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Technical Assignment One

Penn State AE Senior Thesis

Office Building - G

Eastern USA

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EXECUTIVE SUMMARY

Technical Assignment One is a composition of the existing conditions and parameters that went into the design and construction of the new Office Building-G in the eastern United States. This project includes a brand new 14 story, 380,100 SF office building along with a four level underground parking garage that totals around 269,000 SF. The building features a glass curtain wall along the southern elevation with the rest being made up of architectural precast concrete with punched out glazing.

The new Office Building-G project is scheduled to take around two years to complete. Turner Construction plans to implement a design-bid-build delivery system with a Guaranteed Maximum Price contract with the owner. The contract is for roughly $70 million. LEED Silver status is projected for the project with the usage of green and white roofs, water reuse/ reduction techniques and the use of recycled materials to name a few key aspects. One of the biggest challenges the construction team faces is the neighboring metro station next to the building site. Pedestrian traffic will be one of the main concerns the team will have to deal with around the site.

Included in the report is information regarding the milestone dates of the garage and building. These are shown in the report and also summarized on the schedule presented in report's appendixes. A detailed look at the building systems describes the design and methods of construction that the team looks to take to complete the project successfully while also achieving a LEED Silver rating as well. The project cost was reviewed using estimating software that will help to show the design details of the project. Because of the complicated site, an existing conditions plan and local conditions summary show the factors that the construction and design teams had to take into account for this project, particularly the adjacent metro station. The final pieces of information in this report include the clients' information as well as the project delivery system and staffing plan for the new Office Building-G project.

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A. PROJECT SCHEDULE SUMMARY

*** Refer to Appendix A for Project Schedule Summary**

The new Office Building project began in November of 2009. Turner was not the first to be awarded the project at the beginning, another contractor was selected. However, things did not work out with that contractor and Turner was awarded the project on December 4, 2009. The process for the building and the garage permits began in March 2010 and the Guaranteed Maximum Price (GMP) contract with the owner began development in May 2010.
The project is broken down into five major phases: excavation, construction of the four parking levels, construction of the building core, the building fitouts, and the tenant's fitouts.

Foundation Sequence:

Major excavation and earthwork began in June 2010 with sheeting and shoring to follow. From the geotechnical report, spread footings were suggested to be used on the underground parking garage. Each level consists of concrete slabs and concrete bearing walls. The garage is scheduled to begin construction in December 2010 and scheduled to finish at the beginning of May 2011.

Structural Sequence:

Cast in place concrete with a steel frame tower is the primary structural system for the building. Tentatively, the core top out date is scheduled for August 29, 2011. Shortly after the start of construction on the building core, the curtain wall along with the precast construction will begin in the summer of 2011. Roofing installation is also set to begin that summer with green and white roofs to be installed.

Finish Sequence:

Once the structural core of the building is complete, each floors fitouts can begin. MEP installation along with electrical installation, plumbing, and fire protection will encompass each floors fitout. The final floor, the penthouse floor, is scheduled to be completed in February 2012. At that point, the final phase will begin with the tenant's fitout. Substantial competition of the project is set for September 12, 2012.

B. BUILDING SYSTEMS SUMMARY

Building Systems Checklist

Yes	No	Work Scope
	x	Demolition
	x	Structural Steel Frame
x		Cast in Place Concrete
x		Precast Concrete
x		Mechanical System
x		Electrical System
x		Masonry
x		Curtain Wall
x		Support of Excavation

Demolition:

Demolition was not required on the New Office Building-G site. The site was relatively undeveloped land and Turner only was responsible for rubbish removal.

Structural Steel Frame:

The new Office Building-G has minimal structural steel since the main structural system is predominantly a concrete system with post-tensioned slabs. The minimal steel used on this project is includes a steel frame tower along with aluminum beams.

Cast in Place Concrete:

The new Office Building-G's cast in place concrete system is the predominant system used on the building. The system contains 7" slabs with a 5000 psi load on the core floors, 4-13, along with post-tensioned girders as well. Columns range from 24" x 24" in size with a 10,000 psi load, used in the garage, to columns with 6000 psi maximum load in the building. Interior shear walls will provide lateral resistance. Plywood and metal will be used for horizontal and vertical formwork. Form-facing panels will be used in areas where smooth-formed finish is required. Reinforcing steel will come from the steel frame tower that will be used along with joist tower aluminum beams. Also, steel reinforcing bars will follow ASTM A615/A 615M grade 60. The CIP concrete placement methods are being developed and not known at this time.

Precast Concrete:

The precast concrete system used on the project is intended to establish and maintain an airtight and waterproof skin on the structure while staying within the limitations and performance standards specified by the wall system design. The precast is also being utilized for architectural purposes that include the facade of the building along with the punched

ribbon windows. The precast will fasten onto the structural concrete of the building by means of anchors, embeds, connections and inserts of different types. The precast concrete's casting location is off site and cannot be disclosed due to project restrictions. Two tower cranes will be used to place the precast concrete, they are to be placed on the north side of the building for use. The exact type and size of the tower cranes are not known at this time.

Mechanical System:

The mechanical contractor on the new Office Building-G project is GHT Limited. The mechanical system has rooms dedicated to mechanical support on the penthouse and first floor garage level. The system includes three variable speed drive chillers that provide chilled water to the air handling units (AHUs). Because of the core and shell type building, each floor will have 1 VAV system. A fully integrated building automation system is also included in the mechanical system. The building have a total of eight elevators throughout the building. Six traction elevators will be installed in the core of the building for office employee use and two shuttle elevators will also be used in the building. To transport employees from the parking garage to the lobby floor, two hydraulic elevators will be used. The two hydraulic elevators will only run from the garage first floor to the lobby floor. The fire suppression system in place is a wet sprinkler pipe system.

Electrical System:

The electrical contractor on the new Office Building-G project is the same as the mechanical contractor, GHT Limited. The main system consists of a 265/460V, 3 phase, 4 wire with a 4000A breaker service. The main electrical room is on the top level of the underground parking garage with electrical rooms on each floor of the building, including the penthouse. There are many different lighting fixtures that make up the new Office Building-G. They range from simple ceiling lighting in the office spaces to aesthetically pleasing pendant and recessed lighting for specialty areas. The lamp types also vary as much as the mounting type. Regular T8 lamps up to highly technical LED lamps are used. The vast majority of the lighting fixtures use a 265V source while others use 120V.

Masonry:

The masonry used on the new Office Building-G will be used for load bearing purposes. Both CMUs and concrete building brick will be used on the project. Reinforcing steel along with joint reinforcing wire will be used for both interior and exterior walls. The CMUs to be used are specified to be lightweight, type I, moisture-controlled units. The concrete building brick are also lightweight, type I, grade N. The masonry is to be filled continuously, grouted and reinforced. Ties and anchors will be used for connection purposes. Scaffolding will be used on the interior of the building, but at this time no details are available.

Curtain Wall:

The curtain wall on the new Office Building-G project is to be constructed on the southern side of the building. The curtain wall is made up of both glass and aluminum and while it will look

curved, it is really made up of segmented glass pieces. The curtain wall subcontractor will own the design and engineering responsibilities, but all decisions must be approved by the architect before any changes are made.

Support of Excavation:

The new Office Building-G project's support system was required due to the soil and water conditions reported in the geotechnical report. The site is to be supported by sheeting and shoring operations along with tie backs near the adjacent metro tunnel. Due to the groundwater readings taken, a dewatering system will be used. Eight localized underground pumps will be utilized during excavation. The dewatering pumps are only temporary and will be removed after excavation. Sheeting and shoring will remain along with proper backfill around the foundation/parking garage.

LEED:

The project and design team on the new Office Building-G are striving to achieve a LEED Silver certification on this project. The major sustainable features that the project includes is the green and white roofs that will be utilized on the building. Along with the roof types, other major sustainability features that are to be included are water reuse/reduction techniques, recycled environmentally friendly materials used during construction and alternative transportation methods by means of the adjacent metro station. The figure below shows a section detail of the green roof that will be used.

