



TECH 2

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*Cost & Schedule
Analysis*

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Executive Summary

The purpose of this technical report is to evaluate and analyze the key features of the project that affect the project execution of the Mansoura Development 2B+G+M+7. Detailed Project Schedule, Structural Estimate and MEP Assemblies Estimate are included within this report. The project construction commenced April 2013, with a completion date of April 2015.

The project schedule provides a thorough look at the durations of each phase, and how the work was divided. The construction schedule lasted around 24 months and was broken down into a floor by floor sequence rather than by trades. After the structural portion was complete, the Upper floors (1-7) were completed before the lower levels due to the lower levels being intended for commercial use. Therefore they postponed work until retailers had rented a spot on the respected floors, in the case of a possible design layout change.

The detailed cost breakdown of the building is part of this report. The entire building is made up of Cast-in- Place concrete. The structural estimate came out to be \$3,340,134.59, which was relatively close to the actual cost which was \$3,236,701.39. The main method that was performed when performing the take-offs for the estimate was using "typical bays". This procedure was used because most of the structure was identical; therefore it was a more efficient way to calculate the total quantities, however created a larger chance of error.

The Assemblies MEP estimate was performed along with the detailed structural estimate. The total for the assemblies estimate came out to be \$5,126,234.04. This value was very different to my actual MEP Cost which is \$1,117,186.30. This estimate isn't very accurate as I had to use substitutes to some of the equipment included in the contract documents as it wasn't included in the RS Means Cost Works data (Web Source). Even though there is a great difference between the estimate and the actual cost, it is understandable as different equipment, pricing, etc. is being used within different countries.

Three site plans were created to represent critical phases of construction. The three phases that are represented in this report are Excavation, Concrete Placing and Interior/Exterior Finishes. The building is located in Al Mansoura Area of Doha, Qatar and sits between Al Mansoura Street (Main Road) and Al Salhiya Street (Inside Road).

A general conditions estimate was also performed with the assistance of RS Means Cost Works database (Web source). The total estimated cost for General Conditions is \$1,095,111.08. This cost was grouped into 5 sub categories, which included, Project Management, Field Operations, Field Office, Testing & Inspections and Insurance. There will be a difference in values when comparing the estimate to the actual, as both are based on pricing and evaluation of different countries.

Constructability challenges were further addressed with possible solutions. The issues that arise of the project can be planned for, in order to best prepare the project workers from any setbacks. The three main constructability concerns included unforeseen high water levels when excavating, intensive heat for working environment and site constraints.

Lastly a LEED strategy for this project was developed using the most up to date LEED Point System. The Mansoura Development project did not consider LEED certification (equivalent to QSAS-Qatar Sustainability Assessment System), therefore comparison would not be possible. After studying the LEED Checklist, the current scoreboard came out to be 32 points (uncertified) out of a maximum of 110 points.

Detailed Project Schedule

The Mansoura Development detailed project schedule begins on November 15, 2012, when Petra Design Architecture Firm was hired to take on the project. The Contractor was selected after construction drawings were produced, on March 28, 2013. The construction schedule lasts 24 months. The schedule is broken down into a floor to floor sequence rather than by trades. The following table gives a summary of the major design and construction phases:

Table 1: Key Schedule Phase Summary

Detailed Schedule Summary			
Phase Description	Start Date	End Date	Dur. (Days)
Design & Pre-Construction	11/15/2012	5/8/2013	128
Sub Structure Structural	4/15/2013	1/23/2014	199
Super Structure Structural	8/22/2013	9/26/2014	284
Plumbing Installation	8/19/2013	1/27/2015	374
Arch Rough-ins	9/23/2013	2/19/2015	359
Electrical Installation	12/30/2013	2/25/2015	303
Fire Safety	1/2/2014	1/30/2015	282
Ventilation & AC	1/8/2014	1/28/2015	276
External Façade Finishes	9/22/2014	2/19/2015	109
Elevator Installation	10/9/2014	1/23/2015	77
External Site Work (Landscape)	10/29/2014	12/29/2014	44
Testing & Closeout	1/14/2015	5/1/2015	81

Design & Pre-Construction

This phase of the schedule doesn't span as long as the other phases, however it takes a good amount of time, which is due to the design of the Mansoura development. It took around 4 months to come up with the construction drawings, as the design was changed a few times, due to heavy owner involvement (Mrs. Fakhriya's change of interest). The selection of Contractor did not take a long time, as they had previous relationship with the contractor on past projects, which helped speed up the process of contractor selection. Demolition was not required on the project, as the owner purchased the land after the previous (existing) building was demolished by the previous owner.

Sub Structure Structural

The Mansoura Development structural began on April 15, 2013. The Substructure will take around 199 days for completion. It started with the formwork of the foundation, followed by

waterproofing and cement sand screed. Columns, walls and retaining walls closely followed the completion of the foundation. Retaining walls run along the exterior perimeter of the building. Both basements were executed similarly and further detail can be found on the schedule in Appendix 1. After the concrete was cast on the first basement level, formwork and reinforcement for columns and walls started on the following basement level. This helps moves the project along at a quick pace.

Superstructure Structural

The superstructure will take around 284 days to complete , however formwork, reinforcement and concrete casting for beams and slabs on the ground floor starts before completion of the second basement level. Followed by the beams and slabs are columns and walls. Once the concrete is cast on a specific floor; formwork and reinforcing start on the following floor. All floors on the superstructure are executed similarly and further detail can be found on the schedule in Appendix 1.

Plumbing Installation

After completion of the structural for the substructure; plumbing installation began for the first basement level. The plumbing work got a complete duration of 374 days. This consisted of installation of the drainage pipe, floor drain, water pipeline, water tank & pump. This was typical on all floors of the building. However for the superstructure, water heating, sanitary wares and the installation of a water meter cabinet were the added difference. There is a noticeable gap in the installation on both basement levels, ground & mezzanine floors (after the water pipeline installation), which is because they are intended for commercial use. Therefore they postponed work until retailers had rented a spot on the respected floors, in the case of a possible design layout change.

Architectural Rough-ins

Architectural installation took around 359 days to complete. Initially installation of curb stone was performed for both basement levels. The basements are then untouched for a whole year, as they proceed to finish the upper floors, leaving the basements to complete at the end. As mentioned in the previous section, both the ground and mezzanine floors are performed after all the upper floors are completed due to the reason that they are for commercial use. Further detail can be seen in the detailed schedule found in Appendix A.

Electrical Installation

The electrical installation took around 303 days to complete. Initially installation of conduits at the walls begun for the basement levels followed by the Ground and Mezzanine Floors.

However as mentioned in the past two sections, completion of these floors would occur after completion of the upper floors 1-7. Conduits, telephone & data access, fire alarm system, cable & wire pulling and socket installation were typically installed on all floors. Additional information can be seen in Appendix A.

Fire Safety

Installation of fire safety equipment took around 282 days. Pipe, Hose Cabinet, Extinguisher & Blanket installation was typical on all floors in the building. Installation began on the ground floor, however as mentioned in the three previous sections, was not completed until the upper floors were finished.

Ventilation & AC

The rough-ins for ventilation & ac took around 276 days. Refrigerant pipe, Condensate Drain pipe, fans, ventilation ducts and split unit installation were typical on all floors. As in the previous sections, installation began on the basement levels, however were not completed until the upper floors (1-7) were finished.

External Façade Finishes

There are four elevations for this building to be completed. The façade took around 109 days to complete all the finishes. Plaster, paint, and installation of the Aluminum Frame for the curtain wall were typical activities to be completed on all elevations. There were different crews for each activity, to maximize efficiency. When one crew finishes an activity (external plaster) on one elevation, they would move on to the next elevation, while a different crew would start a different activity (the paint) on the previous elevation.

Elevator Installation

This is an important task on the project, as this is where the crane is dismantled in order to install the elevator. To prepare and install the elevator took around 77 days.

External Site Works

Landscaping proceeded right after the elevator installation had begun. Construction of drainage manhole, pipe line, holding tank, and curb stone are typical activities in this phase. The duration of this phase is approximately 44 days.

Testing & Closeout

This is the final phase of the schedule. It occurs after the building is completed and ready to handover to the owner. Testing, building inspection and building handover took around 81 days to assure substantial completion.

