2013

Technical Report 1

The Woodley

The JBG Companies

CLARK CONSTRUCTION

The Pennsylvania State University
Department Architectural of Engineering
Construction Option

AE 481W – Fall 2013
Faculty Advisor – Ray Sowers

PSUAE
Kevin R. Kroener
9/16/2013

Executive Summary

The Wardman West Residential project or The Woodley is an 8-story; 212-unit luxury apartment building located in Woodley Park, Washington, DC with two sub-grade parking garage levels. The 421,000 GSF building was joint venture between JBG Companies and CIM Group. JBG Companies, headquartered in Chevy Chase, MD owns over $10 million in assets and has built over 23.6 million SF of office, residential, hotel and retail space in the Washington, DC Metropolitan Area. As one of DC's top investors, owners, and developers, JBG had a mission to build an apartment building with a classic design with modern accents. They opted for maxed out floor plans with larger room sizes and classic open layouts, rather than the typical trend of smaller, more efficient residences in the DC area. This was a challenging proposal for the architect Cooper Carry with their design having to maintain the historical integrity of the Marriot Wardman Park Tower built in 1918. High quality was of the upmost importance for JBG with an early 2014 opening pushing the schedule. The overall cost of the project was not as much of a concern with the large contingency awarded to Clark Construction the general contractor. The Woodley also had a LEED Silver certification requirement as part of its design and construction scope.

The Woodley's delivery method was unique in the fact that it was a negotiated GMP bid at approximately $85 million between Clark Construction and JBG Companies. This allowed Clark to procure many repeat subcontractors helping to build relationships for future work. An interesting aspect of the project's delivery method is the use of Third Party Exterior Skin Consultants by both Clark and the architect Cooper Carry to maintain checks and balances during construction, due to JBG holding very stringent quality control requirements for the buildings very intricate and expensive façade.

The project was staffed with a typical managerial breakdown with a Clark project executive overseeing the entire project, internally and externally, and a senior project Manager overseeing all on-site operations with management team of one project manager, one project engineer and

an entry level office engineer. Typical to many Clark projects the project manager and project engineer divided up responsibility between exterior and interior trades, as well as MEP coordination. The unique aspect of The Woodley project was the breakdown of its field employees, with a very experienced construction executive heading up all field operations and managing a team of one superintendent and two assistant superintendents. Furthermore, responsibilities for exterior and interior construction were divided equally between the four field employees with the two most senior superintendents managing over the two assistant superintendents. There were also two owner representatives involved throughout the entirety of construction, one handling construction management issues and the other overseeing financial requirements.

Located in the heart of Northwest Washington, DC only a block away from the Woodley Park/Zoo Metro Station, The Woodley's site is accessed by Woodley Road off of the 2700th block of Connecticut Avenue. The existing conditions result in a very compact site with a boundary converging close to the existing 10 - story Marriot Wardman Hotel. A temporary site road was built to access the site's East, North and West staging areas allowing for material deliveries and limited on-site traffic and parking. The site's only gate was located across from Woodley Road's intersection with 27th Street; this made deliveries a key scheduling and logistical challenge with large trucks and tractor trailers needing to park along Woodley Road, often interfering with pedestrian traffic feeding in and out of the existing Woodley Park Hotel Complex.

The Woodley's site required demolition of an existing multi-story parking garage and the pavement of its surrounding parking lot. The sites existing conditions also called for the removal several retaining walls, elevated concrete walks, service gates and booths, vegetation and underground utility lines. Materials removed during demolition were predominantly concrete and asphalt pavement. Asbestos abatement was performed for the existing parking garage and contracted out to ACM Services, Inc. by JBG Companies. Sitting on cast-in-place spread footings the building's structure is made up entirely of cast-in-place concrete columns and post tensioned concrete slabs. Plywood formwork was primarily used throughout the below and above-grade structures construction with all formwork being designed per ACI 301, ACI 117 and ACI 347.

