

John Dixon

Construction Management

Aquarium Hilton Garden Inn Atlanta, Georgia



Spring 2007
Dr. Messner

Aquarium Hilton Garden Inn Atlanta, Georgia



Project Team

Owner:	Legacy Pavilion, LLC
GC:	Holder Construction Company
Architect:	Stevens & Wilkinson/Stang & Newdow
Structural Engineer:	KSI Structural Engineers
MEP Engineer:	B & A Consulting Engineers

Project Overview

Function:	Parking Deck/Hotel/Retail/Entertainment
Construction Dates:	June 2006 – October 2007
Size:	458,809 SF
Cost:	\$45,262,294

Project Features

- 242 Hotel Rooms Spread Throughout 14 Floors (Approx 202,464 SF)
- Parking Deck Featuring 670 Spaces Over 12 Floors (Approx. 256,345 SF)
- Approximately 14,200 SF of Retail Space on Lower Level of Hotel
- Approximately 8831 SF Sky Bar w/ Mezzanine on 14 Floor of Hotel
- Two Restaurants in Hotel Area
- Outdoor Pool/Spa and Indoor Pool on 7th Level of Hotel
- Storefront Glazing, Aluminum Panel, and EIFS Façade
- Metal Deck with 3 Layers of Insulation with an Elastomeric Sheet Membrane

Structural System

- Parking Deck is a cast in place concrete (long-span) structure
- Hotel consisting of cast in place (short-span) structure
- Post Tensioning to be used in slabs and beams
- 3000psi, 3500psi, 4000psi and 5000psi concrete are all to be used

Mechanical, Electrical, and Lighting

- Two 790GPM/Cell Cooling Towers
- Three Rooftop Air Conditioning Units Ranging from 2213 CFM to 2510 CFM
- One 20,565/19,125 CFM Rooftop Recovery Unit
- Each Hotel Room has individual Heating/Cooling System
- 120 and 277 Volt Lighting with wattage ranging from 75-1000 Watts
- 36 – 277/480V Panelboards and 46- 120/208 Panelboards service area

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Construction Management

CPEP Website: <http://www.arche.psu.edu/thesis/eportfolio/2007/portfolios/JPD210/>

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Executive Summary

The project for this thesis is the Aquarium Hilton Garden Inn located in Atlanta, Georgia. This is a mixed use project consisting of a hotel, parking garage, retail area, restaurant area, and a sky bar. Several building components are analyzed to see if an alternate means could be used to construct the building.

The first analysis looks at the foundation system on the project. The current system is a caisson deep foundation system. This caused many delays in the project due to underground conditions. The proposed mat foundation system was found to speed the construction schedule up by two months allowing the building to get out of the ground faster. The cost of this mat foundation system was much more expensive than the current system but this price difference may be made up in schedule difference.

The second analysis looks the foundation systems on the south entrance to the hotel. The construction documents call for a basalt stone that comes from Europe and has an extremely long lead time. The proposed StoneLite panels are cheaper, lighter, mechanically comparable and have a much shorter lead time than the stone façade system. The research in this thesis explores how BIM can be implemented and used in the construction process. It showed that although there is a lot to be learned about BIM it is still very worthwhile to have on a construction project.

PROJECT INFORMATION AND BACKGROUND

Project Information:

This is a 14 story cast in place Hilton Hotel being built across the street from the new Aquarium in Atlanta, Georgia. This is in downtown Atlanta, Georgia on the corner of Marietta St. NW and Thurmond St. NW and therefore is a very congested site. This building will include 242 hotel rooms as well as retail on the lower levels and a sky bar on the 14th floor overlooking the city. The building will include 2 restaurants, a coffee shop, retail space, conference rooms and both an exterior and interior swimming pool. The project will consist of demolition of an existing 4-story parking garage structure. After demolition the Hilton Hotel as well as a 12 story 670 space parking garage will be built on the site.

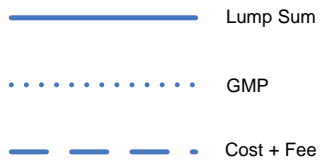
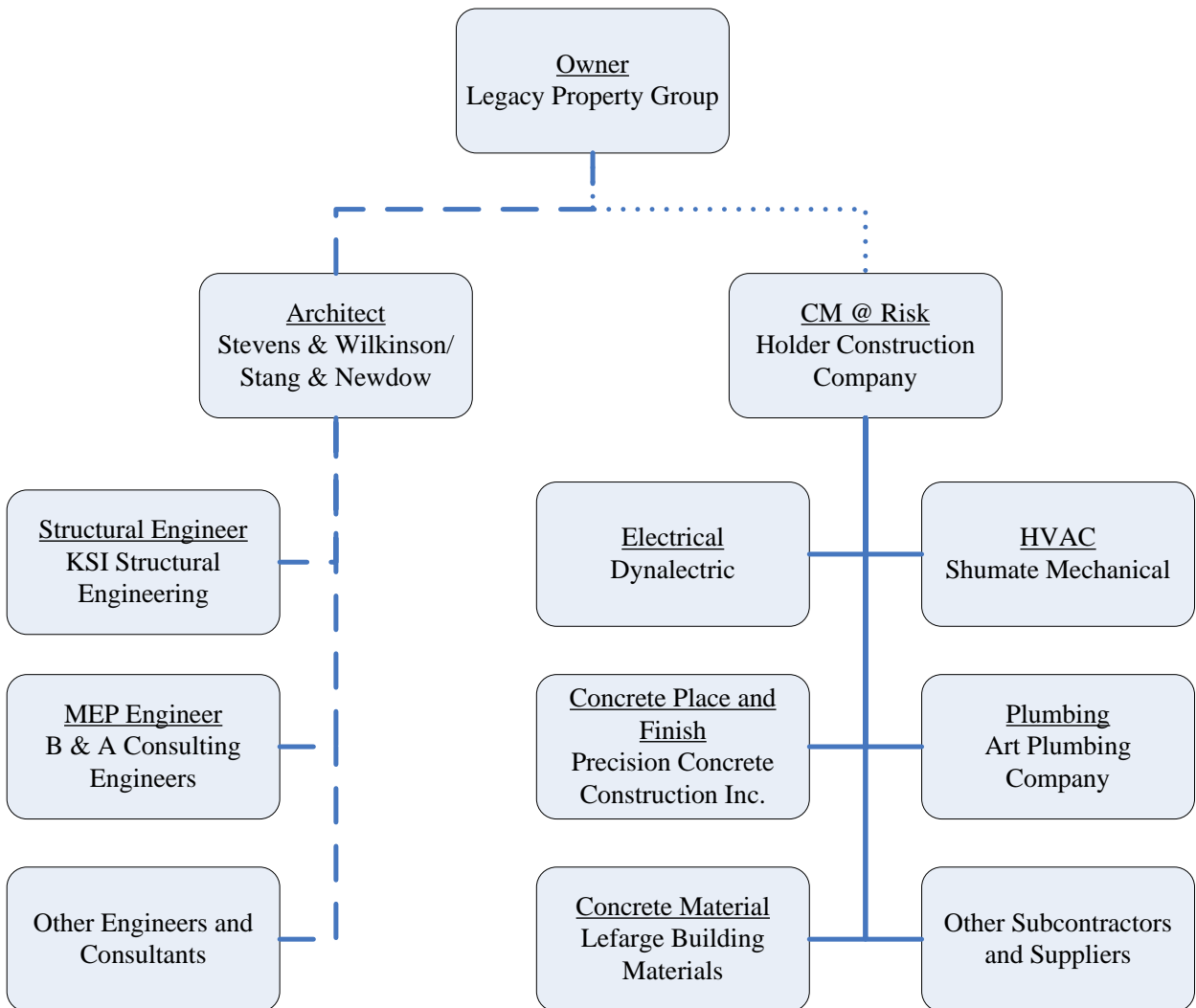
This hotel and parking garage are in a perfect location downtown across from the Aquarium and near the soon to be open World of Coke. These two tourist attractions should bring a large number of visitors to the hotel and parking garage. The primary members of the project team include Legacy Pavilion, LLC (Owner), Stevens & Wilkinson Stang & Newdow, Inc. (Architect), and Holder Construction Company (General Contractor).

Client Information:

The owner of this project is Legacy Property Group www.legacyproperty.com. They are a real estate developer based out of the Atlanta area. Legacy Property group is composed of a core group of executives with over 75 years of experience. The group works independently, with institutions, and with private investors to develop an array of projects in the Atlanta area including a \$200 million Legacy at Centennial Olympic Park mixed-use project, a 321 Embassy Suites Hotel, and the Centennial Park West condominium project. The Centennial Park West project was the first condominium to be built in downtown Atlanta. Legacy refers to this project as the Park Pavilion project, which includes the hotel, parking garage, retail space, restaurant, and sky bar. The project is being built because of the opening of the new Georgia Aquarium across the street as well as the soon to be opened World of Coke attraction coming in 2007. These two attractions will bring many tourists to the area which will help this project flourish. Hilton was able to be chosen as the hotel operator due to the fact a 30 year restriction between the city of Atlanta and another Hilton hotel in the Atlanta area. Legacy saw this as a great time to capitalize on this prime property and moved forward with this project. It is important for this project to be completed in a timely manner to not miss out on tourists visiting both the aquarium and the World of Coke.