Typical Floors

As specified in previous sections, Upper floors (1-7) were typically completed first due to the intention for commercial use of the Ground and Mezzanine floors. Therefore they postponed work until retailers had rented a spot on the respected floors, in the case of a possible design layout change. To maximize productivity, crews with specific tasks were assigned to a floor for a given amount of time. When they finished they would move on to the next floor and repeat the same activities. A crew performing a different task would then take the place of the old crew and follow a similar schedule but with different activities (trades). The work typically builds off what is already in place.

Detailed Structural & Assemblies MEP Estimate

Detailed Estimate

A quantity takeoff of the structural system was performed in order to get a more accurate estimate of the project. Values were taken off RS Means Cost works Data from the RS Means web source. The location factor I chose to match closely to Doha, Qatar was Philadelphia, Pennsylvania. The reason I chose this location was because it would be a more neutral cost than New York, where construction will be very expensive, and so I would be able to compare it to my square foot estimate which was completed in Tech 1.

The building was made up of cast-in-place structural concrete. The concrete columns, slabs, footings and reinforcing were taken off using the method of a “typical bay”. This bay was assumed to be similar on select floors. Due to the similarity of beams and columns, I chose to proceed using this method. This procedure provided an efficient way to calculate the total quantities of the remaining floors, however will create a larger chance for error. Since the Basements and Ground Floor had similar structural plans, they were assumed alike. Therefore after one floor was calculated, the values were multiplied by three in order to get the total value for all those floors. Meanwhile Floors Mezzanine to 7 had similar structural plans too, so as mentioned before; one floor was calculated, and then multiplied by 7 to get the total value for all those floors. The “typical bay” method could have affected the outcome of the estimate, however I would not be able to compare my actual cost values accurately, as the prices for labor, equipment and material would differ greatly in different countries.

***See Appendix B-1, B-2 & B-3 for the Detailed Structural Estimate**

Foundation & Retaining Wall

The retaining walls found on this project ran along the perimeter on the foundation (building) footprint. It is 10' high (3.3m) and are reinforced using #4 Rebars. There is a mat foundation made up of 3000 psi normal weight concrete, extending over the footprint of the building and is 4' thick.

***See Appendix B-1 for the Detailed Col/Wall/Slab & Reinforcing Estimate**

Concrete Columns & Beams

The columns and beams support the elevated slab. All beams were individually taken off, unlike the columns which was taken off using the “typical bay” method. The columns and beams are made up of 4000 psi normal weight concrete with various rebar sizes (typical bay method used).

***See Appendix B-1 for Columns and Rebars, Appendix B-2 for Beams.**

Cost Summary

Table 2 – Detailed Structural System Cost Comparison

System	Detailed Estimate	SF Estimate	Actual Cost
Structural	\$ 3,340,134.59	\$ 2,860,627.22	\$ 3,236,701.39

As seen in Table 2 above, my estimate came really close to the actual cost of the structural portion of my building. There are a few reasons why this estimate came to be very close to my actual cost even though they are both priced at different locations.

Labor rates in the US are much higher compared to Qatar; however material pricing, renting of equipment, etc. can be valued at a much higher rate in Qatar in comparison to the US. This can therefore cancel each other out and reach a value that is quite similar.

Assemblies MEP Estimate

The MEP assemblies system totals \$5,126,234.04. This estimate isn't very accurate as I had to use substitutes to some of the equipment included in the contract documents as it wasn't included in the RS Means Cost Works data (Web Source). The actual MEP Cost is \$1,117,186.30. Even though there is a great difference between the estimate and the actual cost, it is understandable as different equipment, pricing, etc. is being used within different countries.

The mechanical estimate totals at \$691,711 in comparison to the actual of \$302,780. This inaccuracy can be understood due to the substitution of select fans and exhaust systems as the ones included in the contract document were not available in RS Means.

The electrical estimate totals at \$3,157,345 in comparison to the actual of \$531,506.85. This is due to RS Means system limitation in calculating, as it includes generic information which makes it hard to apply into the estimate with multiple systems. Added to these limitations is the fact that the actual values are not prices with the US standards, therefore the inaccuracy can be understood.

Lastly the Plumbing estimate totals at \$1,277,178.54 in comparison to the actual \$282,900. Similar to the electrical estimate description, the values of the estimate will be completely off due to the generic information provided by RS Means and the difference in pricing within the two countries.

***See Appendix C for Assemblies MEP Estimate**

Site Layout Planning

Detailed Estimate

The building is located in Al Mansoura Area of Doha, Qatar. The building sits between Al Mansoura Street (Main Road) and Al Salhiya Street (Inside Road). As seen below in Figure 1, the site is very busy and congested due to being in a residential and office area.



Figure 1 – Project Site Location

Excavation

Since demolition was completed before the contractor was selected, Commitment Construction Contractors can set up their site trailer. The major activity here is the excavation of earthwork and preparation for underground foundation of the basement floors. Referencing Appendix D, the site logistics in this phase include site fencing, excavation of support, flaggers to direct traffic, and action of mid-stage of site excavation.

All that is needed during site excavation are the front-end loaders, excavators and dumpster trucks to carry the earthwork away from the site. A ramp made of the excavated earth work is constructed to allow the excavators and trucks the ability to get down the site. In looking at this

plan, there is a possibility to get more dumpster trucks in order for the excavation to progress more efficiently. This can be executed by creating two ramps instead of the one, to ease access and exit.

***See Appendix D-1 for further detail of the excavation plan.**

Concrete Placing

The major activity here is the pouring of the concrete. Starting at the basement, the floors will be poured one after the other similar to what was mentioned in the Detailed Structural Schedule. As the floors increase, assistance will be needed in order to form and place the concrete. The use of a crane will assist with this matter (crane shown on finishes plan: C-3). To increase productivity, pump trucks will be utilized after one another in order to complete this task in a timely manner. A storage area and dumpster will be located on site for further assistance. Both gates will be utilized in this phase, in order for better functionality.

***See Appendix D-2 for further detail of the Concrete Placing plan.**

Exterior/Interior Finishes

This is one of the last phases of the project. Having a crane in the elevator shaft prevents the need to move the crane, as it can build and reach the entire perimeter of the building from the same point. The crane will then be dismantled once the elevator is ready to be installed, as mentioned before in the Detailed Project Schedule. The use of scaffolding and hoist helps to haul up material and laborers to their respected floors. As in the previous plan, both gates will be utilized, in order for material delivery trucks to transport the materials to their respected storage areas.

***See Appendix D-3 for further detail of the Exterior/Interior Finishes plan.**

General Conditions Estimate

The general conditions estimate was done with the assistance of RS Means Cost Works database (Web source) and Commitment Construction Percentages for Insurance work. The total estimated cost for General Conditions is \$1,095,111.08, which can be seen in detail in Appendix D. This cost was grouped into 5 sub categories, which included, Project Management, Field Operations, Field Office, Testing & Inspections and Insurance. There will be a difference in values when comparing the estimate to the actual, as both are based on pricing and evaluation of different countries. The summary of the schedule breakdown can be seen on Table 3 and Figure 2 below.

Project Management costs that were included for Commitment Construction staff were taken from the project organizational chart submitted in Tech 1. All members but one in project team was assumed to have spent the entire 24 months of the project on the site.

Field Operation costs included items like fencing, signage, temporary power, water supply and site cleanup. All items are used at different phases of the project, however were all important to include in the estimate.

Field Office costs included items related to the office trailer on site. Items that are included in the costs are trailer rental and office facilities. Items such as office supplies and equipment are included under office facilities. The trailer was assumed to only last 12 months, as after erection of the structure, they would be move into the building, to make more space on site for other equipment and storage.

Testing & Inspections included testing the building services after the completion of the building, right before the owner move-in date.

Lastly Insurance was included in the estimate. This consisted of a Performance Bond, Insurance of Work, Third Party Insurance and Workmen Insurance. All these items were based off a percentage of the entire building construction cost (\$12,647,791.60). The building construction cost was taken off the SF Estimate value and not the actual cost because it would more likely match the previous values taken from RS Means.

