Lowell Stine
CM
Dr. Leicht
Library in Metropolitan Washington, D.C
9/16/2013

Library in Metropolitan Washington D.C

Technical Assignment I

Picture from on-site Web cam, Provided by Multivista

Executive Summary

Owner Information

The county owner's primary concern with the project is that it meet the requirements of an increasing urban, ethnically and culturally diverse residential and business community. Currently the county has a 16,000 SF library that is over extended and very busy, which the county would like to replace with this modern project. Fit out of the non-profit art gallery space will not start until after substantial completion because the owner does not want this to interfere with and delay the GC in any way. The county is requiring that the site adjacent to the construction site be vacated by the GC before March of 2014 because this is when the residential tower construction will start. While moving into the new space, the old library will be shut down, which means this moving phase must go smoothly with no delays so the new library can open on time to the public.

Project Delivery System

Design-Bid-Build is the style of project delivery on this project. This is mainly because the owner and the community wanted to be heavily involved in the design, finishes selection, and train stop integration. To pick an architect, CM, and commissioning agents the owner has a group of pre-selected companies. To select a GC the owner preselected a group of contractors through a public Request for Expression of Interest (REOI), collected bids, and then selected the lowest reasonable price that was similar to the owners estimate. For project organizational chart see Appendix A.

GC Staffing Plan

Costello's owner is acting as the Project Executive for this project. The Quality Control Manager reports directly to the Project Executive, not to the Project Manager. There are a number of Superintendents and Assistant Managers that report to the Project Manager. Under the Senior Superintendent there are three trade Foreman for the work performed by Costello Construction. For Costello Construction's project staffing chart see Appendix B.

Existing Conditions

Before construction was started water lines, sanitary sewer lines, and storm drains were rerouted and electric, cable, and phone lines were run underground near the building as to minimize architectural interference. In conjunction with this project, a five story residential tower will be build adjacent to this site but in a separate contract. During construction parking will be available across the street in a large parking garage. Soils encountered on site were topsoil, engineered fill, weathered rock, and residual soils. For a site plan see Appendix C.

Summary of Schedule

This library in metropolitan Washington D.C. has a 22 month construction time line. Notice to proceed was given in January of 2013, and there is a substantial completion deadline of October of 2014. The structure and foundation of the building will be completed in mid-October 2013. Building dry enclosure, permanent power, and conditioned air will all take place in March of 2014. After substantial completion, the librarians will be moving into the new library for approximately one and half months, then the new library will open to the public in December of 2014. For the entire summary schedule see Appendix D.

Demolition Requirements

Over a five year period the county purchased property that was occupying the corner location that will soon be the new library. These properties had existing buildings on them including: a four story apartment building, a large house that was being used as a Moose Lodge, a one story car repair garage, and a small fried chicken shop, all of which were required to be demolished. During the excavation period an old petroleum tank was uncovered and had to be removed by a certified specialty contractor. After removal of the tank was complete excavation continued and tiebacks were installed along the north side of the building near the existing road, and steel column and wood slat lagging were installed along the west side near the existing apartment complex.

Cast-in-place Concrete

Cast-in-place concrete was used for all the caissons, matt slabs, foundation walls, and elevator/ stair shafts. Caissons were placed a variety of different depths depending upon the required bearing capacity was reached. After installation, the exact depth of each caisson was measured using an ultrasonic measuring tool. Both the foundation walls and the vertical shafts were formed using aluminum reusable panels. A composite slab system will be used for the elevated slabs in the building. Where it was feasible, concrete was/ will be placed directly from the truck using the shoot. If the shoot cannot be used, a crane and bucket system will be used to place the concrete on site, and where the crane does not reach, a concrete pump can be brought in for the pour.

Structural System

In the area this building is being built, a structural steel structure is common. Because of this, and the complexity of the structure, the superstructure is structural steel, other than the three vertical shafts that act as shear walls. The structural engineer was presented with a challenge because the third, fourth, and fifth floors are cantilevered over the future train stop on one corner and span the train stop on the other corner. To overcome this challenge the roof framing is made up of 15' tall trusses that are laid across the building from west to east. Two of the trusses cantilever 50' over the east side of the building, which the third, fourth, and fifth floors are then hung from.

Enclosure System

There are three types of veneer masonry used on the project, which include: stone, terracotta, and CMU. All three types of veneer will be installed from stick built scaffolding. Other building enclosure systems include only the aluminum and glazing curtain wall that almost entirely comprises the North, East, and South third through fifth floor walls. Accessories that will also be applied to the curtain wall are sunshades and a UV protective glazing to prevent the books from getting UV damage.

Mechanical System

A unique mechanical system is designed to condition the three story library space. This system's mechanical equipment and mechanical room will be an Integrated Packaged Equipment Center (IPEC), which is a pre-manufactured mechanical room that is brought on site and lifted into place. This system has the capability to do variable air volume control and heat recovery. To transport and exhaust the air for the library there was a vertical duct shaft that was designed into the west side of the building. Through these same ducts smoke will be exhausted in the event of a fire. The first two floors have their own mechanical system that is located in mechanical rooms on the first and second floors. Both the first two levels and the library space are conditioned using forced air and hot water piping both for heating units/ radiators and radiant floor systems where overhangs may cause cold bridging.

Electrical System

Feeders for the electrical system are 277/480V, and there are two utility lines that entire the building; one for the main portion of the building and one for the coffee shop located on the first floor. A 400A transocket is feeding the coffee shop while a 3000A main distribution switch gear distributes power to the rest of the building. Lighting controls in the building are handled through a system of Light Management Hubs which control dimming and occupancy requirements and that can be remotely controlled. As a backup power system there is a 250KW natural gas powered generator located on the roof.

LEED

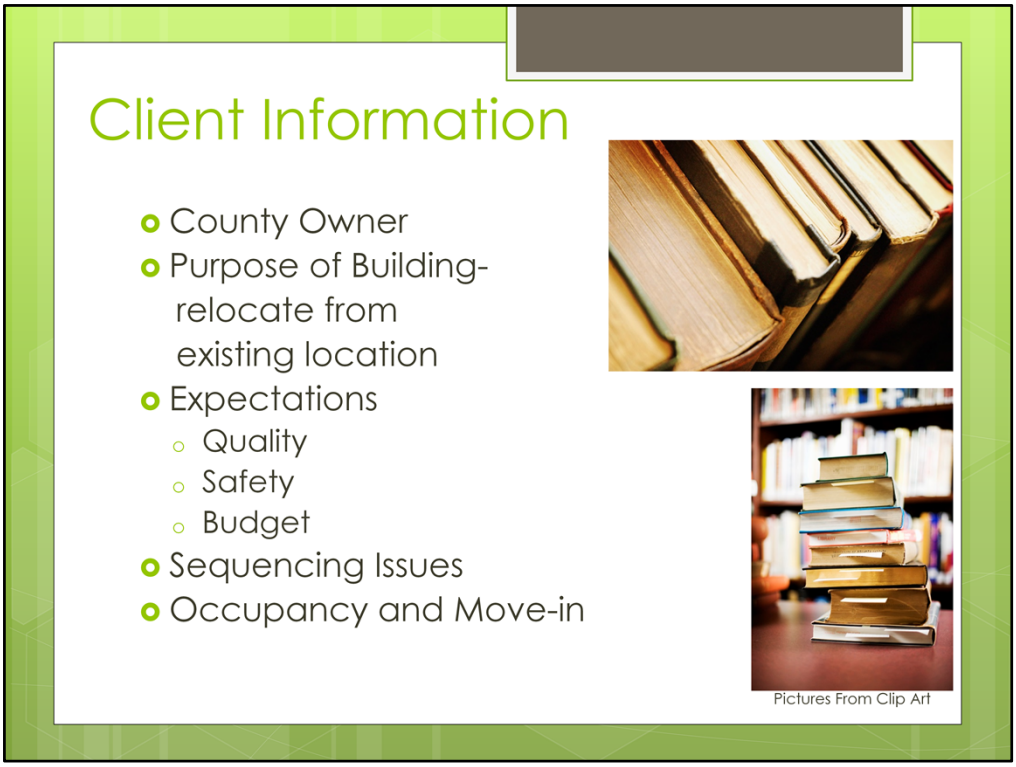
LEED Silver was a requirement made by the county since the project has begun. On this particular project the GC has their own rock crushing machine that they use to make fill and construction roads from rocks found in the excavation. Another interesting, but challenging LEED credit that is being used is 75% to 95% of the construction material waste is recyclable, which is sorted offsite by the waste management contractor.

