Images Courtesy of The Preston Partnership

SOLAIRE WHEATON

Image Courtesy of Charlie Liesfeld - CBG

Kevin Martyn

Technical Report 1

Construction Management

Advisor: Dr. Rob Leicht

9/16/2013

Executive Summary

Solaire Wheaton is a 361,000 square foot luxury apartment building in the upcoming city of Wheaton, MD. The project consists of a 108,000 square foot semi below grade two-story parking garage topped by six floors of apartments. This technical report aims to give a background on the owner, existing project conditions, project delivery system, a brief description of the design, and the projected cost and schedule estimates.

Owner Information

In 2010 the owner of the project, Washington Property Company (WPC), began steps to develop the plot of land by demolishing the existing church, seen in figures 8 and 9 on slide 5 of the appendix, and building a new apartment building. The area of Wheaton is just north of Silver Spring, MD, and only approximately 10 miles from Washington, D.C. Located only two miles from the Georgia Avenue exit of the outer loop of the beltway, this site is a prime location for commuting professionals. The site is also across the street from the Wheaton metro station, which is a stop along the red line. WPC is seeking to take advantage of the opportunity in a booming area by offering affordable housing. As seen in Figure 2 on slide 1 in the appendix, WPC owns several properties in Maryland and Virginia. The Solaire Wheaton project is part of the owner's recent infiltration into the residential market. Prior to 2012, the company specialized in commercial and retail properties. Aside from being one of the owner's first residential buildings, it is also their first wood structure, and is pursing LEED certified status. Schedule is the most important factor to the success of the project as several other apartment buildings are being constructed in the area. The team's goal is to complete the project first and lock in pursuing tenants. In order to make this possible, the owner required a phased occupancy plan with the first turnover in November 2013. This will allow the sales team to begin showing units and signing leases.

Existing Conditions

Prior to commencing construction, the existing church needed to be abated of hazardous material, demolished, and materials recycled. As part of the LEED certification, waste diversion was an important aspect of demolition and construction. Because of the existing structure, most of the necessary utilities are already on or adjacent to the site. As seen in the notes on the 2nd slide of the appendix, the soil conditions are favorable and only require a small earth retention system in the Northeast corner of the site. As seen in Figure 1 at the right, the project includes some offsite work, particularly stream restoration immediately West of the jobsite. The improvements consist primarily of removing debris and stabilizing the streams drainage channel.

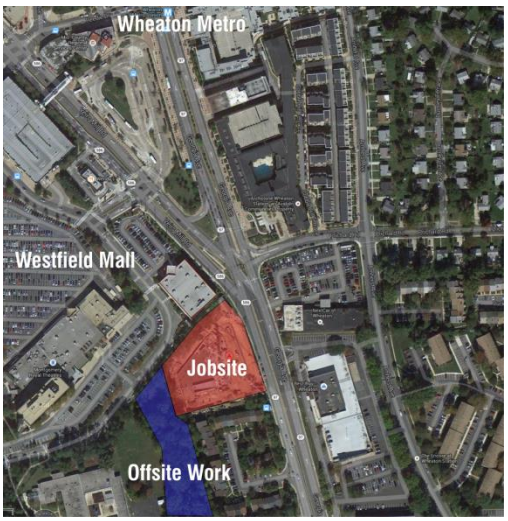


Figure 1. Site Map

Project Delivery System

The project utilizes a CM @ Risk delivery method with Clark Builders Group (CBG) as the construction manager. This was chosen in combination with a guaranteed maximum price contract to allow the project team to make decisions with an incomplete design as the project progresses. As seen in the organizational chart on slide 3, the owner also holds lump sum contracts directly with the architect, interior design architect, and civil engineer. The structural and MEP engineers are contracted by the architect. This type of delivery method allows the Owner to have much control over the project, while passing risk to other parties who are better able to manage these risks. The downside of this delivery method is the extensive amount of communication that needs to occur between all of the parties, particularly the CM and architect, as well as the need to recognize the chain of command. When selecting the specialty contractors for the project, Clark Builders Group considered price, manpower, and bonding capacity. Originally the owner was going to require CBG to acquire payment and performance bonds; however CBG was already requiring this of specialty contractors with high price and high risk on the project. When some specialty contractors were unable to receive bonds, CBG had to provide the bonds. On this project the owner purchased a builders risk policy and CBG provided a contractor controlled insurance program (CCIP). There is a liquidated damages clause for not meeting the project milestones.