Table 3 and Figure 2 on the next page provide a summary of the General Conditions Estimate as a percentage of the entire estimate.

***See Appendix E for General Conditions Estimate**

Table 3 – General Conditions Estimate Summary

Category	Project Cost	% of GC
Project Management	\$ 662,100.00	60%
Field Operations	\$ 86,443.95	8%
Field Office	\$ 9,070.00	1%
Testing & Inspections	\$ 6,125.60	1%
Insurance	\$ 331,372.26	30%
Total	\$ 1,095,111.81	100%

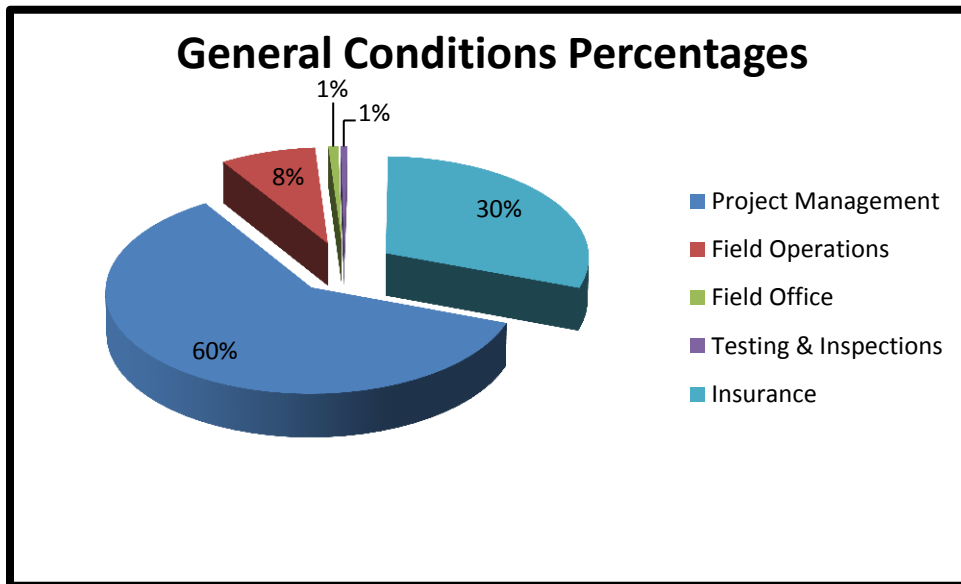


Figure 2 – General Conditions Estimate Graph

Constructability Challenges

There are three constructability concerns that have occurred and can be expected in the future of the project. Even though the project is still in the beginning phase, these issues can be planned for to best prepare the project workers from any setbacks. The three main constructability concerns included unforeseen high water levels when excavating, intensive heat for working environment and site constraints.

The first constructability concern that came as a challenge was the unforeseen high water table when excavation began for the foundation. This was a concern to the project team as when water enters an excavation it has the tendency to destabilize the sides of the hole and has the potential to cause cave-ins. This created more work for the laborers, and was a potential hazardous condition for the workers inside. Increased work means increased costs. The solution that the project team came up with was creating a dewatering plan, to separate the water from the soil and control the surface and subsurface. This helps lower the ground water table to permit excavation within a dry environment. Sumps were used to help pump out the water.

The second constructability concern that can be foreseen in the summer months of construction is the intensive heat of weather, which could halt construction, as workers could not work under those intense conditions. During the months of June, July and August, temperatures can reach over 122°F. Each year the Ministry of Labor states that during those months, construction work must stop between the hours of 11:30am and 3pm, otherwise a penalty will be furnished to the company that does not conform to these rules. This can create a setback to the schedule if no premature action is taken to solve the issue. A possible solution to this matter is extending the work hours in the afternoon, to make up for the afternoon break. For example if normal work days ended at 5pm; during the summer work can be extended to 8pm to make up for the hours that were missed.

The last constructability concern that can be foreseen is the site constraints and where it is located. The project is located and surrounded around other residential and office buildings, which acquire daily traffic due to being located on the main road. This will make it difficult to access the site with larger equipment and can bring about safety challenges to surrounding buildings. This can also increase traffic in that area as vehicles will have to slow down when equipment is being hauled in or out of the site. A solution to this will have to consider increasing the number of flaggers to be able to direct and make traffic flow smoothly to keep disorder to a minimum. Furthermore due to the site being located in a residential/work area, hiring a security guard to watch over the site, will help maintain a safe free zone, avoid theft and damage from unauthorized access to the site.

Having these constructability concerns reviewed, will help Commitment Construction be prepared from some future problems that may arise. Keeping this in mind, other problems may arise, which cannot be prepared for and may halt construction.

LEED Evaluation

The Mansoura development was not aiming for a LEED Certification (equivalent to QSAS-Qatar Sustainability Assessment System). After reviewing the LEED Checklist, the current scoreboard (the link available in Appendix F) has a total of 32 points (uncertified) out of a maximum of 110 points. Sustainability wasn't the primary factor when construction of the project had begun. Evaluation of each major category is given below.

Sustainable Sites

Mansoura Development receives 12 out of a possible 26 points in this category. The site sits on a previously developed land, which does not disturb nature and does not include any sensitive elements. The site is part of a well-known commercial area, which satisfies ease of transportation and basic services for its community. There is a lot of potential to be awarded points in other areas within this section; some that can be considered are; designing transportation amenities such as bicycle racks, changing facilities, etc. Share parking facilities with the adjacent buildings (to limit the use of single occupancy vehicles). Promote Storm water infiltration to reduce pollutant loadings and decrease the heat island effect by installing different roofing materials to reduce heat absorption.

Water Efficiency

Mansoura Development receives 4 out of a possible 10 points in this category. The potable water used for the building sewage conveyance is reduced by at least 50%, by the use of water closets, urinals, etc. The estimated reduction of water use from the utilities is within the 30-35% range, which earns some points. There is some potential to gain a few points, by increasing the reduction of water to over 40%.

Energy and Atmosphere

Mansoura Development receives 0 out of a possible 35 points in this category. Due to it being a mixed-use development, energy consistency was critical; therefore renewable energy was not looked upon. However there is great potential to earn a few points in this section, which could include; selecting HVAC&R equipment with reduced refrigerant charge and increased equipment life. Developing an M&V (measurement & verification) plan to evaluate building/energy system performance.

Material and Resources

Mansoura Development receives 4 out of a possible 14 points in this category. Due to the site being purchased after demolition, the reuse of the existing (demolished) building was not possible. A construction waste management plan was implemented, by recycling materials such

as, cardboard, insulation, etc. A large sum of the material was manufactured within a 500 miles of the project site, which in turn helped reduce the environmental impacts of transportation. Some points can be easily gained by increasing the recycled content value of material to at least 10%.

Indoor Environmental Quality

Mansoura Development receives 12 out of a possible 15 points in this category. Due to this building being a mixed-use development, air quality was one of the main factors taken into account during the design phase, which is why this is the strongest of all the categories. Adhesives, sealants, paints, coats, and concrete have Volatile Organic Compound (VOC) content below the LEED requirement. The building is designed to have operable windows to maximize ventilation, day lighting and viewing opportunities. Since this is of the strongest categories, more attention should be paid to the previous sections mentioned earlier in this evaluation.