Cost Evaluation

Cost of the total project is set at $69,000,000, while the cost of construction is $35,000,000 ($389/SF). Specific system cost are as follows; General Conditions- $825,000 ($9.17/SF), Mechanical System-$3,860,000 ($42.89/SF), Sprinkler System- $352,000 ($3.91/SF), Electrical System-$4,010,000 ($44.55/SF), Structural Steel- $3,061,000 ($34.01/SF), Roofing System- $517,000 ($5.74/SF), Curtain Wall- $2,330,000 ($25.89/SF), Elevators and Escalators- $1,420,000 ($15.78/SF), IPEC- $2,650,000 ($29.44/SF), New Book Allowance is $750,000, New Radio Frequency Inventory Device (RFID) is $700,000. In the square foot estimate preformed from R.S. Means, it was estimated that the building costs $29,000,000 ($322/SF). This estimate is almost $6,000,000 lower than the actual construction cost, which could be from a number of things including the higher quality architectural finishes that are being used, the more complex structural steel frame from the cantilevered trusses, the customized IPEC system, and the new book and RFID system allowance. For cost information sources see Appendix E.

Library In Metropolitan Washington D.C.

By: Lowell Stine
Dr. Leicht
9/16/13



County Owner

Purpose of Building

- Meet the requirements of an increasing urban, ethnically and culturally diverse residential and business community.
- There is a current county library that is 16,000 S.F. and is over extended and very busy.

Expectations

- Quality- This is shown by the multiply commissioning and Construction Managers the owner has hired to assist them on this project.
- Safety- Appropriate PPE, sidewalk closures and sidewalk covers, and safety management program.
- Budget- Independent estimates before bidding and cost monitoring during construction.

Sequencing Issues

- A quick start up and design was need.
- The fit-out would not start on the first and second floor until after construction because the organization was not ready to have their pace design when the rest of the building was being design.
- Part of the laydown area currently being used for this project will have to be vacated and cleared by March of 2014 because this is when a developer plans to start construction of a five story senior residential tower, which is adjacent to this project. The County is concerned about the active construction of these two buildings taking place simultaneously in such close proximity to each other.

Occupancy and Move-in Concerns

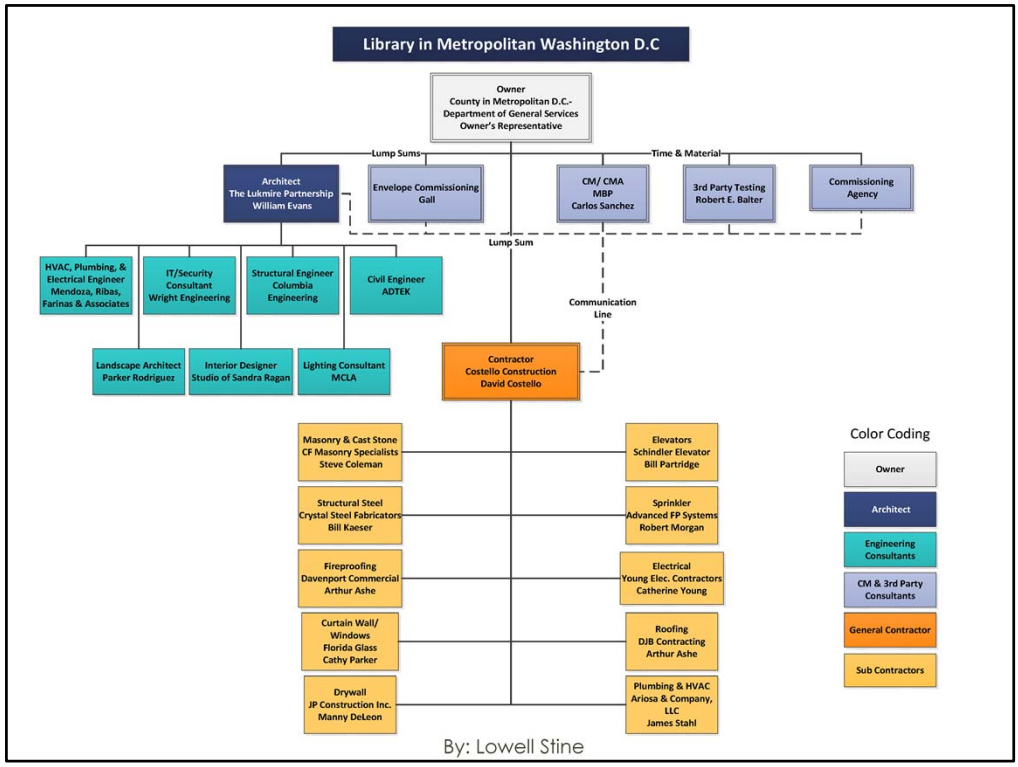
- At time of substantial completion a fit out of the first and second floor will start for the

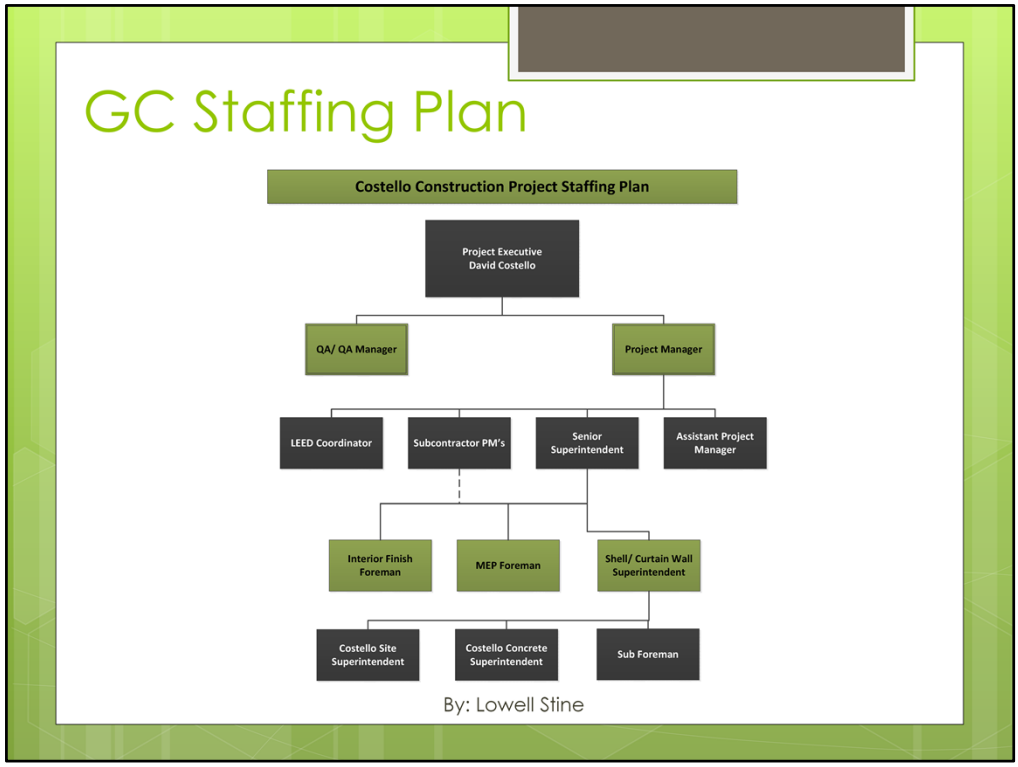
none profit art organization that will be occupying that space.

- Also after substantial completion the librarian staff will start to move the books from the old library to their new home, but all the furniture in the new building will be new and specially designed for the space. While the moving process is taking place the old library will be shut down for one and a half months, until the new library is open to the public. In this time all the old books must be sorted for which will go to the new library and which will be donated to charity. Also in this time, all books from the old library and all new books must be sorted by topic, tagged, and entered into the new RFID (Ratio Frequency Inventory Device) system, in which the county has made a $700,000 investment in.