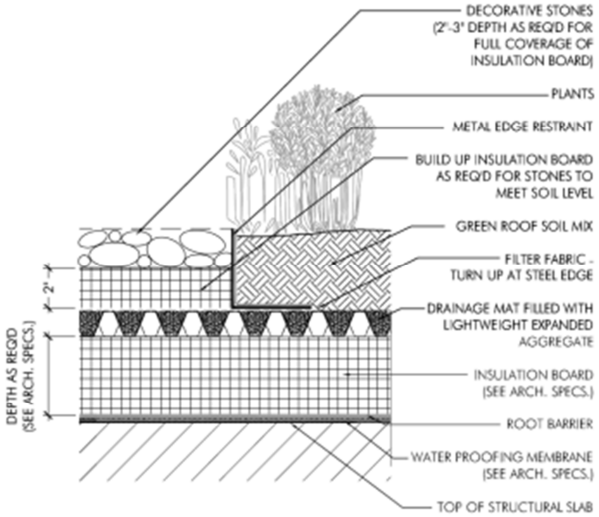


FIGURE 1 : GREEN ROOF DETAIL

C. PROJECT COST EVALUATION

Cost Summary:

Office Building - G	Cost	Cost/SF
Construction Cost	$ 63,283,188.00	$ 166.21
Total Project Cost	$ 69,662,980.00	$ 182.97

Building Systems Cost:

Building System	Cost	Cost/SF
CIP Concrete	$ 14,909,500.00	$ 39.16
Precast Concrete	$ 3,049,823.00	$ 8.01
Glazing	$ 6,047,032.00	$ 15.88
Elevators	$ 2,584,000.00	$ 6.79
HVAC/Plumbing	$ 8,322,123.00	$ 21.86
Electrical	$ 5,132,167.00	$ 13.48
Fire Protection	$ 787,538.00	$ 2.07

RS Means Estimate:

*** Refer to Appendix B for RS Means CostWorks Report**

	Office Building-G	Underground Garage
Perimeter	730 LF	1090.5 LF
Square Footage	380,741 SF	268,720 SF
Floor Height	12.25 FT	10 FT
Elevators	8	2 (up to lobby floor)

Total Building Cost:

$ 54,173,000.00

Total Garage Cost:

$16,020,500.00

Total Project Cost:

$70,193,500.00

D4 Cost Estimate:

*** Refer to Appendix C for D4 Cost Report**

Building Data:

Name	Size	Floor(s)	Building Cost
Ha-Lo Headquarters	267,334	7	$ 37,643,382.00

Garage Data:

Name	Size	Floor(s)	Garage Cost
Parking Garage	144,000	5	$ 4,492,052.00
City-Centre Parking Garage	159,326	4	$ 5,792,244.00

Total Project Cost (for D4 estimate):

Total Building Cost:

$ 56,103,012.00

Total Garage Cost:

$16,519,098.00

Total Project Cost:

$72,622,110.00

The projects above were chosen from the D4 cost historical database. The reason these projects were selected is because they are very similar to the new Office Building-G. They had similar size, number of floors, and building cost.

Comparison between RS Means and D4 Estimate:

The comparison between the RS Means data and the D4 data for the new Office Building-G project determined that both differed from the original total cost estimate by under $2 million dollars. The reasons that the estimates differ from the real estimate are:

- Location factors used in both the D4 data and RS Means
- The projects were not the same as the new Office Building-G project. Office Building-G is being built on top of the underground garage and the data from both estimates do not take that into account.
- The excavation data will differ since the building estimate takes excavation data into account which inflates the estimate of the project. The estimate for the excavation only needs to be made once since excavation will be needed for the garage and the building

will be built on top. In both estimates, excavation is accounted for, meaning it is accounted for twice instead of once, inflating the total building estimate.

- Detwatering systems are taken into account in the original estimate, however, in both the RS Means and D4 cost estimates, a dewatering system is not accounted for which will affect the total estimate.

D. SITE PLAN OF EXISTING CONDITIONS

*** Refer to Appendix D for Existing Conditions Site Plan**

The site for the new Office Building – G is located between two major roadways to the north and south of the building's location. The main issue with the buildings location is the existing metro station that is to the west of the building. The metro station will continue to function during the construction of the building so proper safety actions will need to take place to protect pedestrians from any hazards that may be caused by construction. The project team plans to cover the sidewalks along the construction site to protect pedestrians that use the sidewalk daily to access the metro station. Along with the covered sidewalks, a special fence will be utilized on the west side of the site for protection of the metro station. Tie backs will be used near the metro's tunnel during excavation.

E. LOCAL CONDITIONS

The location of the new Office Building-G is in a location where many buildings use Cast-In-Place concrete as their primary structure. Height restrictions limit the maximum height buildings can be constructed to, so concrete can be utilized instead of steel.

Due to the condensed area this new building is in, parking areas have to be utilized efficiently. That is why many parking garages being built in the area are either underground or above ground. Also, luckily for the project team, there is ample parking for the construction staff to the east of the project site.

From the geotechnical report, it was stated that the new Office Building-G site contains compact soils of Stratum B and disintegrated rock of Stratum C. The report recommends that spread footings should be used as means of foundation support for the building. The spread footings are suggested to be designed to support soil bearing pressure of 15,000 psf. The report also took groundwater readings and found the presence of water as high as 14 ft below

existing grade. Thus, dewatering systems will be provided during construction. Drilled caissons are also recommended in the report in areas of Stratum C soil. The caissons should be designed for an end-bearing pressure of 40 tsf and an allowable skin friction value of 1500 psf within the disintegrated rock of Stratum C.

Due to the existing metro station to the west of the building, special considerations must be made. The metro's adjacent construction design manual must be carefully studied and be in accordance with the project design plans. The metro's tunnel is in the vicinity of the site which makes it sensitive to changes in loading. The sensitivity is due to the compressible nature of the residual soil supporting the tunnel. Because the tunnel is only a few feet below the ground, it probably was constructed using sloped elevations, therefore, sheeting and shoring may not exist for the tunnel structure. The new office building is within the metro's "zone of influence", so special precautions will need to be made that include tie backs beneath the track and tunnel. Rakers and heel blocks may be required if tie backs cannot be used.

F. CLIENT INFORMATION

Due to owner restrictions on the project, much of the client information on the new Office Building-G cannot be disclosed. From an owner's perspective, I believe one of the main reasons they are building this new office building is for growth. Cost will be a major factor as it is for any project but safety will be the number one concern. Keeping the construction process on schedule is something I'm sure the owner is concerned about, but they will not want to sacrifice safety to keep the project on schedule. Because of owner restrictions I can only speculate on these issues, so I am unaware if there are any sequencing issues or any phased, joint or dual occupancy.

G. PROJECT DELIVERY SYSTEM

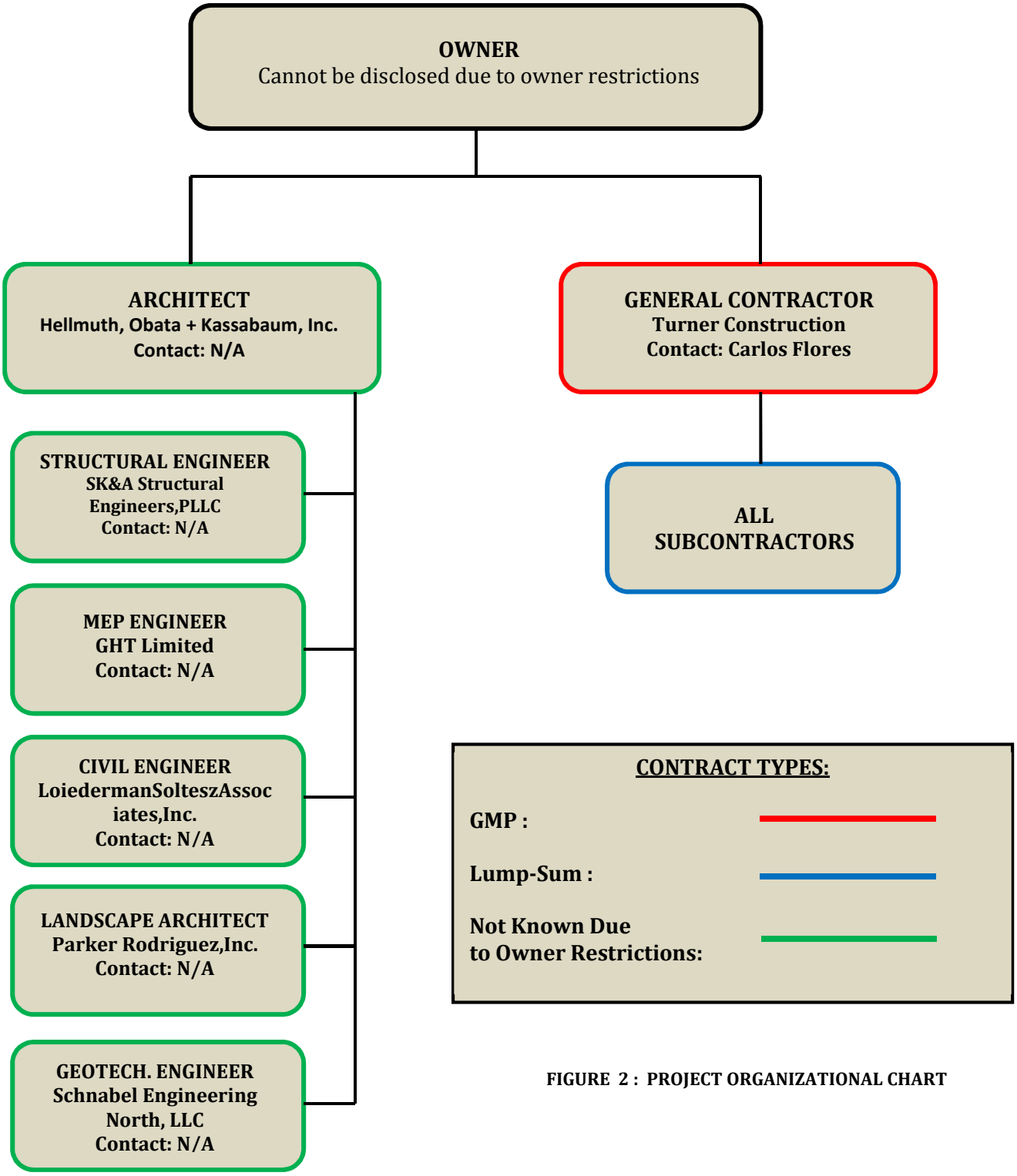


FIGURE 2 : PROJECT ORGANIZATIONAL CHART

From figure 2 above, you can see the contractual agreements are between all respected parties. Turner holds a GMP (guaranteed maximum price)with the owner and a lump-sum contract with all of the subcontractors. Due to owner restrictions, the types of contracts held between the owner and the architects and engineers are not known. What is known is that the architect has contracts with the engineers and other architects. Even though the architect and general contractor do not have a contract between them, communication is still used between both parties frequently.

