

TECH 1

**TECHNICAL
ASSIGNMENT**

1



Grand View
AT ANNAPOLIS TOWNE CENTRE AT PAROLE

ANNAPOLIS, MD

Matthew Karle
Construction Management
Dr. Chimay Anumba
Monday, October 6, 2008



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 Grandview at Annapolis Towne Centre
 1915 Towne Centre Blvd
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Technical Assignment #1

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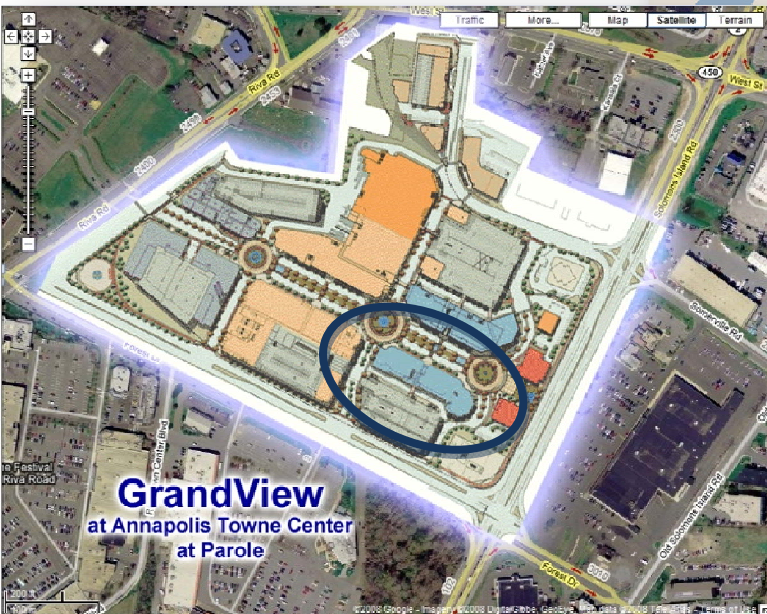
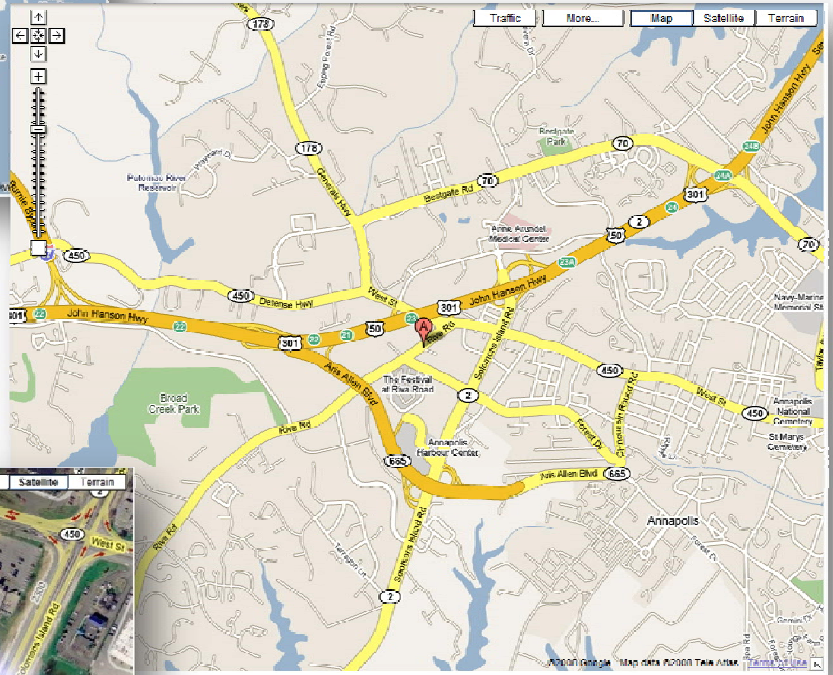
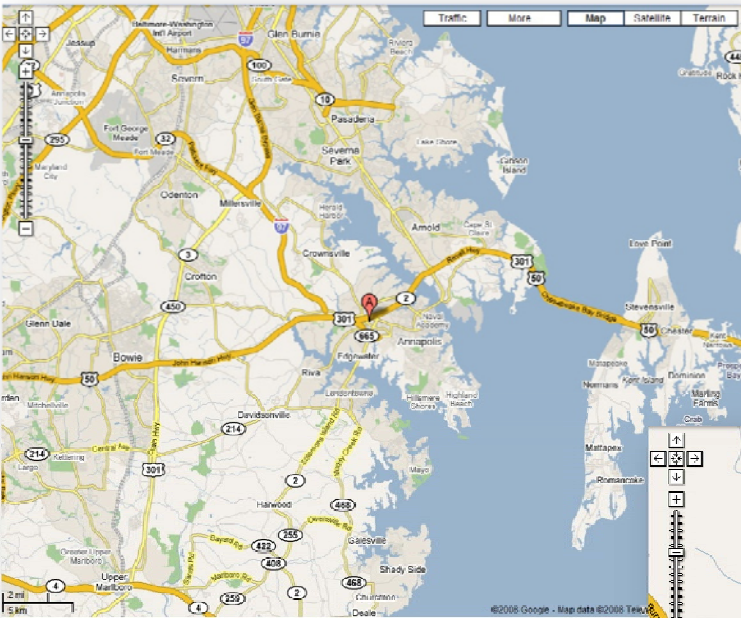
Executive Summary

This Technical Assignment takes a detailed look at the existing conditions of GrandView at Annapolis Towne Centre. Several facets relating to the construction and management structure will be summarized along with a brief project schedule, cost evaluation, and project delivery system. An overview of the local conditions, existing siteplan, and building systems will also be presented.

GrandView at Annapolis Towne Centre at Parole is a 13 story mixed-use residential and commercial high-rise located in Annapolis, MD. It's 385,000 square feet will consist of a commercial first floor for tenant fit-out retail spaces, and 12 stories of luxury condominiums. The total project cost is estimated to be \$68,500,00 and will provide 125 residential units. Amenities include a rooftop pool and sundeck, fitness center and social club. Situated on 33 acres just outside of Annapolis, the site is considered the second oldest retail venue in the state.

GrandView is only a small portion of the overall massive development that is Annapolis Towne Centre. Greenberg Gibbons serves as the Master Developer and has empowered Sturbridge Homes to act as owner of GrandView. Gilbane ATC, was awarded the contract in October of 2006 as a Design-Bid-Build delivery system with a Guaranteed Maximum Price. The Project broke ground in March of 2007 and is currently on schedule to be completed in June of 2009.

Location



ADDRESS

Grandview at Annapolis Towne Center

1915 Towne Centre Blvd

Annapolis, MD 21401

Client Information

GrandView is only a small part of the large scale development plan that is happening at the Annapolis Towne Centre at Parole. Greenberg Gibbons Commercial Corporation is the Master Developer of the area. Sturbridge Homes is the direct owner of Grandview at ATC and has hired Gilbane ATC to act as the General Contractor.

Annapolis Towne Center is the former site of the Parole Plaza Shopping Center, which was built in the early 1960's, closed in the 1990's, and has remained vacant for a decade. Parole Plaza Shopping Center was the first shopping center developed in the Annapolis area that contained major department stores. This was a defining event in the commercial evolution of the Annapolis area — before the opening of this shopping center, Annapolis residents had to travel to Washington, DC or Baltimore to shop in an upscale department store. The new Towne Centre will create a revitalized living, shopping, entertainment and community center for the city and for Anne Arundel County.

GrandView is located in one of the most affluent areas of Maryland with an average household income exceeding \$82,000. More than 100,000 people living in 5-mile radius will help provide a steady stream of consumers. GrandView will provide up-scale living with the convenience of a shopping center directly at its doorstep. The location also provides great accessibility to several major roadways: Route 2, Riva Road and West Street and MD Route 50.

Sturbridge has concentrated mostly on smaller residential villages and complexes This is the first project of this caliber for Sturbridge Homes. The success of this project will no doubt give them the knowledge and respect to obtain similar jobs like this in the future. They proudly earned the Certified Master Builder certification by meeting the highest standards for industry experience, customer satisfaction, financial stability and adherence to accepted building technology standards.

Local Conditions

- Regional Soil Types: Clay, Sand, Gravel, Silt
- Preferred Method of Construction: Cast-in-Place Concrete, Masonry, Light Steel
- Available Parking: Existing Parking on outskirts as well as newly built parking garages on the site
- Tipping Fees: The Annapolis area usually imposes a \$300-\$400 tipping fee. No LEED certification required.