Project Delivery System

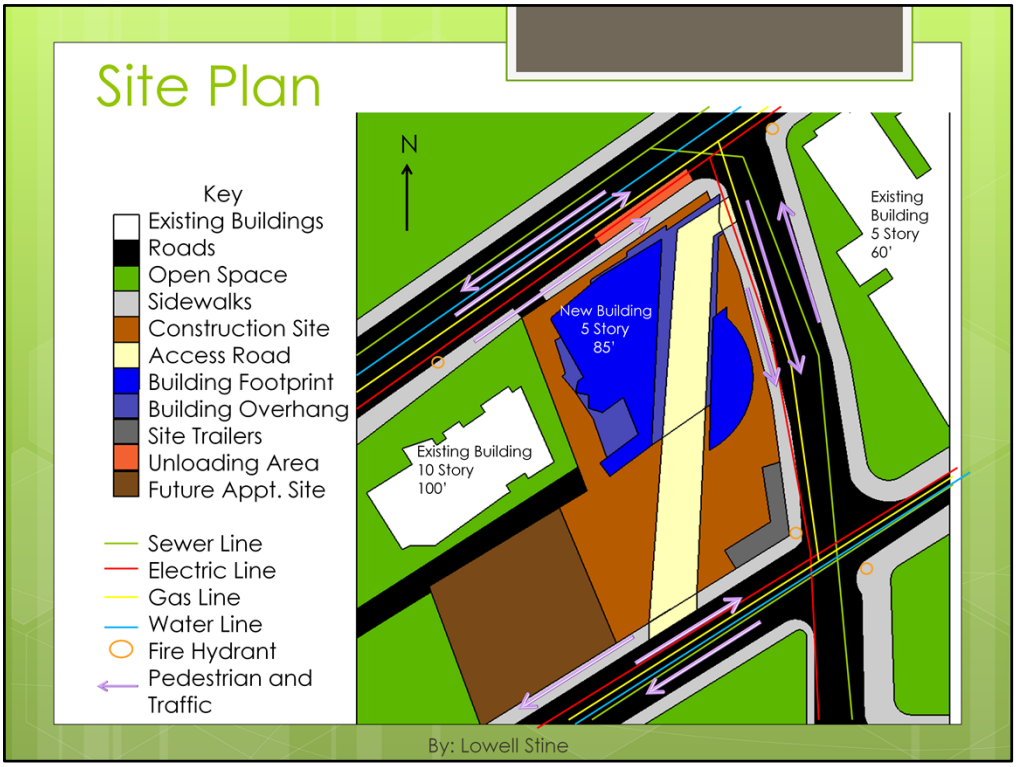
- Design-Bid-Build
- Owner wanted to have a big part in designing the building interior and finishes.
- Originally the owner wanted the library to be on the bottom floors of a residential tower built by a developer. As the idea progressed the County decided that it would take too long to get a developer on board, so they went ahead and got the Architect started on the design of just the library building. There are four different preselected architects that the county rotates between when new projects are started. This rotation process is the same for the commissioning consultants as well as the Construction Manager.
- In choosing a contractor, first the county sent out a public Request for Expression of Interest (REOI). From the list of contractors that expressed interest in biding the project, six were chosen to actually bid on the project.
- Design-Bid-Build I believe was an appropriate delivery method for this owner and for this project because the county still got the price of an competitive bid while still prequalifying a number of General Contractors. Also, the owner could greatly influence the design before the Contractor was selected.


Library in Metropolitan Washington D.C
Owner
County in Metropolitan D.C.-
Department of General Services
Owner's Representative
Lump Sums
Time & Material
Architect
The Lukmire Partnership
William Evans
Envelope Commissioning
Gail
CM/ CMA
MBP
Carlos Sanchez
3rd Party Testing
Robert E. Balter
Commissioning
Agency
Lump Sum
HVAC, Plumbing, &
Electrical Engineer
Mendoza, Ribas,
Farinas & Associates
IT/Security
Consultant
Wright Engineering
Structural Engineer
Columbia
Engineering
Civil Engineer
ADTEK
Communication
Line
Landscape Architect
Parker Rodriguez
Interior Designer
Studio of Sandra Ragan
Lighting Consultant
MCLA
Contractor
Costello Construction
David Costello
Masonry & Cast Stone
CF Masonry Specialists
Steve Coleman
Structural Steel
Crystal Steel Fabricators
Bill Kaeser
Fireproofing
Davenport Commercial
Arthur Ashe
Curtain Wall/
Windows
Florida Glass
Cathy Parker
Drywall
JP Construction Inc.
Manny DeLeon
Elevators
Schindler Elevator
Bill Partridge
Sprinkler
Advanced FP Systems
Robert Morgan
Electrical
Young Elec. Contractors
Catherine Young
Roofing
DJB Contracting
Arthur Ashe
Plumbing & HVAC
Ariosa & Company,
LLC
James Stahl
Color Coding
Owner
Architect
Engineering
Consultants
CM & 3rd Party
Consultants
General Contractor
Sub Contractors
By: Lowell Stine



GC Staffing Plan

- Costello's owner as Project Executive
- Quality Control Manager reports directly to owner, not to the Project Manager.
- There are a number of Superintendents and Assistant Managers that report to the Project Manager.
- Under the Senior Superintendent is three trade Forman and the Trade Foreman for the work performed by Costello Construction.

