Wellington Condominiums

Exton PA

Extraordinary Residences Exceptional Lifestyle

Wellington

Design and Construction Team:

Owner: The Hankin Group
General Contractor: Wellington Commercial Construction
Construction Manager: Wellington Commercial Construction
Architects: Minno & Wasko Architects and Planner
Engineers: Liberty Engineering

General Scope:

Size: 147,069 S.F. 4 Story luxury condominiums w/ Parking Garage
Building Cost: $18.1 million
Schedule: September 2005 thru May 2007
Project Delivery: CM @ Risk

Architecture:

-Designed in the tradition of grand estate homes
-Situated at Eagleview community town center
-8 designs with a choice of décor being “traditional” or “contemporary”
-Designated areas for concerts, shopping, dining and fun
-Building surrounded by landscaped parks and native woods
-Stylish brick and cast stone exterior veneer
-Composite slate roof and membrane roof w/ copper eave drip edge

M.E.P. Systems:

-Fire protection system includes sprinklers, fire alarms and smoke detectors throughout each residence and public areas
-Building access communication system, telephone, cable and internet ready
-HVAC is an all air gas fired furnace supplying each condominium residence
-Main Electrical Distribution switch board is 1600 Amp, 3 phase, 120/208 V
-The main electrical distribution connects to 4 meter banks which are then broken down to each individual apartments

Construction and Structural:

-Being built in a very developed commercial neighborhood
-Geotech report indicated site had variance in quality of soils
-Installed permanent dewatering system before actual construction
-Delay in Permits and architectural approvals pushed façade construction to winter
-Foundation utilizes 18” strip and column footings w/ 5” slab on grade
-First floor makes use of a 12” heavily reinforced two way flat plate concrete slab
-Other floors use innovative Hambros Joist 3” slab on deck composite system

Wellington Features:

-48 unique floor plans up to 2,300 S.F.
-Great views from large bay windows
-Hardwood floors in all living areas
-Polished Granite Countertops
-Elegant lobby entry

FLYNN STONE
Design and Fabrication
We Move Mountains To Satisfy You

Sean Flynn

Construction Management

www.arche.psu.edu/thesis/eportfolio/2007/portfolios/SRF163/

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Existing Construction Conditions

A. Executive Summary

Some of the key points that are analyzed and researched on the Wellington Condominiums project are: construction schedule and budget, construction site plans, local conditions, client perspective, project delivery methods, staffing plan, and any technological solutions applied.

The contractual relationships are based on a CM @ Risk delivery method. The project is also fast tracked so that construction can get started as quickly as possible. Time and flexibility in designs and construction are the major issues to the owner and developer.

The construction schedule indicates and sets forth a start date on February 2005 and is to be completed in the month of May 2007. Early delays from architectural approvals on the building façade and poor quality subsurface conditions have led to delays of the project. To make up for that lost time and compress the schedule, innovative Hambro's Joist 3" slab on deck composite system is being used.

The budget and estimates for the project have been compiled and have been systematically reviewed and analyzed to determine whether or not this building is over or under what is to be expected. It was found that the estimates from D4 Cost 2002 estimating software and R.S. Means that the actual budget for the project is realistic and fits well to the project constraints and requirements set forth by the owner. The actual building budget and estimates are listed as followed: $17,818,947 Actual Building Cost; $17,460,844 D4 Estimate Building Cost; and $16,764,944.71 R.S. Means Building Cost.

B. Project Schedule

Wellington Condominiums Project Schedule

ID	Task Name	Duration	Start	Finish
1	Design Phase	366 days	Mon 2/28/05	Mon 7/24/06
2	Preconstruction	356 days	Mon 9/26/05	Mon 2/5/07
3	Buyout	168 days	Tue 12/6/05	Thu 7/27/06
4	Shop Drawings	207 days	Wed 12/7/05	Thu 9/21/06
5	Fabrication	266 days	Mon 1/30/06	Mon 2/5/07
6	Site Work	49 days	Mon 1/16/06	Thu 3/23/06
7	Parking Lot	39 days	Mon 1/30/06	Thu 3/23/06
8	Excavation	34 days	Mon 1/16/06	Thu 3/2/06
9	Foundation and Columns	44 days	Wed 2/22/06	Mon 4/24/06
10	Garage Slab	5 days	Tue 4/25/06	Mon 5/1/06
11	Transfer Slab	75 days	Thu 6/1/06	Wed 9/13/06
12	First Floor Panels and Deck	15 days	Thu 9/7/06	Wed 9/27/06
13	Second Floor Panels and Deck	15 days	Thu 9/28/06	Wed 10/18/06
14	Third Floor Panels and Deck	15 days	Thu 10/19/06	Wed 11/8/06
15	Fourth Floor Panels	5 days	Thu 11/9/06	Wed 11/15/06
16	Roof Trusses and Decking	40 days	Thu 11/16/06	Wed 1/10/07
17	Exterior Shell	335 days	Mon 1/16/06	Fri 4/27/07
18	Elevator Installation	40 days	Thu 2/1/07	Wed 3/28/07
19	Interior Roughin and Finshes	125 days	Thu 9/28/06	Wed 3/21/07
20	Exterior Sitework	55 days	Mon 2/19/07	Fri 5/4/07
21	Fitout and Finishes	76 days	Wed 12/13/06	Wed 3/28/07
22	Punchlist	1 day	Thu 3/29/07	Thu 3/29/07
23	Handover	1 day	Fri 3/30/07	Fri 3/30/07

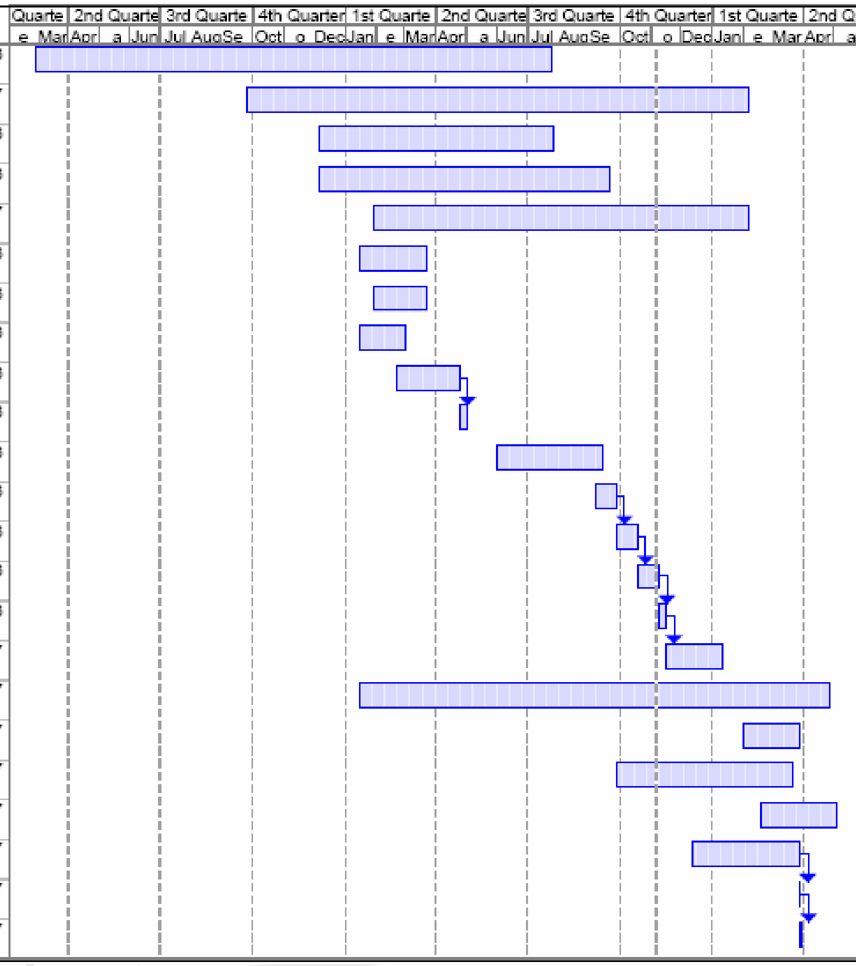


Figure 1: Project Schedule

As the project schedule shows, the preparation for the construction site took a lot of time before the foundation system could be installed. Being that the project was fast tracked; the team had to communicate effectively on the issues of poor quality subsurface conditions. This took a lot of time and reorganization of how the structure would be built but once the permanent dewatering system and soil compaction was completed the actual construction of the foundation footers, walls, columns, and slab could begin. The most critical part of the schedule came when the 12” transfer slab was being constructed. This took by itself 75 days to complete and was very critical to the project being completed on time. Once the transfer slab was completed, the rest of the structure was erected very quickly with the innovative composite deck system. Some of the disadvantages to the schedule are installing the final decking and roof trusses in the middle of winter. For that reason shingles cannot be installed until the following spring when the temperature reaches at least 40 degree Fahrenheit.

Another point worth mentioning is that the building envelope is continually being worked on from the start for installing waterproofing, membranes, etc. and trying to enclose the building as soon as possible. Brickwork is not scheduled to start until January 8, 2007. This creates a longer duration of 80 workdays to lay the brickwork due to the fact of weather days and decreased productivity. The rough in and finish sequences follow very closely to the structural sequence since the project utilizes a new composite deck system. This is where the schedule saves time and allows for the finish trades to get started earlier then usual. To the developers and owners on the project any way the project team can save time but not necessarily money is of great value. The sooner the project can reach the handover date the sooner the revenue can come in.