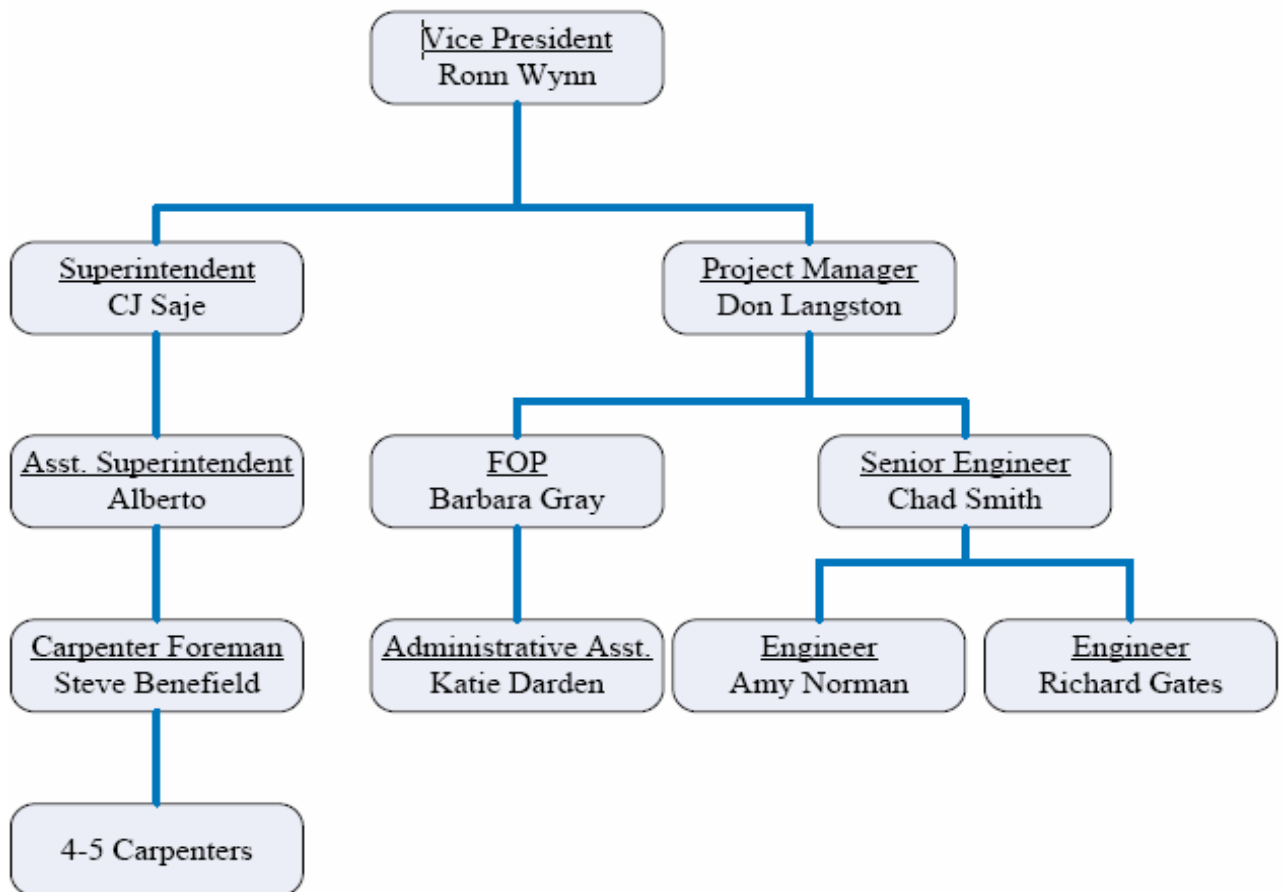
Project Delivery:

Holder Construction Company has a contract as a CM at risk on this job with a GMP contract. Holder was selected for this project with a negotiated GMP. Holder Construction then holds lump sum contracts with its subcontractors and suppliers and deals with the Architect and owner on RFI's and submittals. The design side is the standard cost plus fee contracts. These contracts are appropriate and pretty standard with Holder Construction Company.



Project Team:

Everyone on the following organizational chart is onsite to ensure the success of the project with the exception of the VP who works out of the corporate office. The VP in this case acts as the project executive while the Project Manager and Superintendent are onsite dealing with the day to day activities to ultimately ensure the project's success. Under the superintendent is an assistant superintendent as well as a carpenter foreman and some carpenters. The superintendent is responsible for the labor force in the field. The project manager is responsible for managing trades to ensure timely delivery and to work on the billing for the project. Assisting the project manager are the senior engineer and engineers to help with the day to day action of managing trades. He also has a field office processor (FOP) to help with billing and also an administrative assistant to assist the F.O.P with her daily activities.



Project Costs:

Parking Garage Not Included (Total Area = 225,500 SF)

Construction Cost (From GMP used by Holder Construction Company)

- \$36,000,000
- \$159.65 / SF

Total Project Cost

- \$38,000,000
- \$168.51 / SF

Major Building Systems

- Mechanical
 - \$2,801,000
 - \$12.42 / SF

- Electrical
 - \$3,215,000
 - \$14.26 / SF
- Structural
 - \$6,675,000
 - \$29.60 / SF

- Plumbing
 - \$2,700,000
 - \$11.97 / SF

General Conditions Estimate:

Please see further General Conditions Breakdown in Appendix A.

The general conditions estimate summary shows the charges the contractor has for general conditions. A further breakdown can be found in Appendix E. It can be seen that many items in the construction requirements that could be considered general conditions are bought into the subcontractors contracts. The total general conditions cost is \$3,222,298. This is about 7% of the total construction cost.

General Conditions Summary		
Bonds/Insurance/Permits		\$310,580
Staffing		\$1,264,570
Office Support		\$65,435
Safety		\$1,700
Temporary Utilities		\$7,200
Other		\$1,572,813
Total:		\$3,222,298

Please view Appendix A for the General Conditions Breakdown.

Detailed Project Schedule:

Please see Appendix B for Detailed Project Schedule:

Key Project Dates Summary

Establish GMP Price Proposal	5/8/2006
Issue Foundation Permit Documents	5/12/2006
Owners NTP Issued - Mobilize Construction	6/12/2006
Start Construction – Hotel	6/13/2006
Issue Structural/Building Permit Documents	7/7/2006
Receive Building Permit	7/7/2006
Issue 100% Contract Documents	8/18/2006
Start Construction – Retail	1/8/2007
Hotel Topped-Out	5/7/2007
Hotel TCO	11/9/2007
Hotel Substantial Completion	11/9/2007
Hotel Ops Occup./Preopening & Training	11/12/2007
Hotel Opening/Project Complete	12/28/2007

Site Work

The site work for this project is broken into three different areas due to elevations changes. Area A is at an elevation of 1000.5 ft, Area B at 1010.5 ft. and Area C at 1020.5 ft. This is due to the way the building and parking garage will interact with the site. There will be two tower cranes on site. The south tower crane will be placed in area A near the end of site work in that area on 9/4/2006. The west tower crane will be placed in area C on 9/20/2006.

Partitions and Finish Schedule

The hotel will start having partitions and finishes done before it is completely topped out. This requires a temporary roof to be built over floors 1-7 in order to keep the area safe from the outdoor elements. This allows partitions and finishes to begin on floors 1-7 while the rest of the structure is being closed in.

The schedule for the partitions of guest rooms, BOH, and public area partitions all follow a similar schedule. It can be seen in the schedule that floors 3, 4 and 5 allow 10 days for each phase of partitioning with 5 day overlap with the previous phase. Floors 6 & 7, 8, 9, 10, 11, 12, and 13 all follow this same schedule. All partitions and finishes in the schedule that do not have the phases broken out follow the common phasing of the partition or finish schedule of the area preceding it. For example the restaurant finishes have the identical time constraints as the meeting rooms finishes.

Site Layout Plan:

Please see Appendix C for the Site Layout Plan

The site layout plan is for the building envelope phase of the building construction. This is an interesting phase because all the work is on the exterior of the building in this very congested site. It can be seen that the two tower cranes are still in place during this phase of construction as well as a mast climbing system. Access to the site remains on the Thurmond Street side of the building. There are two small storage areas outside the building but not much storage is needed during this phase of construction. The offices for the jobsite staff are located across the street offsite due to the congestion of the site. All contractors are responsible for finding and paying for offsite parking for their employees.

Please view the Site Layout Plan in Appendix C.

ANALYSIS 1-Foundation System Analysis

Background:

The Aquarium Hilton Garden Inn project is being constructed on a site that was formally occupied by a parking garage. This parking garage was supported by a total of 41 caissons. According to the Geotechnical Engineering report, completed by NOVA Engineering and Environmental Inc., these caissons range from 34-42 inches and are designed to support 80 kips per square foot. However the calculations show that they are currently only supporting approx 35 kips per square foot. The maximum load the 42 inch caissons are currently supporting are 320kips. If these current caissons for the new construction an additional 475 kips of load may be added to this maximum taking the total contact pressure to 90 ksf which is higher than the designed 80 ksf. It was believed the caissons could handle this load if the caissons were on competent rock that was commonly used for caissons. However, the fact the lack of the former caisson construction put a lot of risk on the owner they followed these thoughts. This has caused the structural engineer to decide to use all new caissons to support this building.

The foundation for the new construction calls for the construction of an additional 88 caissons in an already tight site do. These newly constructed caissons range from 36 in. to 96 in. and will be spaced throughout the site. Many of the new caissons will be constructed directly next to the old existing caissons. The caissons will be constructed to have top heights of 99'-06" and 109'-00"

Problem:

This construction of 88 new caissons is very time consuming and caused a very large delay in the construction due to unforeseen circumstances. There were many factors that caused these delays in the construction.

- The tight site caused many of the new caissons to be constructed very close to existing caissons. As these new caissons were drilled down they hit the existing caissons that were not completely vertical. This caused the many problems as the holes had to be moved to miss the existing caissons.
- Much of the rock that was hit during the drilling process was sloped rock that was unacceptable for caissons to be bearing on. This caused the rock to have to be drilled/chiseled to make it level and acceptable for bearing caissons. This process was very slow and time consuming further delaying the construction process.
- The newly constructed caissons were various different sizes. This caused for a number of different sized casings to be present. The changing of these casings was time consuming and the presents of the casings further congested the site.
- Once the construction process fell behind more drilling rigs were brought onto site and this caused the tight site to be even more congested.

