TECHNICAL ASSIGNMENT TWO

The Pennsylvania State AE Senior Thesis

Duval County Unified Courthouse Facility

Jacksonville, Florida

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Construction Management

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EXECUTIVE SUMMARY

Project performance is the basis of research analysis behind the Technical Assignment Two. After implementing a thorough investigation, this project theme has sparked the notion of existing standards and their role with project delivery phases. This notion was examined with the 798,000 square foot Duval County Unified Courthouse Facility (DCUCF) construction project and its obstacle to find financial prosperity. While the construction industry was in turmoil from rising material costs, the DCUCF sought guidance under its city government and Turner Construction Company's project management team. Through positive measures, this team was able to construct a financially stable estimate and an efficient schedule. Along with overcoming this hardship, Turner Construction Company had to deal with the Duval County Unified Courthouse Facility's site logistics and the surrounding community. The project location is in the heart of the mainstream intersection of Monroe Street and Clay Street. Alternate routes had to be devised while maintaining vehicular traffic flow to keep the Jacksonville City operable.

Data displaying effective schedule breakdowns utilizing a three and four phase method to meet the projected completion date are presented within this research narrative. This narrative demonstrates a detailed schedule of major trades and components of the project that are properly linked for construction success. Insights of efficient lead time are included through the phasing sequences of the superstructure and interior services/MEP. The analysis of the superstructure concludes with competent crane lift activities being employed at the south facing side of the site to follow the desired schedule. The interior services/MEP analysis yields an effective display of work flow for these specific trades to gain access to the site from the South, to receive materials from the West, and to execute work from the North and South. Site layout plans for these two phases are provided in order to accurately support the given outcomes. A detailed estimate was performed for the DCUCF to determine the ratio of structural divisions versus the total project cost. This estimate concluded with components of 154 CY of concrete and 2500 TONS of steel used for the construction of the structure. This averages a steel takeoff to be roughly 50% of the project cost and a concrete takeoff to be roughly 0.16%. Projected costs of personnel, documents/services, project facilities, project equipment, and temporary utilities are given in the form of a general conditions estimate. This estimate established a dollar figure of roughly $12 million which accommodates for 6% of the total construction project cost evaluation. Lastly, a summary of construction industry issues will be discussed from the 2010 PACE Roundtable Seminar that will take place on October 27, 2010.

With comprehensive research of the Duval County Unified Courthouse Facility for this technical assignment and from previously analyzed Technical Assignment 1, a concentration will be targeted at the redetermination of site logistics work flow and trade sequencing phases of the project. Examining these topics will provide a knowledgeable base focus on both preconstruction and construction relationships. Foreshadowing reports from the 2010 PACE Roundtable Seminar are expected to aid in studies of these potential subject topics.

PROJECT SCHEDULE SUMMARY

***See APPENDIX A for the Detailed Project Schedule**

While working in Duval County division of the Jacksonville area, high volume pedestrian and vehicular traffic must be taken into account in order to sustain proper scheduling procedures. Turner Construction Company implemented a four phase construction procedure for the building of the foundation, structural, and finishing systems of the project. These phases were broken up into sections of center, east, west, and colonnade. For the construction of the foundation, a three phase process was only required due to the colonnade sitting on the center section foundation. The center section started first and was followed by the east and west section respectively within a two to three day gap. By starting with the center section, an allowance for future work on the colonnade would be provided.

Within the construction phase of the Duval County Unified Courthouse Facility, Turner Construction Company utilized a pour, in-slab electrical conduit, and steel girt framing sequential order for each floor per section of work flow. This method allows for an efficiently erected superstructure to support interior power service connections that will be provided later in the construction schedule. The steel girt framing system is constructed with the floor pouring and in-slab electrical conduit sequence of the floor above to aid in laterally supported structural influences. This structural component permits for a faster schedule productivity rate by pertaining to working with multiple floors at a given sequence.

With the exception to the steel girt framing system, the DCUCF follows a standard commercial project schedule. This standard consists of work sequencing of foundation, superstructure, building enclosure and finishes. By maintaining a project environment similar to the construction industry and incorporating a bracing system at the same time as slab layouts, the Duval County Unified Courthouse Facility is projected to be completed in May 2012. With this target completion date, building operation can start before traffic congestion and high usage of the facility is predicted at the beginning of the summer session.

SITE LAYOUT PLANNING SUMMARY

***See APPENDIX B for the Site Layout Plans**

SUPERSTRUCTURE SITE PLAN

The superstructure phase poses the most susceptible factors for site congestion. Within this layout, steel, masonry, and precast concrete panels are delivered on site and correlate with temporary facilities along with construction equipment. Careful site utilization must be noted during construction operation due to safety concerns that could arise. The most notable section of the layout is the two crane involvement system. Crane one is a stationary unit located at the center exterior of the colonnade portion of the structure with a larger reach of 265 feet. This crane is then removed for the colonnade phase to be constructed due to its materials not needing a lift support. A secondary mobile crane is present on the East side of the structure and then moves to the West side with a reach of 229 feet. Each crane location has a respective laydown material area for work outside of the given structure parameters. Reference Figure 1. for a snapshot of crane locations for a lift involving an exterior component being added to the superstructure. Effective communication is required for these lifts in the laydown areas because their reaches can interfere with one another and could result with unforeseen consequences.

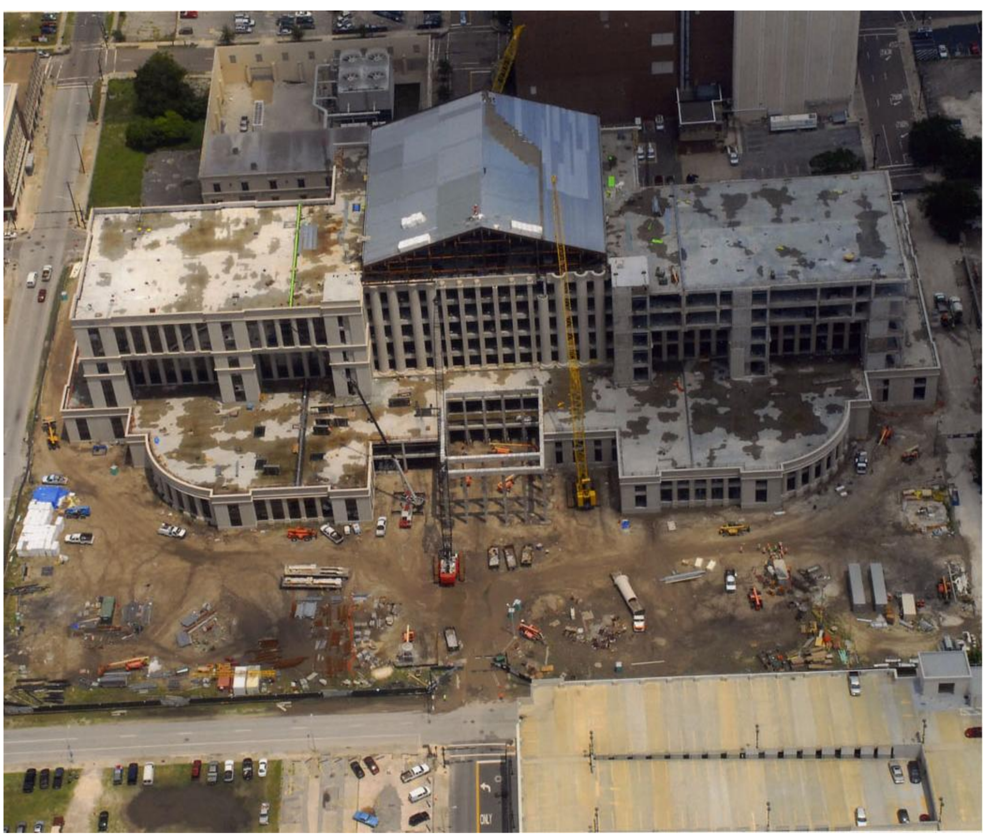


Figure 1. Aerial view of crane locations during s lift.

INTERIOR SERVICES/MEP SITE PLAN

Once the operation of the superstructure ceases, the interior services/MEP work can start. Site congestion and activities are at a lower rate due to the cranes and their laydown areas being removed. The only exterior storage for this portion of the construction phase is allotted by a storage shed near the personnel area on the West side of the site. This procedure gives way for exterior transportation on site among the many trades that must come onto the project. The new material storage area is within the structure and is only permitted for materials that are currently being worked with. Restrictions on materials inside the structure promote a clean project and dissipate any source of interior congestion. A side observation can be noted that worker conflict is depleted by not favoring a certain trade by granting more storage time on site with this restriction. Work flow for this site plan starts with the center section where access routes are implemented at the center South side of the structure. For West and East sections, access routes are mapped on South facing side of each respective section. Two additional sources of admittance are located on the North boundary of the structure and require regulated entry granted from the general contractor to the subcontractors.

DETAILED STRUCTURAL ESTIMATE

***See APPENDIX C for the Detailed Structural Estimate**

The Duval County Unified Courthouse Facility's superstructure is primarily composed of cast-in-place concrete along with steel for the upper-roof portions. This project measures in at approximately 798,000 square feet which gives many explorations for structure components to be analyzed. In order to produce an accurate estimate, R.S.Means Costworks Software and R.S.Means 2010 Building Construction Cost Data book were used. Table 1 and Figure 2. display a physical summary of the structural breakdown of the superstructure, calculated from both the book and software sources. Values were averaged from a national standpoint of the construction industry in order to obtain the material, labor, and equipment unit costs. Actual structural estimates from this project are currently not accessible for comparison to the national average.

Component	Unit	Unit Cost	Quantity	Total Cost
Concrete Formwork	SFCA	$2.11	6304	$13,301.44
Concrete Reinforcing	TONS	$2,440.00	223.84	$546,169.60
Cast-In-Place Concrete	CY	$153.45	488957.32	$77,059,352.36
Steel Trusses	LF	$370.54	972	$360,164.88
Pan Joist Decking	SF	$50.98	800000	$40,784,000.00
			Total	$118,762,988.28

Table 1. Structural Summary

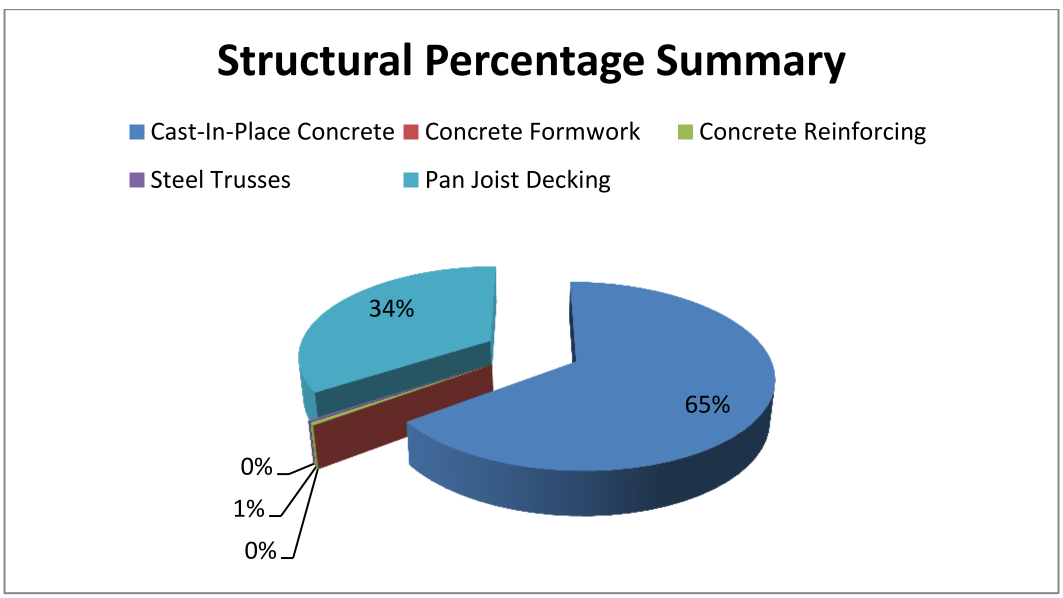


Figure 2. Structural Percentage Summary

After investigating the structure of the DCUCF, an indifferent pan joist system at 4,000 psi and seven inches was observed for the guidelines of the structural system. For construction of pan joists, a reusable one cost steel decking is used. Evaluating this system gives a layout of one floor while being able to construct another floor at the same time of construction. A typical bay method was used to acquire the structural analysis for this concrete beam and joist system. Six typical bays at twenty-four feet were taken and spanned across the entire building's footprint for each floor. Each bay consisted of (4) 8x29 secondary concrete joists and a 19x29, 27x29, and 27x32 primary concrete joist. Very precise symmetrical floor plans were assumed for these calculations which would offset the final result to be over the actual beam estimate. Figure 3shows a sectional cut of a pan joist.

