New Harbor Village

IPRO 356

Abstract

The aim of this project was to design a use for the area around the Michael Reese memorial. This area is currently unused and the city has asked for ideas to use the area. The previous IPRO had designed an extended living facility to be placed in the area. This was a good start but there is an extensive amount of land that is still unused. The city wishes to utilize this land so that the maximum amount of tax revenue can be seen.

This semester, the IPRO team took what was suggested last year and improved it by developing a hotel, residential, and retail area. The plan called for different phases in which each area was either developed or added to during each phase. Extensive research was done to calculate number of units and location of the units. In the future the IPRO should future its research in the cost aspect of the project.

Background and Objective

The Michael Reese Hospital Restoration IPRO is sponsored by CB Richard Ellis and Jones Lang LaSalle. There are several major problems to be solved in this project. Firstly, our iPro must determine which methods will be most effective to bring the two existing structures, the Main Hospital and Singer Pavilion, up to current code while also incorporating sustainable architectural concepts. The site must then be taken into consideration; this 37-acre parcel must be put to use in the most sensible and productive manner possible. While exploring the site's development, existing resources must be taken into consideration. The lakefront / 31st Street Harbor, downtown Chicago, McCormick Place, Museum Campus, and the proximity to

Chicago land area airports, specifically Midway, must be considered in relation to the Michael Reese site. Developing means to access the site by public transportation would be a logical next step. In order to solve the problem at hand, we seek to use various sustainable building and planning methods to improve the site. The Michael Reese Hospital campus has not been vacant long; already there are several proposed plans - Tech Park, casino, outdoor exhibit space, hotel, entertainment district - which remain contenders and others, notable the Olympic Village Plan, which unfortunately will never be possibilities. Ethically speaking, problems which arise in this investigation would be concentrated in the area of reconciling varying demographic disparities which currently exist in this area. The problem of what to do with abandoned buildings/lots which are adjacent to the former hospital campus also arises.

IPRO 356 is comprised of a team of students who possess a large diversity of skills. The purpose of this team was to revive the small plot of land that the Reese memorial hospital rests on. The team hoped to develop a plan that will attract investors, sponsors, and consumers to the area as well as bring profit to the city. The IPRO team will accomplished this by creating an extended care facility that is both attractive and unique to the city of Chicago. It also took advantage of the surrounding area, including the lake and McCormick center, in order to increase revenue for the city. Hotels and residential areas were built along with a commercial area that will increase activity in the area.

Organization and Approach

In order to design a project plan the team divided into sub groups. The groups were the architecture team, the engineering team, and the business team. The teams worked separately on the different aspects of the project plan and then collaborated to meet final decisions.

The architecture team was responsible for designing the master plan. The team collaborated together to determine where each of the building would be placed and how many rooms would be in each. Extensive amount of research was done to determine why each building was placed where it was. The team looked into surrounding areas to determine if the building that was being designed was placed in the most beneficial location and how each of the rooms in the building should look. The design on the room was based on the rooms designed by the previous IPRO and the design of current rooms employed in hotels and apartments. The team then sent the plans to the engineering team to be analyzed.

The engineering team had two main goals. The first goal was area development. This meant that the team looked into street lighting, sewage, water retention, and other utilities. This research was used to help determine location of roads and the buildings designed by the architecture team. The team also looked into improving the material used in building the buildings such as insulation and alternative energy such as geothermal energy. The second part of the engineering team was double check the work of the architecture team. The team would look at each building and make sure that it was a reasonable design. If the engineering team found that the design would cost too much or was an unreasonable design then they would ask the architecture team to redo it with suggestions.

The business team's goal was to construct a budget plan for the area. The team worked together to determine the cost of construction for each building and what it would cost to rent

each space. The team looked at competitors' prices for rooms in the hotel and rental space and based the budget plan of the numbers that were found. The team also looked into how long it take to pay of costs of construction and other debt before a profit can be made. The numbers calculated by the team was sent to the engineering team to be compared to the buildings that were designed. The three teams then compiled all of the work that was done and planed a final master plan.

Analysis and Findings

The site layout was completed by the midterm review. During the designing of the layout phase each of the teams tried to determine the building layout. Once this was settled on the teams divided the work up and focused on their aspects. During the last two weeks before IPRO presentation day, the teams compiled the work and finished any last minute work.

The business team found the cost for staying at each of the different rooms in the extended care. They concluded that they would allow a certain percentage of the initial cost of renting the room be returned to the families upon the death of the resident. This would make staying at the extended care facility more appealing. Profit was made off the original installment by collecting interest on the installment by placing it in stocks. The team also proposed an estimated cost of construction for the hotel and the extended care facility. After further calculations, the team found that after 30 years the site would start making profit. This means that after 30 years the debt for construction and development will be paid off. The work the team did can be seen in the appendix section of this report. This includes construction costs, rental costs, and overall profit gained.

The architecture team worked to determine site layout and building design. The team based occupancy for the extended care and hotel on demand of the area. Research was done to determine how many people can be estimated to stay in the building. For the residential area the team found that by placing retail on the first floor of each building will be profitable. This was also true for the hotel. The designs and location of each building was done after the team researched the surrounding area and demand. The hotel was placed to the north to take advantage of McCormick center. As there are not many hotels near the McCormick center, the hotel will see a high amount of revenue. The residential buildings were placed on the west side to take advantage of the lake view. The retail buildings were located on the south side of the site to take advantage of the main street that passes by it. The Metra station was extended in order to center the station in reference to the site. The team also looked into creating a pedestrian bridge that would allow easy passage from the site to the lake.

The engineering team looked into site development. The team determined the layout of the roads which was then passed to the architecture team to determine building locations. The team also spit up to find, site lighting, sanitary sewer layout, fire hydrant placement, gas line layout, water line layout, and storm water retention. Research helped to determine the path and location of each. The proper equations were found and used to determine the amount of lights and fire hydrants. The utilities were determined by research on similar developed sites and estimating demand on each of the utilities. The team also looked into the hospital building envelope. This aspect was later abandoned as the city decided to destroy the building. Alternative power source was researched as well. It was found that geo thermal

energy would be the most beneficial to the site. The alternative power source however, was not applied to any of the buildings though extensive research was done.

The findings were brought together and a final project plan was determined. The findings can be seen in the appendix section of this report.

Conclusion and Recommendations

In conclusion, the site was found to be profitable. The locations of each building were deemed to be profitable based on what the building offered. The site design allowed for easy access to any of the facilities the site had to offer and easy access to other buildings. The area of this project that needs to be further researched is the business aspect. The prices that were given were for the hotel and extended living areas. The budget for the retail and residential was researched minimally. Future IPRO's should look into the cost of construction for each of the retail and residential buildings. The budget should also include cost of renting the areas and the time frame to make profit of the buildings. Another goal for future IPRO's should be to research into alternative energy. Though some research was done by the current IPRO team, not enough was done to allow the alternative energy to be used in the site plan. If this site plane is found to be successful, the city may be able to utilize the area and start gaining profit.

Acknowledgements and References

We would like to thank the professors that assisted the IRPO team and the members from the city who offered insight on the project plan.