Two mechanical penthouses sit atop The Woodley's roof level servicing the buildings Cooling and Heating Water-to-Air System. The smaller north penthouse houses one of the two 25,000 CFM MUAU's which services half of the buildings water source heat pumps sized from 200 to 1500 CFM in corridors and apartment units. Located in the south penthouse is the other MUAU servicing corridor and unit water source heat pumps and a 2,450 GPM Cooling Tower. There are also two 270 GPM gas boilers in each penthouses servicing the two MUAU's and WSHP's. Additionally, another noteworthy feature is that the fire suppression system utilizes CPVC for piping, an increasingly more common material being used for residential projects in place of traditional copper piping. The buildings main electrical service feed comes from PEPCO by three main duct banks with 4 #750AL 4''C feeders which is stepped down into three 208/120V main switchboards, with two sized at 2500A feeing 3000A main busses and the other at 4000A feeding a 4000A main bus. From these three main busses 36 panel boards sized at either 100A or 225A feed the building's apartment units' and other spaces' panel boards.

The exterior façade of the building requires extremely intricate masonry construction calling for three main veneer materials: brick, cast stone and limestone. The prefabricated cast stone and limestone pieces are anchored with engineered stone anchors adhesively attached to rigid insulation between sill joints. The brick is anchored with masonry tiebacks 16'' OC vertically and horizontally, with a 4'' pintel tying the brick veneer to the sheathing through elf drilling fastened tie back plates. Two forms of scaffolding were utilized for masonry construction of the building's exterior façade. Swing stage scaffolding was used on the south elevation due to a lack of ground staging area and the remaining North, East and West elevations using FRACO Climbing Work Platforms, allowing for a drastic reduction in scaffold installation time, in turn accelerating the already slow paced exterior masonry schedule. Excavation of the building's spread footings and two sub-grade parking levels required a soldier pile & lagging support system for its pit.

An interesting aspect of The Woodley project was that it was actually bid out in two phases. Phase 1 being the demolition of the existing parking garage and lot along with the construction of a pedestrian tunnel connecting to the existing Marriot Wardman hotel. Phase 2 was the actual construction of the residential building starting in early June of 2011 and needing with substantial completion by early March of 2014. It is worth noting that the masonry activities to construct the exterior skin of the building was a continually lagging activity that was a critical path activity due to interior finishes being dependent on the building being water and air tight. The total cost for The Woodley's construction was budgeted at $88,083,000 or $209.22 per square foot. This total cost includes all sitework and excavation as well as the construction of the two sub-grade parking garage levels and mezzanine fitness center. When compared to a combined square foot estimate for an 8-24 story apartment building and underground parking garage, the actual cost per square foot was significantly higher than the resulting RSMeans 2013 estimate at $163.55/SF. The most logical explanation for this difference in cost is the

assumed lower cost per square foot for enclosure by RSMeans, where $3.46/SF resulted compared to the actual $36.34/SF., considering The Woodley's expensive brick, limestone and cast stone façade.

The Woodley

Tech 1: Construction Project Management

AE 481W Senior Thesis

Kevin Kroener

Faculty Consultant:

Ray Sowers

CLARK CONSTRUCTION

Client Information

THE JBG COMPANIES ⟷ CIM

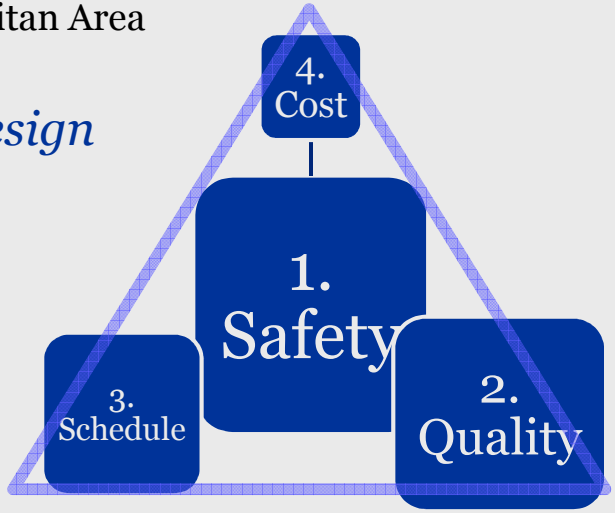
JBG Companies

- Headquarters – Chevy Chase , MD
- Investor, owner, developer and manager of real estate properties since 1960
- Over $10 billion in assets and 23.6 million SF of office, residential, hotel and retail in the Washington, DC Metropolitan Area

