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Construction Management Option
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Technical Assignment 1:

Existing Construction Conditions

&

Construction Project Management

Capital One Lecture Hall Addition

Advisor: Dr. Michael Horman

Executive Summary

This technical assignment examines the existing construction conditions and a few of the project management issues associated with the Capital One Lecture Hall Addition. In this document, the project's existing conditions are analyzed in accordance with its proposed project schedule, the main engineering and construction systems, and a project cost evaluation. Project Management concerns are presented through Capital One's proposal, the project delivery system, and James G. DAVIS Construction Corporation's staffing plan.

Situated on a 29 acre site in McLean, Virginia, the 20,400 ft2 addition to the base building will eventually house Capital One's recruiting and educational events. From the start of the demolition phase on 13-May-2005 to the proposed project closeout on 23-August-2006, the Design-Bid-Build project will approach $15 million. Given the fast-track of the project, Jones Lang LaSalle and Capital One entered into a Guaranteed Maximum Price (GMP) contract with a construction manager, that being James G. DAVIS Construction Corporation.

A number of the Lecture Halls' distinct architectural and technological details normally not incorporated within auditoriums include; a garden atrium with water features, medium-size conference rooms with audio-visual support, wireless internet throughout the auditorium, a large skylight, and a glass screen wall system from Italy. When attempting to create an approximate square foot and parametric estimate from similar standard quality construction projects, the calculated $3.1 and $4.7 million estimates did not come close.

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Existing Construction Conditions

Project Schedule Summary

Please see the attached project schedule located in **Appendix A**.

Foundation Sequence

Supported by concrete footings and shear walls, the Lecture Hall basement foundation sequence began on 20-June-05 and was completed in mid-September. Once the footings had been placed, the southern most shear wall was the first section to be poured. Working in a clockwise direction, the entire basement was to be enclosed after 10 separate pours. The arrows outside of the floor plan sketch to the right represent the individual sections.

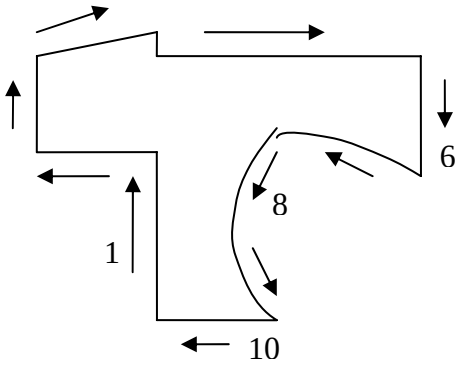


Figure 1. Foundation Pour Sketch

Before the entire basement walls had been complete, the slab on grade began. The first of three slab pours began in the upper left portion of the building footprint once wall pour 6 was complete. Once the eighth wall pour cured, the second slab section to the right side of the footprint could be poured. After completed the last wall pour, the remaining slab on grade placement could be done.

Structural Sequence

Similar to the foundation sequence, the structural flow was in the same clockwise manner. As you can see in the accompanying photograph, the 1st floor steel began in the southern most area and proceeded to be placed in relation to the slab on grade pours. Even in the upper floor, once the slab on deck is complete in the circular manner, the corresponding steel will be placed.

Finish Sequence

The finish sequences between the main auditorium space and the remaining floor area are similar to each other. Interior work in the auditorium starts at the ceiling with installing the catwalk and doing rough-ins, then working their way down to the floor with installing millwork and auditorium seating. All the while appropriate levels of scaffolding are removed and returned to the supplier to cut back on rental costs. This emphasizes the importance of completing all of the higher elevation work before continuing down, because once the scaffolding is gone it will be quite difficult to reach certain heights.

Like practically all construction projects, the interior work for the remaining floor space starts on the upper level and works downward toward the exit of the building. Once all of the carpet and audio-visual equipment has been installed in the respective places, one final clean will proceed through the entire building at the same time.

Building Systems Summary

Demolition

Being an addition to Capital One's base building, the Lecture Hall project entailed quite a bit of demolition to the recently completed work. In total, two conference rooms and a coffee shop contained on the end of two separate floors had to be completely removed. The mechanical and electrical systems were cut and are to be re-routed in these spaces until the Lecture Hall is complete and can be tied back in. Structurally, all of the steel and post-tensioned slabs were knocked down. In order to maintain a structurally stable second floor slab, an additional beam was connected between an existing concrete column and steel column. The removal of lead paint or asbestos was not a problem in the demolition work of the new base building. Other than the countertops in the coffee shop, light fixtures, and concrete pavers in the patio, everything was eliminated.

Figure 3. Base Building Demolition

Structural Steel Frame

Due to the abnormally shaped building and large open spaces, the Lecture Hall had to be custom built by the structural engineer. The elliptically shaped configuration prevents the use of repetitive steel sizes and typical bay dimensions. With the two large open spaces of the auditorium and garden atrium, the steel system had to be designed with moment connections. Cross bracing can only be found in the trusses for the roof. A 40-ton truck mounted crane from Link Belt has been used to place the regular steel pieces, but a larger undetermined crane will be needed for the roof trusses.

Cast-in-Place Concrete

The Lecture Hall is supported by a foundation with 14" thick shear walls and concrete column footings. Also, the facility utilizes slab on grade and concrete slabs on each floor level. The 5" slab on grade at the basement is reinforced with 6x6 – W2.0xW2.0 WWF on 6" No.57 stone. For the auditorium slab on grade, a similar system is used, except that it is a stepped concrete slab to conform to the seating elevation layout.

