



6 | Existing Conditions Report

6.1 Design Overview

- Architecture
 - The general architecture of the Flagship Building and Gymnasium is classical with a brick façade. Three prominent towers with peaked gable roofs along the Flagship Building serve as focal points of the architecture. These peaks are symbolic of historic tradition, something the WCA prides itself on. Each tower contains a large aluminum and glass storefront window with cast stone lintels. The brick pattern on the towers is made up of assorted bricks that protrude ½” from the face brick. A brick entry archway greets visitors with a cast stone decorative medallion above the door. The gymnasium showcases similar architecture, thus creating a unified campus aesthetic.

- Applicable Codes
 - International Building Code 2003 (IBC)
 - NFPA 101 Life Safety Code 1997

- Zoning and Historical Information
 - Washington Christian Academy History
 - The original school was founded in 1960 by families from Presbyterian and Christian churches. It was founded on the principle of Reformed Tradition, which is based on welcoming a diverse student population (racially, socially, and any Christian denomination). In 1996, the school merged with Silver Spring Christian Academy and henceforth was named Washington Christian Academy. The new Flagship school will serve approximately 300 K-12 students.
 - Zoning
 - The WCA campus will eventually cover a 60 acre site. Of the 60 acre site, approximately 26 acres are reserved for forest retention. This land was bought by the WCA in 2004. The Flagship's construction zoning classification for the building use is E-Educational and A2-Assembly. The Gymnasium's construction classification is A3-Assembly.

- Building Envelope
 - The buildings' envelopes utilize a standard cavity wall system. The Flagship Building uses an 8” CMU load bearing back up wall, and the Gymnasium uses a 12” CMU wall. To the exterior of the CMU walls are 2 inches of rigid insulation and then a 2 inch air gap. Cavity drainage material and through wall flashing are located within the cavity wall near ground level, which allows the moisture to escape. The exterior of the cavity wall system is a brick façade, also referred to as face brick. A standard modular size brick in two colors is used, as well as bands of 8” split face CMU. 8” accent brick patterns project ½” from the face brick on all of the 3-story peaked tower elevations as well as on



the gymnasium exterior walls. Three large arched storefront windows are located on both the Flagship building and the Gymnasium. There is one window on each of the 3 towers of the Flagship, and 3 on the NE face of the Gymnasium. These windows are aluminum and glass, with cast stone lintels.

- Similar roofing systems are used on the two buildings. Both roofs support the mechanical units for the building. The roof system is a Built-Up Roof. The roof is formed by steel roof deck, followed by 3" rigid insulation, 1" cover board, and built-up asphalt roofing. There is a multiple-ply membrane base flashing that extends a minimum of 8" up the parapet wall for moisture protection. The parapet wall is comprised of 100% solid CMU, covered by continuous through wall flashing and a cavity drainage material. Weep holes are located every 16" O.C. Metal gutters and downspouts are used on the perimeter of the roof.
- Both buildings also employ asphalt shingled gabled roofs with a 12:12 pitch. The Gymnasium uses this roof type over the entry canopy. The Flagship building uses this roof on the 3 peaked towers and the entrance to the building. Additionally, a smaller shed-like shingled roof runs along the roof's perimeter of the Flagship building. This aesthetic barrier will add a sense of completeness to the building, as well as hide the roof top mechanical units. The familiar, family-style roof coincides with the architectural appeal of the campus and exemplifies the WCA theme of tradition.



6.2 Building Systems Summary

The following table and written information summarizes the main building systems in the WCA Flagship and Gymnasium Buildings. The information describes the key design and construction aspects of the project.

Table 6.1 Building Systems Summary Table.

