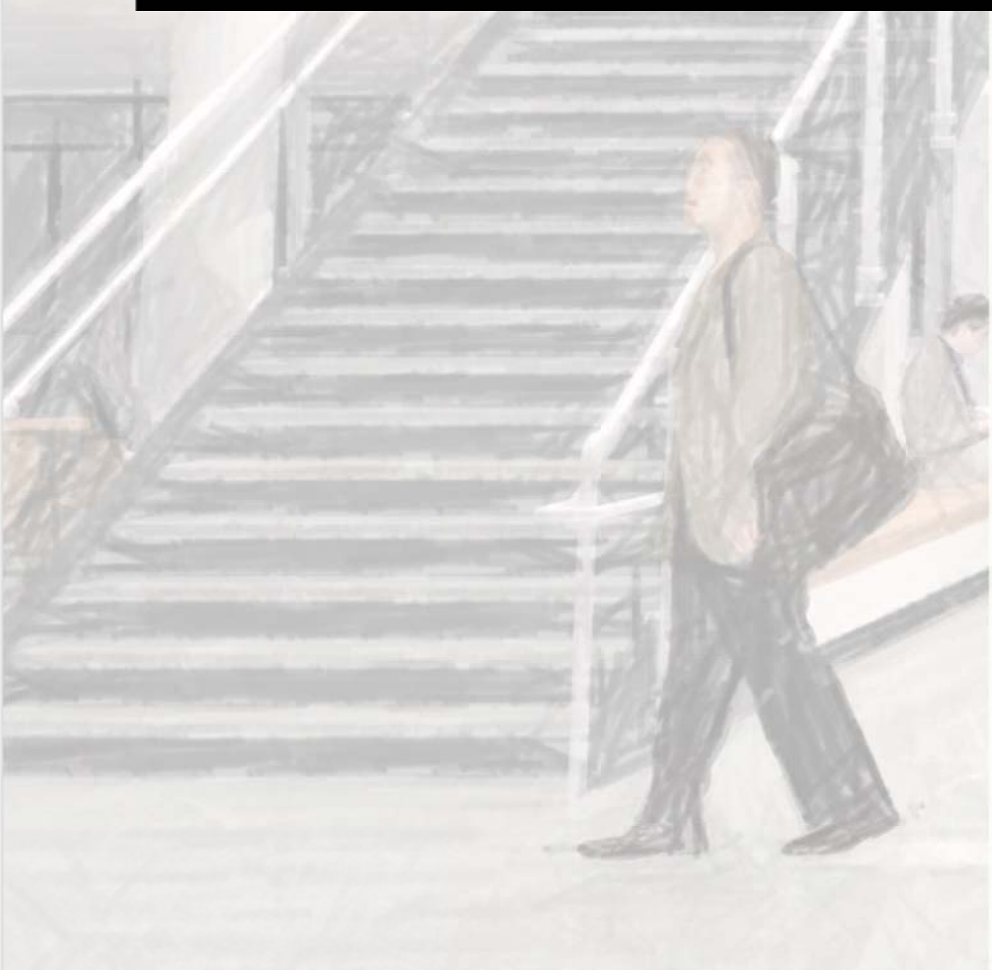
DeSales University

Technical Report 1

Rev. James G. Gambet
Center for Business and Healthcare



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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 being constructed as 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 open in May 2013. The following technical assignment offers a broad look into the project requirements needed to complete the construction of the building.

Within the last five years, DeSales University has made a major push into educating students and facilitating sustainable practices. Through combining the business and healthcare departments in one building they are exposing the nurses and physician assistants to the business side of their industry, while providing them all with a new building that promotes sustainability and healthy lifestyles. It is for this they hope to achieve a LEED® Silver certification for the Gambet Center.

Analysis of the various building systems and project schedule provide the necessary insights into the background of the project to help understand how the work will be performed. The affiliation between DeSales University and Alvin H. Butz, Inc. goes back to the founding of the college in 1964, and has remained solid since. This high level of trust between the two parties led to their collaboration on the Gambet Center and has a profound effect on the project delivery. By having the construction manager brought into the project early, the owner sees an added benefit of smart design, value engineering, and cost savings. Also, a guaranteed maximum price contract style creates a less adversarial relationship between the two.

Discussion of the project costs enables a more in-depth view of the project requirements and allows construction managers to see where risks in the project lie, and then take measures to mitigate them. By comparing the cost breakdown of the actual project to that of a more conceptual estimate, the unique qualities of a project stand out more clearly. This report also shows that it's better to use more than one assessment. When comparing the assemblies estimate to that of the actual cost, it was if the sophisticated MEP systems in the building were driving the cost of the square foot estimate down, but after a closer examination it is discovered that the existing condition of the soil was not properly accounted for in the square foot estimate.

At the conclusion of the first technical report, understanding the owner and their requirements, the existing conditions and site, and how the building systems affect the project schedule and flow are all keys to successfully managing building construction.

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Project Schedule Summary

Overview

The project schedule for the Gambet Center is one of the main forces influencing the construction of the facility. DeSales University wants the building to be completed by the end of the Spring 2013 semester, and so the construction sequence of the Gambet Center provides a loose schedule to account for any delays or unforeseen conditions, in addition to allowing for ample time for the Business, Nursing, and Physician Assistant Departments to move in. The Project Summary Schedule for the Gambet Center, which is scheduled to be completed in November 2012, can be found in Appendix A-1.

Sitework

There is a total of 28 days from the Notice to Proceed (NTP) to the time the work on erosion and sedimentation (E&S) controls on site begin. During this mobilization period, temporary fencing and utilities, jobsite trailers, and parking areas will be installed on site. Then the topsoil will be stripped and stockpiled for future use. The installation of a new road, tentatively named Loop Road, will also be constructed. During this phase, the first 200 feet of Loop Road will be completed, and will eventually connect to opposite ends of Station Avenue to provide easy access to residence halls, the Connelly Chapel, and the Gambet Center.

Excavations and Foundations

Immediately following mobilization and preparation of the site, excavation for the concrete footings will be performed. Simultaneously, the concrete footings will be formed and poured as the excavation continues. As these begin to set, the foundation walls will start to be built, underslab utilities and work on the superstructure will begin.

Superstructure

After structural steel is furnished, fabricated, and delivered to site, the erection of the two-story moment frame will start to be placed. During this time, the steel deck will also be installed, along with the pouring of concrete slab-on-grade and floor slabs. This is followed by construction of roof blocking and EPDM membrane.

Enclosure

Exterior steel studs and sheathing are installed and the masonry façade is erected. Prefabrication of Alucobond ® exterior aluminum wall panels are delivered to the site and placed. During this time, the aluminum curtain wall and glazing are also connected to the structural steel frame. Once completed, the building will be permanently enclosed and work on interior finishes can begin.

Interior

Before the building reaches enclosure, interior framing, stairs, and MEP and fire protection systems are roughed-in. Once enclosed, construction on drywall, ceiling grids, ceramic tile, and terrazzo floors, and carpet are completed. Drop ceilings and MEP fixtures, such as lavatories, sinks, faucets, switchgear, and HVAC grilles and registers are put into place.

Substantial Completion and Occupancy

The Gambet Center will reach substantial completion after final exterior grading, sidewalks, parking lots, and landscaping are finished. Commissioning of the various systems inside the building must also take place. Once this milestone is reached, various technological systems will be installed and furniture will be placed. DeSales is now ready for occupancy, while LEED ® ATC Commissioning takes place, and the building reaches final completion.

Building Systems Summary

Summaries of the various systems that make up the Gambet Center are detailed following the Building Systems Checklist, Table 1, below.

BUILDING SYSTEM CHECKLIST		
WORK SCOPE	YES	NO
Demolition		●
Structural Steel Frame	●	
Cast in Place Concrete	●	
Precast Concrete		●
Mechanical System	●	
Electrical System	●	
Masonry	●	
Curtain Wall	●	
Support of Excavation		●

Table 1 : Building Systems Checklist

Structural Steel Frame

The structural steel frame consists mostly of two-story columns extending from the top of the footing or pier up to the roof. Wide flanged steel beams, spaced at 6' 8", support the second floor with a 1-½", 20-gauge metal deck that is topped with 3-½" of reinforced (W2.9xW2.9 WWF) lightweight concrete. Roof framing is comprised of a combination of wide flanged steel beams with open web steel joists ranging from a depth of 10" to 24", usually spaced at 5'. Roof decking consists of 22 gauge, 1-½" steel deck and a single-ply EPDM covering over rigid insulation tapered at ¼" per foot toward the roof drains. On site, a single crawler crane sized at 110 tons was used to erect the steel frame.

Cast-in-Place Concrete

In addition to all strip, step, and column footers, the Gambet Center required reinforced cast-in-place concrete for foundation walls, column piers, slab-on-grade, and floor slabs. The altitude of the slab-on-grade is 473' above sea level. This is roughly the natural height of the east side of the building, which slopes down to the west to roughly 460'. However, the top elevations of the different footings vary east to west from 471.67' to 462', respectively. Therefore, most of the excavation took place on the east side of the building, but there was approximately 3' of soft surface soils that also required excavation on the west side. A compacted layer of structural fill was added before the plywood formwork could be constructed, reinforced, and pumped into place. Plywood formwork was also used for the cast-in-place foundation walls and column piers. The concrete was also pumped into these forms in shallow lifts not greater than 24", and mechanically vibrated to consolidate; ensuring concrete is evenly distributed into corners and worked around reinforcement. The interior of the new foundation is then evenly backfilled to an elevation of approximately 472.33' and topped with at least 4" of drainage fill (gravel or crushed stone). Once erection of the steel columns began, the 4" slab-on-grade, covering a vapor barrier and welded wire fabric reinforcing was placed within the construction joints. Figure 1 below shows the excavated foundation and constructed cast-in-place and CMU foundation walls. The second floor metal decking provided the form for the floor slab, and the concrete was placed in a similar manner to that of the slab-on-grade.

Courtesy of DeSales University

Figure 1: Footing Excavation and Constructed Foundation Walls

Mechanical System

The Gambet Center for Business and Healthcare is a state of the art facility that has a variety of uses, and therefore, requirements for thermal comfort and indoor air quality. To fulfill these needs, the HVAC system is comprised of a combination of air and water based systems. Located in the first floor mechanical room, two hot water boilers fired by natural gas and powered by two variable speed pumps supply heated water to all heating equipment in the building.