Figure 4. Ulma Forms in Staging Area

Figure 5. Ulma Forms

On this job there were multiple concrete placement methods as well as formwork types. Although all the shear walls were poured with the help of a 1.5 yard bucket attached to a 40-ton mobile crane, two different framing types were used. For the curved wall along the north end of the basement, special metal Ulma forms were used. A majority of the remaining shear walls were framed with wood forms constructed by hand on site. The wood forms allowed the concrete subcontractor to re-use them for multiple pours once the wall had set and forms taken down. All of concrete used for the slab on grade pours had been pumped.

Precast Concrete

Besides the intricate glazing system designed and fabricated in Italy, the exterior of the Lecture Hall is mainly comprised of precast concrete panels around the nose of the building. All of these panels which are to match the existing base building will be cast at the subcontractor's site in Virginia. Arban & Carosi will create the finished panels from their own concrete forms. Once they are complete, all of the precast panels will be delivered to the site in sections 40' in height. One 70-ton hydraulic truck crane from Link Belt, model HTC-8670, will be used to maneuver the panels into place. The upper portions of the precast have welded/bolted connections to the steel above to keep it from moving in and out. At the ground level, the panels are to be welded to plates on the concrete wall.

Mechanical System

The two mechanical rooms within the Lecture Hall are located in the basement. Mechanically, Capital One's lecture hall is supported by 3 air handling units and 2 boilers. While the air handing units supply the VAV boxes located throughout the building, the two 4,100 pound boilers will be utilized for heating and hot water. AHU-1,-2 and -3 respectively have 4,800 CFM, 19,200 CFM, and 10,725 CFM supply fans.

In the event of a fire, the Lecture Hall is equipped with a wet pipe sprinkler system with alarm indicators, check valve, tees, and all associated piping. Concealed sprinkler heads are located in all public areas, while pendent heads are in the storage and equipment rooms.

Electrical System

The Lecture Hall power distribution originates from the base building. By removing one existing 3 phase – 400A circuit breaker and replacing it with a new 3 phase – 1200A circuit breaker, the two main distribution panels can be supplied with power. Both main panel boards are specified to be 227/480V, 800A, 3 phase, 4 wire. MDP-A and MDP-B have a total connected/demand load of 464KVA / 397KVA and 280KVA / 280KVA respectively. The remaining secondary surface mounted panels are either 120/208V or 277/480V, 3 phase, 4 wire. In the event of an emergency, one 800KW life-safety generator and one 1750KW standby generator will supply power to the Lecture Hall.

Masonry

No masonry was required for this project.

Curtain Wall

At the front entrance of the building, it will be impossible not to notice the impressive glass screen wall spanning a width of around 180'. The entire glazing and support system, including the screen printed detailing, shall be manufactured in Italy. Steel rods that are to be anchored into the precast have four small wedges at the end of them to act as a sleeve for the corners of the class to be inserted in.

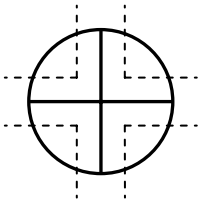


Figure 6. Glazing Sleeve on Rod

Support of Excavation

Due to the relatively shallow excavation depth, no excavation support system was required for this project. Although no initial support systems were needed for excavating, a modified system was required once the basement shear walls had been poured. In order to continue backfilling and pour the slab on grade around the basement perimeter, DAVIS had to devise a bracing system. This had to be done because the slab on deck above was yet to be poured, which would lock the walls into place. In picture below you can see the temporary steel angles connected to the concrete and braced with normal shoring equipment.

Despite the record low of rainfall over the past few months in McLean, a temporary dewatering pump system has been used when needed. In the chance that rain is expected and soil has been excavated in particular areas; the concrete workers will pour a mud-mad to hold the soil in place. This will allow them to place footings or whatever it may be on top of the mud-mat. If it rains and the soil is too wet and unsuitable for bearing or backfill, it is the job of the concrete subcontractor to remove it. They will then put the cost on a ticket to be reimbursed from DAVIS.

Figure 7. Shear Wall Support

Project Cost Summary

The following table is a breakdown of the contracts awarded to each subcontractor and their respective work. These numbers were presented to the owner as a part of DAVIS' GMP proposal in August 2005. A building size of 20,400 ft^2 has been assumed for the Lecture Hall from the Federal Acquisition Regulation's allotment of allowable space for this site. To receive a better understanding of the numbers used to find this calculation, see the "Summary of Project Program Requirements" in the **Project Overview** to follow.

- Total Building Construction Cost (CC): **$13,270,291**
  - CC per ft^2: **$650.50/ft^2**
- Total Project Cost (TC): **$15,095,988**
  - TC per ft^2: **$740.00/ft^2**
- Mechanical System (HVAC & Plumbing): **$1,612,900**
  - Mechanical System per ft^2: **$79.06/ft^2**
- Electrical System: **$1,208,536**
  - Electrical System per ft^2: **$59.24/ft^2**
- Structural System (Concrete & Steel): **$2,012,944**
  - Structural System per ft^2: **$98.67/ft^2**
- Interior/Exterior Glass and Glazing: **$2,074,355**
  - Glass and Glazing System per ft^2: **$101.68/ft^2**

