

Granby Tower
515 Granby Street
Norfolk Virginia



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Technical Assignment #3
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Executive Summary

This report outlines the issues I plan to research this spring. The PACE Roundtable held on October 24, 2007 was useful, because it helped to identify issues that are current in the industry and those that I may wish to research more. The issues covered at the roundtable included prefabrication, building information modeling (BIM), and labor/management shortages.

I have chosen to research further the issue of labor/management shortages issue. The purpose of this research will be to determine why there is a labor shortage and what can be done to stop. I will talk with industry professionals to get their opinions as to why this is happening and what they think can be done about. I may also have a questionnaire for graduating high school senior and college freshman to see if they have an interest in a job in construction.

The remaining sections of the report deal with analyzing the Granby Tower project further. One item I chose to analyze is comparing the current structural system to an alternate system, steel. The price, scheduling effects, and many other comparisons will be made between these two systems will be made and then a decision as to which works best for this project and why will be made. Another item I chose to analyze was the MEP system of the building. The main aspect of this section is to analyze ways in which value engineering can be applied for this project. The final area that will be analyzed is site congestion. Ways to get around and even prevent /minimize site congestion will be looked into.

Critical Industry Issues

The theme at this years PACE Roundtable event held on October 24, 2007 at the Nittany Lion Inn at Penn State University was “Building Collaboration.” The topics at that event included prefabrication, building information modeling (BIM), and labor/management shortages.

Prefabrication

Prefabrication is being used more and more in the construction industry. It can be applied to several aspects of construction and can be very useful if used correctly. Prefabrication is most beneficial if it is used from the beginning of the project, because it takes time to coordinate and is not something that can be decided on a whim if the outcome is to be of the best quality. Prefabrication can also be incorporated with green building and can be used to gain LEED credits.

Some benefits of using prefabrication are that the quality is typically better and it can be more efficient than typical stick built construction, since it is performed in a controlled environment. If used correctly it can also lead to a decrease in the schedule. Since the item is being constructed offsite in a controlled environment it can be built while other things are happening on site, where this would not be the case if it had to be constructed on site. Also since construction is happening in a controlled environment, weather will not have an effect on it being completed on time.

Some of the negatives of prefabrication are how does it get to the site. The prefabricated items will need to be delivered to the site; there are additional costs in this. Another issue is where the prefabrication can be performed.

Prefabrication could be beneficial for the Granby Tower project; it would be most beneficial for the curtain wall system. It could also be beneficial to prefabricate the layouts for the mechanical room and the condominiums. However the tenants may wish to layout the condominium in their own way, so prefabricated the layout for those may server to be very difficult.

At the roundtable event Dr. Horman was one of the panelists who talked about prefabrication. He would be very helpful in getting questions answered in this topic. Ted Border from Whiting-Turner could also be a beneficial in gaining information about prefabrication.

Building Information Modeling (BIM)

The thing I remember most about BIM from the roundtable is that it is more than just 4-D computer modeling and that it is an actual process. It is very useful during preconstruction as well as construction. During the preconstruction phase BIM can be utilized for performing takeoffs and estimates. During construction BIM can be very helpful in coordinating between subcontractors and can be very beneficial in reducing the schedule of a project by reducing coordination issues. BIM also had costs benefits. It is very useful for visualization and is a lot more helpful than 2-D CAD drawings.

A major downfall with BIM is getting everyone on the same side, yes it's beneficial but it also takes time to develop and people need to be trained to understand and use it. The main question that has to be asked with BIM is: How do you measure benefits? Do you measure

them with schedule and saving money or are they measured in the amount of effort it takes to implement something like BIM?

Dr. Messner was on the panel that discussed BIM at the roundtable and he could be a very useful source for information on BIM. Another person who could be very helpful is Kurt Maldovan from Jacobs Engineering.

Labor/Management Shortages

It was brought to our attention at the roundtable event that there is a shortage of worker's in the construction industry. This is happening because the people who have been in construction their whole lives are starting to retire and no one is stepping in to take their places. The main reason for this is because people have a certain image of what a construction worker is and what they do, which leads to the fact that with this image floating around people just do not want to work in construction.