CIM Group

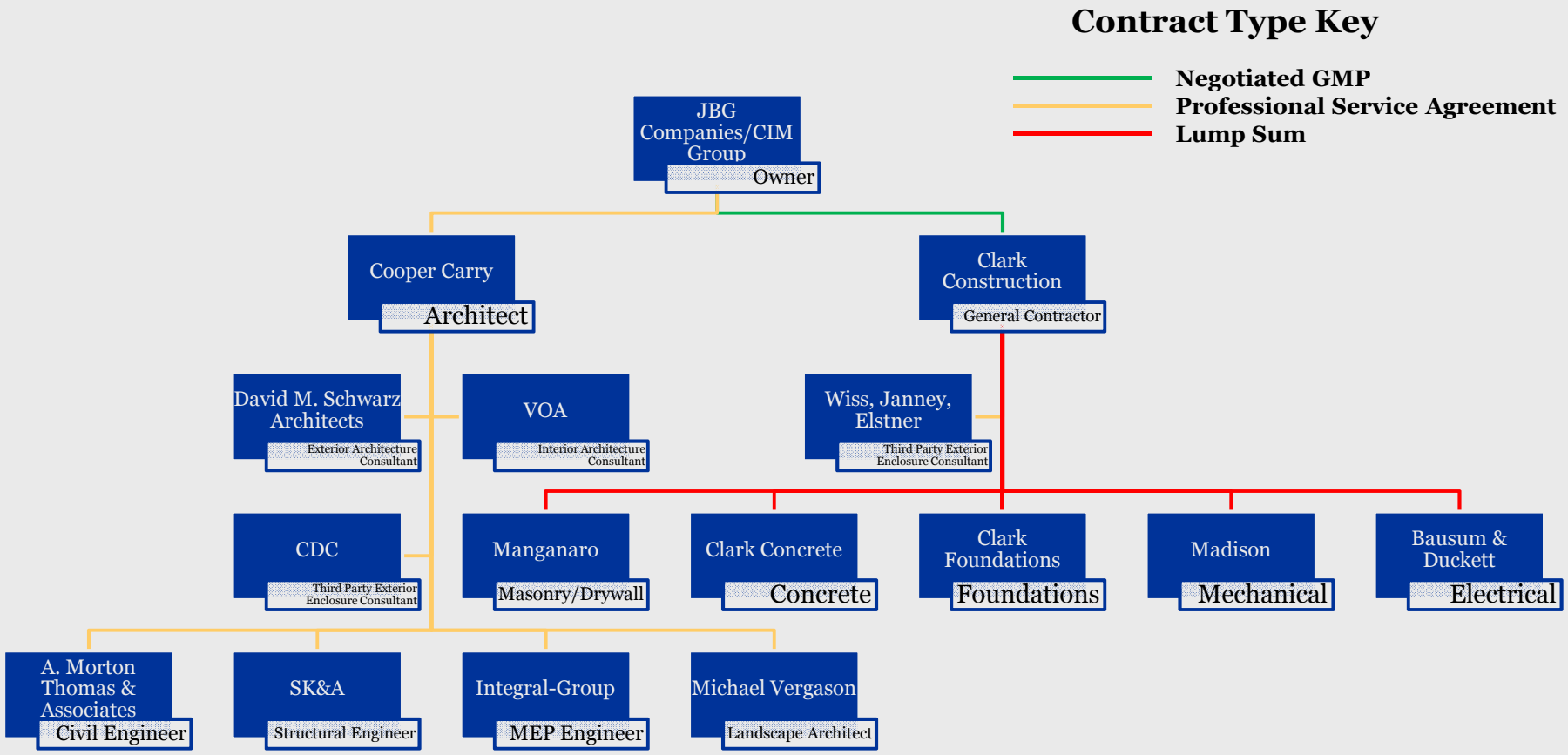
- Headquarters – Los Angles, CA
- Real Estate and Infrastructure Investment Firm since 1994