Turner has a design-bid-build delivery system in place for the project. This delivery system is effective because of the size of the project. It allows the general contractor to focus on the construction of the project and the many complexities that will need the full attention of the general contractor.

The new Office Building-G was originally not awarded to Turner, they lost the bid. However, after time the owner was not happy with the way the project was going with the contractor that they originally selected. They cut ties with them and decided to award the project to Turner.

Turner has bonds with all of the subcontractors on the project with what they call Subcontractor Default Insurance or Subguard. They also utilize CCIP (Construction Controlled Insurance Program) with their own private insurance carrier.

F. STAFFING PLAN

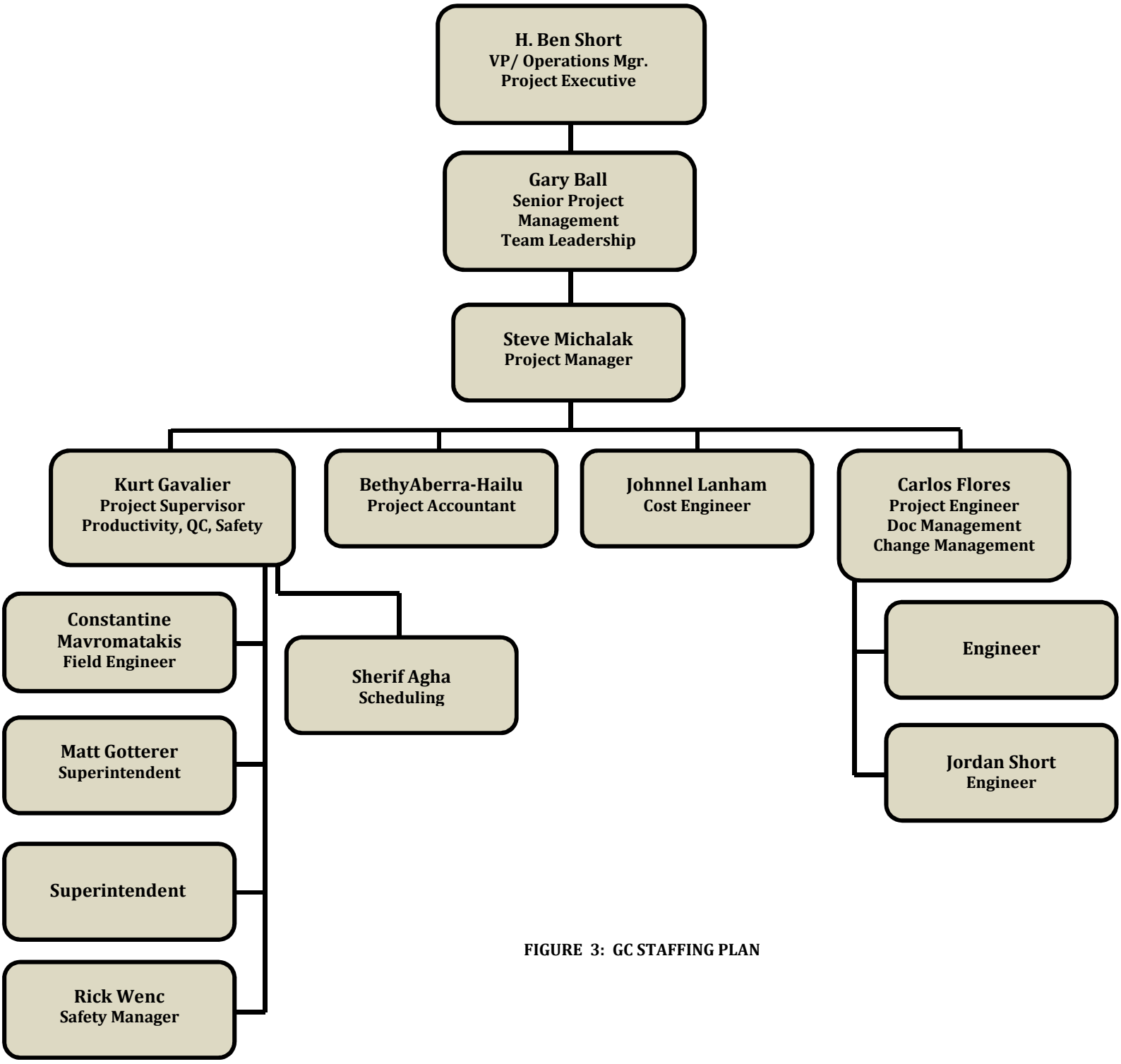
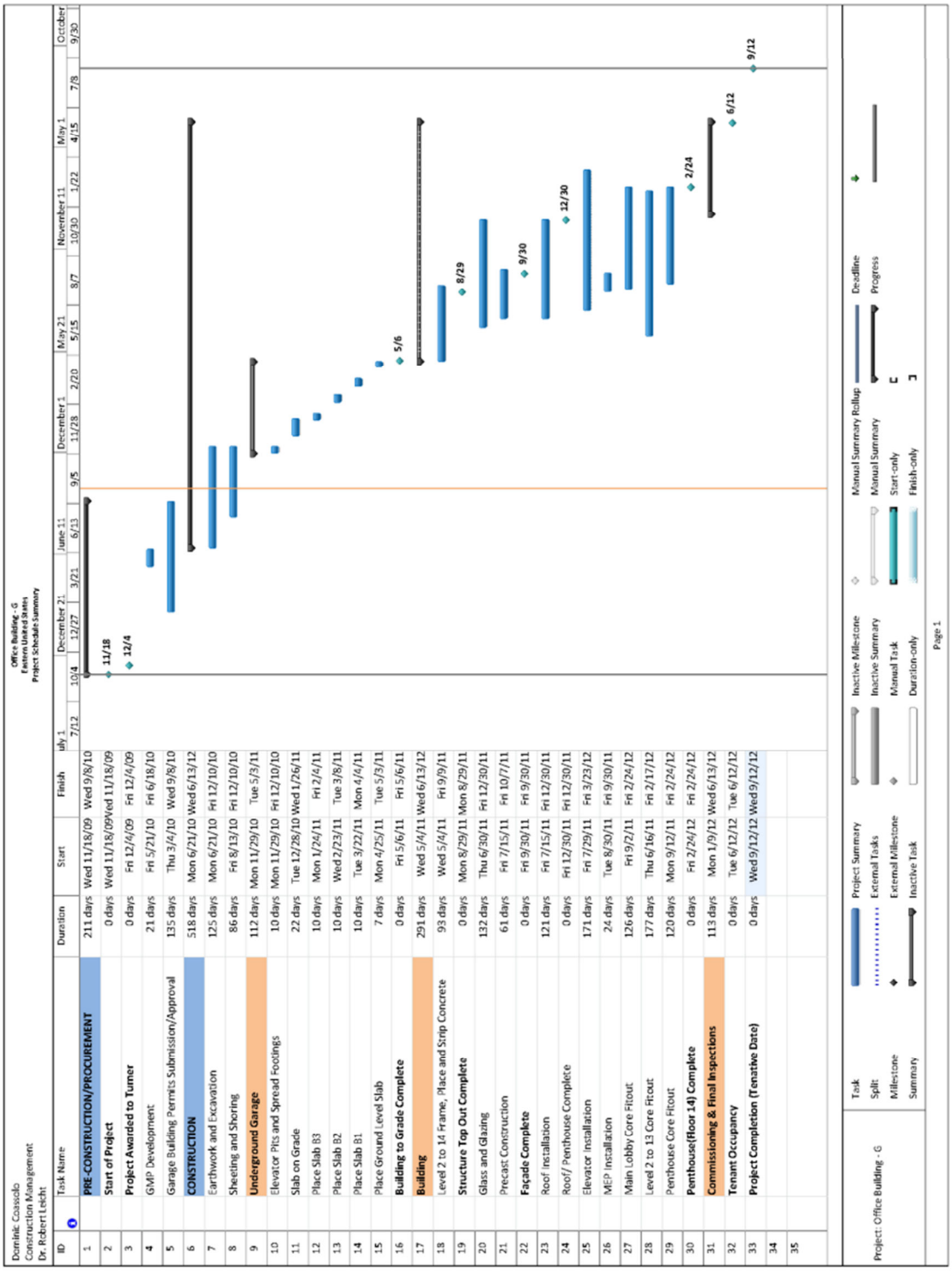


FIGURE 3: GC STAFFING PLAN

From figure 3 above, you can see Turner's managing staff for the new Office Building-G project. The staff is split into two groups, the office staff and the field staff. The office staff includes the project VP, senior project manager, project manager, accountant, cost engineer, project engineer and any engineers or interns who preside below the project engineer. The field staff includes the project supervisor, field engineer, scheduler, superintendent and safety manager.

Turner's staff sizes vary on each project. More or less staff may be assigned depending on the sizes of the project. Figure 3 shows the current staffing plan for the new Office Building-G but the plan can change if more help is needed on the project. The same goes for all Turner projects.