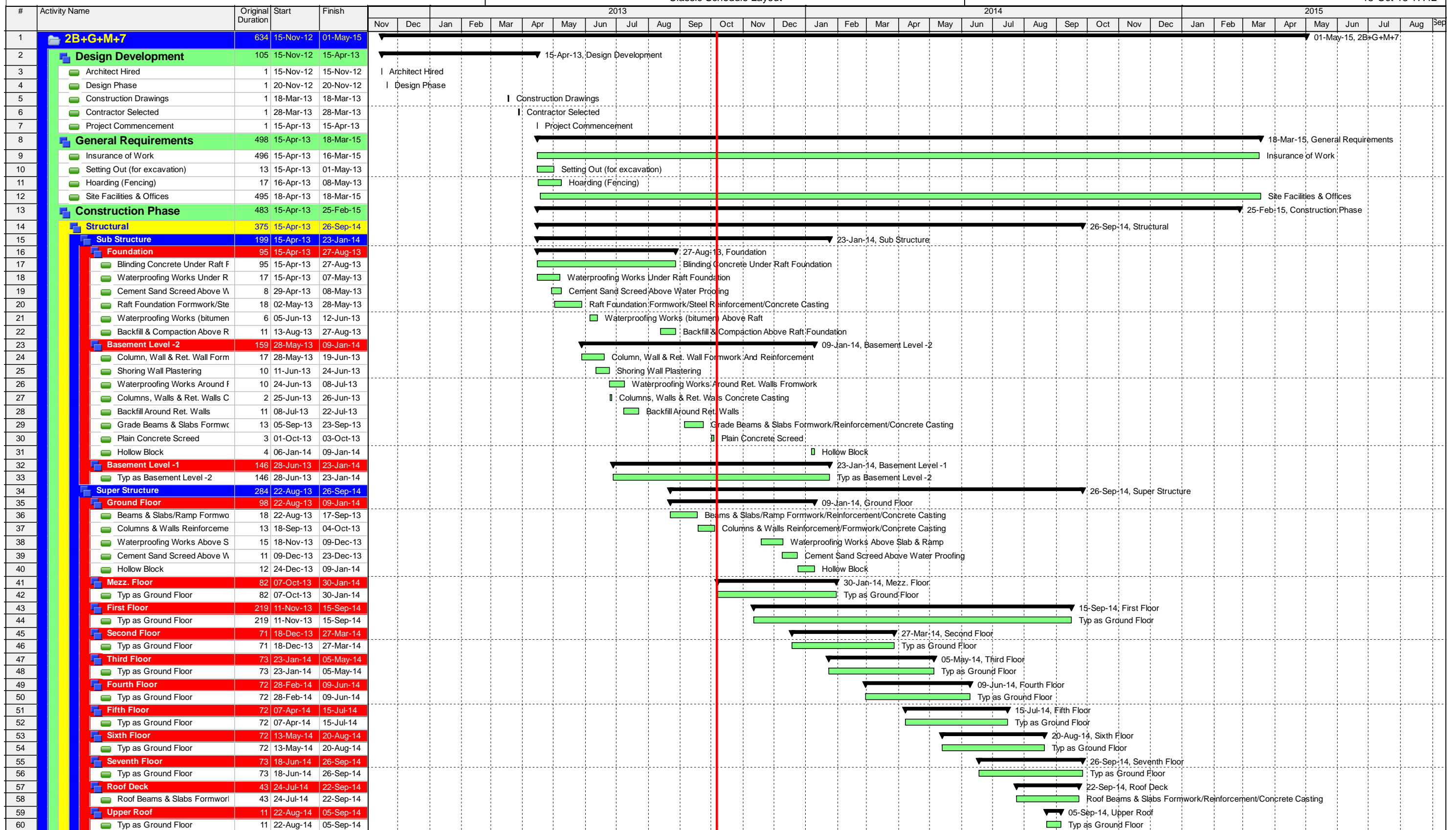
Innovation in Design & Regional Priority

Mansoura Development receives 0 points for both these sections. This is partly due to the fact that they did not initially consider attaining LEED certification. Therefore points could easily be awarded if the project was considering being certified, by simply employing a LEED Accredited Professional (AP) to the project.

Areas of Improvement

As seen in this evaluation, Mansoura Development has the potential for improvement in most of the categories listed above; especially 'Energy and Atmosphere'. With the suggested evaluation, points can be earned in order to achieve the minimum and be able to have a LEED certified building.

Appendix A – Detailed Project Schedule



█ Actual Level of Effort █ Remaining Work ◆ Milestone
█ Actual Work █ Critical Remaining Work ▼ summary

#	Activity Name	Original Duration	Start	Finish	2013												2014												2015											
					Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
61	Plumbing Installation	374	19-Aug-13	27-Jan-15	[Summary bar from Aug-13 to Jan-15]																																			
62	Basement Level -2	374	19-Aug-13	27-Jan-15	[Summary bar from Aug-13 to Jan-15]																																			
63	Drainage Pipe & FD Install.	13	19-Aug-13	05-Sep-13	[Green bar from Aug-13 to Sep-13]																																			
64	Installation of FD & FG Cover	8	05-Sep-13	16-Sep-13	[Green bar from Sep-13 to Sep-13]																																			
65	Water Pipeline Installation	9	13-Sep-13	25-Sep-13	[Green bar from Sep-13 to Sep-13]																																			
66	Oil & Petrol Interceptor	6	13-Sep-13	20-Sep-13	[Green bar from Sep-13 to Sep-13]																																			
67	Installation of Channel Grating	3	13-Sep-13	17-Sep-13	[Green bar from Sep-13 to Sep-13]																																			
68	Water Tank & Pump Installation	18	02-Jan-15	27-Jan-15	[Green bar from Jan-15 to Jan-15]																																			
69	Basement Level -1	3	21-Nov-14	25-Nov-14	[Summary bar from Nov-14 to Jan-15]																																			
70	Typ as Basement Level -2	3	21-Nov-14	25-Nov-14	[Green bar from Nov-14 to Jan-15]																																			
71	Ground Floor	266	10-Jan-14	16-Jan-15	[Summary bar from Jan-14 to Jan-15]																																			
72	Drainage Pipe & FD Install.	8	10-Jan-14	21-Jan-14	[Green bar from Jan-14 to Jan-14]																																			
73	Water Pipeline Installation	7	16-Jan-14	24-Jan-14	[Green bar from Jan-14 to Jan-14]																																			
74	Installation of Channel Grating	3	03-Nov-14	05-Nov-14	[Green bar from Nov-14 to Nov-14]																																			
75	Installation of Water Heating	3	29-Dec-14	31-Dec-14	[Green bar from Dec-14 to Dec-14]																																			
76	Sanitary Wares & Fittings Installat	5	08-Jan-15	14-Jan-15	[Green bar from Jan-15 to Jan-15]																																			
77	Installation of Water Meter Cabinet	6	08-Jan-15	15-Jan-15	[Green bar from Jan-15 to Jan-15]																																			
78	Installation of FD & FG Cover	3	14-Jan-15	16-Jan-15	[Green bar from Jan-15 to Jan-15]																																			
79	Mezz. Floor	258	30-Jan-14	26-Jan-15	[Summary bar from Jan-14 to Jan-15]																																			
80	Typ as Ground Floor	258	30-Jan-14	26-Jan-15	[Green bar from Jan-14 to Jan-15]																																			
81	First Floor	66	19-Feb-14	21-May-14	[Summary bar from Feb-14 to May-14]																																			
82	Typ as Ground Floor	66	19-Feb-14	21-May-14	[Green bar from Feb-14 to May-14]																																			
83	Second Floor	66	03-Apr-14	03-Jul-14	[Summary bar from Apr-14 to Jul-14]																																			
84	Typ as Ground Floor	66	03-Apr-14	03-Jul-14	[Green bar from Apr-14 to Jul-14]																																			
85	Third Floor	81	28-Apr-14	18-Aug-14	[Summary bar from Apr-14 to Aug-14]																																			
86	Typ as Ground Floor	81	28-Apr-14	18-Aug-14	[Green bar from Apr-14 to Aug-14]																																			
87	Fourth Floor	74	09-Jun-14	18-Sep-14	[Summary bar from Jun-14 to Sep-14]																																			
88	Typ as Ground Floor	74	09-Jun-14	18-Sep-14	[Green bar from Jun-14 to Sep-14]																																			
89	Fifth Floor	74	15-Jul-14	24-Oct-14	[Summary bar from Jul-14 to Oct-14]																																			
90	Typ as Ground Floor	74	15-Jul-14	24-Oct-14	[Green bar from Jul-14 to Oct-14]																																			
91	Sixth Floor	73	21-Aug-14	01-Dec-14	[Summary bar from Aug-14 to Dec-14]																																			
92	Typ as Ground Floor	73	21-Aug-14	01-Dec-14	[Green bar from Aug-14 to Dec-14]																																			
93	Seventh Floor	67	26-Sep-14	29-Dec-14	[Summary bar from Sep-14 to Dec-14]																																			
94	Typ as Ground Floor	67	26-Sep-14	29-Dec-14	[Green bar from Sep-14 to Dec-14]																																			
95	Roof Deck	51	22-Sep-14	01-Dec-14	[Summary bar from Sep-14 to Dec-14]																																			
96	Typ as Ground Floor	51	22-Sep-14	01-Dec-14	[Green bar from Sep-14 to Dec-14]																																			
97	Arch Rough-ins	359	23-Sep-13	09-Feb-15	[Summary bar from Sep-13 to Feb-15]																																			
98	Basement Level -2	359	23-Sep-13	09-Feb-15	[Summary bar from Sep-13 to Feb-15]																																			
99	Curb Stone Installation	7	23-Sep-13	01-Oct-13	[Green bar from Sep-13 to Sep-13]																																			
100	Internal Wall Plastering	5	09-Dec-14	15-Dec-14	[Green bar from Dec-14 to Dec-14]																																			
101	Marble Wall Tiles Installation	3	15-Dec-14	17-Dec-14	[Green bar from Dec-14 to Dec-14]																																			
102	Porcelain Floor Tiles Installation	3	17-Dec-14	19-Dec-14	[Green bar from Dec-14 to Dec-14]																																			
103	Installation of Skirting	2	19-Dec-14	22-Dec-14	[Green bar from Dec-14 to Dec-14]																																			
104	Internal Wall & Ceiling Paint (Prim	10	22-Dec-14	02-Jan-15	[Green bar from Dec-14 to Jan-15]																																			
105	Glazed Aluminum Doors & Windo	3	02-Jan-15	06-Jan-15	[Green bar from Jan-15 to Jan-15]																																			
106	Stair Steps & Landing	6	02-Jan-15	09-Jan-15	[Green bar from Jan-15 to Jan-15]																																			
107	Internal Wall & Ceiling Painting (1c	6	06-Jan-15	13-Jan-15	[Green bar from Jan-15 to Jan-15]																																			
108	Installation of Steel Doors	2	09-Jan-15	12-Jan-15	[Green bar from Jan-15 to Jan-15]																																			
109	Installation of Stair Handrail	5	09-Jan-15	15-Jan-15	[Green bar from Jan-15 to Jan-15]																																			
110	Wooden Door Installation	2	09-Jan-15	12-Jan-15	[Green bar from Jan-15 to Jan-15]																																			
111	Internal Wall & Ceiling Painting (Fi	5	23-Jan-15	29-Jan-15	[Green bar from Jan-15 to Jan-15]																																			
112	Epoxy Paint on Screed	3	29-Jan-15	02-Feb-15	[Green bar from Jan-15 to Feb-15]																																			
113	Parking Marking	5	02-Feb-15	06-Feb-15	[Green bar from Feb-15 to Feb-15]																																			
114	Installation of Wheel Stopper	6	02-Feb-15	09-Feb-15	[Green bar from Feb-15 to Feb-15]																																			
115	Basement Level -1	313	01-Nov-13	15-Jan-15	[Summary bar from Nov-13 to Jan-15]																																			
116	Typ as Basement Level -2	313	01-Nov-13	15-Jan-15	[Green bar from Nov-13 to Jan-15]																																			
117	Ground Floor	76	17-Oct-14	30-Jan-15	[Summary bar from Oct-14 to Jan-15]																																			
118	Internal Wall Plastering	12	17-Oct-14	03-Nov-14	[Green bar from Oct-14 to Oct-14]																																			
119	Ceramic Wall Tiles Installation	6	23-Oct-14	30-Oct-14	[Green bar from Oct-14 to Oct-14]																																			
120	Ceramic Floor Tiles Installation	5	30-Oct-14	05-Nov-14	[Green bar from Oct-14 to Oct-14]																																			
121	Installation of Spiral Stair	6	03-Nov-14	10-Nov-14	[Green bar from Oct-14 to Oct-14]																																			

