

Adam De Luca
Construction Management

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Main & Gervais
Columbia, South Carolina

September 29, 2008

Dr. Riley

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I. Executive Summary

The goal of this technical assignment is to convey information about Main & Gervais located in Columbia, South Carolina, with respect to the client, project site, building systems, project schedule and costs, and the project delivery system.

Main & Gervais is expected to be an exceptional 16 story office building located in the city of Columbia right next to the State Capital. Holder Properties is the developer for the building with three tenants already signed up for leases when the construction is completed. Each tenant is signed up for three floors.

The building contains retail space on the lobby floor including a signature restaurant with an exterior plaza, a six level parking garage, and nine stories of office space with a breathtaking view of the city in every direction. Also, there is a carved out portion on floors nine through eleven for an exterior terrace located on the southeast portion of the building that has a view of the State Capital.

The structural system for the building consists of cast-in-place concrete that will be post tensioned. The glazed aluminum curtain wall will be installed as unit-and-mullion assemblies that tie into the cast-in-place concrete structural system. On top of the roof sits two cooling towers along with several fans with various purposes including stair pressurization and outside air intake. The office levels and lobby floor have self contained air conditioning units. The parking garage levels contain split system air handling units and electric wall heaters. There is a backup generator located on the lobby floor.

The total project cost is \$41,151,000 with a start date of July 1, 2008, and a finish date of December 31, 2009. Duda/Paine Architects is the architect and Holder Construction Company is the general contractor in a design-bid-build delivery system.

II. Client Information

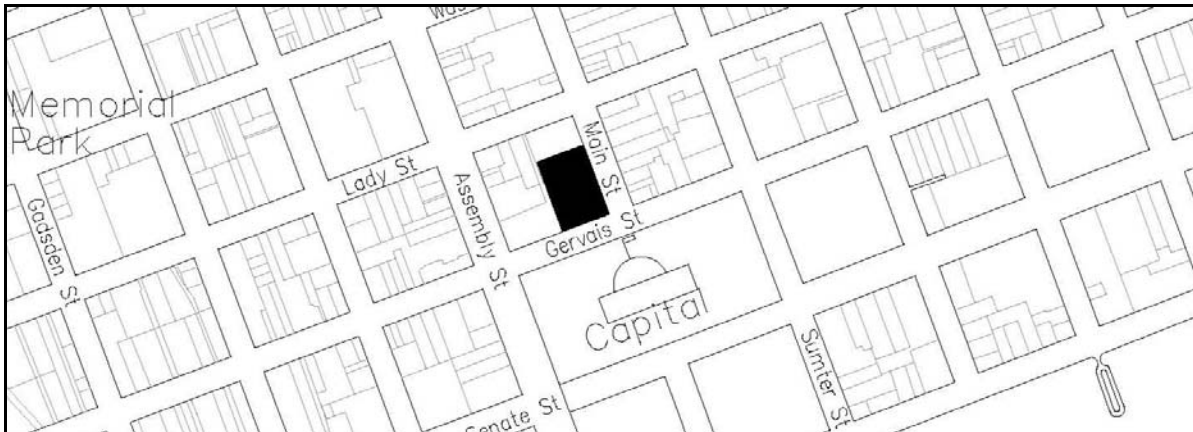
The developer for Main & Gervais is Holder Properties and there are three clients to occupy the office levels when the project is complete. Holder Properties also develops corporate offices, contact centers, data centers, residential, and educational facilities. The building is in a prime location in Columbia, South Carolina, considering it is right next to the State Capital. This would leave only the best façade and impressive interiors acceptable for the building's tenants. Each of the three tenants has their own three floors stacked on one another above the parking garage.

The three tenants that are going to occupy the building have already executed their leases to start when construction is scheduled to finish, otherwise there are penalties assigned each day the building is incomplete. Coordination is a key part of this project because there are three different tenants each with their own interior architects. There are phased occupancy requirements for the tenants because each of them is moving in on different dates.

III. Local Conditions

The site is located in downtown Columbia, South Carolina. Cast-in-place concrete is the preferred method of construction in Columbia, which is what Main & Gervais chosen method happens to be. The building is identified as the black rectangle on the map below. In a situation such as this, there is generally limited to no parking for the workers on site. All employees working on site have to park in the parking lots/decks available in downtown Columbia.

