

# Technical Assignment 1

The Apartment Building  
East Coast, USA

B. Kerem Demirci | Construction Option | Advisor: Dr. Messner | 9.19.14



Source: JMAV

## EXECUTIVE SUMMARY

The Apartment Building is a high-end apartment building located on the East Coast. It consists of ten stories above grade, amounting to 151,158 SF. The building also has a two-story, 62,250 SF underground parking garage. Ten of the units are designated affordable housing for 40 years which allows the maximum zoning height restriction to increase from 77 feet to 99 feet. The ground floor houses amenities such as a lounge, business center, and fitness room. An additional club room is located on the fifth floor. Accessible terraces are



Figure 1: Rendering

(Source JMAV)

located on the fifth and eighth floor and include gas grills, gas fire pits, and water/gas features. The average rental price for the apartment units is roughly \$2,100 per month.

This report includes a background on the project, owner, project team, project delivery method, existing conditions, building systems, schedule, and cost. This project will be LEED certified based on LEED 2009 for new construction.

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## THE CLIENT

The client for The Apartment Building is BMPI. BMPI is a partnership between three main investors of which one is the owner of the general contractor of this project, John Moriarty & Associates (JMA). The other two partners are a developer out of Boston and a local developer. The goal of BMPI is to promote the growth of an up and coming metro accessible area. According to an economic impact study, conducted by Delta Associates, The Apartment Building will increase the value of nearby single family houses by 2.9% per year. The main priority of the client is to create this building will cost in mind, while keeping the schedule in mind in order for a quick return on investment.

## PROJECT TEAM

John Moriarty & Associates Virginia (JMAV) office staffed this project in a traditional structure. A regional director oversees all JMAV projects. Under the regional director is the field operations manager and senior project manager. The field operations manager oversees the field operations on multiple projects. On this project the field staff is comprised of a head superintendent, three assistant superintendent and a field intern who are all onsite daily. The senior project manager oversees the project management staff of multiple projects. On this project the project management staff is comprised of a project manager and an assistant project manager who are onsite daily.

## PROJECT DELIVERY METHOD

The delivery method on this project is a CM at Risk. The advantages of this delivery method is that only one party is responsible for construction and it allows the contractor to be involved early on in the design phase. Since this is a private project and one of the owners is also the owner of JMAV, the contract is a sole source negotiated contract. The contract type between the owner and the general contractor is a negotiated GMP, which includes open book accounting. This project also included two design-build subcontractors. Power Design Inc. and Mechanical Design Group, the electrical and mechanical/ plumbing respectively. The these two design build subcontractors hold contracts with the general contractor but have key communication paths with the architect, Rust Orling Architecture. See slide 3 of Appendix 1 for the complete project organizational chart.

## EXISTING CONDITIONS

This building is being built on what used to be an old middle school which closed in 1979. Since the closing of the middle school, multiple office buildings and residential buildings have been built nearby. Currently, the site is surrounded by two four story office buildings, townhomes and an eight story condominium. Above grade, the existing buildings appear to be a modest distance away from The Apartment Building. However, many of the existing buildings have underground parking levels that extend further than their above grade footprints. This makes the construction site much more congested than it appears. Since there are already existing buildings nearby. Utility lines are in close proximity to the new building, refer to Appendix 2. The majority of the utility lines run up Main Street. Some utilities, such as sanitary, storm, and water lines branch off Main Street and wrap around the west side of the construction site and down 2nd Street and tie into other existing buildings. Traffic in the area is not extremely heavy since it is primarily a residential area with office buildings. Due to requests by neighboring buildings, construction parking will not be available onsite and street parking is prohibited. All construction personnel must park in a designated off-site parking lot then be bussed to the job site.

## BUILDING SYSTEMS SUMMARY

### STRUCTURAL SYSTEM

The structural design criteria for this building is based off the 2009 International Building Code and the 2009 Virginia Construction Code. The design loads are listed in Table 1.

**Table 1: Residential, Multi Family Design Loads**

Area	Load
Private rooms and corridors	40 PSF
Public rooms and corridors	100 PSF
Stairs and exit ways	100 PSF
Yards and terraces, pedestrian	100 PSF
Garages, passenger vehicles	40 PSF, 3000LB Concentrated
Vehicular driveways, loading	250 PSF, 3000LB Concentrated
Fire truck loading	350 PSF, 3000LB Concentrated
Roof	30 PSF

The structural system supporting these loads is primarily cast-in-place concrete. The foundation is comprised a 36-40" mat slab and foundation walls. Beginning on the second floor and up through the roof, post-tensioning is used in the slabs which allow for a thinner slab thickness, eight inches on average. The post-tension tendons are low-relaxation strands that are comprised of seven wires and have a minimum ultimate strength of 270 KSI.

