Thesis
Technical
Assignment I

1099 New York Avenue
Washington, D.C.

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Construction Management
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10/5/2007

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Executive Summary

This Technical Assignment takes an in depth look at the existing construction conditions for the 1099 New York Avenue project in Washington, D.C. Several aspects of the construction management process were explored, including the project schedule, building systems, project costs, project site, client information and the project delivery system.

1099 New York Avenue is to be Tishman Speyer's new premier office building located in the heart of Washington, D.C. near the newly constructed convention center. The New York based company is looking for the opportunity to establish itself in the D.C. market.

The ground floor will serve as a main lobby for the 10 stories of office space above and will include two retail spaces that will have separate street access located on both New York Avenue and 11th street. Below grade will be 4 levels of parking structure that includes a fitness center accessible to all future tenants.

The entire structural frame of the building is composed of a cast-in-place concrete system that will be post-tensioned for additional strength. The cooling towers and emergency generator are located in the mechanical penthouse. Each floor is served by its own Air Conditioning Unit which is located in the centrally located in the core of the building. The fuel storage for the generator however is located on level B2 thus requiring a system of pumps for fuel to serve the penthouse.

The primary feature of the building is a state of the art high performance glass curtain wall in which each piece of glass lies in a different horizontal plane.

The project construction cost is $31,600,000 and has an expected duration dating from June 2006 to March 2008. Thomas Phifer is the Architect and James G. Davis Construction is the General Contractor in the Design-Bid-Build Delivery System.

A. Project Schedule Summary

The design of the project began in early 2004 after the site was purchased from Hertz Rental Company. Construction services had been procured by early 2006.

Construction activity on the project is expected to begin June 22, 2006. Demolition of an existing 2 story structure is required as well as the removal of the surrounding sidewalk areas. Demolition is supposed to take 26 days and be completed by early August. Excavation is scheduled to begin at the end of August shortly before all of the soldier beams have been driven.

Foundation work is scheduled to begin once excavation is complete in mid December. Immediately following is the forming, reinforcing, and pouring of the garage level. The substructure is to be complete to grade by early April. The superstructure is expected to ensue and will be complete 4 months later in August.

Curtain wall construction will begin once the superstructure is complete and has an expected finish of October 30, 2007. Because of its complexity, the 11th Street and New York Avenue façade elevations will be constructed simultaneously in order to enclose the building sooner. Once weatherproofed, interior core construction is only expected to take 3 months. This includes the monumental lobby at the ground floor. Substantial Completion is scheduled for March 3, 2008.

The Project Schedule Summary can be found in **Appendix A.**

B. 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

An existing two story concrete structure must be removed before any new construction can begin. The building was formally a rental car dealer and had several marked parking spaces.

Most of the paint used in the garage areas contained lead and had to be separated before removal from the site. All fluorescent light fixtures had to be removed as well because of the hazardous materials in the older ballasts. Below the structure was an abandoned fuel tank which had leaked into the soil over the years. Special precautions had to be taken as the soil was separated and removed.

Cast in Place Concrete

The garage levels are short-spanned reinforced concrete slabs varying between thicknesses of 4", 8" and 12". The typical bay size is 25'-0" x 30'-0". Slabs on grade are to be 3,000 psi in strength whereas suspended slabs are 5,000 psi. 8" drop panels at each of the columns are incorporated into the structure.

All slabs above grade are 8" thick and scheduled to be post-tensioned with an effective strength between 100 and 1000 kips. The typical bay above grade is spanned longer and sized at an average of 25'-0" x 40'-0".

Mechanical System

The primary Mechanical room for this project is located at the Penthouse. Located there are (2) 1440 GPM 500 ton Cooling Towers which serve (15) Self-Contained Water Cooled Air-Conditioning Units throughout the building. The AC unit at the penthouse provides conditioned outdoor air to the smaller units at each of the 15 levels at a rate of almost 30,000 CFM. From each of these units, Variable Air Volume Boxes with Reheat Coils distribute air throughout the occupied spaces.

The Fire-Suppression system combined sprinkler/standpipe system. A dry system is required in areas subject to freezing such as the loading dock and garage levels, whereas all other areas are to have an automatic wet system. A 6" fire service with backflow prevention will be provided.