Mission – A classic design with modern accents

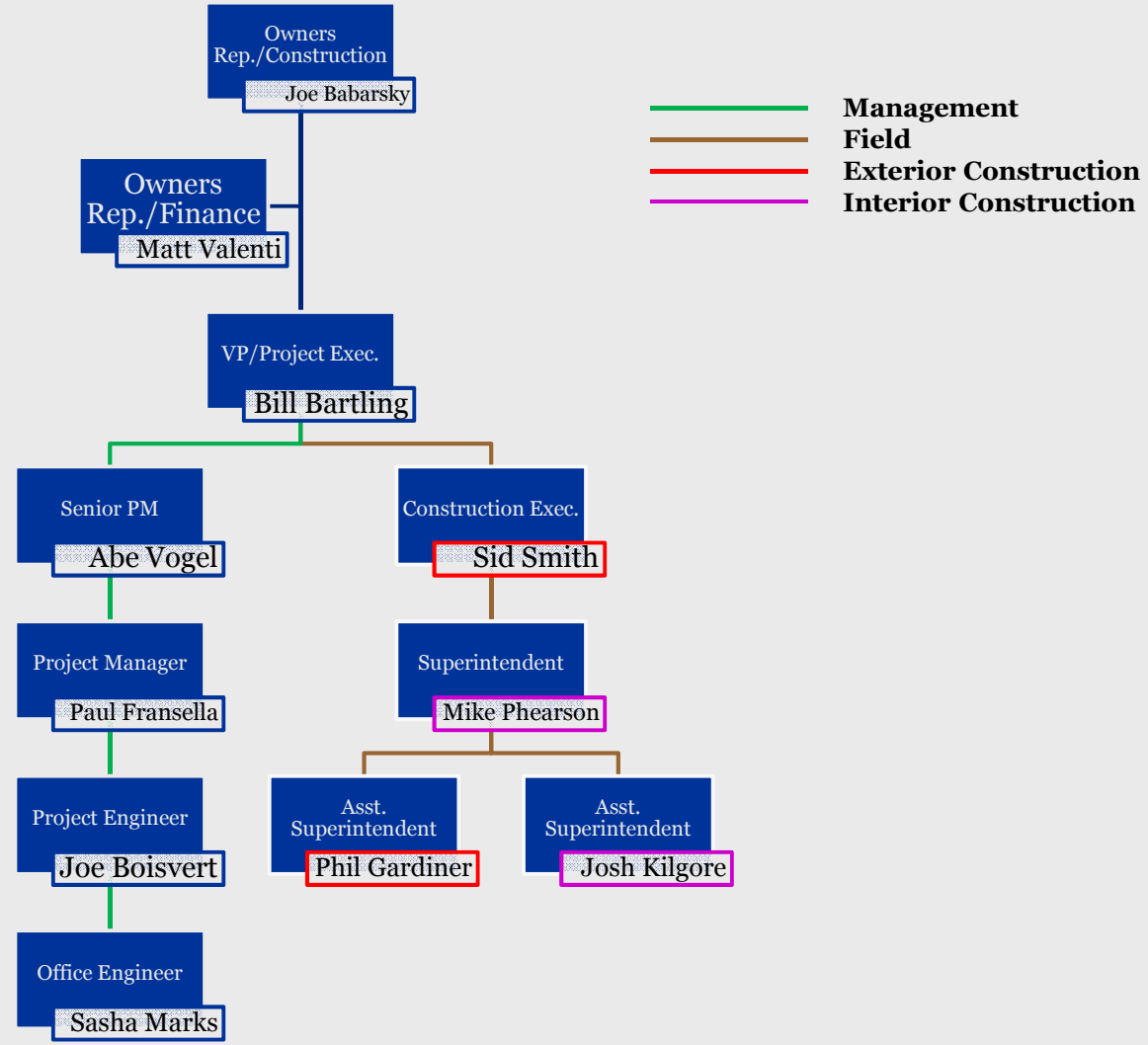


Marriot Wardman Park Hotel Tower - 1918

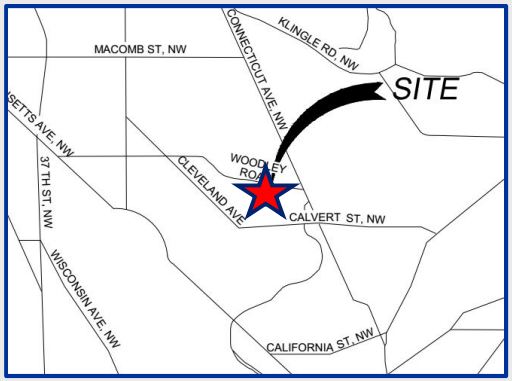
Project Delivery System



Staffing Plan



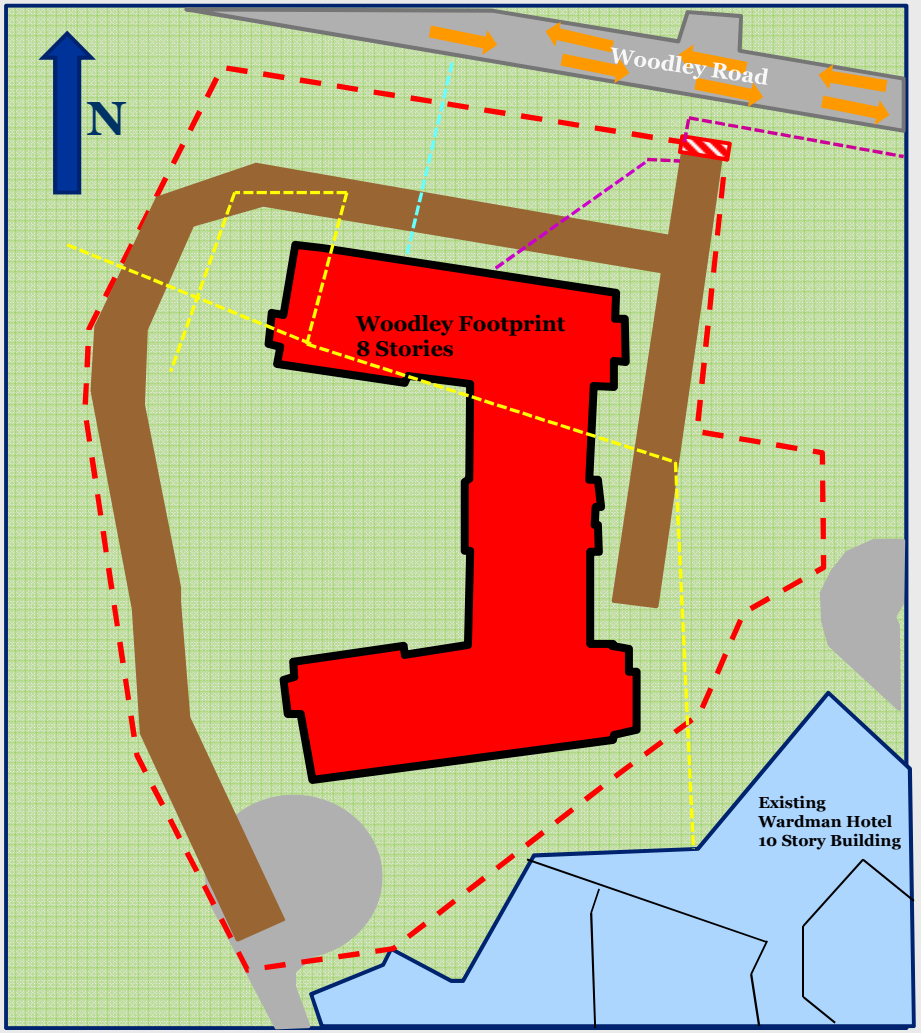
Existing Conditions Site Plan