### SUPPORT OF EXCAVATION

The surrounding existing buildings contain underground parking levels that extend past the above ground footprint. This congestion makes excavation for The Apartment Building very tight. Since the adjacent underground levels are so close to the building site, excavation had to be supported within the footprint of the new building. This was done so using a raker system with soldier beams and lagging.

## BUILDING ENCLOSURE

The Apartment Building uses a multitude of different materials for the façade. The primary materials are brick, architectural concrete masonry units (ACMU), and metal cladding. Each elevation of the building utilizes these three primary façade materials. Although the materials are the same for each elevation, various colors, patterns, and mortar types create different visual appearances throughout the façade of the building.

From the ground level to the third floor, the façade is primarily comprised of Type 1 ACMU and Type 2 brick. Type 1 brick is used from the third floor through eighth floor. From the eighth floor up a combination of metal cladding, Type 2 brick, and Type 1 brick are used. In addition to the three main façade materials, cast stone is used in horizontal bands that encompass the building as well as window sills. Additional features of the building enclosure include aluminum windows, metal railings, prefinished aluminum trellis and projected metal sunscreens (5<sup>th</sup>, 8<sup>th</sup> and 10<sup>th</sup> floor). The majority of the façade is supported by anchoring to 3-5/8" metal studs that are supported by the post-tensioned concrete structure. A typical exterior wall assembly, from outside to inside, is made up of the façade material, air space, rigid insulation, air barrier, gypsum sheathing, metal studs with batt insulations, then interior gypsum board. The thicknesses of each component vary based on the façade material being supported and the intended fire rating. Punch windows are used throughout the exterior of the building. In addition, four story curved segmented aluminum window assemblies are located at each of the main entrances. Both glazing systems are prefinished aluminum.

## MECHANICAL SYSTEM

The primary mechanical room is located in a central location on the ground floor, see slide 7 of Appendix 2 for the exact location. Two primary types of mechanical systems are used to service the various spaces within the building. Two roof top units, 5580 and 6150 CFM, serve the main corridors of the building. The individual apartment units, and common areas are conditioned by split system heat pumps. The sizes of these split system heat pumps range from 300 CFM to 3000 CFM. In addition electric unit heaters are used in stair cases, the trash room, pump room and storage rooms.

## ELECTRICAL SYSTEM

The electrical connection point is located in the northeast corner of the building. The main transformer vault and electrical room are located at the G2 level, see slide 7 of Appendix 1. The Apartment Building runs on 208/120V which is typical for residential buildings. Four 1000A switchgears supply the 16 to 20 load centers located on each floor.

## SCHEDULE

The Apartment Building received the notice to proceed on February 11<sup>th</sup>, 2013 and will reach substantial completion on February 13, 2015, resulting in a duration of roughly 24 months. The post-tensioned concrete structure was completed in June, 2014, roughly 16 months after notice to proceed. Turnover of this building will be done in phases, allowing early revenue for the owner. The first phase of turnover is planned for December 10<sup>th</sup>, 2014 and includes the garage through the 2<sup>nd</sup> floor. From this point on the schedule dictates a turnover rate of a floor per week. A summary schedule of construction (design phases excluded) can be found in Appendix 4.

## COST EVALUATION

The total contract value of the negotiated GMP contract is \$32,752,717, or \$216.75 per SF. A square foot estimate was performed using RSMeans. The closest category in RSMeans that The Apartment Building fell in was an 8-24 story apartment building with face brick with concrete block backup and reinforced concrete frame. The final estimated cost came to \$27,598,000 which comes to \$182.64 per SF. This estimate is just about 15% lower than the actual cost which is an acceptable for a square foot estimate. A summary of the square foot estimate can be found in Appendix 3.

There are many factors that explain the lower estimated cost. The square foot estimate does not include an outdoor swimming pool and post-tensioned concrete. Also due to the nature of the estimate, only a single below grade level can be able, so the second garage level is excluded from the estimate. The finishes in the apartments units are also much higher quality, thus more expensive, than what was specified in the square foot estimate. The electrical estimate was roughly half the actual cost. The building actually uses twice as many switch gears than the estimate specifies as well as a more complex distribution system



APPENDIX 1: PRESENTATION SLIDES (9/15/14)

