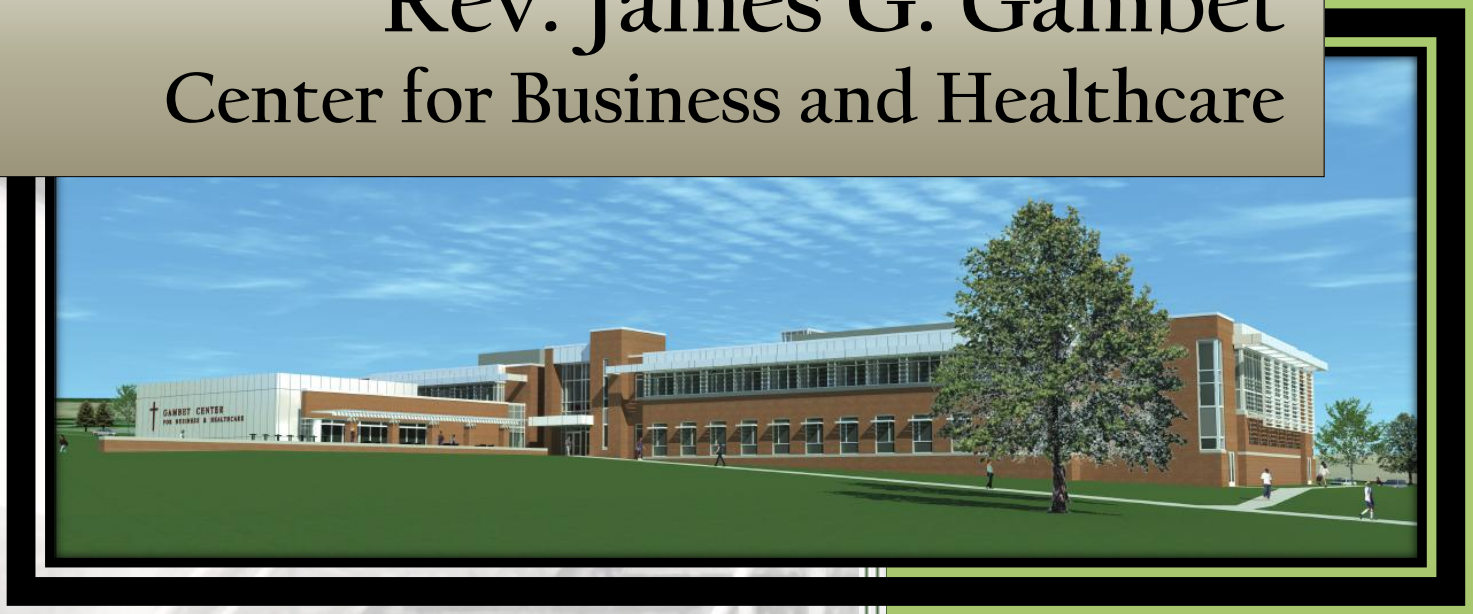
DeSales University

Technical Report 2

Rev. James G. Gambet
Center for Business and Healthcare



Brett Tallada

Construction Management

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10.12.2012

Executive Summary

The Reverend James G. Gambet Center for Business and Healthcare is the latest addition to the campus at DeSales University. The new $27 million facility, which is the new home of the Business, Nursing, and Physician Assistant Programs, will be state of the art and include technologically advanced labs and classrooms. DeSales' continual growth and ever increasing quality in education has caused these programs to reach their maximum potential in the current facilities. Construction of the 77,000 square foot building is being managed by Alvin H. Butz, Inc., and is scheduled to complete in November 2012. The following technical assignment offers a more in depth look into the project schedule, structural steel and general condition estimates, Building Information Modeling (BIM) use evaluation, and constructability challenges.

The construction of the Gambet Center can be broken into three distinct phases; design and preconstruction, construction, and site work. On August 3, 2011, over a year after initial planning for the new facility began, Construction Manager Alvin H. Butz, Inc. received the notice to mobilize the site. Excavation began in late October 2011 after various site preparation and temporary storm water control systems were put in place. Production on site has been consistent throughout the construction process, however, excessive precipitation in the beginning and end of the project have pushed the schedule back slightly to bring a substantial completion date in early November 2012. With ample time between building completion and operation, there are no problems arising with the owner.

In addition to analysis of the detailed project schedule, RS Means Construction Cost Data was used to create both structural system and general conditions estimates and compared to the actual costs of the project. The structural estimate of a chosen bay, which includes both the steel structure and concrete foundation, comes in at $7.24 per square foot less than that actual cost of $44.41 per square foot, or an error of approximately 16 percent. The estimated general conditions were closer to the actual total, with an error of 8.9 percent. Analyses of the variation between estimated and actual costs are discussed in their respective sections.

Building Information Modeling is a relatively new practice in the construction industry, but with every passing year it is becoming increasingly popular. An evaluation into the use of BIM implementation is included with recommendations on how the owner and construction manager could have benefited from a greater effort to utilize BIM. One argument for 4D modeling is perfectly illustrated when considering the poor weather and existing site conditions generate constructability challenges that make it critical to prepare and execute plans effectively.

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Detailed Project Schedule

**Please see Appendix A-1 for the Detailed Project Schedule*

Schedule Overview

The schedule was a major driving force for the construction of the Gambet Center. DeSales' five year plan, which forecasts future enrollment, indicated the University would reach a maximum capacity of 1600 students by 2015. Scheduled completion is currently on track for November 2012, and the University plans to have the building completely operational by May 2013. This provided a padded window of construction that reduced risks associated with delays in the schedule. However, the potential for poor weather conditions and their negative impact on the schedule were the main areas of concern. For the Detailed Project Schedule, see Appendix A-1. The Detailed Project Schedule does not incorporate any delays, but details the initial projected construction timeline.

Project Sequence

The Detailed Project Schedule condenses the major areas of construction for the project into three phases. The first phase consists of design, preconstruction, and procurement activities associated with the Gambet Center. The second phase, which started when Phase 1 was mostly complete, is broken down by building system and demonstrates the sequence of construction performed by the trades. The large site allows for Phase 3 to be completed concurrently with Phase 2 without creating problems with site logistics.

DeSales University started programming for the Gambet Center in July 2010 after they realized extra space was needed to keep enrollment from reaching the maximum capacity. During this time, initial plans were made to select the site location on campus, decide which academic departments would relocate, and determine which facilities and equipment were needed. The Business Department was selected because it is the fastest growing degree program at DeSales. The Nursing and Physician Assistant programs are the top rated programs in the country, but students were choosing other schools because the existing labs were outdated. Early on it became clear the building would need sophisticated labs with a high level of technological integration.

DeSales hired Breslin Ridyard Fadero Architects in November 2010 to complete the design of the Gambet Center. The owner required the building to at least achieve LEED® Certification. During the first phase, Alvin H. Butz, Inc. was also brought into the project as the construction manager to perform preconstruction activities and help with

design decisions. After the design was finalized, Butz began to collect bid packages and award subcontracts.

During Phase 2 construction, work performed by many of the subcontractors fell on the critical path. Coordination among trades was crucial to keep one from affecting the schedule of work completed by others. This became apparent early in the project when excessive rain caused issues with the excavation due to the soft soil conditions on site. When there was dry weather, it was imperative to backfill excavations with compacted structural fill as soon as possible to prevent future concerns with excavation, differential settlement and to maintain the project schedule for foundations and underslab utilities.

Before excavation of the building foundation could start on October 24, 2011, many initial site work activities in Phase 3 had to be completed. This included temporary storm ponds, erosion and sedimentation controls, and the first 200' of Loop Road. Also part of Phase 3 activities were the relocation of utility lines, a permanent storm water diversion system, parking lots and sidewalks, site lighting, and landscaping.

The Detailed Project Schedule also contained critical milestones for the project. Approximately five months after excavation began, the rough building enclosure was completed in late March 2011. The Gambet Center was originally scheduled to reach substantial completion by October 2, 2012, however inclement weather has caused this date to slip to early November. Despite the delays, the Gambet Center should be completed with plenty of time for the owner to reach their first day of operation, and the relationship between DeSales University and Butz remains strong.

Detailed Structural System Estimate

**Please see Appendix B for Detailed Takeoff and Structural Estimate*

The 77,000 square foot facility consists of the new construction of a two story structural steel frame with shallow slab on grade foundation. The typical bay was selected because it showed the most uniformity with other areas of the building, while remaining conservative. As shown in Figure 1, the chosen bay lies between column lines 3 and 6.

Figure 1: Typical Bay Chosen for Structural System Estimate

The structural system is a slab on grade foundation, consisting of reinforced concrete footings, piers, and foundation walls, and a two story structural steel frame with a composite floor system. All takeoff information was assembled from the structural drawings provided by Breslin Ridyard Fadero Architects, and organized in tables to display quantities. A unit cost estimate was produced using RS Means Construction Cost Data, adjusted for location in Lehigh Valley, PA, and a building cost index for January 2012. Other adjustments to quantity takeoffs were based on a 10 percent waste factor for concrete formwork, reinforcing, and metal decking, and 5 percent for concrete. Table 1 below shows the quantity takeoff summary for the structural system between column lines 3 and 6. For a more detailed breakdown of the takeoff, go to Appendix B-1.

Table 1: Structural Takeoff Summary		
Structural Steel		
	Quantity	**Units**
W 8X24	30	lf
W 10X12	225.34	lf
W 10X33	112	lf
W 10X45	280	lf
W 10X68	252	lf
W 12X14	284.64	lf
W 12X19	25.34	lf
W 12X50	62.25	lf
W 14X22	180.5	lf
W 16X26	80	lf
W 18X35	849.125	lf
W 18X40	40	lf
W 18X46	249	lf
10K1	120	lf
14K1	213.5	lf
24K8	186.75	lf
Concrete Slab Systems		
Normal Weight Concrete, 4000 psi	228.98	cu. yd.
Lightweight Concrete, 4000 psi	448.09	cu. yd.
WWF - W2.9xW2.9	7957	sq. ft.
WWF - W4.0xW4.0	1935.00	sq. ft.
20 gauge, 1-1/2" metal floor deck	4946	sq. ft.
22 gauge, 1-1/2" metal roof deck	4946.00	sq. ft.
Foundations		
Normal Weight Concrete, 4000 psi	101.95	cu. yd.
Normal Weight Concrete, 3000 psi	229.28	cu. yd.
#4-#7 Rebar, Footings	4596.04	lbs
#3-#7 Rebar, Walls/Piers	6680.06	lbs
#8-#18 Rebar, Walls/Piers	2950.35	lbs
Formwork, Piers	878.80	sq. ft.
Formwork, Walls	1466.32	sq. ft.
Formwork, Footings	1380.40	sq. ft.