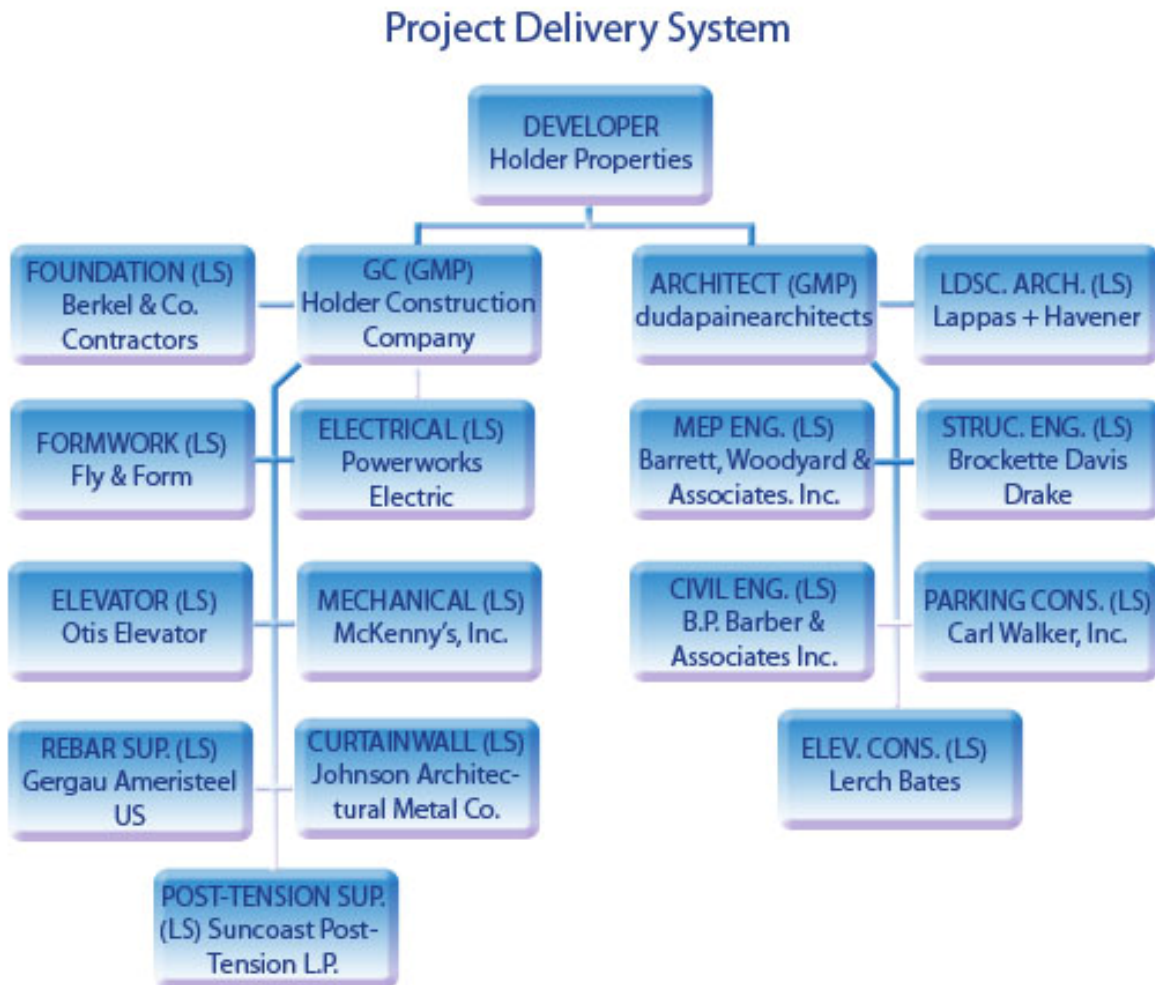
From the soils report conducted, it appears that the subsurface profile consists of a few feet of surficial fill (silty and clayey sand with some debris) with coastal plain deposits underneath extending to 100 feet below grade. Coastal plain deposits consist of medium dense to dense silty and clayey sands interbedded with low plasticity sandy clays extending to 75 feet and below 75 feet there are medium dense silty sands with considerable gravel. This soil analysis indicates that shallow footings would not be appropriate for the foundation. Groundwater was reached at 45 to 50 feet below grade.



