sequencing problem with the trades since a swing station must be used in lieu of stick-built scaffolding. If the scaffolding were used, multiple trades could be working simultaneously as opposed to in succession of each other. I will be investigating both alternative façade and staging systems in this analysis.

A. Project Introduction

1099 New York Avenue is to be Tishman Speyer's new premier office building located in the heart of Washington, D.C. near the newly constructed convention center. The New York based company is looking for the opportunity to establish itself in the D.C. market.

The ground floor will serve as a main lobby for the 10 stories of office space above and will include two retail spaces that will have separate street access located on both New York Avenue and 11th street. Below grade will be 4 levels of parking structure that includes a fitness center accessible to all future tenants.

The entire structural frame of the building is composed of a cast-in-place concrete system that will be post-tensioned for additional strength. The cooling towers and emergency generator are located in the mechanical penthouse. Each floor is served by its own Air Conditioning Unit which is located in the centrally located in the core of the building. The fuel storage for the generator however is located on level B2 thus requiring a system of pumps for fuel to serve the penthouse.

The primary feature of the building is a state of the art high performance glass curtain wall in which each piece of glass lies in a different horizontal plane.

The project construction cost is \$31,600,000 and has an expected duration dating from June 2006 to March 2008. Thomas Phifer is the Architect and James G. Davis Construction is the General Contractor in the Design-Bid-Build Delivery System.

The areas I chose for analysis include sustainability, MEP coordination, scheduling and sequencing. These concentrations were chosen specifically because they had developed as problem areas on the project. More detail as to what was problematic is outlined in each section of this proposal.

B. Analysis I - Sustainability (Includes Mechanical and Structural Breadths)

Problem

Shortly after construction on 1099 New York Avenue began, Tishman Speyer Properties adopted a new company wide policy which stated that all new projects were to achieve at least a LEED Silver Rating. 1099 New York Avenue was not designed to be a sustainable building, therefore in order to achieve this rating the design and construction methods would have to be altered.

Goal

The goal of the research will be to investigate the variety sustainable systems already utilized in the industry and determine what aspects of 1099 New York Avenue can be altered to make the

building a LEED Silver Project. This will include an in depth analysis of sustainable mechanical systems and green roofs to serve as my breadth topics.

Methodology

In order to make 1099 New York Avenue a sustainable project, several building systems and construction methods would have to be augmented to meet LEED specifications. Investigation into this issue would have to begin with research in the U.S. Green Building Council's requirements for the different LEED Ratings. Once obtained, the construction documents should be reviewed to see if any aspects already meet LEED specifications. Next, a list of areas for improvement should be composed and be assigned the point values. Possible areas of focus could include the mechanical system, the addition of a green roof, building enclosure, and the recycling of waste materials.

Typically on a project, the largest portion of LEED points comes from the mechanical system. As my Mechanical Breadth, I will redesign the building's mechanical system to further comply with LEED requirements. This will include performing all of the necessary design calculations and sizing new equipment according to building loads. To perform this analysis for my project, I would begin by researching the common components that are used on sustainable projects through literature and survey, determine which ones would be integrated the best and appropriately size them for the building. In addition I will perform an assemblies estimate to provide cost differential information.

Currently, the roof of the building is designed to be accessible to the public. In light of this, the addition of a green roof becomes another valid LEED option. If vegetation were to be incorporated into a certain percentage of the roof area, the rating for the building would be higher. Of course changing the composition of the system would require investigation into the structural integrity of the current roof structure in order to ensure the new system can still be supported. As my structural breadth, I will determine how a green roof would alter the loading on the roof then compare it to the maximum load allowed. If the weight of the green roof exceeds that load, then I would have to calculate if a new slab thickness, additional reinforcement, or change in column stress would prove to be sufficient.

For the building enclosure, the appropriateness of the energy and light transfer levels could be investigated to see if they meet LEED specifications. The composition of the north and east facades could be analyzed as well for proper materials and insulation.

During the construction process, recycling waste materials can earn points for a project. The implication of a plan in which 50%-75% of all materials are recycled could prove to be beneficial. A cost analysis could be provided.

