Loyola Intercollegiate Athletic Complex
Baltimore, MD

Technical Assignment # 1

Submitted: October 5, 2009

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Construction Management

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Executive Summary

The Loyola Intercollegiate Athletic Complex is a project located off Cold Spring Lane just north of Baltimore, MD and is owned by Loyola University in Maryland. It is a multi-venue facility providing field space for a diverse range of outdoor athletics including lacrosse, soccer, rugby, and track and field. The project consists of a home synthetic turf game field and a synthetic turf practice field. The stadium is configured at the west side of the field and includes supporting locker room spaces, athletic training/equipment spaces, athletic offices, a press box with broadcast capabilities, and upper and lower grandstands, which seats 5,966 people.

The new stadium started construction in January 2007 and is marked for substantial completion in December 2009. The project will cost the owner $53,872,347 in total project costs. Estimates using D4 Cost estimating and RS means are included and compared to the total project costs.

The delivery system for the new stadium's construction is a Construction Management (CM) @ risk. The CM is Whiting-Turner and the architect is Sasaki. All the subcontractors hold lump sum contracts with Whiting-Turner. Whiting-Turner currently has eight employees working onsite and three working offsite.

A. PROJECT SCHEDULE SUMMARY

A.1 Project Schedule Overview

The Loyola Intercollegiate Athletic Complex (IAC) schedule, refer to Appendix A, is broken down into three phases. Phase one consists of the mass excavation and the Vegetation Reinforcing Steep Slopes (VRSS). Phase two consists of the site work to include: the utility trench, track, game field, practice fields, and storm water management ponds. Phase three consists of the construction of the IAC. The schedule shows the construction timeline of the IAC to be just a little over three years.

A.2 Foundation Sequence

The footings for the building were poured first starting with the North end of the building and then finishing up with the South end of the building. After the footings were poured for each end, the foundation walls and columns followed in sequence. The building was poured before the lower grandstands because the lower grandstand ties into the foundation walls of the building.

The lower grandstand foundations consist of spread footings, columns, spandrel beams, raker beams, main deck risers, and the stairs. The footings and columns started being poured on the North end following the same sequence as the building. The foundation end walls followed behind the footings and columns. Once the foundation end walls were poured, the spandrel beams followed, starting first with column lines 1-9. The raker beams were then poured along column lines 1-9. The same sequence was used for column lines 9-18. The main deck risers were poured in 9 pours. Each pour consisted of two column lines, starting with column lines 1 and 2 and finishing with column lines 17 and 18. This took more time than expected because of the lower grandstands being cast-in-place concrete.

A.3 Superstructure Steel Sequence

The structural steel was erected in six sequences. A normal sequence went like this:

- erect steel
- bolt up steel
- miscellaneous detailing
- install metal decking/ shear studs
- finish up welding

All sequences started with the North end of the building and ended with the South end. The size of the site allowed the project team to utilize two movable cranes to erect the steel, which cut time off the schedule.

A.4 Finish Sequence

Once the structure was completed, the exterior of the building will be made water tight by installing the exterior skin, which consists of metal stud backup, masonry/ stucco backup, and glass/glazing. While the exterior skin is being constructed, the roof for the building and the concessions will be installed.

The interior is finished by the North and South ends of the building and by floor. The interior starts on the North side of level 1 and works its way to the south side of the level. Every floor follows the same sequence.

The normal finish sequence will be:

- metal studs
- MEP Rough-In
- electric/ security/ audio visual/ telephone/ data/ fire alarm wire pulls
- drywall
- painting
- fire protection
- hang finish ceilings
- light fixtures
- set countertops
- flooring
- finish paint
- ceiling tile
- doors and hardware
- trim out
- punchlist

B. Building Systems Summary

Table 1: Building Systems Summary

Work Scope Questions	**Loyola IAC**	
	Yes	No
Is Demolition Required?		**X**
Is there a Structural Steel Frame?	**X**	
Is there Cast in Place Concrete?	**X**	
Is Precast Concrete used?		**X**
Describe Mechanical System	**n/a**	**n/a**
Describe Electrical System	**n/a**	**n/a**
Is Masonry used?	**X**	
Is there a Curtain Wall?	**X**	
What supports the Excavation?	**n/a**	**n/a**

B.1 Structural Steel Frame

The structural system is made up of wide flange columns, beams, and hollow steel sections. Columns and beams range from W8x48 to W18x175. The hollow steel sections are used for miscellaneous steel framing. For lateral support, 3 1/4" lightweight concrete slabs on 3"x20 gauge composite metal decking were used.

Crawler Cranes

The structural steel was erected with two different cranes. A 90 ton crawler crane was used to erect the larger wide flange beams and the North end of the building. For the smaller beams and the South end of the building, a 70 ton crawler crane was used.

B.2 Cast in Place Concrete

All the concrete on the project will be cast in place concrete. 3000 psi reinforced concrete was used for all footings, grade beams, walls and piers. For the slab on grade and slab on metal deck, 3500 psi concrete with welded wire fabric was used. The lower grandstands consist of 4000 psi reinforced concrete. All concrete is placed by a concrete pump truck.

B.3 Mechanical System

The mechanical system being used at the IAC consists of (7) ERVs, (66) water source heat pumps, central heat pump system, and (1) cooling tower. The ERVs have a total output of 24, 850 CFM and provide the building with the proper circulation. There are 11 different types of water source heat pumps each having a different output, which ranges anywhere from 350 CFM to 2000 CFM. The heat pumps are the main source of heat for the building. The water source heat pumps get their heat from the central heat pump system, which has a system volume of 20,000 gallons and maintains a constant temperature at 90˚. The cooling tower provides the cooling to the building and is 860 GPM.