The site plan with existing conditions can be seen in **Appendix A**.

IV. Project Delivery System

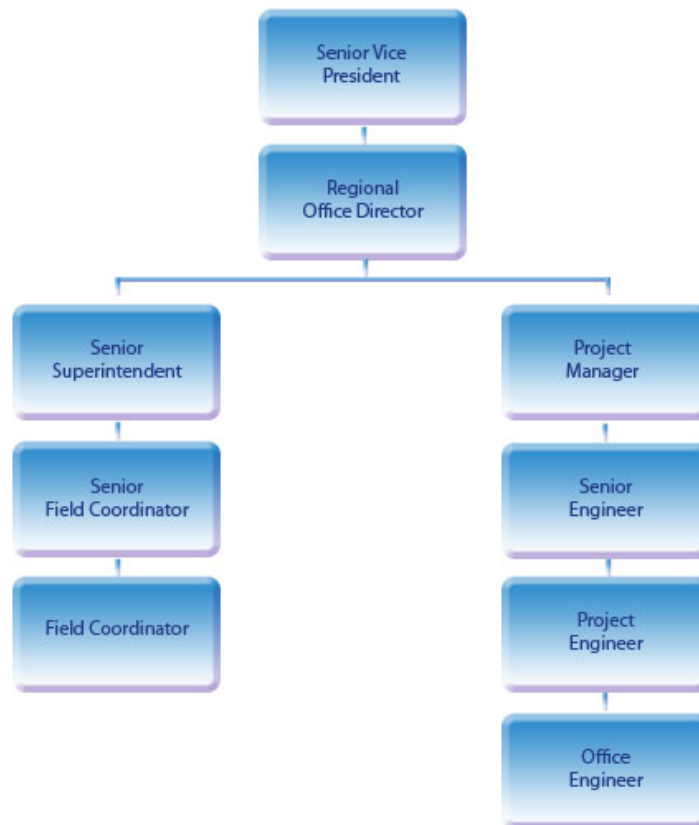
The project was delivered as a design-bid-build project with a building permit set out on June 7, 2008. The 100% construction documents will be out early October of 2008. Holder Construction Company rarely uses a design-build delivery system. The developer, Holder Properties, and the general contractor, Holder Construction Company, have owners that are brothers. It is easy to see how the two came across each other. The following chart lists the contracts that are held for this project. The developer holds a contract with the architect and the general contractor. The architect then holds contracts with all the designers and consultants. The general contractor holds contracts with all the subcontractors and vendors. I posted only major cost subcontractors and vendors. There are smaller subcontractors and vendors to list, but I chose to leave them out to eliminate unnecessary repetition. Holder has chosen some of the subcontractors they have previously worked with and this helps eliminate some extra relationship building.



V. Project Management Overview

The project team starts out with a senior vice president at the top of the hierarchy. This person is located at the headquartered office down in Atlanta, Georgia. In this case, he typically oversees several projects and is responsible for the administrative tasks. He will visit his respective sites periodically throughout the duration. The following person is the regional office director and he is head of Holder Construction Company's branch office located in South Carolina. He will oversee the projects being constructed in the area of this office. The lower half of the chart indicates the staffing that is typically seen in the trailers on site daily. The lower left side covers the staff that will take care of field operations. They manage the subcontractors on a daily basis ensuring completion of the trade's respective responsibilities. Each week a subcontractor's meeting will be held by the field staff to make sure the schedule is being followed and make sure any problems are solved immediately. Any deliveries on site will go through the field employees as well. The lower right side contains the staff that covers the office operations of construction. The operations include managing all the financial obligations with all the contracts being held between the owner, architect, engineers, construction manager, subcontractors, and vendors. The office side is also responsible for any necessary paperwork including RFIs, submittals, notices to comply, etc.