Another reason for the diminishing amount of workers is a combination of things. One of these factors is a language barrier between workers and the people running the construction projects. Another factor is labor laws and government regulations.

Labor shortages and language barriers could become a problem on the Granby Tower project or any project for that matter.

Dr. Riley was a member of the panel that discussed the labor shortages and would be a great source for information on this topic. Also anyone who has been in the industry over the last twenty years and has seen the workforce diminish would also be very helpful in getting a firsthand account.

Critical Issues Research Method

Problem

Over the years the workforce in the construction industry has been diminishing. People who have been in the industry their whole lives are now retiring and nobody is entering the workforce to fill that void. People have a certain perceived image about construction work and are not entering the workforce. Couple this with labor laws and government regulations and the problem can only get worse. Not only are people not entering the workforce, but now you are being told who you can and can not hire.

Goal

The goal of this research will be to figure out why people are not entering the workforce, once that is discovered the objective will be to figure out how to either change their perspective of construction so people want to do it or what else can be done to get people interested in construction again.

Proposed Steps

Build on what was learned at the PACE roundtable about labor shortages. Why do people have the image about construction that they have? How can that image be changed? These are the types of things that need to be figured out.

The way this will be achieved is by talking to Dr. Riley and other industry professionals about the issue at hand and seeing what they have to say about the issue. Another step could be talking to graduating seniors or undecided college freshman and seeing if they would be interested in a career in construction, if no then why not.

These are ways to determine what people's image of construction actually is and what we can do to get them into the industry.

Problem Identification

Structural System

Several types of construction are being used for this project. The majority of the high rise section is CIP concrete with some CMU load bearing walls. The town homes are to be constructed using standard structural wood framing. There are also some structural steel connections being used. This will take a lot of coordination while performing the construction of the structure of the building.

The column sizes for the CIP concrete structure vary throughout the building as well as the CIP concrete beams. This leaves for a lot of different size formwork that may not be necessary.

Site Congestion/Lay Down Areas

The building footprint encompasses almost the entire site; this makes it very difficult to stage deliveries and for lay down areas. It will be difficult to coordinate the concrete deliveries for the CIP concrete structure; this will also be difficult once the trucks are on site.

Building Façade

The building façade is a hand set curtain wall. It is comprised of several items and is very difficult to construct. It is best if the façade can be prefabricated in sections off site and then set once it gets to site, as it would be very difficult to construct while on site. Since the façade is one of the main features of the building quality is also very important.

Miscellaneous

There was a slight funding issue that postponed construction for a month, this had a profound effect on the project because now it is behind schedule and methods will need to be taken to get back on track.

Technical Analysis

Structural System

An alternate structure for a structural steel structure will be analyzed and compared to the current structure which is a combination of structural elements. The impact on budget and schedule will be closely compared to that of the current system.

The first steps will be to analyze the loading for the building. Then the steel structure will be designed. The costs will then be calculated and a schedule will be made. This will then be compared to that of the original system.

The main reason for choosing to change the structural system is to be able to use fewer columns which will allow for more freedom with the layouts of the floor spaces. The steel can span a longer distance than the concrete which will allow for less columns being used.

Site Congestion

Changing the structural system will make an already congested site even more congested, but there are ways through this. Most likely a street will need to be closed down so deliveries can be made. The steel will have to be picked off the truck and then put into place. This will require a lot of coordination to get the deliveries made, but should require less coordination once the deliveries are made.

Mechanical System

Research will need to be completed to look into other mechanical systems available. The purpose is to try and reduce the amount of equipment needed without reducing the quality. Alternative heat pumps, boilers, heat exchangers, etc. will be looked into to see if more efficient equipment is available. Can the amount of equipment be reduced without increasing the sizes of the equipment? If the size of the equipment increases the loading will need to be checked to ensure that the structure can handle the load placed on it.

Weight Matrix

Description	Research	Value Eng.	Const. Rev.	Sched. Red.	Total
Alternate structural system		5	15	15	35
Site Congestion			10		10
Redesign of mechanical system	5	20	5		30
Labor Shortage Research	25				25
Total	30	25	30	15	100