SLIDE 1: INTRODUCTION



# Apartment Building

Technical Assignment 1: Construction Project Management

B. Kerem Demirci  
Construction Option  
Advisor: Dr. Messner  
September 15, 2014

SLIDE 2: CLIENT INFORMATION

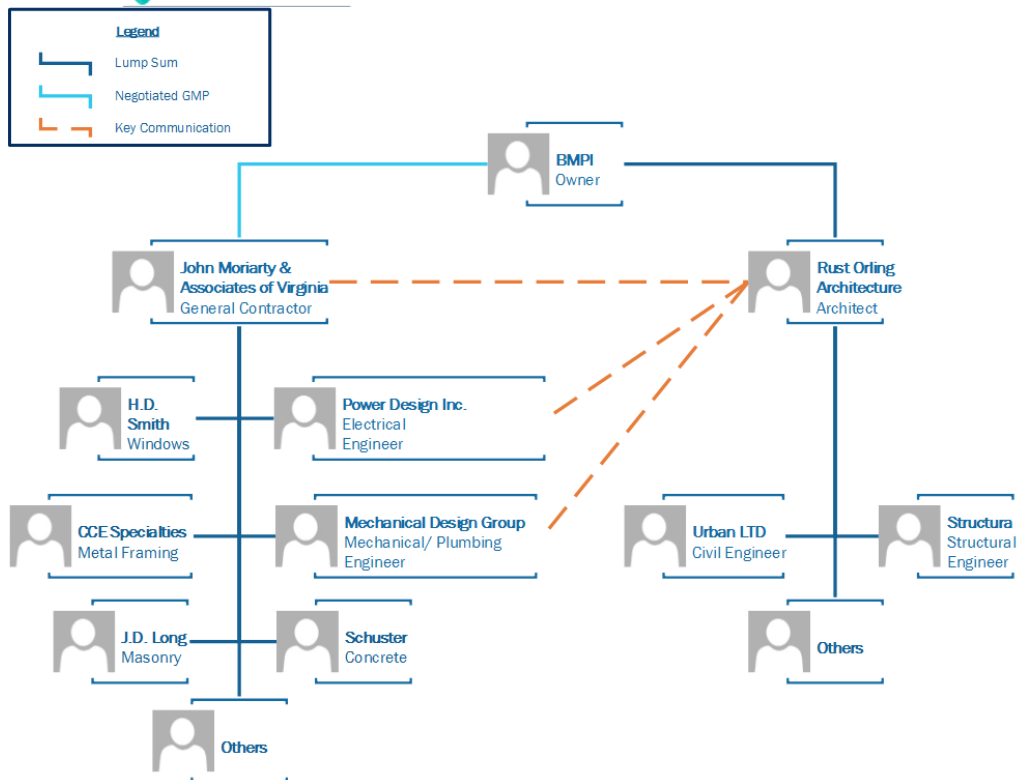
# Client Information

- BMPI, LLC
- 3 Main Partners
  - John Moriarty
  - Will
  - Mike



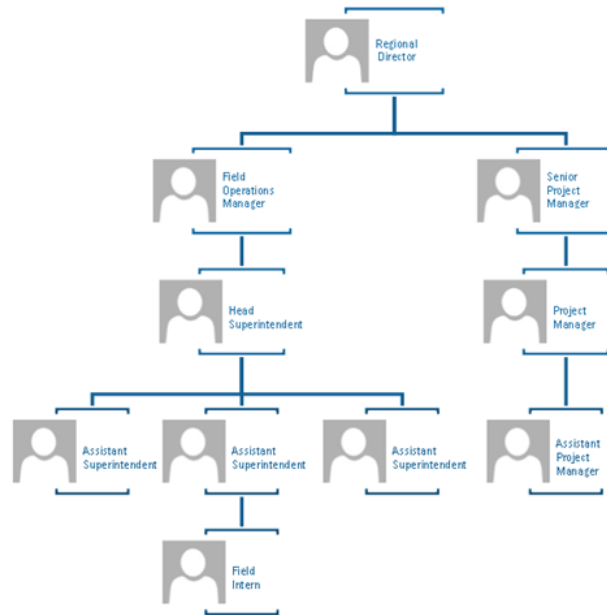
SLIDE 3: PROJECT DELIVERY

# Project Delivery



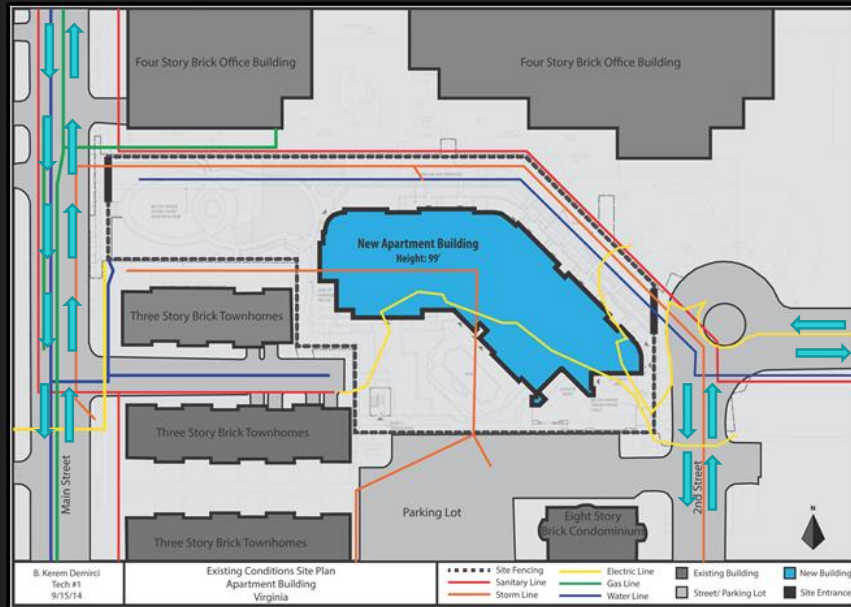
SLIDE 4: PROJECT TEAM

# Project Team



SLIDE 5: EXISTING CONDITIONS

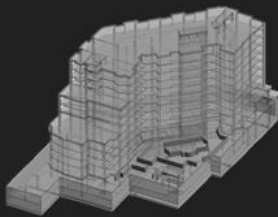
# Existing Conditions



## SLIDE 6: BUILDING SYSTEMS

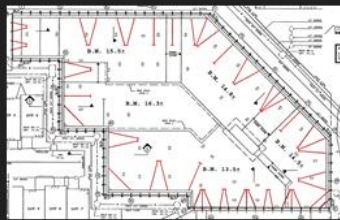
# Building Systems

## Structural System



- Cast-in-Place Concrete