Work Scope	Flagship Building		Gymnasium	
	Yes	No	Yes	No
A. Is demolition required?		✓		✓
B. What provides excavation support?	--	--	--	--
C. Is there a structural steel frame?	✓		✓	
D. Is concrete cast-in-place?	✓		✓	
E. Is precast concrete used?		✓		✓
F. Describe the mechanical system.	--	--	--	--
G. Describe the electrical system.	--	--	--	--
H. Is there masonry?	✓		✓	
I. Is there a curtain wall?		✓		✓

As seen in the table, the same design and construction elements are used in the Flagship and Gymnasium Buildings. This is to alleviate an added learning curve, make construction more efficient, and create buildings that look similar.

A. Demolition

The Washington Christian Academy Flagship Building and Gymnasium reside on 60 acres that was once covered in forests. This land will eventually become a resting place for an entire educational and recreational campus. Of the 60 acre site, approximately 26 acres are reserved for forest retention. Retaining a high amount of trees and green space is important to the owner and the community. Therefore, the only demolition that must take place is the necessary clearing of trees and vegetation to make way for the buildings. Extra caution and money were spent to carefully remove only what was necessary, and to retain as much natural vegetation as possible especially along the roadways.

B. Excavation

The excavation for the foundation was simple in nature due to the shallowness of the foundation system. The foundation is comprised of continuous concrete wall footings and a slab on grade. Most of the excavation work had to do with removing the upper 1-2 feet of the top layer of soil and recompacting for bearing strength under the slab on grade. A few man made storm water management ponds were excavated around the site for water management which are not deep enough to require sloped sides. As far as the actual footings, they are under the 5 foot depth requirement that necessitates the use of excavation support, such as sloped or stepped walls. The soils from the onsite cuts are acceptable to use as compacted backfill, as long as they are aerated and dried a bit. The



excavated soils have moisture contents above what is needed for optimum compaction levels. In order to handle the excess water, the man made ponds around the site collect most of the site drainage. They are bordered by silt fences to ensure that they do not overflow or clog with silt and other fine particles. Additionally, there is a pump for dewatering during construction. A stream that runs near the entrance of the site has been temporarily diverted for the construction of an entrance bridge, and will be returned to its original location upon bridge completion. Any remaining ground water is pumped through hoses into one of the storm water management ponds so that the water does not cause erosion and further problems during construction.

C. Structural Systems

Cast-in-place concrete, CMU load bearing block walls, and steel joists comprise the foundation and superstructure of the building. There are also steel tube columns that are supported by cast-in-place concrete piers and footings in the areas of the building where the span from each load bearing wall is too great for the steel joists alone. No precast concrete (unless the concrete masonry units are an exception) is used in either the Flagship Building or Gymnasium.

D. Cast-in-Place Concrete

The cast-in-place concrete foundation is the same for both buildings. The continuous wall footings range in size from 2'-6" to 4'-0" and in thickness from 1'-0" to 1'-4". They are typically reinforced with #5 or #7 rebar running in both directions along the bottom of the footing. Turned down slabs are employed in the foundation of the Flagship Building. The depth of this part of the foundation is intended to surpass the freeze-thaw line. Also unique to the Flagship Building are concrete footings and piers in the center of the building to support steel tube columns. The cast-in-place pier footings range from 5' square to 8'-6" square, and support 20"x20" concrete piers with 4-#8 reinforcing bars. The slab on grade (SOG) requires the bearing soil to have a minimum compaction strength of 2500 psf. On top of the compacted soil is 4" of washed gravel and a 6 mil. vapor barrier. The SOG is 5" thick. The cast-in-place concrete slabs for the second and third floors are 3" thick. All slabs in the building are reinforced with 6"x6" W1.4xW1.4 welded wire fabric for reinforcing. The required strength of the concrete is 3000 psi normal weight at 28 days, with the extra stipulation of 4500 psi normal weight if the concrete will be exposed to weather while curing. The preferred method of placing concrete on the site is by a concrete pump. The pump can easily reach the third floor slab, and can reach the entire floor with a minimal amount of truck movement. Keyed construction joints allow for multiple concrete placements.

