

# **Technical Report #2**

## **50 Connell Drive Office Building Berkeley Heights, NJ**



**Submitted 10/24/08  
By: Jason Salyer  
Option: Construction Management  
Thesis Advisor: Dr. Messner**

## Table of Contents

Executive Summary.....	Page 3
A. Detailed Project Schedule .....	Page 4
B. Site Layout Planning.....	Page 6
C. Detailed Structural System Estimate.....	Page 7
D. General Conditions Estimate.....	Page 9
E. Critical Industry Issues.....	Page 11
Appendix A – Project Schedule.....	Page 13
Appendix B – Site Layout Plan.....	Page 17
Appendix C – Structural Takeoff.....	Page 18

## Executive Summary

It was determined that the schedule was mainly driven by two factors. The schedule was designed around the location of the electrical room. Turner Construction wanted to allow ample time to install electrical equipment. They also wanted the building to be energized as quickly as possible. Temporary generators would no longer be needed once the building had power. This desire to have the electrical room operational as soon as possible dictated the structural steel erection. Steel erection began where the electrical room would later be located and progressed outward from that location. The steel itself also drove the schedule. Once steel is erected the decking is placed and the remaining trades follow.

Some modifications were made to the construction manager's original site plan. The subcontractor trailers were relocated and placed next to the Turner trailers. It was felt this would foster better communication between the two parties. The temporary toilets were also relocated and placed next to the trailers.

The structural systems estimate was determined to be \$5.16 Million. The structural steel was the most costly item at over \$2 Million. This was followed by metal decking at just over \$1 Million and cast in place concrete at \$574,000. Performing the takeoff revealed that the heaviest steel members make up the core of the building. This was to be expected since the mechanical penthouse, with its heavy equipment, sits atop the core of the building.

Staffing expenses accounted for 75% of the total general conditions cost. The cost of drawings and job trailer set-up, removal and maintenance were other costly items.

Energy and the economy are having an effect on the construction industry and everyone in the business will likely need to make adjustments in how they do their business. A weakening economy and a financial crisis in the banking industry are making it tougher to finance construction projects. High energy prices and causing more owners to consider the life cycle costs of their decisions. Energy retrofits on existing buildings and energy efficient mechanical systems on new buildings are becoming the norm.

## A. Detailed Project Schedule

See **Appendix A** for a detailed project schedule. The detailed schedule is organized by trades and the corresponding phases of work. The schedule is driven by the location of the electrical room and the desire to have the electrical room operational as soon as possible. This controlled the steel erection.

Steel erection begins in the northeast corner of the building and moves west to the northwest corner. See **Figure 1** and **Figure 2** below for an illustration of the steel sequencing. Once the north side is erected work flows in similar direction along the south side of the building. The electrical room located on the ground floor of the northeast corner. Steel is starting in this area so that the electrical room can be completed as quickly as possible. Since the electrical room feeds power to the building and has equipment with long lead times it is desirable to finish work in this area as soon as possible. Once steel is erected in a section the parade of trades begins to follow.

The building enclosure is installed face by face. Crews begin installing the exterior wall on the south elevation. Once the south side is complete the workers move in a clockwise fashion around the building. Once one elevation is complete they move on to the next. Once the building is enclosed MEP equipment is installed and then the finishes are installed. These items are scheduled in a top-down sequence.

**Figure 1** shows the order that steel is erected. The colored regions are the different sections that the schedule in **Appendix A** and the Site Plan in **Appendix B** make reference to. The black lines are the bays within the building.

	Section 3			Section 2				Section 1	
Section 11		Section 10		Section 9		Section 8		Section 7	

**Figure 1**  
 Bays and Corresponding Section on Schedule – Floors 1-3

**Figure 2** shows the order that steel is erected. Once all of the steel depicted in Figure 1 has been erected the workers erect the steel shown in this figure. The colored regions are the different sections that the schedule in **Appendix A** and the Site Plan in **Appendix B** make reference to. The black lines are the bays within the building.

	Section 6			Section 5				Section 4	
Section 16		Section 15		Section 14		Section 13		Section 12	

**Figure 2**  
 Bays and Corresponding Section on Schedule – 4<sup>th</sup> Floor - Roof

## B. Site Layout Planning

Refer to **Appendix B** for the superstructure site layout plan .

A 150 ton crawler crane is used to erect the steel in bays. **Figure 1** and **Figure 2** illustrate the relationship between the different sections that the schedule in **Appendix A** and the Site Layout Plan in **Appendix B** make reference to. The work moves from east to west. The building is divided into two zones. The first zone is on the north and second zone is on the south. The crane erects all of the bays on the north zone and then moves to the southern zone. The crane will make two passes on the north. It will erect steel up to the 3<sup>rd</sup> floor in sections 1-3. Then the crane will move on to sections 4-6 which encompasses steel from the 3<sup>rd</sup> floor to the roof. Once the north side is completely erected the crane moves to the south side of the building and erects the remaining sections. The flow of work on this side of the building is similar to that of the north side, moving from east to west. Sections 7-11 cover steel up to the 3<sup>rd</sup> floor. Once these sections are complete the crane erects the remaining steel on sections 12-16. The steel decking and concrete placement will follow in this order.

The deliveries coming into the site will be instructed to enter through the primary entrance on the south side and exit through the gate on the north side of Oak Way Road. In the event that one of the gates becomes blocked temporarily the truck will be able to use the other gate. Both gates are wide enough to allow for two-way traffic.

There is an access road that completely encircles the building. This will make it simple to move materials to where they are needed. The road also allows emergency response teams to access the site in the event of an accident.

This layout is slightly different than that used by the contractor. The actual plan had the subcontractor trailers in the northwest corner of the site. The plan used for this project has them located to the south of the building directly next to the Turner trailers. This was done to facilitate communication between the different parties. Another difference is the location of the temporary toilets. The actual site layout plan had them located in the parking lot on the east side of the building. In the new arrangement they are located next to the trailers. This was done because there will usually be more people in that area.

