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CONSTRUCTION MANAGEMENT
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TECHNICAL ASSIGNMENT #1

OFFICE/RETAIL BUILDING
WASHINGTON, D.C.

SUBMITTED: OCTOBER 5, 2007

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EXISTING BUILDING

NEW CONSTRUCTION

EXECUTIVE SUMMARY

This existing downtown 10-story office/retail building was fully-renovated with a new façade and state-of-the-art building systems. Located at a street corner of the D.C. business district, this newly developed design prominently sets itself apart from its surrounding buildings. The new "skin" of the building features a glass curtain wall system with white metal panels on the two sides of the building facing the street, which replaces the existing strip windows and brick façade. The floor-to-ceiling glass provides office tenants plenty of natural light along with landmark views of our nation's capital. This vertically configured design also consists of a new monumental roof cornice to add to its architectural stature. Other new features include an entrance canopy, rooftop terrace, and an enhanced retail storefront at street level. The building footprint is shaped like an "L", which allows space for a private courtyard in the northwest corner of the site. The new glass vestibule on the east side of the building leads into an elegant lobby area highlighted by Carrara Italian Marble panels with luminous wall panels running along the perimeter.

NEW ENTRANCE LOBBY

A renovation of this magnitude presents some unique challenges to the general contractor. Any desired structural modification or MEP core drills in the existing concrete slab must be scanned for existing reinforcing bar and approved by the structural engineer, which can be a headache at times depending on how critical it may be and the time it takes to get approval. The demolition process was also hindered due to the limitations on the equipment used to not disturb the existing structure. The design team created drawings based off of 40-year-old plans while the building was occupied, thus preventing it from being analyzed and exposed. This makes the new design very subject to changes resulting from unforeseen conditions. The general contractor was responsible for constructing the base building, or the "core and shell", while a separate tenant contractor was hired to install the finishes in the general office spaces. This joint occupancy of the general contractor and the tenant contractor presented some coordination difficulties to the job as well.