Project Delivery System

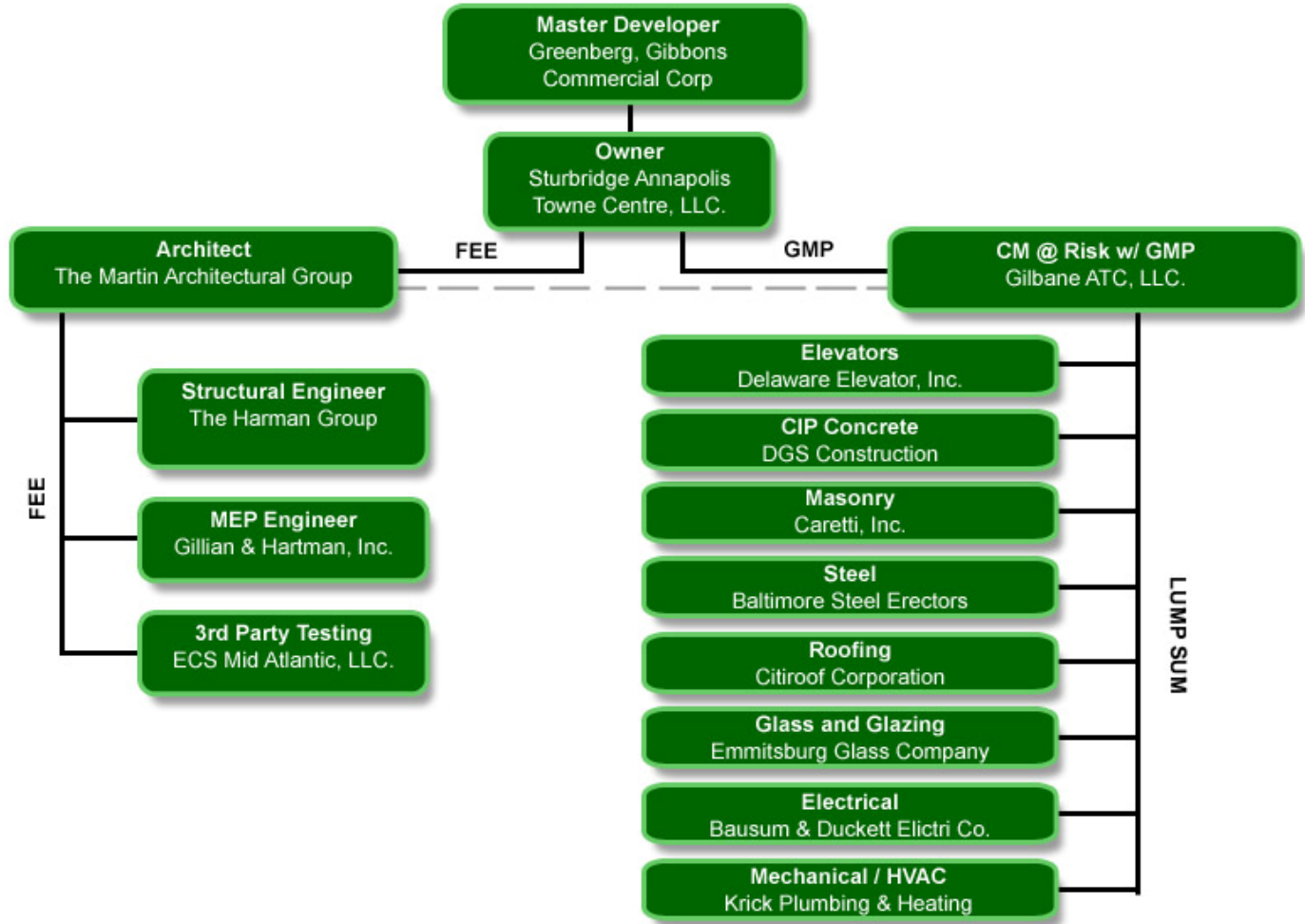


Chart 1: Project Delivery System

Contractual Agreements

Gilbane Building Company holds all contracts with the sub-contractors directly as a lump sum bid. Sturbridge hold contracts with the Martin Architectural group as well as the 3rd party testing firms. A close client relationship couple with a great networking team played a large part in the procurement of the project for Gilbane. Because Gilbane was brought on board early in the project, many issues were solved during the GMP negotiations phase. This was beneficial and saved time in early preconstruction.

Project Management Overview

On the GrandView project, Gilbane uses a relatively straight-forward and direct staffing plan. The hierarchical configuration allows for fast communication and flow of information.

The responsibilities of the following positions include the following:

Project Executive

The Project Executive deals directly with the owner and Gilbane senior management (update meetings, cost forecasting/updating). Basically he acts as the update contact to the Corporate Office as to where the project stands once a month in the PX meetings. Bill also reviews all changes before being sent to the owner, and acts as the GBC ATC, LLC representative at the master developer meetings once a week.

Project Accountant

Their duty is to complete cost reports, pay the subs, process the pay applications monthly, and run cost report meetings once a month at the field office.

Sr. Project Engineer

The Senior Project Engineer acts as the assistant to the PX. He provides project manager style supervision for the Assistant PE's and is in charge of creating the schedule and updating it with the superintendents every two weeks. Duties also include management of all change orders and the associated paper work that comes with them. He also reviews pay applications monthly, gives senior level advice to younger APE's on RFIs, submittals, and field issues.

Assistant PE

Assistant PE's act as the 'paper workhorse' for the project. They are in charge of RFI's submittals, field coordination with subs, material-equipment-status reports, first delivery inspections, and reviewing pay applications.

Staffing Chart

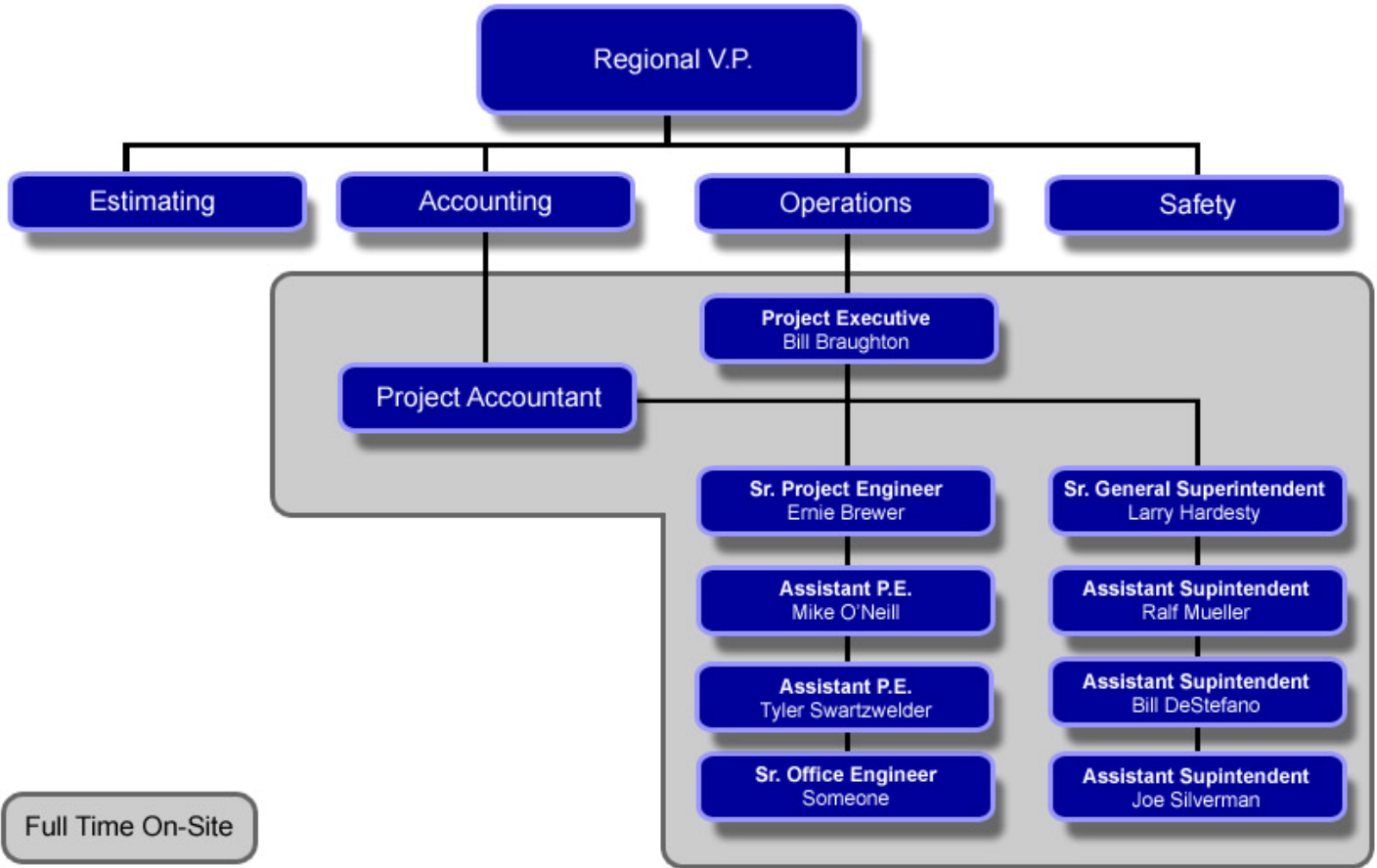


Chart 2: Gilbane Staffing Plan

Site Plan of Existing Conditions

See Appendix A for layout of existing conditions of GrandView at Annapolis Towne Centre.

