nexus

Submission Category: Construction Management

Date: 12 November 2012

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Summary Narrative

The construction management portion of this project encompasses the three design engineering disciplines. The construction managers were tasked with ensuring an integrated building design that addressed the delivery method, project planning, budget, and schedule. This integration began by developing a BIM Execution Plan, which helped define team dynamics. The BIM Execution Plan is frequently referred to for information exchanges, milestone deadlines, and collaboration procedures amongst team members.

The delivery method meets state regulations that the construction manager must act as an agent and not hold any contracts. Moreover, there must be at least four prime contractors. There can be any number of additional contractors, but there cannot be a general contractor that holds all of the subcontracts and self-performs a portion of the work. As written below, Nexus proposes utilizing 17 subcontractors. The four prime or major subcontractors will be the general works, concrete, mechanical and plumbing, and electrical contractors.

The project planning portion of the assignment is largely surrounded by site logistics planning during and after construction. The site logistics plans developed for construction show how the various trades will be able to easily flow on site from one task to another. By breaking the building up into three sections, contractors will be able to properly divide their work crews to address concerns when they arise. The final site plan shows how the building was repositioned to the center of the northern half of the site to accommodate space for the pool. Additionally, the northeast parking lot was reduced in size. However, the existing parking area was increased in size. Lastly, the baseball field proportions were not affected, thus maintaining the existing playground area.

The project budget is usually the first item defined during the feasibility study and programming phase. As discussed below, based on the amount of money spent on each Reading School District student annually, the district would likely only allocate $13.7 million dollars to the construction of a new school. However, this number becomes unreasonably low when one recognizes that with an 89,500 square foot building, that equates to only $153 per square foot. Thus, Nexus proposes to increase the cost per square foot to $195 and the total cost to $17.5 million. This increased cost is of value to the owner based on greater life cycle savings and the longevity of the facility itself.

The project schedule is discussed in depth in the succeeding pages. The new school will be built in 15 months. This fast track project must start immediately following the end of the school year and continue throughout the following school year, and finally end before the subsequent academic year commences. This schedule can be achieved by having a construction manager work to complete all submittal and pre-planning activities prior to the start of construction. This will ensure that subcontractors are not set behind schedule, except for unforeseen conditions and force majeure.

Project Goals / Requirements

Nexus defined several owner objectives for the construction of Reading School District's new elementary school. The objectives can be lumped into three categories: safety, life cycle, and cost benefit. Safety is a big concern for Reading School District. By increasing the safety on the elementary school campus, students will feel more comfortable and willing to come to school. As a result, student attendance rates are expected to rise with Nexus' design. In addition, having a sense of 'hidden' security will enhance the feeling of safety in the new building. Not having a site fence with barbed wire or metal detectors at all entrances, but rather having hidden security cameras and putting the main entrance on the interior part of the site increases the 'hidden' sense of security. Next, Reading School District desires a building that will last for perhaps 100 years. However, this building must be adaptable and flexible with new emerging technologies and learning / teaching styles. The community must also be integrated into the use of the building, which will increase wear and tear on the finishing materials. Lastly, Reading School District wants a building that is both cost effective in the short term, but also cost efficient in the long term. The city of Reading is economically disadvantaged and therefore will not have the necessary funds to support the construction of a new elementary school. Moreover, they receive little state and federal funding due to the poor testing performance of their students. By reducing initial cost, and maintaining a low life-cycle (operations and maintenance) cost, Reading will be able to afford a new elementary school.

Nexus' project goals can also be lumped into three main categories: integration, lean practices, and learning tools. Integration is the all-encompassing goal of meeting the owner's objectives. Integration involves not only team work and collaboration, but also the integration of the building systems and components. As the main theme of the architecture of the building was already established, Nexus was tasked with integrating the structural, mechanical, and electrical aspects of the building. This integration was produced through lean practices. These lean practices include reduce, reuse, recover. This incorporates lean from all four major disciplines – construction management, structural engineering, mechanical engineering, and lighting / electrical engineering. Lastly, Nexus desired to create a building that could be used as a learning tool for the end users. The building has exposed ceilings, painted structural, mechanical, and electrical elements, and the exterior façade and site can be used to teach.

To reinforce the project goals, and meet the owner objectives, construction management also defined three goals for the construction discipline. The decisions made in the narrative below were all based off of these goals and the support they provided to the project goals and how the met the owner objectives. The construction goals include cost advantage, lifecycle, and efficiency. The cost advantage comes from value engineering principles in both building material and construction labor costs along with schedule sequencing. Lifecycle comes from material and building system selection and maintainability. Lastly, efficiency incorporates the cost advantage and lifecycle by teaching the owner to use the building and its systems as they were designed to reap the benefits of the system's respective attributes.

Narrative Description of and Rationale for Systems / Solutions

Reading

Reading School District is one of the least affluent school districts in Pennsylvania. The state average for dollars allocated to each student is $14,535, whereas Reading only allocates $12,989 per student. The vast majority (84%) of Reading's educational revenue comes from state and federal revenue. Only 12% of the district's educational revenue comes from local taxes. Reading's economic situation had a major impact on the projected cost budget for the project and ultimately Nexus' design.

Reading School District's students consistently underperform in comparison to their fellow Pennsylvania students. This may be a product of the fact that they are not allocated the same resources as their counterparts. The environment in which they learn may also have an impact on how they perform. Nexus strove to design a cost effective building which encourages students to come to school and creates an environment which is conducive to learning.

Safety

Prior to creating a learning environment, safety had to be established. Reading is near the top of the list in terms of crime in Pennsylvania, so Nexus focused heavily on the importance of maintaining the safety and security of the students. In order to maintain the secure feel Nexus turned the educational campus in on itself to shelter the students. This inward turn created a large group congregation space on the inside of the campus. This area allows students to congregate away from the main roads and the dangers of the community. The theme of safety was carried into the building by maintaining one secure entrance. The one entrance ensures that no unwanted visitors enter the school, which is crucial at an elementary school. Nexus also promoted safety by creating a more open atmosphere with high ceilings and easy access to all parts of the building. Reducing sharp edges and potential hazards from materials was also an issue that had to be addressed.

Materials

Material selection was heavily driven by the theme of using the building as a learning tool. Creating a very visible structure and mechanical system can be used to help better educate the students. Using high impact gypsum wall board on metal studs as opposed to concrete block is another way Nexus tried to soften the environment in which students learn.

Using gypsum wall board also allows teachers and students to easily customize the room to facilitate learning.

Flexibility

One of the goals of the owner was flexibility. Gypsum wall board on metal stud allows the owner to more easily change the layout of classrooms and other spaces. There is minimal lateral cross bracing so it would be conceivable to take down a wall and make a classroom twice as large. The open ceiling plane also allows for the mechanical or lighting layouts to be changed much more easily. Excluding a drop ceiling also allows for future telecommunication or electrical to be run to accommodate new technology. The floors of the classrooms have been selected as carpet tile so that when accidents happen there is minimal maintenance and floor tiles can be easily replaced.

Cost

There is also an economical benefit to many of these material selections. The material and labor costs associated with a drop ceiling become direct savings to the owner and provide all the benefits denoted above. By simply using finished concrete for the flooring in the hallway saves on finishes and labor as well while not sacrificing aesthetics. These are all upfront cost savings which are important so that Reading's budget can be met.

The projected budget for the new elementary school was based off of the dollars allocated per student and the size of the project. The $12,989 per student multiplied by the 1,055 projected students gave Nexus a ballpark number of $13.7 million. This results in $153 per square foot which is fairly low for an elementary school. A square foot cost of $195 seemed much more achievable and only pushed the project cost to $17.5 million. However, the budget is ultimately up to the school district.

Pool

One of the major concerns that Nexus has is the addition of a pool to the school. The first concern is that the pool is a huge strain on the budget. Constructing the pool and purchasing the equipment seem excessive considering the projected budget. Additionally, the maintenance required for a pool also increase life-cycle costs. A pool also poses a potential safety threat to the occupants of the school. Overall the pool does not seem to align well with the goals laid out by the owner or by Nexus.

Despite Nexus' misgivings about the pool it has been designed and incorporated into the design as best as possible. The pool sits on the west end of the site and shares a wall with the gymnasium and a stairwell. The building was shifted towards the east end of the site in order to accommodate the pool. Nexus has provided the pool as a potential later phase to help accommodate Reading School District's budget. The pool's mechanical, structural and electrical systems have all been kept separate to allow for the phase potential. The projected cost of the pool is $2.5 million which increases the cost per square foot of the school from $195/SF to $223/SF. If Reading chooses not to build the pool the building will stay shifted to the east to provide a small buffer between 13th Street and the building. Nexus thinks that it might be in the school district's best interest to talk to Albright University about accessing their aquatic facilities prior to taking on the upfront and maintenance costs associated with a pool.

Operations & Maintenance

Nexus also focused heavily on the operations and maintenance costs which will be borne by Reading for the life of the building. Another excellent example of this is the carpet tiles in the classrooms. When accidents occur the tiles can be easily taken up and replaced. This requires minimal material and there is very little labor associated with this change. There are also operations and maintenance costs saved by using static overhangs as opposed to other operable systems. This saves on training school employees as well as future maintenance costs.

Lifecycle

The overhangs / lightshelves are also an important part of another one of Nexus' goals - the reduction of lifecycle costs. Reducing direct light from entering the classrooms helps create a better learning environment and reduces the amount of solar heat gain. Reducing solar gain helps to cut down on the use of the mechanical system and ultimately reduces the energy consumption of the building saving Reading School District's money. In the case of the lobby the opposite approach is used, and glazing is used to allow light into the atrium space. This helps to illuminate the lobby and hallways and reduces the need for luminaires in these spaces. This is a savings of both upfront costs and lifecycle costs.

LEED

An owner goal that was heavily stressed is the achievement of a LEED certification. Nexus took the approach of focusing on lifecycle and the learning environment in order to meet this requirement. An excellent example of this is the mechanical system. In order to create a comfortable learning environment the mechanical system had to be sized to improve indoor air quality by increasing the amount of outside air provided. The motive for this was improving the learning environment but it in turn also helped us meet LEED requirements under indoor environmental quality. The same goes for water efficiency, energy and atmosphere, materials and resources, and sustainable site.

Nexus chose to leave the existing elementary school in place to be repurposed as the Reading School District saw fit. Choosing to keep the elementary school was driven by a few factors. Not demolishing the building created a large savings in both cost and schedule. The reuse of a building is also a very sustainable concept and helps to keep unnecessary waste out of landfills. The economic status of Reading was already addressed and Nexus did not think it was very logical to deprive them of an already existing resource.

Delivery Method

Reading School District's new 89,500 square foot elementary school will be built with the aid of several local contractors. With both state and federal funding, the innovative learning facility will be constructed under the Construction Manager Agent delivery method (see diagram attached in Supporting Documentation section). This is a type of the standard design-bid-build delivery method. The construction management agent will act as the school district's advocate throughout the preconstruction and construction processes. The construction manager will not be responsible (hold) any of the subcontracts on the project.

The construction manager will be responsible for overseeing all of the preconstruction and construction efforts. The preconstruction efforts encompass preliminary cost estimates, schedule projections, risk and constructability analyses. Additionally, the construction manager may define a project execution guidelines and work flow interchanges. The work flow interchanges will most likely be managed through an internet-based project management document system. These documents include construction drawings, shop drawings, change order requests, change order, request for information, cost accounting reports, architectural supplementary information, and supplementary information. Next, the construction manager will begin with site investigation, verifying the geotechnical report discoveries, utility tie-in points, along with obtaining necessary construction permits from local jurisdictions. Moreover, the construction manager will develop a sustainability work plan with explicit strategies that will reinforce Reading School District's emphasis on addressing energy conservation and environmentalism in the new school.

The two biggest preconstruction tasks involve schedule and cost estimations. For this project, Nexus determined that the construction schedule will start in early June immediately after school adjourns for the summer. Construction must then be completed by the end of the following August, approximately 15 months later. Thus, early schedule estimates show that the design phase of the project will need to start in September 2012. The school district will need to take the first six months of design producing a feasibility study to determine if a new elementary school is the most beneficial option to new learning spaces. In the next three months, Reading School District will need to make a project program defining what they desire in a new school. This is most likely when an architect will be hired to consult with the owner.

Starting in May 2013, the architect will be tasked with creating a conceptual design based on the school district's project program. This design will define the shape of the building based on site conditions and constraints, along with the general exterior façade appearance and interior space layout. Next, a more defined schematic design will start identifying spaces, address codes and zoning ordinances, and better represent the owner's needs. Finally, in August 2012, the project will be at the design development stage when the architect hires engineers and consultants to begin the final design iterations. After engineering input and collaboration, the architect will publish construction documents in early 2014. At this point, the construction manager agent is hired by the owner to join the project team.