- Posttensioning
- 8" thick floor slabs

## Excavation



- Internally supported raker system
- Soldier beams and lagging

## Enclosure

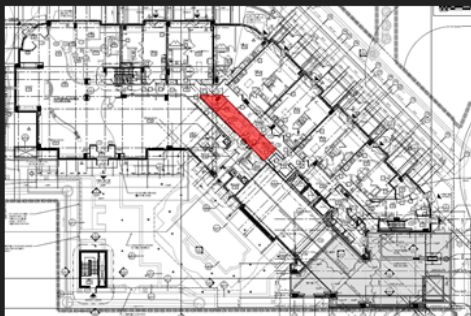


- Brick
- ACMU
- Metal Cladding
- Aluminum Windows/ Doors

## SLIDE 7: BUILDING SYSTEMS CONTINUED

# Building Systems

## Mechanical



- Mechanical Room located on ground floor
- (2) Roof Top Units
  - 5580- 6150 CFM
- Split System Heat Pumps serve apartment units, common areas, and service room
  - 300 – 3000 CFM

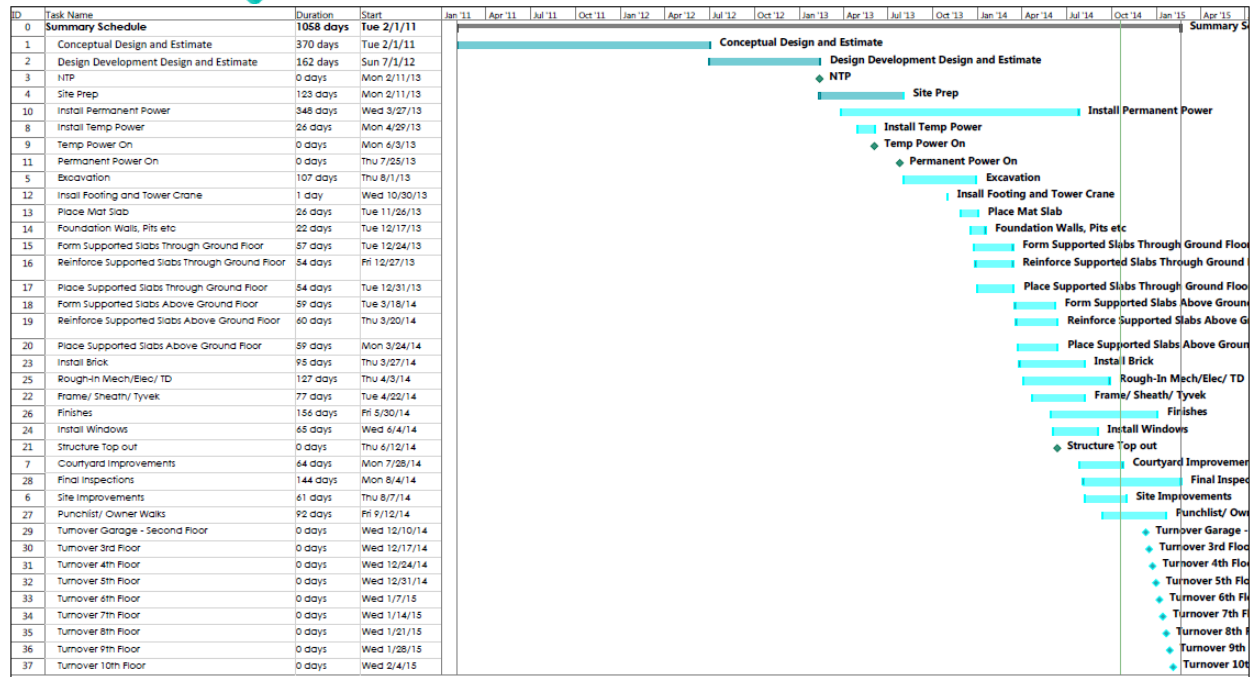
## Electrical



- Main Electrical Room located on G2 level
- Transformer located on G2 level
- 120/208V Service
- (4) 1000A Switchboards
- 6 – 20 Unit load centers located on each floor