Annapolis Towne Centre offers the project team for GrandView an exceptional site layout with dealing with logistics, material storage, and trailer placement. An existing office building north of the construction site made a perfect housing facility for the Gilbane and Sturbridge staff. While an open area directly south of the office building allowed for the subcontractors to set up office trailers. The close proximity of the trades allowed for easy communication and also aided in material delivery and logistics planning.

GrandView is fortunate because roads were completed very early in the project to allow for uninterrupted vehicle flow and material deliveries. Four gates provide easy access from all sides of the site. However, the main entrance, located near the Gilbane office, serves as the primary entrance for deliveries. This is also important because the off-site material storage space is located directly East of the entrance.

An early stage parking garage serves as the primary parking facility for workers of the whole site. Satellite parking is also available near the Gilbane Safety trailer located South East of GrandView.

Neighboring Structures Include:

- Parking Garage with integrated retail space on the ground floor.
- Target Department Store (35 ft.)
- Residential Condominiums (11 Stories)

The size of the site made it difficult for a common fence to be erected. For the foundation phase of the project, a temporary fence was set up with an approximate 50 ft. offset from the perimeter. However, once the foundation and early structure was erected. The temporary fence was taken down and a large outer fence along the entire ATC site was installed and staffed with a 24/7 security crew at each gate. This allowed for easier traffic movement and united all projects involved.

Building Systems Summary

Yes	No	Work Scope
x		Demolition Required
x		Structural Steel Frame
x		Cast in Place Concrete
	x	Precast Concrete
x		Mechanical System
x		Electrical System
x		Masonry
x		Curtain Wall
	x	Support of Excavation
x		Roofing System
x		Envelope

Building Systems Summary: Quick View			
Yes	No	Work Scope	Information
X		Structural Steel	<ul style="list-style-type: none"> Miscellaneous structural steel used to support three cupola dome roofs GFRC Cornice bracing
X		Cast In Place Concrete	<ul style="list-style-type: none"> Two-way flat slab system, shear resistance elements elevator shaft and two stair towers Typical formwork with shoring and wood frames placed with two pump towers on opposite ends of building that stayed throughout construction
	X	Precast Concrete	<ul style="list-style-type: none"> No precast used
X		Mechanical Systems	<ul style="list-style-type: none"> Typical condo units, floors 2-10, have packaged HVAC system (Magic-Pak) Penthouse units and common spaces utilize split systems with gas fired furnaces. Mechanical equipment on Mezzanine roof and main roof Wet-type fire suppression system
X		Electrical Systems	<ul style="list-style-type: none"> 4000 A Main Service Gear (Condos) -- 1000 A Service Gear for Shell Building 350 kW Emergency Generator Back-up
X		Masonry	<ul style="list-style-type: none"> Masonry veneer, brick and calcium silicate masonry units GFRC (Glass Fiber Reinforced Concrete) Decorative Elements Henry spray applied air/moisture barrier system Relief angles (5x5x1/2) at each floor, brick ties 24" o.c. Climbing scaffold used primarily, portion of work done from traditional scaffold
X		Curtain Wall	<ul style="list-style-type: none"> Kawneer 1800 system used, dry seal Operable windows incorporated, vision and spandrel glazing used Stick built and erected in sections (3 floors at a time) Curved full glass walls at 2 corners A/E of record base design, shop drawings by contractor
	X	Support of Excavation	<ul style="list-style-type: none"> Shallow foundations and auger cast piles used, no significant excavation
X		Roofing System	<ul style="list-style-type: none"> Single-ply EPDM "Upside-down" roof utilized at pool deck, with secondary roofing system underneath of pool deck
X		Envelope	<ul style="list-style-type: none"> See Masonry above. Unique feature is Henry air/moisture barrier system as inspected by ABAA ABAA (Air Barrier Association of America)

Chart 3: Building Systems Summary

Structural

GrandView is predominately a concrete 2-way flat slab system with shear resistance elements including a central elevator shaft and two stair towers at both the East and West ends of the building. The frame is made up of 16"-24" cast-in-place concrete columns. Favorable soil conditions allow a shallow foundation which consists of a 5" S.O.G with primarily 2' footings and augured piles. Half of floor two will house more retail and has an 8" 1-way slab. Common residential floors 3-10 and penthouse floors 11-12 all have 8" 2-way slabs. The roof also has an 8" slab with the exception of a 16" slab around the pool area. W12x22 steel columns and miscellaneous structural steel hold up 3 cupola domes that house various mechanical systems on the roof. A typical masonry curtain wall is used for floors 3-10 with a stucco finish primarily at the lower retail portion of the building.

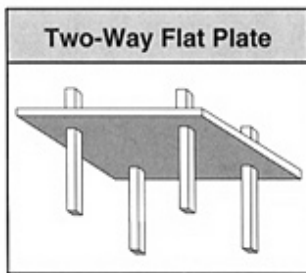


Figure 1: Two Way Flat Slab



Figure 2: Placing Cupola Dome

Electrical

Two different service utilities are incorporated in GrandView in accommodate both the residential and commercial sections of the building. A 120/280V transformer is provided for the residential sections and is fed into a 4000A, 120/208V, 3PH, 4W switchboard. From the switchboard, (2) 2000A bus ducts are fed which help power (8) 1000A meter centers located throughout the levels. From these meter centers, individual distribution panels are fed which power the apartment panelboards.

The commercial section of GrandView is serviced by a 480/277V transformer. Housing equipment, which is used in multi-use areas, is connected by a 1000A 480/277V, 3PH, 4W switchboard. Redundancy is provided by a 350Kw/437.5 kVA 480/277, 3PH, 4W emergency generator.



Figure 3: Bus Duct



Figure 4: Meter Center



Figure 5: Panel Board

Lighting

The majority of interior lighting in the residential units consists of standard lensed incandescent fixtures. These are controlled by multiple dimmer switches. While each dwelling unit is individually controlled, multi-use areas employ dimming, architectural, and daylighting controls. Lithonia 32 W T8 fluorescents lamps illuminate almost all of the retail space. GrandView also makes use of 100W HID lamps mounted on poles to light up the pool and lounge area located on the roof.

Mechanical

Typical condo units, floors 2-10, have packaged (Magic-Pak) HVAC systems. These units are housed in vibration isolated closets in one bedroom of each unit. Additional design of an exterior ventilation system (simple copper tubing) was needed in order to ensure an extremely low noise level in each closet. Penthouse units and common spaces utilize split systems with gas fired furnaces.



Figure 6: Magic-Pak System in Bedroom

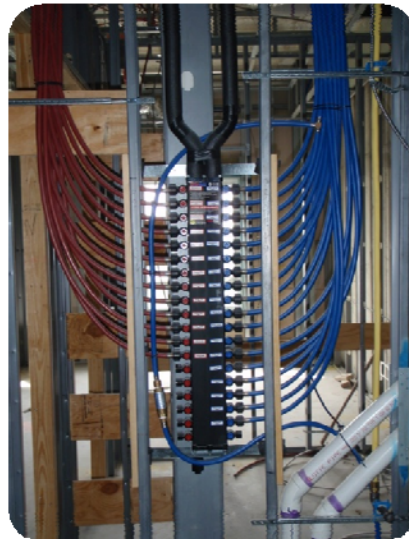


Figure 7: Flexible PEX Plumbing System

Cost Evaluations

Building Costs

Overall Cost Summary

GrandView: Overall Costs		
Costs	Total Cost	Cost / SF
Construction 'Direct Costs'	\$56,500,000	\$146.56
Building Costs	\$64,400,000	\$167.06
Total Project Cost	\$68,500,000	\$177.69

Chart 4: Overall Costs

Building Systems Summary

GrandView: Building Systems Cost		
Building System	Cost	Cost / SF
Structure	\$8,610,000.00	\$22.33
HVAC/Plumbing	\$8,110,000.00	\$21.04
Electrical	\$4,223,000.00	\$10.95
Fire Protection	\$800,000.00	\$2.08
Conveying Systems	\$1,235,000.00	\$3.20

Chart 5: Building Systems Costs

RS Means Estimate

See Appendix C for RS Means 2008 Data Sheets

Residential Apartments (Floors 2-13)

SF Area: 339,000 SF
 LF Perimeter: 1667 LF
 12 Stories – 13 ‘ Average Story Height

Cost per Square Foot of Floor Area: \$159.79/SF

Perimeter Adjustment: $(1667-530)/(100) \times (\$3.40) = +\$56.70$ SF
 Height Adjustment: +\$1.60
 Location Modifier: 0.84 (Annapolis, MD)

Total Cost per SF of Floor Area: \$183.20/SF

Estimated Residential Cost: \$62,105,000

Assumptions:

Apartment: SF Area: 275000
 LF Per: 530

-Face Brick w/ Conc. Block Back up

Retail: SF Area: 22000
 LF Per: 594

-Painted Concrete Block

Location: Annapolis, MD (0.84)

Store / Retail (Ground Floor + Partial Second Floor)

SF Area: 46,700 SF
 LF Perimeter: 1667
 1.5 Stories – 14 ‘ Average Story Height

Cost per Square Foot of Floor Area: Assumed \$78.20/SF through guessed interpolation

Perimeter Adjustment: $(1667-594)/(100) \times (\$2.60) = +\$27.90$
 Height Adjustment: +\$1.40
 Location Modifier: 0.84 (Annapolis, MD)

Total Cost per SF of Floor Area: \$90.30/SF

Estimated Residential Cost: \$4,217,000

TOTAL COMBINED PROJECT COST: \$ 66,322,000

D4Cost 2008 Estimate

See Appendix B for Additional D4 Cost Estimate Breakdown

The D4Cost estimate was performed by selecting similar residential projects that mirrored GrandView in both relative cost per floor as well as square footage. Parkway Place and 201 Turk St. Complex were chosen because of their relative size and design. In order to get a more accurate result, Convent High School and University Student Residence were chosen because of the location near Annapolis, MD and also the delivery system that they were built under. The High School exhibits multi-use features which can be seen in the ground floor of GrandView. Overall, once square footage was adjusted, D4Cost produced a relatively accurate final cost.

