Kaiser Permanente Largo Medical Office Building – Largo, MD

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Construction

Technical Assignment 2

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Executive Summary

Technical Assignment 2 investigates several key features of the Kaiser Permanente Largo Medical Office Building and was valuable teaching about different construction processes. The first analysis is a much deeper look into the construction schedule. A lot was learned in the fact that this schedule is a live document and constantly changing. Interesting facts were discovered; for example, the roof was put in place before structural framing was anywhere near the roof level. An image of the roof in place as previously described can be seen on the cover page of this document.

For the first technical analysis a study was done on the cost break down for the project with a square foot and assemblies estimate of the MEP systems. This analysis consisted of a more detailed breakdown for the building's superstructure. Quantity takeoff was provided by the BIM model which is what allowed for the whole system to be analyzed as opposed to finding a typical bay. This medical office building has a steel structure and sits on concrete foundations. The total estimate was about 10.5% off of the actual cost due to assumptions that were made, possible cost differences due to the unique SidePlate connection systems, and other reasons that will be discussed in the Detailed Structural Systems Estimate section.

A general conditions estimate was investigated in more detail as well. The general conditions estimate turned out to be much higher than the actual job cost estimate. Substantial Completion for the project has been pushed to February 11, 2013 from October 2, 2012, accounting for the overestimate. Project staffing made up for the majority of the general conditions cost estimate, approximately 59% of the total cost, and accounted for the largest difference between estimates. The extended duration can quickly turn a profit-earning project into a large loss as a 28% general conditions increase has been estimated.

Building Information Modeling use was evaluated. It's difficult at first imagine how the model is used other than for coordination meetings. Analyzing the BIM goals and uses helped me understand the owner and the project team better while learning what professionals expect from this technology. BIM was extremely beneficial for dealing with intense MEP systems, medical gas equipment, and headwall units. There were also some unexpected BIM challenges; including design and coordination occurring at the same time causing inefficiency and others that will be discussed in the BIM Use Evaluation section.

The final thing that was looked into more was constructability issues. Sometimes the smallest things end up causing the largest or most effective problems. There are a lot of day-to-day occurrences that take place in construction that are unavoidable, but there are definitely ways to avoid some events. When things do go wrong, it's important to have a strong team that knows what they're doing because things often don't go according to plan, especially in the construction industry.

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Detailed Project Schedule Summary

Kaiser Permanente's Largo Medical Office Building project schedule has provided challenges and surprises that will be discussed further in the following summary. Table 1 shows the key dates and systems driving that drove the schedule and important dates currently under construction. A detailed project schedule can be found in **Appendix A**.

Description	Start	Finish	Duration (days)
Design and Procurement	**1-Nov-10**	**4-Sep-12**	**482**
Building Permit (Owner Provided)	1-Nov-10	25-Aug-11	214
Construction Phase	**10-Jun-11**	**13-Feb-13**	**439**
Foundations	31-Aug-11	12-Dec-11	74
Superstructure	19-Dec-11	24-May-12	114
Exterior Enclosure	5-Mar-12	25-Sep-12	144
Roof Construction	6-Mar-12	16-Oct-12	161
MEP Rough In	5-Mar-12	24-Oct-12	233
Finishes	1-Aug-12	20-Feb-12	142
3rd Floor OR Surgical Suites	20-Sep-12	20-Feb-13	107
Elevators	4-Sep-12	1-Feb-13	106
Closeout and Occupancy	**18-Sep-12**	**17-Jun-13**	**212**
OFCI	30-Oct-12	11-Feb-13	72
Substantial Completion	11-Feb-13	11-Feb-13	0
First Patient	17-Jul-13	17-Jul-13	0

Table 1 - Summary of the Kaiser Permanente Medical Office Building detailed schedule. These events have the most impact on the critical path. Table created by Chris Pozza.

The schedule is broken into three main categories; Design and Procurement, the Construction Phase, and Closeout and Occupancy. Each of the phases will be briefly discussed in more detail relating to its impact on the schedule.

Design and Procurement

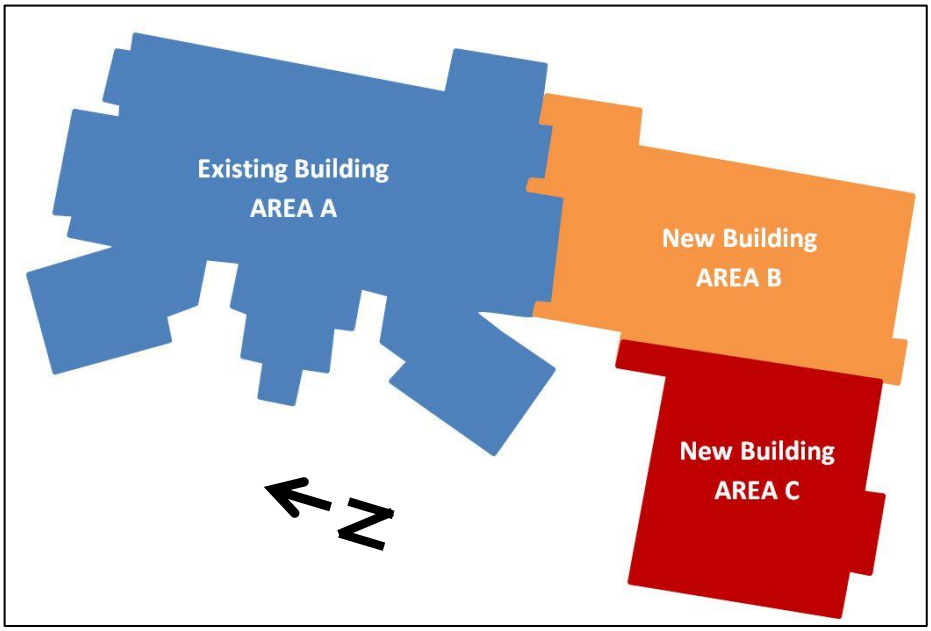
Design and Procurement began in November 2010 and recently wrapped up after 482 days. This included bid/buyout, shop drawings, design and preconstruction services. The reason that the Owner Provided Building Permit was listed should because of its total duration. Receiving the permit took from the time Design and Procurement started until August 25, 2011 or 209 days. This had its impact on the rest of the schedule very early on in the construction process. Subcontractor bidding and buyout began mid-April and lasted until December 29, 2011. Submittals and shop drawings began April 4, 2011 and concluded on September 17, 2012.

Construction Phase

This phase began with the Notice to Proceed from Kaiser Permanente on June 10, 2011. Immediately site mobilization started, however no major work could be done until the Owner Provided Building Permit was received. Once it was received, underground utility work began prior to preparations for foundations. The building rests on spread footings and perimeter foundations. The slab on grade dates caught my attention on the schedule. Structural steel began before the slab on grade did, therefore; the slab had to be poured a few days after the crane was able to move from Area B to Area C. The breakdown of areas can be seen in Figure 1. Laydown areas for steel were east of Area A and south of Area C.

Although there is curtain wall used, the majority of the exterior enclosure is brick to match the existing building. Early weather delays and complex drawing details hindered early progress. Along with other delays, the Watertight milestone was reached on September 20, compared to the original April 25 schedule date. Brick was put in place starting on the east elevation and moved clockwise around the building. The exterior façade was completed September 25, 2012, after 144 days.

Figure 1 - The flow of construction is typical for almost all trades throughout construction of the addition. Area B and C make up the adddition. Work starts in Area B and flows to Area C. The existing building, Area A, will be getting renovated once the addition is complete.



The roof will be discussed more in the Constructability Challenges Section because it was actually put in place before there was much framing anywhere in the building. Temporary roofing was needed for specific parts of the building including in Area C. A small portion of this area is only one level with brick façade on the levels above. A Mason King lift was used on this temporary roof for materials to be stored with allowable loads and so workers are able to access the whole façade as needed without the need for heavy equipment in the areas with limited access. This construction lasted 158 days.

MEP, Electrcity & Tele/Data rough-ins all began within a few days of each other. This process began in March. Typically the sequence would begin once walls were laid out, overhead systems roughed in, and the framing of walls completed. MEP Rough-ins averaged about 115 days per floor area (B or C). Rough-

ins usually included about 25 items that would repeat in sequence. These were condensed in the **Appendix A** schedule after detailing the first floor entirely. Before change orders started hindering work, a good flow was able to start. Trades eventually were required to work in other locations as change orders started affecting flow in certain areas, which will be discussed more in Technical Assignment 3. Some challenges for MEP rough-ins were presented in certain areas like the MRI or Operating Rooms which will be discussed more in the BIM Uses Evaluation section. These MEP-heavy spaces required intense 3D coordination. Extra time was required for medical gas systems and headwall installation due to the extra complication of these systems.

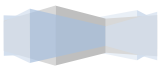
As construction proceeded, finishes were expected to be a key driver approaching Substantial Completion on February 11, 2013. The superintendents described the challenging duration were becoming more challenging due to lost time throughout the project caused by untimely responses and change order delays. Finishes consists of hanging, taping and finishing drywall. Also included is ceiling grid installation, paint, floors, cabinets, and door and hardware installation. Finishes are completed once a rolling completion walk through is approved and signed off. Most items appear on the critical path under the "Finishes" breakdown on the schedule because the project is beyond the required contract date and have absolutely zero time to spare.

There have been some recent changes to the schedule. 3rd floor operating room suites are now on the critical path. After speaking with a project superintendent, he claimed that equipment and work in this area are crucial and it is going to be a challenge to complete. Elevators have recently been readjusted to have zero float and are now on the critical path. This shows how much a project can change in a very short amount of time. The critical path is constantly being updated and has greatly evolved from what it was just a few weeks ago. Site work is an example of an item that has actually been given extra float.

This schedule has proved to be extremely challenging, and has varied greatly from what was originally expected. On several occasions, work has been started out of sequence as conditions changed. Superintendents chose to do work out of sequence in order to keep work moving. This requires an experienced team that's flexible and communicates well. Keeping work flowing smooth says a lot about the dynamic of the team. These challenges and solutions will be discussed in more detail later in this report.

Closeout & Occupancy

Commissioning is set to begin October 18, 2012 and last until Substantial Completion currently expected for February 11, 2013. Life Safety and Fire Alarm Inspections are expected to take 48 days and finishing just in time for Substantial Completion. There will be shared services activation expected to end on the Final Completion Milestone, April 12, 2013. Finally, KP regional services activation will next be taking place until July 17, 2013, which is the First Patient milestone.



Detailed Structural Systems Estimate

A detailed estimate of the superstructure has been conducted on the Kaiser Permanente Largo Medical Office Building Addition. Although this building is only 3 stories, the footprint is a large L-shape with 106,700 square feet (SF) and varying bay sizes. Because of this and having access to the BIM model used on the project, a detailed estimate of the entire superstructure was calculated and compared to the original. This building has a steel skeleton with concrete foundations and elevated concrete slabs on metal deck, concrete and metals were the only materials quantified.

RSMeans CostWorks was used to calculate the estimate. The data release used was year 2012 and the localization selected was Silver Spring, MD, because that is the closest city to Largo, MD. Both time and location adjustments were made automatically throughout the calculations. The values produced are documented below in Table 2, along with using the project budget values for comparison.

	Original Cost		RSMeans Estimate	
Material	Total Cost	Cost / SF	Total Cost	Cost / SF
Concrete	**$870,118**	**$8.15**	**$779,152**	**$7.30**
Metals	**$2,252,965**	**$21.11**	**$2,018,451**	**$18.92**

Table 2 - Estimate comparison using RSMeans CostWorks. Both estimates are in range of actual costs, but both are underestimated slightly. Table created by Chris Pozza.

A more detailed breakdown of estimates can be found in **Appendix B.** Estimates and quantities taken from the project's BIM model show how beneficial it could be to implement BIM for things like cost tracking and actually assigning costs to material before it's entered into the model.

	Original Cost		RSMeans Estimate	
Combined	Total Cost	Cost / SF	Total Cost	Cost / SF
Final	**$3,123,083**	**$29.26**	**$2,797,603**	**$26.22**

Table 3 - Comparison of combined systems. The total estimate is off by slightly under 10.5%. Table created by Chris Pozza.

The overall detailed estimate is off by $325,480. With just over a $3 per square foot difference, the calculated estimate is under budget by roughly 10.5%. There are many contributing reasons to the gap. Many contributing factors could be due to assumptions that were made. Average reinforcing was assumed for all foundations, beams, and columns. This would most likely lead to an underestimate because many footings would have a better chance of being oversized for an extra factor of safety for large loads; and, in turn, would require larger and more expensive reinforcement. Another contributing factor is due to neglect of many miscellaneous metals and rooftop pate curbs. All of these require equipment but more importantly, labor. 200 SidePlate Moment connections have been assumed; this is an example of a negative consequence using a model as connections are expensive and have not been included in this model's quantity takeoff.

Concrete and steel estimates both differentiate from the actual amounts by roughly 10.5%. Although models give very precise measurements of materials, quantity take off from a model is not a perfect practice. Models don't take into account things like waste or smaller components that would take a long time to model, like bolts or base plates. Things like unit rounding can always play a small role, especially with such large quantities of materials, but another source of misconception can be variability in estimating equipment as well. Designs almost always include items that can't be found in RSMeans and require an alternate substitution. Therefore, some cases required assumptions to be made which can be found under Table 4. Table 4 is a more detailed breakdown of the estimate performed.