SLIDE 8: SCHEDULE SUMMARY

# Schedule Summary





## SLIDE 9: PROJECT COST

# Project Cost

## Actual Project Costs

	Cost	Cost per SF
Structural System	\$6,221,434	\$41.17
Plumbing/Mechanical System	\$3,030,500	\$20.06
Electrical System	\$3,169,500	\$20.98
<b>Construction Cost</b>	<b>\$29,942,641</b>	<b>\$198.16</b>
<b>Total Project Cost</b>	<b>\$32,752,717</b>	<b>\$216.75</b>

## Square Foot Estimate

	Cost	Cost per SF
Structural System	\$5,438,000	\$35.92
Plumbing/Mechanical System	\$3,324,500	\$22.17
Electrical System	\$1,457,000	\$9.65
<b>Construction Cost</b>	<b>\$24,009,500</b>	<b>\$158.89</b>
<b>Total Project Cost</b>	<b>\$27,598,000</b>	<b>\$182.64</b>



Apartment, 8-24 Story with Face Brick with Concrete Block Back-up and Reinforced Concrete Frame



APPENDIX 2: ENLARGED SITE LOGISTICS PLAN

## APPENDIX 3: SUMMARY ESTIMATE



## Square Foot Cost Estimate Report

Cost Estimate Report  
RSMeansOnlineEstimate Name: **Apartment Building**

Building Type: **Apartment, 8-24 Story with Face Brick with Concrete Block Back-up / R/Conc. Frame**  
 Location: **ALEXANDRIA, VA**  
 Stories Count (L.F.): **11.00**  
 Stories Height: **10.00**  
 Floor Area (S.F.): **151,105.00**  
 Labor Type: **STD**  
 Basement Included: **Yes**  
 Data Release: **Year 2014 Quarter 3**  
 Cost Per Square Foot: **\$182.64**  
 Total Building Cost: **\$27,598,000.00**



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 SF	Cost
<b>A Substructure</b>		<b>9.6%</b>	<b>\$15.28</b>	<b>\$2,309,500</b>
<b>A1010</b>	<b>Standard Foundations</b>		<b>\$0.58</b>	<b>\$87,500</b>
	Pile caps, 6 piles, 8'-6" x 5'-6" x 37", 40 ton capacity, 14" column size, 458 K column			
	Pile caps, 12 piles, 11'-6" x 8'-6" x 49", 40 ton capacity, 19" column size, 900 K column			
<b>A1020</b>	<b>Special Foundations</b>		<b>\$12.80</b>	<b>\$1,934,500</b>
	Steel H piles, 100' long, 400K load, end bearing, 6 pile cluster			
	Steel H piles, 100' long, 800K load, end bearing, 12 pile cluster			
	Grade beam, 30' span, 52" deep, 14" wide, 12 KLF load			
<b>A1030</b>	<b>Slab on Grade</b>		<b>\$0.44</b>	<b>\$66,000</b>
	Slab on grade, 4" thick, non industrial, reinforced			
<b>A2010</b>	<b>Basement Excavation</b>		<b>\$0.29</b>	<b>\$44,000</b>
	Excavate and fill, 10,000 SF, 8' deep, sand, gravel, or common earth, on site storage			
<b>A2020</b>	<b>Basement Walls</b>		<b>\$1.17</b>	<b>\$177,500</b>
	Foundation wall, CIP, 12' wall height, pumped, .591 CY/LF, 28.79 PLF, 16" thick			
<b>B Shell</b>		<b>23.9%</b>	<b>\$38.00</b>	<b>\$5,742,500</b>
<b>B1010</b>	<b>Floor Construction</b>		<b>\$20.93</b>	<b>\$3,162,500</b>
	Cast-in-place concrete column, 16" square, tied, 300K load, 14' story height, 253 lbs/LF, 4000PSI			
	Cast-in-place concrete column, 24" square, tied, 900K load, 12' story height, 567 lbs/LF, 4000PSI			
	Cast-in-place concrete beam and slab, 6" slab, one way, 12" column, 25'x25' bay, 40 PSF superimposed load, 129 F			
	Cast-in-place concrete beam and slab, 6" slab, one way, 18" column, 25'x25' bay, 125 PSF superimposed load, 227 F			
	Flat slab, concrete, with drop panels, 6" slab/2.5" panel, 12" column, 15'x15' bay, 75 PSF superimposed load, 153 P			
<b>B1020</b>	<b>Roof Construction</b>		<b>\$1.41</b>	<b>\$213,000</b>
	Roof, concrete, beam and slab, 25'x25' bay, 40 PSF superimposed load, 12" deep beam, 6" slab, 129 PSF total load			
<b>B2010</b>	<b>Exterior Walls</b>		<b>\$11.50</b>	<b>\$1,737,000</b>
	Brick wall, composite double wythe, standard face/CMU back-up, 8" thick, perlite core fill			
<b>B2020</b>	<b>Exterior Windows</b>		<b>\$3.40</b>	<b>\$514,500</b>

