

# Shivam Patel

## Technical Assignment 2



Construction  
Option

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## Executive Summary

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The following report details the new construction commercial high rise project and the construction techniques employed to build it. The exact project location and name is to be held confidential but it can be known that the project is located in a major US city. In this technical assignment the following will be discussed

- Detailed Project Schedule
- Detailed Structural Estimate & Assemblies MEP Estimates
- General Conditions Estimate
- Site Layout Planning
- Constructability Challenges
- LEED Evaluation



Figure 1: Image courtesy of Hines

The detailed project schedule breaks down the scope of the work by trade and provides enough detail that the sequencing of the work can be understood. The project start date is set at December 24<sup>th</sup> 2012 and is scheduled for substantial completion on March 3<sup>rd</sup> 2015. This is roughly a 26 month project duration or 600 working days. Each trade begins approximately two months apart from each other per floor. In other words the concrete core, steel, superstructure, SOFP, Envelope, and core-fit-out start dates are all two months apart. This is mainly the reason why the project duration is 26 months.

The detailed structural systems estimate was calculated for floors with similar layouts and was extrapolated for the entire building. Two separate takeoffs for concrete and steel were completed. It was found that the structural steel system will cost \$14,088,458.30, which is a \$32.60 per square foot. This is slightly lower than the \$45.22 per square foot for the steel system. This can be because of the variability of the steel system. The same can be said for the concrete as a total cost was estimated to be \$20,553,271.01 which is \$47.54 per square foot and the actual is \$43.28 per square foot.

The assemblies estimate was calculated for the MEP system of the building. Various systems were unaccounted for many each of the systems due to the complexity of the systems used. Pricing for these assemblies was not found in RS Means and left out of the estimate.

The general conditions estimate for the project came out to be \$15,661,621.33 for the project. This is roughly \$602,370.05 per month. The most costly section was the insurance and bonding, followed by the personnel, and then the miscellaneous costs. This estimate was relatively close to the original estimate of \$18.7M.

Site layout plans were completed for three phases; excavation, superstructure, and building envelope. Various features change throughout each plan, but a similar layout was adopted as Turners due to site constraints of the project.

Three Constructability Challenges have arisen from the downtown site location and the constraints that come along with them. Some of these issues included the excavation, installation of utility lines, and public safety.

Finally, a LEED evaluation was done using the latest scorecard for Core & Shell. A approach similar to the Penn State method was used and then compared to the approach the project team used.

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## Detailed Project Schedule

The detailed project schedule for The Tower was made using Primavera P6 scheduling and can be found in Appendix A. The project is in the middle of construction the concrete core and metro station with structural steel to begin on November 20<sup>th</sup> 2013. This detailed schedule breaks down the scope of the work by trade and details the work that will be performed by those different trades. The schedule consists of 200 activities and milestones that starts with the GMP preparation and finishes with the final completion. The project start date is December 12<sup>th</sup>, 2012, and is scheduled to finish on May 29<sup>th</sup> 2015. This is roughly twenty six months or 600 working days. The level of detail in this schedule allows for the sequencing of work to be understood without being too excessive in detail. The detailed schedule is organized by the different major trades / activities such as excavation and foundation, concrete core, structural steel, and enclosure. The phases which drive the project will be discussed in detail in the following section. Table 1 below gives an overview of the project and some of these phases will be summarized in order to give a quick overview of the project.

Table 1: Detailed Project Schedule Overview

Detailed Schedule Overview			
Phase	Start Date	Finish Date	Duration (Days)
Excavation/Foundation	24-Dec-2012	29-Jul-2013	152
Metro Transit	13-Mar-2013	3-Mar-2015	499
Concrete Core	24-Jul-2013	9-May-2014	202
Structural Steel	20-Nov-2013	13-Aug-2014	184
Superstructure Concrete	10-Jan-2014	21-Jul-2014	133
Envelope	24-Mar-2014	20-Feb-2015	232
Building Dried in and Water Tight (Top Down)		29-Oct-2014	1
Core Fit Out	10-Mar-2014	12-Feb-2015	237
Elevators	20-Mar-2014	23-Jan-2015	215
Interiors (Lobby, Loading Dock, Lower Levels)	9-May-2014	7-Jan-2015	170
MEPS	10-Feb-2014	28-Apr-2015	308
Full Building TCO		29-Mar-2012	1
Full Project	24-Dec-2012	29-May-2012	600

The major activities that drive the schedule of the project are as follows

- Concrete Core
- Structural Steel
- Superstructure Concrete
- Core Fit Out
- Envelope

Below in Table 2 shows the schedule of work for these trades for a typical floor.

Table 2: Schedule of Typical Floor

Schedule of Typical Floor			
Activity	Start Date	Finish Date	Duration (Days)
Install Reinf and Pour 4th Floor Core Shear Walls	29-Oct-2013	1-Nov-2013	4
Set 4th Floor Framing	30-Dec-2013	3-Jan-2014	4
Install Deck and Studs 4th Floor	23-Jan-2014	28-Jan-2014	4
4th Floor Reinforce & Pour Concrete Deck	14-Feb-2014	20-Feb-2014	4
Install Spray on Fireproofing 4th Floor	6-Mar-2014	11-Mar-2014	4
Core Fit Out 4th Floor	24-Mar-2014	12-Aug-2014	100
Install Curtainwall 4th Floor	7-Apr-2014	11-Apr-2014	5

As seen in Table 2 the average duration for each activity is four days, with each trade set a month or two apart from each other. It roughly takes six months to complete a floor. While construction of a certain trade is taken place on one floor another trade will start or be taking place on a different floor.

**Concrete Core**

With the concrete core being the first trade to start construction after the foundation wall was completed, the first seven floors for the core were critical path activities. This is because the crane for the structural steel is set to arrive the day after the seventh floor core activity is to be completed. The dates of these start and end dates can be seen in Table 3. The core follows typical high rise construction sequencing; each floor’s walls will be reinforced and poured in its entirety before the hydraulic formwork moves up to the next building level. The crane located in a bay of the core is used solely for the pouring of the core walls. As mentioned earlier the average erection duration per floor is four days, with a total duration of 202 days.

Table 3: Concrete Core Erection Dates

Important Concrete Core Erection Dates		
Activity	Start Date	End Date
Layout and Install Climbing Form System	24-Jul-2013	20-Aug-2013
Install Reinforce and Pour LL2-7th Floors	20-Aug-2013	19-Nov-2013
Install Crane for Steel Erection	20-Nov-2013	4-Dec-2013
Concrete Core Completion	27-Mar-2014	1-Apr-2014

Table 2: Concrete Core Erection



**Structural Steel**

The structural steel phase starts immediately after that installation of the crane on December 5<sup>th</sup> 2013 with the framing of Lower Level One. Once the framing for Lower Level One is complete the Ground Floor framing and the installation of the metal deck and stud for Lower Level one will begin on the same day. The duration of the installation of the metal deck and stud for Lower Level One is ten days and immediately after the framing for the ground floor is complete the framing for the second floor will begin. It’s not until the completion of the deck and studs on the ground floor and framing for the fifth floor where we see a steady construction sequence between the decking and studs for a floor and the framing for a floor. The average duration per floor is four days with the deck and studs and four days for the framing.

In Figure 1 it can be seen that activities were grouped together in order to narrow the schedule down to 200. This was done because the start date and end date for the deck and studs of a floor and framing for a floor were the same.

Figure 3: Excerpt from the detailed schedule. Formed by Shivam Patel

- Install Deck and Studs 2nd-3rd Floor, Set 6th-7th Floor Framing
- Install Deck and Studs 4th-5th Floor, Set 8th-9th Floor Framing
- Install Deck and Studs 6th-7th Floor, Set 10th-11th Floor Framing
- Install Deck and Studs 8th-9th Floor, Set 12th-13th Floor Framing
- Install Deck and Studs 10th-11th Floor, Set 14th-15th Floor Framing

(2<sup>nd</sup> floor deck and studs and 6<sup>th</sup> floor framing: start and end date same) The duration of the steel framing decreases to three days once the 17<sup>th</sup> floor framing begins and is because of the decrease in floor area. This occurs for the rest of the structural steel phase until its completion. Before the crane can be dismantled it will be used to hoist penthouse equipment starting on July 17<sup>th</sup> 2014. This can only occur after the hoist installation is completed on July 8<sup>th</sup> 2014. These are critical activities because the equipment has specific delivery dates and this work must be completed in time for these deliveries.

### **Superstructure Concrete**

Following the completion and turnover of a floor by the steel erection team the cast-in-place concrete contractor will be responsible for installing the concrete decks. This project has an average schedule lag of 15 working days between the steel turnover of a floor until the concrete workers start roughing in their work. This is to allow the structural steel team to work their way up a few floors so that there are a few layers of metal decking protecting and workers below from safety hazards such as falling debris. Once again the average duration for a floor is four days. The entire phase of the superstructure is critical work with a start date of January 10<sup>th</sup> 2014 and end date of July 21<sup>st</sup> 2014

### **Enclosure**

As described in the first technical report the enclosure consists of high vision glass with low iron IGU with Low E coating and a mullion module of linen finish stainless steel spandrel panels. The schedule of activities for the wall enclosure starts with the curtainwall installation on the second floor on March 24<sup>th</sup> 2014 with the milestone date of October 29<sup>th</sup> 2014 for the building dried-in and water tight (top down). The curtainwall system is installed using a monorail system and the average duration is five days per floor.

## Detailed Structural Systems Estimate

This detailed structural estimate will focus on the following

- Steel Beams
- Steel Columns
- Metal Decking
- Concrete Slab
- Foundation
- Concrete Columns
- Concrete Core

As this is a project with 30 levels above ground and 2 levels below takeoffs for certain floors were assessed and then averaged based on similarity. For the structural steel the number of floors which were evaluated varied between the beams columns and decking. The same for the concrete was done.

### Structural Steel

Due to the shape of the building and the decreasing floor area as the building rises an accurate number for the amount of members and tonnage of steel could not be calculated for the steel framing and columns. The majority of shaped members were W with a handful of HSS and Plate Girders. Many W shaped steel members were also special order which complicated the pricing. The W shapes ranged in size anywhere from a W12x14 to W44x290. Special order beams included ones such as W36x800, W40x503, W36x362 and others.

An average price for tonnage of steel for material, labor, and installation costs was used for the beams and columns and the deck was price by square foot. Using the program Autodesk Quantity Takeoff the linear footage of the member and square footage of the decking were taken off and recorded into an Excel spreadsheet that can be seen in Appendix B1. The linear footages of each beam and column were used to calculate the amount of tonnage of steel on that specific floor. The results of this takeoff are summarized below in Tables below.

Table 4: Structural Beams Takeoff Details

Structural Beams Takeoff Details			
Description	Tonnage of Steel	# Floors	Total Ton
Lower Level 1	44.29665	2	88.5933
Level 1	61.642891	2	123.285782
Level 2	61.8835	1	61.8835
Level 5	78.173475	7	547.214325
Level 10	309.77419	1	309.77419
Level 15	35.496175	9	319.465575
Level 20	37.984335	10	379.84335
Roof	92.25	1	92.25
<b>Total</b>			<b>1922.310022</b>

Table 5: Steel Columns Takeoff Details

Steel Columns Takeoff Details			
Description	Tonnage of Steel	# Floors	Total Ton
Lower Level 2	13.125	1	13.125
Lower Level 1	12.4575	1	12.4575
Level 1	68.2125	1	68.2125
Level 5	30.39975	8	243.198
Level 15	16.897	9	152.073
Level 20	16.233	10	162.33
<b>Total</b>			<b>651.396</b>

Table 6: Steel Decking Takeoff Details

Steel Decking Takeoff Details			
Description	SF	# Floors	Total SF
Lower Level 1	12604.74	2	25209.48
Level 1	15369.25	1	15369.25
Level 3	13991.12	1	13991.12
Level 5	14648.54	6	87891.24
Level 6	14613.3	1	14613.3
Level 10	15041.08	1	15041.08
Level 15	9457.81	9	85120.29
Level 20	9915.49	10	99154.9
Roof	5559.7	1	5559.7
<b>Total</b>			<b>361950.36</b>

As you can see the framing plans contribute the most number of tonnages of the two takeoffs. Worth noting is that the schedule calls for an average of 4 days to erect a floor of steel framing. From this the productivity of the steel erection team can be determined by dividing the total amount of steel tons (2574) by the amount of days scheduled (107). Therefore, the steel productivity must be 24 tons of steel per day to meet the construction schedule. This is a high rate of steel erection that the team is scheduled to meet and will be a challenge during the construction.

**Concrete**

For the concrete portion of the structural estimate the foundations, footings, slab decks, and core were all estimated. Each portion of concrete was priced by cubic yard. To determine the cubic yardage the square footage was taken off using Autodesk Quantity Takeoff, then multiplied by its thickness and divided by a conversion factor of 27. These results were recorded in an Excel spreadsheet and can be found in Appendix B2. A similar method as the steel estimate was used where an individual floor was assessed for the slab decks and core. The foundation, columns and footings were assessed by type and amount. All reinforcing was also accounted for and priced by tonnage or CSF. The concrete slabs ranged from 5 1-2” normal weight concrete to 9” normal weight concrete and the reinforcing was either # 4 rebar’s or WWF 6x6-W1.4xW1.4.

The majority of the estimate was contributed from the concrete core and the concrete slabs as they are found on every floor.

The following is the total amount of cubic yard of concrete used for each concrete system.

- Slabs: 6390.6 CY
- Foundation: 780 CY
- Footings 130 CY
- Concrete Columns: 167.5 CY
- Concrete Core: 9521 CY

**Pricing**

Before pricing was applied to the takeoffs they were grouped together by CSI division. The only divisions that were needed for this estimate were divisions 03 Concrete and 05 Metals. The items that were grouped together in the 03 section were the concrete material, placement, finishing, reinforcing and forming. While the 05 section the structural steel and metal decking were grouped together. Using RS Means online the location factor was already accounted for in the pricing. For the structural steel portion a 10% addition for each beam was added for connections. Table 7 breaks down each division’s cost and compares it back to the original estimated by Turner.

Table 7: Structural System Estimate Overview

Structural System Estimate Overview					
Division	Estimated Total Cost	Turners Estimate	\$/SF Detailed	\$/SF Turner	
03 Concrete	\$ 20,553,271.07	\$ 18,708,632.26	\$ 47.54	\$ 43.28	
05 Metals	\$ 14,088,458.30	\$ 19,550,000.00	\$ 32.60	\$ 45.22	



Note that these numbers reflect the cost of the material, labor and equipment necessary to complete the project. No overhead or profit was included in this estimate due to the fact that this could be different depending on the job or company. An overestimation for concrete was likely because of the when the rebar in the slabs entire of the building. The rebar that were in the slabs were placed each way and top and bottom. Also for the concrete core an assumption was made that rebar was all on size and placed in the same order but in reality each wall has a different layout of rebar and different types of bars.

For the metals portion, the steel beams were estimated by a tonnage and not an exact cost for the size of beam or column. This was because many of the steel members could not be found in RS Means and these certain members were special ordered due to the size. There are also plate girders and HSS type members as well. Also not every floor layout is the same for the columns and beams. An assumption was made that certain floors with a similar layout had the same amount and types of members.

## Assemblies Estimate

This Assemblies Estimate will focus on the projects MEP’s systems and discuss how the estimation was evaluated. This estimation will be compared to the actual system’s estimate done by Turner and evaluate the accuracy of the estimate done. Table 9 below breaks down the cost by each estimate and compares the \$/SF to the original estimate done by Turner.

Table 7: Structural System Estimate Overview

Assemblies Estimate Overview					
System	Assemblies Estimated Cost	Turner's Estimated Cost	\$/SF Detailed	\$/SF Turner	
Mechanical	\$ 10,172,657.58	\$ 17,200,000.00	\$ 23.53	\$ 39.79	
Electrical	\$ 12,056,483.69	\$ 19,728,000.00	\$ 27.89	\$ 45.63	
Plumbing	\$ 1,493,385.00	\$ 4,687,000.00	\$ 3.45	\$ 10.84	
Fire Protection	\$ 446,685.00	\$ 1,570,000.00	\$ 1.03	\$ 3.63	

### Mechanical

When estimating the mechanical portion of the building it was found that not all the systems were included in RS Means. A number of systems were found and were able to be estimated to come to a difference of roughly \$7 million dollars. A detailed portion of all the systems estimated can be found in Appendix C1. The following is a list of systems that were not able to be included in the estimate

- Primary Condenser Water System
- Unit and Entrance Heaters
- Linear Diffusers
- Ceiling Supply Diffusers
- Ceiling Return Grilles and Registers
- Constant Volume Regulators

These systems can be found throughout the building and it was assumed that this accounts for a good portion of the difference. When pricing some of the systems that were between two costs an interpolation process was done. This price could be more expensive than the interpolation value because of the system being unique. With the scale of the project and the complexity of the system, specialty prices could have been assumed when the original estimate took place.

### Electrical

A similar approach was taken when evaluating the electrical system of the building. Various systems were able to be estimated, but a difference of \$7.67 million was still evaluated. A detailed portion of the systems estimated can be found in Appendix C2. Again the assumption of the scale of the project and the complexity of the system is the reason for such a large difference. Also an estimation of only the service and distribution switchboard feeders was accounted for. The following is a list of systems that were not able to be included in the estimate

- Con Edison Transformers (Feeder)
- Panelboard Feeders
- Network Protectors
- Fire Alarm systems
- Security Systems

➤ **Telecommunication Systems**

The telecommunication, security, and fire alarm systems were not provided by the owner and could not be priced. It could also be assumed that since many of the systems are a 265/460 V – 3 phase- 4 Wires, that these systems could be priced differently from the RS Means values obtained. Values for a 260/480 V 3 phase-4wires were used.

**Plumbing**

For the plumbing system many systems were found but this estimation differed by \$3.2 million from the actual estimate by Turner. Appendix C3 shows the detailed systems estimate. The following systems were not be able to estimated

- Storm Water Detention Tank
- Combination Domestic – Fire Water Tank
- Duplex Ejector Pit
- Storm water Filtration pumps

These systems and the piping are assumed to cover a majority of the difference. Also many of the systems used in the estimate for the plumbing were systems that were similar to the ones used for the project but not the exact system. This is where prices can vary.

## General Conditions Estimate

The general conditions estimate for the project can be considered the operating costs for the job site. It can be seen on page eleven and its cost includes personnel, field offices, temporary utilities, insurance and bonding, and other miscellaneous costs. The estimate is broken down into three main sections:

- Personnel
- Miscellaneous costs
- Insurance and bonding.

Personnel costs are the costs of the staff’s salary and benefits. Miscellaneous costs are associated with items such as the field office rent, supplies, temporary utilities, telephone bills, and job clean up. Finally the insurance and bonding costs include builders risk insurance, general liability insurance, and performance bonds.

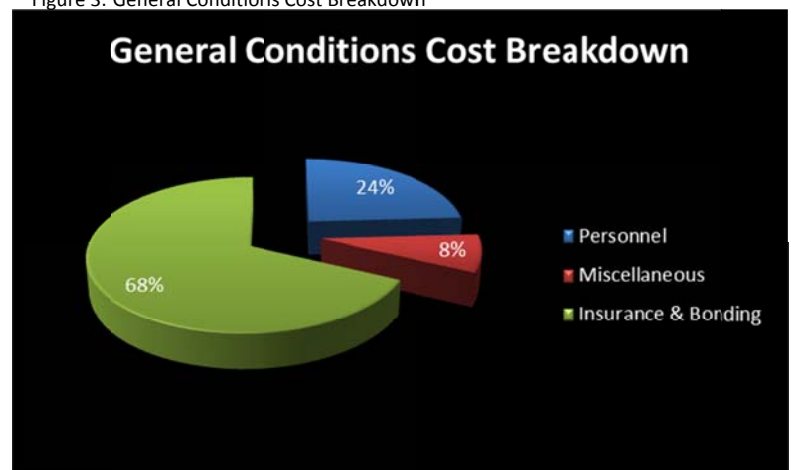
Table 8: General Conditions Summary

General Conditions Summary		
Section	Total Cost	Cost per Month
Personnel	\$ 3,780,000.00	\$ 145,384.62
Miscellaneous	\$ 1,232,021.33	\$ 47,385.44
Insurance & Bonding	\$ 10,649,600.00	\$ 409,600.00
<b>Totals</b>	<b>\$ 15,661,621.33</b>	<b>\$ 602,370.05</b>

The general conditions estimate is based off a 26 month construction schedule. From this the monthly cost for each cost breakdown can be determined. This along with a summary of the general conditions estimate can be seen above in Table 8. The total estimate came out to be \$15,661,621 for the project, and a cost per month of \$602,370.05. The pricing was obtained from 2013 RS Means Construction Cost Data. The most costly general conditions section was the insurance and bonding at 68%, followed by the personnel section at 24%. The miscellaneous section makes up the rest with 9%. This can be seen in Figure 2.

The insurance and bonding section is higher than the other sections due to high contract value of the project which is \$208 million. Turner estimated the general conditions to be \$18.7M so these two estimated match up closely. Turner did not release the details of their general conditions estimate so the sub sections of the estimate cannot be compared in detail.

Figure 3: General Conditions Cost Breakdown



As seen in the estimate various miscellaneous costs were chosen. These were chosen as an assumption based off viewing the site logistic plans Turner had provided. Costs such as barriers, cranes, security, hoists, and safety netting were all included.