Appendix Map

- Appendix A – Member roster
- Appendix B – Site Map and Design of Rooms
- Appendix C – Utilities
- Appendix D - Budget

Appendix A Member roster

Konstantin Balakierv
Roberta Brucato
Lawrence Dorn
Ellen Gallagher
Juan Gonzalez
Yoojee Kim
Steven Kwon
William Matuszak
Abhishek Patel
Ruoxi Wang
Yani Wang
Churl Jong Kim
Chris Marangoudakis
William Paschal

Appendix B site map and design of rooms

Figure 1, shows the plan for room designs in the extended living facilities and hotel.

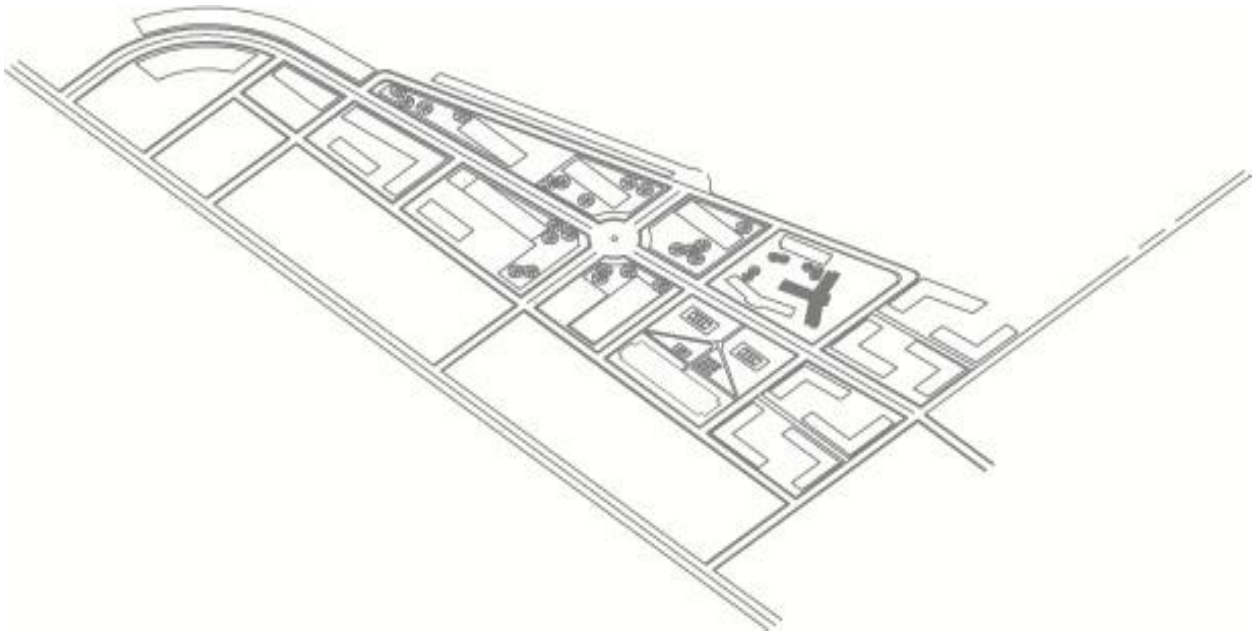


Figure 2, shows the master plan of the site. 3D images of the master plan can be seen in the following images.

Figure 3, shows the residential areas as a light blue color.

Figure 4, shows the hotel colored in orange.

Figure 5, shows the extended living area on the right with a activity center on the left in blue.

Appendix C Utilities

Live Detention Storage

Live Detention Storage (in.) = (Volume Runoff, 100 yea r) - (Release Rate x Duration)

$S_{ld} = V100 - Q_r t_d$

$S_{ld} = c_d\, i_{100}\, t_d - c_u\, i_3\, t_d$

$S_{ld} = t_d(c_d\, i_{100} - c_u\, i_{3)}$

Maximum storage volume calculated by this equation for any and all duration (t_d) will be the required storage.

The terms of the above equation are defined as:

Q_r = The maximum release rate in inches per hour from the land in its natural undeveloped state.

c_d = The co effi ci errt of runoff for the completely developed drainage area tributary to the reservoir.

i_{100} = The intensity in inches per hour of rainfall from the U. S. Weather Bureau curve for 100-year frequency for any and all durations.

t_d = The duration of the lOa-year storm, which must be varied to determine the most critica land therefore maximum required detention

c_u = The coefficient of runoff for the undeveloped land.
$c_u = 0.15$

i_3 = T'he intensity in inches per hour of the rainfall from the U. S. Weather Bureau curve for three-year frequency for the time of concentration of the undeveloped land.

Note: i_{100} varies with t_d, .however i_3 is calculated using the longest time of concentration for the undeveloped land and becomes a constant in the above equation.

The live detention storage, in inches of depth, can be converted to acre-feet by multiplying the inches of depth by the drainage area in acres, and by the factor 0.0833.

Live Detention Storage

$S_{ld} = td(c_d\, i_{100} - c_u\, i_{3)}$

Area: 34.715 Acres $t_{undeveloped\ land}$: 1 hour

c_u = 0.15 c_d = 0.632973136

Time	Rainfall 100-year	Runoff Rate	Rainfall 3-year	Release Rate		Live Storage	Live Storage	Live Storage
t_d	i_{100}	$c_d\, i_{100}$	i_3	$c_u\, i_3$	$c_d\, i_{100} - c_u\, i_3$	S_{ld}	0.0833	
Hours	*in/hr*		*in/hr*	*in/hr*		*Inches*	*Acre-feet*	*cu. feet*
0.17	7.60	4.81	1.67	0.2505	4.56	0.78	2.24	
0.33	5.50	3.48	1.67	0.2505	3.23	1.07	3.08	
0.50	4.40	2.79	1.67	0.2505	2.53	1.27	3.66	
0.67	3.70	2.34	1.67	0.2505	2.09	1.40	4.05	
0.83	3.20	2.03	1.67	0.2505	1.78	1.47	4.26	
1.00	2.80	1.77	1.67	0.2505	1.52	1.52	4.40	
1.50	2.10	1.33	1.67	0.2505	1.08	1.62	4.68	
2.00	1.70	1.08	1.67	0.2505	0.83	1.65	**4.77**	**207,982**
3.00	1.20	0.76	1.67	0.2505	0.51	1.53	4.42	
4.00	1.00	0.63	1.67	0.2505	0.38	1.53	4.42	
5.00	0.84	0.53	1.67	0.2505	0.28	1.41	4.07	

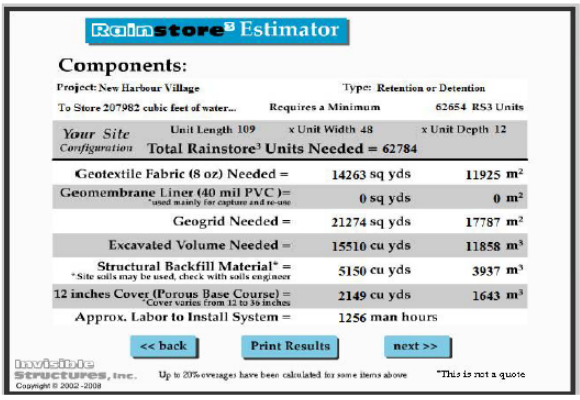
Percentage of Area that is ...

