



Wisconsin Place Residential

Chevy Chase, MD

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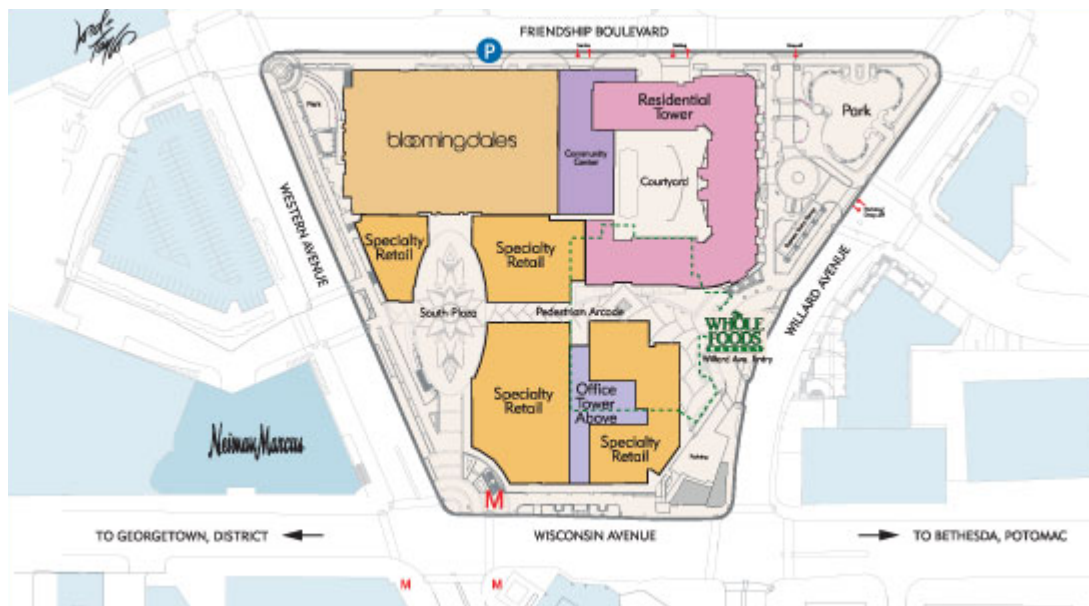
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PROJECT OVERVIEW

Archstone-Smith, a prominent developer in the Washington, DC area, hired Turner as the general contractor for the 15 story, 485,000 square foot GMP project that began construction in June 2007. WPR is only part of a 1.1 million square foot mixed use development known as Wisconsin Place that includes high end retail, restaurant, and office space. A basic site plan below depicts the proposed layout. Wisconsin Place presents a very unique situation. Due to the magnitude of the project, it has been divided into four main parts and the work was awarded to four separate general contractors. They are assigned as follows:

1. Turner- parking garage
2. Turner- residential tower
3. Centex- office tower
4. TBD- retail

Three developers are also involved in the massive project: New England Development, Archstone-Smith Trust, and Boston Properties, Inc. Each firm has a specialized interest in Wisconsin Place, and three grand visions will be realized in its construction. It will be interesting to see how all of these players interact and cooperate on a congested site in the middle of the city.





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PROJECT SCHEDULE SUMMARY

*A detailed existing project summary can be found in Appendix A.

Foundation

Wisconsin Place Residential sits directly on top of a four level below grade parking garage. Therefore, no foundation system is required for the residential tower. Turner is the General Contractor on the parking garage project, but that is an entirely separate job with separate team members. Construction of the parking garage is still in progress, which poses daily challenges to both Turner teams working in such close quarters. Weekly coordination meetings alleviate site congestion problems.

The parking garage is supported by spread footings and foundation walls and was designed to carry the full load of the residential tower above. The parking garage sits on a very sturdy foundation of solid rock which was hit almost immediately after excavation began. Spread footings and slab on grade were then a suitable foundation system since they sat upon such stable sub grade. The column and wall footings are designed for a bearing pressure of 40,000 psf. Turner entered the WPR site in June 2007 to pour the 1st floor slab, and construction has progressed from there.

Structural

The building structure consists of concrete columns and post-tensioned concrete slabs. The 7-wire stress-relieved strands are unbonded and spaced at no more than 5 feet apart. A minimum of 2 tendons in each direction is required directly over columns.

