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### Thesis Technical Assignment #2

### Cost and Schedule Analysis

# George Mason University PE Building Renovation & Expansion Fairfax, Virginia



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#### **Executive Summary**

The following report contains: a detailed project schedule, analysis of site planning, a detailed estimate for the structural system, a general conditions estimate, and a summary of current critical industry issues for the George Mason PE Building Renovation and Expansion. A detailed construction schedule was produced by taking the schedule from the previous technical assignment and adding to it. This schedule contains 172 activities and is broken down by trades. By breaking down the schedule in this manner, the sequencing and work order become apparent.

Site layout planning for the superstructure phase of the project was analyzed as well. Since this phase is broken up into two separate sequences, several site plans were developed showing the site layout for each sequence. In developing these site plans, it seemed interesting that only one crane was used to erect the steel. The structural system for the new addition seems large enough that using two cranes may have been a better option. The schedule and monetary impact of using two cranes instead of one could be an interesting aspect to research at a later time.

The detailed structural system estimate was calculated using *MC<sup>2</sup> Estimating Software*. An easy to read estimate summary broken down by CSI Division shows how the final cost was obtained. Through this estimate, a more in depth analysis of the structural system was performed than in the previous technical assignment and specifics about the structure were learned. The general conditions estimate was calculated using *RS Means Building Cost Data 2009*. Included in this estimate are the CM's staffing fees, general project item costs, and temporary utilities.

Lastly, critical industry issues discussed at the PACE Roundtable Meeting were analyzed. The PACE Roundtable is an event for students and industry members to come together and share current information and issues going on in the industry. The issues discussed at this meeting included LEED, BIM, and Energy and the Economy. The current issues of the economy crisis and how it affects the construction industry is the specific topic analyzed in this paper.

#### Detailed Project Schedule Summary

As previously mentioned in technical assignment one, the construction schedule for this project spans a time period of approximately two years. The preconstruction phase started in May 2007 following with the construction starting in October 2007. The completion date for the PE Building is set for April 2009. The detailed schedule was produced simply by revamping the previously made schedule. This was done by breaking out each general activity into the activities of the different trades. In doing this, 172 activities were scheduled. Some of the different trades the schedule is broken into are as follows:

- Demolition
- Site work
- Concrete
- Steel
- Mechanical & HVAC
- Electrical

By looking at the detailed schedule, the sequencing, work flow, and in what order the building was constructed can be recognized with ease. The PE Building has been strategically phased by the different building sectors. These phases include:

- Cage Gym
- Linn Gym
- Existing Core
- Mechanical Room
- New Venue Gym
- New Venue Gym Public Space
- New East Wing

On the schedule, the Mechanical Room and New Venue Gym Areas are part of sequence 1A and 1B. The New East Wing is Sequence 2 and the renovation of the existing core is Sequence 3. A couple activities found that do not follow the traditional start on the bottom floor and build up are in Sequence 3. In this sequence, the MEP rough-in and hanging and finishing the walls of the upper level are done before the lower level. It has yet to be determined why this was done, since the rest of the work flows in the traditional manner. The detailed schedule can be seen in Appendix A.

#### Site Layout Planning

Following up the site plan made in technical assignment one for GMU's PE Building, site layout planning needed to be done for a critical construction phase of the project. In this case, the erection of the superstructure phase was chosen. The PE Building's new superstructure includes steel erection for the new Mechanical Plant, new Venue Gym, and new East Wing. These areas are broken down into two sequences with the Mechanical Plant and Venue Gym being sequence one and the East Wing being sequence two. Figure 1 (below) shows the site layout with the respected sequences. Note that prior to this time the existing East Wing has been demolished.



Figure 1.



Figure 2.

Figure 2 (above) shows the site layout for sequence one steel erection. Note only one 70 ton hydraulic truck crane was used to erect the steel. The site plan shows two cranes only for the purpose of showing the work flow from West to East, which is represented by the (red) arrow. The material hoist follows the crane and is used to hoist men and tools to connect the steel members. The (orange) arrows are the entrance and exit to the site. Material staging on the PE Building's site is rather limited to the South and East sides of the site due to congestion. As Figure 2 shows, the staging area for this sequence is South of the new Venue Gym. Note the trailers shown do not include the CM's (Gilbane) trailers. These are trades trailers only. At this point in the project, Gilbane had their office set up inside the existing core of the building. Also note that the parking shown is only for Gilbane personnel. As mentioned in technical assignment one, the subs had other designated parking areas on GMU's campus.



Figure 3.

Figure 3 (above) shows the site layout for sequence two steel erection. Again, note the multiple cranes are only shown to portray the work flow from South to North represented by the (red) arrows. The material hoist again follows the crane with the purpose of hoisting men and tools to connect the steel members. For this sequence there are two staging areas, one at each end of the East Wing. This may not be the most ideal staging setup, but again options are limited due to site congestion. Note in this sequence, Gilbane's office is now outside in the trailers since this steel erection hinders their ability to enter from the East side until the steel sequence is complete. No site plans were able to be obtained from the CM to compare and critique to these. Larger, scale versions of the sequence one and two site plans can be seen in Appendix B.

#### Detailed Structural Systems Estimate

The detailed structural systems estimate was calculated using  $MC^2$  Estimating Software. This estimate encompasses the structural system for the new construction on the GMU PE Building. The new construction includes the Mechanical Plant, Venue Gym and public spaces, and East Wing. The structural system for these new areas is a combination of the following:

- Concrete Strip Footings
- Concrete Slab on Grade
- Concrete Column Footings
- Steel Columns
- Steel Beams
- Elevated Composite Metal Deck Floor Slabs
- Metal Roof Deck

Figure 4 (right) shows quantities of the concrete and steel components of the structural system.

Concrete & Steel Quantities									
Item Quantity Unit									
Concrete	1316.69	CY							
Steel	332.61	Tons							
Steel	744	Pieces							

Figure 4.

Figure 5 (right) shows the labor, material, and equipment costs for the entire structural system.

<u>Manpower Costs</u>							
Description Total Cos							
Labor	\$2,150,917.80						
Materials	\$419,347.59						
Equipment \$37,022.37							

Figure 5.

The total cost of the structural system obtained using the MC<sup>2</sup> Software was approximately 2.6 million dollars. For more quantity and cost related data, see quantity takeoff sheets and the estimate summary broken down into CSI Divisions in Appendix C.

#### General Conditions Estimate

The general conditions estimate was calculated using *RS Means Building Cost Data* 2009. It is a representative of what Gilbane's general conditions estimate would include. Some items included in this estimate are as follows:

- Staffing costs
- Jobsite Office costs
- Vehicle/Travel costs
- Temporary Utilities

For a more in-depth breakdown, see Appendix D for the full general conditions estimate as well as supporting RS Means data sheets.

#### Critical Industry Issues

During the PACE Roundtable Meeting, there were three different breakout sessions that discussed various topics and how they affect the construction industry. The topics included LEED, BIM, and Energy and the Economy. Given the current economic crisis, the topic of choice was Energy and the Economy. During this session, industry members explained how the crisis was affecting their projects and ways of doing business. The first affect brought up was material escalation. This is a major issue due to gas prices skyrocketing, which leads to higher freight charges and delivery costs. To manage this, contractors are buying out work early and including price guarantees into their contracts for projects that span several years. Owners are starting to demand more emphasis on the design of control systems for their buildings, as well as caring more about the life cycle costs. As a result of this, energy retrofits are becoming popular. There has also been an increase in European and Japanese products being used, specifically mechanical systems and building facades. These products are more energy efficient than American products, hence the increase.

On the economy side of things, current good and bad markets were discussed. The good markets being:

- Data Centers
- Federal Work
- Healthcare
- Education
- PPP

The bad markets being:

- Gaming
- Condos
- Spec Offices

Some industry members viewed the current crisis as a good thing instead of bad, pointing out that there are a lot of opportunities to pick up work were maybe another contractor left the job. Lastly, they pointed out that renovation projects were on the rise as the result of our current economy. George Mason's PE Building fits right in being that it is in the Education market and is part renovation.

Another important topic discussed, while not being an industry issue, was the idea of a mentoring program for the students. This is a great idea if implemented properly. It would not only help students in deciding what option to pursue within the major, but keep them aware of what is really going on in the industry. It would also help develop the people skills needed to succeed in this business. This program would initiate the first contact with an industry member, which can be quite intimidating to a young student who is not used to that type of situation. These mentors would also be people students could go to for help on projects as well as thesis as they advance through their college careers. Overall, it will help develop a better all around engineer, and it is a program that should have been thought of and put into action years ago.

#### Key Contacts Met

- Seth Glinski Forrester Construction Co.
- Coleman Walker Hassel Construction Co.