Electrical System

The main service feeder for the building enters from the Pepco transformer vaults on New York Avenue at the B2 level. The service is a 3-Phase, 4-Wire, 460/265 Volt, 4000A Main Bus that steps down through (3) 30KVA, 3-Phase 460-208/120 V Transformers. The power supply for the retail area is separate from that of the office space. Emergency power is supplied by a 350/438 KW/KVA 480/277V Generator located at the penthouse.

Curtain Wall System

The curtain wall on the west and south facades is a very complex system. It consists of a "fish-scale" frame on which each corner (except for the upper left hand) on each piece of glass lies in a separate plane. Each panel is constructed of a high performance low-e coated insulated glass

assembly which rests on structurally glazed aluminum frame. The design of the system was completed by a separate architect and requires its own consulting firm. Because of the great detail required, phasing began before the building permit was even obtained. To keep the project on schedule, construction of the west and south elevations must begin as soon as the superstructure is complete and be erected simultaneously. The system is being fabricated in Toronto and requires considerable coordination during the shipping, staging, and construction process on behalf of the contractor.

Support of Excavation

Sheeting and Shoring was required for support during the temporary excavation. It was recommended in the Geotechnical report that a free draining sheeting system consisting of H beams, wood lagging, and appropriate bracing be used. The soldier beams must penetrate at least 5 feet below the lowest point of excavation and wood lagging should not be less than 3 inches in thickness. At least 3 or 4 tiers of tiebacks were required for lateral support. Pressure-injected anchors were installed at an angle of 15˚ to the horizontal. In locations where tiebacks cannot be installed, rakers and heel blocks were substituted.

The ground water levels were found to be at about 22 to 29 feet below existing surface grades. Because of this a sub-drainage system will be required. Ground water levels were required to be maintained at least 2 feet below the lowest excavation levels. The system consists of interior collector pipes below the lowest floor slab and perimeter footing drains. To avoid infiltration of fine size silts into the pipes, filter material was placed around them. Cleanouts were incorporated to facilitate flushing of the system.

C. Project Cost Evaluation

The building construction cost for the project as reported by Davis Construction is approximately $31,600,000. This amount does not include land costs, site work, or design fees that are the responsibility of the owner. The total project cost to Tishman Speyer Properties is an estimated $65,000,000. This number includes all costs including construction, design and land accusation. With an approximate value of 173,260 square feet of above grade space, the construction cost and total project cost are roughly $182.38/SF and $375.16/SF respectively. This analysis as well as a breakdown of the building's major system cost can be seen in Table C-1.

For Comparative purposes a parametric estimate was prepared using D4 Cost 2002 software. The basis for pricing consists of an average cost of similar past projects. In addition a square foot estimate was also performed using R.S. Means 2007 cost data. These estimates can be seen in Tables C-2 and C-3.

Building System	Cost	Cost Per SF (173,260 SF)
Overall Building		
Building Construction Costs	$31,600,000.00	$182.38
Total	$31,600,000.00	$182.38
Overall Project		
Owner's Project Costs	$65,000,000.00	$375.16
Total	$65,000,000.00	$375.16
Structural		
Concrete	$7,500,000.00	$43.29
Masonry	$836,926.00	$4.83
Miscellaneous Metals	$445,000.00	$2.57
Roofing	$275,000.00	$1.59
Total	$9,056,926.00	$52.27
Curtainwall		
Antamex Glazing	$5,205,662.00	$30.05
UAD Storefront Glazing	$200,000.00	$1.15
Total	$5,405,662.00	$31.20
Finishes		
Drywall	$826,325.00	$4.77
Ceramic & Stone Tile	$111,200.00	$0.64
Carpet and Resilient Tile	$6,372.00	$0.04
Paint	$61,500.00	$0.35
Total	$1,005,397.00	$5.80
Elevator		
Elevators	$1,173,700.00	$6.77
Parking Attendent Lift	$25,000.00	$0.14
Total	$1,198,700.00	$6.92
Mechanical		
HVAC/Plumbing	$3,600,000.00	$20.78
Sprinkler	$490,000.00	$2.83
Total	$4,090,000.00	$23.61
Electrical		
Electrical	$1,895,000.00	$10.94
Total	$1,895,000.00	$10.94