The post-tensioned concrete structure is built floor by floor. The specifications mandate that at least one floor be fully formed or shored with a minimum of 3 floors reshored at any time. This ensures the concrete has fully cured and reached its maximum compressive strength before the forms are released, keeping the building and the workers safe. Concrete reaches its minimum stressing strength within 72 hours of pouring, and the tendons should be stressed within 96 hours of pouring.

The slabs are typically broken into 3 to 5 sections for pumped concrete pours. To track progress more closely, Turner has created a concrete pour schedule that is updated daily. The schedule projects that they will pour 15,893 SF of concrete per week in 32 weeks. The average area of a pour is 6,228 SF.

Two types of formwork are used for the structure of the building: plywood and preassembled. Currently, the concrete subcontractor is using the preassembled to expedite the process. The preassembled formwork is one unit connected by joints that easily snap together with anchors and fasteners. It is reusable and conducive for such a large project. Snap-off form ties hold the formwork together and a colorless, non-staining form release agent is used to lubricate the forms.



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Finishes

The finishes of the building are installed from the first floor up, and trades are staggered as necessary to avoid field collisions and counter productivity. Finishes will be installed in the following order:

- Light Fixtures
- Drywall
- Ceilings
- Ceramic Tile
- Cabinets and Counters
- Finish Paint
- Flooring
- MEP Trim-Out



Mechanical System

All of the major mechanical equipment is located on the penthouse level. Each apartment unit contains a small AHU to regulate temperature and air flow. This makes each apartment independent of the next and optimizes comfort control for residents. Placing the large cooling towers and air handling units on the roof also minimizes noise throughout WPR. No one ever wants to rent the apartment adjacent to a mechanical room because it generates so much noise, heat, and vibration. The mechanical system features automatic temperature controls and a submetering system.

The constant air volume system includes open and closed loop filtration to service WPR. The penthouse contains 5 rooftop units made up of a compressor, supply air, heating and cooling coil that operate on 480 Volt 3 phase power. Two cooling towers with a 48 gpm pump also inhabit the penthouse. They operate at a 1450 gpm flow rate between temperatures of 85 to 95 degrees Fahrenheit. A sand filtration and UV disinfection system help purify the water that passes through the cooling towers, and nitrites are added to further cleanse the system.

A hydronic fire protection system, consisting of wet and dry standpipes, is to be installed throughout the building. Sprinkler heads are located below the ductwork and above light fixtures in finished spaces. A supervised shut-off valve, flow detector, drain line, and inspector's test connection are to be provided at each connection between standpipes and sprinkler systems. Where water pressure exceeds 100 psig, automatic pressure restricting fire hose valves are to be provided.

Electrical System

Wisconsin Place receives a main feed of 3 phase 2,000 Amp service from the existing switchboard in the parking garage electrical room. Each apartment has its own 120/208 Volt panel along with



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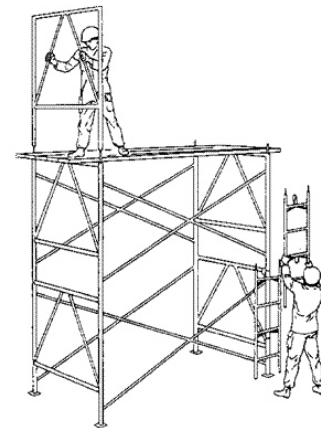
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an individual metering unit. This makes it possible to bill each apartment separately for electricity and saves the owner a lot of footwork. A 350 kW standby emergency generator is located on the roof. Small electric rooms are located on each floor of the apartment building, while a larger main electric room is located on the penthouse level.

Masonry

Many non-load-bearing materials constitute the façade of Wisconsin Place, including glass, glazing, aluminum-faced composite wall panels, brick, precast and cast stone, aluminum window system, aluminum metal panel system, and pre-finished steel channels.

The brick exterior wall system is comprised of 1/2 inch gypsum board followed by a 6 mil polyethylene vapor barrier. R13 batt insulation lines the space between the gypsum and 4 inch light gauge steel studs topped with 1/2 inch sheathing and asphalt felt. Galvanized brick ties fasten the brick to the façade, and continuous flashing extends 1/8 inch beyond the face of the brick for proper drainage. Cell vents are placed at 24 inches on center horizontal above finish grade where flashing does not cover the brick.