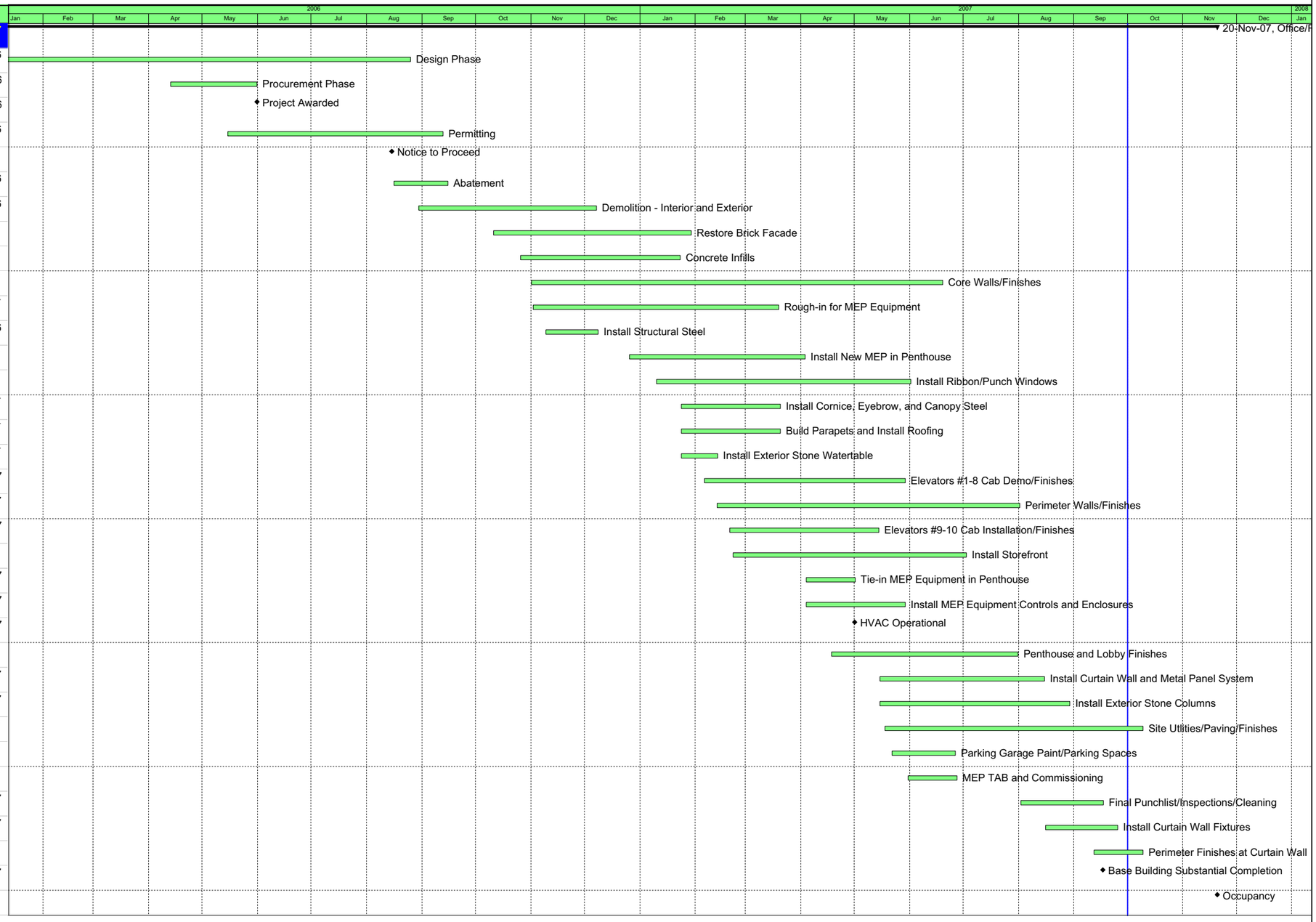
PROJECT SCHEDULE SUMMARY

The schedule for the office/retail building renovation project is a fast-paced 13 months, which includes extensive demolition and abatement. The foundation and structural systems of the building were slightly modified from the existing building with the new elevator pit for elevators #9-10 and steel bracing beneath the penthouse floor and throughout the major mechanical shafts. The finish sequencing for the core included a "top-down" approach for the interior and an "end-to-end" method for the curtain wall installation. Per the owner's interest, the bathrooms and electrical rooms were finished starting at Level 10 and working down to Level 2. It is important to point out that the owner had a special agreement with the curtain wall subcontractor which allowed them to complete their work after the general contractor's substantial completion date. Also, the tenant contractor was still performing work after substantial completion, which is why the occupancy milestone is placed towards the end of November.

MONUMENT VIEW OF D.C.

Office/Retail Building - Washington, D.C.

Activity ID	Activity Name	Duration	Start	Finish
Office/Retail Building - Washington, D.C.		483	03-Jan-06	20-Nov-07
001	Design Phase	167	03-Jan-06	25-Aug-06
002	Procurement Phase	34	13-Apr-06	31-May-06
003	Project Awarded	0		31-May-06
004	Permitting	84	15-May-06	12-Sep-06
005	Notice to Proceed	0	15-Aug-06	
006	Abatement	22	16-Aug-06	15-Sep-06
007	Demolition - Interior and Exterior	69	30-Aug-06	07-Dec-06
008	Restore Brick Facade	75	11-Oct-06	29-Jan-07
009	Concrete Infills	60	26-Oct-06	23-Jan-07
010	Core Walls/Finishes	161	01-Nov-06	19-Jun-07
011	Rough-in for MEP Equipment	94	02-Nov-06	19-Mar-07
012	Install Structural Steel	20	09-Nov-06	08-Dec-06
013	Install New MEP in Penthouse	70	26-Dec-06	03-Apr-07
014	Install Ribbon/Punch Windows	103	10-Jan-07	01-Jun-07
015	Install Cornice, Eyebrow, and Canopy Steel	40	24-Jan-07	20-Mar-07
016	Build Parapets and Install Roofing	40	24-Jan-07	20-Mar-07
017	Install Exterior Stone Watertable	15	24-Jan-07	13-Feb-07
018	Elevators #1-8 Cab Demo/Finishes	81	06-Feb-07	29-May-07
019	Perimeter Walls/Finishes	122	13-Feb-07	01-Aug-07
020	Elevators #9-10 Cab Installation/Finishes	60	20-Feb-07	14-May-07
021	Install Storefront	93	22-Feb-07	02-Jul-07
022	Tie-in MEP Equipment in Penthouse	20	04-Apr-07	01-May-07
023	Install MEP Equipment Controls and Enclosures	40	04-Apr-07	29-May-07
024	HVAC Operational	0		01-May-07
025	Penthouse and Lobby Finishes	75	18-Apr-07	31-Jul-07
026	Install Curtain Wall and Metal Panel System	67	15-May-07	15-Aug-07
027	Install Exterior Stone Columns	77	15-May-07	29-Aug-07
028	Site Utlities/Paving/Finishes	103	18-May-07	09-Oct-07
029	Parking Garage Paint/Parking Spaces	26	22-May-07	26-Jun-07
030	MEP TAB and Commissioning	20	31-May-07	27-Jun-07
031	Final Punchlist/Inspections/Cleaning	33	02-Aug-07	17-Sep-07
032	Install Curtain Wall Fixtures	29	16-Aug-07	25-Sep-07
033	Perimeter Finishes at Curtain Wall	20	12-Sep-07	09-Oct-07
034	Base Building Substantial Completion	0		17-Sep-07
035	Occupancy	0	20-Nov-07	