Table 9: General Conditions Estimate

General Conditions Estimate					
Description	EA	Quantity	Unit	Rate	Total Cost
<b>Personnel Costs</b>					
Project Manager	1	105	Week	\$ 3,400.00	\$ 357,000.00
Project Engineer	1	105	Week	\$ 2,800.00	\$ 294,000.00
Project Superintendent	1	105	Week	\$ 3,200.00	\$ 336,000.00
Superintendent	3	105	Week	\$ 2,900.00	\$ 913,500.00
Engineer	7	105	Week	\$ 1,800.00	\$ 1,323,000.00
Safety	1	105	Week	\$ 2,700.00	\$ 283,500.00
Accountant	1	105	Week	\$ 2,600.00	\$ 273,000.00
<b>Miscellaneous Costs</b>					
CPM Schedule (Large Scaled Project)	1	0.03%	Job	\$208,000,000.00	\$ 62,400.00
Computers	1	20	EA	\$ 1,200.00	\$ 24,000.00
Temporary Utilites Electric	1	84.127	CSF	\$ 47.99	\$ 4,037.25
Temporary Utilities Water	1	26	Month	\$ 250.00	\$ 6,500.00
Field Office	1	26	Month	\$ 6,500.00	\$ 169,000.00
Office Equipment Rental	1	26	Month	\$ 216.60	\$ 5,631.60
Office Supplies	1	26	Month	\$ 81.23	\$ 2,111.98
Coffee & Water Cooler	1	26	Month	\$ 100.00	\$ 2,600.00
Internet	1	26	Month	\$ 325.00	\$ 8,450.00
Messenger Service	1	26	Month	\$ 500.00	\$ 13,000.00
Telephone Bill	1	26	Month	\$ 225.00	\$ 5,850.00
Testing & Inspection Steel and Concrete Building	1	1	Job	\$ 71,544.00	\$ 71,544.00
Daily Clean Up	1	105	Week	\$ 300.00	\$ 31,500.00
Barricades	1	30	EA	\$ 422.37	\$ 12,671.10
Site Fence (plywood 4"x4" frame 8' high)	1	300	LF	\$ 109.68	\$ 32,904.00
Security	1	3000	HR	\$ 24.18	\$ 72,540.00
Safety Netting	1	3000	SF	\$ 1.20	\$ 3,600.00
Safety supplies and first aid kits	1	26	Month	\$ 25.50	\$ 663.00
Hoist	1	24	Week	\$ 4,205.15	\$ 100,923.60
Steel Tower Crane	1	9	Month	\$ 31,689.20	\$ 285,202.80
Concrete Crane	1	10	Month	\$ 31,689.20	\$ 316,892.00
<b>Insurance &amp; Bonding</b>					
Builders Risk Insurance	1	By Owner	Job	\$208,000,000.00	By Owner
General Liability Insurance	1	0.62%	Job	\$208,000,000.00	\$ 1,289,600.00
Permits	1	2%	Job	\$208,000,000.00	\$ 4,160,000.00
Payment and Performance Bonds	1	2.50%	Job	\$208,000,000.00	\$ 5,200,000.00
					\$ 15,661,621.33

## Site Layout Planning

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Three main phases of construction were analyzed and from this site layouts were created. The following are the three phases analyzed.

- Excavation
- Superstructure: Level 10 – Roof
- Exterior Envelope & Roof/Bulkhead

In this section each phase will be discussed in detail and key features will be discussed. In each phase a similar approach was used as Turner due to the size of the site and its restrictions. Each phase can be seen in Appendix D

### Excavation

Going back to the schedule the Excavation phase begins on December 24<sup>th</sup> 2012 and ends on July 29<sup>th</sup> 2013. The detailed site layout can be seen in Appendix D. The safety for this phase is very important because of surrounding streets and MTA tunnels. As seen in the layout, an excavation of 34 feet was done. A dirt ramp is used in order to bring the excavated dirt away from the site. As the site is very tight and surrounded by three one way streets, lanes were closed in order to extend the site. A temporary path for pedestrians was designed and is guarded by jersey barriers. It is also important to note that there is an existing subway entrance still used during this phase of construction. Also during this phase of construction the subcontractor trailers are placed on the existing sidewalk. Guardrails are protecting all sides of the excavation as well. Vehicles will enter through the site through one of the six gates around the site. The project location is in a major city and in this city, the excavation must follow a code of having to means of ingress and egress that is kept available all times. This is covered by the ramp and stairs seen in the layout.

### Superstructure: Level 10 – Roof

The superstructure phase from level 10 – roof was chosen in order to show the complexity of this site in greater detail. The site is very cluttered. During this phase there are two cranes present on site with loading stations very close to the building. The following are items that are different from the excavation phase to this superstructure phase

- News stand torn down
- MTA entrance closed
- Netting used to protect floors below as structural framing is set.
- Site Fence extended due to news station tear down
- 17' 3" between building and site fence
- Overhead protection installed
- Subcontractor Trailers move into building.
- Standpipes and Stairs within Concrete Core

The site fence being extended allows for loading stations to be within the site perimeter. The area where the contractor trailers were has become the layout areas for concrete and steel. These temporary facilities have moved within the interior floors that have been completed. The steel crane is used for the steel framing, while the concrete crane is used for pouring the concrete core at the high levels using a bucket. Each floor is poured using the concrete trucks seen at the northern portion of the site. During this phase it is critical for pedestrian protection hence the construction of overhead protections above the temporary path created in the earlier phase. Also communication between the concrete crane crew and steel crane crew is critical as both are in the radius of each other. As part of the city's fire department requires an active standpipe with in 50ft. The department of buildings also requires two paths of egress within the core.

**Exterior Envelope & Roof/Bulkhead**

This is the final phase that involves the use of a crane and hoists. Once this phase is completed the focus turns to the interior floors that remain. This phase is important because once this is completed the building will be dried and water tight. The following are items that are different from the superstructure phase to the envelope phase and can be seen in Appendix D3

- Concrete Crane dismantled
- Protective netting no longer required
- Mechanical equipment is being installed
- Trolley Beam system to be engineered for the west side curtain wall system

This phase moves into full effect after the roof slab has been fully set and the concrete crane has been dismantled. There are only a handful of levels that the exterior curtain wall need to be installed on. The steel crane is still available to finish the remaining steel on the roof and hoist assist. A trolley beam system was engineered in the previous phase but was not able to be seen. It is shown in Appendix D3. This is used to install the west side curtain wall as the space between the project and the adjacent building is very narrow.

## *Constructability Challenges*

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This section will provide insight into some of the constructability challenges that the project team has had to face during the construction of the project. Some of the main constructability issues have arisen from the downtown site location and the constraints that come along with that. The following issues are ones that will be discussed in detail

- Excavation, Foundation, and Support of Excavation
- Construction of Utility Lines
- Public Safety

### **Excavation, Foundation and Support of Excavation**

With the project having just a tight and cluttered site the importance of SOE and the Foundation is critical. As mentioned earlier the site is surrounded by three one way streets. Also there is metro tunnel that runs next to the site on the east side. With the excavation 34 feet below the side walk the existing subway wall needed support. In order to properly support the surrounding streets and subway tunnel the excavation had to be done in stages. Solider piles were used as support and were lagged in between. A photo of this system can be seen in Figure 4. Turner also utilized three steel walers for extra support. This can be seen in Figure 5

Figure 4: Support of Excavation



Figure 5: Waler support

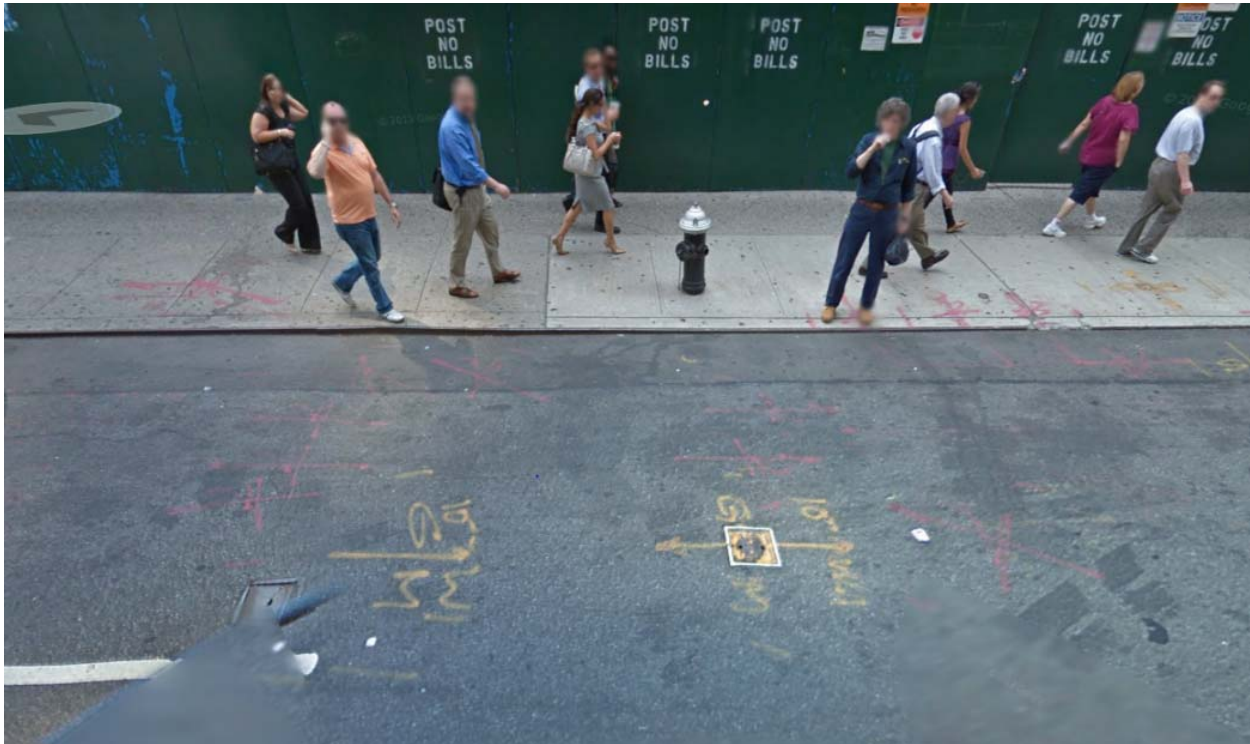




### Construction of Utility Lines

Various utility lines such as telecommunication, electrical, gas and sanitary need to be brought into the building from both the north and south ends of the building. Again because of those streets being one lane and one way, the utilities lines were brought in during the night time. Various permits were pursued to bring these lines in during night time, and Turner pursued to close the north and south streets during the construction but was only able to secure permits. All utility lines are coming from an existing main, or tapped into the various manholes surrounding the site. In order to bring these lines in the streets were trenched and dug out. A partial photo of where the trenching occurs before construction started can be seen in Figure 6

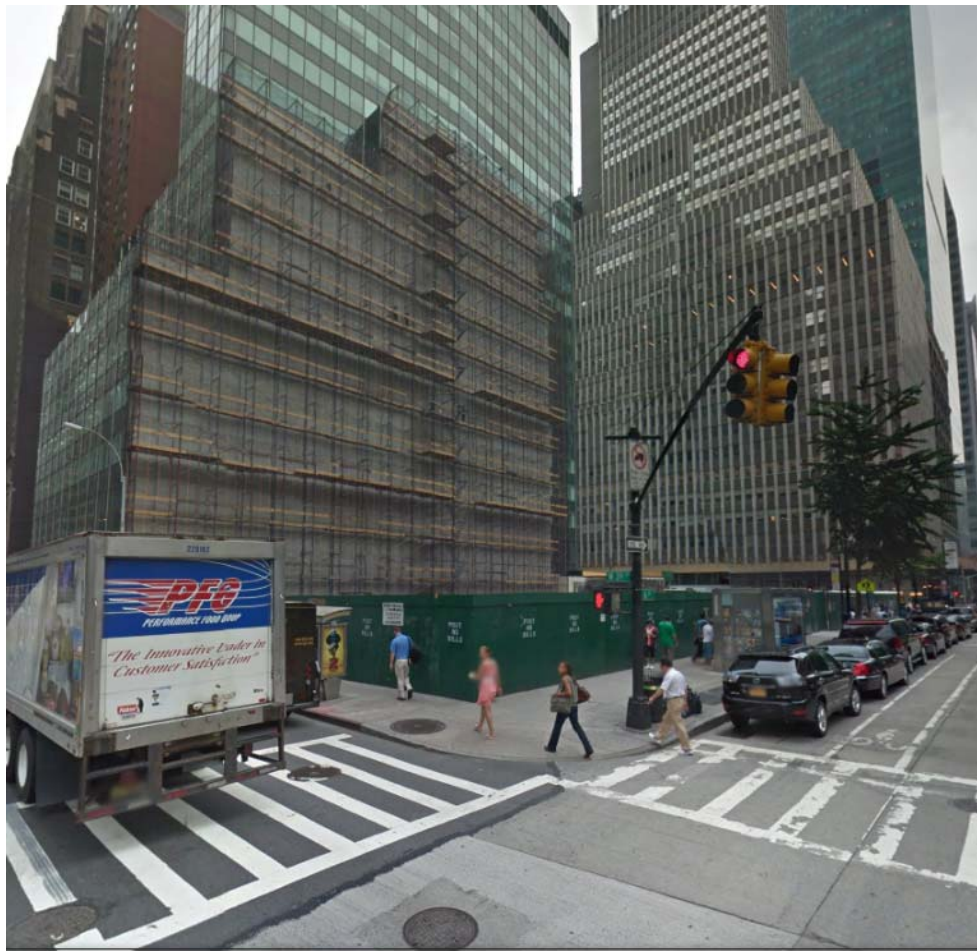
Figure 6: North street of project, trenching: Image courtesy of Google maps



**Public Safety**

Another construction issue that arises from the downtown location is preserving the safety of the public. The site is located in a downtown location that is in the middle of developing shopping, restaurant, and bar area. Because of this there will be a very high level of pedestrian activity during and after work hours on the site. In order to protect the public Turner implemented a few safety measures. An eight foot high site fence was built around the perimeter of the site. There is signage throughout the temporary walk way warning the public of the construction zone. The green barrier seen in Figure 7 is footprint of the project and excavation will be occurring to there. The site fence for the start of the project covers the sidewalk and the temporary walkway is where the cars are currently parked. This walkway is surrounded by jersey barriers and once the steel phase begins overhead protection will be constructed over that temporary walkway. There are four gates and a staff member will be stationed at each insuring nobody from the public enter the site unless they are required to and have the proper personal protective equipment. They will also be responsible for directing deliveries.

Figure 7: Southwest corner of Site: Image courtesy of Google maps



## *LEED Evaluation*

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This section will detail the process of a LEED evaluation by comparing a checklist based upon the Penn State approach, and the actual approach used by Turner. The Tower is aiming for LEED Gold and through the various systems, and site sustainability it is well on its way to achieving this goal. The architect, owner, and the company Viridian as all coordinating with each other in order to achieve a total of 60 points. The following categories need to be evaluated. Each has a one or more prerequisites in order to pursue that category and all were determined possible to pursue.

- Sustainable Sites: 28 points
- Water Efficiency: 10 points
- Energy Atmosphere: 37 points
- Materials & Resources: 13 points
- Indoor Environmental Quality: 12 points
- Innovative Design Process: 6 points
- Regional Priorities: 4 points

After evaluating each category it was found that after evaluating the project using the Penn State approach a total of 64 points was accounted for. This differs from the actual approach that Turner used by 3 points (61). Turner added an extra column with “less likely” points. This is because some of these points are less likely to achieve because of core and shell design. These checklists can be seen in Appendix E. The following will detail how each point was determined with only the mandatory credits.

### **Sustainable Sites**

Out of a total 28 points 22 points were accounted for. The prerequisite for this category is to reduce pollution from construction activities by controlling soil erosion by creating and implementing an erosion sedimentation plan. This plan was already created by Viridian allowing to pursue LEED points in this category.

- Alternative Transportation – Public Transportation Area: 6 points were awarded in this category because the project is located within a ½ mile walking distance of an existing subway station.
- Tenant Design & Construction Guidelines: With this being a core and shell project the tenants can be educated about implementing sustainable design and construction features. In order to achieve this point an illustrated document must be created with information about the sustainable design and construction features incorporated within the project. Also information that enables a tenet to coordinate space design and construction with the projects building systems

- **Stormwater Design: Quality Control:** The purpose of this is to increasing on-site infiltration. In order to achieve this point a stormwater management plan must be implemented. With the building having a stormwater detention tank it was assumed this plan is already implemented.

### **Energy and Atmosphere**

15 out of a total 37 points were obtained when pursuing this LEED category. The prerequisite that was chosen was the Fundamental Commissioning of the Building Energy Systems which a member of the project team to work with a CX agent in implementing a commissioning plan, and collect documentation.

- **Enhanced Commissioning:** This credit is awarded if the commissioning process begins early in the design process and executes addition activities after systems performance verification is completed. Viridian is the CxA and has done all the requirements in order to achieve these points.
- **Green Power:** To encourage the development and use of grid-source, renewable energy technologies on a net zero pollution. Either by determining the Baseline Electricity use or estimating this value can result in being awarded these points.

### **Materials and Resources**

Six out of 13 points were obtained when evaluating this category. By providing an easily-accessible dedicated area or area for the collection and storage of materials for recycling opens this category for evaluation.

- **Construction Waste Management: Divert 50-75% from disposal:** By developing a waste management plan which identifies the materials to be recycled or salvages will award points in this category.
- **Certified Wood:** Using minimum of 50% of wood based materials and products certified with the FSC for wood building components will award points in this category. (Formwork)

### **Indoor Environmental Quality**

11 out of a total 12 points was obtained. By preventing smoking in the building or 25 feet from the entries allows this category to be evaluated.

- **Construction indoor Air Quality Management Plan – During Construction:** By developing and implementing an IAQ management plan after installation of all finishes and completion of building cleaning before occupancy the point for this category can be awarded

**Innovation and Design Process**

3 out of 6 possible points was achieved after evaluation. A credit in design that can be achieved is Exemplary Performance in SSc4.1 (Transportation Access). With the metro tunnel addition this credit is awarded for also implementing a new access point for an existing subway station

*Appendix A: Detailed Project Schedule*

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Detailed Schedule		Classic Schedule Layout					2012 2013 2014 2015 2016 2017																							
Activity ID	Activity Name	Original Duration	Remaining Duration	Schedule % Complete	Start	Finish	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21			
		M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J																												
<b>The Tower Detailed Schedule</b>		750	750	0%	29-Jun-12	29-May-15	29-May-15, The Tower: Detailed Schedule																							
<b>The Tower.1 GMP Preparation</b>		87	87	0%	29-Jun-12	01-Nov-12	01-Nov-12, The Tower.1: GMP Preparation																							
A1000	Prepare Initial GMP Proposal	32	32	100%	29-Jun-12	15-Aug-12	Prepare Initial GMP Proposal																							
A1010	Client Review of Initial GMP Proposal	12	12	100%	16-Aug-12	31-Aug-12	Client Review of Initial GMP Proposal																							
A1020	Present Initial GMP to Client	2	2	100%	21-Aug-12	22-Aug-12	Present Initial GMP to Client																							
A1030	Prepare Final GMP Proposal	23	23	100%	11-Sep-12	11-Oct-12	Prepare Final GMP Proposal																							
A1040	Client Review GMP Proposals and Select CM	15	15	100%	12-Oct-12	01-Nov-12	Client Review GMP Proposals and Select CM																							
<b>The Tower.2 Exterior Wall Shop Drawings &amp; Fabrication</b>		332	332	0%	05-Sep-12	23-Dec-13	23-Dec-13, The Tower.2: Exterior Wall Shop Drawings & Fabrication																							
A1050	Prepare Performance Mockup Shop Drawings	40	40	100%	05-Sep-12	30-Oct-12	Prepare Performance Mockup Shop Drawings																							
A1060	Prepare Curtain Wall Embed Drawings	41	41	100%	31-Oct-12	28-Dec-12	Prepare Curtain Wall Embed Drawings																							
A1070	Fabricate Performance Mockup	83	83	100%	31-Oct-12	27-Feb-13	Fabricate Performance Mockup																							
A1080	Curtain Wall Shop Drawings & Approval	125	125	100%	31-Oct-12	26-Apr-13	Curtain Wall Shop Drawings & Approval																							
A1090	Assemble & Test Performance Mockup	21	21	100%	28-Feb-13	28-Mar-13	Assemble & Test Performance Mockup																							
A1100	Fabricate Extrusions & Glass	124	124	100%	29-Mar-13	23-Sep-13	Fabricate Extrusions & Glass																							
A1110	Assemble Curtainwall Panels	126	126	60.32%	26-Jun-13	23-Dec-13	Assemble Curtainwall Panels																							
<b>The Tower.3 Mobilization</b>		9	9	0%	02-Nov-12	14-Nov-12	14-Nov-12, The Tower.3: Mobilization																							
A1120	Mobilization/Permits	9	9	100%	02-Nov-12	14-Nov-12	Mobilization/Permits																							
<b>The Tower.4 Excavation/Foundations</b>		152	152	0%	24-Dec-12	29-Jul-13	29-Jul-13, The Tower.4: Excavation/Foundations																							
A1130	Install Site Fence	5	5	100%	24-Dec-12	31-Dec-12	Install Site Fence																							
A1140	Install Secant Wall System	25	25	100%	02-Jan-13	05-Feb-13	Install Secant Wall System																							
A1150	General Excavation	48	48	100%	23-Jan-13	29-Mar-13	General Excavation																							
A1160	Install Caissons & Sheeting	30	30	100%	30-Jan-13	12-Mar-13	Install Caissons & Sheeting																							
A1170	Install Sheeting	40	40	100%	06-Feb-13	02-Apr-13	Install Sheeting																							
A2920	Install Rock Anchors	40	40	100%	18-Feb-13	12-Apr-13	Install Rock Anchors																							
A2930	Install Column Footings	40	40	100%	01-Apr-13	24-May-13	Install Column Footings																							
A1180	Install Foundation Walls-3 Sides	54	54	100%	15-Apr-13	28-Jun-13	Install Foundation Walls-3 Sides																							
A1190	Install LL2 Slab on Grade	20	20	100%	03-Jun-13	28-Jun-13	Install LL2 Slab on Grade																							
A1200	Install Underslab Drainage	30	30	100%	03-Jun-13	15-Jul-13	Install Underslab Drainage																							
A1210	Install LL1 Slab on Grade	20	20	100%	01-Jul-13	29-Jul-13	Install LL1 Slab on Grade																							
<b>The Tower.5 Metro Transit</b>		510	510	0%	13-Mar-13	03-Mar-15	03-Mar-15, The Tower.5: Metro Transit																							
A1220	Install Drilled Piles	35	35	100%	13-Mar-13	30-Apr-13	Install Drilled Piles																							
A1230	Load Test Pile	32	32	100%	02-Apr-13	15-May-13	Load Test Pile																							
A1240	Install Pile Caps and Grade beams	40	40	100%	16-Apr-13	11-Jun-13	Install Pile Caps and Grade beams																							
A1250	Back Fill to Elevation 40'	15	15	100%	12-Jun-13	02-Jul-13	Back Fill to Elevation 40'																							
A1260	Install Foundation Walls -Avenue on 'A' line	25	25	100%	03-Jul-13	07-Aug-13	Install Foundation Walls -Avenue on 'A' line																							
A1270	Install Slab on Grade at A line	10	10	100%	08-Aug-13	21-Aug-13	Install Slab on Grade at A line																							
A1280	Close Lane on - Avenue	6	6	100%	16-Sep-13	23-Sep-13	Close Lane on - Avenue																							
A1290	Support Con Ed Manhole	60	60	25%	23-Sep-13	16-Dec-13	Support Con Ed Manhole																							
A1300	Install Connector tunnel to -TA subway station	123	123	0%	04-Nov-13*	25-Apr-14	Install Connector tunnel to -TA subway station																							
A1310	Install Subway Finishes	283	283	0%	31-Jan-14*	03-Mar-15	Install Subway Finishes																							
A1320	Rebuild existing Con Ed Manhole	65	65	0%	28-Apr-14*	25-Jul-14	Rebuild existing Con Ed Manhole																							
<b>The Tower.6 Concrete Core</b>		205	205	0%	24-Jul-13	09-May-14	09-May-14, The Tower.6: Concrete Core																							
A1330	Layout and Install Climbing Form	20	20	100%	24-Jul-13	20-Aug-13	Layout and Install Climbing Form																							
A1340	Install Reinforce and Pour LL2-2nd Floor Core Shear Walls	43	43	86.05%	21-Aug-13	21-Oct-13	Install Reinforce and Pour LL2-2nd Floor Core Shear Walls																							
A1350	Install Reinforce and Pour 3rd-8th Floor Core Shear Walls	25	25	0%	22-Oct-13*	25-Nov-13	Install Reinforce and Pour 3rd-8th Floor Core Shear Walls																							