At this junction, the construction manager analyzes the design and engineering aspects of the building and determines the 15 month construction schedule. Thereafter, the construction manager will develop a cost estimate for the entire project. Then, after writing scopes of work, will develop an estimate for each work scope. Once a bid schedule for the entire project is defined, the construction manager will send out invitations to bid to qualified subcontractors, with an emphasis on local contractors. Once bids are received in March 2014, the construction manager will conduct scope reviews of the subcontractors' bids and select the lowest bidder for each scope (based on Pennsylvania state regulations for public school project that receive federal, state, and local funding). The school district, as the owner of the subcontracts, will award and hold the subcontracts throughout the entirety of the project.

It is important to note that while writing scopes of work, the construction manager must identify, with the architect and engineers, long lead items. For this project, those items include, steel mill order, insulated concrete form order, concrete, sheetmetal, and mechanical units and equipment. It is necessary for the respective subcontractors to order these items so that they are delivered to the site and installed on time. These requirements are normal on most projects, but even more so on this project as 89,500 square feet needs to be constructed in 15 months. The next step involves submittals. The construction manager will need to require the subcontractors to have all submittals approved before construction starts in June 2014. Having the submittals approved will help ensure all lead times are met.

Another aspect of the delivery method for this project involves the subcontractors. Pursuant to Pennsylvania contract law, as previously stated, based on Pennsylvania state regulations for public school projects that receive federal, state, and local funding, there must be a minimum of four prime contractors. These prime contractors will most likely be defined as a general works subcontractor, concrete subcontractor, mechanical and plumbing subcontractor, and electrical subcontractor. In addition, there will be excavation, underground utilities, piles, structural steel, roofing, curtain wall, masonry, glazing, doors, carpet, flooring, fire protection, and testing-adjusting-balancing contractors. In total, that is at least 17 subcontractors. The list below is a general overview of each subcontractor's scope of work.

- General Works
  - metal stud interior partition framing; gypsum wallboard; casework; finishes; painting
- Concrete
  - footers; pile caps / column piers; insulated concrete forms; cast-in-place concrete walls; slab-on-decks; slab-on-grades
- Mechanical and Plumbing
  - mechanical equipment and units; sheetmetal; piping; domestic and sanitary piping; diffusers, registers, grilles
- Electrical
  - electrical equipment; transformers; switchgear; utility connections; conduit; wiring; fixtures; luminaires
- Data
  - cable trays; data and telecommunication wiring; data and telecommunication devices
- Excavation
  - soil excavation; hauling offsite; disposal of contaminated soil
- Utilities
  - Underground utility runs and connections
- Piles
  - steel-driven piles
- Structural Steel
  - structural steel members (HSS columns and lateral bracing); wide-flange girders and beams; joists; trusses; truss braces; metal decking; shear studs
- Roofing
  - built-up white membrane roofing
- Curtain Wall
  - curtain wall elements in classroom spaces; aluminum panel exterior cladding
- Masonry
  - concrete masonry unit infill walls; face-brick exterior cladding
- Glazing
  - glazing elements
- Doors
  - exterior and interior doors; retractable wall systems in gymnasium and stage
- Carpet
  - carpet tiles in the classroom spaces
- Flooring
  - Finished concrete flooring in corridors and auxiliary spaces; gymnasium hardwood floor; stage floor

- Fire Protection
    - sprinkler piping and heads
- Testing, Adjusting, Balancing
    - mechanical, plumbing, electrical, and fire protection system commissioning

Schedule and Sequencing

As stated above, with the scopes of work defined, a bid schedule will be developed. This schedule will be utilized to hold the subcontractors to dates they bid to based on their respective scopes of work (see schedule attached in Supporting Documentation section). The sequencing of the schedule was developed after building a 4-dimensional model in Navisworks. To develop this model, a 3-dimensional model was imported from Revit. The Revit model incorporated architectural, structural, mechanical, plumbing, and lighting / electrical aspects. The Navisworks model was utilized for schedule, sequencing, constructability, and clash-detection purposes. The Navisworks model was the greatest tool to show systems integration and team collaboration.

The project schedule was developed based on the 15 month construction period. It reinforces Nexus' project goal of reducing construction time on site. Reducing this duration will have a smaller impact on the environment and most likely reduce construction cost since labor is the most expensive part of construction. All of these factors meet the school district's objectives of cost benefit, sustainability, and functionality.

The last day of the 2013-2014 Reading School District academic year is Friday, June 6, 2014. On Monday, June 9, 2014, the construction manager will be given a Notice to Proceed. This first major construction milestone means that the site is ready to be mobilized. Immediately after, excavation will begin and last for approximately five weeks. No other contractor will be permitted on site due to the presence of contaminated soils. Thereafter, prior to the foundation commencing, the utilities contractor will perform their necessary work on site. As the summer progresses, all foundation work will occur during the month of August. The sequencing of this work will proceed as it did during excavation, from the west to east side of the site. After the steel-drive piles are installed, the concrete strip footers and pile caps will follow. Lastly, the pool and basement walls and slabs will be cast.

The general sequencing of the remaining three floors will proceed in a nearly identical fashion. In essence, the concrete work on each floor will lead the steel work. The steel work will remain one to two sections behind. As seen on the attached site logistics plans and as described in the section below, the structure is divided into three main sections (pool / gym area, classroom area, and east wing area). On the first floor, the structural steel columns will be erected first. They will be braced to the ground with guyed wires. This will require the use of a crawler crane positioned on the south access road of the site. As the crane moves eastward to erect the basement beams, the concrete pump will be positioned in the pool and gym region of the site to start placing the slabs-on-grade and first lift of insulated concrete form walls. The insulated concrete form walls, although only cast in 14 foot lifts, will be temporarily braced until the steel members supporting them are erected. As seen on the schedule, this end of the building is the most concrete intensive. Then, the first floor beams (second level floor support) will be erected. The classroom area, as seen on the schedule, is the most intensive steel erection area. Consequently, the second and third levels will proceed in a very similar manner.

Next on the schedule is the metal decking placement and slab-on-deck placement. Next, the curtain wall will be stick-built and insulated to meet the same thermal requirements as the insulated concrete form walls. Then the masonry contractor can mobilize and set up scaffolding to start the face-brick installation. In concurrence with this work on upper floors, the curtain wall contractor will begin the aluminum panel installations. Once the exterior walls are complete, the glazing contractor will install the window modules. While this is happening, the roofing contractor will make the building water-tight for interior construction to begin.

The main entrance of the building is a glass curtain wall on the upper two floors, and aluminum paneled curtain wall on the first level. This area will be left open and unconstructed for a hoist to be positioned there for material access into the building. Once this is underway, the mechanical, plumbing, electrical, and fire protection work can begin. These various rough-ins will be followed by the metal stud wall framing and gypsum wallboard tasks. Finishing work by the general works contractor will include casework installation, fixtures, and painting. Then, the carpet tile floors can be installed in the classrooms along with the concrete finished flooring in the corridors. Lastly, the testing, adjusting, and balancing contractor can test the building automated systems.

To reach substantial completion, the construction manager and remaining subcontractors on site will demobilize so the end-users have two weeks to move into the building. Also during these two weeks, any new equipment training for the end-users will be conducted. Finally, school will begin on Monday, August 24, 2015 for the 2015-2016 academic year. To better understand the schedule and sequencing, watching the 4-dimensional Navisworks video is beneficial. This video shows each of the structural and exterior architectural elements of the building being constructed. In conjunction, it is valuable to look at the site logistics plan created to represent construction procedures.

Site Logistics

Continuing with the theme of the schedule meeting Nexus' project goals, the attached site logistics plans meet Nexus' team goals of integration and sustainability and the school district's objectives of safety, accessibility, flexibility, and cost benefit. To begin, the site logistics plan encompasses the entire project site, surrounding roads, and the existing elementary school on site. First, it is imperative to notice the planned new elementary school was repositioned to the center of the top of the site. This was due in large part to accommodate room for the pool on the west end. As seen in the final site plan for the finished building, the parking area in the northeast corner was reduced in size due to the building moving east. This displaced parking was moved to a new central lot which increased the size of the existing parking lot. The bus lane will remain one way, with traffic progressing from west to east.

A construction fence will be installed on the northern and eastern halves of the site to protect the students, teachers, and staff members of the current elementary school, pedestrians on the sidewalks, and traffic passengers. There are two attached traffic plans that represent how the site will function for deliveries. The proposed new bus lane will be the guide for the main access road. However, it is important to note that this access road will only have an entrance to it from the west end during excavation work. This will help with dump truck flow continuity in removal of the contaminated soil. Also important to note is that the north gate will only be utilized as an entrance while the east gate will only be utilized as an exit. By having two gates, we allow for the possibility of a union and non-union gate, along with the possibility of having a third gate (the west gate) for site access in the case of a labor strike.

General site logistics items to note are the site trailers (most likely utilized by the construction manager and four prime contractors) with space available for parking. The placement of the trailers between the two main gates is to oversee deliveries and other vehicles arriving on site. Various storage containers and laydown areas can be staged in the south-eastern region of the site. As explained in the above section, construction will proceed from west to east. One of the biggest site concerns is the sequencing of the concrete and steel structure. The concrete pump will be stages between the south access road and building at all times to leave the road open for concrete trucks. In addition, this road will be used for the crawler crane and steel delivery trucks. In the case of a bottleneck, due to the safety concerns of the crane and its delivery trucks, the steel contractor will have precedence of the access road over the concrete contractor (which has more mobile equipment and trucks).

Safe site working conditions will be achieved largely through contractor work practices, but also with the site fence. The site fence will double as a security fence for the site during construction. The building footprint will be lit at night to attempt to prevent vandalism, which is of great concern in the city of Reading. Moreover, the bus lane will have bollards at the west end put up during the school day so that traffic may only enter the site from the existing south entrance and exit. However, the east exit will always be open. Furthermore, the site’s accessibility and flexibility are displayed through the two access roads and three gates. Lastly, the school district will notice cost benefits by the site only being occupied for the 15 month construction durations. The site will contain a comingled dumpster for offsite recycling. This will help cut down on contractor material waste and promote material reuse.

Look-ahead

Report and presentation content:

Detailed estimate – structure (concrete, steel), glazing, masonry, aluminum panels, mechanical, lighting, finishing materials; first cost versus life cycle analyses

Detailed schedule – update structural components based on feedback; more in-depth MEP and finishing sequences; risk analysis

Site logistics / 4D – more detailed (include equipment simulations)

Constructability – systems integration; crane and concrete pump sizing; hoist functionality

LEED analysis – LEED checklist; sustainability challenges; cost benefit analysis

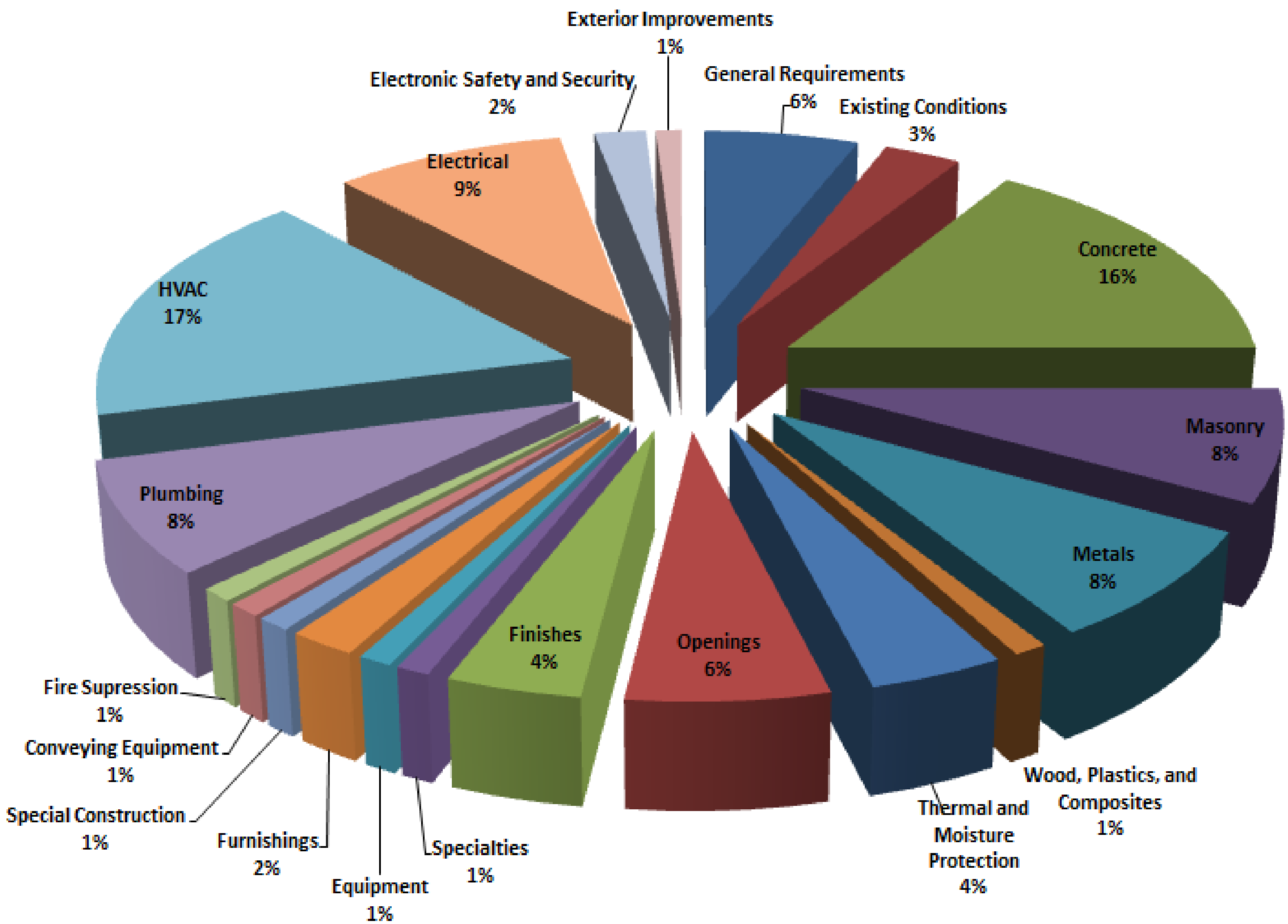
Modeling – building completeness, material selections, rendering capabilities