Packaged gas fired VAV systems, located on the roof, will provide heated air to the faculty offices, physician assistant (PA), business and nursing administration suites, the standardized patient exam suite, and basic nursing/PA labs, in addition to the lounge area, lobby, and corridors. Rooftop central air handlers supplying air to VAV energy recovery units will deliver either heated or cooled air to areas requiring large amounts of outdoor air (classrooms, seminar rooms, lecture halls, and conference rooms). A gas fired constant volume heat recovery unit, also placed on the roof, will heat the anatomy lab. For the remaining areas, such as toilets, stair towers, and vestibules, comfortable hydronic heaters will be implemented.

For air conditioning, the aforementioned rooftop and heat recovery units will be equipped with cooling coils that supply chilled air to all areas except mechanical spaces, restrooms, and custodial closets in the same way as described above. For areas along the perimeter of the building, fan powered VAV boxes with a reheat coil will be utilized. The interior spaces will also use VAV boxes with reheating coils, but these will not be fan powered. Exhaust systems are not required, except for the toilets and mechanical room, since the implemented system conditions with a percentage of outdoor air. Automatic temperature controls will be connected to the existing Campus Building Automation System, and give direct electric damper and valve control.

To help attain LEED® accreditation, the boilers will be 94 percent high efficiency units, and all VAV boxes will contain electronically controlled motors, helping to save energy. All hot water piping will be wrapped with fiberglass insulation, and the cooling coils in the rooftop units will contain R410A refrigerant, also helping to achieve LEED® credits. To gain credits for thermal comfort, all offices except corner offices will share a single fan powered VAV box.

Electrical System

The Gambet Center will receive its electrical power from the existing campus distribution system from the S&C PMH (pad mounted gear) switch, positioned to the south of the University Center. Existing empty underground conduits run from the PMH and extend to the south under Station Ave. A new 12,470-volt service will connect to these existing conduits and feed a 480/277-volt exterior transformer located near the service area on the east side of the building, and enter into the switchboard in the mechanical room.

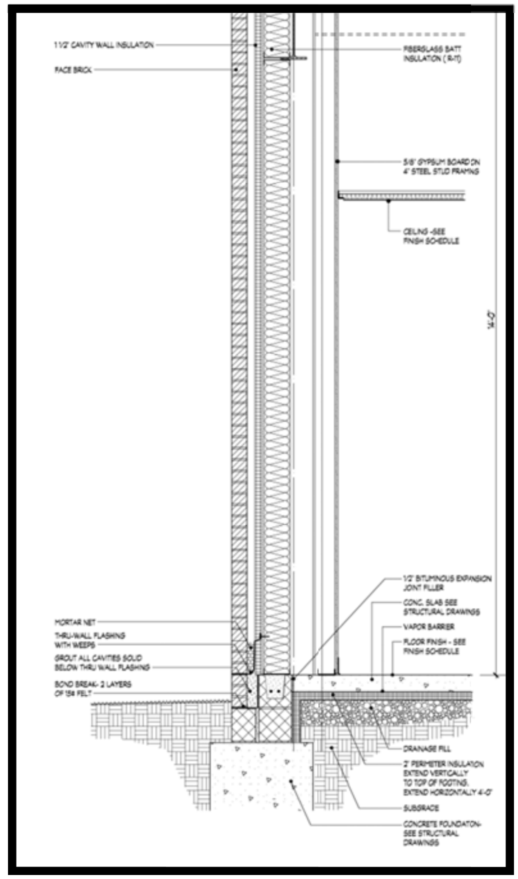
In the 2000 amp switchboard, incoming power is metered and fused, and then distributed to equipment requiring 480/277 volts of power. This includes all mechanical equipment (480V or 277V) and the lighting system (277V). A 208/120-volt transformer is also included in the switchgear to source the receptacles (120V) and any equipment requiring 208V.

Two natural gas fired emergency generators (100 kW and 70 kW) will be provided, and also housed in the mechanical room on the first floor. The 100 kW generator is connected to two automatic transfer switches, one that will power the anatomy lab's heat recovery unit, and the other for lighting, controls, and the fire alarm system. The third ATS, connected to the 70 kW generator, will provide emergency power for two air-cooled chillers and the two air handling units in the computer room. The uninterruptible power supply (UPS) in the will also receive emergency power in order to keep the computer systems from shutting down.

Masonry

Depicted in Figure 2 on the right, the wall section shows the building enclosure of red face brick, with a 1-½" air cavity, 1-½" cavity wall insulation, and ½" sheathing on a 6" structural steel frame. Variances to this basic structure occur in the stair towers and mechanical room, where the brick veneer will be backed by CMUs, with 2" cavity wall insulation. Masonry ties are used to connect the brick veneer to the exterior sheathing. Limestone will be used for all sills, trim, and banding to compliment the brick. 8" CMUs are also used in the construction of a portion of the foundation walls, which can be seen in Figure 1.

Figure 2: Brick Veneer Facade Construction



Curtain Wall

All exterior glazing consists of extruded aluminum curtain wall, either 6" or 7-½" deep as required. 1" thick insulating glass is used, with no operable windows. The aluminum doors are constructed similarly with extruded aluminum and 1" insulating glass. Horizontal sunshades are to be supported by a galvanized structural steel frame. The aluminum frame of the curtain wall will be supported by steel connectors, supplied by the manufacturer, and attached the structural steel frame. Movable lifts will be used where required to assist in the attachment of second story curtain walls.

Support of Excavation:

Due to the shallow foundation of the Gambet Center, a one to one slope of the excavated walls was sufficient to ensure both the integrity of the excavation and, in this regard, safety on site. Groundwater was only discovered by the geotechnical evaluation at an altitude of approximately 450'. As this is sufficiently below any excavation on the site, dewatering will not be necessary. In addition to typical erosion and sedimentation controls, however, the site work package for the job includes an extensive storm water and drainage system to be completed in three phases over the course of construction.

Project Cost Evaluation

A detailed estimate provided by Alvin H. Butz, Inc. provides a breakdown of the total lump sum costs for each subcontractor on the project. From this the total cost of construction and total project costs can be calculated per square foot of building area, which is represented in Table 2.

GENERAL PROJECT COST INFORMATION		
Total Square Footage:	**76,751 Sq. Ft.**	
	Total Cost	Cost/Sq. Ft.
Total Construction Cost	$16,337,017.00	$212.86
Total Project Cost	$20,266,619.00	$264.06
Guaranteed Maximum Price	$27,000,000.00	$351.79

Table 2 : General Project Cost Information

Total construction cost is defined as the cost of work directly relating to the construction of the building. Total project cost includes the total construction cost of the building including sitework and contingency, but does not include the CM's overhead and profit. The guaranteed maximum price is the price contractually agreed upon between the owner and construction manager. Table 3 outlines the cost breakdown of the major building systems for the Gambet Center.

BUILDING SYSTEM COST BREAKDOWN			
BUILDING SYSTEM	ACTUAL COST	COST/SQ. FT.	PERCENT OF BUILDING COST
Concrete	$1,424,100.00	$18.55	7.02%
Masonry	$877,000.00	$11.65	4.41%
Structural Steel	$2,039,602.00	$26.57	10.06%
Curtain Wall	$835,000.00	$10.88	4.12%
Fire Protection	$201,284.00	$2.62	0.99%
Plumbing	$704,600.00	$9.18	3.48%
HVAC	$2,633,000.00	$34.31	12.99%
Electrical	$2,089,000.00	$27.22	10.31%

Table 3 : Building System Cost Breakdown

Table 3 provides a lot of insight into the nature of this project. As usual, the mechanical, electrical, and structural systems are the most expensive in the building. This is especially true for the Gambet Center with respect to the mechanical and electrical systems. The large size of the rooftop air handling units with heat recovery, the many variable air volume terminal units, and the large amount of power required to run the server room all contribute to the high cost of these systems.

Estimate Cost Comparison

Square Foot Estimate | Please see Appendix B-1 for the detailed R.S. Means Square Foot Estimate Breakdown

In order to complete a conceptual square foot estimate with R.S. Means Cost Data books, a building type similar to the Gambet Center must be chosen. There were a variety of different building types that could apply, such as a college classroom or a college laboratory. Since the Gambet Center is a mix of these two types of buildings, it was a matter of comparing the two and deciding which more closely resembled the true construction of the Gambet Center. I decided to use the college classroom due to its inclusion of two stories, an elevator, matching incoming electrical service, one 100 kW emergency generator, and a dry standpipe and sprinkler system. Amended in the estimate were two factors: the building perimeter and the floor height. Following in Table 4 are the results of the R.S. Means conceptual square foot estimate.

Square Foot Cost Estimate Report	
Rev. James G. Gambet Center	
Building Type:	College, Classroom, 2-3 Story with Face Brick with Concrete Block Back-up / Steel Frame
Location:	LEHIGH VALLEY, PA
Story Count:	2
Story Height (L.F.):	14
Floor Area (S.F.):	76,751
Labor Type:	Union
Basement Included:	No
Data Release:	Year 2012
Cost Per Square Foot:	**$157.55**
Building Cost:	**$12,092,000**

Table 4 : R.S. Means Square Foot Estimate

It's interesting to note that the square foot estimate comes in over $4 million dollars under the actual construction cost of the Gambet Center. When looking at the cost breakdown of the square foot estimate in Appendix B-1, it's clear that R.S. Means vastly underestimates the cost of the substructure on the project. According to R.S. Means the entire substructure of the building amounts to only 3.3% of the total building, or approximately 400,000. Concrete alone, a large portion of which went into the foundation walls and slab-on-grade accounts for about 7% of the project on its own, which does not include excavation. Also, from the cost breakdown received from Butz, there was a roughly $300,000 expense for structural backfill to remedy the unsuitable soil conditions. Other than that, the square foot estimate was astonishingly accurate within 1% for the MEP systems (not including the elevator).

Assemblies Estimate | Please see Appendix B-2 for the detailed R.S. Means Assembly Estimate Breakdown

Table 5, below, summarizes the estimated assembly cost of the MEP and fire protection systems for the Gambet Center. I tried to match all major equipment and systems to the correct component and sizes included in the R.S. Means Assemblies Cost Data. However, it was difficult at times to find equipment that matched up exactly. For example, there was no cost data for a rooftop variable volume air handler with cooling coil and energy recovery, so I was forced to use equipment that did not include the heat recovery wheels, which shaved a large amount from the final budget. I also could not find any data on duct mounted fans, although this most likely does not contribute to a large amount of the mechanical system cost. Again, for a detailed breakdown of the R.S. Means Assemblies Estimate Breakdown, see Appendix B-2.

MEP & FIRE PROTECTION ASSEMBLY COST	
SYSTEM	TOTAL COST
Mechanical	$1,109,866.66
Electrical	$1,147,587.41
Plumbing	$439,150.61
Fire Protection	$2,13,848.34

Table 5 : R.S. Means Assemblies Cost Estimate

Existing Conditions

Please see Existing Conditions Site Layout Plan in Appendix C-1.