Building Systems Summary

The foundation of the structure consists of spread column and wall footings. As seen in Figure 2 at the right, the structure begins with 3 levels of cast in place concrete. The substructure is topped by a post tensioned concrete podium on northeast corner of the third floor. The remaining structure from the 2nd floor to the 6th is constructed of wood framing at 12" on center. The floor system is designed as 18" deep pre-engineered open web wood trusses typically spaced at 24" on center. The exterior sheathing and shear panels nailed to the sides of the floor trusses make up the lateral system.

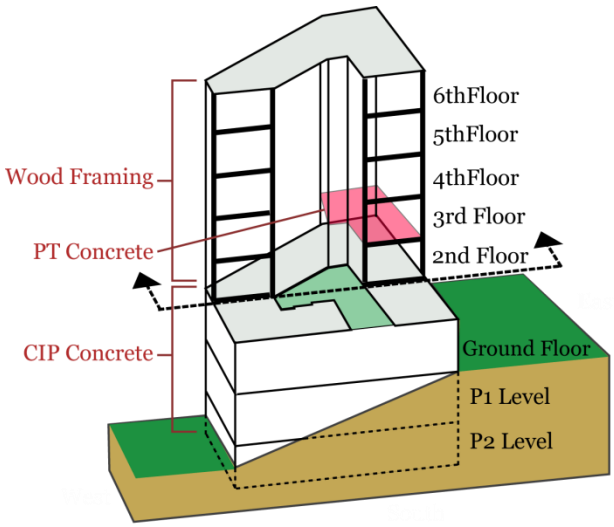


Figure 2. Isometric Section

The mechanical system for the building is separated into two separate systems. The common spaces on floors 2 through 6 are conditioned by two 50 ton (7500 CFM) packaged rooftop air handling units with direct expansion cooling and natural gas heating sources. The remaining areas of the building including apartment units and amenity areas are conditioned by split system heat pumps. Residential units are serviced by 600 and 800 CFM heat pumps respectively based on their heating and cooling load. Condensing units are located on the roof while the air handling units are wall hung in the units' mechanical closet. The garage uses natural ventilation with circulation fans and an exhaust system.

Solaire Wheaton uses a three phase 208/120 V electrical distribution system provided by PEPCO. Two transformers are located on the Southeast corner of the building adjacent to the garage entrance. The main electrical room is located on the southeast corner of the P1 level where the two 4000A switchboards are located. Emergency power is supplied by a 250 KW diesel engine generator also located on the P1 level of the garage.

The enclosure of the building is comprised of masonry stone and brick work on the East and North elevations to give an impressive look from Georgia Avenue paired with James Hardie fiber cement siding on the remaining elevations and within the courtyard. The building is topped with a flat roof system using a combination of interior and exterior water drainage systems. The roof is closed in with a white thermoplastic polyolefin membrane (TPO) roof and metal coping.

Schedule

The project started in March 2010 when WPC had the property rezoned. As the design started, Clark Builders Group joined the team to perform preconstruction services. During this stage CBG conducted constructability analyses, created cost and schedule estimates, and made value engineering contributions. Once the design was complete, the project went to a competitive bid between three or four contractors. When financing was available the owner went through the abatement and demolition of the existing church. Clark Builders Group was given the notice to proceed on June 25th, 2012 and started excavation. The structure was planned to be topped out in approximately 9 months, 11 months after notice to proceed. Interior work was originally planned to start from the ground floor and move up through the building. This plan for interior finishes changed during the project to jump to the 6th floor and work down and out of the building after completing the ground and 2nd floors. The first turnover for the phased occupancy plan is scheduled for November 27th, 2013 which included the garage and site, first floor, courtyard, and amenity spaces located on the 1st and 2nd floors. Substantial completion is scheduled for March 21st, 2014.