Supporting Documentation and Drawings – codes, zoning, and other legal requirements; specification standards

Cost Breakdown

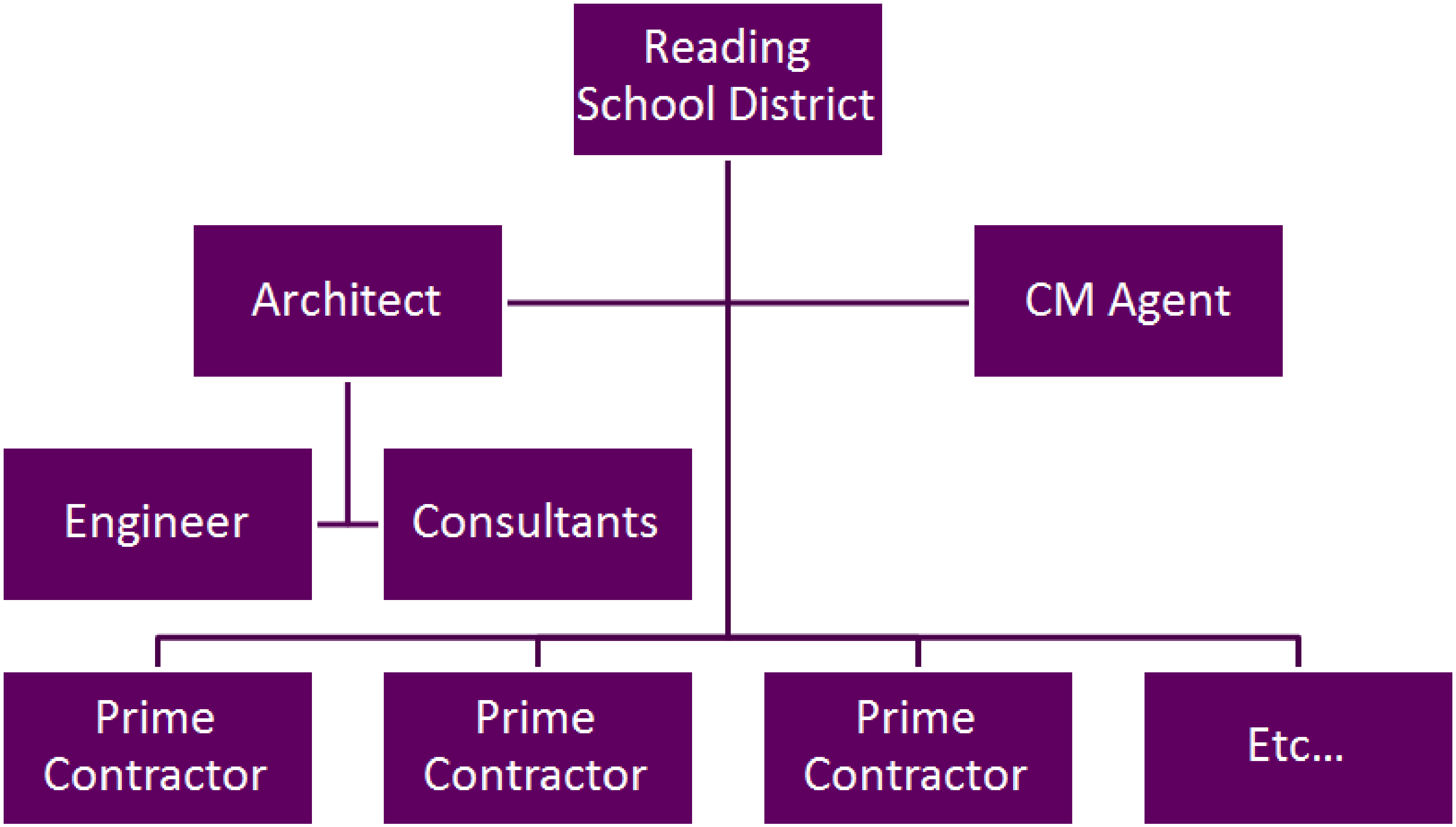
		Cost/SF	% of Cost	Cost
Division 1	General Requirements	$ 11.73	6%	$ 1,050,000
Division 2	Existing Conditions	$ 5.86	3%	$ 525,000
Division 3	Concrete	$ 31.28	16%	$ 2,800,000
Division 4	Masonry	$ 15.64	8%	$ 1,400,000
Division 5	Metals	$ 15.64	8%	$ 1,400,000
Division 6	Wood, Plastics, and Composites	$ 1.95	1%	$ 175,000
Division 7	Thermal and Moisture Protection	$ 7.82	4%	$ 700,000
Division 8	Openings	$ 11.73	6%	$ 1,050,000
Division 9	Finishes	$ 7.82	4%	$ 700,000
Division 10	Specialties	$ 1.95	1%	$ 175,000
Division 11	Equipment	$ 1.95	1%	$ 175,000
Division 12	Furnishings	$ 3.91	2%	$ 350,000
Division 13	Special Construction	$ 1.95	1%	$ 175,000
Division 14	Conveying Equipment	$ 1.95	1%	$ 175,000
Division 21	Fire Supression	$ 1.95	1%	$ 175,000
Division 22	Plumbing	$ 15.64	8%	$ 1,400,000
Division 23	HVAC	$ 33.23	17%	$ 2,975,000
Division 26	Electrical	$ 17.59	9%	$ 1,575,000
Division 28	Electronic Safety and Security	$ 3.91	2%	$ 350,000
Division 32	Exterior Improvements	$ 1.95	1%	$ 175,000
	Cost / SF	**$ 195.48**	**Total**	**$ 17,500,000**

Cost Breakdown



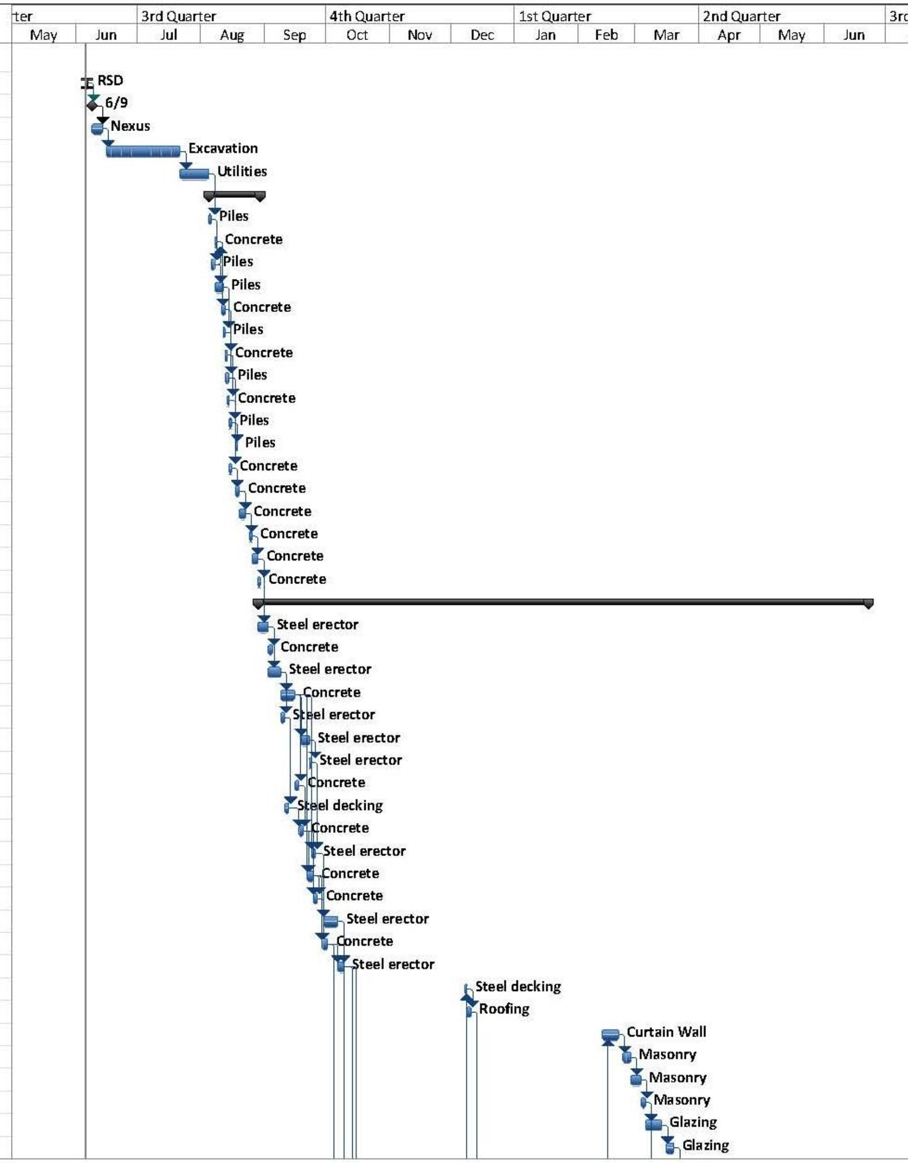
Cost Breakdown w/ Pool					
		Cost/SF	% of Cost	Cost	
Division 1	General Requirements	$ 11.73	6%	$	1,050,000
Division 2	Existing Conditions	$ 5.86	3%	$	525,000
Division 3	Concrete	$ 31.28	16%	$	2,800,000
Division 4	Masonry	$ 15.64	8%	$	1,400,000
Division 5	Metals	$ 15.64	8%	$	1,400,000
Division 6	Wood, Plastics, and Composites	$ 1.95	1%	$	175,000
Division 7	Thermal and Moisture Protection	$ 7.82	4%	$	700,000
Division 8	Openings	$ 11.73	6%	$	1,050,000
Division 9	Finishes	$ 7.82	4%	$	700,000
Division 10	Specialties	$ 1.95	1%	$	175,000
Division 11	Equipment	$ 1.95	1%	$	175,000
Division 12	Furnishings	$ 3.91	2%	$	350,000
Division 13	Special Construction	$ 1.95	1%	$	175,000
	Pool	$ 27.93	-	$	2,500,000
Division 14	Conveying Equipment	$ 1.95	1%	$	175,000
Division 21	Fire Supression	$ 1.95	1%	$	175,000
Division 22	Plumbing	$ 15.64	8%	$	1,400,000
Division 23	HVAC	$ 33.23	17%	$	2,975,000
Division 26	Electrical	$ 17.59	9%	$	1,575,000
Division 28	Electronic Safety and Security	$ 3.91	2%	$	350,000
Division 32	Exterior Improvements	$ 1.95	1%	$	175,000
	Cost / SF	**$ 223.41**	**Total**	**$**	**20,000,000**