Total Project Bid Summary

CSI	Description	Recommended Subcontractor	IGMP
02200	General Excavation	PARRECO	$410,236
02250	Dewatering	DAVIS	$10,000
02510	Asphalt Paving	ALLOWANCE	$10,000
02560	Site Utilities	FRANK JOY	$71,415
02620	Site Concrete & Pavers	ALLOWANCE	$65,450
02815	Water Fountain System	DELTA FOUNTAIN	$72,220
02900	Landscaping & Irrigation	SUNSET HILLS	$158,179
02950	Site Development	DAVIS	$115,000
02951	Surveying	DAVIS	$0
02952	Demolition	NECO	$314,929
03300	Concrete	SOUTHLAND	$1,122,817
03450	Precast	ARBAN & CAROSI	$479,150
04200	Masonry	N/A	$0
04400	Stone	LORTON	$314,300
05120	Structural Steel	LYNCHBURG	$890,127
05500	Miscellaneous Metals	MISC. METALS	$359,728
06100	Carpentry	DAVIS	$103,035
06400	Millwork	PATELLA	$852,801
07100	Waterproofing	ADVANCED	$91,875
07250	Spray-on Fireproofing	DIAMOND	$86,700
07500	Roofing	PROSPECT	$147,661
07900	Caulking	CAULKING APPL.	$30,974
08110	Doors, Frames, & Hardware	ATLANTIC BUILDERS	$64,650
08800	Exterior Glass & Glazing	TSI / ARCHIGLAZE	$1,620,530
08801	Interior Glass & Glazing	TSI	$453,825
09250	Drywall & Ceilings	TRISTATE	$842,801
09310	Ceramic Tile & Stone Countertops	NICHOLAS TROIANO	$59,060
09680	Floor Finishes	EASTERN FLOORING	$136,500
09900	Painting & Wall covering	MILLER PAINTING	$62,300
09950	Stretched Fabric Panels	Z-BEST	$88,654
10160	Toilet Partitions & Accessories	ACCESSIBLE	$28,920
10200	Louvers	E.F. RODGERS	$2,100
10425	Interior Signage	ALLOWANCE	$10,000
10520	Fire Extinguishers	N/A	$0
10650	Operable Partition	SURFACE & SYSTEM	$15,280
11060	Lecture Hall Room Divider	AE MITCHELL	$125,000
11132	Projection Screens	MATERIAL DIST	$68,800
12000	Window Treatment	DIRECT PATH/SUN	$68,030
14200	Elevators	OTIS	$100,936
14430	Wheelchair Lift	ACCESS LIFTS	$20,000
15000	HVAC & Plumbing	W.E. BOWERS	$1,612,900
15300	Fire Protection	ECFP	$179,522
16000	Electrical	FREESTATE	$1,208,536
16720	Security	N/A	$0
18000	Auditorium Chairs	FIGUERAS	$795,350
	Expansion Joints	TBD	$0
	Total Direct Cost		**$13,270,291**
	General Conditions		$826,927
	Subtotal		**$14,097,218**
	Fee		$455,000
	Virginia Gross Receipts Tax (0.12%)		$17,463
	General Liability Insurance (0.40%)		$58,279
	Builder's Risk Insurance (0.25%)		$36,570
	Contingency (2%)		$431,458
	Performance % Payment Bond		$0
	GMP TOTAL		**$15,095,988**

Parametric Estimate (Using D4 Cost 2005)

Assumptions:

- Due to the limited amount of sources available for the parametric estimate, these three projects were used to calculate the similar Lecture Hall project:
  - Dogwood Center/Performing Arts, 28,000 ft^2, 2 Floors, Cost $5,599,165
  - Forest Hills Fine Arts Center, 63,000 ft^2, 2 Floors, Cost $12,343,317
  - Fine & Performing Arts Center, 84,107 ft^2, 2 Floors, Cost $11,189,000
- Although the Dogwood Center has the most similar project size to Capital One's proposed Lecture Hall, the cost was 2.5 times less than DAVIS' GMP. In an attempt to obtain a higher parametric estimate, the other two more costly projects were included in the overall "Smart Averages" offered by D4 Cost.
- Appropriate subdivisions with their respective percentages, in relation to the IGMP Bids and 'Total Direct Cost' shown above, have been added to the parametric estimate for a more in depth cost comparison. These subdivisions can be seen in **Appendix B**.

Code	Division Name	%	Sq. Cost	Projected
0	Bidding Requirements	0.63	1.47	29,960
1	General Requirements	7.55	17.7	361,017
2	Site Work	8.44	19.78	403,441
3	Concrete	11.18	26.22	534,875
4	Masonry	2.31	5.41	110,367
5	Metals	8.22	19.27	393,015
6	Wood & Plastics	6.61	15.49	316,000
7	Thermal & Moisture Protection	2.45	5.74	116,999
8	Doors & Windows	12.63	29.6	603,887
9	Finishes	8.74	20.49	417,894
10	Specialties	0.43	1.01	20,518
11	Equipment	1.41	3.32	67,639
12	Furnishings	0.51	1.19	24,215
13	Special Construction	5.52	12.94	263,973
14	Conveying Systems	0.9	2.1	42,862
15	Mechanical	13.38	31.36	639,839
16	Electrical	9.11	21.36	435,654
	Total Building Costs	100	234.42	4,782,155

RS Means Square Foot Estimate

Assumptions:

- Since the main function of the building is a lecture hall, the estimate of a Precast Exterior and Steel Frame 20,400 ft^2 Auditorium is used. A 7,600ft^2 basement is also added in.
- To factor in the large Garden Atrium space in the Lobby, a 7,200 ft^2 commercial greenhouse is included in Building Type costs. This space was considered as an additional overlap to the previous auditorium square footage.
- In addition to the theater equipment, other equipment needed for the 3 conference rooms has been included.
- Due to the high quality auditorium seating with wireless internet, an additional cost for the estimated 450 seats are estimated.
- The Hydraulic elevator is assumed to service two floors and hold a maximum capacity of 1,500 lb.
- A Fairfax, Virginia location factor of 0.91 is used for the Lecture Hall. No costs for inflation have been calculated in this estimate.