Projects Based On Historical Data

Project ID	Project Name	# Floors
RS000314	Parkway Place	3
RS041160E4	Convent Highschool	4
RS070321	University Student Residence	4
RS960330	201 Turk St. Apartment Complex	9

Cost and Percentage breakdown by Division

Division	Division Name	%	Sq. Cost	Projected
0	Bidding Requirements	1.52	\$2.67	\$1,028,959
1	General Requirements	7.23	\$12.74	\$4,911,153
2	Site Work	5.13	\$9.04	\$3,486,503
3	Concrete	7.32	\$12.89	\$4,970,268
4	Masonry	2.95	\$5.20	\$2,006,338
5	Metals	1.08	\$1.90	\$731,112
6	Wood & Plastics	6.4	\$11.28	\$4,347,291
7	Thermal & Moisture Protection	4.85	\$8.54	\$3,293,365
8	Doors & Windows	3.21	\$5.66	\$2,181,016
9	Finishes	10.05	\$17.70	\$6,824,667
10	Specialties	0.76	\$1.33	\$514,111
11	Equipment	1.7	\$2.99	\$1,153,324
12	Furnishings	0.9	\$1.59	\$613,090
13	Special Construction	0.26	\$0.46	\$179,227
14	Conveying Systems	1.23	\$2.17	\$836,355
15	Mechanical	11.57	\$20.38	\$7,858,061
16	Electrical	7.62	\$13.43	\$5,175,656
21	Fire Suppression	1.45	\$2.56	\$985,837
22	Plumbing	4.84	\$8.53	\$3,288,016
23	HVAC	9.62	\$16.94	\$6,531,928
26	Electrical	7.83	\$13.80	\$5,320,263
31	Earthwork	0.93	\$1.64	\$633,603
32	Exterior Improvements	1.41	\$2.49	\$958,582
33	Utilities	0.12	\$0.22	\$83,412
	Total Building Costs	100	\$176.16	\$67,912,135.00

Chart 6: D4Cost Breakdown by Division

Cost Comparison

Both RS Means and D4Cost estimates produced surprisingly accurate project costs that required very little re-working. RS Means came in with \$66,322,000, which was within 3.2% of the actual project cost. D4 produced an even closer estimate of \$67,912,135. Astonishingly, this is within %1 of the actual project cost. 1% is extremely good to see considering other figures that colleges were coming up with in their analysis.

In order to increase the accuracy of the RS Means Estimate, the addition of building systems and façade details should be added in order to increase the SF cost in the residential area. There was some discrepancy in calculating the retail portion of GrandView because of limited data. Unfortunately RS Means only produced SF estimates up to 22000 SF. GrandView calls for more than double that. However, a lower SF price would be expected which would ultimately lower the price per square foot and set the estimate off by even more. Therefore, future estimates should take into account the quality of the retail space being produced and find a more accurate representation.

Overall, both forms of estimation produced very high quality results that confirm actual price of the project.

Project Schedule Summary

See Appendix D for Project Schedule Summary

Gilbane ATC, was awarded the project in early December. This allowed roughly 3 months for preconstruction including obtaining permits and issuing trade contracts.

Sequencing

Foundation

Auger cast piles were working concurrently with the concrete footings starting at the West end of the building and working East. A direct truck pour was implemented during regular construction hours. There were no pump towers at the site at this time.

Structural

Pouring the concrete at 2 a.m. helped in the fast erection time per floor. By doing this, workers were able to set the column cages for the next pour by 10 a.m. The building was phased in two sections and had little or no curing issues. Minimal flash patching was required at the stair towers. For a cleaner finish, the stairs were pre-cast on site and crane set.

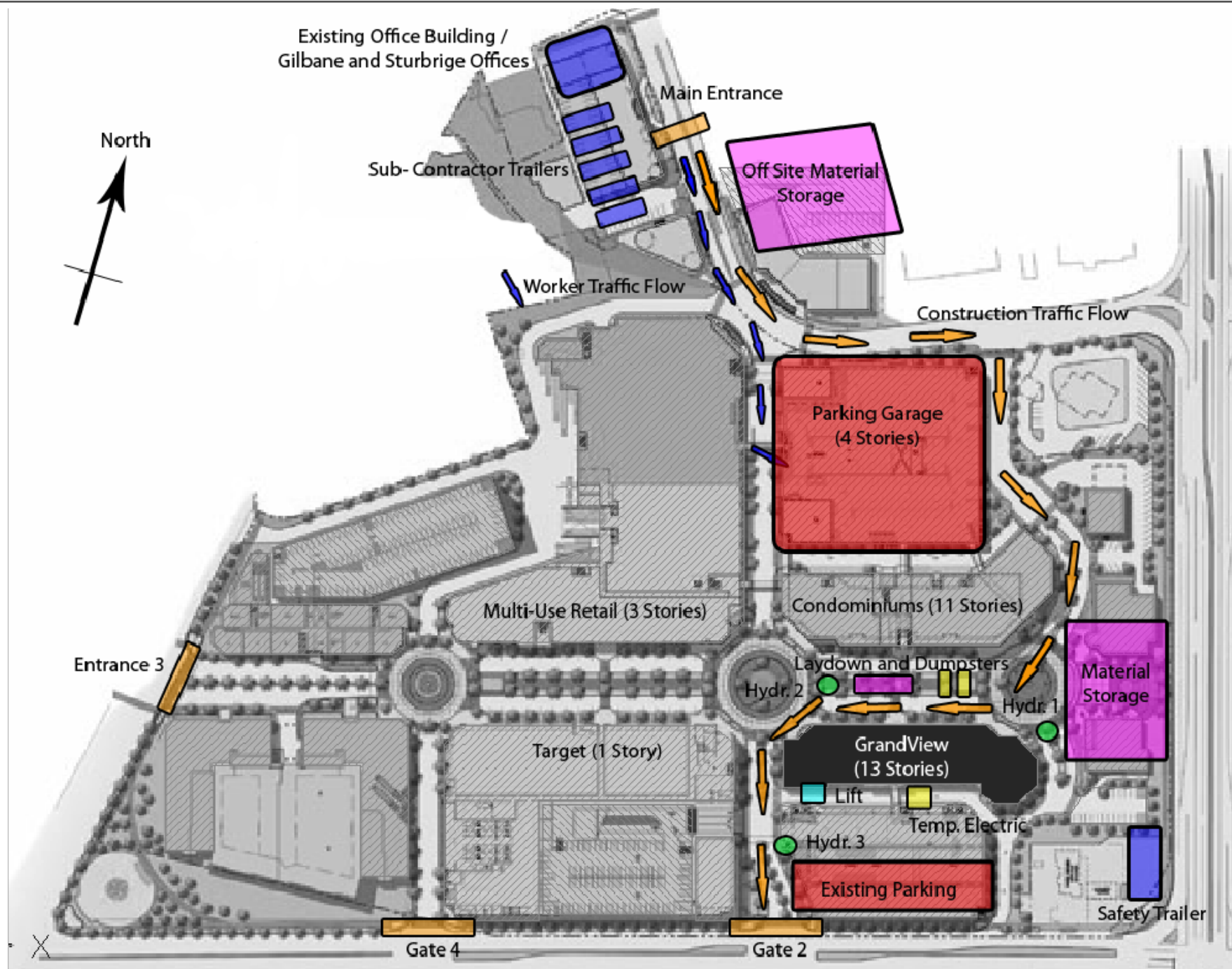
Finishes

In order to maintain flow and speed, a parade effect of trade work was implemented. Trades started in the East section of the 10th floor, starting with drywall, flooring, electrical, MEP, cabinets, then countertops. Each trade followed one another. Once a week a “composite cleanup crew”, that consisted of 1-3 men from each company, made a clean sweep of the floor to ensure proper tidiness. This was required from Gilbane. The 11th and 12th floors were completed after the 2nd floor because they wanted to make sure that no water damage would occur when the roof was tested for water tightness.

