

THESIS PROPOSAL

LAFAYETTE TOWER
WASHINGTON, DC
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CONSTRUCTION MANAGEMENT



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Executive Summary

This proposal serves as an outline for the specific issues that I plan on researching and analyzing during the spring semester pertaining to 801 17th Street NW, Washington DC, the site of Lafayette Tower. After a brief background on the project, three topic areas will be explored include a critique of the buildings column-free perimeters from both a construction management and structural point of view and the implementation of solar design.

Analysis I - Column-Free Perimeter (Construction Management Depth)

This analysis will assess the actual value of having column-free perimeters on three sides of the building, compared to including them on only one side, and determine which brings more value to the project with the big picture in mind. I feel that this architectural feature was overused in unnecessary areas and therefore cost the project time and money that could have been used elsewhere. This analysis will somewhat subjective but I plan on remaining as unbiased as possible throughout so that a concrete solution can be reached.

Analysis II - Column-Free Perimeter (Structural Breadth)

This analysis will include developing a typical floor plan with the column-free perimeter only incorporated on the South face of the building and evaluating it structurally. This will be a continuation of the depth study and will consider different designs in order to discover the best all around final product. Calculations will be run to prove structural integrity.

Analysis II - Solar implementation (Electrical Breadth/Critical Industry Issue)

This analysis will look the affects of incorporating solar design into the building systems in an effort to make the building more sustainable. With one of today's critical construction issues being energy and the economy, incorporating solar power into the design of a building addresses both. Solar implementation with not only reduce the life cycle costs of Lafayette Tower but also make it more sustainable which is important with the nations push for going green.

The weight matrix shows an approximation of how much time and energy will be placed on the core areas of investigation: critical industry issues research, value engineering, constructability, and schedule reduction. Along with the weight matrix, a time table (which is not attached and can be found in the "Thesis Proposal" section of my webpage) represents how my thesis will progress over the course of the semester. It will provide deadlines prevent procrastination and keep me from falling behind in a much less structured spring semester.

Background

Lafayette Tower is an 11 story core & shell office building in downtown Washington, DC owned by Louis Dreyfus Property Group. The design team consists of design architect, Kevin Roche John Dinkeloo & Associates, LLC, structural engineer, Tadjer Cohen Edelson & Associates, Inc. and MEP engineers, TOLK, Inc.

The project includes demolition of the Existing building that housed the FDIC Headquarters. Demolition began in August 2006 under an early start agreement and was completed in August 2007. The existing foundations and foundation walls were salvaged and support three tiers of rakers and tiebacks during demolition. The project team utilized a 3D scale model to plan the exact placement of the rakers and corner bracing to minimize the number of conflicts in the demolition of the existing and construction of the new structure. Construction of the new building started in August 2007 and will be completed in December 2008.

Lafayette Tower is designed to LEED Gold standard and will comprise 327,688 square feet of mixed use space, with the ground floor dedicated to retail. The combination of column-free perimeter and floor-to-floor glass curtain wall skin will offer spectacular views of the city specifically The White House and The Washington Monument. Lastly, the penthouse level will have a green roof terrace and there will be three levels of underground parking available for tenant use.



Figure 1 - Renderings of Lafayette Tower

Analysis Descriptions

Analysis I: Column-Free Perimeters (Construction Management Depth)

Problem

The column-free perimeters are an exciting feature to potential tenants because of the increased square footage of window space they provide on the North, West, and South faces of the building but they greatly increase the difficulty of construction due to the incorporation of detailed fall protection plans and cantilevered slabs.

Solution

I agree that the views to the South side of the building are worthwhile due to the fact that they overlook The White House. However, I don't feel the views to the West and North are worthy of the extra time, money and energy needed to incorporate this feature. I would like to analyze the effects of only incorporating them South face and come to my own conclusion whether or not they are worth including.

Methodology

The dollar value gained from removing this feature will be hard to determine. One of the items I'll have to examine and estimate is the cost differential between the current cantilevered slab to a normal PT slab. Along with that, I will have to ballpark a figure on how much additional time and money was lost due to implementing the atypical fall protection plan. And finally, I will have to determine how the change will affect the \$/SF rental price for the building if at all.

Resources

In order to obtain the necessary information, I will rely on the contacts I have made in the construction industry and attempt to obtain \$/SF rental costs from with my owner's representative or a realtor. Any other needed facts or values will be found through research online or through contacts found from that research.

Concluding Remarks

I feel that the gains from limiting the column-free perimeter to only the South face of the building will prove to be worthwhile. But also, I recognize that this analysis will be highly subjective. I will do my best to keep this analysis as unbiased as possible in order to determine if this architectural feature should have been included in this project.