The Gambet Center for Business and Healthcare is located on the main campus of DeSales University in Center Valley, PA. The extensive development of the campus in the past places many utilities underground. The relatively flat site does dip down from the nearby roads and provides a path for runoff water to drain away from the current buildings. Determined in the geotechnical report, the area has some soft soil conditions, especially near the surface, so diverting rainwater away from the building will be necessary. For the Gambet Center, pedestrian traffic does not pose a big threat to safety because the site fence is large and there aren't any instances of someone walking on a sidewalk being in close proximity to the construction site. It is important to keep the site secure and to put up clear signage directing the general public in the right direction.

One way site access is possible with all incoming vehicles coming into the site from the west from Station Avenue, and exiting to the south onto Landis Mill Road. Contractor parking is available on the east of the site near the contractor trailers, and they are able to turn around and exit onto Landis Mill Road as well. Parking for the work crew is available to the south, across the street from the job site. Also on the south side of the site there is a foundation from an old barn that remains underground. The only plan for this area is to place a parking lot over it, so this will most likely not become an issue, but it is still important to keep in mind.

The Gambet Center will tie in to electricity and telecommunications through the lines located in to north to the University Center (shown as an existing building but not labeled). Empty conduits are already buried beneath Station Ave. and will continue down underground to the east side of the building and enter into the first floor mechanical room.

Site Layout Planning

Excavation/Foundation Phase

Please see Excavation/Foundation Site Layout Plan in Appendix C-2.

The initial mobilization of the site will involve preparing the site for the work that will be completed, excavating, and constructing the foundation of the Gambet Center. Temporary utilities will be brought into and installed near the contractor trailers on site. A delivery and staging area will be set up in the location the west parking lot will occupy at the completion of the project. Near this is where the dumpsters will be located for easy pick up by Waste Management. On the north end of the site, an equipment storage lot will be constructed for the duration of the job, along with material sheds and portable restrooms for the workforce.

During the excavation phase of the project, an excavator will be used to strip the topsoil and stockpile it on site. Other equipment used during this phase will be vibratory rollers to compact the soil and structural fill beneath the building footprint, a backhoe for digging column footings and other trenches for utilities. Dump trucks will also be entering and leaving the site, bringing structural soil and removing the unneeded excavated soil. Finally, a concrete truck will be needed to pour the footings and cast-in-place foundations.

Superstructure Phase

Please see Superstructure Site Layout Plan in Appendix C-3.

During this stage of the construction process, the biggest addition to site equipment will be the 110 ton crawler crane to erect the structural steel. Concrete trucks will still be needed in this phase since the slab-on-grade and floor slabs cannot be poured until the structure starts to go up. Once the steel is in place, a mortar mixer and scaffolding need to be set up to apply the face brick veneer to the exterior façade. Then, the curtain walls and aluminum panels can start to be connected to the steel frame with the help of hoists, and telehandlers.

Finishes Phase

Please see Finishes Site Layout Plan in Appendix C-4

The finishes phase of construction marks the time when most of the work is happening on the inside of the building. For this reason, the vibratory roller and backhoe are back to start to grade and compact the soil before the topsoil is laid back down over and landscaping finishes. A loading dock is added near the exterior of the building to assist with any large deliveries/hauls for the Gambet Center.

Local Conditions

The Lehigh Valley is a very diverse area in regard to the population density and preferred methods of construction. Allentown, Bethlehem, and Easton are the largest sectors in the Lehigh Valley, and each offers their own unique building styles. As the third largest city in Pennsylvania, many high-rise structures have been built in Allentown in the past. These buildings were usually supported with steel frames, due to the nearby Bethlehem Steel. Since the steel factory's failure, however, many of the office buildings remain vacant. In an effort to revitalize downtown Allentown and create opportunities for growth, local contractors including Alvin H. Butz are using tax credits to entice white collar, service related companies to the area.

Bethlehem also has its own unique style. It is a much more historical town, and there are many regulations for construction. Again, with the collapse of Bethlehem Steel, the Lehigh Valley has needed to find new ways to grow the economy, and the region has exploded with retail activity. Recently, the Las Vegas Sands Corp. initiated the largest reinvestment at an abandoned site and opened The Sands Casino Resort Bethlehem, while many of the old steel warehouses have been retrofitted into residential apartments.

Just minutes outside of the urban setting of the Lehigh Valley, rolling hills and farmlands dominate. Here, healthcare and universities have become another major market sector contributing to construction in the territory. In the case of DeSales University, the campus has grown to a total of 23 major buildings, including the brand new Gambet Center, with plans for at least two more in the near future. Located in Center Valley, PA, the specific site conditions of the Gambet Center must be analyzed before construction.

Geotechnical Report

There are many varying subsurface conditions that were discovered during the geotechnical survey on site. A total of 27 borings were drilled, 19 of which were located in the building footprint. The investigation concluded that the top layers of soil were comprised of roughly 12" of topsoil and anywhere from 12" to 24" of soft surface soils with concentrated areas of shallow rock. Most of the site showed existence of carbonate (sedimentary) rocks that indicated potential for sinkhole activity, though there were also intermittent areas of hard weathered rock. Out of all the test borings, only one displayed evidence of groundwater, which occurred at 18'. Due to the shallow foundation, dewatering will not be an issue.

It was concluded that the construction of a shallow foundation was feasible provided care was taken to keep the excavation from collecting water, all soft soils were removed and replaced with clean soil, structural fill was placed at the bottom of all excavations above the areas with carbonate rock, and all future water collection was properly drained away from the site.

Client Information

Before being renamed in 2001, DeSales University was originally founded in 1964 as the Allentown College of St. Francis de Sales. Since that time, DeSales has transformed from an initial enrollment of 156 students with two unfinished buildings on a vast cornfield to a sprawling campus with over 1500 students and 23 large structures. By choosing to construct the Gambet Center, DeSales is continuing their growth by ensuring it does not reach its maximum acceptance of 1600 students, while also enabling them to offer its first doctoral degree in chemical nursing. The quality of the business, nursing, and physician assistant (PA) programs has been constantly improving in the last decade. So much that they have reached the upper limit of their potential in the existing facilities. The Gambet Center now allows the students of these programs to get the most out of their education, and in turn facilitates achieving new levels of excellence within the University.

One major concern with respect to the practicality of getting this project off the ground was cost. Although the college enjoys a $34 million endowment, in order to achieve the goals described above, the Gambet Center must include state of the art technology to foster its continued development, putting the business, nursing, and PA departments in a position of leadership and positive change in the community. For this, Pennsylvania awarded DeSales with a $7 million Redevelopment Assistance Capital Program grant for construction projects that, among other things, encourage employment and other economic activity. DeSales believes the Gambet Center will better showcase these programs and attract more students and become an agent for growth. To a lesser extent, schedule is also a driving factor on the project. The University plans to open the doors to the public in May 2013, and since the Gambet Center is scheduled to reach substantial completion in November 2012, there is a good chance DeSales' move in date will not be affected by any unforeseen circumstances. DeSales chose Butz for the project based on their long-standing working relationship since the founding of the college, and so both parties are confident in each other's ability to successfully complete the project.

While one of every owner's top priorities is the quality of the finished product, due to their previous experiences, DeSales has every assurance that Butz will deliver again. More recently, the University has become a strong proponent of introducing many green initiatives across the campus. In 2010, the new McShea Student Center was the first building at DeSales to become certified LEED® Silver. For these high principles in sustainability, the Delaware Valley Green Building Council awarded DeSales University with the 2011 Lehigh Valley Green Campus Sustainability Award. It should come as no surprise that this would set the bar for all new construction on campus. Alvin H. Butz, Inc. has incorporated LEED® in many new projects, has over 20 LEED® certified professionals on its staff, and is sure they can achieve a LEED® Silver rating with the Gambet Center.

The most important aspect of every project, defined by both DeSales University and Butz, is safety on the job site. New construction poses a huge liability to everyone involved, and accident prevention is always the top priority. Although the building site is relatively remote and pedestrian traffic is not the most critical safety issue, it is imperative proper signage, lights, and barriers are in place to keep any unauthorized persons out of the site. This, in addition to construction worker safety, Butz has a safety director on staff that not only helps to ensure zero citations on site, but also reduces costs on the project.

Project Delivery System

Alvin H. Butz, Inc. was chosen by DeSales University based on their abovementioned rapport, which is a result of the many years of working together. Typical of a Design-Bid-Build project approach, once construction documents are complete multiple contractors will bid on the job, and the owner either selects the contractor with the lowest price or best-perceived value. Instead, DeSales and Butz entered a negotiated contract, and Butz selected the subcontractors by the lowest bid. By bringing the construction manager into the project early, the owner and architect get to utilize their construction experience to help make better decisions regarding the design of the project. For this, Butz will charge DeSales with a preconstruction fee as part of the agreement between the two.

DeSales and Butz signed a contract in which Butz would be brought on as a construction manager at risk, hold all subcontracts, and complete the project for a guaranteed maximum price (GMP), preventing the situation in which low bids come in considerably over budget. This also has the added benefit of maintaining the non-adversarial relationship between the owner and construction manager, which can benefit both parties now and in the future. Utilizing a GMP contract type, Butz also provides the owner with the added incentive of returning 100% of savings under the maximum price to the owner, but the agreed price also includes allowances and contingency to hedge against the risk. As an at risk construction manager, Butz holds lump sum contracts with all of the subcontractors, and does not self-perform any work on the job.

Subcontractor bonding capacity is determined by the size of the contract, the company's current financial situation, and can also be affected by prior working relationships with Butz. As part of the Butz Family, a limited liability company between Shoemaker Construction, Alexander Building Company, and themselves, Butz has a strong financial background, an excellent credit rating, and superior bonding capacity.

Typical types of insurance carried by the construction manager are general liability insurance, auto and equipment insurance, builder's insurance, and some form of umbrella coverage, and workers' compensation.

Following in Figure 4, the organizational structure of the project is shown depicting both contractual agreements between parties (solid lines), and non-contractual, but collaborative relationship (dotted lines). This organizational set-up of this project seems very appropriate for the construction of the Gambet Center due to the history between DeSales University and Alvin H. Butz, Inc. Breslin Ridyard and Fadero Architects have also successfully worked independently with both the owner and construction manager in the past; further suggesting this project delivery system will be favorable for all.