All work is proceeding as scheduled. However, there can no longer be deliveries by 53' trailers because of the loss of the material hoist. The opening of Target prohibits any view of 'construction' from their property, therefore all materials will be delivered through building elevators. This takes much longer than the hoist and hinders production time slightly.

Appendix A

GrandView at Annapolis Towne Centre
Existing Conditions Site Plan



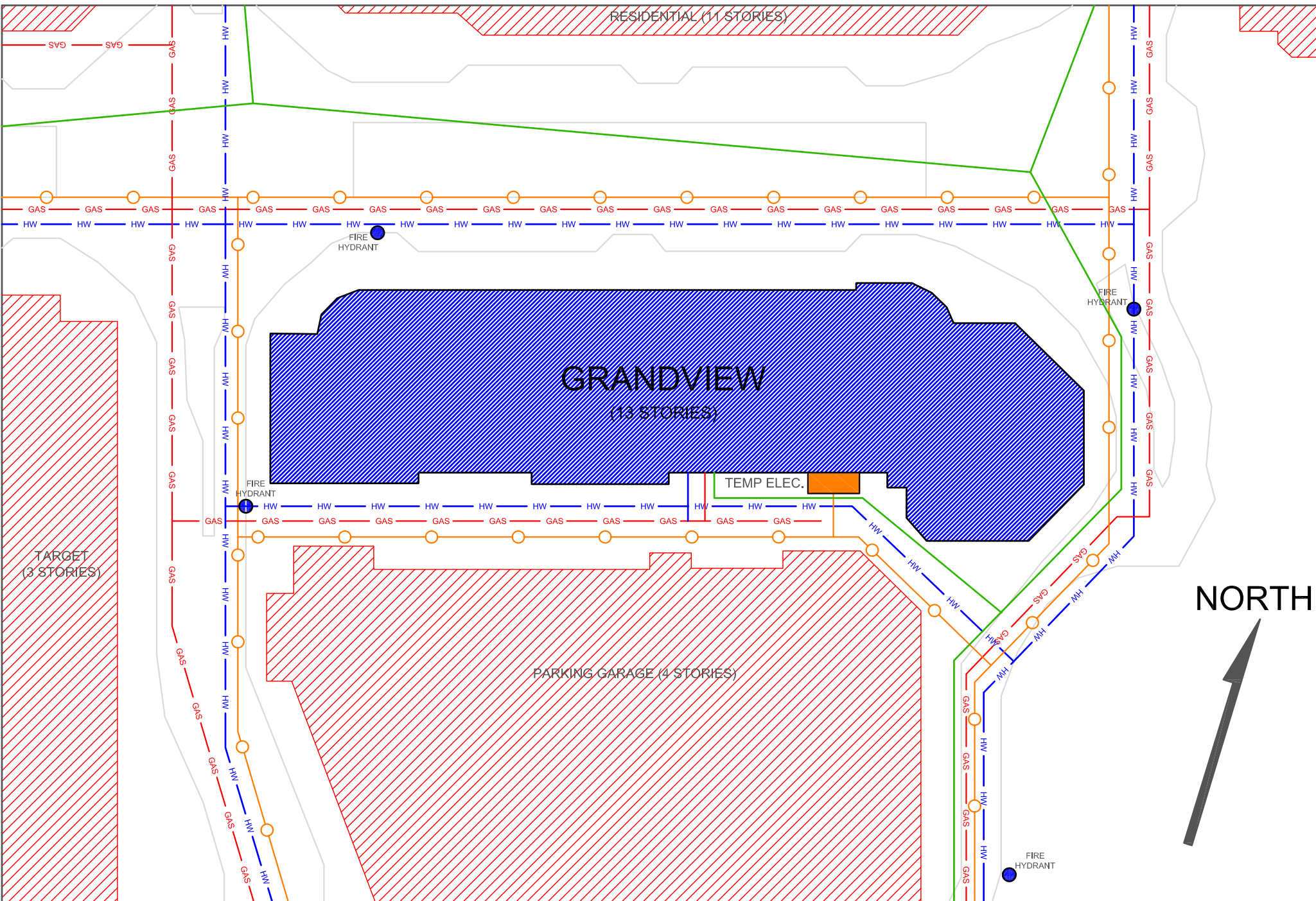
FULL SITE PLAN



note: due to large site, civil drawings were not able to be obtained. artist rendering of site was used in order to convey basic facility and traffic layout



GRANDVIEW
AT ANNAPOLIS TOWNE CENTRE
ANNAPOLIS, MD



EXISTING UTILITIES PLAN

- SANITATION LINE
- EXISTING ELECTRICAL
- HW— EXISTING WATER
- GAS— EXISTING GAS
- TEMP. ELECTRIC
- FIRE HYDRANT

note: existing lines are considered new, pre-construction. No temporary lighting needed. Night work is lit by portable light generators.



GRANDVIEW
AT ANNAPOLIS TOWNE CENTRE
ANNAPOLIS, MD

NORTH

MIXED RETAIL (3 STORIES)

RESIDENTIAL (11 STORIES)

RESTAURANT

RESTROOMS

LAYDOWN

DUMPSTERS

TARGET (3 STORIES)

GRANDVIEW
(13 STORIES)

LIFT

MATERIAL STORAGE

PARKING GARAGE
(4 STORIES)

GILBANE SAFETY TRAILER

TEMP. PARKING

FOREST DRIVE

TRAFFIC SITE PLAN

LEGEND

—□— FENCE

—▶— PED/WORKER

—▶— DELIVERY/CONSTRUCT



LIFT

note: due to outer site fences and security, movement of vehicles and pedestrians is extremely fluid and only confined to roads. Paths shown only convey assumed movement.



GRANDVIEW AT ANNAPOLIS TOWNE CENTRE ANNAPOLIS, MD

Appendix B

GrandView at Annapolis Towne Centre
D4 Cost Schedule Summary

Statement of Probable Cost

Grandview - Mar 2006 - MD - Annapolis

Prepared By: Matthew Karle AE Construction Management	Prepared For: Dr. Anumba PSU AE Department Head
State College, PA 16801	University Park, PA 16802
Fax: 385518	Fax: 1101175
Building Sq. Size: 385518	Site Sq. Size: 1101175
Bid Date: 10/23/2006	Building use: Residential
No. of floors: 13	Foundation: CON
No. of buildings: 1	Exterior Walls: MAS
Project Height: 165	Interior Walls: GYP
1st Floor Height: 12	Roof Type: MEM
1st Floor Size: 29000	Floor Type: CON
	Project Type: NEW

Division		Percent	Sq. Cost	Amount
00	Bidding Requirements	1.52	2.67	1,028,959
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01	General Requirements	7.23	12.74	4,911,153
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02	Site Work	5.13	9.04	3,486,503
	Site Work	5.13	9.04	3,486,503
03	Concrete	7.32	12.89	4,970,268
	Concrete	7.32	12.89	4,970,268
04	Masonry	2.95	5.20	2,006,338
	Masonry	2.95	5.20	2,006,338
05	Metals	1.08	1.90	731,112
	Metals	1.08	1.90	731,112
06	Wood & Plastics	6.40	11.28	4,347,291
	Wood & Plastics	6.40	11.28	4,347,291
07	Thermal & Moisture Protection	4.85	8.54	3,293,365
	Thermal & Moisture Protection	4.85	8.54	3,293,365
08	Doors & Windows	3.21	5.66	2,181,016
	Doors & Windows	3.21	5.66	2,181,016
09	Finishes	10.05	17.70	6,824,667
	Finishes	10.05	17.70	6,824,667
10	Specialties	0.76	1.33	514,111
	Specialties	0.76	1.33	514,111
11	Equipment	1.70	2.99	1,153,324
	Equipment	1.70	2.99	1,153,324
12	Furnishings	0.90	1.59	613,090
	Furnishings	0.90	1.59	613,090
13	Special Construction	0.26	0.46	179,227
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14	Conveying Systems	1.23	2.17	836,355
	Conveying Systems	1.23	2.17	836,355
15	Mechanical	11.57	20.38	7,858,061
	Mechanical	11.57	20.38	7,858,061
16	Electrical	7.62	13.43	5,175,656
	Electrical	7.62	13.43	5,175,656
21	Fire Suppression	1.45	2.56	985,837
	Fire Suppression	1.45	2.56	985,837

22	Plumbing	4.84	8.53	3,288,016
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23	HVAC	9.62	16.94	6,531,928
	HVAC	9.62	16.94	6,531,928
26	Electrical	7.83	13.80	5,320,263
	Electrical	7.83	13.80	5,320,263
31	Earthwork	0.93	1.64	633,603
	Earthwork	0.93	1.64	633,603
32	Exterior Improvements	1.41	2.49	958,582
	Exterior Improvements	1.41	2.49	958,582
33	Utilities	0.12	0.22	83,412
	Utilities	0.12	0.22	83,412
Total Building Costs		100.00	176.16	67,912,135
Total Non-Building Costs		100.00	0.00	0
Total Project Costs		--	--	67,912,135

Appendix C

2008 RS Means Square Foot Costs
M.030 Apartment, 8-24 Story
M.630 Store, Retail

RSMMeans

Square Foot Costs

29th Annual Edition

- Residential • Commercial
- Industrial • Institutional



2008

Engin.