These quantities were extrapolated to produce a detailed cost estimate for the bay. Appendix B-2 contains the Detailed Structural System Estimate. This estimated cost is compared below to the actual costs provided by Alvin H. Butz, Inc.

Table 2: Structural System Estimated vs. Actual Cost Comparison						
	Estimated Cost	Estimated Floor Area	Cost per Square Foot	Actual Cost	Actual Floor Area	Cost per Square Foot
Concrete	$172,011.27	9892	**$17.39**	$1,424,100.00	78000	**$18.26**
Steel	$195,628.49	9892	**$19.78**	$2,039,602.00	78000	**$26.15**
Total	$367,639.76	9892	**$37.17**	$3,463,702.00	78000	**$44.41**

The unit price estimate calculates a cost per square foot $7.24 less than that of the actual cost. This corresponds to a 16.3 percent error in the estimated total. Examining further, about 88% of the error stems from the steel. For a detailed estimate this is usually unacceptable, however after continuing to examine the structural system, the chosen bay only conservatively estimates the cost of the structural system. A focus on column lines D3 to F6 on the roof framing plan shows members comprised mostly of steel roof joists, and transitioning to W18x46 structural steel beams at column line 4, where extra support is needed for the roof to adequately hold the large rooftop mechanical units. Only considering the chosen bay and consulting Appendix B-2, the W18x46 beams cost approximately $16,000 more than the 24K8 joists. This also occurs in the East wing of the building. The estimate also does not include any hollow steel frames used for sunscreen and elevated roof construction or any steel used to construct stairs. With this taken into account, such a low estimate starts to make more sense.

Although the price of the concrete portion of the estimate is lower than the actual cost, it seems to be high when considering the amount of concrete work that does not involve the structural system. Contrasting the conservative estimate for the steel, the foundations supporting the selected bay are considerably deeper on the east side of the building. The cost of concrete per square foot decreases when coupling the deeper foundation on the west with the CMU masonry foundation that comprises most of the east wing of the building. This allows room to account for the exterior site concrete, stair treads, etc.

Although the structural unit price estimate differs greatly from the actual cost, it becomes more accurate when the variations in the system throughout the building are analyzed. The cost breakdown provided by Butz is helpful when trying to understand

how certain areas of the building impact the total cost of construction, but difficulty arises due to the generalization of grouping the work by subcontractor. This causes limitations when trying to determine the portion of the cost each subcontractor contributes to a particular building system. Regardless, knowing the scope of each contractor on a project enables the project team to understand discrepancies between estimated and actual costs.

General Conditions Estimate

**Please see Appendix C for the General Conditions Estimate*

Every project requires money beyond the direct costs to complete construction. There are many indirect costs that are not reflected in the final product, but are inherent to the job. Most of these costs are general conditions and usually include staffing costs, temporary utilities and site preparation, contractor trailers and office equipment, insurance and bonding, and other miscellaneous costs that are not directly related to the actual construction. Table 3 details the breakdown of the major groups of the general conditions estimated for the Gambet Center. Appendix C-1 contains the detailed breakdown of the general conditions on the project, which is based off RS Means Construction Cost Data.

Table 3: General Conditions Cost Comparison

Category	Estimated Cost	Actual Cost
Personnel	$734,850.00	$823,080.00
Temporary Utilities	$97,323.85	$115,077.26
Site Office and Equipment	$9,372.96	$11,082.74
Miscellaneous Costs	$44,927.24	$53,600.00
Insurance, Bonds, and Permits	$313,399.95	$314,311.00
Total	**$1,199,874.00**	**$1,317,151.00**

The project team on the Gambet Center is comprised of a Senior Project Manager, Tom Daniels, who is not billed for the entire duration of the job. Tom is on the project from the start of preconstruction until closeout and is billed for 35 of the 84 weeks required to complete the project. Todd Rothermel, the Project Manager, is on the project the entire time from the beginning of preconstruction to closeout, and Dean Misera is on site for the 70 week construction period as the Superintendent. The MEP Project Manager, Larry McCabe, assists in both preconstruction and construction with 28 total weeks scheduled. A safety manager is assigned to the project for 25 percent of the construction time, or 18 weeks, which is more heavily weighted during times of more dangerous construction activities. About $90,000 separates the estimated and actual cost of staffing for the project, and is due to clerical and administrative work completed in the home office, which is not included in the General Conditions Estimate.

Temporary utilities are made up by the cost of utilities to power, light, and heat the building and site during the construction period. Included in temporary utilities for this general conditions estimate are three portable toilets for the length of construction. Not included in this estimate are costs to have the power company connect necessary

equipment to temporary underground power. Rental costs for site trailers, equipment, supplies, utilities, and storage containers are included in the Site and Office Equipment category. Construction fencing, temporary roads and parking, signage, cleanup, and commissioning make up Miscellaneous Costs. These estimates are reasonable and provide insight into the majority of the general conditions on the project; however limitations in RS Means Cost Data make it difficult to account for more obscure costs like cell phones, trash removal/recycling, etc., that give a clearer picture of the general costs required.

One category estimated very accurately by RS Means is Insurance, Bonding, and Permits. Based on a percentage of total construction cost, which was made available by Butz, the estimated costs for these general conditions was accurate within $312. Below in Figures 2 and 3, graphs depict the differences and percentage breakdown between the actual and estimated prices, respectively.

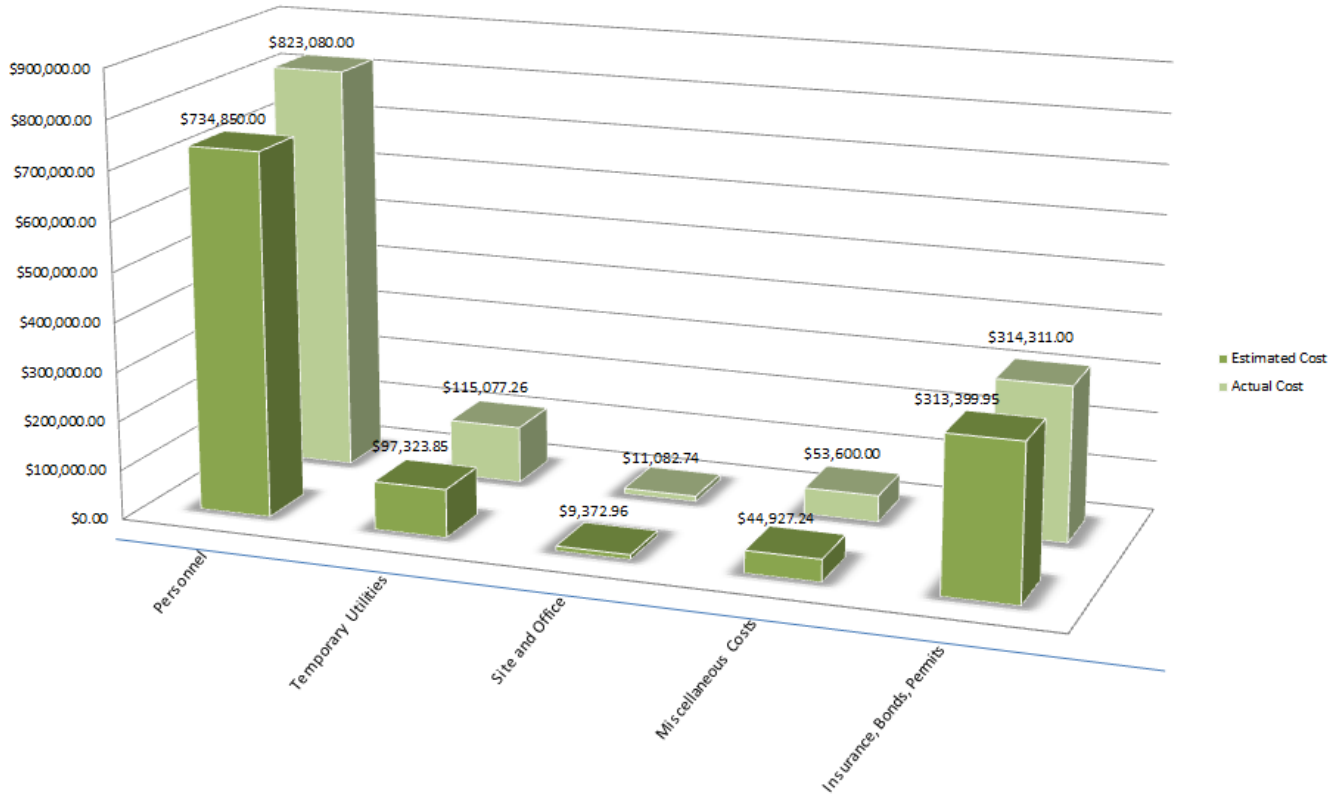
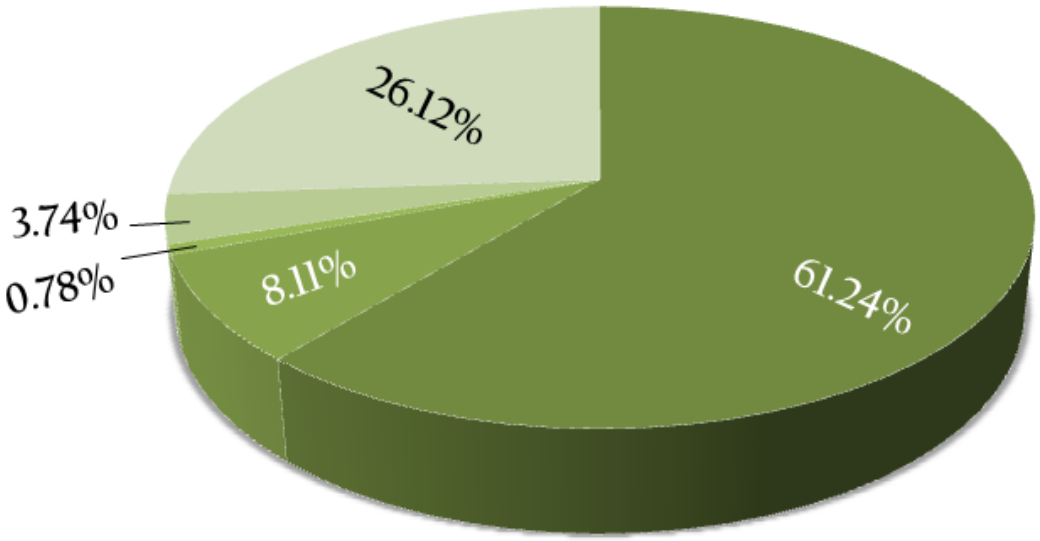
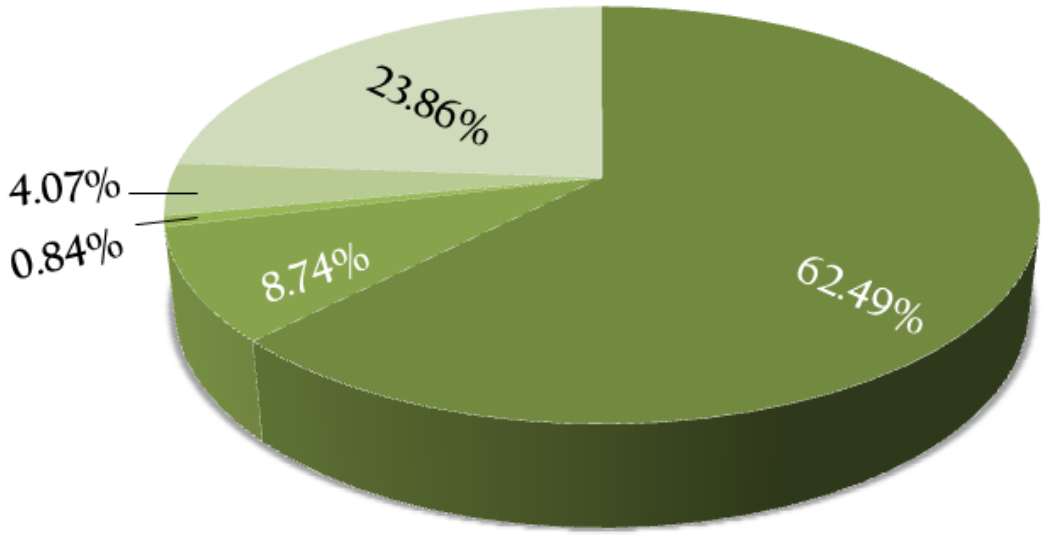