Analysis II: Column-Free Perimeters (Structural Breadth)

Problem

In order to eliminate the column-free perimeters and cantilevered slabs, a new structural plan needs to be devised.

Solution

I plan to choose a typical floor and relocate the columns. The current sizes and strengths of the columns and slabs will also need to be evaluated to establish if they will support the new plan.

Methodology

My first step in the structural redesign will be to consult a few contacts from industry along with classmates in order to obtain some general knowledge about how a building is designed. During this process, I hope to come across a couple different options to consider for the new plan.

From there, I will select a new layout and begin analyzing it for structural integrity. I plan on trying to use the same typical strengths of concrete and sizes of rebar that are used throughout the building to keep things more simple for the subcontractors.

I will primarily use hand calculations in order to analyze the building. If time is available, I may also try to learn and incorporate the use of structural software to check my work.

Resources

In order to obtain the necessary information, I will rely on the contacts I have made in the construction industry, knowledge gained through the courses I have taken here at The Pennsylvania State University, and my peers.

Concluding Remarks

The somewhat odd geometry of the building may make redesign difficult. I will try to keep bay sizes as consistent as possible. Also, this breadth will be tied very closely to the aforementioned construction depth and parts from each will be tied in with one another.

This analysis will give me a much greater understanding of structural systems and their design techniques which will be very valuable to me as a new engineer.

Analysis III: Solar Implementation (Electrical Breadth/Critical Industry Issue)

Problem

With today's economy in a recession and the growing global awareness of green technologies, saving money and the environment is on everyone's mind. As a soon to be construction manager, both topics are of the utmost importance to me and lead me to the question: *what can I do about it?*

Solution

One answer to this question is to do everything in my power to try to incorporate as much sustainable design into my projects as possible. A great way to add sustainable design into Lafayette Tower would be the introduction of photovoltaic panels into the current building systems in order to utilize one of nature's greatest energy sources, the sun. I will investigate the use of different products including Solar Trackers which take the energy collect technologies of PV panels and place them on an array which "tracks" the sun across the sky to prolong the amount of time and efficiency of the energy collection.

The penthouse roof would be an ideal location for the implementation of solar technologies which would lower the buildings energy costs in the future and make the building more sustainable as a whole.

Methodology

Equipment and installation cost, availability of local contractors who have had experience with this type of system, coordination between the solar equipment and the existing electrical system, D.C. height restrictions, federal reimbursement for incorporating solar design, the city's net-metering policy, and the payback period for the entire system would all have to be considered.

To start this analysis, I plan to research online to find out popular products and what type of equipment is better suited for the D.C. area. After a product is chosen, I need to consider how it will be linked to the existing electrical system and what other implications will be involved with that such as constructability and schedule impacts.

Once those items are addressed, the only critical issues left would be to research the cost implications of other items mentioned above and weigh them against the potential financial (both energy costs and federal incentives) and environmental gains the system can obtain and determine if/when it will pay itself off.

Resources

In order to obtain the necessary information, I will rely on both the contacts I have made in the construction industry as well as knowledge gained through my sustainable design class that I plan on taking next semester. Any other needed facts or values will be found through research online or through contacts found from that research.

Concluding Remarks

I expect that the final assessment of the incorporation of solar design will be that it will indeed be worth installing and benefit the building in the long run.

Weight Matrix & Time Tables

Description	Research	Value Eng.	Const. Rev.	Sched. Red.	Total
Column-Free Perimeter (Construction Depth)	15%	15%	10%	5%	45%
Column-Free Perimeter (Structural Breadth)	10%	5%	5%	5%	25%
Solar Implementation	15%	10%	5%	0%	30%
Total	40%	30%	20%	10%	100%

Table 1 - Weight Matrix

Conclusions

Lafayette Tower is soon to be one of the most extravagant office buildings located in the District of Columbia and has already had a lot of value added into it by the General Contractor, Clark Construction, but I feel there are still some areas that could be changed to increase the value of the building as a whole. The three areas continually mentioned above, a critique of the buildings column-free perimeters both from a construction and structural point of view and the addition of solar technologies, are items that I believe may have potential to bring more to this project.

The solar implementation will have a greater upfront cost but they will pay themselves off over time with the energy savings along with the federal incentives. The other two do not necessarily add value to the project but have potential to reduce costs, save time on the schedule, and aid in the constructability of the project. This will allow the owner to either take back the extra savings, put the extra resources back into the project in an effort to receive a better final product, or a little bit of both.

I am very happy with the topics I've chosen because I not only find all three interesting and have a desire to investigate them further but think that the knowledge I will gain through their detailed dissection will be extremely valuable as a soon to be member of the construction industry.