### Appendix A- Detailed Project Schedule Summary

#### Appendix A

ID	0	Task Name	Duration	Start	Finish	2008 2009 Mard Jun Lut Jaun Sam Ont Marul Jan Engl Mart Ang Marul Jun Lut Jaun Sam Ont Marul Den Lan Engl Ang Marul Jun L		
1	-	George Mason PE Building Project	413 days	Mon 10/1/07	Mon 4/27/09	vavisuri su indulsebros novi becisari ebrivari Abrivavisuri su indulsebros novi becisari rebrivari Abrivavisuri		
2		Sitework	014 days	Mon 10/1/07	Wed 12/10/00			
3	11	Finish Grade SW Quadrent	5 days	Mon 10/1/07	Sun 10/7/07			
4	1 H	Install Mech. Rm Loading dock paving	15 days	Tue 10/2/07	Sun 10/21/07			
5		Excavation of Mech. Room	24 days	Thu 12/27/07	Tue 1/29/08	— i i I		
6		SEQ 3 new underground utilities LL	33 days	Mon 2/4/08	Wed 3/19/08			
7		New Gym underground utilities	13 days	Tue 3/11/08	Thu 3/27/08			
8		New Mech. Km underground utilities	44 GJ3y5	Mon 3/1//U6	I NU 5/15/UK			
9		New East Wing underground utilities	20 days	Mon 3/31/08	Frl 4/25/08			
10		Finish Grade South Side	5 days	Frl 10/3/08	Thu 10/9/08	0		
11		Install sidewalks	46 days	Wed 10/8/08	Wed 12/10/08			
12	-	instali planters	15 days	Fri 10/10/08	Thu 10/30/08			
13		install new parking lot	32 days	Tue 10/21/08	Wed 12/3/08			
14		Landscaping	49 days	Wed 10/15/08	Mon 12/22/08			
15		Landscape SW Quadrent	8 days	Wed 10/15/08	Frl 10/24/08			
16		Landscape South Entry	10 days	Tue 12/9/08	Mon 12/22/08			
17		Landscape East & North Sides	8 days	Thu 12/11/08	Mon 12/22/08			
18		Demolition	163 days	Tue 10/2/07	Wed 5/14/08	· · · · · · · · · · · · · · · · · · ·		
19		Hazmat Abatement Bathrooms & Locker Room	44 days	Tue 10/2/07	Thu 11/29/07			
20	<u> </u>	MEP make safe/temp systems	57 days	Frl 10/5/07	Fr1 12/21/07			
21	<u> </u>	Abate Trailers	3 days	Tue 10/9/07	Thu 10/11/07			
22		Demolish north & south trailers	15 days	Tue 10/16/07	Frl 1 1/2/07			
23	1	Hazmat Abatement 1st floor lobby	14 days	Mon 12/3/07	Thu 12/20/07			
24	1	Abate LL room off Linn Gym	6 days	Frl 12/21/07	Ffl 12/28/07			
25	11	Glove bag Linn Gym	6 days	Fif1 12/28/07	Fil 1/4/08			
26	-	Demolition of Existing East Wing	36 days	Wed 1/2/08	Wed 2/20/08			
2/		Giove bag Cagle Gym	3 days	Mon 1/7/08	Wed 1/9/08			
28	<u> </u>	Demo Linn Gym Ductwork	/ days	TUE 5/6/08	Wed 5/14/08	<b>8</b>		
29		Start of New Construction	100 days	Thu 1/21/08	FIT 5/30/08	♦ 330		
30	-	Vocin Pro Equipidations	122 uays	Thu 1/31/00	FIT //10/00			
20	11	New Cym Enundations	21 days	Ed 2/22/08	EX 3/24/08			
22		Establish New East Mine Building Dad SEO 1	12 days	Ed 2/22/08	Mon 3/10/08			
24	<u> </u>	Install SEO 2 Englines	30 days	Mon 3/10/08	EH 4/19/09	i <b>*</b> i i I		
24	<u> </u>	New Cum SOC	5 days	Tup 3/25/08	Mon 3/31/08			
36	<u> </u>	Fast Winn SOG	11 days	Ed 4/18/08	Ed 5/2/08			
37	-	Conorete on metal deok EEQ 1B	8 days	Wed 5/21/08	Fri 5/30/08			
38		New Mech. Rm SOG	9 days	Mon 5/26/08	Thu 6/5/08			
39		Concrete on metal deck SEQ 1A	5 days	Erl 5/30/08	Thu 6/5/08			
40		Concrete on metal deck SEQ 2	10 days	Mon 7/7/08	Frl 7/18/08			
41	<u> </u>	Steel	75 days	Fr1 4/4/08	Frl 7/18/08			
42		Set new own structural steel	38 davs	Frl 4/4/08	Tue 5/27/08			
43		Set new Mech. Rm. Structural steel	32 days	Thu 4/17/08	Sal 5/31/05			
44		Install Cooling tower support steel	7 days	Frl 5/2/08	Mon 5/12/08			
45		Set East wing structural steel	37 days	Wed 5/14/08	Thu 7/3/08	· · · · · · · · · · · · · · · · · · ·		
46		Toping out of steel	0 days	Fri 7/18/08	Fri 7/18/08	♦ 7/18		
47		Masonry	139 days	Fri 2/29/08	Wed 9/10/08	· · · · ·		
48		Install New East Wing CMU Shear wall	9 days	Fri 2/29/08	Wed 3/12/08			
		Task		Miestone		External Tasks		
Project	: TECH	2 schedule.mpp		Oursease		Enternal Millionen A		
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		Progress		Project Sum	nmary 🛧	Deadline 🖑		
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D	Δ.	Task Name	Duration	Start	Finish	2008 2009
40	<u>-</u>	Install CML at Line Cure East groupings	2 dave	Tus 6/2/78	Thu S/S/02	Mavi Juni Juli Augi Seol Oct Novi Deci Jani Febi Mari Agri Mavi Juni Juli Augi Seol Oct Novi Deci Jani Febi Mari Agri Mavi Juni
49	10	Install CMU at Chill Gyn East openings	36 days	Med 6/11/09	Mind 7/20/09	
50	-	Install cylinder OMU Javas Javal Mash. Sm.	30 uaya	The straight	The 740/00	
51	10	Install exterior CMU lower level Mech. Rm	21 days	110 6/12/06	Thu //10/06	
52	-	Install block SEQ 1D	47 days	Wed 7/2/06	Thu 9/4/06	
53		Install Intenor CMU Lower Level Mech. Rm	10 days	Mon //14/06	FIT //25/06	
54	-	Install East wing brick taçade	25 days	Mon //28/08	FII 8/29/06	
55	-	install Brick Façade Mech. Rm	21 days	Wed 8/13/08	Wed 9/10/08	
56		Spray Fireproofing	88 days	Thu 5/22/08	Mon 9/22/08	· · · · · · · · · · · · · · · · · · ·
57		Spray fireproof SEQ 1B	14 days	Thu 5/22/06	Tue 6/10/08	
58		Spray fireproof SEQ 1A roof	77 days	Frl 6/6/08	Mon 9/22/08	
59		Spray fireproof Mech. Rm beams	2 days	Fri 6/20/08	Mon 6/23/08	
60	1	Spray fireproof SEQ 2 beams & columns	10 days	Mon 7/14/08	Fri 7/25/08	
61		Spray fireproof New East wing SEQ 2 roof de	15 days	Tue 9/2/08	Mon 9/22/08	
62	1	Spray fireproof SEQ 1B roof deck	2 days	Wed 9/10/08	Thu 9/11/08	I
63		Building Enclosures	186 days	Thu 2/14/08	Thu 10/30/08	· · · · · · · · · · · · · · · · · · ·
64		Infil roof openings @ existing core	3 days	Thu 2/14/08	Mon 2/18/08	
65		install new parapet roofing	5 days	Frl 6/6/08	Thu 6/12/08	
66		Frame & hang walls SEQ 1B	75 days	Frl 6/13/08	Thu 9/25/08	
67		Frame North wall of Raquet ball courts	3 days	Mon 6/16/08	Wed 6/18/08	
68	6	Install East wing skylights	8 days	Ed 7/11/08	Tue 7/22/08	
69	6-	East wing perimeter framing & sheathing	10 days	Mon 7/21/08	Frt 8/1/08	
70		Erame unper level exterior wall Mech. Rm	20 days	Wed 7/30/08	Tue 8/25/08	
71	8	East wing portion	20 days	Man 8/4/08	Erl 8/20/08	
70	100 C	Last wing rooming	20 days	The SHOURS	Thu 0/20/00	
72	<u> </u>	install East wing enuly metal panels	o days	Tue 0/19/00	The 0/20/00	
7.5	-	SEQ 16 low rooning	11 0.3ys	Tue 8/26/06	TUE 9/9/06	
74	-	Peniniouse roomg	8 days	Tue 6/26/06	Thu 9/4/08	
/5	-	instali Metal panels @ North Wall Haquetball (	5 days	Wed 8/2//08	TUE 9/2/08	
/6	11	Install nigh roor SEQ 1 @ courts	16 days	Wed 8/2//08	Wed 9/1//08	
77		instali metal panels North taçade	11 days	Fn 8/29/08	FN 9/12/08	
/8	11	install windows East taçade	8 days	Tue 9/2/08	Thu 9/11/08	
79		Install Metal panels SEQ 1 courts	20 days	Wed 9/3/08	Tue 9/30/08	
80		install low roof @ raquetball court lobby	4 days	Wed 9/3/08	Mon 9/8/08	
81		Install Metal panels SEQ 1B	30 days	Frl 9/12/08	Thu 10/23/08	
82		Install East Wing entry curtain wall	25 days	Tue 9/16/08	Mon 10/20/08	
83		Install curtain wall at North façade	10 days	Wed 9/24/08	Tue 10/7/08	
84		New Gym roofing	20 days	Fri 9/26/08	Thu 10/23/08	
85		Install windows SEQ 1B	16 days	Thu 10/9/08	Thu 10/30/08	
86		Building Water Tight	0 days	Thu 10/30/08	Thu 10/30/08	<b>b</b> 10/30
87	1	Mechanical & Plumbing	185 days	Tue 3/25/08	Mon 12/8/08	· · · · · · · · · · · · · · · · · · ·
88		MEP roughin SEQ 3 upper level	75 days	Tue 3/25/08	Mon 7/7/08	
89		install new ductwork @ Cage Gym	25 days	Mon 4/7/08	Frl 5/9/08	