Description	Total Cost	Cost / SF
Structural Steel Framing	$1,628,571	$15.26
Steel Floor/Roof Decking	$389,880	$3.65
Welded Wire Fabric	$7,321	$0.07
Cast in Place Concrete	$188,521	$1.77
Structural Concrete Elements	$583,304	$5.47

Table 4 - Square foot breakdown based off of the RSMeans CostWorks estimate.
Table created by Chris Pozza.

Major Assumptions:

- 115,000 SF of Metal deck is used. 10% waste is taken into account for deck and welded wire fabric.
- All footings and exterior walls are 3000 PSI normal weight concrete. Slabs on grade are 3000 PSI normal weight concrete. Slab-on-grade reinforcement is 6x6 W2.9xW2.9.
- All concrete foundations and concrete beams have average reinforcement included in estimate of total cubic yards of concrete.
- Slabs on composite deck are 3000 PSI lightweight concrete. All slab-on-deck is 2.5" lightweight concrete on 3" steel deck, gage 18 with 6x6 W1.4xW1.4. All roof deck is 3" deep, type N, 20 gage.
- 25 Housekeeping pads throughout the building.
- 4-use forms in place are used for perimeter with 6,480 square feet of contact area.
- Assume all anchor bolts are ¾" in diameter and 12" long.
- There are 200 Sideplate Moment connections throughout the structure and each plate requires a 2.5 hours of welding.

General Conditions Estimate

The general conditions estimate discussion focuses primarily on the addition, as the renovation has not yet begun and is still in the planning stages. Being that the addition is fully underway, it can provide a much more valuable comparison to investigate current conditions and how things have changed throughout construction. Table 1 shows a breakdown of the estimate with values from the original estimate on the left side and updated values on the right side. A more detailed general conditions estimate breakdown can be found in **Appendix C.** Items having cost savings potential can be seen in Appendix C based off of whether they were included as single-line charges or time dependent. RSMeans Costworks was used for the estimate calculated. In some cases, when chosen items could not be matched with reasonable items provided by Costworks, user defined values based off of actual quantities were used to provide as accurate of an estimate possible. These values were provided by the project's Final Guaranteed Maximum Price (FGMP) document. It can be noted in Table 5 that every estimated value has been increased, usually substantially, compared to its original counterpart.

Addition General Conditions Estimate		
FGMP Value	**Description**	**Estimated**
$1,849,186	**Staffing Cost**	**$2,326,450**
$199,820	**Temporary Facilities**	**$244,312**
$384,174	**Temporary Utilities**	**$519,706**
$33,086	**Temporary Equipment**	**$44,662**
$222,070	**Safety/Protection**	**$311,570**
$287,390	**Cleaning**	**$374,971**
$99,400	**General Expense**	**$115,187**
$3,075,126	**Total**	**$3,936,858**

Table 5 - General Conditions comparison. The original FGMP estimate is given on the left side. The overall estimate is broken down into different categories to show major differences more easily. The estimated calculations were done using RSMeans Costworks provided a larger estimate.

The estimate calculated was roughly $860,000 (2.2% of the entire project cost) over DPR's estimate. A major difference between calculations is the time frame that the project was initially expected to last. Many of the items included in the original General Conditions estimate that were expected to last the duration of the project were based off Substantial Completion occurring on October 2, 2012. That date has been pushed back a few months and is currently February 11, 2013. This creates a time frame of over 4 months or 20 weeks of added general conditions costs justifying the $860,000 difference.

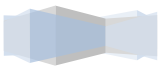
Project staff was a large portion of the general conditions estimate and definitely the most impacted by the extra amount of time added. In addition to the extra 20 weeks allotted for the project, additional staff members were required throughout construction. Project team members added included an assistant project manager, superintendent, project engineer, and also a large extension on the BIM Engineer's estimated time. The additional staff was required for the heavy workload that came with so many RFI's, change orders, construction change directives and submittals.

A third superintendent is required for the last few months of construction to help handle changes. The BIM engineer was required for coordination much longer than expected; that will be described in more detail in the BIM Use Evaluation section.

Temporary facilities increased primarily due to extended need for the office trailers. Also, jobsite vehicles and fuel costs have contributed to the $45,000 difference. Utilities have increased dramatically as well, mostly due to total power consumption. Most of the utility costs were provided by DPR for this section, although new durations needed to be calculated.

Two things contribute to the increased Safety/Protection estimate. Temporary protection at the loading dock was required for the majority of construction since the time cranes started picking steel on site. Protection was required until the loading dock was taken out of commission for construction, about eight months after construction started. The bigger contributor is due to the laborers on site responsible for keeping the site organized and protected. The amount of laborers dedicated to this changed throughout construction, ranging from 2-4. Some of these manhours have also contributed to the large increase in the Cleaning section of the estimate.

The crane was not included in the general conditions estimate at all; it was under the steel subcontractor's scope, SteelFab. Temporary equipment was very low for this project, mostly due to subcontractors being responsible for it. The equipment estimates, both being small, are actually for two entirely different pieces of equipment. Originally it was intended to have a hoist that had a permanent hoist operator. The labor cost for the operator makes up the full $33,000, but was never utilized. The piece of equipment that was actually paid by general conditions for was a lull. An all-terrain forklift was used, and was key for getting materials to the second and third floors.



All estimates have been adjusted for time and location, using a Data Release for 2012. A slight inflation factor between the years the estimate was done contributes to only a very small amount. The location factor of Silver Spring, Maryland, was chosen because it is the closest city to Largo, MD. It should be noted that bonds, insurance, taxes and fee were not mentioned because they're not included in the general conditions for the project; however, Table 6 summarizes those costs.

Total Addition General Conditions, Bonds, and Fee			
General Conditions	-	$3,936,858	-
Description	Percent of Contract	Total Cost	Cost Per Month
Fee	3%	$813,990	$58,142.14
Bonds, Insurance, Taxes	3%	$892,426	$63,744.71
Total		**$5,643,274**	**$121,886.86**

Table 6 - Fee, bonds and Insurance prices broken down per month and combined with general conditions.

Building Information Modeling Use Evaluation

Kaiser Permanente required that Building Information Modeling (BIM) is implemented for the construction of the three-story addition. **See Appendix D for the Level 1 Process Map of how BIM was used.** BIM services were purchased from DPR. Below in Table 7 are the project goals and uses for BIM. These three goals have been defined by DPR, but were supported by KP. The table includes the original intentions BIM was intended to be utilized for.

Priority (HIGH/ MED/ LOW)	Goal Description	BIM Uses
High	To minimize the amount and severity of field clashes between building systems	3D Coordination
High	To reduce schedule conflicts due to field clashes between building systems	3D Coordination
High	Create, collaboratively 3D virtual mock-ups of challenging building skin interface details and connection details	Virtual Mock-up

Table 7 - BIM Goals and Uses defined by DPR to originally perform for Kaiser Permanente. Table created by Chris Pozza and modeled after Penn State's BIM Project Execution Planning Guide - 2.0.

3D Coordination is the major purpose BIM is being implemented on the medical office building addition. With so many complex building systems, virtual coordination will serve a great benefit to all parties involved as errors on 2D drawings are now detected much more easily before ever reaching the field where it's much more expensive to fix. Clash detection is a powerful tool that Kaiser Permanente would like to see be used to minimize the amount of field clashes between building systems and reduce schedule conflicts. Finding clashes in a model and on paper is believed to pay for itself as time, resources, and rework will not be wasted in the event of a design error.

The third and final goal for this project was to create virtual mock-ups digitally. A mock-up of the building façade with a window built into it has been physically fabricated on site. This mock-up has been used to ensure quality and grout colors meet the design intentions and how connections between different systems will be detailed, and has been very beneficial. As the building is being enclosed and finishes are being put in place, no virtual mock-ups have been created. At this point of construction, virtual mock-ups will most likely not be created. The original intention of creating virtual mock-ups was more for DPR's own benefit. Although they could have been useful, it's not felt that the project was impacted negatively without them. Even if that goal is not reached, the project overall has benefitted from the coordination that took place using BIM.

Table 8 below shows how BIM was used throughout the project. A more detailed evaluation of BIM uses can also be found in **Appendix D.** *Design Authoring* was the first step of executing BIM. All of the different design models were brought together into Navisworks Manage to create a central model. This is important to create transparency between involved parties and creates a powerful visualization tool. As mentioned in the BIM Goals, *3D Coordination* was the primary use of BIM. It was used for design and throughout construction while coordination and modeling took place simultaneously, which will be discussed ahead in more detail. *Generate Drawings* was another BIM use. This was specifically chosen to go under the "Construct" phase because the model became a living document in most cases that would be updated as changes were made and coordination was dealt with in the field, and then transferred back to the model from which subcontractors could produce their own updated, finalized shop drawings. Also included in this step of the BIM process is *Virtual Mock-Up.* Again, as noted in the BIM Goals section, this use was an original intention but never actually utilized. The final major BIM Use included in Table 2 is *Record Modeling.* Although not contractually bound, DPR plans to turn over the model to Kaiser Permanente once construction is complete. This record model will minimize building turnover information and can be used for future modeling and 3D coordination if ever any renovations.

	PLAN	X	DESIGN	X	CONSTRUCT	X	OPERATE
		X	DESIGN AUTHORING	X	3D COORDINATION	X	RECORD MODELING
		X	3D COORDINATION		VIRTUAL MOCK-UP		
				X	GENERATE DRAWINGS		

Table 8 - BIM Uses utilized throughout the project. Virtual Mock-up was listed under the construction phase, but not marked as used because although it was originally expected to, virtual mock-ups were never created. Table created by Chris Pozza and modeled after Penn State's BIM Project Execution Planning Guide - 2.0.

Weekly coordination meetings took place on Wednesdays. Depending on specific points of construction and the area being modeled, different subcontractors would be required to attend meetings. Throughout construction, several different subcontractors contributed to the overall project model. Models were included for structural steel, duct and sheet metal, mechanical and plumbing, electric, fire protection, and glazing model. Coordination meetings began on site August 17, 2011, starting with underground utility coordination.

Development of the BIM model was originally expected to take 183 days for the entire addition, however; it actually ended up taking 283 days. There were several reasons for this. It wasn't intentional but modeling and coordination were basically occurring at the same time. Both tasks occurring simultaneously caused the process to take longer than expected. Unfortunately, the design of the contract didn't allow for DPR to start BIM coordination with subcontractors earlier in the design process so there wasn't much that could be done to prevent the extra time required.

With that, there were several coordination issues:

- Imaging area – tight ceiling areas in imaging suites created problems with coordination of complex systems
- Design of arched ceilings – working around arches made it challenging to place MEP systems around structure in certain spaces
- Ducts – ceiling height and limited space on the 2nd floor made very tight squeezes for large ducts
- Operating Rooms – more ceiling height restrictions present problems for MEP systems and boom supports which were
- Drains and risers – (seen to the right in Figure 2) presented a challenge due to the third floor slab being poured before model coordination was finished. That required penetrations to be core drilled. Several drains ran and pipes were out of place and protruding through walls which would've required bump outs if not otherwise moved.

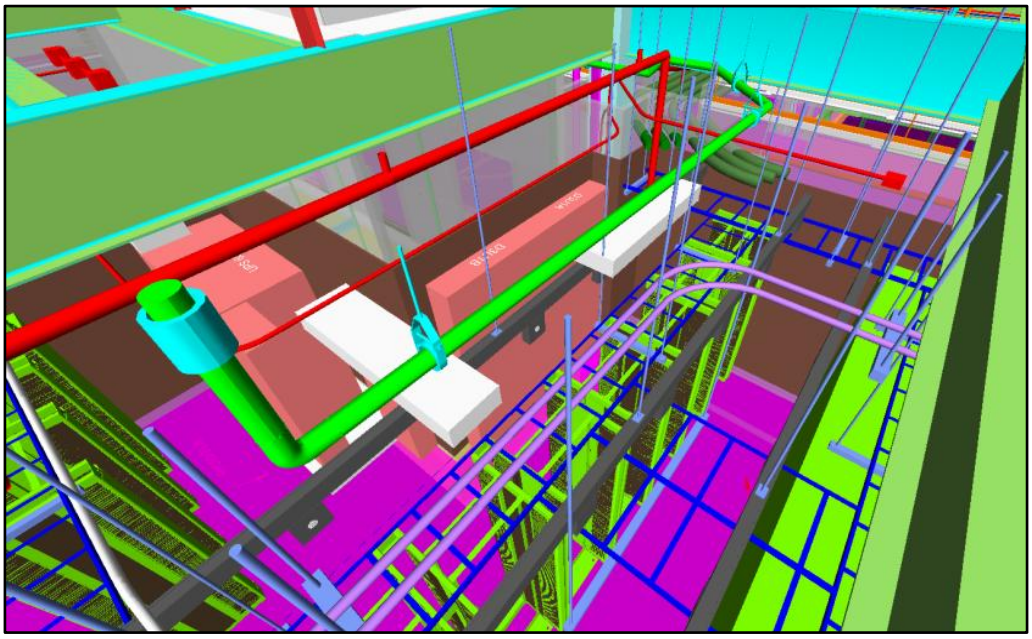


Figure 2 - At a quick glance, it would be hard to notice a clash in this image. That is partially due to its size but the bigger reason is there actually is no direct clash. The problem is the green pipe in the center of the screen is a sanitary line which is directly above a second floor Telecommunications Room. This pipe was required to be moved to eliminate any potential water hazards near equipment.