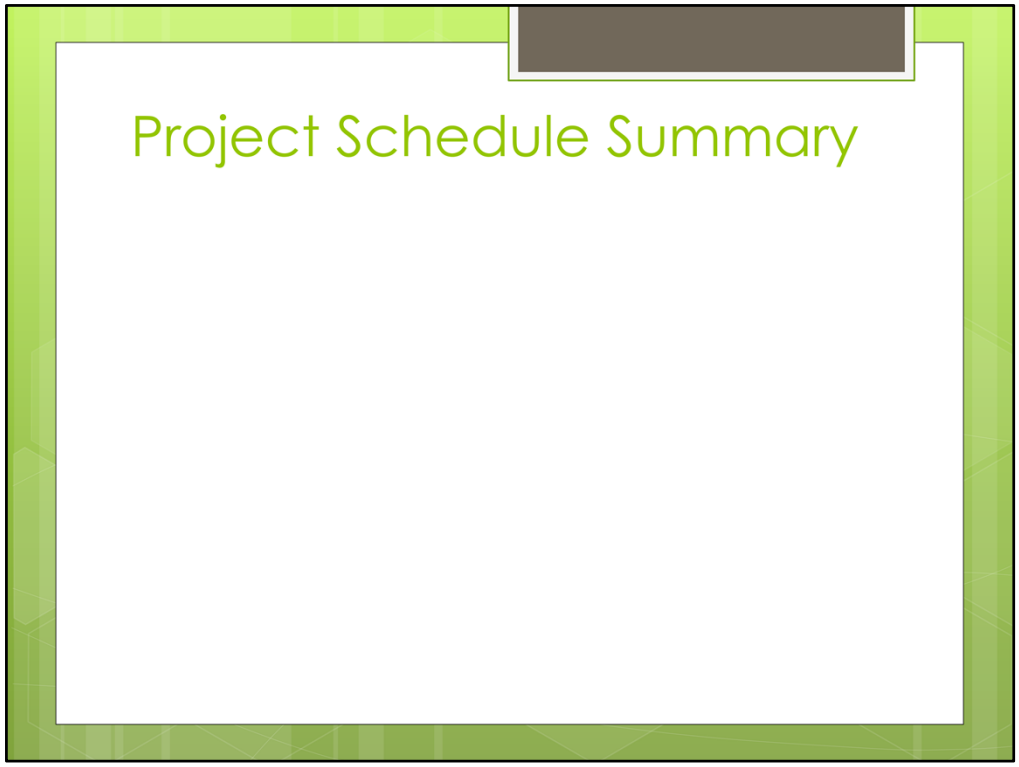


Existing Conditions and Site Plans

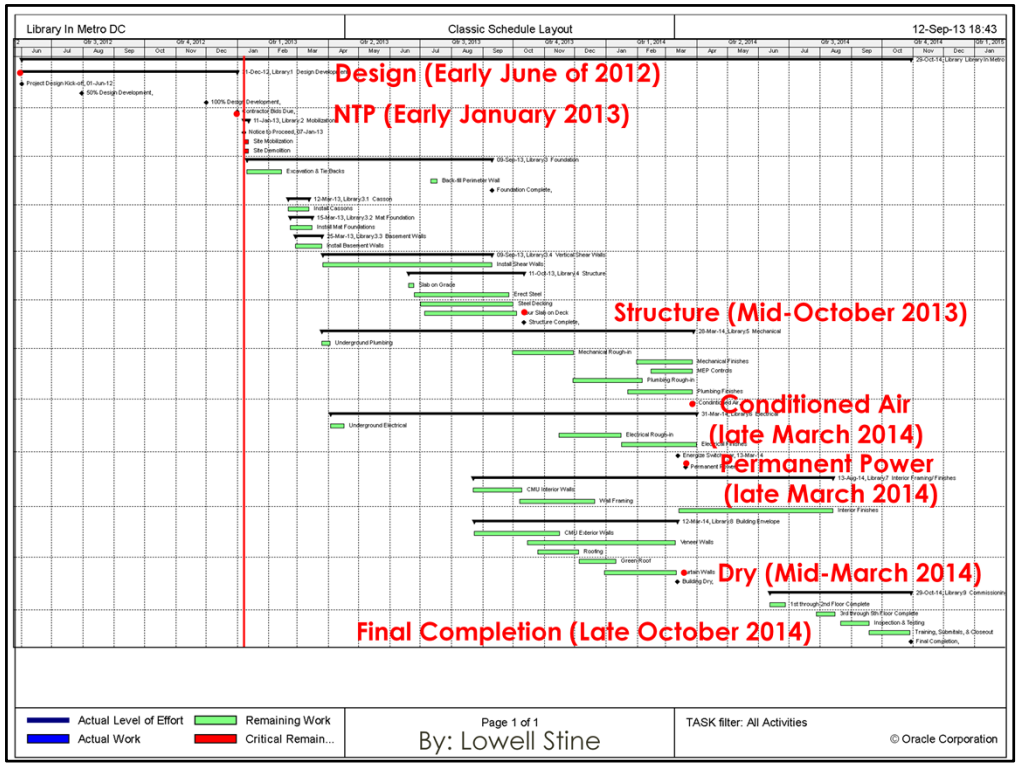
- Over a few year period the County bought the property that made up the current building site, which included: an old four story apartment building, a large house that was being used as a Moose Lodge, a one story car repair garage, and a small fried chicken shop.
- Before construction was started water lines, sanitary sewer lines, and storm drains were rerouted and electric, cable, and phone lines were ran underground near the building as to not take away from the architectural aspect of the building.
- There will be a five story residential building that will be built adjacent to the site next to an existing residential tower.
- During construction parking will be available across the street in a large parking garage.
- According to the Geotechnical Report, soils encountered on site were topsoil and fill up to 12 feet in depth, residual soils 12 to 25 feet in depth, and weathered & not weathered rock between 25 and 50 feet in depth and even beyond. This is why caissons and mat slabs had to be placed throughout the building until sufficient barring capacity was reached, which occurred at a variety of different depths (5ft to 40ft).

Preferred Methods of Construction

- Most buildings in the area have a structural steel framing system much like this project is using.



The Schedule can be found on the following slide.



Timeline

- Construction will take place from January 2013 to October 2014.
- Design was started in early June of 2012
- Bids were collected and notice to proceed was given in early January 2013.
- The structure will be completed in mid October 2013.
- The building will be dry in mid March 2014.
- Permanent power will be switched on in late March 2014.
- The mechanical system will be conditioning the building in late March 2014.
- Substantial Completion is to be late October 2014.

Demolition Requirements

- Site had an old four story apartment building, a large house that was being used as a Moose Lodge, a one story car repair garage, and a small fried chicken shop before demolition started.
- While excavation was taking place, an old petroleum tank was uncovered and had to be removed by a certified specialty contractor.

Excavation Support

- Tiebacks and lagging are providing the building with excavation support.

Structural Steel Frame

- Structural Steel Framed building supported on caissons.
- Three elevator or stair shafts that act like shear walls.
- Each floor deck is made up of a composite concrete slab systems.
- There are two trusses that support the Northeast side of building and that cantilever 50'.

Cast-in-place Concrete

- Caissons
- Foundation walls are poured using wall forms
- Matt slabs
- Elevator shafts formed with removable and reusable wall forms.
- Concrete on this site will be placed using one of three methods. One is a direct shoot from the concrete truck, but when this method can not be used, a crane

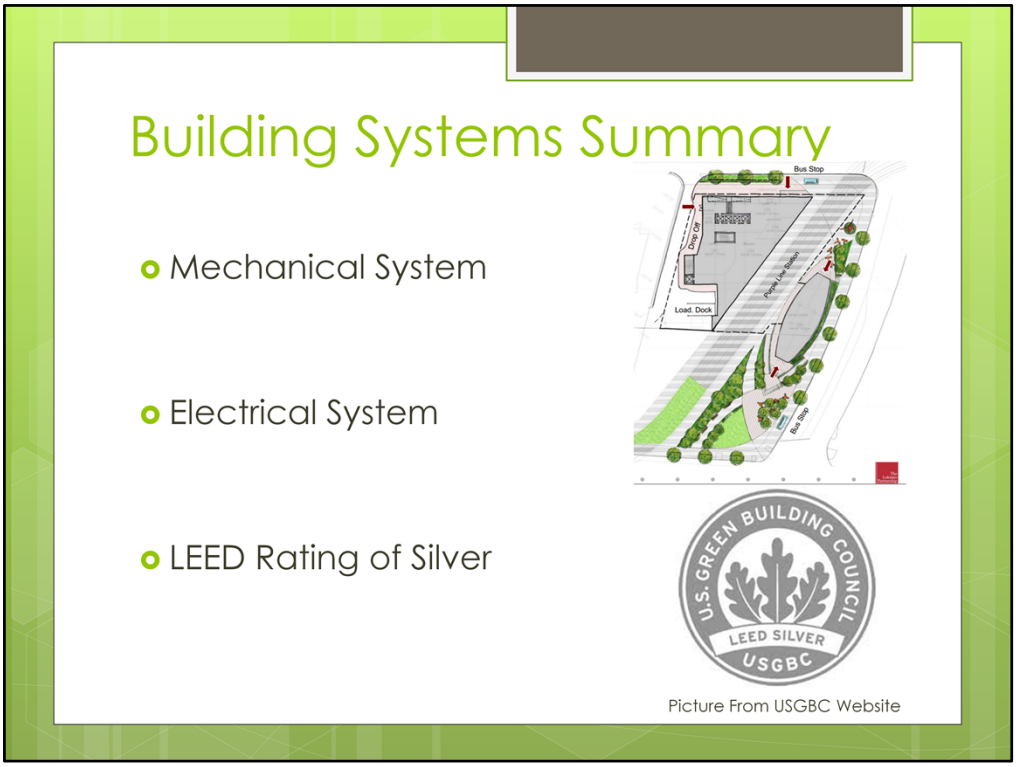
and bucket will be used. Because the crane has limited access, a concrete pump truck may/has been brought in for a pour.

Masonry

- Veneer stone, terracotta, and/or CMU's on first two floors, vertical shafts and West side.
- There are a few instances where there is load bearing CMU's.
- For the most part stick built scaffolding will be used to lay any and all masonry.

Curtain Walls

- Aluminum and glazing.
- Sunshades above each floor.
- Floors three through five is almost completely comprised of a curtain wall assembly on North, East, and South sides.



Mechanical System

- Mechanical rooms are located on the roof, attached to the pavilion elevator shaft on the first, third, and forth floor, and one on the first floor attached to the East elevator shaft. The three top floors are conditioned by the roof top mechanical room using a duct shaft that drops down the Southwest side of the building.
- Gas fired source of heat, and cooling tower with integrated package equipment center (IPEC), which is a prefabricated package equipment plant mechanical room on the roof that conditions the library portion of the building. This system also has the ability to do VAV, and heat recovery.
- The heat/cooling means is by ducted forced air with a variety of reheat boxes, coils, and a lot of supply ducks at the curtain wall perimeter and hot water piping with radiators. Hydronic in-slab radiant floor heating systems near overhangs and other cold bridging areas are also used.
- Fire suppression- Smoke evacuation system, smoke detectors in air plenums, and sprinklers.