## C. Detailed Structural Systems Estimate

A quantity takeoff was performed to arrive at an estimate for the structural systems. *R.S. Means Building Construction Cost Data 2009* was used to obtain unit prices. The total structural estimate was determined to be \$5.1 Million. Refer to **Figure 2** for a summary of the costs and **Appendix C** for detailed calculations.

### Assumptions:

- The third floor was used as a typical floor for the takeoff and these quantities were multiplied by three since there are three elevated office levels – the mechanical penthouse was “taken off” separately and added to the total
- 12% was added to the weight of the steel framing to account for connections and base plates
- 5% waste factor on rebar and concrete
- 10% waste factor on formwork
- An average weight of rebar per linear foot of foundation wall was calculated and this was used to extrapolate the total weight of rebar in the wall
- A location factor of 1.10 was used
- 3500 psi concrete was used throughout the building
- The unit prices of long span joists 40LH10 and 40LH15 were averaged to obtain a unit price for 40LH12 long span joists
- Calculations for slab areas do not take into consideration column penetrations for ease of calculation

Structural Estimate								
50 Connell Drive Office Building								
				Unit Cost				
Division	Item	Unit	Amount	Material	Labor	Equipment	M+L+E	Total Cost
03100	Formwork Spread Footings	SFCA	7,077	\$ 0.95	\$ 3.32	\$ -	\$ 4.27	\$ 30,218.79
03100	Formwork Cont. Footings	SFCA	13,778	\$ 3.28	\$ 2.84	\$ -	\$ 6.12	\$ 84,321.36
03210	Reinforcing Bar	Tons	39	\$ 1,622.00	\$ 748.00	\$ -	\$2,370.00	\$ 92,430.00
03220	Welded Wire Fabric	C.S.F.	2295	\$ 41.80	\$ 26.00	\$ -	\$ 67.80	\$ 155,601.00
03310	Concrete	CY	5019	\$ 114.40	\$ -	\$ -	\$ 114.40	\$ 574,173.60
03310	Concrete Placement	CY	2952	\$ -	\$ 17.05	\$ 6.22	\$ 23.27	\$ 68,693.04
05120	Structural Steel	Tons	672	\$ 2,475.00	\$ 412.50	\$ 143.00	\$3,030.50	\$2,036,496.00
05200	Long Span Metal Joists	LF	5520	\$ 32.00	\$ 1.60	\$ 0.91	\$ 34.51	\$ 190,495.20
05300	Metal Roof Deck	SF	45,000	\$ 3.54	\$ 0.44	\$ 0.04	\$ 4.02	\$ 180,900.00
05300	Metal Floor Deck	SF	135,450	\$ 7.26	\$ 0.59	\$ 0.05	\$ 7.90	\$1,070,055.00
<b>Sub Total</b>								\$4,483,383.99
<b>15% Overhead &amp; Profit</b>								\$ 672,507.60
<b>Total</b>								\$5,155,891.59

**Figure 2 - Structural Estimate Summary**



## **D. General Conditions Estimate**

Please refer to **Figure 3** on the following page for a breakdown of general conditions items. The figures used for the unit costs are ballpark figures provided by Turner's cost department. The general conditions estimate for 50 Connell Drive is approximately \$2,000,000. The items included in the estimate are fairly standard. As expected, staffing costs comprise a large percentage of the total estimate. Staffing costs are about 75% of the total GC's. It is important to note that this estimate does not take into account insurance, bonding, contingency or fee. These items are covered separately.

<b>General Conditions Estimate</b>				
<b>Description</b>	<b>Units</b>	<b>Duration</b>	<b>Cost per Unit</b>	<b>Budgeted Cost</b>
<b>General Construction Expenses</b>				
Tools & Supplies	Months	15	\$ 750.00	\$ 11,250.00
Job Trailer Including Set-up/Removal	Months	15	\$ 6,500.00	\$ 91,000.00
Toilets	Months	15	\$ 1,600.00	\$ 22,400.00
Construction Fence	Months	15	\$ 2,000.00	\$ 28,000.00
Dumpsters	Months	15	\$ 5,400.00	\$ 75,600.00
Company Vehicles/Parking Fees	Months	15	\$ 285.00	\$ 3,990.00
Temp Power install/maintain/usage	Months	11	\$ 1,100.00	\$ 15,400.00
Watchman/Safety Program	Months	15	\$ 1,100.00	\$ 15,400.00
Office Supplies/Printer/Copier	Months	15	\$ 1,885.00	\$ 26,390.00
Phone/Fax/Communication	Months	15	\$ 1,400.00	\$ 19,600.00
Drawings	NA	NA	NA	\$ 106,000.00
Computer Expenses/Prolog	Months	15	\$ 2,364.00	\$ 33,096.00
Progress Photos/ Aerial Photos	Months	15	\$ 500.00	\$ 7,000.00
Postage/Shipping Fees	Months	15	\$ 700.00	\$ 9,800.00
<b>General Expenses</b>				<b>\$ 464,926.00</b>

<b>Staffing Expenses</b>	<b>Units</b>	<b>% Time on Job</b>	<b>Cost per Unit</b>	<b>Budgeted Cost</b>
Project Executive	Months	0.75	\$ 12,000.00	\$ 135,000.00
Project Superintendent	Months	0.95	\$ 9,500.00	\$ 135,375.00
Field Engineer	Months	1	\$ 6,500.00	\$ 97,500.00
Field Engineer	Months	1	\$ 6,500.00	\$ 97,500.00
Project Manager	Months	0.9	\$ 10,000.00	\$ 135,000.00
Project Engineer	Months	1	\$ 7,000.00	\$ 105,000.00
Assistant Project Engineer	Months	1	\$ 5,700.00	\$ 85,500.00
Cost Engineer	Months	0.25	\$ 8,000.00	\$ 30,000.00
Purchasing Engineers	Months	0.3	\$ 8,100.00	\$ 36,450.00
Estimating Engineers	Months	0.3	\$ 10,000.00	\$ 45,000.00
Staff Employee Benefits Expense	NA	NA	NA	\$ 490,000.00
S.S./Taxes	NA	NA	NA	\$ 120,000.00
<b>Staffing Subtotal</b>				<b>\$ 1,512,325.00</b>
<b>Total General Conditions</b>				<b>\$ 1,977,251.00</b>

**Figure 3 – General Conditions Estimate**

## **E. Critical Industry Issues**

On October 16, 2008 students and industry members meet with one another at the 17<sup>th</sup> annual PACE Roundtable meeting to discuss current day issues that are affecting the construction industry. At the roundtable students were able to freely interact with professionals to discuss the topic of energy and the economy.