Holder Construction Company (CM) - Project Team



VI. Building Systems Summary

Yes	No	Work Scope	Comments
X		Demolition	There was an existing parking lot that had to be removed. Some items including existing storm drainage, some brick, and a retaining wall remained. Parking meters and fire hydrants were removed and need to be replaced.
X		Structural Steel Frame	The crane onsite is a SK415 tower crane from Amquip. There is structural steel bracing for the screen wall on the penthouse level.
X		Cast in Place Concrete	The concrete will be pumped and bucketed into place for the most part, or placed directly from the chute where possible.
X		Precast Concrete	Electrical vault and water vault are precast by Tindall.
X		Mechanical System	<p><u>Lobby:</u> Mechanical room is centralized. There is a self contained A/C unit capable of 6,330 CFM and a split system AHU rated at 2,000 CFM</p> <p><u>Parking Garage Levels:</u> No mechanical rooms. There are split systems AHUs capable of 800 CFM in the elevator lobby and electric wall heaters with 4.8KW capacities in the stairways.</p> <p><u>Office Space Levels:</u> Mechanical rooms are located in the core of each floor. Each room has self contained A/C units each rated around 20,000 CFM connected to galvanized ductwork with VAV boxes at the end.</p> <p><u>Rooftop:</u> Many items including: Two stair pressurization intake fans rated at 16,000 CFM. Outside air flow fan rated at 22,700 CFM. Two cooling towers rated at 999.5 GPM. Two chill water pumps rated at 1,999 GPM each. Two split system AHUs with one rated at 3,000 and the other 600 CFM.</p> <p><u>Fire Suppression System:</u> Automatic wet sprinkler system in office tower/retail areas. Class 1 standpipe system for office portion and class 1 manual dry standpipe system for parking garage. The storage tank and pump are located on the lobby floor.</p>
X		Electrical System	There is an electrical room on the lobby floor. For every floor above the lobby, there is an electrical room in the core near the elevator. The 3 phase diesel generator is located on the lobby floor rated at 600KW. The main feed is a 3 phase single sided busway rated at 4000A, 480/277V.
X		Masonry	Some of the interior non load bearing walls consists of concrete masonry units.
X		Curtainwall	There is a glazed aluminum curtain wall installed as unit-and-mullion assemblies to the cast-in-place concrete structural system.
X		Support Excavation	For the most part they were able to step all the excavations except for a few where they used trench boxes. They are putting in HDPE pipe for the foundation drain.

VII. Project Schedule Summary

The design of the project is an ongoing process throughout the course of the construction process. Although most of the documents are complete for construction, there is still design required for the interior office spaces. Each of the three tenants is working with their respective architects to maximize the effectiveness of their designs. This process will continue until the point where all the furniture, fixtures, and equipment are moved in.

Deep foundations started late July 2008, after mobilization and demolition took place. This was then followed up with the foundation's walls and columns in the middle of August 2008. After the foundations are complete, the process of placing formwork, placing blockouts for MEP, setting rebar, and placing the concrete for each of the levels will take place. Each of the parking garage levels is sequenced by separating the level into four sections. Each of office space levels is sequenced by separating the level into two sections.

After the lobby slab on grade is placed, the shell finishes will start with the lobby in January 2009, and continue all the way with the parking garage and office space through August 2009. Shell finishes include MEP rough in, masonry walls, and drywall framing. The interior finishes will start after the shell finishes have reached level 12 in June 2009, and continue until July 2010. Interior finishes are yet to be designed for the lobby and office spaces.

It is important that each scheduled item is followed appropriately to ensure completion upon the move in dates for each of the tenants. When it comes to the interior finishes for each of the tenants, coordination will be difficult. The contractor will have to coordinate with three separate architects because each tenant chose different interior architects for their office spaces.

A project schedule with the major key elements can be seen in **Appendix B**.

VIII. Project Cost Evaluation

Actual Project Cost Information

Square footage of office building: 205,000 ft²
Square footage of parking garage: 210,000 ft²
Total square footage: 415,000 ft²
Total Project Cost: \$41,151,000
TC/SF: \$99.16/ft²

Note: Financial restrictions limit me from provided construction and building systems costs.

Square Foot Estimate

I used pages 136 and 178 from R.S. Means 2008 Square Foot Estimate. I had to make a few assumptions for my square foot estimate. Main & Gervais is a 16 story office building that has a six level parking garage on top of a lobby. There is no such building type in R.S. Means, therefore I had to improvise and make a few assumptions. The final number I obtained is the result of an estimate of a six story parking garage plus an estimate of a ten story office building. Also, there was no curtainwall selection under the office building page; therefore I took the highest average cost with the assumption that curtainwalls are generally the most expensive. The following lines contain the results from the calculations I made.