Table C-1 Project Cost Breakdown

Parametric Cost Estimate				
Code	Division Name	%	Sq. Cost	Projected
00	Bidding Requirements	4.18	$5.76	$997,670.00
01	General Requirements	3.80	$5.23	$906,005.00
02	Site Work	5.36	$7.38	$1,279,175.00
03	Concrete	13.72	$18.90	$3,274,193.00
04	Masonry	6.66	$9.17	$1,588,583.00
05	Metals	9.16	$12.61	$2,185,316.00
06	Wood & Plastics	0.82	$1.13	$195,361.00
07	Thermal & Moisture Protection	1.99	$2.74	$473,894.00
08	Doors & Windows	7.70	$10.61	$1,837,697.00
09	Finishes	5.77	$7.95	$1,377,372.00
10	Specialties	1.23	$1.70	$294,310.00
11	Equipment	0.70	$0.97	$167,341.00
12	Furnishings	1.94	$2.67	$462,919.00
13	Special Construction	0.13	$0.18	$30,342.00
14	Conveying Systems	3.30	$4.55	$787,657.00
15	Mechanical	10.72	$14.77	$2,559,185.00
16	Electrical	8.10	$11.16	$1,933,138.00
21	Fire Suppression	1.10	$1.52	$262,597.00
22	Plumbing	2.06	$2.84	$492,404.00
23	HVAC	4.14	$5.71	$988,783.00
26	Electrical	6.16	$8.48	$1,469,841.00
31	Earthwork	1.05	$1.44	$249,661.00
33	Utilities	0.21	$0.29	$50,655.00
	Total Building Costs	**100**	**$137.74**	**$23,864,098.00**

Table C-2 D4 Cost 2002 Parametric Estimate

R.S. Means 2007 Square Foot Estimate				
Calculations				
	S.F. Area	170,000	**173,260**	200,000
Exterior Wall	L.F. Perimeter	470	**472.17**	490
Double Glazed Heat Absorbing Tinted Glass Panels	R/Conc. Frame	$131.00	**$130.48**	$126.25
Perimeter Adjustment (544 L.F.)	Per 100 L.F.	$5.50	**$5.42**	$4.75
Story Height Adjustment (11.67 L.F.)	Per 1 L.F.	$2.50	**$2.47**	$2.25
Location Factor			**$0.98**	
Adjusted Cost/S.F.			**$136.52**	
Adjustments				
Item	**Qty**	**Unit**	**Cost**	**Total**
Estimated Building Cost	173,260	S.F.	$136.52	$23,653,455.20
Basement Area	63,000	S.F.	$31.31	$1,972,593.00
4000 LB Elevator @ 10 Stops	3	Ea.	$267,540.00	$802,620.00
Additional Stop	5	Ea.	$7,521.50	$37,607.50
5000 LB Elevator @ 10 Stops	1	Ea.	$272,440.00	$272,440.00
			Total	**$26,738,715.70**

Table C-3 R.S. Means Square Foot Estimate

The resulting values form the parametric estimate were $137.74/SF and $23,864,098.00 overall, whereas the results from the square foot estimate were $136.52/SF and $26,738,715.70 overall. These estimates may be comparable to each other, but they differ significantly from the actual costs of construction.

One of the factors that may explain such a difference is the cost of the curtain wall system. The actual cost of the system is over $5,400,000 which is about $31.20/SF alone. In the parametric estimate, all of Division 8 was only quoted at $10.61. Other building systems differ as well. Conveying systems from both estimates were approximately $800,000 when actual cost is close to $1.2 million, the cost of the Mechanical, Plumbing, and Fire Suppression System is nearly double the parametric value as well as the structural elements.

D. Site Plan of Existing Conditions

The site for the project is located at the corner of 11th Street NW and New York Avenue NW in Washington, D.C. Neighboring on the east side is the Embassy Suites Hotel, a recently constructed 14 story structure. The only space between these two areas is a 10 ft public

alleyway. To the north is another active construction site. This project began just weeks after mobilization on 1099 New York Avenue, so careful coordination had to be taken into consideration while excavating.

Due to a congested site, one of the north bound lanes on 11th Street will be closed for the duration of the project. This will allow for more flexibility in material staging and room for a covered pedestrian walkway. This way there is still a steady flow of pedestrian traffic. Because it is a downtown location, parking is scarce and only available at the meters on New York Avenue and the public parking lot across the street.