Figure 2: Estimated vs. Actual General Conditions Costs

Figure 3: Estimated vs. Actual General Condition Cost Percentage Comparison



Estimated Cost Breakdown



Actual Cost Breakdown

BIM Use Evaluation

**Please See Appendix D for the BIM Use Analysis Worksheet and Level 1 Process Map*

BIM Goals

Although Building Information Modeling was not a requirement for the Gambet Center, a 3D architectural model was created. The main objective for the model was to help BRF Architects to understand the massing of the building as the early design evolved. It also allowed analysis of the interior feature spaces, such as the Lobby and Labs. As the owner began to release more information to the public about the construction of the Gambet Center, the model also acted as a great marketing tool for both the owner and architect to show the building to the public. The mechanical contractor, H.T. Lyons, created a 3D mechanical and plumbing coordination model to assist with design, estimation, and coordination between trades. H.T. Lyons has been on the leading edge of investing in BIM, and is one of very few mechanical contractors in the Lehigh Valley Area to do so. While not a BIM goal for the project, it may have been beneficial to Butz to use the Gambet Center for an opportunity to expose their company to some facets of Building Information Modeling. Table 4 below prioritizes the BIM Goals and Objectives for the Gambet Center.

Table 4: BIM Goals and Objectives

Priority (High/Med/Low)	Goal Description	Potential BIM Uses
High	Understand building massing during architectural design	Design Authoring, Design Reviews, 3D Coordination
High	Analyze interior and feature spaces	Design Authoring, Design Reviews, 3D Coordination
Med	Coordination between mechanical and plumbing trades	3D Coordination, Mechanical Analysis, LEED Evaluation, Cost Estimation, Construction System Design, Digital Fabrication
Low	3D Record model for DeSales Department of Facilities Management	Record Modeling, Building Maintenance Scheduling
High	Create renderings for marketing	Design Authoring

BIM Use Analysis

**See Appendix D-1 for BIM Use Analysis Worksheet*

Building Information Modeling was limited on the Gambet Center to a 3D architectural and mechanical system model, but there are many ways to utilize BIM to expand the usefulness of these models. The most likely to be used or the most potentially beneficial uses are described below. For the full list of considerations, the BIM Use Analysis Worksheet in Appendix C-1 contains an examination of different ways BIM could be implemented on this project.

Maintenance Scheduling

Adding mechanical and electrical equipment to the 3D model and loading them with information describing maintenance routines enables the owner to shift from reactionary maintenance and move toward preventative maintenance. Cost savings can be obtained by anticipating when equipment will need maintenance work, eliminating emergency calls, and reducing technician time on each call. DeSales University currently has no technological infrastructure linking their facilities electronically through the use of BIM. A large investment would be required to procure the advanced software needed, create 3D models of their buildings, and train their personnel. Despite these advantages proving to reduce costs substantially, this use of BIM was not be implemented on the Gambet Center project at DeSales.

Record Modeling

As with maintenance scheduling, DeSales does not currently demand record set models of their newly constructed buildings, and none were completed for the Gambet Center. This can have some negative effects on the owner in the future. They may not have any use for a 3D record model of their new construction, however as time goes on and BIM becomes more mainstream, DeSales could decide to establish new protocols for facility management using BIM. It would be much less expensive to have the record model completed now rather than to go back to create it in the future.

4D Modeling

One of the most beneficial uses for the contractor to see savings through BIM is to use 4D modeling to simulate phasing and constructability. Adding the dimension of time to the architectural model can also communicate to the owner how their project will come together, which can reduce their stress and give them more confidence in the contractor.

Specifically for the Gambet Center project, 4D modeling could have been implemented to examine site phasing, steel frame erection, and curtain wall construction.

3D Coordination

The use of BIM as a tool outside of 3D modeling for the Gambet Center was limited to the 3D mechanical model produced by H.T. Lyons. This model allowed the subcontractor to analyze the geometry of the systems and coordinate between the two out of the field. An important component of 3D coordination is running clash detection software, which can solve numerous issues that would have only been encountered in the field

BIM Uses

As stated above, Building Information Modeling was not a major aspect of this project, although there were some applications. Table 5 below lists the many ways to utilize BIM during each phase of construction, and highlights those used on the Gambet Center.

Table 5: BIM Uses

PLAN		DESIGN		CONSTRUCT		OPERATE	
	Programming	X	**Design Authoring**		Site Utilization Planning		Building Maintenance Scheduling
	Site Analysis	X	**Design Reviews**		Construction System Design		Building System Analysis
		X	**3D Coordination**	X	**3D Coordination**		Asset Management
			Structural Analysis		Digital Fabrication		Space Management/ Tracking
			Lighting Analysis		3D Control and Planning		Disaster Planning
			Energy Analysis		Record Modeling		Record Modeling
		X	Mechanical Analysis				
			Other Eng. Analysis				
			LEED Evaluation				
			Cade Validation				
	Phase Planning (4D Modeling)		Phase Planning (4D Modeling)		Phase Planning (4D Modeling)		Phase Planning (4D Modeling)
	Cost Estimation	X	**Cost Estimation**		Cost Estimation		Cost Estimation
	Existing Conditions Modeling		Existing Conditions Modeling		Existing Conditions Modeling		Existing Conditions Modeling

Constructability Challenges

Shallow Foundations, Soft Soils, and Structural Fill

The rainy weather mentioned in the Detailed Project Schedule section not only impacted the timeline at the beginning of the job, but also imposed several challenges to the construction of the foundation system. The soft ground conditions described in the Geotechnical Report required compacted structural fill to be placed over the soft soil, however the large amount of rain made the soil even softer. It was not practical to place the fill on top. To counteract both the delays to the schedule and the wet ground, productivity on dry days needed to be at a maximum. As soon as the excavations were complete, it was important to compact the virgin soil and then place and compact the structural fill.

An inadequately supported foundation would move and cause differential settling. This is especially a problem with slabs on grade, leading to cracks, leaks, and other performance issues. Only time will tell if the foundation will settle unevenly, even if the soil and fill were compacted correctly.