Organizational Structure

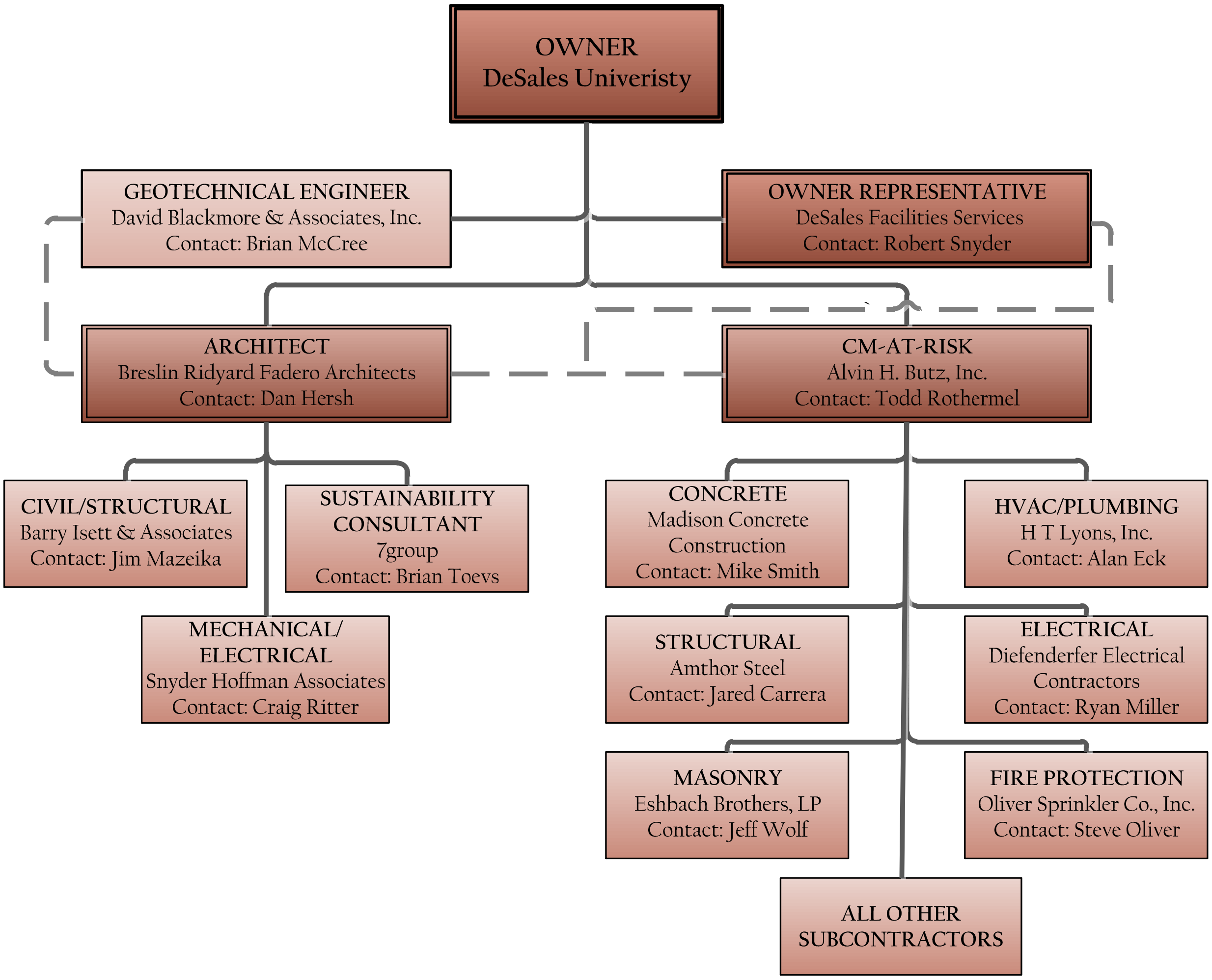


Figure 4: Gambet Center Organizational Structure

Staffing Plan

The project staffing plan shown in Figure 5 is representative of how most projects at Butz are managed. A Senior Project Manager oversees multiple Project Managers and only visits the site once in a while. It is their job to ensure that the Project Manager effectively manages the various projects they are in charge of, and to provide assistance and leadership when needed. Project Managers also have an administrative assistant on their team to help them stay on top of all projects. Depending on the size and/or complexity of the project, one or more Superintendents oversee daily production on the job and are there to ensure timely performance of the subcontractors and laborers. In the case of the Gambet Center, which has a relatively extensive MEP system, a MEP Project Manager is assigned to the project. Lastly, Butz employs a full time safety engineers who oversee and try to ensure a safe jobsite for all.

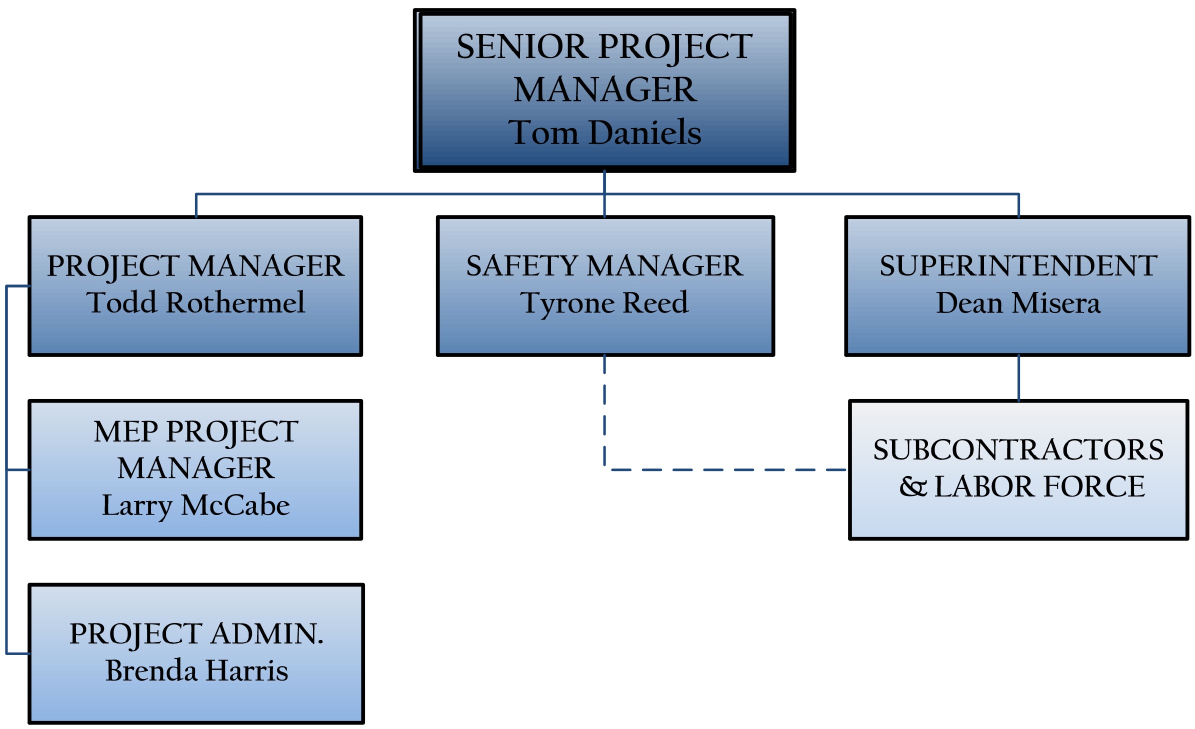


Figure 5: Alvin H. Butz Staffing Plan for the Gambet Center

Resources

Alvin H. Butz, Inc. Alvin H. Butz, Inc. 2012. 20 9 2012 ‹http://www.butz.com›.

DeSales University. "Gambet Construction." flickr. 20 09 2012 ‹http://www.flickr.com/photos/desalesuniversity›.

DeSales University. News: DeSales University. 10 6 2010. 20 09 2012 ‹http://web1.desales.edu/default.aspx?pageid=13548›.

DeSales Univeristy. Sustainability - DeSales University. 2012. 20 09 2012 ‹http://www.desales.edu/home/about/campus-region/sustainability›.

Transformation: The Gambet Center. DeSales University. YouTube, 2010. ‹http://www.youtube.com/watch?v=8_HmqXsB7UM›