Preliminary Tools to be Used

- U.S. Green Building Council LEED Reference Guide
- Industry Professionals
- ASHRAE, ASCE 7 and ACI 318 Codes

Expected Outcome

Through my research I hope to identify a clear guideline for what aspects of 1099 New York Avenue could have been altered in order to achieve a LEED Silver Rating. The guideline could serve Tishman Speyer as a reference for achieving LEED Ratings on future projects.

C. Analysis II - MEP Coordination with Building Information Modeling**Problem**

During core construction of the building it was discovered that although the MEP systems had been coordinated on the drawings, there was still difficulty with fitting all the components into the physical space. A redesign of the plenum space was required to ensure that each system fit.

The same problem has been noticed in the lobby area as well. With the installation of the stone flooring and the ceiling system above, the available usable space is decreasing. This causes concern, because as stated before, the lobby is one of the main selling points of the building.

Methodology

To begin my research I would like to interview different professionals that are currently using BIM for coordination purposes, and research various journals and articles to create a general consensus of what the standard operating procedure is since there is not one currently in place. Some of the questions I will be looking to answer include: What parties are typically involved? What roles do they play? What is their process? Were there any specific instances where BIM proved to be exceptionally beneficial?

Once my review is complete, my areas of focus will include, but are not limited to, efficiency of design, schedule duration, and communication between trades. Other topics of discussion may include the learning curve that is experienced while implementing BIM.

I will then develop three dimensional model of the typical core on my thesis project and its mechanical systems based off of the construction documents. I will do this by using AutoCAD or one of the Revit Applications. Once the model is complete, I will follow the standard operating procedure I developed through research. Some steps may include importing the model into a

viewing application that has collision detection capabilities, reviewing where the design flaws are located, and making the necessary adjustments to the system. This will be done in order to compare and contrast the different methods on a single project and illustrate what the advantages and disadvantages of each are for the overall project.

Once this experiment is complete, I will report my findings and create a commentary for each of my procedures.

To tie into other analyses, investigation can be done on BIM and its implementation with LEED mechanical systems. This resulting process can be a baseline for how MEP Coordination on sustainable projects in the industry can be conducted using BIM technology.

Preliminary Tools to be Used

- Industry professionals
- Revit MEP 2008
- Navisworks Jetstream 5.0

Expected Outcome

This resulting process should reflect how MEP Coordination on sustainable projects can be useful, and illustrate the advantages that may be experienced in comparison to other primitive methods.

D. Analysis III - Constructability of the East Facade

Problem

The east façade consists of punch out windows and a masonry system that rests on brick shelves. Below the elevation is a public alley that has to remain accessible for the duration of the entire project. This presents a sequencing problem with the trades since a swing station must be used in lieu of stick-built scaffolding. If the scaffolding were used, multiple trades could be working simultaneously as opposed to in succession of each other.

Methodology

To solve the sequencing issues with the east elevation, the means and methods of an alternative wall assembly could be investigated. The use of the swing station cannot be changed because of site logistics; however, there may be another type of wall system that may be better suited for this type of installation. External Insulation Finishing System (EIFS) may be one of the plausible substitutions and a value engineering item as well. Research through literature or other projects could also be done on other types of enclosures or scaffolding options.

With the redesign of a system, other areas of the project will have to be investigated as well. The structural system will have to be analyzed to see if it has the capacity, insulation and energy transfer will have to be considered, the change in material cost, and construction duration will have to be presented as well.

If a different system does not prove to be beneficial, an analysis of the current sequencing could be done to see if a different order or activity duration would be the better alternative.

Preliminary Tools to be Used

- Industry Professionals and Literature
- IBC and ASCE 7 Codes
- Primavera Project Management

Expected Outcome

My efforts should yield an alternative façade system that would provide a more efficient sequencing of activities and an increased value to the project.

E. Weight Matrix

The following table is a visual representation of how I plan to distribute my time between the research and analyses mentioned above.

<u>Description</u>	<u>Research</u>	<u>Value Engineering</u>	<u>Constructability Review</u>	<u>Schedule Review</u>	<u>Total</u>
Sustainability	25%	10%	5%		40%
MEP Coordination with BIM	20%		5%	10%	35%
East Façade	5%		15%	5%	25%
Total	50%	10%	25%	15%	100%

Table E.1 Weight Matrix for time distribution