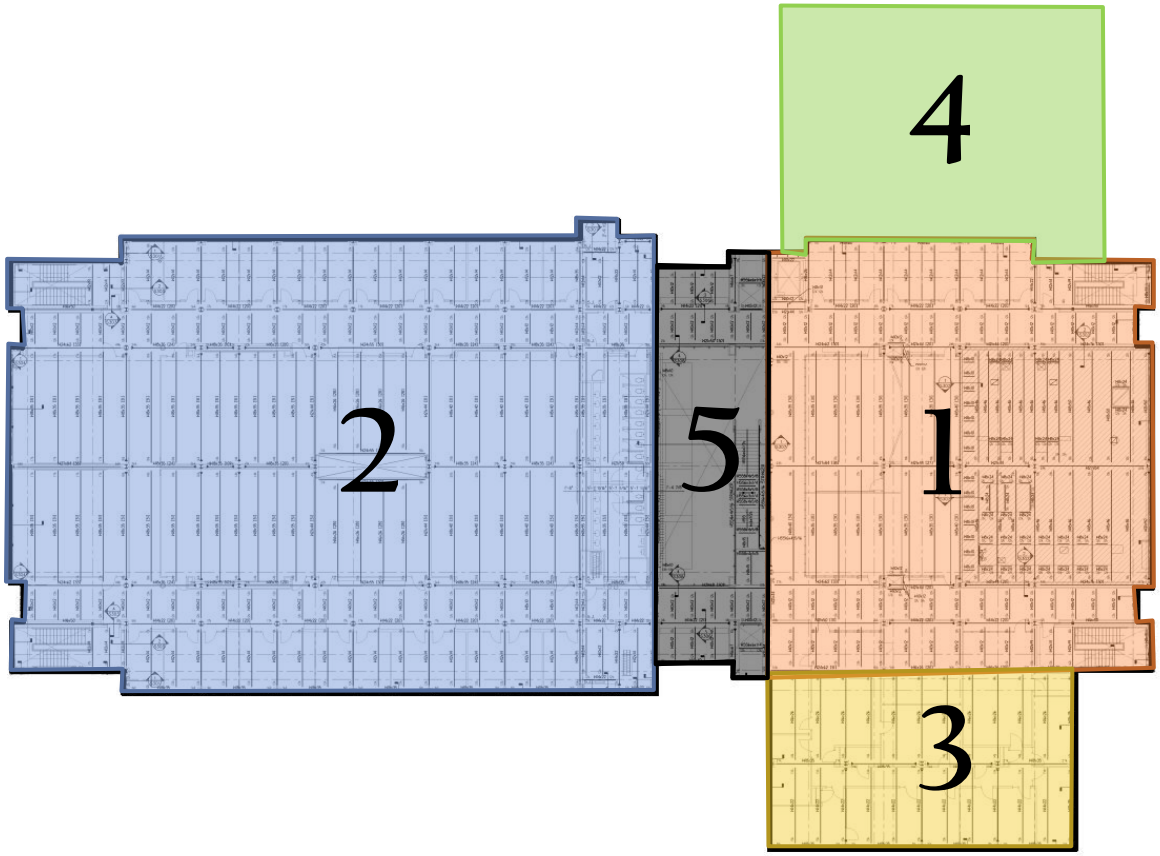
Steel Erection and Cold Weather Cast-In-Place Concrete

Another challenge to the project team was coordinating the construction sequence of the structural steel with placement of the slab on grade. Issues relating to cold weather and its effects on the setting of concrete had to be addressed, especially since the probability of an issue with settlement would increase with weak concrete. Fortunately, the winter of 2012 was very mild and the addition of non-chloride accelerating admixtures to the concrete design with thermal blankets mitigated any issues with curing.

In order to leave a lane for the crane to lift members, the slab had to be cast in different areas. Columns were erected on the east side of the building, and worked toward the west until reaching the interface where the atrium lobby began. The cranes went west and worked east until they got to the opposite wall of the atrium. While the west wing was erected, the slab on grade on the east side was cast.

The crane moved to the south side of the east wing and lifted the steel for the nursing and business offices, followed by the lecture hall on the north side of the east wing. Finally, the crane moved back to the middle of the building and completed the structural steel in the atrium, connecting the two wings. Figure 4 below highlights the phases of the steel and slab on grade construction on a plan of the building.

Figure 4: Steel and Slab on Grade Sequencing; Concrete follows steel, but both follow same sequence



Main Lobby Stair Construction

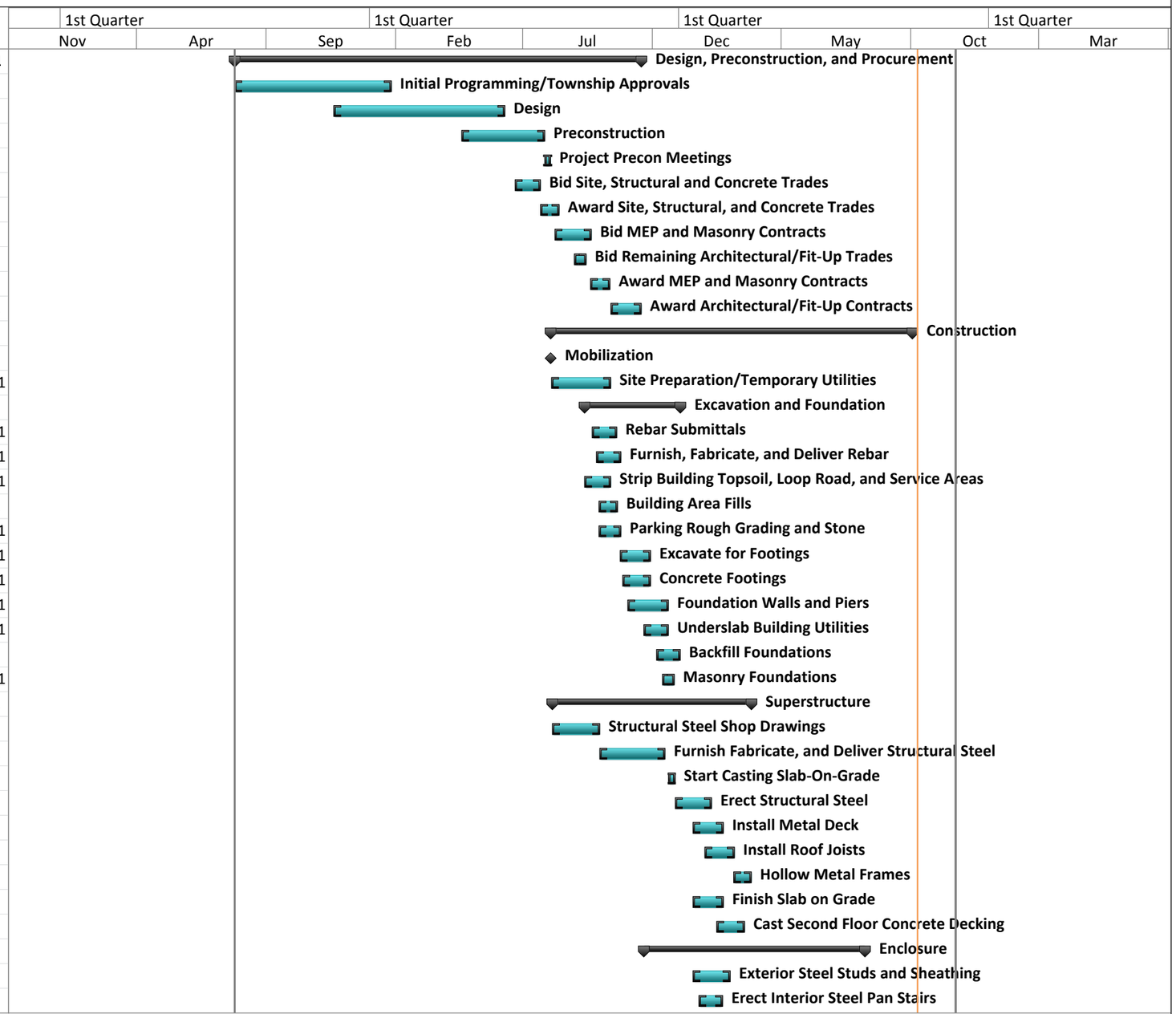
Construction of the main staircase in the atrium lobby was also difficult to put erect. The staircase originally had a straight forward design with a column support at the middle landing. The owner did not like the aesthetics of the column under the staircase, so it was redesigned during the beginning of construction. The solution to the issue was to remove the middle support, which left the remaining supports at the top and bottom of the stair. This would not be enough to withstand the loading. To address the "freestanding" design of the stairs, a column was added off to the side with a cantilever beam attached to the column to support the staircase at midspan. The weights of the steel stringers were also increased to reduce the deflection. In the end, the assembly of the staircase went together very smoothly, and the owner was very pleased.