APPENDIX A – PROJECT SUMMARY SCHEDULE



APPENDIX B – RSMEANS COSTWORKS REPORTS

Square Foot Cost Estimate Report

Estimate Name:	**Office Building -G**
Building Type:	**Office,11-20 Story with Precast Concrete Panel With Exposed Aggregate / R/Conc. Frame**
Location:	**COLLEGE PARK, MD**
Story Count:	**14**
Story Height (L.F.):	**12.25**
Floor Area (S.F.):	**380741**
Labor Type:	**Union**
Basement Included:	**No**
Data Release:	**Year 2010 Quarter 3**
Cost Per Square Foot:	**$142.28**
Building Cost:	**$54,173,000**

Costs are derived from a building model with basic components.

Scope differences and market conditions can cause costs to vary significantly.

		% of Total	Cost Per S.F.	Cost
A Substructure		**6.40%**	**$6.92**	**$2,633,500**
A1010	**Standard Foundations** Pile caps, 12 piles, 11' - 6" x 8' - 6" x 52", 80 ton capacity, 27"column size, 1856 K column Pile caps, 18 piles, 13' - 0" x 11' - 6" x 56", 80 ton capacity, 33"column size, 2776 K column		**$0.73**	**$279,000**
A1020	**Special Foundations** Steel H piles, 50' long, 1200K load, end bearing, 11 pile cluster Steel H piles, 50' long, 2000K load, end bearing, 18 pile cluster Grade beam, 30' span, 52" deep, 14" wide, 12 KLF load		**$5.50**	**$2,095,500**
A1030	**Slab on Grade** Slab on grade, 4" thick, non industrial, reinforced		**$0.33**	**$126,500**
A2010	**Basement Excavation** Excavate and fill, 10,000 SF, 4' deep, sand gravel, or common earth, on site storage		**$0.02**	**$7,000**
A2020	**Basement Walls** Foundation wall, CIP, 4' wall height, direct chute, .148 CY/LF, 7.2 PLF, 12" thick		**$0.33**	**$125,500**
B Shell		**28.40%**	**$30.50**	**$11,613,500**
B1010	**Floor Construction**		**$14.78**	**$5,628,000**

	Cast-in-place concrete column, 16" square, tied, 400K load, 14' story height, 253 lbs/LF, 4000PSI Cast-in-place concrete column, 28", square, tied, minimum reinforcing, 1000K load, 10'-14' story height, 740 lbs/LF, 4000PSI Cast-in-place concrete column, 36", square, tied, minimum reinforcing, 1800K load, 10'-14' story height, 1220 lbs/LF, 4000PSI Flat plate, concrete, 9.5" slab, 20" column, 25'x25' bay, 75 PSF superimposed load, 194 PSF total load		
B1020	**Roof Construction** Floor, concrete, beam and slab, 25'x25' bay, 40 PSF superimposed load, 20" deep beam, 9" slab, 152 PSF total load	**$0.90**	**$344,500**
B2010	**Exterior Walls** Exterior wall, precast concrete, flat, 6" thick, 8' x 8', white face, 2" rigid insulation, low rise	**$11.01**	**$4,192,500**
B2020	**Exterior Windows** Glazing panel, plate glass, 1/2" thick, tinted	**$2.90**	**$1,103,500**
B2030	**Exterior Doors** Door, aluminum & glass, without transom, full vision, double door, hardware, 6'-0" x 7'-0" opening Door, aluminum & glass, with transom, non-standard, double door, hardware, 6'-0" x 10'-0" opening	**$0.60**	**$227,000**
B3010	**Roof Coverings** Roofing, single ply membrane, reinforced, PVC, 48 mils, fully adhered, adhesive Insulation, rigid, roof deck, composite with 2" EPS, 1" perlite Roof edges, aluminum, duranodic, .050" thick, 6" face Flashing, aluminum, no backing sides, .019"	**$0.31**	**$118,000**
C Interiors		**15.30%**	**$16.41**	**$6,249,000**
C1010	**Partitions** Concrere block (CMU) partition, regular weight, hollow, 8" thick, 5/8" gyp board, 1 side Metal partition, 5/8"fire rated gypsum board face, 5/8"fire rated gypsum board base, 3-5/8" @ 24", same opposite face, no insulation 1/2" fire ratedgypsum board, taped & finished, painted on metal furring	**$2.11**	**$803,000**
C1020	**Interior Doors** Door, single leaf, kd steel frame, hollow metal, commercial quality, flush, 3'-0" x 7'-0" x 1-3/8"	**$2.37**	**$903,000**
C1030	**Fittings** Toilet partitions, cubicles, ceiling hung, plastic laminate	**$0.37**	**$141,000**
C2010	**Stair Construction** Stairs, steel, cement filled metal pan & picket rail, 16 risers, with landing	**$1.08**	**$411,000**
C3010	**Wall Finishes**	**$0.63**	**$238,000**

	Painting, interior on plaster and drywall, walls & ceilings, roller work, primer & 2 coats		
	Vinyl wall covering, fabric back, medium weight		
C3020	**Floor Finishes**	**$4.40**	**$1,677,000**
	Carpet tile, nylon, fusion bonded, 18" x 18" or 24" x 24", 35 oz		
	Vinyl, composition tile, maximum		
	Tile, ceramic natural clay		
C3030	**Ceiling Finishes**	**$5.45**	**$2,076,000**
	Acoustic ceilings, 3/4"mineral fiber, 12" x 12" tile, concealed 2" bar & channel grid, suspended support		
D Services	**49.90%**	**$53.54**	**$20,385,500**
D1010	**Elevators and Lifts**	**$13.51**	**$5,144,500**
	6 - Traction gearless elevators, passenger, 3000 lb, 10 floors, 200 FPM		
	Traction, geared passenger, 3500 lb,15 floors, 10' story height, 2 car group, 350 FPM		
D2010	**Plumbing Fixtures**	**$3.16**	**$1,201,500**
	Water closet, vitreous china, bowl only with flush valve, wall hung		
	Urinal, vitreous china, wall hung		
	Lavatory w/trim, vanity top, PE on CI, 20" x 18"		
	Service sink w/trim, PE on CI,wall hung w/rim guard, 24" x 20"		
	Water cooler, electric, wall hung, 8.2 GPH		
	Water cooler, electric, wall hung, wheelchair type, 7.5 GPH		
D2020	**Domestic Water Distribution**	**$0.27**	**$101,000**
	Gas fired water heater, commercial, 100< F rise, 300 MBH input, 278 GPH		
D2040	**Rain Water Drainage**	**$0.14**	**$54,000**
	Roof drain, CI, soil,single hub, 4" diam, 10' high		
	Roof drain, CI, soil,single hub, 5" diam, for each additional foot add		
D3020	**Heat Generating Systems**	**$2.01**	**$765,500**
	Plate heat exchanger, 1800 GPM		
	Utility fan set system, belt drive, 7500 CFM		
	Boiler, cast iron, gas & oil, hot water, 6000 MBH		
	Pump, base mounted with motor, end-suction, 6" size, 25 HP, to 1550 GPM		
D3030	**Cooling Generating Systems**	**$12.97**	**$4,938,000**
	Packaged chiller, water cooled, with fan coil unit, offices, 60,000 SF, 190.00 ton		
D4010	**Sprinklers**	**$2.45**	**$934,500**
	Wet pipe sprinkler systems, steel, light hazard, 1 floor, 10,000 SF		
	Wet pipe sprinkler systems, steel, light hazard, each additional floor, 10,000 SF		
	Standard High Rise Accessory Package 16 story		

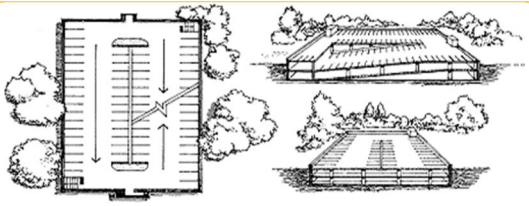
D4020	**Standpipes**	**$0.38**	**$145,500**
	Wet standpipe risers, class III, steel, black, sch 40, 6" diam pipe, 1 floor		
	Wet standpipe risers, class III, steel, black, sch 40, 6" diam pipe, additional floors		
	Fire pump, electric, with controller, 5" pump, 100 HP, 1000 GPM		
	Fire pump, electric, for jockey pump system, add		
D5010	**Electrical Service/Distribution**	**$0.74**	**$280,000**
	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 2000 A		
	Feeder installation 600 V, including RGS conduit and XHHW wire, 60 A		
	Feeder installation 600 V, including RGS conduit and XHHW wire, 200 A		
	Feeder installation 600 V, including RGS conduit and XHHW wire, 2000 A		
	Switchgear installation, incl switchboard, panels & circuit breaker, 2000 A		
D5020	**Lighting and Branch Wiring**	**$11.29**	**$4,300,000**
	Receptacles incl plate, box, conduit, wire, 16.5 per 1000 SF, 2.0 W per SF, with transformer		
	Miscellaneous power, 1.2 watts		
	Central air conditioning power, 4 watts		
	Motor installation, three phase, 460 V, 15 HP motor size		
	Motor feeder systems, three phase, feed to 200 V 5 HP, 230 V 7.5 HP, 460 V 15 HP, 575 V 20 HP		
	Motor connections, three phase, 200/230/460/575 V, up to 5 HP		
	Motor connections, three phase, 200/230/460/575 V, up to 100 HP		
	Fluorescent fixtures recess mounted in ceiling, 1.6 watt per SF, 40 FC, 10 fixtures @32watt per 1000 SF		
D5030	**Communications and Security**	**$6.08**	**$2,315,500**
	Telephone wiring for offices & laboratories, 8 jacks/MSF		
	Communication and alarm systems, fire detection, addressable, 100 detectors, includes outlets, boxes, conduit and wire		
	Fire alarm command center, addressable with voice, excl. wire & conduit		
	Internet wiring, 8 data/voice outlets per 1000 S.F.		
D5090	**Other Electrical Systems**	**$0.54**	**$205,500**
	Generator sets, w/battery, charger, muffler and transfer switch, diesel engine with fuel tank, 200 kW		
	Uninterruptible power supply with standard battery pack, 15 kVA/12.75 kW		
E Equipment & Furnishings		**0.00%**	**$0.00**	**$0**
E1090	**Other Equipment**		**$0.00**	**$0**
F Special Construction		**0.00%**	**$0.00**	**$0**