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







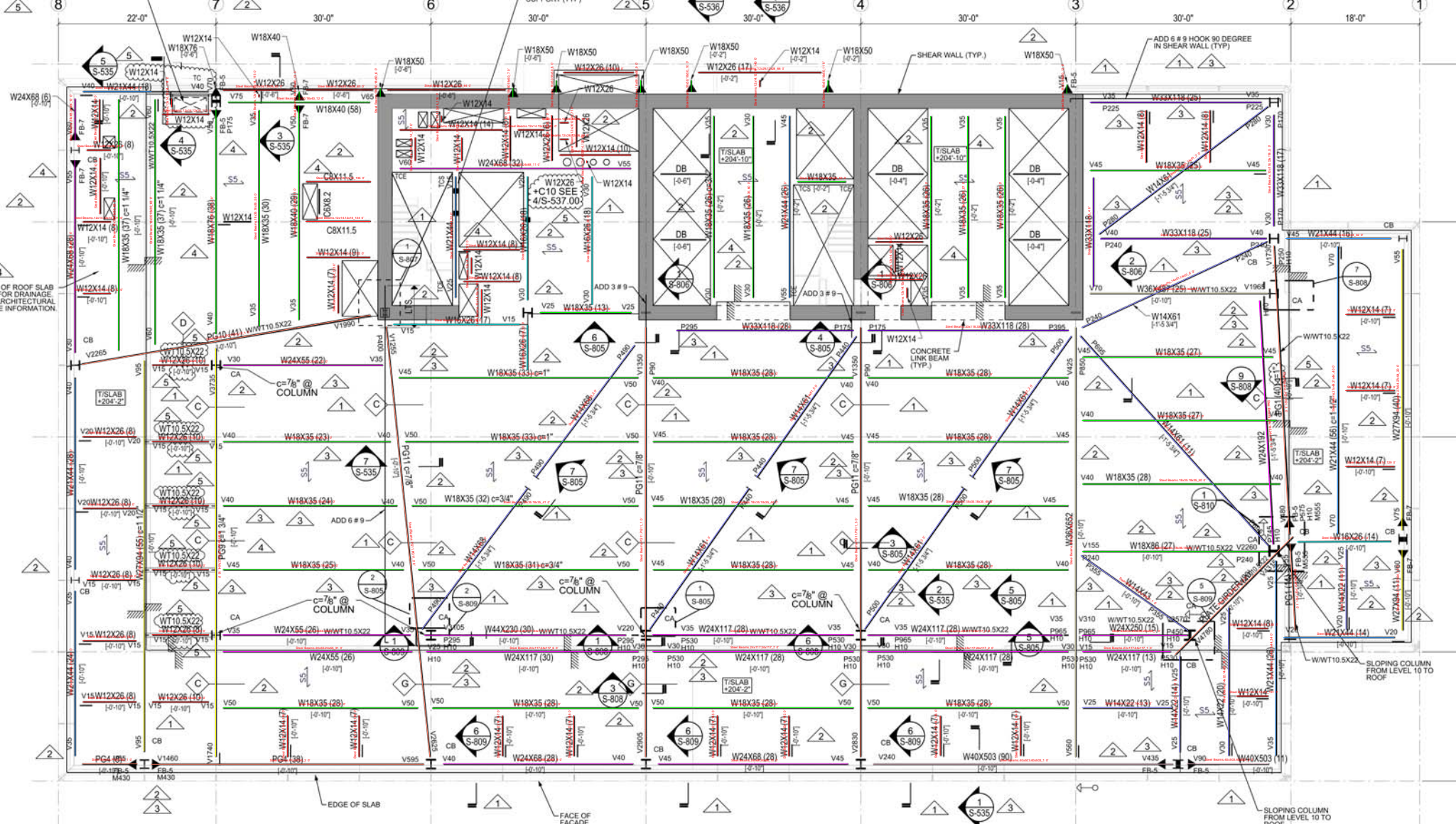




*Appendix B1: Detailed Structural Steel Takeoff*

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FUTURE OPENING PROVIDE REBAR AROUND THE OPENING PER 1/S-526.00



HEET NOTES:  
T/STRUCTURAL SLAB EL 205'-0" UON THUS:

8. SYMBOLS:  
INDICATES MOMENT CONNECTION



**Structural Steel Beam Estimate**

Shape/Description	Linear Weight (lb/ft)	Total Length (Ft)	Weight (lb)	Weight (Tons)	# Floors	Avg Ton	Material Cost/Unit	Material Cost	Labor Cost/Unit	Labor Cost	Equipment Cost/Unit	Equipment Cost	Total/Unit	Total	Totals/Floor
<b>Cellar (Lower Level 1)</b>															
W12x	14	173	2422	1.211			\$ 3,570.00	\$ 4,755.60	\$ 703.43	\$ 937.04	\$ 152.36	\$ 202.96	\$ 4,425.79	\$ 5,895.59	
W12x	26	115	2990	1.495			\$ 3,570.00	\$ 5,870.87	\$ 703.43	\$ 1,156.79	\$ 152.36	\$ 250.56	\$ 4,425.79	\$ 7,278.21	
W14x	22	19	418	0.209			\$ 3,570.00	\$ 820.74	\$ 703.43	\$ 161.72	\$ 152.36	\$ 35.03	\$ 4,425.79	\$ 1,017.49	
W16x	26	235.15	6113.9	3.05695			\$ 3,570.00	\$ 12,004.64	\$ 703.43	\$ 2,365.39	\$ 152.36	\$ 512.33	\$ 4,425.79	\$ 14,882.36	
W16x	31	28	868	0.434			\$ 3,570.00	\$ 1,704.32	\$ 703.43	\$ 335.82	\$ 152.36	\$ 72.74	\$ 4,425.79	\$ 2,112.87	
W16x	45	136.3	6133.5	3.06675			\$ 3,570.00	\$ 12,043.13	\$ 703.43	\$ 2,372.97	\$ 152.36	\$ 513.98	\$ 4,425.79	\$ 14,930.07	
W16x	89	28.3	2518.7	1.25935			\$ 3,570.00	\$ 4,945.47	\$ 703.43	\$ 974.45	\$ 152.36	\$ 211.06	\$ 4,425.79	\$ 6,130.98	
W18x	35	155	5425	2.7125			\$ 3,570.00	\$ 10,651.99	\$ 703.43	\$ 2,098.86	\$ 152.36	\$ 454.60	\$ 4,425.79	\$ 13,205.45	
W18x	46	21	966	0.483			\$ 3,570.00	\$ 1,896.74	\$ 703.43	\$ 373.73	\$ 152.36	\$ 80.95	\$ 4,425.79	\$ 2,351.42	
W18x	55	12.7	698.5	0.34925			\$ 3,570.00	\$ 1,371.50	\$ 703.43	\$ 270.24	\$ 152.36	\$ 58.53	\$ 4,425.79	\$ 1,700.28	
W18x	76	14.7	1117.2	0.5586			\$ 3,570.00	\$ 2,193.62	\$ 703.43	\$ 432.23	\$ 152.36	\$ 93.62	\$ 4,425.79	\$ 2,719.47	
W21x	44	136	5984	2.992			\$ 3,570.00	\$ 11,749.58	\$ 703.43	\$ 2,315.13	\$ 152.36	\$ 501.45	\$ 4,425.79	\$ 14,566.16	
W21x	50	16.3	815	0.4075			\$ 3,570.00	\$ 1,600.25	\$ 703.43	\$ 315.31	\$ 152.36	\$ 68.30	\$ 4,425.79	\$ 1,983.86	
W24x	55	395.7	21763.5	10.88175			\$ 3,570.00	\$ 42,732.63	\$ 703.43	\$ 8,420.00	\$ 152.36	\$ 1,823.74	\$ 4,425.79	\$ 52,976.37	
W24x	68	32.3	2196.4	1.0982			\$ 3,570.00	\$ 4,312.63	\$ 703.43	\$ 849.76	\$ 152.36	\$ 184.05	\$ 4,425.79	\$ 5,346.44	
W24x	76	26.3	1998.8	0.9994			\$ 3,570.00	\$ 3,924.64	\$ 703.43	\$ 773.31	\$ 152.36	\$ 167.50	\$ 4,425.79	\$ 4,865.45	
W24x	94	22.8	2143.2	1.0716			\$ 3,570.00	\$ 4,208.17	\$ 703.43	\$ 829.18	\$ 152.36	\$ 179.60	\$ 4,425.79	\$ 5,216.94	
W27x	84	34	2856	1.428			\$ 3,570.00	\$ 5,607.76	\$ 703.43	\$ 1,104.95	\$ 152.36	\$ 239.33	\$ 4,425.79	\$ 6,952.03	
W27x	146	40	5840	2.92			\$ 3,570.00	\$ 11,466.84	\$ 703.43	\$ 2,259.42	\$ 152.36	\$ 489.38	\$ 4,425.79	\$ 14,215.64	
W30x	99	41	4059	2.0295			\$ 3,570.00	\$ 7,969.85	\$ 703.43	\$ 1,570.37	\$ 152.36	\$ 340.14	\$ 4,425.79	\$ 9,880.35	
W30x	118	13.5	1593	0.7965			\$ 3,570.00	\$ 3,127.86	\$ 703.43	\$ 616.31	\$ 152.36	\$ 133.49	\$ 4,425.79	\$ 3,877.66	
W30x	130	40.17	5222.1	2.61105			\$ 3,570.00	\$ 10,253.59	\$ 703.43	\$ 2,020.36	\$ 152.36	\$ 437.60	\$ 4,425.79	\$ 12,711.55	
W40x	149	25.5	3799.5	1.89975			\$ 3,570.00	\$ 7,460.32	\$ 703.43	\$ 1,469.98	\$ 152.36	\$ 318.39	\$ 4,425.79	\$ 9,248.68	
HSS10x4x3/8	32.6	20	652	0.326			\$ 3,570.00	\$ 1,280.20	\$ 703.43	\$ 252.25	\$ 152.36	\$ 54.64	\$ 4,425.79	\$ 1,587.09	
PG8	27.11(ft*3)	490	13284.922	6.64			\$ 3,570.00	\$ 26,075.28	\$ 703.43	\$ 5,137.85	\$ 152.36	\$ 1,112.84	\$ 4,425.79	\$ 32,325.97	
<b>Subtotal: Lower Level 1</b>		<b>2271.72</b>	<b>87941.3</b>	<b>44.29665</b>	<b>2</b>	<b>88.5933</b>		<b>\$ 200,028.22</b>		<b>\$ 39,413.40</b>		<b>\$ 8,536.78</b>		<b>\$ 247,978.41</b>	<b>\$ 495,956.82</b>
<b>Level 1</b>															
W12x	14	255.3	3574.2	1.7871			\$ 3,570.00	\$ 7,017.94	\$ 703.43	\$ 1,382.81	\$ 152.36	\$ 299.51	\$ 4,425.79	\$ 8,700.26	
W12x	26	87.782	2282.332	1.141166			\$ 3,570.00	\$ 4,481.36	\$ 703.43	\$ 883.00	\$ 152.36	\$ 191.25	\$ 4,425.79	\$ 5,555.62	
W14x	22	189	4158	2.079			\$ 3,570.00	\$ 8,164.23	\$ 703.43	\$ 1,608.67	\$ 152.36	\$ 348.43	\$ 4,425.79	\$ 10,121.34	
W14x	30	35	1050	0.525			\$ 3,570.00	\$ 2,061.68	\$ 703.43	\$ 406.23	\$ 152.36	\$ 87.99	\$ 4,425.79	\$ 2,555.89	
W16x	26	193.5	5031	2.5155			\$ 3,570.00	\$ 9,878.37	\$ 703.43	\$ 1,946.43	\$ 152.36	\$ 421.59	\$ 4,425.79	\$ 12,246.38	
W16x	31	18	558	0.279			\$ 3,570.00	\$ 1,095.63	\$ 703.43	\$ 215.88	\$ 152.36	\$ 46.76	\$ 4,425.79	\$ 1,358.27	
W16x	45	111.7	5026.5	2.51325			\$ 3,570.00	\$ 9,869.53	\$ 703.43	\$ 1,944.68	\$ 152.36	\$ 421.21	\$ 4,425.79	\$ 12,235.43	
W16x	50	90.5	4525	2.2625			\$ 3,570.00	\$ 8,884.84	\$ 703.43	\$ 1,750.66	\$ 152.36	\$ 379.19	\$ 4,425.79	\$ 11,014.68	
W18x	35	65.33	2286.55	1.143275			\$ 3,570.00	\$ 4,489.64	\$ 703.43	\$ 884.64	\$ 152.36	\$ 191.61	\$ 4,425.79	\$ 5,565.88	
W18x	40	133.3	5332	2.666			\$ 3,570.00	\$ 10,469.38	\$ 703.43	\$ 2,062.88	\$ 152.36	\$ 446.81	\$ 4,425.79	\$ 12,979.07	
W18x	46	21	966	0.483			\$ 3,570.00	\$ 1,896.74	\$ 703.43	\$ 373.73	\$ 152.36	\$ 80.95	\$ 4,425.79	\$ 2,351.42	
W18x	71	15.5	1100.5	0.55025			\$ 3,570.00	\$ 2,160.83	\$ 703.43	\$ 425.77	\$ 152.36	\$ 92.22	\$ 4,425.79	\$ 2,678.82	
W21x	44	139.5	6138	3.069			\$ 3,570.00	\$ 12,051.96	\$ 703.43	\$ 2,374.71	\$ 152.36	\$ 514.35	\$ 4,425.79	\$ 14,941.02	
W21x	48	17.3	830.4	0.4152			\$ 3,570.00	\$ 1,630.49	\$ 703.43	\$ 321.27	\$ 152.36	\$ 69.59	\$ 4,425.79	\$ 2,021.35	
W21x	50	49.5	2475	1.2375			\$ 3,570.00	\$ 4,859.66	\$ 703.43	\$ 957.54	\$ 152.36	\$ 207.40	\$ 4,425.79	\$ 6,024.61	
W24x	55	428	23540	11.77			\$ 3,570.00	\$ 46,220.79	\$ 703.43	\$ 9,107.31	\$ 152.36	\$ 1,972.60	\$ 4,425.79	\$ 57,300.70	
W24x	68	17.5	1190	0.595			\$ 3,570.00	\$ 2,336.57	\$ 703.43	\$ 460.39	\$ 152.36	\$ 99.72	\$ 4,425.79	\$ 2,896.68	
W24x	76	107	8132	4.066			\$ 3,570.00	\$ 15,967.18	\$ 703.43	\$ 3,146.16	\$ 152.36	\$ 681.45	\$ 4,425.79	\$ 19,794.79	
W27x	84	171	14364	7.182			\$ 3,570.00	\$ 28,203.71	\$ 703.43	\$ 5,557.24	\$ 152.36	\$ 1,203.67	\$ 4,425.79	\$ 34,964.63	
W27x	94	36	3384	1.692			\$ 3,570.00	\$ 6,644.48	\$ 703.43	\$ 1,309.22	\$ 152.36	\$ 283.57	\$ 4,425.79	\$ 8,237.28	
W27x	114	40	4560	2.28			\$ 3,570.00	\$ 8,953.56	\$ 703.43	\$ 1,764.20	\$ 152.36	\$ 382.12	\$ 4,425.79	\$ 11,099.88	
W30x	99	40	3960	1.98			\$ 3,570.00	\$ 7,775.46	\$ 703.43	\$ 1,532.07	\$ 152.36	\$ 331.84	\$ 4,425.79	\$ 9,639.37	
W30x	116	37.3	4326.8	2.1634			\$ 3,570.00	\$ 8,495.67	\$ 703.43	\$ 1,673.98	\$ 152.36	\$ 362.58	\$ 4,425.79	\$ 10,532.23	
W30x	132	40	5280	2.64			\$ 3,570.00	\$ 10,367.28	\$ 703.43	\$ 2,042.76	\$ 152.36	\$ 442.45	\$ 4,425.79	\$ 12,852.49	
W33x	130	16	2080	1.04			\$ 3,570.00	\$ 4,084.08	\$ 703.43	\$ 804.72	\$ 152.36	\$ 174.30	\$ 4,425.79	\$ 5,063.10	
W33x	201	35.5	7135.5	3.56775			\$ 3,570.00	\$ 14,010.55	\$ 703.43	\$ 2,760.63	\$ 152.36	\$ 597.94	\$ 4,425.79	\$ 17,369.12	
<b>Subtotal: Level 1</b>		<b>2390.512</b>	<b>123285.782</b>	<b>61.642891</b>	<b>2</b>	<b>123.12245</b>		<b>\$ 242,071.63</b>		<b>\$ 47,697.60</b>		<b>\$ 10,331.10</b>		<b>\$ 300,100.34</b>	<b>\$ 600,200.68</b>
<b>Level 2</b>															
W21x	44	97	4268	2.134			\$ 3,570.00	\$ 8,380.22	\$ 703.43	\$ 1,651.23	\$ 152.36	\$ 357.65	\$ 4,425.79	\$ 10,389.10	
W30	108	69.75	7533	3.7665			\$ 3,570.00	\$ 14,791.05	\$ 703.43	\$ 2,914.42	\$ 152.36	\$ 631.25	\$ 4,425.79	\$ 18,336.71	
W36	150	148	22200	11.1			\$ 3,570.00	\$ 43,589.70	\$ 703.43	\$ 8,588.88	\$ 152.36	\$ 1,860.32	\$ 4,425.79	\$ 54,038.90	
HSS10x4x3/8	32.6	82	2673.2	1.3366			\$ 3,570.00	\$ 5,248.83	\$ 703.43	\$ 1,034.22	\$ 152.36	\$ 224.01	\$ 4,425.79	\$ 6,507.06	
HSS4x4x5/8	15	334.5	5017.5	2.50875			\$ 3,570.00	\$ 9,851.86	\$ 703.43	\$ 1,941.20	\$ 152.36	\$ 420.46	\$ 4,425.79	\$ 12,213.52	
PG5	167.5 (ft*3)	490(lb/ft*3)	82075	41.0375			\$ 3,570.00	\$ 161,154.26	\$ 703.43	\$ 31,753.71	\$ 152.36	\$ 6,877.72	\$ 4,425.79	\$ 199,785.69	
<b>Subtotal: Level 2</b>		<b>825.75</b>	<b>123766.7</b>	<b>61.88335</b>		<b>61.88335</b>		<b>\$ 243,015.92</b>		<b>\$ 47,883.67</b>		<b>\$ 10,371.40</b>		<b>\$ 301,270.98</b>	<b>\$ 301,270.98</b>
<b>Level 5</b>															
W12x	14	143.5	2009	1.0045			\$ 3,570.00	\$ 3,944.67	\$ 703.43	\$ 777.25	\$ 152.36	\$ 168.35	\$ 4,425.79	\$ 4,890.28	
W12x	26	80.5	2093	1.0465			\$ 3,570.00	\$ 4,109.61	\$ 703.43	\$ 809.75	\$ 152.36	\$ 175.39	\$ 4,425.79	\$ 5,094.75	
W14x	22	13	286	0.143			\$ 3,570.00	\$ 561.56	\$ 703.43	\$ 110.65	\$ 152.36	\$ 23.97	\$ 4,425.79	\$ 696.18	
W16x	26	34.3	891.8	0.4459			\$ 3,570.00	\$ 1,751.05	\$ 703.43	\$ 345.03	\$ 152.36	\$ 74.73	\$ 4,425.79		