		% of Total	Cost Per SF	Cost
	Windows, aluminum, sliding, standard glass, 5' x 3'			
<b>B2030</b>	<b>Exterior Doors</b>		<b>\$0.16</b>	<b>\$24,500</b>
	Door, aluminum & glass, without transom, wide stile, hardware, 3'-0" x 7'-0" opening			
	Door, aluminum & glass, without transom, non-standard, double door, hardware, 6'-0" x 7'-0" opening			
<b>B3010</b>	<b>Roof Coverings</b>		<b>\$0.60</b>	<b>\$91,000</b>
	Roofing, asphalt flood coat, gravel, base sheet, 3 plies 15# asphalt felt, mopped			
	Insulation, rigid, roof deck, composite with 2" EPS, 1" perlite			
	Roof edges, aluminum, duranodic, .050" thick, 6" face			
	Flashing, aluminum, no backing sides, .019"			
	Gravel stop, aluminum, extruded, 4", mill finish, .050" thick			
<b>C Interiors</b>		<b>20.6%</b>	<b>\$32.79</b>	<b>\$4,954,500</b>
<b>C1010</b>	<b>Partitions</b>		<b>\$9.50</b>	<b>\$1,436,000</b>
	Concrete block (CMU) partition, light weight, hollow, 6" thick, no finish			
	Metal partition, 5/8" fire rated gypsum board face, 1/4" sound deadening gypsum board, 2-1/2" @ 24", same opposite			
	Furring 1 side only, steel channels, 3/4", 16" OC			
	Gypsum board, 1 face only, exterior sheathing, fire resistant, 1/2"			
	Add for the following: taping and finishing			
	1/2" fire rated gypsum board, taped & finished, painted on metal furring			
<b>C1020</b>	<b>Interior Doors</b>		<b>\$6.76</b>	<b>\$1,021,000</b>
	Door, single leaf, wood frame, 3'-0" x 7'-0" x 1-3/8", birch, solid core			
	Door, single leaf, wood frame, 3'-0" x 7'-0" x 1-3/8", birch, hollow core			
<b>C1030</b>	<b>Fittings</b>		<b>\$4.01</b>	<b>\$606,500</b>
	Cabinets, residential, wall, two doors x 48" wide			
<b>C2010</b>	<b>Stair Construction</b>		<b>\$1.29</b>	<b>\$194,500</b>
	Stairs, steel, cement filled metal pan & picket rail, 12 risers, with landing			
<b>C3010</b>	<b>Wall Finishes</b>		<b>\$2.50</b>	<b>\$378,000</b>
	Painting, interior on plaster and drywall, walls & ceilings, roller work, primer & 2 coats			
	Vinyl wall covering, fabric back, medium weight			
	Ceramic tile, thin set, 4-1/4" x 4-1/4"			
<b>C3020</b>	<b>Floor Finishes</b>		<b>\$5.37</b>	<b>\$811,000</b>
	Carpet tile, nylon, fusion bonded, 18" x 18" or 24" x 24", 24 oz			
	Carpet tile, nylon, fusion bonded, 18" x 18" or 24" x 24", 35 oz			
	Carpet, padding, add to above, minimum			
	Carpet, padding, add to above, maximum			
	Vinyl, composition tile, minimum			
	Vinyl, composition tile, maximum			
	Tile, ceramic natural clay			
<b>C3030</b>	<b>Ceiling Finishes</b>		<b>\$3.36</b>	<b>\$507,500</b>
	Gypsum board ceilings, 1/2" fire rated gypsum board, painted and textured finish, 7/8" resilient channel furring, 24" O			
<b>D Services</b>		<b>48.0%</b>	<b>\$76.32</b>	<b>\$11,532,000</b>
<b>D1010</b>	<b>Elevators and Lifts</b>		<b>\$21.93</b>	<b>\$3,313,500</b>
	3.00-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			
<b>D2010</b>	<b>Plumbing Fixtures</b>		<b>\$15.21</b>	<b>\$2,299,000</b>
	Kitchen sink w/trim, countertop, PE on CI, 24" x 21", single bowl			
	Laundry sink w/trim, PE on CI, black iron frame, 24" x 20", single compt			
	Service sink w/trim, PE on CI, comer floor, 28" x 28", w/rim guard			
	Bathroom, lavatory & water closet, 2 wall plumbing, stand alone			
	Bathroom, three fixture, 2 wall plumbing, lavatory, water closet & bathtub, stand alone			
<b>D2020</b>	<b>Domestic Water Distribution</b>		<b>\$5.20</b>	<b>\$785,500</b>
	Gas fired water heater, residential, 100< F rise, 30 gal tank, 32 GPH			