G Building Sitework		0.00%	$0.01	$3,500
G4020	Site Lighting		$0.01	$3,500
	Light pole, aluminum, 20' high, 1 arm bracket			

SubTotal	100%	$107.38	$40,885,000
Contractor Fees (General Conditions,Overhead,Profit)	25.00%	$26.85	$10,221,500
Architectural Fees	6.00%	$8.05	$3,066,500
User Fees	0.00%	$0.00	$0
Total Building Cost		$142.28	$54,173,000

Square Foot Cost Estimate Report

Estimate Name:	Office Building-G
Building Type:	Garage, Underground Parking with Reinforced Concrete / R/Conc. Frame
Location:	COLLEGE PARK, MD
Story Count:	4
Story Height (L.F.):	10
Floor Area (S.F.):	268720
Labor Type:	Union
Basement Included:	No
Data Release:	Year 2010 Quarter 3
Cost Per Square Foot:	$59.62
Building Cost:	$16,020,500



Costs are derived from a building model with basic components.

Scope differences and market conditions can cause costs to vary significantly.

Parameters are not within the ranges recommended by RSMeans.

		% of Total	Cost Per S.F.	Cost
A Substructure		16.60%	$7.31	$1,965,500
A1010	Standard Foundations		$3.68	$988,000
	Strip footing, concrete, reinforced, load 11.1 KLF, soil bearing capacity 6 KSF, 12" deep x 24" wide			
	Spread footings, 3000 PSI concrete, load 200K, soil bearing capacity 3 KSF, 8' -6" square x 20" deep			
	Spread footings, 3000 PSI concrete, load 300K, soil bearing capacity 3 KSF, 10' - 6" square x 25" deep			
	Foundation dampproofing, asphalt with fibers, 1/8" thick, 8' high			
A1030	Slab on Grade		$1.57	$422,500
	Slab on grade, 5" thick, light industrial, reinforced			
A2010	Basement Excavation		$2.07	$555,000

	Excavate and fill, 30,000 SF, 16' deep, sand, gravel, or common earth, off site storage			
B Shell		**59.00%**	**$26.05**	**$7,000,000**
B1010	**Floor Construction** Cast-in-place concrete column, 28", square, tied, minimum reinforcing, 1000K load, 10'-14' story height, 740 lbs/LF, 4000PSI Cast-in-place concrete beam and slab, 9" slab, one way, 26" column, 35'x35' bay, 200 PSF superimposed load, 355 PSF total load Floor, metal deck, 18 ga, 2" deep, concrete slab, 10' span, 4" deep, 125 PSF superimposed load, 165 PSF total load		**$16.68**	**$4,482,500**
B1020	**Roof Construction** Floor, concrete, beam and slab, 35'x35' bay, 40 PSF superimposed load, 26" deep beam, 9" slab, 209 PSF total load		**$5.28**	**$1,418,000**
B2010	**Exterior Walls** Concrete wall, reinforced, 8' high, 8" thick, plain finish, 4000 PSI		**$2.99**	**$804,500**
B2030	**Exterior Doors** Door, aluminum & glass, with transom, black finish, double door, hardware, 6'-0" x 10'-0" opening Door, steel 18 gauge, hollow metal, 1 door with frame, no label, 3'-0" x 7'-0" opening		**$0.16**	**$43,500**
B3010	**Roof Coverings** Vinyl and neoprene membrane traffic deck		**$0.94**	**$251,500**
C Interiors		**1.20%**	**$0.53**	**$143,000**
C1010	**Partitions** Concrere block (CMU) partition, light weight, hollow, 8" thick, no finish 8" concrete block partition		**$0.23**	**$61,000**
C1020	**Interior Doors** Door, single leaf, kd steel frame, hollow metal, commercial quality, flush, 3'-0" x 7'-0" x 1-3/8"		**$0.03**	**$7,500**
C2010	**Stair Construction** Stairs, CIP concrete, w/landing, 16 risers, with nosing		**$0.25**	**$67,500**
C3010	**Wall Finishes** Painting, masonry or concrete, latex, brushwork, primer & 2 coats		**$0.03**	**$7,000**
D Services		**22.40%**	**$9.88**	**$2,655,000**
D1010	**Elevators and Lifts** Hydraulic passenger elevator, 2500 lb., 2 floor, 125 FPM		**$1.53**	**$410,500**
D2010	**Plumbing Fixtures** Water closet, vitreous china, bowl only with flush valve, floor mount Lavatory w/trim, wall hung, PE on CI, 19" x 17"		**$0.05**	**$13,000**
D2020	**Domestic Water Distribution** Electric water heater, commercial, 100< F rise, 50 gallon tank, 9 KW 37 GPH		**$0.10**	**$26,500**

D2040	**Rain Water Drainage**	**$1.04**	**$280,000**
	Roof drain, steel galvsch 40 threaded, 3" diam piping, 10' high Roof drain, steel galvsch 40 threaded, 3" diam piping, for each additional foot add		
D3050	**Terminal & Package Units**	**$0.15**	**$39,500**
	16000 CFM, 5 HP vane axial fan		
D4010	**Sprinklers**	**$3.42**	**$918,500**
	Dry pipe sprinkler systems, steel, ordinary hazard, 1 floor, 50,000 SF Dry pipe sprinkler systems, steel, ordinary hazard, each additional floor, 50,000 SF		
D4020	**Standpipes**	**$0.13**	**$34,000**
	Dry standpipe risers, class III, steel, black, sch 40, 4" diam pipe, 1 floor Dry standpipe risers, class III, steel, black, sch 40, 4" diam pipe, additional floors		
D5010	**Electrical Service/Distribution**	**$0.12**	**$33,000**
	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 200 A Feeder installation 600 V, including RGS conduit and XHHW wire, 200 A Switchgear installation, incl switchboard, panels & circuit breaker, 400 A		
D5020	**Lighting and Branch Wiring**	**$3.12**	**$837,500**
	Receptacles incl plate, box, conduit, wire, 2.5 per 1000 SF, .3 watts per SF		
	Miscellaneous power, to .5 watts Fluorescent fixtures recess mounted in ceiling, 0.8 watt per SF, 20 FC, 5 fixtures @32 watt per 1000 SF		
D5030	**Communications and Security**	**$0.17**	**$45,500**
	Communication and alarm systems, fire detection, addressable, 12 detectors, includes outlets, boxes, conduit and wire Fire alarm command center, addressable without voice, excl. wire & conduit		
D5090	**Other Electrical Systems**	**$0.06**	**$17,000**
	Generator sets, w/battery, charger, muffler and transfer switch, gas/gasoline operated, 3 phase, 4 wire, 277/480 V, 11.5 kW		
E Equipment & Furnishings		**0.90%**	**$0.39**	**$103,500**
E1030	**Vehicular Equipment**	**$0.39**	**$103,500**
	Architectural equipment, parking equipment, automatic gates, 8 FT arm, 1 way Architectural equipment, parking equipment, booth for attendant, economy Architectural equipment, parking equipment, ticket printer/dispenser, rate computing		
E1090	**Other Equipment**	**$0.00**	**$0**
F Special Construction		**0.00%**	**$0.00**	**$0**

G Building Sitework	0.00%	$0.00	$0
SubTotal	100%	$44.16	$11,867,000
Contractor Fees (General Conditions,Overhead,Profit)	25.00%	$11.04	$2,967,000
Architectural Fees	8.00%	$4.42	$1,186,500
User Fees	0.00%	$0.00	$0
Total Building Cost		$59.62	$16,020,500

APPENDIX C – D4COST REPORTS

Sunday, September 26, 2010

Statement of Probable Cost

Office Bldg G-Building - Jul 2010 - MD - Baltimore

Prepared By:	Dominic Coassolo	Prepared For:	AE Senior Thesis - Technical Report One
Fax:		Fax:	
Building Sq. Size:	380741	Site Sq. Size:	239425
Bid Date:		Building use:	Office
No. of floors:	14	Foundation:	CON
No of buildings:	1	Exterior Walls:	CUR
Project Height:	93.6	Interior Walls:	DRY
1st Floor Height:	12.25	Roof Type:	LVR
1st Floor Size:	37528	Floor Type:	N/A
		Project Type:	NEW

