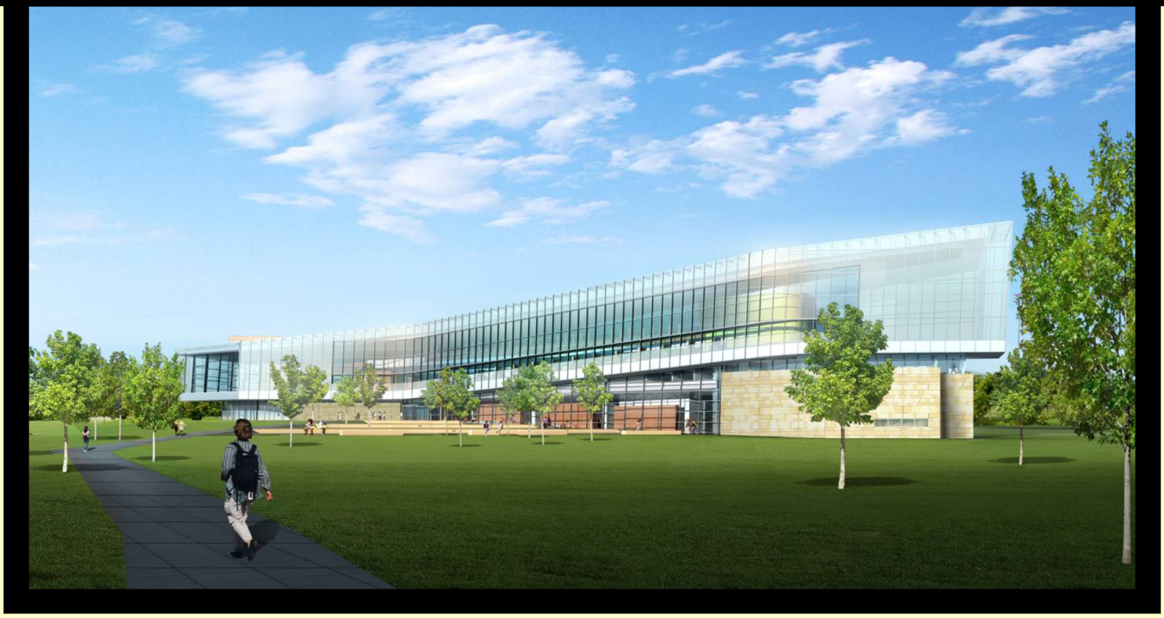
THE NEW DICKINSON SCHOOL OF LAW

University Park, PA
Steve Ayer
Construction Management Option



Technical Assignment No. 1

Submitted: Friday, October 5th, 2007

CPEP Website: http://www.engr.psu.edu/ae/thesis/portfolios/2008/ska124/

Faculty Consultant: Dr. Messner

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EXECUTIVE SUMMARY:

This Technical Assignment begins to examine the construction management aspects of the New Dickinson School of Law on Penn State's University Park campus. It specifically looks at existing site conditions, preliminary project schedule, building systems, building cost, local conditions, specific client needs and expectations, the project delivery system used, and the staffing plan for the construction manager.

The project examined is a 113,000SF higher education facility being constructed for the Pennsylvania State University and the recently acquired Dickinson School of Law. The building has a myriad of different features all designed to fit under one roof. These features include numerous tiered classrooms, a large lecture auditorium, a mock courtroom, a small snack café, a number of faculty and graduate student offices, meeting/study spaces, and a substantial legal library.

There are a few particular points of interest on this project. First of all, it will be seeking LEED certification upon completion. To achieve this certain design elements and construction practices have been employed. In addition to the LEED goals, the construction manager is also utilizing 3D Building Information Modeling (BIM) coordination efforts. This style of coordination allows the computer to locate all clashes between trades.

Construction Management services are being provided on this job through Gilbane Building Company. The design work is done by Polshek Partnership Architects. The project delivery system is a fast-tracked design-bid-build which is explained in more detail later in the paper. The owner deals with the design professionals based on a professional fee for services contract. Penn State contracts with the construction manager with a cost plus fee contract. All of the subcontractors on the project contract with Gilbane via a lump sum contract.

BUILDING ESTIMATE:

This project's total construction cost is approximately $345/SF. This figure does not take into account fees, soft costs, or sitework.

In actuality, the total project cost as a square footage cost is approximately $530/SF. This square footage cost includes all FF&E costs, the designer's costs and fees, the construction manager's fees, and all soft costs.

The costs for specific building systems are listed below:

System	Cost
HVAC	$42/SF
Electrical	$33/SF
Plumbing	$7/SF
Fire Protection	$5/SF
Structural	$51/SF

Using D4 cost estimating software, I determine a square footage cost of $310. I arrived at this number by modifying case EU050114 which was the Two Rivers Middle School project in Connecticut. I felt this would be an appropriate project to compare to the Dickinson project to because it was an educational facility that was only 7000SF larger than the law school. The costs for these two projects, however, did vary significantly. The middle school project was approximately $16 million cheaper than the law school. I decided to attempt to deal with the cost discrepancies by increasing some of the cost line items in D4. I increased the finishes by 100% because of the exotic woods and stones used as finishes to the interior of the law school which would undoubtedly raise costs. I also increased Mechanical, Electrical by 100% because of the size and shape of the building which would require more complex duct and conduit runs. I increased Metals, Concrete, and Doors and Windows by 100% as well because of the shape of the building which adds complexity to forming CIP concrete walls and coordination and fabrication efforts for the steel and curtain wall. Finally, I increased Furnishings, and Equipment by 100% because of the extra features designed into the building.