Garage, Parking (M.270) – 10 ft story height

Area: 210,000 ft²
Perimeter: 750 ft
Interpolated unit cost: \$39.49/ft²

Perimeter deduction: -\$1.03/ft²
Adjusted unit cost: \$38.46/ft²
Cost: \$8,122,625

Common Additives:

Elevators (3500# capacity): \$671,500
Additional Stops: \$78,750

Subtotal cost (Parking Garage): \$8,872,875

Buildings Combined

Total Cost (Garage + Office): \$36,272,965
Location Modifier (Columbia, SC): 0.79

Grand Total Cost: \$29,248,340

Office, 5-10 Story (M.470) – 12 ft story height

Area: 205,000 ft²
Perimeter: 552 ft
Interpolated \$/ft²: \$136.44/ft²

Perimeter deduction: -\$1.32/ft²
Height addition (12'-14'): +\$2.40/ft²
Adjusted unit cost: \$137.52/ft²
Cost: \$28,150,345

Common Additives:

Elevators included in garage estimate

Subtotal cost (Office Building): \$28,150,345

The estimate obtained from R.S. Means is a bit lower than the actual project cost. There are a couple possible reasons for this. There was no similar building type in R.S. Means to compare Main & Gervais to because of its combined parking garage and office space aspect. The curtainwall covers up all of the office levels and a portion of the parking garage. This type of detail cannot be extrapolated from an R.S. Means square footage estimate. This could account for the reason why this estimate is lower than the actual project cost.

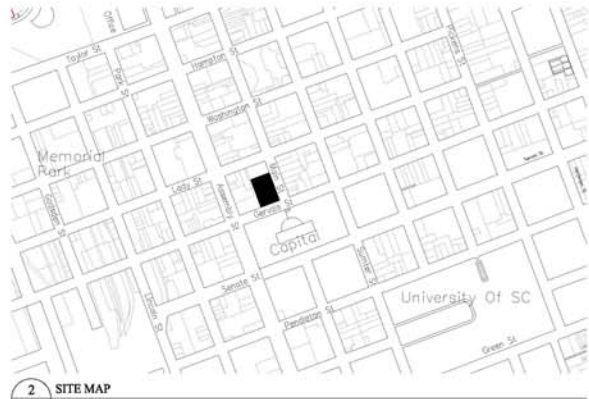
Parametric Estimate

For the parametric estimate, I utilized D4Cost V9 software. I had to make a few assumptions when using this computer software. The database is a compilation of projects from the past; therefore there may not necessarily be a complete match to Main & Gervais building characteristics. Also, there was no combination of a 16 story office building with a parking garage for six levels. Because of this, I obtained information on two separate buildings, which include a parking garage and an office building. The problem with this method is that some of the costs may be duplicated. For example, the general conditions for both estimates will have some overlap. The total cost combined from each project sampled is **\$50,385,000**. This cost surpasses the actual projected cost by about nine million.