All these items lead to a slow foundation construction process and delayed an already slow construction process putting the construction schedule over a month behind schedule.

Proposal:

The proposed solution to this problem is to construct a mat slab foundation in place of caisson deep foundation system currently in place for the Aquarium Garden Hilton Inn.

Goal:

To get the building out of the ground faster therefore improving the project construction schedule and avoiding the long delays caused by the drilling the deep foundation schedule.

Analysis:

Please refer to Appendix D for mat slab calculations:

The design of a mat slab is similar to that of a upside down slab with a distributed load being placed on the bottom of slab and being supported by the columns coming off the top of the slab. Two books were used to aid in the calculations of this mat slab design: Principles of Foundation Engineering sixth edition and Design of Concrete Structures thirteenth edition.

Step 1:

The total load of the building was found:

- The square footages of the total building and the total area of the Parking area were calculated and live and dead loads taken from the structural notes were applied.
- The self weight of the structure was found by finding the total area of the concrete, multiplying this cubic footage by 150 pounds per cubic foot and the total tonnage of reinforcement in the building.

This gave a total live load of 25,401.5 kips and a total dead load of 152,500 kips for a total load of 177,902 kips. The factored loads are found by multiplying the live load by 1.7 and the dead load by 1.4 according to ACI 318-95 giving a total factored building load of 256,683.55 kips.

Step 2:

The critical column was found for the design of the mat slab.

- The column loads for the columns were not available so it was assumed a distributed load of 5.94 kips/ft would uniformly be loaded on the mat slab based on the step 1 calculations.
- This gave the column with the largest span a total load of 5702 kips.
- The mat slab design therefore found that the slab thickness needed to be 75 inches with No. 11 rebar spaced 6 inches on center both ways at the top and the bottom of the slab.

Step 3:

The soil bearing capacity was found to make sure it could support building.

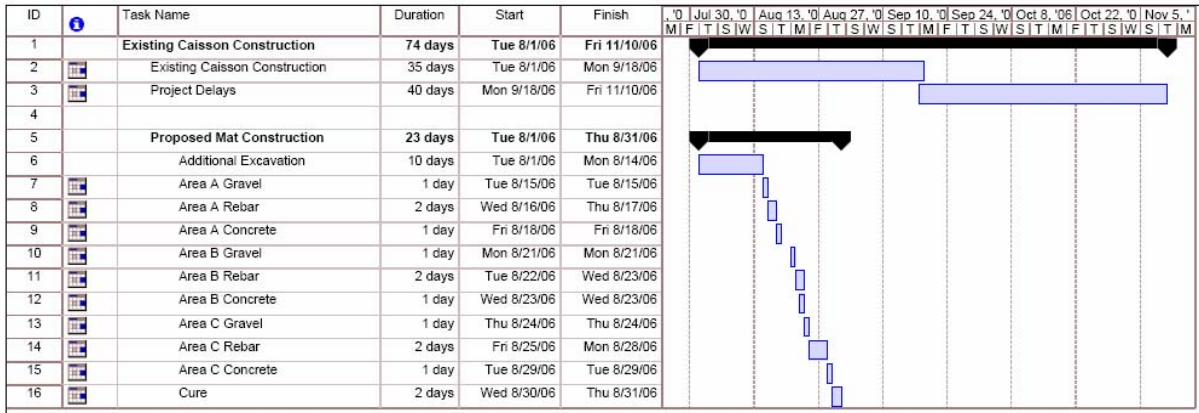
- The soil bearing capacity was found assuming a N60 of 20 based on the Geotechnical Engineering Report and a Se of 1. This calculation gave a total soil bearing capacity of 5.65 kips per foot squared.
- The weight of the mat slab was then calculated and found to be 40,747.55 Kips.
- This mat slab weight was added to the total building load and the total average pressure on the soil was found to be 3.668 kips/ft.

These calculations showed that the use of a mat slab foundations system would work to support the building. The total safety factor is only 1.38, however, none of the existing caissons which would be used to help support the mat foundation and fight pullout.

Schedule Comparison:

The existing deep foundation caisson system was originally scheduled to be completed in 3 levels. The total construction of the foundation was originally scheduled for work to be going on in all three levels at the same time and would take a total of 35 days to complete. The construction of the caissons was delayed a total of approximately 40 days making the completion date around 11/10/2006.

The proposed mat slab foundation system would take approximately 23 days to complete. A SIPS type schedule was used moving from one level to the next level. There would be a total of three pours, one at Area A, one for Area B, and one for Area C. The pours would be done at night consisting between the hours of 3:00am and 7:00am. The pours would be done at this time in order to avoid daytime traffic congestion and to keep the concrete temperature lower to slow down the setting process. This would involve getting a special noise ordinance variance from the city of Atlanta. Holder Construction has taken this same approach with a previous mat slab pour and it ran very smoothly.



The proposed mat slab would get the building out of the ground approx 2 months earlier which would directly lead to a shorter overall project schedule. This project would lead to the owner being able to open the hotel and parking garage at an earlier date than the current schedule. The following chart is an estimated revenue the owner would make by being able to open 2 months earlier.

- The previous parking garage brought in between \$50,000 and \$100,000 a month.
- The chart assumes only 75 of the 242 rooms are occupied of the hotel rooms at \$125 a night.

Price/Unit	Units	Time	Revenue
\$50,000	1	2 Months	\$100,000
\$125	75 Rooms	60 Nights	\$562,500
		Total:	\$662,500

Please note that this \$662,000 is a very safe estimated revenue. The cost of operations would need to be deducted from this to find a profit.

Cost Comparison:

The cost of the existing caisson foundation came to a total of \$1,307,960. This does not include any of the change order cost that can be expected from the huge delays in the caisson construction due to unforeseen circumstances.

The estimated cost of the proposed construction came to a total of \$2,347,037. This is about a \$1,000 higher than the original estimate of the called for caisson system.

Description	Qty	Units	Unit Price	Cost
Machine Excav/Backfill	80	HR	\$125	\$10,000
Excess Haul-off	12,500	CY	\$15	\$187,500
Gravel	193	Ton	\$18	\$3,474
Concrete (Material,Place,Finish)	10,512	CY	\$104	\$1,093,248
Reinforcing Steel	965	Ton	\$1,091	\$1,052,815
			Total:	\$2,347,037

Site Impact:

The site would still be congested with work going on throughout the entire building during the construction of the mat slab. However, it would not be any different then the pours for each floor of the building. This new plan would not take up anymore site space than the existing system would take with caissons being drilled on all levels. The congestion for the proposed mat slab foundation would of course be for a shorter period time as well.

Conclusion:

The benefits of the proposed mat slab can clearly be seen in the scheduling impacts of the job. The cost of the system does appear to be initially higher than the caisson system. However, with change orders, added general conditions cost, and revenue generated the proposed mat slab does seem like a good choice to keep both the owner and the owners clients happy.

ANALYSIS 2 – Façade Investigation

Background and Problem:

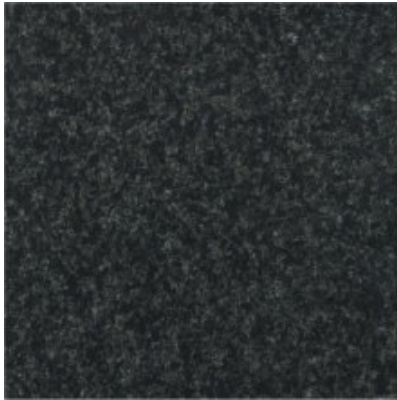
The south entrance calls for approx 2000 SF of stone as a facade system. This stone is a basalt stone. Basalt is a dark gray or black volcanic rock or is sometimes a rock with similar qualities to this volcanic rock. The stone called for in this project has an extremely long lead time and will not arrive to the site till well after the rest of the building façade system is complete. This will cause the mason to have to come back to place this stone at a later time and the exterior will not be complete till this is done.

Proposal:

To alleviate this problem with the long lead time and to save money on the project I am proposing the use of a paneling system called StoneLite. Stone light is a lightweight paneling system that consists of a thin natural stone facing, a fiber reinforced epoxy skin, aluminum honeycomb and another fiber reinforced skin.



This StoneLite system comes in a number of different stone types and they have an impala black granite that as a very similar look to the basalt stone called for in the construction documents.



StoneLite Impala Black



Black Basalt

U-Value and Moisture Comparison:

The U-value of a wall system is a good way to see how the wall will work to when keeping heat in the building during the cold system and keeping heat out of the building during the hot summer season. The U-value is the amount of BTUs the flow through the assembly per square foot per temperature degree difference between the inside and outside of the wall. A lower U value is preferred because it means that less heat will flow out of the building in the cold season and less heat will enter the building during the hot seasons. The follow tables compare the two alternate façade systems proposed in this section.

Existing Conditions	
Air Film	0.17
Stone	0.09
Air Space	0.7
Gypsum Sheathing	0.56
6" Stud w/ R19	19
Gypsum Board	0.56
Inside Air Film	0.68
R-Value Sum	21.76
U-Value	0.045955882

StoneLite System	
Air Film	0.17
StoneLite	negligible
Air Space	0.7
Gypsum Sheathing	0.56
6" Studs w/ R19	19
Gypsum Board	0.56
Inside Air Film	0.68
R-Value Sum	21.67
U-Value	0.046146747

The U-values for these two systems are very close however the proposed new StoneLite system is a little lower than the Basalt stone system. This little change would have little effect on the performance but if need be the batting insulation could be increased to R-21 still keeping the systems cost well under that of the Basalt stone and increasing the U-value of the system.