B.4 Electrical System

The building runs on 480Y/277 delivering 3000 Amps, 3 phase, 4 wire electrical system and is connected to Baltimore Gas and Electric (BGE). A 400 kW diesel generator provides emergency power to certain parts of the system through two automatic transfer switches (A.T.S). One A.T.S. is 400 amps and the other is 800 amps. The luminaries throughout the main areas of the building are fluorescent luminaries. However, there are also different types of lighting throughout the building.

B.5 Masonry

Ground Face CMU

There are three different types of masonry used to give the building its architectural features. Concourse level toilet rooms/ concessions and the two story building beneath the concourse are ground faced CMU. Limited areas of Butler stone veneer are used to accent the west entry. A cast masonry unit veneer known as “Renaissance Stone”, is used for the lobby tower and the north stair tower of the stadium.

B.6 Curtain Wall Systems

Aluminum Storefront

Fenestration includes glazed aluminum curtain wall system, glazed aluminum storefront framing and entrance doors, and aluminum windows. Glazing generally is clear, 1" insulated, low-E type glass units. The stadium press box is a prefabricated metal panel system over stud backup and storefront glazing system with in-fill vertical sliding (single hung) windows on the field elevation.

B.7 Excavation Support

VRSS-2

The mass excavation is permanently supported by five Vegetation Reinforcing Steep Slopes (VRSS). The heights range from 60 feet to 110 feet tall. The system features geo-membranes to reinforce the soil structures and fill materials plus erosion control blankets, seeding & sodding, landscaped vegetation and bioengineering.

C. Project Cost Evaluation

C.1 Cost Summary

Table 2: Cost Summary

Loyola IAC: Costs			
	Cost	**Total SF**	**Cost/SF**
Construction Cost	$20,237,252	41,520	$487.41
Building Cost	$28,189,112	41,520	$678.93
Total Project Cost	$53,872,347	41,520	$1297.50

*Construction Cost excludes sitework and permits.

*Building Cost includes sitework and permits.

C.2 Building Systems Cost

Table 3: Building Systems Cost

Loyola IAC: Building System Costs			
Building System	**Cost**	**Total SF**	**Cost/SF**
Structural	$6,005,389	41,520	$144.64
HVAC/ Plumbing	$3,602,794	41,520	$86.77
Fire Protection	$207,750	41,520	$5.00
Electrical	$1,522,280	41,520	$36.66
Conveying System	$137,300	41,520	$3.31
Fixed Grandstands	$1,110,165	41,520	$26.74
Gas Collection System	$900,074	41,520	$21.68

C.3 D4 Cost Estimate

Table 4: Historical Data Projects

Historical Data Projects			
Project Name	**Size(SF)**	**# of Floors**	**Cost**
YMCA Recreational Center	83,377	4	$13,495,528
Kemper Arena	75,750	3	$15,937,000

The complete summary of the D4 cost estimate can be found in Appendix B. These projects were selected based on the number of floors and occupant use. D4 cost estimates ran closer to the construction cost and was 39.1% lower than the total project costs, which was $21,085,271 or $507.83/SF.

C.4 RS Means

The complete summary of the RS means square foot estimate can be found in Appendix C. In RS means, there was no athletic complex or stadium for building type. So I chose a gymnasium to closely mimic the seating arrangements and the building type. Since RS means did not have face brick with metal stud back-up, I assumed it to be face brick with concrete block back-up.

C.5 Cost Comparison

Table 5: Cost Comparison

Cost Comparison	
Method	Total Construction Costs
D4 Cost Software	$21,085,271
RS Means Data	$22,699,500
Actual Costs	$28,189,112

An analysis of all three costs shows D4 Cost estimate and RS means to be lower than the actual building costs.

There are several factors that I believe contributed to the differences among the estimates:

- The split between steel and cast in place concrete. Cast in place concrete took a lot of extra time and the steel had to wait for the cast in place concrete to finish.
- D4 cost estimate and RS means did not have an exact match for the building type. These estimates did not account for the stadium seating or the building type.
- The amount of sitework that had to be done was not taken into account.

D. Site Plan of Existing Conditions

Please see Appendix D for Existing Conditions Site Plan

D.1 Site Location

The site is located on Cold Spring land north of downtown Baltimore, Maryland off of Interstate 83.

Figure 1: Existing Site

Figure 2: Site/ Adjacent Bldg. Outlines

D.2 Adjacent Structures

The project is next to the Kennedy Krieger Institute (indicated in teal in Figure 2) and the Emerald Estates Retirement Community (indicated in red in Figure 2). Also, the entrance of the site is the baltimore City police station, which is outlined in blue in figure two. Emerald Estates Retirement Community is approximately 50 feet tall. The Kennedy Kriger Institute stands approximately 40 feet tall. The police station is approximately 25 feet in elevation.

D.3 Temporary Utilities

The site had no existing utilities so everything had to be brought on site. The electricity came from Emerald Estates Retirement Community. The telephone and data lines were tapped into the same service Emerald Estates and Kennedy Kreiger used.

E. Local Conditions

E.1 Preferred Method of Construction

Baltimore uses a mix of concrete and in the inner city steel high rises. Hambro systems are very popular in Baltimore County. For this project, a mix of steel and cast in place concrete were used. The ground face CMU matches the existing Emerald Estates building.

E.2 Availability for Construction Parking

The size of the site allows all construction parking to be onsite. All the subcontractors are required to enter the site through the police station and not through Kennedy Krieger.

E.3 Available Recycling and Tipping Fees

The dumpsters are provided by Whiting-Turner. There were no recycling dumpsters utilized for the project.