Derek C. Bauer - Construction Management

BUILDING SYSTEMS SUMMARY

YES	NO	WORK SCOPE
x		Demolition Required?
	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

Since this project is a major renovation, there was a significant amount of demolition to be performed. Basically, only the cast in place concrete slabs, the rear façade, and eight elevators remained from the former building. There was also asbestos that was removed prior to demolition, which by contract included textured ceiling plaster in the main lobby and stairwells, floor tile and mastic in all stairwells and penthouse, and silver paint on metal flashing on the roof. Additional asbestos was found in the guts of fan coil units, floor tile throughout the building, valve gaskets in the penthouse, roofing material in penthouse troughs, and existing flashing at exterior CMU walls.

Cast in Place Concrete

The building has existing structural cast in place concrete slabs, ranging from 8" to 12" thick. There was no significant amount of new concrete work in this case.

Mechanical System

The majority of the mechanical equipment is located in the penthouse and basement levels. Throughout the building are six water cooled air conditioning units ranging from 800 CFM to 14,000 CFM supply, as well as two split system heat pump air conditioning units which produce 800 CFM each. Variable air volume boxes supply air to the office and retail spaces at a range of 0 – 800 CFM. This building also features two 2100 GPM cooling towers on the roof as well as a 550 gallon fuel oil tank in the Basement B-3 Level. The building's fire suppression system consists of a wet sprinkler system throughout the building.

Electrical System

The building electricity runs through three switchboards, each of 4000 A, 265/460 V, 3 phase, 4 wire. Power is fed from the PEPCO transformer vault located in the penthouse. Seven transformers ranging from 15 – 225 kVA with a system voltage of 460 V primary to 208Y/120 secondary are stationed throughout the building. Two copper busways of 1600A and 2500A, 460V, 3 phase, 4 wire feed floors 2-10. A 400kW/500kVA emergency generator located in the penthouse backs up the electrical system.

Masonry

The majority of the new masonry work consists of two new elevator CMU shaftwalls and other various CMU walls throughout the first floor and penthouse. The new lobby area is highlighted by Carrara Italian Marble wall and floor panels.