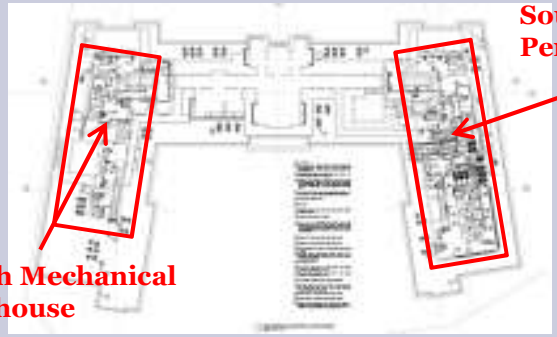
Existing Conditions SUP
The Woodley
15 September 2013
Kevin Kroener

SUP Key:

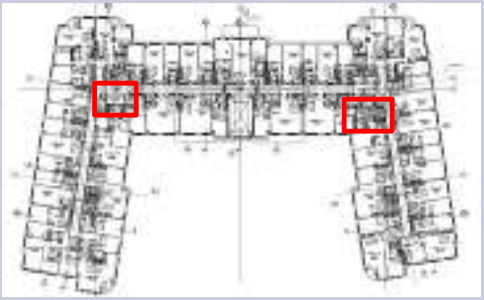
- Pedestrian Traffic
- Site Fence/Boundary
- Site Gate
- Temporary Road
- Underground Electric Line
- Storm drain Line
- Sanitary Sewer Line