All of these reasons are how BIM was used successfully where drawings would make it difficult to find solutions, especially in the important spaces noted above. Arched ceilings are typically in lobbies and waiting areas making accurate coordination important to prevent architecture from being affected or create unappealing bump outs to cover up protruding objects. Operating rooms, which require so much necessary precision, supports the appropriateness of BIM. Straps attaching to boom supports are unable to be in repetitive locations at different supports, so very intense coordination was needed to document exact locations to prevent clashes in such tight spaces.

Constructability Issues

The Kaiser Permanente Largo Medical Office Building presented several challenges throughout the duration of the project. One of the first major challenges faced was dealing with the exterior façade. On top of early major weather delays, flashing details at windows were extremely challenging. While the project team was working hard trying to determine the best way to move forward or create an alternative solution, time was still lost and the masonry subcontractor had to rebound the lost time.

Other than making up for lost time, there were now Fraco Lifts on site much longer than expected. The site is not extremely small, but very busy and having Fraco Lifts wrap entirely around the south and east side of the building limited flow of construction traffic and took away valuable lay down area. Figure 3 shows an image of the east façade as work is wrapping up, although the large laydown area is still being used by the mason. Figure 4, taken the very same day on the south façade, shows the amount of space this equipment occupies. No work can be done underneath and building exits get blocked by them or are impassable depending on where work is. Delay of the exterior façade also affected the critical path and forced the Watertight Milestone to be pushed back. In an effort to try making up for the lost time early, the mason crew quickly doubled and tripled in size. More laborers on site allowed a larger area of façade to go up at a time as the Fraco Lifts were able to be utilized. People were also required to work weekends. Comparing a brick façade to precast panels could be a potential research topic.

Figure 3 - The east elevation is shown almost completed. A Fraco lift can be seen in the center, with a Mason King manual cranked scaffold equipment sits on the canopy roof. Notice the amount of space currently taken up by the mason subcontractor. Personal photograph taken by Chris Pozza.

Figure 4 - Image taken the same day as Figure 10. Masons preparing for the next phase at the south elevation. Work can never take place underneath Fraco Lifts. Personal photograph taken by Chris Pozza.

Another challenging feature can be found in the northwest of the addition. Tying into the existing building was expected in this precise area, but the drawings present a tricky connection as seen in Figure 5. Between all parties involved, no one has ever used a connection quite like this. With curtain wall coming from the south (as seen to the left of Figure 6) to connect to new brick via an expansion joint, there won't be much room for error as the new brick is intended to land perfectly flush with the interior wall. This area is important as timely planning is necessary to deal with demolition involving occupied space.

The challenge has become to find a way to overlap the new Air/Vapor Barrier (AVB) over existing AVB. DPR is currently underway working with subcontractors to prepare a cost effective alternative solution. Drawings and sketches have been passed between subs, superintendents, and architects. The process is of finding a solution is ongoing.

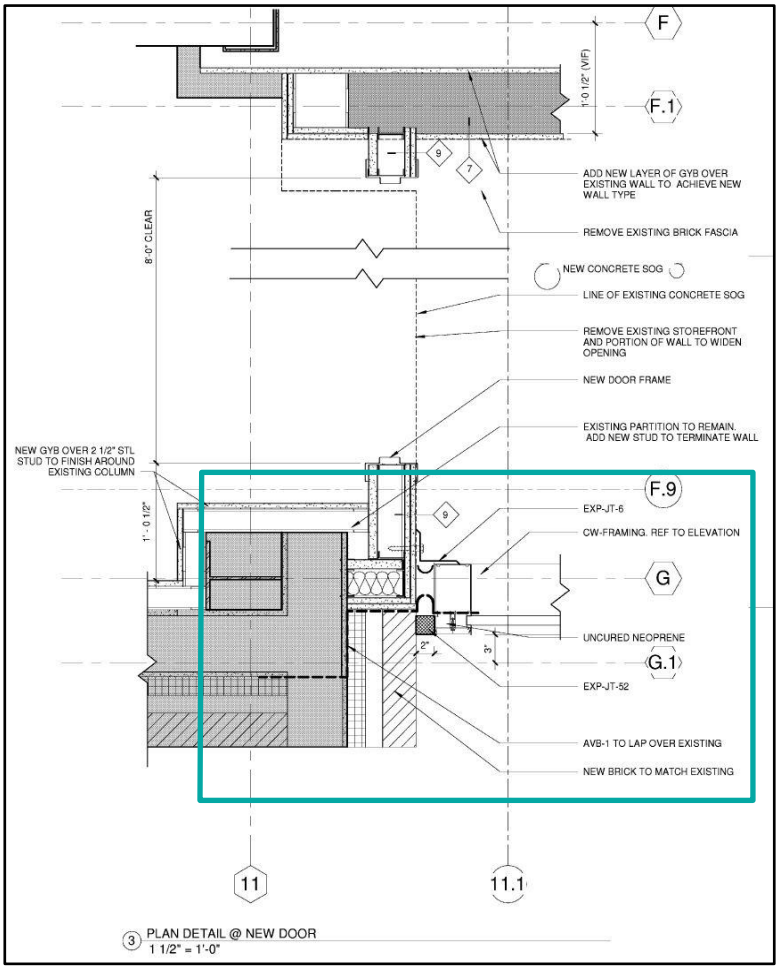


Figure 5 - Detail of a corridor entrance from the addition into the existing building. Notice in the lower central part of the image the bold dashed line that extends into the darker shaded area. This line is Air/Vapor Barrier (AVB) which is shown intruding into the existing brick extremely far as it is intended to overlap the existing AVB. Image courtesy of Ellerbe Becket.

Figure 6 - Photograph taken from the interior of the addition looking at the corner of the existing building. The challenge is ging to be demolishing small areas of existing facade and tying Air/Vapor Barrier to AVB behind that façade which will be getting opened. Personal photograph taken by Chris Pozza.

The last major constructability issue involves the schedule and sequencing. Throughout the project, there have been several activities that started out of sequence. It's been tough to avoid with an extremely tight schedule and the superintendents have pursued finding alternatives where possible to keep moving forward. A prime example of an activity beginning out of sequence involves the roof. When the roof was being built, there was actually no framing yet at the exterior walls. Construction of the roof began April 10, 2012 and completion was scheduled for October 16, 2012. The roof had to be temporarily fastened down, which meant the parapet wall had to be fabricated at a later point. A progress photo, shown below in Figure 7, was taken on April 21, 2012 and clearly shows the temporary roof. The entire scenario created a challenge that required the team to seriously consider logistics. Roof work couldn't be completed right away for several reasons; including unfinished design for the roof hatch, scaffolding located on low roofs in Areas A and C, and how to keep water out of the building. How and when the remaining materials would be put in place, where it will be stored, along with impacts of leaks in what has been put in place initially were all need to be taken into consideration.

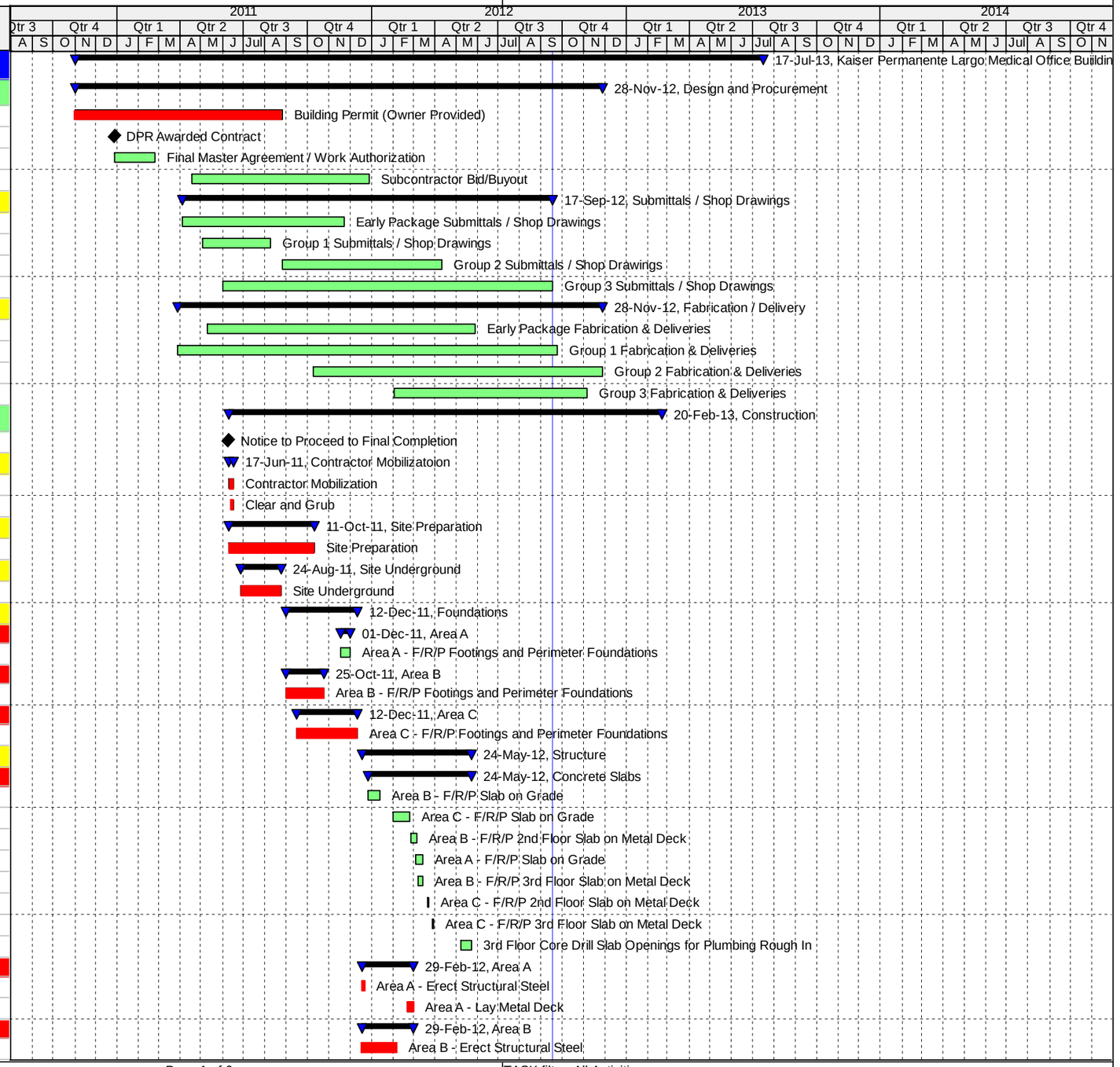
Figure 7 - An aerial progress photo taken on April 21, 2012 shows the temporary roof just 12 days after its construction began. Take notice that there is no framing on the east façade. Image courtesy of DPR Construction.

In response to there being a roof with virtually no walls, the superintendents worked to make sure the interior would remain as dry as possible at all times. With open floors in every direction, this was a challenge and laborers would repeatedly need to sweep the water out of low spots, but it was necessary to keep equipment and stored materials dry, especially if they were in the open building. Temporary plastic sheets were draped prior to storms and materials were stored away from the perimeter of the building when possible. Leaks in the mechanical room, located in Area C and had temporary roofing overhead for an extended period of time, required installation of new drywall, insulation, and fireproofing at different locations within the space. Although that might not sound overly impressive, it became habit because making sure safe working conditions were maintained inside and outside the building is top priority.