NEW ELEVATOR LOBBY

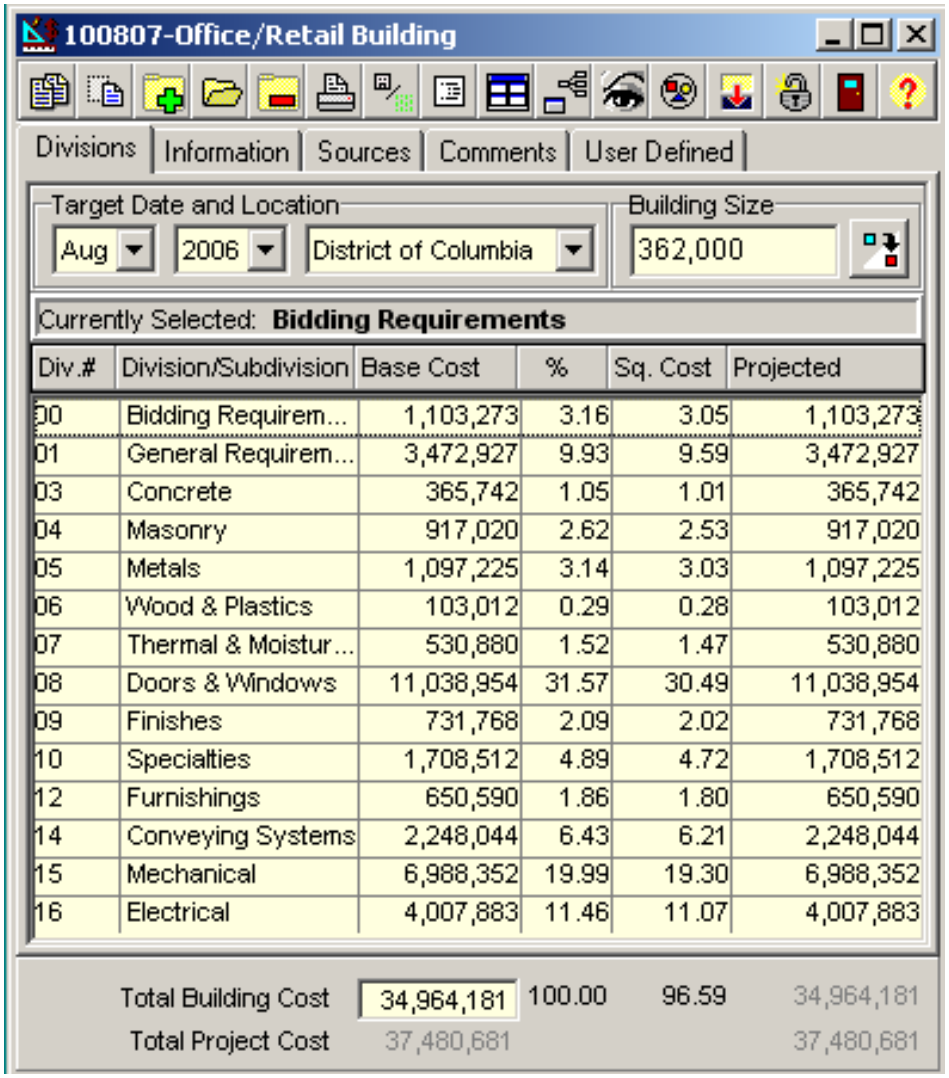
Curtain Wall

The new "skin" of the building features a glass curtain wall system with white metal panels on the two sides of the building facing the street, as well as a portion of the west side. This replaces the existing strip windows and brick façade, vastly improving the supply of natural light to the office tenants and providing landmark views of the city. The two-story high glass panels were put into place by a crane, starting at one end of the building and making its way across to the other side. The curtain wall consultant, WJE, was selected to take the design responsibility. Harmon, the curtain wall contractor, made the necessary in-field modifications to properly erect the panels.

PROJECT COST EVALUATION

The owner acquired this existing office/retail building a couple years ago for an undisclosed amount. The base building construction cost for the renovation project, which included very little sitework, was $33,597,800. The total area of the building, not including the parking garage, is 362,000 square feet, making the construction cost $93/SF. The mechanical/plumbing package was worth about $9,510,000 ($26/SF, 28.3%). The electrical system cost was approximately $3,152,000 ($9/SF, 9.4%). Besides the existing structure, the structural system made up about $1,270,000 ($4/SF, 3.8%) of the total building cost.

D4 Cost Parametric Estimate



Div.#	Division/Subdivision	Base Cost	%	Sq. Cost	Projected
00	Bidding Requirem...	1,103,273	3.16	3.05	1,103,273
01	General Requirem...	3,472,927	9.93	9.59	3,472,927
03	Concrete	365,742	1.05	1.01	365,742
04	Masonry	917,020	2.62	2.53	917,020
05	Metals	1,097,225	3.14	3.03	1,097,225
06	Wood & Plastics	103,012	0.29	0.28	103,012
07	Thermal & Moistur...	530,880	1.52	1.47	530,880
08	Doors & Windows	11,038,954	31.57	30.49	11,038,954
09	Finishes	731,768	2.09	2.02	731,768
10	Specialties	1,708,512	4.89	4.72	1,708,512
12	Furnishings	650,590	1.86	1.80	650,590
14	Conveying Systems	2,248,044	6.43	6.21	2,248,044
15	Mechanical	6,988,352	19.99	19.30	6,988,352
16	Electrical	4,007,883	11.46	11.07	4,007,883
	Total Building Cost	34,964,181	100.00	96.59	34,964,181
	Total Project Cost	37,480,681			37,480,681