Energy and the economy both have a large impact on the health of the construction market. This is a very important topic that the industry must acknowledge especially given the fact that the economy is weakening and we are just beginning to come off of record high energy prices.




























































































Industry members brought it to the student's attention that there is a lot of volatility in the market due to the economy and energy prices. The volatility in the price of oil is having a big impact on material pricing because the cost of materials is largely dependant on the cost of oil. Oil has been increasing in price steadily over the past few years and this has correlated to higher materials costs. As a result contractors have been making an effort to guarantee procurement prices early in the building process in anticipation of rising costs. Contractors have also been making an effort to procure local materials in an effort to reduce transportation costs. However in the last few weeks oil prices, as well as the economy, have fallen dramatically. This is resulting in lower material costs. As a result contractors are stuck paying the higher prices that they fought hard to lock in just a short time ago. The price of steel has been particularly affected by the volatile energy costs. Steel, which was recently at record prices, has begun to fall in price.

High energy costs and an economy that has been on the downfall have forced building owners to look for ways to reduce their cost. Owners are now starting to question the life cycle costs of their decisions. Industry members at the meeting have noticed that owners are making façade changes to their design in an effort to keep their buildings better insulated and reduce their energy consumption. Contractors have been seeing more and more owners who are trying to reduce their energy costs by retrofitting their existing mechanical systems. Likewise, energy efficient mechanical systems in new buildings are becoming commonplace. This becomes increasingly attractive to owners now that there are new state and federal incentives and requirements for switching to more efficient systems. 50 Connell Drive had to install the new generation of TP-1 transformers as a result of this legislation. As the economy slows and owners are pulling back on new projects it can be expected that there will be a push to upgrade the existing mechanical systems within buildings in order to save money. This is good news for specialty contractors who specialize in energy retrofits.

The poor economy is making it difficult for owners to get financing for new projects. In addition, real estate prices are falling throughout the country. This will likely result in fewer new construction projects. One of the industry members pointed out an interesting relationship that I was not previously aware of. He compared the real estate market to the

stock market. When the price of stocks fall investors look for good deals that were previously unavailable and purchase stock. Developers do the same thing with buildings. When real estate prices fall developers often purchase new buildings at a lower price than what was previously available on the market. If this theory holds true there will be an increase in the number of interior renovation projects. Contractors need to be aware of this relationship in order to stay competitive in a changing market. This will also have an impact on this year's graduating class. There is a growing chance that students who will be entering the workforce will become involved with renovation projects.































































































I was fortunate enough to meet several people who I feel will be able to advise me in my thesis studies. I believe John Bechtel of OPP will be able to provide an interesting perspective from an owner's standpoint regarding energy issues and the steps that owners are taking to reduce their energy consumption. Raj Vora from Southland Industries would be able to provide excellent feedback regarding mechanical retrofits. Jumanne Smith from Clark Construction would be able to provide good incite from a general contractor's perspective regarding any changes I may propose for my thesis proposal.