Appendix A – Detailed Project Schedule

Detailed Project Schedule

#	Activity ID	Activity Name	Original Duration	Start	Finish
1		**Kaiser Permanente Largo Medical Office B**	691	01-Nov-10	17-Jul-13
2		**Design and Procurement**	530	01-Nov-10	28-Nov-12
3	A0012	Building Permit (Owner Provided)	209	01-Nov-10	25-Aug-11
4	A0013	DPR Awarded Contract	1	27-Dec-10	27-Dec-10
5	A0015	Final Master Agreement / Work Authorization	42	27-Dec-10	23-Feb-11
6	A0018	Subcontractor Bid/Buyout	179	18-Apr-11	29-Dec-11
7		**Submittals / Shop Drawings**	372	04-Apr-11	17-Sep-12
8	A0020	Early Package Submittals / Shop Drawings	165	04-Apr-11	23-Nov-11
9	A0030	Group 1 Submittals / Shop Drawings	67	04-May-11	08-Aug-11
10	A0035	Group 2 Submittals / Shop Drawings	160	25-Aug-11	10-Apr-12
11	A0040	Group 3 Submittals / Shop Drawings	331	01-Jun-11	17-Sep-12
12		**Fabrication / Delivery**	428	28-Mar-11	28-Nov-12
13	A0050	Early Package Fabrication & Deliveries	268	11-May-11	29-May-12
14	A0055	Group 1 Fabrication & Deliveries	382	28-Mar-11	24-Sep-12
15	A0060	Group 2 Fabrication & Deliveries	291	10-Oct-11	28-Nov-12
16	A0065	Group 3 Fabrication & Deliveries	195	02-Feb-12	05-Nov-12
17		**Construction**	433	10-Jun-11	20-Feb-13
18	A1000	Notice to Proceed to Final Completion	0	10-Jun-11	10-Jun-11
19		**Contractor Mobilizatoion**	6	10-Jun-11	17-Jun-11
20	A1010	Contractor Mobilization	5	10-Jun-11	16-Jun-11
21	A1010.1	Clear and Grub	4	14-Jun-11	17-Jun-11
22		**Site Preparation**	86	10-Jun-11	11-Oct-11
23	A1011	Site Preparation	86	10-Jun-11	11-Oct-11
24		**Site Underground**	42	27-Jun-11	24-Aug-11
25	A1015	Site Underground	42	27-Jun-11	24-Aug-11
26		**Foundations**	72	31-Aug-11	12-Dec-11
27		**Area A**	10	17-Nov-11	01-Dec-11
28	A1020	Area A - F/R/P Footings and Perimeter Founda	10	17-Nov-11	01-Dec-11
29		**Area B**	39	31-Aug-11	25-Oct-11
30	A1030	Area B - F/R/P Footings and Perimeter Founda	39	31-Aug-11	25-Oct-11
31		**Area C**	61	16-Sep-11	12-Dec-11
32	A1040	Area C - F/R/P Footings and Perimeter Founda	61	16-Sep-11	12-Dec-11
33		**Structure**	112	19-Dec-11	24-May-12
34		**Concrete Slabs**	107	27-Dec-11	24-May-12
35	A1110	Area B - F/R/P Slab on Grade	13	27-Dec-11*	13-Jan-12
36	A1120	Area C - F/R/P Slab on Grade	19	31-Jan-12	24-Feb-12
37	A1130	Area B - F/R/P 2nd Floor Slab on Metal Deck	6	27-Feb-12	05-Mar-12
38	A1140	Area A - F/R/P Slab on Grade	8	05-Mar-12	14-Mar-12
39	A1150	Area B - F/R/P 3rd Floor Slab on Metal Deck	6	08-Mar-12	15-Mar-12
40	A1160	Area C - F/R/P 2nd Floor Slab on Metal Deck	3	21-Mar-12	23-Mar-12
41	A1170	Area C - F/R/P 3rd Floor Slab on Metal Deck	3	28-Mar-12	30-Mar-12
42	A1180	3rd Floor Core Drill Slab Openings for Plumbin	12	09-May-12	24-May-12
43		**Area A**	51	19-Dec-11	29-Feb-12
44	A1050	Area A - Erect Structural Steel	4	19-Dec-11	22-Dec-11
45	A1080	Area A - Lay Metal Deck	6	22-Feb-12	29-Feb-12
46		**Area B**	51	19-Dec-11	29-Feb-12
47	A1060	Area B - Erect Structural Steel	34	19-Dec-11	06-Feb-12



Actual Work | Critical Remaining Work | Summary
Remaining Work | Milestone

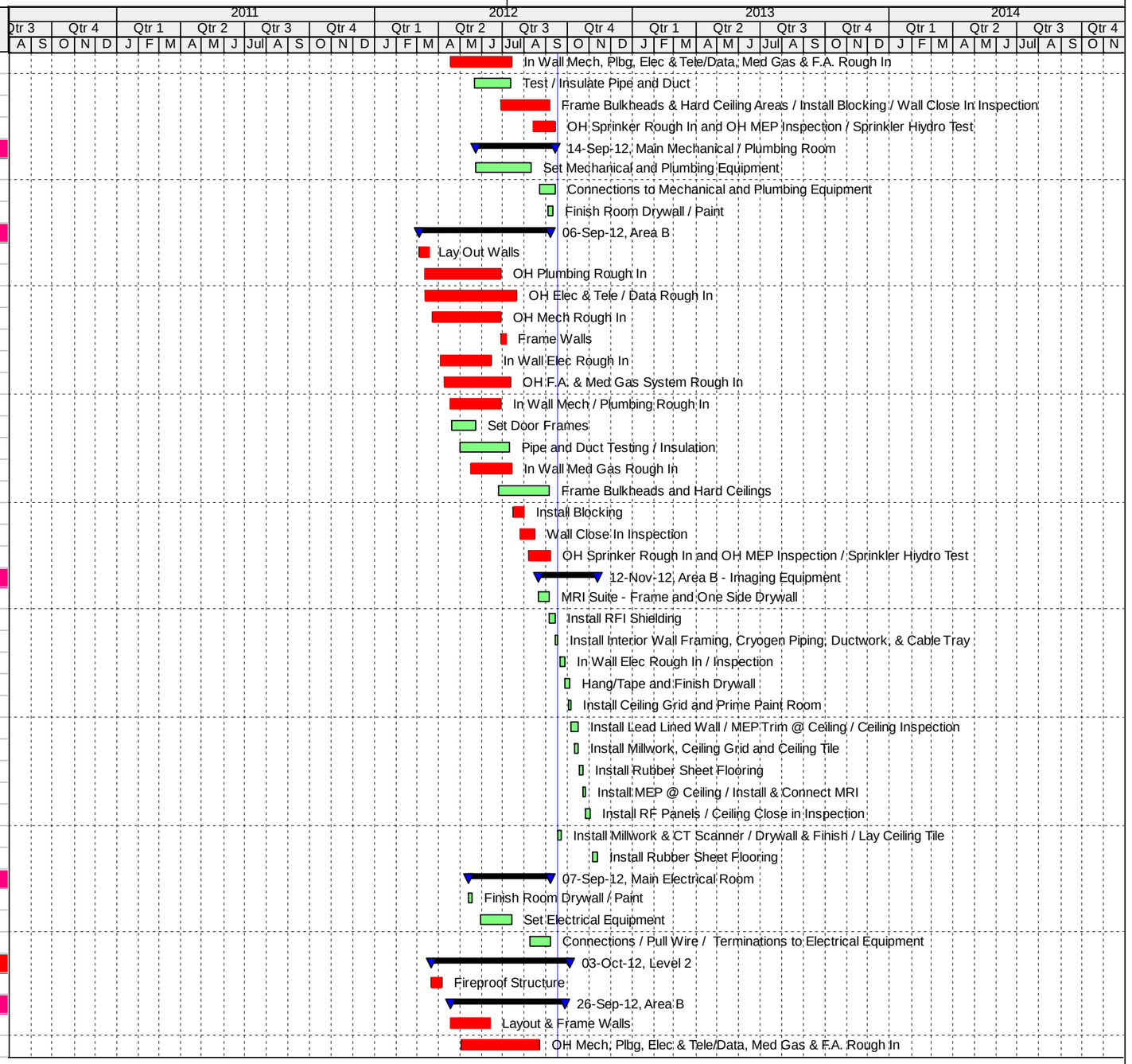
TASK filter: All Activities

#	Activity ID	Activity Name	Original Duration	Start	Finish
48	A1090	Area B - Lay Metal Deck / Install Shear Studs	40	05-Jan-12	29-Feb-12
49	**Area C**		37	08-Feb-12	29-Mar-12
50	A1070	Area C - Erect Structural Steel	11	08-Feb-12	22-Feb-12
51	A1100	Area C - Lay Metal Deck / Install Shear Studs	27	22-Feb-12	29-Mar-12
52	**Exterior**		144	05-Mar-12	25-Sep-12
53	**East Elevation**		136	05-Mar-12	13-Sep-12
54	A1190	East Elevation - Layout, Setup, Frame Perimet	41	05-Mar-12	30-Apr-12
55	A1200	East Elevation - Install Wall Sheathing and Vap	54	17-Apr-12	02-Jul-12
56	A1210	East Elevation - Erect Exterior Brick and Precz	23	25-Jun-12	26-Jul-12
57	A1220	East Elevation - Install Exterior Windows	17	13-Aug-12	05-Sep-12
58	A1230	East Elevation - Install Curtainwall	8	04-Sep-12	13-Sep-12
59	**West Elevation**		109	11-Apr-12	13-Sep-12
60	A1264	West Elevation - Layout, Setup, Frame Perime	29	11-Apr-12	21-May-12
61	A1265	West Elevation - Install Wall Sheathing and Vaj	35	21-May-12	10-Jul-12
62	A1266	West Elevation - Erect Exterior Brick and Prec	29	25-Jul-12	04-Sep-12
63	A1267	West Elevation - Install Exterior Windows	4	10-Sep-12	13-Sep-12
64	A1268	West Elevation - Install Curtainwall	67	01-Jun-12	05-Sep-12
65	**North Elevation**		121	02-Apr-12	20-Sep-12
66	A1270	North Elevation - Layout, Setup, Frame Perime	43	02-Apr-12	31-May-12
67	A1271	North Elevation - Install Wall Sheathing and Vaj	47	02-Jul-12	06-Sep-12
68	A1272	North Elevation - Erect Exterior Brick and Prec	23	10-Aug-12	12-Sep-12
69	A1273	North Elevation - Install Exterior Windows	4	13-Sep-12	18-Sep-12
70	A1274	North Elevation - Install Curtainwall	6	13-Sep-12	20-Sep-12
71	**South Elevation**		142	07-Mar-12	25-Sep-12
72	A1240	South Elevation - Layout, Setup, Frame Perime	24	07-Mar-12	09-Apr-12
73	A1250	South Elevation - Install Wall Sheathing and Va	46	24-Apr-12	27-Jun-12
74	A1260	South Elevation - Erect Exterior Brick and Prec	19	02-Jul-12	27-Jul-12
75	A1261	South Elevation - Install Exterior Windows	19	13-Aug-12	07-Sep-12
76	A1263	South Elevation - Install Curtainwall	12	10-Sep-12	25-Sep-12
77	**Roof Construction**		158	06-Mar-12	16-Oct-12
78	A1278	Install Roof Blocking	24	06-Mar-12	06-Apr-12
79	A1280	Install Main Roof System	58	10-Apr-12	29-Jun-12
80	A1290	Area C - High Roof System Installation	7	07-May-12	15-May-12
81	A1295	Area C - Low Roof Temp Roof Installation	3	15-May-12	17-May-12
82	A1300	Metal Framing & Sheating at Clerestory Windo	33	10-May-12	26-Jun-12
83	A1320	Metal Framing at Cobra Head Roof and High R	52	21-Jun-12	04-Sep-12
84	A1330	Cobra Head Roof - Install Roofing System	9	06-Aug-12	16-Aug-12
85	A1340	Area C - Install Low Roofing System	3	30-Aug-12	04-Sep-12
86	A1350	Area A - Install Roofing system	4	04-Sep-12	07-Sep-12
87	A1360	Install Canopies Roofing System / Caulk Cleres	5	05-Sep-12	11-Sep-12
88	A1370	Detail Roof System ___ 56 ITEMS	20	19-Sep-12	16-Oct-12
89	**M/E/P & FP Rough Ins**		178	05-Mar-12	12-Nov-12
90	**Level 1**		178	05-Mar-12	12-Nov-12
91	A1400	Fireproof Structure	15	09-Mar-12	29-Mar-12
92	**Area C**		129	15-Mar-12	14-Sep-12
93	A17	Layout & Frame Walls ------- 100 ----------	52	15-Mar-12	25-May-12
94	A17	OH Mech, Plbg, Elec & Tele/Data, Med Gas &	70	12-Apr-12	20-Jul-12

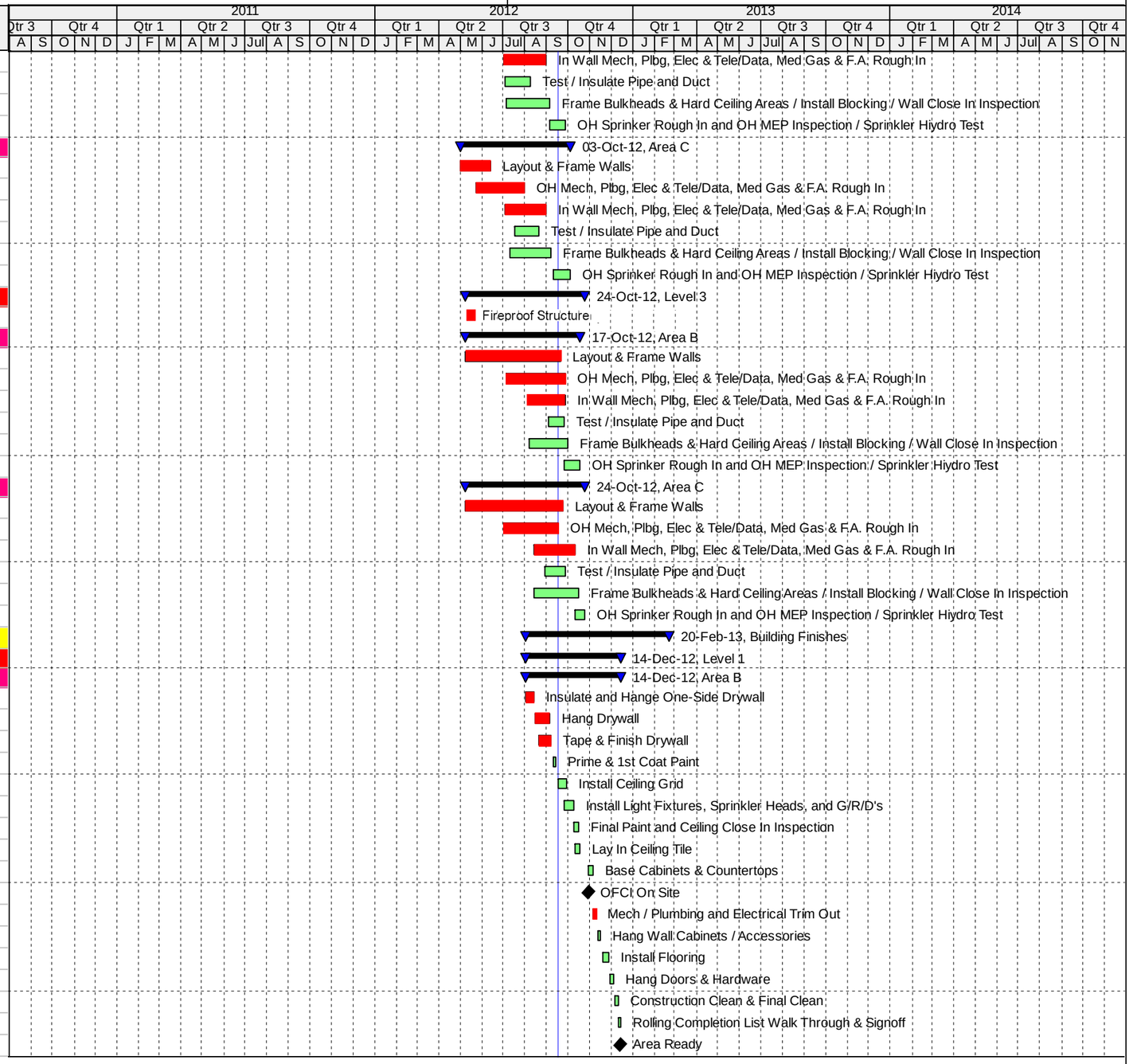
Actual Work | Critical Remaining Work | Summary
Remaining Work | Milestone