Cost evaluation

As seen in table 1 on slide 8 of the appendix, the contracted guaranteed maximum price for the project was $31.5 million with a total building cost of approximately $24.7 million. The use of wood framing brings the cost of the project to $87.18 per square feet. The systems that contribute most to the price are structural concrete and carpentry as well as electrical system.

As seen on slide 8 of the appendix, in order to report an accurate square foot cost estimate from RS Means the project was broken into two separate buildings, a 3 story reinforced concrete parking garage and a 5 story wood framed apartment building. This method provided a final cost of $23.8 million, yielding a difference of $900,000.

The difference in cost is presumably due to the excavation and earth retention needs. The building also has a courtyard with a swimming pool and elaborate landscaping that, when included in the square foot cost could, produce a more accurate estimate.

Technical Assignment 1

Figure 1. Image Courtesy of The Preston Partnership

Figure 2. Image Courtesy of WPC

Kevin Martyn
Construction Management
Advisor: Dr. Rob Leicht
September 16, 2013

WASHINGTON PROPERTY COMPANY
Development Management Leasing
Figure 3. Image Courtesy of WPC

Figure 4. Image Courtesy of Google Maps

Solaire Wheaton – Wheaton, MD

- Six story luxury apartment building in Wheaton MD
- 361,018 total gross SF
    - 118,000 SF Garage & Courtyard
    - 244,000 SF units and
- Offsite stream restoration work West of the jobsite

Client Information

Washington Property Company

- Commercial & residential real estate firm
- Solaire Wheaton
    - Reason for building: Financial investment to capitalize on a booming location by offering affordable housing
    - 3rd residential property
    - 1st wood frame structure
    - Schedule is critical (finish prior to other new apartment construction in the area)
        - Ex: The owner decided to purchase a different type of wood flooring from Austria because the original specified product had an extensive lead time due to the product going out production
    - Phased occupancy
        - First turnover in November 2013(Site, Garage, first floor, and amenity areas)
    - Keys to project success: organization, efficiency, quality