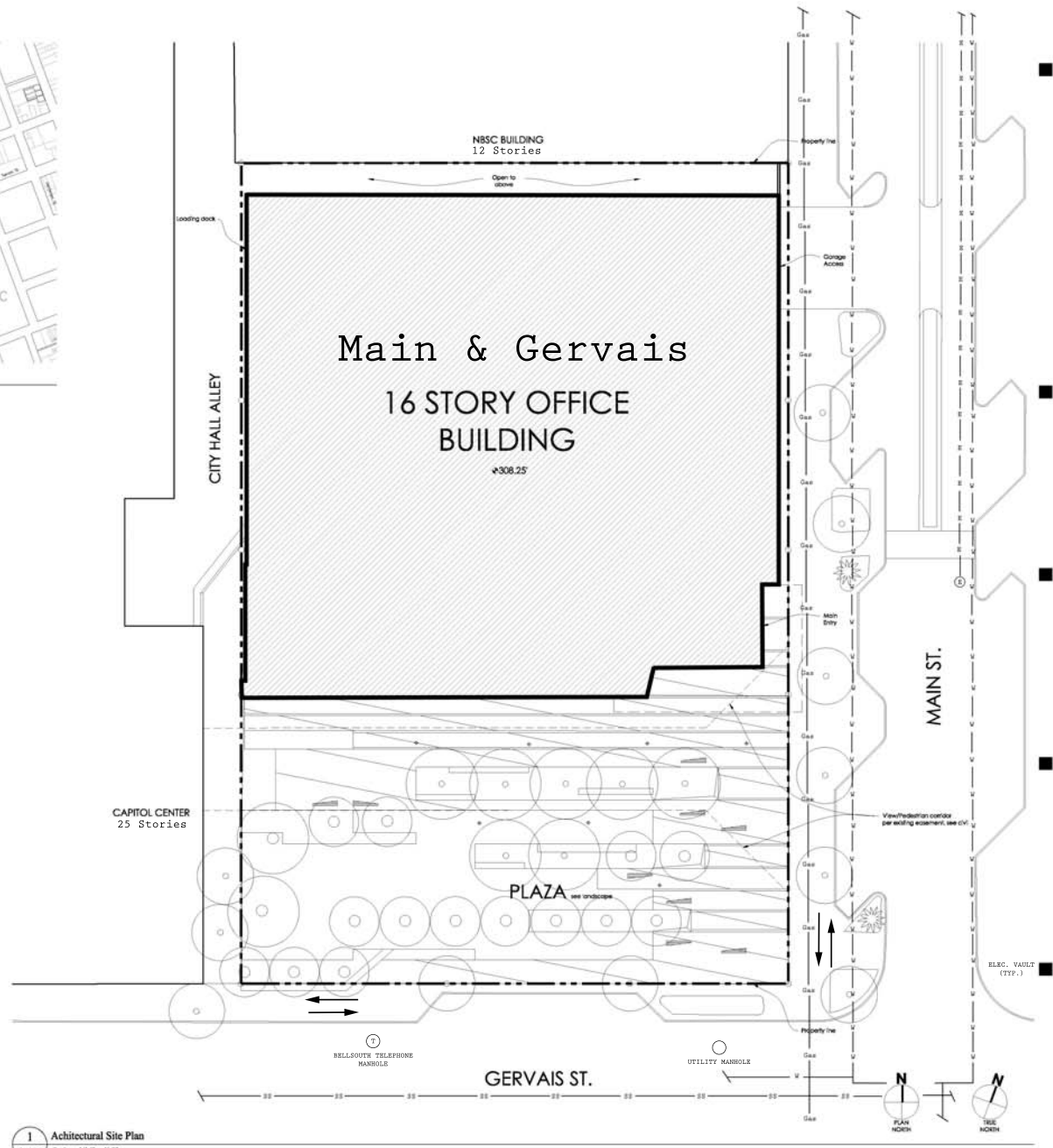
The D4Cost estimate information can be seen in **Appendix C**.

Estimate Comparison

Both of the estimates that were executed missed the actual project cost by a considerable amount. The estimates were unable to take in to account several aspects including: specifics of the curtainwall, the exterior terrace which probably requires extra design/construction coordination, and a six level parking garage above the lobby floor. After looking at the results, the average of the two estimates is \$39,816,670. This would bring the estimates close to the actual project cost of \$41,151,000.