| Appendix A-1 |

PROJECT SCHEDULE SUMMARY

ID	Task Name	Duration	Start	Finish
1	Design	110 days	Mon 1/3/11	Fri 6/3/11
2	Preconstruction Meetings	5 days	Wed 7/27/11	Tue 8/2/11
3	Notice to Proceed	0 days	Wed 8/3/11	Wed 8/3/11
4	Mobilization	22 days	Wed 8/3/11	Thu 9/1/11
5	Temporary Services	38 days	Thu 9/1/11	Mon 10/24/11
6	Excavation	31 days	Mon 10/24/11	Mon 12/5/11
7	Concrete Footings	37 days	Thu 10/27/11	Fri 12/16/11
8	CIP Foundation Walls	48 days	Wed 11/2/11	Fri 1/6/12
9	Masonry Foundation Walls	41 days	Sun 11/13/11	Fri 1/6/12
10	Erect Structural Steel	29 days	Tue 1/31/12	Fri 3/9/12
11	Pour Slab on Grade	48 days	Tue 12/20/11	Thu 2/23/12
12	Pour Decks and Slabs	24 days	Tue 2/21/12	Fri 3/23/12
13	Roof Construction	23 days	Fri 4/13/12	Tue 5/15/12
14	Exterior Studs and Sheathing	44 days	Mon 3/12/12	Thu 5/10/12
15	Spray Exterior Insulation	29 days	Fri 5/11/12	Wed 6/20/12
16	Exterior Enclosure	41 days	Tue 6/5/12	Tue 7/31/12
17	Building Enclosure Complete	0 days	Tue 7/31/12	Tue 7/31/12
18	HVAC	117 days	Tue 3/6/12	Wed 8/15/12
19	Electrical	116 days	Tue 3/27/12	Tue 9/4/12
20	Plumbing/Fire Protection	83 days	Mon 4/9/12	Wed 8/1/12
21	Interior Finishes	111 days	Wed 5/16/12	Wed 10/17/12
22	Sitework/Landscaping	31 days	Wed 8/1/12	Wed 9/12/12
23	Testing and Commissioning	70 days	Thu 7/12/12	Wed 10/17/12
24	Substantial Completion	0 days	Wed 10/17/12	Wed 10/17/12
25	LEED Commissioning	15 days	Thu 10/18/12	Wed 11/7/12
26	Owner Occupancy	18 days	Tue 10/2/12	Thu 10/25/12
27	Final Completion	0 days	Thu 10/25/12	Thu 10/25/12
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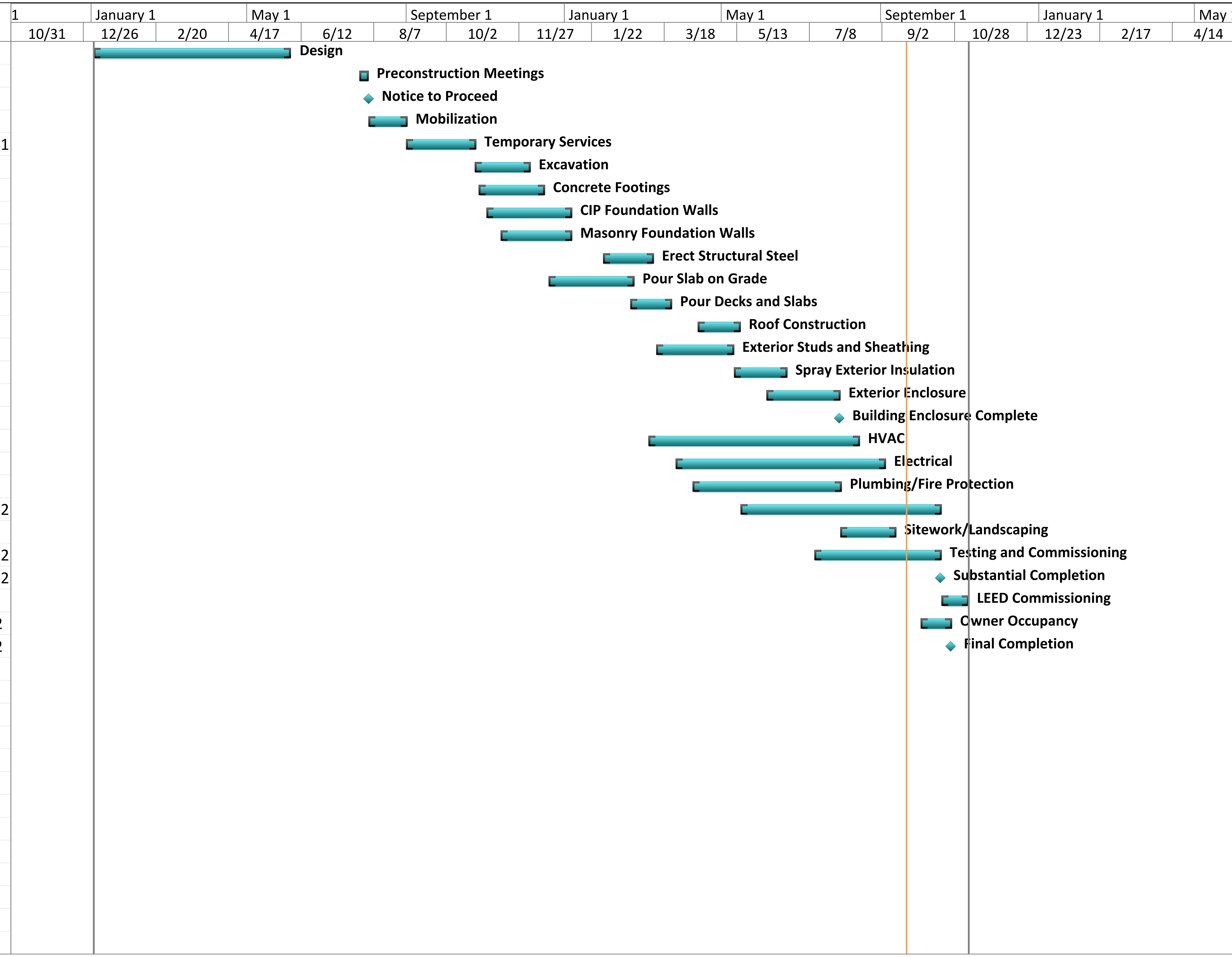


Project: Tech 1 Schedule
Date: Fri 9/21/12

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 |

R.S. MEANS COSTWORKS 2012 SQUARE FOOT COST ESTIMATE REPORT

Square Foot Cost Estimate Report

Estimate Name:	**Rev. James G. Gambet Center**
Building Type:	**College, Classroom, 2-3 Story with Face Brick with Concrete Block Back-up / Steel Frame**
Location:	**LEHIGH VALLEY, PA**
Story Count:	**2**
Story Height (L.F.):	**14**
Floor Area (S.F.):	**76751**
Labor Type:	**Union**
Basement Included:	**No**
Data Release:	**Year 2012**
Cost Per Square Foot:	**$157.55**
Building Cost:	**$12,092,000**

Costs are derived from a building model with basic components.

Scope differences and market conditions can cause costs to vary significantly.

		% of Total	Cost Per S.F.	Cost
A Substructure		**3.30%**	**$5.18**	**$397,500**
A1010	**Standard Foundations**		**$0.44**	**$34,000**
	Spread footings, 3000 PSI concrete, load 150K, soil bearing capacity 6 KSF, 5' - 6" square x 18" deep			
	Spread footings, 3000 PSI concrete, load 300K, soil bearing capacity 6 KSF, 7' - 6" square x 25" deep			
A1030	**Slab on Grade**		**$2.55**	**$195,500**
	Slab on grade, 4" thick, non industrial, reinforced			
A2010	**Basement Excavation**		**$0.16**	**$12,000**
	Excavate and fill, 100,000 SF, 4' deep, sand, gravel, or common earth, on site storage			
A2020	**Basement Walls**		**$2.03**	**$156,000**
	Foundation wall, CIP, 4' wall height, direct chute, .099 CY/LF, 4.8 PLF, 8" thick			
	Foundation wall, CIP, 4' wall height, direct chute, .148 CY/LF, 7.2 PLF, 12" thick			
B Shell		**25.40%**	**$40.07**	**$3,075,500**
B1010	**Floor Construction**		**$14.90**	**$1,143,500**
	Steel column, W10, 150 KIPS, 16' unsupported height, 45 PLF			
	Steel column, W12, 300 KIPS, 16' unsupported height, 72 PLF			
	Floor, composite metal deck, shear connectors, 5.5" slab, 35'x35' bay, 29.5" total depth, 75 PSF superimposed load, 121 PSF total load			
	Fireproofing, gypsum board, fire rated, 3 layer, 1.5" thick, 10" steel column, 3 hour rating, 27 PLF			

	Fireproofing, gypsum board, fire rated, 3 layer, 1.5" thick, 14" steel column, 3 hour rating, 35 PLF		
B1020	**Roof Construction**	**$5.28**	**$405,000**
	Floor, steel joists, beams, 1.5" 22 ga metal deck, on columns, 35'x35' bay, 25" deep, 30 PSF superimposed load, 52 PSF total load		
	Floor, steel joists, beams, 1.5" 22 ga metal deck, on columns, 35'x35' bay, 25" deep, 30 PSF superimposed load, 52 PSF total load, add for column		
B2010	**Exterior Walls**	**$9.80**	**$752,000**
	Brick wall, composite double wythe, standard face/CMU back-up, 8" thick, perlite core fill		
B2020	**Exterior Windows**	**$6.44**	**$494,000**
	Aluminum flush tube frame, for 1/4"glass,1-3/4"x4", 5'x6' opening, no intermediate horizontals		
	Glazing panel, plate glass, 1/4" thick, clear		
B2030	**Exterior Doors**	**$0.68**	**$52,000**
	Door, aluminum & glass, with transom, narrow stile, double door, hardware, 6'-0" x 10'-0" opening		
B3010	**Roof Coverings**	**$2.98**	**$229,000**
	Roofing, asphalt flood coat, gravel, base sheet, 3 plies 15# asphalt felt, mopped		
	Insulation, rigid, roof deck, composite with 2" EPS, 1" perlite		
	Roof edges, aluminum, duranodic, .050" thick, 6" face		
	Flashing, aluminum, no backing sides, .019"		
	Gravel stop, aluminum, extruded, 4", mill finish, .050" thick		
C Interiors	**22.40%**	**$35.32**	**$2,710,500**
C1010	**Partitions**	**$4.64**	**$356,000**
	Concrete block (CMU) partition, light weight, hollow, 6" thick, no finish		
C1020	**Interior Doors**	**$5.71**	**$438,500**
	Door, single leaf, kd steel frame, hollow metal, commercial quality, flush, 3'-0" x 7'-0" x 1-3/8"		
C1030	**Fittings**	**$5.64**	**$432,500**
	Chalkboards, liquid chalk type, wood frame & chalktrough		
	Cabinets, school, counter, wood, 32" high		
C2010	**Stair Construction**	**$3.13**	**$240,500**
	Stairs, steel, cement filled metal pan & picket rail, 20 risers, with landing		
C3010	**Wall Finishes**	**$4.42**	**$339,500**
	2 coats paint on masonry with block filler		
	Painting, masonry or concrete, latex, brushwork, primer & 2 coats		
	Painting, masonry or concrete, latex, brushwork, addition for block filler		
	Ceramic tile, thin set, 4-1/4" x 4-1/4"		
C3020	**Floor Finishes**	**$4.80**	**$368,500**
	Carpet, tufted, nylon, roll goods, 12' wide, 36 oz		

	Carpet, padding, add to above, maximum			
	Vinyl, composition tile, minimum			
	Vinyl, composition tile, maximum			
	Tile, ceramic natural clay			
C3030	**Ceiling Finishes**		**$6.97**	**$535,000**
	Acoustic ceilings, 3/4"mineral fiber, 12" x 12" tile, concealed 2" bar & channel grid, suspended support			
D Services		**48.40%**	**$76.19**	**$5,848,000**
D1010	**Elevators and Lifts**		**$3.56**	**$273,000**
	Hydraulic passenger elevator, 2500 lb., 2 floor, 125 FPM			
D2010	**Plumbing Fixtures**		**$16.67**	**$1,279,500**
	Water closet, vitreous china, bowl only with flush valve, wall hung			
	Urinal, vitreous china, wall hung			
	Lavatory w/trim, wall hung, vitreous china, 19" x 17"			
	Lab sink w/trim, polyethylene, single bowl, double drainboard, 54" x 24" OD			
	Service sink w/trim, vitreous china, wall hung 22" x 20"			
	Water cooler, electric, wall hung, wheelchair type, 7.5 GPH			
D2020	**Domestic Water Distribution**		**$2.25**	**$172,500**
	Gas fired water heater, commercial, 100< F rise, 600 MBH input, 576 GPH			
D2040	**Rain Water Drainage**		**$0.63**	**$48,000**
	Roof drain, CI, soil,single hub, 6" diam, 10' high			
	Roof drain, CI, soil,single hub, 6" diam, for each additional foot add			
D3050	**Terminal & Package Units**		**$20.21**	**$1,551,000**
	Rooftop, multizone, air conditioner, schools and colleges, 25,000 SF, 95.83 ton			
D4010	**Sprinklers**		**$3.34**	**$256,000**
	Wet pipe sprinkler systems, steel, light hazard, 1 floor, 10,000 SF			
	Wet pipe sprinkler systems, steel, light hazard, each additional floor, 10,000 SF			
D4020	**Standpipes**		**$0.33**	**$25,500**
	Dry standpipe risers, class III, steel, black, sch 40, 6" diam pipe, 1 floor			
	Dry standpipe risers, class III, steel, black, sch 40, 6" diam pipe, additional floors			
D5010	**Electrical Service/Distribution**		**$3.52**	**$270,000**
	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 2000 A			
	Feeder installation 600 V, including RGS conduit and XHHW wire, 2000 A			
	Switchgear installation, incl switchboard, panels & circuit breaker, 2000 A			
D5020	**Lighting and Branch Wiring**		**$16.34**	**$1,254,000**
	Receptacles incl plate, box, conduit, wire, 10 per 1000 SF, 1.2 W per SF, with transformer			