Electrical System

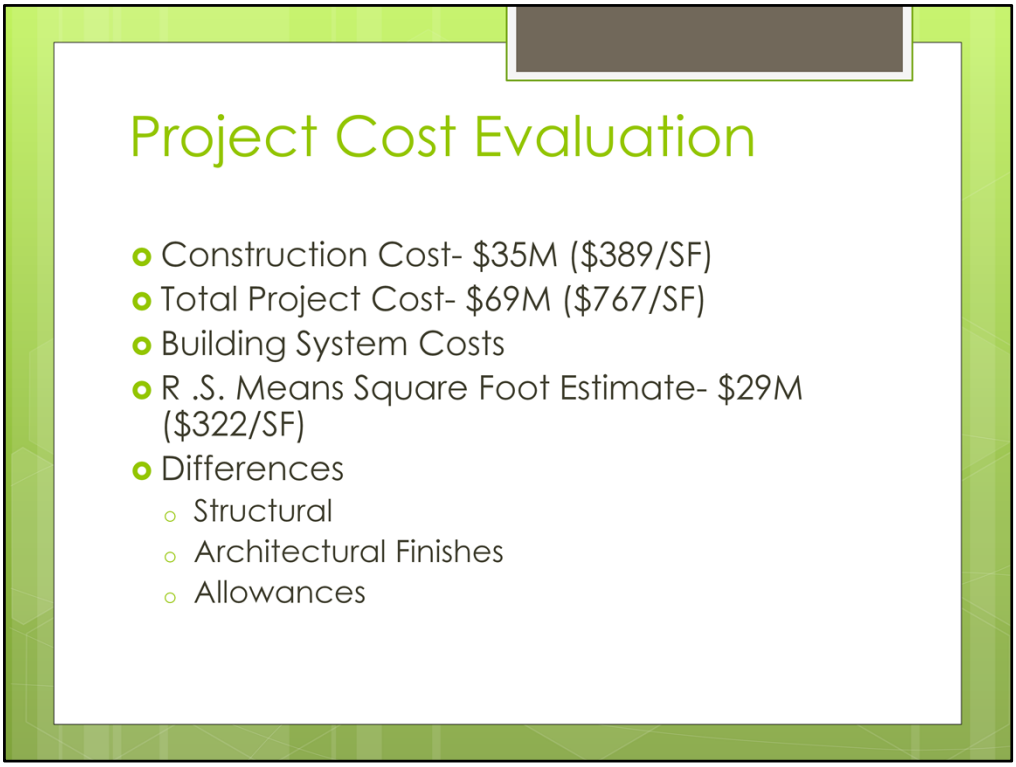
- Lighting System is controlled through a network of Light Management Hubs that control dimming, occupancy, and can be fully managed from a remote location.
- There is an electrical room located on the first, third, forth, and fifth floors located in the core of the building attached to the elevator shaft and a small electrical panel access point on the first floor of the pavilion located on the back wall.
- Building feed is 277/480V that feeds a 3000A rated Main Distribution Switch Board and there is a second incoming utility line that is also 277/480V that feeds a 400A rated

transocket that powers the coffee shop space.

- The building has a 250KW natural gas powered generator.

LEED Silver

- Silver requirement set by owner before project started.
- The project is on track with LEED but it is still early.
- Contractor has their own rock crushing machine to reuse excavated rocks as stone for fill and construction access roads.
- Construction waste must be 75% to 95% recyclable. 75% is challenging, while 95% is almost impossible to .
- Waste is taken offsite, sorted, and recorded, which is becoming the norm for a lot of construction sites.
- Alternative transportation (bus and train)



Construction Cost

- Total actual building construction cost is at $35,000,000 or $389/SF.

Total Project Cost

- Total project cost is at $69,000,000 or $767/SF.

Building System Cost

- General Conditions- $825,000 ($9.17/SF)
- Mechanical System-$3,860,000 ($42.89/SF)
- Sprinkler System- $352,000 ($3.91/SF)
- Electrical System-$4,010,000 ($44.55/SF)
- Structural Steel- $3,061,000 ($34.01/SF)
- Roofing System- $517,000 ($5.74/SF)
- Curtain Wall- $2,330,000 ($25.89/SF)
- Elevators and Escalators- $1,420,000 ($15.78/SF)
- IPEC- $2,650,000 ($29.44/SF)
- New Book Allowance- $750,000
- New Radio Frequency Inventory Device (RFID)- $700,000

Square Foot Estimate

- Square foot- 90,000 SF
- Perimeter- 800 ft
- Story Height- 17ft
- Basement Area- 8,000 SF
- RS Means cost per SF- $184 (Not Adjusted)
- Perimeter Adjustment- add $7/SF for every 100ft over 440ft= add $25.20/SF

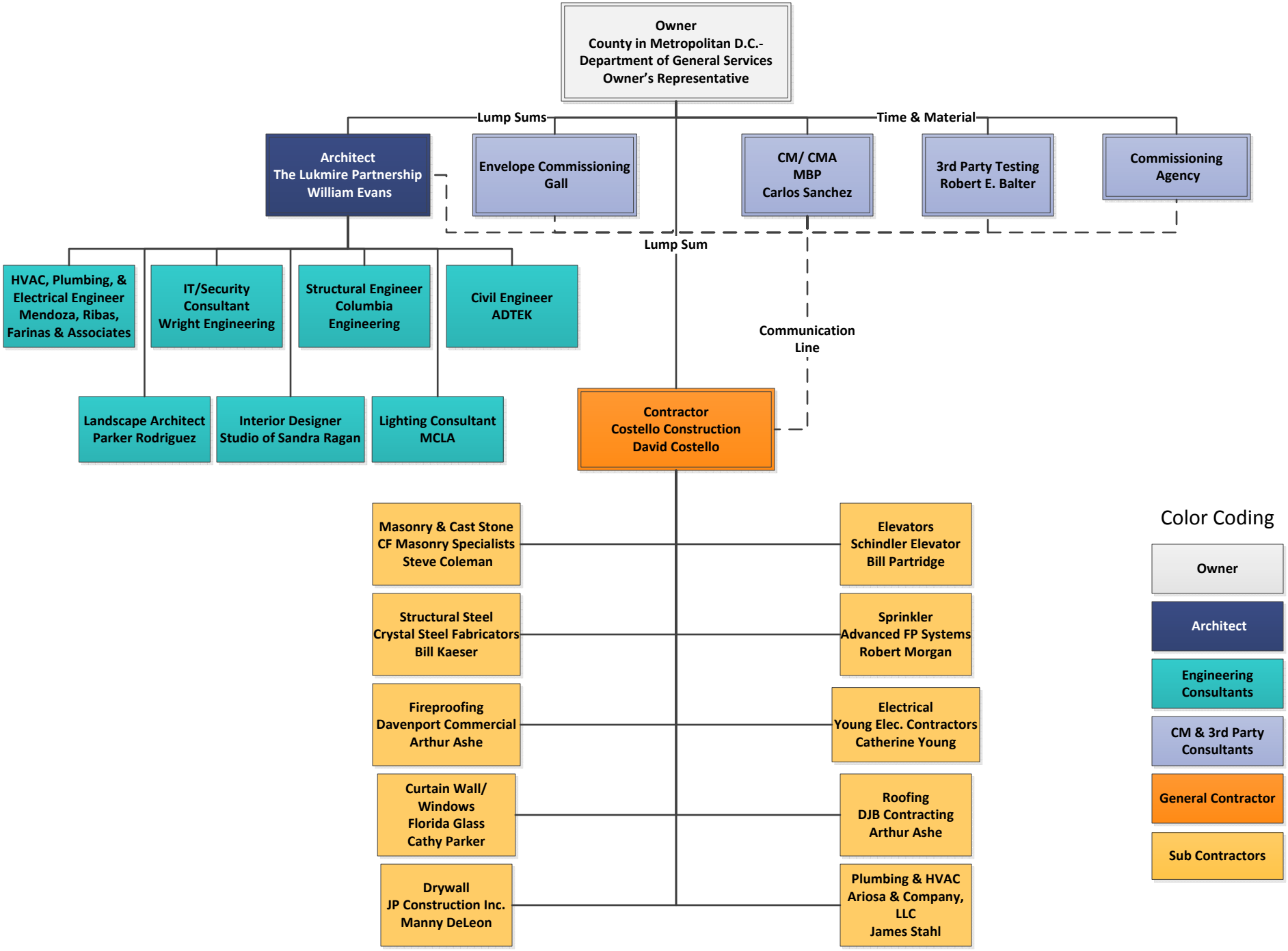
- Height Adjustment- add $2.55/SF for every 1ft over 12ft= add 12.75/SF
- Subtotal $/SF- $222/SF= $20M
- Basement Adjustment- add $38.65/SF of basement area= $309,000
- Subtotal $/SF- $20M+ $309,000= $20.3M
- Location Adjustment- multiply by a factor of 1.43
- Total Cost of Construction- $29M ($322/SF)

Differences

- Architectural- The quality of finishes and architectural components on this project is well over the norm, so this will raise the $/SF value of the project.
- Structural- While the structure of this building is made of structural steel which is common for this area, the structure is complex because the roof framing is made of large trusses, two of which have a 50’ cantilever.
- There is a $750,000 allowance that is added into the cost of the building to purchase new books for the library. Also, the new RFID system, which is handpicked by the owner and somewhat complicated, is already priced at $700,000.