E.4 Local Soil Conditions

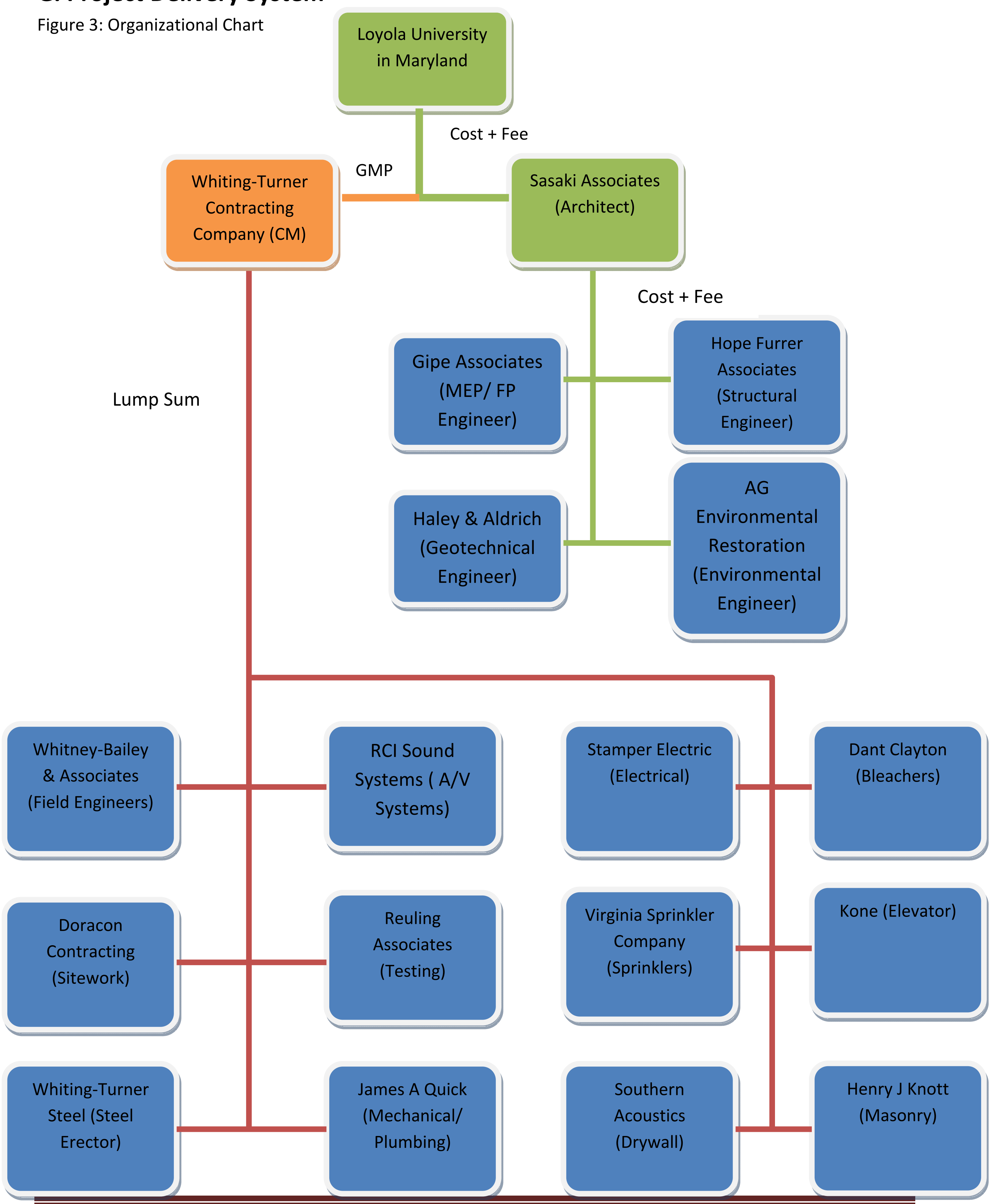
The subsurface explorations conducted at the site revealed natural soils weathered from bedrock, uncontrolled soil/ rock fill, and MSW landfill. The subsurface explorations identified several ground water conditions. Ground water levels were close to the bedrock surface and perched ground water was encountered in the landfill areas.

F. Client Information

The Loyola IAC is owned by Loyola University in Maryland. Loyola is a Catholic university based on high standards upon which St. Ignatius built the Jesuit. Loyola is building the IAC for three main reasons: to get nationally televised, be able to compete with other Division 1 lacrosse programs, and for a larger facility for the expanding university. Loyola wants a quality building built safely and on time. Loyola representatives come to the site and identify issues that they see and bring them up to the project manager. The main sequencing issues that Loyola has identified are the weather so the VRSS walls can be built and ordering/ installation of the mechanical equipment because of the lead times for the equipment. The keys things that Whiting-Turner has identified to complete the project to the owner's satisfaction are to complete the project on time, under budget, and have a quality building.

G. Project Delivery System

Figure 3: Organizational Chart



G.1 Key Contacts

Loyola University- Les Pely (Director of Facilities)
Whiting-Turner (WT)- Shawn Hayford (Project Manager)
Gipe Associates- John Latrobe (Project Manager)
Haley & Aldrich- Derrick Shelton (Senior Engineer)
Hope Furrer- Stephanie Slocum (Engineer)
Sasaki- Ed Calamari (Head Architect)
WT Steel- Tim Wolfe (Project Manager)
James A. Quick- Ric Orvis (Project Manager)
Stamper Electric-John Kielian (Project Manager)

G.2 Project Delivery

As shown in figure 3 above, there are three key players in the delivery of the project. Loyola University in Maryland is the owner of the building and the occupant is the lacrosse, soccer, and rugby teams at Loyola University. Whiting-Turner (WT) acts as the CM at risk and holds a GMP contract with the owner. WT has lump sum contracts will all of the subcontractors. Sasaki is the architect on the project and was chosen based on their experience with athletic complexes and their past performance with Loyola. WT has a good and long standing relationship with Loyola and was selected for this project based on their competitive bid.