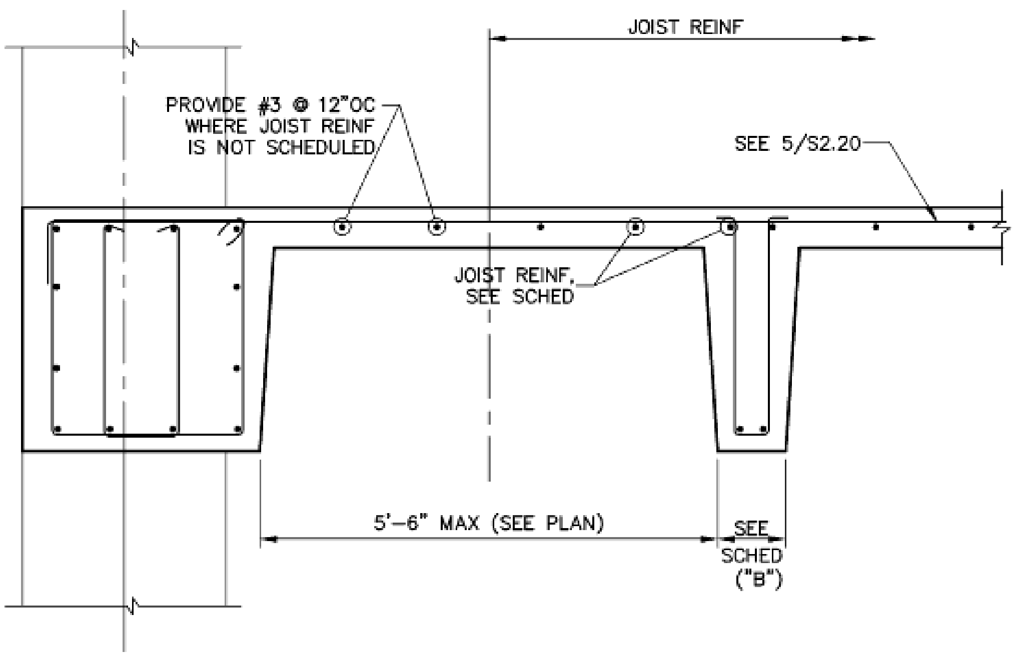


Figure 3. Sectional cut of a standard pan joist.

Concrete columns for this project contained only vertical reinforcing with support of tie offsets. Two specific columns- 16"x24"and 24"x24"- were most represented for construction due to their high capacity endurance and span. Specialty concrete pile caps were also represented; the most distinguished was the Type 3 at a quantity of seventy-one. The Type 3 pile cap was composed of 3-#10 3 WAYS reinforcing formatting with a special designed shape which allows them to withstand the most building transfer loading. See Figure 4 for the Type 3 pile cap.

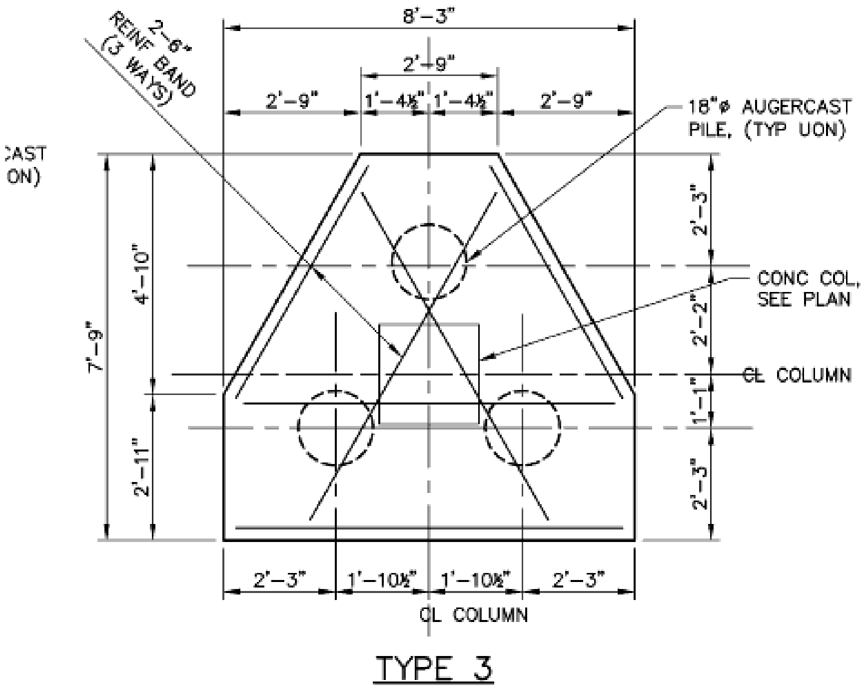


Figure 4. Type 3 pile cap

Steel is constructed in the upper-roof area of the Duval County Courthouse Facility. Beams sizes of W24x104 and W12x40 are used more frequently in chevron bracing to accommodate for roof lateral loads. The W24x104 and W24x131 didn't have unit pricing in the R.S.Means resources so an average value between two similar steel beams was used.

GENERAL CONDITIONS ESTIMATE SUMMARY

***See APPENDIX D for the General Conditions Estimate**

A brief overview of the general conditions estimate for the Duval County Unified Courthouse Facility (DCUCF) can be observed in Figure 5**.** These values were gathered from the R.S.Means 2010 Edition and in no shape or form reflect the actual obtained contract values gathered from the estimating division of Turner Construction Company. Allocation of assigned tasks and numbers were presented as an assumed efficient construction project modeled from the research project of the DCUCF. This estimate was consolidated into five classifications: personnel, documents/services, project facilities, project equipment, and temporary utilities. The personnel aspect includes suggested staffing members that were referenced off of the actual Turner Construction Company staffing organization consisting of field engineers, superintendents, clerks, and project managers. The documents/services portion includes contractual agreements on bonds, insurance, inspections, scheduling, waste-management, and expenses. The project facilities entail the contractor trailers and storage trailers which help in housing functions and activities within the project. Project equipment such as signage, fencing, and barricades regulates site efficiency and distinguishes public and private sectors. Power, lighting, water/sanitary supply, and portable toilets make up the temporary utilities for the constructed general conditions of the site.

Line Item	Units	Unit Rate($)	Quantity	Cost ($)
Personnel	WEEK	16415	135	2216025
Documents/Services	WEEK	44012.91	135	10,217,235.96
Temporary Facilities	WEEK	471.81	135	63695
Project Equipment	WEEK	432.39	135	58,372.12
Temporary Utilities	WEEK	1249.42	135	168672.16
	Total	62581.53	135	12,724,000.25

Figure 5. General Conditions Estimate Breakdown

Figure 6. indicates that that documents/services along with temporary utilities make up majority of the general conditions estimate. When analyzing the results of the data, this estimate concludes a cost of approximately $12 million that averages 6% of the total cost of the entire project.

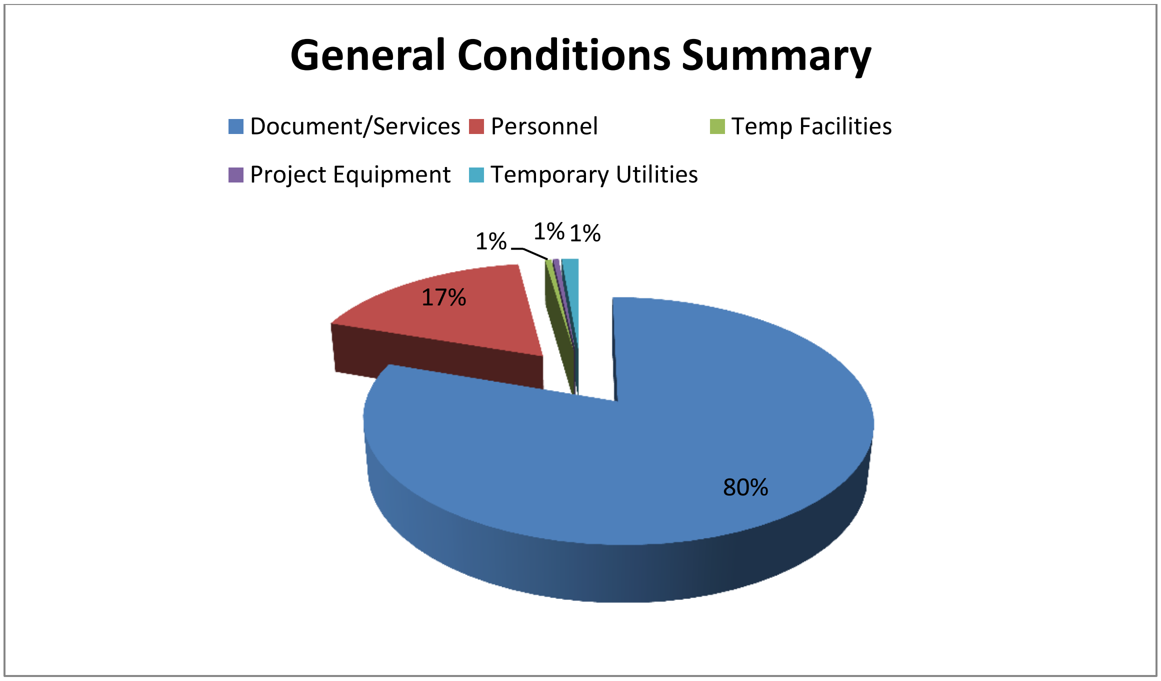


Figure 6. General Conditions Summary

CRITICAL INDUSTRY ISSUES

The Department of Architectural Engineering at the Pennsylvania State University hosted the 19th Annual PACE Roundtable at the Penn Stater Conference Center Hotel on October 27th-28th, 2010. "Building a Collaboration Culture "was the overall theme discussed with the attendees who included faculty, AE graduate students, AE undergraduate students, and industry members. Reference Figure 7, for resourceful key thesis contacts. Three main topics of critical industry issues were formed into two break-out sessions that pertained to:

1. Sustainability/Green Building
   - Educating a future workforce for delivering high performance buildings.
   - The Smart Grid: Energy impacts in the building industry.
2. Technology Applications
   - Transformation: What are the innovations that will transform our industry?
   - Carrying BIM to the field – new responsibilities, roles, and competencies.
3. Process Innovation
   - IPD: Exploring the drivers behind highly integrated delivery of projects.
   - Operations and Maintenance process integration in new and retrofit projects.

These categories were deliberated among the attendees to gain insight on the perspectives that each person had experienced and wanted to receive more information about. The "collaboration" led to very informative conversations on a person and his or her role that influenced the construction industry and aimed at its affects for a positive future. Though all three main discussion topics are very important in sustaining an optimistic building practice, my efforts led me to investigate Technology Applications and Process Innovation.

My first segment attended was the Technology Applications- Transformation: What are the innovations that will transform our industry?, directed by Dr. John Messner . The baseline of this topic was construction product innovations and Building Information Modeling (BIM) with consumer interaction. Industry members started the discussion with the most current product innovations of our time and their real-life practices. Products such as robots and handheld PCs were introduced in order to improve project productivity. They provided efficient layouts and process analysis through proper communication between contractors. A second tribute to the industry and is a most compelling project method is prefabrication. Industry members conveyed its relativity with MEP trades involving quick performance ceiling work. Each trade is present and responsible for connections while maintaining strong technical communication with one another. An urge for early identification and "out-of-the-box" thinking was brought up in the aid of prefabrication benefits. This is practical to the Duval County Unified Courthouse Facility, since most of its units utilize prefabrication of concrete due to its large-scale project size. A common practice of Revit is now being brought up by owners and expected out of current architectural engineering students into the field. A foreshadow of advances in this program of knowledge from everyone in the project phases is expected within time.