TH435
.M44
29th.ed.
2008



Costs per square foot of floor area

Exterior Wall	S.F. Area	95000	112000	129000	145000	170000	200000	225000	250000	275000
	L.F. Perimeter	345	386	406	442	460	510	530	590	630
Ribbed Precast Concrete Panel	Steel Frame	195.90	192.05	187.75	185.70	182.25	178.50	170.95	164.70	160.20
	R/Conc. Frame	188.65	184.90	180.80	178.80	175.60	172.05	164.95	159.10	154.85
Face Brick with Concrete Block Back-up	Steel Frame	176.20	172.70	169.00	167.15	164.20	161.05	154.70	149.55	145.70
	R/Conc. Frame	183.95	180.45	176.75	174.90	171.95	168.80	162.45	157.25	153.45
Stucco on Concrete Block	Steel Frame	165.80	162.85	160.00	158.40	156.10	153.75	149.20	145.40	142.70
	R/Conc. Frame	173.55	170.60	167.75	166.15	163.85	161.50	156.95	153.15	150.45
Perimeter Adj., Add or Deduct	Per 100 L.F.	9.80	8.35	7.20	6.40	5.50	4.65	3.40	2.35	1.50
Story Hgt. Adj., Add or Deduct	Per 1 Ft.	3.15	2.95	2.70	2.60	2.40	2.25	1.60	1.25	0.90
<i>For Basement, add \$31.15 per square foot of basement area</i>										

The above costs were calculated using the basic specifications shown on the facing page. These costs should be adjusted where necessary for design alternatives and owner's requirements. Reported completed project costs, for this type of structure, range from \$77.70 to \$182.35 per S.F.

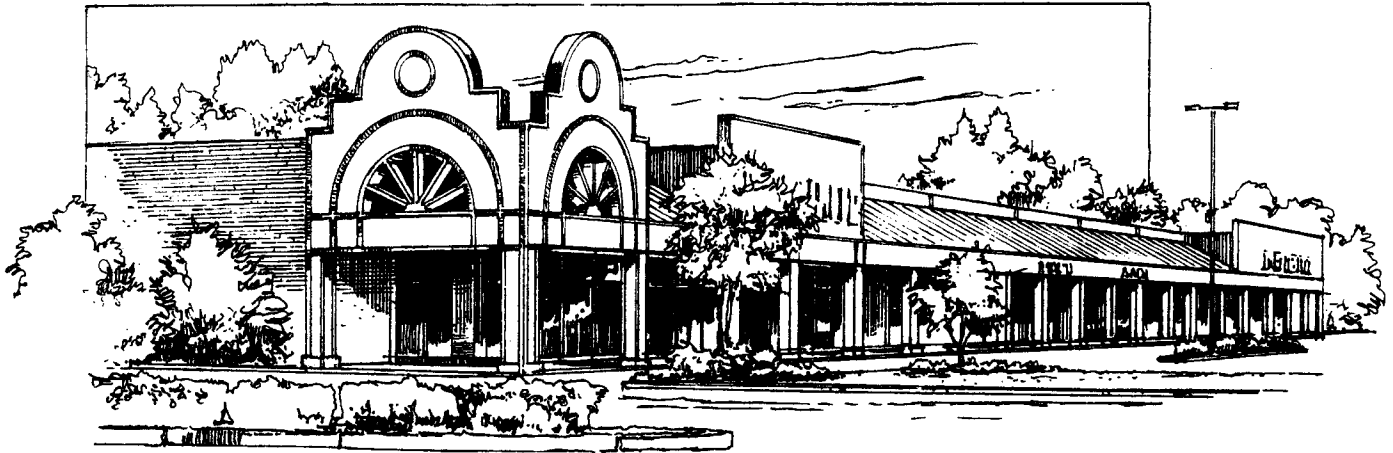
Common additives

Description	Unit	\$ Cost	Description	Unit	\$ Cost
Appliances			Closed Circuit Surveillance, One station		
Cooking range, 30" free standing			Camera and monitor	Each	1750
1 oven	Each	375 - 2175	For additional camera stations, add	Each	940
2 oven	Each	1750 - 2025	Elevators, Electric passenger, 10 stops		
30" built-in			3000# capacity	Each	278,500
1 oven	Each	620 - 2100	4000# capacity	Each	281,000
2 oven	Each	1700 - 2300	5000# capacity	Each	286,000
Counter top cook tops, 4 burner	Each	330 - 860	Additional stop, add	Each	7875
Microwave oven	Each	230 - 740	Emergency Lighting, 25 watt, battery operated		
Combination range, refrig. & sink, 30" wide	Each	1550 - 4050	Lead battery	Each	278
72" wide	Each	4450	Nickel cadmium	Each	800
Combination range, refrigerator, sink, microwave oven & icemaker	Each	5175	Laundry Equipment		
Compactor, residential, 4-1 compaction	Each	615 - 775	Dryer, gas, 16 lb. capacity	Each	860
Dishwasher, built-in, 2 cycles	Each	570 - 890	30 lb. capacity	Each	3525
4 cycles	Each	600 - 1300	Washer, 4 cycle	Each	1050
Garbage disposer, sink type	Each	179 - 325	Commercial	Each	1400
Hood for range, 2 speed, vented, 30" wide	Each	259 - 1325	Smoke Detectors		
42" wide	Each	480 - 2225	Ceiling type	Each	174
Refrigerator, no frost 10-12 C.F.	Each	610 - 840	Duct type	Each	445
18-20 C.F.	Each	765 - 1175			

Model costs calculated for a 15 story building with 10'-6" story height and 145,000 square feet of floor area

Apartment, 8-24 Story

			Unit	Unit Cost	Cost Per S.F.	% Of Sub-Total
A. SUBSTRUCTURE						
1010	Standard Foundations	CIP concrete pile caps	S.F. Ground	8.55	.57	9.2%
1020	Special Foundations	Steel H-piles, concrete grade beams	S.F. Ground	176	11.74	
1030	Slab on Grade	4" reinforced concrete with vapor barrier and granular base	S.F. Slab	4.63	.31	
2010	Basement Excavation	Site preparation for slab, piles and grade beam	S.F. Ground	.25	.02	
2020	Basement Walls	4' Foundation wall	L.F. Wall	65	.24	
B. SHELL						
B10 Superstructure						
1010	Floor Construction	Open web steel joists, slab form, concrete, interior steel columns	S.F. Floor	20.11	18.77	13.7%
1020	Roof Construction	Open web steel joists with rib metal deck, interior steel columns	S.F. Roof	6	.40	
B20 Exterior Enclosure						
2010	Exterior Walls	Ribbed precast concrete panel	87% of wall S.F. Wall	37.25	15.56	14.1%
2020	Exterior Windows	Aluminum horizontal sliding	Each	468	1.94	
2030	Exterior Doors	Aluminum and glass	13% of wall Each	2624	2.23	
B30 Roofing						
3010	Roof Coverings	Built-up tar and gravel with flashing; perlite/EPS composite insulation	S.F. Roof	5.10	.34	0.2%
3020	Roof Openings	N/A	-	-	-	
C. INTERIORS						
1010	Partitions	Gypsum board on concrete block and metal studs	10 S.F. of Floor/L.F. Partition S.F. Partition	12.27	12.27	26.0%
1020	Interior Doors	15% solid core wood, 85% hollow core wood	Each	584	7.30	
1030	Fittings	Kitchen cabinets	S.F. Floor	2.82	2.82	
2010	Stair Construction	Concrete filled metal pan	Flight	9700	2.88	
3010	Wall Finishes	70% paint, 25% vinyl wall covering, 5% ceramic tile	S.F. Surface	1.37	2.73	
3020	Floor Finishes	60% carpet, 30% vinyl composition tile, 10% ceramic tile	S.F. Floor	4.92	4.92	
3030	Ceiling Finishes	Painted gypsum board on resilient channels	S.F. Ceiling	3.49	3.49	
D. SERVICES						
D10 Conveying						
1010	Elevators & Lifts	Four geared passenger elevators	Each	305,588	8.43	6.0%
1020	Escalators & Moving Walks	N/A	-	-	-	
D20 Plumbing						
2010	Plumbing Fixtures	Kitchen, bathroom and service fixtures, supply and drainage	1 Fixture/210 S.F. Floor Each	2371	11.29	10.7%
2020	Domestic Water Distribution	Gas fired water heater	S.F. Floor	3.58	3.58	
2040	Rain Water Drainage	Roof drains	S.F. Roof	2.25	.15	
D30 HVAC						
3010	Energy Supply	Oil fired hot water, baseboard radiation	S.F. Floor	5.90	5.90	9.6%
3020	Heat Generating Systems	N/A	-	-	-	
3030	Cooling Generating Systems	Chilled water, air cooled condenser system	S.F. Floor	7.56	7.56	
3050	Terminal & Package Units	N/A	-	-	-	
3090	Other HVAC Sys. & Equipment	N/A	-	-	-	
D40 Fire Protection						
4010	Sprinklers	Wet pipe sprinkler system	S.F. Floor	2.11	2.11	2.3%
4020	Standpipes	Standpipe	S.F. Floor	1.09	1.09	
D50 Electrical						
5010	Electrical Service/Distribution	4000 ampere service, panel board and feeders	S.F. Floor	2	2	8.2%
5020	Lighting & Branch Wiring	Incandescent fixtures, receptacles, switches, A.C. and misc. power	S.F. Floor	6.80	6.80	
5030	Communications & Security	Alarm systems, internet wiring, emergency lighting, antenna, intercom and security television	S.F. Floor	2.51	2.51	
5090	Other Electrical Systems	Emergency generator, 80KW	S.F. Floor	.18	.18	
E. EQUIPMENT & FURNISHINGS						
1010	Commercial Equipment	N/A	-	-	-	0.0%
1020	Institutional Equipment	N/A	-	-	-	
1030	Vehicular Equipment	N/A	-	-	-	
1090	Other Equipment	N/A	-	-	-	
F. SPECIAL CONSTRUCTION						
1020	Integrated Construction	N/A	-	-	-	0.0%
1040	Special Facilities	N/A	-	-	-	
G. BUILDING SERVICES						
			Sub-Total		140.13	100%
					25%	35.06
					6%	10.51
CONTRACTOR FEES (General Requirements: 10%, Overhead: 5%, Profit: 10%)						
ARCHITECT FEES						
Total Building Cost					185.70	