This number still varies significantly from the actual square footage cost. I could probably have gotten the final number to be closer to the actual square footage cost by increasing some of the other values in D4, but I probably could not have justified my reasons for increasing some of the other numbers. The actual reason for the discrepancy in the costs between the two projects is most likely due to the fact that D4 only allows you to increase costs by 100%. For some items such as Doors and Windows, the actual cost of the law school project is most likely more than double what the middle school project was because of the complex curtain walls. Unfortunately, this skews the square footage cost estimate that D4 provides. To see a full printout of the D4 Cost estimate results please see Appendix A.

In addition to the D4 cost estimate made, I have also prepared a square footage estimate using RS Means Square Footage Data. The calculations are included below:

Base Cost (100,000SF 825LF)	100000	SF	825	LF Perimeter	$150.25	/SF
Base Cost (150,000SF 1035LF)	150000	SF	1035	LF Perimeter	$147.15	/SF
Interpolated Value for Cost:	113000	SF			$149.44	/SF
Interpolated Value for Perimeter:	113000	SF	880	LF Perimeter		
Additional Actual Perimeter	1160-880 =		280	LF Perimeter		
Additional $/SF per 100' Additional Perimeter			$1.00	/100 LF		
Additonal $/SF for Perimeter			$2.80			
Model Building Story Height	12	Ft				
Actual Building Story Height	16	Ft				
Actual Additional Height	4	Ft				
Additional $/SF per 1' Story Height	$0.55	/Ft				
Additional $/SF for Story Height			$2.20			
$/SF Subtotal			**$154.44**			
Additional Costs						
Elevators			$673,500			
Lockers			$6,100			
Fixed Seating			$140,322			
Additional Cost Total			$819,922			
Additional Cost in $/SF			$7.26			
Base RS Means Estimate in $/SF			$161.70			
Location Modifier			0.91			
Time Modifier (N/A from 2007 RS Means)			1			
Total RS Means Estimate in $/SF			**$147.15**			

Figure 1: **RS Means estimate calculations. All information was obtained using the 2007 Square Foot RS Means. (Balboni, Barbara. RS Means Square Foot Costs. Kingston, MA: Reed Construction Data, Inc., 2006.)**

It is evident that this estimate of $147.15/SF is not even close to the actual construction cost. Let's examine the reasons for the discrepancy:

1. When Means uses perimeter feet to determine building cost it assumes the building is "a generally rectangular economical building shape." This description clearly does not hold true for the Dickinson School of Law. In the entire building, you would be hard-pressed to find a rectangular section anywhere. From the curved interior walls and ceilings, to the curved curtain wall, to the varied structural bays. This building is intentionally not rectangular. It was designed to make an aesthetic statement. While it accomplishes this goal, it does so at a significant cost.

2. The model building used as a basis for the RS Means estimate is a college classroom building. This may sound like exactly what the law school project is, but look closer and you see that the DSL project is a classroom building as well as a library, a storage area, a café, a courtroom, an auditorium, and an office building. All of these extra features create extra costs above and beyond the scope of a typical college classroom building.

3. Going along with number 2, this model building is a basic classroom building. It does not incorporate the materials and finishes designed in the Dickinson School of Law building. The DSL building calls for European Red Elm which is an exotic wood that is expensive and hard to find. This requires contractors to search extensively for a supplier who can supply them with the needed quantities of this rare wood. The building also uses Anigre wood which is an exotic rainforest wood. Again, because of the rarity of the wood, costs rise. This building also uses some slate accent panels. For example, in the mock courtroom there is a large slate panel assembly on the wall that was an additional $10,000. Perhaps one or two locations with exotic finishes would not greatly change the cost from the model data to the actual project being estimated, but for the law school, there are exotic features incorporated throughout the building.

Ultimately the point that becomes apparent after using RS Means data for estimating the Dickinson School of Law is that Means offers a simple and effective estimating method for standard buildings serving a basic function. For a project like this one, there are very few run-of-the-mill elements in the building plans, which make it nearly impossible to estimate through Means.

BUILDING SYSTEMS SUMMARY:

Yes	No	Work Scope	If yes, address these questions / issues
X		Demolition Required	Types of materials, lead paint, or asbestos
X		Structural Steel Frame	Type of bracing, composite slab, crane size/ type/ location
X		Cast in Place Concrete	Horis. and Vert. formwork types
	X	Precast Concrete	Casting location, connection methods, crane size/ type/ location
X		Mechanical System	Mech./ room locations, system type, types of distribution systems, types of fire suppression
X		Electrical System	Size/ capacity, redundancy
X		Masonry	Load bearing or veneer, connection details, scaffolding
X		Curtain Wall	Materials included, construction methods, design responsibility
X		Support of Excavation	Type of excavation support system, dewatering system, permanent vs. temporary

FIGURE 2: **Table to indicate which building systems are incorporated in this project and what issues will be discussed related to those systems.**

DEMOLITION:

Demolition was required on this project. There was an existing 1200 space parking lot with light poles located on the project site. The parking lot and lights needed to be demolished so construction could occur for the building on the site.

In addition to the parking lot demolition, there was also a substantial flower garden on the south side of the site that would be demolished. This demolition work would include removing all flowers/vegetation in the flower garden and removing the flower garden fence. The underground irrigation system in this area would remain, however. Any pipes from the irrigation system that would extend above grade would be removed and capped at grade level.