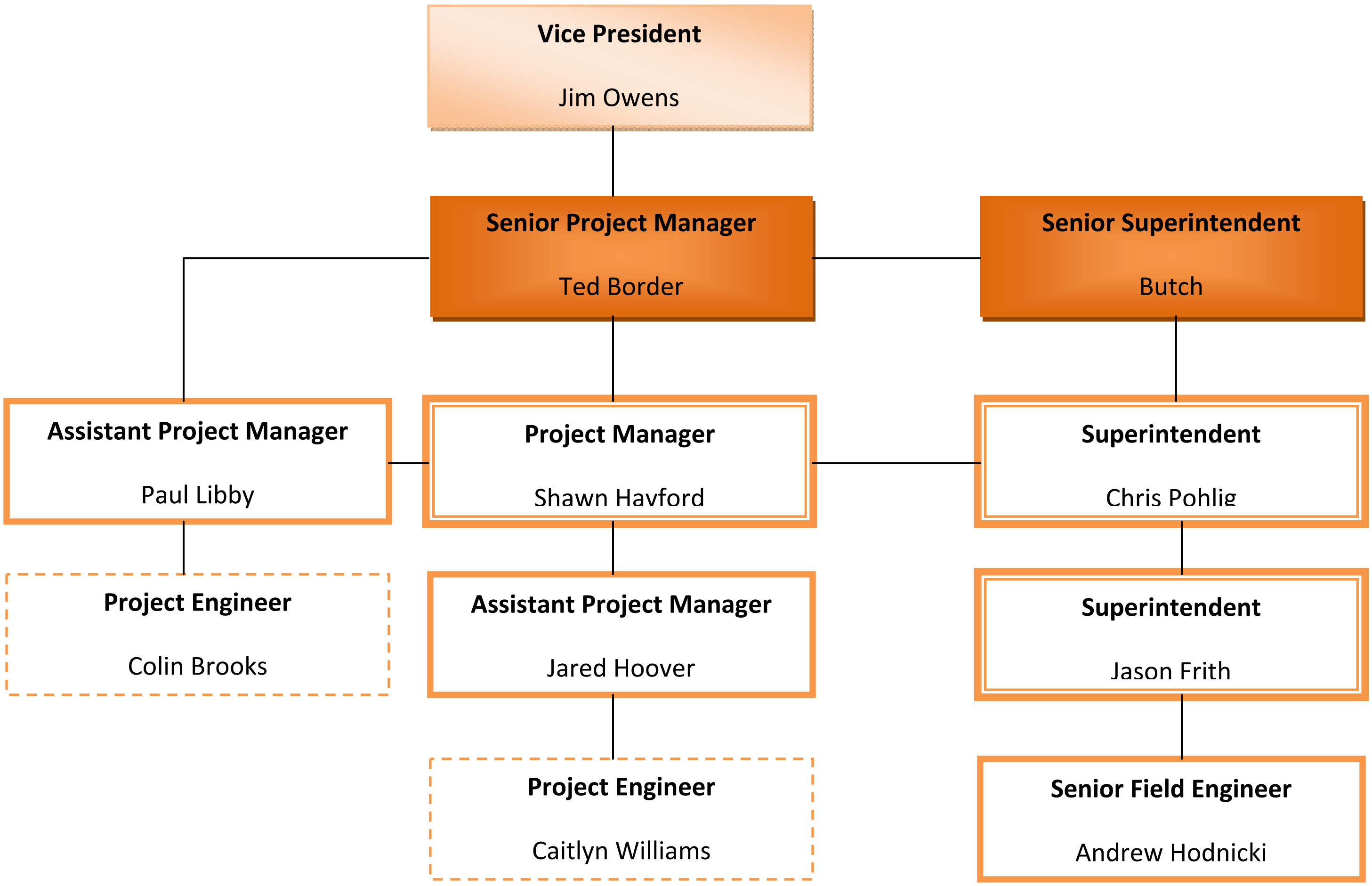
G.3 Subcontractors

Each subcontractor was selected based on their competitive bid and past performance with WT. Each of these subcontractors was required to meet minimum WT requirements to having general liability and builders risk insurances. Subcontractors with a contract amount over $500,000 were required to have a bond.

H. Staffing Plan

Figure 4 shows all the people involved with the construction of the Loyola IAC. The Vice President acts as the project executive and spends most of his time working from the main office. The Senior Project Manager and Senior Superintendent split their time between multiple projects and usually stop by the project to solve major issues or for owner meetings. Their main job is to keep everyone onsite on top of their toes so nothing gets missed. The rest of the staff works onsite 100% of the time to ensure construction is being done to the proper specifications according to the architect, engineers, and owner. The project manager is ultimately responsible for the successful completion of the project. Shawn's daily duties include: writing contracts, submitting pay applications, budgets, schedule, and change orders. The assistant project manager is responsible for setting up and overseeing the submittal and RFI system for the project. In this project, Jared was also responsible for reviewing all the steel submittals and once the steel was done being erected he took over the MEP coordination. Since Paul had a lot of experience with sitework, he was put in charge of Phase 2, which included all the site utilities. The project engineer is responsible for quality control, RFI submission, permit tracking, and normally given a specific trade to work with. Caitlyn handled Divisions 8 and 9 and Colin handled Division 2. The superintendent is in charge of everything that gets built onsite and ensures coordination between deliveries and subcontractors. Chris worked with Phase 3 and Jason worked with Phase 2. The Senior Field Engineer is responsible for daily reports, coordination between trades, and quality control. Andrew worked closely with Chris to ensure the building was being properly built.