Delivery Method



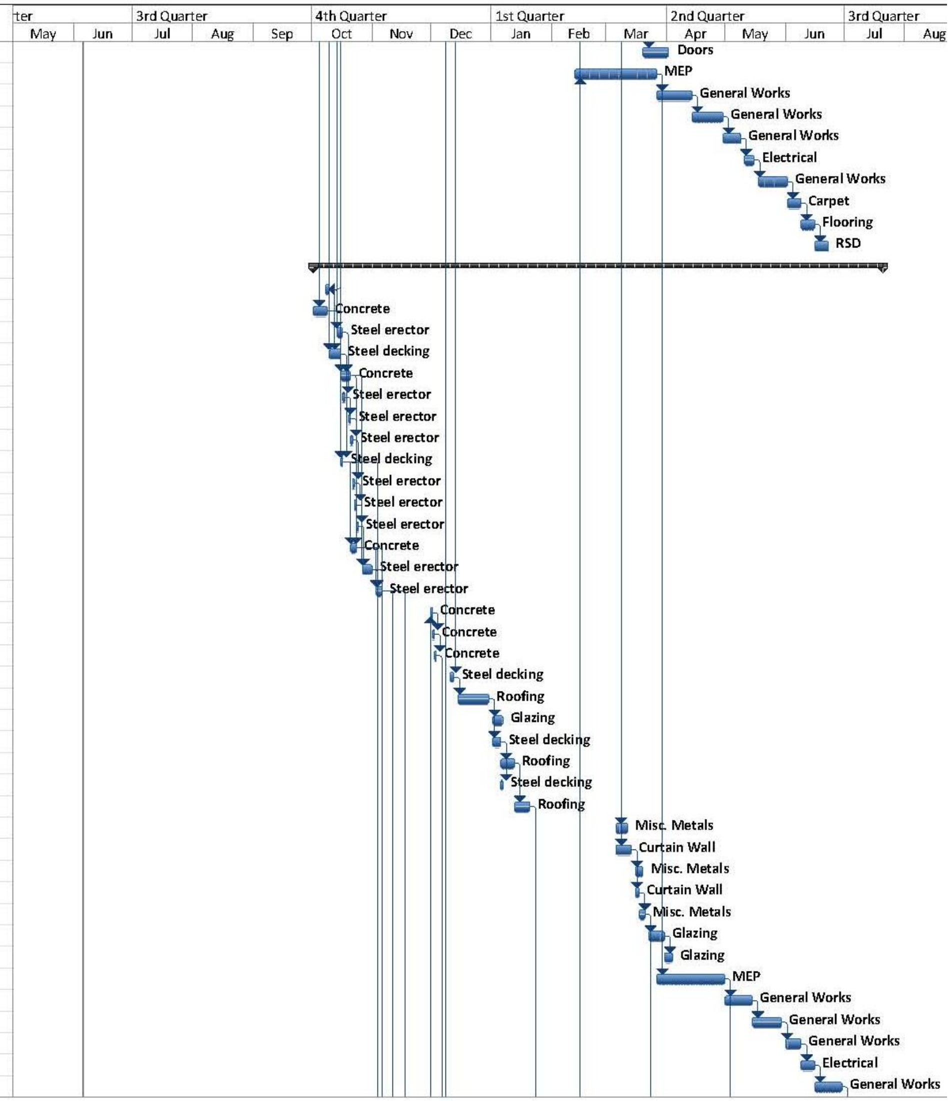
Nexus

ID	Task Name	Duration	Start	Finish	Resource Names
1	**<u>Construction</u>**				
2	*Last Day of School*	1 day	Fri 6/6/14	Fri 6/6/14	RSD
3	*Notice to Proceed*	0 days	Mon 6/9/14	Mon 6/9/14	Nexus
4	*Mobilization*	5 days	Mon 6/9/14	Fri 6/13/14	Nexus
5	Excavation	25 days	Mon 6/16/14	Mon 7/21/14	Excavation
6	Utilities	10 days	Tue 7/22/14	Mon 8/4/14	Utilities
7	**Foundation**	**19 days**	**Tue 8/5/14**	**Fri 8/29/14**	
8	piles - pool	1 day	Tue 8/5/14	Tue 8/5/14	Piles
9	footers - pool	1 day	Fri 8/8/14	Fri 8/8/14	Concrete
10	piles - gym north	2 days	Wed 8/6/14	Thu 8/7/14	Piles
11	piles - gym south	2 days	Fri 8/8/14	Mon 8/11/14	Piles
12	footer - gym	2 days	Mon 8/11/14	Tue 8/12/14	Concrete
13	piles - stair north	1 day	Tue 8/12/14	Tue 8/12/14	Piles
14	footers -stair	1 day	Wed 8/13/14	Wed 8/13/14	Concrete
15	piles - classroom	2 days	Wed 8/13/14	Thu 8/14/14	Piles
16	footers -classroom	1 day	Thu 8/14/14	Thu 8/14/14	Concrete
17	piles - NE corner	1 day	Fri 8/15/14	Fri 8/15/14	Piles
18	piles - east	1 day	Mon 8/18/14	Mon 8/18/14	Piles
19	footers - east	1 day	Fri 8/15/14	Fri 8/15/14	Concrete
20	pool walls	2 days	Mon 8/18/14	Tue 8/19/14	Concrete
21	pool slabs	3 days	Wed 8/20/14	Fri 8/22/14	Concrete
22	pool deck slab	1 day	Mon 8/25/14	Mon 8/25/14	Concrete
23	basement walls	3 days	Tue 8/26/14	Thu 8/28/14	Concrete
24	basement slab	1 day	Fri 8/29/14	Fri 8/29/14	Concrete
25	**First Floor**	**205 days**	**Fri 8/29/14**	**Mon 6/22/15**	
26	pool and gym columns	2 days	Fri 8/29/14	Tue 9/2/14	Steel erector
27	gym slab on grade 1st	2 days	Wed 9/3/14	Thu 9/4/14	Concrete
28	classroom columns	4 days	Wed 9/3/14	Mon 9/8/14	Steel erector
29	pool and gym walls 1st lift	5 days	Tue 9/9/14	Mon 9/15/14	Concrete
30	basement beams	2 days	Tue 9/9/14	Wed 9/10/14	Steel erector
31	pool beams	2 days	Fri 9/19/14	Mon 9/22/14	Steel erector
32	pool and gym girders	1 day	Tue 9/23/14	Tue 9/23/14	Steel erector
33	classroom slab on grade 1st	2 days	Tue 9/16/14	Wed 9/17/14	Concrete
34	classroom metal decking	2 days	Thu 9/11/14	Fri 9/12/14	Steel decking
35	classroom slab on deck 1st	2 days	Thu 9/18/14	Fri 9/19/14	Concrete
36	pool and gym beams 1st	2 days	Wed 9/24/14	Thu 9/25/14	Steel erector
37	classroom walls 1st lift	3 days	Mon 9/22/14	Wed 9/24/14	Concrete
38	east slab on grade 1st	2 days	Thu 9/25/14	Fri 9/26/14	Concrete
39	classroom beams 1st	5 days	Tue 9/30/14	Mon 10/6/14	Steel erector
40	east walls 1st	3 days	Mon 9/29/14	Wed 10/1/14	Concrete
41	east beams 1st	3 days	Tue 10/7/14	Thu 10/9/14	Steel erector
42	classroom 1st floor roof decking	1 day	Mon 12/8/14	Mon 12/8/14	Steel decking
43	classroom 1st floor roof	2 days	Tue 12/9/14	Wed 12/10/14	Roofing
44	classroom curtain walls 1st	6 days	Fri 2/13/15	Fri 2/20/15	Curtain Wall
45	pool and gym brick 1st	4 days	Mon 2/23/15	Thu 2/26/15	Masonry
46	classroom brick 1st	3 days	Fri 2/27/15	Tue 3/3/15	Masonry
47	east brick 1st	2 days	Wed 3/4/15	Thu 3/5/15	Masonry
48	windows 1st floor icf	6 days	Fri 3/6/15	Fri 3/13/15	Glazing
49	windows 1st floor cw	4 days	Mon 3/16/15	Thu 3/19/15	Glazing