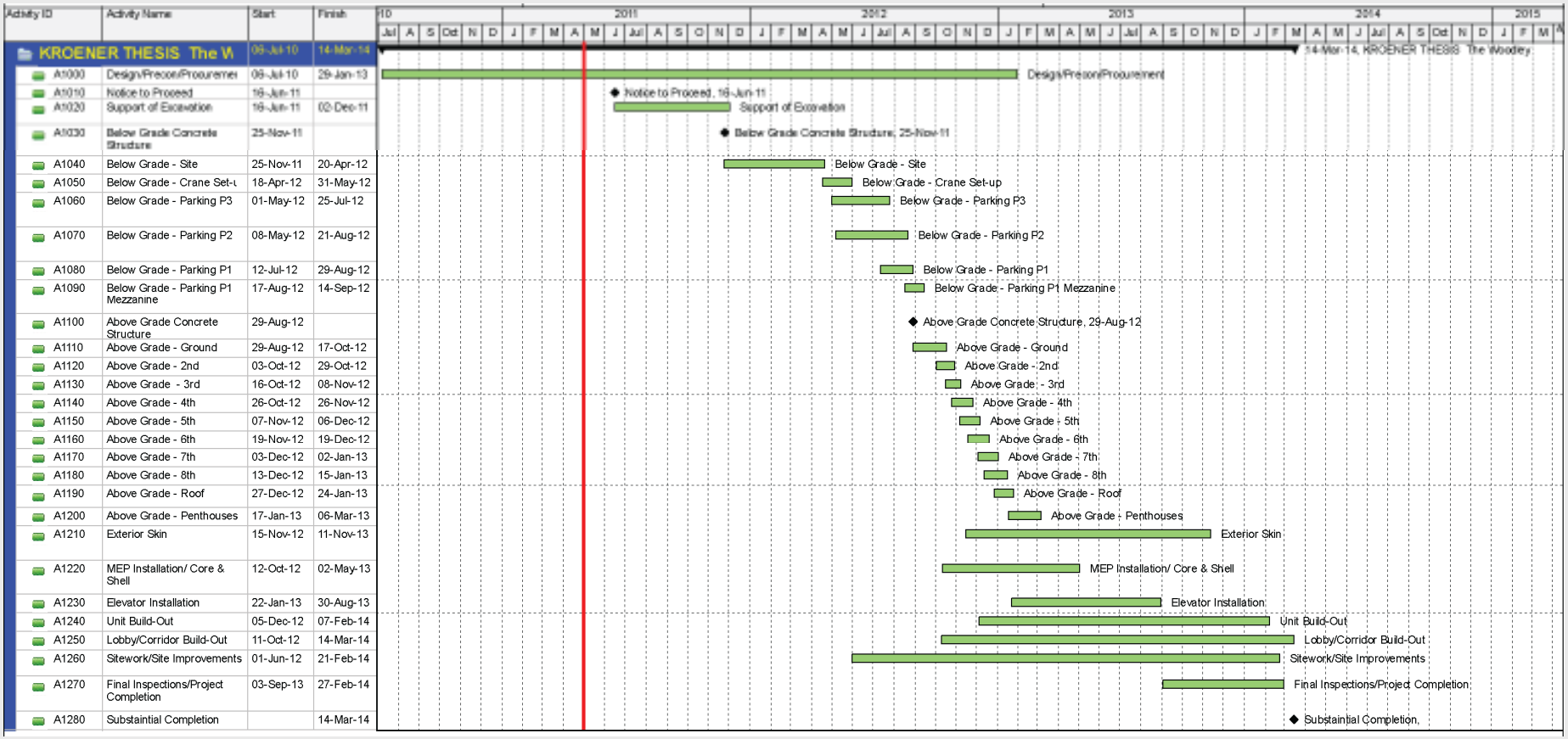
Building Systems Summary

Scope	Specs	
Demolition (Phase 1)	• Multi Story Parking Garage and Lot • Asbestos Abatement & Removal • Retaining walls, elevated concrete walks, and underground utilities	 ACM SERVICES, INC. **Multi Story Parking Garage Parking Lot**
Cast in Place Concrete	• Plywood Formwork and Other Materials per ACI 301, ACI 117, ACI 347 • Unbound Post-tensioned Concrete Slabs	 
Mechanical System	• Water to Air System • 2 Roof-top Mechanical Penthouses • 2 MUAU's at 25,000 CFM • Cooling Tower at 2,450 GPM • 2 Boilers at 270 GPM • Individual WSHP's for all 212 Units and Spaces • CPVC Fire Suppression Piping	 **South Mechanical Penthouse** **North Mechanical Penthouse**