90		MEP roughin SEQ 3 lower level	36 days	Mon 4/21/08	Mon 6/9/08	
91		MEP roughin SEQ 18	114 days	Tue 5/20/08	Frl 10/24/08	
92		Install hangers in Mech. Rm	10 days	Fri 6/6/08	Thu 6/19/08	
93		Install new ductwork @ Linn Gym	16 days	Mon 6/9/08	Mon 6/30/08	
94	1	Set Mech. Tower	3 days	Fri 6/20/08	Tue 6/24/08	
95		MEP roughin Mech. Rm	77 days	Frt 6/27/08	Mon 10/13/08	
96		MEP roughin SEQ 2 Lower Level	41 days	Mon 7/21/08	Mon 9/15/08	
Droles	t TECH	2 schedule mnn		Milestone	۲	External Taleks
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		Progress		Project Sum	mary 🛧 🚃	Deadline 🕀
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ID	0	Task Name		Duration	Start	Finish	Marel Jun Jul Jaun Gan J Ori May Dan	2008 Jan Esh Mari Ang I	And has but Aug See Oa	i May Dea	2009 Jac Schlätzel Applateur Jun								
97		Set New Gym ro	oftop AHU's	3 days	Thu 8/14/08	Mon 8/18/08	May Juni Juli Rudi Sedi Octivovi Dec	Jan Februari Abrir	AVIJUTI JULIAUDISEDICO		Jan Pebliwar MortMavi Jun								
98	111	Set Mech. Equipr	ment	21 days	Wed 8/27/08	Wed 9/24/08			·										
99		MEP roughin SE	0 2 Upper Level	30 days	Tue 9/23/08	Mon 11/3/08													
100	11	Install New Gvm	ductwork	22 days	Frl 11/7/08	Mon 12/8/08			_										
101		Startup Mech. Ed	uloment	17 days	Tue 11/11/08	Wed 12/3/08													
102	Ē-	Electrical	1-1	276 days	Mon 11/19/07	Mon 12/8/08													
103	1	Connect temp, fe	eders for Linn Gvm	13 days	Mon 11/19/07	Wed 12/5/07	· · · ·			•									
104		Connect Temp. fe	eeders for Cage Gym	11 days	Wed 11/21/07	Wed 12/5/07													
105		Refeed/Clean ext	sting lights in Cage Gym	24 days	Mon 3/17/08	Thu 4/17/08	_												
106		install conduit for	AHUS	49 days	Tue 3/25/08	Frl 5/30/08													
107	1	Re feed existing	ichts in Linn Gym	20 days	Tue 5/6/08	Mon 6/2/08			_										
108		Set emergency of	enerator	3 days	Tue 9/16/08	Thu 9/18/08													
109		Set switch gear		5 days	Thu 9/18/08	Wed 9/24/08													
110		Install New Gym	liahting & conduit roughin	12 days	Frl 11/21/08	Mon 12/8/08													
111	<u> </u>	Fire Protection	,,,,,	214 days	Tue 3/18/08	Frl 1/9/09				_									
112	1	install Sprinkler s	ystem Cage Gym	7 days	Tue 3/18/08	Wed 3/26/08					•								
113		Install Sprinkler s	vstem Linn Gym	10 days	Mon 5/19/08	Fri 5/30/08			<b>a</b>										
114		Sprinkler roughin	New Gvm	8 days	Frl 5/30/08	Tue 6/10/08			<b>1</b> 1										
115	1	Sprinkler roughin	SEQ 3 LL	31 days	Wed 6/11/08	Wed 7/23/08													
116	1	Sprinkler roughin	SEQ 3 UL	30 days	Tue 7/8/08	Mon 8/18/08				i									
117	1	Sprinkler test SE	Q3LL	2 days	Thu 7/24/08	Frl 7/25/08			T	i									
118	11	Sprinkler drops S	EQ 3 LL	2 days	Mon 7/28/08	Tue 7/29/08			- i i	i									
119	1	Sprinkler roughin	SEQ 2 LL	31 days	Mon 8/18/08	Mon 9/29/08			· _	i									
120		Sprinkler test SE	Q 3 UL	2 days	Tue 8/19/08	Wed 8/20/08				i									
121		Sprinkler drops S	EQ 3 UL	2 days	Thu 8/21/08	Frl 8/22/08				İ .									
122	1	Set fire pump		6 days	Wed 8/27/08	Wed 9/3/08			<u>`</u>										
123	1	Sprinkler roughin	SEQ 1A	20 days	Tue 9/9/08	Mon 10/6/08													
124	1	Sprinkler roughin	SEQ 1B	20 days	Frl 9/19/08	Thu 10/16/08				ĺ									
125		Fire pump test		3 days	Thu 9/25/08	Mon 9/29/08													
126		Sprinkler Test SE	Q 2 LL	2 days	Tue 9/30/08	Wed 10/1/08													
127		Sprinkler test SE	Q 1A	2 days	Tue 10/7/08	Wed 10/8/08													
128	1	Sprinkler drops S	EQ 1A	2 days	Thu 10/9/08	Fri 10/10/08													
129	1	Sprinkler roughin	SEQ 2 UL	30 days	Tue 10/14/08	Mon 11/24/08													
130		Sprinkler test SE	Q 1B	2 days	Frl 10/17/08	Mon 10/20/08			7										
131		Sprinkler drops S	EQ 1B	2 days	Tue 10/21/08	Wed 10/22/08			i										
132	1	Sprinkler Test SE	Q 2 UL	2 days	Tue 11/25/08	Wed 11/26/08				I									
133	1	Sprinkler drops S	EQ 2 LL	2 days	Thu 12/18/08	Frl 12/19/08				11									
134		Sprinkler drops S	EQ 2 UL	5 days	Mon 1/5/09	Fri 1/9/09				· ·	0								
135	1	Elevators		206 days	Wed 2/27/08	Wed 12/10/08				-	~								
136		Install Elevator Ja	ack hole	2 days	Wed 2/27/08	Thu 2/28/08		1											
137		Install Elevators		62 days	Tue 9/9/08	Wed 12/3/08		T											
138		Test Elevators		5 days	Thu 12/4/08	Wed 12/10/08				D									
139	<u> </u>	Interior Walls		162 days	Thu 5/22/08	Frl 1/2/09			·	_	<b>b</b>								
140		Frame walls SEQ	13 UL	20 days	Thu 5/22/08	Wed 6/18/08													
141		Frame walls SEC	3LL	19 days	Thu 5/29/08	Tue 6/24/08													
142		Hang & Finish wa	Alls SEQ 3 UL	20 days	Fri 7/11/08	Thu 8/7/08													
143		Hang & Finish wa	Alls SEQ 3 LL	20 days	Tue 7/22/08	Mon 8/18/08													
144		Frame Interior pa	rtitions SEQ 2 LL	30 days	Tue 9/2/08	Mon 10/13/08													
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ID	6	Task Name	Durat	on	Start	Finish		2008	2009
145	Ť.	Frame Interior partition	s SEO 2 U 20 (	tavs	Tue 107/08	Mon 11/3/08	Mavi Jun I Jul I Audi Sebi Oct i Novi Dec	Jan FebiMar Abr MaviJur	Jul IAudiSeol Oct NoviDeci Jan FebiMari Abri Mavi Jun
146		Hang & Finish Interior	walls SEQ 211 42 (	tavs	Tue 10/21/08	Wed 12/17/08			
147		Hang & Finish Interior	walk SEQ 2 LL 39 (	1375	Tue 11/11/08	Ed 1/2/09			
148	1	Finish New Gym Interio	or walls 80	tays	Tue 12/9/08	Thu 12/18/08			
149	-	Interior Painting	233 0	lavs	Wed 3/26/08	Frl 2/13/09			
150	1	Paint Cage Gym ceiling	05 80	tavs	Wed 3/26/08	Frl 4/4/08			
151		Paint Cage Gym walls	17 (	iays	Mon 5/12/08	Tue 6/3/08			
152		Paint Linn Gym Celling	5 60	jays	Fri 5/30/08	Fri 6/6/08			i i
153	11	Paint Linn Gym walls	6	jays	Tue 7/1/08	Tue 7/8/08		· •	• i i
154	11	Re open Linn Gym	0 (	iays	Fri 8/15/08	Frl 8/15/08			♦ 8/15
155	11	Re open Cage Gym	0(	iays	Tue 8/19/08	Tue 8/19/08			o 8/19
156	1	Paint New Gym ceiling	s 50	iays	Frl 10/31/08	Thu 11/6/08			. <u>.</u>
157	1	Paint SEQ 3 LL	27 0	iays	Fri 12/19/08	Mon 1/26/09			i 📥
158		Paint New Gym walls	80	days	Tue 1/6/09	Thu 1/15/09			
159		Paint SEQ 3 UL	25 0	lays	Mon 1/12/09	Frl 2/13/09			i 👝
160	1	Interior finishes	185 0	lays	Mon 7/7/08	Frl 3/20/09			· · · · · · · · · · · · · · · · · · ·
161	11	install new floor in Cag	e Gym 20 d	tays	Mon 7/7/08	Fri 8/1/08			
162	11	Miscelaneous finishes	In Linn Gym 5 (	days	Mon 7/14/08	Fri 7/18/08			
163		SEQ 1A Interior finishe	5 620	lays	Thu 12/4/08	Frl 2/27/09			
164		SEQ 1B Interior finishe	5 620	lays	Thu 12/4/08	Frl 2/27/09			
165		Interior finishes SEQ 2	LL 62 0	lays	Thu 12/18/08	Fri 3/13/09			
166	21	Interior finishes SEQ 2	UL 62 (	lays	Thu 12/18/08	Fri 3/13/09			
167	1	Interior finishes SEQ 3	LL 52 (	1ays	Fil 12/19/08	Mon 3/2/09			
168	11	New Gym Interior finish	165 49 (	lays	Mon 12/29/08	Thu 3/5/09			
169	11	Interior finishes SEQ 3	UL 50 (	lays	Mon 1/12/09	Frl 3/20/09			
170		Substantial Completion	00	lays	Fri 3/27/09	Fri 3/27/09			♦ 3/27
1/1	-	Punch List and Closeout	210	13y5	Mon 3/30/09	Sun 4/26/09			
1/2	21.	rinal completion		layo	MUT 4/2//03	1001 4/2/103			· · · · · · · · · · · · · · · · · · ·
Proje Date:	ct: TECH Fri 10/2	H 2 schedule.mpp Split 4/08			Miestone Summary	¢ 	External Tasks		
		Prog	gress		Project Sum	mary 🖈	* Deadline 🕴		
							Page 4		