STRUCTURAL STEEL FRAME:

Structural Steel will make up the skeleton of the DSL superstructure. There are structural steel columns, beams, and decks. These elements will be placed by a 130 ton crawler crane located south of the building footprint. In addition to the steel erected by crane, this building utilizes composite slabs on metal deck, which will require shear studs to be welded on the decks by hand once they are placed.

CAST IN PLACE CONCRETE:

Cast in Place (CIP) concrete is also being used on this project. The composite slabs on metal deck are CIP, the foundation walls are CIP, the lower level slab on grade is CIP, and the building's grade beams and spread footings are also CIP. The concrete used on this project is transported to its end placement destination in the building via a concrete pump truck.

The predominant type of vertical formwork for the CIP concrete on this project is engineered steel forms. These forms are reusable and can be assembled and disassembled fairly quickly. The one disadvantage of these forms is that they are fairly heavy and require a small crane or backhoe to hoist them into place. For the horizontal formwork, angle steel determines the slab edge and will never actually be stripped from the slab. For pour stops within the building perimeter, where there will not be angle steel, simple 2x4's and plywood sheets are used to form the concrete slab edge.

MECHANICAL SYSTEM:

The building's environment is regulated by 7 air handling units located in the lower level of the building in the mechanical rooms. The 7 units are fed from the campus utilities and range in size from 2,500 CFM to 26,000 CFM. The units also vary greatly in cooling and heating capacities. The smallest has 89,000 Btu/Hr cooling and 109,000 Btu/Hr heating capacities. The largest capacity is 972,000 Btu/Hr cooling and 1,128,000 Btu/Hr heating.

Variable Air Volume (VAV) control units are used to control the temperature in each room. These allow for the supply air temperature to remain relatively constant throughout the whole building and will use differing amounts of air flow to change room temperatures. The return air system in this building uses predominantly ceiling plenum space to direct it back to the air handlers in the lower level of the building. Essentially air is supplied to the rooms and then exhausted via a small return duct that directs the air into the ceiling plenum in the long corridor through the building.

This building is fully sprinklered with a wet pipe fire suppression system and standard sprinkler heads. Essentially when there is a fire, the stopper in the sprinkler head will break and water will rush out of the head(s) where it is needed. By the nature of this type of fire suppression system, the supply of water will not stop automatically. Someone will have to turn off the supply of water and let the excess water in the pipes spray out of the pipes.

ELECTRICAL SYSTEM:

The Law School is fed by a 1500kVA 480Y/277 power supply. That power supply is distributed to a series of distribution panel boards which, in turn, feed the room panel boards. The building also utilizes a 40,000 Watt uninterruptible power supply (UPS) backup system for potential electrical system failure.

MASONRY:

The building utilizes a substantial amount of brick and stone masonry veneer on the lower half of the south face and most of the north side. The stone masonry is made up of stones with cut tops and “split face” sides. Therefore the stone masonry walls will visually have straight horizontal lines, but no continuous vertical lines of grout.

The brick masonry will use a 1/3 running bond connection method. The bricks on this project are not the standard bricks used on Penn State’s campus buildings. They are a light tan that will hopefully stand out and offer a unique and modern aesthetic to go along with the modern style of the building. The bricks used on this project are also of interest because of their shape. Given the nature of the building, there are many curved walls – some of which having masonry veneers. To place brick on these portions of the building, contractors will use curved bricks so a vertical line at different corners will not be seen.

The masonry veneer walls are connected to the building’s structure by masonry wall ties. Between the brick and steel stud framing there is an air gap, rigid insulation (of varied thicknesses), an air/vapor barrier on exterior sheathing. To erect the masonry walls workers used standard masonry scaffolding. The possibility of hydraulic scaffolding was considered, but was ruled out because of the curves on the building footprint.

CURTAIN WALL:

The main curtain wall on this project (CW-4) curves, tilts, and escalates vertically simultaneously as you look from west to east across the building’s façade. It is made up of extruded aluminum mullions and heat strengthened flat and curved glass panes. This wall will be stick-built on site and will attach to the structural steel.

The most difficult aspect of this wall from a construction point of view is dealing with the coordination of other trades that interface with the curtain wall. The curtain wall on this project was initially designed by the architect, but after a basic schematic design was made, DM Products was brought on board to assist in the curtain wall design and also to assume the role of contractor once design was complete. This was done because this contractor had a significant amount of experience installing curtain walls. Because of the experience that the contractor has and the power they were given by asking them to assist in the curtain wall’s design, they play a key role in facilitating coordination efforts with other trades.

SUPPORT OF EXCAVATION:

During excavation an issue with a sinkhole arose. The sinkhole was located beneath the building footprint and required substantial excavation to remove the unsuitable clay soil out of the hole and then refill it with concrete. During this process, shotcrete was sprayed on the rock and soil as a method of permanent excavation support.

LOCAL CONDITIONS:

State College does not seem to have one preferred style of construction. There are precast concrete projects, Cast-In-Place concrete projects and steel projects seen in the area. That being said, it does seem that, in recent years, Penn State has been doing a lot of steel projects similar to this building's style of construction.

Parking for some projects in State College can be a big challenge – especially in the downtown area. The law school has some space for parking, but not enough for all workers. This has created some challenges related to parking on-site. To deal with this problem, workers were asked to park their cars off site and a small school bus was used to bring all workers to site in the mornings and take them back to their vehicles at the end of the day.