Future product innovations consist of Latista programming and event simulation. Latista allows product information retrieval from suppliers of the project and is best used at the closeout phase. There is an obstacle with keeping up with updated data from multiple sources due to constant changes that take place on a project. A solution was proposed for future referencing of a centralized public access unit. This would allow for a wireless capability onsite to check for up-to-date modifications. The group consensus dealt with technological advances that would allow Latista data to be presented on the actual equipment and service to permit for problem identification. A more progressive approach for event simulation was predicted within the next ten to twenty years. Building functions and client tasks could be performed by the project team so they know first-hand on how the building will operate. Along with building functionality, structure sequence can be analyzed to see how project workers could best perform their work. The remote user could actually layout the concrete pour as though he or she is the concrete contractor. Both opportunities lead to a unified idea of detailing and prototyping in the industry.

Building Information Modeling is the most sought out technological innovation that is applicable to today's advances. Owners are now inquiring for usage of this program for their projects. Industry members and AE students agreed that BIM is a great idea, but is lacking consumer interaction. The benefits are contributed to the creator only due to lack of effort of other team members participation with the program. All participants of the project need to be interfaced with the model for success. This is to say that the construction industry needs to be more concerned with the "designing of the process" and not concentrated on "designing the building". A willing of wanting to learn BIM is needed in order to wreak in the glory of its profits. To best know if BIM is suitable for a company, one must look at the individual benefactors and synergistic impact to see if a positive outcome will result.

My second attended segment was the Process Innovation- Operations and Maintenance process integrations in new and retrofit projects., directed by Dr. Robert Leicht. The subject of this break-out session related to challenges when turning over the building documentation to the owner. Due to its quantity of system summaries that are incorporated into the project and must be maintained, the DCUCF is most practical for this theme through contract terms. From this topic, implementation of obstacles spawns from both the owner-side and project tea- side. Owner created challenges come from a staffing structure that lacks coordination with the actual systems that are being installed into the building. It was determined that this staff correlates with the idea of doing what is "easy" and not what is "correct". A technical team is needed to teach to decode the "foreign language" of the construction programs that are being used for building systems. Mr. Eric Nulton, from the Office of the Physical Plant (OPP), stated that "the construction engineer sees the system as itself and the maintenance team views the system as a problem." A disregard to project drive and experience seems to be the highlighted point because owners in government jobs can't afford to lose system power due to their high job security so they have this drive for correction and knowledge. “Owning up to miscommunication along with the operations staff being stuck in their way of work is the main component.” Retorted Mr. Trey Hooper of DPR Construction INC. There’s a boundary of not wanting to learn new technologies that owners must recognize in order to provide a successful project as a whole before and after construction.

Project team turnover errors are represented in the form of explanation and communication. The industry members of OPP, DPR Construction, and Forrester all agreed that they have witnessed this lack of relationship on behalf of the project team (but not subjected from their companies). A better plan for system educating to the owner- side should be carefully analyzed. Basic knowledge is perceived from the owner and the staffing, but a step-by-step process should be taken into account to guide them to proper understanding. This should spark a motivation of system data awareness to be planned for so that building systems can efficiently work after the documentation is turned over.

Secondary strategies were then discussed on procedure of operations once completion of the project phase was finished. John Bechtel of OPP debated, “Occupancy happiness: Should it be 100%? Because at times energy efficiency is then lowered.” Viewpoints from employees of home comfortability is then applied to the workplace. Everyone wants to have that satisfaction of environment control, but it is difficult to achieve due to differing standards of each person. Industry members and AE students brainstormed methods to try to accommodate an average standard to be met. Retrofit sensoring was one of the two main points discussed. With this sensoring mechanism, rooms could have devices to regulate energy from a control panel to give an average environment control. The Duval County Unified Courthouse Facility took this into consideration and benefited from sensor regulation because of consistent occupancy loading. Next survey seeking was debated on behalf of the project team to aid in sustaining building system operations. If surveys were taken then a mean is distributed of employee satisfaction versus productivity from the owner-side which then acts as an invisible sensoring method. The group debate concluded that a perception of “This is the best product or service provided so why should there be errors involved, if any then they should be easily fixed?” on behalf of the owner and project team. With this existing perception, therein lies the question still needing to be resolved, How do we coordinate together to see operations and maintenance process benefits?

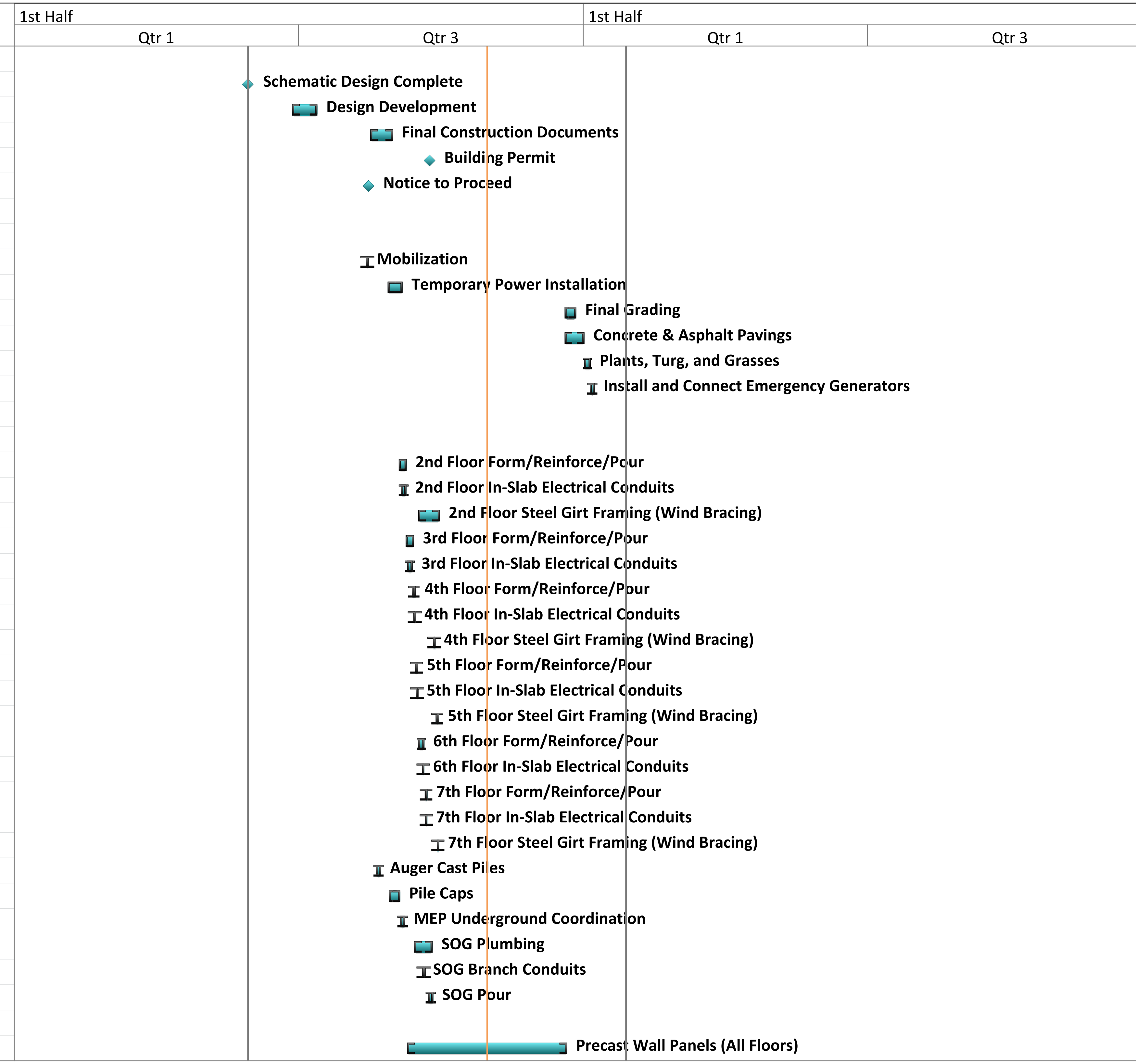
In conclusion, the 19th Annual PACE Roundtable was a most vital seminar to attend to adhere to factors that are currently affecting the construction industry. This event permitted industry members to relay obstacles and solutions that pertained to the AE career field that students should prepare for. Through this exchange of debate, experiences were applied to scenarios to give a first-hand application of how an architectural engineering background is adequately employed to accomplish project success throughout its lifecycle.

PACE INDUSTRY KEY CONTACTS			
Name	Company	Contact	Note
Mr. John Bechtel	Office of the Physical Plant	jrb115@psu.edu	Maintenance & Operation Turn-Over
Mr. Matt Hedrick	DPR Construction Inc.	matthe@dpr.com	BIM Uses and Strategies
Mr. Trey Hooper	DPR Construction Inc.	treyh@dpr.com	Collaborative Assistance & Resources

Figure 7. Resourceful Key Thesis Contacts

APPENDIX A – DETAILED PROJECT SCHEDULE

Task Name	Duration	Start	Finish	Predecessors
Preconstruction				
Schematic Design Complete	0 days	Fri 11/16/07	Fri 11/16/07	
Design Development	80 days	Tue 6/3/08	Mon 9/22/08	
Final Construction Documents	73 days	Wed 5/20/09	Fri 8/28/09	
Building Permit	0 days	Wed 2/10/10	Wed 2/10/10	
Notice to Proceed	0 days	Tue 5/12/09	Tue 5/12/09	
Construction				
Sitework				
Mobilization	5 days	Mon 5/4/09	Fri 5/8/09	
Temporary Power Installation	48 days	Thu 8/6/09	Sat 10/10/09	
Final Grading	37 days	Mon 10/10/11	Tue 11/29/11	
Concrete & Asphalt Pavings	64 days	Mon 10/10/11	Thu 1/5/12	
Plants, Turg, and Grasses	20 days	Fri 1/6/12	Thu 2/2/12	
Install and Connect Emergency Generators	15 days	Tue 1/31/12	Mon 2/20/12	
West				
Structural				
2nd Floor Form/Reinforce/Pour	24 days	Fri 9/25/09	Wed 10/28/09	
2nd Floor In-Slab Electrical Conduits	17 days	Mon 10/5/09	Tue 10/27/09	
2nd Floor Steel Girt Framing (Wind Bracing)	69 days	Tue 12/22/09	Fri 3/26/10	
3rd Floor Form/Reinforce/Pour	26 days	Mon 10/26/09	Mon 11/30/09	
3rd Floor In-Slab Electrical Conduits	17 days	Mon 11/2/09	Tue 11/24/09	
4th Floor Form/Reinforce/Pour	12 days	Mon 11/23/09	Tue 12/8/09	
4th Floor In-Slab Electrical Conduits	3 days	Thu 12/3/09	Mon 12/7/09	
4th Floor Steel Girt Framing (Wind Bracing)	5 days	Mon 3/1/10	Fri 3/5/10	
5th Floor Form/Reinforce/Pour	9 days	Tue 12/8/09	Fri 12/18/09	
5th Floor In-Slab Electrical Conduits	4 days	Mon 12/14/09	Thu 12/17/09	
5th Floor Steel Girt Framing (Wind Bracing)	10 days	Wed 3/10/10	Tue 3/23/10	
6th Floor Form/Reinforce/Pour	21 days	Mon 12/21/09	Sat 1/16/10	
6th Floor In-Slab Electrical Conduits	6 days	Fri 1/8/10	Fri 1/15/10	
7th Floor Form/Reinforce/Pour	9 days	Wed 1/20/10	Sat 1/30/10	
7th Floor In-Slab Electrical Conduits	6 days	Fri 1/22/10	Fri 1/29/10	
7th Floor Steel Girt Framing (Wind Bracing)	7 days	Mon 3/15/10	Tue 3/23/10	
Auger Cast Piles	16 days	Mon 6/15/09	Mon 7/6/09	
Pile Caps	35 days	Wed 8/12/09	Tue 9/29/09	
MEP Underground Coordination	14 days	Fri 10/2/09	Wed 10/21/09	
SOG Plumbing	58 days	Thu 12/3/09	Mon 2/22/10	
SOG Branch Conduits	1 day	Fri 1/15/10	Fri 1/15/10	
SOG Pour	16 days	Thu 2/4/10	Thu 2/25/10	
Exterior				
Precast Wall Panels (All Floors)	513 days	Mon 11/2/09	Wed 10/19/11	