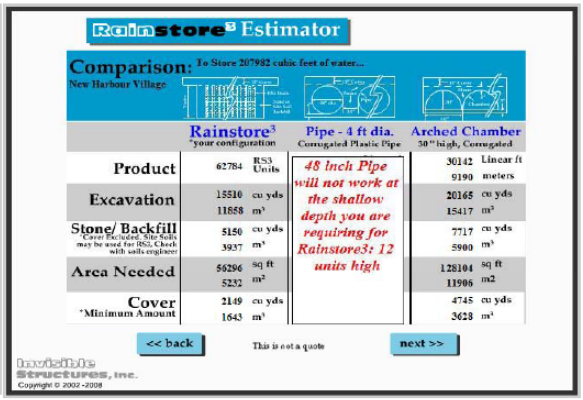
Areas	Sq. Footage	Pervious	Runoff Coefficient 0.45	Impervious	Runoff Coefficient 0.9	Coefficient applied	
Roads	264170	0	0	1	264170	0	237753
hotel	19318	0.13	2511.34	0.87	16806.66	1130.103	15125.994
hotel land	115182	0.33	38010.06	0.67	77171.94	17104.527	69454.746
care bldg north	11300	0.13	1469	0.87	9831	661.05	8847.9
	11300	0.13	1469	0.87	9831	661.05	8847.9
hospital wing	22240	0.13	2891.2	0.87	19348.8	1301.04	17413.92
NW Retail lot	167000	0.26	43420	0.74	123580	19539	111222
SW Retail lot	59751	0.13	7767.63	0.87	51983.37	3495.4335	46785.033
Park/Gazebo	10430	0	0	1	10430	0	9387
SE lot	73876	0.18	13297.68	0.82	60578.32	5983.956	54520.488
Singer Pav	15600	0.13	2028	0.87	13572	912.6	12214.8
Singer adj bldgs	11300	0.13	1469	0.87	9831	661.05	8847.9
	11300	0.13	1469	0.87	9831	661.05	8847.9
Parking Lot	77500	0	0	1	77500	0	69750
South Bldgs	205000	0.26	53300	0.74	151700	23985	136530
Sub Total	1075267		169101.91	12.93	906165.09	76095.8595	815548.581
Area of Site	1512205						
Lawn or Park (C = 0.15)	436938						65540.7
Total of Area X Coefficients	957185.1405						
Ratio to Entire Site	**0.632973136** <---Weighted Run-off Coefficient of Fully Developed Site						

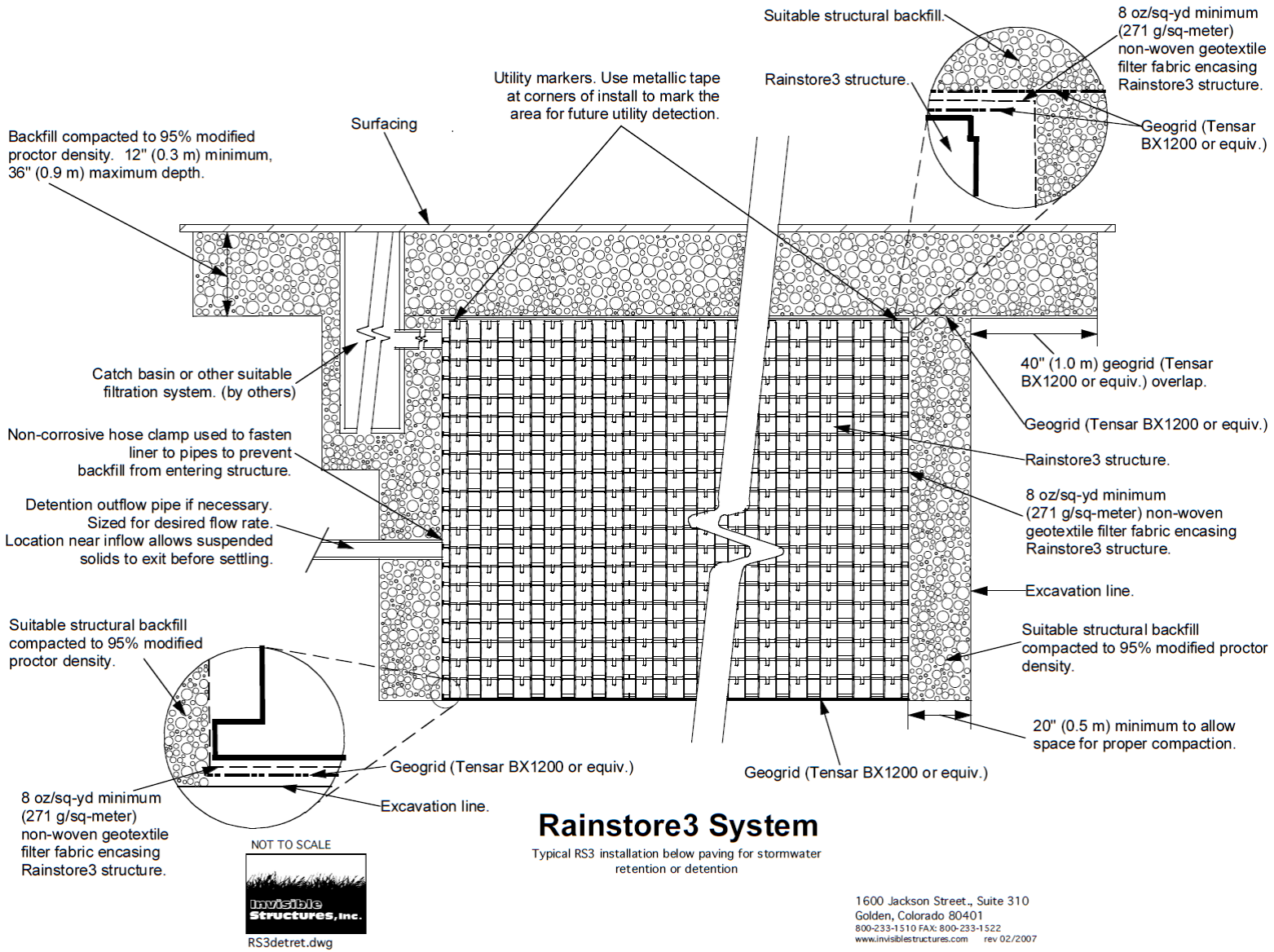
Note: These are preliminary design values, since more detail is needed as the plan progresses

Detension Potential Solution

http://www.invisiblestructures.com/rainstore3.html







Rainstore3 System

Typical RS3 installation below paving for stormwater retention or detention

NOT TO SCALE

RS3detret.dwg

1600 Jackson Street., Suite 310
Golden, Colorado 80401
800-233-1510 FAX: 800-233-1522
www.invisiblestructures.com rev 02/2007

Rainstore3 Estimator Data

firstname	Steven	lastname	Kwon
Company	IPRO 356	Phone	
Fax		Ship to Zip	60616
Email	skwon6@iit.edu		

Project Title	New Harbour Village	date	11/9/2010
System type	Retention or Detention	timestamp	11/9/2010

Water Volume

To Store 207982 cubic feet of water...

Length RS	109
Width RS	48
Cell Depth	12
Total Rainstore3 Units	**62784**

minimum RS units
62654

Excavated Volume	15510	cubic yds	11858	cubic meters
Geotextile	14263	square yds	11925	square meters
Geogrid	21274	square yds	17787	square meters
Membrane/Liner	0	square yds	0	square meters
Backfill	5150	cubic yds	3937	cubic meters
Minimum Cover	2149	cubic yds	1643	cubic meters
Man Hours	1256			

Invisible Structures, Inc.