<b>Level 10</b>																						
W12x	14	220.5	3087	1.5435			\$	3,570.00	\$	6,061.32	\$	703.43	\$	1,194.32	\$	152.36	\$	258.68	\$	4,425.79	\$	7,514.33
W12x	26	176.33	4584.58	2.29229			\$	3,570.00	\$	9,001.82	\$	703.43	\$	1,773.71	\$	152.36	\$	384.18	\$	4,425.79	\$	11,159.71
W14x	22	57.75	1270.5	0.63525			\$	3,570.00	\$	2,494.63	\$	703.43	\$	491.54	\$	152.36	\$	106.47	\$	4,425.79	\$	3,092.63
W14x	43	18.33	788.19	0.394095			\$	3,570.00	\$	1,547.61	\$	703.43	\$	304.94	\$	152.36	\$	66.05	\$	4,425.79	\$	1,918.60
W14x	61	193.5	11803.5	5.90175			\$	3,570.00	\$	23,176.17	\$	703.43	\$	4,566.61	\$	152.36	\$	989.11	\$	4,425.79	\$	28,731.90
W14x	68	47.75	3247	1.6235			\$	3,570.00	\$	6,375.48	\$	703.43	\$	1,256.22	\$	152.36	\$	272.09	\$	4,425.79	\$	7,903.80
W16x	26	72	1872	0.936			\$	3,570.00	\$	3,675.67	\$	703.43	\$	724.25	\$	152.36	\$	156.87	\$	4,425.79	\$	4,556.79
W18x	35	887.5	31062.5	15.53125			\$	3,570.00	\$	60,991.22	\$	703.43	\$	12,017.66	\$	152.36	\$	2,602.98	\$	4,425.79	\$	75,611.86
W18x	40	50.75	2030	1.015			\$	3,570.00	\$	3,985.91	\$	703.43	\$	785.38	\$	152.36	\$	170.11	\$	4,425.79	\$	4,941.39
W18x	50	10.33	516.5	0.25825			\$	3,570.00	\$	1,014.15	\$	703.43	\$	199.83	\$	152.36	\$	43.28	\$	4,425.79	\$	1,257.26
W18x	76	31.33	2381.08	1.19054			\$	3,570.00	\$	4,675.25	\$	703.43	\$	921.21	\$	152.36	\$	199.53	\$	4,425.79	\$	5,795.99
W18x	86	26	2236	1.118			\$	3,570.00	\$	4,390.39	\$	703.43	\$	865.08	\$	152.36	\$	187.37	\$	4,425.79	\$	5,442.84
W21x	44	198.75	8745	4.3725			\$	3,570.00	\$	17,170.81	\$	703.43	\$	3,383.32	\$	152.36	\$	732.81	\$	4,425.79	\$	21,286.94
W24x	55	75	4125	2.0625			\$	3,570.00	\$	8,099.44	\$	703.43	\$	1,595.91	\$	152.36	\$	345.67	\$	4,425.79	\$	10,041.01
W24x	68	118	8024	4.012			\$	3,570.00	\$	15,755.12	\$	703.43	\$	3,104.38	\$	152.36	\$	672.40	\$	4,425.79	\$	19,531.90
W24x	117	181	21177	10.5885			\$	3,570.00	\$	41,581.04	\$	703.43	\$	8,193.10	\$	152.36	\$	1,774.59	\$	4,425.79	\$	51,548.73
W24x	192	34	6528	3.264			\$	3,570.00	\$	12,817.73	\$	703.43	\$	2,525.60	\$	152.36	\$	547.03	\$	4,425.79	\$	15,890.36
W24x	250	14.75	3687.5	1.84375			\$	3,570.00	\$	7,240.41	\$	703.43	\$	1,426.64	\$	152.36	\$	309.01	\$	4,425.79	\$	8,976.06
W27x	94	162	15228	7.614			\$	3,570.00	\$	29,900.18	\$	703.43	\$	5,891.51	\$	152.36	\$	1,276.08	\$	4,425.79	\$	37,067.76
W33x	118	130.33	15378.94	7.68947			\$	3,570.00	\$	30,196.55	\$	703.43	\$	5,949.90	\$	152.36	\$	1,288.72	\$	4,425.79	\$	37,435.18
W36x	362	60	21720	10.86			\$	3,570.00	\$	42,647.22	\$	703.43	\$	8,403.17	\$	152.36	\$	1,820.09	\$	4,425.79	\$	52,870.49
W36x	487	25	12175	6.0875			\$	3,570.00	\$	23,905.61	\$	703.43	\$	4,710.34	\$	152.36	\$	1,020.24	\$	4,425.79	\$	29,636.20
W40x	503	53.33	26824.99	13.412495			\$	3,570.00	\$	52,670.87	\$	703.43	\$	10,378.23	\$	152.36	\$	2,247.88	\$	4,425.79	\$	65,296.97
PG1	110.44(ft^3)	490(lb/ft^3)	54115.6	27.0578			\$	3,570.00	\$	106,255.98	\$	703.43	\$	20,936.60	\$	152.36	\$	4,534.78	\$	4,425.79	\$	131,727.35
PG4	55(ft^3)	490(lb/ft^3)	26950	13.475			\$	3,570.00	\$	52,916.33	\$	703.43	\$	10,426.59	\$	152.36	\$	2,258.36	\$	4,425.79	\$	65,601.27
PG10	113.45(ft^3)	490(lb/ft^3)	55590.5	27.79525			\$	3,570.00	\$	109,151.95	\$	703.43	\$	21,507.21	\$	152.36	\$	4,658.37	\$	4,425.79	\$	135,317.53
PG11	560(ft^3)	490(lb/ft^3)	274400	137.2			\$	3,570.00	\$	538,784.40	\$	703.43	\$	106,161.66	\$	152.36	\$	22,994.17	\$	4,425.79	\$	667,940.23
<b>Subtotal: Level 10</b>		3186.33	619548.38	309.77419		309.77419	\$		\$	1,216,483.24	\$		\$	239,694.90	\$		\$	51,916.92	\$		\$	1,508,095.06
<b>Level 15</b>																						
W12x	14	153.33	2146.62	1.07331			\$	3,570.00	\$	4,214.89	\$	703.43	\$	830.50	\$	152.36	\$	179.88	\$	4,425.79	\$	5,225.27
W12x	26	22	572	0.286			\$	3,570.00	\$	1,123.12	\$	703.43	\$	221.30	\$	152.36	\$	47.93	\$	4,425.79	\$	1,392.35
W16x	26	99.33	2582.58	1.29129			\$	3,570.00	\$	5,070.90	\$	703.43	\$	999.17	\$	152.36	\$	216.42	\$	4,425.79	\$	6,286.48
W16x	40	12.75	510	0.255			\$	3,570.00	\$	1,001.39	\$	703.43	\$	197.31	\$	152.36	\$	42.74	\$	4,425.79	\$	1,241.43
W18x	35	138	4830	2.415			\$	3,570.00	\$	9,483.71	\$	703.43	\$	1,868.66	\$	152.36	\$	404.74	\$	4,425.79	\$	11,757.11
W21x	44	172	7568	3.784			\$	3,570.00	\$	14,859.77	\$	703.43	\$	2,927.96	\$	152.36	\$	634.18	\$	4,425.79	\$	18,421.91
W21x	50	587.5	29375	14.6875			\$	3,570.00	\$	57,677.81	\$	703.43	\$	11,364.79	\$	152.36	\$	2,461.57	\$	4,425.79	\$	71,504.17
W21x	68	133.5	9078	4.539			\$	3,570.00	\$	17,824.65	\$	703.43	\$	3,512.16	\$	152.36	\$	760.72	\$	4,425.79	\$	22,097.53
W24x	55	32.33	1778.15	0.889075			\$	3,570.00	\$	3,491.40	\$	703.43	\$	687.94	\$	152.36	\$	149.01	\$	4,425.79	\$	4,328.35
W24x	68	87	5916	2.958			\$	3,570.00	\$	11,616.07	\$	703.43	\$	2,288.82	\$	152.36	\$	495.75	\$	4,425.79	\$	14,400.64
W27x	84	79	6636	3.318			\$	3,570.00	\$	13,029.79	\$	703.43	\$	2,567.38	\$	152.36	\$	556.08	\$	4,425.79	\$	16,153.25
<b>Subtotal: Level 15</b>		1516.74	70992.35	35.496175		9	\$		\$	139,393.48	\$		\$	27,465.98	\$		\$	5,949.02	\$		\$	172,808.48
<b>Level 20</b>																						
W12x	14	202.75	2838.5	1.41925			\$	3,570.00	\$	5,573.39	\$	703.43	\$	1,098.18	\$	152.36	\$	237.86	\$	4,425.79	\$	6,909.43
W12x	26	21.33	554.58	0.27729			\$	3,570.00	\$	1,088.92	\$	703.43	\$	214.56	\$	152.36	\$	46.47	\$	4,425.79	\$	1,349.95
W16x	26	123.33	3206.58	1.60329			\$	3,570.00	\$	6,296.12	\$	703.43	\$	1,240.58	\$	152.36	\$	268.70	\$	4,425.79	\$	7,805.41
W16x	31	54.33	1684.23	0.842115			\$	3,570.00	\$	3,306.99	\$	703.43	\$	651.61	\$	152.36	\$	141.14	\$	4,425.79	\$	4,099.73
W16x	40	12.75	510	0.255			\$	3,570.00	\$	1,001.39	\$	703.43	\$	197.31	\$	152.36	\$	42.74	\$	4,425.79	\$	1,241.43
W18x	35	93.75	3281.25	1.640625			\$	3,570.00	\$	6,442.73	\$	703.43	\$	1,269.47	\$	152.36	\$	274.96	\$	4,425.79	\$	7,987.17
W21x	44	236.75	10417	5.2085			\$	3,570.00	\$	20,453.78	\$	703.43	\$	4,030.20	\$	152.36	\$	872.92	\$	4,425.79	\$	25,356.90
W21x	50	663.33	33166.5	16.58325			\$	3,570.00	\$	65,122.42	\$	703.43	\$	12,831.67	\$	152.36	\$	2,779.29	\$	4,425.79	\$	80,733.38
W21x	55	24.33	1338.15	0.669075			\$	3,570.00	\$	2,627.46	\$	703.43	\$	517.71	\$	152.36	\$	112.13	\$	4,425.79	\$	3,257.30
W21x	144	12.5	1800	0.9			\$	3,570.00	\$	3,534.30	\$	703.43	\$	696.40	\$	152.36	\$	150.84	\$	4,425.79	\$	4,381.53
W24x	55	32.33	1778.15	0.889075			\$	3,570.00	\$	3,491.40	\$	703.43	\$	687.94	\$	152.36	\$	149.01	\$	4,425.79	\$	4,328.35
W24x	68	77.33	5258.44	2.62922			\$	3,570.00	\$	10,324.95	\$	703.43	\$	2,034.42	\$	152.36	\$	440.65	\$	4,425.79	\$	12,800.01
W27x	84	63.33	5319.72	2.65986			\$	3,570.00	\$	10,445.27	\$	703.43	\$	2,058.13	\$	152.36	\$	445.78	\$	4,425.79	\$	12,949.18
W27x	129	37.33	4815.57	2.407785			\$	3,570.00	\$	9,455.37	\$	703.43	\$	1,863.08	\$	152.36	\$	403.54	\$	4,425.79	\$	11,721.99
<b>Subtotal: Level 20</b>		1655.47	75968.67	37.984335		10	\$		\$	149,164.48	\$		\$	29,391.25	\$		\$	6,366.02	\$		\$	184,921.76
<b>Roof</b>																						
W12x	14	118	1652	0.826			\$	3,570.00	\$	3,243.70	\$	703.43	\$	639.14	\$	152.36	\$	138.43	\$	4,425.79	\$	4,021.27
W12x	26	33.33	866.58	0.43329			\$	3,570.00	\$	1,701.53	\$	703.43	\$	335.27	\$	152.36	\$	72.62	\$	4,425.79	\$	2,109.42
W16x	26	20.33	528.58	0.26429			\$	3,570.00	\$	1,037.87	\$	703.43	\$	204.50	\$	152.36	\$	44.29	\$	4,425.79	\$	1,286.66
W18x	35	62.33	2181.55	1.090775			\$	3,570.00	\$	4,283.47	\$	703.43	\$	844.01	\$	152.36	\$	182.81	\$	4,425.79	\$	5,310.30
W18x	40	67.75	2710	1.355			\$	3,570.00	\$	5,321.09	\$	703.43	\$	1,048.46	\$	152.36	\$	227.09	\$	4,425.79	\$	6,596.64
W21x	44	168.75	7425	3.7125			\$	3,570.00	\$	14,578.99	\$	703.43	\$	2,872.63	\$	152.36	\$	622.20	\$	4,425.79	\$	18,073.82
W21x	50	72.75	3637.5	1.81875			\$	3,570.00	\$	7,142.23												

**Steel Column Estimate**

Shape/Description	Linear Weight (lb/ft)	Total Height (Ft)	Weight (lb)	Weight (Tons)	# Floors	Avg Ton	Material Cost/Unit	Material Cost	Labor Cost/Unit	Labor Cost	Equipment Cost/Unit	Equipment Cost	Total Cost/Unit	Total	Total/Floor
<b>Subcellar Lower Level 2</b>															
W14x	120	15	1800	0.9			\$ 3,570.00	\$ 3,534.30	\$ 703.43	\$ 696.40	\$ 152.36	\$ 150.84	\$ 4,425.79	\$ 4,381.53	
W14x	665	15	9975	4.9875			\$ 3,570.00	\$ 19,585.91	\$ 703.43	\$ 3,859.19	\$ 152.36	\$ 835.89	\$ 4,425.79	\$ 24,280.99	
W14x	90	15	1350	0.675			\$ 3,570.00	\$ 2,650.73	\$ 703.43	\$ 522.30	\$ 152.36	\$ 113.13	\$ 4,425.79	\$ 3,286.15	
W14x	26		13125	6.5625	1	6.5625		\$ 25,770.94		\$ 5,077.89		\$ 1,099.85		\$ 31,948.67	\$ 31,948.67
<b>Subtotal: Lower Level 2</b>															
<b>Cellar Lower Level 1</b>															
W14x	61	15	915	0.4575			\$ 3,570.00	\$ 1,796.60	\$ 703.43	\$ 354.00	\$ 152.36	\$ 76.68	\$ 4,425.79	\$ 2,227.28	
W14x	55	15	825	0.4125			\$ 3,570.00	\$ 1,619.89	\$ 703.43	\$ 319.18	\$ 152.36	\$ 69.13	\$ 4,425.79	\$ 2,008.20	
W14x	61	15	915	0.4575			\$ 3,570.00	\$ 1,796.60	\$ 703.43	\$ 354.00	\$ 152.36	\$ 76.68	\$ 4,425.79	\$ 2,227.28	
W14x	61	15	915	0.4575			\$ 3,570.00	\$ 1,796.60	\$ 703.43	\$ 354.00	\$ 152.36	\$ 76.68	\$ 4,425.79	\$ 2,227.28	
W14x	61	15	915	0.4575			\$ 3,570.00	\$ 1,796.60	\$ 703.43	\$ 354.00	\$ 152.36	\$ 76.68	\$ 4,425.79	\$ 2,227.28	
W14x	61	15	915	0.4575			\$ 3,570.00	\$ 1,796.60	\$ 703.43	\$ 354.00	\$ 152.36	\$ 76.68	\$ 4,425.79	\$ 2,227.28	
W14x	120	15	1800	0.9			\$ 3,570.00	\$ 3,534.30	\$ 703.43	\$ 696.40	\$ 152.36	\$ 150.84	\$ 4,425.79	\$ 4,381.53	
W14x	665	15	9975	4.9875			\$ 3,570.00	\$ 19,585.91	\$ 703.43	\$ 3,859.19	\$ 152.36	\$ 835.89	\$ 4,425.79	\$ 24,280.99	
W14x	90	15	1350	0.675			\$ 3,570.00	\$ 2,650.73	\$ 703.43	\$ 522.30	\$ 152.36	\$ 113.13	\$ 4,425.79	\$ 3,286.15	
W14x	426	15	6390	3.195			\$ 3,570.00	\$ 12,546.77	\$ 703.43	\$ 2,472.20	\$ 152.36	\$ 535.47	\$ 4,425.79	\$ 15,554.44	
<b>Subtotal: Lower Level 1</b>															
<b>Level 1</b>															
W14x	193	25	4825	2.4125			\$ 3,570.00	\$ 9,473.89	\$ 703.43	\$ 1,866.73	\$ 152.36	\$ 404.33	\$ 4,425.79	\$ 11,744.94	
W14x	500	25	12500	6.25			\$ 3,570.00	\$ 24,543.75	\$ 703.43	\$ 4,836.08	\$ 152.36	\$ 1,047.48	\$ 4,425.79	\$ 30,427.31	
W14x	455	25	11375	5.6875			\$ 3,570.00	\$ 22,334.81	\$ 703.43	\$ 4,400.83	\$ 152.36	\$ 953.20	\$ 4,425.79	\$ 27,688.85	
W14x	550	25	13750	6.875			\$ 3,570.00	\$ 26,998.13	\$ 703.43	\$ 5,319.69	\$ 152.36	\$ 1,152.22	\$ 4,425.79	\$ 33,470.04	
W14x	311	25	7775	3.8875			\$ 3,570.00	\$ 15,266.21	\$ 703.43	\$ 3,008.04	\$ 152.36	\$ 651.53	\$ 4,425.79	\$ 18,925.78	
W14x	550	25	13750	6.875			\$ 3,570.00	\$ 26,998.13	\$ 703.43	\$ 5,319.69	\$ 152.36	\$ 1,152.22	\$ 4,425.79	\$ 33,470.04	
W14x	61	25	1525	0.7625			\$ 3,570.00	\$ 2,994.34	\$ 703.43	\$ 590.00	\$ 152.36	\$ 127.79	\$ 4,425.79	\$ 3,712.13	
W14x	90	25	2250	1.125			\$ 3,570.00	\$ 4,417.88	\$ 703.43	\$ 870.49	\$ 152.36	\$ 188.55	\$ 4,425.79	\$ 5,476.92	
W14x	99	25	2475	1.2375			\$ 3,570.00	\$ 4,859.66	\$ 703.43	\$ 957.54	\$ 152.36	\$ 207.40	\$ 4,425.79	\$ 6,024.61	
W14x	665	25	16625	8.3125			\$ 3,570.00	\$ 32,643.19	\$ 703.43	\$ 6,431.99	\$ 152.36	\$ 1,393.14	\$ 4,425.79	\$ 40,468.32	
W14x	90	25	2250	1.125			\$ 3,570.00	\$ 4,417.88	\$ 703.43	\$ 870.49	\$ 152.36	\$ 188.55	\$ 4,425.79	\$ 5,476.92	
W14x	455	25	11375	5.6875			\$ 3,570.00	\$ 22,334.81	\$ 703.43	\$ 4,400.83	\$ 152.36	\$ 953.20	\$ 4,425.79	\$ 27,688.85	
W14x	342	25	8550	4.275			\$ 3,570.00	\$ 16,787.93	\$ 703.43	\$ 3,307.88	\$ 152.36	\$ 716.47	\$ 4,425.79	\$ 20,812.28	
W14x	90	25	2250	1.125			\$ 3,570.00	\$ 4,417.88	\$ 703.43	\$ 870.49	\$ 152.36	\$ 188.55	\$ 4,425.79	\$ 5,476.92	
W14x	342	25	8550	4.275			\$ 3,570.00	\$ 16,787.93	\$ 703.43	\$ 3,307.88	\$ 152.36	\$ 716.47	\$ 4,425.79	\$ 20,812.28	
W14x	233	25	5825	2.9125			\$ 3,570.00	\$ 11,437.39	\$ 703.43	\$ 2,253.61	\$ 152.36	\$ 488.12	\$ 4,425.79	\$ 14,179.12	
W14x	311	25	7775	3.8875			\$ 3,570.00	\$ 15,266.21	\$ 703.43	\$ 3,008.04	\$ 152.36	\$ 651.53	\$ 4,425.79	\$ 18,925.78	
W14x	120	25	3000	1.5			\$ 3,570.00	\$ 5,890.50	\$ 703.43	\$ 1,160.66	\$ 152.36	\$ 251.39	\$ 4,425.79	\$ 7,302.55	
<b>Subtotal: Level 1</b>															