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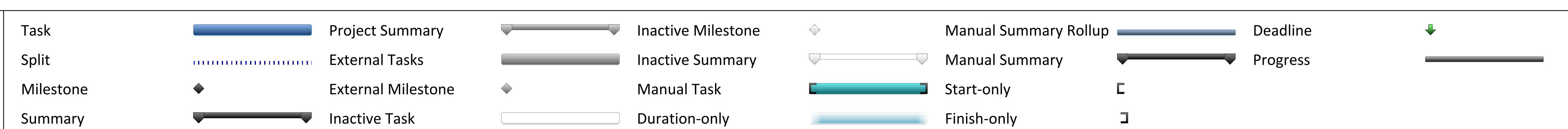
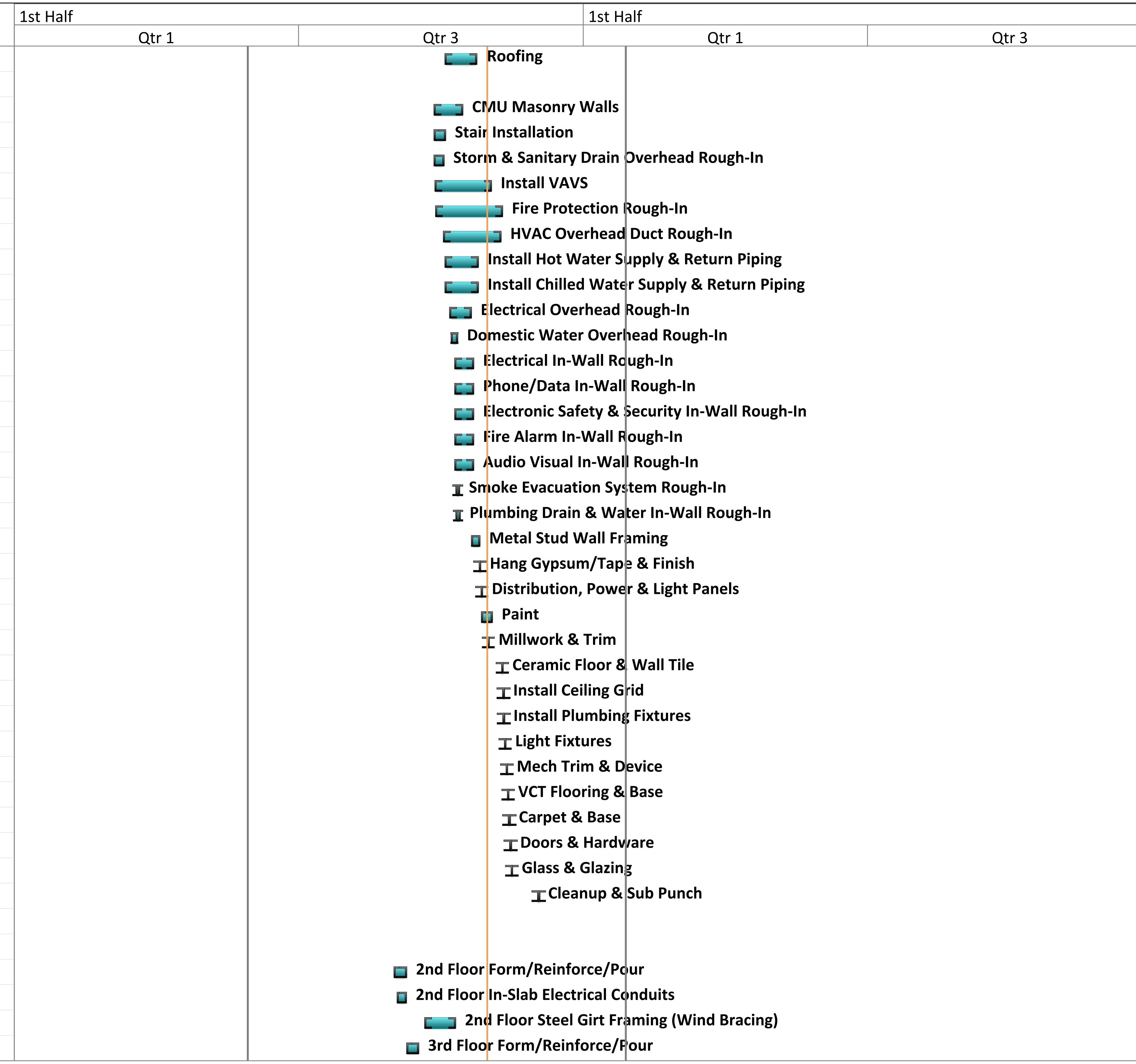


Task Name	Duration	Start	Finish	Predecessors
Roofing	105 days	Mon 4/19/10	Fri 9/10/10	
Interior				
CMU Masonry Walls	95 days	Mon 3/1/10	Fri 7/9/10	
Stair Installation	40 days	Mon 3/1/10	Fri 4/23/10	
Storm & Sanitary Drain Overhead Rough-In	35 days	Mon 3/1/10	Fri 4/16/10	
Install VAVS	182 days	Fri 3/5/10	Mon 11/15/10	
Fire Protection Rough-In	217 days	Mon 3/8/10	Tue 1/4/11	
HVAC Overhead Duct Rough-In	187 days	Mon 4/12/10	Tue 12/28/10	
Install Hot Water Supply & Return Piping	110 days	Mon 4/19/10	Fri 9/17/10	
Install Chilled Water Supply & Return Piping	110 days	Mon 4/19/10	Fri 9/17/10	
Electrical Overhead Rough-In	72 days	Mon 5/10/10	Tue 8/17/10	
Domestic Water Overhead Rough-In	23 days	Mon 5/17/10	Wed 6/16/10	
Electrical In-Wall Rough-In	63 days	Wed 6/2/10	Fri 8/27/10	
Phone/Data In-Wall Rough-In	63 days	Wed 6/2/10	Fri 8/27/10	
Electronic Safety & Security In-Wall Rough-In	63 days	Wed 6/2/10	Fri 8/27/10	
Fire Alarm In-Wall Rough-In	63 days	Wed 6/2/10	Fri 8/27/10	
Audio Visual In-Wall Rough-In	63 days	Wed 6/2/10	Fri 8/27/10	
Smoke Evacuation System Rough-In	15 days	Mon 6/7/10	Fri 6/25/10	
Plumbing Drain & Water In-Wall Rough-In	16 days	Mon 6/7/10	Mon 6/28/10	
Metal Stud Wall Framing	30 days	Mon 8/16/10	Fri 9/24/10	
Hang Gypsum/Tape & Finish	5 days	Tue 9/21/10	Mon 9/27/10	
Distribution, Power & Light Panels	7 days	Tue 9/28/10	Wed 10/6/10	
Paint	37 days	Thu 9/30/10	Fri 11/19/10	
Millwork & Trim	8 days	Wed 10/27/10	Fri 11/5/10	
Ceramic Floor & Wall Tile	6 days	Thu 12/30/10	Thu 1/6/11	
Install Ceiling Grid	3 days	Thu 1/6/11	Mon 1/10/11	
Install Plumbing Fixtures	3 days	Fri 1/7/11	Tue 1/11/11	
Light Fixtures	7 days	Tue 1/11/11	Wed 1/19/11	
Mech Trim & Device	5 days	Thu 1/20/11	Wed 1/26/11	
VCT Flooring & Base	6 days	Tue 1/25/11	Tue 2/1/11	
Carpet & Base	3 days	Wed 2/2/11	Fri 2/4/11	
Doors & Hardware	4 days	Mon 2/7/11	Thu 2/10/11	
Glass & Glazing	5 days	Fri 2/11/11	Thu 2/17/11	
Cleanup & Sub Punch	3 days	Tue 6/14/11	Thu 6/16/11	
Center				
Structural				
2nd Floor Form/Reinforce/Pour	43 days	Wed 9/2/09	Fri 10/30/09	
2nd Floor In-Slab Electrical Conduits	32 days	Wed 9/16/09	Thu 10/29/09	
2nd Floor Steel Girt Framing (Wind Bracing)	101 days	Mon 1/18/10	Mon 6/7/10	
3rd Floor Form/Reinforce/Pour	40 days	Thu 10/29/09	Wed 12/23/09	



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Date:

Task — Project Summary — Inactive Milestone — Manual Summary Rollup — Deadline

Split — External Tasks — Inactive Summary — Manual Summary — Progress

Milestone — External Milestone — Manual Task — Start-only

Summary — Inactive Task — Duration-only — Finish-only

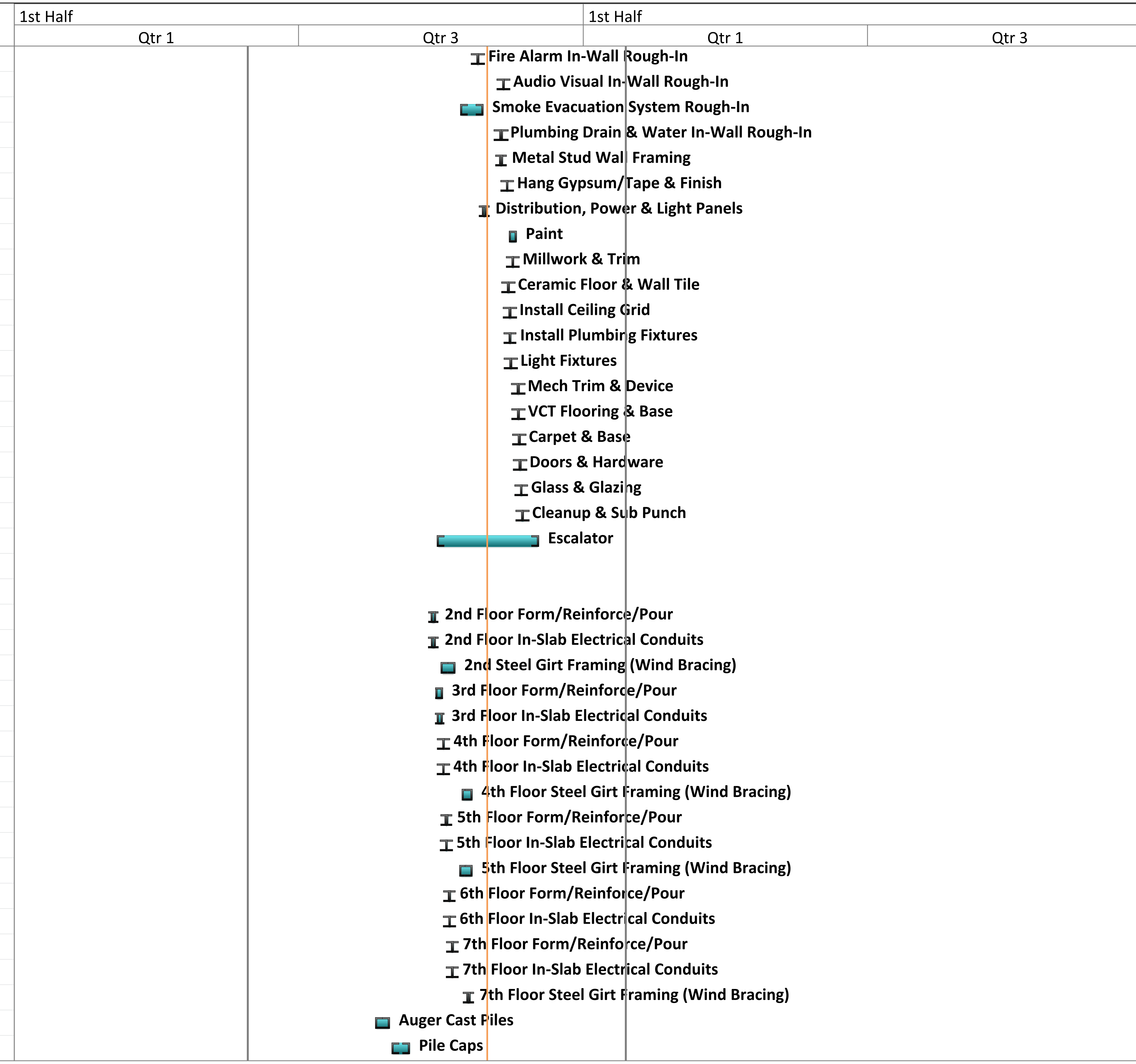
Task Name	Duration	Start	Finish	Predecessors
3rd Floor In-Slab Electrical Conduits	36 days	Tue 11/3/09	Tue 12/22/09	
4th Floor Form/Reinforce/Pour	26 days	Mon 12/21/09	Sat 1/23/10	
4th Floor In-Slab Electrical Conduits	13 days	Wed 1/6/10	Fri 1/22/10	
4th Floor Steel Girt Framing (Wind Bracing)	71 days	Wed 5/5/10	Wed 8/11/10	
5th Floor Form/Reinforce/Pour	26 days	Wed 1/20/10	Wed 2/24/10	
5th Floor In-Slab Electrical Conduits	18 days	Thu 1/28/10	Mon 2/22/10	
5th Floor Steel Girt Framing (Wind Bracing)	71 days	Wed 5/5/10	Wed 8/11/10	
6th Floor Form/Reinforce/Pour	21 days	Mon 2/22/10	Sat 3/20/10	
6th Floor In-Slab Electrical Conduits	15 days	Mon 3/1/10	Fri 3/19/10	
7th Floor Form/Reinforce/Pour	32 days	Mon 3/22/10	Tue 5/4/10	
7th Floor In-Slab Electrical Conduits	24 days	Wed 3/31/10	Mon 5/3/10	
7th Floor Steel Girt Framing (Wind Bracing)	25 days	Thu 7/8/10	Wed 8/11/10	
Auger Cast Piles	21 days	Mon 6/8/09	Sat 7/4/09	
Pile Caps	44 days	Mon 7/6/09	Thu 9/3/09	
MEP Underground Coordination	14 days	Fri 10/2/09	Wed 10/21/09	
SOG Plumbing	26 days	Fri 1/22/10	Fri 2/26/10	
SOG Branch Conduits	60 days	Mon 1/25/10	Fri 4/16/10	
SOG Pour	86 days	Fri 3/19/10	Fri 7/16/10	
Roof Form/Reinforce/Pour	48 days	Sat 4/10/10	Tue 6/15/10	
Roof In-Slab Electrical Conduit	26 days	Mon 4/19/10	Sat 5/22/10	
Roof Steel Framing	15 days	Mon 5/17/10	Fri 6/4/10	
Roof Framing Deck	42 days	Wed 6/9/10	Thu 8/5/10	
Roof Fireproofing	17 days	Tue 8/31/10	Wed 9/22/10	
Exterior				
Precast Wall Panels (All Floors)	262 days	Mon 11/16/09	Tue 11/16/10	
Roofing	102 days	Wed 7/21/10	Thu 12/9/10	
Interior				
CMU Masonry Walls	137 days	Tue 6/1/10	Wed 12/8/10	
Stair Installation	90 days	Mon 3/8/10	Fri 7/9/10	
Storm & Sanitary Drain Overhead Rough-In	131 days	Fri 4/9/10	Fri 10/8/10	
Install VAVS	69 days	Tue 7/6/10	Fri 10/8/10	
Fire Protection Rough-In	224 days	Thu 2/25/10	Tue 1/4/11	
HVAC Overhead Duct Rough-In	132 days	Mon 6/28/10	Tue 12/28/10	
Install Hot Water Supply & Return Piping	76 days	Sun 6/13/10	Fri 9/24/10	
Install Chilled Water Supply & Return Piping	35 days	Mon 8/16/10	Fri 10/1/10	
Electrical Overhead Rough-In	102 days	Mon 8/16/10	Tue 1/4/11	
Domestic Water Overhead Rough-In	76 days	Sun 6/13/10	Fri 9/24/10	
Electrical In-Wall Rough-In	69 days	Tue 7/6/10	Fri 10/8/10	
Phone/Data In-Wall Rough-In	4 days	Fri 9/17/10	Wed 9/22/10	
Electronic Safety & Security In-Wall Rough-In	8 days	Mon 1/10/11	Wed 1/19/11	