The D4 Cost Parametric Estimate came out fairly similar to that of the office/retail building. Since the most similar D4 Cost project selected (medium rise office building with a curtain wall) was all new construction, the majority of the structural costs (Divisions 3 and 5) were removed to make the comparison more equal. The mechanical and plumbing (Division 15) systems in the office/retail building were significantly greater than the D4 Cost estimate, likely due to the state-of-the-art building systems in place. The electrical system of the D4 Cost was pricier than that of the office/retail building by $1,000,000. This is probably because the office/retail building contract is only based on the core and shell, which eliminates some cost of providing electric to the office and retail spaces.

R.S. Means Square Foot Estimate

R.S. Means 2008 Building Construction Cost Data							
Office Med Rise (5 to 10 Story)							
		SF Costs			% of Total		
	Location Factor	1/4	Median	3/4	1/4	Median	3/4
Total Project Costs	99.1	$90.68	$110.00	$145.68			
Plumbing	97.4	$2.70	$4.18	$5.99	2.8%	3.7%	4.5%
HVAC	97.4	$6.77	$9.69	$15.44	7.7%	9.4%	11.0%
Electrical	99.4	$6.76	$8.65	$11.98	6.4%	7.8%	10.0%

Office/Retail Building Estimate			
	Cost	$/SF	% of Total
Total Project Costs	$33,597,800	$92.81	
Plumbing/HVAC	$9,510,000	$26.27	28.3
Electrical	$3,152,000	$8.71	9.4
Structural	$1,270,000	$3.51	3.8

The R.S. Means square foot comparison to the office/retail building presented some interesting findings. The differences most likely dealt with new construction (R.S. Means data) versus this renovation project. The cost per square foot of the office/retail building renovation fell between the lower quartile and median of the R.S. Means data. The mechanical and plumbing systems were more costly than the upper quartile of R.S. Means. The electrical systems came out to be almost exactly the median value in R.S. Means.

SITE PLAN OF EXISTING CONDITIONS

The site plan of existing conditions clearly indicates a congested site in the business district of downtown Washington, D.C. There is a temporary jobsite trailer/office located on the third floor of the existing building. Parking is available on-site in the three levels of underground garage space. A temporary chain-link fence partially blocks off a portion of the street on the south and east sides of the building to allow for crane placement, deliveries, and staging areas. The rear courtyard is used for smaller amounts of stored materials.

EXISTING BUILDING
ROOF (145.00')
ROOF OVER BASEMENT
ROOF (74.17')
ROOF (147.17')
EXISTING PLANTER
ROOF (53.92')
EXISTING COURTYARD (51.00')
EXISTING PLANTER
EXISTING PLANTER
EXISTING MAIN ROOF (160.65')
GARAGE AIR INTAKE
EXISTING BUILDING
EXISTING PLANTER
ROOF (144.70')
GARAGE AIR INTAKE
GARAGE ROOF (60.60')
PROPERTY LINE
EXISTING BUILDING
EXISTING PLANTER
EXISTING PLANTER
EXISTING PLANTER
EXISTING PLANTER
EXISTING PENTHOUSE ROOF SLAB (184.33')
EXISTING COURTYARD (51.08')
EXISTING ELEV. MACHINE ROOM ROOF (191.00')
EXISTING PLANTER
EXISTING PLANTER
EXISTING PLANTER
EXISTING PLANTER
EXISTING PLANTER
ROOF (35.63')
(169.00')
CORNICE (173.67')
EXISTING PLANTER
EXISTING TERRACE (63.17')
EXISTING MAIN ROOF (160.65')
EXISTING BUILDING
ROOF TERRACE (162.07')
ROOF (142.96')
SAN LINE
ELECT LINE
ELECT LINE
ELECT LINE
WATER LINE
CHAIN-LINK FENCING
CONSTRUCTION ACCESS
EXISTING BUILDING
SAN LINE
ELECT LINE
ELECT LINE
MAIN BUILDING ENTRY
WATER LINE
ONE-WAY TRAFFIC
SAN LINE
ELECT LINE
ELECT LINE
WATER LINE
ELECT LINE
WATER LINE
FIRE HYDRANT
WATER LINE
SAN LINE
PARKING GARAGE ENTRY
LOADING DOCK ENTRY
GAS LINE
WATER LINE
SAN LINE
PROPERTY LINE
ELECT LINE
ELECT LINE
SAN LINE
COMM LINE
COMM LINE
ELECT LINE
CONSTRUCTION ACCESS
CHAIN-LINK FENCING
EXISTING CROSSWALKS
ONE-WAY TRAFFIC
EXISTING BUILDING
EXISTING CROSSWALKS
EXISTING BUILDING
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OFFICE/RETAIL BLDG
SITE PLAN
OCT. 5, 2007
DEREK BAUER