The cast stone exterior wall system is very similar to the brick wall system. Galvanized brick ties hold cast stone in place while 1/2 inch mortar joints are left between each row of stone. Weep holes are located at 24 inches on center to allow water to escape.

There are two types of scaffolding being used on the project. The 1st through 3rd floor masonry will be applied using a typical two frame built up scaffolding system shown to the right. This basic form of scaffolding is constructed from the ground up but becomes dangerous at high levels. It must be fastened to the building in some way to prevent collapse or tipping. To prevent this hazard, swinging scaffolding is used for the 4th through 15th floors. Swinging scaffolding is suspended by ropes or cables from a block and tackle attached by roof hooks and can be raised or lowered to any height. This is convenient for tall buildings like WPR because it is so versatile.

PROJECT COST INFORMATION

The total square footage of Wisconsin Place is 484,960 gross SF, 395,503 net SF, with an average efficiency of 81.55%.

Construction Cost: \$85,115,971

CC/SF: \$175.51/SF

Total Project Costs: \$93,394,462

TC/SF: \$192.58/SF



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Building Systems Costs:

Mechanical Total: \$20,653,363

Mechanical Total/SF: \$42.59/SF

HVAC/Plumbing: \$19,428,363

Fire Protection: \$1,225,000

Electrical Total: \$11,565,198

Electrical Total/SF: \$23.85/SF

Structural Total: \$18,433,019

Structural Total/SF: \$38.01/SF

Concrete: \$12,435,819

Structural Steel & Misc Metals: \$1,187,200

Masonry: \$4,810,000



LOCAL CONDITIONS

Concrete structures, especially pre-stressed systems, are common to the Maryland/Washington, DC area due to labor availability. The cost of labor can be reduced through competitive bidding. Concrete seems to be the optimal solution to the extreme site congestion of Wisconsin Place. Steel requires laydown and staging areas and is a permanent fixture on site until erection is complete. Concrete, on the other hand, arrives in a truck each day and leaves the site when it is finished. Steel erection is also a crane intensive activity, while concrete only utilizes a pump truck that arrives just before the concrete truck. Post-tensioned concrete is a much faster process than cast-in-place concrete because the slabs can be stressed, stripped, and reshored when the concrete reaches 75% of its ultimate 28 day strength.