1st Half: Qtr 1, Qtr 3 | 1st Half: Qtr 1, Qtr 3

Proje
Date:

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

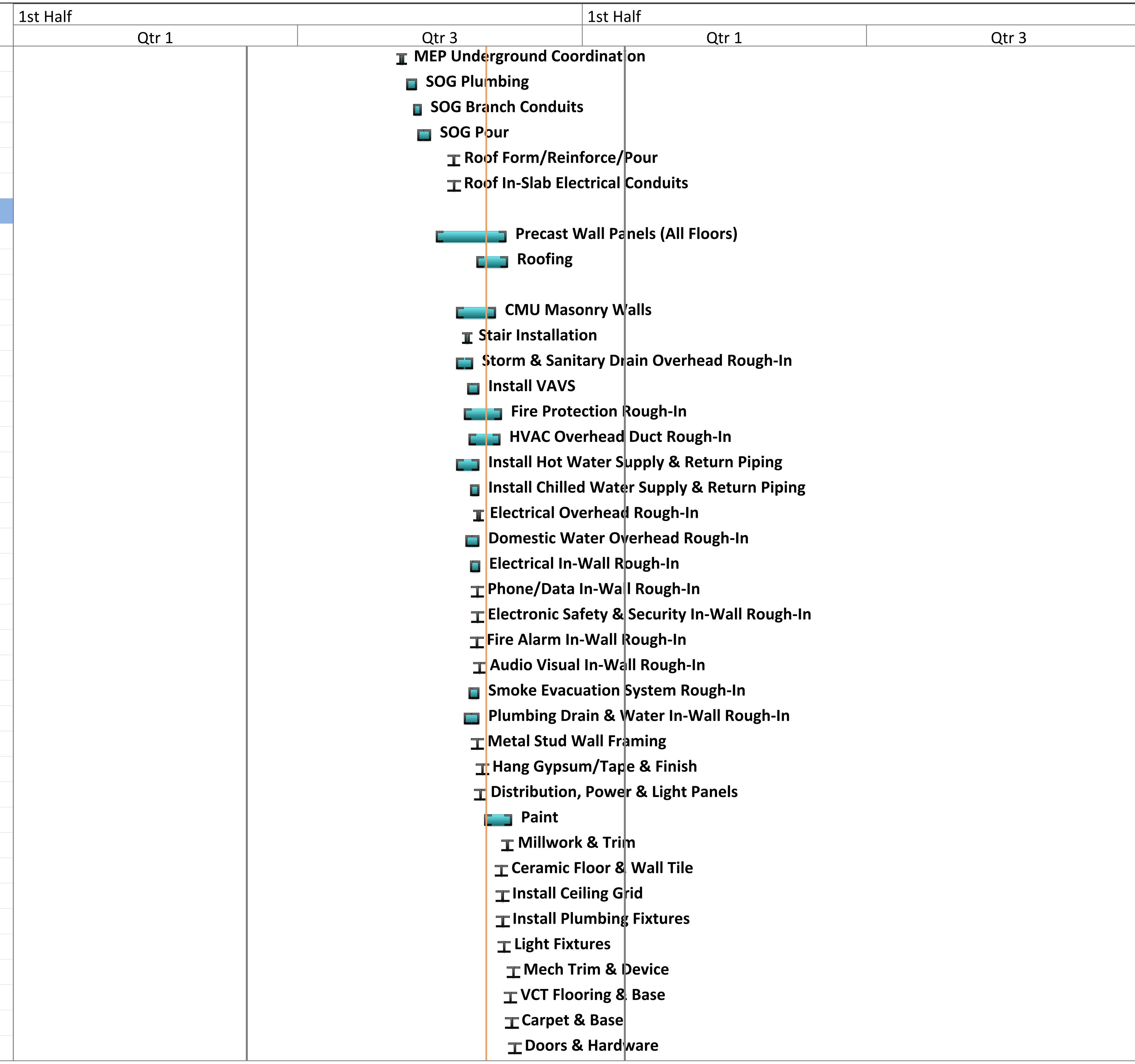
Task Name	Duration	Start	Finish	Predecessors
Fire Alarm In-Wall Rough-In	4 days	Mon 9/13/10	Thu 9/16/10	
Audio Visual In-Wall Rough-In	4 days	Wed 1/5/11	Mon 1/10/11	
Smoke Evacuation System Rough-In	75 days	Mon 6/28/10	Fri 10/8/10	
Plumbing Drain & Water In-Wall Rough-In	1 day	Tue 12/28/10	Tue 12/28/10	
Metal Stud Wall Framing	12 days	Mon 12/20/10	Tue 1/4/11	
Hang Gypsum/Tape & Finish	5 days	Fri 1/21/11	Thu 1/27/11	
Distribution, Power & Light Panels	15 days	Mon 10/4/10	Fri 10/22/10	
Paint	24 days	Wed 2/2/11	Mon 3/7/11	
Millwork & Trim	4 days	Wed 2/16/11	Mon 2/21/11	
Ceramic Floor & Wall Tile	2 days	Fri 1/28/11	Mon 1/31/11	
Install Ceiling Grid	2 days	Fri 2/4/11	Mon 2/7/11	
Install Plumbing Fixtures	8 days	Tue 2/1/11	Thu 2/10/11	
Light Fixtures	4 days	Tue 2/8/11	Fri 2/11/11	
Mech Trim & Device	3 days	Mon 3/14/11	Wed 3/16/11	
VCT Flooring & Base	4 days	Mon 3/14/11	Thu 3/17/11	
Carpet & Base	2 days	Fri 3/18/11	Mon 3/21/11	
Doors & Hardware	3 days	Tue 3/22/11	Thu 3/24/11	
Glass & Glazing	5 days	Fri 3/25/11	Thu 3/31/11	
Cleanup & Sub Punch	3 days	Fri 4/1/11	Tue 4/5/11	
Escalator	328 days	Mon 3/15/10	Wed 6/15/11	
East				
Structural				
2nd Floor Form/Reinforce/Pour	16 days	Tue 2/16/10	Tue 3/9/10	
2nd Floor In-Slab Electrical Conduits	14 days	Wed 2/17/10	Mon 3/8/10	
2nd Steel Girt Framing (Wind Bracing)	47 days	Thu 4/1/10	Fri 6/4/10	
3rd Floor Form/Reinforce/Pour	24 days	Tue 3/9/10	Fri 4/9/10	
3rd Floor In-Slab Electrical Conduits	19 days	Mon 3/15/10	Thu 4/8/10	
4th Floor Form/Reinforce/Pour	7 days	Fri 4/9/10	Sat 4/17/10	
4th Floor In-Slab Electrical Conduits	6 days	Fri 4/9/10	Fri 4/16/10	
4th Floor Steel Girt Framing (Wind Bracing)	35 days	Mon 7/5/10	Fri 8/20/10	
5th Floor Form/Reinforce/Pour	11 days	Mon 4/19/10	Mon 5/3/10	
5th Floor In-Slab Electrical Conduits	7 days	Thu 4/22/10	Fri 4/30/10	
5th Floor Steel Girt Framing (Wind Bracing)	42 days	Thu 6/24/10	Fri 8/20/10	
6th Floor Form/Reinforce/Pour	10 days	Tue 5/4/10	Sat 5/15/10	
6th Floor In-Slab Electrical Conduits	7 days	Thu 5/6/10	Fri 5/14/10	
7th Floor Form/Reinforce/Pour	9 days	Tue 5/18/10	Fri 5/28/10	
7th Floor In-Slab Electrical Conduits	8 days	Tue 5/18/10	Thu 5/27/10	
7th Floor Steel Girt Framing (Wind Bracing)	13 days	Mon 7/26/10	Wed 8/11/10	
Auger Cast Piles	47 days	Thu 6/11/09	Fri 8/14/09	
Pile Caps	59 days	Mon 8/24/09	Thu 11/12/09	



Proje
Date:

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

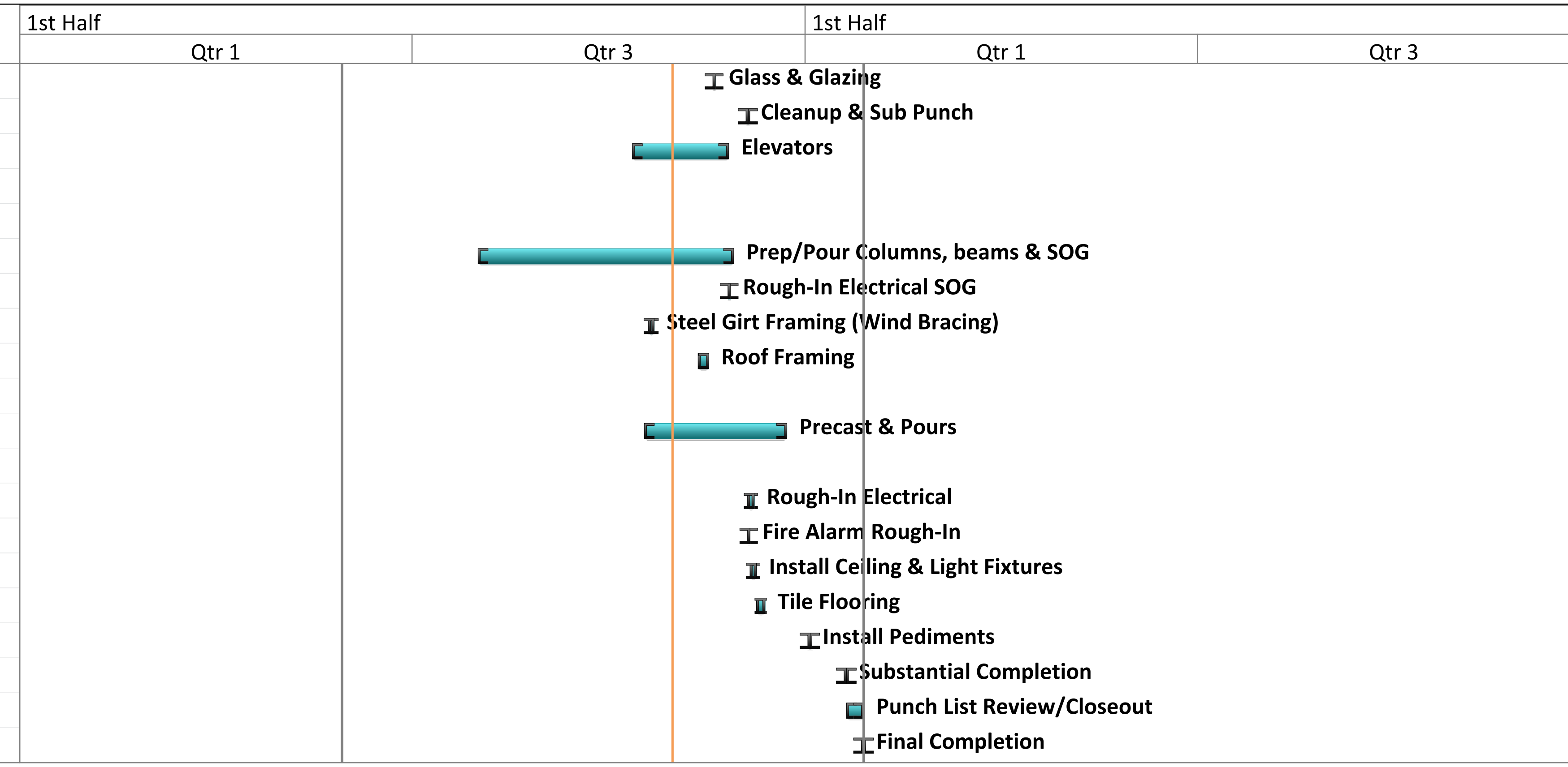
Task Name	Duration	Start	Finish	Predecessors
MEP Underground Coordination	14 days	Fri 10/2/09	Wed 10/21/09	
SOG Plumbing	35 days	Mon 11/2/09	Fri 12/18/09	
SOG Branch Conduits	27 days	Thu 12/3/09	Fri 1/8/10	
SOG Pour	44 days	Tue 12/22/09	Fri 2/19/10	
Roof Form/Reinforce/Pour	8 days	Sat 5/29/10	Tue 6/8/10	
Roof In-Slab Electrical Conduits	4 days	Wed 6/2/10	Mon 6/7/10	
Exterior				
Precast Wall Panels (All Floors)	226 days	Mon 3/15/10	Mon 1/24/11	
Roofing	101 days	Mon 9/13/10	Mon 1/31/11	
Interior				
CMU Masonry Walls	128 days	Mon 6/14/10	Wed 12/8/10	
Stair Installation	15 days	Fri 7/23/10	Thu 8/12/10	
Storm & Sanitary Drain Overhead Rough-In	55 days	Mon 6/14/10	Fri 8/27/10	
Install VAVS	39 days	Tue 8/3/10	Fri 9/24/10	
Fire Protection Rough-In	122 days	Mon 7/19/10	Tue 1/4/11	
HVAC Overhead Duct Rough-In	102 days	Mon 8/9/10	Tue 12/28/10	
Install Hot Water Supply & Return Piping	75 days	Mon 6/14/10	Fri 9/24/10	
Install Chilled Water Supply & Return Piping	30 days	Mon 8/16/10	Fri 9/24/10	
Electrical Overhead Rough-In	15 days	Mon 9/13/10	Fri 10/1/10	
Domestic Water Overhead Rough-In	45 days	Mon 7/26/10	Fri 9/24/10	
Electrical In-Wall Rough-In	32 days	Mon 8/16/10	Tue 9/28/10	
Phone/Data In-Wall Rough-In	7 days	Mon 9/13/10	Tue 9/21/10	
Electronic Safety & Security In-Wall Rough-In	7 days	Tue 9/14/10	Wed 9/22/10	
Fire Alarm In-Wall Rough-In	5 days	Mon 9/13/10	Fri 9/17/10	
Audio Visual In-Wall Rough-In	7 days	Thu 9/23/10	Fri 10/1/10	
Smoke Evacuation System Rough-In	35 days	Mon 8/9/10	Fri 9/24/10	
Plumbing Drain & Water In-Wall Rough-In	50 days	Mon 7/19/10	Fri 9/24/10	
Metal Stud Wall Framing	7 days	Mon 9/13/10	Tue 9/21/10	
Hang Gypsum/Tape & Finish	5 days	Thu 10/7/10	Wed 10/13/10	
Distribution, Power & Light Panels	7 days	Mon 9/27/10	Tue 10/5/10	
Paint	90 days	Mon 10/18/10	Fri 2/18/11	
Millwork & Trim	10 days	Mon 1/24/11	Fri 2/4/11	
Ceramic Floor & Wall Tile	6 days	Thu 12/30/10	Thu 1/6/11	
Install Ceiling Grid	3 days	Thu 1/6/11	Mon 1/10/11	
Install Plumbing Fixtures	3 days	Fri 1/7/11	Tue 1/11/11	
Light Fixtures	7 days	Tue 1/11/11	Wed 1/19/11	
Mech Trim & Device	5 days	Wed 2/23/11	Tue 3/1/11	
VCT Flooring & Base	6 days	Wed 2/9/11	Wed 2/16/11	
Carpet & Base	3 days	Thu 2/17/11	Mon 2/21/11	
Doors & Hardware	4 days	Wed 3/2/11	Mon 3/7/11	

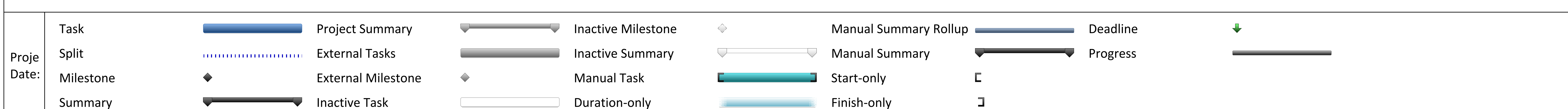


Proje
Date:

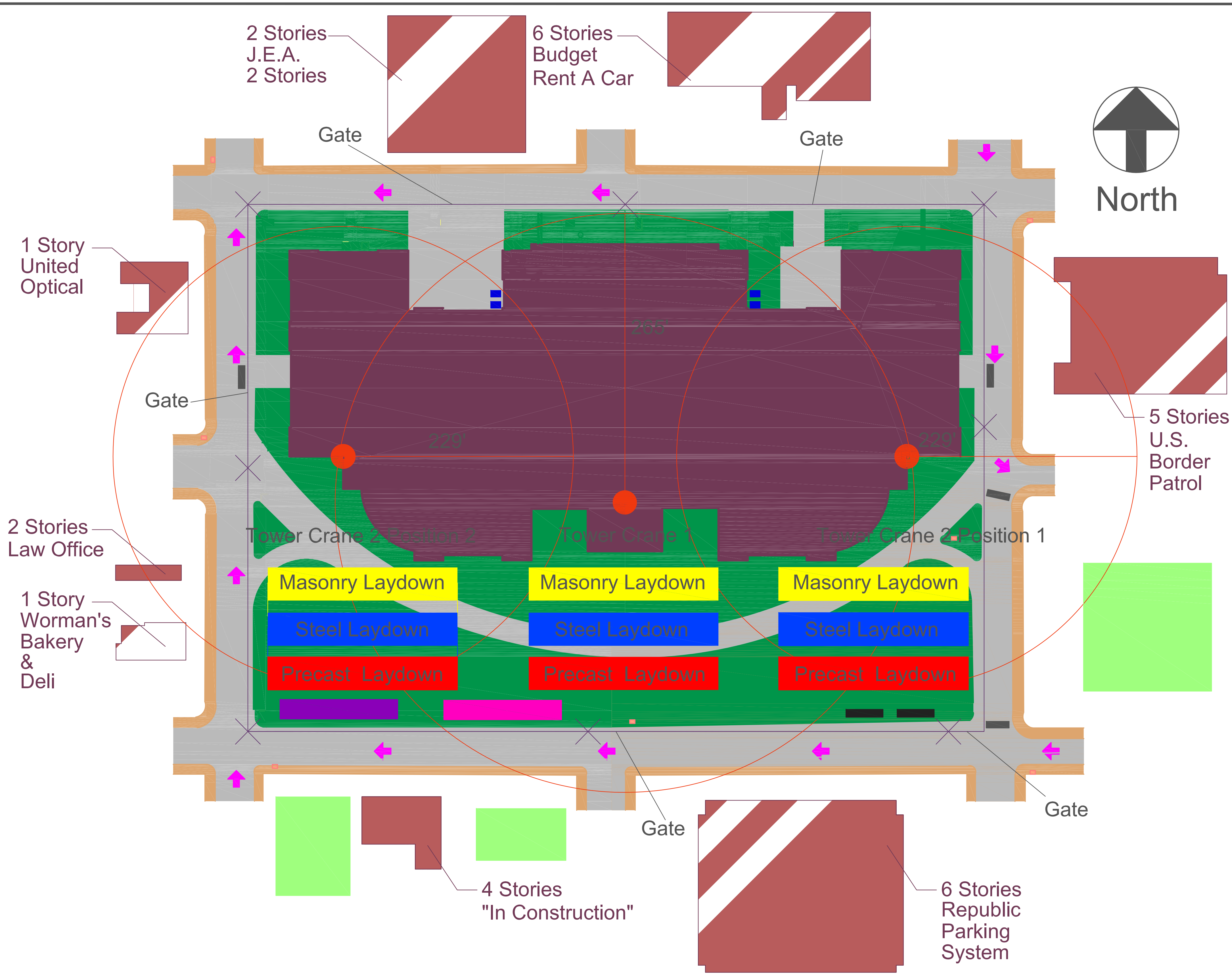
Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
Milestone	External Milestone	Manual Task	Start-only	
Summary	Inactive Task	Duration-only	Finish-only	

Task Name	Duration	Start	Finish	Predecessors
Glass & Glazing	**5 days**	**Tue 3/8/11**	**Mon 3/14/11**	
Cleanup & Sub Punch	**3 days**	**Tue 6/28/11**	**Thu 6/30/11**	
Elevators	**224 days**	**Fri 6/18/10**	**Wed 4/27/11**	
Colonnade				
Structural				
Prep/Pour Columns, beams & SOG	**596 days**	**Sun 2/1/09**	**Fri 5/13/11**	
Rough-In Electrical SOG	**5 days**	**Tue 4/26/11**	**Mon 5/2/11**	
Steel Girt Framing (Wind Bracing)	**15 days**	**Mon 8/9/10**	**Fri 8/27/10**	
Roof Framing	**25 days**	**Tue 1/18/11**	**Mon 2/21/11**	
Exterior				
Precast & Pours	**332 days**	**Tue 7/27/10**	**Wed 11/2/11**	
Interior				
Rough-In Electrical	**16 days**	**Tue 6/28/11**	**Tue 7/19/11**	
Fire Alarm Rough-In	**6 days**	**Tue 6/28/11**	**Tue 7/5/11**	
Install Ceiling & Light Fixtures	**15 days**	**Wed 7/6/11**	**Tue 7/26/11**	
Tile Flooring	**20 days**	**Wed 7/27/11**	**Tue 8/23/11**	
Install Pediments	**2 days**	**Mon 1/16/12**	**Tue 1/17/12**	
Substantial Completion	1 day	Mon 5/14/12	Mon 5/14/12	
Punch List Review/Closeout	40 days	Tue 5/15/12	Mon 7/9/12	
Final Completion	1 day	Mon 7/9/12	Mon 7/9/12	





APPENDIX B – SITE LAYOUT PLANS



LEGEND:

Symbols:

- Masonry Laydown
- Steel Laydown
- Precast Laydown
- Construction Parking
- Double Hoist
- Road Closed
- General Contractor Trailers
- Portable Toilets
- Vehicular Traffic
- Construction Fence
- Fire Hydrant
- Dumpsters

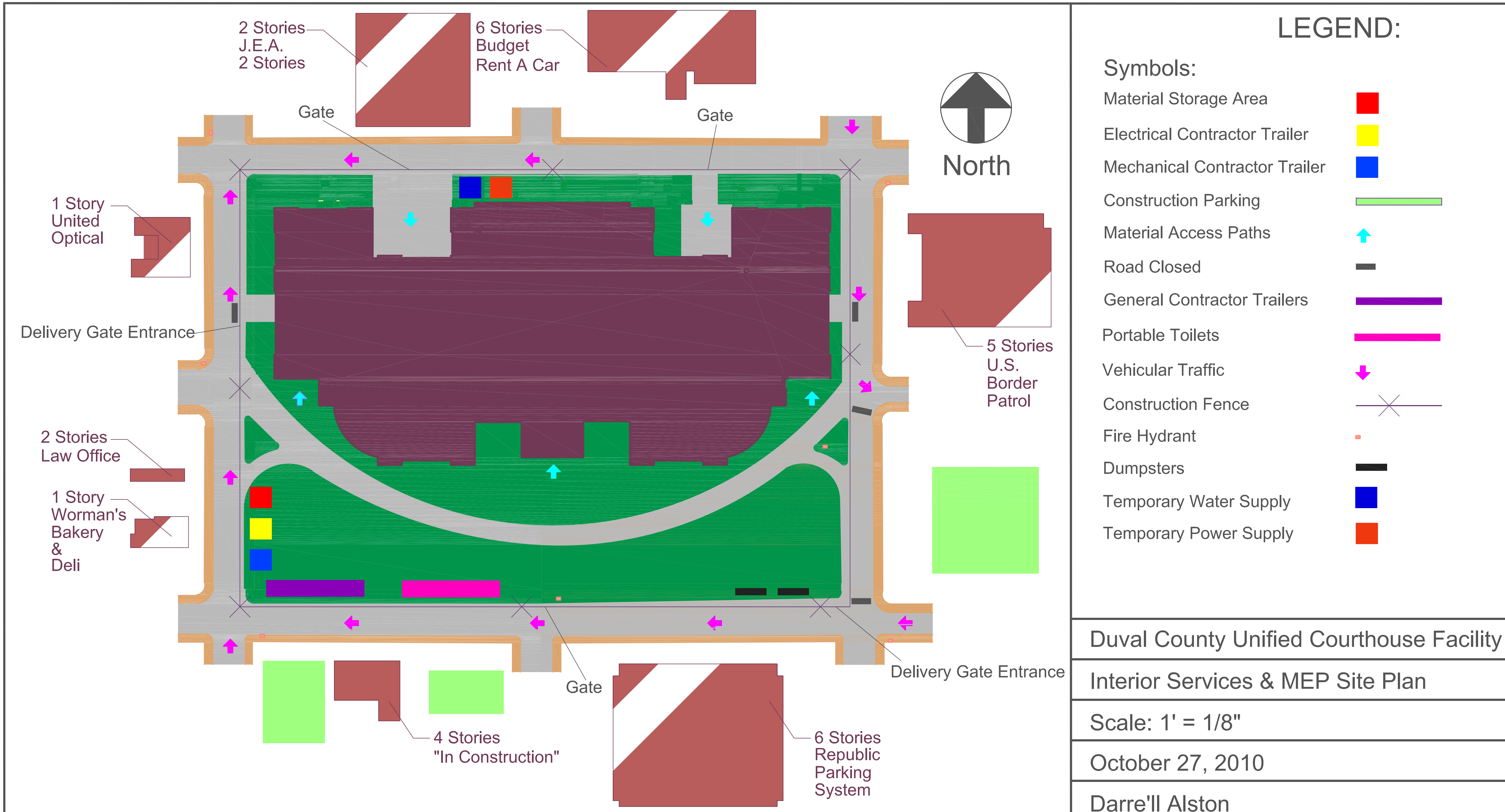
Duval County Unified Courthouse Facility

Superstructure Phase Plan

Scale: 1' = 1/8"

October 27, 2010

Darre'll Alston



Duval County Unified Courthouse Facility

Interior Services & MEP Site Plan

Scale: 1' = 1/8"

October 27, 2010

Darre'll Alston

APPENDIX C – DETAILED STRUCUTRAL ESTIMATE

FLOORS

1 Typical Bay Method

Pan-Joists

Size	Units	Quantity	Bay Width (LF)	Length of Building (LF)	Bay Area Covered (SF)	Bay Area Covered Total (SF)	Bay Area Covered Building Total (SF)	Total CY	Member Size	Units	Quantity	Material	Labor	Equipment	Total	Material	Labor	Equipment	Total	No. Bays	Rebar	Length	Weight	Material	Labor	Equipment	Total	Material	Labor	Equipment	Total
27x29	L.F.	30.3	24	620.6	727.2	18804.18	112825.08	65814.63	27x29	CY	73.23	106	34.5	12.95	153.45	7762.38	2526.435	948.3285	11237.14		14-#3	24	0.0631	840	380	0	1220	53.004	23.978	0	76.982
8x29	L.F.	30.3							8x29	CY	21.7	106	34.5	12.95	153.45	2300.2	748.65	281.015	3329.865		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	30.3							8x29	CY	21.7	106	34.5	12.95	153.45	2300.2	748.65	281.015	3329.865		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	30.3							8x29	CY	21.7	106	34.5	12.95	153.45	2300.2	748.65	281.015	3329.865		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	30.3							8x29	CY	21.7	106	34.5	12.95	153.45	2300.2	748.65	281.015	3329.865		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
																		Total	24556.6	x 18 Bays										Total	340.99
																				442018.8										x 18 Bays	6120
Size	Units	Quantity							Member Size	Units	Quantity	Material	Labor	Equipment	Total	Material	Labor	Equipment	Total												
27x32	L.F.	37	24	520.6	888	12494.4	74964	43729	27x32	CY	98.67	106	34.5	12.95	153.45	10459.02	3404.115	1277.7765	15140.91		14-#3	24	0.0631	840	380	0	1220	53.004	23.978	0	76.982
8x29	L.F.	37							8x29	CY	26.49	106	34.5	12.95	153.45	2807.94	913.905	343.0455	4064.891		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	37							8x29	CY	26.49	106	34.5	12.95	153.45	2807.94	913.905	343.0455	4064.891		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	37							8x29	CY	26.49	106	34.5	12.95	153.45	2807.94	913.905	343.0455	4064.891		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	37							8x29	CY	26.49	106	34.5	12.95	153.45	2807.94	913.905	343.0455	4064.891		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
																		Total	31400.47	x 18 Bays										Total	340.99
																				565208.46										x 18 Bays	6120
Size	Units	Quantity							Member Size	Units	Quantity	Material	Labor	Equipment	Total	Material	Labor	Equipment	Total												
27x29	L.F.	32.2	24	620.6	772.8	18804.18	112825.08	65814.63	27x29	CY	77.82	106	34.5	12.95	153.45	8248.92	2684.79	1007.769	11941.48		14-#3	24	0.0631	840	380	0	1220	53.004	23.978	0	76.982
8x29	L.F.	32.2							8x29	CY	23.06	106	34.5	12.95	153.45	2444.36	795.57	298.627	3538.557		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	32.2							8x29	CY	23.06	106	34.5	12.95	153.45	2444.36	795.57	298.627	3538.557		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	32.2							8x29	CY	23.06	106	34.5	12.95	153.45	2444.36	795.57	298.627	3538.557		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	32.2							8x29	CY	23.06	106	34.5	12.95	153.45	2444.36	795.57	298.627	3538.557		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
																		Total	26095.71	x 18 Bays										Total	340.99
																				469722.78										x 18 Bays	6120
Size	Units	Quantity							Member Size	Units	Quantity	Material	Labor	Equipment	Total	Material	Labor	Equipment	Total												
27x29	L.F.	38	24	620.6	912	18804.18	112825.08	65814.63	27x29	CY	91.83	106	34.5	12.95	153.45	197.83	126.33	104.78	428.94		14-#3	24	0.0631	840	380	0	1220	53.004	23.978	0	76.982
8x29	L.F.	38							8x29	CY	27.21	106	34.5	12.95	153.45	133.21	61.71	40.16	235.08		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	38							8x29	CY	27.21	106	34.5	12.95	153.45	133.21	61.71	40.16	235.08		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	38							8x29	CY	27.21	106	34.5	12.95	153.45	133.21	61.71	40.16	235.08		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	38							8x29	CY	27.21	106	34.5	12.95	153.45	133.21	61.71	40.16	235.08		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
																		Total	1369.26	x 18 Bays										Total	340.99
																				24646.68										x 18 Bays	6120
Size	Units	Quantity							Member Size	Units	Quantity	Material	Labor	Equipment	Total	Material	Labor	Equipment	Total												
19x29	L.F.	12.2	24	620.6	292.8	18804.18	112825.08	65814.63	19x29	CY	20.75	106	34.5	12.95	153.45	126.75	715.875	268.7125	1111.338		14-#3	24	0.0631	840	380	0	1220	53.004	23.978	0	76.982
8x29	L.F.	12.2							8x29	CY	8.74	106	34.5	12.95	153.45	114.74	301.53	113.183	529.453		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	12.2							8x29	CY	8.74	106	34.5	12.95	153.45	114.74	301.53	113.183	529.453		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	12.2							8x29	CY	8.74	106	34.5	12.95	153.45	114.74	301.53	113.183	529.453		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	12.2							8x29	CY	8.74	106	34.5	12.95	153.45	114.74	301.53	113.183	529.453		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
																		Total	3229.15	x 18 Bays										Total	340.99
																				58124.7										x 18 Bays	6120
Size	Units	Quantity							Member Size	Units	Quantity	Material	Labor	Equipment	Total	Material	Labor	Equipment	Total												
19x29	L.F.	29.1	24	620.6	698.4	18804.18	112825.08	65814.63	19x29	CY	49.49	106	34.5	12.95	153.45	5245.94	1707.405	640.8955	7594.241		14-#3	24	0.0631	840	380	0	1220	53.004	23.978	0	76.982
8x29	L.F.	29.1							8x29	CY	20.84	106	34.5	12.95	153.45	2209.04	718.98	269.878	3197.898		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	29.1							8x29	CY	20.84	106	34.5	12.95	153.45	2209.04	718.98	269.878	3197.898		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	29.1							8x29	CY	20.84	106	34.5	12.95	153.45	2209.04	718.98	269.878	3197.898		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
8x29	L.F.	29.1							8x29	CY	20.84	106	34.5	12.95	153.45	2209.04	718.98	269.878	3197.898		12-#3	24	0.0541	840	380	0	1220	45.444	20.558	0	66.002
																		Total	20385.83	x 18 Bays										Total	340.99
																				366944.94										x 18 Bays	6120

Concrete Columns

Size	Height (LF)	CY	Quantity	Material	Labor	Equipment	Total	Material	Labor	Equipment	Total	Reinforcement	LF	Rebar Weight, Tons	Material	Labor	Equipment	Total	Material	Labor	Equipment	Total
16x24"	18	21.33	118	106	34.5	12.95	153.45	266795.64	86834.43	32594.373	386224.443	10-#3	180	0.0338	840	380	0	1220	28.392	12.844	0	41.236
18"x24"	18	24	19	106	34.5	12.95	153.45	48336	15732	5905.2	69973.2	10-#3	180	0.0338	840	380	0	1220	28.392	12.844	0	41.236
18"x28"	18	28	1	106	34.5	12.95	153.45	2968	966	362.6	4296.6	16-#7	288	4.71	840	380	0	1220	3956.4	1789.8	0	5746.2
24"x24"	18	32	532	106	34.5	12.95	153.45	1804544	587328	220460.8	2612332.8	9-#9	162	2.48	840	380	0	1220	2083.2	942.4	0	3025.6
26"x26"	18	37.56	3	106	34.5	12.95	153.45	11944.08	3887.46	1459.206	17290.746	20-#7	360	7.36	840	380	0	1220	6182.4	2796.8	0	8979.2
24"x28"	18	37.33	1	106	34.5	12.95	153.45	3956.98	1287.885	483.4235	5728.2885	16-#7	288	4.71	840	380	0	1220	3956.4	1789.8	0	5746.2
										Total	3095846.078										Total	23579.672