| Appendix A-1 |

DETAILED PROJECT SCHEDULE

James G. Gambet Center - Detailed Project Schedule

ID	Task Name	Duration	Start	Finish
1	**Design, Preconstruction, and Procurement**	**344 days**	**Mon 7/26/10**	**Thu 11/17/11**
2	Initial Programming/Township Approvals	133 days	Mon 7/26/10	Wed 1/26/11
3	Design	145 days	Sat 11/20/10	Thu 6/9/11
4	Preconstruction	70 days	Wed 4/20/11	Tue 7/26/11
5	Project Precon Meetings	5 days	Wed 7/27/11	Tue 8/2/11
6	Bid Site, Structural and Concrete Trades	22 days	Wed 6/22/11	Thu 7/21/11
7	Award Site, Structural, and Concrete Trades	16 days	Fri 7/22/11	Fri 8/12/11
8	Bid MEP and Masonry Contracts	31 days	Mon 8/8/11	Mon 9/19/11
9	Bid Remaining Architectural/Fit-Up Trades	10 days	Wed 8/31/11	Tue 9/13/11
10	Award MEP and Masonry Contracts	17 days	Mon 9/19/11	Tue 10/11/11
11	Award Architectural/Fit-Up Contracts	26 days	Thu 10/13/11	Thu 11/17/11
12	**Construction**	**305 days**	**Wed 8/3/11**	**Tue 10/2/12**
13	Mobilization	0 days	Wed 8/3/11	Wed 8/3/11
14	Site Preparation/Temporary Utilities	50 days	Thu 8/4/11	Wed 10/12/11
15	**Excavation and Foundation**	**81 days**	**Mon 9/12/11**	**Mon 1/2/12**
16	Rebar Submittals	21 days	Wed 9/21/11	Wed 10/19/11
17	Furnish, Fabricate, and Deliver Rebar	21 days	Mon 9/26/11	Mon 10/24/11
18	Strip Building Topsoil, Loop Road, and Service Areas	23 days	Mon 9/12/11	Wed 10/12/11
19	Building Area Fills	16 days	Thu 9/29/11	Thu 10/20/11
20	Parking Rough Grading and Stone	18 days	Thu 9/29/11	Mon 10/24/11
21	Excavate for Footings	26 days	Mon 10/24/11	Mon 11/28/11
22	Concrete Footings	23 days	Thu 10/27/11	Mon 11/28/11
23	Foundation Walls and Piers	34 days	Wed 11/2/11	Mon 12/19/11
24	Underslab Building Utilities	21 days	Mon 11/21/11	Mon 12/19/11
25	Backfill Foundations	20 days	Tue 12/6/11	Mon 1/2/12
26	Masonry Foundations	10 days	Tue 12/13/11	Mon 12/26/11
27	**Superstructure**	**167 days**	**Fri 8/5/11**	**Mon 3/26/12**
28	Structural Steel Shop Drawings	40 days	Fri 8/5/11	Thu 9/29/11
29	Furnish Fabricate, and Deliver Structural Steel	55 days	Fri 9/30/11	Thu 12/15/11
30	Start Casting Slab-On-Grade	6 days	Tue 12/20/11	Tue 12/27/11
31	Erect Structural Steel	31 days	Wed 12/28/11	Wed 2/8/12
32	Install Metal Deck	26 days	Wed 1/18/12	Wed 2/22/12
33	Install Roof Joists	25 days	Wed 2/1/12	Tue 3/6/12
34	Hollow Metal Frames	15 days	Tue 3/6/12	Mon 3/26/12
35	Finish Slab on Grade	26 days	Wed 1/18/12	Wed 2/22/12
36	Cast Second Floor Concrete Decking	24 days	Wed 2/15/12	Sun 3/18/12
37	**Enclosure**	**187 days**	**Mon 11/21/11**	**Tue 8/7/12**
38	Exterior Steel Studs and Sheathing	32 days	Wed 1/18/12	Thu 3/1/12
39	Erect Interior Steel Pan Stairs	20 days	Wed 1/25/12	Tue 2/21/12

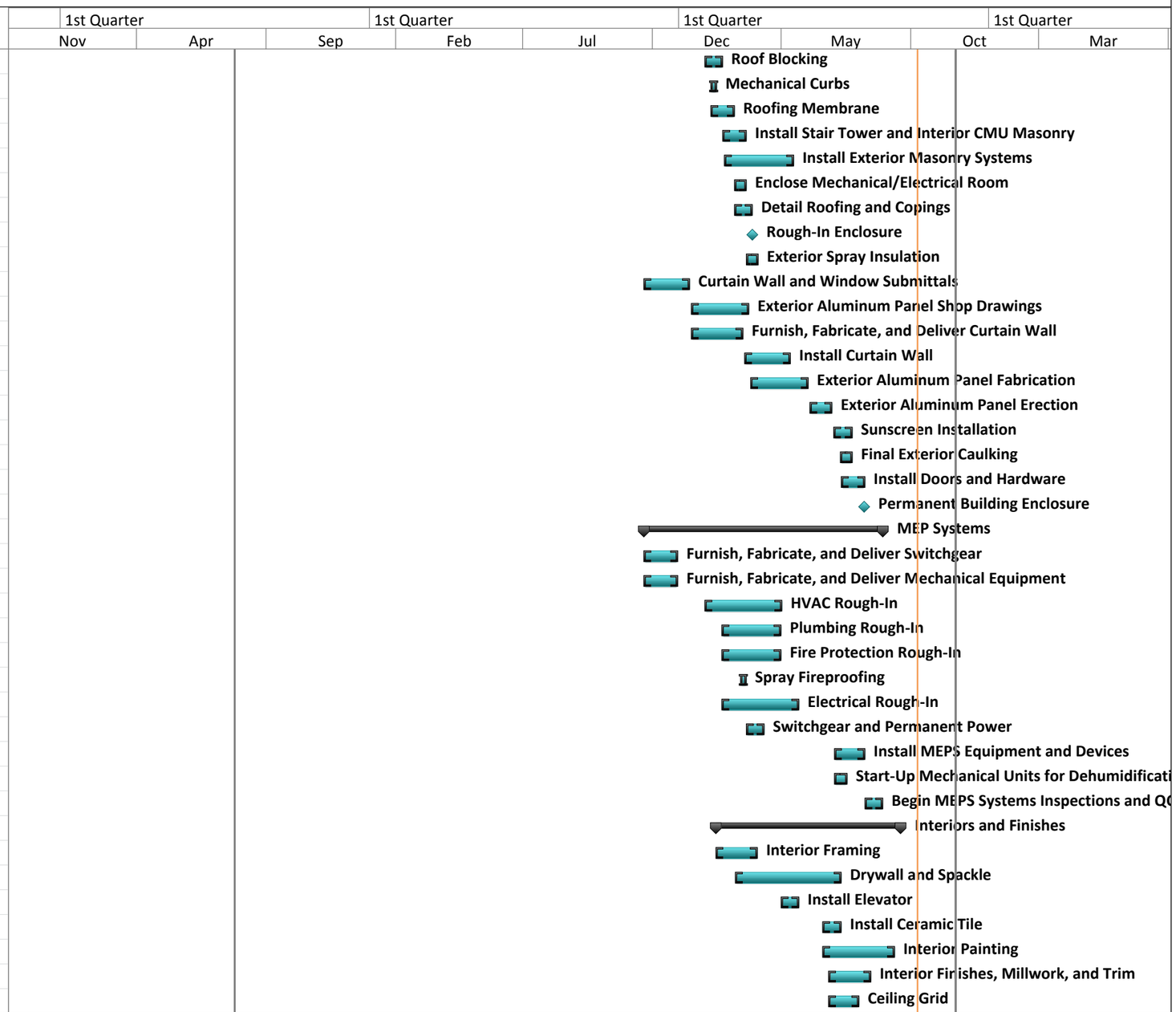


Project: Rev. James G. Gambet Ce
Date: Tue 10/9/12

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline	
Split	External Tasks	Inactive Summary	Manual Summary	Progress	
Milestone	External Milestone	Manual Task	Start-only		
Summary	Inactive Task	Duration-only	Finish-only		

James G. Gambet Center - Detailed Project Schedule

ID	Task Name	Duration	Start	Finish
40	Roof Blocking	15 days	Wed 2/1/12	Tue 2/21/12
41	Mechanical Curbs	5 days	Wed 2/8/12	Tue 2/14/12
42	Roofing Membrane	20 days	Wed 2/8/12	Tue 3/6/12
43	Install Stair Tower and Interior CMU Masonry	20 days	Wed 2/22/12	Tue 3/20/12
44	Install Exterior Masonry Systems	58 days	Fri 2/24/12	Tue 5/15/12
45	Enclose Mechanical/Electrical Room	10 days	Wed 3/7/12	Tue 3/20/12
46	Detail Roofing and Copings	15 days	Wed 3/7/12	Tue 3/27/12
47	Rough-In Enclosure	0 days	Wed 3/28/12	Wed 3/28/12
48	Exterior Spray Insulation	10 days	Wed 3/21/12	Tue 4/3/12
49	Curtain Wall and Window Submittals	40 days	Mon 11/21/11	Fri 1/13/12
50	Exterior Aluminum Panel Shop Drawings	50 days	Mon 1/16/12	Fri 3/23/12
51	Furnish, Fabricate, and Deliver Curtain Wall	45 days	Mon 1/16/12	Fri 3/16/12
52	Install Curtain Wall	40 days	Mon 3/19/12	Fri 5/11/12
53	Exterior Aluminum Panel Fabrication	50 days	Mon 3/26/12	Fri 6/1/12
54	Exterior Aluminum Panel Erection	20 days	Mon 6/4/12	Fri 6/29/12
55	Sunscreen Installation	16 days	Mon 7/2/12	Mon 7/23/12
56	Final Exterior Caulking	10 days	Tue 7/10/12	Mon 7/23/12
57	Install Doors and Hardware	20 days	Wed 7/11/12	Tue 8/7/12
58	Permanent Building Enclosure	0 days	Tue 8/7/12	Tue 8/7/12
59	**MEP Systems**	**202 days**	**Mon 11/21/11**	**Tue 8/28/12**
60	Furnish, Fabricate, and Deliver Switchgear	30 days	Mon 11/21/11	Fri 12/30/11
61	Furnish, Fabricate, and Deliver Mechanical Equipment	30 days	Mon 11/21/11	Fri 12/30/11
62	HVAC Rough-In	65 days	Wed 2/1/12	Tue 5/1/12
63	Plumbing Rough-In	50 days	Tue 2/21/12	Mon 4/30/12
64	Fire Protection Rough-In	50 days	Tue 2/21/12	Mon 4/30/12
65	Spray Fireproofing	5 days	Wed 3/14/12	Tue 3/20/12
66	Electrical Rough-In	65 days	Tue 2/21/12	Mon 5/21/12
67	Switchgear and Permanent Power	15 days	Wed 3/21/12	Tue 4/10/12
68	Install MEPS Equipment and Devices	26 days	Tue 7/3/12	Tue 8/7/12
69	Start-Up Mechanical Units for Dehumidification	11 days	Tue 7/3/12	Tue 7/17/12
70	Begin MEPS Systems Inspections and QC	15 days	Wed 8/8/12	Tue 8/28/12
71	**Interiors and Finishes**	**156 days**	**Tue 2/14/12**	**Tue 9/18/12**
72	Interior Framing	35 days	Tue 2/14/12	Mon 4/2/12
73	Drywall and Spackle	89 days	Thu 3/8/12	Tue 7/10/12
74	Install Elevator	15 days	Tue 5/1/12	Mon 5/21/12
75	Install Ceramic Tile	16 days	Tue 6/19/12	Tue 7/10/12
76	Interior Painting	61 days	Tue 6/19/12	Tue 9/11/12
77	Interior Finishes, Millwork, and Trim	36 days	Tue 6/26/12	Tue 8/14/12
78	Ceiling Grid	26 days	Tue 6/26/12	Tue 7/31/12