█ Actual Level of Effort
 █ Remaining Work
 █ Critical Remaining Work
 ◆ Milestone
 ─ summary

Appendix B – Detailed Structural System Estimate

Columns, Walls, Slabs & Reinforcing										
Code	Description (Typ. Bay)	Quantity	# Bays	Total/Floor	Unit	# of Floors	Total (All Floors)	Crew	Extended Total	Extended Total O&P
Foundation										
0.033053406250	Retaining Wall (Typ Bay)	27	4	108	CY	1	108	C14D	\$ 24,296.76	\$ 31,321.08
0.033053404050	Spread Footings	381.25	4	1525	CY	1	1525	C14C	\$ 432,856.00	\$ 553,986.75
0.032110600550	#4 (#12 Metric) Rebar	0.13	4	0.52	Tons	1	0.52	4 Rodman	\$ 863.16	\$ 1,107.86
2 Basements & Ground Floor										
0.033053400700	Column C1a	2.43	4	9.72	CY	3	29.16	C14 A	\$ 41,713.67	\$ 58,576.32
0.033053400700	Column C3	2.14	4	8.56	CY	3	25.68	C14 A	\$ 36,735.50	\$ 51,585.32
0.033053400700	Column C4	1.88	4	7.52	CY	3	22.56	C14 A	\$ 32,272.31	\$ 45,318.30
0.033053400700	Column C5a	1.22	4	4.88	CY	3	14.64	C14 A	\$ 20,942.67	\$ 29,408.69
0.033053400700	Column C9	3.5	4	14	CY	3	42	C14 A	\$ 60,081.42	\$ 84,369.18
0.033053400700	Column C10	0.43	4	1.72	CY	3	5.16	C14 A	\$ 7,381.43	\$ 10,365.36
0.033053401900	Elevated Slab	40	4	160	CY	3	480	C14B	\$ 281,558.40	\$ 379,612.80
0.032110600200	#3 (#10 Metric) Rebar	0.038	4	0.152	Tons	3	0.46	4 Rodman	\$ 1,166.26	\$ 1,629.01
0.032110600200	#4 (#12 Metric) Rebar	0.00167	4	0.00668	Tons	3	0.02	4 Rodman	\$ 50.71	\$ 70.83
0.032110600250	#8 (#25 Metric) Rebar	0.47	4	1.88	Tons	3	5.64	4 Rodman	\$ 11,402.22	\$ 15,280.45
0.032110600250	#10 (#32 Metric) Rebar	1.28	4	5.12	Tons	3	15.36	4 Rodman	\$ 31,052.85	\$ 41,614.85
Floors M-7										
0.033053400700	Column C1a	3	4	12	CY	8	96	C14A	\$ 137,328.96	\$ 192,843.84
0.033053400700	Column C3	2.34	4	9.36	CY	8	74.88	C14A	\$ 107,116.59	\$ 150,418.20
0.033053400700	Column C4	2.1	4	8.4	CY	8	67.2	C14A	\$ 96,130.27	\$ 134,990.69
0.033053400700	Column C5a	1.14	4	4.56	CY	8	36.48	C14A	\$ 52,185.00	\$ 73,280.66
0.033053400700	Column C10	0.85	4	3.4	CY	8	27.2	C14A	\$ 38,909.87	\$ 54,639.09

0.033053401900	Elevated Slab	40	4	160	CY	8	1280	C14B	\$ 750,822.40	\$ 1,012,300.80
0.032110600200	#3 (#10 Metric) Rebar	0.03	4	0.12	Tons	8	0.96	4 Rodman	\$ 2,433.94	\$ 3,399.68
0.032110600200	#4 (#12 Metric) Rebar	0.001625	4	0.0065	Tons	8	0.052	4 Rodman	\$ 126.77	\$ 177.07
0.032110600250	#8 (#25 Metric) Rebar	0.35	4	1.4	Tons	8	11.2	4 Rodman	\$ 22,642.70	\$ 30,344.16
0.032110600250	#10 (#32 Metric) Rebar	1.19	4	4.76	Tons	8	38.08	4 Rodman	\$ 76,985.19	\$ 103,170.14
Subtotal									\$ 2,303,790.55	\$ 3,111,396.45