	Wall switches, 1.0 per 1000 SF			
	Miscellaneous power, 1.2 watts			
	Central air conditioning power, 4 watts			
	Motor installation, three phase, 460 V, 15 HP motor size			
	Motor feeder systems, three phase, feed to 200 V 5 HP, 230 V 7.5 HP, 460 V 15 HP, 575 V 20 HP			
	Fluorescent fixtures recess mounted in ceiling, 2.4 watt per SF, 60 FC, 15 fixtures @ 32 watt per 1000 SF			
D5030	**Communications and Security**		**$8.63**	**$662,000**
	Communication and alarm systems, includes outlets, boxes, conduit and wire, sound systems, 30 outlets			
	Communication and alarm systems, fire detection, addressable, 25 detectors, includes outlets, boxes, conduit and wire			
	Fire alarm command center, addressable with voice, excl. wire & conduit			
	Communication and alarm systems, includes outlets, boxes, conduit and wire, master clock systems, 20 rooms			
	Communication and alarm systems, includes outlets, boxes, conduit and wire, master TV antenna systems, 30 outlets			
	Internet wiring, 8 data/voice outlets per 1000 S.F.			
D5090	**Other Electrical Systems**		**$0.74**	**$56,500**
	Generator sets, w/battery, charger, muffler and transfer switch, gas/gasoline operated, 3 phase, 4 wire, 277/480 V, 100 kW			
E Equipment & Furnishings		**0.50%**	**$0.79**	**$60,500**
E1090	**Other Equipment**		**$0.79**	**$60,500**
	197 - Auditorium chair, fully upholstered, spring seat			
F Special Construction		**0.00%**	**$0.00**	**$0**
G Building Sitework		**0.00%**	**$0.00**	**$0**
SubTotal		**100%**	**$157.55**	**$12,092,000**
Contractor Fees (General Conditions,Overhead,Profit)		**0.00%**	**$0.00**	**$0**
Architectural Fees		**0.00%**	**$0.00**	**$0**
User Fees		**0.00%**	**$0.00**	**$0**
Total Building Cost			**$157.55**	**$12,092,000**

| Appendix B-2 |

R.S. MEANS COSTWORKS 2012 ASSEMBLIES COST DATA ESTIMATE REPORT

Quantity	Assembly Number	Description	Unit	Material O&P	Installation O&P	Total O&P	Ext. Material O&P	Ext. Installation O&P	Ext. Total O&P	Labor Type	Data Release
Plumbing									$ 439,150.61		
26	D20101101880	Water closet, vitreous china, tank type, wall hung, close	Ea.	$ 1,673.83	$ 777.70	$ 2,451.53	$ 43,519.58	$ 20,220.20	$ 63,739.78	STD	Year 2012
6	D20102102040	type	Ea.	$ 1,296.63	$ 1,044.34	$ 2,340.97	$ 7,779.78	$ 6,266.04	$ 14,045.82	STD	2012
28	D20103101960	Lavatory w/trim, vanity top, vitreous china, 19" x 16"	Ea.	$ 711.97	$ 816.59	$ 1,528.56	$ 19,935.16	$ 22,864.52	$ 42,799.68	STD	Year 2012
2	D20103102300	Lavatory w/trim, wall hung, vitreous china, 20" x 27",	Ea.	$ 990.15	$ 949.91	$ 1,940.06	$ 1,980.30	$ 1,899.82	$ 3,880.12	STD	Year 2012
6	D20104101800	Kitchen sink w/trim, countertop, PE on CI, 32" x	Ea.	$ 815.70	$ 922.13	$ 1,737.83	$ 4,894.20	$ 5,532.78	$ 10,426.98	STD	Year 2012
1	D20104101880	Kitchen sink w/trim, countertop, stainless steel,	Ea.	$ 1,084.45	$ 855.47	$ 1,939.92	$ 1,084.45	$ 855.47	$ 1,939.92	STD	Year 2012
10	D20108101920	Drinking fountain, 1 bubbler, wall mounted, non recessed,	Ea.	$ 1,296.62	$ 511.06	$ 1,807.68	$ 12,966.20	$ 5,110.60	$ 18,076.80	STD	Year 2012
5	D20108201840	hung, 8.2 GPH	Ea.	$ 1,060.88	$ 661.04	$ 1,721.92	$ 5,304.40	$ 3,305.20	$ 8,609.60	STD	2012
2	D20202501980	Gas fired water heater, commercial, 100< F rise, 155	Ea.	$ 9,052.80	$ 2,360.88	$11,413.68	$ 18,105.60	$ 4,721.76	$ 22,827.36	STD	Year 2012
17	D20402101960	diam, 10' high	Ea.	$ 325.34	$ 861.03	$ 1,186.37	$ 5,530.78	$ 14,637.51	$ 20,168.29	STD	2012
20	D20402102000	Roof drain, DWV PVC, 3" diam, for each additional foot	Ea.	$ 6.37	$ 25.00	$ 31.37	$ 127.40	$ 500.00	$ 627.40	STD	Year 2012
57	D20402102040	Roof drain, DWV PVC, 4" diam, diam, 10' high	Ea.	$ 400.78	$ 955.46	$ 1,356.24	$ 22,844.46	$ 54,461.22	$ 77,305.68	STD	Year 2012
20	D20402102080	Roof drain, DWV PVC, 4" diam, for each additional foot	Ea.	$ 8.63	$ 27.22	$ 35.85	$ 172.60	$ 544.40	$ 717.00	STD	Year 2012
2	D30201060700	Boiler, electric, steel, hot water, 510 KW, 1,739 MBH	Ea.	$ 18,388.50	$ 6,304.93	$24,693.43	$ 36,777.00	$ 12,609.86	$ 49,386.86	STD	Year 2012
6	D30203301020	Pump, base mounted with motor, end-suction, 3" size, 5	Ea.	$ 12,636.20	$ 4,797.02	$17,433.22	$ 75,817.20	$ 28,782.12	$ 104,599.32	STD	Year 2012
Mechanical									$ 1,109,866.66		
14	D30401341010	VAV terminal, cooling, hot water reheat, with	Ea.	$ 2,216.05	$ 2,444.20	$ 4,660.25	$ 31,024.70	$ 34,218.80	$ 65,243.50	STD	Year 2012
3	D30401341020	VAV terminal, cooling, hot water reheat, with actuator /	Ea.	$ 2,498.95	$ 3,333.00	$ 5,831.95	$ 7,496.85	$ 9,999.00	$ 17,495.85	STD	Year 2012
2	D30401341040	VAV terminal, cooling, hot water reheat, with actuator /	Ea.	$ 2,994.03	$ 5,305.03	$ 8,299.06	$ 5,988.06	$ 10,610.06	$ 16,598.12	STD	Year 2012
5	D30401381010	VAV terminal, cool, hot water reheat, fan powered, with	Ea.	$ 2,734.70	$ 2,416.43	$ 5,151.13	$ 13,673.50	$ 12,082.15	$ 25,755.65	STD	Year 2012
8	D30401381020	VAV terminal, cool, hot water reheat, fan powered, with	Ea.	$ 3,041.18	$ 3,333.00	$ 6,374.18	$ 24,329.44	$ 26,664.00	$ 50,993.44	STD	Year 2012
33	D30401381030	VAV terminal, cool, hot water reheat, fan powered, with	Ea.	$ 3,418.38	$ 4,555.10	$ 7,973.48	$ 112,806.54	$ 150,318.30	$ 263,124.84	STD	Year 2012
19	D30401381050	VAV terminal, cool, hot water reheat, fan powered, with	Ea.	$ 3,866.30	$ 5,860.53	$ 9,726.83	$ 73,459.70	$ 111,350.07	$ 184,809.77	STD	Year 2012
7	D30401381070	VAV terminal, cool, hot water reheat, fan powered, with	Ea.	$ 4,856.45	$ 8,721.35	$13,577.80	$ 33,995.15	$ 61,049.45	$ 95,044.60	STD	Year 2012
3	D30401381080	VAV terminal, cool, hot water reheat, fan powered, with	Ea.	$ 5,728.73	$ 12,109.90	$17,838.63	$ 17,186.19	$ 36,329.70	$ 53,515.89	STD	Year 2012
9	D30501401010	Unit heater, cabinet type, horizontal blower, hot water,	Ea.	$ 2,168.90	$ 1,583.18	$ 3,752.08	$ 19,520.10	$ 14,248.62	$ 33,768.72	STD	Year 2012
1	D30501850580	Computer room unit, air cooled, includes remote	Ea.	$ 18,482.80	$ 2,694.18	$21,176.98	$ 18,482.80	$ 2,694.18	$ 21,176.98	STD	Year 2012
4	D30502041010	A/C packaged, DX, air cooled, hot water heat, VAV, 10 ton	Ea.	$ 11,881.80	$ 10,165.65	$22,047.45	$ 47,527.20	$ 40,662.60	$ 88,189.80	STD	Year 2012
2	D30502041020	A/C packaged, DX, air cooled, hot water heat, VAV, 20 ton	Ea.	$ 24,140.80	$ 13,332.00	$37,472.80	$ 48,281.60	$ 26,664.00	$ 74,945.60	STD	Year 2012
1	D30502041030	A/C packaged, DX, air cooled, hot water heat, VAV, 30 ton	Ea.	$ 35,928.30	$ 16,451.70	$52,380.00	$ 35,928.30	$ 16,451.70	$ 52,380.00	STD	Year 2012
1	D30502041040	A/C packaged, DX, air cooled, hot water heat, VAV, 40 ton	Ea.	$ 49,036.00	$ 17,787.90	$66,823.90	$ 49,036.00	$ 17,787.90	$ 66,823.90	STD	Year 2012
Fire Protection									$ 213,848.34		
30000	D40103100640	Dry pipe sprinkler systems, steel, light hazard, 1 floor,	S.F.	$ 1.70	$ 1.91	$ 3.61	$ 51,000.00	$ 57,300.00	$ 108,300.00	STD	Year 2012
30000	D40103100760	Dry pipe sprinkler systems, steel, light hazard, each	S.F.	$ 1.29	$ 1.70	$ 2.99	$ 38,700.00	$ 51,000.00	$ 89,700.00	STD	Year 2012
2	D40203300540	Dry standpipe risers, class I, steel, black, sch 40, 4" diam	Floor	$ 2,852.58	$ 2,944.15	$ 5,796.73	$ 5,705.16	$ 5,888.30	$ 11,593.46	STD	Year 2012
2	D40203300560	Dry standpipe risers, class I, steel, black, sch 40, 4" diam	Floor	$ 1,060.88	$ 1,066.56	$ 2,127.44	$ 2,121.76	$ 2,133.12	$ 4,254.88	STD	Year 2012