1600 Jackson Street, Suite 310, Golden, CO 80401-1958 • Phone: 800-233-1510 Fax: 800-233-1522 • www.invisiblestructures.com

Name Steven Kwon
Company IPRO 356
Fax
Phone None Given
Email skwon6@iit.edu

Quote # 150393

Quote By Jane Roche
Rep Terr. 137
Quote Date 11/10/2010
Quote Expires Dec 10, 10

Project New Harbor Village
Estimator Quote / No Plans
Exp. Ship Date *Please call to tell us when product is needed.*
Ship to Zip 60616 State IL UPS Zone 5
Ship Via TRUCK
Product Rainstore3
RS3 Units 62,784.0

Cell Depth	3.94 ft	1.2 m
	ft³	gal
	221,718	

Notes: Thank you for this Quote Request. A signed copy of this quote must accompany any order.

CHAMBER SIZE	in feet and units	
Length	357.61	109
Width	157.48	48
Depth	3.94	12

WATER STORAGE EQUIVALENT
208,416.4 Cubic feet
1,559,063.1 Gallons
FOLLOWING MATERIAL NOT INCLUDED IN QUOTE

Geotextile for Detention (sf)	128,358.34	ft2
Geogrid (sf)	191,457.67	ft2
Units	=62784	

Price

Cost per RS3 unit	$19.750
Quantity of RS3 units	62,784
Total Product $'s	$1,239,984.00
FOB Aurora, CO Approx CO Tax	$0.00
Freight Charges	$0.00
Handling Charge	"Will call" and long term trailer storage subject to handling charges
Total Del. Cost	**$1,239,984.00**

Shipping Data
-Cells shipped

87.20	# Trucks Req'd
62,784	Quantity of Rainstore3 Units
5,232	Stacks of RS @ 12 units = 3.9 ft
2,616.00	Quantity of Pallets
kgs	lbs
456,762	Total Ship Wt 1,007,160

Payment Options

Call for ISI Credit Application. Must be completed prior to shipment.

Payment received prior to shipment or within the first 10 days - take 3% off the product price. All payments not recieved withing 30 days of shipment are subject to 2% penalties. 2% penalties include product and all freight due.

Approx. Delivered Cost of Water Storage

Del $ per m³	$210.11
Del $ per ft³	$5.950
Del $ per Gal	$0.795

Notes & Terms

- Quote is for ISI products described above only. Base course, fill, grass, and/or other materials, plus installation labor are additional (local supply and cost).
- Estimated freight shown is subject to change, based on freight rates at the time of shipment.

Payment Options

- Prepay is required for all first time orders and will include a 3% discount on product price.
- Accepted payments include VISA, MASTERCARD, AMERICAN EXPRESS, DISCOVER, wire transfer, and check received prior to shipment.
- Repeat customer orders requires the completion and approval of an ISI credit application, prior to shipment.
- Deposit may be required.
- PLEASE BE ADVISED: Please determine quantities carefully, WE DO NOT ACCEPT RETURNS due to additional freight charges and packaging damage from mulitiple transit and handling.
- Actual areas and costs calculated are based upon the metric unit.
- Invisible Structures, Inc. will not be held responsible for taxes outside of jurisdiction.

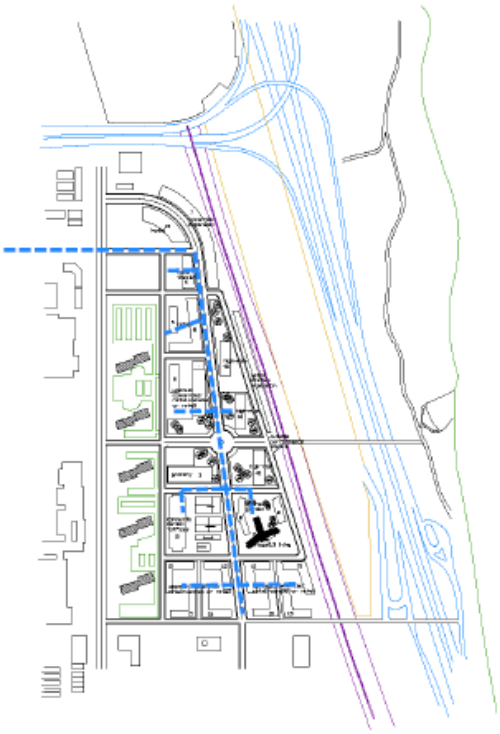
Dec 10, 10

This Quote and Terms are accepted hereby: Name:..... Title.....
Signature:..... Date:.....

Manufacturer: **Invisible Structures, Inc., 1600 Jackson Street, Suite 310, Golden, Colorado, 80401 USA**
Phone: 1-800-233-1510 USAFax: 1-800-233-1522
Overseas Ph: (USA) 303-233-8383 Overseas Fax: (USA) 303-233-8282

This data shows water retention on site.

Proposed Gas Network



Proposed Fresh Water Supply Network

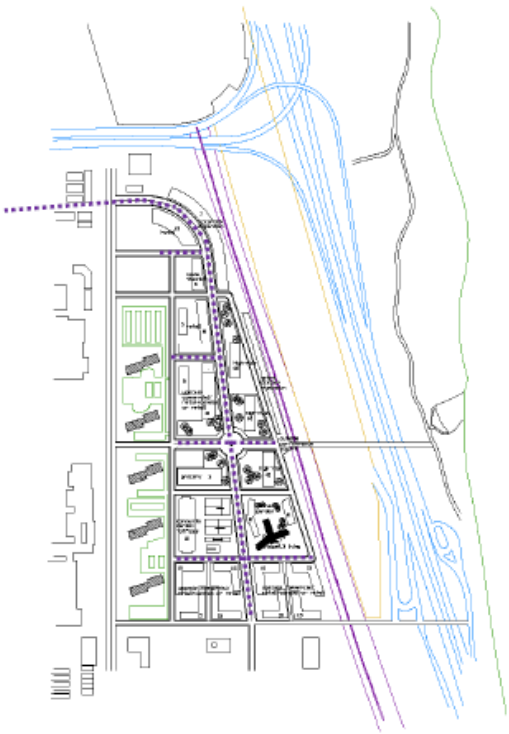


Figure 6, shows gas and water networks on site and fire hydrant placements.