		% of Total	Cost Per SF	Cost
D2040	<b>Rain Water Drainage</b> Roof drain, DWV PVC, 4" diam, diam, 10' high Roof drain, DWV PVC, 4" diam, for each additional foot add		\$0.17	\$25,000
D3010	<b>Energy Supply</b> Apartment building heating system, fin tube radiation, forced hot water, 30,000 SF area, 300,000 CF vol		\$7.48	\$1,130,500
D3030	<b>Cooling Generating Systems</b> Packaged chiller, air cooled, with fan coil unit, medical centers, 40,000 SF, 93.33 ton		\$9.32	\$1,408,500
D4010	<b>Sprinklers</b> 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		\$2.63	\$397,500
D4020	<b>Standpipes</b> Wet standpipe risers, class III, steel, black, sch 40, 6" diam pipe, 1 floor Fire pump, electric, with controller, 5" pump, 100 HP, 1000 GPM Fire pump, electric, for jockey pump system, add		\$1.58	\$238,500
D5010	<b>Electrical Service/Distribution</b> Overhead 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, 2000 A Switchgear installation, incl switchboard, panels & circuit breaker, 120/208 V, 2000 A		\$1.63	\$246,000
D5020	<b>Lighting and Branch Wiring</b> Receptacles incl plate, box, conduit, wire, 10 per 1000 SF, 1.2 W per SF, with transformer Wall switches, 2.5 per 1000 SF Miscellaneous power, 2 watts Central air conditioning power, 3 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 Incandescent fixtures recess mounted, type A, 1 watt per SF, 8 FC, 6 fixtures per 1000 SF		\$7.83	\$1,183,000
D5030	<b>Communications and Security</b> Communication and alarm systems, fire detection, addressable, 100 detectors, includes outlets, boxes, conduit and Fire alarm command center, addressable with voice, excl. wire & conduit Communication and alarm systems, includes outlets, boxes, conduit and wire, intercom systems, 100 stations Communication and alarm systems, includes outlets, boxes, conduit and wire, master TV antenna systems, 30 outlets Internet wiring, 2 data/voice outlets per 1000 S.F.		\$3.16	\$477,000
D5090	<b>Other Electrical Systems</b> Generator sets, w/battery, charger, muffler and transfer switch, gas/gasoline operated, 3 phase, 4 wire, 277/480 V, 8 Generator sets, w/battery, charger, muffler and transfer switch, diesel engine with fuel tank, 30 kW		\$0.19	\$28,000
<b>E Equipment &amp; Furnishings</b>		3.0%	\$4.79	\$723,500
E1090	<b>Other Equipment</b> 165.00-Laundry equipment, washer, residential, 4 cycle, average 165.00-Laundry equipment, dryers, gas-fired residential, 16 lb capacity, average 165.00-Refrigerator, residential appliances, no frost, 10 to 12 C.F., minimum 165.00-Range hood, residential appliances, vented, min, 2 speed, 30" wide, minimum 165.00-Garbage disposal, residential appliances, sink type, minimum 165.00-Dishwasher, residential appliances, built-in, 2 cycles, minimum 165.00-Cooking range, residential appliances, free standing, 1 oven, 30" wide, minimum		\$4.79	\$723,500
<b>F Special Construction</b>		0.0%	\$0.00	\$0
<b>G Building Sitework</b>		0.0%	\$0.00	\$0

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	<b>% of Total</b>	<b>Cost Per SF</b>	<b>Cost</b>
<b>Sub Total</b>	<b>100%</b>	<b>\$158.89</b>	<b>\$24,009,500.00</b>
<b>Contractor's Overhead &amp; Profit</b>	<b>9.1 %</b>	<b>\$14.51</b>	<b>\$2,192,000.00</b>
<b>Architectural Fees</b>	<b>0.0 %</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>User Fees</b>	<b>5.3 %</b>	<b>\$9.24</b>	<b>\$1,396,500.00</b>
<b>Total Building Cost</b>		<b>\$182.64</b>	<b>\$27,598,000.00</b>