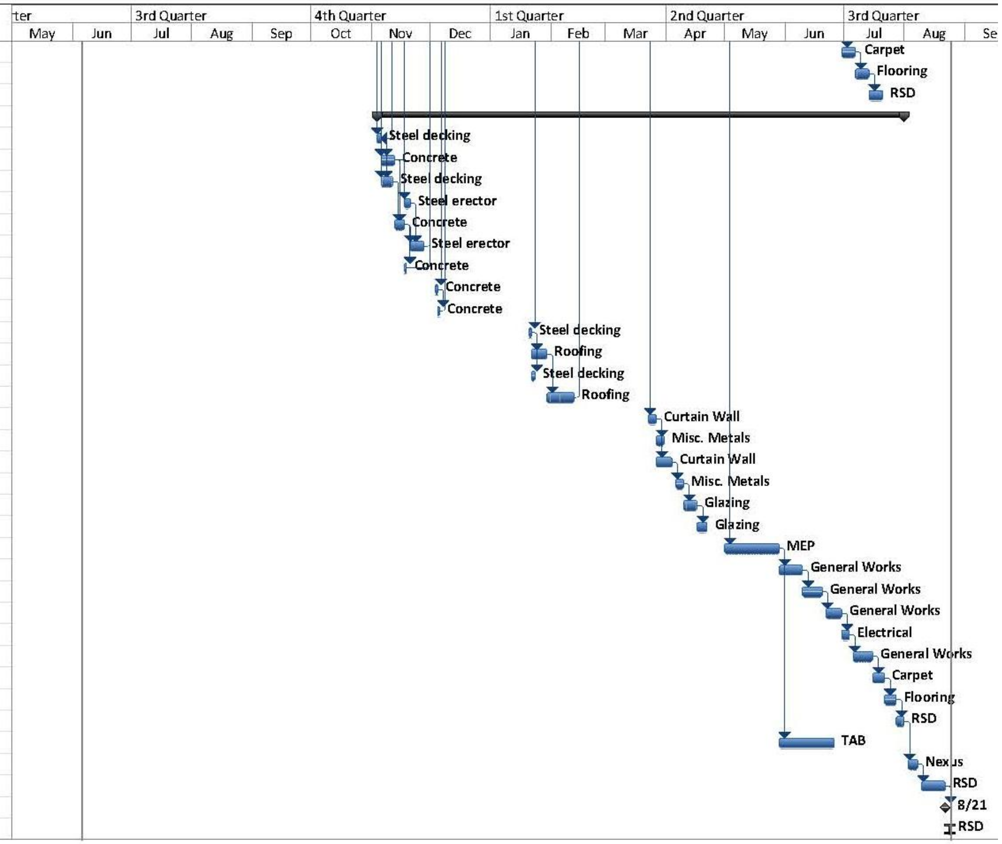
Nexus

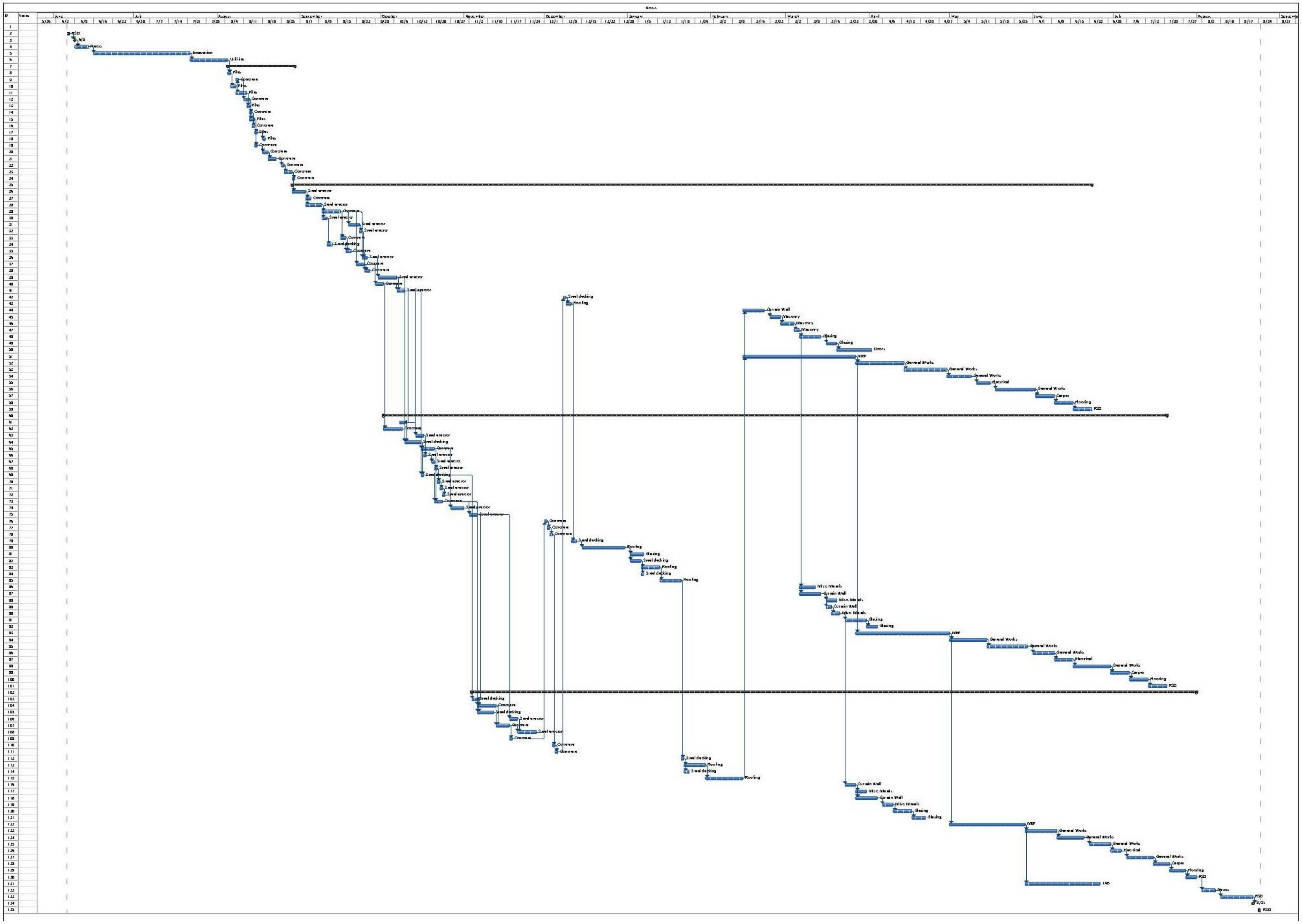
ID	Task Name	Duration	Start	Finish	Resource Names
50	exterior doors 1st floor	9 days	Fri 3/20/15	Wed 4/1/15	Doors
51	MEFP rough-ins	30 days	Fri 2/13/15	Thu 3/26/15	MEP
52	stud walls	12 days	Fri 3/27/15	Mon 4/13/15	General Works
53	gypsum wallboard	12 days	Tue 4/14/15	Wed 4/29/15	General Works
54	casework	7 days	Thu 4/30/15	Fri 5/8/15	General Works
55	fixtures	5 days	Mon 5/11/15	Fri 5/15/15	Electrical
56	finishes	10 days	Mon 5/18/15	Mon 6/1/15	General Works
57	carpet tile flooring	5 days	Tue 6/2/15	Mon 6/8/15	Carpet
58	concrete floor finishing	5 days	Tue 6/9/15	Mon 6/15/15	Flooring
59	equipment	5 days	Tue 6/16/15	Mon 6/22/15	RSD
60	**Second Floor**	**202 days**	**Thu 10/2/14**	**Mon 7/20/15**	
61	gym metal decking	2 days	Wed 10/8/14	Thu 10/9/14	
62	pool and gym walls 2nd lift	5 days	Thu 10/2/14	Wed 10/8/14	Concrete
63	gym beams 2nd	3 days	Tue 10/14/14	Thu 10/16/14	Steel erector
64	classroom metal decking	4 days	Fri 10/10/14	Wed 10/15/14	Steel decking
65	classroom walls 2nd lift	3 days	Thu 10/16/14	Mon 10/20/14	Concrete
66	pool trusses north	1 day	Fri 10/17/14	Fri 10/17/14	Steel erector
67	pool trusses south	1 day	Mon 10/20/14	Mon 10/20/14	Steel erector
68	pool truss braces	1 day	Tue 10/21/14	Tue 10/21/14	Steel erector
69	east metal decking	1 day	Thu 10/16/14	Thu 10/16/14	Steel decking
70	gym trusses west	1 day	Wed 10/22/14	Wed 10/22/14	Steel erector
71	gym trusses east	1 day	Thu 10/23/14	Thu 10/23/14	Steel erector
72	gym truss braces	1 day	Fri 10/24/14	Fri 10/24/14	Steel erector
73	east walls 2nd	3 days	Tue 10/21/14	Thu 10/23/14	Concrete
74	classroom beams 2nd	5 days	Mon 10/27/14	Fri 10/31/14	Steel erector
75	east beams roof	3 days	Mon 11/3/14	Wed 11/5/14	Steel erector
76	gym slab on deck 2nd	1 day	Mon 12/1/14	Mon 12/1/14	Concrete
77	classroom slab on deck 2nd	1 day	Tue 12/2/14	Tue 12/2/14	Concrete
78	east slab on deck 2nd	1 day	Wed 12/3/14	Wed 12/3/14	Concrete
79	pool and gym roof decking	2 days	Thu 12/11/14	Fri 12/12/14	Steel decking
80	pool and gym roof	10 days	Mon 12/15/14	Tue 12/30/14	Roofing
81	pool and gym skylights	3 days	Fri 1/2/15	Tue 1/6/15	Glazing
82	classroom 2nd floor roof decking	2 days	Fri 1/2/15	Mon 1/5/15	Steel decking
83	classroom 2nd floor roof	5 days	Tue 1/6/15	Mon 1/12/15	Roofing
84	east roof decking	1 day	Tue 1/6/15	Tue 1/6/15	Steel decking
85	east roof	6 days	Tue 1/13/15	Tue 1/20/15	Roofing
86	pool and gym aluminum panel 2nc	4 days	Fri 3/6/15	Wed 3/11/15	Misc. Metals
87	classroom curtain walls 2nd	6 days	Fri 3/6/15	Fri 3/13/15	Curtain Wall
88	classroom aluminum panel 2nd	4 days	Mon 3/16/15	Thu 3/19/15	Misc. Metals
89	east curtain wall 2nd	2 days	Mon 3/16/15	Tue 3/17/15	Curtain Wall
90	east aluminum panel 2nd	3 days	Wed 3/18/15	Fri 3/20/15	Misc. Metals
91	windows 2nd floor icf	6 days	Mon 3/23/15	Mon 3/30/15	Glazing
92	windows 2nd floor cw	4 days	Tue 3/31/15	Fri 4/3/15	Glazing
93	MEFP rough-ins	25 days	Fri 3/27/15	Thu 4/30/15	MEP
94	stud walls	10 days	Fri 5/1/15	Thu 5/14/15	General Works
95	gypsum wallboard	10 days	Fri 5/15/15	Fri 5/29/15	General Works
96	casework	6 days	Mon 6/1/15	Mon 6/8/15	General Works
97	fixtures	5 days	Tue 6/9/15	Mon 6/15/15	Electrical
98	finishes	10 days	Tue 6/16/15	Mon 6/29/15	General Works



Nexus

ID	Task Name	Duration	Start	Finish	Resource Names
99	carpet tile flooring	5 days	Tue 6/30/15	Mon 7/6/15	Carpet
100	concrete floor finishing	5 days	Tue 7/7/15	Mon 7/13/15	Flooring
101	equipment	5 days	Tue 7/14/15	Mon 7/20/15	RSD
102	**Third Floor**	**188 days**	**Tue 11/4/14**	**Fri 7/31/15**	
103	gym metal decking 3rd	2 days	Tue 11/4/14	Wed 11/5/14	Steel decking
104	gym walls 3rd lift	5 days	Thu 11/6/14	Wed 11/12/14	Concrete
105	classroom metal decking	4 days	Thu 11/6/14	Tue 11/11/14	Steel decking
106	gym beams roof	3 days	Tue 11/18/14	Thu 11/20/14	Steel erector
107	classroom walls 3rd lift	3 days	Thu 11/13/14	Mon 11/17/14	Concrete
108	classroom beams roof	5 days	Fri 11/21/14	Thu 11/27/14	Steel erector
109	east walls 3rd lift	1 day	Tue 11/18/14	Tue 11/18/14	Concrete
110	gym slab on deck 3rd	1 day	Thu 12/4/14	Thu 12/4/14	Concrete
111	classroom slab on deck 3rd	1 day	Fri 12/5/14	Fri 12/5/14	Concrete
112	gym roof decking	1 day	Wed 1/21/15	Wed 1/21/15	Steel decking
113	gym roof	6 days	Thu 1/22/15	Thu 1/29/15	Roofing
114	classroom roof decking	2 days	Thu 1/22/15	Fri 1/23/15	Steel decking
115	classroom roof	10 days	Fri 1/30/15	Thu 2/12/15	Roofing
116	gym curtain walls 3rd	4 days	Mon 3/23/15	Thu 3/26/15	Curtain Wall
117	gym aluminum panel 3rd	2 days	Fri 3/27/15	Mon 3/30/15	Misc. Metals
118	clasroom curtain walls 3rd	6 days	Fri 3/27/15	Fri 4/3/15	Curtain Wall
119	classroom aluminum panel 3rd	4 days	Mon 4/6/15	Thu 4/9/15	Misc. Metals
120	windows 3rd floor icf	5 days	Fri 4/10/15	Thu 4/16/15	Glazing
121	windows 3rd floor cw	3 days	Fri 4/17/15	Tue 4/21/15	Glazing
122	MEFP rough-ins	19 days	Fri 5/1/15	Thu 5/28/15	MEP
123	stud walls	8 days	Fri 5/29/15	Tue 6/9/15	General Works
124	gypsum wallboard	8 days	Wed 6/10/15	Fri 6/19/15	General Works
125	casework	6 days	Mon 6/22/15	Mon 6/29/15	General Works
126	fixtures	4 days	Tue 6/30/15	Fri 7/3/15	Electrical
127	finishes	8 days	Mon 7/6/15	Wed 7/15/15	General Works
128	carpet tile flooring	4 days	Thu 7/16/15	Tue 7/21/15	Carpet
129	concrete floor finishing	4 days	Wed 7/22/15	Mon 7/27/15	Flooring
130	equipment	4 days	Tue 7/28/15	Fri 7/31/15	RSD
131	*Commissioning*	20 days	Fri 5/29/15	Thu 6/25/15	TAB
132	*Demobilization*	5 days	Mon 8/3/15	Fri 8/7/15	Nexus
133	*FF&E*	10 days	Mon 8/10/15	Fri 8/21/15	RSD
134	*Substantial Completion*	0 days	Fri 8/21/15	Fri 8/21/15	Nexus
135	*First Day of School*	1 day	Mon 8/24/15	Mon 8/24/15	RSD