Division		Percent	Sq. Cost	Amount
00	**Bidding Requirements**	2.14	3.02	1,148,519
	Permits	0.56	0.79	301,934
	Site Security	0.19	0.26	99,252
	Testing	0.17	0.24	91,188
	Insurance	1.06	1.49	567,428
	Civil Engineer	0.17	0.23	88,717
01	**General Requirements**	12.81	18.03	6,865,524
	Architect Fee	6.06	8.54	3,250,169
	General Requirements	4.52	6.37	2,425,160
	Contractor Fee	2.22	3.13	1,190,195
03	**Concrete**	19.43	27.36	10,418,673
	Cast-In-Place	19.43	27.36	10,418,673
04	**Masonry**	1.78	2.51	954,628
	Unit	0.50	0.70	266,960
	Architectural Stone Flooring	1.28	1.81	687,668
05	**Metals**	9.45	13.31	5,068,284
	Architectural Metal Framing	4.66	6.56	2,496,160
	Fabrications	2.32	3.27	1,244,647
	Ornamental	2.48	3.49	1,327,478
06	**Wood & Plastics**	0.20	0.28	107,236
	Rough Carpentry	0.05	0.08	29,235
	Finish Carpentry	0.15	0.20	78,001
07	**Thermal & Moisture Protection**	1.03	1.45	552,652
	Waterproofing	0.11	0.16	59,623
	Firestopping	0.19	0.27	101,777
	Membrane Roofing	0.73	1.03	391,252
08	**Doors & Windows**	21.43	30.18	11,491,672
	Metal Doors & Frames	0.17	0.24	89,935
	Special Doors	0.44	0.62	234,255
	Structural Glazing	11.43	16.09	6,126,006
	Glazed Curtainwalls	9.16	12.90	4,910,080
	Interior/Exterior Glass Cleaning	0.25	0.35	131,397
09	**Finishes**	1.42	2.00	761,778
	Metal Studs & Drywall	1.00	1.42	538,770
	Ceramic Tile	0.31	0.44	166,496
	Resilient Flooring	0.00	0.00	1,467
	Painting	0.10	0.14	55,044
10	**Specialties**	3.32	4.67	1,778,579
	Raised Access Floor	2.96	4.17	1,585,849
	Toilet Partitions	0.28	0.39	150,232
	Louvers	0.08	0.11	42,499
12	**Furnishings**	1.26	1.78	677,271
	Window Treatment Furnish	1.18	1.67	634,488

	Window Treatment Install	0.08	0.11	42,783
14	**Conveying Systems**	**4.37**	**6.15**	**2,340,238**
	Elevators	3.70	5.21	1,981,990
	Hoists & Cranes	0.67	0.94	358,248
15	**Mechanical**	**13.57**	**19.11**	**7,274,951**
	Plumbing	1.46	2.06	783,963
	Fire Protection	2.02	2.85	1,085,434
	HVAC	10.08	14.20	5,405,554
16	**Electrical**	**7.78**	**10.96**	**4,172,250**
	Service & Distribution	7.78	10.96	4,172,250
Total Building Costs		**100.00**	**140.81**	**53,612,256**
02	**Site Work**	**100.00**	**10.40**	**2,490,756**
	Preparation	2.93	0.30	72,946
	Earthwork	21.29	2.22	530,349
	Caissons	12.41	1.29	309,043
	Paving & Surfacing	24.05	2.50	599,112
	Utilities #1	20.08	2.09	500,115
	Utilities #2	4.11	0.43	102,323
	Landscaping	15.13	1.57	376,868
Total Non-Building Costs		**100.00**	**10.40**	**2,490,756**
Total Project Costs		**--**	**--**	**56,103,012**

Sunday, September 26, 2010

Statement of Probable Cost

Project Notes

Office Bldg G-Building - Jul 2010 - MD - Baltimore

Estimate Based On Case: OF020152 - Ha-Lo Headquarters
Location: IL - Other
Date: Aug 1998
Building Size: 267,334

*Niles, Illinois
*Construction Period Nov 98 to Oct 00

Special Project Notes

The conceptual ideas about the Ha-Lo Headquarters deal with urban planning, function and technology. The building is arranged like a simple and clear diagram. Its components are placed in a logical, rational and constructed way. Interest is in engineering and performance, rather than design and style. The result is a building of maximum transparency. Transparency deals with light. Traditionally light has been directed at the material fabric of a building, illuminating the solid. At the Ha-Lo Headquarters they are moving into a realm, where light is the essence of the design. The building is luminous, not illuminated. The facade acts as a fabric which moderates the natural and the artificial light, it becomes a screen. The functions are within an adaptable envelope, which responds to the exterior environmental conditions and creates the desired interior environment.

The 7-story building establishes the desired identity at Touhy and Leigh. Projecting loggias from entries at both ends. Building, parking and warehouse are organized through the landscaping like a collage of shifted geometries.

The functions are placed around a 7-story open court. The low floors are loft-type offices. The top 2 floors are showrooms and executive offices around a 2-story skycourt. This clear stacking is readable at the entry facade and contributes to the building's transparency.

Technology is not added, it is an integral part of the design. Technology is not exhibited, but working towards meeting the building's functional, spatial and environmental goals. Technology is advanced, but more in the way that proven and tested materials and components are put together than through invention. Newness is achieved through the elimination of the inessential.

The only way architecture can be new today is through assuming responsibility for more than form and aesthetic. Responsible architecture has to control its environment through design not solely through added technical and mechanical systems. Otherwise technology becomes self-purpose.

Daylight, solar energy and the idea that the skin of a building modulates its own climate have not yet been integrated as essential components in commercial design. The inclusion of these methodologies is a desirable goal. Through this, we can rededicate ourselves towards our natural reflexes and intuitive actions. The result: Buildings with high technology and low energy.

This meets an "eco-tech" approach. A building in harmony between people, technology and nature.

MANUFACTURERS/SUPPLIERS

DIV 07: Skylights: ASI Advanced Structural Systems; Modified Bituminous Membrane: The Garland Company.
DIV 08: Curtainwall: Gardner Metal Products; Insulated Glass Units: Viracon; Structural Glazing: ASI Advanced Structural Systems; Low Iron Glass: Eckelt; Hollow Metal Doors: Curries; Sliding Fire Doors: American Metal Door Co.; Glass Revolving Doors: Boon-Edam; Wood Doors: VT Industries.
DIV 09: Ceramic Tile: Dal-Tile; Drywall, Metal Studs: United States Gypsum.
DIV 10: Access Flooring: Tate Access Floor; Toilet Partitions: Flush Metal Corp.; Toilet & Bath Accessories: American Specialties, Inc.
DIV 14: Elevators: Fujitec Co. Limited; Glass Cabs: Hauenstein & Burmeister Custom Cabs.

Photo Courtesy of Doug Snower
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Sunday, September 26, 2010

Statement of Probable Cost

Office Bdg G GARAGE - Jul 2010 - MD - Baltimore

Prepared By:	**Dominic Coassolo**	Prepared For:	**AE Senior Thesis - Technical Report One**
	, Fax:		, Fax:
Building Sq. Size:	**268720**	Site Sq. Size:	**435600**
Bid Date:	**5/28/2004**	Building use:	**Models**
No. of floors:	**4**	Foundation:	**CON**
No. of buildings:	**1**	Exterior Walls:	**CON**
Project Height:	**40**	Interior Walls:	**CON**
1st Floor Height:	**10**	Roof Type:	**CON**
1st Floor Size:	**40955**	Floor Type:	**CON**
		Project Type:	**NEW**

Division		Percent	Sq. Cost	Amount
01	**General Requirements**	**21.03**	**11.60**	**3,117,176**
	4 Change Orders	0.52	0.28	76,360
	Builder Risk	0.23	0.12	33,457
	Cleanup	0.74	0.41	109,001
	Crane #1	2.85	1.57	422,145
	Crane #2	2.48	1.37	367,778
	Gross Receipts Tax	4.31	2.38	639,238
	Job Office Expenses	0.23	0.13	34,496
	Layout & Engineering	0.86	0.48	128,051
	Mobilization & Permits	1.19	0.66	176,805
	Other Hoisting Equipment	2.24	1.24	332,323
	SVC Allowance	0.09	0.05	12,792
	Supervision	5.07	2.79	750,600
	Utilities	0.23	0.13	34,130
03	**Concrete**	**57.01**	**31.44**	**8,448,604**
	L1 Arch Precast Labor East	0.15	0.08	22,694
	L1 Arch Precast Labor North	0.26	0.14	37,819
	L1 Arch Precast Labor South	0.26	0.14	37,819
	L1 Arch Precast Labor West	0.15	0.08	22,691
	L1 Arch Precast Material East	0.46	0.25	68,073
	L1 Arch Precast Material North	0.77	0.42	113,457
	L1 Arch Precast Material South	0.77	0.42	113,457
	L1 Arch Precast Material West	0.46	0.25	68,075
	L1 Barrier Cables	0.20	0.11	29,883
	L1 Cast-In-Place (A to B &.1 to 8)	0.88	0.49	130,374
	L1 Cast-In-Place (A to B &.8 to17)	0.88	0.49	130,374
	L1 Cast-In-Place (B to C &.1 to 8)	0.88	0.49	130,374
	L1 Cast-In-Place (B to C &.8 to 17)	0.88	0.49	130,374
	L1 Formwork (A to B &.1 to 8)	1.11	0.61	163,838
	L1 Formwork (A to B &.8 to17)	1.11	0.61	163,838
	L1 Formwork (B to C &.1 to 8)	1.11	0.61	163,838
	L1 Formwork (B to C &.8 to 17)	1.11	0.61	163,838
	L1 Post Cables (A to B &.1 to 8)	0.09	0.05	13,133
	L1 Post Cables (A to B &.8 to17)	0.09	0.05	13,133
	L1 Post Cables (B to C &.1 to 8)	0.09	0.05	13,133
	L1 Post Cables (B to C &.8 to 17)	0.09	0.05	13,133
	L1 Reinf. Labor (A to B &.1 to 8)	0.21	0.12	31,182
	L1 Reinf. Labor (A to B &.8 to17)	0.21	0.12	31,182
	L1 Reinf. Labor (B to C &.1 to 8)	0.21	0.12	31,182
	L1 Reinf. Labor (B to C &.8 to 17)	0.21	0.12	31,182
	L1 Reinf. Mat. (A to B &.1 to 8)	0.26	0.14	38,505
	L1 Reinf. Mat. (A to B &.8 to17)	0.26	0.14	38,505
	L1 Reinf. Mat. (B to C &.1 to 8)	0.26	0.14	38,505
	L1 Reinf. Mat. (B to C &.8 to 17)	0.26	0.14	38,505
	L2 Arch Precast Labor East	0.09	0.05	12,969
	L2 Arch Precast Labor North	0.15	0.08	21,611
	L2 Arch Precast Labor South	0.15	0.08	21,611
	L2 Arch Precast Labor West	0.09	0.05	12,966
	L2 Arch Precast Material East	0.26	0.14	38,901
	L2 Arch Precast Material North	0.44	0.24	64,834
	L2 Arch Precast Material South	0.44	0.24	64,834
	L2 Arch Precast Material West	0.26	0.14	38,901