<b>Level 5</b>																						
W14x	145	14.75	2138.75	1.069375			\$	3,570.00	\$	4,199.44	\$	703.43	\$	827.45	\$	152.36	\$	179.22	\$	4,425.79	\$	5,206.11
W14x	370	14.75	5457.5	2.72875			\$	3,570.00	\$	10,715.80	\$	703.43	\$	2,111.43	\$	152.36	\$	457.33	\$	4,425.79	\$	13,284.56
W14x	370	14.75	5457.5	2.72875			\$	3,570.00	\$	10,715.80	\$	703.43	\$	2,111.43	\$	152.36	\$	457.33	\$	4,425.79	\$	13,284.56
W14x	398	14.75	5870.5	2.93525			\$	3,570.00	\$	11,526.73	\$	703.43	\$	2,271.22	\$	152.36	\$	491.94	\$	4,425.79	\$	14,289.88
W14x	233	14.75	3436.75	1.718375			\$	3,570.00	\$	6,748.06	\$	703.43	\$	1,329.63	\$	152.36	\$	287.99	\$	4,425.79	\$	8,365.68
W14x	455	14.75	6711.25	3.355625			\$	3,570.00	\$	13,177.54	\$	703.43	\$	2,596.49	\$	152.36	\$	562.39	\$	4,425.79	\$	16,336.42
W14x	61	14.75	899.75	0.449875			\$	3,570.00	\$	1,766.66	\$	703.43	\$	348.10	\$	152.36	\$	75.40	\$	4,425.79	\$	2,190.16
W14x	74	14.75	1091.5	0.54575			\$	3,570.00	\$	2,143.16	\$	703.43	\$	422.29	\$	152.36	\$	91.47	\$	4,425.79	\$	2,656.91
W14x	550	14.75	8112.5	4.05625			\$	3,570.00	\$	15,928.89	\$	703.43	\$	3,138.62	\$	152.36	\$	679.81	\$	4,425.79	\$	19,747.32
W14x	311	14.75	4587.25	2.293625			\$	3,570.00	\$	9,007.07	\$	703.43	\$	1,774.75	\$	152.36	\$	384.40	\$	4,425.79	\$	11,166.21
W14x	311	14.75	4587.25	2.293625			\$	3,570.00	\$	9,007.07	\$	703.43	\$	1,774.75	\$	152.36	\$	384.40	\$	4,425.79	\$	11,166.21
W14x	61	14.75	899.75	0.449875			\$	3,570.00	\$	1,766.66	\$	703.43	\$	348.10	\$	152.36	\$	75.40	\$	4,425.79	\$	2,190.16
W14x	311	14.75	4587.25	2.293625			\$	3,570.00	\$	9,007.07	\$	703.43	\$	1,774.75	\$	152.36	\$	384.40	\$	4,425.79	\$	11,166.21
W14x	68	14.75	1003	0.5015			\$	3,570.00	\$	1,969.39	\$	703.43	\$	388.05	\$	152.36	\$	84.05	\$	4,425.79	\$	2,441.49
W14x	193	14.75	2846.75	1.423375			\$	3,570.00	\$	5,589.59	\$	703.43	\$	1,101.37	\$	152.36	\$	238.55	\$	4,425.79	\$	6,929.51
W14x	211	14.75	3112.25	1.556125			\$	3,570.00	\$	6,110.90	\$	703.43	\$	1,204.09	\$	152.36	\$	260.80	\$	4,425.79	\$	7,575.79
<b>Subtotal Level 5</b>			60799.5	30.39975	8	243.198		\$	119,379.82		\$	23,522.51		\$	5,094.88		\$	147,997.20		\$	1,183,977.60	
<b>Level 15</b>																						
W14x	342	14	4788	2.394			\$	3,570.00	\$	9,401.24	\$	703.43	\$	1,852.41	\$	152.36	\$	401.22	\$	4,425.79	\$	11,654.88
W14x	257	14	3598	1.799			\$	3,570.00	\$	7,064.67	\$	703.43	\$	1,392.02	\$	152.36	\$	301.51	\$	4,425.79	\$	8,758.20
W14x	257	14	3598	1.799			\$	3,570.00	\$	7,064.67	\$	703.43	\$	1,392.02	\$	152.36	\$	301.51	\$	4,425.79	\$	8,758.20
W14x	257	14	3598	1.799			\$	3,570.00	\$	7,064.67	\$	703.43	\$	1,392.02	\$	152.36	\$	301.51	\$	4,425.79	\$	8,758.20
W14x	145	14	2030	1.015			\$	3,570.00	\$	3,985.91	\$	703.43	\$	785.38	\$	152.36	\$	170.11	\$	4,425.79	\$	4,941.39
W14x	370	14	5180	2.59			\$	3,570.00	\$	10,170.93	\$	703.43	\$	2,004.07	\$	152.36	\$	434.07	\$	4,425.79	\$	12,609.08
W14x	193	14	2702	1.351			\$	3,570.00	\$	5,305.38	\$	703.43	\$	1,045.37	\$	152.36	\$	226.42	\$	4,425.79	\$	6,577.17
W14x	193	14	2702	1.351			\$	3,570.00	\$	5,305.38	\$	703.43	\$	1,045.37	\$	152.36	\$	226.42	\$	4,425.79	\$	6,577.17
W14x	145	14	2030	1.015			\$	3,570.00	\$	3,985.91	\$	703.43	\$	785.38	\$	152.36	\$	170.11	\$	4,425.79	\$	4,941.39
W14x	145	14	2030	1.015			\$	3,570.00	\$	3,985.91	\$	703.43	\$	785.38	\$	152.36	\$	170.11	\$	4,425.79	\$	4,941.39
W14x	109	14	1526	0.763			\$	3,570.00	\$	2,996.30	\$	703.43	\$	590.39	\$	152.36	\$	127.88	\$	4,425.79	\$	3,714.57
<b>Subtotal Level 15</b>			33782	16.891	9	152.019		\$	66,330.96		\$	13,069.80		\$	2,830.86		\$	82,231.62		\$	740,084.59	
<b>Level 20</b>																						
W14x	233	14	3262	1.631			\$	3,570.00	\$	6,404.94	\$	703.43	\$	1,262.02	\$	152.36	\$	273.35	\$	4,425.79	\$	7,940.31
W14x	176	14	2464	1.232			\$	3,570.00	\$	4,838.06	\$	703.43	\$	953.29	\$	152.36	\$	206.48	\$	4,425.79	\$	5,997.83
W14x	176	14	2464	1.232			\$	3,570.00	\$	4,838.06	\$	703.43	\$	953.29	\$	152.36	\$	206.48	\$	4,425.79	\$	5,997.83
W14x	176	14	2464	1.232			\$	3,570.00	\$	4,838.06	\$	703.43	\$	953.29	\$	152.36	\$	206.48	\$	4,425.79	\$	5,997.83
W14x	90	14	1260	0.63			\$	3,570.00	\$	2,474.01	\$	703.43	\$	487.48	\$	152.36	\$	105.59	\$	4,425.79	\$	3,067.07
W14x	342	14	4788	2.394			\$	3,570.00	\$	9,401.24	\$	703.43	\$	1,852.41	\$	152.36	\$	401.22	\$	4,425.79	\$	11,654.88
W14x	176	14	2464	1.232			\$	3,570.00	\$	4,838.06	\$	703.43	\$	953.29	\$	152.36	\$	206.48	\$	4,425.79	\$	5,997.83
W14x	370	14	5180	2.59			\$	3,570.00	\$	10,170.93	\$	703.43	\$	2,004.07	\$	152.36	\$	434.07	\$	4,425.79	\$	12,609.08
W14x	132	14	1848	0.924			\$	3,570.00	\$	3,628.55	\$	703.43	\$	714.97	\$	152.36	\$	154.86	\$	4,425.79	\$	4,498.37
W14x	90	14	1260	0.63			\$	3,570.00	\$	2,474.01	\$	703.43	\$	487.48	\$	152.36	\$	105.59	\$	4,425.79	\$	3,067.07
W14x	109	14	1526	0.763			\$	3,570.00	\$	2,996.30	\$	703.43	\$	590.39	\$	152.36	\$	127.88	\$	4,425.79	\$	3,714.57
W14x	159	14	2226	1.113			\$	3,570.00	\$	4,370.75	\$	703.43	\$	861.21	\$	152.36	\$	186.53	\$	4,425.79	\$	5,418.49
W14x	90	14	1260	0.63			\$	3,628.80	\$	2,514.76	\$	703.43	\$	487.48	\$	152.36	\$	105.59	\$	4,484.59	\$	3,107.82
<b>Subtotal Level 20</b>			32466	16.233	10	162.33		\$	63,787.74		\$	12,560.66		\$	2,720.59		\$	79,068.98		\$	790,689.82	
<b>Final Totals</b>			301512.5	150.75625		644.7795		\$	592,060.54		\$	116,651.12		\$	25,266.14		\$	733,977.80		\$	3,139,432.01	

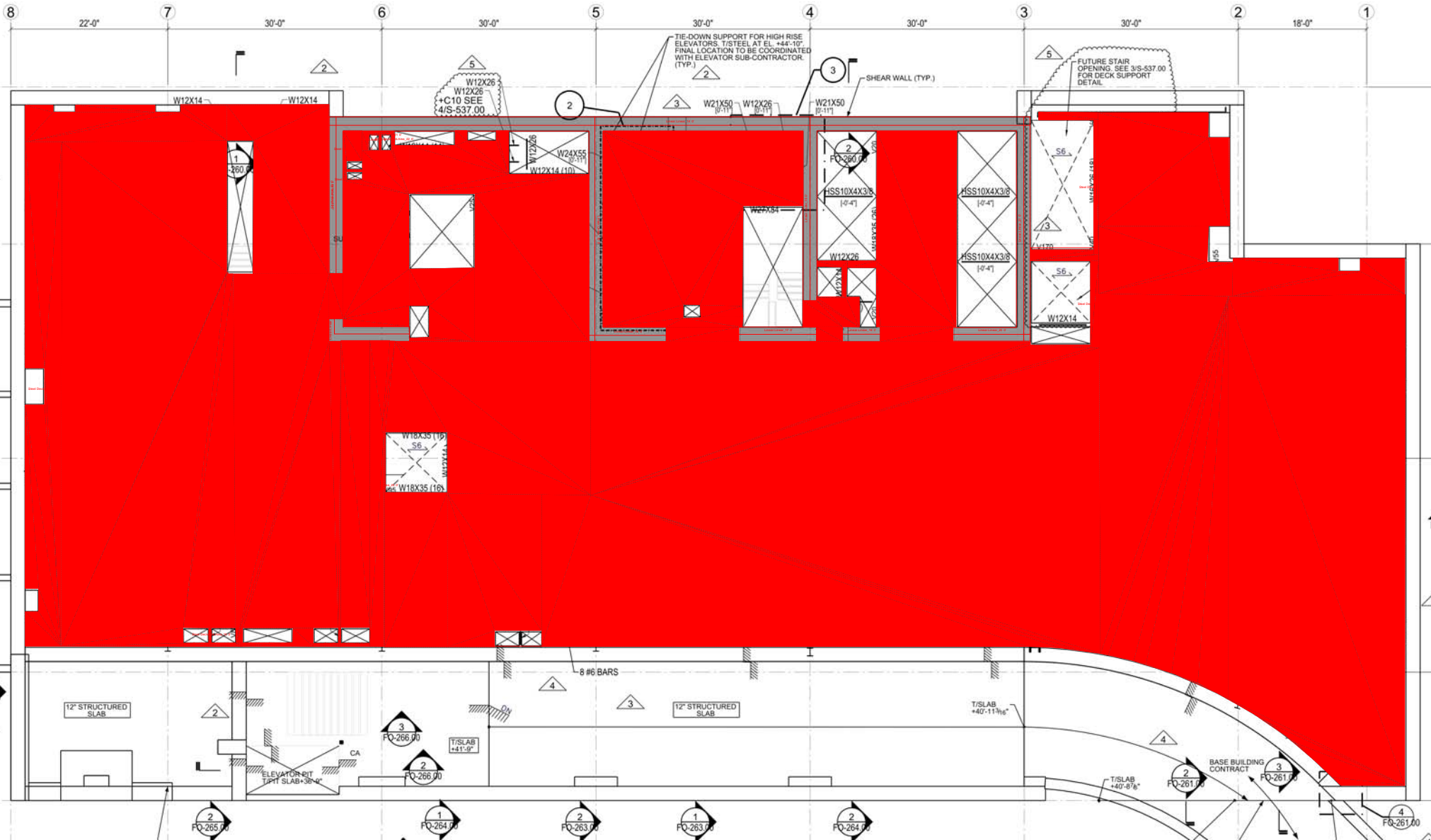
**Steel Decking Estimate**

Shape/Description	SF	# Floors	Mark	-	-2	-3	Material Cost/Unit	Material Cost	Labor Cost/Unit	Labor Cost	Equipment Cost/Unit	Equipment Cost	Total/Unit	Column1	Total/Floor
<b>Lower Level 1</b>															
3"-18 GA	12,604.74	2	S6				\$ 3.25	\$ 81,930.78	\$ 0.86	\$ 21,680.14	\$ 0.06	\$ 1,512.57	\$ 4.17	\$ 105,123.49	\$ 105,123.49
<b>Level 1</b>															
3"-18 GA	14,310.33	1	S1				\$ 3.25	\$ 46,508.58	\$ 0.86	\$ 12,306.89	\$ 0.06	\$ 858.62	\$ 4.17	\$ 59,674.08	
3"-18 GA	1,058.92	1	S6				\$ 3.25	\$ 3,441.48	\$ 0.86	\$ 910.67	\$ 0.06	\$ 63.54	\$ 4.17	\$ 4,415.69	
															\$ 64,089.77
<b>Level 3</b>															
3"-16 GA	13,991.12	1	S5				\$ 4.33	\$ 60,581.53	\$ 0.90	\$ 12,592.00	\$ 0.06	\$ 839.47	\$ 5.29	\$ 74,013.00	\$ 74,013.00
<b>Level 5</b>															
3" 18 GA	14,648.54	6	S1				\$ 3.25	\$ 285,646.59	\$ 0.86	\$ 75,586.48	\$ 0.06	\$ 5,273.48	\$ 4.17	\$ 366,506.55	\$ 366,506.55
<b>Level 6</b>															
3"-16 GA	14,613.30	1	S5				\$ 4.33	\$ 63,275.58	\$ 0.90	\$ 13,151.97	\$ 0.06	\$ 876.80	\$ 5.29	\$ 77,304.34	\$ 77,304.34
<b>Level 10</b>															
3"-16 GA	15,041.08	1	S5				\$ 4.33	\$ 65,127.86	\$ 0.90	\$ 13,536.97	\$ 0.06	\$ 902.46	\$ 5.29	\$ 79,567.29	\$ 79,567.29
<b>Level 15</b>															
3-18" GA	9,457.81	9	S2				\$ 3.25	\$ 276,640.88	\$ 0.86	\$ 73,203.43	\$ 0.06	\$ 5,107.22	\$ 4.17	\$ 354,951.53	\$ 354,951.53
<b>Level 20</b>															
3-18" GA	9,915.49	10	S2				\$ 3.25	\$ 322,253.52	\$ 0.86	\$ 85,273.24	\$ 0.06	\$ 5,949.30	\$ 4.17	\$ 413,476.06	\$ 413,476.06
<b>Roof</b>															
3"-18 GA	5,559.70	1	S8				\$ 3.25	\$ 18,069.03	\$ 0.86	\$ 4,781.34	\$ 0.06	\$ 333.58	\$ 4.17	\$ 23,183.96	\$ 23,183.96
<b>Final Totals</b>								\$ 1,223,475.83		\$ 313,023.14		\$ 21,717.02		\$ 1,558,215.99	\$ 1,558,215.99

Totals						2566.922838		\$ 4,282,914.60		\$ 993,090.26				Structural Steel Subtotal	\$ 14,120,814.45
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*Appendix B2: Detailed Concrete Takeoff*

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Concrete Slab Estimate																
Column1	Area(ft²)	Slab Thickness (ft)	CY	Material Cost/Unit	Material Cost	Labor Cost/Unit	Labor Cost	Equipment Cost/Unit	Equipment Cost	Finishing Labor	Finishing Cost	Total	# Floors	Total2		
Cellar Lower Level 1	12604.735	0.75	350.1311776	\$ 109.65	\$ 38,391.88	\$ 77.36	\$ 27,086.15	\$ 18.66	\$ 6,533.45	\$ 1.42	\$ 72,011.48	\$ 144,022.96	2	\$ 288,045.92		
Level 1	14295.578	0.5	264.7326612	\$ 109.65	\$ 29,027.94	\$ 77.36	\$ 20,479.72	\$ 18.66	\$ 4,939.91	\$ 1.42	\$ 54,447.57	\$ 108,895.13	1	\$ 108,895.13		
Level 3	13991.115	0.667	24.76511705	\$ 109.65	\$ 2,715.50	\$ 77.36	\$ 1,915.83	\$ 18.66	\$ 462.12	\$ 1.42	\$ 5,093.44	\$ 10,186.88	1	\$ 10,186.88		
Level 5	14648.543	0.5	345.6320138	\$ 109.65	\$ 37,898.55	\$ 77.36	\$ 26,738.09	\$ 18.66	\$ 6,449.49	\$ 1.42	\$ 71,086.14	\$ 142,172.27	1	\$ 142,172.27		
Level 6	14613.297	0.5	271.2690435	\$ 109.65	\$ 29,744.65	\$ 77.36	\$ 20,985.37	\$ 18.66	\$ 5,061.88	\$ 1.42	\$ 55,791.90	\$ 111,583.81	6	\$ 669,502.85		
Level 10	15041.076	0.5	270.6163405	\$ 109.65	\$ 29,673.08	\$ 77.36	\$ 20,934.88	\$ 18.66	\$ 5,049.70	\$ 1.42	\$ 55,657.66	\$ 111,315.33	1	\$ 111,315.33		
Level 15	9442.787	0.4583	278.5381659	\$ 109.65	\$ 30,541.71	\$ 77.36	\$ 21,547.71	\$ 18.66	\$ 5,197.52	\$ 1.42	\$ 57,286.94	\$ 114,573.89	1	\$ 114,573.89		
Level 20	9915.493	0.4583	160.2824057	\$ 109.65	\$ 17,574.97	\$ 77.36	\$ 12,399.45	\$ 18.66	\$ 2,990.87	\$ 1.42	\$ 32,965.28	\$ 65,930.56	9	\$ 593,375.08		
Roof	5559.702	0.5	168.3061444	\$ 109.65	\$ 18,454.77	\$ 77.36	\$ 13,020.16	\$ 18.66	\$ 3,140.59	\$ 1.42	\$ 34,615.52	\$ 69,231.05	10	\$ 692,310.49		
Subtotals			2237.230411	\$	245,312.31	\$	173,072.14	\$	41,746.72	\$	460,131.18	\$	920,262.36	\$	2,772,728.32	

Reinforcing																
Column1	Area(ft²)	# of Bars	Span	LF	Weight(lb/ft)	Ton	CSF	Material Cost/Unit	Material Cost	Labor Cost/Unit	Labor Cost	Total	# Floors	Total2		
Cellar Lower Level 1	12604.735	WWF6x6-W2.9xW2.9					\$	699.75	\$ 23.31	\$ 16,311.17	\$ 103.30	\$ 72,284.18	\$ 88,595.35	2	\$ 177,190.70	
Level 1	14295.578	WWF 6x6-W1.4xW1.4					\$	506.72	\$ 15.13	\$ 7,666.61	\$ 86.38	\$ 43,770.13	\$ 51,436.74	1	\$ 51,436.74	
Level 3	13991.115	#4@12" T&B Parallel To Deck	6	36	216.00	0.67	\$	1,163.48	\$ 83.94	\$ 1,032.90	\$ 74.52	\$ 158.46	\$ 158.46	1	\$ 158.46	
Level 5	14648.543	#4@12" One Layer Perp To Deck	3	36	108.00	0.67	\$	1,163.48	\$ 41.97	\$ 1,032.90	\$ 37.26	\$ 79.23	\$ 79.23	1	\$ 79.23	
Level 6	14613.297	#4@12" Each Way T&B	100	190	19,000.00	6.35	\$	1,163.48	\$ 7,383.44	\$ 1,032.90	\$ 6,554.78	\$ 13,938.23	1	\$ 13,938.23		
Level 10	15041.076	#4@12" Each Way T&B	100	190	19,000.00	6.35	\$	1,163.48	\$ 7,383.44	\$ 1,032.90	\$ 6,554.78	\$ 13,938.23	1	\$ 13,938.23		
Level 15	9442.787	WWF 6x6-W1.4xW1.4	100	190	19,000.00	6.35	\$	1,163.48	\$ 7,383.44	\$ 1,032.90	\$ 6,554.78	\$ 13,938.23	1	\$ 13,938.23		
Level 20	9915.493	#4@12" Each Way T&B	100	190	19,000.00	6.35	\$	1,163.48	\$ 7,383.44	\$ 1,032.90	\$ 6,554.78	\$ 13,938.23	1	\$ 13,938.23		
Roof	5559.702	WWF 6x6-W1.4xW1.4	100	190	19,000.00	6.35	\$	1,163.48	\$ 7,383.44	\$ 1,032.90	\$ 6,554.78	\$ 13,938.23	1	\$ 13,938.23		
Subtotals							\$	76.26	\$ 134,233.90	\$	297,914.21	\$	1,266,266.05			

Foundation Estimate																
Column1	Wall Thickness (ft)	Span (ft)	Height	CY	Material Cost/Unit	Material Cost	Labor Cost/Unit	Labor Cost	Equipment Cost/Unit	Equipment Cost	Column2	# Floors	Column3	Total		
Lower Level 2	2	520.121	10	390	\$ 161.25	\$ 62,887.50	\$ 410.10	\$ 159,939.00	\$ 21.26	\$ 8,291.40		2		\$ 231,117.90		
Lower Level 2	Reinforcing	Height (ft)	Span	# of Bars	Rod Weight	Ton	Material Cost/Unit	Material Cost	Labor Cost/Unit	Labor Cost	Total	# Floors				
	#9	15	520	520	3.4	13.26	\$ 1,163.48	\$ 15,427.74	\$ 751.20	\$ 9,960.91	\$ 25,388.66	2		\$ 50,777.31		
	#11	15	520	520	5.313	20.7207	\$ 1,163.48	\$ 24,108.12	\$ 751.20	\$ 15,565.39	\$ 39,673.51	2		\$ 79,347.02		
	#5	520	520	76	1.043	20.60968	\$ 1,163.48	\$ 23,978.95	\$ 995.34	\$ 20,513.64	\$ 44,492.59	2		\$ 88,985.18		
						54.59038	\$	63,514.82	\$	46,039.94	\$ 109,554.76			\$ 450,227.41		