APPENDIX 4: SUMMARY SCHEDULE

ID	Task Name	Duration	Start	Jan '11	Apr '11	Jul '11	Oct '11	Jan '12	Apr '12	Jul '12	Oct '12	Jan '13	Apr '13	Jul '13	Oct '13	Jan '14	Apr '14	Jul '14	Oct '14	Jan '15	Apr '15
0	<b>Summary Schedule</b>	<b>1058 days</b>	<b>Tue 2/1/11</b>	<b>Summary S</b>																	
1	Conceptual Design and Estimate	370 days	Tue 2/1/11	<b>Conceptual Design and Estimate</b>																	
2	Design Development Design and Estimate	162 days	Sun 7/1/12	<b>Design Development Design and Estimate</b>																	
3	NTP	0 days	Mon 2/11/13	<b>NTP</b>																	
4	Site Prep	123 days	Mon 2/11/13	<b>Site Prep</b>																	
10	Install Permanent Power	348 days	Wed 3/27/13	<b>Install Permanent Power</b>																	
8	Install Temp Power	26 days	Mon 4/29/13	<b>Install Temp Power</b>																	
9	Temp Power On	0 days	Mon 6/3/13	<b>Temp Power On</b>																	
11	Permanent Power On	0 days	Thu 7/25/13	<b>Permanent Power On</b>																	
5	Excavation	107 days	Thu 8/1/13	<b>Excavation</b>																	
12	Insall Footing and Tower Crane	1 day	Wed 10/30/13	<b>Insall Footing and Tower Crane</b>																	
13	Place Mat Slab	26 days	Tue 11/26/13	<b>Place Mat Slab</b>																	
14	Foundation Walls, Pits etc	22 days	Tue 12/17/13	<b>Foundation Walls, Pits etc</b>																	
15	Form Supported Slabs Through Ground Floor	57 days	Tue 12/24/13	<b>Form Supported Slabs Through Ground Floor</b>																	
16	Reinforce Supported Slabs Through Ground Floor	54 days	Fri 12/27/13	<b>Reinforce Supported Slabs Through Ground Floor</b>																	
17	Place Supported Slabs Through Ground Floor	54 days	Tue 12/31/13	<b>Place Supported Slabs Through Ground Floor</b>																	
18	Form Supported Slabs Above Ground Floor	59 days	Tue 3/18/14	<b>Form Supported Slabs Above Ground Floor</b>																	
19	Reinforce Supported Slabs Above Ground Floor	60 days	Thu 3/20/14	<b>Reinforce Supported Slabs Above Ground Floor</b>																	
20	Place Supported Slabs Above Ground Floor	59 days	Mon 3/24/14	<b>Place Supported Slabs Above Ground Floor</b>																	
23	Install Brick	95 days	Thu 3/27/14	<b>Install Brick</b>																	
25	Rough-In Mech/Elec/ TD	127 days	Thu 4/3/14	<b>Rough-In Mech/Elec/ TD</b>																	
22	Frame/ Sheath/ Tyvek	77 days	Tue 4/22/14	<b>Frame/ Sheath/ Tyvek</b>																	
26	Finishes	156 days	Fri 5/30/14	<b>Finishes</b>																	
24	Install Windows	65 days	Wed 6/4/14	<b>Install Windows</b>																	
21	Structure Top out	0 days	Thu 6/12/14	<b>Structure Top out</b>																	
7	Courtyard Improvements	64 days	Mon 7/28/14	<b>Courtyard Improvements</b>																	
28	Final Inspections	144 days	Mon 8/4/14	<b>Final Inspections</b>																	
6	Site Improvements	61 days	Thu 8/7/14	<b>Site Improvements</b>																	
27	Punchlist/ Owner Walks	92 days	Fri 9/12/14	<b>Punchlist/ Owner Walks</b>																	
29	Turnover Garage - Second Floor	0 days	Wed 12/10/14	<b>Turnover Garage -</b>																	
30	Turnover 3rd Floor	0 days	Wed 12/17/14	<b>Turnover 3rd Floor</b>																	
31	Turnover 4th Floor	0 days	Wed 12/24/14	<b>Turnover 4th Floor</b>																	
32	Turnover 5th Floor	0 days	Wed 12/31/14	<b>Turnover 5th Floor</b>																	
33	Turnover 6th Floor	0 days	Wed 1/7/15	<b>Turnover 6th Floor</b>																	
34	Turnover 7th Floor	0 days	Wed 1/14/15	<b>Turnover 7th Floor</b>																	
35	Turnover 8th Floor	0 days	Wed 1/21/15	<b>Turnover 8th Floor</b>																	
36	Turnover 9th Floor	0 days	Wed 1/28/15	<b>Turnover 9th Floor</b>																	
37	Turnover 10th Floor	0 days	Wed 2/4/15	<b>Turnover 10th Floor</b>																	

Project: Summary Schedule Date: Mon 10/20/14	Task	Project Summary	Manual Task	Start-only	Deadline
	Split	Inactive Task	Duration-only	Finish-only	Progress
	Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
	Summary	Inactive Summary	Manual Summary	External Milestone	

## APPENDIX 5: PRESENTATION COMMENTS AND RESPONSE

<b>Comment</b>	<b>Response/Action</b>
<b>Validate design-build subcontractor contract. Cannot be with the GC and Architect.</b>	Validated and updated the org chart such that the design-build subs are contracted only with the GC
<b>Include design phase in summary schedule</b>	Design phase added to summary schedule