Building Type	$/SF	SF	Cost
Auditorium	127.19	20,400	$2,594,676
+ Basement	20.95	7,600	$159,220
Greenhouse	43	7,200	$309,600
		Total	$3,063,496

Equipment/Furnishings	$/Each	Units	Cost
Projection Screens	2,300	6	$13,800
Projector Mechanisms	10,400	6	$62,400
Lecture Hall Seating	545	450	$245,250
		Total	$321,450

Services	$/Each	Units	Cost
Hydraulic Elevator	47,900	1	$47,900
		Total	$47,900

RS Means Estimate (w/ Location Factor): **$3,123,890**

Cost Evaluation

Both estimates fail to grasp the numerous unique features contained within Capital One's Lecture Hall Addition design. This space was designed to be a high end "upper-class, white collar" facility. In addition to the auditorium space, other architectural and building systems contribute to the challenging task of accurately estimating from known averages. Some of these distinct spaces which are not normally found in an auditorium include; a garden atrium and water features inside the lobby, medium-size conference rooms with audio-visual support, wireless internet throughout the auditorium space, a large skylight, and a glass screen wall system from Italy.

Finding similar buildings in D4 to produce an accurate estimate into one project type was quite difficult. Of the six total performing arts facilities given in D4, the three buildings listed in the estimate assumptions were the most analogous to Capital One's Lecture Hall. Even the buildings that are larger than the Lecture Hall did not have a price as high as the GMP presented to the Owner. Although the software was accurately able to estimate each division's percentage of the total project cost, compared to the DAVIS' GMP bid summary percentages, the total cost was quite small.

The estimate received from R.S. Means undergoes similar downfalls. Multiple building types would be essential in order to obtain the many functions contained within the Lecture Hall. R.S. Means square foot and unit cost estimates are accurate in using standard industry construction styles, but lack the ability to approximate figures that correlate with highly technical and exceptionally designed structures. In order to receive more accurate estimates one would have to do detailed material take-offs and similar approximations.

Construction Project Management

Site Plan of Existing Conditions

Please view the attached Existing Site and Utility Plan in **Appendix C**.

Local Conditions

With all of the construction going on in the Virginia and Washington, D.C. area, all work must follow local laws and zoning requirements. One point of interest is the height restriction law enacted by Congress in 1899 which ensures that no private structure in Washington, D.C., will extend higher than the Capitol. Although the Capital One Lecture Hall is in Virginia, this law is only for the District of Columbia and does not affect the surrounding counties.

The project site is located north of and adjacent to the existing Capital One Building in Tysons Corner, Fairfax County, Virginia. Within the 29 acre plot of land, construction parking and deliveries are not a concern. A separate access road has been constructed at the end of Scott's Crossing Road and contains around 20 temporary parking spaces.

A typical soil profile in this area consists of a thin layer of clayey silt or silty clay near the ground surface, where weathering is more advanced. The near surface clay soils transition to more granular, less weathered soil with depth. The density of the soils generally increases with depth as a result of the reduced extent of the weathering process. It is not unusual to find lenses and boulders of hard rock and zones of decomposed rock within the soil mantle well above the general bedrock level.

Fairfax County Soils Mapping indicates that the surface soils in the eastern half of the site are Glenelg soils, which occur in the high elevations or areas of the site. Meadowville soils, a type B soil, are mapped in the western half of the site, in the low, concave bottom slope and drainage areas. Both of these soils are described as silts and clays overlaying silty and sandy decomposed rock.

Of the four borings taken at the proposed site, groundwater was observed at a depth of 28.5 feet below ground surface level for only one. However, based on the test results of Engineering Consulting Services, the moisture content is observed to be increasing with depth. The previous borings in the nearby vicinity indicate a ground water depth between 26.5 and 28 feet below ground surface level.

Based on the results of ECS' field exploration program, the site is suited for the proposed development. With the recent subsurface investigation, the proposed building can be supported on spread footings designed for a maximum new allowable bearing capacity of 3,000 pounds per square foot (psf) with the natural in-place soils.

Client Information

a. Introduction

Jones Lang LaSalle ("JLL") had been retained by Capital One to serve as its Development Manager to handle the day-to-day administration of the project and facilitate effective communication within the project team. It is in the role as Development Manager that JLL solicit proposals from qualified construction management firms. Due to the unique nature of the Lecture Hall project and the schedule requirements involved, JLL and Capital One desire to engage the services of the Consultant as early as possible in its planning and design process.

b. Project Overview

Purpose Statement

The primary drive for this project resides in the need to allow Capital One the ability to continue and expand its ongoing utilization of large meetings, currently held off-site at the University of Virginia Darden facility. The creation of an addition to the existing building is seen as an opportunity to create a flexible, multi-functional amenity that supports and facilitates the collaborative culture inherent within the organization. Locating a Lecture Hall facility on the headquarters' campus provides a local venue that offers opportunities for the CEO and other senior executives to meet with staff, both formally in the auditorium or informally in the Garden Atrium.