TASK filter: All Activities

#	Activity ID	Activity Name	Original Duration	Start	Finish
95	A17	In Wall Mech, Plbg, Elec & Tele/Data, Med Gas	62	17-Apr-12	13-Jul-12
96	A17	Test / Insulate Pipe and Duct	36	22-May-12	12-Jul-12
97	A17	Frame Bulkheads & Hard Ceiling Areas / Instal	46	29-Jun-12	04-Sep-12
98	A17	OH Sprinker Rough In and OH MEP Inspectior	23	14-Aug-12	14-Sep-12
99	**Main Mechanical / Plumbing Room**		79	24-May-12	14-Sep-12
100	A17	Set Mechanical and Plumbing Equipment	55	24-May-12	10-Aug-12
101	A17	Connections to Mechanical and Plumbing Equi	16	23-Aug-12	14-Sep-12
102	A17	Finish Room Drywall / Paint	5	04-Sep-12	10-Sep-12
103	**Area B**		131	05-Mar-12	06-Sep-12
104	A14	Lay Out Walls	9	05-Mar-12	15-Mar-12
105	A14	OH Plumbing Rough In	78	13-Mar-12	29-Jun-12
106	A14	OH Elec & Tele / Data Rough In	92	13-Mar-12	20-Jul-12
107	A14	OH Mech Rough In	69	23-Mar-12	28-Jun-12
108	A14	Frame Walls	5	28-Jun-12	05-Jul-12
109	A14	In Wall Elec Rough In	52	04-Apr-12	15-Jun-12
110	A14	OH F.A. & Med Gas System Rough In	67	09-Apr-12	12-Jul-12
111	A14	In Wall Mech / Plumbing Rough In	51	18-Apr-12	28-Jun-12
112	A15	Set Door Frames	24	20-Apr-12	23-May-12
113	A15	Pipe and Duct Testing / Insulation	48	02-May-12	10-Jul-12
114	A15	In Wall Med Gas Rough In	41	16-May-12	13-Jul-12
115	A15	Frame Bulkheads and Hard Ceilings	50	25-Jun-12	04-Sep-12
116	A15	Install Blocking	12	16-Jul-12	31-Jul-12
117	A15	Wall Close In Inspection	15	26-Jul-12	15-Aug-12
118	A15	OH Sprinker Rough In and OH MEP Inspectior	22	07-Aug-12	06-Sep-12
119	**Area B - Imaging Equipment**		59	21-Aug-12	12-Nov-12
120	A15	MRI Suite - Frame and One Side Drywall	10	21-Aug-12	04-Sep-12
121	A15	Install RFI Shielding	7	05-Sep-12	13-Sep-12
122	A15	Install Interior Wall Framing, Cryogen Piping, D	2	14-Sep-12	17-Sep-12
123	A16	In Wall Elec Rough In / Inspection	4	21-Sep-12	26-Sep-12
124	A16	Hang/Tape and Finish Drywall	5	27-Sep-12	03-Oct-12
125	A16	Install Ceiling Grid and Prime Paint Room	4	02-Oct-12	05-Oct-12
126	A16	Install Lead Lined Wall / MEP Trim @ Ceiling / (	8	05-Oct-12	16-Oct-12
127	A16	Install Millwork, Ceiling Grid and Ceiling Tile	5	10-Oct-12	16-Oct-12
128	A16	Install Rubber Sheet Flooring	5	17-Oct-12	23-Oct-12
129	A16	Install MEP @ Ceiling / Install & Connect MRI	5	22-Oct-12	26-Oct-12
130	A16	Install RF Panels / Ceiling Close in Inspection	5	26-Oct-12	01-Nov-12
131	A16	Install Millwork & CT Scanner / Drywall & Finisl	5	17-Sep-12	21-Sep-12
132	A17	Install Rubber Sheet Flooring	5	06-Nov-12	12-Nov-12
133	**Main Electrical Room**		82	14-May-12	07-Sep-12
134	A17	Finish Room Drywall / Paint	5	14-May-12	18-May-12
135	A17	Set Electrical Equipment	31	31-May-12	13-Jul-12
136	A16	Connections / Pull Wire / Terminations to Elect	22	08-Aug-12	07-Sep-12
137	**Level 2**		137	22-Mar-12	03-Oct-12
138	A1810	Fireproof Structure	12	22-Mar-12	06-Apr-12
139	**Area B**		114	17-Apr-12	26-Sep-12
140	A16	Layout & Frame Walls	41	17-Apr-12	13-Jun-12
141	A16	OH Mech, Plbg, Elec & Tele/Data, Med Gas &	78	03-May-12	22-Aug-12



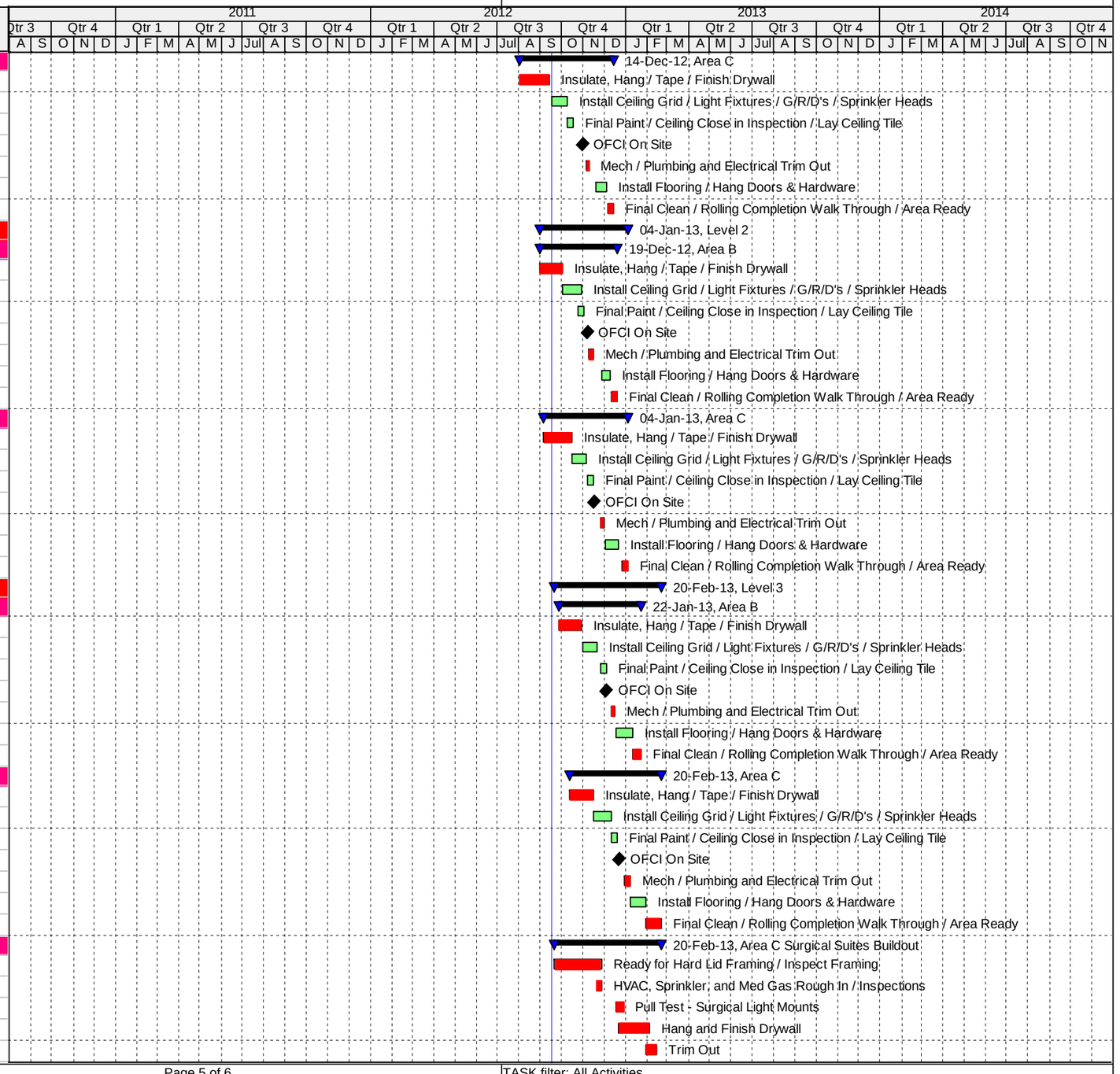
#	Activity ID	Activity Name	Original Duration	Start	Finish
142	A1E	In Wall Mech, Plbg, Elec & Tele/Data, Med Gas	44	02-Jul-12	31-Aug-12
143	A1E	Test / Insulate Pipe and Duct	26	03-Jul-12	08-Aug-12
144	A1E	Frame Bulkheads & Hard Ceiling Areas / Instal	43	05-Jul-12	04-Sep-12
145	A1E	OH Sprinker Rough In and OH MEP Inspectior	16	05-Sep-12	26-Sep-12
146	**Area C**		108	02-May-12	03-Oct-12
147	A1E	Layout & Frame Walls	29	02-May-12	12-Jun-12
148	A1E	OH Mech, Plbg, Elec & Tele/Data, Med Gas &	47	24-May-12	31-Jul-12
149	A1E	In Wall Mech, Plbg, Elec & Tele/Data, Med Gas	43	03-Jul-12	31-Aug-12
150	A1E	Test / Insulate Pipe and Duct	24	18-Jul-12	20-Aug-12
151	A1E	Frame Bulkheads & Hard Ceiling Areas / Instal	43	10-Jul-12	07-Sep-12
152	A1E	OH Sprinker Rough In and OH MEP Inspectior	18	10-Sep-12	03-Oct-12
153	**Level 3**		119	08-May-12	24-Oct-12
154	A1940	Fireproof Structure	5	08-May-12	22-May-12
155	**Area B**		114	08-May-12	17-Oct-12
156	A1E	Layout & Frame Walls	95	08-May-12	20-Sep-12
157	A1E	OH Mech, Plbg, Elec & Tele/Data, Med Gas &	60	05-Jul-12	27-Sep-12
158	A1E	In Wall Mech, Plbg, Elec & Tele/Data, Med Gas	38	06-Aug-12	27-Sep-12
159	A1E	Test / Insulate Pipe and Duct	16	04-Sep-12	25-Sep-12
160	A1E	Frame Bulkheads & Hard Ceiling Areas / Instal	39	07-Aug-12	01-Oct-12
161	A2C	OH Sprinker Rough In and OH MEP Inspectior	16	26-Sep-12	17-Oct-12
162	**Area C**		119	08-May-12	24-Oct-12
163	A2C	Layout & Frame Walls	97	08-May-12	24-Sep-12
164	A2C	OH Mech, Plbg, Elec & Tele/Data, Med Gas &	54	02-Jul-12	17-Sep-12
165	A2C	In Wall Mech, Plbg, Elec & Tele/Data, Med Gas	42	14-Aug-12	11-Oct-12
166	A2C	Test / Insulate Pipe and Duct	20	29-Aug-12	26-Sep-12
167	A2C	Frame Bulkheads & Hard Ceiling Areas / Instal	45	13-Aug-12	15-Oct-12
168	A2C	OH Sprinker Rough In and OH MEP Inspectior	11	10-Oct-12	24-Oct-12
169	**Building Finishes**		142	01-Aug-12	20-Feb-13
170	**Level 1**		96	01-Aug-12	14-Dec-12
171	**Area B**		96	01-Aug-12	14-Dec-12
172	A2C	Insulate and Hange One-Side Drywall	10	01-Aug-12	14-Aug-12
173	A2C	Hang Drywall	14	15-Aug-12	04-Sep-12
174	A2C	Tape & Finish Drywall	14	20-Aug-12	07-Sep-12
175	A21	Prime & 1st Coat Paint	5	10-Sep-12	14-Sep-12
176	A21	Install Ceiling Grid	10	17-Sep-12	28-Sep-12
177	A21	Install Light Fixtures, Sprinkler Heads, and G/F	10	25-Sep-12	08-Oct-12
178	A21	Final Paint and Ceiling Close In Inspection	5	09-Oct-12	15-Oct-12
179	A21	Lay In Ceiling Tile	5	11-Oct-12	17-Oct-12
180	A21	Base Cabinets & Countertops	5	30-Oct-12	05-Nov-12
181	A21	OFCI On Site	1	30-Oct-12	30-Oct-12
182	A21	Mech / Plumbing and Electrical Trim Out	5	05-Nov-12	09-Nov-12
183	A21	Hang Wall Cabinets / Accessories	4	13-Nov-12	16-Nov-12
184	A21	Install Flooring	6	19-Nov-12	27-Nov-12
185	A22	Hang Doors & Hardware	5	29-Nov-12	05-Dec-12
186	A22	Construction Clean & Final Clean	4	06-Dec-12	11-Dec-12
187	A22	Rolling Completion List Walk Through & Signoff	3	12-Dec-12	14-Dec-12
188	A22	Area Ready	1	14-Dec-12	14-Dec-12