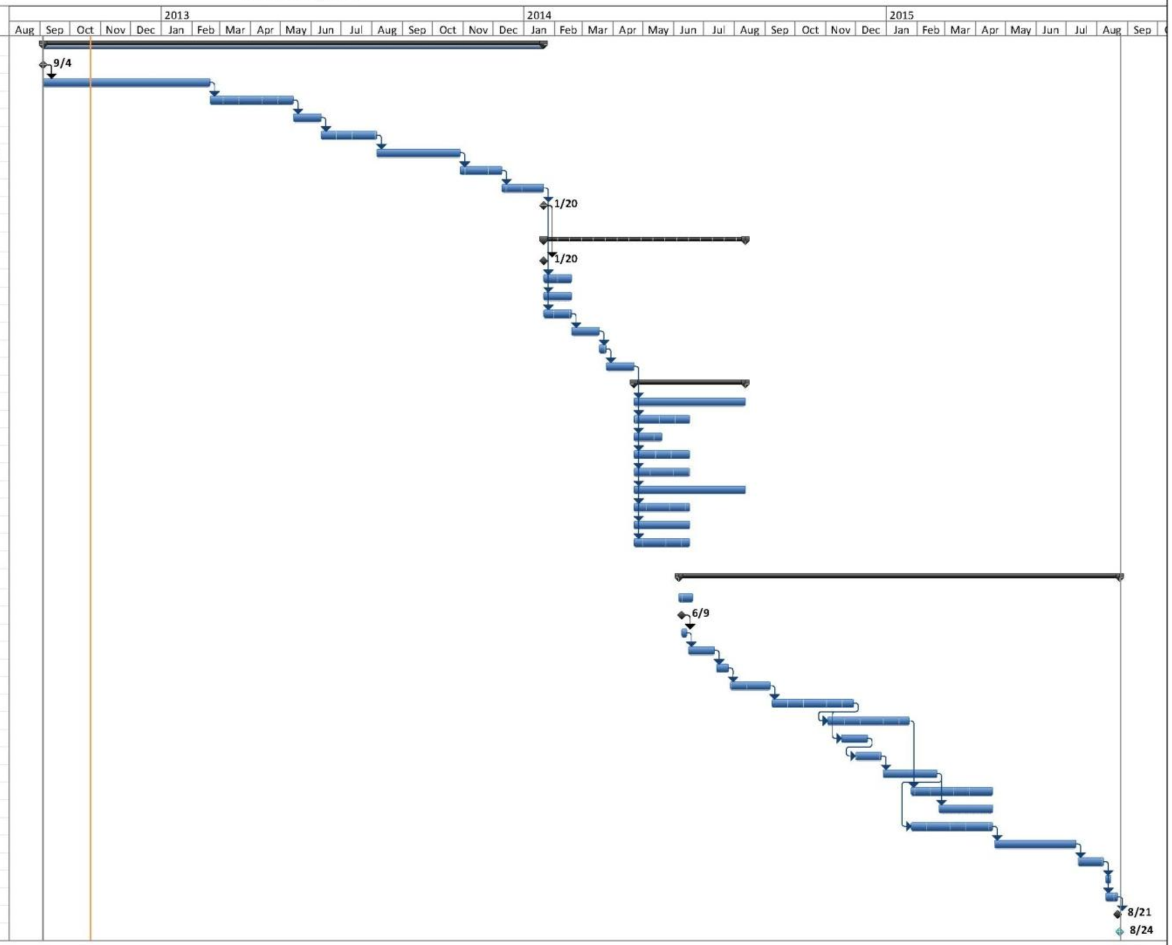




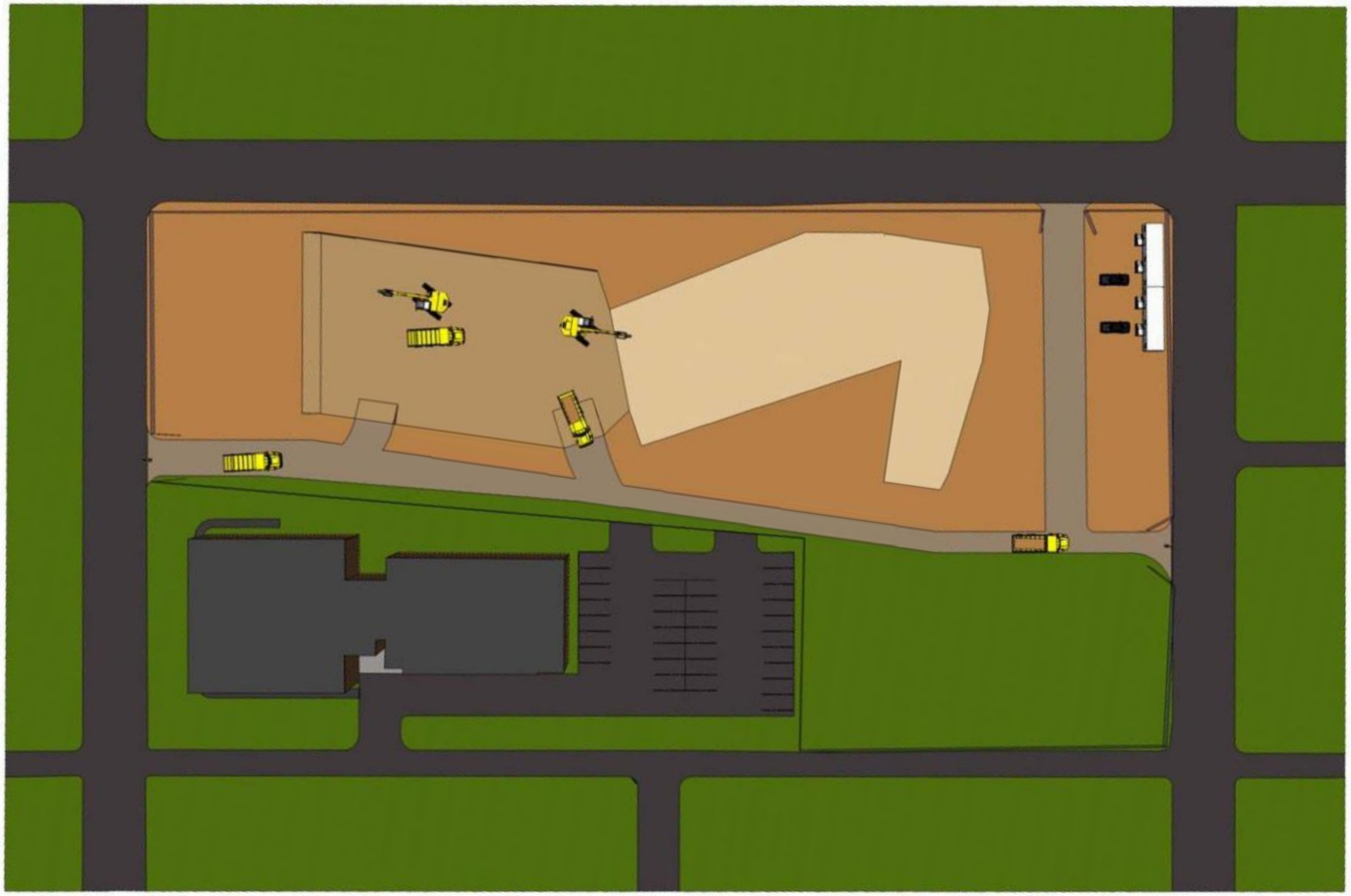
Excavation
Utilities
Piles
Concrete
Steel erector
Steel decking
Roofing
Glazing
Curtain Wall
Masonry
Doors
MEP
General Works
Electrical
Carpet
Flooring
Misc. Metals

Reading Area School District
New Elementary School

ID	Task Mode	Task Name	Duration	Start	Finish
1		**Design**	**360 days**	**Tue 9/4/12**	**Mon 1/20/14**
2		*Notice to Proceed*	0 days	Tue 9/4/12	Tue 9/4/12
3		Feasibility Study	6 mons	Tue 9/4/12	Mon 2/18/13
4		Programming	3 mons	Tue 2/19/13	Mon 5/13/13
5		Conceptual Design	1 mon	Tue 5/14/13	Mon 6/10/13
6		Schematic Design	2 mons	Tue 6/11/13	Mon 8/5/13
7		Design Development	3 mons	Tue 8/6/13	Mon 10/28/13
8		50% Construction Documents	1.5 mons	Tue 10/29/13	Mon 12/9/13
9		Construction Documents	1.5 mons	Tue 12/10/13	Mon 1/20/14
10		*Substantial Completion*	0 days	Mon 1/20/14	Mon 1/20/14
11					
12		**Preconstruction**	**145 days**	**Mon 1/20/14**	**Mon 8/11/14**
13		Design Complete	0 days	Mon 1/20/14	Mon 1/20/14
14		Estimate Complete	1 mon	Tue 1/21/14	Mon 2/17/14
15		Bid Schedule Complete	1 mon	Tue 1/21/14	Mon 2/17/14
16		Scopes of Work Defined	1 mon	Tue 1/21/14	Mon 2/17/14
17		Invitation to Bid	1 mon	Tue 2/18/14	Mon 3/17/14
18		Subcontractor Awarding	1 wk	Tue 3/18/14	Mon 3/24/14
19		Submittals	1 mon	Tue 3/25/14	Mon 4/21/14
20		Lead Times - Delivery Times	**80 days**	**Tue 4/22/14**	**Mon 8/11/14**
21		Steel Mill Order	4 mons	Tue 4/22/14	Mon 8/11/14
22		ICF Order	2 mons	Tue 4/22/14	Mon 6/16/14
23		Concrete Order	1 mon	Tue 4/22/14	Mon 5/19/14
24		Sheetmetal	2 mons	Tue 4/22/14	Mon 6/16/14
25		Fans	2 mons	Tue 4/22/14	Mon 6/16/14
26		AHUs	4 mons	Tue 4/22/14	Mon 8/11/14
27		Pumps	2 mons	Tue 4/22/14	Mon 6/16/14
28		Cooling Tower	2 mons	Tue 4/22/14	Mon 6/16/14
29		Boiler	2 mons	Tue 4/22/14	Mon 6/16/14
30					
31		**Construction**	**316 days**	**Fri 6/6/14**	**Mon 8/24/15**
32		Last Day of School	10 days	Fri 6/6/14	Thu 6/19/14
33		*Notice to Proceed*	0 days	Mon 6/9/14	Mon 6/9/14
34		*Mobilization*	1 wk	Mon 6/9/14	Fri 6/13/14
35		Excavation	1 mon	Mon 6/16/14	Fri 7/11/14
36		Utilities	2 wks	Mon 7/14/14	Fri 7/25/14
37		Foundation	1.5 mons	Mon 7/28/14	Fri 9/5/14
38		ICF Walls	3 mons	Mon 9/8/14	Fri 11/28/14
39		Structural Steel	3 mons	Mon 11/3/14	Fri 1/23/15
40		Metal Decking	1 mon	Mon 11/17/14	Fri 12/12/14
41		Slab-On-Deck	1 mon	Mon 12/1/14	Fri 12/26/14
42		Roofing	2 mons	Mon 12/29/14	Fri 2/20/15
43		Building Façade	3 mons	Mon 1/26/15	Fri 4/17/15
44		Glazing	2 mons	Mon 2/23/15	Fri 4/17/15
45		MEP Rough-Ins	3 mons	Mon 1/26/15	Fri 4/17/15
46		Interiors	3 mons	Mon 4/20/15	Fri 7/10/15
47		Finishes	1 mon	Mon 7/13/15	Fri 8/7/15
48		*Demobilization*	1 wk	Mon 8/10/15	Fri 8/14/15
49		*FF&E*	2 wks	Mon 8/10/15	Fri 8/21/15
50		*Substantial Completion*	0 days	Fri 8/21/15	Fri 8/21/15
51		**First Day of School**	0 days	Mon 8/24/15	Mon 8/24/15