# Appendix B – Superstructure Sequencing Site Plans

### <u>Appendix C – Detailed Structural System Estimate</u>

#### Appendix C – MC<sup>2</sup> Estimate Summary

# GMU PE Building Structural System Estimate Summary - Standard Construction Project

Detail - Without Taxes and Insurance Indirect Costs are S	Spread								Group	1: Divisions	
Estinator :											
Project Size : sqft											
ItemCode Description	Quantity UM	Lab.Unit	Lab.Total	Nat.Unit Temp.Mat.Unit	Mat.Total	Eqp.Unit	Eqp.Rent.Unit Eqp.Tota	al Sub.Unit	Other Unit Tot.UnitCost	TotalCost	
Sitework											
02316.100 MACH EXCAV CONTINUOUS FTG 02316.102 FINE GRADE CONTINUOUS FTG	101.19 CUYD 2,732.00 SQFT	6.9549 0.4761	703.73 1,300.71			0.950	98.13	3	7.905 0.476	799.86 1,300.71	
02316.110 MACH EXCAV COLUMN FTG	394.19 CUYD	6.9549	2,741.54			0.950	374.4	3	7.905	3,116.02	
* Total Sitework	3,803.00 GQFT	0.4/01	6,633.05				470.6	I	0.470	7,103.65	
Concrete											
03110.520 COLUMN FOOTING EDGE FORMS	3,447.64 SQFT	4.4257	15,258.22	1.039	3,581.06				5.464	18,839.28	
03111.800	2,164.60 EACH	3.0128	0.702.01	0.001	1.557.07				3.824	0.008.00	
03150.650 SCREEDS FOR SLAB 03150.650 SCREEDS FOR SLAB	4,166.98 LNFT 4,791.72 LNFT	0.9219	3,840.62 4 417 49	0.320	1,333.11				1.242	5,173.73 5,950.84	
03210.210 COLUMN FOOTING REBAR	7.41 CWT	31.7857	235.69	26.750	198.35				58.536	434.04	
03220.010 8x6 W1.4/W1.4 MESH 03220.012 8x6 W2.9/W2.9 MESH	439.24 SQS 381.88 SQS	18.8640 23.1663	8,285.84 8,846.73	8.200 15.000	3,501.78 5,728.22				27.064 38.160	11,887.62 14,575.00	
03310.150 "CONC IN CONTINUOUS FOOTING"	2011 40 CUVD	11,0000	4 442 05	55 000	E 585 10				48.000	8 870 40	
03310.200 "CONC IN COLUNN FOOTING"	101.18 0010	11.0080	1,113.85	35.000	0,000.18				00.008	0,078.15	
03310.201 3000 PSI DIRECT 03310.350 **CONC IN SLAB ON GRADE**	248.40 CUYD	11.0090	2,734.61	55.000	13,561.86				66.009	16,396.46	
03310.351 3000 PSI DIRECT	535.75 CUYD	11.0090	5,898.05	55.000	29,466.17				66.009	35,364.22	
03311.713 3500 PSI DIRECT	431.35 CUYD	14.6787	6,331.71	54.500	23,508.76				69.179	29,840.47	
03315.971 * CONTINUOUS FOOTING LENGTH * 03315.972 * NO. OF COLUMN FOOTINGS *	1,366.00 LNFT 78.00 EACH										
03315.976 'SOG AREA'	34,716.50 SQFT										
03315.991 * SLAB OVER METAL LECK AREA * 03350.130 MACHINE TROWEL FINISH	39,931.00 SQFT 34,716.50 SQFT	0.3304	11,470.33						0.330	11,470.33	
03350.130 MACHINE TROWEL FINISH	39,931.00 SQFT	0.3304	13,193.20	0.010	200 50				0.330	13,193.20	
03390.010 PROTECT & CORE 03390.010 PROTECT & CURE	39,931.00 SQFT	0.1102	3,820.70 4,400.40	0.019	706.68				0.129	4,492.32 5,107.07	
* Total Concrete			96,555.25		91,468.15					188,023.40	
Metals	1313										
05129-101 STEEL BEAMS	1323										
05129.102   BEAMS	4,029.49 CWT 1,106.34 CWT	28.7300	115,767.33	35.000	141,032.25	5.000	20,147.40	3	68.730	276,947.05	
05129.103 CHANNELS	15.91 CWT	28.7300	457.18	35.000	556.96	8.000	127.3	, ,	71.730	1,141.44	
05129.121 STEEL COLUMNS 05129.122 I SHAPES	1.246.50 CWT	28.7300	35.812.00	35.000	43.527.57	5.000	6.232.5	1	68.730	85.672.08	
05129.181 BRACING 05129.182 I BEAMS	253.82 CWT	38,3067	9,722.82	35.000	8.383.53	5.000	1.269.0	3	78.307	19.875.42	
05129.990 * STRUCTURAL STEEL WEIGHT *	264.60 TONS				-,						
05310.018 2" METAL DECK	39,931.00 SQFT	0.4445	17,749.33	0.870	34,755.94				1.315	52,505.27	
05310.052 1-1/2X20 GA MTL DECK GALV	32,086.00 SQFT	0.4134	13,264.35	0.806	25,374.15				1.220	39,138.50	
* Total Metals	19,901.00 OQF1	0.4440	230,975.53	1.120	309,714.57		33,308.04	l I	1.971	573,998.14	
Thermal and moisture protection											
07310.031 CEMENT TIOUS FIREPROOFING	33,263.25 BDFT	44.8068	1,490,413.23	0.448	14,901.94	0.080	2,661.0	3	45.335	1,507,976.23	
* Total Thermal and moisture protection	1,209.32 DUFI	44.0000	1,816,753.97	0.990	18,164.86	0.000	3,243.73	3	+0.525	1,838,162.56	
Total Estimate			2,150,917.80		419,347.59		37,022.3			2,607,287.76	

Column Takeoff											
Size	Weight (plf)	Height (ft)	Quantity	lbs of Steel	Tons						
W10X33	33	26	20	17160	8.58						
W10X33	33	12	4	1584	0.792						
W10X39	39	26	6	6084	3.042						
W10X39	39	12	1	468	0.234						
W10X45	45	26	12	14040	7.02						
W10X49	49	26	4	5096	2.548						
W12X45	45	35	2	3150	1.575						
W12X53	53	12	2	1272	0.636						
W12X53	53	14	4	2968	1.484						
W12X53	53	26	2	2756	1.378						
W12X65	65	35	4	9100	4.55						
W12X65	65	26	6	10140	5.07						
W14X90	90	35	12	37800	18.9						
W8X48	48	14	5	3360	1.68						
HSS6X6X3/8	27.48	35	9	8656.2	4.3281						
HSS6X6X3/8	27.48	26	1	714.48	0.35724						
HSS6X6X3/8	27.48	12	1	329.76	0.16488						
	TOTAL 124678.44 62.33922										

Appendix	C – (	Quantity	/ Takeoffs

Slab on Grade Takeoff										
Concrete thickness (in)         Concrete (SF)         Concrete (CF)         Concrete (CY)         Reinforcing (WWF)										
				6x6						
5	34716.5	14465.2	535.7	W2.9xW2.9						
6	4140	2070	76.7	6x6 W4xW4						

Elevated Slabs on Metal Decking Takeoff										
Concrete Thickness (in)Concrete (SF)Concrete (CF)Concrete (CY)Reinforcing (WWF)										
				6x6						
4.5	39,931	14,974	554.6	W1.4xW1.4						