C. Building System Summary

Building Systems Summary		
Yes	No	Work Scope
	X	Demolition Required
X		Cast in Place Concrete
X		Structural Steel
	X	Precast Concrete
X		Mechanical System
X		Electrical System
X		Masonry
X		Curtain Wall
X		Support of Excavation

Data Table 1: Building Systems Summary

C.1 Cast in Place Concrete

The foundation and first floor consists of a large part of the cast in place concrete that was done on the construction site. The structural engineer has specified in the construction documents that all concrete work except the slab on grade shall have a minimum compressive strength of 6,000 PSI. The type of horizontal and vertical formworks and concrete placement methods of the foundation and first floor elements are described in more detail as followed:

Footings:

- Normal weight concrete with a minimum compressive strength of 6,000 PSI at 28 days
- Reinforcing will consist of A615, Grade 60
- Average size of column footing 15'L X 15'W X 18"D
- Minimum of 3 feet below finished surface where exposed to frost
- Minimum allowable bearing pressure of 3,500 PSF

Slab on Grade:

- 5 inches of normal weight concrete with a minimum compressive strength of 3,000 PSI at 28 days
- Reinforced with 6 X 6 – W2.1 X W2.1 welded wire fabric, over a 14 inch crushed stone sub base and vapor barrier

Foundation Bearing and Shear Wall Construction: (includes exterior and stair and tower walls)

- 8" and 12" normal weight reinforced concrete with a minimum compressive strength of 6,000 PSI at 28 days

First Floor:

- 12" of normal weight reinforced concrete with a minimum compressive strength of 6,000 PSI at 28 days

Since the soil at the time had enough cohesion to stay in place, the foundation strip and column footings did not require any horizontal or vertical formwork. The only task left was to situate the footing rebar and place the concrete with a concrete pump at the locations required. Once the footings were to the strength required, the foundation's exterior walls and columns took form with large gang forms. These large forms took shape very quickly with a 120 ton AmQuip crane tipping up each one into position. The formwork was connected and reinforced into place with lateral bracing. After the formwork was set and properly supported, the rebar was placed in the foundation walls and columns. Following inspection from the project management team, the concrete was placed with a concrete pump and allowed time to gain strength.

After pouring the slab on grade with the concrete pump the next focus was on the first floor. The first floor would be the first encounter and need for horizontal formwork. The formwork consisted of setting up metal shores, stringers, and joists with plywood as the sheathing. The first floor's vertical formwork would also make use of plywood as the ease of handling and construction. The rebar and roughins were situated and the concrete was placed using the concrete pump truck. For pictures of the horizontal and vertical formwork used on the Wellington Condominiums project see Appendix A.

C.2 Structural Steel

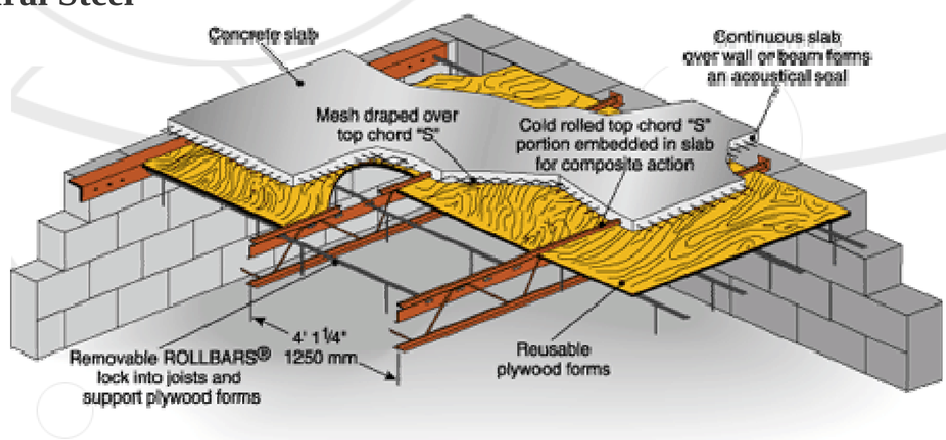


Figure 2: Typical Usage of Hambros Joist System Prescribed by Manufacturer – Reference: www.swirnow.com

The Wellington Condominiums project did not make use of large structural steel components but is using a very innovative system called the Hambro's joist 3" slab on deck composite system. The second, third, and penthouse floor make use of this system. This floor's bearing and shear wall components were designed into the Wellington Condominiums project by the stud engineer and made use of 4" and 6" metal stud walls at 16" o.c. These walls are capable of carrying the loads directly and therefore make it very easy to lay up this composite system. The general steps with advantages to this system are laid out as prescribed by the manufacturer Swirnow Structures.

1. **Spreading Joists:** Spread Hambro joist at 4'-1 ¼" on load bearing walls
2. **Placing Roll bars:** Roll bars are to keep uniform spacing while providing lateral and tensional stability

3. **Installing Plywood Forms:** Installing the plywood creates a working surface and forms a rigid diaphragm during construction
4. **Mesh In Place:** Mesh over top chord of joist creates a way of reinforcing concrete
5. **Pouring Concrete:** No shoring is required with this system when pouring concrete. The minimum thickness requirement is 2 ½”. The Wellington Condominiums project makes use of 3” slab thickness.
6. **Stripping Formwork:** When concrete reaches strength of 500 PSI (usually the day after the pour) the plywood forms can be taken out. When the concrete reaches strength of 1000 PSI (usually within 48 hours) the deck is ready for other trades and the formwork can be removed for future re-use.

The 150 ton AmQuip mobile crane utilized on the project will work around the building as required. The crane after placement of all floors/ceilings will then continue to be of service when the metal roof trusses are installed. With road access to all sides of the building structure there is no great danger of conflicts when the concrete trucks and cranes are working simultaneously.

C.3 Mechanical Systems

There are no mechanical rooms to the condominium but many mechanical closets. On the garage level there are two mechanical closets centrally located in the garage. The other mechanical closets are located in each condo and supply air for that particular condo. The system is an all air and distributes the air through insulated metal ductworks.

In a little more detail, the garage HVAC systems primary concern is air flow with car pollutants. Proper ventilation is critical when the comfort and safety of homeowners is on the line. The designers from Liberty Engineering have specified that 2 main intake lovers 162 X 30 NCA Model XAD – 6 –GL with motor operated control be installed on the north and south side of the garage. On the east face of the building 6 9300 CFM Jenco fans model FSWE – 302A remove the containments that are entered into the building. Two mechanical closets centrally located in the garage each holding a Renzor CAUA indoor gas fired heating units. The heating units are then connected to 18” diameter fabric ductwork that can supply 2200 CFM. This ductwork is attached to the slab above and run the lengthways of the structure. Two gas meters on the building's south east side supplies natural gas to the heating units and other parts of the building where needed.

Other rooms worth mentioning of systems involved are the electric/telephone/cable room, sprinkler room, and elevator rooms. Each room has a 24 X 8 transfer duct that sends in

500 CFM of air directly from the space. The electric/telecommunications/cable and sprinkler rooms have a Q Mark electric unit heater. This unit heater would take the intake air and mix to the temperature required for that space. A 500 CFM Jenko Fan model FDWE – 123A on opposite sides of the room exhaust return air back into the space. The two centrally located elevator rooms also contain a 24 X 8 transfer duct that brings in air from the garage space. These rooms contain a Carrier packaged terminal air conditioning unit which has a capacity of 350 CFM. No electric unit heaters are located in these rooms but they do contain a 500 CFM Jenko Fan model FDWE – 123A to exhaust the return air back into the garage space. Four carbon monoxide detectors are spread across the entire footprint of the garage to detect any large levels of carbon monoxide present from the fumes of cars.

The stairways only contain a Q Mark electric wall heater model AHW - 44083 on the garage floor level. No other return air or supply air acts in the stairways. All refuse rooms from the garage floor up to the penthouse are connected by a main vertical ductwork for return air. This return air is then sent to a 900 CFM Jenko Fan model LPX 120A that is located on the roof. The typical air distribution for the main hallways are two 630 CFM Trane split – system heat pump units with a Metalaire V400 mixing chamber. The fresh air supplied to this system come directly from the roof’s Metalaire 5000 air inlet and Trane Condensing Units. This air inlet is fed through a vertical shaft closet to each floor level. No return air distribution system is installed in the main hallways and corridors. It is assumed that the return air is lost through opening of doors, stairs, and elevator shaft. Also a build up of high pressure is recommended during a fire. Most likely area for a fire is in the condos and if high pressure is built up in the hallway the less likely smoke will occur in the hallway.

The condominiums HVAC systems begin in there own separate mechanical rooms. Each mechanical room is connected to its own Trane condensing unit located on the roof and contains a Trane cooling coil and gas fired furnace. This is then connected into the mixing chamber and then supplied by air ducts off to each room in the condo. There is only one return air duct that is centrally installed into the condos for reuse of air in the mixing chamber. Ductworks from bathroom exhaust air outlets connect back at the mechanical room and are supplied up to the roof to a Jenco Fan. Also typical on the condos façade is a dryer and range hood vent and a gas and fireplace flue. On the roof there is also roof and elevator relief vents for to balance the buildings inner environment conditions.

C.4 Fire Protection

The life safety operations of the building are all hardwired to the emergency control panel of the building. The sprinkler piping main line comes into the north side of the building and connects to the sprinkler system in the sprinkler room. The sprinkler pipes are then distributed to each floor level where the main piping is branched off into smaller circuits for diffusion. The sprinkler heads used for fire protection are dry type sprinkler heads. This system is also powered and controlled by the fire alarm panel.

C.5 Electrical

The incoming primary electrical duct bank runs along the west side of the building and into two step down transformers. The primary duct bank has six 4” schedule 40 PVC conduits which 2 will be used for service. The incoming cable duct bank has four 4” schedule 40 PVC conduits which all four will be used. From the transformers the primary duct bank goes into a secondary duct bank and into the building’s electrical/telecommunications/cable room main distribution switch board (MDSB). The secondary duct bank encases eight 4” schedule 40 PVC conduits which 5 are used. The main service feed for the MDSB is 1600 ampere, 3 phase, 120/208 V, 38 KAIC rated. The physical size of the MDSB is estimated to be 90”H X 102”W X 28” D. The MDSB feeds into Meter Bank’s A, B, C, and D, and the House Distribution Panel (HDP). The four meter bank serves all functions that the condos require in the building. Two meter banks share each feeder run up to there proper level. From there each condo gets fed a service of 125 ampere, single phase, 3 wire, and 120/208 V into there own panel board. The HDP services the elevator motor #1 and #2, HVAC, lighting and receptacles for all floors (other than the condos). The fire alarm panel is fed separately and controls the main sprinkler, elevator control panel, remote enunciator, and all life safety functions of the building. Overall the electrical engineers have designed this system to allow for some redundancy by having the primary duct bank only utilizing two out of the six 4” schedule 40 PVC conduits, the secondary duct bank only utilizing five out of eight 4” schedule 40 PVC conduits, and extra space and spares left on the circuit boards of emergency panels and condos. It is very important to do this because of the ever increasing growth of technology. If a building is able to expand and grow with technology the better able the building is to adapting to an ever constantly changing world.