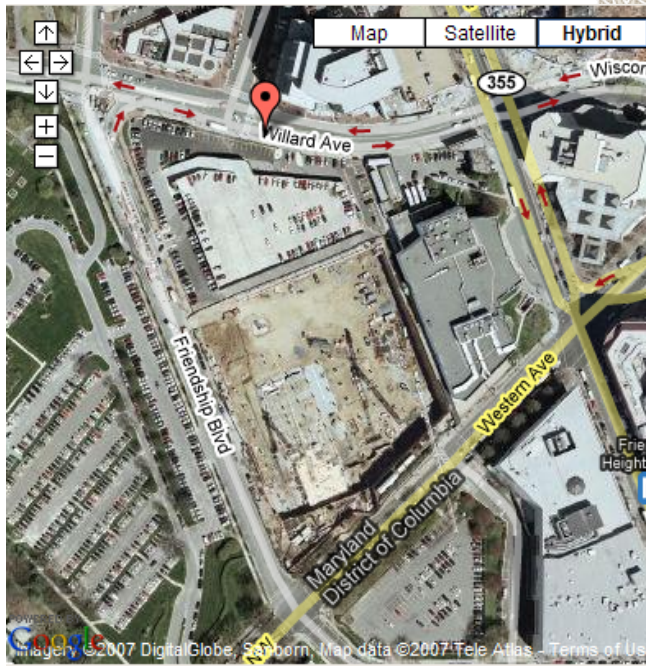
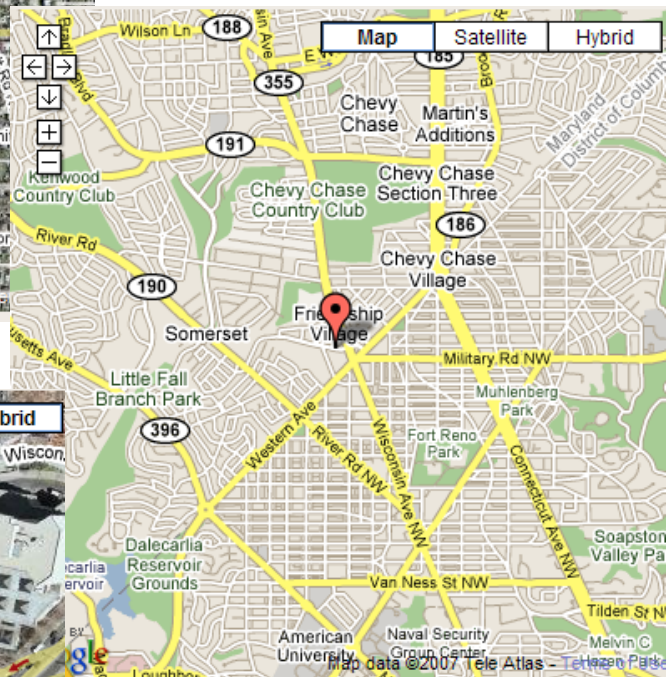
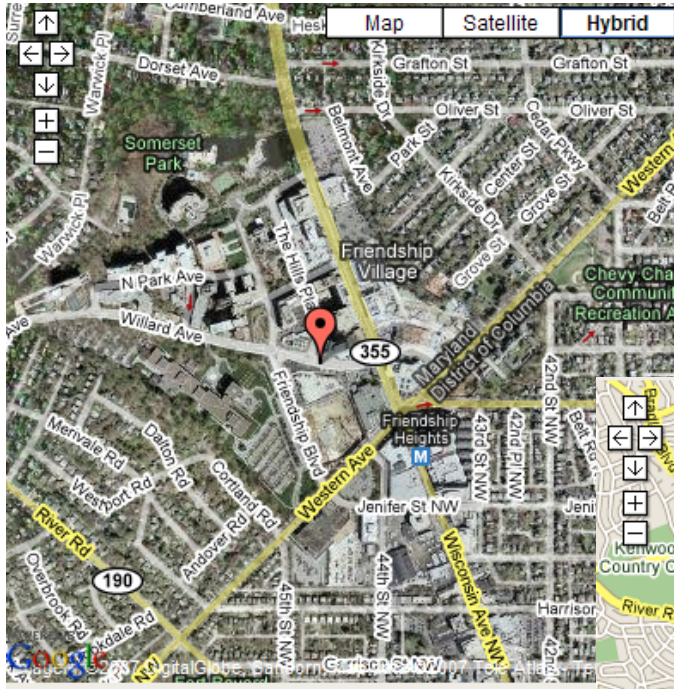
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VICINITY MAPS: CHEVY CHASE AND SURROUNDING AREA





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EXISTING SITE LAYOUT PLAN

The site plan below shows the superstructure phase of the Wisconsin Place project. At first glance, it is evident that the site is very congested. Three other projects including an office tower, parking garage, and retail stores are happening concurrently on the same plot of land. Turner has experienced many space and coordination issues thus far.

One potential way to divide the floor slabs into sections is shown on the existing site layout plan. Most of the deliveries and staging happens in the northwest corner of the site, as there is limited space elsewhere. Two main entrances to the site are depicted on the plan as well.



The far right lane of Friendship Boulevard has been closed for construction and helps with the space constraint. Delivery trucks, however, are not allowed to unload from this section of road. It becomes dangerous when a thin metal fence is the only thing that separates passing vehicles from heavy machinery and materials. So, it is best to keep the hazardous material as far away from the public as possible.

Trash chutes are a great way to manage waste on a job site. They keep debris contained until trucks haul it all away. These chutes are conveniently located along the driving path so that dump trucks can pick and go.