Beams Take-off								
Code	Item	Quantity	Unit	Amouont	Subtotal	Crew	Extended Total	Extended Total O&P
Basements								
0.033053400300	BB1	1.4	CY	1	1.4	C14A	\$ 1,575.39	\$ 2,218.23
0.033053400300	BB2	0.56	CY	1	0.56	C14A	\$ 630.16	\$ 887.29
0.033053400300	BB3	2.78	CY	2	5.56	C14A	\$ 6,256.56	\$ 8,809.54
0.033053400300	BCB 1	0.44	CY	1	0.44	C14A	\$ 495.12	\$ 697.16
0.033053400300	BCB 2	0.3	CY	1	0.3	C14A	\$ 337.58	\$ 475.34
0.033053400300	TB 1	0.94	CY	1	0.94	C14A	\$ 1,057.76	\$ 1,489.38
0.033053400300	TB 2	0.19	CY	3	0.57	C14A	\$ 641.41	\$ 903.14
Subtotal					9.77	-	\$ 10,993.98	\$ 15,480.08
Ground								
0.033053400300	GB1	0.53	CY	3	1.59	C14A	\$ 1,789.20	\$ 2,519.28
0.033053400300	GB2	2.07	CY	1	2.07	C14A	\$ 2,329.33	\$ 3,279.81
0.033053400300	GB3	3.71	CY	2	7.42	C14A	\$ 8,349.58	\$ 11,756.62
0.033053400300	GB4	2.13	CY	3	6.39	C14A	\$ 7,190.54	\$ 10,124.64
0.033053400300	GB5	0.67	CY	1	0.67	C14A	\$ 753.94	\$ 1,061.58
0.033053400300	GB6	5	CY	2	10	C14A	\$ 11,252.80	\$ 15,844.50
0.033053400300	GB7	0.53	CY	3	1.59	C14A	\$ 1,789.20	\$ 2,519.28
0.033053400300	GB8	1.3	CY	1	1.3	C14A	\$ 1,462.86	\$ 2,059.76
0.033053400300	GB9	3.15	CY	1	3.15	C14A	\$ 3,544.63	\$ 4,991.02
0.033053400300	GB10	1.53	CY	2	3.06	C14A	\$ 3,443.36	\$ 4,848.42
0.033053400300	GB11	4.97	CY	1	4.97	C14A	\$ 5,592.64	\$ 7,874.72
0.033053400300	GB12	2.41	CY	2	4.82	C14A	\$ 5,423.85	\$ 7,637.05
0.033053400300	TB 1	0.94	CY	1	0.94	C14A	\$ 1,057.76	\$ 1,489.38
0.033053400300	TB 2	0.19	CY	2	0.38	C14A	\$ 427.61	\$ 602.09
0.033053400300	RMB 1	0.89	CY	2	1.78	C14A	\$ 2,003.00	\$ 2,820.32
0.033053400300	RMB 2	3.15	CY	1	3.15	C14A	\$ 3,544.63	\$ 4,991.02
Subtotal					35.81	-	\$ 59,954.93	\$ 84,419.49
Mezzanine								
0.033053400300	MB1	0.69	CY	15	10.35	C14A	\$ 11,646.65	\$ 16,399.06

0.033053400300	MB2	0.69	CY	8	5.52	C14A	\$ 6,211.50	\$ 8,746.16
0.033053400300	MB3	1.4	CY	1	1.4	C14A	\$ 1,575.39	\$ 2,218.23
0.033053400300	MB4	0.68	CY	2	1.36	C14A	\$ 1,530.38	\$ 2,154.85
0.033053400300	MB5	0.7	CY	1	0.7	C14A	\$ 787.70	\$ 1,109.12
0.033053400300	TB 1	0.94	CY	2	1.88	C14A	\$ 2,115.53	\$ 2,978.77
0.033053400300	TB 2	0.19	CY	2	0.38	C14A	\$ 427.61	\$ 609.02
Subtotal					21.59	-	\$ 24,294.76	\$ 34,215.21
1st Floor								
0.033053400300	FB1	1.05	CY	12	12.6	C14A	\$ 14,178.53	\$ 19,964.07
0.033053400300	FB2	1.67	CY	6	10.02	C14A	\$ 11,275.31	\$ 15,876.19
0.033053400300	FB3	1.26	CY	1	1.26	C14A	\$ 1,417.85	\$ 1,996.41
0.033053400300	FB4	0.98	CY	2	1.96	C14A	\$ 2,205.55	\$ 3,105.52
0.033053400300	FB5	1.4	CY	4	5.6	C14A	\$ 6,301.57	\$ 8,872.92
0.033053400300	FB6	0.8	CY	2	1.6	C14A	\$ 1,800.45	\$ 2,535.12
0.033053400300	FB7	0.44	CY	3	1.32	C14A	\$ 1,485.37	\$ 2,091.47
0.033053400300	FCB 5	0.16	CY	1	0.16	C14A	\$ 180.04	\$ 253.51
0.033053400300	FCB 7	0.24	CY	2	0.48	C14A	\$ 540.13	\$ 760.54
0.033053400300	TB 1	0.94	CY	2	1.88	C14A	\$ 2,115.53	\$ 2,978.77
0.033053400300	TB 2	0.19	CY	2	0.38	C14A	\$ 427.61	\$ 602.09
Subtotal					37.26	-	\$ 41,927.94	\$ 59,036.61
2nd - Roof								
0.033053400300	TB 1	0.94	CY	16	15.04	C14A	\$ 16,924.21	\$ 23,830.13
0.033053400300	TB 2	0.19	CY	16	3.04	C14A	\$ 3,420.85	\$ 4,816.73
Subtotal					18.08	-	\$ 20,345.06	\$ 28,646.86
Machine Room								
0.033053400300	MRB 1	0.39	CY	8	3.12	C14A	\$ 3,510.87	\$ 4,943.48
0.033053400300	MRB 2	0.39	CY	2	0.78	C14A	\$ 877.72	\$ 1,235.87
0.033053400300	MRB 3	0.48	CY	1	0.48	C14A	\$ 540.13	\$ 760.54
Subtotal					4.38	-	\$ 4,928.72	\$ 6,939.89
Total Calculated (CY)					126.89	-	\$ 162,445.39	\$ 228,738.14

Total Structural Estimate	
Col/Wall/Slabs & Reinf.	\$ 3,111,396.45
Beams	\$ 228,738.14
Subtotal	\$ 3,340,134.59