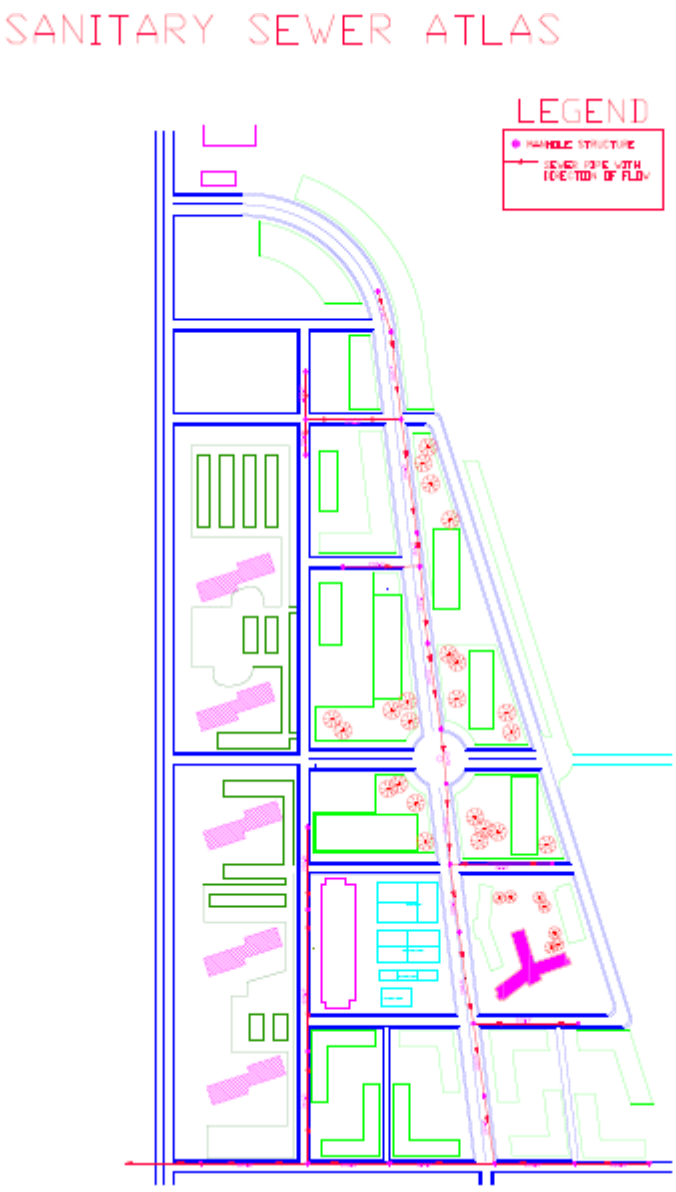


Figure 7, shows sewage route.

Building	Square foot of building	size of unit in Tons for 100% airchange per min
Hotel	193,183	482.9575
complete air change per hour	time cycle	size(Tons) for unit based on airchange rate
20	3	160.9858333
extra cost	previous cost of gass	40%
482957.5	48295.75	28977.45
80%	Average year savings for 40%	Average years savings for 80%

9659.15	19318.3	38636.6
years to pay off 40% savings	years to pay off 80% savings	previous cost of gass
25	12.5	202842.15

Figure 8, shows geothermal cost and calculations

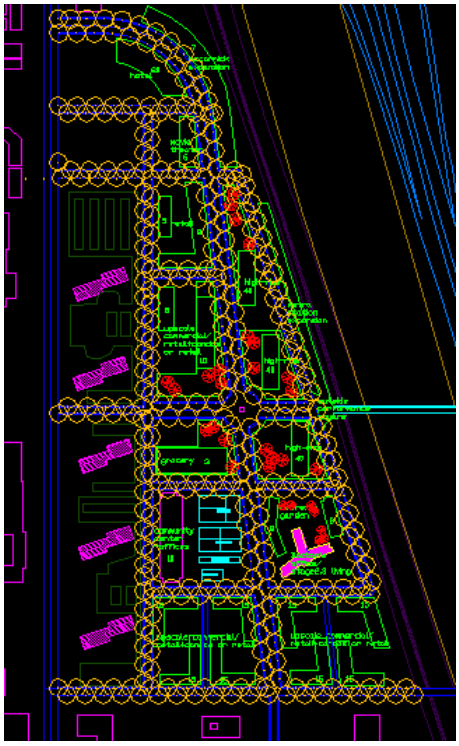


Figure 9, shows placement of street lights.

Appendix D Budget

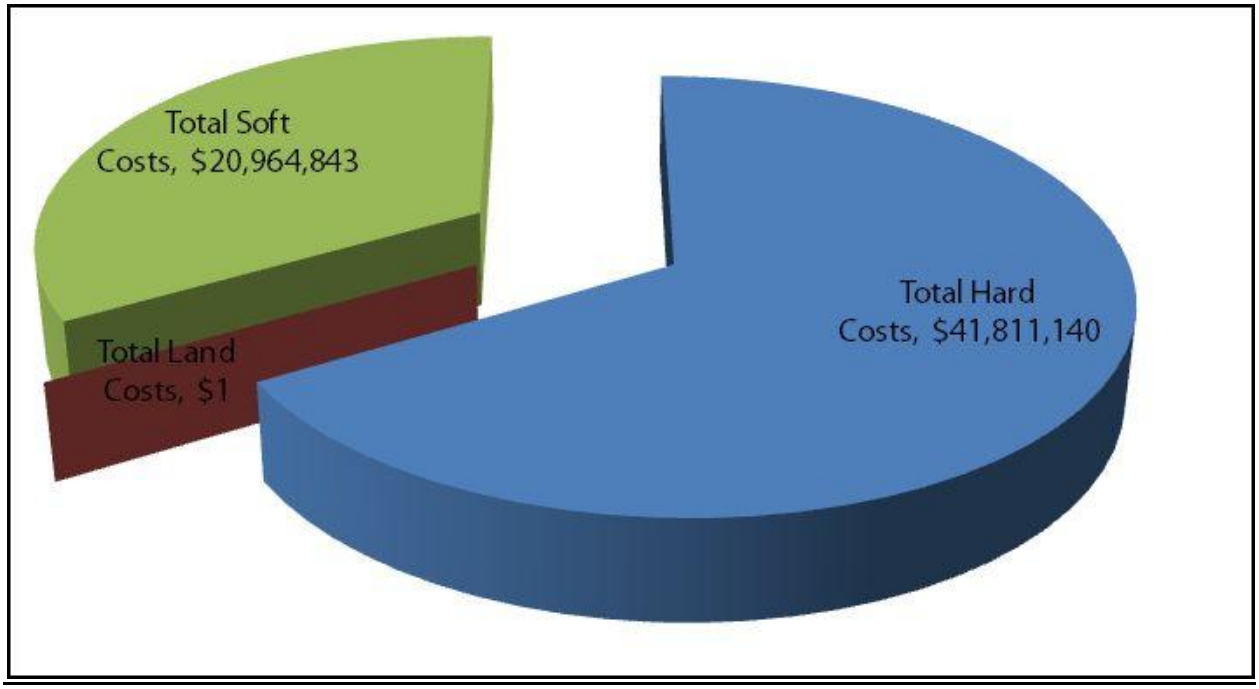
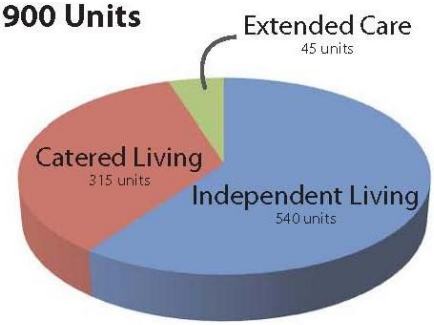