			Concrete	e Column	Footings	<u>Takeoff</u>			
Size	Thickness	Quantity	Concrete (SF)	Concrete (CF)	Concrete (CY)	Rebar Qty.	Rebar size	Rebar Dia. (in.)	Rebar Wt. (plf)
10'X10'	24"	1	100	200	7.4	44	#7	0.875	2.044
10'X11'	24"	1	110	220	8.1	46	#7	0.875	2.044
10'X12'	24"	1	120	240	8.9	24	#7	0.875	2.044
10'X20.66'	24"	1	206.6	413.2	15.3	70	#7	0.875	2.044
15'X13'	24"	1	195	390	14.4	60	#8	1	2.67
16'X15'	24"	1	240	480	17.8	66	#8	1	2.67
2'X4'	12"	1	8	8	0.3	8	#5	0.625	1.043
3'X7'	12"	1	21	21	0.8	12	#5	0.625	1.043
4'X4'	12"	4	16	64	2.4	48	#5	0.625	1.043
5'X5'	14"	1	25	29.2	1.1	16	#5	0.625	1.043
5'X5'	18"	17	25	637.5	23.6	272	#5	0.625	1.043
5'X5'	12"	4	25	100	3.7	64	#5	0.625	1.043
6'X11'	12"	1	66	66	2.4	20	#5	0.625	1.043
6'X6'	14"	1	36	42	1.6	16	#5	0.625	1.043
6'X6'	18"	3	36	162	6.0	48	#5	0.625	1.043
6'X6'	24"	2	36	144	5.3	48	#5	0.625	1.043
6'X6'	30"	2	36	180	6.7	64	#5	0.625	1.043
7'X7'	32"	2	49	261.3	9.7	32	#6	0.75	1.502
7'X7'	18"	18	49	1323	49.0	288	#6	0.75	1.502
7'X7'	24"	2	49	196	7.3	64	#6	0.75	1.502
8'X8'	18"	4	64	384	14.2	72	#6	0.75	1.502
8'X8'	24"	1	64	128	4.7	36	#6	0.75	1.502
8'X8'	18"	3	64	96	3.6	36	#5	0.625	1.043
9'X9'	24"	3	81	486	18.0	120	#6	0.75	1.502
9'X9'	18"	2	81	243	9.0	40	#6	0.75	1.502

Roof Decking Takeoff					
Deck Depth (in)	Gauge	Area (SF)			
1.5	20	32,086			
3	18	14,437.5			

Floor Decking Takeoff					
Deck Depth (in)	Gauge	Area (SF)			
2	18	39,931			

<u>Steel B</u>	eam Take	off
Size	Length (ft)	Quantity
C12x20 7	8	3
C12x20.7	10	4
C6x8.2	6	4
C6x8.2	8.5	1
HSS 12x12x1/2	26.25	8
HSS 12x12x1/2	27.5	5
HSS 12x12x1/2	24	13
HSS 12x12x1/2	32.17	1
HSS5x5x3/8	17.5	6
HSS6x6x3/8	8.5	1
W12x14	26.75	2
W12x16	6	16
W12x16	15	4
W12x16	8	8
W12x16	13	3
W12x16	7.5	30
W12x16	10	23
W12x16	16	2
W12x16	22	16
W12x16	5	16
W12x16	9	7
W12x16	14	1
W12x16	2	3
W12x16	18.5	1
W12x16	21	8
W12x16	23	11
W12x16	24	2
W12x16	12	- 3
W12x16	1/	2
W12x16	25	1
W12x16	20	2
W12x16	11	2
W12x19	18	8
W12x19	22	8
W12x19	21	4
W12x19	20	3
W12x19	19	5
W12x19	17	4
W12x22	9	1
W12x22	21	1
W12x26	7.5	- 5
W12x26	16	4
W12x26	17	5

_		
W12x26	32.83	1
W12x26	8.5	10
W12x26	18.5	3
W12x26	20	2
W12x26	30	1
W12x26	25.66	5
W12x26	4	23
W12x26	5	3
W12x26	10	3
W12x26	21	1
W12x26	22.5	2
W12x26	12	2
W12x26	28.33	1
W12x26	14.33	1
W12x26	11	1
W12x40	27.5	1
W12x40	26.25	2
W14x22	21	5
W14x22	19	3
W14x22	20	5
W14x22	22	5
W14x22	18	3
W14x22	23	11
W14x22	8	1
W14x22	25	2
W14x22	26.33	4
W14x22	24	3
W14x22	13.5	1
W14x22	17	1
W14x43	6	1
W16x26	22	6
W16x26	20	7
W16x26	16	1
W16x26	7	2
W16x26	4	10
W16x26	10	1
W16x26	25.6	1
W16x31	20	9
W16x31	10	2
W16x31	16	3
W16x31	24	4
W16x31	25.25	2
W16x31	22.83	6
W16x31	22	9
W16x31	21	2
W16x31	32	3
W16x31	6	2

W16x31	28	3
W16x31	18	3
W16x31	26	8
W16x31	23	3
W16x31	15	2
W16x36	24	2
W16x36	22.25	2
W16x36	26.75	1
W16x36	21	1
W16x36	20	1
W16x40	26.75	1
W16x45	22.83	1
W18x35	30	3
W18x35	28.58	5
W18x35	25.75	8
W18x35	32.83	104
W18x35	6	5
W18x35	23	2
W18x35	35.33	13
W18x35	17.5	3
W18x35	10	2
W18x35	21	1
W18x35	20	1
W18x35	16.33	1
W18x35	27.17	1
W18x35	12.75	1
W18x35	20.25	1
W18x40	21	1
W18x40	32	1
W18x40	32.83	2
W18x40	25.66	1
W18x40	5.5	1
W18x40	22	2
W18x40	23	1
W18x50	32.83	4
W18x77	24	1
W21x44	27.5	7
W21x44	30	5
W21x44	25.75	1
W21x44	16	1
W21x44	28.58	4
W21x44	34.25	1
W21x44	29.83	2
W21x44	32.83	8
W21x44	35	1
W21x44	6	2
W21x44	20	1

-		
W21x50	27.5	3
W21x50	25.75	2
W21x50	32.83	1
W21x57	32.83	1
W21x62	24	1
W21x68	24	1
W21x73	26	1
W24x55	30.66	7
W24x55	28.58	1
W24x55	26.83	1
W24x55	8.5	1
W24x55	32.17	2
W24x55	32.83	1
W24x55	29.83	1
W24x55	35	1
W24x55	38.75	1
W24x62	25.25	2
W24x62	34.25	1
W24x62	29.83	1
W24x62	30.66	2
W24x62	27.5	10
W24x68	30.66	1
W24x68	35	1
W24x68	38.75	2
W24x68	32.17	1
W24x76	36	1
W24x84	36	1
W24x84	40	1
W8x10	10	1
W8x24	10	1
W8x31	6	2
W8x58	12	1
HSS8x8x3/8	25.25	3
HSS8x8x3/8	27.5	6
HSS6x6x3/8	30	4
HSS6x6x3/8	35	4
HSS6x6x3/8	24.33	4
HSS6x6x3/8	32.83	4
HSS6x6x3/8	26.83	4

### Appendix D – General Conditions Estimate

<u>G</u>	eneral Co	nditions	<u>s Estimate</u>		
Description	Quantity	Unit	Unit Cost	Subtotal	Total
Jobsite Management					
Project Director	104	Weeks	5114.58	\$531,916.32	
Field Personnel					
Project Manager	104	Weeks	2175	\$226,200.00	
Field Engineer	104	Weeks	1350	\$140,400.00	
Cost Engineer	104	Weeks	1350	\$140,400.00	
Superintendent	83	Weeks	2025	\$168,075.00	
Project Controls	T				1
Document Control	100	Weeks	1882.17	\$188,217.00	
Safety	83	Weeks	2452.17	\$203,530.11	
QA/QC	75	Weeks	3075.86	\$230,689.50	
SUBTOTAL Management					\$1,829,427.93
SITE REQUIREMENTS					
Jobsite Office					
Office Trailers (50'x12')	8	Months	416	\$3,328.00	
Office Equipment	18	Months	155	\$2,790.00	
Office Supplies	18	Months	85	\$1,530.00	
Telephone Bill	18	Months	80	\$1,440.00	
High Speed Data Setup	1	LS	2600	\$2,600.00	
High Speed Data Monthly	18	Months	200	\$3,600.00	
Lights & HVAC	18	Months	150	\$2,700.00	
Site					
Port-a-Johns	3	Ea.	171	\$513.00	
Toilets, Trailer	2	Ea.	355	\$710.00	
Dumpsters (2) 40 C.Y. capacity	83	Weeks	1300	\$215,800.00	
Vehicles/Travel					
Pickup Trucks 4x4 (4)	24	Months	645	\$61,920.00	
Fuel, Trucks	104	Weeks	800	\$83,200.00	
Temporary Services					
Temporary Lighting	66926	CSF	27.7	\$1,853,850.20	
Temporary Power (18 months)	66926	CSF	0.75	\$903,501.00	
SUBTOTAL Site Requirements					\$3,137,482.20
TOTAL ESTIMATE					\$4,966,910.13