C.6 Masonry

To achieve such high standards, the architects and planners first decided on what exterior material to use that was equally appealing and durable at the same time. After much contemplation, the architects and planners determined that the Wellington

Condominium's building façade was to consist of predominately a stylish brick and elegant cast stone exterior veneer**.** The transitions of façade materials are central to creating a pleasing environment with future homeowners. The cast stone veneer is primarily situated on the first floor building façade, is utilized around windows and doors as pre cast headers, and serves as a pre cast band and trim linking the transitions of façade materials. From the first floor to the upper floors the elegantly placed cast stone veneer serenely evolves into a modish and colorful brick. The brick façade continues up to the roof line where it is met by a 1 x 12 Azek Trim Board with Fypon BKT8X8x4 décor. Also scattered across the building façade is pre cast medallions and ornamentation to give the condominiums a refined and polished look.

The type of connection for the masonry is typical among the construction industry. The system that holds the façade and interior walls together is 22 gauge galvanized metal ties. The specifications call for the following list of items to be completed for the correct installation of anchoring masonry veneers:

1) Insert slip-in anchors in metal studs as sheathing is installed. Provide one anchor at each stud in each horizontal joint between sheathing boards.
2) Embed tie sections in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and face of sheathing.
3) Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4) Space anchors by no more than 16” o.c. vertically and 24” o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12” of openings and at intervals, not exceeding 36”, around perimeter.

With all the early delays on the project it has pushed construction of the building façade to the winter months of 2006. This creates logistical issues on how to construct the building façade and keep on schedule. Sometimes the winter months can be harsh in Pennsylvania therefore proper weather days accounted for cannot be overlooked. With that in mind, the scaffolding at this current time is through the use of a typical metal modular frame scaffolding system. This system is very easy to assemble and light to handle. This system if done in the winter would have to be protected from the winter elements and provide a proper work place for all construction workers. Decreased productivity will result if the scaffolding operation is not properly planned for in the winter months.

C.7 Curtain Wall

The composition of the 1 hour fire rated exterior wall section of the first through the fourth floor starting from the exterior to the interior are as follows: brick/stone veneer, metal ties, 1 ½" minimum air space, 15" building felt, 5/8" dens glass gold sheathing, 6" metal studs, R-19 batt insulation, vapor barrier, and 5/8" type 'X' G.W.B. The foundation wall which encloses the parking garage has architecturally exposed concrete and is composed of with the following: a fluid applied waterproofing membrane extended to cover footing, a bituthene liquid member joint sealant, and a 12" concrete foundation wall.

The construction methods in producing a sustainable curtain wall starts with having a solid foundation. Once the foundation is constructed the shell of the building structure can be built. For the Wellington Condominiums the base utilizes a concrete floor and walls while the upper levels consist of composite decking with metal stud wall framing. Once the main framing of the exterior is complete the curtain wall can then begin construction. Starting from the base and working your way up with scaffolding placing stone and brick veneer at the locations the drawing documents require. The construction of the building curtain wall will take a little more time due to the fact that is being constructed in the winter but the schedule has taken into the account of possible weather day occurrences. The design responsibility falls directly on the structural engineer in specifying the ties and loads present. The contractor is responsible for the correct placement of the curtain wall elements and is to make sure construction is up to code requirements. For example the contractor is responsible that all concrete masonry units be ASTM C90 grade N and have a minimum compressive strength of 1900 PSI, provide temporary bracing for masonry walls during entire erection of walls until adequate strength is developed (usually 7 days or longer), all 8" masonry walls be reinforced with #5 @ 32" vertical minimum, and fill masonry wall cores containing reinforcing with coarse grout.

D. Project Cost Evaluation

D.1 Actual Building Cost

Actual Building Cost:
- $17,818,947
- At 147, 069 SF – $121.16/SF

Total Project Cost:
- $18,105,952
- At 147,069 SF - $123.11/SF

Building System Costs:

- Mechanical: $1,137,000 - $7.73/SF
- Electrical: $1,541,212 – $10.48/SF
- Structural: $3,257,291 - $22.15/SF
- Site work: $776,348 – $5.28/SF
- Plumbing: $890,000 - $6.05/SF
- Fire Protection: $270,000 - $1.84/SF

D.2 D4 Cost 2002 Estimating

See the following Attached Pages

Estimate of Probable Cost

Wellington Condominiums Estimate - Oct 2006 - PA - Allentown

Prepared By:		Prepared For:	
	,		,
	Fax:		**Fax:**
Building Sq. Size:	**116349**	Site Sq. Size:	**1807740**
Bid Date:		Building use:	**Residential**
No. of floors:	**4**	Foundation:	**CON**
No. of buildings:	**1**	Exterior Walls:	**MET**
Project Height:	**59**	Interior Walls:	**MET**
1st Floor Height:		Roof Type:	**SLA**
1st Floor Size:	**29134**	Floor Type:	**CON**
		Project Type:	**NEW**

Division		Percent	Sq. Cost	Amount
00	**Bidding Requirements**	**0.49**	**0.74**	**86,421**
	Bidding Requirements	0.49	0.74	86,421
01	**General Requirements**	**11.48**	**17.23**	**2,005,168**
	General Requirements	11.48	17.23	2,005,168
02	**Site Work**	**12.34**	**18.51**	**2,154,162**
	Site Work	12.34	18.51	2,154,162
03	**Concrete**	**9.25**	**13.88**	**1,615,254**
	Concrete	9.25	13.88	1,615,254
04	**Masonry**	**1.87**	**2.81**	**327,256**
	Masonry	1.87	2.81	327,256
05	**Metals**	**2.25**	**3.38**	**392,830**
	Metals	2.25	3.38	392,830
06	**Wood & Plastics**	**7.08**	**10.63**	**1,236,949**
	Wood & Plastics	7.08	10.63	1,236,949
07	**Thermal & Moisture Protection**	**1.80**	**2.70**	**314,027**
	Thermal & Moisture Protection	1.80	2.70	314,027
08	**Doors & Windows**	**6.64**	**9.97**	**1,159,506**
	Doors & Windows	6.64	9.97	1,159,506
09	**Finishes**	**15.61**	**23.42**	**2,724,936**
	Finishes	15.61	23.42	2,724,936
10	**Specialties**	**0.79**	**1.18**	**137,381**
	Specialties	0.79	1.18	137,381
11	**Equipment**	**1.40**	**2.10**	**243,768**
	Equipment	1.40	2.10	243,768
12	**Furnishings**	**0.20**	**0.30**	**35,411**
	Furnishings	0.20	0.30	35,411
13	**Special Construction**	**0.57**	**0.86**	**99,921**
	Special Construction	0.57	0.86	99,921
14	**Conveying Systems**	**1.08**	**1.63**	**189,366**
	Conveying Systems	1.08	1.63	189,366
15	**Mechanical**	**18.08**	**27.14**	**3,157,420**
	Mechanical	18.08	27.14	3,157,420
16	**Electrical**	**9.05**	**13.59**	**1,581,068**
	Electrical	9.05	13.59	1,581,068
Total Building Costs		**100.00**	**150.07**	**17,460,844**

Estimate of Probable Cost

Eola South Residential Condominium - Nov 2003 - FL - Orlando

Prepared By:	**Baker Barrios Architects, Inc.** **300 South Orange Avenue Ste 900** **Orlando, FL 32801** **Fax:**	Prepared For:	**,** **Fax:**
Building Sq. Size:	**60000**	Site Sq. Size:	**435600**
Bid Date:	**11/1/2003**	Building use:	**Residential**
No. of floors:	**4**	Foundation:	**PIL**
No. of buildings:	**1**	Exterior Walls:	**PRE**
Project Height:	**50.8**	Interior Walls:	**MAS**
1st Floor Height:	**11.8**	Roof Type:	**BUP**
1st Floor Size:	**15000**	Floor Type:	**CON**
		Project Type:	**NEW**

Division		Percent	Sq. Cost	Amount
00	**Bidding Requirements**	**0.31**	**0.30**	**18,000**
	Permits	0.31	0.30	18,000
01	**General Requirements**	**14.29**	**13.72**	**823,342**
	Builder's Risk Insurance	0.12	0.12	7,000
	Building Permit Fees	0.43	0.42	25,000
	Change Orders	3.18	3.05	183,222
	Contractor's Fee	3.41	3.27	196,250
	Equipment Tools	0.14	0.13	8,050
	Field Labor, Safety, Clean-up	1.29	1.24	74,500
	Field Supervision	1.15	1.10	66,000
	General Conditions	1.14	1.10	65,700
	General Requirements	1.56	1.50	90,000
	Insurance (General Condition Items)	0.42	0.40	24,200
	MEP Consulting Fees	0.63	0.61	36,330
	MOT, Traffic Control	0.20	0.19	11,500
	Temporary Utilities	0.39	0.37	22,250
	Trash Removal/Hoisting	0.23	0.22	13,340
03	**Concrete**	**36.01**	**34.58**	**2,074,734**
	2nd Fl Post Tension-1st Fl Columns	4.25	4.08	245,000
	3rd Fl Post Tension-2nd Fl Columns	4.25	4.08	245,000
	4th Fl Post Tension-3rd Fl Columns	4.25	4.08	245,000
	Architectural Precast North Elevati on	2.60	2.50	150,000
	Architectural Precast South Elevati on	2.60	2.50	150,000
	Architectural Precast West Elevatio n	6.77	6.50	390,100
	Elevator Shaft	0.69	0.67	40,000
	Pile Caps/Foundations	3.47	3.33	200,000
	Retaining Wall	0.31	0.30	18,000
	Roof Post Tension-4th Fl Columns	4.25	4.08	245,000
	Slab-On-Grade	1.24	1.19	71,634
	Stair Enclosures/Shear Wall	1.30	1.25	75,000
04	**Masonry**	**1.04**	**1.00**	**60,000**
	Masonry	1.04	1.00	60,000
05	**Metals**	**3.38**	**3.25**	**194,750**
	Exterior Handrails	1.52	1.46	87,750
	Metal Stairs (2)	1.13	1.08	65,000
	Misc. Metals	0.03	0.03	2,000
	Roof HVAC Screen Wall	0.69	0.67	40,000
06	**Wood & Plastics**	**3.54**	**3.40**	**204,100**
	Closets	0.22	0.21	12,650
	Millwork/Countertops	2.60	2.50	150,000
	Rough Carpentry-Blocking	0.46	0.44	26,600
	Wood Trim/Base	0.26	0.25	14,850
07	**Thermal & Moisture Protection**	**2.32**	**2.23**	**133,535**
	Balcony Coatings	0.29	0.28	16,650