Figure 4: Construction Manager Organizational Chart

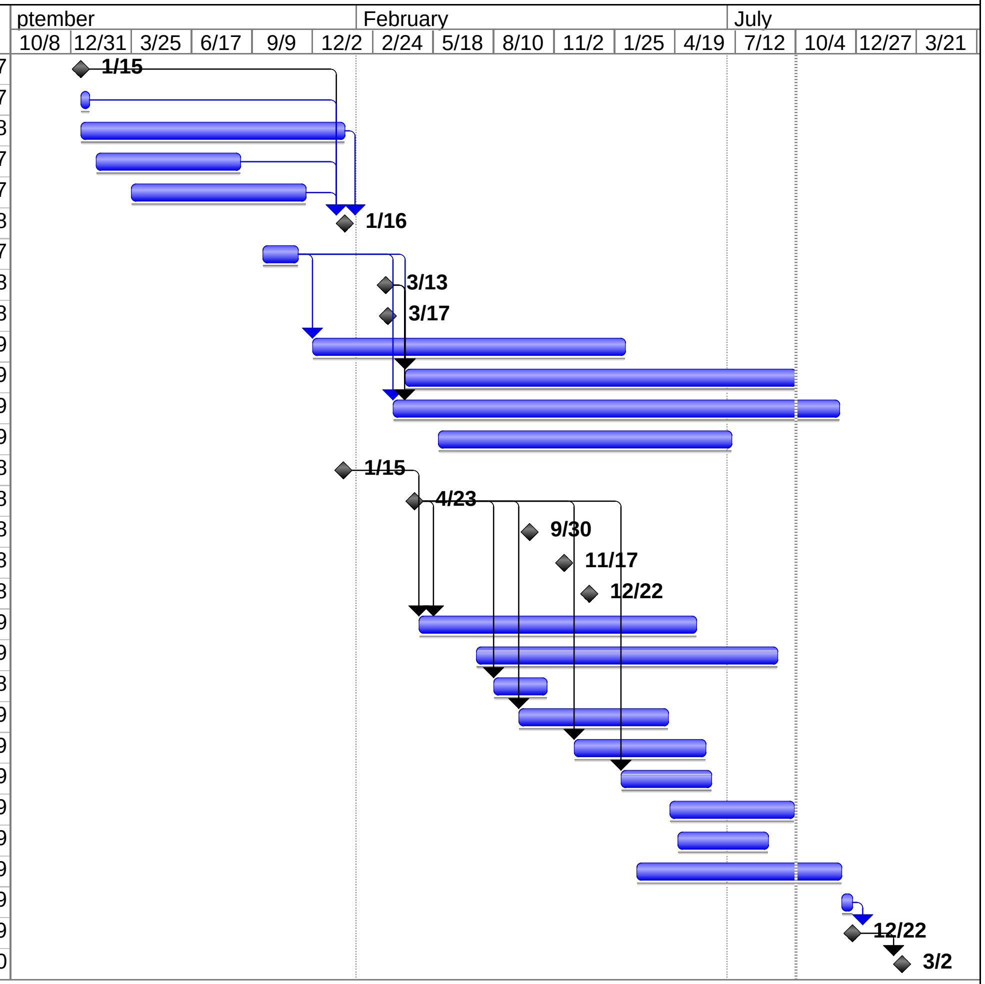


Appendix A:

Project Schedule Summary

Loyola IAC Summary Schedule

ID	Task Name	Duration	Early Start	Early Finish
1	Notice to Proceed	0 days	Mon 1/15/07	Mon 1/15/07
2	Mobilize Onsite	10 days	Mon 1/15/07	Fri 1/26/07
3	Phase 1-Mass Excavation Cut/Fill	263 days	Mon 1/15/07	Wed 1/16/08
4	Phase 1-DDC Ground Improvements	145 days	Mon 2/5/07	Fri 8/24/07
5	Phase 1-VRSS Slopes	175 days	Mon 3/26/07	Fri 11/23/07
6	Phase 1-Complete Earthwork	0 days	Wed 1/16/08	Wed 1/16/08
7	Phase 2-Drawings Completed & Submitted	35 days	Tue 9/25/07	Mon 11/12/07
8	Phase 2-Received Permit	1 day	Thu 3/13/08	Thu 3/13/08
9	Phase 2-Begin Construction	0 days	Mon 3/17/08	Mon 3/17/08
10	Phase 2-Procurement	311 days	Mon 12/3/07	Mon 2/9/09
11	Phase 2-Utility Trench	388 days	Thu 4/10/08	Mon 10/5/09
12	Phase 2-Track, Gamefield, and Practice Fields	445 days	Mon 3/24/08	Fri 12/4/09
13	Phase 2-Stormwater Management Ponds	292 days	Mon 5/26/08	Tue 7/7/09
14	Phase 3-Schematic Drawings	0 days	Tue 1/15/08	Tue 1/15/08
15	Phase 3-Main Frame Structural Package	0 days	Wed 4/23/08	Wed 4/23/08
16	Phase 3 Architectural/MEP 75% Drawings	0 days	Tue 9/30/08	Tue 9/30/08
17	Phase 3-Architectural/MEP 100% Drawings	0 days	Mon 11/17/08	Mon 11/17/08
18	Phase 3-Sitework 100% Drawings	0 days	Mon 12/22/08	Mon 12/22/08
19	Phase 3-Permits	276 days	Tue 4/29/08	Tue 5/19/09
20	Phase 3-Procurement	299 days	Fri 7/18/08	Wed 9/9/09
21	Phase 3-Building Foundations	54 days	Mon 8/11/08	Thu 10/23/08
22	Phase 3-Lower Grandstand Foundations	150 days	Mon 9/15/08	Fri 4/10/09
23	Phase 3-Superstructure Steel Sequence 1-6	131 days	Mon 12/1/08	Mon 6/1/09
24	Phase 3-Structural Slabs	90 days	Wed 2/4/09	Tue 6/9/09
25	Phase 3-Exterior Skin	125 days	Mon 4/13/09	Fri 10/2/09
26	Phase 3-Roofing	90 days	Fri 4/24/09	Thu 8/27/09
27	Phase 3-MEP/Interior Work/Finishes	203 days	Thu 2/26/09	Mon 12/7/09
28	Phase 3-Final Commissioning	11 days	Tue 12/8/09	Tue 12/22/09
29	Substantial Completion	0 days	Tue 12/22/09	Tue 12/22/09
30	Occupancy	0 days	Tue 3/2/10	Tue 3/2/10