Existing Conditions Site Plans

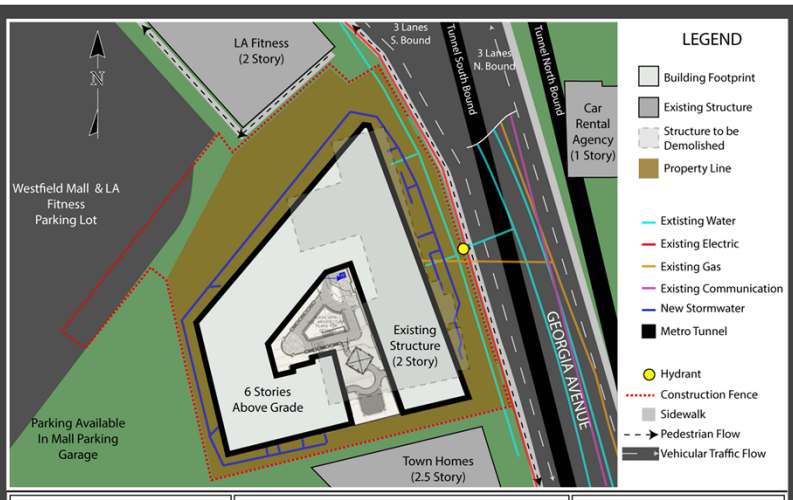


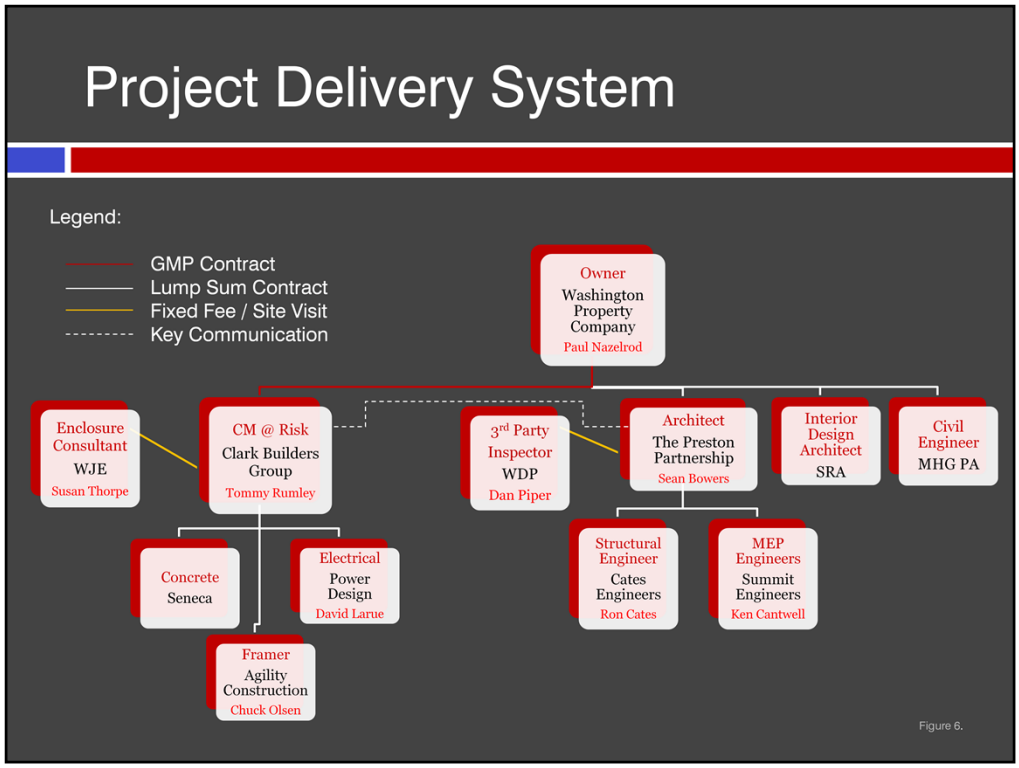
Figure 5.

Existing Conditions

- All utilities run under or along Georgia Avenue (MD 97)
- New storm water utilities to accommodate the bio-retention vaults along the East elevation
- Wheaton Metro Station located to the north with the tunnels running under Georgia Avenue
- Surrounding buildings include a 2 story LA fitness to the North and 2.5 story town homes to the South
- Strong vehicular traffic on Georgia Avenue with 3 lanes in both directions
- High pedestrian traffic along Georgia Avenue in both directions
- Parking available in the Westfield Mall parking garage NOT in the lot adjacent to the site

Subsurface Investigation (according to the geothech report by ECS)

- Seven borings at a depth of 40 feet below the surface
- Clayey sand with varying amounts of Gravel, silt, asphalt, and organics
- Weathered rock encountered in all borings at depths ranging from 8.5 to 32 feet below the existing ground surface
- Long term groundwater table is anticipated to be at a depth below the maximum depth explored
- Earth retention system (soldier beams and wood lagging) necessary in the Northeast corner of the site



Project Delivery System

- CM @ Risk
- Owner/CM contract – Cost Plus Fee with Guaranteed Maximum Price (GMP)
- Designer Contracts – Lump Sum

- Preconstruction services provided by Clark Builders Group
- Project competitively bid
- Bonds provided by certain specialty contractors and CBG
- Contractor Controlled Insurance Program (CCIP) provided by CBG

- CM @ Risk was appropriate because of the incomplete design, phasing, sequential occupancy, and early contractor involvement