StoneLite System w/R21	
Air Film	0.17
StoneLite	negligible
Air Space	0.7
Gypsum Sheathing	0.56
6" Studs w/ R21	21
Gypsum Board	0.56
Inside Air Film	0.68
R-Value Sum	23.67
U-Value	0.042247571

The StoneLite system is impervious to water penetration due to the fiber-reinforced epoxy skin. This skin acts as a water barrier not allowing water to pass through the system. In conventional stone construction there are generally small holes in the mortar where water can pass through into the system. This causes for the need of an additional water barrier in the system.

Schedule and Site Impact:

The proposed StoneLite system will allow for the south entrance facade to be constructed sooner than the Basalt stone system. The current system had a couple month lead time coming from Europe and it is unknown exactly when it will arrive on site. This stonelite system can be to site in a couple days notice and can be constructed by common construction personnel. The previous stone system of course would need to be constructed by masons who would have to remobilize to site. This new system would allow the scaffolding to be removed from the south elevation of the building clearing space on site to lesson the congestion.

The new system comes in standard 4' x 8' panels and can be constructed in 1 day as oppose to the week or two of the Basalt Stone system.

Structural Impact:

The StoneLite system weights approximately 3.3 pounds per square foot as opposed to the approximate 20 pounds per square foot of the stone system. This is a significantly lighter material and may allow for the structural steel studs to be spaced 24 inches on center as opposed to the current 16 inch spacing.

Cost Savings:

The existing basalt stone façade system has an estimated cost of \$297,263 for the 2000 square feet of stone called for. The pricing for the new system was quoted by Lavern Chamness the southeast Regional Technical Consultant at a price of \$38 per square foot for around 2000 square feet of the paneling system. This would include all the paneling with anchoring, delivery as well as shop drawings. Mr. Chamness also quoted the installation at being approximately \$10 per square foot. This gave a total system cost of \$96,000 and a total savings of \$201,263 from the basalt stone system.

StoneLite Pricing				
Type	Qty	Units	Unit Price	Cost
Material	2000	SF	\$38	\$76,000
Labor	2000	SF	\$10	\$20,000
Total:				\$96,000

Conclusion:

The proposed StoneLite has benefits in every category examined. The StoneLite system would shorten up the façade schedule allowing for the site to be cleared and less congested. The StoneLite system would be very comparable to the stone system mechanically and fights water penetrations better. This system is also much lighter and would cost much less then the basalt stone system called for on the project.

Implementation of BIM in the Construction Process

This section contains confidential information and was submitted to the faculty in writing.

Conclusion

In this thesis a couple potential changes were proposed and analyzed to the design of the Aquarium Hilton Garden Inn located in Atlanta Georgia. These changes had a number of benefits as well as some downfalls. The foundation analysis found that the mat foundation system was capable of supporting the building. The initial estimate of the mat foundation was about \$1,000,000 more than the caisson system but with the now known delays the mat foundation system seems like a viable alternative to the caisson system used.

The façade analysis found the StoneLite panel system to be comparable mechanically as well as be much cheaper, lighter, and easier to install. The StoneLite system appears to be a good alternative to the Basalt Stone system called for.

The research showed that BIM is very beneficial when implemented and used properly on a project schedule. There are still strides to be made in this process but it should be implemented on more and more construction projects.

John Dixon
Dr. John Messner
4/12/2007

Aquarium Hilton Garden Inn
Atlanta, Georgia
Final Report

Appendix A
General Conditions Estimate



General Conditions					
Description	Labor/ Material	Qty	Units	Unit Price	Amount
As-built Drawings	M	1	LS	\$2,000	\$2,000
Assistant Superintendent P/D	M	66	WK	\$0	\$0
Building Information Modeling Services	M	1	LS	\$40,000	\$40,000
Communications Equipment	M	1	LS	\$2,000	\$2,000
Contractors Fee	P	3.25	%	\$442,859	\$1,439,293
Copier	M	18	MO	\$500	\$9,000
Courier	M	18	MO	\$150	\$2,700
Daily Photos	M	17	MO	\$30	\$510
Fax Machine	M	1	LS	\$500	\$500
Field Office Processor	M	79	WK	\$0	\$0
Field Office Setup	M	120	MH	\$28	\$3,360
Field Office Setup	M	1	LS	\$4,000	\$4,000
Field Office Trailer	M	18	MO	\$750	\$13,500
First Aid	M	17	MO	\$100	\$1,700
Job Signs	M	60	MH	\$28	\$1,680
Job Signs	M	1	LS	\$2,500	\$2,500
Management Substance Abuse Testing	M	17	EA	\$65	\$1,105
Meeting Expense / M&E	M	17	MO	\$250	\$4,250
Monthly Photos	M	17	MO	\$350	\$5,950
Network Connection Fees	M	18	MO	\$200	\$3,600
Office Furniture	M	1	LS	\$1,500	\$1,500
Office Security	M	1	LS	\$2,000	\$2,000
Office Supplies	M	18	MO	\$650	\$11,700
Offsite Parking (5 Spaces)	M	0	MO	\$0	\$0
Operations Manager	M	630	MH	\$0	\$0
PC's / Modems	M	5	MO	\$175	\$875
Postage / Expressage	M	18	MO	\$650	\$11,700
Project Auditor	M	1	EA	\$1,500	\$1,500
Project Engineer #2	M	79	WK	\$0	\$0
Project Engineer P/D	M	33	WK	\$0	\$0
Project Manager	M	79	WK	\$0	\$0
Project Manager Car	M	18	MO	\$950	\$17,100
Salary Accrual Code	M	1	LS	\$1,264,570	\$1,264,570
Secretary	M	65	WK	\$0	\$0
Software	M	125	MO	\$141	\$17,675
Sr. Project Engineer	M	70	WK	\$0	\$0
Superintendent	M	74	WK	\$0	\$0
Superintendent Truck	M	17	MO	\$1,150	\$19,550
Telephone	M	18	MO	\$900	\$16,200
Telephone Set-up	M	1	LS	\$2,500	\$2,500
Temporary Power (Trailer)	M	18	MO	\$300	\$5,400
Temporary Water (Trailer)	M	18	MO	\$100	\$1,800
Travel Expenses	M	0	MO	\$0	\$0
Total					\$2,911,718



Description	Amount
Builders Risk Insurance	\$76,495
Building Permit	\$200,671
Demolition Permit	\$0
Equipment Floater Insurance	\$7,500
General Liability Insurance	\$0
Gross Receipts Taxes	\$914
Licensed Survey	\$5,000
Performance Bond	\$0
Warranty	\$20,000
Total	\$310,580

Construction Requirements				
Description	Labor	Material/ Equipment	Fee	Total
Continuous Cleanup	\$121,380	\$8,500	\$0	\$129,880
Dumpster	\$0	\$93,500	\$0	\$93,500
Final Cleanup	\$0	\$37,113	\$0	\$37,113
First Aid	\$0	\$2,550	\$0	\$2,550
General Safety	\$170,742	\$0	\$0	\$170,742
General Small Tools	\$0	\$3,400	\$0	\$3,400
Ice, Cups, Water	\$0	\$3,740	\$0	\$3,740
Layout Engineering	\$0	\$250,019	\$0	\$250,019
Man Hoist	\$36,530	\$165,350	\$0	\$201,880
Mechanical Startup	\$0	\$50,000	\$0	\$50,000
Misc. Hoisting - Lull	\$0	\$38,500	\$0	\$38,500
Offsite Data Storage	\$0	\$3,000	\$0	\$3,000
Safety Program	\$7,020	\$19,325	\$0	\$26,345
Temp Protection	\$5,000	\$5,500	\$0	\$10,500
Temp Dry-in	\$0	\$12,000	\$0	\$12,000
Temporary Fencing	\$0	\$7,200	\$0	\$7,200
Temporary Power	\$0	\$39,000	\$0	\$39,000
Temporary Toilets	\$5,616	\$12,750	\$0	\$18,366
Temporary Water	\$0	\$5,950	\$0	\$5,950
Tower Cranes	\$296,405	\$525,650	\$0	\$822,055
Waterproofing Consultant	\$0	\$2,000	\$0	\$2,000
Total				\$1,927,740