Figure 10, shows construction cost

Catered Living

900 Units



Revenues

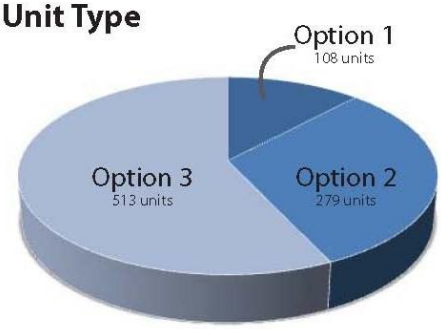
Option 1 @ $350,000 = $37,800,000
Option 2 @ $250,000 = $54,000,000
Option 3 @ $150,000 = $32,400,000

TOTAL: $124,200,000

Invested Revenue @ 5%

Per year: $6,210,000
over 30 years: **$310,500,000**

Unit Type



Unit Type Square Footage

Option 1 2 Bed/2Bath @ 940 SQ FT
Option 2 1 Bed/1Bath @ 700 SQ FT
Option 3 Studio w/ Bath @ 350 SQ FT

Total Square Footage
476,370 SQ FT

Estimated Profit Over 30 years

construction cost: $90 million
refund after death of occupant: $62.1 million
invested revenue over 30 years: $310.5 million

profit over 30 years: $248.4 million

Figure 11, shows catered living costs

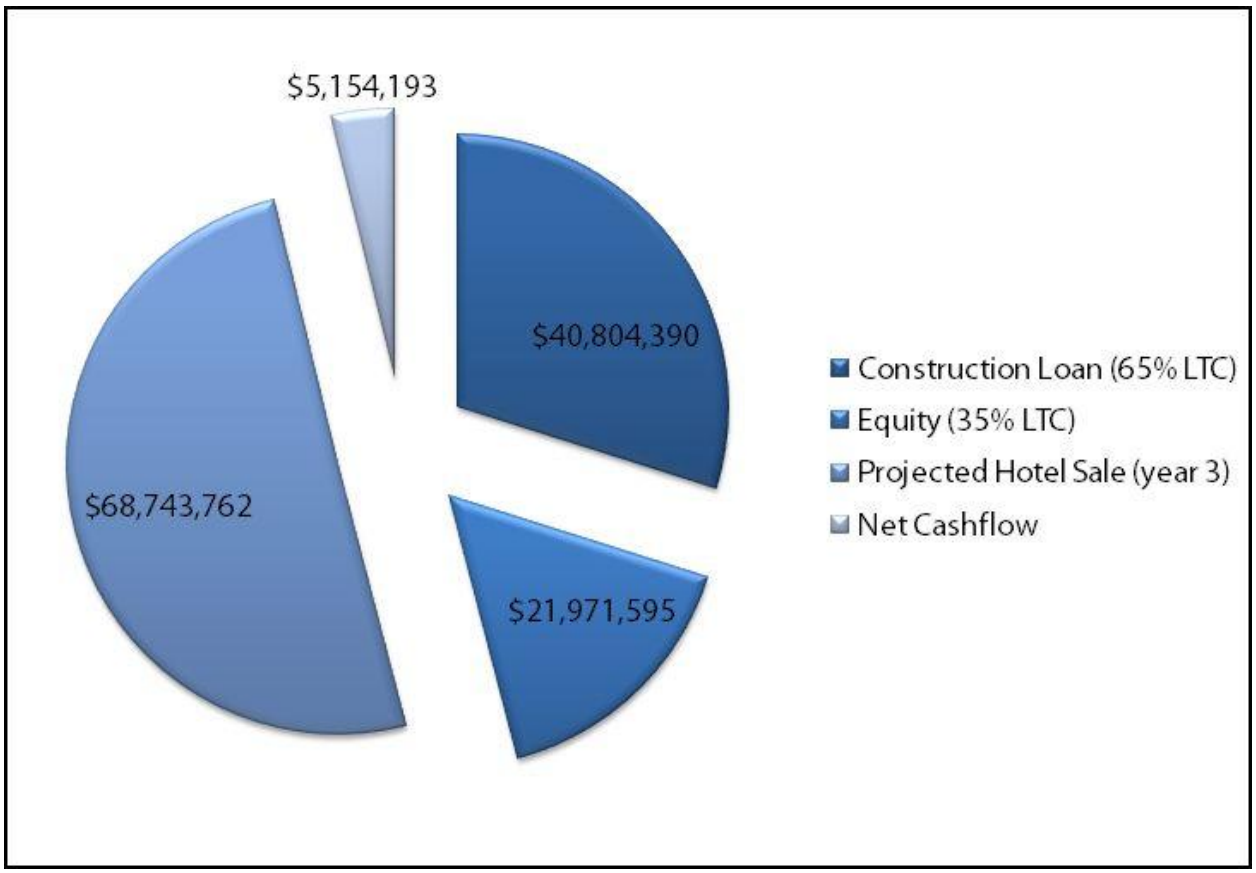


Figure 12, shows the source of money.

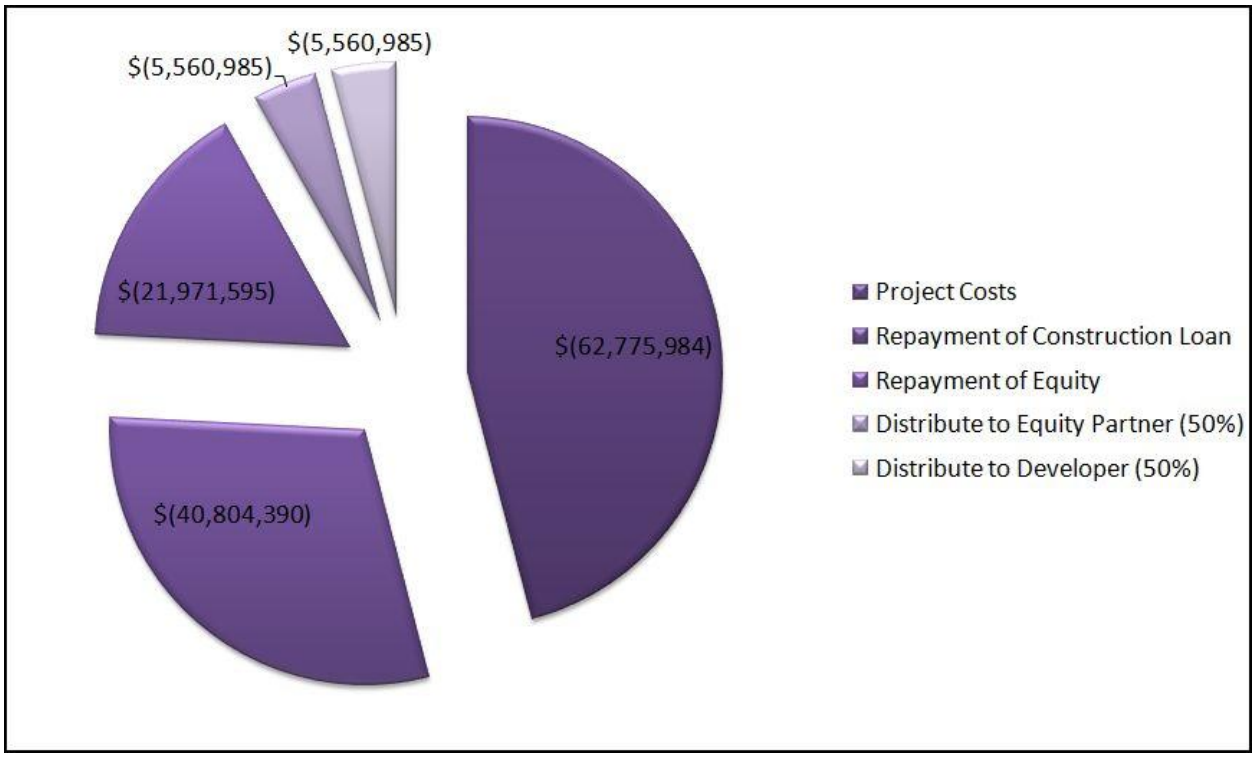


Figure 13, shows use of money.