Staffing Plan

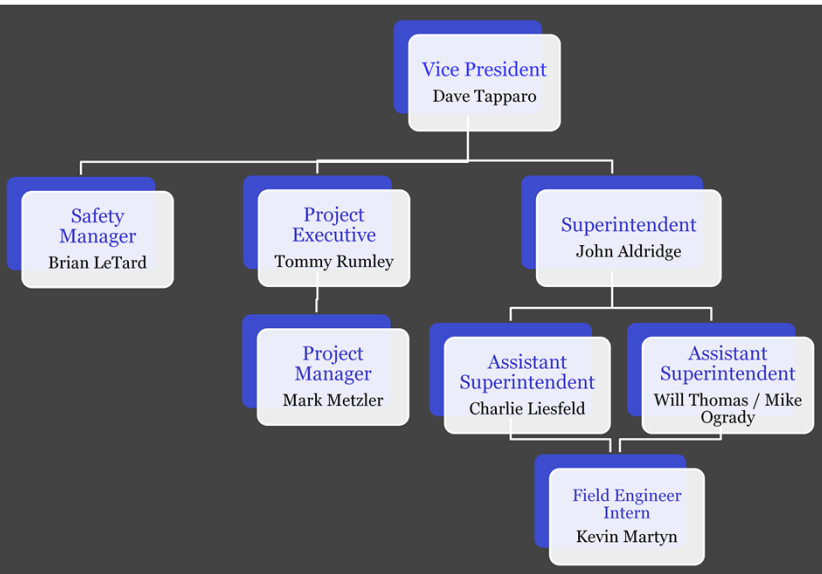
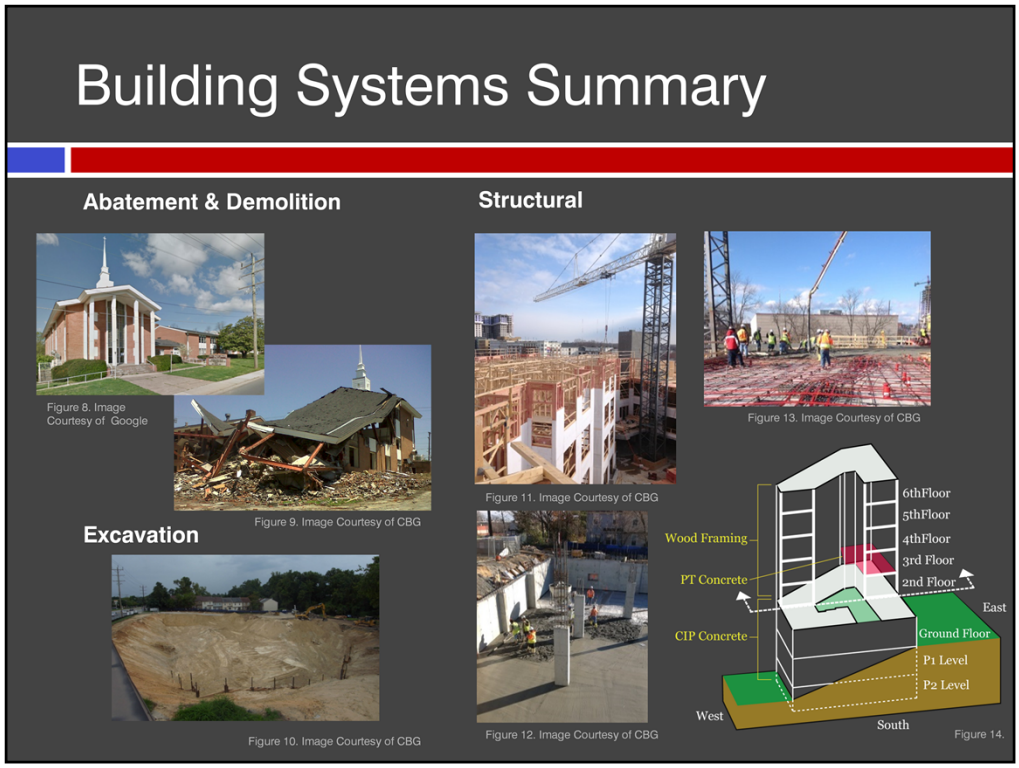


Figure 7.