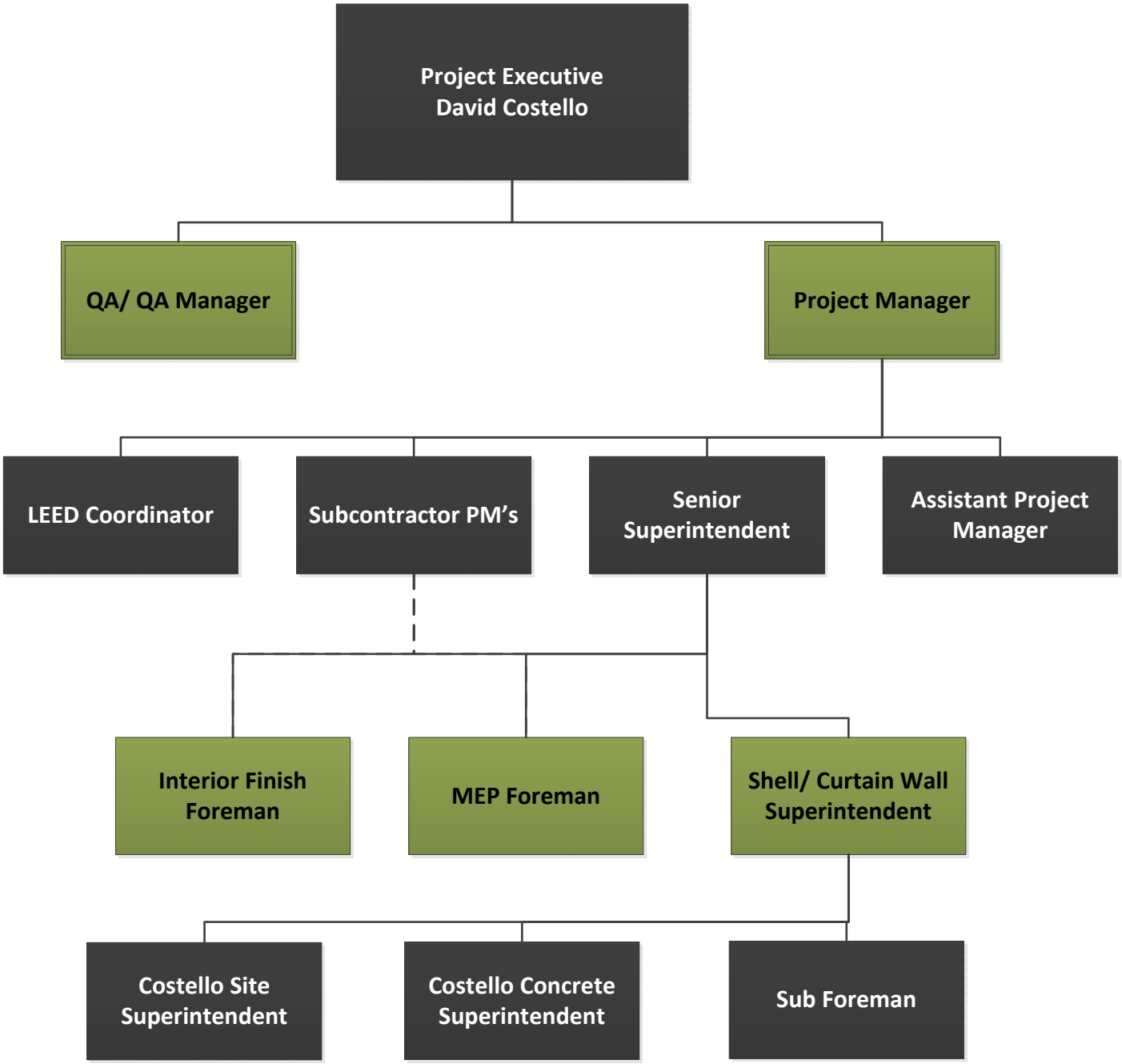
Appendix A

Library in Metropolitan Washington D.C



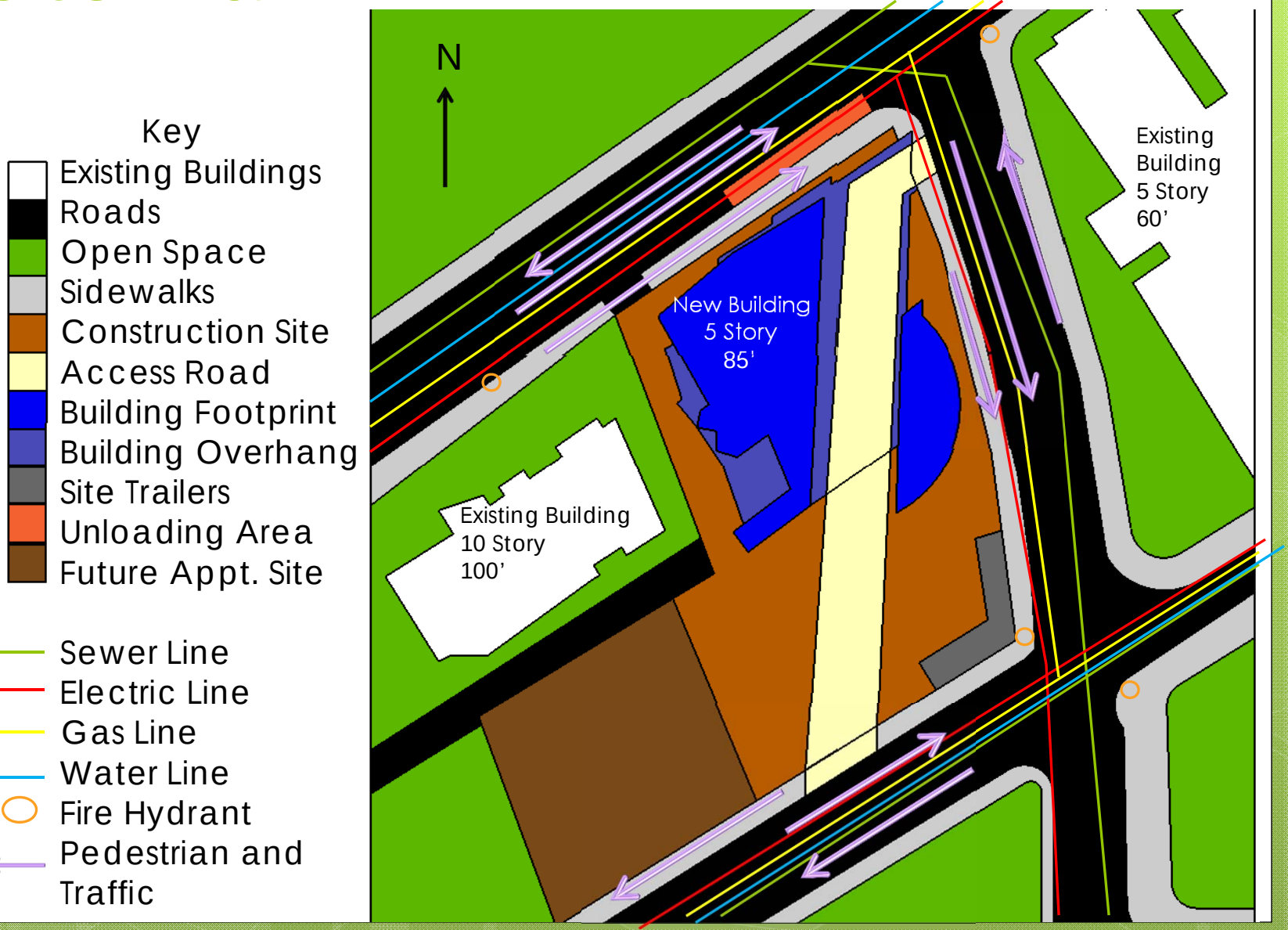
Appendix B

Costello Construction Project Staffing Plan



Appendix C

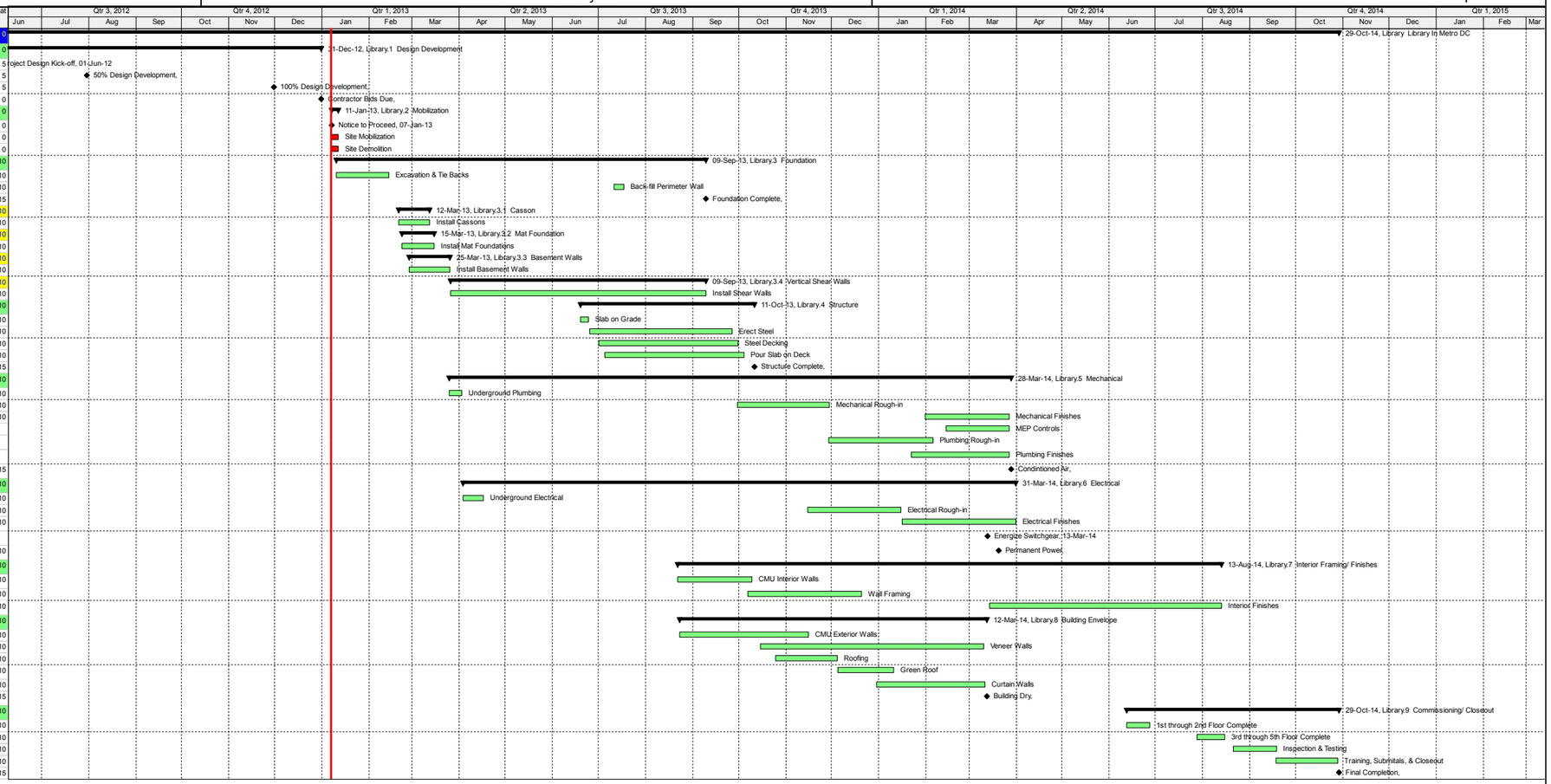
Site Plan



By: Lowell Stine

Appendix D

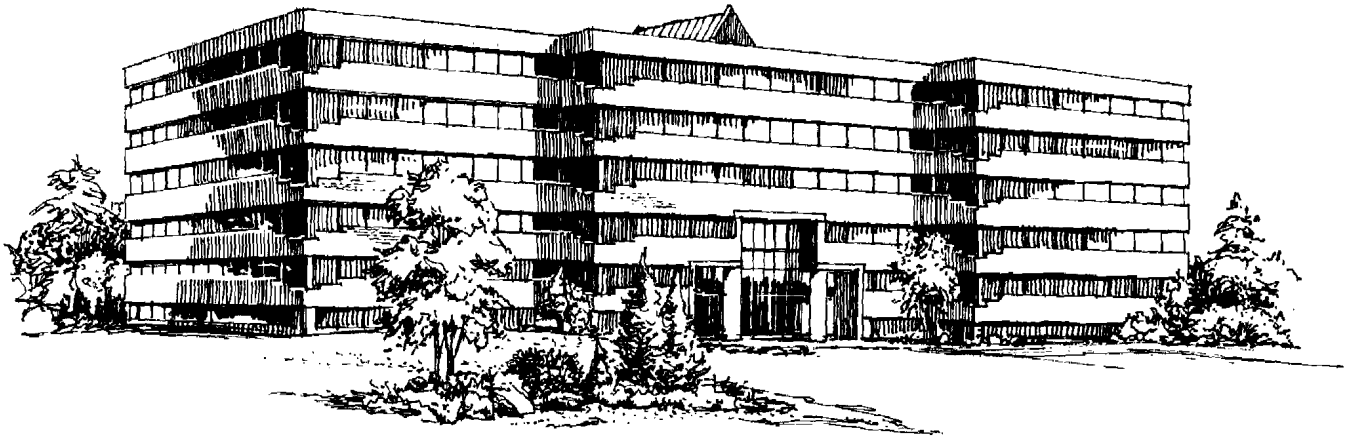
Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish	Total Float
Library	**Library In Metro DC**	619	619	0%	01-Jun-12	29-Oct-14	0
Library.1	**Design Development**	148	148	0%	01-Jun-12	31-Dec-12	0
A1200	Project Design Kick-off	0	0	100%	01-Jun-12		5
A1210	50% Design Development	0	0	100%		30-Jul-12	5
A1220	100% Design Development	0	0	100%		30-Nov-12	5
A1240	Contractor Bids Due	0	0	100%		31-Dec-12	0
Library.2	**Mobilization**	5	5	0%	07-Jan-13	11-Jan-13	0
A1060	Notice to Proceed	0	0	0%	07-Jan-13		0
A1070	Site Mobilization	5	5	0%	07-Jan-13	11-Jan-13	0
A1080	Site Demolition	5	5	0%	07-Jan-13	11-Jan-13	0
Library.3	**Foundation**	170	170	0%	10-Jan-13	09-Sep-13	10
A1250	Excavation & Tie Backs	25	25	0%	10-Jan-13*	13-Feb-13	10
A1410	Back-fill Perimeter Wall	5	5	0%	11-Jul-13	17-Jul-13	10
A1500	Foundation Complete	0	0	0%		09-Sep-13	15
Library.3.1	**Casson**	15	15	0%	20-Feb-13	12-Mar-13	10
A1260	Install Cassons	15	15	0%	20-Feb-13	12-Mar-13	10
Library.3.2	**Mat Foundation**	16	16	0%	22-Feb-13	15-Mar-13	10
A1270	Install Mat Foundations	16	16	0%	22-Feb-13	15-Mar-13	10
Library.3.3	**Basement Walls**	19	19	0%	27-Feb-13	25-Mar-13	10
A1280	Install Basement Walls	19	19	0%	27-Feb-13	25-Mar-13	10
Library.3.4	**Vertical Shear Walls**	117	117	0%	26-Mar-13	09-Sep-13	10
A1290	Install Shear Walls	117	117	0%	26-Mar-13	09-Sep-13	10
Library.4	**Structure**	81	81	0%	19-Jun-13	11-Oct-13	10
A1300	Slab on Grade	4	4	0%	19-Jun-13	24-Jun-13	10
A1310	Erect Steel	66	66	0%	25-Jun-13	26-Sep-13	10
A1320	Steel Decking	64	64	0%	01-Jul-13	30-Sep-13	10