Project: Rev. James G. Gambet Ce
Date: Tue 10/9/12

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline	
Split	External Tasks	Inactive Summary	Manual Summary	Progress	
Milestone	External Milestone	Manual Task	Start-only		
Summary	Inactive Task	Duration-only	Finish-only		

James G. Gambet Center - Detailed Project Schedule

ID	Task Name	Duration	Start	Finish
79	Install Lobby Staircase	15 days	Wed 7/11/12	Tue 7/31/12
80	Plumbing Fixtures	10 days	Wed 7/11/12	Tue 7/24/12
81	Drop Acoustical Ceiling Tiles	20 days	Wed 8/1/12	Tue 8/28/12
82	Install Terazzo	20 days	Wed 8/15/12	Tue 9/11/12
83	Install Carpet	20 days	Wed 8/22/12	Tue 9/18/12
84	Punchlist and Commissioning	10 days	Wed 9/19/12	Tue 10/2/12
85	Pre-Purge HVAC System	10 days	Wed 9/19/12	Tue 10/2/12
86	Building Substantial Completion	0 days	Tue 10/2/12	Tue 10/2/12
87	**Site Work**	**257 days**	**Wed 8/3/11**	**Fri 7/27/12**
88	UGI Gas Line Relocation Study and Engineering	79 days	Wed 8/3/11	Mon 11/21/11
89	Begin Erosion and Sedimentation Controls	7 days	Thu 9/1/11	Fri 9/9/11
90	Temporary Storm Ponds and Diversion Work	11 days	Tue 9/6/11	Tue 9/20/11
91	Begin Infiltration Basin and Install Soil Mix	47 days	Mon 9/19/11	Tue 11/22/11
92	First 200' of Loop Road	7 days	Thu 9/29/11	Fri 10/7/11
93	Station Ave. Waterline Relocations	28 days	Mon 10/10/11	Wed 11/16/11
94	Gas Line Pipe Delivery/UGI Delays	8 days	Tue 11/22/11	Thu 12/1/11
95	Station Ave. Gas Relocation	15 days	Fri 12/2/11	Thu 12/22/11
96	Begin Stormwater Conveyance System	40 days	Fri 12/2/11	Thu 1/26/12
97	PennDOT Station Ave. Improvements/Pipe Crossings	30 days	Fri 12/23/11	Thu 2/2/12
98	Sanitary Sewerage System	15 days	Fri 1/27/12	Thu 2/16/12
99	Internal Water Loop	20 days	Fri 1/27/12	Thu 2/23/12
100	Complete Permanent Storm System	20 days	Wed 4/11/12	Tue 5/8/12
101	Remove Temporary Storm Diversion System	15 days	Wed 5/9/12	Tue 5/29/12
102	Parking Lot Curbs, Site Concrete, Etc.	25 days	Wed 5/9/12	Tue 6/12/12
103	Station Ave. Widenings, Milling, Etc.	23 days	Tue 6/12/12	Thu 7/12/12
104	Underground Site Electrical/Lighting Rough-In	15 days	Thu 3/1/12	Wed 3/21/12
105	Curbs for Loop Road	20 days	Thu 3/22/12	Wed 4/18/12
106	Loop Road - Fine, Stone, and Binder Course	10 days	Thu 4/19/12	Wed 5/2/12
107	Exterior Slabs, Site Walks, and Site Concrete	30 days	Wed 5/16/12	Tue 6/26/12
108	Final Site Grading	15 days	Wed 5/30/12	Tue 6/19/12
109	Permanent Seeding/Landscaping	10 days	Wed 5/30/12	Tue 6/12/12
110	Site Lighting/Electrical Fixtures	10 days	Wed 6/20/12	Tue 7/3/12
111	Wearing Course, Line Striping, and Signage	10 days	Fri 7/13/12	Thu 7/26/12
112	Site Substantial Completion	0 days	Fri 7/27/12	Fri 7/27/12
113	Owner Occupancy	18 days	Tue 10/2/12	Thu 10/25/12
114	Post Purge	20 days	Fri 10/26/12	Thu 11/22/12
115	Final Completion	0 days	Thu 11/1/12	Thu 11/1/12

Project: Rev. James G. Gambet Ce
Date: Tue 10/9/12

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline	
Split	External Tasks	Inactive Summary	Manual Summary	Progress	
Milestone	External Milestone	Manual Task	Start-only		
Summary	Inactive Task	Duration-only	Finish-only		

| Appendix B-1 |

DETAILED STRUCTURAL SYSTEM QUANTITY TAKEOFF

Detailed Structural System Quantity Takeoff

Second Floor Framing			
Type/Size	**Length (ft)**	**Quantity**	**Total Length**
W 10X12	10	14	140
W 12X14	17.79	12	213.48
W 12X19	12.67	2	25.34
W 14X22	5.125	2	10.25
W 14X22	20	4	80
W 18X35	10	3	30
W 18X35	20	10	200
W 18X35	31.125	16	498

Roof Framing			
Type/Size	**Length (ft)**	**Quantity**	**Total Length**
W 16X26	20	4	80
W 14X22	5.125	2	10.25
W 14X22	20	4	80
W 18X35	10	3	30
W 18X35	20	3	60
W 18X35	31.125	1	31.125
W 18X40	20	2	40
W 18X46	31.125	8	249
W 10X12	12.67	2	25.34
W 10X12	10	6	60
W 12X14	17.79	4	71.16
W 12X50	31.125	2	62.25
W 8X24	5	6	30
10K1	10	12	120
14K1	17.79	12	213.48
24K8	31.125	6	186.75

Column Framing			
Type/Size	**Length (ft)**	**Quantity**	**Total Length**
W 10X45	28	10	280
W 10X33	28	4	112
W 10X68	28	9	252

Detailed Structural System Quantity Takeoff

Foundation				
	Size	**Type**	**Quantity**	**Unit**
Spread Footings				
Concrete	3000 psi	Normal	79.75	cu. yd.
Rebar	#5		1539.47	lbs
	#6		904.2	lbs
Formwork			226.86	sq. ft.
Column Footings				
Type F2 (x2)				
Concrete	3000 psi	Normal	4.08	cu. yd.
Rebar	#5		65.71	lbs
Formwork			42.00	sq. ft.
Type F3 (x6)				
Concrete	3000 psi	Normal	16	cu. yd.
Rebar	#5		200.26	lbs
Formwork			432	sq. ft.
Type F4 (x4)				
Concrete	3000 psi	Normal	13.50	cu. yd.
Rebar	#5		187.74	lbs
Formwork			108.00	sq. ft.
Type F6 (x2)				
Concrete	3000 psi	Normal	11.25	cu. yd.
Rebar	#5		160.62	lbs
Formwork			73.5	sq. ft.
Type F9 (x4)				
Concrete	3000 psi	Normal	36.36	cu. yd.
Rebar	#6		588.78	lbs
Formwork			187.04	sq. ft.

Detailed Structural System Quantity Takeoff

Foundation - Continued				
	Size	**Type**	**Quantity**	**Unit**
Type F9 (x4)				
Concrete	3000 psi	Normal	36.36	cu. yd.
Rebar	#6		588.78	lbs
Formwork			187.04	sq. ft.
Type F10 (x1)				
Concrete	3000 psi	Normal	11.45	cu. yd.
Rebar	#6		180.24	lbs
Formwork			55	sq. ft.
Type F11 (x4)				
Concrete	3000 psi	Normal	56.89	cu. yd.
Rebar	#6		769.02	lbd
Formwork			256.00	sq. ft.
Pier Type V (x19)				
Concrete	4000 psi	Normal	48.71	cu. yd.
Rebar	#8		2950.35	lbs
	#3		121.82	lbs
Formwork			876.80	sq. ft.
Foundation Walls				
Concrete	4000 psi	Normal	63.11	cu. yd.
Rebar	#4		219.77	lbs
	#5		1727.21	lbs
	#7		4611.26	lbs
Formwork			1466.32	sq. ft.

Detailed Structural System Quantity Takeoff

Metal Deck/Concrete Slabs				
	Size	**Type**	**Quantity**	**Unit**
Slab On Grade				
Concrete	4000 psi	Normal Weight		
	4"		111.56	cu. yd.
	6"		107.56	cu. yd.
WWF				
4" slab on grade	6"x 6"	66-W2.9xW2.9	3011	sq. ft.
6" slab on grade	6"x 6"	44-W4.0xW4.0	1935	sq. ft.
Second Floor Slab				
Metal Deck	1-1/2", 20 ga		4,946	sq. ft.
Concrete	4000 psi	Lightweight		
	5"		228.98	cu. yd.
WWF	6"x 6"	66-W2.9xW2.9	4,946	sq. ft.
Roof Decking				
Metal Roof Deck	1-1/2", 22 ga		4,946	sq. ft.