Appendix B
Detailed Project Schedule

ID	Task Name	Duration	Start	Finish	2006				2007				2008		
					Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	
1	Permitting	185 days	Fri 12/30/05	Thu 9/14/06											
2	Design/Preconstruction	142 days	Thu 2/2/06	Fri 8/18/06											
3	Notice to Proceed	0 days	Mon 6/12/06	Mon 6/12/06											
4	Sitework Area A-Basement Level 1000.5	71 days	Tue 6/13/06	Tue 9/19/06											
5	Demolition of Existing Structure	45 days	Tue 6/13/06	Mon 8/14/06											
6	Sitework Cut/Fill to Subgrade @ 1000.5	10 days	Wed 7/26/06	Tue 8/8/06											
7	Install Caissons/Foundations/Walls/Columns @ 1000.5 North End	15 days	Tue 8/1/06	Mon 8/21/06											
8	Backfill to subgrade @ 1000.5 North End	5 days	Tue 8/22/06	Mon 8/28/06											
9	Install Caissons/Foundations/Walls/Columns @ 1000.5 South End	21 days	Tue 8/22/06	Tue 9/19/06											
10	Backfill to Subgrade @ 1000.5 South End	5 days	Tue 9/12/06	Mon 9/18/06											
11	Sitewok Area B - Level 1010.5	40 days	Wed 7/26/06	Tue 9/19/06											
12	Sitework Cut/Fill to Subgrade @ 1010.5	5 days	Wed 7/26/06	Tue 8/1/06											
13	Install Caissons/Foundations/Walls/Columns @ 1010.5	30 days	Wed 8/2/06	Tue 9/12/06											
14	Backfill to subgrade @ 1010.5	5 days	Wed 9/13/06	Tue 9/19/06											
15	Sitework Area C - Loading Dock Level @ 1020.5	32 days	Mon 8/14/06	Tue 9/26/06											
16	Backfill to Subgrade at East Retaining Wall	5 days	Tue 8/22/06	Mon 8/28/06											
17	Sitework cut/fill to subgrade @ 1020.5	10 days	Mon 8/14/06	Fri 8/25/06											
18	Install Caissons/Foundations/Walls/Columns @ 1020.5	20 days	Wed 8/30/06	Tue 9/26/06											
19	Elevated Slabs	169 days	Wed 9/13/06	Mon 5/7/07											
20	Floor 1	9 days	Wed 9/13/06	Mon 9/25/06											
21	Floor 2	17 days	Thu 9/21/06	Fri 10/13/06											
22	Floor 3	13 days	Wed 10/11/06	Fri 10/27/06											
23	Floor 4	24 days	Wed 10/25/06	Mon 11/27/06											
24	Floor 5	13 days	Thu 11/23/06	Mon 12/11/06											
25	Floor 6	17 days	Thu 12/7/06	Fri 12/29/06											
26	Floor 7	19 days	Thu 12/28/06	Tue 1/23/07											
27	Floor 8	13 days	Fri 1/19/07	Tue 2/6/07											
28	Floor 9	14 days	Mon 2/5/07	Thu 2/22/07											
29	Floor 10	15 days	Tue 2/20/07	Mon 3/12/07											
30	Floor 11	16 days	Thu 3/8/07	Thu 3/29/07											
31	Floor 12	9 days	Tue 3/27/07	Fri 4/6/07											
32	Floor 13	15 days	Wed 4/4/07	Tue 4/24/07											
33	Roof Slab	12 days	Fri 4/20/07	Mon 5/7/07											
34	Slab on Grade	25 days	Tue 12/12/06	Mon 1/15/07											
35	Exterior Skin	174 days	Mon 1/1/07	Thu 8/30/07											
36	Exterior Framing Level 1-7	50 days	Mon 1/1/07	Fri 3/9/07											
37	Erect Mast Climbers/Curtain Wall/Ext Sheathing/EFIS Lvl 1-7	59 days	Fri 3/30/07	Wed 6/20/07											
38	Exterior Framing Level 8-13	50 days	Wed 4/25/07	Tue 7/3/07											
39	Exterior Framing Roof Parapet/Skybar	10 days	Wed 7/18/07	Tue 7/31/07											
40	Curtain Wall/Ext Sheathing/EFIS/Punch Windows Level 8-Roof	42 days	Wed 7/4/07	Thu 8/30/07											
41	MEP Rough Ins	90 days	Wed 1/24/07	Tue 5/29/07											
42	Masonry Walls Basement-Roof Levels	80 days	Wed 1/24/07	Tue 5/15/07											
43	Guest Partitions	125 days	Fri 2/23/07	Thu 8/16/07											
44	Level 2	45 days	Fri 2/23/07	Thu 4/26/07											
45	Ductwork / Layout	5 days	Fri 2/23/07	Thu 3/1/07											
46	Metal Studs	5 days	Fri 3/2/07	Thu 3/8/07											

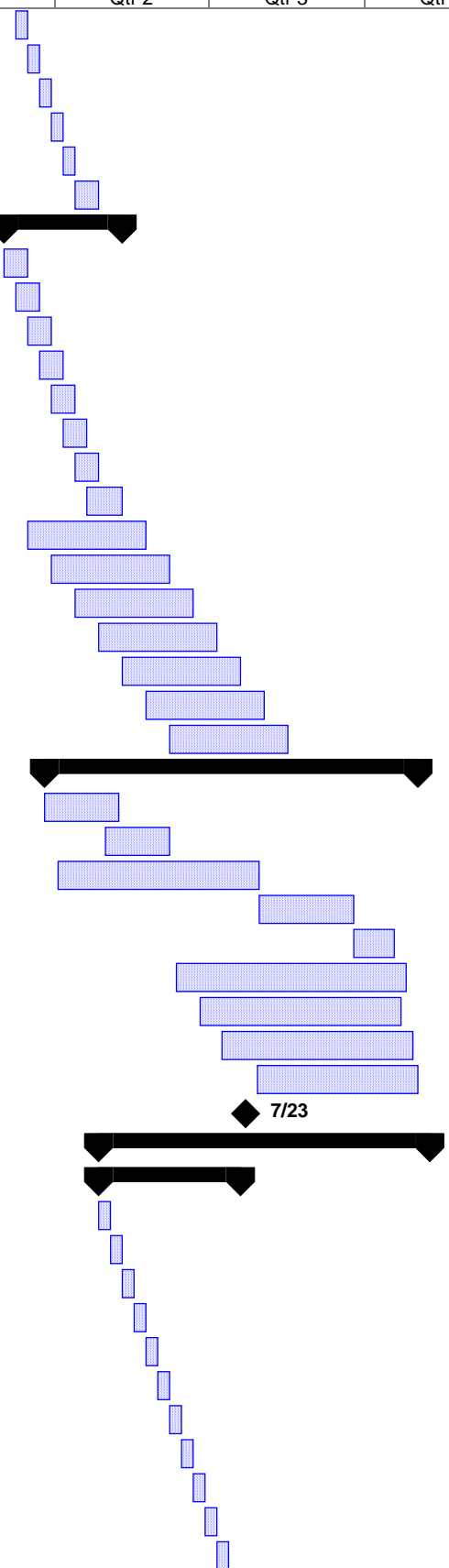
Project: Aquarium Hilton Garden Inn
Date: Mon 10/30/06

Task: Progress
Split: Milestone

Summary: External Tasks: Deadline:

Project Summary: External Milestone:

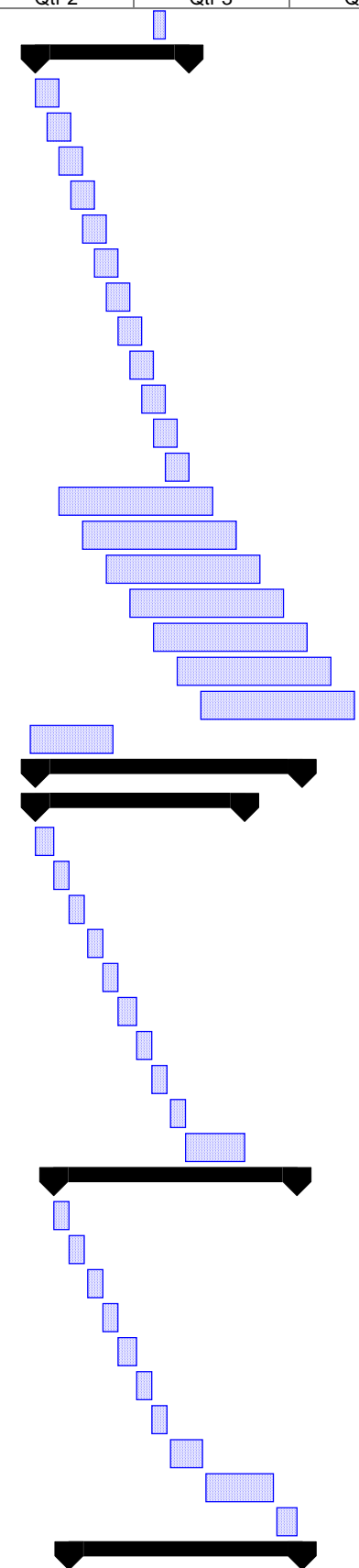
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47	MEP Wall Rough In	5 days	Fri 3/9/07	Thu 3/15/07											
48	Drywall	5 days	Fri 3/16/07	Thu 3/22/07											
49	Ceiling Framing	5 days	Fri 3/23/07	Thu 3/29/07											
50	Ceiling Rough In	5 days	Fri 3/30/07	Thu 4/5/07											
51	Ceiling Drywall	5 days	Fri 4/6/07	Thu 4/12/07											
52	Tape and Finish	10 days	Fri 4/13/07	Thu 4/26/07											
53	Level 3, 4 & 5	50 days	Fri 3/2/07	Thu 5/10/07											
54	Ductwork / Layout	10 days	Fri 3/2/07	Thu 3/15/07											
55	Metal Studs	10 days	Fri 3/9/07	Thu 3/22/07											
56	MEP Wall Rough In	10 days	Fri 3/16/07	Thu 3/29/07											
57	Drywall	10 days	Fri 3/23/07	Thu 4/5/07											
58	Ceiling Framing	10 days	Fri 3/30/07	Thu 4/12/07											
59	Ceiling Rough In	10 days	Fri 4/6/07	Thu 4/19/07											
60	Ceiling Drywall	10 days	Fri 4/13/07	Thu 4/26/07											
61	Tape and Finish	15 days	Fri 4/20/07	Thu 5/10/07											
62	Level 6 & 7	50 days	Fri 3/16/07	Thu 5/24/07											
63	Level 8	50 days	Fri 3/30/07	Thu 6/7/07											
64	Level 9	50 days	Fri 4/13/07	Thu 6/21/07											
65	Level 10	50 days	Fri 4/27/07	Thu 7/5/07											
66	Level 11	50 days	Fri 5/11/07	Thu 7/19/07											
67	Level 12	50 days	Fri 5/25/07	Thu 8/2/07											
68	Level 13	50 days	Fri 6/8/07	Thu 8/16/07											
69	Elevators	159 days	Mon 3/26/07	Thu 11/1/07											
70	Dock Elevator #7	32 days	Mon 3/26/07	Tue 5/8/07											
71	Restaurant Elevator #2	28 days	Tue 5/1/07	Thu 6/7/07											
72	Hotel Service Elevator # 3	85 days	Tue 4/3/07	Mon 7/30/07											
73	Temp Use - Hotel Service Elevator #3	40 days	Tue 7/31/07	Mon 9/24/07											
74	Refurbish Service Elevator #3	18 days	Tue 9/25/07	Thu 10/18/07											
75	Hotel Passenger Elevator #4	98 days	Tue 6/12/07	Thu 10/25/07											
76	Hotel Passenger Elevator #5	85 days	Tue 6/26/07	Mon 10/22/07											
77	Hotel Passenger Elevator #6	81 days	Mon 7/9/07	Mon 10/29/07											
78	Sky Bar Elevator #1	69 days	Mon 7/30/07	Thu 11/1/07											
79	Building "Dried In"	0 days	Mon 7/23/07	Mon 7/23/07											
80	Guest Finishes	140 days	Fri 4/27/07	Thu 11/8/07											
81	Level 2	60 days	Fri 4/27/07	Thu 7/19/07											
82	Prime Paint	5 days	Fri 4/27/07	Thu 5/3/07											
83	Tile	5 days	Fri 5/4/07	Thu 5/10/07											
84	Vanities	5 days	Fri 5/11/07	Thu 5/17/07											
85	Paint	5 days	Fri 5/18/07	Thu 5/24/07											
86	Vinyl Wall Covering	5 days	Fri 5/25/07	Thu 5/31/07											
87	Toilet Fixtures	5 days	Fri 6/1/07	Thu 6/7/07											
88	Doors / Accessories	5 days	Fri 6/8/07	Thu 6/14/07											
89	MEP Trim Out	5 days	Fri 6/15/07	Thu 6/21/07											
90	Carpet	5 days	Fri 6/22/07	Thu 6/28/07											
91	Clean / Punch	5 days	Fri 6/29/07	Thu 7/5/07											
92	Owner Punch	5 days	Fri 7/6/07	Thu 7/12/07											