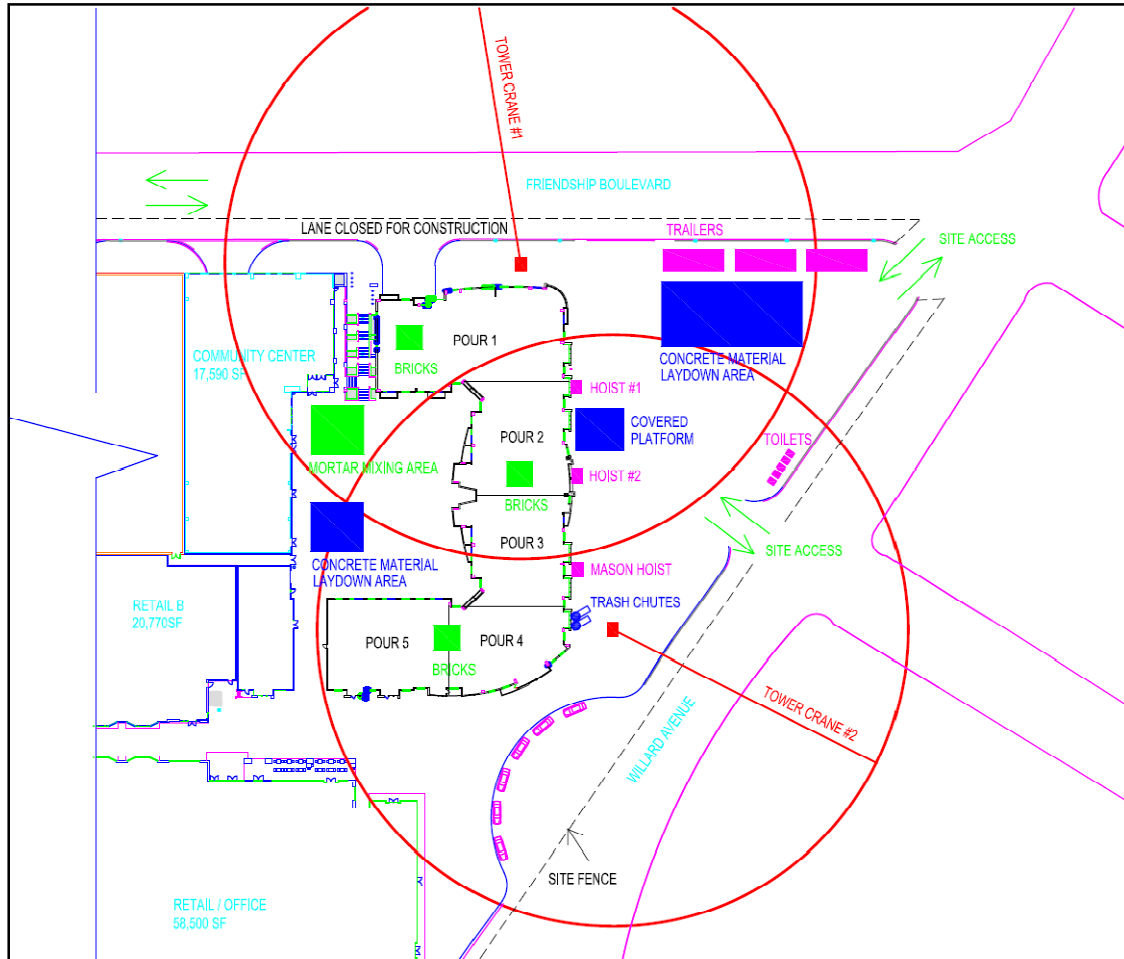
It would be interesting to see the tower cranes repositioned within the building footprint to increase space in the public areas. For example, the tower crane could be placed in the elevator shaft until the building tops out. Then, it can be removed and the elevators installed. As evidenced by the site photo on the previous page, the WPR construction site is extremely tight. Employees are no longer allowed to park on site due to congestion issues. To add to this, Tower Crane #1 seems to be placed in an inopportune spot, with nearly half of its boom swing wasted over Friendship Boulevard. Perhaps it could be positioned in a way that would make it more accessible to resources on site.



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Existing Site Layout Plan

CLIENT INFORMATION

Archstone-Smith, the owner of Wisconsin Place, is recognized in the Washington, DC area as a leader in apartment investments and operations. A partnership of two major developers, Archstone and Charles E. Smith, they pride themselves on a strong 56-year legacy in the greater Washington D.C. market. Consequently, Archstone-Smith ranks as one of the largest apartment owners and operators, with more than 21,000 apartments in greater Washington, D.C. Their market also focuses on the most desirable neighborhoods in Southern California, the San Francisco Bay Area, the New York metropolitan area, Seattle, and Boston. The company's mission is "to leverage the talents and resources of our organization to reinvent our industry and create value for our shareholders, customers and associates."