LOCAL CONDITIONS

This urban project is pretty standard as far as typical city restrictions on construction. The allowable work hours were 7:00 AM – 7:00 PM, Monday through Saturday. The office/retail building sits at the corner of two busy one-way streets in a developed city block, making it hard to access and providing minimal lay down and delivery space. Aside from the new elevator pit, the soil/subsurface water condition was not really a factor in this case since the building was existing. The methods of construction were typical for a core and shell office building renovation of its type, as employed by many commercial developers throughout Washington, D.C.

CLIENT INFORMATION

The owner of this project is a major commercial real estate developer in the Washington, D.C. metropolitan region. With this office/retail building, they wanted to continue establishing their presence in the business district of Washington, D.C. with a repeat contractor, Balfour Beatty Construction. Their main focus throughout the course of the project was getting their tenants moved in as soon as possible, which seemed to influence every decision made during the construction process. The faster the project was completed, the sooner their tenants would start paying rent. This mindset caused them to be "hands off" at times in terms of day to day happenings and details with the contractor of the base building project. The owner seemed to worry much more about when the tenant contractor can begin work and anything that would affect their progress. Since this job was a "hard bid" project, the owner wanted as few added costs as possible. This project also had very little expectations for safety from the owner's perspective. This was evident when the contractor had issues with prospective tenants repeatedly not following the OSHA safety rules on site.