Square Foot Cost Estimate Report

Estimate Name:	**IPRO Hotel**

Building Type:	**Hotel, 8-24 Story with Glass and Metal Curtain Walls / Steel Frame**
Location:	CHICAGO, IL
Stories Count (L.F.):	**10.00**
Stories Height	**10.00**
Floor Area (S.F.):	**193,183.00**
LaborType	**Union**
Basement Included:	No
Data Release:	**Year 2008**
Cost Per Square Foot	**$196.50**
Total Building Cost	**$37,960,000**

Costs are derived from a building model with basic components. Scope differences and market conditions can cause costs to vary significantly.

		% of Total	Cost Per SF	Cost
A Substructure		**6.4%**	**10.39**	**$2,007,600**
A1010	**Standard Foundations**		**0.46**	**$88,600**
	Pile caps, 6 piles, 8' - 6" x 5' - 6" x 40", 80 ton capacity, 19" column size, 936 K column			
	Pile caps, 8 piles, 8' - 6" x 7' - 9" x 44", 80 ton capacity, 22" column size, 1243 K column			
A1020	**Special Foundations**		**8.96**	**$1,728,600**
	Steel H piles, 100' long, 800K load, end bearing, 5 pile cluster			
	Steel H piles, 100' long, 1200K load, end bearing, 8 pile cluster			
	Grade beam, 30' span, 52" deep, 14" wide, 12 KLF load			
A1030	**Slab on Grade**		**0.59**	**$113,600**
	Slab on grade, 4" thick, non industrial, reinforced			
A2010	**Basement Excavation**		**0.02**	**$4,600**
	Excavate and fill, 30,000 SF, 4' deep, sand, gravel, or common earth, on site storage			
A2020	**Basement Walls**		**0.38**	**$72,600**
	Foundation wall, CIP, 4' wall height, direct chute, .148 CY/LF, 7.2 PLF, 12" thick			
B Shell		**20.4%**	**33.06**	**$6,386,000**
B1010	**Floor Construction**		**21.89**	**$4,248,000**
	Floor, concrete, slab form, open web bar joist @ 2' OC, on W beam and column, 20'x25' bay, 29" deep, 125 PSF sup			
	Floor, concrete, slab form, open web bar joist @ 2' OC, on W beam and column, 20'x25' bay, 29" deep, 125 PSF sup			
B1020	**Roof Construction**		**1.08**	**$209,000**
	Floor, steel joists, beams, 1.5" 22 ga metal deck, on columns, 20'x25' bay, 20" deep, 40 PSF superimposed load, 60			
	Floor, steel joists, beams, 1.5" 22 ga metal deck, on columns, 20'x25' bay, 20" deep, 40 PSF superimposed load, 60			
B2020	**Exterior Windows**		**9.06**	**$1,761,000**
	Glazing panel, insulating, 5/8" thick units, 2 lites 3/16" float glass, tinted			
B2030	**Exterior Doors**		**0.23**	**$44,600**
	Door, aluminum & glass, without transom, narrow stile, with panic hardware, 3'-0"x 7'-0"opening			
	Door, aluminum & glass, without transom, narrow stile, double door, hardware, 6'-0" x 7'-0" opening			
	Door, steel 18 gauge, hollow metal, 1 door with frame, no label, 3'-0" x 7'-0" opening			
B3010	**Roof Coverings**		**0.67**	**$128,600**

		% of Total	Cost Per SF	Cost
	Roofing, asphalt flood coat, gravel, base sheet, 3 plies 15# asphalt felt, mopped			
	Insulation, rigid, roof deck, composite with 2" EPS, 1" perlite			
	Roof edges, aluminum, duranodic, .050" thick, 6" face			
	Flashing, aluminum, no backing sides, .019"			
	Gravel stop, aluminum, extruded, 4", mill finish, .050" thick			
B3020	**Roof Openings**		0.02	$3,000
	Roof hatch, with curb, 1" fiberglass insulation, 2'-6" x 3'-0", galvanized steel, 165 lbs			
C Interiors		23.0%	37.31	$7,208,600
C1010	**Partitions**		8.22	$1,588,600
	Metal partition, 5/8"fire rated gypsum board face, 5/8"fire rated gypsum board base, 3-5/8" @ 24", 5/8"fire ratedoppc			
	5/8" gypsum board, taped & finished, painted on metal furring			
C1020	**Interior Doors**		10.78	$2,079,000
	Door, single leaf, kd steel frame, hollow metal, commercial quality, flush, 3'-0" x 7'-0" x 1-3/8"			
C2010	**Stair Construction**		3.37	$650,500
	Stairs, steel, cement filled metal pan & picket rail, 16 risers, with landing			
C3010	**Wall Finishes**		4.11	$794,000
	Painting, interior on plaster and drywall, walls & ceilings, roller work, primer & 2 coats			
	Vinyl wall covering, fabric back, medium weight			
	Ceramic tile, thin set, 4-1/4" x 4-1/4"			
C3020	**Floor Finishes**		5.58	$1,078,000
	Carpet tile, nylon, fusion bonded, 18" x 18" or 24" x 24", 35 oz			
	Vinyl, composition tile, maximum			
	Tile, ceramic natural clay			
C3030	**Ceiling Finishes**		5.27	$1,018,500
	Gypsum board ceilings, 1/2" fire rated gypsum board, painted and textured finish, 7/8"resilient channel furring, 24" O			
D Services		50.3%	81.84	$15,771,000
D1010	**Elevators and Lifts**		6.91	$1,334,600
	Traction geared freight, 4000 lb., 15 floors, 10' story height, 200FPM			
	Traction, geared passenger, 3500 lb,15 floors, 10' story height, 2 car group, 350 FPM			
D2010	**Plumbing Fixtures**		21.98	$4,248,000
	Water closet, vitreous china, bowl only with flush valve, wall hung			
	Water closets, battery mount, wall hung, back to back, first pair of closets			
	Water closets, battery mount, wall hung, each additional pair of closets, back to back			
	Urinal, vitreous china, wall hung			
	Lavatory w/trim, vanity top, PE on CI, 20" x 18"			
	Kitchen sink w/trim, countertop, stainless steel, 33" x 22" double bowl			
	Service sink w/trim, PE on CI, corner floor, wall hung w/rim guard, 22" x 18"			
	Bathtub, recessed, PE on CI, mat bottom, 5' long			
	Shower, stall, baked enamel, terrazzo receptor, 36" square			
	Water cooler, electric, wall hung, wheelchair type, 7.5 GPH			
	Water cooler, elec, floor mounted, refrigerated compartment type, 1.5 GPH			
	Bathroom, three fixture, 1 wall plumbing, lavatory, water closet & bathtub share common plumbing wall *			
D2020	**Domestic Water Distribution**		10.44	$2,017,000
	Electric water heater, commercial, 100< F rise, 1000 gal, 480 KW 1970 GPH			
	Gas fired water heater, commercial, 100< F rise, 500 MBH input, 480 GPH			
D2040	**Rain Water Drainage**		0.27	$52,000
	Roof drain, CI, soil,single hub, 5" diam, 10' high			
	Roof drain, CI, soil,single hub, 5" diam, for each additional foot add			
D3010	**Energy Supply**		2.59	$501,000
	Commercial building heating system, fin tube radiation, forced hot water, 1mil SF, 10 mil CF, total 5 floors			