Steel Trusses for Upper Roofs

Size	Units	Quantity	No.	Material	Labor	Equipment	Total	Material	Labor	Equipment	Total
W24x104	L.F.	18	19	128	3.77	1.89	133.66	165	40.77	38.89	244.66
W12x40	L.F.	18	21	51	3.01	2.01	56.02	90	42.01	41.01	173.02
W24x131	L.F.	18	2	5.22	4.35	2.24	11.81	25.22	24.35	22.24	71.81
W12x79	L.F.	18	6	91	4.31	3.27	98.58	115	28.31	27.27	170.58
W12x53	L.F.	18	6	65.25	3.13	2.09	70.47	89.25	27.13	26.09	142.47
										Total	802.54

Concrete and Rebar for Pile Caps

Type	Width (LF)	Length (LF)	Area (SF)	Depth (LF)	Concrete Used (CY)	Quantity	Reinforcement		Rebar Weight, Tons	Pile Cap	Material	Labor	Equipment	Total	Material	Labor	Equipment	Total	Rebar	Material	Labor	Equipment	Total	Material	Labor	Equipment	Total
Type 1	3.5	3.5	12.25	3.5	1.588	10	5-#6 Vert.	5-#6 Hor.	0.263	Type 1	106	34.5	12.95	153.45	1683.24	547.85	205.64	2436.73		840	380	0	1220	0.263	99.94	0	100.203
Type 2	8.25	6	49.5	3.5	6.417	18	5-#10 Vert.	8-#4 Hor.	1.56	Type 2	106	34.5	12.95	153.45	12243	3984.75	1495.73	17723.48		840	380	0	1220	1.56	592.8	0	594.36
Type 3	8.25	7.75	33.92	3.5	4.397	71	3-#10 3 WAYS		11.11	Type 3	106	34.5	12.95	153.45	33092.10	10770.54	4042.86	47905.50		840	380	0	1220	11.11	4221.8	0	4232.91
Type 4	8.25	8.25	68.06	3.75	9.453	18	9-#10 Vert.	9-#10 Hor.	5.75	Type 4	106	34.5	12.95	153.45	18035.90	5870.18	2203.44	26109.52		840	380	0	1220	5.75	2185	0	2190.75
Type 5	9.83	9.83	96.69	3.75	13.43	16	11-#10 Vert.	11-#10 Hor.	7.44	Type 5	106	34.5	12.95	153.45	22775.87	7412.90	2782.52	32971.29		840	380	0	1220	7.44	2827.2	0	2834.64
Type 6	8.25	12	99	4.5	16.5	8	10-#11 Vert.	13-#10 Hor.	4.4	Type 6	106	34.5	12.95	153.45	13992.00	4554.00	1709.40	20255.40		840	380	0	1220	4.4	1672	0	1676.4
Type 7	11	12	132	4.9	23.96	4	12-#10 Vert.	13-#10 Hor.	2.47	Type 7	106	34.5	12.95	153.45	10157.16	3305.87	1240.90	14703.92		840	380	0	1220	2.47	938.6	0	941.07
Type 8	11	12	132	4.3	21.02	14	15-#11 Vert.	13-#11 Hor.	12.01	Type 8	106	34.5	12.95	153.45	31196.98	10153.73	3811.33	45162.04		840	380	0	1220	12.01	4563.8	0	4575.81
Type 8A	8.25	15.75	129.94	5.3	25.51	2	14-#11 Vert.	16-#10 Hor.	1.74	Type 8A	106	34.5	12.95	153.45	5407.43	1759.97	660.62	7828.02		840	380	0	1220	1.74	661.2	0	662.94
Type 9	12	12	144	5	26.67	19	14-#11 Vert.	14-#11 Hor.	17	Type 9	106	34.5	12.95	153.45	53706.67	17480.00	6561.33	77748.00		840	380	0	1220	17	6460	0	6477
Type 10	11	15.75	173.25	5	32.08	8	15-#11 Vert.	16-#10 Hor.	8.05	Type 10	106	34.5	12.95	153.45	27206.67	8855.00	3323.83	39385.50		840	380	0	1220	8.05	3059	0	3067.05
Type 11	11	15.75	173.25	5.5	35.29	5	18-#11 Vert.	18-#10 Hor.	5.9	Type 11	106	34.5	12.95	153.45	18704.58	6087.81	2285.14	27077.53		840	380	0	1220	5.9	2242	0	2247.9
Type 12	12	15.75	189	5.6	39.2	2	19-#11 Vert.	17-#11 Hor.	2.67	Type 12	106	34.5	12.95	153.45	8310.40	2704.80	1015.28	12030.48		840	380	0	1220	2.67	1014.6	0	1017.27
Type 13	12	17.5	210	6.25	48.61	4	21-#11 vert.	18-#11 Hor.	6.2	Type 13	106	34.5	12.95	153.45	20611.11	6708.33	2518.06	29837.50		840	380	0	1220	6.2	2356	0	2362.2
																	Total	401174.90								Total	32980.5

Concrete Footings and Slabs

Description	Area (SF)	Depth (LF)	Volume (CY)	Material ($/unit)	Labor($/unit)	Equipment ($/unit)	Total ($)	Material($)	Labor ($)	Equipment ($)	Total ($)
Footings	169.92	1	169.92	106	34.5	12.95	153.45	18011.52	5862.24	2200.464	26074.224
2nd Floor Deck Slab	170700	0.58333	99574.431	106	34.5	12.95	153.45	10554889.7	3435317.87	1289488.881	15279696.44
3rd Floor Deck Slab	88300	0.58333	51508.039	106	34.5	12.95	153.45	5459852.13	1777027.346	667029.1051	7903908.585
4th Floor Deck Slab	86500	0.58333	50458.045	106	34.5	12.95	153.45	5348552.77	1740802.553	653431.6828	7742787.005
5th Floor Deck Slab	86500	0.58333	50458.045	106	34.5	12.95	153.45	5348552.77	1740802.553	653431.6828	7742787.005
6th Floor Deck Slab	93100	0.58333	54308.023	106	34.5	12.95	153.45	5756650.44	1873626.794	703288.8979	8333566.129
7th Floor Deck Slab	96500	0.58333	56291.345	106	34.5	12.95	153.45	5966882.57	1942051.403	728972.9178	8637906.89
Slab on Grade	178400	0.58333	104066.072	106	34.5	12.95	153.45	11031003.6	3590279.484	1347655.632	15968938.75
										Total	71635665.02

Rebar for Concrete Footings and Slabs

Typical Bay

Floor	Rebar	Bay Dimension (LFxLF)	Area (SF)	Units (LF)	Total (LF)	Quantity (Floors)	Total (LF)	Weight, Tons	Material ($/unit)	Labor ($/unit)	Equipment ($/unit)	Total ($/unit)	Material ($)	Labor ($)	Equipment ($)	Total ($)
Typical Floor	4-#3 Vertical	24'x34'	178400	816	29342.44	2	58684.88	11.03	840	380	0	1220	9265.2	4191.4	0	13456.6
					14671.22	5	73356.1	13.79	840	380	0	1220	11583.6	5240.2	0	16823.8
															Total	30280.4

Pan Joist Metal Decking

Item	Units	Quantity	Material	Labor	Equipment	Total
Metal Decking up to 40 tons	SF	800000	47.5	2.26	1.22	40784000

APPENDIX D – GENERAL CONDITIONS ESTIMATE

General Conditions Estimate

Division	Description	Unit	Quantity	Mt'l Unit Cost($/unit)	Mt'l Cost($)	Labor Unit Cost($/unit)	Labor Cost ($)	Equip Unit Cost($/unit)	Equip Cost($)	Total Cost Units($)	Total Cost($)
Permits 01 41 26.50											
20	Rule of Thumb, most cities, minimum	project								0.50%	1,124,180
Field Personnel 01 31 13.20											
120	Field Engineers (avg)	week	135			1,215				1875	164,025
120	Field Engineers (avg)	week	135			1,215				1875	164,025
120	Field Engineers (avg)	week	135			1,215				1875	164,025
120	Field Engineers (avg)	week	135			1,215				1875	164,025
120	Field Engineers (avg)	week	135			1,215				1875	164,025
260	Superintendents	week	135			1850				2850	249,750
260	Superintendents	week	135			1850				2850	249,750
260	Superintendents	week	135			1850				2850	249,750
200	Project Managers	week	135			2,000				3,075	270,000
200	Project Managers	week	135			2,000				3,075	270,000
20	Clerks	week	135			395				605	53,325
20	Clerks	week	135			395				605	53,325
Inspections and Testing Services 01 45 26.50											
100	For concrete building costing, $10 million minimum	project								33,100	33,100
Scheduling 01 32 13.50											
600	Rule of Thumb, CPM scheduling, large job ($50 million)	job								0.03%	67,451
Temporary Facilities 01 52 13.20											
20	Field Trailers 20' x 8' buy	Ea	1	8,550	8,550	680	680			9,230	9,230
20	Field Trailers 20' x 8' buy	Ea	1	8,550	8,550	680	680			9,230	9,230
20	Field Trailers 20' x 8' buy	Ea	1	8,550	8,550	680	680			9,230	9,230
1000	Toilet,Portable	Month	36	150	5400					150	5400
1000	Toilet,Portable	Month	36	150	5400					150	5400
1000	Toilet,Portable	Month	36	150	5400					150	5400
1000	Toilet,Portable	Month	36	150	5400					150	5400
1000	Toilet,Portable	Month	36	150	5400					150	5400
1000	Toilet,Portable	Month	36	150	5400					150	5400
1200	Storage Trailers/Shed 20' x 8' Buy	Ea	1	3,225		380				3,605	3605
Temporary Utilities 01 51 13.80											
100	Heat incl. fuel and operation, per week, 12 hrs. per day	CSF Flr	1784	27	48168	3.41	6083.44			30.41	54251.44
350	Lighting, incl service lamps, wiring & outlets, minimum	CSF Flr	1784	2.63	4691.92	11.55	20605.2			14.18	25297.12
430	Power for temp lighting only, per month, average/month 11.8 KWH	CSF Flr	1784	1.65	2943.6					1.65	2943.60
600	Power for job duration incli elevator, etc, minimum	CSF Flr	1784	47	83848					47	83848.00
700	Temp construction water bill per mo. Average	month	36	62	2232					62	2332.00
Field Office Expenses 01 52 13.20											
100	Equipment Rental	month	36	155	5580					155	5580
120	Office Supplies	month	36	85	3060					85	3060
160	Lights & HVAC	month	36	150	5400					150	5400
140	Telephone bill avg. bill/month incl long distance	month	36	80	2880					80	2880
Roadways and Sidewalks 01 55 23.50											
50	Roads, gravel fill, no surfacingg, 4" gravel depth	SY	180.72	4	722.88	2.34	422.8848	0.47	84.9384	6.81	1230.70
Temporary Fencing 01 56 26.50											
550	4" x 4" wire meshposts 8' high	L.F.	2439.68	14.75	35985.28	8.3	20249.344			23.05	56234.624
Signs 01 58 13.50											
20	High Intensity Reflective	SF	15	26.5	397.5					26.5	397.5
Cleaning and Waste Management 01 74 13.20											
40	Job Completion Maximum	job								1%	2246360
Construction Management Fees 01 11 31.20											
300	$50,000,000 minimum	project								2.50%	5620900
Insurance 01 31 13.30											
20	Builder's Risk Minimum	job								0.24%	539606.4
50	All-risk type	job								0.25%	562090
Performance Bond 01 31 13.90											
20	For buildings	job								0.60%	1349016
Temporary Protective Walkways 01 56 29.50											
2300	Sidewalks 2" x 12" planks, 2 uses 1/2" thick	SF	3659.52	0.21	768.4992	0.44	1610.1888			0.65	2378.69
Demolition 02 41 13.17											
5010	Pavement removal, bituminous roads, 3" thick	S.Y.	782.22			2.15	1681.773	1.71	1337.5962	3.86	3019.37
Temp Barricades 01 56 23.10											
300	Stock units 6' high, 8' wide, buy	EA	1	435						435	435
300	Stock units 6' high, 8' wide, buy	EA	1	435						435	435
300	Stock units 6' high, 8' wide, buy	EA	1	435						435	435
300	Stock units 6' high, 8' wide, buy	EA	1	435						435	435
										Total General Conditions Cost	12,724,000.25