Appendix C – Assemblies MEP Estimate

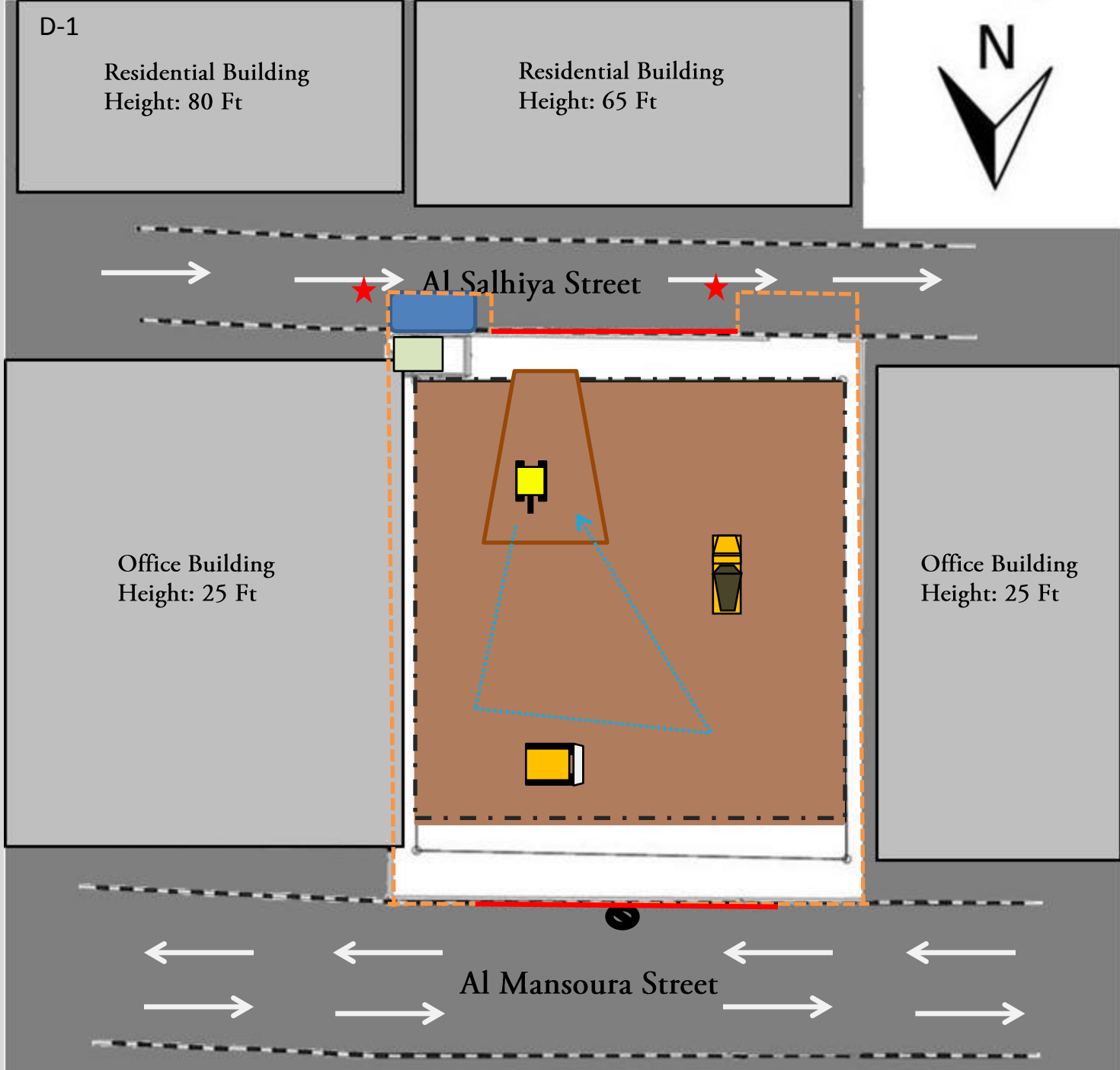
2B+G+M+7 Assemblies Estimate					
Data Release :Year 2013 Quarter 3					
Quantity	Assembly Number	Description	Unit	Total O&P	Ext. Total O&P
3	D30903101040	Fume hood exhaust system, 6 FT long, 5000 CFM	Ea.	\$ 40,183.58	\$ 120,550.74
1	D30903101050	Fume hood exhaust system, 10 FT long, 8000 CFM	Ea.	\$ 53,461.35	\$ 53,461.35
9	D30903201600	Garage, single exhaust, 5" outlet, diesel trucks, 1 bay	Ea.	\$ 6,855.43	\$ 61,698.87
80000	D30501701280	Split system, air cooled condensing unit, apartment corridors, 1,000 SF, 1.83 ton	S.F.	\$ 5.70	\$ 456,000.00
99	D20101101880	Water closet, vitreous china, tank type, wall hung, close coupled 2 piece	Ea.	\$ 2,456.63	\$ 243,206.37
46	D20101101920	Water closet, vitreous china, tank type, floor mount, 1 piece	Ea.	\$ 2,457.11	\$ 113,027.06
40	D20105102000	Bathtub, recessed, PE on CI, 48" x 42"	Ea.	\$ 4,621.01	\$ 184,840.40
22	D20107101560	Shower, stall, baked enamel, molded stone receptor, 30" square	Ea.	\$ 2,791.46	\$ 61,412.12
24	D20402101880	Roof drain, DWV PVC, 2" diam, piping, 10' high	Ea.	\$ 1,019.28	\$ 24,462.72
147	D20202101820	Electric water heater, residential, 100< F rise, 20 gallon tank, 7 GPH	Ea.	\$ 2,353.43	\$ 345,954.21
1	D40104100620	Wet pipe sprinkler systems, steel, light hazard, 1 floor, 10,000 SF	S.F.	\$ 3.76	\$ 3.76
90000	D40104100740	Wet pipe sprinkler systems, steel, light hazard, each additional floor, 10,000 SF	S.F.	\$ 2.85	\$ 256,500.00
1	D40203100600	Wet standpipe risers, class I, steel, black, sch 40, 6" diam pipe, 1 floor	Floor	\$ 14,325.83	\$ 14,325.83
9	D40203100620	Wet standpipe risers, class I, steel, black, sch 40, 6" diam pipe, additional floors	Floor	\$ 3,716.23	\$ 33,446.07

C

1	D50102400620	Switchgear installation, incl switchboard, panels & circuit breaker, 277/480 V, 2000 A	Ea.	\$ 56,035.40	\$ 56,035.40
17	D50102504080	Panelboard, 4 wire w/conductor & conduit, NEHB, 277/480 V, 100 A, 10 stories, 75' horizontal		\$ 11,788.76	\$ 200,408.92
20000	D50202181000	Fluorescent high bay-4 lamp, 8'-10' above work plane, 2.5 watt/SF, 162 FC, 11 fixtures per 1000 SF	S.F.	\$ 11.53	\$ 230,600.00
405	D50201250680	Toggle switch single pole, 15 A with box, plate, 3/4" EMT & wire	Ea.	\$ 319.37	\$ 129,344.85
225	D50201250760	3 way switch, 15 A with box, plate, 3/4" EMT & wire	Ea.	\$ 336.55	\$ 75,723.75
20000	D50202080560	Fluorescent fixtures, type A, 11 fixtures per 600 SF	S.F.	\$ 11.80	\$ 236,000.00
30000	D50202140400	Incandescent fixtures recess mounted, 100 FC, type A, 34 fixtures per 400 SF	S.F.	\$ 40.73	\$ 1,221,900.00
734	D50201250560	Receptacle duplex 120 V grounded, 20 A with box, plate, 3/4" EMT & wire	Ea.	\$ 335.08	\$ 245,948.72
100000	D50303100680	Telephone systems, conduit system with floor boxes, high density	S.F.	\$ 6.07	\$ 607,000.00
1	D50309100440	Communication and alarm systems, fire detection, non-addressable, 100 detectors, includes outlets, boxes, conduit and wire	Ea.	\$ 74,793.90	\$ 74,793.90
100	D50309200102	Internet wiring, 2 data/voice outlets per 1000 S.F.	M.S.F.	\$ 795.89	\$ 79,589.00
















Total	\$5,126,234.04
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Appendix D – Site Layout Planning



Excavation

LEGEND

-  Direction of Traffic
-  Office Trailer
-  Transformer
-  Gate
-  Excavation
-  Excavation Support
-  Fence
-  Excavator
-  Front-end Loader
-  Dumpster Truck
-  Existing Hose Connection
-  Flow of Trucks
-  Flagger
-  Street
-  Adj. Building