50 Connell Drive Prepared by Jason salyer																															
ID		Task Name	Duration	Start	Finish													2008												2009	
						Qtr 2, 2007				Qtr 3, 2007				Qtr 4, 2007				Qtr 1, 2008			Qtr 2, 2008			Qtr 3, 2008			Qtr 4, 2008			Qtr 1, 2009	
						Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb		
1		<b>Pre Construction &amp; Coordination</b>	<b>248 days</b>	<b>Tue 3/6/07</b>	<b>Thu 2/14/08</b>																										
2		Design Phase	130 days	Tue 3/6/07	Mon 9/3/07																										
3		MEP Coordination for Slab on Grade	72 days	Mon 10/15/07	Tue 1/22/08																										
4		Above Ceiling MEP Coordination Process	47 days	Wed 12/12/07	Thu 2/14/08																										
5		<b>Site Work - Phase 1</b>	<b>119 days</b>	<b>Wed 11/7/07</b>	<b>Mon 4/21/08</b>																										
6		Construct New Basin Headwalls	74 days	Wed 11/7/07	Mon 2/18/08																										
7		Earthwork at Storm Water Basin	15 days	Wed 2/20/08	Tue 3/11/08																										
8		Install Modular Block retaining Walls	12 days	Wed 3/12/08	Thu 3/27/08																										
9		Install Low flow Storm Water Channels	7 days	Thu 4/3/08	Fri 4/11/08																										
10		Install Storm Basin Grating	4 days	Wed 4/9/08	Mon 4/14/08																										
11		Topsoil/Seeding Stabilize Stormbasin	5 days	Tue 4/15/08	Mon 4/21/08																										
12		<b>Site Utilities</b>	<b>32 days</b>	<b>Mon 12/3/07</b>	<b>Tue 1/15/08</b>																										
13		Install Underground Ductbank Elec/Tele/Comm.	21 days	Mon 12/3/07	Mon 12/31/07																										
14		Install Underground Water Piping	27 days	Mon 12/10/07	Tue 1/15/08																										
15		<b>Foundations</b>	<b>119 days</b>	<b>Mon 9/10/07</b>	<b>Thu 2/21/08</b>																										
16		Excavate for Foundations	16 days	Mon 9/10/07	Mon 10/1/07																										
17		Pour Foundations	60 days	Tue 10/2/07	Mon 12/24/07																										
18		Backfill Foundations and Foundation Walls	46 days	Thu 12/20/07	Thu 2/21/08																										
19		<b>Superstructure</b>	<b>65 days</b>	<b>Tue 12/18/07</b>	<b>Mon 3/17/08</b>																										
20		<b>Structural Steel</b>	<b>37 days?</b>	<b>Tue 12/18/07</b>	<b>Wed 2/6/08</b>																										
21		Erect Section 1	2 days	Tue 12/18/07	Wed 12/19/07																										
22		Erect Section 2	3 days	Thu 12/20/07	Mon 12/24/07																										
23		Erect Section 3	2 days	Thu 12/27/07	Fri 12/28/07																										
24		Erect Section 4	1 day	Wed 1/2/08	Wed 1/2/08																										
25		Erect Section 5	2 days	Thu 1/3/08	Fri 1/4/08																										
26		Erect Section 6	2 days	Mon 1/7/08	Tue 1/8/08																										
27		Erect Section 7	1 day	Thu 1/10/08	Thu 1/10/08																										
28		Erect Section 8	3 days	Fri 1/11/08	Tue 1/15/08																										
29		Erect Section 9	2 days	Wed 1/16/08	Thu 1/17/08																										
30		Erect Section 10	2 days	Fri 1/18/08	Mon 1/21/08																										
31		Erect Section 11	2 days	Tue 1/22/08	Wed 1/23/08																										
32		Erect Section 12	2 days?	Thu 1/24/08	Fri 1/25/08																										
33		Erect Section 13	2 days	Mon 1/28/08	Tue 1/29/08																										
34		Erect Section 14	2 days	Wed 1/30/08	Thu 1/31/08																										
35		Erect Section 15	2 days	Fri 2/1/08	Mon 2/4/08																										
36		Erect Section 16	2 days	Tue 2/5/08	Wed 2/6/08																										
37		<b>Structural Steel Bolt-Up</b>	<b>39 days</b>	<b>Thu 12/20/07</b>	<b>Tue 2/12/08</b>																										
38		Bolt/Weld Sections 1-3	11 days	Thu 12/20/07	Thu 1/3/08																										
39		Bolt/Weld Sections 4-6	7 days	Fri 1/4/08	Mon 1/14/08																										
40		Bolt/Weld Sections 7-11	10 days	Tue 1/15/08	Mon 1/28/08																										
41		Bolt/Weld Sections 12-16	11 days	Tue 1/29/08	Tue 2/12/08																										
42		<b>Decking &amp; Studs</b>	<b>31 days</b>	<b>Mon 1/14/08</b>	<b>Mon 2/25/08</b>																										
43		Deck & Studs, 2nd Floor North	3 days	Mon 1/14/08	Wed 1/16/08																										
44		Deck & Studs, 3rd Floor North	3 days	Thu 1/17/08	Mon 1/21/08																										
45		Deck & Studs, 4th Floor North	3 days	Tue 1/22/08	Thu 1/24/08																										
46		Deck & Studs, 3rd Floor South	3 days	Fri 2/8/08	Tue 2/12/08																										
47		Deck & Studs, 2nd Floor South	3 days	Wed 2/13/08	Fri 2/15/08																										
48		Deck & Studs, 4th Floor South	3 days	Wed 2/13/08	Fri 2/15/08																										
49		Deck & Studs, Penthouse Slab & Main Roof	4 days	Mon 2/18/08	Thu 2/21/08																										
50		Deck & Studs, Penthouse Roof	2 days	Fri 2/22/08	Mon 2/25/08																										
51		<b>Slabs on Deck</b>	<b>23 days</b>	<b>Thu 2/14/08</b>	<b>Mon 3/17/08</b>																										
52		Prep & Pour 2nd Floor Slab, East	3 days	Thu 2/14/08	Mon 2/18/08																										
<div><div>Project: 50 Connell Drive Date: Tue 10/21/08</div><div><div>Task</div><div></div><div>Split</div><div></div></div><div><div>Progress</div><div></div><div>Milestone</div><div></div></div><div><div>Summary</div><div></div><div>Project Summary</div><div></div></div><div><div>External Tasks</div><div></div><div>External Milestone</div><div></div></div><div><div>Deadline</div><div></div></div><div><div></div></div></div>																															
Page 1																															