Project: Summary Schedule.mpp
Date: Sun 10/4/09

Task		Milestone		External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	

Steven Rogers

Appendix B

D4 Cost Estimate

Statement of Probable Cost

Loyola IAC - Jan 2007 - MD - Baltimore

Prepared By: **Steven Rogers**
AE Senior Thesis: Class of 2010
232 E. Fairmount Ave.
State College, PA 16801
724-953-3014 Fax:

Prepared For: **Faculty Consultant: Dr. Riley**
AE Faculty
104 Engineering Unit A
University Park, PA 16802
814-865-6394 Fax:

Building Sq. Size:	**41520**	Site Sq. Size:	**72**
Bid Date:		Building use:	
No. of floors:	**4**	Foundation:	**CAS**
No. of buildings:	**1**	Exterior Walls:	**CMU**
Project Height:	**65.4**	Interior Walls:	**GYP**
1st Floor Height:		Roof Type:	**EPD**
1st Floor Size:		Floor Type:	**CON**
		Project Type:	**NEW**

Division		Percent	Sq. Cost	Amount
00	**Bidding Requirements**	**0.00**	**0.00**	**0**
01	**General Requirements**	**10.06**	**51.08**	**2,120,831**
	General Requirements	10.06	51.08	2,120,831
02	**Site Work**	**0.00**	**0.00**	**0**
03	**Concrete**	**12.41**	**63.01**	**2,616,354**
	Concrete	12.41	63.01	2,616,354
04	**Masonry**	**2.26**	**11.49**	**477,250**
	Masonry	2.26	11.49	477,250
05	**Metals**	**21.08**	**107.06**	**4,445,042**
	Structural Steel	16.07	81.62	3,389,035
	Miscellaneous Steel	5.01	25.43	1,056,007
06	**Wood & Plastics**	**1.57**	**7.96**	**330,475**
	Finish Carpentry	1.25	6.36	263,875
	Wood Lockers	0.32	1.60	66,600
07	**Thermal & Moisture Protection**	**6.00**	**30.45**	**1,264,122**
	Waterproofing	0.64	3.23	134,100
	Stucco System	2.37	12.06	500,716
	Fireproofing	0.84	4.26	177,000
	Expansion Joint System	0.59	3.01	125,056
	Caulking	0.24	1.23	50,900
	Roofing	1.31	6.66	276,350
08	**Doors & Windows**	**5.16**	**26.21**	**1,088,084**
	Glass and Glazing	1.99	10.12	420,184
	Sliding Glass Doors	0.62	3.16	131,408
	Doors and Hardware	1.53	7.76	322,300
	Misc.	1.02	5.16	214,192
09	**Finishes**	**9.67**	**49.11**	**2,039,210**
	Drywall	5.87	29.82	1,237,970
	Flooring	2.55	12.97	538,540
	Paint	1.25	6.33	262,700
10	**Specialties**	**0.54**	**2.72**	**113,130**
	Visual Display Surfaces	0.06	0.29	12,000
	Metal Lockers	0.06	0.33	13,575
	Misc.	0.42	2.11	87,555
11	**Equipment**	**0.04**	**0.22**	**9,309**
	Locker Room Clocks	0.03	0.16	6,500
	Ceiling Mounted Projector w/ Contro ls	0.01	0.07	2,809
12	**Furnishings**	**0.01**	**0.03**	**1,175**
	Sun Shades	0.01	0.03	1,175

13	**Special Construction**	**5.27**	**26.74**	**1,110,165**
	Fixed Grandstands	5.27	26.74	1,110,165
14	**Conveying Systems**	**0.65**	**3.31**	**137,300**
	Elevator	0.65	3.31	137,300
15	**Mechanical**	**18.07**	**91.78**	**3,810,544**
	Fire Protection	0.99	5.00	207,750
	Plumbing & HVAC	17.09	86.77	3,602,794
16	**Electrical**	**7.22**	**36.66**	**1,522,280**
	Electrical	7.22	36.66	1,522,280
Total Building Costs		**100.00**	**507.83**	**21,085,271**
Total Non-Building Costs		**100.00**	**0.00**	**0**
Total Project Costs		**--**	**--**	**21,085,271**

Appendix C

2009 RS Means Square Foot Costs

Square Foot Cost Estimate Report

Estimate Name: **Untitled**

Building Type:	**Gymnasium with Face Brick with Concrete Block Back-up / Rigid Steel Frame**
Location:	National Average
Stories Count (L.F.):	**4.00**
Stories Height	**79.50**
Floor Area (S.F.):	**41,520.00**
LaborType	**Union**
Basement Included:	No
Data Release:	**Year 2009**
Cost Per Square Foot	**$546.71**
Total Building Cost	**$22,699,500**

Costs are derived from a building model with basic components. Scope differences and market conditions can cause costs to vary significantly.
Parameters are not within the ranges recommended byRSMeans.