Summary of Project Program Requirements

Sizing of the new addition is the result of both program needs and the remaining square footage allowable based on the site's Federal Acquisition Regulation (FAR). Phase I construction has an area of 479,622 ft^2. With an approved FAR of 500,000 ft^2, a 20,378 ft^2 addition to the existing structure is allowed. The level of design is based on a "business class" image that will complement and respect the architecture of the existing office tower.

Critical program requirements presented by Capital One to be incorporated within the new facility include:

- A Lecture Hall with approximately 400 seats, designed to accommodate large meetings, recruiting events, and educational sessions.
- A design that will allow the Lecture Hall to be divided to accommodate smaller meetings while providing a more intimate facility.
- A stage with front-screen projection as well as audio-visual support. Flexible lighting for both the audience chamber and stage that is appropriate for Capital One's methods of presentation, which can include two presenters at the same time.
- A Lecture Hall design with architectural, interior finish and structural properties that shelter the hall from unwanted outside noise while enhancing the acoustical experience within.
- Lecture Hall seating that is comfortable, stadium-style, uni-directional and on one level; seating will facilitate long meetings and a wide range of presentations by including tablet arms, power, and wireless internet access.
- Support space, including a green room, breakout space, a catering pantry, administrative space and two mid-size conference rooms.

Summary of Design Concepts

- Integrate the new structure into the existing headquarters structure and reinforce the strength of the total architectural experience.
- Create an autonomous identity for the Lecture Hall without detracting from the existing headquarters building.
- Provide a garden atrium to create a transitional link between the existing structure and the new facility.

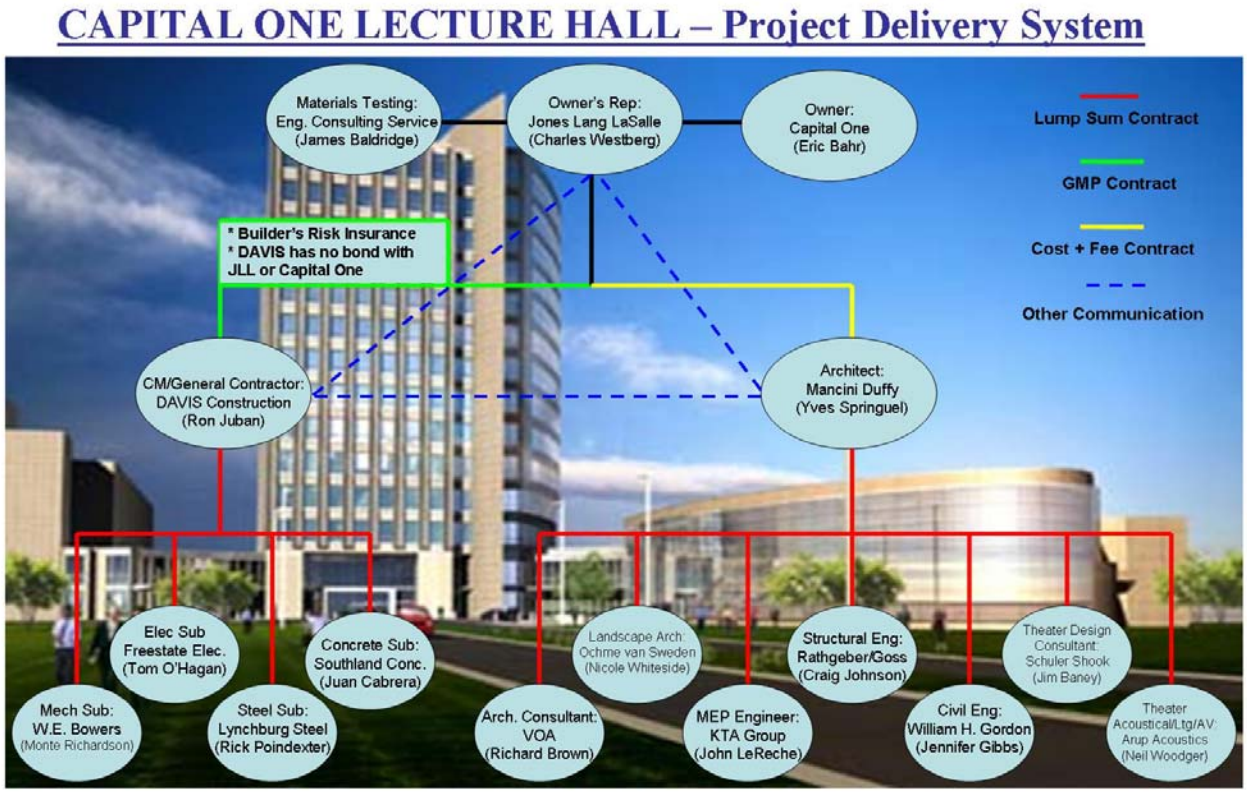
- Create a structure that offers Capital One's staff a multi-functional facility that also reinforces the collaborative culture of the organization by enhancing face-to-face interaction.
- Incorporate sustainable design elements and efficiencies to create a high performance building.