50 Connell Drive Prepared by Jason salyer																																												
ID		Task Name	Duration	Start	Finish											2008												2009																
						Qtr 2, 2007				Qtr 3, 2007			Qtr 4, 2007			Qtr 1, 2008			Qtr 2, 2008			Qtr 3, 2008			Qtr 4, 2008			Qtr 1, 2009																
						Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb															
53		Prep & Pour 2nd Floor Slab, West	3 days	Tue 2/19/08	Thu 2/21/08																																							
54		Prep & Pour 3rd Floor Slab, East	3 days	Fri 2/22/08	Tue 2/26/08																																							
55		Prep & Pour 3rd Floor Slab, West	3 days	Wed 2/27/08	Fri 2/29/08																																							
56		Prep & Pour 4th Floor Slab, East	3 days	Mon 3/3/08	Wed 3/5/08																																							
57		Prep & Pour 4th Floor Slab, West	3 days	Thu 3/6/08	Mon 3/10/08																																							
58		Prep & Pour Penthouse Slab	5 days	Tue 3/11/08	Mon 3/17/08																																							
59		Slab on Grade and Underslab MEP	42 days	Thu 1/24/08	Fri 3/21/08																																							
60		Underslab Electric Kitchen/Cafeteria	5 days	Thu 1/24/08	Wed 1/30/08																																							
61		Underslab Plumbing Kitchen/Cafeteria	7 days	Thu 1/24/08	Fri 2/1/08																																							
62		Underslab Electric, East (Power/Tele/data/Sec)	11 days	Mon 2/4/08	Mon 2/18/08																																							
63		Prep & Pour SOG, East	10 days	Thu 2/21/08	Wed 3/5/08																																							
64		Underslab Electric, West (Power/Tele/data/Sec)	15 days	Mon 2/18/08	Fri 3/7/08																																							
65		Prep & Pour SOG, West	10 days	Mon 3/10/08	Fri 3/21/08																																							
66		Spray-on fireproofing	21 days	Tue 2/19/08	Tue 3/18/08																																							
67		Spray-on fireproofing, 2nd East	3 days	Tue 2/19/08	Thu 2/21/08																																							
68		Spray-on fireproofing, 2nd west	2 days	Fri 2/22/08	Mon 2/25/08																																							
69		Spray-on fireproofing, 3rd East	3 days	Wed 2/27/08	Fri 2/29/08																																							
70		Spray-on fireproofing, 3rd West	2 days	Mon 3/3/08	Tue 3/4/08																																							
71		Spray-on fireproofing, 4th East	3 days	Thu 3/6/08	Mon 3/10/08																																							
72		Spray-on fireproofing, Roof East	3 days	Thu 3/6/08	Mon 3/10/08																																							
73		Spray-on fireproofing, 4th West	2 days	Tue 3/11/08	Wed 3/12/08																																							
74		Spray-on fireproofing, Roof West	2 days	Tue 3/11/08	Wed 3/12/08																																							
75		Spray-on fireproofing, Penthouse	4 days	Thu 3/13/08	Tue 3/18/08																																							
76		Stairways	20 days	Mon 3/24/08	Fri 4/18/08																																							
77		Install Stairway A & B Pans	10 days	Mon 3/24/08	Fri 4/4/08																																							
78		Pour Stairway A & B Landings and Treads	10 days	Mon 4/7/08	Fri 4/18/08																																							
79		Building Envelope - Main Structure	162 days	Thu 3/13/08	Fri 10/24/08																																							
80		Precast Concrete Panels	35 days	Thu 3/13/08	Wed 4/30/08																																							
81		Exterior Precast Panels, South Elevation	14 days	Thu 3/13/08	Tue 4/1/08																																							
82		Exterior Precast Panels, North Elevation	15 days	Thu 4/10/08	Wed 4/30/08																																							
83		Exterior Stone Panels	42 days	Thu 3/13/08	Fri 5/9/08																																							
84		Install Stone Panels, South	15 days	Thu 3/13/08	Wed 4/2/08																																							
85		Install Stone Panels, East	6 days	Thu 4/3/08	Thu 4/10/08																																							
86		Install Stone Panels, North	15 days	Fri 4/11/08	Thu 5/1/08																																							
87		Install Stone Panels, West	6 days	Fri 5/2/08	Fri 5/9/08																																							
88		Curtain Wall & Spandrel Glass	44 days	Thu 3/27/08	Tue 5/27/08																																							
89		Install Ribbon windows, South	15 days	Thu 3/27/08	Wed 4/16/08																																							
90		Install curtain Wall, South	15 days	Thu 4/10/08	Wed 4/30/08																																							
91		Install Storefront South	15 days	Thu 4/10/08	Wed 4/30/08																																							
92		Install Ribbon Windows, East	7 days	Thu 4/17/08	Fri 4/25/08																																							
93		Install Ribbon Windows, North	15 days	Mon 4/28/08	Fri 5/16/08																																							
94		Install Ribbon Windows, West	7 days	Mon 5/19/08	Tue 5/27/08																																							
95		Install curtain Wall, West Elevation	10 days	Fri 5/9/08	Thu 5/22/08																																							
96		Install curtain Wall, North Elevation	10 days	Mon 5/12/08	Fri 5/23/08																																							
97		Roofing - Main Roof	34 days	Thu 3/13/08	Tue 4/29/08																																							
98		Install Roof Drains	5 days	Thu 3/13/08	Wed 3/19/08																																							
99		Install Roofing	20 days	Thu 3/20/08	Wed 4/16/08																																							
100		Install Parapet Coping, Flashing, Sheathing	9 days	Thu 4/17/08	Tue 4/29/08																																							
101		Exterior Canopies above Walkway	64 days	Mon 5/19/08	Thu 8/14/08																																							
102		Install Exterior Canaopy Steel	31 days	Mon 5/19/08	Mon 6/30/08																																							
103		Apply Finish Coats to Steel	9 days	Tue 7/1/08	Fri 7/11/08																																							
104		Install Exterior Canaopy Glass	24 days	Mon 7/14/08	Thu 8/14/08																																							
Project: 50 Connell Drive Date: Tue 10/21/08																																												
		Task		Progress		Summary			External Tasks		Deadline																																	
		Split		Milestone		Project Summary			External Milestone																																			
Page 2																																												