E. CMU Block & Steel

The Flagship Building uses 8" CMU and the Gymnasium uses 12" CMU block for the load bearing walls. The reinforcing in these walls is spaced every 24" on center. For non-load bearing walls, the only difference is that the reinforcement spaces out to 48" on center. The CMU minimum compression strength is 1900 psi. The steel used in both buildings acts as a load bearing system that spans the distance between load bearing walls. The steel is in the standard forms of beams, joists, and trusses. The ends of the steel beams bear on an average size steel plate of 8"x12"x5/8". Joists that bear on masonry walls are supported by a steel plate and a bond beam. There are 13 steel tube columns in the



Flagship Building, which allow for large, open architectural spaces. The large spaces would not be possible with CMU load bearing walls alone because the span distance would be too great for the steel joists. The typical column is a HSS 8"x8"x ½". Anchor bolts with a ¾" diameter connect the columns to a steel base plate that sits on top of the cast-in-place concrete pier mentioned previously. The steel is set in place by a mobile crane that will move through three locations for the Flagship Building and one location for the Gymnasium.

F. Mechanical System

Once the building's structure is complete, the mechanical and electrical systems are ready to be put in place. The Flagship Building has an adjoining mechanical and electrical room in the northwest section of the building. There is also a small electrical closet located in the main corridor of every floor. 16 mechanical rooftop units serve the entire building and are typically 480V, 3phase. These units are hidden from a pedestrian line of sight by a shed-like gabled roof that runs along the perimeter of the built up roof. This aesthetic barrier adds a sense of completeness to the building, as well as hides the roof mechanical units. Roof top metal ventilators, bases, and soil stacks are kept watertight by metal flashing and roof sheathing. The kitchen on the main floor of the building requires additional mechanical equipment that would not typically be seen in every building. Compressors and condensing units for the kitchen are located on the roof in addition to 2 exhaust fans. The exhaust fans are rated at 600 and 3250 cfm and are equipped to exhaust very high air temperatures reaching up to 300 degrees Fahrenheit with no damage to the fans.

The supply air is distributed throughout the Flagship Building by VAV fan powered terminal units with electric heat. The size of the units range from 720 to 1350 max cfm. Most of these VAV units serve 4 or 5 air supply diffusers. Typically, one unit is located above each room for maximum occupant temperature control and comfort. The VAV units are connected to each diffuser with a removable flex duct. Larger open spaces, such as the corridors, are equipped with VAV single duct terminal units with electric heat that range in capacity from 300 to 1025 cfm. Typical registers and grilles collect the return air. All of the ductwork is to be insulated sheet metal and sealed with a mastic sealer. Any duct interiors that are visible through a grille or register are to be spray painted mat black to avoid an unfinished metal aesthetic look.

The Gymnasium's mechanical system is similar, only with less ductwork and stronger powered air handling units. There are two roof top units. The first unit has a capacity of 1600 cfm, which serves the lobby, locker rooms, restrooms, and offices. The second unit has a much larger capacity of 6000 cfm and serves the entire gymnasium. Both units are 480V, 3 phase. There is a small mechanical room located in the gym.

G. Electrical System

Electricity is supplied to the Flagship Building through a switchgear located on the other side of Batchellors Forest Road from the school. The 15kV switchgear connects by way of a one-way duct bank to an electrical manhole. This manhole is then connected by a one-way duct bank to a pad mounted 480V Delta Primary – 208Y/120V Secondary 3 phase transformer which is located directly outside the



south end of the Flagship Building. Once inside the building, the main power distribution panel is 480Y/277V 3 phase, 4 wire, 1600A, and 100% rated. All conductors are copper with type THW 75C insulation. The current AV equipment is connected to a junction box embedded in the slab by a 3" diameter conduit. To account for future demand, an extra 3" diameter conduit is attached to a junction box in the ceiling above the AV room for future equipment hookup. Electrical receptacles are mounted on the roof for servicing mechanical equipment.

The lighting in the Flagship Building hallways and classrooms are rectangular fluorescent luminaires. The foyer, also referred to as the Great Hall, has incandescent ceiling and wall mounted fixtures. Indirect wall pendants are used in this space to create an aesthetically pleasing atmosphere.