Project Schedule

An estimated schedule for the project has been included in the previous submittal for Existing Construction Conditions. Capital One anticipated occupying the Lecture Hall addition the second quarter of 2006. Construction is expected to start in the spring of 2005.

Given the fast-track of the project, JLL and Capital One expect to enter into a Guaranteed Maximum Price (GMP) contract with a construction manager. Such a contract will be between Capital One and the Construction Manager.

Project Delivery System



Starting at the earliest recorded actions of the Lecture Hall Addition project on June 23, 2004, Capital One has had countless decisions to make. During this time it was in their best interest to release a design team to further advance the development of the project and a civil engineer to develop a preliminary site plan. With the help of JLL and Engineering Consulting Services ("ECS") performing existing soils tests, project procurement was on the way. Mancini Duffy was awarded a "Cost+Fee" contract with JLL because of other smaller projects occurring on site and their involvement with them. Although the Lecture Hall is the main focus for Mancini Duffy, they can utilize their "fee" capabilities since Capital One and JLL have had additional design requests affecting the overall site. The design-bid-build project delivery system for the Lecture Hall is most appropriate because of Capital One's desire for a high quality structure that is not pressed for time.

With the design phase in full swing, another consultant and landscape architect were assigned to the Lecture Hall with a lump sum because of their familiarity with the base building. Between mid-July and early September of 2004, the remaining portion of the Architectural and Engineering Team was mobilized. Rathgeber/Goss Associates came under a lump sum contract with Mancini Duffy during this time. An MEP Engineer was soon to follow and the KTA Group was awarded its own contract. Theater Design assistance from Schuler Shook and Arup Acoustics began once the two firms signed their lump sum agreement with Mancini Duffy.

These lump sum contracts between the architect, engineers, and designers are fairly standard in the industry when projects are not incredibly technical. Not only are lump sum contracts easiest for the architects to use, it is more convenient to maintain the contract drawings. The ability to maintain lump sum drawings make it more convenient for the architect in sustaining an accurate "Cost+Fee" with JLL.

As major design teams got involved in the Lecture Hall project, Capital One also needed to find itself a General Contractor. Following suit with the base building, James G. Davis Construction had a slight advantage over other construction managers in obtaining the work.

With the relatively short project duration and cost in comparison to the base building, DAVIS does not hold a bond with JLL. Their minute chance of going out of business and their great reputation with Cap One has allowed them to do so. Although, DAVIS has purchased Builder's Risk Insurance to insure the Lecture Hall while it is under construction and decrease liability. This insurance is provided for loss resulting from accidental direct physical damage to the structure.

Key communication lines are also represented between the three major players involved in this project. The Owner holds weekly meetings with the Architect, GC, and Engineers. Any changes made by the Owner are passed onto Mancini Duffy, which then travel to the engineers for review and re-submission. Once resubmitted and approved by the Architect, the GC obtains the documents to be passed to the subcontractors for their review. In order to keep a well informed construction staff, the DAVIS holds weekly meetings with subcontractors. Any changes in cost or scope of work will be evaluated by DAVIS and sent to JLL and Mancini Duffy. Final submittals are always passed onto Capital One and JLL from DAVIS.