The relocation of existing utilities is minimal. Most will be cut and capped until reattached once sufficient construction has progressed.

The site plan of existing conditions can be visualized in **Appendix B**.

E. Local Conditions

In Washington, D.C. the preferred structure of recent has tended to be post-tensioned concrete. This structure type has proven to be beneficial for a number of reasons. Primarily because concrete is better on congested sites than steel, the cost of labor required is cheaper in Washington and the smaller plenum spaces allow for more real estate below the height constrictions.

Soil conditions in D.C. tend to be very poor. Deep construction is rare and at most is only 4 stories below grade.

Parking is very limited for construction workers just as it is for most commuters in a downtown area. The only parking spaces available near the project site are either at meters or in public parking lots, both of which are at the expense of the workers. The subway, however, has proven to be a more economical alternative. 1099 New York Avenue is located just three blocks from a Metro Station.

Recycling is encouraged, but can be very costly because of the travel distance. The majority of recycling done on the project was during the demolition phase.

F. Client Information

Tishman Speyer Properties is the owner of the project. They consider themselves to be one of the leading owners, developers, and operators and fund managers of first-class real estate in the world. They pride themselves in seeking opportunity where others see difficulties and

transforming those opportunities into assets of even greater value. They feel that vertical integration is the key to their success, their ability to envision a broader array of possibilities than others. The project is to be one of Tishman Speyer's premier office buildings in the District from both a design and functional standpoint. The company is New York based and is looking for prime opportunities to establish itself in the D.C. market. 1099 New York Avenue is to be a Class A office building, because of this, Tishman Speyer expects nothing but the best in terms of cost, quality, schedule and safety on 1099 New York Avenue. To assure these expectations are met, Tishman Spyer manages the project themselves in order to meet the performa established when the best consultants and contractors were hired.

The building's signature is to be its glass curtain wall. It has already become the talk of the town and is written about in several different business journals. As a result, Tishman Speyer is paying very close attention to the sequencing of its erection. Another concern is the delivery schedule for construction on the adjacent site and future tenants. Adjustments are already being made to allow tenet contractors access prior to base building completion.

In order to make this process run smoothly Davis is focusing on honesty and openness with Tishman Speyer at all times - even when difficulties arise. This is so the job can be done right the first time. The same amount of quality that Tishman expects from Davis is expected of the subcontractors, and of course clear communication at all times is key.

G. Project Delivery System

The delivery method selected by the owner was Design-Bid-Build with a General Contractor (CM @ Risk). This method is preferred on a company-wide scale because Tishman Speyer typically wants control of the design consultants. They do not wish to take on the risks an owner might encounter in a Design-Build delivery. In figure G-1, you can see the breakdown of the project team organization.