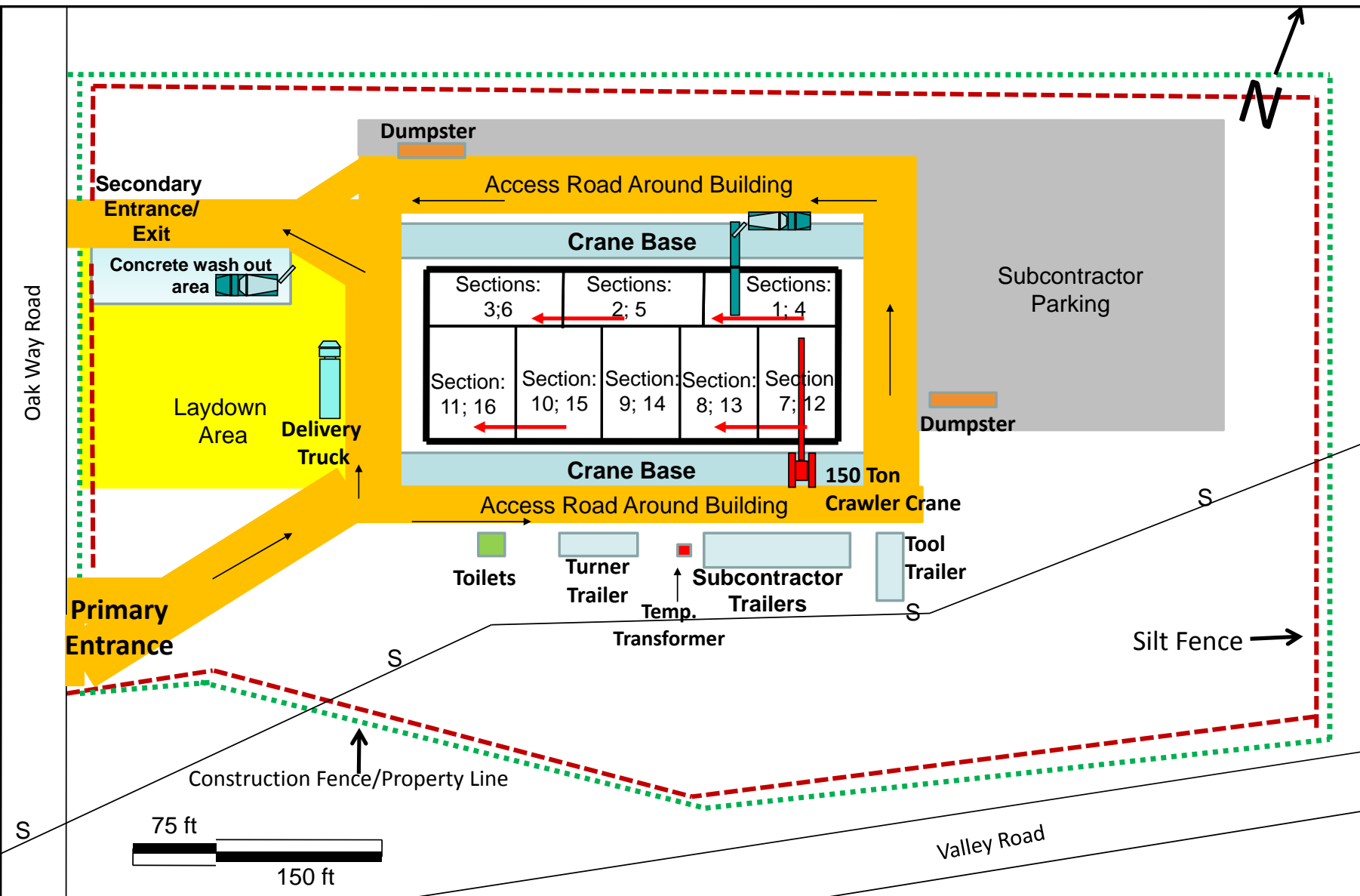


50 Connell Drive  
Prepared by Jason salyer

ID		Task Name	Duration	Start	Finish													2008												2009	
						Qtr 2, 2007				Qtr 3, 2007			Qtr 4, 2007			Qtr 1, 2008			Qtr 2, 2008			Qtr 3, 2008			Qtr 4, 2008			Qtr 1, 2009			
						Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb		
105		<b>Building Envelope - Penthouse</b>	18 days	Wed 3/19/08	Fri 4/11/08																										
106		<b>Penthouse Exterior Walls</b>	<b>45 days</b>	<b>Wed 3/19/08</b>	<b>Tue 5/20/08</b>																										
107		Exterior Framing	10 days	Wed 3/19/08	Tue 4/1/08																										
108		Exterior Sheathing	10 days	Wed 4/2/08	Tue 4/15/08																										
109		Exterior Metal Panels	20 days	Wed 4/16/08	Tue 5/13/08																										
110		Louvers	5 days	Wed 5/14/08	Tue 5/20/08																										
111		<b>Penthouse Roof</b>	<b>19 days</b>	<b>Tue 3/18/08</b>	<b>Fri 4/11/08</b>																										
112		Instal PH Roof Drains	4 days	Tue 3/18/08	Fri 3/21/08																										
113		Install PH Roofing Membrain	10 days	Mon 3/24/08	Fri 4/4/08																										
114		Install Parapet Coping & Flashing	5 days	Mon 4/7/08	Fri 4/11/08																										
115		<b>MEP Equipment &amp; Risers</b>	<b>48 days</b>	<b>Wed 4/2/08</b>	<b>Fri 6/6/08</b>																										
116		Install Local AHU's, 4th Floor	5 days	Wed 4/2/08	Tue 4/8/08																										
117		Install Local AHU's, 3rd Floor	5 days	Wed 4/9/08	Tue 4/15/08																										
118		Install Local AHU's, 2nd Floor	5 days	Wed 4/16/08	Tue 4/22/08																										
119		Install Local AHU's, 1st Floor	5 days	Wed 4/23/08	Tue 4/29/08																										
120		Install Fire Protection Equip., 1st Floor	10 days	Fri 5/9/08	Thu 5/22/08																										
121		Install Emergency Generator	10 days	Fri 5/9/08	Thu 5/22/08																										
122		Install electrical Equip., 1st Floor	21 days	Fri 5/9/08	Fri 6/6/08																										
123		<b>Penthouse</b>	<b>126 days</b>	<b>Tue 3/25/08</b>	<b>Tue 9/16/08</b>																										
124		Install AHU's	10 days	Tue 3/25/08	Mon 4/7/08																										
125		Install Boilers	10 days	Wed 4/2/08	Tue 4/15/08																										
126		Install Exhaust Fans	10 days	Wed 4/2/08	Tue 4/15/08																										
127		Install Heating Pumps	10 days	Wed 4/16/08	Tue 4/29/08																										
128		Install Cooling Towers	20 days	Wed 4/16/08	Tue 5/13/08																										
129		Install Cooling Pumps	11 days	Wed 5/14/08	Wed 5/28/08																										
130		Install Mechanical Piping	67 days	Wed 5/7/08	Thu 8/7/08																										
131		Install Conduit and Wire	83 days	Fri 5/23/08	Tue 9/16/08																										
132		<b>MEP Rough-in, Framing &amp; Drywall</b>	86 days	Fri 3/14/08	Fri 7/11/08																										
133		<b>4th Floor</b>	<b>55 days</b>	<b>Fri 3/14/08</b>	<b>Thu 5/29/08</b>																										
134		Install Interior MEP Rough-in	30 days	Fri 3/14/08	Thu 4/24/08																										
135		Install door Frames	10 days	Fri 3/28/08	Thu 4/10/08																										