	Dampproofing/Caulking	0.49	0.47	28,390
	Modified Bituminous Roof System	1.54	1.47	88,495
08	**Doors & Windows**	**4.72**	**4.54**	**272,230**
	Aluminum Windows & Doors	2.67	2.57	153,930
	Doors, Frames & Hardware	1.63	1.56	93,800
	Mirrors	0.12	0.12	7,000
	Shower Doors	0.30	0.29	17,500
09	**Finishes**	**15.89**	**15.26**	**915,379**
	Carpet/VCT	1.08	1.03	62,000
	Drywall	4.06	3.90	234,000
	Floor Topping	0.38	0.37	22,000
	Metal Studs/Drywall/Plaster	4.76	4.58	274,500
	Painting	2.60	2.50	150,000
	Special Coating - Stain	0.12	0.12	7,175
	Stone Flooring	0.14	0.14	8,204
	Tile	0.78	0.75	45,000
	Wood Floor	1.95	1.88	112,500
10	**Specialties**	**0.57**	**0.54**	**32,600**
	Entrance Canopy	0.09	0.08	5,000
	Fire Extinguishers	0.02	0.02	1,050
	Lockers	0.03	0.03	1,800
	Mailboxes	0.07	0.07	4,000
	Signage	0.09	0.08	5,000
	Toilet Accessories	0.27	0.26	15,750
11	**Equipment**	**1.28**	**1.23**	**73,600**
	Appliances	1.28	1.23	73,600
12	**Furnishings**	**0.33**	**0.32**	**18,995**
	Garage Entrance Door	0.23	0.23	13,500
	Trash Chute	0.10	0.09	5,495
14	**Conveying Systems**	**0.95**	**0.92**	**55,025**
	Elevator System	0.95	0.92	55,025
15	**Mechanical**	**8.93**	**8.58**	**514,600**
	Fire Protection	1.29	1.24	74,100
	Fixtures	0.43	0.42	25,000
	HVAC/Ductwork/Piping	3.73	3.58	215,000
	Plumbing	3.48	3.34	200,500
16	**Electrical**	**6.44**	**6.18**	**370,993**
	CATV/Audio/Music	0.17	0.17	10,000
	Distribution Panels	0.26	0.25	15,000
	Electrical	3.75	3.60	216,050
	Fire Alarm	0.17	0.17	10,000
	Panel Boards	0.26	0.25	15,000
	Rough-In/Wire/Conduit	1.82	1.75	104,943
Total Building Costs		**100.00**	**96.03**	**5,761,883**
02	**Site Work**	**100.00**	**0.88**	**381,339**
	Asphalt Pavement/Striping	7.87	0.07	30,000
	Auger Cast Piling	38.20	0.33	145,665
	Building Demolition	4.89	0.04	18,650
	Chain Link Fence	0.79	0.01	3,024
	Concrete Sidewalks/Curbs	3.67	0.03	14,000
	Dewatering System	5.77	0.05	22,000
	Earthwork	6.82	0.06	26,000
	Gravity Wall	1.84	0.02	7,000
	Landscape Irrigation	6.56	0.06	25,000
	Utilities	23.60	0.21	90,000
Total Site Costs		**100.00**	**0.88**	**381,339**
Total Project Costs		**--**	**--**	**6,143,222**

Project Notes

Eola South Residential Condominium - Nov 2003 - FL - Orlando

* Orlando, Florida
** Construction Period: Dec 2003 to Jan 2005

Special Project Notes

Sited in downtown Orlando, at the edge of the Thornton Park residential fabric and immediately across the street from a high-rise/multi-family condominium, Eola South Condominium becomes an important element of scale and proportion. The four-story height of the building tempers the 10-story vertical element located across the street as it acts as a proper introduction and transition to the surrounding residential neighborhood.

Its character and design supports the nearby commercial and mixed use buildings. The increased density will support the new, burgeoning retail businesses while the streamlined contemporary design will create a sense of unity with the existing and growing new urban fabric. One of the primary considerations in the design was identifying a way to responsibly take advantage of the natural beauty of Lake Eola Park, located northwest of the building site.

The building program is issue driven and responds to the need for height, both as a transition and a way to take advantage of the view of Lake Eola and the surrounding green-space. Other identified issues that influenced the design were parking density, circulation, security of unit occupants, and the market ability of the units themselves based on current trends and developer philosophies.

The building design responds to the identified program issues by utilizing large glass expanses on the afternoon shaded western and northern elevations of the building. The fenestrations and massing interplay create a unique rhythm connecting the units to the streets below. The building units also feature large balconies, some of which are partially covered.

The building is constructed of cast-in-place concrete as it provided the best quality finish opportunities expected by the developer and prospective occupants. The majority of the units are sized to allow more moderate-income levels the opportunity to experience the downtown urban lifestyle becoming more prevalent in Orlando.

The overall design provides a sense of connectedness and unity to the surrounding urban fabric. The design results in positive interaction and interplay between the building residents and the surrounding neighbors and businesses, providing an expanded sense of community.

MANUFACTURERS/SUPPLIERS
DIV 07: Roofing: Johns Manville.
DIV 08: Window System, Entrances & Storefronts: Vistawall.

CONSTRUCTION TEAM
STRUCTURAL ENGINEER: Walter P. Moore and Associates, Inc. - 300 South Orange Avenue, #875, Orlando, FL 32801
GENERAL CONTRACTOR: Jennings Construction Services, LLC - 1030 Wilfred Drive, Orlando, FL 32803
ELECTRICAL & MECHANICAL ENGINEER: CHP & Associates Consulting Engineers, Inc. - 1051 Winderly Place, #101, Maitland, FL 32751
LANDSCAPE ARCHITECT: Lucido & Sole Design - 827 N. Thornton Avenue, Orlando, FL 32803

Photos Courtesy of Ray Acosta/Taina Benitez

Estimate of Probable Cost

Convent & High School - Jan 2002 - PA - Other

Prepared By:
Perkins Eastman
1100 Liberty Avenue
Pittsburgh, PA 15222
Fax:

Prepared For:
,
Fax:

Building Sq. Size:	**161428**	Site Sq. Size:	**3179880**
Bid Date:	**1/1/2002**	Building use:	**Residential**
No. of floors:	**4**	Foundation:	**EXT**
No. of buildings:	**1**	Exterior Walls:	**EXT**
Project Height:	**49**	Interior Walls:	**GYP**
1st Floor Height:	**9.8**	Roof Type:	**MEM**
1st Floor Size:	**46482**	Floor Type:	**WOD**
		Project Type:	**REN**

Division		Percent	Sq. Cost	Amount
00	**Bidding Requirements**	**0.66**	**0.65**	**104,754**
	Bond	0.66	0.65	104,754
01	**General Requirements**	**12.74**	**12.58**	**2,031,254**
	Scaffold at Chapel	0.31	0.31	49,815
	General Conditions	8.19	8.09	1,306,529
	Fees	4.23	4.18	674,910
03	**Concrete**	**1.55**	**1.53**	**247,095**
	Building Concrete	1.07	1.06	170,704
	Light Weight Concrete	0.05	0.05	7,973
	Cementitious Underlayment	0.03	0.03	5,298
	Patching	0.40	0.39	63,120
04	**Masonry**	**2.54**	**2.51**	**404,712**
	Masonry Repairs - New Openings	0.71	0.71	113,826
	Masonry	1.66	1.64	264,038
	Restoration	0.17	0.17	26,848
05	**Metals**	**2.29**	**2.26**	**365,020**
	Structural Steel/Joists & Decking	1.72	1.70	274,800
	Miscellaneous	0.54	0.54	86,810
	Architectural Joint Systems	0.02	0.02	3,410
06	**Wood & Plastics**	**9.73**	**9.61**	**1,552,040**
	Rough Carpentry	0.57	0.57	91,435
	Plywood Underlayment	0.73	0.72	116,719
	Finish Carpentry	2.71	2.68	432,412
	Install Salvaged Items	2.06	2.04	328,766
	Architectural Woodwork (Casework)	2.97	2.94	474,296
	Wood Laboratory Casework	0.68	0.67	108,412
07	**Thermal & Moisture Protection**	**1.97**	**1.94**	**313,593**
	Waterproofing	0.05	0.05	7,350
	Membrane Roofing	1.77	1.75	282,100
	Metal Roofing	0.12	0.12	19,072
	Roof Accessories	0.01	0.01	1,556
	Caulking	0.02	0.02	3,515
08	**Doors & Windows**	**8.62**	**8.52**	**1,375,241**
	Doors & Hardware	2.21	2.19	352,913
	Storefront/Glass & Glazing	0.22	0.22	34,995
	Metal Windows	5.29	5.23	844,048
	Decorative Glass & Mirrors	0.45	0.45	72,285
	Fireproofing	0.45	0.44	71,000
09	**Finishes**	**18.56**	**18.34**	**2,960,675**
	Plaster - (Patching)	0.40	0.40	64,513
	Drywall/Metal Studs	10.73	10.60	1,711,424
	Acoustical Wall Panels	0.29	0.29	46,667
	Ceramic Tile Work Allowance	1.06	1.05	169,165
	Terrazzo (Patch & Repair)	0.13	0.12	20,000
	Wood Floor & Refinishing	1.44	1.42	229,566