The Gymnasium gains its electricity from the main Flagship Building electrical room. Two 4" diameter PVC conduits run underground from the electrical room to the Gymnasium. Fluorescent lighting is used in the lobby, offices, and locker rooms. In the gym, HID light fixtures are ceiling mounted for efficiency. There are two main electrical panels for the building, which serve the same areas as the mechanical units.

H. Masonry Facade

Masonry exists in two forms on this project. First, it appears as CMU blocks to provide the main superstructure and interior walls. Secondly, brick serves as the exterior veneer of both buildings. All of the buildings on the WCA campus will be brick in order to create a unified campus aesthetic. The brick exterior exudes a familiar, time-honored architectural feel that exemplifies the WCA traditional theme. A standard modular size brick in two colors is used, as well as bands of 8" split face CMU. 8" accent brick patterns project 1/2" from the face brick on all of the Flagships 3-story peaked tower elevations as well as on the Gymnasium exterior walls. The brick is supported by masonry wall ties anchored into the CMU backup walls. It is the responsibility of the mason to ensure that the brick and mortar are the correct size and color. The schedule allows for a continual work flow from the Gymnasium to the Flagship Building.

I. Building Envelope

While no curtain wall exists on either building, a standard cavity wall system serves as the building envelope. The cavity wall system is located to the exterior of the CMU load bearing walls and is comprised of 2" rigid insulation and 2" air gap. Cavity drainage material and through wall flashing are located within the cavity wall near ground level, which allows the moisture to escape. Six large arched storefront windows are located on the Flagship building and three on the Gymnasium. There is one window on each side of the three towers of the Flagship, and three on the NE face of the Gymnasium. These windows are aluminum and glass, with cast stone lintels.

J. Emergency System

The fire and emergency systems for the two buildings are the same. The fire alarm control panel is located in the first floor main electrical room of the Flagship Building. Annunciator panels are located



next to the front doors of each building. The Great Hall has addressable smoke detectors, and the rest of the building and gym has dual audio/visual smoke detectors. Any HVAC duct producing or serving over 2000 cfm each, or any HVAC serving a common plenum space exceeding 2000 cfm in that plenum, requires a smoke detector. The emergency lighting is unique because it is self-testing. Self-testing bodine ballasts and circuitry will automatically test emergency lights for 30 seconds every 30 days and 90 minutes per year. The sprinkler systems in both buildings are a standard wet sprinkler with cast iron pipe and steel fittings. The sprinkler heads are semi-recessed pendants with a chrome painted finish.

6.3 Local Conditions

The new Washington Christian Academy site is located in a rural area of Montgomery Count, Maryland. It is approximately 30 miles in the slight northwest direction from the center of Washington, DC. The rural area and large site eliminate many of the typical constraints that come along with congested, urban sites. There is designated room to store the excavated soil on site so it can be reused at a later date. As a result, excavating, hauling, and bringing in more soil is a costly process that is eliminated at the WCA site. Another advantage of having a large site is the ability to have a large job site trailer. The WCA team can work together on site everyday and avoid a lot of the misunderstandings and communication delays that occur when teams work in separate buildings.

The soil conditions on site are defined as the following:

- Minimum required bearing pressure is 2500 psf.
- Soils from site may be compacted and reused.
- In place moisture contents are above optimum level for compaction, so excavated soils must be spread out and aerated (for drying purposes) before being reused.
- No rock excavation will be needed.
- Two dry storm water management ponds collect site water and runoff.
- Soils are typically soft to medium density sandy silt and lean clay.

One unique local condition the WCA team faces is a substantial overgrowth of bamboo on the site. Bamboo is natural to this region and is a threat to building structures. Bamboo grows at an alarmingly fast rate and spreads easily. Its strength can break concrete foundations, which is why it must be removed from the site. Removing the bamboo will take a fairly long amount of time due to the fact that it must be chopped down and then each new shoot must be mowed down before it has time to spread again. Eventually, after an unpredictable amount of attempts, the bamboo will lose its energy supply and die.