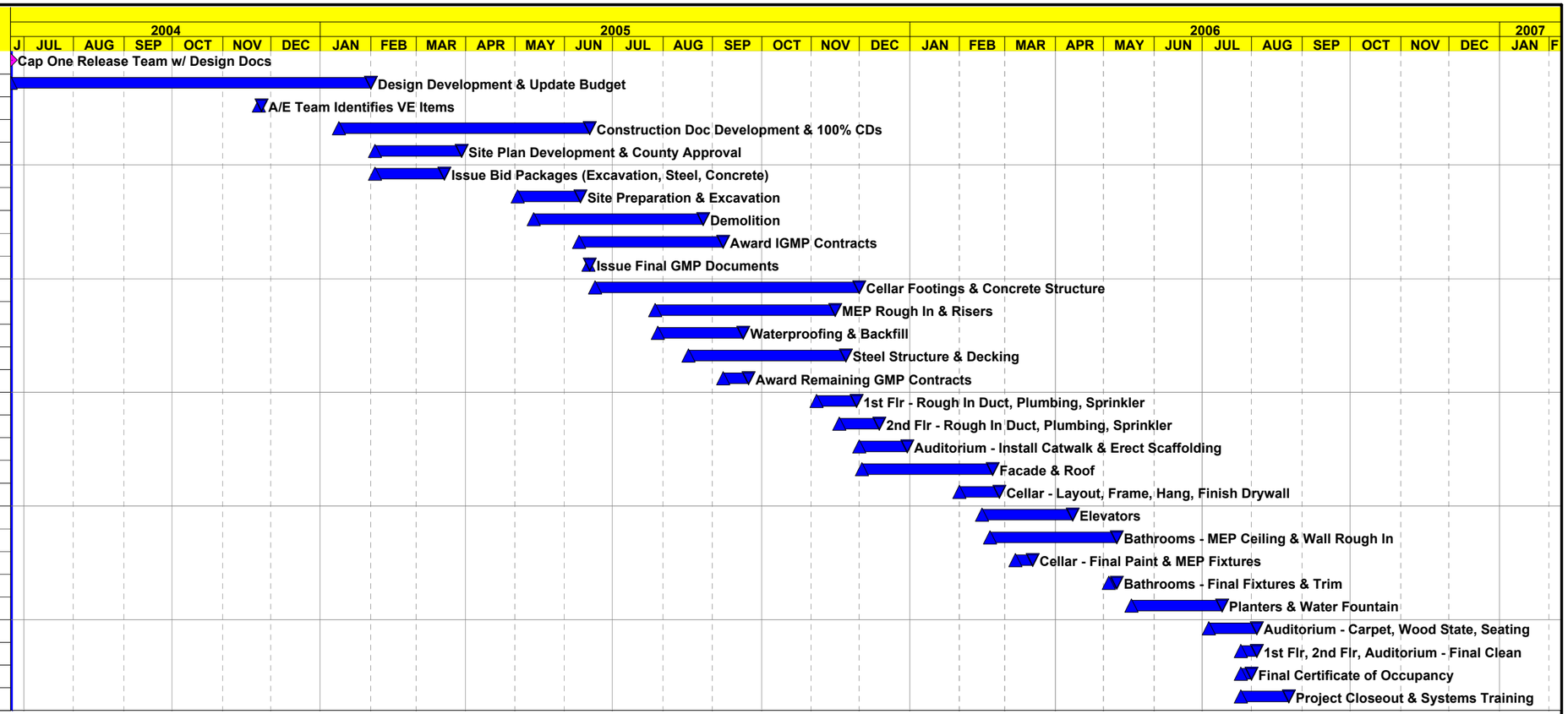
Staffing Plan

In order to maximize productivity and minimize excess General Conditions costs throughout the Lecture Hall Addition, DAVIS developed the employee organization chart that can be seen on the following page.

A majority of the preconstruction work is to be split between 6 of the 9 team members listed. As the Senior Vice President and Vice President of DAVIS, it was the job of Bill Moyer and Mike Pittsman to do a majority of the initial project engineering and planning. Once DAVIS generated an appropriate cost estimate, the project manager and site superintendents needed to become more accustomed to the existing site conditions and the proposed design development.

With the construction phase of the Lecture Hall being in full swing, both superintendents and the two project managers have been spending all of their hours on this project. In order to keep everyone on this team at DAVIS up-to-date with construction progress, a free flow of information is required between the Vice President, Project Managers, and Superintendents. To lighten some of the tasks requested of the Senior Superintendent, the Senior Layout Engineer develops site layouts and helps to resolve some preliminary trade coordination issues. Throughout the entire project, Stan Manvell oversees the work being performed on site and executes safety checks to make sure everything is in order to reduce the chance of accidents.

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish
001	Cap One Release Team w/ Design Docs	0	23JUN04A	
011	Design Development & Update Budget	159	23JUN04A	31JAN05A
021	A/E Team Identifies VE Items	1	24NOV04A	24NOV04A
031	Construction Doc Development & 100% CDs	112	12JAN05A	16JUN05A
041	Site Plan Development & County Approval	37	04FEB05A	28MAR05A
051	Issue Bid Packages (Excavation, Steel, Concrete)	31	04FEB05A	18MAR05A
061	Site Preparation & Excavation	29	03MAY05A	10JUN05A
071	Demolition	75	13MAY05A	25AUG05A
081	Award IGMP Contracts	63	10JUN05A	06SEP05A
091	Issue Final GMP Documents	1	16JUN05A	16JUN05A
101	Cellar Footings & Concrete Structure	118	20JUN05A	30NOV05A
111	MEP Rough In & Risers	80	27JUL05A	15NOV05A
121	Waterproofing & Backfill	37	29JUL05A	19SEP05A
131	Steel Structure & Decking	69	17AUG05A	21NOV05A
141	Award Remaining GMP Contracts	12	07SEP05A	22SEP05A
151	1st Flr - Rough In Duct, Plumbing, Sprinkler	17	04NOV05A	28NOV05A
161	2nd Flr - Rough In Duct, Plumbing, Sprinkler	17	18NOV05A	12DEC05A
171	Auditorium - Install Catwalk & Erect Scaffolding	21	01DEC05A	29DEC05A
181	Facade & Roof	57	02DEC05A	20FEB06A
191	Cellar - Layout, Frame, Hang, Finish Drywall	18	01FEB06A	24FEB06A
201	Elevators	40	15FEB06A	11APR06A
211	Bathrooms - MEP Ceiling & Wall Rough In	56	20FEB06A	08MAY06A
221	Cellar - Final Paint & MEP Fixtures	9	07MAR06A	17MAR06A
231	Bathrooms - Final Fixtures & Trim	3	04MAY06A	08MAY06A
241	Planters & Water Fountain	40	18MAY06A	12JUL06A
251	Auditorium - Carpet, Wood State, Seating	22	05JUL06A	03AUG06A
261	1st Flr, 2nd Flr, Auditorium - Final Clean	8	25JUL06A	03AUG06A
271	Final Certificate of Occupancy	5	25JUL06A	31JUL06A
281	Project Closeout & Systems Training	22	25JUL06A	23AUG06A