Project: Aquarium Hilton Garden Inn
Date: Mon 10/30/06

Task: Progress: Summary: External Tasks: Deadline: Split: Milestone: Project Summary: External Milestone:

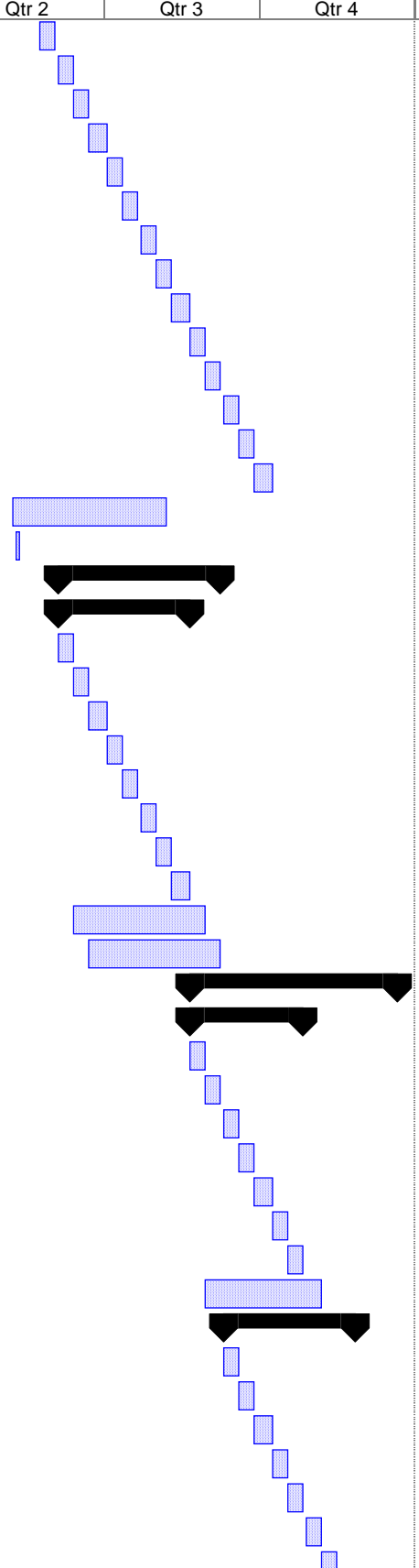
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93	Repunch / Turnover	5 days	Fri 7/13/07	Thu 7/19/07											
94	Level 3,4,5	65 days	Fri 5/4/07	Thu 8/2/07											
95	Prime Paint	10 days	Fri 5/4/07	Thu 5/17/07											
96	Tile	10 days	Fri 5/11/07	Thu 5/24/07											
97	Vanities	10 days	Fri 5/18/07	Thu 5/31/07											
98	Paint	10 days	Fri 5/25/07	Thu 6/7/07											
99	Vinyl Wall Covering	10 days	Fri 6/1/07	Thu 6/14/07											
100	Toilet Fixtures	10 days	Fri 6/8/07	Thu 6/21/07											
101	Doors / Accessories	10 days	Fri 6/15/07	Thu 6/28/07											
102	MEP Trim Out	10 days	Fri 6/22/07	Thu 7/5/07											
103	Carpet	10 days	Fri 6/29/07	Thu 7/12/07											
104	Clean / Punch	10 days	Fri 7/6/07	Thu 7/19/07											
105	Owner Punch	10 days	Fri 7/13/07	Thu 7/26/07											
106	Repunch / Turnover	10 days	Fri 7/20/07	Thu 8/2/07											
107	Level 6 & 7	65 days	Fri 5/18/07	Thu 8/16/07											
108	Level 8	65 days	Fri 6/1/07	Thu 8/30/07											
109	Level 9	65 days	Fri 6/15/07	Thu 9/13/07											
110	Level 10	65 days	Fri 6/29/07	Thu 9/27/07											
111	Level 11	65 days	Fri 7/13/07	Thu 10/11/07											
112	Level 12	65 days	Fri 7/27/07	Thu 10/25/07											
113	Level 13	65 days	Fri 8/10/07	Thu 11/8/07											
114	Structural / Misc. Steel	35 days	Tue 5/1/07	Mon 6/18/07											
115	Back of House Partitions / Finishes	112 days	Fri 5/4/07	Mon 10/8/07											
116	BOH / Laundry	88 days	Fri 5/4/07	Tue 9/4/07											
117	Ductwork / Layout	7 days	Fri 5/4/07	Mon 5/14/07											
118	Metal Studs	7 days	Tue 5/15/07	Wed 5/23/07											
119	MEP Wall Rough In	7 days	Thu 5/24/07	Fri 6/1/07											
120	Drywall	7 days	Mon 6/4/07	Tue 6/12/07											
121	Tape & Finish	7 days	Wed 6/13/07	Thu 6/21/07											
122	Paint	7 days	Fri 6/22/07	Mon 7/2/07											
123	Ceiling	7 days	Tue 7/3/07	Wed 7/11/07											
124	MEP Trim Out	7 days	Thu 7/12/07	Fri 7/20/07											
125	Flooring	7 days	Mon 7/23/07	Tue 7/31/07											
126	Install Laundry Equipment	25 days	Wed 8/1/07	Tue 9/4/07											
127	Kitchen	104 days	Tue 5/15/07	Fri 10/5/07											
128	Ductwork / Layout	7 days	Tue 5/15/07	Wed 5/23/07											
129	Metal Studs	7 days	Thu 5/24/07	Fri 6/1/07											
130	MEP Wall Rough In	7 days	Mon 6/4/07	Tue 6/12/07											
131	Drywall	7 days	Wed 6/13/07	Thu 6/21/07											
132	Tape & Finish	7 days	Fri 6/22/07	Mon 7/2/07											
133	Paint	7 days	Tue 7/3/07	Wed 7/11/07											
134	Ceiling	7 days	Thu 7/12/07	Fri 7/20/07											
135	Flooring	15 days	Mon 7/23/07	Fri 8/10/07											
136	Install Kitchen Equipment	30 days	Mon 8/13/07	Fri 9/21/07											
137	MEP Trim Out	10 days	Mon 9/24/07	Fri 10/5/07											
138	Fitness/ Administration Area	98 days	Thu 5/24/07	Mon 10/8/07											



Project: Aquarium Hilton Garden Inn
Date: Mon 10/30/06

Task: Progress: Summary: External Tasks: Deadline: Split: Milestone: Project Summary: External Milestone:

ID	Task Name	Duration	Start	Finish	2006				2007				2008		
					Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	
139	Ductwork / Layout	7 days	Thu 5/24/07	Fri 6/1/07											
140	Metal Studs	7 days	Mon 6/4/07	Tue 6/12/07											
141	MEP Wall Rough In	7 days	Wed 6/13/07	Thu 6/21/07											
142	Drywall	7 days	Fri 6/22/07	Mon 7/2/07											
143	Tape & Finish	7 days	Tue 7/3/07	Wed 7/11/07											
144	Prime Paint	7 days	Thu 7/12/07	Fri 7/20/07											
145	Paint/Tile	7 days	Mon 7/23/07	Tue 7/31/07											
146	Ceiling	7 days	Wed 8/1/07	Thu 8/9/07											
147	Vinyl Wall Covering	7 days	Fri 8/10/07	Mon 8/20/07											
148	Toilet Fixtures	7 days	Tue 8/21/07	Wed 8/29/07											
149	Doors/ Accessories	7 days	Thu 8/30/07	Fri 9/7/07											
150	MEP Trim Out	7 days	Mon 9/10/07	Tue 9/18/07											
151	Carpet	7 days	Wed 9/19/07	Thu 9/27/07											
152	Clean / Punch	7 days	Fri 9/28/07	Mon 10/8/07											
153	Roofing	65 days	Tue 5/8/07	Mon 8/6/07											
154	Temp Roof on Level 7	2 days	Thu 5/10/07	Fri 5/11/07											
155	Public Area Partitions	70 days	Mon 6/4/07	Fri 9/7/07											
156	Meeting Rooms	56 days	Mon 6/4/07	Mon 8/20/07											
157	Ductwork / Layout	7 days	Mon 6/4/07	Tue 6/12/07											
158	Metal Studs	7 days	Wed 6/13/07	Thu 6/21/07											
159	MEP Wall Rough In	7 days	Fri 6/22/07	Mon 7/2/07											
160	Drywall	7 days	Tue 7/3/07	Wed 7/11/07											
161	Ceiling Framing	7 days	Thu 7/12/07	Fri 7/20/07											
162	Ceiling Rough In	7 days	Mon 7/23/07	Tue 7/31/07											
163	Ceiling Drywall	7 days	Wed 8/1/07	Thu 8/9/07											
164	Tape and Finish	7 days	Fri 8/10/07	Mon 8/20/07											
165	Restaurant	56 days	Wed 6/13/07	Wed 8/29/07											
166	Lobby	56 days	Fri 6/22/07	Fri 9/7/07											
167	Public Area Finishes	89 days	Tue 8/21/07	Fri 12/21/07											
168	Meeting Rooms	49 days	Tue 8/21/07	Fri 10/26/07											
169	Millwork Trim	7 days	Tue 8/21/07	Wed 8/29/07											
170	Paint	7 days	Thu 8/30/07	Fri 9/7/07											
171	Vinyl Wall Covering	7 days	Mon 9/10/07	Tue 9/18/07											
172	Doors / Accessories	7 days	Wed 9/19/07	Thu 9/27/07											
173	MEP Trim Out	7 days	Fri 9/28/07	Mon 10/8/07											
174	Carpet	7 days	Tue 10/9/07	Wed 10/17/07											
175	Clean / Punch	7 days	Thu 10/18/07	Fri 10/26/07											
176	Restaurant	49 days	Thu 8/30/07	Tue 11/6/07											
177	Lobby	56 days	Mon 9/10/07	Mon 11/26/07											
178	Millwork Trim	7 days	Mon 9/10/07	Tue 9/18/07											
179	Paint	7 days	Wed 9/19/07	Thu 9/27/07											
180	Vinyl Wall Covering	7 days	Fri 9/28/07	Mon 10/8/07											
181	Doors / Accessories	7 days	Tue 10/9/07	Wed 10/17/07											
182	Cabinetry	7 days	Thu 10/18/07	Fri 10/26/07											
183	MEP Trim Out	7 days	Mon 10/29/07	Tue 11/6/07											
184	Carpet	7 days	Wed 11/7/07	Thu 11/15/07											

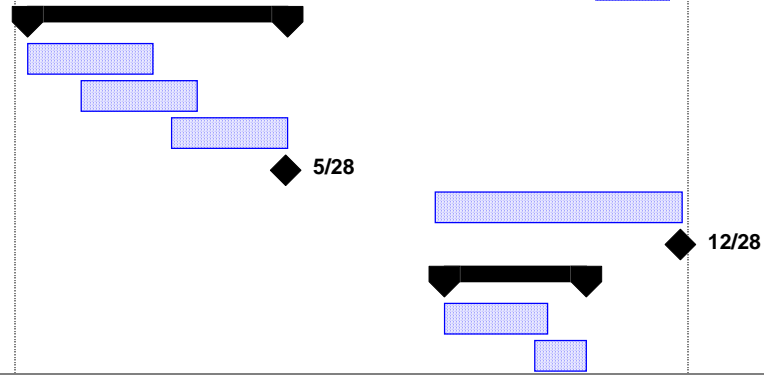


Project: Aquarium Hilton Garden Inn
Date: Mon 10/30/06

Task: Progress Summary External Tasks Deadline

Split: Milestone Project Summary External Milestone

ID	Task Name	Duration	Start	Finish	2006				2007				2008	
					Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1
185	Clean / Punch	7 days	Fri 11/16/07	Mon 11/26/07										
186	TCO	10 days	Mon 10/29/07	Fri 11/9/07										
187	Substantial Completion	0 days	Fri 11/9/07	Fri 11/9/07										
188	Final Punch, Clean, & Closeout	30 days	Mon 11/12/07	Fri 12/21/07										
189	Retail	101 days	Mon 1/8/07	Mon 5/28/07										
190	MEP Rough Ins	50 days	Mon 1/8/07	Fri 3/16/07										
191	Glass & Glazing	45 days	Tue 2/6/07	Mon 4/9/07										
192	Partitions	45 days	Tue 3/27/07	Mon 5/28/07										
193	First Tenant Occup. For TI Building	0 days	Mon 5/28/07	Mon 5/28/07										
194	Owner Equipment / FFE	96 days	Fri 8/17/07	Fri 12/28/07										
195	Hotel Opening / Project Complete	0 days	Fri 12/28/07	Fri 12/28/07										
196	Hardscape / Landscape	55 days	Wed 8/22/07	Tue 11/6/07										
197	Hardscape	40 days	Wed 8/22/07	Tue 10/16/07										
198	Landscape	20 days	Wed 10/10/07	Tue 11/6/07										



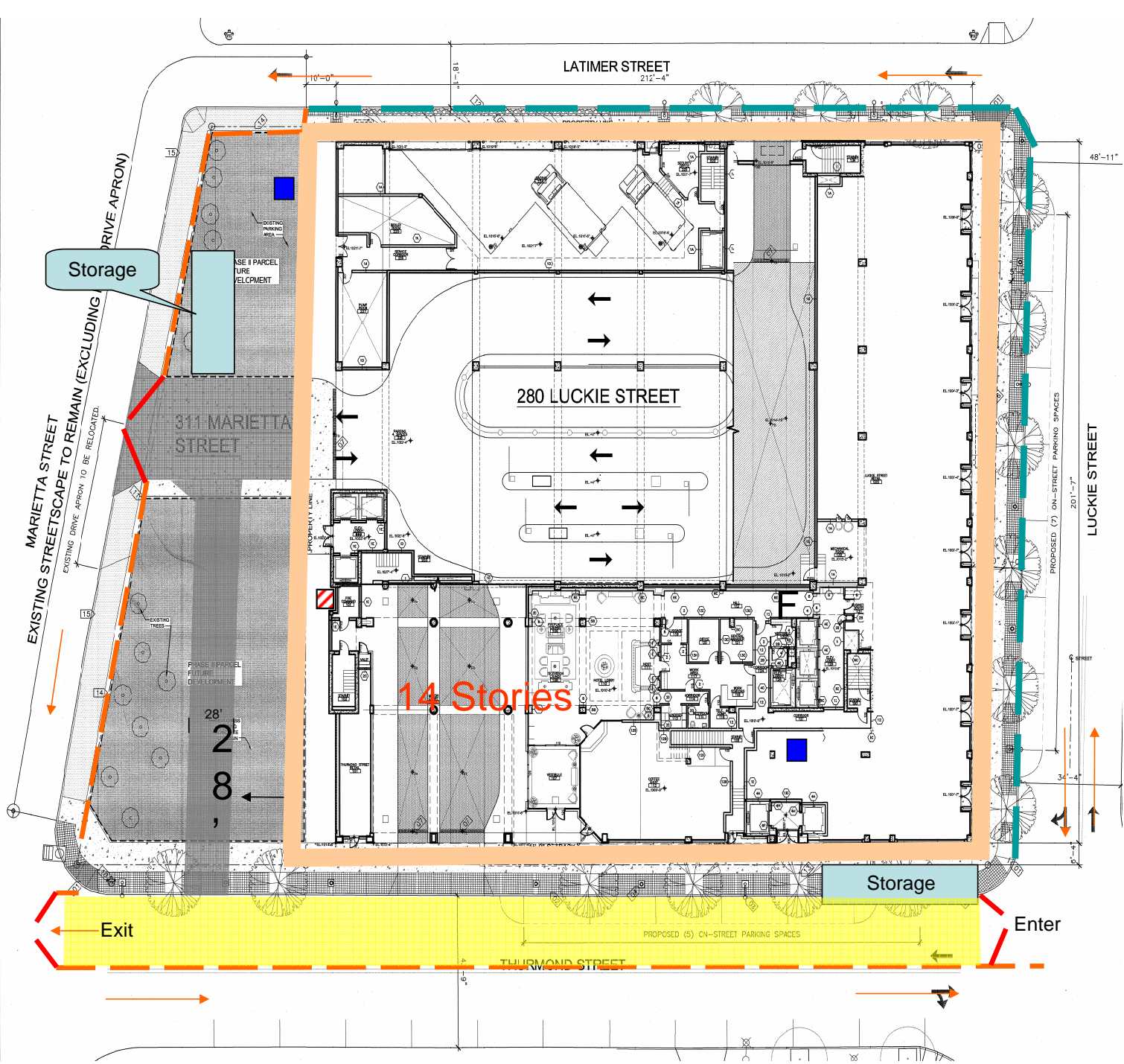
Project: Aquarium Hilton Garden Inn
Date: Mon 10/30/06

Task Progress Summary External Tasks Deadline
Split Milestone Project Summary External Milestone

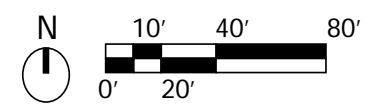
John Dixon
Dr. John Messner
4/12/2007

Aquarium Hilton Garden Inn
Atlanta, Georgia
Final Report

Appendix C
Site Layout Plan



- Legend:**
-  Access Road
 -  Cranes
 -  Buck hoist
 -  Lane Closer
 -  Netting Fence
 -  Slate Fence
 -  Gate
 -  Mast Climbers