A fairly substantial recycling effort has been made to earn some LEED credits on this project. Different dumpsters are on site for general trash, wood, and metals. The wood and metal dumpsters can be recycled which is why the LEED credits are given out for this type of effort on a construction site. The recycling and tipping fees for Centre County are $66.00 per ton for municipal waste and $6.00 per ton for recyclables.

The subsurface soil conditions on the site proved to be a challenge for construction. The soil on the site is made up of primarily clay and rock. The issues on site arose from the prevalence of clay. After excavation started, it was discovered that there was a large sinkhole under the project site. This vast amount of clay was unsuitable for supporting the spread footings that would need to support the building mass. To remedy this situation the clay soil had to be excavated out of the sinkhole and the void had to be filled with 1650 CY of concrete to provide a suitable base for the building's foundations to rest on.

CLIENT INFORMATION:

The owner of this project is The Pennsylvania State University – Specifically the Office of the Physical Plant (OPP). OPP manages facility construction and maintenance on the University Park campus. For this project, they act to oversee construction of the new law school building. Recently, Penn State merged with the Dickinson School of Law. University officials decided that to properly integrate Carlisle's law school with Penn State, they would need to build a building on the University Park campus to offer students the Dickinson law education in the Penn State environment.

Penn State has relatively high expectations for this project – especially as it relates to building quality. As always, there are three expectations that an owner can have for a project which are cost, quality, and speed of construction. Typically an owner can set priorities on one or two of these expectations, but the third will likely suffer as a result of the first two. For this project, the owner clearly has a priority on quality, with time as a secondary priority, and cost as a third priority. Based on the design of this project, construction quality has to be top-notch. The coordination efforts necessary to incorporate a complex curtain wall, curved masonry walls, and curved interior walls and ceilings into the project require skilled contractors to perform quality work. To ensure a high-quality finished project, Penn State requires all contractors interested in bidding on the project to be pre-qualified.

The fourth expectation that an owner can have (that should always be a top priority) is safety – for workers and occupants after project completion. The construction manager (Gilbane Building Company) attempts to ensure project safety during construction by requiring workers to wear hard hats and safety glasses as well as having an annual safety day where workers attend discussions about how to stay safe on the job site. Penn State also expects the building occupants to be safe in the building after project completion. A good example of how they hope to accomplish this goal is that they have asked for sprinklers to protect the building and its occupants in case of a fire and a security system to keep people and property safe.

PROJECT SCHEDULE SUMMARY:

A project summary schedule can be found in Appendix B of this technical assignment. There are a few features of the schedule that are worth looking at. First it is interesting to note that procurement of subcontractors technically began while the project was in the midst of the design phase. On 9/8/07 the curtain wall contractor was brought on to the project to assist in the design of the curtain wall system. Another scheduling item to note related to contractor procurement is that, because of the way the design of this project was being completed, the different trade contractors were not brought on site until close to the time when they would begin their work. This was done mainly so that the design could progress and any changes that would be made to the design early on in the project would be accounted for in the contractor bids and would not require change orders to deal with potential added costs.

So looking at the actual construction activities in the schedule, it can be seen that construction actually began on 1/15/07 with excavation activities. After excavation was complete, substructure work including footers, grade beams, and foundation walls started on 2/14/07. By 5/23/07, the steel superstructure began erection. By 7/16/07, the curtain wall construction commenced. Finally, by the end of 2007, the building would be scheduled to be enclosed. At this point some of the interior trades like drywall, interior framing, paint, and flooring can begin their work. By 10/1/08 the project will obtain its certificate of occupancy. And lastly, by 1/1/09 the project should be fully complete.

PROJECT DELIVERY SYSTEM:

This project is being delivered using a Design-Bid-Build (DBB) with a CM system. Gilbane was chosen to provide the construction management at risk services for this project. This delivery method was chosen over a standard owner-managed DBB system because of the complexity of the building project. This project's organization is slightly different than many other projects. Contractors bid on work before a design is complete which is typically not seen on DBB projects, but the contractors are given documents to base bids on and any changes that occur to the design and increase their costs are treated as change orders. Arguably a cost plus fee contract could have been used with the subcontractors to account for design changes that would arise, but instead a cost plus fee arrangement was used for the contract between Penn State and Gilbane. This way, if a design change occurs, the subcontractor gives a quote for the change cost, which the owner can see and decide if the change is still desirable. If it is desirable, the change is authorized and Gilbane is reimbursed for the added cost and they pay the subcontractor for the extra work. To understand all contractual and professional relationships on this project, an organizational chart is shown at the end of this section.

This type of organizational structure utilizes 3 different contract types listed on the diagram. The contracts on the construction side of the diagram have already been discussed so let's examine the contracts on the design side of the diagram. There, it can be seen that the design professionals are all paid based on a fee for their professional services. The owner hires the architect who contracts with other design professionals as needed.

In addition to contractual relationships, there are also professional relationships between parties. This type of relationship is shown with a dashed purple line. It is important to note that these types of interactions are between the design professionals and the construction manager only. In other words, if a subcontractor needs to have an RFI (Request For Information) addressed, they go through the construction manager who, in turn, contacts the design professionals. Conversely, if the architect issues an ASI, (Architect's Supplemental Instruction) they contact the construction manager who informs the necessary subcontractors. This allows the construction manager to maintain a log of all communication and documentation that exists on the job.