2 SITE MAP
Scale: Not to Scale



1 Architectural Site Plan
Scale: 1/16" = 1'-0"

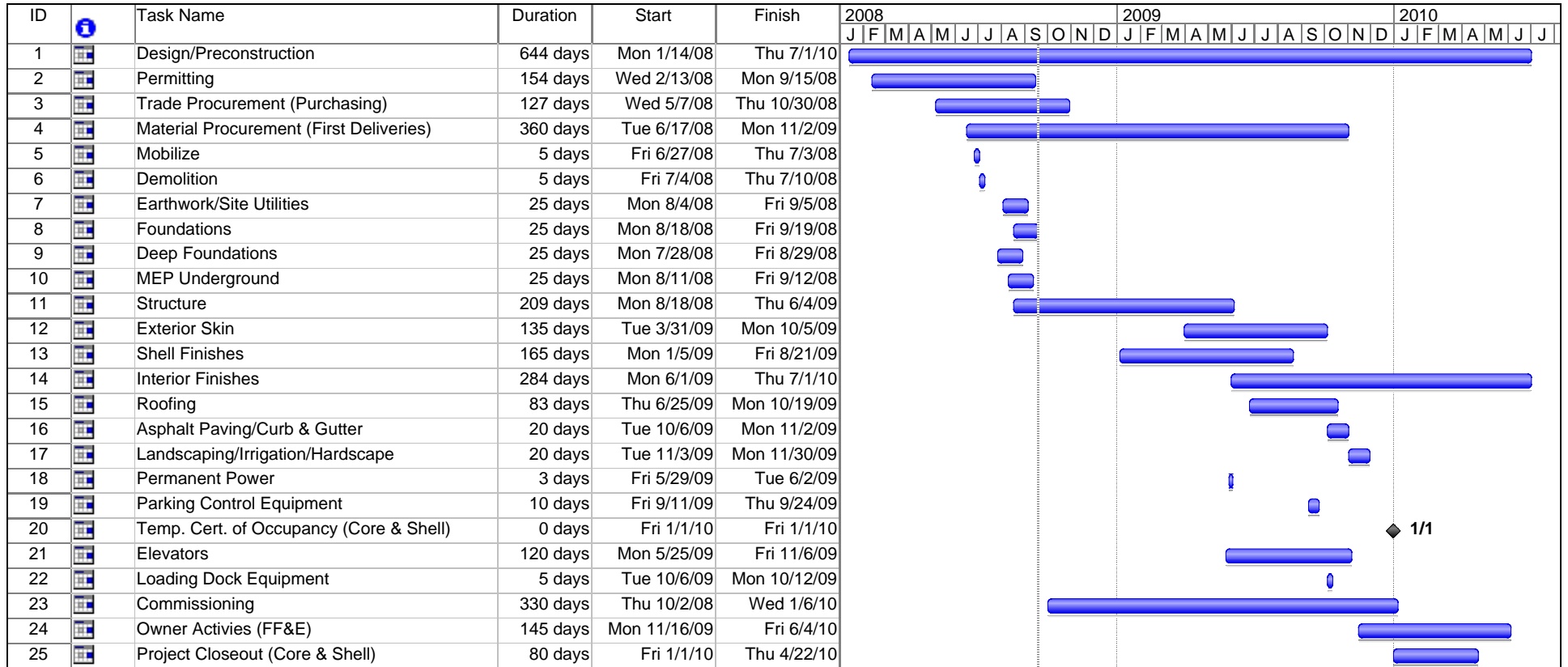
Main & Gervais

MARK	DATE	DESCRIPTION

SITE PLAN

Adam De Luca
9/29/2008

Appendix B



Project: Schedule Date: Thu 9/18/08	Task		Milestone		External Tasks	
	Split		Summary		External Milestone	
	Progress		Project Summary		Deadline	

Schematic Estimate

Appendix C

Main & Gervais - Jul 2008 - SC - Columbia

Prepared By: Adam De Luca AE 481W 348 Blue Course Dr State College, PA 16802 Fax:	Prepared For: Dr. Riley Pennsylvania State University Engineering Unit A University Park, PA 16802 Fax:
Building Sq. Size: 205000 Bid Date: 8/1/1998 No. of floors: 7 No. of buildings: 1 Project Height: 93.6 1st Floor Height: 12 1st Floor Size: 37528	Site Sq. Size: 239425 Building use: Office Foundation: CON Exterior Walls: CUR Interior Walls: DRY Roof Type: MEM Floor Type: CON Project Type: NEW

Division		Percent	Sq. Cost	Amount
00	Bidding Requirements	2.14	4.05	829,579
	Permits	0.56	1.06	218,087
	Site Security	0.19	0.35	71,690
	Testing	0.17	0.32	65,865
	Insurance	1.06	2.00	409,855
	Civil Engineer	0.17	0.31	64,081
01	General Requirements	12.81	24.19	4,958,987
	Architect Fee	6.06	11.45	2,347,606
	General Requirements	4.52	8.54	1,751,700
	Contractor Fee	2.22	4.19	859,681
03	Concrete	19.43	36.71	7,525,436
	Cast-In-Place	19.43	36.71	7,525,436
04	Masonry	1.78	3.36	689,531
	Unit	0.50	0.94	192,826
	Architectural Stone Flooring	1.28	2.42	496,704
05	Metals	9.45	17.86	3,660,836
	Architectural Metal Framing	4.66	8.80	1,802,983
	Fabrications	2.32	4.39	899,012
	Ornamental	2.48	4.68	958,841
06	Wood & Plastics	0.20	0.38	77,457
	Rough Carpentry	0.05	0.10	21,116
	Finish Carpentry	0.15	0.27	56,341
07	Thermal & Moisture Protection	1.03	1.95	399,182
	Waterproofing	0.11	0.21	43,066
	Firestopping	0.19	0.36	73,514
	Membrane Roofing	0.73	1.38	282,602
08	Doors & Windows	21.43	40.49	8,300,466
	Metal Doors & Frames	0.17	0.32	64,960
	Special Doors	0.44	0.83	169,203
	Structural Glazing	11.43	21.58	4,424,831
	Glazed Curtainwalls	9.16	17.30	3,546,564
	Interior/Exterior Glass Cleaning	0.25	0.46	94,908
09	Finishes	1.42	2.68	550,235
	Metal Studs & Drywall	1.00	1.90	389,155
	Ceramic Tile	0.31	0.59	120,261
	Resilient Flooring	0.00	0.01	1,060
	Painting	0.10	0.19	39,759
10	Specialties	3.32	6.27	1,284,673
	Raised Access Floor	2.96	5.59	1,145,463
	Toilet Partitions	0.28	0.53	108,513
	Louvers	0.08	0.15	30,697
12	Furnishings	1.26	2.39	489,195
	Window Treatment Furnish	1.18	2.24	458,292