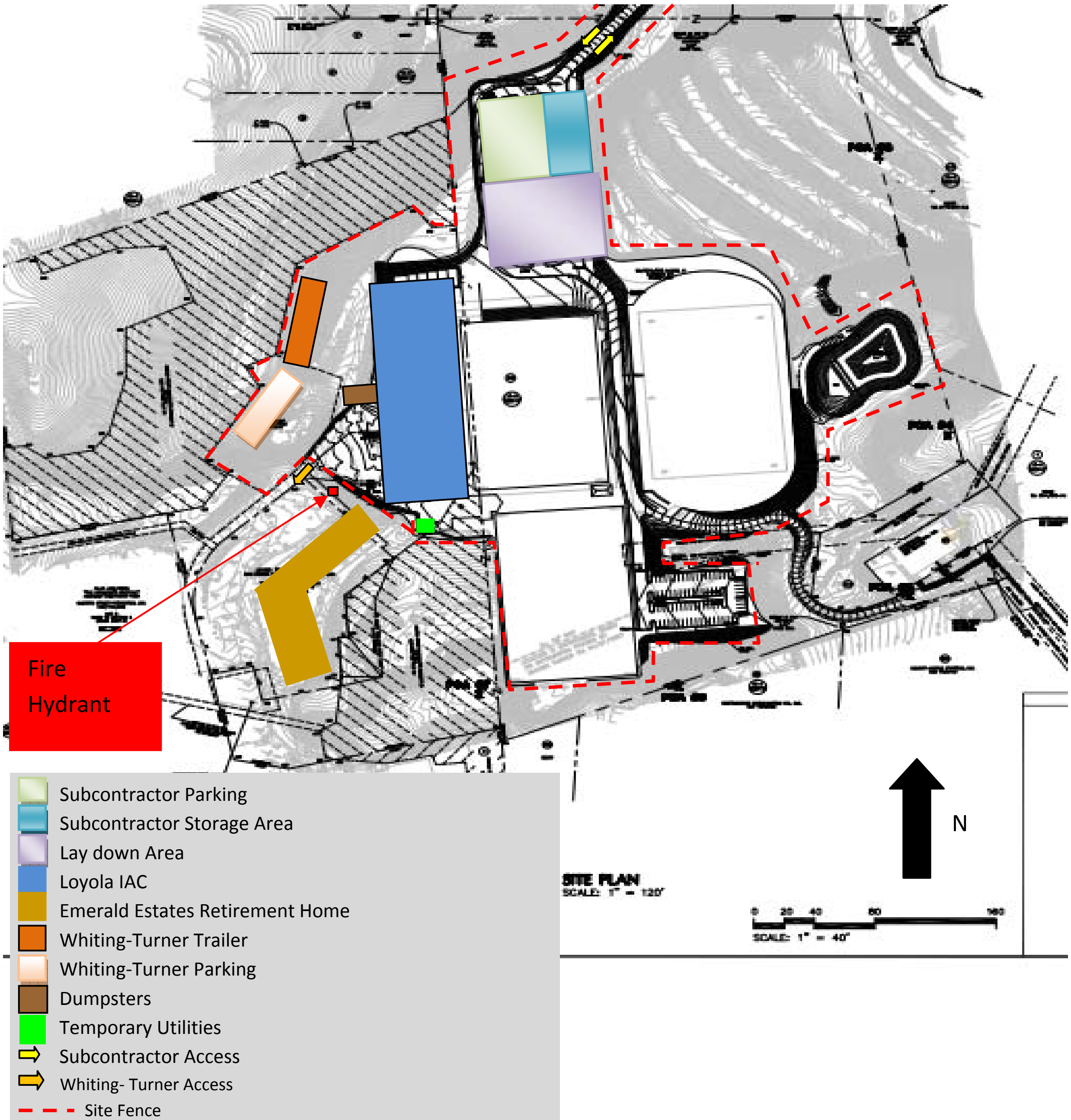
		% of Total	Cost Per SF	Cost
A Substructure		**1.1%**	**4.37**	**$181,500**
A1010	**Standard Foundations**		**1.37**	**$57,000**
	Strip footing, concrete, reinforced, load 11.1 KLF, soil bearing capacity 6 KSF, 12" deep x 24" wide			
	spread footings, 3000 PSI concrete, load 50K, soil bearing capacity 3 KSF, 4' - 6" square x 12" deep			
	spread footings, 3000 PSI concrete, load 50K, soil bearing capacity 6 KSF, 3' - 0" square x 12" deep			
A1030	**Slab on Grade**		**1.18**	**$49,000**
	Slab on grade, 4" thick, non industrial, reinforced			
A2010	**Basement Excavation**		**0.05**	**$2,000**
	Excavate and fill, 30,000 SF, 4' deep, sand, gravel, or common earth, on site storage			
A2020	**Basement Walls**		**1.77**	**$73,500**
	Foundation wall, CIP, 4' wall height, direct chute, .099 CY/LF, 4.8 PLF, 8" thick			
B Shell		**67.6%**	**276.16**	**$11,466,000**
B1020	**Roof Construction**		**16.17**	**$671,500**
	Steel frame for 1 story buildings, 60 - 100' span			
	Steel deck, 3" deep, 16 ga, single 20' span, 6.0 PSF, 40 PSF superimposed load			
B2010	**Exterior Walls**		**223.62**	**$9,284,500**
	Brick wall, composite double wythe, standard face/CMU back-up, 8" thick, perlite core fill			
B2020	**Exterior Windows**		**34.63**	**$1,438,000**
	Windows, aluminum, awning, standard glass, 3'-1" x 3'-2"			
B2030	**Exterior Doors**		**0.52**	**$21,500**
	Door, aluminum & glass, sliding patio, tempered glass, economy, 6'-0" x 7'-0" opening			
	Door, wood, overhead, panels, heavy duty, manual operation, 10'-0" x 10'-0" opening			
	Door, steel 24 gauge, overhead, sectional, manual operation, 10'-0" x 10'-0" opening			
B3010	**Roof Coverings**		**1.22**	**$50,500**
	Drip edge, aluminum .016" thick, 5" girth, mill finish			
	Roofing, single ply membrane, EPDM, 60 mils, fully adhered			
	Insulation, rigid, roof deck, polyisocyanurate, 2#/CF, 3.5" thick, R25			
C Interiors		**9.3%**	**38.02**	**$1,578,500**