The two buildings on the WCA site are not attempting LEED certification. However, some attempt to recycle construction materials is still being made. There is a “masonry only” dumpster on site that is used for CMU waste. Tipping fees are less expensive to have “masonry only” dumpsters pulled from the site. While typical dumpster removal charges by weight, the masonry dumpsters are charged a flat fee per dumpster. This creates a win-win situation for the environment and the construction teams.



6.4 Site Plan of Existing Conditions

Site Plan of the Existing Conditions at the WCA Site

16227 Batchellors Forest Road, Olney, MD 20832

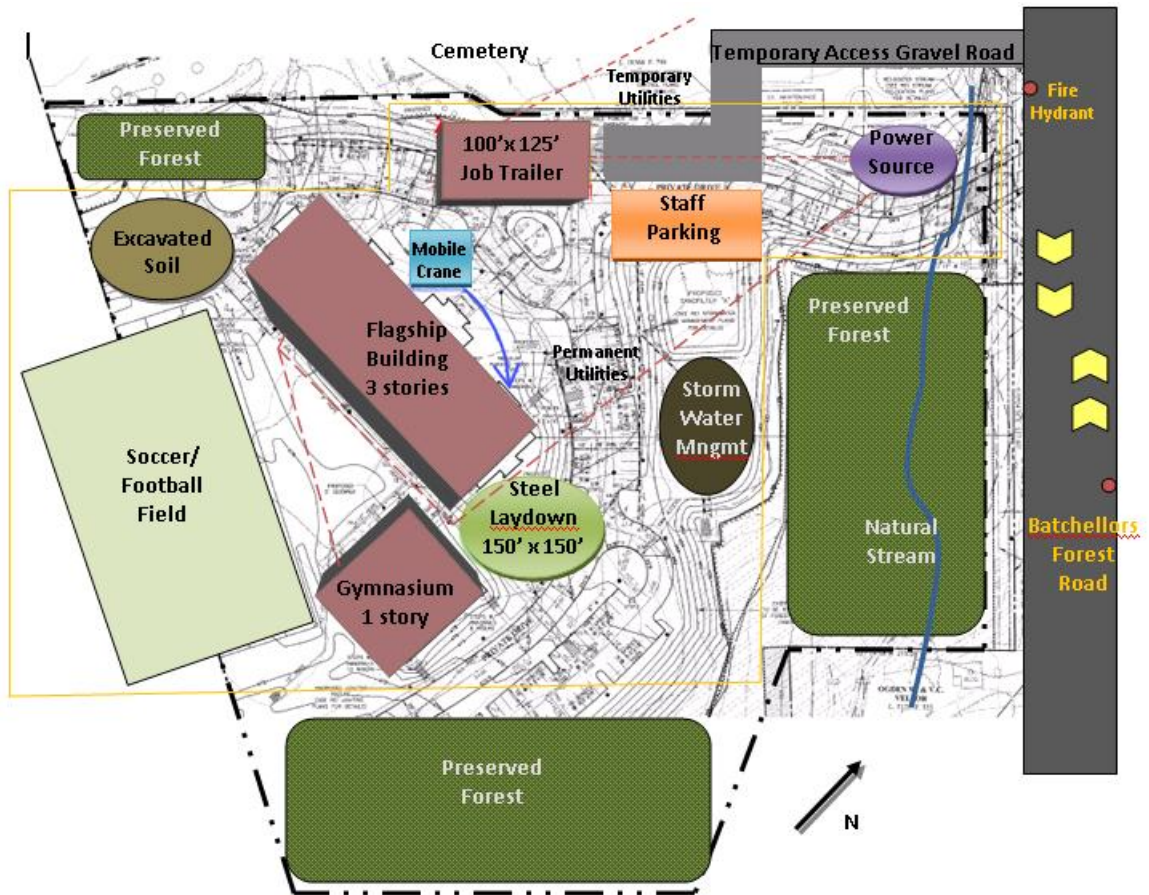


Figure 6.1 WCA Existing Conditions Site Plan

The above site plan represents Phase I of construction. A large site lends itself nicely to much storage area. The site fence (orange line) runs to the interior of the preserved forests. The natural stream was temporarily diverted to build an entrance bridge onto the site from Batchellors Forest Road. There is no traffic light to turn into the site; however Batchellors Forest Road is not busy enough to complicate machinery and truck deliveries. The largest obstructions in the temporary site plan are the turns in the temporary access road, which may cause problems with large delivery trucks. The road had to be run around the utility access point, which also powers a maintenance building for the neighboring cemetery. The site is concealed from the street by thick trees, which also helps to dampen sound coming from construction.



6.5 Site Layout Planning

Please see the two Site Layout Planning Drawings (S.1 & S.2) in **Appendix A**.

Overview

- Address: 16227 Batchellors Forest Road, Olney, Maryland 20832
- County: Montgomery
- Site Size: 60 acres; 26 of the 60 acres are reserved for forest retention



Figure 6.2 Google Earth image of WCA site in Olney, MD

The *Google Earth* aerial photograph above shows the vast 60 acre site roughly highlighted in the red box. Only a portion of this site will be developed for the WCA Flagship Building and Gymnasium construction. The rest of the site will be developed over the next decade and will eventually become an entire WCA campus. A full 60 acre site plan can be seen in Appendix A (S.1), with the site perimeter and preserved forests shown. The second site plan (S.2) shows the planning and layout for the superstructure phase of the project.

Site Layout Planning Analysis

- Temporary Facilities:
 - Trailers: The two trailers on site serve as field offices for the general contractor (Forrester Construction) and the owner (Washington Christian Academy). The double-wide trailer is large enough to accommodate the entire WCA project team. This is important to the success and coordination of the project. The trailer is equipped with



electricity and utilities from the nearby temporary transformer and with water from the existing utilities on the neighboring site. The trailers' locations are at the front of the site for easy monitoring of deliveries and visitors.