For this project contractors interested in bidding had to be prequalified by Penn State and also by Gilbane via iBidPro which is their online prequalification system. After bidders were successfully prequalified by both parties, winning bidders were selected on the basis of lowest bid. The contractors had to be fully bonded with payment and performance bonds. In addition to the bonding requirements, contractors were also required to have statutory workers' compensation, employers' liability, commercial general liability, automobile liability, and excess umbrella liability insurance.

Overall, I think this organizational structure makes sense for this project. Construction started when the building design was just wrapping up the schematic design phase. Therefore a Cost Plus Fee contract would make sense. It allows some leeway for design modifications. Also it is advantageous to bring a CM on board at this early phase of the project because they can make constructability suggestions throughout the design development phase.

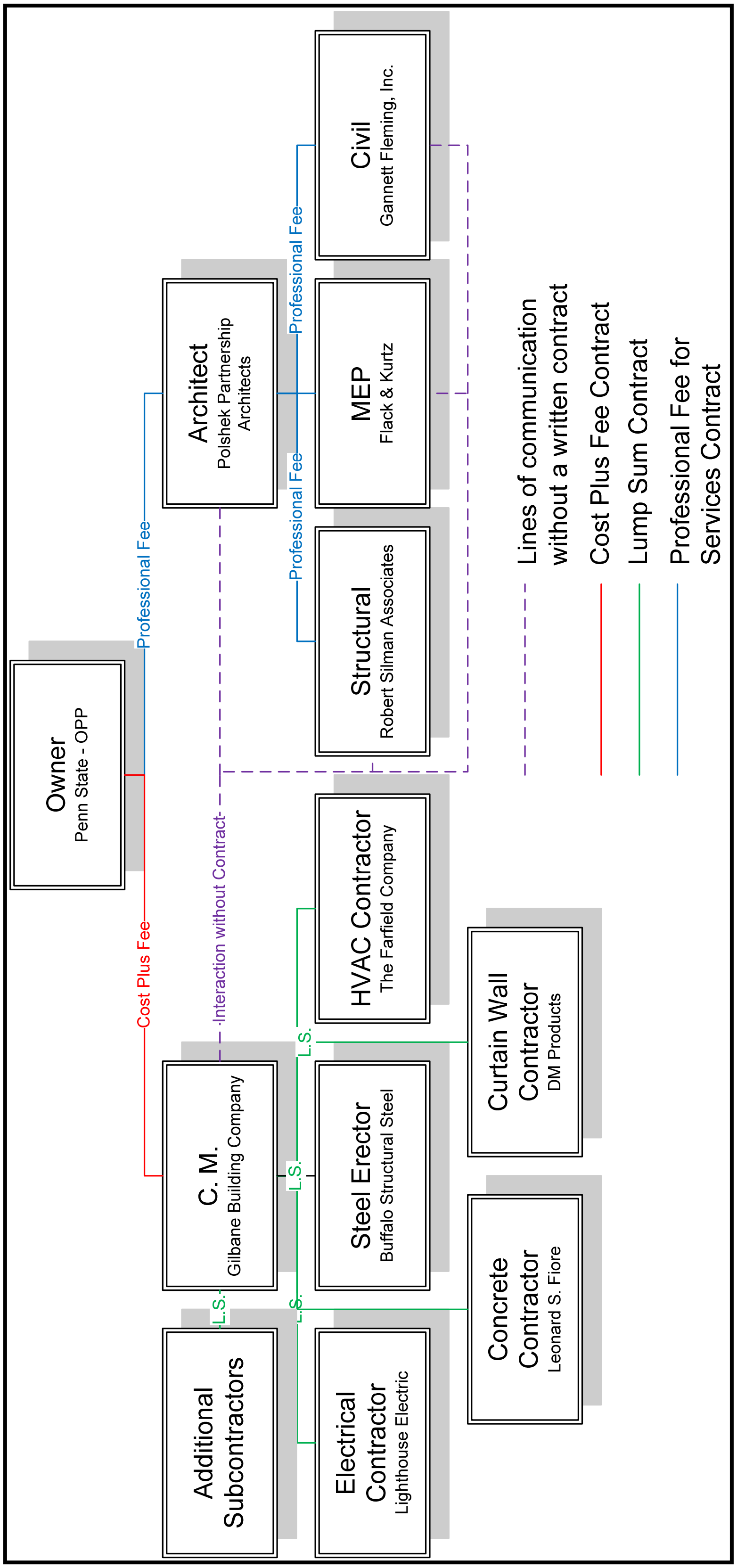

Figure 3: **Project Level Organizational Structure Diagram**

STAFFING PLAN:

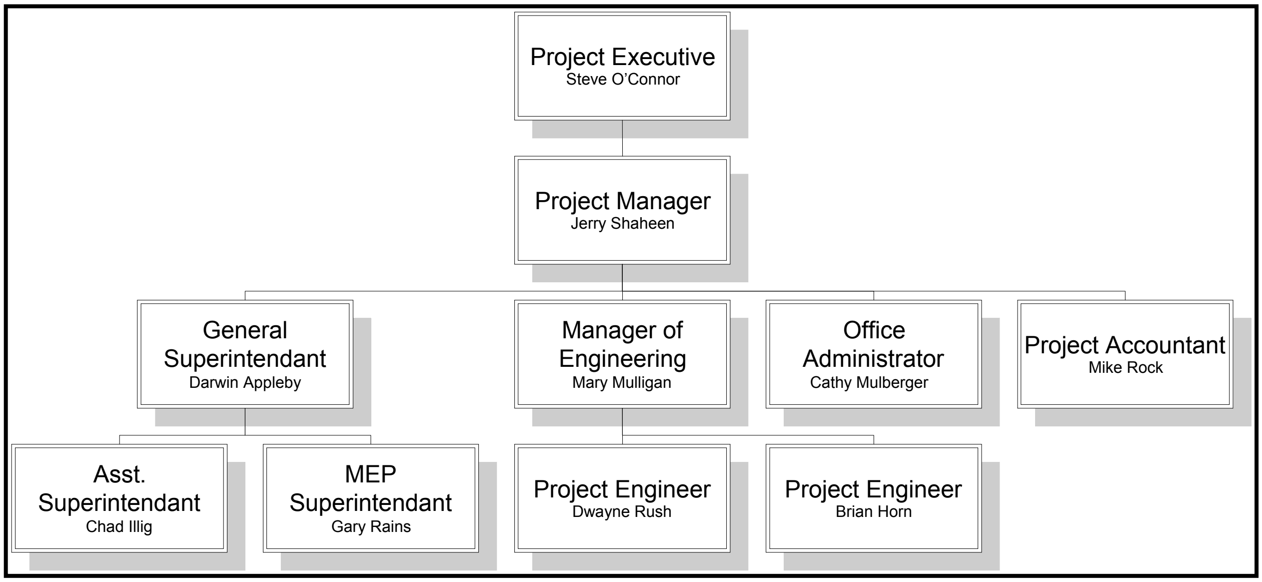

Figure 4: **Staffing plan.**

This diagram illustrates the construction manager's basic staffing plan for this project. The project executive is responsible to generally oversee the project. The project manager runs the project on a day-to-day basis. The manager of engineering is in charge of most of the paperwork associated with the project including, submittals, RFI's, bid packages, change orders, etc. The superintendants supervise the project from onsite and help to ensure quality workmanship, worker safety, and appropriate work sequencing on site. The accountant processes all payments and money issues related to the project.

APPENDIX A:

D4 Cost Analysis

Estimate of Probable Cost

DSL - Jan 2009 - PA - State College

Prepared By: **Steve Ayer**
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University Park, PA 16802
Fax:

Prepared For:

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Fax:

Building Sq. Size:	**113000**	Site Sq. Size:	**87120**
Bid Date:	**9/21/2000**	Building use:	**Educational**
No. of floors:	**4**	Foundation:	**CON**
No. of buildings:	**1**	Exterior Walls:	**GLA**
Project Height:	**68**	Interior Walls:	**WOD**
1st Floor Height:	**17**	Roof Type:	**MEM**
1st Floor Size:	**29000**	Floor Type:	**CON**
		Project Type:	**NEW**