#### Appendix D – General Conditions Estimate

#### Appendix D – RS Means Data Sheets

5

10 M 10	21 61 – Cost Indexes									
01.0	14 44 EQ. Material Index		Doily	Lobar-	11-5	Hatadal	2009 B	are Costs	Tetal	Toto
012	1 61.50 Material Index	LIEW	OUIDUI	HOUIS	Unit	Material	Lobor	Equipment	IOTOI	Incio
0010	MATERIAL INDEX (Reference) For over 930 zip code locations in	133						and and a		14
0020	the U.S. and Canada, minimum (Elizabethtown, KY)	195	1		%	90.10%				100
0040	Average					100%				12.5
0000	Plaxinum (Ketchikon, AK)	1.2	and a		*	37.00%		P. United a	1000 C	-
UI	21 03 - 1825	Sav-	200		4	i intelli	1.1.1.		198.41	10.000
01 2	1 63.10 Taxes	1000	1000						I APPEN	
0010	R012909-80	D.S.			ar	4 010/			Top shi	1.5
0020	Sules lax, sidle, overlage				28	4.7170				1.00
0000	Niuxiii Uiii R012909-85 Social Couries an first \$102.000 of wrone	125				1.2370	7 4 504			
0200	Unemployment combined Earleral and State minimum	1000					80%		Conversa	
0350	biernae						6.20%			
0400	Maxing Maxing						11.74%			
							1		1	1
0120	Average Maximum			real for			1,165		1.165 1,350	1,800
0160 0180 0200	General pumase laborer, average Project manager, minimum						1,250		1,250	1,925
0160 0180 0200	General pumose aborer, average Project manager, minimum Average Maximum						1,250 1,650 1,925 2,175		1,250 1,650 1,925 2,175	1,925 2,550 2,975 3,375
0160 0180 0200 0220 0220	General pumase aborer, average Project manager, minimum Average Maximum Superistendent, minimum			63		110.154	1,250 1,650 1,925 2,175 1,600		1,250 1,650 1,925 2,175 1,600	1,925 2,550 2,975 3,375 2,475
0160 0180 0200 0220 0240 0260	General purpase aborer, average Project morioger, minimum Average Maximum Superintendent, minimum Average	11 St. 12		100	1000		1,250 1,650 1,925 2,175 1,600 1,775		1,250 1,650 1,925 2,175 1,600 1,775	1,925 2,550 2,975 3,375 2,475 2,750
0160 0180 0200 0220 0240 0260 0280	General purpase aborer, average Project monoger, minimum Average Maxmum Superintendent, minimum Average Maxmum			16467			1,250 1,650 1,925 2,175 1,600 1,775 2,025		1,250 1,650 1,925 2,175 1,600 1,775 2,025	1,925 2,550 2,975 3,375 2,475 2,750 3,125
0160 0180 0200 0220 0240 0260 0280 0290	General purpase aborer, overage Project manager, minimum Average Maxmum Superintendent, minimum Average Maximum Timekeeper, average						1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040	1,925 2,550 2,975 3,375 2,475 2,750 3,125 1,600
0160 0180 0200 0220 0240 0260 0260 0280 0290 01 31	General purpose aborer, overage Project manager, minimum Average Maxmum Superintendent, minimum Average Maximum Timekeeper, average 1 13.30 Insurance						1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040	1,925 2,550 2,975 3,375 2,475 2,750 3,125 1,600
0160 0180 0200 0220 0240 0260 0260 0280 0290 01 31 0010	General purpose aborer, overage Project manager, minimum Average Maxmum Superintendent, minimum Average Maximum Timekeeper, average 1 13.30 Insurance INSURANCE R01311340						1,250 1,650 1,925 <b>2,175</b> 1,600 1,775 2,025 1,040		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040	1,925 2,550 2,975 3,375 2,475 2,750 3,125 1,600
0160 0180 0200 0240 0260 0280 0290 01 3 0010 0020	General purpose aborer, overage Project manager, minimum Average Maxmum Superintendent, minimum Average Maximum Timekeeper, average 1 13.30 Insurance INSURANCE Buildes risk, stordord, minimum						1,250 1,650 1,925 <b>2,175</b> 1,600 1,775 2,025 1,040		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040	1,925 2,550 2,975 3,375 2,475 2,750 3,125 1,600
0160 0180 0200 0240 0260 0280 0290 01 3 0010 0020 0050	General purpose aborer, overage Project manager, minimum Average Maxmum Superintendent, minimum Average Maximum Timekeeper, average 113.30 Insurance INSURANCE R013113.40 Buildes risk, stardord, minimum Maximum R013113.50				Job		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,043	1,925 2,550 2,975 3,375 2,475 2,750 3,125 1,600
0160 0180 0200 0220 0240 0260 0260 0290 01 3 0010 0020 0050 0200	General purpose aborer, overage Project manager, minimum Average Maxmum Superintendent, minimum Average Maximum Timekeeper, average 113.30 Insurance INSURANCE R013113.40 Buildes risk, stordord, minimum Miximum R013113.50 Al-risk type, minimum				-		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040	1,925 2,550 2,975 3,375 2,475 2,750 3,125 1,600
0160 0180 0200 0220 0240 0260 0280 0290 01 3 0010 0020 0050 0200 0250	General purpose aborer, overage Project manager, minimum Average Maxmum Superintendent, minimum Average Maximum Timekeeper, average 113.30 Insurance INSURANCE R013113.40 Buildes risk, stardord, minimum Maximum R013113.50 Al-risk type, minimum Maximum R013113.60				doL		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040	1,925 2,550 2,975 3,375 2,475 2,750 3,125 1,600 .2 .6 .6 .2 .6
0160 0180 0200 0220 0240 0260 0280 0290 011 3 0010 0020 0050 0250 0400	General purpose aborer, overage Project manager, minimum Average Maxmum Superintendent, minimum Average Maximum Timekeeper, average 113.30 Insurance INSURANCE R013113.40 Buildes risk, stordord, minimum Maximum R013113.50 Al-risk type, minimum Maximum R013113.60 Centractor's equigment floater, rrinimum				Job Value		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040	1,925 2,550 2,975 3,375 2,475 2,750 3,125 1,600 .2 .6 .6 .6 .5 .5
0160 0180 0200 0220 0240 0260 0280 0290 0113 0010 0020 0050 0250 0400 0450	General purpose aborer, overage Project manager, minimum Average Maxmum Superintendent, minimum Average Maximum Timekeeper, average 113.30 Insurance INSURANCE R013113.40 Buildes risk, stordord, minimum Miximum R013113.50 Al-risk type, minimum Miximum R013113.60 Centractor's equipment floater, minimum Miximum				Job Value		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040	1,925 2,550 2,975 3,375 2,475 2,750 3,125 1,600 .2 .6 .6 .2 .6 .6 .5 .1 .5 .1 .5
0160 0180 0200 0220 0240 0240 0260 0290 01 3 0010 0020 0050 0200 0250 0400 0450	General purpose aborer, overage Project manager, minimum Average Maxmum Superintendent, minimum Average Maximum Timekeeper, average 113.30 Insurance INSURANCE R013113.40 Buildes risk, stordord, minimum Maximum R013113.50 Al-risk type, minimum Maximum R013113.60 Centractor's equipment floater, rrinimum Maximum Public lability, average				Job Vdue Job		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040	1,925 2,550 2,975 3,375 2,475 2,475 3,125 1,600 2,2 .6 .6 .5 .5 .20
0160 0180 0200 0220 0240 0240 0240 0250 0113 0010 0020 0050 0200 0250 0400 0450 0600 0800	General purpose aborer, overage Project manager, minimum Average Maxmum Superintendent, minimum Average Maximum Timekeeper, average 113.30 Insurance INSURANCE R013113.40 Buildes risk, stordord, minimum Mickimum R013113.50 Al-risk type, minimum Mickimum R013113.60 Centractor's equipment floater, minimum Mickimum Public lability, average Warkers' compensation & employer's lability, average				dol Vdue Job		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040	1,925 2,550 2,975 2,475 2,475 2,750 3,125 1,600 2, 2, 8, 6 6 5 9 1,500
0160 0180 0200 0220 0240 0260 0280 0290 0113 0010 0020 0020 0020 0250 0400 0450 0600 0800 0800	General purpose aborer, overage Project manager, minimum Average Maxmum Superintendent, minimum Average Maximum Timekeeper, average 113.30 Insurance INSURANCE R013113.40 Buildes risk, stordord, minimum Mickimum R013113.50 Al-risk type, minimum Mickimum R013113.60 Centractor's equipment floater, minimum Maximum Public lability, average Warkers' compensation & amployer's lability, average by trade, compentry, general				Job Vdue Job		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040	1,925 2,550 2,975 2,475 2,475 2,750 3,125 1,600
0160 0180 0200 0220 0240 0260 0280 0290 010 0020 0020 0020 0250 0400 0450 0400 0450 0800 0800	General purpose aborer, overage Project manager, minimum Average Maxmum Superintendent, minimum Average Maximum Timekeeper, average 113.30 Insurance INSURANCE R013113.40 Buildes risk, stordard, minimum Miximum R013113.50 Al-risk type, minimum Miximum R013113.60 Contractor's equipment floater, minimum Miximum Public lability, average Warkes' compensation & employer's lability, average by trade, camentry, general Clerical				Job Vdue Job		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040	1,925 2,550 2,975 2,475 2,475 2,475 2,750 3,125 1,600
0360 0180 0200 0220 0240 0260 0280 0290 013 0010 0020 0050 0250 0400 0450 0800 0800 0800 0900 0955	General purpose aborer, overage Project manager, minimum Average Maxmum Superintendent, minimum Average Maximum Timekeeper, average 113.30 Insurance INSURANCE R013113.40 Builders risk, stordard, minimum Miximum Miximum R013113.50 Al-risk type, minimum Miximum R013113.60 Contractor's equipment floater, minimum Miximum Public tability, average by trade, camentry, general Clerical Cancrote Bursten				Job Vdue Job		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040 1,780% .58% 14,58%		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040	1,925 2,550 2,975 2,475 2,475 2,750 3,125 1,600
0360 0180 0200 0220 0240 0260 0280 0290 013 0010 0020 0050 0250 0400 0400 0400 0800 0800 0800 0800 0900 09	General purpose aborer, overage Project manager, minimum Average Maxmum Superintendent, minimum Average Maximum Timekeeper, average 113.30 Insurance INSURANCE R013113.40 Builders risk, stordard, minimum Maximum Maximum R013113.50 Al-risk type, minimum Maximum R013113.60 Contractor's equipment floater, minimum Maximum Public tability, average Workes' compensation & employer's liability, average by trade, concentry, general Clerical Cancrote Electrica Electrica				Job Vdue Job		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040 1,780% .58% 14,58% 6,46%		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040	1,925 2,550 2,975 2,475 2,475 2,750 3,125 1,600
0360 0180 0200 0220 0240 0240 0280 0290 0113 0010 0020 0250 0400 0450 0400 0450 0800 0800 0800 0900 09550 1000	General purpose aborer, overage Project manager, minimum Average Maxmum Superintendent, minimum Average Maximum Timekeeper, average 113.30 Insurance INSURANCE R013113.40 Buildew risk, stordard, minimum Miximum Miximum R013113.50 Al-risk type, minimum Miximum Miximum Naximum Public tability, average Workes' compensation & employer's liability, average by trade, comentry, general Clerical Cancrote Electrica Excavation Clerican Cancrote Electrica Excavation Excavation Electrica Excavation Electrica Excavation Electrica Excavation Electrica Excavation Electrica El				Job Vdue Job		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040 1,780% .58% 14,58% 6,46% 10,01%		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040	1,925 2,550 2,975 2,475 2,475 2,750 3,125 1,600
0360 0180 0200 0220 0240 0240 0280 0290 01 3 0010 0020 0250 0400 0450 0400 0450 0560 0800 0800 0800 09900 1000	General purpose aborer, overage Project manager, minimum Average Maxmum Superintendent, minimum Average Maximum Timekeeper, average 113.30 Insurance INSURANCE R013113.40 Builders risk, stordard, minimum Maximum Maximum R013113.50 Al-risk type, minimum Maximum Naximum Public tability, average Workes' compensation & employer's liability, average by trade, consentry, general Clerical Cancrote Electrica Excavation Glazing Insulation				Job Vdue Job		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040 1,780% .58% 14,58% 6,46% 10.01% 13,89%		1,250 1,650 1,925 2,175 1,600 1,775 2,025 1,040	1,925 2,550 2,975 2,475 2,475 2,750 3,125 1,600