D-2

Residential Building
Height: 80 Ft

Residential Building
Height: 65 Ft



Concrete Placing

LEGEND

→ Direction of Traffic

Office Trailer

Transformer

Storage Area

Dumpster

Concrete Pump Station

Concrete Truck

Delivery Truck

Flagger

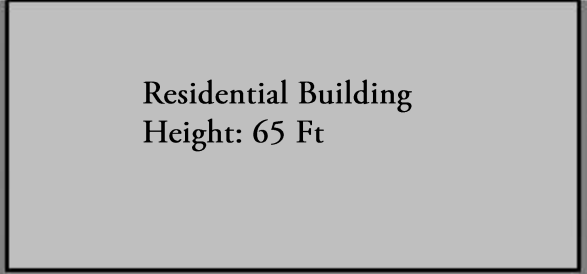
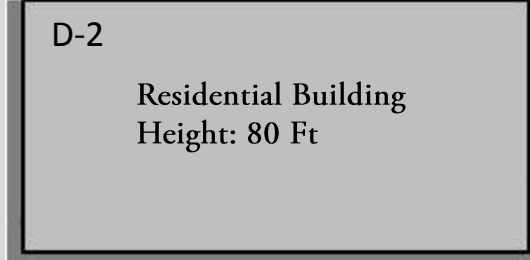
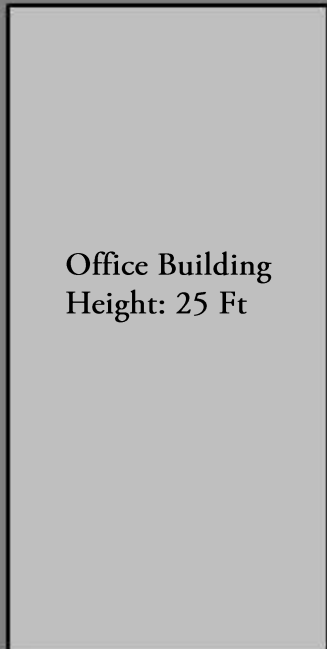
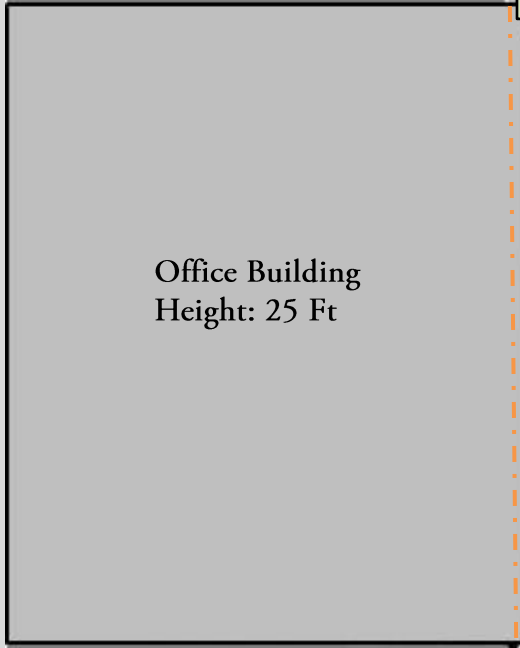
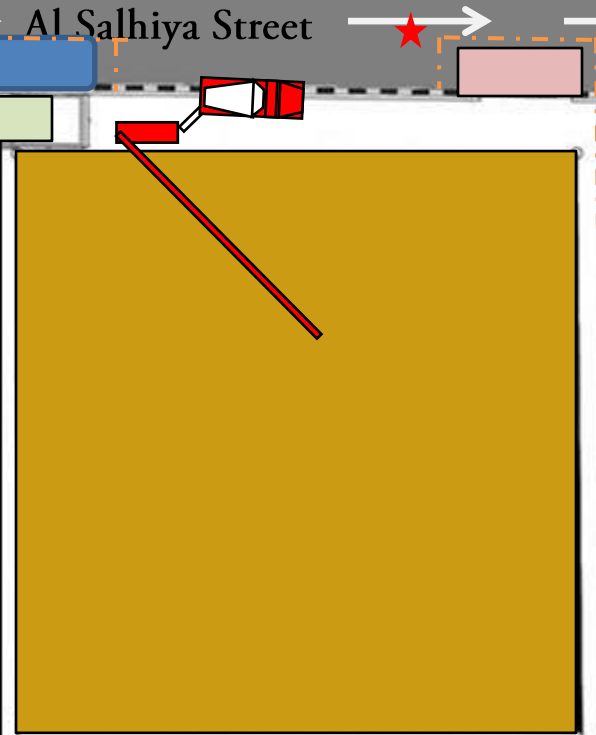
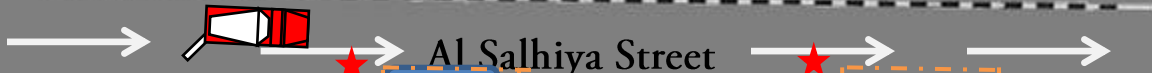
Fence

Existing Hose Connection

Site in Construction

Street

Adj. Building



D-3

Residential Building
Height: 80 Ft

Residential Building
Height: 65 Ft



Ext/Int Finishes

LEGEND

→ Direction of Traffic

 Scaffolding

 Hoist

 Gate

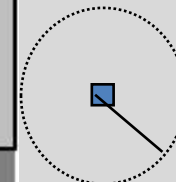
 Storage Area

 Transformer


 Fence

 Flagger

 Material Delivery

 Crane

 Street

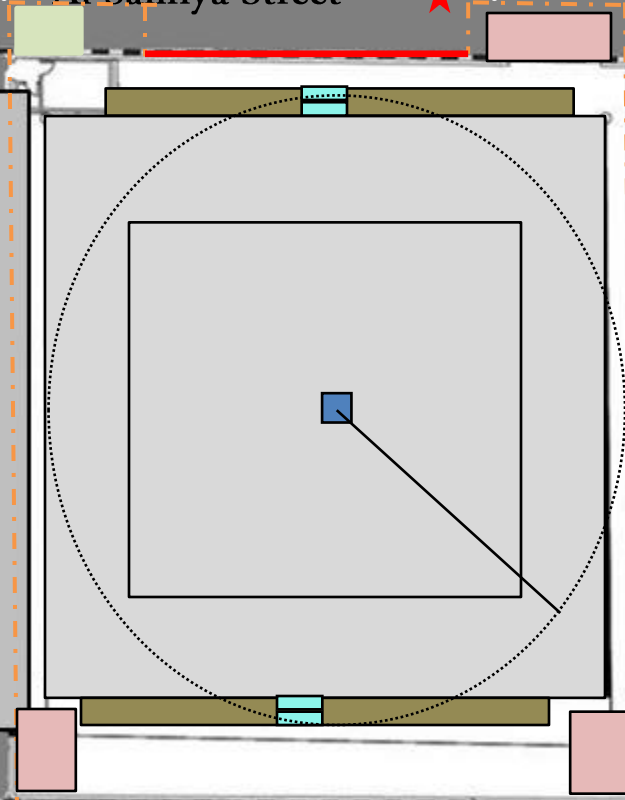
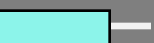
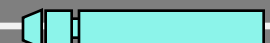
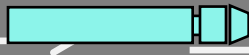
 Adj. Building

Al Salhiya Street

Al Mansoura Street

Office Building
Height: 25 Ft

Office Building
Height: 25 Ft



Appendix E – General Conditions Estimate

E

General Conditions Estimate				
Item	Unit	Quantity	Cost/Unit	Total
Project Management				\$ 662,100.00
General Manager	Weeks	12	\$ 2,525.00	\$ 30,300.00
Project Engineer	Weeks	104	\$ 2,225.00	\$ 231,400.00
MEP Engineer	Weeks	104	\$ 1,925.00	\$ 200,200.00
Quantity Surveyor	Weeks	104	\$ 1,925.00	\$ 200,200.00
Field Operations				\$ 86,443.95
Perimeter Fencing	L.F.	443	\$ 23.85	\$ 10,565.55
Project Sign Board	S.F.	500	\$ 31.50	\$ 15,750.00
Safety Handrails (For all Floors)	Months	12	\$ 1,200.00	\$ 14,400.00
Temp Power, 400A	EA.	1	\$ 2,625.00	\$ 2,625.00
Lighting	Months	24	\$ 152.00	\$ 3,648.00
Water Supply	Months	24	\$ 63.00	\$ 1,512.00
Site Cleanup	%	0.3	\$ 12,647,791.60	\$ 37,943.40
Field Office				\$ 9,070.00
Site Office Trailer	Months	14	\$ 305.00	\$ 4,270.00
Site Office Facilities	Months	24	\$ 200.00	\$ 4,800.00
Testing & Inspections				\$ 6,125.60
Testing Service	EA.	1	\$ 5,566.05	\$ 6,125.60
Insurance				\$ 331,372.26
Performance Bond	%	0.6	\$ 12,647,791.60	\$ 75,886.70
Insurance Work (Commitment Co.)	%	0.02	\$ 12,647,791.60	\$ 2,529.56
Third Party Insurance (Commitment Co.)	%	1	\$ 12,647,791.60	\$ 126,478.00
Workmen Insurance (Commitment Co.)	%	1	\$ 12,647,791.60	\$ 126,478.00
Subtotal				\$ 1,095,111.81

Appendix F - Reference

- Rendering on Cover Page courtesy of Petra Design.
- Detailed Structural Estimate
“RSMMeans Costworks Online Construction Cost Data”
Web. 15 Oct 2013. <www.rsmeansonline.com>
- Lead Evaluation Checklist
Web. 14 Oct 2013. <<http://www.usgbc.org/leed/rating-systems/new-construction>>