A1330	Pour Slab on Deck	65	65	0%	05-Jul-13	04-Oct-13	10
A1340	Structure Complete	0	0	0%		11-Oct-13	15
Library.5	**Mechanical**	260	260	0%	25-Mar-13	28-Mar-14	10
A1350	Underground Plumbing	7	7	0%	25-Mar-13	02-Apr-13	10
A1360	Mechanical Rough-in	44	44	0%	30-Sep-13	29-Nov-13	10
A1370	Mechanical Finishes	40	40	0%	31-Jan-14	27-Mar-14	10
A1375	MEP Controls	30	30	0%	14-Feb-14	27-Mar-14	
A1490	Plumbing Rough-in	48	48	0%	29-Nov-13	05-Feb-14	
A1495	Plumbing Finishes	47	47	0%	22-Jan-14	27-Mar-14	
A1560	Condintioned Air	0	0	0%		28-Mar-14	15
Library.6	**Electrical**	254	254	0%	03-Apr-13	31-Mar-14	10
A1380	Underground Electrical	10	10	0%	03-Apr-13	16-Apr-13	10
A1390	Electrical Rough-in	42	42	0%	15-Nov-13	15-Jan-14	10
A1400	Electrical Finishes	53	53	0%	16-Jan-14	31-Mar-14	10
A1491	Energize Switchgear	0	0	0%	13-Mar-14		
A1492	Permanent Power	0	0	0%		20-Mar-14	10
Library.7	**Interior Framing/ Fir**	252	252	0%	22-Aug-13	13-Aug-14	10
A1420	CMU Interior Walls	34	34	0%	22-Aug-13	09-Oct-13	10
A1430	Wall Framing	54	54	0%	07-Oct-13	20-Dec-13	10
A1440	Interior Finishes	109	109	0%	14-Mar-14	13-Aug-14	10
Library.8	**Building Envelope**	141	141	0%	23-Aug-13	12-Mar-14	10
A1450	CMU Exterior Walls	60	60	0%	23-Aug-13	15-Nov-13	10
A1460	Veneer Walls	103	103	0%	15-Oct-13	10-Mar-14	10
A1470	Roofing	28	28	0%	25-Oct-13	04-Dec-13	10
A1480	Green Roof	26	26	0%	05-Dec-13	10-Jan-14	10
A1510	Curtain Walls	52	52	0%	30-Dec-13	11-Mar-14	10
A1520	Building Dry	0	0	0%		12-Mar-14	15
Library.9	**Commissioning/ Clo**	100	100	0%	12-Jun-14	29-Oct-14	10
A1530	1st through 2nd Floor Com	12	12	0%	12-Jun-14*	27-Jun-14	10
A1540	3rd through 5th Floor Com	15	15	0%	28-Jul-14	15-Aug-14	10
A1550	Inspection & Testing	21	21	0%	21-Aug-14	18-Sep-14	10
A1570	Training, Submitals, & Clos	29	29	0%	18-Sep-14	28-Oct-14	10
A1580	Final Completion	0	0	0%		29-Oct-14	15