	Stone Window Sills	0.45	0.44	71,340
	Painting/High Performace Coatings	1.88	1.86	300,000
	Flooring Carpet/Resilient	2.18	2.16	348,000
10	**Specialties**	**1.02**	**1.01**	**162,602**
	Visual Display Boards	0.03	0.03	5,500
	Toilet Compartments	0.13	0.13	20,457
	Impact-Resistant Wall Protection	0.01	0.01	1,386
	Signs Allowance	0.13	0.12	20,000
	Metal Lockers	0.20	0.20	32,000
	Fire Protection	0.03	0.03	4,605
	Toilet Accessories	0.29	0.28	45,660
	Folding & Portable Stages	0.16	0.15	24,994
	Stage Curtains	0.05	0.05	8,000
11	**Equipment**	**1.71**	**1.69**	**273,014**
	Projection Screens	0.01	0.01	2,236
	Food Service	1.52	1.50	242,270
	Residential Appliances	0.16	0.16	25,824
	Barber & Beauty	0.02	0.02	2,684
12	**Furnishings**	**0.20**	**0.20**	**31,487**
	Floor Mats & Frames	0.03	0.03	4,167
	Window Treatment	0.17	0.17	27,320
13	**Special Construction**	**0.44**	**0.44**	**70,800**
	Fixed Auditorium Seating	0.44	0.44	70,800
14	**Conveying Systems**	**1.34**	**1.33**	**214,200**
	Elevator	1.34	1.33	214,200
15	**Mechanical**	**24.88**	**24.58**	**3,968,000**
	Plumbing	5.44	5.37	867,000
	Fire Protection	2.34	2.31	373,000
	HVAC	17.10	16.90	2,728,000
16	**Electrical**	**11.76**	**11.62**	**1,875,446**
	Electrical	11.57	11.44	1,845,946
	Light Allowance	0.18	0.18	29,500
Total Building Costs		**100.00**	**98.81**	**15,949,933**
02	**Site Work**	**100.00**	**0.84**	**2,677,411**
	Demo/Salvage/ASB Abate Phase 1	53.78	0.45	1,439,965
	Structural Demolition Phase 1a	17.35	0.15	464,439
	Excavation & Grading	9.66	0.08	258,548
	Asphalt Paving	2.17	0.02	58,111
	Landscaping	4.93	0.04	132,000
	Site Concrete	2.25	0.02	60,258
	Trash Enclosure Fence	0.13	0.00	3,410
	Relocation of Statues	0.67	0.01	18,000
	Storm Drainage	0.86	0.01	22,950
	Relocation of Underground Pipelines	0.37	0.00	10,000
	Site Retaining Walls	0.46	0.00	12,420
	Underpinning	1.21	0.01	32,310
	Courtyard Improvements	5.60	0.05	150,000
	Remote Garage	0.56	0.00	15,000
Total Site Costs		**100.00**	**0.84**	**2,677,411**
Total Project Costs		**--**	**--**	**18,627,344**

Project Notes

Convent & High School - Jan 2002 - PA - Other

* Coraopolis, Pennsylvania
** Construction Period: Mar 2002 to Aug 2003
*** LEED(R) GOLD PENDING

Special Project Notes

The Franciscan nuns of the Felician Sisters Convent wanted to renovate their 70-year-old provincial house to feel less like an institution and more like a home. The community was living in two buildings: St. Joseph Hall, a 1960's infirmary building, and the 1930's motherhouse, which also housed Our Lady of the Sacred Heart High School.

Perkins Eastman completed a master planning study and the Sisters decided to renovate the motherhouse and consolidate the community under one roof. As such, the existing building plan was not workable as an assisted living facility. The elderly Sisters' bedrooms were too far from existing gang bathrooms, which were too small to negotiate with walkers or wheelchairs. The building systems had not been upgraded since the 1930's, there were no individual temperature controls, and the existing partitions contained asbestos. The building needed to be gutted, yet doing so would jeopardize the very reason for renovating the motherhouse.

With full community participation, Perkins Eastman re-configured the 150,000-square-foot convent into clusters of individual rooms with private baths in 10 households arrayed around a living room, kitchen and dining room. Spatially, four different Halls organize the new school plan and express the Franciscan Order's ethics: the Hall of Life, the Hall of Social Justice, the Hall of Peace, and the Hall of Community. These Halls are focal points on each floor and are used for the presentation of student work and as informal gathering spaces. Large openings in the classrooms provide natural light, along with high reflectance paint and mecco shades. On the grounds, the students enjoy trails cut into seven acres of newly planted meadow from an area previously maintained as lawn. All plants are selected from native species.

The project team held a strong commitment to making the renovation environmentally responsible and to preserving the house's historic architectural character. While the Felician Sisters were not educated about many environmental issues, they are followers of Saint Francis of Assisi who is the Patron Saint of the Environment. This commitment allows them to view environmental stewardship as a responsibility. As the project evolved and the Sisters became more aware of the building's potential environmental impacts, they consistently made decisions based on stewardship.

Working through the project and environmental goals, the team soon realized the value in the resources that the building contained. Many materials installed in 1930 were still in excellent condition. If the Sisters wanted low maintenance and durable materials, they could not buy new materials that would perform as well as the old. A subcontractor was hired to catalog, remove, touch-up, repair and reinstall the doors, flooring, trim and cabinetry.

More than 300 original hardwood doors and transoms were refinished and re-hung; over an acre of hardwood flooring was lifted, cleaned and re-laid; over a mile of trim was removed, preserved and installed; and over 275,000 pounds of ballast for the roof was stockpiled and reused as underlayment for paving. New windows were made using energy efficient technologies but were manufactured to look like the original windows. The perimeter of the building was studded out and insulated. Construction waste was recycled and all new finishes were made from low emitting materials to preserve indoor air quality. New energy efficient systems for both lighting and heating were installed as well as solar hot water panels to aid in energy reduction.

As the project progressed it became clear that decisions most benefiting the community were also beneficial to the environment. The building has preserved the character of the original structure, is energy efficient, better serves an aging and student population, and promotes environmental stewardship. The architect achieved over a 30% reduction in energy consumption compared to a baseline model. Systems used to achieve the reduction included heat recovery from air and kitchen exhausts; individual controls in each classroom; landscaped plantings that shade the south and west facades; and recycled roof water used in the evaporative cooler. The client has used the project, which is seeking a gold LEED(R) rating, to educate their Sisters, students and staff in issues of the environment including green cleaning, recycling, vermicomposting, renewable energy, and the building itself.

MANUFACTURERS/SUPPLIERS
DIV 02: Pavers: Hanover Architectural Products.
DIV 07: Wall Insulation: Johns Manville; Roof Insulation: Carlisle Sure-Seal(R); Membrane Roofing: Carlisle Sure-Weld(R).
DIV 08: Windows: Keystone Industries.
DIV 09: Paint: Sherwin Williams; Linoleum: Forbo Marmoleum; Carpet: Interface, Collins & Aikman; Ceramic Tile: Terra Green.

CONSTRUCTION TEAM
GENERAL CONTRACTOR: Sota Construction Services, Inc. - 80 Union Avenue, Pittsburgh, PA 15202
STRUCTURAL ENGINEER: The Kachele Group - 1014 Perry Highway, #100, Pittsburgh, PA 15237
ELECTRICAL/MECHANICAL/PLUMBING ENGINEER: Elwood S. Tower Corp. - 115 Evergreen Heights Drive, #400, Pittsburgh, PA 15229
MATERIALS REUSE CONTRACTOR: Clearview Project Services Company - 3977 William Flynn Highway, Allison Park, PA 15101
LANDSCAPE ARCHITECT: Rolf Sauer and Partners, Ltd. - 3868 Terrace Street, Philadelphia, PA 19128

Photos Courtesy of Denmarsh Photography

D.3 R.S. Means Building Cost

2006 RS Means Square Foot Costs			
UsedSection M.020 Apartment, 4-7 Story, 100,000 SF			
General Estimate	**Quantity**	**Unit Price**	**Amount**
Face Brick w/ Concrete Frame	116349 SF	$130.70/SF	$15,206,814.30
Added Revisions			
Garage	30,720	$27.30/SF	$838,656.00
Elevators	2	$127,300/Unit	$254,600
Emergency Lighting	50	$259/Unit	$12,950
Smoke Detectors	250	$164/Unit	$41,000
Ovens	48	$1000/Unit	$48,000
Trash Compactors	1	$600/Unit	$600
Garbage Disposal	48	$200/Unit	$9,600
Hood Vents	48	$500/Unit	$24,000
Assumptions: Based Calcultions on RS Means Max Data of 100,000 SF (Wellington Condominiums 116,349 SF) Used mid to high unit prices for added revisions Assumed Brick and concrete frame structure		**Total:**	$16,436,220.30 x 1.02 location factor (Allentown, PA) **$16,764,944.71**

Data Table 2: R.S. Means Estimates

D.3 Discussion

Actual Building Cost:
- **$17,818,947**

D4 Estimate Building Cost:
- **$17,460,844**

R.S. Means Building Cost:
- **$16,764,944.71**

From the information provided the estimates and actual building costs are very good. The methods performed for the two estimates were done in very dissimilar manners therefore differences are to be expected. The RS Means data goes by the average project cost in the United States today. The Wellington Condominiums project is not an average apartment complex but has a higher level of quality demanded. Also Wellington Condominiums project is a little higher square footage then the 100,000 square foot industry project average. Therefore being that RS Means bases its calculations off an industry average and lower square footage estimate the estimate should be a little low as shown.