- Portable Toilets: Four portable toilets are located in a convenient location for the construction workers and management. There are three for men and one for women.
- Construction Fence: The fence runs around the work area for this construction project, not the entire site. A natural barrier is created by the trees. The fence still surrounds the construction areas and prohibits pedestrians and vehicles from access.
- Dumpsters: There are two locations for the dumpsters. One on the north side of the Flagship Building and the other on the south side near the Gymnasium. This is to alleviate long travel distances to discard waste. Additionally, there are two dumpsters in each location because one is for general waste and the other is for masonry only and recycling purposes. The dumpsters are located near the traffic routes for easy trash removal.
- Traffic:
 - Entrance: The only entrance to the site is off of Batchellors Forest Road. There is no traffic light; however traffic on this road is light enough that turning in to the site should not be a problem. The existing paved entrance road outside the site boundary was previously used as a rear entrance for the neighboring cemetery. During construction, it will be used solely for the WCA project.
 - Personal Automobiles: The subcontractors, management, owners, and visitors may continue on the entrance road beyond the trailers to the parking lot created temporarily for the project. After completion, this lot will be demolished. The lot is out of danger from the crane and other construction activities.
 - Deliveries and Equipment: The site is large enough to allow the most efficient traffic pattern; one-way. Material delivery trucks, garbage trucks, and equipment will never have to turn around on the site in order to exit. The circular path is large enough for most vehicles to turn, yet small enough to create efficient route times. There are two routes by the gym in case the crane is working overhead. This alternate route allows trucks to continue moving while the crane is in use.
- Designated Areas:
 - Steel Laydown: This large site lends itself nicely to storage areas. There is plenty of room to have two steel staging areas. These areas were selected to make delivery easy and crane placement efficient. A forklift can easily fit near these two areas to unload the steel delivery trucks.
 - Excavated Soil: The excavated soil is permitted to be reused for backfill and for the athletic fields. Therefore, storing it on site is more cost efficient than having it removed and then brought back.
 - Mock-Up: This area is near the owner's trailer and is relatively far from daily construction activities. Façade mock-ups and other needed scaled mock-ups can be built in a safe zone.
 - Storm Water Management Pond: This is located slightly down grade from the buildings.