| Appendix B-2 |

DETAILED STRUCTURAL SYSTEM ESTIMATE

Quantity	Line Number	Description	Crew	Daily Output	Labor Hours	Unit	Mat. O&P	Labor O&P	Equip. O&P	Total O&P	Ext. Mat. O&P	Ext. Labor O&P	Ext. Equip. O&P	Ext. Total O&P	Data Release
Concrete															**$172,011.27**
Formwork															
966.68	031113256600	C.I.P. concrete forms, column, square, plywood, 24" x 24", 3 use, includes erecting, bracing, stripping and cleaning	C1	230	0.14	SFCA	$ 1.09	$ 10.53	$ -	$ 11.62	$ 1,053.68	$ 10,179.14	$ -	$ 11,232.82	Year 2012 Quarter 2
1612.95	031113450100	C.I.P. concrete forms, footing, continuous wall, plywood, 3 use, includes erecting, bracing, stripping and cleaning	C1	470	0.07	SFCA	$ 2.51	$ 5.16	$ -	$ 7.67	$ 4,048.50	$ 8,322.82	$ -	$ 12,371.33	Year 2012 Quarter 2
101.2	031113451500	C.I.P. concrete forms, footing, keyway, tapered wood, 2" x 4", 4 use, includes erecting, bracing, stripping and cleaning	CARP	530	0.02	L.F.	$ 0.18	$ 1.20	$ -	$ 1.38	$ 18.22	$ 121.44	$ -	$ 139.66	Year 2012 Quarter 2
1518.44	031113455100	C.I.P. concrete forms, footing, spread, plywood, 3 use, includes erecting, bracing, stripping and cleaning	C1	401	0.08	SFCA	$ 0.81	$ 6.06	$ -	$ 6.87	$ 1,229.94	$ 9,201.75	$ -	$ 10,431.68	Year 2012 Quarter 2
Reinforcement															
5055.64	032110600502	Reinforcing Steel, in place, footings, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	RODM	4200	0.01	Lb.	$ 0.54	$ 0.67	$ -	$ 1.21	$ 2,730.05	$ 3,387.28	$ -	$ 6,117.32	Year 2012 Quarter 2
3.67	032110600700	Reinforcing Steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	RODM	3	10.67	Ton	$ 997.33	$ 932.70	$ -	$ 1,930.03	$ 3,660.20	$ 3,423.01	$ -	$ 7,083.21	Year 2012 Quarter 2
1.63	032110600750	Reinforcing Steel, in place, walls, #8 to #18, A615, grade 60, incl labor for accessories, excl material for accessories	RODM	4	8	Ton	$ 997.33	$ 698.13	$ -	$ 1,695.46	$ 1,625.65	$ 1,137.95	$ -	$ 2,763.60	Year 2012 Quarter 2
87.53	032205500300	Welded wire fabric, sheets, 6 x 6 - W2.9 x W2.9 (6 x 6) 42 lb. per C.S.F., A185, incl labor for accessories, excl material for accessories	RODM	29	0.55	C.S.F.	$ 25.78	$ 48.59	$ -	$ 74.37	$ 2,256.52	$ 4,253.08	$ -	$ 6,509.61	Year 2012 Quarter 2
21.29	032205500400	Welded wire fabric, sheets, 6 x 6 - W4 x W4 (4 x 4) 58 lb. per C.S.F., A185, incl labor for accessories, excl material for accessories	RODM	27	0.59	C.S.F.	$ 35.51	$ 51.94	$ -	$ 87.45	$ 756.01	$ 1,105.80	$ -	$ 1,861.81	Year 2012 Quarter 2
Concrete															
240.744	033105350150	Structural concrete, ready mix, normal weight, 3000 psi, includes local aggregate, sand, Portland cement and water, delivered, excludes all additives and treatments				C.Y.	$ 94.86	$ -	$ -	$ 94.86	$ 22,836.98	$ -	$ -	$ 22,836.98	Year 2012 Quarter 2
347.4765	033105350300	Structural concrete, ready mix, normal weight, 4000 PSI, includes local aggregate, sand, Portland cement and water, delivered, excludes all additives and treatments				C.Y.	$ 95.71	$ -	$ -	$ 95.71	$ 33,256.98	$ -	$ -	$ 33,256.98	Year 2012 Quarter 2
51.1455	033105700800	Structural concrete, placing, column, square or round, pumped, 24" thick, includes strike off & consolidation, excludes material	C20	92	0.696	C.Y.	$ -	$ 41.40	$ 10.45	$ 51.85	$ -	$ 2,117.42	$ 534.47	$ 2,651.89	Year 2012 Quarter 2
240.45	033105701400	Structural concrete, placing, elevated slab, pumped, less than 6" thick, includes strike off & consolidation, excludes material	C20	140	0.457	C.Y.	$ -	$ 27.43	$ 6.87	$ 34.30	$ -	$ 6,595.54	$ 1,651.89	$ 8,247.44	Year 2012 Quarter 2
83.7375	033105701900	Structural concrete, placing, continuous footing, shallow, direct chute, includes strike off & consolidation, excludes material	C6	120	0.4	C.Y.	$ -	$ 23.29	$ 0.57	$ 23.86	$ -	$ 1,950.25	$ 47.73	$ 1,997.98	Year 2012 Quarter 2
35.259	033105702400	Structural concrete, placing, spread footing, direct chute, under 1 C.Y., includes strike off & consolidation, excludes material	C6	55	0.873	C.Y.	$ -	$ 50.72	$ 1.25	$ 51.97	$ -	$ 1,788.34	$ 44.07	$ 1,832.41	Year 2012 Quarter 2
109.935	033105702600	Structural concrete, placing, spread footing, direct chute, over 5 C.Y., includes strike off & consolidation, excludes material	C6	120	0.4	C.Y.	$ -	$ 23.29	$ 0.57	$ 23.86	$ -	$ 2,560.39	$ 62.66	$ 2,623.05	Year 2012 Quarter 2
230.0655	033105704350	Structural concrete, placing, slab on grade, pumped, up to 6" thick, includes strike off & consolidation, excludes material	C20	130	0.492	C.Y.	$ -	$ 29.50	$ 7.38	$ 36.88	$ -	$ 6,786.93	$ 1,697.88	$ 8,484.82	Year 2012 Quarter 2
240.45	033116100820	Structural concrete, ready mix, lightweight, 110 #/C.F., 4000 PSI, includes lightweight aggregate, sand, portland cement and water, excludes all additives and treatments				C.Y.	$ 131.29	$ -	$ -	$ 131.29	$ 31,568.68	$ -	$ -	$ 31,568.68	Year 2012 Quarter 2
Structural Steel															**$195,628.49**
Beams and Columns															
30	051223750360	Structural steel member, 100-ton project, 1 to 2 story building, W8x24, A992 steel, shop fabricated, incl shop primer, bolted connections	E2	550	0.1	L.F.	$ 33.22	$ 10.28	$ 3.43	$ 46.93	$ 996.60	$ 308.40	$ 102.90	$ 1,407.90	Year 2012 Quarter 2
225.34	051223750600	Structural steel member, 100-ton project, 1 to 2 story building, W10x12, A992 steel, shop fabricated, incl shop primer, bolted connections	E2	600	0.09	L.F.	$ 16.52	$ 9.42	$ 3.14	$ 29.08	$ 3,722.62	$ 2,122.70	$ 707.57	$ 6,552.89	Year 2012 Quarter 2
112	051223750740	Structural steel member, 100-ton project, 1 to 2 story building, W10x33, A992 steel, shop fabricated, incl shop primer, bolted connections	E2	550	0.1	L.F.	$ 45.50	$ 10.28	$ 3.43	$ 59.21	$ 5,096.00	$ 1,151.36	$ 384.16	$ 6,631.52	Year 2012 Quarter 2

Quantity	Line Number	Description	Crew	Daily Output	Labor Hours	Unit	Mat. O&P	Labor O&P	Equip. O&P	Total O&P	Ext. Mat. O&P	Ext. Labor O&P	Ext. Equip. O&P	Ext. Total O&P	Data Release
532	051223750900	Structural steel member, 100-ton project, 1 to 2 story building, W10x49, A992 steel, shop fabricated, incl shop primer, bolted connections	E2	550	0.1	L.F.	$ 67.34	$ 10.28	$ 3.43	$ 81.05	$ 35,824.88	$ 5,468.96	$ 1,824.76	$ 43,118.60	Year 2012 Quarter 2
310	051223751100	Structural steel member, 100-ton project, 1 to 2 story building, W12x16, A992 steel, shop fabricated, incl shop primer, bolted connections	E2	880	0.06	L.F.	$ 21.84	$ 6.43	$ 2.14	$ 30.41	$ 6,770.40	$ 1,993.30	$ 663.40	$ 9,427.10	Year 2012 Quarter 2
56	051223751560	Structural steel member, 100-ton project, 1 to 2 story building, W12x50, A992 steel, shop fabricated, incl shop primer, bolted connections	E2	750	0.07	L.F.	$ 68.71	$ 7.59	$ 2.52	$ 78.82	$ 3,847.76	$ 425.04	$ 141.12	$ 4,413.92	Year 2012 Quarter 2
180.5	051223751900	Structural steel member, 100-ton project, 1 to 2 story building, W14x26, A992 steel, shop fabricated, incl shop primer, bolted connections	E2	990	0.06	L.F.	$ 35.95	$ 5.73	$ 1.90	$ 43.58	$ 6,488.98	$ 1,034.27	$ 342.95	$ 7,866.19	Year 2012 Quarter 2
80	051223752700	Structural steel member, 100-ton project, 1 to 2 story building, W16x26, A992 steel, shop fabricated, incl shop primer, bolted connections	E2	1000	0.06	L.F.	$ 35.95	$ 5.67	$ 1.89	$ 43.51	$ 2,876.00	$ 453.60	$ 151.20	$ 3,480.80	Year 2012 Quarter 2
849.125	051223753300	Structural steel member, 100-ton project, 1 to 2 story building, W18x35, A992 steel, shop fabricated, incl shop primer, bolted connections	E5	960	0.08	L.F.	$ 48.23	$ 8.63	$ 2.12	$ 58.98	$ 40,953.30	$ 7,327.95	$ 1,800.15	$ 50,081.39	Year 2012 Quarter 2
40	051223753500	Structural steel member, 100-ton project, 1 to 2 story building, W18x40, A992 steel, shop fabricated, incl shop primer, bolted connections	E5	960	0.08	L.F.	$ 55.06	$ 8.63	$ 2.12	$ 65.81	$ 2,202.40	$ 345.20	$ 84.80	$ 2,632.40	Year 2012 Quarter 2
249	051223753520	Structural steel member, 100-ton project, 1 to 2 story building, W18x46, A992 steel, shop fabricated, incl shop primer, bolted connections	E5	960	0.08	L.F.	$ 63.25	$ 8.63	$ 2.12	$ 74.00	$ 15,749.25	$ 2,148.87	$ 527.88	$ 18,426.00	Year 2012 Quarter 2
Steel Roof Joists															
120	052119100140	Open web bar joist, K Series, 40-ton job lots, 10K1, 5.0 plf, spans up to 30', shop fabricated, incl shop primer, horizontal bridging	E7	1200	0.07	L.F.	$ 4.81	$ 7.01	$ 1.84	$ 13.66	$ 577.20	$ 841.20	$ 220.80	$ 1,639.20	Year 2012 Quarter 2
213.5	052119100180	Open web bar joist, K Series, 40-ton job lots, 14K3, 6.0 plf, spans up to 30', shop fabricated, incl shop primer, horizontal bridging	E7	1500	0.05	L.F.	$ 5.77	$ 5.60	$ 1.47	$ 12.84	$ 1,231.90	$ 1,195.60	$ 313.85	$ 2,741.34	Year 2012 Quarter 2
186.75	052119100580	Open web bar joist, K Series, 40-ton job lots, 24K6, 9.7 plf, 30' to 50' spans, shop fabricated, incl shop primer, horizontal bridging	E7	2200	0.04	L.F.	$ 9.14	$ 3.82	$ 1.00	$ 13.96	$ 1,706.90	$ 713.39	$ 186.75	$ 2,607.03	Year 2012 Quarter 2
Metal Decking															
5440.6	053113505140	Metal floor decking, steel, non-cellular, composite, galvanized, 1-1/2" D, 20 gauge	E4	3800	0.01	S.F.	$ 2.39	$ 0.93	$ 0.05	$ 3.37	$ 13,003.03	$ 5,059.76	$ 272.03	$ 18,334.82	Year 2012 Quarter 2
5440.6	053123502100	Metal roof decking, steel, open type B wide rib, galvanized, under 50 sq., 1-1/2" D, 22 gauge	E4	4500	0.01	S.F.	$ 2.18	$ 0.78	$ 0.03	$ 2.99	$ 11,860.51	$ 4,243.67	$ 163.22	$ 16,267.39	Year 2012 Quarter 2
Total							**$ 2,898.80**	**$ 2,060.32**	**$ 59.72**	**$ 5,018.84**	**$ 257,949.14**	**$ 97,764.41**	**$ 11,926.24**	**$ 367,639.76**	