The D4 estimate made use of two closely related residential projects of similar characteristics to the Wellington Condominiums. One project called Eola South Residential Condominium is a four story complex of the same structure system but has a smaller cost and square footage footprint. The Convent and High School project was very similar in size and cost but has some different structural systems to the project. Therefore to gain a better cost estimate of the project the two projects were averaged to get the results shown. The D4 Estimate Program recommends that if one project is to be manipulated then the analysis should stay within 20%. The Eola South Residential Condominium as mentioned had a sizeable difference in square footage and therefore the averaging system was utilized for the best results possible. The D4 estimate was very accurate for what is to be expected for a project of this size and style. One of the major reasons for the difference in the D4 estimate and actual building cost data is that the actual building costs includes change orders. Most of the change orders are from bad soil conditions that were encountered on the project and added just by itself over $160,000. There were other change orders that added to this amount and made the actual building cost higher then the estimates. Also the Wellington Condominiums are utilizing very expensive materials like granite countertops and add additional costs to the project.

Construction Project Management

A. Site Plan of Existing Conditions

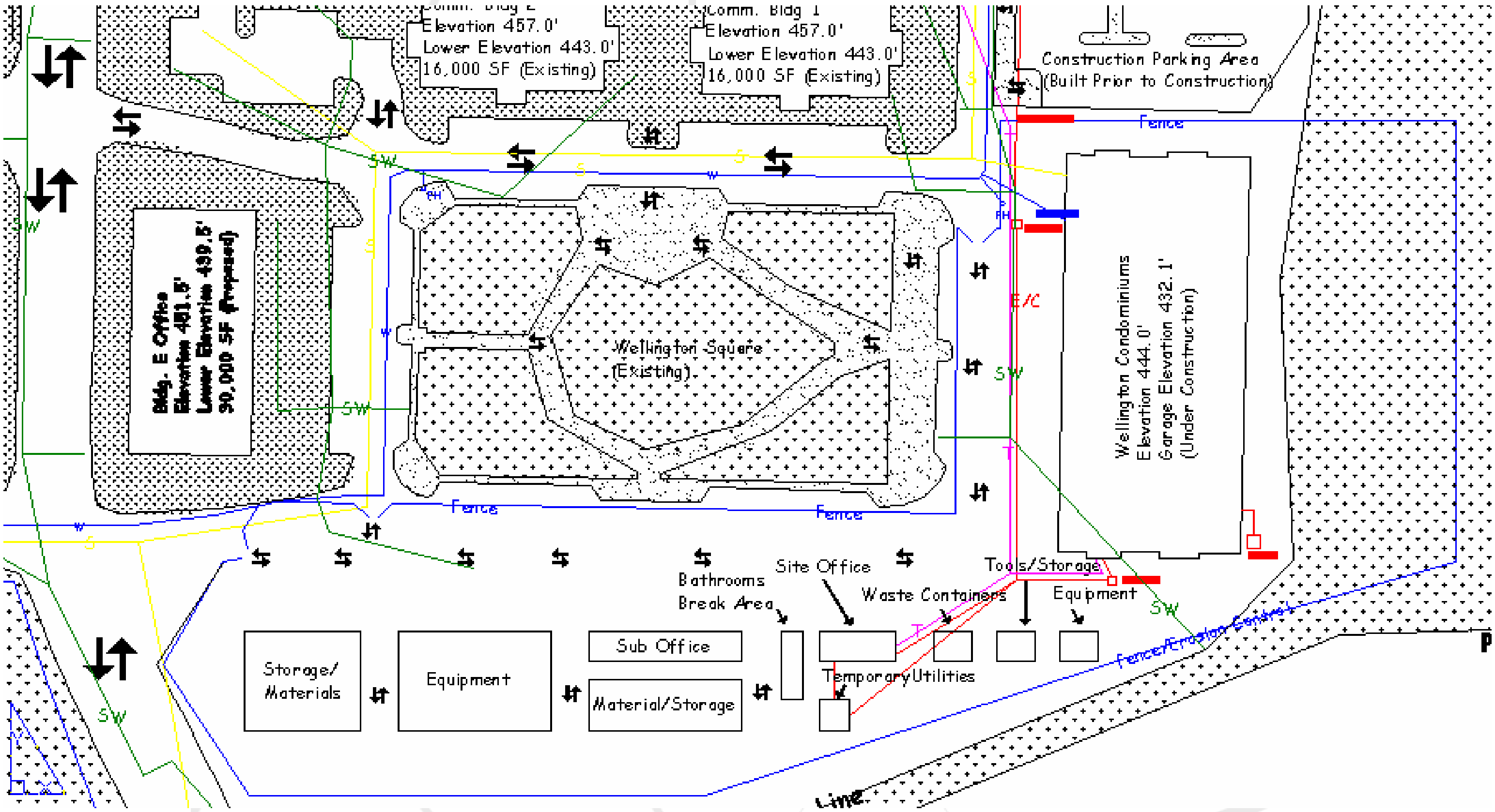
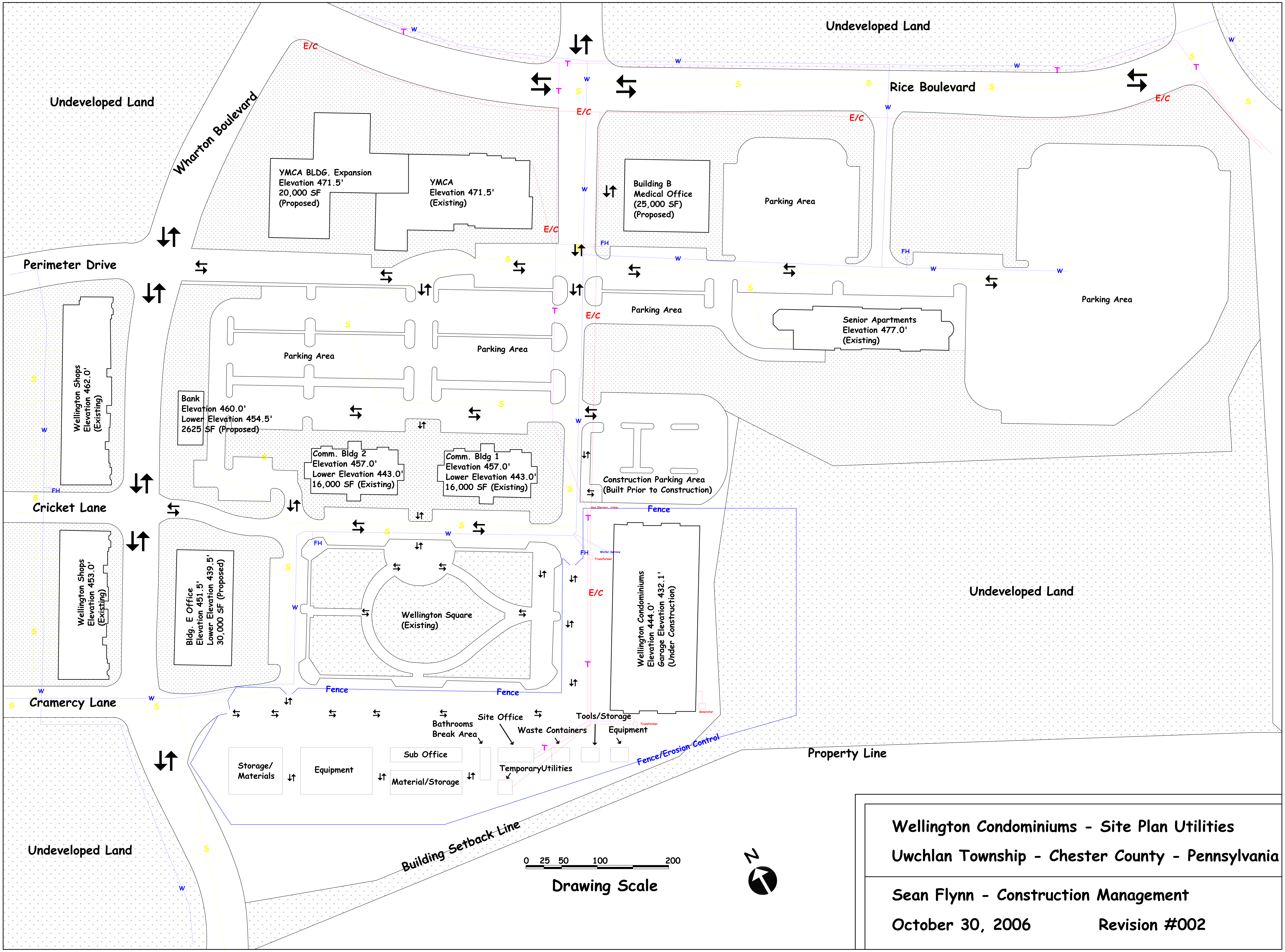


Figure 3: Wellington Condominium Site Plan

See the Following Attached Pages for Large Scale Site Plans


Undeveloped Land
Wharton Boulevard
Rice Boulevard
Undeveloped Land
Perimeter Drive
YMCA BLDG. Expansion
Elevation 471.5'
20,000 SF
(Proposed)
YMCA
Elevation 471.5'
(Existing)
Building B
Medical Office
(25,000 SF)
(Proposed)
Parking Area
Parking Area
Parking Area
Senior Apartments
Elevation 477.0'
(Existing)
Parking Area
Parking Area
Wellington Shops
Elevation 462.0'
(Existing)
Bank
Elevation 460.0'
Lower Elevation 454.5'
2625 SF (Proposed)
Comm. Bldg 2
Elevation 457.0'
Lower Elevation 443.0'
16,000 SF (Existing)
Comm. Bldg 1
Elevation 457.0'
Lower Elevation 443.0'
16,000 SF (Existing)
Construction Parking Area
(Built Prior to Construction)
Cricket Lane
Fence
Wellington Shops
Elevation 453.0'
(Existing)
Bldg. E Office
Elevation 451.5'
Lower Elevation 439.5'
30,000 SF (Proposed)
Wellington Square
(Existing)
Wellington Condominiums
Elevation 444.0'
Garage Elevation 432.1'
(Under Construction)
Undeveloped Land
Camercy Lane
Fence
Fence
Bathrooms
Break Area
Site Office
Waste Containers
Tools/Storage
Equipment
Storage/
Materials
Equipment
Sub Office
Material/Storage
TemporaryUtilities
Fence/Erosion Control
Property Line
Undeveloped Land
Building Setback Line
0 25 50 100 200
Drawing Scale
N
Wellington Condominiums - Site Plan Utilities
Uwchlan Township - Chester County - Pennsylvania
Sean Flynn - Construction Management
October 30, 2006
Revision #002

B. Local Conditions

The Wellington Condominiums project is located in Exton, Pennsylvania, where to the project team's knowledge the area dose not have any preferences to what method of construction is presented to them. The most important thing to the project team is not whether or not it is a steel or concrete building rather what is the fastest and best way to constructing the building. The condominium project features a new composite deck system which saves time and money for the developer. It makes use of steel and concrete and at first takes longer to install then scheduled due to the learning curve involved in constructing the composite decks. But once an established repetition is put into motion the faster the crews get as they go up floor by floor. Also the Chester County Local District doesn't establish rules or regulations on whether union or non union labor forces are required for this area. This gives the project team some flexibility in picking who they would want on the job and take out the factor if or if not they are union laborers.