		% of Total	Cost Per SF	Cost
D3030	**Cooling Generating Systems**		13.18	$2,541,600
	Packaged chiller, water cooled, with fan coil unit, medical centers, 60,000 SF, 140.00 ton			
D4010	**Sprinklers**		4.00	$772,000
	Wet pipe sprinkler systems, steel, light hazard, 1 floor, 50,000 SF			
	Wet pipe sprinkler systems, steel, light hazard, each additional floor, 50,000 SF			
	Standard High Rise Accessory Package 16 story			
D4020	**Standpipes**		3.50	$676,000
	Wet standpipe risers, class III, steel, black, sch 40, 6" diam pipe, 1 floor			
	Wet standpipe risers, class III, steel, black, sch 40, 6" diam pipe, additional floors			
	Fire pump, electric, with controller, 5" pump, 100 HP, 1000 GPM			
	Fire pump, electric, for jockey pump system, add			
D5010	**Electrical Service/Distribution**		3.88	$761,000
	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 2000 A			
	Feeder installation 600 V, including RGS conduit and XHHW wire, 60 A			
	Feeder installation 600 V, including RGS conduit and XHHW wire, 200 A			
	Feeder installation 600 V, including RGS conduit and XHHW wire, 2000 A			
	Switchgear installation, incl switchboard, panels & circuit breaker, 2000 A			
D5020	**Lighting and Branch Wiring**		9.89	$1,930,000
	Receptacles incl plate, box, conduit, wire, 10 per 1000 SF, 1.2 W per SF, with transformer			
	Wall switches, 5.0 per 1000 SF			
	Miscellaneous power, to .5 watts			
	Central air conditioning power, 4 watts			
	Motor installation, three phase, 460 V, 15 HP motor size			
	Motor feeder systems, three phase, feed to 200 V 5 HP, 230 V 7.5 HP, 460 V 15 HP, 575 V 20 HP			
	Motor connections, three phase, 200/230/460/575 V, up to 5 HP			
	Motor connections, three phase, 200/230/460/575 V, up to 100 HP			
	Fluorescent fixtures recess mounted in ceiling, 0.8 watt per SF, 20 FC, 5 fixtures @32 watt per 1000 SF			
D5030	**Communications and Security**		4.64	$877,600
	Communication and alarm systems, fire detection, addressable, 100 detectors, includes outlets, boxes, conduit and			
	Fire alarm command center, addressable with voice			
	Communication and alarm systems, includes outlets, boxes, conduit and wire, intercom systems, 100 stations			
	Communication and alarm systems, includes outlets, boxes, conduit and wire, master TV antenna systems, 100 outle			
	Internet wiring, 2 data/voice outlets per 1000 S.F.			
D5090	**Other Electrical Systems**		0.38	$72,600
	Generator sets, w/battery, charger, muffler and transfer switch, diesel engine with fuel tank, 500 kW			
E Equipment & Furnishings		0.0%	0.00	$0
E1090	**Other Equipment**		0.00	$0
F Special Construction		0.0%	0.00	$0
G Building Sitework		0.0%	0.00	$0
Sub Total		100%	$162.40	$31,372,000
Contractor's Overhead & Profit		10.0%	$16.24	$3,137,000
Architectural Fees		10.0%	$17.86	$3,451,000
User Fees		0.0%	$0.00	$0
Total Building Cost			$196.50	$37,960,000

Figure 14, shows the cost of hotel construction.

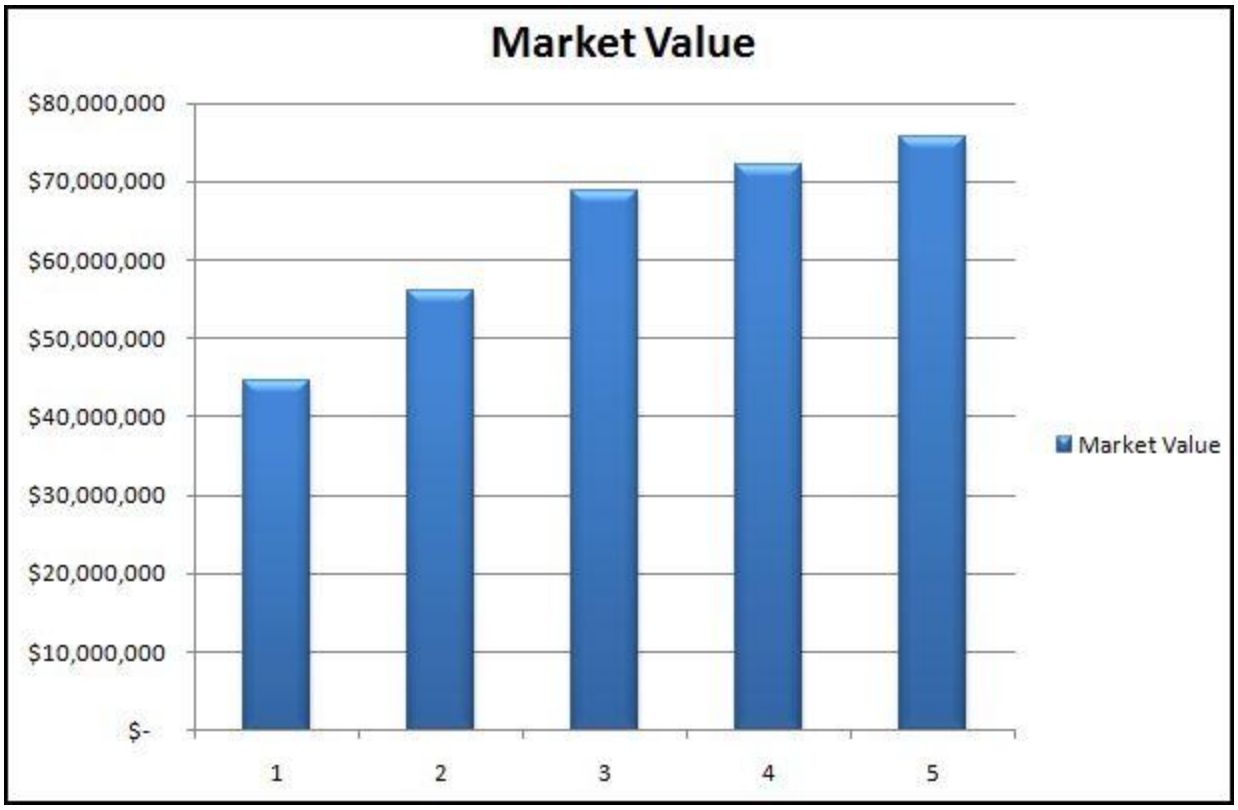


Figure 15, shows Market value of hotel.