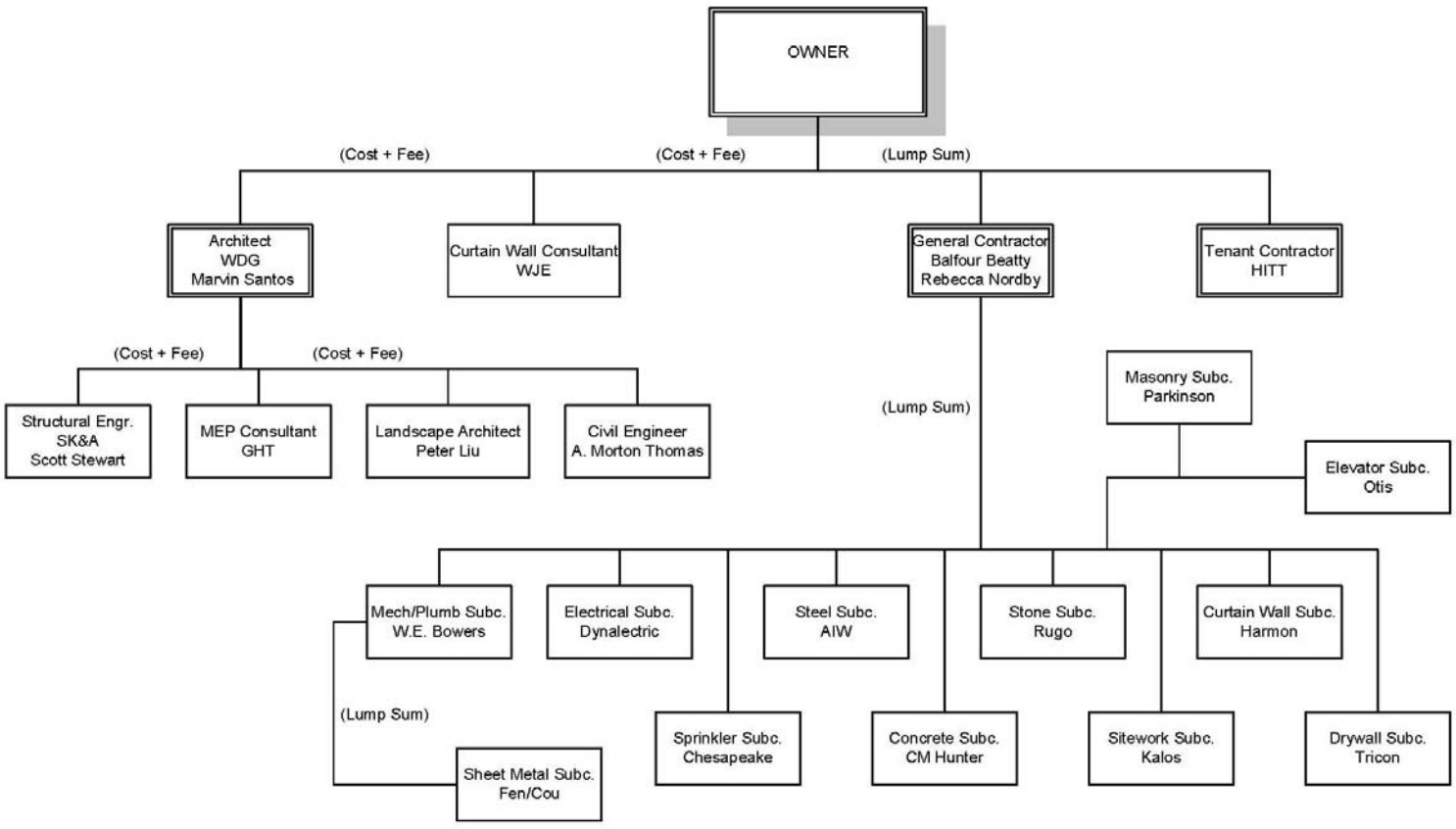
The sequencing issues of the project were consistent with the main drive from the owner to get the tenant moved into the building as soon as possible. As mentioned in the "Project Schedule Summary" explanation, the general contractor worked from Level 10 down in the core areas (bathrooms and electrical closets). Since the owner can lease the upper floors faster than the lower floors, the base building contractor concentrated on turning the floors over to the tenant contractor from the top down.

In order to complete this project to the owner's satisfaction, several things should be addressed. The base building contractor and the tenant contractor working simultaneously in the office/retail building presented some challenges. This makes it all the more important for the general contractor to get their trades focused on making the base building a finished product and not a construction zone, which is nearly impossible with tenant construction ongoing after the general contractor's substantial completion date. Additional problems arise when the coordination is not properly planned out and executed with the tenant contractor. For example, the sidewalk pavers cannot be installed when the tenant's dumpster and deliveries prevent the general contractor from working in that same location. Finally, as in all schedule-driven projects, the general contractor must accurately track the completion dates the trades commit to in order to ensure they will be met.

PROJECT DELVERY SYSTEM

The project delivery system used in this office/retail building project was design-bid-build. This approach was taken to use competition to get the best price and value possible for the owner. The owner held "cost plus fee" contracts with the architect, WDG, and the curtain wall consultant, WJE. The contract between the owner and the general contractor was a "lump sum" agreement. The general contractor, Balfour Beatty, held "lump sum" contracts with each of their subcontractors and suppliers. The major subcontractors are indicated in the diagram below.

The general contractor was selected mostly through the bid, with some minor negotiations. Besides a typical start-up meeting used to establish procedures, there was little communication between the major parties (owner, architect, general contractor) before the project began. No teaming was done to open lines of communication. The owner waived the bond based on their confidence in the general contractor's resources.



STAFFING PLAN

As outlined in the organizational chart below, the general contractor staffing plan of the office/retail building involves several hierarchical relationships, with the Vice President of Operations acting as the "middle man" between the company executives and the Owner. The Project Manager and Superintendent each have important management roles and report directly to the Project Executive, who in turn reports to the Vice President of Operations over him. The Assistant Project Manager reports to the project manager while also overseeing the Senior Project Engineer and the Project Engineer positions. The responsibilities of the major trades of the project are divided amongst the three sub-positions of the Project Manager. The Superintendent is also assigned an Assistant Superintendent who oversees the Chief Field Engineer of the project.