Archstone-Smith sees Chevy Chase as a very up-and-coming location in Maryland. It is quickly developing into a posh upscale region inhabited by young professionals and families. Their



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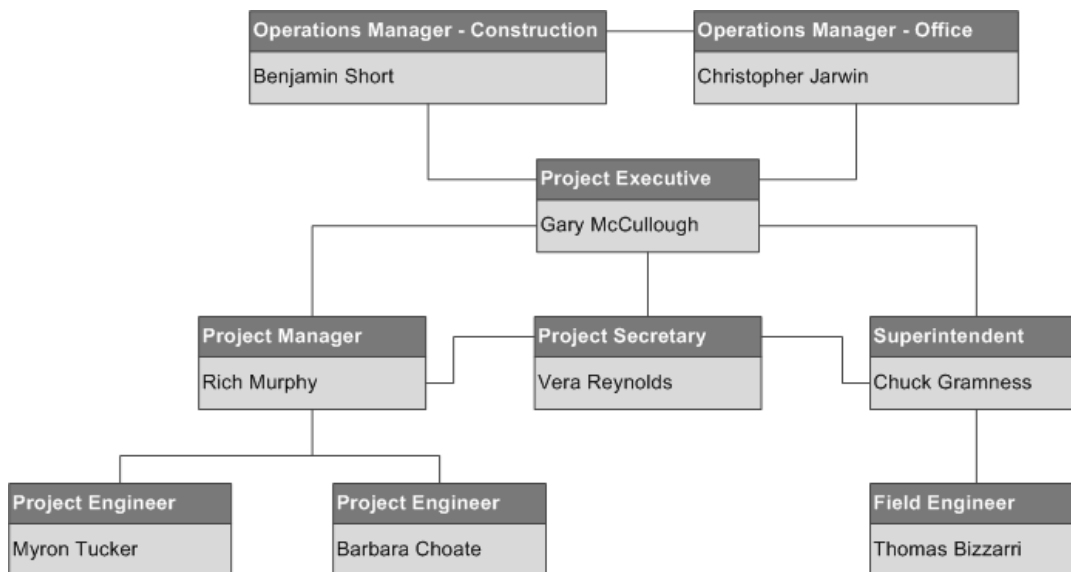
primary interest in this project is the monetary aspect. Downtown apartments are a highly lucrative market that Archstone-Smith has been capitalizing upon for decades.

Archstone-Smith is dedicated to ensuring cost, quality, and schedule performance and it shows in their involvement in the project. They have one representative who is permanently positioned on site. He is the liaison to the owner and keeps Archstone-Smith closely connected to Turner. Another representative visits the site about once a week to attend coordination and progress meetings.

There are two sequencing issues of principal concern to the owner. Those are access to the site and concrete pours. With four separate projects happening concurrently, logistics are of utmost importance. Painstaking planning is required to ensure each GC can get their labor and materials to the site every day. Painstaking planning is required to ensure each GC can get their labor and materials to the site every day. Working in such close quarters makes it difficult to allocate storage and laydown areas as well. There are currently 2 cranes on site that belong to Turner. A third crane is being utilized by the general contractor on the office building and is in close proximity to the other 2 cranes. Turner has closed down a lane of traffic on Friendship Boulevard and Willard Avenue to alleviate some site traffic flow problems.

TURNER PROJECT TEAM

The project team works very closely together on WPR. Dealing with a project of this magnitude, there is really no other way. On a typical day they will encounter numerous pressing issues that need to be resolved in a short time frame to keep the project moving. In a single day, one project engineer was juggling tracking the status of cast stone for the façade, working with the architect to change the anchors for the window washing system, and getting the sprinkler system approved by the county, all critical tasks.