L2 Barrier Cables	0.20	0.11	29,883
L2 Cast-In-Place (A to B &.1 to 8)	0.88	0.49	130,374
L2 Cast-In-Place (A to B &.8 to17)	0.88	0.49	130,374
L2 Cast-In-Place (B to C &.1 to 8)	0.88	0.49	130,374
L2 Cast-In-Place (B to C &.8 to 17)	0.88	0.49	130,374
L2 Formwork (A to B &.1 to 8)	0.80	0.44	117,963
L2 Formwork (A to B &.8 to17)	0.80	0.44	117,963
L2 Formwork (B to C &.1 to 8)	0.80	0.44	117,963
L2 Formwork (B to C &.8 to 17)	0.80	0.44	117,963
L2 Post Cables (A to B &.1 to 8)	0.15	0.08	21,888
L2 Post Cables (A to B &.8 to17)	0.15	0.08	21,888
L2 Post Cables (B to C &.1 to 8)	0.15	0.08	21,888
L2 Post Cables (B to C &.8 to 17)	0.15	0.08	21,888
L2 Reinf. Labor (A to B &.1 to 8)	0.17	0.09	24,945
L2 Reinf. Labor (A to B &.8 to17)	0.17	0.09	24,945
L2 Reinf. Labor (B to C &.1 to 8)	0.17	0.09	24,945
L2 Reinf. Labor (B to C &.8 to 17)	0.17	0.09	24,945
L2 Reinf. Mat. (A to B &.1 to 8)	0.26	0.14	38,505
L2 Reinf. Mat. (A to B &.8 to17)	0.26	0.14	38,505
L2 Reinf. Mat. (B to C &.1 to 8)	0.26	0.14	38,505
L2 Reinf. Mat. (B to C &.8 to 17)	0.26	0.14	38,505
L3 Arch Precast Labor East	0.09	0.05	12,969
L3 Arch Precast Labor North	0.15	0.08	21,611
L3 Arch Precast Labor South	0.15	0.08	21,611
L3 Arch Precast Labor West	0.09	0.05	12,966
L3 Arch Precast Material East	0.26	0.14	38,901
L3 Arch Precast Material North	0.44	0.24	64,834
L3 Arch Precast Material South	0.44	0.24	64,834
L3 Arch Precast Material West	0.26	0.14	38,901
L3 Barrier Cables	0.20	0.11	29,883
L3 Cast-In-Place (A to B &.1 to 8)	0.88	0.49	130,374
L3 Cast-In-Place (A to B &.8 to17)	0.88	0.49	130,374
L3 Cast-In-Place (B to C &.1 to 8)	0.88	0.49	130,374
L3 Cast-In-Place (B to C &.8 to 17)	0.88	0.49	130,374
L3 Formwork (A to B &.1 to 8)	0.80	0.44	117,963
L3 Formwork (A to B &.8 to17)	0.80	0.44	117,963
L3 Formwork (B to C &.1 to 8)	0.80	0.44	117,963
L3 Formwork (B to C &.8 to 17)	0.80	0.44	117,963
L3 Post Cables (A to B &.1 to 8)	0.15	0.08	21,888
L3 Post Cables (A to B &.8 to17)	0.15	0.08	21,888
L3 Post Cables (B to C &.1 to 8)	0.15	0.08	21,888
L3 Post Cables (B to C &.8 to 17)	0.15	0.08	21,888
L3 Reinf. Labor (A to B &.1 to 8)	0.17	0.09	24,945
L3 Reinf. Labor (A to B &.8 to17)	0.17	0.09	24,945
L3 Reinf. Labor (B to C &.1 to 8)	0.17	0.09	24,945
L3 Reinf. Labor (B to C &.8 to 17)	0.17	0.09	24,945
L3 Reinf. Mat. (A to B &.1 to 8)	0.26	0.14	38,505
L3 Reinf. Mat. (A to B &.8 to17)	0.26	0.14	38,505
L3 Reinf. Mat. (B to C &.1 to 8)	0.26	0.14	38,505
L3 Reinf. Mat. (B to C &.8 to 17)	0.26	0.14	38,505
L4 Arch Precast Labor East	0.09	0.05	12,969
L4 Arch Precast Labor North	0.15	0.08	21,611
L4 Arch Precast Labor South	0.15	0.08	21,611
L4 Arch Precast Labor West	0.09	0.05	12,966
L4 Arch Precast Material East	0.26	0.14	38,901
L4 Arch Precast Material North	0.44	0.24	64,834
L4 Arch Precast Material South	0.44	0.24	64,834
L4 Arch Precast Material West	0.26	0.14	38,901
L4 Barrier Cables	0.20	0.11	29,883
L4 Cast-In-Place (A to B &.1 to 8)	0.88	0.49	130,374
L4 Cast-In-Place (A to B &.8 to17)	0.88	0.49	130,374
L4 Cast-In-Place (B to C &.1 to 8)	0.88	0.49	130,374
L4 Cast-In-Place (B to C &.8 to 17)	0.88	0.49	130,374
L4 Formwork (A to B &.1 to 8)	0.80	0.44	117,963
L4 Formwork (A to B &.8 to17)	0.80	0.44	117,963
L4 Formwork (B to C &.1 to 8)	0.80	0.44	117,963
L4 Formwork (B to C &.8 to 17)	0.80	0.44	117,963
L4 Post Cables (A to B &.1 to 8)	0.15	0.08	21,888
L4 Post Cables (A to B &.8 to17)	0.15	0.08	21,888
L4 Post Cables (B to C &.1 to 8)	0.15	0.08	21,888
L4 Post Cables (B to C &.8 to 17)	0.15	0.08	21,888
L4 Reinf. Labor (A to B &.1 to 8)	0.17	0.09	24,945
L4 Reinf. Labor (A to B &.8 to17)	0.17	0.09	24,945
L4 Reinf. Labor (B to C &.1 to 8)	0.17	0.09	24,945
L4 Reinf. Labor (B to C &.8 to 17)	0.17	0.09	24,945
L4 Reinf. Mat. (A to B &.1 to 8)	0.26	0.14	38,505