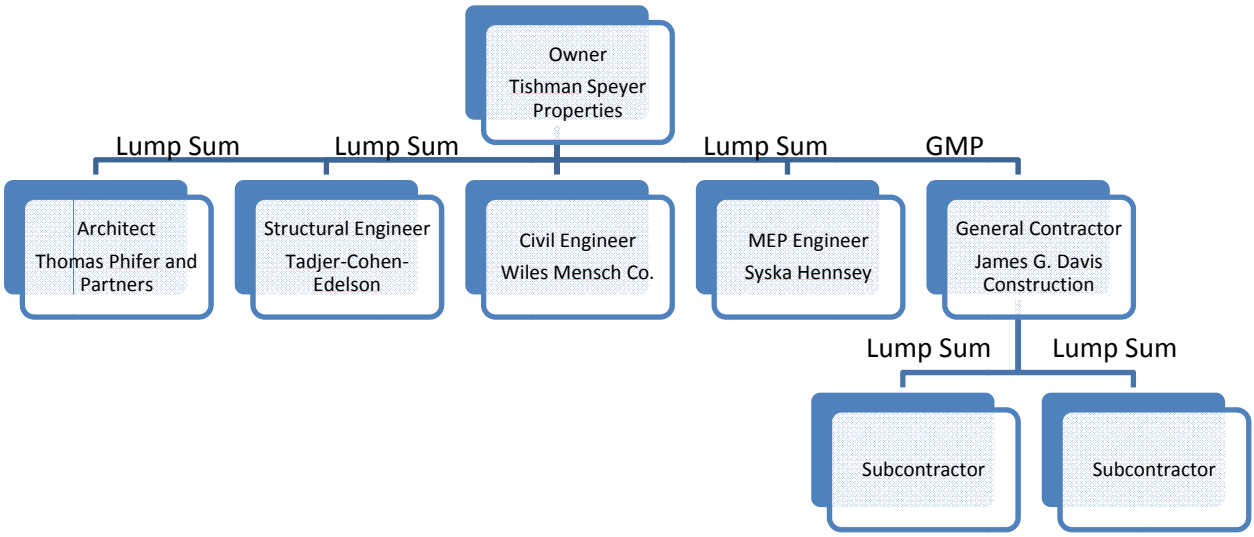


Figure G-1 Project Organizational Chart

Tishman Speyer holds standard Lump Sum contracts with the Architect and each of the Engineers whereas Davis Construction holds a Guaranteed Maximum Price Contract. The details of the contract with Davis include a savings clause in which 25% of all savings earned on the project stay with Davis as an incentive to complete the project under budget. No payment and performance bond is required.

With each of the subcontractors, Davis holds a Lump Sum contract. The doors, frames, and hardware contractor is under a Lump Sum purchase agreement since they install the materials themselves. Each subcontractor was picked based on the lowest bid compared to Davis' budget estimate. Every contractor is required to be insured, but bonds were only purchased on the larger contracts ($200,000 or more) to provide some cost savings. The major subcontractors are listed below.

Concrete: ONCORE Construction
Electrical: Freestate Electrical Co.
Mechanical: W.E. Bowers
Fire Protection: Strickland Fireproofing
Curtain Wall: Antamex International
Earthwork: National Wrecking