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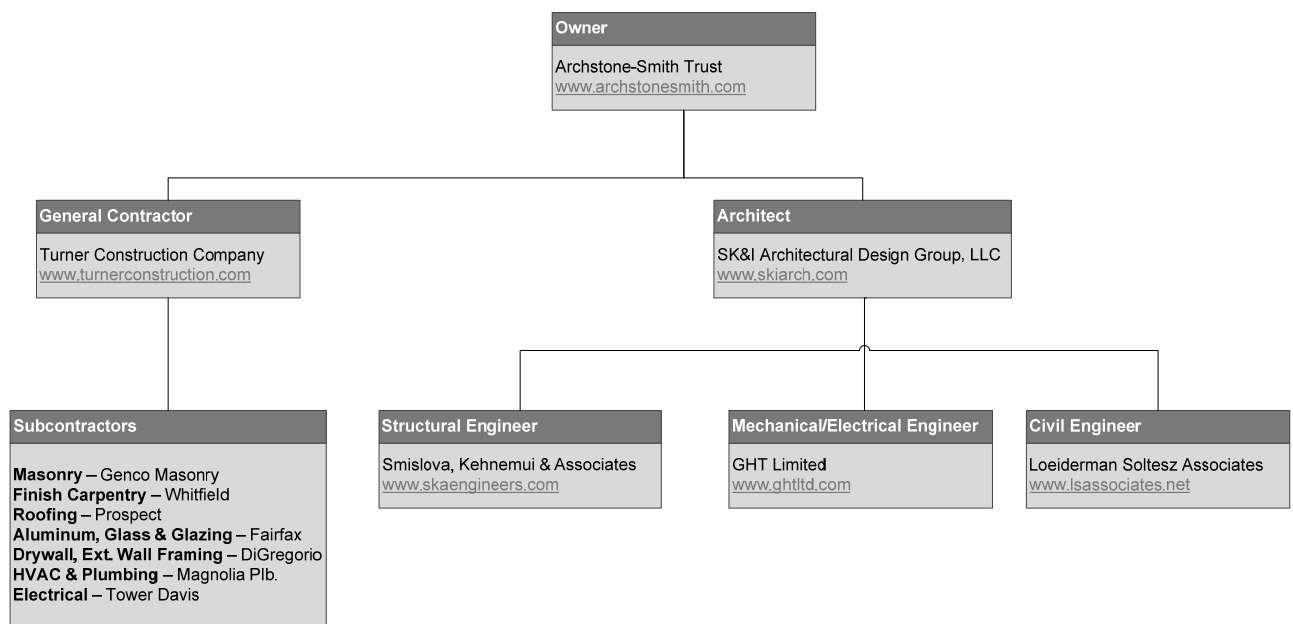
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Two operations managers monitor all Turner projects in the Maryland territory, an enormous job considering there are currently about 64 projects underway in the region. One operations manager takes care of the construction side, and the other takes care of the office side. An assistant visits the site every six weeks to address scheduling, budget, or staffing issues. He then reports back to the operations managers who will repair any imbalances.

Both the project executive and project manager are on site 100% of the time. The project executive communicates more with the owner while the project manager is more closely associated with project-specific operations. The project manager is described as the “problem solver” by team members. He uses his work experience to come up with solutions before an RFI has to be sent out to the architect. The project engineers essentially build the project on paper in the form of submittals and drawing control before it is physically built in the field. They are responsible for ensuring materials arrive to site in time. From here, the superintendents take over and oversee the installation of these materials on site. A field engineer is an entry level superintendent. He performs the same tasks and responsibilities as the main superintendent but under supervision. The on-site project team meets once a week with the owner to discuss current issues and look ahead schedules.

Project Delivery System

Turner acts as the General Contractor on Wisconsin Place and provided comprehensive pre-construction services to the development team over a 28 month period. Archstone-Smith chose a GMP because the design was incomplete when the project went out to bid. The GMP provides built in flexibility in the form of allowances for the uncertain portions of work. For instance, the GMP budget for WPR has allocated funds such as “Plumbing Allowance” or “Electric Allowance” to accommodate changes or refinements to design.





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Turner holds a CCIP with most of their subcontractors, which includes worker's compensation and general liability insurance. This CCIP also covers payment and performance bonds. Some subcontractors are classified as "high risk" and are required to provide individual bonds to Turner to ensure they are covered. For example, Otis Elevator was not part of the CCIP, so they will provide their own bond for the duration of the project.

All of the contracts held between Turner and subcontractors are lump sum. This is a typical contract arrangement and allows for change orders to easily reimburse costs that exceed the project budget.

The owner would not disclose the types of contracts held between Archstone-Smith and their hired consultants. However, Turner explained that they are most likely service agreements, which means that each firm establishes a fixed price for defined services and the owner pays for additional services beyond the defined scope. For example, a service agreement between the owner and the structural engineer may include drawings and test reports. If the owner decides at a later date that he would like this engineer to attend weekly meetings on site that would be an additional charge beyond what is outlined in the contract.