50 Connell Drive Prepared by Jason salyer																															
ID		Task Name	Duration	Start	Finish													2008												2009	
						Qtr 2, 2007				Qtr 3, 2007			Qtr 4, 2007			Qtr 1, 2008			Qtr 2, 2008			Qtr 3, 2008			Qtr 4, 2008			Qtr 1, 2009			
						Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb		
157		Install Finishes	75 days	Thu 5/22/08	Wed 9/3/08																										
158		Core Finishes	122 days	Thu 5/22/08	Fri 11/7/08																										
159		Finish 4th Floor	64 days	Thu 5/22/08	Tue 8/19/08																										
160		Finish 3rd Floor	64 days	Fri 6/6/08	Wed 9/3/08																										
161		Finish 2nd Floor	85 days	Fri 6/20/08	Thu 10/16/08																										
162		Finish 1st Floor	90 days	Mon 7/7/08	Fri 11/7/08																										
163		Bathroom/Locker Room Finishes	80 days	Thu 5/15/08	Wed 9/3/08																										
164		Finish 4th Floor Bathrooms	50 days	Thu 5/15/08	Wed 7/23/08																										
165		Finish 3rd Floor Bathrooms	49 days	Fri 6/6/08	Wed 8/13/08																										
166		Finish 2nd Floor Bathrooms	54 days	Fri 6/13/08	Wed 8/27/08																										
167		Finish 1st Floor Bathrooms/Locker Room	54 days	Fri 6/20/08	Wed 9/3/08																										
168		Phase 2 Site Work	62 days	Tue 6/17/08	Wed 9/10/08																										
169		Install Light Bases/Poles, Area A	10 days	Tue 6/17/08	Mon 6/30/08																										
170		Install Sidewalks, Area A	6 days	Tue 7/1/08	Tue 7/8/08																										
171		Install Paving Area A	5 days	Wed 7/9/08	Tue 7/15/08																										
172		Install Light Bases/Poles, Area B	9 days	Thu 8/14/08	Tue 8/26/08																										
173		Install Sidewalks, Area B	6 days	Wed 8/27/08	Wed 9/3/08																										
174		Install Paving Area B	5 days	Thu 9/4/08	Wed 9/10/08																										
175		Install Granite Walkway	5 days	Wed 9/3/08	Tue 9/9/08																										
176		MEP Testing, Inspections & Closeout	48 days	Fri 8/8/08	Tue 10/14/08																										
177		Test & Energize Electrical Equipment	10 days	Fri 8/8/08	Thu 8/21/08																										
178		Test & Start-up Emergency Generator	10 days	Wed 9/3/08	Tue 9/16/08																										
179		Cooling Tower Start-up & Testing	10 days	Wed 9/17/08	Tue 9/30/08																										
180		Boiler Start-up & Testing	20 days	Wed 9/17/08	Tue 10/14/08																										
181		Punchlist & Project Closeout	63 days	Mon 10/20/08	Wed 1/14/09																										
182		Punchlist	25 days	Mon 10/20/08	Fri 11/21/08																										
183		Deliverables Transmitted to Owner	43 days	Mon 11/17/08	Wed 1/14/09																										
184		Core & Shell Contract Complete	1 day	Wed 1/14/09	Wed 1/14/09																							◆ 1/14			
Project: 50 Connell Drive Date: Tue 10/21/08		Task		Progress		Summary		External Tasks		Deadline																					
		Split		Milestone		Project Summary		External Milestone																							
Page 4																															





50 Connell Drive
Prepared by: Jason Salyer
10/24/08
Superstructure Phase Site Plan

- |   |   |   |  |
|---|---|---|--|
| <p>..... Fence/Property Line</p> <p>→ Traffic</p> <p>- - - Silt Fence</p> | <p>■ Toilets</p> <p>■ Trailers</p> <p>■ Crane Pad</p> | <p>■ Access Road</p> <p>■ Subcontractor Parking</p> <p>■ Dumpster</p> | <p>← Workflow</p> <p>■ Temp. Transformer</p> <p>-S- Sanitary</p> |
|---|---|---|--|

## Appendix C – Structural Takeoff

50 Connell Drive  
Structural Takeoff Calculations

Framing	Tons
Columns	130.8
Beams	418.8
Canapy Framing	33.0
X-Bracing	20
12% for base plates and connections added to above numbers	69
<b>Total</b>	<b>672</b>

### Typical Floor - Beams

Member	Count	Length (ft)	Weight (lbs)
W12x14	42	10	5880
W12x19	3	10	570
W14x22	4	20	1760
W16x26	128	30	99840
W16x31	2	30	1860
W18x35	19	30	19950
W18x40	4	30	4800
W21x50	45	30	67500
W21x57	3	30	5130
W21x62	1	30	1860
W21x68	1	30	2040
W21x73	1	30	2190
W21x44	9	30	11880

**Total lbs** 225260  
**Total tons/floor** 112.63  
**Total for 3 floors** 337.89

## Appendix C – Structural Takeoff

### Penthouse - Beams

Member	Count	Length (ft)	Weight (lbs)
W18x40	6	30	7200
W18x35	8	30	8400
W21x83	2	30	4980
W21x122	5	30	18300
W21x111	2	30	6660
W21x182	1	30	5460
W21x144	2	15	4320
W16x26	5	8	1040
W12x14	15	8	1680
<b>Total lbs</b>			58040
<b>Total Tons</b>			<b>29.02</b>