H. Staffing Plan

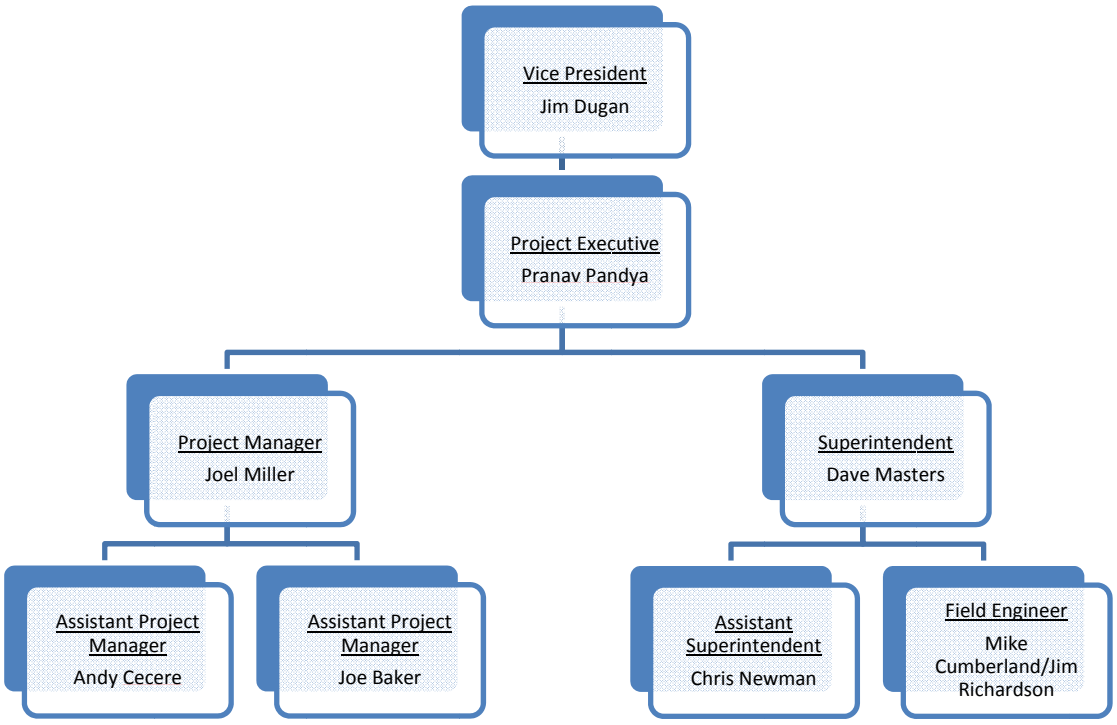


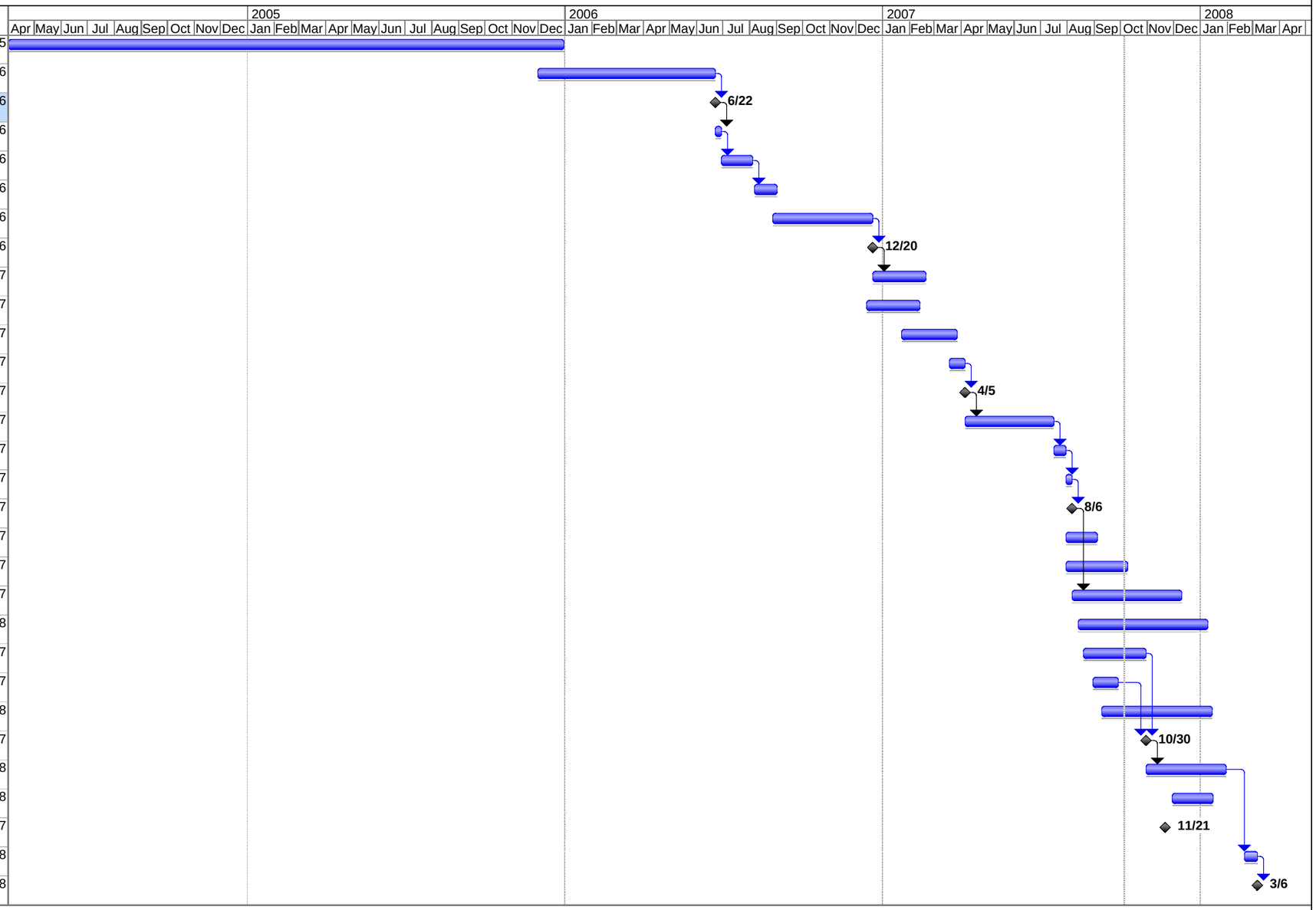
Figure H-1 1099 New York Avenue Management/Supervision Staff Hierarchy