Costs per square foot of floor area

Construction Item	SF Area L.F. Perimeter	4000	4500	5000	5500	6000	6500	7000	7500	8000
		260	340	380	410	440	490	540	545	590
Split Face Concrete Block	Steel Joists	122.95	111.40	101.35	97.05	93.15	89.60	87.20	85.70	84.60
Stucco on Concrete Block	Steel Joists	120.05	108.90	99.40	95.20	91.55	88.15	85.85	84.40	83.35
Painted Concrete Block	Steel Joists	114.40	103.55	94.45	90.50	87.00	83.75	81.55	80.20	79.20
Face Brick on Concrete Block	Steel Joists	139.65	126.00	112.95	107.60	102.60	98.00	94.90	92.95	91.50
Painted Reinforced Concrete	Steel Joists	129.90	117.50	106.20	101.50	97.10	93.05	90.40	88.70	87.50
Tilt-up Concrete Panels	Steel Joists	120.25	109.05	99.50	95.40	91.65	88.25	85.95	84.50	83.50
Perimeter Adj., Add or Deduct	Per 100 L.F.	14.20	9.50	7.15	5.70	4.75	3.70	3.10	2.80	2.60
Story Hgt. Adj., Add or Deduct	Per 1 Ft.	1.75	1.60	1.25	1.15	1.00	0.90	0.85	0.75	0.70
<i>For Basement, add \$30.70 per square foot of basement area</i>										

The above costs were calculated using the basic specifications shown on the facing page. These costs should be adjusted where necessary for design alternatives and owner's requirements. Reported completed project costs, for this type of structure, range from \$51.50 to \$179.05 per S.F.

Common additives

Description	Unit	\$ Cost
Emergency Lighting, 25 watt, battery operated		
Lead battery	Each	278
Nickel cadmium	Each	800
Safe, Office type, 4 hour rating		
30" x 18" x 18"	Each	4075
62" x 33" x 20"	Each	8850
Smoke Detectors		
Ceiling type	Each	174
Duct type	Each	445
Sound System		
Amplifier, 250 watts	Each	2225
Speaker, ceiling or wall	Each	181
Trumpet	Each	345

Model costs calculated for a 1 story building with 14' story height and 8,000 square feet of floor area

Store, Retail

			Unit	Unit Cost	Cost Per S.F.	% Of Sub-Total	
A. SUBSTRUCTURE							
1010	Standard Foundations	Poured concrete; strip and spread footings	S.F. Ground	1.70	1.70		
1020	Special Foundations	N/A	—	—	—		
1030	Slab on Grade	4" reinforced concrete with vapor barrier and granular base	S.F. Slab	4.63	4.63	12.9%	
2010	Basement Excavation	Site preparation for slab and trench for foundation wall and footing	S.F. Ground	.25	.25		
2020	Basement Walls	4' foundation wall	L.F. Wall	70	3.13		
B. SHELL							
B10 Superstructure							
1010	Floor Construction	N/A	—	—	—	8.5%	
1020	Roof Construction	Metal deck, open web steel joists, beams, interior columns	S.F. Roof	6.40	6.40		
B20 Exterior Enclosure							
2010	Exterior Walls	Decorative concrete block	S.F. Wall	15.54	8.81		
2020	Exterior Windows	Storefront windows	Each	39.95	2.52	15.7%	
2030	Exterior Doors	Sliding entrance door and hollow metal service doors	Each	1802	.45		
B30 Roofing							
3010	Roof Coverings	Built-up tar and gravel with flashing; perlite/EPS composite insulation	S.F. Roof	5.41	5.41	7.4%	
3020	Roof Openings	Roof hatches	S.F. Roof	.12	.12		
C. INTERIORS							
1010	Partitions	Gypsum board on metal studs	S.F. Partition	5.22	.87		
1020	Interior Doors	Single leaf hollow metal	Each	842	1.40		
1030	Fittings	N/A	—	—	—	15.8%	
2010	Stair Construction	N/A	—	—	—		
3010	Wall Finishes	Paint	S.F. Surface	5.37	1.79		
3020	Floor Finishes	Vinyl tile	S.F. Floor	3.05	3.05		
3030	Ceiling Finishes	Mineral fiber tile on concealed zee bars	S.F. Ceiling	4.74	4.74		
D. SERVICES							
D10 Conveying							
1010	Elevators & Lifts	N/A	—	—	—	0.0%	
1020	Escalators & Moving Walks	N/A	—	—	—		
D20 Plumbing							
2010	Plumbing Fixtures	Toilet and service fixtures, supply and drainage	Each	2243	2.52		
2020	Domestic Water Distribution	Gas fired water heater	S.F. Floor	3.74	3.74	9.8%	
2040	Rain Water Drainage	Roof drains	S.F. Roof	1.08	1.08		
D30 HVAC							
3010	Energy Supply	N/A	—	—	—		
3020	Heat Generating Systems	Included in D3050	—	—	—		
3030	Cooling Generating Systems	N/A	—	—	—	9.2%	
3050	Terminal & Package Units	Single zone unit, gas heating, electric cooling	S.F. Floor	6.93	6.93		
3090	Other HVAC Sys. & Equipment	N/A	—	—	—		
D40 Fire Protection							
4010	Sprinklers	Wet pipe sprinkler system	S.F. Floor	3.43	3.43	4.6%	
4020	Standpipes	N/A	—	—	—		
D50 Electrical							
5010	Electrical Service/Distribution	400 ampere service, panel board and feeders	S.F. Floor	2.39	2.39		
5020	Lighting & Branch Wiring	Fluorescent fixtures, receptacles, switches, A.C. and misc. power	S.F. Floor	9.16	9.16	16.1%	
5030	Communications & Security	Alarm systems and emergency lighting	S.F. Floor	.37	.37		
5090	Other Electrical Systems	Emergency generator, 15 kW	S.F. Floor	.19	.19		
E. EQUIPMENT & FURNISHINGS							
1010	Commercial Equipment	N/A	—	—	—		
1020	Institutional Equipment	N/A	—	—	—	0.0%	
1030	Vehicular Equipment	N/A	—	—	—		
1090	Other Equipment	N/A	—	—	—		
F. SPECIAL CONSTRUCTION							
1020	Integrated Construction	N/A	—	—	—	0.0%	
1040	Special Facilities	N/A	—	—	—		
G. BUILDING SITEWORK N/A							
					Sub-Total	75.08	100%
CONTRACTOR FEES (General Requirements: 10%, Overhead: 5%, Profit: 10%)				25%	18.76		
ARCHITECT FEES				8%	7.51		
Total Building Cost					101.35		