Footings Estimate																
Column1	Footing Description	Length (ft)	Width (ft)	Height (ft)	CY	Material Cost/Unit	Material Cost	Labor Cost/Unit	Labor Cost	Equipment Cost/Unit	Equipment Cost	# of Footings	Total Cost/Unit	Total		
Lower Level 2	F4	4	4	3	1.777777778	\$ 211.78	\$ 376.50	\$ 235.95	\$ 419.47	\$ 6.77	\$ 12.04	4	\$ 808.00	\$ 3,232.00		
	F5	5	5	3	2.777777778	\$ 211.78	\$ 588.28	\$ 235.95	\$ 655.42	\$ 6.77	\$ 18.81	2	\$ 1,262.50	\$ 2,525.00		
	F10.5	10.5	10.5	4.5	18.375	\$ 192.43	\$ 3,535.90	\$ 147.68	\$ 2,713.62	\$ 6.40	\$ 117.60	1	\$ 6,367.12	\$ 6,367.12		
	F11.5	11.5	11.5	6.5	31.83796296	\$ 192.43	\$ 6,126.58	\$ 147.68	\$ 4,701.83	\$ 6.40	\$ 203.76	1	\$ 11,032.17	\$ 11,032.17		
	RC5.2	5	3	3	1.666666667	\$ 211.78	\$ 352.97	\$ 235.95	\$ 393.25	\$ 6.77	\$ 11.28	1	\$ 757.50	\$ 757.50		
	RC6	6	3	3	3.333333333	\$ 211.78	\$ 705.93	\$ 235.95	\$ 786.50	\$ 6.77	\$ 22.57	1	\$ 1,515.00	\$ 1,515.00		
	RC9.5	9.5	3	3	5.277777778	\$ 211.78	\$ 1,117.73	\$ 235.95	\$ 1,245.29	\$ 6.77	\$ 35.73	1	\$ 2,398.75	\$ 2,398.75		
	RC12	12	3	4.5	6	\$ 211.78	\$ 1,270.68	\$ 235.95	\$ 1,415.70	\$ 6.77	\$ 40.62	1	\$ 2,727.00	\$ 2,727.00		
	RC15.5	15.5	7	5	20.09259259	\$ 192.43	\$ 3,866.42	\$ 147.68	\$ 2,967.27	\$ 6.40	\$ 128.59	1	\$ 6,962.28	\$ 6,962.28		
	RC18.5	18.5	7	6	28.77777778	\$ 192.43	\$ 5,537.71	\$ 147.68	\$ 4,249.90	\$ 6.40	\$ 184.18	1	\$ 9,971.79	\$ 9,971.79		
					119.9166667	\$	23,478.69	\$	19,548.25	\$	775.18		\$ 43,802.12	\$ 47,488.62		
	Reinforcement	#Bars	Span (ft)	LF	Weight	Ton	Material Cost/Unit	Material Cost	Labor Cost/Unit	Labor Cost	# of Footings	Total Cost/Unit	Total			
	F4	# 8 Each Way	8	40	2.67	0.0534	\$ 1,163.48	\$ 62.13	\$ 1,032.90	\$ 55.16	4	\$ 117.29	\$ 469.15			
	F5	# 8 Each Way	10	60	2.67	0.0801	\$ 1,163.48	\$ 93.19	\$ 1,032.90	\$ 82.74	2	\$ 175.93	\$ 351.86			
	F10.5	#10 Each Way	12	252	4.303	0.542178	\$ 1,163.48	\$ 630.81	\$ 1,032.90	\$ 560.02	1	\$ 1,190.83	\$ 1,190.83			
	F11.5	#10 Each Way	17	391	4.303	0.8412365	\$ 1,163.48	\$ 978.76	\$ 1,032.90	\$ 868.91	1	\$ 1,847.68	\$ 1,847.68			
	RC5.2	# 8	8	64	2.67	0.08544	\$ 1,163.48	\$ 309.41	\$ 1,032.90	\$ 88.25	1	\$ 187.66	\$ 187.66			
	RC6	# 8	11	143	2.67	0.199005	\$ 1,163.48	\$ 312.11	\$ 1,032.90	\$ 197.19	1	\$ 419.30	\$ 419.30			
	RC9.5	# 10	14.5	261	4.303	0.5615415	\$ 1,163.48	\$ 503.34	\$ 1,032.90	\$ 580.02	1	\$ 1,233.36	\$ 1,233.36			
	RC12	# 10	19	285	4.303	0.6131775	\$ 1,163.48	\$ 503.34	\$ 1,032.90	\$ 633.35	1	\$ 1,346.77	\$ 1,346.77			
	RC15.5	# 11	22.5	742.5	5.313	1.97245125	\$ 1,163.48	\$ 2,294.91	\$ 1,032.90	\$ 2,037.34	1	\$ 4,332.25	\$ 4,332.25			
	RC18.5	# 11	25.5	1020	5.313	2.70963	\$ 1,163.48	\$ 3,152.60	\$ 1,032.90	\$ 2,798.78	1	\$ 5,951.38	\$ 5,951.38			
						7.65005975	\$	8,900.69	\$	7,901.75	\$	16,802.44	\$ 17,330.23			

Concrete Column Estimate																
Column1	Column Description	W (ft)	D (ft)	Height (ft)	CY	Material Cost/Unit	Material Cost	Labor Cost/Unit	Labor Cost	Equipment Cost/Unit	Equipment Cost	# of Columns	Total Cost/Unit	Column2		
Lower Level 2	C1	3	3	30	10	\$ 736.38	\$ 7,363.80	\$ 1,199.86	\$ 11,998.60	\$ 66.63	\$ 666.30	8	\$ 20,028.70	\$ 160,229.60		
	C2	3.5	3.5	30	13.61111111	\$ 736.38	\$ 10,022.95	\$ 1,199.86	\$ 16,331.43	\$ 66.63	\$ 906.91	1	\$ 27,261.29	\$ 27,261.29		
	C3	4	4	30	17.77777778	\$ 736.38	\$ 13,091.20	\$ 1,199.86	\$ 21,330.84	\$ 66.63	\$ 1,184.53	1	\$ 35,606.58	\$ 35,606.58		
	C6	5	3.5	30	19.44444444	\$ 736.38	\$ 14,318.50	\$ 1,199.86	\$ 23,330.61	\$ 66.63	\$ 1,295.58	1	\$ 38,944.69	\$ 38,944.69		
	C7	5	4.5	30	25	\$ 736.38	\$ 18,409.50	\$ 1,199.86	\$ 29,996.50	\$ 66.63	\$ 1,665.75	1	\$ 50,071.75	\$ 50,071.75		
	C11	3.5	3	30	11.66666667	\$ 736.38	\$ 8,591.10	\$ 1,199.86	\$ 13,998.37	\$ 66.63	\$ 777.35	1	\$ 23,366.82	\$ 23,366.82		
					97.5		\$ 71,797.05		\$ 116,986.35		\$ 6,496.43		\$ 195,279.83	\$ 335,480.73		
Reinforcement																
Column1	#Bars	# Ties	Span (ft)	LF	Weight of Rods	Weight of Ties	Total Ton	Material Cost/Unit	Material Cost	Labor Cost/Unit	Labor Cost	# of Columns	Total			
C1	8	20	30	240	4.303	0.67	0.52	\$ 1,163.48	\$ 608.55	\$ 1,032.90	\$ 540.25	8	\$ 9,190.36			
C2	8	20	30	240	5.313	0.67	0.64	\$ 1,163.48	\$ 749.56	\$ 1,032.90	\$ 665.44	1	\$ 1,415.00			
C3	16	20	30	480	5.313	0.67	1.28	\$ 1,163.48	\$ 1,491.35	\$ 1,032.90	\$ 1,323.97	1	\$ 2,815.32			
C6	14	20	30	420	5.313	0.67	1.12	\$ 1,163.48	\$ 1,305.90	\$ 1,032.90	\$ 1,159.34	1	\$ 2,465.24			
C7	18	20	30	540	5.313	0.67	1.44	\$ 1,163.48	\$ 1,676.80	\$ 1,032.90	\$ 1,488.61	1	\$ 3,165.40			
C11	10	20	30	300	4.303	0.67	0.65	\$ 1,163.48	\$ 758.74	\$ 1,032.90	\$ 673.59	1	\$ 1,432.33			
							5.66		\$ 6,590.89		\$ 5,851.18		\$ 20,483.64			

Concrete Core Estimate																
Column1	Wall Thickness (ft)	Span (ft)	Height	CY	Material Cost/Unit	Material Cost	Labor Cost/Unit	Labor Cost	Equipment Cost/Unit	Equipment Cost	Total Cost/Unit	# Floors	Column2	Total		
Core Wall 1	2	12	15	13.33333333	\$ 322.50	\$ 4,300.00	\$ 877.21	\$ 11,696.13	\$ 57.76	\$ 770.13	\$ 16,766.27					
Core Wall 2	2	32	15	35.55555556	\$ 322.50	\$ 11,466.67	\$ 877.21	\$ 31,189.69	\$ 57.76	\$ 2,053.69	\$ 44,710.04					
Core Wall 3	2	100	15	111.1111111	\$ 322.50	\$ 35,833.33	\$ 877.21	\$ 97,467.78	\$ 57.76	\$ 6,417.78	\$ 139,718.89					
Core Wall 4	2	12	15	13.33333333	\$ 322.50	\$ 4,300.00	\$ 877.21	\$ 11,696.13	\$ 57.76	\$ 770.13	\$ 16,766.27					
Core Wall 5	2	32	15	35.55555556	\$ 322.50	\$ 11,466.67	\$ 877.21	\$ 31,189.69	\$ 57.76	\$ 2,053.69	\$ 44,710.04					
Core Wall 6	2	12	15	13.33333333	\$ 322.50	\$ 4,300.00	\$ 877.21	\$ 11,696.13	\$ 57.76	\$ 770.13	\$ 16,766.27					
Core Wall 7	2	26	15	28.88888889	\$ 322.50	\$ 9,316.67	\$ 877.21	\$ 25,341.62	\$ 57.76	\$ 1,668.62	\$ 36,326.91					
Core Wall 8	2	5	15	5.55555556	\$ 322.50	\$ 1,791.67	\$ 877.21	\$ 4,873.39	\$ 57.76	\$ 320.89	\$ 6,985.94					
Core Wall 9	2	12	15	13.33333333	\$ 322.50	\$ 4,300.00	\$ 877.21	\$ 11,696.13	\$ 57.76	\$ 770.13	\$ 16,766.27					
Core Wall 10	2	32	15	35.55555556	\$ 322.50	\$ 11,466.67	\$ 877.21	\$ 31,189.69	\$ 57.76	\$ 2,053.69	\$ 44,710.04					
				305.5555556		\$ 98,541.67		\$ 268,036.39		\$ 17,648.89	\$ 384,226.94	22		\$ 8,452,992.78		
Core Wall 1	2	8	15	8.88888889	\$ 322.50	\$ 2,866.67	\$ 877.21	\$ 7,797.42	\$ 57.76	\$ 513.42	\$ 11,177.51					
Core Wall 2	2	32	15	35.55555556	\$ 322.50	\$ 11,466.67	\$ 877.21	\$ 31,189.69	\$ 57.76	\$ 2,053.69	\$ 44,710.04					
Core Wall 3	2	36	15	40	\$ 322.50	\$ 12,900.00	\$ 877.21	\$ 35,088.40	\$ 57.76	\$ 2,310.40	\$ 50,298.80					
Core Wall 4	2	12	15	13.33333333	\$ 322.50	\$ 4,300.00	\$ 877.21	\$ 11,696.13	\$ 57.76	\$ 770.13	\$ 16,766.27					
Core Wall 5	2	32	15	35.55555556	\$ 322.50	\$ 11,466.67	\$ 877.21	\$ 31,189.69	\$ 57.76	\$ 2,053.69	\$ 44,710.04					
Core Wall 6	2	12	15	13.33333333	\$ 322.50	\$ 4,300.00	\$ 877.21	\$ 11,696.13	\$ 57.76	\$ 770.13	\$ 16,766.27					
Core Wall 7	2	12	15	13.33333333	\$ 322.50	\$ 4,300.00	\$ 877.21	\$ 11,696.13	\$ 57.76	\$ 770.13	\$ 16,766.27					
Core Wall 8	2	26	15	28.88888889	\$ 322.50	\$ 9,316.67	\$ 877.21	\$ 25,341.62	\$ 57.76	\$ 1,668.62	\$ 36,326.91					
Core Wall 9	2	10	15	11.11111111	\$ 322.50	\$ 3,583.33	\$ 877.21	\$ 9,746.78	\$ 57.76	\$ 641.78	\$ 13,971.89					
				200		\$ 64,500.00		\$ 175,442.00		\$ 11,552.00	\$ 251,494.00	14		\$ 3,520,916.00		
Reinforcement																
Column1	#Bars	# Ties	Span (ft)	LF	Weight of Rods	Weight of Ties	Total Ton	Material Cost/Unit	Material Cost	Labor Cost/Unit	Labor Cost	# of Floors	Total			
Core Wall 1	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	36	18	12	864	4.443	0.668	1,925388	\$ 1,163.48	\$ 2,240.15	\$ 1,032.90		\$ 1,988.73			
Core Wall 2	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	36	18	32	2304	4.443	0.668	5,124348	\$ 1,163.48	\$ 5,962.08	\$ 1,032.90		\$ 5,292.94			
Core Wall 3	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	36	18	100	7200	4.443	0.668	16,000812	\$ 1,163.48	\$ 18,616.62	\$ 1,032.90		\$ 16,527.24			
Core Wall 4	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	36	18	12	864	4.443	0.668	1,925388	\$ 1,163.48	\$ 2,240.15	\$ 1,032.90		\$ 1,988.73			
Core Wall 5	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	36	18	32	2304	4.443	0.668	5,124348	\$ 1,163.48	\$ 5,962.08	\$ 1,032.90		\$ 5,292.94			
Core Wall 6	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	36	18	12	864	4.443	0.668	1,925388	\$ 1,163.48	\$ 2,240.15	\$ 1,032.90		\$ 1,988.73			
Core Wall 7	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	36	18	26	1872	4.443	0.668	4,16466	\$ 1,163.48	\$ 4,845.50	\$ 1,032.90		\$ 4,301.68			
Core Wall 8	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	36	18	5	360	4.443	0.668	0,805752	\$ 1,163.48	\$ 937.48	\$ 1,032.90		\$ 832.26			
Core Wall 9	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	36	18	12	864	4.443	0.668	1,925388	\$ 1,163.48	\$ 2,240.15	\$ 1,032.90		\$ 1,988.73			
Core Wall 10	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	36	18	32	2304	4.443	0.668	5,124348	\$ 1,163.48	\$ 5,962.08	\$ 1,032.90		\$ 5,292.94			
								44,04582		\$ 51,246.43		22	\$ 45,494.93	\$ 2,128,309.88		
Core Wall 1	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	36	18	8	576	4.443	0.668	1,285596	\$ 1,163.48	\$ 1,495.77	\$ 1,032.90		\$ 1,327.89			
Core Wall 2	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	36	18	32	3456	4.443	0.668	7,683516	\$ 1,163.48	\$ 8,939.62	\$ 1,032.90		\$ 7,936.30			
Core Wall 3	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	54	18	36	3888	4.443	0.668	8,643204	\$ 1,163.48	\$ 10,056.19	\$ 1,032.90		\$ 8,927.57			
Core Wall 4	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	54	18	12	1296	4.443	0.668	2,885076	\$ 1,163.48	\$ 3,356.73	\$ 1,032.90		\$ 2,980.00			
Core Wall 5	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	54	18	32	3456	4.443	0.668	7,683516	\$ 1,163.48	\$ 8,939.62	\$ 1,032.90		\$ 7,936.30			
Core Wall 6	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	54	18	12	1296	4.443	0.668	2,885076	\$ 1,163.48	\$ 3,356.73	\$ 1,032.90		\$ 2,980.00			
Core Wall 7	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	54	18	12	1296	4.443	0.668	2,885076	\$ 1,163.48	\$ 3,356.73	\$ 1,032.90		\$ 2,980.00			
Core Wall 8	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	54	18	26	2808	4.443	0.668	6,243984	\$ 1,163.48	\$ 7,264.75	\$ 1,032.90		\$ 6,449.41			
Core Wall 9	# 9 Vertical EF # 5 Horizontal EF # 4 Ties	54	18	10	1080	4.443	0.668	2,405232	\$ 1,163.48	\$ 2,798.44	\$ 1,032.90		\$ 2,484.36			
								42,600276		\$ 49,564.57		14	\$ 44,001.83	\$ 1,309,929.52		

Final Totals

3350.202633

230.81

\$ 20,553,271.07

*Appendix C1: Mechanical Assemblies Takeoff*

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Mechanical Assemblies Estimate

Description	Quantity	Unit	Material/Unit	Material Cost	Installation/Unit	Installation Cost	Total unit cost	# Floors	Total Cost
<b>Condensing Boilers (BMK-3.0) 64x28x78, 2250 MBH, 2580 lbs</b>		7 EA	\$ 33,245.90	\$ 232,721.30	\$ 16,981.68	\$ 118,871.76	\$ 351,593.06	1	\$ 351,593.06
<b>Heating/Ventilation and Air Conditioning Systems</b>									
9000 CFM AHU Cool/Heat Coils	1	EA	\$ 36,709.46	\$ 36,709.46	\$ 15,448.96	\$ 15,448.96	\$ 52,158.42	1	\$ 52,158.42
7500 CFM AHU Cool/Heat Coils	1	EA	\$ 32,925.15	\$ 32,925.15	\$ 14,082.81	\$ 14,082.81	\$ 47,007.96	1	\$ 47,007.96
80000 CFM AHU Cool/Heat Coils	1	EA	\$ 354,908.00	\$ 354,908.00	\$ 102,911.20	\$ 102,911.20	\$ 457,819.20	1	\$ 457,819.20
10500 CFM AHU Cool/Heat Coils	1	EA	\$ 42,524.82	\$ 42,524.82	\$ 16,944.34	\$ 16,944.34	\$ 59,469.16	1	\$ 59,469.16
<b>Electical Drive Centrifugal Chiller, Water cooled, Standard Controls</b>	2	EA	\$ 347,736.79	\$ 695,473.58	\$ 73,853.80	\$ 147,707.60	\$ 843,181.18	1	\$ 843,181.18
<b>Expansion Tanks (1000 L)</b>	5	EA	\$ 9,141.00	\$ 45,705.00	\$ 386.51	\$ 1,932.55	\$ 47,637.55	1	\$ 47,637.55
<b>Chilled Water Packaged AHU (16,000 CFM)</b>	1	EA	\$ 85,164.40	\$ 85,164.40	\$ 22,743.12	\$ 22,743.12	\$ 107,907.52	26	\$ 2,805,595.52
<b>Chilled Water Packaged AHU (25,000 CFM)</b>	1	EA	\$ 109,485.25	\$ 109,485.25	\$ 28,208.80	\$ 28,208.80	\$ 137,694.05	2	\$ 275,388.10
							\$ -		\$ -
<b>Plate and Frame Heat Exchanger</b>	6	EA	\$ 54,502.00	\$ 327,012.00	\$ 3,150.00	\$ 18,900.00	\$ 345,912.00	1	\$ 345,912.00
<b>Cooling Towers</b>	3	EA	\$ 89,083.33	\$ 267,249.99	\$ 16,888.58	\$ 50,665.74	\$ 317,915.73	1	\$ 317,915.73
<b>Hot Water Fired Absorption Chiller</b>	1	EA	\$ 130,750.00	\$ 130,750.00	\$ 18,442.70	\$ 18,442.70	\$ 149,192.70	1	\$ 149,192.70
<b>Variable Volume Boxes, Cooling, Hot Water Reheat</b>	6	EA	\$ 4,222.55	\$ 25,335.30	\$ 9,282.18	\$ 55,693.08	\$ 81,028.38	1	\$ 81,028.38
<b>Fan Powered Terminal Units</b>	4	EA	\$ 3,597.19	\$ 14,388.76	\$ 4,773.70	\$ 19,094.78	\$ 33,483.54	27	\$ 904,055.58
<b>Pump, General utility, End Suction, 1350 GMP, 50 H.P</b>	1	EA	\$ 18,172.20	\$ 18,172.20	\$ 1,399.44	\$ 1,399.44	\$ 19,571.64	23	\$ 450,147.72
<b>Duct Sound Traps</b>	20	EA	\$ 2,719.60	\$ 54,392.00	\$ 369.26	\$ 7,385.20	\$ 61,777.20	1	\$ 61,777.20
<b>Condenser Water Cooled AC Units (Fan Coil A/C System, 4 pipe, 6 ton)</b>	1	EA	\$ 12,828.00	\$ 12,828.00	\$ 26,178.30	\$ 26,178.30	\$ 39,006.30	12	\$ 468,075.60
<b>Return, Exhaust, and Ventilation Fans (Floors)</b>									
2000 CFM	39	EA	\$ 2,939.75	\$ 114,650.25	\$ 15,826.75	\$ 617,243.25	\$ 731,893.50	1	\$ 731,893.50
3500 CFM	2	EA	\$ 5,024.30	\$ 10,048.60	\$ 28,060.40	\$ 56,120.80	\$ 66,169.40	3	\$ 198,508.20
5000 CFM	1	EA	\$ 6,601.08	\$ 6,601.08	\$ 44,143.80	\$ 44,143.80	\$ 50,744.88	2	\$ 101,489.76
8500 CFM	1	EA	\$ 11,865.90	\$ 11,865.90	\$ 59,029.50	\$ 59,029.50	\$ 70,895.40	1	\$ 70,895.40
10000 CFM	1	EA	\$ 12,614.20	\$ 12,614.20	\$ 60,227.20	\$ 60,227.20	\$ 72,841.40	2	\$ 145,682.80
20000 CFM	1	EA	\$ 24,800.80	\$ 24,800.80	\$ 163,913.80	\$ 163,913.80	\$ 188,714.60	4	\$ 754,858.40
<b>Return, Exhaust, and Ventilation Fans (Roof)</b>									
200 CFM	1	EA	\$ 1,362.98	\$ 1,362.98	\$ 3,208.13	\$ 3,208.13	\$ 4,571.11	1	\$ 4,571.11
8500 CFM	1	EA	\$ 8,712.35	\$ 8,712.35	\$ 56,463.00	\$ 56,463.00	\$ 65,175.35	1	\$ 65,175.35
13800 CFM	1	EA	\$ 12,400.40	\$ 12,400.40	\$ 81,956.90	\$ 81,956.90	\$ 94,357.30	1	\$ 94,357.30
35000 CFM	1	EA	\$ 41,400.00	\$ 41,400.00	\$ 245,870.70	\$ 245,870.70	\$ 287,270.70	1	\$ 287,270.70
				\$ 2,730,201.77		\$ 2,054,787.46			\$ 10,172,657.58