The project also features the construction of a new parking area for the Wellington Condominiums before the building footprint ever takes rise. In the original design the parking lot was supposed to be the stockpile of excavated material that would be used at a later time. The project team decided that a parking lot would be preferred due to the lack of space during construction. During the site work phase of the schedule the material was shipped elsewhere so that the parking area could be built at the time of excavation. This proved to be a great decision in that it gave extra parking for not only the people on the construction site but other local business as well. This was one way to give some positive reception to the community's patience for when trucks and huge equipment were digging, creating noise and dust, and creating what might look like a sizeable hole in the ground to local residences.

The project makes use of recycling and proper disposal of waste at the south side of the construction site. This project is not going for a LEED rating but the developers and owners of the project have experience in LEED rated buildings. The fee for disposing of waste will run you $500 per dumpster in Chester County. It is expected on the construction site to go through about 60 dumpsters totaling $30,000 in getting rid of waste for the project duration. Also simple things like reusing plywood for forms are a big thing on the Wellington Condominiums project. With the use of the new composite deck system, plywood forms can be used many times without having to throw them away. This is just one of the many ways that the project team has thought of for recycling and disposing of materials.

The subsoil conditions on the construction site as specified in the geotechnical report from Earth Engineering was not very good and that a good portion of the sub grade soils

would have to be removed and replaced with structural fill. This material as specified by the specifications and recommendations of the geotechnical engineers was that if the structural fill was placed and properly rolled or vibrated that the subsoil would be able to properly distribute the loads from the building's foundation. Another cause for alert to the project team in the geotechnical report was that the foundation floor grade was under the groundwater level. If the design was to stay as planned the whole bottom third of the foundation would be underwater. The geotechnical engineers offered two solutions to the problem in both raising the foundation up to where the Uwchlan Township zoning would specify or permanent dewatering systems and waterproofing would have to be instituted to the design. The architects and designers felt that it was best to proceed with installing permanent dewatering systems with waterproofing.

Another problem with continuing the original design is substantial excavations below the existing grade would have to be done to achieve the proper amount of required structural fill. This would result in having to rock excavate and use equipment like hydraulic hammering, splitting, or other rock removal techniques. Blasting was not recommended therefore a rock crusher and other equipment would have to be brought on to do the job. All these added expenses can be seen in the estimate to how much it costs the developer and owner. The total expenses just for poor subsurface conditions not including the dewatering and waterproofing systems was well over $160,000. This also delayed the construction and handover date for the project. Other means and methods would be achieved to try to accelerate the schedule as best as possible and try to make up for lost time from having to deal with poor subsurface conditions.

C. Client Information

The owner of the project is the Hankin Group and is a development company that owns a large portion of the land in the area. Hankin Group has its roots in being a family owned company that has been developing real estate and communities for a long period of time. Hankin group is recognized as a leader in developing high quality homes and communities in the construction industry. In the recent years the company has developed commercial and industrial parks that well suit the residential areas. The company takes great pride and devotion to how the communities are organized and how to develop the land for future use. The company is very sound in commitment to the communities that they developed and have very strong company values and ethics in doing good business with and for others.

One of the main reasons that Hankin Group went forth with the Wellington Condominiums was that the building would offer home owners a luxury style home right at the center of the local community town square. The ease and convenience of walking

out your door and being walking distance to shops and offices was something of great demand. Also with the boom of the residential market in that area for the past few years the opportunity presented itself and Hankin Group then gave the project the green light to start construction. The expectation's from the owner's perspective is only the very best in quality. Top of the line materials and construction are utilized in order to attract the higher cliental. Granite countertops, wooden floors, walk in closets, large bay windows, private balconies, etc. are some of the things that Hankin group has pushed for in the design of the condominiums. Safety is something else that the developers take seriously and is their number one issue when it came time to constructing the project. The project team enforces to all subcontractors of the proper ways of construction so that it is safe to not only to them but future home owners as well. The schedule is another important issue to Hankin Group. The faster the project is constructed, the faster people will want to move in. Future buyers even with the nicest of renders do not want to buy something of great value without ever seeing a building. Once the building takes form future home owners can see progress made and make the decision to buy a condo. It is up to the project team's best interest to construct the most efficient way possible and still keep the quality of the project at high standards. The cost even though it is not the largest concern is still something that they pay very close attention to. Hankin Group is a business and in order to stay in business it has to make money. If the costs are in check and the quality and schedule is up to par then the Hankin Group is very content with how the project performs.

The main sequencing issues that are of interest to the owner are when it is time for people to move into the condos. The sooner the future home owners can move in the faster the owner can get there money. During construction the owner is most concerned with getting out of the ground and seeing a structure being developed. The transfer slab is the big stepping point for the project and once that is complete the rest of the structure will go up very quickly. Once the building starts taking form the building can start being enclosed and initiate the selling of condos.

Some of the keys to completing the project to the owner's satisfaction are to produce a high quality project on time and if possible stay as close to the budget. The owner wants to use the very best in materials and results in the budget continuing to rise. It is the project team's goal and responsibility to keep the owner involved and voices an opinion on decisions. Some things like granite countertops or the fancier brick façade is what the owner expects and wants to see. Most of the time if present the information correctly to the owner of what the situation is, the owner is satisfied with having to pay a little more for what they really want. But in the end to construct a successful project the communication line between the project team and owner is critical when doing a project of this size and magnitude.

D. Project Delivery System

The project delivery method that was used on the Wellington Condominiums project was a fast-tracked CM @ Risk. The owner and developer Hankin Group wanted to be very flexible in the design and coordination of the project but not take on the bulk of contractual risk. Time is essential on the project and a systematic approach design-bid-build delivery method would not be very effective. Hankin Group’s major goal is to deliver the highest quality building at the fastest time possible.

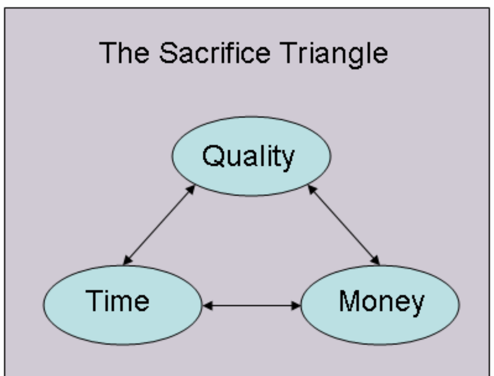


Figure 4: The Sacrifice Triangle
- Reference: Fundamentals of Construction Management

To help explain this concept of the sacrifices an owner has to make is by looking at the sacrifice triangle. For example the Hankin Group on this project wanted high quality as fast as possible. This leaves the owner to make the sacrifice of money. More money would have to be done to fulfill the owner’s needs and requirements. This chart also works with any other two systems of sacrifice. For example if an owner wants the lowest cost and highest quality then the owner must accept that the project will take longer to be built. If the owner wants the lowest cost and shortest time to complete a project then quality should not be the main issue for the owner. These things must be understood and analyzed by the owner in order for the project to be successful. Feasibility studies and analysis on the Wellington Condominiums was conducted by Hankin Group and was found that the sooner the condominium would be built the greater the potential profits would be. With this in mind Hankin group then proceeded to go with a fast-tracked CM @ Risk rather then a traditional project delivery system.

The contractual relationships for the Wellington Condominium are very straight forward in that the owner Hankin Group has contracts with the GC/CM, Architect, land surveyor, and geotechnical engineer. The surveyor and geotechnical engineer have a lump sum contractual arrangement, the GC/CM on the project has a GMP, and architect utilizes a cost plus fee arrangement.

Another interesting point is that “Wellington Commercial Construction” is really part of the developers firm. For protection reasons the developer creates a company for that particular project and acts like its own separate entity from the firm. Even though the project manager has an office at Hankin Group under a GMP contract, legally he works

for Wellington Commercial Construction. The architect's job by contract is to manage the design team on the project while the GC/CM is fully responsible for the management of contractors and construction of the project. The architect and GC/CM work very closely together on the project in any changes that are requested from the owner. Every other day a call from the owner is issued to the project team and this request from the owner is put on the project team's table. The team then gets together and meets with consultants on the conditions of the order and sees if it is possible to do within reason. The architects are then in charge of the consultants to change the design and GC/CM is in charge of the contractors to see that those changes are constructed. All the consultants and contractors contracts go by a lump sum to each party on the project.

The selection process for the Wellington Project is based on trust and previous relationships with the owner. The architect, civil engineer and land surveyor, geotechnical engineer and owner have in past worked very closely with other projects and therefore got the job. By doing many development projects over the years the owner starts to develop a relationship with someone they can get along with and function well. Again time is money and the less introducing to a new system or format the quicker it is to get a project completed. The GC/CM is in reality part of the owners company but for legality reasons is seen as its own entity. The contractors on the job were either selected due to trust and previous experience or had the most economical and value adding to the project. These decisions were made by the GC/CM and then passed onto the owner for final approval.