Actual Work | Critical Remaining Work | Summary
Remaining Work | Milestone

TASK filter: All Activities

#	Activity ID	Activity Name	Original Duration	Start	Finish
189		**Area C**	96	01-Aug-12	14-Dec-12
190	A22	Insulate, Hang / Tape / Finish Drywall	32	01-Aug-12	14-Sep-12
191	A22	Install Ceiling Grid / Light Fixtures / G/R/D's / S	16	17-Sep-12	08-Oct-12
192	A22	Final Paint / Ceiling Close in Inspection / Lay C	7	09-Oct-12	17-Oct-12
193	A22	OFCI On Site	1	30-Oct-12	30-Oct-12
194	A22	Mech / Plumbing and Electrical Trim Out	5	05-Nov-12	09-Nov-12
195	A22	Install Flooring / Hang Doors & Hardware	12	19-Nov-12	05-Dec-12
196	A23	Final Clean / Rolling Completion Walk Through	7	06-Dec-12	14-Dec-12
197		**Level 2**	88	30-Aug-12	04-Jan-13
198		**Area B**	78	30-Aug-12	19-Dec-12
199	A23	Insulate, Hang / Tape / Finish Drywall	23	30-Aug-12	02-Oct-12
200	A23	Install Ceiling Grid / Light Fixtures / G/R/D's / S	20	03-Oct-12	30-Oct-12
201	A23	Final Paint / Ceiling Close in Inspection / Lay C	7	25-Oct-12	02-Nov-12
202	A23	OFCI On Site	1	05-Nov-12	05-Nov-12
203	A23	Mech / Plumbing and Electrical Trim Out	5	09-Nov-12	15-Nov-12
204	A23	Install Flooring / Hang Doors & Hardware	10	27-Nov-12	10-Dec-12
205	A23	Final Clean / Rolling Completion Walk Through	7	11-Dec-12	19-Dec-12
206		**Area C**	85	05-Sep-12	04-Jan-13
207	A23	Insulate, Hang / Tape / Finish Drywall	29	05-Sep-12	15-Oct-12
208	A23	Install Ceiling Grid / Light Fixtures / G/R/D's / S	16	16-Oct-12	06-Nov-12
209	A24	Final Paint / Ceiling Close in Inspection / Lay C	7	07-Nov-12	15-Nov-12
210	A24	OFCI On Site	1	16-Nov-12	16-Nov-12
211	A24	Mech / Plumbing and Electrical Trim Out	5	26-Nov-12	30-Nov-12
212	A24	Install Flooring / Hang Doors & Hardware	15	03-Dec-12	21-Dec-12
213	A24	Final Clean / Rolling Completion Walk Through	7	26-Dec-12	04-Jan-13
214		**Level 3**	107	20-Sep-12	20-Feb-13
215		**Area B**	80	28-Sep-12	22-Jan-13
216	A24	Insulate, Hang / Tape / Finish Drywall	23	28-Sep-12	30-Oct-12
217	A24	Install Ceiling Grid / Light Fixtures / G/R/D's / S	16	31-Oct-12	21-Nov-12
218	A24	Final Paint / Ceiling Close in Inspection / Lay C	7	26-Nov-12	04-Dec-12
219	A24	OFCI On Site	1	05-Dec-12	05-Dec-12
220	A24	Mech / Plumbing and Electrical Trim Out	5	11-Dec-12	17-Dec-12
221	A25	Install Flooring / Hang Doors & Hardware	16	18-Dec-12	10-Jan-13
222	A25	Final Clean / Rolling Completion Walk Through	8	11-Jan-13	22-Jan-13
223		**Area C**	91	12-Oct-12	20-Feb-13
224	A25	Insulate, Hang / Tape / Finish Drywall	25	12-Oct-12	15-Nov-12
225	A25	Install Ceiling Grid / Light Fixtures / G/R/D's / S	17	16-Nov-12	11-Dec-12
226	A25	Final Paint / Ceiling Close in Inspection / Lay C	7	12-Dec-12	20-Dec-12
227	A25	OFCI On Site	1	21-Dec-12	21-Dec-12
228	A25	Mech / Plumbing and Electrical Trim Out	5	31-Dec-12	07-Jan-13
229	A25	Install Flooring / Hang Doors & Hardware	16	08-Jan-13	29-Jan-13
230	A25	Final Clean / Rolling Completion Walk Through	16	30-Jan-13	20-Feb-13
231		**Area C Surgical Suites Buildout**	107	20-Sep-12	20-Feb-13
232	A25	Ready for Hard Lid Framing / Inspect Framing	49	20-Sep-12	28-Nov-12
233	A26	HVAC, Sprinkler, and Med Gas Rough In / Insp	5	21-Nov-12	28-Nov-12
234	A26	Pull Test - Surgical Light Mounts	7	19-Dec-12	28-Dec-12
235	A26	Hang and Finish Drywall	30	21-Dec-12	04-Feb-13
236	A26	Trim Out	12	30-Jan-13	14-Feb-13



Actual Work | Critical Remaining Work | Summary
Remaining Work | Milestone

TASK filter: All Activities

#	Activity ID	Activity Name	Original Duration	Start	Finish
237	A26	Surgical Suite Floor Finishes	9	08-Feb-13	20-Feb-13
238	**Telecomm Room Buildout**		161	23-Mar-12	07-Nov-12
239	**Level 1**		121	23-Mar-12	12-Sep-12
240	A2650	Level 1	121	23-Mar-12	12-Sep-12
241	**Level 2**		96	10-May-12	25-Sep-12
242	A2660	Level 2	96	10-May-12	25-Sep-12
243	**Level 3**		124	15-May-12	07-Nov-12
244	A2670	Level 3	124	15-May-12	07-Nov-12
245	**Loading Dock and Canopy**		70	02-Aug-12	08-Nov-12
246	A2730	Existing Loading Dock Modifications and Demo	12	02-Aug-12	17-Aug-12
247	A2740	Form / Pour / Strip New Screen Wall and Pour	52	02-Aug-12	15-Oct-12
248	A2750	Install & Strip Base Course Asphalt	18	16-Oct-12	08-Nov-12
249	A2760	Erect South Side Steel Canopy	3	28-Sep-12	02-Oct-12
250	A2770	Install Translucent Skylight at Canopy	5	16-Oct-12	22-Oct-12
251	**Generator Yard**		29	07-Aug-12	17-Sep-12
252	A2780	Layout / Form / Rebar / Pour Footings, Walls &	13	07-Aug-12	23-Aug-12
253	A2790	Erect Masonry Walls / Excavate & Install Unde	10	20-Aug-12	31-Aug-12
254	A2800	Set Generators and Transformer	2	04-Sep-12	05-Sep-12
255	A2810	Pepoe Pull Main Power Feeders / Emergency I	6	06-Sep-12	13-Sep-12
256	A2820	Startup / Load Bank Testing	2	14-Sep-12	17-Sep-12
257	**Vertical Transportation**		106	04-Sep-12	01-Feb-13
258	A2680	Install Freight Elevatorsand Controls / Test Ins	106	04-Sep-12	01-Feb-13
259	A2690	Install Passenger Elevatorsand Controls / Test	71	23-Oct-12	01-Feb-13
260	**Sitework**		56	21-Sep-12	10-Dec-12
261	A2700	Curbs, Gutters & Sidewalks	30	21-Sep-12	01-Nov-12
262	A2710	Landscaping / Plantings / Bio Retention	15	23-Oct-12	12-Nov-12
263	A2720	Install Site Ligiting and Pole Bases	26	02-Nov-12	10-Dec-12
264	**Startup & Commissioning**		212	18-Sep-12	17-Jul-13
265	A2830	Commissioning / Testing / Balancing Floors	80	18-Oct-12	11-Feb-13
266	A2840	Shared Services Activation	44	12-Feb-13	12-Apr-13
267	A2850	Med Gas Certification	11	15-Feb-13	01-Mar-13
268	A2860	KP Regional Sercies Activation	65	15-Apr-13	16-Jul-13
269	**Electrical System**		93	18-Sep-12	29-Jan-13
270	A2900	Electrical / F.A. / Paging System / Nurse Call / S	93	18-Sep-12	29-Jan-13
271	**Occupancy**		158	04-Dec-12	17-Jul-13
272	A2910	Life Safety & Fire Alarm Inspections / Signoffs	48	04-Dec-12	11-Feb-13
273	A2920	Final Completion	1	12-Apr-13	12-Apr-13
274	A2930	First Patient	1	17-Jul-13	17-Jul-13
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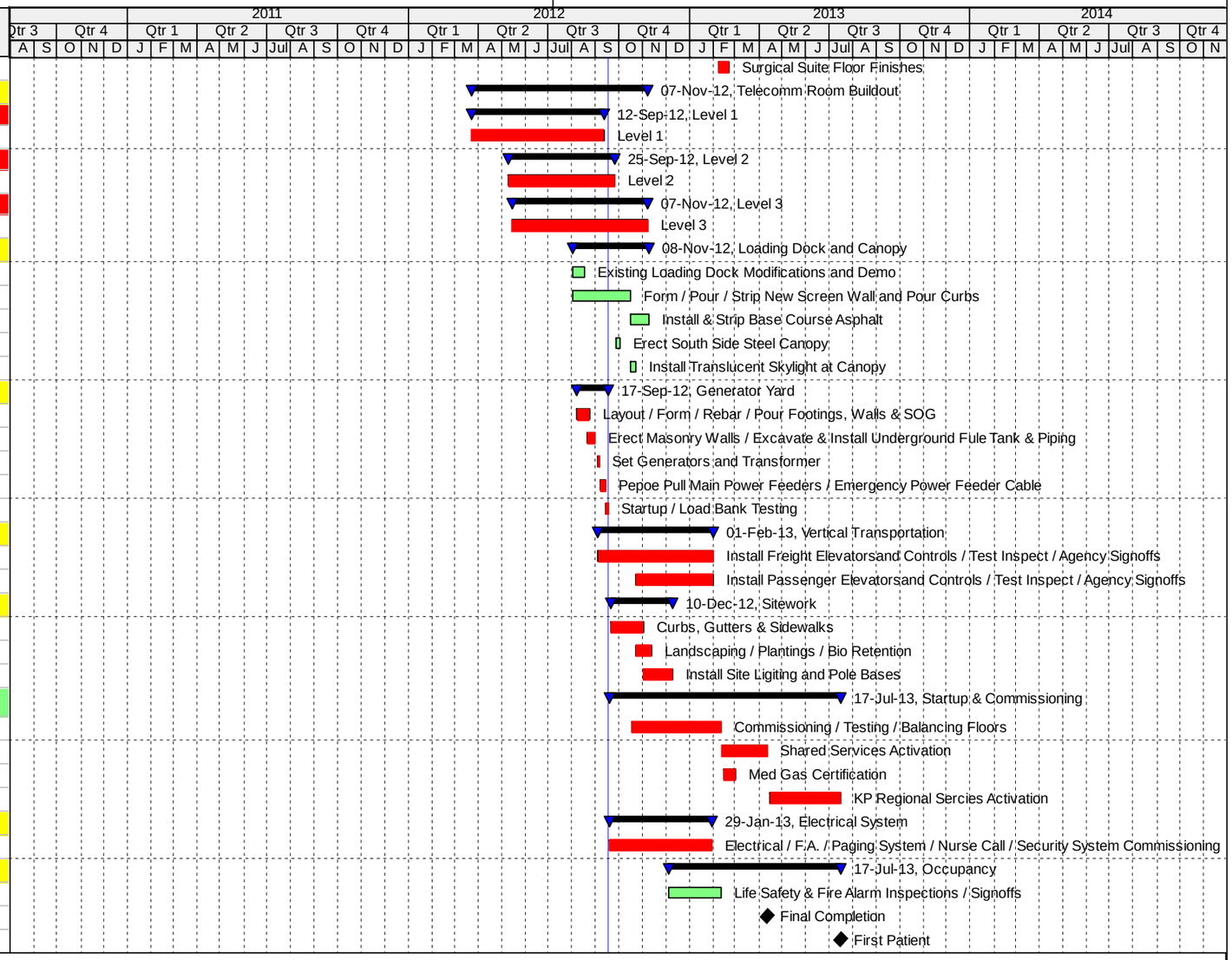