		% of Total	Cost Per SF	Cost
C1010	**Partitions**		**1.69**	**$70,000**
	Concrere block (CMU) partition, light weight, hollow, 6" thick, no finish			
C1020	**Interior Doors**		**1.75**	**$72,500**
	Door, single leaf, kd steel frame, hollow metal, commercial quality, flush, 3'-0" x 7'-0" x 1-3/8"			
C1030	**Fittings**		**0.22**	**$9,000**
	Toilet partitions, cubicles, ceiling hung, stainless steel			
C3010	**Wall Finishes**		**19.20**	**$797,000**
	2 coats paint on masonry with block filler			
	Painting, masonry or concrete, latex, brushwork, primer & 2 coats			
	Ceramic tile, thin set, 4-1/4" x 4-1/4"			
C3020	**Floor Finishes**		**14.22**	**$590,500**
	Tile, ceramic natural clay			
	Maple strip, sanded and finished, maximum			
	Add for sleepers on concrete, treated, 24" OC, 1"x2"			
C3030	**Ceiling Finishes**		**0.95**	**$39,500**
	Acoustic ceilings, 3/4"mineral fiber, 12" x 12" tile, concealed 2" bar & channel grid, suspended support			
D Services		**7.8%**	**32.00**	**$1,328,500**
D2010	**Plumbing Fixtures**		**5.52**	**$229,000**
	Water closet, vitreous china, bowl only with flush valve, wall hung			
	Urinal, vitreous china, wall hung			
	Lavatory w/trim, wall hung, PE on CI, 19" x 17"			
	Service sink w/trim, PE on CI, corner floor, wall hung w/rim guard, 24" x 20"			
	Shower, stall, baked enamel, terrazzo receptor, 36" square			
	Water cooler, electric, wall hung, dual height, 14.3 GPH			
D2020	**Domestic Water Distribution**		**2.38**	**$99,000**
	Electric water heater, commercial, 100< F rise, 500 gal, 240 KW 984 GPH			
D3050	**Terminal & Package Units**		**10.34**	**$429,500**
	Rooftop, single zone, air conditioner, banks or libraries, 10,000 SF, 41.67 ton			
D4010	**Sprinklers**		**2.77**	**$115,000**
	Wet pipe sprinkler systems, steel, light hazard, 1 floor, 10,000 SF			
D5010	**Electrical Service/Distribution**		**0.48**	**$20,000**
	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 400 A			
	Feeder installation 600 V, including RGS conduit and XHHW wire, 400 A			
	Switchgear installation, incl switchboard, panels & circuit breaker, 400 A			
D5020	**Lighting and Branch Wiring**		**8.49**	**$352,500**
	Receptacles incl plate, box, conduit, wire, 8 per 1000 SF, .9 watts per SF			
	Wall switches, 1.0 per 1000 SF			
	Miscellaneous power, 1 watt			
	Central air conditioning power, 4 watts			
	Fluorescent fixtures recess mounted in ceiling, 2 watt per SF, 40 FC, 10 fixtures @40 watt per 1000 SF			
D5030	**Communications and Security**		**1.82**	**$75,500**
	Communication and alarm systems, includes outlets, boxes, conduit and wire, sound systems, 12 outlets			
	Communication and alarm systems, fire detection, non-addressable, 25 detectors, includes outlets, boxes, conduit a			
D5090	**Other Electrical Systems**		**0.19**	**$8,000**
	Generator sets, w/battery, charger, muffler and transfer switch, gas/gasoline operated, 3 phase, 4 wire, 277/480 V, 7			
E Equipment & Furnishings		**14.2%**	**58.21**	**$2,417,000**
E1090	**Other Equipment**		**58.21**	**$2,417,000**
	10 - Sound system, amplifier, 250 W			
	200 - Lockers, steel, baked enamel, single tier, maximum			
	2 - School equipment, scoreboards, basketball, one side, maximum			

	% of Total	Cost Per SF	Cost
6900 - Bleachers, telescoping, school equipment, manual, 21 to 30 tier, maximum			
Architectural equipment, school equipment bleachers-telescoping, manual operation, 15 tier, economy (per seat)			
Architectural equipment, school equipment, weight lifting gym, universal, deluxe			
Architectural equipment, sauna, prefabricated, including heater and controls, 7' high, 6' x 4'			
F Special Construction	**0.0%**	**0.00**	**$0**
G Building Sitework	**0.0%**	**0.00**	**$0**
Sub Total	**100%**	**$408.75**	**$16,971,500**
Contractor's Overhead & Profit	**25.0%**	**$102.19**	**$4,243,000**
Architectural Fees	**7.0%**	**$35.77**	**$1,485,000**
User Fees	**0.0%**	**$0.00**	**$0**
Total Building Cost		**$546.71**	**$22,699,500**

Appendix D

Existing Conditions Site Plan


Fire
Hydrant
N
SITE PLAN
Subcontractor Parking
Subcontractor Storage Area
Lay down Area
Loyola IAC
Emerald Estates Retirement Home
Whiting-Turner Trailer
Whiting-Turner Parking
Dumpsters
Temporary Utilities
Subcontractor Access
Whiting- Turner Access
Site Fence