# **01 52 Construction Facilities**

			Daily	Labor-			2009 B	are Costs	1000	Total
01 5	2 13.20 Office and Storage Space	Crew	Output	t Hours	Unit	Material	Labor	Equipment	Total	Incl O&P
0010	OFFICE AND STORAGE SPACE					Trees.				lais Sti
0020	Trailer, furnished, no hookups, 20' x 8', buy	2 Skwk	1	16	Eo.	8,200	655		8,855	10,000
0250	Rent per month	<b>美国、744</b> 次(4		12.11		163			163	179
0300	32' x 8', buy	2 Skwk	.70	22.857	311	12,200	935		13,135	15,000
0350	Rent per month					200			200	220
0400	50' x 10', buy	2 Skwk	.60	26.667		23,200	1,100		24,300	27,300
0450	Rent per month					281			281	310
1		2 Skwk	.50	32		27,900	1,300		29,200	32,700
0550	Rent per month	STRUCTURE OF	12.5	100.50	33	375	C. P. State	10	375	410
0700	For air conditioning, rent per month, add	10 21			*	41			41	45
0800	For delivery, add per mile				Mile	4.50			4.50	4.95
1000	Partable buildings, prefab, on skids, economy, 8' x 8"	2 Corp	265	.060	S.F.	85	2.41		87.41	97
1100	Deluxe, 8' x 12'		150	.107	"	95	4.26		99.26	112
1200	Storage boxes, 20' x 8', buy	2 Skwk	1.80	8.889	Ea.	4,675	365		5,040	5,700
1250	Rent per month				1	72			72	79
1300	40' x 8', buy	2 Skwk	1.40	11.429		6,400	465		6,865	7,775
1350	Rent per month	STATUTO STATE		1200	*	99			99	109
5000	Air supported structures, see Div, 13 31 13,13	A PART								

45 4.95 97

01 52 13.40 Field Office Expense

0010	FIELD OFFICE EXPENSE		Number of Street		1.00
0100	Office equipment rental average	Month	155	155	171
0120	Office supplies, average		85	85	93.50
0125	Office trailer rental, see Div. 01 52 13.20				
0140	Telephone bill; avg. bill/month ind, long dist.	Month	80	80m	88
0160	Lights & HVAC		150	. 150	165

### 01 54 Construction Aids

01 54 09 - Protection Equipment

0010       PERSONNEL PROTECTIVE EQUIPMENT         0015       Hazardous waste protection         0020       Respirator mask only, fuil face, silicone         0030       Half face, silicone         0040       Respirator contridges, 2 reg'd/mask, dust or osbestos         0050       Chemical vapor         0060       Compilation	223 33 5.30 4.69	245 36.50 5.85
0015     Hazardous waste protection       0020     Respirator mask only, full face, silicone       0030     Half face, silicone       0040     Respirator cortridges, 2 req'd/mask, dust or osbestos       0050     Chemical vapor       0060     Corpitation provident	223 33 5.30 4.69	245 36.50 5.85
0020     Respirator mask only, full face, silicone     Ea.     223       0030     Half face, silicone     33       0040     Respirator contridges, 2 reg'd/mask, dust or asbestas     5.30       0050     Chemical vapor     4.69       0060     Compilation work of the second dust.     9.70	223 33 5.30 4.69	245 36.50 5.85
0030     Half face, silicone     33       0040     Respirator contridges, 2 reg'd/mask, dust or osbestos     5.30       0050     Chemical vapor     4.69       0060     Compilation under the second data     9.79	33 5.30 4.69	36.50 5.85
0040         Respirator cortridges, 2 reg'd/mask, dust or osbestos         5.30           0050         Chemical vapor         4.69           0060         Combination under the second data         9.70	5.30	5.85
0050 Chemical vapor 4.69 0060 Combination 2.70	4.69	
000 Combination many and that		5.15
	9.70	10.65
100 Emergency escape breathing apparatus, 5 min. 465	465	510
D110 10 min 500	500	550
1150 Self contained breathing annumbus with full fine piece 30 min 1750	1 750	1 025
1160 60 min 2 925	2 925	3 225
200 Encossulating suits limited use level & gas	2,723	005
2210 Level B 270	270	207
300 Over boots Intex	270	277
1310 PVC 11. 0.35	0.33	1
1320 Neptrepa	21,50	24
41.50 Gloves nimile/pu/	41.50	46
1410 Neoprene control	21	23.50
24 09.60 Safety Martin	24	26.50
VIIO SAFETY HETS		
VO20 No.	1	
S.F. 1.10	1.10	1.21

01	54 33   Equipment Rental	UNIT	HOURLY OPER. COST	PER DAY	RENT PER WEEK	RENT PER MONTH	
5700	Salamanders, L.P. gas fired, 100,000 BTU	Ea.	4.56	15.35	46	138	Γ
5705	50,000 BTU		3.40	8.65	26	78	L
5720	Sandblaster, portable, open top, 3 C.F. capacity		.55	27	81	243	
5730	6 C.F. capacity		.85	40	120	360	1
5740	Accessories for above		.12	19.65	59	177	
5750	Sander, floor		.81	18.65	56	168	
5760	Edger		.75	25.50	11	231	
5800	Saw, chain, gas engine, 18" long		1.90	17.65	53	159	L
5900	Hydraulic powered, 36" long		.50	55	1 70	495	
5950	6U' tong		.05	55.50	170	510	-
6000	Maisonry, table mounted, 14" diameter, 5 H.P.		1.25	53	159	4/5	
6050	Portable cut-off, 8 H.P.		2.05	28	84	252	-
6100	Circular, hand held, electric, 7-1/4" diameter		.19	4	12	36	
6250	12" diameter		.20	60	100	66	-
6275	wan saw, w/nyurauro power, 10 H.P Shot bloster, well, behind, 20% wide		1.50	200	180	0.100	
6280	Shut braster, walk behind		4.00	500	1.71	2,125	
6280	Sidewalk broom, walk-benind		2.31	5/	1/1	515	
6310	200 gallogs per hour		2.90	40.00	140	420	_
6340	Zoto galloris per nour Tas Kattle /Bat 400 gallon		4.15	33	240	490	
6260	Tarrh, cutting, peoplene on igen 1.50' have		6.10	21.60	240	105	_
6360	Journ, Cataling, accepted coxygen, 1 30 hose		9.45	21.30	05	190	
6410	Totet nortable chamical		11	19	57	10178	-
6420	Recurde flucture		14	22	50	207	
6430	Tollat fresh water flush garden hose		16	26 50	79	207	-
6440	Hoistad non-fluch for high rise		14	22.50	68	204	
5450	Trat trailers minimum		24	39.50	118	355	-
6460	Maximum		72	119	358	1.075	
6465	Tractor, farm with attachment		14.40	262	785	2.350	-
6500	Trailers, platform, flush deck, 2 axie, 25 top canacity		4.75	107	320	960	
6600	40 ton capacity		6.20	150	450	1.350	
6700	3 axle, 50 ton capacity		6.70	165	495	1,475	
6800	75 ton capacity		8.35	218	655	1,975	-
6810	Trailer mounted cable reel for H.V. line work		4.84	231	692	2,075	
6820	Trailer mounted cable tensioning rig		9.59	455	1,370	4,100	
6830	Cable pulling rig		69.62	2,575	7,710	23,100	
6900	Water tank, engine driven discharge, 5000 gallons		6.25	143	430	1,300	
6925	10,000 gallons		8.50	202	605	1,825	_
6950	Water truck, off highway, 6000 gallons		66.95	775	2,320	6,950	
7010	Tram car for H.V. line work, powered, 2 conductor		6.48	125	375	1,125	
7020	Transit (builder's level) with tripod		.08	14	42	126	
7030	Trench box, 3000 lbs. 6'x8'		.56	93	279	835	_
7040	7200 lbs. 6'x20'		1.05	175	525	1,575	
7050	8000 lbs., 8' x 16'		.95	158	475	1.425	-
7060	9500 lbs., 8'x20'		1.16	194	581	1,750	
7065	11,000 lbs., 8'x24'		1.27	212	637	1,900	
7070	12,000 lbs., 10' x 20'		1.71	285	855	2,5/5	
7100	Truck, pickup, 3/4 ton, 2 wheel drive		10.35	56.50	170	510	
7200	4 wheel drive		10.65	71.50	215	790	
7250	Crew carrier, 9 passenger		14.70	86.50	260	1100	-
7290	Flat bed truck, 20,000 G.V.W.		15.55	122	365	1 700	
7300	Tractor, 4 x 2, 220 H.P.		21.80	190	570	2 350	-
7410	330 H.P.		32.15	262	785	2,150	
/500	6 x 4, 380 H.P.		36.85	305	920	1.325	-
/600	450 H.P.		44.90	370	1,110	2.775	-
/620	Vacuum truck, hazardous material, 2500 gallon		10.80	310	925	3 900	-
7625	5.000 galon		16.90	435	1.300	Mile and	