Davis Construction structures its company by groups. Each group generally focuses on a type of construction and has a Vice President in charge. Jim Dugan is a Base Building VP and 1099 NY Avenue is one of the projects that his group is working on. Under each VP on the project management staff, there are three Project Executives that manage an assortment of Projects (usually 2 or 3). Pranav Pandya is the executive for this project. Under the executive Davis staffed one Project Manager to 1099, Joel Miller, whose sole responsibilities lie with this job. Under Joel are two Assistant Project Managers, Andy Cecere and Joe Baker. The supervision staff on the project consists of one full-time Superintendent, Dave Masters, and his assistant Chris Newman. Because a full-time Field Engineer is not required, two members of Davis' engineering staff, Mike Cumberland and Jim Richardson, share time on site.

Appendix A

Project Schedule Summary

ID	Task Name	Duration	Start	Finish
1	Design Phase	456 days	4/2/04	12/30/05
2	Procurement of Construction Services	146 days	12/1/05	6/22/06
3	Notice to Proceed	0 days	6/22/06	6/22/06
4	Mobilize Site	5 days	6/23/06	6/29/06
5	Demolish Existing Conditions	26 days	6/30/06	8/4/06
6	Drive Soldier Beams	20 days	8/7/06	9/1/06
7	Excavtion & Tiebacks	83 days	8/28/06	12/20/06
8	Excavation Complete	0 days	12/20/06	12/20/06
9	Install Foundation Drains and Sumps	43 days?	12/21/06	2/19/07
10	Place Footings, Grade Beams Elevator Pits	43 days	12/14/06	2/12/07
11	Form, Reinforce, Pour Level B4-B1	46 days	1/23/07	3/27/07
12	Form, Reinforce, Pour Ground Level Slab	14 days	3/19/07	4/5/07
13	Substructure Complete to Grade	0 days	4/5/07	4/5/07
14	Form, Reinforce, Pour Levels 2-11	72 days	4/6/07	7/16/07
15	Form, Reinforce, Pour Roof	10 days	7/17/07	7/30/07
16	Penthouse Structure	5 days	7/31/07	8/6/07
17	Superstructure Complete	0 days	8/6/07	8/6/07
18	Light Gauge Framing at North & East Elev.	26 days	7/31/07	9/4/07
19	Curtainwall at 11th St. Elev.	51 days	7/31/07	10/9/07
20	Garage Interiors	90 days	8/7/07	12/10/07
21	MEP in Penthouse	107 days	8/14/07	1/9/08
22	Curtainwall at NY Avenue	52 days	8/20/07	10/30/07
23	Penthouse Roof and Main Roof	21 days	8/31/07	9/28/07
24	Elevator Installation	91 days	9/10/07	1/14/08
25	Façade and Roof Complete	0 days	10/30/07	10/30/07
26	Main Lobby Construction	66 days	10/31/07	1/30/08
27	Typical Core Construction Floors 1-11	33 days	11/30/07	1/15/08
28	Tenant Full Access	0 days	11/21/07	11/21/07
29	Inspections	11 days	2/21/08	3/6/08
30	Substantial Completion	0 days	3/6/08	3/6/08



Project: 1099 New York Avenue
Date: 10/05/2007

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

Appendix B

Existing Conditions Site Plan

1099 New York Avenue
Washington, D.C.

Neighboring Construction Site

Construction Fence

Fence Gate

Covered Pedestrian Walkway

Existing Fire Hydrant

1099
New York Avenue
11 Stories
126'-0"

Public Alleyway

Existing Embassy Suites Hotel
14 Stories

1101 New York Avenue
12 Stories

11th St NW

New York Avenue NW

Temporary Power Shed

GC Trailer

Storage Trailer

Fence Gate

Fence Gate

Fence Gate

Pedestrian Crosswalk

Metered Parking

Ex. 15" Storm

Ex. 8" Water

Ex. 16" Storm

Ex. 12" Water

Ex. 8" Water

Ex. 21" Sanitary

Legend

- Sanitary
- Storm
- Water
- Electric
- Gas
- Fence
- Existing Sidewalk
- Traffic Median
- Covered Walkway
- Fire Hydrant

Existing Site Conditions
Drawn by: Will Cox
Date: October 5, 2007

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