Appendix B – Detailed Structural Systems Estimate

Detailed Structural Systems Estimate

Unit Detail Report

Cost Estimate Report CostWorks RSMeans

Largo,

Year 2012

Date: 11-Oct-12

Concrete Estimate

Prepared By:
Topher Pozza
State

LineNumber			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
Division 03 Concrete							
031113357070			C.I.P. concrete forms, elevated slab, edge forms, 7" to 12" high, 1 use, includes shoring, erecting, bracing, stripping and cleaning	2,640.00	SFCA	$9.90	$26,136.00
031113450150			C.I.P. concrete forms, footing, continuous wall, plywood, 4 use, includes erecting, bracing, stripping and cleaning	6,480.00	SFCA	$4.97	$32,205.60
031113653000			C.I.P. concrete forms, slab on grade, edge, wood, to 6" high, 4 use, includes erecting, bracing, stripping and cleaning	1,050.00	L.F.	$2.70	$2,835.00
032205500100			Welded wire fabric, sheets, 6 x 6 - W1.4 x W1.4 (10 x 10) 121 lb. per C.S.F., A185, incl labor for accessories, excl material for accessories	115.00	C.S.F.	$42.16	$4,848.40
032205500300			Welded wire fabric, sheets, 6 x 6 - W2.9 x W2.9 (6 x 6) 42 lb. per C.S.F., A185, incl labor for accessories, excl material for accessories	42.00	C.S.F.	$58.87	$2,472.54
033053400920			Structural concrete, in place, column (4000 psi), square, avg reinforcing, 24" x 24", includes forms(4 uses), reinforcing steel, concrete, placing and finishing	21.00	C.Y.	$1,276.42	$26,804.82
033053401000			Structural concrete, in place, column (4000 psi), square, min reinforcing, 36" x 36", includes forms(4 uses), reinforcing steel, concrete, placing and finishing	20.00	C.Y.	$646.84	$12,936.80
033053403540			Structural concrete, in place, equipment pad (3000 psi), 3' x 3' x 6", includes forms, reinforcing steel, concrete, placing and finishing	25.00	Ea.	$122.45	$3,061.25
033053403940			Structural concrete, in place, continuous strip footing (3000 psi), 24" wide x 12" deep, reinforced, includes forms, reinforcing steel, concrete, placing and finishing	25.00	C.Y.	$322.45	$8,061.25
033053403950			Structural concrete, in place, continuous strip footing (3000 psi), 36" wide x 12" deep, reinforced, includes forms, reinforcing steel, concrete, placing and finishing	85.00	C.Y.	$290.45	$24,688.25
033053404250			Structural concrete, in place, free-standing wall (3000 psi), 8" thick x 14' high, includes forms(4 uses), reinforcing steel, concrete, placing and finishing	30.00	C.Y.	$716.88	$21,506.40

LineNumber			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
033105350150			Structural concrete, ready mix, normal weight, 3000 psi, includes local aggregate, sand, Portland cement and water, delivered, excludes all additives and treatments	660.00	C.Y.	$150.19	$99,125.40
033105700800			Structural concrete, placing, column, square or round, pumped, 24" thick, includes strike off & consolidation, excludes material	180.00	C.Y.	$40.60	$7,308.00
033105701000			Structural concrete, placing, column, square or round, pumped, 36" thick, includes strike off & consolidation, excludes material	72.00	C.Y.	$26.85	$1,933.20
033105701400			Structural concrete, placing, elevated slab, pumped, less than 6" thick, includes strike off & consolidation, excludes material	1,615.00	C.Y.	$26.85	$43,362.75
033105702150			Structural concrete, placing, continuous footing, deep, pumped, includes strike off & consolidation, excludes material	440.00	C.Y.	$23.35	$10,274.00
033105703250			Structural concrete, placing, grade beam, pumped, includes strike off & consolidation, excludes material	270.00	C.Y.	$20.81	$5,618.70
033105705100			Structural concrete, placing, walls, pumped, 12" thick, includes strike off & consolidation, excludes material	25.00	C.Y.	$34.00	$850.00
033116100760			Structural concrete, ready mix, lightweight, 110 #/C.F., 3000 psi, includes lightweight aggregate, sand, portland cement and water, excludes all additives and treatments	1,612.00	C.Y.	$197.13	$317,773.56
033529300200			Concrete finishing, floors, basic finishing for unspecified flatwork, bull float, manual float & manual steel trowel, excludes placing, striking off & consolidating	141,500.00	S.F.	$0.90	$127,350.00
Division 03 Subtotal							**$779,151.92**

Unit Detail Report

Cost Estimate Report CostWorks RSMeans

Largo,

Year 2012

Date: 11-Oct-12

Steel Framing

Prepared By:
Topher Pozza
State

LineNumber			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
Division 05 Metals							
050521900300			Welding structural steel in field, cost per welder, 1/8" dia, type 6011, incl 1 operating engineer	500.00	Hr.	$168.48	$84,240.00
050523050080			Anchor bolts, hooked type, single, 3/4" diameter x 12" long, installed in fresh concrete, includes nut and washer, excludes template	208.00	Ea.	$8.53	$1,774.24
051223170930			Column, structural, concrete filled, 6" dia, extra strong pipe, incl shop primer, cap & base plate, excludes bolts	70.00	L.F.	$73.52	$5,146.40
051223171950			Column, structural, 12" dia x 18'-0" H, extra strong pipe, incl shop primer, cap & base plate, excludes bolts	17.00	Ea.	$1,524.19	$25,911.23
051223174550			Column, structural tubing, 6" x 6" x 1/4" x 12'-0", incl shop primer, cap & base plate, bolts	40.00	Ea.	$425.98	$17,039.20
051223174600			Column, structural tubing, 8" x 8" x 3/8" x 14'-0", incl shop primer, cap & base plate, bolts	14.00	Ea.	$807.59	$11,306.26
051223175600			Column, structural tubing, 8" x 4" x 3/8" x 12'-0", incl shop primer, cap & base plate, bolts	2.00	Ea.	$537.52	$1,075.04
051223175700			Column, structural tubing, 12" x 8" x 1/2" x 16'-0", incl shop primer, cap & base plate, bolts	33.00	Ea.	$1,387.58	$45,790.14
051223177000			Column, structural, 2-tier, W10x45, A992 steel, incl shop primer, splice plates, bolts	580.00	L.F.	$64.02	$37,131.60
051223177050			Column, structural, 2-tier, W10x68, A992 steel, incl shop primer, splice plates, bolts	30.00	L.F.	$94.31	$2,829.30
051223177250			Column, structural, 2-tier, W12x120, A992 steel, incl shop primer, splice plates, bolts	54.00	L.F.	$162.26	$8,762.04
051223177300			Column, structural, 2-tier, W12x190, A992 steel, incl shop primer, splice plates, bolts	347.00	L.F.	$252.69	$87,683.43
051223750320			Structural steel member, 100-ton project, 1 to 2 story building, W8x15, A992 steel, shop fabricated, incl shop primer, bolted connections	460.00	L.F.	$29.03	$13,353.80
051223750360			Structural steel member, 100-ton project, 1 to 2 story building, W8x24, A992 steel, shop fabricated, incl shop primer, bolted connections	60.00	L.F.	$41.93	$2,515.80

LineNumber			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
051223750600			Structural steel member, 100-ton project, 1 to 2 story building, W10x12, A992 steel, shop fabricated, incl shop primer, bolted connections	139.00	L.F.	$25.29	$3,515.31
051223750700			Structural steel member, 100-ton project, 1 to 2 story building, W10x22, A992 steel, shop fabricated, incl shop primer, bolted connections	8.00	L.F.	$38.46	$307.68
051223750740			Structural steel member, 100-ton project, 1 to 2 story building, W10x33, A992 steel, shop fabricated, incl shop primer, bolted connections	157.00	L.F.	$53.51	$8,401.07
051223750740			Structural steel member, 100-ton project, 1 to 2 story building, W10x33, A992 steel, shop fabricated, incl shop primer, bolted connections	485.00	L.F.	$53.51	$25,952.35
051223751100			Structural steel member, 100-ton project, 1 to 2 story building, W12x16, A992 steel, shop fabricated, incl shop primer, bolted connections	930.00	L.F.	$27.23	$25,323.90
051223751300			Structural steel member, 100-ton project, 1 to 2 story building, W12x22, A992 steel, shop fabricated, incl shop primer, bolted connections	228.00	L.F.	$35.38	$8,066.64
051223751500			Structural steel member, 100-ton project, 1 to 2 story building, W12x26, A992 steel, shop fabricated, incl shop primer, bolted connections	659.00	L.F.	$40.53	$26,709.27
051223751520			Structural steel member, 100-ton project, 1 to 2 story building, W12x35, A992 steel, shop fabricated, incl shop primer, bolted connections	566.00	L.F.	$52.67	$29,811.22
051223751560			Structural steel member, 100-ton project, 1 to 2 story building, W12x50, A992 steel, shop fabricated, incl shop primer, bolted connections	172.00	L.F.	$72.60	$12,487.20
051223751580			Structural steel member, 100-ton project, 1 to 2 story building, W12x58, A992 steel, shop fabricated, incl shop primer, bolted connections	39.00	L.F.	$82.90	$3,233.10
051223751740			Structural steel member, 100-ton project, 1 to 2 story building, W12x87, A992 steel, shop fabricated, incl shop primer, bolted connections	141.00	L.F.	$122.41	$17,259.81
051223751900			Structural steel member, 100-ton project, 1 to 2 story building, W14x26, A992 steel, shop fabricated, incl shop primer, bolted connections	1,103.00	L.F.	$39.80	$43,899.40
051223752100			Structural steel member, 100-ton project, 1 to 2 story building, W14x30, A992 steel, shop fabricated, incl shop primer, bolted connections	14.00	L.F.	$45.54	$637.56
051223752320			Structural steel member, 100-ton project, 1 to 2 story building, W14x43, A992 steel, shop fabricated, incl shop primer, bolted connections	119.00	L.F.	$62.97	$7,493.43

LineNumber			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
051223752380			Structural steel member, 100-ton project, 1 to 2 story building, W14x90, A992 steel, shop fabricated, incl shop primer, bolted connections	47.00	L.F.	$124.59	$5,855.73
051223752700			Structural steel member, 100-ton project, 1 to 2 story building, W16x26, A992 steel, shop fabricated, incl shop primer, bolted connections	4,135.00	L.F.	$39.74	$164,324.90
051223752900			Structural steel member, 100-ton project, 1 to 2 story building, W16x31, A992 steel, shop fabricated, incl shop primer, bolted connections	2,962.00	L.F.	$46.83	$138,710.46
051223753100			Structural steel member, 100-ton project, 1 to 2 story building, W16x40, A992 steel, shop fabricated, incl shop primer, bolted connections	424.00	L.F.	$59.23	$25,113.52
051223753300			Structural steel member, 100-ton project, 1 to 2 story building, W18x35, A992 steel, shop fabricated, incl shop primer, bolted connections	464.00	L.F.	$53.74	$24,935.36
051223753500			Structural steel member, 100-ton project, 1 to 2 story building, W18x40, A992 steel, shop fabricated, incl shop primer, bolted connections	825.00	L.F.	$60.18	$49,648.50
051223753520			Structural steel member, 100-ton project, 1 to 2 story building, W18x46, A992 steel, shop fabricated, incl shop primer, bolted connections	70.00	L.F.	$67.90	$4,753.00
051223753700			Structural steel member, 100-ton project, 1 to 2 story building, W18x50, A992 steel, shop fabricated, incl shop primer, bolted connections	624.00	L.F.	$73.51	$45,870.24
051223753920			Structural steel member, 100-ton project, 1 to 2 story building, W18x65, A992 steel, shop fabricated, incl shop primer, bolted connections	35.00	L.F.	$93.36	$3,267.60
051223754100			Structural steel member, 100-ton project, 1 to 2 story building, W21x44, A992 steel, shop fabricated, incl shop primer, bolted connections	1,532.00	L.F.	$64.51	$98,829.32
051223754300			Structural steel member, 100-ton project, 1 to 2 story building, W21x50, A992 steel, shop fabricated, incl shop primer, bolted connections	112.00	L.F.	$72.23	$8,089.76
051223754500			Structural steel member, 100-ton project, 1 to 2 story building, W21x62, A992 steel, shop fabricated, incl shop primer, bolted connections	1,870.00	L.F.	$88.33	$165,177.10
051223754700			Structural steel member, 100-ton project, 1 to 2 story building, W21x68, A992 steel, shop fabricated, incl shop primer, bolted connections	973.00	L.F.	$96.05	$93,456.65
051223754720			Structural steel member, 100-ton project, 1 to 2 story building, W21x83, A992 steel, shop fabricated, incl shop primer, bolted connections	72.00	L.F.	$116.08	$8,357.76

LineNumber			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
051223754780			Structural steel member, 100-ton project, 1 to 2 story building, W21x122, A992 steel, shop fabricated, incl shop primer, bolted connections	25.00	L.F.	$166.70	$4,167.50
051223754780			Structural steel member, 100-ton project, 1 to 2 story building, W21x122, A992 steel, shop fabricated, incl shop primer, bolted connections	937.00	L.F.	$166.70	$156,197.90
051223755300			Structural steel member, 100-ton project, 1 to 2 story building, W24x68, A992 steel, shop fabricated, incl shop primer, bolted connections	432.00	L.F.	$95.53	$41,268.96
051223774300			Column base plates, structural, light, 100-ton project, up to 150 lb each, A992 steel, shop fabricated, incl shop primer	14,263.00	Lb.	$1.95	$27,812.85
053113505900			Metal floor decking, steel, non-cellular, composite, galvanized, 3" D, 18 gauge	76,000.00	S.F.	$3.38	$256,880.00
053123503300			Metal roof decking, steel, open type N wide rib, galvanized, under 50 Sq, 3" D, 20 gauge	38,000.00	S.F.	$3.50	$133,000.00
055113500300			Stair, shop fabricated, steel, 4'-0" W, incl picket railing, stringers, metal pan treads, excl concrete for pan treads, per riser	4.00	Riser	$657.33	$2,629.32
Division 05 Subtotal							**$2,016,002.85**
Division 07 Thermal and Moisture Protection							
077233100600			Roof Hatches, with curb, 1" fiberglass insulation, aluminum curb & cover, 2'-6" x 4'-6"	2.00	Ea.	$1,223.92	$2,447.84
Division 07 Subtotal							**$2,447.84**