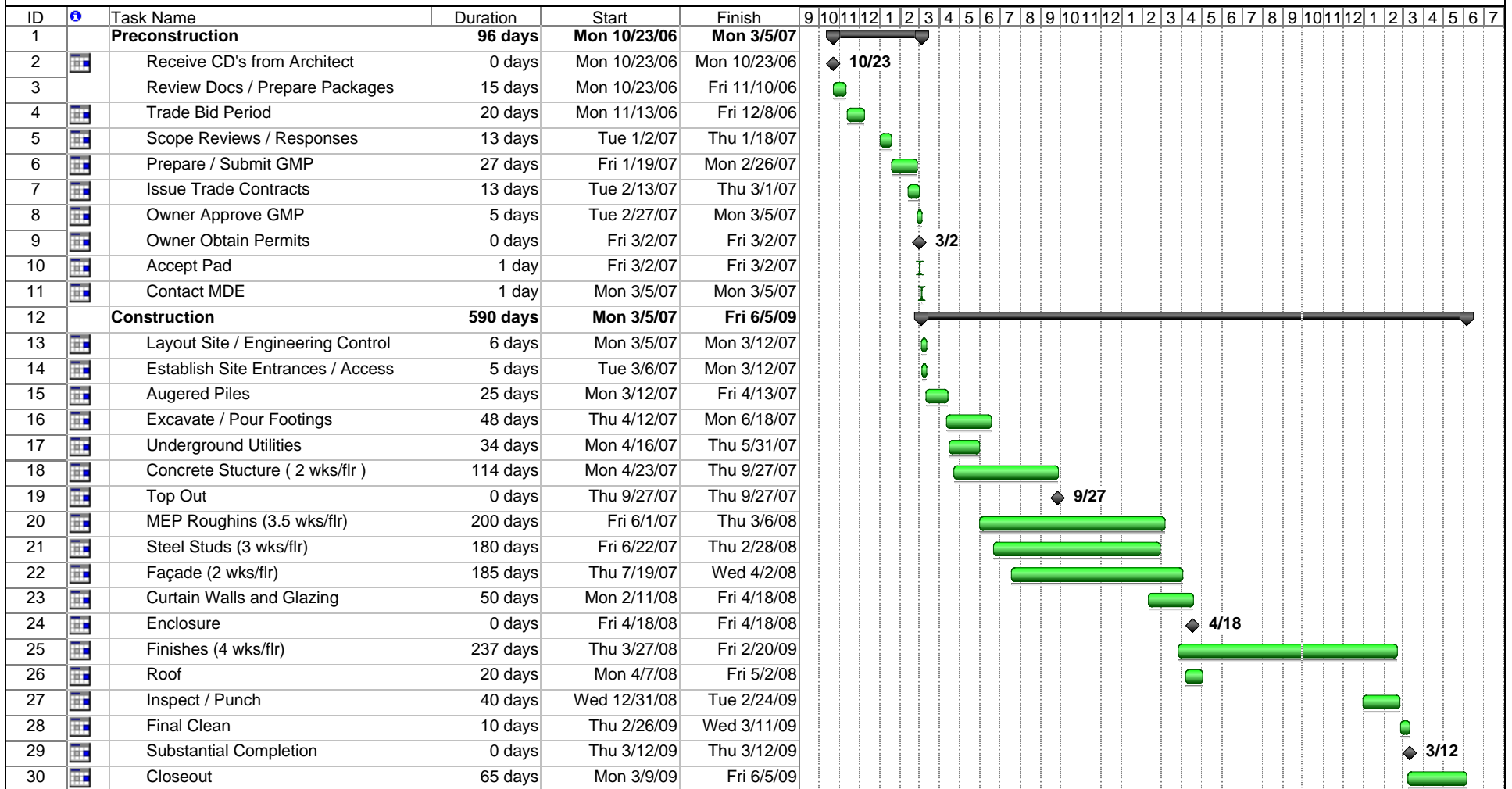
Location Factors

STATE/ZIP	CITY	Residential	Commercial	STATE/ZIP	CITY	Residential	Commercial
STATES & POSS.							
969	Guam	.99	1.08	KENTUCKY (CONTD)			
IDAHO				406	Frankfort	.86	.90
832	Pocatello	.86	.90	407-409	Corbin	.77	.82
833	Twin Falls	.73	.82	410	Covington	.99	.97
834	Idaho Falls	.75	.83	411-412	Ashland	.92	.95
835	Lewiston	.97	.97	413-414	Campton	.78	.83
836-837	Boise	.87	.90	415-416	Pikeville	.84	.90
838	Coeur d'Alene	.95	.96	417-418	Hazard	.73	.79
				420	Paducah	.89	.90
ILLINOIS				421-422	Bowling Green	.89	.91
600-603	North Suburban	1.10	1.08	423	Owensboro	.88	.90
604	Joliet	1.11	1.06	424	Henderson	.90	.90
605	South Suburban	1.10	1.08	425-426	Somerset	.77	.83
606-608	Chicago	1.19	1.15	427	Elizabethtown	.86	.87
609	Kankakee	.99	1.00	LOUISIANA			
610-611	Rockford	1.06	1.05	700-701	New Orleans	.87	.87
612	Rock Island	.97	.96	703	Thibodaux	.84	.85
613	La Salle	1.06	1.02	704	Hammond	.79	.81
614	Galesburg	1.00	.98	705	Lafayette	.82	.82
615-616	Peoria	.99	1.00	706	Lake Charles	.83	.83
617	Bloomington	.98	.98	707-708	Baton Rouge	.85	.84
618-619	Champaign	1.00	1.00	710-711	Shreveport	.78	.80
620-622	East St. Louis	.99	.98	712	Monroe	.74	.79
623	Quincy	.99	.96	713-714	Alexandria	.74	.79
624	Effingham	.99	.97	MAINE			
625	Decatur	.97	.96	039	Kittery	.87	.86
626-627	Springfield	.96	.95	040-041	Portland	.89	.89
628	Centralia	1.00	.97	042	Lewiston	.88	.88
629	Carbondale	.96	.94	043	Augusta	.89	.87
INDIANA				044	Bangor	.87	.87
460	Anderson	.91	.89	045	Bath	.87	.87
461-462	Indianapolis	.94	.93	046	Machias	.88	.86
463-464	Gary	1.03	.99	047	Houlton	.89	.87
465-466	South Bend	.91	.90	048	Rockland	.88	.86
467-468	Fort Wayne	.90	.89	049	Waterville	.87	.87
469	Kokomo	.92	.88	MARYLAND			
470	Lawrenceburg	.87	.87	206	Waldorf	.85	.88
471	New Albany	.87	.86	207-208	College Park	.88	.92
472	Columbus	.92	.90	209	Silver Spring	.86	.90
473	Muncie	.91	.90	210-212	Baltimore	.90	.92
474	Bloomington	.94	.90	214	Annapolis	.84	.90
475	Washington	.91	.90	215	Cumberland	.85	.87
476-477	Evansville	.90	.92	216	Easton	.68	.73
478	Terre Haute	.90	.92	217	Hagerstown	.85	.88
479	Lafayette	.92	.89	218	Salisbury	.74	.77
				219	Elkton	.80	.80
IOWA				MASSACHUSETTS			
500-503,509	Des Moines	.89	.90	010-011	Springfield	1.04	1.01
504	Mason City	.77	.82	012	Pittsfield	1.02	1.00
505	Fort Dodge	.76	.80	013	Greenfield	1.01	.99
506-507	Waterloo	.78	.82	014	Fitchburg	1.12	1.06
508	Creston	.80	.82	015-016	Worcester	1.13	1.08
510-511	Sioux City	.85	.87	017	Framingham	1.13	1.08
512	Sibley	.72	.77	018	Lowell	1.13	1.09
513	Spencer	.74	.77	019	Lawrence	1.13	1.09
514	Carroll	.74	.77	020-022, 024	Boston	1.21	1.16
515	Council Bluffs	.82	.90	023	Brockton	1.12	1.08
516	Shenandoah	.74	.77	025	Buzzards Bay	1.10	1.04
520	Dubuque	.85	.89	026	Hyannis	1.10	1.06
521	Decorah	.75	.77	027	New Bedford	1.12	1.07
522-524	Cedar Rapids	.93	.92	MICHIGAN			
525	Ottumwa	.83	.86	480,483	Royal Oak	1.02	.99
526	Burlington	.86	.86	481	Ann Arbor	1.03	1.00
527-528	Davenport	.97	.96	482	Detroit	1.06	1.04
KANSAS				484-485	Flint	.97	.97
660-662	Kansas City	.98	.97	486	Saginaw	.93	.93
664-666	Topeka	.79	.85	487	Bay City	.94	.94
667	Fort Scott	.88	.87	488-489	Lansing	.95	.95
668	Emporia	.74	.82	490	Battle Creek	.92	.92
669	Belleville	.79	.83	491	Kalamazoo	.91	.92
670-672	Wichita	.79	.84	492	Jackson	.93	.94
673	Independence	.84	.84	493,495	Grand Rapids	.80	.82
674	Salina	.77	.83	494	Muskegan	.88	.89
675	Hutchinson	.79	.83	496	Traverse City	.79	.83
676	Hays	.82	.83	497	Gaylord	.82	.85
677	Colby	.83	.84	498-499	Iron mountain	.89	.92
678	Dodge City	.81	.85	MINNESOTA			
679	Liberal	.80	.83	550-551	Saint Paul	1.12	1.09
KENTUCKY				553-555	Minneapolis	1.16	1.11
400-402	Louisville	.90	.91	556-558	Duluth	1.08	1.04
403-405	Lexington	.88	.89				

Appendix D

GrandView at Annapolis Towne Centre
Project Schedule Summary

GrandView at ATC Schedule Summary



Project: Schedule Date: Mon 9/29/08	Task		Milestone		External Tasks	
	Split		Summary		External Milestone	
	Progress		Project Summary		Deadline	