Start Date 23JUN04
Finish Date
Data Date 23JUN04
Run Date 28SEP05 18:26

Early Bar
Float Bar
Progress Bar
Critical Activity

COLH

Sheet 1 of 1

DAVIS Construction

Cap One Lecture Hall Addition

Cap One Lecture Hall

Date	Revision	Checked	Approved

Appendix B

D4 Detailed Cost Estimate

Code	Division Name	%	Sq. Cost	Projected
00	**Bidding Requirements**	**0.63**	**1.47**	**29,960**
	Bidding Requirements	0.63	1.47	29959.64
01	**General Requirements**	**7.55**	**17.70**	**361,017**
	General Requirements	7.55	17.70	361016.93
02	**Site Work**	**8.44**	**19.78**	**403,441**
	General Excavation	2.75	6.44	131360.71
	Dewatering	0.07	0.17	3403.65
	Asphalt Paving	0.07	0.17	3406.37
	Site Utilities	0.48	1.13	23117.85
	Site Concrete & Pavers	0.44	1.03	21080.61
	Landscaping & Irrigation	1.08	2.54	51812.32
	Water Fountain System	0.49	1.16	23639.13
	Site Development	0.80	1.88	38419.51
	Demolition	2.24	5.25	107200.70
03	**Concrete**	**11.18**	**26.22**	**534,875**
	Concrete	7.75	18.17	370747.01
	Precast	3.43	8.05	164127.95
04	**Masonry**	**2.31**	**5.41**	**110,367**
	Stone	2.31	5.41	110367.29
05	**Metals**	**8.22**	**19.27**	**393,015**
	Structural Steel	5.81	13.61	277724.36
	Miscellaneous Metals	2.41	5.65	115290.23
06	**Wood & Plastics**	**6.61**	**15.49**	**316,000**
	Carpentry	0.67	1.58	32259.89
	Millwork	5.93	13.91	283739.83
07	**Thermal & Moisture Protection**	**2.45**	**5.74**	**116,999**
	Waterproofing	0.62	1.46	29803.73
	Roofing	1.01	2.38	48483.30
	Caulking	0.21	0.49	10069.25
	Spray-on Fireproofing	0.60	1.40	28642.75
08	**Doors & Windows**	**12.63**	**29.60**	**603,887**
	Doors, Frames, Hardware	0.43	1.01	20551.52
	Exterior Glass & Glazing	12.20	28.59	583335.50
	Interior Glass & Glazing	0.00	0.00	0.00
09	**Finishes**	**8.74**	**20.49**	**417,894**
	Drywall & Ceilings	6.16	14.45	294707.00
	Ceramic Tile & Stone Countertops	0.43	1.01	20510.89
	Floor Finishes	1.01	2.38	48513.82
	Painting & Wall covering	0.47	1.09	22241.91
	Stretched Fabric Panels	0.67	1.56	31920.42
10	**Specialties**	**0.43**	**1.01**	**20,518**
	Louvers	0.02	0.05	952.43
	Toilet Partitions & Access	0.22	0.51	10504.44
	Interior Signage	0.08	0.19	3812.77
	Operable Partition	0.11	0.26	5248.33

11	**Equipment**	**1.41**	**3.32**	**67,639**
	Lecture Hall Room Divider	0.91	2.13	43467.47
	Projection Screens	0.51	1.18	24171.53
12	**Furnishings**	**0.51**	**1.19**	**24,215**
	Window Treatment	0.51	1.19	24215.40
13	**Special Construction**	**5.52**	**12.94**	**263,973**
	Auditorium Chairs	5.52	12.94	263973.46
14	**Conveying Systems**	**0.90**	**2.10**	**42,862**
	Elevators	0.74	1.74	35406.24
	Wheelchair Lift	0.16	0.37	7455.28
15	**Mechanical**	**13.38**	**31.36**	**639,839**
	HVAC & Plumbing	12.04	28.22	575756.27
	Fire Protection	1.34	3.14	64082.99
16	**Electrical**	**9.11**	**21.36**	**435,654**
	Electrical	9.11	21.36	435654.33
	Total Building Costs	**100.00**	**234.42**	**4,782,155**

CAPITAL BELTWAY – INTERSTATE 495

DAVIS

TEMPORARY POWER FED FROM TELEPHONE POLE

FENCE

ROAMING SECURITY GATE

* ACCESS ROAD TO BE WIDENED. REQUIRES MINOR GRADING AND TRIMMING OF TREE BRANCHES ABOVE IN ORDER TO ACCOMMODATE CONSTRUCITON VEHICLES.

ENTRANCE GATE

FORMER OLD SPRINGHOUSE ROAD

ACCESS ROAD*

MOBILE CRANE PATH

TRUCK TURN-AROUND

PROPOSED CONSTRUCTION PARKING

TRAILERS

EXISTING CAPITAL ONE BUILDING
14 Stories above grade

LECTURE HALL
2 Stories above grade

STAGING AREA*

* REQUIRES LEVELING OF TERRAIN FOR CONSTRUCTION VEHICLES.

STOCKPILE

SCOTTS CROSSING ROAD ROUTE 6102

MOBILE CRANE PATH

BACKFILL DIRT

1500 VPD

LEGEND

PROPERTY LINE	
SITE FENCE	
TEMP. OVERHEAD RAILING	
TRAFFIC FLOW	
CONSTRUCTION PARKING	
COMMUNICATION UTILITY *From Base Building	
ELECTRIC UTILITY *From Base Building	
WATER UTILITY *From Base Building	
SAN. SEWER UTILITY	

EXISTING POND

N

Capital One

LECTURE HALL ADDITION

1680 CAPITAL ONE DRIVE, McLEAN, VA 22102

APPENDIX B

EXISTING SITE & UTILITY PLAN

Scale: NTS

Prepared by	Date	Sheet
Sean C. Ehlers Construction Management	October 5, 2005	1 of 1