*Appendix C2: Electrical Assemblies Takeoff*

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Electrical Assemblies Estimate									
Description	Quantity	Unit	Material/Unit	Material Cost	Installation/Unit	Installation Cost	Total unit cost	# Floors	Total Cost
<b>Service Switchboard 265/460 V 3 Phase 4 Wires</b>									
4000 A	3	EA	\$ 137,034.00	\$ 411,102.00	\$ 39,410.00	\$ 118,230.00	\$ 529,332.00	1	\$ 529,332.00
<b>Distribution Switchboard 265/460 V 3 Phase 4 Wires</b>									
2000 A	4	EA	\$ 68,517.00	\$ 274,068.00	\$ 19,705.00	\$ 78,820.00	\$ 352,888.00	1	\$ 352,888.00
1600 A	1	EA	\$ 57,594.00	\$ 57,594.00	\$ 16,080.00	\$ 16,080.00	\$ 73,674.00	1	\$ 73,674.00
<b>Emergency Distribution Switchboard 265/460 3 Phase - 4 Wires</b>									
1600A	1	EA	\$ 57,594.00	\$ 57,594.00	\$ 16,080.00	\$ 16,080.00	\$ 73,674.00	1	\$ 73,674.00
<b>Distribution Panelboard 265/460 V 3 Phase 4 Wires</b>									
600A	3	EA	\$ 45,684.00	\$ 137,052.00	\$ 36,531.00	\$ 109,593.00	\$ 246,645.00	1	\$ 246,645.00
400 A	1	EA	\$ 23,760.00	\$ 23,760.00	\$ 24,413.40	\$ 24,413.40	\$ 48,173.40	1	\$ 48,173.40
200 A	1	EA	\$ 12,204.00	\$ 12,204.00	\$ 11,939.40	\$ 11,939.40	\$ 24,143.40	1	\$ 24,143.40
<b>Elevator Distribution Panelboard 460 V 3 phase 4 wire</b>									
600 A	2	EA	\$ 45,684.00	\$ 91,368.00	\$ 36,531.00	\$ 73,062.00	\$ 164,430.00	1	\$ 164,430.00
400 A	4	EA	\$ 23,760.00	\$ 95,040.00	\$ 24,413.40	\$ 97,653.60	\$ 192,693.60	1	\$ 192,693.60
225A	2	EA	\$ 12,204.00	\$ 24,408.00	\$ 11,939.40	\$ 23,878.80	\$ 48,286.80	1	\$ 48,286.80
<b>Automatic Transfer Switch</b>				\$ -		\$ -	\$ -		\$ -
800 A	7	EA	\$ 20,412.00	\$ 142,884.00	\$ 9,845.55	\$ 68,918.85	\$ 211,802.85	1	\$ 211,802.85
600 A	2	EA	\$ 17,280.00	\$ 34,560.00	\$ 8,865.45	\$ 17,730.90	\$ 52,290.90	1	\$ 52,290.90
400 A	2	EA	\$ 12,312.00	\$ 24,624.00	\$ 7,707.15	\$ 15,414.30	\$ 40,038.30	1	\$ 40,038.30
<b>Panelboards</b>									
120/208 V 30 Circuits 100 Amp	8	EA	\$ 1,300.00	\$ 10,400.00	\$ 840.00	\$ 6,720.00	\$ 17,120.00	1	\$ 17,120.00
265/460 V 30 Circuits 225 Amp	8	EA	\$ 2,325.00	\$ 18,600.00	\$ 800.00	\$ 6,400.00	\$ 25,000.00	1	\$ 25,000.00
120/208 V 42 Circuits 225 Amp	13	EA	\$ 2,375.00	\$ 30,875.00	\$ 1,200.00	\$ 15,600.00	\$ 46,475.00	1	\$ 46,475.00
120/208 V 84 Circuits 100 Amp	8	EA	\$ 4,350.00	\$ 34,800.00	\$ 2,400.00	\$ 19,200.00	\$ 54,000.00	1	\$ 54,000.00
265/460 V 84 Circuits 225 Amp	11	EA	\$ 8,450.00	\$ 92,950.00	\$ 2,400.00	\$ 26,400.00	\$ 119,350.00	1	\$ 119,350.00
<b>Diesel Enginer with Fuel Tank Generator 750kW</b>	1	kW	\$ 181,500.00	\$ 181,500.00	\$ 7,770.00	\$ 7,770.00	\$ 189,270.00	1	\$ 189,270.00
<b>Diesel Enginer with Fuel Tank Generator 1500kW</b>	2	kW	\$ 363,000.00	\$ 726,000.00	\$ 15,540.00	\$ 31,080.00	\$ 757,080.00	1	\$ 757,080.00
<b>Bus Duct 3200A aluminum, 3 phase 4 wire</b>	1260	LF	\$ 435.00	\$ 548,100.00	\$ 56.00	\$ 70,560.00	\$ 618,660.00	1	\$ 618,660.00
<b>Bus Duct 4000A aluminum, 3 phase 4 wire</b>	1540	LF	\$ 625.00	\$ 962,500.00	\$ 37.00	\$ 56,980.00	\$ 1,019,480.00	1	\$ 1,019,480.00
<b>Bus Duct 3200A aluminum, 3 phase 4 wire Cable Tap Box</b>	1	EA	\$ 2,300.00	\$ 2,300.00	\$ 840.00	\$ 840.00	\$ 3,140.00	13	\$ 40,820.00
<b>Bus Duct 4000A aluminum, 3 phase 4 wire Cable Tap Box</b>	1	EA	\$ 3,075.00	\$ 3,075.00	\$ 1,125.00	\$ 1,125.00	\$ 4,200.00	16	\$ 67,200.00
<b>Bus Duct 3200A aluminum, 3 phase 4 wire Expansion joint</b>	1	EA	\$ 3,550.00	\$ 3,550.00	\$ 335.00	\$ 335.00	\$ 3,885.00	1	\$ 3,885.00
<b>Bus Duct 4000A aluminum, 3 phase 4 wire Expansion joint</b>	1	EA	\$ 4,675.00	\$ 4,675.00	\$ 420.00	\$ 420.00	\$ 5,095.00	1	\$ 5,095.00
<b>Transformers 3 phase, 460 primary 120/208 secondary</b>									
15 KVA	14	EA	\$ 1,150.00	\$ 16,100.00	\$ 610.00	\$ 8,540.00	\$ 24,640.00	1	\$ 24,640.00
30 KVA	8	EA	\$ 1,200.00	\$ 9,600.00	\$ 745.00	\$ 5,960.00	\$ 15,560.00	1	\$ 15,560.00
45 KVA	5	EA	\$ 1,350.00	\$ 6,750.00	\$ 840.00	\$ 4,200.00	\$ 10,950.00	1	\$ 10,950.00
75 KVA	31	EA	\$ 2,050.00	\$ 63,550.00	\$ 960.00	\$ 29,760.00	\$ 93,310.00	1	\$ 93,310.00
<b>Circuit breakers, High interrupting capacity, 3 pole, 240, 480, or 600 V, 1000 amp for feeder section</b>	202	EA	\$ 9,180.00	\$ 1,854,360.00	\$ 596.97	\$ 120,587.94	\$ 1,974,947.94	1	\$ 1,974,947.94
<b>Wall Mounted Duplex Recetacle, ground fault interrupting 20 A</b>									
Lower Level 2	60	EA	\$ 82.00	\$ 4,920.00	\$ 188.00	\$ 11,280.00	\$ 16,200.00	1	\$ 16,200.00
Lower Level 1	25	EA	\$ 82.00	\$ 2,050.00	\$ 188.00	\$ 4,700.00	\$ 6,750.00	1	\$ 6,750.00
Ground Level	32	EA	\$ 82.00	\$ 2,624.00	\$ 188.00	\$ 6,016.00	\$ 8,640.00	1	\$ 8,640.00
Level 2	10	EA	\$ 82.00	\$ 820.00	\$ 188.00	\$ 1,880.00	\$ 2,700.00	27	\$ 72,900.00
Penthouse Level	30	EA	\$ 82.00	\$ 2,460.00	\$ 188.00	\$ 5,640.00	\$ 8,100.00	1	\$ 8,100.00
Roof Level	20	EA	\$ 82.00	\$ 1,640.00	\$ 188.00	\$ 3,760.00	\$ 5,400.00	1	\$ 5,400.00
<b>Service Switchboard Feeders (3)</b>	1800	LF	\$ 665.32	\$ 1,197,576.00	\$ 406.20	\$ 731,160.00	\$ 1,928,736.00	1	\$ 1,928,736.00
<b>Distribution Switchboard Feeders 2000A (3)</b>	650	LF	\$ 332.66	\$ 216,229.00	\$ 203.10	\$ 132,015.00	\$ 348,244.00	1	\$ 348,244.00
<b>Distribution Switchboard Feeders 1600A (3)</b>	750	LF	\$ 269.10	\$ 201,825.00	\$ 154.53	\$ 115,897.50	\$ 317,722.50	1	\$ 317,722.50
<b>Distribution Switchboard Feeders 1600A (11)</b>	5200	LF	\$ 269.10	\$ 1,399,320.00	\$ 154.53	\$ 803,556.00	\$ 2,202,876.00	1	\$ 2,202,876.00
			\$ 8,985,407.00			\$ 2,900,196.69			\$ 12,056,483.69

*Appendix C3: Plumbing and Fire Protection Takeoff*

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**Plumbing Assemblies Estimate**

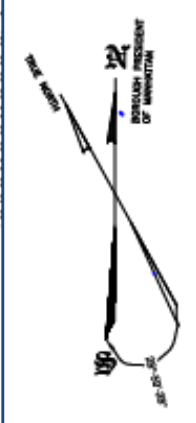
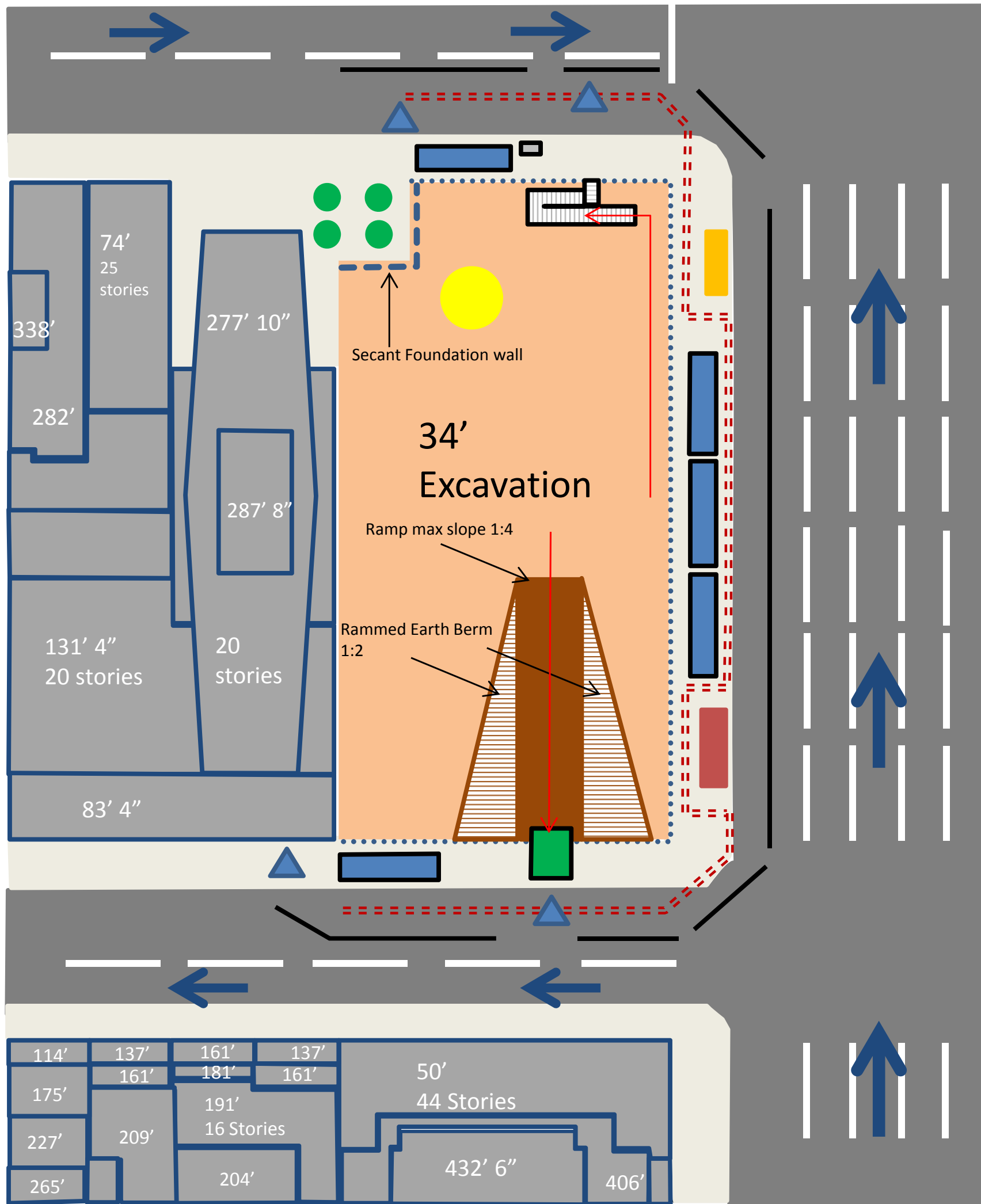
Description	Quantity	Unit	Material/Unit	Material Cost	Installation/Unit	Installation Cost	Total unit cost	# Floors	Total Cost
Roof Drain 4" Diameter 450'	6	EA	\$ 27,075.00	\$ 162,450.00	\$ 15,925.00	\$ 95,550.00	\$ 258,000.00	1	\$ 258,000.00
Hot Water Heater, 10 Gallon Tank, 4 kW	1	EA	\$ 5,075.00	\$ 5,075.00	\$ 940.00	\$ 940.00	\$ 6,015.00	30	\$ 180,450.00
Water Closet Bowl only with flush valve wall hung	5	EA	\$ 1,900.00	\$ 9,500.00	\$ 655.00	\$ 3,275.00	\$ 12,775.00	10	\$ 127,750.00
Water Closet Bowl only with flush valve wall hung	3	EA	\$ 1,900.00	\$ 5,700.00	\$ 655.00	\$ 1,965.00	\$ 7,665.00	19	\$ 145,635.00
Water Closet Bowl only with flush valve floor mount ADA compliant with 18" high bowl	2	EA	\$ 840.00	\$ 1,680.00	\$ 640.00	\$ 1,280.00	\$ 2,960.00	29	\$ 85,840.00
Urinal Stall type	2	Ea	\$ 1,375.00	\$ 2,750.00	\$ 775.00	\$ 1,550.00	\$ 4,300.00	29	\$ 124,700.00
Laboratory System, Wall hung 19"x17"	8	EA	\$ 985.00	\$ 7,880.00	\$ 635.00	\$ 5,080.00	\$ 12,960.00	29	\$ 375,840.00
Drinking Fountain Floor mounted, pedestal type aluminum	2	EA	\$ 2,850.00	\$ 5,700.00	\$ 515.00	\$ 1,030.00	\$ 6,730.00	29	\$ 195,170.00
				\$ 200,735.00		\$ 110,670.00			\$ 1,493,385.00

**Fire Protection Estimate**

Description	Quantity	Unit	Material/Unit	Material Cost	Installation/Unit	Installation Cost	Total unit cost	# Floors	Total Cost
<b>Automatic Fire Pump</b>									
750 GPM, 120 HP, 4" pump	1	EA	\$ 27,250.00	\$ 27,250.00	\$ 1,969.18	\$ 1,969.18	\$ 29,219.18	1	\$ 29,219.18
750 GPM, 50 HP 4" pump	1	EA	\$ 19,729.00	\$ 19,729.00	\$ 1,898.00	\$ 1,898.00	\$ 21,627.00	1	\$ 21,627.00
Jockey Pump	2	EA	\$ 2,670.00	\$ 5,340.00	\$ 267.16	\$ 534.32	\$ 5,874.32	1	\$ 5,874.32
<b>Wet Pipe Sprinkler System</b>				\$ -		\$ -	\$ -		\$ -
Lower Level 2	6500	SF	\$ 5.68	\$ 36,920.00	\$ 2.67	\$ 17,355.00	\$ 54,275.00	1	\$ 54,275.00
Lower Level 1	6000	SF	\$ 5.68	\$ 34,080.00	\$ 2.67	\$ 16,020.00	\$ 50,100.00	1	\$ 50,100.00
Level 2	1000	SF	\$ 5.68	\$ 5,680.00	\$ 2.67	\$ 2,670.00	\$ 8,350.00	28	\$ 233,800.00
<b>Dry Pipe System</b>				\$ -		\$ -	\$ -		\$ -
Loading Dock	2000	SF	\$ 6.16	\$ 12,320.00	\$ 3.46	\$ 6,920.00	\$ 19,240.00	1	\$ 19,240.00
Penthouse MER	5000	SF	\$ 3.89	\$ 19,450.00	\$ 2.62	\$ 13,100.00	\$ 32,550.00	1	\$ 32,550.00
				\$ 160,769.00		\$ 60,466.50			\$ 446,685.50

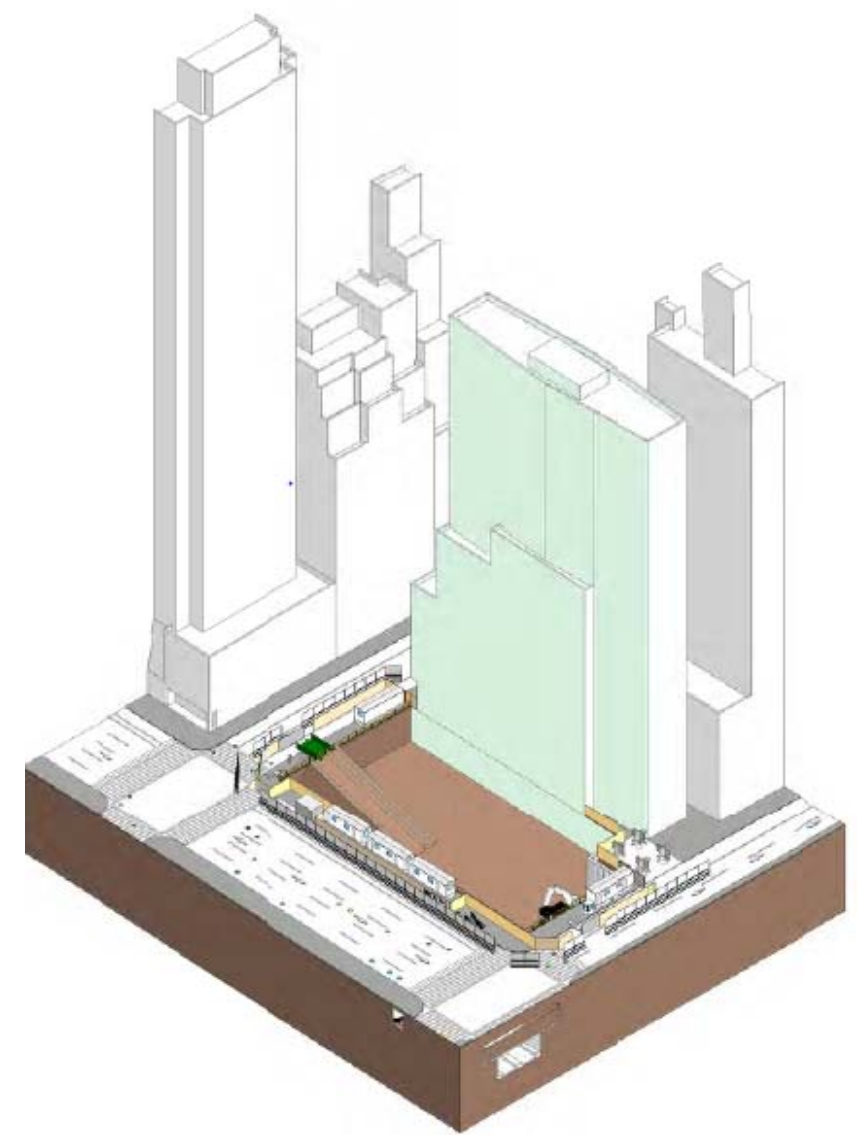
*Appendix D: Site Layouts*

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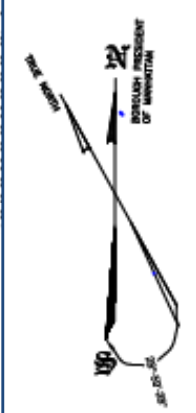
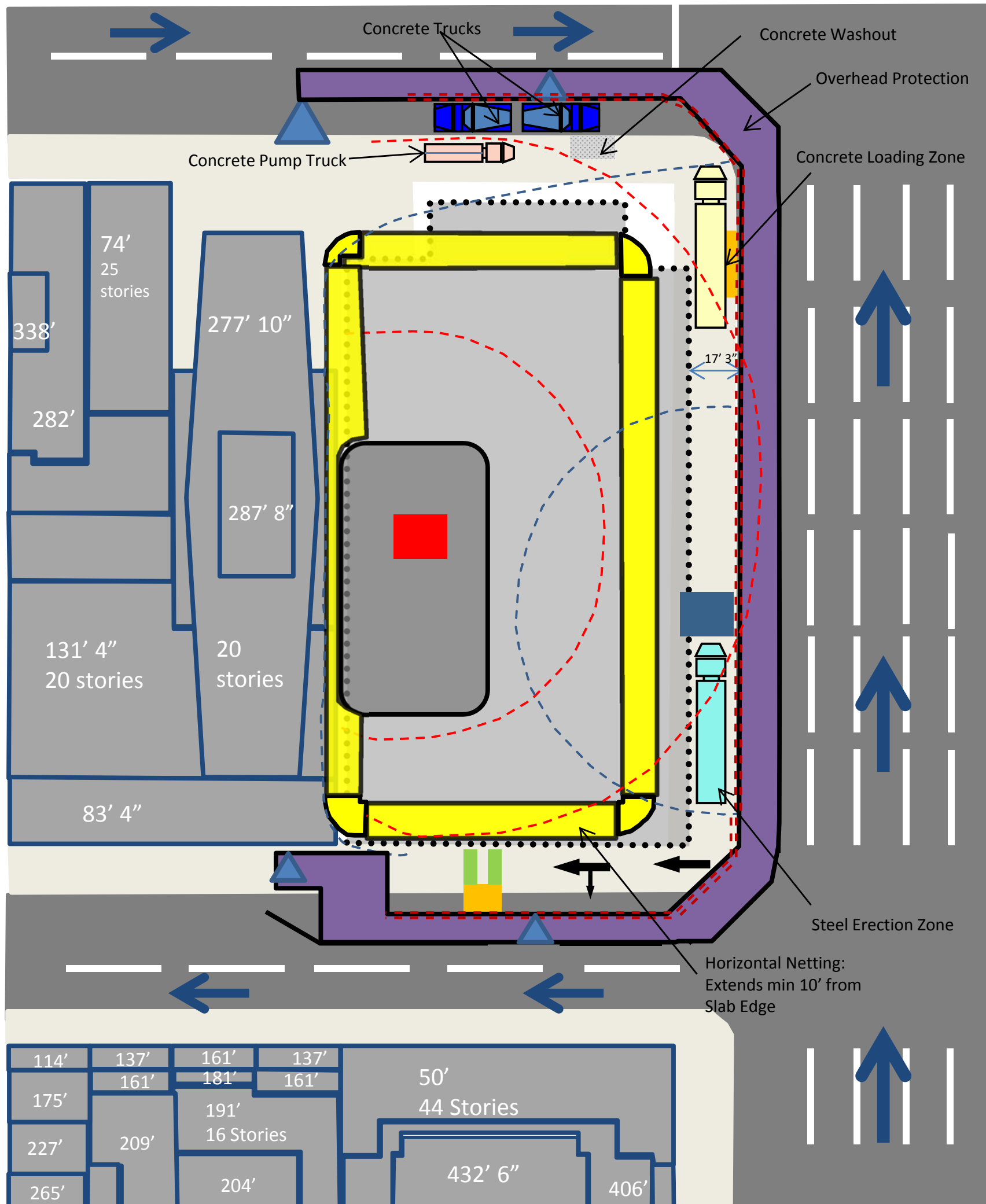