### Main Roof - Beams

Member	Count	Length (ft)	Weight (lbs)
W18x35	10	30	10500
W21x44	20	30	26400
W21x68	10	30	20400
<b>Total lbs</b>			57300
<b>Total Tons</b>			<b>28.65</b>

### High Roof - Beams

Member	Count	Length (ft)	Weight (lbs)
W12x19	4	6	456
W14x99	2	30	5940
W16x26	12	30	9360
W18x40	2	30	2400
W24x55	4	30	6600
<b>Total lbs</b>			24756
<b>Total Tons</b>			<b>12.378</b>

<b>Elev. Machine Rm &amp; Cooling Tower Support Framing</b>			
Member	Count	Length (ft)	Weight (lbs)
W12x19	14	10	2660
W16x31	7	30	6510
W12x30	2	10	600
W24x117	2	30	7020
<b>Total lbs</b>			16790
<b>Total Tons</b>			<b>8.395</b>

## Appendix C – Structural Takeoff

### Generator Pit - Beams

Member	Count	Length (ft)	Weight (lbs)
W12x14	17	12	2856
W12x26	4	20	2080
<b>Total lbs</b>			4936
<b>Total Tons</b>			2.468

Beams		<b>Total</b>	<b>418.801</b>
-------	--	--------------	----------------

### Columns

Member	Count	Length (ft)	Weight (lbs)
W14x61	26	32	50752
W14x68	8	32	17408
W14x68	11	20	14960
W14x61	3	32	5856
W14x82	8	32	20992
W14x109	6	32	20928
W14x132	4	32	16896
W14x90	4	32	11520
W14x90	12	44	47520
W14x48	31	24	35712
W14x48	17	11	8976
W14x53	4	24	5088
W14x68	3	24	4896

**Total lbs** 261504

**Total Tons** **130.752**

Canapy Framing = 33 tons

### Main Roof - Joists

Member	Count	Unit Length (ft)	Total L.F.
40LH12	80	60	4800
40LHSP1	1	60	60
40LHSP2	3	60	180
40LHSP3	8	60	480
<b>Total</b>			<b>5520</b>

## Appendix C – Structural Takeoff

### Concrete

Item	Dimensions (ft)	Quantity	Volume (cf)	Volume (cy)	Formwork Contact Area (sf)
Spread Footing F100	10x10x2	35	200	7	2800
Spread Footing F90	9x9x2	5	162	6	360
Spread Footing F80	8x8x2	4	128	5	256
Spread Footing F110	11x11x2.5	4	302.5	11	440
Spread Footing F120	12x12x2.5	4	360	13	480
Spread Footing F130	13x13x2.75	4	465	17	572
Core Footing 1	3.5x16x49	1	2744	102	455
Core Footing 2	3.5x43x16	1	2408	89	413
Core Footing 3	3.5x40x13	1	1820	67	371
Core Footing 4	3.5x16x25	1	1400	52	287
<b>Total</b>				<b>370</b>	<b>6434</b>

Waste 5% =

389

Waste 10% = 7,077

Item	Dimensions (ft)	Quantity	Volume (cf)	Volume (cy)	Formwork Contact Area (sf)
SOG	150x300x.5	1	22500	833	450
SOG generator	32x35x2	1	2240	83	280
<b>Totals</b>				<b>916</b>	<b>730</b>

Waste 5% = 962 CY

Waste 10% = 803

Item	Dimensions (ft)	Quantity	Volume (cf)	Volume (cy)	Formwork Contact Area (sf)
Concrete on Deck Main	150x300x.33	4	59400	2200	0
Concrete on Deck PH	150x300x.33	1	14999	556	0
Penthouse Roof	150x30x.33	1	1499	56	0
<b>Total</b>				<b>2811</b>	

Waste 5% = 2952

Item	Dimensions (ft)	Quantity	Volume (cf)	Volume (cy)	Formwork Contact Area (sf)
Foundation Wall North	2.33x11x300	1	7689	285	6600
Foundation Wall east	3x1.1x150	1	495	18	900
Foundation Wall south	3x1.1x300	1	990	37	1800
Foundation Wall west	3x1.1x75	1	247.5	9	450
<b>Total</b>				<b>349</b>	<b>9750</b>

Waste 5% =

367

Waste 10% = 10,725

## Appendix C – Structural Takeoff

Item	Dimensions (ft)	Quantity	Volume (cf)	Volume (cy)	Formwork Contact Area (sf)
Cont. wall footing north	11x2x300	1	6600	244	1200
Cont. wall footing east	3x1.5x150	1	675	25	450
Cont. wall footing south	3x1.5x300	1	1350	50	900
Cont. wall footing west	3x1.5x75	1	337.5	13	225
<b>Total</b>				332	2775

Waste 5% =  
349

Waste 10% = 3,053

**Concrete Total = 5019 CY**

### Rebar

#7 bar = 2.044 lb/ft

#6 bar = 1.5 lb/ft

#4 bar = .668 lb/ft

Item

North Foundation

Wall 2\*11\*300ft\*2.044lb/ft= 13490.4 lbs

North Foundation

Wall 28\*300ft\*1.5lb/ft= 12600 lbs

26\*300\*2.044 = 15943

Footing north wall

lbs

27\*300 \*1.5lb/ft =

Footing north wall

12150

Foundations walls on west/east/south = 9.35 lb/ft = 5611 lbs

Average square spread footing has 110 ft of #7 = 224.8 lb/footing = 13490 lbs

Total Footing Rebar = 73284 lb \* 1.05 (waste) = 76948.6 lb = 39

tons

### Metal Deck

Roof 150x300 = 45,000sf

Floor 150x300x3 + 150x30 = 135,450 sf

total = 180450 sf

### Welded wire mesh

150'x300'x5 + 150' x30' = 229500 sf