Actual Level of Effort | Actual Work | Remaining Work | Critical Remaining Work | Milestone | summary

TASK filter: All Activities

Appendix E



Costs per square foot of floor area

Exterior Wall	S.F. Area	20000	40000	60000	80000	100000	150000	200000	250000	300000
	L.F. Perimeter	260	360	400	420	460	520	600	640	700
Precast Concrete Panel	Steel Frame	235.70	204.10	187.05	176.90	172.15	164.00	160.55	157.50	155.85
	R/Conc. Frame	233.70	201.90	184.85	174.65	169.85	161.65	158.20	155.10	153.45
Face Brick with Concrete Block Back-up	Steel Frame	218.15	191.15	177.15	168.85	164.95	158.35	155.50	153.00	151.70
	R/Conc. Frame	213.60	188.00	174.50	166.55	162.75	156.25	153.60	151.15	149.85
Limestone Panel Concrete Block Back-up	Steel Frame	261.05	221.55	200.00	187.10	181.05	170.65	166.35	162.45	160.35
	R/Conc. Frame	258.65	219.20	197.60	184.70	178.65	168.30	163.95	160.05	157.95
Perimeter Adj., Add or Deduct	Per 100 L.F.	32.55	16.30	10.85	8.10	6.50	4.30	3.20	2.55	2.20
Story Hgt. Adj., Add or Deduct	Per 1 Ft.	6.75	4.70	3.45	2.75	2.40	1.80	1.55	1.30	1.25

***For Basement**, add $38.65 per square foot of basement area*

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 $80.70 to $237.35 per S.F.

Common additives

Description	Unit	$ Cost
Closed circuit surveillance, one station		
Camera and monitor	Each	1950
For additional camera stations, add	Each	1050
Directory boards, plastic, glass covered		
30" x 20"	Each	660
36" x 48"	Each	1475
Aluminum, 24" x 18"	Each	620
36" x 24"	Each	725
48" x 32"	Each	1050
48" x 60"	Each	2175
Electronic, wall mounted	S.F.	980
Free standing	S.F.	1100
Escalators, 10' rise, 32" wide, glass balustrade	Each	137,400
Metal balustrade	Each	143,400
48" wide, glass balustrade	Each	143,400
Metal balustrade	Each	150,900
Pedestal access floor system w/ plastic laminate cover		
Computer room, less than 6000 SF	S.F.	11.95
Greater than 6000 SF	S.F.	11.20
Office, greater than 6000 S.F.	S.F.	8

Description	Unit	$ Cost
Security access systems		
Metal detectors, wand type	Each	98
Walk-through portal type, single-zone	Each	4325
Multi-zone	Each	5400
X-ray equipment		
Desk top, for mail, small packages	Each	3850
Conveyer type, including monitor, minimum	Each	17,500
Maximum	Each	31,100
Explosive detection equipment		
Hand held, battery operated	Each	28,100
Walk-through portal type	Each	47,900
Uninterruptible power supply, 15 kVA/12.75 kW	kW	1735

Model costs calculated for a 8 story building with 12' story height and 80,000 square feet of floor area

Office, 5-10 Story

				Unit	Unit Cost	Cost Per S.F.	% Of Sub-Total
A. SUBSTRUCTURE							
1010	Standard Foundations	Poured concrete; strip and spread footings		S.F. Ground	11.92	1.49	
1020	Special Foundations	N/A		—	—	—	
1030	Slab on Grade	4" reinforced concrete with vapor barrier and granular base		S.F. Slab	5.18	.65	2.0%
2010	Basement Excavation	Site preparation for slab and trench for foundation wall and footing		S.F. Ground	.32	.04	
2020	Basement Walls	4' foundation wall		L.F. Wall	79	.53	
B. SHELL							
B10 Superstructure							
1010	Floor Construction	Concrete slab with metal deck and beams		S.F. Floor	24.06	21.05	16.4%
1020	Roof Construction	Metal deck, open web steel joists, interior columns		S.F. Roof	7.04	.88	
B20 Exterior Enclosure							
2010	Exterior Walls	Precast concrete panels	*80% of wall*	S.F. Wall	47.67	19.22	
2020	Exterior Windows	Vertical pivoted steel	*20% of wall*	Each	584	3.93	17.5%
2030	Exterior Doors	Double aluminum and glass doors and entrance with transoms		Each	4154	.26	
B30 Roofing							
3010	Roof Coverings	Built-up tar and gravel with flashing; perlite/EPS composite insulation		S.F. Roof	6.08	.76	0.6%
3020	Roof Openings	N/A		—	—	—	
C. INTERIORS							
1010	Partitions	Gypsum board on metal studs	*30 S.F. Floor/L.F. Partition*	S.F. Partition	9.54	3.18	
1020	Interior Doors	Single leaf hollow metal	*400 S.F. Floor/Door*	Each	1212	3.03	
1030	Fittings	Toilet Partitions		S.F. Floor	.70	.70	
2010	Stair Construction	Concrete filled metal pan		Flight	14,150	3.01	19.6%
3010	Wall Finishes	60% vinyl wall covering, 40% paint		S.F. Surface	1.46	.97	
3020	Floor Finishes	60% carpet, 30% vinyl composition tile, 10% ceramic tile		S.F. Floor	8.44	8.44	
3030	Ceiling Finishes	Mineral fiber tile on concealed zee bars		S.F. Ceiling	6.86	6.86	
D. SERVICES							
D10 Conveying							
1010	Elevators & Lifts	Four geared passenger elevators		Each	304,000	15.20	11.4%
1020	Escalators & Moving Walks	N/A		—	—	—	
D20 Plumbing							
2010	Plumbing Fixtures	Toilet and service fixtures, supply and drainage	*1 Fixture/1370 S.F. Floor*	Each	3685	2.69	
2020	Domestic Water Distribution	Gas fired water heater		S.F. Floor	.56	.56	2.7%
2040	Rain Water Drainage	Roof drains		S.F. Roof	2.32	.29	
D30 HVAC							
3010	Energy Supply	N/A		—	—	—	
3020	Heat Generating Systems	Included in D3050		—	—	—	
3030	Cooling Generating Systems	N/A		—	—	—	12.9 %
3050	Terminal & Package Units	Multizone unit gas heating, electric cooling		S.F. Floor	17.25	17.25	
3090	Other HVAC Sys. & Equipment	N/A		—	—	—	
D40 Fire Protection							
4010	Sprinklers	Wet pipe sprinkler system		S.F. Floor	2.85	2.85	2.9%
4020	Standpipes	Standpipes and hose systems		S.F. Floor	1.02	1.02	
D50 Electrical							
5010	Electrical Service/Distribution	1600 ampere service, panel board and feeders		S.F. Floor	1.48	1.48	
5020	Lighting & Branch Wiring	High efficiency fluorescent fixtures, receptacles, switches, A.C. and misc. power		S.F. Floor	11.63	11.63	14.0%
5030	Communications & Security	Addressable alarm systems, internet and phone wiring, emergency lighting		S.F. Floor	4.48	4.48	
5090	Other Electrical Systems	Emergency generator, 100 kW, uninterruptible power supply		S.F. Floor	1.07	1.07	
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	133.52	**100%**
	CONTRACTOR FEES (General Requirements: 10%, Overhead: 5%, Profit: 10%)				*25%*	33.37	
	ARCHITECT FEES				*6%*	10.01	
					Total Building Cost	**176.90**	