| Appendix C-1 |

GENERAL CONDITIONS ESTIMATE

Quantity	LineNumber	Description	Crew	Daily Output	Labor Hours	Unit	Mat. O&P	Labor O&P	Equip. O&P	Total O&P	Ext. Mat. O&P	Ext. Labor O&P	Ext. Equip. O&P	Ext. Total O&P	Data Release	Category Total
Personnel																$ 734,850.00
28	013113200140	Field personnel, MEP Project Manager				Week	$ -	$ 2,275.00	$ -	$ 2,275.00	$ -	$ 63,700.00	$ -	$ 63,700.00	Year 2012	
18	013113200180	Field personnel, Safety Manager				Week	$ -	$ 2,850.00	$ -	$ 2,850.00	$ -	$ 51,300.00	$ -	$ 51,300.00	Year 2012	
84	013113200200	Field personnel, Project Manager				Week	$ -	$ 3,275.00	$ -	$ 3,275.00	$ -	$ 275,100.00	$ -	$ 275,100.00	Year 2012	
35	013113200220	Field personnel, Senior Project Manager				Week	$ -	$ 3,750.00	$ -	$ 3,750.00	$ -	$ 131,250.00	$ -	$ 131,250.00	Year 2012	
70	013113200260	Field personnel, Superintendent, average				Week	$ -	$ 3,050.00	$ -	$ 3,050.00	$ -	$ 213,500.00	$ -	$ 213,500.00	Year 2012	
Temporary Utilities																$ 97,323.85
780	015113800100	Temporary Heat, per week, 12 hours per day, incl. fuel a	1 Skwk	100	0.08	CSF Flr	$ 38.24	$ 6.36	$ -	$ 44.60	$ 29,827.20	$ 4,960.80	$ -	$ 34,788.00	Year 2012	
780	015113800350	Temporary Power, lighting, incl. service lamps, wiring and outlets, min	1 Elec	34	0.235	CSF Flr	$ 2.94	$ 20.60	$ -	$ 23.54	$ 2,293.20	$ 16,068.00	$ -	$ 18,361.20	Year 2012	
780	015113800430	Temporary Power, for temp lighting only, 11.8 KWH/mo				CSF Flr	$ -	$ -	$ -	$ 1.88	$ -	$ -	$ -	$ 1,466.40	Year 2012	
780	015113800600	Temporary Utilities, power for job duration, incl. elevator, etc, min				CSF Flr	$ -	$ -	$ -	$ 53.30	$ -	$ -	$ -	$ 41,574.00	Year 2012	
13	0.152012	3 Portable Chemical Toilets				Ea.	$ -	$ -	$ 87.25	$ 87.25	$ -	$ -	$ 1,134.25	$ 1,134.25	Year 2012	
Site Office and Equipment																$ 9,372.96
1	015213200550	Office Trailer, furnished, rent per month, 50' x 12', excl.				Ea.	$ 382.40	$ -	$ -	$ 382.40	$ 382.40	$ -	$ -	$ 382.40	Year 2012	
13	015213201250	Storage Boxes, rent per month, 20' x 8'				Ea.	$ 75.52	$ -	$ -	$ 75.52	$ 981.76	$ -	$ -	$ 981.76	Year 2012	
15	015213400100	Field Office Expense, office equipment rental, average				Month	$ 210.32	$ -	$ -	$ 210.32	$ 3,154.80	$ -	$ -	$ 3,154.80	Year 2012	
15	015213400120	Field Office Expense, office supplies, average				Month	$ 78.87	$ -	$ -	$ 78.87	$ 1,183.05	$ -	$ -	$ 1,183.05	Year 2012	
15	015213400140	Field Office Expense, telephone bill; avg. bill/month, in				Month	$ 85.08	$ -	$ -	$ 85.08	$ 1,276.20	$ -	$ -	$ 1,276.20	Year 2012	
15	015213400160	Field Office Expense, field office lights & HVAC				Month	$ 159.65	$ -	$ -	$ 159.65	$ 2,394.75	$ -	$ -	$ 2,394.75	Year 2012	
Miscellaneous Costs																$ 44,927.24
1500	015626500250	Temporary Fencing, chain link, rented up to 12 months	2 Clab	300	0.053	L.F.	$ 3.46	$ 3.27	$ -	$ 6.73	$ 5,190.00	$ 4,905.00	$ -	$ 10,095.00	Year 2012	
2000	0.15501	Temporary Road				S Y	$ 0.36	$ 1.19	$ 0.36	$ 1.90	$ 720.00	$ 2,370.00	$ 710.00	$ 3,800.00	Year 2012	
200	015813500020	Project signs, sign, high intensity reflectorized, buy, exc				S.F.	$ 35.85	$ -	$ -	$ 35.85	$ 7,170.00	$ -	$ -	$ 7,170.00	Year 2012	
78	017413200050	Cleaning up, cleanup of floor area, continuous, per day, during construction	A5	24	0.75	M.S.F.	$ 1.85	$ 45.97	$ 2.75	$ 50.57	$ 144.30	$ 3,585.66	$ 214.50	$ 3,944.46	Year 2012	
78	017413200100	Cleaning up, cleanup of floor area, final by GC at end of	A5	11.5	1.565	M.S.F.	$ 2.93	$ 95.34	$ 5.74	$ 104.01	$ 228.54	$ 7,436.52	$ 447.72	$ 8,112.78	Year 2012	
4722000	0.151138001	Commissioning/Inspection				%	$ -	$ -	$ -	$ 0.00	$ -	$ -	$ -	$ 11,805.00	Year 2012	
Insurance and Permitting																$ 313,399.95
20567000	015113800100	Permits rule of thumb, most cities, minimum				% Job	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 102,835.00	Year 2012	
20567000	015113800100	Performance Bond, for buildings, minimum				% Job	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 109,786.65	Year 2012	
20567000	015113800100	All-risk Insurance, minimum				% Job	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 51,417.50	Year 2012	
20567000	015113800100	Builders Risk Insurance, standard, minimum				% Job	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 49,360.80	Year 2012	
Total											$ 54,946.20	$ 774,175.98	$ 2,506.47	$ 1,199,874.00		

| Appendix D-1 |

BIM USE EVALUATION WORKSHEET

BIM Use Analysis Worksheet

BIM Use	Value to Project	Responsible Party	Value to Resp Party	Capability Rating			Additional Resources / Competencies Required to Implement	Notes	Proceed with Use
				Scale 1-3					
				Resources	Competency	Experience			
Maintenance Scheduling	Low	DeSales University, Owner	Low	1	1	1	Requires training and software		NO
							No existing infrastructure		
Building Systems Analysis	Med	H.T. Lyons, Mechanical	High	3	3	2	Requires training and software		YES
		Amthor Steel, Structural	Low	2	1	1			
		Diefenderfer, Electrical	Low	1	1	1			
Record Modeling	Low	BRF Architects	Low	2	2	2		As the campus grows, owner may	NO
		DeSales, Owner	Med	1	1	1		want to utilize record models for	
								facility management in the future	
Cost Estimation	Med	H.T. Lyons, Mechanical	High	3	3	2			YES
3D Coordination	High	Butz, Construction Manager	High	1	2	1	Requires training and software	No specific BIM requirements on	YES
		H.T. Lyons, Mechanical	High	3	3	2		project	
Engineering Analysis	High	BRF Architects	Med	2	2	2	May require additional training		YES
		H.T. Lyons, Mechanical	High	3	3	2			
Design Reviews	High	BRF Architects	High	2	2	2			YES
3D Coordination (Design)	Med	BRF Architects	High	2	2	2			YES
Design Authoring	Med	BRF Architects	High	2	2	2			YES

| Appendix D-2 |

BUILDING INFORMATION MODELING

LEVEL 1 PROCESS MAP

Rev. James G. Gambet Center
DeSales University
Center Valley, PA

Level One BIM Process Map

Developed with the BIM Project Execution Planning Procedure by the Penn State CIC Research Team.
http://www.engr/psu.edu/ae/cic/bimex