- Crane:
 - The crane was selected on three main criteria: mobility, lifting capacity, and placement radius.
 - The following mobile crane was selected:
 - LTM 1030-2.1
 - 42 ton max capacity at 10' radius
 - 148' max lifting height
 - 132' max radius (approx. 120' used in site plan)



Figure 6.3 LTM 1030-2.1 Mobile Crane

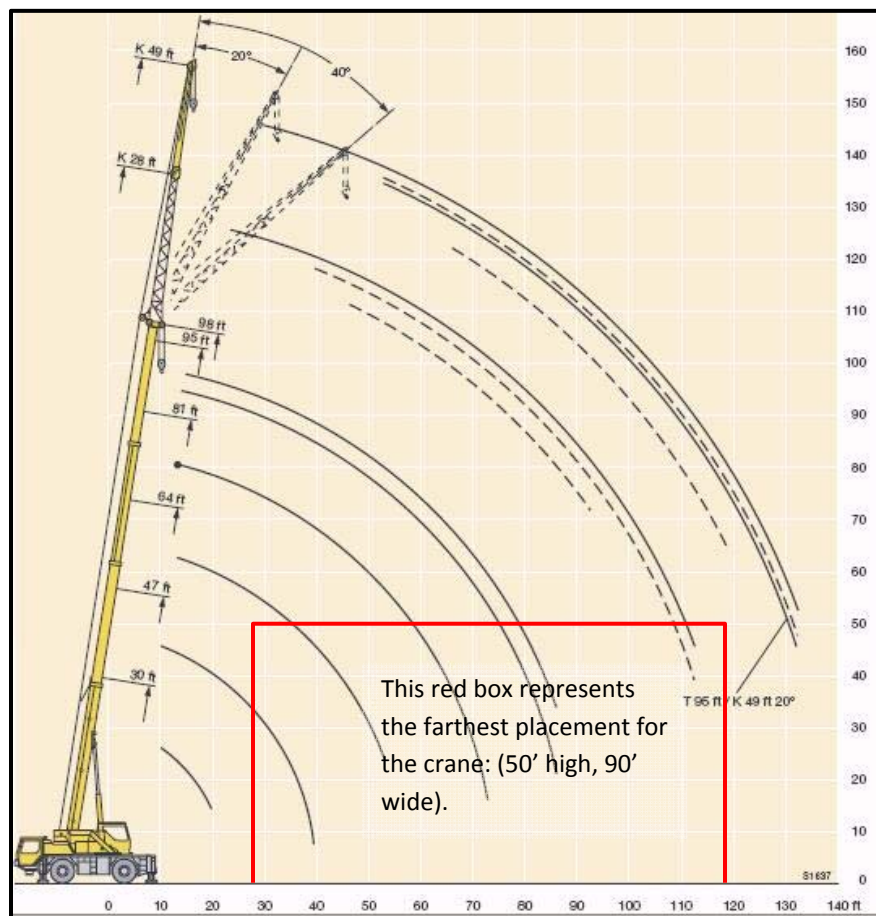


Figure 6.4 Crane reach capabilities diagram from http://www.liebherr.com/at/en/57534_57537.asp

The most difficult placement for the crane will be at 50' high and 90' away. The diagram indicates that this mobile crane is more than capable. The heaviest pick will be a 30' W 18x97 (97 plf x 30' = 2910 lbs → 1.45 tons). Therefore, the crane capacity is more than adequate. The mobility of the crane will allow for easy transport to and from site. Additionally, the crane will be able to move between the three locations necessary to erect the Flagship Building and Gymnasium.