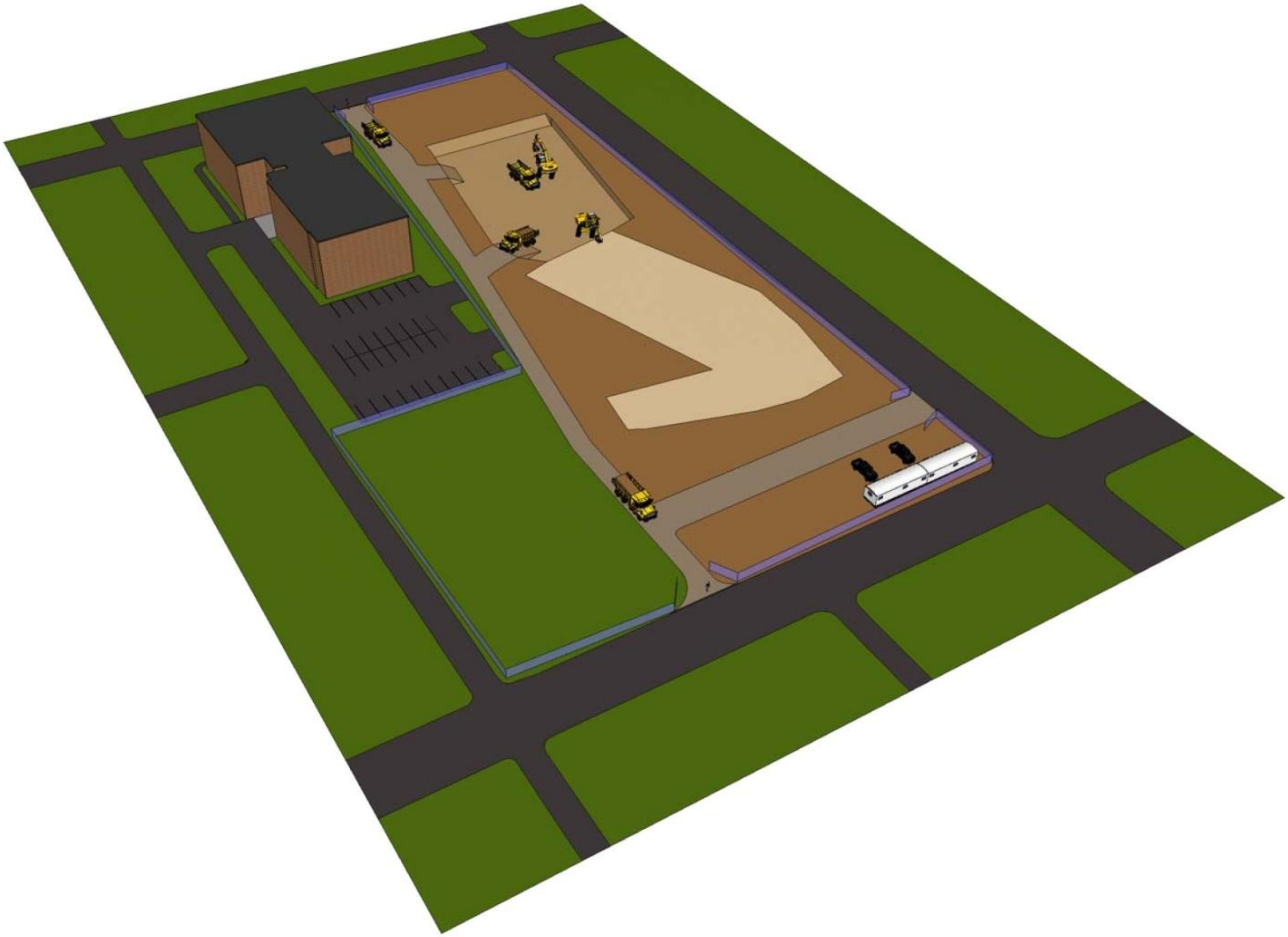


Excavation Site Layout



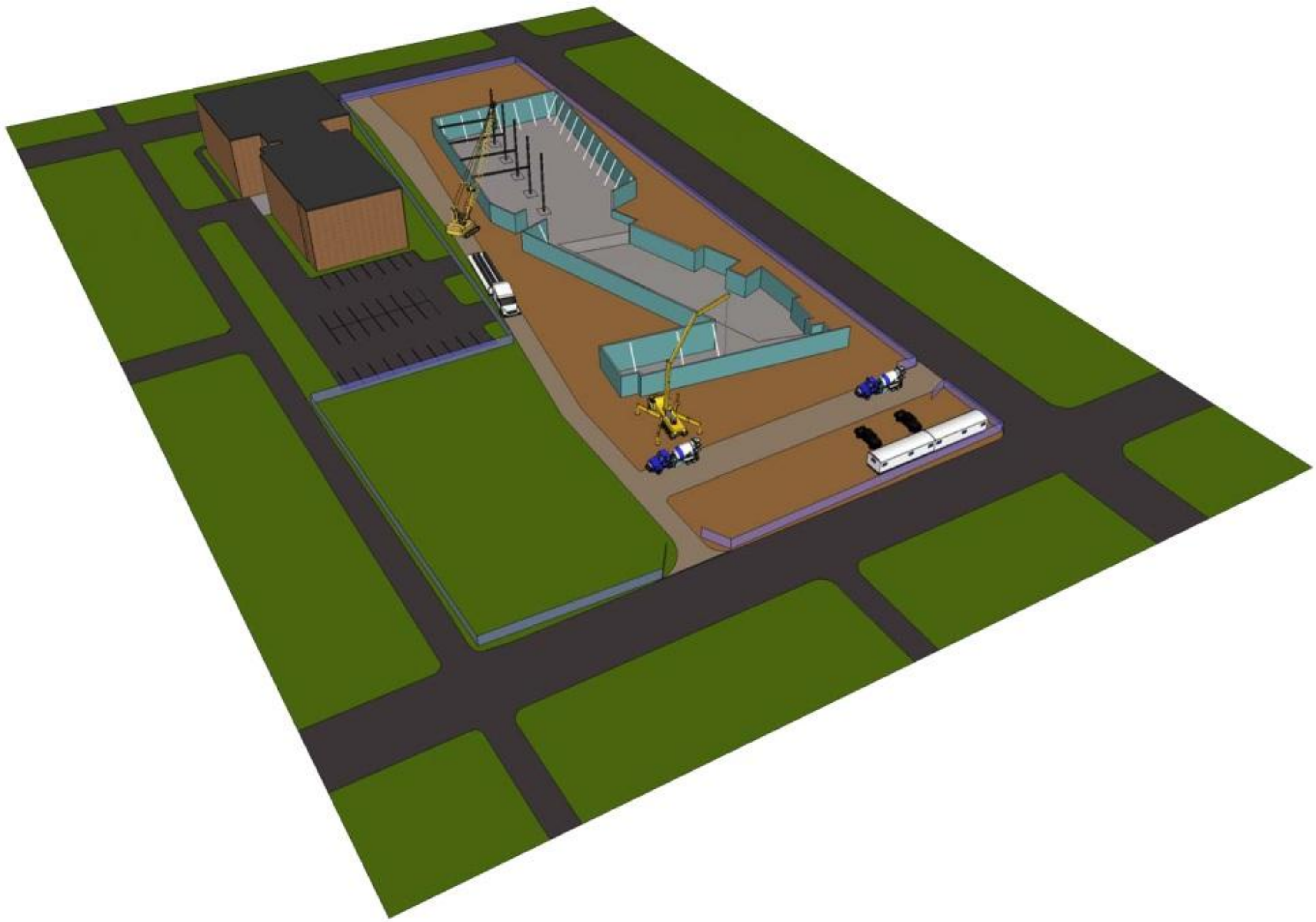
Excavation Site Layout

Excavation Site Layout



Steel Erection and Concrete Pour Site Layout

Steel Erection and Concrete Pour Site Layout



Steel Erection and Concrete Pour Site Layout

Completed Building on Site

Preliminary

Hydraulic Crawler Crane

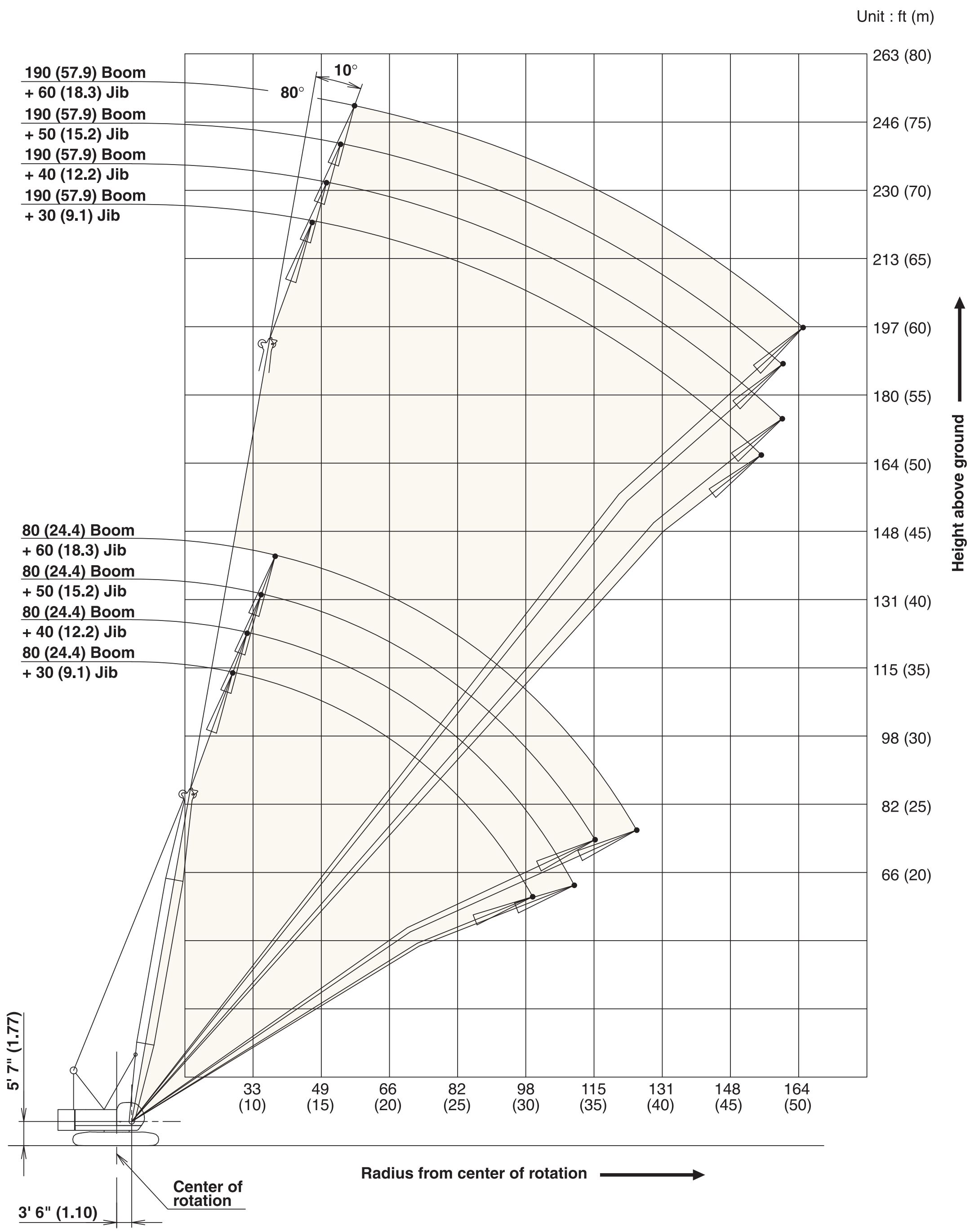
CK 1100G

Model : CK1100G

Max. Lifting Capacity : **220,000 lbs x 11.0 ft**
Max. Crane Boom Length : **200 ft**
Max. Fixed Jib Combination : **190 ft + 60 ft**

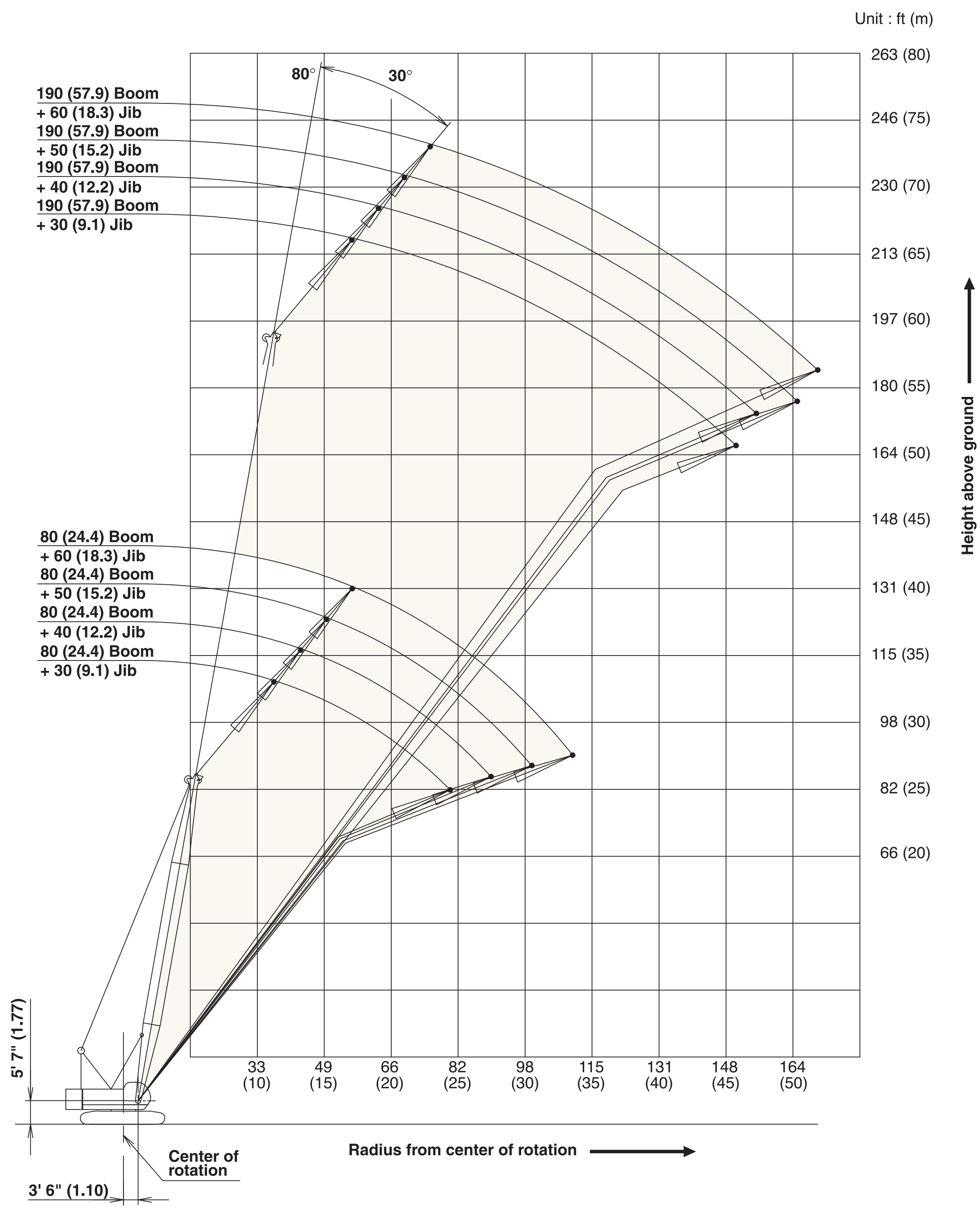
KOBELCO

Fixed Jib 10°


Unit : ft (m)
190 (57.9) Boom + 60 (18.3) Jib
190 (57.9) Boom + 50 (15.2) Jib
190 (57.9) Boom + 40 (12.2) Jib
190 (57.9) Boom + 30 (9.1) Jib
80 (24.4) Boom + 60 (18.3) Jib
80 (24.4) Boom + 50 (15.2) Jib
80 (24.4) Boom + 40 (12.2) Jib
80 (24.4) Boom + 30 (9.1) Jib
10°
80°
263 (80)
246 (75)
230 (70)
213 (65)
197 (60)
180 (55)
164 (50)
148 (45)
131 (40)
115 (35)
98 (30)
82 (25)
66 (20)
Height above ground
33 (10)
49 (15)
66 (20)
82 (25)
98 (30)
115 (35)
131 (40)
148 (45)
164 (50)
5' 7" (1.77)
3' 6" (1.10)
Center of rotation
Radius from center of rotation

WORKING RANGES

Fixed Jib 30°



LIFTING CAPACITY

Fixed Jib Lifting Capacity

Unit: lbs

Counterweight: 69,000 lbs, Carbody weight: 31,700 lbs

120' Boom

30 ft Jib – Offset Angle (deg.)