	Window Treatment Install	0.08	0.15	30,903
14	Conveying Systems	4.37	8.25	1,690,361
	Elevators	3.70	6.98	1,431,597
	Hoists & Cranes	0.67	1.26	258,764
15	Mechanical	13.57	25.63	5,254,717
	Plumbing	1.46	2.76	566,259
	Fire Protection	2.02	3.82	784,012
	HVAC	10.08	19.05	3,904,447
16	Electrical	7.78	14.70	3,013,627
	Service & Distribution	7.78	14.70	3,013,627
Total Building Costs		100.00	188.90	38,724,281
02	Site Work	100.00	13.96	3,341,383
	Preparation	2.93	0.41	97,858
	Earthwork	21.29	2.97	711,470
	Caissons	12.41	1.73	414,585
	Paving & Surfacing	24.05	3.36	803,717
	Utilities #1	20.08	2.80	670,911
	Utilities #2	4.11	0.57	137,268
	Landscaping	15.13	2.11	505,574
Total Non-Building Costs		100.00	13.96	3,341,383
Total Project Costs		--	--	42,065,664

Schematic Estimate

Appendix C

Main & Gervais - Jul 2008 - SC - Columbia

Prepared By:	Adam De Luca AE 481W 348 Blue Course Dr. State College, PA 16803 Fax:	Prepared For:	Dr. Riley Pennsylvania State University Engineering Unit A University Park, PA 16802 Fax:
Building Sq. Size:	210000	Site Sq. Size:	87120
Bid Date:	3/1/1995	Building use:	Commercial
No. of floors:	6	Foundation:	CON
No. of buildings:	1	Exterior Walls:	PRE
Project Height:	64	Interior Walls:	CON
1st Floor Height:	12	Roof Type:	CON
1st Floor Size:	38000	Floor Type:	CON
		Project Type:	NEW

Division	Percent	Sq. Cost	Amount
00 Bidding Requirements	8.03	2.81	590,051
Bidding Requirements	8.03	2.81	590,051
03 Concrete	59.51	20.82	4,372,587
Concrete	59.51	20.82	4,372,587
04 Masonry	0.59	0.21	43,477
Masonry	0.59	0.21	43,477
05 Metals	4.40	1.54	322,975
Metals	4.40	1.54	322,975
07 Thermal & Moisture Protection	2.11	0.74	155,277
Thermal & Moisture Protection	2.11	0.74	155,277
08 Doors & Windows	1.61	0.56	118,010
Doors & Windows	1.61	0.56	118,010
09 Finishes	0.68	0.24	49,688
Finishes	0.68	0.24	49,688
10 Specialties	0.51	0.18	37,266
Specialties	0.51	0.18	37,266
14 Conveying Systems	7.78	2.72	571,418
Elevators	7.78	2.72	571,418
15 Mechanical	5.07	1.77	372,664
Mechanical	5.07	1.77	372,664
16 Electrical	9.72	3.40	714,272
Electrical	9.72	3.40	714,272
Total Building Costs	100.00	34.99	7,347,684
02 Site Work	100.00	11.15	971,055
Site Work	100.00	11.15	971,055
Total Non-Building Costs	100.00	11.15	971,055
Total Project Costs	--	--	8,318,739