With bonding and insurance, the GC/CM holds much of the responsibility and not the owner. Since the owner and GC/CM are of the same company the owner tends to shed most of that responsibility to the GC/CM on the project so that the owner is free from any legal stance. The owner is only going to do what is necessary to protect themselves and let the GC/CM do as they see fit to protect themselves during the project. The contractors on the project are expected to have there own insurance and liabilities when working on the construction site.

The contract types and delivery systems for the project are a good selection for a developer for the very reason time is money. If an owner has to wait for the project to be designed, bid and built in a systematic way the opportunity for larger profitability is over. Therefore flexibility in design and construction, easy paths of communication with many parties, and ways of protection for the owner are the major reasons for why the project was setup this way. Risk is a big factor to play in being a developer and by shedding responsibility to another entity in the company for that project and working with familiar faces is critical to whether or not this project is successful.

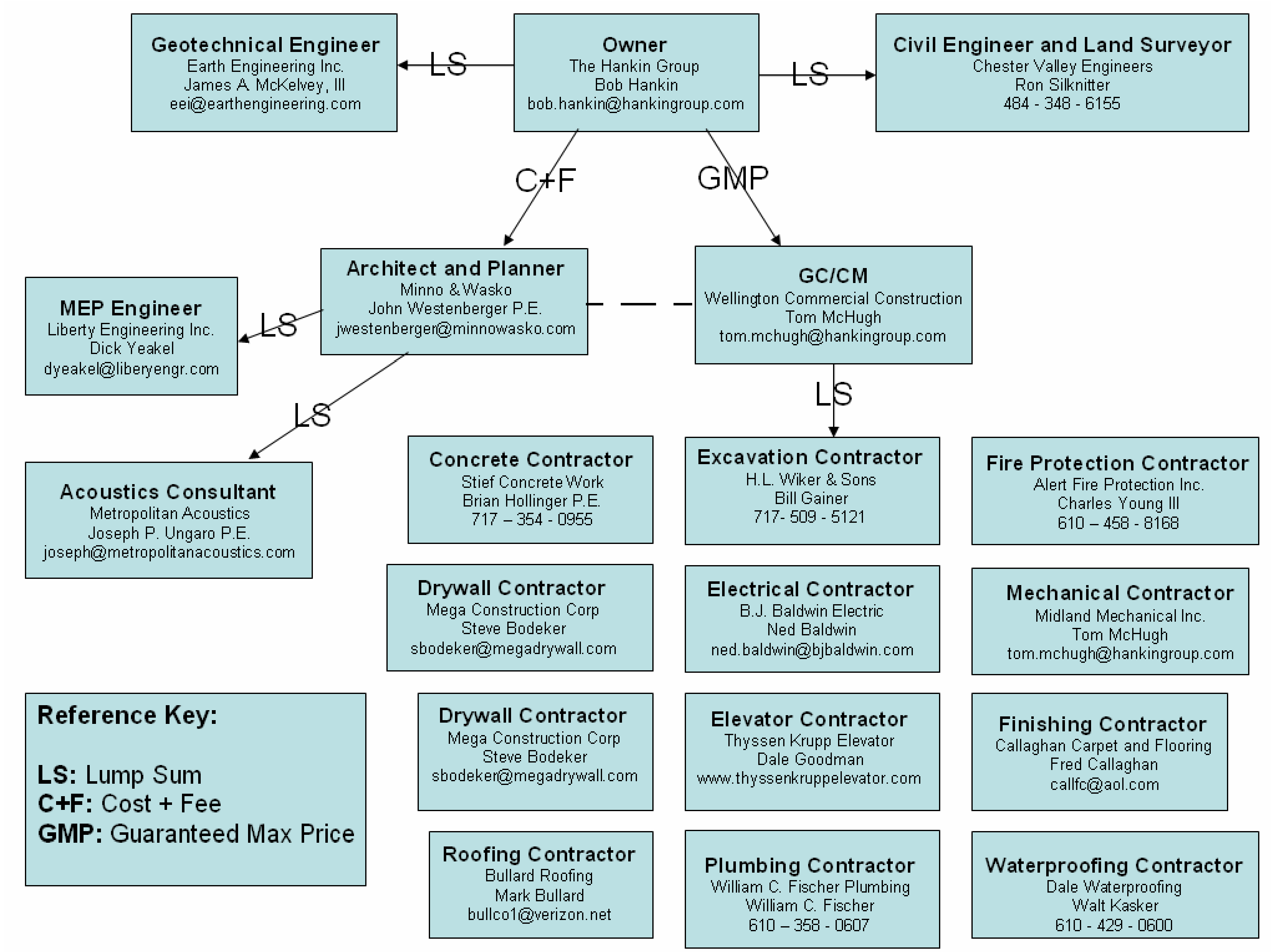


Figure 5: Project Delivery of Wellington Condominiums

E. Staffing Plan

First and foremost Bob Hankin; president from Hankin Group oversees all projects including Wellington Commercial Construction which is run by Tom McHugh; director of construction. Even though technically by contract Bob Hankin has nothing associated with the company he still has authority and control over what the GC/CM dose on the project. Bob Hankin is primarily concerned over the big picture of the project and leaves

the details to Tom McHugh. Tom McHugh's primary responsibility is to manage the everyday issues on this particular project and is the key link between the owner and GC/CM on the project. The senior project manager Ray Winch organizes and manages what happens on the construction site. The rest of the staff answer in the same fashion one way or another to Ray Winch and predominately are on the construction site full time managing the crews and production of the project. The staff from working on many other projects is very close and knows from experience what to expect from each other. Everyone has there role to play and have been very successful up to this date.

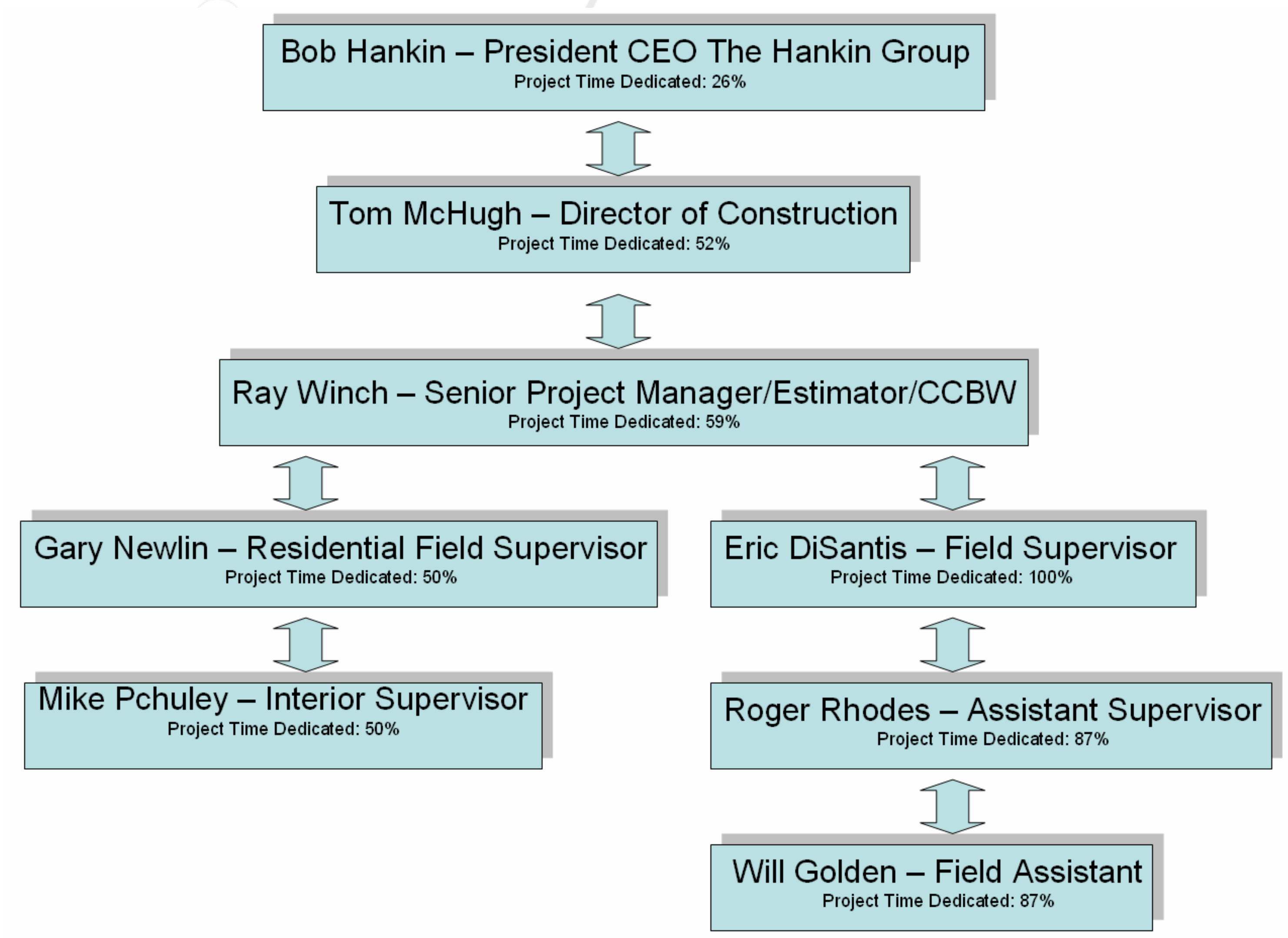


Figure 6: Staffing Chart of Wellington Commercial Construction

Appendix A. Pictures

Picture 1: Column Footings being erected

Picture 2: Vertical Formwork being used for Foundation walls

Picture 3: Foundation Columns and Footings installed prior to slab on grade

Picture 4: 12" transfer slab on first floor before pour

Picture 5: First of three pours on first floor with concrete pumps utilized

Picture 6: Horizontal Formwork being utilized for the first floor pour