10: Load Radius (ft)	10: Boom Angle (deg.)	10: Rated Load (lbs)	30: Load Radius (ft)	30: Boom Angle (deg.)	30: Rated Load (lbs)
36.0	79.7	24,000*			
38.0	79.0	24,000*			
40.0	78.2	24,000*			
45.0	76.3	24,000*	45.0	79.7	21,000*
50.0	74.3	24,000*	50.0	77.7	21,000*
55.0	72.2	24,000*	55.0	75.6	20,560*
60.0	70.2	24,000*	60.0	73.5	19,680*
65.0	68.2	21,970	65.0	71.4	18,910*
70.0	66.1	19,860	70.0	69.3	18,180*
75.0	63.9	17,940	75.0	67.0	17,500*
80.0	61.7	16,400	80.0	64.8	16,790
85.0	59.5	15,050	85.0	62.6	15,410
90.0	57.3	13,860	90.0	60.2	14,170
95.0	54.8	12,740	95.0	57.7	13,020
100.0	52.4	11,790	100.0	55.2	12,050
105.0	49.9	10,950	105.0	52.6	11,170
110.0	47.3	10,200			
115.0	44.4	9,470			
120.0	41.6	8,860			
125.0	38.5	8,280			
130.0	35.2	7,690*			
135.0	31.6	6,830*			
Reeves		1	Reeves		1

40 ft Jib – Offset Angle (deg.)

10: Load Radius (ft)	10: Boom Angle (deg.)	10: Rated Load (lbs)	30: Load Radius (ft)	30: Boom Angle (deg.)	30: Rated Load (lbs)
40.0	79.9	24,000*			
45.0	78.1	24,000*			
50.0	76.2	24,000*			
55.0	74.3	24,000*	55.0	78.5	14,880*
60.0	72.4	24,000*	60.0	76.6	14,240*
65.0	70.5	22,240	65.0	74.7	13,690*
70.0	68.6	20,100	70.0	72.7	13,160*
75.0	66.5	18,160	75.0	70.6	12,670*
80.0	64.5	16,620	80.0	68.5	12,250*
85.0	62.5	15,250	85.0	66.4	11,860*
90.0	60.5	14,040	90.0	64.3	11,500*
95.0	58.2	12,910	95.0	62.0	11,170*
100.0	56.0	11,970	100.0	59.7	10,860*
105.0	53.8	11,130	105.0	57.4	10,600*
110.0	51.5	10,360	110.0	55.0	10,360*
115.0	48.9	9,630	115.0	52.3	9,870
120.0	46.5	8,990			
125.0	43.8	8,420			
130.0	41.1	7,890			
135.0	38.1	7,420			
140.0	34.7	6,700*			
Reeves		1	Reeves		1

50 ft Jib – Offset Angle (deg.)

10: Load Radius (ft)	10: Boom Angle (deg.)	10: Rated Load (lbs)	30: Load Radius (ft)	30: Boom Angle (deg.)	30: Rated Load (lbs)
45.0	79.5	20,000*			
50.0	77.7	20,000*			
55.0	75.9	20,000*			
60.0	74.2	20,000*	60.0	79.2	11,330*
65.0	72.4	19,240*	65.0	77.4	10,860*
70.0	70.6	18,010*	70.0	75.6	10,420*
75.0	68.7	16,840*	75.0	73.6	10,030*
80.0	66.8	15,890*	80.0	71.7	9,670*
85.0	65.0	15,030*	85.0	69.7	9,340*
90.0	63.1	14,190	90.0	67.8	9,060*
95.0	61.0	13,050	95.0	65.6	8,770*
100.0	59.0	12,100	100.0	63.6	8,500*
105.0	57.0	11,260	105.0	61.4	8,280*
110.0	54.9	10,490	110.0	59.3	8,060*
115.0	52.6	9,740	115.0	56.8	7,870*
120.0	50.4	9,100	120.0	54.5	7,690*
125.0	48.1	8,530	125.0	52.1	7,530*
130.0	45.6	8,000			
135.0	43.1	7,510			
140.0	40.3	7,030			
145.0	37.4	6,540*			
150.0	34.3	5,880*			
Reeves		1	Reeves		1

60 ft Jib – Offset Angle (deg.)

10: Load Radius (ft)	10: Boom Angle (deg.)	10: Rated Load (lbs)	30: Load Radius (ft)	30: Boom Angle (deg.)	30: Rated Load (lbs)
50.0	78.9	18,000*			
55.0	77.2	18,000*			
60.0	75.5	17,720*			
65.0	73.9	16,460*	65.0	79.7	9,080*
70.0	72.2	15,380*	70.0	78.0	8,700*
75.0	70.4	14,390*	75.0	76.1	8,350*
80.0	68.7	13,550*	80.0	74.4	8,040*
85.0	67.0	12,780*	85.0	72.6	7,730*
90.0	65.2	12,120*	90.0	70.7	7,470*
95.0	63.3	11,480*	95.0	68.7	7,230*
100.0	61.5	10,930*	100.0	66.8	7,010*
105.0	59.6	10,420*	105.0	64.9	6,790*
110.0	57.7	9,960*	110.0	62.9	6,610*
115.0	55.6	9,520*	115.0	60.7	6,410*
120.0	53.6	9,140*	120.0	58.6	6,260*
125.0	51.5	8,610	125.0	56.4	6,100*
130.0	49.3	8,060	130.0	54.1	5,970*
135.0	47.1	7,580	135.0	51.7	5,860*
140.0	44.6	7,090			
145.0	42.2	6,670			
150.0	39.6	6,300			
155.0	36.8	5,730*			
160.0	33.6	5,090*			
Reeves		1	Reeves		1

130' Boom

30 ft Jib – Offset Angle (deg.)

10: Load Radius (ft)	10: Boom Angle (deg.)	10: Rated Load (lbs)	30: Load Radius (ft)	30: Boom Angle (deg.)	30: Rated Load (lbs)
38.0	79.7	24,000*			
40.0	79.0	24,000*			
45.0	77.1	24,000*			
50.0	75.3	24,000*	50.0	78.5	21,000*
55.0	73.4	24,000*	55.0	76.5	20,980*
60.0	71.5	24,000*	60.0	74.6	20,120*
65.0	69.6	21,730	65.0	72.7	19,350*
70.0	67.7	19,620	70.0	70.7	18,650*
75.0	65.6	17,680	75.0	68.6	17,960*
80.0	63.7	16,130	80.0	66.6	16,600
85.0	61.6	14,790	85.0	64.5	15,180
90.0	59.6	13,600	90.0	62.4	13,950
95.0	57.3	12,470	95.0	60.1	12,780
100.0	55.2	11,530	100.0	57.9	11,810
105.0	52.9	10,690	105.0	55.6	10,950
110.0	50.6	9,940	110.0	53.2	10,160
115.0	48.1	9,210			
120.0	45.6	8,570			
125.0	43.0	8,020			
130.0	40.2	7,490			
135.0	37.3	6,940*			
140.0	33.9	6,150*			
Reeves		1	Reeves		1

40 ft Jib – Offset Angle (deg.)

10: Load Radius (ft)	10: Boom Angle (deg.)	10: Rated Load (lbs)	30: Load Radius (ft)	30: Boom Angle (deg.)	30: Rated Load (lbs)
45.0	78.8	24,000*			
50.0	77.1	24,000*			
55.0	75.2	24,000*	55.0	79.3	15,100*
60.0	73.5	24,000*	60.0	77.5	14,500*
65.0	71.7	22,000	65.0	75.7	13,930*
70.0	69.9	19,860	70.0	73.8	13,420*
75.0	68.0	17,920	75.0	71.8	12,940*
80.0	66.2	16,350	80.0	69.9	12,520*
85.0	64.3	14,990	85.0	68.0	12,140*
90.0	62.4	13,800	90.0	66.1	11,770*
95.0	60.3	12,650	95.0	63.9	11,440*
100.0	58.3	11,700	100.0	61.9	11,130*
105.0	56.3	10,860	105.0	59.8	10,860*
110.0	54.2	10,090	110.0	57.6	10,420
115.0	51.9	9,360	115.0	55.2	9,650
120.0	49.7	8,730	120.0	52.9	8,990
125.0	47.4	8,150			
130.0	45.0	7,620			
135.0	42.5	7,140			
140.0	39.6	6,670			
145.0	36.8	6,040*			
150.0	33.7	5,370*			
Reeves		1	Reeves		1

50 ft Jib – Offset Angle (deg.)

10: Load Radius (ft)	10: Boom Angle (deg.)	10: Rated Load (lbs)	30: Load Radius (ft)	30: Boom Angle (deg.)	30: Rated Load (lbs)
45.0	80.0	20,000*			
50.0	78.4	20,000*			
55.0	76.7	20,000*			
60.0	75.1	20,000*	60.0	79.9	11,480*
65.0	73.4	20,000*	65.0	78.2	11,020*
70.0	71.7	18,760*	70.0	76.5	10,620*
75.0	69.9	17,570*	75.0	74.6	10,200*
80.0	68.2	16,530	80.0	72.8	9,850*
85.0	66.5	15,160	85.0	71.0	9,540*
90.0	64.7	13,950	90.0	69.2	9,230*
95.0	62.8	12,800	95.0	67.2	8,950*
100.0	61.0	11,860	100.0	65.3	8,700*
105.0	59.1	11,000	105.0	63.4	8,480*
110.0	57.2	10,220	110.0	61.4	8,260*
115.0	55.1	9,470	115.0	59.2	8,040*
120.0	53.1	8,840	120.0	57.1	7,870*
125.0	51.0	8,260	125.0	54.9	7,710*
130.0	48.8	7,730	130.0	52.6	7,560*
135.0	46.6	7,250			
140.0	44.1	6,760			
145.0	41.7	6,340			
150.0	39.1	5,860*			
155.0	36.3	5,260*			
160.0	33.1	4,650*			
Reeves		1	Reeves		1

60 ft Jib – Offset Angle (deg.)

10: Load Radius (ft)	10: Boom Angle (deg.)	10: Rated Load (lbs)	30: Load Radius (ft)	30: Boom Angle (deg.)	30: Rated Load (lbs)
50.0	79.5	18,000*			
55.0	77.9	18,000*			
60.0	76.3	18,000*			
65.0	74.8	17,100*			
70.0	73.2	16,000*	70.0	78.7	8,840*
75.0	71.5	14,960*	75.0	76.9	8,480*
80.0	69.9	14,100*	80.0	75.3	8,170*
85.0	68.3	13,330*	85.0	73.6	7,890*
90.0	66.6	12,630*	90.0	71.9	7,620*
95.0	64.8	11,970*	95.0	70.0	7,360*
100.0	63.1	11,410*	100.0	68.3	7,140*
105.0	61.4	10,890*	105.0	66.5	6,940*
110.0	59.6	10,310	110.0	64.6	6,740*
115.0	57.7	9,560	115.0	62.6	6,560*
120.0	55.9	8,920	120.0	60.7	6,390*
125.0	54.0	8,350	125.0	58.7	6,230*
130.0	52.0	7,820	130.0	56.6	6,100*
135.0	50.0	7,310	135.0	54.5	5,970*
140.0	47.8	6,830	140.0	52.2	5,860*
145.0	45.6	6,410			
150.0	43.3	6,040			
155.0	41.0	5,620*			
160.0	38.3	5,040*			
165.0	35.6	4,540*			
170.0	32.7	4,010*			
Reeves		1	Reeves		1

Note: Designed and rated to comply with ANSI Code B30.5.
Capacities based on factors other than machine stability such as structural competence are shown by asterisk * in the charts.
Refer to notes P10.