02	41 Demolition						A Carl				
02	41 19 - Selective Structure Demoli	tion	IL En		1	-				1	
02 4	1 19.19 Selective Demolition, Dump Charges		Crew	Daily Output	Labor- Hours	Unit	Material	2009 B labor	are Costs Equipment	Total	Totel Incl C&P
0010	SELECTIVE DEMOLITION, DUMP CHARGES	R024119-10		E-S	843	1944	16.5		1.14		
0020	Dump charges, typical urban city, tipping fees only		3.2			R.K.					
0100	Building construction materials				1.63	Ton	100			100	110
0200	Trees, brush, lumber		12.01	12.33			75			75	82.5
0300	Rubbish only						90			90	97
0500	Reclamation station, usual charge		1			+	100			100	110
02 41	19.21 Selective Demolition, Gutting										
0010	SELECTIVE DEMOLITION, GUTTING	R024119-10	1			T	10.54			1. 1. 1.	
0020	Building interior, including disposal, dumps or fees not included		100								
0500	Residential building		15						12.00		
0560	Minimum		8-16	400	.080	SE FIL		2.58	1.33	3.91	5.4
0580	Maximum		"	360	089	11	and the second second	2.85	1.48	4.34	6.04
0900	Commercial building										
1000	Mininum		R-16	350	091	SE FIF		2.94	1 52	4.46	6.24
1020	Meximum		11	250	128	"		4 12	2 13	6.25	8.74
00 41	1993 Selective Demolition Publish Handlin	30	-	1.50				1.14	1.10	6.2.3	4.7.
0010	SELECTIVE DEMOLITION PURPISH HANDLING	13	1		6	1			100 m 100 m		
0020	The following are to be added to the demoition prices	KU24 19-10	1000			1301	20		1.18		
0400	The top write an analysis and steel 18" diameter		P.1	40	400	15	47	10 25	1.385-1	16.35	99
0400	2017 diameter		11	30	.000	L.F.	4/	74		74.50	02
0726	Durante workh unital 1 duran (weak 30 C V constitu (9 Teac)	0004110.00	and the second second	00	.900	Week	90.50	20	Rest Street	74.00	00.00
0000	20.6 V seesity femal, 1 aump/week, 20.0 t appany (6 lans)	R024119-20				Week	1/5			1000	1 100
DRAD	SOC.Y. copacity (10 Tons)						1,000			1,000	1,100
1000	Protectilies ( -1 -1 - the law 3" - 2" - 2" -		00	0000	200	*	1,200	20		1,000	1,430
1000	Dust partition, 6 mil polyemylene, 1" x 3" trame		2 Cop	2000	.008	.1.C	.44	.32		./6	.99
2000	Z X4" mme		o du	2000	800.	C.V.	.27	.32		.59	.00
2000	Lood, naul, and aump, SU" raul		2 LICD	24	100.	L.Y.		21		21	32.50
2040	TOU' houl			16.50	.970			30.50		30.50	47.50
2000	Over TOO' haul, add per TOO LF.		2.10	35.50	.451		100.00	14.25	and the state	14.25	22
2000	In elevators, per Utioors, add		*	140	.114			3.61		3.61	5.60
3000	Loading & trucking, including 2 mile haul, chute loaded		B-16	45	.711			23	11.85	34.85	48.50
3040	Hand loading truck, 50' haul		"	48	.667			21.50	11.10	32.60	45
3080	Machine loading truck		B-17	120	.267			8.95	5.15	14.10	19.40
5000	Haul, per mile, up to 8 C.Y. truck		B-343	1165	.007			.22	.4ó	.68	.84
5100	Over 3 C.Y. truck	ali ali a	11	1550	.005	*	No. a set	.16	.34	.50	.63
02 41	19.25 Selective Demolition, Saw Cutting										
0010	SELECTIVE DEMOLITION, SAW CUTTING	R024119-10				5.03				和此的影响	
0015	Aspholt, up to 3" deep		B-89	1050	.015	L.E.	.40	.53	.38	1.31	1.67
10020	Eoch additional inch of depth		"	1800	.009		.08	.31	.22	.6]	.81
1200	Masonry walls, hydraulic saw, brick, per inch of depth		B-898	300	.053	100	.42	1.87	2.28	4.57	5.80
1220	Block walls, solid, per indi of depth			250	.064		.42	2.24	2.74	5.40	685
2000	Brick or masonry w/hand heid sow, per inch of depth		A-1	125	064		.34	2.02	.5	2.87	407
5000	Wood sheathing to 1" thick, on walls		1 Caro	200	.040			1.60		1.50	2.48
00.0	On roof		. 11	250	.032	-		1.28		1.28	1.98
002 41	19.27 Selective Demolition, Torch Cutting										
0020	SELECTIVE DEMOLITION, TORCH CUTTING	2024119-10	1 - 21	1		1		1	1		
0040	Steel, 1" thick plate	102411710	1 Clab	360	.022	L.F.	.22	.70		92	133
1000	1" diameter bar		N.	210	.038	Eo		1 20		1.20	187
1040	Uxygen lonce cutting, reinforced concrete walls							1.20		1.25	
	12" to 16" thick wolls		1 Clab	10	.800	LE		25.50		25 50	30
080			1 100	1.4	THWW .	Sec. 1 a		Sec. and a second list		6.0.0	

01 45 Quality Contro	
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			Daily	Labor-			2009 B	are Costs		Tota
01 45	23.50 Testing	Crew	Output	Hours	Unit	Materia	Labor	Equipment	Total	Incl O
4735	Soil density, nuclear method, ASTM D2922				Ea.				35	38
4740	Sond cone method ASTM D1556	1 August	1.10					TEVENT	27	30
4750	Moisture content, ASTM D 2216	2.130	1.00		5.	C. C. La		MALT:	9	10
4780	Permeability test, double ring infiltrameter	1 22	Para		2 23	142		13.24	500	550
4800	Permeability, var. or constant head, undist., ASTM D 2434	1000							227	250
4850	Recompacted								250	275
4900	Proctor compoction, 4" standard mold, ASTM D 6.98								123	135
4950	6" modified mold								68	75
5100	Shear tests, triaxial, minimum								409	450
5150	Maximum	1.							545	600
5300	Direct shear, minimum, ASTM D 3080							1 marsh	318	350
5350	Moximum	2124				21514-1			409	450
5550	Technician for inspection, per day, earthwork					25.9			210	231
5650	Bolting								268	295
5750	Roofing		0 1						244	256
5790	Welding				+				257	283
5820	Non-destructive metal testing, dye penetrant				Day				310	341
5840	Magnetic particle	1. 192 1		1 Sect		124213		1.5.5.5	310	341
5860	Radiography	12							450	495
5880	Ultrasonic				+	122			309	340
6000	Welding certification, minimum			Dir.	Ea.	1.1			91	100
6100	Maximum								250	275
7000	Underground storage tank									
7500	Volumetric tightness test ,<=12,000 gal				Eo.				435	478
7510	<=30,000 gal								613	675
7600	Vadose zone (soil gas) sampling, 10-40 samples, min.	10000	1.00		Day	874 33			1,364	1,500
7610	Maximum	1.			11				2,273	2,500
7700	Ground water monitoring incl. drilling 3 wells, min.	100		1	Total				4,545	5,000
7710	Maximum	18-31		aru I				13.01	6.364	7,000
3000	X-ray concrete slabs	-			Eq.	and the second second			182	200
9000	Thermographic testing, for bldg envelope heat loss, gverage 2,000 S.F.				"					500

01 5	1 13 - Temporary Electricity	all and a start	-				V 211 - 1	alles and the second	
01 51	13.80 Temporary Utilities	And and a second	- contin	-					-
0010	TEMPORARY UTILITIES			1.		1	8.1.2		
0100	Heat, incl. fuel and operation, per week, 12 hrs. per day	1 Skwk	100	.080	CSF Flr	27	3.27	30.27	34
0200	24 hrs. per day		60	.133		52	5.45	57.45	66
0350	Lighting, ind. service lamps, wiring & outlets, minimum	1 Elec	34	.235	C. F	2.63	11.05	13.68	19
0360	(Maximum)	<i>0</i> *	17	.471		5.70	22	27.70	39
0400	Power for temp lighting only, per manife, peny month 6.6 KWH							a75	1
0450	Maximum/month 23.6 KWH							2.85	31
0600	Power for job duration incl. elevator, etc., minimum							47	51
0650	Maximum				+			110	121
1000	Toilet, portable, see Equip. Rental 01 54 33 in Reference Section						12		- 1