Demolition

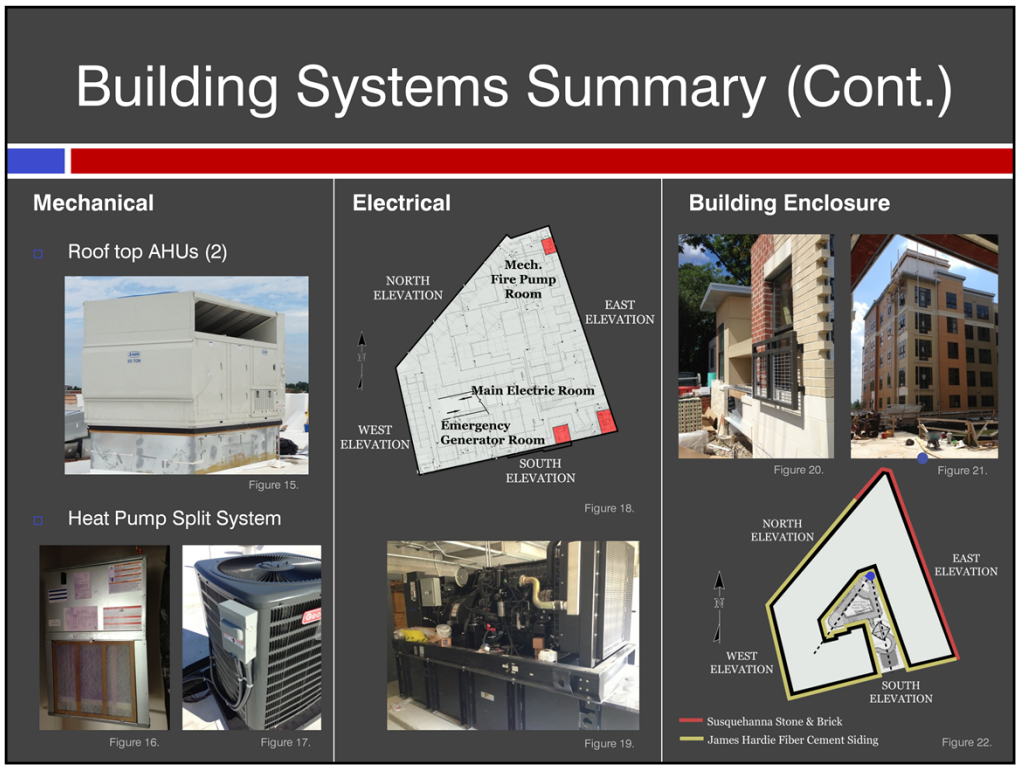
- Abatement of hazardous materials and demolition of the existing structure
- Waste diversion from landfill

Excavation

- Earth retention system – Soldier beams and wood lagging at the Northeast corner of the site

Structural

- Cast in place concrete
    - Pre-engineered formwork
    - Concrete poured with both a crane and bucket and a pump truck
    - Two story garage semi below grade
        - 5” slab on grade
        - 8” elevated two way slabs
    - Ground floor with metal infill framing
- Post tensioned concrete
    - 3rd floor 10 ½” podium PT deck
- Wood Framing
    - Pre-engineered 18” deep open wood floor trusses typically 24” on center
    - Wood framed walls 12” o.c. typical
- Tower crane with a 180’ reach in the northeast corner of the courtyard
    - Removed once the building is topped out and rooftop equipment has been set



Mechanical and Electrical rooms located on the P1 level

Mechanical System

Roof top AHU (2)

- Service the common areas on floors 2 through 6
- 50 ton / 7500 CFM
- Located on the East and West sides of the roof

Heat Pump Split System closet type units

- Serve the residential units as well as the amenity areas located on the 1st and 2nd floors
- The residential unit systems - between 600 and 800 CFM.

Fire Protection

- Sprinkler system throughout entire building

Electrical System

- 208/120V distribution throughout the building
- Main electric room located on the P1 level with (2) 4000A switchboards
- Two meter electric rooms located on alternating floors (Floors 2, 4, and 6)
- 250KW diesel powered emergency generator

Building Enclosure

- Masonry
    - Susquehanna stone veneer on the face of the cast in place concrete parking garage
    - Combination of tan and red brick as well as Susquehanna stone veneer along the East and partial North elevations

        - Connected to the structure with masonry ties every 16” in both directions
- James Hardie fiber cement siding on the remaining elevations and within the courtyard
- White TPO roof with metal coping
- Aluminum windows and doors
    - Higher STC rating on the upper floor and along Georgia Avenue