	L4 Reinf. Mat. (A to B &.8 to17)	0.26	0.14	38,505
	L4 Reinf. Mat. (B to C &.1 to 8)	0.26	0.14	38,505
	L4 Reinf. Mat. (B to C &.8 to 17)	0.26	0.14	38,505
	Roof Arch Precast Labor East	0.04	0.02	6,486
	Roof Arch Precast Labor North	0.07	0.04	10,804
	Roof Arch Precast Labor South	0.07	0.04	10,804
	Roof Arch Precast Labor West	0.04	0.02	6,483
	Roof Arch Precast Material East	0.13	0.07	19,449
	Roof Arch Precast Material North	0.22	0.12	32,416
	Roof Arch Precast Material South	0.22	0.12	32,416
	Roof Arch Precast Material West	0.13	0.07	19,449
	Roof Barrier Cables	0.20	0.11	29,883
	Roof Cast-In-Place (A-B &.1 to 8)	0.88	0.49	130,374
	Roof Cast-In-Place (A-B &.8 to17)	0.88	0.49	130,374
	Roof Cast-In-Place (B-C &.1 to 8)	0.88	0.49	130,374
	Roof Cast-In-Place (B-C &.8 to 17)	0.88	0.49	130,374
	Roof Formwork (A to B &.1 to 8)	0.80	0.44	117,963
	Roof Formwork (A to B &.8 to17)	0.80	0.44	117,963
	Roof Formwork (B to C &.1 to 8)	0.80	0.44	117,963
	Roof Formwork (B to C &.8 to 17)	0.80	0.44	117,963
	Roof Post Cables (A to B &.1 to 8)	0.15	0.08	21,888
	Roof Post Cables (A to B &.8 to17)	0.15	0.08	21,888
	Roof Post Cables (B to C &.1 to 8)	0.15	0.08	21,888
	Roof Post Cables (B to C &.8 to 17)	0.15	0.08	21,888
	Roof Reinf. Labor (A to B &.1 to 8)	0.17	0.09	24,945
	Roof Reinf. Labor (A to B &.8 to17)	0.17	0.09	24,945
	Roof Reinf. Labor (B to C &.1 to 8)	0.17	0.09	24,945
	Roof Reinf. Labor (B-C &.8 to 17)	0.17	0.09	24,945
	Roof Reinf. Mat. (A to B &.1 to 8)	0.26	0.14	38,505
	Roof Reinf. Mat. (A to B &.8 to17)	0.26	0.14	38,505
	Roof Reinf. Mat. (B to C &.1 to 8)	0.26	0.14	38,505
	Roof Reinf. Mat. (B to C &.8 to 17)	0.26	0.14	38,505
04	**Masonry**	**0.85**	**0.47**	**125,364**
	L1 Masonry Labor	0.53	0.29	78,980
	L1 Masonry Material	0.23	0.13	33,848
	L2 Masonry Labor	0.06	0.03	8,776
	L2 Masonry Material	0.03	0.01	3,761
05	**Metals**	**7.65**	**4.22**	**1,134,249**
	Aluminum Handrails	0.70	0.38	103,121
	Expansion Joint Assembly	0.60	0.33	88,405
	L2 Grilles/Perforated Panel Lab	0.34	0.19	50,212
	L2 Grilles/Perforated Panel Mat	1.36	0.75	200,849
	L3 Grilles/Perforated Panel Lab	0.34	0.19	50,212
	L3 Grilles/Perforated Panel Mat	1.36	0.75	200,849
	L4 Grilles/Perforated Panel Lab	0.34	0.19	50,212
	L4 Grilles/Perforated Panel Mat	1.36	0.75	200,849
	Structural Steel Labor	0.45	0.25	66,520
	Structural Steel Material	0.83	0.46	123,018
06	**Wood & Plastics**	**0.05**	**0.03**	**8,105**
	Finish Carpentry	0.03	0.01	3,740
	Rough Carpentry	0.03	0.02	4,365
07	**Thermal & Moisture Protection**	**1.02**	**0.56**	**151,665**
	Modified Bitumen Roofing	0.15	0.08	22,514
	Waterproofing L1	0.17	0.10	25,830
	Waterproofing L2	0.17	0.10	25,830
	Waterproofing L3	0.17	0.10	25,830
	Waterproofing L4	0.17	0.10	25,830
	Waterproofing Roof	0.17	0.10	25,830
08	**Doors & Windows**	**3.05**	**1.68**	**452,092**
	Door Hardware	0.12	0.07	17,925
	L1 Glass & Glazing Labor	0.22	0.12	32,564
	L1 Glass & Glazing Material	0.66	0.36	97,690
	L2 Glass & Glazing Labor	0.13	0.07	18,994
	L2 Glass & Glazing Material	0.38	0.21	56,985
	L3 Glass & Glazing Labor	0.13	0.07	18,994
	L3 Glass & Glazing Material	0.38	0.21	56,985
	L4 Glass & Glazing Labor	0.13	0.07	18,994
	L4 Glass & Glazing Material	0.38	0.21	56,985
	Roof Glass & Glazing Labor	0.13	0.07	18,994
	Roof Glass & Glazing Material	0.38	0.21	56,985

09	**Finishes**	**0.58**	**0.32**	**85,340**
	Drywall	0.12	0.07	17,508
	Painting	0.46	0.25	67,832
10	**Specialties**	**0.07**	**0.04**	**9,858**
	Misc. Specialties/Toilet Acc's	0.07	0.04	9,858
14	**Conveying Systems**	**2.96**	**1.63**	**439,139**
	Elevator #1	0.99	0.54	146,380
	Elevator #2	0.99	0.54	146,380
	Elevator #3	0.99	0.54	146,380
15	**Mechanical**	**2.20**	**1.21**	**326,203**
	L1 Mechanical Labor	0.53	0.29	78,289
	L1 Mechanical Material	0.79	0.44	117,433
	L2 Mechanical Labor	0.11	0.06	15,658
	L2 Mechanical Material	0.16	0.09	23,487
	L3 Mechanical Labor	0.11	0.06	15,658
	L3 Mechanical Material	0.16	0.09	23,487
	L4 Mechanical Labor	0.11	0.06	15,658
	L4 Mechanical Material	0.16	0.09	23,487
	Roof Mechanical Labor	0.04	0.02	5,219
	Roof Mechanical Material	0.05	0.03	7,829
16	**Electrical**	**3.52**	**1.94**	**521,414**
	L1 Electrical Labor	0.34	0.19	50,402
	L1 Electrical Material	0.43	0.24	63,961
	L2 Electrical Labor	0.34	0.19	50,402
	L2 Electrical Material	0.43	0.24	63,961
	L3 Electrical Labor	0.34	0.19	50,402
	L3 Electrical Material	0.43	0.24	63,961
	L4 Electrical Labor	0.34	0.19	50,402
	L4 Electrical Material	0.43	0.24	63,961
	Roof Electrical Labor	0.17	0.10	25,585
	Roof Electrical Material	0.26	0.14	38,377
Total Building Costs		**100.00**	**55.15**	**14,819,209**
02	**Site Work**	**100.00**	**3.90**	**1,699,889**
	Asphalt Paving	1.12	0.04	19,095
	Brick Pavers Labor	0.48	0.02	8,169
	Brick Pavers Material	0.16	0.01	2,723
	Concrete Paving	1.73	0.07	29,488
	Drilled Piers	44.75	1.75	760,618
	Earthwork/Demolition	42.99	1.68	730,827
	Security Fencing Labor	1.28	0.05	21,789
	Security Fencing Material	4.07	0.16	69,164
	Sidewalks/Curbs/Gutters	1.86	0.07	31,584
	Temporary Fencing	1.55	0.06	26,432
Total Non-Building Costs		**100.00**	**3.90**	**1,699,889**
Total Project Costs		**--**	**--**	**16,519,098**

Project Notes

Office Bdg G GARAGE - Jul 2010 - MD - Baltimore

Estimate Based On Case: CM040544 - Parking Garage
Location: IA - Sioux City
Date: Sep 2001
Building Size: 144,000

Estimate Based On Case: CM060534 - City Centre Parking Garage
Location: MS - Jackson
Date: May 2004
Building Size: 159,326

* Jackson Mississippi
** Construction Period: July 2004 to Apr 2005
*** 517 space double helix functional layout.

Special Project Notes

The City Centre Office Building was undergoing interior renovations in preparation for major new tenants. The black glass skin, installed in the mid-1980's was to remain unchanged on this circa 1960's building.

Three functional designs for the garage were carried through schematics on this site. The client chose to take a 517 space double helix functional layout forward due to higher efficiency and ease of circulation. The prominent sloping decks presented a challenge on this site facing the home of Jackson's elite cultural events. A series of vertical projecting columns mirror the formal colonnade of the Thalia Mara Hall across the street to form a base of counteraction to the sloping parking decks. A lighter color was used on this part of the elevation for emphasis. A metal grillwork floats within the openings formed in the elevation to filter site of the sloping decks while maintaining the open feel desired in secure feeling parking structures. The grillwork extends throughout the ground level wall openings functioning as security barriers and extending the new metallic theme around the site. The garage is pulled well back from the most prominent street along the south leaving a wide landscaped public sidewalk facing the Auditorium. A warm gray precast enclosure is used, complimentary to the black glass of City Centre Office Building, to build a link to the building's ownership of the garage and smoked glass on the vertical circulation elements recalls the dark glazing of the office building.

Also to reinforce the tie to the City Centre Office Building the former service area between the garage and building was transformed into a green space pedestrian way. A new visual axis was formed between the glazed tower of circulation on the garage and the new entry vestibule attached to the building Lobby. This axis is reinforced by offsetting the sidewalk and canopy to the side thereby allowing the low green space to continue uninterrupted between the two elements. The canopy design celebrates the green space by opening up to that side of the walkway, using a single row of columns on the opposing side of the walk from the green space. The simple exposed steel framing makes up the canopies structure establishing a rhythm that is reinforced in the sidewalk paving pattern. Metallic and gray colors begun in the garage are carried through to the building entry. This courtyard development has moved the main entry to that from the garage instead of those from sidewalk and street. The workers and visitors using the garage then experience a varied sequence of spaces all under protective cover.

MANUFACTURERS/SUPPLIERS
DIV 07: Roofing: Johns Manville; Metal: Architectural Building Components Permaseam(R).
DIV 08: Entrances & Storefronts, Curtainwall: Kawneer; Metal Doors: Curries.
DIV 10: Grilles: Intertec.
DIV 14: Elevators: KONE.
DIV 16: Antique Street Lamps: Lithonia.

CONSTRUCTION TEAM
STRUCTURAL ENGINEER: Structural Design Group - 220 Great Circle Road, #106, Nashville, TN 37228
GENERAL CONTRACTOR: Yates Construction Co. - P.O. Box 465, Philadelphia, MS 39350
ELECTRICAL & MECHANICAL ENGINEER: HESM&A - 315 Newpointe Drive, Ridgeland, MS 39157

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APPENDIX D – EXISTING CONDITIONS SITE PLAN