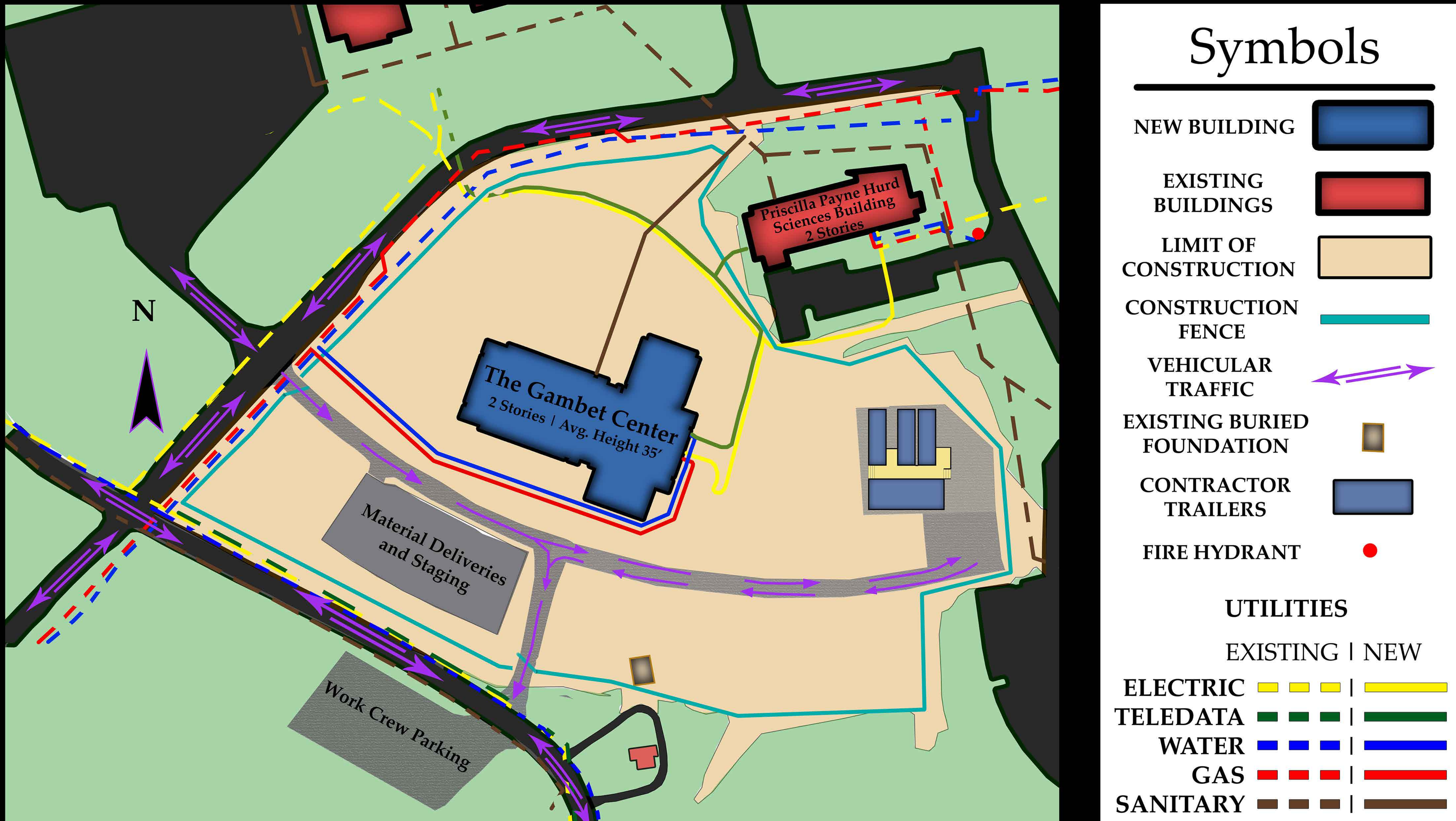
Electrical									$ 1,147,587.41		
1.25	D50101200560	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4	Ea.	$ 29,798.80	$ 13,988.50	$43,787.30	$ 37,248.50	$ 17,485.63	$ 54,734.13	STD	Year 2012
0	D50101200570	Svce inst,incls bkrs,ming,20' cnd & wire,3 ph, add 25% for		$ -	$ -	$ -	$ -	$ -	$ -	STD	Year 2012
1.2	D50102400400	Switchgear installation, incl switchboard, panels & circuit	Ea.	$ 33,759.40	$ 28,531.00	$62,290.40	$ 40,511.28	$ 34,237.20	$ 74,748.48	STD	Year 2012
0	D50102400410	277/480 volt		$ -	$ -	$ -	$ -	$ -	$ -	STD	2012
77000	D50201150760	Receptacle systems, conduit system with floor boxes, high	S.F.	$ 2.75	$ 2.87	$ 5.62	$ 211,750.00	$ 220,990.00	$ 432,740.00	STD	Year 2012
77000	D50201300240	SF	S.F.	$ 0.08	$ 0.35	$ 0.43	$ 6,160.00	$ 26,950.00	$ 33,110.00	STD	2012
77000	D50202100500	Fluorescent fixtures recess mounted in ceiling, 0.8 watt per SF, 20 FC, 5 fixtures @32	S.F.	$ 0.88	$ 2.52	$ 3.40	$ 67,760.00	$ 194,040.00	$ 261,800.00	STD	Year 2012
40000	D50303100520	telepoles, low density	S.F.	$ 1.15	$ 0.93	$ 2.08	$ 46,000.00	$ 37,200.00	$ 83,200.00	STD	2012
60	D50309200106	Internet wiring, 6 data/voice outlets per 1000 S.F.	M.S.F.	$ 471.50	$ 1,835.13	$ 2,306.63	$ 28,290.00	$ 110,107.80	$ 138,397.80	STD	Year 2012
70	D50902100360	Generator sets, w/battery, charger, muffler and transfer switch, gas/gasoline	kW	$ 363.06	$ 71.04	$ 434.10	$ 25,414.20	$ 4,972.80	$ 30,387.00	STD	Year 2012
100	D50902100400	Generator sets, w/battery, charger, muffler and transfer switch, gas/gasoline	kW	$ 315.90	$ 68.80	$ 384.70	$ 31,590.00	$ 6,880.00	$ 38,470.00	STD	Year 2012

Total **2910453.01**

| Appendix C-1 |

EXISTING CONDITIONS SITE LAYOUT PLAN

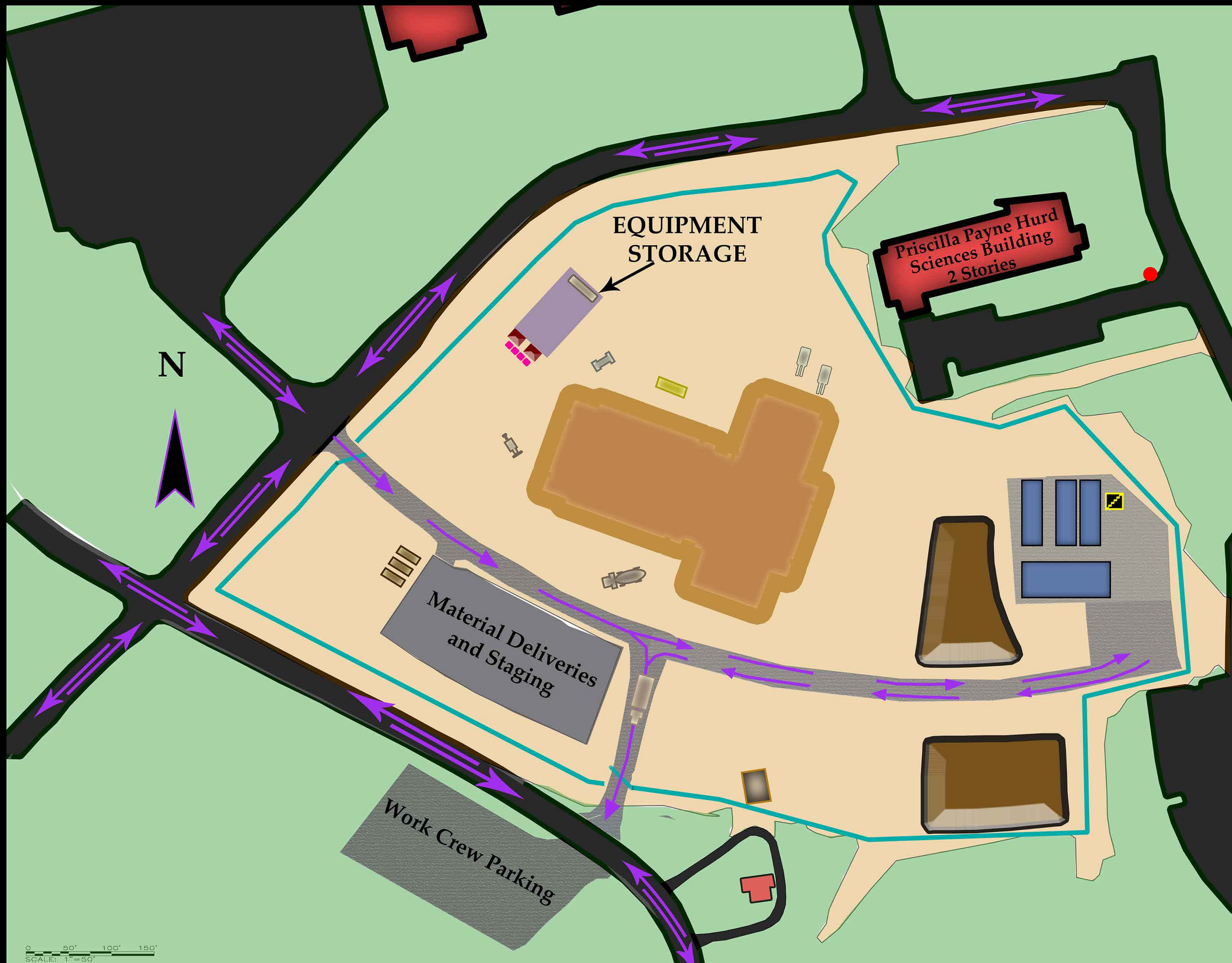
Existing Conditions Site Layout Plan



| Appendix C-2 |

EXCAVATION/FOUNDATION SITE LAYOUT PLAN

Excavation/Foundation Site Layout Plan



Symbols

- EXCAVATION & SOG
- EXISTING BUILDINGS
- LIMIT OF CONSTRUCTION
- CONSTRUCTION FENCE
- VEHICULAR TRAFFIC
- CONTRACTOR TRAILERS
- TOPSOIL STOCKPILE
- TEMPORARY UTILITY
- TOOL SHEDS
- DUMPSTERS
- PORTABLE TOILETS