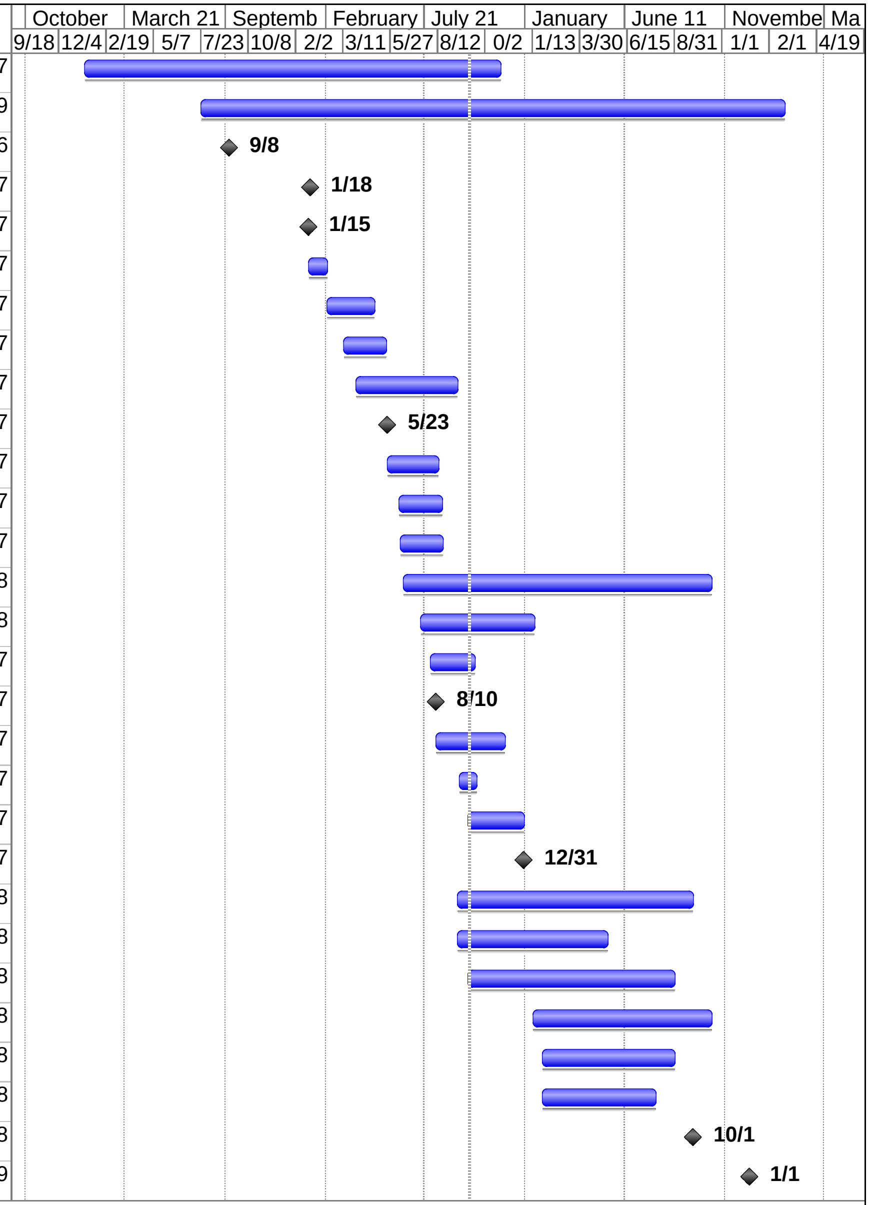
Division		Percent	Sq. Cost	Amount
00	**Bidding Requirements**	**4.59**	**14.24**	**1,608,600**
	Agreement Forms	0.10	0.31	34,839
	Bonds & Certificates	0.34	1.04	117,700
	General Conditions	3.61	11.21	1,266,303
	Supplementary Conditions	0.08	0.26	29,685
	Addenda	0.46	1.42	160,073
01	**General Requirements**	**7.08**	**21.99**	**2,485,374**
	Summary of Work	1.72	5.34	603,981
	Allowances	3.37	10.45	1,180,771
	Field Engineering	0.03	0.08	9,416
	Regulatory Requirements	0.63	1.94	219,397
	Identification Systems	0.20	0.62	70,620
	Submittals	0.27	0.83	94,160
	Constr. Facilities & Temp. Controls	0.35	1.08	122,409
	Contract Closeout	0.53	1.63	184,618
03	**Concrete**	**10.23**	**31.77**	**3,590,000**
	Concrete	10.23	31.77	3,590,000
04	**Masonry**	**7.65**	**23.74**	**2,682,427**
	Masonry	7.65	23.74	2,682,427
05	**Metals**	**11.94**	**37.06**	**4,187,684**
	Metals	11.94	37.06	4,187,684
06	**Wood & Plastics**	**7.32**	**22.72**	**2,566,812**
	Wood & Plastics	7.32	22.72	2,566,812
07	**Thermal & Moisture Protection**	**3.25**	**10.09**	**1,140,674**
	Thermal & Moisture Protection	3.25	10.09	1,140,674
08	**Doors & Windows**	**5.63**	**17.48**	**1,975,278**
	Doors & Windows	5.63	17.48	1,975,278
09	**Finishes**	**8.20**	**25.47**	**2,877,794**
	Finishes	8.20	25.47	2,877,794
10	**Specialties**	**0.35**	**1.07**	**121,074**
	Specialties	0.35	1.07	121,074
11	**Equipment**	**1.05**	**3.25**	**366,883**
	Equipment	1.05	3.25	366,883
12	**Furnishings**	**5.42**	**16.82**	**1,900,445**
	Furnishings	5.42	16.82	1,900,445
14	**Conveying Systems**	**0.20**	**0.62**	**70,620**
	Elevators	0.20	0.62	70,620
15	**Mechanical**	**17.42**	**54.07**	**6,110,068**
	Mechanical	17.42	54.07	6,110,068

16	**Electrical**	**9.69**	**30.07**	**3,398,248**
	Electrical	9.69	30.07	3,398,248
Total Building Costs		**100.00**	**310.46**	**35,081,981**
02	**Site Work**	**100.00**	**18.65**	**1,624,461**
	Site Work	100.00	18.65	1,624,461
Total Non-Building Costs		**100.00**	**18.65**	**1,624,461**
Total Project Costs		**--**	**--**	**36,706,442**

APPENDIX B:

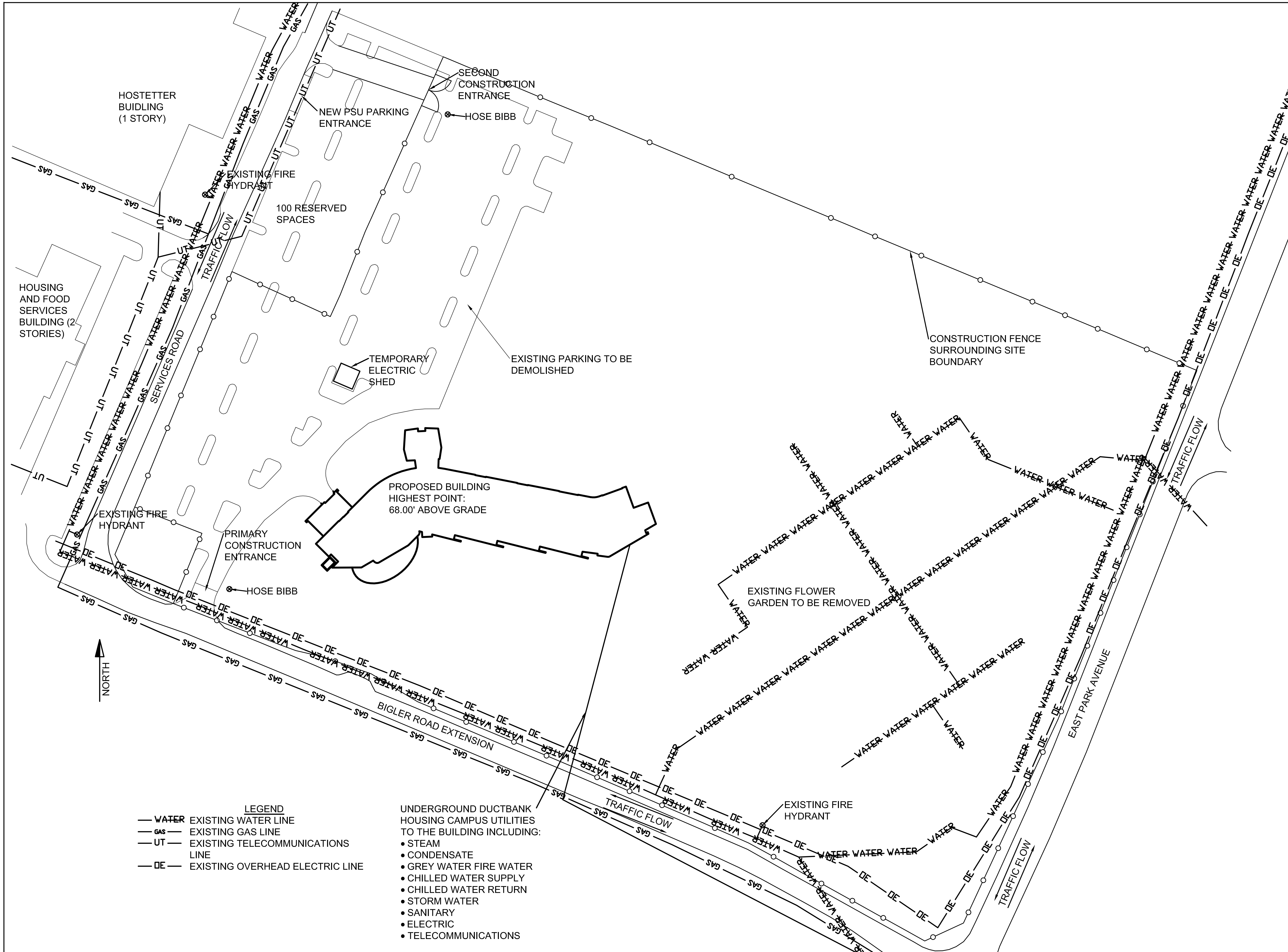
Project Summary Schedule

ID		Task Name	Duration	Start	Finish
1		Design Phase	485 days	Mon 1/16/06	Fri 11/23/07
2		Construction Manager Hired	680 days	Mon 7/24/06	Fri 2/27/09
3		Curtain Wall Sub Procured for Design Assist	0 days	Fri 9/8/06	Fri 9/8/06
4		Groundbreaking Ceremony	0 days	Thu 1/18/07	Thu 1/18/07
5		Procurement of Subcontractors Begins	0 days	Mon 1/15/07	Mon 1/15/07
6		Excavation	23 days?	Mon 1/15/07	Wed 2/14/07
7		Foundations	56 days	Wed 2/14/07	Wed 5/2/07
8		Substructure Walls	50 days	Tue 3/13/07	Mon 5/21/07
9		Plumbing Rough Rough In	120 days?	Mon 4/2/07	Fri 9/14/07
10		Super Structure Starts	0 days	Wed 5/23/07	Wed 5/23/07
11		Steel Erection	60 days?	Wed 5/23/07	Tue 8/14/07
12		MEP Concrete Embeds	51 days?	Mon 6/11/07	Mon 8/20/07
13		Slabs on Metal Deck	50 days	Wed 6/13/07	Tue 8/21/07
14		Electrical	360 days?	Mon 6/18/07	Fri 10/31/08
15		Curtain Wall	134 days?	Mon 7/16/07	Thu 1/17/08
16		Exterior Wall Framing	53 days?	Wed 8/1/07	Fri 10/12/07
17		Subcontractor Procurement Finished	0 days	Fri 8/10/07	Fri 8/10/07
18		Roofing	81 days?	Fri 8/10/07	Fri 11/30/07
19		Fireproofing	21 days?	Mon 9/17/07	Mon 10/15/07
20		Masonry	66 days?	Mon 10/1/07	Mon 12/31/07
21		Building Enclosed	0 days	Mon 12/31/07	Mon 12/31/07
22		Plumbing Finishes	274 days?	Fri 9/14/07	Wed 10/1/08
23		Interior Framing & Drywall	175 days?	Fri 9/14/07	Thu 5/15/08
24		Automatic Temperature Controls	241 days?	Mon 10/1/07	Mon 9/1/08
25		Elevators	209 days?	Tue 1/15/08	Fri 10/31/08
26		Flooring	154 days?	Wed 1/30/08	Mon 9/1/08
27		Interior Paint	133 days?	Wed 1/30/08	Fri 8/1/08
28		Substantial Completion & C. of O.	0 days	Wed 10/1/08	Wed 10/1/08
29		Punchlist Complete	0 days	Thu 1/1/09	Thu 1/1/09



APPENDIX C:

Project Existing Conditions Site Plan



THE NEW DICKINSON SCHOOL OF LAW

The Pennsylvania State University
The Dickinson School of Law

University Park, PA

Steve Ayer
C.M. Option

Faculty Consultant:
Dr. Messner

Date: 10/5/2007

Scale: N.T.S.

Technical Assignment #1
Site Plan