Building Systems Summary

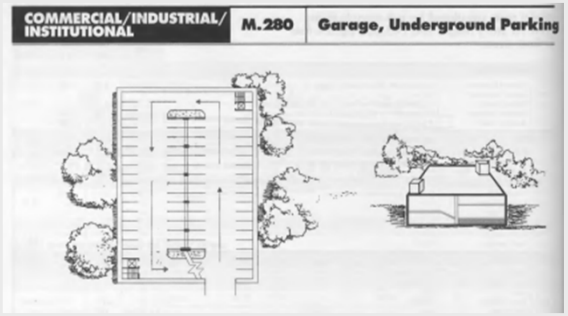
Scope	Specs	
Electrical	• Three 208/120V main switchboards, (2) at 2500 A and one at 4000A • 36 Panel boards at 100A and 225A • Serviced by PEPCO	
Masonry	• Brick , Limestone and Cast stone Exterior Skin • Engineered Stone Anchors and Masonry tiebacks • Swing Scaffolding and FRACO Mast Climbing Work Platforms	 
Support of Excavation	• Soldier Piles & Lagging	

Project Schedule Summary



Activity ID	Activity Name	Start	Finish
KROENER THESIS The W		09-Jul-10	14-Mar-14
A1000	Design/Precon/Procureme	09-Jul-10	29-Jan-13
A1010	Notice to Proceed	16-Jun-11	
A1020	Support of Excavation	16-Jun-11	02-Dec-11
A1030	Below Grade Concrete Structure	25-Nov-11	
A1040	Below Grade - Site	25-Nov-11	20-Apr-12
A1050	Below Grade - Crane Set-u	18-Apr-12	31-May-12
A1060	Below Grade - Parking P3	01-May-12	25-Jul-12
A1070	Below Grade - Parking P2	08-May-12	21-Aug-12
A1080	Below Grade - Parking P1	12-Jul-12	29-Aug-12
A1090	Below Grade - Parking P1 Mezzanine	17-Aug-12	14-Sep-12
A1100	Above Grade Concrete Structure	29-Aug-12	
A1110	Above Grade - Ground	29-Aug-12	17-Oct-12
A1120	Above Grade - 2nd	03-Oct-12	29-Oct-12
A1130	Above Grade - 3rd	16-Oct-12	08-Nov-12
A1140	Above Grade - 4th	26-Oct-12	26-Nov-12
A1150	Above Grade - 5th	07-Nov-12	06-Dec-12
A1160	Above Grade - 6th	19-Nov-12	19-Dec-12
A1170	Above Grade - 7th	03-Dec-12	02-Jan-13
A1180	Above Grade - 8th	13-Dec-12	15-Jan-13
A1190	Above Grade - Roof	27-Dec-12	24-Jan-13
A1200	Above Grade - Penthouses	17-Jan-13	06-Mar-13
A1210	Exterior Skin	15-Nov-12	11-Nov-13
A1220	MEP Installation/ Core & Shell	12-Oct-12	02-May-13
A1230	Elevator Installation	22-Jan-13	30-Aug-13
A1240	Unit Build-Out	05-Dec-12	07-Feb-14
A1250	Lobby/Corridor Build-Out	11-Oct-12	14-Mar-14
A1260	Sitework/Site Improvements	01-Jun-12	21-Feb-14
A1270	Final Inspections/Project Completion	03-Sep-13	27-Feb-14
A1280	Substaintial Completion		14-Mar-14

Project Cost Evaluation



Sq. Foot
$163.55/SF

Actual
$209.22/SF

Square Foot Estimate			
Item	Cost	Cost/SF	SF
Apartment, 8-24 Story	$59,494,470.00	$206.22	288,500
Underground Parking	$9,339,000.00	$70.75	132,000
Total SF Cost	$68,854,550.00	$163.55	421,000
Building Systems			
Structure	$11,413,310.00	$27.11	421,000
Mechanical	$15,732,770.00	$37.37	421,000
Electrical	$4,921,490.00	$11.69	421,000
Enclosure	$1,456,660.00	$3.46	421,000

Project Cost Breakdown		
Item	Cost	Cost/SF
Construction Cost	$80,916,000	$192.20
Total Project Cost	$88,083,000	$209.22
Building Systems		
Structure	$11,065,000	$26.28
Mechanical	$9,947,000	$23.63
Electrical	$6,740,000	$16.01
Enclosure	$15,297,000	$36.34

Questions?