Project Summary Schedule

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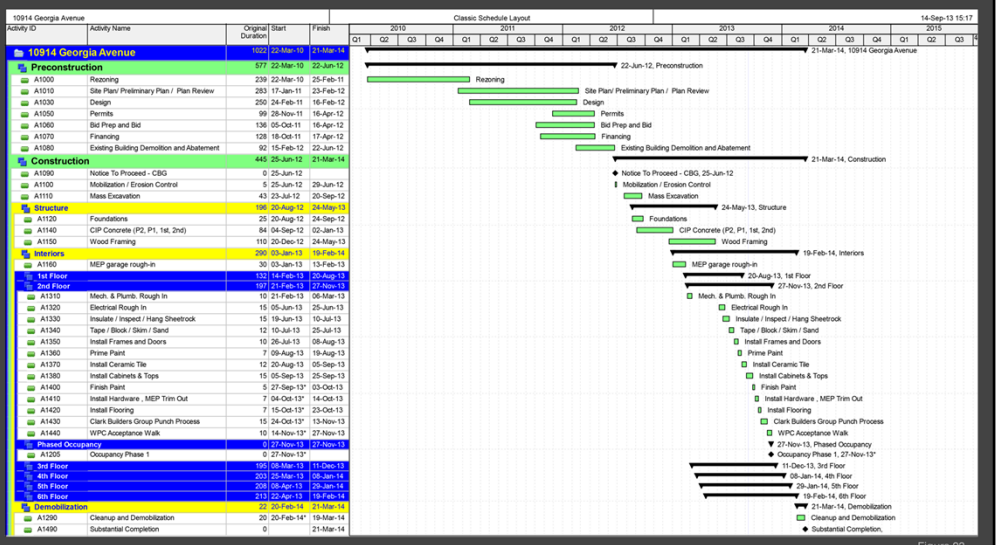

Figure 23.

Milestone Dates

- Notice to Proceed – June 25th, 2012
- First Turnover (Site, Garage & Marketing) – November 27th, 2013
- Substantial Completion – March 21st, 2014

Projected Durations

- Total Project Duration : 48 Months
- Total Construction Duration : 21 Months
- Interiors / Floor Duration : 9 Months

Procurement of subcontractors

- Continual process
- Clark procured the larger trades early on
- Subcontracts were 100% bought with approximately 8 months of receiving the project

Project Cost Evaluation

Description	Cost ($)	Cost ($/SF)
Building Construction Cost	$24,653,602	$69.64
Total Project Cost (GMP)	$31,475,000	$87.18
Building Systems Costs	**Cost ($)**	**Cost ($/SF)**
Concrete (Garage SF = 148,952)	$3,639,221	$31.18
Rough Carpentry (Net SF = 212,066)	$2,383,662	$9.76
Masonry	$1,165,520	$3.22
Mechanical	1,813,000	$5.02
Electrical	$2,122,974	$5.88
Plumbing	$1,548,300	$4.29
Insulation, Drywall, Paint	$1,376,000	$3.81
Aluminum Windows & Doors, Storefront	$1,732,826	$4.80

Table 1. Project Cost

Square Foot Cost Estimate

Location : Silver Spring, MD
No. of Stories : 8
Floor Area : 361,018 SF

Total Cost : $23,781,700
Cost / SF : $65.87

Parking Garage : Face Brick / R. Conc. Frame
No. of Stories : 3
Floor Area : 148,952 SF
Perimeter : 910 ft.

Cost : $5,844,500
Cost / SF : $39.24

Apartment Building : Brick Veneer / Wood Frame
No. of Stories : 5
Floor Area : 212,066 SF
Perimeter : 380 ft.

Cost : $18,029,000
Cost / SF : $86.61

Apartment Building: Wood Siding / Wood Frame
No. of Stories : 5
Floor Area : 212,066 SF
Perimeter : 960 ft.

Cost : $17,901,500
Cost / SF : $86.01

Table 2. Square Foot Estimate

Project Cost

- GMP = $31.5 million
- Wood framing allows for the low cost per square foot of $87.18

Square Foot Estimate Procedure and Assumptions

- Performed separate estimated for wood frame structure and concrete garage and added them together
- Used percentages based on perimeter to account for the differences in exterior finishes
- Subtracted out foundations for the wood structure as it is supported by the garage

Potential Differences

- Courtyard pool and landscaping not included in RS Means
- Extensive excavation and earth retention systems not included in RS Means