### Legend








-  Man/Vehicle Gate
-  Caterpillar 365B
-  Existing Subway Entrance
-  Subcontractor Trailer
-  Truck Wash
-  Existing Newsstand
-  Jersey Barrier
-  Existing Tree to be protected
-  Site Fence
-  Guardrails

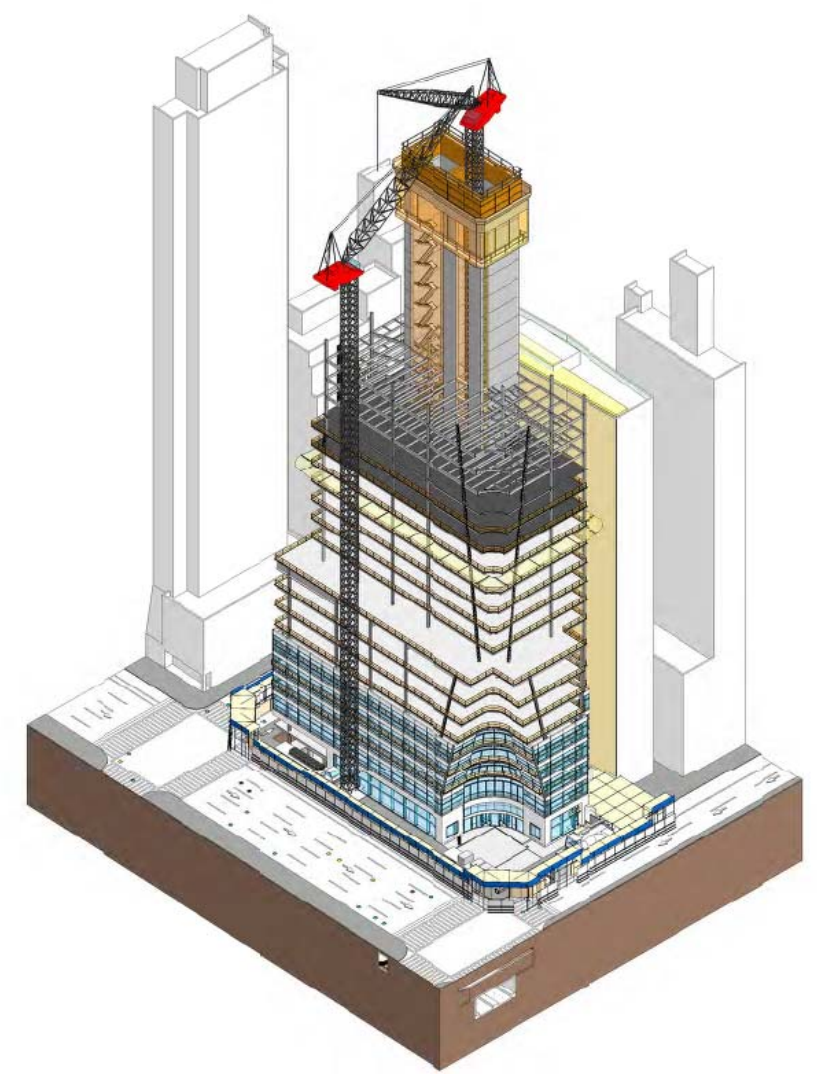


Excavation-Secant Foundation Wall

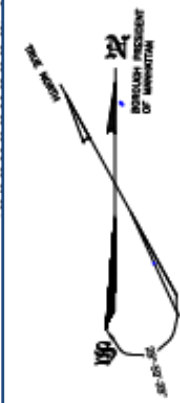
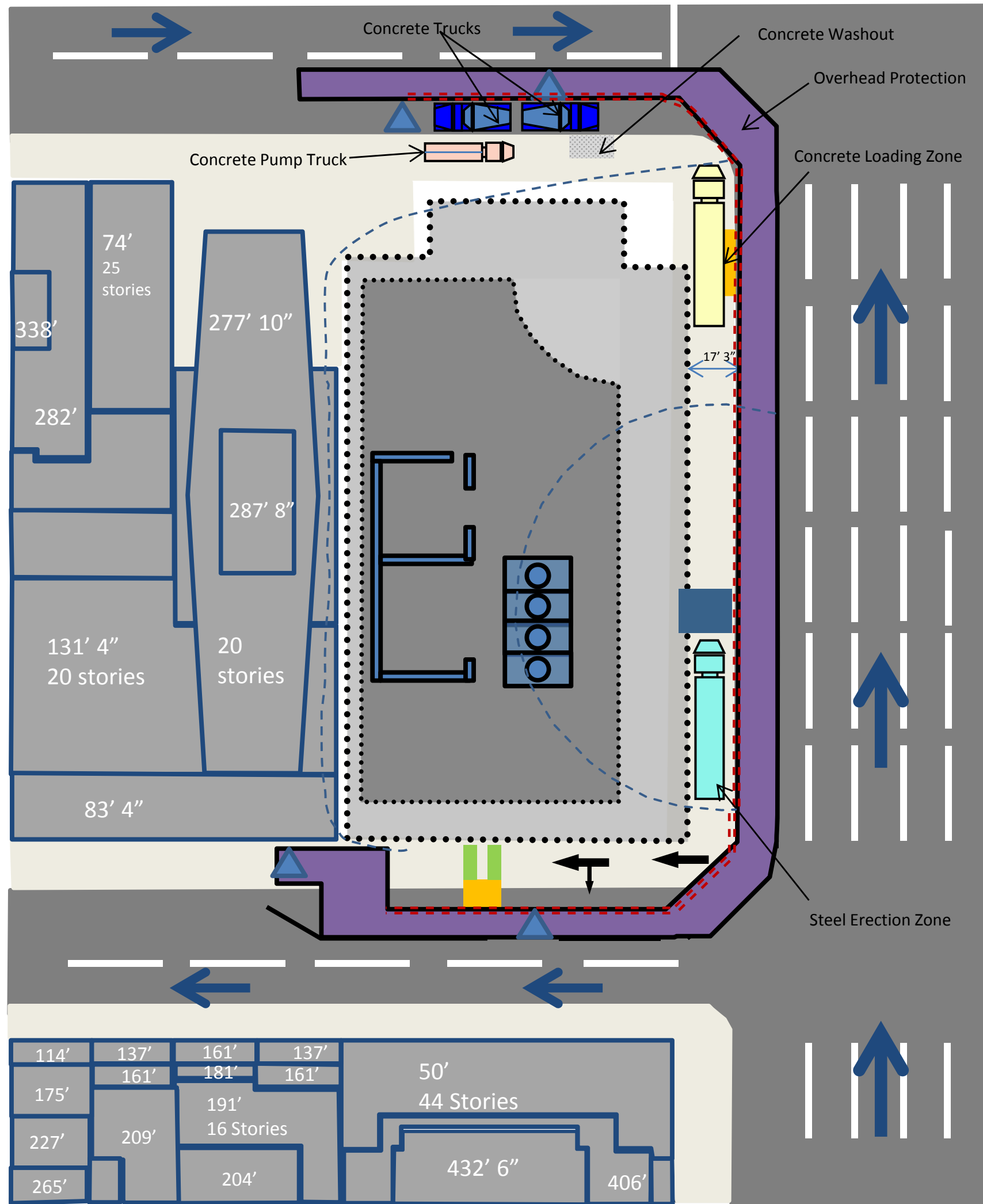


### Legend

-  Man/Vehicle Gate
-  Concrete Crane
-  Hoist Platform
-  Material Hoist
-  Structural Steel Crane
-  Site Fence
-  Guardrails

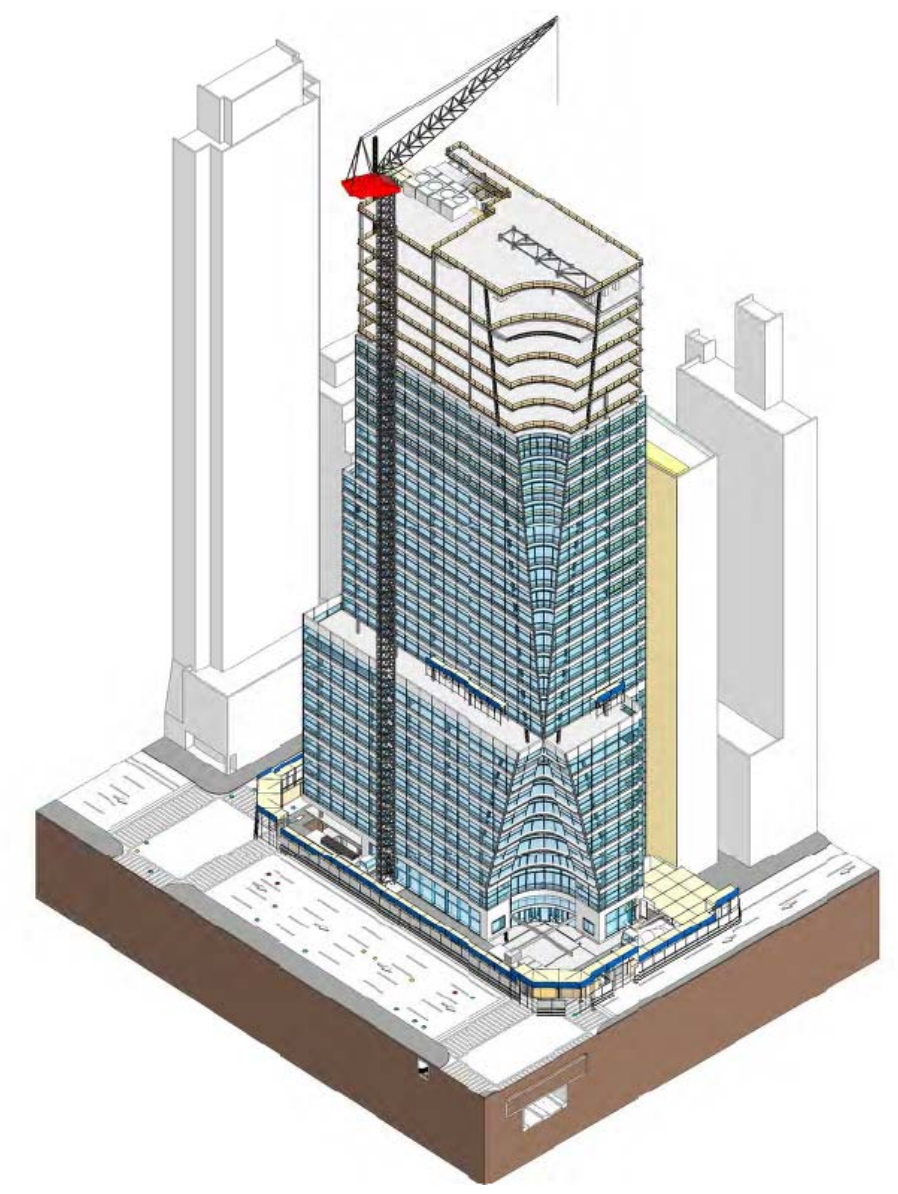


Superstructure From 10 – Roof



### Legend

- Hoist Platform
- Material Hoist
- Structural Steel Crane
- Site Fence
- Guardrails



Exterior Envelope & Roof/ Bulkhead



*Appendix E: LEED Scorecards*

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# LEED 2009 for Core and Shell Development

Project Name

## Project Checklist

Date

### 22 1 2 Sustainable Sites Possible Points: 28

Y	?	N			
			Prereq 1	Construction Activity Pollution Prevention	
1			Credit 1	Site Selection	1
5			Credit 2	Development Density and Community Connectivity	5
1			Credit 3	Brownfield Redevelopment	1
6			Credit 4.1	Alternative Transportation—Public Transportation Access	6
2			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	2
			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
2			Credit 4.4	Alternative Transportation—Parking Capacity	2
	1		Credit 5.1	Site Development—Protect or Restore Habitat	1
		1	Credit 5.2	Site Development—Maximize Open Space	1
1			Credit 6.1	Stormwater Design—Quantity Control	1
1			Credit 6.2	Stormwater Design—Quality Control	1
1			Credit 7.1	Heat Island Effect—Non-roof	1
1			Credit 7.2	Heat Island Effect—Roof	1
		1	Credit 8	Light Pollution Reduction	1
1			Credit 9	Tenant Design and Construction Guidelines	1

### 6 1 3 Water Efficiency Possible Points: 10

Y	?	N			
			Prereq 1	Water Use Reduction—20% Reduction	
4			Credit 1	Water Efficient Landscaping	2 to 4
		2	Credit 2	Innovative Wastewater Technologies	2
2	1	1	Credit 3	Water Use Reduction	2 to 4

### 15 3 19 Energy and Atmosphere Possible Points: 37

Y	?	N			
			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
3	3	15	Credit 1	Optimize Energy Performance	3 to 21
		4	Credit 2	On-Site Renewable Energy	4
2			Credit 3	Enhanced Commissioning	2
2			Credit 4	Enhanced Refrigerant Management	2
3			Credit 5.1	Measurement and Verification—Base Building	3
3			Credit 5.2	Measurement and Verification—Tenant Submetering	3
2			Credit 6	Green Power	2

### 6 1 6 Materials and Resources Possible Points: 13

Y	?	N			
			Prereq 1	Storage and Collection of Recyclables	
Y			Credit 1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 5
2		5	Credit 2	Construction Waste Management	1 to 2
		1	Credit 3	Materials Reuse	1
1	1		Credit 4	Recycled Content	1 to 2
2			Credit 5	Regional Materials	1 to 2
1			Credit 6	Certified Wood	1

### 11 1 1 Indoor Environmental Quality Possible Points: 12

Y	?	N			
			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
1			Credit 1	Outdoor Air Delivery Monitoring	1
1			Credit 2	Increased Ventilation	1
1			Credit 3	Construction IAQ Management Plan—During Construction	1
1			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
1			Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
1			Credit 5	Indoor Chemical and Pollutant Source Control	1
1			Credit 6	Controllability of Systems—Thermal Comfort	1
1			Credit 7	Thermal Comfort—Design	1
		1	Credit 8.1	Daylight and Views—Daylight	1
1			Credit 8.2	Daylight and Views—Views	1

### 3 1 1 Innovation and Design Process Possible Points: 6

Y	?	N			
1			Credit 1.1	Innovation in Design: Green House Keeping Plan	1
1			Credit 1.2	Exemplary Performance in SSc4.1 (Transportation Access)	1
			Credit 1.3	Exemplary Performance in SSc2 (Development Density)	1
			Credit 1.4	Innovation in Design: Specific Title	1
			Credit 1.5	Innovation in Design: Specific Title	1
1			Credit 2	LEED Accredited Professional	1

### 1 1 1 Regional Priority Credits Possible Points: 4

Y	?	N			
1			Credit 1.1	Regional Priority: Stormwater Design	1
			Credit 1.2	Regional Priority: Specific Credit	1
			Credit 1.3	Regional Priority: Specific Credit	1
			Credit 1.4	Regional Priority: Specific Credit	1

### 64 6 31 Total Possible Points: 110

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

LEED for Core & Shell Version 3.0 Summary Scorecard

1045 Avenue of the Americas

Thursday, February 21, 2013

114 10 6 34 Total Project Score

Certified 40 points Silver 50 points Gold 60 points Platinum 80 points

28 Possible Points

Available	Likely	Possible	Less Likely	Not Viable
28	3	2	2	2
Av	L	P	LL	NV
Y	1	1	1	1
Prereq 1				
SS 1	1	1	1	1
SS 2	1	1	1	1
SS 3	1	1	1	1
SS 4.1	1	1	1	1
SS 4.2	1	1	1	1
SS 4.3	1	1	1	1
SS 4.4	1	1	1	1
SS 5.1	1	1	1	1
SS 5.2	1	1	1	1
SS 6.1	1	1	1	1
SS 6.2	1	1	1	1
SS 7.1	1	1	1	1
SS 7.2	1	1	1	1
SS 8	1	1	1	1
SS 9	1	1	1	1

Materials & Resources

Available	Likely	Possible	Less Likely	Not Viable
13	5	2	6	6
Av	L	P	LL	NV
Y	5	2	6	6
Prereq 1				
MR 1	2	2	2	2
MR 2	1	1	1	1
MR 3	2	2	2	2
MR 4	2	2	2	2
MR 5	2	2	2	2
MR 6	1	1	1	1

Indoor Environmental Quality

Available	Likely	Possible	Less Likely	Not Viable
12	9	1	1	1
Av	L	P	LL	NV
Y	9	1	1	1
Prereq 1				
EQ 1	1	1	1	1
EQ 2	1	1	1	1
EQ 3	1	1	1	1
EQ 4.1	1	1	1	1
EQ 4.2	1	1	1	1
EQ 4.3	1	1	1	1
EQ 4.4	1	1	1	1
EQ 5	1	1	1	1
EQ 6	1	1	1	1
EQ 7	1	1	1	1
EQ 8.1	1	1	1	1
EQ 8.2	1	1	1	1

Innovation & Design Process

Available	Likely	Possible	Less Likely	Not Viable
6	5	1	1	1
Av	L	P	LL	NV
Y	5	1	1	1
Prereq 1				
ID 1.1	1	1	1	1
ID 1.2	1	1	1	1
ID 1.3	1	1	1	1
ID 1.4	1	1	1	1
ID 1.5	1	1	1	1
ID 2	1	1	1	1

28 Possible Points

Available	Likely	Possible	Less Likely	Not Viable
28	3	2	2	2
Av	L	P	LL	NV
Y	3	2	2	2
Prereq 1				
SS 1	1	1	1	1
SS 2	1	1	1	1
SS 3	1	1	1	1
SS 4.1	1	1	1	1
SS 4.2	1	1	1	1
SS 4.3	1	1	1	1
SS 4.4	1	1	1	1
SS 5.1	1	1	1	1
SS 5.2	1	1	1	1
SS 6.1	1	1	1	1
SS 6.2	1	1	1	1
SS 7.1	1	1	1	1
SS 7.2	1	1	1	1
SS 8	1	1	1	1
SS 9	1	1	1	1

10 Possible Points

Available	Likely	Possible	Less Likely	Not Viable
10	6	1	3	1
Av	L	P	LL	NV
Y	6	1	3	1
Prereq 1				
WE 1	1	1	1	1
WE 1.1-1.2	2	2	2	2
WE 2	2	2	2	2
WE 3	4	4	4	4

35 Possible Points

Available	Likely	Possible	Less Likely	Not Viable
37	13	4	1	19
Av	L	P	LL	NV
Y	13	4	1	19
Prereq 1				
Prereq 2				
Prereq 3				
EA 1	21	2	1	15
EA 2	4	4	4	4
EA 3	2	2	2	2
EA 4	2	2	2	2
EA 5.1	3	3	3	3
EA 5.1	3	3	3	3
EA 6	2	2	2	2

Report made + provide for Finance 10/12/2013