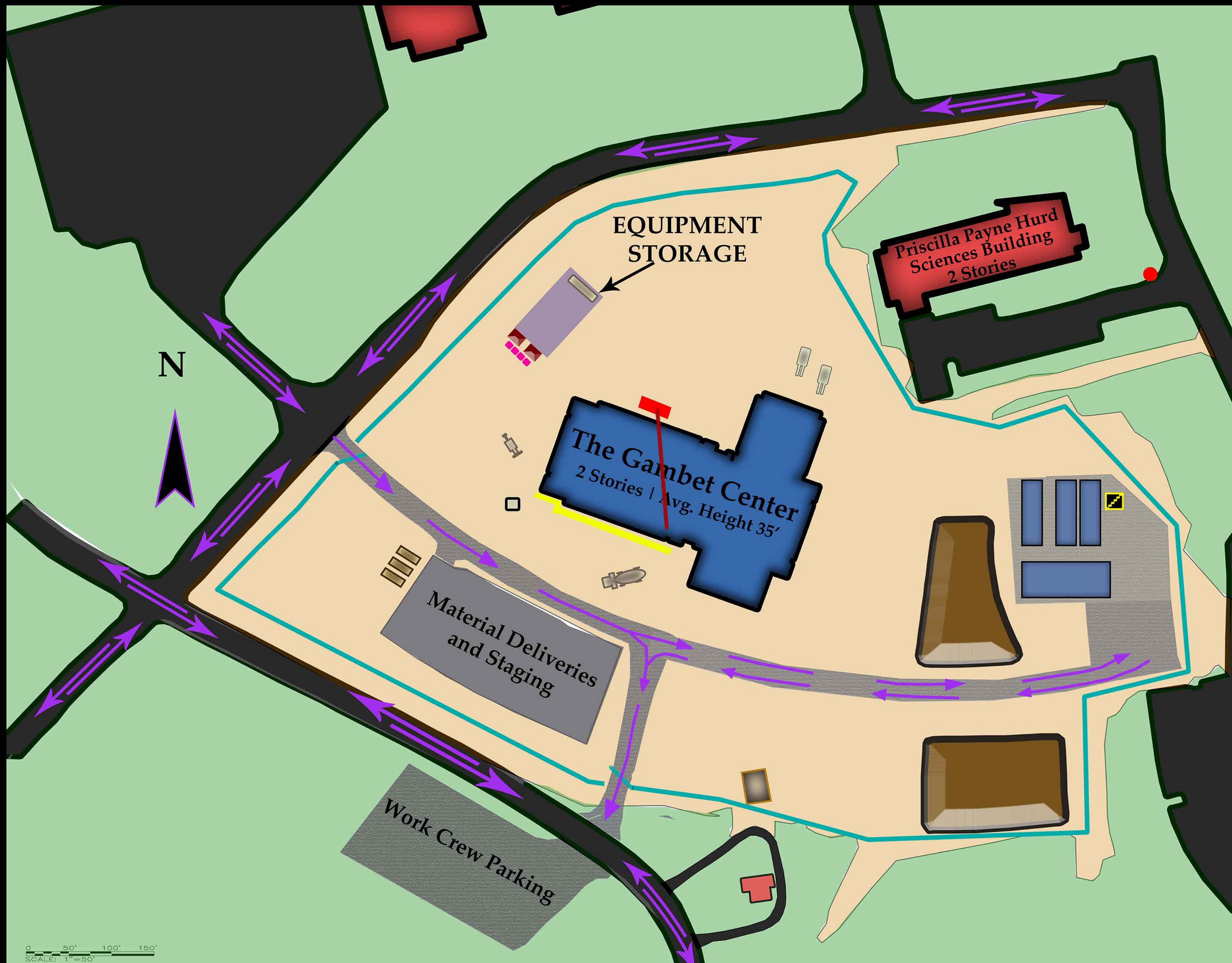
EQUIPMENT

- EXCAVATOR
- CONCRETE TRUCK
- TELEHANDLER
- VIBRATORY ROLLER
- BACKHOE
- HOIST
- DUMP TRUCK

| Appendix C-3 |

SUPERSTRUCTURE SITE LAYOUT PLAN

Superstructure Site Layout Plan



Symbols

- BUILDING OUTLINE
- EXISTING BUILDINGS
- LIMIT OF CONSTRUCTION
- CONSTRUCTION FENCE
- VEHICULAR TRAFFIC
- CONTRACTOR TRAILERS
- TOPSOIL STOCKPILE
- TEMPORARY UTILITY
- TOOL SHEDS
- DUMPSTERS
- PORTABLE TOILETS

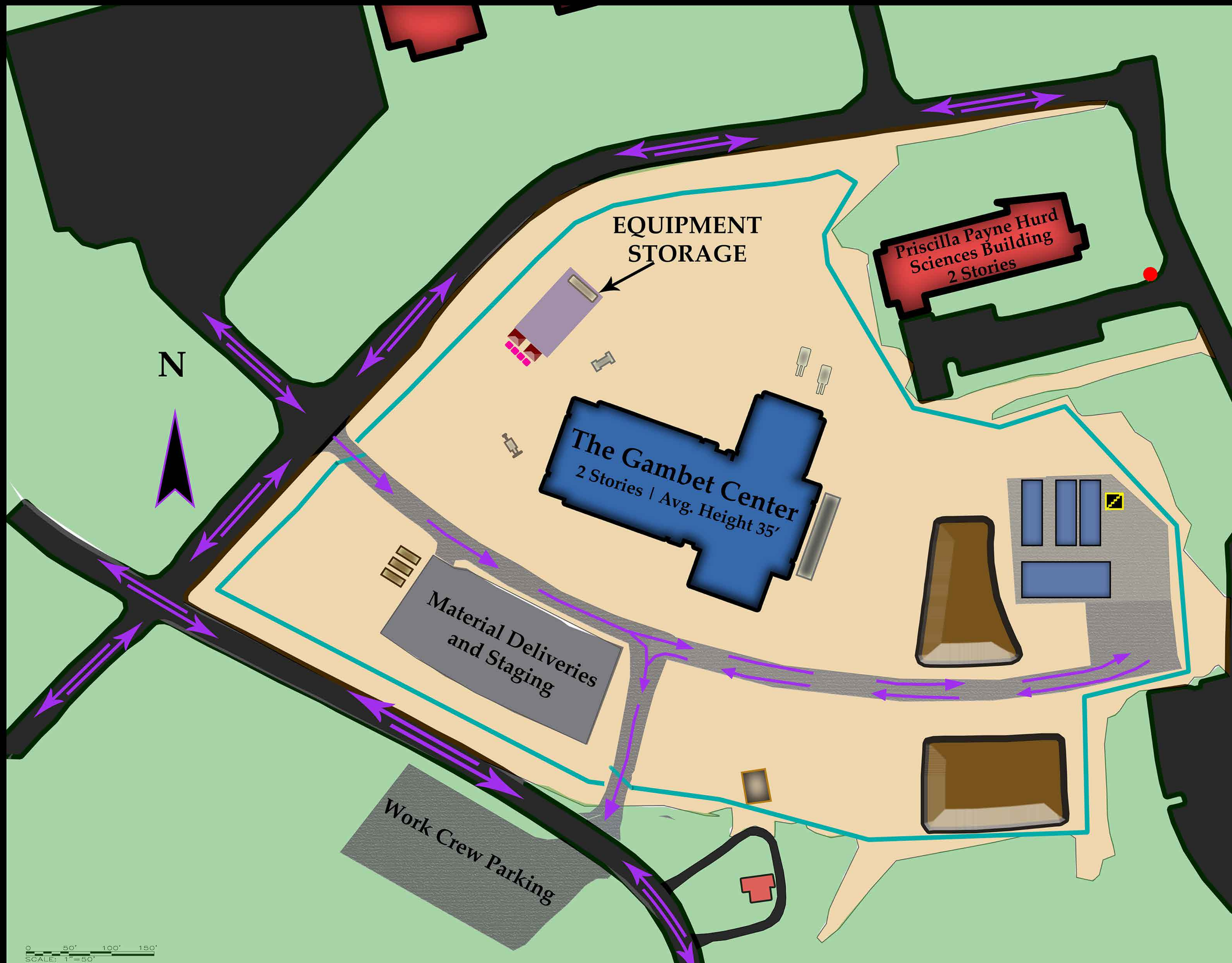
EQUIPMENT

- SCAFFOLDING
- CONCRETE TRUCK
- TELEHANDLER
- CRAWLER CRANE (110t)
- BACKHOE
- HOIST
- MORTAR MIXER

| Appendix C-4 |

FINISHES SITE LAYOUT PLAN

FINISHES SITE LAYOUT PLAN



Symbols

BUILDING OUTLINE

EXISTING BUILDINGS

LIMIT OF CONSTRUCTION

CONSTRUCTION FENCE

VEHICULAR TRAFFIC

CONTRACTOR TRAILERS

TOPSOIL STOCKPILE

TEMPORARY UTILITY

TOOL SHEDS

DUMPSTERS

PORTABLE TOILETS

EQUIPMENT

LOADING DOCK

TELEHANDLER

VIBRATORY ROLLER

BACKHOE

HOIST