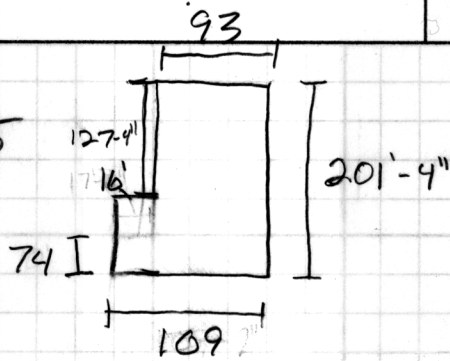


Aquarium Hilton Garden Inn

Site Layout Plan – Building Envelope Phase

Appendix D
Mat Slab Calculations

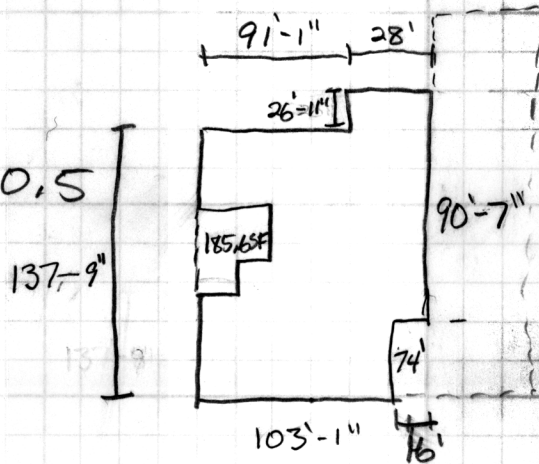
AREA A - 1000.5
BASEMENT



AREA =

$$(93' \times 201.33') + (16' \times 74') = \boxed{19907.7 \text{ SF}}$$

AREA B - 1010.5
LEVEL 1

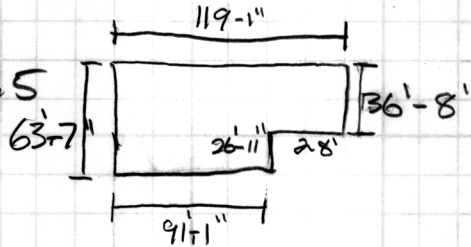


AREA =

$$(137.75' \times 103.08') + (28' \times 26.9') + (16' \times 90.6') = 16402.1 \text{ SF} + 185.65 \text{ SF}$$

$$= \boxed{16216.5 \text{ SF}}$$

AREA C - 1020.5
LEVEL 2



$$\text{AREA} = (91.08' \times 63.6') + (28' \times 36.75') = \boxed{6821.7 \text{ SF}}$$

$$\text{TOTAL AREA} = 19907.7 \text{ SF} + 16216.5 \text{ SF} + 6821.7 \text{ SF}$$

$$= \boxed{42945.3 \text{ SF}}$$

	BUILDING SF	RETAIL SF	PARKING SF
BASEMENT	18,995 GSF	13,138 GSF	0 GSF
L1	19,755 GSF	2,121 GSF	12,189 GSF
L2	40,930 GSF	0 GSF	14,539 GSF
L3	24,472 GSF	0 GSF	16,124 GSF
L4	39,953 GSF	0 GSF	21,100 GSF
L5	26,934 GSF	0 GSF	21,100 GSF
L6	31,541 GSF	0 GSF	20,816 GSF
L7	34,013 GSF	0 GSF	21,100 GSF
L8-11	35,011 GSF	0 GSF	21,100 GSF
L12-13	34,267 GSF	0 GSF	21,100 GSF
L14	6,996 GSF	0 GSF	0 GSF
L15	3,811 GSF	0 GSF	0 GSF
	<u>316,678 GSF</u>	<u>15,259 GSF</u>	<u>147,864 GSF</u>

LIVE LOAD

$$(100 \text{ PSF})(316,678 \text{ GSF})(100 \text{ PSF}) + (147,864 \text{ GSF})(50 \text{ PSF})$$

$$\text{LL} = 24274.6 \text{ KIPS} + \overset{\text{Roof Snow}}{(25 \text{ PSF})(45,074 \text{ SF})}$$

$$\text{LIVE LOAD} = 25401.5 \text{ KIPS}$$

MISC FLOOR LOADS

$$30 \text{ PSF}(316,678 \text{ SF}) = 9500.34 \text{ KIPS}$$

ROOF

$$20 \text{ PSF}(45,074 \text{ SF}) = 901.48 \text{ KIPS}$$

$$\begin{aligned} \text{LOADS} &= 9500.34 \text{ KIPS} + 901.48 \text{ KIPS} \\ &= 10,401.8 \text{ KIPS} \end{aligned}$$

CONCRETE QUANTITIES

	<u>HOTEL</u>	<u>PARKING DECK</u>
Structural Concrete	5400 CY	8929 CY
Elevated Slab	9500 CY	7570 CY
Shear Walls	1000 CY	770 CY
Columns	655 CY	447 CY
	<u>16555 CY</u>	<u>17,716 CY</u>

$$\text{TOTAL CY} = 16555 \text{ CY} + 17,716 \text{ CY} = 34,271 \text{ CY}$$

$$34,271 \text{ CY} \times 27 \frac{\text{CF}}{\text{CY}} \times 150 \frac{\text{lbs}}{\text{CF}} = 138798 \text{ KIPS}$$

$$\text{REINFORCING} = 530 \text{ TWS} + 985 \text{ TWS} = 1515 \text{ TWS}$$

$$1515 \text{ TWS} \times \frac{2000 \text{ lbs}}{\text{TW}} = 3030 \text{ KIPS}$$

$$\text{POST TENSIONING} = 270,000 \text{ lbs} = 270 \text{ KIPS}$$

WEIGHT STRUCTURE

$$138798 \text{ KIPS} + 3030 \text{ KIPS} + 270 \text{ KIPS} = 142,098 \text{ KIPS}$$

TOTAL BUILDING DEAD LOAD

$$142,098 \text{ KIPS} + 10,401.8 \text{ KIPS} = 152,500 \text{ KIPS}$$

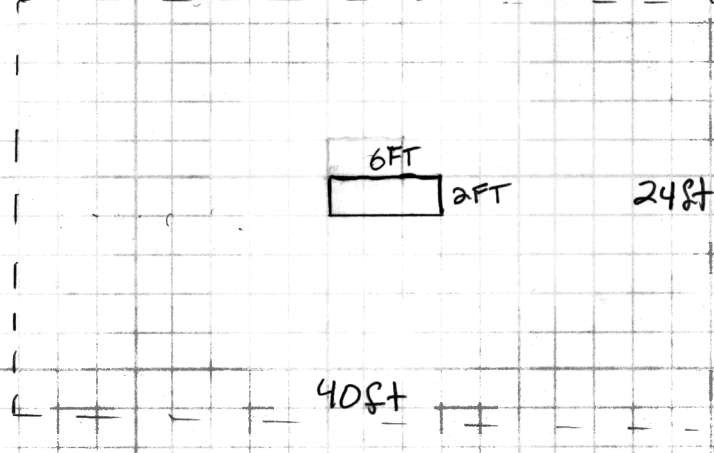
FACTORED LOAD #1 ACI 318-95

$$(1.4)(152,500 \text{ KIPS}) + (1.7)(25401.5 \text{ KIPS}) \\ = 256683.55 \text{ KIPS}$$

$$\text{NOW FACTORED LOAD} = 177,902 \text{ KIPS}$$

$$256,683 \text{ KIPS} / (212 \times 204) = 5.94 \text{ KIPS/FT}$$

CRITICAL COLUMN (largest span on drawings)



FACTORED LOAD ON COLUMN

$$(40 \text{ FT}) \times (24 \text{ FT}) \times (5.94 \text{ KIPS/FT}) = 5702.4 \text{ KIPS}$$

$$b_0 = 4(24 + d) = 96 + 4d$$

$$\frac{(0.185)(4)(\sqrt{4000})}{1000} \geq 5702.4 \text{ KIPS}$$

$$(96 + 4d)d \geq 26518.5 \text{ KIPS}$$

$$d \approx 70.3 \rightarrow \text{use } 71$$

3 in over rebar + 1 in Rebar

MAT SLAB THICKNESS = 75 inches

REINFORCING - (ACI 318-95)

$$200 / f_y = 200 / 60,000 = 0.00333$$

$$A_s = (0.0033)(12)(71) \Rightarrow A_s = 2.82 \text{ in}^2/\text{ft}$$

USE No. 11 bars @ 6 in on center each way for top and bottom of foundation

MAT CONCRETE QUANTITY

$$(75/12)(212)(204) = 270300/27 = 10,011 \text{ CY} \times 1.05 \\ = 10512 \text{ CY}$$

REINFORCE QUANTITY

$$(8) \times (212 \text{ ft}) (204 \text{ ft}) = 345984 \text{ ft}$$

$$345984 \text{ ft} (5.313 \text{ lb/ft}) / 2000 \text{ lb} = 918.9 \text{ TONS} \times 1.05 \\ = 965 \text{ TONS}$$

WEIGHT OF MAT SLAB

$$10,011 \text{ CY} \times 27 \text{ CF/CY} \times 150 \text{ lb/CF} + 965 \text{ TONS} \times 200 \text{ lb/TON} \\ = 40,737.55 \text{ KIPS}$$

NET ALLOWABLE BEARING CAPACITY

$$q_{\text{net(allow)}} (\text{kip/ft}^2) = 0.25 N_{60} \left[1 + 0.33 \left(\frac{D_f}{B} \right) \right] [C_e (\text{in})]$$
$$\leq 0.33 N_{60} [C_e (\text{in.})] = 3.3$$

$$N_{60} = 20 \quad C_e = 1$$

$$q_{\text{net(allow)}} = 0.25 (20) \left[1 + 0.33 \left(\frac{12}{204} \right) \right] [1 \text{ in}]$$

$$q_{\text{net(allow)}} = 5.065 \text{ KIPS/ft}^2$$

$$q = \frac{Q}{A} - \gamma D_f = \frac{152,500 \times 10^3 + 40,737,55 \times 10^3}{(212 \times 204)} - 8 (100)$$

$$q = 3668.13 \text{ lb/ft}^2 = 3.668 \text{ KIPS/FT}^2$$

OK

$$FS = \frac{5.065 \text{ KIP/FT}^2}{3.668 \text{ KIP/FT}^2} = 1.38 + \text{EXISTING CAISSONS}$$