Appendix C – General Conditions Estimate

General Conditions Estimate

Chris Pozza
psu

Date: 10-Oct-12

General Condition Estimate

Line Number			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
Division 01 General Requirements							
013113200020			Field Personnel, clerk, average	80	Week	$650.00	$52,000.00
013113200140			Field personnel, field engineer, maximum	95	Week	$2,275.00	$216,125.00
013113200140			Field personnel, field engineer, maximum	95	Week	$2,275.00	$216,125.00
013113200140			Field personnel, field engineer, maximum	60	Week	$2,275.00	$136,500.00
013113200200			Field personnel, project manager, average	70	Week	$3,275.00	$229,250.00
013113200220			Field personnel, project manager, maximum	100	Week	$3,750.00	$375,000.00
013113200240			Field personnel, superintendent, minimum	25	Week	$2,775.00	$69,375.00
013113200280			Field personnel, superintendent, maximum	95	Week	$3,475.00	$330,125.00
013113200280			Field personnel, superintendent, maximum	91	Week	$3,475.00	$316,225.00
013113200280			Field personnel, superintendent, maximum	91	Week	$3,475.00	$316,225.00
013113200280			Field personnel, superintendent, maximum	20	Week	$3,475.00	$69,500.00
Division 01 General Requirements Subtotal							$2,326,450.00

Chris Pozza
psu

Date: 10-Oct-12

Temporary Facilities

Line Number			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
Division 01 General Requirements							
015212400122	U		Large Trailer Setup	1	Each	$25,000.00	$25,000.00
015212400132	U		Jobsite Setup/Tear Down	1	Each	$15,000.00	$15,000.00
015213200300			Office Trailer, furnished, buy, 32' x 8', excl. hookups	2	Ea.	$15,971.80	$31,943.60
015213200500			Office Trailer, furnished, buy, 50' x 12', excl. hookups	1	Ea.	$30,868.65	$30,868.65
015523000010	U		Offsite Parking	20	Month	$2,000.00	$40,000.00
015523000020	U		Jobsite Vehicles	70	Month	$800.00	$56,000.00
015523000030	U		Fuel	91	Month	$500.00	$45,500.00
Division 01 General Requirements Subtotal							$244,312.25

Temporary Utilities Estimate

Chris Pozza

Date: 10-Oct-12

psu

Line Number			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
Division 01 General Requirements							
012123111000	U		Temporary Toilets (Building)	20	Month	$800.00	$16,000.00
012311111110	U		Water Consumption	20	Month	$400.00	$8,000.00
012312111110	U		Water Meter	1	Each	$15,000.00	$15,000.00
012354100000	U		Power Consumption	13	Month	$32,282.00	$419,666.00
015113100000	U		Temporary Generators	4	Month	$13,260.00	$53,040.00
015433110000	U		Temporary Toilets (Trailers)	20	Month	$400.00	$8,000.00
Division 01 General Requirements Subtotal							**$519,706.00**

Safety and Protection Estimate

Chris Pozza

Date: 10-Oct-12

psu

Line Number			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
Division 01 General Requirements							
013113200160			Field personnel, general purpose laborer, average	84	Week	$2,125.00	$178,500.00
014523505900			Vibration monitoring, seismograph and technician	40	Day	$449.96	$17,998.40
015409500005	U		Safety Supplies and First Aid	20	Month	$500.00	$10,000.00
015423700005	U		Scaffold Stair Tower	16	Month	$750.00	$12,000.00
015616000005	U		Temporary Walkway Protection	300	LF	$125.00	$37,500.00
015626500015	U		Temporary Fence Installation	1	Each	$7,500.00	$7,500.00
015626500025	U		Site Signage	1	Each	$7,500.00	$7,500.00
Division 01 General Requirements Subtotal							**$270,998.40**
Division 10 Specialties							
104416131100			Fire extinguishers, dry chemical, pressurized, standard type, portable, painted, 20 lb	35	Ea.	$138.00	$4,830.00
Division 10 Specialties Subtotal							**$4,830.00**
Division 32 Exterior Improvements							
320130200420			Snow removal, sidewalks and drives, double driveway (20' x 50'), 10" - 15" deep, 24" power blower	188	Ea.	$190.11	$35,740.68
Division 32 Exterior Improvements Subtotal							**$35,740.68**

Chris Pozza
psu

Cleaning Estimate

Date: 10-Oct-12

Line Number			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
Division 01 General Requirements							
013113200160			Field personnel, general purpose laborer, average	110	Week	$2,125.00	$233,750.00
015409600205	U		Debris Boxes	130	Each	$550.00	$71,500.00
017413200105	U		Final Clean	106700	SF	$0.51	$54,417.00
Division 01 General Requirements Subtotal							**$359,667.00**
Division 14 Conveying Equipment							
149182103000			Chutes, package, spiral type, max	2	Floor	$7,652.45	$15,304.90
Division 14 Conveying Equipment Subtotal							**$15,304.90**

General Expense Estimate

Date: 11-Oct-12

State

Line Number			Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
Division 01 General Requirements							
011131110105	U		Blueprints throughout construction	10	Month	$1,500.00	$15,000.00
013233500600			Construction photographs, aerial photos, initial fly-over, 6 shots, 1 print ea., 16" x 20" prints	2	Set	$1,294.53	$2,589.06
015213200010	U		Office Furniture (all Trailers)	1	Each	$3,000.00	$3,000.00
015213200020	U		Network and Server	20	Month	$800.00	$16,000.00
015213200030	U		DSL Line Setup and Charges	1	Each	$5,000.00	$5,000.00
015213200040	U		Printer/Fax/Copy Machine	20	Month	$350.00	$7,000.00
015213200050	U		Jobsite Telephones	20	20	$250.00	$5,000.00
015213200060	U		Jobsite Telephones Service Setup	1	Each	$2,000.00	$2,000.00
015213200070	U		Postage/Federal Express	20	Month	$250.00	$5,000.00
015213200080	U		Meeting Supplies/Snacks/Coffee	20	Month	$300.00	$6,000.00
015213200090	U		Survey	1	Each	$40,000.00	$40,000.00
015213400100			Field Office Expense, office equipment rental, average	40	Month	$214.94	$8,597.60
Division 01 General Requirements Subtotal							**$115,186.66**

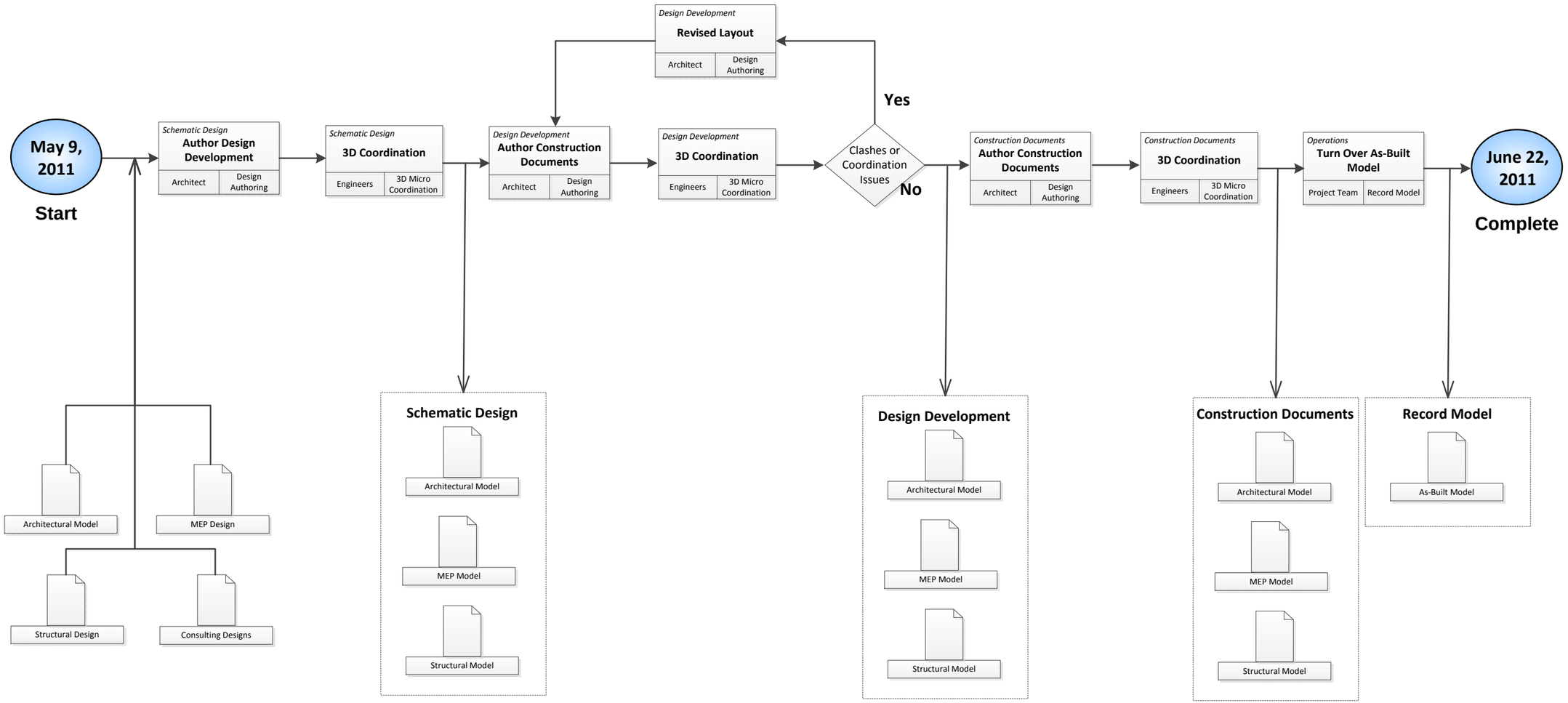
Appendix D – Level 1 Process Map

BIM Process Map

Chris Pozza

Level 1 Process Map: Kaiser Permanente Largo Medical Center

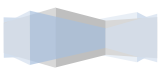
Largo, MD



October 12, 2012

Appendix E – BIM Uses Evaluation

BIM Uses Evaluation



BIM USE WORKSHEET

BIM Use*	Value to Project	Responsible Party	Value to Resp Party	Capability Rating			Additional Resources / Competencies Required to Implement	Notes	Proceed with Use
	High / Med / Low		High / Med / Low	Scale 1-3 (1 = Low)					YES / NO / MAYBE
				Resources	Competency	Experience			
3D Coordination (Design)	High	Architect	High	3	3	3	BIM Model and Analysis Programs to Help Determine Potetential Clashes Between Disciplines	Coordinating and modelling took place at the same time. Creating the BIM model took longer than originally anticipated due to the tasks happening simultaneously.	**YES**
		Structural	High	3	2	2			
		Mechanical	High	3	2	1			
		Electrical	High	3	2	2			
		BIM Engineer	High	3	3	3			
		Plumbing	High	3	3	3			
Design Authoring	High	Architect	High	3	3	3	Design plans and 3D modeling software to create overall BIM Model, Requires close collaboration between BIM users	Teamwork and experience allowed decisions to be made that were best for the project team and	**YES**
		BIM Engineer	High	3	3	3			
		Structural	High	3	2	2			
		Mechanical	High	3	2	1			
		Electrical	High	3	2	2			
		Plumbing	High	3	3	3			
3D Coordination (Construction)	High	Architect	High	3	3	3	BIM Engineer to lead meetings throughout design and construction. Members are to meet on site weekly in order to complete different building areas in their entirety.	Coordinating and modelling took place at the same time. There were a lot of coordination issues which slowed this process much more than expected.	**YES**
		BIM Engineer	High	3	3	3			
		Structural	High	3	2	2			
		Mechanical	High	3	2	1			
		Electrical	High	3	2	2			
		Plumbing	High	3	3	3			
Generate Shop Drawings	High	Architect	High	3	2	2	3D Model Manipulation Tools Ability to effectively communicate between design, construction, and facilities management teams	Changes are made to models during weekly meetings and noted in order to make changes to subcontractor models and produce up-to-date drawings.	**YES**
		Structural	High	3	2	1			
		Mechanical	High	3	3	1			
		Electrical	High	3	3	3			
		Plumbing	High	3	2	2			
Record Modeling	Low	Mechanical	Low	1	1	1	Ability to understand typical equipment operation and maintenance practices	General Contractor is not legally required to give model to owner, but will hand over once complete.	**YES**
		Lighting	Low	1	1	1			
		Structural	Low	1	1	1			
Virtual Mockup	Medium	BIM Engineer	Low	3	3	3	Drawings and Specs for specific systems to be constructed virtually	Originally a BIM Goal to construct virtual mockups, however this goal was never achieved	**NO**
		Architect	Low	3	3	3			
		Structural	Low	3	2	2			

* Additional BIM Uses as well as information on each Use can be found at http://www.engr.psu.edu/ae/cic/bimex/